Lanner

Network Computing

Innovative Platforms for Next Generation Network Infrastructure

NCA-2520
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.

Icon Descriptions

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, if there are any technical queries, you could submit a support ticket to our **Lanner Technical Support** department.

Documentation Feedback

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Copyright and Trademarks

Acknowledgment

Compliances and Certification

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

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.

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).

Warning Avertissement

- Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.
  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.
- The machine can only be used in a restricted access location and must be installed by a skilled person.
  Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.
- Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.
  Équipement de classe I. Ce matériel doit être relié à la terre. La fiche d'alimentation doit être raccordée à une prise de terre correctement câblée. Une prise de courant mal câblée pourrait induire des tensions dangereuses sur des parties métalliques accessibles.
- "Product shall be used with Class 1 laser device modules."
  "Le produit doit être utilisé avec des modules de dispositifs laser de classe 1."

Electrical Safety Instructions

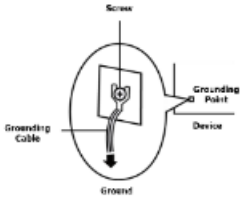
Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect the ground wire after turning off the power. A ground wire (green-and-yellow) is required and the part connecting the conductor must be greater than 1mm2 or 16 AWG.

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 1mm2 ou 16 AWG.

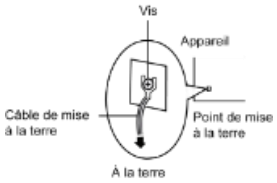
Grounding Procedure for DC Power Source

- Connect the grounding cable to the ground.
- The protection device for the DC power source must provide 10A current.
- This protection device must be connected to the power source before DC power.



Procédure de mise à la terre pour source d'alimentation CC

- Branchez le câble de mise à la terre à la terre.
- L'appareil de protection pour la source d'alimentation CC doit fournir 10A de courant.
- Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation CC.



For DC input, this unit is intended to be supplied by an UL listed power source, rated 42 to 72Vdc, 10A min, and an altitude operation 5000m min.

Table of Contents

CHAPTER 1: PRODUCT OVERVIEW

The NCA-2520, 1U rackmount multi-core x86 network appliances powered by Intel® Atom P5300 CPU, codenamed Snow Ridge NS, offering up to 24 cores of processing prowess. The high-performance system delivers ample networking capabilities by way of 8x GbE RJ45, 4x 10G SFP+ and another 4x 10G SFP+ via SFI signal (by project), in addition to supporting 2x 2.5" SSD/HDD storage, 1x M.2 2280 storage, and 1x mini-PCIe expansion. The appliances come built in with Intel Secure Boot, Intel Virtualization Technology, Intel QuickAssist Technology and Intel AES-NI, making it an ideal hardware solution for vCPE, uCPE, SD-WAN, and SD-Security on Intel architecture servers.

Package Content

Your package contains the following items:

- 1x NCA-2520 Network Security Platform
- 1x PSU Power Cord (US Standard Type Default)
- 1x RJ45 Console Cable
- 2x SATA Data Cable
- 8x HDD Rubber Washers and Screws
- Nameplate
- Short Ear Rackmount Kit with Screws

Note: If you should find any components missing or damaged, please contact your dealer immediately for assistance.

Ordering Information

SKU No.	Description
NCA-2520**A**	Intel® P5362 CPU 24 cores, 4x DDR4 DIMM, 8x GbE ports w/ 2 pair bypass, 4x SFP+, 1x NIC Slot, 1x PGN Slot, 1x M.2 Storage Slot, IPMI slot (Optional) and 4x SFP+ (Optional)
NCA-2520**B**	Intel® P5352 CPU 20 cores, 4x DDR4 DIMM, 8x GbE ports w/ 2 pair bypass, 4x SFP+, 1x NIC Slot, 1x PGN Slot, 1x M.2 Storage Slot, IPMI slot (Optional) and 4x SFP+ (Optional)
NCA-2520**C**	Intel® P5342 CPU 16 cores, 4x DDR4 DIMM, 8x GbE ports w/ 2 pair bypass, 4x SFP+, 1x NIC Slot, 1x PGN Slot, 1x M.2 Storage Slot, IPMI slot (Optional) and 4x SFP+ (Optional)
NCA-2520**D**	Intel® P5332 CPU 12 cores, 4x DDR4 DIMM, 8x GbE ports w/ 2 pair bypass, 4x SFP+, 1x NIC Slot, 1x PGN Slot, 1x M.2 Storage Slot, IPMI slot (Optional) and 4x SFP+ (Optional)
NCA-2520**E**	Intel® P5322 CPU 8 cores, 4x DDR4 DIMM, 8x GbE ports w/ 2 pair bypass, 4x SFP+, 1x NIC Slot, 1x PGN Slot, 1x M.2 Storage Slot, IPMI slot (Optional) and 4x SFP+ (Optional)

Optional Accessories

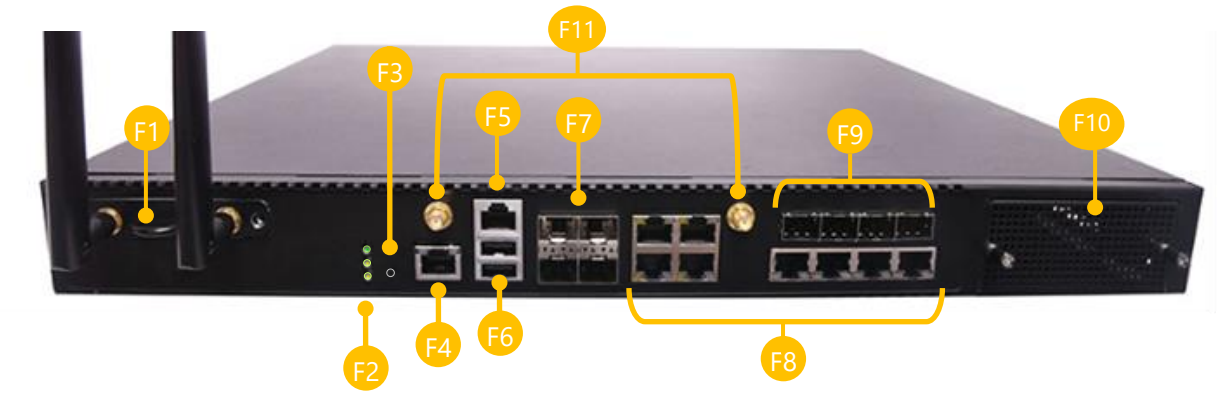
Model No.	Description
Riser Card Kit NCA-2520	Riser Card Kit for rear side PCIe expansion
IO & Riser Card Kit	Upper layer IO-2520IXM401A+RC-25102A
IAC-AST2401A	IPMI (Intelligent Platform Management Interface) Card Module
IAC-TPM04A	TPM 2.0 Module
PGN-300 LTE KIT NCA-2520	4G LTE Radio Modem with LTE Cat-6 Embedded Module
PGN-600 LTE KIT NCA-2520	4G LTE Radio Modem with LTE Cat-12 Embedded Module
WLE600VX WI-FI KIT NCA-2520	Mini-PCIe Wi-Fi Module Card Kit
AP12356 WI-FI KIT NCA-2520	Mini-PCIe Wi-Fi Module Card Kit
1U Slide Rail Kit	A pair of rails and 1x screw pack

System Specifications

Form Factor		1U 19" Rackmount
Platform	Processor Options	SKU A: Intel® Atom™ P5362, 24 cores, 83W SKU B: Intel® Atom™ P5352, 20 cores, 78W SKU C: Intel® Atom™ P5342, 16 cores, 71W SKU D: Intel® Atom™ P5332, 12 cores, 61W SKU E: Intel® Atom™ P5322, 8 cores, 55W
	CPU Socket	Onboard
	Chipset	SoC
	Security Acceleration	Intel® QuickAssist Technology
BIOS		AMI SPI Flash BIOS
System Memory	Technology	DDR4 REG DIMM, or UDIMM, up to 2933MHz
	Max. Capacity	256GB (64GB x4 slots)
	Socket	4x 288pin DIMM
Networking	Ethernet Ports	8x 1GbE RJ45 w LED via Intel® i350-AM4 (2 Port support PXE; Default enabled); 4x 10G SFP+ Intel® SoC Integrated MAC; 4x 10G SFP+ Intel® C827 via SFI Signal (Optional)
	Bypass	2x Pairs Gen3 Bypass
	NIC Module Slot	1x PCIE*8 or 2x PCIE*4, for front slim type NCS2 NIC Module (via Riser Card RC-75842Z)
LOM	IO Interface	Yes, 1x RJ45 LOM Port for IPMI Card
	OPMA slot	Yes
I/O Interface	Smart Power/ Reset Button	1x Reset Button (Software reset control by GPIO), 1x Power Button, refer to Appendix C
	LED Indicators	Power/Status/Storage, refer to Appendix A
	Console Port	1x RJ45 Console Port (Default Bard Rate : 115200)
	USB Port	2x USB 2.0 Ports
	Display	From OPMA slot (Optional)
	Power Input	AC Power Inlet on PSU
Storage	HDD/SSD Support	2x 2.5" Internal HDD/SSD Bay Drive
	Onboard Slots	1x M.2 2280 M-Key (SATAIII/PCIE*2 Signal)
Expansion	PCIe	1x PCIE*8 or 2x PCIE*4, for FH/HL Size Card at Rear
	mini-PCIe	1x Mini PCIE (PCIEx1/USB2.0 Signal)
Miscellaneous	Watchdog	Yes (through SIO)
	Internal RTC with Li-Battery	Yes
	TPM	Yes (Optional)
Cooling	Processor	Passive CPU Heatsink
	System	3x Cooling Smart Fans
	Fan Specification	Axial 2-Ball 12V, 23000RPM, 4P Molex 51191, 40x40x56mm, L: 200mm NMB
Environmental Parameters	Temperature	0 to 40ºC Operating -20 to 70ºC Non-Operating
	Humidity (RH)	5%~90% Operating 5%~95% Non-Operating
System Dimensions	Size (WxDxH)	438 x 428.6 x 44 mm
	Weight	10.1kg
Package Dimensions	(WxDxH)	582 x 548 x 182mm
	Weight	17.1kg

Power	Type/Watts	350W Single Power Supply
	Input	AC 90~264V @47~63Hz
OS Support		LINUX, UEFI BIOS Intel® Firmware Support Package (Intel® FSP) No Support for OPROMS, including PXE OPROM Manageability: SPS 5.0 FW NOTE: No Support for Legacy BIOS, Only UEFI FW and UEFI Aware Linux OS
Approvals and Compliance		RoHS Directive (EU) 2015/863, CE/FCC Class A, VCCI, UL, UKCA

Front Panel



No.	Description	
F1	PGN	1x PGN Front Slot for PGN-300/PGN-600 (Optional)
F2	LED Indicators	System Power System Status HDD Activity
F3	Reset Button	1x Reset Button
F4	LOM Port	1x LOM Port for IPMI Card
F5	Console Port	1x RJ45 Console Port
F6	USB Port	2x USB 2.0 Ports
F7	LAN Port	4x 10G SFP+ Intel® SoC Integrated MAC Ports
F8	LAN Port	8x GbE RJ45 w/ LED (via Intel® i350-AM4) Ports
F9	LAN Port	4x 10G SFP+ Intel® C827 (via SFI Signal) Ports (Optional)
F10	NIC Module	1x NCS2 Slim Type NIC Module (Optional)
F11	Antenna Holes	2x Semi-Shearing Antenna Holes, for Mini-PCIE Slot on board (Optional)

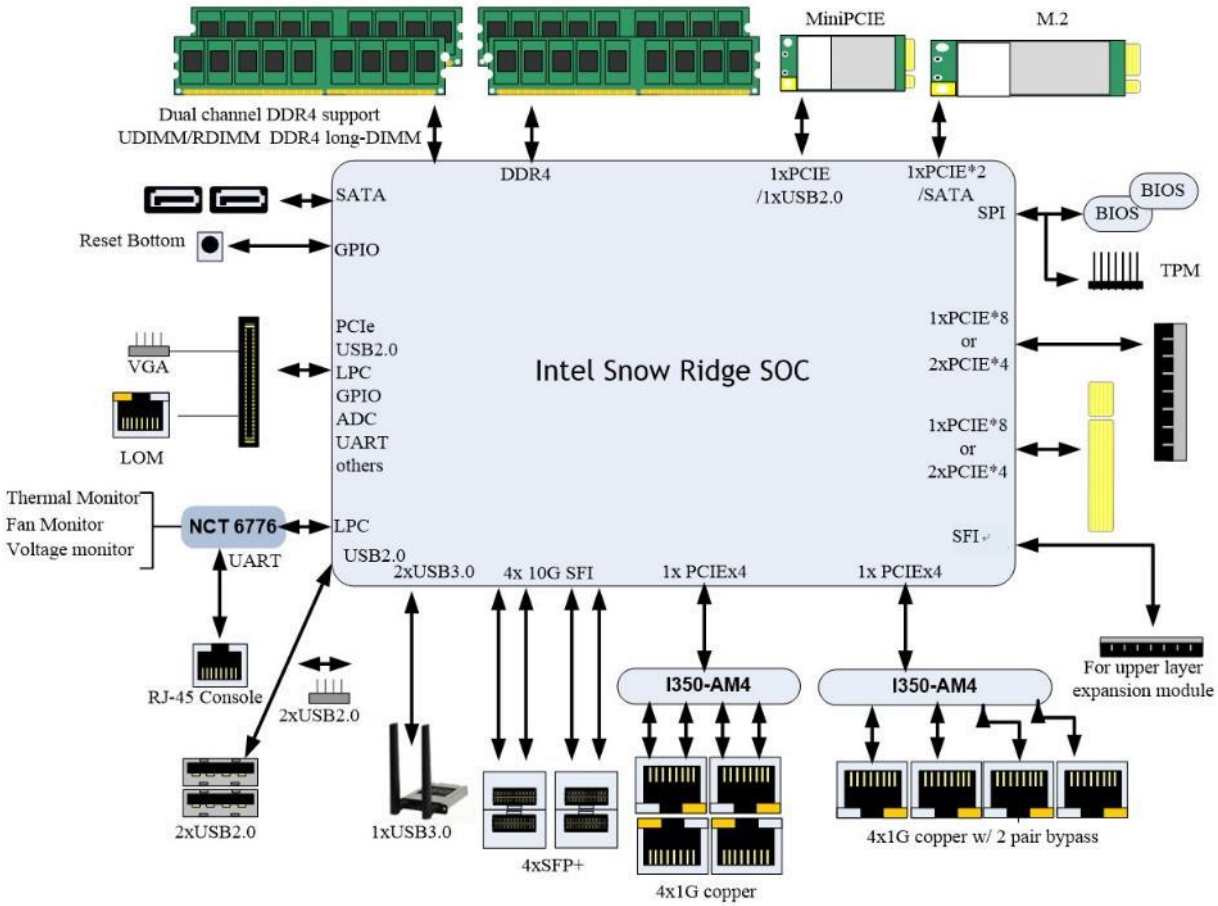
Rear Panel

No.	Description	
R1	PCIe Expansion	1x PCIE*8 or 2x PCIE*4, FH/HL Size Card at Rear (Optional)
R2	Semi-Shearing Hole	D89 or 2x DB15 and 1x USB (Optional)
R3	ESD Screw	1x ESD Jack
R4	Cooling Fan	3x Cooling Smart Fans
R5	Ground Screw	1x Grounding Hole/Screw
R6	Power Switch	1x ATX Slim Type Power Switch
R7	Power Supply	1x 350W Single Power Supply

CHAPTER 2: MOTHERBOARD INFORMATION

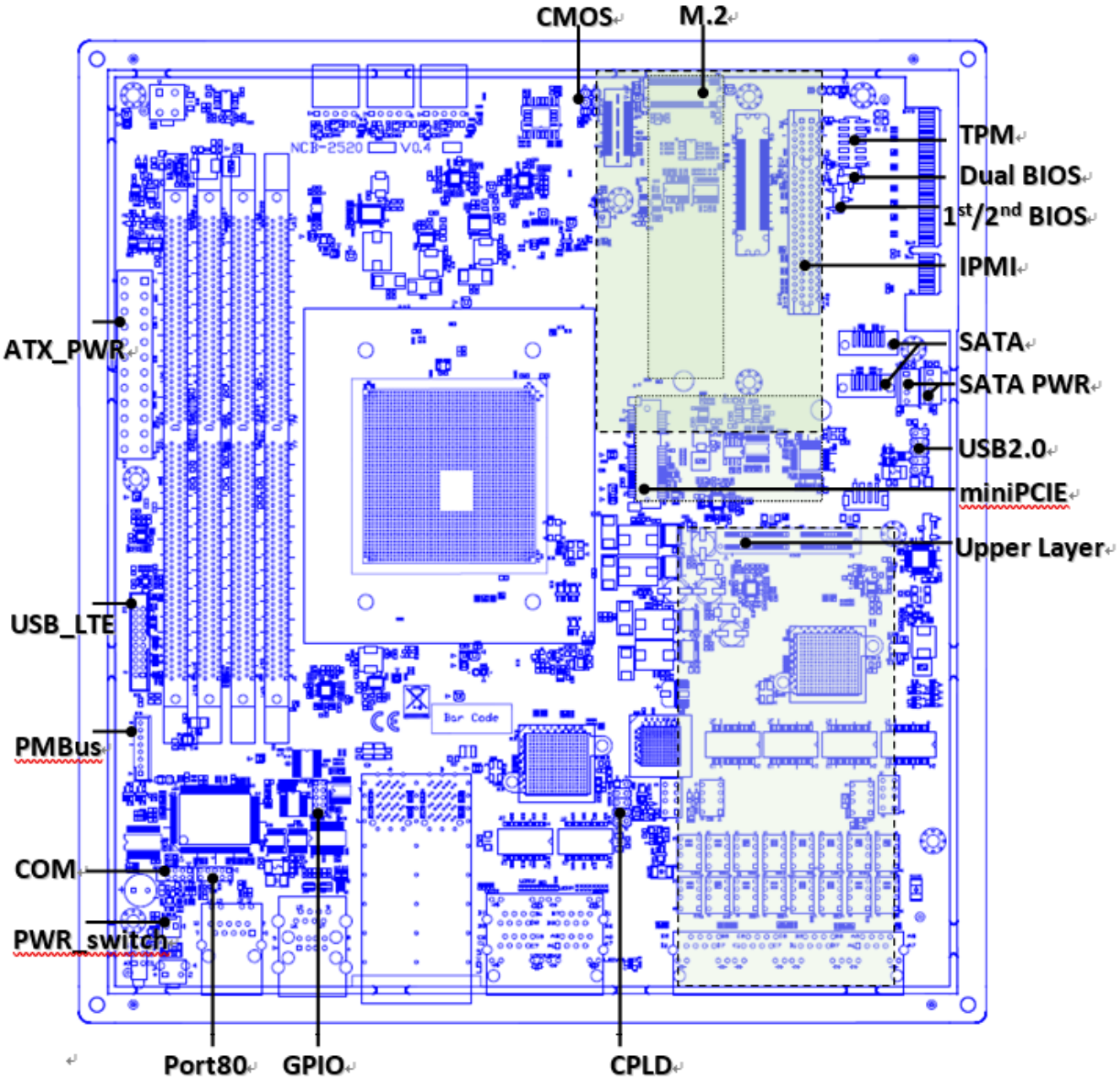
Block Diagram

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



Motherboard Layout

The motherboard layout shows the connectors and jumpers on the board. Refer to the following picture as a reference of the pin assignments and the internal connectors.

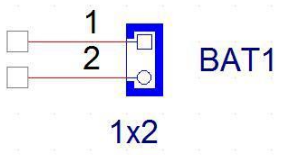


Internal Jumper & Connectors

The pin headers on the motherboard are often associated with essential functions. With the shunt (Jumper) pushed down on the designated pins (the pin numbers are printed on the circuit board, surrounding the pin header), particular features can be enabled or disabled. While changing the jumpers, make sure your system is completely turned off.

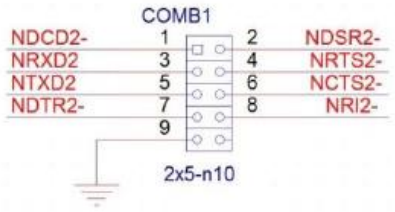
1. BAT1: RTC Battery Connector

Pin No.	Description
1	VCC_BATTERY
2	GND



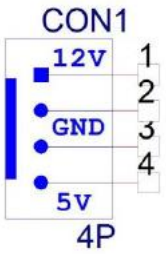
2. COMB1: Consol Port Header (Pitch 2.0mm)

Pin No.	Description	Pin No.	Description
1	COM_DCD	2	COM_DSR
3	COM_RXD	4	COM_RTS
5	COM_TXD	6	COM_CTS
7	COM_DTR	8	COM_RI
9	GND	10	NC



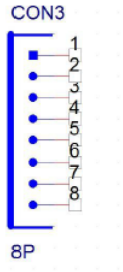
3. CON1 / CON2: SATA Power

Pin No.	Description
1	12V
2	GND
3	GND
4	5V



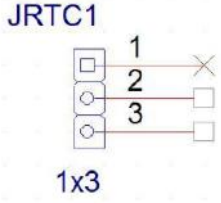
4. CON3: TTL & PMBUS Header

Pin No.	Description	Pin No.	Description
1	PSU_TTL1	5	NC
2	PSU_TTL2	6	PMBUS_CLK
3	NC	7	PMBUC_DAT
4	GND	8	VCC



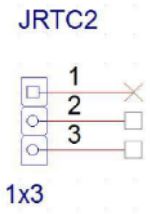
5. JRTC1: Clear CMOS

Pin No.	Description
1	P3V3_RTC
2	SRTCRST_N
3	GND



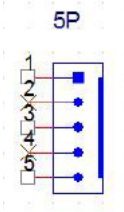
6. JRTC2: Clear CMOS

Pin No.	Description
1	P3V3_RTC
2	SOC_RESET_N
3	GND



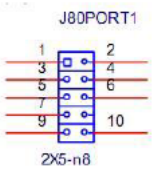
7. FAN1~3: Fan Connector

Pin No.	Description
1	HM_FANOUT
2	NC
3	SYSFANIN
4	P12V
5	GND



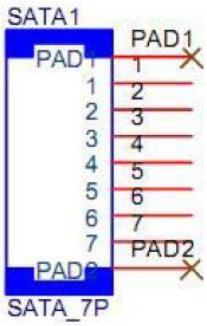
8. J80PORT1: Port80 Connector

Pin No.	Description	Pin No.	Description
1	CLK_LPC_OUT	2	SOC_LPC_LAD1
3	80PORT_RST#	4	SOC_LPC_LAD0
5	SOC_LPC_FRAME_N	6	P3V3_S
7	SOC_LPC_LAD3	8	NC
9	SOC_LPC_LAD2	10	GND



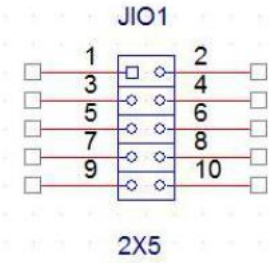
9. SATA1~2: SATA Connector

Pin No.	Description
1	GND
2	SATA_TXDP
3	SATA_TXDN
4	GND
5	SATA_RXDP
6	SATA_RXDN
7	GND



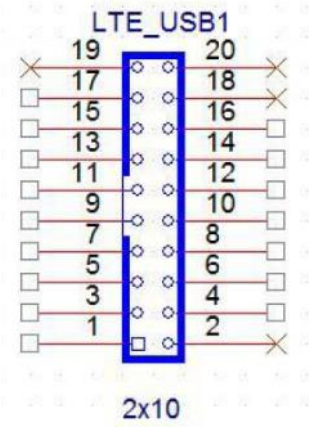
10. JI01: GPI0 Header (Pitch 2.0mm)

Pin No.	Description	Pin No.	Description
1	GP0_B_1	2	GPI_B_1
3	GP0_B_2	4	GPI_B_2
5	GP0_B_3	6	GPI_B_3
7	GP0_B_4	8	GPI_B_4
9	GND	10	GND



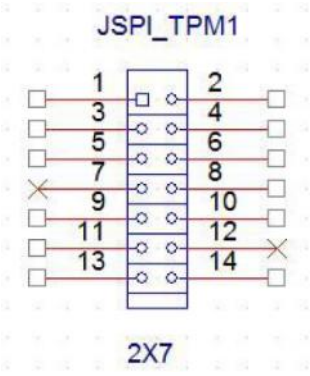
11. LTE_USB1: LTE Module Header

Pin No.	Description	Pin No.	Description
19	NA	20	NA
17	USB2_1+	18	NA
15	USB2_1-	16	GND
13	GND	14	SIM_SW
11	USB3_T0+	12	P3V3_STBY
9	USB3_T0-	10	GND
7	GND	8	P3V3_STBY
5	USB3_R0+	6	P3V3-STBY
3	USB3_R0-	4	P3V3_STBY
1	USB1_PW	2	NA



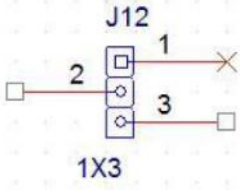
12. JSPI_TPM1: TPM & BIOS Update Header

Pin No.	Description	Pin No.	Description
1	SPI_HD1#	2	SPI_CS1#_DUAL
3	SPI_CS0#_DUAL	4	P3V3_SB_SPI
5	SPI_MIS0_TPM	6	SOC_SPI_I03
7	NA(KEY)	8	SPI_CLK_TPM
9	GND	10	SPI_MOSI_TPM
11	IRQ_TPM_SPI#_R	12	NA
13	SPI_TPM_CS0#	14	TPM_RST_N_R



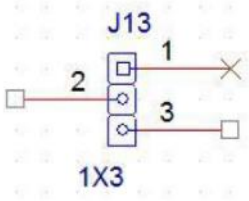
13. J12: Disable Dual BIOS Function

Pin No.	Description
1-2	Enable dual BIOS(Default)
2-3	Disable Dual BIOS



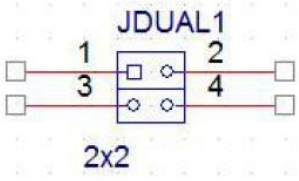
14. J13: BIOS Boot Up Select

Pin No.	Description
1-2	Force Boot Up from BIOS1(Default)
2-3	Force Boot Up from BIOS2



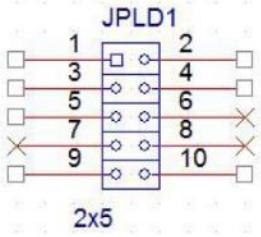
15. JDUAL1: Select CS for Flash Fixture

Pin No.	Description
1-2 3-4	Flash 1st BIOS(Default)
1-3 2-4	Flash 2nd BIOS



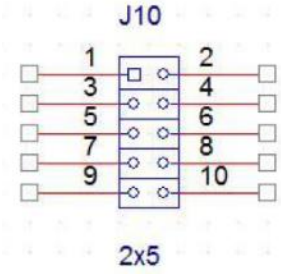
16. JPLD1: CPLD Programming Header

Pin No.	Description	Pin No.	Description
1	JTAG_PLD_TCK	2	GND
3	JTAG_PLD_TD0	4	P3V3_STBY
5	JTAG_PLD_TMS	6	NA
7	NA	8	NA
9	JTAG_PLD_TDI	10	GND



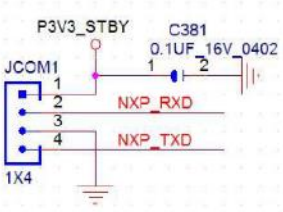
17. J10: USB2.0 Pin Header

Pin No.	Description	Pin No.	Description
1	P5V	2	P5V
3	USB2_L_N3	4	USB2_L_N2
5	USB2_L_P3	6	USB2_L_P2
7	GND	8	GND
9	GND	10	GND



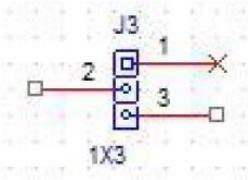
18. JCOM1: Gen3 Bypass Flash Connector

Pin No.	Description
1	P3V3_STBY
2	NXP_RXD
3	GND
4	NXP_TXD



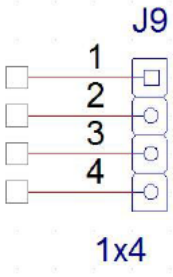
19. J3: Gen3 Bypass Flash Jumper

Pin No.	Description
1-2	Disable (Default)
2-3	Enable



20. J9: SMBUS Test Header

Pin No.	Description
1	P3V3_STBY
2	SMB_HOST_CLK
3	SMB_HOST_DATA
4	GND



CHAPTER 3: HARDWARE SETUP

To reduce the risk of personal injury, electric shock, or damage to the system, please remove all power connections to completely shut down the device, and wear ESD protection gloves when handling the installation steps.

Opening the Chassis

1. Power off the system.
2. Loosen and remove the two (2) screws on the rear panel.

3. Gently slide the chassis cover slightly backwards.

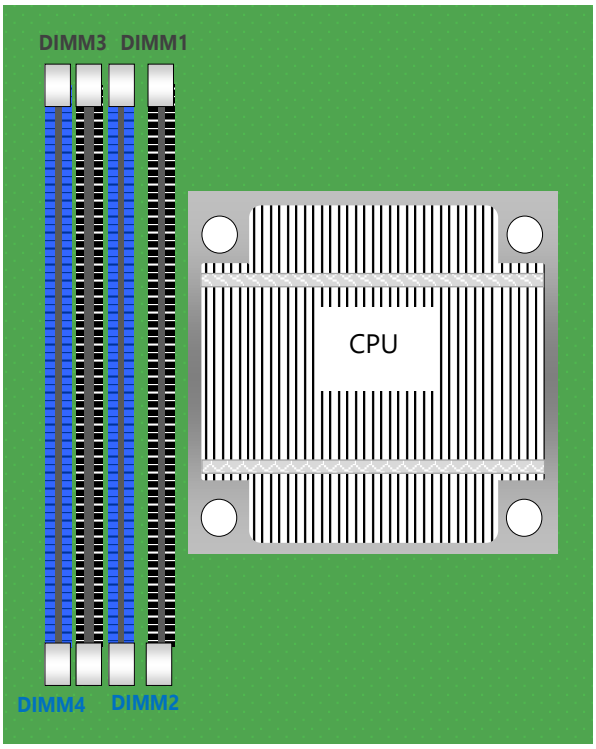
4. Lift the chassis cover up to remove.

Installing System Memory

The motherboard supports 4 memory slots for DDR4 UDIMM with speeds of up to 2933MHz. The CPU requires at least 1 memory modules to boot and run from.

Supported System Memory Summary

Total Slots	4
Number of Channels	2 (2 DIMMs per channel)
Supported DIMM Capacity	4GB, 8GB, 16GB, 32GB, 64GB
Memory Size	Maximum 256GB (64GB*4)
Memory Type	DDR4 REG DIMM, UDIMM 2933MHZ
Minimum DIMM Installed	At least 1 memory modules to boot and run



DIMM Population Guidelines

- The CPU requires at least 1 memory module to boot and run from, always insert memory module starting with the blue DIMMs for optimal performance.
- Use memory modules of the same capacity, speed, and from the same manufacturer to avoid compatibility issues and to achieve optimal CPU performance.

