Lanner

Industrial Communication Platforms

Energy Management and Industrial Cyber Security Solutions

LEC-3340EFG
User Manual

Version: 1.2

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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.

Technical Support

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.

Documentation Feedback

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Contact Information

Taiwan Corporate Headquarters

Lanner Electronics Inc.

7F, No.173, Sec.2, Datong Rd.

Xizhi District, New Taipei City 22184,

Taiwan

立端科技股份有限公司

221 新北市汐止區

大同路二段 173 號 7 樓

T: +886-2-8692-6060

F: +886-2-8692-6101

E: contact@lannerinc.com

China

Beijing L&S Lancom Platform Tech. Co., Ltd.

Guodong LOFT 9 Layer No. 9 Huinan Road,

Huilongguan Town, Changping District, Beijing

102208 China

T: +86 010-82795600

F: +86 010-62963250

E: service@ls-china.com.cn

USA

Lanner Electronics Inc.

47790 Westinghouse Drive

Fremont, CA 94539

T: +1-855-852-6637

F: +1-510-979-0689

E: sales_us@lannerinc.com

Canada

Lanner Electronics Canada Ltd

3160A Orlando Drive

Mississauga, ON

L4V 1R5 Canada

T: +1 877-813-2132

F: +1 905-362-2369

E: sales_ca@lannerinc.com

Europe

Lanner Europe B.V.

Wilhelmina van Pruisenweg 104

2595 AN The Hague

The Netherlands

T: +31 70 701 3256

E: sales_eu@lannerinc.com

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.

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.

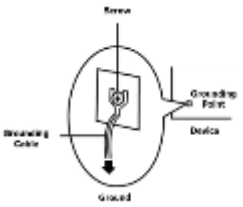
Consignes de sécurité électrique

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.

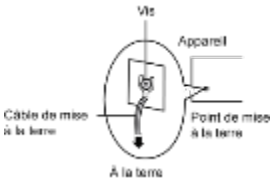
Grounding Procedure for Power Source

- 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 LEC-3340EFG, a robust 3U rackmount industrial edge consolidation server, plays a crucial role in modern digitalized substations by leveraging SCADA systems for the efficient collection and conversion of analog data from the entire power grid into a digital format. Powered by Intel® Xeon® W-11000 series (Tiger Lake-H) processors, it delivers outstanding performance. Compliant with IEC-61850 and IEEE 1613 standards, this industrial-grade server features rich I/O functions, including 4x PCIe slots, 4x 2.5GbE RJ45, 5x USB 3.0 ports, 2x HDMI display ports, and 4x COM ports. With support for 2x M.2 slots for storage expansion, as well as 2x swappable HDD/SSD drive bays with RAID support, the LEC-3340 enhances situational awareness, operational efficiency, and maintenance practices in digital substations.

Key Features

- IEC 61850-3 and IEEE 1613 compliant
- Support Intel® Xeon® W-11000 Series (Tiger Lake-H) CPU
- Support 2x DDR4 ECC / Non-ECC SODIMM Memory, up to 64GB
- Rich I/O: 4x PCIe Slots, 4x 2.5GbE RJ45 Ports, 5x USB Ports, 2x 2.5" Swappable Drive bays
- Support 2x HDMI Display Ports, 4x COM ports
- Wide Temperature Range (-40°C ~70°C)

Package Content

Your package contains the following items:

- 1x LEC-3340EFG System
- 1x HDD Key
- 2x 3-Pin Terminal Block; 1x 2-Pin Terminal Block
- 2x Power Cable
- 1x PSU Cover with Screws
- 1x Rackmount Screw Kit

Ordering Information

SKU No.	Main Features
LEC-3340E	Intel® Xeon® W-11865MLE CPU w/ 2x DDR4 ECC / Non-ECC SODIMM, 2x HDMI, 4x 2.5 GbE RJ45, 1x SATA M.2 2242 M-key, 1x PCIe x4 M.2 2280, No PSU
LEC-3340F	Intel® Xeon® W-11555MLE CPU w/ 2x DDR4 ECC / Non-ECC SODIMM, 2x HDMI, 4x 2.5 GbE RJ45, 1x SATA M.2 2242 M-key, 1x PCIe x4 M.2 2280, No PSU
LEC-3340G	Intel® Xeon® W-11155MLE CPU w/ 2x DDR4 ECC / Non-ECC SODIMM, 2x HDMI, 4x 2.5 GbE RJ45, 1x SATA M.2 2242 M-key, 1x PCIe x4 M.2 2280, No PSU

Note: If any component should be missing or damaged, please contact your dealer immediately for assistance.

Additional Accessories

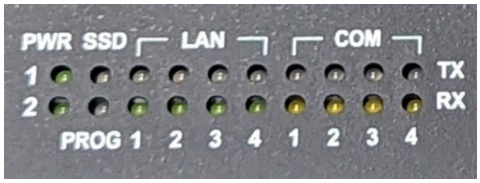
SKU No.	Main Features
LEA-PB3340A	100W DC 16.6~160V PSU Kit
LEA-PB3340B	200W AC 100~240V PSU Kit

System Specifications

Processor System	Processor Options	SKU E: Intel® Xeon® W-11865MLE SKU F: Intel® Xeon® W-115555MLE SKU G: Intel® Xeon® W-11155MLE
	Frequency	1.5GHz/1.9GHz/1.8GHz
	Core Number	8 / 6 / 4 Cores
	Chipset	Intel® RM590
	BIOS	AMI SPI Flash BIOS
Memory	Technology	DDR4 ECC / Non-ECC SODIMM, up to 3200Mhz
	Max. Capacity	Up to 64GB
	Socket	2x 260-pin SODIMM
Ethernet	Controller	Intel® i226IT
	Speed	Either 2500Mbps or 1000Mbps
	Interface	4x 2.5GbE RJ45 Ports
Power		N/A
I/O Interface	Serial Port	4x DB9 Male RS-232/422/485 COM Ports; 1x DB9 Male RS-232 IRIG-B Port
	Isolation Protection	2KV Digital Isolation
	ESD Protection	15KV ESD Protection
	USB 3.0 Port	5x USB 3.0 Type A Ports (Rear USB with Key Lock)
	TPM	TPM 2.0 onboard
	LED Indicators	LED Indicators
Expansion	SATA Storage	2x 2.5" Swappable HDD/SSD drive bay, support RAID0,1;
	M.2 Storage	1x M.2 2242 M-Key for SATA; 1x M.2 2280 M-Key for NVMe
	PCIe	1x PCIe*16 slot; 3x PCIe*4 slots
Watchdog Timer		Watchdog timer, 256 level time interval system reset, software programmable
Graphics	Controller	Intel® HD Graphics P630
	Display Interface	2x HDMI Ports
Mechanical	Dimension (W x H x D)	438 x 131.8 x 300 mm
	Construction	Aluminum + Steel
	Weight	8.5 kg
	Mounting	Rackmount
Environmental	Operating Temperature	-40°C ~ 70°C
	Storage Temperature	-40°C ~ 85°C
	Relative Humidity	5% ~ 95%, non-condensing
OS Support	Microsoft Windows	Windows 10 Embedded
	Linux	Kernel 5.18, Ubuntu
Certification	EMC	CE/FCC Class A
	Safety	CB, UL
	Electrical Substations	EC 61850-3, IEEE 1613

Physical Overview

Front Panel

<table>
<tr><th>No.</th><th colspan="2">Description</th></tr>
<tr><td>F1</td><td colspan="2">2x 2.5” SATA HDD/SSD Bay</td></tr>
<tr><td>F2</td><td colspan="2">Reset Button</td></tr>
<tr><td>F3</td><td>LED Indicators</td><td>


PWR: PSU Power Status
<table>
<tr><th></th><th>1 (PSU1)</th><th>2 (PSU2)</th></tr>
<tr><td>Solid Green</td><td colspan="2">The system is powered on</td></tr>
<tr><td>Off</td><td colspan="2">The system is powered off</td></tr>
</table>
HDD: mSATA/HHD1/HHD Activities
<table>
<tr><td>Blinking Green</td><td>Data access activity</td></tr>
<tr><td>Off</td><td>No data access activity</td></tr>
</table>
PROG: Failure LED (User Programmable)
<table>
<tr><td>Solid Green</td><td>Defined by GPIO</td></tr>
<tr><td>Solid Red</td><td>Defined by GPIO</td></tr>
<tr><td>Off</td><td>Defined by GPIO</td></tr>
</table>
COM: COM1/COM2/COM3/COM4 Status
<table>
<tr><th></th><th>RX</th><th>TX</th></tr>
<tr><td>Solid Yellow</td><td>Signal Access</td><td>--</td></tr>
<tr><td>Solid Green</td><td>--</td><td>Signal Access</td></tr>
</table>
LAN
Link
<table>
<tr><td>Blinking Yellow</td><td>Link has been established, and there is activity on this port</td></tr>
<tr><td>Solid Yellow</td><td>Link has been established, and there is no activity on this port</td></tr>
<tr><td>Off</td><td>No link is established</td></tr>
</table>
Speed
<table>
<tr><td>Solid Green</td><td>Operating as a Gigabit Connection (2500 Mbps)</td></tr>
<tr><td>Solid Amber</td><td>Operating as a Gigabit Connection (1000 Mbps)</td></tr>
</table>

</td></tr>
<tr><td>F4</td><td colspan="2">1x USB 3.0 Port with Key Lock;
Key lock controls USB power:  ON;  OFF</td></tr>
</table>

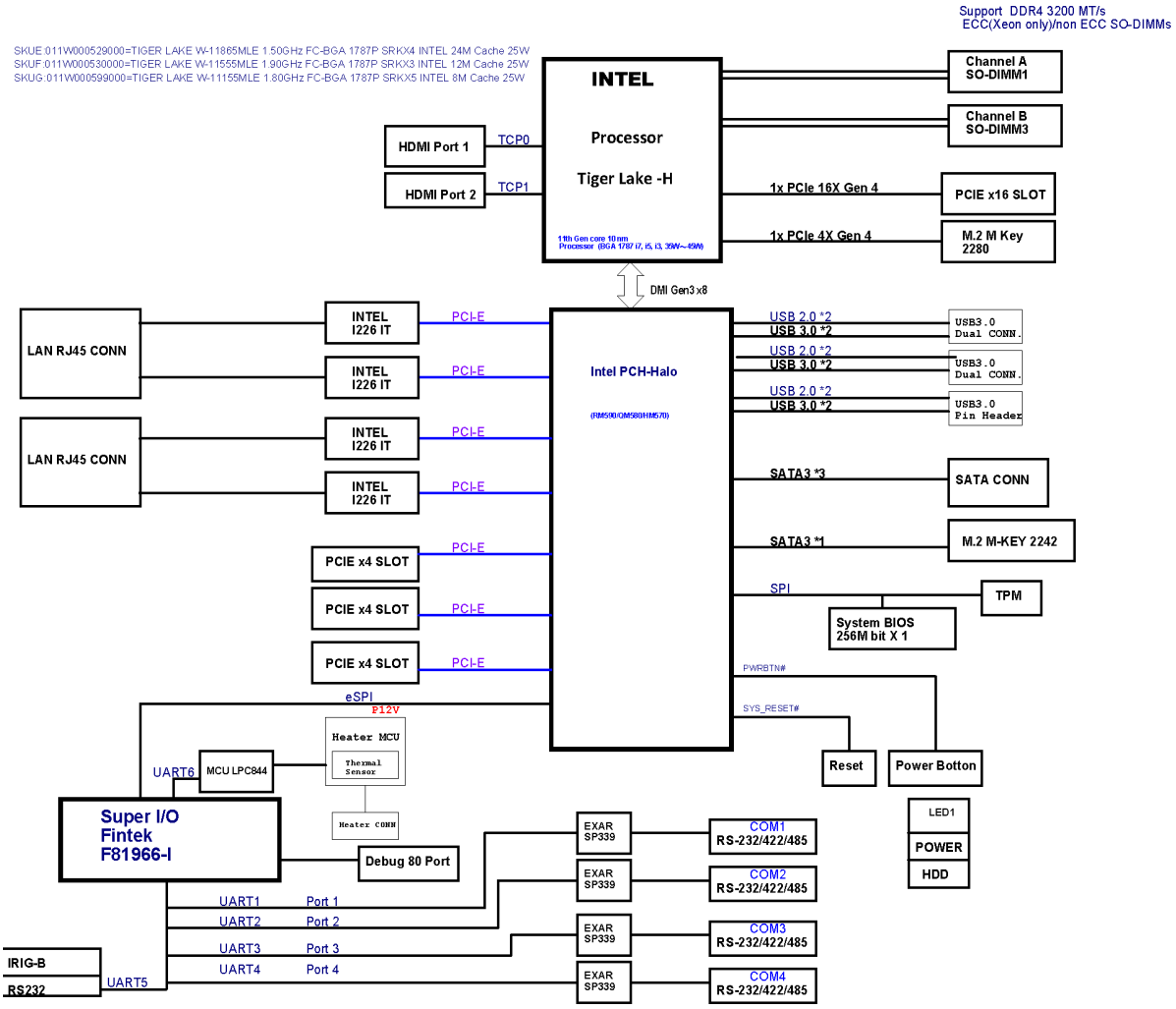
Rear Panel

No.	Description	
R1	PCIe Slot	1x PCIe x16 slot; 3x PCIe x4 slot (from left to right: x16, x4, x4, x4) Note: The overall power consumption of all slots shall not exceed 35W
R2	Relay Output	1x Relay Out for Power Failure Alarm
R3	HDMI Port	2x HDMI Ports
R4	IRIG-B Port	1x DB9 Male for IRIG-B
R5	USB Port	4x USB3.0 Ports
R6	LAN Port	4x 2.5GbE RJ45 LAN Port
R7	COM Port	4 x DB9 Male (COM1/COM2/COM3/COM4) with isolation, software selectable RS-232/422/485
R8	Grounding	1x Grounding Hole

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

ATX1 (+12V): 8-Pin Power Connector

Pin	Signal
1,3,5,7	GND
2,4,6,8	+12V

ATX3 (+12V): 8-Pin Power Connector for PCIe Card

Pin	Signal
1,3,5,7	GND
2,4,6,8	+12V

JCOMS1

Pin	Signal
1	NC
2	RTC_RST#
3	GND

JCOMS2

Pin	Signal
1	NC
2	SRTC_RST#
3	GND

J3

(1-2): Default

(2-3): For Program MCU

Pin	Signal
1	+P3V3_MCU
2	PIO0_12
3	GND

SW2

Pin	Normal	Program
1-8, 2-7	ON	OFF
3-6, 4-5	OFF	ON

Pin	Signal
1 ON (Default)	SOUT4
2 ON (Default)	SIN4

3 OFF	NXP_RXD
4 OFF	NXP_TXD

CON3

Pin	Signal
1	+P3V3_STBY
2	NXP_RXD
3	GND
4	NXP_TXD

JSPI1

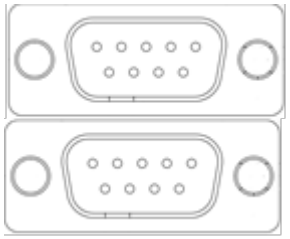
Pin	Signal
1	SPI_HD1#
2	NC
3	SOC_SPI_CS0#_ROM
4	P3V3_SB_SPI
5	SOC_SPI_MISO_ROM
6	SOC_SPI_IO3_ROM
7	NC
8	SOC_SPI_CLK_ROM
9	GND
10	SOC_SPI_MOSI_ROM

ESPI1

Pin	Signal
1	ESPI_CLK
2	ESPI_IO1
3	ESPI_RST#
4	ESPI_IO0
5	ESPI_CS0#
6	+P3V3
7	ESPI_IO3
8	NA
9	ESPI_IO2
10	GND
11	+P3V3_STBY
12	NC

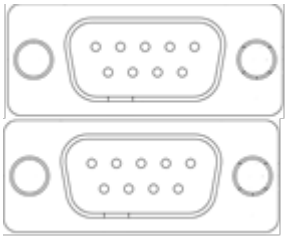
COM1/2

Pin	Signal
1	COM_DCD1#_P
2	COM_RXD1_P
3	COM_TXD1_P
4	COM_DTR1#_P
5	GND
6	COM_DSR1#_P
7	COM_RTS1#_P
8	COM_CTS1#_P
9	COM_RI1#_SEL



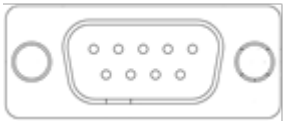
COM3/4

Pin	Signal
1	COM_DCD2#_P
2	COM_RXD2_P
3	COM_TXD2_P
4	COM_DTR2#_P
5	GND
6	COM_DSR2#_P
7	COM_RTS2#_P
8	COM_CTS2#_P
9	COM_RI2#_SEL

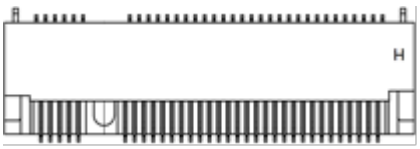


RS-232: IRIG-B

Pin	Signal
1	NC
2	COM_CON_RXD
3	COM_CON_TXD
4	NC
5	GND
6	NC
7	COM_CON_RTS
8	COM_CON_CTS
9	NC



NGFF1: M.2 M-Key 2242 SATA



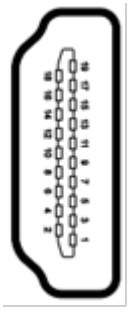
Pin	Description	Pin	Description
1	GND	2	3V3_AUX
3	GND	4	3V3_AUX
5	NC	6	NC
7	NC	8	NC
9	GND	10	DAS/DSS#
11	NC	12	3V3_AUX
13	NC	14	3V3_AUX
15	GND	16	3V3_AUX
17	NC	18	3V3_AUX
19	NC	20	NC
21	GND	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	NC	30	NC
31	NC	32	NC
33	GND	34	NC
35	NC	36	NC
37	NC	38	DEVSLP
39	GND	40	SMB_S0_CLK
41	PETn0/SATA_B+	42	SMB_S0_DAT
43	PETp0/SATA_B-	44	NC
45	GND	46	NC
47	PERn0/SATA_A-	48	NC
49	PERp0/SATA_A+	50	PRESET#
51	GND	52	NC
53	NC	54	WALE#
55	NC	56	NC
57	GND	58	NC
KEY M			
67	NC	68	NC
69	GND	70	3V3_AUX
71	GND	72	3V3_AUX
73	GND	74	3V3_AUX
75	GND	--	--

JNGFF1: M-Key NVME Slot

Pin	Signal	Pin	Signal	Pin	Signal
1	GND	26	NC	51	GND
2	+P3V3	27	GND	52	M2_2_CLKREQ_N
3	GND	28	NC	53	CLKOUT_PCIE_N0
4	+P3V3	29	PCIE4_RX_N1	54	PCH_WAKE#
5	PCIE4_RX_N3	30	NC	55	CLKOUT_PCIE_P0
6	NC	31	PCIE4_RX_P1	56	NC
7	PCIE4_RX_P3	32	NC	57	GND
8	NC	33	GND	58	NC
9	GND	34	NC	59	NC
10	GEN4_LED	35	PCIE4_TX_N1	60	NC
11	PCIE4_TX_N3	36	NC	61	NC
12	+P3V3	37	PCIE4_TX_N1	62	NC
13	PCIE4_TX_P3	38	NC	63	NC
14	+P3V3	39	GND	64	NC
15	GND	40	NC	65	NC
16	+P3V3	41	PCIE4_RX_N0	66	NC
17	PCIE4_RX_N2	42	NC	67	NC
18	+P3V3	43	PCIE4_RX_P0	68	SUSCLK
19	PCIE4_RX_P2	44	NC	69	+P3V3
20	NC	45	GND	70	+P3V3
21	GND	46	NC	71	GND
22	NC	47	PCIE4_TX_N0	72	+P3V3
23	PCIE4_TX_N2	48	NC	73	GND
24	NC	49	PCIE4_TX_P0	74	+P3V3
25	PCIE4_TX_P2	50	PLTRST_GEN4	75	GND

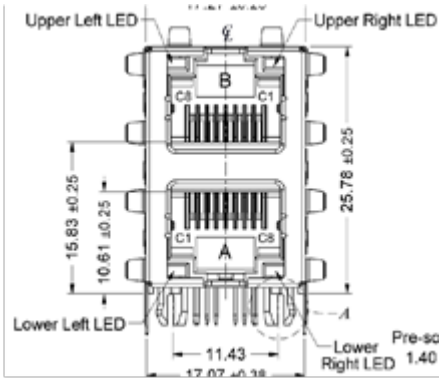
HDMI 1-2

Pin	Description	Pin	Description
1	DATA2+	2	GND
3	DATA2-	4	DATA1+
5	GND	6	DATA1-
7	DATA0+	8	GND
9	DATA0-	10	CLK+
11	GND	12	CLK-
13	N.C	14	N.C
15	DDC CLK	16	DDC DAT
17	GND	18	HDMI_VCC
19	HPD	--	--



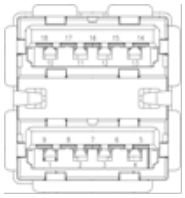
LAN 1-2: 1x2 Dual RJ45 with LED

Pin	Description
	2.5G / 1G / 100M
A1	LAN1_MDX0P
A2	LAN1_MDX0N
A3	LAN1_MDX1P
A4	LAN1_MDX1N
A5	LAN1_MDX2P
A6	LAN1_MDX2N
A7	LAN1_MDX3P
A9	LAN1_MDX3N
A10	LAN1_T
L1	GND
L2	LAN1_LINK_2500_N
L3	LAN1_LINK_1000_N
L4	LAN1_LINK_ACT_N



USB 1-2

Pin	9	8	7	6	5
Description	USB1_TX+	USB1_TX-	GND	USB1_RX+	USB1_RX-
Pin	1	2	3	4	
Description	USB_VCC1	USB1_D-	USB1_D+	GND	
Pin	9	8	7	6	5
Description	USB1_TX+	USB1_TX-	GND	USB1_RX+	USB1_RX-
Pin	1	2	3	4	
Description	USB_VCC1	USB1_D-	USB1_D+	GND	



PCIE1: x16 PCIe Slot

Pin	Description	Pin	Description
B1	12V	A1	PRSNT1#
B2	12V	A2	12V
B3	12V	A3	12V
B4	GND	A4	GND
B5	SMCLK	A5	JTAG2
B6	SMDAT	A6	JTAG3

B7	GND	A7	JTAG4
B8	3.3V	A8	JTAG5
B9	JTAG1	A9	3.3V
B10	3.3VAUX	A10	3.3V
B11	WAKE#	A11	PERST#
Key B			
B12	RSVD	A12	GND
B13	GND	A13	REFCLKA+
B14	HSOP0	A14	REFCLKA-
B15	HSON0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT2#	A17	HSIN0
B18	GND	A18	GND
B19	HSOP1	A19	RSVD
B20	HSON1	A20	GND
B21	GND	A21	HSIP1
B22	GND	A22	HSIN1
B23	HSOP2	A23	GND
B24	HSON2	A24	GND
B25	GND	A25	HSIP2
B26	GND	A26	HSIN2
B27	HSOP3	A27	GND
B28	HSON3	A28	GND
B29	GND	A29	HSIP3
B30	RSVD	A30	HSIN3
B31	PRSNT2#	A31	GND
B32	GND	A32	RSVD(REFCLKB+)
B33	HSOP4	A33	RSVD(REFCLKB-)
B34	HSON4	A34	GND
B35	GND	A35	HSIP4
B36	GND	A36	HSIN4
B37	HSOP5	A37	GND
B38	HSON5	A38	GND
B39	GND	A39	HSIP5
B40	GND	A40	HSIN5
B41	HSOP6	A41	GND
B42	HSON6	A42	GND
B43	GND	A43	HSIP6
B44	GND	A44	HSIN6

B45	HSOP7	A45	GND
B46	HSON7	A46	GND
B47	GND	A47	HSIP7
B48	PRSNT2#	A48	HSIN7
B49	GND	A49	GND
B50	HSOP8	A50	RSVD
B51	HSON8	A51	GND
B52	GND	A52	HSIP8
B53	GND	A53	HSIN8
B54	HSOP9	A54	GND
B55	HSON9	A55	GND
B56	GND	A56	HSIP9
B57	GND	A57	HSIN9
B58	HSOP10	A58	GND
B59	HSON10	A59	GND
B60	GND	A60	HSIP10
B61	GND	A61	HSIN10
B62	HSOP11	A62	GND
B63	HSON11	A63	GND
B64	GND	A64	HSIP11
B65	GND	A65	HSIN11
B66	HSOP12	A66	GND
B67	HSON12	A67	GND
B68	GND	A68	HSIP12
B69	GND	A69	HSIN12
B70	HSOP13	A70	GND
B71	HSON13	A71	GND
B72	GND	A72	HSIP13
B73	GND	A73	HSIN13
B74	HSOP14	A74	GND
B75	HSON14	A75	GND
B76	GND	A76	HSIP14
B77	GND	A77	HSIN14
B78	HSOP15	A78	GND
B79	HSON15	A79	GND
B80	GND	A80	HSIP15
B81	PRSNT2#	A81	HSIN15
B82	RSVD(CARD_DET#)	A82	GND

PCIE 2-4: x4 PCIe Slot

Pin	Description	Pin	Description
B1	12V	A1	PRSNT1#
B2	12V	A2	12V
B3	12V	A3	12V
B4	GND	A4	GND
B5	SMCLK	A5	JTAG2
B6	SMDAT	A6	JTAG3
B7	GND	A7	JTAG4
B8	3.3V	A8	JTAG5
B9	JTAG1	A9	3.3V
B10	3.3VAUX	A10	3.3V
B11	WAKE#	A11	PERST#
Key B			
B12	RSVD	A12	GND
B13	GND	A13	REFCLKA+
B14	HSOP0	A14	REFCLKA-
B15	HSON0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT2#	A17	HSIN0
B18	GND	A18	GND
B19	HSOP1	A19	RSVD
B20	HSON1	A20	GND
B21	GND	A21	HSIP1
B22	GND	A22	HSIN1
B23	HSOP2	A23	GND
B24	HSON2	A24	GND
B25	GND	A25	HSIP2
B26	GND	A26	HSIN2
B27	HSOP3	A27	GND
B28	HSON3	A28	GND
B29	GND	A29	HSIP3
B30	RSVD	A30	HSIN3
B31	PRSNT2#	A31	GND
B32	GND	A32	RSVD(REFCLKB+)

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.

