Lanner

# Embedded Computing Platform

Hardware Platforms for Intelligent Edge Computing

# LEC-2290E
# User Manual

Version: 1.3

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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.

# Icon Descriptions

The icons are used in the manual to serve as an indication of interest topics or important messages. Below is a description of these icons:

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

**Warning 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 and Technical Support

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In addition to contacting your distributor or sales representative, you could visit our Lanner Technical Support, to fill in a support ticket to our technical support department.

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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 authority to operate the equipment.

Important

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

# Safety Guidelines

Follow these guidelines to ensure general safety:

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

# Consignes de sécurité

Suivez ces consignes pour assurer la sécurité générale :

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

# Lithium Battery Caution

- There is risk of Explosion if 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 rackmount 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.
- This product is intended to be supplied by a Listed Power Adapter or DC power source, rated 12-24Vdc, 17.5-8A minimum, Tma = 70°C, and the altitude of operation = 5000m.
- 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.

# Electrical Safety Instructions

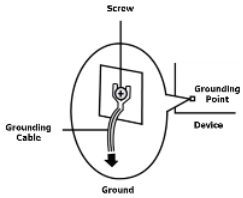
Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect 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.

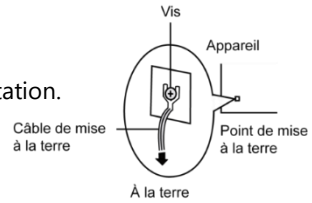
# Grounding Procedure for Power Source

- 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 hould 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 16 AWG



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# CHAPTER 1: PRODUCT OVERVIEW

The LEC-2290E, a GPU intelligent edge computing appliance with NVIDIA® A2 GPU support, is a robust box PC powered by the Intel® Core™ i7-9700TE (Codenamed Coffee Lake S) processor.

## Key Features

- Intel® Core™ i7-9700TE
- NVIDIA® A2 GPU Card Support
- 2x DDR4 2133/2400 SO-DIMM, Max 32GB
- 2x RJ45 GbE LAN, 4x PoE, 4x USB 3.0, 6x COM Ports, 8x DI & 8x DO
- 2x Removable HDD/SSD External Slot w/ RAID, 1x mSATA
- 1x PCIe*16, 1x PCIe*4, 1x Mini-PCIe w/ Nano-SIM, 1x B-Key M.2 w/ Nano-SIM
- Built-in TPM 2.0 & IPMI Support

## Package Content

Your package contains the following items:

- 1x LEC-2290E System Unit
- 4x Rubber Foot

## Ordering Information

| SKU No. | Description |
|---|---|
| LEC-2290E | Intelligent Edge Computing Box PC with Intel® Core™ i7-9700TE, 32GB System Memory, mSATA 128GB, 2.5" SSD/HDD Storage, 240W AC/DC Adapter, Nvidia Tesla A2 GPU & Thermal Kit |

## Optional Accessories

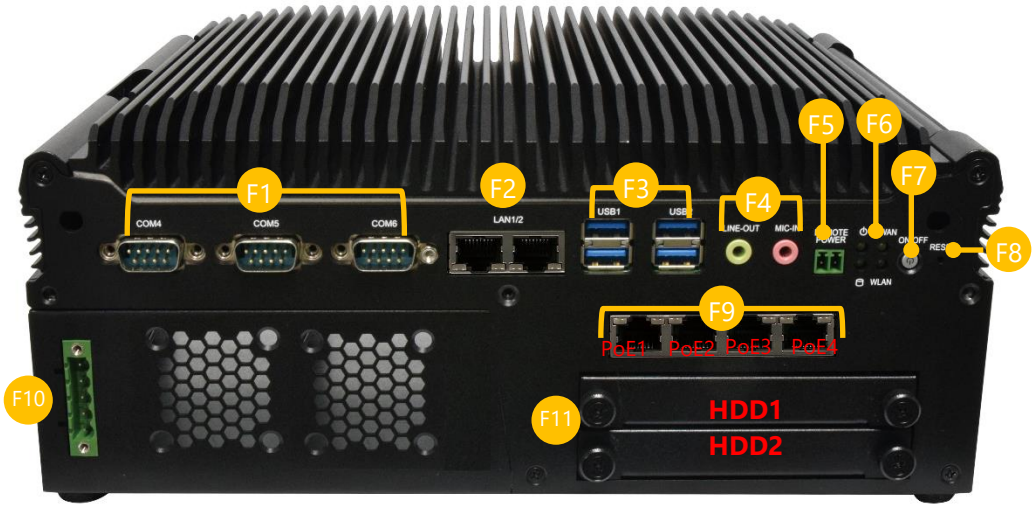
| Model No. | Description |
|---|---|
| IAC-AST2500I | IPMI BMC Card |
| 0TAW000234000 | EG25GGB-MiniPCIe-S Quectel IoT/M2M-optimized LTE Cat 4 |
| 0TAW000165000 | WPEQ-261ACN(BT) Sparklan WI-FI Card 2T2R Wi-Fi+Bluetooth 4.1 Combo |
| 090W000791100 | Extending Bracket for half-size mini-card in full-size miniPCIe |
| 0TAW000222000 | EM7455 Sierra LTE M.2 Card (Americas and EMEA), CAT 6 |
| 0TAW000147000 | EM7430 Sierra LTE M.2 Card (Asia Pacific), CAT 6 |
| 0TAW000223000 | EM7511 Sierra LTE M.2 Card (AT&T for the FirstNet), CAT 12 |
| PSF7184-001 | 4G Module PGN-300 LTE KIT |
| PSF7877-001 | 4G Module PGN-600 LTE KIT |
| 098W000004000 | Wall mount Kit (with screws) |
| 098W000006000 | Rack mount Kit (with screws) |

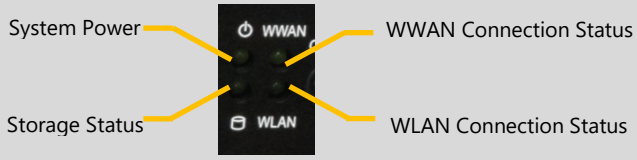
# System Specifications

| | | |
|---|---|---|
| **Processor System** | CPU | Intel® Core™ i7-9700TE (Codenamed Coffee Lake) |
| | Frequency | Up to 1.8GHz |
| | Core Number | 8 Cores |
| | Chipset | C246 |
| **Fanless** | | No |
| **Memory** | Technology | DDR4 2133/2400 SO-DIMM |
| | Max. Capacity | Up to 32GB |
| | Socket | 2x 260-pin SO-DIMM |
| **Graphic** | Processor | Intel® UHD Graphics 630 |
| **Audio** | Codec | TSI 92HD73C HD code |
| **Ethernet** | Controller | 6x Intel i210IT Ethernet controller |
| | Speed | 10/100/1000 Mbps |
| | PoE | 4x IEEE 802.3af / IEEE 802.3at (Total PoE Budget of 60W) |
| **Storage** | HDD/SSD | 2x Removable HDD/SSD External Slot with RAID |
| | mSATA | 1x mSATA |
| **I/O** | Serial Port | 6x D-sub 9 COM ports, support RS232/422/485 |
| | Ethernet Port | 6x RJ45 GbE Ethernet ports |
| | USB Port | 4x USB 3.0 Type A ports |
| | Audio Interface | 1x Mic-in, 1x Line-out |
| | Remote Power Switch | 1x 2-Pin Remote Power Switch |
| | LED Indicators | Power/Storage/WWAN/WLAN, refer to Appendix A |
| | Reset/Power-ON Button | 1x Reset Button,<br>1x Power-on button w/ LED (Red-Standby, Green-Operating) |
| | Display Port | 1x Display port, max. 4096x2304@60Hz,<br>2x HDMI ports, max. 4096x2304@24Hz |
| | Digital Interface | 1x Terminal Block Isolation,<br>8x DI (12V), 8x DO (Sink mode, 12V@100mA) |
| | PoE Port | 4x PoE supporting IEEE802.3af (15.5W),<br>Single port supporting IEEE802.3at (25.5W),<br>Total PoE Power Budget: 60W |
| | Power Input | 1x 4-Pin Terminal block (Pin define: -/+/+/-) for 9~30V DC input (normal 12VDC & 24VDC) |
| | Antenna | 4x SMA-type Antenna Hole |
| **Expansion Interface** | PCIe | 1x PCIe x16 Slot,<br>1x PCIe x4 Slot,<br>1x mini-PCIe (PCIe + USB2.0) with Nano-SIM,<br>1x B-Key M.2 (PCIe + USB3.0) with Nano-SIM |
| **Miscellaneous** | Watchdog Timer | 1-255 Level Time Interval System Reset, Software Programmable |
| | TPM | Yes |
| **Power** | Connector | 1x 4pin terminal block |
| | Supply Voltage | DC 9~30V (-/+/+/-) |
| | Power Consumption (Idle) | 29.5W@ +12VDC-IN |
| | Power Consumption (Full Load) | 121.6W@ +12VDC-IN |
| **Environment** | Operating Temperature | 0°C~40°C |
| | Storage Temperature | -40°C~70°C |
| | Relative Humidity | 10%~90% (Non-condensing) |
| | Vibration | IEC 60068-2-64, 0.5Grms, random 5~500Hz, 40 mins/axis |
| **Mechanical** | Dimension (W x H x D) | 275 x115 x 225mm |
| | Weight | 6.2 kg |

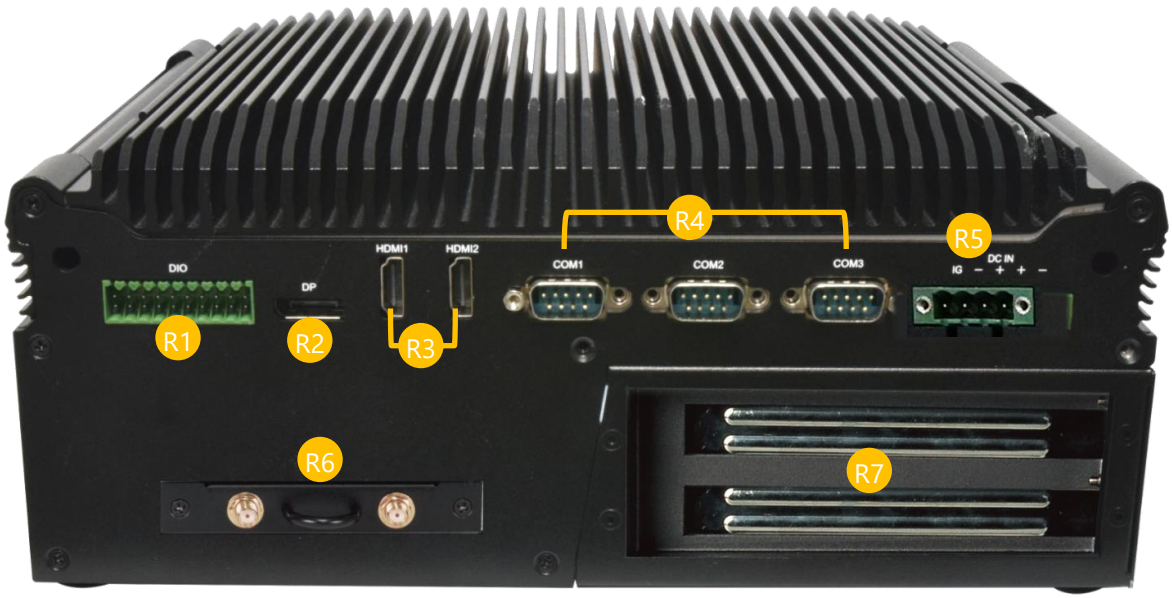
| | | |
|---|---|---|
| | Mounting | Wallmount |
| **OS Support** | Microsoft Windows | Windows 10 IoT 64-bit series |
| | Linux | Kernel 3.12 or Above,<br>Ubuntu 18.10 64bit or Above,<br>Cent OS 7 or Above,<br>Fedora 30 64bit or Above |
| **Certification** | EMC | FCC/CE Class A (To be acquire by early March 2022) |
| | Safety | UL62368/CB 62368 & 60950 (To be acquire by early March 2022) |

# Front Panel




| No. | Description | |
|---|---|---|
| F1 | COM Port | 3x DB9 Male Connector for RS232/422/485 |
| F2 | GbE Port | 2x RJ45 port with LED indicators |
| F3 | USB 3.0 Port | 4x USB 3.0 Type A |
| F4 | Audio Jack | 3.5mm Line-out and Mic-in Jack |
| F5 | Remote Switch | 1x 2-pin remote power switch |
| F6 | LED Indicator |   |
| F7 | Power Button | Power On/Off button with LED Indicator |
| F8 | Reset Button | For software reset |
| F9 | PoE Port | 4x PoE Port with LED indicators supporting IEEE802.3af (15.5W),<br>Single port supporting IEEE802.3at (25.5W), Total PoE Power Budget: 60W |
| F10 | DC Input | 1x 4-pin terminal block (pin define: -/+/+/-) for 12V DC input (max. 200W) |
| F11 | Storage Bay | 2x HDD/SSD Disk Bays (9.5mm height each max.) |

# Rear Panel

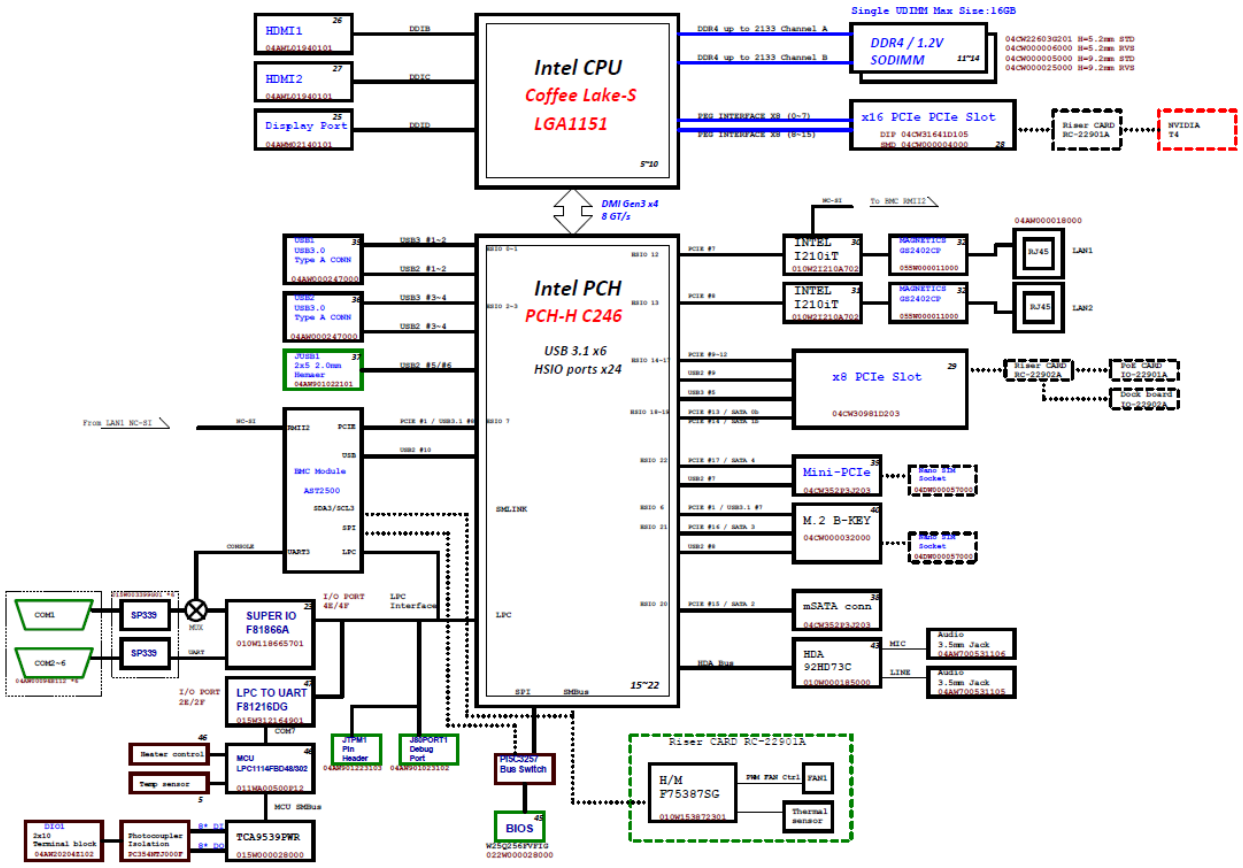



| No. | Description | |
|---|---|---|
| R1 | DIO | 1x 20-pin terminal block, 8x DI (12V) & 8x DO (12V,100mA) Isolation |
| R2 | Display Port | 1x Display Port |
| R3 | HDMI Port | 2x HDMI Ports |
| R4 | COM Port | 3x DB9 Male Connector for RS232/422/485 |
| R5 | DC Input | 1x 4-pin terminal block for DC 9~36V system power source |
| R6 | Module Slot (Antenna Port) | Removable PGN Module Slot supporting Dual SIM and 2x Antenna Hole with dust cover |
| R7 | PCIE Slot | 1x PCIe*16 Slot |

