Lanner

Network Appliance Platform

Hardware Platforms for Network Computing

NCA-5520 User Manual

Version: 1.9

Date of Release:2023-07-11

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:

Note: This mark indicates that there is a note of interest and is something that you should pay special attention to while using the product.

Warning: 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.

For troubleshooting the issues with your system, please check the Lanner Q&A page for a diagnostic procedure and troubleshooting steps.

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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 the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. The operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

EMC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. The operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

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.
  In order not to result in potential electric shock or fire, please avoid improper use narrated below:
- Replacing a battery with an incorrect type (e.g. in the case of certain lithium battery types), which can defeat a safety guard.
- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, which can result in an explosion.
- Leaving a battery in an extremely high temperature surrounding environment, which can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.

Lithium Battery Caution

- There is risk of Explosion if Battery is replaced by an incorrect type.
- Dispose of used batteries according to the instructions.
- Installation only by a trained electrician or only by an electrically trained person who knows all Installation 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 surrounding environment can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.

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).

Mounting Installation Precaution

- Do not install and/or operate this unit in any place that flammable objects are stored or used in.
- 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.
- Installation of the equipment (especially in a rack) should consider the ventilation of the system's intake (for taking chilled air) and exhaust (for emitting hot air) openings so that the amount of air flow required for safe operation of the equipment is not compromised.
- To avoid a hazardous load condition, be sure the mechanical loading is even when mounting.
- 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 over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable earthing 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).

Installation & Operation:

- 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.

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.

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.
- La machine ne peut être utilisée qu'à un lieu fixe comme en laboratoire, salle d'ordinateurs ou salle de classe.

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).

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.

Electrical Safety Instructions

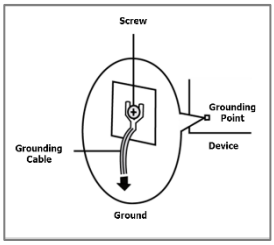
- Before turning on the device, ground the grounding cable of the equipment.
- Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike.
- To uninstall the equipment, 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.
- Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

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.
- 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.

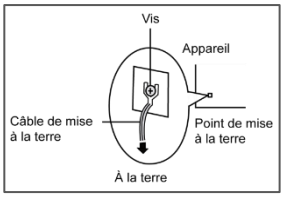
Grounding Procedure for DC Power Source

- Loosen the screw of the earthing point.
- 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 CC

- Desserrez la vis du terminal de mise à la terre.
- Branchez le câble de mise à la terre à la terre.
- L'appareil de protection pour la source d'alimentation CC doit fournir 0 A de courant.
- Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation CC.



The machine can only be used in a restricted access location, such as labs or computer facilities with the proper authorization.
Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.

CAUTION: TO DISCONNECT POWER, REMOVE ALL POWER CORDS FROM UNIT.
注意：要断开电源，请将所有电源线从本机上拔下。
WARNUNG: Wenn Sie das Gerät zwecks Wartungsarbeiten vom Netz trennen müssen, müssen Sie beide Netzteile abnehmen.
ATTENTION: DÉBRANCHER LES TOUT CORDONS D'ALIMENTATION POUR DÉCONNECTER L'UNITÉ DU SECTEUR.

Table of Contents

CHAPTER 1: PRODUCT OVERVIEW

Thank you for choosing NCA-5520. The NCA-5520, powered by Intel® Xeon® Processor Scalable Family and Intel® C626 or C621 chipset, features optimized computing power and virtualization capacity in a compact 1U form factor with support for up to 640GB DDR4 system memory at 2933MHz. It delivers a multitude of advanced networking features for maximizing packet processing efficiency and cryptography acceleration.

Package Content

Your package contains the following items:

- 1x NCA-5520 Network Appliance
- 2x US Power Cord
- 1x Console Cable (RS-232)
- 1x LAN Cable (Cross-over)
- 1x LAN Cable (Straight)
- 1x Ear Kit (2x Mounting Ears, 6x Mounting Ear Screws)

Ordering Information

SKU No.	Main Features
NCA-5520A	Intel® Cascade Lake (165W) C626 w/ BMC, 4x 10G SFP+ MGMT
NCA-5520B	Intel® Cascade Lake (165W) C621, 4x GbE RJ45 MGMT

Optional Accessories

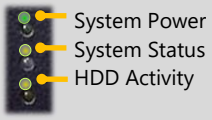
Model Name	Description
NCS2-IGM806A	8-port NIC with Intel i350 AM4 and 4 Pairs G3 Bypass
NCS2-ISM405A	4-port NIC with Intel i350-AM4 and 2 pairs Bypass
NCS2-ISM802A	8-port NIC with Intel i350-AM4 and No Bypass
NCS2-IMM802A	4x RJ45 + 4x SFP cage with Intel i350-AM4 and 2 pairs Bypass
NCS2-IXM407	4-port 10Gbe SFP with Intel Fortville XL710 Ethernet controller
NCS2-IQM201A	Dual-port 40GbE QSFP NIC Module with Intel® XL710 Ethernet Controller
NCS2-IXM801A	8-port 10GbE SFP+ NIC Module with Intel® XL710 Ethernet Controller
NCS2-IXM409A	4-port 10G LC Fiber with Intel® XL710-BM1 (Multi-Mode)
NCS2-IVM201A	Dual 25G Fiber SFP28 Ports with Intel® Fortville XXV710

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

System Specifications

Form Factor		1U 19" Rackmount
Platform	Processor Options	2nd Gen Intel® Xeon® Processor Scalable Family (Cascade Lake)
	CPU Socket	1x LGA3647
	Chipset	Intel® C621/626
	Security Acceleration	Intel® QuickAssist Technology (By SKU)
BIOS		AMI SPI Flash BIOS
System Memory	Technology	DDR4 2933/2666/2400/2133 MHz REG DIMM (By CPU)
	Max. Capacity	Up to 640GB
	Socket	10x 288pin DIMM
Networking	Ethernet Ports	4x GbE RJ45 or 4x 10G SFP+ Lewisburg Internal MAC (By SKU)
	Bypass	Depends on NIC module specifications
	NIC Module Slot	4x NIC Modules Slots
LOM	IO Interface	1x RJ45 (Optional)
	OPMA slot	IPMI onboard (SKU A)
I/O Interface	Reset Button	1x Reset Button
	LED	Power/Status/Storage LED indicators
	Power Button	1x ATX Power Switch
	Console	1x RJ45; 1x Mini USB
	USB	2x USB 3.0 Type A
	LCD Module	N/A (Optional)
	Display	1x VGA (Internal Pin Header)
	Power input	AC power inlet on PSU
Storage	HDD/SSD Support	2x 2.5" Internal Bays
	Onboard Slots	1x mSATA
Expansion	PCIe	1x PCI-E*8 FH/HL (Optional)
Miscellaneous	Watchdog	YES
	Internal RTC with Li Battery	YES
	TPM	YES (Optional)
Cooling	Processor	Passive CPU heat sink
	System	4x individual hot-swappable cooling fans w/ smart fan control
Environmental Parameters	Temperature	0~40ºC Operating -20~70ºC Non-Operating
	Humidity (RH)	5~90% Operating 5~ 95% Non-Operating
System Dimensions	(WxDxH)	650mm x 438mm x 44mm
	Weight	11kg
Package Dimensions	(WxDxH)	841mm x 588mm x 215mm
	Weight	17kg
Power	Type/Watts	650W 1+1 Redundant PSUs
	Input	AC 100~240V @47~63 Hz
Approvals and Compliance		CE/FCC Class A, UL, RoHS

Front Panel

No.	Description	
F1	Reset Button	For software reset
F2	LED Indicators	 System Power System Status HDD Activity
F3	Console Port	1x RJ45 console port
F4	USB Ports	2x USB 3.0 port
F5	RJ45/SFP+ Ports	4x RJ45 port with LED 4x 10G SFP+ port
F6	MGT LAN Port	1x RJ45 for MGT and LOM share port
F7	Micro USB	1x Mini USB Console port
F8	NCS2 Module	4x STD NIC Module

Note: Please refer to Appendix A: LED Indicator Explanations for descriptions of the LED Indicators

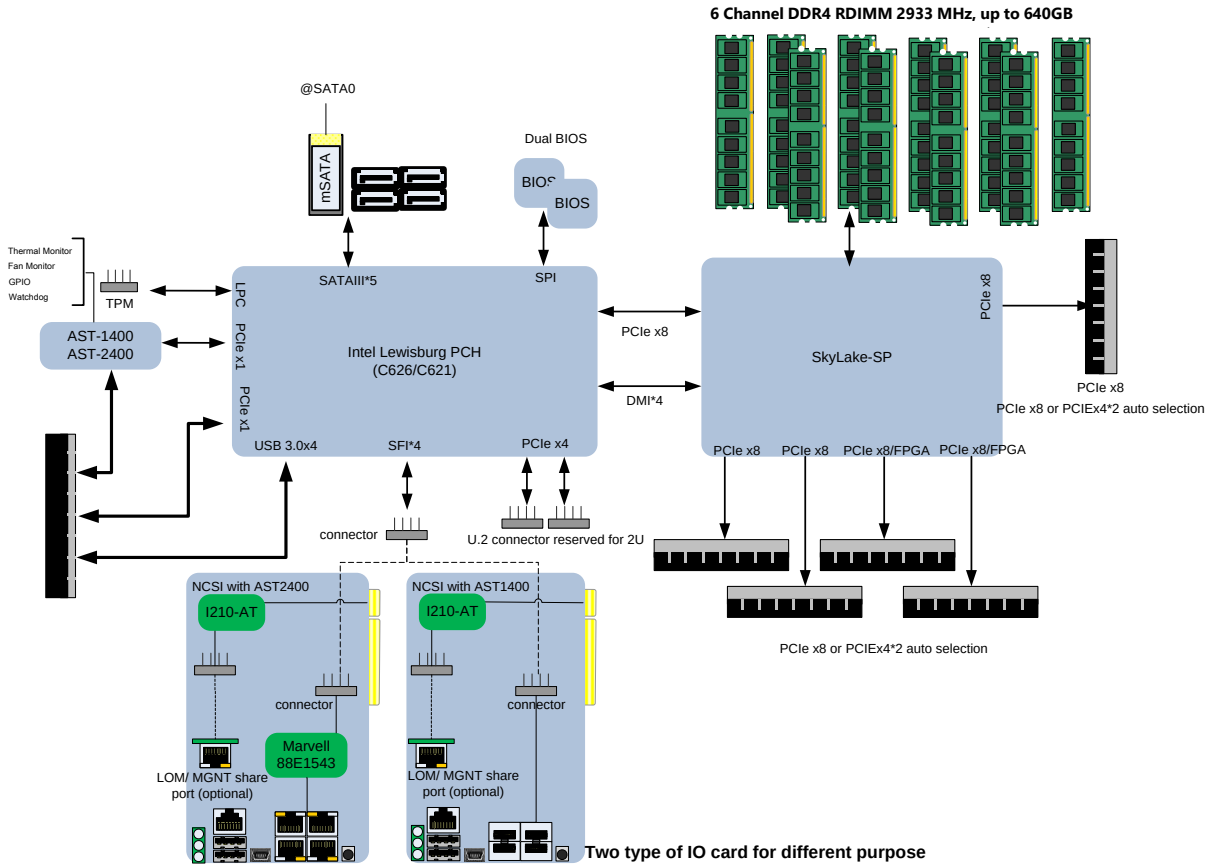
Rear Panel

No.	Description	
R1	Rear PCIe Expansion	1x PCIe expansion slot
R2	Alarm off Button	An audible alarm will sound when the system's redundant power is missing. Press this button to turn the alarm off.
R3	Power Switch	1x Power button
R4	Fans	4x Independent Swappable Fans
R5	Power Supply	2x 650W Redundant (N+1 Design)

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.

Jumper Setting and Pin Assignment

1(JPWR1)

System Power-On Switch CONN (Must be connected)

2(SW1)

Power-On Button

3(JATX2)

8 PinATX 12V Power CONN (Must be connected)

4(JATX8)

4Pin ATX 12VSB Power CONN (Not connected/Reserve)

5(JFAN4)

PWM FAN CONN

1	PWM Input
2	--
3	FAN Tachometer Output
4	P12V
5	GND

6(JFAN3)

PWM FAN CONN

7(JFAN2)

PWM FAN CONN

8(JFAN1)

PWM FAN CONN

10(JDDR4)

DDR4 CHANNEL C DIMM0(BLUE)

11(JDDR2)

DDR4 CHANNEL B DIMM0(BLUE)

12(JDDR3)

DDR4 CHANNEL B DIMM1(BLACK)

13(JDDR0)

DDR4 CHANNEL A DIMM0(BLUE)

14(JDDR1)

DDR4 CHANNEL A DIMM1(BLACK)

15(JDDR6)

DDR4 CHANNEL D DIMM1(BLACK)

16(JDDR5)

DDR4 CHANNEL D DIMM0(BLUE)

17(JDDR8)

DDR4 CHANNEL E DIMM1(BLACK)

18(JDDR7)

DDR4 CHANNEL E DIMM0(BLUE)

19(JDDR9)

DDR4 CHANNEL F DIMM0(BLUE)

20(JCPU0)

CPU LGA-3647 socket, only support Skylake-sp.

21(JIOB1)

I/O CONN for Connecting IO-32301/ IO-32302

A1	USB_OC#2	A29	LED_GBE3_ACT	A57	—
A2	HDD_LED_N	A30	LED_GBE3_LOW_SPEED	A58	GND
A3	LED_GRN_STATUS	A31	FM_L2_LVC3_MOD_ABS0	A59	BMC_RMII2_TXEN
A4	LED_YEW_STATUS	A32	GND	A60	BMC_RMII2_RXER
A5	GND	A33	LED_GBE2_SPEED	A61	BMC_RMII2_RCLK
A6	—	A34	LED_GBE2_ACT	A62	BMC_RMII2_CRSDV
A7	—	A35	LED_GBE2_LOW_SPEED	A63	+P5V_SB
A8	GND	A36	FM_T2_LVC3_MOD_ABS0	A64	
A9	FM_PHY_DIS#	A37	GND	A65	
A10	PCIE_WAKE#	A38	LED_GBE1_SPEED	A66	
A11	PLT_RST#	A39	LED_GBE1_ACT	A67	
A12	GND	A40	LED_GBE1_LOW_SPEED	A68	
A13	BMC_UART1_CTS#	A41	FM_L1_LVC3_MOD_ABS0	A69	
A14	BMC_UART1_RTS	A42	GND	A70	+P3V3_AUX
A15	BMC_UART1_DSR#	A43	LED_GBE0_SPEED	A71	
A16	BMC_UART1_DTR	A44	LED_GBE0_ACT	A72	
A17	BMC_UART1_RX	A45	LED_GBE0_LOW_SPEED	A73	
A18	BMC_UART1_TX	A46	FM_T1_LVC3_MOD_ABS0	A74	
A19	SMB_PCH10G_SDA3	A47	GND	A75	
A20	SMB_PCH10G_SCL3	A48	BMC_SOL_SEL#	A76	
A21	SMB_PCH10G_SDA2	A49	FM_LAN_WAKE#	A77	+P3V3
A22	SMB_PCH10G_SCL2	A50	—	A78	
A23	SMB_PCH10G_SDA1	A51	—	A79	
A24	SMB_PCH10G_SCL1	A52	GND	A80	
A25	SMB_PCH10G_SDA0	A53	—	A81	
A26	SMB_PCH10G_SCL0	A54	—	A82	
A27	GND	A55	GND		
A28	LED_GBE3_SPEED	A56	—		

B1	CLK_BMC_125M	B29	PCIE_PRX_C_LANTX_N0	B57	BMC_RGMII_TXCTL
B2	—	B30	GND	B58	BMC_RGMII_TXD0
B3	—	B31	—	B59	BMC_RGMII_TXD1
B4	GND	B32	—	B60	BMC_RGMII_TXD2
B5	USB20_P6	B33	PCIE_PTX_C_LANRX_P1	B61	BMC_RGMII_TXD3
B6	USB20_N6	B34	PCIE_PTX_C_LANRX_N1	B62	BMC_RGMII_TXCLK
B7	GND	B35	GND	B63	GND
B8	USB20_P5	B36	PCIE_PRX_C_LANTX_P1	B64	BMC_M1_RGMIILINK
B9	USB20_N5	B37	PCIE_PRX_C_LANTX_N1	B65	BMC_RGMII_MDIO
B10	GND	B38	GND	B66	BMC_RGMII_MDC
B11	GND	B39	GND	B67	BMC_MAC2_RST#
B12	USB30_TX3P	B40	CLK_PCIE_LAN1_P	B68	GND
B13	USB30_TX3N	B41	CLK_PCIE_LAN1_N	B69	BMC_SRST#
B14	GND	B42	GND	B70	FP_RESET#
B15	USB30_TX4P	B43	CLK_PCIE_LAN2_P	B71	GND
B16	USB30_TX4N	B44	CLK_PCIE_LAN2_N	B72	—
B17	GND	B45	GND	B73	—
B18	GND	B46	BMC_RMII2_TXD0	B74	GND
B19	USB30_RX3P	B47	BMC_RMII2_TXD1	B75	—
B20	USB30_RX3N	B48	BMC_RMII2_RXD0	B76	—
B21	GND	B49	BMC_RMII2_RXD1	B77	GND
B22	USB30_RX4P	B50	BMC_RGMII_RXCTL	B78	—
B23	USB30_RX4N	B51	BMC_RGMII_RXD0	B79	—
B24	GND	B52	BMC_RGMII_RXD1	B80	GND
B25	PCIE_PTX_C_LANRX_P0	B53	BMC_RGMII_RXD2	B81	—
B26	PCIE_PTX_C_LANRX_N0	B54	BMC_RGMII_RXD3	B82	—
B27	GND	B55	BMC_RGMII_RXCLK		
B28	PCIE_PRX_C_LANTX_P0	B56	GND		

22(MH1/2/3/4/5/6)

ATX Power Board BP-32303 CONN (must be connected)

MH4	GND
MH5	GND
MH6	GND
MH1	+P12V
MH2	+P12V
MH3	+P3V3

23(JSFI2)

PCH PCIE GEN3 NVME SFF8643 CONN for supporting U.2 HDD

24(JSFI3)

PCH PCIE GEN3 NVME SFF8643 CONN for supporting U.2 HDD

25(JMSATA1)

2	+P3V3_NGFF	1	—	30	—	29	GND
4	GND	3	—	32	—	31	SATA_PTX_C_DRX_N16
6	—	5	—	34	GND	33	SATA_PTX_C_DRX_P16
8	—	7	—	36	—	35	GND
10	—	9	GND	38	—	37	GND
12	—	11	—	40	GND	39	+P3V3_NGFF
14	—	13	—	42	—	41	+P3V3_NGFF
16	—	15	GND	44	—	43	GND
18	GND	17	—	46	—	45	—
20	—	19	—	48	—	47	—
22	—	21	GND	50	GND	49	—
24	+P3V3_NGFF	23	SATA_PRX_DTX_P16	52	+P3V3_NGFF	51	—
26	GND	25	SATA_PRX_DTX_N16	54	GND	53	GND
28	—	27	GND	56	—	55	—

26(JRISER1)

CPU PCIE GEN3 Slot (Support X8 OR 2X4)

28(JLCM1) (EITHER JCOM2 OR JLCM1)

UART2 CONN

4	+P5V
3	GND
2	BMC_COM2_RX
1	BMC_COM2_TX

29(JCOM2) (either JCOM2 OR JLCM1)

UART2 CONN

30(J80P1)

80PORT CONN

1	CLK_24M_DB	2	LPC_LAD1
3	PLT_RST#	4	LPC_LAD0
5	LPC_LFRAME#	6	+P3V3
7	LPC_LAD3	8	—
9	LPC_LAD2	10	GND

31(JTPM1)

TPM Module CONN (Support TPM1.2 & 2.0)

1	IRQ_SERIAL	2	LPC_LFRAME#
3	LPC_LAD0	4	CLK_24M_LPC
5	LPC_LAD1	6	+P3V3_AUX
7	LPC_LAD2	8	—
9	LPC_LAD3	10	+P3V3
11	PLT_RST#_B	12	GND

32(JSATA3)

SATA CONN: Supports UP TO 6GB/S

33(JSATA1)

SATA CONN: Supports UP TO 6GB/S

34(JSATA4)

SATA CONN: Supports UP TO 6GB/S

35(JSATA2)

SATA CONN: Supports UP TO 6GB/S

36(UPCH1)

PCH LEWISBURG

Model	PCH SKU
NCB-3230A	C627
NCB-3230B	C626
NCB-3230C	C621

37(JUSB1)

USB2.0 X2 PORTS

1	+P5V_USB1	2	+P5V_USB1
3	USB20_L_N3	4	USB20_L_N4
5	USB20_L_P3	6	USB20_L_P4
7	GND	8	GND
9	GND	10	GND
1	—	2	BMC_COM2_DSR#
3	BMC_COM2_RX	4	BMC_COM2_RTS
5	BMC_COM2_TX	6	BMC_COM2_CTS#
7	BMC_COM2_DTR	8	—
9	GND		

38(JSFI1)

MODEL	LAN
NCB-3230A	SFP+ x4 with IO-32302
NCB-3230B	SFP+ x4 with IO-32302
NCB-3230C	Copper x4 with IO-32301

39(JATX3)

ATX Power CONN(5V/5VSB/12VSB) (Must be connected)

1	GND	2	+P5V
3	GND	4	+P5V_SB
5	GND	6	+P12V_STBY_PSU
7	GND	8	+P12V_STBY_PSU

40(JPMB1)

ATX POWER-ON/SMBUS PIN HEADER

1	—
2	—
3	ATX_PSON#
4	GND
5	ATXPWGD
6	PMBUS_CLK
7	PMBUS_DAT
8	GND

42(JSATAPW1)

5V SATA Power CONN

1	--
2	GND
3	GND
4	+P5V

43(JCMOS1)

Jumper	Status
1-2 Short	Normal
2-3 Short	Clear CMOS

44(JSPIROM1)

Pin Header for Updating BIOS

45(JDUAL1)

Select which BIOS ROM to be flashed

Jumper (1-2 / 3-4)	Flash 1ST BIOS
Jumper (1-3 / 2-4)	Flash 2ND BIOS

46(BAT1)

PCH RTC Battery Hold

47(BZ1)

Buzzer

48(JOPEN1)

Case Open Function Pin Header

49(JPCIESL1)

CPU PCIE GEN3 Slot (Support x8 or 2x4)

50(JRST1)

PIN 1-2	H/W Reset
PIN 2-3	S/W Reset

51(SW3)

RESET BUTTON

52(JNMI1)

NMI Pin Header (Reserve)

53(JPCIESL2)

CPU PCIE GEN3 Slot (Support x8 or 2x4)

54(JPCIESL3)

CPU PCIE GEN3 Slot (Support x8 or 2x4)

55(JPCIESL4)

CPU PCIE GEN3 Slot (Support x8 or 2x4)

56(JGP1)

GPIO Pin Header

1	GPO_B_1	2	GPI_B_1
3	GPO_B_2	4	GPI_B_2
5	GPO_B_3	6	GPI_B_3
7	GPO_B_4	8	GPI_B_4
9	GND	10	GND

57(JPLD1)

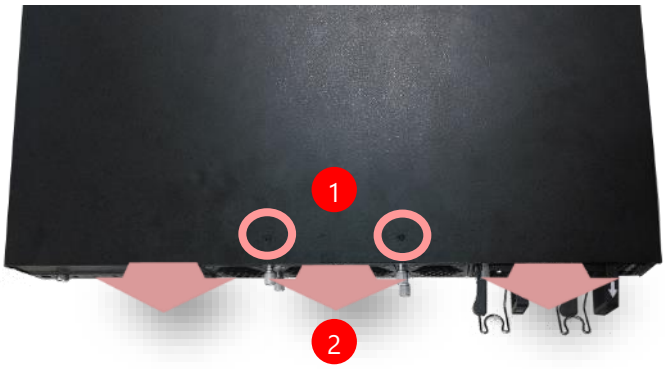
UPDATE CPLD TOOL PIN HEADER

CHAPTER 3: HARDWARE SETUP

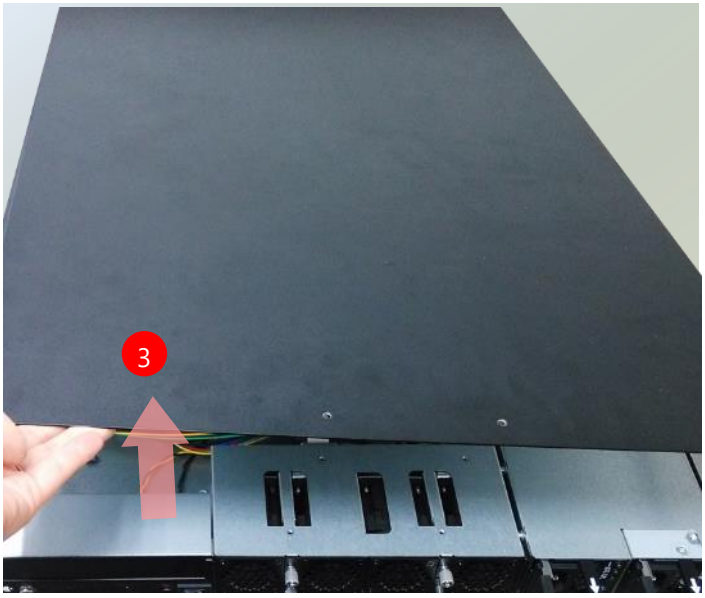
To reduce the risk of personal injury, electric shock, or damage to the unit, please remove all power connections to completely shut down the device and wear ESD protection gloves when handling the installation steps.

Opening the Chassis

1. Loosen the two (2) screws on the top cover.
2. Gently pull the cover backward a bit.



3. Lift the cover up to remove.



Installing the CPU

Please note that the system delivered to you is already installed with the processor and that this processor, LGA3647, comes with rather sophisticated design; therefore, the assembly of which must be handled with exclusive tools and extreme care by professionals. It is strongly recommended that you not make any adjustments to, remove or even re-install the processor on your own. If handling the processor on your own is inevitable, please read through the instructions in this section and refer to the official tutorial released by Intel® to make sure you have acquired the necessary knowledge and comply with the requirements.

Installing the processor onto the motherboard involves two stages:

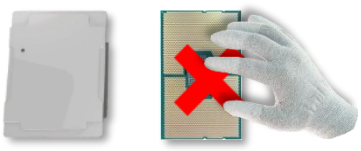
1. Mount the processor onto the heat sink to make a PHM (Processor + Heat Sink Module)
2. Install the PHM onto the motherboard.

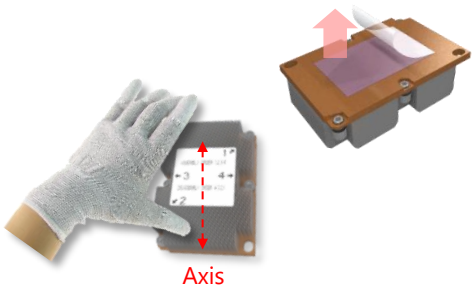
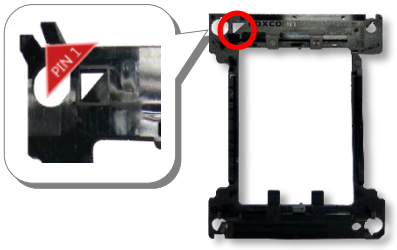
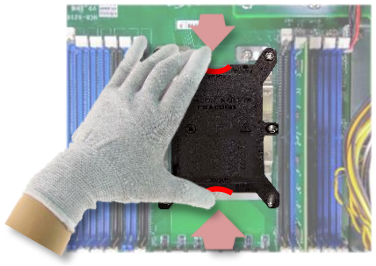
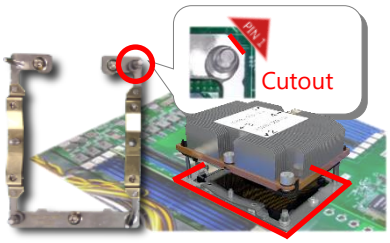
Tools Required

Tool	Description	
Torque screwdriver (Star T30)	Set to 1.36 N.m. or 12 in-lbf for tightening the nuts which fasten the PHM on the bolster plate.	
ESD Protection (ESD gloves, ESD-safe work surface, etc.)	During the entire assembly process, at least wear a pair of ESD gloves to avoid damaging or contaminating the electronic parts while enhancing your own safety.	

Note: The images of tools shown in this document are merely for reference; the actual tools you use might differ.

Parts Explanation:

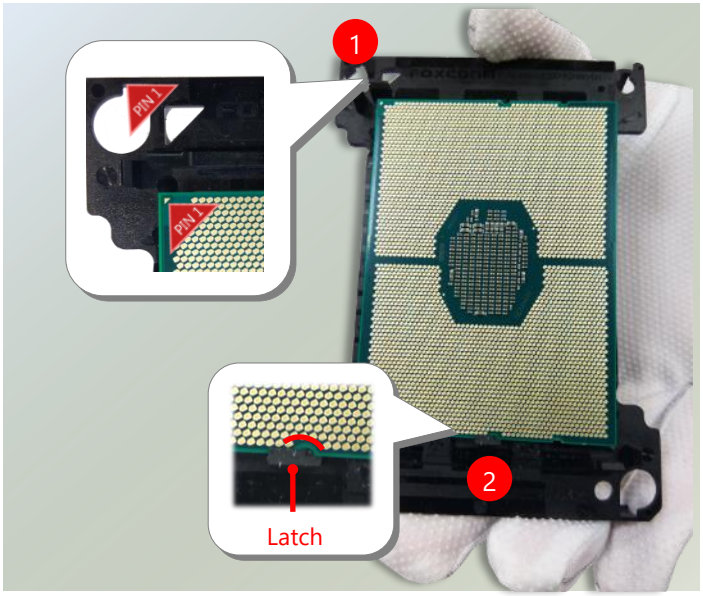
Item	Description	
Processor	Please avoid touching the gold fingers or package lands of the processor even if you are wearing ESD gloves.	

Heat Sink	If a TIM (Thermal Interface Material) protective film is already attached to the base of the heat sink, remove it before you mount the processor on it. When holding it, please grip it along the axis of its fins with your thumb and your index finger.	
Processor Carrier	This is packed along with the processor. Before performing any assembly involving this part, please locate PIN1 on one of the corners, an important indicator used to align this carrier with the processor and the bolster plate correctly.	
Dust Cover	This cover is used to protect the package land surface of the processor from contamination. To remove it from the processor, grasp the holding features with your thumb and your index finger while pulling the cover off vertically.	
Bolster Plate	A robust bolster plate is used to assist in PHM alignment for installation, while effectively helping eliminate PCB bowing during compression. Please locate the Cutout on one of the four corners before starting PHM installation.	

Mounting the CPU onto the Heat Sink

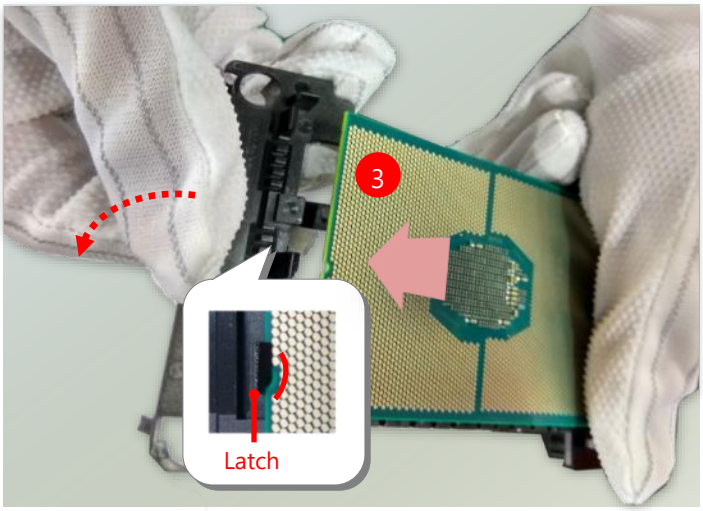
1. Align the PIN1 indicator on the processor with that on the carrier.

2. Gently insert one side of the processor into the carrier and make sure the alignment feature is aligned with the latch of the carrier.

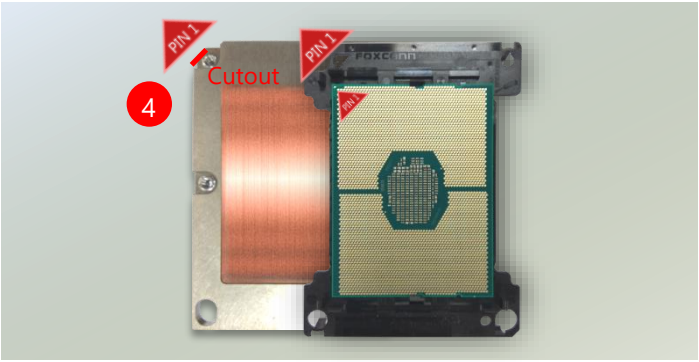


Note: During assembly, it is essential to have (1)PIN1 on the processor aligned with that on the carrier, and (2) the alignment features on the top and the bottom of the CPU aligned with the corresponding carrier latches.

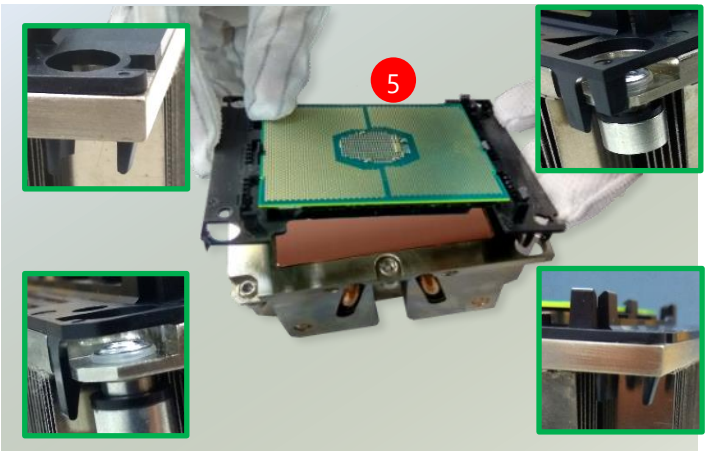
3. For the other end of the carrier, align the alignment feature of the processor with the carrier latch, and then gently bend over the carrier end to have the latch clamp on the processor.