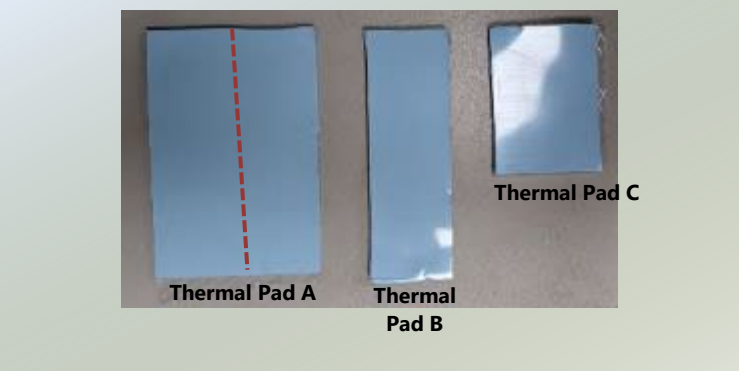
Installing the System Memory

The system supports two DIMM DDR4 memory module slot, which is located on the bottom side of the system. Please follow the steps below to install the system memory module.

A thermal pads kit is included:

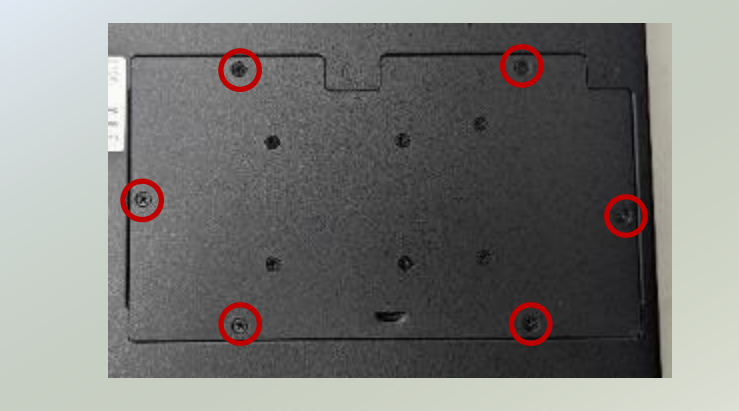
- 3x thermal pads

[All pictures shown are for illustration purposes only. Actual product may vary.]

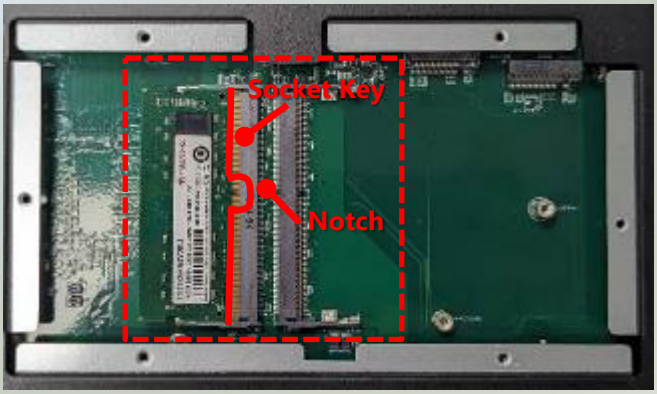


1. Power off the system and turn the system upside down, with its bottom side facing up.
2. Locate the cover.

3. Unscrew the six (6) screws securing the cover. Then, gently lift the cover.



4. Locate the system memory slot. Align the notch of the memory module with the socket key in the pin slot.

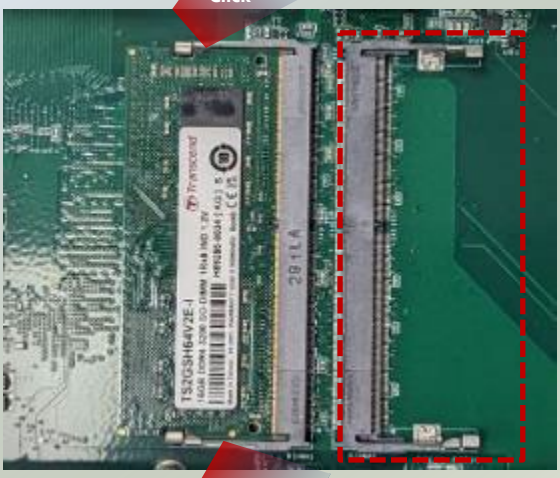


5. Insert the memory module at 30 degrees into the socket until it is fully seated.

Click

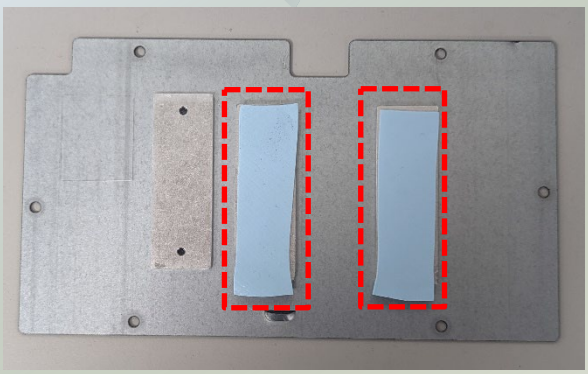
6. Push down on the module card until the slot latches catches and clicks into place.

7. Repeat steps if installing a second memory module.



Click

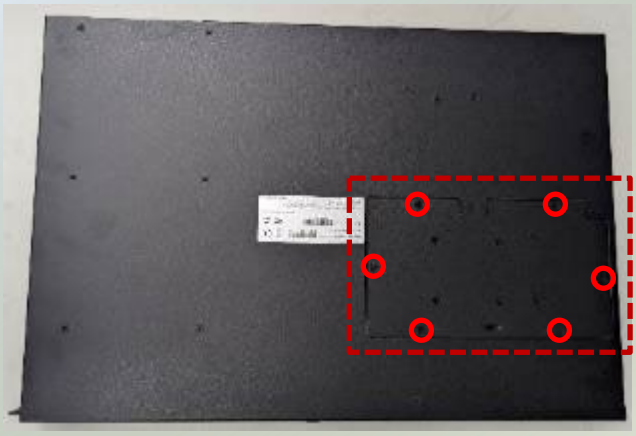
8. Next, thermal pad placement. Remove the protective film on Thermal Pad A, split into two pieces, and gently place on the underside of the cover. Then, place the cover back and secure with the original six screws.



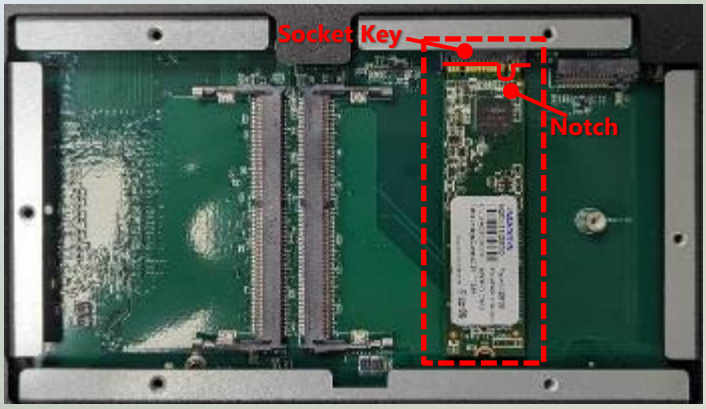
Installing the M.2 NVMe Storage (Optional)

The system supports one M.2 M-Key socket for additional data storage. Please follow the steps for installation.

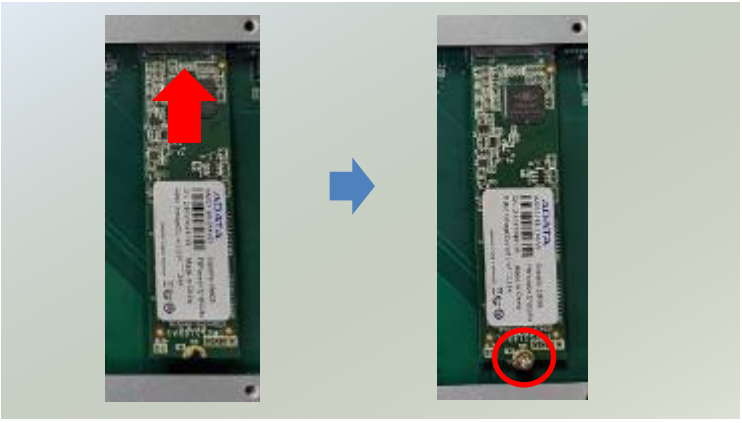
1. Power off the system and turn the system upside down, with its bottom side facing up.
2. Locate the cover and unscrew the six (6) screws securing the cover. Then, gently lift the cover.



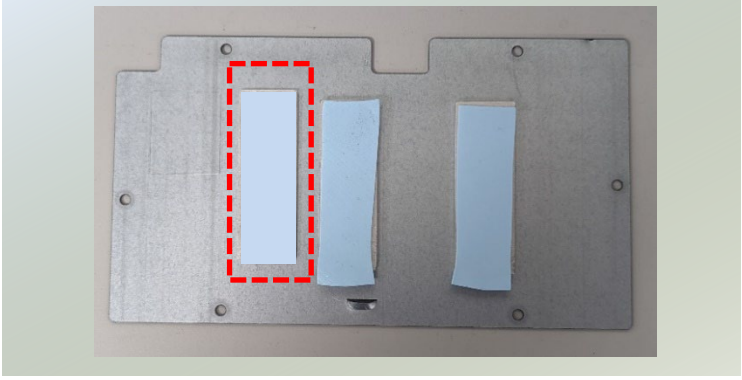
3. Locate the M.2 slot on the motherboard.
4. Align the notch of the storage module with the socket key in the pin slot.



5. Insert the storage module at 30 degrees into the socket until it is fully seated.
6. Push down on the module card and secure it with a screw.



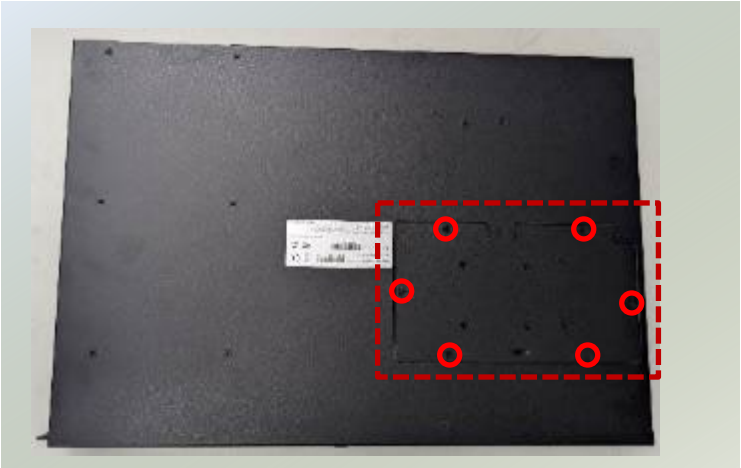
7. Next, thermal pad placement. Remove the protective film on Thermal Pad B, and gently place on the underside of the cover. Then, place the cover back and secure with the original six screws.



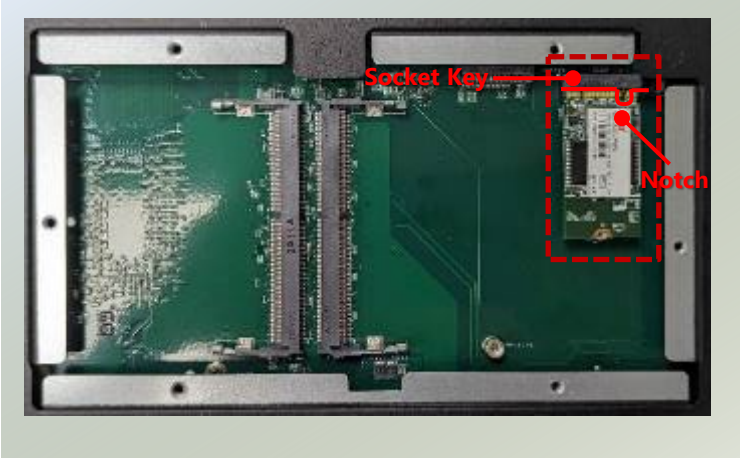
Installing the M.2 SATA Storage (Optional)

The system supports one M.2 socket for additional SATA storage expansion. Please follow the steps for installation.

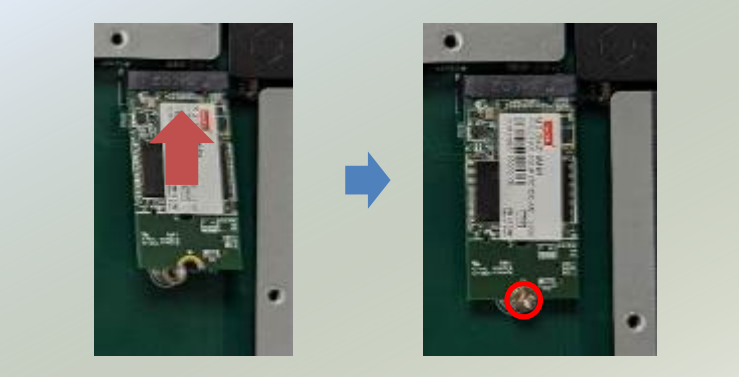
1. Power off the system and turn the system upside down, with its bottom side facing up.
2. Locate the cover and unscrew the six (6) screws securing the cover. Then, gently lift the cover.



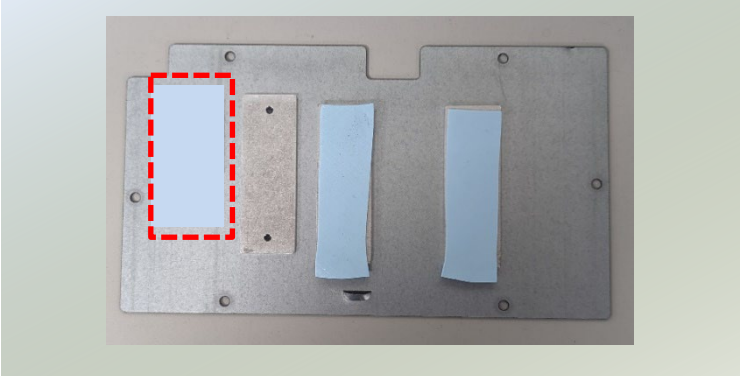
3. Locate the M.2 storage module slot.
4. Align the notch of the storage module card with the socket key in the pin slot.



5. Insert the module card at 30 degrees into the socket until it is fully seated.
6. Push down on the module card and secure it with two screws.



7. Next, thermal pad placement. Remove the protective film on Thermal Pad C, and gently place on the underside of the cover. Then, place the cover back and secure with the original six screws.

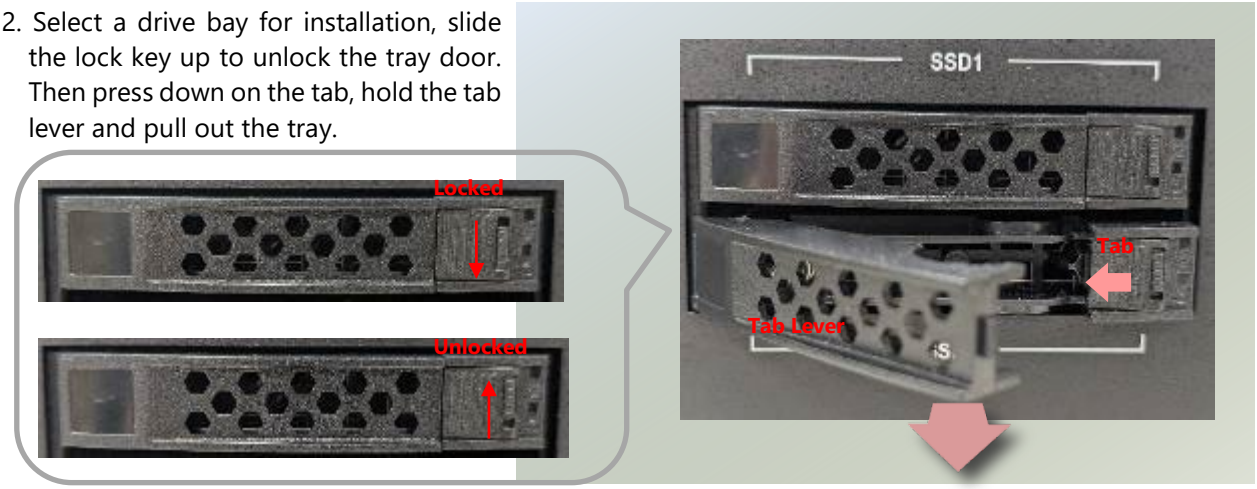


Installing the Hard Disks (Optional)

The system supports two externally accessible disk drive bays on the front panel. Please follow the steps below to install or replace disk drives.

1. 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.

CHAPTER 3: BIOS SETUP

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

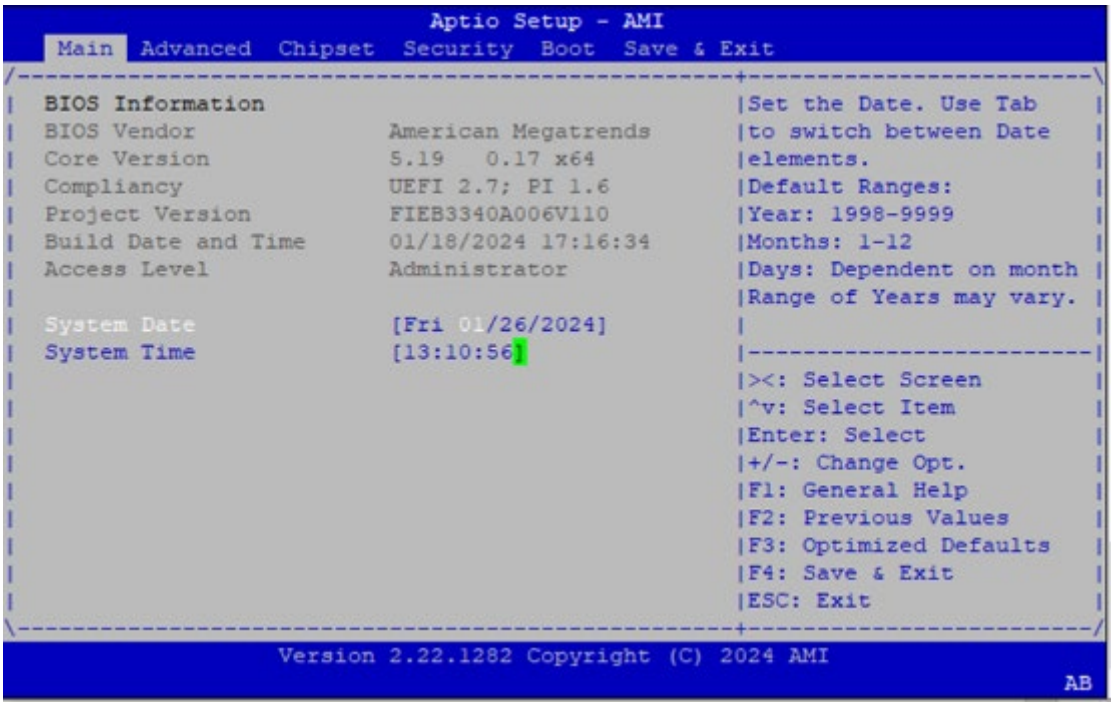
1. Boot up the system.
2. Pressing the **<Tab>** or **<Del>** key immediately allows you to enter the Setup utility, then you will be directed to the BIOS main screen. The instructions for BIOS navigations are as below:

Control Keys	Description
→←	select a setup screen
↑↓	select an item/option on a setup screen
<Enter>	select an item/option or enter a sub-menu
+/-	adjust values for the selected setup item/option
F1	display General Help screen
F2	retrieve previous values, such as the last configured parameters during the last time you entered BIOS
F3	load optimized default values
F4	save configurations and exit BIOS
<Esc>	exit the current screen

[The screenshots presented in this section are for reference only]

Main Page

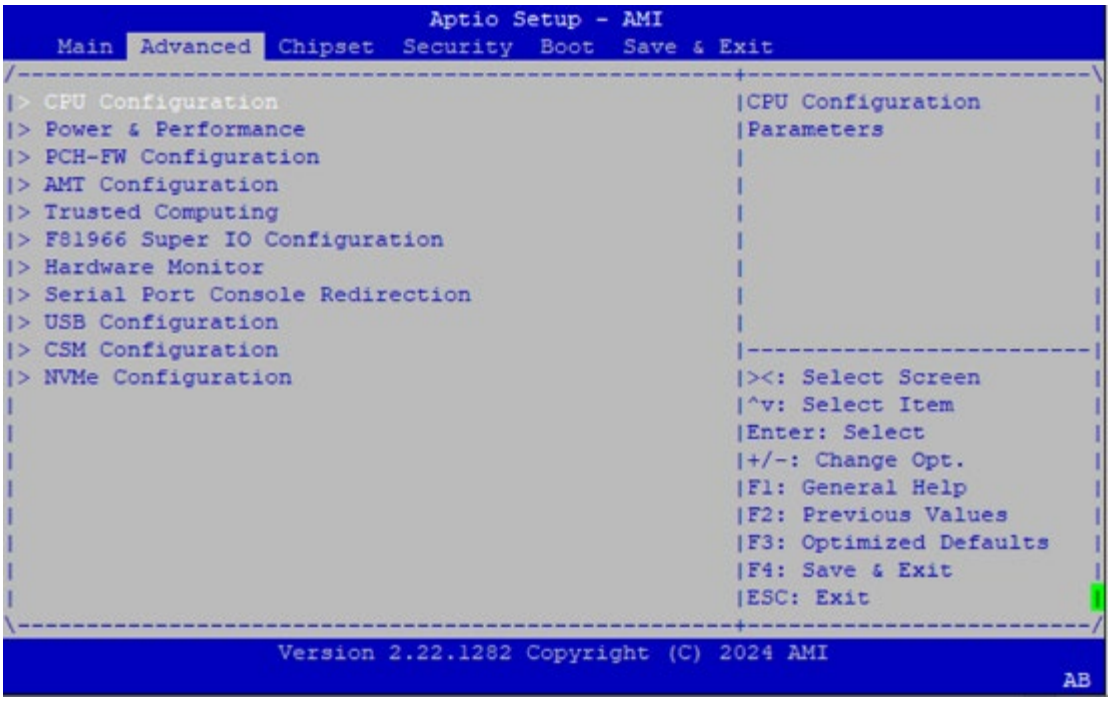
Setup main page contains BIOS information and project version information.



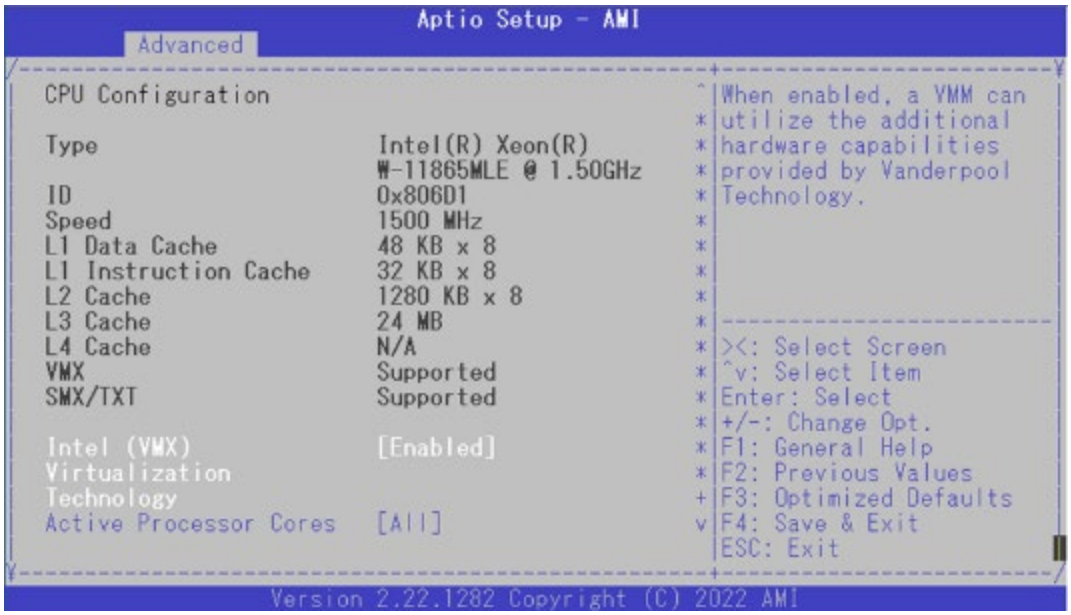
Item	Description
BIOS Information	BIOS Vendor: American Megatrends Core Version: AMI Kernel version, CRB code base, X64 Compliancy: UEFI version, PI version Project Version: BIOS release version Build Date and Time: MM/DD/YYYY Access Level: Administrator / User
System Date	To set the Date, use **<Tab>** 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.

