Lanner

Industrial Communication Platforms

Energy Management and Industrial Cyber Security Solutions

ICS-P770
User Manual

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About this Document

This manual describes the overview of the various functionalities of this product, and the information you need to get it ready for operation. It is intended for those who are:

- responsible for installing, administering and troubleshooting this system or Information Technology professionals.
- assumed to be qualified in the servicing of computer equipment, such as professional system integrators, or service personnel and technicians.

The latest version of this document can be found on Lanner's official website, available either through the product page or through the Lanner Download Center page with a login account and password.

Icons Description

The icons are used in the manual to serve as an indication of interest topics or important messages. Below is a description of these icons.

Icon	Usage
 **Note or Information**	This mark indicates that there is something you should pay special attention to while using the product.
 **Warning or Important**	This mark indicates that there is a caution or warning and it is something that could damage your property or product.

Online Resources

To obtain additional documentation resources and software updates for your system, please visit the Lanner Download Center. As certain categories of documents are only available to users who are logged in, please be registered for a Lanner Account at http://www.lannerinc.com/ to access published documents and downloadable resources.

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In addition to contacting your distributor or sales representative, you could submit a request at our Lanner Technical Support and fill in a support ticket to our technical support department.

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Acknowledgment

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of 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, 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 help.

FCC Caution

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note

1. An unshielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.
2. Use only shielded cables to connect I/O devices to this equipment.
3. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Important

1. Operations in the 5.15-5.25GHz band are restricted to indoor usage only.
2. This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

Safety Guidelines

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Do not wear loose clothing or jewelry that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Disconnect all power by turning off the power and unplugging the power cord before installing or removing a chassis or working near power supplies
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit; always check the circuit.

Consignes de sécurité

Suivez ces consignes pour assurer la sécurité générale :

- Laissez la zone du châssis propre et sans poussière pendant et après l'installation.
- Ne portez pas de vêtements amples ou de bijoux qui pourraient être pris dans le châssis. Attachez votre cravate ou écharpe et remontez vos manches.
- Portez des lunettes de sécurité pour protéger vos yeux.
- N'effectuez aucune action qui pourrait créer un danger pour d'autres ou rendre l'équipement dangereux.
- Coupez complètement l'alimentation en éteignant l'alimentation et en débranchant le cordon d'alimentation avant d'installer ou de retirer un châssis ou de travailler à proximité de sources d'alimentation.
- Ne travaillez pas seul si des conditions dangereuses sont présentes.
- Ne considérez jamais que l'alimentation est coupée d'un circuit, vérifiez toujours le circuit. Cet appareil génère, utilise et émet une énergie radiofréquence et, s'il n'est pas installé et utilisé conformément aux instructions des fournisseurs de composants sans fil, il risque de provoquer des interférences dans les communications radio.

Lithium Battery Caution

- There is risk of explosion if the battery is replaced by an incorrect type.
- Dispose of used batteries according to the instructions.
- Installation should be conducted only by a trained electrician or only by an electrically trained person who knows all installation procedures and device specifications which are to be applied.
- Do not carry the handle of power supplies when moving to another place.
- Please conform to your local laws and regulations regarding safe disposal of lithium battery.
- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- Leaving a battery in an extremely high temperature environment can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure may result in an explosion or the leakage of flammable liquid or gas.

Avertissement concernant la pile au lithium

- Risque d'explosion si la pile est remplacée par une autre d'un mauvais type.
- Jetez les piles usagées conformément aux instructions.
- L'installation doit être effectuée par un électricien formé ou une personne formée à l'électricité connaissant toutes les spécifications d'installation et d'appareil du produit.
- Ne transportez pas l'unité en la tenant par le câble d'alimentation lorsque vous déplacez l'appareil.

Operating Safety

- Electrical equipment generates heat. Ambient air temperature may not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Be sure that the room in which you choose to operate your system has adequate air circulation.
- Ensure that the chassis cover is secure. The chassis design allows cooling air to circulate effectively. An open chassis permits air leaks, which may interrupt and redirect the flow of cooling air from internal components.
- Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures. Be sure to follow ESD-prevention procedures when removing and replacing components to avoid these problems.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. If no wrist strap is available, ground yourself by touching the metal part of the chassis.
- Periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).

Sécurité de fonctionnement

- L'équipement électrique génère de la chaleur. La température ambiante peut ne pas être adéquate pour refroidir l'équipement à une température de fonctionnement acceptable sans circulation adaptée. Vérifiez que votre site propose une circulation d'air adéquate.
- Vérifiez que le couvercle du châssis est bien fixé. La conception du châssis permet à l'air de refroidissement de bien circuler. Un châssis ouvert laisse l'air s'échapper, ce qui peut interrompre et rediriger le flux d'air frais destiné aux composants internes.
- Les décharges électrostatiques (ESD) peuvent endommager l'équipement et gêner les circuits électriques. Des dégâts d'ESD surviennent lorsque des composants électroniques sont mal manipulés et peuvent causer des pannes totales ou intermittentes. Suivez les procédures de prévention d'ESD lors du retrait et du remplacement de composants.
- Portez un bracelet anti-ESD et veillez à ce qu'il soit bien au contact de la peau. Si aucun bracelet n'est disponible, reliez votre corps à la terre en touchant la partie métallique du châssis.
- Vérifiez régulièrement la valeur de résistance du bracelet antistatique, qui doit être comprise entre 1 et 10 mégohms (Mohms).

Mounting Installation Precautions

The following should be put into consideration for rack-mount or similar mounting installations:

- Do not install and/or operate this unit in any place that flammable objects are stored or used in.
- The installation of this product must be performed by trained specialists; otherwise, a non-specialist might create the risk of the system's falling to the ground or other damages.
- Lanner Electronics Inc. shall not be held liable for any losses resulting from insufficient strength for supporting the system or use of inappropriate installation components.
- Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.
- Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Grounding - Reliable grounding of rack mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).
- Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.
- The machine can only be used in a restricted access location and must be installed by a skilled person.

CAUTION: Stability hazard - The rack may tip over causing serious personal injury
Before extending the rack to the installation position, read the installation instructions.
Do not put any load on the slide-rail mounted equipment in the installation position.
Do not leave the slide-rail mounted equipment in the installation position."

ATTENTION: Danger d'instabilité - Le rack peut basculer et provoquer des blessures corporelles graves
Avant d'étendre le rack en position d'installation, lire les instructions d'installation.
Ne pas charger l'équipement monté sur rail de glissière en position d'installation.
Ne pas laisser l'équipement monté sur rail de glissière en position d'installation.

Electrical Safety Instructions

Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect the ground wire after turning off the power. A ground wire is required and the part connecting the conductor must be greater than 4 mm2 or 10 AWG.

- This equipment must be grounded. The power cord for product should be connected to a socket-outlet with earthing connection.
- Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.
- The machine can only be used in a restricted access location and has installation instructions by a skilled person.

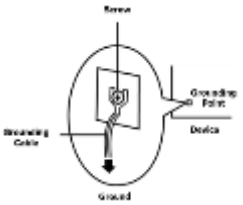
Consignes de sécurité électrique

Avant d'allumer l'appareil, reliez le câble de mise à la terre de l'équipement à la terre. Une bonne mise à la terre (connexion à la terre) est très importante pour protéger l'équipement contre les effets néfastes du bruit externe et réduire les risques d'électrocution en cas de foudre. Pour désinstaller l'équipement, débranchez le câble de mise à la terre après avoir éteint l'appareil. Un câble de mise à la terre est requis et la zone reliant les sections du conducteur doit faire plus de 4 mm2 ou 10 AWG.

- Cet équipement doit être mis à la terre. La fiche d'alimentation doit être connectée à une prise de terre correctement câblée
- Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.
- Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.

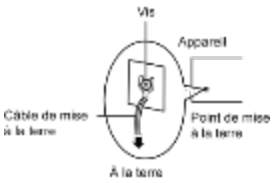
Grounding Procedure for Power Source

- Connect the grounding cable to the ground.
- The protection device for the DC power source must provide 30 A current.
- This protection device must be connected to the power source before DC power.



Procédure de mise à la terre pour source d'alimentation

- Branchez le câble de mise à la terre à la terre.
- L'appareil de protection pour la source d'alimentation CC doit fournir 30 A de courant.
- Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation CC.



Important

1. The appliance is only to be connected to network without routing to outside plant.
2. Instruction for the installation of the conductor to building earth by a skilled person.

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CHAPTER 1: PRODUCT OVERVIEW

The ICS-P770 series is a powerful 3U box designed for automation and security in digital substation. Featuring an Intel® Xeon® 6 Processor (Sierra Forest-SP/ Granite Rapids-SP and Clearwater Forest-SP), up to 512GB DDR5 memory, and versatile networking options (including 2.5GbE, 25GbE, 10GbE, and GbE ports with SR-IOV), it ensures high performance and flexibility. With PCIe Gen5 expansion and an IP30-rated rackmount chassis with smart cooling, it's built for reliability and scalability.

Key Features

- IEC 61850-3 and IEEE 1613 compliant
- Intel® Xeon® 6 Processor (Sierra Forest-SP)
- DDR5 Memory, up to 512GB
- 4x 2.5GbE RJ45; 4x 25GbE SFP28 or 2x GbE SFP & 2x 10GbE SFP+ or 2x GbE RJ45 & 2x 10GbbE RJ45 w/ SRIOV (By SKU)
- 1x Console, 5x USB 3.1, 1x BGA
- 2x FHFL PCIe*16, 1x FHFL PCIe Gen5*8, 1x FHFL PCIe Gen5*4
- 4x 2.5" U.2 NVMe Hot-Swappable Drive Bays, 1x M.2 2280/22110 M-Key (for NVMe)
- IP30-rated 3U Rackmount, Smart Fan

Package Content

Your package contains the following items:

- 1x ICS-P770 Industrial Computer
- 1x USB Lock Key
- HDD/SSD Screw pack
- 1x PSU Safety Cover
- 2x 3-Pin Terminal Block

Ordering Information

SKU	CPU	Memory	Ethernet	I/O	Power
ICS-P770A	Intel® Xeon® 6710E	DDR5, up to 512GB	4x 2.5GbE RJ45; 4x 25GbE SFP28; 1x 1GbE RJ45 (IPMI)	1x RJ45 Console; 5x USB 3.1 Gen1; 1x VGA	100~240VAC/ 110~240VDC
ICS-P770C			4x 2.5GbE RJ45; 2x 1GbE RJ45; 2x 10GbE RJ45 w/SRIOV; 1x 1GbE RJ45 (IPMI)		
ICS-P770D			4x 2.5GbE RJ45; 1x 1GbE RJ45 (IPMI)		

System Specifications

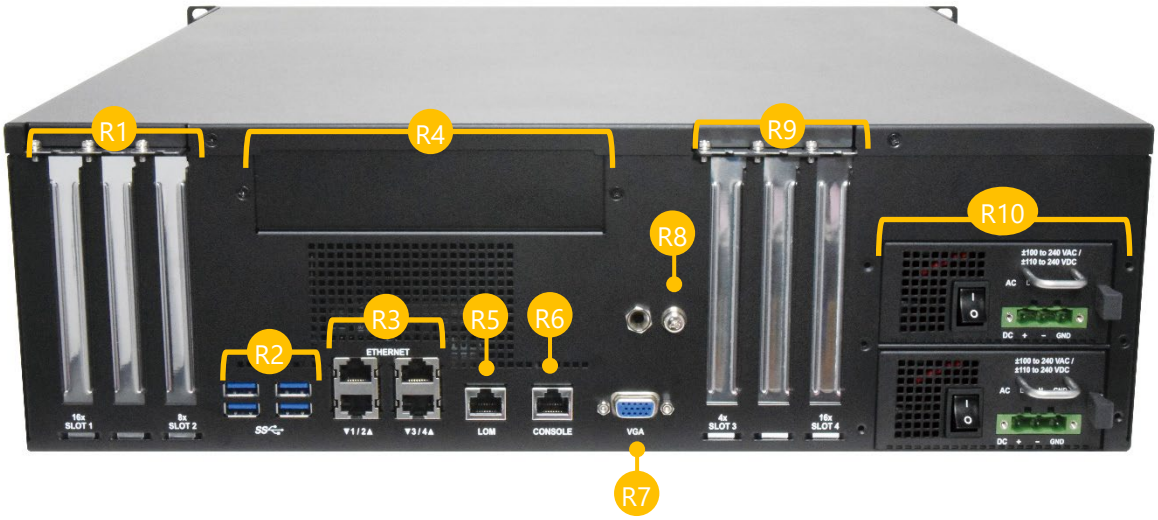
Processor System	Processor Options	Intel® Xeon®6 Processor (Sierra Forest-SP/Granite Rapids-SP/Clearwater Forest-SP) 6710E 64C/64T, 24GHz Single Socket
	CPU TDP	Max. 205W (w/ heater)
	Security Acceleration	Intel® QuickAssist Technology
	BIOS	AMI SPI Flash BIOS
System Memory	Technology	DDR5 6400MHz RDIMM
	Max. Capacity	Up to 512GB
	Socket	8x 288-Pin DIMM
Networking	Ethernet	SKU A: 4x 2.5GbE RJ45; 4x 25GbE SFP28 SKU C: 4x 2.5GbE RJ45; 2x 1GbE RJ45; 2x 10GbE RJ45 w/SRIOV SKU D: 4x 2.5GbE RJ45
	Speed	10/100/1000/2500 Mbpskk
LOM/OOB		1x RJ45 IPMI LOM Port
I/O Interface	Reset Button	1x Reset Button
	LED Indicator	Power/Status/HDD/LAN/LOM LED Indicator
	USB Port	4x USB 3.1 Ports & 1x USB 3.1 Port with Key Lock
	Console Port	1x 1GbE RJ45 Console Port
	Display Port	1x VGA Port
	Grounding Hole	1x Grounding Hole
Expansion	HDD/SSD Support	4x 2.5" U.2 NVMe Hot-Swappable Drive Bays
	M.2 Storage	1x M.2 2280/22110 M-Key for NVMe (PCIe Gen5)
	PCIe	2x FHFL (Double-Width) PCIe Gen5*16; 1x FHHL (Single-Width) PCIe Gen5*8; 1x FHHL (Single-Width) PCIe Gen5*4
Miscellaneous	Watchdog	Yes
	Internal RTC	Yes, with Li Battery
	TPM	TPM 2.0 Onboard
Cooling	Processor	Passive CPU Heatsink
	System	3x Smart Cooling Fans
Mechanical	Dimension (WxHxD)	438 x 131.8 x 455 mm
	Weight	TBD
	Form Factor	3U 19" Rackmount, IP30
Environmental	Temperature	-40°C ~ 55°C
	Humidity (RH)	Operating: 5% ~ 90%; Non-Operating: 5%~95%
Power	Type/Watts	Dual Power Input Up to 750W each
	Input	100~240VAC / 110~240VDC
Driver Support	OS	Linux
Certification	EMC	CE/UKCA, FCC Class A, RoHS, MTBF
	Safety	EN50121-4, UL+CB, IEC-61850-3, IEEE 1613

Physical Overview

Front Panel

No.	Description	
F1	HDD/SSD Bay	4x 2.5" U.2 HDD/SSD Bay Caddy Tray
F2	Reset Button	1x Reset Button
F3	LED Indicator	Power/Status/HDD/LAN/LOM LED Indicator
F4	USB Port	1x USB3.0 Port with Key Lock; Key lock controls USB power:  ON;  OFF
F5	Smart Fan	3x System Smart Fans

Rear Panel

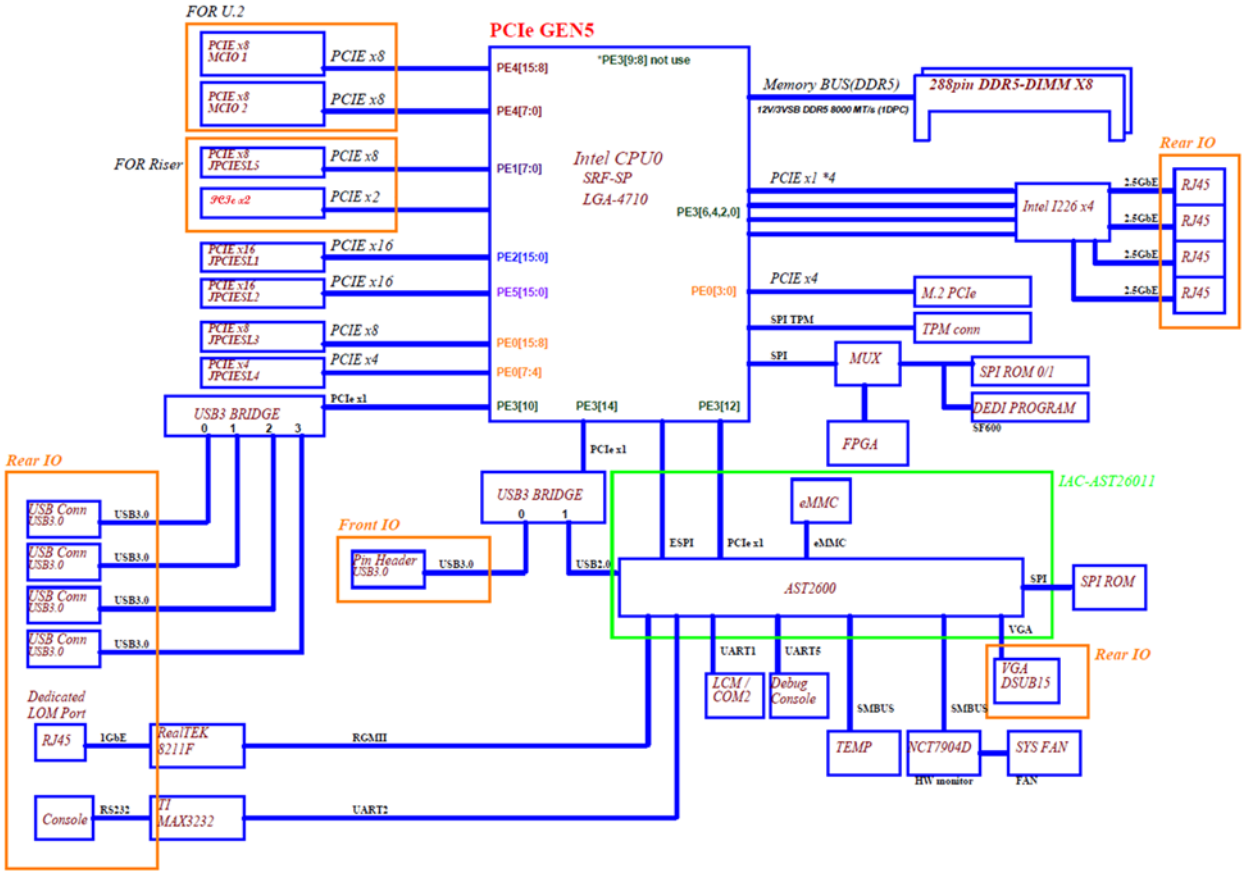


No.	Description	
R1	PCIe Slot	Slot1: 1x PCIe Gen5*16 Double-Width (FHFL) slot; Slot 2: 1x PCIe Gen5*8 Single-Width (FHHL) slot
R2	USB Port	4x USB 3.1 Ports
R3	LAN Port	4x 2.5GbE RJ45
R4	LAN Module Slot (By SKU)	SKU A: 4x 25GbE SFP28 w/ SRIOV SKU C: 2x 1GbE RJ45; 2x 10GbE RJ45 w/ SRIOV SKU D: N/A
R5	LOM Port	1x 1GbE RJ45 LOM Port (IPMI)
R6	Console Port	1x 1GbE RJ45 Console Port
R7	VGA Port	1x VGA Port
R8	Grounding	1x Grounding Hole
R9	PCIe Slot	Slot 3: 1x PCIe Gen5*4 Single-Width (FHHL) slot; Slot 4: 1x PCIe Gen5*16 Double-Width (FHFL) slot
R10	Power Module	Dual Power Input 100-240Vac & 110-240Vdc, Up to 400W each

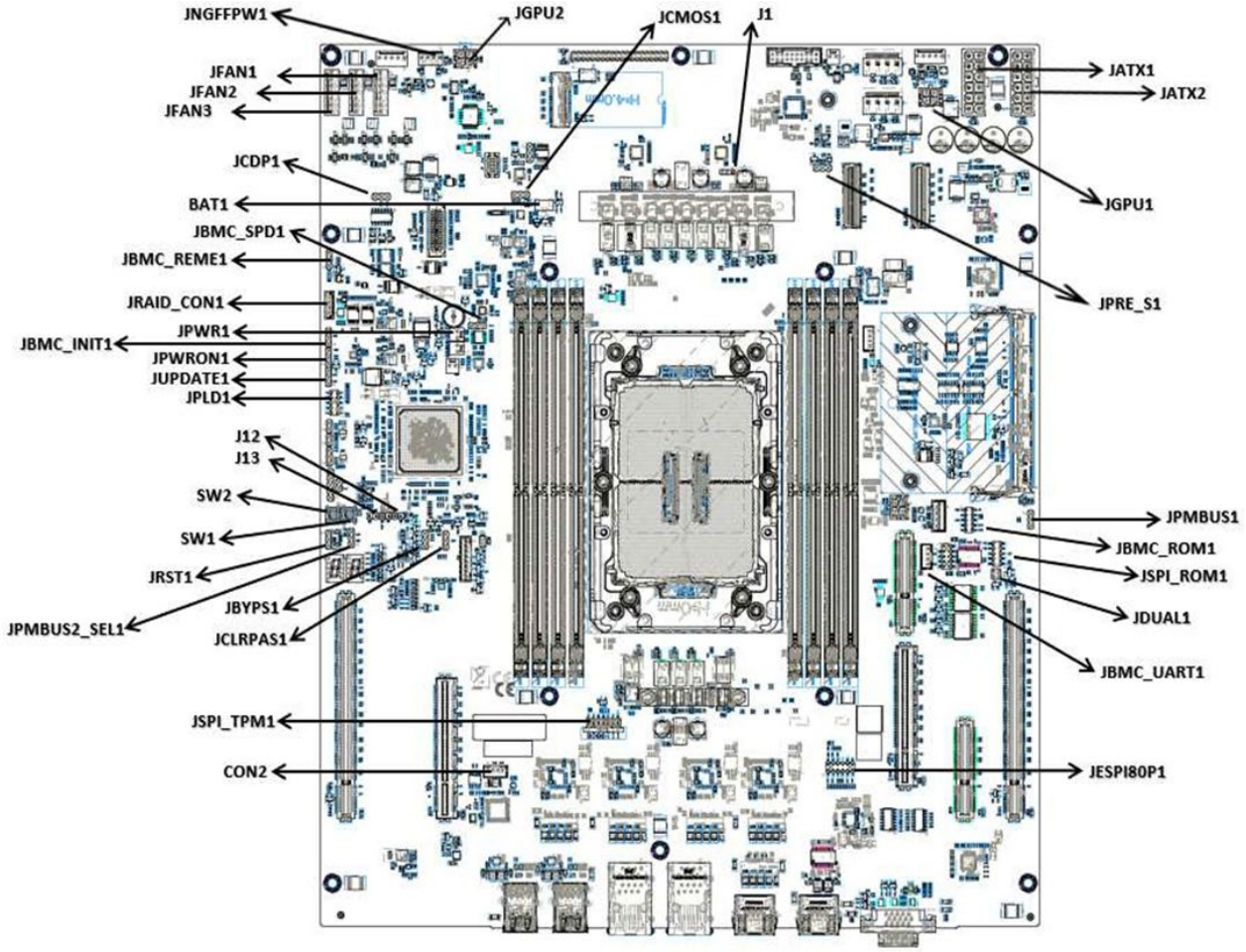
Motherboard Information

Block Diagram

The block diagram indicates how data flows among components on the motherboard. Please refer to the following figure for your motherboard's layout design.



Connector Pin Assignment



Power Connector

1. JATX 1~2: Power Connector

Pin	Description	Pin	Description
1	GND	2	+P12V_STBY
3	GND	4	+P12V_STBY
5	GND	6	+P12V_STBY
7	GND	8	+P12V_STBY
9	GND	10	+P12V_STBY
11	GND	12	+P12V_STBY

2. JGPU 1~2: PCIe 4-Pin Power Connector

Pin	Description	Pin	Description
1	GND	2	GND
3	_P12V	4	+P12V

3. JNGFFPW1: SATA 4-Pin Power Connector

Pin	Description
1	+P12V
2	GND
3	GND
4	+P5V

Function Connector and Pin Header

4. JFAN 1~3: Fan Connector

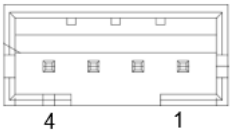
Pin	Description
1	GND
2	GND
3	+P12V
4	+P12V
5	RPM Sense
6	RPM Sense
7	PWM

5. BAT1: Battery Connector

Pin	Description
1	+P3V3_BAT
2	GND
3	+P3V3_BAT

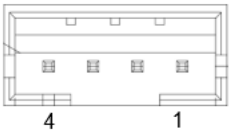
6. CON2: FPGA Console

Pin	Description
1	+P3V3_AUX
2	RX
3	GND
4	TX



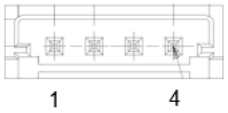
7. JBMC_UART1: BMC Console

Pin	Description
1	+P3V3_AUX
2	RX
3	GND
4	TX



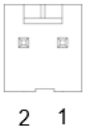
8. JRAID_CON1: VROC Key Connector

Pin	Description
1	GND
2	PU_VROC_HW_KEY
3	GND
4	FM_VROC_HW_KEY

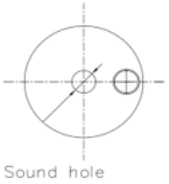


9. JPWR1: Power Button Cable Connector

Pin	Description
1	GND
2	PWRBTN

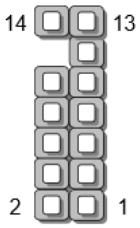


10. BZ1: Buzzer Function



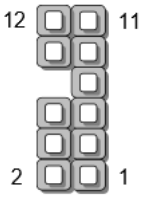
11. JSPI_TPM1: TPM Pin Header

Pin	Description	Pin	Description
1	NC	2	NC
3	NC	4	+PVCCFA_EHV_P1V8_AUX
5	SPI_MISO	6	NC
7	NC	8	SPI_CLK
9	GND	10	SPI_MOSI
11	IRQ_TPM		
13	SPI_CS	14	RST_TPM



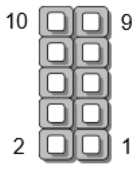
12. JESPI80P1: Debug Port Pin Header

Pin	Description	Pin	Description
1	ESPI_CLK_HDR	2	ESPI_IO1_HDR
3	RST_ESPI_HDR	4	ESPI_IO0_HDR
5	ESPI_CS_HDR	6	+P3V3
7	ESPI_IO3_HDR		
9	ESPI_IO2_HDR	10	GND
11	+P3V3_AUX	12	NC



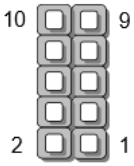
13. JPLD1: FPGA Pin Header, For FPGA Programming

Pin	Description	Pin	Description
1	JTAG_PLD_TCK	2	GND
3	JTAG_PLD_TDO	4	+P2V5_MAX10_JTAG
5	JTAG_PLD_TMS	6	NC
7	NC	8	NC
9	JTAG_PLD_TDI	10	GND



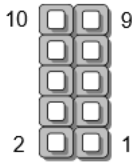
14. JBMC_ROM1: BMC SPI ROM Pin Header, For BMC SPI ROM Programming

Pin	Description	Pin	Description
1	BMC_SPI_HD1	2	BMC_SPI_CS1
3	SPI_BMC_CS	4	+P3V3_BMC_SPI_AUX
5	SPI_BMC_IO1	6	NC
7	NC	8	SPI_BMC_CLK
9	GND	10	SPI_BMC_IO0



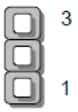
15. JSPI_ROM1: CPU SPI ROM Pin Header, For CPU SPI ROM Programming

Pin	Description	Pin	Description
1	SPI_HD1	2	SPI_CS1
3	SPI_CS0	4	+P1V8_AUX
5	SPI_CPU0_IO1	6	NC
7	NC	8	SPI_CPU0_CLK
9	GND	10	SPI_CPU0_IO0



16. J1: SMB VR DEBUG Pin Header

Pin	Description
1	GND
2	SMB_DEBUG_SCL
3	SMB_DEBUG_SDA



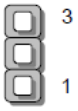
17. JPMBUS1: PSU SMbus Pin Header

Pin	Description
1	SMB_PMBUS1_SDA
2	GND
3	SMB_PMBUS1_SCL

18. JBMC_REME1 (2-3)

1-2: Enable Remote Debug

2-3: Disable Remote Debug (Default)