Recommended DIMM Population Scheme

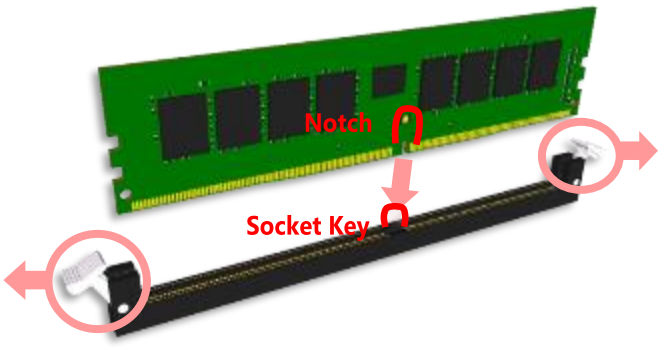
The table below shows the recommended schemes for DIMM population. To guarantee balanced system performance, please install identical DIMMs of the same capacity, speed, number of ranks, and from the same manufacturer.

SLOT #	DIM4	DIM3	DIM2	DIM1
2 DIMMs	○		○	
4 DIMMs	○	○	○	○

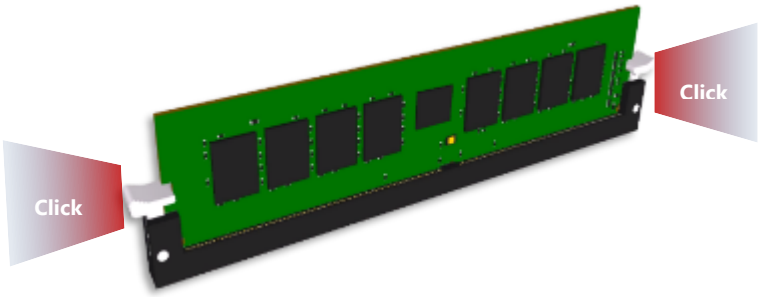
Memory Module Installation Instructions

1. Power off the system, open the chassis cover.
2. Locate the DIMM memory slots.

3. Pull open the white DIMM slot latches.
4. Align the notch of the module with the socket key in the slot and carefully insert the card into the slot.



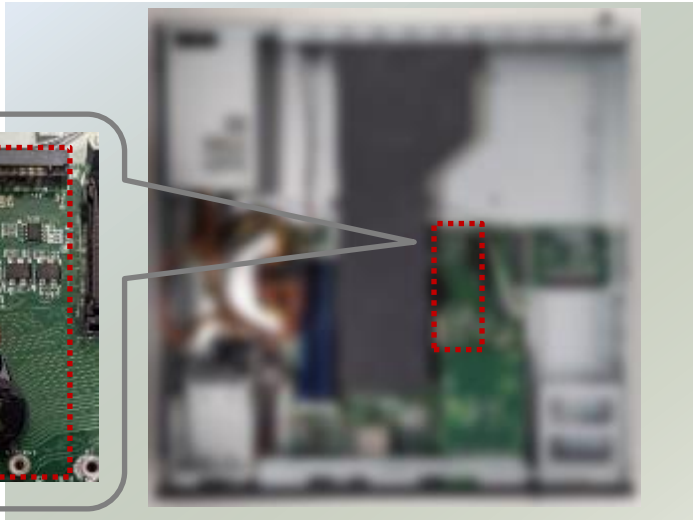
5. Push the module down into the slot until it is firmly seated. Press vertically on both corners of the card until it clicks into place.



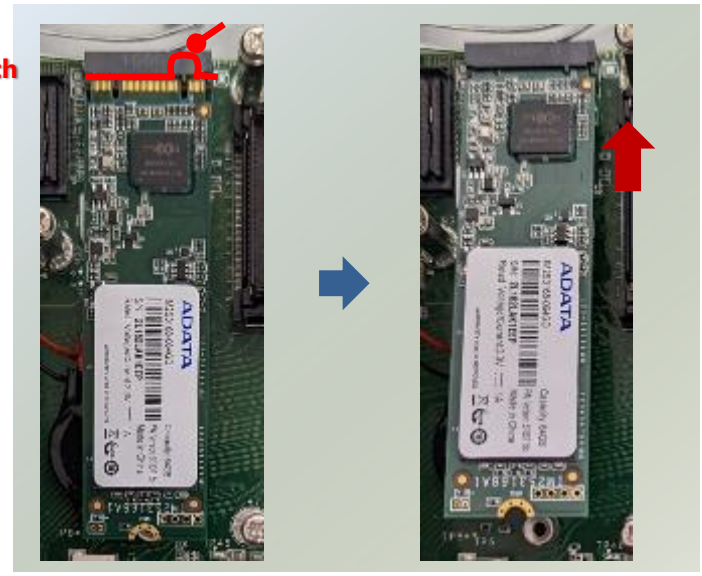
Installing M.2 Storage (Optional)

The motherboard supports one M.2 M-Key 2280 storage slot. Please follow the steps for installation.

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



3. Align the notch of the M.2 storage card with the socket in the pin slot.
4. Insert the M.2 storage card pins at a 30-degrees angle into the socket until it is firmly seated.

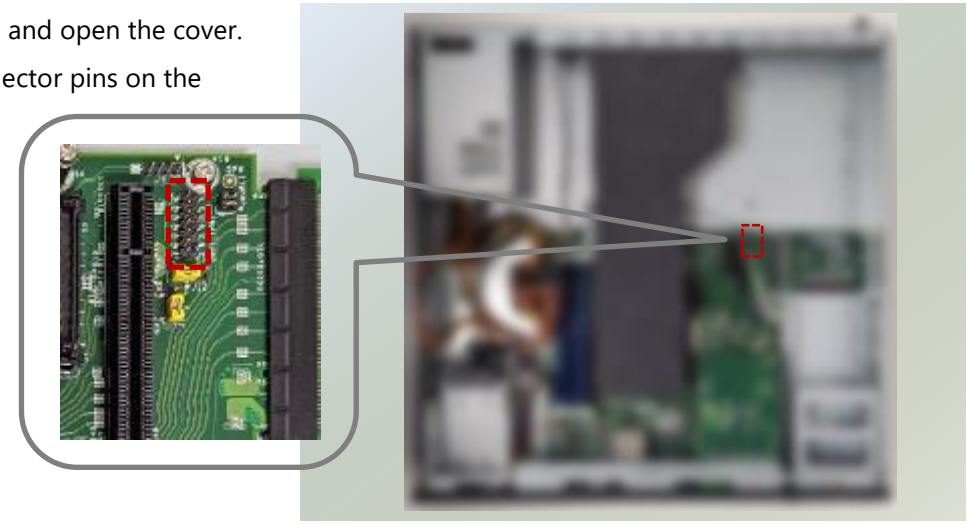


5. Vertically push down on the module and secure with one (1) screw.

Installing TPM Module (Optional)

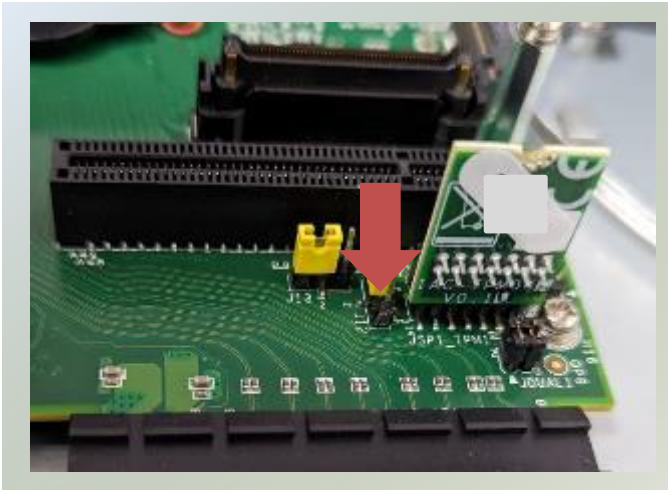
The system provides one slot for a TPM module card to provide hardware-based security-related functions. Follow the steps below for installation.

1. Power off the system and open the cover.
2. Locate the TPM connector pins on the motherboard.



3. Insert the module card pins with the connector pins, until the module card is firmly seated.

TPM

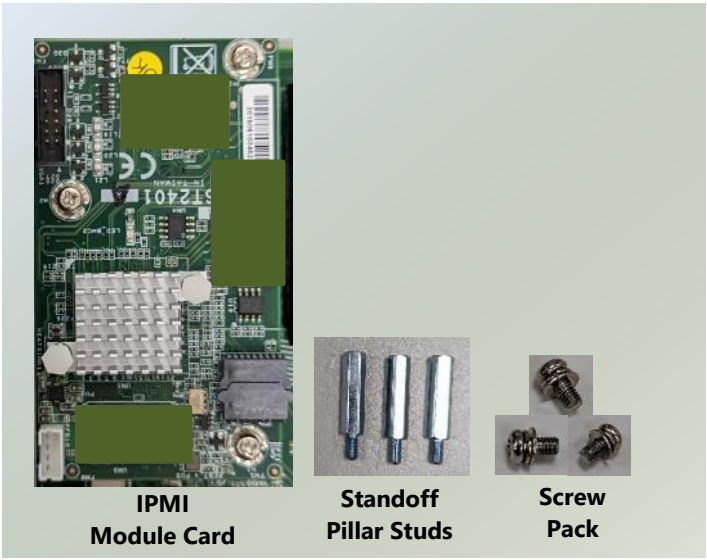


Installing IPMI Module Card (Optional)

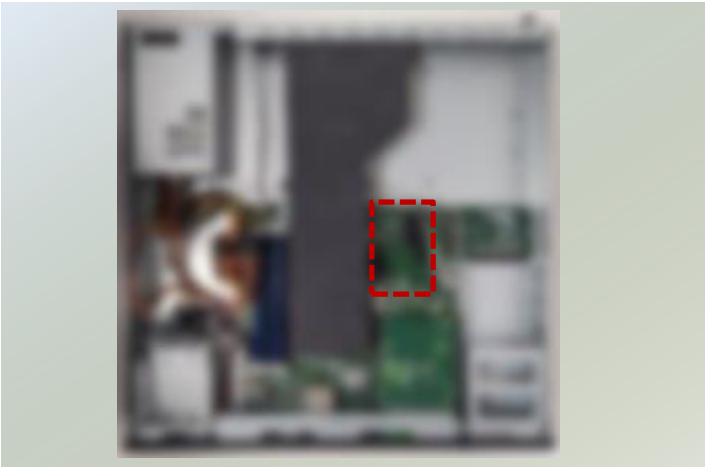
The system supports the placement of one IPMI module card, allowing system administrators to remotely manage and monitor system health. Follow the steps below for installation.

The IPMI Module Kit includes:

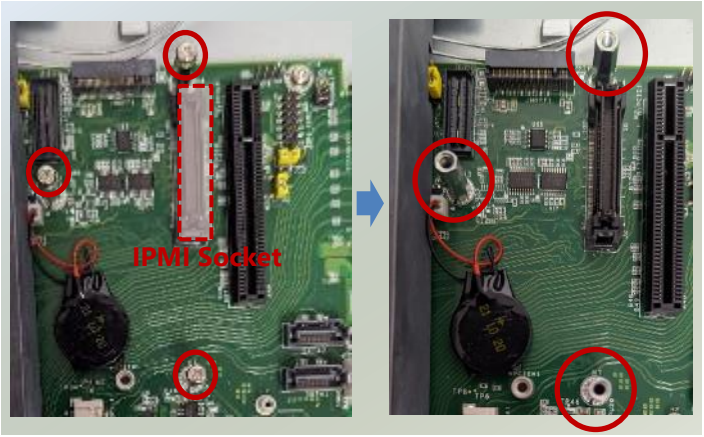
- 1x IPMI Module Card
- 3x Stainless Steel Standoff Pillar Studs
- Screw pack



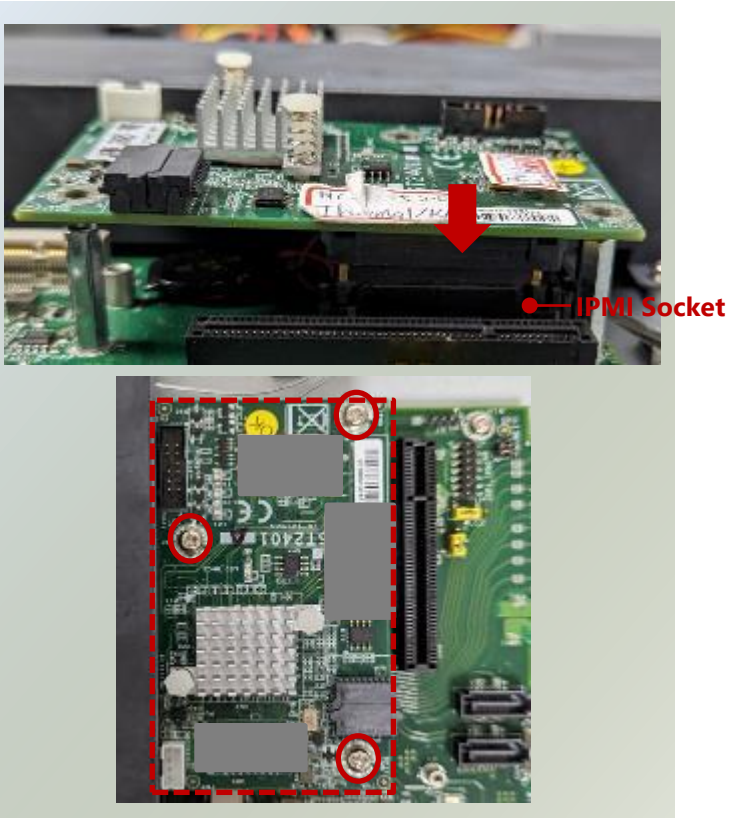
1. Power off the system and open the cover.
2. Locate the IPMI socket and pillars on the motherboard.



3. Unscrew the three (3) screws on the motherboard.
4. Screw on the three (3) standoff pillar studs.



5. Insert the IPMI module card into the socket until it is fully seated in the connector.



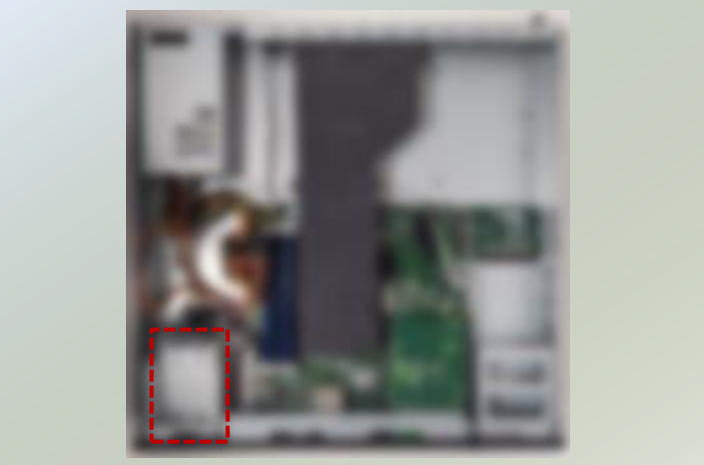
6. Secure the IPMI module card with three (3) screws, one for each standoff pillar.

Installing Disk Drive(s) (Optional)

The HDD/SSD bay supports two 2.5" SATA HDDs or SSD for additional data storage. Follow the steps below for installation.

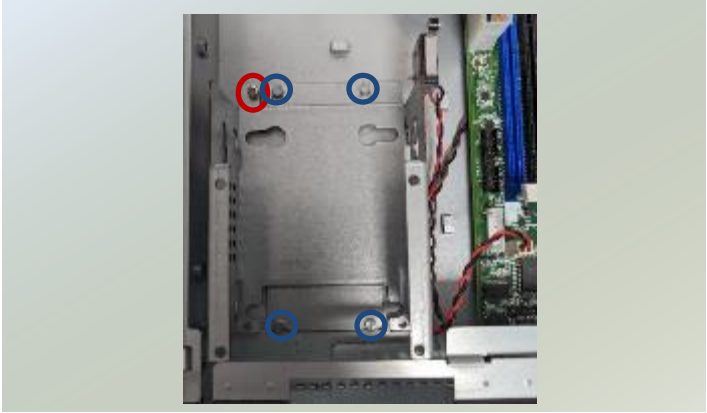
After you have installed the drives on the disk bay, make sure the SATA data cables and SATA power cables are connected to the designated connectors on the motherboard.

1. Power off the system and open the cover.
2. Locate the 2.5" disk trays inside the system.



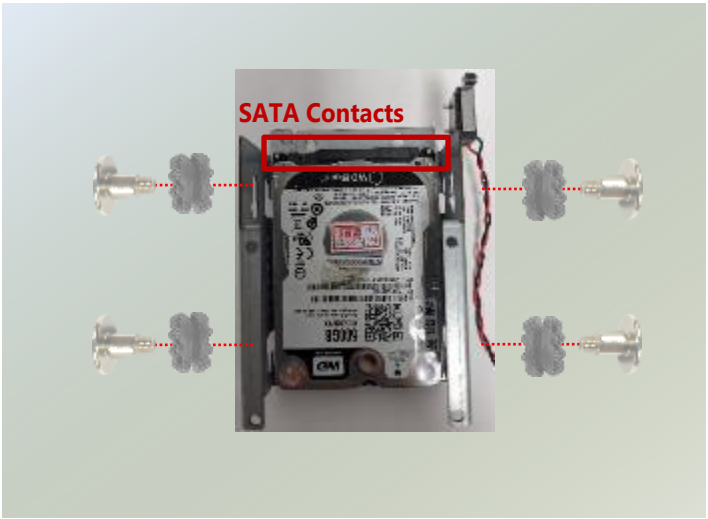
3. Loosen the one (1) screw that secures the tray. Remove the screw, take the tray out and prepare to install the disk drives.

Note: Make sure to watch out for the notches (circled in blue) on the sides of the tray, especially when placing the tray back in the system.



4. Mount the disk drives in the tray, make sure the SATA Contacts (SATA data cables and power cable connectors) are facing outwards. Apply two (2) disk screws with rubber washers on each side of the disk drive.

NOTE: If you are going to install two disk drives, always start by installing the disk in the lower (bottom) slot.



5. Attach the SATA data cable and power cable to the HDD/SSD disk.

6. Place the tray (with the disk drives now installed) back to its original place inside the system. Secure with the original one (1) screw.

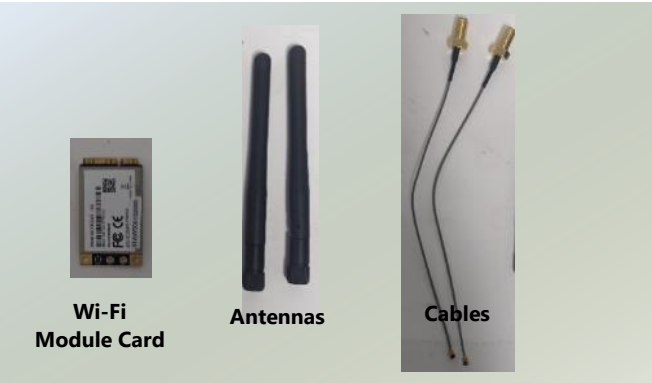
7. Then, insert the other end of the SATA data cable into the corresponding connector on the motherboard.

Installing Wi-Fi Module Card (Optional)

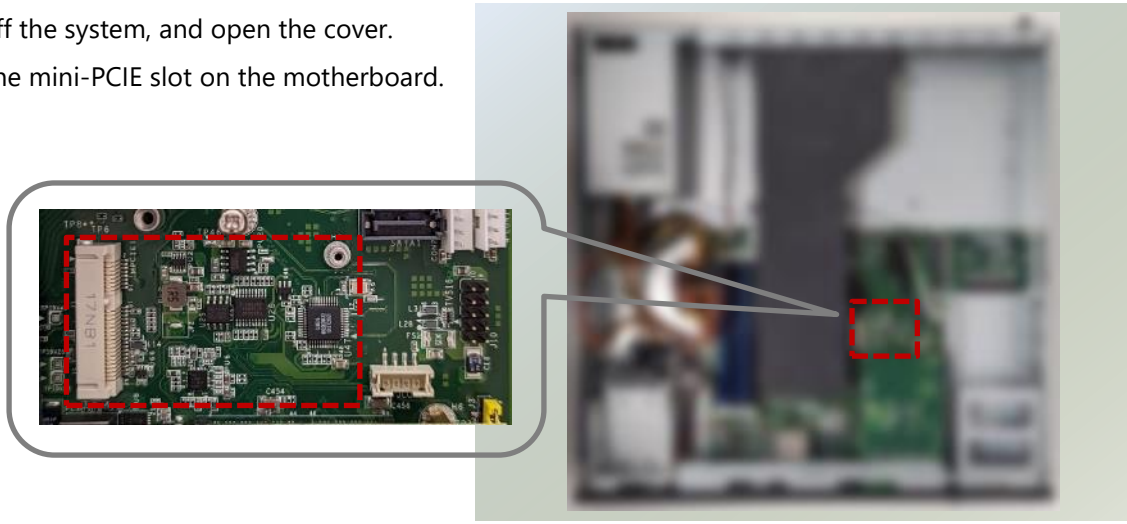
The motherboard provides one mini-PCIe slot, to support one Wi-Fi module card. Wi-Fi module will also require two (2) antennas. Follow the steps for installation.

The Wi-Fi Module Card kit contains the following items:

- 1x Wi-Fi Module Card
- 2x SMA to IPEX cable
- 2x Antennas



1. Power off the system, and open the cover.
2. Locate the mini-PCIE slot on the motherboard.



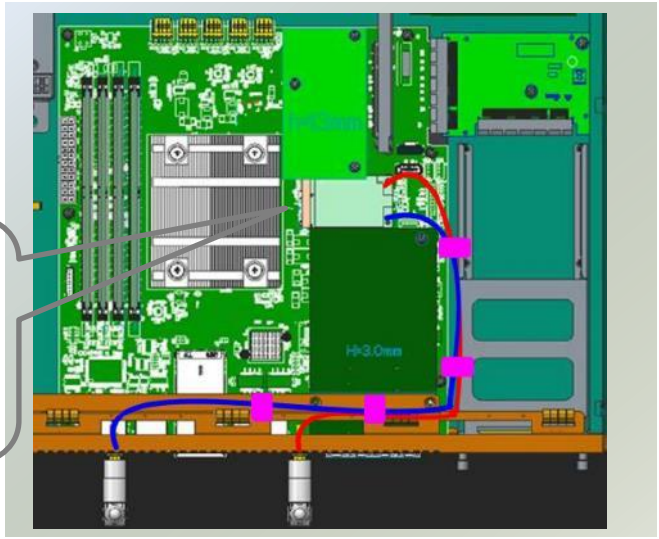
3. Align the notch of the Wi-Fi module card with the socket key in the slot.

4. Insert at 30 degrees into the socket until it is fully seated in the connector.

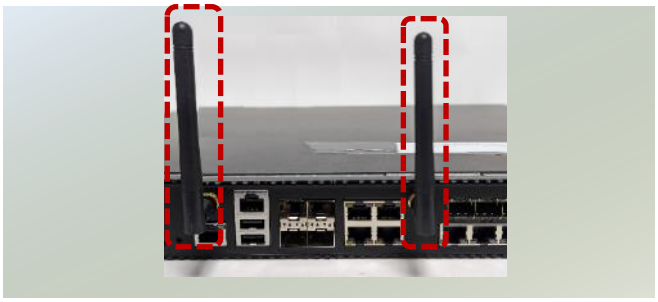
5. Vertically push down on the Wi-Fi module card and secure it with one (1) screw.

Installing Wi-Fi Antennas

1. Locate the IPEX connectors (A1, A2) on the Wi-Fi module card.
2. Connect the cables to the Wi-Fi module card IPEX connectors.



3. Screw on the two (2) antennas on the outside of the system.



Installing NIC Modules

NCA-2520 comes with one NIC module slot for expansion. Follow the steps for installation.

1. Locate the NIC module slot on the front panel of the system.

2. Rotate clockwise and loosen the two lock-screws, and remove the NIC module slot door.

4. Insert your NIC module. (The module shown here is for reference only.)

5. Once the module is firmly seated, rotate counter-clockwise and tighten the two lock screws.

Installing PGN Module (Optional)

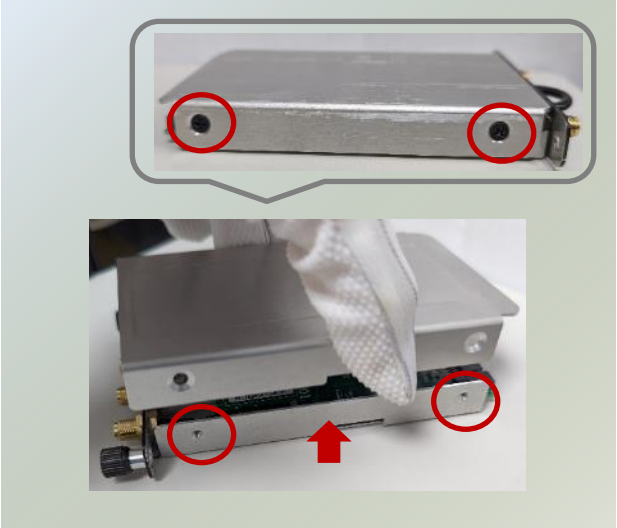
NCA-2520 comes with one PGN module slot for 4G/LTE add-on. Follow the steps for installation.

The PGN Module with Bracket kit contains the following items:

- 1x PGN Module
- 1x PGN Bracket
- 1x PGN Cable
- 2x Antennas
- 1x Screw packet

Installing LTE Module Card into the PGN Module

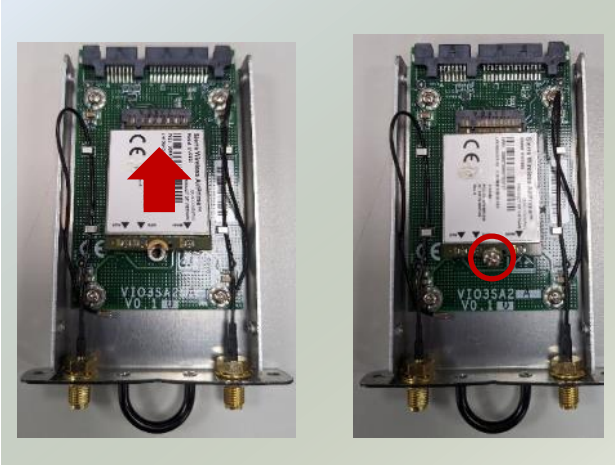
1. Loosen the two (2) screws on each side of the PGN module and lift up the cover.



2. Locate the LTE module card slot on the board. Align the notch of the LTE module card with the socket key in the slot.

3. Insert at 30 degrees into the socket until it is fully seated in the connector.

4. Vertically push down on the LTE module card and secure it with one (1) screw.

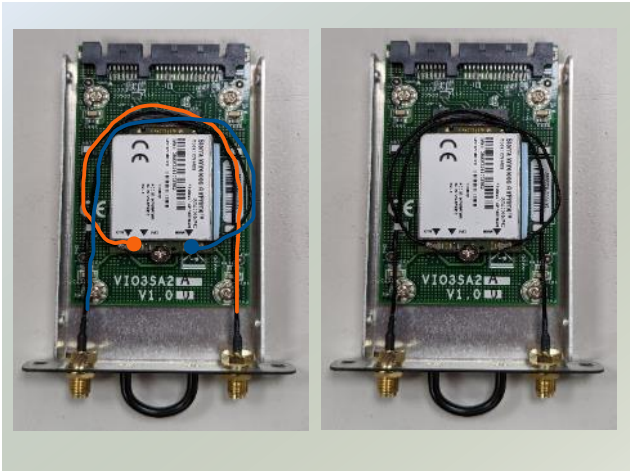


Installing LTE Antennas

1. Locate the IPEX connectors (A1, A2) on the LTE module card.

2. Connect the cables to the LTE module card IPEX connectors.

3. Place the top cover back on and secure with two (2) screws on each side.

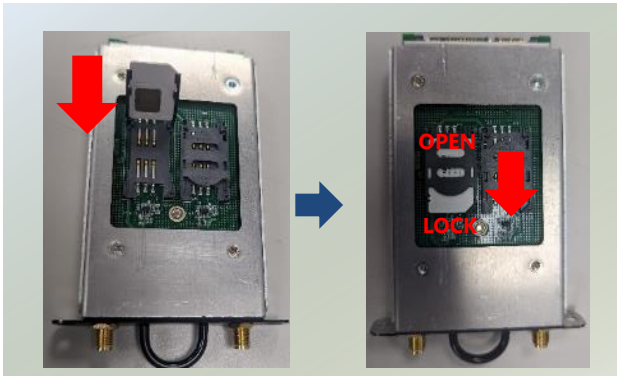


Installing SIM Cards

1. Locate the SIM card holder on the bottom side of the PGN module.

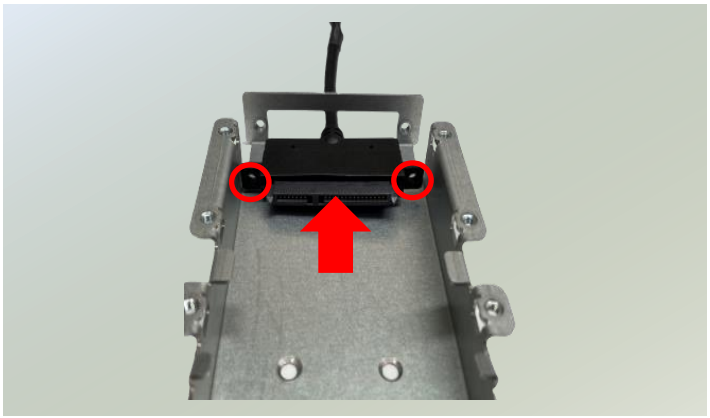
2. Slide the SIM card holder to the open position, and then carefully lift the cover on its hinges.

