



Telecom Datacenter Appliances

Hybrid TCA Platforms

HTCA-6400 User Manual

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About this Document

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

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

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



Conventions & Icons

This document utilizes different font types and icons to make the selected text more transparent and explicable to users. Please note that this document contains the following conventions:

Font Conventions

| Example | Convention | Usage |
|--------------------------|------------------------------------|--|
| <code>iptables -F</code> | Monospace, shaded | A command to be entered at a shell command-line |
| Setup page | Bold | A title of a dialog box or a page |
| <Enter> | Between a pair of inequality signs | A physical keyboard button |
| "Menu" | Between a pair of quotation marks | A menu option or a software button to be clicked |
| <i>Readme.txt</i> | In Italic | A filename or a file path |
| <u>IPMI User Guide</u> | Underlined | The name of another document or a chapter in this document |

Icon Descriptions

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

Online Resources

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

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

Technical Support

In addition to contacting your distributor or sales representative, you could submit a request to our the [Lanner Technical Support](#) page to fill in a support ticket to our technical support department.

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Contact Information

Taiwan Corporate Headquarters

Lanner Electronics Inc.

7F, No.173, Sec.2, Datong Rd.
Xizhi District, New Taipei City 22184,
Taiwan

立端科技股份有限公司

221 新北市汐止區
大同路二段 173 號 7 樓
T: +886-2-8692-6060
F: +886-2-8692-6101
E: contact@lannerinc.com

USA

Lanner Electronics Inc.

47790 Westinghouse Drive
Fremont, CA 94539
T: +1-855-852-6637
F: +1-510-979-0689
E: sales_us@lannerinc.com

Europe

Lanner Europe B.V.

Wilhelmina van Pruysenweg 104
2595 AN The Hague
The Netherlands
T: +31 70 701 3256
E: sales_eu@lannerinc.com

China

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

Guodong LOFT 9 Layer No. 9 Huinan Road,
Huilongguan Town, Changping District, Beijing
102208 China
T: +86 010-82795600
F: +86 010-62963250
E: service@ls-china.com.cn

Canada

Lanner Electronics Canada Ltd

3160A Orlando Drive
Mississauga, ON
L4V 1R5 Canada
T: +1 877-813-2132
F: +1 905-362-2369
E: sales_ca@lannerinc.com

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ▶ Reorient or relocate the receiving antenna.
- ▶ Increase the separation between the equipment and receiver.
- ▶ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- ▶ Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

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



Note

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



Important

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

Safety Guidelines

Follow these guidelines to ensure general safety:

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

Consignes de sécurité

Suivez ces consignes pour assurer la sécurité générale :

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

Lithium Battery Caution

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

Avertissement concernant la pile au lithium

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

Operating Safety

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

Sécurité de fonctionnement

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

Mounting Installation Precaution

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

- ▶ Do not install and/or operate this unit in any place that flammable objects are stored or used in.
- ▶ The installation of this product must be performed by trained specialists; otherwise, a non-specialist might create

the risk of the system's falling to the ground or other damages.

- ▶ Lanner Electronics Inc. shall not be held liable for any losses resulting from insufficient strength for supporting the system or use of inappropriate installation components.
- ▶ Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- ▶ Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.
- ▶ Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- ▶ Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- ▶ Reliable Grounding - Reliable grounding of rack mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Installation & Operation

- ▶ This equipment must be grounded. The power cord for product should be connected to a socket-outlet with earthing connection.
Cet équipement doit être mis à la terre. La fiche d'alimentation doit être connectée à une prise de terre correctement câblée
- ▶ Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.
Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.
- ▶ The machine can only be used in a restricted access location and must be installed by a skilled person.
Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.

Warning


Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.

"Product shall be used with Class 1 laser device modules."

Avertissement

Équipement de classe I. Ce matériel doit être relié à la terre. La fiche d'alimentation doit être raccordée à une prise de terre correctement câblée. Une prise de courant mal câblée pourrait induire des tensions dangereuses sur des parties métalliques accessibles.

"Le produit doit être utilisé avec des modules de dispositifs laser de classe 1."

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.

Electrical Safety Instructions

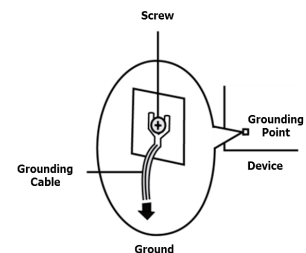
Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect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

Consignes de sécurité électrique

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

Grounding Procedure for Power Source

- ▶ Loosen the screw of the earthing point.
- ▶ Connect the grounding cable to the ground.
- ▶ The protection device for the power source must provide 30 A current.
- ▶ This protection device must be connected to the power source before power.
- ▶ The cable should be 16 AWG



Procédure de mise à la terre pour source d'alimentation

- ▶ 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 doit fournir 30 A de courant.
- ▶ Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation.
- ▶ Le câble doit être 16 AWG

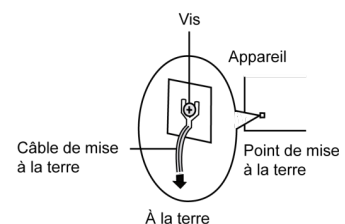


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CHAPTER 1: PRODUCT OVERVIEW

Thank you for choosing HTCA-6400. The network appliance is designed for high-availability telecommunication application. Built in 4U form factor chassis, HTCA-6400 supports up to 4 Intel x86 motherboards and 4 swappable, front-panel I/O blades. The blades can be configured to max. 4x line cards and/or max. 2x switches. HTCA-6400 also integrates switch fabric for enhanced communications between motherboards.

Internally, each motherboard of HTCA-6400 is empowered by 2x 2nd Gen Intel® Xeon® Processor Scalable Family CPUs and 16x DDR4 R-DIMMs. Storage wise, each motherboard supports 2x SATA 2.5" disk drive bay, therefore, there will be a total of 8 HDD/SSD externally accessible drive bay for HTCA-6400. As designed for telecommunication application, HTCA-6400 is NEBS compliant.

Key Features

- ▶ 4 CPU blades in the rear, supports 2x 2nd Gen Intel® Xeon® Scalable Processor Family CPU for each motherboard
- ▶ BCM StrataXGS™ Tomahawk BCM56960 Switch Fabric with 3.2Tbps
- ▶ 4x Swappable I/O blades on the front, supporting up to 2x Switch blades or 4x Ethernet blades, and 8x swappable 2.5"HDD bays
- ▶ NEBS compliant design
- ▶ Redundant power supply and removable fan module

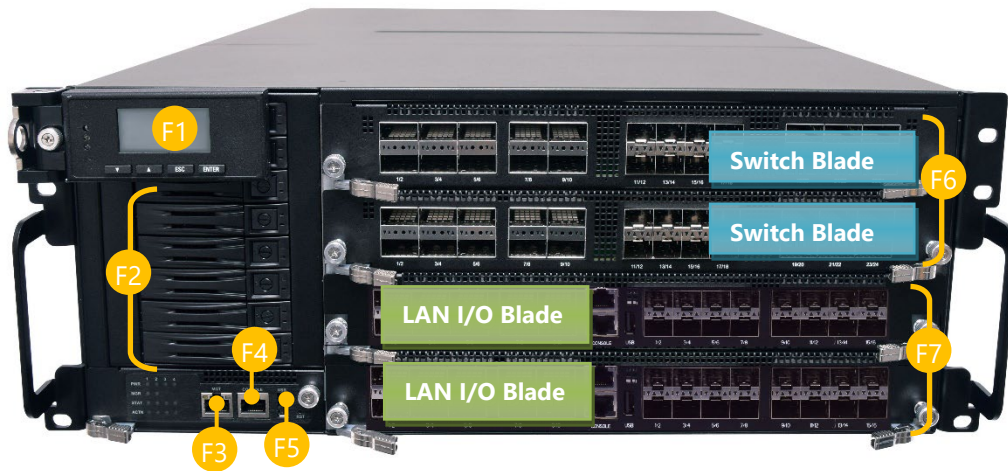
Ordering Information

| Item | Model Name | Description |
|---------------------|----------------------------|--|
| 4U System | HTCA-6400B | 4U telecom network appliance with 4x CPU blades, 8x 2.5" HDD drive bays, 4x I/O blades with 4x PSU slots |
| Compute Node | HMB-6110 | X86 compute node supports 2x 2nd Gen Intel® Xeon® Scalable Processor Family, with C621/C627 PCH |
| NIC Blade | HLM-1001 | 20x SFP+ Ethernet Network Interface |
| Switch Blade | HLM-1021 | 2x QSFP28, 16x SFP+, 4x 10G Base-T, with Control Board |
| | HCM-1030 | 10x QSFP28, 6x 10G SFP+ (and optional Timing Card) |
| | HLM-1101 | 14x QSFP28 with Control Board |

System Specifications

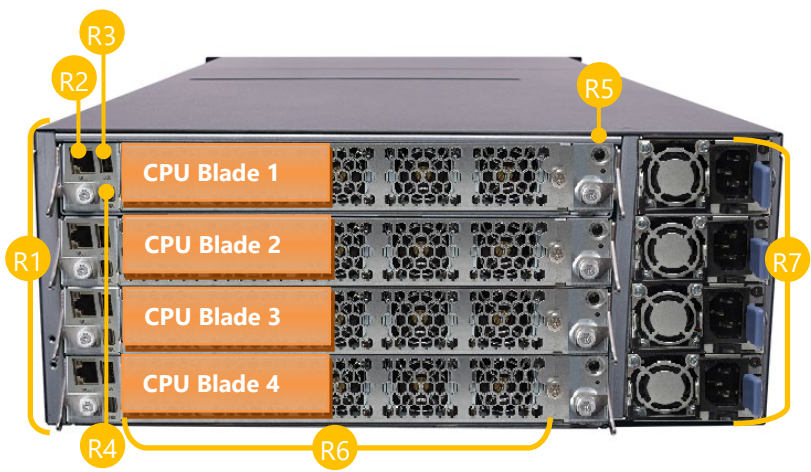
| Form Factor | | 4U Rackmount |
|----------------|-------------------------------|--|
| Platform | CPU Options | 2nd Gen Intel® Xeon® Scalable Processors Family |
| | Frequency | Depending on CPU |
| | CPU TDP | Up to 165W |
| | Number of Cores | Depending on CPU |
| | Chipset | Intel® C621/ C627 Chipset |
| BIOS | | AMI SPI Flash BIOS |
| System Memory | Technology | DDR4 2933MHz (Registered) |
| | Max. Capacity | Up to 512GB (Registered) per M/B tray |
| | Socket | Up to 16x 288-pin DIMM per M/B tray |
| Switch Blade | Switch Fabric | 100G/ 40G/ 10G/ 1G/ Optical fiber |
| | Speed | KR4, QSFP28, QSFP+, SFP+, SFP |
| | Interface | By SKU |
| Ethernet Blade | Controller | XL710 |
| | Speed | 10Gbps |
| | Interface | Up to 20x SFP+ |
| Storage | Type | SATA III, 6Gb/s per port |
| | Installation | 8x 2.5" swappable drive bays |
| | Type | M.2 M-Key |
| | Installation | 1 x M.2 M-Key socket per M/B tray |
| I/O | Reset Button | Yes |
| | Console | 1 x RJ45 |
| | USB | 1 x Type A |
| | IPMI | OPMA socket to support IPMI (IAC-AST2500) |
| Expansion | PCIe | N/A |
| | PCI | N/A |
| Cooling | Processor | CPU heatsinks |
| | System | Up to 5x independent hot-swappable cooling Fans with smart fan control, each blade x5 |
| Environment | Operating/Storage Temperature | 0 ~ 40°C /-20 ~ 70°C |
| | Relative Humidity | 5% to 90%, non-condensing |
| Miscellaneous | LCD Module | 2 x 20 characters |
| | Watchdog | Yes |
| | Internal RTC with Li Battery | Yes |
| Mechanical | Dimension (W x H x D) | 438 x 177.3 x 685.8 mm |
| | Weight | TBD |
| | Mounting | Rack mount |
| Power | Type / Watts | AC 1200-watt N+1 Redundant /each DC 1010-watt N+1 Redundant /each PM bus support, up to 3x PSU slots |
| | Input | AC 85~264V; DC -36~-72V |
| | Linux | Linux Kernel 2.6 or above |
| Certification | EMC | CE Class A, FCC Class A |

Front Panel



| No. | Description | |
|-----|-------------------------|--------------------------------------|
| F1 | LCM | LCM with 4x keypads |
| F2 | Removable HDD/SSD Trays | 8x 2.5" SATA HDD/SSD removable trays |
| F3 | MGT Port | 1x RJ-45 Management port |
| F4 | Console Port | 1x RJ-45 Console port |
| F5 | USB Port | 1x USB 2.0 Type-A port |
| F6 | Switch Blade | Max. 2x Switch Boards (swappable) |
| F7 | LAN I/O Blade | Max. 4x LAN I/O Blades (swappable) |

Rear Panel

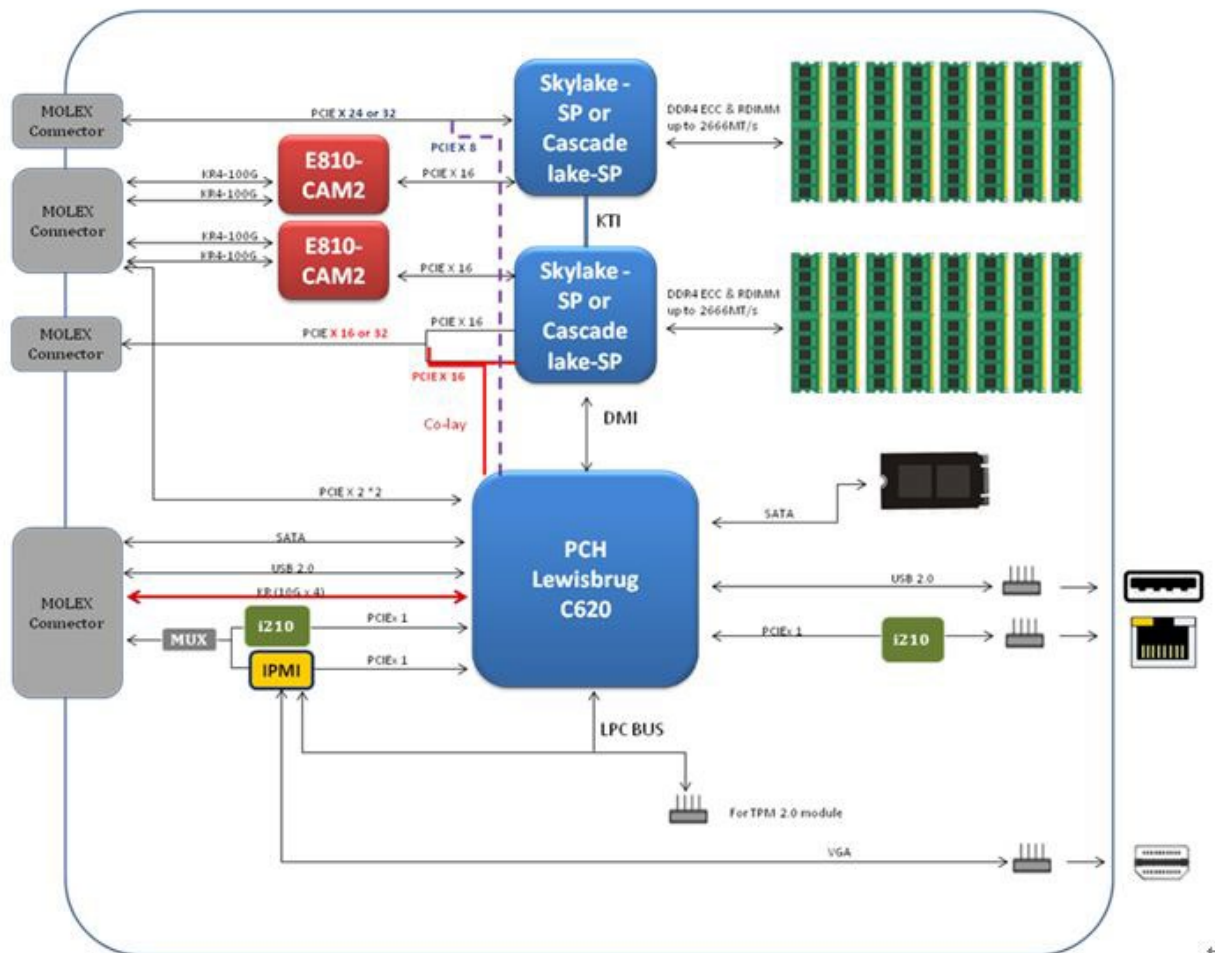


| No. | Description | |
|-----|--------------|------------------------------------|
| R1 | CPU Blades | 4x Swappable CPU blades |
| R2 | MGT Port | 1x RJ45 Management Port |
| R3 | USB Port | 1x USB 2.0 |
| R4 | VGA Port | 1x Video Graphics Array (VGA) Port |
| R5 | Power Button | 1x Power Button |
| R6 | Cooling Fans | 5x Cooling fans per CPU blade |
| R7 | Power Supply | 4x Redundant power supply units |

CHAPTER 2: MOTHERBOARD INFORMATION

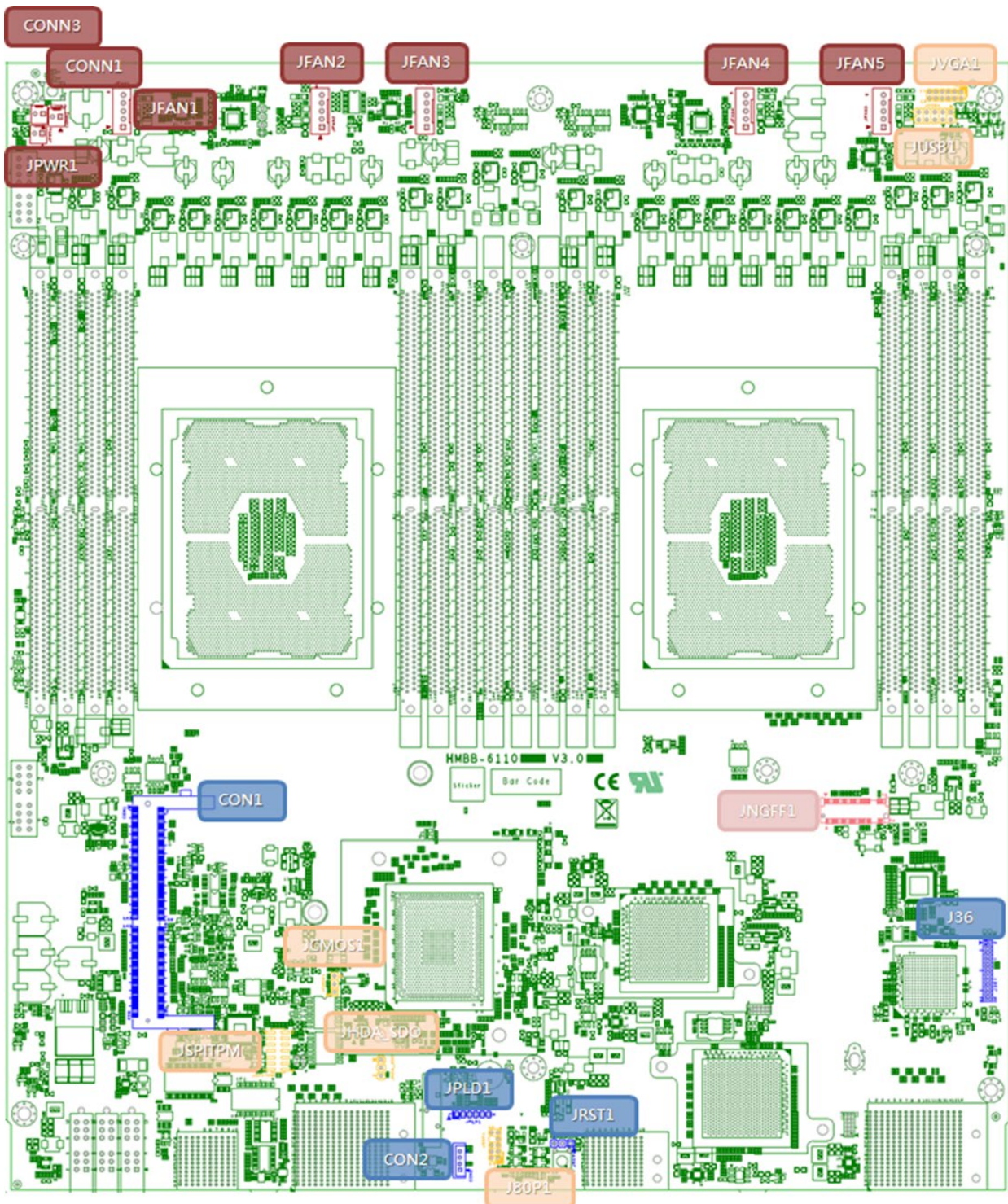
Block Diagram

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

CONN3: For Power LED indication

| Pin | Description |
|-----|-------------|
| 1 | Anode |
| 2 | Cathode |

CONN1: For Thumb Screw detection

| Pin | Description |
|-----|-------------|
| 1 | Detect |
| 2 | GND |

JPWR1: For Power Button detection

| Pin | Description |
|-----|-------------|
| 1 | GND |
| 2 | Power on |

JFAN1 ~ JFAN5 : For Fan Module Connection

| Pin | Description |
|-----|-------------|
| 1 | GND |
| 2 | +12V |
| 3 | RPM sense |
| 4 | RPM sense |
| 5 | PWM control |

JVGA1: For VGA Monitor Connection

| Pin | Description | Pin | Description |
|-----|-------------|-----|-------------|
| 1 | RED | 2 | GND |
| 3 | GREEN | 4 | GND |
| 5 | BLUE | 6 | GND |
| 7 | HSYNC | 8 | NC |
| 9 | VSNC | 10 | GND |
| 11 | DDC_DATA | 12 | DDC_CLK |

JUSB1: For USB Device Connection

| Pin | Description | Pin | Description |
|-----|-------------|-----|-------------|
| 1 | +5V_SB | 2 | +5V_SB |
| 3 | D1_N | 4 | D2_N |
| 5 | D1_P | 6 | D2_P |
| 7 | GND | 8 | GND |
| 9 | GND | 10 | GND |

JNGFF1: For M.2 - 2280 socket 3 module

| Pin | Description | Pin | Description |
|---|-----------------|---|-------------|
| 1, 3, 9, 15, 21, 27, 33, 39, 45, 51, 57, 71, 73, 75 | GND | 2, 4, 12, 14, 16, 18, 70, 72, 74 | +3.3V |
| 5 | PERN3 | 6, 8, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 56, 58, 68, | NC |
| 7 | PERP3 | | |
| 11 | PETN3 | | |
| 13 | PETP3 | | |
| 17 | PERN2 | | |
| 19 | PERP2 | | |
| 23 | PETN2 | | |
| 25 | PETP2 | | |
| 29 | PERN1 | | |
| 31 | PERP1 | | |
| 35 | PETN1 | | |
| 37 | PETP1 | | |
| 41 | PERN0 / SATA_RP | | |
| 43 | PERP0 / SATA_RN | | |
| 47 | PETN0 / SATA_TN | | |
| 49 | PETP0 / SATA_TP | | |
| 53 | REFCLKN | 10 | DAS# |
| 55 | REFCLKP | 50 | PERST# |
| 67 | NC | 52 | CLKREQ# |
| 69 | DETECT | 54 | PEWAKE# |

CON1: For Lanner IPMI Card (IAC-AST2500)**J36: For Lanner LAN Extension Card (HRC-61001)**

JPLD1: For Lanner CPLD Debug Purpose

JRST1: For Reset Debug Purpose

CON2: For Function Reserved

JCMOS1 : For Clear CMOS

| Pin | Description |
|-------|-------------|
| 1 - 2 | Normal |
| 2 - 3 | Clear CMOS |

JHDA_SDO : For Flash Descriptor Security Override

| Pin | Description |
|-------|-------------|
| 1 - 2 | Normal |
| 2 - 3 | Override |

JSPITPM : For Lanner TPM Module (IAC-TPM04) or SPI Fixture Debug Purpose

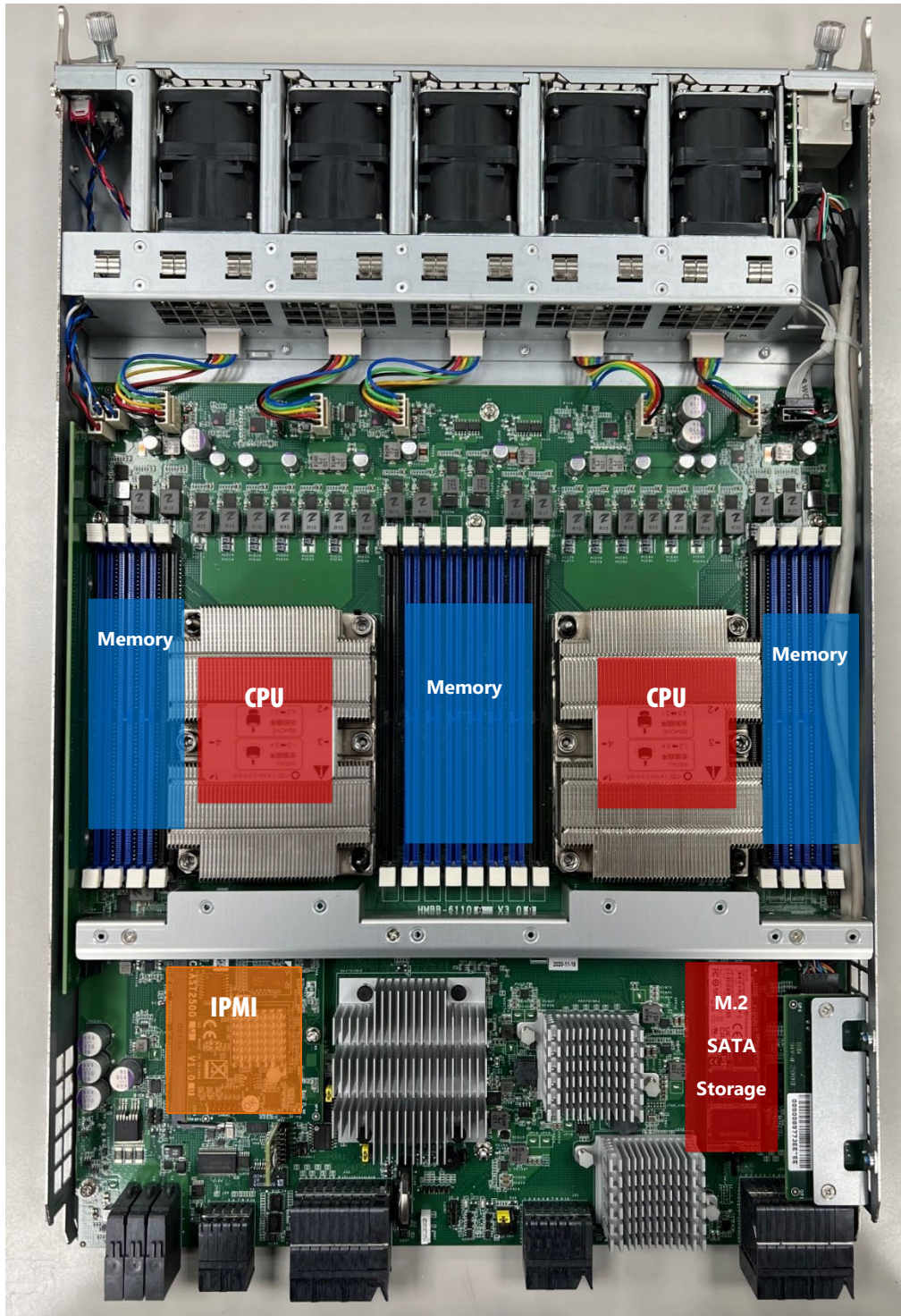
J80P1 : For Lanner LPC Fixture Debug Purpose

CHAPTER 3: HARDWARE SETUP



WARNING: (1) To reduce the risk of personal injury, electric shock, or damage to the equipment, please remove all power sources. (2) Please wear ESD protected gloves before conducting the following steps. This exclamation point indicates that there is a caution or warning and it is something that could damage your property or product.