Pin	Description
1	+P3V3_AUX
2	FM_ASD_EN_DET
3	NC

19. JCDP1 (1-2): MBP_I3C_SEL Strap Control

1-2: MBP Mode (Default)

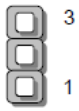
2-3: I3C MIPI10 Mode

Pin	Description
1	NC
2	FM_I3C_CDP_ENABLE_N
3	GND

20. JBMC_SPD1 (1-2): BMC SPD Remote

1-2: BMC SPD Remote Debug Disable (Default)

2-3: BMC SPD Remote Debug Enable

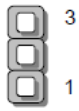


Pin	Description
1	NC
2	PD_SPD_REMOTE_EN
3	FM_SPD_SWITCH_CTRL_N

21. JBYPS1 (2-3): Bypass Chain Control CPU0

1-2: Force Bypass of CPU0

2-3: Normal Operation (Default)



Pin	Description
1	NC
2	FM_CPU0_SKTOCC_N
3	FM_CPU0_SKTOCC_LVT3_N

22. JPRE_S1 (1-2): PRE-S5 Mode

1-2: Normal S5 Mode (Default)

2-3: PRE-S5 Full for Mode

Pin	Description
1	PRES5
2	GND

3	NC

23. JUPDATE1 (1-2): BMC Force Update

1-2: Normal (Default)

2-3: BMC Force Update

Pin	Description
1	+P3V3_AUX
2	FM_FORCE_BMC_UPDATE_N
3	GND

24. JPWRON1 (1-2): Force Power On

1-2: Disable (Default)

2-3: Enable

Pin	Description
1	NC
2	FM_FORCE_PWRON_LVC18
3	+P1V8_AUX

25. JBMC_INIT1 (2-3): BMC INIT

1-2: BMCINIT Strap Driven by BMC

2-3: BMCINIT Strap Forced to 0 (Default)

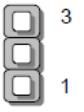
Pin	Description
1	+P3V3_AUX
2	FM_FORCE_PWRON_LVC18
3	NC

26. JPMBUS2_SEL1 (1-2): PMBUS2 Mux Select

1-2: BMC PFR PMBUS 2 (Default)

2-3: SMB HOSY

Pin	Description
1	NC
2	FM_PMBUS2_MUX_SEL_FPGA
3	+P3V3_AUX

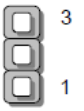


27. J12 (1-2): Dual BIOS Select

1-2: Enable Dual BIOS (Default)

2-3: Disable Dual BIOS

Pin	Description
1	+P1V8_AUX



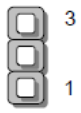
2	DUAL_BIOS_DIS
3	GND

28. J13 (1-2): BIOS Boot Up Select

1-2: Force Boot Up from BIOS1 (Default)

2-3: Force Boot Up from BIOS2

Pin	Description
1	+P1V8_AUX
2	BIOS_BOOT_SEL
3	GND



29. JDUAL1 (1-2, 3-4): Flash BIOS Select

1-2, 3-4: Flash 1st BIOS (Default)

1-3, 2-4: Flash 2nd BIOS

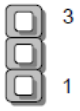
Pin	Description
1	SPI_CS0#
2	SPI_CS0#_DUAL
3	SPI_CS1#_DUAL
4	SPI_CS1#

30. JRST1 (1-2): Select Front Panel Reset

1-2: Hardware Reset (Default)

2-3: Software Reset

Pin	Description
1	FP_RST_BTN_N
2	FP_RST_SEL
3	SW_RST#

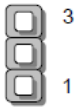


31. JCLRPAS1 (1-2): Password Clear Select

1-2: Normal (Default)

2-3: Password Clear

Pin	Description
1	NC
2	FM_PASSWORD_CLEAR_N
3	GND



32. JCMOS1 (1-2): CPU0 CMOS Clear

1-2: Normal (Default)

2-3: Clear RTC Registers

Pin	Description
1	NC
2	RST_CPU0_RTCRST_N
3	GND

33. SW2

Power ON Button

34. SW1

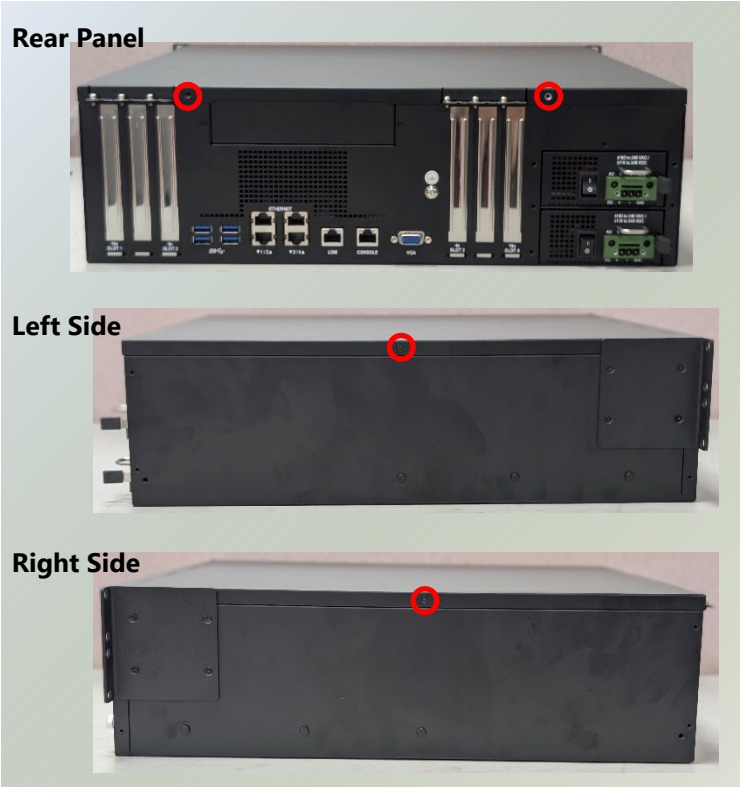
Reset Button

CHAPTER 2: HARDWARE INSTALLATION

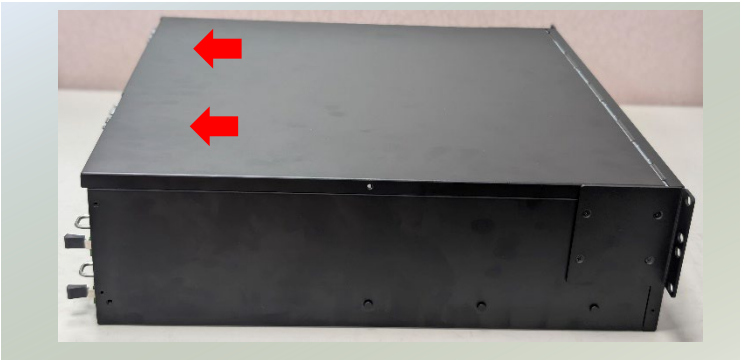
To reduce the risk of personal injury, electric shock, or damage to the system, please remove all power connections to shut down the device completely. Also, please wear ESD protection gloves when conducting the steps in this chapter.

Opening the Chassis

1. Power off the system. Loosen the two screws on the rear panel and one screw on each side.



2. Slide the cover slightly backward.



3. Lift the cover up to remove.

Installing the System Memory

The system supports eight DDR5 RDIMM memory module slots for heavy-duty operations.

DIMM Population Guidelines:

- To guarantee balanced system performance, please install identical DIMMs of the same capacity, speed, number of ranks, and from the same manufacturer.
- As the recommended minimum requirement, each channel pair of a processor should have at least one DIMM installed.
- P configs are strongly recommended as will bring the system better performance.
- Enforce Population POR BIOS knob must be enabled for production.

The table below shows the recommended schemes for DIMM population.

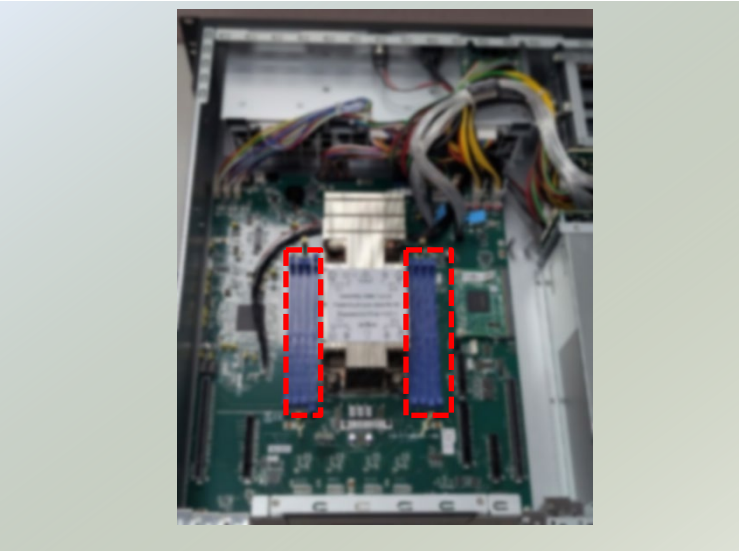
	iMC7		iMC6		iMC5		iMC4			iMC0		iMC1		iMC2		iMC3									
	Ch7		Ch6		Ch5		Ch4			Ch0		Ch1		Ch2		Ch3									
DDR5	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	Slot 1		Slot 1	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	Slot 1	Slot 0	All2All	Degraded All2All	SNC2	Hemi	Interleaving	SGX	Mirroring		
1											DDR5							N	Y	N	N	N	N	P config	1
4			DDR5				DDR5				DDR5				DDR5			N	N	N	Y	Y	N	F config	4
	DDR5				DDR5								DDR5				DDR5	N	N	N	Y	Y	N	F config	
8			DDR5	DDR5			DDR5	DDR5		DDR5	DDR5			DDR5	DDR5			N	N	N	Y	N	N	F config	8
	DDR5	DDR5			DDR5	DDR5						DDR5	DDR5			DDR5	DDR5	N	N	N	Y	N	N	F config	
	DDR5		DDR5		DDR5		DDR5				DDR5		DDR5		DDR5		DDR5	N	N	N	Y	Y	Y	P config	
16	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5		DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	N	N	N	Y	Y	Y	P config	16

Flow arrows shows all possible resulting configs, based on 1 DIMM failed then whole channel is off case.

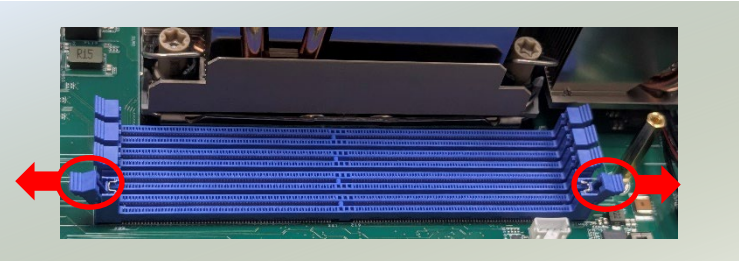
Memory Modules Installation Instructions

Please follow the steps below to install the DIMM memory modules.

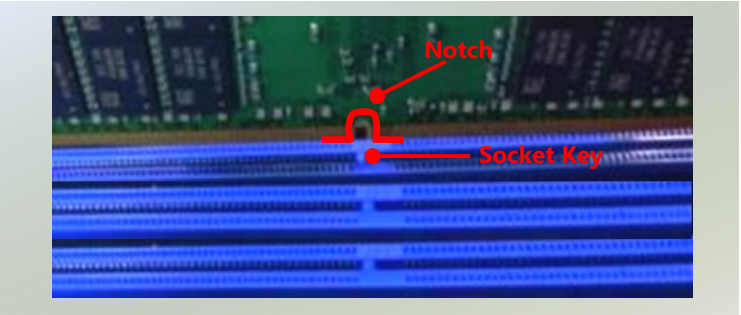
1. Power off the system, remove the top chassis cover and locate the DIMM memory slots.



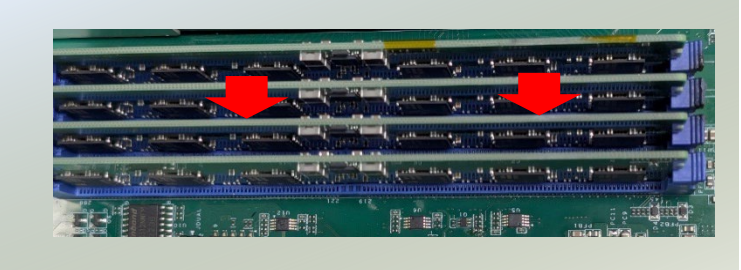
2. Pull open the DIMM slot latches.



3. Align the notch of the DIMM module with the socket key in the slot.



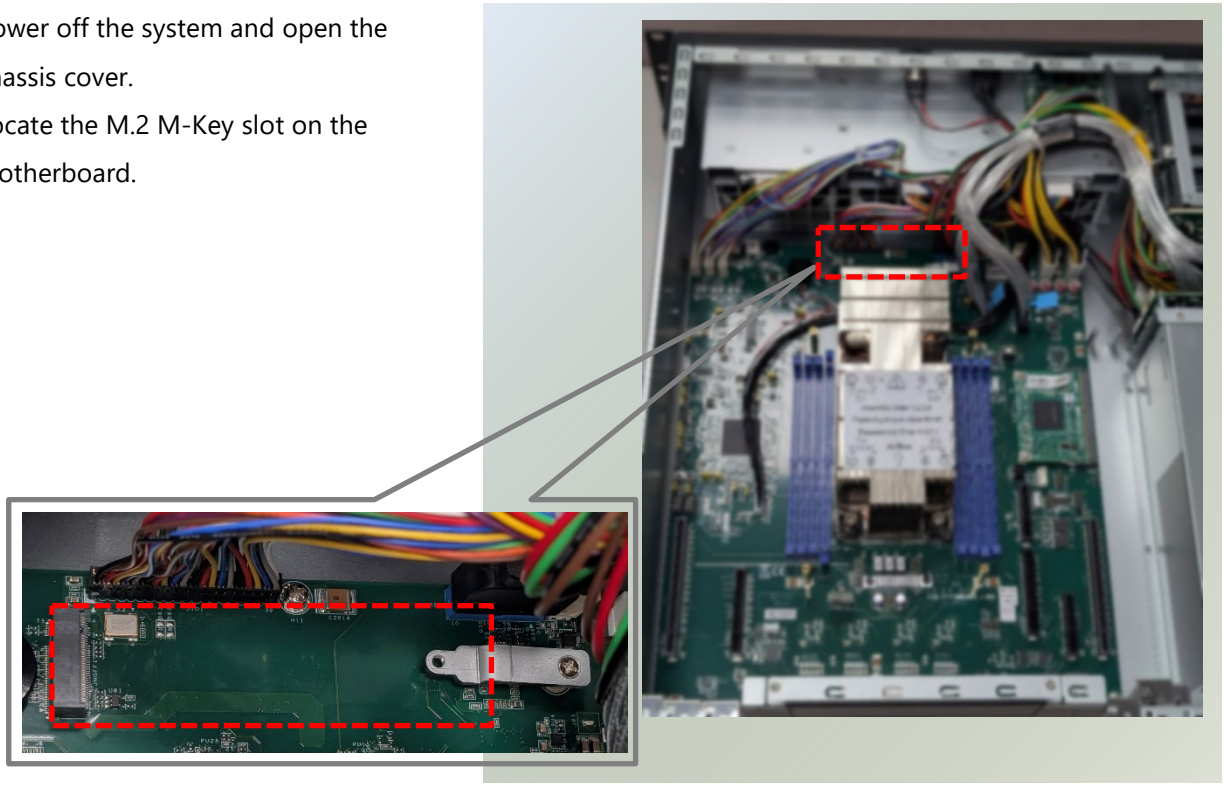
4. Insert the module into the slot until it is firmly seated.



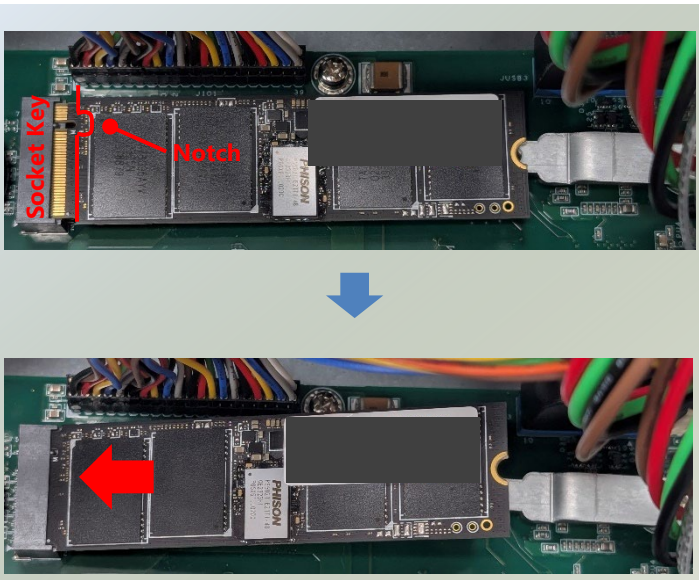
Installing the M.2 NVMe Storage (Optional)

The system supports one M.2 2280/22110 M-Key socket for additional NVMe storage. Please follow the steps for installation.

1. Power off the system and open the chassis cover.
2. Locate the M.2 M-Key slot on the motherboard.



3. Align the notch of the storage module with the socket key in the pin slot.
4. Insert the storage module at 30 degrees into the socket until it is fully seated.

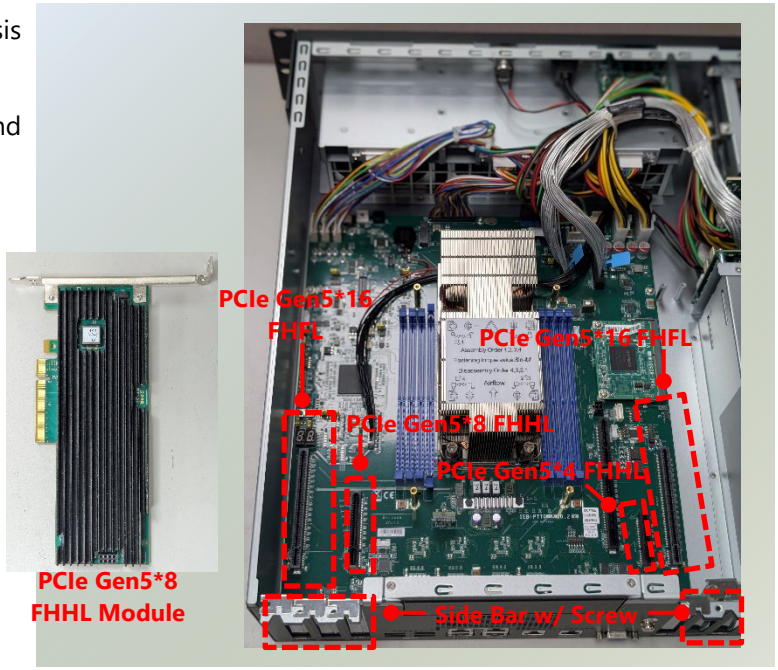


5. Push down on the module card and secure it with a screw.

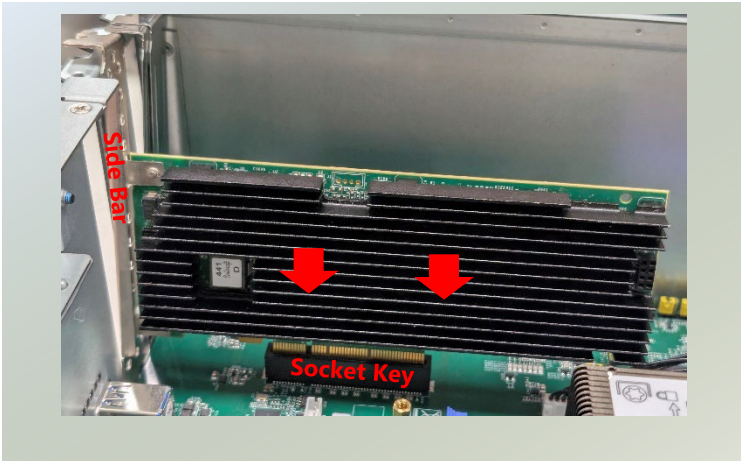
Installing the FHFL PCIe Module (Optional)

The ICS-P770 supports module expansion, including two PCIe Gen5*16 Double-Width (FHFL), one PCIe Gen5*8 Single-Width (FHHL), and one PCIe Gen5*4 Single-Width (FHHL) slot.

1. Power off the system and open the chassis cover.
2. Locate the PCIe slot in the system and remove screw and sidebar.



3. Align the GPU module to the PCIe socket. Slide the CPU module into the PCIe socket key until it is completely seated. Make sure the side bar slides in properly.



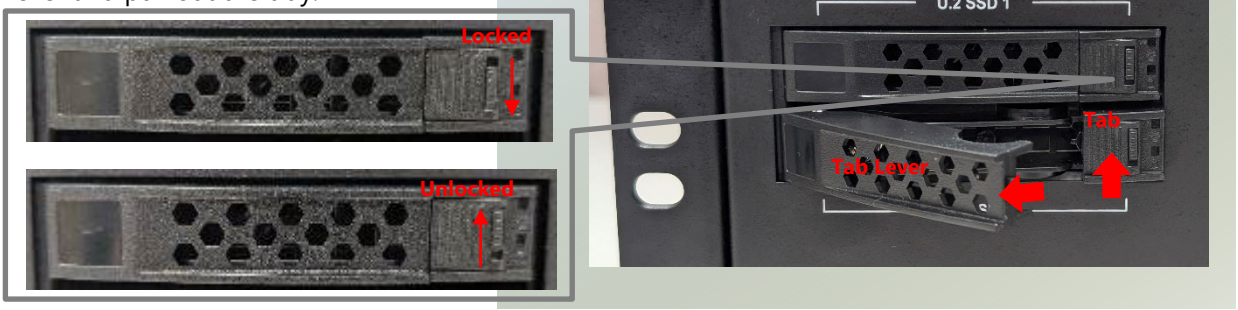
4. Secure the GPU Module with one screw.

Installing the Disk Drives (Optional)

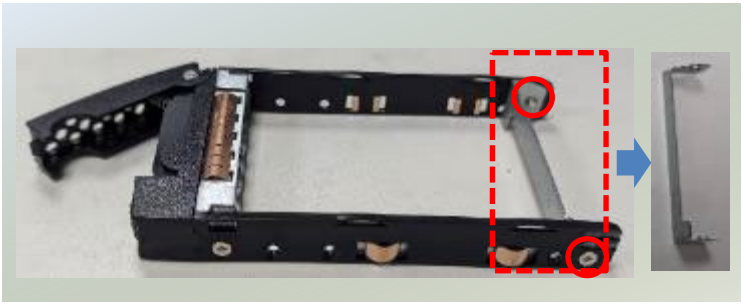
The system supports four 2.5" U.2 HDD/SSD swappable drive bays on the front panel. Please follow the steps below to install or replace disk drives.

1. Power off the system. Locate the disk drive bays on the front panel.

2. Select a drive bay for installation, slide the lock key up to unlock the tray door. Then press down on the tab, hold the tab lever and pull out the tray.



3. Remove the two screws on the side and remove the metal liner.



4. Install a 2.5" HDD/SSD disk drive into the tray. Secure with four (4) screws, two on each side.

   Keep in mind that the contacts should be facing outwards (bottom section of the drive bay), towards the inside of the system.

5. Then gently slide the drive bay completely back into its slot. Slide down the lock key to lock the tray door.

Replacing the Smart Cooling Fans

Cooling fans may wear down eventually, please refer to the steps below for replacing smart cooling fans.

1. Power off the system and locate the cooling fans on the front panel.

2. Using a screwdriver, loosen the two lock-screws of the fan you would like to replace.
3. Hold onto the lock-screw and gently pull out the cooling fan.

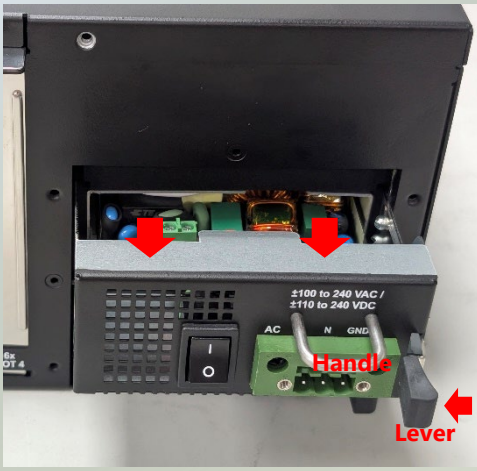
4. Insert a new fan into the fan bracket and push until it clicks into place and screw in the two lock-screws.

Replacing the Power Supply Units

Power supply units can wear down over time. The ICS-P770 is compatible with dual power input up to 750W each, based on your chosen configuration. Ensure to use power supply units that align with these capacities.

1. Power off the system and locate the power supply units on the rear panel.

2. Grip the handle and press the lever inward, to pull out the power supply unit.



3. Insert a new power supply unit and push until it clicks into place.

Installing Handles on the Ear Mount (Optional)

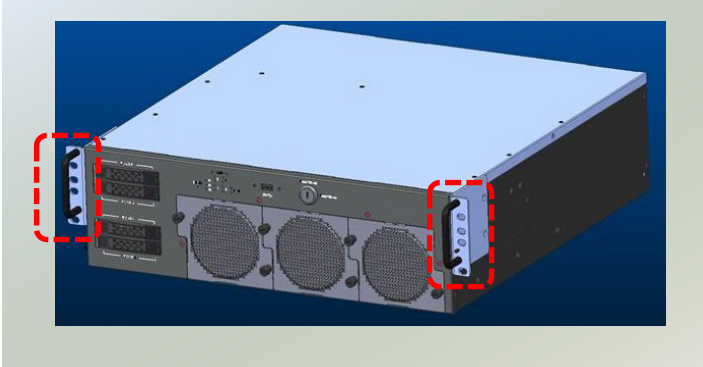
The system provides an option to add handles to the Ear Mount Brackets (Sold Separately). Please inquire Sales Representative to purchase and follow the installation process below.

1. The Handles Kit includes:
   - 2x Handles
   - 1x Screw pack

NOTE: The photos here are for reference only.

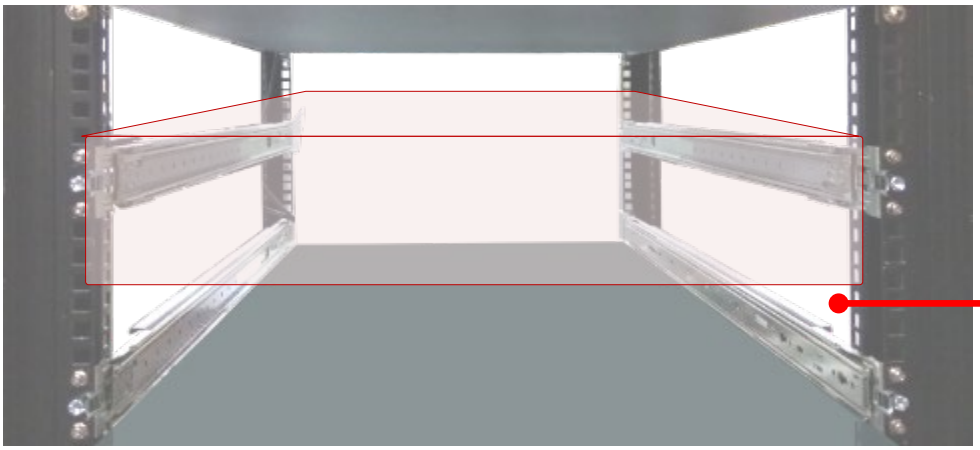
2. Install the handles to the ear brackets using the provided screws.

3. Then, install the ear brackets on both sides of the system.



Rackmount the System

The system supports rack installation using the optional Slide Railmount Kit (sold separately). While installation may require additional steps, the sliding rails allow for secure mounting and easy system access. Follow the steps below to complete the rackmount installation.



The Slide Rail-Mount Kit provides secure system placement and reliable weight support within the rack.