3. Insert the SIM card into the slot, fold down the SIM card holder and slide the socket cover to the Lock position.

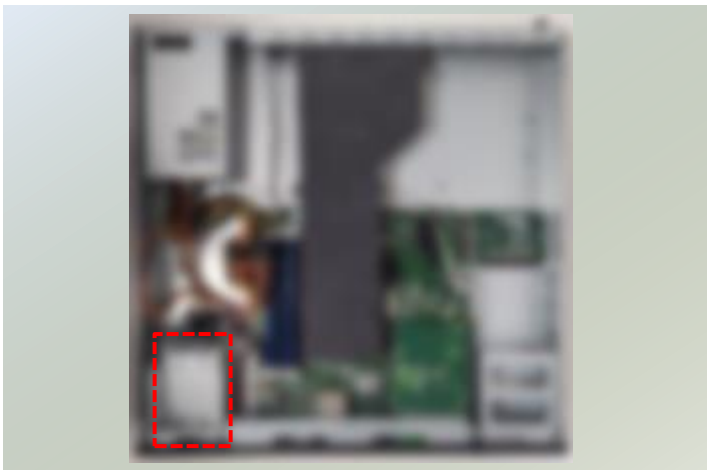


Installing PGN Bracket

1. Hold the PGN bracket and insert the PGN cable to the bottom section, and secure with two (2) screws.

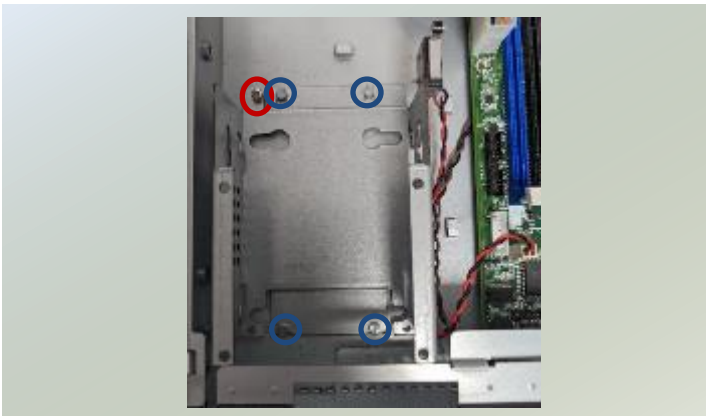


2. Next, make sure to power off the system and open the chassis cover. Locate the 2.5" disk tray inside the system.

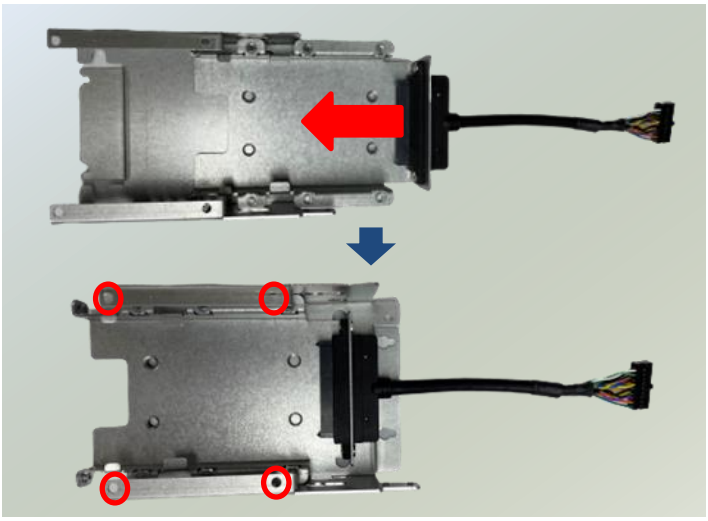


3. Loosen the one (1) screw that secures the disk tray. Remove the screw, and take the tray out.

Note: Make sure to watch out for the notches (circled in blue) on the sides of the tray, especially when placing the tray back in the system.



4. Insert the PGN bracket into the disk tray bracket, and secure with four (4) screws.



5. Place the disk tray (with the PGN bracket now installed) back to its original place inside the system. Secure with the original one (1) screw.

6. Insert the PGN cable into the corresponding connector on the motherboard.

Installing PGN Module

1. Locate the PGN module slot on the front panel of the system.

2. Insert the PGN module.

3. Once the module is firmly seated, secure with the two (2) original screws.

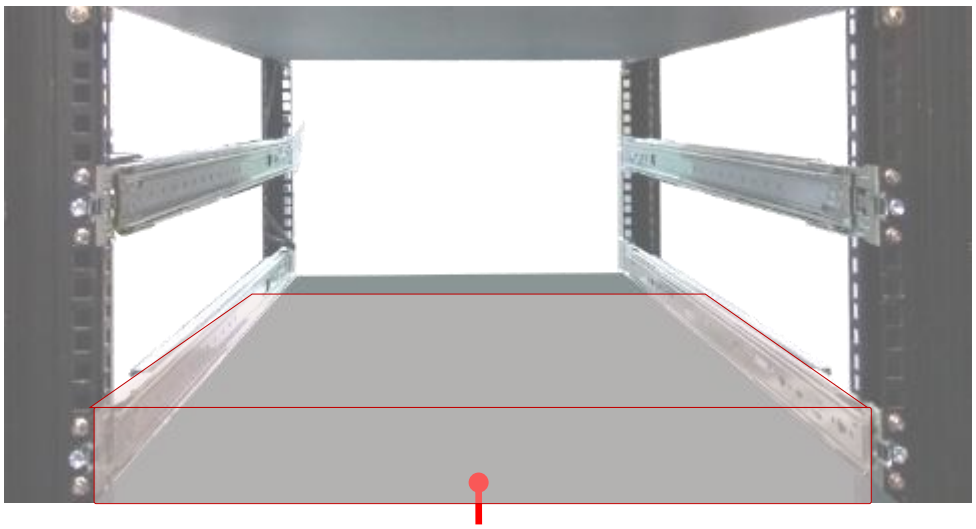
4. Secure the two (2) antennas on the front side of the PGN module.

Mounting the System

There are two methods for installing this system into a rack:

- With **Mounting Ear Brackets** only

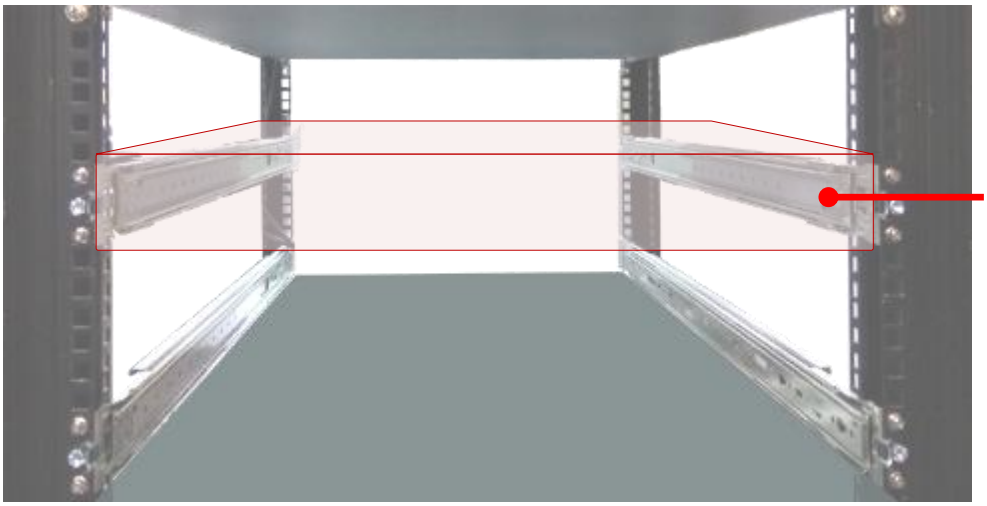
This method is quick and easy by fixing this system to the front posts of the rack, but it also makes servicing the system more difficult. Please note that the use of these brackets must go with a rack shelf or slide rails to prevent the chassis from falling over, for the bracket assembly alone cannot provide sufficient support to the chassis.



The system shall be installed on the rack along with a shelf or slide rails, for the "Mounting Ears" are meant to secure the system, not to support it.

- With **Slide Rail Kit + Mounting Ear Brackets**

This method is rather complicated, but the slidable rails allow you to access the system easily while securing it in the rack solidly.



The Slide Rail Kit can secure the system while providing sufficient weight support for the device.

Installing the System Using Mounting Ear Brackets Only

1. Check the accessory pack for the following items:
   - 1x Screw Pack
   - 2x Ear Brackets

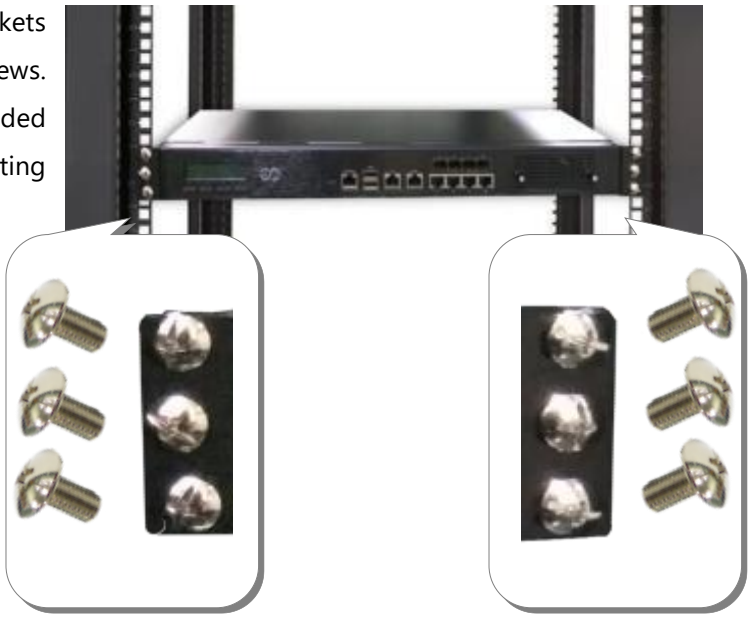
Screw Pack

Ear Brackets

2. Align the bracket to the side of the chassis and make sure the screw-holes are matched, and then secure the bracket onto the chassis with three provided screws.

3. Repeat Step 2 to attach the bracket to the other side of the chassis.

4. Install the chassis into the rack with the brackets fixed onto the posts using the provided screws. The actual approach you adopt and the needed parts for assembly will depend on the supporting accessory (shelf or rail kit) you use.



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Installing the System Using the Slide Rail Kit (with Mounting Ear Brackets)

1. Check the package contents of the Slide Rail Kit. The kit shall include the following items:

   - 1x pack of M4X4L screws (for securing the Rail Brackets on the system)
   - 1x pack of 7.1 Round Hole screws (for securing the system on the rail posts)
   - 2x Slide Rails

M4X4L Screws

7.1 Round Hole Screws

Slide Rails

A rail consists of the following parts:

2. Unpack a slide rail and slide the Inner Rail all the way to the end.

3. Stretch the Rail Bracket to the fullest.
4. Remove the Rail Bracket from the Inner Rail by pushing the Release Tab on the bracket outwards while sliding it out.

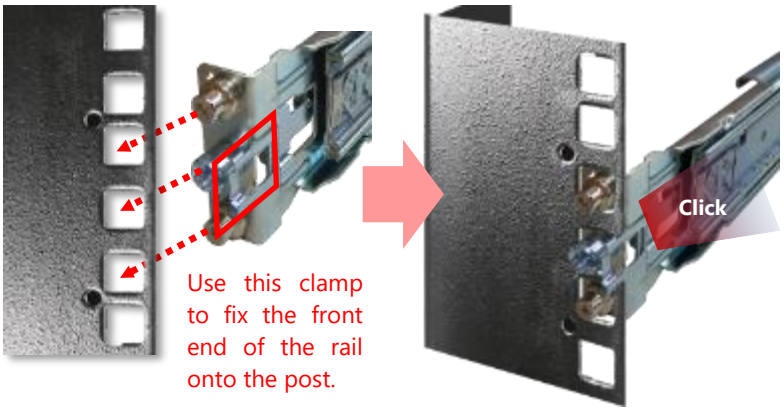
5. Align the bracket to the side of the chassis and make sure the screw-holes are matched, and then secure the bracket onto the chassis with three provided M4X4L screws.

Align the screws with the holes indicated on the brackets and the screw holes on the side of the chassis.

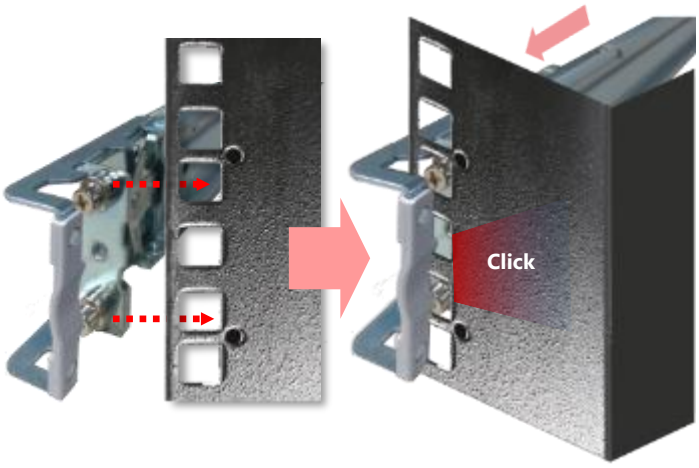
6. Repeat Steps 2~5 to attach the bracket to the other side of the chassis.
7. Follow the instructions in Installing the System Using Mounting Ear Brackets Only to attach the Mounting Ear Brackets.

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

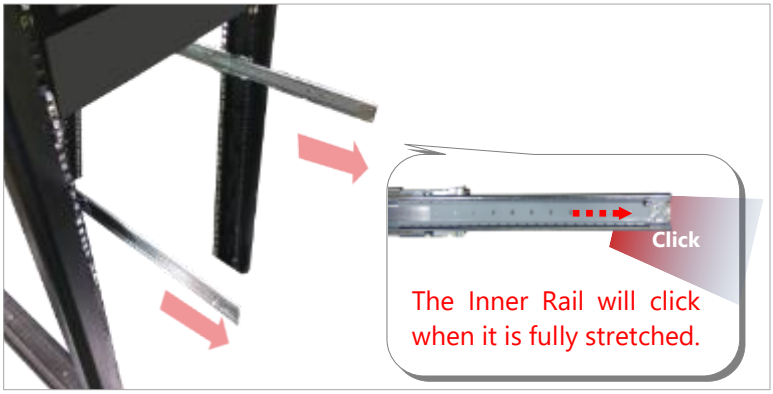
8. This slide rail kit does NOT require screw-fixing. Simply aim at three available screw holes on the rack front and snap the rail front into the rack post as shown in the image. You should hear a "click" sound once it is firmly attached.



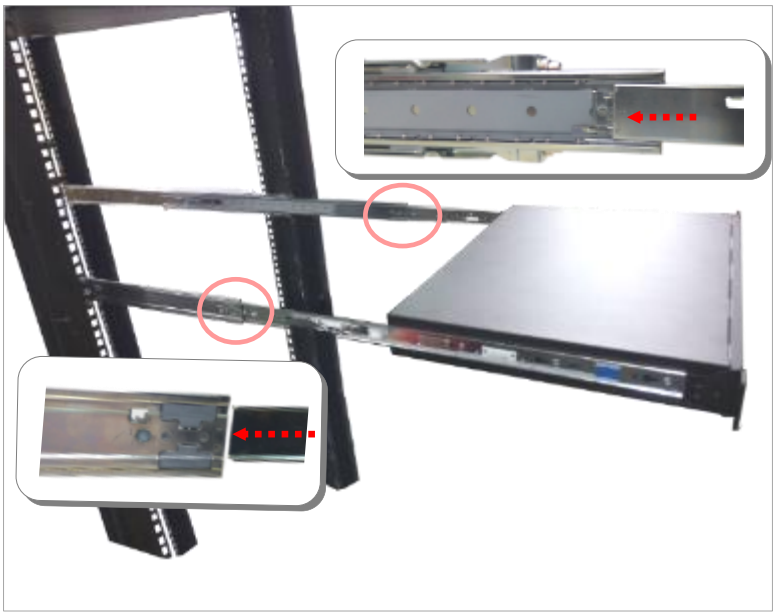
9. For the rear rack installation, slide the rail to aim and engage the bolts on the rail's rear end with the two available holes on the post, and the rail assembly will click into place.



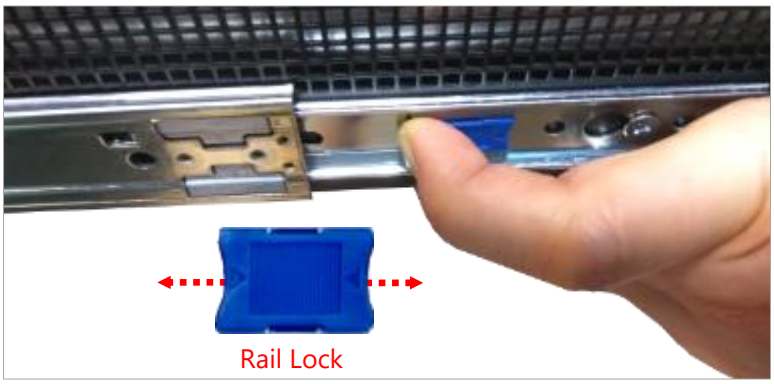
10. Stretch both of the Inner Rails out to their fullest extent. You will hear a click sound when they are fully stretched and locked.



11. Hold the system with its front facing you, lift the chassis and gently engage the brackets on the system while aligning them with the Inner Rails as shown in the image, and then push the system into the cabinet.

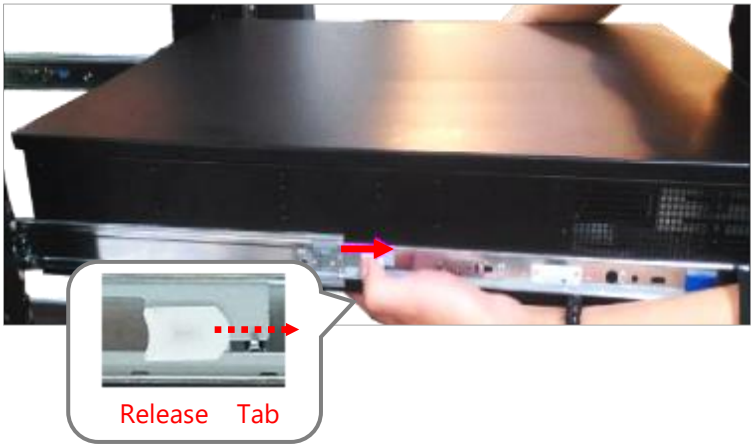


12. While pushing in the system, also push and hold the Rail Lock tab on both brackets.



Push the system all the way in until it stops.

To remove the system from the rack, gently pull it outwards, towards you, while pushing the Release Tab on both sides of the brackets.



CHAPTER 4: SOFTWARE SETUP

BIOS 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

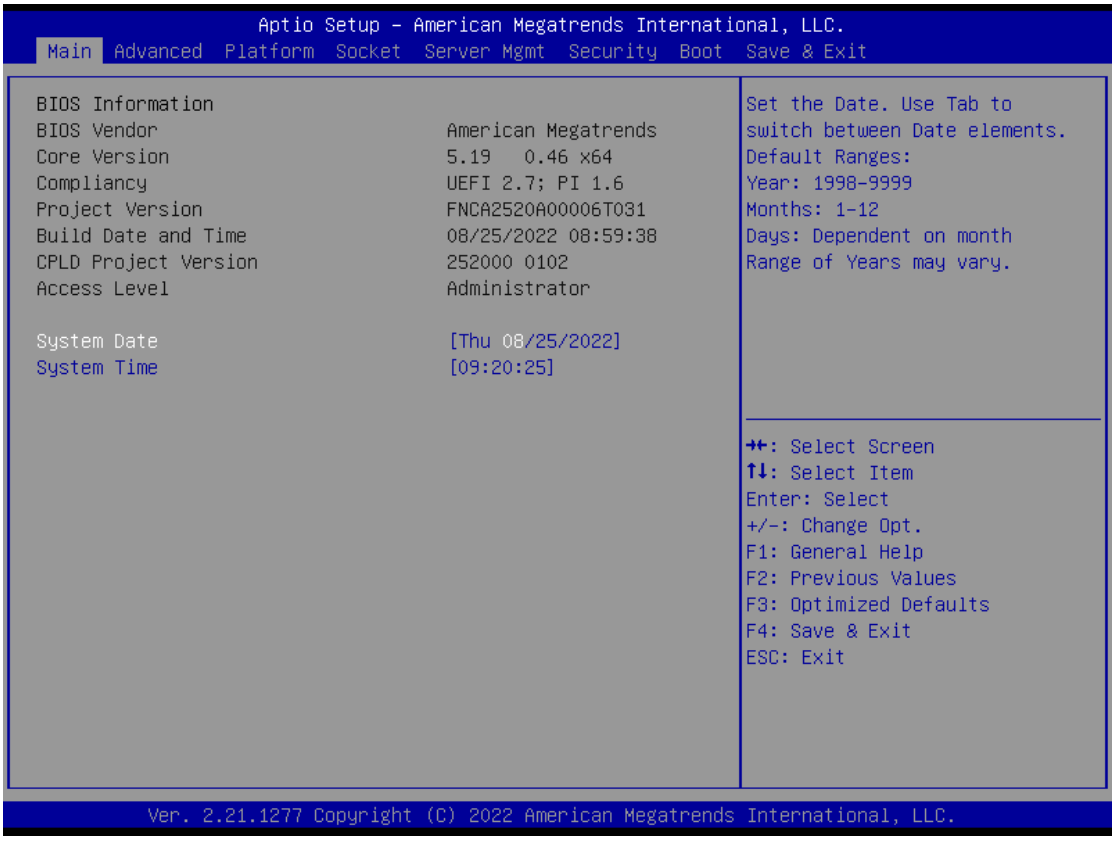
To enter the BIOS setup utility, simply follow the steps below:

1. Boot up the system.
2. Press **<Delete>** 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

Main Page

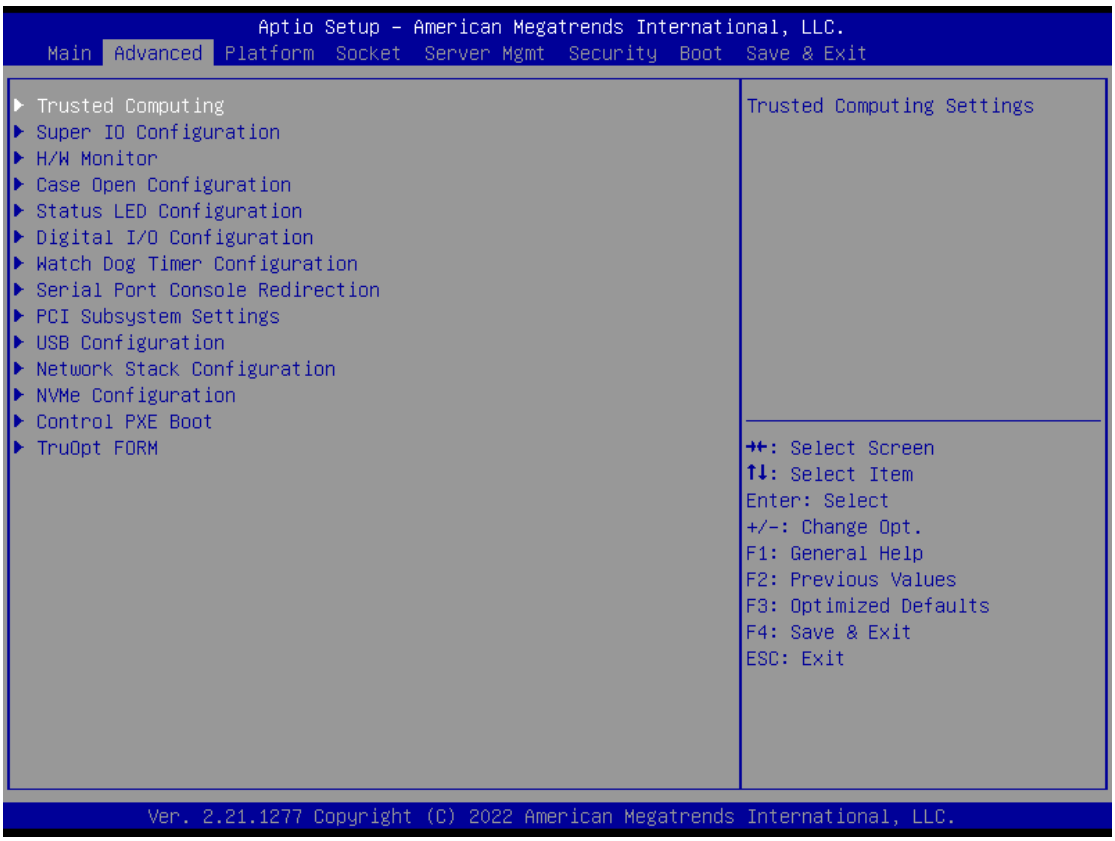
Setup Main Page contains BIOS information and project version information.



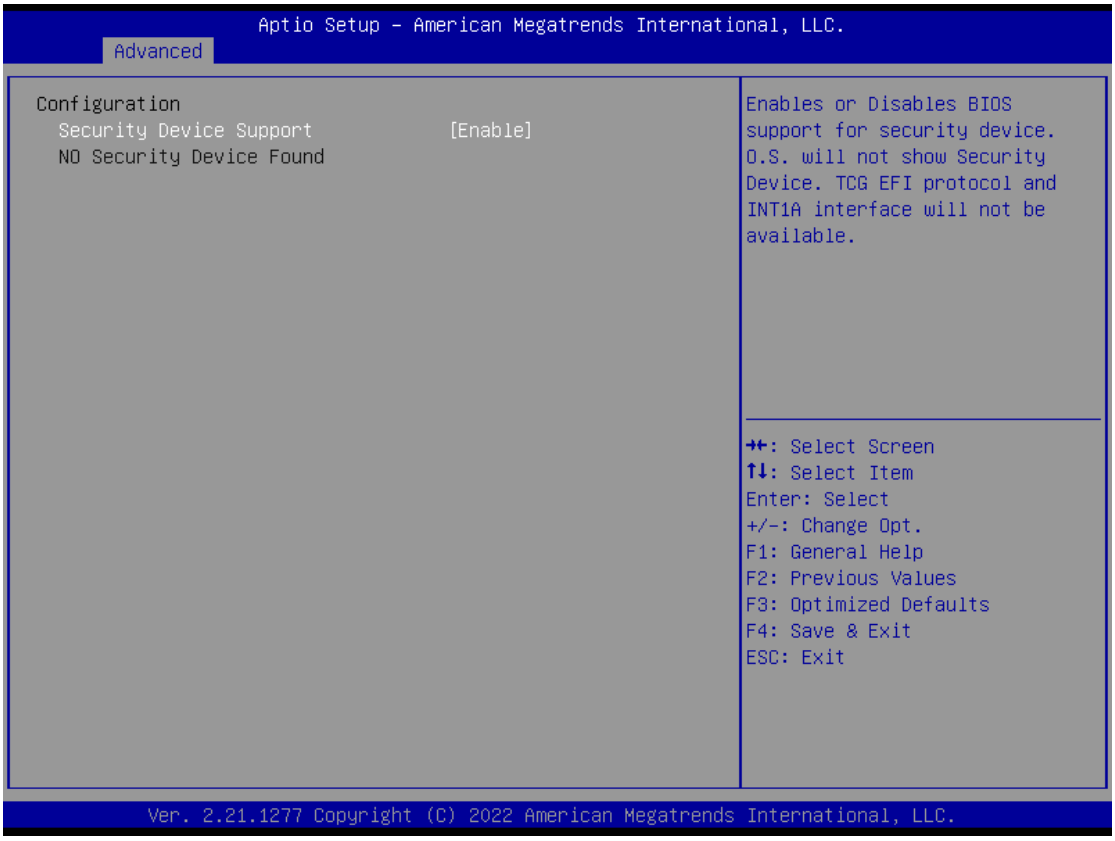
Feature	Description
BIOS Information	BIOS Vendor: American Megatrends Core Version: AMI Kernel version, CRB code base, X64 Compliancy: UEFI version, PI version Project Version: BIOS release version Build Date and Time: MM/DD/YYYY Access Level: Administrator / User
System Date	To set the Date, use **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