Based on your application and modules used, install modules in the corresponding slots.



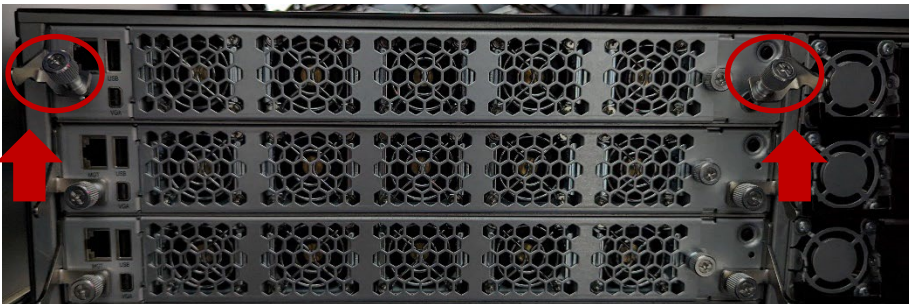
Accessing the Compute Blade(s)

You have to access the compute blade(s) in order to install or replace CPUs, heatsinks, and DDR memory DIMMs. Please follow the steps below to access the compute blades.

1. Select a compute blade you wish to access the internal components.



2. Rotate and loosen the captive screws circled in the image below. You may apply a screwdriver to conduct this task.
3. Hold onto both captive screws and handles and lift them upwards at the same time.



4. Then, pull the compute blade out.





Installing the CPU(s)

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

Installing the processor onto the motherboard involves two stages:

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

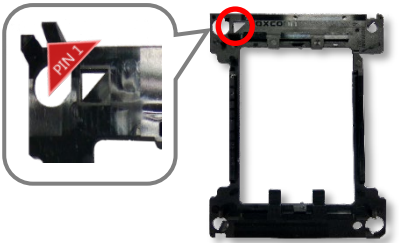
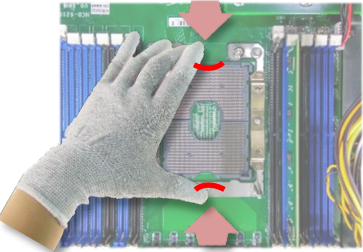
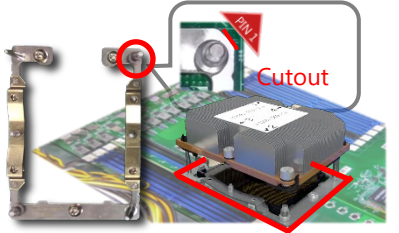
Tools Required

| Tool | Description | |
|--|--|---|
| Torque Screwdriver (Star T30) | Set to 1.36N.m. or 12 in-lbf for tightening the nuts, which fasten the PHM on the bolster plate. |  |
| ESD Protection (ESD gloves, ESD-safe work surface, etc.) | During the entire assembly process, 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 may differ.

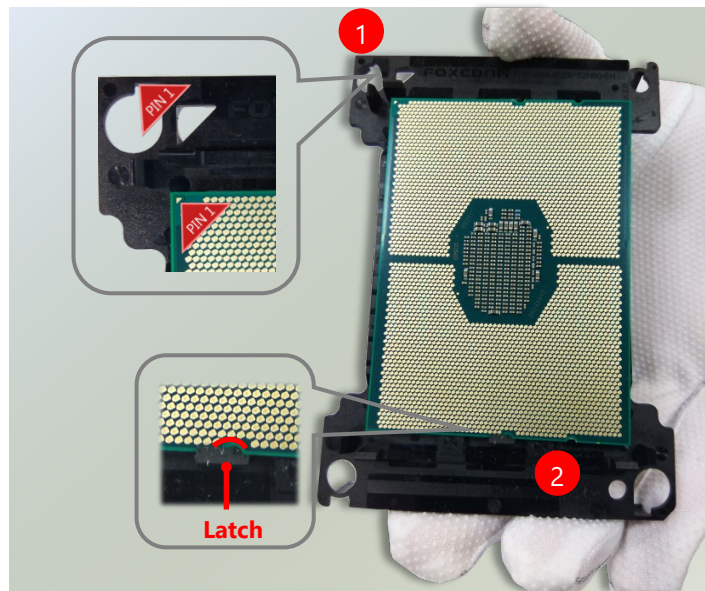
Parts Explanation

| Item | Description | |
|------------------|--|---|
| Processor | Please avoid touching the gold fingers or package lands of the processor even if you are wearing ESD gloves. |  |
| Heat Sink | If a TIM (Thermal Interface Material) protective film is already attached to the base of the heat sink, remove it before you mount the processor on it. When holding the heat sink, please grip it along the axis of its fins with your thumb and your index finger |  |

| | | |
|--------------------------|---|--|
| Processor Carrier | This is packed along with the processor. Before performing any assembly involving this part, please locate PIN1 on one of the corners, an important indicator used to align this carrier with the processor and the bolster plate correctly. |  |
| Dust Cover | This cover is used to protect the package land surface of the processor from contamination. To remove it from the processor, grasp the holding features with your thumb and your index finger while pulling the cover off vertically. |  |
| Bolster Plate | A robust bolster plate is used to assist in PHM alignment for installation, while effectively helping eliminate PCB bowing during compression. Please locate the Cutout on one of the four corners before starting PHM installation. |  |

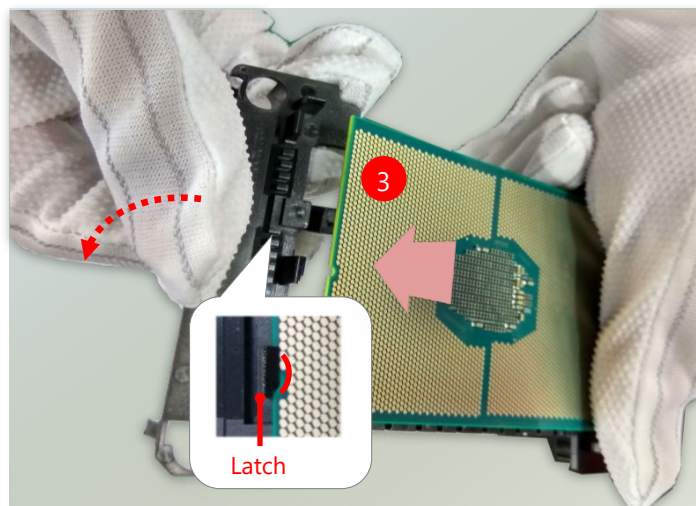
Mounting the CPU onto the Heat Sink

1. Align the PIN1 indicator on the processor with that on the carrier.
2. Gently insert one side of the processor into the carrier and make sure the alignment feature is aligned with the latch of the carrier.

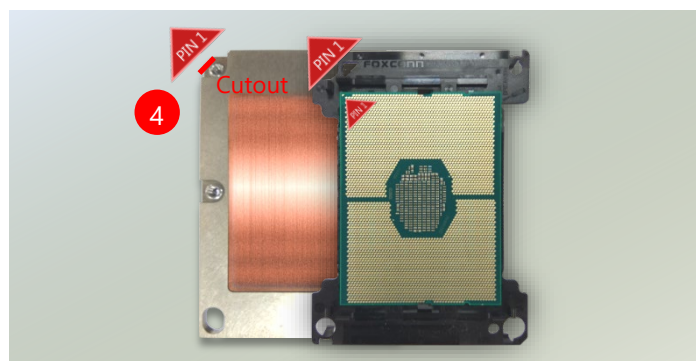


NOTE: During assembly, it is essential to have (1) PIN1 on the processor aligned with that on the carrier, and (2) the alignment features on the top and the bottom of the CPU aligned with the corresponding carrier latches.

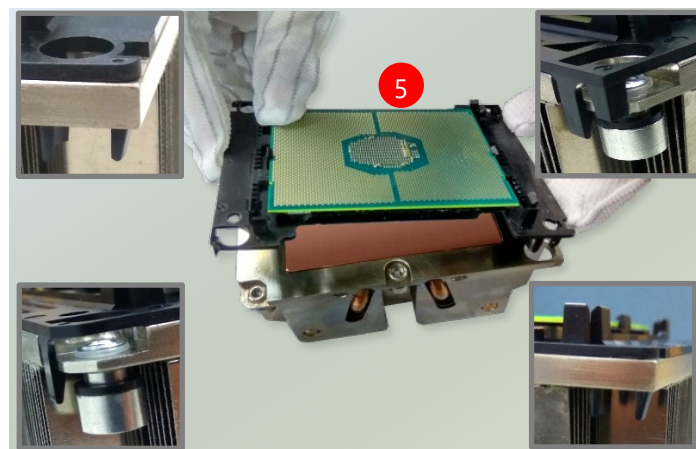
3. For the other end of the carrier, align the alignment feature of the processor with the carrier latch, and then gently bend over the carrier end to have the latch secured on the processor.



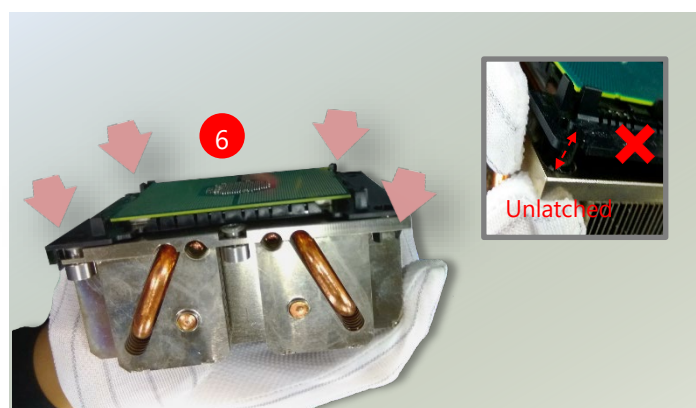
4. Align **PIN1** of the processor with the corner cutout of the heat sink (if there are two corner cutouts on one heat sink, either will do).



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



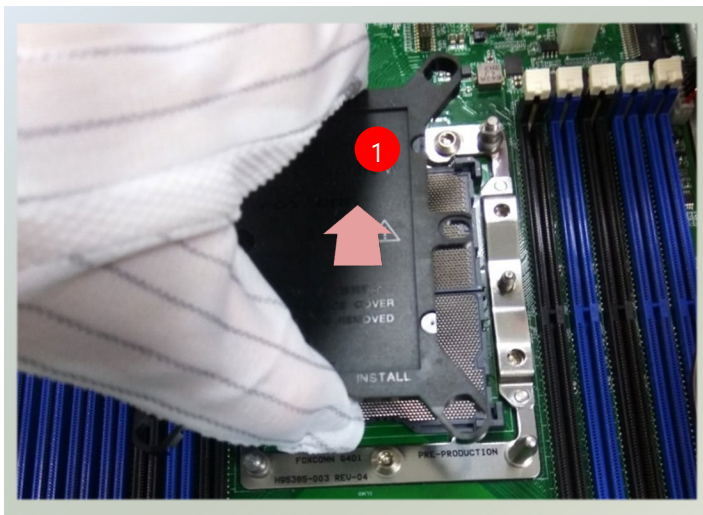
6. Inspect the four corners to make sure the latches are all engaged. If correctly latched, the corners of the carrier should be tightly attached to the heat sink, with no gap in-between observed.



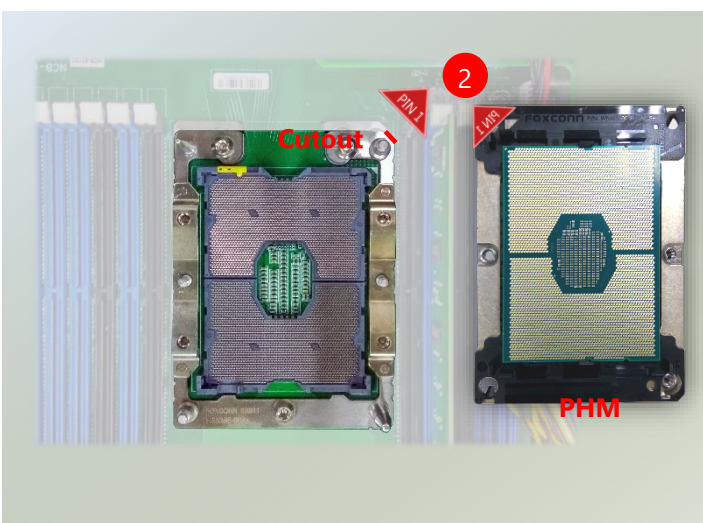
Installing the PHM onto the Motherboard

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

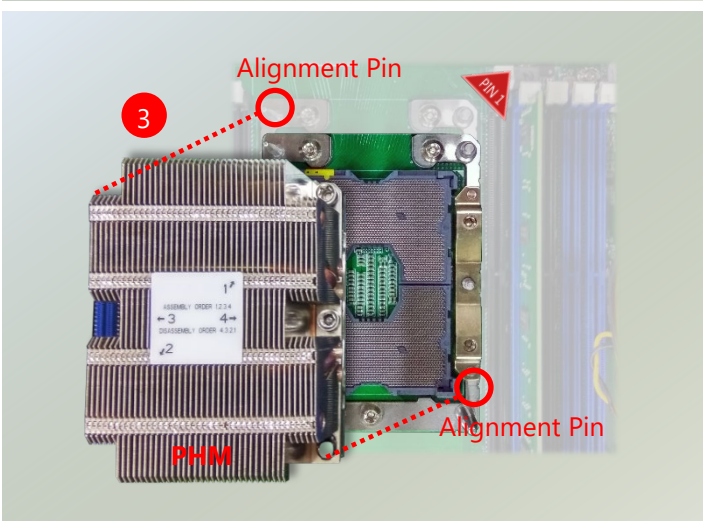
Note: Inspect the surface of the socket under sufficient light to ensure there is no contamination or damage prior to the PHM installation.



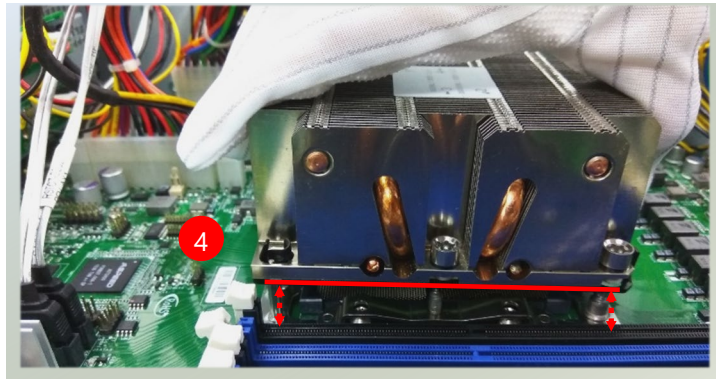
2. Flip the PHM over to align **PIN1** of the carrier with the **Cutout** of the bolster plate.



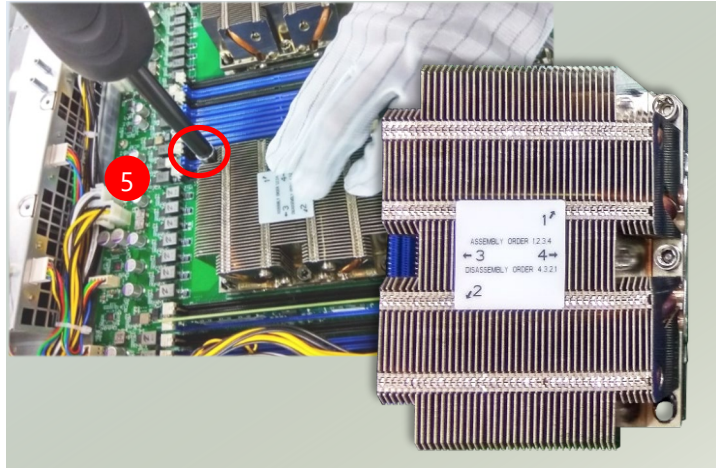
3. Flip the PHM back over, so the package land of the processor will face the socket. Lower the PHM vertically to engage it to the alignment pins of the bolster plate.



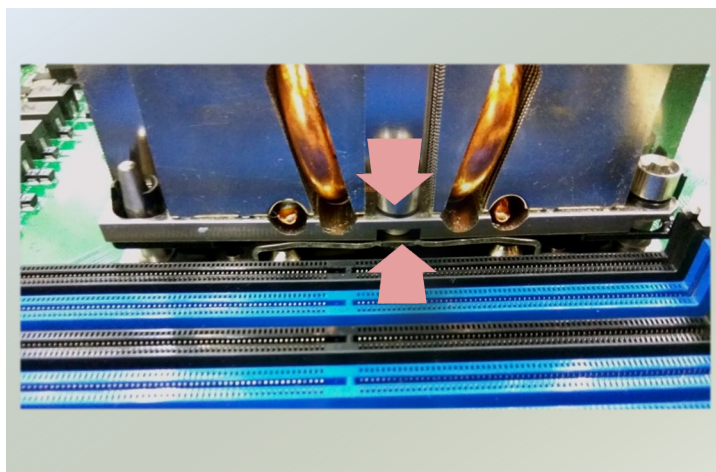
4. Make sure the PHM is sitting horizontally on the bolster plate.



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.

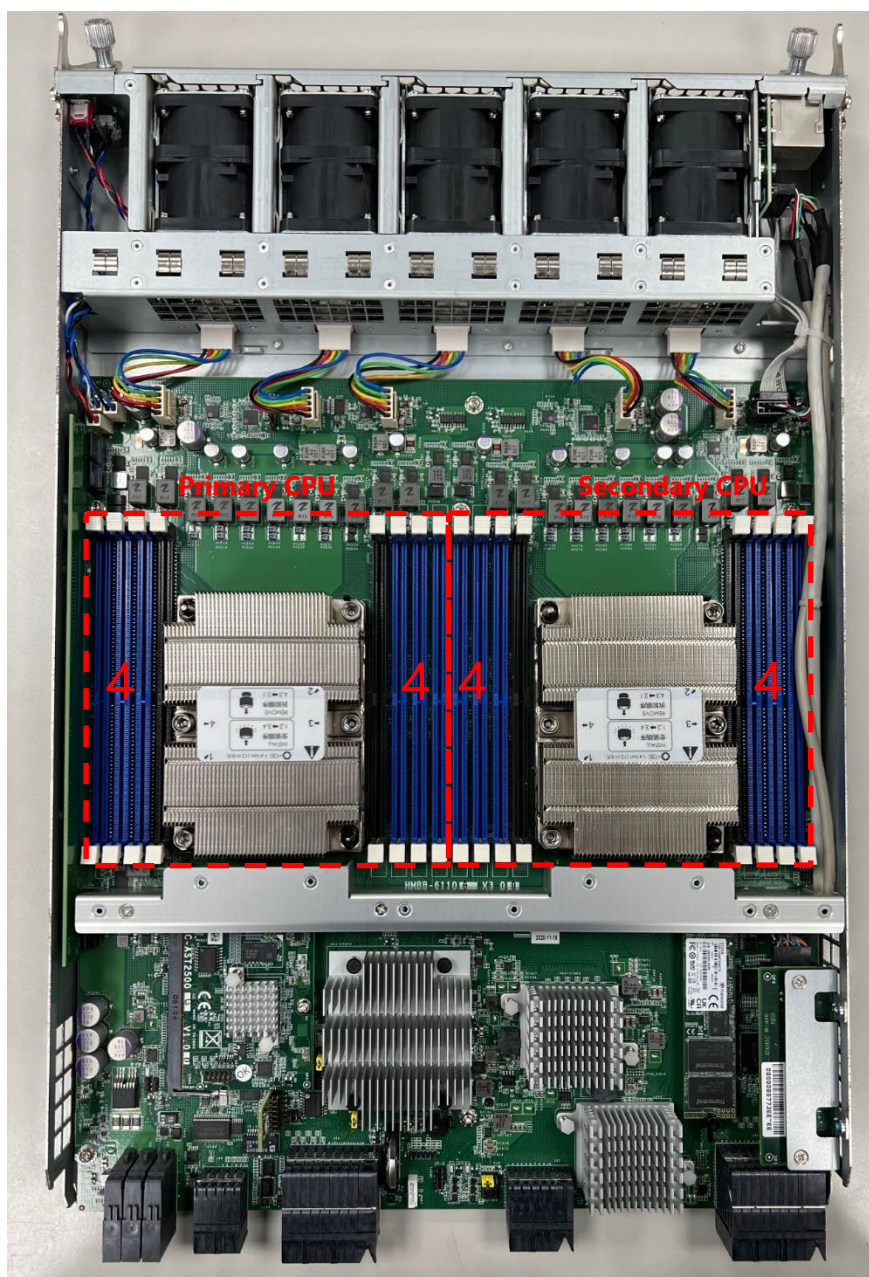


Installing System Memory

The motherboard supports 16 memory slots for DDR4 registered DIMM.

Supported System Memory Summary

| | |
|-------------------------|---|
| Total Slots | 16 (8 slots per processor) |
| Number of Channels | 6 Channels (4 for 1 Dimm per Channel, and 2 for 2 Dimm per Channel) |
| Supported DIMM Capacity | 4GB, 8GB, 16GB, 32GB |
| Memory Size | Maximum 512 GB RDIMM (32GB*16) |
| Memory Type | DDR4 RDIMM/ECC DIMM depending on CPU sku |
| Minimum DIMM Installed | Each processor requires at least 1 memory modules to boot and run from. |



DIMM Population Guidelines

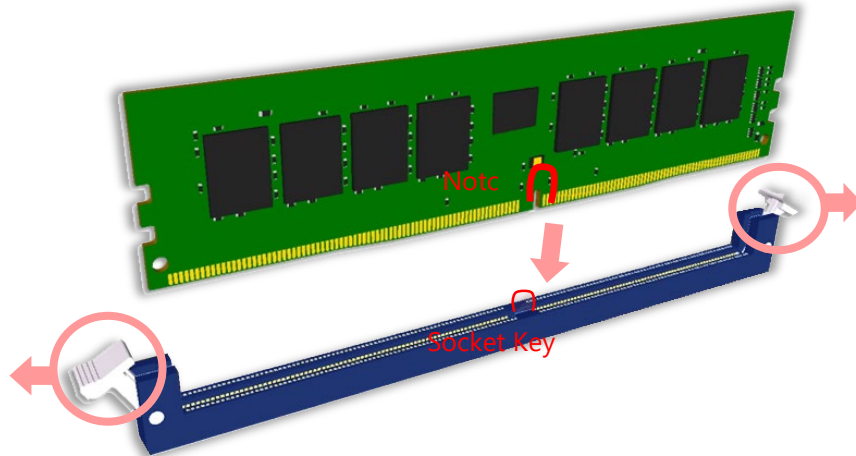
Please do follow the memory module installation instructions to install the DIMMs, and make sure

- Each CPU requires **at least 1** memory module to boot and run from.
- If you do not plan to fill up all the sockets with 16 memory modules, always install memory modules starting with the **blue** sockets to avoid memory detection issues.
- Try to split the DIMMs evenly across the CPUs.
- Using memory modules of the same capacity, speed and from the same manufacturer are highly recommended. However, with mixed module speeds, the overall speed will be that of the slowest installed memory module.

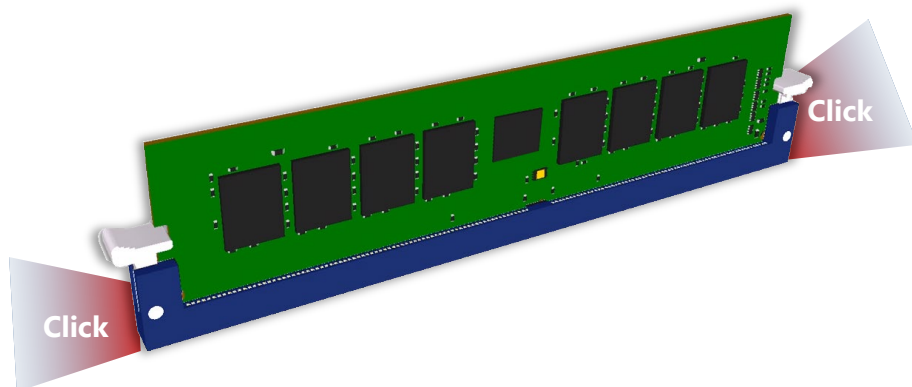
Memory Module Installation Instructions

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

1. Power off the system.
2. Pull open the DIMM slot latches.
3. Align the notch of the module with the socket key in the slot and carefully insert the card into the slot.