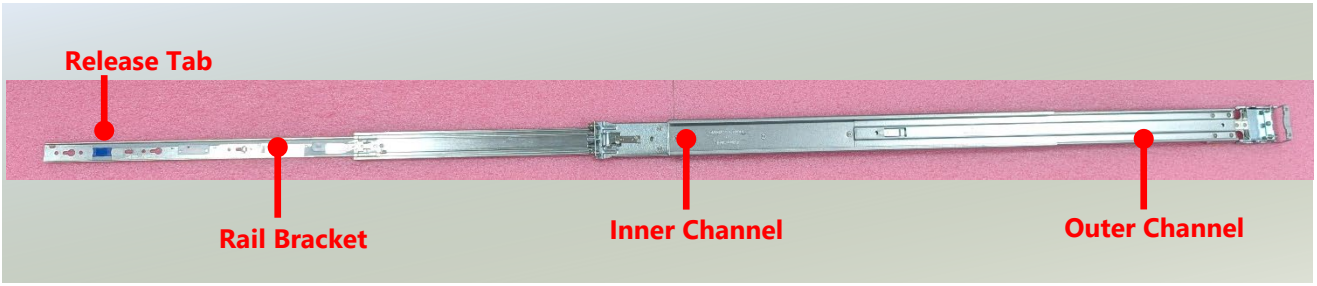
1. The Slide Rail Kit shall include the following items:

- 2x Screw Pack
- 2x Slide Rails

Screw Pack

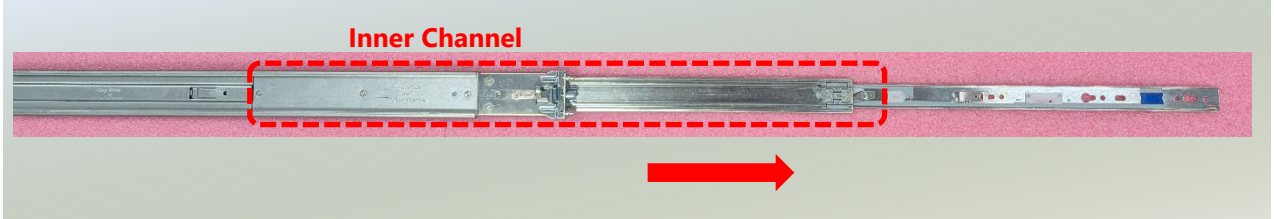
Slide Rails

The rail consists of the following parts:

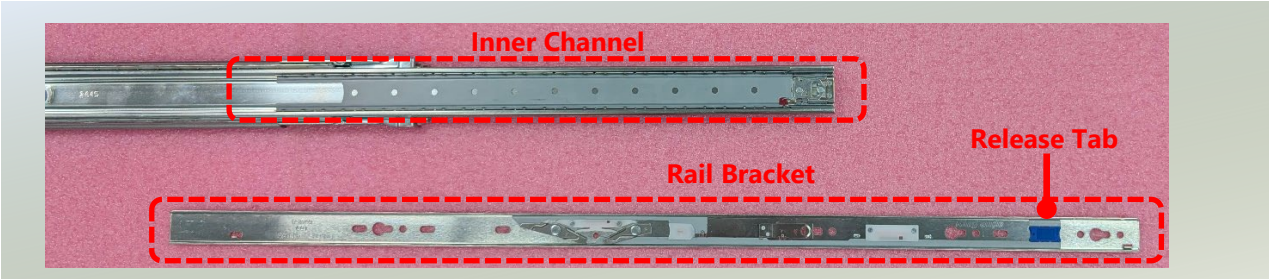


Attaching the Rail Brackets

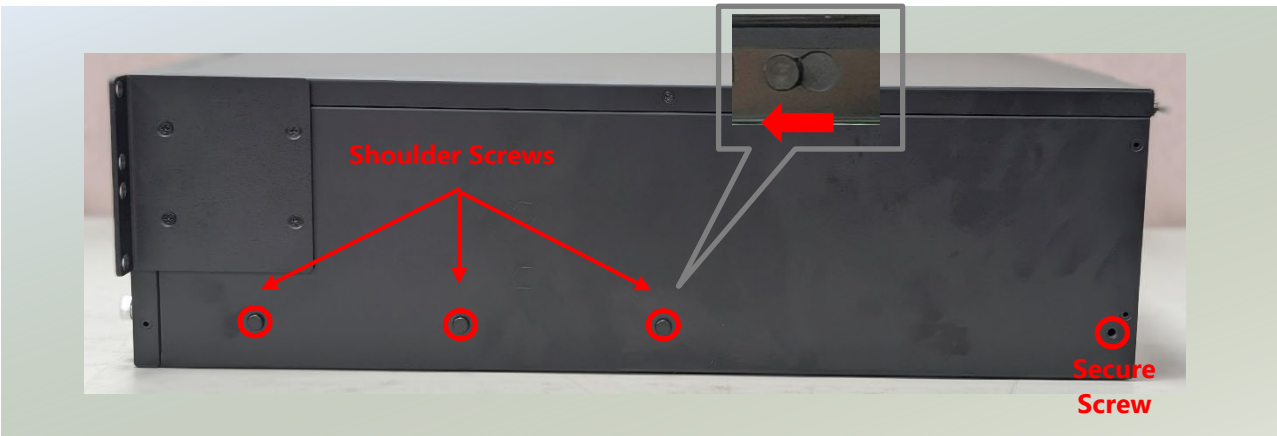
1. Unpack a slide rail and slide the **inner channel** all the way to the end.



2. Remove the **rail bracket** from the **inner channel** by pushing the **Release Tab** on the **rail bracket** outwards while sliding it out. Stretch the **rail bracket** to the fullest.



3. Align the side mounting rail keyholes to the built-in two shoulder screws on the side of the system chassis. Slide and lock the side mounting rail in place and use one screw to secure. Repeat for the other side of the system.

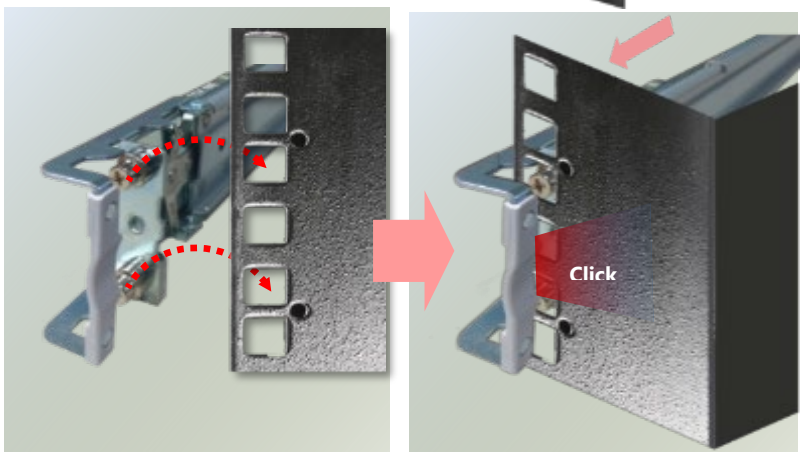


Installing the Slide Rails

Next, you shall install the slide rail assemblies onto the rack.

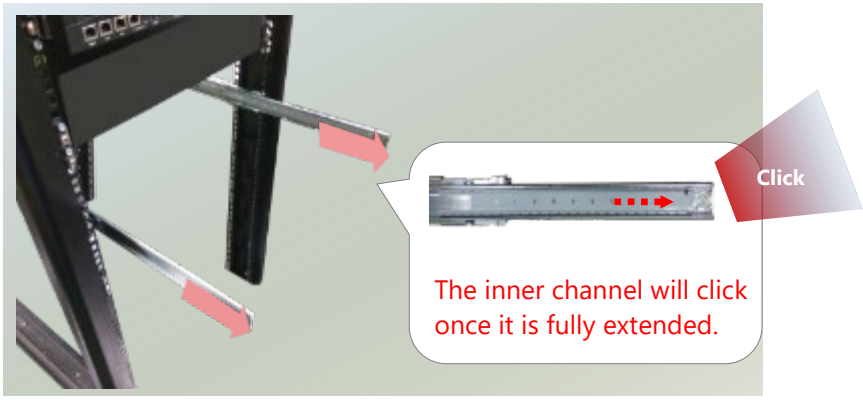
1. This slide-rails does NOT require screw-fixing. Simply aim at three (3) available screw holes on the rack front and snap the rail (outer channel) front into the rack post, as shown in the image below. You should hear a "click" sound once it is firmly attached.

2. For the rear rack installation, slide the rail (outer channel) to aim and engage the bolts on the rail's rear end with the two available holes on the post, and the rail assembly will click into place.

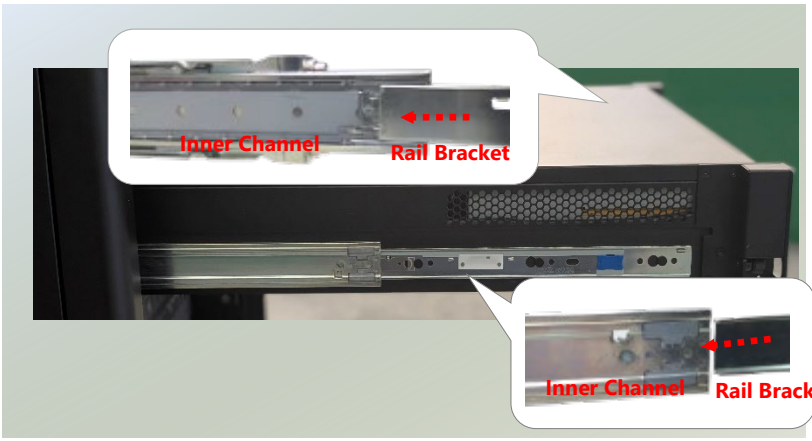


Installing the System into the Rack

1. Extend both **inner channels** to their maximum length. A click sound will indicate when they are fully stretched and locked into place.



2. While facing the front of the system, hold the chassis, gently align the **rail brackets** with the **inner channel** as depicted in the image, and then slide the system into the cabinet.



3. While sliding the system in, make sure to press and hold the **release tab** on each of the brackets.

4. The system is now successfully installed in the rack.

CHAPTER 3: REMOTE SERVER MANAGEMENT

This document specifies the BMC firmware features. The BMC firmware implements IPMI 2.0 based on ASPEED service processor. It performs all the BMC management tasks defined by IPMI 2.0.
In addition, BMC firmware runs an embedded web-server for full configuration using Web UI, which has a low learning curve.

BMC Main Features

Feature		Description
IPMI 2.0 Standard Features	System Interface Support	• KCS (System Interface Support) • LAN (RMCP+)
	IPMI 2.0 based Management	• BMC stack with an IPMI 2.0 implementation
	System Management	• Sensor monitoring • System power management • Watchdog timer • Fan speed monitor and control • FRU information
	Event Log	• System Event Log (SEL)
	Text Console Redirection: SOL	• Support in IPMI stack for SOL to remotely access BIOS and text console before OS booting
	User Management	• IPMI based user management • Multiple user permission level
Non-IPMI Functions	Web User Interfaces	• BMC management via web user interface • Integrated KVM and Virtual Media • TLS 1.2 and TLS 1.3 support
	User Authorization	• RADIUS support • LDAP support
	Security	• SSL and HTTPS support
	Maintenance	• Auto-sync time with NTP server • Remote firmware update by Web UI or Linux tool
	SNMP v3 Access	• SNMP walk to get BMC info • SNMP set to control system power status

BMC Firmware Functional Description

System Health Monitoring

The BMC implements system sensor monitoring feature. It could monitor voltage, temperature, and current of critical components.

System Power Management

The BMC implements chassis power and resets functions for system administrators to control and manage the system power behavior. These functions can be activated by sending the IPMI 2.0 compatible chassis commands to the BMC over messaging interfaces. The following list summaries the supported functions.

- Chassis power on
- Chassis power off
- Chassis power cycle
- Chassis power reset
- Chassis power soft
- Server's power status report

Watchdog Timer

The BMC provides an IPMI 2.0 compatible watchdog timer which can prevent the system from system hanging.

Fan Speed Control

BMC oversees fan speed control. The fan speed can be modified by varying the duty cycle of PWM signal. The fan speed control algorithm mainly refers to the readings of on-board temperature sensors.

Field Replaceable Unit (FRU)

The BMC implements an interface for logical FRU inventory devices as specified in IPMI 2.0 specification. This functionality provides commands for system administrators to access and management the FRU inventory information.

System Event Log (SEL)

A non-volatile storage space is allocated to store system events for system status tracking.

Serial over LAN (SOL)

IPMI 2.0 SOL is implemented to redirect the system serial controller traffic over an IPMI session. System administrators are able to establish a SOL connection with a standard IPMI client, like IPMITOOL, to remotely interact with serial text-based interfaces such as OS command-line and serial redirected BIOS interfaces.

User Management

The BMC supports 9 IDs for IPMI user accounts. The maximum length of the username and password are 16 and 20 respectively, and the possible privilege levels are Callback, User, Operator, and Administrator.

Moreover, the account creator is allowed to enable/disable the user account at any time. If not specified, the default user accounts are listed follows:

User Name	Password	User Access	Characteristics
admin	admin	Enabled	Password can be changed

Keyboard, Video, Mouse (KVM) Redirection

- The BMC provides keyboard, video, and mouse (KVM) redirection over LAN. This application is available remotely from the embedded web server.
- Support video recording, recorded videos to be downloaded & playable.

Virtual Media Redirection

- The BMC provides remote virtual CD, HD and FD redirection. CD image could be mounted directly in KVM window. HD, FD could be mounted by NFS and SAMBA.
- Efficient USB 2.0 based CD/DVD redirection with a typical speed of 20XCD.
- Completely secured transmission.

SNMP v3 Access

The BMC provides SNMP v3 accessibility, user could use the SNMP after setup the related setting on the User List page. The following are some SNMP command examples.

1.3.6.1.4.1.51188.2.1.1 (Get Sensor Info, column-1: index, column-2: name, column-3: number, column-4: reading)

1.3.6.1.4.1.51188.1.1.0 (Get/Set Hostname)

1.3.6.1.4.1.51188.1.2.0 (Get BMC Version)

1.3.6.1.4.1.51188.1.3.0 (Get System Power Status, 0 for off, 1 for on)

1.3.6.1.4.1.51188.1.4.0 (System Power Control, 1 for off, 2 for on, 3 for cycle, 4 for soft-off)

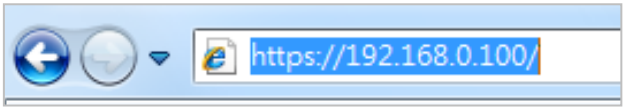
IPMI Commands Support List

COMMANDS	NETFN	CMD
IPM Device "Global" Commands		
Get Device ID	APP (06h)	00h
Cold Reset	APP (06h)	02h
Warm Reset	APP (06h)	03h
Get Device GUID	APP (06h)	08h
BMC Watchdog Timer Commands		
Reset Watchdog Timer	APP (06h)	22h
Set Watchdog Timer	APP (06h)	24h
Get Watchdog Timer	APP (06h)	25h
BMC Device and Messaging Commands		
Get System GUID	APP (06h)	37h
Get Channel Info	APP (06h)	42h
Set User Access	APP (06h)	43h
Get User Access	APP (06h)	44h
Set User Name	APP (06h)	45h
Get User Name	APP (06h)	46h
Set User Password	APP (06h)	47h
Chassis Device Commands		
Get Chassis Capabilities	Chassis (00h)	00h
Get Chassis Status	Chassis (00h)	01h
Chassis Control	Chassis (00h)	02h
Chassis Reset	Chassis (00h)	03h
Sensor Device Commands		
Get Sensor Reading Factors	S/E (04h)	23h
Get Sensor Hysteresis	S/E (04h)	25h
Get Sensor Threshold	S/E (04h)	27h
Get Sensor Event Enable	S/E (04h)	29h
Get Sensor Event Status	S/E (04h)	2Bh
Get Sensor Reading	S/E (04h)	2Dh
Get Sensor Type	S/E (04h)	2Fh
FRU Device Commands		
Get FRU Inventory Area Info	Storage (0Ah)	10h
Read FRU Data	Storage (0Ah)	11h
Write FRU Data	Storage (0Ah)	12h
SDR Device Commands		
Get SDR Repository Info	Storage (0Ah)	20h
Get SDR Repository Allocation Info	Storage (0Ah)	21h
Get SDR	Storage (0Ah)	23h
Get SDR Repository Time	Storage (0Ah)	28h
SEL Device Commands		
Get SEL Info	Storage (0Ah)	40h
Get SEL Allocation Info	Storage (0Ah)	41h
Get SEL Entry	Storage (0Ah)	43h

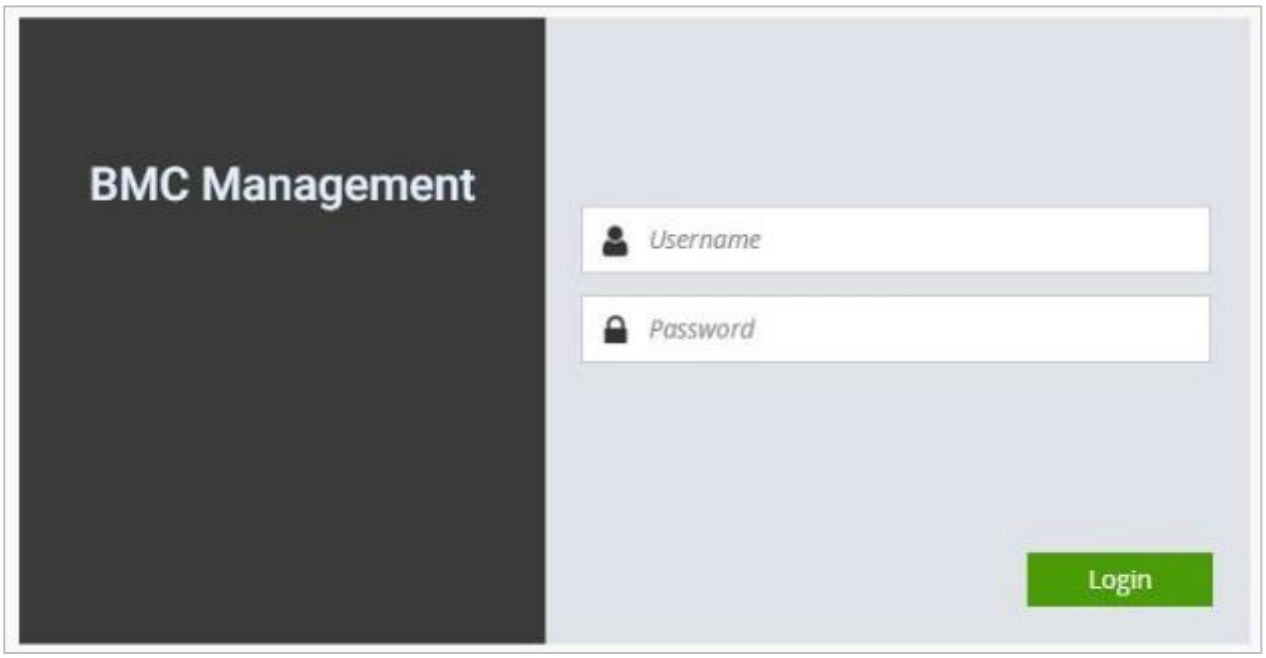
Delete SEL Entry	Storage (0Ah)	46h
Clear SEL	Storage (0Ah)	47h
Get SEL Time	Storage (0Ah)	48h
Set SEL Time	Storage (0Ah)	49h
Get SEL Time UTC Offset	Storage (0Ah)	5Ch
Set SEL Time UTC Offset	Storage (0Ah)	5Dh
LAN Device Commands		
Set LAN Configuration Parameters	Transport (0Ch)	01h
Get LAN Configuration Parameters	Transport (0Ch)	02h
Serial/Modem Device Commands		
Set SOL Configuration Parameters	Transport (0Ch)	21h
Get SOL Configuration Parameters	Transport (0Ch)	22h

Using BMC Web UI

In the address bar of your Internet browser, input the IP address of the remote server to access the BMC interface of that server.



Initial access of BMC prompts you to enter the User Name and Password. A screenshot of the login screen is given below:



Login Page

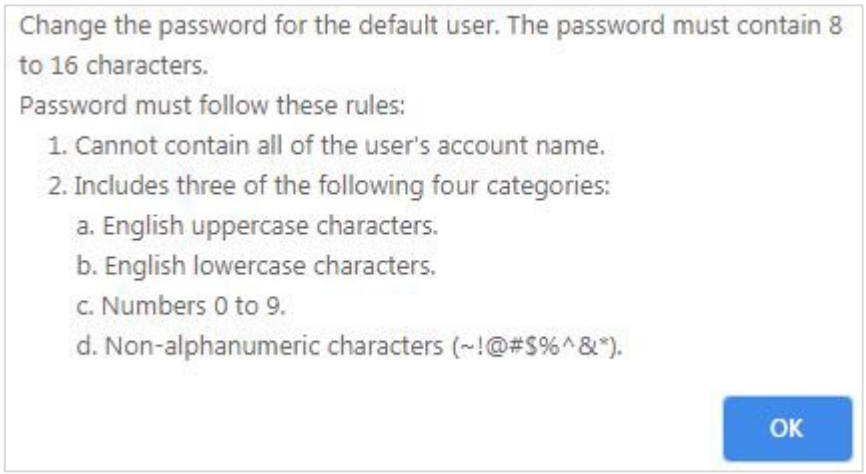
- **Username**: Enter your username in this field.
- **Password**: Enter your password in this field.
- **Sign me in**: After entering the required credentials, click the **Sign me in** to log in to Web UI.

Note: (1) If not specified, the default IP to access BMC is https://192.168.0.100.
(2) Please use **https** to access Web UI.

Default User Name and Password

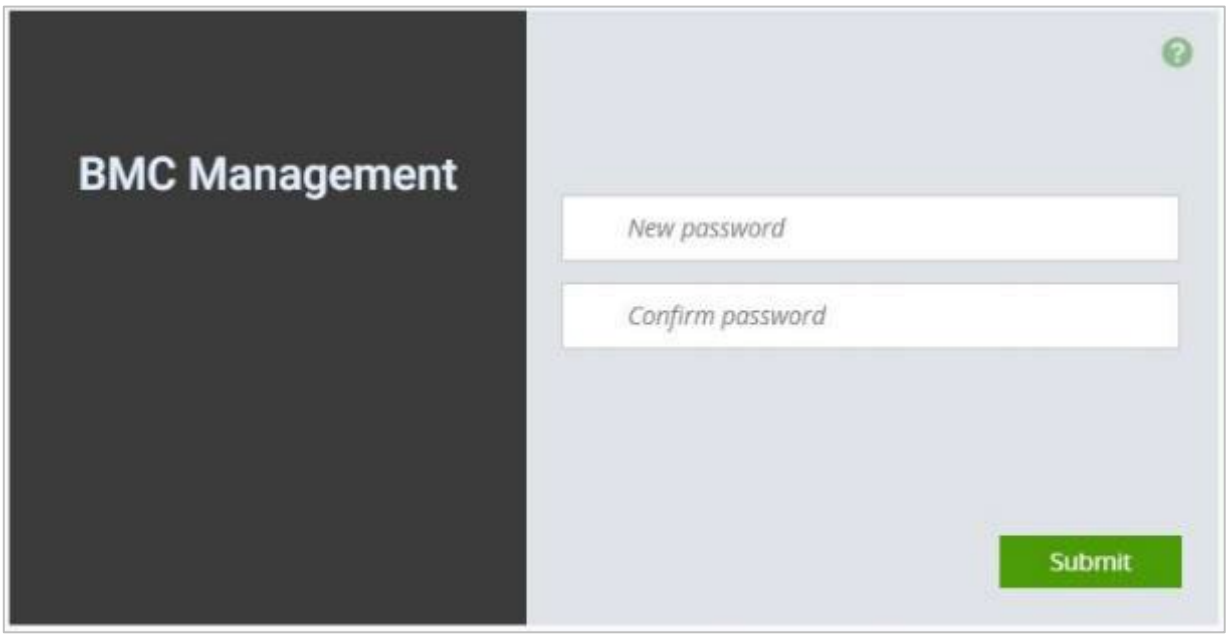
- **Username:** admin
- **Password**: admin

The default username and password are in lower-case characters. When you log in using the default username and password, you will get full administrative rights, and it will ask you to change the default password once you log in. The dialog is shown below:



Change the default password – Dialog

Clicking on **OK** will take you to set a password.



Change the default password – Set password

Note: Duplicate usernames shouldn't exist across different authentication methods like LDAP, RADIUS or IPMI, since the privilege of one Authentication method is overwritten by another authentication method during logging in, and hence the correct privilege cannot be returned properly.

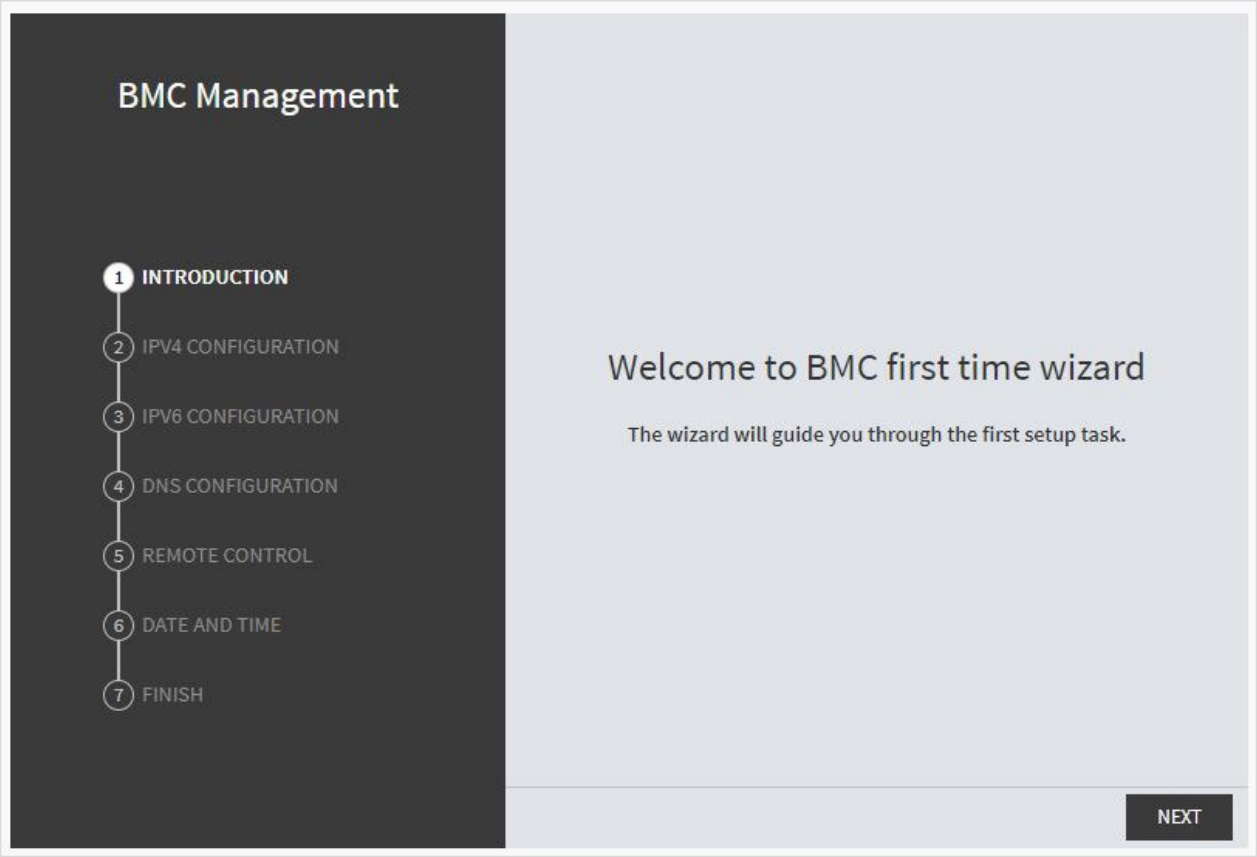
First Time Wizard Page Introduction

After the first-time login, you will see first time wizard welcome page as the following picture. Please press the “Next” button and configure your BMC step by step.

On the “IPv4”, “IPv6” and “DNS” pages, you could specify the hostname and network settings of BMC.

On the “Remote Control” page, you could specify allowed IP region which could access KVM and Remote media web pages.

On the “Date and Time” page, you could specify the NTP and time settings.