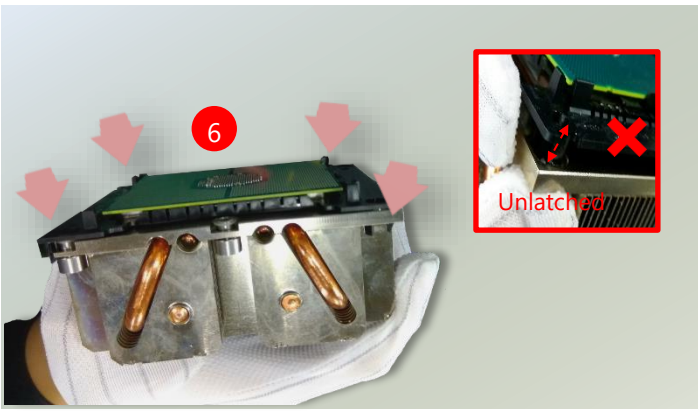
4. Align PIN1 of the processor with the corner cutout of the heat sink (if there are two corner cutouts on one heat sink, either will do).



5. With a little pressure, push the four corners of the carrier down to engage their latching features with the corresponding corners of the heat sink. You might hear a clicking sound when the latch clicks into place.

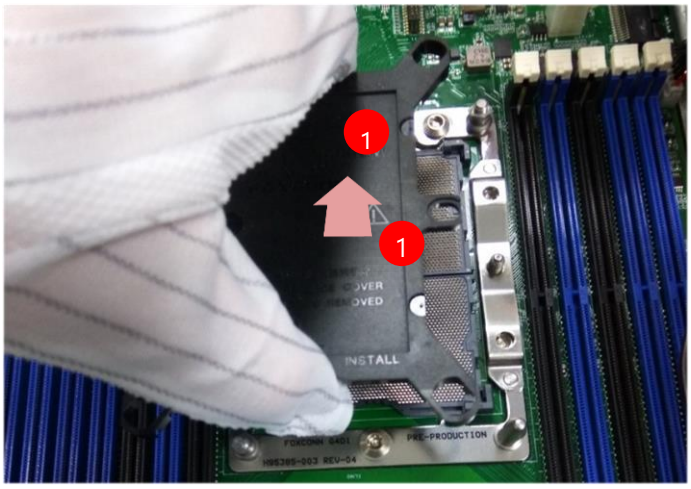


6. Go through the four corners to check if the latches are engaged. If correctly latched, the corners of the carrier should be tightly attached to the heat sink, and no gap in-between is observed.



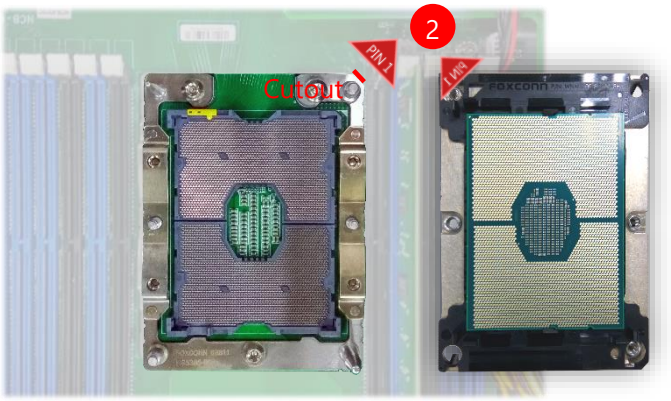
Installing the PHM onto the Motherboard

1. Remove the dust cover from the socket contacts of the motherboard.

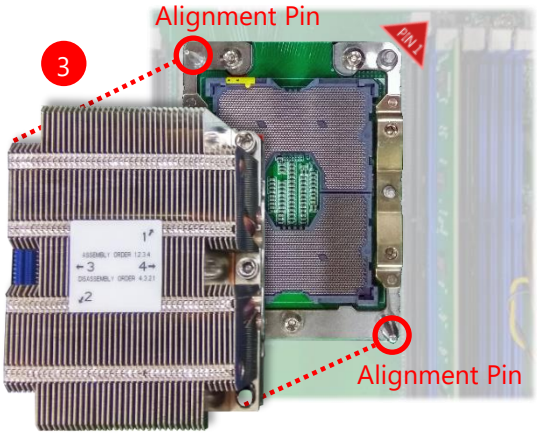


Note: Inspect the surface of the socket under sufficient light to ensure there is no contamination or damage prior to the PHM installation.

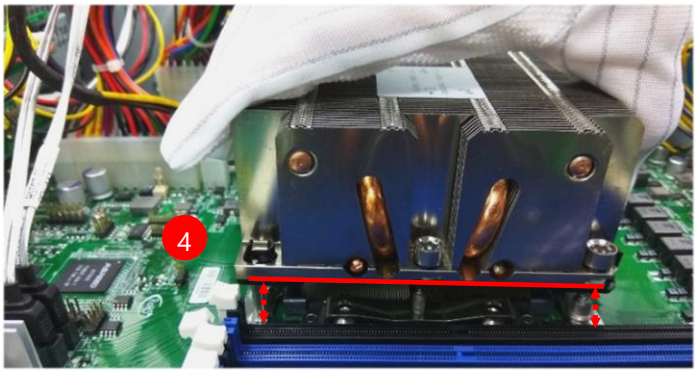
2. Flip the PHM over to align PIN1 of the carrier with the Cutout of the bolster plate.



3. Flip the PHM over, with the package land of the processor facing the socket, carefully hold the PHM while lowering it vertically to engage it to the alignment pins of the bolster plate.

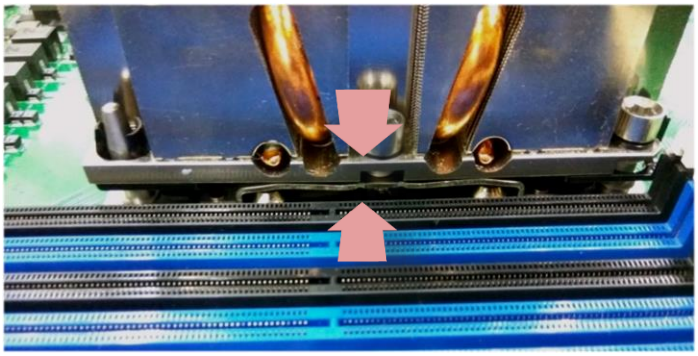


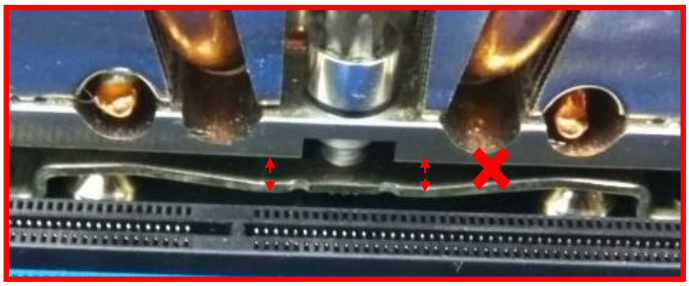
4. Make sure the PHM is sitting horizontally on the bolster plate.



5. Use a torque driver to tighten the four nuts to 12 in-lbf into the bolster plate following the sequence indicated on the heat sink (#1→ #2→#3→#4).

Note: When fastening #3 and #4 nuts, the gap between the metal spring leaf of the bolster plate and the PHM will gradually diminish as you drive the nuts.

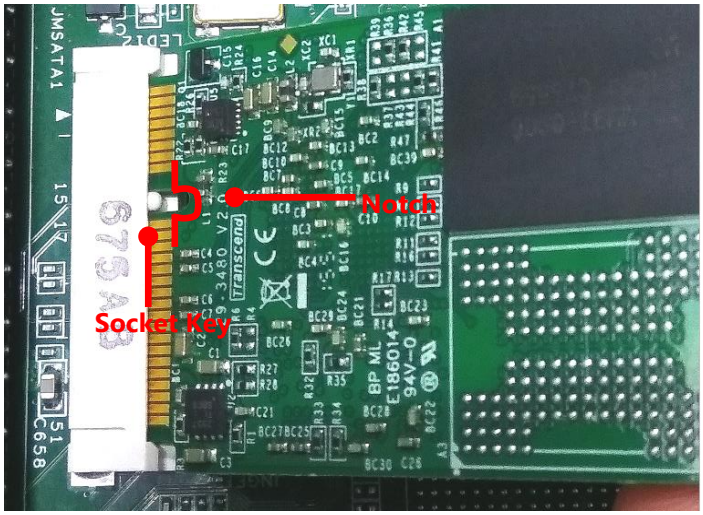




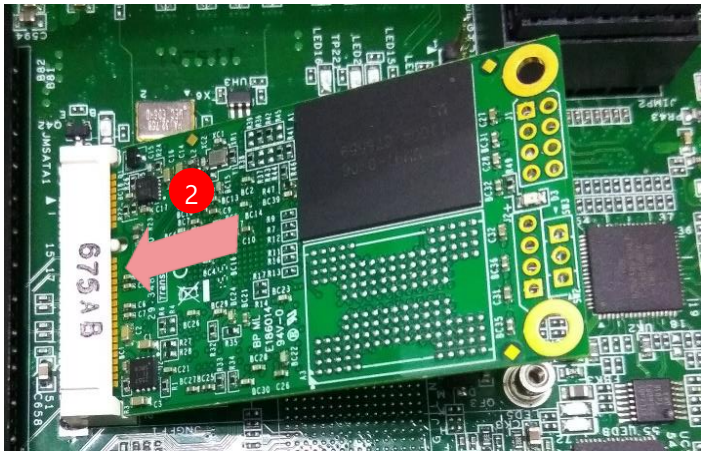
Installing the mSATA

The motherboard provides one mSATA slot. Follow the procedures below for installing an mSATA card.

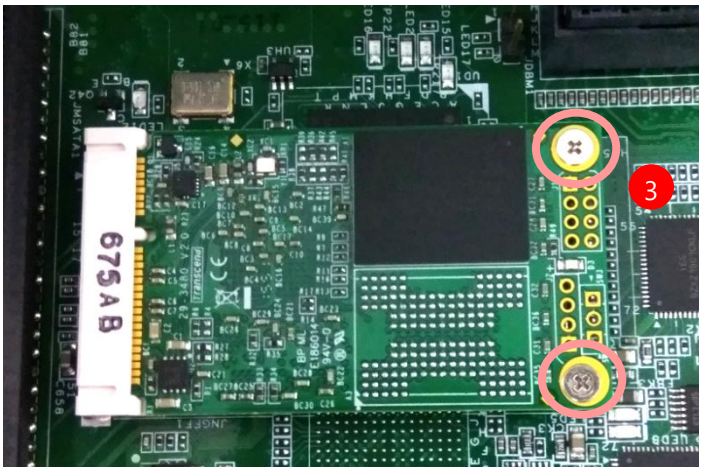
1. Locate the mSATA socket. Align the notch of the module with the socket key in the slot.



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



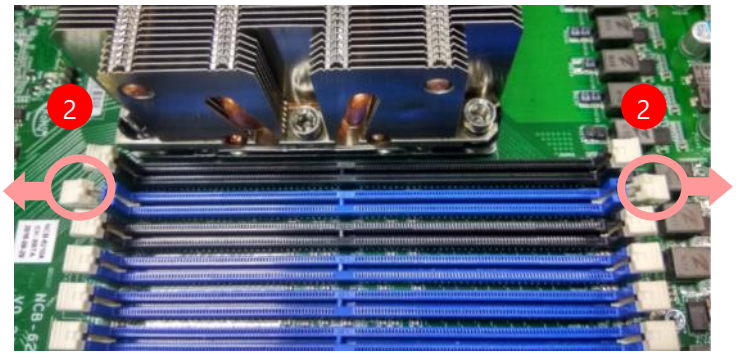
3. Push down on the module and secure it with screws that come with it.



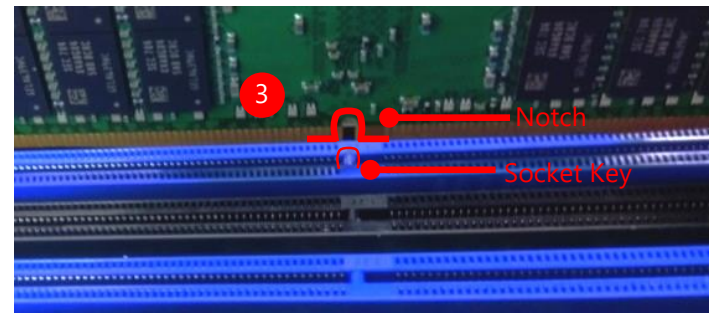
Installing the System Memory

The motherboard supports DDR4 registered DIMM memory for heavy-duty operations. Please follow the steps below to install the DIMM memory modules. The CPU has 10 DIMM sockets (5 on its both sides). If you do not plan to fill up all the sockets with 10 memory modules, always start with the blue ones for optimal performance.

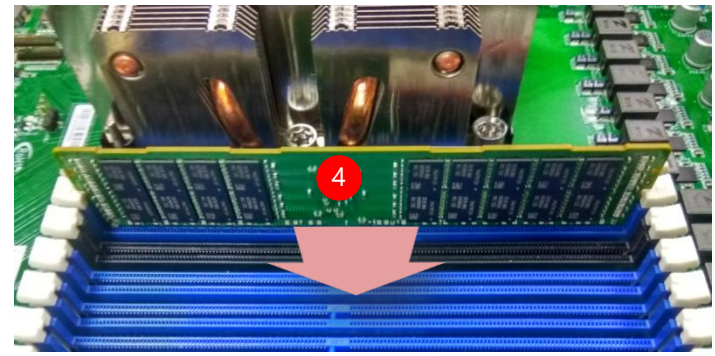
1. Power off the system.
2. Pull open the DIMM slot latches.



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



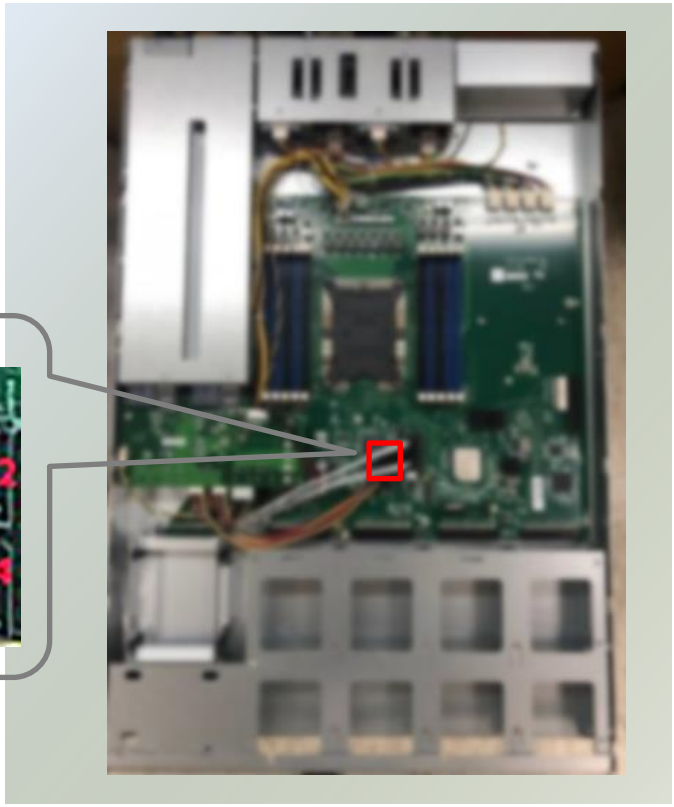
4. Insert the module into the slot until it is firmly seated. The motherboard of NCA-5520 is designed with 10 DIMM sockets.



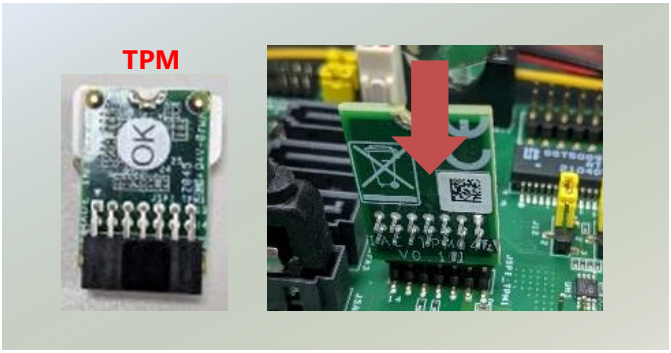
Installing the TPM Module

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

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



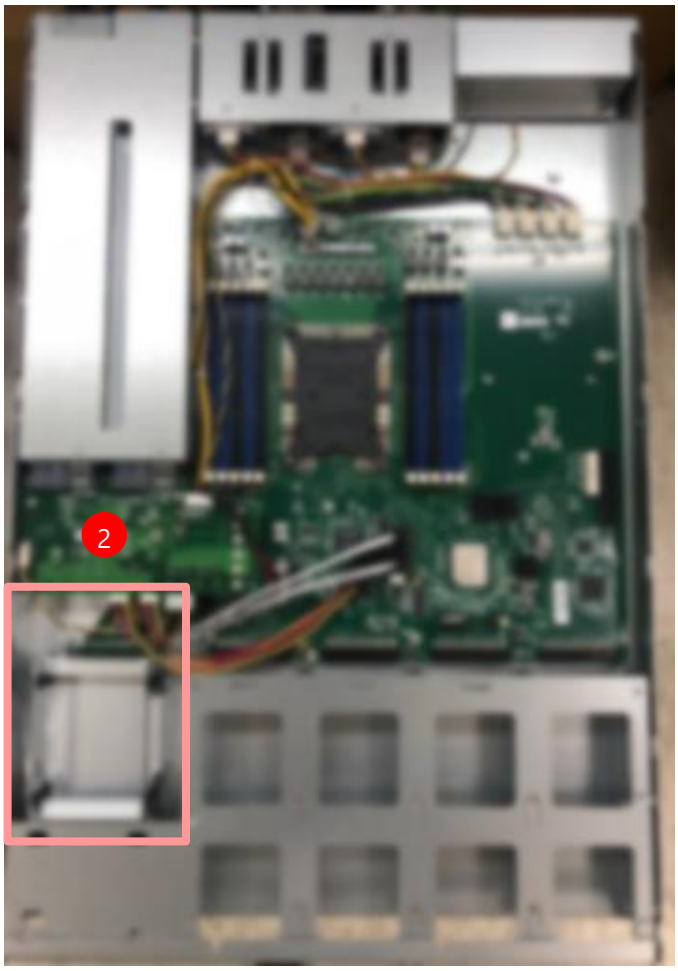
2. Insert the module card pins with the connector pins until the module card is firmly seated.



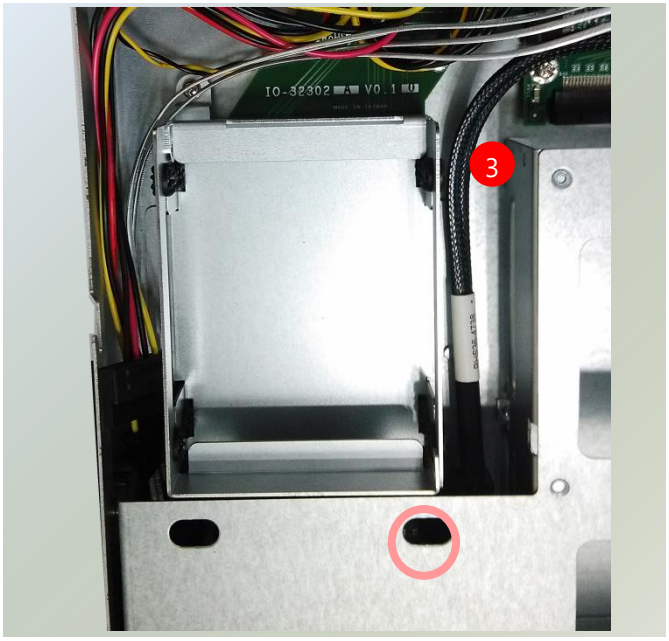
Installing the Disk Drive(s)

NCA-5520 is built with two 2.5" HDD/SSD slot (HDD preferred) drive bay. The following will discuss disk drive installation procedures based on their HDD/SSD designs.

1. Power off the system and open the chassis cover.
2. Locate the 2.5" disk bay on the front panel.

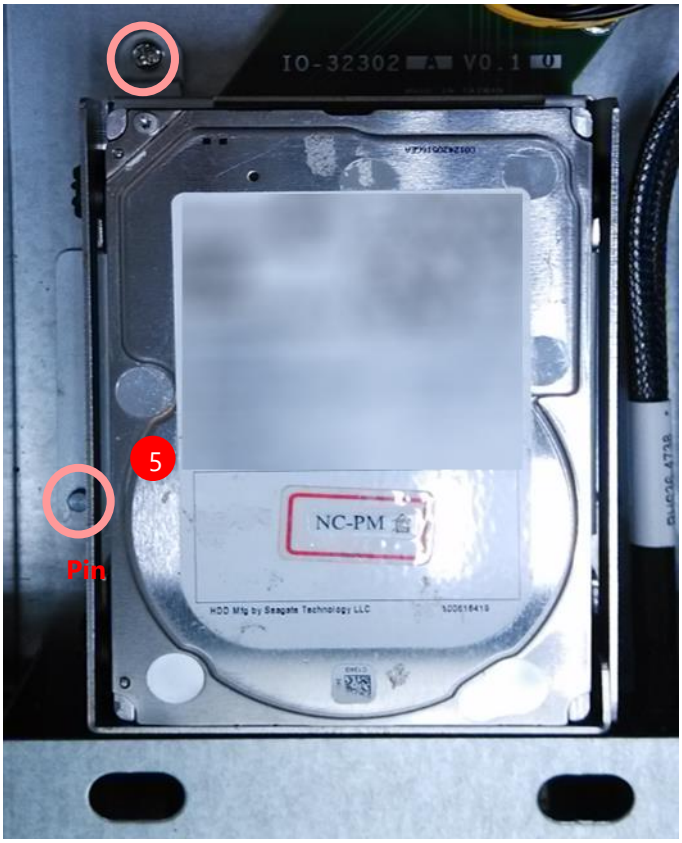


3. Loosen the one (1) screw that fixes the tray onto the motherboard.

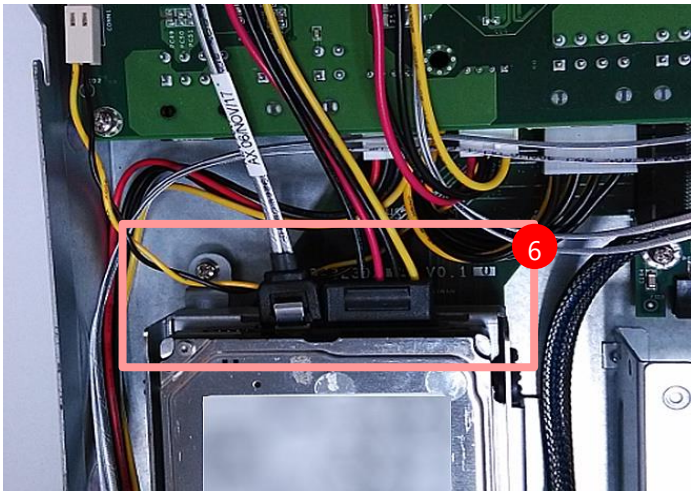


4. Mount the disk onto the empty tray. Make sure the disk connector faces the SATA contacts inside the system.

5. Install the tray back to the original position with the screw. Make sure the notch of the tray's side engages properly into the pin as shown in the picture.



6. Connect the SATA cable and SATA power cable to the hard disk.



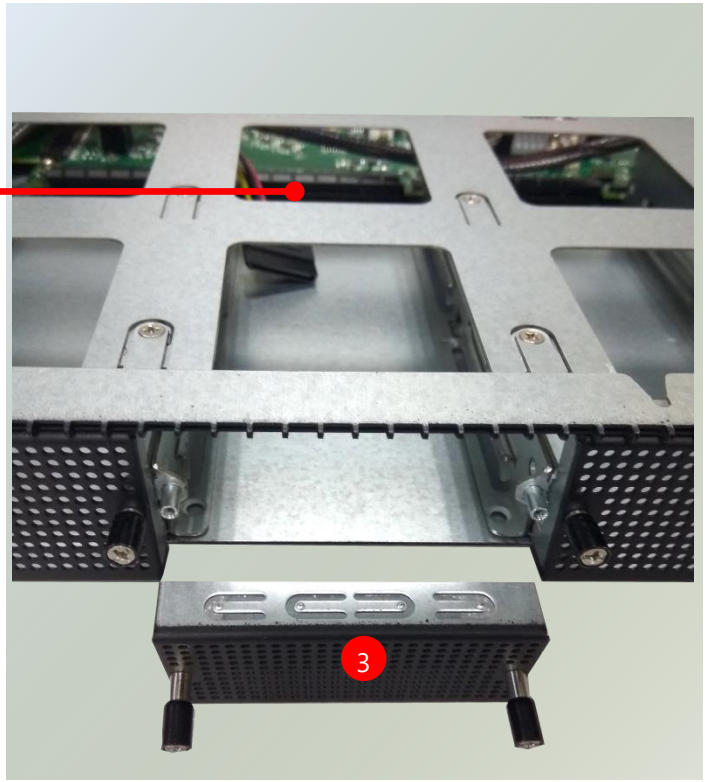
Installing the NIC Modules

NCA-5520 comes with 4 NIC Ethernet module slots for network bandwidth expansion. Please follow the steps for installation.

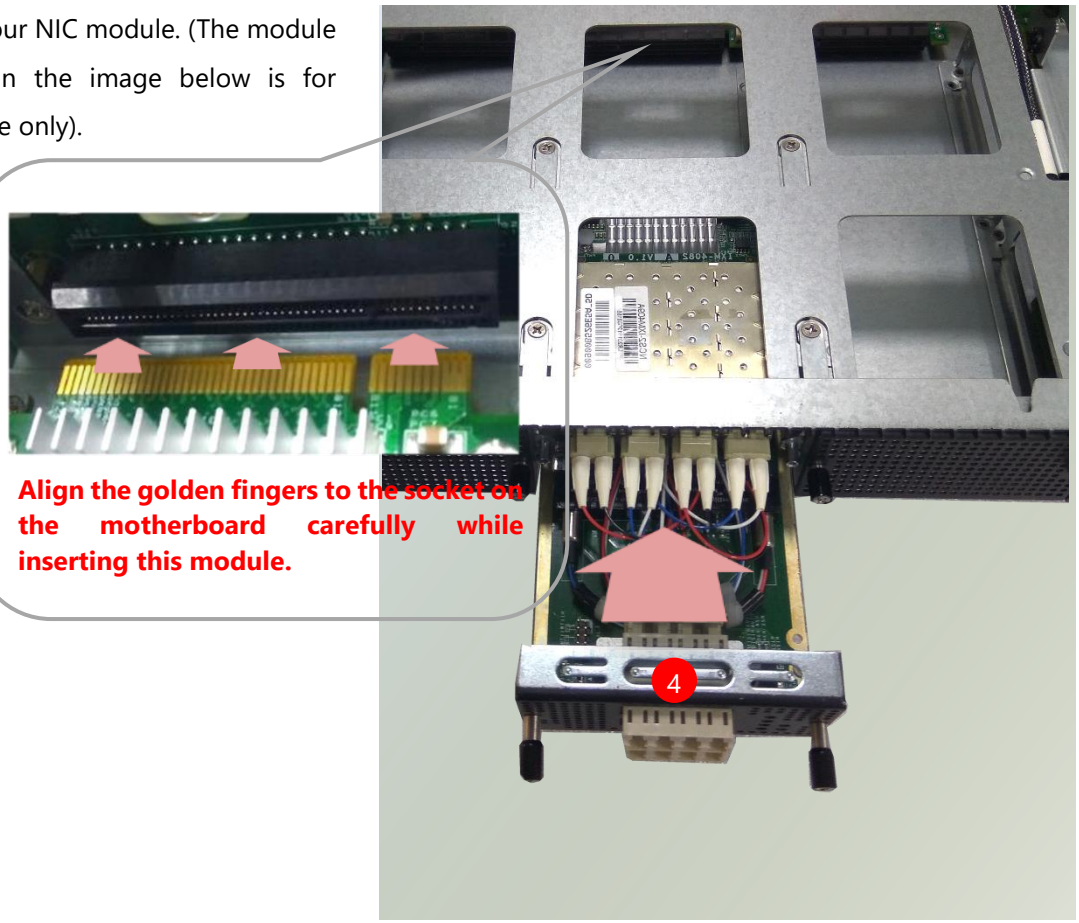
1. On the front panel, select a NIC Ethernet module slot.

2. Rotate clockwise and loosen the two lock-screws.

3. Remove the door and locate the socket for module insertion.



4. Insert your NIC module. (The module shown in the image below is for reference only).



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

Installing the LCM Module

NCA-5520 comes with 4 module slots for expansion. Please follow the steps for LCM Module installation.

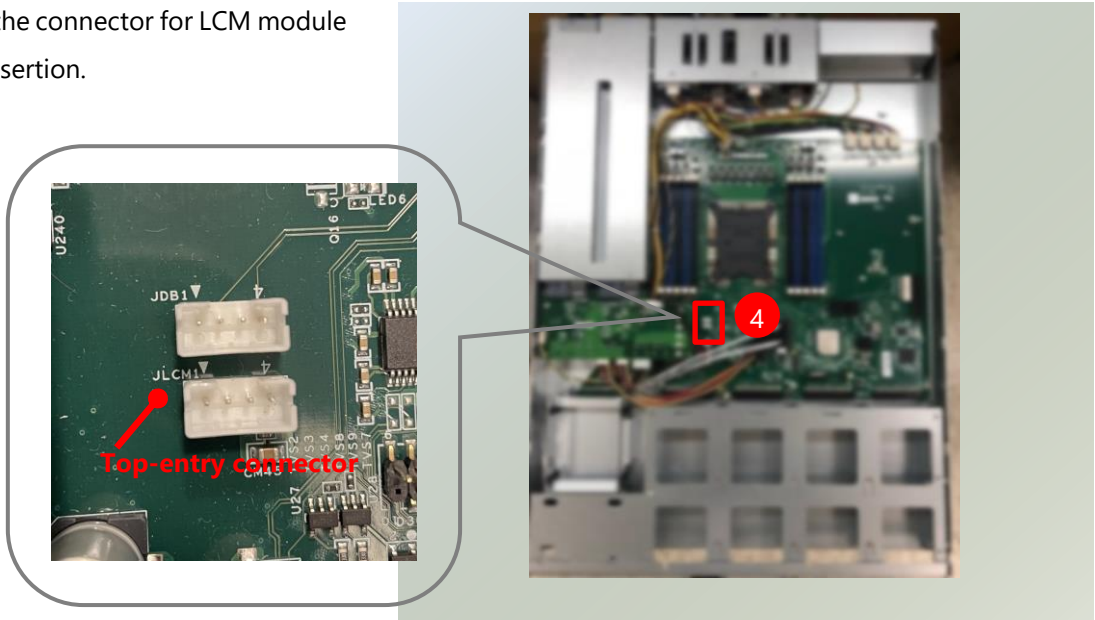
1. Open the LCM module package. The package kit will include:

- 1x LCM Panel,
- 1x LCM connector cable
- 2x screws

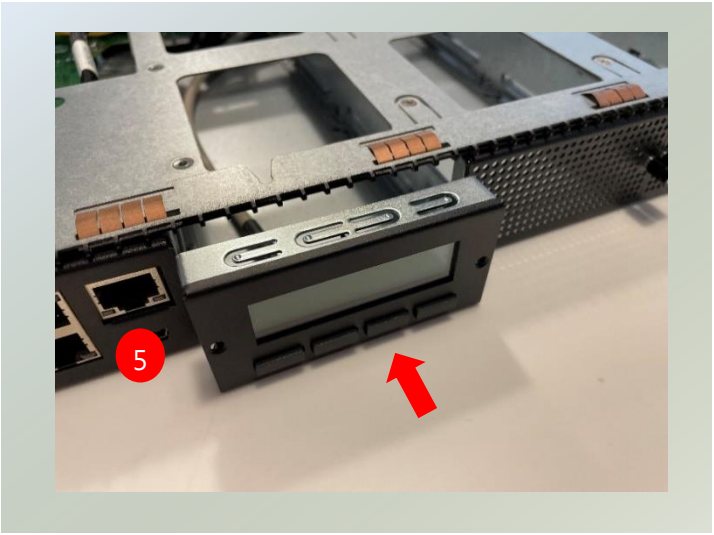
2. On the front panel of NCA-5520, select the first or second module slot for LCM Module placement.

3. Loosen the two lock-screws, and remove the door.

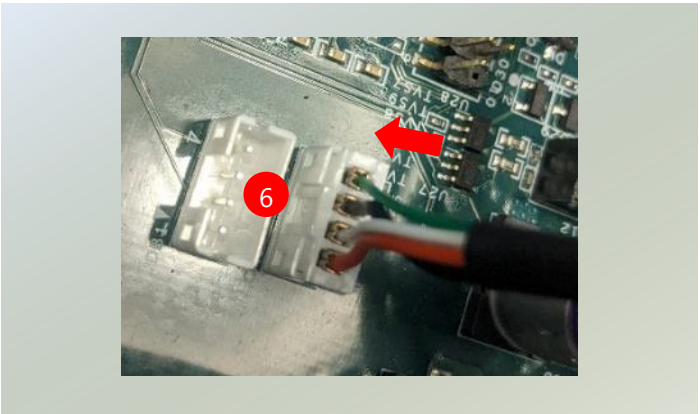
4. Locate the connector for LCM module cable insertion.