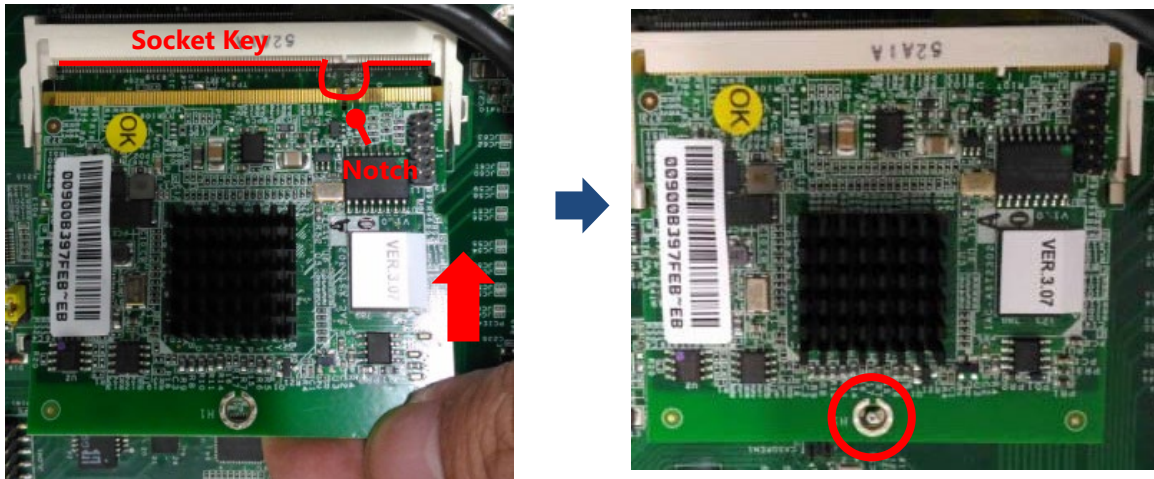
4. Push the module down into the slot until it is firmly seated. Press vertically on both corners of the card until it clicks into place.



Installing IPMI Card (Optional)

The motherboard provides one OPMA socket which is used to install an IPMI card. Please follow the steps for installation.

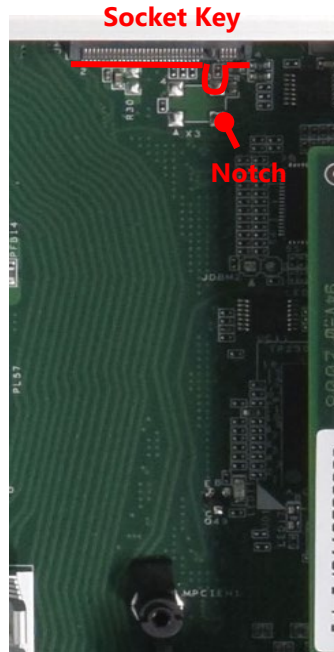
1. Locate the OPMA socket on the motherboard.
2. Align the notch of the IPMI card with the socket key in the slot. Insert at 30 degrees into the socket until it is fully seated in the connector until it is fully seated in the connector.
3. Push down on the IPMI card and secure it with one (1) screw.



Installing M.2 SATA Storage Card (Optional)

The motherboard provides one M.2 socket for SATA storage card. Please follow the steps for installation.

1. Locate the M.2 socket on the motherboard.
2. Align the notch of the M.2 storage card with the socket key in the slot. Insert the storage card at 30 degrees into the socket until it is fully seated.



3. Push down on the module card and secure it with one (1) screw.



Installing Disk Drives

The system provides six externally accessible disk drive bays on the front panel. Notably, the system requires 3.5" SATA HDD/SSD. Please follow the steps below to install or replace disk drives.

The pictures below demonstrate the hard disk installation method of horizontally-mounted disk trays, which is exactly the same as that of vertically mounted disk trays except for the orientation.

1. Select a drive bay for installation and hold the lock of the drive bay.



2. Open the lock outwards.



3. Pull the drive bay out and install a SATA disk drive. Please keep in mind that the SATA connector of your SATA disk drive should point to the inside of the system.



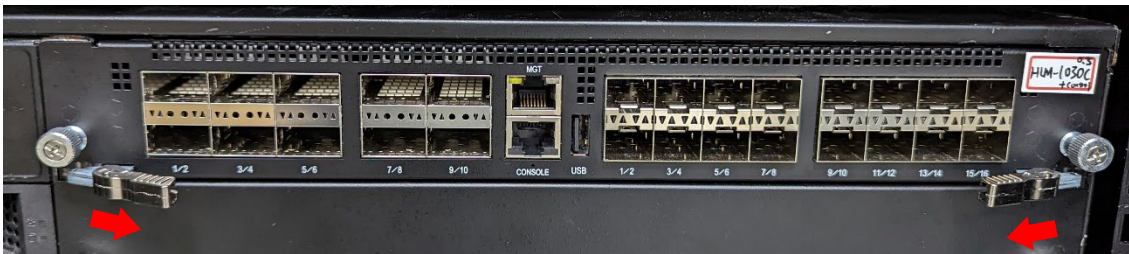
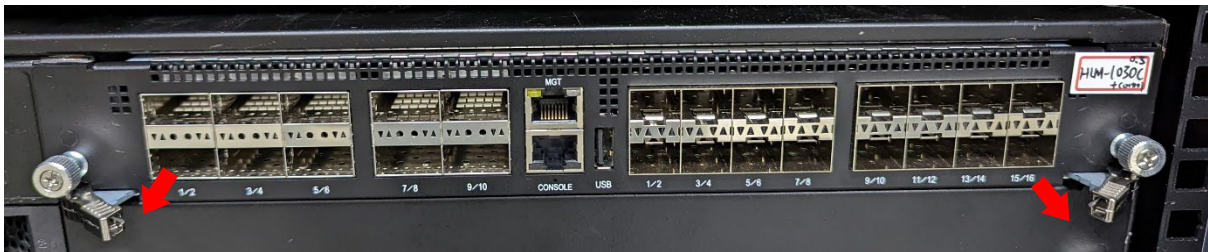
Replacing Front Network I/O Blades & Switch Boards

The system provides a total of six externally accessible LAN I/O blades and/or switch boards, varied depending on ordering configurations (the system supports up to 2 switch boards and up to 5 LAN I/O blades). To replace a new blade/board, please follow the steps below.

1. Rotate and loosen the two captive screws at both ends. You may use a screwdriver to conduct this task.



2. Pull the two locks frontwards, then extend outwards.



3. Holding on to the locks, gently pull the board/blade out.



Replacing Cooling Fans

Cooling fans are wearable components and may have to be replaced eventually. Please follow the steps below to replace cooling fans.

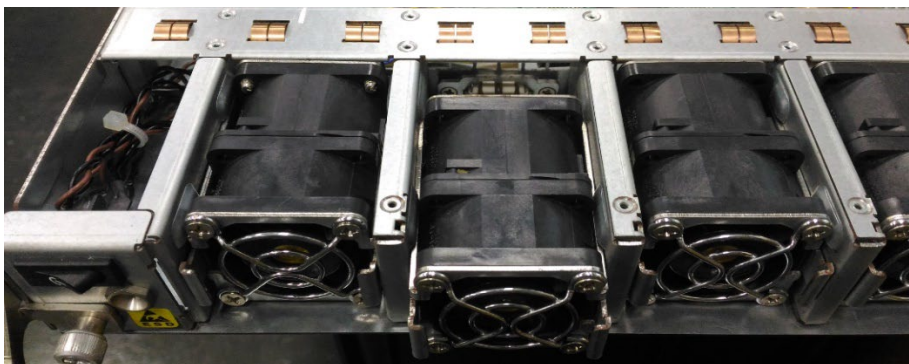
1. Locate the cooling fans at the rear of CPU blades. The fans are covered by a bezel.
2. Rotate and loosen the captive screw that locks the bezel for the cooling fans.



3. Hold onto the loosened captive screw and remove the bezel.



4. Take the worn-out fan out of its original place, and insert a new fan into the system. Repeat same steps for additional worn-out fan.



Replacing Power Supply Units

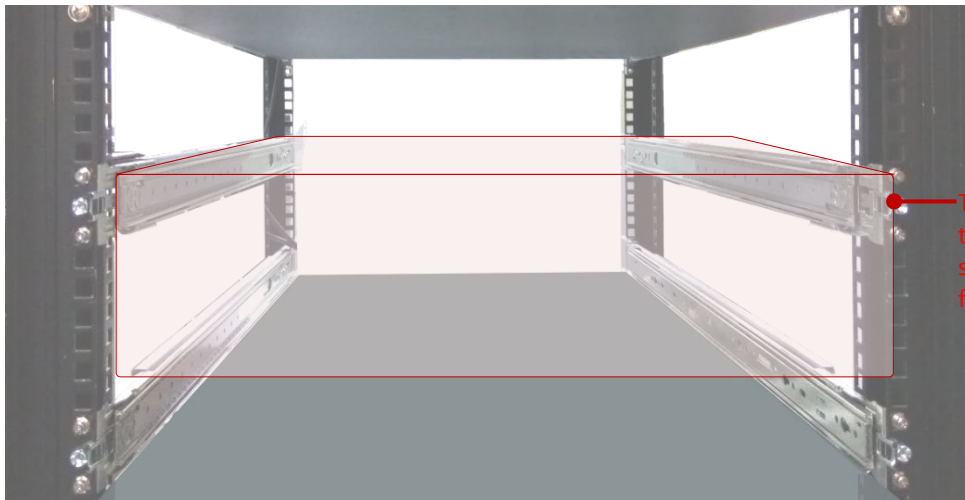
Power supply units may wear out eventually and have to be replaced. Please follow the steps below to replace a power supply unit.

1. Hold onto the handle of the power supply unit and pull the lock towards the right.
2. Pull the power supply unit out.



Mounting the System

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.

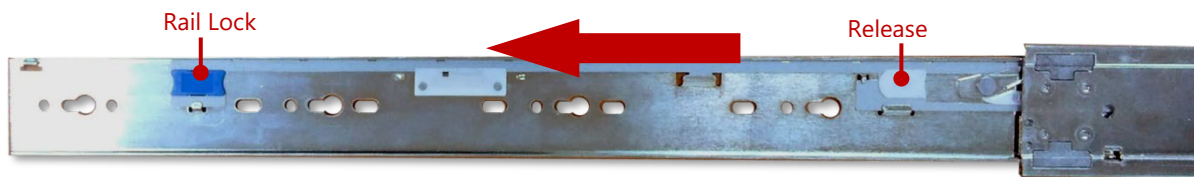
1. Check the package contents of the Slide Rail Kit. The kit shall include a pack of screws (for securing the Rails on the system) and a pair of Slide Rails.



Outer Rail

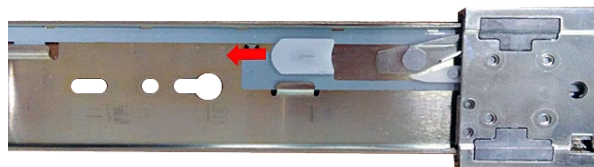


2. Pull out the Inner Rail and slide it all the way to the end.

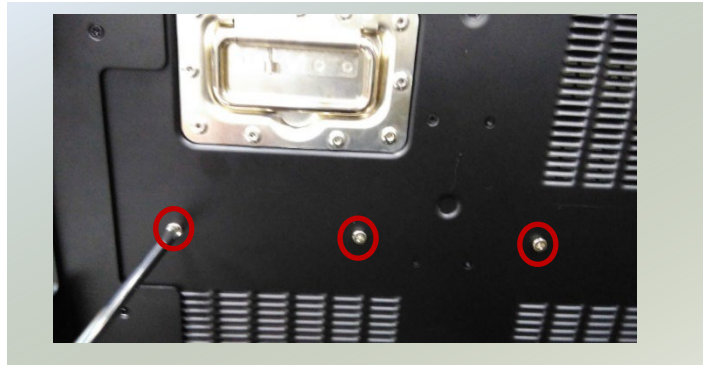


Inner Rail

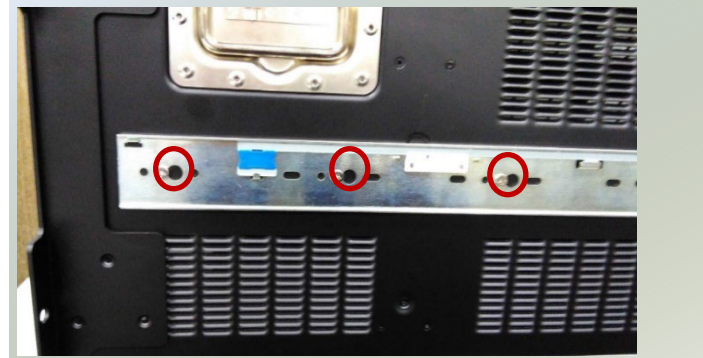
3. Push the Release Tab to detach the Inner Rail.



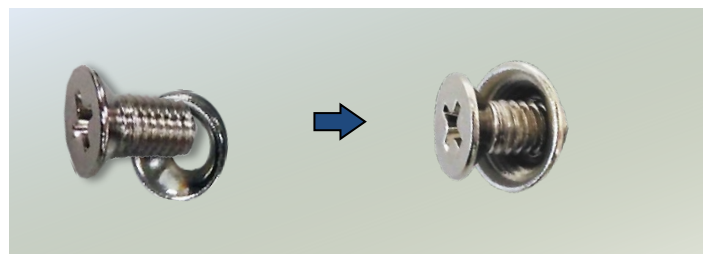
4. Attach the six (6) shoulder screws on both side panes of the chassis.



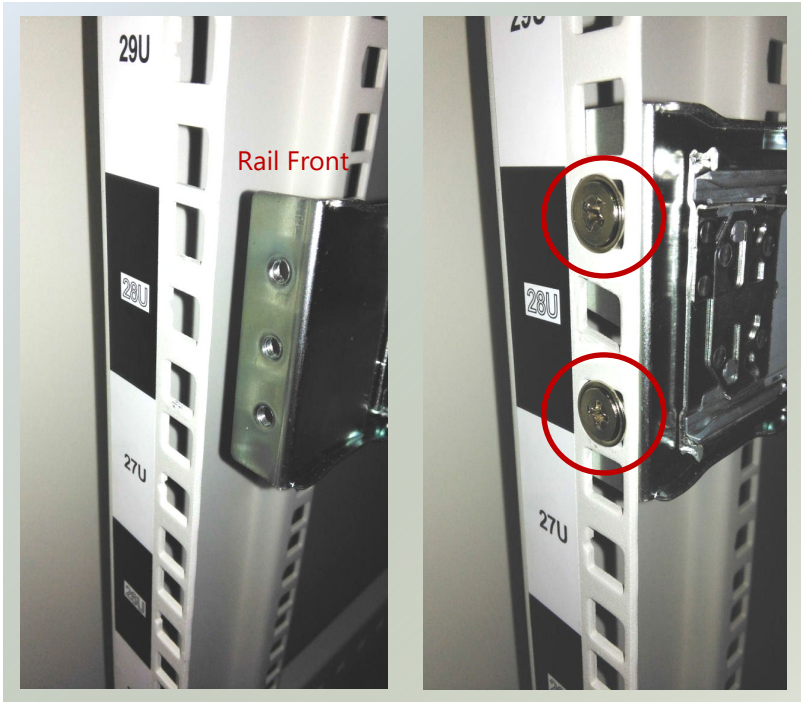
5. On each side, align the screw holes on Inner Rail to the shoulder screws on the chassis, and then secure it onto the chassis. You can loosen the screws a bit to fix the rail more easily.



6. Assemble the Washer and the rail screw.



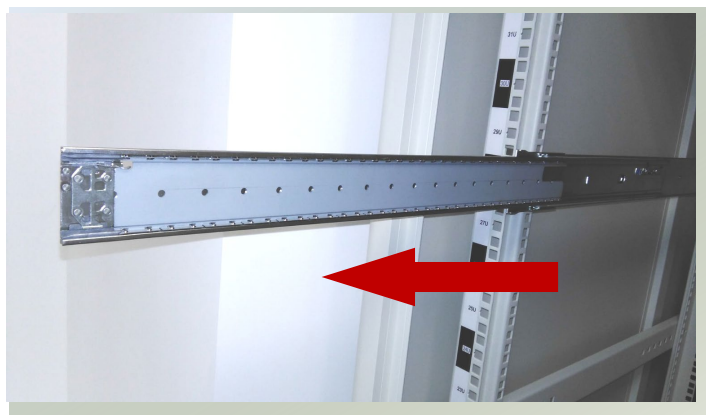
- Simply attach both Outer Rails to the front posts of the rack, and then secure the rails with the screw assemblies.



- On the rear posts, secure each rail with two screw assemblies.



- Pull out the rails.



10. Hold the system with its front facing you, lift the chassis and gently engage the Inner Rails on the system while aligning them with the Outer Rails as shown in the image.



11. Push the chassis into the cabinet.



CHAPTER 4: BIOS SETUP

BIOS (Basic Input / Output System) is the program that controls the computer boot process.

Entering Setup

BIOS is a firmware embedded on an exclusive chip on the system's motherboard. Lanner's BIOS firmware offering including market-proven technologies such as Secure Boot and Intel Boot Guard technology deliver solid commitments for the shield protection against malware, uncertified sequences and other named cyber threats.

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

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

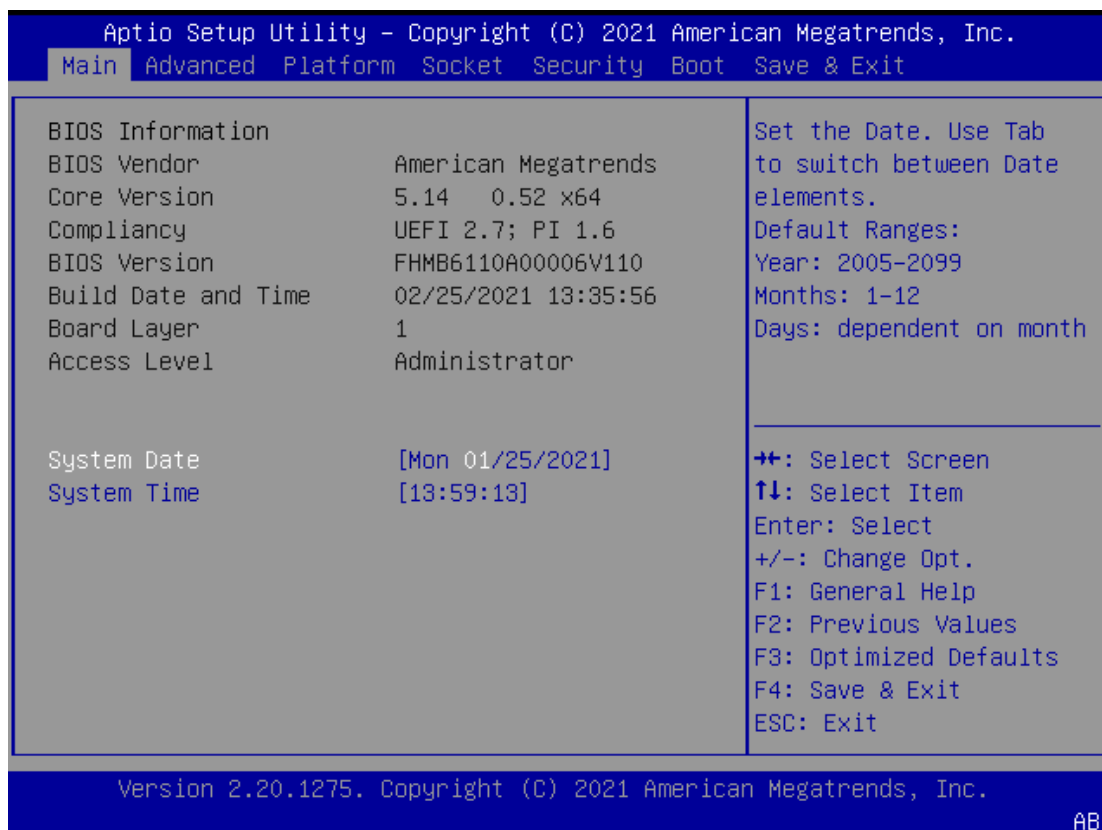
| Control Keys | Description |
|--------------|--|
| →← | select a setup screen |
| ↑↓ | select an item/option on a setup screen |
| <Enter> | select an item/option or enter a sub-menu |
| +/- | adjust values for the selected setup item/option |
| F1 | display General Help screen |
| F2 | retrieve previous 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 |



Note: the images in the following section are for reference only.

Main

Setup main page contains BIOS information and project version information.



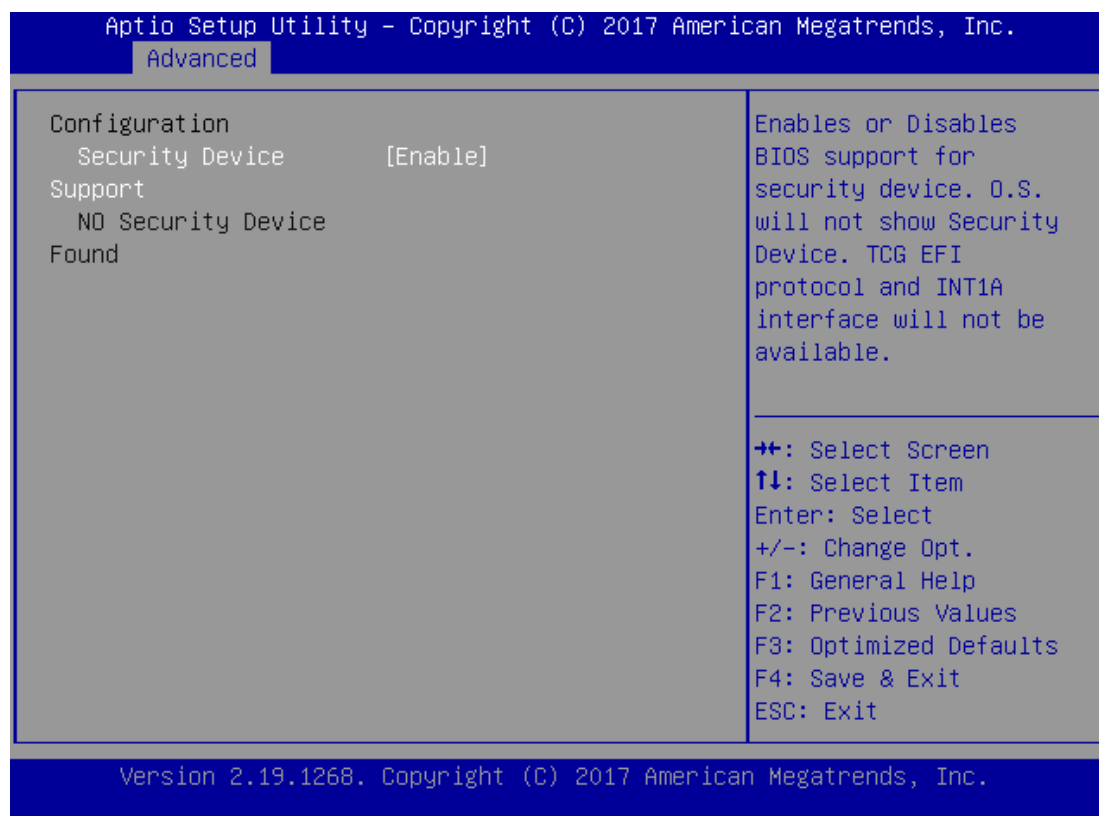
| Feature | Description |
|------------------|--|
| BIOS Information | BIOS Vendor: American Megatrends Core Version: AMI Kernel version, CRB code base, X64 Compliance: UEFI version, PI version Project Version: BIOS release version Build Date and Time: MM/DD/YYYY Access Level: Administrator / User |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

Advanced

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

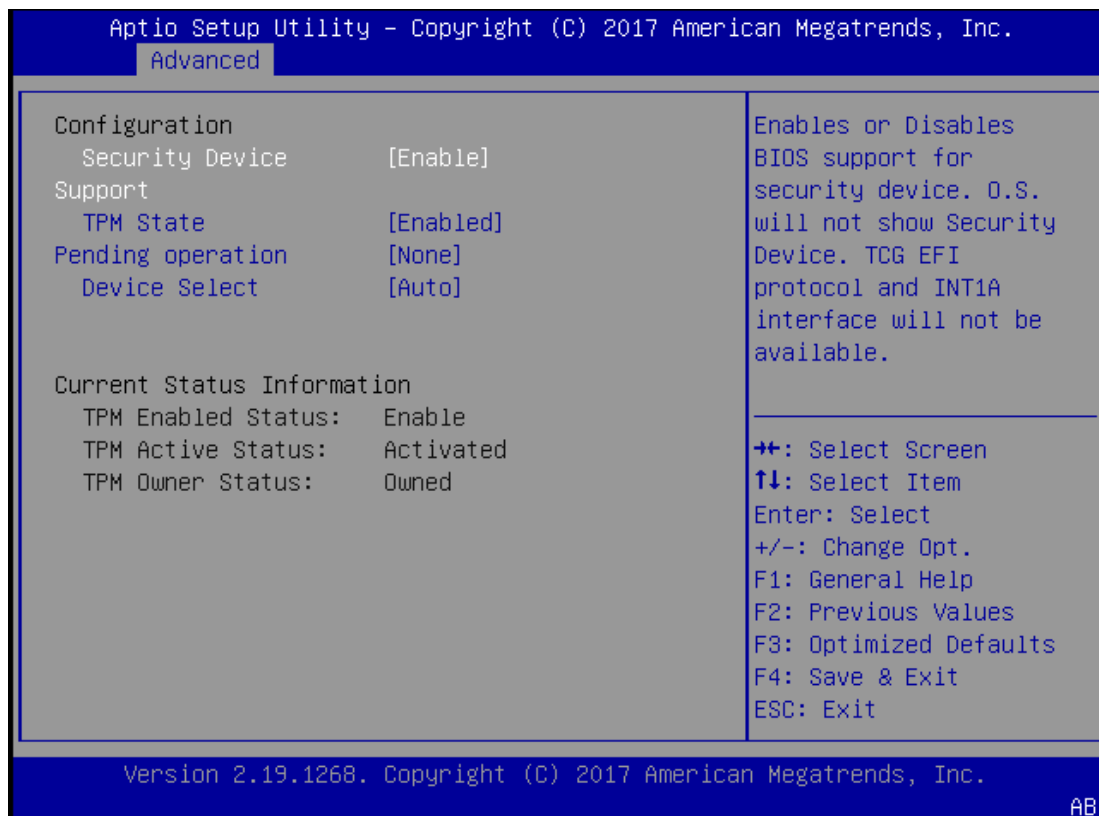


Trusted Computing



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

Trusted Computing (TPM 1.2)



| Feature | Options | Description |
|-------------------------|----------------------------|--|
| Security Device Support | Enabled Disabled | Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |
| TPM State | Enabled Disabled | Enables or disables Security Device. NOTE: Your computer will reboot during restart in order to change State of the Device. |
| Pending operation | None TPM Clear | Schedules an Operation for the Security Device. NOTE: Your computer will reboot during restart in order to change State of Security Device. |
| Device Select | TPM 1.2 TPM 2.0 Auto | TPM 1.2 will restrict support to TPM 1.2 devices; while TPM 2.0 will restrict support to TPM 2.0 devices; Auto will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated. |