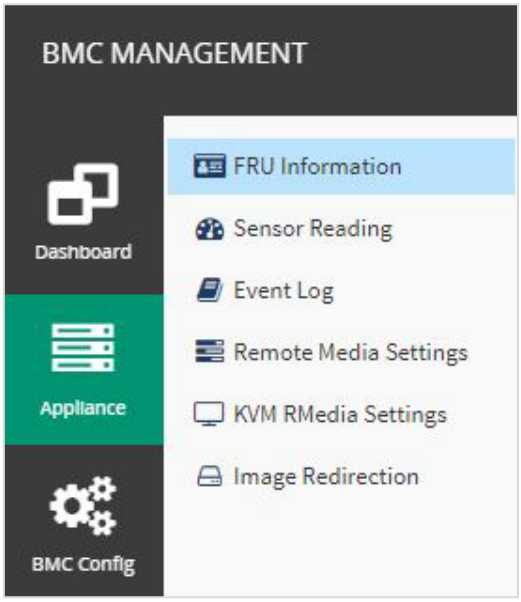
In the final page, please press “Finish” button to complete the first-time wizard. BMC will be rebooted and apply new settings. You could reconnect to the WebUI after a few minutes.

Web UI Layout Introduction

The BMC Web UI consists of various menu items:

Menu Bar

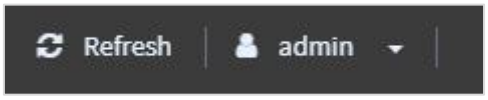
A screenshot of the menu bar is shown below, please select the page you would like to navigate.



Menu Bar

Quick Button and Logged-in User

The user information and quick buttons are located at the top right of the Web UI.

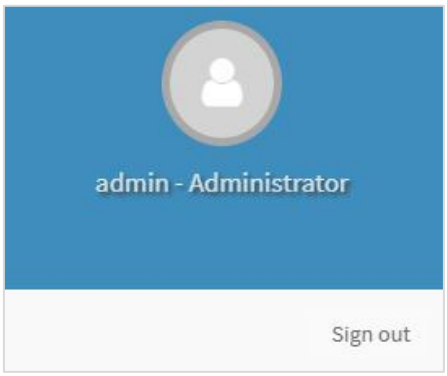


User Information

Logged-in user information: Click the icon 

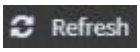
to view the logged-in user information.

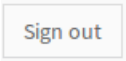
A screenshot of the logged-in user information is shown below:



Logged-in User Information

The logged-in user information shows the logged-in user's username, user privilege, with the quick buttons allowing you to perform the following functions:

- **Refresh**: Click the icon 

to reload the current page.
- **Sign out**: Click the icon 

to log out of the Web UI.

Logged-in User and its Privilege Level

This option shows the logged-in username and privilege. There are four kinds of privileges:

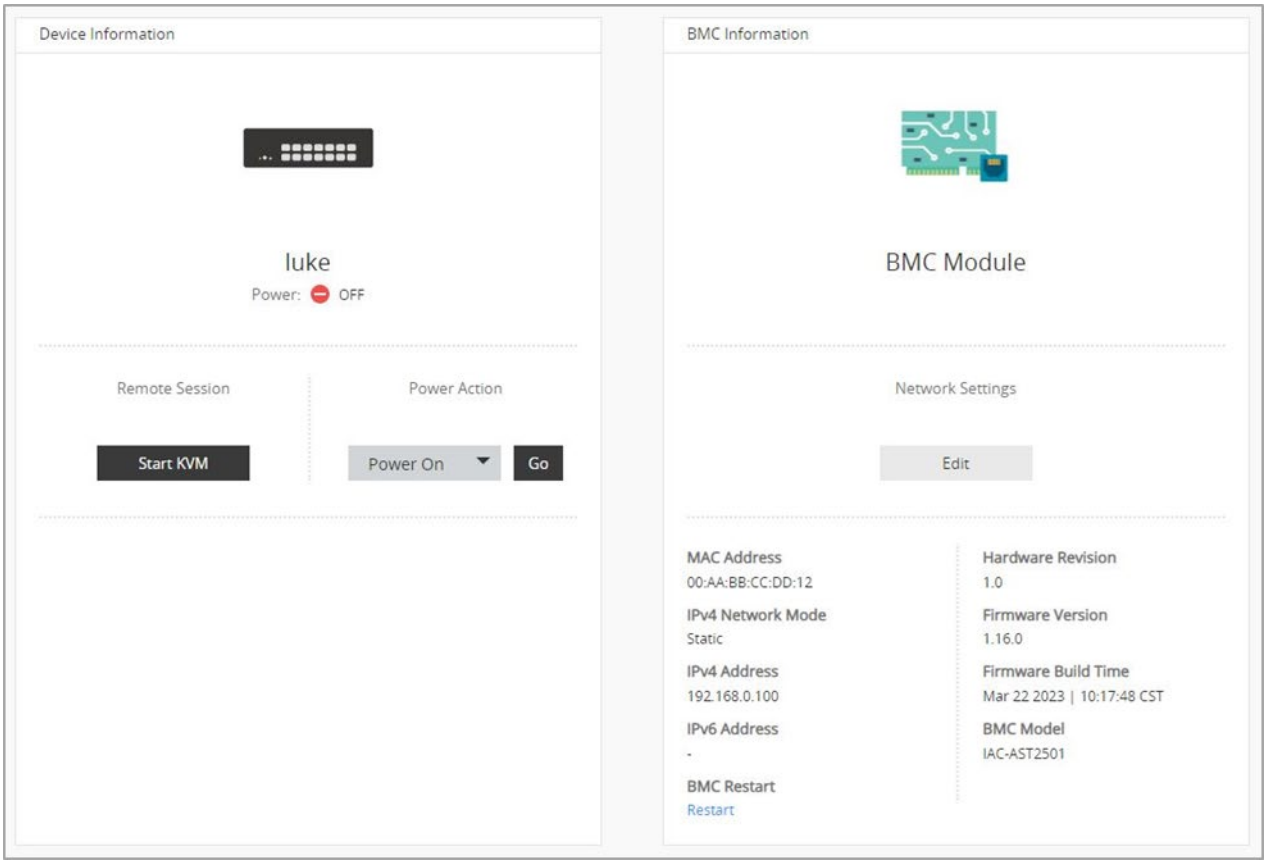
- **User**: Only valid commands are allowed.
- **Operator**: All BMC commands are allowed except for the configuration commands that can change the behavior of the out-of-hand interfaces.
- **Administrator**: All BMC commands are allowed.
- **No Access:** Login access denied.

Help

Help: The **Help** icon is located at the top right of each page in Web UI. Click this help icon to view more detailed field descriptions.

Dashboard

The dashboard page gives the overall information about the status of a device. To open the Dashboard page, click Dashboard from the menu bar. A sample screenshot of the Dashboard page is shown below:



Dashboard Page

A brief description of the Dashboard page is given below:

- **Device Information**

  This indicates the system information such as power status, model name and serial number. You could also execute power action and remote KVM here.

- **BMC Information**

  This indicates the BMC module information such as network settings, firmware info, and model name.

CHAPTER 5: SOFTWARE SETUP

The system has AMI BIOS built-in, with a SETUP utility that allows users to configure required settings or to activate certain system features. Pressing the **<Tab>** or **<Del>** key immediately allows you to enter the Setup Utility.

Enter BIOS Setup

To enter the BIOS setup utility, simply follow the steps below:

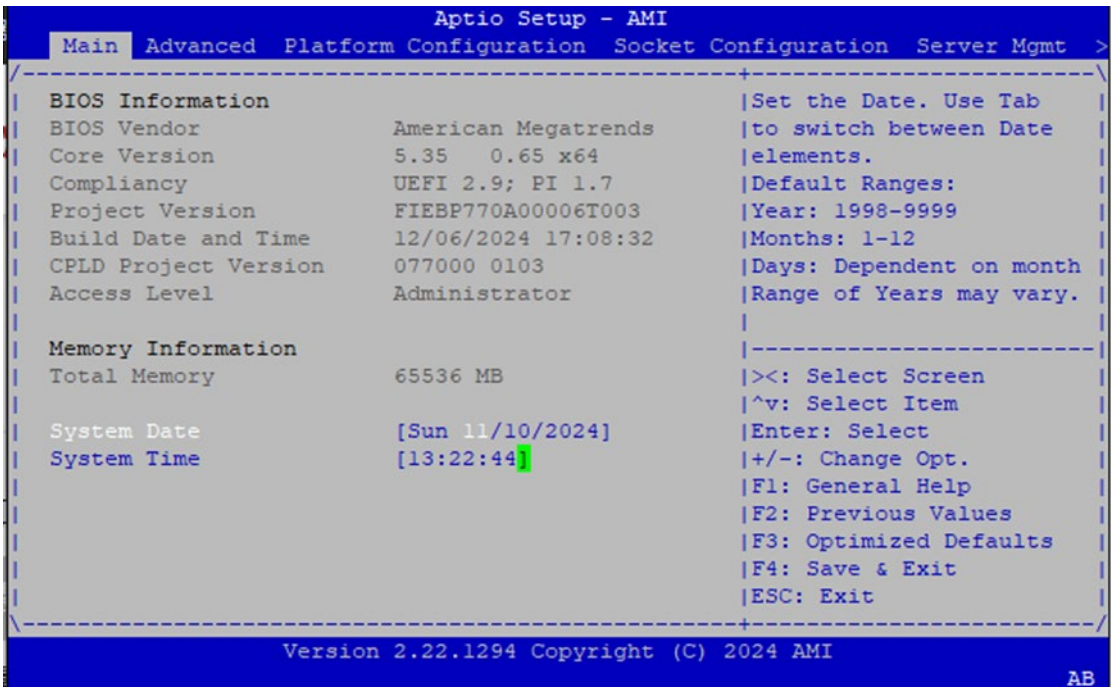
1. Boot up the system.
2. Press **<Del>** during the boot-up if you connect a keyboard to this unit. But if you connect a PC to this unit through console USB/Serial connection, then press **<Tab>**. Your system should be running POST (Power-On-Self-Test) upon booting up.
3. Then you will be directed to the BIOS main screen.
4. Instructions of BIOS navigations:

Control Keys	Description
→←	select a setup screen, for instance, [Main], [Advanced], [Platform], [Socket], [Server Mgmt], [Security], [Boot], and [Save & Exit]
↑↓	select an item/option on a setup screen
<Enter>	select an item/option or enter a sub-menu
+/-	to adjust values for the selected setup item/option
F1	to display General Help screen
F2	to retrieve previous values, such as the parameters configured the last time you had entered BIOS.
F3	to load optimized default values
F4	to save configurations and exit BIOS
<Esc>	exit the current screen

(The screenshots presented in this section are for reference only)

Main Page

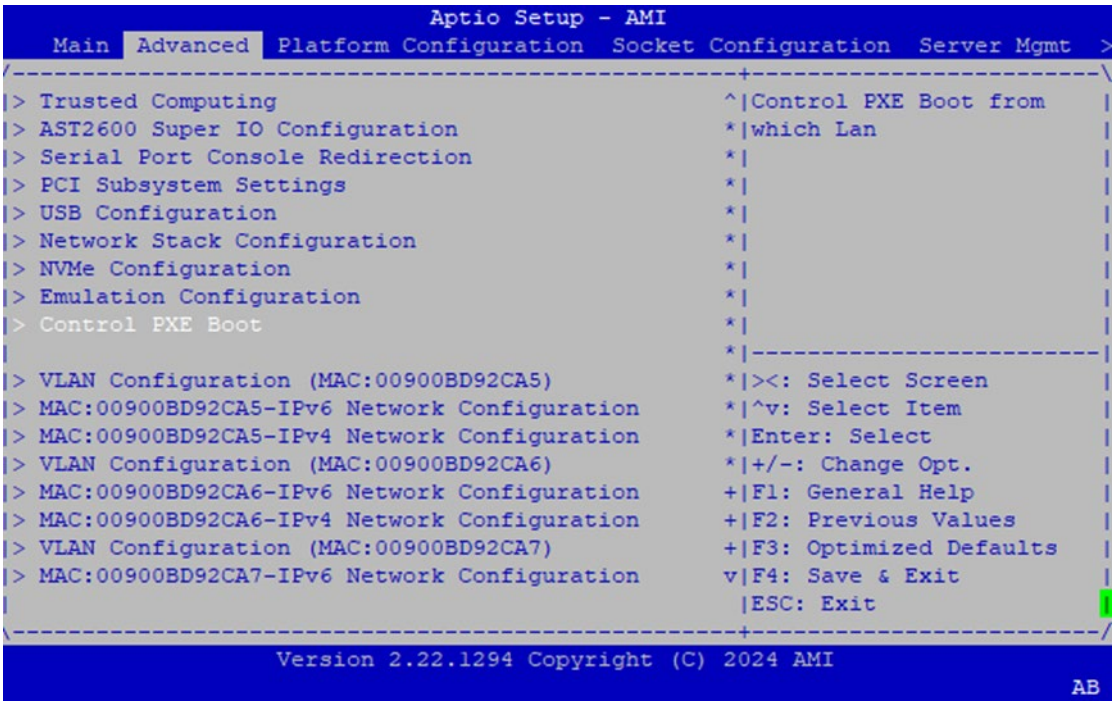
Setup Main Page contains BIOS information and project version information.



Item	Description
BIOS Information	BIOS Vendor: American Megatrends Core Version: AMI Kernel version, CRB code base, X64 Compliancy: UEFI version, PI version BIOS Version: BIOS release version Build Date and Time: MM/DD/YYYY CPLD Version(M): MB CPLD release version CPLD Version(S): BMC Card CPLD release version Access Level: Administrator / User
Memory Information	Total Memory: by case
System Date	To set the Date, use **<Tab>** to switch between Date elements. Default range of Year: 2005-2099 Default range of Month: 1-12 Days: dependent on Month.
System Time	To set the Date, use **<Tab>** to switch between Date elements.

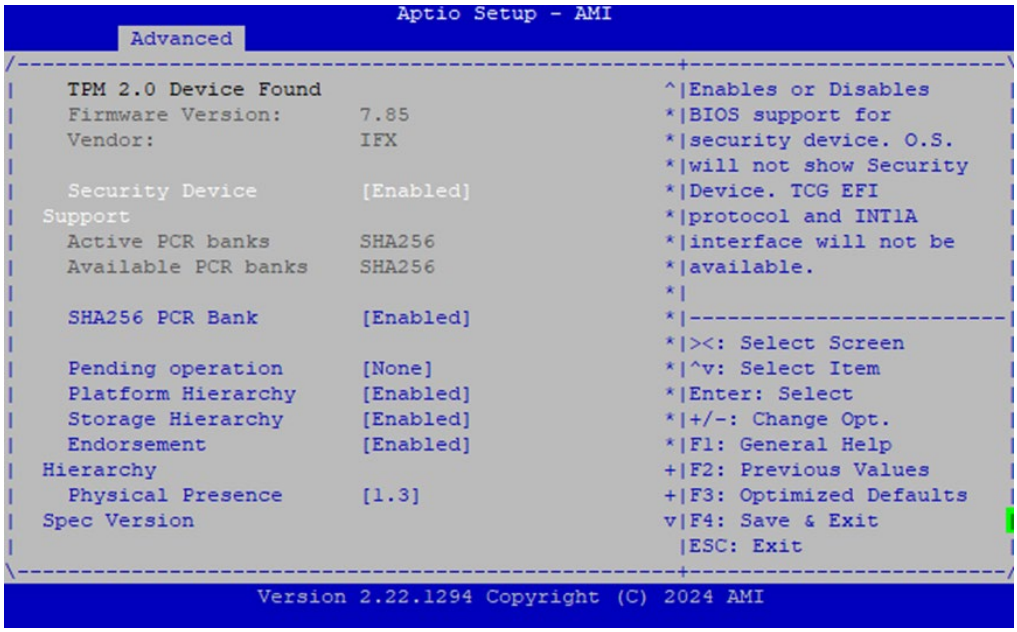
Advanced Page

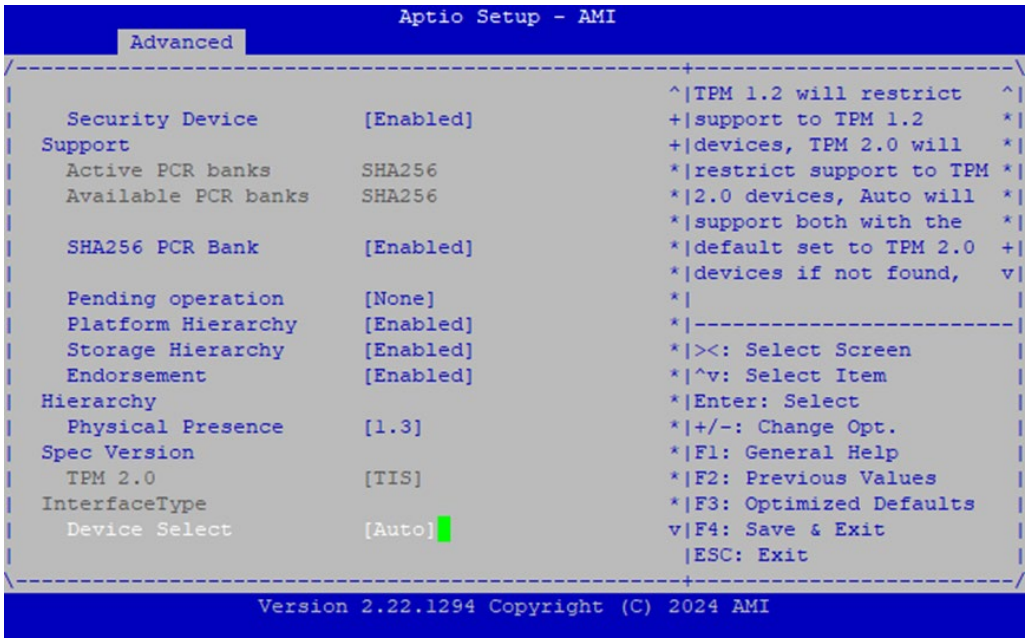
Select the **Advanced** menu tab from the BIOS setup screen to enter the "Advanced" setup screen. Users can select any of the items in the left frame of the screen.



Trusted Computing

Trusted Computing (TPM2.0)

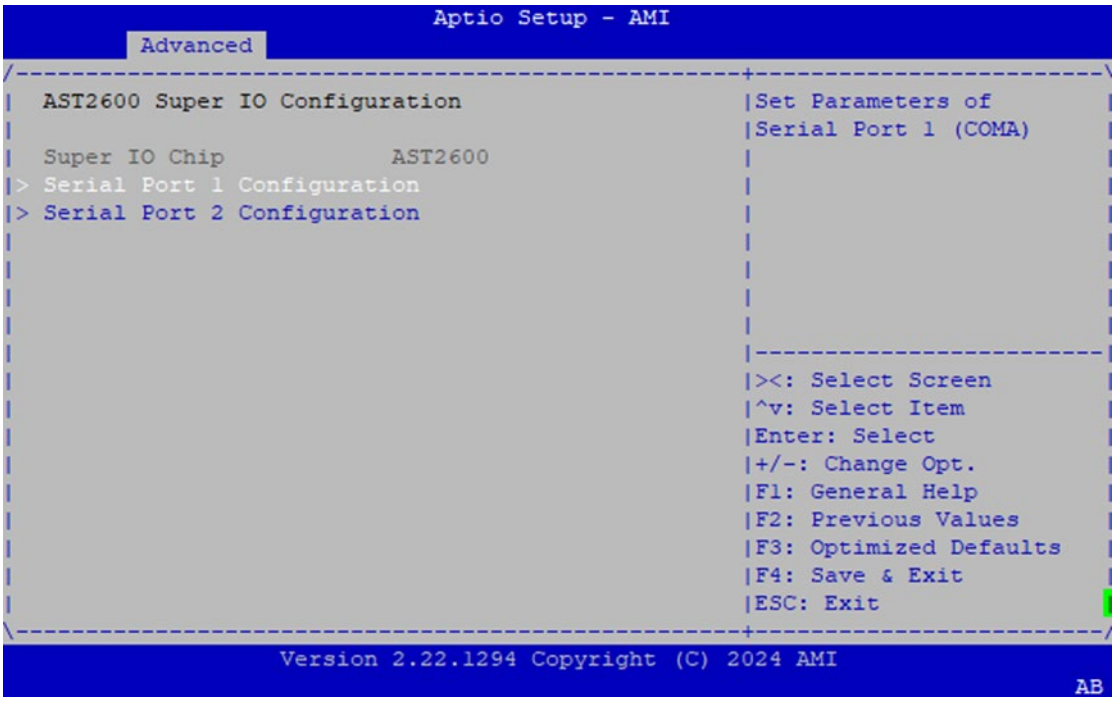




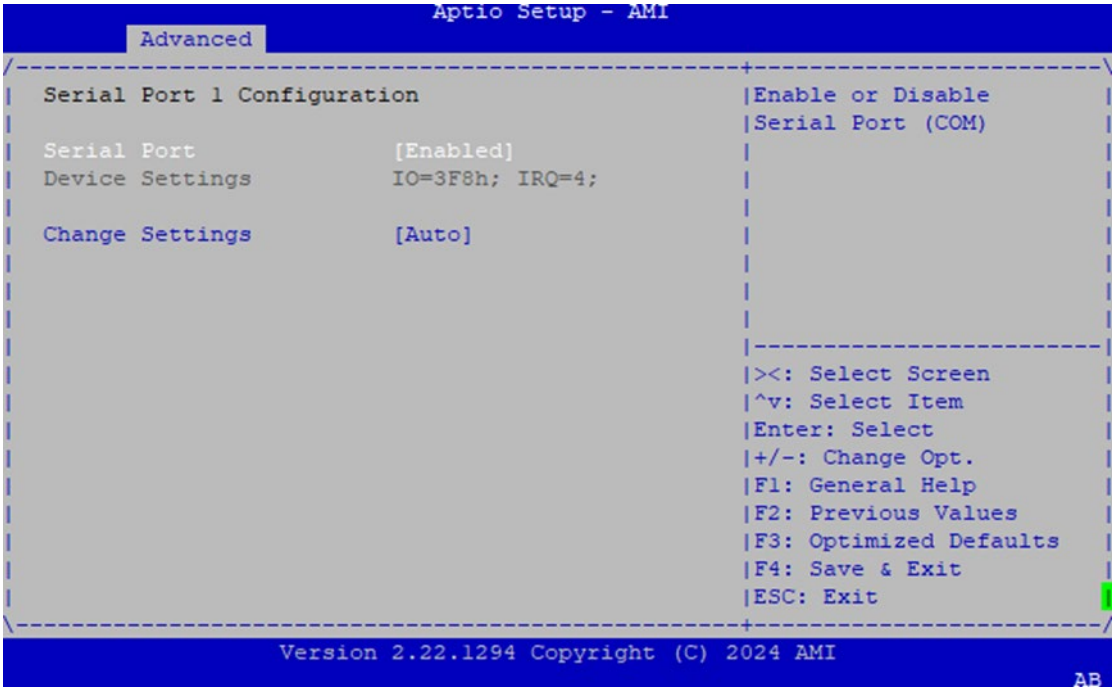
Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA256 PCR Bank	Enabled Disabled	Enable or Disable SHA256 PCR Bank
Pending operation	None TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
Platform Hierarchy	Enabled Disabled	Enable or Disable Platform Hierarchy

Storage Hierarchy	Enabled Disabled	Enable or Disable Storage Hierarchy
Endorsement Hierarchy	Enabled Disabled	Enable or Disable Endorsement Hierarchy
Physical Presence Spec Version	1.2 1.3	Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. NOTE: Some HCK tests might not support 1.3.
TPM 2.0 InterfaceType	TIS	Select the Communication Interface to TPM 20 Device.
Device Select	TPM 1.2 TPM 2.0 Auto	TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated

Super IO Configuration

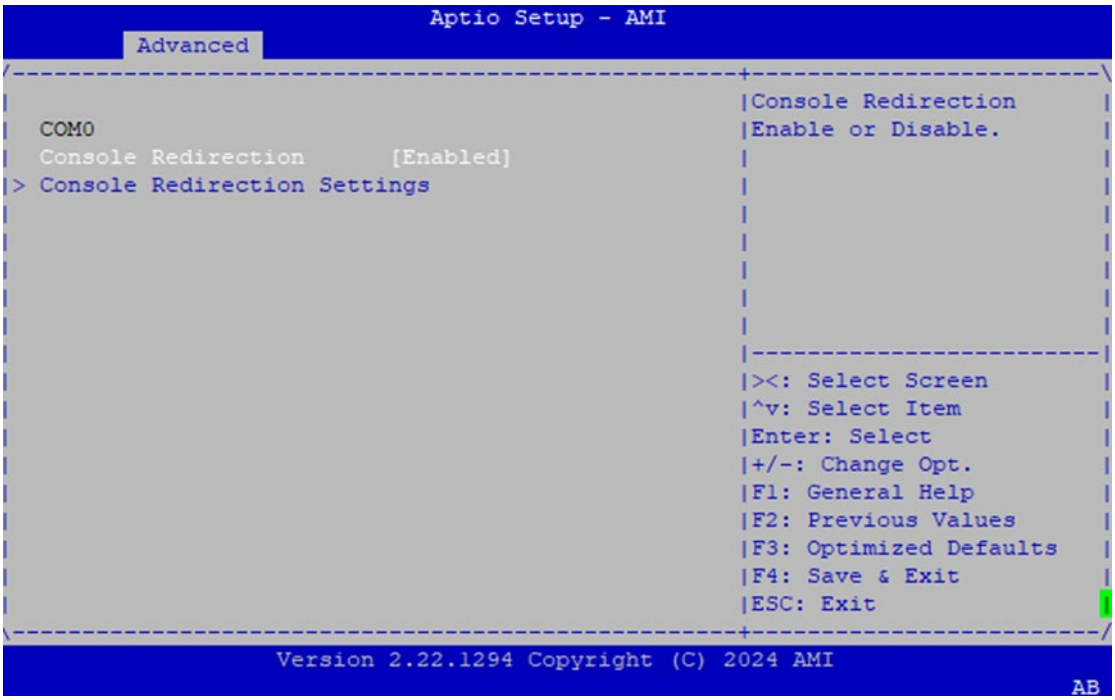


Serial Port 1 Configuration



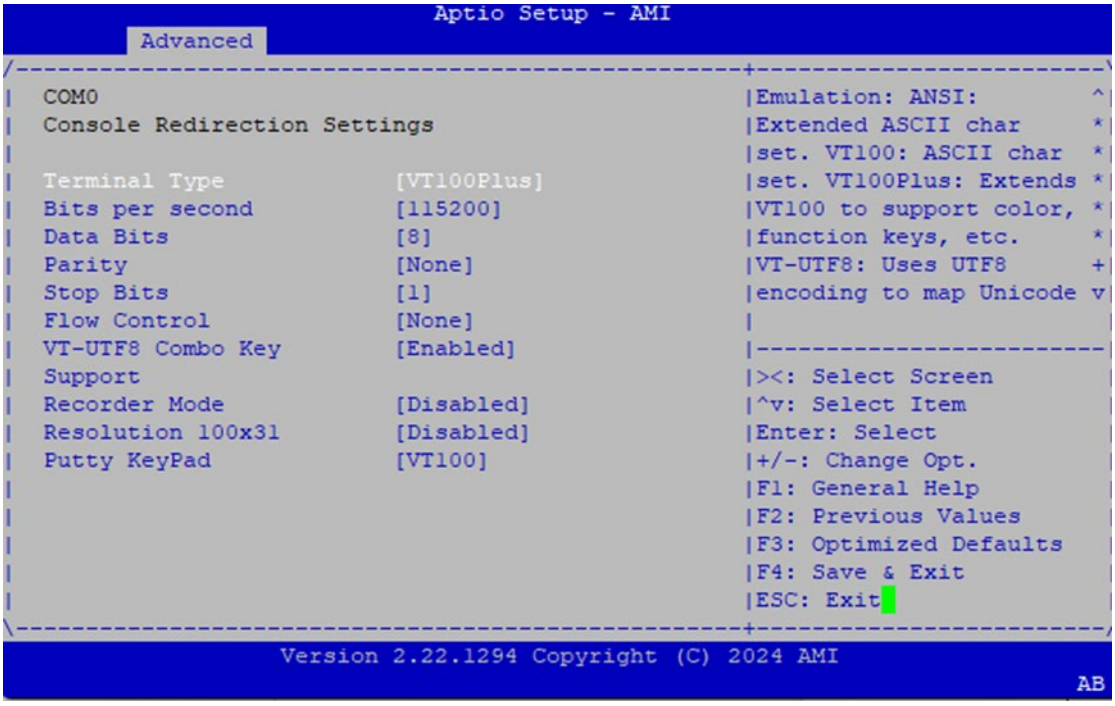
Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port (COM)
Device Settings	IO=3F8h; IRQ = 4	N/A
Change Settings	Auto IO=3F8h; IRQ=4; IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	Select an optimal setting for Super IO Device

Serial Port Console Redirection



Feature	Options	Description
Console Redirection	Enabled Disabled	Console Redirection Enable or Disable.