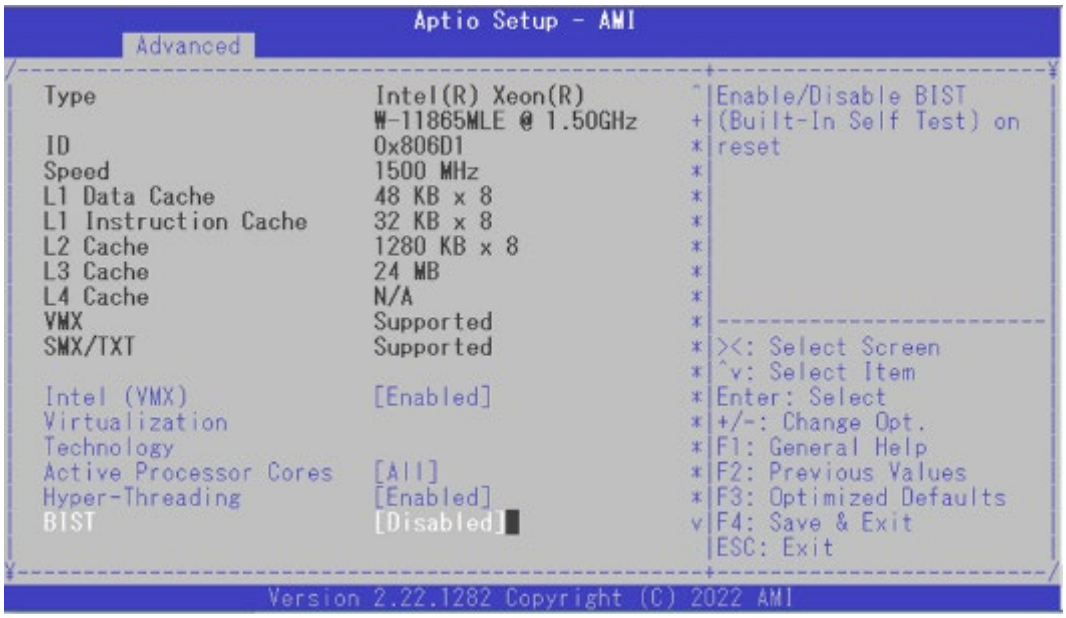
Advanced

Select the **Advanced** menu item 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.



CPU Configuration

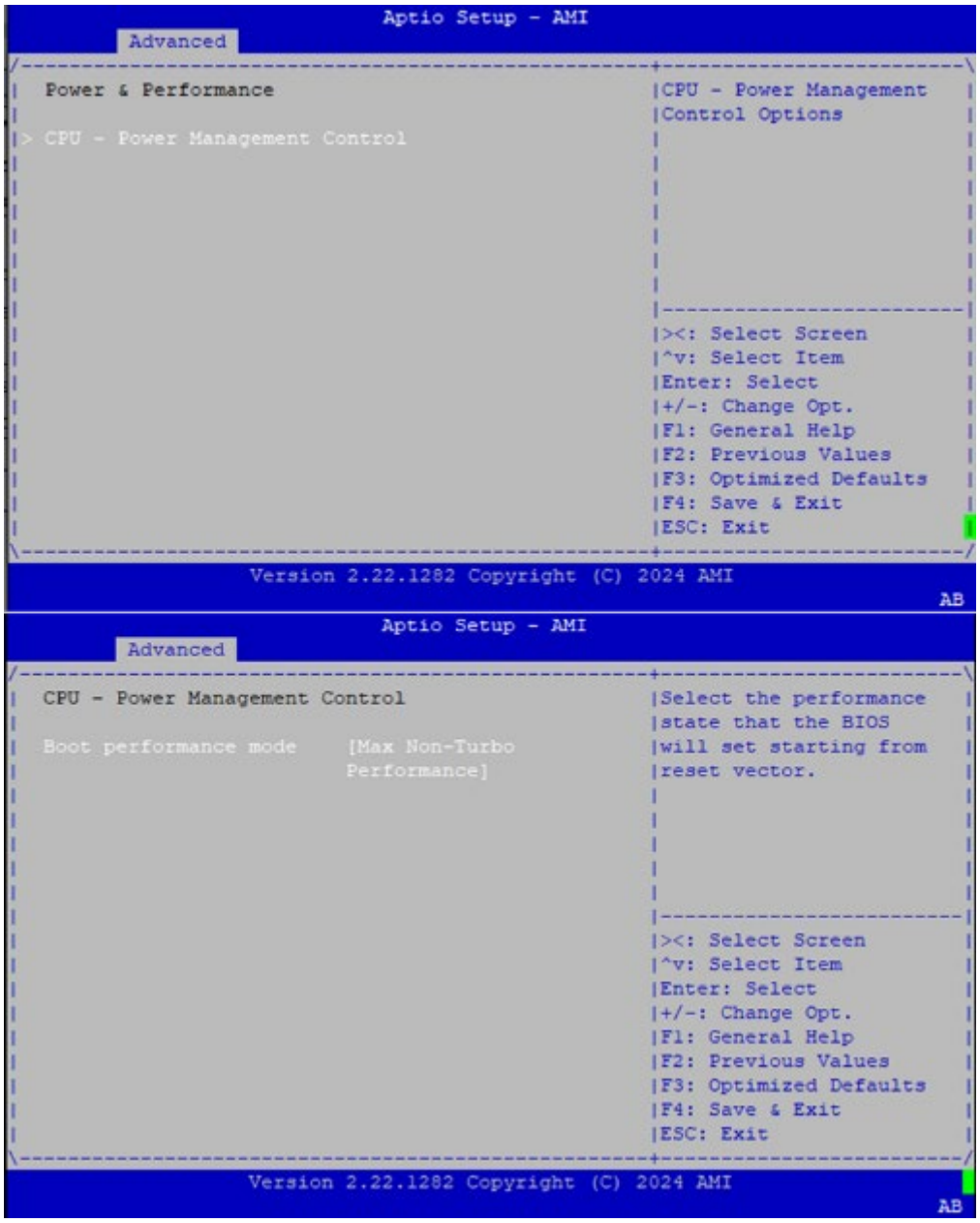




Feature	Options	Description
Intel (VMX) Virtualization Technology	Enabled Disabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	All 1 2 3	Number of cores to enable in each processor package.
Hyper-Threading	Enabled Disabled	Enable or Disable Hyper-Threading Technology.
BIST	Enabled Disabled	Enable/Disable BIST (Built-In Self-Test) on reset

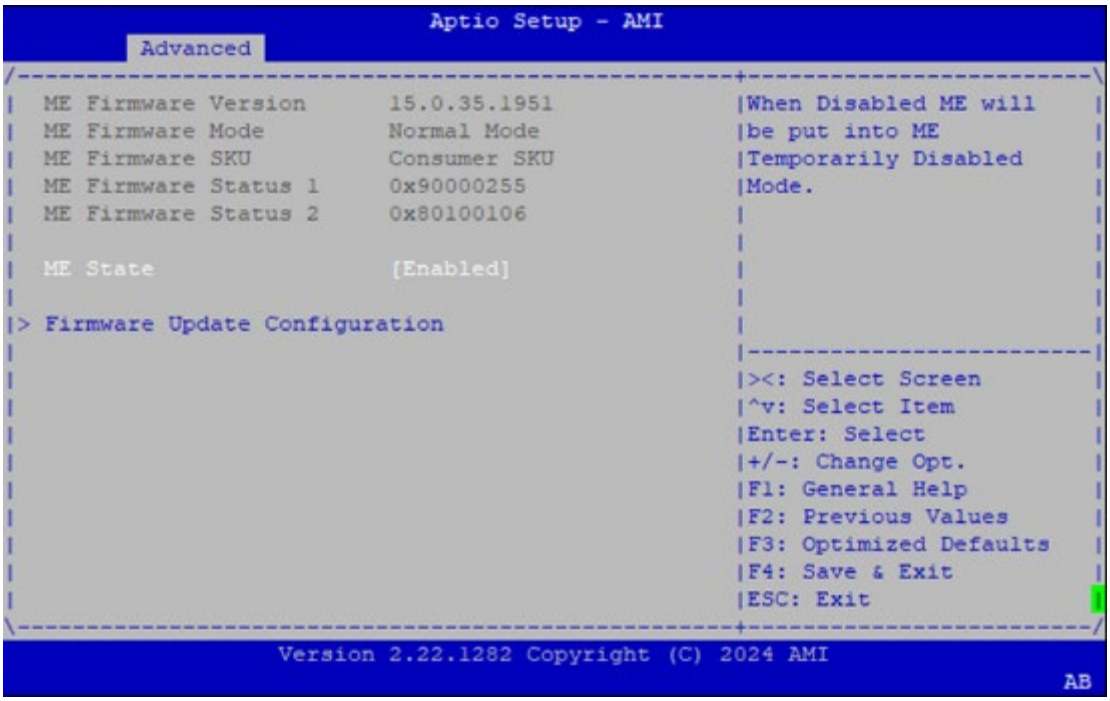
Power & Performance

CPU – Power Management Control



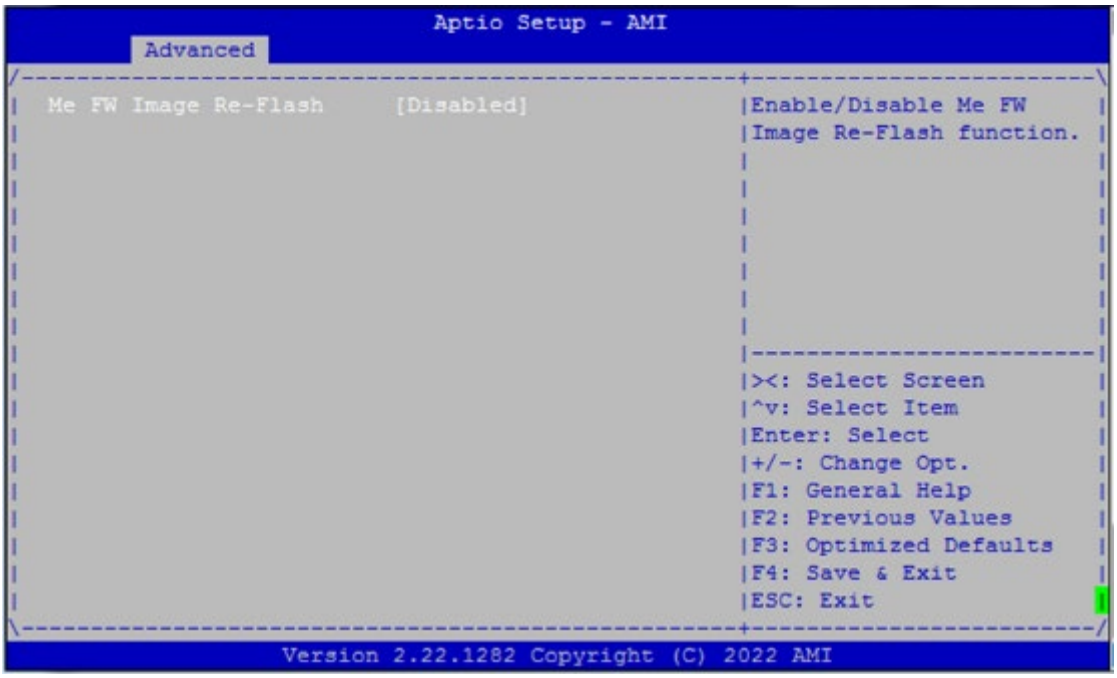
Feature	Options	Description
Boot performance mode	Max Battery Max Non-Turbo Performance Turbo Performance	Select the performance state that the BIOS will set starting from reset vector.

PCH-FW Configuration



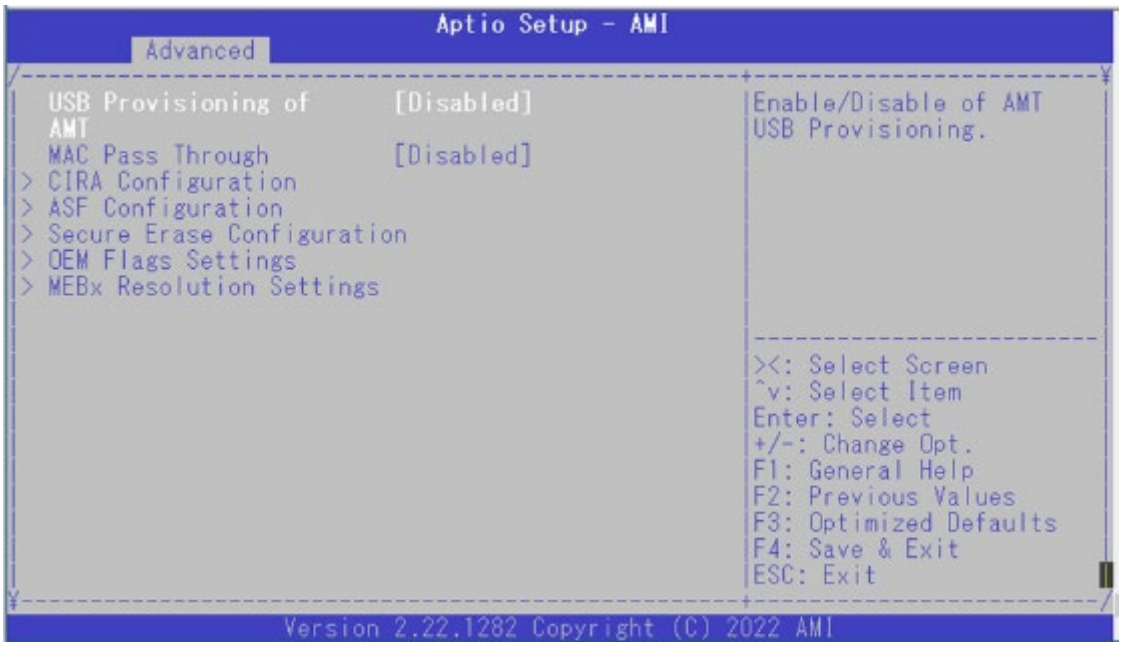
Feature	Options	Description
ME State	Enabled Disabled	When Disabled ME will be put into ME Temporarily Disabled Mode.

Firmware Update Configuration



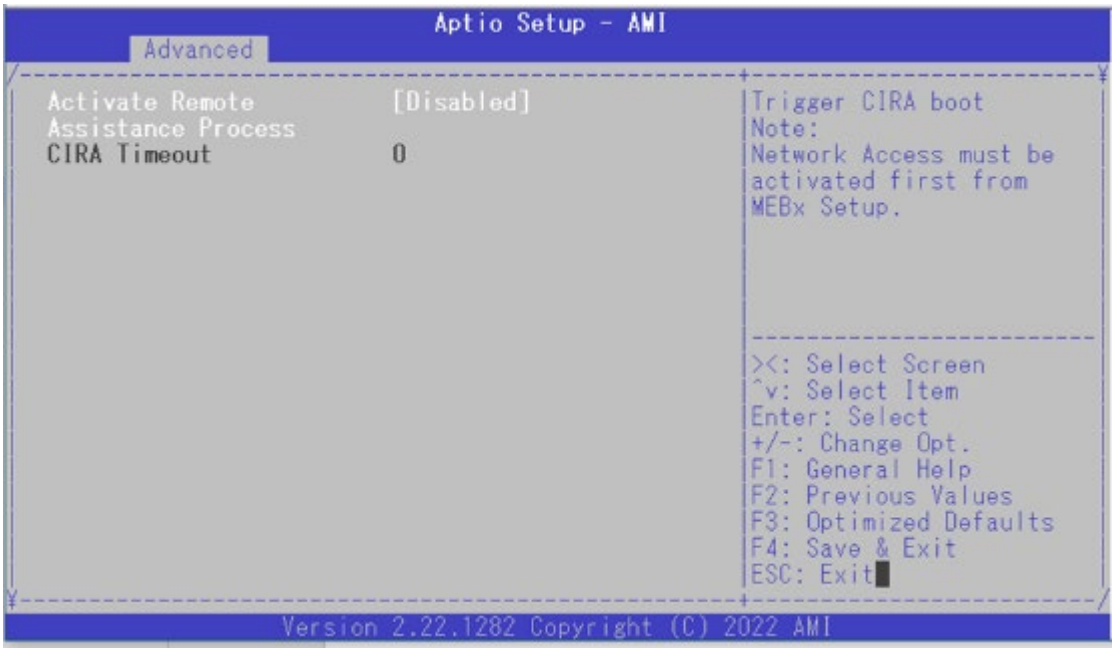
Feature	Options	Description
ME FW Image Re-Flash	Enabled Disabled	Enable/Disable ME FW Image Re-Flash function.

AMT Configuration



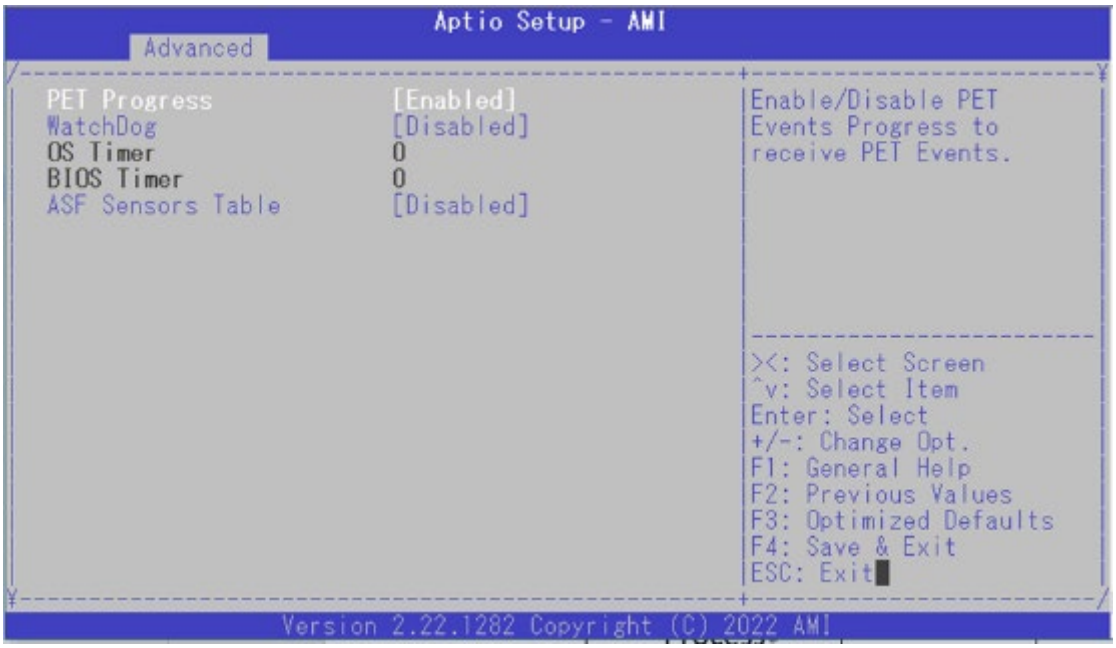
Feature	Options	Description
USB Provisioning of AMT	Enabled Disabled	Enable/Disable of AMT USB Provisioning.
MAC Pass Through	Enabled Disabled	Enable/Disable MAC Pass Through function.

CIRA Configuration



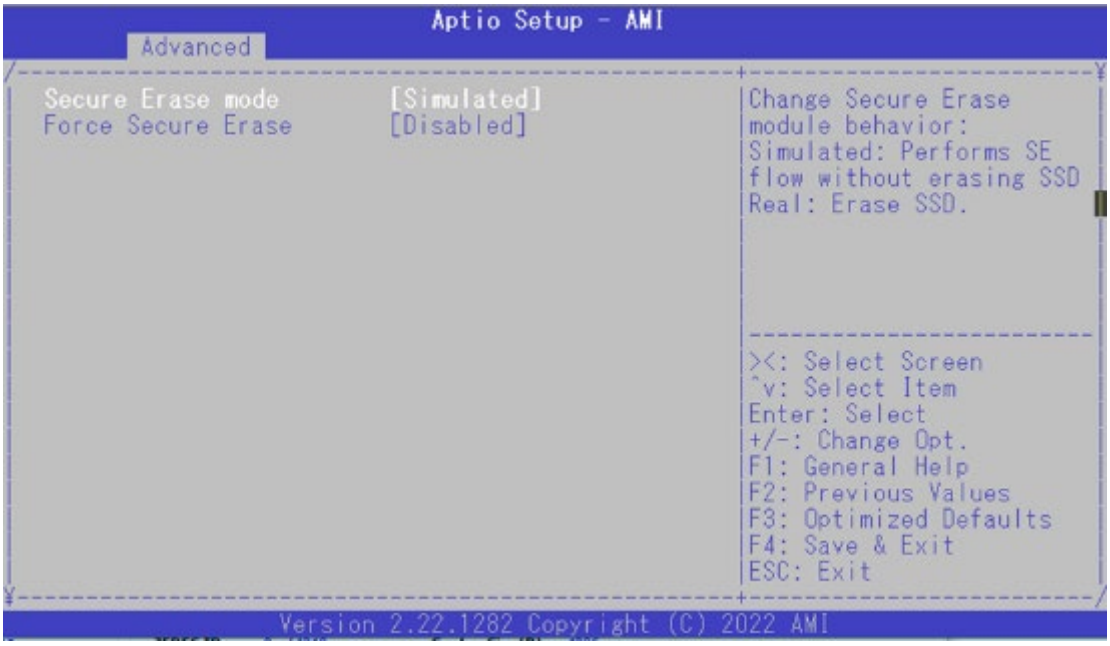
Feature	Options	Description
Activate Remote Assistance Process	Enabled Disabled	Trigger CIRA boot\n\nNote:\nNetwork Access must be activated first from MEBx Setup.