Trusted Computing (TPM 2.0)

| Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc. | | |
|---|--------------|--|
| 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 | | |
| Active PCR banks | SHA-1,SHA256 | |
| Available PCR banks | SHA-1,SHA256 | |
| SHA-1 PCR Bank | | ++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| SHA256 PCR Bank | | |
| Pending operation | | |
| Platform Hierarchy | | |
| Storage Hierarchy | | |
| Endorsement | | |
| Hierarchy | | |
| Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc. AB | | |
| Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc. | | |
| Advanced | | |
| Active PCR banks | | ▲ 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, |
| Available PCR banks | | |
| SHA-1 PCR Bank | | |
| SHA256 PCR Bank | | |
| Pending operation | | |
| Platform Hierarchy | | |
| Storage Hierarchy | | |
| Endorsement | | |
| Hierarchy | | |
| TPM2.0 UEFI Spec | | ++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| Version | | |
| Physical Presence | | |
| Spec Version | | |
| TPM 20 | | |
| InterfaceType | | |
| Device Select | | |
| Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc. AB | | |

| Feature | Options | Description |
|--------------------------------|----------------------------|--|
| Security Device Support | Enabled Disabled | Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |
| SHA-1 PCR Bank | Enabled Disabled | Enables or disables SHA-1 PCR Bank. |
| SHA256 PCR Bank | Enabled Disabled | Enables or disables SHA256 PCR Bank. |
| Pending operation | None TPM Clear | Schedules an Operation for the Security Device. NOTE: Your computer will reboot during restart in order to change State of Security Device. |
| Platform Hierarchy | Enabled Disabled | Enables or disables Platform Hierarchy. |
| Storage Hierarchy | Enabled Disabled | Enables or disables Storage Hierarchy. |
| Endorsement Hierarchy | Enabled Disabled | Enables or disables Endorsement Hierarchy. |
| TPM2.0 UEFI Spec Version | TCG_1_2 TCG_2 | Select the TCG2 Spec Version, TCG_1_2: Supports the Compatible mode for Win8/Win10 TCG_2: Supports new TCG2 protocol and event format for Win10 or later. |
| Physical Presence Spec Version | 1.2 1.3 | Select to tell OS to support PPI Spec Version 1.2 or 1.3. NOTE: Some HCK tests might not support 1.3. |
| TPM 20 InterfaceType | TIS | Select TPM 20 Device for the Communication Interface. |
| Device Select | TPM 1.2 TPM 2.0 Auto | TPM 1.2 will restrict support to TPM 1.2 devices; while TPM 2.0 will restrict support to TPM 2.0 devices; Auto will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated. |

Trusted Computing (PTT Enable)

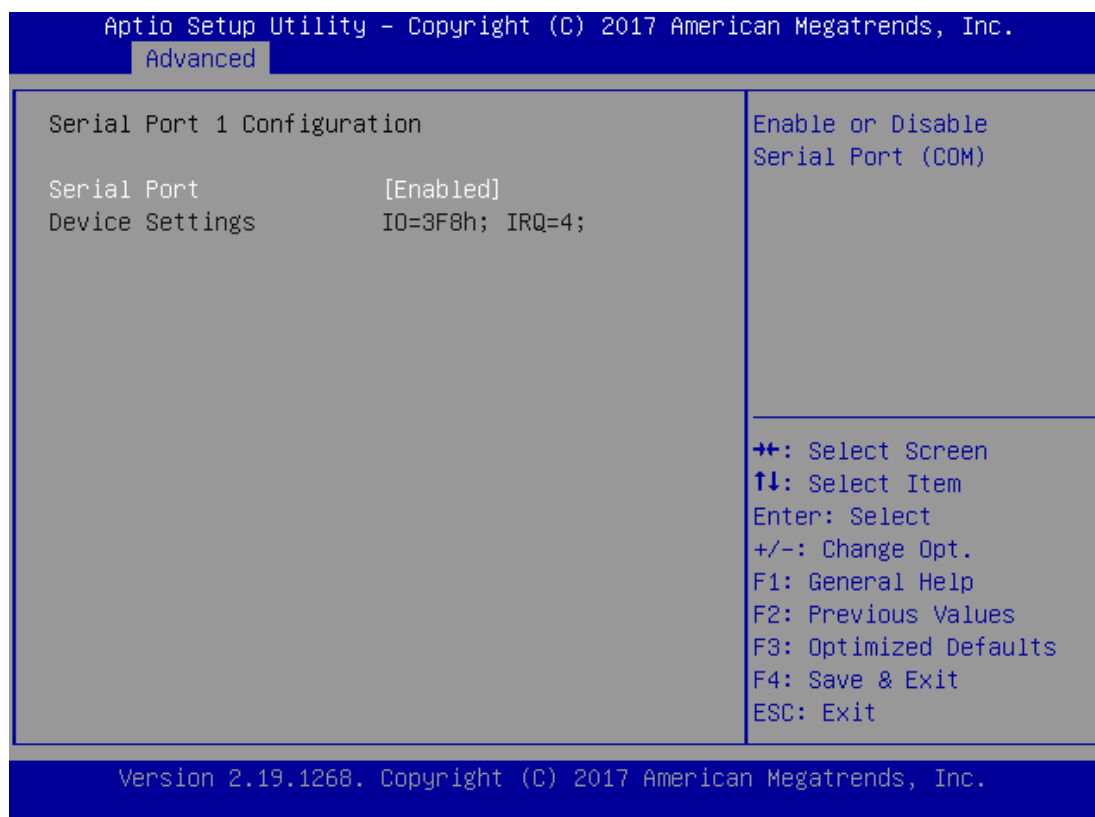
| Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc. | | |
|---|--|--|
| Advanced | | |
| TPM20 Device Found Vendor: INTC Firmware Version: 4.0 | | ▲ Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |
| Security Device [Enable] Support Active PCR banks SHA-1,SHA256 Available PCR banks SHA-1,SHA256 | | |
| 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 | | |
| Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc. | | |
| AB | | |
| Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc. | | |
| 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] | | |
| Pending operation [None] Platform Hierarchy [Enabled] Storage Hierarchy [Enabled] Endorsement [Enabled] Hierarchy | | ⇐: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| TPM2.0 UEFI Spec [TCG_2] Version Physical Presence [1.3] Spec Version TPM 20 [CRB] InterfaceType Device Select [Auto] | | |
| Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc. | | |
| AB | | |

| Feature | Options | Description |
|--------------------------------|----------------------------|--|
| Security Device Support | Enabled Disabled | Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |
| SHA-1 PCR Bank | Enabled Disabled | Enables or disables SHA-1 PCR Bank. |
| SHA256 PCR Bank | Enabled Disabled | Enables or disables SHA256 PCR Bank. |
| Pending operation | None TPM Clear | Schedules an Operation for the Security Device. NOTE: Your computer will reboot during restart in order to change State of Security Device. |
| Platform Hierarchy | Enabled Disabled | Enables or disables Platform Hierarchy. |
| Storage Hierarchy | Enabled Disabled | Enables or disables Storage Hierarchy. |
| Endorsement Hierarchy | Enabled Disabled | Enables or disables Endorsement Hierarchy. |
| TPM2.0 UEFI Spec Version | TCG_1_2 TCG_2 | Select the TCG2 Spec Version, TCG_1_2: Supports the Compatible mode for Win8/Win10 TCG_2: Supports new TCG2 protocol and event format for Win10 or later. |
| Physical Presence Spec Version | 1.2 1.3 | Select to tell OS to support PPI Spec Version 1.2 or 1.3. NOTE: Some HCK tests might not support 1.3. |
| TPM 20 InterfaceType | CRB | Select the CRB (Communication Interface) for TPM 20 Device. |
| Device Select | TPM 1.2 TPM 2.0 Auto | TPM 1.2 will restrict support to TPM 1.2 devices; while TPM 2.0 will restrict support to TPM 2.0 devices; Auto will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated. |

AST2500 Super IO Configuration

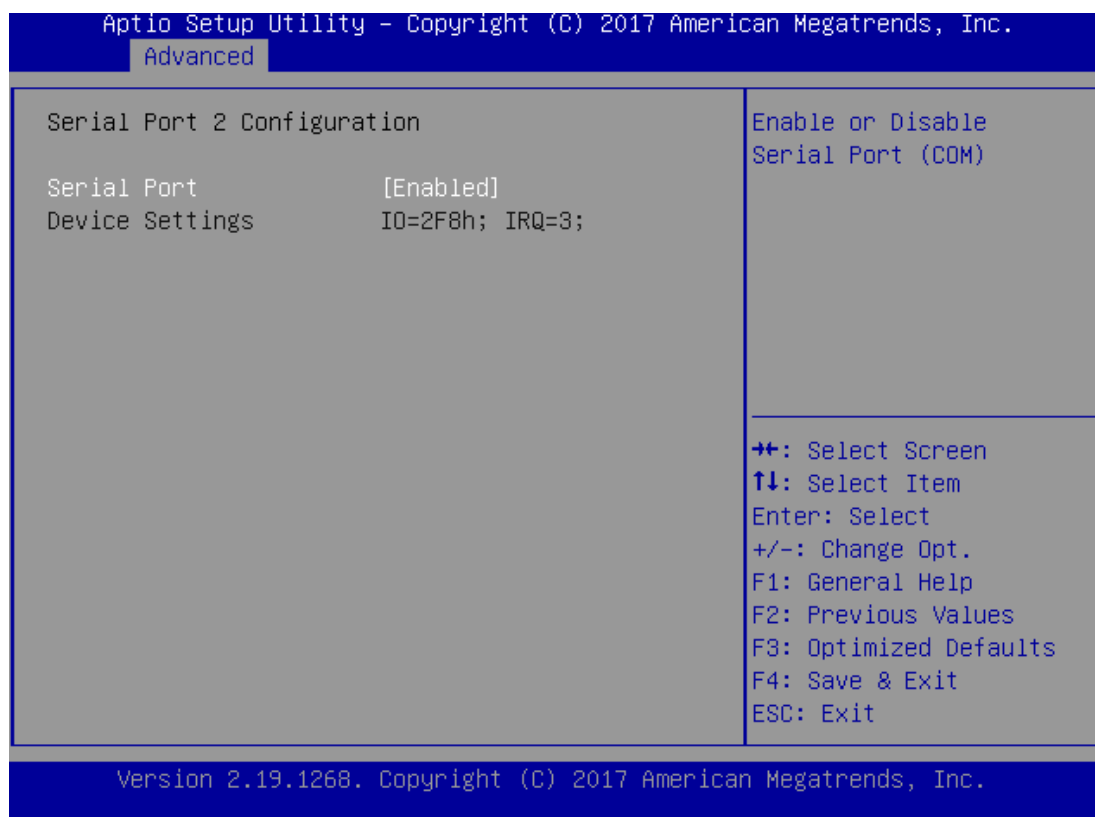


Serial Port 1 Configuration



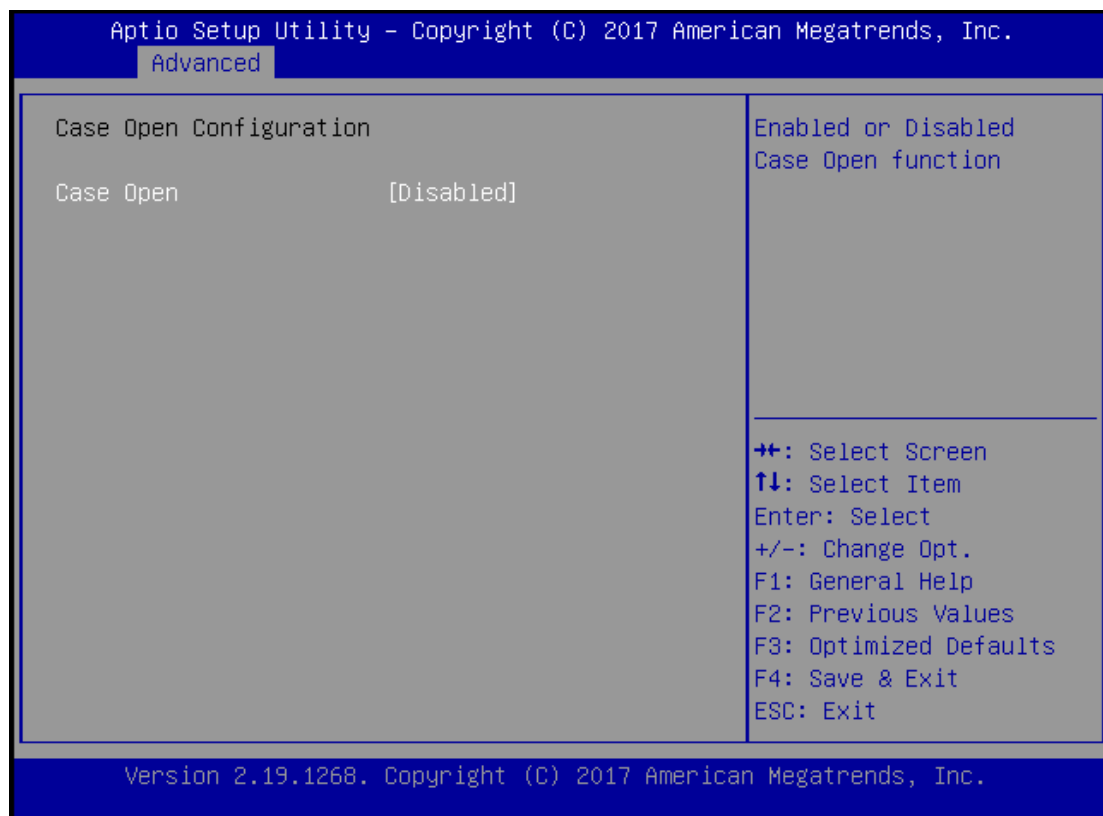
| Feature | Options | Description |
|-----------------|---------------------|------------------------------------|
| Serial Port | Enabled Disabled | Enables or disables Serial Port 1. |
| Device Settings | NA | IO=3F8h; IRQ = 4 |

Serial Port 2 Configuration



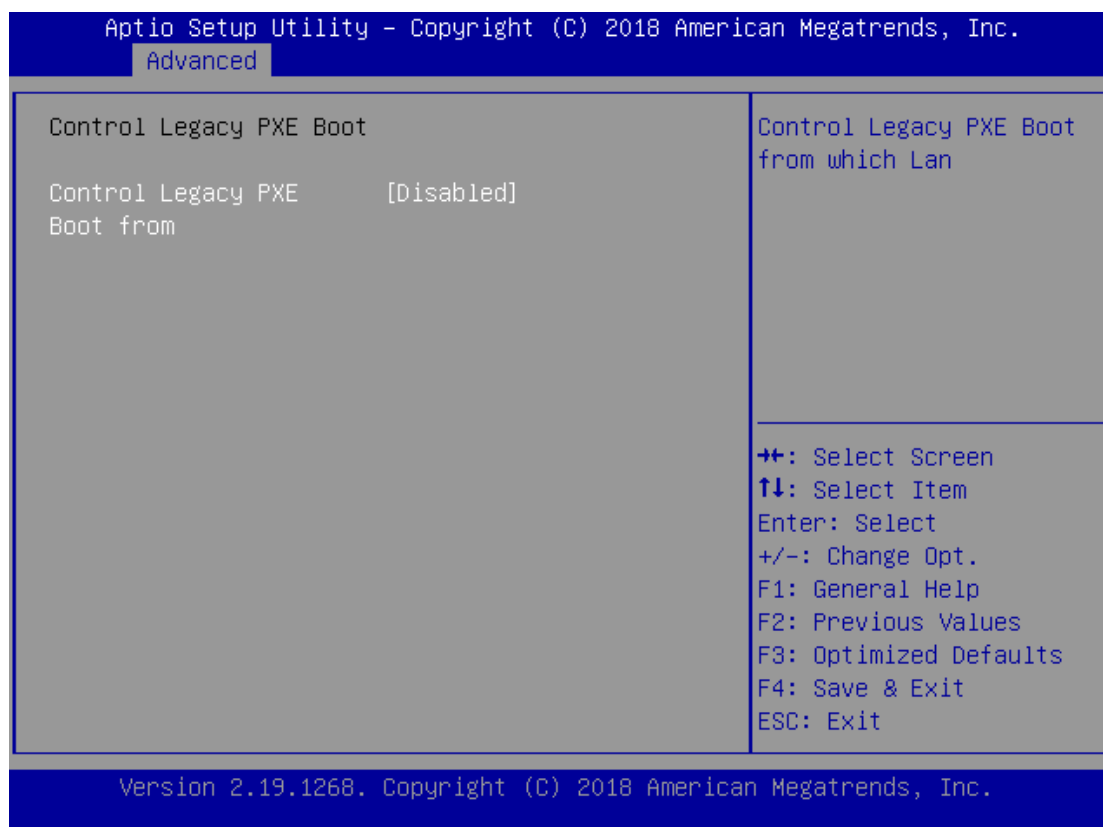
| Feature | Options | Description |
|-----------------|---------------------|-----------------------------------|
| Serial Port | Enabled Disabled | Enables or disables Serial Port 2 |
| Device Settings | NA | IO=2F8h; IRQ = 3 |

Case Open Configuration



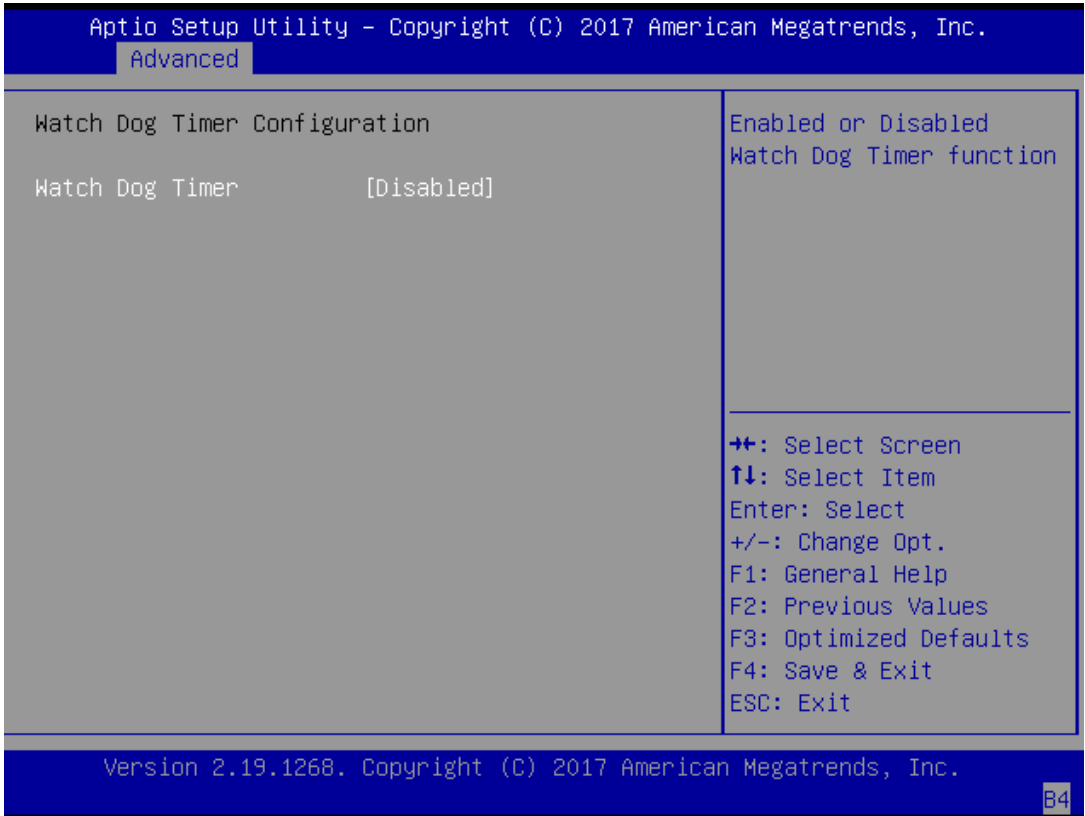
| Feature | Options | Description |
|-----------|---------------------|--|
| Case Open | Enabled Disabled | Enables or disables Case Open function |

Control Legacy PXE Boot



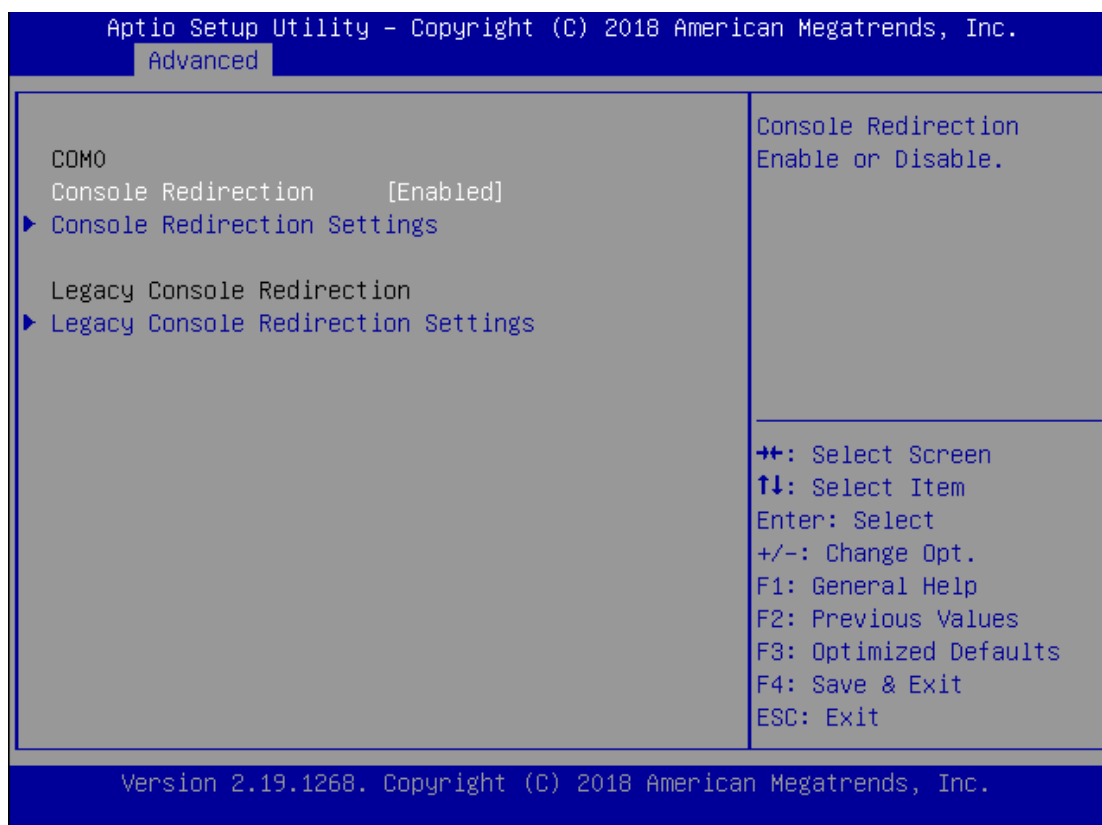
| Feature | Options | Description | SKU |
|---------------------------------|----------------------------------|---------------------------|-----------|
| Control Legacy PXE Boot From | Disabled MGT LAN1 MGT LAN2 | Select On Board LAN# Boot | NCA-6110A |

Watch Dog Timer Configuration



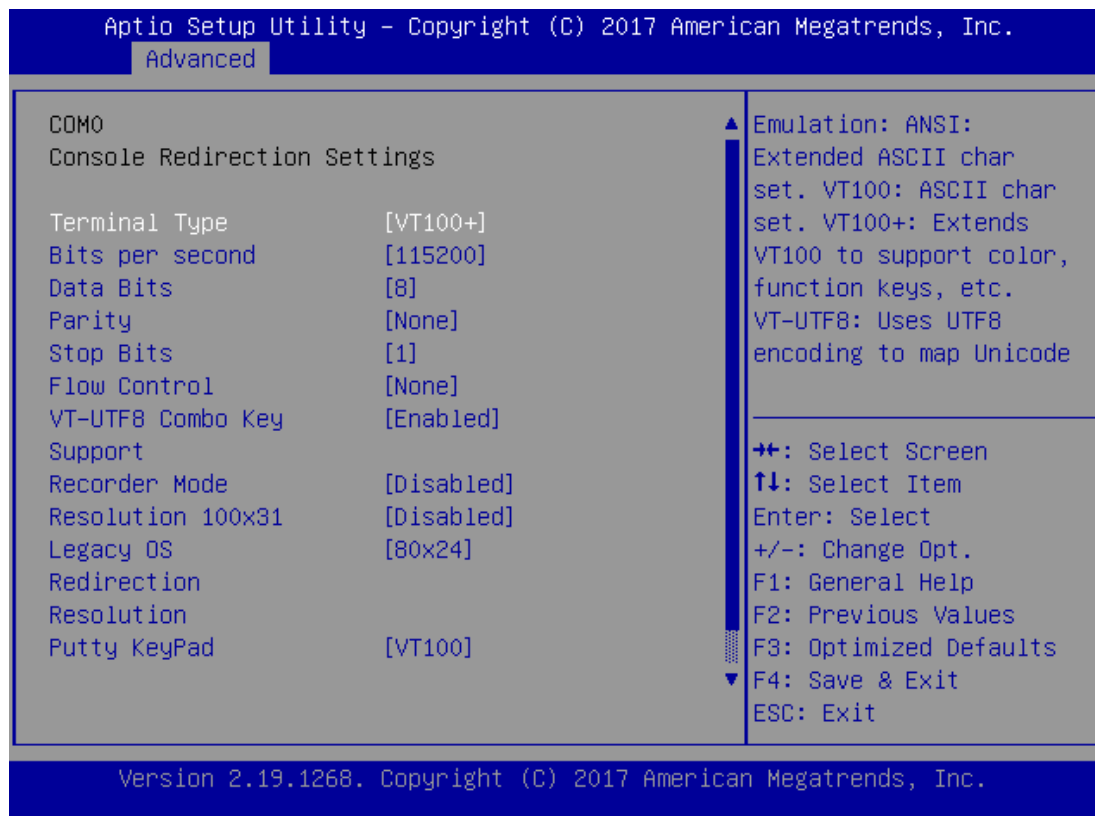
| Feature | Options | Description |
|-----------------|---------------------|--|
| Watch Dog Timer | Enabled Disabled | Enables or disables Watch Dog Timer function |