# Motherboard Information

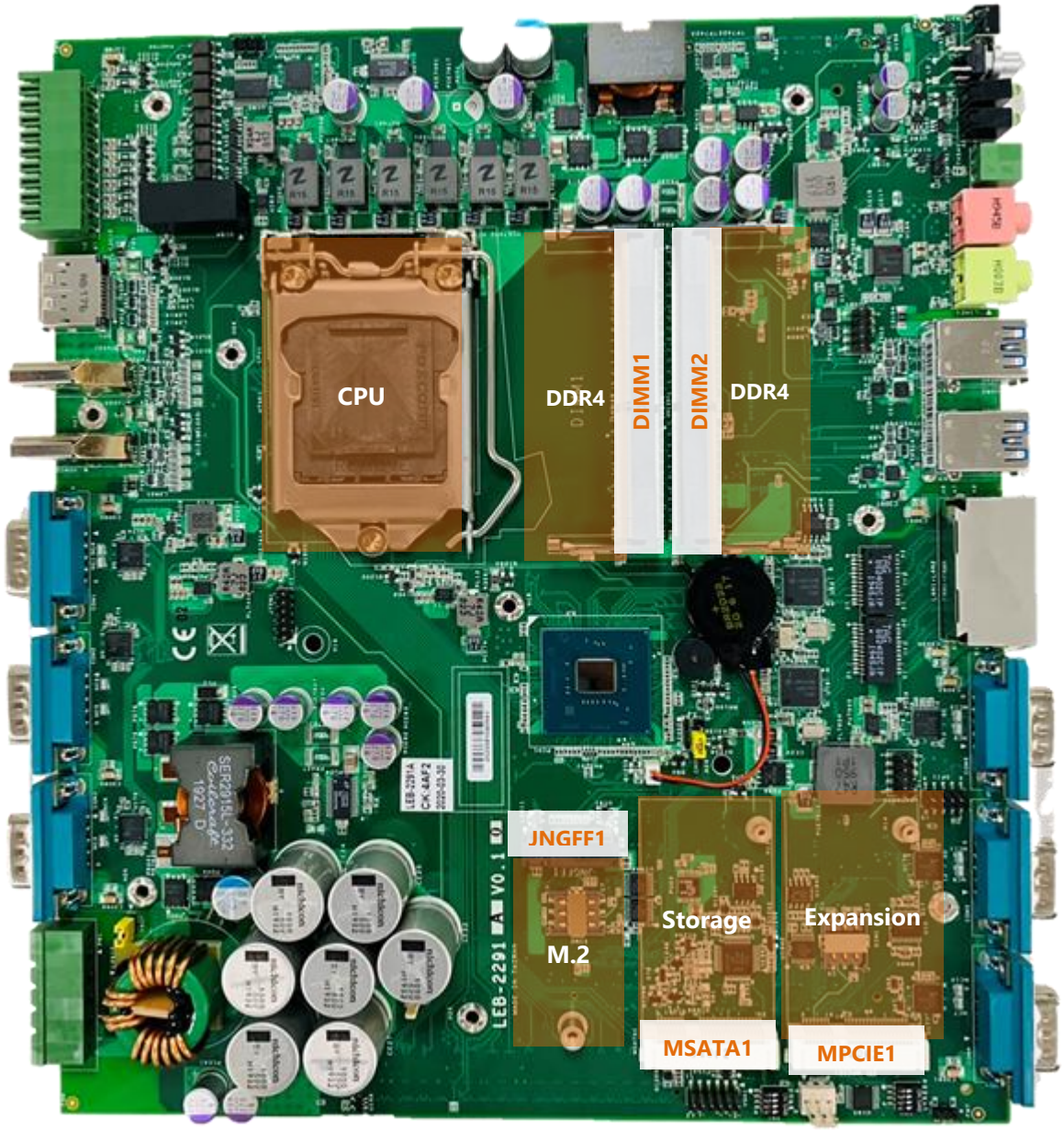
## Block Diagram

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

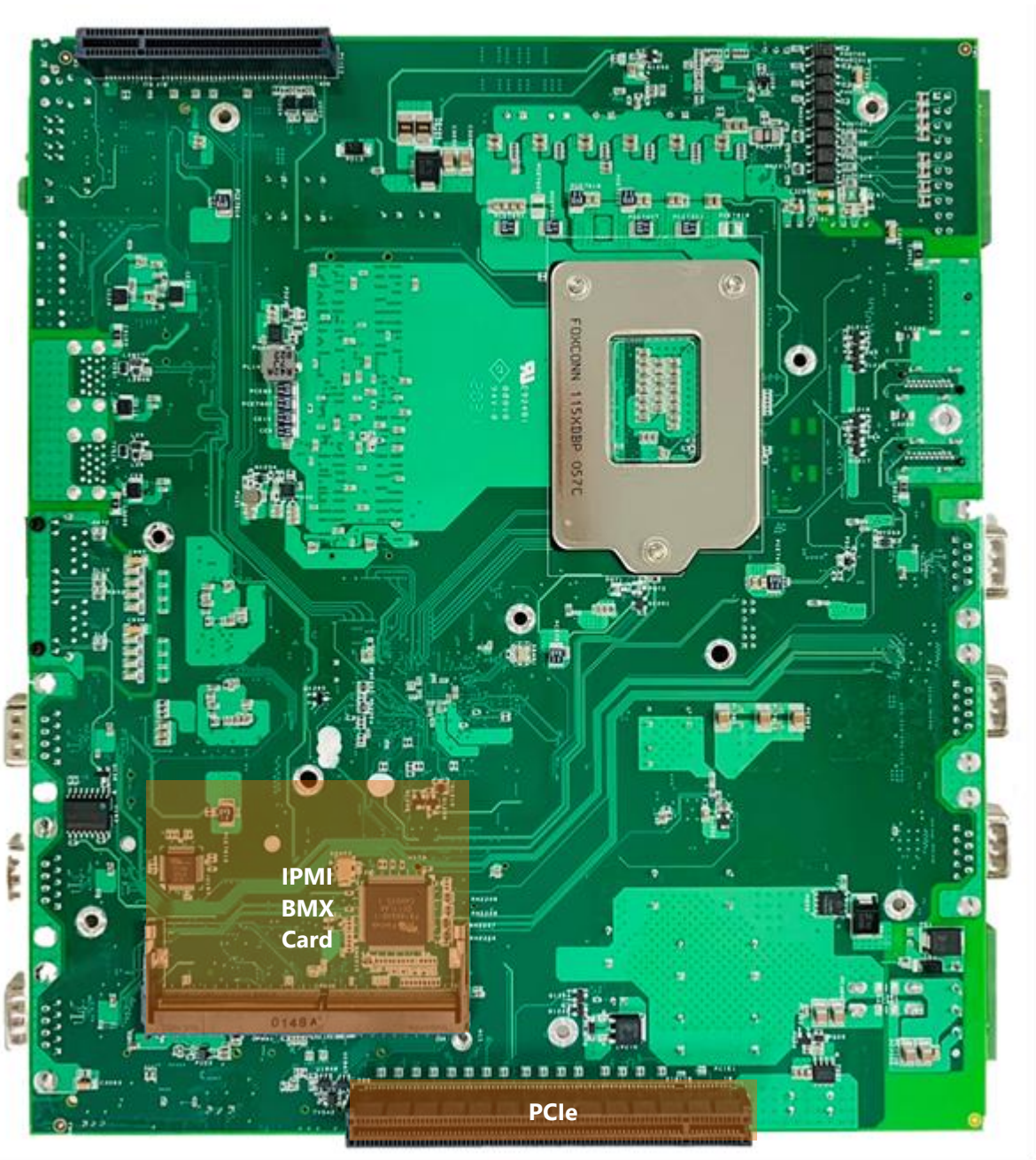


# Motherboard Layout

## Front view



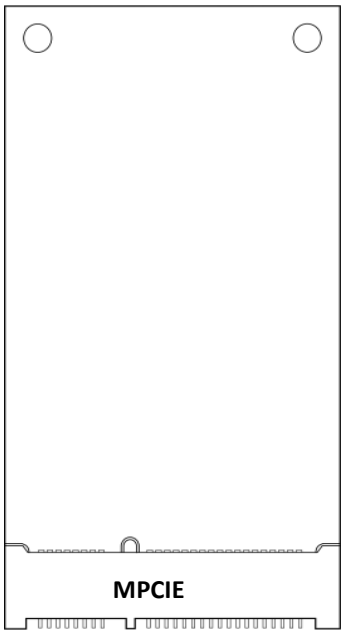
## Rear view



# Internal Jumpers and Connector

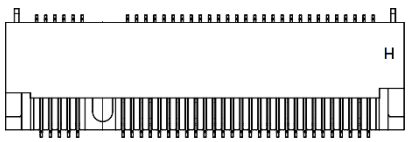
## MPCIE1 (MCCIE Mini Card Slot)

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | WAKE# | 2 | +3.3V |
| 3 | RSVD | 4 | GND |
| 5 | RSVD | 6 | +1.5V |
| 7 | CLKREQ# | 8 | UIM_PWR |
| 9 | GND | 10 | UIM_DATA |
| 11 | REFCLK- | 12 | UIM_CLK |
| 13 | REFCLK+ | 14 | UIM_RESET |
| 15 | GND | 16 | UIM_VPP |
| KEY B | | | |
| 17 | RSVD | 18 | GND |
| 19 | RSVD | 20 | W_DISABLE# |
| 21 | GND | 22 | PERST# |
| 23 | PERn0 | 24 | +3.3V |
| 25 | PERp0 | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |
| 31 | PETn0 | 32 | SMB_DATA |
| 33 | PETp0 | 34 | GND |
| 35 | GND | 36 | USB_D+ |
| 37 | GND | 38 | USB_D- |
| 39 | +3.3V | 40 | GND |
| 41 | +3.3V | 42 | LED_WWAN# |
| 43 | GND | 44 | LED_WLAN# |
| 45 | RSVD | 46 | LED_WPAN# |
| 47 | RSVD | 48 | +1.5V |
| 49 | RSVD | 50 | GND |
| 51 | RSVD | 52 | +3.3V |
| 57 | GND | 56 | NC |
| 59 | ANTCTL0 | 58 | NC |
| 61 | ANTCTL1 | 60 | COEX3 |
| 63 | ANTCTL2 | 62 | COEX2 |
| 65 | ANTCTL3 | 64 | COEX1 |
| 67 | PEDET | 66 | SIM_DET |
| 69 | PEDET/CONFIG1 | 68 | SUSCLK |
| 71 | GND | 70 | 3V3_AUX |
| 73 | GND | 72 | 3V3_AUX |
| 75 | CONFIG2 | 74 | 3V3_AUX |




## JNGFF1: M.2 Slot (B-KEY)

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | CONFIG3 | 2 | 3V3_AUX |
| 3 | GND | 4 | 3V3_AUX |
| 5 | GND | 6 | CARD PWROFF |
| 7 | USB D+ | 8 | W_DIS |
| 9 | USB D- | 10 | DAS/DSS# |
| 11 | GND | | |
| KEY B | | | |



| | | | |
|---|---|---|---|
| 21 | CONFIG0 | 20 | AUDIO_0 |
| 23 | NC | 22 | AUDIO_1 |
| 25 | NC | 24 | AUDIO_2 |
| 27 | GND | 26 | AUDIO_3 |
| 29 | PERn1/USB3RX- | 28 | UIM_RFU |
| 31 | PERp1/USB3RX+ | 30 | UIM_RESET |
| 33 | GND | 32 | UIM_CLK |
| 35 | PETn1/USB3TX- | 24 | UIM_DATA |
| 37 | PETp1/USB3TX+ | 36 | UIM_PWR |
| 39 | GND | 38 | DEVSLP |
| 41 | PETn0/SATA_B+ | 40 | GNSS0 |
| 43 | PETp0/SATA_B- | 42 | GNSS1 |
| 45 | GND | 44 | GNSS2 |
| 47 | PERn0/SATA_A- | 46 | GNSS3 |
| 49 | PERp0/SATA_A+ | 48 | GNSS4 |
| 51 | GND | 50 | PRESET# |
| 53 | REFCLK- | 52 | CLKREQ# |
| 55 | REFCLK+ | 54 | WALE# |
| 57 | GND | 56 | NC |
| 59 | ANTCTL0 | 58 | NC |
| 61 | ANTCTL1 | 60 | COEX3 |
| 63 | ANTCTL2 | 62 | COEX2 |
| 65 | ANTCTL3 | 64 | COEX1 |
| 67 | PEDET | 66 | SIM_DET |
| 69 | PEDET/CONFIG1 | 68 | SUSCLK |
| 71 | GND | 70 | 3V3_AUX |
| 73 | GND | 72 | 3V3_AUX |
| 75 | CONFIG2 | 74 | 3V3_AUX |

### PCIE1: 16x PCIE Slot

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| B1 | 12V | A1 | PRSNT1# |
| B2 | 12V | A2 | 12V |
| B3 | 12V | A3 | 12V |
| B4 | GND | A4 | GND |
| B5 | SMCLK | A5 | JTAG2 |
| B6 | SMDAT | A6 | JTAG3 |
| B7 | GND | A7 | JTAG4 |
| B8 | 3.3V | A8 | JTAG5 |
| B9 | JTAG1 | A9 | 3.3V |
| B10 | 3.3VAUX | A10 | 3.3V |
| B11 | WAKE# | A11 | PERST# |
| KEY B | | | |
| B12 | RSVD | A12 | GND |
| B13 | GND | A13 | REFCLKA+ |

| | | | |
|---|---|---|---|
| B14 | HSOP0 | A14 | REFCLKA- |
| B15 | HSON0 | A15 | GND |
| B16 | GND | A16 | HSIP0 |
| B17 | PRSNT2# | A17 | HSIN0 |
| B18 | GND | A18 | GND |
| B19 | HSOP1 | A19 | RSVD |
| B20 | HSON1 | A20 | GND |
| B21 | GND | A21 | HSIP1 |
| B22 | GND | A22 | HSIN1 |
| B23 | HSOP2 | A23 | GND |
| B24 | HSON2 | A24 | GND |
| B25 | GND | A25 | HSIP2 |
| B26 | GND | A26 | HSIN2 |
| B27 | HSOP3 | A27 | GND |
| B28 | HSON3 | A28 | GND |
| B29 | GND | A29 | HSIP3 |
| B30 | RSVD | A30 | HSIN3 |
| B31 | PRSNT2# | A31 | GND |
| B32 | GND | A32 | RSVD(REFCLKB+) |
| B33 | HSOP4 | A33 | RSVD(REFCLKB-) |
| B34 | HSON4 | A34 | GND |
| B35 | GND | A35 | HSIP4 |
| B36 | GND | A36 | HSIN4 |
| B37 | HSOP5 | A37 | GND |
| B38 | HSON5 | A38 | GND |
| B39 | GND | A39 | HSIP5 |
| B40 | GND | A40 | HSIN5 |
| B41 | HSOP6 | A41 | GND |
| B42 | HSON6 | A42 | GND |
| B43 | GND | A43 | HSIP6 |
| B44 | GND | A44 | HSIN6 |
| B45 | HSOP7 | A45 | GND |
| B46 | HSON7 | A46 | GND |
| B47 | GND | A47 | HSIP7 |
| B48 | PRSNT2# | A48 | HSIN7 |
| B49 | GND | A49 | GND |
| B50 | HSOP8 | A50 | RSVD |