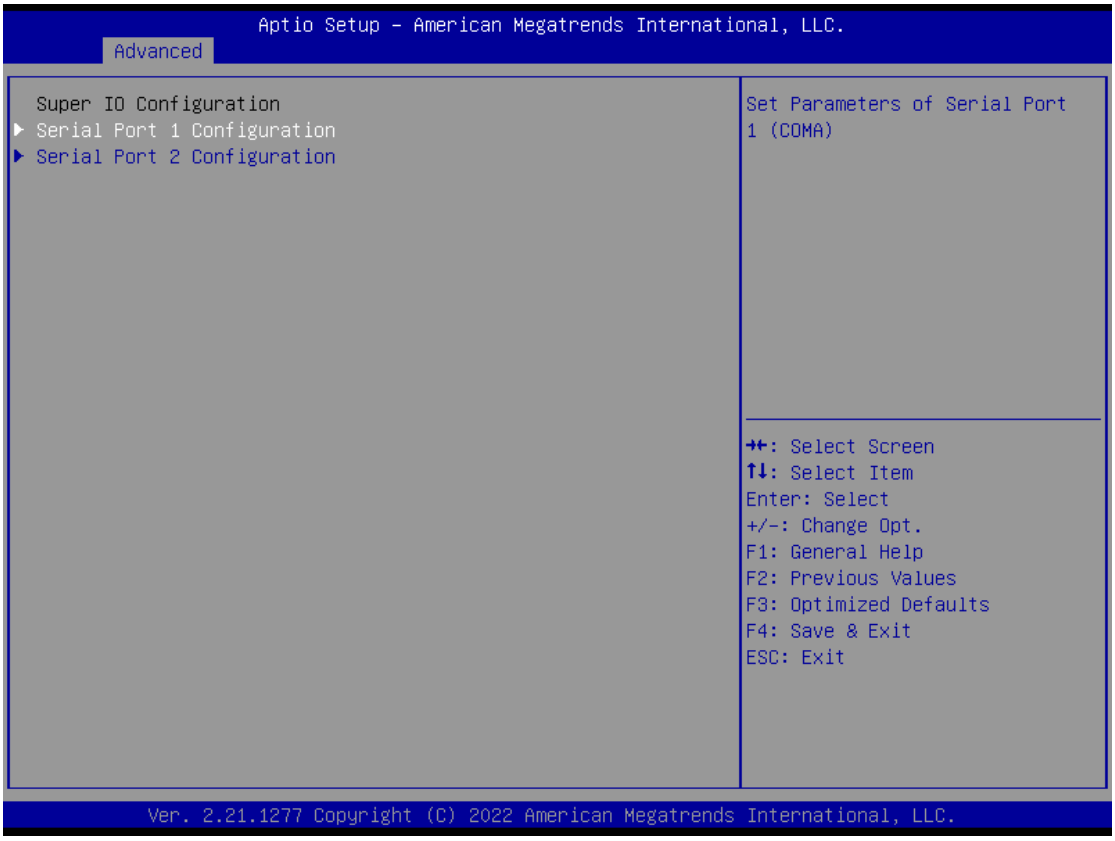


Trusted Computing

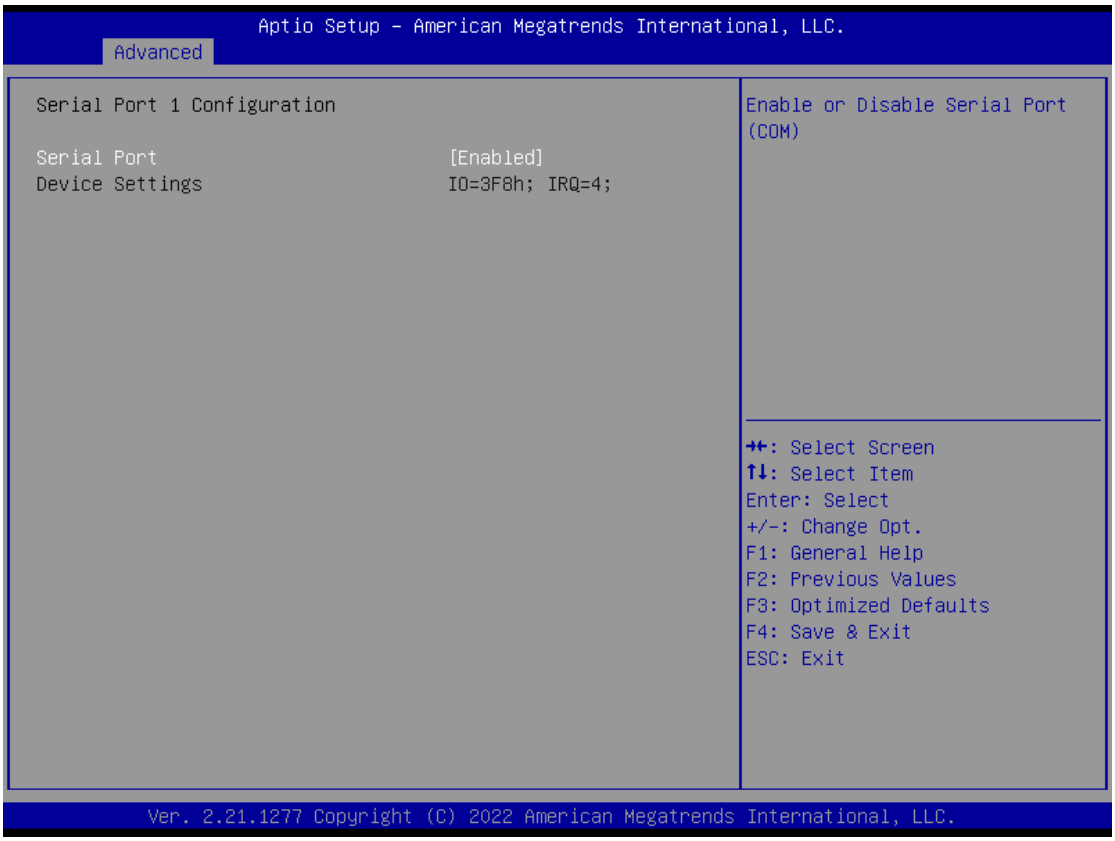


Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

Super IO Configuration

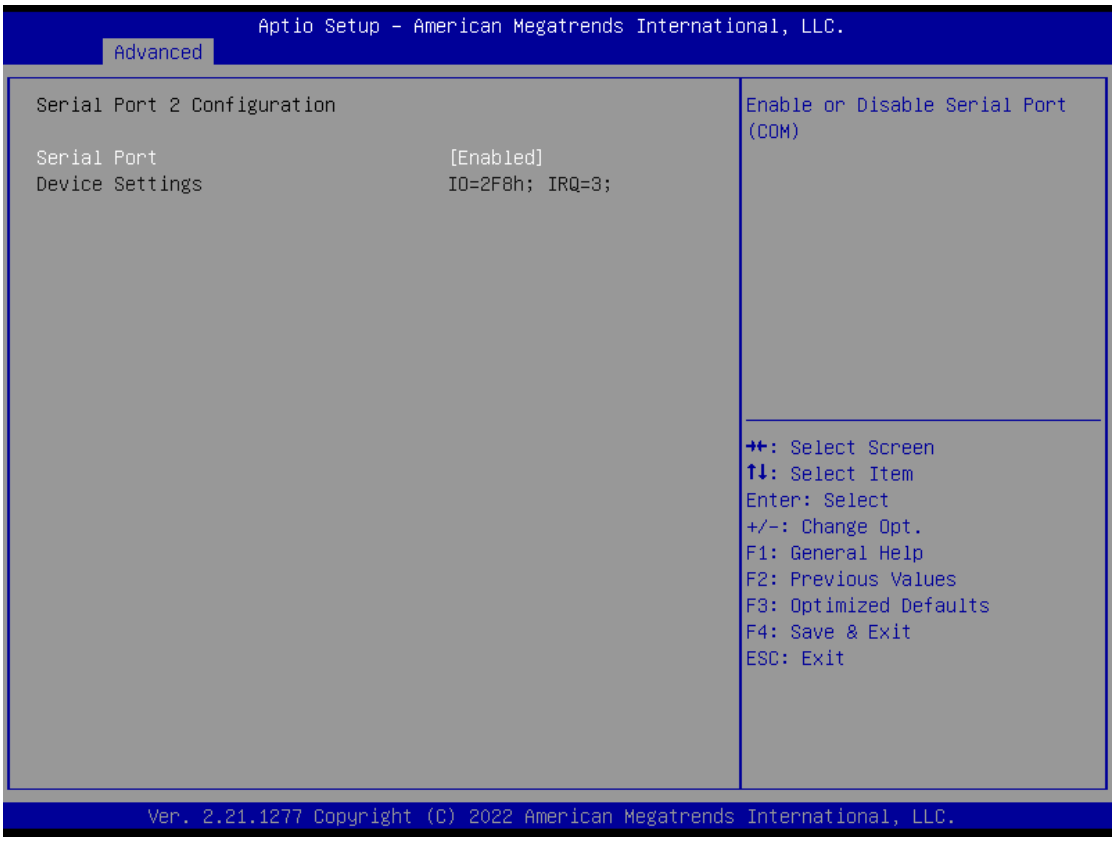


Serial Port 1 Configuration



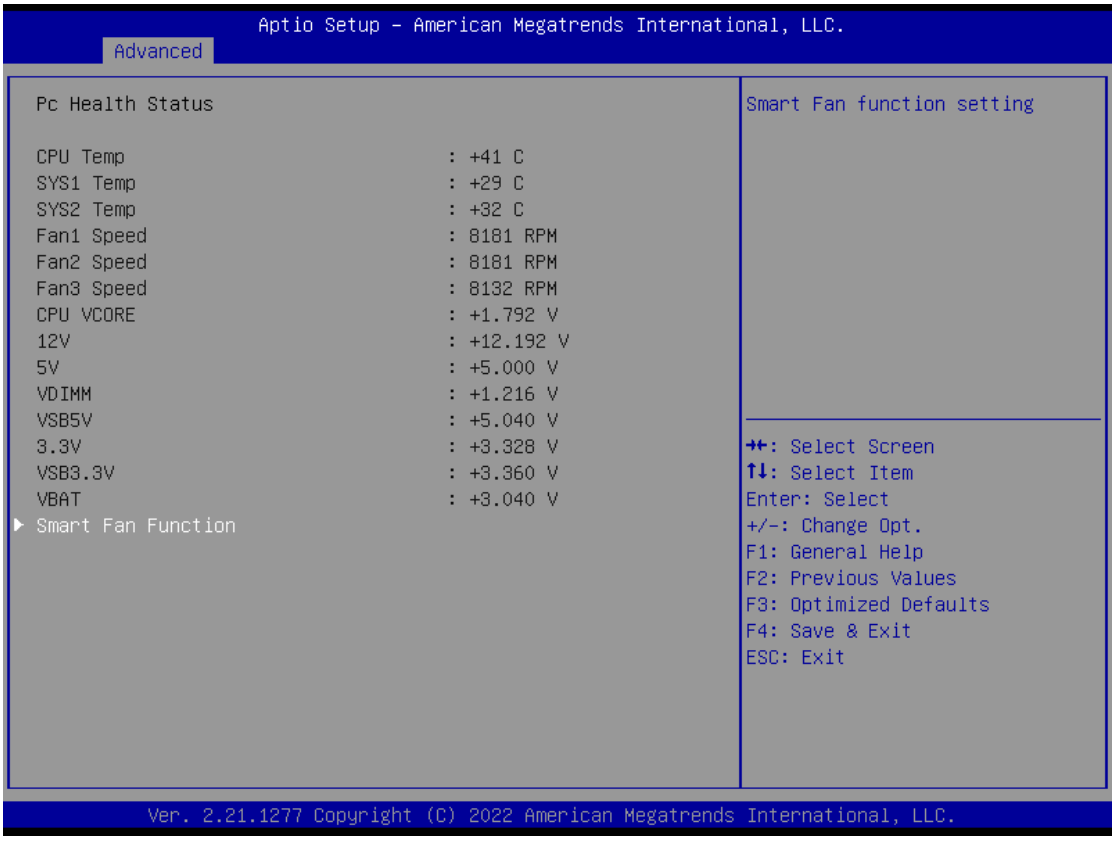
Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port (COM)
Device Settings	--	--

Serial Port 2 Configuration



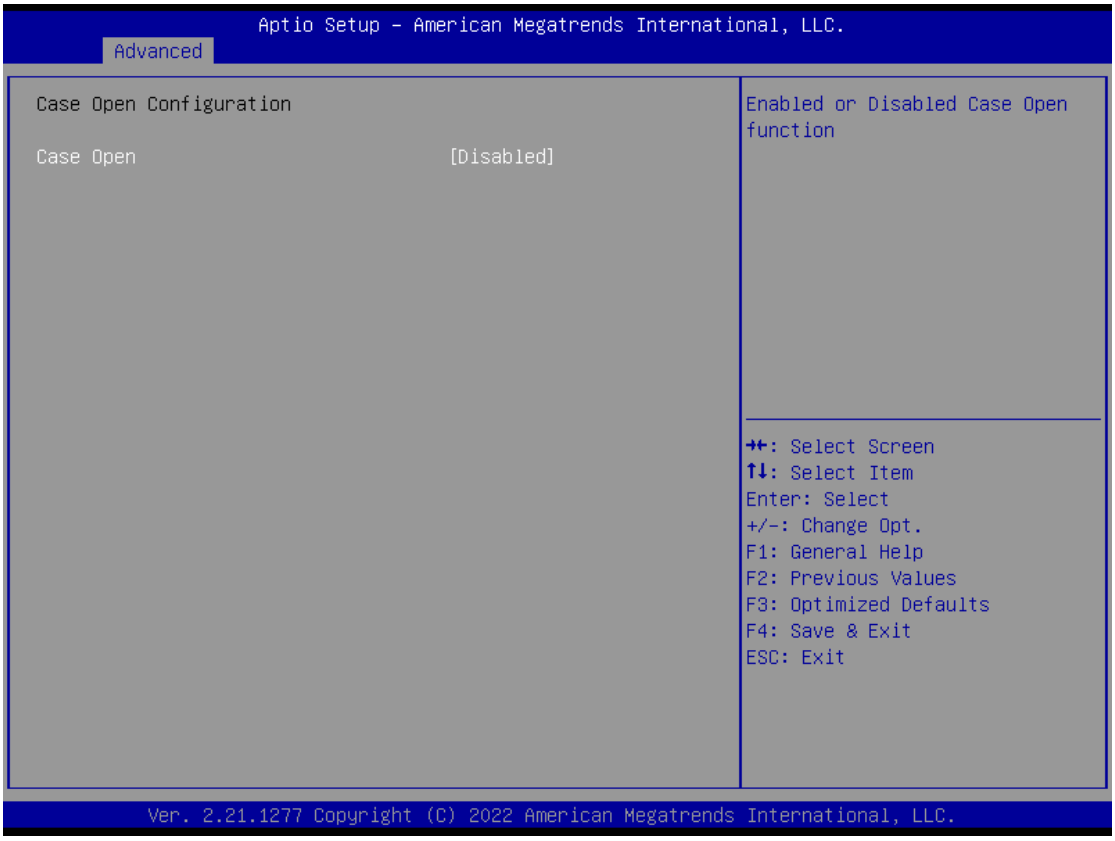
Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port (COM)
Device Settings	--	--

H/W Monitor



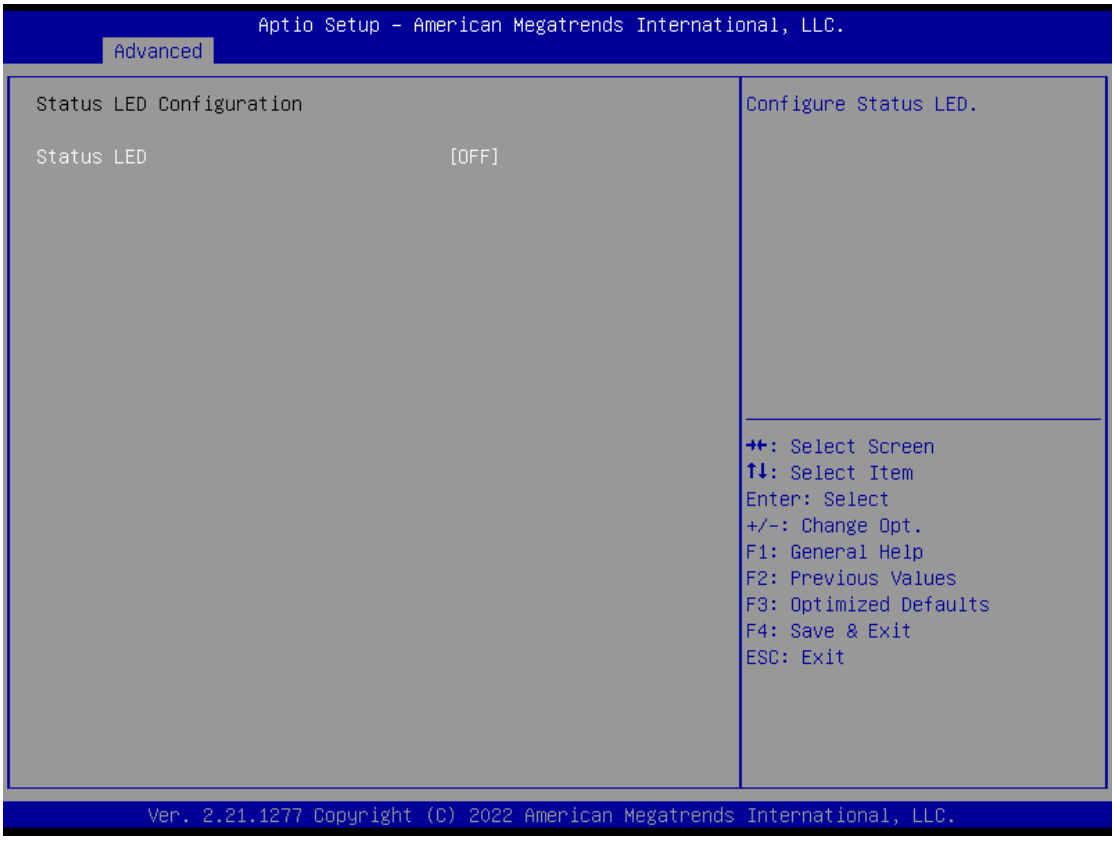
Feature	Options	Description
Smart Fan 2 Mode	Manual mode Smart Fan IV	Smart Fan 2 Mode Select

Case Open Configuration



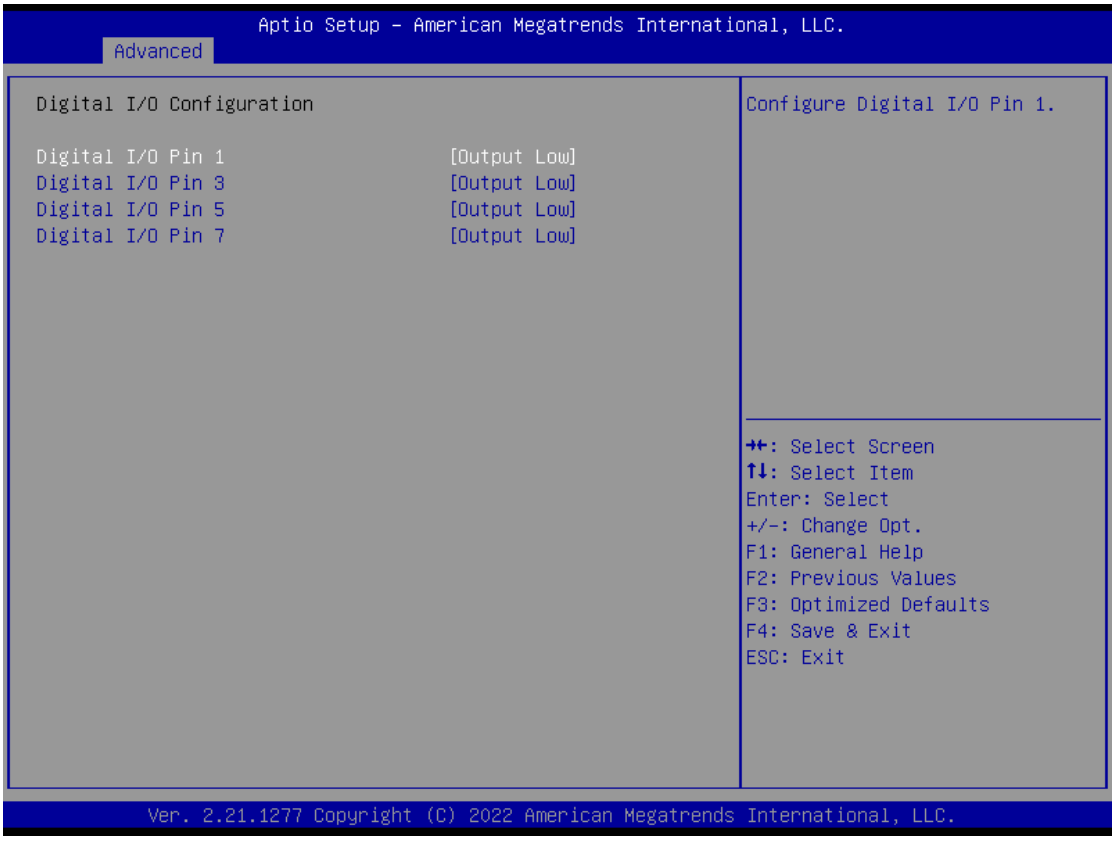
Feature	Options	Description
Case Open	Enabled Disabled	Enable or Disable Case Open function

Status LED Configuration



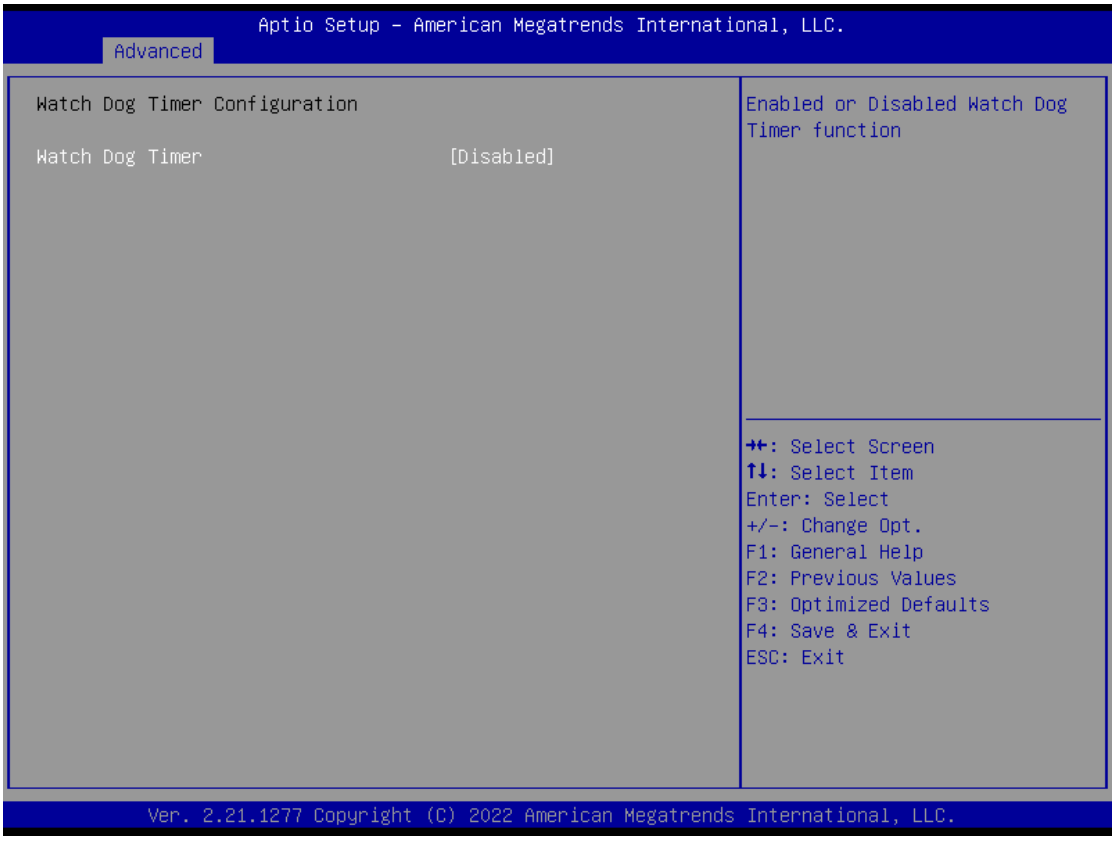
Feature	Options	Description
Status LED	OFF GREEN RED	Configures Status LED color

Digital I/O Configuration



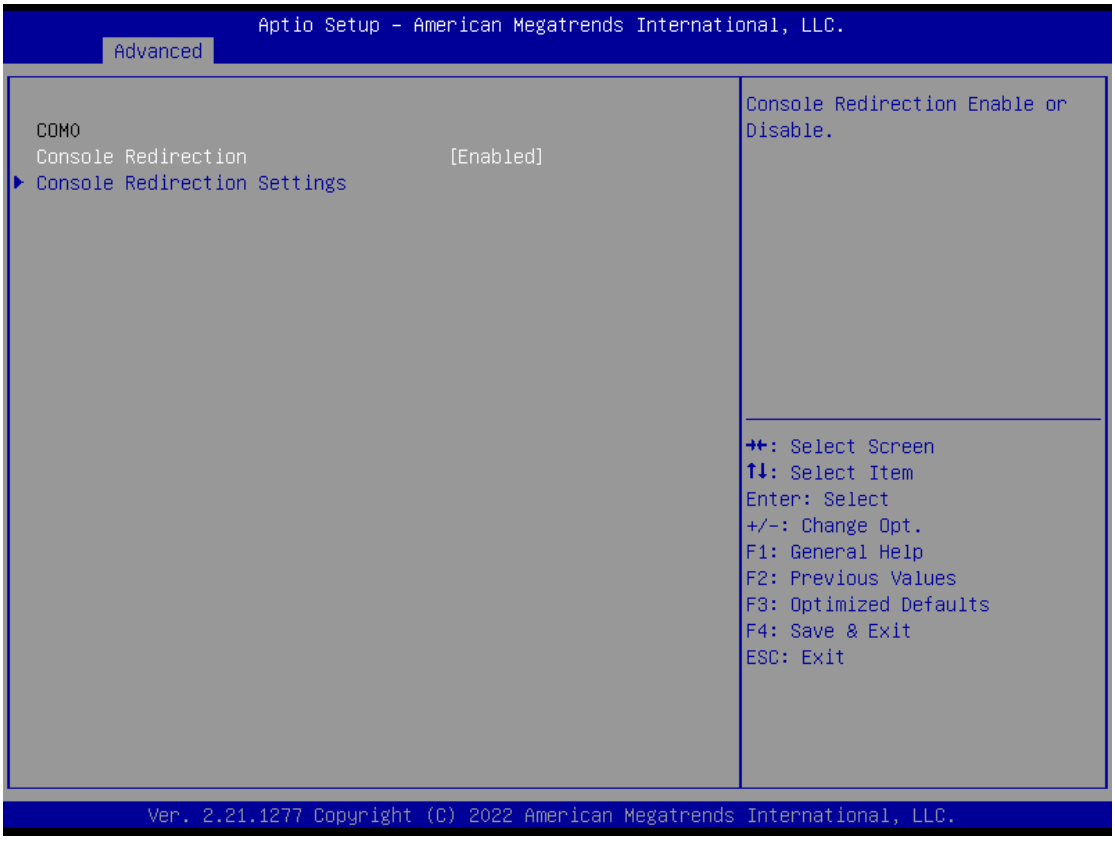
Feature	Options	Description
Digital I/O Output 1	Output High Output Low	Configure Digital I/O Pin1
Digital I/O Output 2	Output High Output Low	Configure Digital I/O Pin3
Digital I/O Output 3	Output High Output Low	Configure Digital I/O Pin5
Digital I/O Output 4	Output High Output Low	Configure Digital I/O Pin7

Watch Dog Timer Configuration



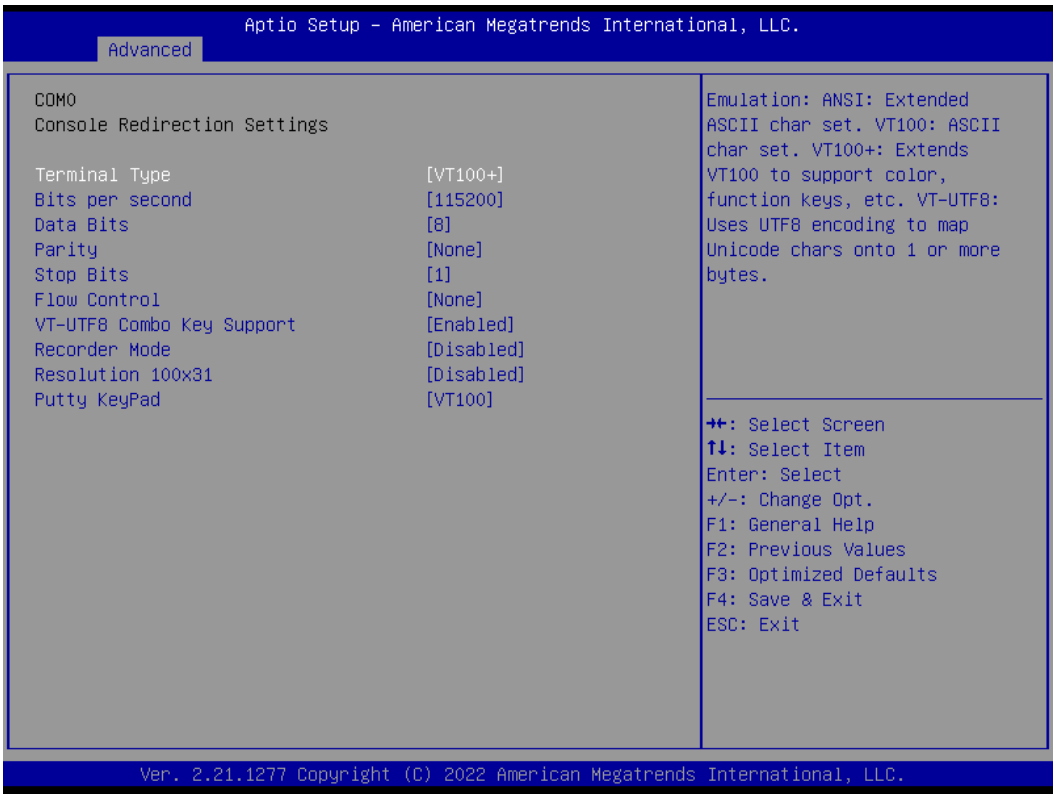
Feature	Options	Description
Watch Dog Timer	Enabled Disabled	Enables or disables Watch Dog Timer function
Watch Dog Timer Count Mode	Second Mode Minute Mode	Select Second Mode or Minute Mode
Watch Dog Timer Time Out Value	60	Watch Dog Timer Time out Value.

Serial Port Console Redirection



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

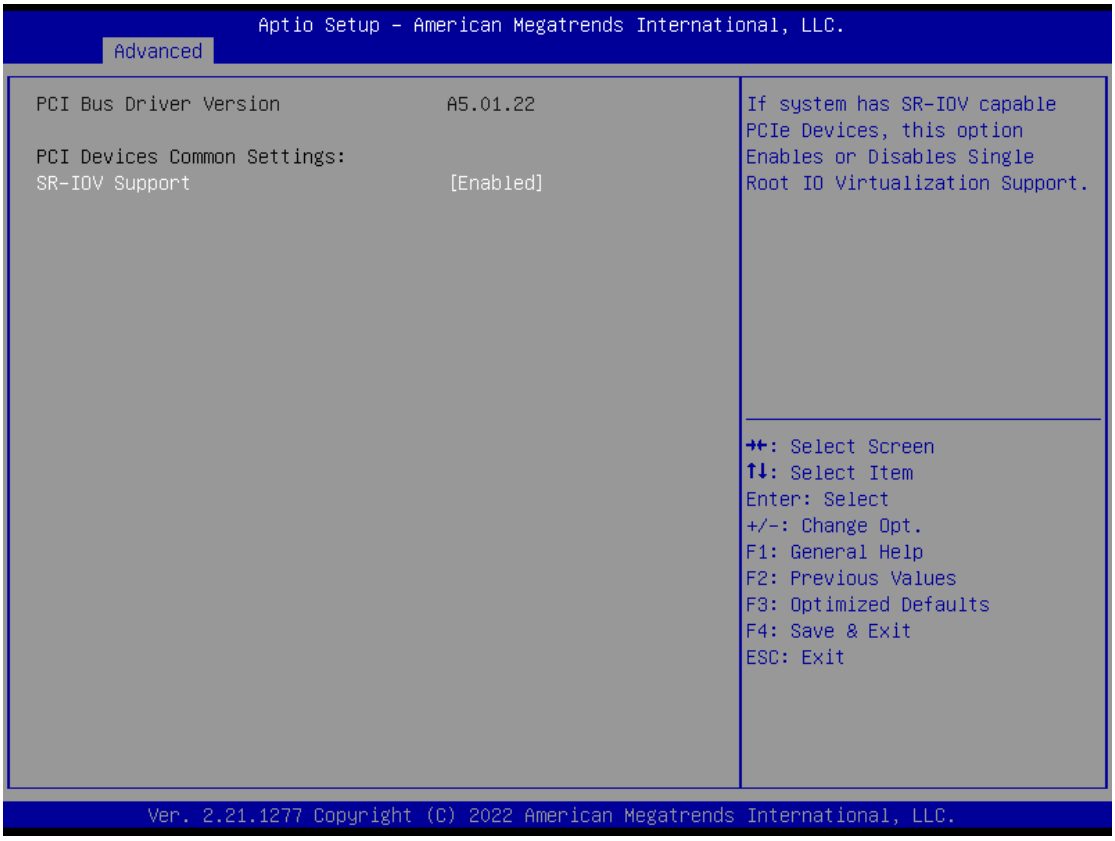
Console Redirection Settings



Feature	Options	Description
Terminal Type	VT100 VT100+ VT-UTF8 ANSI	**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. **ANSI**: Extended ASCII char set
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	Indicates the end of a serial data packet.
Flow Control	None Hardware RTS/CTS	Flow Control can prevent data loss from buffer overflow.

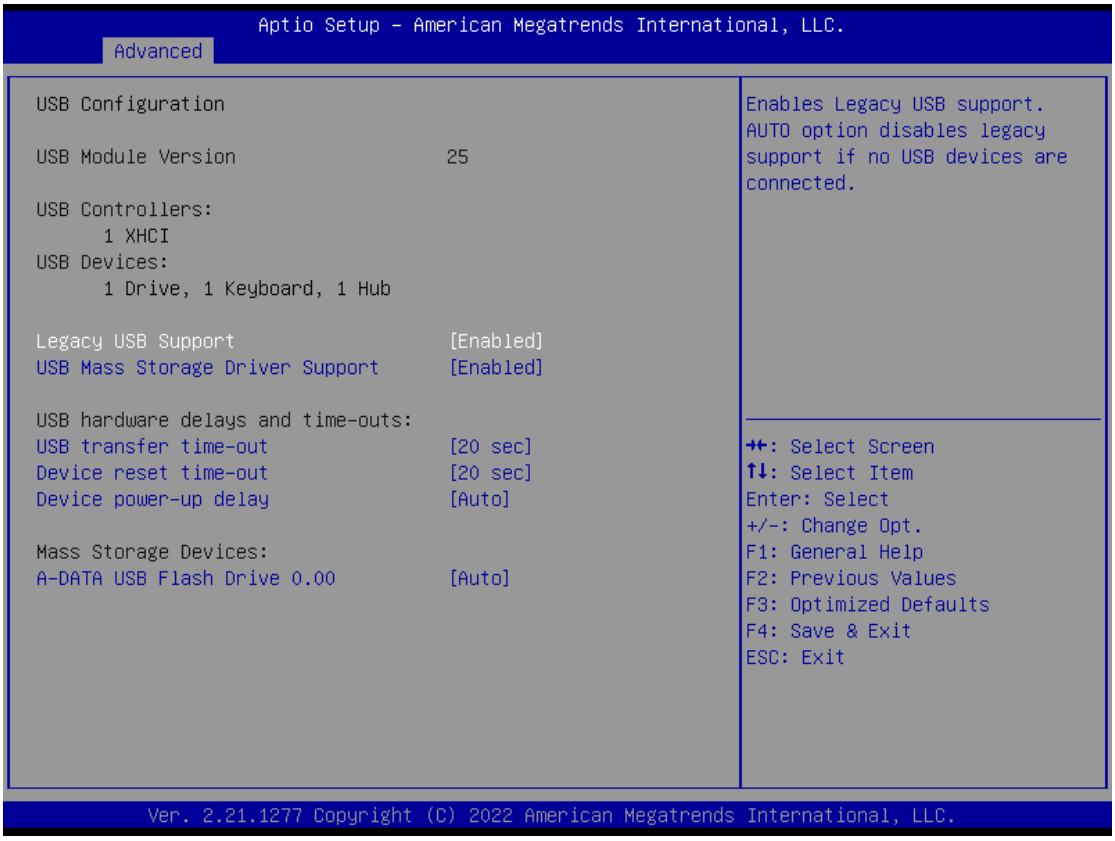
VT-UTF8 Combo Key Support	Disabled Enabled	Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	Disabled Enabled	With this mode enabled, only text will be sent. This is to capture Terminal data.
Resolution 100x31	Disabled Enabled	Enables or disables extended terminal resolution
Putty KeyPad	VT100 LINUX XTERM86 SCO ESCN VT400	Selects FunctionKey and KeyPad on Putty.