ASF Configuration



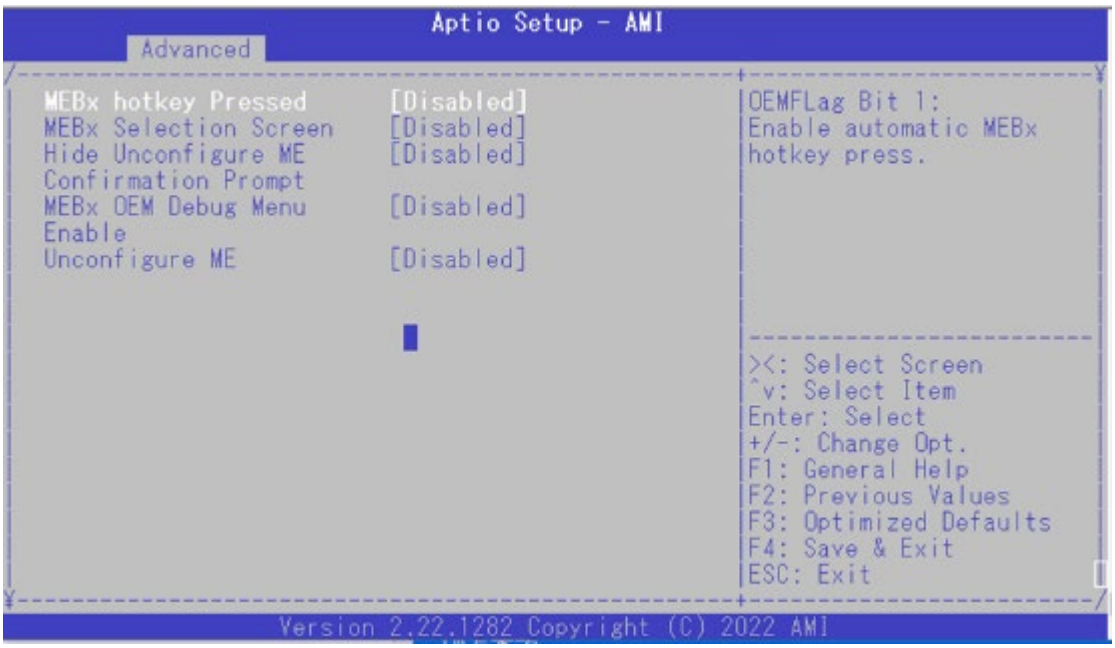
Feature	Options	Description
PET Progress	Enabled Disabled	Enable/Disable PET Events Progress to receive PET Events.
WatchDog	Enabled Disabled	Enable/Disable WatchDog Timer.
ASF Sensors Table	Enabled Disabled	Adds ASF Sensor Table into ASF! ACPI Table

Secure Erase Configuration



Feature	Options	Description
Secure Erase mode	Simulated Real	Change Secure Erase module behavior: Simulated: Performs SE flow without erasing SSD Real: Erase SSD.
Force Secure Erase	Enabled Disabled	Force Secure Erase on next boot

OEM Flags Settings

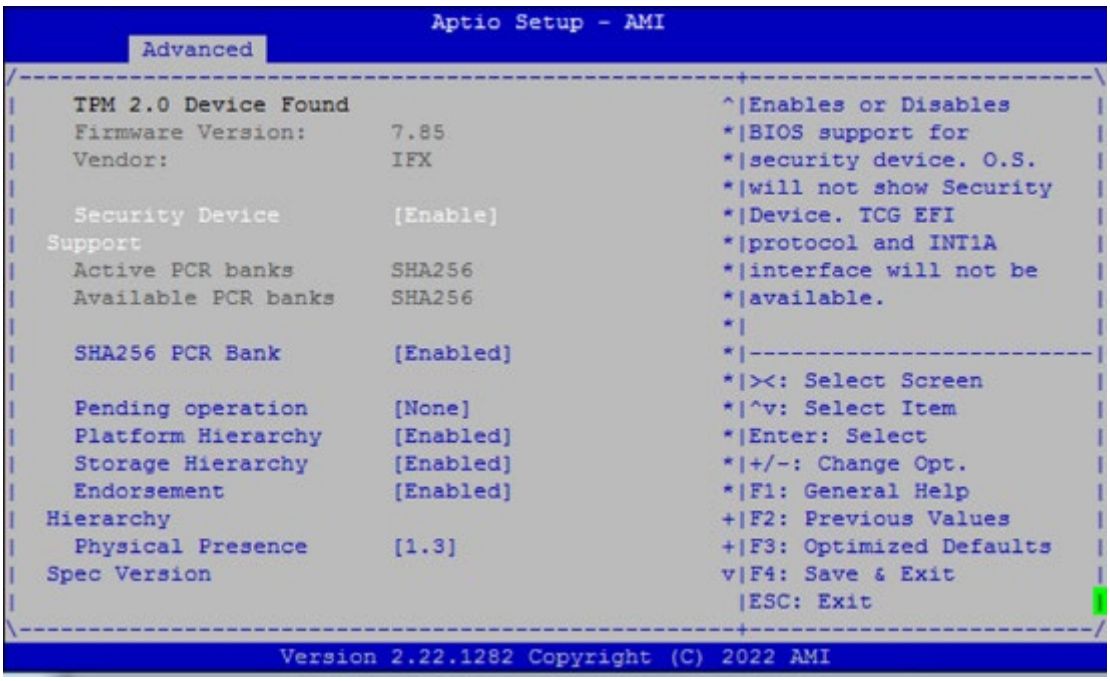


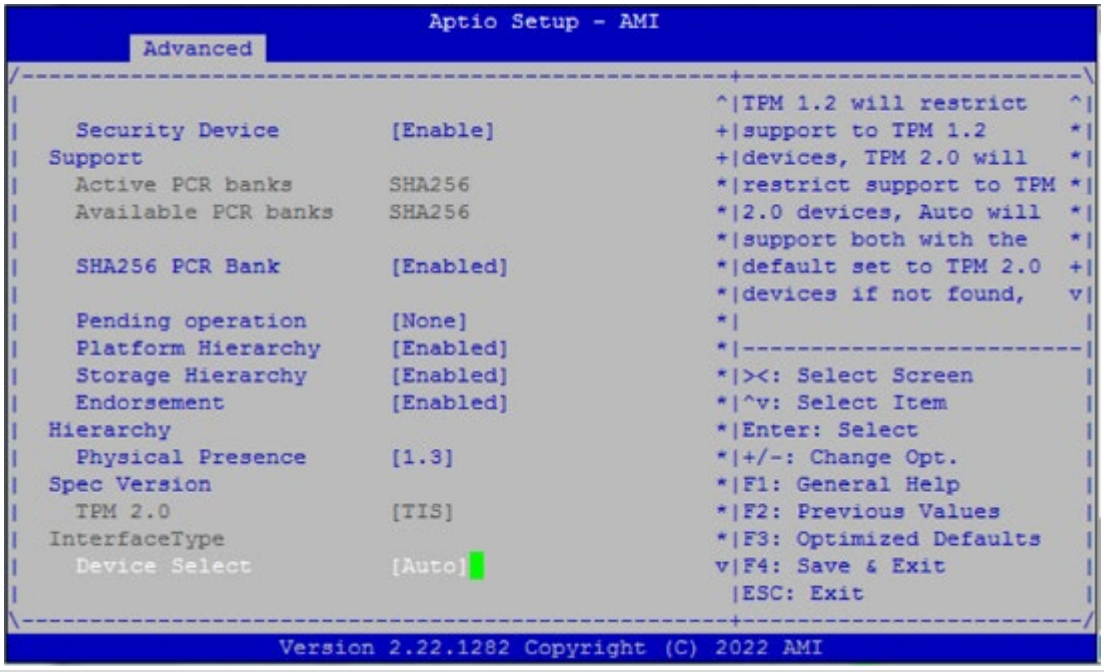
Feature	Options	Description
MEBx hotkey Pressed	Enabled Disabled	OEMFLag Bit 1:Enable automatic MEBx hotkey press.
MEBx Selection Screen	Enabled Disabled	OEMFLag Bit 2: Enable MEBx selection screen with 2 options: Press 1 to enter ME Configuration Screens Press 2 to initiate a remote connection Note: Network Access must be activated from MEBx Setup for this screen to be displayed.
Hide Unconfigure ME Confirmation Prompt	Enabled Disabled	OEMFlag Bit 6: Hide Unconfigure ME confirmation prompt when attempting ME unconfiguration.
MEBx OEM Debug Menu Enable	Enabled Disabled	OEMFlag Bit 14: Enable OEM debug menu in MEBx.
Unconfigure ME	Enabled Disabled	OEMFlag Bit 15: Unconfigure ME with resetting MEBx password to default."

MEBx Resolution Settings

Feature	Options	Description
Non-UI Mode Resolution	Auto 80x25 100x31	Resolution for non-UI text mode.
UI Mode Resolution	Auto 80x25 100x31	Resolution for UI text mode.
Graphics Mode Resolution	Auto 640x480 800x600 1024x768	Resolution for graphics mode.

Trusted Computing

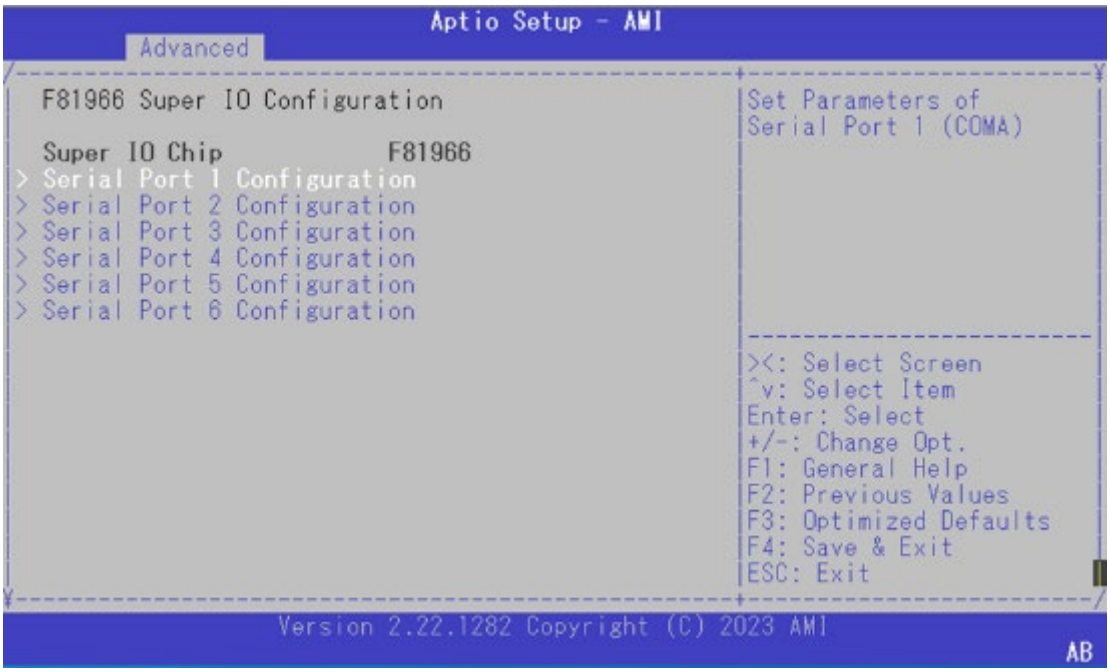




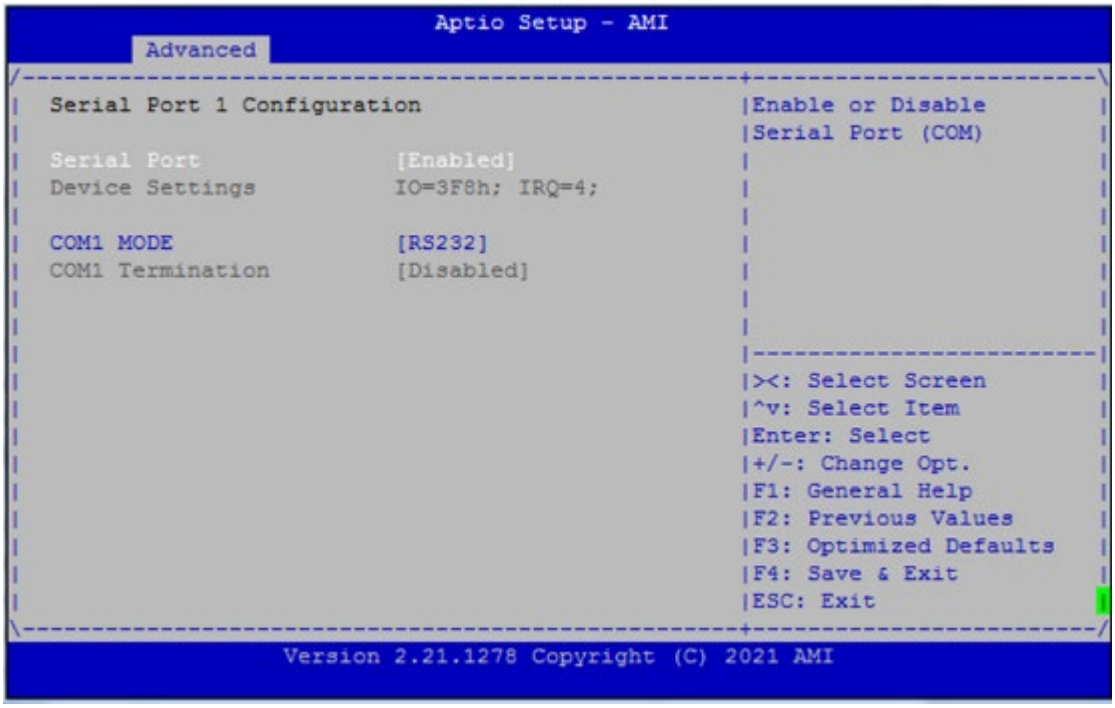
Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA256 PCR Bank	Enabled Disabled	Enables or Disables SHA256 PCR Bank.
Pending Operation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

Storage Hierarchy	Enabled Disabled	Enables or disables Storage Hierarchy.
Endorsement Hierarchy	Enabled Disabled	Enables or disables Endorsement Hierarchy.
Physical Presence Spec Version	1.2 1.3	Select to tell OS to support PPI Spec Version 1.2 or 1.3. NOTE: Some HCK tests might not support 1.3.
Device Select	TPM 1.2 TPM 2.0 Auto	**TPM 1.2** will restrict support to TPM 1.2 devices; while **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.

F81966 Super IO Configuration

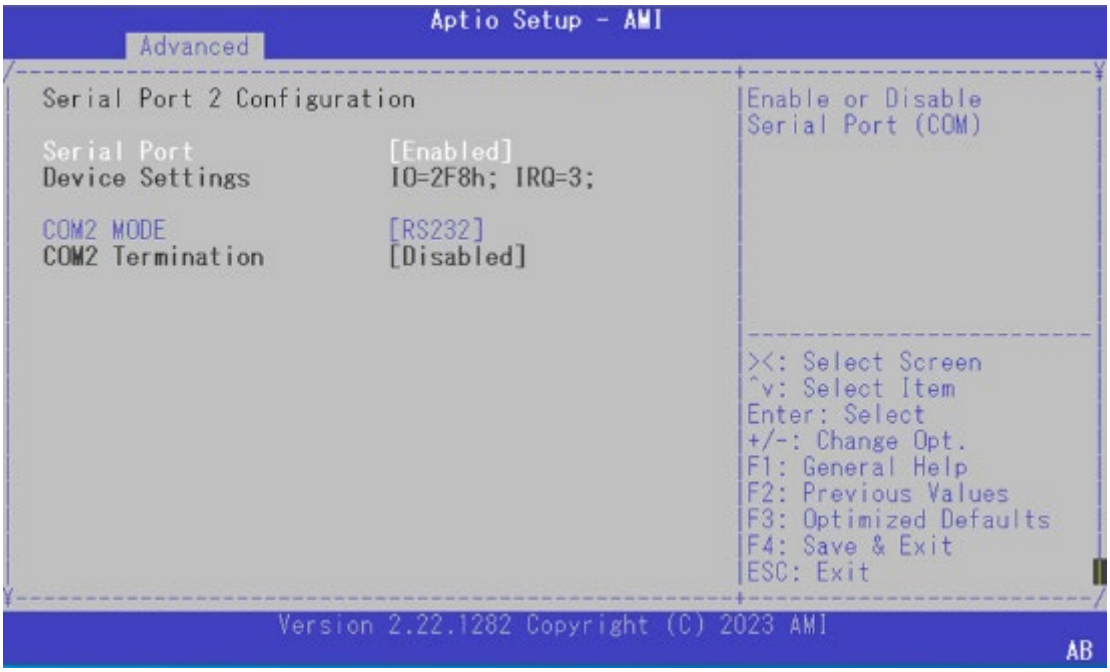


Serial Port 1 Configuration



Feature	Options	Description
Serial Port	Enabled Disabled	Enables or Disables Serial Port (COM)
Device Settings	NA	IO=3F8h; IRQ = 4
COM1 MODE	Loopback RS232 RS485 Half Duplex RS485/422 Full Duplex	Select Com Mode as RS232/RS485
COM1 Termination	Enabled Disabled	COM RS-422/485 Receiver Termination

Serial Port 2 Configuration

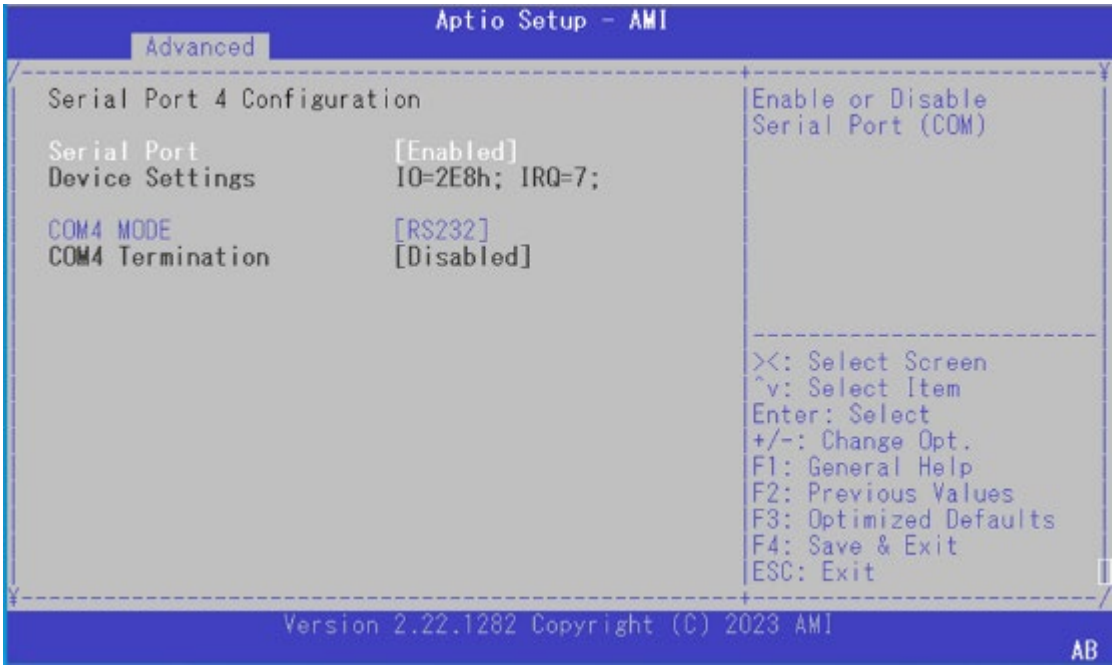


Feature	Options	Description
Serial Port	Enabled Disabled	Enables or Disables Serial Port (COM)
Device Settings	NA	IO=2F8h; IRQ = 3
COM2 MODE	Loopback RS232 RS485 Half Duplex RS485/422 Full Duplex	Select Com Mode as RS232/RS485
COM2 Termination	Enabled Disabled	COM RS-422/485 Receiver Termination

Serial Port 3 Configuration

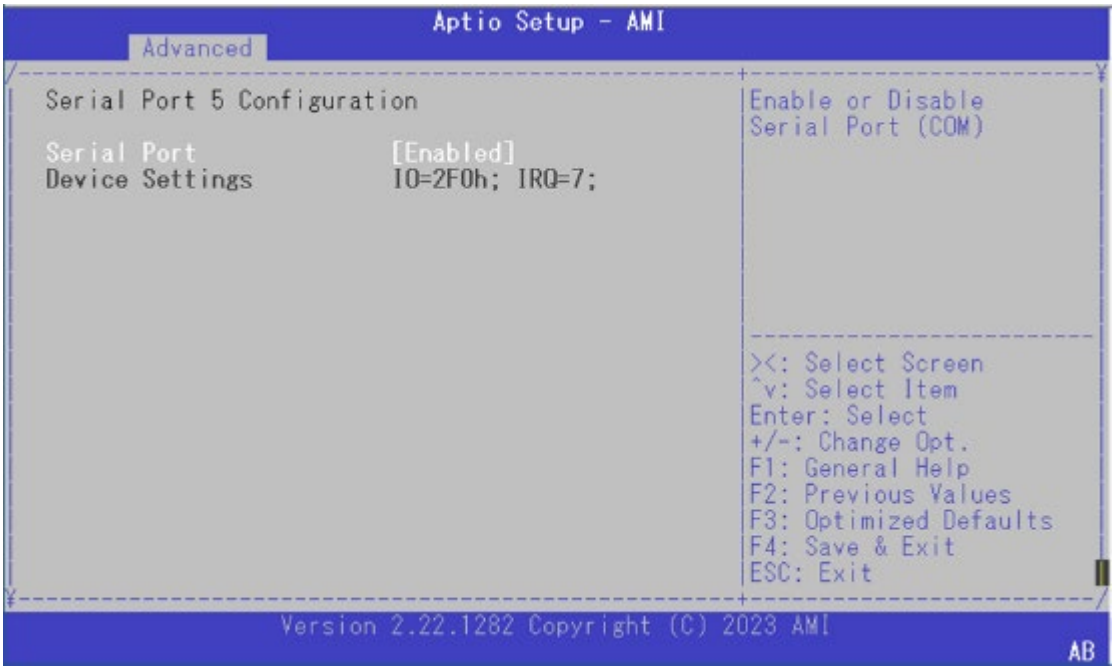
Feature	Options	Description
Serial Port	Enabled Disabled	Enables or Disables Serial Port (COM)
Device Settings	NA	IO=3E8h; IRQ = 7
COM3 MODE	Loopback RS232 RS485 Half Duplex RS485/422 Full Duplex	Select Com Mode as RS232/RS485
COM3 Termination	Enabled Disabled	COM RS-422/485 Receiver Termination

Serial Port 4 Configuration



Feature	Options	Description
Serial Port	Enabled Disabled	Enables or Disables Serial Port (COM)
Device Settings	NA	IO=2E8h; IRQ = 7
COM4 MODE	Loopback RS232 RS485 Half Duplex RS485/422 Full Duplex	Select Com Mode as RS232/RS485
COM4 Termination	Enabled Disabled	COM RS-422/485 Receiver Termination

Serial Port 5 Configuration

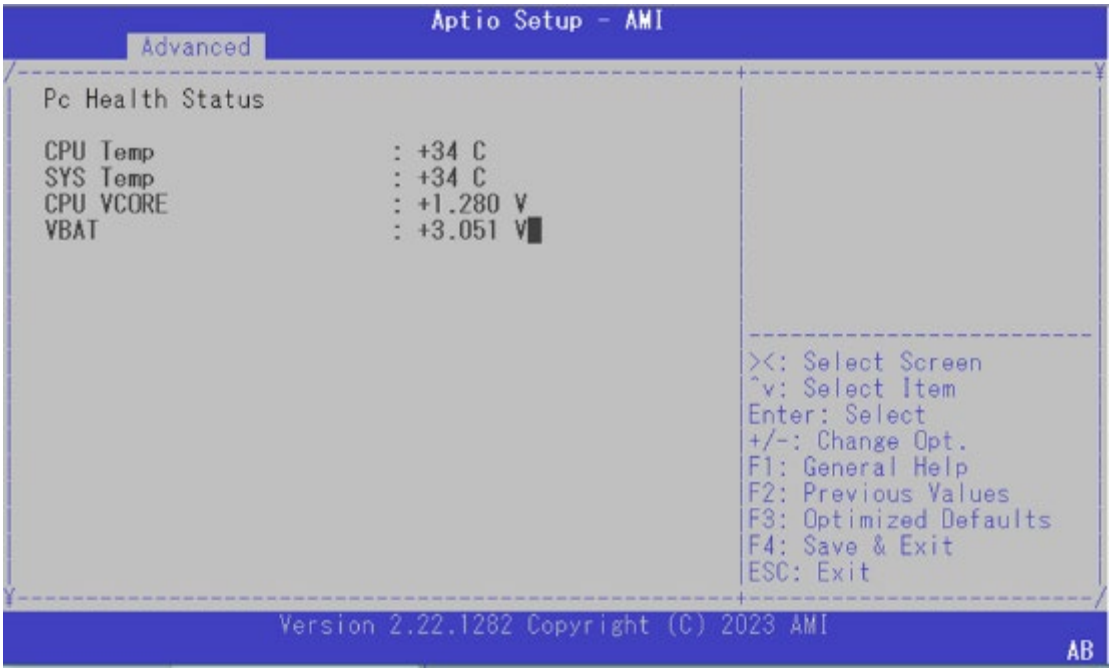


Feature	Options	Description
Serial Port	Enabled Disabled	Enables or Disables Serial Port (COM)
Device Settings	NA	IO=2F0h; IRQ = 7

Serial Port 6 Configuration

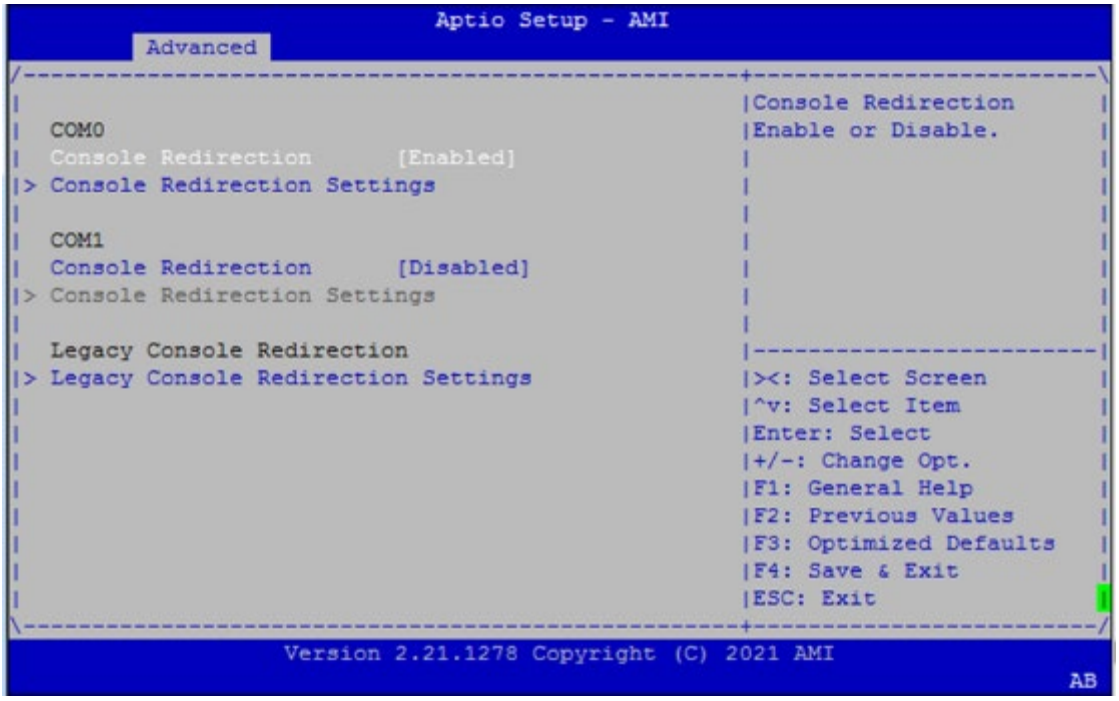
Feature	Options	Description
Serial Port	Enabled Disabled	Enables or Disables Serial Port (COM)
Device Settings	NA	IO=2E0h; IRQ = 7

Hardware Monitor



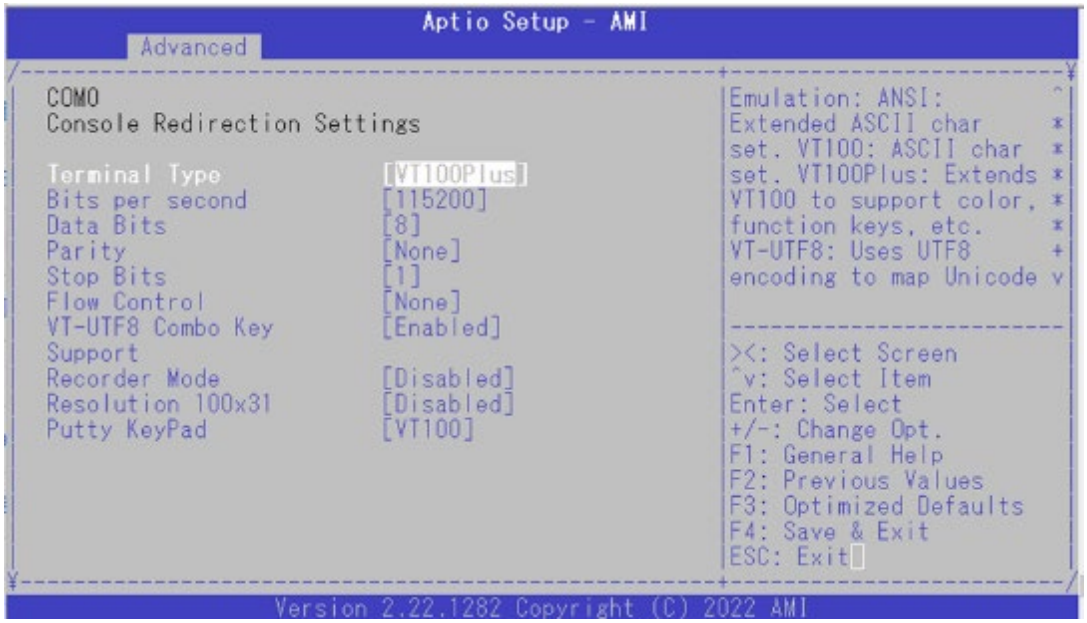
Feature	Description
CPU Temp	This value reports the CPU temperature.
SYS Temp	This value reports the System temperature.
CPU VCORE	This value reports the CPU VCORE.
VBAT	This value reports the VBAT Input voltage.