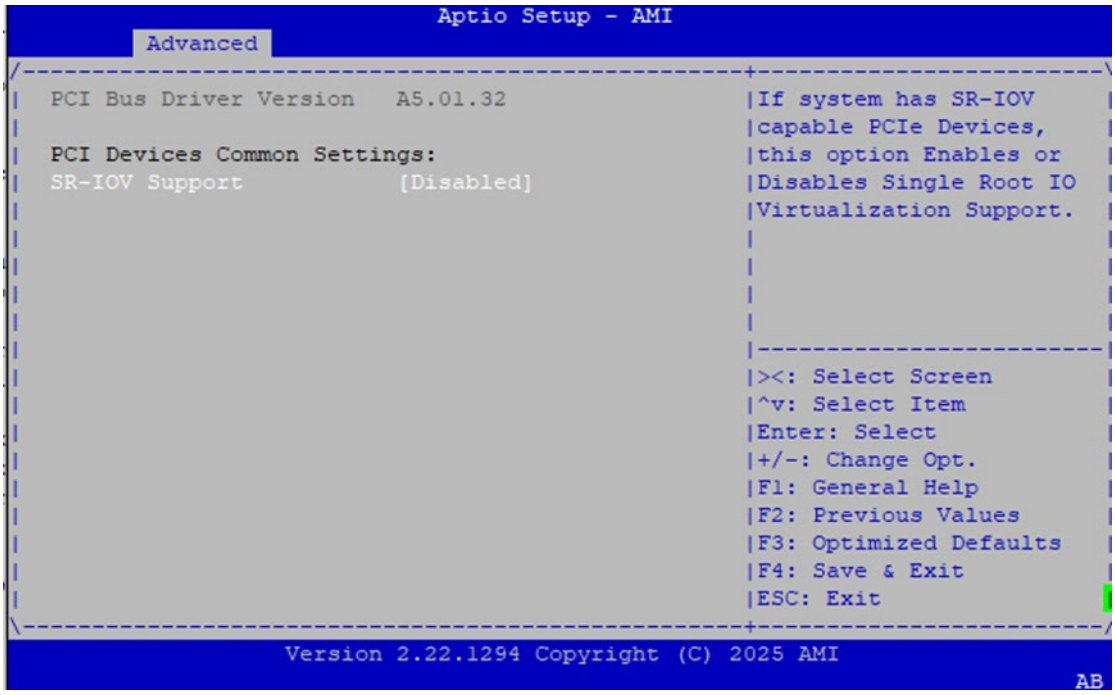
Console Redirection Settings



Feature	Options	Description
Terminal Type	VT100 VT100Plus VT-UTF8 ANSI	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second	9600 19200 38400 57600 115200	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits	7 8	Data Bits
Parity	None Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.
Stop Bits	1 2	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

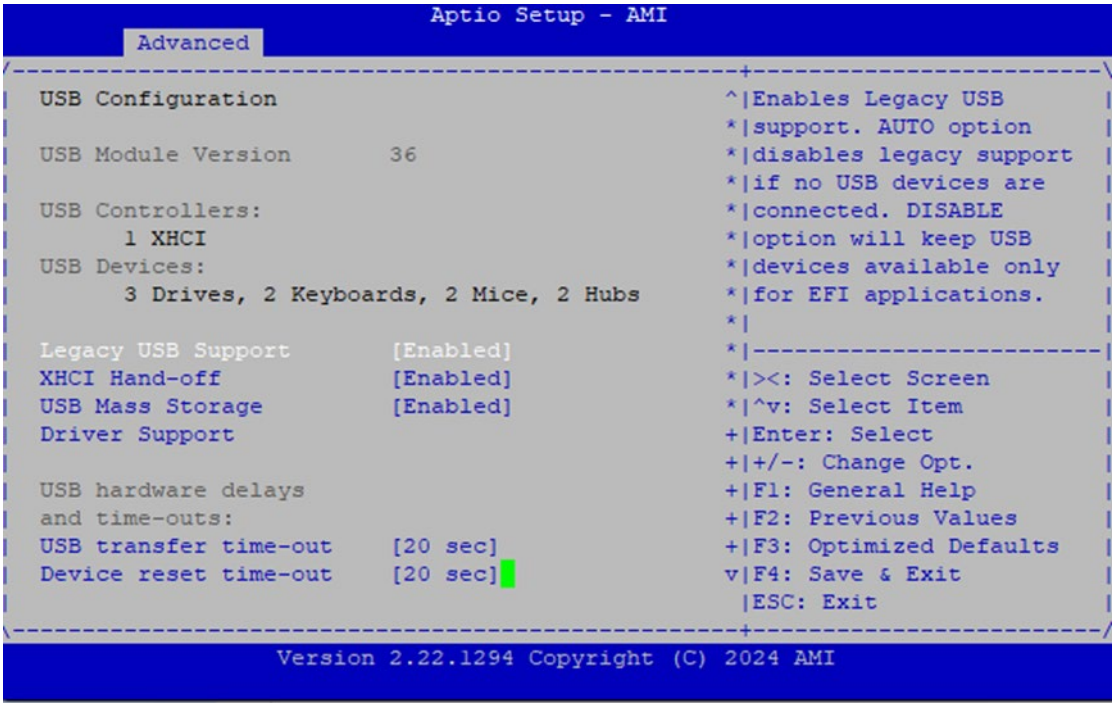
Flow Control	None Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
VT-UTF8 Combo Key Support	Disabled Enabled	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	Disabled Enabled	With this mode enabled only text will be sent. This is to capture Terminal data.
Resolution 100x31	Disabled Enabled	Enables or disables extended terminal resolution
Putty Keypad	VT100 LINUX XTERM86 SCO ESCN VT400	Selects Function Key and Keypad on Putty.

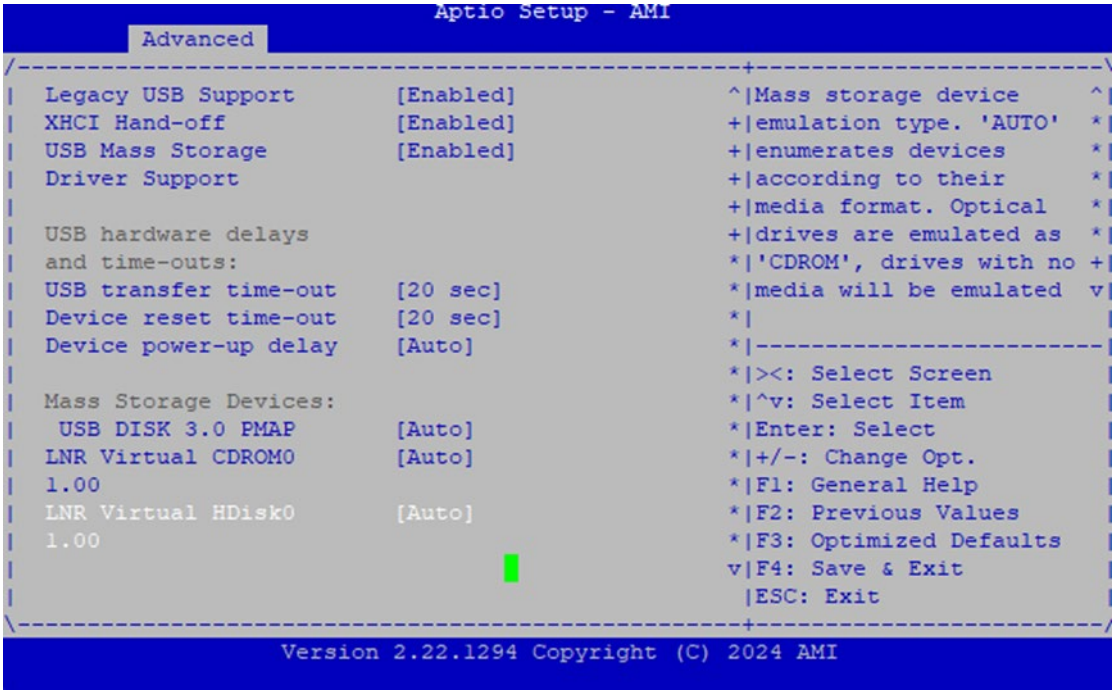
PCI Subsystem Settings



Feature	Options	Description
SR-IOV Support	Disabled Enabled	If system has SR-IOV capable PCIe Devices, this option Enables or Disables Single Root IO Virtualization Support.

USB Configuration

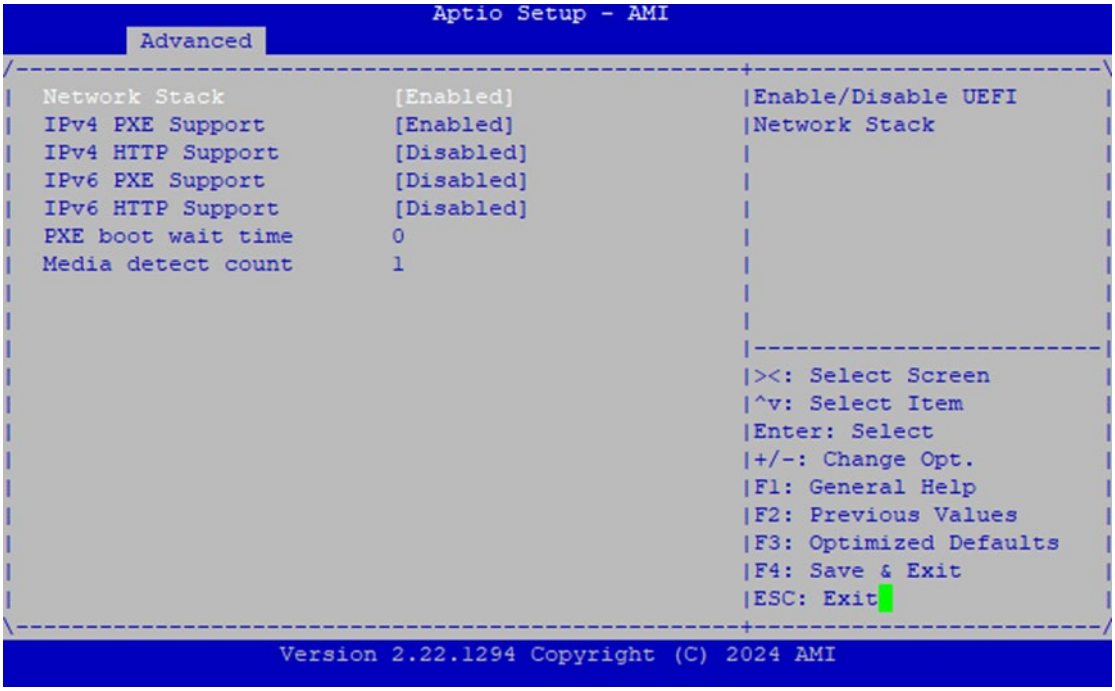




Feature	Options	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enabled Disabled	Enables or disables USB Mass Storage Driver Support.

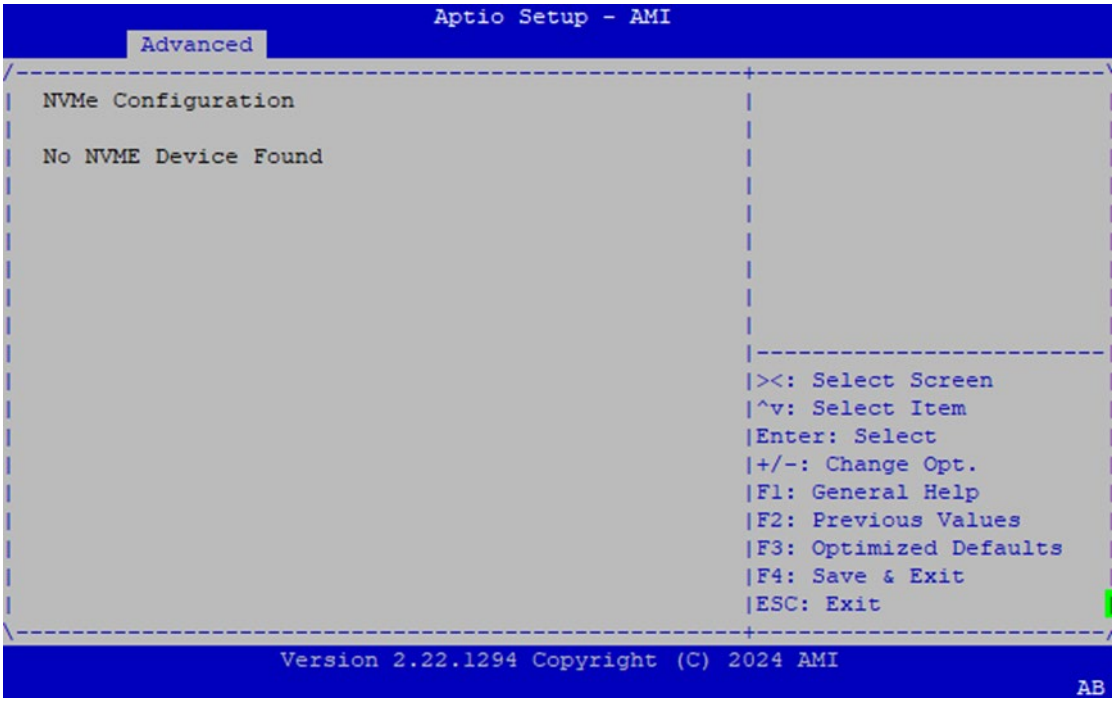
USB transfer time-out	1 sec 5 sec 10 sec 20 sec	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	1 sec 5 sec 10 sec 20 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto Manual	Maximum time the device will take before it properly reports 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 Hub descriptor.

Network Stack Configuration

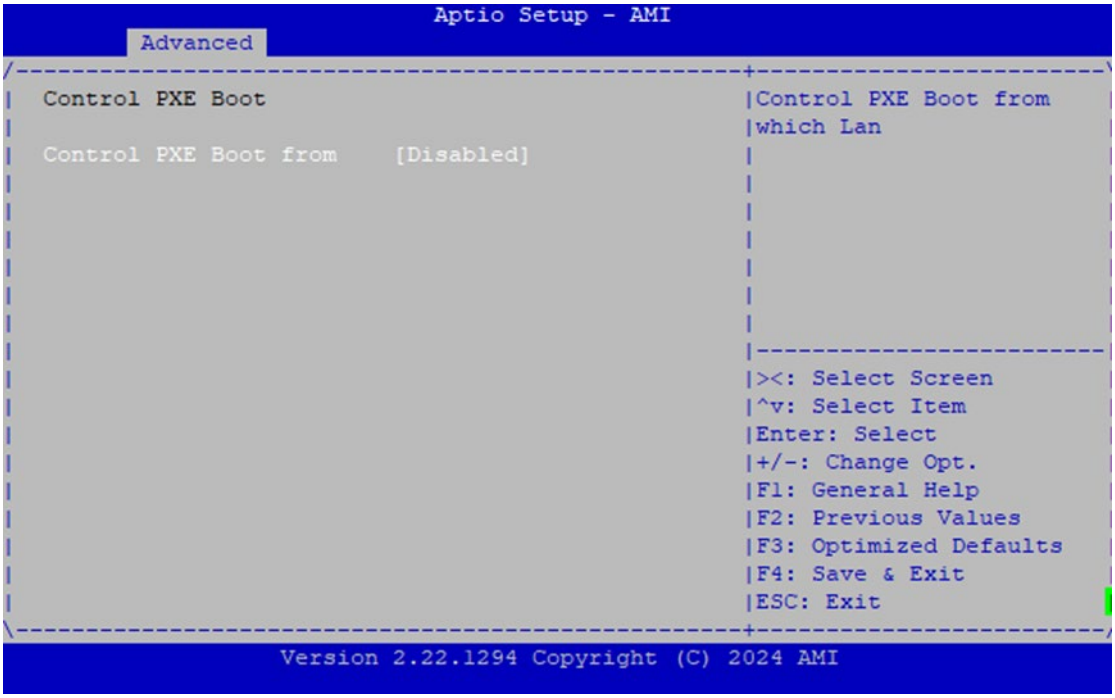


Feature	Options	Description
Network Stack	Disabled Enabled	Enables or disables UEFI Network Stack
IPv4 PXE Support	Disabled Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
IPv4 HTTP Support	Disabled Enabled	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.
IPv6 PXE Support	Disabled Enabled	Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
IPv6 HTTP Support	Disabled Enabled	Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.
PXE boot wait time	0	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.
Media detect count	1	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

NVMe Configuration

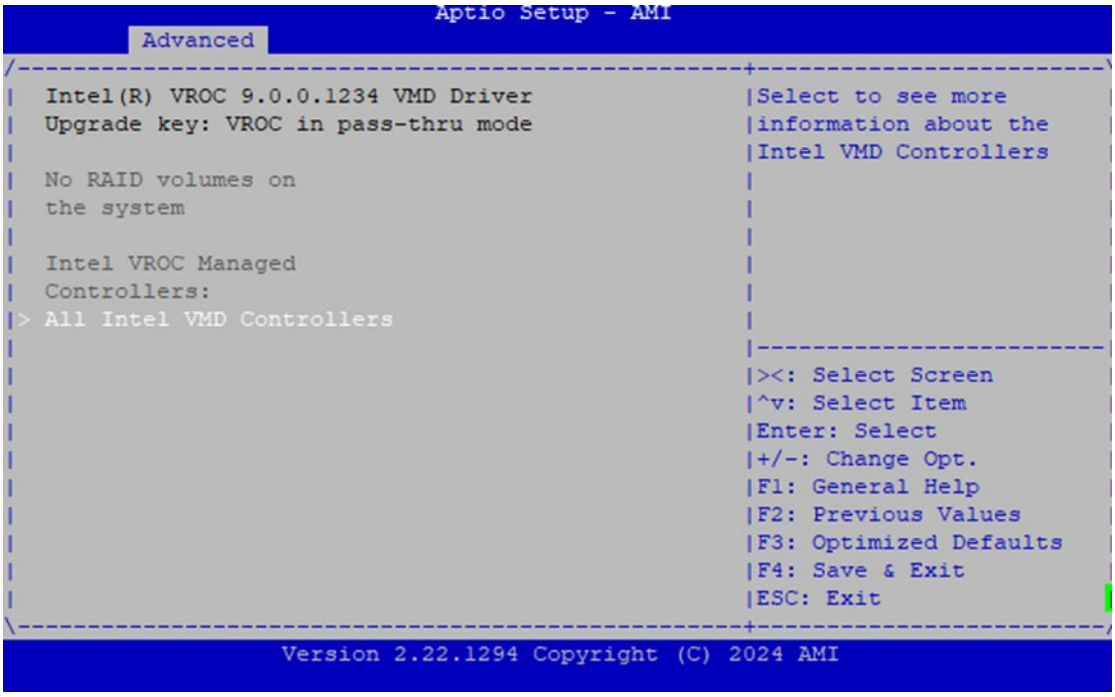


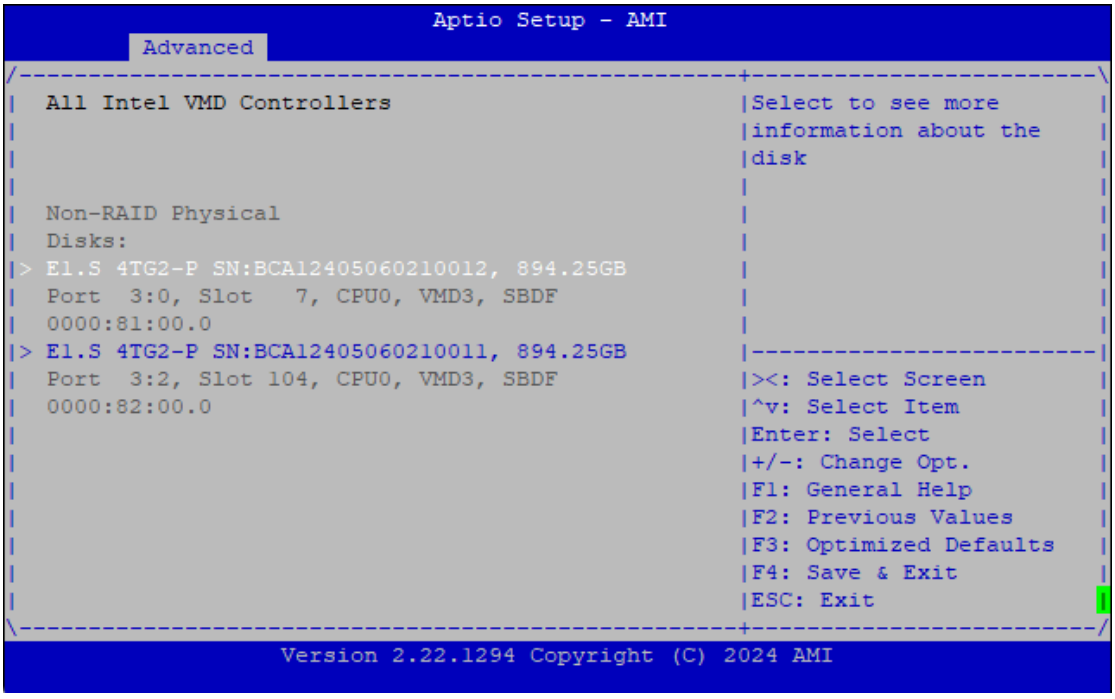
Control PXE Boot



Feature	Options	Description
Control PXE Boot from	Disable Enable	Control PXE Boot from which Lan. Note: LAN port is set with Intel I210, the setup menu item is Enable or Disable PXE Boot function via Intel I210 LAN port.

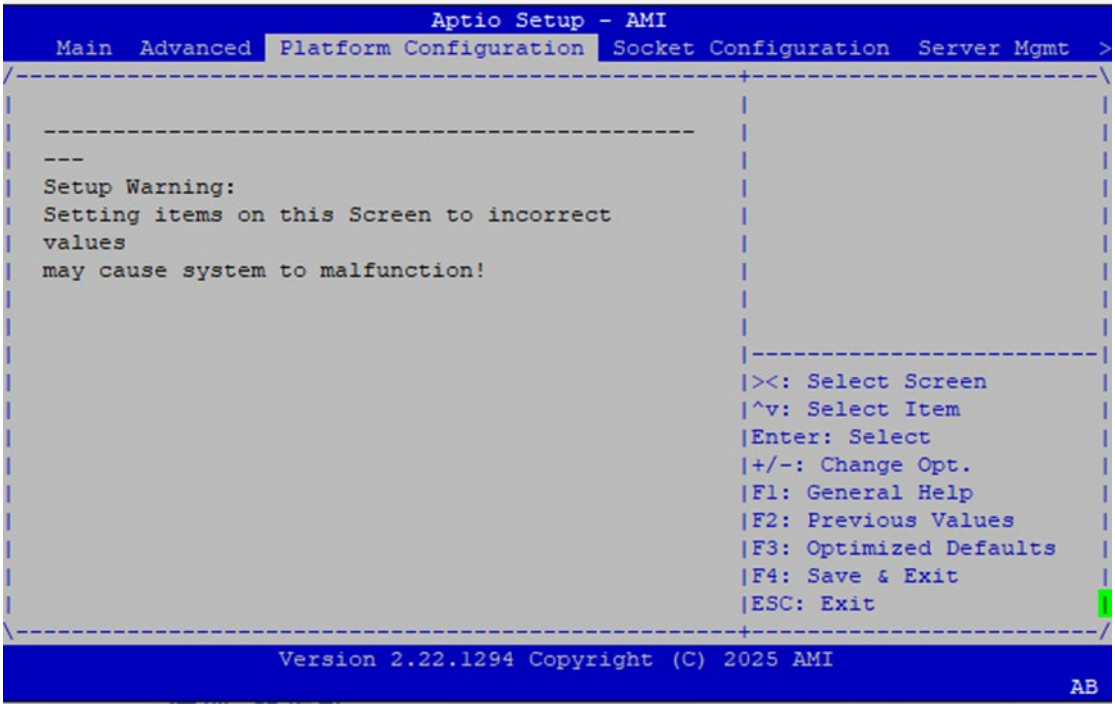
Intel VROC


Aptio Setup – AMI
Advanced
Intel(R) VROC 9.0.0.1234 VMD Driver
Upgrade key: VROC in pass-thru mode
No RAID volumes on
the system
Intel VROC Managed
Controllers:
> All Intel VMD Controllers
Select to see more
information about the
Intel VMD Controllers
><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1294 Copyright (C) 2024 AMI


Aptio Setup – AMI
Advanced
All Intel VMD Controllers
Non-RAID Physical
Disks:
> E1.S 4TG2-P SN:BCA12405060210012, 894.25GB
Port 3:0, Slot 7, CPU0, VMD3, SBDF
0000:81:00.0
> E1.S 4TG2-P SN:BCA12405060210011, 894.25GB
Port 3:2, Slot 104, CPU0, VMD3, SBDF
0000:82:00.0
Select to see more
information about the
disk
><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1294 Copyright (C) 2024 AMI

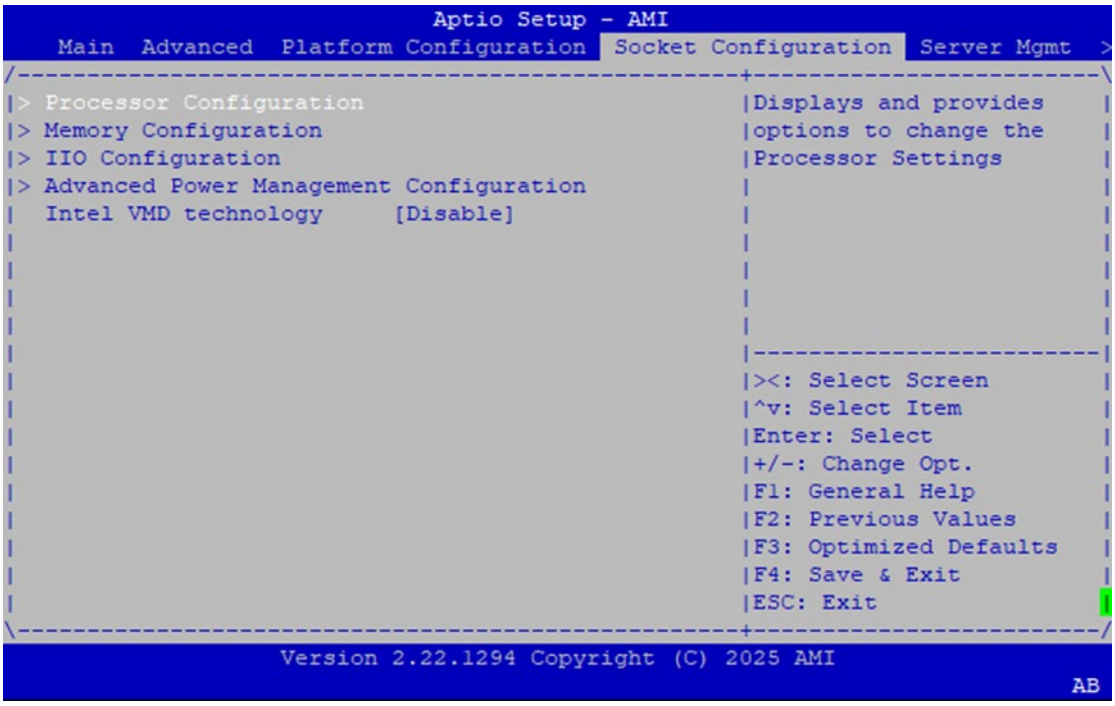
Platform Configuration

Select the Platform menu item from the BIOS setup screen to enter the Platform Setup screen. Users can select any of the items in the left frame of the screen.