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

### PCIE2 x8PCIE Slot (non-standard x8 PCIE SLOT)

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| B1 | 12V | A1 | PRSNT1# |
| B2 | 12V | A2 | 12V |
| B3 | 12V | A3 | 12V |
| B4 | GND | A4 | GND |
| B5 | SMCLK | A5 | JTAG2 |
| B6 | SMDAT | A6 | JTAG3 |
| B7 | GND | A7 | JTAG4 |
| B8 | 3.3V | A8 | JTAG5 |
| B9 | JTAG1 | A9 | 3.3V |
| B10 | 3.3VAUX | A10 | 3.3V |
| B11 | WAKE# | A11 | PERST# |
| KEY B | | | |
| B12 | RSVD | A12 | GND |
| B13 | GND | A13 | REFCLK+ |
| B14 | HSOP0 | A14 | REFCLK- |
| B15 | HSON0 | A15 | GND |
| B16 | GND | A16 | HSIP0 |
| B17 | PRSNT2# | A17 | HSIN0 |
| B18 | GND | A18 | GND |
| B19 | HSOP1 | A19 | PoE_INT |
| B20 | HSON1 | A20 | GND |
| B21 | GND | A21 | HSIP1 |
| B22 | GND | A22 | HSIN1 |
| B23 | HSOP2 | A23 | GND |
| B24 | HSON2 | A24 | GND |
| B25 | GND | A25 | HSIP2 |
| B26 | GND | A26 | HSIN2 |
| B27 | HSOP3 | A27 | GND |
| B28 | HSON3 | A28 | GND |
| B29 | GND | A29 | HSIP3 |
| B30 | RSVD | A30 | HSIN3 |
| B31 | PRSNT2# | A31 | GND |
| B32 | GND | A32 | 12V |
| B33 | USB2_P9 | A33 | 12V |
| B34 | USB2_N9 | A34 | GND |

| | | | |
|---|---|---|---|
| B35 | GND | A35 | 12V |
| B36 | GND | A36 | 12V |
| B37 | USB3_TX5+ | A37 | GND |
| B38 | USB3_TX5- | A38 | GND |
| B39 | GND | A39 | USB3_RX5+ |
| B40 | GND | A40 | USB3_RX5- |
| B41 | SATA_TX1+ | A41 | GND |
| B42 | SATA_TX1- | A42 | GND |
| B43 | GND | A43 | SATA_RX1+ |
| B44 | GND | A44 | SATA_RX1- |
| B45 | SATA_TX2+ | A45 | GND |
| B46 | SATA_TX2- | A46 | GND |
| B47 | GND | A47 | SATA_RX2+ |
| B48 | 4G_PERST# | A48 | SATA_RX2- |
| B49 | VSIM_SW | A49 | GND |

### OPMA1 (Non-standard DIMM socket)

### DDR4 OPMA Pin Define

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | Card detect | 2 | P12V_ADC11 / GPIX3 |
| 3 | GND1 | 4 | RSVD9 |
| 5 | I2C_SCL8 / GPIOK6 | 6 | SYS_UART2_DCD |
| 7 | I2C_SDA8 / GPIOK7 | 8 | SYS_UART2_DSR |
| 9 | RSVD1 | 10 | SYS_UART2_CTS |
| 11 | RSVD2 | 12 | SYS_UART2_RI |
| 13 | TACH4 / GPIOO4 | 14 | GND32 |
| 15 | TACH3 / GPIOO3 | 16 | RSVD10 |
| 17 | TACH11 / GPIOP3 | 18 | P5V_ADC10 / GPIX2 |
| 19 | RSVD3 | 20 | RSVD11 |
| 21 | P3V3_ADC9 / GPIX1 | 22 | BMC_UART_RXD |
| 23 | RSVD4 | 24 | BMC_UART_TXD |
| 25 | GND2 | 26 | GND33 |
| 27 | I2C_SDA6 / GPIOK3 | 28 | ADC2 / GPIW2 |
| 29 | I2C_SCL6 / GPIOK2 | 30 | ADC3 / GPIW3 |
| 31 | GND3 | 32 | ADC8 / GPIX0 |
| 33 | I2C_SDA7 / GPIOK5 | 34 | GND34 |
| 35 | I2C_SCL7 / GPIOK4 | 36 | SYS_UART1_DSR |
| 37 | GND4 | 38 | SYS_UART1_TXD |
| 39 | SYS_UART1_DCD | 40 | SYS_UART1_RXD |

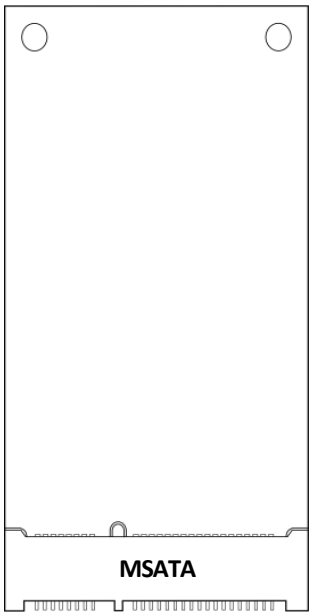
| | | | |
|---|---|---|---|
| 41 | SYS_UART1_CTS | 42 | SYS_UART1_RI |
| 43 | GND5 | 44 | SYS_UART1_DTR |
| 45 | PWM5 / GPION5 | 46 | SYS_UART1_RTS |
| 47 | PWM3 / GPION3 | 48 | GND35 |
| 49 | PWM0 / GPION0 | 50 | RSVD12 |
| 51 | PWM1 / GPION1 | 52 | CPU_CORE1_ADC1 / GPIW1 |
| 53 | GND6 | 54 | ADC5 / GPIW5 |
| 55 | TACH1 / GPIOO1 | 56 | ADC4 / GPIW4 |
| 57 | TACH0 / GPIOO0 | 58 | ADC7 / GPIW7 |
| 59 | TACH2 / GPIOO2 | 60 | CPU_CORE0_ADC0 / GPIW0 |
| 61 | GND7 | 62 | ADC6 / GPIW6 |
| 63 | SYS_UART2_RXD | 64 | RSVD13 |
| 65 | SYS_UART2_TXD | 66 | GND36 |
| 67 | SYS_UART2_RTS | 68 | I2C_SCL5_Transceiver/others |
| 69 | SYS_UART2_DTR | 70 | I2C_SDA5_Transceiver/others |
| 71 | GND8 | 72 | GND37 |
| 73 | RSVD5 | 74 | PWM2 / GPION2 |
| 75 | GND9 | 76 | PWM4 / GPION4 |
| 77 | TACH8 / GPIOP0 | 78 | GND38 |
| 79 | TACH7 / GPIOO7 | 80 | RSVD14 |
| 81 | TACH5 / GPIOO5 | 82 | PECI_VDD |
| 83 | TACH9 / GPIOP1 | 84 | PECI |
| 85 | TACH6 / GPIOO6 | 86 | GND39 |
| 87 | TACH10 / GPIOP2 | 88 | BIOS_SPICK |
| 89 | GND10 | 90 | BIOS_MOSI |
| 91 | RSVD6 | 92 | BIOS_MISO |
| 93 | GND11 | 94 | BIOS_CS0 |
| 95 | GPIOS2 / SALT5 | 96 | GND40 |
| 97 | GPIOZ1 / NORA1 / SIOPWRGD | 98 | GPIOZ0 / NORA0 / SIOPB# |
| 99 | GPIOZ2 / NORA2 / SIOPBO# | 100 | GPIOS0 / SPI2CS1# |
| 101 | GPIOZ3 / NORA3 / SIOSCI# | 102 | GPIOS1 / BMCINT |
| 103 | GPIOAB1 / NORWE# | 104 | GPIOS3 / SALT6 |
| 105 | GPIOAB2 / WDTSRT1 | 106 | GPIOAB0 / NOROE# |
| 107 | SYS_SLP_S5_IN | 108 | GPIOAB3 / WDTSRT2 |
| 109 | SYS_SLP_S3_IN | 110 | EXTRST# |
| 111 | GPIOY3 / SIOONCTRL# | 112 | PEWAKE# / GPIOQ7 |
| 113 | BMC_SPI_SWITCH_OUT | 114 | GND41 |
| 115 | I2C_SCL14_IPMIB2 | 116 | I2C_SDA1_Thermail Sensors/HW_monitor |
| 117 | I2C_SDA14_IPMIB2 | 118 | I2C_SCL1_Thermail Sensors/HW_monitor |

| | | | |
|---|---|---|---|
| 119 | GND12 | 120 | GND42 |
| 121 | PERXP | 122 | I2C_SCL2_MB_ID_EEPROM/LOM_EEPROM |
| 123 | PERXN | 124 | I2C_SDA2_MB_ID_EEPROM/LOM_EEPROM |
| 125 | GND13 | 126 | GND43 |
| 127 | PETXP | 128 | PERST# |
| 129 | PETXN | 130 | GND44 |
| 131 | GND14 | 132 | RSVD15 |
| 133 | PEREFCLKP | 134 | RSVD16 |
| 135 | PEREFCLKN | 136 | GND45 |
| 137 | GND15 | 138 | SOL_UART_DCD |
| 139 | SOL_UART_DSR | 140 | SOL_UART_RI |
| 141 | SOL_UART_DTR | 142 | SOL_UART_RTS |
| 143 | GND16 | 144 | GND46 |
| 145 | SYSCS# / GPIOI0 | 146 | SYS_UART_SWITCH_OUT |
| 147 | SYSMISO / GPIOI3 | 148 | BIOS_READY_IN |
| 149 | SYSCK / GPIOI1 | 150 | BMC_PWRBTN_OUT |
| 151 | SYSMOSI / GPIOI2 | 152 | BMC_READY_OUT |
| 153 | GND17 | 154 | SYS_NMI_IN |
| 155 | GND18 | 156 | GND47 |
| 157 | SYS_SMI_IN | 158 | BMC_SMI_OUT |
| 159 | MDC2 / GPIOA6 / TIMER7 | 160 | CPU_CATERR_IN |
| 161 | MDIO2 / GPIOA7 / TIMER8 | 162 | BMC_UART_SWITCH_OUT |
| 163 | SYS_RSMRST_IN | 164 | GND48 |
| 165 | GND19 | 166 | CPU_THERMTRIP_IN |
| 167 | ESPI_RESET | 168 | BMC_RSTBTN_OUT |
| 169 | LSIRQ# / ESPIALT# / GPIOAC6 | 170 | SYS_PWROK_IN |
| 171 | ESPI_ALERT | 172 | CPU0_PROCHOT_IN |
| 173 | GND20 | 174 | CPU0_FIVR_FAULT_IN |
| 175 | LPCRST# / ESPIRST# / GPIOAC7 | 176 | BMC_SPKR_OUT |
| 177 | LFRAMEN# / ESPICS# / GPIOAC5 | 178 | CPU1_FIVR_FAULT_IN |
| 179 | LAD1 / ESPID1 / GPIOAC1 | 180 | GND49 |
| 181 | LAD0 / ESPID0 / GPIOAC0 | 182 | I2C_SCL9_IPMB1 |
| 183 | LAD3 / ESPID3 / GPIOAC3 | 184 | I2C_SDA9_IPMIB1 |
| 185 | LAD2 / ESPID2 / GPIOAC2 | 186 | GND50 |
| 187 | LCLK / ESPICK / GPIOAC4 | 188 | I2C_SDA3_SMLink0 |

| | | | |
|---|---|---|---|
| 189 | GND21 | 190 | I2C_SCL3_SMLink0 |
| 191 | CPU_ERR_0_IN | 192 | GND51 |
| 193 | CPU_ERR_1_IN | 194 | I2C_SCL4_PMBus |
| 195 | CPU_ERR_2_IN | 196 | I2C_SDA4_PMBus |
| 197 | GND31 | 198 | GND52 |
| 199 | USB2A_DP | 200 | BMC_NMI_OUT |
| 201 | USB2A_DN | 202 | CPU1_PROCHOT_IN |
| 203 | GND22 | 204 | GND53 |
| 205 | RSVD7 | 206 | LAN_100M# |
| 207 | RSVD8 | 208 | LAN_ACT# |
| 209 | GND23 | 210 | LAN_1G# |
| 211 | SOL_CTS3 | 212 | GND54 |
| 213 | SOL_TXD3 | 214 | GPIOA1_MAC2LINK |
| 215 | SOL_RXD3 | 216 | RGMII2RXD3 / RMII2RXER / GPIOV7 |
| 217 | GND24 | 218 | RGMII2RXD0 / RMII2RXD0 / GPIOV4 |
| 219 | MDI0P | 220 | RGMII2RXCK / RMII2RCLKI / GPIOV2 |
| 221 | MDI0N | 222 | RGMII2RXCTL / GPIOV3 |
| 223 | GND25 | 224 | RGMII2RXD2 / RMII2CRSDV / GPIOV6 |
| 225 | MDI1P | 226 | RGMII2RXD1 / RMII2RXD1 / GPIOV5 |
| 227 | MDI1N | 228 | GND55 |
| 229 | GND26 | 230 | MAC2 STRAP |
| 231 | MDI2P | 232 | RGMII2TXD3 / GPIOU3 |
| 233 | MDI2N | 234 | RGMII2TXCK / RMII2RCLKO / GPIOT6 |
| 235 | GND27 | 236 | RGMII2TXD0 / RMII2TXD0 / GPIOU0 |
| 237 | MDI3P | 238 | RGMII2TXD2 / GPIOU2 |
| 239 | MDI3N | 240 | RGMII2TXCK /RMII2RCLKO /GPIOT7 |
| 241 | GND28 | 242 | RGMII2TXD1 / RMII2TXD1 / GPIOU1 |
| 243 | DAC_RO | 244 | GND56 |
| 245 | DAC_GO | 246 | RSVD17 |
| 247 | DAC_BO | 248 | P1V8_SB |
| 249 | HSYNC_O | 250 | RSVD18 |
| 251 | VSYNC_O | 252 | P3V3_SB_1 |
| 253 | GND29 | 254 | P3V3_SB_2 |
| 255 | DDC_DATA | 256 | P3V3_SB_3 |
| 257 | DDC_CLK | 258 | RSVD19 |
| 259 | GND30 | 260 | P5V_SB |

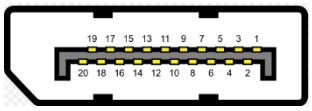
## MSATA1: MSATA Slot (Full Size)

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | N.C | 2 | +3.3V |
| 3 | N.C | 4 | GND |
| 5 | N.C | 6 | N.C |
| 7 | N.C | 8 | N.C |
| 9 | GND | 10 | N.C |
| 11 | N.C | 12 | N.C |
| 13 | N.C | 14 | N.C |
| 15 | GND | 16 | N.C |
| KEY | | | |
| 17 | N.C | 18 | GND |
| 19 | N.C | 20 | N.C |
| 21 | GND | 22 | N.C |
| 23 | SATA_RXp | 24 | +3.3V |
| 25 | SATA_RXn | 26 | GND |
| 27 | GND | 28 | N.C |
| 29 | GND | 30 | N.C |
| 31 | SATA_TXn | 32 | N.C |
| 33 | SATA_TXp | 34 | GND |
| 35 | GND | 36 | N.C |
| 37 | GND | 38 | N.C |
| 39 | +3.3V | 40 | GND |
| 41 | +3.3V | 42 | N.C |
| 43 | GND | 44 | N.C |
| 45 | N.C | 46 | N.C |
| 47 | N.C | 48 | N.C |
| 49 | N.C | 50 | GND |
| 51 | N.C | 52 | +3.3V |



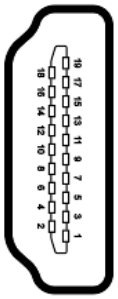

## DP1: Display Port Interface

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | LANE0+ | 2 | GND |
| 3 | LANE0- | 4 | LANE1+ |
| 5 | GND | 6 | LANE1- |
| 7 | LANE2+ | 8 | GND |
| 9 | LANE2- | 10 | LANE3+ |
| 11 | GND | 12 | LANE3- |
| 13 | GND | 14 | GND |
| 15 | AUX CH+ | 16 | GND |
| 17 | AUX CH- | 18 | HOT PLUG |
| 19 | RETURN | 20 | DP PWR |



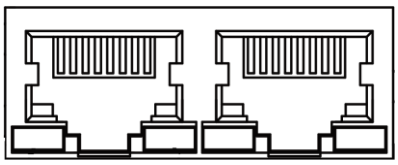
## HDMI1/HDMI2: High-definition Multimedia Interface

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



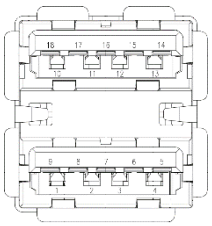
## Ethernet LAN1/LAN2: Dual RJ-45 with LED

| PIN | DESCRIPTION | |
|---|---|---|
| | Fast E-Net | Giga Net |
| 1 | TX+ | MD0+ |
| 2 | TX- | MD0- |
| 3 | RX+ | MD1+ |
| 4 | T45 | MD2+ |
| 5 | T45 | MD2- |
| 6 | RX- | MD1- |
| 7 | T78 | MD3+ |
| 8 | T78 | MD3- |
| 9 | 10-/100-/1000+ | |
| 10 | 10+/100+/1000- | |
| 11 | Link+/ACT- | |
| 12 | Link-/ACT+ | |