Serial Port Console Redirection



Feature	Options	Description
COM0 Console Redirection	Enabled Disabled	Enables or disables Console Redirection
COM1 Console Redirection	Enabled Disabled	Enables or disables Console Redirection

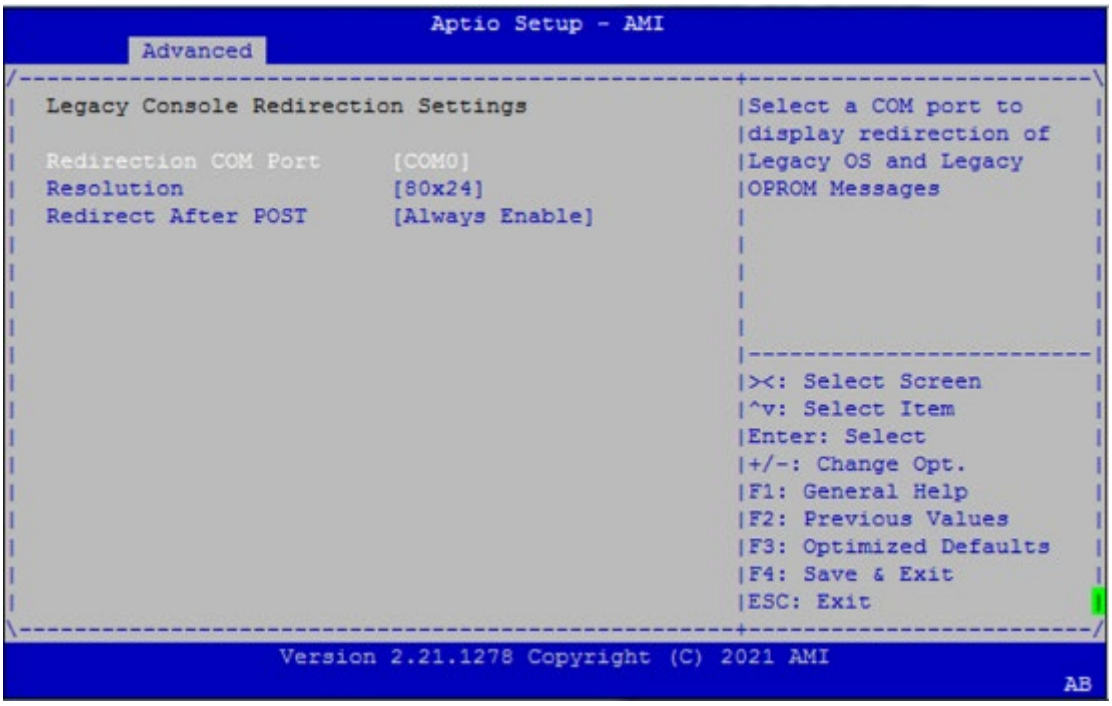
Console Redirection Settings



Feature	Options	Description
Terminal Type	VT100 VT100Plus VT-UTF8 ANSI	ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: 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.
Stop Bits	1 2	Stop bits indicate the end of a serial data packet.
Flow Control	None Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow.
VT-UTF8 Combo Key Support	Disabled Enabled	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals

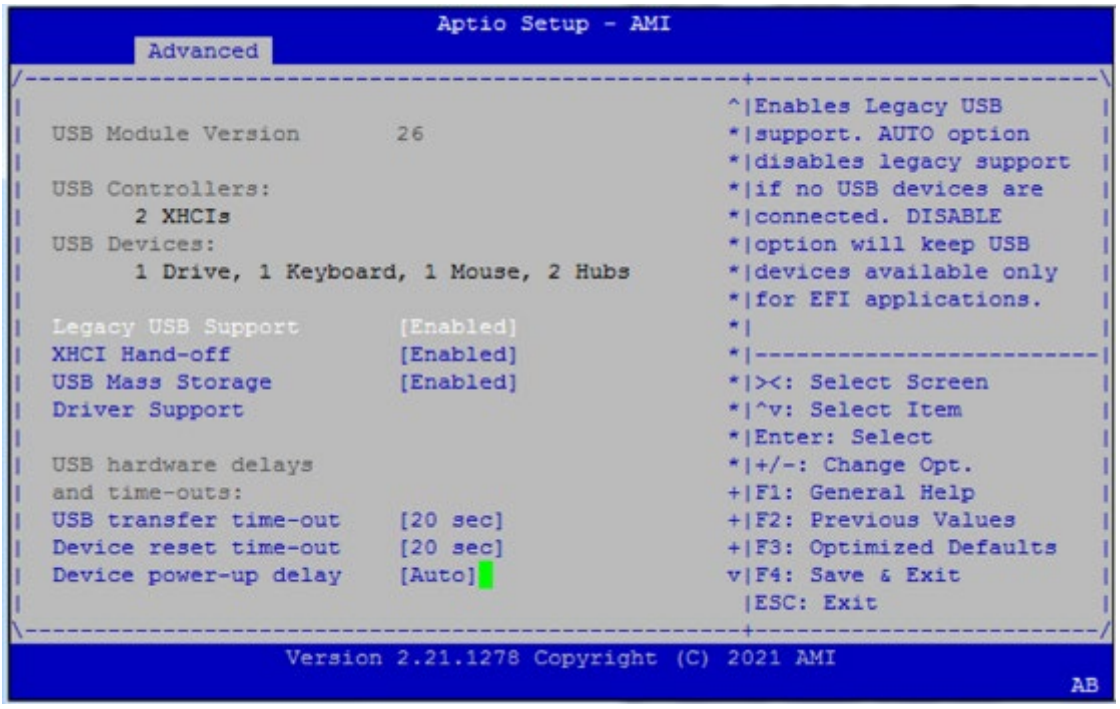
Recorder Mode	Disabled Enabled	With this mode enabled only text will be sent. This is to capture Terminal data.
Resolution 100x31	Disabled Enabled	Enables or disables extended terminal resolution.
Putty KeyPad	VT100 LINUX XTERM86 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

Legacy Console Redirection Settings



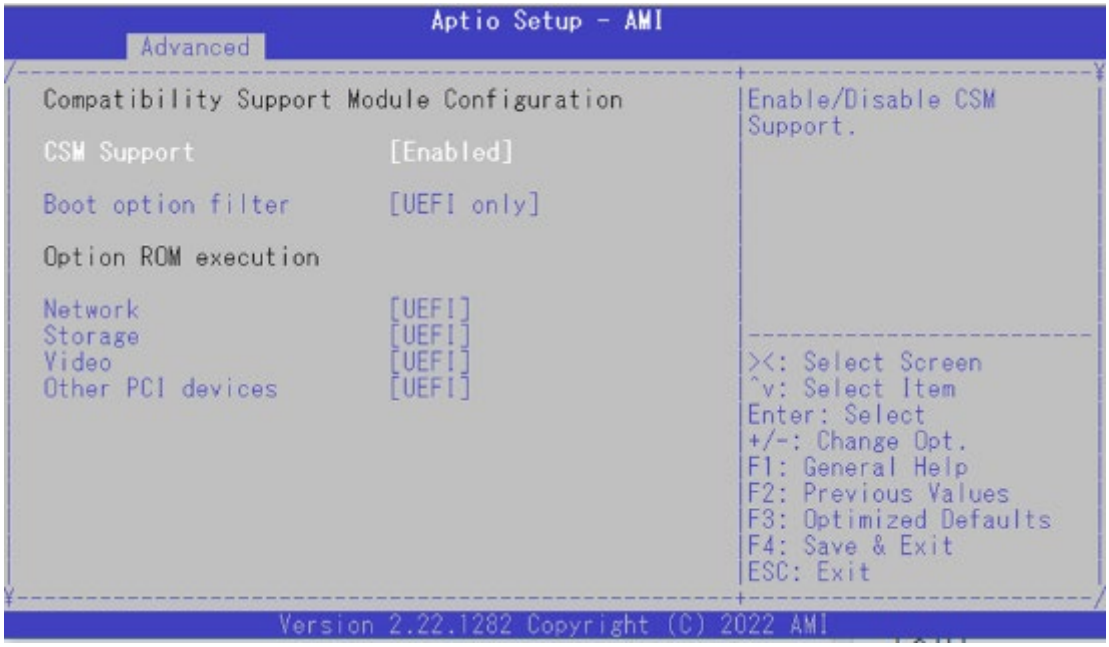
Feature	Options	Description
Redirection COM Port	COM0 COM1	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages
Resolution	80x24 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
Redirection After POST	Always Enable BootLoader	When Bootloader is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to Always Enable.

USB Configuration



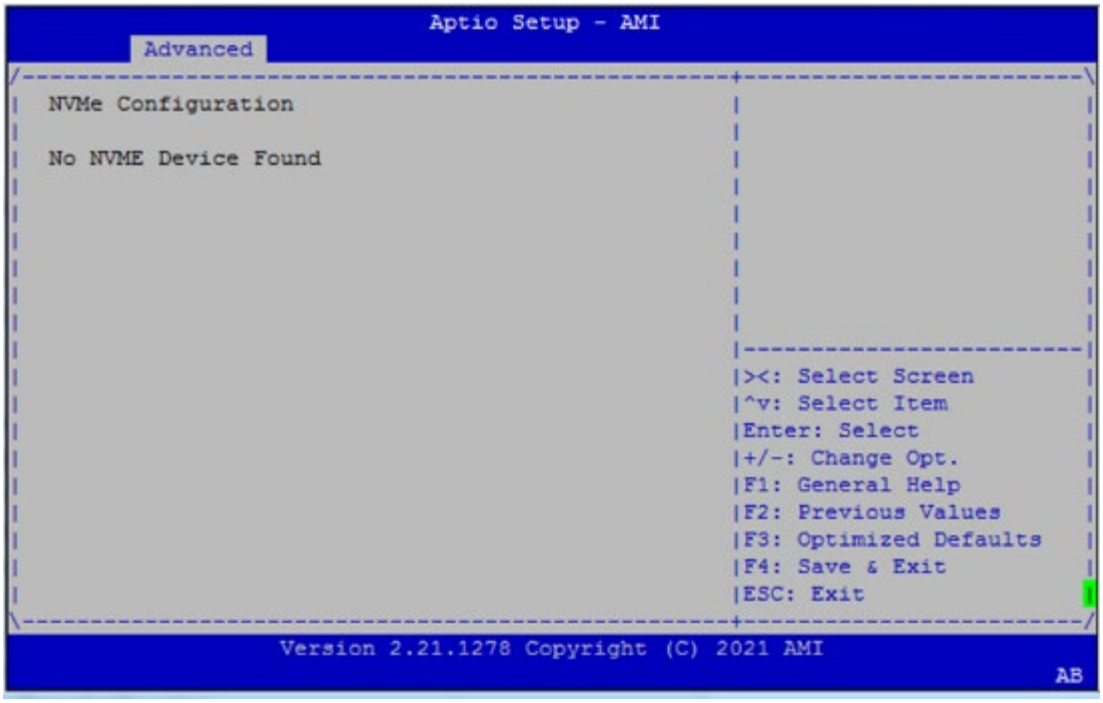
Feature	Options	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB support. **Auto** option disables legacy support if no USB devices are connected; **Disabled** option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled Disabled	This is a workaround 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.

CSM Configuration



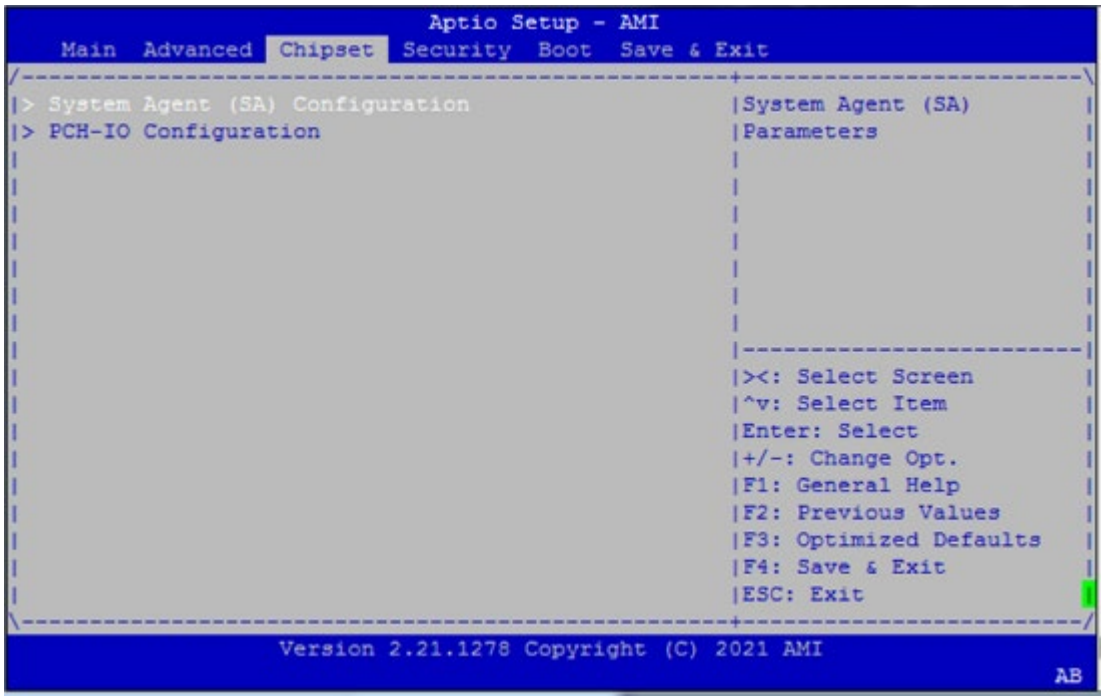
Feature	Options	Description
CSM Support	Disabled Enabled	Enables or disables CSM Support
Boot option filter	UEFI and Legacy Legacy only UEFI only	This option controls Legacy/UEFI ROMs priority
Network	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Video OpROM
Other PCI device	Do Not Launch UEFI Legacy	Determines OpROM execution policy for devices other than Network, Storage, or Video

NVMe Configuration

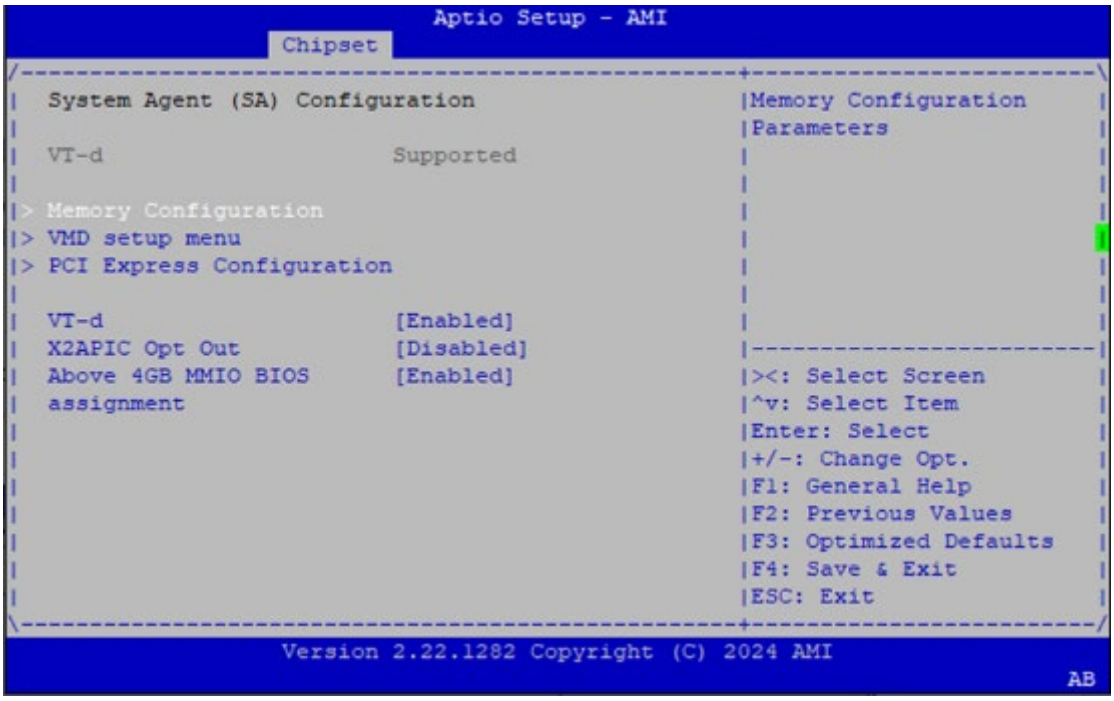


Chipset Page

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

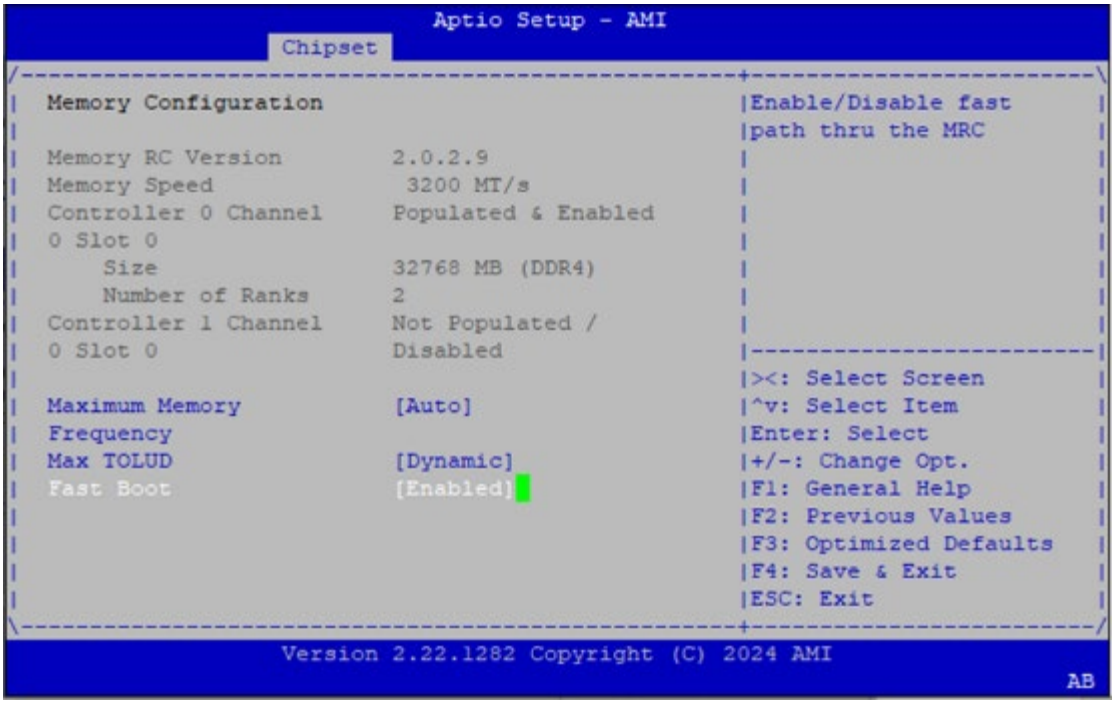


System Agent (SA) Configuration



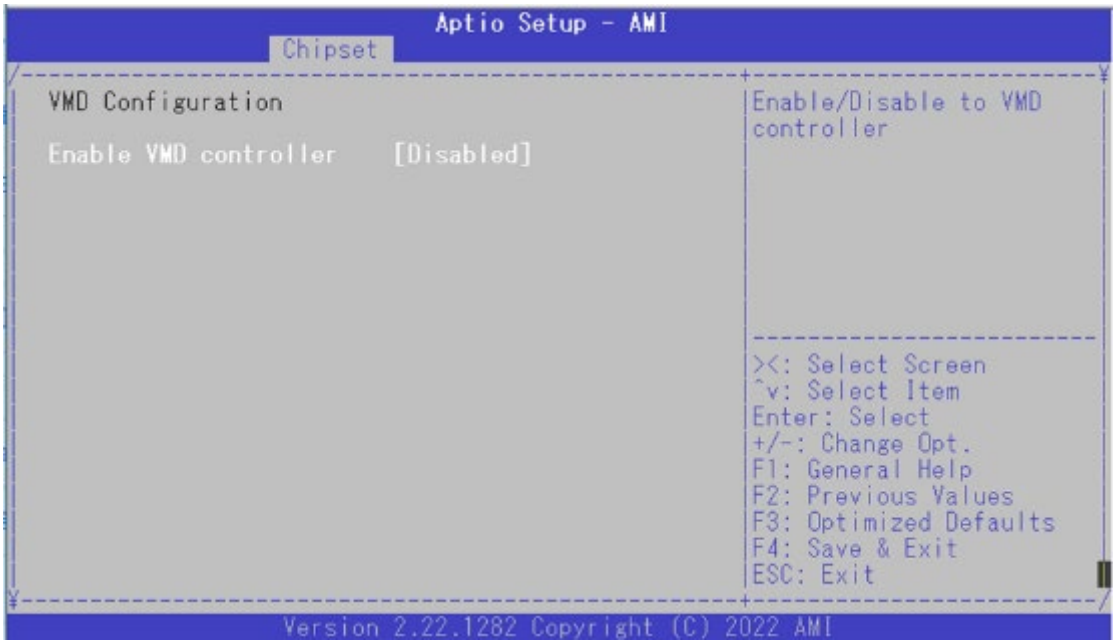
Feature	Options	Description
VT-d	Enabled Disabled	VT-d capability
X2APIC Opt Out	Enabled Disabled	Enable/Disable X2APIC_OPT_OUT bit
Above 4GB MMIO BIOS assignment	Enabled Disabled	Enable/Disable above 4GB MemoryMappedIO BIOS assignment This is disabled automatically when Aperture Size is set to 2048MB

Memory Configuration



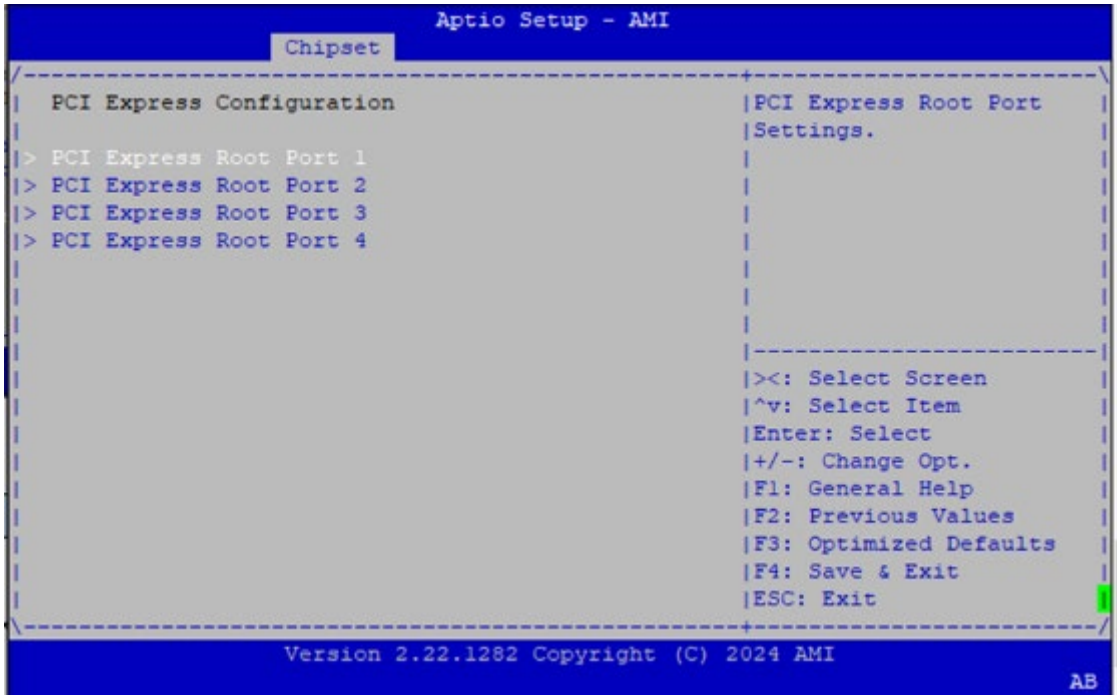
Feature	Options	Description
Maximum Memory Frequency	Auto 1067 ~ 8400	Maximum Memory |Frequency Selections in Mhz.
Max TOLUD	Dynamic 1 GB ~ 3.5 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller
Fast Boot	Disabled Enabled	Enable/Disable fast path thru the MRC