Serial Port Console Redirection



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

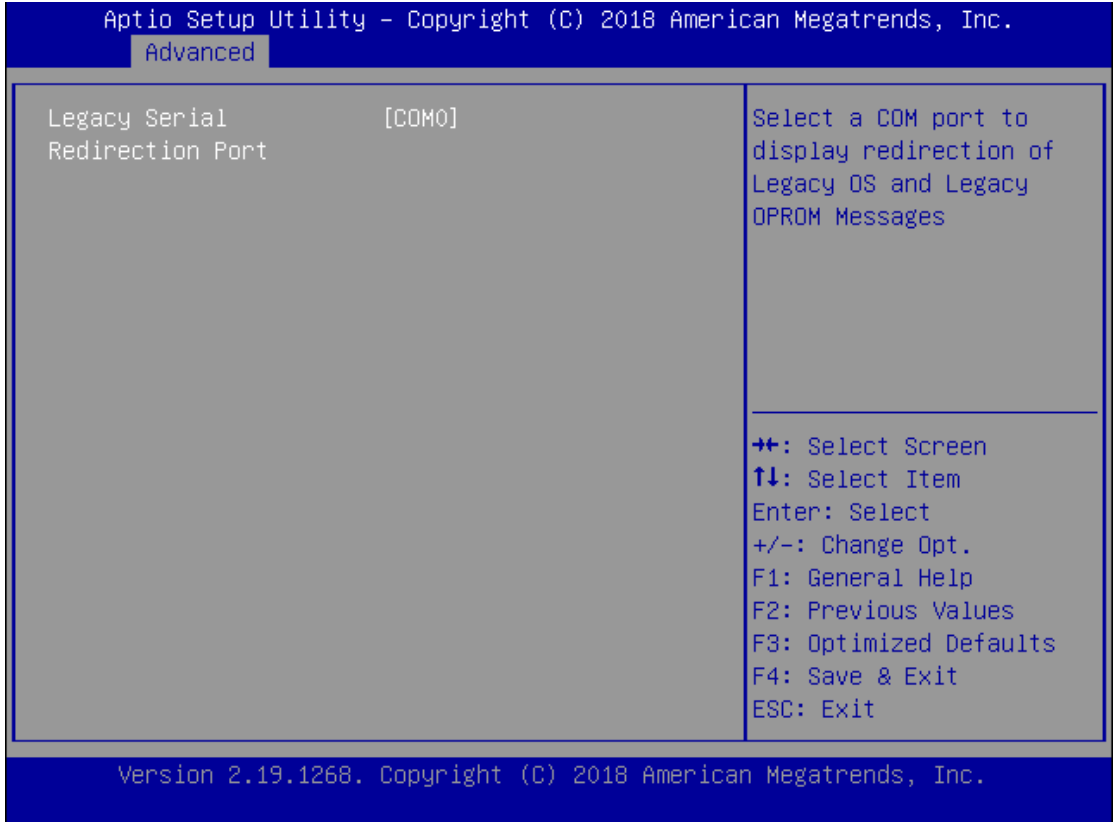
Console Redirection Settings



| Feature | Options | Description |
|-----------------|---|--|
| Terminal Type | VT100 VT100+ VT-UTF8 ANSI | VT100: ASCII char set VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes ANSI: Extended ASCII char set |
| Bits per second | 9600 19200 38400 57600 115200 | Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds. |
| Data Bits | 7 8 | Data Bits |
| Parity | None Even Odd Mark Space | A parity bit can be sent with the data bits to detect some transmission errors. |
| Stop Bits | 1 2 | Indicates the end of a serial data packet. |
| Flow Control | None Hardware | Flow Control can prevent data loss from buffer overflow. |

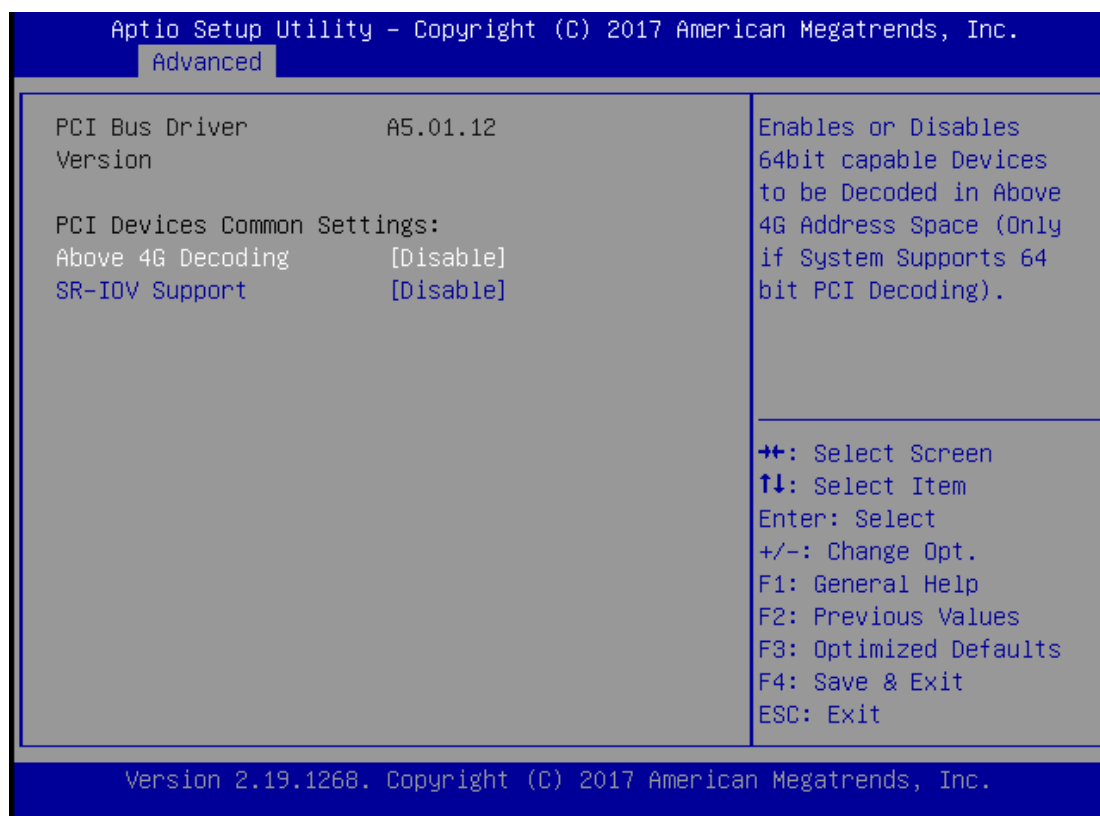
| | | |
|----------------------------------|---|---|
| | RTS/CTS | |
| VT-UTF8 Combo Key Support | Disabled Enabled | Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals |
| Recorder Mode | Disabled Enabled | With this mode enabled, only text will be sent. This is to capture Terminal data.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

Legacy Console Redirection Settings



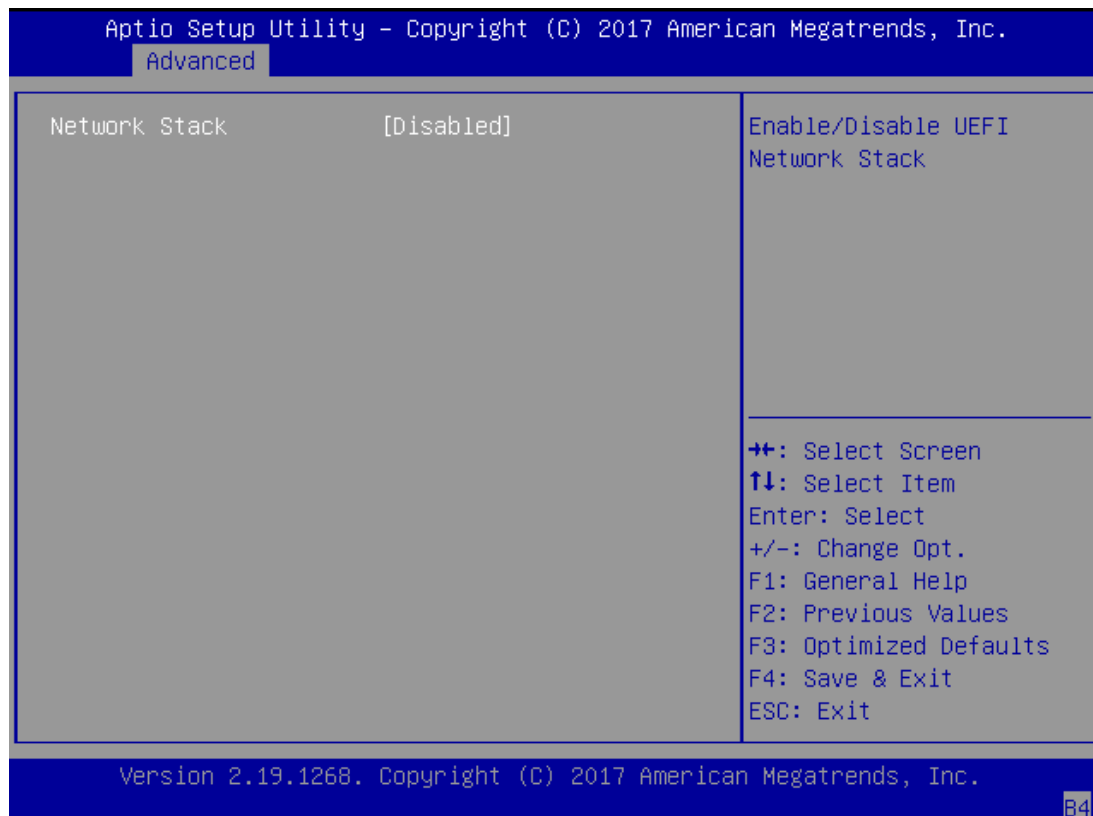
| Feature | Options | Description |
|--------------------------------|---------|--|
| Legacy Serial Redirection Port | COM0 | Select a COM port to display redirection of Legacy OS and Legacy OPRM Messages |

PCI Subsystem Settings



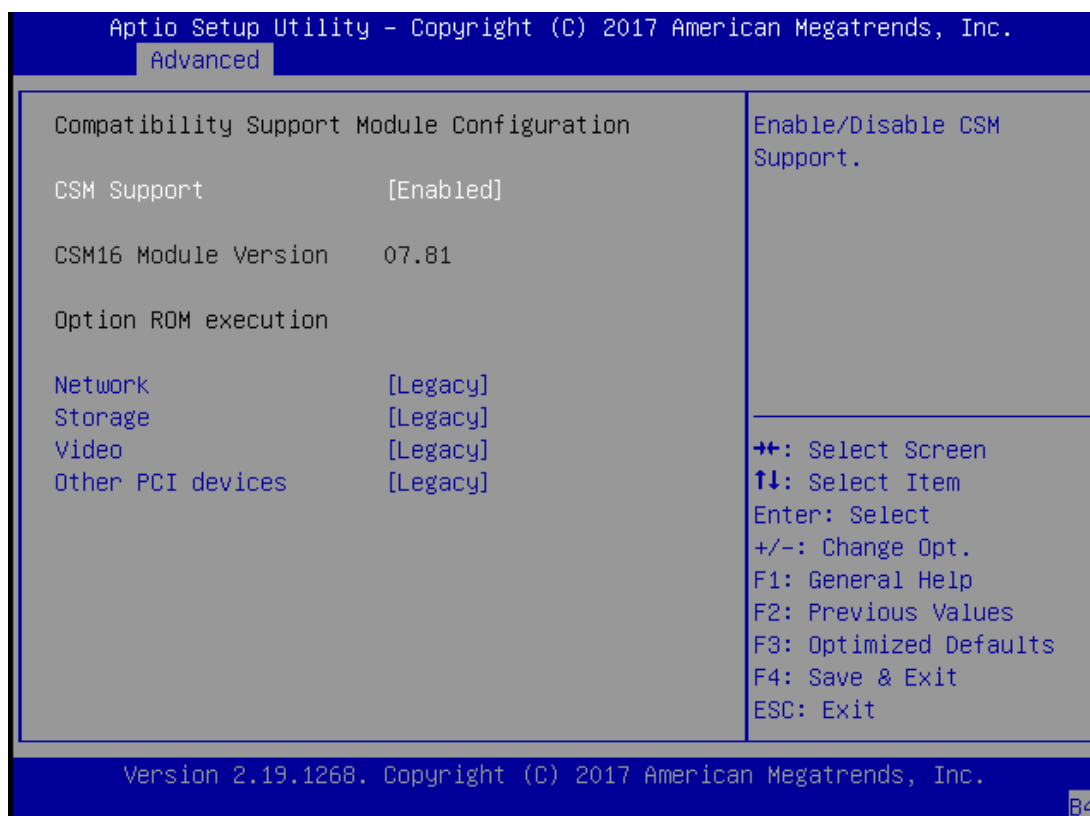
| Feature | Options | Description |
|-------------------|---------------------|---|
| Above 4G Decoding | Disabled Enabled | Enables or disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding) |
| SR-IOV Support | Disabled Enabled | If the system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

Network Stack Configuration



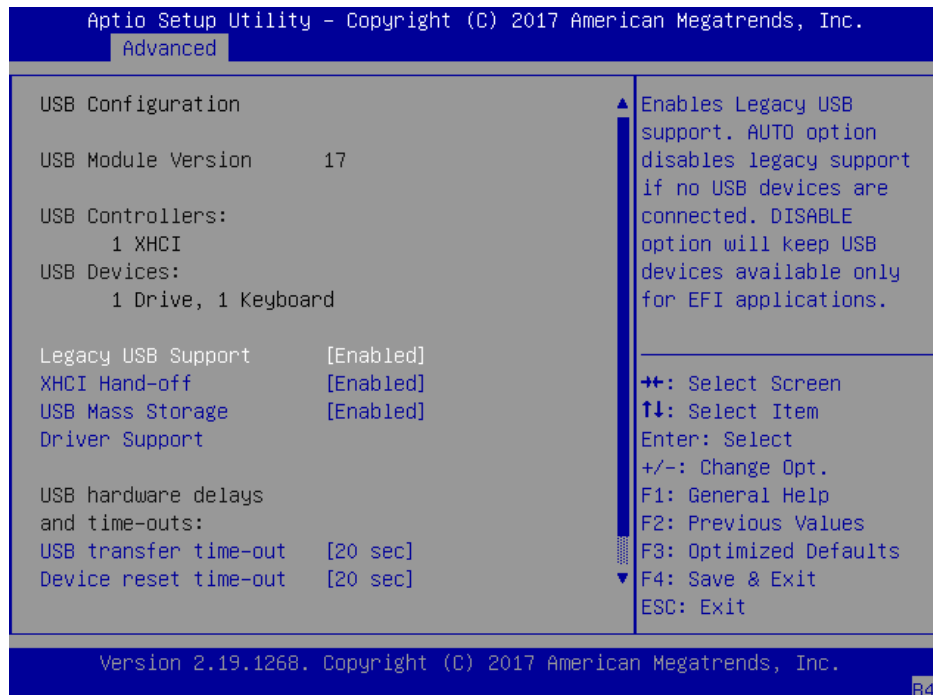
| Feature | Options | Description |
|--------------------|---------------------|--|
| Network Stack | Disabled Enabled | Enables or disables UEFI Network Stack |
| Ipv4 PXE Support | Disabled Enabled | Enables Ipv4 PXE Boot Support. If IPV4 is disabled, PXE boot option will not be created. |
| Ipv4 HTTP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

CSM Configuration



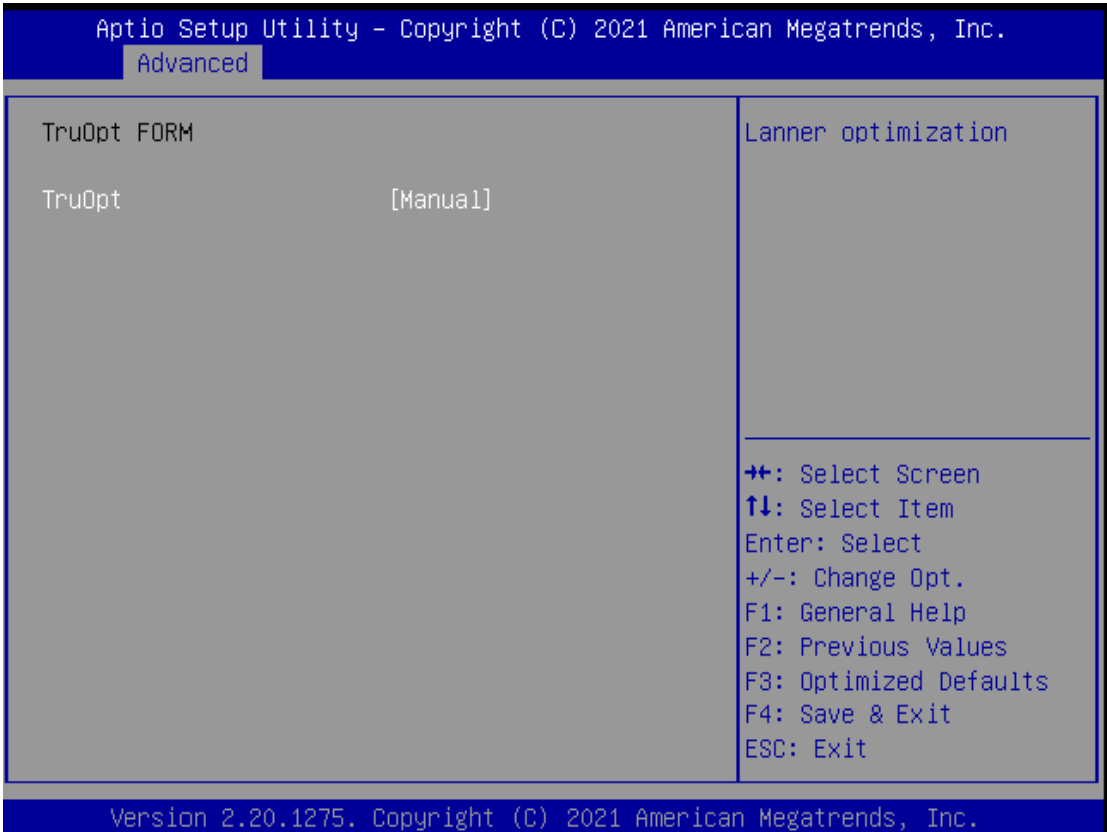
| Feature | Options | Description |
|------------------|--|---|
| CSM Support | Disabled Enabled | Enables or disables CSM Support |
| Network | Do Not Launch UEFI Legacy | Controls the execution of UEFI and Legacy PXE OpROM |
| Storage | Do Not Launch UEFI Legacy | Controls the execution of UEFI and Legacy Storage OpROM |
| Video | Do Not Launch UEFI Legacy | Controls the execution of UEFI and Legacy Video OpROM |
| Other PCI device | Do Not Launch UEFI Legacy | Determines OpROM execution policy for devices other than Network, Storage, or Video |

USB Configuration



| Feature | Options | Description |
|---------------------------------|------------------------------------|---|
| Legacy USB Support | Enabled Disabled Auto | Enables Legacy USB support. Auto option disables legacy support if no USB devices are connected; Disabled option will keep USB devices available only for EFI applications. |
| XHCI Hand-off | Enabled Disabled | This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. |
| USB Mass Storage Driver Support | Enabled Disabled | Enables or disables USB Mass Storage Driver Support. |
| USB transfer time-out | 1 sec 5 sec 10 sec 20 sec | The time-out value for Control, Bulk, and Interrupt transfers |
| Device reset time-out | 1 sec 5 sec 10 sec 20 sec | USB mass storage device Start Unit command time-out |
| Device power-up delay | Auto Manual | Maximum time the device will take before it properly reports itself to the Host Controller. Auto uses default value: for a Root port, it is 100 ms, for a Hub port the delay is taken from Hub descriptor. |

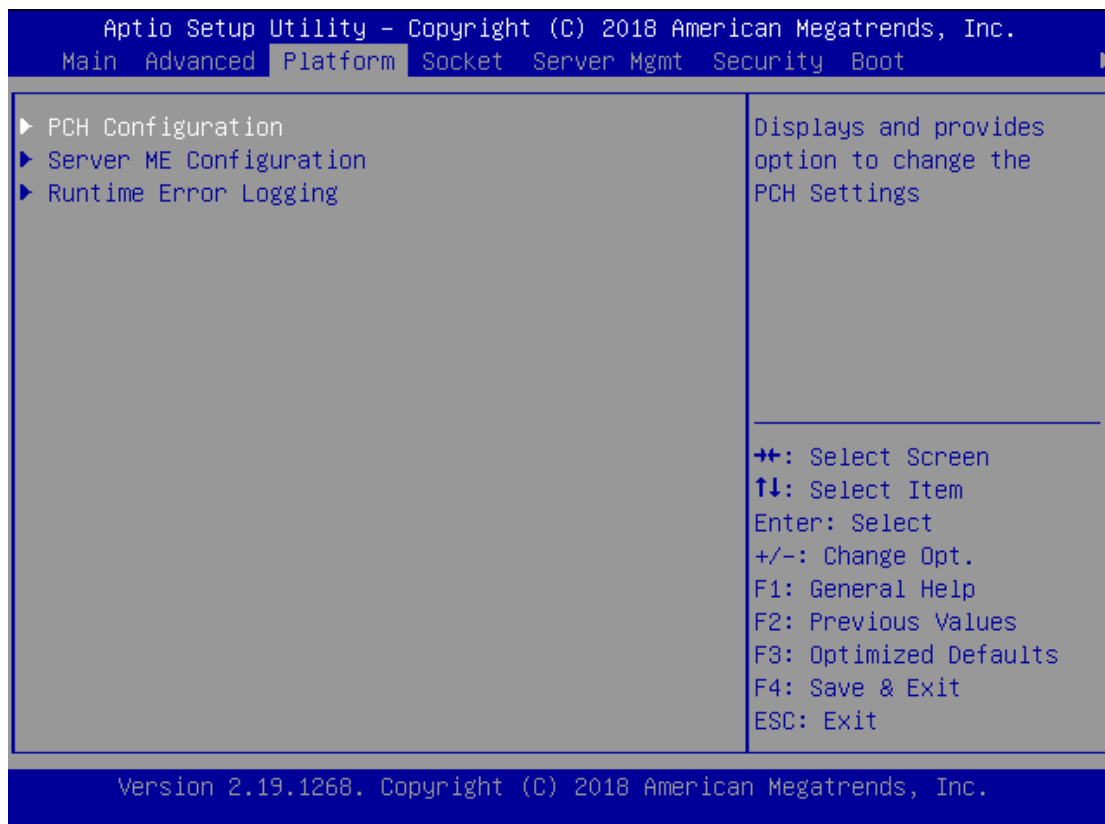
TruOpt FORM



| Feature | Options | Description |
|---------|-------------------|---------------------|
| TruOpt | Enabled Manual | Lanner Optimization |

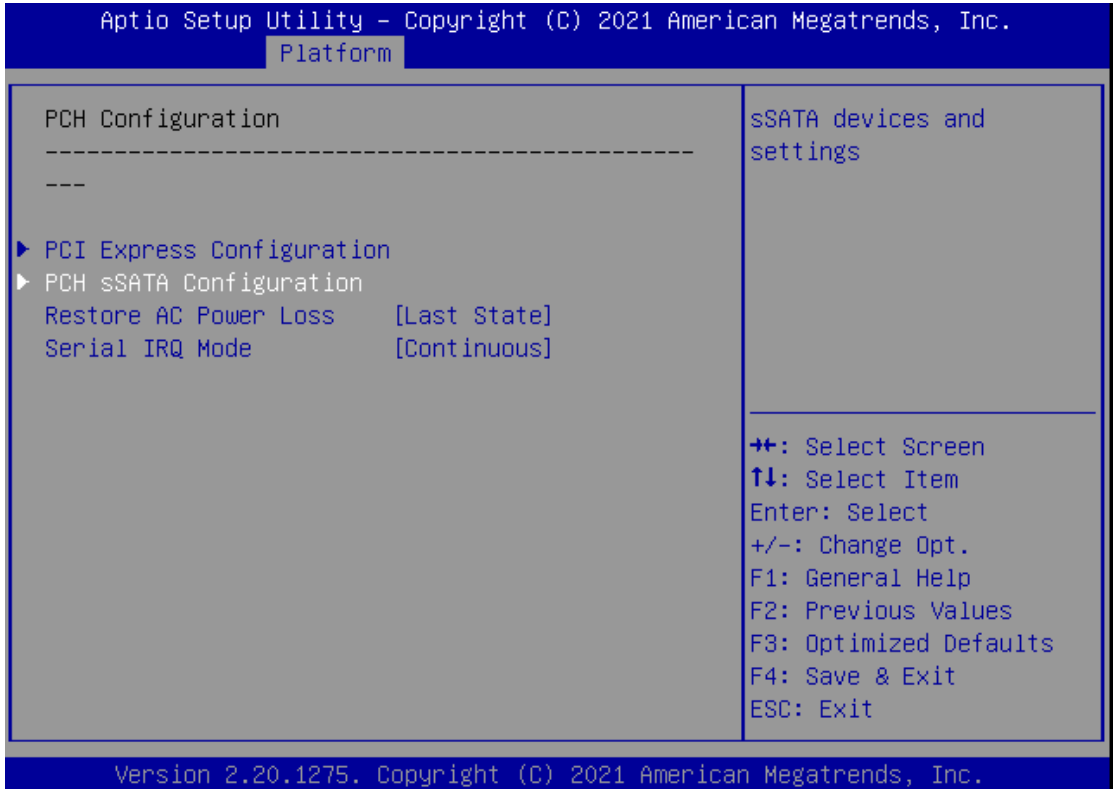
Platform

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



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

PCH Configuration



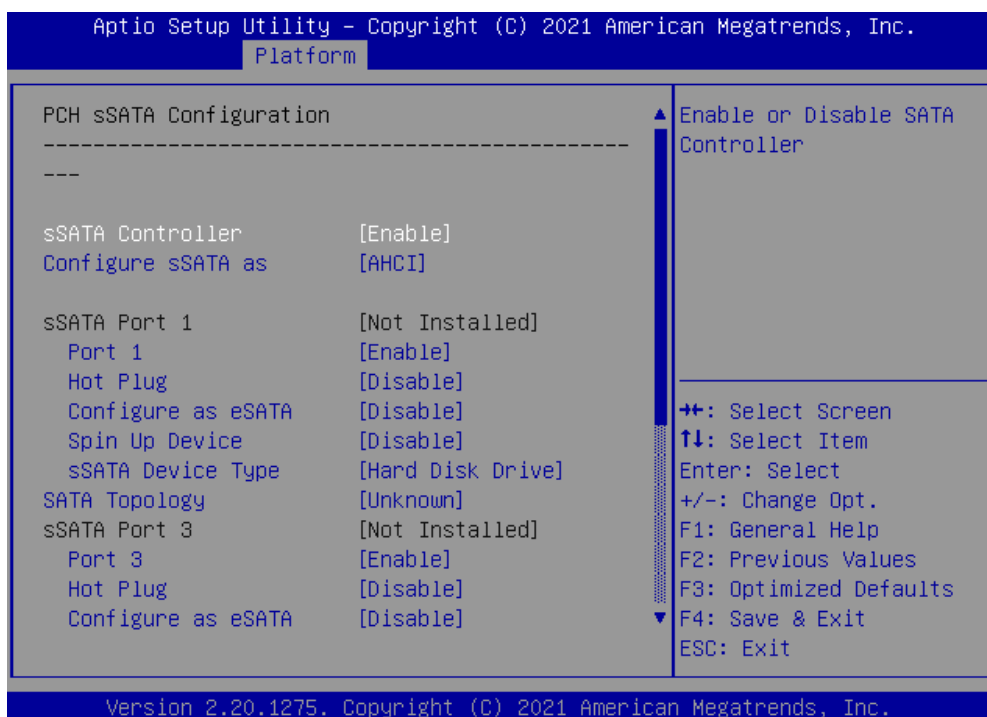
| Feature | Options | Description |
|---------------------------|-------------------------------------|--|
| PCI Express Configuration | None | PCI Express Configuration settings |
| PCH sSATA Configuration | None | sSATA devices and settings |
| Restore AC Power Loss | Power ON Power Off Last State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