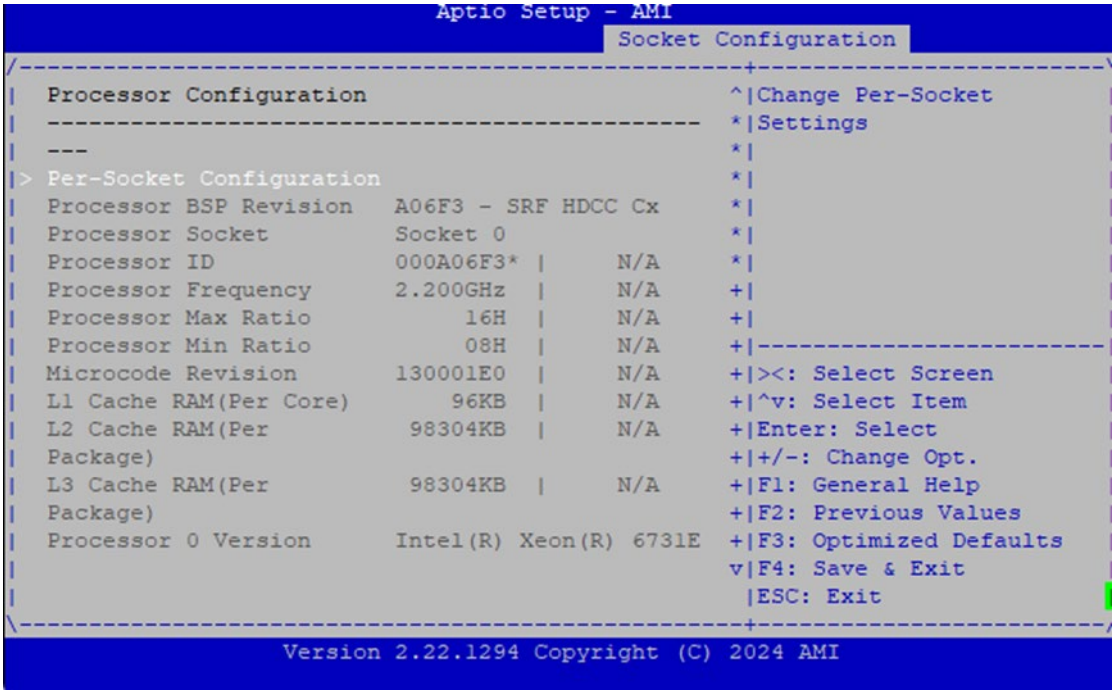
Socket Configuration

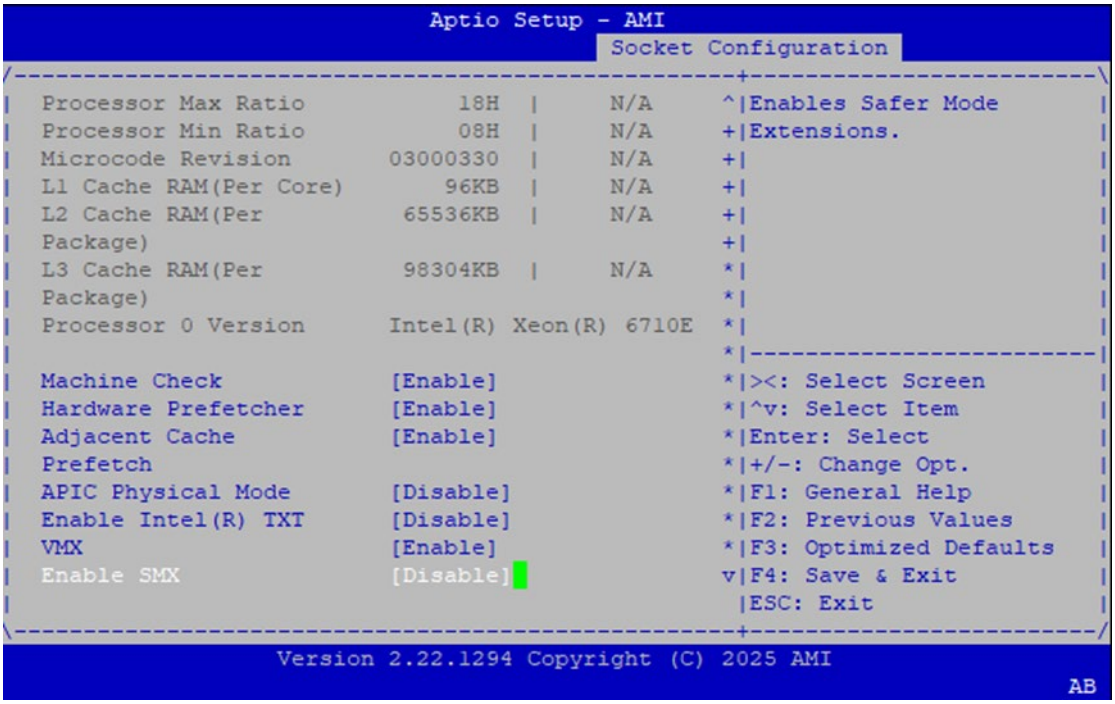
Select the Socket menu item from the BIOS setup screen to enter the Socket Setup screen. Users can select any of the items in the left frame of the screen.



Feature	Options	Description
Processor Configuration	None	Displays and provides option to change the Processor Settings
Memory Configuration	None	Displays and provides option to change the Memory Settings
IIO Configuration	None	Displays and provides option to change the IIO Settings
Advanced Power Management Configuration	None	Displays and provides option to change the Power Management Settings
Intel VMD technology	Disable Enable	Enable/Disable VMD this IIO Domain.

Processor Configuration

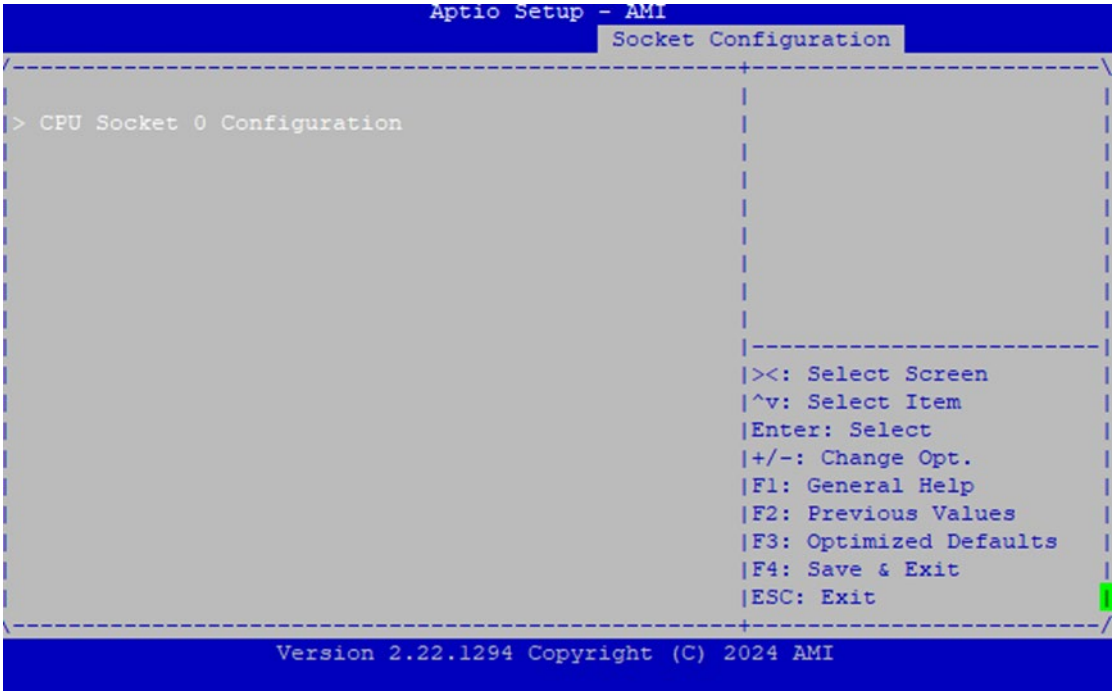




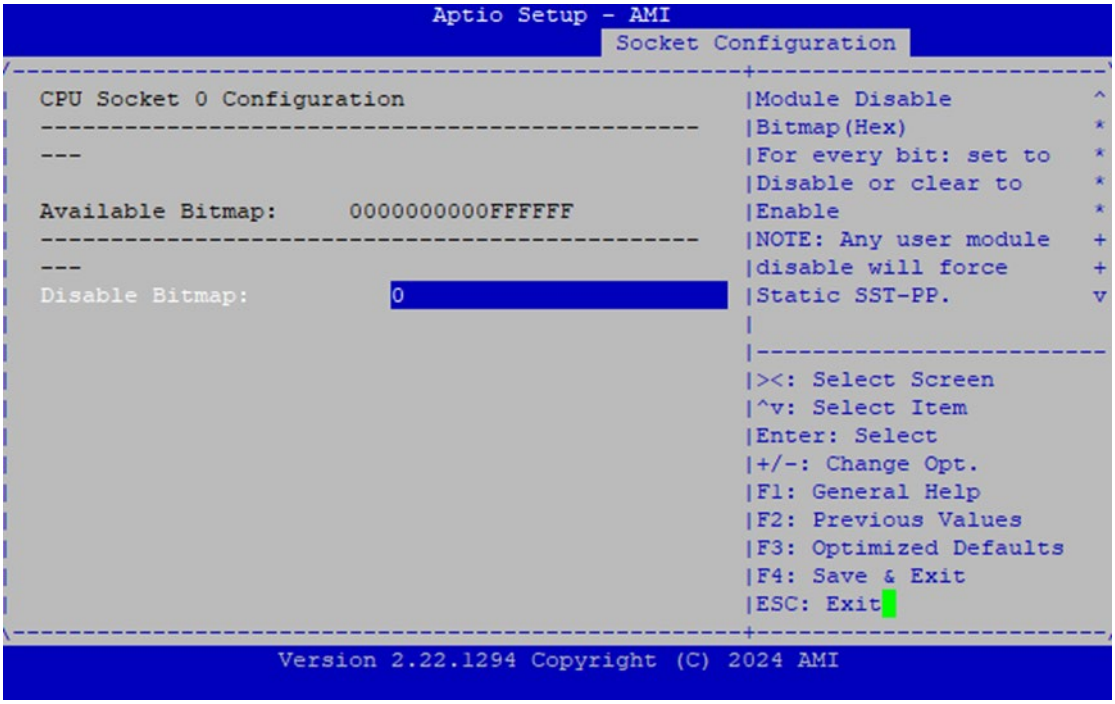
Feature	Options	Description
Machine Check	Disabled Enabled	Enable or Disable the Machine Check
Hardware Prefetcher	Disabled Enabled	MLC Streamer Prefetcher (MSR 1A4h Bit [0])
Adjacent Cache Prefetcher	Disabled Enabled	MLC Spatial Prefetcher (MSR 1A4h Bit [1])
APIC Physical Mode	Disabled Enabled	Enable/Disable the APIC physical destination mode

Enable Intel® TXT	Disabled Enabled	Enables Intel(R) TXT
VMX	Disabled Enabled	Enables the Vanderpool Technology, which takes effect after reboot.
Enable SMX	Disabled Enabled	Enables Safer Mode Extensions

Per-Socket Configuration

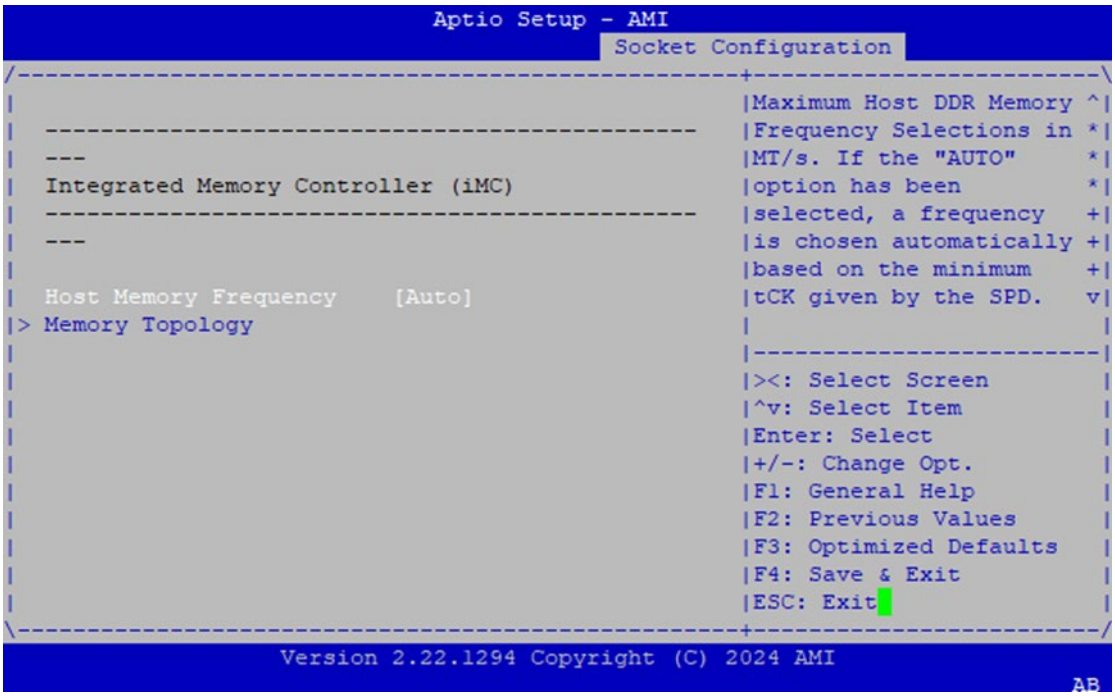


CPU Socket0 Configuration



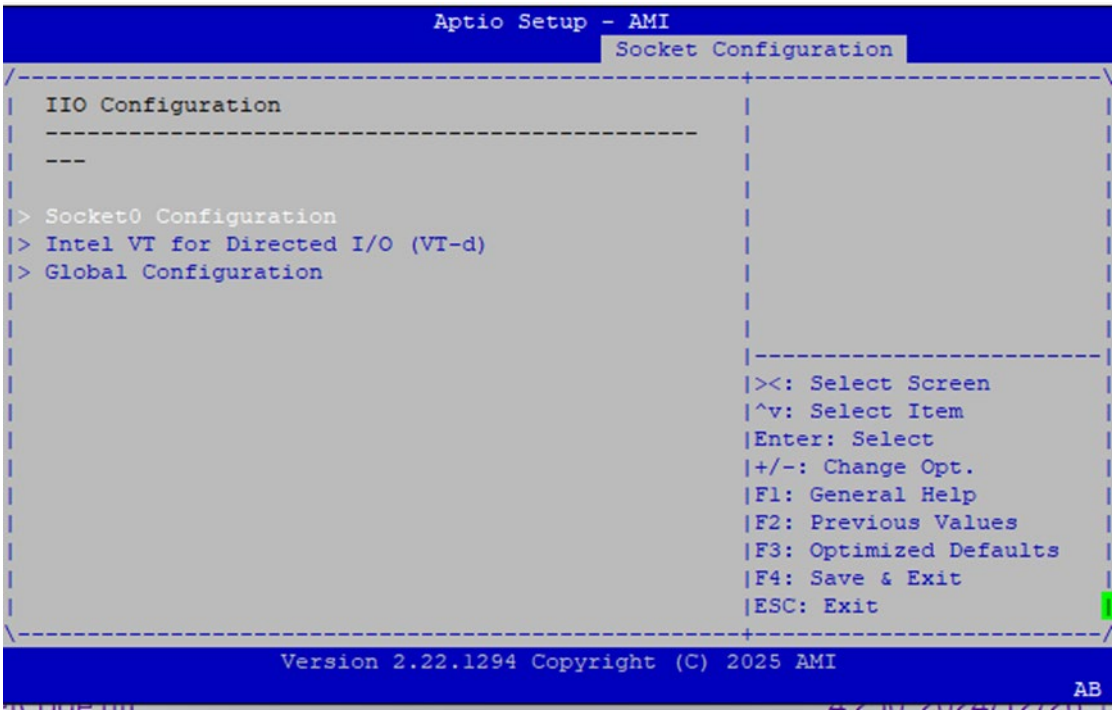
Feature	Options	Description
Disable Bitmap (Hex)	0	0: Enable all cores. FFFFFFFFFF: Disable all cores least one core per CPU must be enabled. Disabling all cores is an invalid configuration.

Memory Configuration



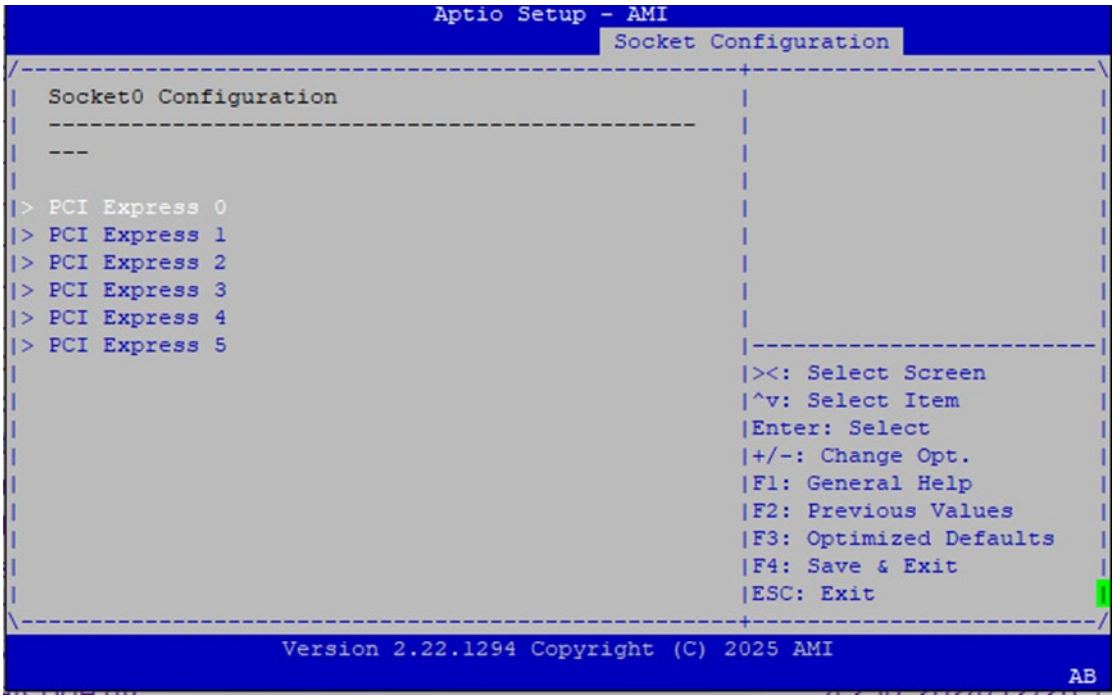
Feature	Options	Description
Host Memory Frequency	Auto 4800 5200 5600 6000 6400	Maximum Memory Frequency Selections in MT/s. If the "AUTO" option has been selected, a frequency is chosen automatically based on the minimum tCK given by the SPD. If Enforce POR is disabled, user will be able to run at higher frequencies than the memory support (limited by processor support)
Memory Topology	None	Displays memory topology with Dimm population information

IIO Configuration



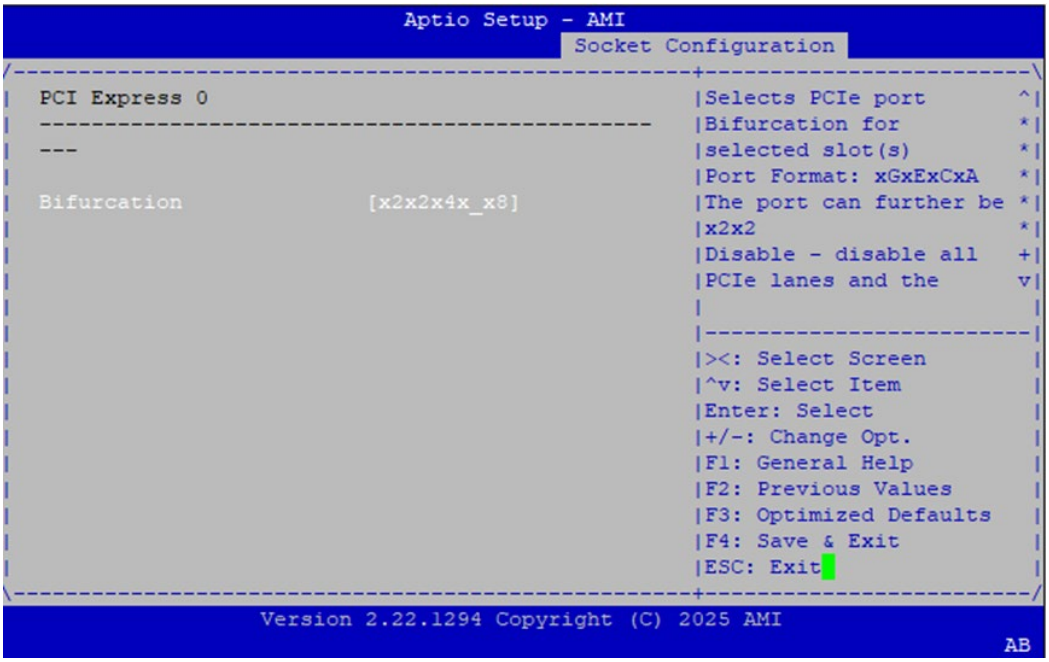
Feature	Options	Description
Socket0 Configuration	None	PCI Express Root Port setting page
Intel VT for Directed I/O (VT-d)	None	Intel VT-d technology setting page. Note: If no understand setting affection, please do not change setting in page
Global Configuration	None	For all PCI Express Root Port setting page

Socket0 Configuration



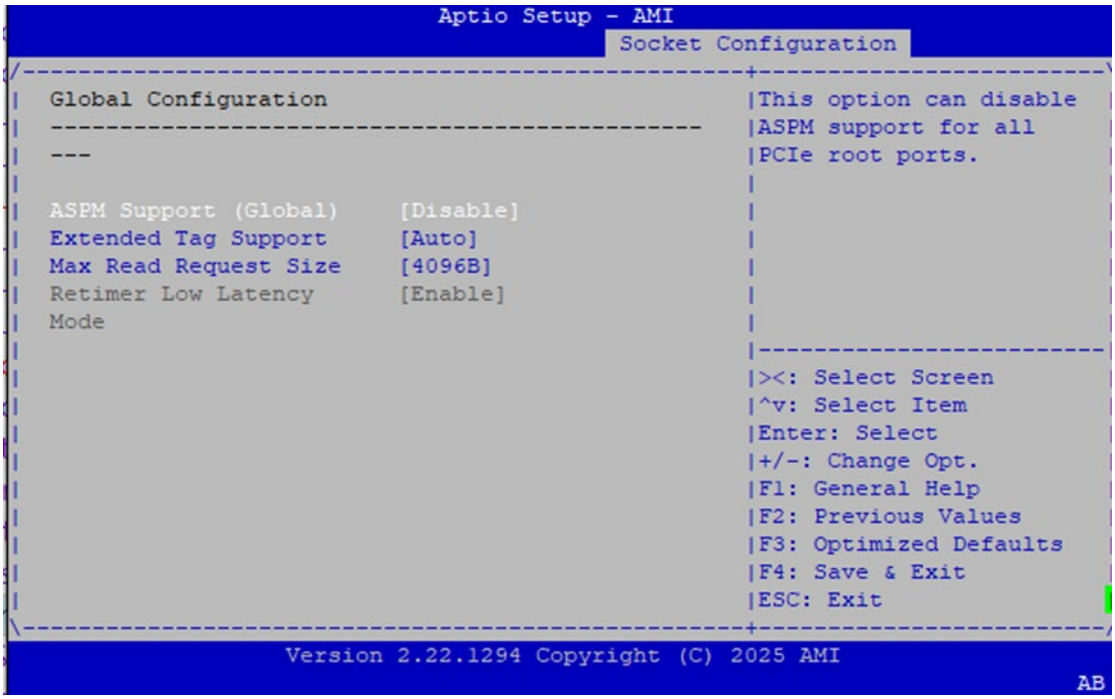
Feature	Options	Description
PCI Express 0~8	None	PCI Express 0~8 can adjust root port setting, such as bifurcation, VMD…etc. Note: Base on HW design, PCI Express 1 will affect BMC and External USB Port

PCI Express 0



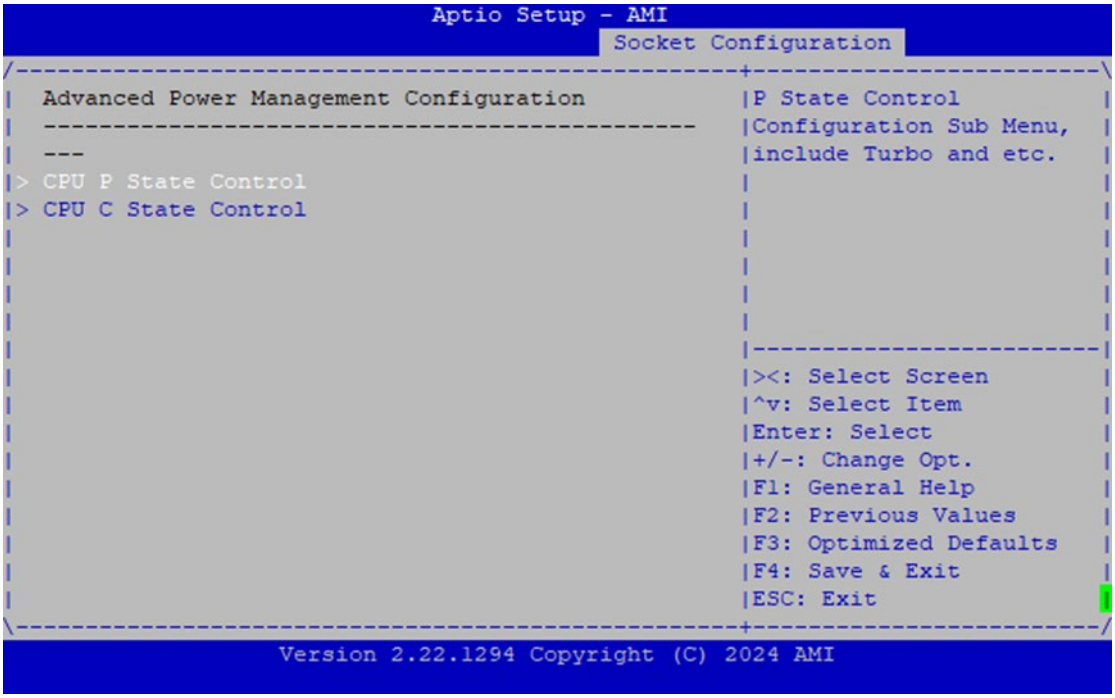
Feature	Options	Description
Bifurcation	Auto x4x4x4x4 x4x4x_x8 x_x8x4x4 x_x8x_x8 x_x_x_x16 x2x2x4x_x8 x4x2x2x_x8 x_x8x2x2x4 x2x2x4x4x4 x4x2x2x4x4 x4x4x2x2x4 x2x2x2x2x_x8 x2x2x2x2x4x4 x2x2x4x2x2x4 x4x2x2x2x2x4 x2x2x2x2x2x2x4 x_x8x4x2x2 x4x4x4x2x2 x_x8x2x2x2x2 x2x2x4x4x2x2 x4x2x2x4x2x2 x4x4x2x2x2x2 x2x2x2x2x4x2x2 x2x2x4x2x2x2x2 x4x2x2x2x2x2x2 x2x2x2x2x2x2x2x2	Selects PCIe port Bifurcation for selected slot(s): "Port Format: xGxExCxA" "The port can further be x2x2" "Disable - disable all PCIe lanes and the controller. Note: if no special device or configuration change, please do not adjust this item

