

# Lanner

## Network Appliance Platform

Hardware Platforms for Network Computing

## FX-3230 User Manual

Version: 1.1

Date of Release:2020-12-18

## 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 exclamation point indicates that there is a caution or warning and it is something that could damage your property or product.

## Online Resources

The listed websites are links to the on-line product information and technical support.

Resources	URL
Lanner	<a href="http://www.lannerinc.com">http://www.lannerinc.com</a>
Product Resource	<a href="http://www.lannerinc.com/download-center">http://www.lannerinc.com/download-center</a>
RMA	<a href="http://eRMA.lannerinc.com">http://eRMA.lannerinc.com</a>

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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:**

- ▶ 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 English Installation and Device Specifications which are to be applied.
- ▶ Do not carry the handle of power supplies when moving to another place.

### **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).
- ▶ Product shall be used with Class 1 laser device modules.

### **Mounting Installation Precaution**

#### **Environment:**

- ▶ 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 ( $T_{ma}$ ) 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.
- ▶ Le produit doit être utilisé avec des modules de dispositifs laser de classe 1.

## **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.

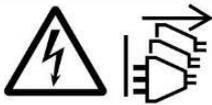
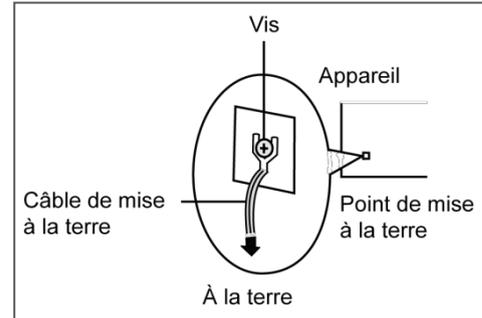
- ▶ Vérifiez que le couvercle du châssis est bien fixé. La conception du châssis permet à l'air de refroidissement de bien circuler. Un châssis ouvert laisse l'air s'échapper, ce qui peut interrompre et rediriger le flux d'air frais destiné aux composants internes.
- ▶ Les décharges électrostatiques (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 mm<sup>2</sup> ou 10 AWG.

## 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 30 A de courant.
- ▶ Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation CC.



**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.

This equipment must be grounded. The power cord for product should be connected to a socket-outlet with earthing connection.

## Battery Precautions

- ▶ Lithium Battery Caution: There is danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type. Dispose batteries according to manufacturer's instructions.
- ▶ 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 may result in an EXPLOSION or the leakage of flammable liquid or gas.

Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.

The machine can only be used in a restricted access location, such as labs or computer facilities with the proper authorization.

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# CHAPTER 1: PRODUCT OVERVIEW

The FX-3230 is a secure, high-performance and high-capacity 2U rackmount storage gateway appliance built with Intel® Xeon® Processor Scalable Family (Skylake-SP). It comes with Intel® QuickAssist Technology and can be configured with up to 320GB of system memory, 4x 3.5" swappable HDD bays, 1x onboard mSATA slot, 4x GbE RJ45 or 4x 10G SFP+, 4x NIC module slots, 1x RJ45 & 1x mini USB consoles and 1x IPMI.

## Package Content

Your package contains the following items:

- ▶ 1x FX-3230 Network Appliance
- ▶ 2x US Power Cord
- ▶ 1x Console Cable (RS232)
- ▶ 1x LAN Cable (Cross-over)
- ▶ 1x LAN Cable (Straight)
- ▶ 1x Ear Kit

## Ordering Information

SKU No.	Main Features
FX-3230A	Intel C626 + 4x 10G SFP+ with LED + BMC, 4x NIC Module Slots
FX-3230B	Intel C621 + 4x GbE RJ45 MGMT, 4x NIC Module Slots
FX-3230C	Intel C627 + 4x 10G SFP+ with LED + BMC, 4x NIC Module Slots

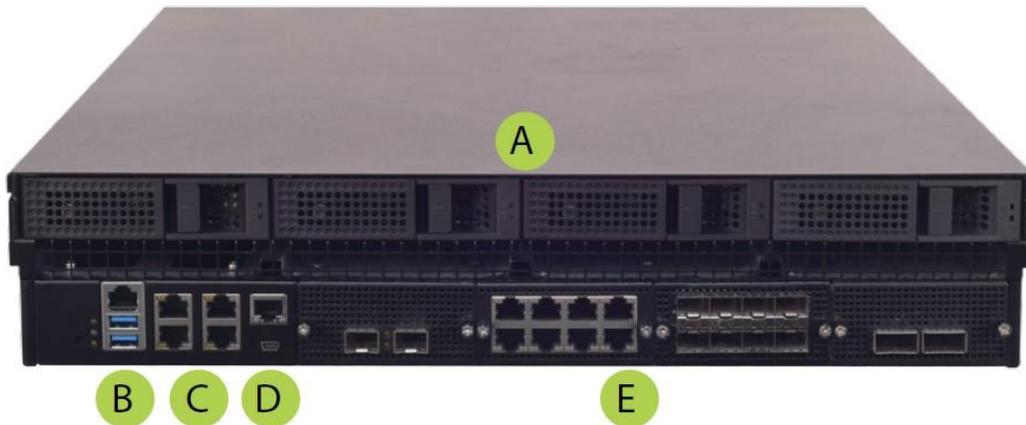


**Note:** If any component is missing or damaged, please contact your dealer immediately for assistance.

## System Specifications

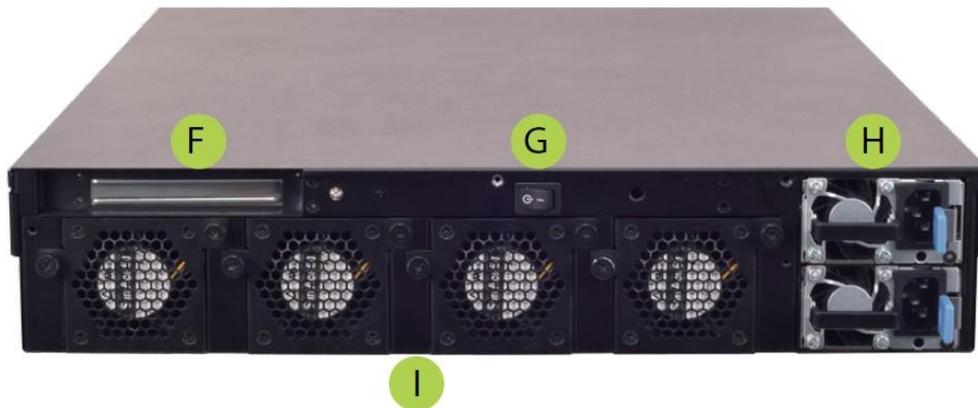
<b>Form Factor</b>		2U 19" Rackmount
<b>Platform</b>	Processor Options	Intel® Xeon® Processor Scalable Family (Skylake-SP)
	CPU Socket	1x LGA3647
	Chipset	Intel® C621/626/627
	Security Acceleration	Intel® QuickAssist Technology (By SKU)
<b>BIOS</b>		AMI SPI Flash BIOS
<b>System Memory</b>	Technology	DDR4 2666 MHz REG DIMM
	Max. Capacity	320GB
	Socket	10 x 288pin DIMM
<b>Networking</b>	Ethernet Ports	4x GbE RJ45 Intel® or 4x 10G SFP+ Lewisburg internal MAC (By SKU)
	Bypass	Depends on NIC module specifications
	NIC Module Slot	4
<b>LOM</b>	IO Interface	1x RJ45 (By SKU)
	OPMA slot	IPMI Chip onboard (SKU A & C)
<b>I/O Interface</b>	Reset Button	1
	LED	Power/Status/Storage
	Power Button	1x ATX Power Switch
	Console	1x RJ45 1x mini USB Console (By SKU)
	USB	2x USB 3.0
	LCM Module	N/A (Optional)
	Display	1x VGA (Internal Pin Header)
	Power input	AC power inlet on PSU
<b>Storage</b>	HDD/SSD Support	4x 3.5" swappable
	Onboard Slots	1x mSATA
<b>Expansion</b>	PCIe	1x PCI-E*8 FH/HL (Optional)
	mini-PCIe	N/A
	SIM card Slot	N/A
<b>Miscellaneous</b>	Watchdog	YES
	Internal RTC with Li Battery	YES
	TPM	YES (Optional)
<b>Cooling</b>	Processor	Passive CPU heat sink
	System	4x individual hot-swappable cooling fans with smart fan
<b>Environmental Parameters</b>	Temperature	0~40°C Operating -20~70°C Non-Operating
	Humidity (RH)	5~90% Operating 5~95% Non-Operating
<b>System Dimensions</b>	(WxDxH)	438 x 600 x 88 mm
	Weight	13kg
<b>Package Dimensions</b>	(WxDxH)	935x588x258mm
	Weight	20kg
<b>Power</b>	Type/Watts	550W 1+1 Redundant PSUs
	Input	AC 100~240V @47~63 Hz
<b>Approvals and Compliance</b>		CE/FCC Class A

## Front Panel



- A** 4x 3.5" Swappable|HDD
- B** Console (RJ45) & 2x USB 3.0
- C** 4x GbE RJ45 or 10G SFP+
- D** Console (Mini USB) & IPMI
- E** 4x NIC Modules

## Rear Panel

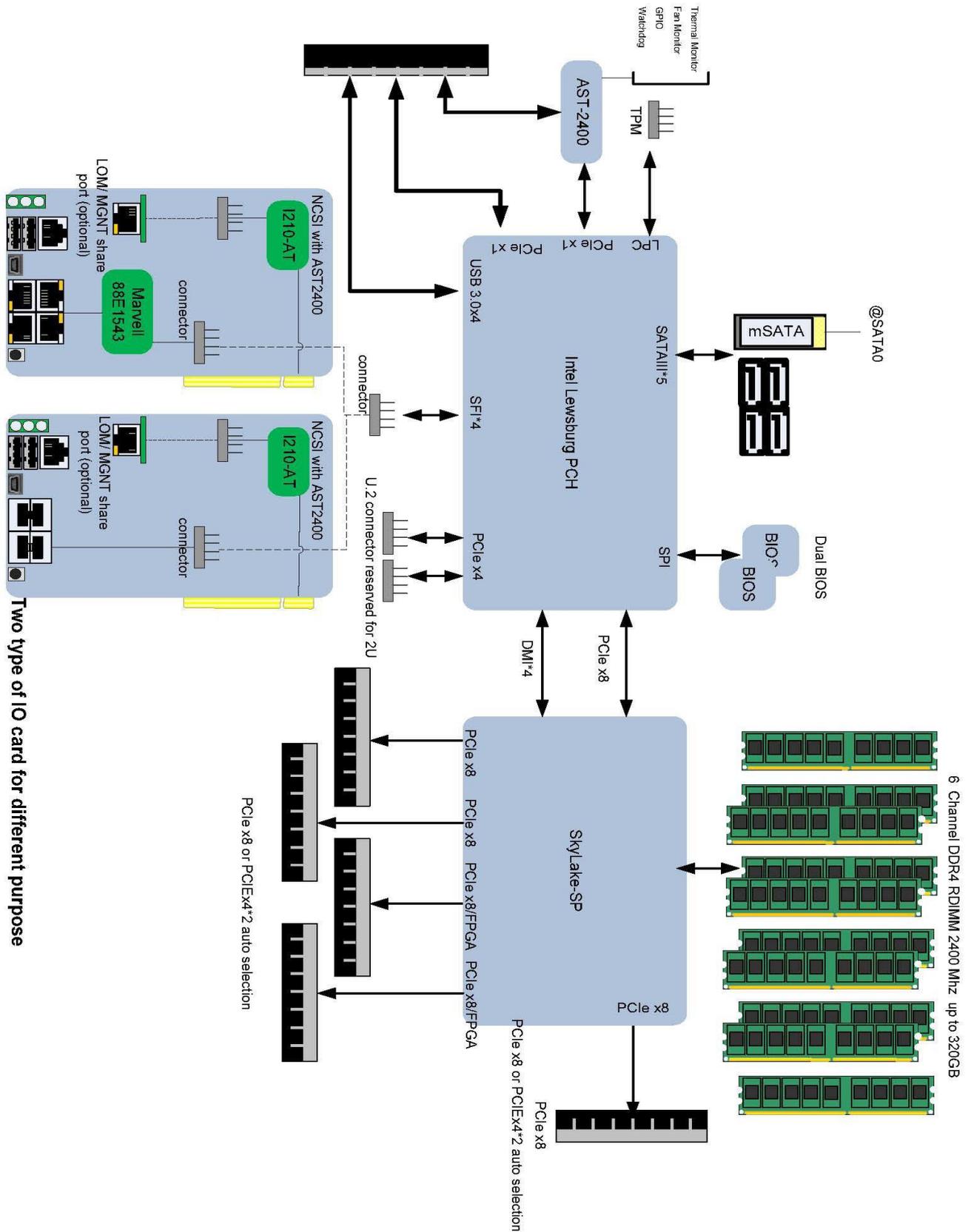


- F** Optional PCI-E\* 8 FH/HL
- G** Power On/Off Switch
- H** PSUs
- I** Cooling Fans

# CHAPTER 2: MOTHERBOARD INFORMATION

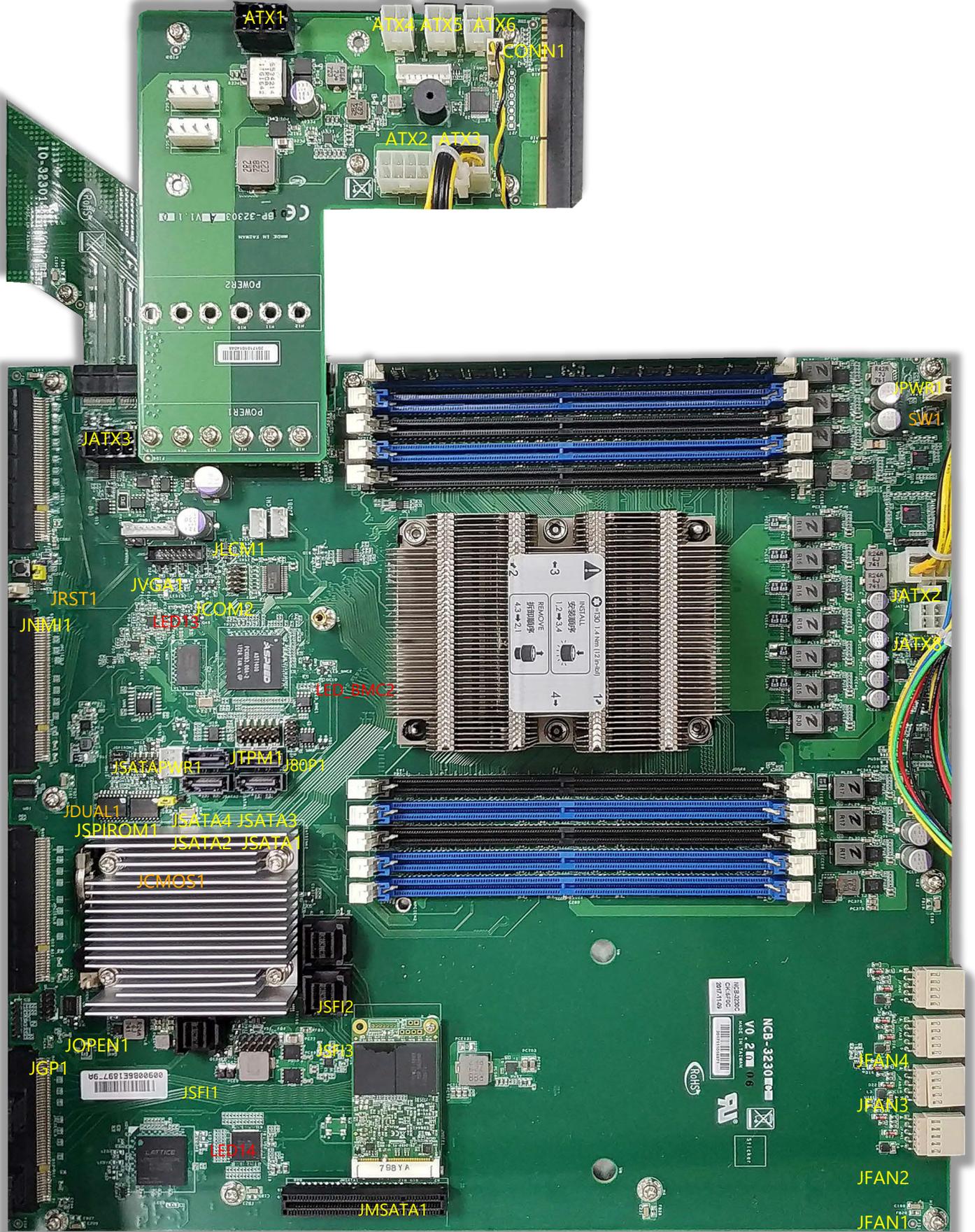
## Block Diagram

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



## Motherboard Layout

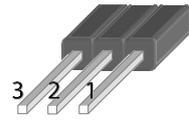
The motherboard layout shows the connectors and jumpers on the board. Refer to the following picture as a reference of the pin assignments and the internal connectors.



## Internal Jumper & Connectors

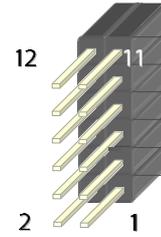
### JRST1:

Setting	Description	Setting	Description
1.2 	HW reset	2.3	SW reset



**JTPM1:** Supports TPM 1.2 & 2.0

Pin	Description	Pin	Description
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	TPM_RST#	12	GND



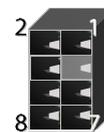
**JVGA1**

Pin	Description	Pin	Description
1	DAC_RO	2	GND
3	DAC_GO	4	GND
5	DAC_BO	6	GND
7	HSYNC_O	8	
9	VSYNC_O	10	GND
11	DDC_DATA	12	DDC_CLK



**ATX6:** 8-Pin Power Connector

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



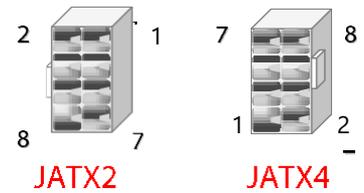
**JATX8:** 4 pin Power Connector (12V standby)

Pin	Description	Pin	Description
1	GND	2	+P12V_1_STBY
3	GND	4	+P12V_1_STBY



**JATX2 & JATX4:** 8 pin Power Connector

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



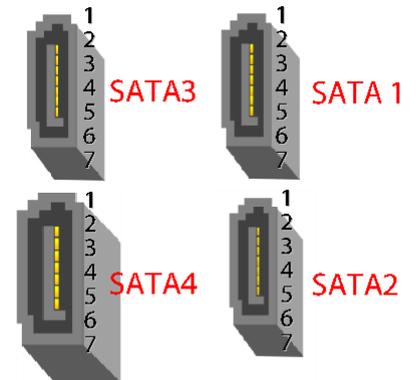
**JATX9:** 4 pin Power Connector (12V standby)

Pin	Description	Pin	Description
1	GND	2	+P12V_2_STBY
3	GND	4	+P12V_2_STBY



**JSATA1~JSATA4:** SATA Port

Pin	Description	Pin	Description
1	GND	2	TX_P
3	TX_N	4	GND
5	RX_N	6	RX_P
7	GND		



**JFAN1~4:** FAN Connector

Pin	Description	Pin	Description
1	GND	2	12V
3	RPM Sense	4	RPM Sense
5	WM Status		

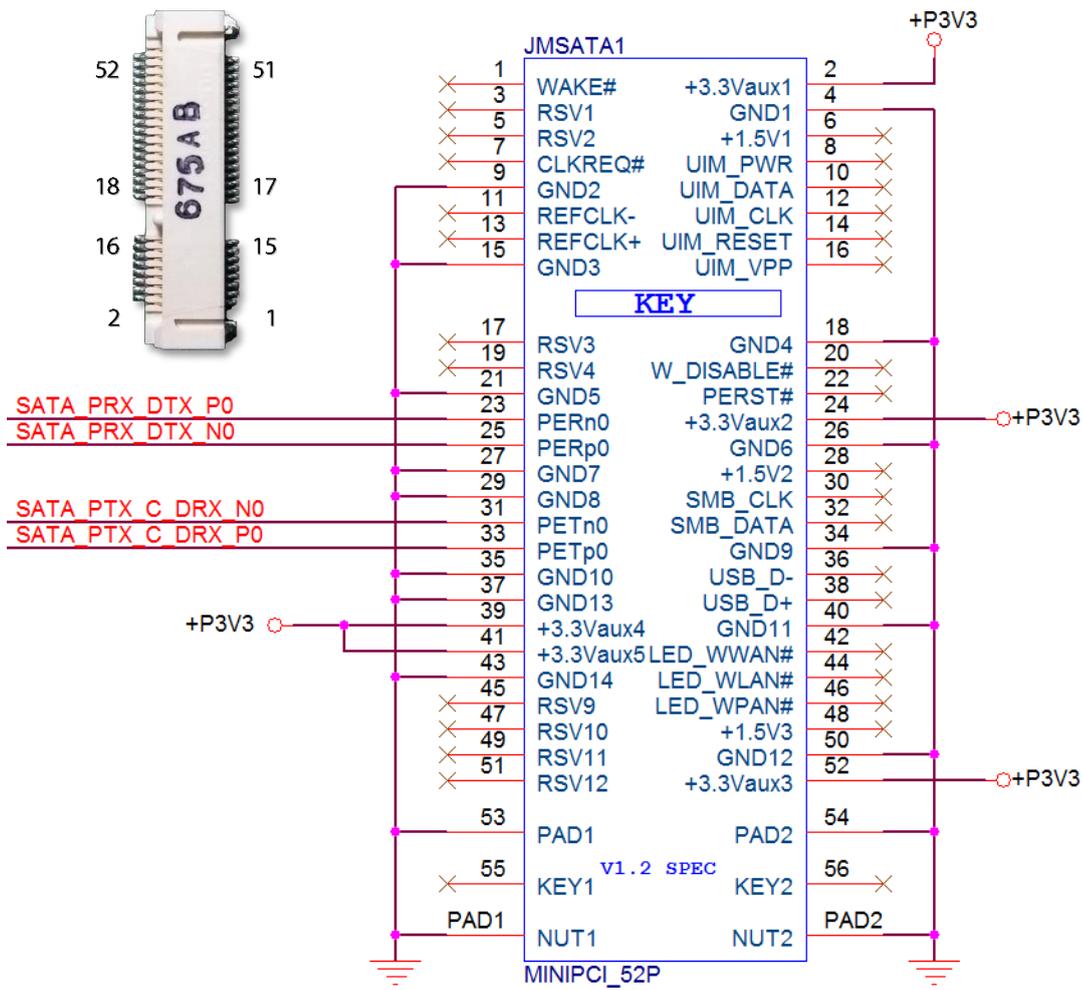


**JNMI1:**

Pin	Description	Pin	Description
1	GND	2	NMIBTN#



**MSATA1:**

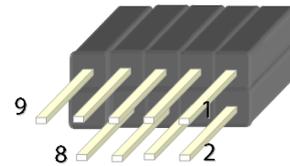


Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	WAKE#	2	+3.3Vaux1	3	RSV1	4	GND1
5	RSV2	6	+1.5V1	7	CLKREQ	8	UIM_PWR
9	GND2	10	UIM_DATA	11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RESET	15	GND3	16	UIM_VPP
17	RSV3	18	GND4	19	RSV4	20	W_DISABLE#
21	GND5	22	PERST#	23	PERn0	24	+3.3Vaux2
25	PERp0	26	GND6	27	GND7	28	+1.5V2
29	GND8	30	SMB_CLK	31	PETn0	32	SMB_DATA

<b>33</b>	PETp0	<b>34</b>	GND9	<b>35</b>	GND10	<b>36</b>	USB_D-
<b>37</b>	GND13	<b>38</b>	USB_D+	<b>39</b>	+3.3Vaux4	<b>40</b>	GND11
<b>41</b>	+3.3Vaux5	<b>42</b>	LED_WWAN#	<b>43</b>	GND14	<b>44</b>	LED_WLAN#
<b>45</b>	RSV9	<b>46</b>	LED_WPAN#	<b>47</b>	RSV10	<b>48</b>	+1.5V3
<b>49</b>	RSV11	<b>50</b>	GND12	<b>51</b>	RSV12	<b>52</b>	+3.3Vaux3

**JCOM2: COM PORT**

Pin	Description	Pin	Description
<b>1</b>	BMC_COM2_DCD#	<b>2</b>	BMC_COM2_DSR#
<b>3</b>	BMC_COM2_RX	<b>4</b>	BMC_COM2_RTS
<b>5</b>	BMC_COM2_TX	<b>6</b>	BMC_COM2_CTS#
<b>7</b>	BMC_COM2_DTR	<b>8</b>	BMC_COM2_RI#
<b>9</b>	COM2_GND2		



**JLCM1: UART2**

Pin	Description
<b>1</b>	BMC_COM2_DCD#
<b>2</b>	BMC_COM2_RX
<b>3</b>	BMC_COM2_TX
<b>3</b>	BMC_COM2_DTR



**Note:** The on-board BMC supports two UARTs: UART1 for console and UART2 for LCM or COM2. If UART2 is to be used for connecting LCM, the on-board COM2 pin header or a reserved COM port opening on rear panel will be of no necessity.