VMD Configuration

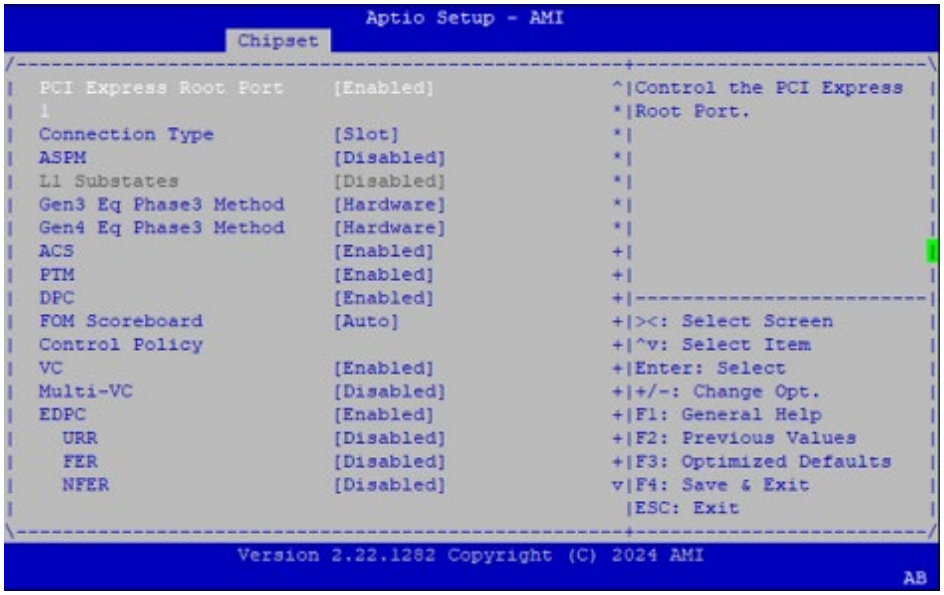


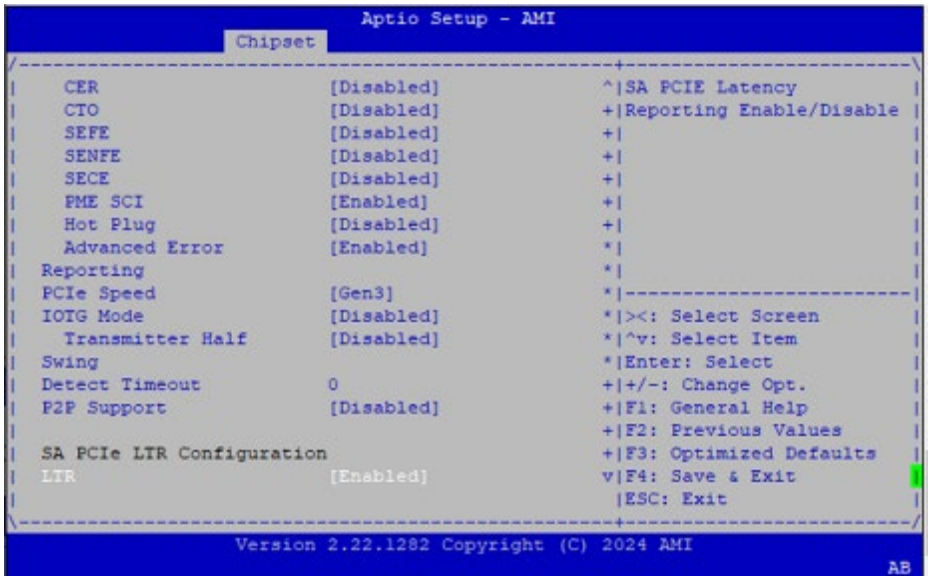
Feature	Options	Description
Enable VMD controller	Enabled Disabled	Enable/Disable to VMD controller

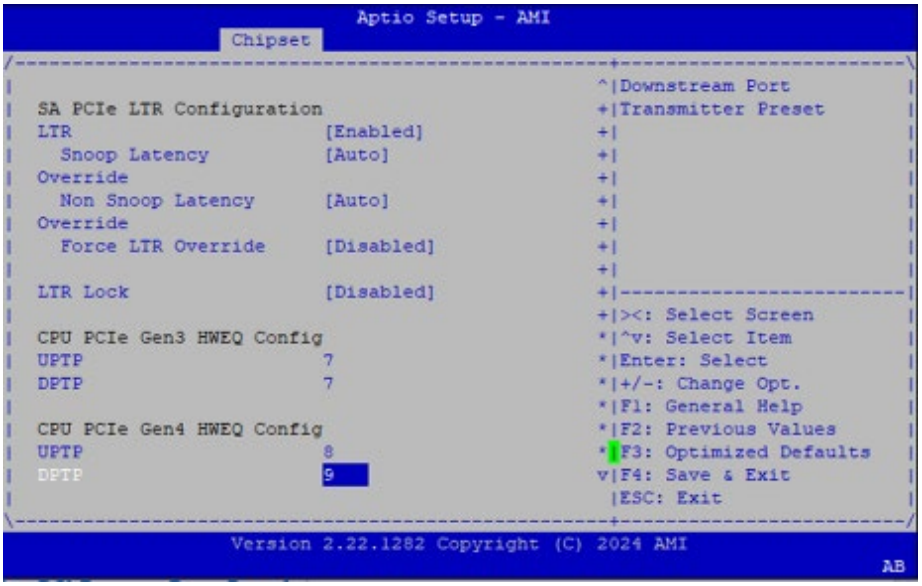
PCI Express Configuration



PCI Express Root Port 1



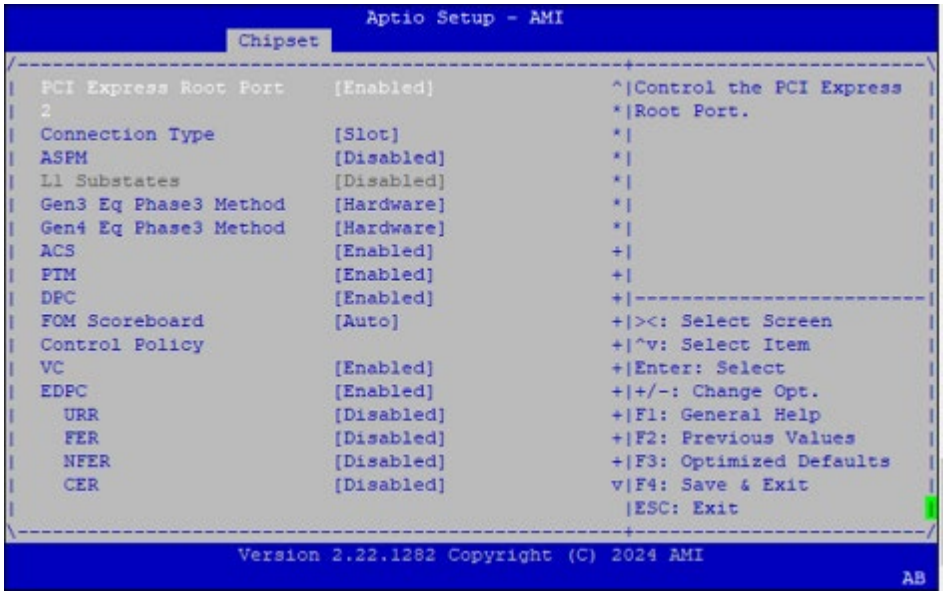


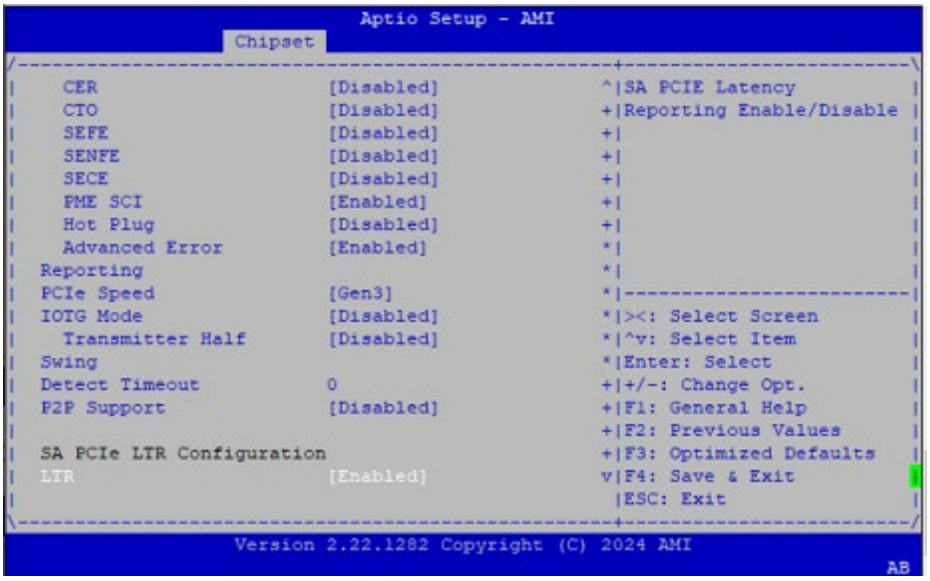


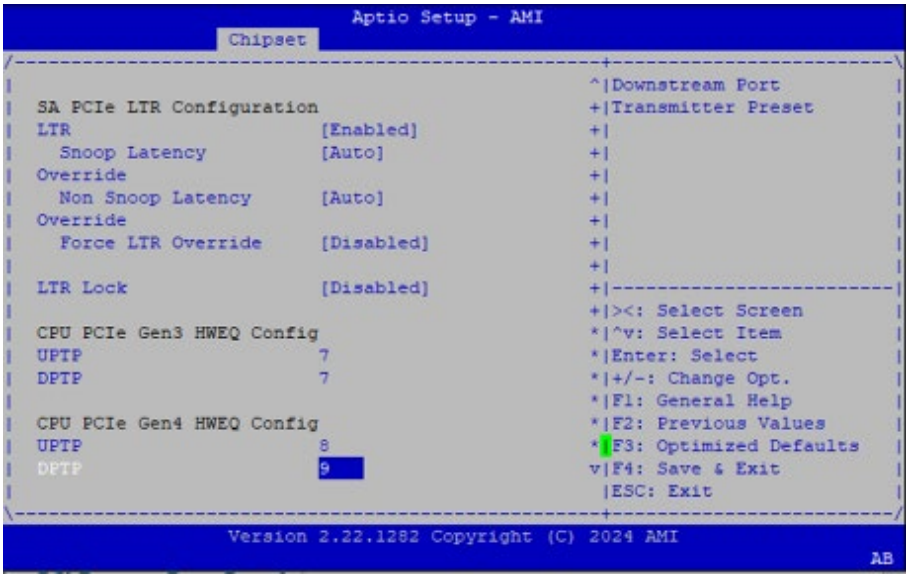
Feature	Options	Description
PCI Express Root Port	Enabled Disabled	Control the PCI Express Root Port.
Connection Type	Slot Build-in	Built-In: a built-in device is connected to this rootport. Slot Implemented bit will be clear. Slot: this rootport connects to user-accessible slot. Slot Implemented
ASPM	Enabled Disabled	Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
Gen3 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen3 Equalization Phase 3 Method
Gen4 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen4 Equalization Phase 3 Method
ACS	Enabled Disabled	Enable/Disable Access Control Services Extended Capability
PTM	Enabled Disabled	Enable/Disable Precision Time Measurement
DPC	Enabled Disabled	Enable/Disable Downstream Port Containment
FOM Scoreboard Control Policy	Auto Gen3 Gen4 Gen3/Gen4	Select the FOM Scoreboard Control Policy, when set to Auto, speed is based on TLS
VC	Enabled Disabled	Enable/Disable Virtual Channel
Multi-VC	Enabled Disabled	Enable/Disable Multi Virtual Channel
EDPC	Enabled Disabled	Enable/Disable Rootport extensions for Downstream Port Containment
URR	Enabled Disabled	PCI Express Unsupported Request Reporting Enable/Disable.
FER	Enabled Disabled	PCI Express Device Fatal Error Reporting Enable/Disable.
NFER	Enabled Disabled	PCI Express Device Non-Fatal Error Reporting Enable/Disable.
CER	Enabled Disabled	PCI Express Device Correctable Error Reporting |Enable/Disable.
CTO	Enabled Disabled	PCI Express Completion Timer TO Enable/Disable.

SEFE	Enabled Disabled	Root PCI Express System Error on Fatal Error Enable/Disable.
SENFE	Enabled Disabled	Root PCI Express System Error on Non-Fatal Error Enable/Disable.
SECE	Enabled Disabled	Root PCI Express System Error on Correctable Error Enable/Disable.
PME SCI	Enabled Disabled	PCI Express PME SCI Enable/Disable.
Hot Plug	Enabled Disabled	PCI Express Hot Plug Enable/Disable.
Advanced Error Reporting	Enabled Disabled	Advanced Error Reporting Enable/Disable.
PCIe Speed	Auto Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
IOTG Mode	Enabled Disabled	IOTG Mode Enable/Disable
Transmitter Half	Enabled Disabled	Transmitter Half Swing Enable/Disable.
PSP Support	Enabled Disabled	Program P2P Support Registers according to setup option
LTR	Enabled Disabled	SA PCIE Latency Reporting Enable/Disable
Snoop Latency Override	Disabled Manual Auto	Snoop Latency Override for SA PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto (default): Maintain default BIOS
Non Snoop Latency Override	Disabled Manual Auto	Non Snoop Latency Override for SA PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto (default): Maintain default BIOS.
Force LTR Override	Enabled Disabled	Force LTR Override for SA PCIE. Disabled: LTR override values will not be forced. Enable: LTR override values will be forced and LTR messages from
LTR Lock	Enabled Disabled	PCIE LTR Configuration Lock

PCI Express Root Port 2



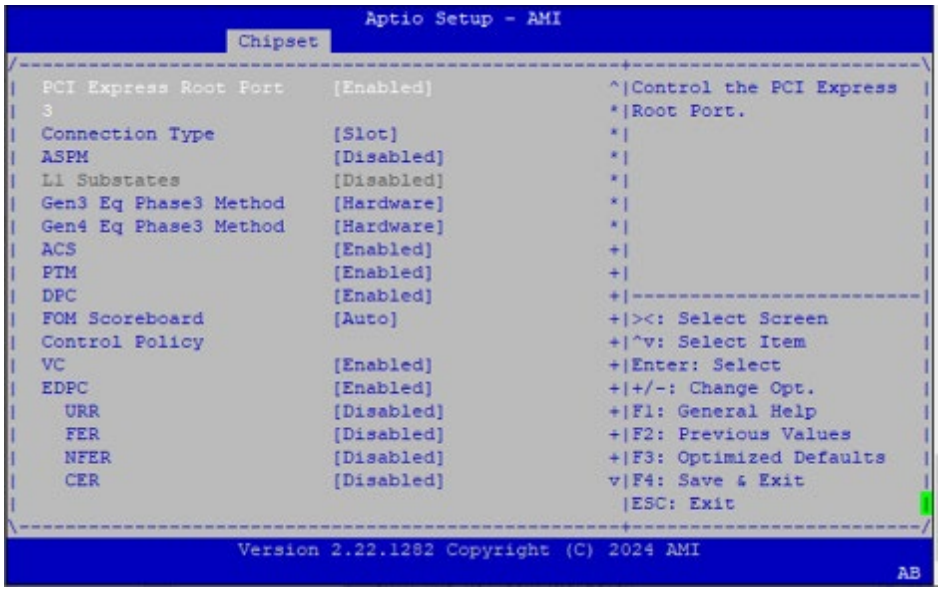


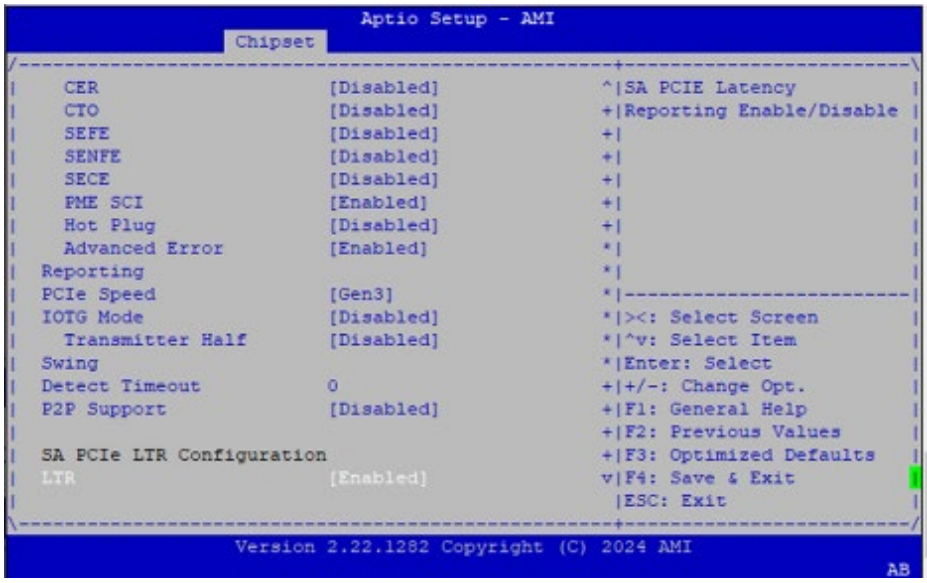


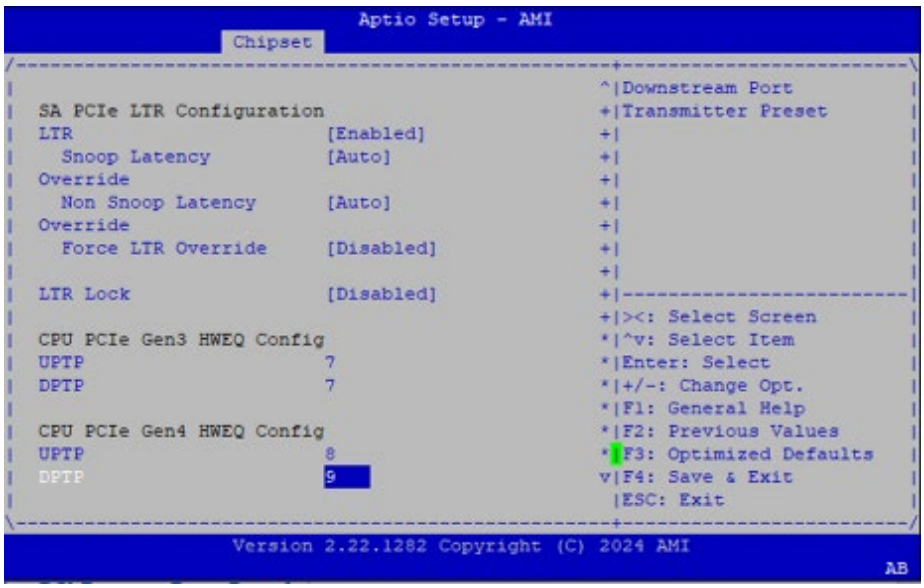
Feature	Options	Description
PCI Express Root Port	Enabled Disabled	Control the PCI Express Root Port.
Connection Type	Slot Build-in	Built-In: a built-in device is connected to this rootport. Slot Implemented bit will be clear. Slot: this rootport connects to user-accessible slot. Slot Implemented
ASPM	Enabled Disabled	Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
Gen3 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen3 Equalization Phase 3 Method
Gen4 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen4 Equalization Phase 3 Method
ACS	Enabled Disabled	Enable/Disable Access Control Services Extended Capability
PTM	Enabled Disabled	Enable/Disable Precision Time Measurement
DPC	Enabled Disabled	Enable/Disable Downstream Port Containment
FOM Scoreboard Control Policy	Auto Gen3 Gen4 Gen3/Gen4	Select the FOM Scoreboard Control Policy, when set to Auto, speed is based on TLS
VC	Enabled Disabled	Enable/Disable Virtual Channel
EDPC	Enabled Disabled	Enable/Disable Rootport extensions for Downstream Port Containment
URR	Enabled Disabled	PCI Express Unsupported Request Reporting Enable/Disable.
FER	Enabled Disabled	PCI Express Device Fatal Error Reporting Enable/Disable.
NFER	Enabled Disabled	PCI Express Device Non-Fatal Error Reporting Enable/Disable.
CER	Enabled Disabled	PCI Express Device Correctable Error Reporting |Enable/Disable.
CTO	Enabled Disabled	PCI Express Completion Timer TO Enable/Disable.
SEFE	Enabled Disabled	Root PCI Express System Error on Fatal Error Enable/Disable.