## USB1/USB2: USB3.0 Double Stack Type A

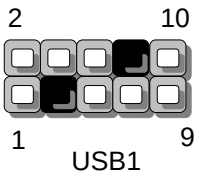
| PIN | 9 | 8 | 7 | 6 | 5 |
|---|---|---|---|---|---|
| DESCRIPTION | USB1_TX+ | USB1_TX- | GND | USB1_RX+ | USB1_RX- |
| PIN | 1 | 2 | 3 | 4 | |
| DESCRIPTION | USB_VCC1 | USB1_D- | USB1_D+ | GND | |



| PIN | 9 | 8 | 7 | 6 | 5 |
|---|---|---|---|---|---|
| DESCRIPTION | USB1_TX+ | USB1_TX- | GND | USB1_RX+ | USB1_RX- |
| PIN | 1 | 2 | 3 | 4 | |
| DESCRIPTION | USB_VCC1 | USB1_D- | USB1_D+ | GND | |

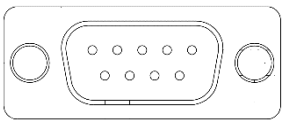
### JUSB1: Internal USB Connector

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | USB_VCC | 2 | GND |
| 3 | KEY | 4 | +USB |
| 5 | -USB | 6 | -USB |
| 7 | +USB | 8 | KEY |
| 9 | GND | 10 | USB_VCC |




### COM1~6: Serial Port 1~6 (RS232/422/485)

| PIN | DESCRIPTION | DESCRIPTION | DESCRIPTION |
|---|---|---|---|
| 1 | DCD# | Tx- | RxTx- |
| 2 | RX | Tx+ | RxTx+ |
| 3 | TX | Rx+ | |
| 4 | DTR# | Rx- | |
| 5 | GND | GND | GND |
| 6 | DSR | | |
| 7 | RTS# | | |
| 8 | CTS# | | |
| 9 | RI# | | |



### DIO1 : Isolation Digital Input / Output

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | DO_0 | 2 | DI_0 |
| 3 | DO_1 | 4 | DI_1 |
| 5 | DO_2 | 6 | DI_2 |
| 7 | DO_3 | 8 | DI_3 |
| 9 | DO_4 | 10 | DI_4 |
| 11 | DO_5 | 12 | DI_5 |
| 13 | DO_6 | 14 | DI_6 |

| | | | |
|---|---|---|---|
| 15 | DO_7 | 16 | DI_7 |
| 17 | DO_COM | 18 | I_COM |
| 19 | DO_COM | 20 | 12V_OUT(400mA) |

### Audio LINE1:

### 3.5mm headphone Jack (Green)

| PIN | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | LINE_OUT_L |
| 3 | GND |
| 4 | GND |
| `5 | LINE_OUT_R |

### Audio MIC1:

### 3.5mm headphone Jack (Pink)

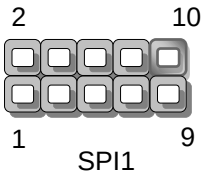
| PIN | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | MIC_L |
| 3 | GND |
| 4 | GND |
| 5 | MIC_R |

### PW1: DC IN Connector (1x4 PIN 5.0mm Terminal block)

| PIN | DESCRIPTION |
|---|---|
| 1 | DC_IN ( - ) |
| 2 | DC_IN ( + ) |
| 3 | DC_IN ( + ) |
| 4 | DC_IN ( - ) |

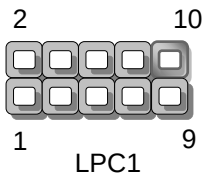
### SP1: SPI Interface (debug only)

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | SPI_HOLD | 2 | N.C |
| 3 | SPI_CS# | 4 | SPI_VCC |
| 5 | SPI_MO | 6 | N.C |
| 7 | N.C | 8 | SPI_CLK |
| 9 | GND | 10 | SPI_MI |



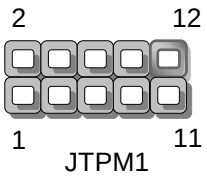

### J80PORT1: LPC Debug 80Port (debug only)

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | SPI_HOLD | 2 | N.C |
| 3 | SPI_CS# | 4 | SPI_VCC |
| 5 | SPI_MO | 6 | N.C |
| 7 | N.C | 8 | SPI_CLK |
| 9 | GND | 10 | SPI_MI |



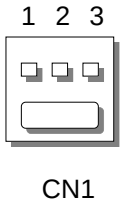
### JTPM1: TPM Module Connector

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | SERIRQ# | 2 | +3.3V |
| 3 | LAD0 | 4 | +3.3V |
| 5 | LAD1 | 6 | GND |
| 7 | LFRAME# | 8 | key |
| 9 | LPC_CLK | 10 | PLTRST# |
| 11 | LAD2 | 12 | LAD3 |



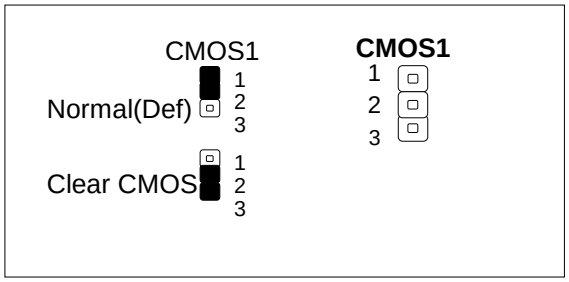

### CN1: MCU Debug Connector (debug only)

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | EXT_TX |
| 2 | GND |
| 3 | EXT_RX |




### CMOS1: Clear CMOS

| Description | CMOS1 |
|---|---|
| Normal (Default) | 1-2 |
| Clear CMOS | 2-3 |

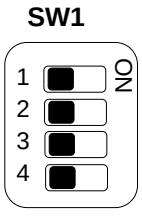



### PSBTN2: External Power button (1x2 Pin 3.81mm Terminal block)

| PIN | DESCRIPTION |
|---|---|
| 1 | PS_IN |
| 2 | GND |

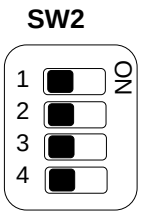
### SW1: Ignition Function setting

| SW | DESCRIPTION | Off | On |
|---|---|---|---|
| S1 | DETECT POWER GOOD | Disable | Enable |
| S2 | LOW POWER DETECT | Disable | Enable |
| S3 | MCU WATCH DOG | Disable | Enable |
| S4 | PROGRAM MODE | Disable | Enable |



### SW2: MCU Communication Port Select

| Description | SW2 |
|---|---|
| Connect internal RS232(COM7) | S1/S2 on<br>S3/S4 off |
| Connect external RS232 from CN1. (Debug & update f.w) | /S2 off<br>S3/S4 on |

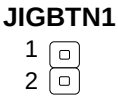



### JIG1: Disable Ignition Function

| Description. | DESCRIPTION |
|---|---|
| Normal | 1-2 Short |
| IG mode | 1-2 Open |

### JIGBTN1: Disable Ignition Function

| Description. | DESCRIPTION |
|---|---|
| Power button from MCU | 1-2 Short |
| Power button from PSBTN1 | 1-2 Open |

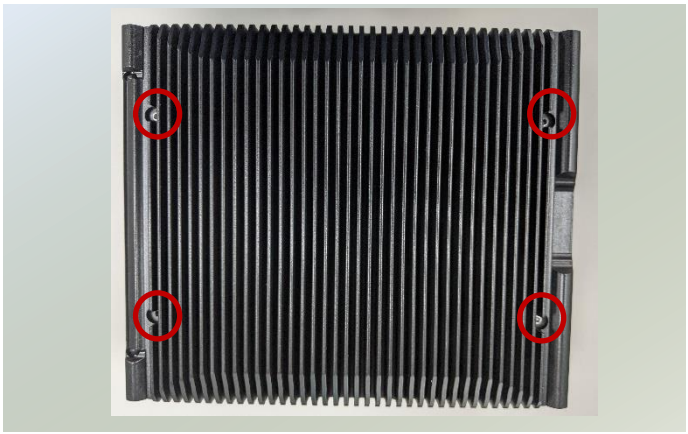


# CHAPTER 2: HARDWARE SETUP

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

## Open the Chassis

1. Power off the system and disconnect the power cord. Unscrew the four (4) screws securing the cover.



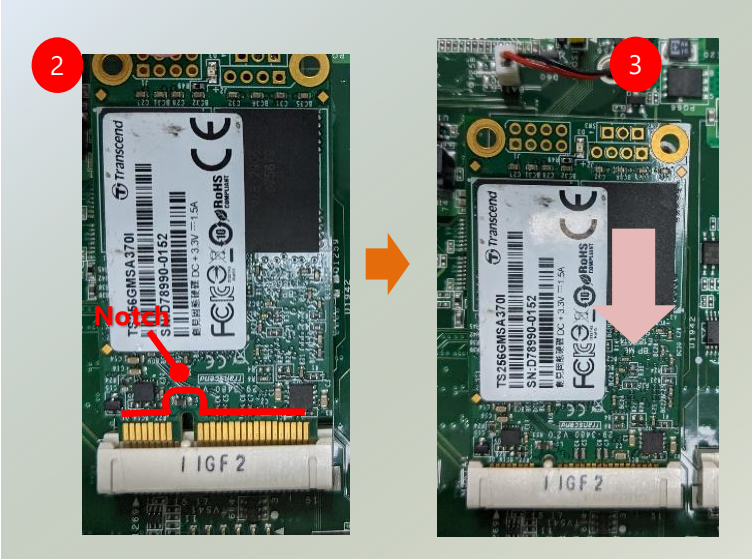
2. Loosen all the screws and lift the cover chassis up.

# Installing Memory Card

The system supports one (1) slot for mSATA memory card. Please follow the steps for installation.

1. Power off the system and open the system chassis cover. Locate the mSATA memory slot on the motherboard.

2. Align the notch of the memory card with the socket key in the pin slot.
3. Insert the memory card pins at 30 degrees into the socket until it is fully seated.

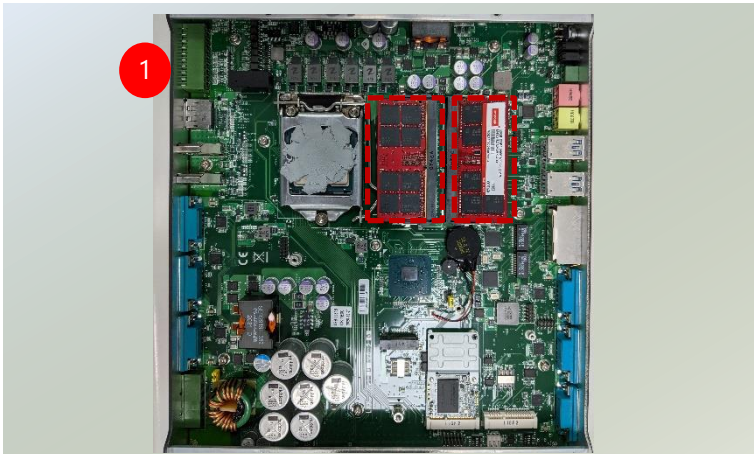



4. Push down on the memory card and secure it with two screws.

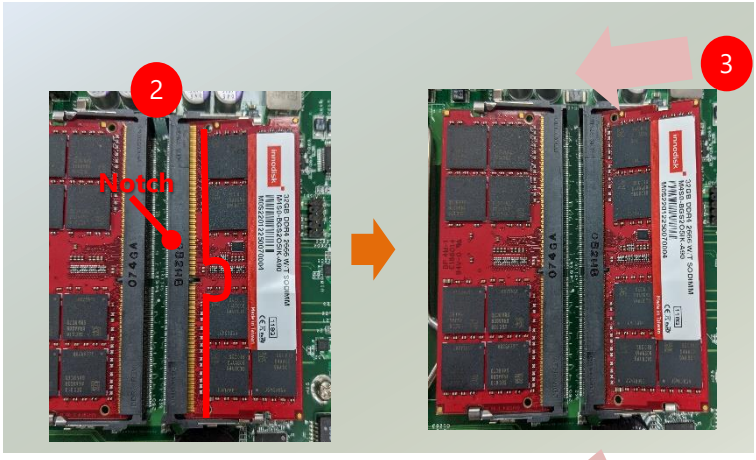
# Installing System Memory

The motherboard supports two (2) memory slots for DDR4 registered DIMM. Please follow the steps for installation.

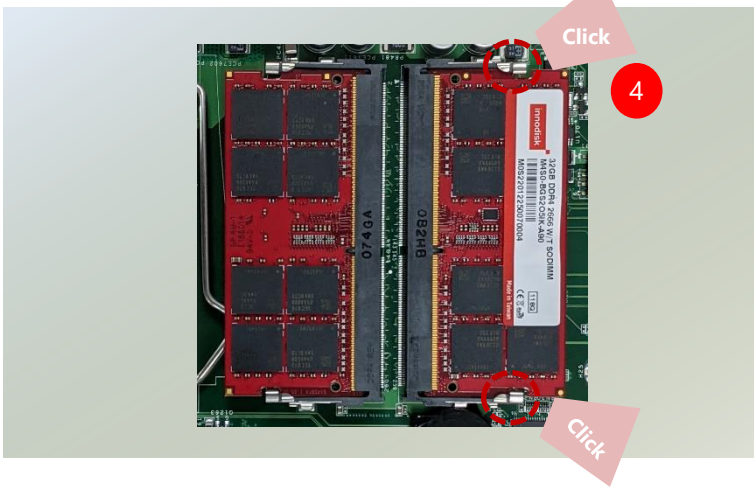
1. Power off the system and open the system chassis cover. Locate the memory slots on the motherboard.




2. Align the notch of the module with the socket key in the pin slot.
3. Insert the memory card pins at 30 degrees into the socket until it is fully seated.




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



# Installing 4G Module (Optional)

This system comes with an external M.2 slot, supporting dual SIM design. The following will discuss the installation of 4G module and SIM cards.

### To Install the 4G module:

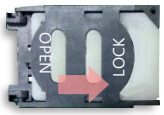
1. Locate the M.2 slot on the motherboard. Align the notch of the module card with the socket key in the slot, and insert it at 30 degrees into the socket until it is fully seated.
2. Push down on the module and secure it with one (1) screw.

### To Install the 4G module:

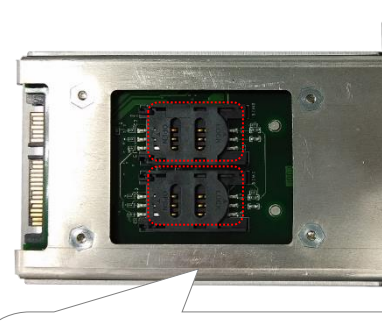
1. Loosen the two (2) screws that secure the tray and draw out the tray by its grip.

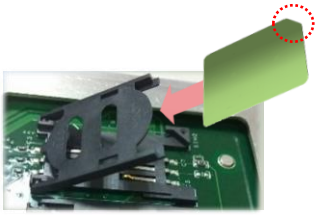
2. Slide open the socket cover and lift the cover on its hinges.

3. Insert the SIM card into the slot in the cover with the gold contacts facing down.




4. Push down the cover to close, and the SIM card will come in contact with the metal contacts in the socket. Finally, Slide the socket cover to the Lock position.



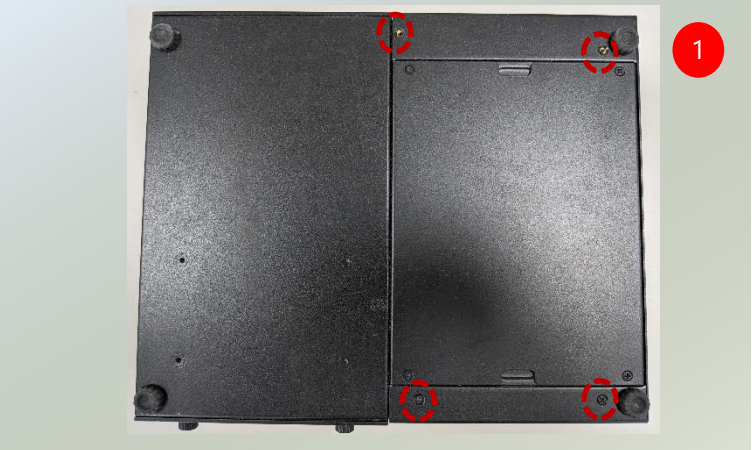


The angled corner of the card is positioned as shown in this picture.

# Install IPMI BMC Card (Optional)

IPMI provides better server management, server monitoring, and remote access. IPMI is independent of the system's CPU operating system via hardware applied directly into the motherboard. Please follow the steps for installation.