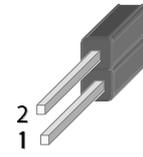
**PMB1: PMBUS**

Pin	Description	Pin	Description
<b>1</b>	PSU_TTL1	<b>2</b>	PSU_TTL2
<b>3</b>	ATX_PSON#	<b>4</b>	GND
<b>5</b>	ATXPWGD	<b>6</b>	PMBUS_CLK
<b>7</b>	PMBUS_DAT	<b>8</b>	PMBUS_ALERT#



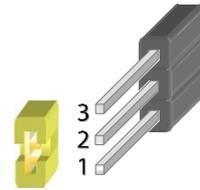
**JOPEN1:** Case open

Pin	Description	Pin	Description
<b>1</b>	GND	<b>2</b>	FM_INTRUDER#



**JCMOS1:** Clear CMOS

Pin	Description	Pin	Description
1	VRTC	2	PCH_RTCRST#
3	GND		



Normal (Default)

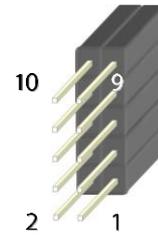


Clear CMOS



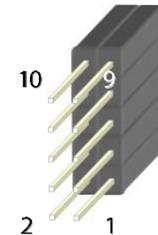
**JSPIROM1:** Flash BIOS

Pin	Description	Pin	Description
1	SPI_HD1#	2	SPI_CS1#_DUAL
3	SPI_CS0#_DUAL	4	+P3V3_SPI_ME
5	SPI_MISO	6	SPI_PCH_IO3
7		8	SPI_CLK
9	GND	10	SPI_MOSI

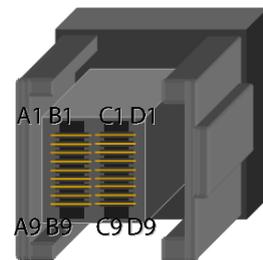
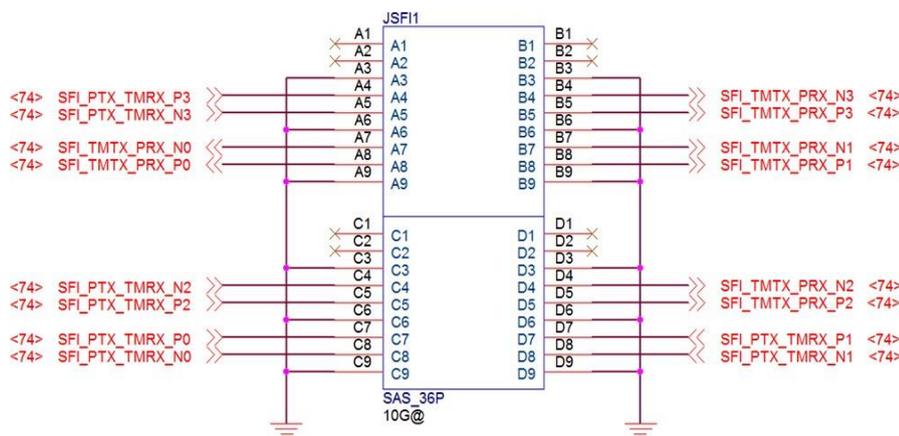


**JGP1:** EXT GPIO header

Pin	Description	Pin	Description
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



**JSFI1:** SFP+ (for fiber cable)

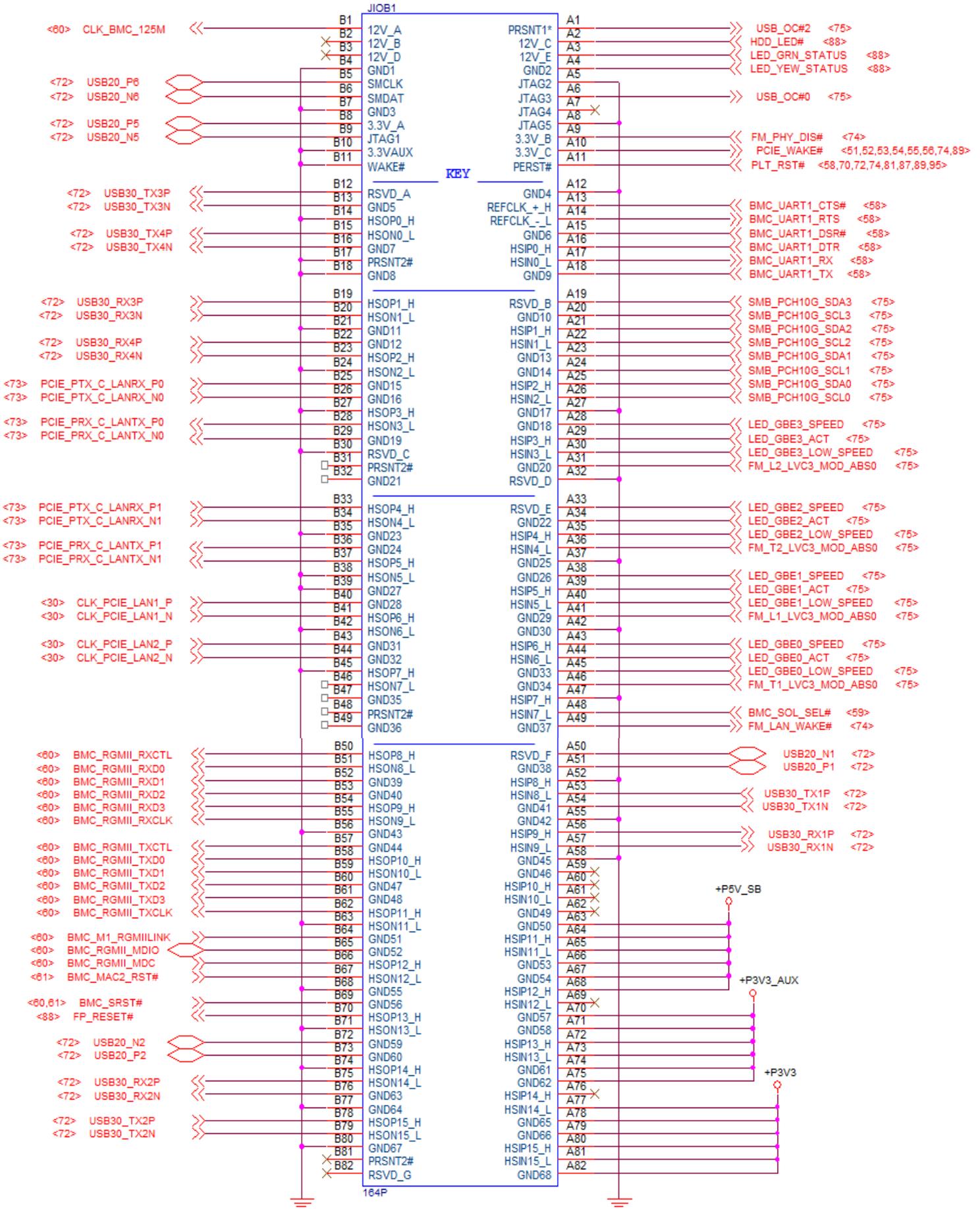


**JPWRON1:** Power on

Pin	Description	Pin	Description
1	GND	2	ATX_PSON#



**JIOB1: IO board**

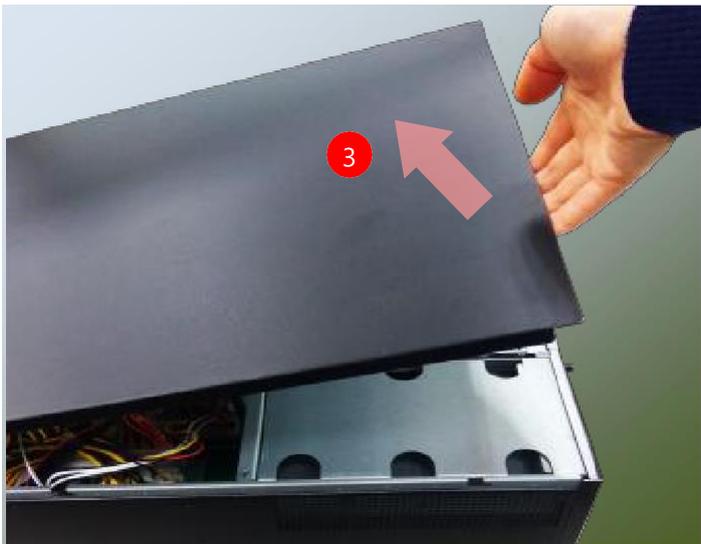


## CHAPTER 3: HARDWARE SETUP

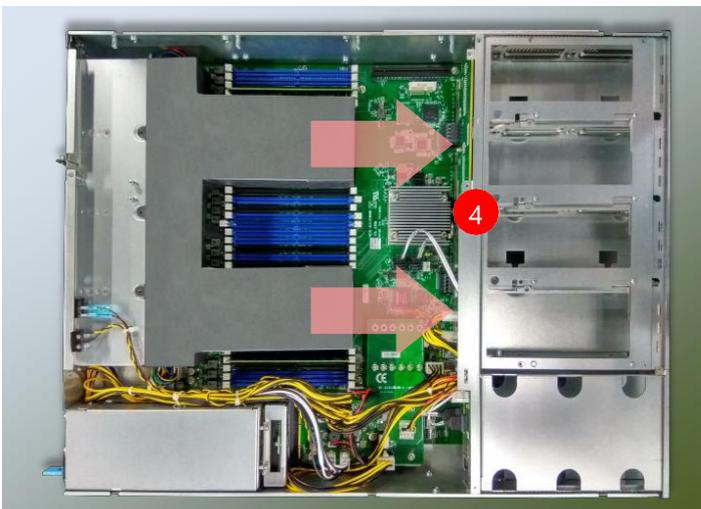
To reduce the risk of personal injury, electric shock, or damage to the system, please remove all power connections to completely shut down the device. Also, please wear ESD protection gloves when conducting the steps in this chapter.

### Opening the Chassis

1. Loosen the 2 thumb screws from the rear panel of FX-3230.
2. Gently pull the cover backward a bit.
3. Lift the cover up to remove it.



4. Remove the cover that protects the CPUs and the fans.



## 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 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

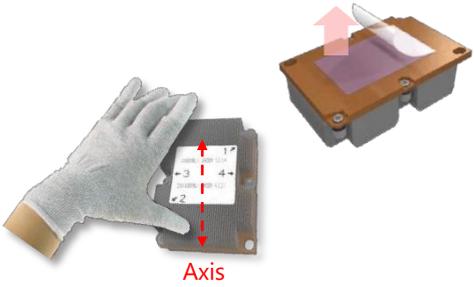
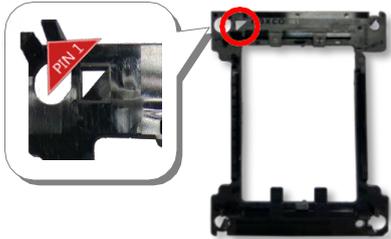
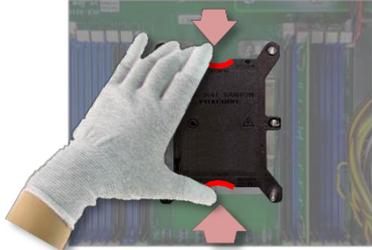
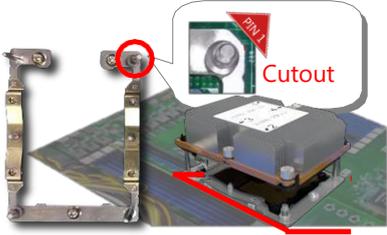
Tool	Description
Torque screwdriver (Star T30)	Set to <u>1.36 N.m.</u> or <u>12 in-lbf</u> for tightening the nuts which fasten the PHM on the bolster plate. 
ESD Protection (ESD gloves, ESD-safe work surface, etc.)	During the entire assembly process, at least wear a pair of ESD gloves to avoid damaging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

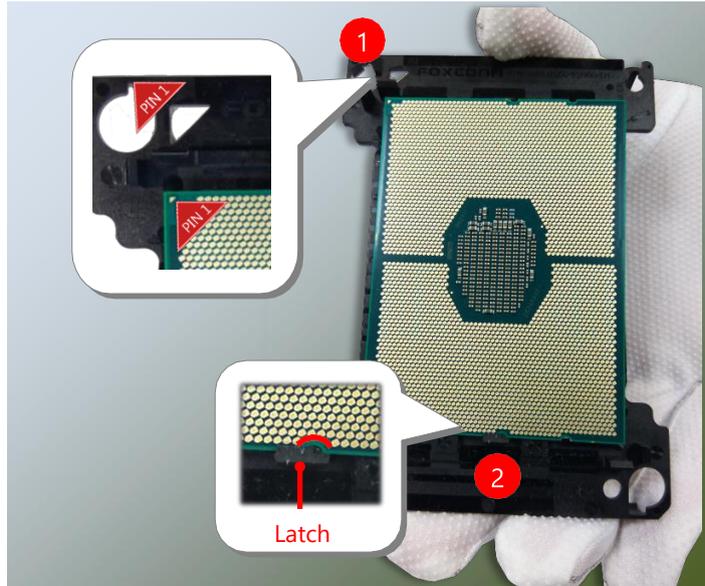
### Parts Explanation:

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

<p><b>Heat Sink</b></p>	<p>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.</p> <p>When holding it, please grip it along the axis of its fins with your thumb and your index finger.</p>	
<p><b>Processor Carrier</b></p>	<p>This is packed along with the processor. Before performing any assembly involving this part, please locate <b>PIN1</b> on one of the corners, an important indicator used to align this carrier with the processor and the bolster plate correctly.</p>	
<p><b>Dust Cover</b></p>	<p>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.</p>	
<p><b>Bolster Plate</b></p>	<p>A robust bolster plate is used to assist in PHM alignment for installation, while effectively helping eliminate PCB bowing during compression. Please locate the <b>Cutout</b> on one of the four corners before starting PHM installation.</p>	

## Mounting the CPU onto the Heat Sink

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

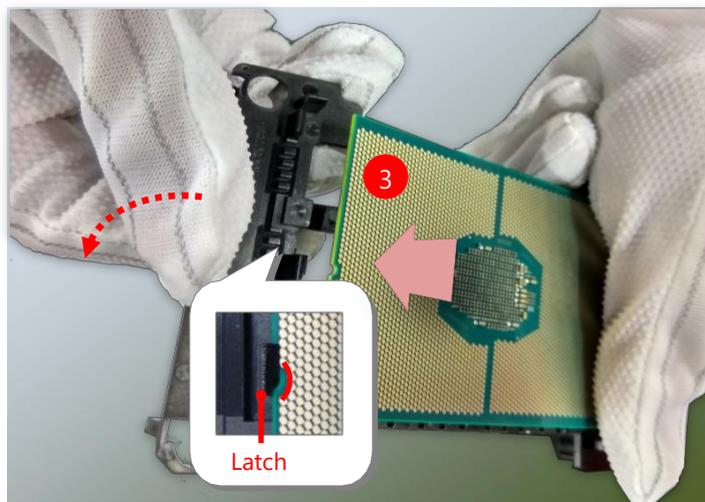


2. Gently insert one side of the processor into the carrier and make sure the alignment feature is aligned with the latch of the carrier.

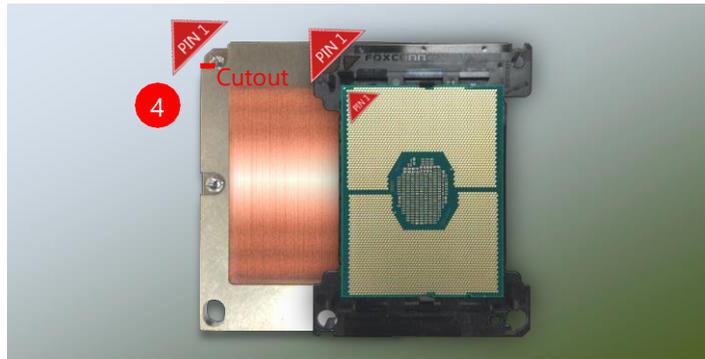


**Note:** During assembly, it is essential to have (1) PIN1 on the processor aligned with that on the carrier, and (2) the alignment features on the top and the bottom of the CPU aligned with the corresponding carrier latches.

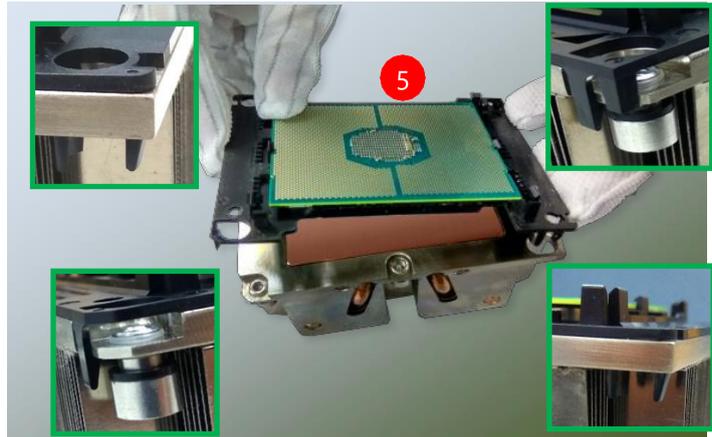
3. For the other end of the carrier, align the alignment feature of the processor with the carrier latch, and then gently bend over the carrier end to have the latch clamp on the processor.



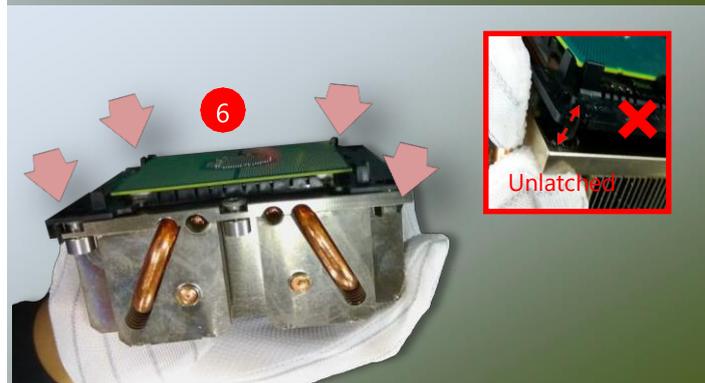
- Align **PIN1** of the processor with the corner cutout of the heat sink (if there are two corner cutouts on one heat sink, either will do).



- 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.



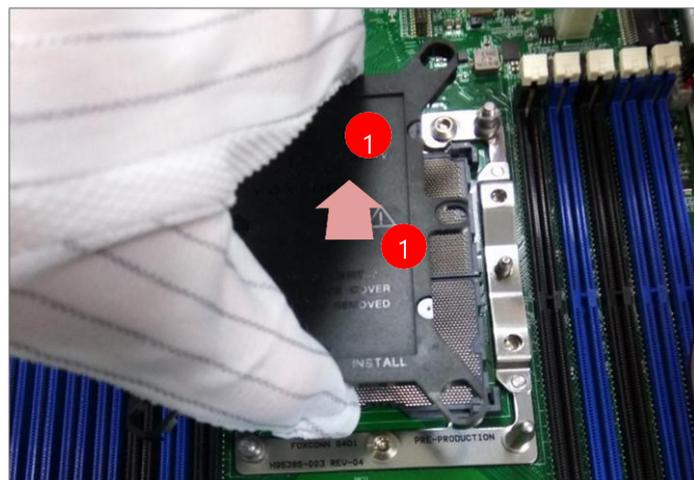
- Go through the four corners to check if the latches are engaged. If correctly latched, the corners of the carrier should be tightly attached to the heat sink, and no gap in-between is observed.



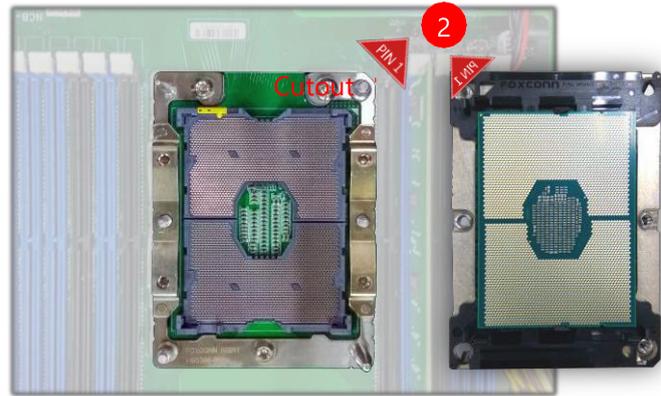
### Installing the PHM onto the Motherboard

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

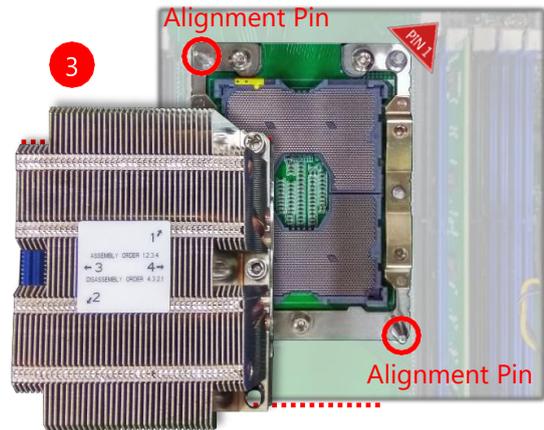
 **Note:** Inspect the surface of the socket under sufficient light to ensure there is no contamination or damage prior to the PHM installation.



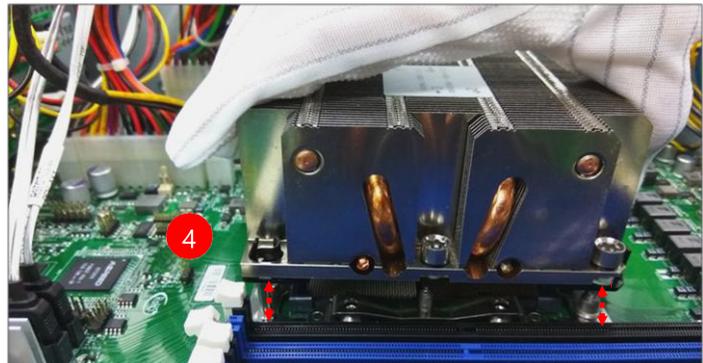
2. Flip the PHM over to align **PIN1** of the carrier with the **Cutout** of the bolster plate.



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.

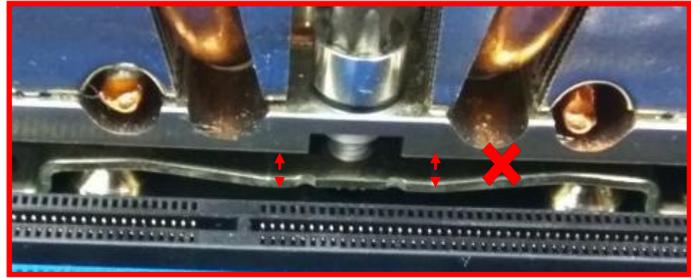
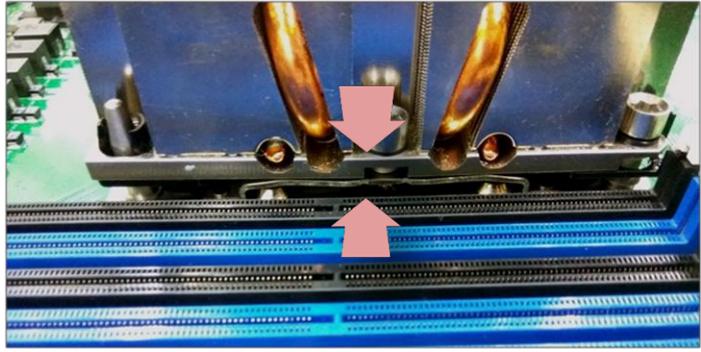


5. Use a torque driver to tighten the four nuts to 12 in-lbf into the bolster plate following the sequence indicated on the heat sink (#1→#2→#3→#4).





**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.



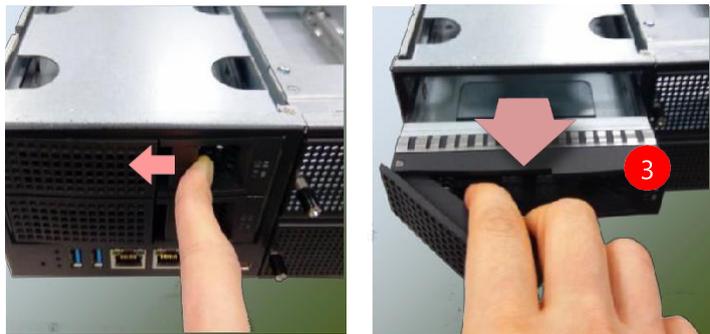
## Installing the Disk Drive(s)

FX-3230 is built with two 3.5" HDD/SSD slot (HDD preferred) drive bay. The following will discuss disk drive installation procedures based on their HDD/SSD designs.

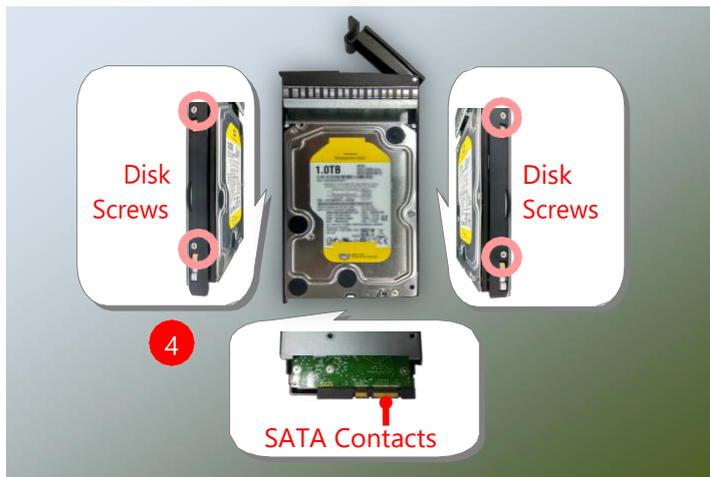
1. Power off the system.
2. Locate the 3.5" disk bay on the front panel.



3. To remove the tray, put your finger on the tab and push it to the left to slide it open, hold the tab lever and pull out the tray.



4. To mount the disk onto the empty tray, secure the hard disk on the tray with the provided disk screws. Make sure the disk connector faces towards the system.



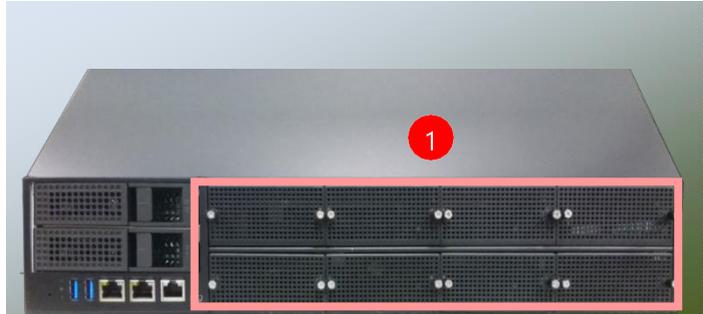
5. To install the mounted disk tray, push the tray into position in the chassis. Press the hinge tab until it clicks into place.



## Installing the Disk Drive(s)

FX-3230 comes with 8 NIC Ethernet module slots for network bandwidth expansion. Please follow the steps for installation.

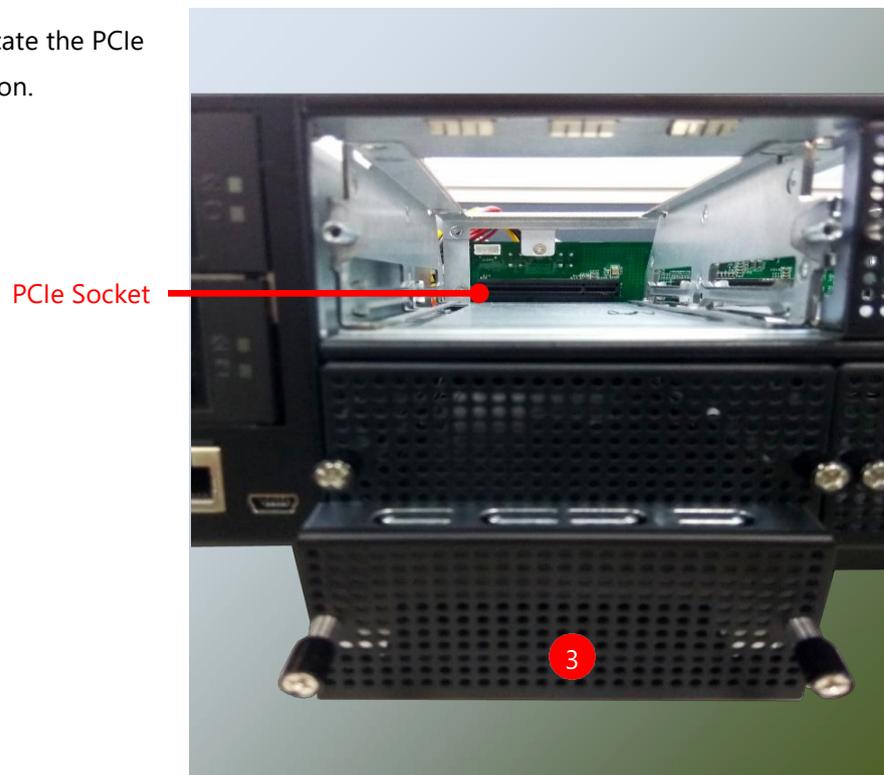
1. On the front panel, select a NIC Ethernet module slot.