PCI Subsystem Setting



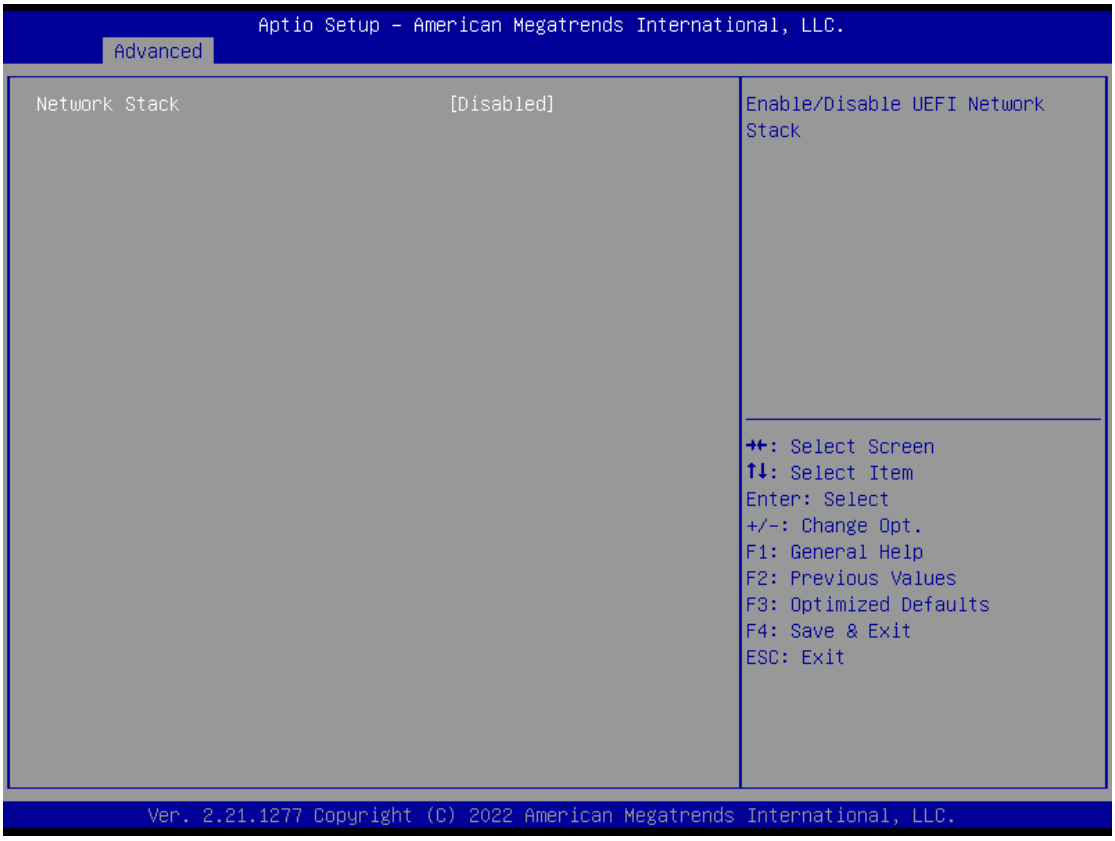
Feature	Options	Description
SR-IOV Support	Disabled Enabled	If the system has SR-IOV capable PCIe Devices, this option enables or disables Single Root IO Virtualization Support.

USB Configuration



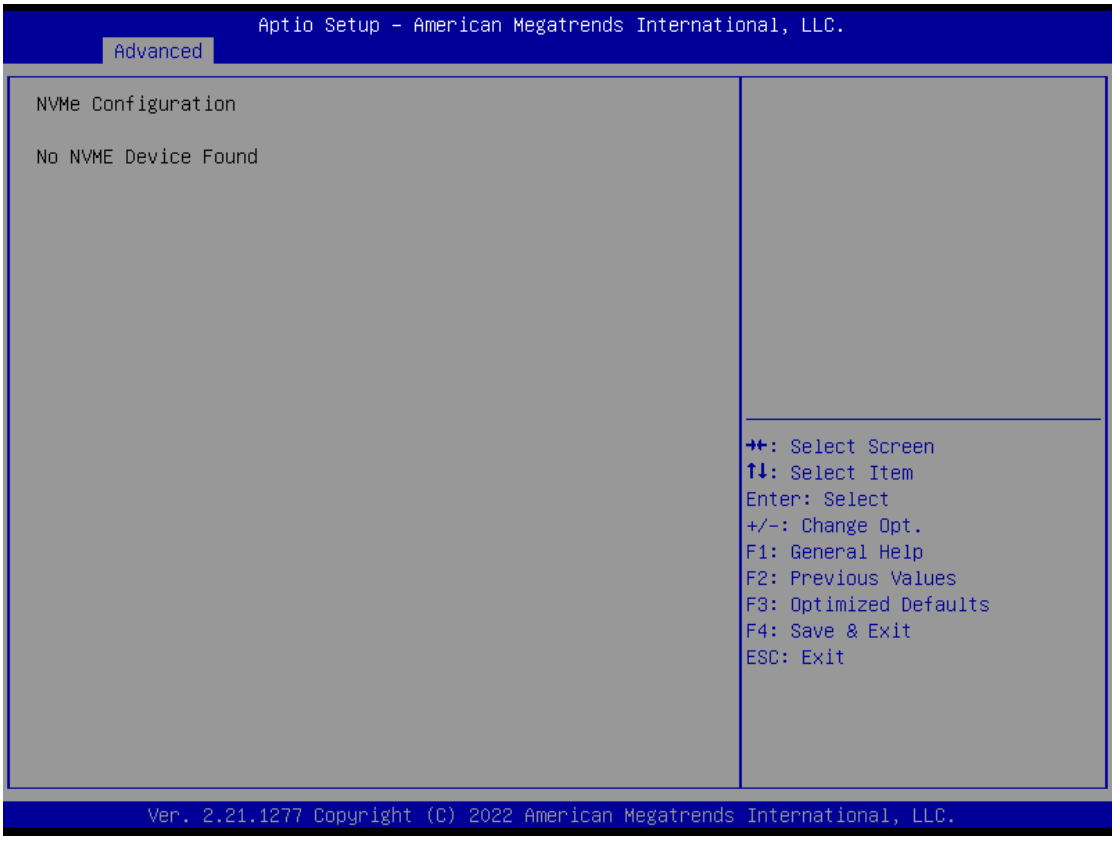
Feature	Options	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB support. **Auto** option disables legacy support if no USB devices are connected; **Disabled** option will keep USB devices available only for EFI applications.
USB Mass Storage Driver Support	Enabled Disabled	Enables 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

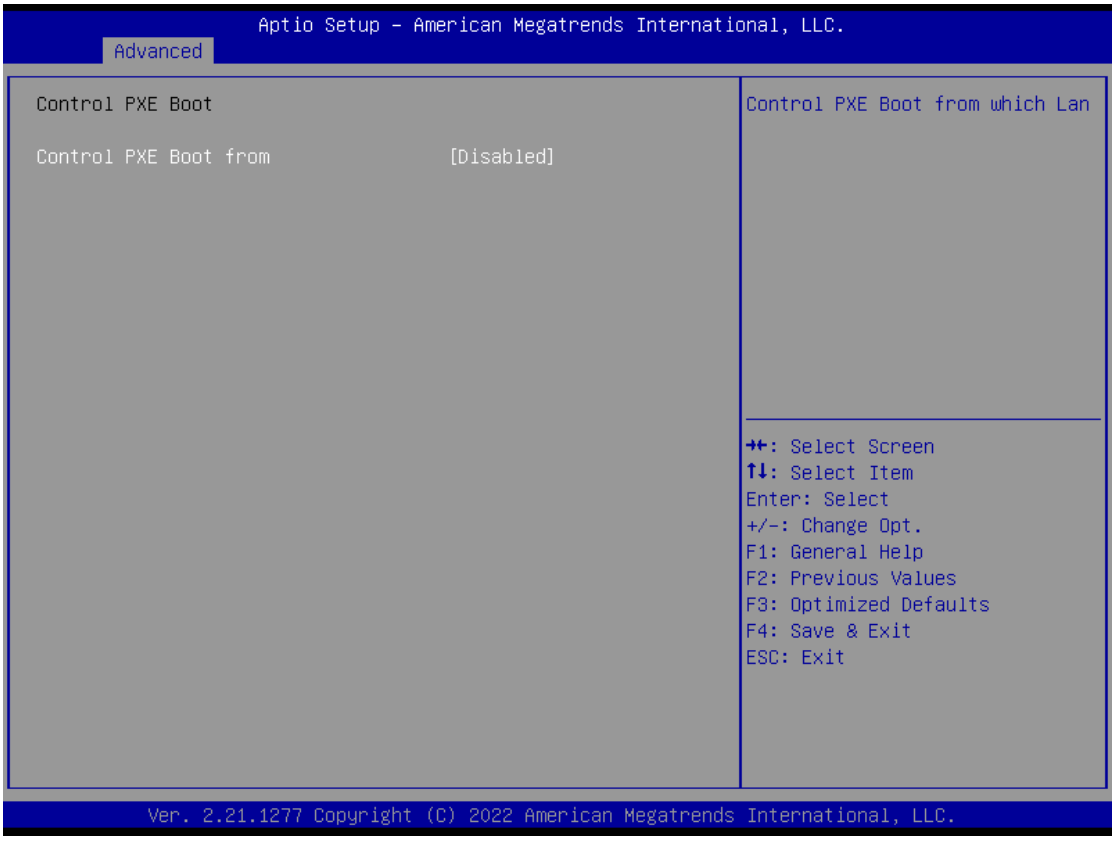


Feature	Options	Description
Network Stack	Disabled Enabled	Enables or disables UEFI Network Stack
Ipv4 PXE Support	Disabled Enabled	Enables Ipv4 PXE Boot Support. If IPV4 is disabled, PXE boot option will not be created.
Ipv4 HTTP Support	Disabled Enabled	Enables Ipv4 HTTP Boot Support. If IPV4 is disabled, HTTP boot option will not be created.
Ipv6 PXE Support	Disabled Enabled	Enables Ipv6 PXE Boot Support. If IPV6 is disabled, PXE boot option will not be created.
Ipv6 HTTP Support	Disabled Enabled	Enables Ipv6 HTTP Boot Support. If IPV6 is disabled, HTTP boot option will not be created.
PXE boot wait time	0	Wait time to press **<ESC>** key to abort the PXE boot
Media detect count	1	Number of times the presence of media will be checked

NVMe Configuration

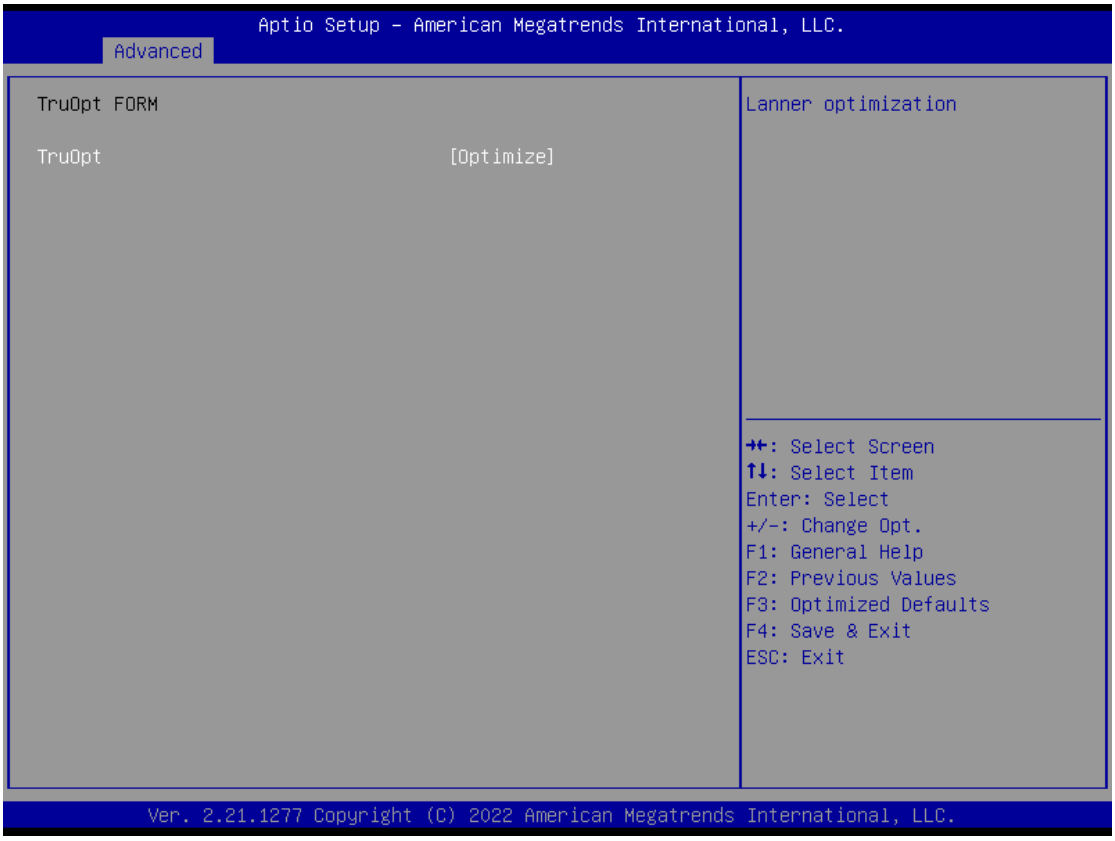


Control PXE Boot



Feature	Options	Description
Control PXE Boot from	Disabled Lan0 Lan1	Control PXE Boot from which Lan

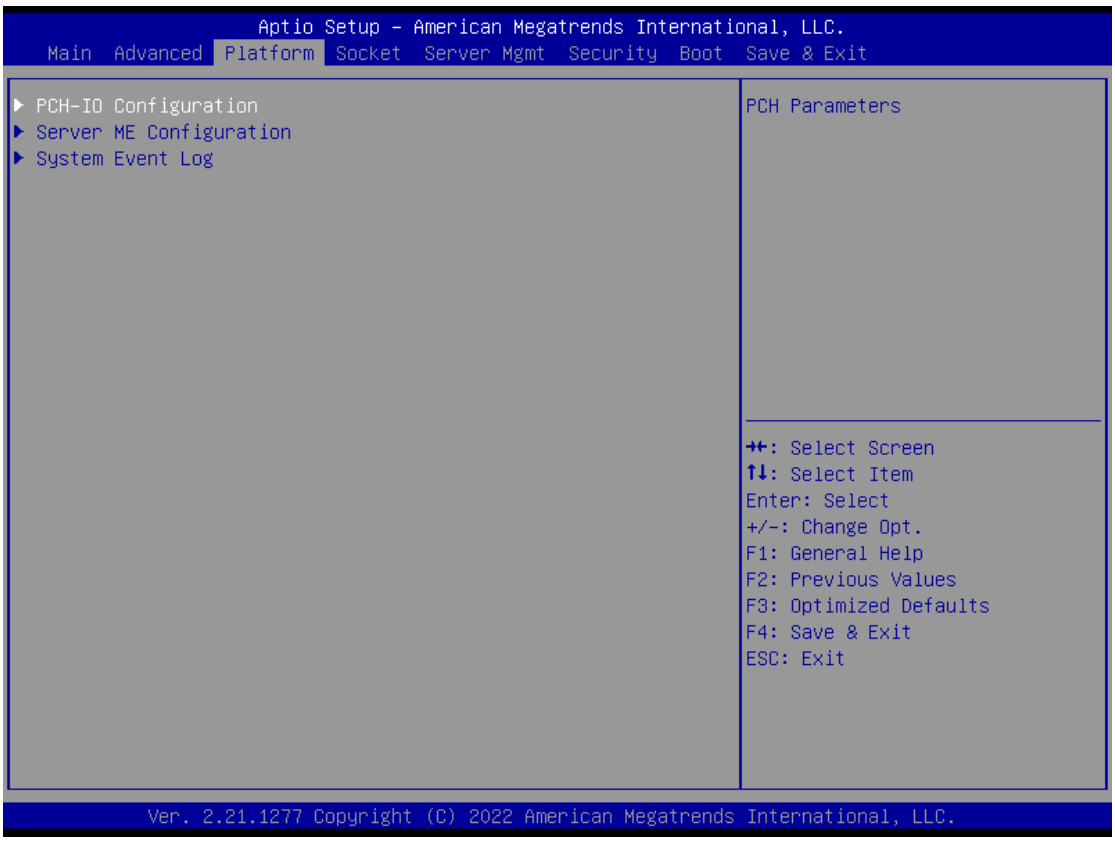
TruOpt FORM



Feature	Options	Description
TruOpt	Optimize Manual	Lanner optimization

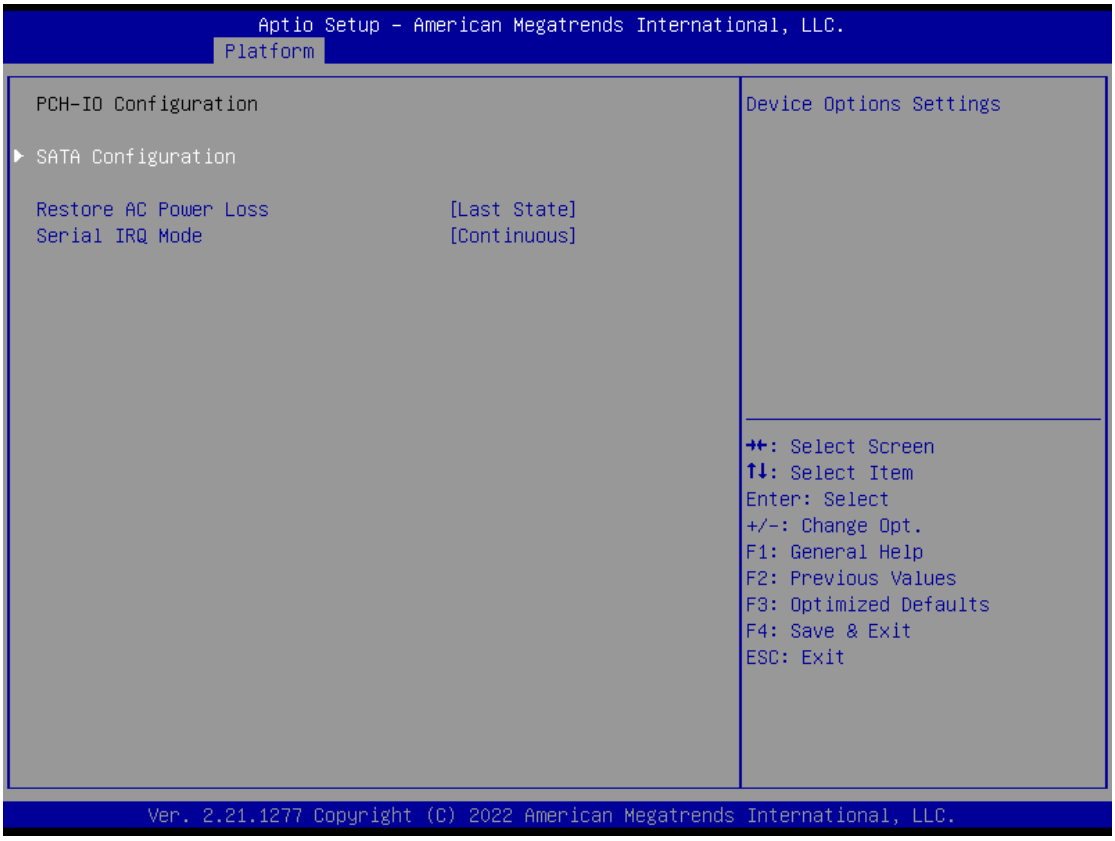
Platform

Select the Platform menu tab 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.



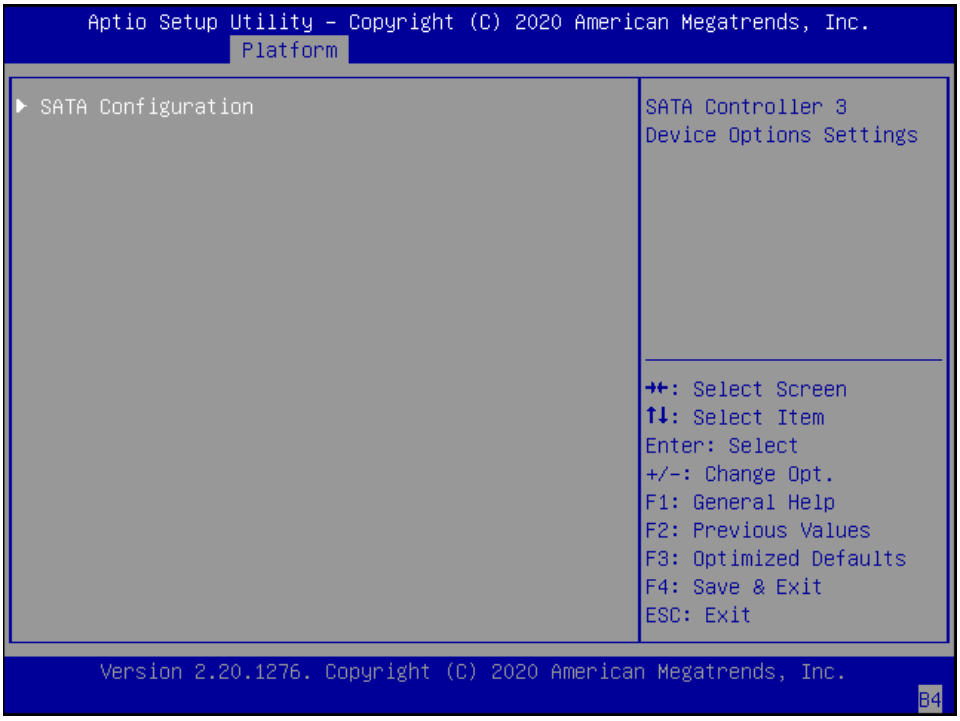
Feature	Options	Description
PCH-IO Configuration	None	PCH Parameters
Server ME Configuration	None	Configure Server ME Technology Parameters
System Event Log	None	Press <Enter> to view or change the event log configuration.

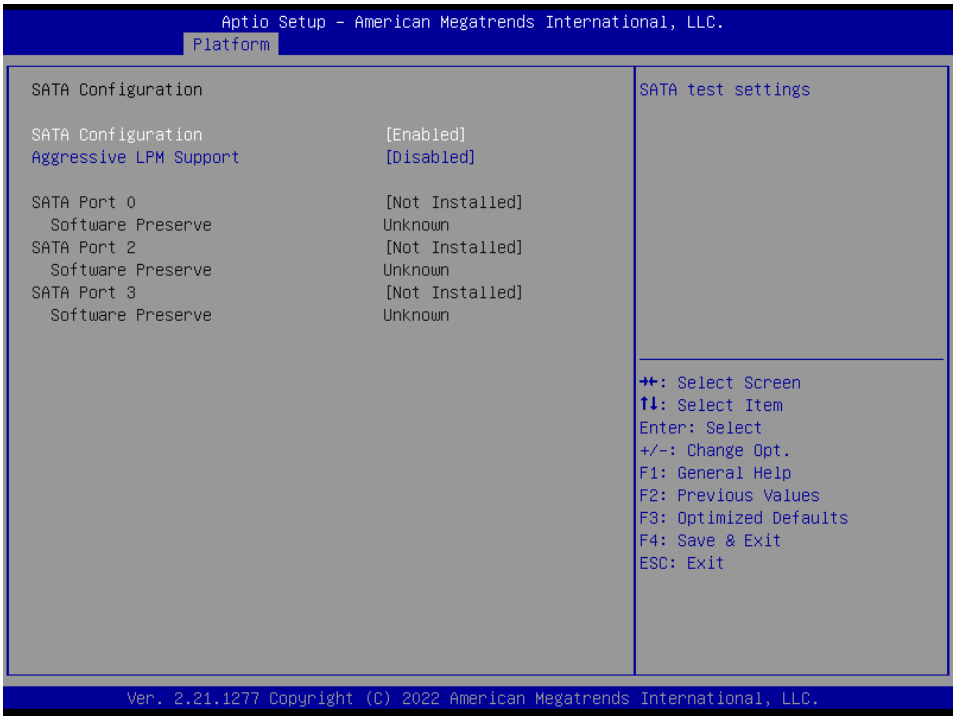
PCH-IO Configuration



Feature	Options	Description
PCH SATA Configuration	None	Device Options settings
Restore AC Power Loss	Power On Power Off Last State	Select S0/S5 for ACPI state after a G3
Serial IRQ Mode	Quiet Continuous	Configure Serial IRQ Mode.

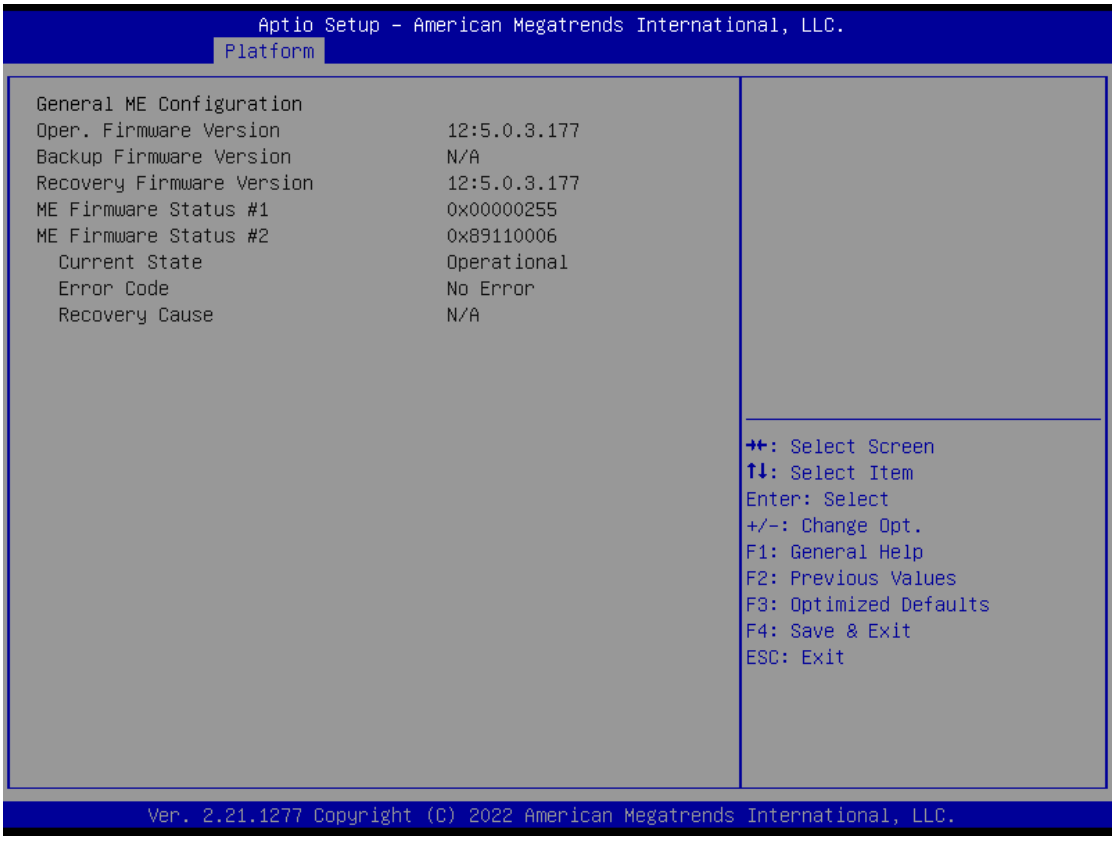
SATA Configuration



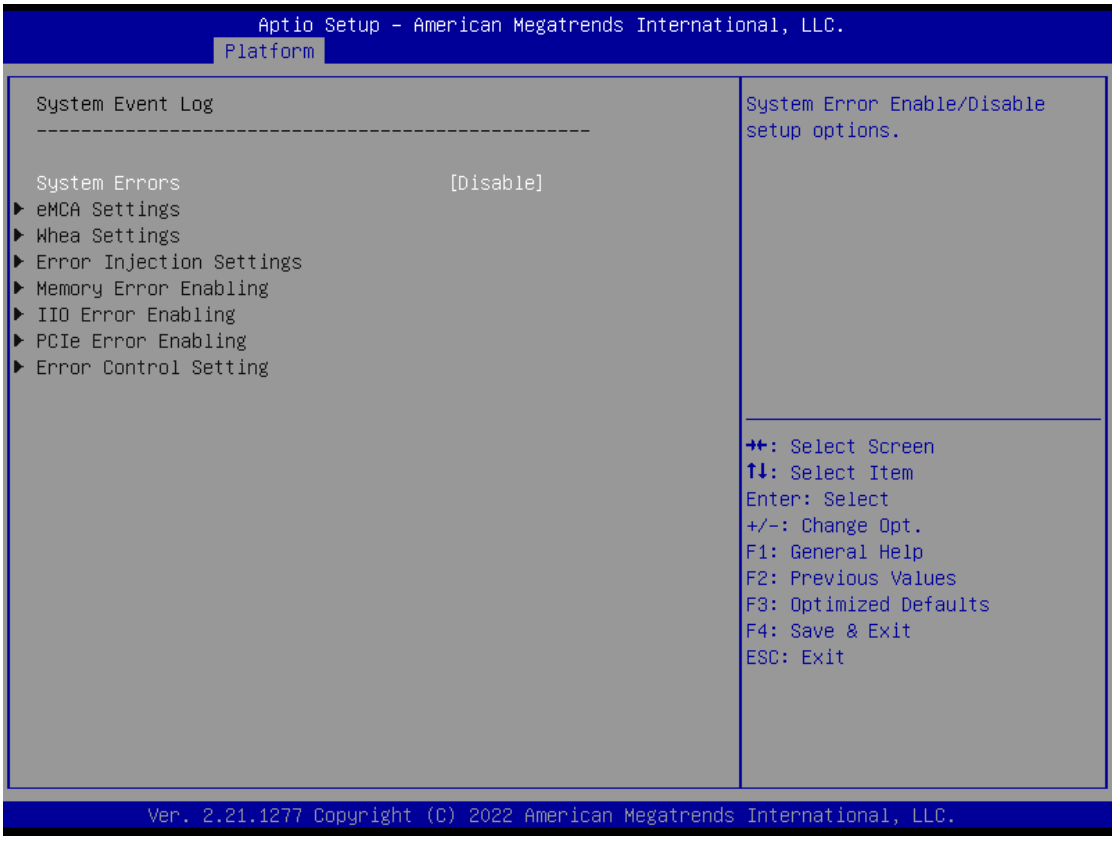


Feature	Options	Description
SATA Configuration	Disabled Enabled	SATA test settings
Aggressive LPM Support	Disabled Enabled	Enable PCH to aggressively enter link power state.