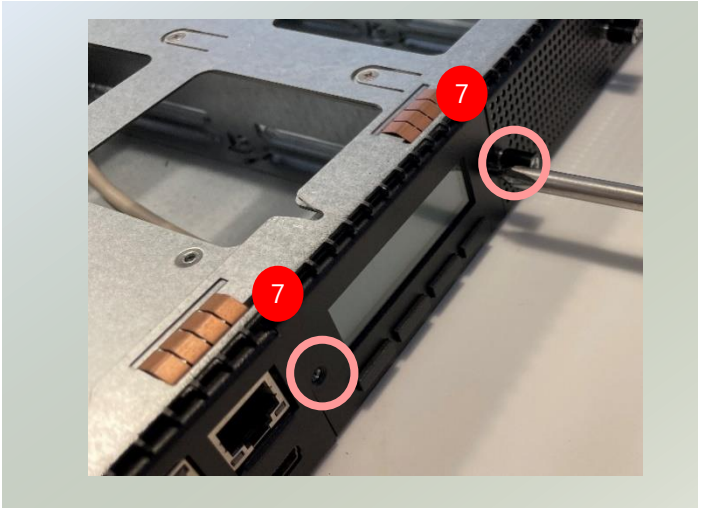
5. Install the LCM module into the module slot.



6. Insert the connector cable into the connector, wire showing-side facing towards LCM module.

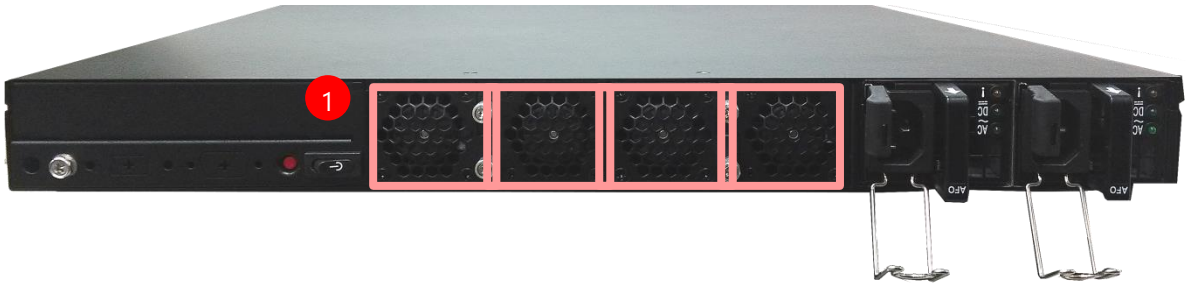


7. Rotate and screw in the two lock screws. The LCM module has been successfully installed.



Replacing the Cooling Fans

Cooling fans may wear down eventually. Please refer to the steps below for replacing cooling fans. When using a new cooling fan, simply reverse the steps to install the fan back onto the enclosure and the system.

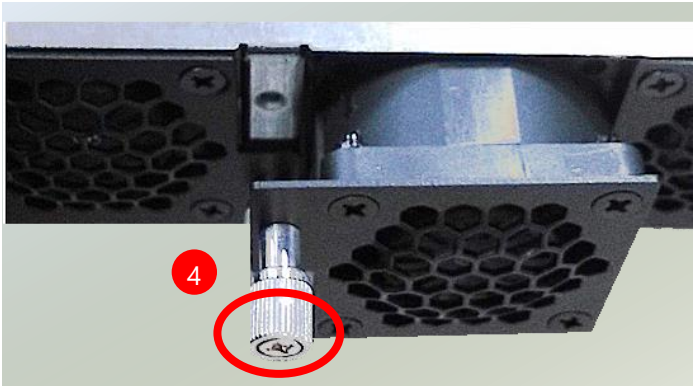


1. Locate the cooling fans at the rear panel.

2. Loosen the lock-screw that secures the fan on the rear panel.

3. Take out the worn fan and disconnect its power cable connector from the motherboard.

4. Install a new fan by reversing the above steps.

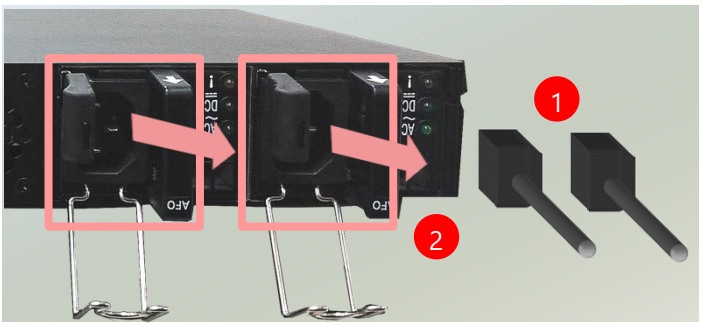


Replacing the Power Supply Units

Power supply units may wear down eventually. Please be noted that the NCA-5520 series supports 550W/800W depending on the ordering preferences. Please prepare the power supply units matching this capacity.

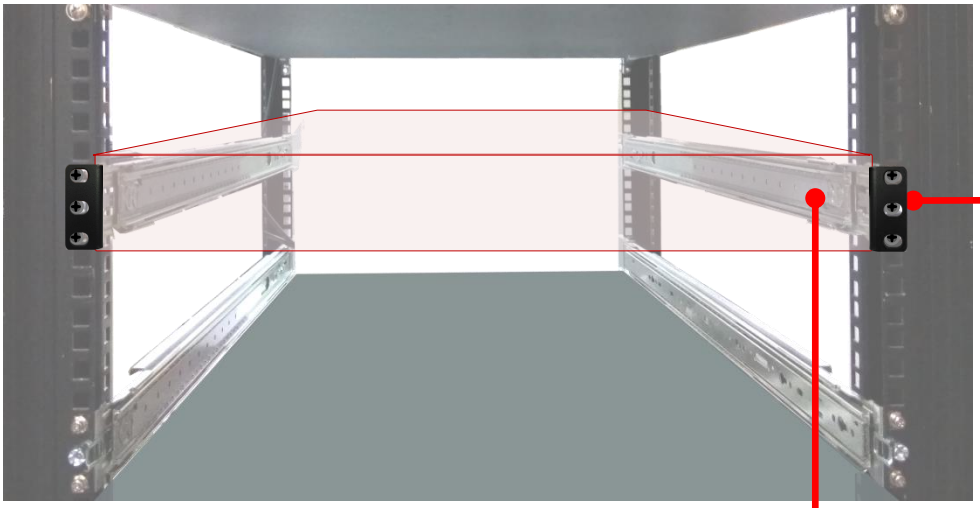
1. On the rear panel, locate the power supply units and disconnect the power cords.

2. Pull the original unit out and replace it with the new one.



Mounting the System

With the **Slide Rackmount Rail Kit** and **Short Ear Brackets**, the system can be secured on the rack.



Installing the System Using the Slide Rackmount Rail Kit (with Short 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 sliding rail on the system)
- 2x Slide Rails

The rail consists of the following parts:

Attaching the Rail Brackets

1. Unpack a slide rail and slide the Inner Channel all the way to the end.

2. Stretch the Bracket out to the fullest.

3. Remove the Bracket from the Inner Channel by pushing the Release Tab on the Bracket outwards while sliding it out.

4. Align the Bracket to the side of the chassis and make sure the screw-holes match and properly engage with the **four** shoulder screws on the side panel as shown in the picture.

Aligning

5. Carefully pull the Bracket backward to have the shoulder screws locked into the **four** screw holes as shown in the picture.

6. Repeat on the other side of the system to attach the Bracket.

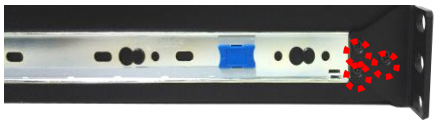
Locked

Assembling the Ear Brackets

1. The system package includes the mounting ear kit, which contains the items below:
   - 1x pack of screws
   - 2x Ear Brackets

For securing the Ear Brackets on the unit

2. Install the Ear Brackets on both sides of the system using the provided screws.

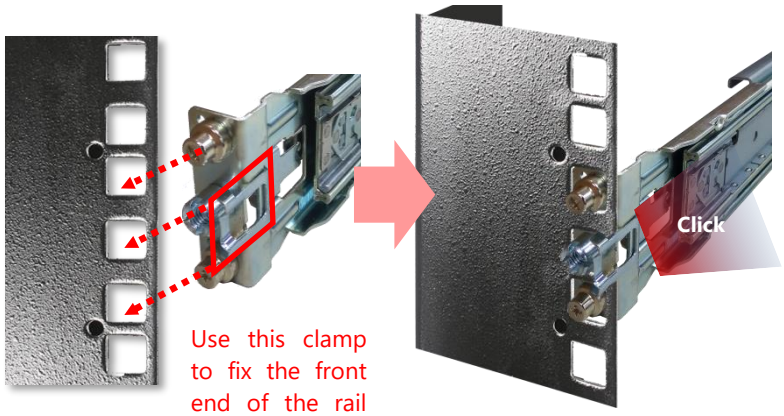


Right Ear

Installing the Slide Rails

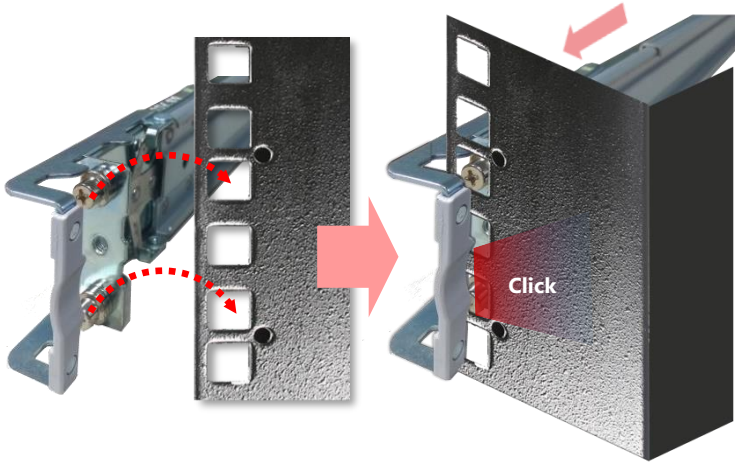
Next, to install the slide rails onto the rack.

1. This slide rail kit does NOT require screw-fixing. Simply latch on the three (3) available screw holes on the rack post front and lock it by clipping the rail's Outer Channel front end to the post as shown in the image. You should hear a "click" sound once it is firmly attached.



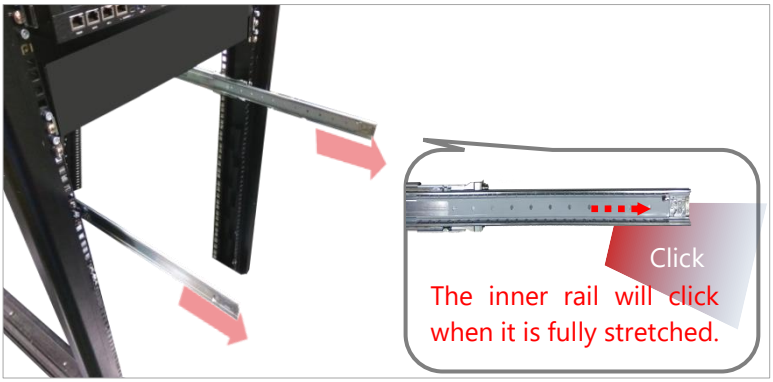
Use this clamp to fix the front end of the rail onto the post.

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



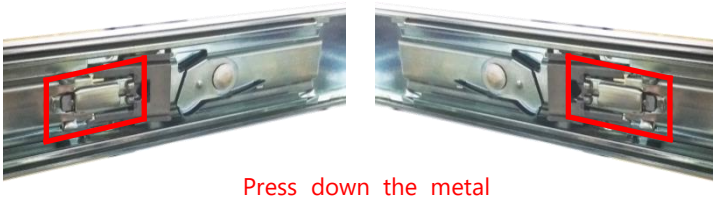
Installing the System into the Rack

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

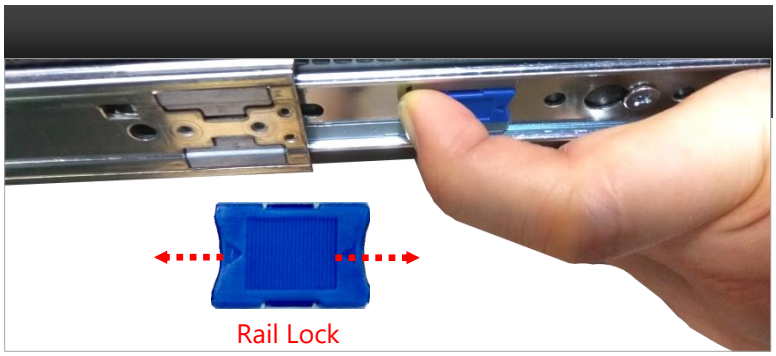


2. Hold the system with its front facing you, lift the chassis and gently engage the Brackets on the system while aligning them with the Inner Channel as shown in the image, and then push the system into the cabinet.

3. Keep sliding the rails in until they stop about halfway. Press down on the metal clips on bother Inner Channels and push them further into the rack cabinet.



4. While pushing in the system, please also push and hold the Rail Lock tab on both Brackets.



5. Push the system all the way in into the rack. The installation is now complete.

6. Fix the lock-screws on the Ear Brackets to both front posts (if needed).

CHAPTER 4 SOFTWARE SETUP

Remote Server Management

Overview

This chapter will introduce the features of Lanner's BMC firmware and how to perform server remote management through it.

Lanner has implements IPMI 2.0 based on the ASPEED service processor, performing all the BMC defined by IPMI 2.0. In addition, Lanner's BMC firmware runs an embedded web-server for full configuration using Web UI, which has a low learning curve.

BMC Main Features

Feature		Description
IPMI 2.0 Standard Features	System Interface support	• KCS (System Interface Support) • LAN (RMCP+)
	IPMI 2.0 based Management	• BMC stack with an IPMI 2.0 implementation
	System Management	• System power management • Watchdog timer
	Event Log	• System Event Log (SEL)
	Text Console Redirection: SOL	• Support in IPMI stack for SOL to remotely access BIOS and text console before OS booting
	User Management	• IPMI based user management • Multiple user permission level
Non-IPMI functions	Web User Interfaces	• BMC management via web user interface • Integrated KVM and Virtual Media
	User authorization	• RADIUS support • LDAP support
	Security	• SSL and HTTPS support
	Maintenance	• Auto-sync time with NTP server • Remote firmware update by Web UI or Linux tool

Firmware Functional Description

System Health Monitoring

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

System Power Management

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

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

Watchdog Timer

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

Fan Speed Control

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

Field Replaceable Unit (FRU)

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

System Event Log (SEL)

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

Serial over LAN (SOL)

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

User Management

The BMC supports 9 IDs for IPMI user accounts. The maximum length of the user name and password are 16 and 20 respectively, and the possible privilege levels are Callback, User, Operator, and Administrator. Moreover, the account creator is allowed to enable/disable the user account at any time. If not specified, the default user accounts are listed follows:

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

Keyboard, Video, Mouse (KVM) Redirection

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

Virtual Media Redirection

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

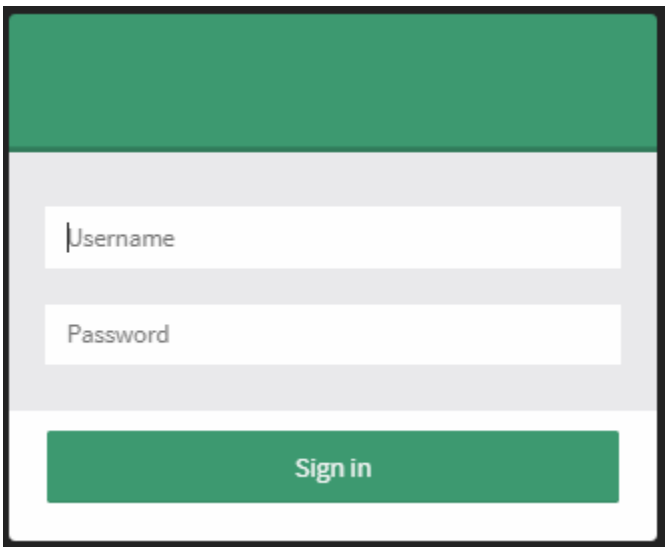
IPMI Commands Support List

COMMANDS	NETFN	CMD
IPM Device "Global" Commands		
Get Device ID	APP (06h)	00h
Cold Reset	APP (06h)	02h
Warm Reset	APP (06h)	03h
Get Device GUID	APP (06h)	08h
BMC Watchdog Timer Commands		
Reset Watchdog Timer	APP (06h)	22h
Set Watchdog Timer	APP (06h)	24h
Get Watchdog Timer	APP (06h)	25h
BMC Device and Messaging Commands		
Get System GUID	APP (06h)	37h
Get Channel Info	APP (06h)	42h
Set User Access	APP (06h)	43h
Get User Access	APP (06h)	44h
Set User Name	APP (06h)	45h
Get User Name	APP (06h)	46h
Set User Password	APP (06h)	47h

Chassis Device Commands		
Get Chassis Capabilities	Chassis (00h)	00h
Get Chassis Status	Chassis (00h)	01h
Chassis Control	Chassis (00h)	02h
Chassis Reset	Chassis (00h)	03h
Sensor Device Commands		
Get Sensor Reading Factors	S/E (04h)	23h
Get Sensor Hysteresis	S/E (04h)	25h
Get Sensor Threshold	S/E (04h)	27h
Get Sensor Event Enable	S/E (04h)	29h
Get Sensor Event Status	S/E (04h)	2Bh
Get Sensor Reading	S/E (04h)	2Dh
Get Sensor Type	S/E (04h)	2Fh
FRU Device Commands		
Get FRU Inventory Area Info	Storage (0Ah)	10h
Read FRU Data	Storage (0Ah)	11h
Write FRU Data	Storage (0Ah)	12h
SDR Device Commands		
Get SDR Repository Info	Storage (0Ah)	20h
Get SDR Repository Allocation Info	Storage (0Ah)	21h
Get SDR	Storage (0Ah)	23h
Get SDR Repository Time	Storage (0Ah)	28h
SEL Device Commands		
Get SEL Info	Storage (0Ah)	40h
Get SEL Allocation Info	Storage (0Ah)	41h
Get SEL Entry	Storage (0Ah)	43h
Delete SEL Entry	Storage (0Ah)	46h
Clear SEL	Storage (0Ah)	47h
Get SEL Time	Storage (0Ah)	48h
Set SEL Time	Storage (0Ah)	49h
Get SEL Time UTC Offset	Storage (0Ah)	5Ch
Set SEL Time UTC Offset	Storage (0Ah)	5Dh
LAN Device Commands		
Set LAN Configuration Parameters	Transport (0Ch)	01h
Get LAN Configuration Parameters	Transport (0Ch)	02h
Serial/Modem Device Commands		
Set User Callback Options	Transport (0Ch)	1Ah
Get User Callback Options	Transport (0Ch)	1Bh
SOL Activating	Transport (0Ch)	20h
Set SOL Configuration Parameters	Transport (0Ch)	21h
Get SOL Configuration Parameters	Transport (0Ch)	22h

Using BMC Web UI

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



Login Page

The fields are explained as follows:

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

Note

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

Required Browser Settings

- **Enable JavaScript for this site**: The icon indicates whether the JavaScript setting is enabled in browser.
- **Enable cookies for this site**: The icon indicates whether the cookies settings are enabled in browser.

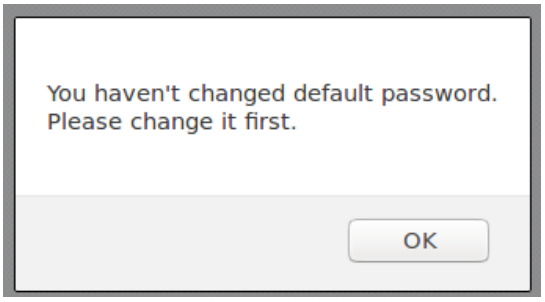
Note

Cookies must be enabled in order to access the website.

Default User Name and Password

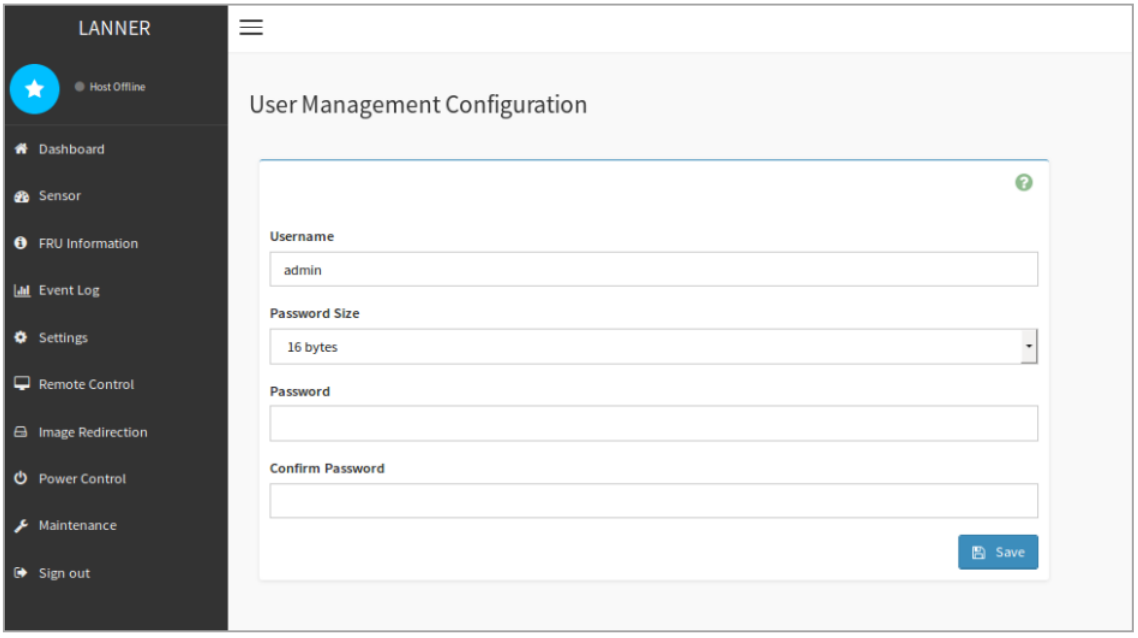
- **Username**: admin
- **Password**: admin

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



Change the default password - Dialog

Click **OK** will bring to set password page.



Change the default password – Set password

Note

Duplicate user names shouldn't exist across various authentication methods like LDAP, RADIUS or IPMI since the privilege of one Authentication method is overwritten by another authentication method when login and hence the correct privilege cannot be returned properly. Duplicate user names shouldn't be existed across different channels in IPMI.

Web UI Layout

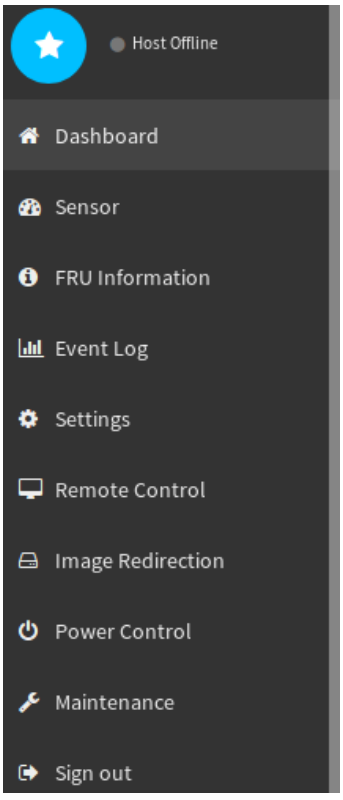
The BMC Web UI consists of various menu items.

Menu Bar

The menu bar displays the following.

- **Dashboard**
- **Sensor**
- **FRU Information**
- **Event Log**
- **Settings**
- **Remote Control**
- **Image Redirection**
- **Power Control**
- **Maintenance**
- **Sign out**

A screenshot of the menu bar is shown below.

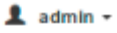


Menu Bar

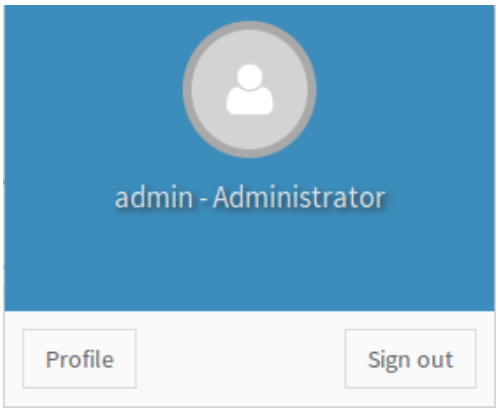
Quick Button and Logged-in User

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

User Information

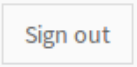
- **Logged-in user information:** Click the icon  to view the logged-in user information.

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



Logged-in User Information

The logged-in user information shows the logged-in user, his/her privilege and the quick buttons allowing you to perform the following functions.

- **Notification**: Click the icon  to view the notification messages.
- **Refresh**: Click the icon  to reload the current page.
- **Sign out**: Click the icon  to log out of the Web UI.

Logged-in user and its privilege level

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

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

Help

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

BIOS Setup

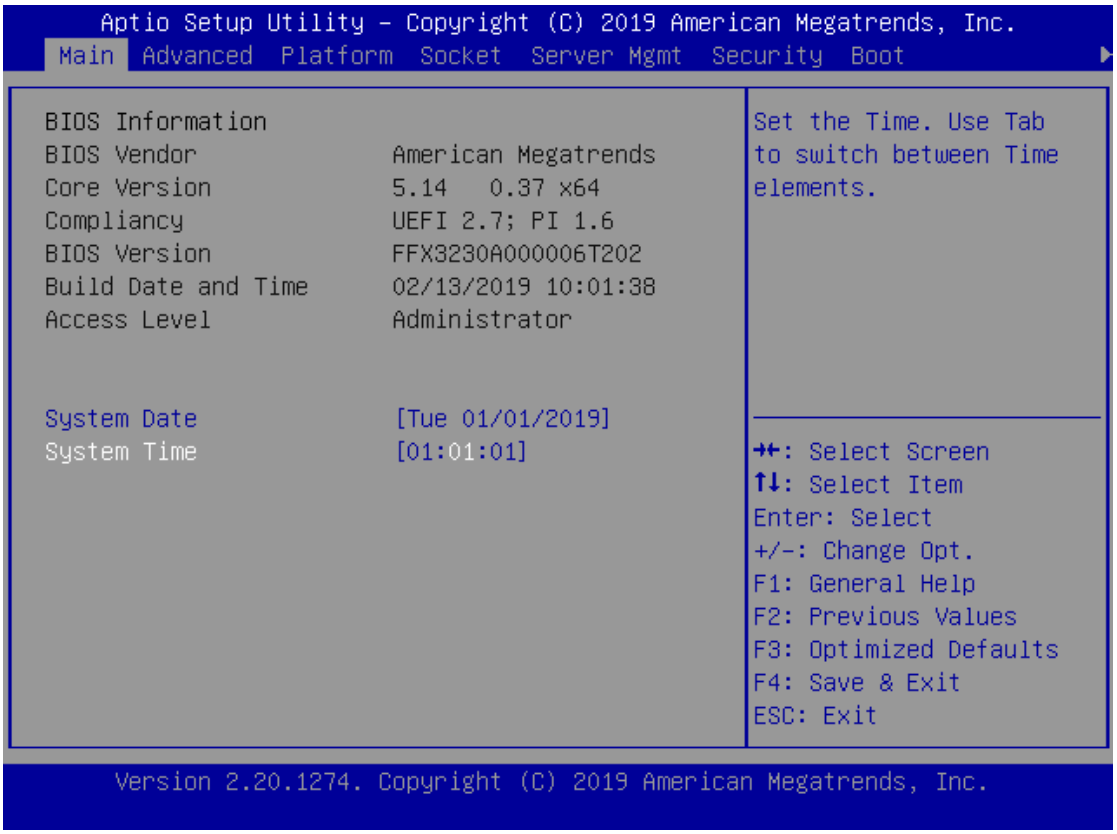
To enter the BIOS setup utility, simply follow the steps below:

1. Boot up the system.
2. 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.

Control Keys	Description
→←	select a setup screen, for instance, [Main], [Advanced],[IntelRCSetup], [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>	to exit the current screen

Main Page

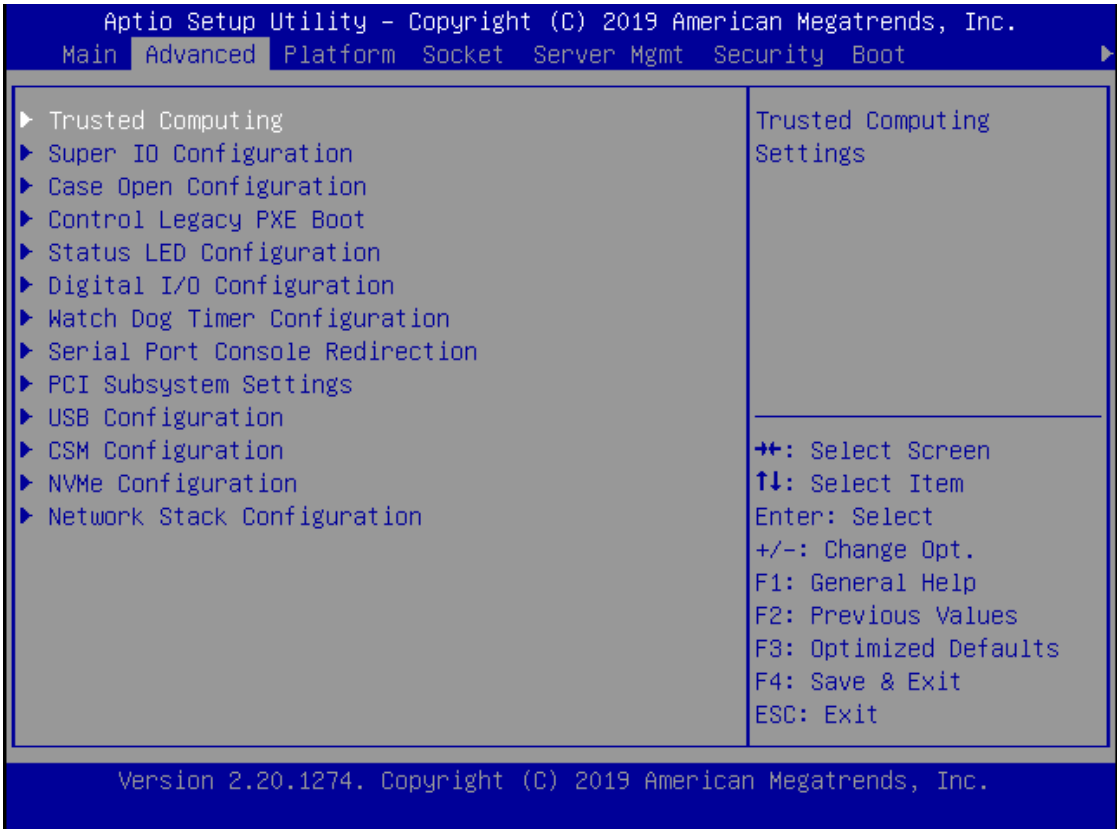
Setup main page contains BIOS information and project version information.



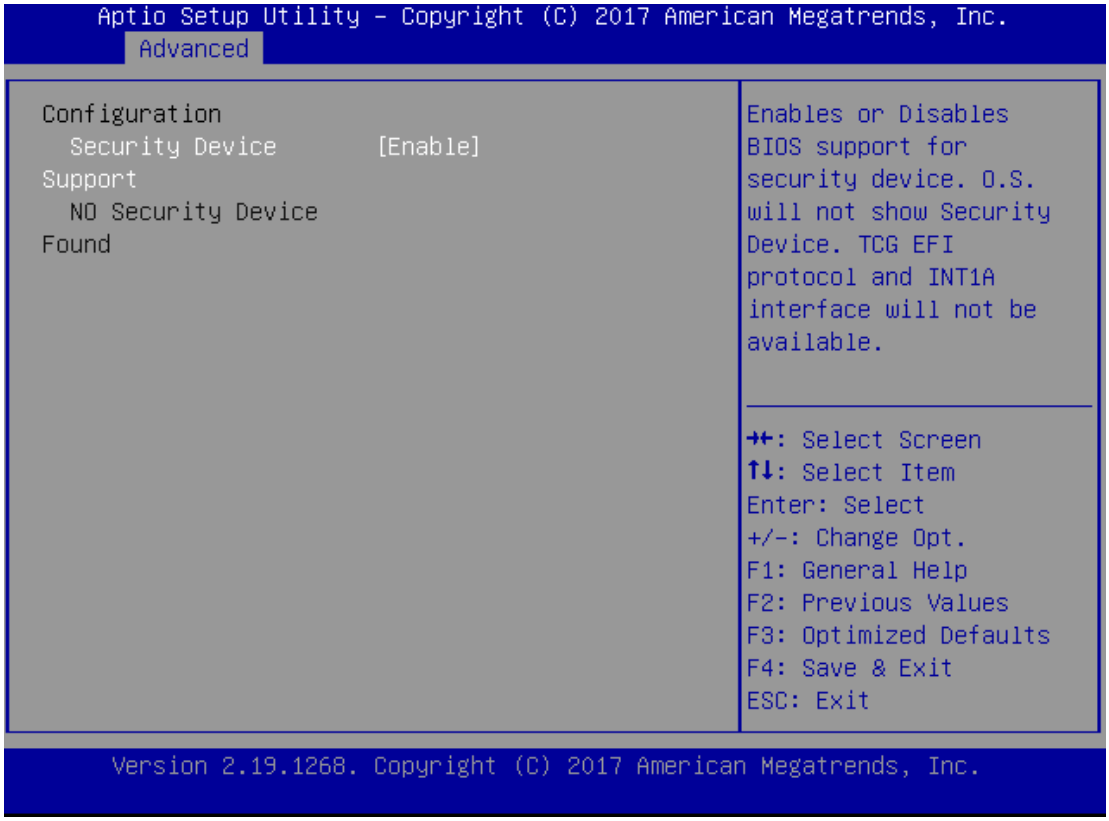
Feature	Description
BIOS Information	BIOS Vendor : American Megatrends Core Version : AMI Kernel version, CRB code base, X64 Compliancy : UEFI version, PI version Project Version : BIOS release version Build Date and Time : MM/DD/YYYY Access Level: Administrator / User
System Date	To set the Date, use **<Tab>** to switch between Date elements. Default Range of Year: 1998-9999 Default Range of Month: 1-12 Days: dependent on Month.
System Time	To set the Time, use **<Tab>** to switch between Time elements.

Advanced Page

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.