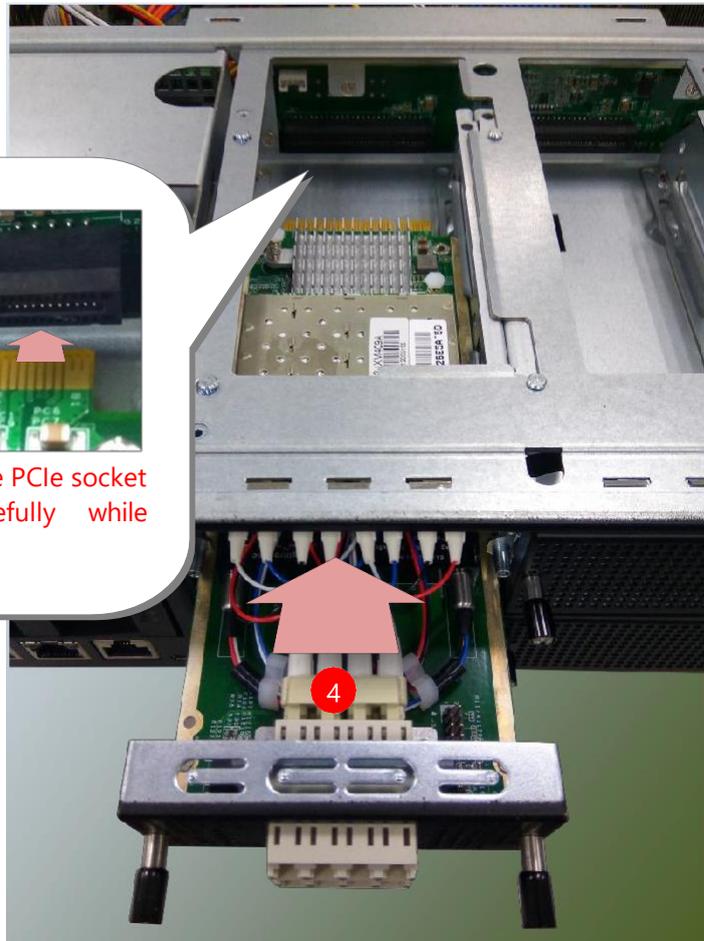
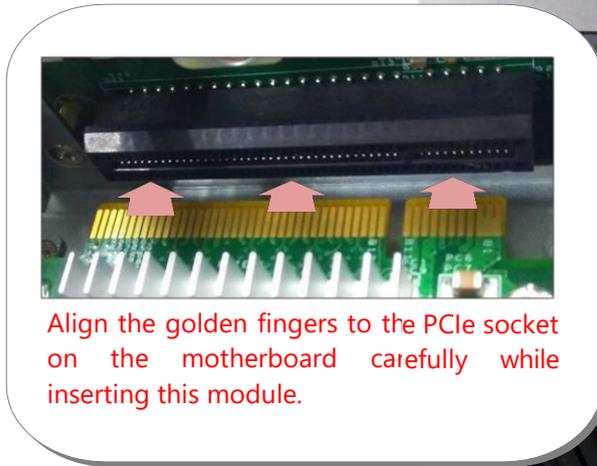
2. Rotate clockwise and loosen the two lock-screws.



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



4. Insert your NIC Ethernet 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.



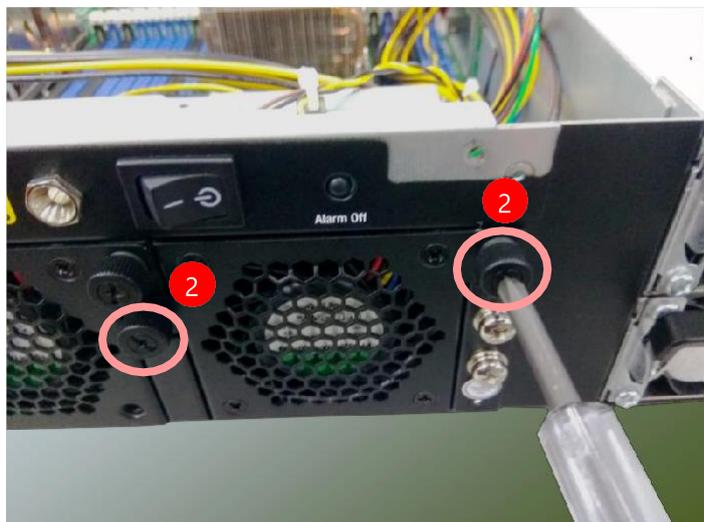
## Replacing the Cooling Fans

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.



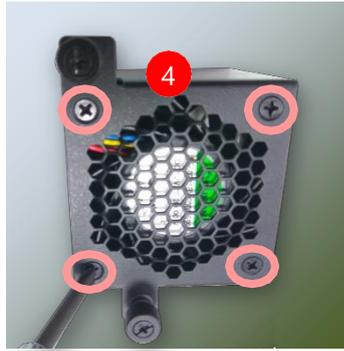
2. Loosen the two lock-screws of the fan you would like to replace.



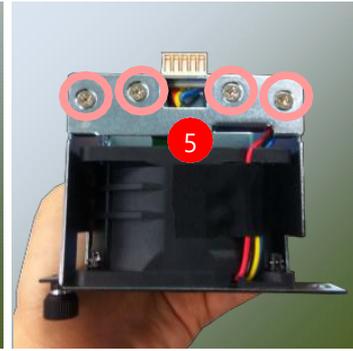
3. Hold onto the two lock-screws and pull it out.



4. Remove the 4 screws that secure the fan.



5. Remove the 4 screws that enclose the fan.



6. Take the fan connector out of the enclosure.



7. Take the worn cooling fan out.



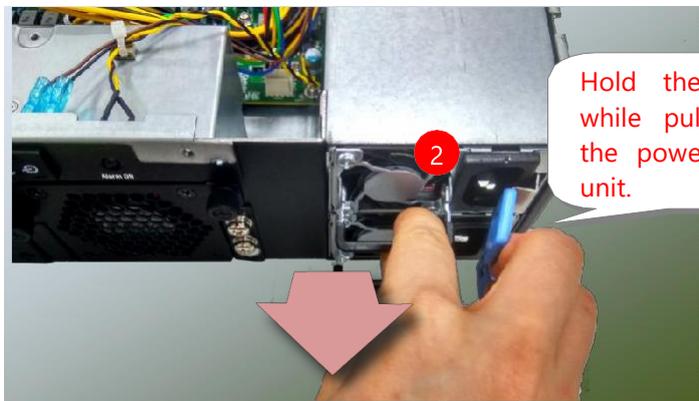
## Replacing the Power Supply Units

Power supply units may wear down eventually. Please be noted that FX-3230 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.

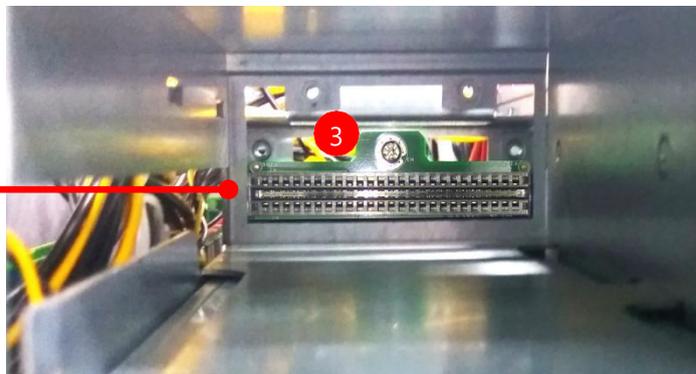


2. Pull the system out.

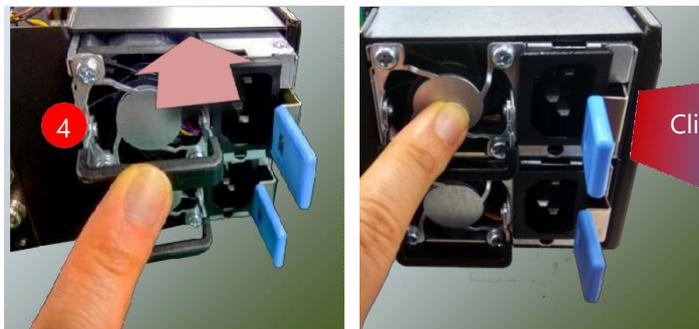


3. Locate the internal connector of the power supply unit.

Power supply connector



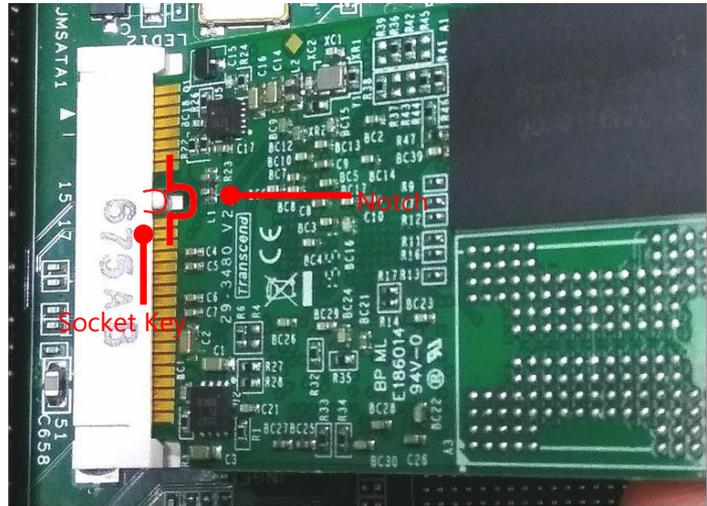
4. Insert a new power supply unit. Push the unit in until it clicks into place.



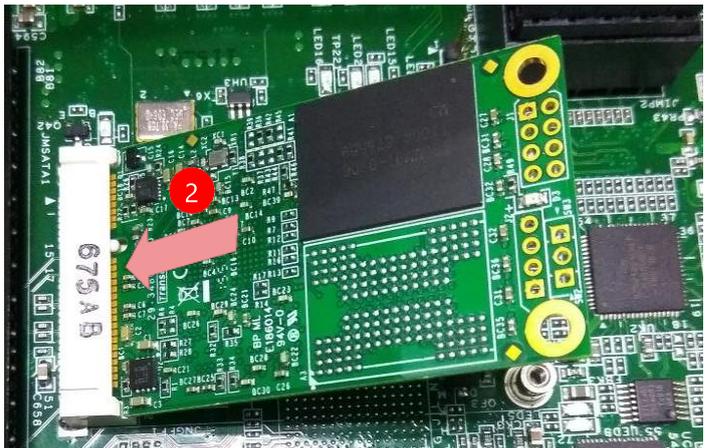
## Installing mSATA

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

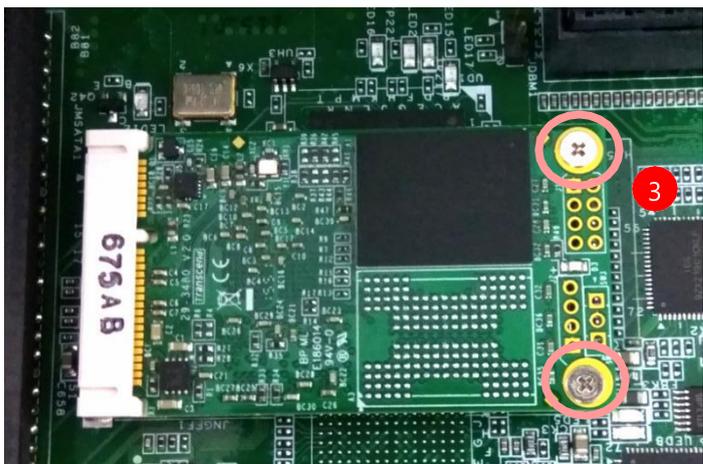
1. Locate the mSATA socket. Align the notch of the DIMM module with the socket key in the slot.



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

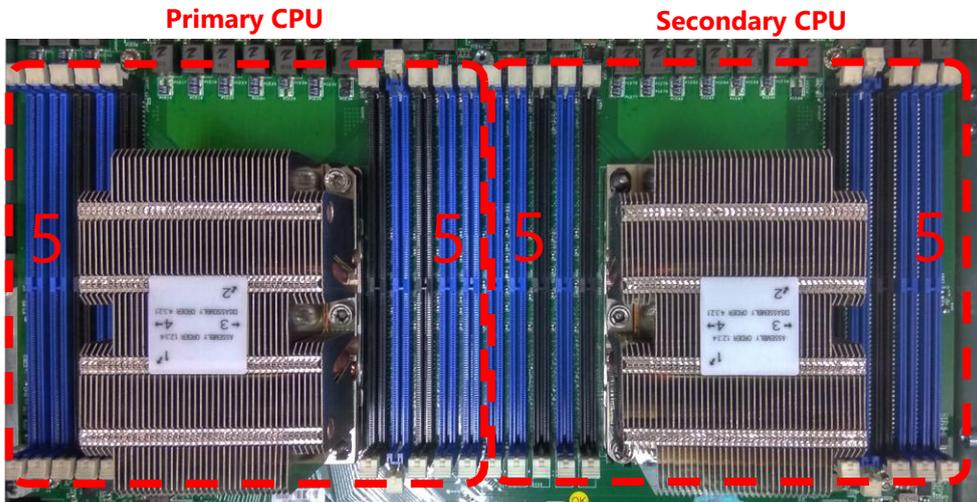


3. Push down on the module and secure it with screws that come with it.

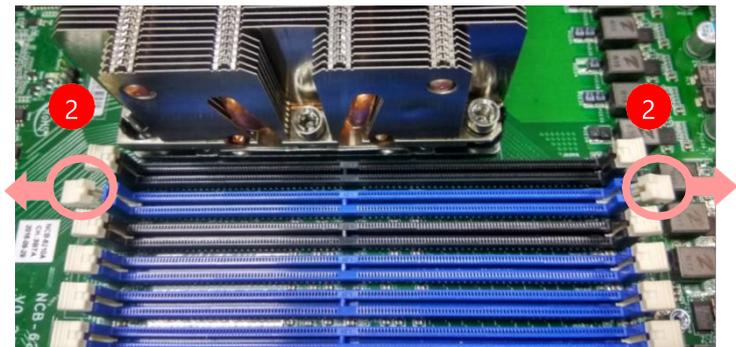


## Installing the System Memory

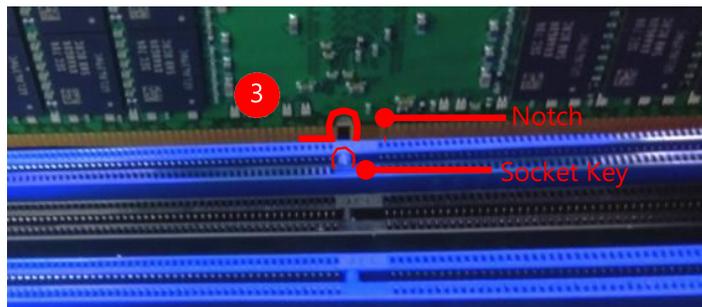
The motherboard supports DDR4 registered DIMM memory for heavy-duty operations. Please follow the steps below to install the DIMM memory modules. The primary CPU and the secondary CPU both have 10 DIMM sockets (5 on its both sides), If you do not plan to fill up all the sockets with 20 memory modules, always start with the blue ones for optimal performance.



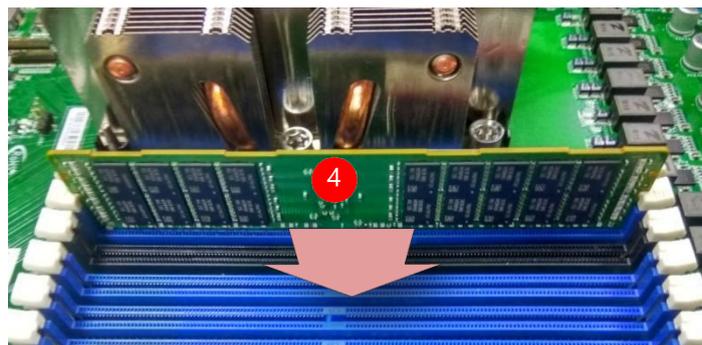
1. Power off the system.
2. Pull open the DIMM slot latches.



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 is designed with 20 DDR DIMM sockets.

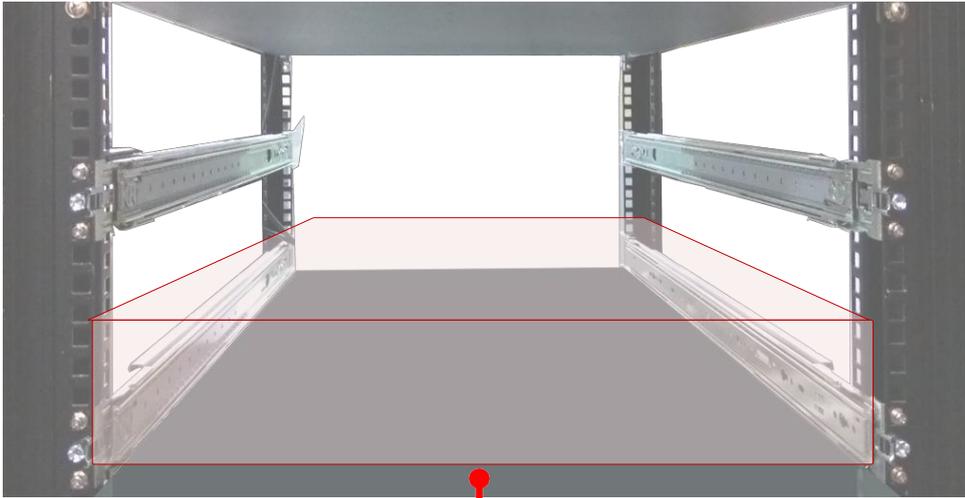


## Mounting the System

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

► With **Mounting Ear Brackets**

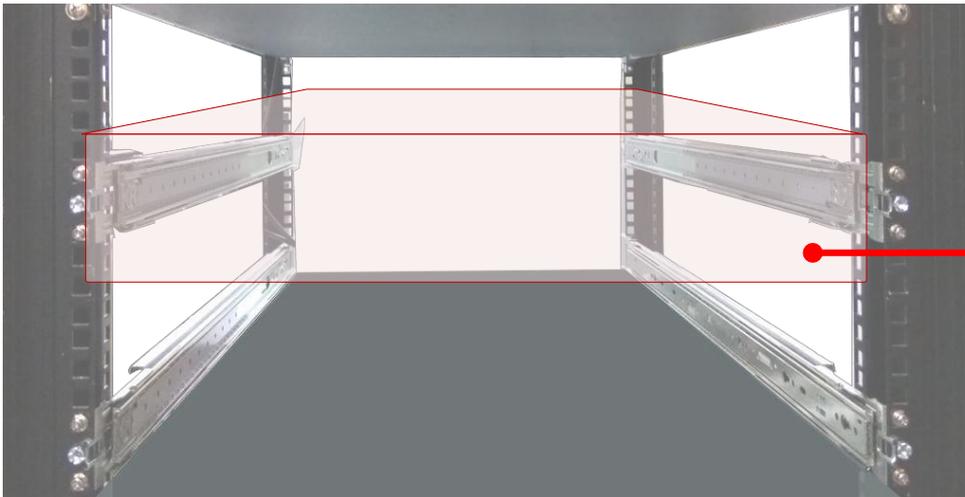
This method is quick and easy by fixing this system to the front posts of the rack, but it also makes servicing the system more difficult. Please note that the use of these brackets must go with a rack shelf or slide rails to prevent the chassis from falling over, for the bracket assembly alone cannot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



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

► With **Slide Rail Kit + Short Mounting Ear Brackets**

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



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

## Installing the System Using Mounting Ear Bracket

1. Check the package contents. The mounting ear brackets shall include the items below:

▶ 1x Screw Pack

▶ 2x Ear Brackets



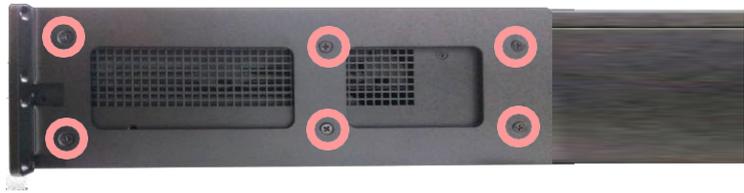
For securing the brackets on the rack posts



For securing the brackets on the unit



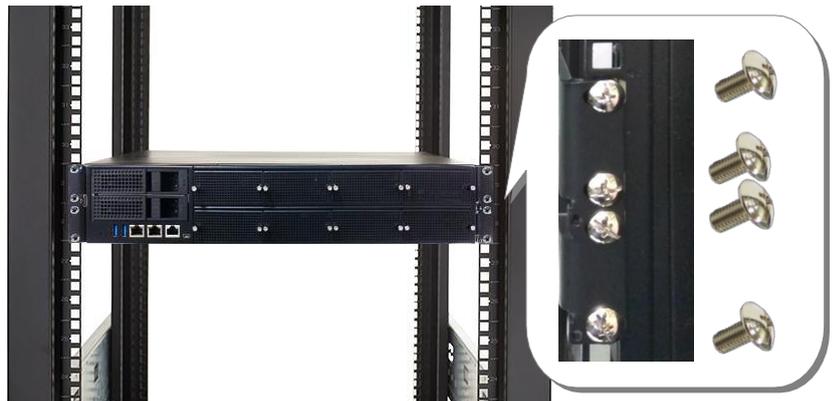
2. Secure the bracket onto one side of the chassis using six provided screws.



3. Secure the other bracket on the other side of the chassis.



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



## Installing the System Using the Slide 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)

1x pack of 7.1 Round Hole screws (for securing the system on the rail posts)

2 x Slide Rails



The rail consists of the following parts:



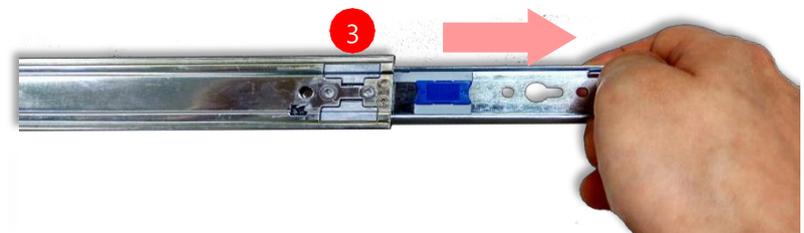
### **Attaching the Rail Brackets**

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

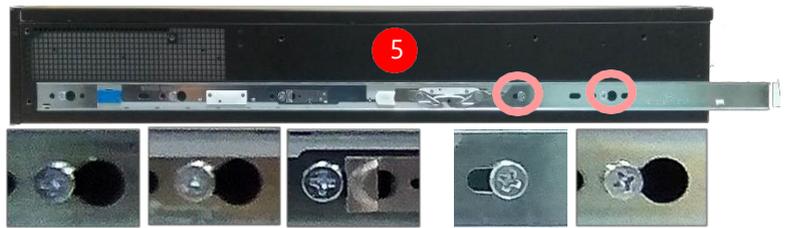


3. Stretch the bracket to the fullest.

4. Remove the bracket from the Inner Rail by pushing the Release Tab on the bracket outwards while sliding it out.



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



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

6. Repeat Steps 2~5 to attach the bracket to the other side of the chassis.



**Assembling the Ear Brackets**

7. Check the package contents. The supplied mounting kit shall include the items below:

- ▶ 1x pack of screws
- ▶ 2x Standard Ear Brackets



For securing the brackets on the unit



Left Ear Right Ear

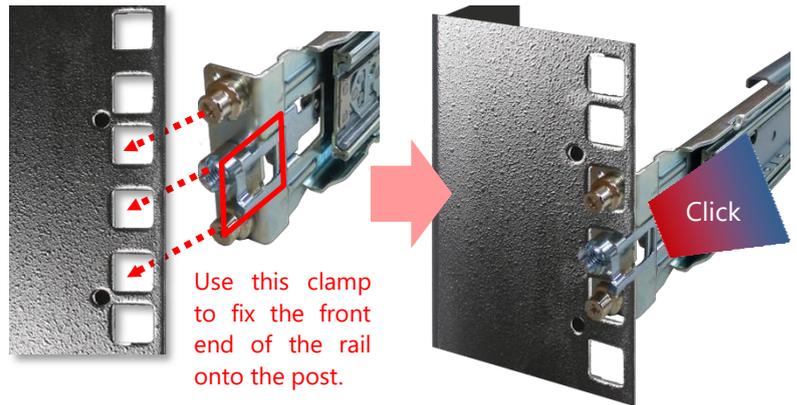
8. Install the brackets on both sides of the system using the provided screws.



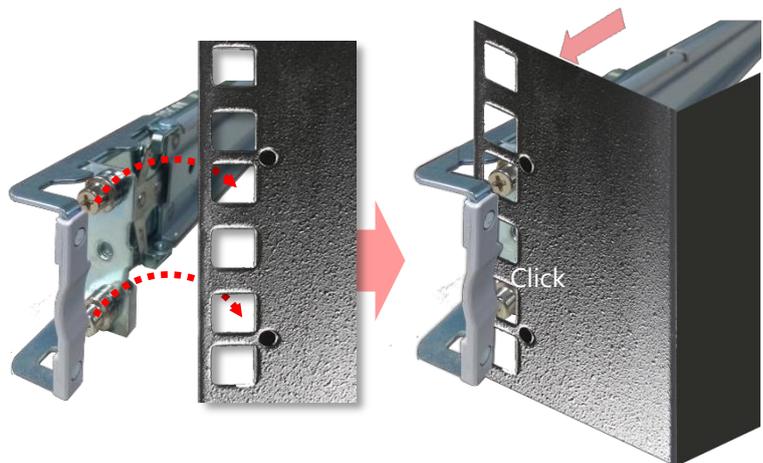
### **Installing the Slide Rails**

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

9. This slide-rail kit does NOT require screw-fixing. Simply aim at **3** available screw holes on the rack front and snap the rail front into the rack post as shown in the image below. You should hear a "click" sound once it is firmly attached.

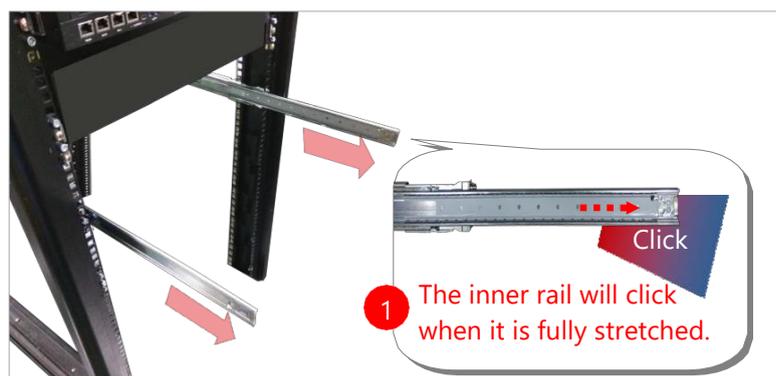


10. For the rear rack installation, slide the rail to aim and engage the bolts on the rail's rear end with the 2 available holes on the post, and the rail assembly will click into place.

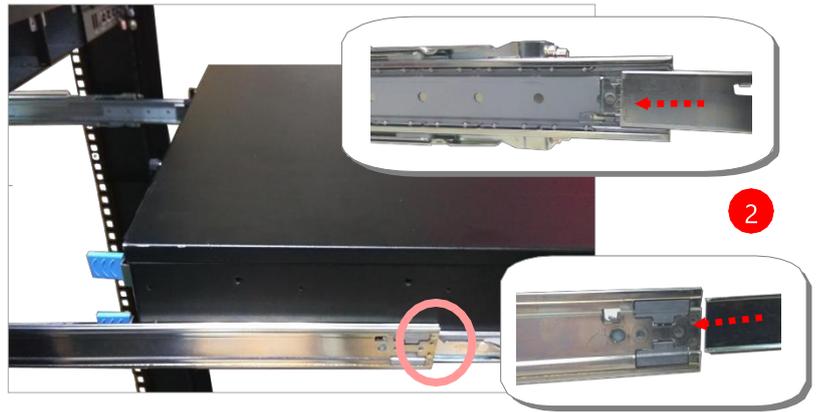


### **Installing the System into the Rack**

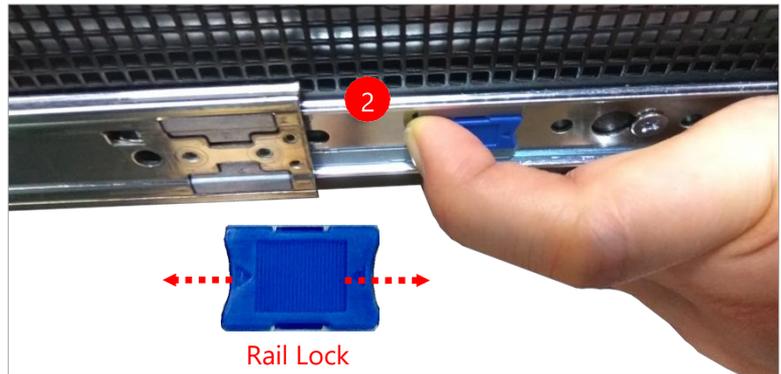
11. Stretch both of the inner rails out to their fullest extent. You will hear a click sound when they are fully stretched and locked.