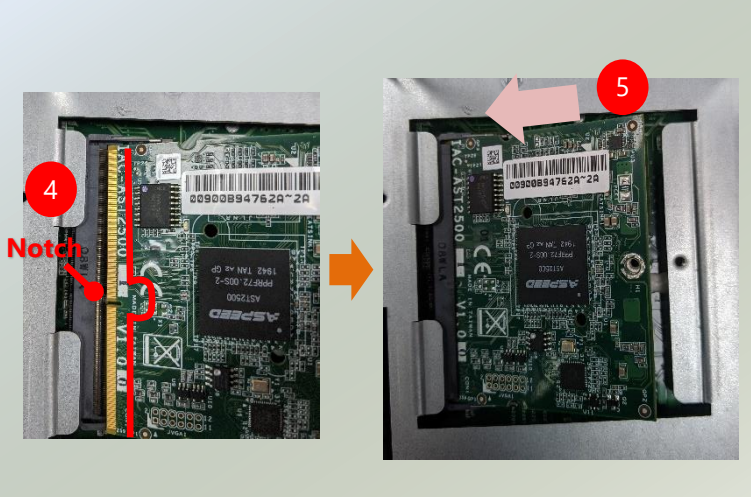
1. Power off the system and turn the system upside down. Locate the four (4) screws on the bottom panel.



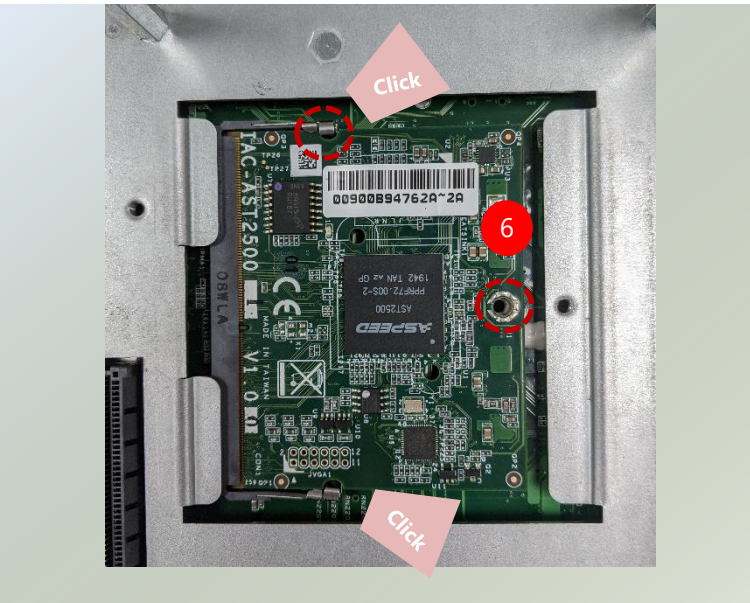

2. Loosen the screws and lift up to remove, and place it aside. Watch out for the metal pillars on each corner and PCIe pins.

3. Locate the BMC module slot on the motherboard.

4. Align the notch of the module with the socket key in the pin slot.
5. Insert the BMC card pins at 30 degrees into the socket until it is fully seated.




6. Push down on the module until the slot latches catches and clicks into place. Then, secure into place with one (1) screw.

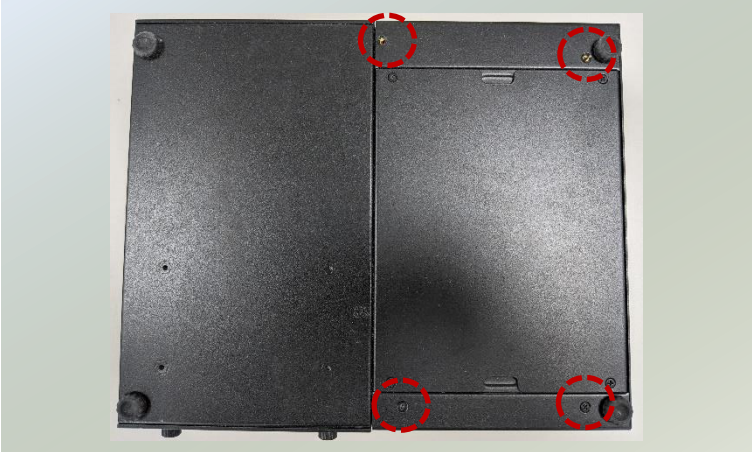


# Installing NVIDIA® A2 GPU Card

LEC-2290E comes with a slot for GPU graphic card expansion. The GPU graphic card requires a rather complex installation process; therefore, the assembly must be handled with care. Please read through the instructions in this section to make sure you have acquired the necessary knowledge and comply with the requirements.

1. The GPU expansion kit will include:
   - 1x GPU module
   - 2x Swappable fans
   - Screws

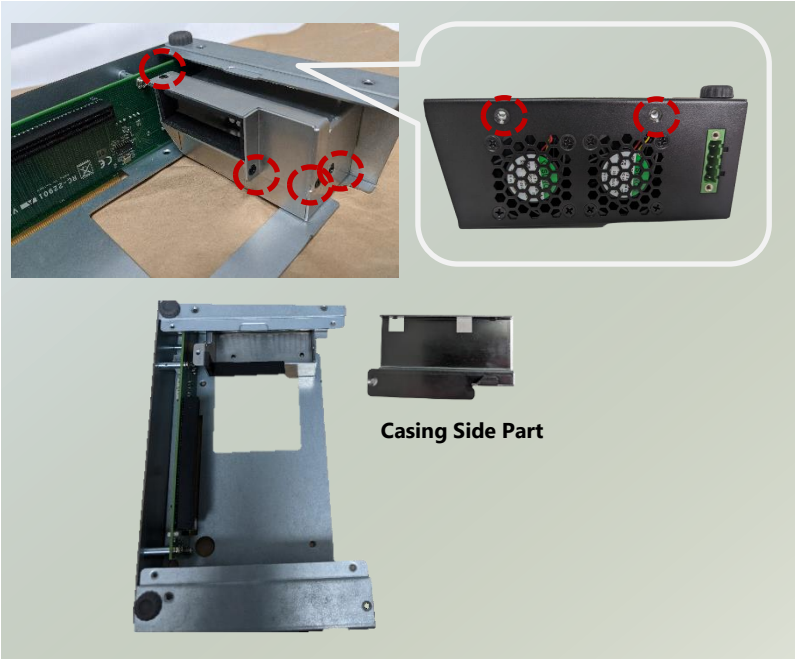
2. Power off the system and turn the system upside down. Locate the four (4) screws on the bottom panel.



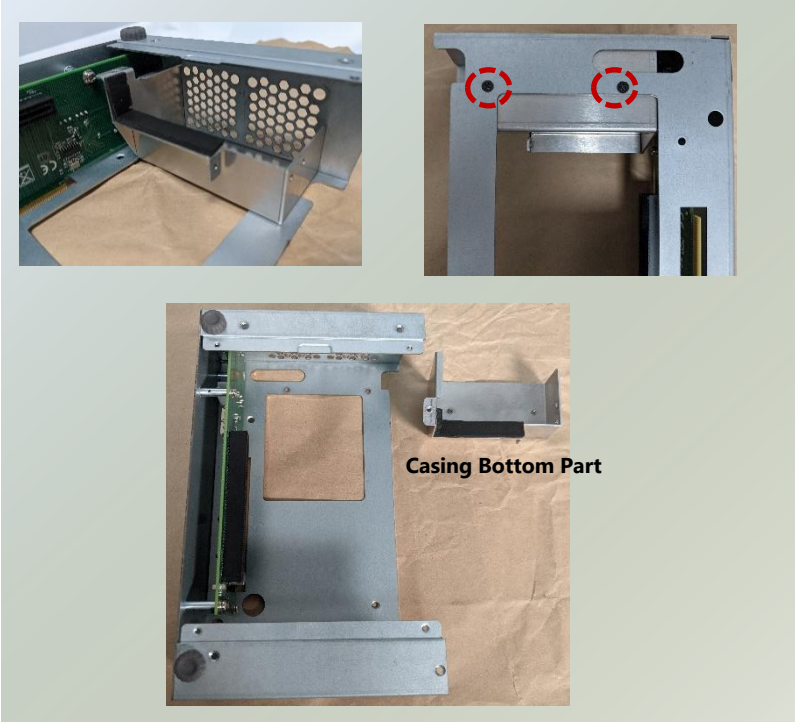
3. Loosen the four (4) screws and lift up the section to remove. Watch out for the pillar studs on each corner and PCIe pins.

4. Loosen the four (4) screws and open the top chassis.

5. First, remove the casings parts (side part & bottom part). To remove the side part, unscrew the six (6) screws.

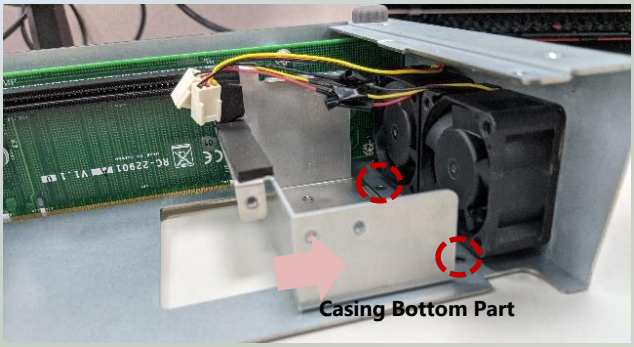



To remove the bottom part, unscrew the two (2) screws from the underside.

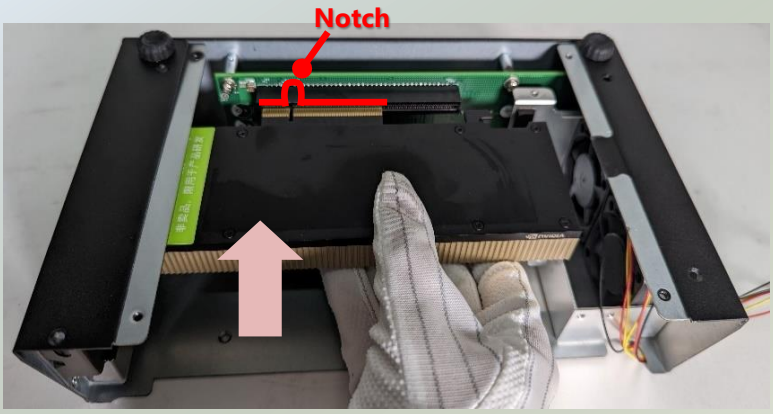


6. After removing the casing parts, install the swappable fans. Secure the fan with four (4) screws each.

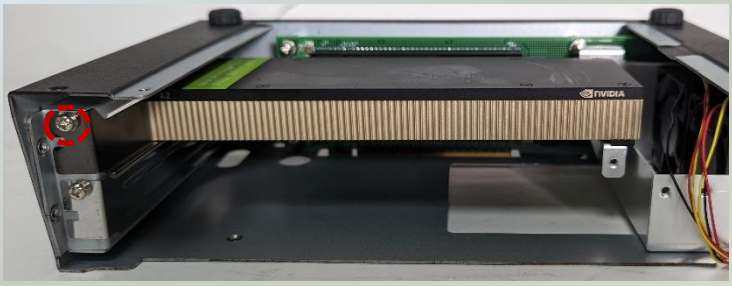
7. Place in the bottom casing part and secure with two (2) screws on the underside.



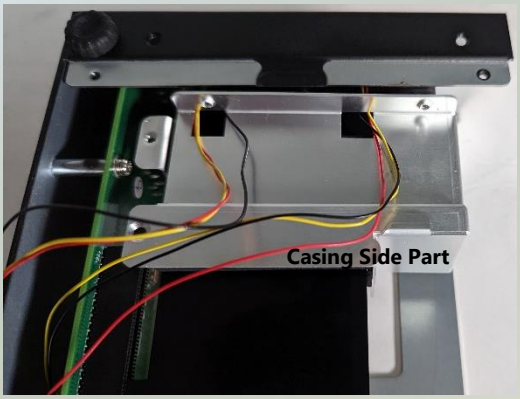

8. Insert the GPU graphic card. Align with the notch and slide until fully seated.



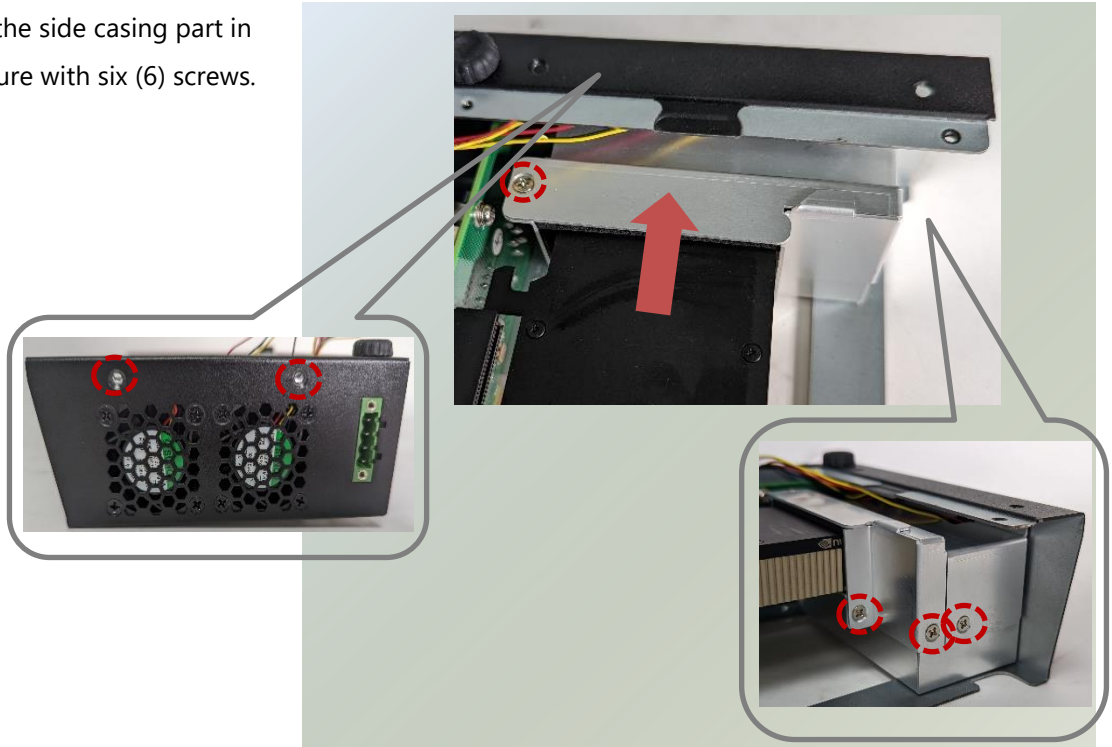

9. Secure with one (1) screw on the side.



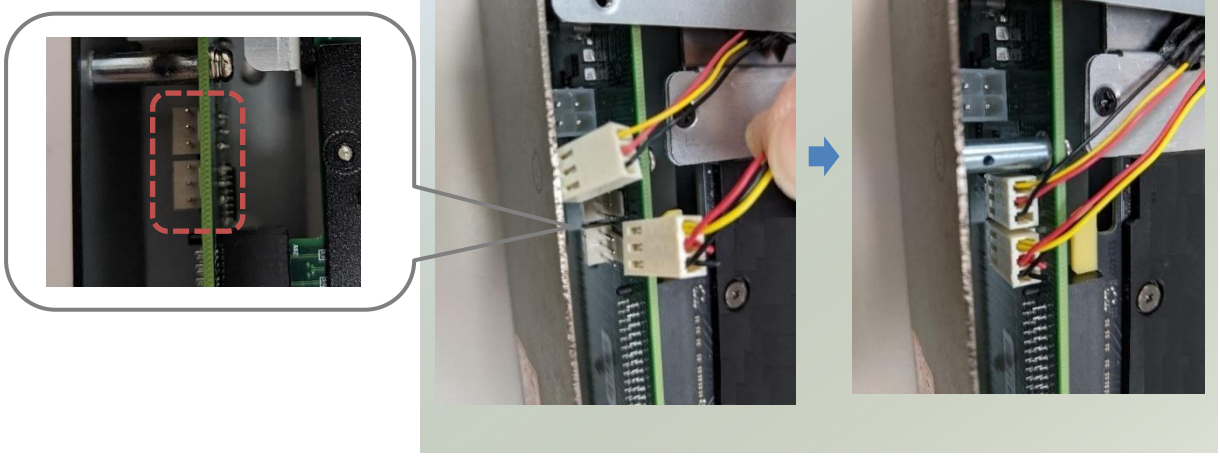
10. Place the fan power cables through the casing side part holes.




11. Gently push the side casing part in place, and secure with six (6) screws.



12. Insert the fan power cables into the connectors.



13. Place the top chassis back and secure with four (4) screws.

14. Insert the bottom panel back, watch out for the PCIe pins and metal pillars. Secure with four (4) screws.
15. The GPU graphic card has been successfully installed.