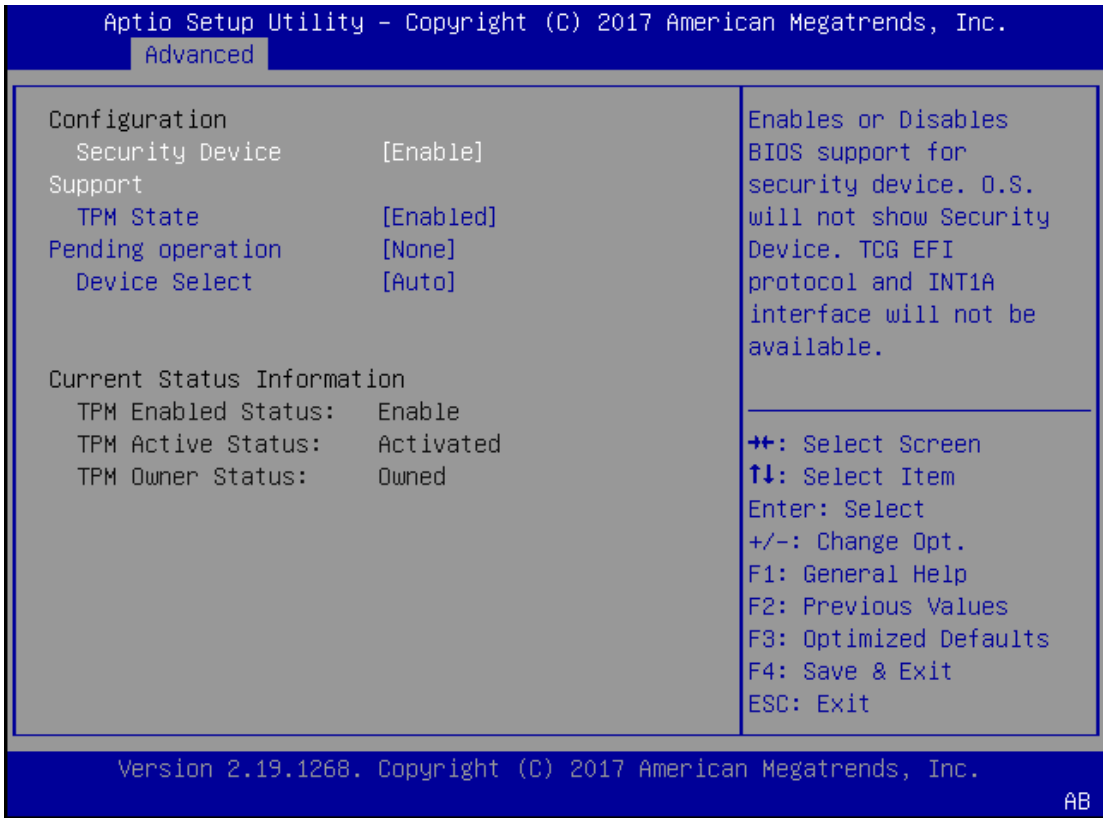


Trusted Computing



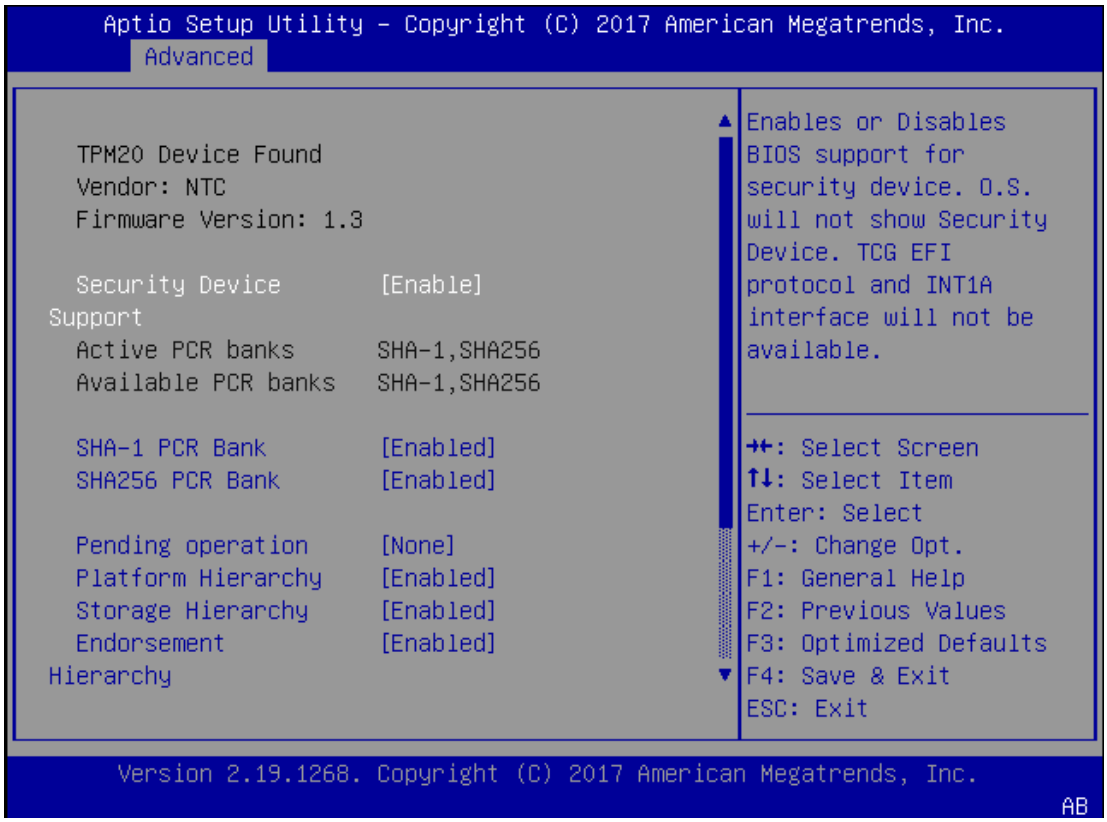
Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

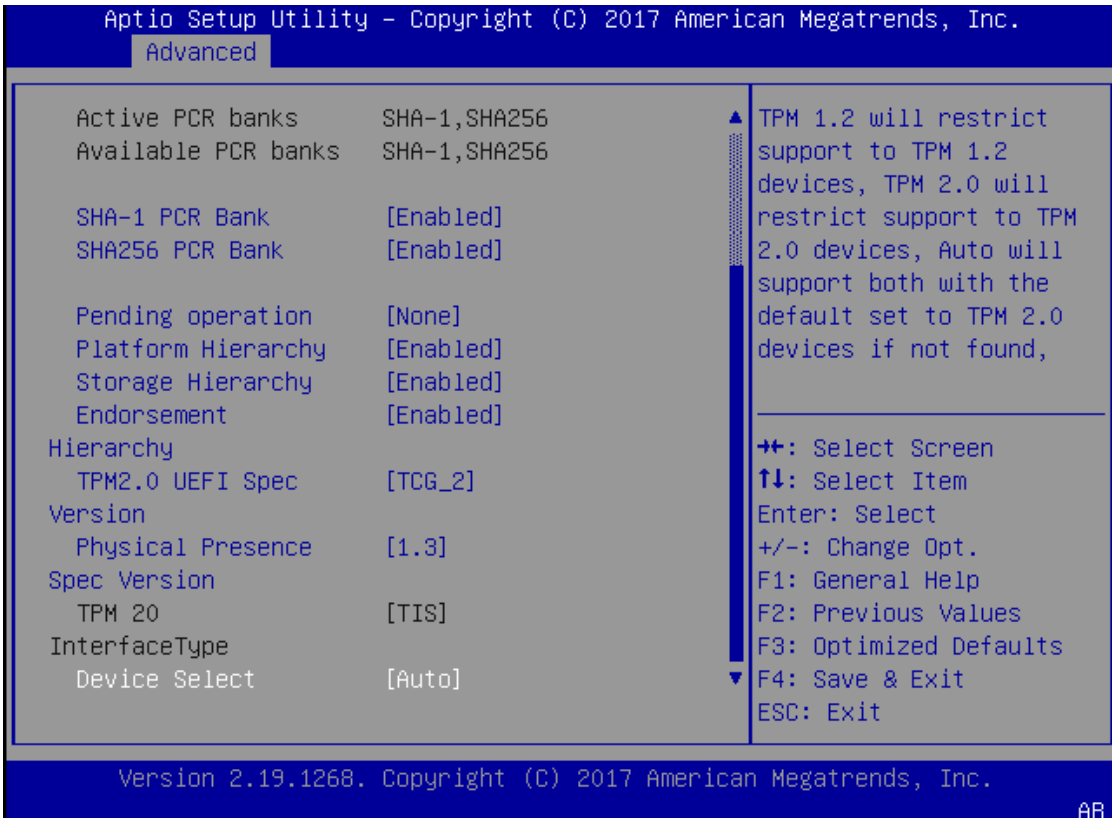
Trusted Computing (TPM1.2)



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.
TPM State	Enabled Disabled	Enables or disables Security Device. NOTE: Your computer will reboot during restart in order to change State of the Device.
Pending operation	None TPM Clear	Schedules an Operation for the Security Device. NOTE: Your computer will reboot during restart in order to change State of Security Device.
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.

Trusted Computing (TPM2.0)

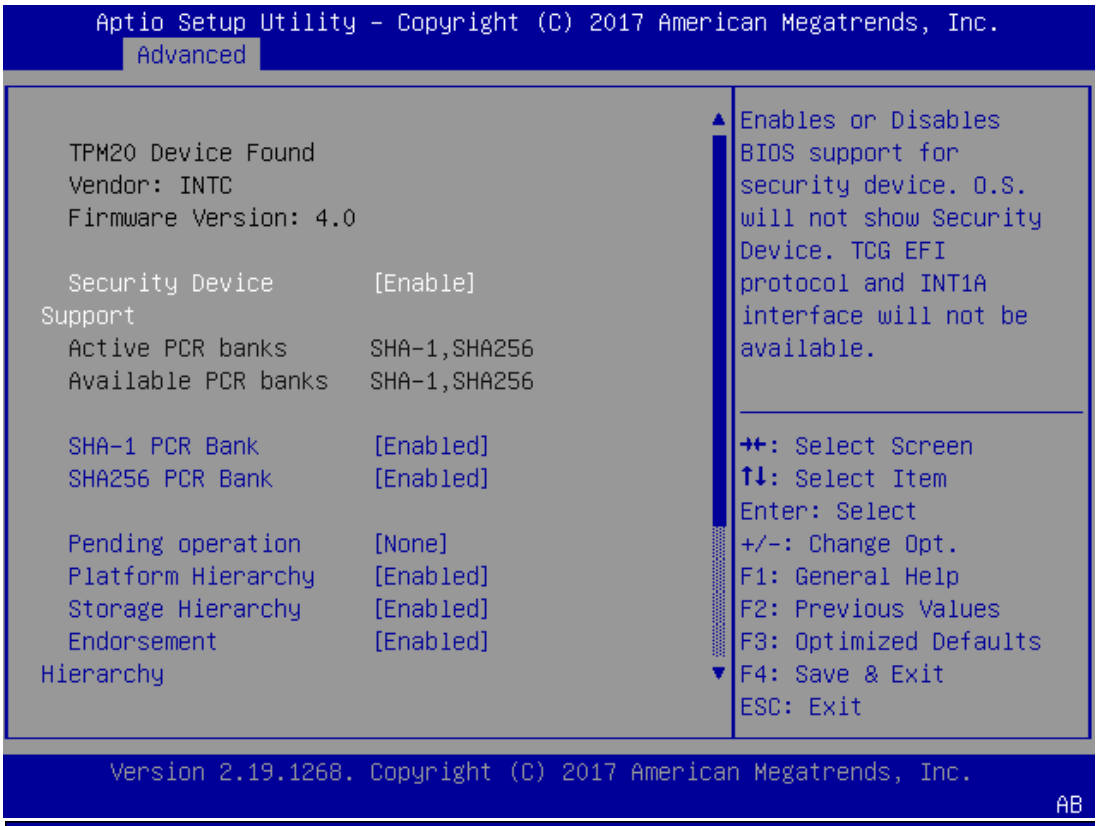


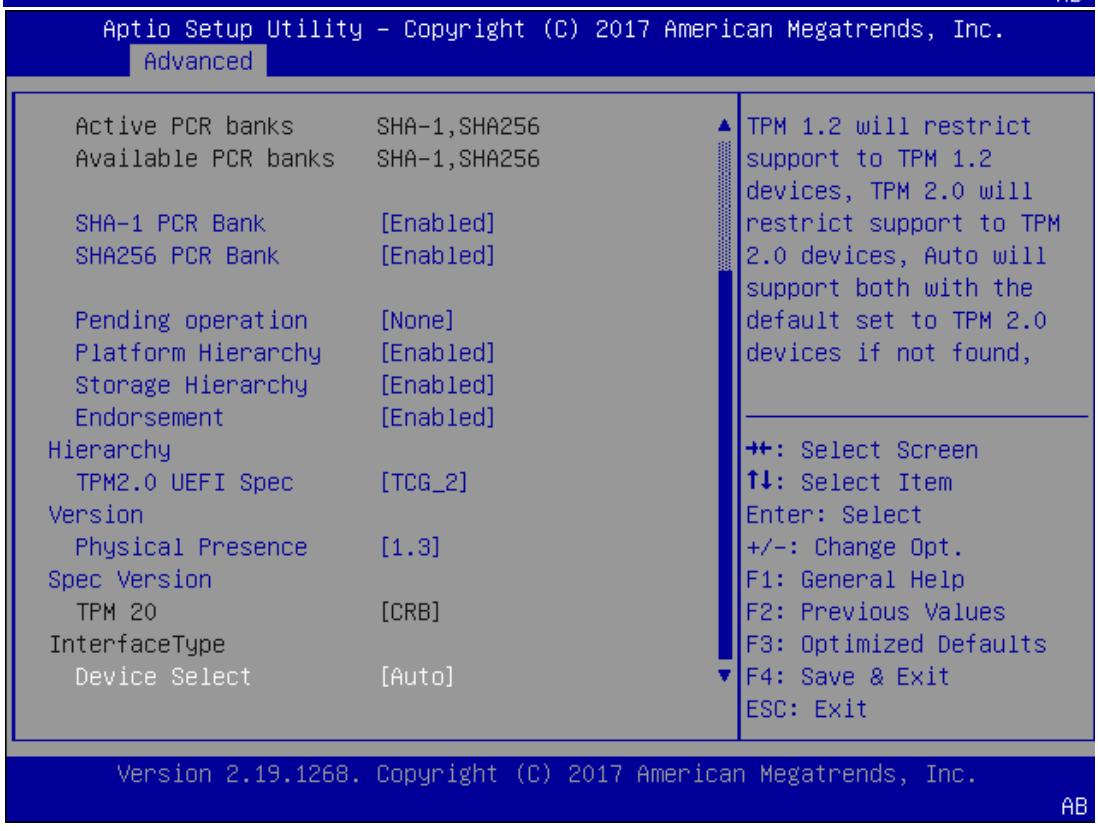


Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security

		Device. TCG EFI protocol and INT1A interface will not be available.
SHA-1 PCR Bank	Enabled Disabled	Enables or disables SHA-1 PCR Bank.
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 in order 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.
TPM2.0 UEFI Spec Version	TCG_1_2 TCG_2	Select the TCG2 Spec Version, **TCG_1_2**: Supports the Compatible mode for Win8/Win10 **TCG_2**: Supports new TCG2 protocol and event format for Win10 or later.
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.
TPM 20 InterfaceType	TIS	Select **TPM 20 Device** for the Communication Interface.
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.

Trusted Computing (PTT Enable)

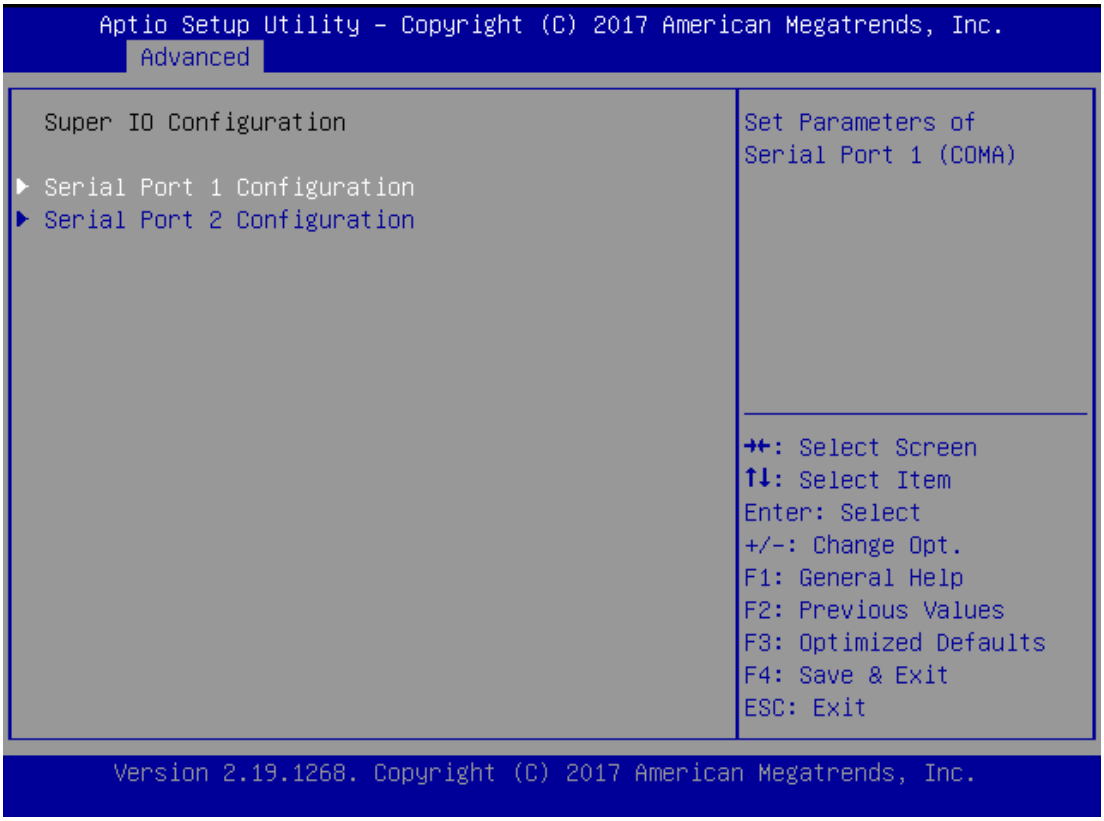




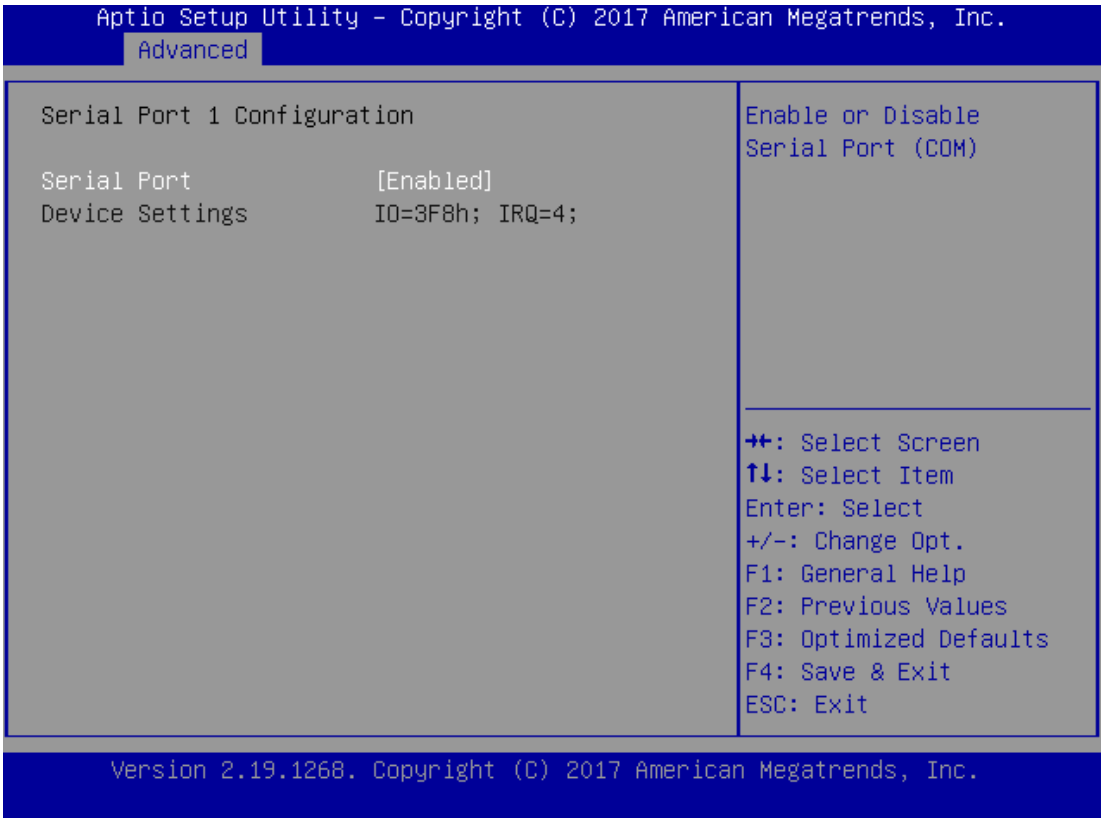
Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

SHA-1 PCR Bank	Enabled Disabled	Enables or disables SHA-1 PCR Bank.
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 in order 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.
TPM2.0 UEFI Spec Version	TCG_1_2 TCG_2	Select the TCG2 Spec Version, **TCG_1_2**: Supports the Compatible mode for Win8/Win10 **TCG_2**: Supports new TCG2 protocol and event format for Win10 or later.
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.
TPM 20 InterfaceType	CRB	Select the **CRB** (Communication Interface) for TPM 20 Device.
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.

Super IO Configuration

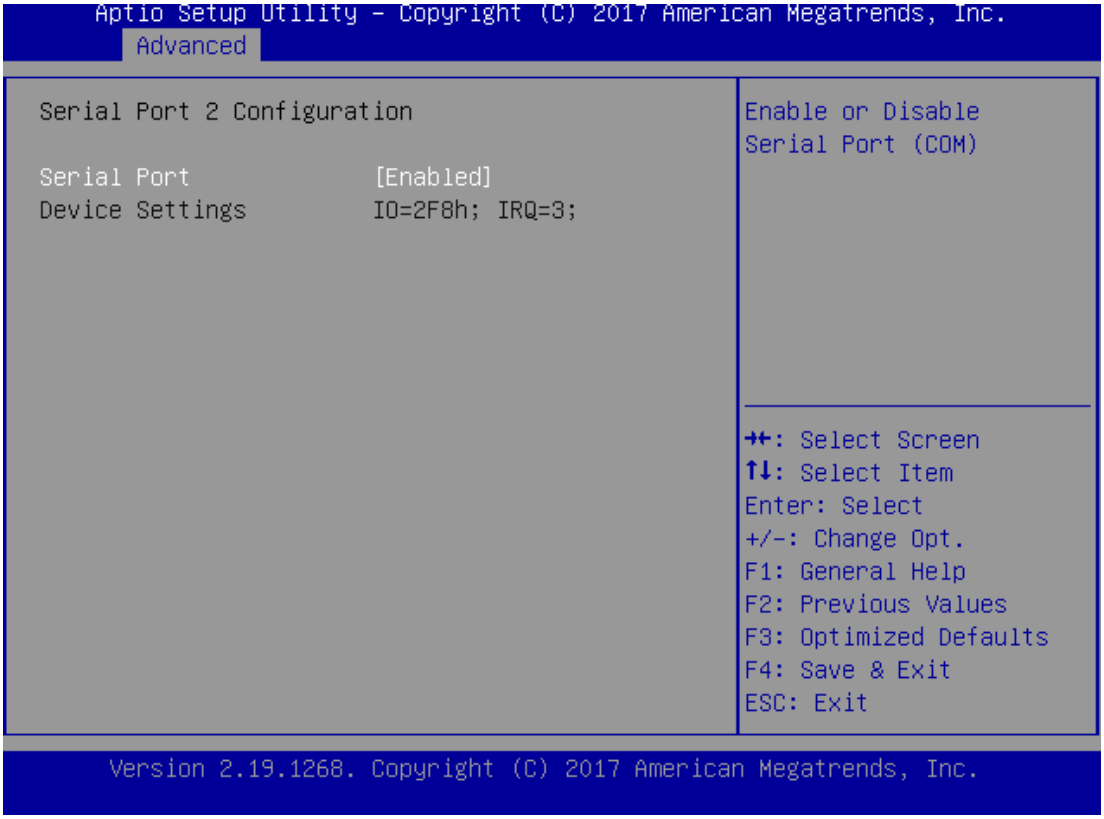


Serial port 1 Configuration



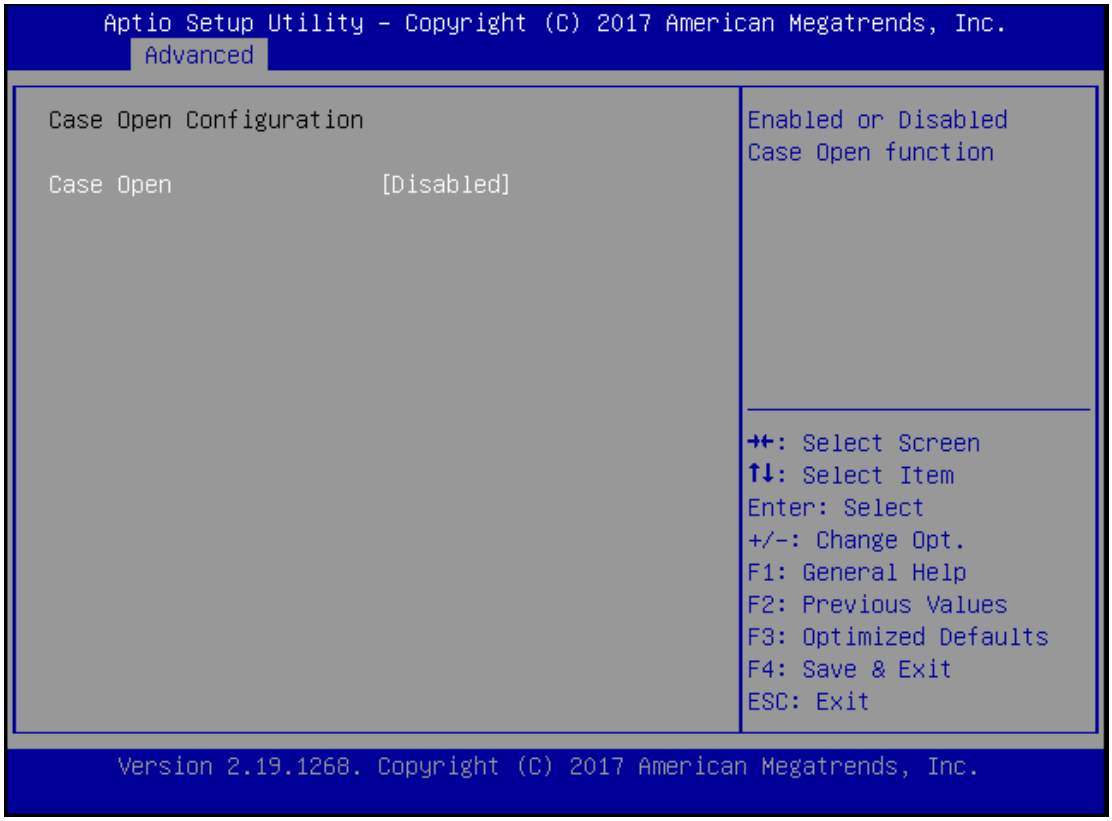
Feature	Options	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 1.
Device Settings	NA	IO=3F8h; IRQ = 4

Serial port 2 Configuration



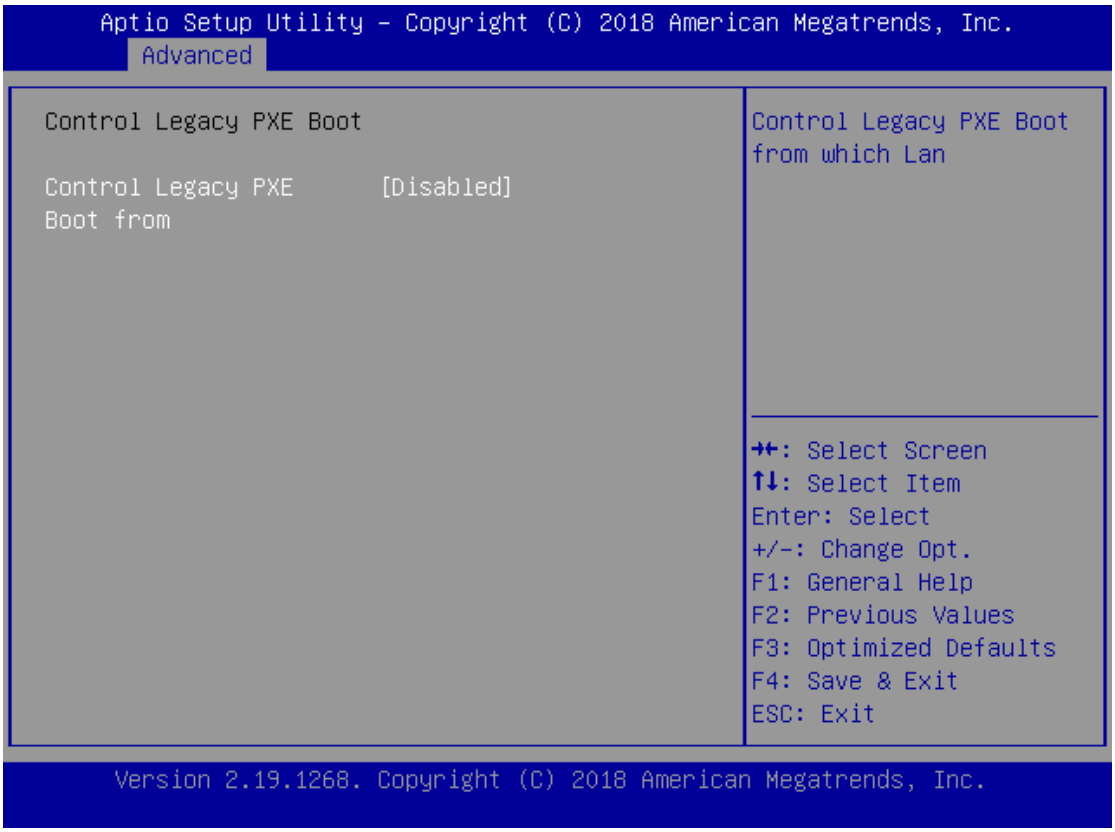
Feature	Options	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 2
Device Settings	NA	IO=2F8h; IRQ = 3

Case Open Configuration



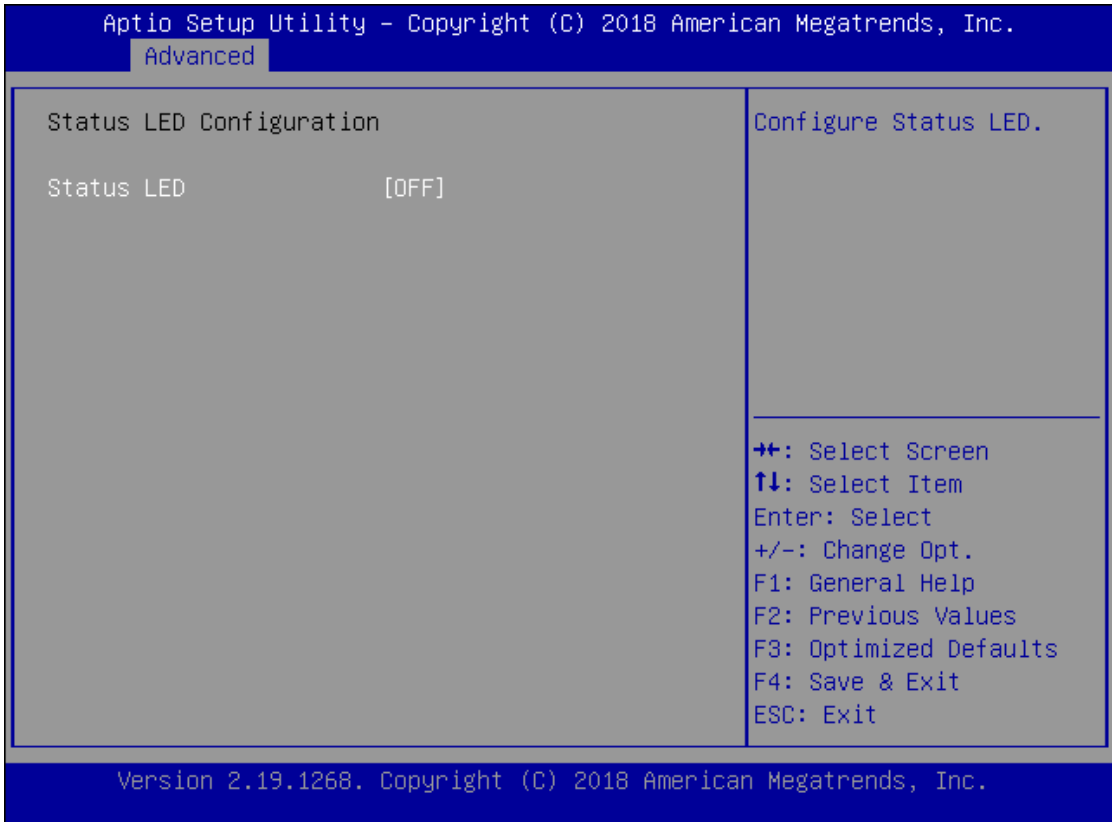
Feature	Options	Description
Case Open	Enabled Disabled	Enables or disables Case Open function