**12.** Hold the system with its front facing you, lift the chassis and gently engage the brackets on the model while aligning them with the slide-rail assemblies as shown in the image below, and then push the system into the cabinet.



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



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





**Note:** Make sure that the system air vents have sufficient airflow from front to rear when the system is mounted in a rack. If the system vents are blocked, the system might be damaged due to overheat.



**Warning:** Since the system is heavy, we recommend that at least two people work together to remove the system from a rack to prevent injury, or damage to the system.

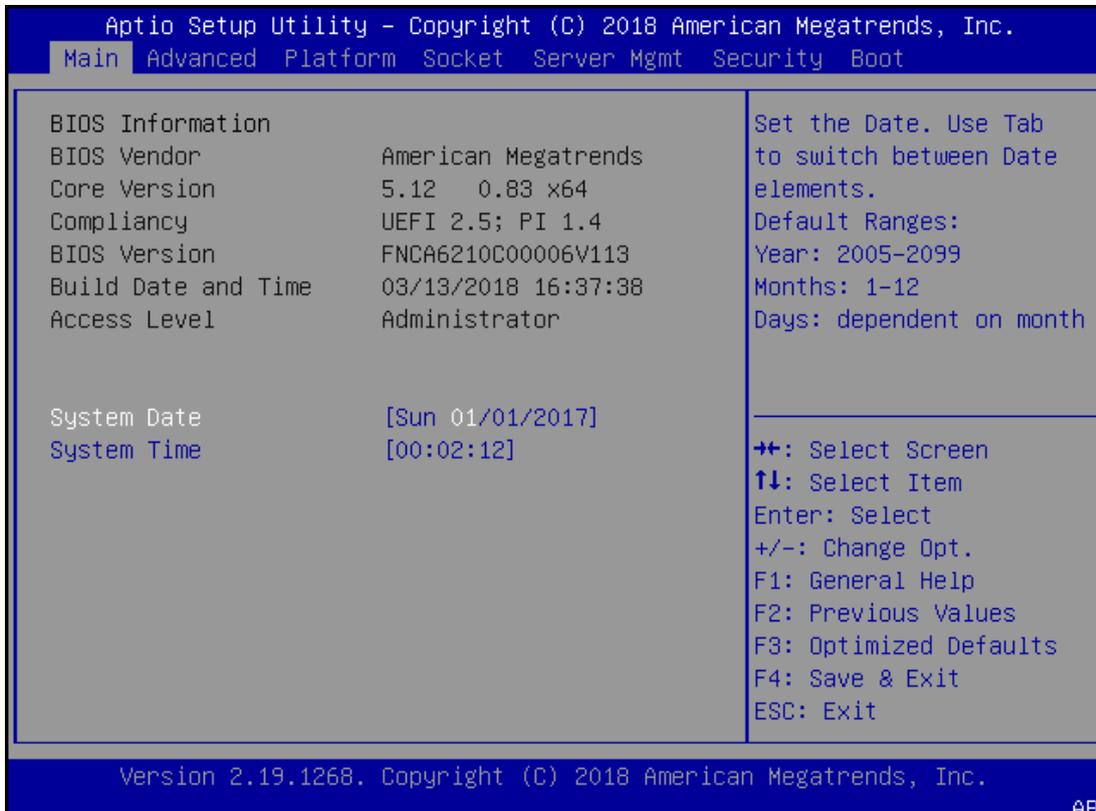
# CHAPTER 4: BIOS SETUP

## Main Setup

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

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

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

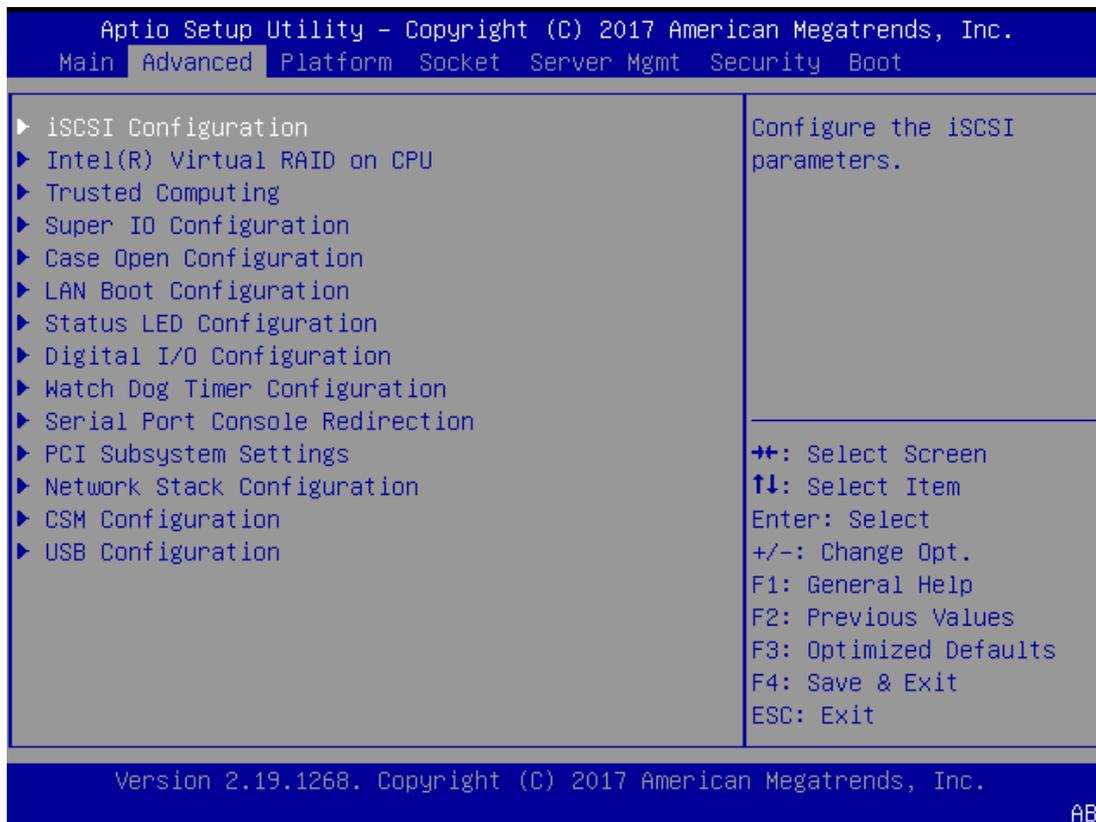


(The screenshots presented in this section are for reference only)

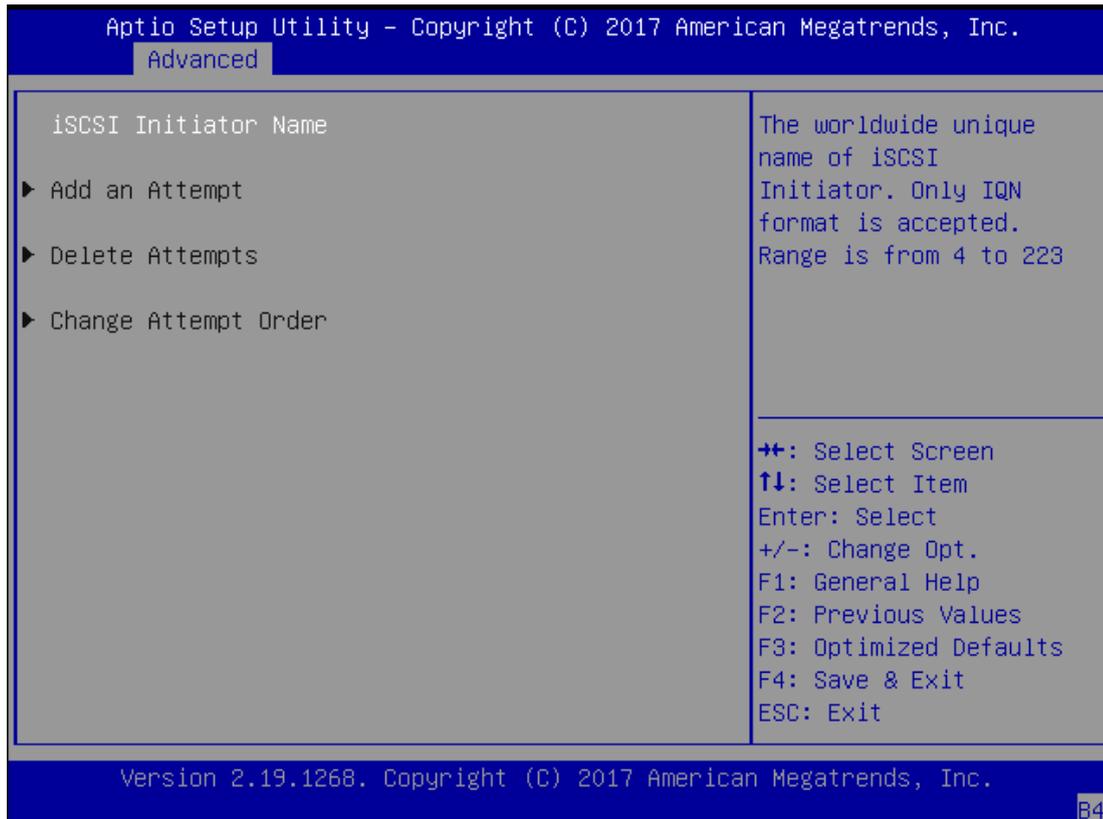
Item	Description
BIOS Information	BIOS Vendor : American Megatrends Core Version : AMI Kernel version, CRB code base, X64 Compliancy : UEFI version, PI version Project Version: BIOS release version Build Date and Time: MM/DD/YYYY Access Level: Administrator / User
System Date	To set the Date, use <b>&lt;Tab&gt;</b> to switch between Date elements. Default range of Year: 2005-2099 Default range of Month: 1-12 Days: dependent on Month.
System Time	To set the Date, use <b>&lt;Tab&gt;</b> to switch between Date elements.

## Advanced Setup

Use [→] or [←] to select [Advanced] setup screen. Under this screen, you may use [↑][↓] to select an item you want to configure.



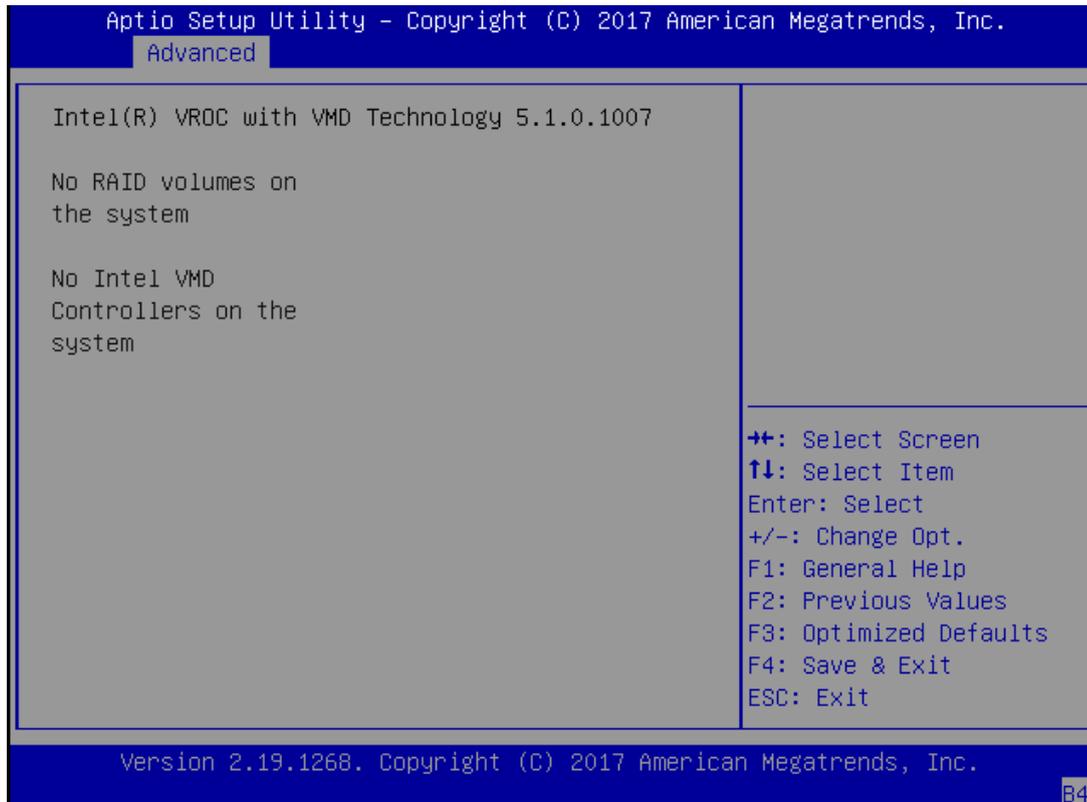
## iSCSI Configuration



Item	Description
iSCSI Initiator Name	The worldwide unique name of iSCSI Initiator. Only IQN format is accepted. The range is from 4 to 223.

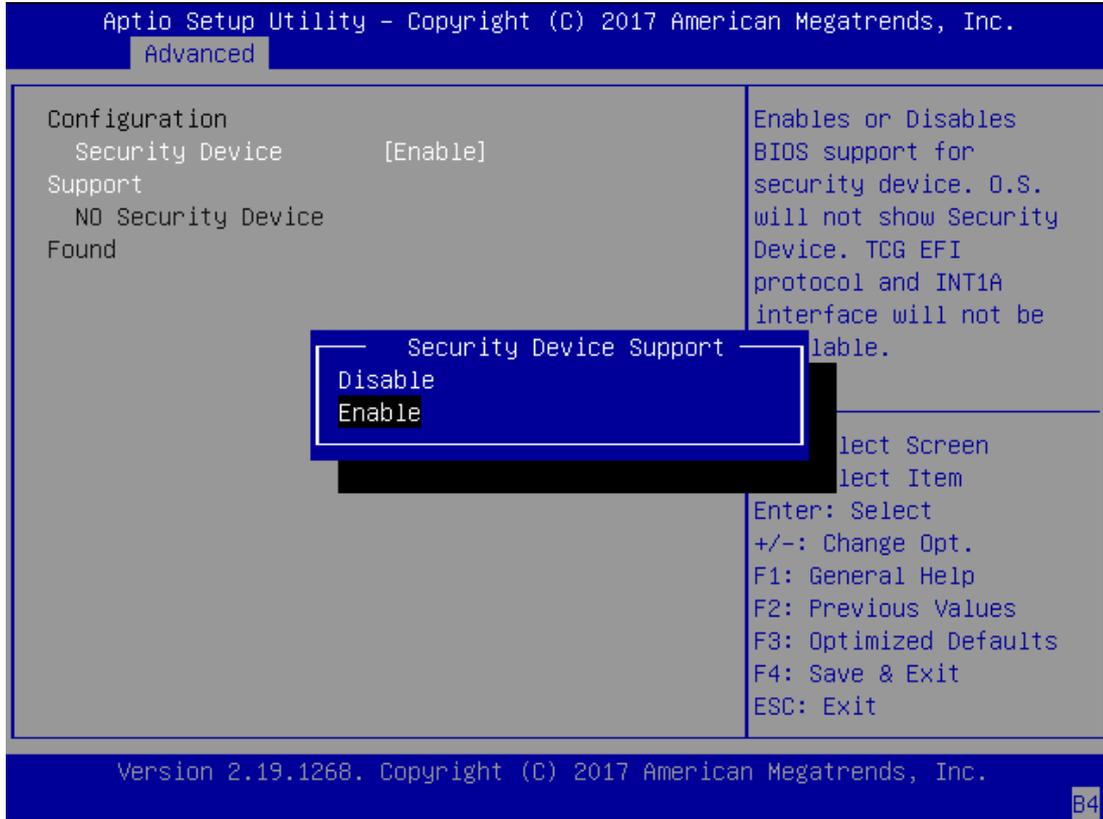
## Intel® Virtual RAID on CPU

This option allows you to check RAID volume management information supported by Intel® Virtual RAID on CPU (Intel® VROC). Press <Enter> access the submenu.



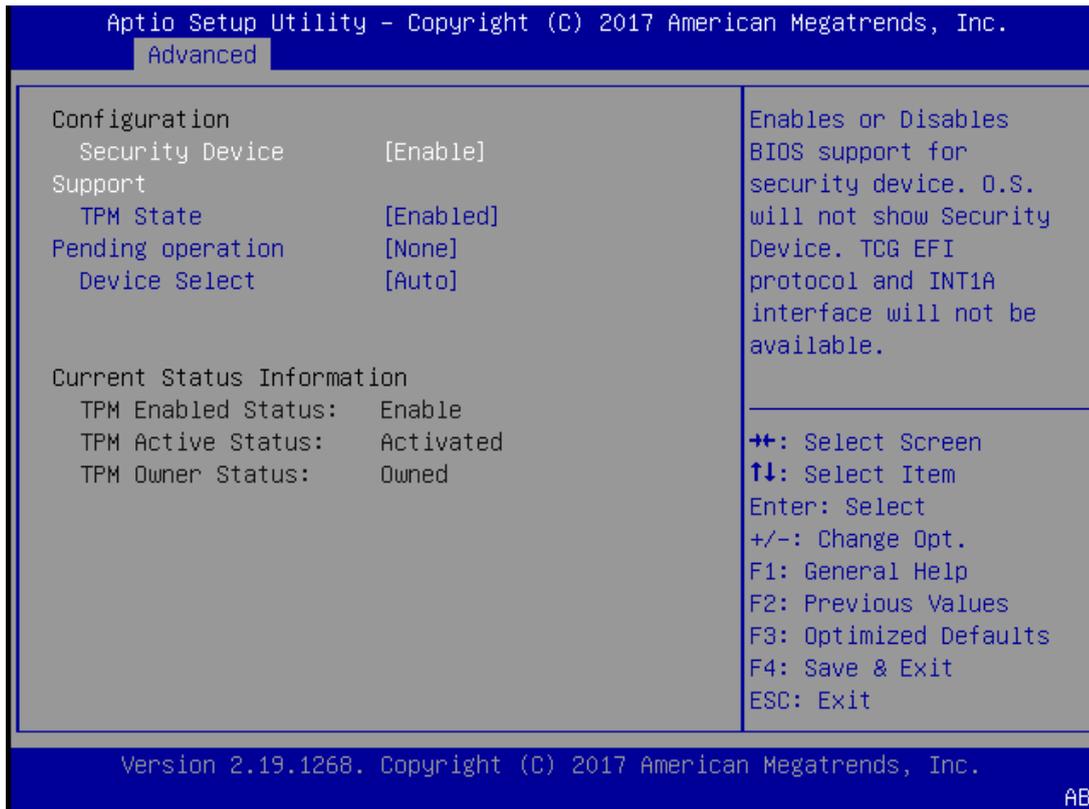
## Trusted Computing

This option allows you to configure parameters regarding BIOS support for security device. Press <Enter> to access the submenu.



Item	Option	Description
Security Device Support	<p>Enabled</p> <p>Disabled</p>	<p>Select "Enable "or "Disable "to turn on or off the BIOS support for Security Device. The default is "Enabled ". By disabling this function, OS will not show Security Device, and neither will TCG EFI protocol and INT1A interface be available.</p>

**Trusted Computing (TPM1.2)**



Item	Option	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. <b>NOTE:</b> 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. <b>NOTE:</b> Your computer will reboot during restart in order to change State of Security Device.
Device Select	TPM 1.2 TPM 2.0 Auto	<b>TPM 1.2</b> will restrict support to TPM 1.2 devices; while <b>TPM 2.0</b> will restrict support to TPM 2.0 devices; <b>Auto</b> 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)**

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Advanced

TPM20 Device Found Vendor: NTC Firmware Version: 1.3	▲ Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Security Device [Enable] Support	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Active PCR banks SHA-1,SHA256 Available PCR banks SHA-1,SHA256	
SHA-1 PCR Bank [Enabled] SHA256 PCR Bank [Enabled]	
Pending operation [None] Platform Hierarchy [Enabled] Storage Hierarchy [Enabled] Endorsement [Enabled] Hierarchy	

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Advanced

Active PCR banks SHA-1,SHA256 Available PCR banks SHA-1,SHA256	▲ TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found,
SHA-1 PCR Bank [Enabled] SHA256 PCR Bank [Enabled]	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Pending operation [None] Platform Hierarchy [Enabled] Storage Hierarchy [Enabled] Endorsement [Enabled] Hierarchy	
TPM2.0 UEFI Spec [TCG_2] Version	
Physical Presence [1.3] Spec Version	
TPM 20 [TIS] InterfaceType	
Device Select [Auto]	

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Item	Option	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. <b>NOTE:</b> 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, <b>TCG_1_2:</b> Supports the Compatible mode for Win8/Win10 <b>TCG_2:</b> 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. <b>NOTE:</b> Some HCK tests might not support 1.3.
TPM 20 InterfaceType	TIS	Select <b>TPM 20 Device</b> for the Communication Interface.
Device Select	TPM 1.2 TPM 2.0 Auto	<b>TPM 1.2</b> will restrict support to TPM 1.2 devices; while <b>TPM2.0</b> will restrict support to TPM 2.0 devices; <b>Auto</b> 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)**

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Advanced

<p>TPM20 Device Found Vendor: INTC Firmware Version: 4.0</p> <p>Security Device [Enable] Support</p> <p>Active PCR banks SHA-1,SHA256 Available PCR banks SHA-1,SHA256</p> <p>SHA-1 PCR Bank [Enabled] SHA256 PCR Bank [Enabled]</p> <p>Pending operation [None] Platform Hierarchy [Enabled] Storage Hierarchy [Enabled] Endorsement [Enabled] Hierarchy</p>	<p>▲ Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.</p> <hr/> <p>⚡: Select Screen ⬆️: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
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Advanced

<p>Active PCR banks SHA-1,SHA256 Available PCR banks SHA-1,SHA256</p> <p>SHA-1 PCR Bank [Enabled] SHA256 PCR Bank [Enabled]</p> <p>Pending operation [None] Platform Hierarchy [Enabled] Storage Hierarchy [Enabled] Endorsement [Enabled] Hierarchy</p> <p>TPM2.0 UEFI Spec [TCG_2] Version</p> <p>Physical Presence [1.3] Spec Version</p> <p>TPM 20 [CRB] InterfaceType</p> <p>Device Select [Auto]</p>	<p>▲ TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found,</p> <hr/> <p>⚡: Select Screen ⬆️: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
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AB

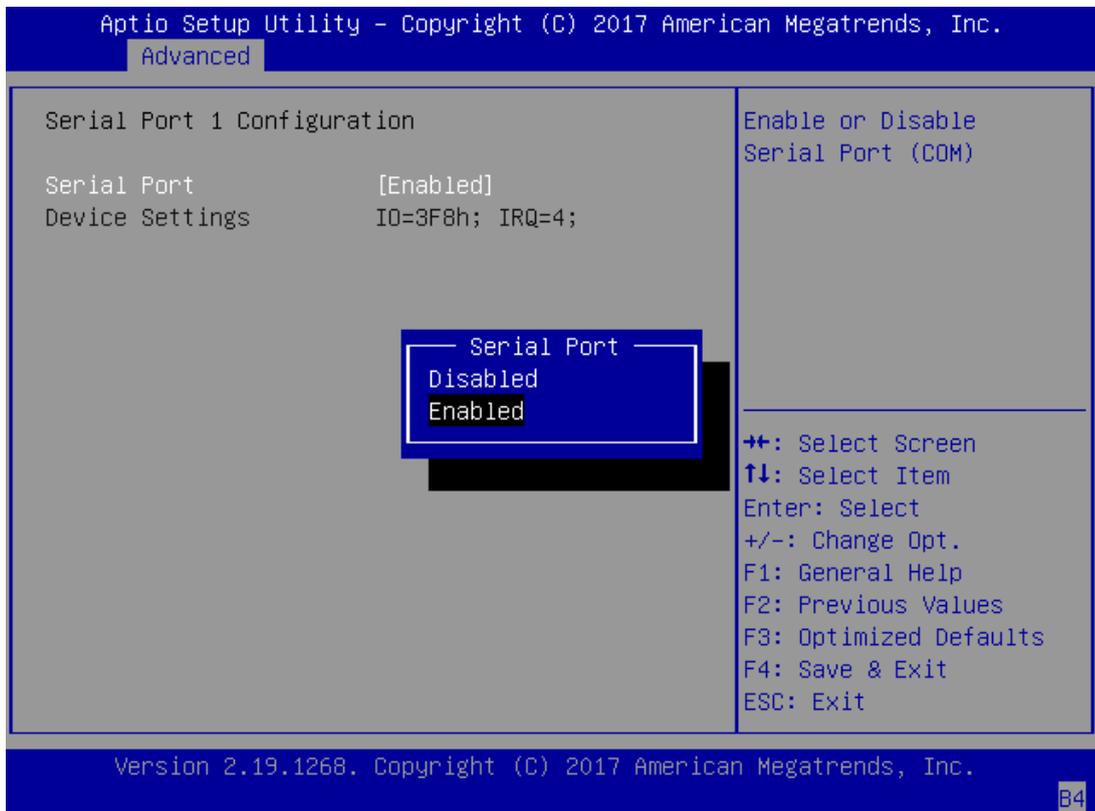
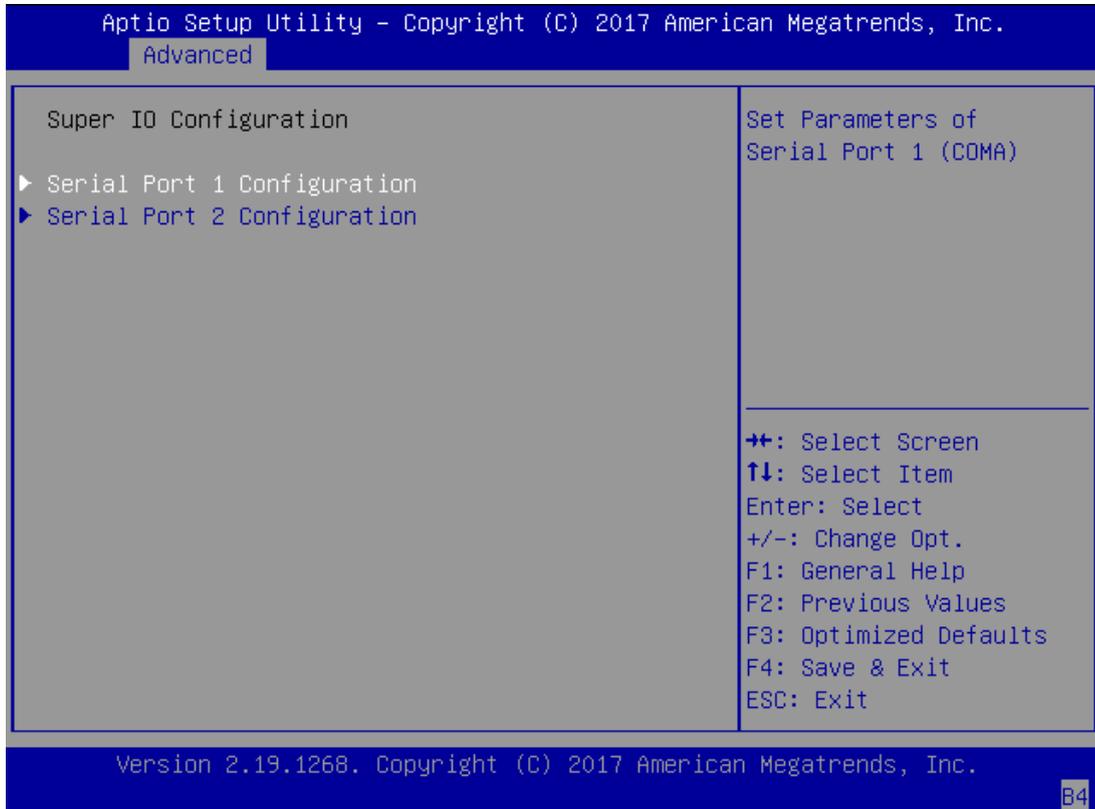
Item	Option	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA-1 PCR Bank	Enabled Disabled	Enables or disables SHA-1 PCR Bank.
SHA256 PCR Bank	Enabled Disabled	Enables or disables SHA256 PCR Bank.
Pending operation	None TPM Clear	Schedules an Operation for the Security Device. <b>NOTE:</b> 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, <b>TCG_1_2:</b> Supports the Compatible mode for Win8/Win10 <b>TCG_2:</b> 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. <b>NOTE:</b> Some HCK tests might not support 1.3.
TPM 20 InterfaceType	CRB	Select the <b>CRB</b> (Communication Interface) for TPM 20 Device.
Device Select	TPM 1.2 TPM 2.0 Auto	<b>TPM 1.2</b> will restrict support to TPM 1.2 devices; while <b>TPM2.0</b> will restrict support to TPM 2.0 devices; <b>Auto</b> 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