SENFE	Enabled Disabled	Root PCI Express System Error on Non-Fatal Error Enable/Disable.
SECE	Enabled Disabled	Root PCI Express System Error on Correctable Error Enable/Disable.
PME SCI	Enabled Disabled	PCI Express PME SCI Enable/Disable.
Hot Plug	Enabled Disabled	PCI Express Hot Plug Enable/Disable.
Advanced Error Reporting	Enabled Disabled	Advanced Error Reporting Enable/Disable.
PCIe Speed	Auto Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
IOTG Mode	Enabled Disabled	IOTG Mode Enable/Disable
Transmitter Half	Enabled Disabled	Transmitter Half Swing Enable/Disable.
PSP Support	Enabled Disabled	Program P2P Support Registers according to setup option
LTR	Enabled Disabled	SA PCIE Latency Reporting Enable/Disable

PCI Express Root Port 3



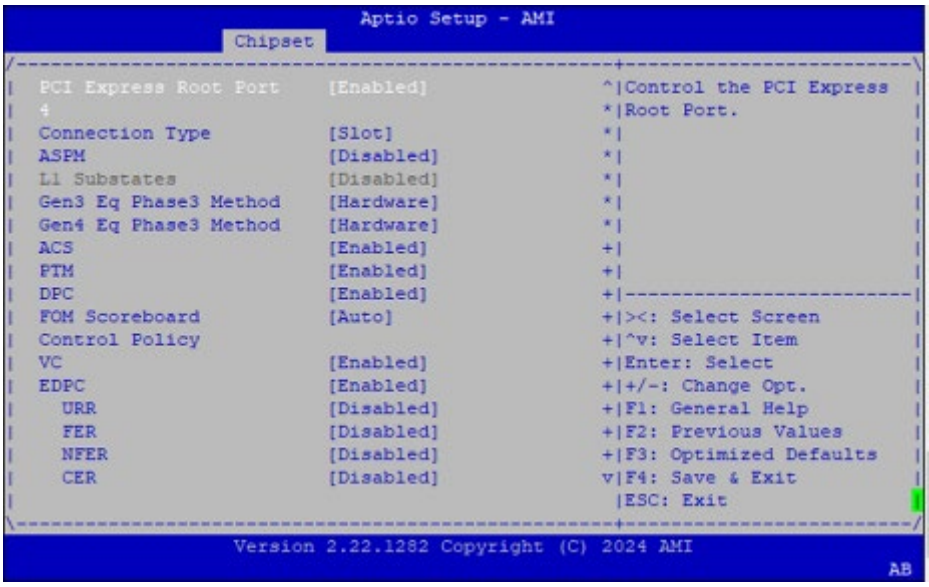


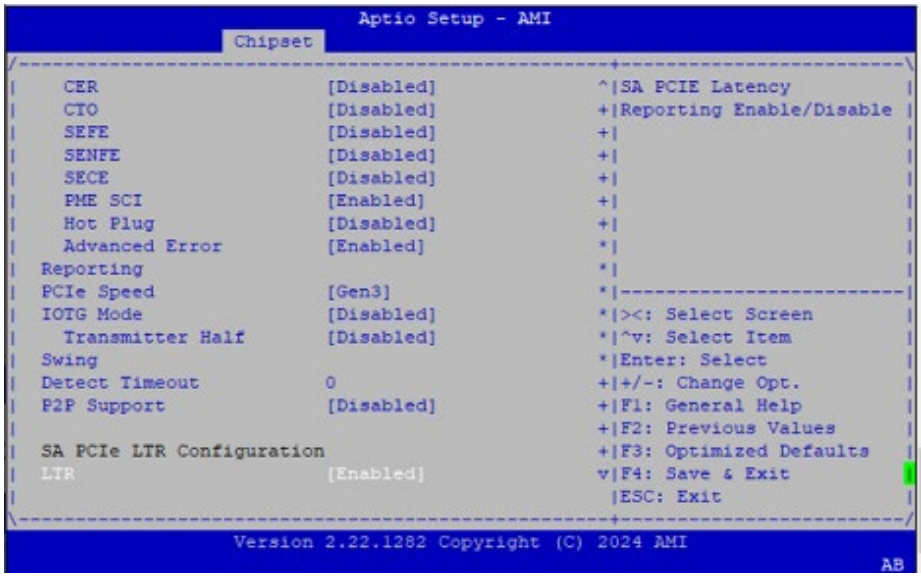


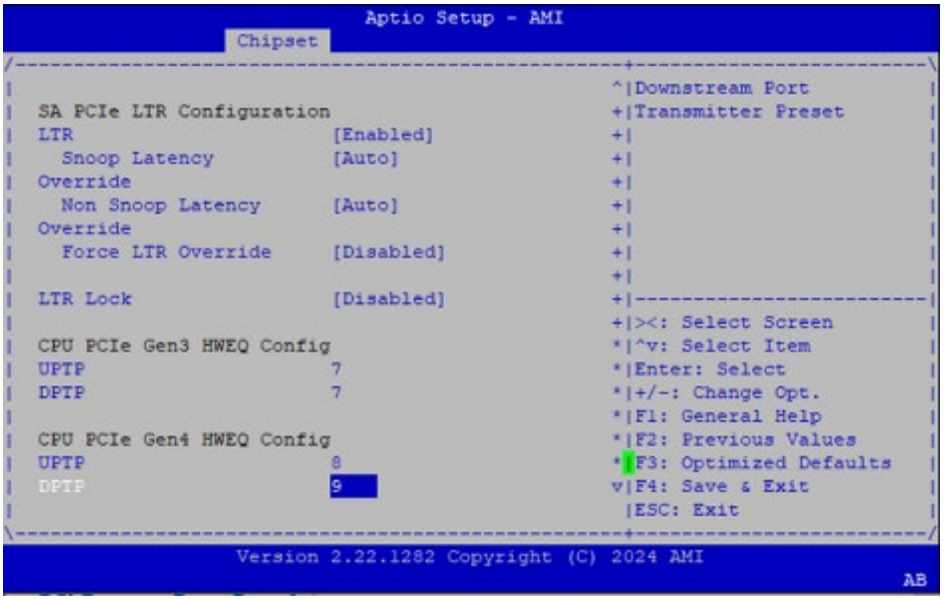
Feature	Options	Description
PCI Express Root Port	Enabled Disabled	Control the PCI Express Root Port.
Connection Type	Slot Build-in	Built-In: a built-in device is connected to this rootport. Slot Implemented bit will be clear. Slot: this rootport connects to user-accessible slot. Slot Implemented
ASPM	Enabled Disabled	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
Gen3 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen3 Equalization Phase 3 Method
Gen4 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen4 Equalization Phase 3 Method
ACS	Enabled Disabled	Enable/Disable Access Control Services Extended Capability
PTM	Enabled Disabled	Enable/Disable Precision Time Measurement
DPC	Enabled Disabled	Enable/Disable Downstream Port Containment
FOM Scoreboard Control Policy	Auto Gen3 Gen4 Gen3/Gen4	Select the FOM Scoreboard Control Policy, when set to Auto, speed is based on TLS
VC	Enabled Disabled	Enable/Disable Virtual Channel
EDPC	Enabled Disabled	Enable/Disable Rootport extensions for Downstream Port Containment
URR	Enabled Disabled	PCI Express Unsupported Request Reporting Enable/Disable.
FER	Enabled Disabled	PCI Express Device Fatal Error Reporting Enable/Disable.
NFER	Enabled Disabled	PCI Express Device Non-Fatal Error Reporting Enable/Disable.
CER	Enabled Disabled	PCI Express Device Correctable Error Reporting |Enable/Disable.
CTO	Enabled Disabled	PCI Express Completion Timer TO Enable/Disable.
SEFE	Enabled Disabled	Root PCI Express System Error on Fatal Error Enable/Disable.

SENFE	Enabled Disabled	Root PCI Express System Error on Non-Fatal Error Enable/Disable.
SECE	Enabled Disabled	Root PCI Express System Error on Correctable Error Enable/Disable.
PME SCI	Enabled Disabled	PCI Express PME SCI Enable/Disable.
Hot Plug	Enabled Disabled	PCI Express Hot Plug Enable/Disable.
Advanced Error Reporting	Enabled Disabled	Advanced Error Reporting Enable/Disable.
PCIe Speed	Auto Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
IOTG Mode	Enabled Disabled	IOTG Mode Enable/Disable
Transmitter Half	Enabled Disabled	Transmitter Half Swing Enable/Disable.
PSP Support	Enabled Disabled	Program P2P Support Registers according to setup option
LTR	Enabled Disabled	SA PCIE Latency Reporting Enable/Disable
Snoop Latency Override	Disabled Manual Auto	Snoop Latency Override for SA PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto (default): Maintain default BIOS
Non Snoop Latency Override	Disabled Manual Auto	Non Snoop Latency Override for SA PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto (default): Maintain default BIOS
Force LTR Override	Enabled Disabled	Force LTR Override for SA PCIE. Disabled: LTR override values will not be forced. Enable: LTR override values will be forced and LTR messages from
LTR Lock	Enabled Disabled	PCIE LTR Configuration Lock

PCI Express Root Port 4



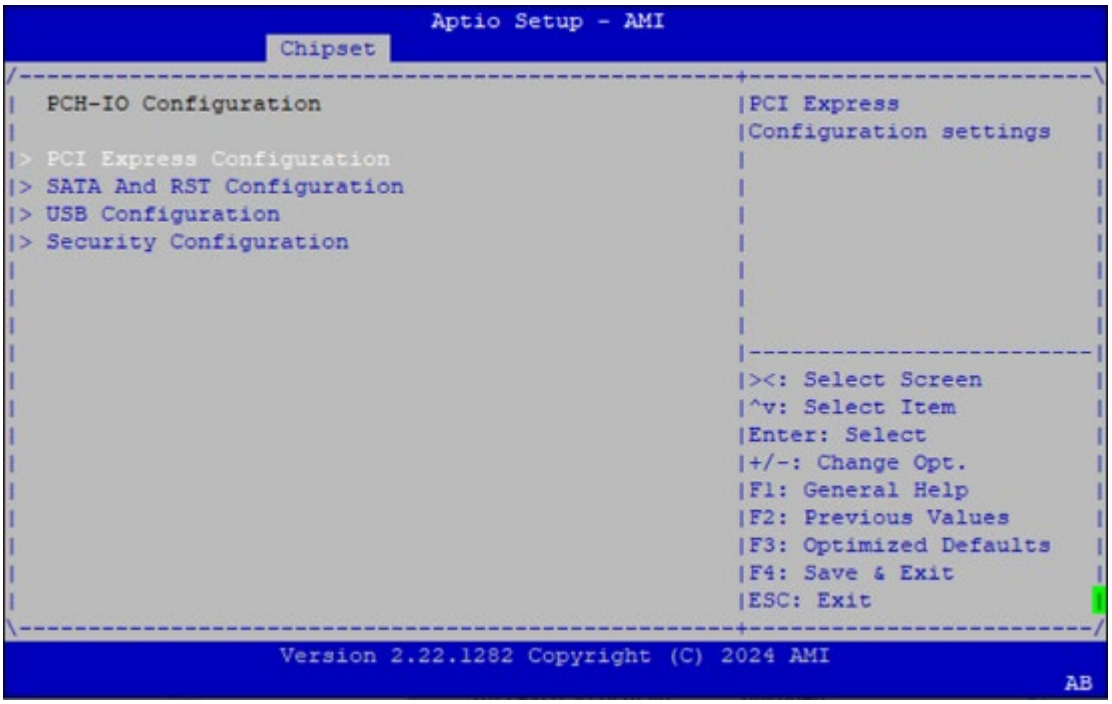




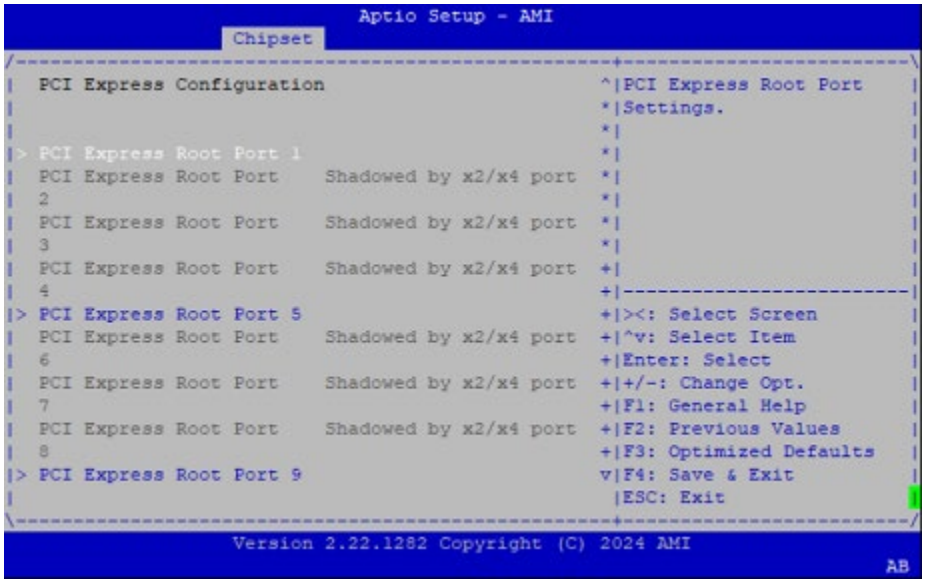
Feature	Options	Description
PCI Express Root Port	Enabled Disabled	Control the PCI Express Root Port.
Connection Type	Slot Build-in	Built-In: a built-in device is connected to this rootport. Slot Implemented bit will be clear. Slot: this rootport connects to user-accessible slot. Slot Implemented
ASPM	Enabled Disabled	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
Gen3 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen3 Equalization Phase 3 Method
Gen4 Eq Phase3 Method	Hardware Static Coeff.	PCIe Gen4 Equalization Phase 3 Method
ACS	Enabled Disabled	Enable/Disable Access Control Services Extended Capability
PTM	Enabled Disabled	Enable/Disable Precision Time Measurement
DPC	Enabled Disabled	Enable/Disable Downstream Port Containment
FOM Scoreboard Control Policy	Auto Gen3 Gen4 Gen3/Gen4	Select the FOM Scoreboard Control Policy, when set to Auto, speed is based on TLS
VC	Enabled Disabled	Enable/Disable Virtual Channel
EDPC	Enabled Disabled	Enable/Disable Rootport extensions for Downstream Port Containment
URR	Enabled Disabled	PCI Express Unsupported Request Reporting Enable/Disable.
FER	Enabled Disabled	PCI Express Device Fatal Error Reporting Enable/Disable.
NFER	Enabled Disabled	PCI Express Device Non-Fatal Error Reporting Enable/Disable.
CER	Enabled Disabled	PCI Express Device Correctable Error Reporting |Enable/Disable.
CTO	Enabled Disabled	PCI Express Completion Timer TO Enable/Disable.
SEFE	Enabled Disabled	Root PCI Express System Error on Fatal Error Enable/Disable.

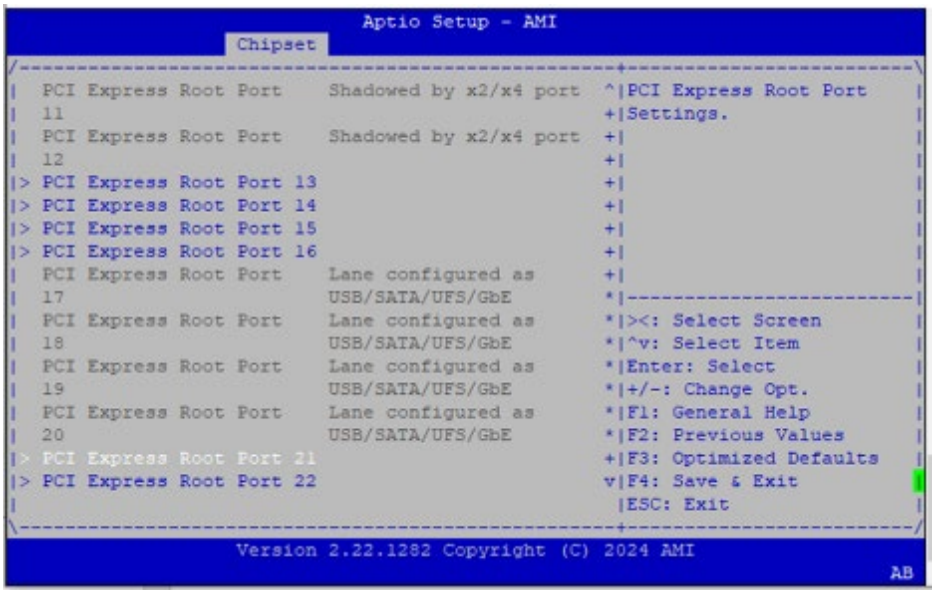
SENFE	Enabled Disabled	Root PCI Express System Error on Non-Fatal Error Enable/Disable.
SECE	Enabled Disabled	Root PCI Express System Error on Correctable Error Enable/Disable.
PME SCI	Enabled Disabled	PCI Express PME SCI Enable/Disable.
Hot Plug	Enabled Disabled	PCI Express Hot Plug Enable/Disable.
PCIe Speed	Auto Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
IOTG Mode	Enabled Disabled	IOTG Mode Enable/Disable
Transmitter Half	Enabled Disabled	Transmitter Half Swing Enable/Disable.
PSP Support	Enabled Disabled	Program P2P Support Registers according to setup option
LTR	Enabled Disabled	SA PCIE Latency Reporting Enable/Disable
Snoop Latency Override	Disabled Manual Auto	Snoop Latency Override for SA PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto (default): Maintain default BIOS
Non Snoop Latency Override	Disabled Manual Auto	Non Snoop Latency Override for SA PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto (default): Maintain default BIOS
Force LTR Override	Enabled Disabled	Force LTR Override for SA PCIE. Disabled: LTR override values will not be forced. Enable: LTR override values will be forced and LTR messages from.
LTR Lock	Enabled Disabled	PCIE LTR Configuration Lock

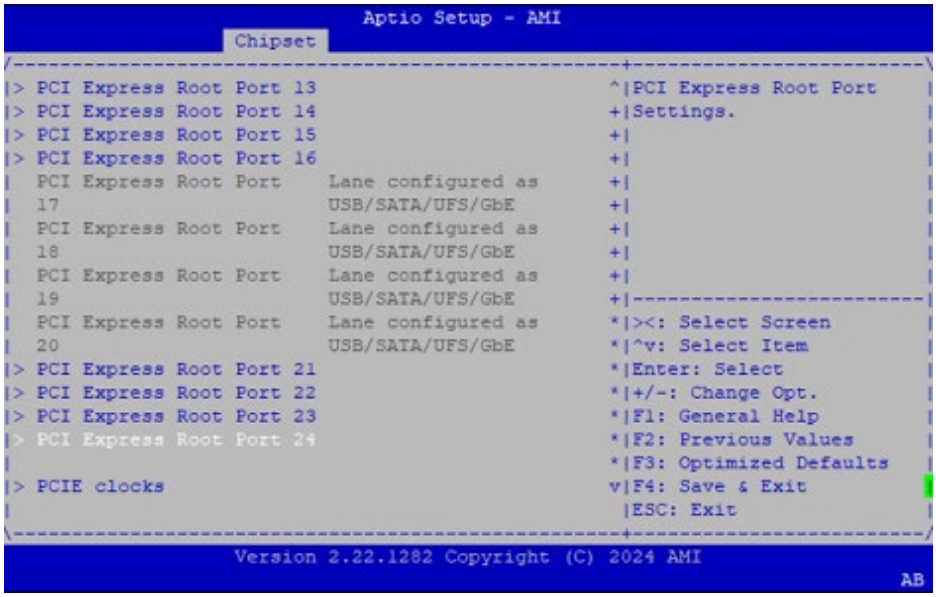
South Bridge



PCI Express Configuration



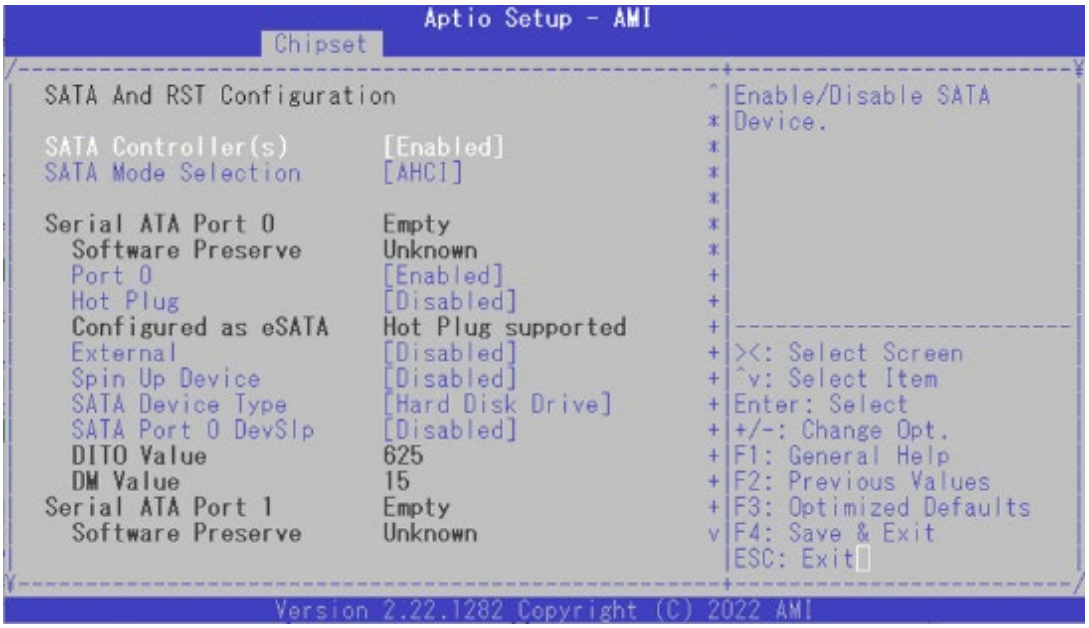


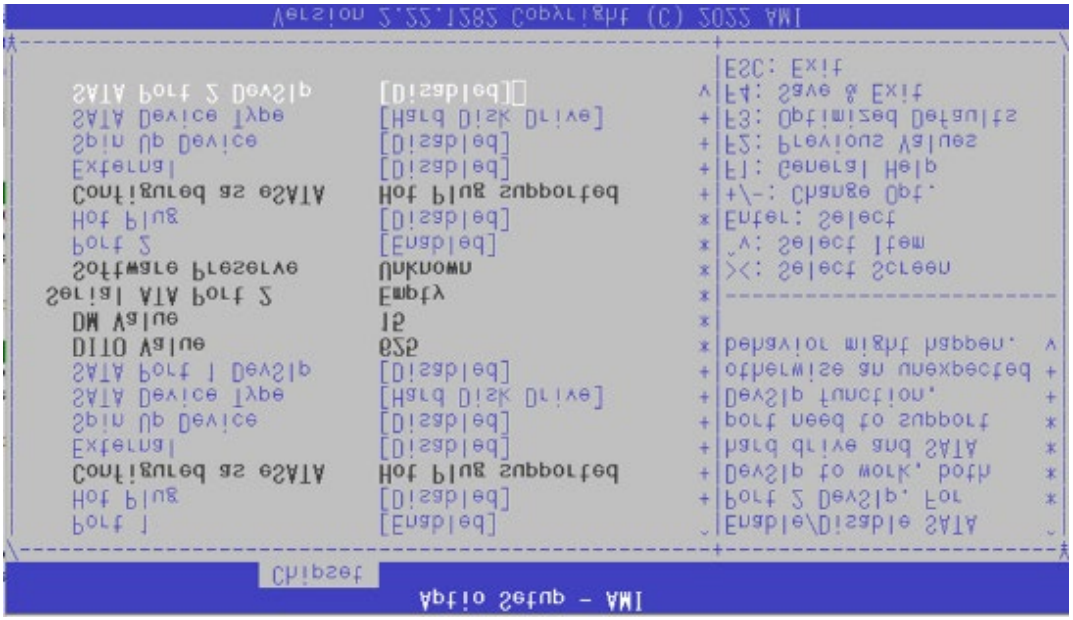


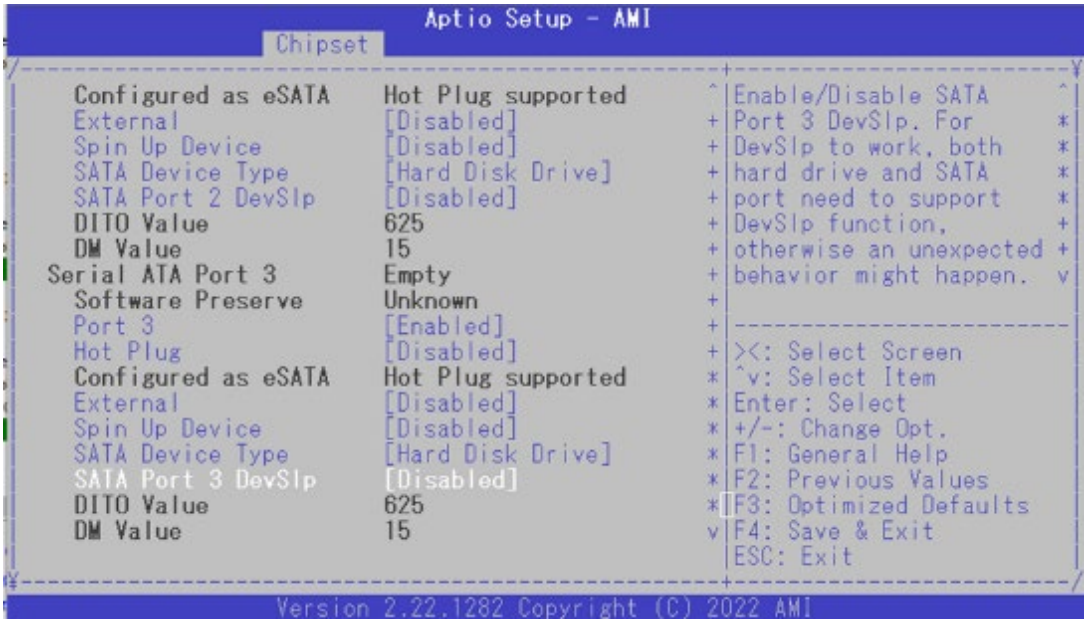
PCI Express Root Port 1,5,9,13,14,15,16,21,22,23,24

Feature	Options	Description
PCI Express Root Port	Enabled Disabled	Control the PCI Express Root Port.
ASPM	Enabled Disabled	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
L1 Substates	Enabled Disabled	PCI Express L1 Substates settings.
Advanced Error	Enabled Disabled	Advanced Error Reporting Enable/Disable.
PCIe Speed	Auto Gen1 Gen2 Gen3	Configure PCIe Speed