Control Legacy PXE Boot



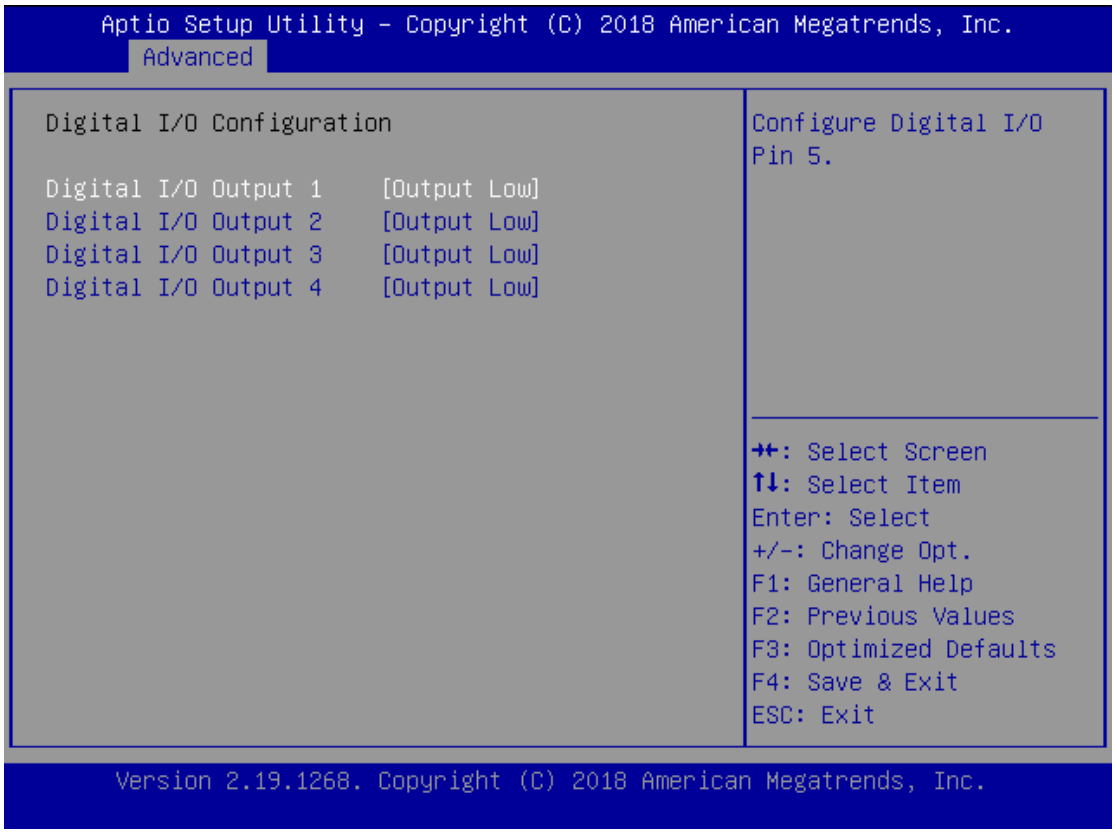
Feature	Options	Description
Control Legacy PXE Boot from	Disabled MGT LAN1	Control Legacy PXE Boot from which Lan

Status LED Configuration



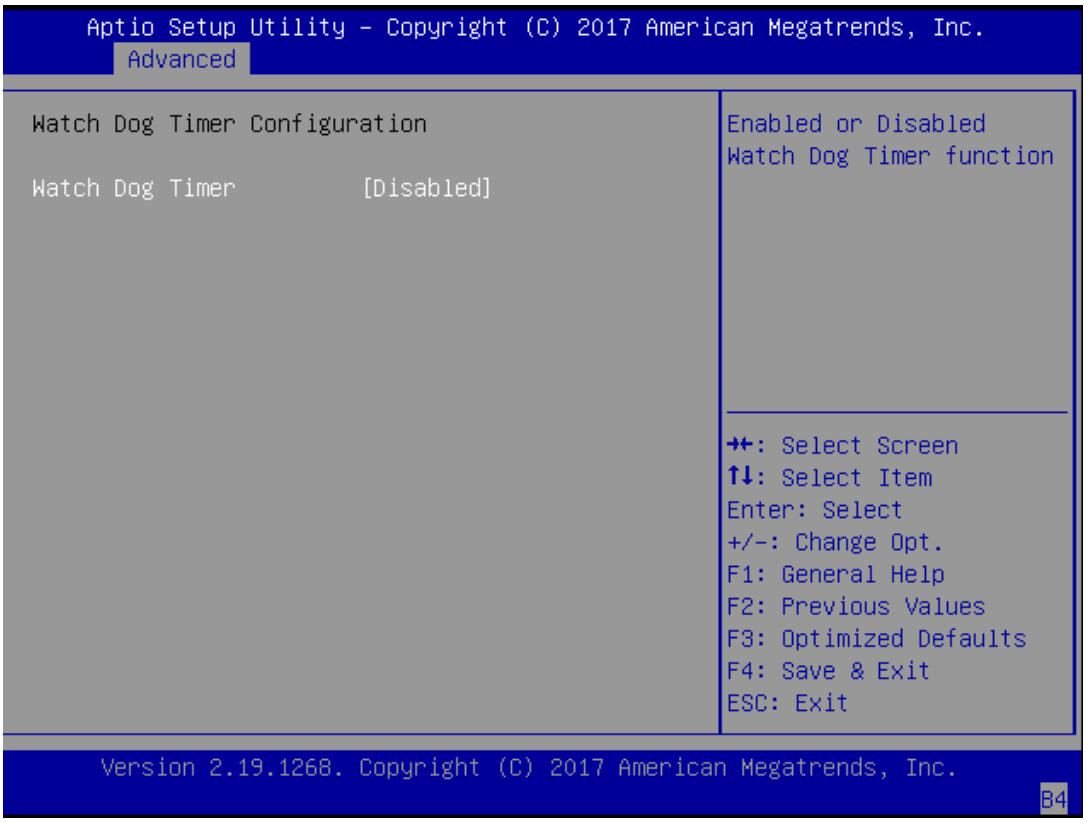
Feature	Options	Description
Status LED	OFF GREEN RED	Configures Status LED color

Digital I/O Configuration



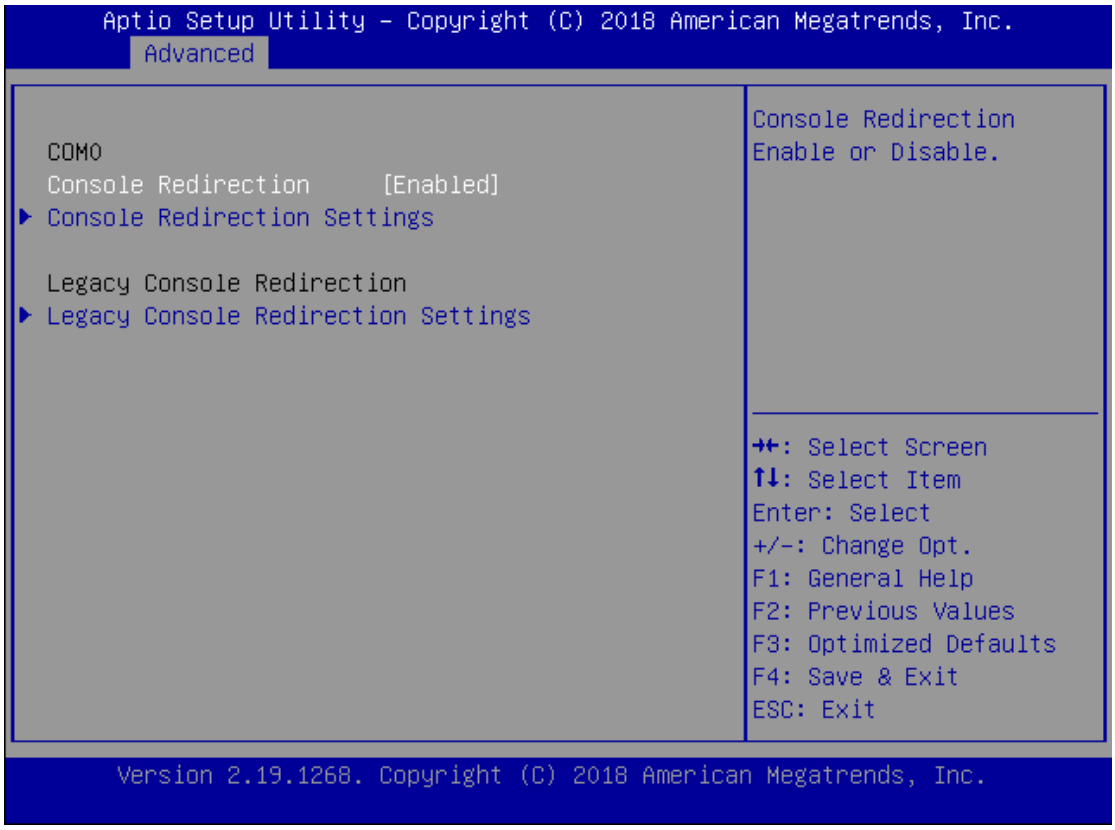
Feature	Options	Description
Digital I/O Output 1	Output High Output Low	Configure Digital I/O Pin5
Digital I/O Output 2	Output High Output Low	Configure Digital I/O Pin6
Digital I/O Output 3	Output High Output Low	Configure Digital I/O Pin7
Digital I/O Output 4	Output High Output Low	Configure Digital I/O Pin8

Watch Dog Timer Configuration



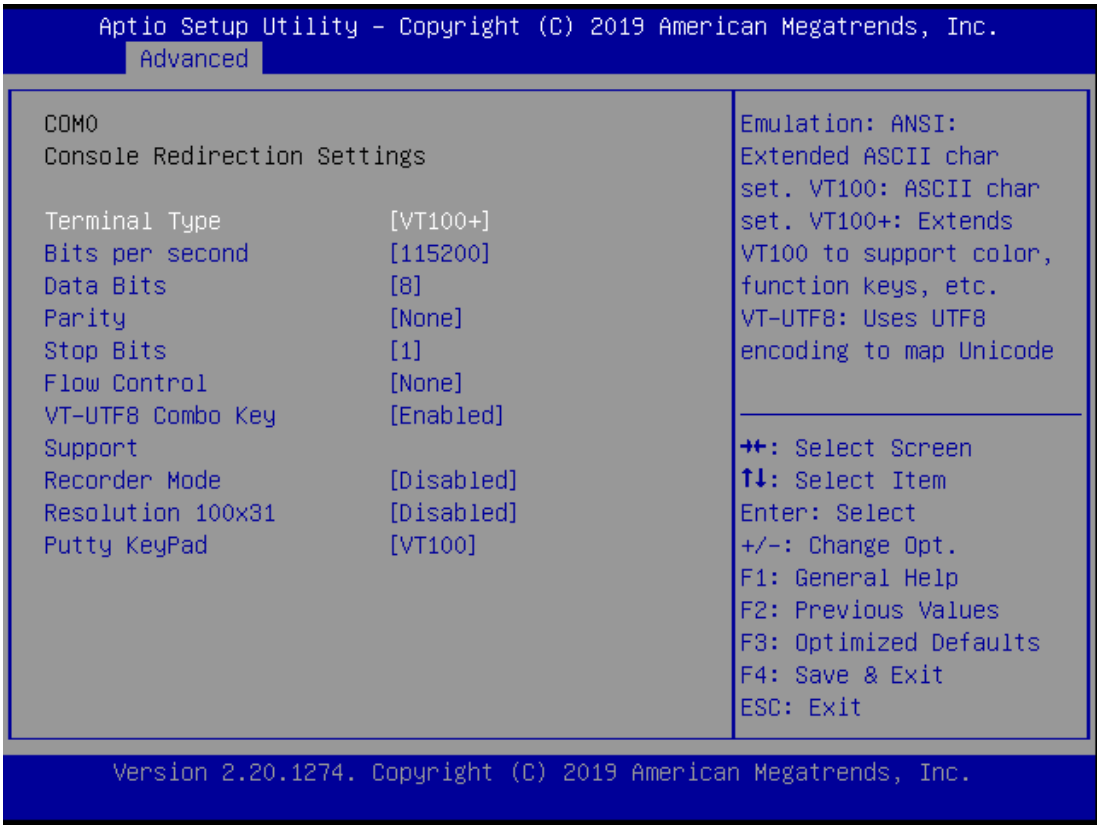
Feature	Options	Description
Watch Dog Timer	Enabled Disabled	Enables or disables Watch Dog Timer function

Serial Port Console Redirection



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

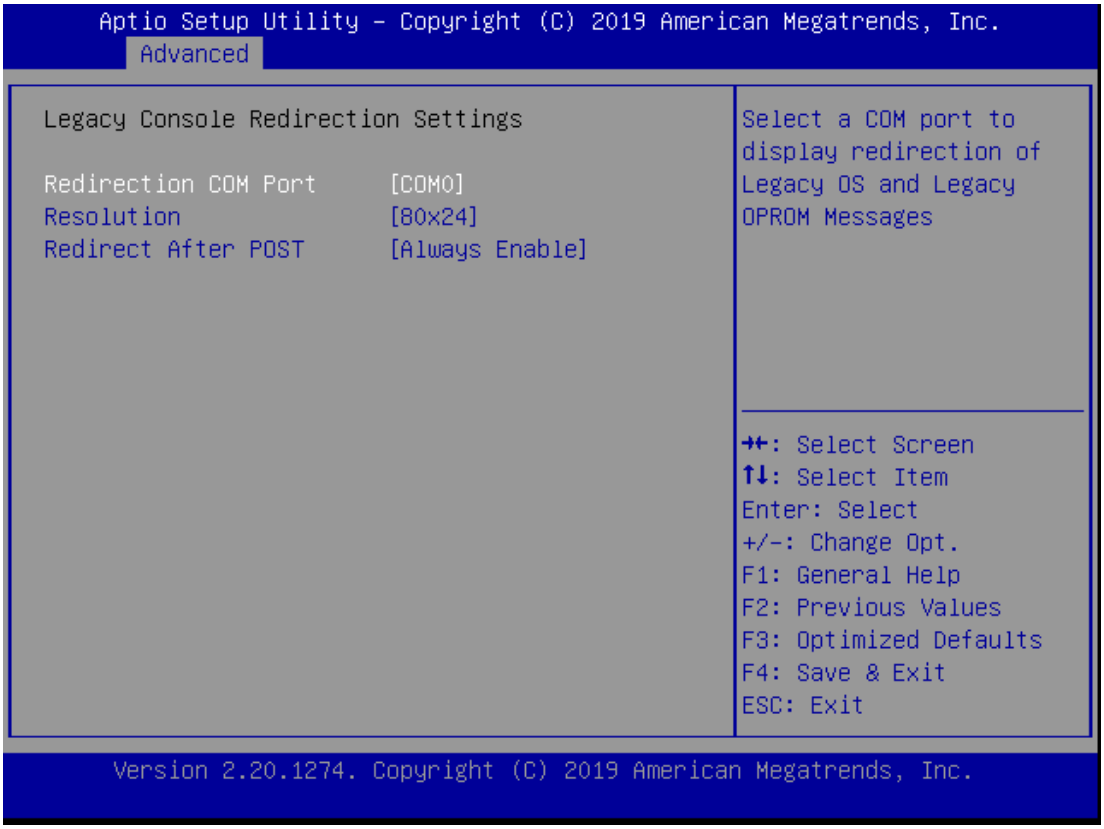
Console Redirection Settings



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.

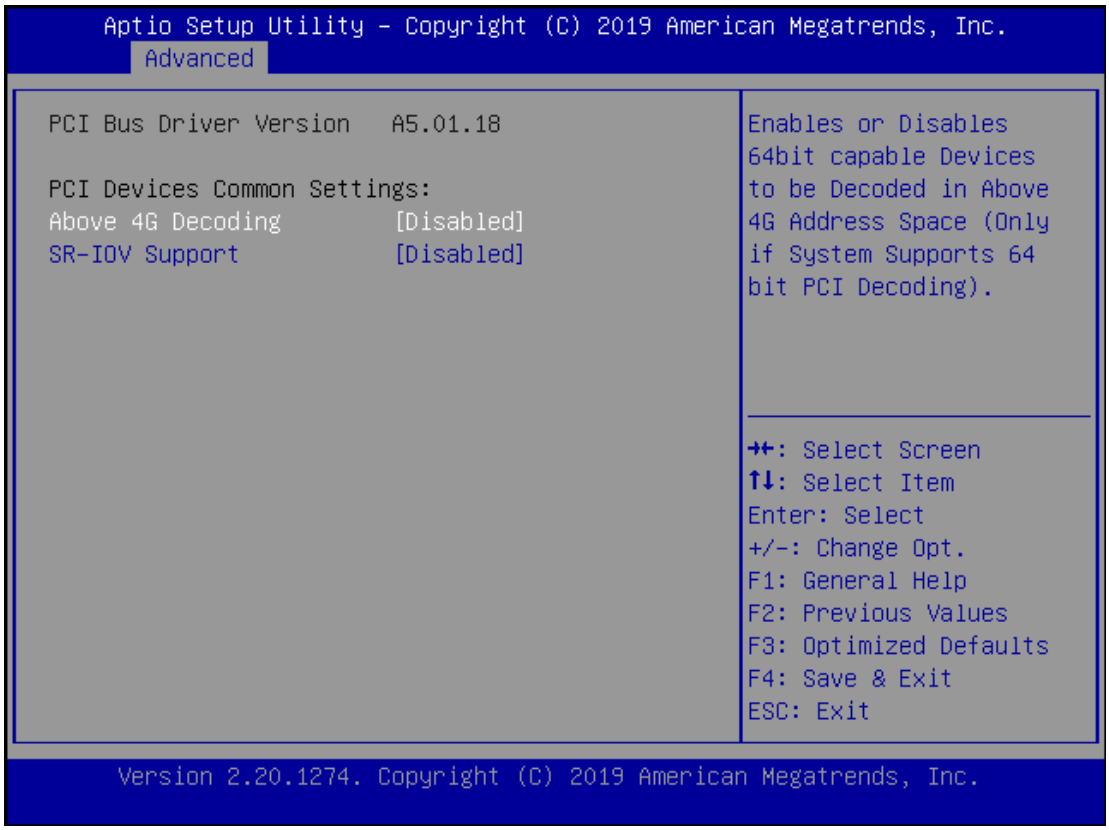
Flow Control	None Hardware RTS/CTS	Flow Control can prevent data loss from buffer overflow.
VT-UTF8 Combo Key Support	Disabled Enabled	Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	Disabled Enabled	With this mode enabled, only text will be sent. This is to capture Terminal 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.

Legacy Console Redirection Settings



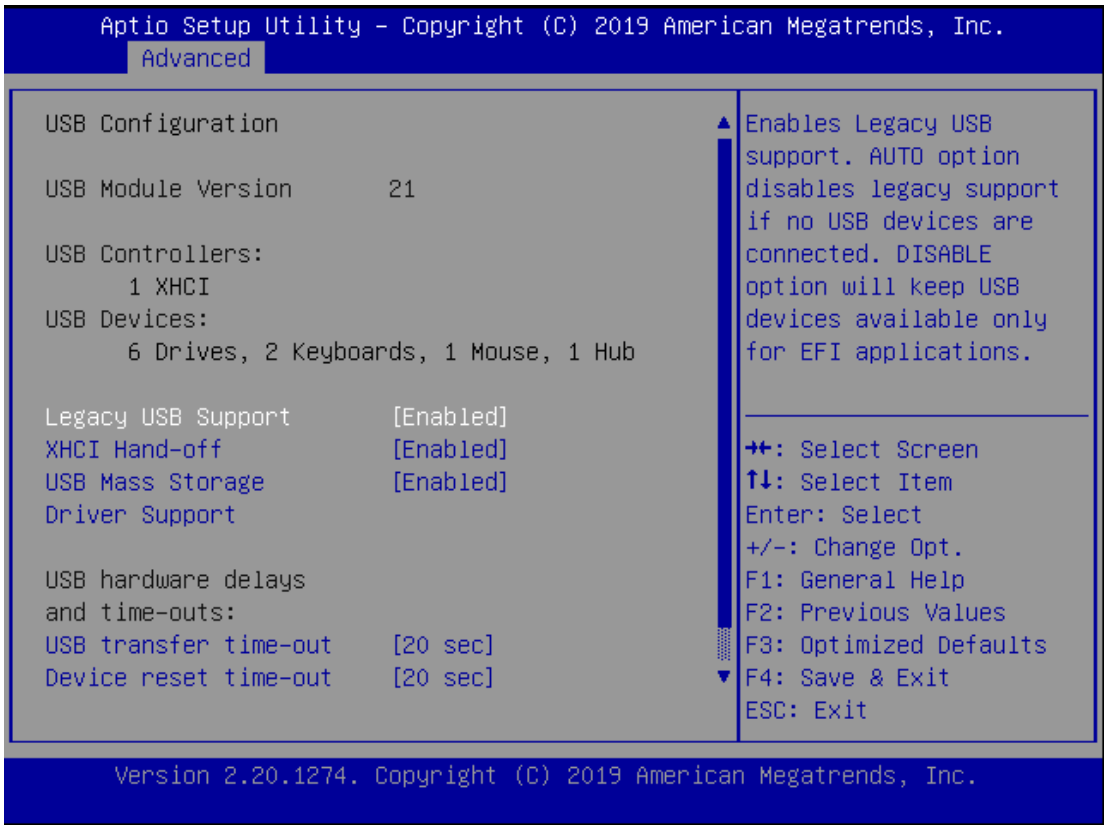
Feature	Options	Description
Redirection COM Port	COM0	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages
Resolution	80x24 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
Redirection After POST	Always Enable BootLoader	When **Bootloader** is selected, 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**.

PCI Subsystem Settings



Feature	Options	Description
Above 4G Decoding	Disabled Enabled	Enables or disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding)
SR-IOV Support	Disabled Enabled	If the system has SR-IOV capable PCIe Devices, this option enables or disables Single Root IO Virtualization Support.

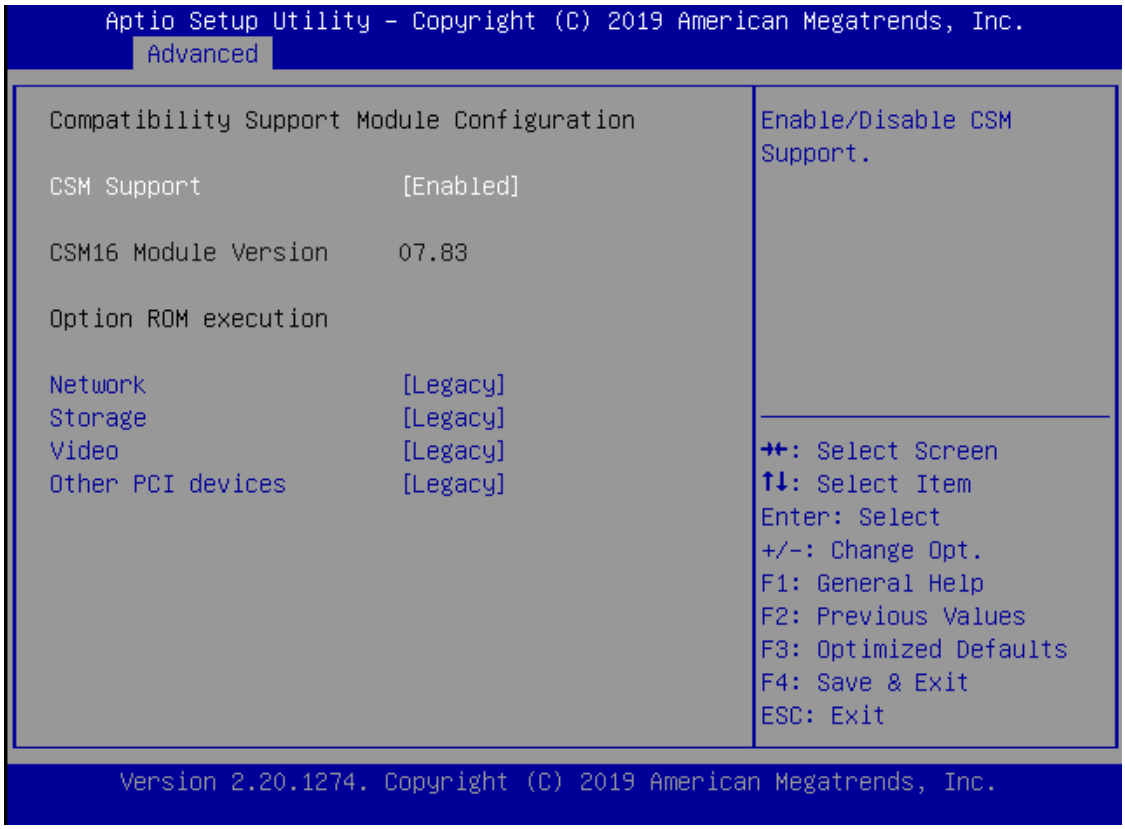
USB Configuration



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.
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

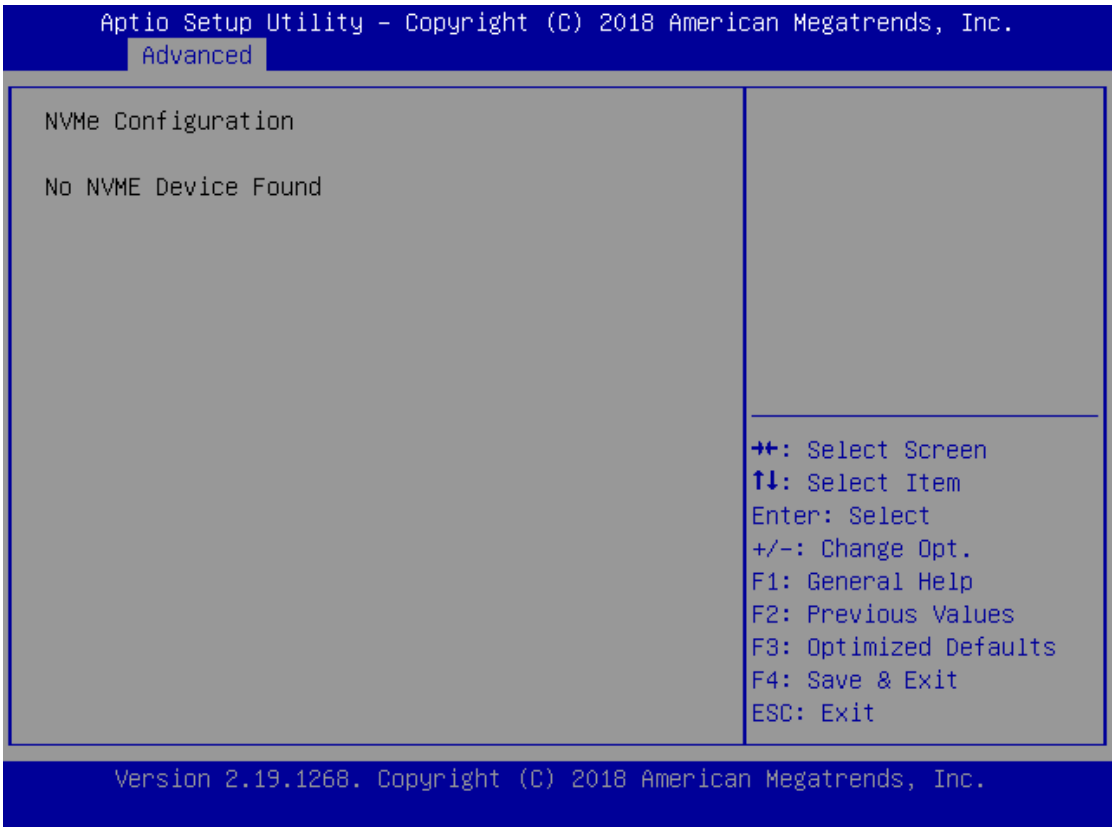
Device power-up delay	Auto Manual	Maximum time the device will take before it properly reports itself to the Host Controller. **Auto** uses default value: for a Root port, it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

CSM Configuration

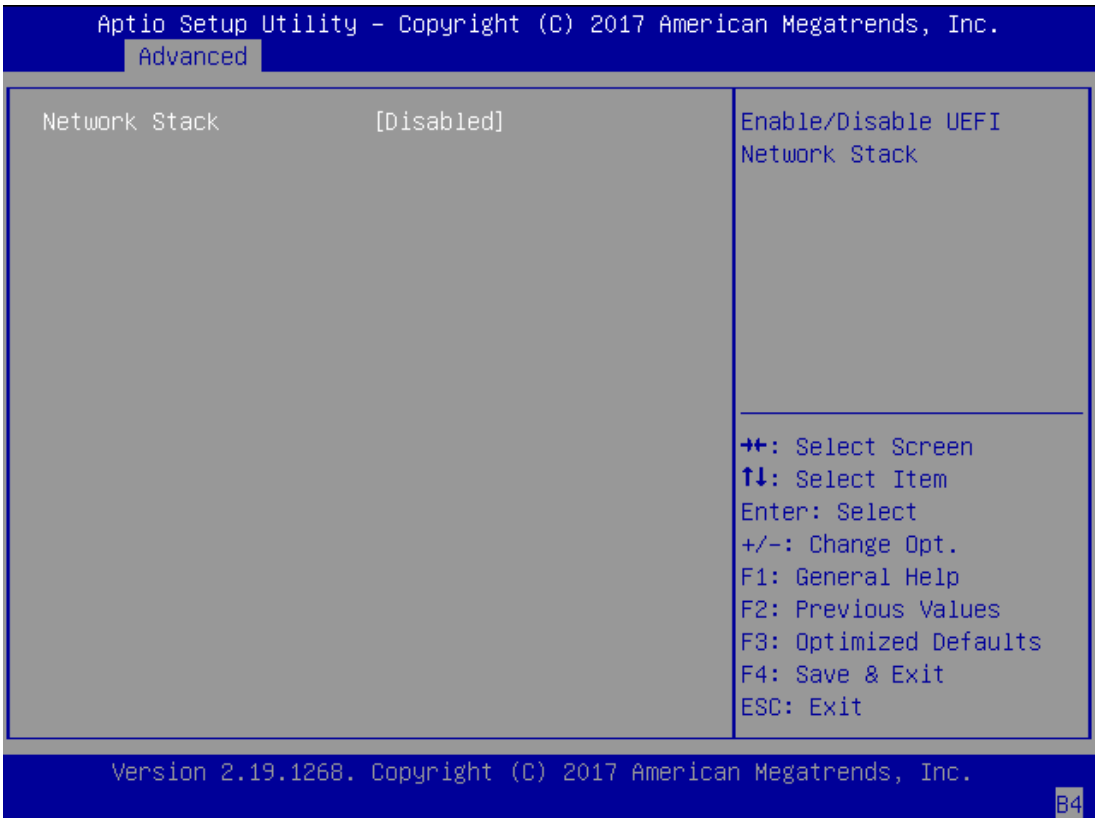


Feature	Options	Description
CSM Support	Disabled Enabled	Enables or disables CSM Support
Network	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do Not Launch UEFI Legacy	Controls 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



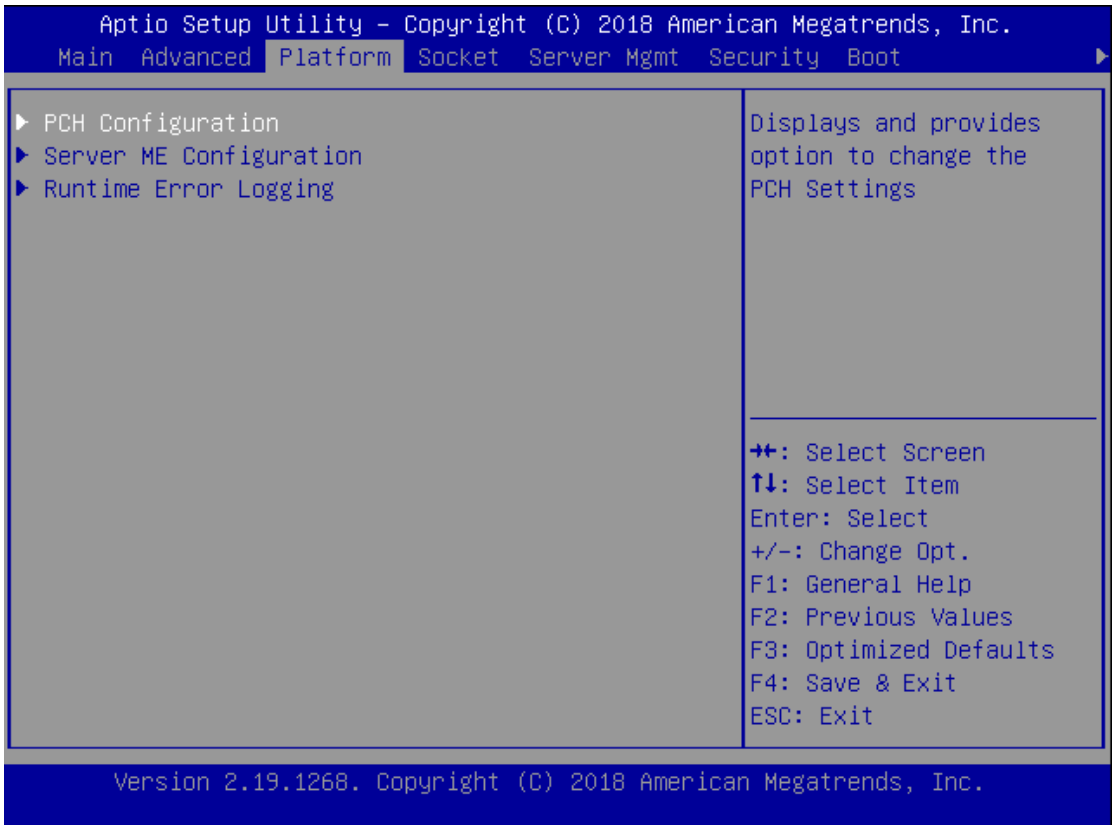
Network Stack Configuration



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.
IPsEC Certificate	Disabled Enabled	Support to Enable/Disable IPSEC certificate for Ikev.
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