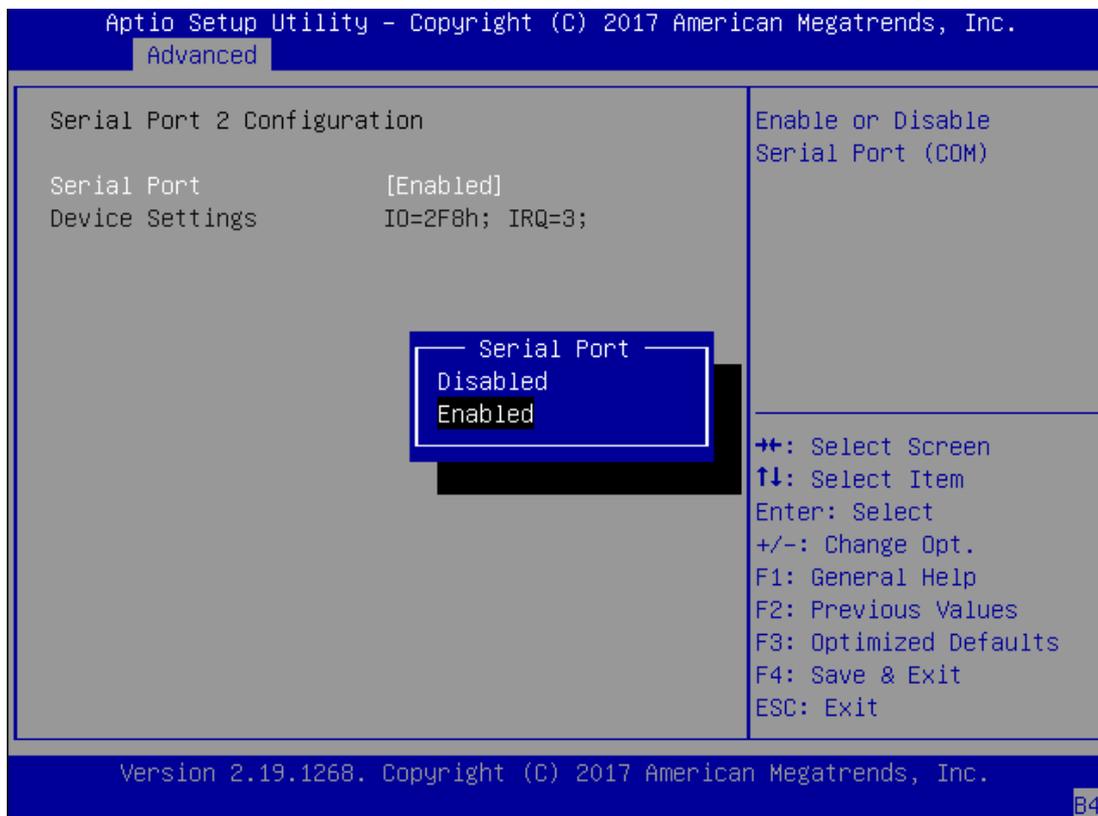
This option allows you to configure parameters about Super IO Chip. Press <Enter> to access the submenu.

### Serial Port Configuration

Select "Serial Port 1 Configuration" or "Serial Port 2 Configuration" to enter sub setting screen.



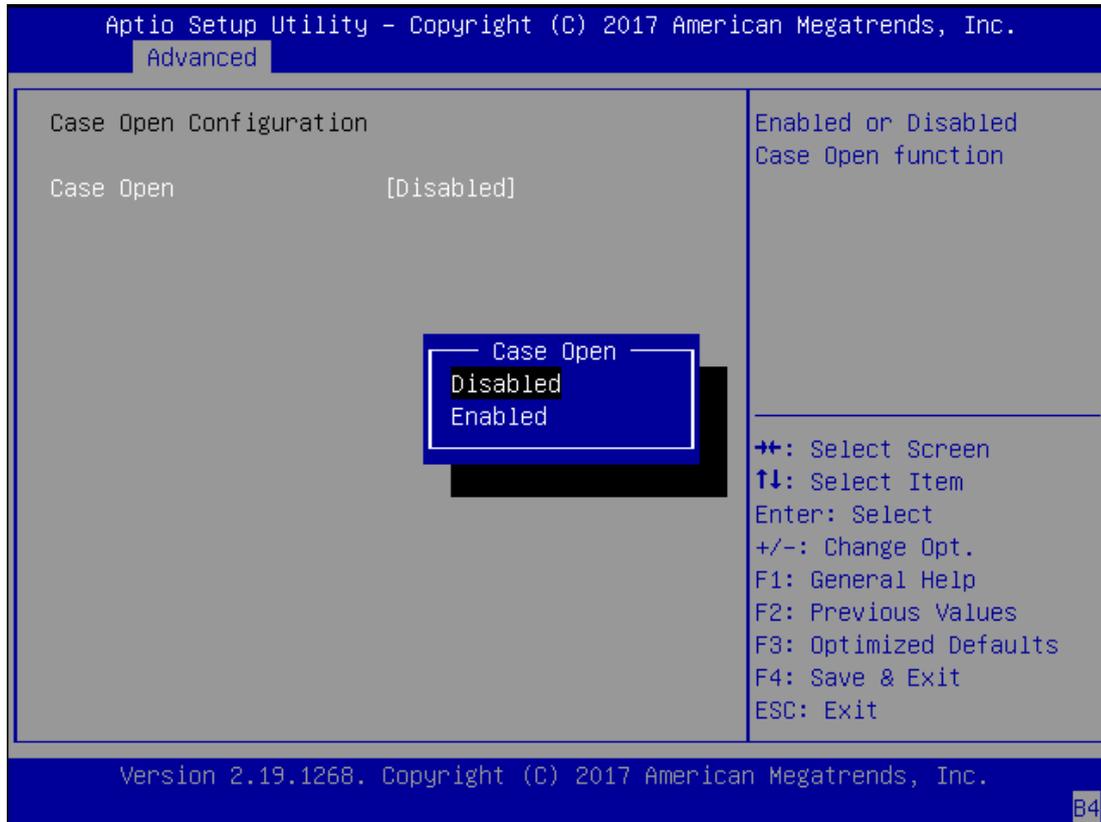
Item	Option	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 1.
Device Settings	NA	IO=3F8h; IRQ = 4



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

## Case Open Configuration

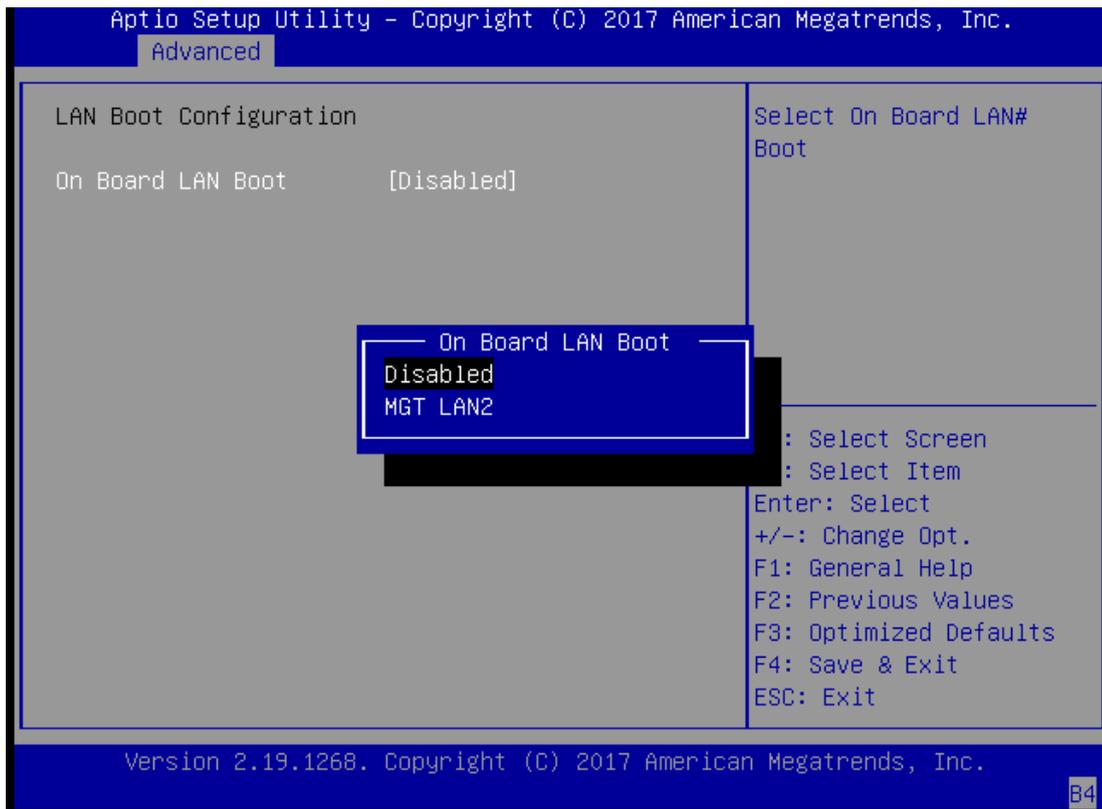
If with the case's support, enabling this option will have the system sound when someone opens the case of this system, which is considered against your organization's policy.



Item	Option	Description
Case Open	Enabled Disabled	Enables or disables Case Open function

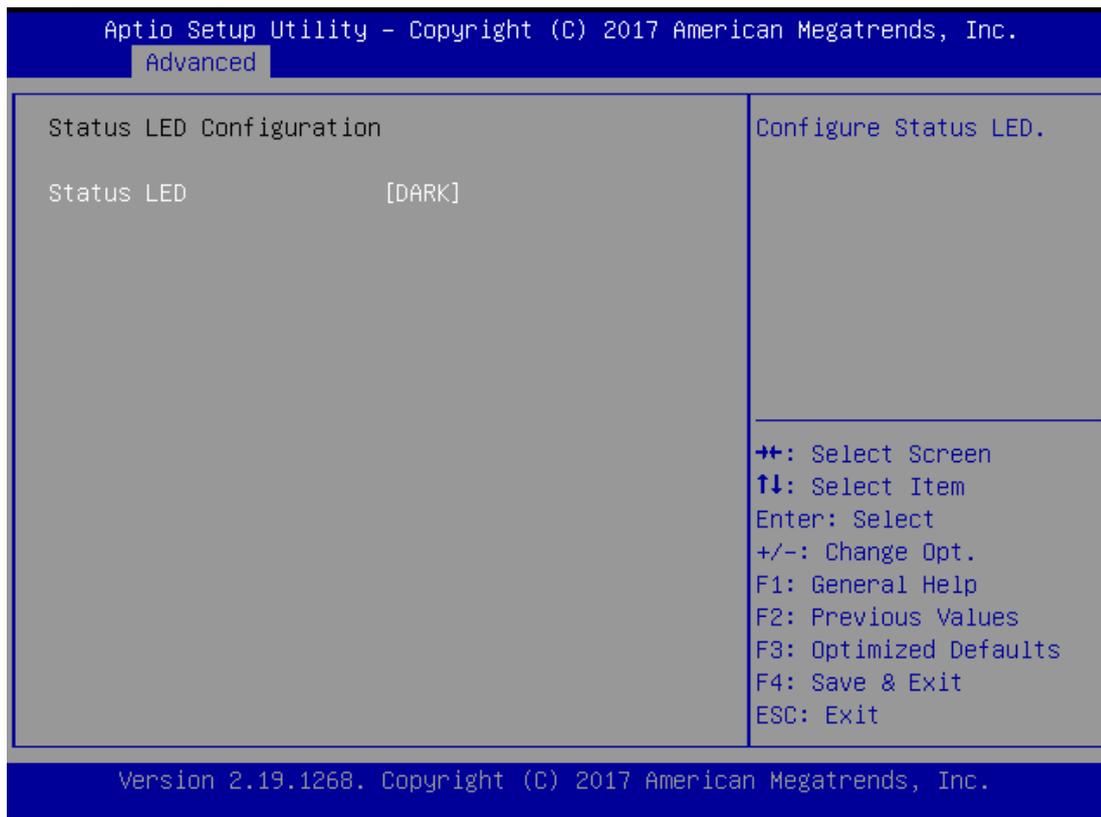
## LAN Boot Configuration

This option allows you to configure parameters about LAN Boot. The options provided will vary by SKU.



## Status LED Configuration

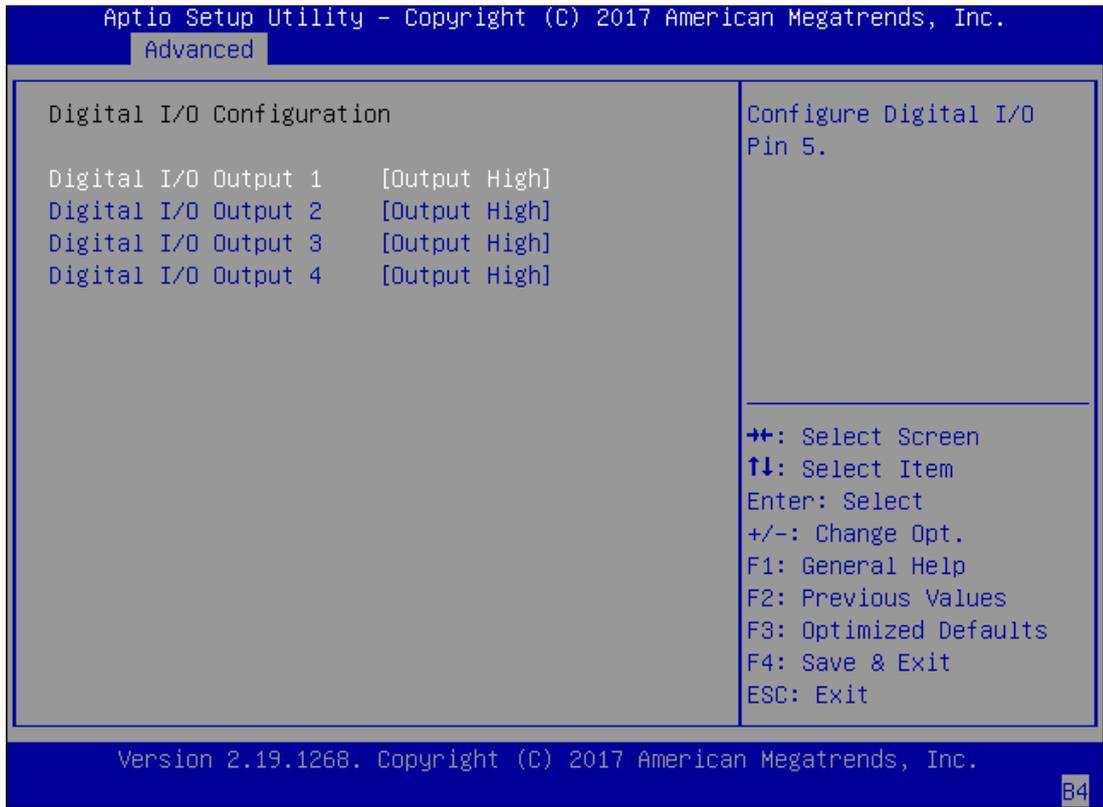
This option allows you to change the color of status LED.



Item	Option	Description
Status LED	DARK	Configures Status LED color
	GREEN	
	RED	

## Digital IO Configuration

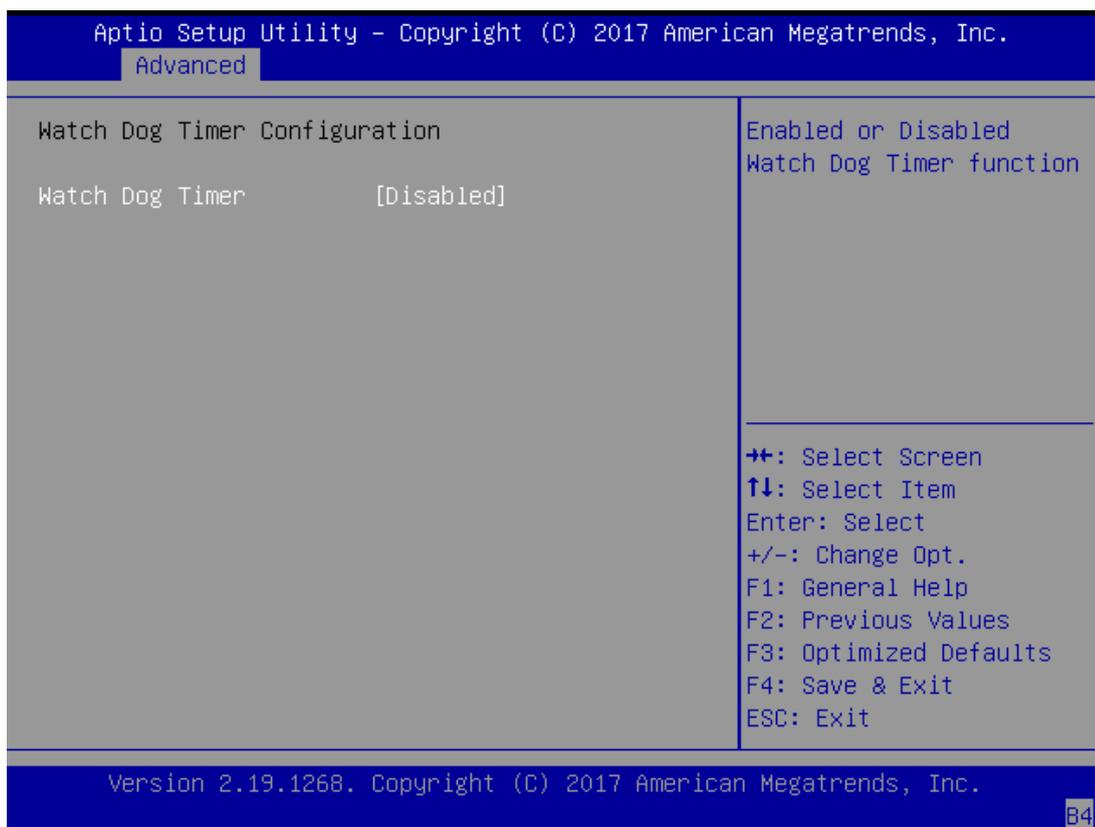
This option allows you to configure parameters about Digital IO pins.



Item	Option	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

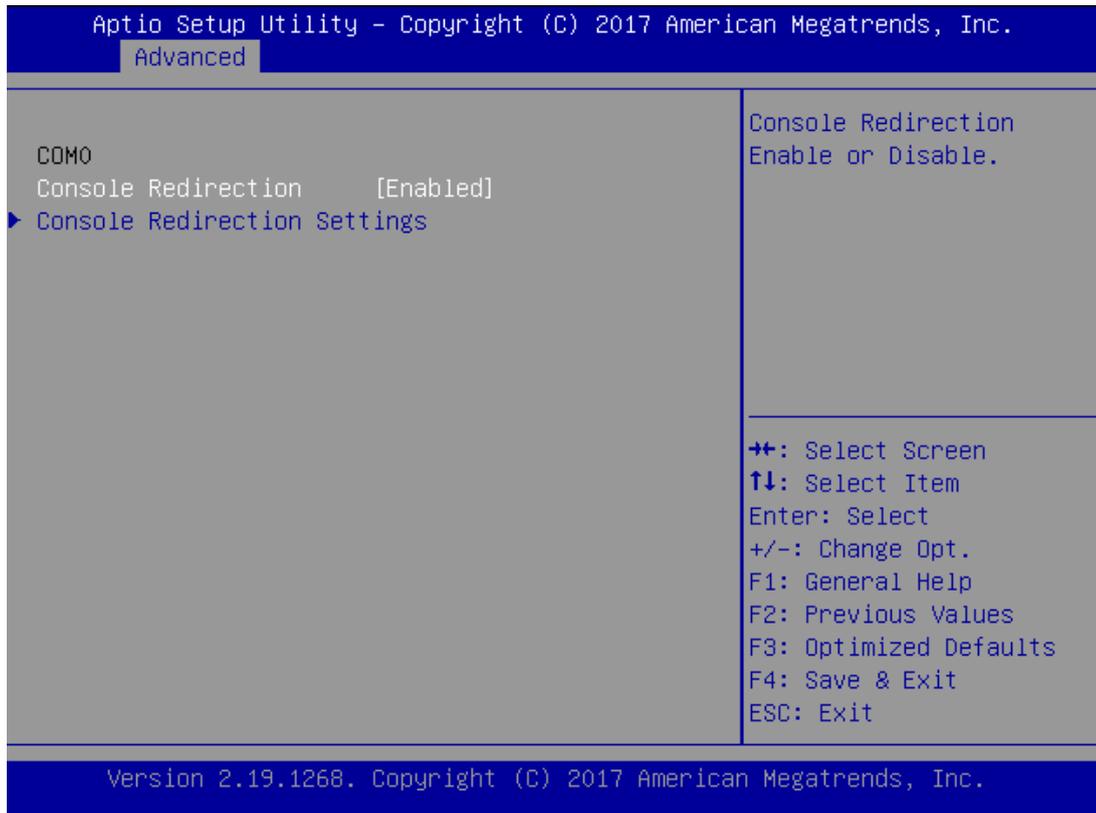
This option allows you to enable or disable the watchdog timer function.



Item	Option	Description
Watch Dog Timer	Enabled Disabled	Enables or disables Watch Dog Timer function

## Watch Dog Timer Configuration

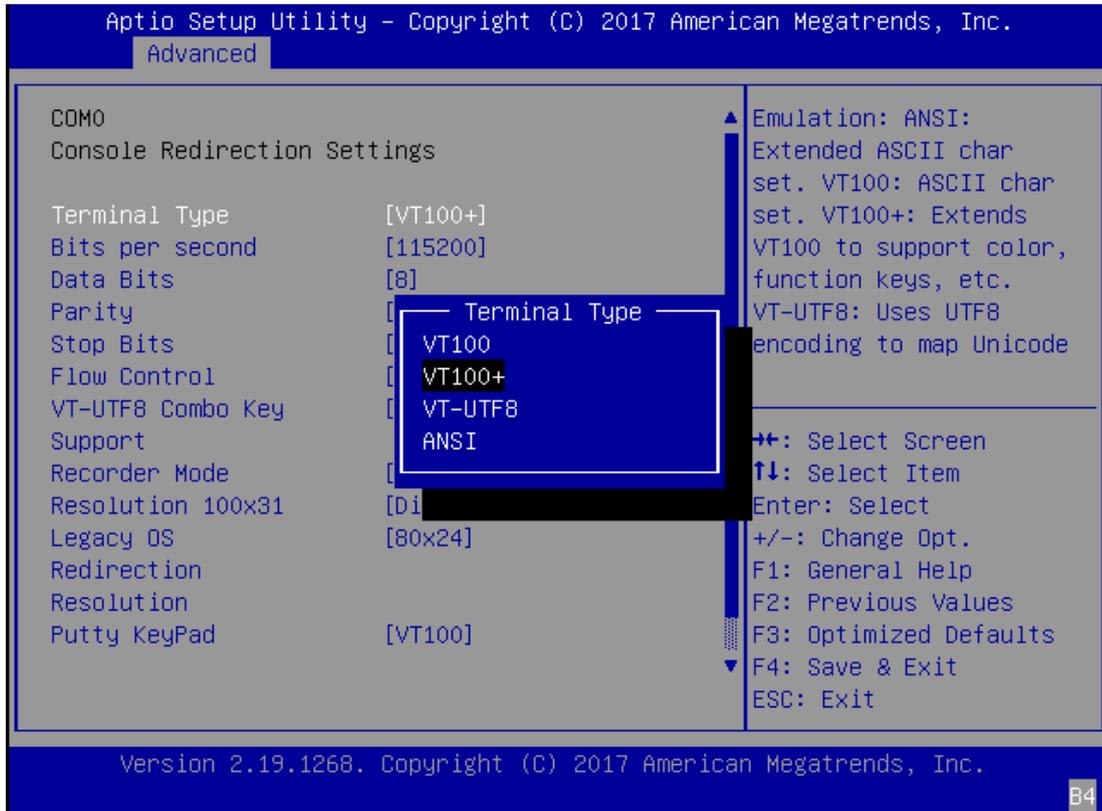
This option allows you to configure parameters about serial port console redirection. Press <Enter> to access the submenu.



Item	Option	Description
COM0	Enabled	Enables or disables Console Redirection
Console Redirection	Disabled	

### Console Redirection Settings

These settings specify how the host computer and the remote computer will exchange data. Both computers should have the same or compatible settings.