Global Configuration

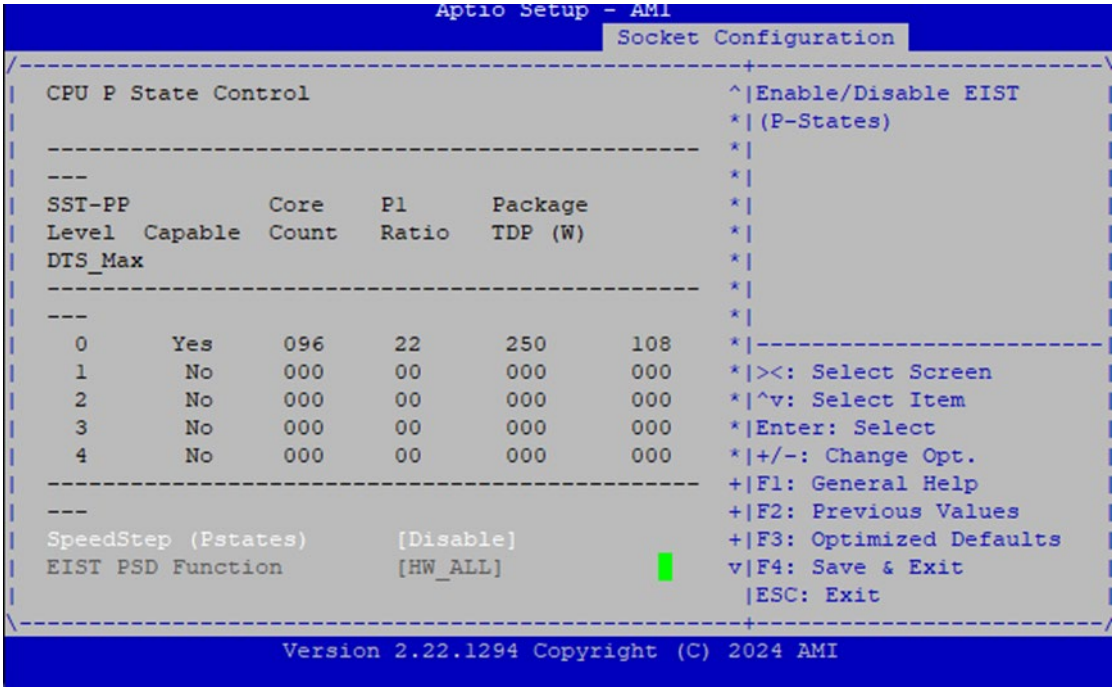


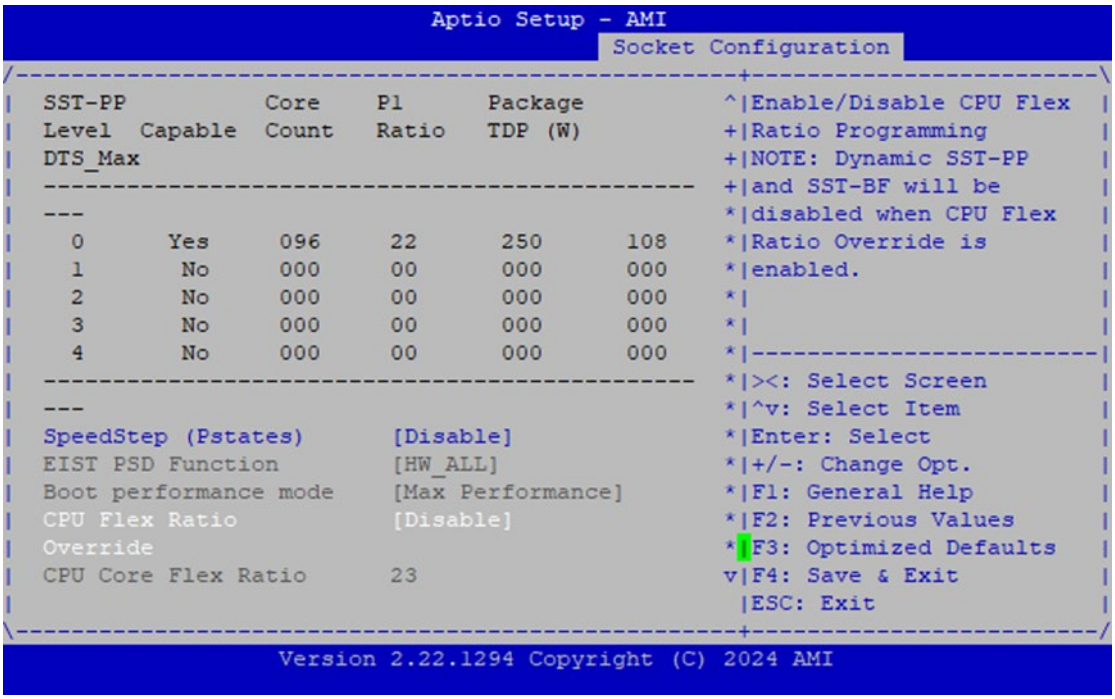
Feature	Options	Description
ASPM Support (Global)	Disable Per-Port	This option can disable ASPM support for all PCIe root ports.
Extended Tag Support	Disable Auto	This option can disable 8-bit Tag support in all PCIe root ports. 'Auto' keeps hardware default.
Max Read Request Size	Auto 128B 256B 512B 1024B 2048B 4096B	Set Max Read Request Size in End Points

Advanced Power Management Configuration



CPU P State Control

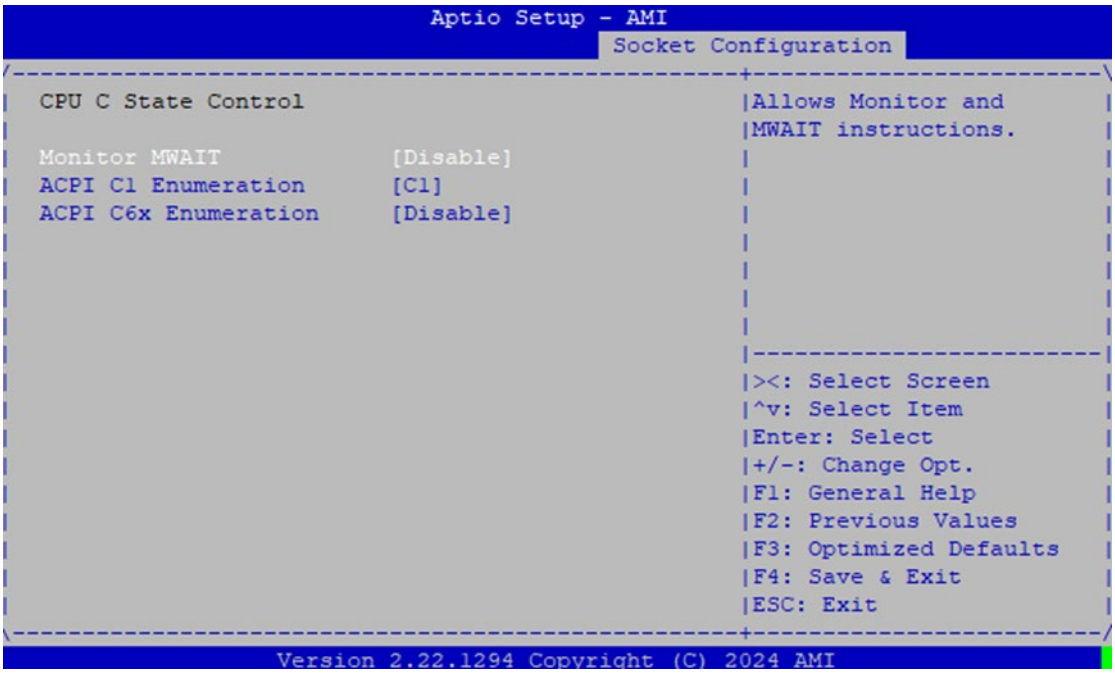




Feature	Options	Description
SpeedStep (Pstates)	Disabled Enabled	Enables or disables EIST (P-States).
EIST PSD Function	HW_ALL SW_ALL	Choose HW_ALL/SW_ALL in _PSD return.
Boot performance mode	Max Performance Max Efficiency	Select the performance state that the BIOS will set before OS hand off.
Turbo Mode	Disable Enable	Enable/Disable processor Turbo Mode.

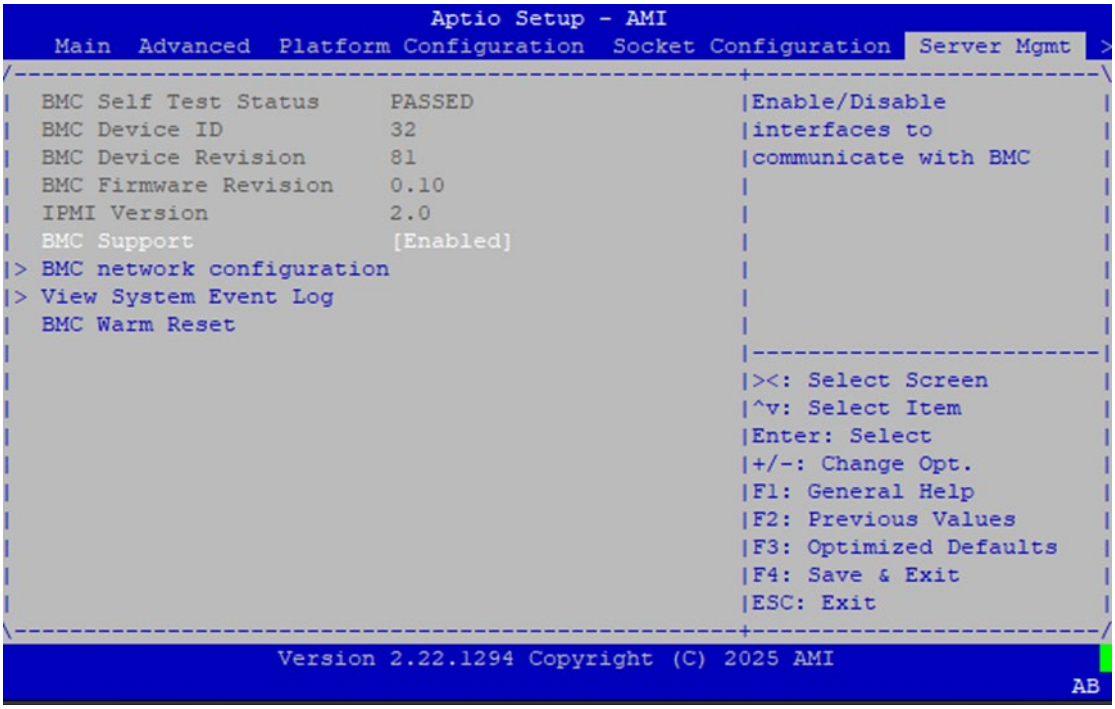
Energy Efficient Turbo	Enable Disable	Enable/Disable Energy Efficient Turbo. Enable: MSR 0x1FC Bit[19] = 0 Disable: MSR 0x1FC Bit[19] = 1.
CPU Flex Ratio Override	Disabled Enabled	Enable/Disable CPU Flex Ratio Programming. NOTE: Dynamic SST-PP and SST-BF will be disabled when CPU Flex Ratio Override is enabled.
CPU Core Flex Ratio	23	Non-Turbo Mode Processor Core Ratio Multiplier.

CPU C State Control



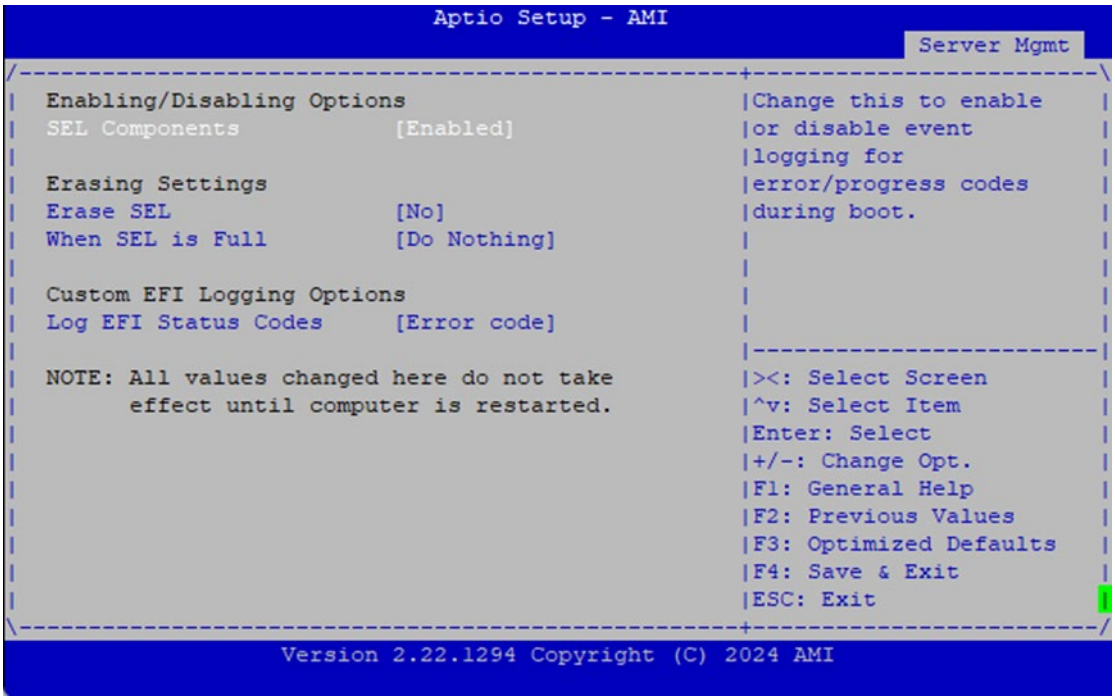
Feature	Options	Description
Monitor MWAIT	Disable Enable	Allows Monitor and MWAIT instructions.
ACPI C1 Enumeration	C1 C1e	Enumerate C1/C1e as ACPI C1.
ACPI C6x Enumeration	Disabled C6S as ACPI C2 C6S as ACPI C3 C6S-P as ACPI C2 C6S-P as ACPI C3 Auto	AUTO: Maps to C6S-P as ACPI C2 Disable: Don't enumerate any C6S state in ACPI C6S as ACPI C2/C3: Enumerate C6S as ACPI C2/C3 state. PkgC6 is not allowed C6S-P as ACPI C2/C3: Enumerate C6S-P as ACPI C2/C3 state. PkgC6 is allowed.

Server Mgmt



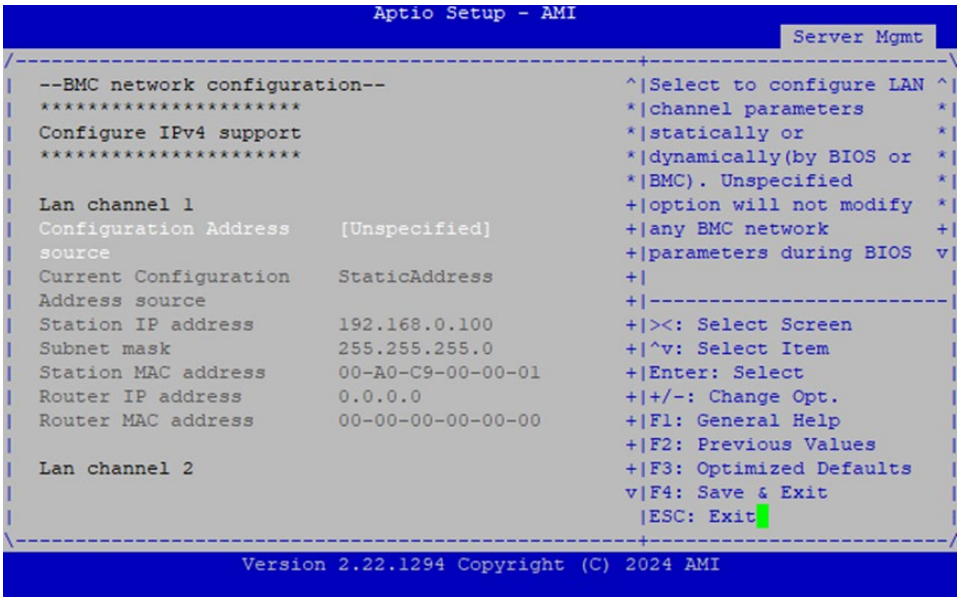
Feature	Options	Description
BMC Support	Enabled Disabled	Enable or disables interfaces to communicate with BMC.
BMC network configuration	NA	Configure BMC network parameters.
View System Event Log	NA	Press **<Enter>** to view the System Event Log Records.
BMC Warm Reset	NA	Press **<Enter>** to do Warm Reset BMC.

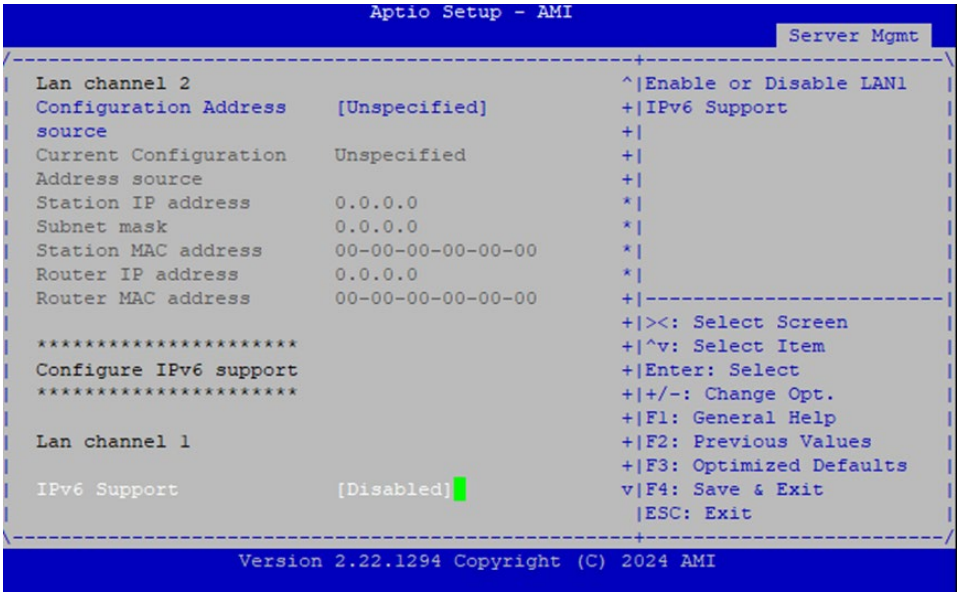
System Event Log

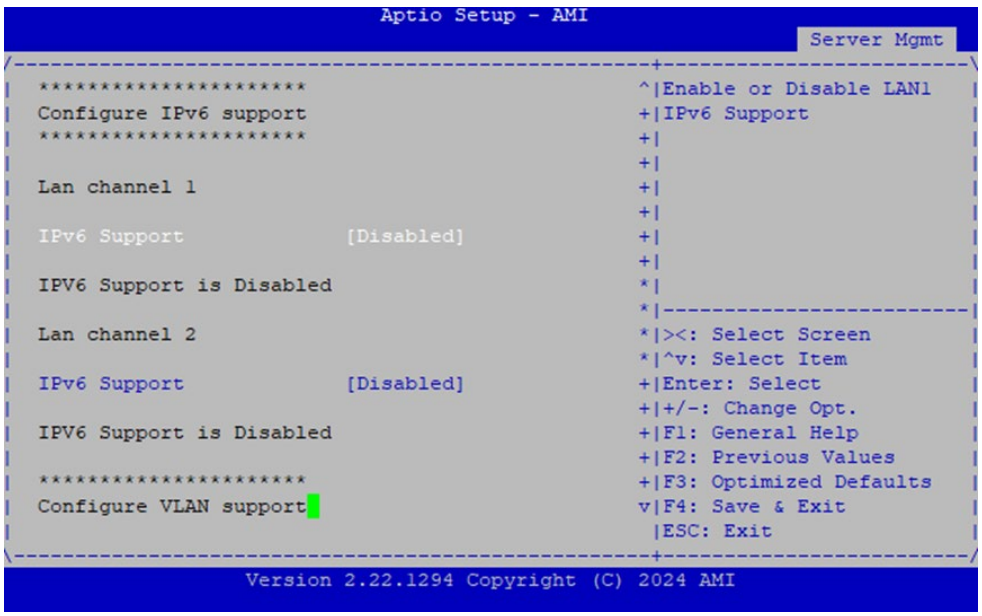


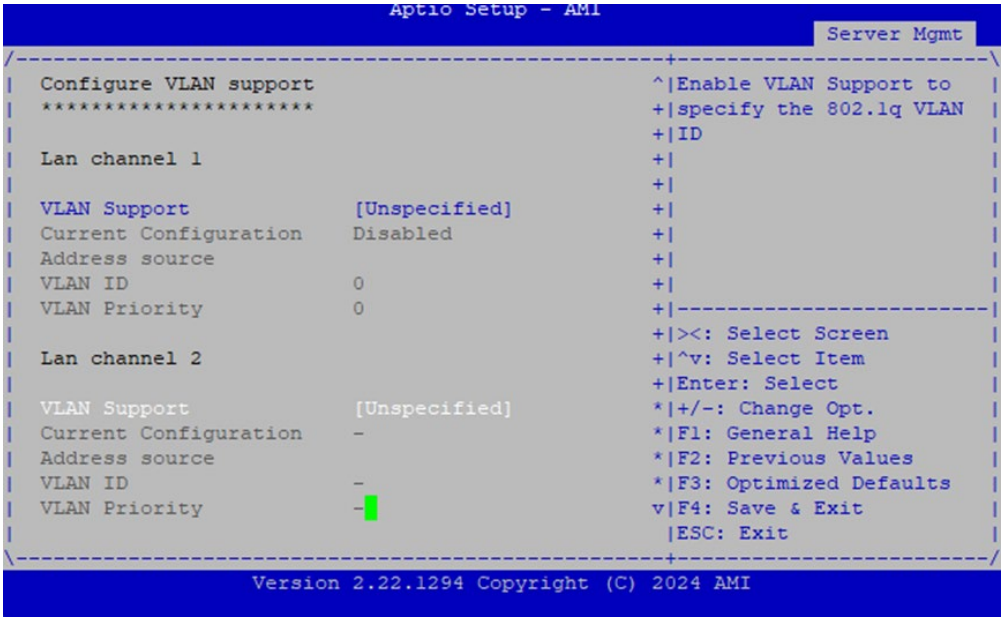
Feature	Options	Description
SEL Components	Disabled Enabled	Change this to enable or disable event logging for error/progress codes during boot.
Erase SEL	NO Yes, On next reset Yes, On every reset	Choose options for erasing SEL.
When SEL is Full	Do Nothing Erase Immediately Delete Oldest Record	Choose options for reactions to a full SEL.
Log EFI Status Codes	Disabled Both Error code Progress code	Disable the logging of EFI Status Codes or log only error code or only progress code or both.

BMC Network Configuration



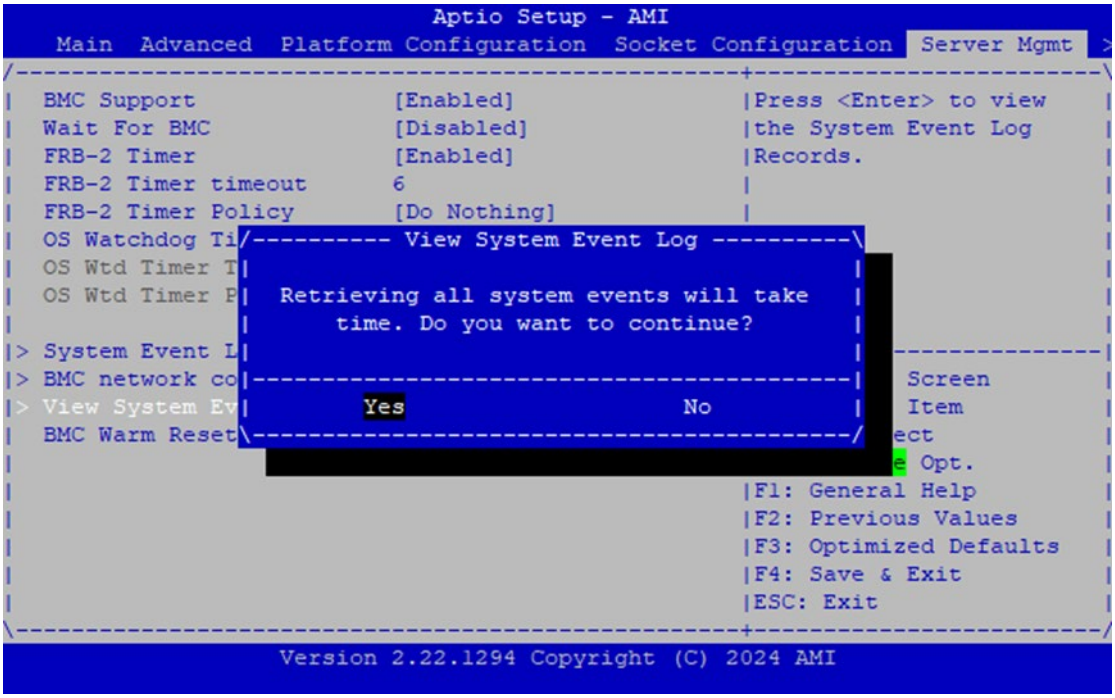






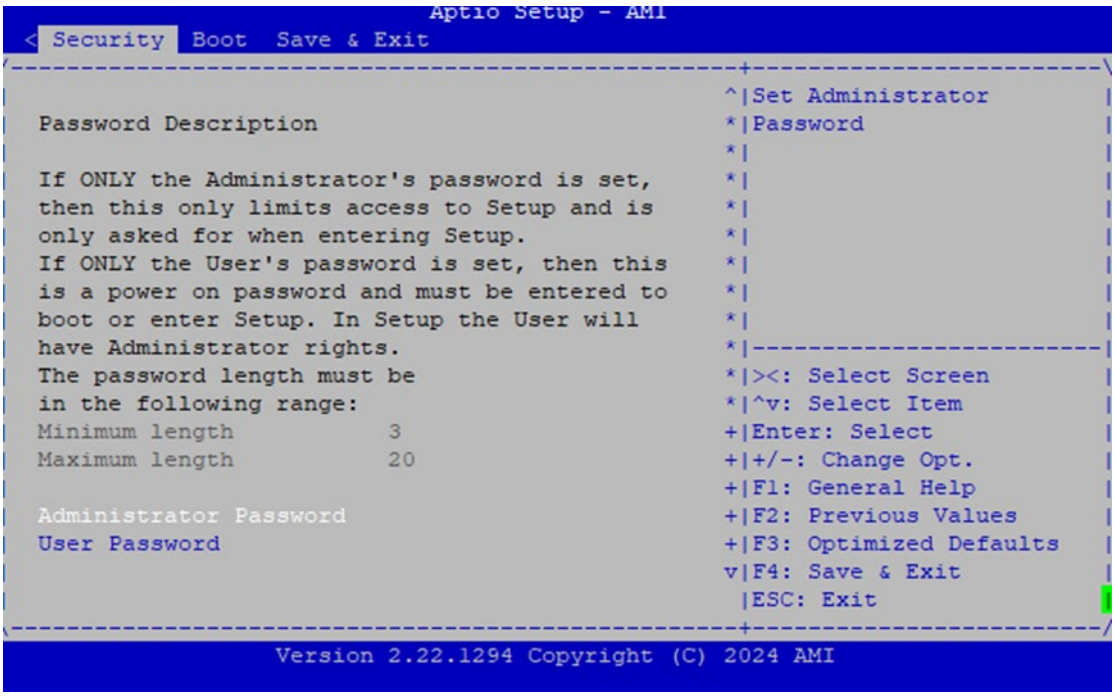
Feature	Options	Description
Configuration Address source	Unspecified Static DynamicBmcDhcp	Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC). The **unspecified** option will not modify any BMC network parameters during BIOS phase.