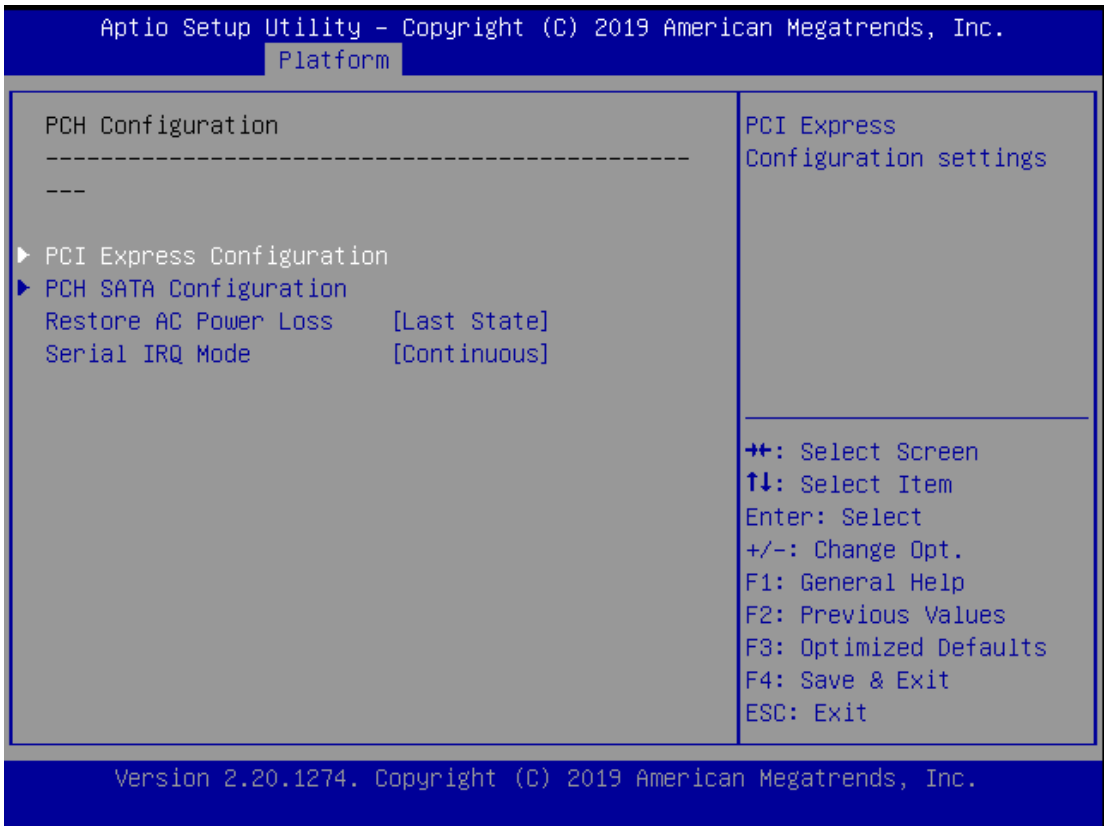
Platform

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



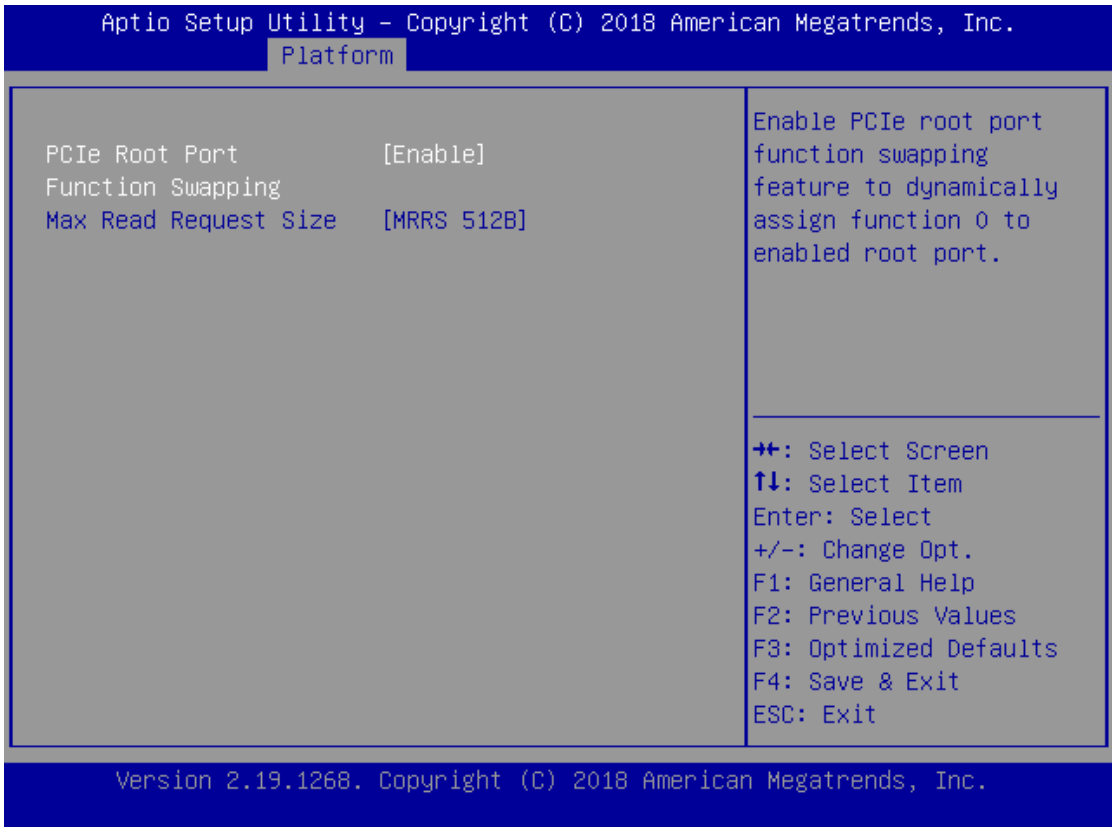
Feature	Options	Description
PCH Configuration	None	Displays and provides option to change the PCH Settings
Server ME Configuration	None	Configure Server ME Technology Parameters
Runtime Error Logging	None	Press <Enter> to view or change the runtime error log configuration.

PCH Configuration



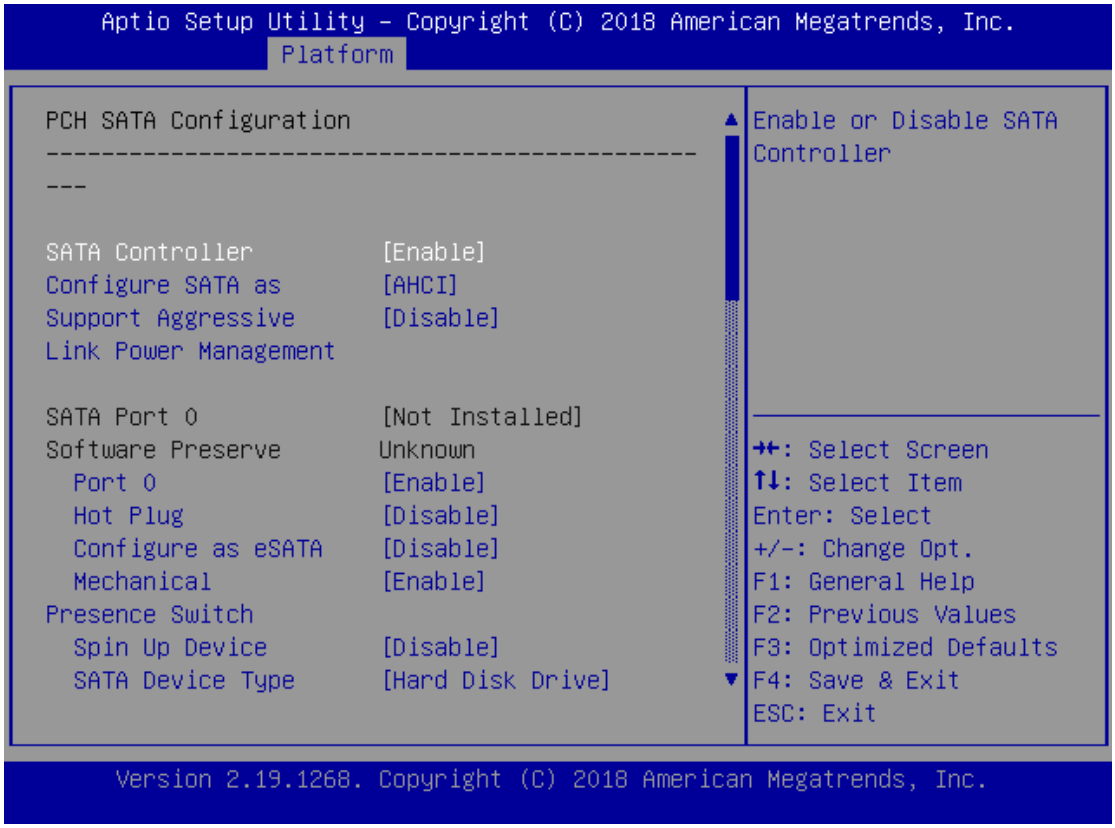
Feature	Options	Description
PCI Express Configuration	None	PCI Express Configuration settings
PCH SATA Configuration	None	SATA devices and settings
Restore AC Power Loss	Power ON Power Off Last State	Select S0/S5 for ACPI state after a G3
Serial IRQ Mode	Quiet Continuous	Configure Serial IRQ Mode.

PCI Express Configuration



Feature	Options	Description
PCIe Root Port Function Swapping	Disabled Enabled	Enable PCIe root port function swapping feature to dynamically assign function 0 to enabled root port.
Max Read Request Size	MRRS 128B MRRS 256B MRRS 512B MRRS 1024B MRRS 2048B MRRS 4096B	PCIE Max Read Request Size Selection.

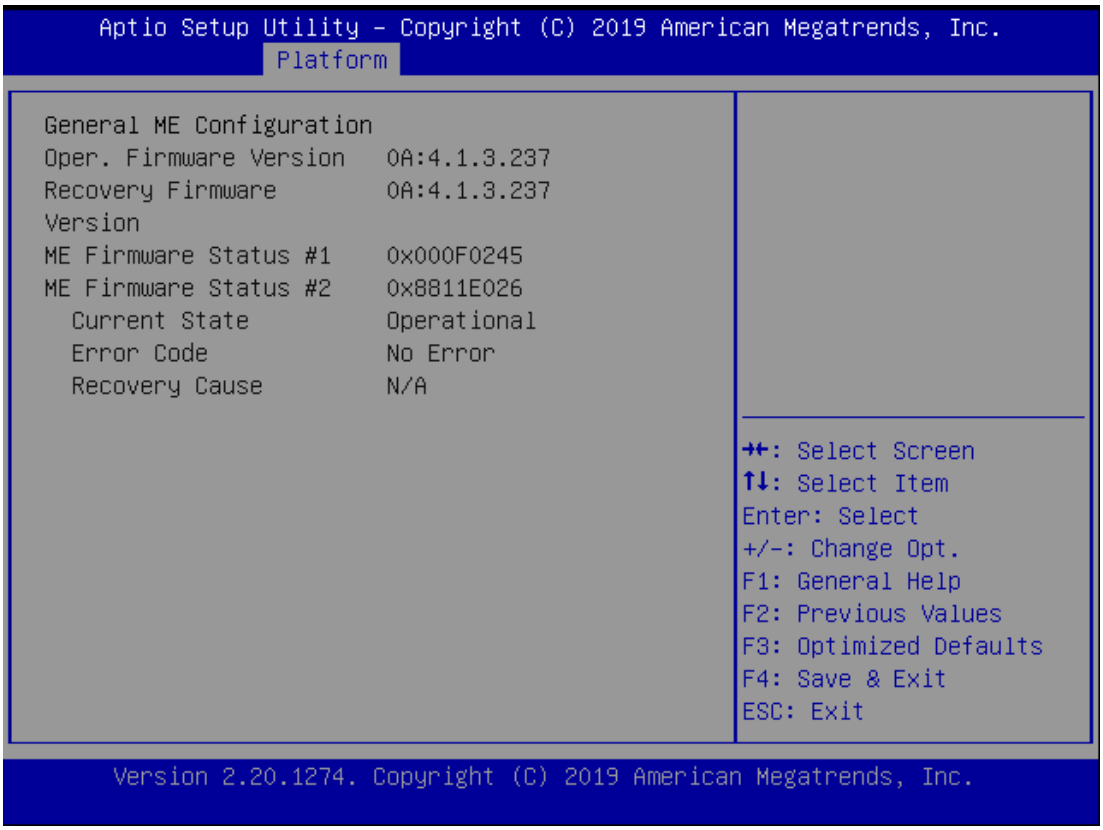
PCH SATA Configuration



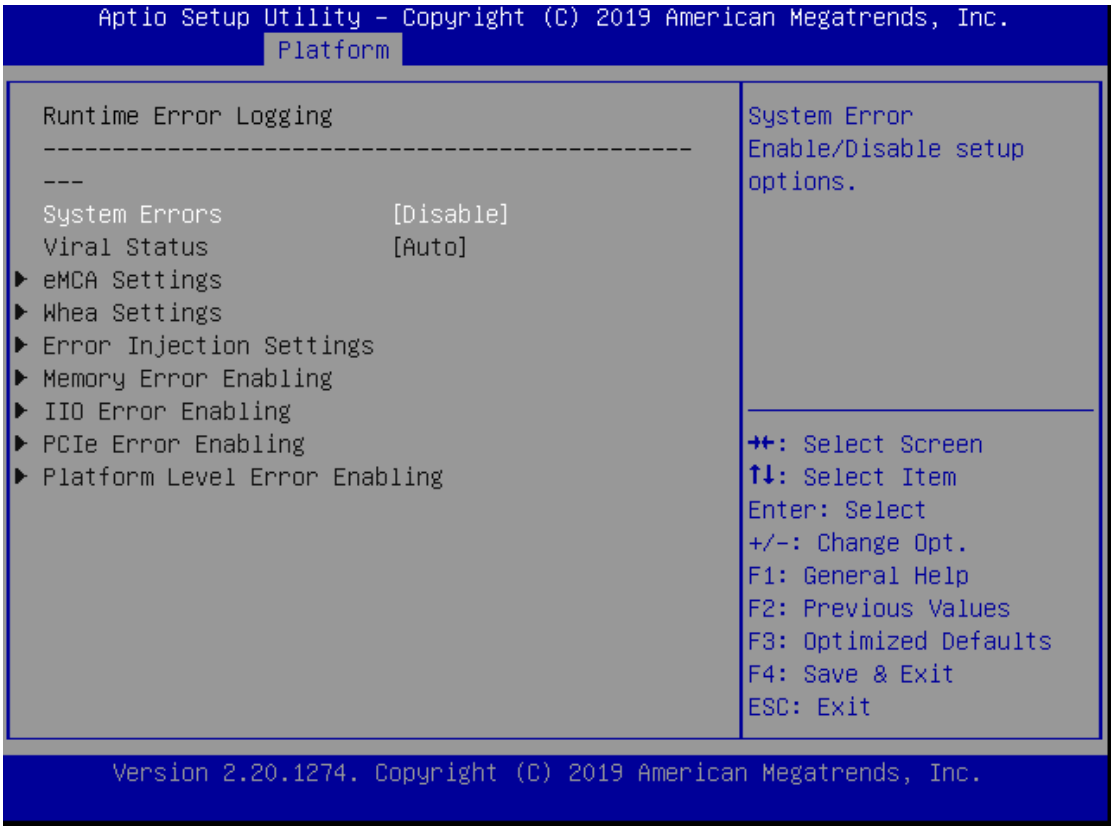
Feature	Options	Description
SATA Controller	Disabled Enabled	Enables or disables SATA Controller
Configure SATA as	AHCI RAID	This will configure SATA as **RAID** or **AHCI**.
Support Aggressive Link Power Management	Disabled Enabled	Enables or disables SALP
Port 0/1/2/3/4	Disabled Enabled	Enable or Disable SATA Port
Hot Plug	Disabled Enabled	Designates this port as Hot Pluggable.
Configure as eSATA	Disabled Enabled	Configures port as External SATA (eSATA)
Mechanical Presence Switch	Disabled Enabled	Controls reporting if this port has a Mechanical Presence Switch. Note: Requires hardware support.
Spin Up Device	Disabled Enabled	If enabled for any of ports Staggered 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 Topology	Unknown ISATA Direct Connect Flex M2	Identify the SATA Topology if it is Default or ISATA or Flex or DirectConnect or M2

Server ME Configuration



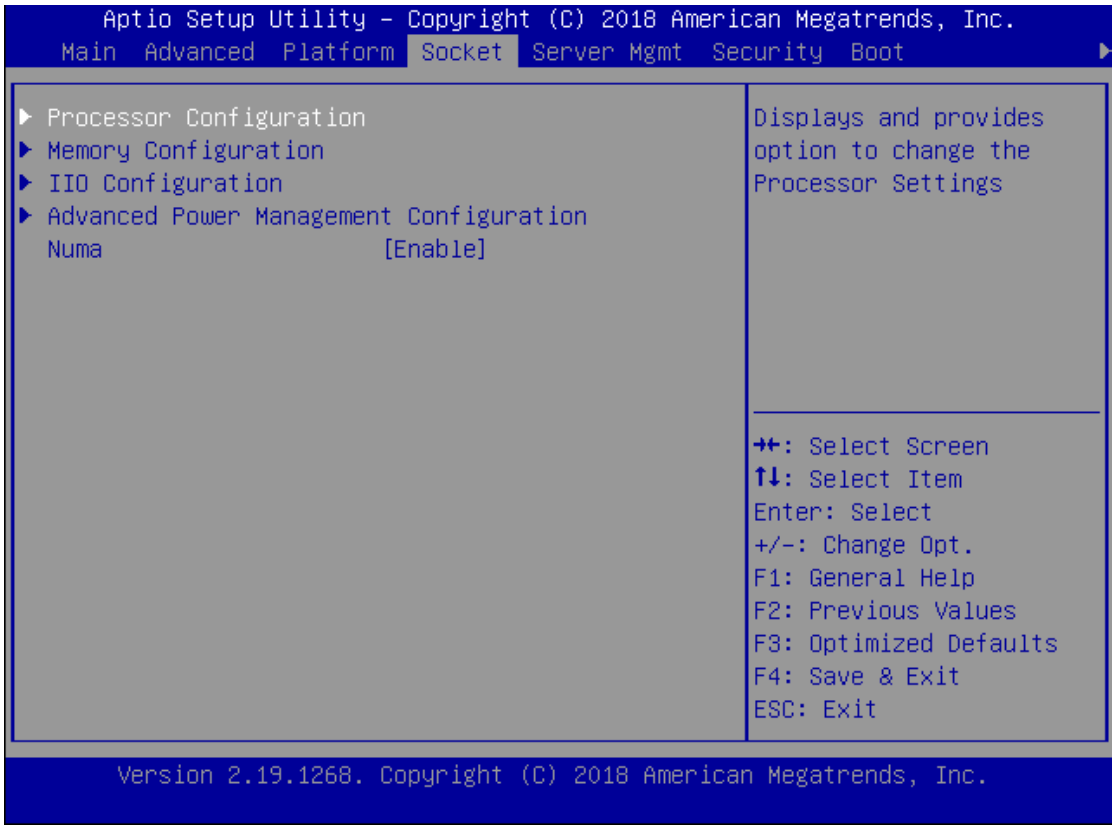
Runtime Error Logging



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

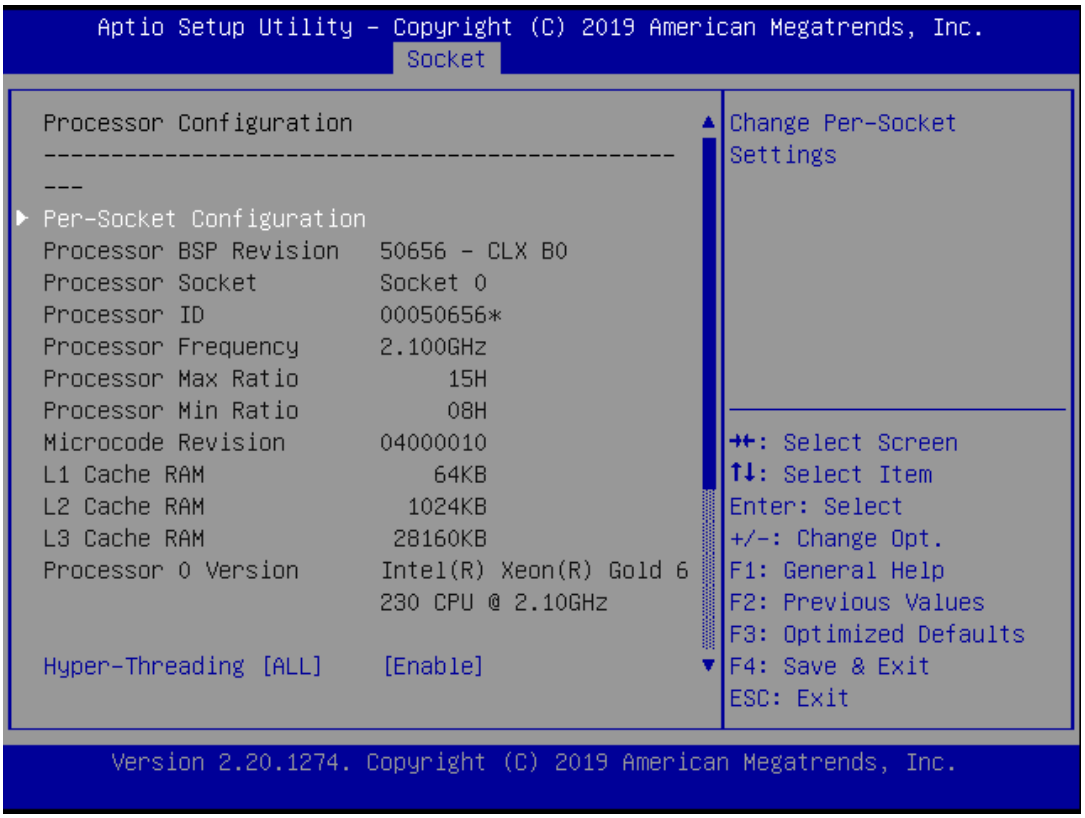
Socket

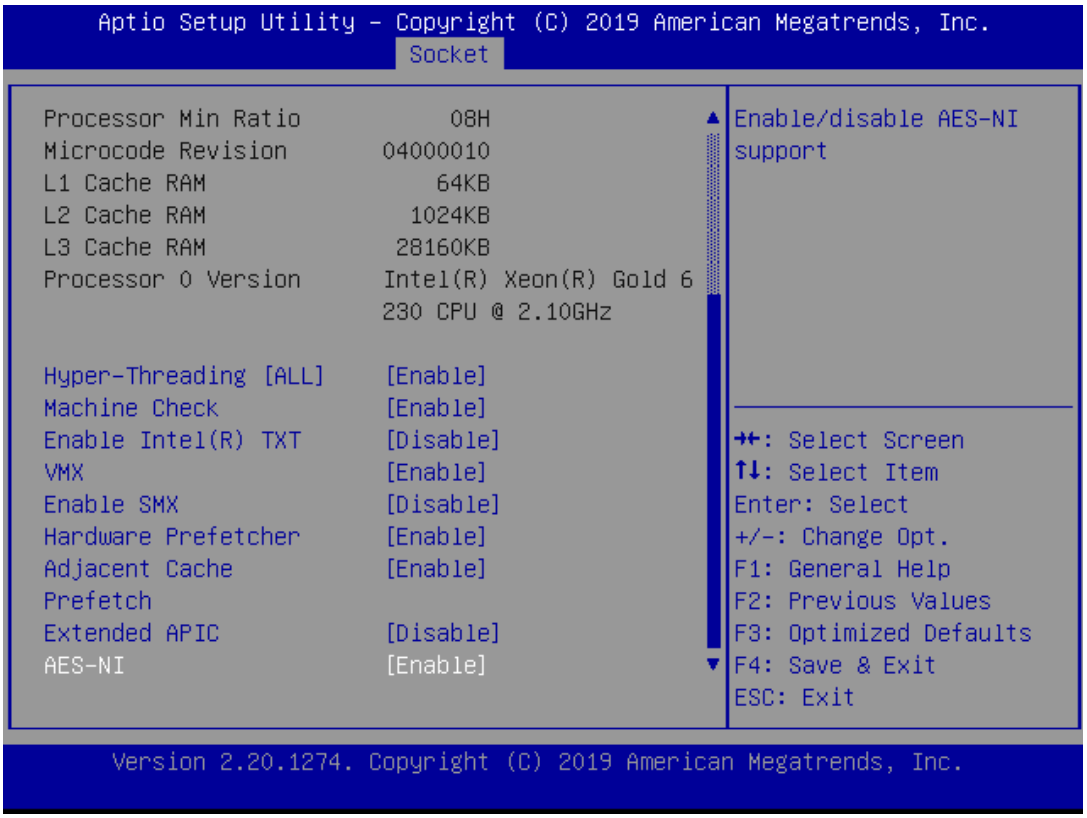
Select the Socket menu item from the BIOS setup screen to enter the Socket Setup screen. Users can select any of the items in the left frame of the screen.



Feature	Options	Description
Processor Configuration	None	Displays and provides option to change the Processor Settings
Memory Configuration	None	Displays and provides option to change the Memory Settings
IIO Configuration	None	Displays and provides option to change the IIO Settings
Advanced Power Management Configuration	None	Displays and provides option to change the Power Management Settings
Numa	Disabled Enabled	Displays and provides option to change the Power Management Settings

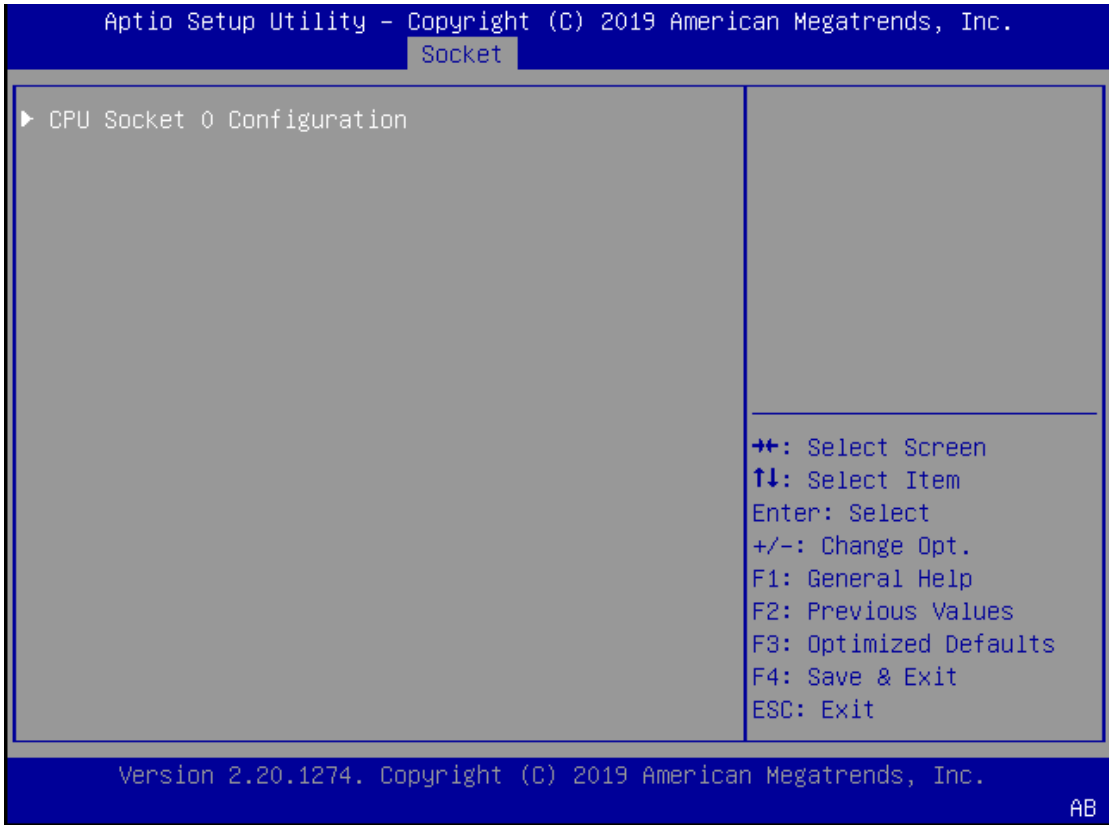
Processor Configuration





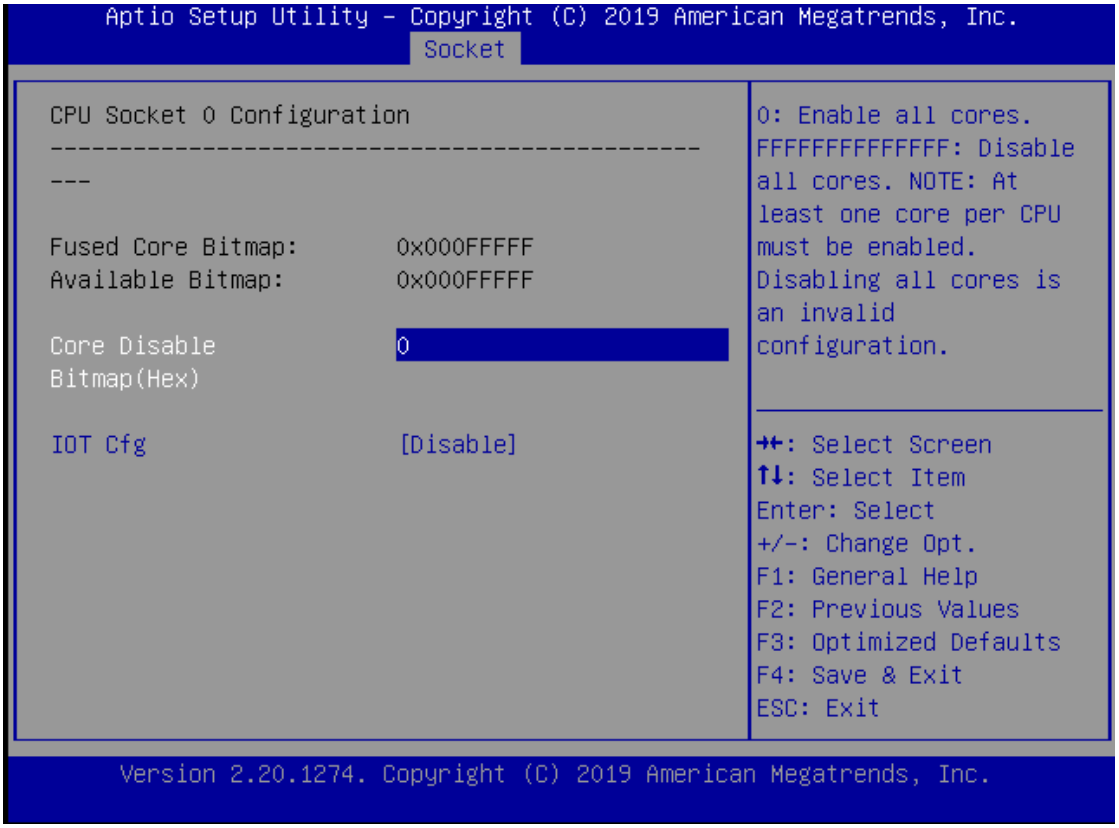
Feature	Options	Description
Hyper-Threading [ALL]	Disabled Enabled	Enables Hyper-Threading (Software Method to Enable/Disable Logical Processor threads.
Machine Check	Disabled Enabled	Enable or Disable the Machine Check
Enable Intel® TXT	Disabled Enabled	Enables Intel(R) TXT
VMX	Disabled Enabled	Enables the Vanderpool Technology, which takes effect after reboot.
Enable SMX	Disabled Enabled	Enables Safer Mode Extensions
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 or disables extended APIC support
AES-NI	Disabled Enabled	Enables or disables AES-NI support

Per-Socket Configuration



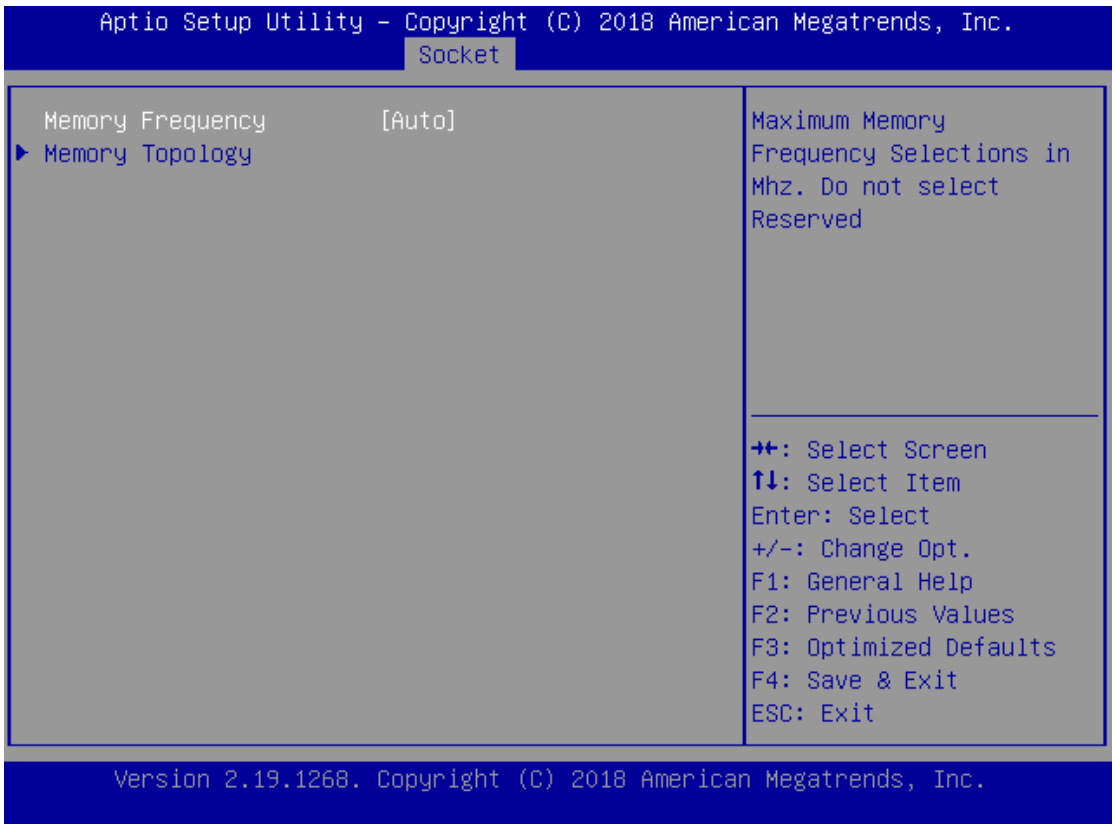
Feature	Options	Description
CPU Socket0 Configuration	None	None