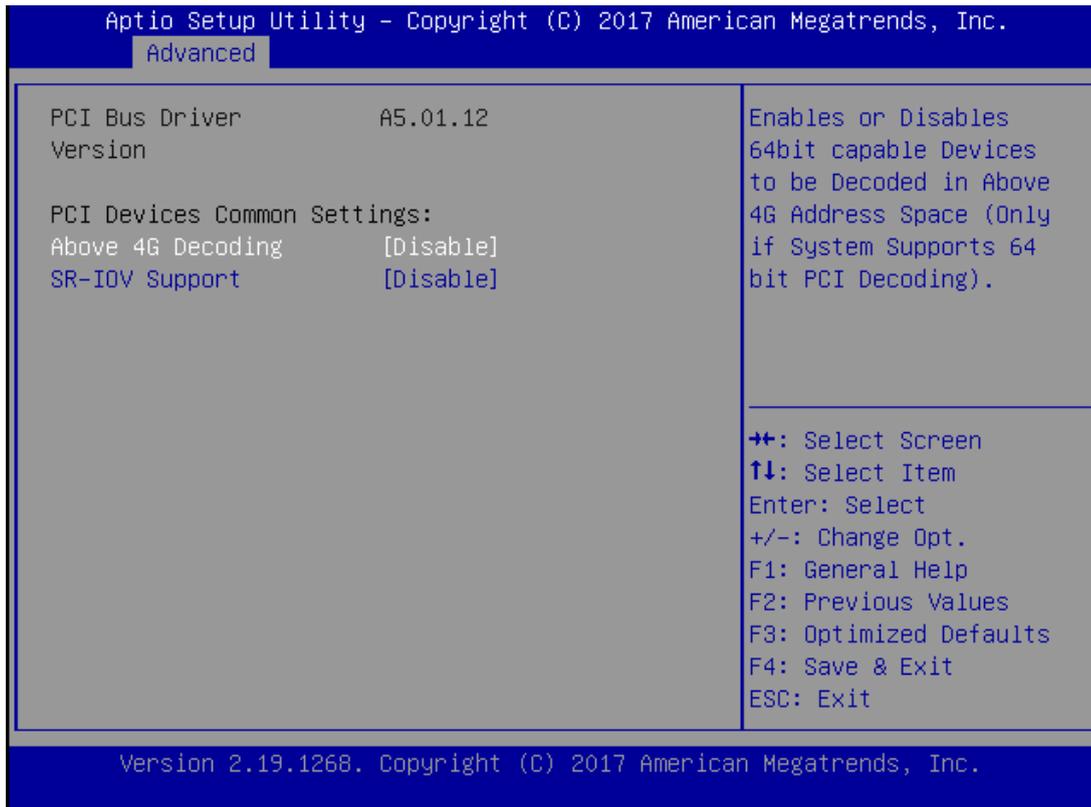


Item	Option	Description
Terminal Type	VT100 <b>VT100+</b> VT-UTF8 ANSI	<b>VT100:</b> ASCII char set <b>VT100+:</b> Extends VT100 to support color, function keys, etc. <b>VT-UTF8:</b> Uses UTF8 encoding to map Unicode chars onto 1 or more bytes <b>ANSI:</b> Extended ASCII char set
Bits per second	9600 19200 38400 57600 <b>115200</b>	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 <b>8</b>	Data Bits
Parity	<b>None</b> 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	<b>None</b>	Flow Control can prevent data loss from buffer overflow.

	Hardware RTS/CTS	
VT-UTF8 Combo Key Support	Disabled <b>Enabled</b>	Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	<b>Disabled</b> Enabled	With this mode enabled, only text will be sent. This is to capture Terminal data.
Resolution 100x31	<b>Disabled</b> Enabled	Enables or disables extended terminal resolution
Legacy OS Redirection Resolution	<b>80x24</b> 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
Putty KeyPad	<b>VT100</b> LINUX XTERM86 SCO ESCN VT400	Selects FunctionKey and KeyPad on Putty.
Redirection After BIOS POST	<b>Always</b> <b>Enable</b> BootLoader	When <b>Bootloader</b> is selected, Legacy Console Redirection is disabled before booting to legacy OS. When <b>Always Enable</b> is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to <b>Always Enable</b> .

## PCI Subsystem Settings

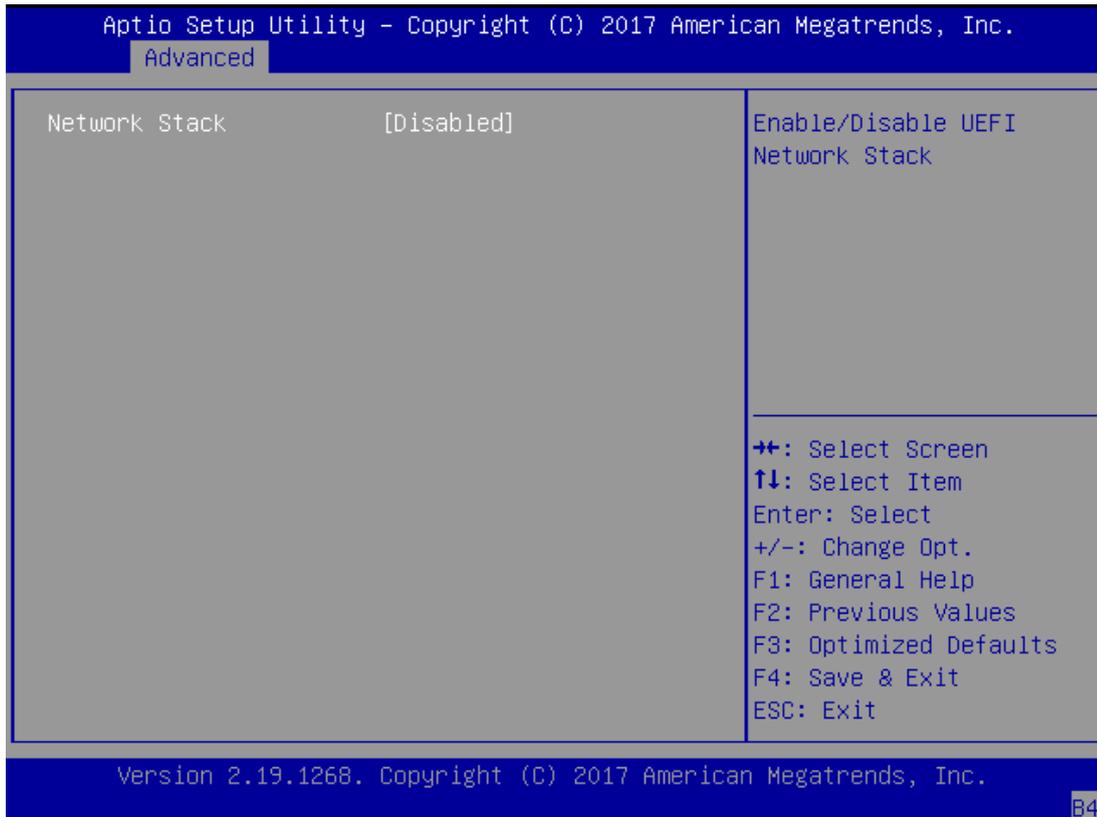
This option allows you to change the PCI, PCI-X and PCI Express settings.



Item	Option	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.

## Network Stack Configuration

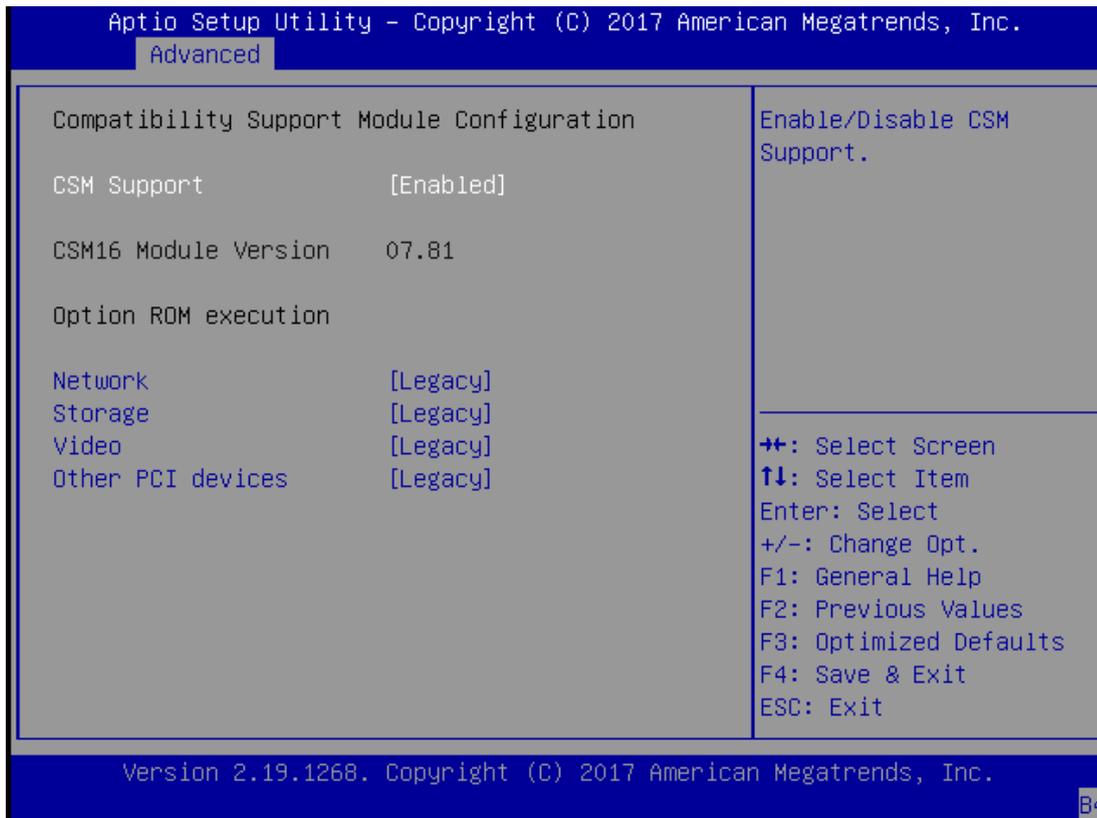
This option enables or disables UEFI network stack.



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

## CSM Configuration

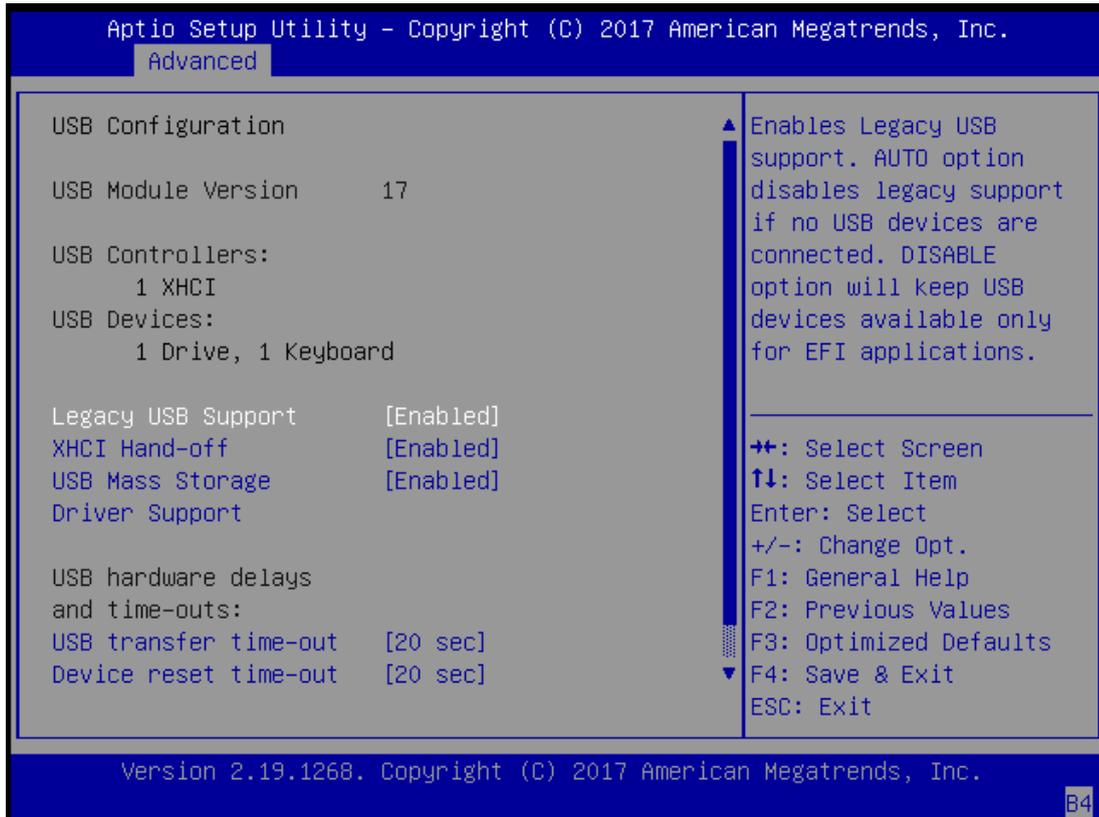
This option allows you to enable or disable ROM execution settings.



Item	Option	Description
CSM Support	Disabled <b>Enabled</b>	Enables or disables CSM Support
Network	Do Not Launch UEFI <b>Legacy</b>	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do Not Launch UEFI <b>Legacy</b>	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do Not Launch UEFI <b>Legacy</b>	Controls the execution of UEFI and Legacy Video OpROM
Other PCI device	Do Not Launch UEFI <b>Legacy</b>	Determines OpROM execution policy for devices other than Network, Storage, or Video

## CSM Configuration

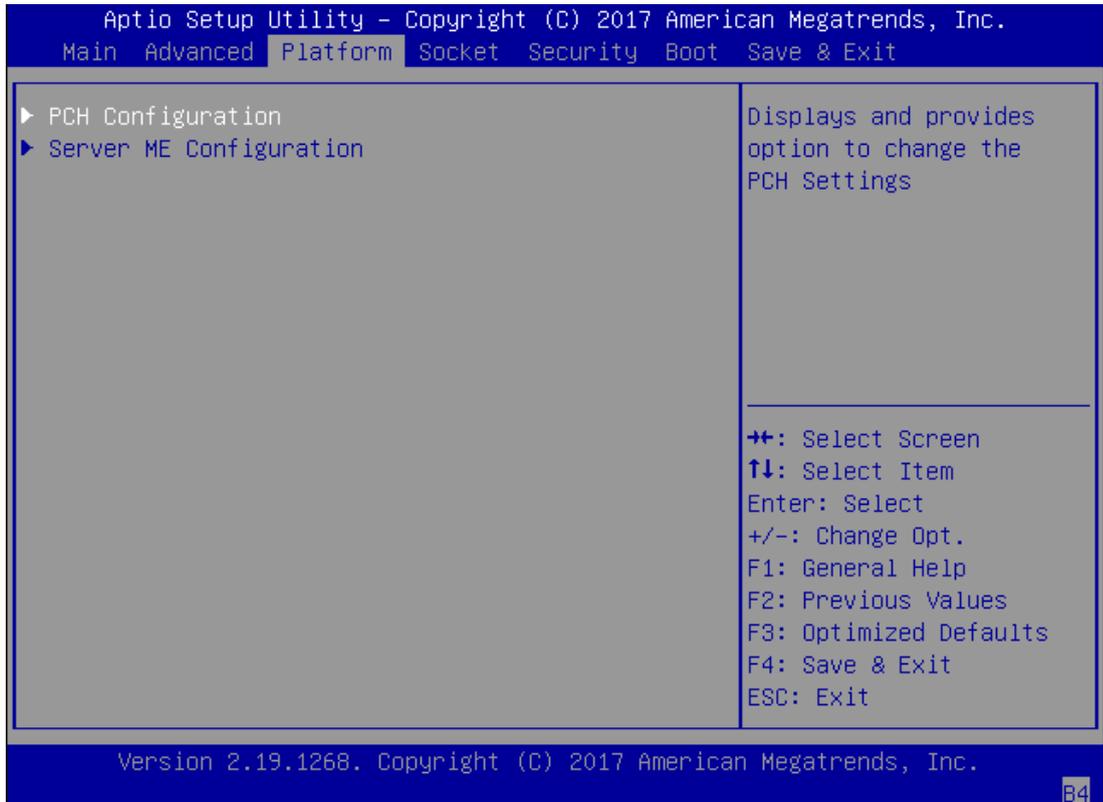
This option allows you to change USB configuration parameters.



Item	Option	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB support. <b>Auto</b> option disables legacy support if no USB devices are connected; <b>Disabled</b> 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. <b>Auto</b> uses default value: for a Root port, it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

## Platform Setup

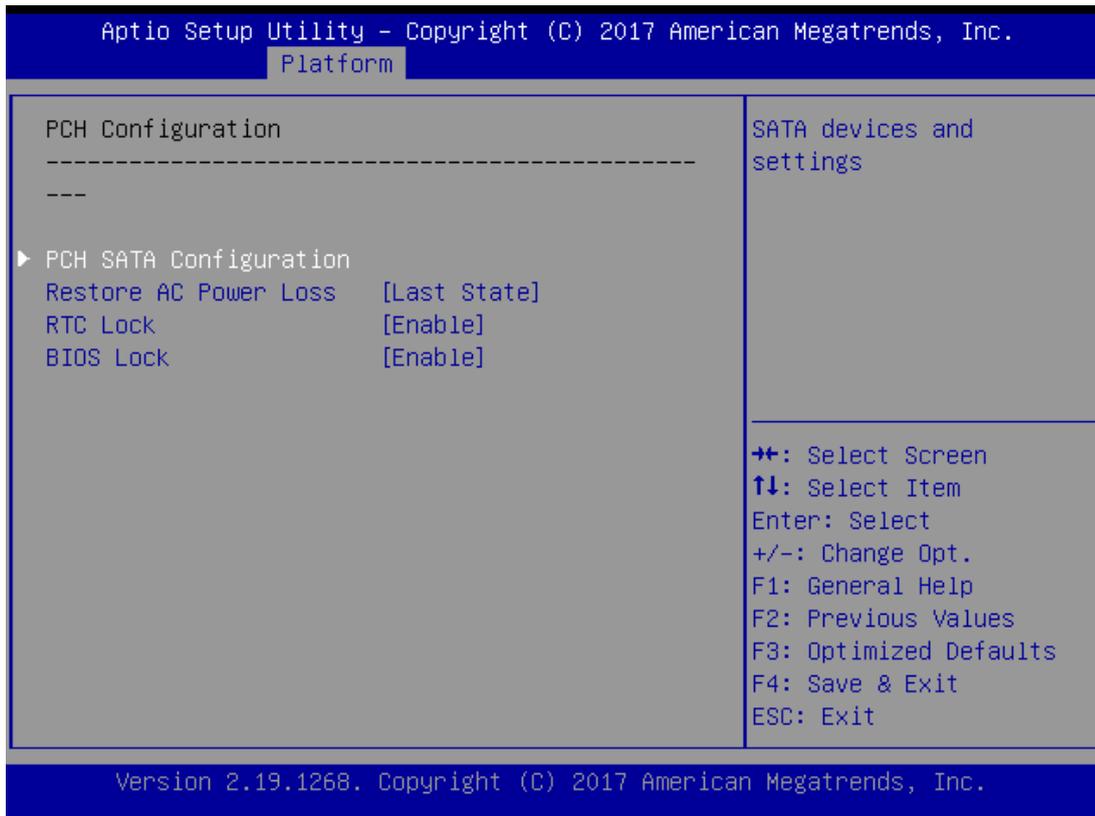
Use [→] or [←] to select [Platform] setup screen. Under this screen, you may use [↑][↓] to select an item you want to configure.



Item	Option	Description
PCH Configuration	None	Displays and provides option to change the PCH Settings
Server ME Configuration	None	Configure Server ME Technology Parameters

## PCH Configuration

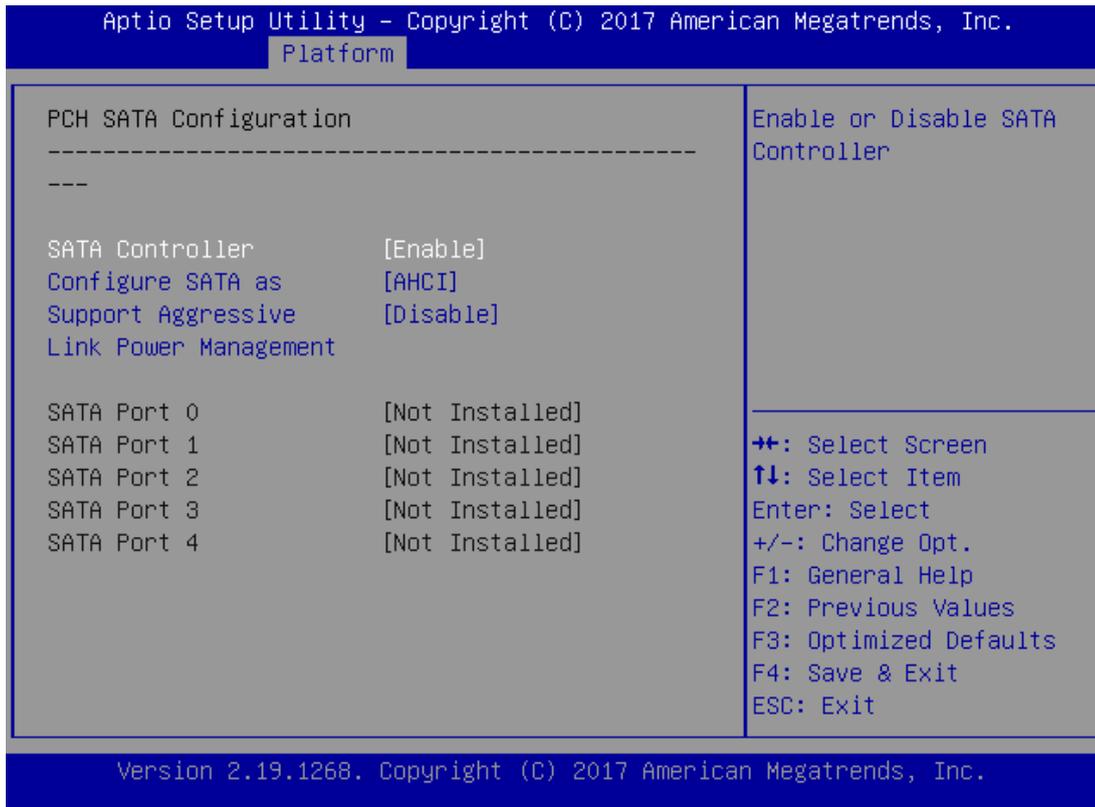
This option displays and provides options to change the PCH Settings.



Item	Option	Description
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
RTC Lock	Disabled Enabled	Enabling this feature will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM
BIOS Lock	Disabled Enabled	Enables or disables the PCH BIOS Lock Enable feature.

### PCH SATA Configuration

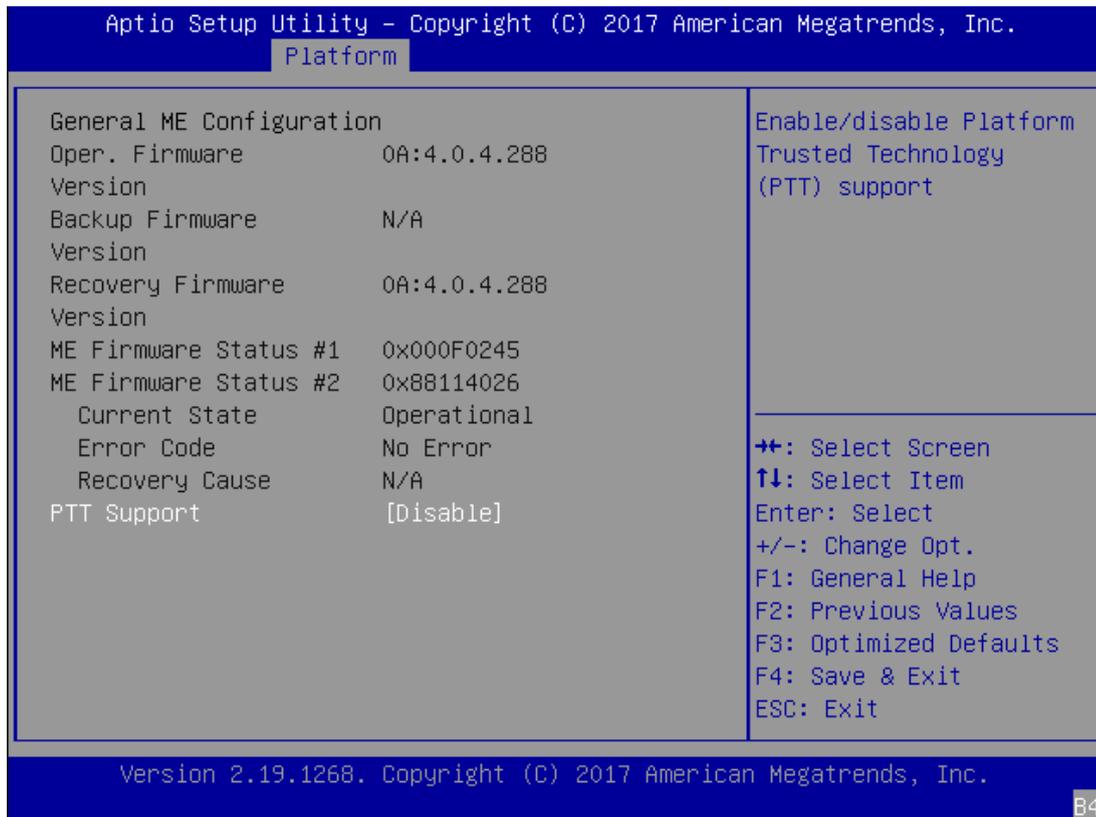
This option allows you to configure SATA devices related options.



Item	Option	Description
SATA Controller	Disabled Enabled	Enables or disables SATA Controller
Configure SATA as	AHCI RAID	This will configure SATA as <b>RAID</b> or <b>AHCI</b> .
Support Aggressive Link Power Management	Disabled Enabled	Enables or disables SALP

## Server ME Configuration

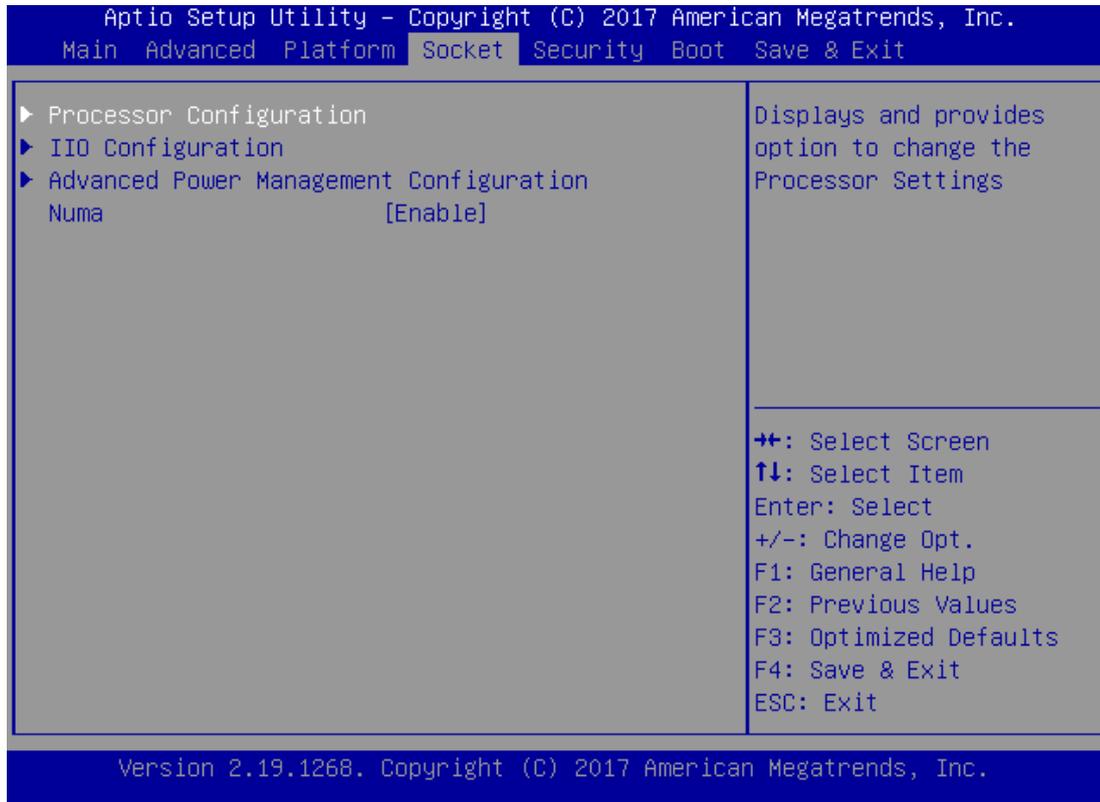
This option configures server ME technology parameters.