PCI Express Configuration



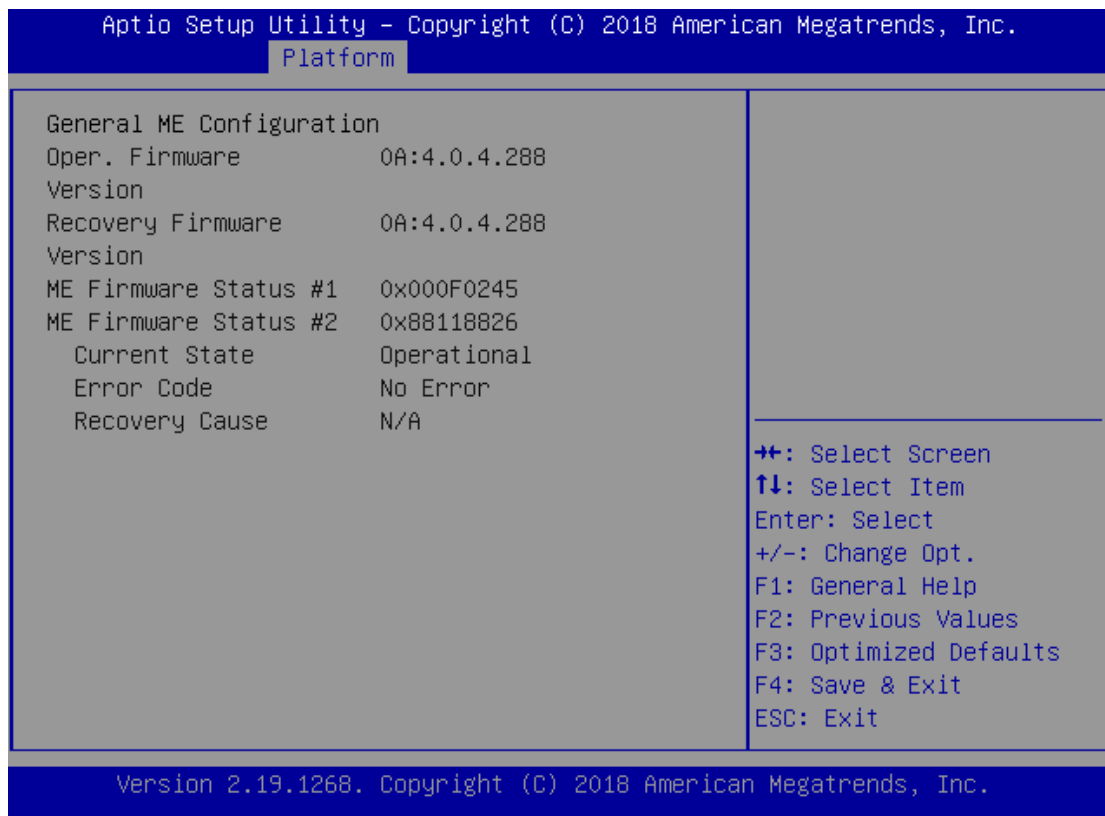
| Feature | Options | Description |
|----------------------------------|--|--|
| PCIe Root Port Function Swapping | Disabled Enabled | Enable PCIe root port function swapping feature to dynamically assign function 0 to enabled root port. |
| Max Read Request Size | MRRS 128B MRRS 256B MRRS 512B MRRS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

PCH sSATA Configuration

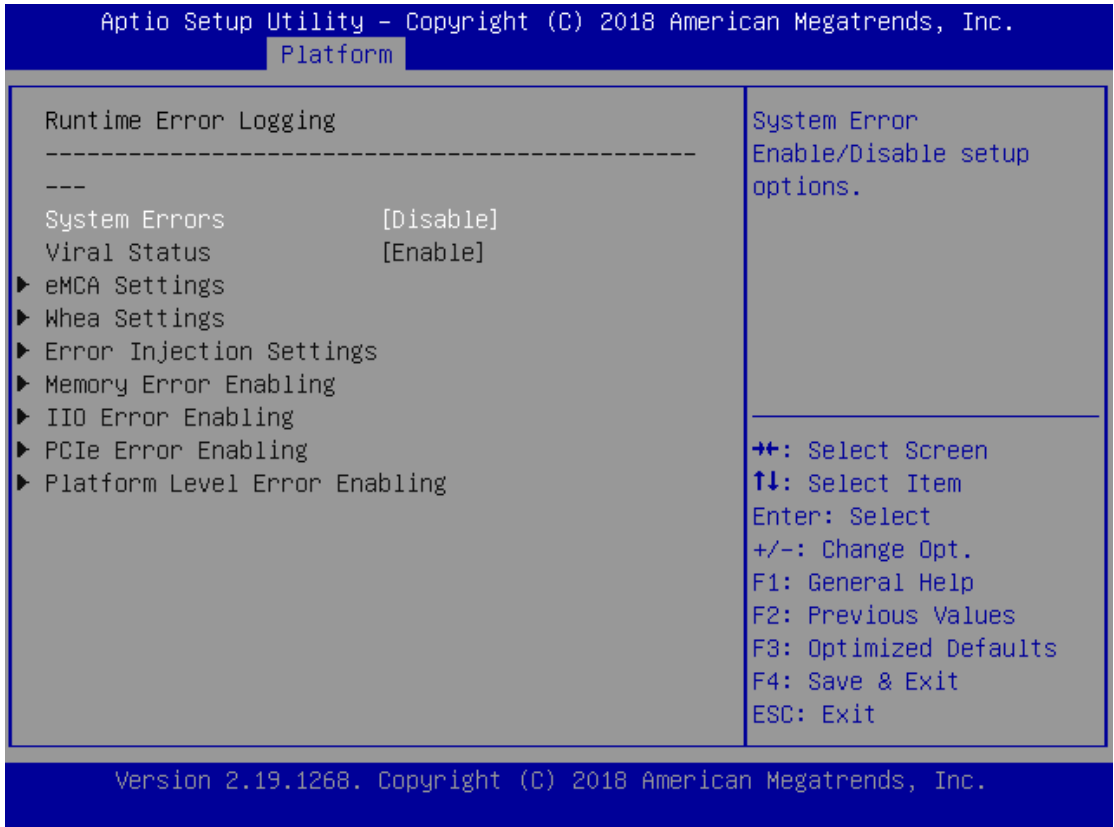


| Feature | Options | Description |
|--------------------|---|--|
| sSATA Controller | Disabled Enabled | Enables or disables SATA Controller |
| Configure sSATA as | AHCI RAID | This will configure SATA as RAID or AHCI . |
| Port 0/1/2/3/4 | Disabled Enabled | Enable or Disable SATA Port |
| Hot Plug | Disabled Enabled | Designates this port as Hot Pluggable. |
| Configure as eSATA | Disabled Enabled | Configures port as External SATA (eSATA) |
| Spin Up Device | Disabled Enabled | If enabled for any of ports Staggered Spin Up will be performed and only the drive switch with this option will spin up at boot. Otherwise all drives spin up at boot. |
| sSATA Device Type | Hard Disk Drive Solid State Drive | Identify the SATA port is connected to Solid State Drive or Hard Disk Drive |
| SATA Topology | Unknown ISATA Direct Connect Flex M2 | Identify the SATA Topology if it is Default or ISATA or Flex or DirectConnect or M2 |

Server ME Configuration



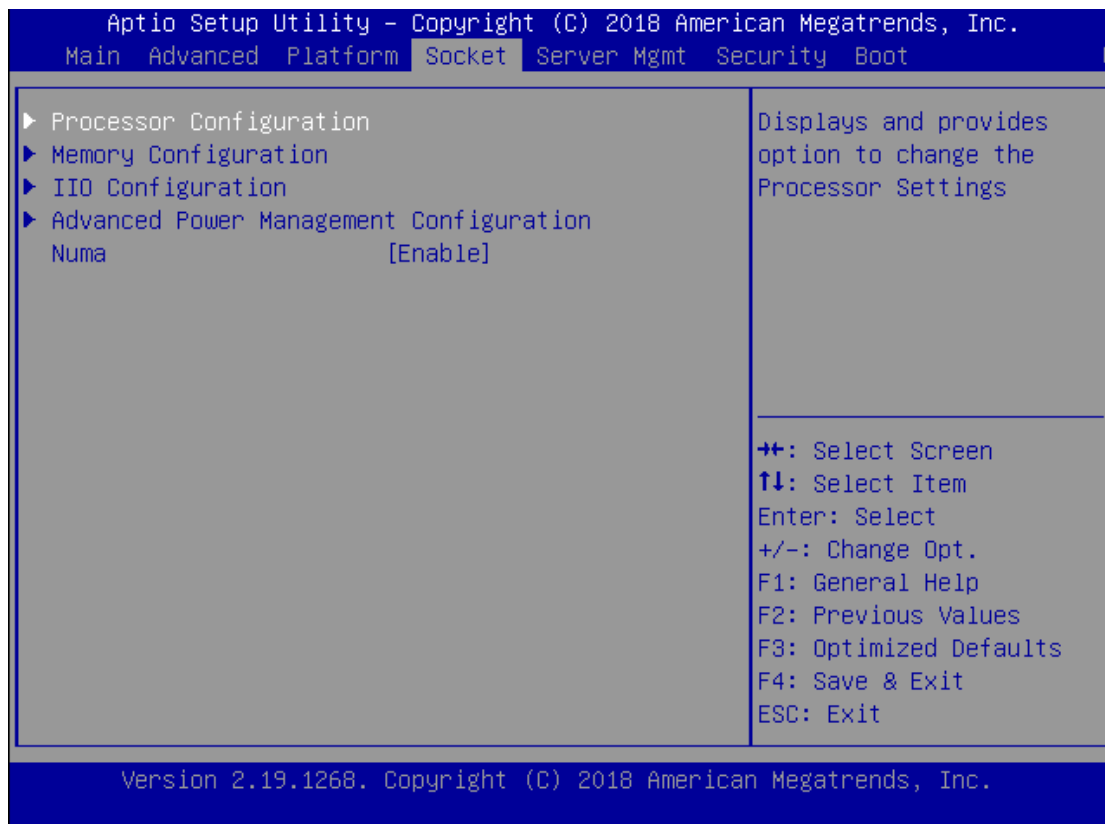
Runtime Error Logging



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

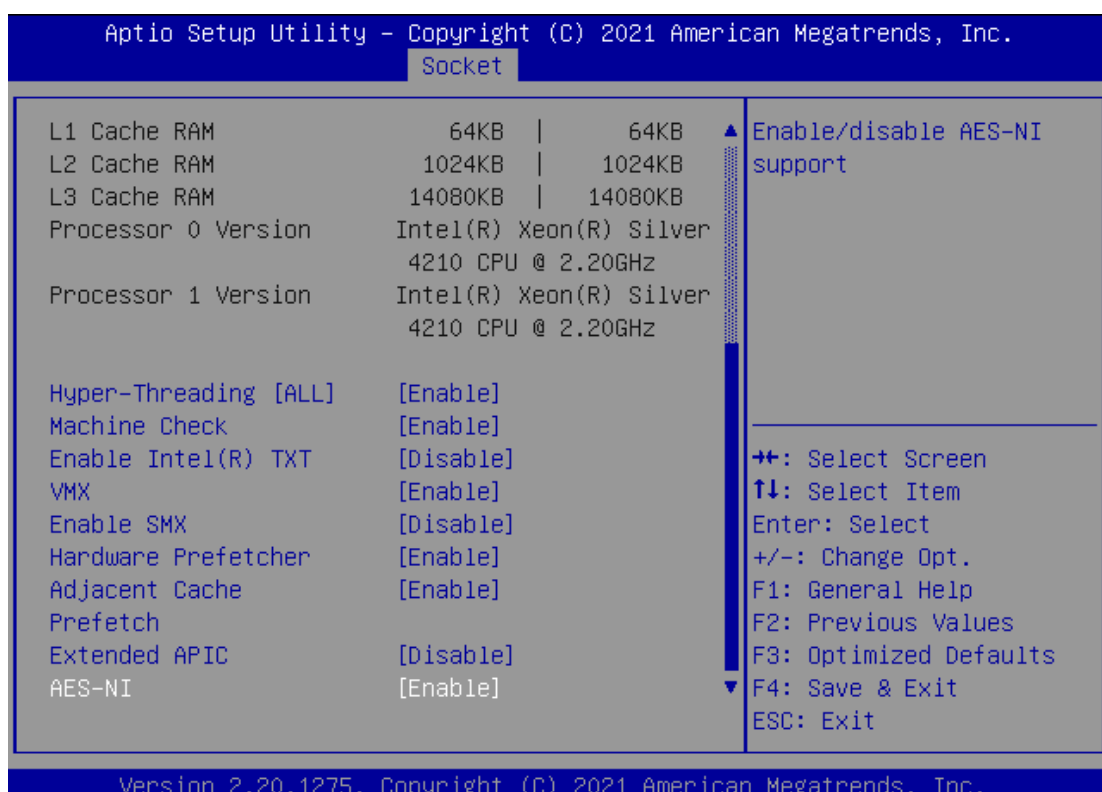
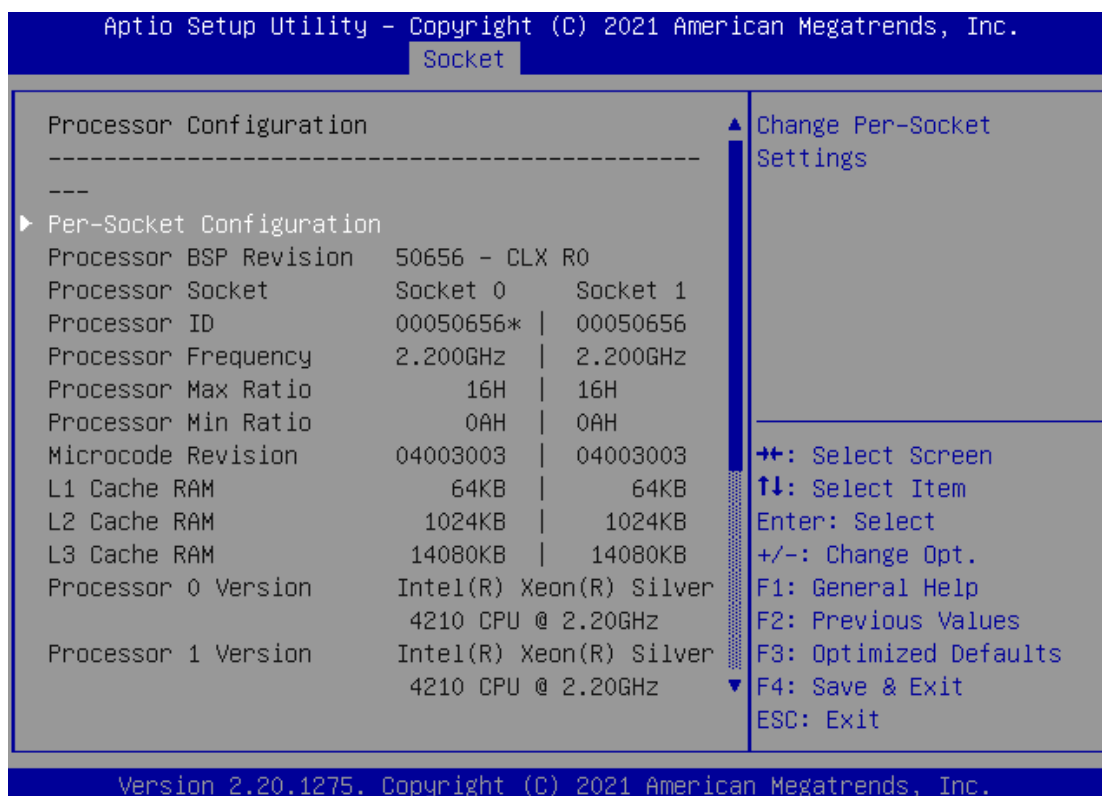
Socket

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



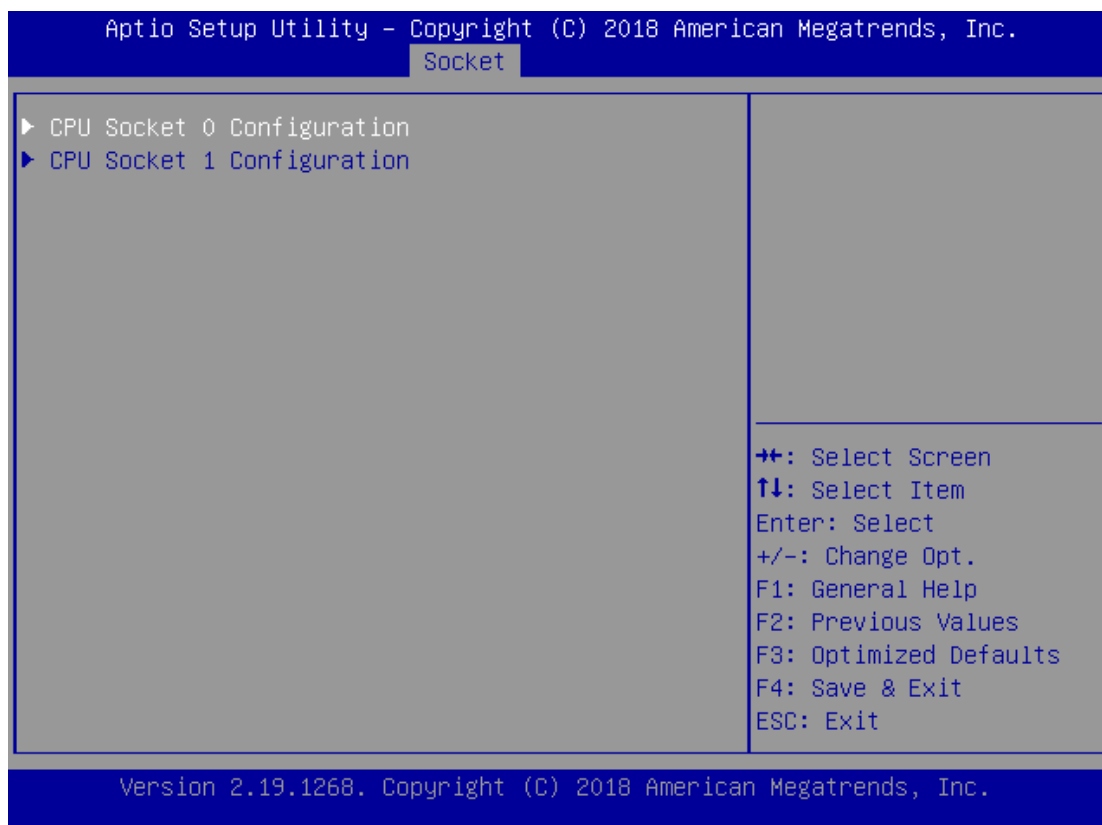
| Feature | Options | Description |
|---|---------------------|--|
| Processor Configuration | None | Displays and provides option to change the Processor Settings |
| Memory Configuration | None | Displays and provides option to change the Memory Settings |
| IIO Configuration | None | Displays and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

Processor Configuration



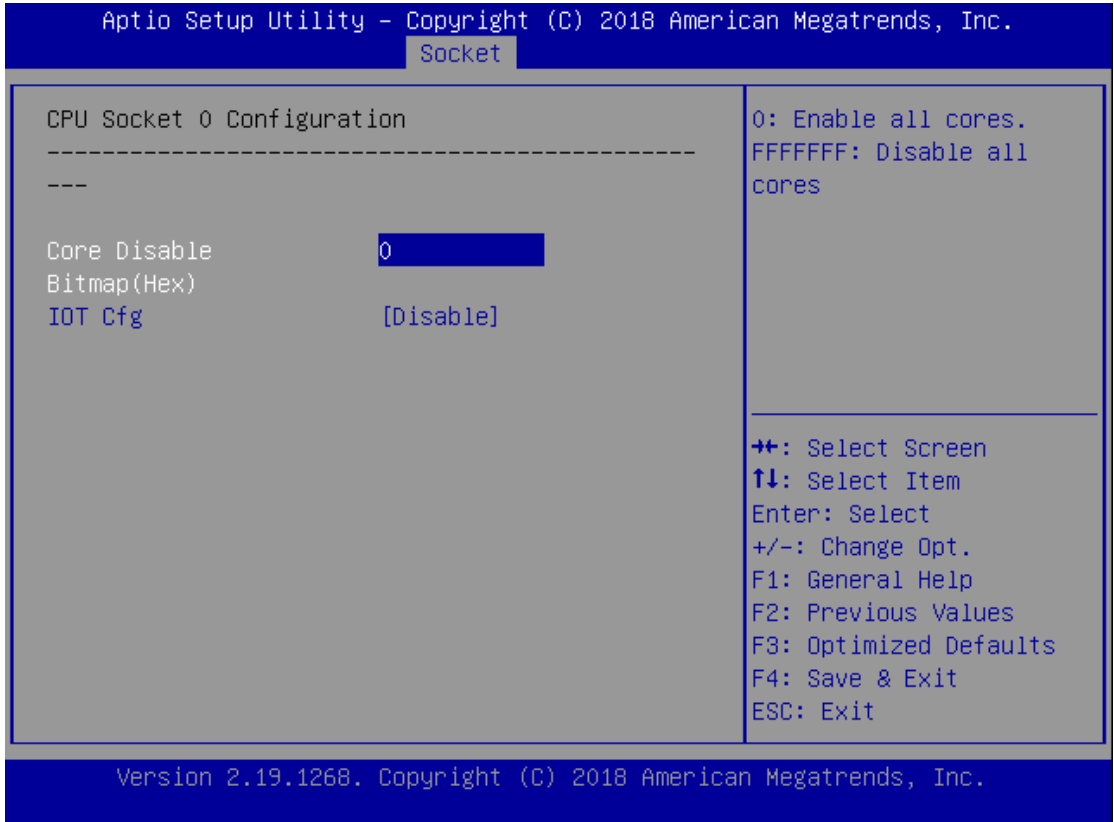
| Feature | Options | Description |
|---------------------------|---------------------|---|
| Hyper-Threading [ALL] | Disabled Enabled | Enables Hyper Threading (Software Method to Enable/Disable Logical Processor threads. |
| Machine Check | Disabled Enabled | Enable or Disable the Machine Check |
| ssEnable Intel® TXT | Disabled Enabled | Enables Intel(R) TXT |
| VMX | Disabled Enabled | Enables the Vanderpool Technology, which takes effect after reboot. |
| Enable SMX | Disabled Enabled | Enables Safer Mode Extensions |
| Hardware Prefetcher | Disabled Enabled | = MLC Streamer Prefetcher (MSR 1A4h Bit[0]) |
| Adjacent Cache Prefetcher | Disabled Enabled | = MLC Spatial Prefetcher (MSR 1A4h Bit[1]) |
| Extended APIC | Disabled Enabled | Enables or disables extended APIC support |
| AES-NI | Disabled Enabled | Enables or disables AES-NI support |

Per-Socket Configuration



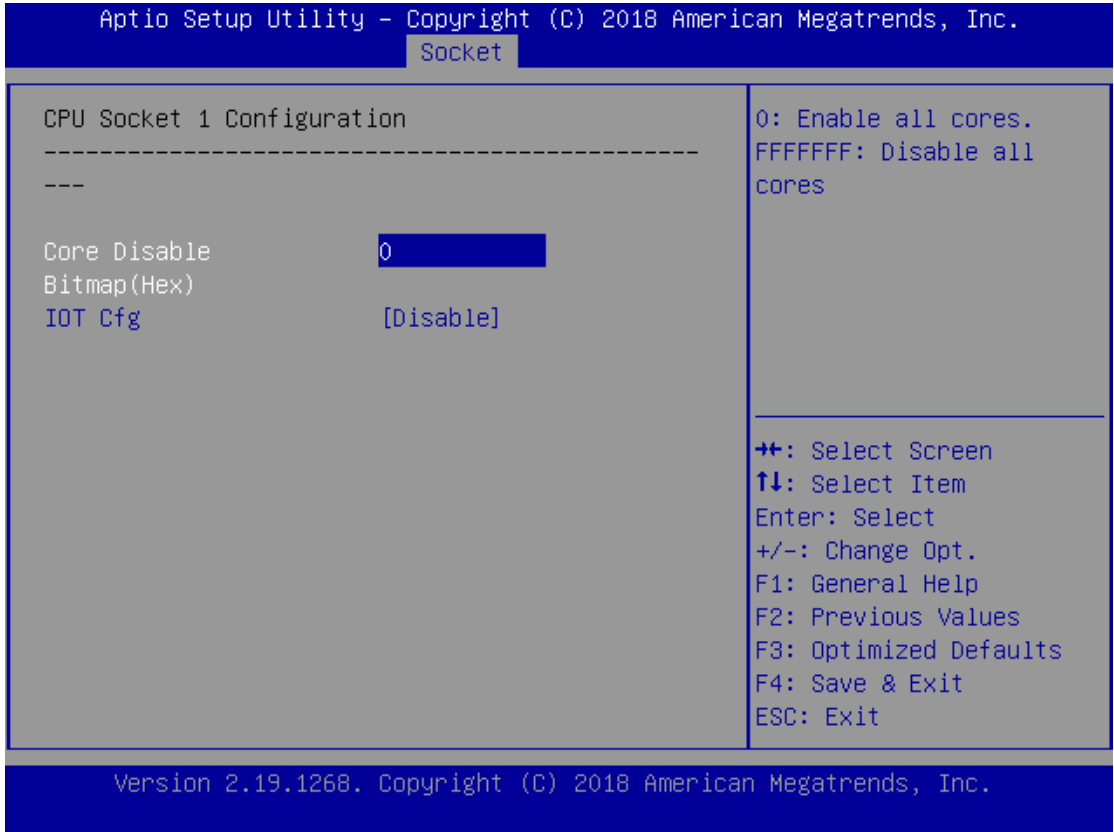
| Feature | Options | Description |
|---------------------------|---------|-------------|
| CPU Socket0 Configuration | None | None |
| CPU Socket1 Configuration | None | None |