CPU Socket0 Configuration



Feature	Options	Description
Core Disable Bitmap (Hex)	0	0: Enable all cores. 3fff: Disable all cores
IOT Cfg	Disabled Enabled	Each bit enables IOT/OCLA for a CBo. Note: IOT Enable will override RDT CAT opportunistic tuning

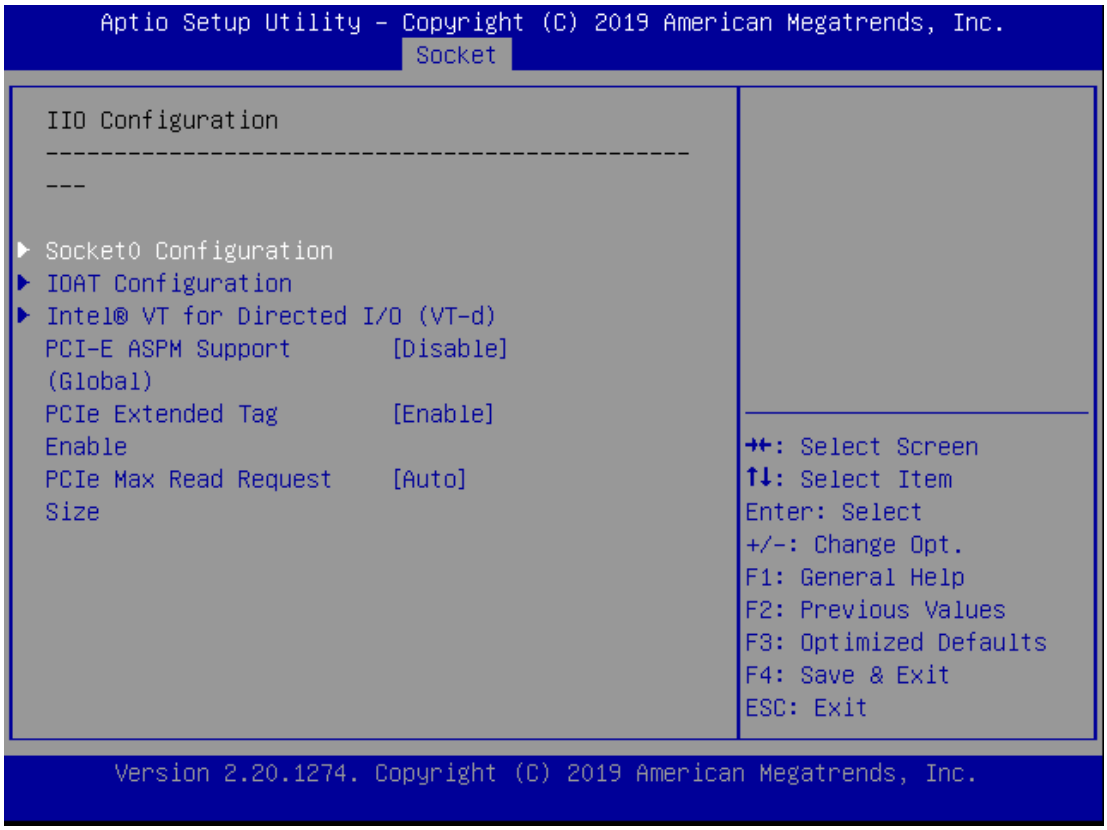
Memory Configuration



Feature	Options	Description
Memory Frequency	Auto 800 1000 1066 1200 1333 1400 1600 1800 1866 2000 2133 2200 2400 2600 2666 2800-OvrClk 2933-OvrClk 3000-OvrClk 3200-OvrClk	Maximum Memory Frequency Selections in Mhz. Do not select Reserved

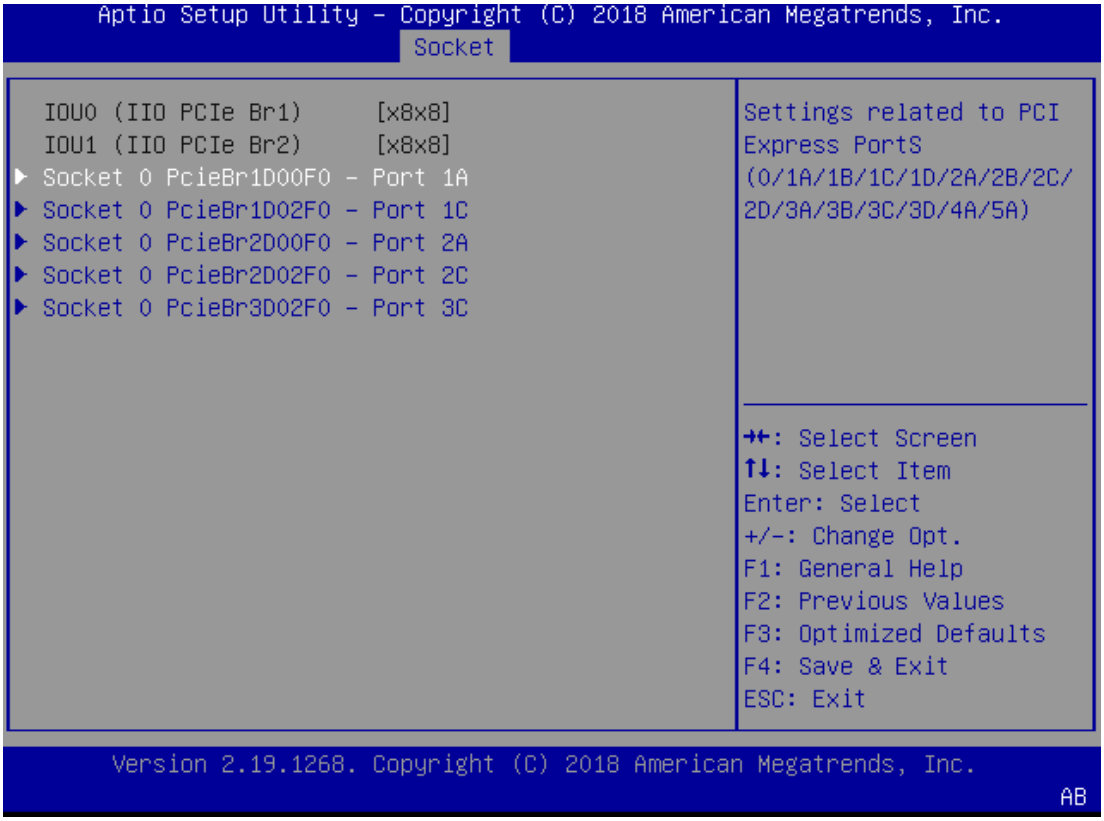
	3400-OvrClk 3600-OvrClk 3733-OvrClk 3800-OvrClk 4000-OvrClk 4200-OvrClk 4266-OvrClk 4400-OvrClk	
Memory Topology	None	Displays memory topology with Dimm population information

IIO Configuration



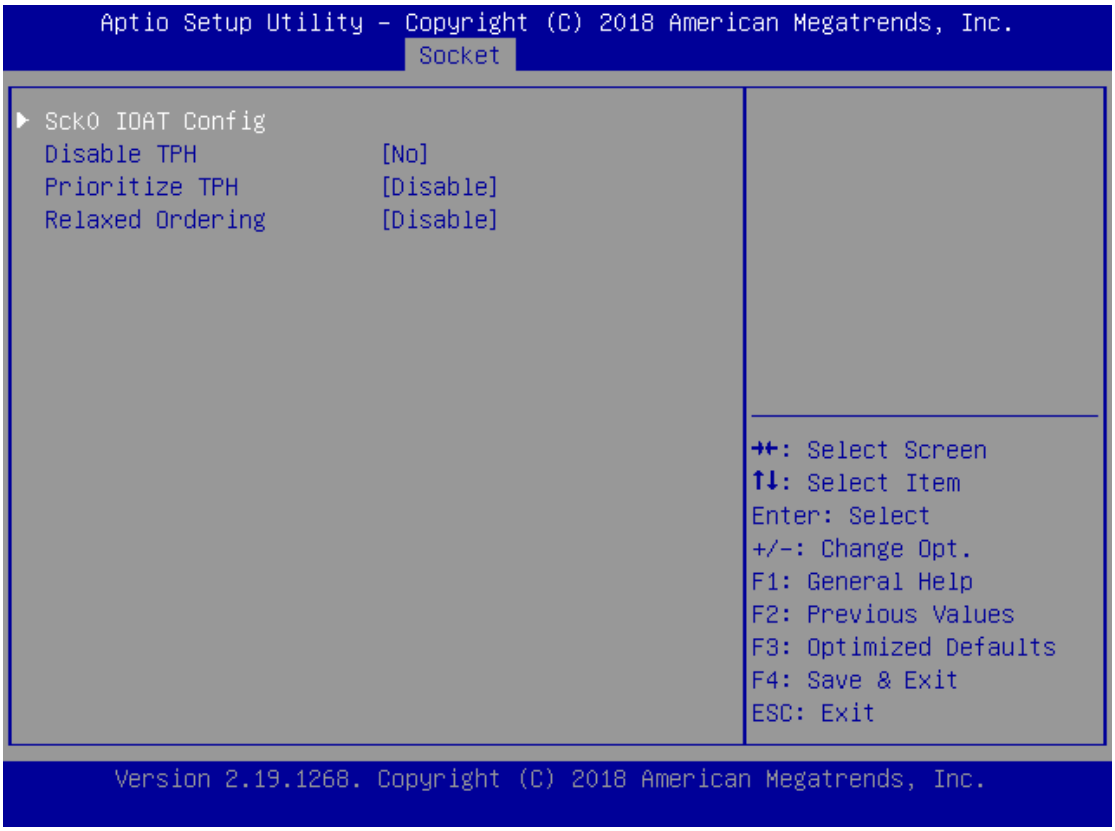
Feature	Options	Description
Socket0 Configuration	None	None
IOAT Configuration	None	All IOAT configuration options
Intel® VT for Directed I/O (VT-d)	None	Press **<Enter>** to bring up the Intel® VT for Directed I/O (VT-d) Configuration menu.
PCI-E ASPM Support (Global)	Disabled Per-Port L1 Only	This option enables / disables the ASPM support for all downstream devices.
PCIe Extended Tag Enable	Auto Disabled Enabled	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



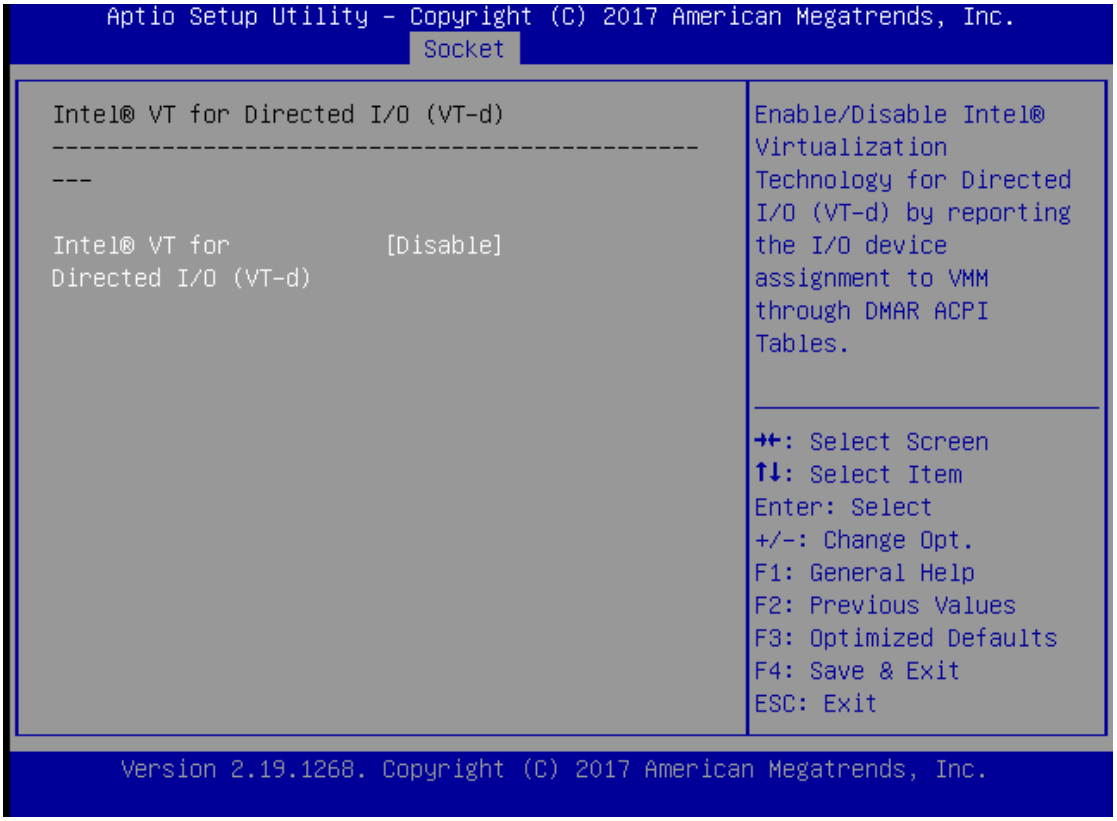
Feature	Options	Description
Socket 0 PcieBr1D00F0	None	Settings related to PCI Express Port 1A
Socket 0 PcieBr1D02F0	None	Settings related to PCI Express Port 1C
Socket 0 PcieBr2D00F0	None	Settings related to PCI Express Port 2A
Socket 0 PcieBr2D02F0	None	Settings related to PCI Express Port 2C
Socket 0 PcieBr3D02F0	None	Settings related to PCI Express Port 3C

IOAT Configuration



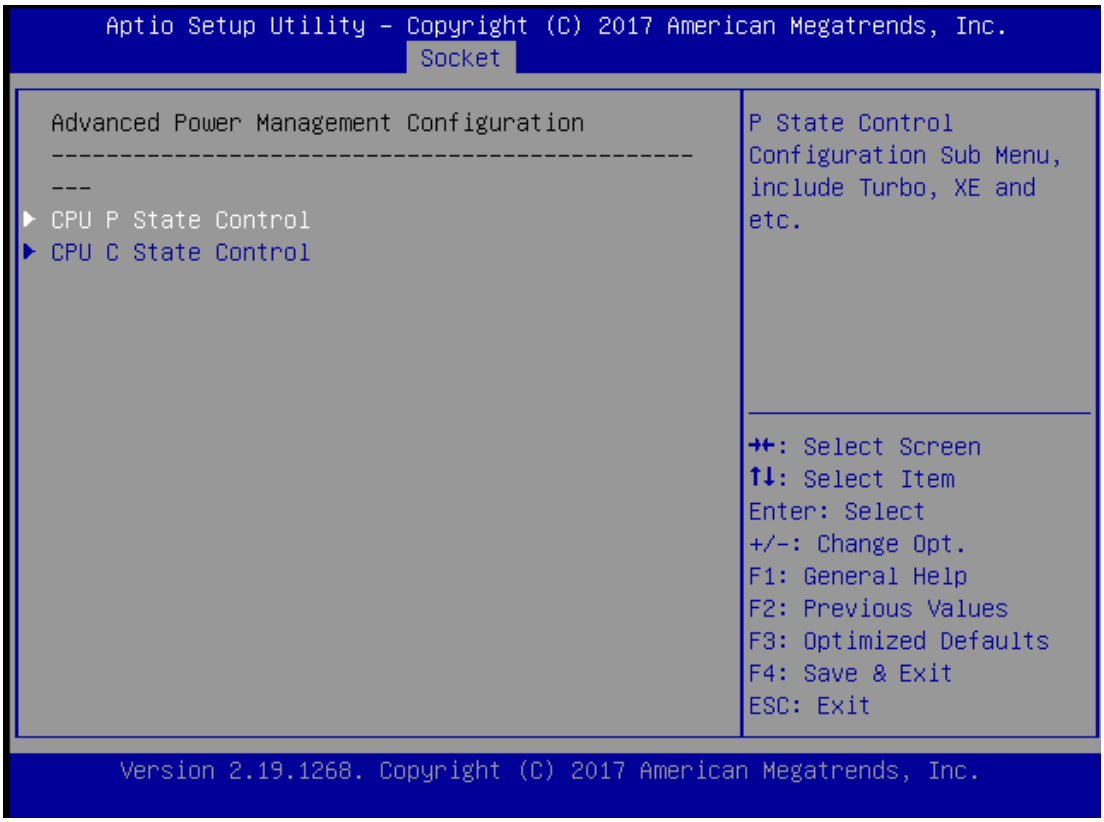
Feature	Options	Description
Sck0 IOAT Config	None	None
Disable TPH	No Yes	TLP Processing Hint disable
Prioritize TPH	Disabled Enabled	Prioritize TPH
Relaxed Ordering	Disabled Enabled	Relaxed Ordering Enable/Disable

Intel® VT for Directed I/O (VT-d)



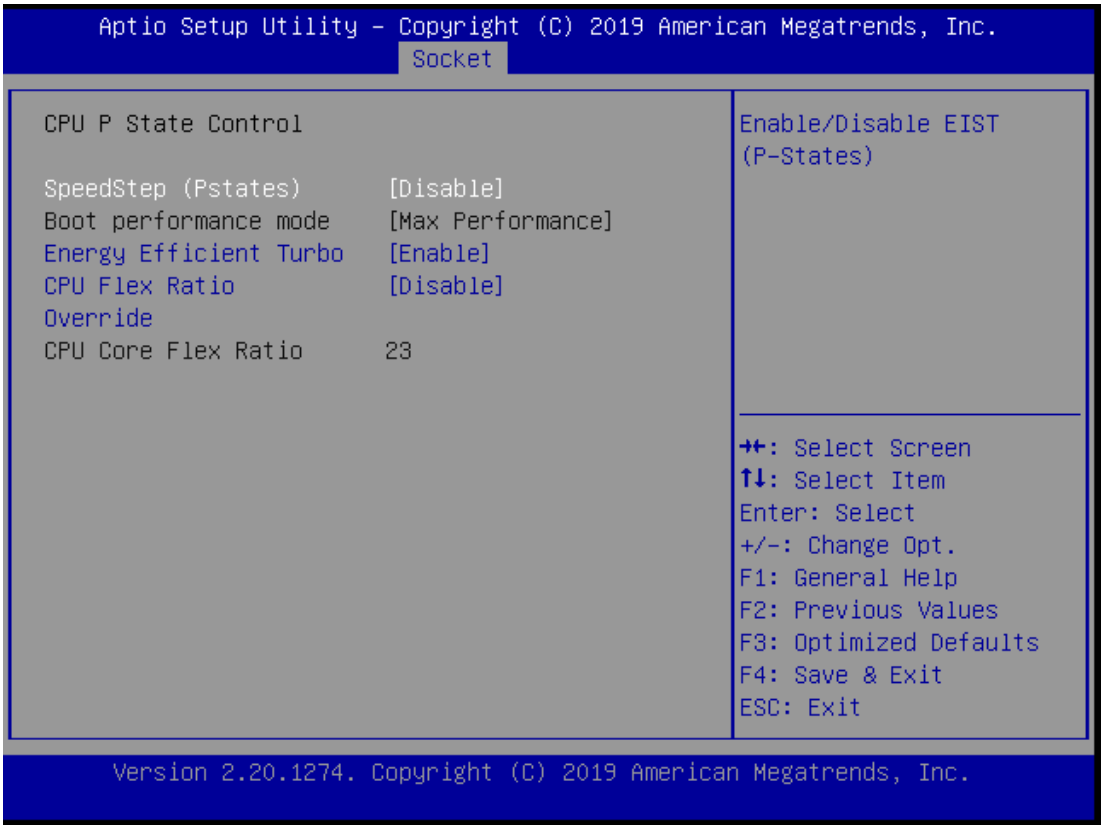
Feature	Options	Description
Intel® VT for Directed I/O (VT-d)	Disabled Enabled	Press **<Enter>** to bring up the Intel? VT for Directed I/O (VT-d) Configuration menu.

Advanced Power Management Configuration



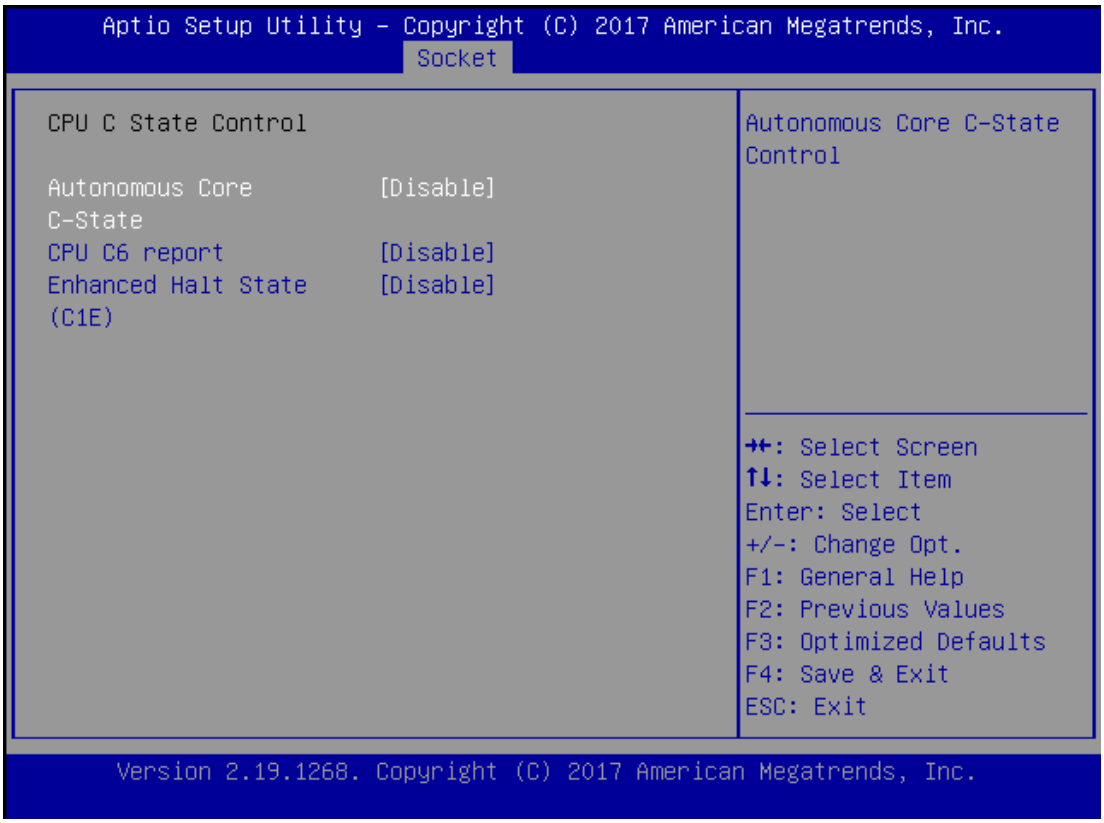
Feature	Options	Description
CPU P State Control	None	P State Control Configuration Sub Menu, include Turbo, XE and etc.
CPU C State Control	None	CPU C State setting

CPU P State Control



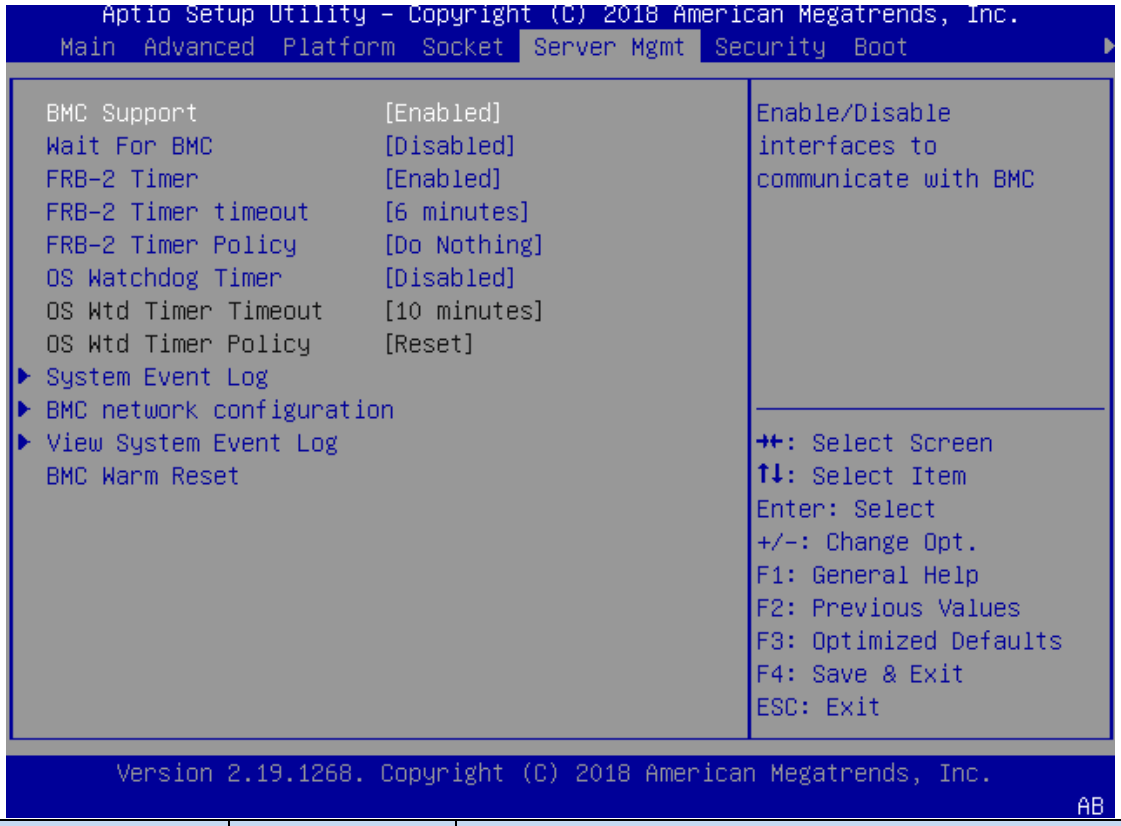
Feature	Options	Description
SpeedStep(Pstates)	Disabled Enabled	Enables or disables EIST (P-States)
Boot performance mode	Max Performance Max Efficient Set by Intel Node Manager	Select the performance state that the BIOS will set before OS hand off.
Energy Efficient Turbo	Disabled Enabled	Energy Efficient 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

CPU C State Control



Feature	Options	Description
Autonomous Core C-State	Disabled Enabled	Autonomous Core C-State Control
CPU C6 report	Disabled Enabled	Enables or disables CPU C6(ACPI C3) report to OS
Enhanced Halt State (C1E)	Disabled Enabled	Core C1E auto promotion Control. Takes effect after reboot.

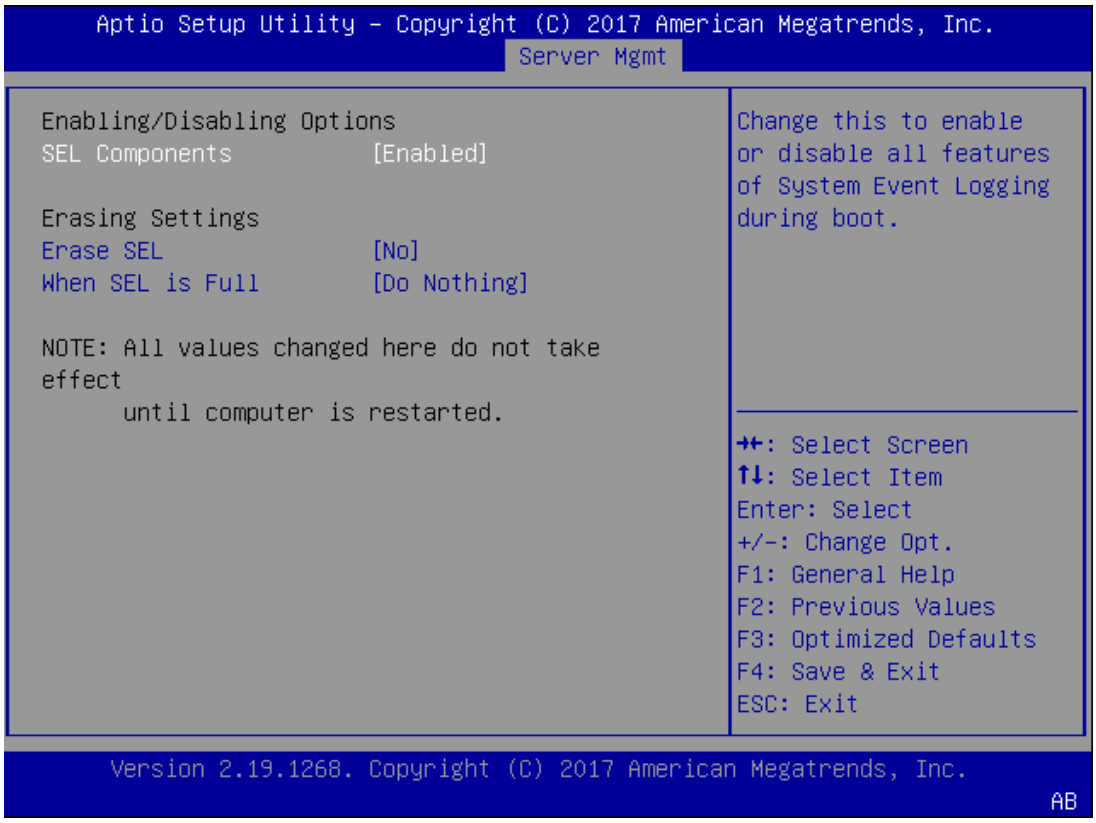
Server Mgmt



Feature	Options	Description
BMC Support	Enabled Disabled	Enable or disables interfaces to communicate with BMC.
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.

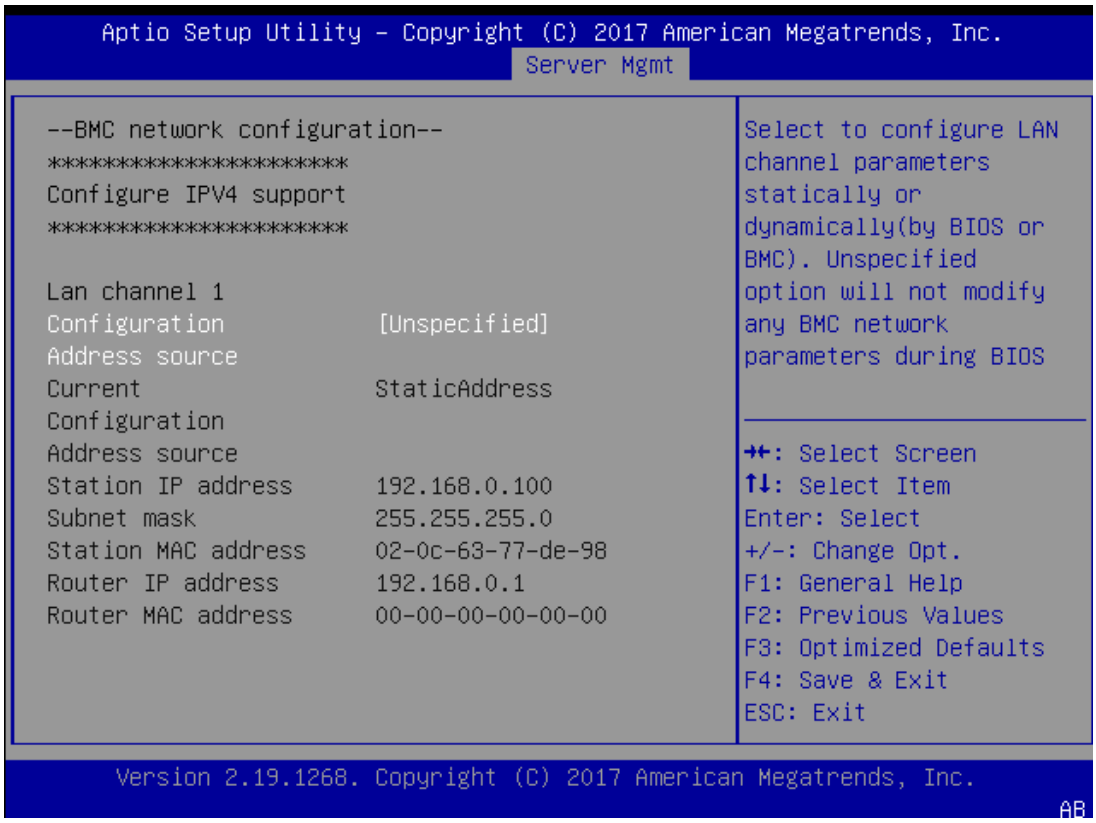
OS Wtd Timer Timeout	5 minutes 10 minutes 15 minutes 20 minutes	Configure the length of the OS Boot Watchdog Timer. Not available if OS Boot Watchdog Timer is disabled.
OS Wtd Timer Policy	Do Nothing Reset Power Down Power Cycle	Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.
System Event Log	NA	Press **<Enter>** to change the SEL event log configuration.
BMC network configuration	NA	Configure BMC network parameters.
View System Event Log	NA	Press **<Enter>** to view the System Event Log Records.
BMC Warm Reset	NA	Press **<Enter>** to do Warm Reset BMC.