Item	Option	Description
PTT Support	Disable Enable	Enables or disables Platform Trusted Technology (PTT) support.

## Socket Setup

Use [→] or [←] to select [Socket] setup screen. Under this screen, you may use [↑] [↓] to select an item you want to configure.



Item	Option	Description
Processor Configuration	None	Displays and provides option to change the Processor 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
Num	Disabled Enabled	Displays and provides option to change the Power Management Settings

## Processor Configuration

In Processor Configuration, you can change the processor settings and view the current parameters.

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Socket

Processor Configuration		▲ Enables Hyper Threading (Software Method to Enable/Disable Logical Processor threads.
-----		
---		
Processor BSP	50654 - SKX M0	
Revision		
Processor Socket	Socket 0    Socket 1	
Processor ID	00050654*   00050654	
Processor Frequency	2.100GHz   2.100GHz	
Processor Max Ratio	15H   15H	
Processor Min Ratio	08H   08H	
Microcode Revision	0200001E	
L1 Cache RAM	64KB   64KB	
L2 Cache RAM	1024KB   1024KB	
L3 Cache RAM	16896KB   16896KB	
Processor 0 Version	Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz	
Processor 1 Version	Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz	
		▲ Select Screen ▲↓ Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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Socket

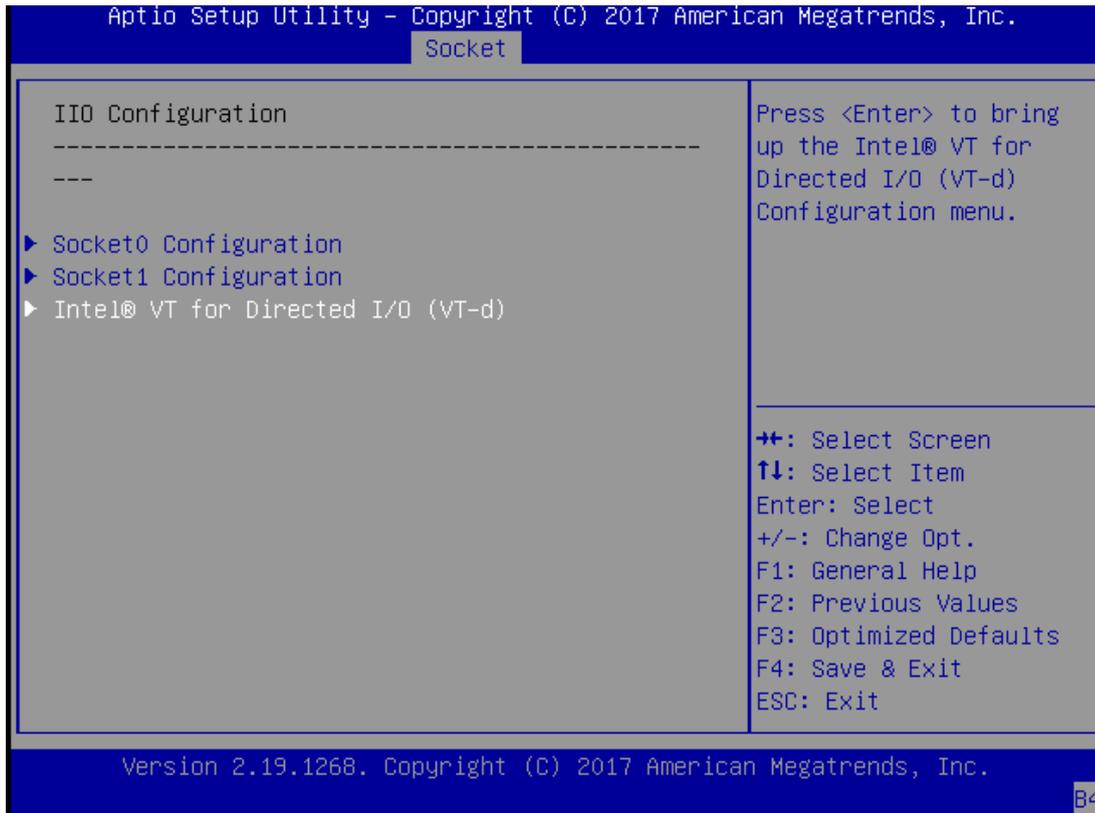
L1 Cache RAM	64KB   64KB	▲ Enable/disable AES-NI support
L2 Cache RAM	1024KB   1024KB	
L3 Cache RAM	16896KB   16896KB	
Processor 0 Version	Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz	
Processor 1 Version	Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz	
Hyper-Threading [ALL]	[Enable]	
Execute Disable Bit	[Enable]	
Enable Intel(R) TXT	[Disable]	
VMX	[Enable]	
Enable SMX	[Disable]	
Hardware Prefetcher	[Enable]	
Adjacent Cache Prefetch	[Enable]	
Extended APIC	[Disable]	
AES-NI	[Enable]	▲ Select Screen ▲↓ Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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Item	Option	Description
Hyper-Threading [ALL]	Disabled Enabled	Enables Hyper Threading (Software Method to Enable/Disable Logical Processor threads.
Execute Disable Bit	Disabled Enabled	When disabled, it forces the XD feature flag to always return 0.
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

## I/O Configuration

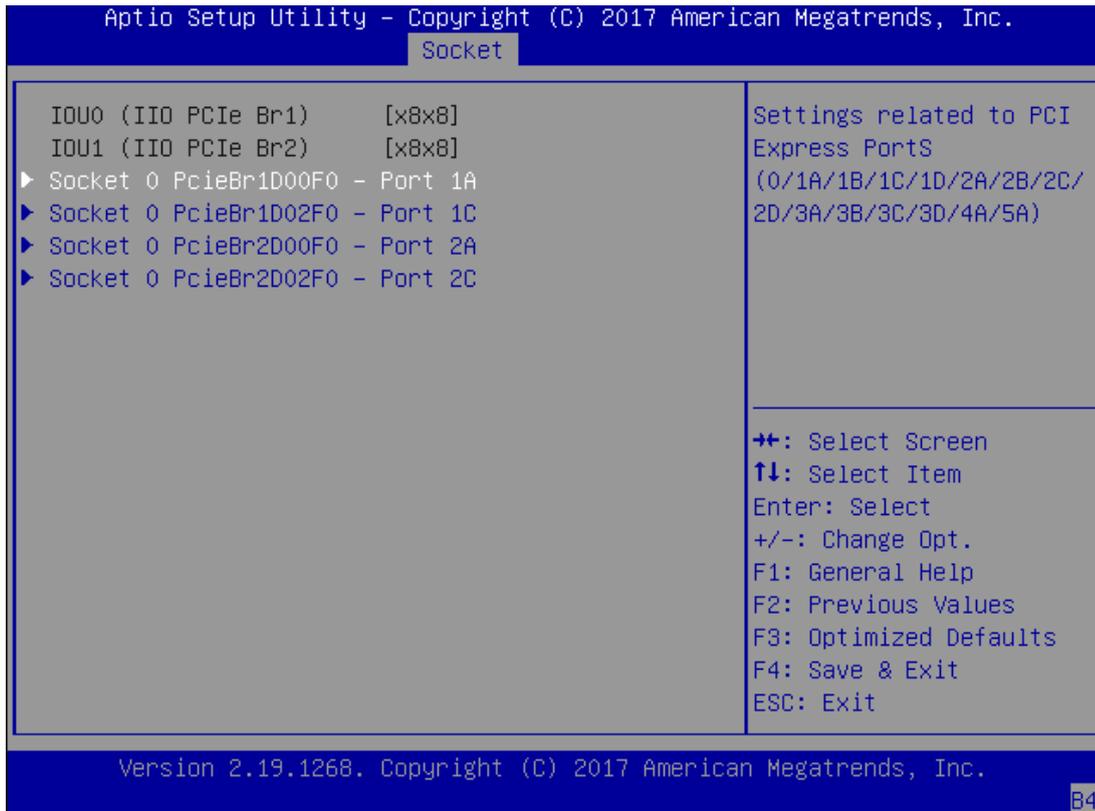
In Processor Configuration, you can change the processor settings and view the current parameters.



Item	Option	Description
Socket0 Configuration	None	None
Socket1 Configuration	None	None
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.

### Socket0 Configuration

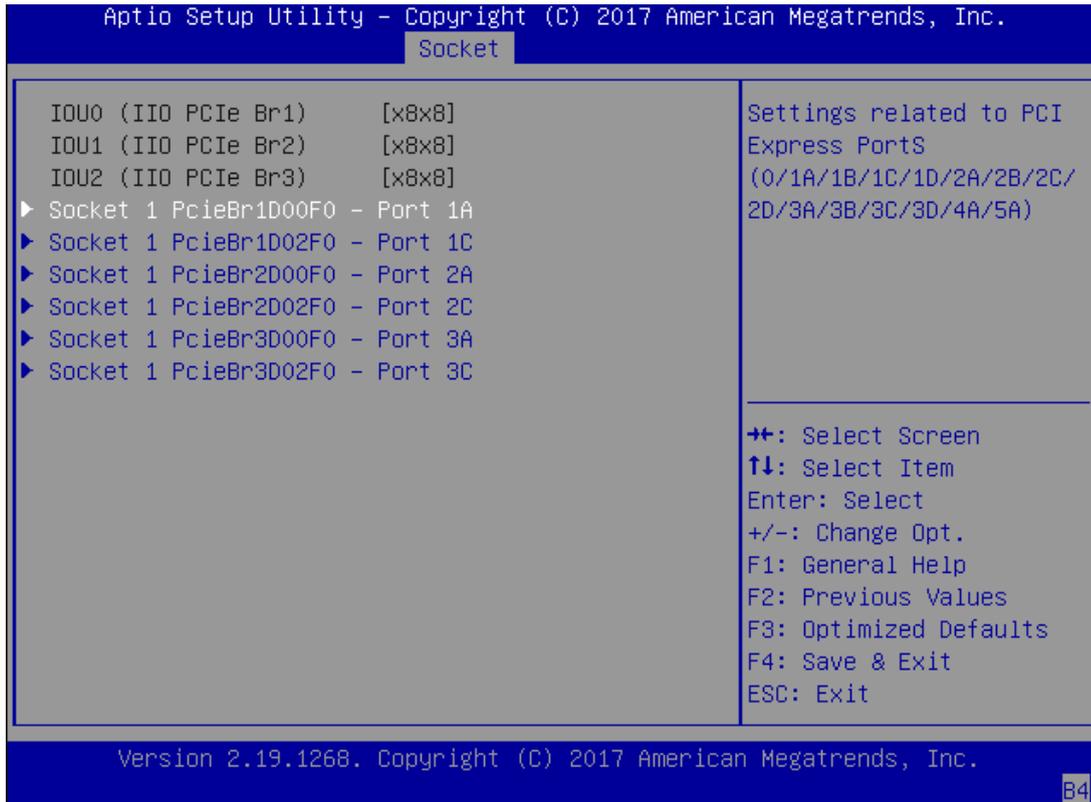
Enter to configure the settings related to PCI Express ports under Socket0.



Item	Option	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

### Socket1 Configuration

Enter to configure the settings related to PCI Express ports under Socket1.



Item	Option	Description
Socket 1 PcieBr1D00F0	None	Settings related to PCI Express Port 1A
Socket 1 PcieBr1D02F0	None	Settings related to PCI Express Port 1C
Socket 1 PcieBr2D00F0	None	Settings related to PCI Express Port 2A
Socket 1 PcieBr2D02F0	None	Settings related to PCI Express Port 2C
Socket 1 PcieBr3D00F0	None	Settings related to PCI Express Port 3A
Socket 1 PcieBr3D02F0	None	Settings related to PCI Express Port 3C

### Intel VT for Directed IO (VT-d)

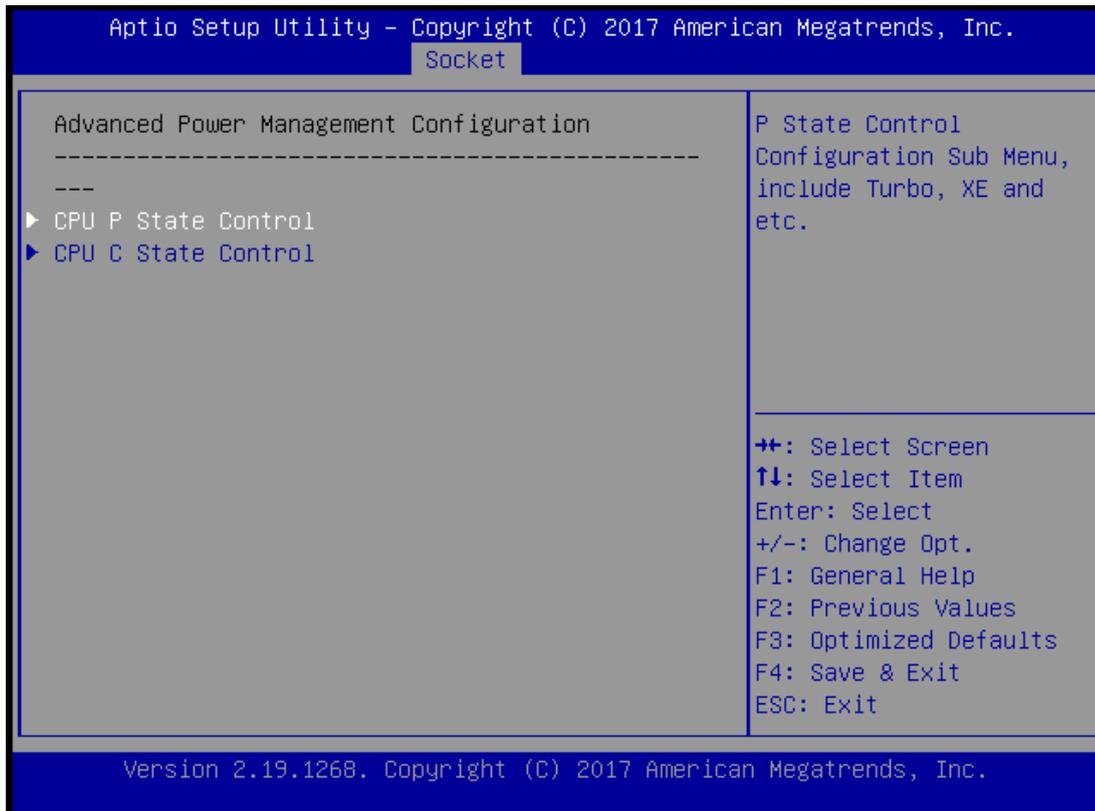
Enter to configure the settings related to Intel® VT for Directed IO (VT-d).



Item	Option	Description
Intel® VT for Directed I/O (VT-d)	<b>Disabled</b> Enabled	Press <b>&lt;Enter&gt;</b> to bring up the Intel® VT for Directed I/O (VT-d) Configuration menu.

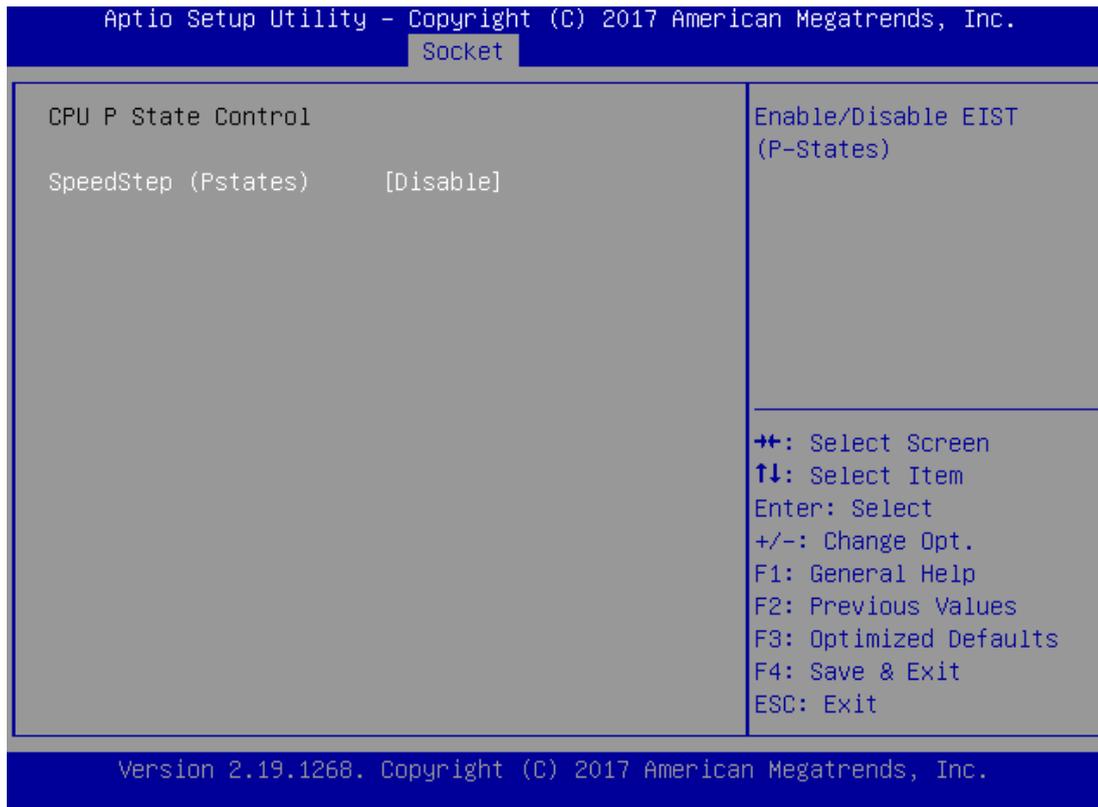
### Advanced Power Management Configuration

This option allows you to modify the Power Management related settings and displays the current parameters.



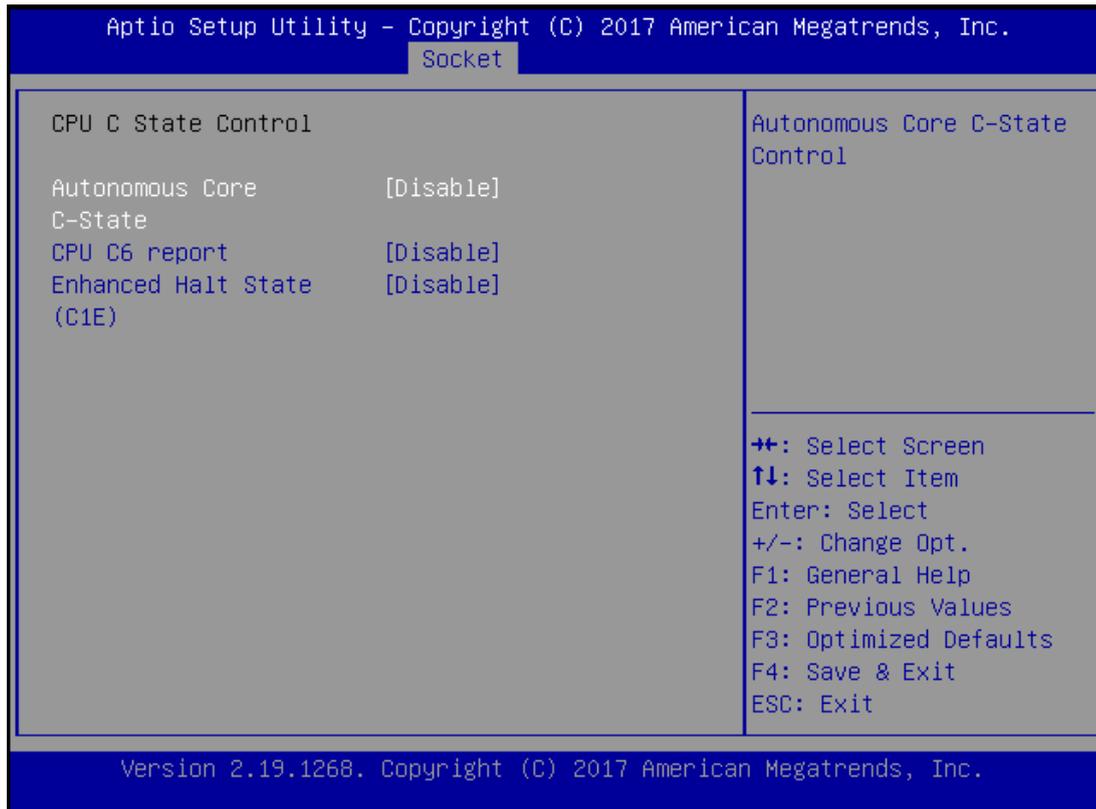
Item	Option	Description
CPU P State Control	None	P State Control Configuration Sub Menu, include Turbo, XE and etc.
CPU C State Control	None	CPU C State setting

**CPU P State Control**



Item	Option	Description
SpeedStep(Pstates)	Disabled Enabled	Enables or disables EIST (P-States)

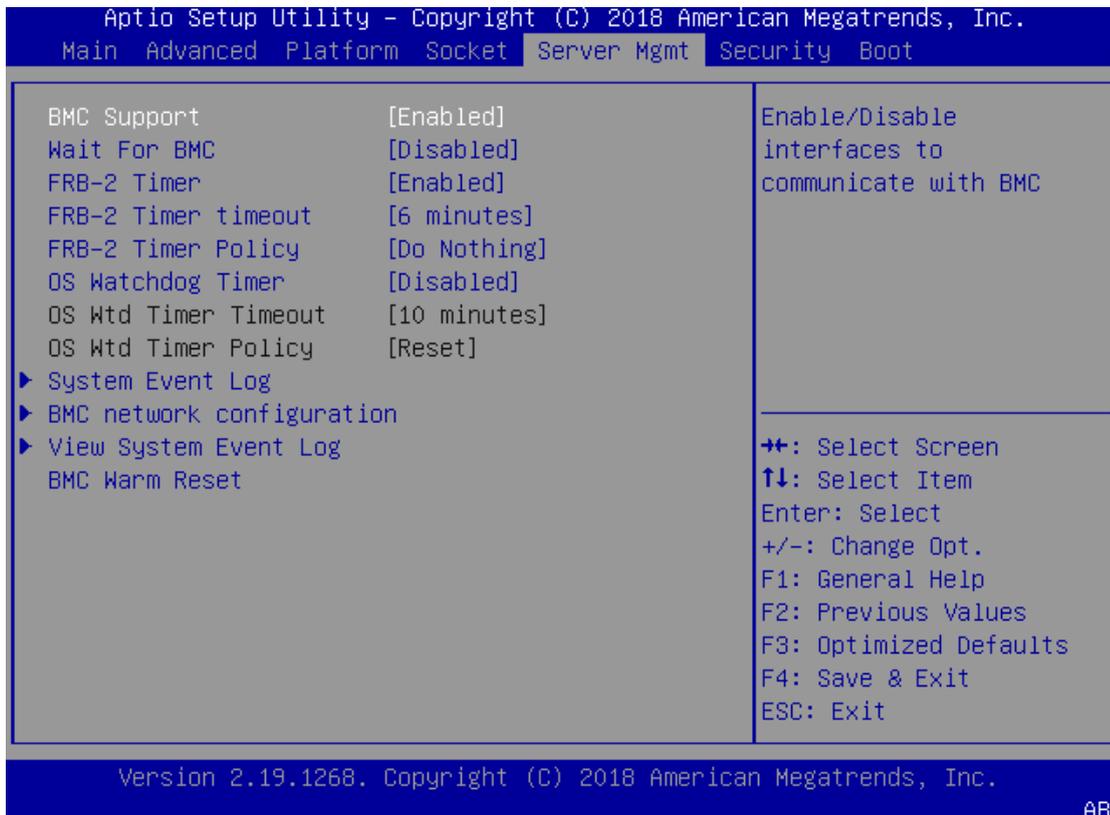
**CPU C State Control**



Item	Option	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

Use [→] or [←] to select [Server Mgmt] setup screen. Under this screen, you may use [↑] [↓] to select an item you want to configure.

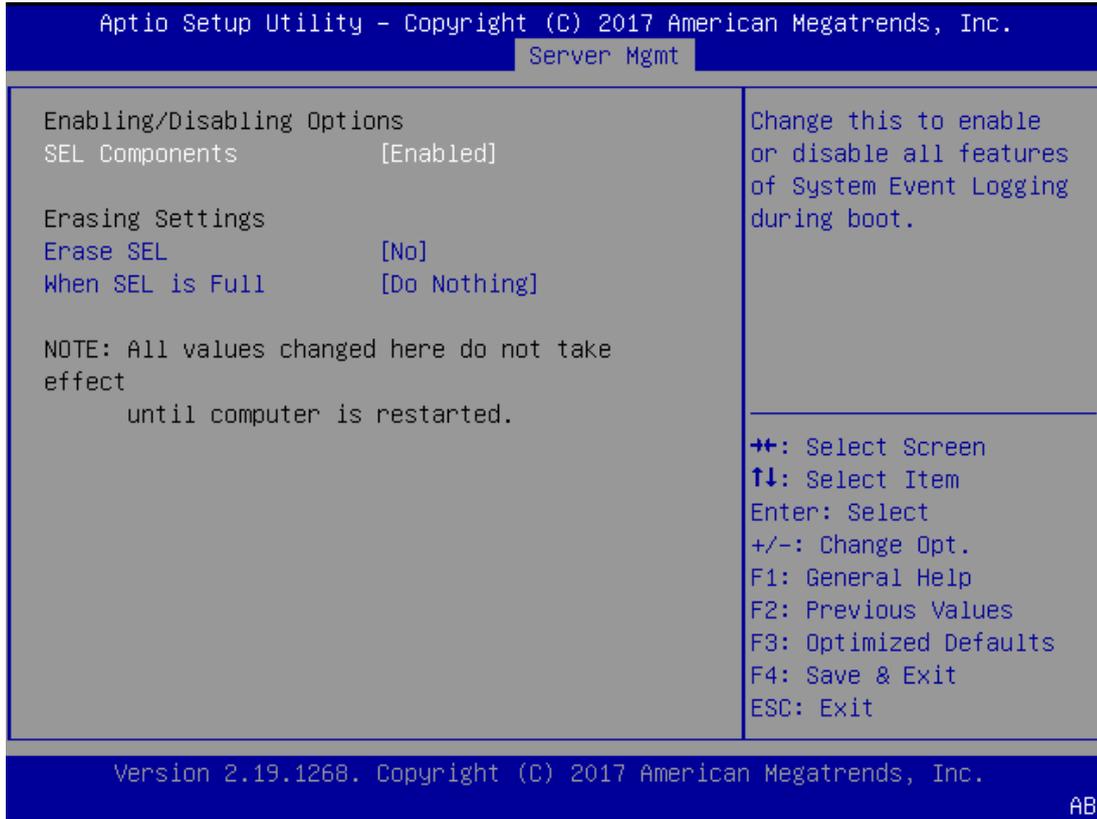


Item	Option	Description
BMC Support	Enabled Disabled	Enable or disables interfaces to communicate with BMC.
Wait For BMC	Enabled Disabled	Wait For BMC response for specified time out. In PILOTII, BMC starts at the same time when BIOS starts during AC power ON. It takes around 30 seconds to initialize 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	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

Timer		the OS is successfully loaded or follows the OS Boot Watchdog Timer policy.
OS Wtd Timer Timeout	5 minutes <b>10 minutes</b> 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 <b>Reset</b> 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 <b>&lt;Enter&gt;</b> to change the SEL event log configuration.
BMC network configuration	NA	Configure BMC network parameters.
View System Event Log	NA	Press <b>&lt;Enter&gt;</b> to view the System Event Log Records.
BMC Warm Reset	NA	Press <b>&lt;Enter&gt;</b> to do Warm Reset BMC.