Server ME Configuration



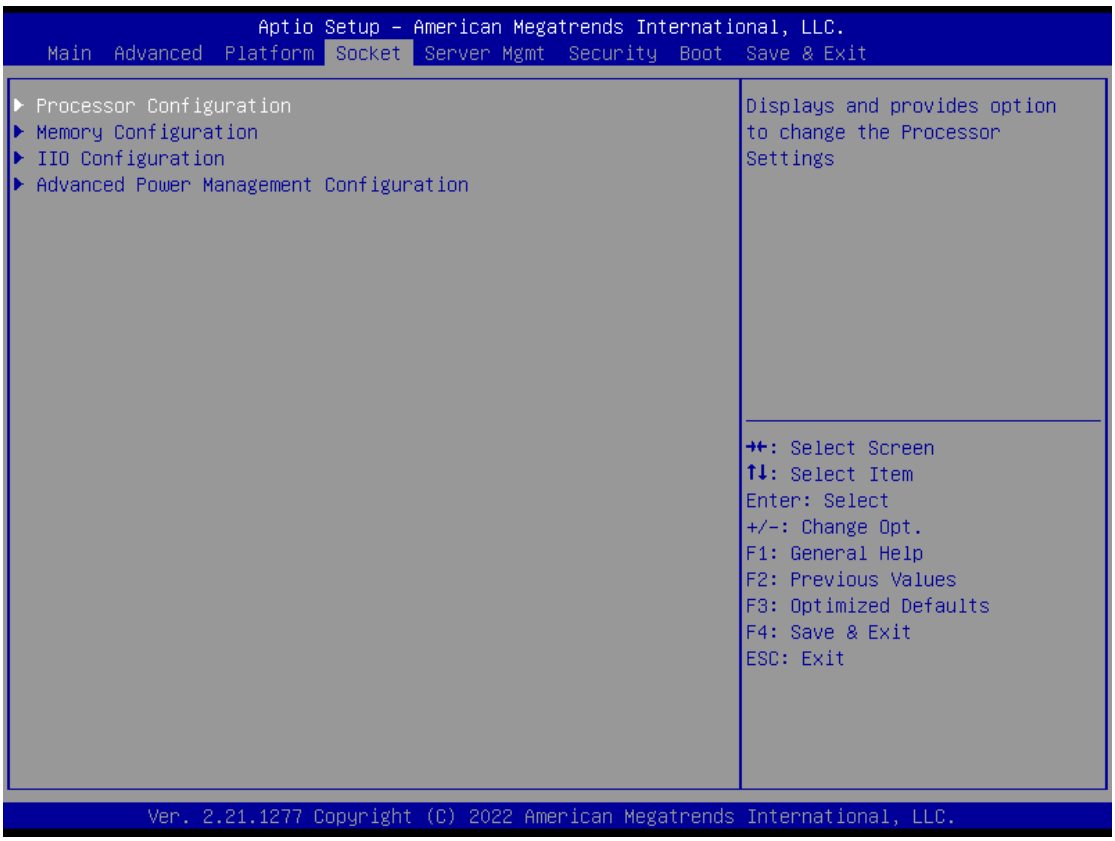
System Event Log



Feature	Options	Description
System Errors	Disabled Enabled	System Error Enable/Disable setup options.

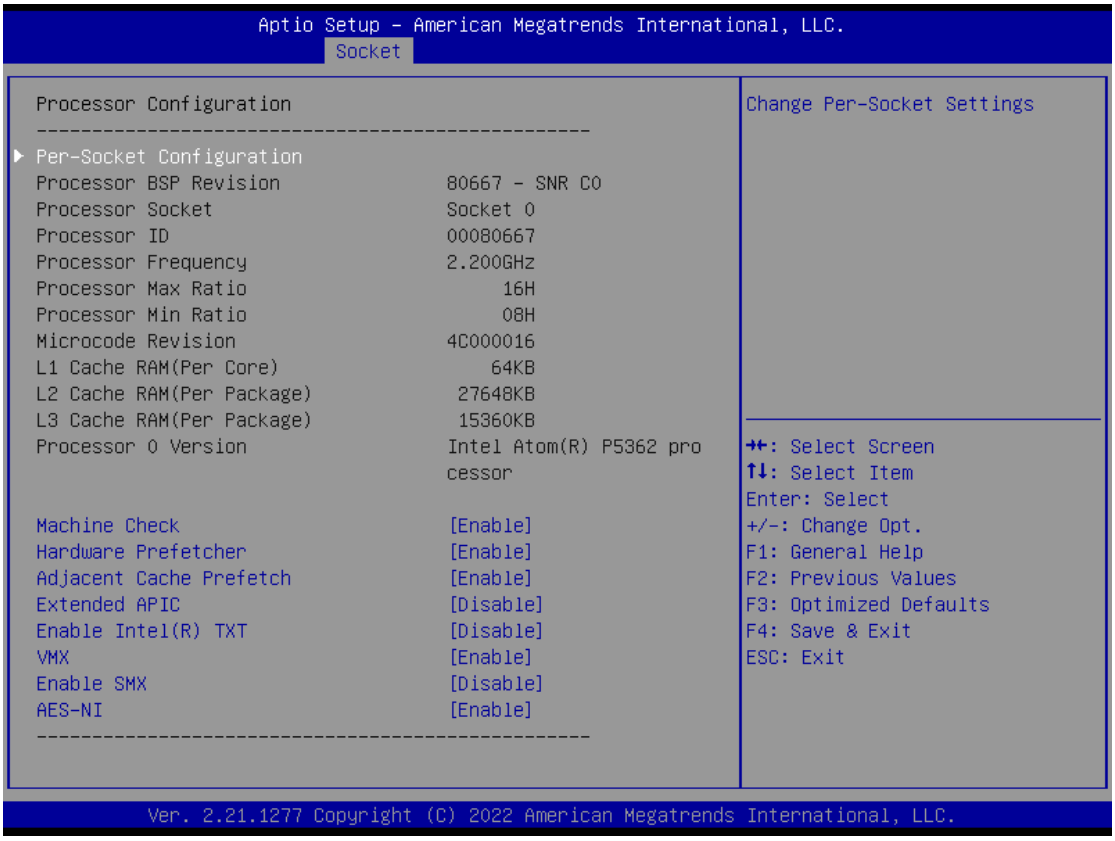
Socket

Select the Socket menu tab 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

Processor Configuration

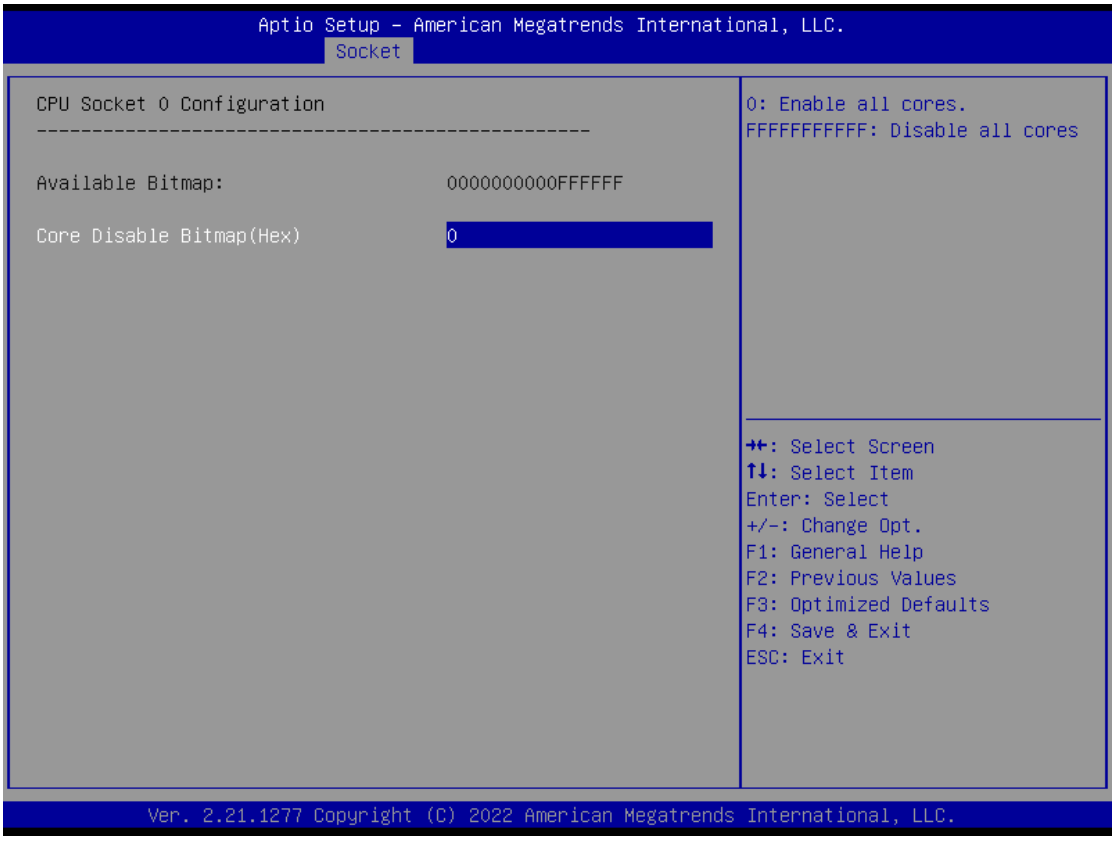


Feature	Options	Description
Machine Check	Disabled Enabled	Enable or Disable the Machine Check
Hardware Prefetcher	Disabled Enabled	= MLC Streamer Prefetcher (MSR 1A4h Bit [0])
Adjacent Cache Prefetcher	Disabled Enabled	= MLC Spatial Prefetcher (MSR 1A4h Bit [1])
Extended APIC	Disabled Enabled	Enables / disables extended APIC support. Note: This will enable VT-d automatically if x2APIC is enabled
Enable Intel® TXT	Disabled Enabled	Enables Intel® TXT.
VMX	Disabled Enabled	Enables the Vanderpool Technology, which takes effect after reboot.
Enable SMX	Disabled Enabled	Enables Safer Mode Extensions
AES-NI	Disabled Enabled	Enable/disable AES-NI support

Per-Socket Configuration

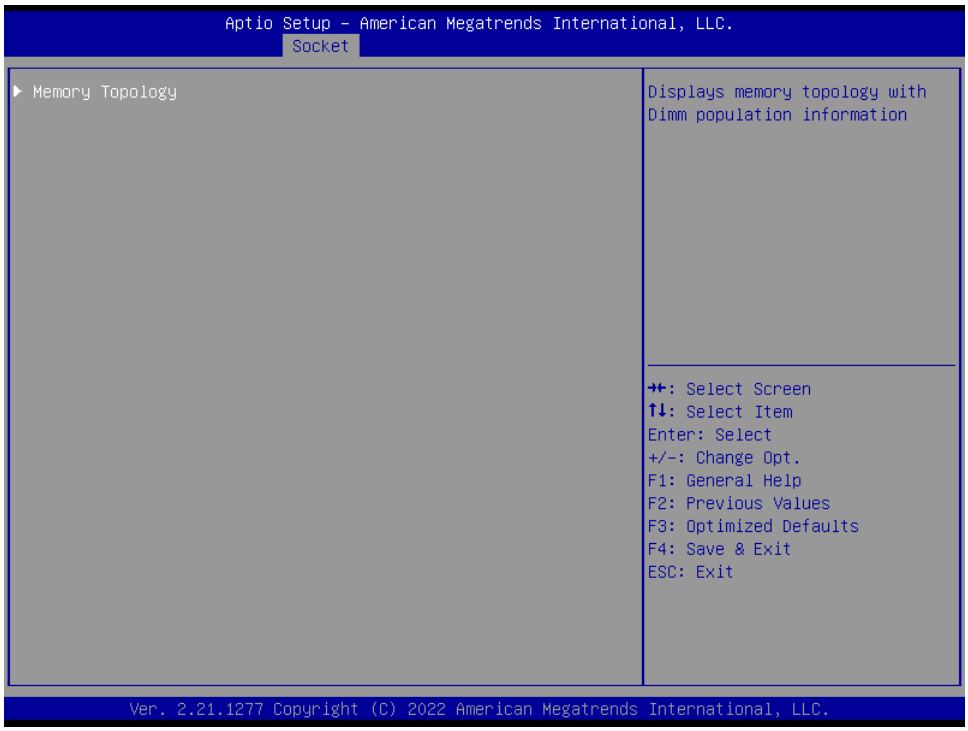
Feature	Options	Description
CPU Socket 0 Configuration	--	--

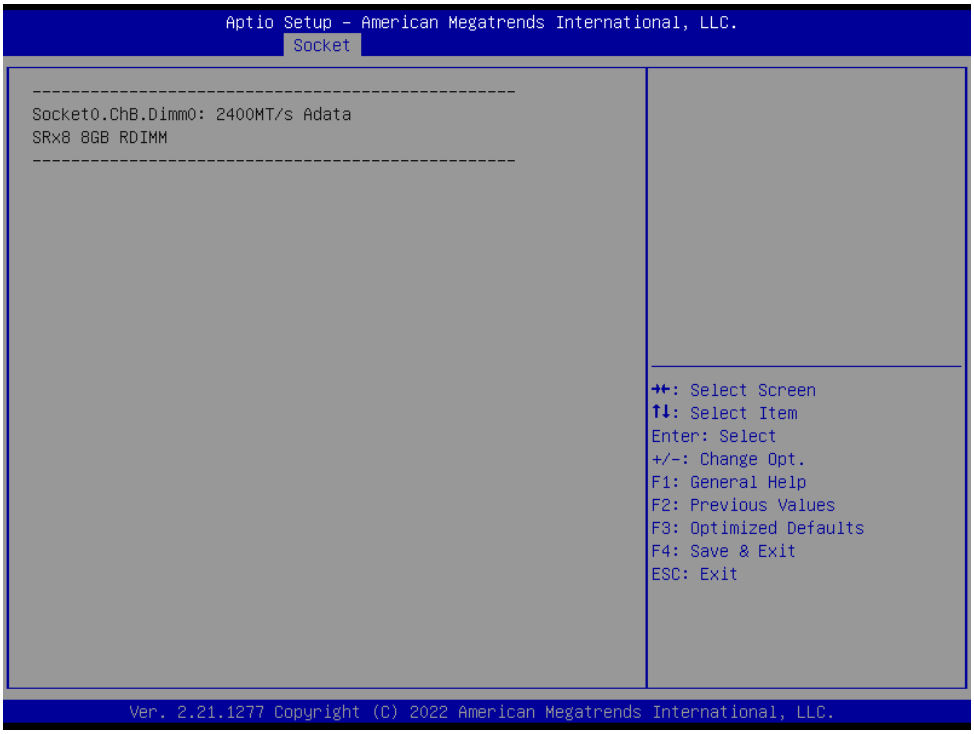
CPU Socket 0 Configuration



Feature	Options	Description
Core Disable Bitmap (Hex)	0	0: Enable All cores. FFFFFFFFFF: Disable all cores.

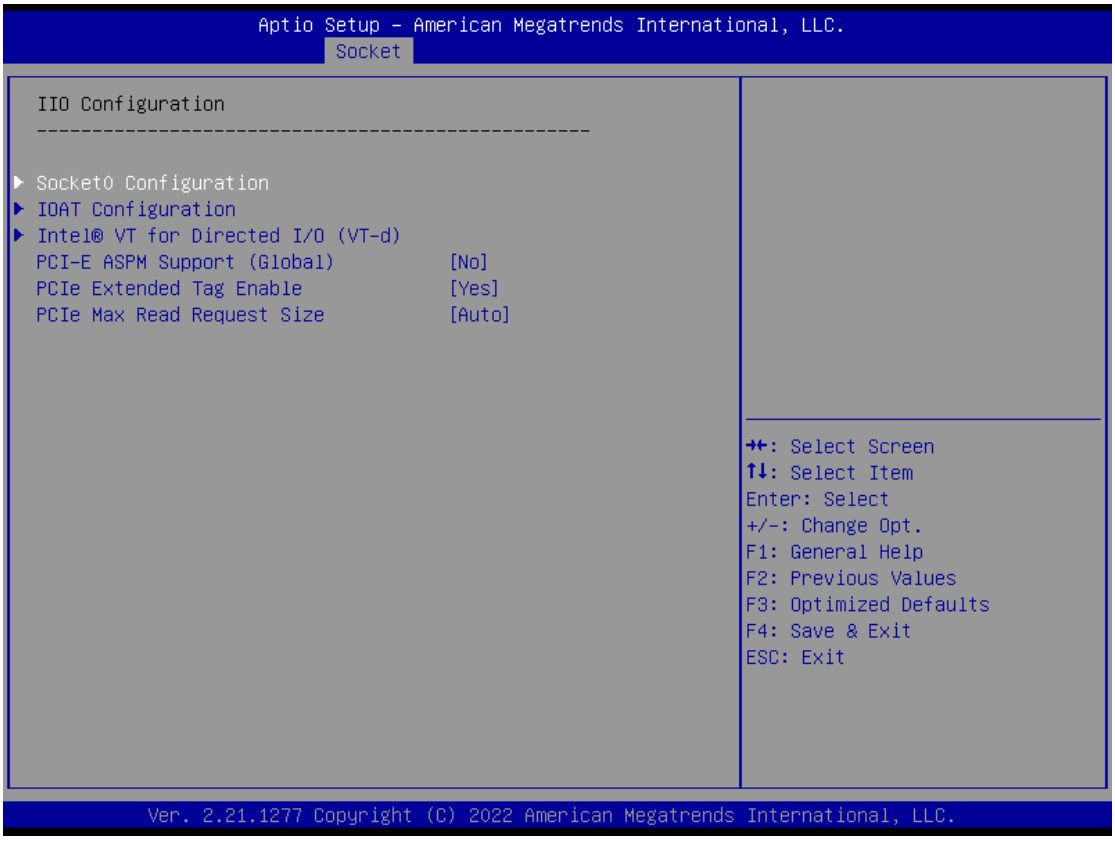
Memory Configuration





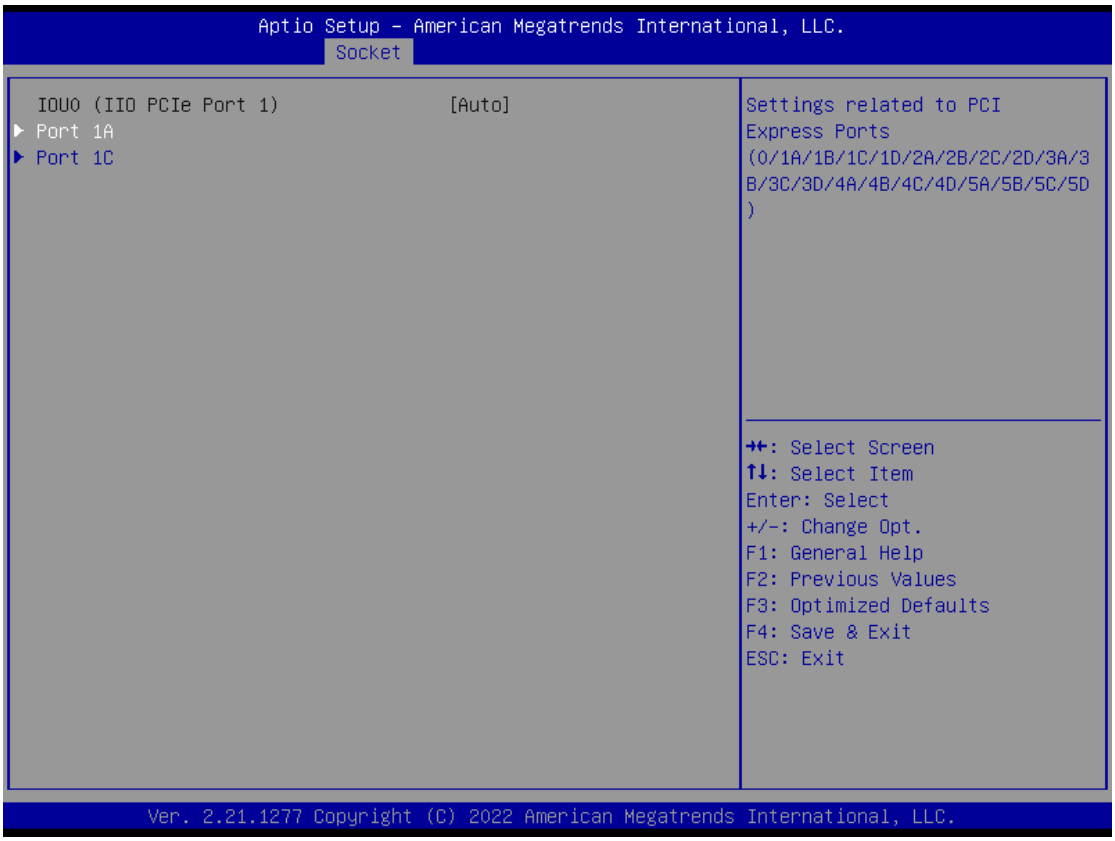
Feature	Options	Description
Memory Topology	None	Displays memory topology with DIMM population information

IIO Configuration



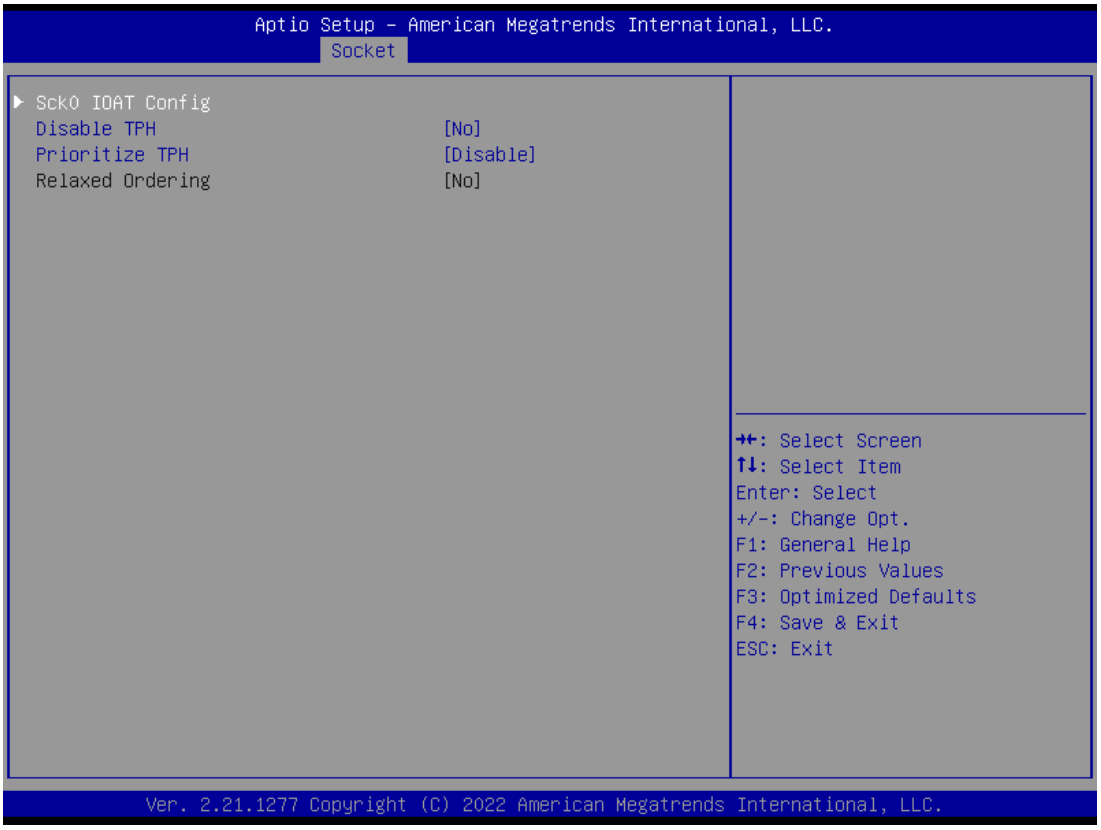
Feature	Options	Description
Socket0 Configuration	None	None
IOAT Configuration	None	All IOAT configuration options
Intel® VT for Directed I/O (VT-d)	None	Press **<Enter>** to bring up the Intel® VT for Directed I/O (VT-d) Configuration menu.
PCI-E ASPM Support (Global)	No Per-Port L1 Only	This option enables / disables the ASPM support for all downstream devices.
PCIe Extended Tag Enable	Auto No Yes	**Auto/Enable** - BIOS sets 8-bit Tag Field for PCIe Root **Port/EndPoint Disable** - BIOS sets 5-bit Tag Field for PCIe Root Port/EndPoint
PCIe Max Read Request Size	Auto 128B 256B 512B 1024B 2048B 4096B	Set Max Read Request Size in EndPoints

Socket0 Configuration



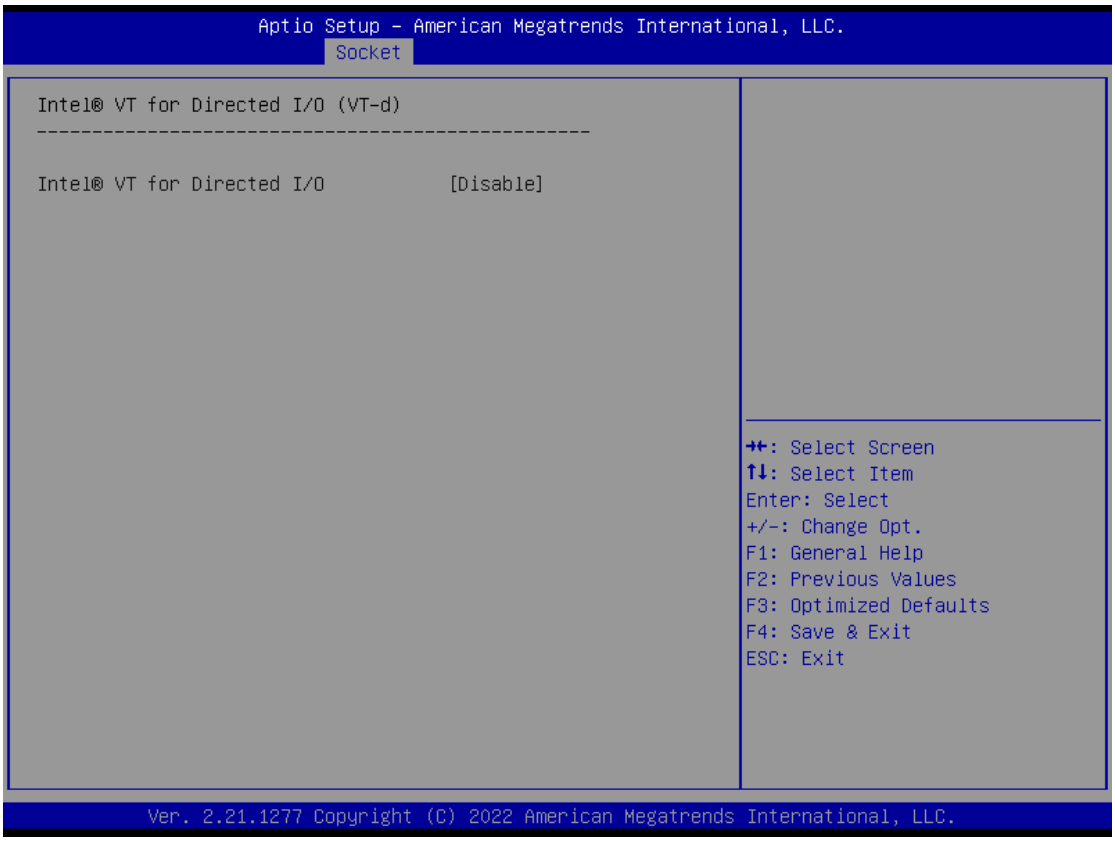
Feature	Options	Description
Port 1A	None	Settings related to PCI Express PortS (0/1A/1B/1C/1D/2A/2B/2C/2D/3A/3B/3C/3D/4A/4B/4C/ 4D/5A/5B/5C/5D)
Port 1C		

IOAT Configuration



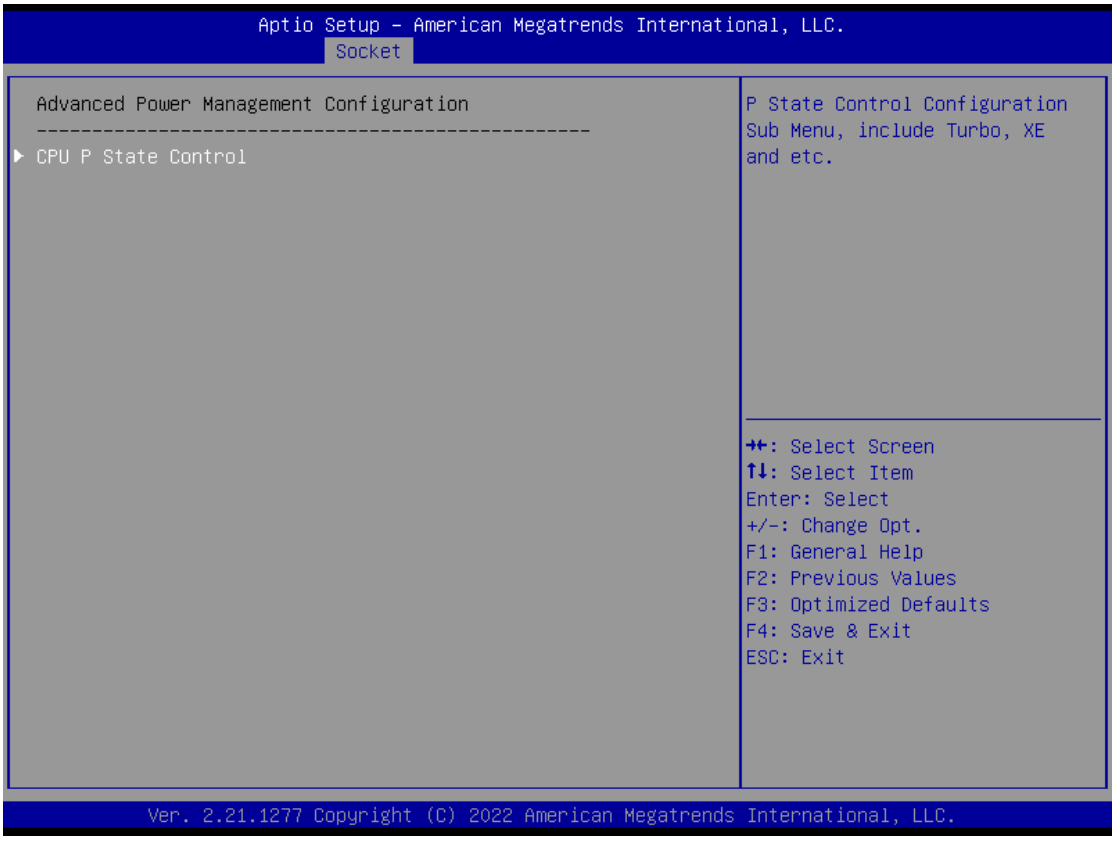
Feature	Options	Description
Sck0 IOAT Config	None	None
Disable TPH	No Yes	TLP Processing Hint disable
Prioritize TPH	Disabled Enabled	Prioritize TPH
Relaxed Ordering	No Yes	Relaxed Ordering Enable/Disable

Intel® VT for Directed I/O (VT-d)



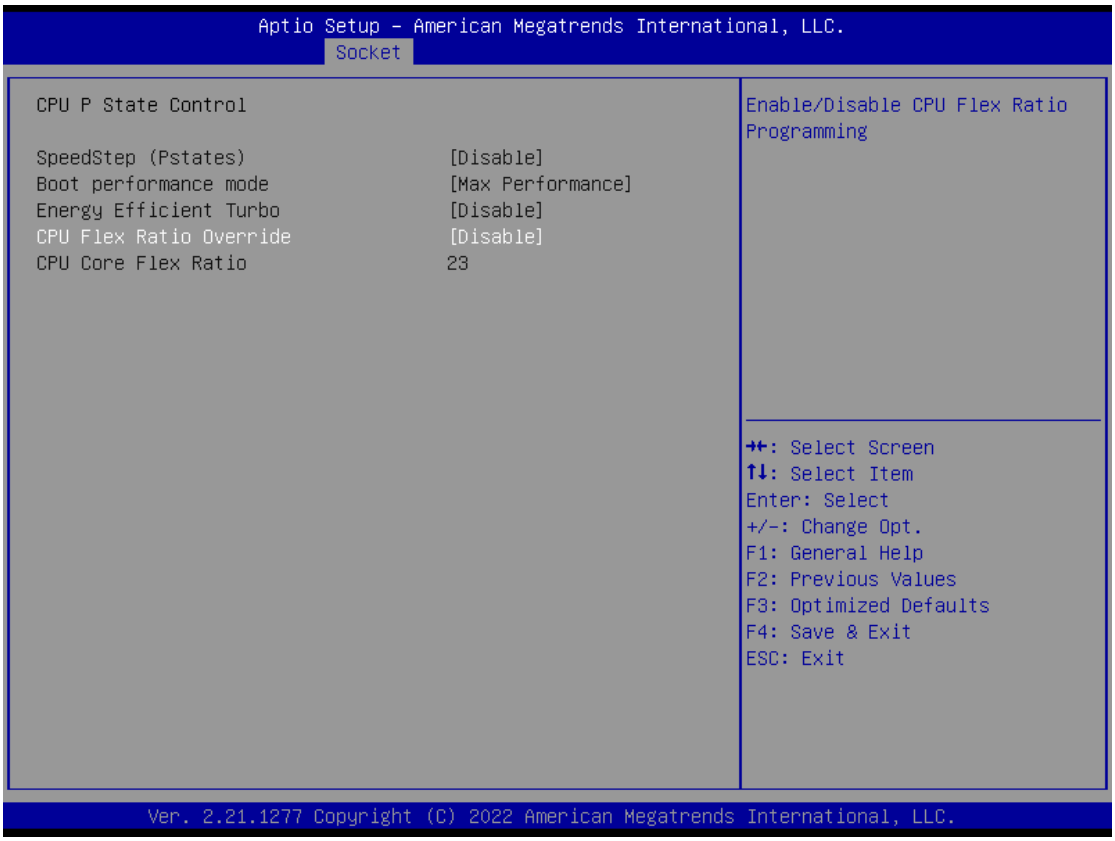
Feature	Options	Description
Intel® VT for Directed I/O (VT-d)	Disabled Enabled	Enable/Disable Intel® Virtualization Technology for Directed I/O (VT-d) by reporting the I/O device assignment to VMM through DMAR ACPI Tables.