System Event Log



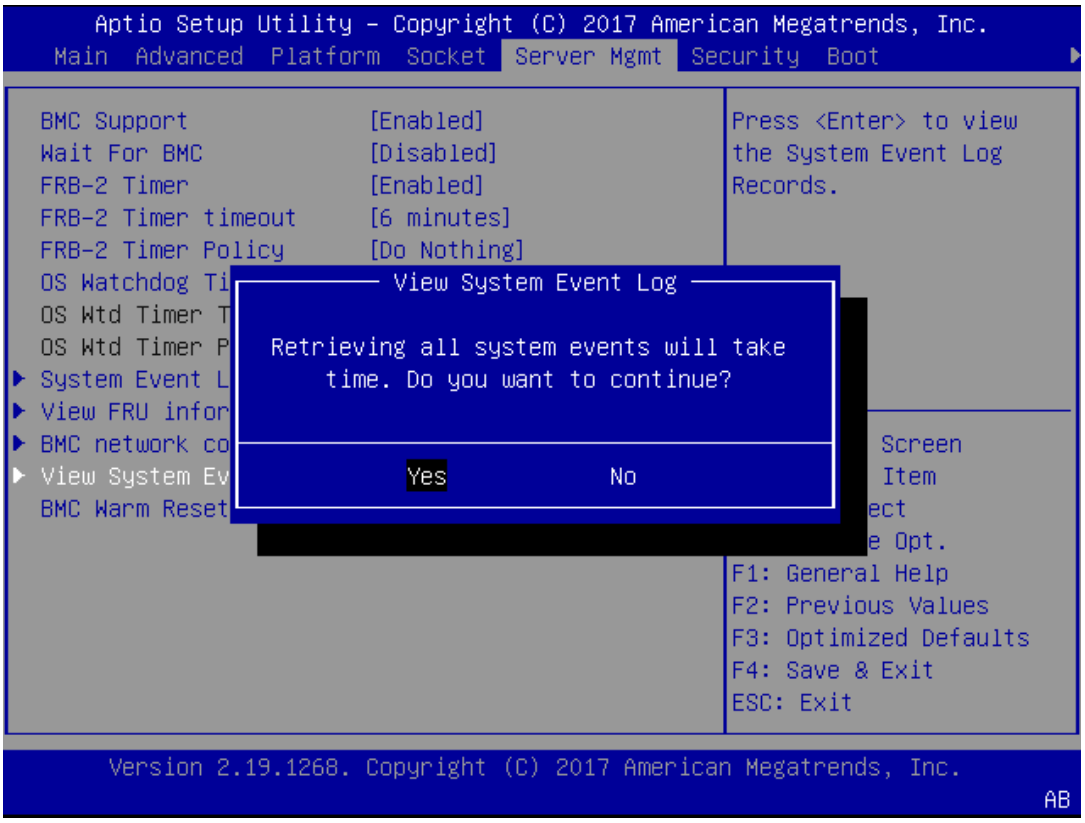
Feature	Options	Description
SEL Components	Disabled Enabled	Enables or disables all features of System Event Logging during boot.
Erase SEL	NO Yes, On next reset Yes, On every reset	Choose options for erasing SEL.
When SEL is Full	Do Nothing Erase Immediately	Choose options for reactions to a full SEL.

BMC network configuration



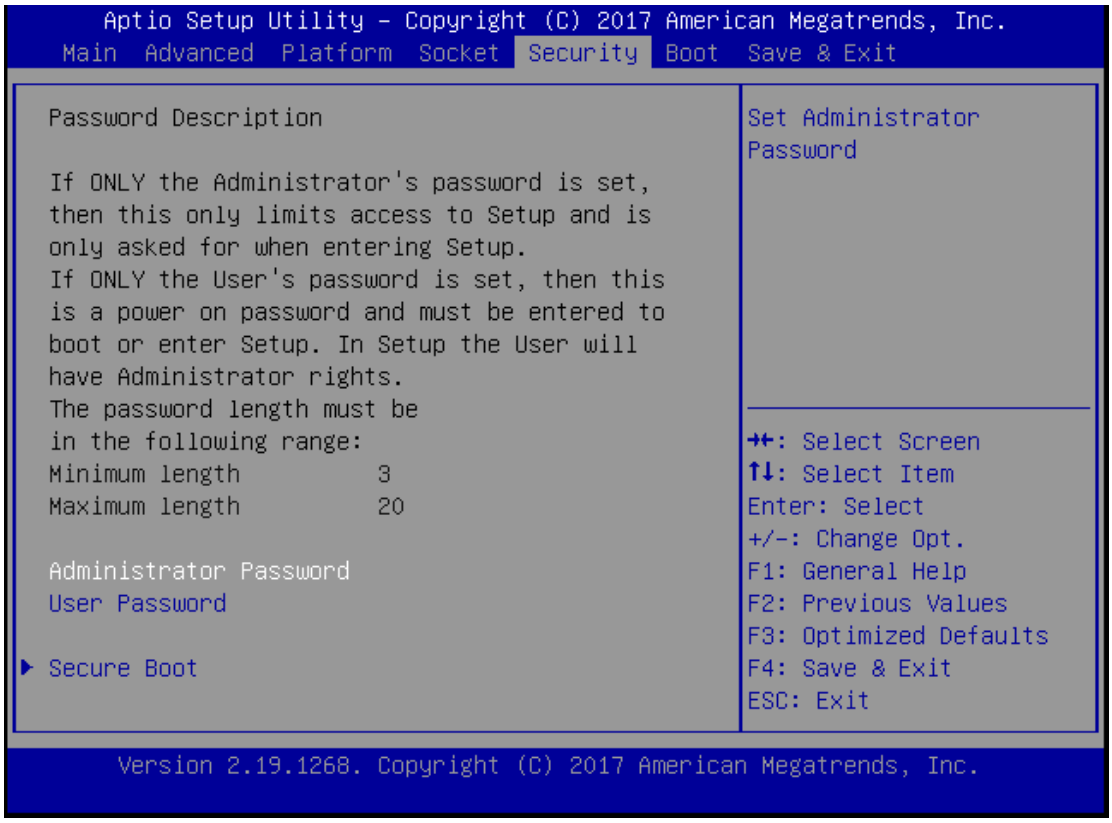
Feature	Options	Description
Configuration Address source	Unspecified Static DynamicBmcDhcp	Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC). The **unspecified** option will not modify any BMC network parameters during BIOS phase.

View System Event Log



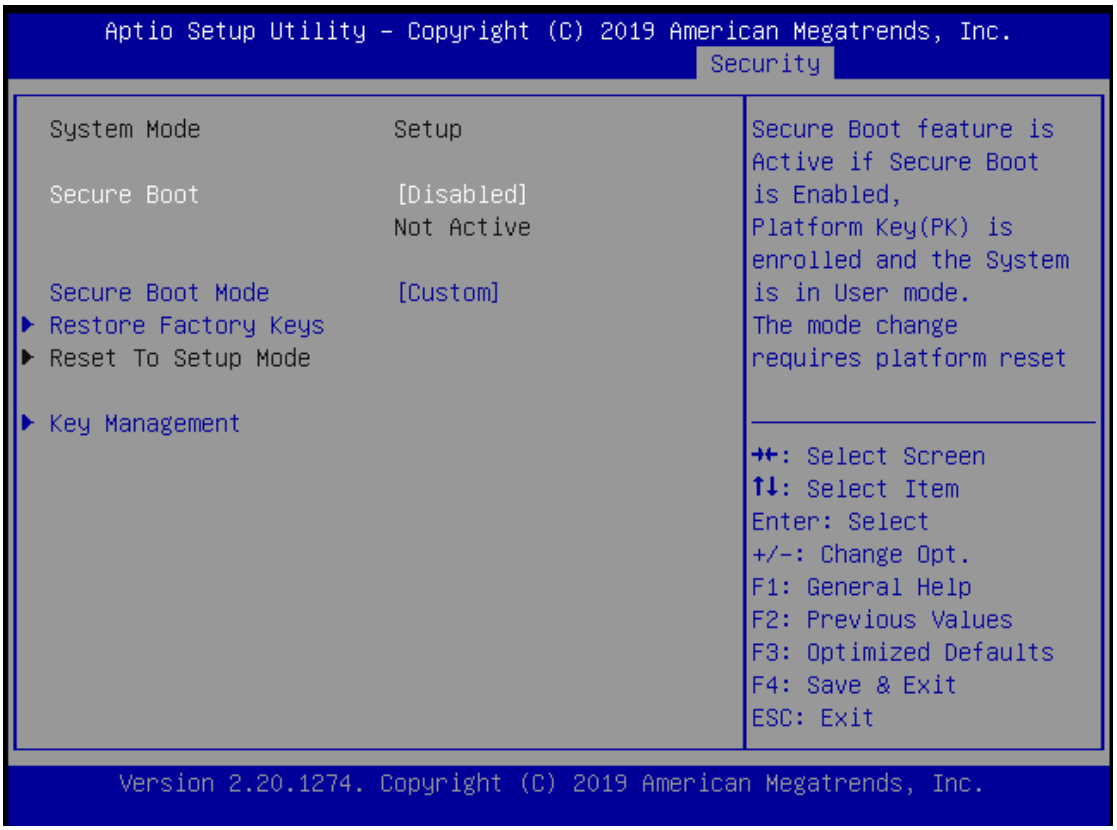
Security

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



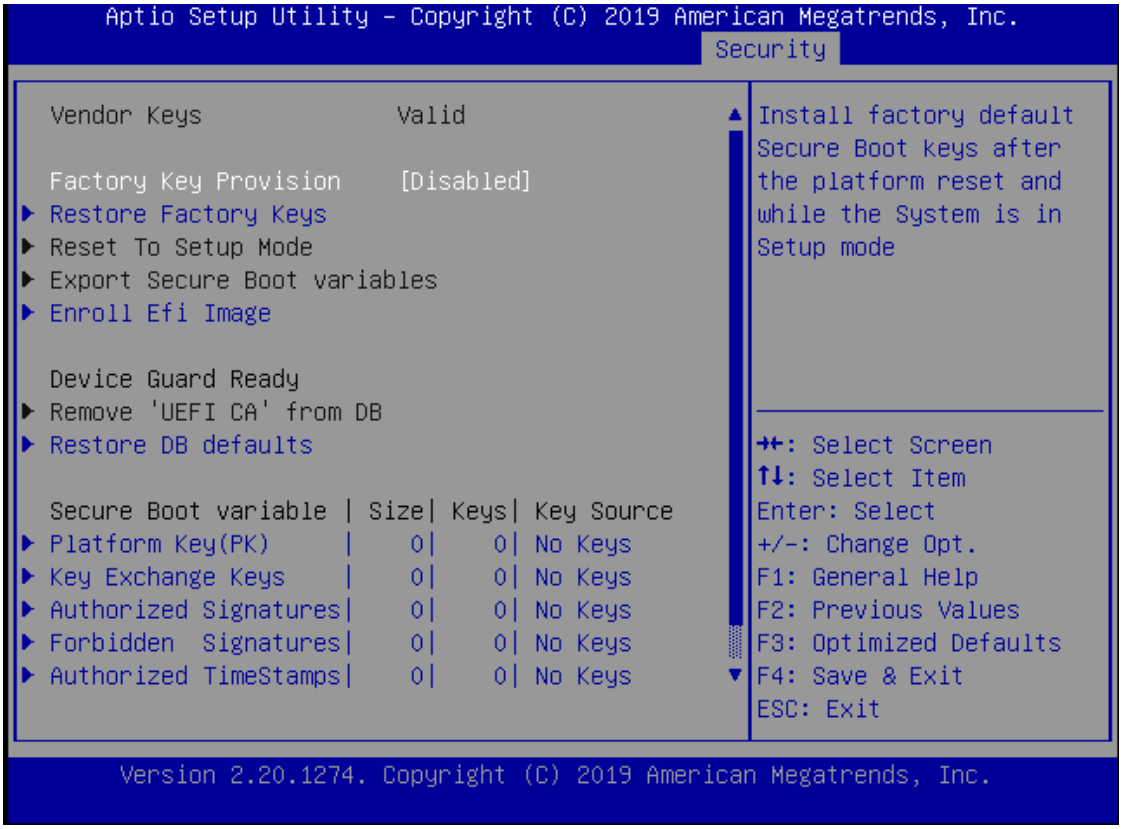
Feature	Description
Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup, the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

Secure Boot



Feature	Options	Description
Secure Boot	Disabled Enabled	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset
Secure Boot Mode	Standard Custom	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication
Restore Factory Keys	None	Force System to User Mode. Install factory default Secure Boot key databases
Key Management	None	Enables expert users to modify Secure Boot Policy variables without full authentication

Key Management

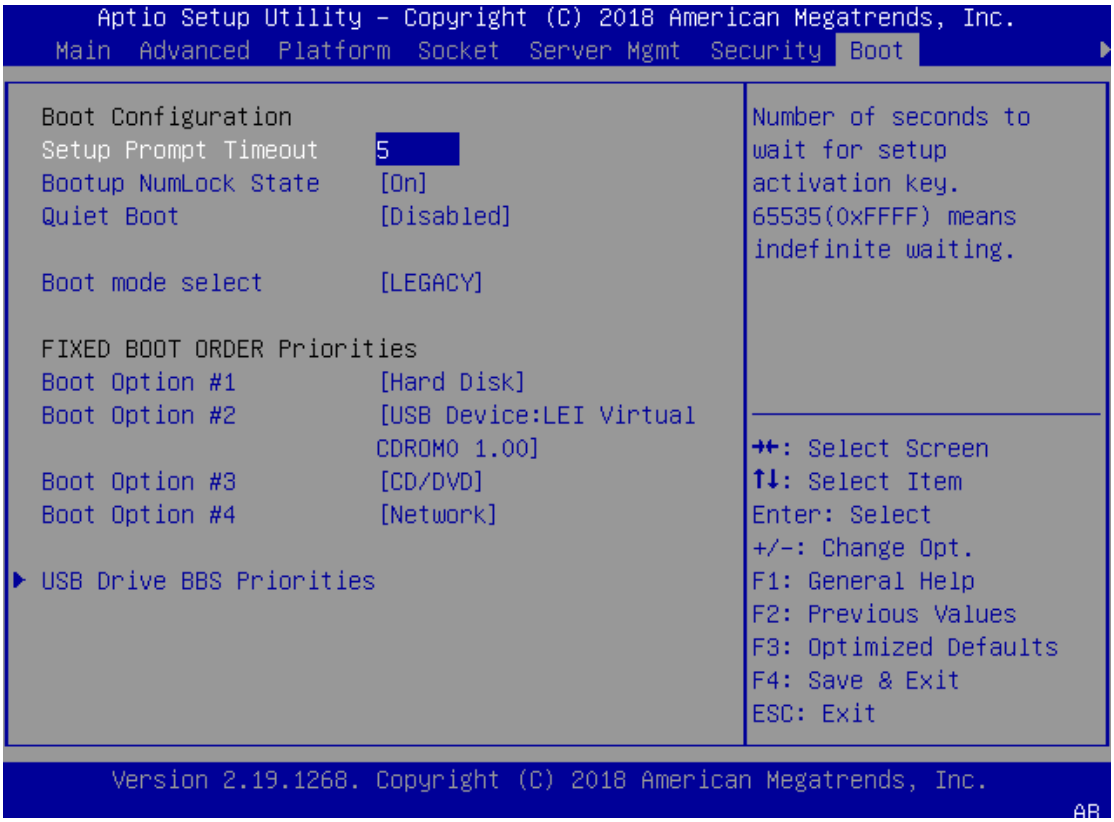


Feature	Options	Description
Factory Key Provision	Disabled Enabled	Provision factory default keys on next re-boot only when System in Setup Mode.
Restore Factory keys	None	Force System to User Mode. Configure NVRAM to contain OEM-defined factory default Secure Boot keys.
Enroll Efi Image	None	Allows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

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.

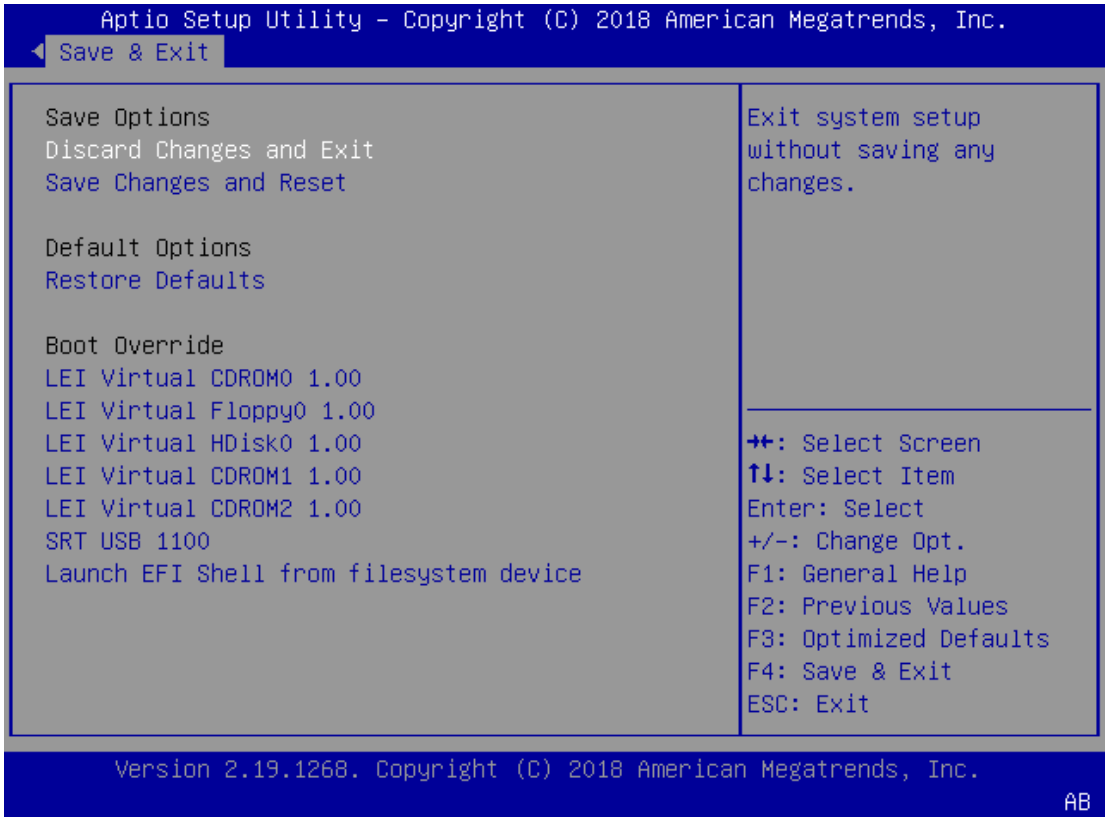
- Choose boot priority from boot option group.
- Choose specifies boot device priority sequence from available Group device.



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.
Boot mode select	LEGACY UEFI DUAL	Select boot mode for LEGACY or UEFI.

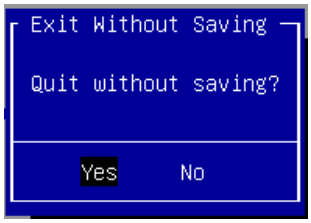
Save and Exit Menu

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



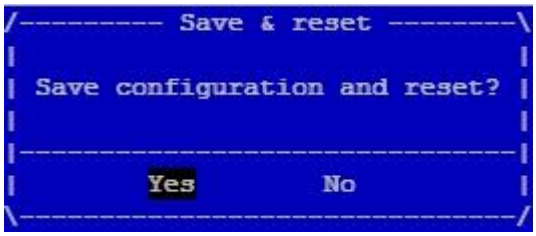
■ Discard Changes and Exit

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



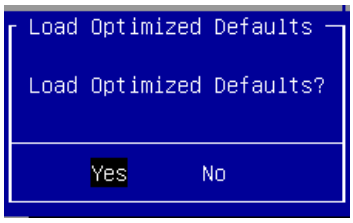
■ Save Changes and Reset

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



■Restore Defaults

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

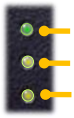


Note

The items under Boot Override may not be the same as what is shown on your device.

APPENDIX A: LED INDICATOR EXPLANATIONS

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



- **System Power**

Solid Green	*The system is powered on*
Off	*The system is powered off*

- **System Status**

  This LED indicator is programmable. You could program it to display the operating status of the behaviors described below:

Solid Green	*Defined by GPIO*
Solid Red	*Defined by GPIO*
Off	*Defined by GPIO*

- **HDD Activity**

  If this LED blinks, it indicates data access activities; otherwise, it remains off.

Blinking Amber	*Data access activity*
Off	*No data access activity*

- **Link Activity**

Blinking Amber	*Link has been established and there is activity on this port*
Solid Amber	*Link has been established and there is no activity on this port*
Off	*No link is established*

- **Speed**

Solid Amber	*Operating as a Gigabit connection (1000 Mbps)*
Solid Green	*Operating as a 100-Mbps connection*
Off	*Operating as a 10-Mbps connection*

- **Link Activity**

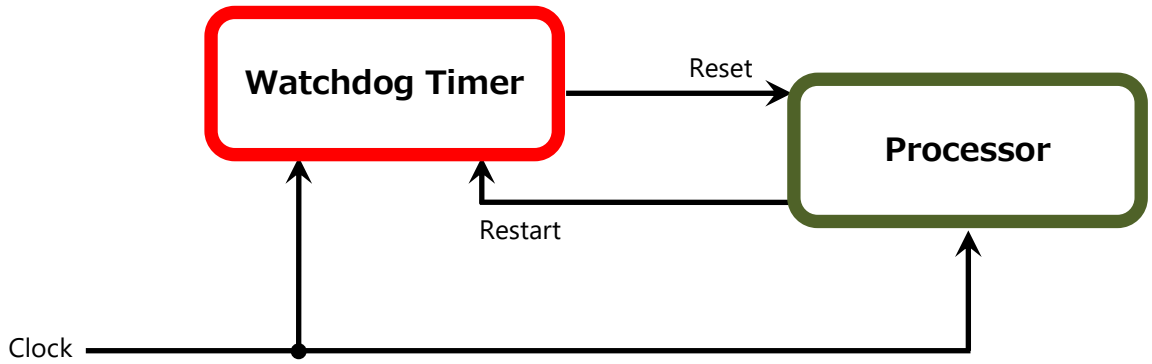
Blinking Green	*Link has been established and there is activity on this port*
Solid Green	*Link has been established and there is no activity on this port*
Off	*No link is established*

- **Speed**

Solid Green	*Operating as 10 Gigabit connection*
Solid Amber	*Operating as a Gigabit connection*
Off	*Operating as a 100 Mbps connection*

APPENDIX B: PROGRAMMING WATCHDOG TIMER

A watchdog timer is a piece of hardware that can be used to automatically detect system anomalies and reset the processor in case there are any problems. Generally speaking, a watchdog timer is based on a counter that counts down from an initial value to zero. The software selects the counter's initial value and periodically restarts it. Should the counter reach zero before the software restarts it, the software is resumed to be malfunctioning and the processor's reset signal is asserted. Thus, the processor will be restarted as if a human operator had cycled the power.



To execute the sample code: enter the number of seconds to start countdown before the system can be reset. Press start to start the counter and stop to stop the counter.

Dwd_tst --swt xxx (Set Watchdog Timer 1-255 seconds)

wd_tst[*] --start (Start Watchdog Timer)

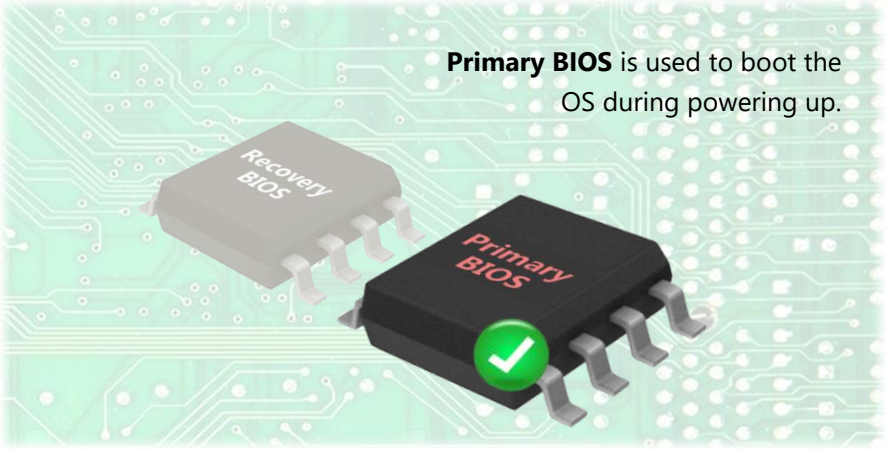
wd_tst --stop (Stop Watchdog Timer)

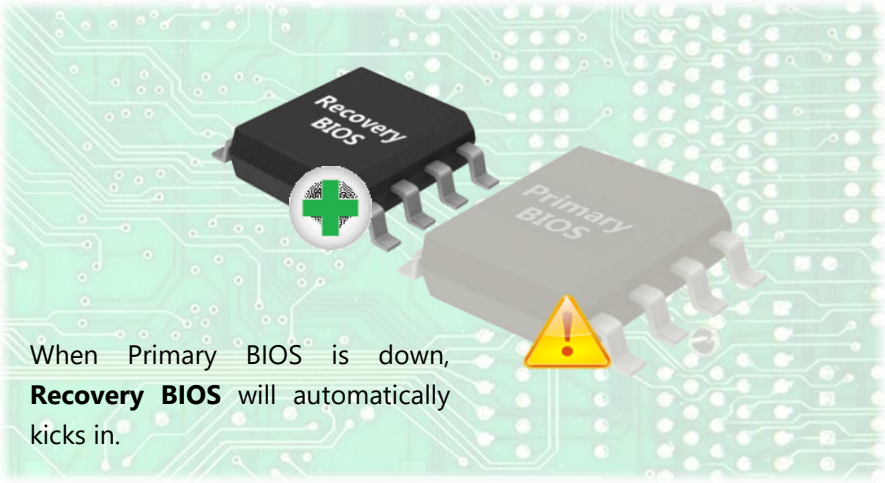
APPENDIX C: DUAL BIOS INTRODUCTION

Why Dual BIOS?

Failure of booting up BIOS is not uncommon to most experienced users, yet it can be the worst nightmare. This occurs mostly during a power failure or a mishandled BIOS update, after a malware's attack that corrupted the data on the chip, or, at worst, due to physical damage that caused the BIOS not to function. When it happens, not merely will the recovering procedures consume considerable time and effort, but all you work might also be to no avail. Eventually, you are left with no choice but to ship the board back to the manufacturer.

Lanner understands this pain and has empowered our products with the Dual BIOS feature. Normally, the Primary BIOS is used to boot the OS during powering up; when Primary BIOS is down, the Recovery BIOS automatically jumps in to boot up the OS for the User to take further steps such as performing data backup and BIOS upgrade.



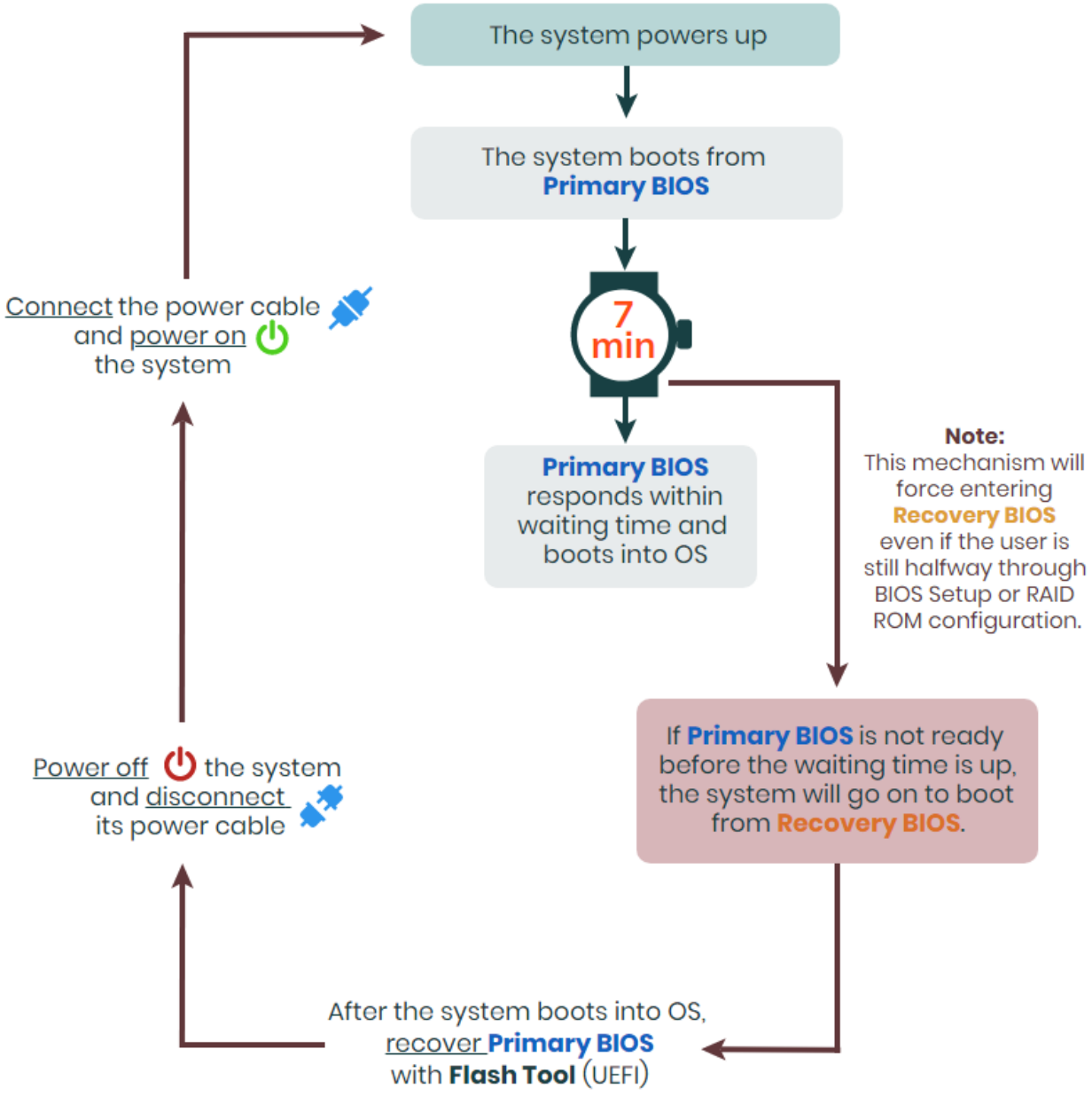


Addressing BIOS Start-up Failure with Dual BIOS

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.

How Dual BIOS Works

Dual BIOS features two physical BIOS ROMs soldered onto the motherboard, carrying two separate BIOS images. The Primary BIOS carries the image for system bootup, the parameters of which can be overwritten, while the Recovery BIOS carries the image locked to the factory default, which guarantees a safe and successful system bootup. If the Primary BIOS is not functioning correctly and fails to respond within 7 minutes, the system will invoke a bootup from the Recovery BIOS, automatically restart the system and launch the operating system.



How do I know which BIOS the system is booting from?

On POST screen, the **Boot Bios** information will display the BIOS used for this bootup.

I just found the system being booted from the Recovery BIOS, what's next?

With the Recovery BIOS at work, it can be asserted that the Primary BIOS is having such severe problem that it failed to function. Before you make certain the BIOS chip is completely corrupted, it is definitely sensible to try the last resort—updating BIOS.

Get Ready for BIOS Update

Flashing a corrupted BOS can never be taken lightly, for once done wrongly, it is almost certain to lead to an unusable system. To get ready for a BIOS update, acquire the following BIOS resources from Lanner technical support:

- Firmware and Flash Tool
- BIOS Engineering Spec
- Release Note

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

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.

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

APPENDIX D: SETTING UP CONSOLE REDIRECTIONS

Console redirection lets you monitor and configure a system from a remote terminal computer by re-directing keyboard input and text output through the serial port. The following steps illustrate how to use this feature. The BIOS of the system allows the redirection of the console I/O to a serial port. With this configured, you can remotely access the entire boot sequence through a console port.

1. Connect one end of the console cable to console port of the system and the other end to the serial port of the Remote Client System.
2. Configure the following settings in the BIOS Setup menu:
   BIOS > **Advanced** > **Serial Port Console Redirection** > **Console Redirection Settings**, select **115200** for the Baud Rate, **None**. for Flow control, **8** for the Data Bit, **None** for Parity Check, and **1** for the Stop Bit.
3. Configure console redirection related settings on the client system. You can use a terminal emulation program that features communication with serial COM ports such as *TeraTerm* or *Putty*. Make sure the serial connection properties of the client conform to those for the server.

APPENDIX E: PROGRAMMING GENERATION 3 LAN BYPASS

The bypass function is used to link two independent Ethernet ports when the system crashes or powers off. This means if your system is equipped with a LAN Bypass function, a condition in your system will not interrupt your network traffic. Different from the previous two generations (Gen1 and Gen2), the Lanner Bypass Gen 3 employs a programming method to control the bypass function by software. There are typically two types of communication status for the bypass function, one is "**Normal"** and another is "Bypass" status. Furthermore, the Lanner Bypass software can control the bypass status in the following 3 instances.

- When the system powers off, it can be forced to enable the LAN Bypass function.
- When the system is in the just-on state which is a brief moment when it powers up.
- The Lanner bypass possesses the following features:
  1. Communication through SMBUS (I2C)
  2. Independent bypass status control for each pair up to a total of 4 pairs
  3. Lanner Bypass Modules can bypass systems Ethernet ports on a host system during three instances: Just-on (Just-on is the brief moment when the internal power supply turns on and booting process starts), system off, or upon software request (during run-time).
  4. Software programmable bypass or normal mode
  5. Software programmable timer interval:

     - **JUST-ON** watchdog timer, used during JUST-ON, has timer setting of 5~1275 seconds of timer interval.

     - **Run-Time** watchdog timer, used during run-time, with of 1~255 seconds of timer interval.
  6. Multiple Watchdog Timers:

     -**Two for run-time**: It is designed to give you a more variety of controls of the bypass on port basis. By using dedicated watchdogs for different pairs of bypass, you have the flexibility to manage the bypass status for them differently.

     -**One for just-on**: It is designed to give you the precise control of the bypass during this phase. You can use this timer to delay enabling the bypass in just-on state.

- For a reference utility that contains sample code for LAN Bypass function programming, please visit http://www.lannerinc.com/support/download-center/drivers, enter the product category and download the utility package of this system.

APPENDIX F: INSTALLING INTEL® LAN CONTROLLER DRIVER FOR LINUX

For the latest driver update, please visit Intel® download center at https://downloadcenter.intel.com/, use the keyword search or the filter to access the driver's product page, and then download the latest controller driver as well as the ReadMe document.

Product Name Keyword	I210-AT
Download Type	Drivers
Operating System	Linux*
Product page	https://downloadcenter.intel.com/product/64400/Intel-Ethernet-Controller-I210-AT

APPENDIX G: 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 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

Authorized Signature / Date

Confirmed By Supplier

Authorized Signature / Date