CPU Socket0 Configuration



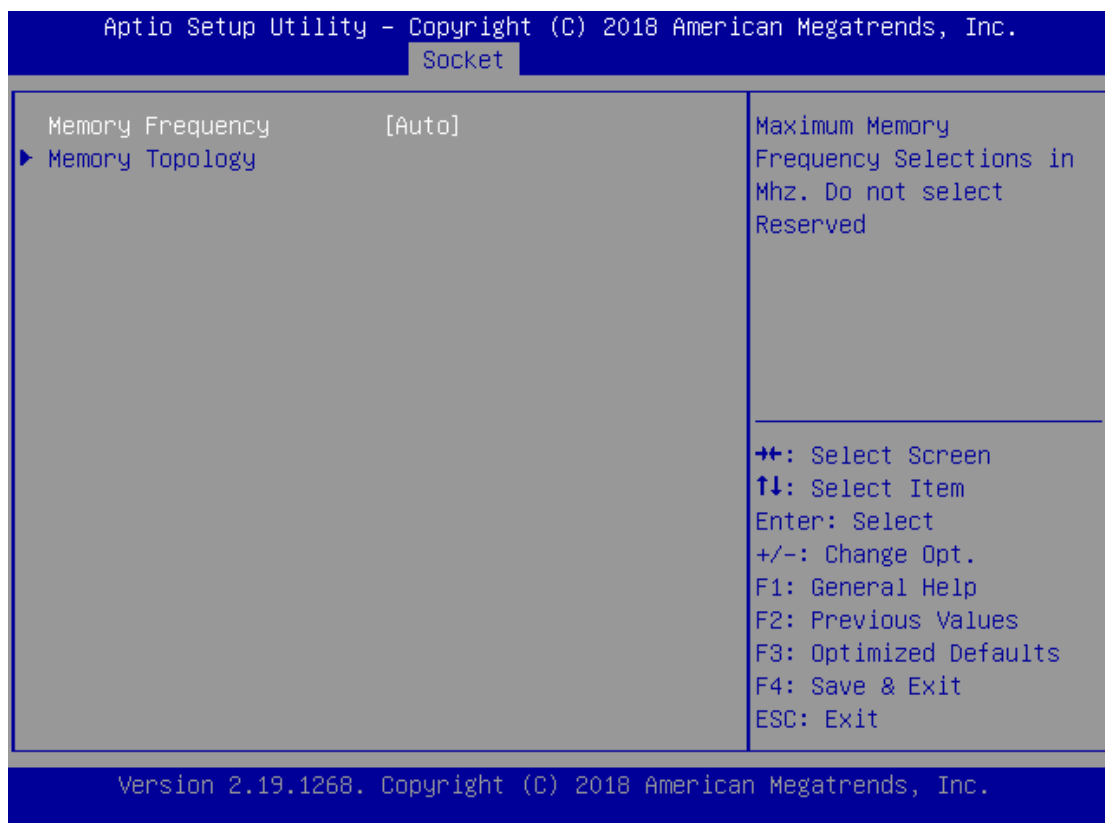
| Feature | Options | Description |
|------------------------------|---------------------|--|
| Core Disable Bitmap (Hex) | 0 | 0: Enable all cores. 3fff: Disable all cores |
| IOT Cfg | Disabled Enabled | None |

CPU Socket1 Configuration



| Feature | Options | Description |
|------------------------------|---------------------|--|
| Core Disable Bitmap (Hex) | 0 | 0: Enable all cores. 3fff: Disable all cores |
| IOT Cfg | Disabled Enabled | None |

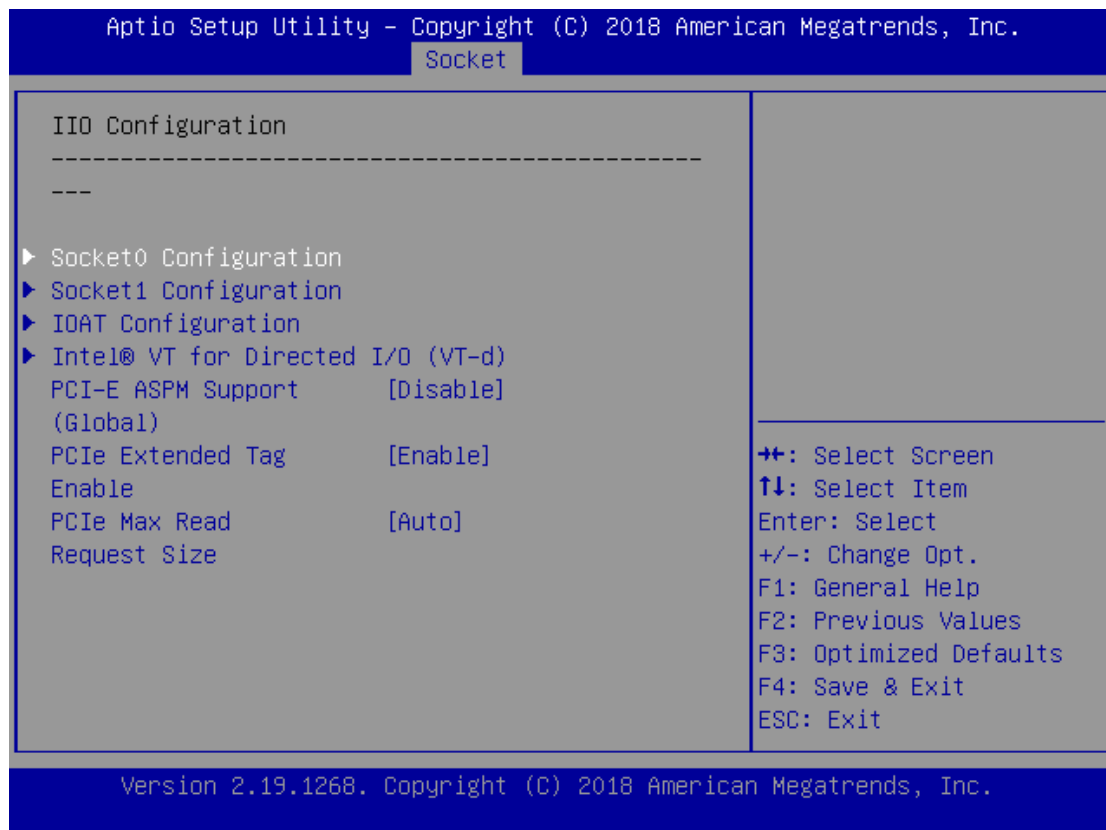
Memory Configuration



| Feature | Options | Description |
|------------------|-------------|--|
| Memory Frequency | Auto | Maximum Memory Frequency Selections in Mhz. Do not select Reserved |
| | 800 | |
| | 1000 | |
| | 1066 | |
| | 1200 | |
| | 1333 | |
| | 1400 | |
| | 1600 | |
| | 1800 | |
| | 1866 | |
| | 2000 | |
| | 2133 | |
| | 2200 | |
| | 2400 | |
| | 2600 | |
| | 2666 | |
| | 2800-OvrClk | |
| | 2933-OvrClk | |
| | 3000-OvrClk | |
| | 3200-OvrClk | |
| | 3400-OvrClk | |

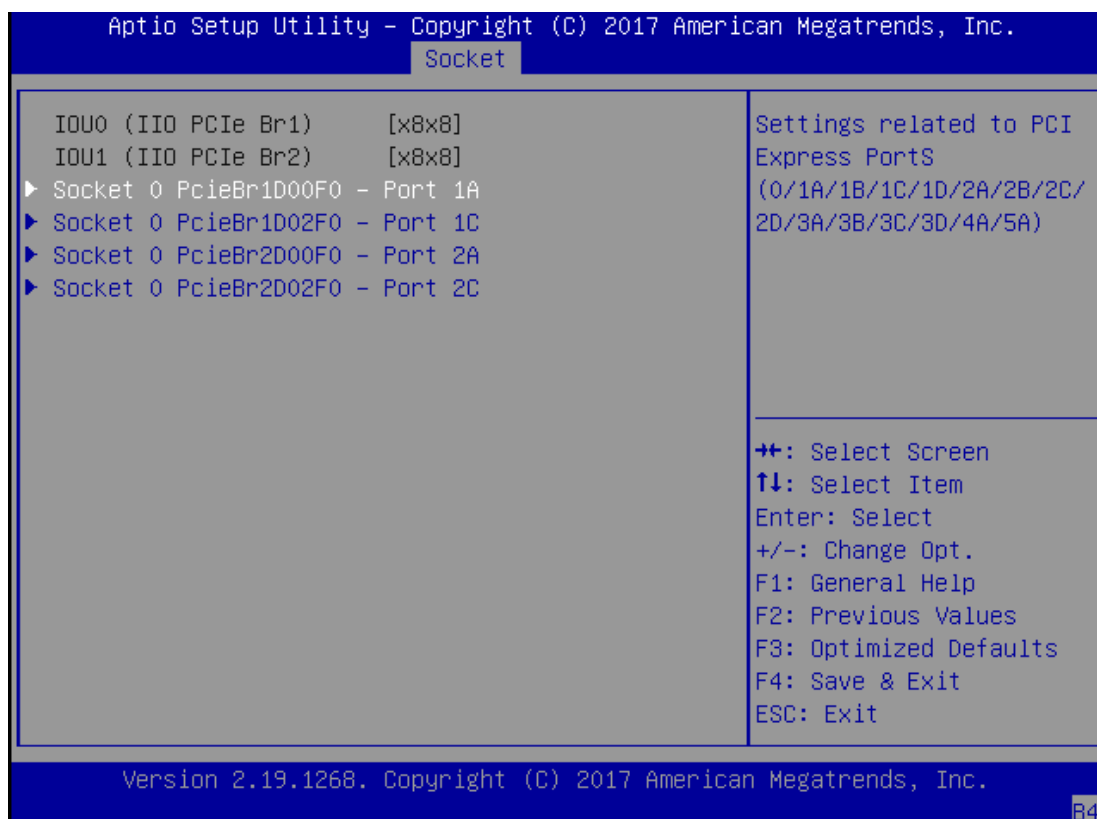
| | | |
|-----------------|---|---|
| | 3600-OvrClk 3733-OvrClk 3800-OvrClk 4000-OvrClk 4200-OvrClk 4266-OvrClk 4400-OvrClk | |
| Memory Topology | None | Displays memory topology with Dimm population information |

I/O Configuration



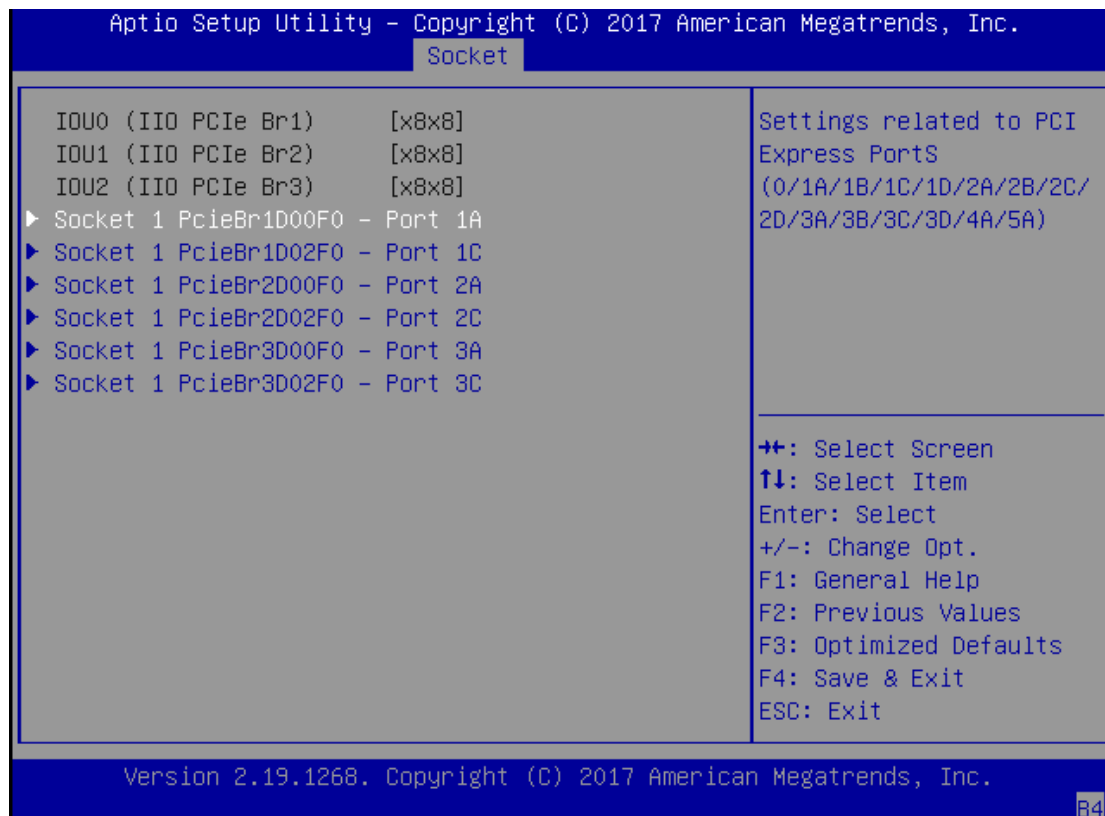
| Feature | Options | Description |
|-----------------------------------|---|--|
| Socket0 Configuration | None | None |
| Socket1 Configuration | None | None |
| IOAT Configuration | None | All IOAT configuration options |
| Intel® VT for Directed I/O (VT-d) | None | Press <Enter> to bring up the Intel® VT for Directed I/O (VT-d) Configuration menu. |
| PCI-E ASPM Support (Global) | Disabled Per-Port L1 Only | This option enables / disables the ASPM support for all downstream devices. |
| PCIe Extended Tag Enable | Auto Disabled Enabled | Auto/Enable - BIOS sets 8-bit Tag Field for PCIe Root Port/EndPoint. Disable - BIOS sets 5-bit Tag Field for PCIe Root Port/EndPoint |
| PCIe Max Read Request Size | Auto 128B 256B 512B 1024B 2048B 4096B | Set Max Read Request Size in EndPoints |

Socket0 Configuration



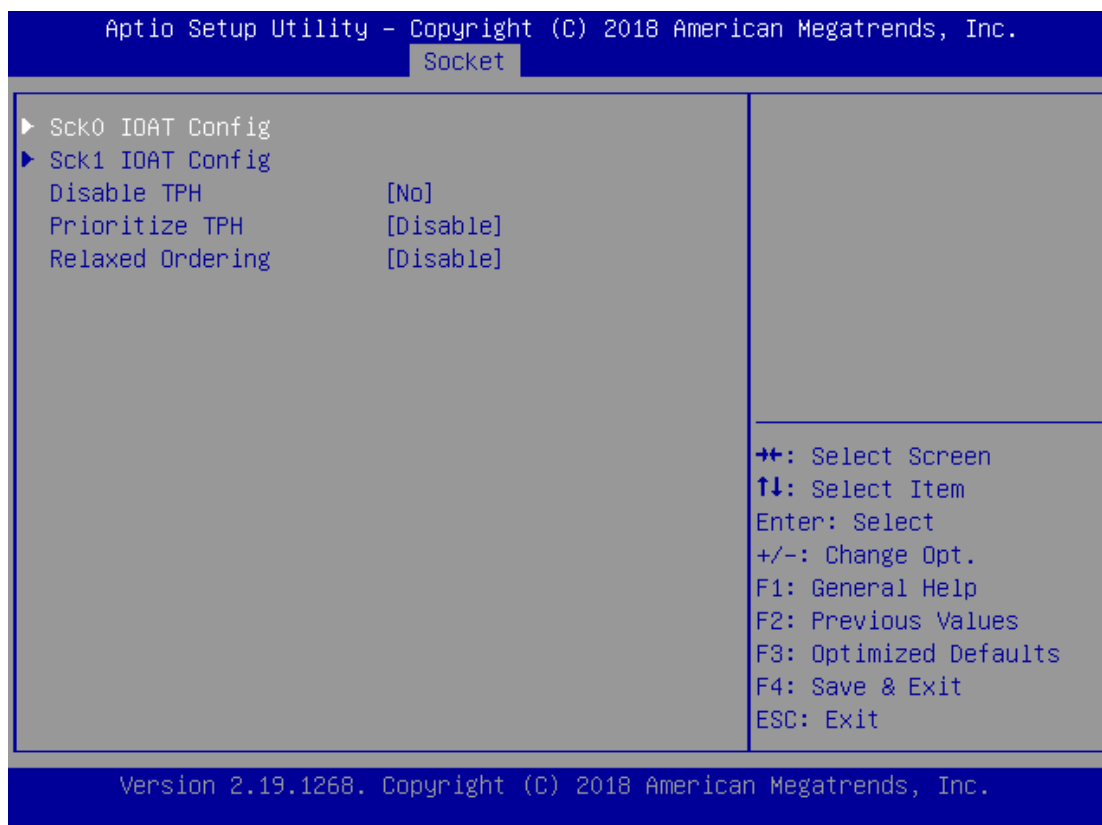
| Feature | Options | Description |
|--------------------------|---------|---|
| Socket 0 PcieBr1D00F0 | None | Settings related to PCI Express Port 1A |
| Socket 0 PcieBr1D02F0 | None | Settings related to PCI Express Port 1C |
| Socket 0 PcieBr2D00F0 | None | Settings related to PCI Express Port 2A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

Socket1 Configuration

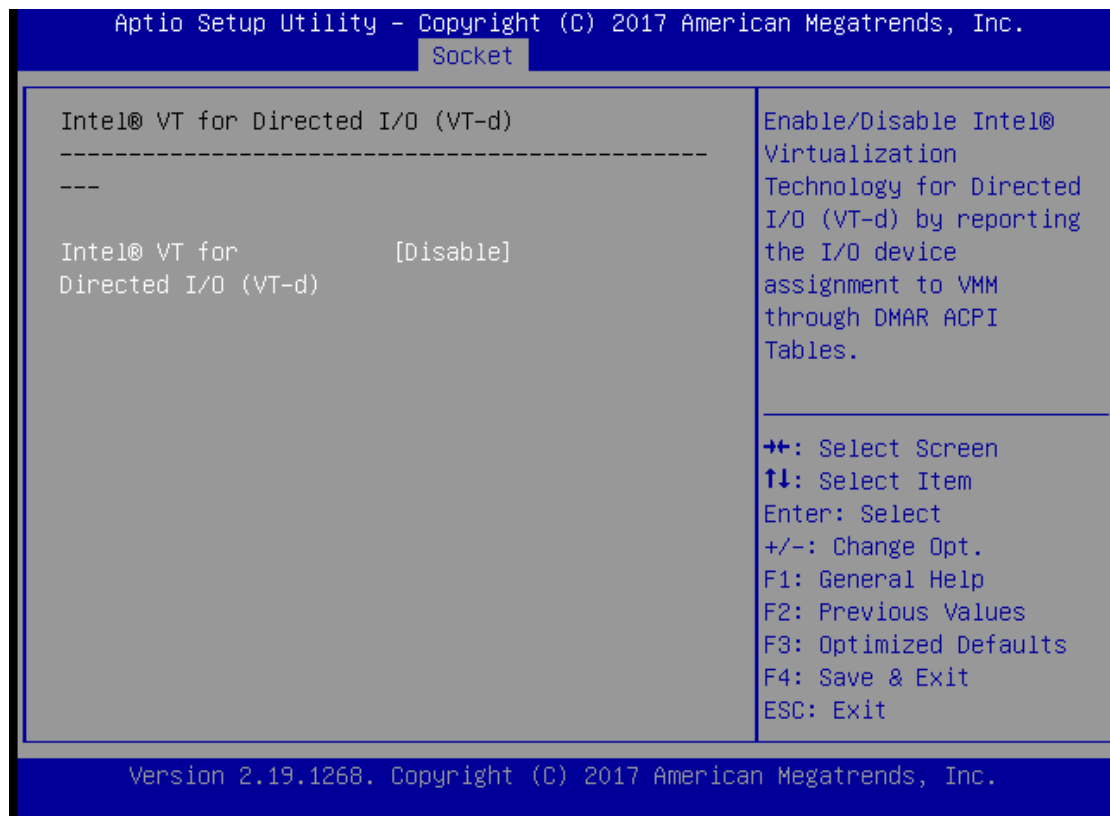


| Feature | Options | Description |
|--------------------------|---------|---|
| Socket 1 PcieBr1D00F0 | None | Settings related to PCI Express Port 1A |
| Socket 1 PcieBr1D02F0 | None | Settings related to PCI Express Port 1C |
| Socket 1 PcieBr2D00F0 | None | Settings related to PCI Express Port 2A |
| 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 |

IOAT Configuration

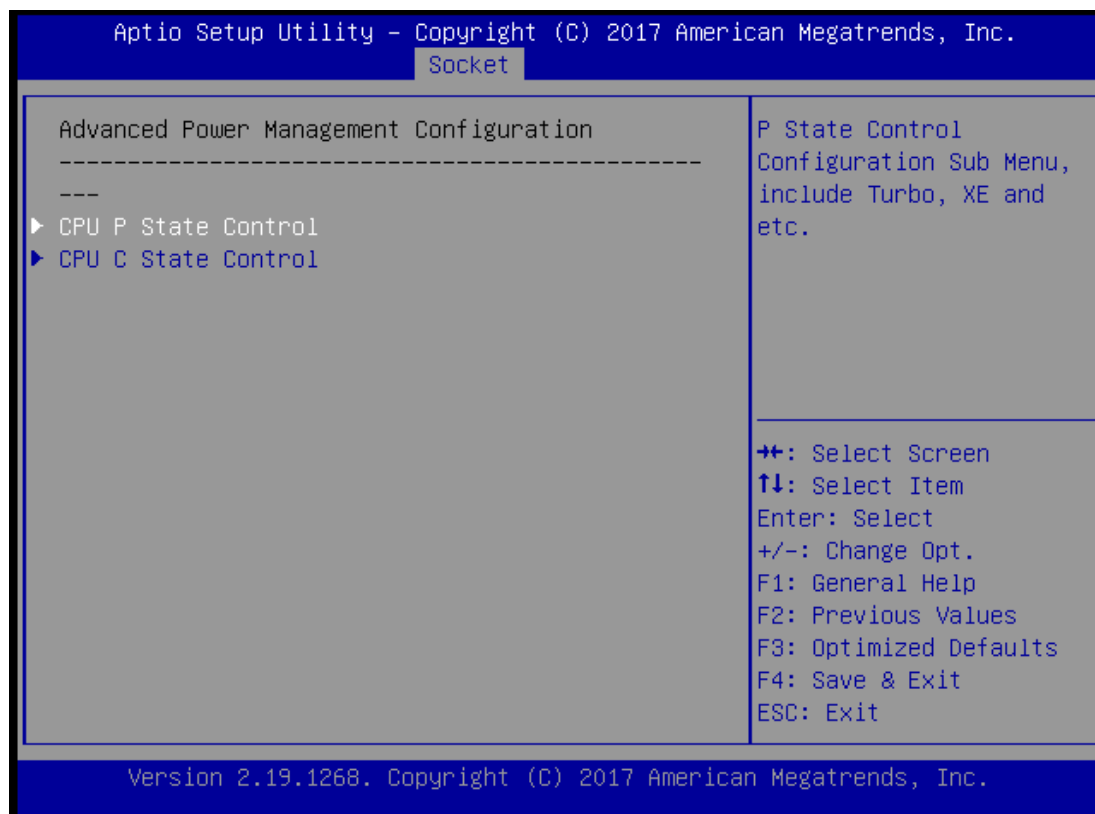


| Feature | Options | Description |
|------------------|----------------------------|---------------------------------|
| Sck0 IOAT Config | None | None |
| Sck1 IOAT Config | None | None |
| Disable TPH | No Yes | TLP Processing Hint disable |
| Prioritize TPH | Disabled Enabled | Prioritize TPH |
| Relaxed Ordering | Disabled Enabled | Relaxed Ordering Enable/Disable |

Intel® VT for Directed I/O (VT-d)

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

Advanced Power Management Configuration



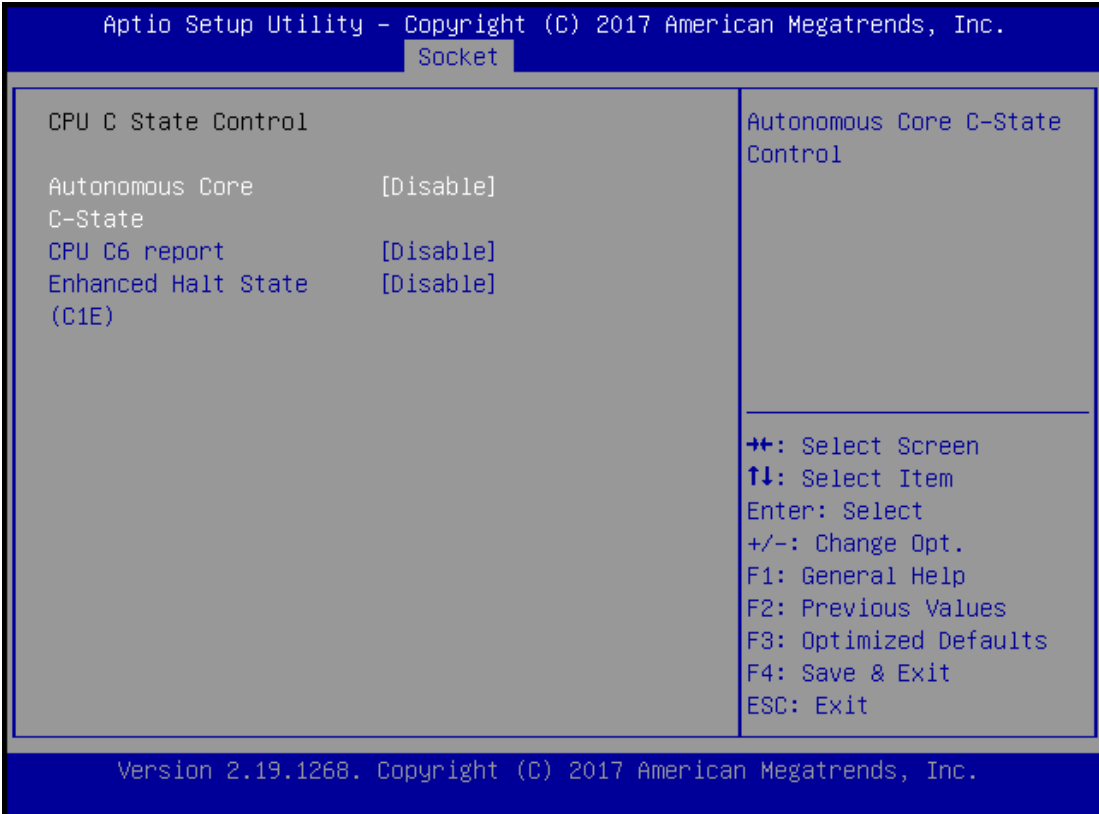
| Feature | Options | Description |
|---------------------|---------|--|
| CPU P State Control | None | P State Control Configuration Sub Menu, include Turbo, XE and etc. |
| CPU C State Control | None | CPU C State setting |