Advanced Power Management Configuration



Feature	Options	Description
CPU P State Control	None	P State Control Configuration Sub Menu, include Turbo, XE and etc.

CPU P State Control



Feature	Options	Description
SpeedStep (Pstates)	Disabled Enabled	Enables or disables EIST (P-States)
Boot performance mode	Max Performance Max Efficient Set by Intel Node Manager	Select the performance state that the BIOS will set before OS hand off.
Energy Efficient Turbo	Disabled Enabled	Energy Efficient Turbo Disable, MSR 0x1FC [19]
CPU Flex Ratio Override	Disabled Enabled	Enable/Disable CPU Flex Ratio Programming
CPU Core Flex Ratio	23	Non-Turbo Mode Processor Core Ratio Multiplier

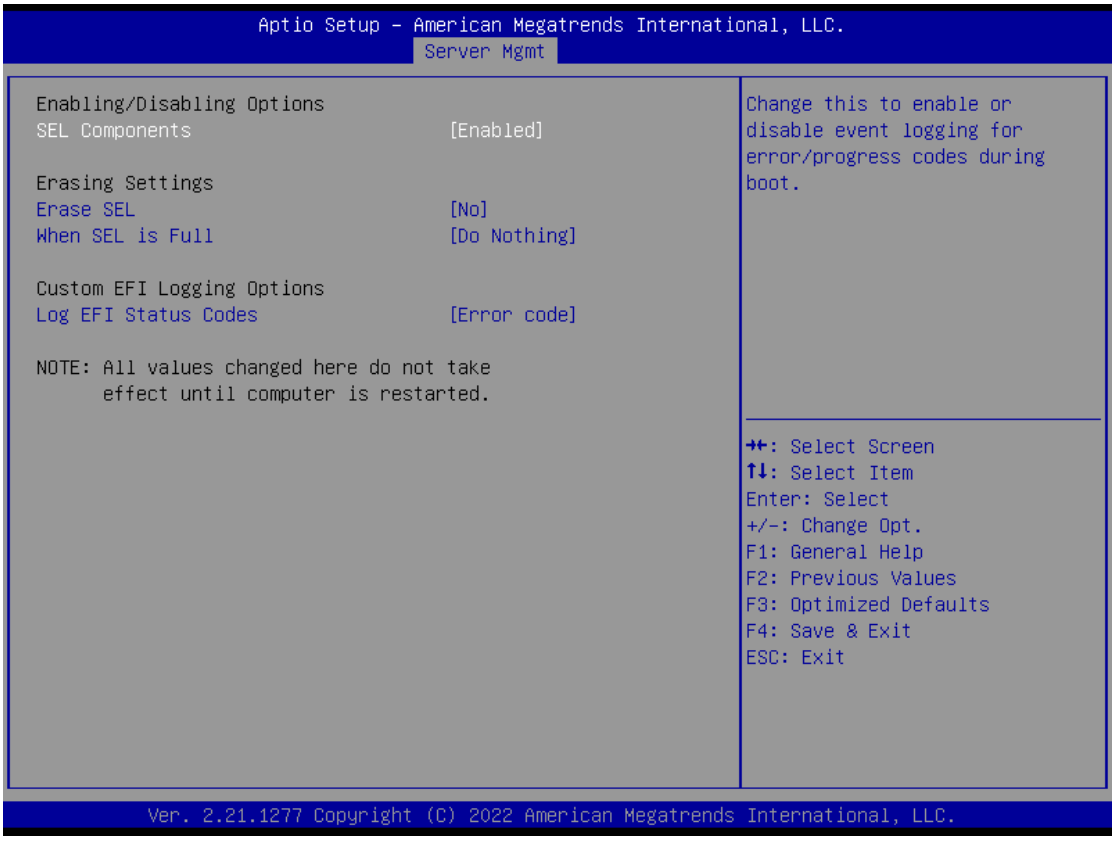
Server Mgmt

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

Feature	Options	Description
BMC HW Detect	Enabled Disabled	Enable: HW detect to support BMC or not. Disable: Manual select BMC Support to Enable or Disable.
BMC Status	--	Displays BMC Status
BMC Support	Enabled Disabled	Enable or disables interfaces to communicate with BMC.(it will be hidden when enabling item of "BMC HW Detect".)
Wait For BMC	Enabled Disabled	Wait For BMC response for specified time out. In PILOTII, BMC starts at the same time when BIOS starts during AC power ON. It takes around 30 seconds to initialize Host to BMC interfaces.
FRB-2 Timer	Enabled Disabled	Enables or disables FRB-2 timer (POST timer).
FRB-2 Timer timeout	3 minutes 4 minutes 5 minutes 6 minutes	Enter value Between 3 to 6 min for FRB-2 Timer Expiration value.
FRB-2 Timer Policy	Do Nothing Reset Power Down Power Cycle	Configure how the system should respond if the FRB-2 Timer expires. Not available if FRB-2 Timer is disabled.

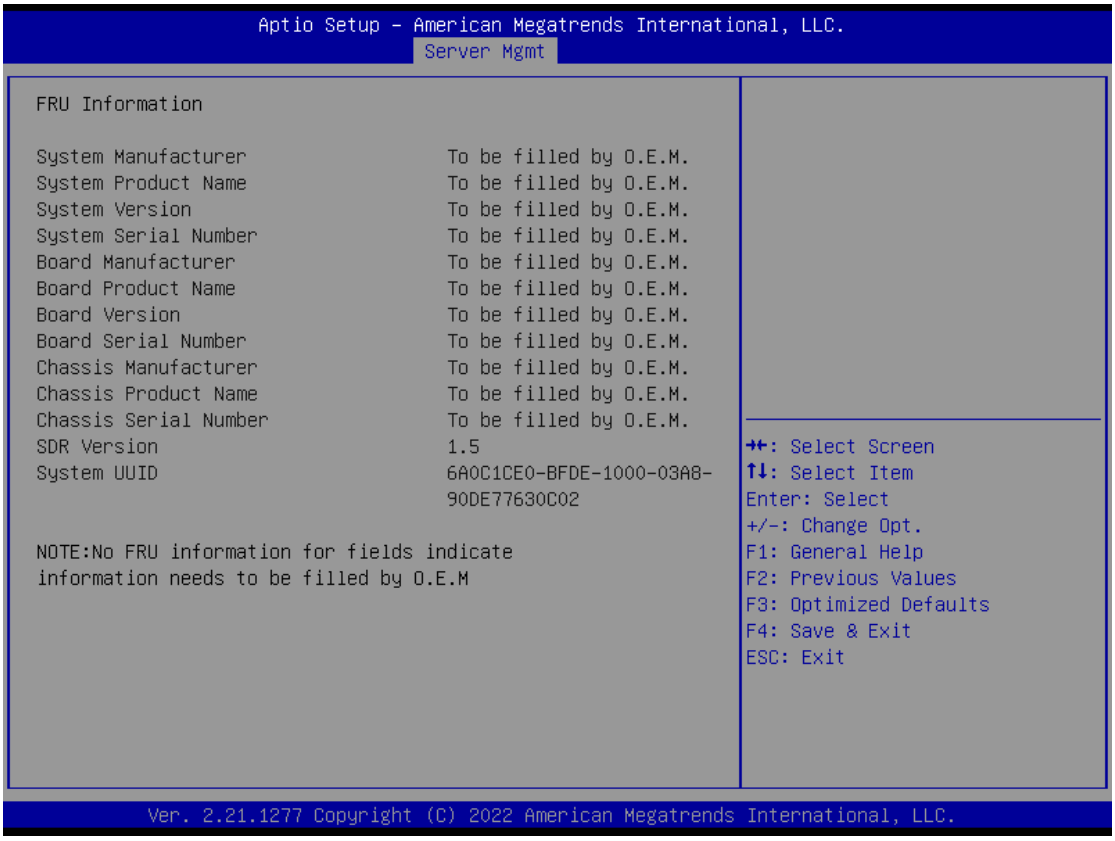
OS Watchdog Timer	Enabled Disabled	If enabled, it starts a BIOS timer which can only be shut off by Management Software after the OS loads. It also helps verify that the OS is successfully loaded or follows the OS Boot Watchdog Timer policy.
OS Wtd Timer Timeout	5 minutes 10 minutes 15 minutes 20 minutes	Configure the length of the OS Boot Watchdog Timer. Not available if OS Boot Watchdog Timer is disabled.
OS Wtd Timer Policy	Do NothingReset Power Down Power Cycle	Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.
Serial Mux	Enable Disable	Press <**Enter**> to enable or disable Serial Mux configuration.
System Event Log	NA	Press **<Enter>** to change the SEL event log configuration.
View FRU information	NA	Press <**Enter**> to view FRU information.
Bmc self test log	NA	logs the report returned by BMC self test command
BMC network configuration	NA	Configure BMC network parameters.
View System Event Log	NA	Press **<Enter>** to view the System Event Log Records.
BMC User Settings	NA	Press <**Enter**> to Add, Delete and Set Privilege level for users.
BMC Warm Reset	NA	Press **<Enter>** to do Warm Reset BMC.

System Event Log

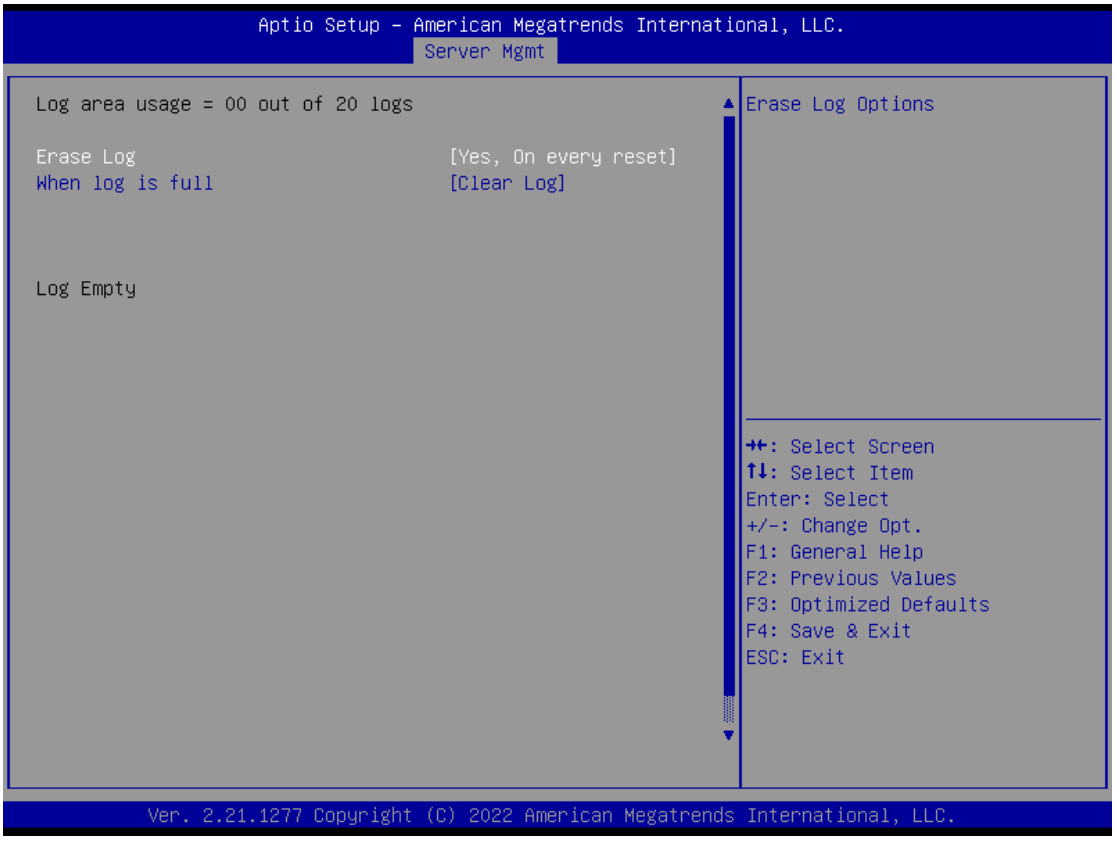


Feature	Options	Description
SEL Components	Disabled Enabled	Enables or disables all features of System Event Logging during boot.
Erase SEL	NO Yes, On next reset Yes, On every reset	Choose options for erasing SEL.
When SEL is Full	Do Nothing Erase Immediately	Choose options for reactions to a full SEL.
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.

View FRU Information

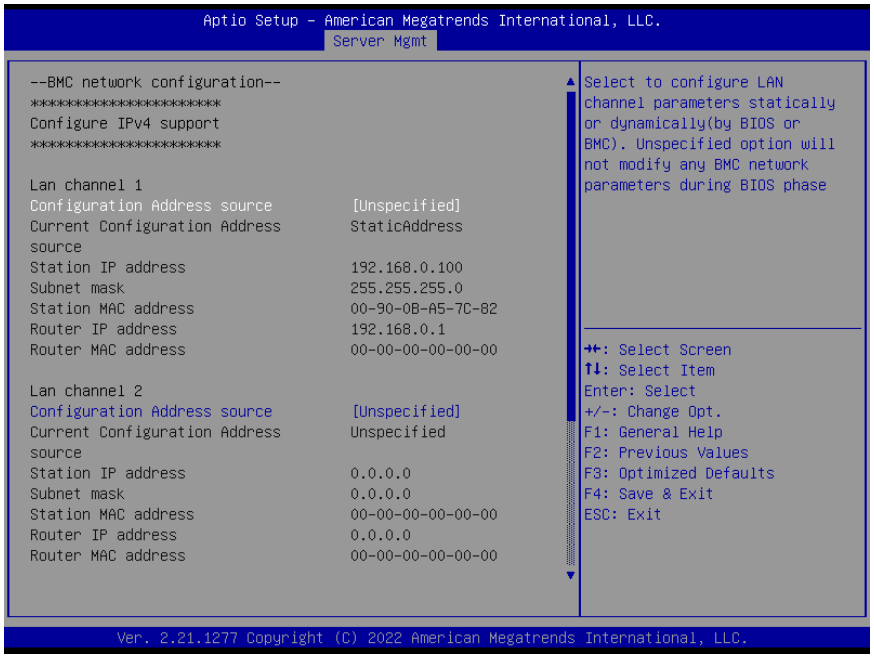


BMC Self-Test Log

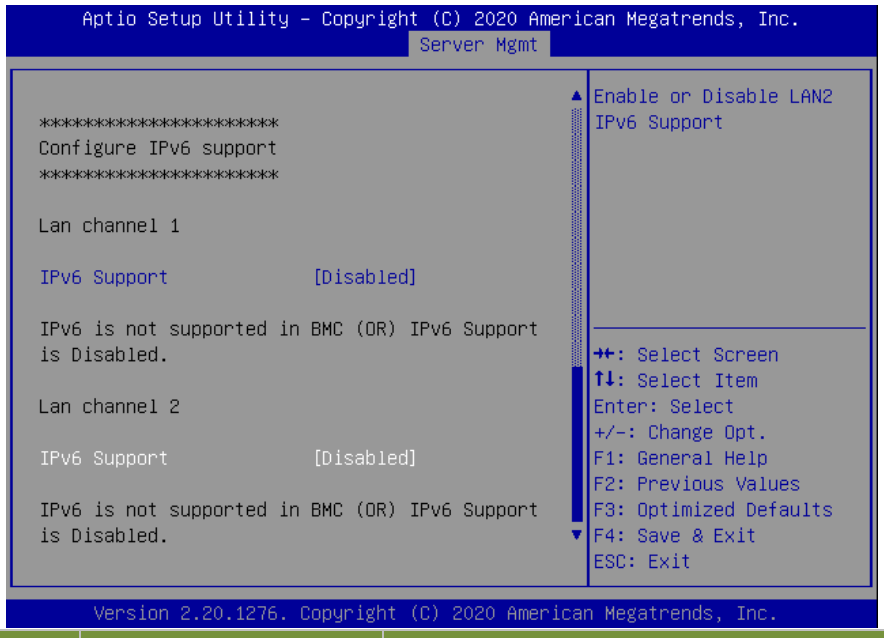


Feature	Options	Description
Erase Log	Yes, On every reset No	Erase Log Options
When log is full	Clear Log Do not log any more	Select the action to be taken when log is full

BMC Network Configuration

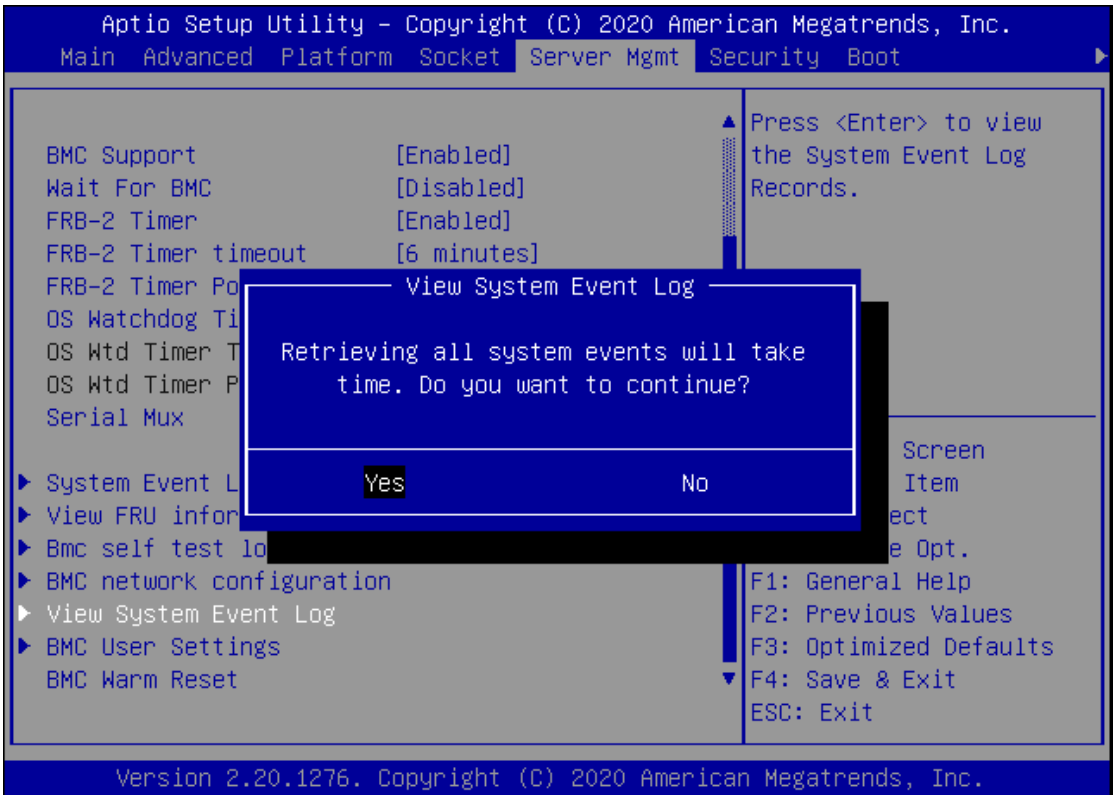


Feature	Options	Description
Configuration Address source	Unspecified Static DynamicBmcDhcp DynamicBmcNonDhcp	Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC). **Unspecified** option will not modify any BMC network parameters during BIOS phase

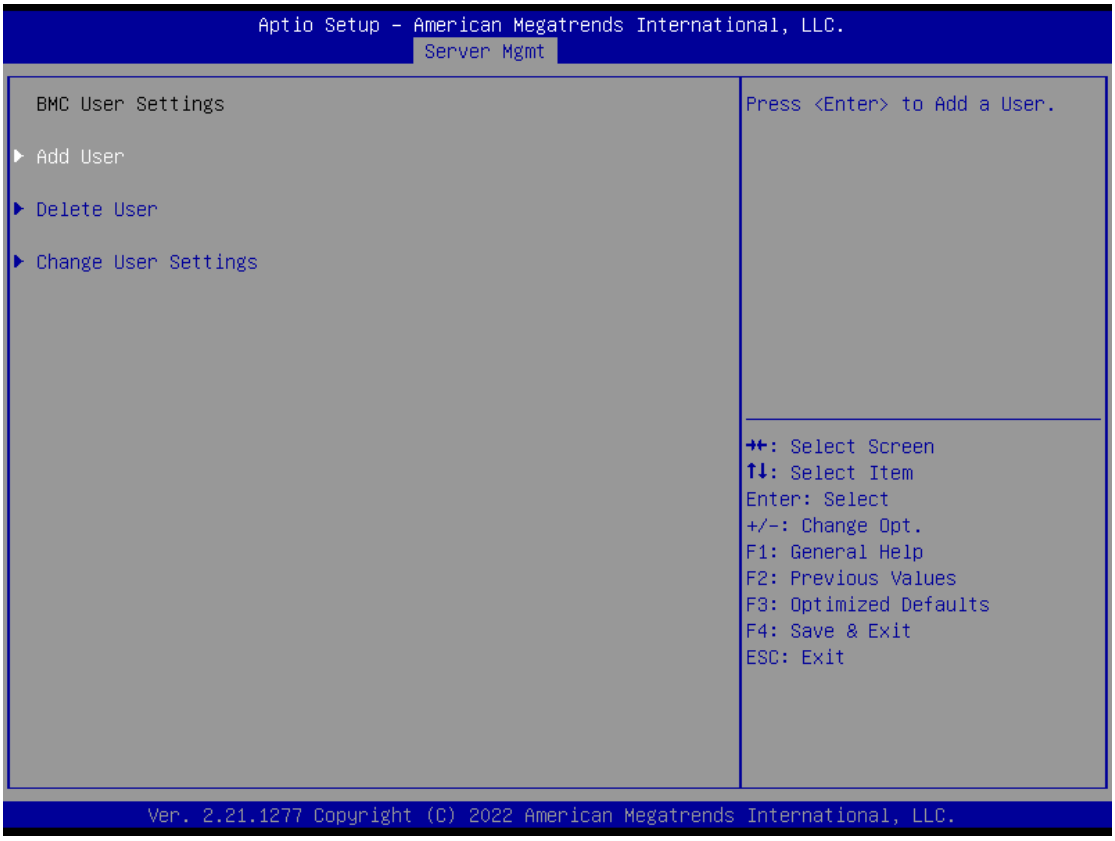


Feature	Options	Description
IPV6 Support	Enabled Disabled	Enable or Disable LAN1 IPV6 Support. Note: Default will change by IPMI current status.

View System Event Log

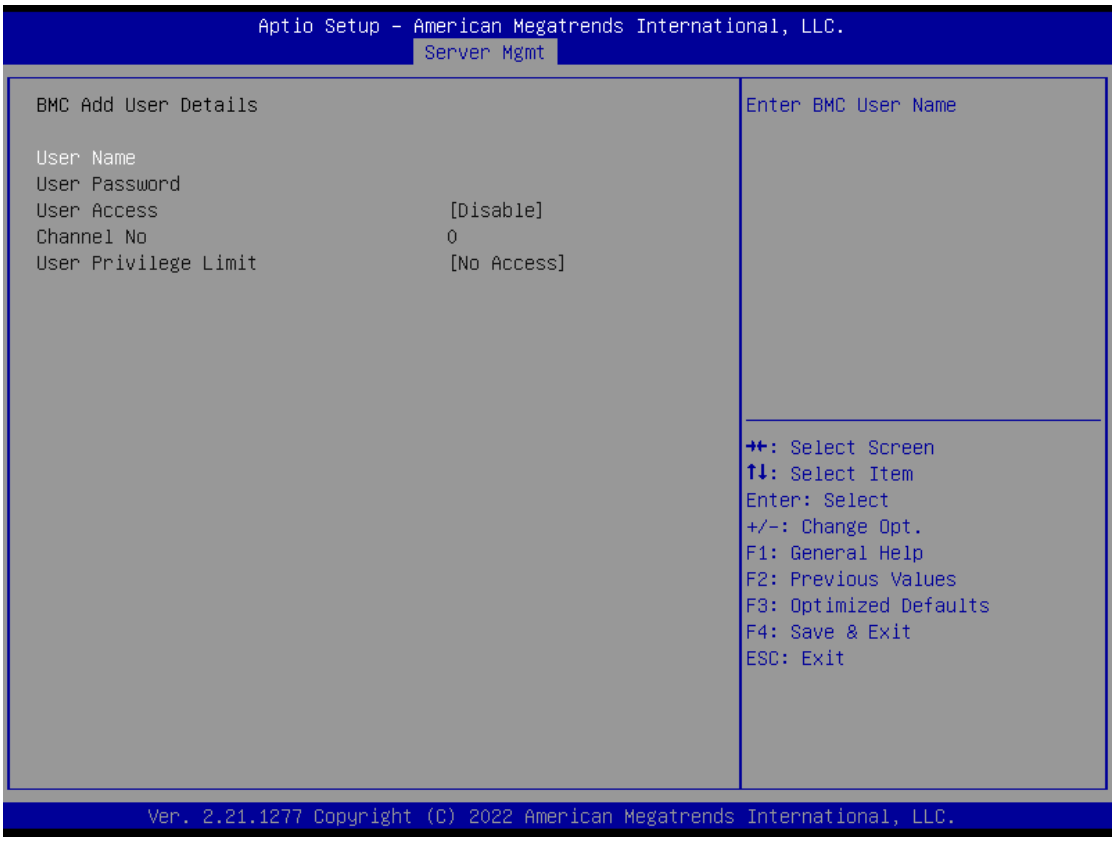


BMC User Settings



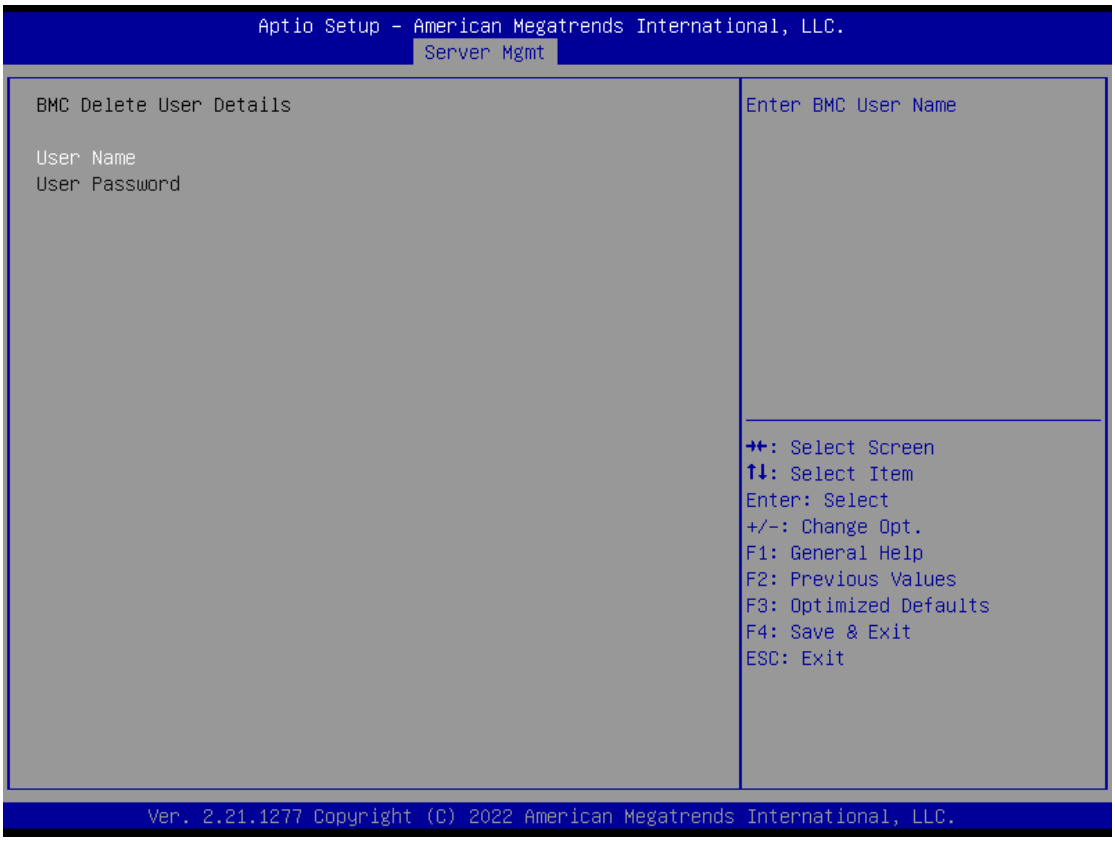
Feature	Options	Description
Add User	NA	Press <Enter> to Add a User.
Delete User	NA	Press <Enter> to Delete a User.
Change User Settings	NA	Press <Enter> to Change User Settings.