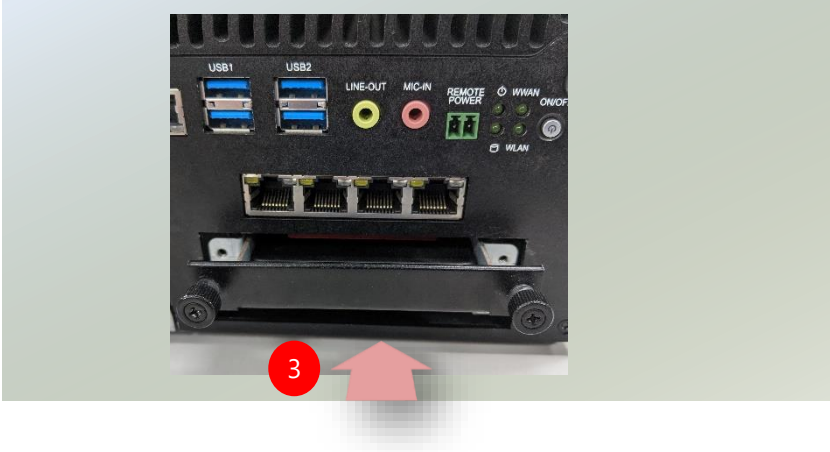
# Installing the Disk Drive

The system supports two 2.5" HDD/SSD drive bays, with one 2.5" SSD drive included. The following will discuss disk drive installation procedures.

1. Power off the system and unplug the power cord. Unscrew the two thumbscrews that fix the tray on the system. Pull the drive tray out.

2. Install the disk onto the tray and secure with four (4) screws, two on each side. Make sure the SATA connector faces outwards as shown in the image.

3. Insert the tray into the bay and fasten the two thumbscrews that fix the tray on the system.

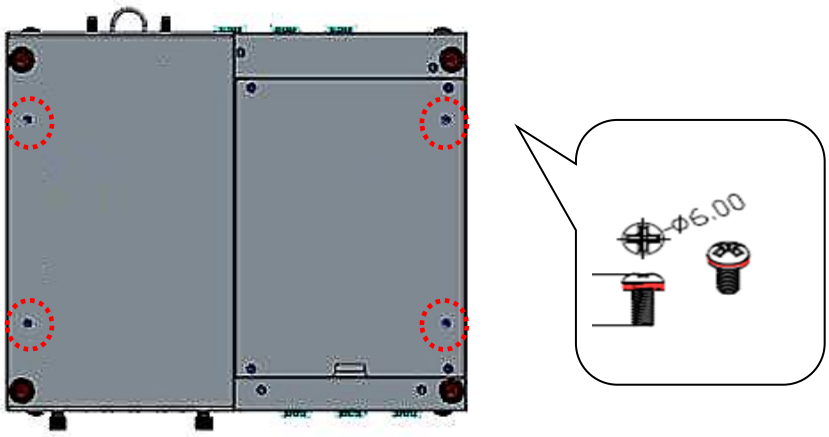


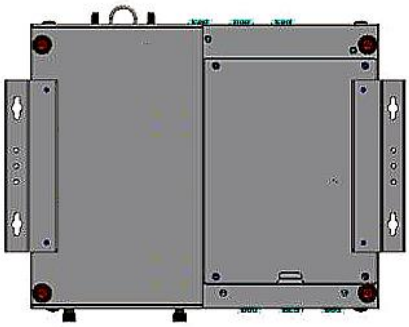
# Wall Mounting

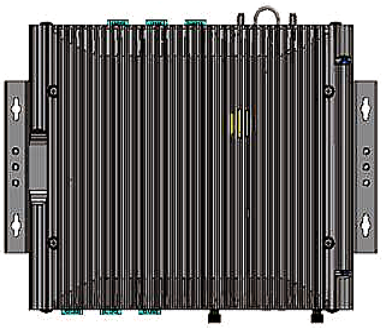
The system can be mounted on a flat surfaced wall. Please take the following into considerations when mounting the system onto the wall.

**1.** Fix the wallmount brackets onto the system bottom by securing them with **four** provided screws.

Mounting Holes

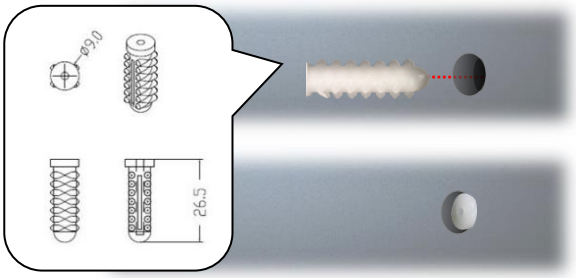


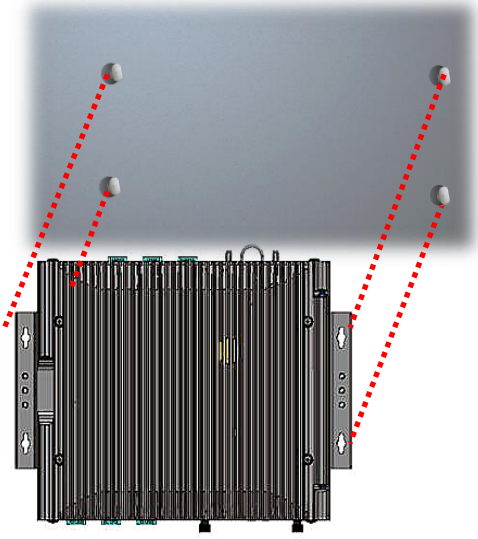


**2.** On the wall, measure the exact place where you want to hang the system, and drill four holes that match the four mounting holes on both brackets.

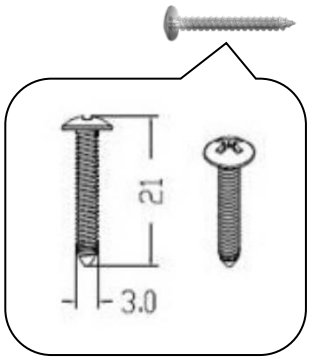
**3.** Insert **four** anchoring bolts into the holes.

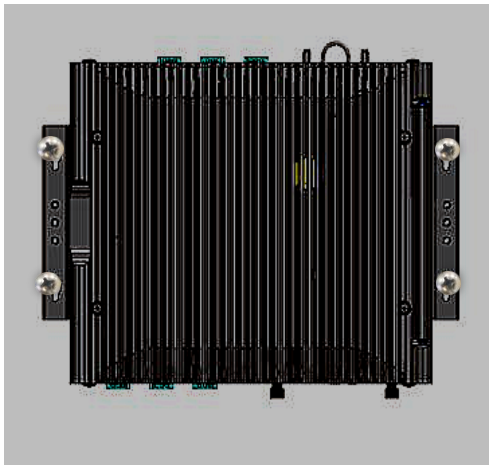



**4.** Align the four mounting holes on the system's brackets with the four anchoring bolts you just installed on the wall.



**5.** Drive **four** long screws into the anchoring bolts to secure the system.



# CHAPTER 3: SOFTWARE SETUP

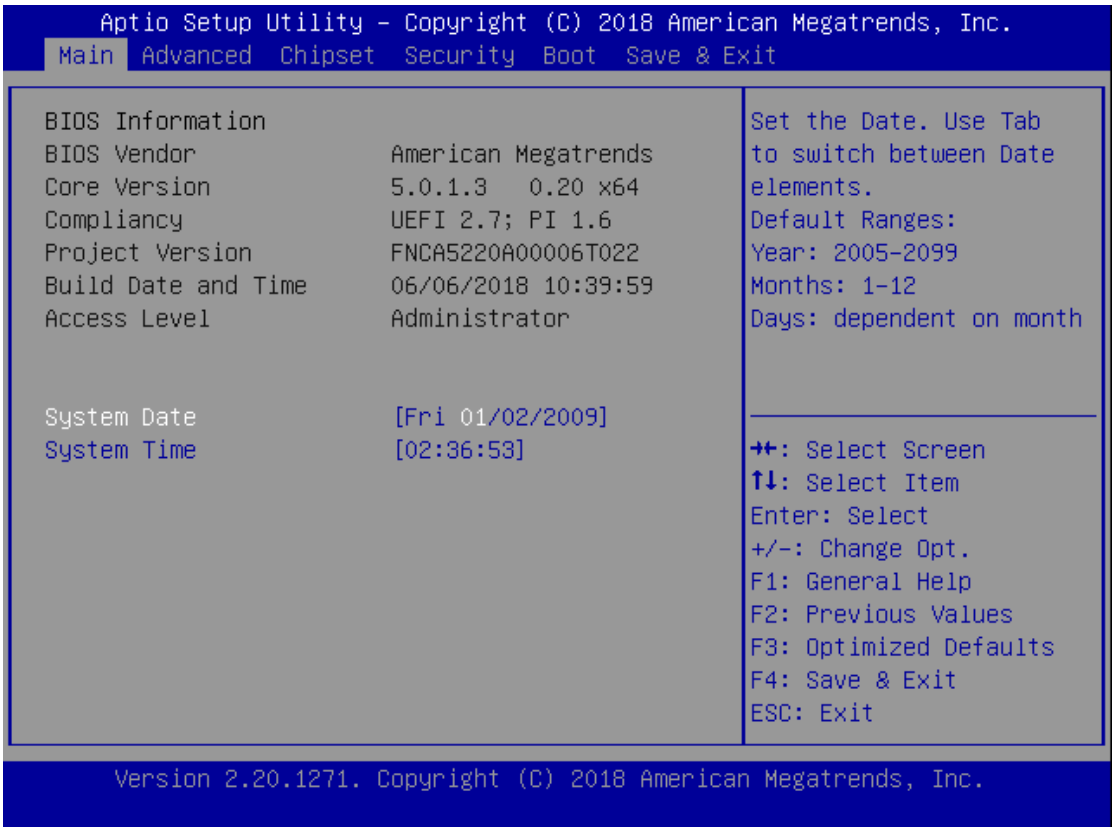
## BIOS Setup

The system has AMI BIOS built-in, with a SETUP utility that allows users to configure required settings or to activate certain system features. Pressing the **<Tab>** or **<Del>** key immediately allows you to enter the Setup utility.

| Control Keys | Description |
|---|---|
| →← | select a setup screen, for instance, [Main], [Advanced], [IntelRCSetup], [Security], [Boot], and [Save & Exit] |
| ↑↓ | select an item/option on a setup screen |
| **<Enter>** | select an item/option or enter a sub-menu |
| **+/-** | to adjust values for the selected setup item/option |
| **F1** | to display General Help screen |
| **F2** | to retrieve previous values, such as the parameters configured the last time you had entered BIOS. |
| **F3** | to load optimized default values |
| **F4** | to save configurations and exit BIOS |
| **<Esc>** | to exit the current screen |

# Main Page

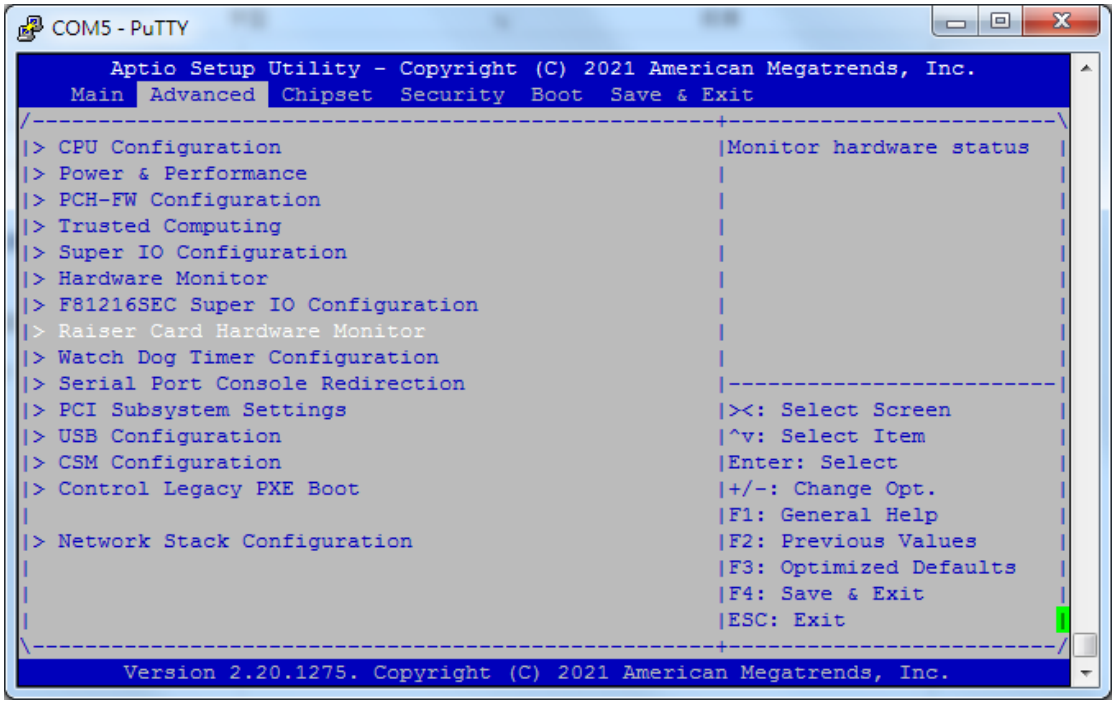
Setup main page contains BIOS information and project version information.



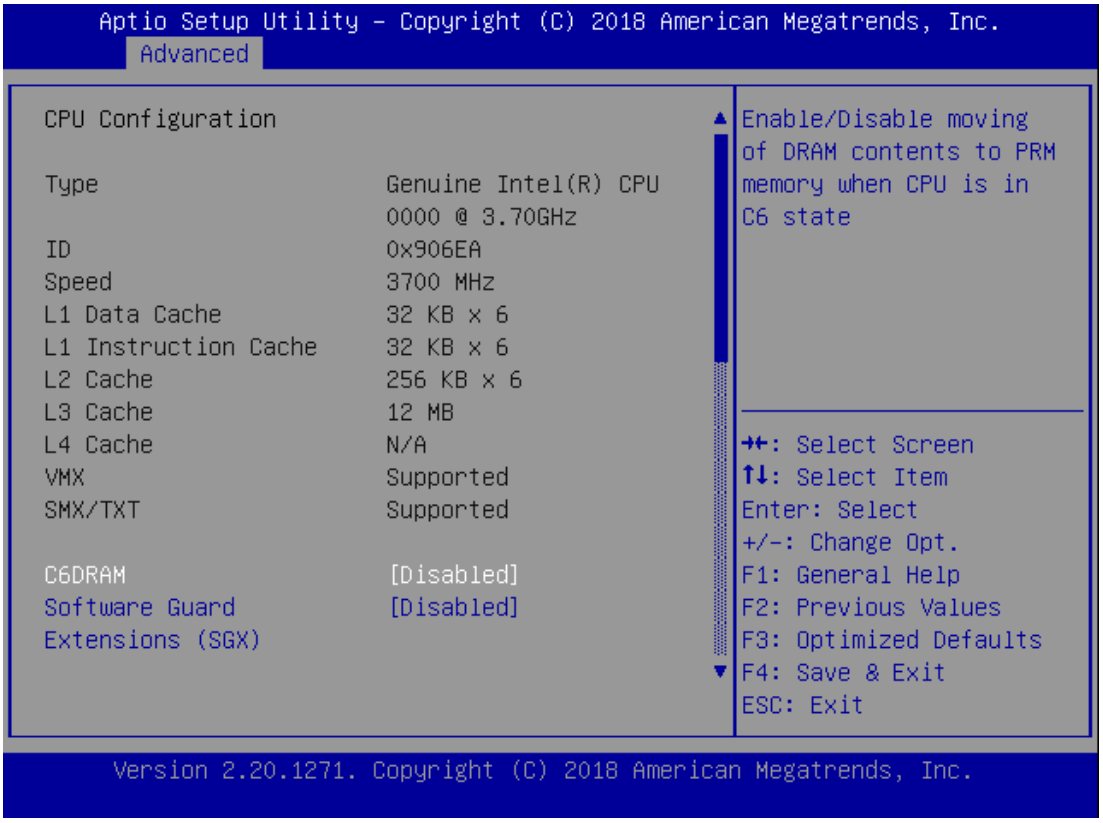

| Feature | Description |
|---|---|
| BIOS Information | BIOS Vendor: American Megatrends<br>Core Version: AMI Kernel version, CRB code base, X64<br>Compliancy: UEFI version, PI version<br>Project Version: BIOS release version<br>Build Date and Time: MM/DD/YYYY<br>Access Level: Administrator / User |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