CPU P State Control



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

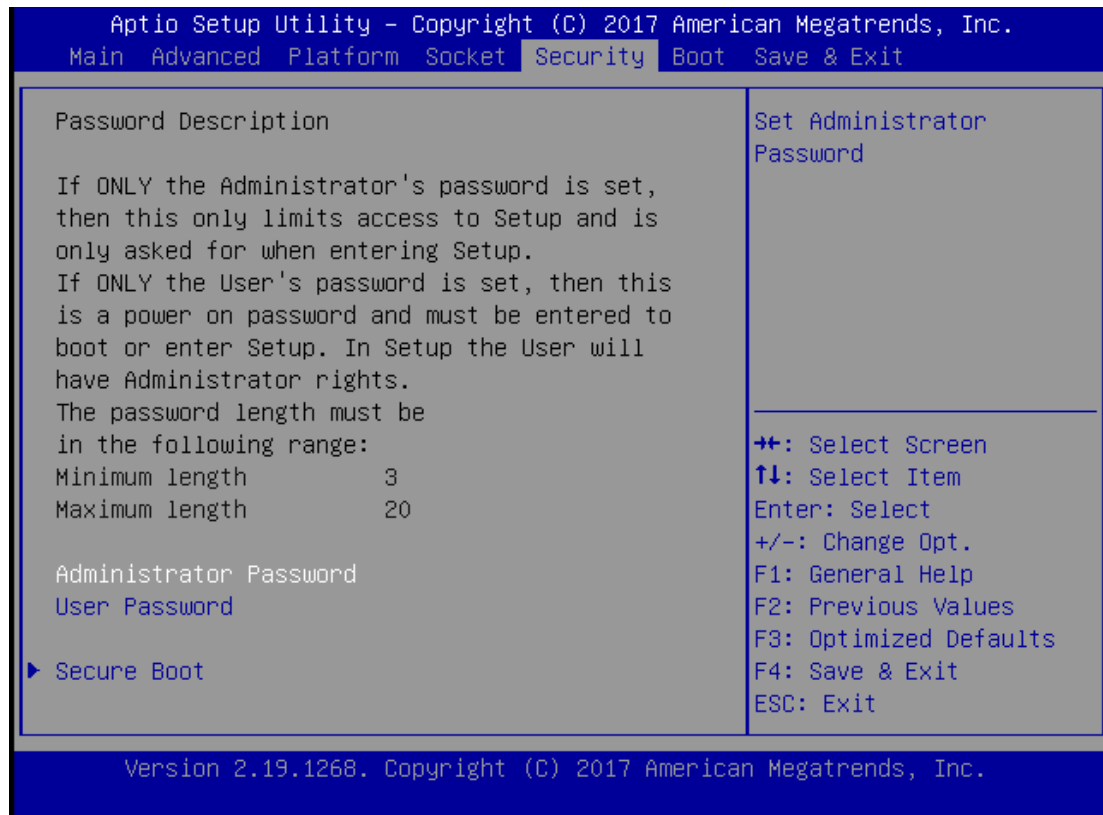
CPU C State Control



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

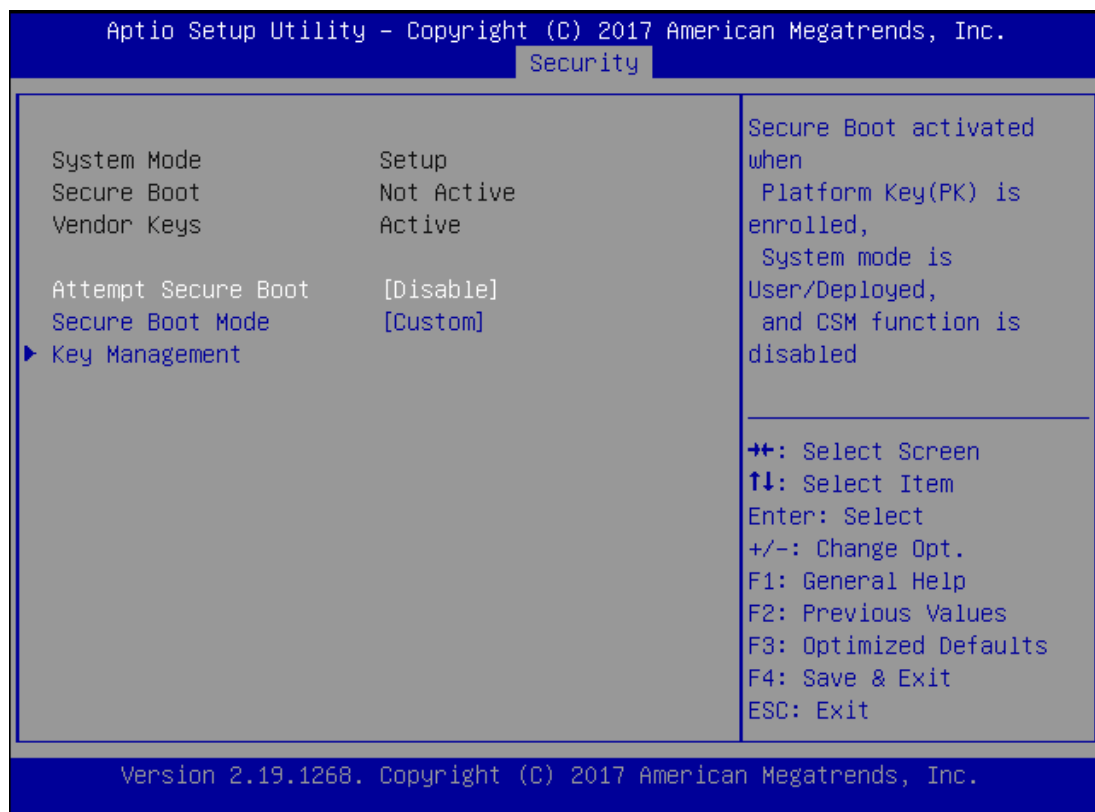
Security

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



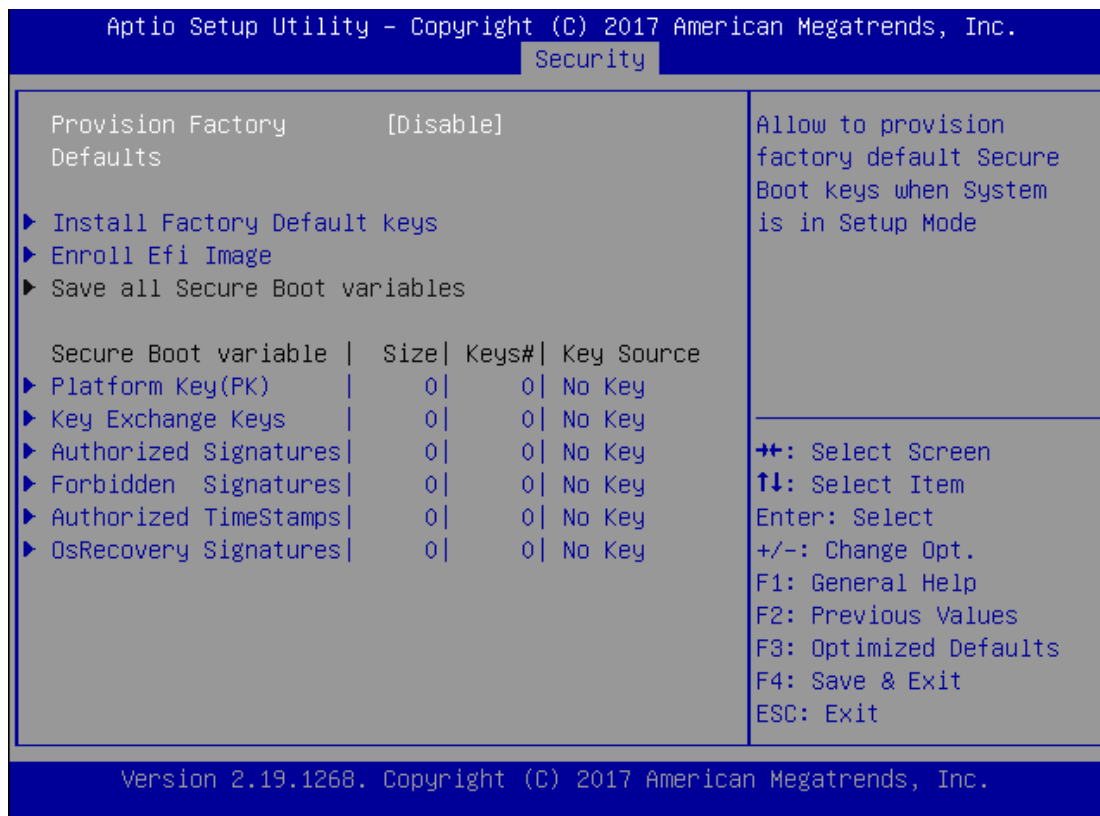
| Feature | Description |
|------------------------|---|
| Administrator Password | If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup. |
| User Password | If ONLY the User's password is set, it serves as a power-on password and must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

Secure Boot



| Feature | Options | Description |
|---------------------|---------------------|--|
| 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 Custom mode, Secure Boot Variables can be configured without authentication |

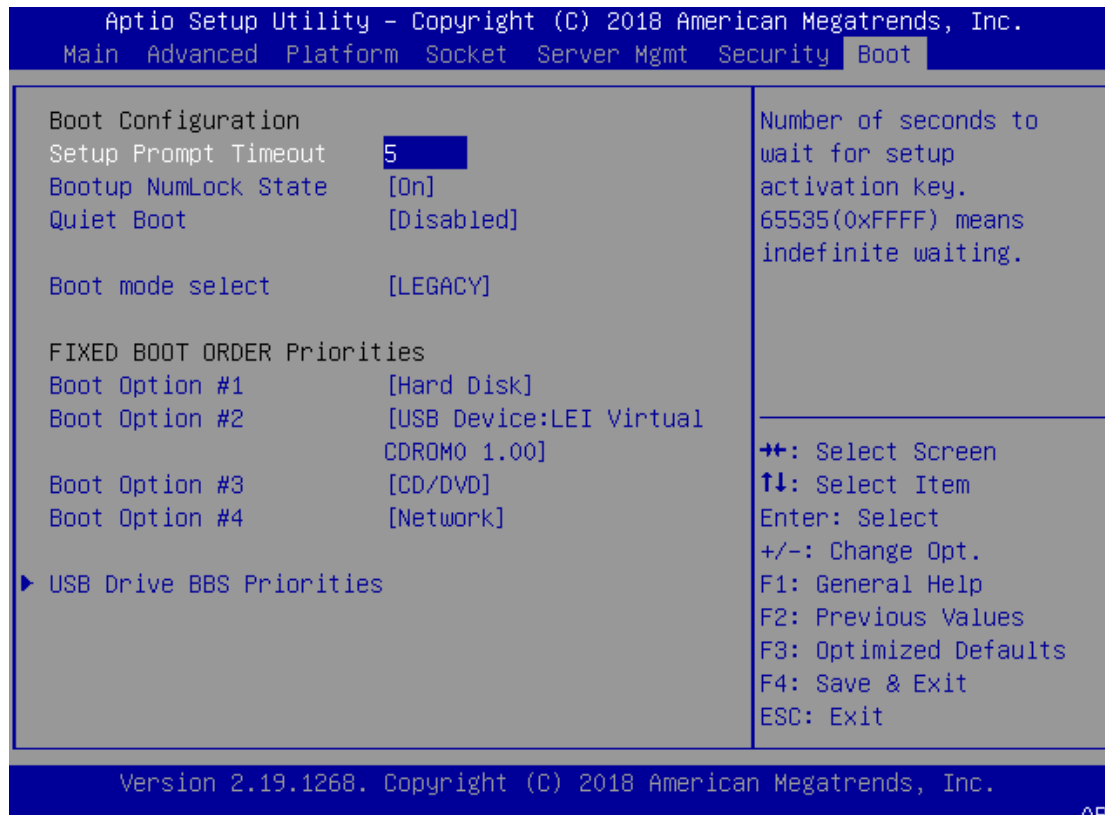
Key Management



| Feature | Options | Description |
|------------------------------|---------------------|---|
| Provision Factory Defaults | Disabled Enabled | 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

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



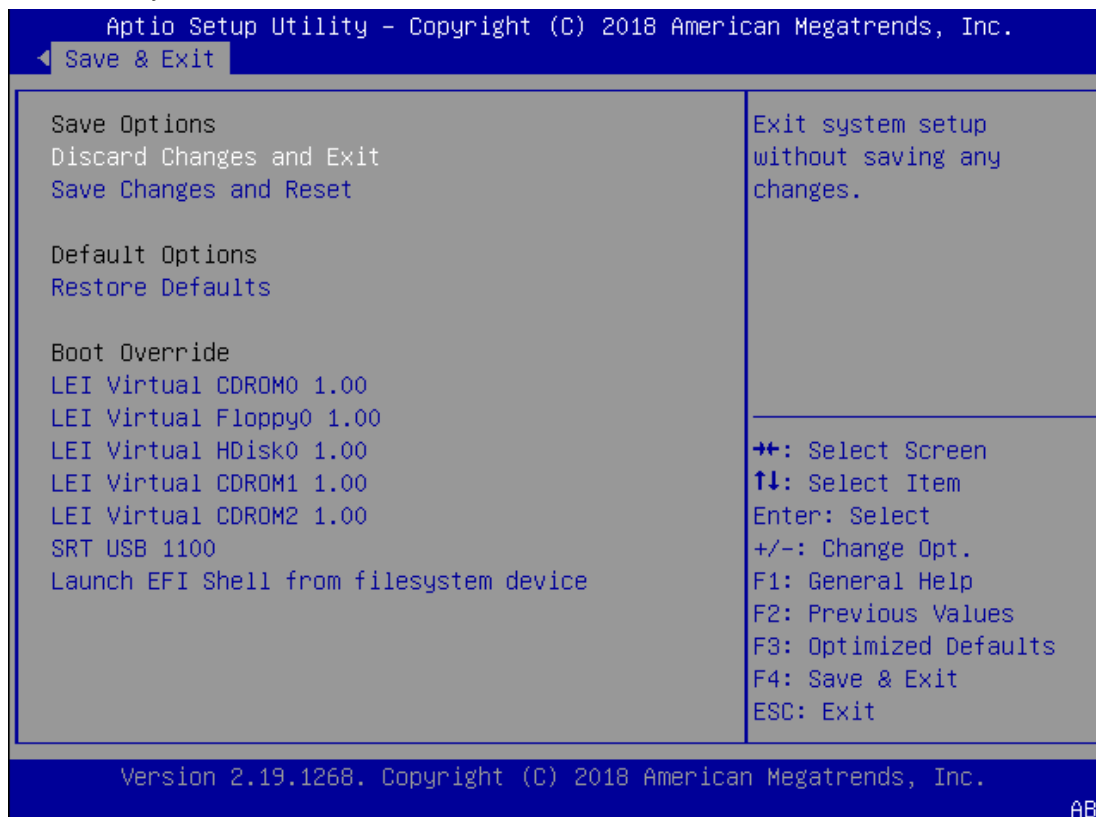
| Feature | Options | Description |
|----------------------|------------------------|--|
| Setup Prompt Timeout | 5 | The Number of seconds to wait for setup activation key. 65535 means indefinite waiting. |
| Bootup NumLock State | On Off | Select the keyboard NumLock state. |
| Quiet Boot | Disabled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

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

Save & Exit

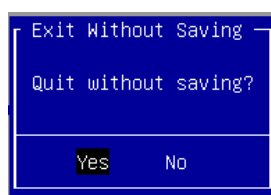
Select the Save and Exit menu item from the BIOS setup screen to enter the Save and Exit Setup screen.

Users can select any of the items in the left frame of the screen.



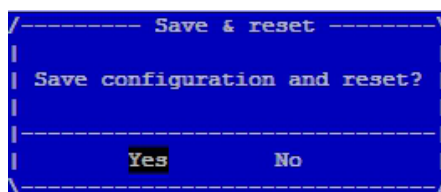
■ Discard Changes and Exit

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



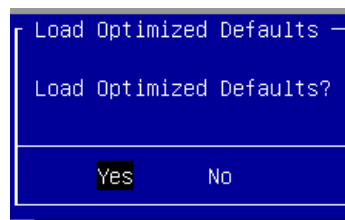
■ Save Changes and Reset

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



■ Restore Defaults

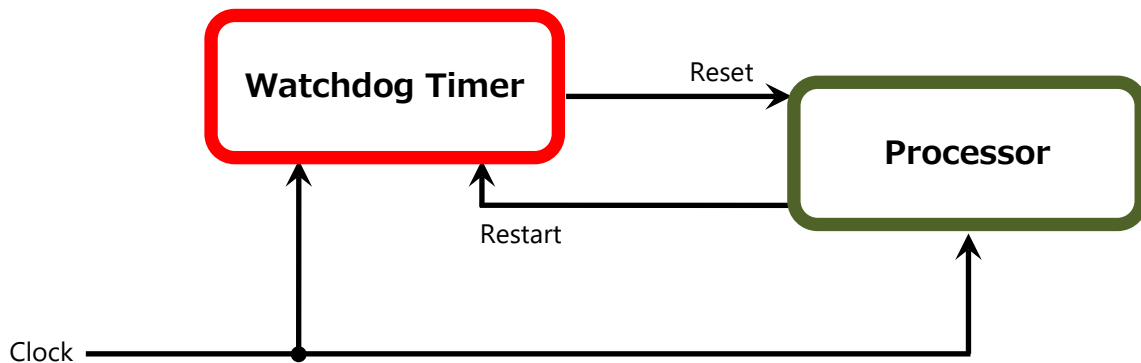
Restore default values for all setup options. Select “**Yes**” to load Optimized defaults.



Note: The items under Boot Override may not be the same, it would depend on the devices connected on the system.

APPENDIX A: PROGRAMMING WATCHDOG TIMER

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



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

`wd_tst -swt xxx` (Set Watchdog Timer 1-255 seconds)

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

`wd_tst -stop` (Stop Watchdog Timer)

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

APPENDIX B: 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 > Remote Access Configuration > Serial Port Mode > [115200, 8 , n , 1]
3. Configure Console Redirection on the client system. The following illustration is an example on Windows platform:
 - A. Click the Start button, point to **Programs > Accessories > Communications** and select **Hyper Terminal**.
 - B. Enter any name for the new connection and select any icon.
 - C. Click **OK**.
 - D. From the "**Connect to** ", pull-down menu, select the appropriate Com port on the client system and click **OK**.
 - E. 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.

APPENDIX C: 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 to 1275 seconds of timer interval.
 - **Run-Time** watchdog timer, used during run-time, with of 1 to 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.
 - ▶ For thorough implementation information of Lanner Bypass and Watchdog functionalities, go to Lanner Support website at <http://www.lannerinc.com/category/1202-network-appliances> to download Lanner Bypass Implementation Manual.
 - ▶ For a description of the physical LAN ports equipped with this function, refer to Front Panel in Chapter 1: Product Overview.

APPENDIX D: INSTALLING INTEL® LAN CONTROLLER DRIVER FOR LINUX

To install the Intel® LAN controller base driver for the Red Hat® and Linux operating system, please visit <http://www.lannerinc.com/support/download-center/drivers>, enter the product category and download the utility package.

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.

APPENDIX E: PROGRAMMING THE LCM

The LCD panel module (LCM) is designed to provide real-time operating status and configuration information for the system. For sample LCM code, see *LCM* folder in the *Driver and Manual CD*. The driver and the program library can also be found in the folder.

The system supports the following 2 kinds of LCM:

- Parallel Text-based LCM: The LCM connects to the motherboard's parallel port. The LCD screen can display 2 lines, 16 (or 20) characters per line.
- USB and Serial Text or Graphic-based LCM: Our next generation LCM. Lanner engineers design a common source code to be deployed on these two differently interfaced LCM modules. Jumpers are used to select between text and graphic types. See next section.

For Parallel Text-based LCM

Build

To build program source code on Linux platform, please use the following steps as a guideline:

1. Extract the source file:

```
# tar -xvzf plcm_drv_v0XX.tgz
```

(0XX is the version of the program.)

2. Change directory to the extracted folder:

```
# cd plcm_drv_v0XX
```

(0XX is the version of the program.)



Note: Apply our Parallel Text-based LCM to the environment of virtualization, please use the version 013 or above of the program.

3. Type "make" to build source code:

```
# make
```

After compiling, the executable programs (plcm_test, plcm_cursor_char, ppdev_test, Test) and the driver (plcm_drv.ko) will appear in the program's folder.



Note: The OS supported by Parallel Text-based LCM function includes platforms based on Linux Kernel series 2.4.x, Linux Kernel series 2.6.x and Linux Kernel series 3.0.x or above.

Install

Install the driver and create a node in the /dev directory by:

```
#insmod plcm_drv.ko
```

```
#mknod /dev/plcm_drv c 248 0
```




Note: If you cannot install the driver, check whether you have enabled the parallel port in the BIOS setting. Once the message of “insmod”: error inserting ‘plcm_drv.ko’: -1 Input/output error” appears, please check that whether the major number is repeated or not. The major number needed with the “mknod” command varies with different software versions; please look up the Readme file for this value.

Execute

This section contains sample executable programs that you could test on your platform. It demonstrates some useful functionality that the LCM provides. Note that the installation needs to be completed before proceeding with these executions.

To execute, run the command:

```
#./plcm_test
```

Backlight Off/On turning off/on the backlight of the LCM display

Display Off turning off the LCM display

Cursor Off/On NOT showing/showing the cursor on the LCM display

Blinking off/On turning off/on the cursor blinking

Writing “Lanner@Taiwan” displaying the specific sentences

Reading “Lanner@Taiwan” reading the specific sentence

CGram Test displaying the user-stored characters

Keypad Testing Get the keypad input: the 1st button is read in as Left, the 2nd button is read in as Up, the 3rd button is read in as Right, and the 4th button is read in as Down)

Corresponding Commands for “plcm_test”

You can directly input the specific command to have its corresponding function worked on your LCM. This will be much more convenient once you would like to merely execute the keypad testing.

-On

— Turn on the backlight of the LCM display.

— To execute, please type:

```
#./plcm_test -On
```

```
-Off
```

— Turn off the backlight of the LCM display.

— To execute, please type:

```
#./plcm_test -Off
```

```
-LCM1
```

— Writing “Lanner@Taiwan” in line1.

— To execute, please type:

```
#./plcm_test -LCM1
```

```
-LCM2
```

— Writing “2013-11-05” in line 2.

— To execute, please type:

```
#./plcm_test -LCM2
```

Keypad

— Get the keypad input: the 1st button is read in as Left, the 2nd button is read in as Up, the 3rd button is read in as Right, and the 4th button is read in as Down.

— To execute, please type:

```
#./plcm_test -Keypad
```

Commands for plcm_cursor_char

This Run this command for cursor shift & single text update

```
# ./plcm_cursor_char
```

Please read the options below

Insert line select Item 1 to set the starting line as either line 1 or line 2

Move cursor right select Item 2 to move the cursor to the right

Move cursor left select Item 3 to move the cursor to the left

Add a char select Item 4 to display a character on the LCM screen

Clean display select Item 5 to clear up the LCM display

Leave select Item 6 to exit the program

Test

This program is a testing script and runs through the following procedures in sequence:

— **rmmod plcm_drv** (remove the kernel mode driver module)

— **insmod plcm_drv.ko** (install the kernel mode driver module)

— **./plcm_test** (execute the driver testing program)

— **./plcm_test -stop** (stop executing the driver testing program)

— **rmmod plcm_drv** (remove the kernel mode driver module)

To execute, please type:

```
#./Test
```

Virtualization Implemented by Parallel

Port Pass Through

By the utilization of the parallel port pass through, the Parallel Text-based LCM implements the following three kinds of virtualization in the Guest OS.

- QEMU/KVM
- Xen
- VMWare Player

Here, we take the Fedora 20 x86_64 operation system for instance to explain 3 virtualization respectively for

parallel port pass through. Use the procedures listed below for step-by-step instructions separately based on your case.

In case of QEMU/KVM or Xen, please use the following steps as a guideline to implement the virtualization :

- (1) Make sure that the Guest OS has been installed.
- (2) Add the following 4 lines into the xml file (for example, add to /etc/libvirt/qemu/<yourvirtualmachine>.xml in linux KVM):

```
<parallel type='dev'>
<source path='/dev/parport0'/>
<target port='0'/>
</parallel>
```

- (3) Open a terminal in the Guest OS and then issue the following commands to install Linux Kernel drivers.

```
# modprobe parport
# modprobe parport_pc
# modprobe ppdev
```

- (4) Check that whether the /dev/parport0 exists or not. You may not find proper /dev/parport0 in the device list, please reconfirm the setup of xml file in the Guest OS.

- (5) Reboot the Guest OS.



Note: It is necessary for you to install "insmod parport.ko", "parport_pc.ko" and "ppdev.ko" Linux Kernel drivers in virtualization environment before executing the "ppdev_test" testing program.

In case of VMWare Player, please use the following steps as a guideline to implement the virtualization:

- (1) Make sure that the Guest OS has been installed.
- (2) To set up the parallel port pass through, please enter VMWare Player's --> Virtual Machine Setting --> VMWare Player's setting page to select /dev/parport0 as parallel port device.

- (3) Open a terminal in the Guest OS and then issue the following commands to install Linux Kernel drivers.

```
# modprobe parport
# modprobe parport_pc
# modprobe ppdev
```

- (4) Check that whether the /dev/parport0 exists or not. You may not find proper "/dev/parport0" in the device list, please reconfirm the setup of VMWare Player's setting page described in Step 2.

- (5) Reboot the Guest OS.

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 the repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:
 - ▶ Improper or inadequate maintenance by the customer
 - ▶ Unauthorized modification, misuse, or reversed engineering of the product
 - ▶ Operation outside of the environmental specifications for the product.

RMA Service

Requesting an RMA#

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



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

RMA Service Request Form

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

| RMA No: | | Reasons to Return: <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