BMC Add User Details



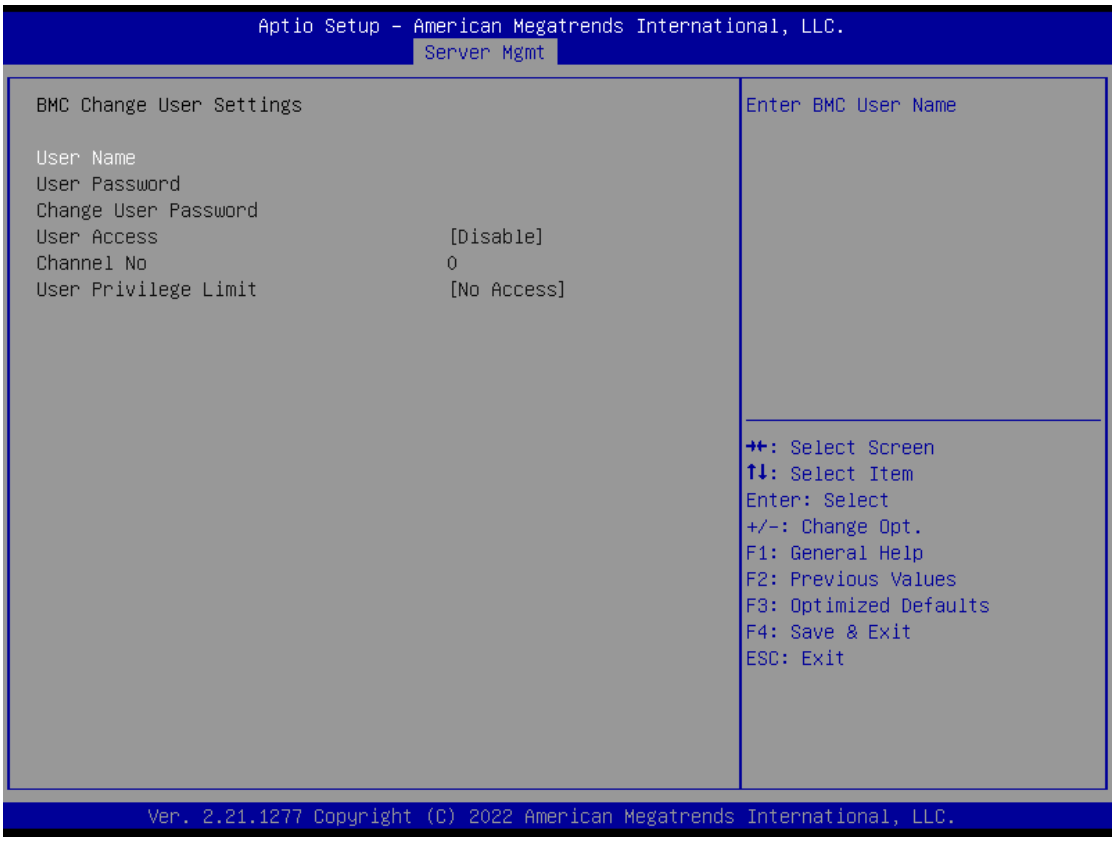
Feature	Options	Description
User Name	NA	Enter BMC User Name
User Password	NA	Enter BMC User Password
Channel No	0	Enter BMC Channel Number
User Privilege Limit	Reserved Callback User Operator Administrator OEM Proprietary	Enter BMC User Privilege Limit for Selected Channel

BMC Delete User Details



Feature	Options	Description
User Name	NA	Enter BMC User Name
User Password	NA	Enter BMC User Password

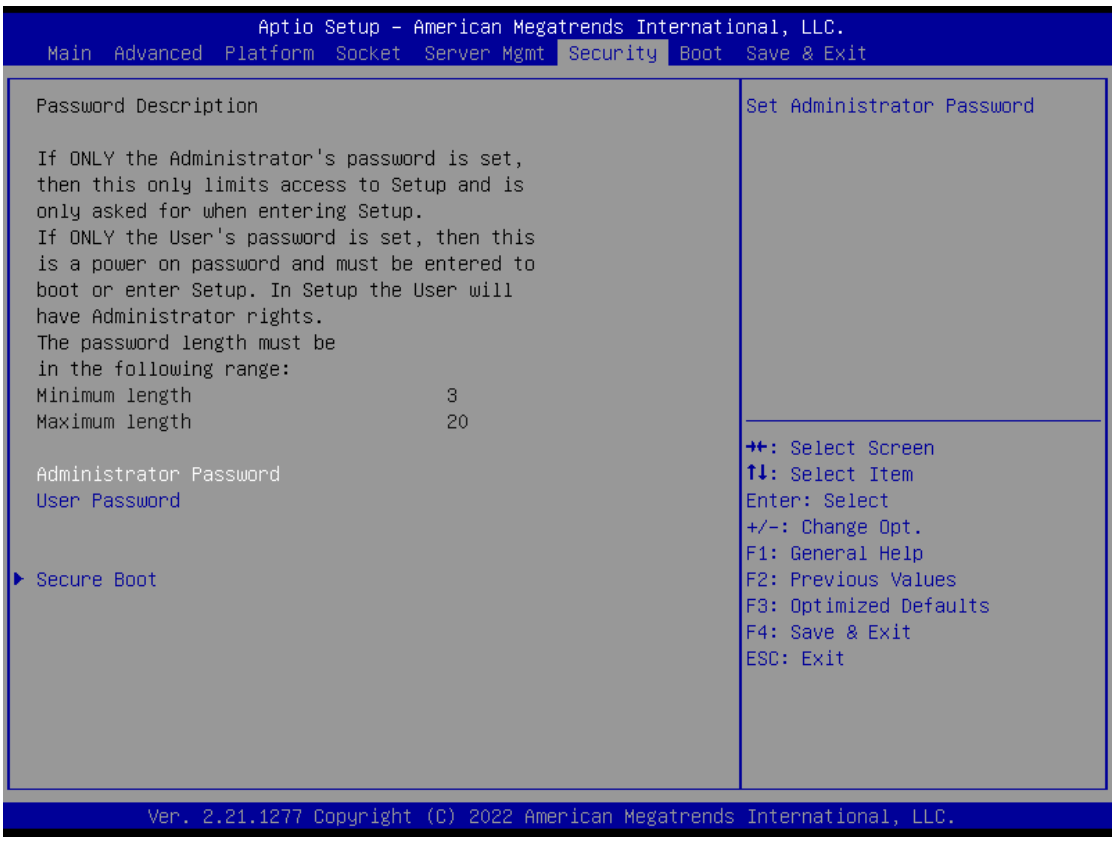
BMC Change User Settings



Feature	Options	Description
User Name	NA	Enter BMC User Name
User Password	NA	Enter BMC User Password
User	Enabled Disabled	Enable/Disable the User.
Change User Password"	NA	Enter New Password to change.
Channel No	0	Enter BMC Channel Number
User Privilege Limit	Reserved Callback User Operator Administrator OEM Proprietary	Enter BMC User Privilege Limit for Selected Channel"

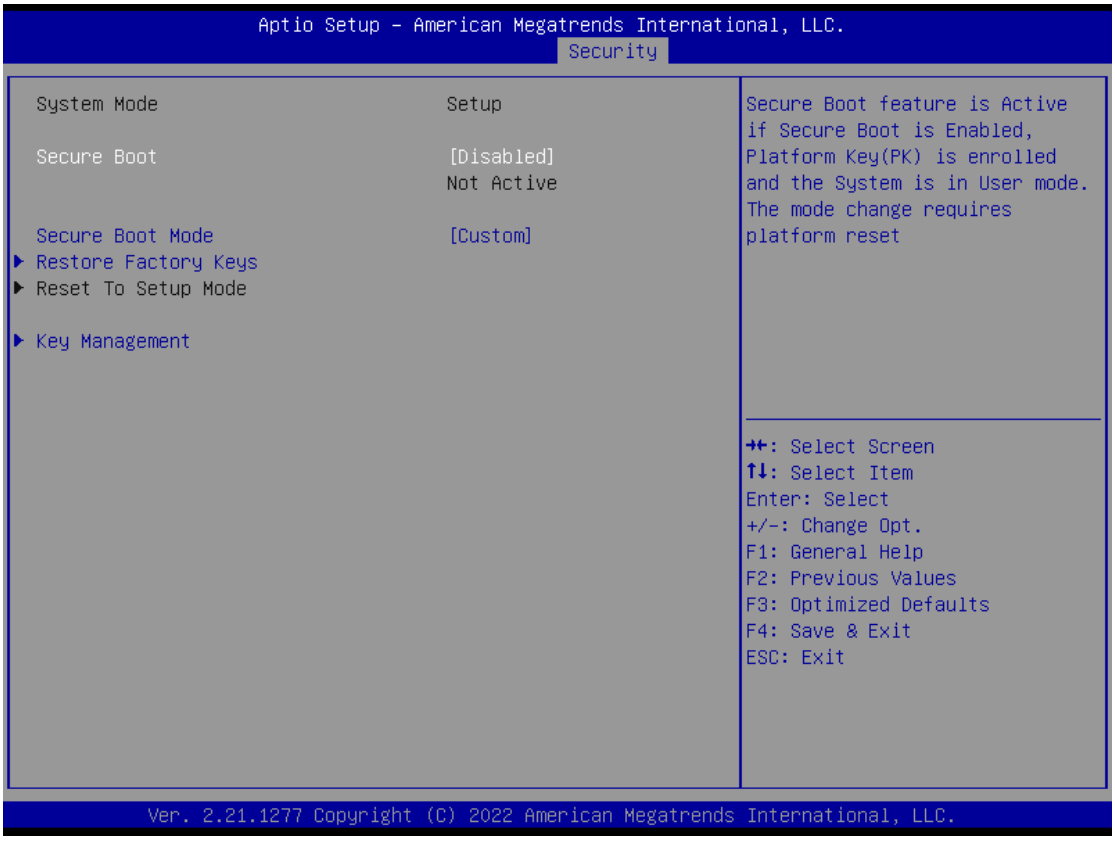
Security

Select the Security menu tab 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.



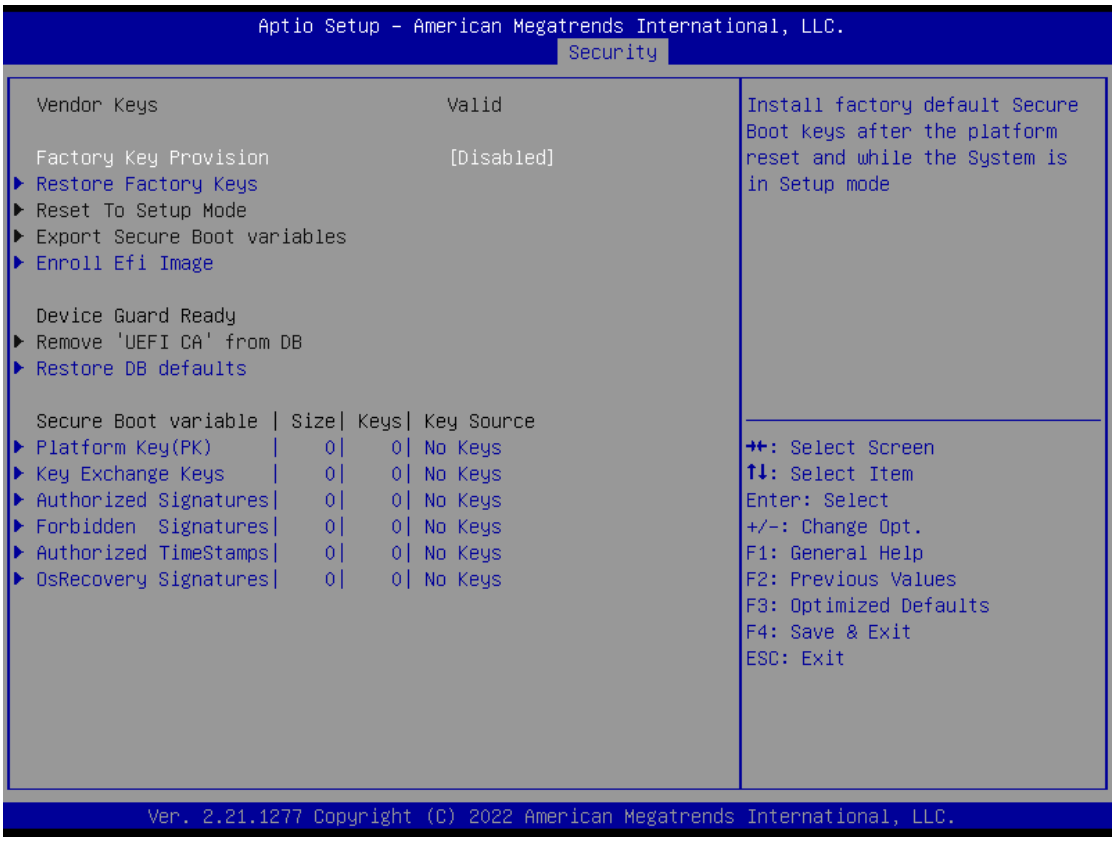
Feature	Description
Administrator Password	ONLY when the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	ONLY when the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup,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

Secure Boot



Feature	Options	Description
Secure Boot Enable	Disabled Enabled	Secure Boot is activated when Platform Key (PK) is enrolled, System mode is User/Deployed, and CSM function is disabled.
Secure Boot Mode	Standard Custom	Customizable Secure Boot mode: In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

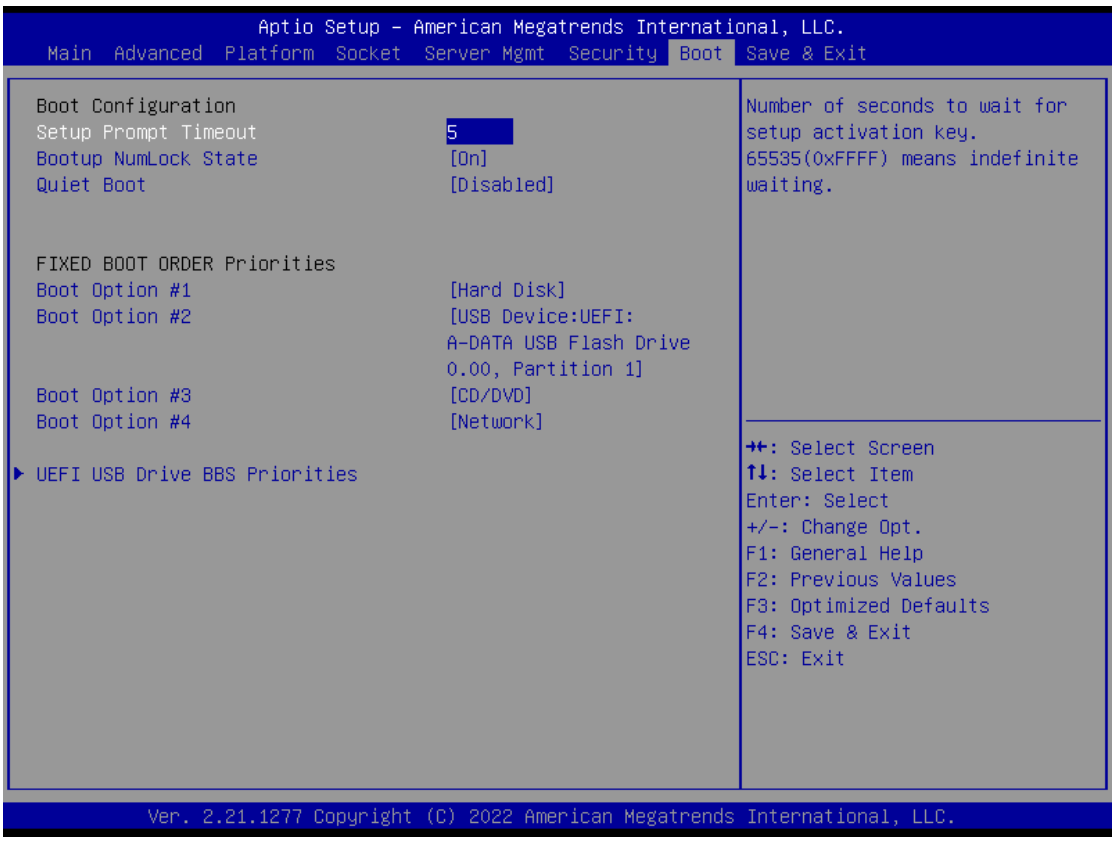
Key Management



Feature	Options	Description
Factory Key Provision	Disabled Enabled	Provision factory default keys on next re-boot only when System in Setup Mode.
Restore Factory keys	None	Force System to User Mode. Configure NVRAM to contain OEM-defined factory default Secure Boot keys.
Enroll Efi Image	None	Allows the image to run in Secure Boot mode. Enroll SHA256 hash of the binary into Authorized Signature Database (db).

Boot Menu

Select the Boot menu tab 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.

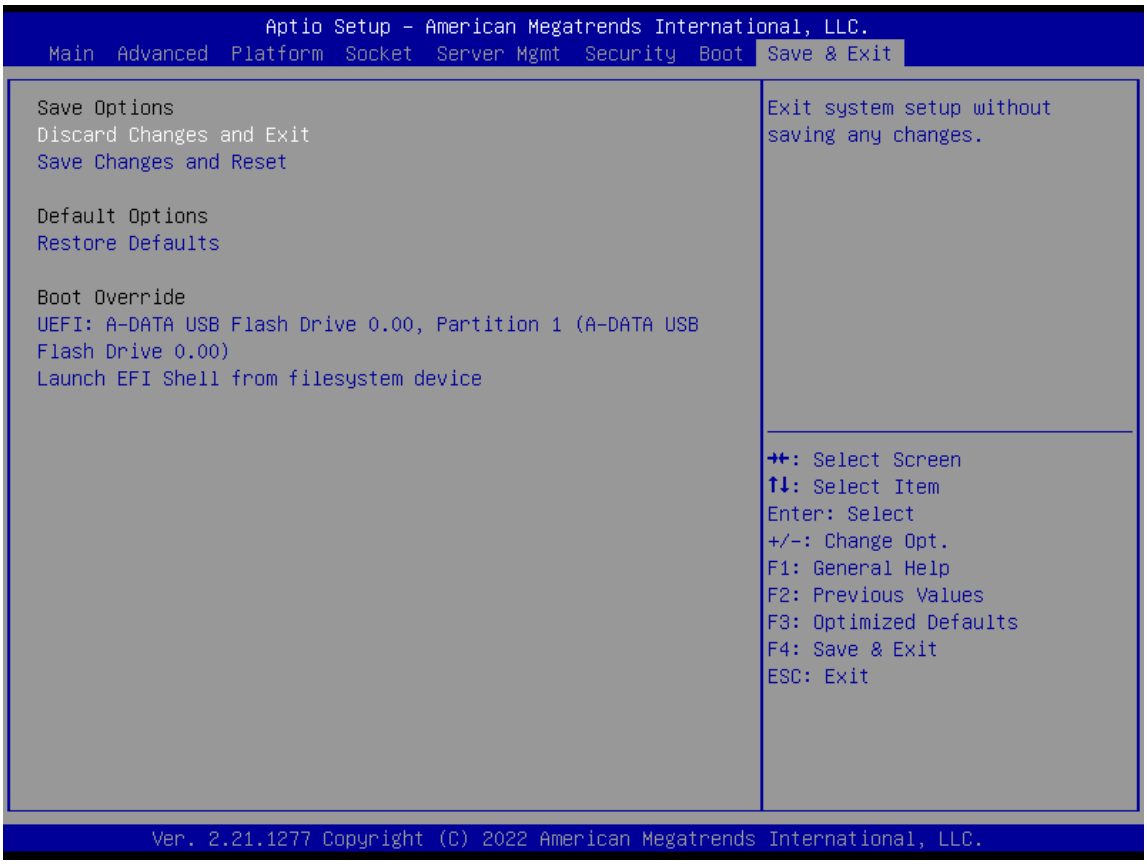


Feature	Options	Description
Setup Prompt Timeout	5	The number of seconds to wait for setup activation key. 65535 means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state
Quiet Boot	Disabled Enabled	Enables or disables Quiet Boot option.

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

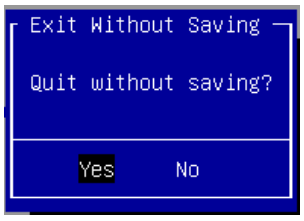
Save and Exit Menu

Select the Save and Exit menu tab 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.



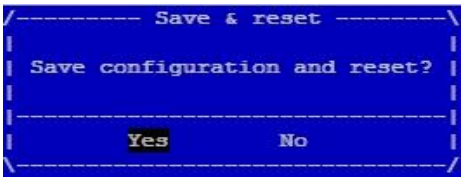
■ Discard Changes and Exit

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.



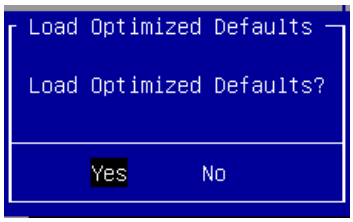
■ Save Changes and Reset

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 as the above images, as it should depend on the devise connected to the system.

APPENDIX A: LED INDICATOR EXPLANATIONS

The status explanations of LED indicators on Front Panel are as follows:

Green: System Power

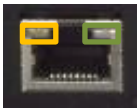
Red/Green: System Status

Amber: HDD Activity

LED	COLOR	LED ACTION	DESCRIPTION
Power	**Green**	Steady	System is powered ON
	OFF	N/A	System is powered OFF
Status	**Green**	Steady	LED controlled by GPIO
	Red	Steady	
	OFF	N/A	System is powered OFF
Storage	**Amber**	Blinking	Storage (HDD/SATA/NVME) Active
	OFF	N/A	No Data Access

- **RJ-45 LAN LED Indicators**

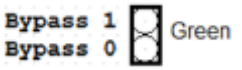
10/100/1G

Amber  *Green/Amber*

- **10M/100M/1GB RJ-45 Define:**

Speed	Amber (Active)	Green/Amber (Link)
10M	Blinking Amber – Indicates data access	OFF
100M	Blinking Amber – Indicates data access	ON (**Green**)
1G	Blinking Amber – Indicates data access	ON (**Amber**)

- **Define Bypass LED**



1 LED per pair, reserve on board 1x2 pin header per port.

NOTE: Standard does not include LED as default
NOTE: If Standard product requires LED out: When Bypass is Enabled, the LED will be **Green**.

- **Bypass Default Configuration**

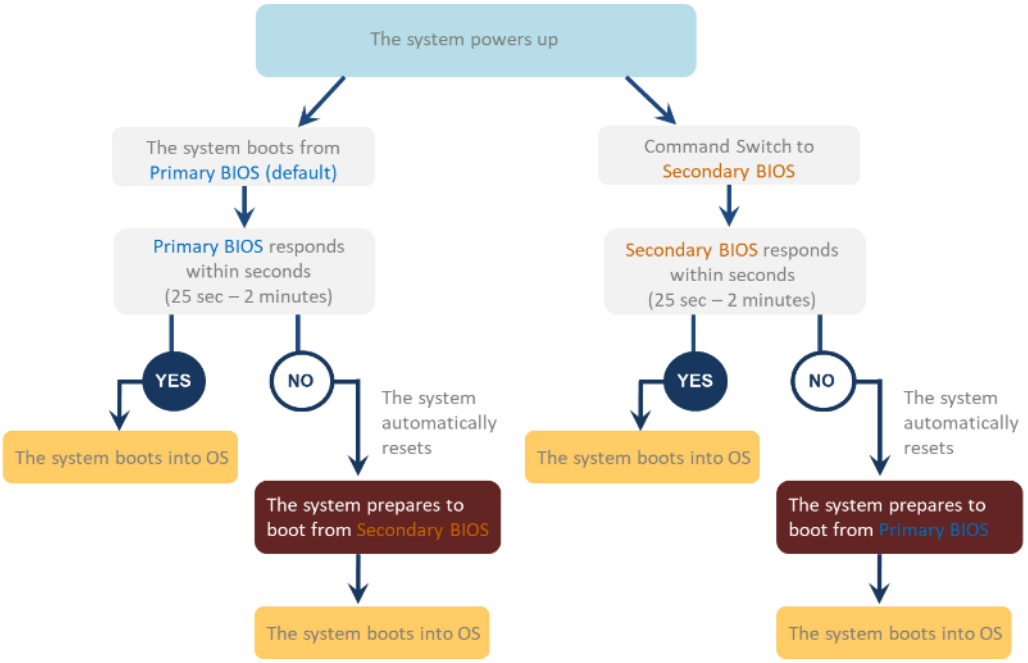
Item	Power ON	Run Time	Power OFF
Bypass (Default)	Disable	Disable	Enable
Remove Power Cord	Change back to default status		
System Reboot	Keep the current status		

APPENDIX B: DUAL BIOS INTRODUCTION

Failure when booting up BIOS is not uncommon and can occur most often during a power failure, a mishandled BIOS update, a malware attack resulting in data corruption. When it happens, recovering procedures consume considerable time and effort. Lanner understands this pain and have empowered our products with the Dual BIOS feature.

How Dual BIOS Works

Dual BIOS features two physical BIOS ROMs soldered onto the motherboard, carrying two separate BIOS images. If the Primary BIOS (default) is not functioning correctly and fails to respond within seconds (~25 seconds to 2 minutes, depend upon appliance), the system will invoke a bootup from the Secondary BIOS, automatically restarting the system and launch the operating system.



2nd Gen Dual BIOS

To provide increased flexibility and usage protection, Lanner has released the 2nd Gen Dual BIOS function on Lanner appliances. With 2nd Gen Dual BIOS, both the primary BIOS and secondary BIOS can be updated and flashed using the BIOS Tool to run different versions of BIOS ROMS independently for maximum compatibility. This additionally allow users to switch BIOS ROMS for booting up, toggling between primary BIOS and secondary BIOS.

- **Flexible recovery timer control**

Users can designate the amount of time before recovery BIOS launch. The amount of time is no longer fixed to 7 minutes.

- **Flexible Dual BIOS ROMs control.**

Users can flash both the Primary BIOS and Secondary BIOS, thus run different versions of BIOS ROMS independently for maximum compatibility.

- **Flexible Dual BIOS ROMs switch**

The 2nd Gen Dual BIOS allow users to choose one of the BIOS ROMS (Primary BIOS/Secondary BIOS) for booting up. Use software command prompt to toggle between Primary BIOS and Secondary BIOS.

	Gen1 Dual BIOS	Gen2 Dual BIOS
Function	Primary / Recovery 2ND BIOS for recovery purpose	Primary / Secondary (Peer to Peer) Both BIOS can let the system work
Detection Time	7 min	Seconds (By platform design)
2nd BIOS updated	Only using the SPI facility	By BIOS tool command or SPI facility
MAC/DMI	Only for BIOS1	For both BIOS
CPLD Interface	GPIO	LPC or eSPI (By Platform)

Figure 1. Gen 1 vs Gen 2 Dual BIOS comparison chart

Few things can shut down a computer as completely as a corrupted BIOS. With Dual BIOS feature, you will be guaranteed to enter a healthy OS to perform thorough troubleshooting before the situation is irreparable.

Get Ready for BIOS Update

Flashing a BIOS needs to be carefully completed, especially pertaining to a corrupted BIOS, which can lead to an unusable system if done incorrectly. To get ready for a BIOS update, acquire the following BIOS resources from Lanner technical support:

- Firmware and Flash Tool
- BIOS Engineering Spec

Before you start, make sure you select the correct firmware version, correct BIOS (Primary or Secondary) and go through the instructions for BIOS update in *BIOS Engineering Spec* thoroughly. If you cannot be certain if this version is correct for your system, please contact Lanner Technical Support.

Note:
1. Dual BIOS feature cannot work with BIOS Boot Guard function
2. To update BIOS, it is mandatory to have both BIOS updated first. This is to avoid both BIOS having ME code variations, which could lead to unexpected risk and errors.
3. When the system enters BIOS menu or Option ROM, the system will not reboot automatically.

Warning
DO NOT power off or reset the system during BIOS updating process.

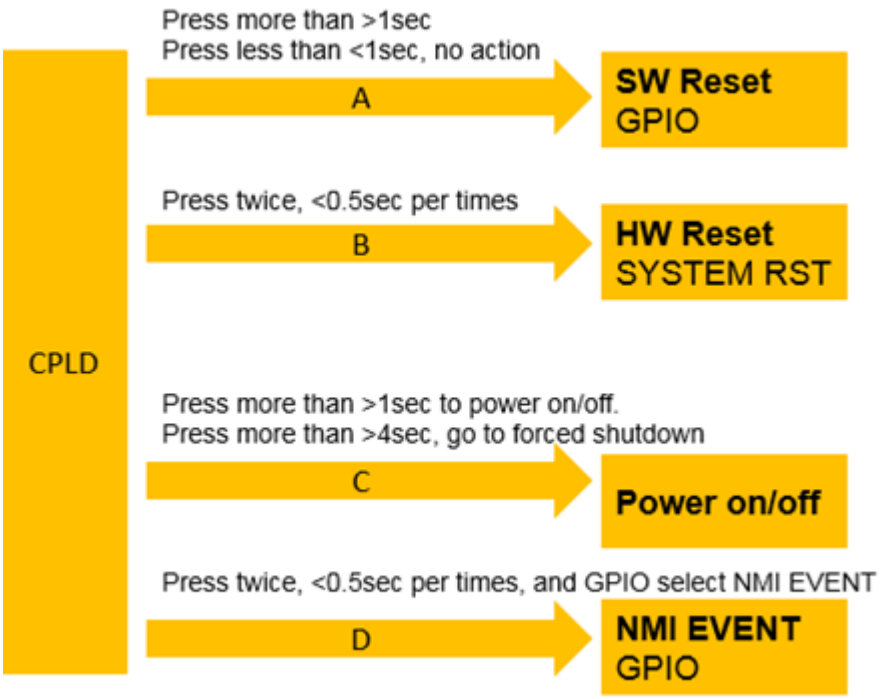
Disclaimer
Under no circumstances will Lanner accept responsibility or liability for damages of any kind whatsoever resulting or arising directly or indirectly from a BIOS update.

APPENDIX C: SMART POWER AND RESET BUTTON

Smart Power and Reset Button – Controlled by CPLD

Reset Button

Power Button



APPENDIX D: TERMS AND CONDITIONS

Warranty Policy

1. All products are under warranty against defects in materials and workmanship for a period of 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, simply 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 ***Confirmed By Supplier***

Authorized Signature / Date **Authorized Signature / Date**