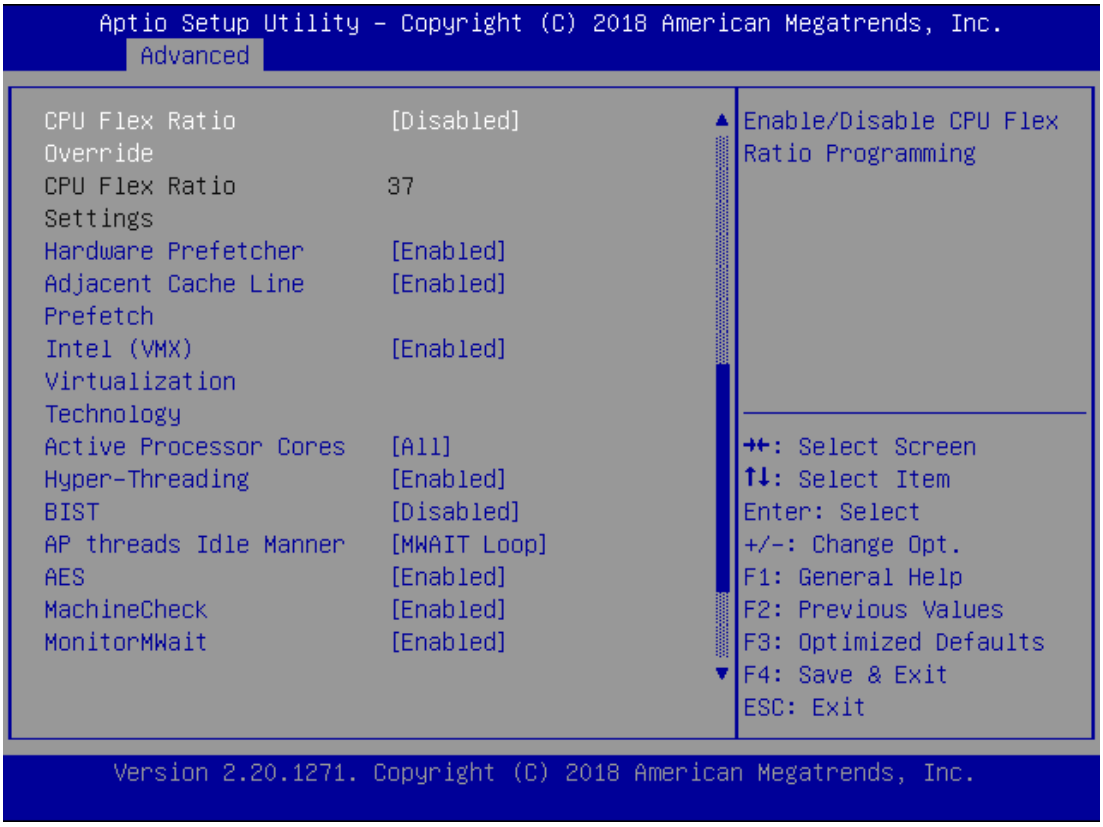
# Advanced Page

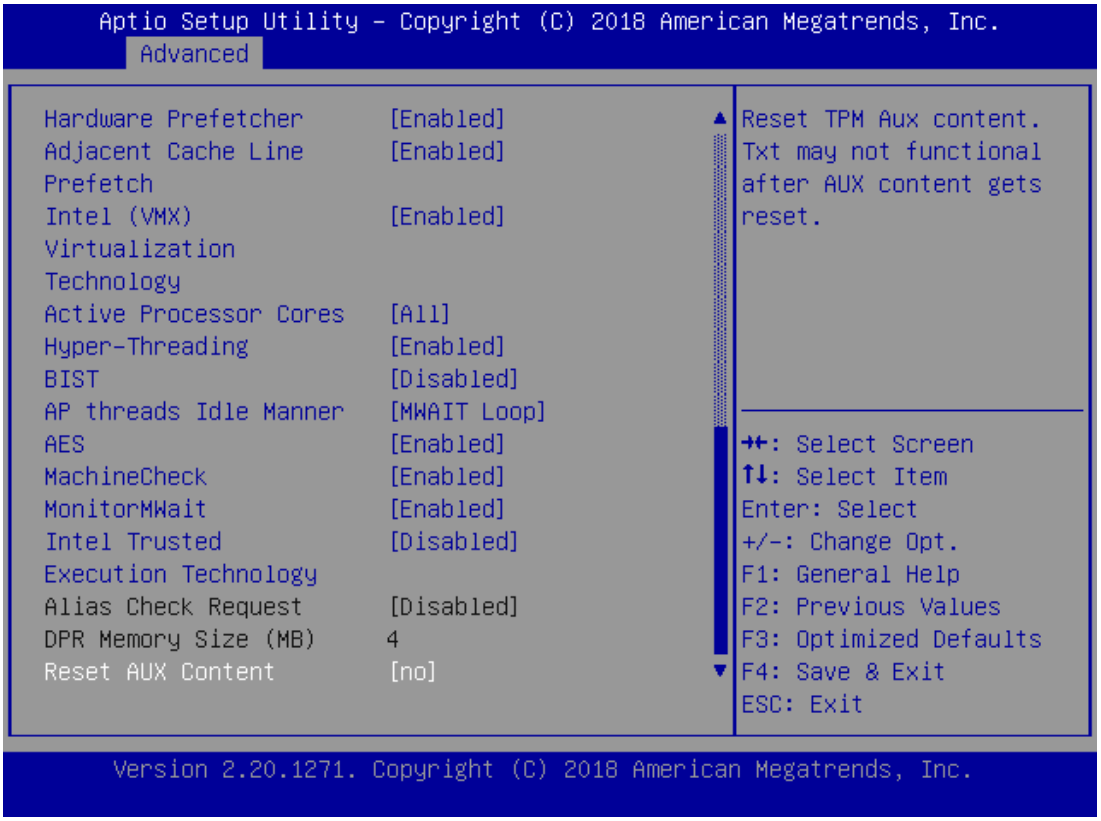
Select the **Advanced** menu item from the BIOS setup screen to enter the "Advanced" setup screen. Users can select any of the items in the left frame of the screen.



## CPU Configuration



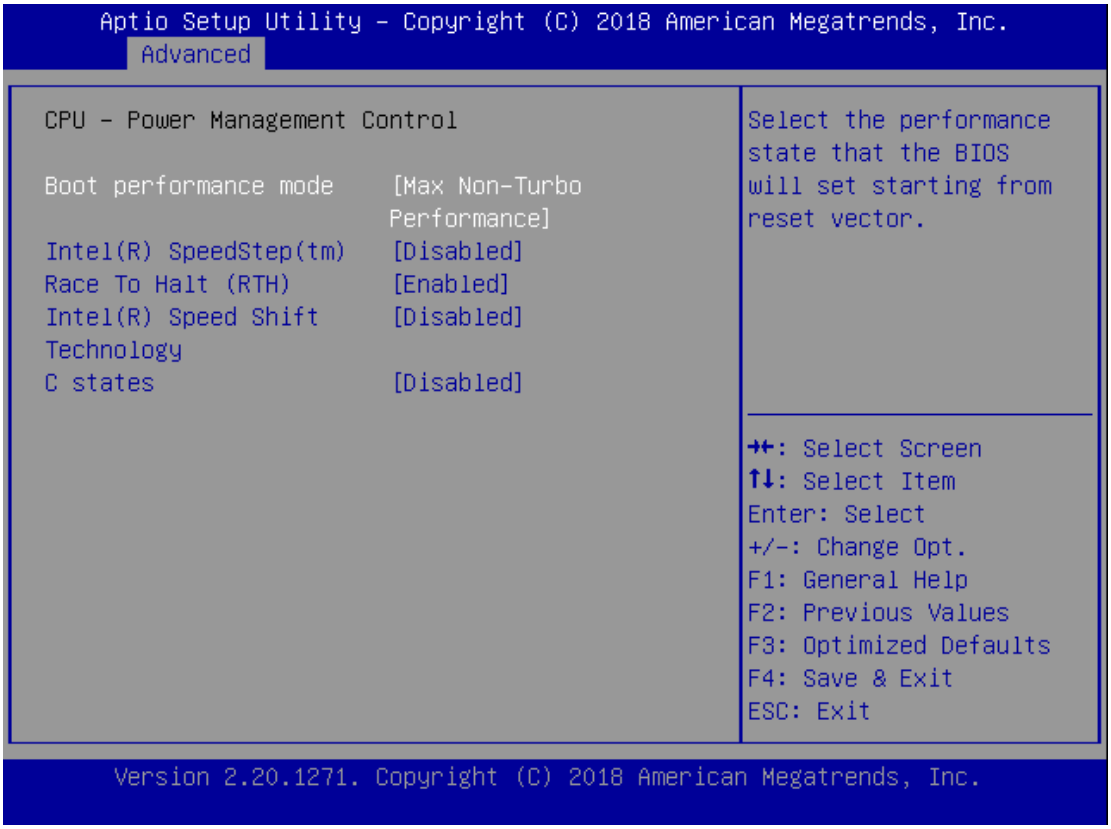






| Feature | Options | Description |
|---|---|---|
| C6DRAM | Disabled<br>Enabled | Enable/Disable moving of DRAM contents to PRM memory when CPU is in C6 state |
| Software Guard Extensions (SGX) | Disabled<br>Enabled | Enable/Disable Software Guard Extensions (SGX) |
| CPU Flex Ratio Override | Disabled<br>Enabled | Enable/Disable CPU Flex Ratio Programming |
| CPU Flex Ratio Override | 37 | Enable/Disable CPU Flex Ratio Programming |
| Hardware Prefetcher | Disabled<br>Enabled | To turn on/off the MLC streamer prefetcher. |
| Adjacent Cache Line Prefetch | Disabled<br>Enabled | To turn on/off prefetching of adjacent cache lines. |
| Intel (VMX) Virtualization Technology | Disabled<br>Enabled | When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. |
| Active Processor Cores | All<br>1<br>2<br>3 | Number of cores to enable in each processor package. |

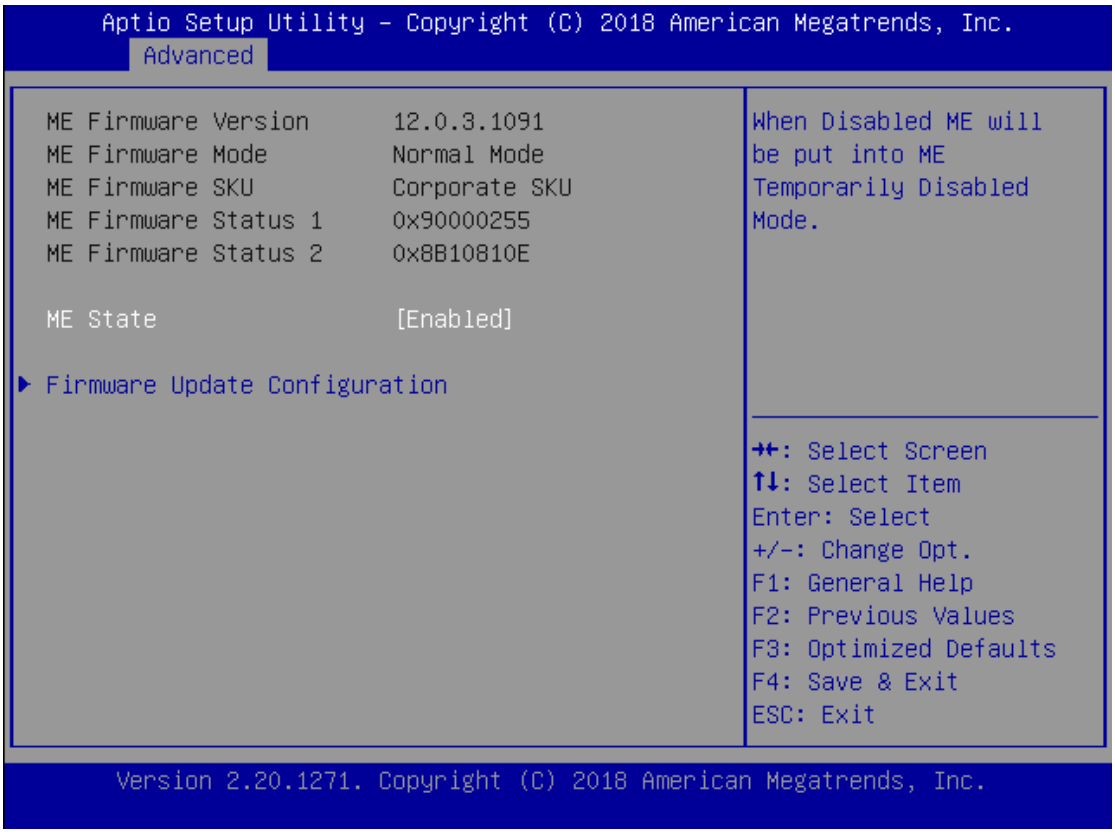
| | | |
|---|---|---|
| | 4<br>5 | |
| Hyper-Threading | Disabled<br>Enabled | Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). |
| BIST | Disabled<br>Enabled | Enable/Disable BIST (Built-In Self Test) on reset |
| AP threads Idle Manner | HALT Loop<br>MWAIT Loop<br>RUN Loop | AP threads Idle Manner for waiting signal to run |
| AES | Disabled<br>Enabled | Enable/Disable AES (Advanced Encryption Standard) |
| MachineCheck | Disabled<br>Enabled | Enable/Disable Machine Check |
| MonitorMWait | Disabled<br>Enabled | Enable/Disable MonitorMWait |
| Intel Trusted Execution Technology | Disabled<br>Enabled | Enables utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology. Changes require a full power cycle to take effect. |
| Alias Check Request | Disabled<br>Enabled | Enables Txt Alias Checking Capability Changes require full Txt capability before it will take effect. It is a one-time only change; next reboot will be reset. |
| DPR Memory Size (MB) | 4 | Reserve DPR memory size (0-255) MB |
| Reset AUX Content | yes<br>no | Reset TPM Aux content. Txt may not functional after AUX content gets reset. |

## Power & Performance



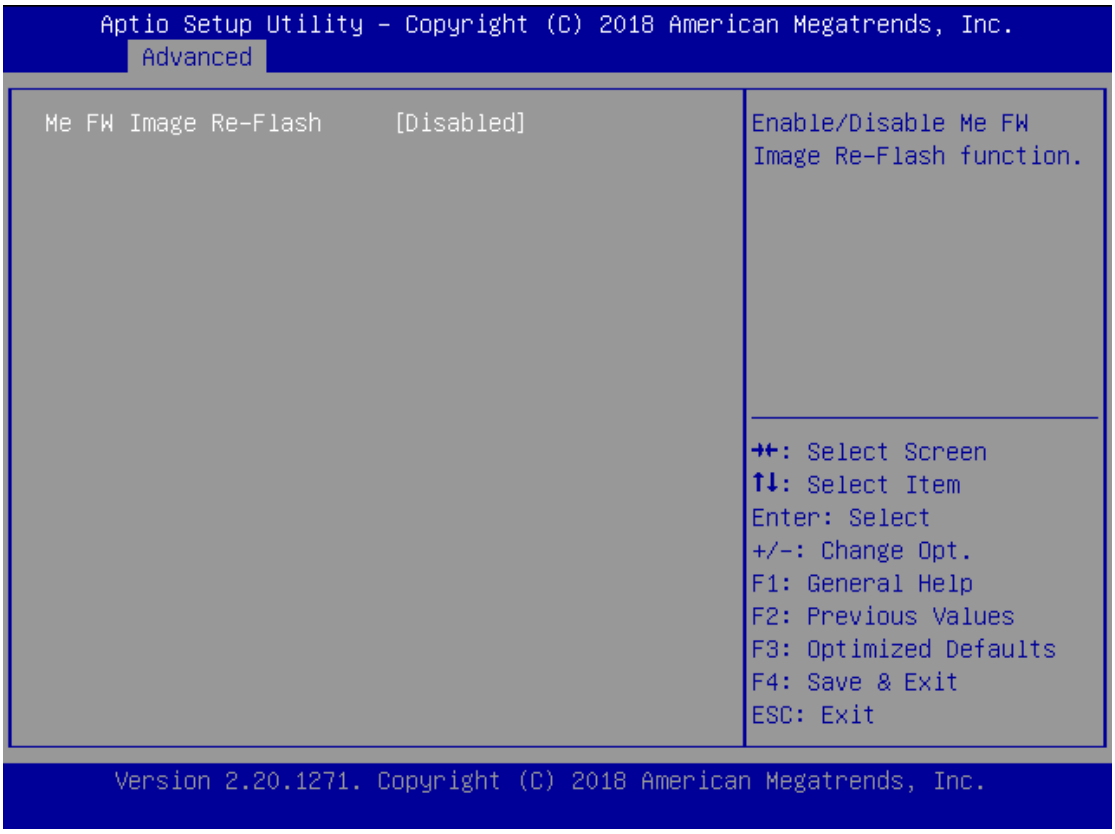

| Feature | Options | Description |
|---|---|---|
| Boot performance mode | Max Battery<br>Max Non-Turbo Performance<br>Turbo Performance" | Select the performance state that the BIOS will set starting from reset vector. |
| Intel(R) SpeedStep(tm) | Disabled<br>Enabled | Allows more than two frequency ranges to be supported. |
| Race To Halt (RTH) | Disabled<br>Enabled | Enable/Disable Race To Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power. (RTH is controlled through MSR 1FC bit 20) |
| Intel(R) Speed Shift Technology | Disabled<br>Enabled | Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware-controlled P-states. |
| C states | Disabled<br>Enabled | Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized. |