SATA and RST Configuration



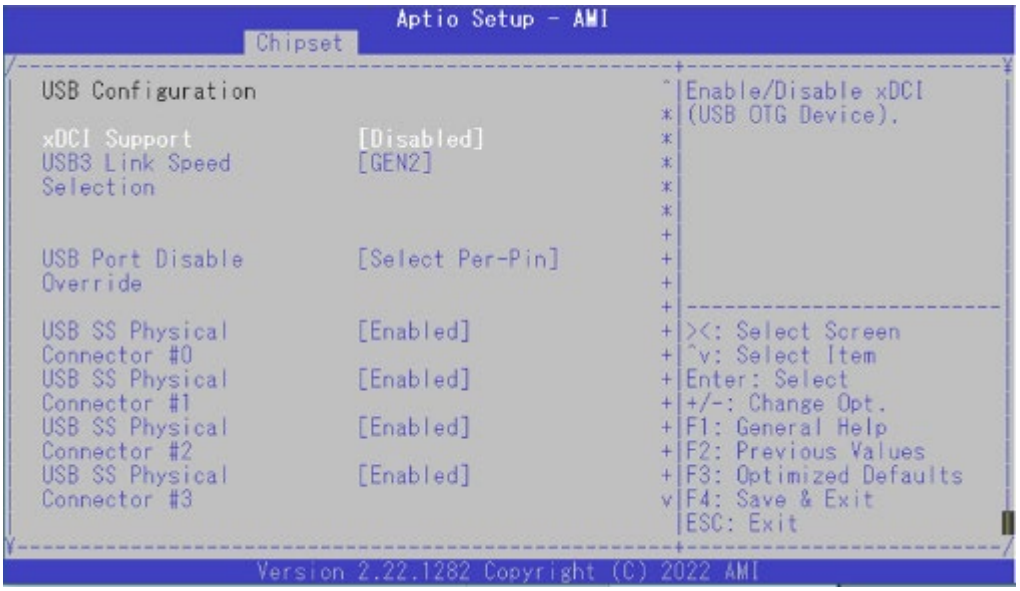


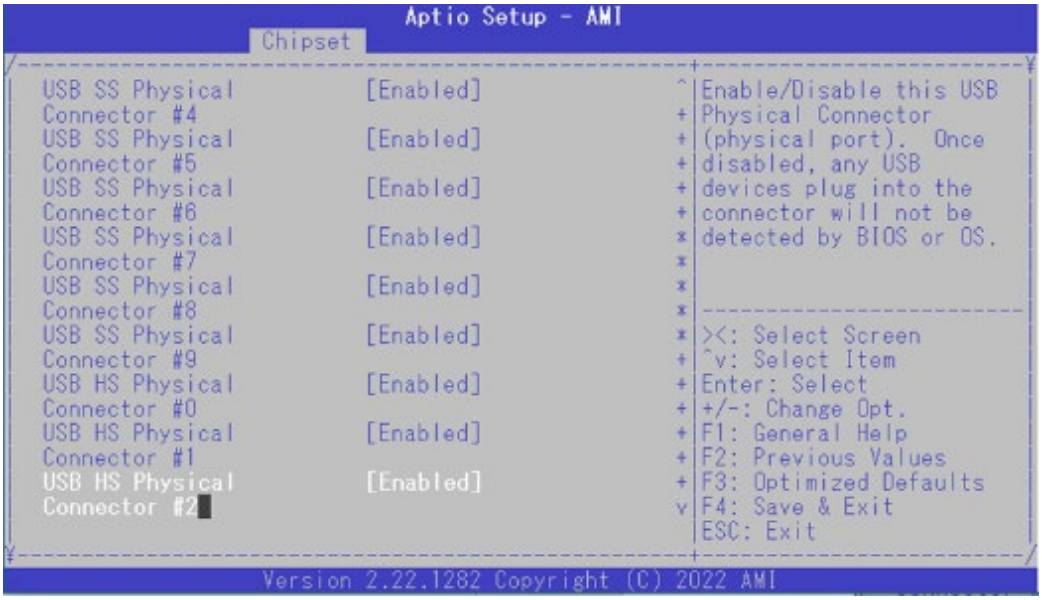


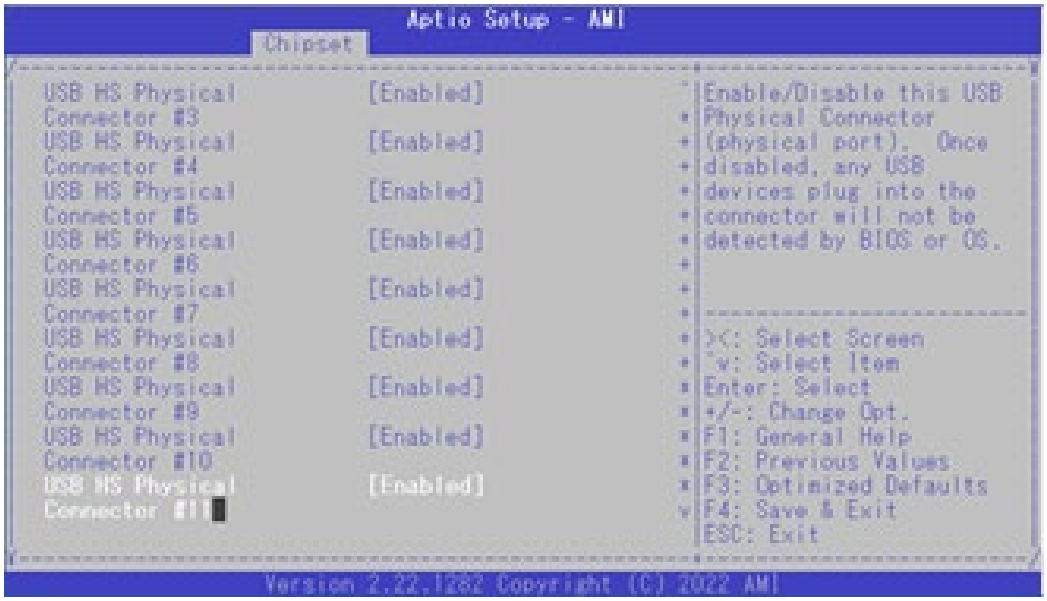
Feature	Options	Description
SATA Controller(s)	Enabled Disabled	Enable/Disable SATA Device.
SATA Mode Selection	AHCI Intel RST	Determines how SATA controller(s) operate.
Port 0	Enabled Disabled	Enable or Disable SATA Port
Hot Plug	Enabled Disabled	Designates this port as Hot Pluggable.
External	Enabled Disabled	Marks this port as external.
Spin Up Device	Enabled Disabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port 0 DevSlp	Enabled Disabled	Enable/Disable SATA Port 0 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
Port 1	Enabled Disabled	Enable or Disable SATA Port
Hot Plug	Enabled Disabled	Designates this port as Hot Pluggable.
External	Enabled Disabled	Marks this port as external.
Spin Up Device	Enabled Disabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port 1 DevSlp	Enabled Disabled	Enable/Disable SATA Port 0 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
Port 2	Enabled Disabled	Enable or Disable SATA Port
Hot Plug	Enabled Disabled	Designates this port as Hot Pluggable.

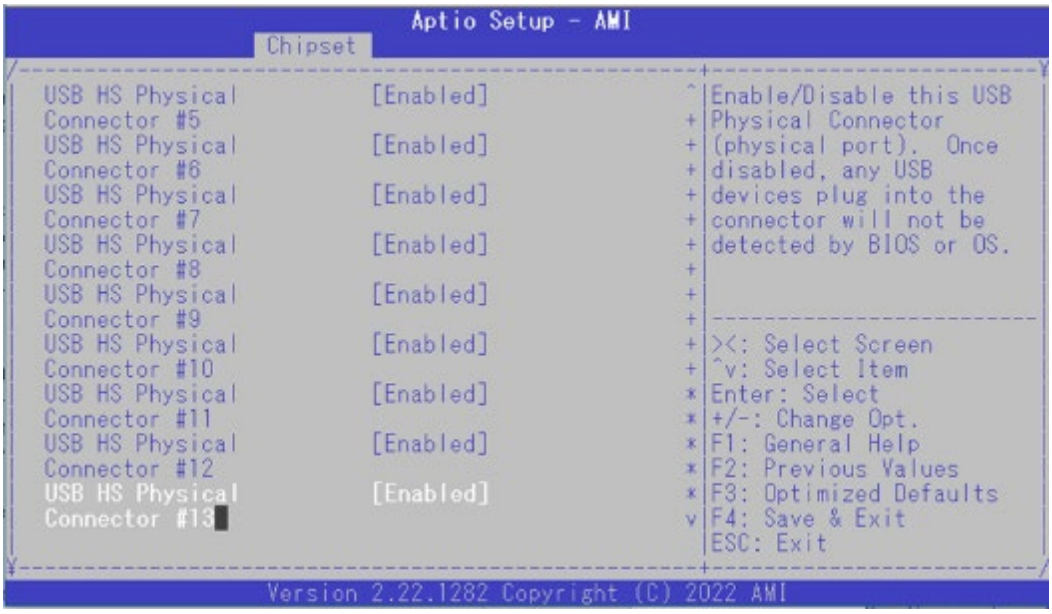
External	Enabled Disabled	Marks this port as external.
Spin Up Device	Enabled Disabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port 2 DevSlp	Enabled Disabled	Enable/Disable SATA Port 2 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
Port 3	Enabled Disabled	Enable or Disable SATA Port
Hot Plug	Enabled Disabled	Designates this port as Hot Pluggable.
External	Enabled Disabled	Marks this port as external.
Spin Up Device	Enabled Disabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port 3 DevSlp	Enabled Disabled	Enable/Disable SATA Port 3 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.

USB Configuration





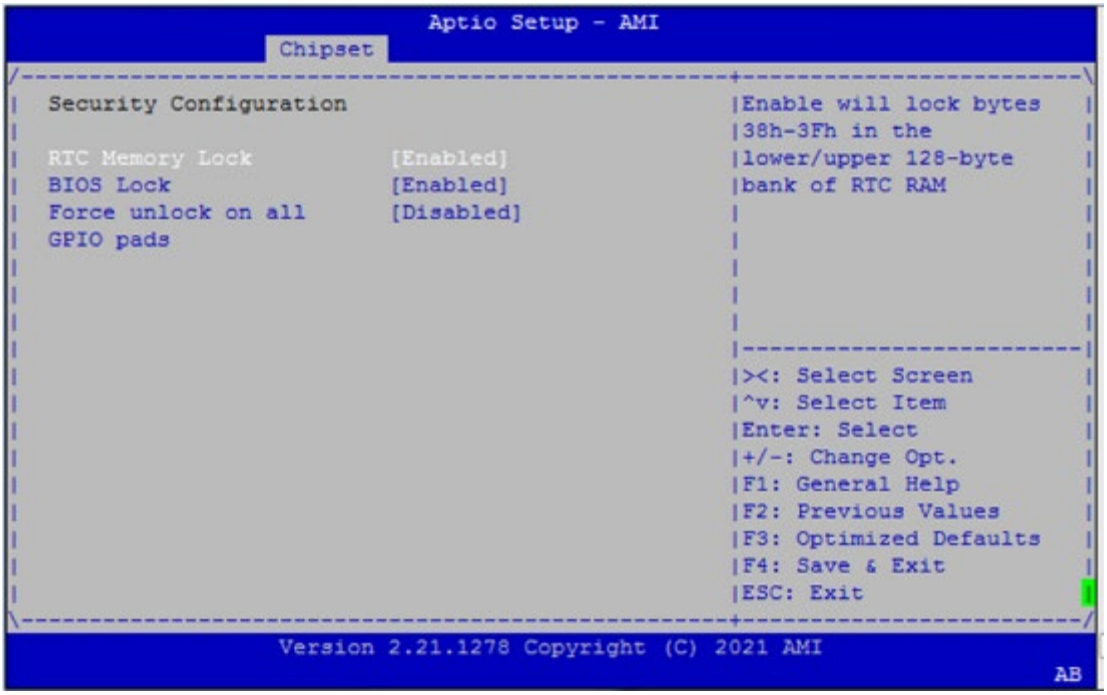




Feature	Options	Description
xDCI Support	Enable Disable	Enable/Disable xDCI (USB OTG Device).
USB3 Link Speed Selection	GEN1 GEN2	This option is to select USB3 Link Speed GEN1 or GEN2
USB Port Disable Override	Disabled Select Per-Pin	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.
USB SS Physical Connector #0	Enabled Disabled	Enable/Disable this USB Physical Connector (physical port. Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS."
USB SS Physical Connector #1	Enabled Disabled	
USB SS Physical Connector #2	Enabled Disabled	
USB SS Physical Connector #3	Enabled Disabled	
USB SS Physical Connector #4	Enabled Disabled	
USB SS Physical Connector #5	Enabled Disabled	
USB SS Physical Connector #6	Enabled Disabled	
USB SS Physical Connector #7	Enabled Disabled	
USB SS Physical Connector #8	Enabled Disabled	

USB SS Physical Connector #9	Enabled Disabled	
USB HS Physical Connector #0	Enabled Disabled	
USB HS Physical Connector #1	Enabled Disabled	
USB HS Physical Connector #2	Enabled Disabled	
USB HS Physical Connector #3	Enabled Disabled	
USB HS Physical Connector #4	Enabled Disabled	
USB HS Physical Connector #5	Enabled Disabled	
USB HS Physical Connector #6	Enabled Disabled	
USB HS Physical Connector #7	Enabled Disabled	
USB HS Physical Connector #8	Enabled Disabled	
USB HS Physical Connector #9	Enabled Disabled	
USB HS Physical Connector #10	Enabled Disabled	
USB HS Physical Connector #11	Enabled Disabled	
USB HS Physical Connector #12	Enabled Disabled	
USB HS Physical Connector #13	Enabled Disabled	

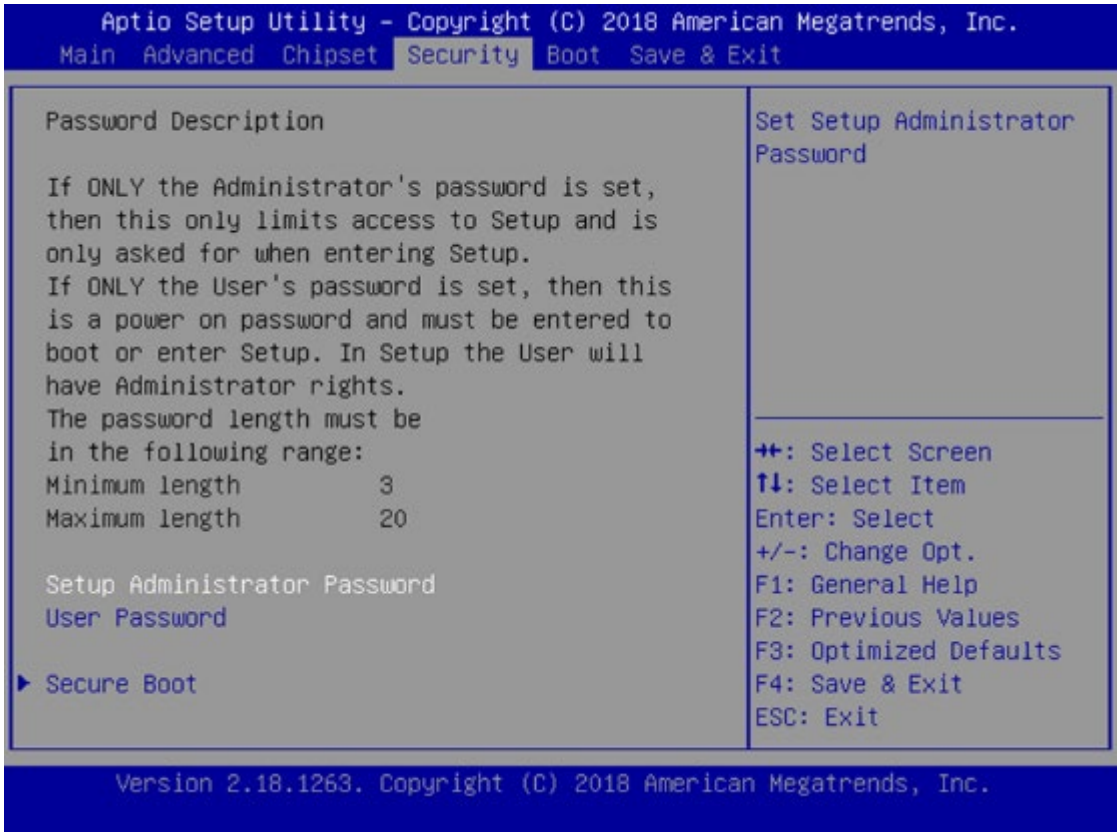
Security Configuration



Feature	Options	Description
RTC Memory Lock	Enabled Disabled	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM
BIOS Lock	Enabled Disabled	Enable/Disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.
Force unlock on all GPIO pads	Enabled Disabled	If Enabled BIOS will force all GPIO pads to be in unlocked state

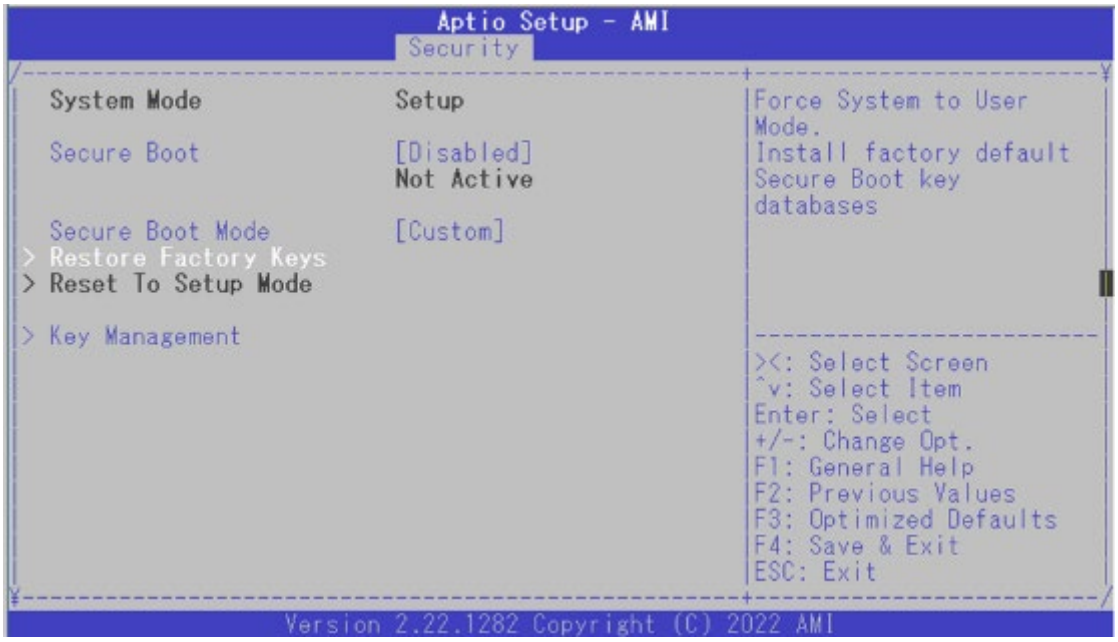
Security

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.



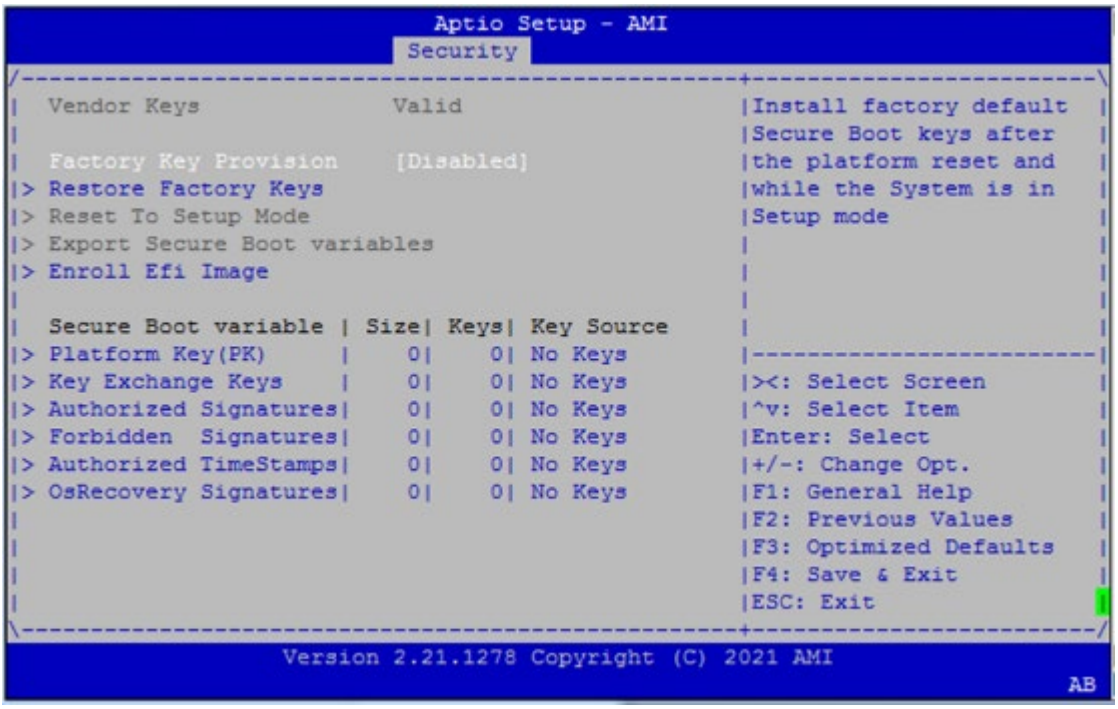
Feature	Description
Setup Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup, 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
Reset To Setup Mode	None	Delete all Secure Boot key databases from NVRAM
Export Secure Boot variables	None	Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device
Enroll Efi Image	None	Allow the 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.

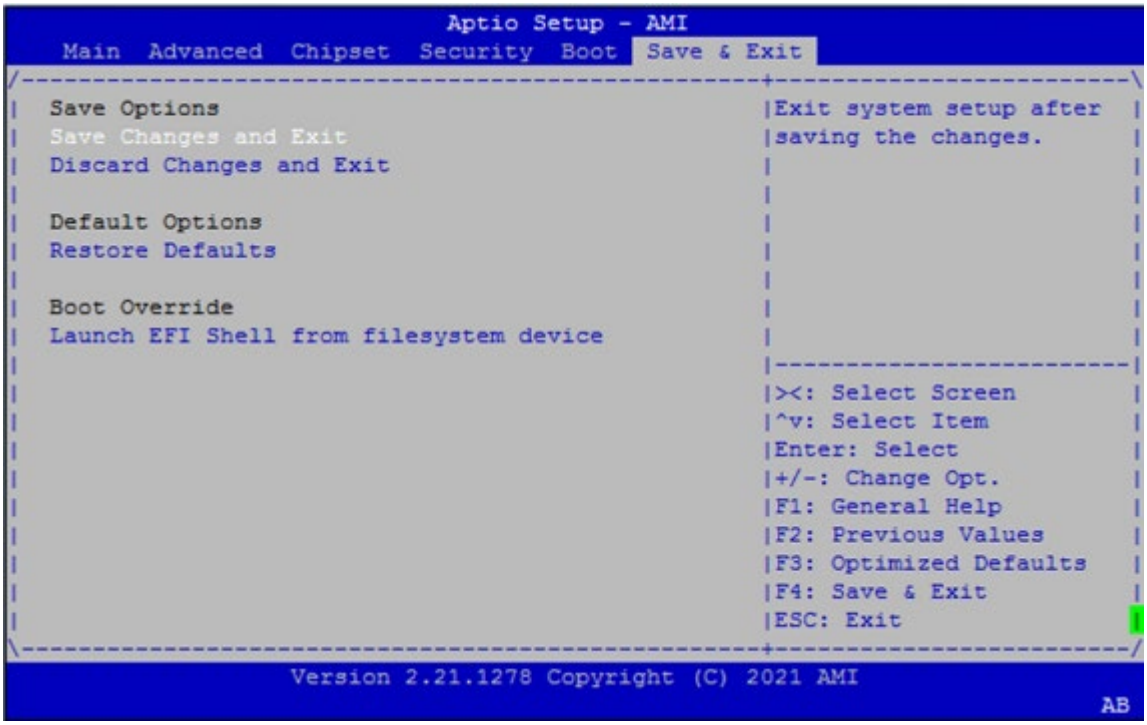
Feature	Options	Description
Setup Prompt Timeout	5	The number of seconds to wait for setup activation key. 65535 means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state
Quiet Boot	Disabled Enabled	Enables or disables Quiet Boot option.

■ Choose boot priority from boot option group.

■ Choose specific boot device priority sequence from available Group device.

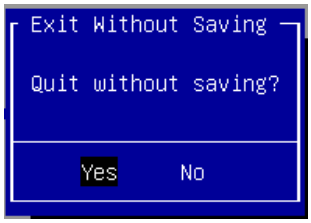
Save and Exit Menu

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.



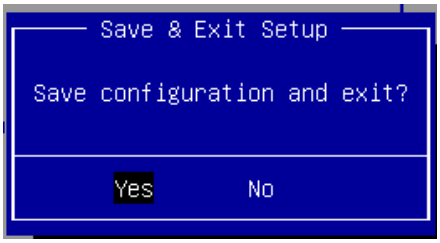
■ Discard Changes and Exit

Select this option to quit Setup without saving any modifications to the system configuration. The following window will appear after selecting the 'Discard Changes and Exit' option selected. Select **YES** to Discard changes and Exit Setup.



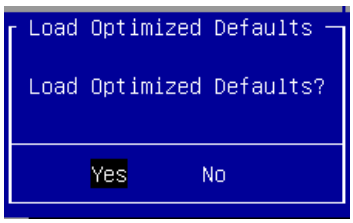
■ Save Changes and Exit

When Users have completed the system configuration changes, select this option to save the changes and Exit from BIOS Setup, so the new system configuration parameters can take effect. The following window will appear after selecting the 'Save Changes and Exit' option selected. Select **YES** to Save Changes and Exit Setup.



■Restore Defaults

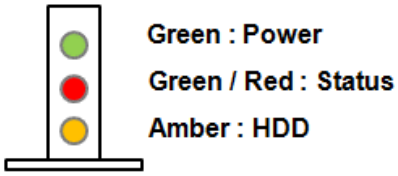
Restore default values for all setup options. Select **YES** to load Optimized defaults.



Note: The items under Boot Override may not be the same as the images above, as it should depend on the actual devices connected on system.

APPENDIX A: LED INDICATOR EXPLANATIONS

▸ System Power / Status / HDD Activity

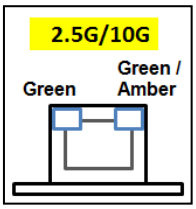


LED	COLOR ON BOARD	LED ACTION	DESCRIPTION
POWER	**Green**	Steady	System Power ON
	Off	N/A	Power OFF
STATUS	**Green**	Steady	Controlled by GPIO
	Red	Steady	Controlled by GPIO
	Off	N/A	Controlled by GPIO (Default) or Power OFF
HDD	**Amber**	**Blinking**	Blinking indicates HDD activity, Include SATA / NVME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

▸ 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**



2.5Gb RJ-45 Define:

Speed	Green (Active)	Green/Amber (Link)
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		

APPENDIX B: 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