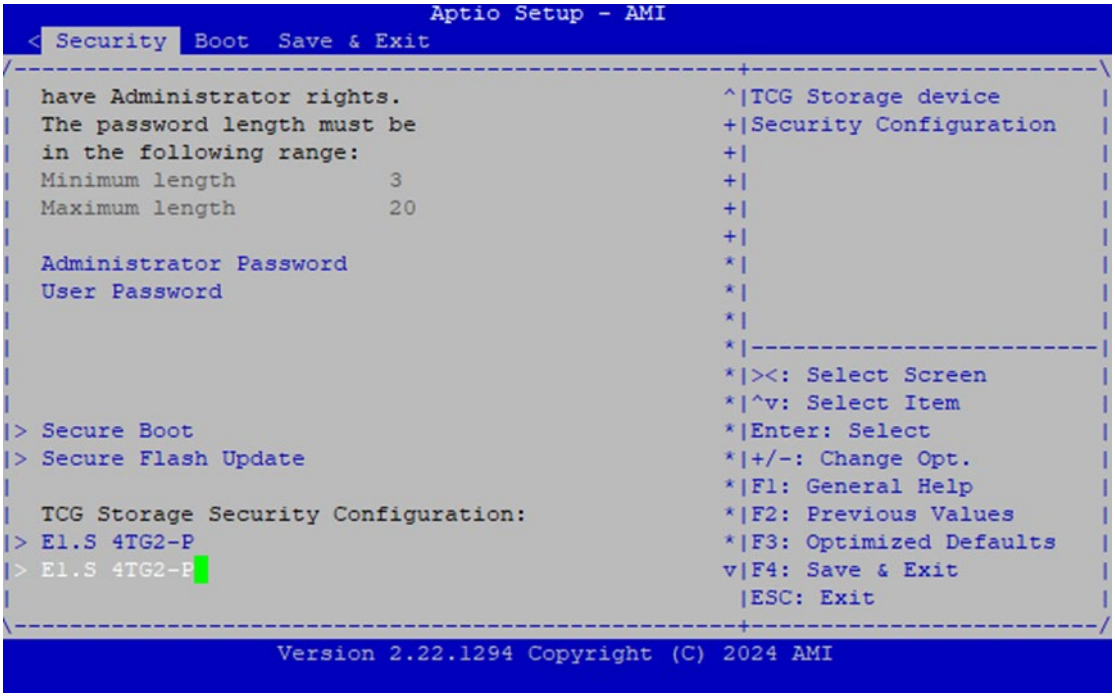
View System Event Log



Security

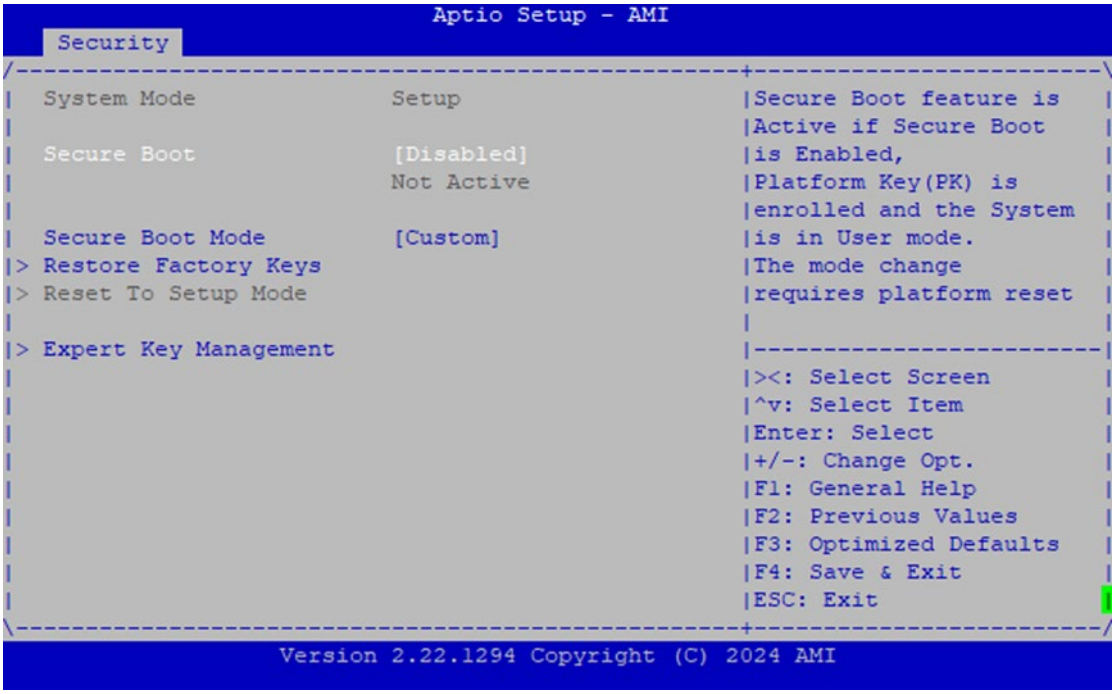
Select the Security menu item from the BIOS setup screen to enter the Security Setup screen. Users can select any of the items in the left frame of the screen.





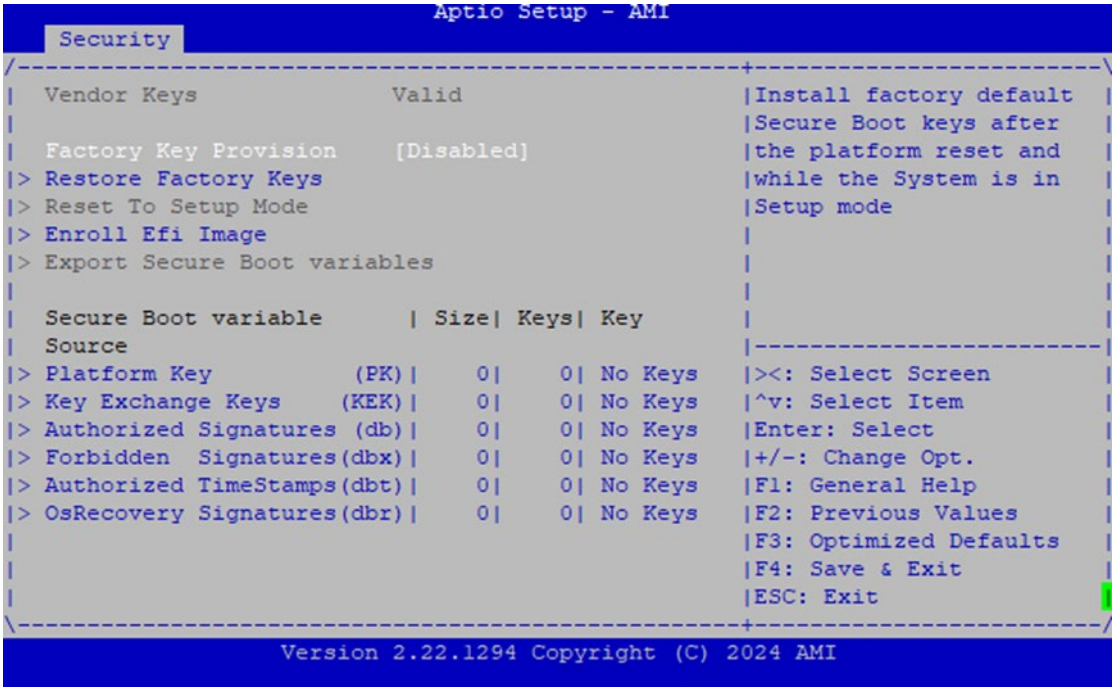
Feature	Description
Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup, the User will have Administrator rights.

Secure Boot



Feature	Options	Description
Secure Boot	Disabled Enabled	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	Standard Custom	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

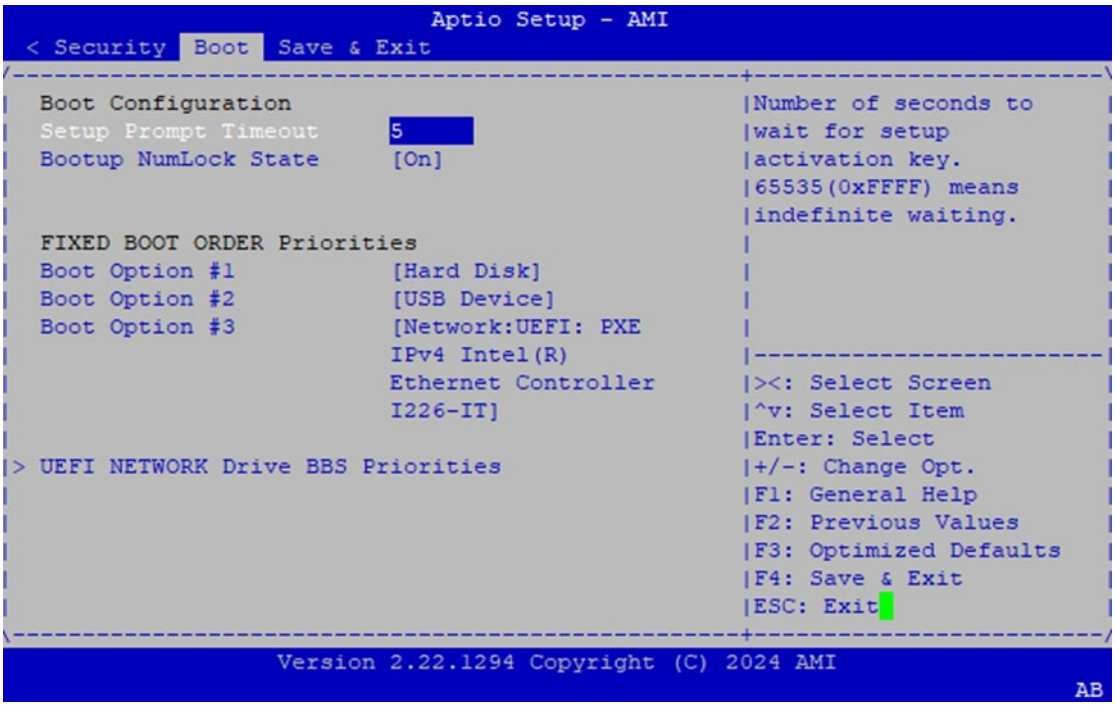
Key Management



Feature	Options	Description
Factory Key Provision	Disabled Enabled	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.
Restore Factory keys	None	Force System to User Mode. Install factory default Secure Boot key databases.
Enroll Efi Image	None	Allow Efi image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db).

Boot Menu

Select the Boot menu item from the BIOS setup screen to enter the Boot Setup screen. Users can select any of the items in the left frame of the screen.

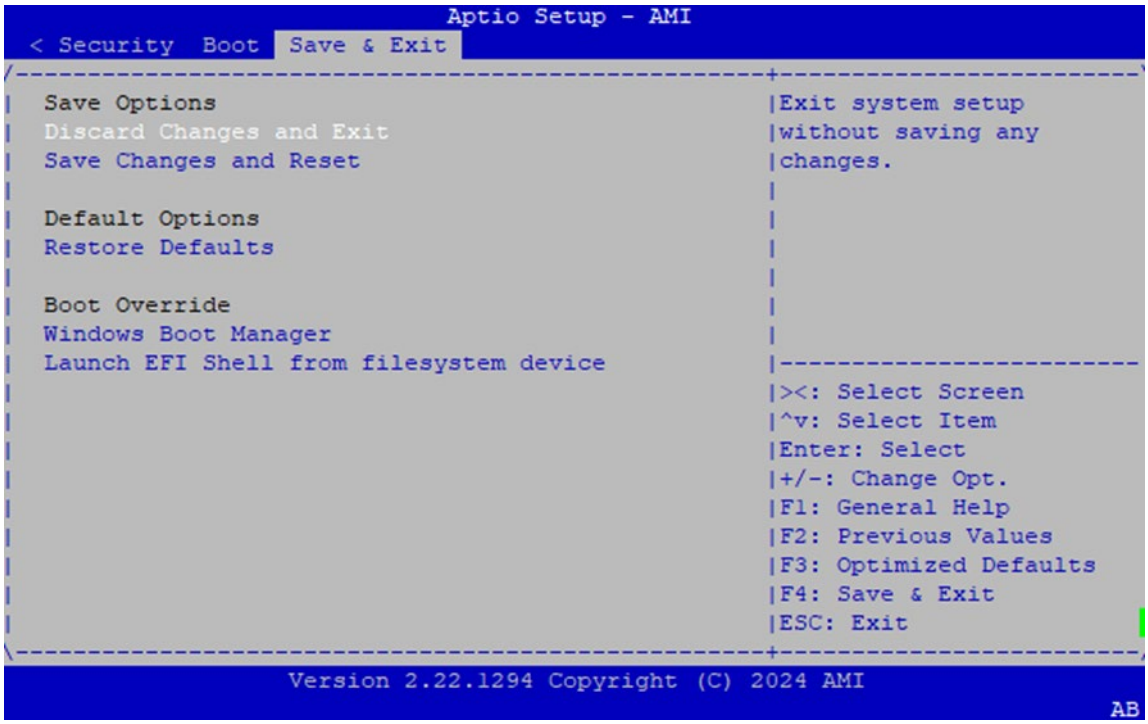


Feature	Options	Description
Setup Prompt Timeout	5	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state

- Choose boot priority from boot option group.
- Choose specific boot device priority sequence from available Group device.

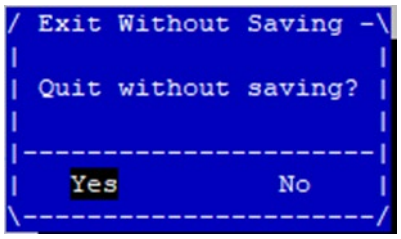
Save and Exit Menu

Select the Save and Exit menu item from the BIOS setup screen to enter the Save and Exit Setup screen. Users can select any of the items in the left frame of the screen.



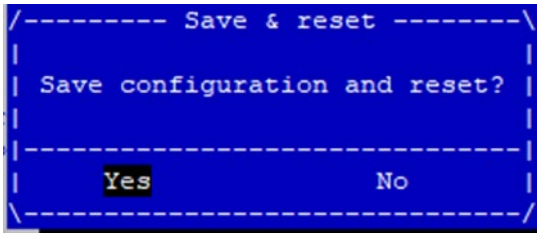
■ Discard Changes and Exit

Select this option to quit Setup without saving any modifications to the system configuration. The following window will appear after the "Discard Changes and Exit" option is selected. Select "Yes" to discard changes and Exit Setup.



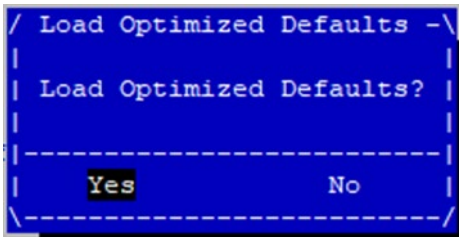
■ Save Changes and Reset

When Users have completed the system configuration changes, select this option to save the changes and reset from BIOS Setup in order for the new system configuration parameters to take effect. The following window will appear after selecting the "Save Changes and Reset" option is selected. Select "Yes" to Save Changes and reset.



■ Restore Defaults

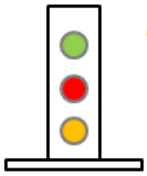
Restore default values for all setup options. Select “Yes” to load Optimized defaults.



NOTE: The items under Boot Override may not be the same a the image above, as it should depend on the actual devices connect to the system.

APPENDIX A: LED INDICATOR EXPLANATIONS

▸ System Power / Status / Storage Activity



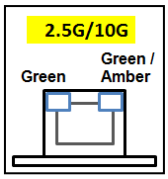
Green : Power
Green / Red : Status
Amber : HDD

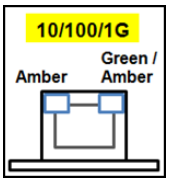
LED	COLOR ON BOARD	LED ACTION	DESCRIPTION
POWER	**Green**	Steady	System Power ON
	Off	N/A	Power OFF
STATUS	**Green**	Steady	Controlled by GPIO
	Red	Steady	Controlled by GPIO
	Off	N/A	Controlled by GPIO (Default) or Power OFF
Storage	**Amber**	**Blinking**	Blinking indicates HDD activity, Include SATA / NVME Storage
	Off	N/A	No data access or No power on

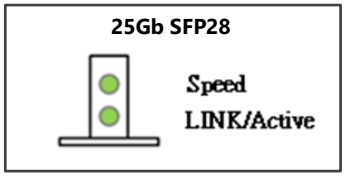
▸ HDD Tray LED

HDD LED	COLOR	LED ACTION	DESCRIPTION
POWER	**Green**	Steady	HDD/SSD Power ON
	Off	N/A	Power OFF
STATUS	**Yellow**	**Blinking**	Blinking indicates HDD activity, Include SATA / NVME Storage
	Off	N/A	No data access or Power OFF

- **RJ-45 LAN LED**







1Gb RJ-45 Define:

Speed	Amber (Link/Active)	Green/Amber (Speed)
10M	Blinking / Data access	OFF
100M	Blinking / Data access	ON (Green)
1G	Blinking / Data access	ON (Amber)
1. When cable is plug-in and network is linked. Both LED lights will be bright. The behavior is as defined. 2. Without the Cable plug-in, the LED should be off 3. If LAN Driver controls the LED, the behavior will follow the driver		

2.5Gb RJ-45 Define:

Speed	Green (Link/Active)	Green/Amber (Speed)
10/100M	Blinking / Data access	OFF
1G	Blinking / Data access	ON (Amber)
2.5G	Blinking / Data access	ON (Green)
1. When cable is plug-in and network is linked. Both LED lights will be bright. The behavior is as defined. 2. Without the Cable plug-in, the LED should be off 3. If LAN Driver controls the LED, the behavior will follow the driver		

10Gb RJ-45 Define:

Speed	Green (Link/Active)	Green/Amber (Speed)
100M	Blinking / Data access	OFF
1/2.5/5G	Blinking / Data access	ON (Amber)
10G	Blinking / Data access	ON (Green)
1. When cable is plug-in and network is linked. Both LED lights will be bright. The behavior is as defined. 2. Without the Cable plug-in, the LED should be off 3. If LAN Driver controls the LED, the behavior will follow the driver		

25Gb SFP28 Define:

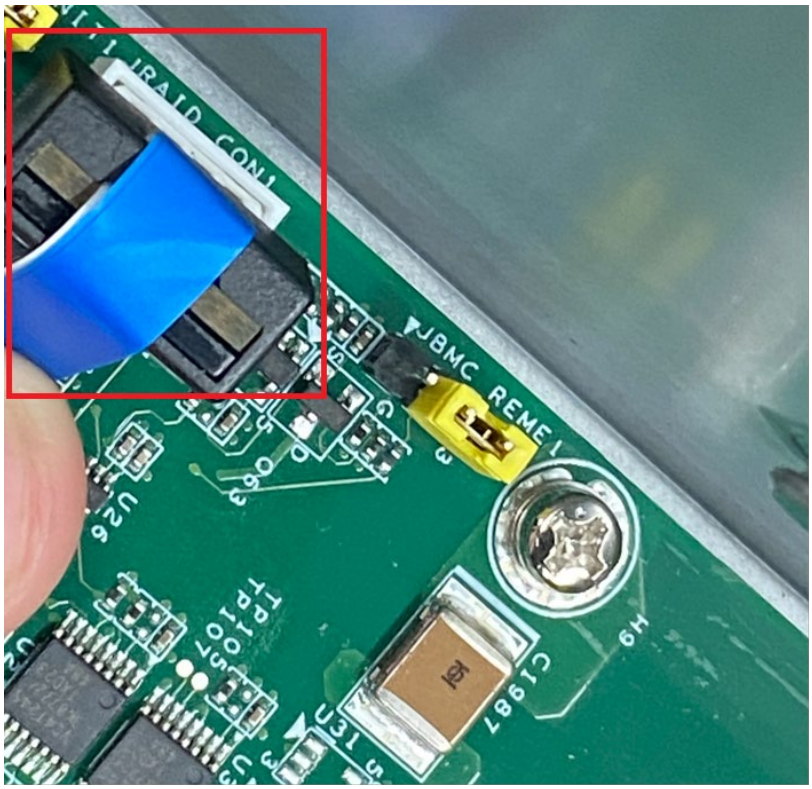
Speed	Green (Link/Active)	Amber/ Green (Speed)
10G	Blinking / Data access	ON (Green)
25G	Blinking / Data access	ON (Amber)
Non-Link	OFF	OFF
1. When cable is plug-in and network is linked. Both LED lights will be bright. The behavior is as defined. 2. Without the Cable plug-in, the LED should be off 3. If LAN Driver controls the LED, the behavior will follow the driver		

APPENDIX B: INTEL® RAID KEY CONFIGURATION

Configuring Intel VMD and Creating a RAID Volume

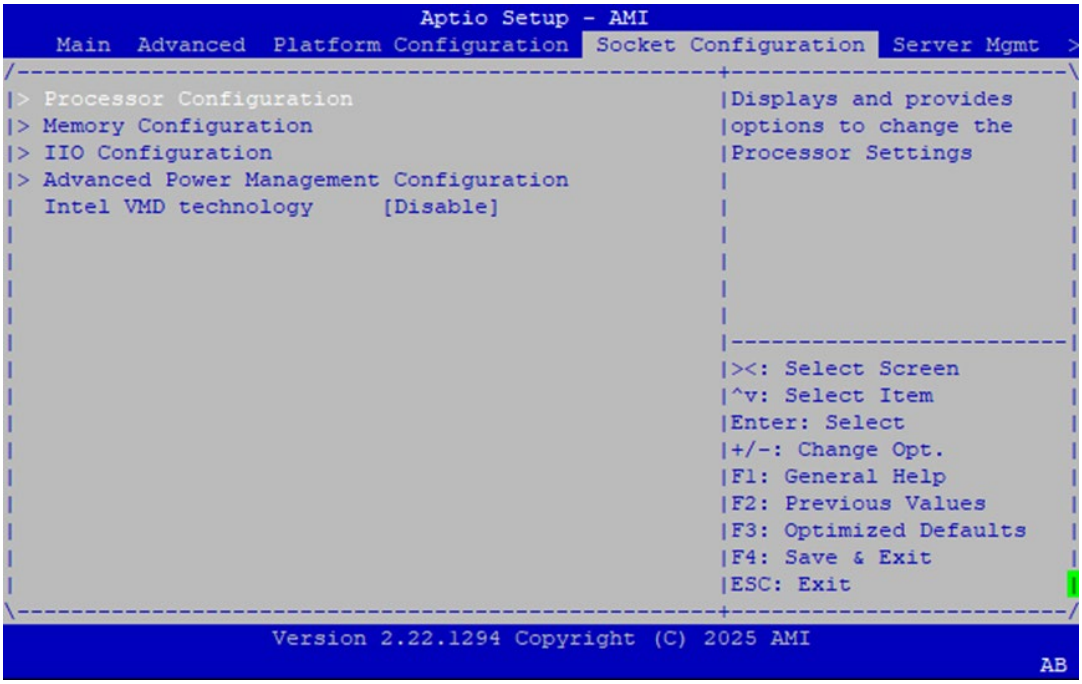
Step 1: Install the VROC Key

Connect the VROC key to the motherboard's JRAID_CON1 header.

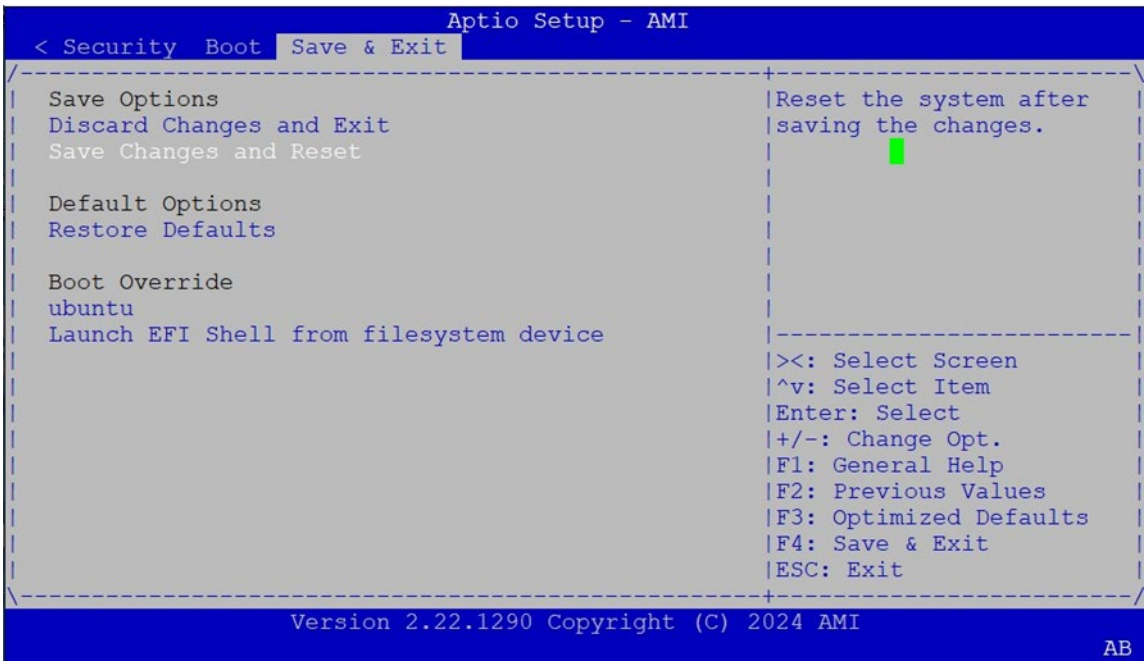


Step 2: Boot into BIOS

1. Boot into BIOS → Navigate to **Socket Configuration** and set **Intel VMD Technology** to **Enabled**

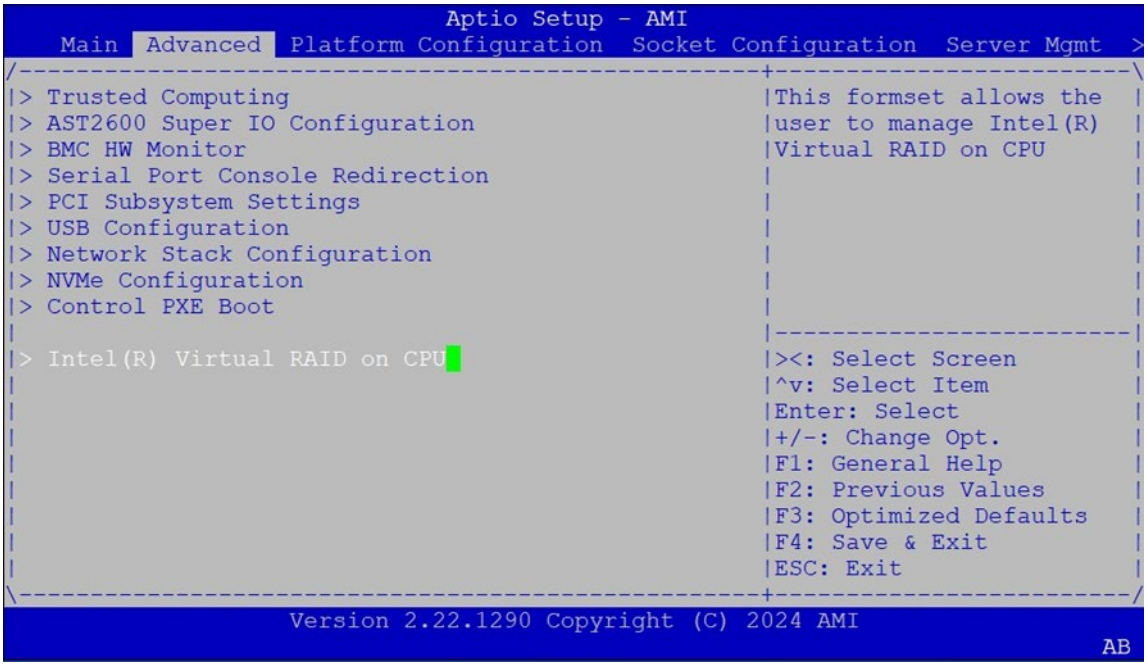


2. Save & Exit: Choose **Save Changes and Reset** to reboot the system.



Step 3: Re-enter BIOS

1. After reboot, enter BIOS again.
2. Navigate to **Advanced** > **Intel Virtual RAID on CPU** > **All Intel VMD Controllers**.



3. Select **Create RAID Volume**, then choose the desired **RAID Level**.
4. Select the storage devices to include in the RAID array.
5. Click **Create Volume**, then confirm with **Yes**.
6. Exit BIOS.

Step 4: Boot into the OS

Use the command `lsblk` to verify the RAID volume. It will appear as `/dev/mdxxx`

APPENDIX C: TERMS AND CONDITIONS

Warranty Policy

1. All products are under warranty against defects in materials and workmanship for one year from the date of purchase.
2. The buyer will bear the return freight charges for goods returned for repair within the warranty period; whereas the manufacturer will bear the after service freight charges for goods returned to the user.
3. The buyer will pay for the repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:
   - Improper or inadequate maintenance by the customer
   - Unauthorized modification, misuse, or reversed engineering of the product
   - Operation outside of the environmental specifications for the product.

RMA Service

Requesting an RMA#

1. To obtain an RMA number, fill out and fax the "RMA Request Form" to your supplier.
2. The customer is required to fill out the problem code as listed. If your problem is not among the codes listed, please write the symptom description in the remarks box.
3. Ship the defective unit(s) on freight prepaid terms. Use the original packing materials when possible.
4. Mark the RMA# clearly on the box.

Note: Customer is responsible for shipping damage(s) resulting from inadequate/loose packing of the defective unit(s). All RMA# are valid for 30 days only; RMA goods received after the effective RMA# period will be rejected.

RMA Service Request Form

When requesting RMA service, please fill out the following form. Without this form enclosed, your RMA cannot be processed.

RMA No:	Reasons to Return: ▫ Repair(Please include failure details) ▫ Testing Purpose
Company:	Contact Person:
Phone No.	Purchased Date:
Fax No.:	Applied Date:
Return Shipping Address: _____ Shipping by: ▫ Air Freight ▫ Sea ▫ Express_____ ▫ Others:_____	

Item	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

*Problem Code:

01:D.O.A.	07: BIOS Problem	13: SCSI	19: DIO
02: Second Time R.M.A.	08: Keyboard Controller Fail	14: LPT Port	20: Buzzer
	09: Cache RMA Problem	15: PS2	21: Shut Down
03: CMOS Data Lost	10: Memory Socket Bad	16: LAN	22: Panel Fail
04: FDC Fail	11: Hang Up Software	17: COM Port	23: CRT Fail
05: HDC Fail	12: Out Look Damage	18: Watchdog Timer	24: Others (Pls specify)
06: Bad Slot			

Request Party

Authorized Signature / Date

Confirmed By Supplier

Authorized Signature / Date