## System Event Log

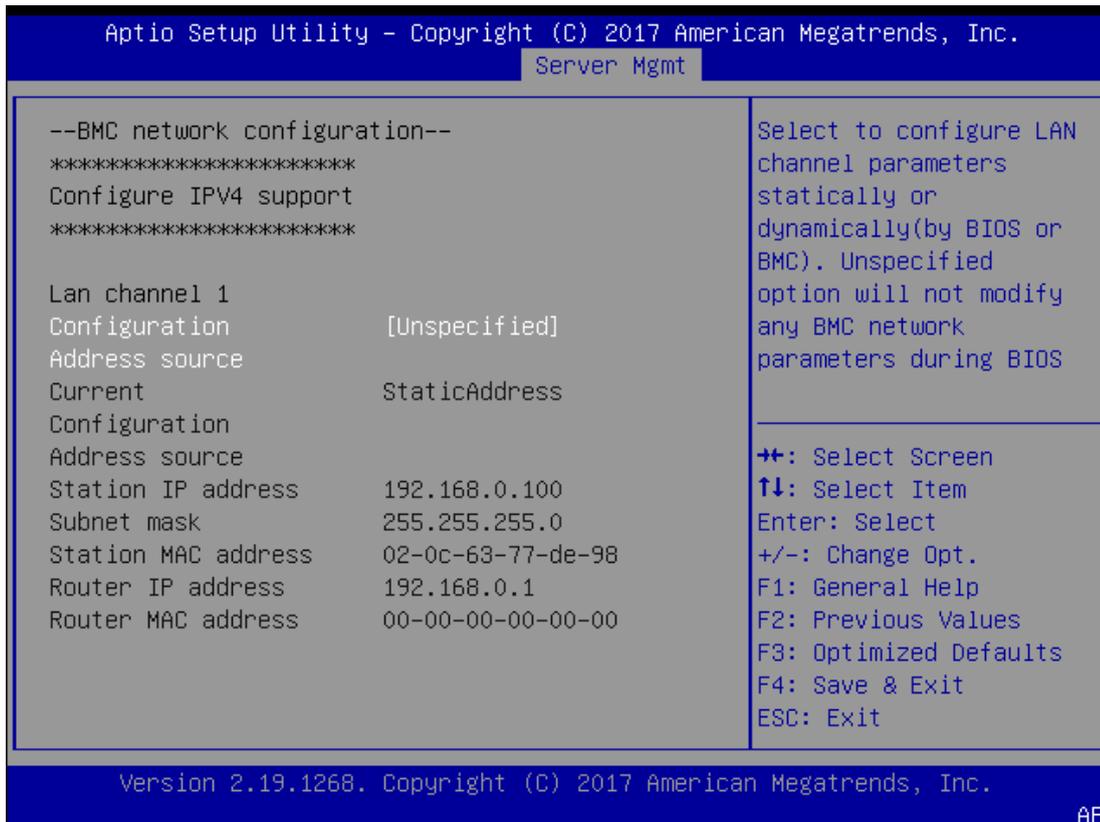
Use this option to change the SEL event log configuration.



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

### BMC network configuration

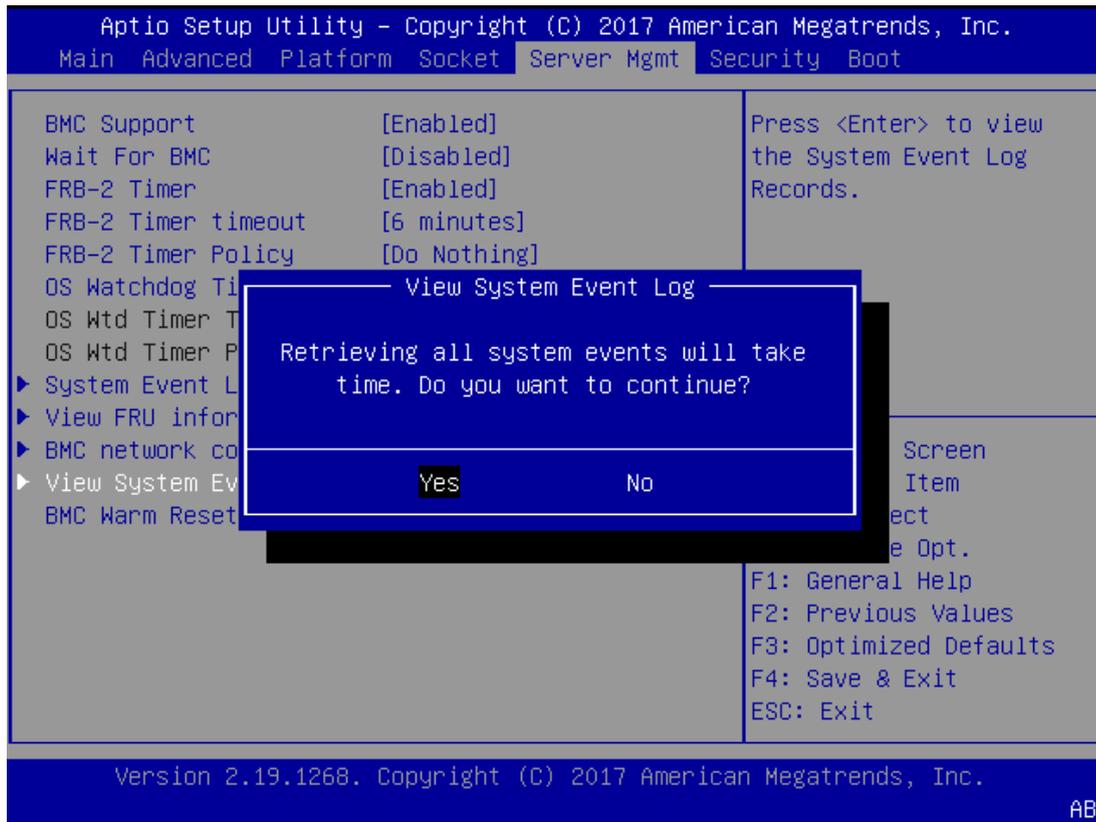
This option allows you to configure BMC network parameters.



Item	Option	Description
Configuration Address source	<b>Unspecified</b> Static DynamicBmcDhcp	Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC). The <b>unspecified</b> option will not modify any BMC network parameters during BIOS phase.

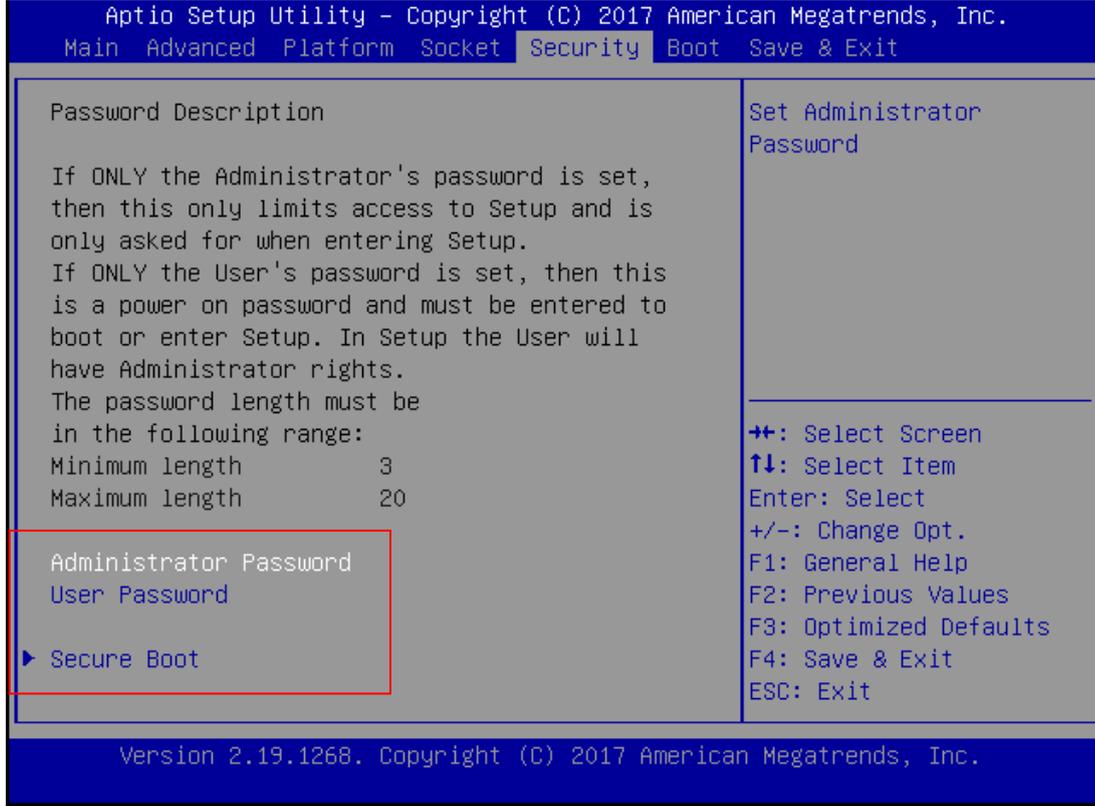
### View System Event Log

This option allows you to view the System Event Log Records.



## Security

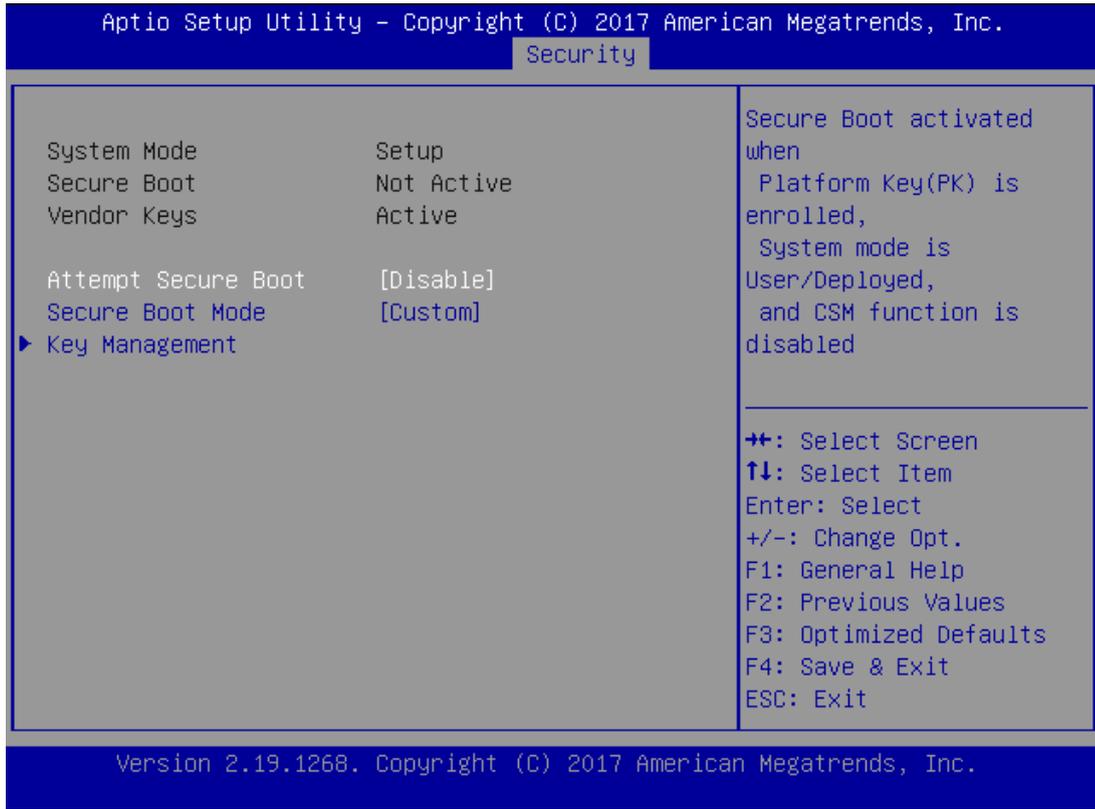
Use [←] / [→] to select [Security] setup screen. Under this screen, you may use [↑] [↓] to select an item you would like to configure.



Item	Description
Administrator Password	Set the administrator password. Once set, then this only limits access to Setup and is only asked for when entering Setup.
User Password	Set the user password. Once set, then this is a power-on password and must be entered to boot or enter Setup. In Setup, the user will have Administrator rights.
Secure Boot	Allows you to customize Secure Boot settings.

## Secure Boot

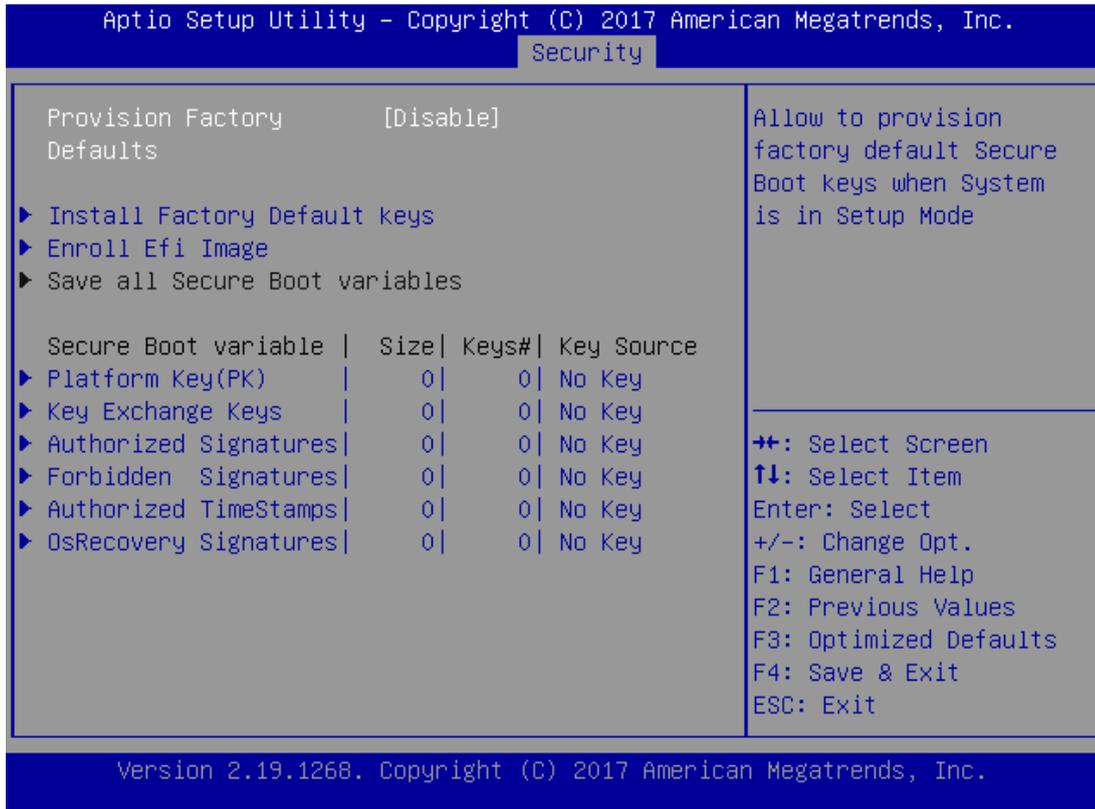
This option allows you to customize Secure Boot settings.



Item	Option	Description
Attempt Secure Boot	Disabled Enabled	Secure Boot is activated when Platform Key(PK) is enrolled, System mode is User/Deployed, and CSM function is disabled.
Secure Boot Mode	Standard Custom	Secure Boot mode selector: In <b>Custom</b> mode, Secure Boot Variables can be configured without authentication

### Key Management

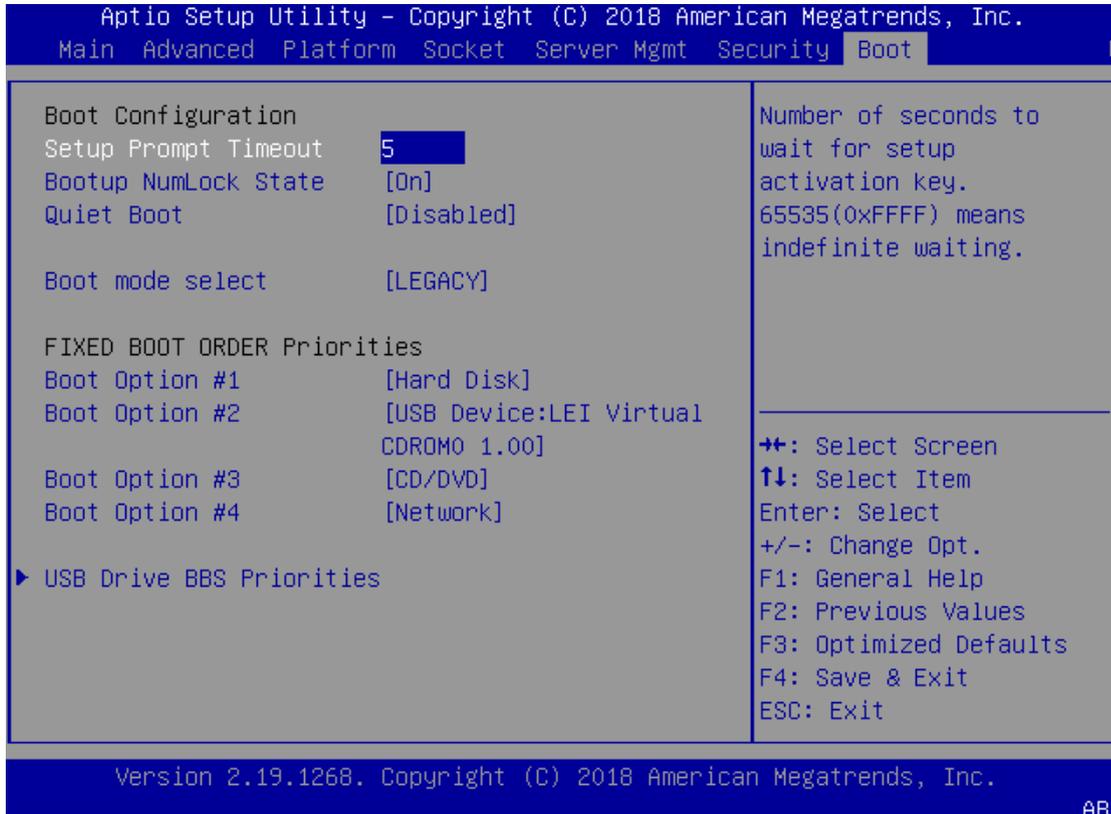
Allows you to provision advanced Secure Boot settings.



Item	Option	Description
Provision Factory Defaults	Disabled	Allows User to provision factory default Secure Boot keys when System is in Setup Mode.
Install Factory Default keys	None	Forces System to User Mode - install all Factory Default keys
Enroll Efi Image	None	Allows the image to run in Secure Boot mode. Enroll SHA256 hash of the binary into Authorized Signature Database (db)

## Boot Setup

Use [←] / [→] to select [Boot] setup screen. Under this screen, you may use [↑] [↓] to select an item you would like to configure.

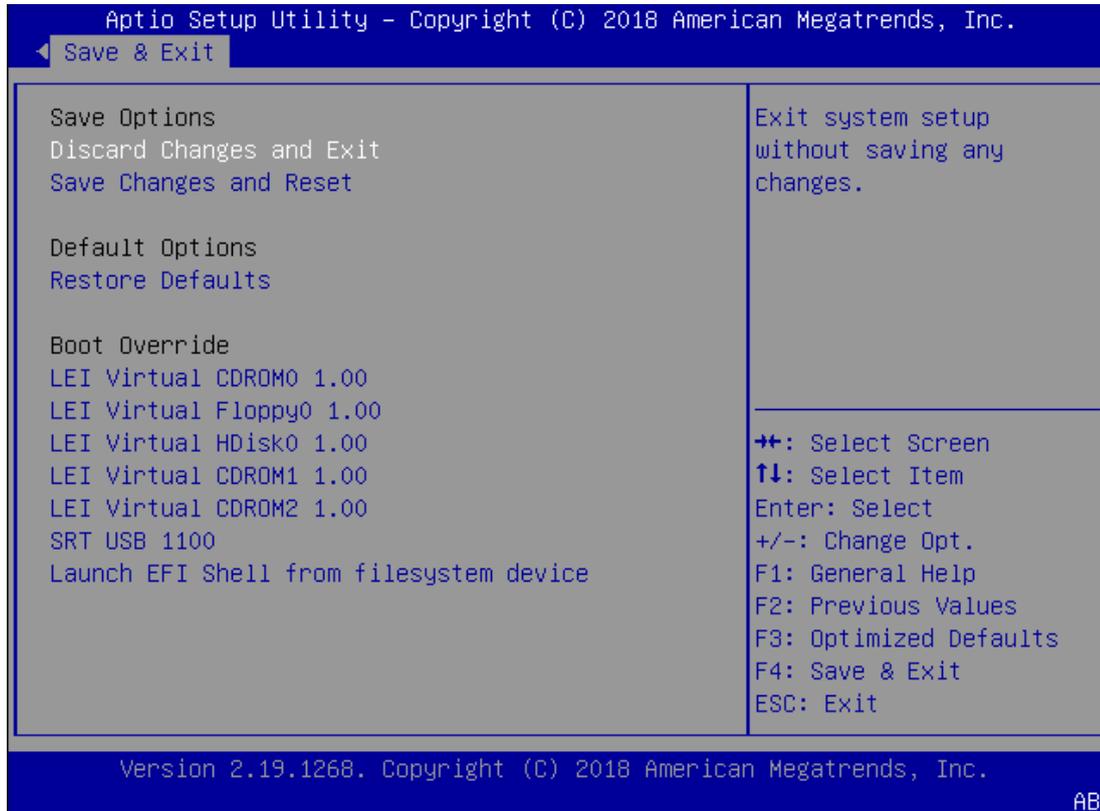


Item	Option	Description
Setup Prompt Timeout	5	Number of seconds to wait for setup activation key. 65535 means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state
Quiet Boot	Disabled Enabled	Enables or disables Quiet Boot option.
Boot mode select	LEGACY UEFI DUAL	Select boot mode for LEGACY or UEFI.

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

## Save and Exit Setup

Use [←] / [→] to select [Save & Exit] setup screen. Under this screen, you may use [↑] [↓] to select an item you would like to configure.



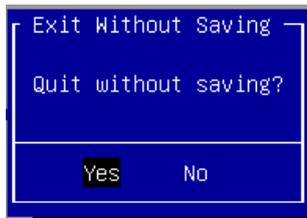
### ■ Save Changes and Reset

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



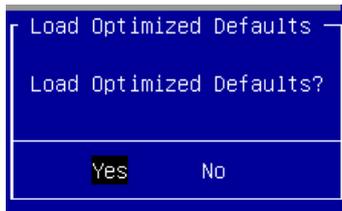
### ■ Discard Changes and Exit

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.



■ **Restore Defaults**

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



# APPENDIX A: LED INDICATOR EXPLANATIONS

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



► **System Power**

<i>Solid Green</i>	<i>The system is powered on</i>
<i>Off</i>	<i>The system is powered off</i>

► **System Status**

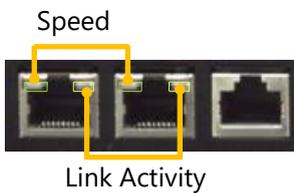
This LED indicator is programmable. You could program it to display the operating status of the behaviors described below:

<i>Solid Green</i>	<i>Defined by GPIO</i>
<i>Solid Red</i>	<i>Defined by GPIO</i>
<i>Off</i>	<i>Defined by GPIO</i>

► **HDD Activity**

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

<i>Blinking Amber</i>	<i>Data access activity</i>
<i>Off</i>	<i>No data access activity</i>



► **Link Activity**

<i>Blinking Amber</i>	<i>Link has been established and there is activity on this port</i>
<i>Solid Amber</i>	<i>Link has been established and there is no activity on this port</i>
<i>Off</i>	<i>No link has been established</i>

► **Speed**

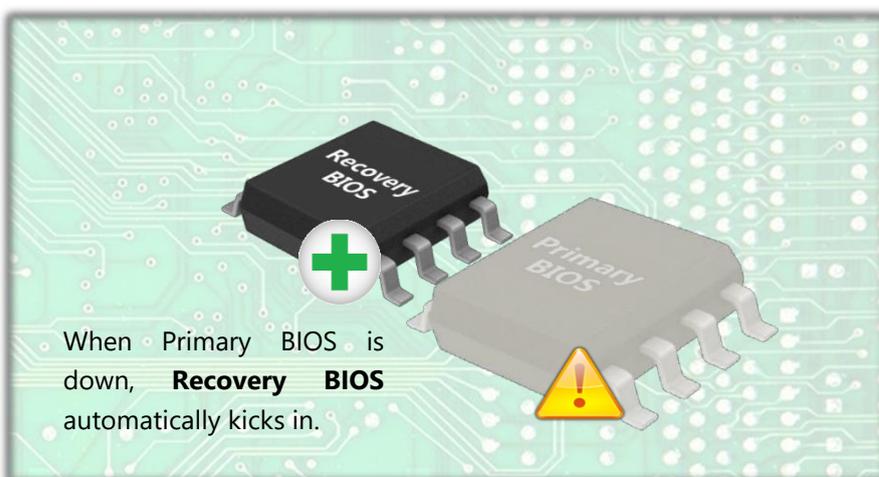
<i>Solid Amber</i>	<i>Operating as a Gigabit connection (1000 Mbps)</i>
<i>Solid Green</i>	<i>Operating as a 100-Mbps connection</i>
<i>Off</i>	<i>Operating as a 10-Mbps connection</i>

## APPENDIX B: 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 it, or, at worst, due to physical damage that caused the BIOS not to function. However, when it happens, not merely will the recovering procedures consume considerable time and effort, but all your 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 goes down, the Recovery BIOS automatically kicks in to boot up the OS for you to take further steps such as performing data backup and BIOS upgrade.



## How Dual BIOS Works

Dual BIOS features two physical BIOS ROMs soldered onto the motherboard, carrying two separate BIOS images:

	Primary BIOS	Recovery BIOS
<b>Image Version</b>	Default: Factory	Default: Factory
<b>Upgradable</b>	Yes (Read, Write)	No (Read only)

*Primary BIOS vs. Recovery BIOS*

The Primary BIOS carries the image used for system boot-up, the parameters of which can be overwritten by custom settings; while the Recovery BIOS carries the read-only image locked to the factory default, which guarantees a safe and successful system boot-up.

If the Primary BIOS fails or stops functioning, the system will automatically invoke a restart followed by a boot-up from the Recovery BIOS. The entire process is completely automatic.

## APPENDIX C: 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 set in Step 1 for server.

# APPENDIX D: 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 is capable of controlling 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 E: 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	I210
Keyword	
Download Type	Drivers
Operating System	Linux*
Product page	<a href="#">Downloads for Intel® Ethernet Controller I210 Series</a>

# APPENDIX F: 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.

<b>RMA No:</b>	Reasons to Return: <input type="checkbox"/> Repair(Please include failure details) <input type="checkbox"/> Testing Purpose
Company:	Contact Person:
Phone No.	Purchased Date:
Fax No.:	Applied Date:
Return Shipping Address: _____	
Shipping by: <input type="checkbox"/> Air Freight <input type="checkbox"/> Sea <input type="checkbox"/> Express _____	
<input type="checkbox"/> 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               |
| 03: CMOS Data Lost     | 09: Cache RMA Problem        | 15: PS2            | 21: Shut Down            |
| 04: FDC Fail           | 10: Memory Socket Bad        | 16: LAN            | 22: Panel Fail           |
| 05: HDC Fail           | 11: Hang Up Software         | 17: COM Port       | 23: CRT Fail             |
| 06: Bad Slot           | 12: Out Look Damage          | 18: Watchdog Timer | 24: Others (Pls specify) |

**Request Party**

**Confirmed By Supplier**

\_\_\_\_\_  
Authorized Signature / Date

\_\_\_\_\_  
Authorized Signature / Date