## PCH-FW Configuration



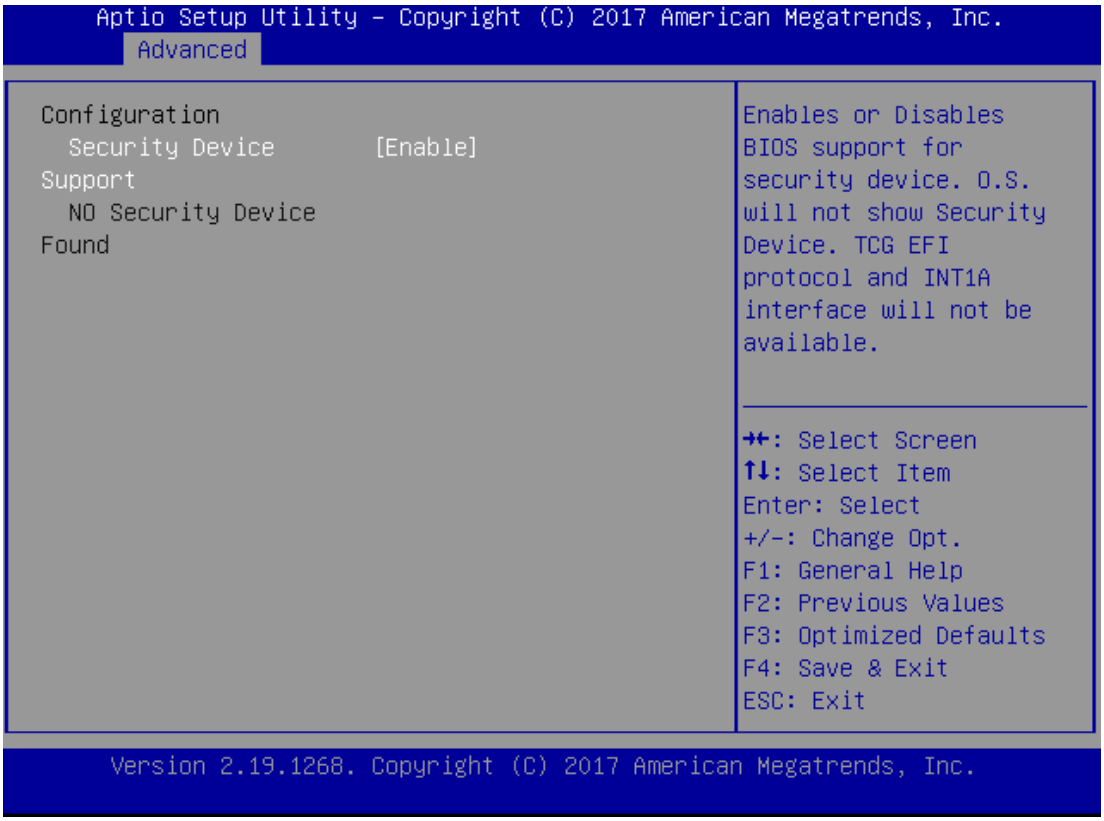

| Feature | Options | Description |
|---|---|---|
| ME State | Disabled<br>Enabled | When Disabled ME will be put into ME Temporarily Disabled Mode. |

## PCH-FW Configuration



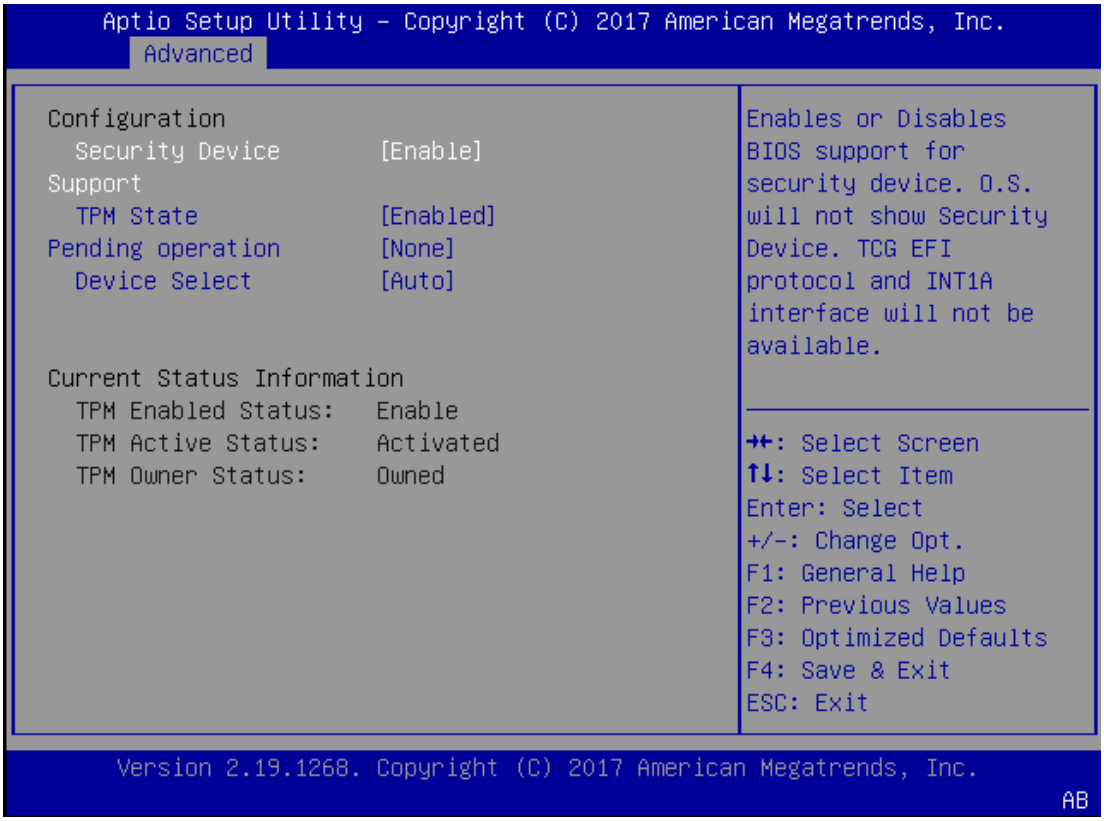

| Feature | Options | Description |
|---|---|---|
| Me FW Image Re-Flash | Disabled<br>Enabled | Enable/Disable Me FW Image Re-Flash function. |

## Trusted Computing



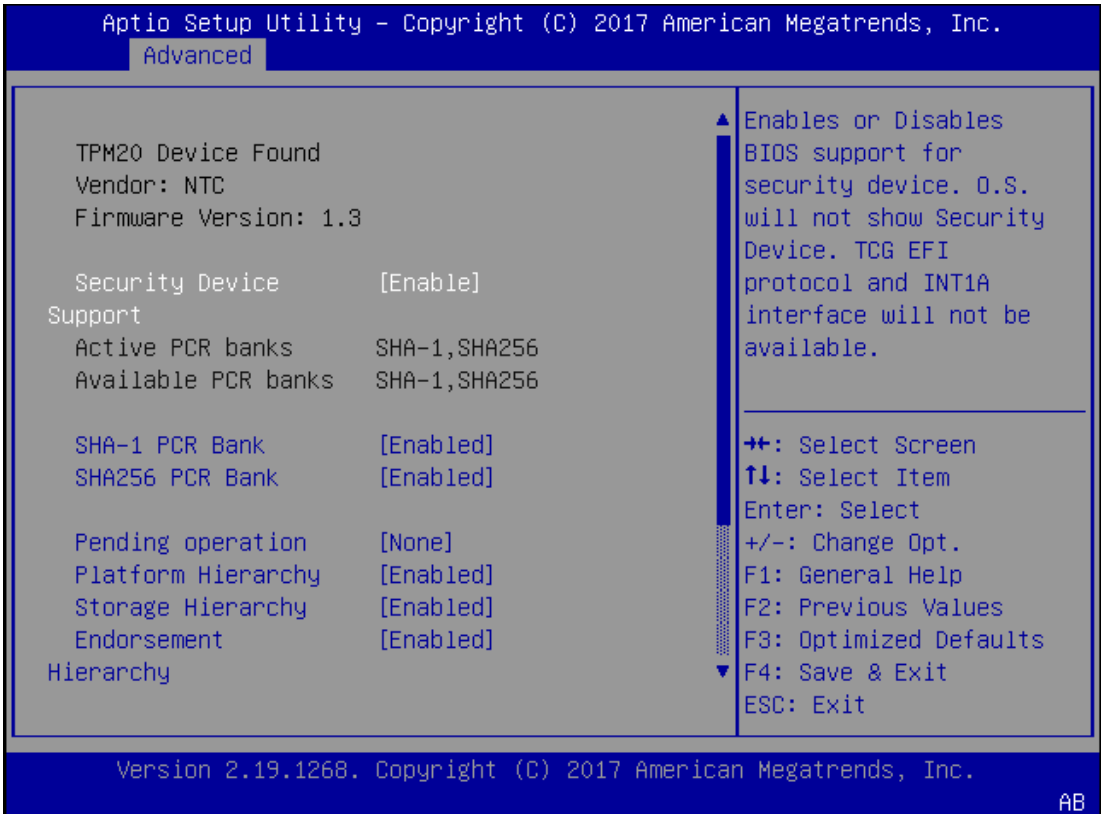

| Feature | Options | Description |
|---|---|---|
| Security Device Support | Enabled<br>Disabled | Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |

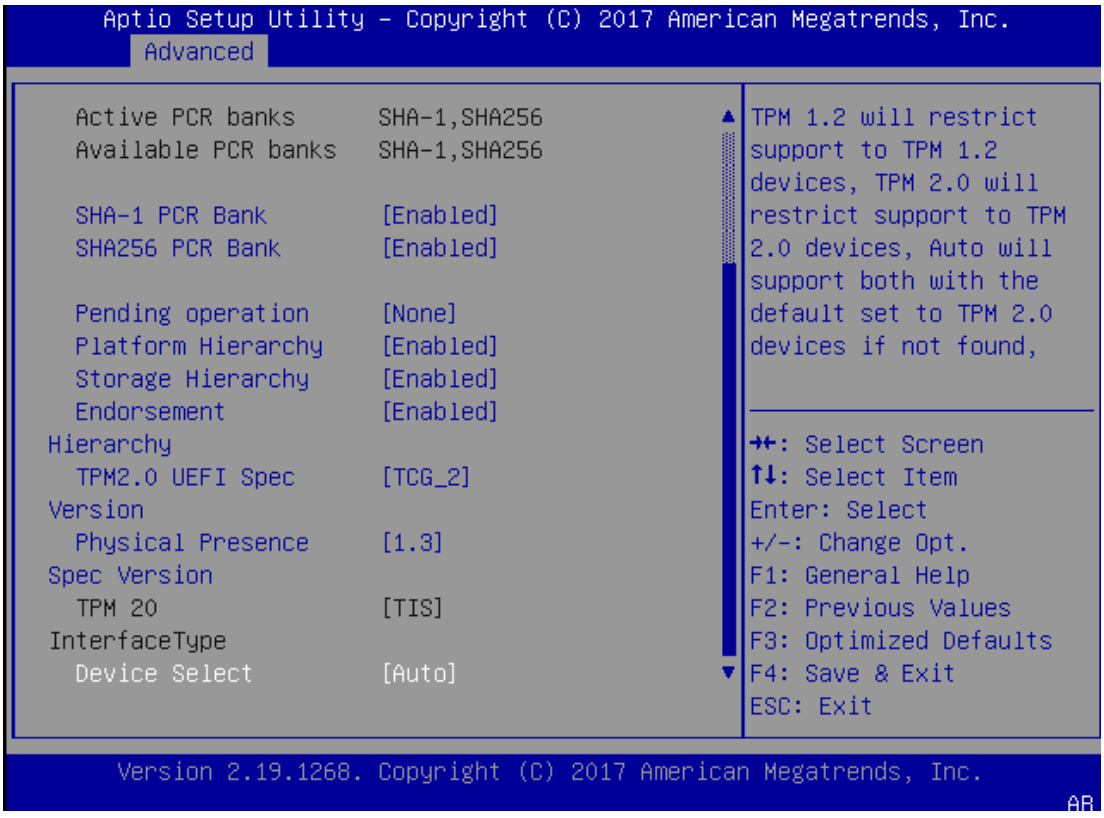
## Trusted Computing (TPM1.2)




| Feature | Options | Description |
|---|---|---|
| Security Device Support | Enabled<br>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<br>Disabled | Enables or disables Security Device.<br>NOTE: Your computer will reboot during restart in order to change State of the Device. |
| Pending operation | None<br>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<br>TPM 2.0<br>Auto | **TPM 1.2** will restrict support to TPM 1.2 devices; while **TPM 2.0** will restrict support to TPM 2.0 devices; **Auto** will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated. |

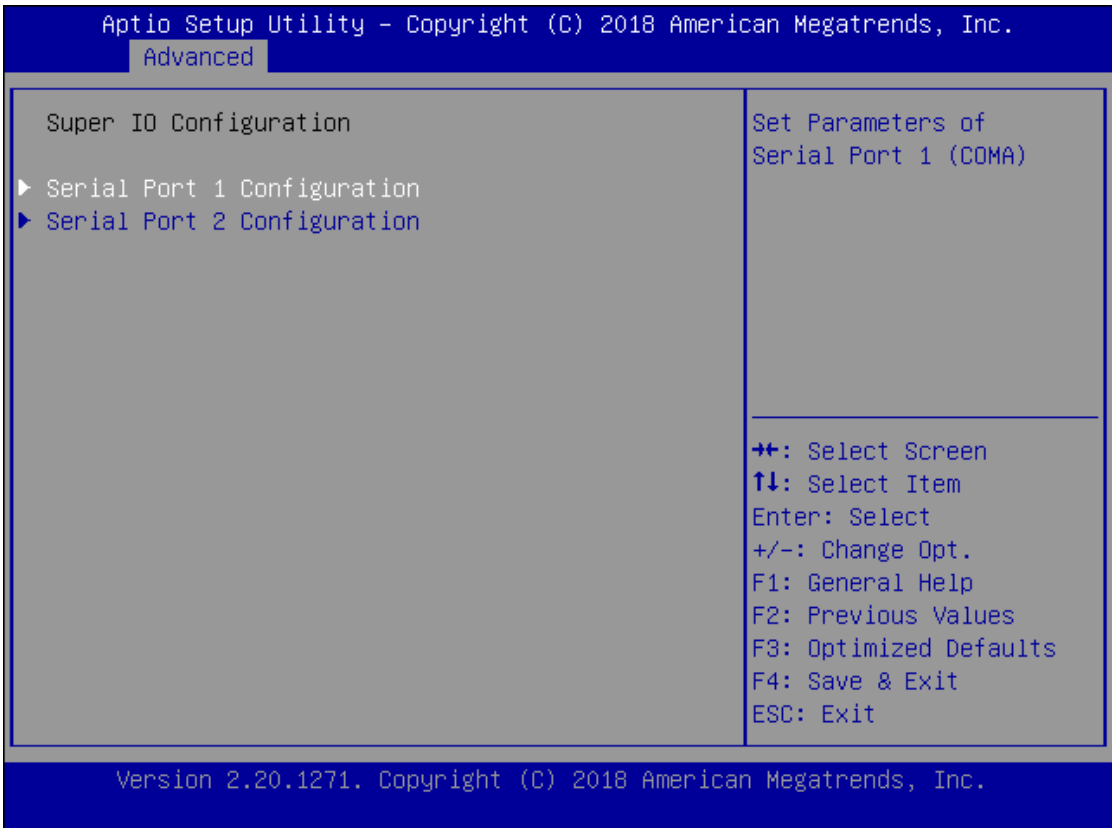
## Trusted Computing (TPM2.0)



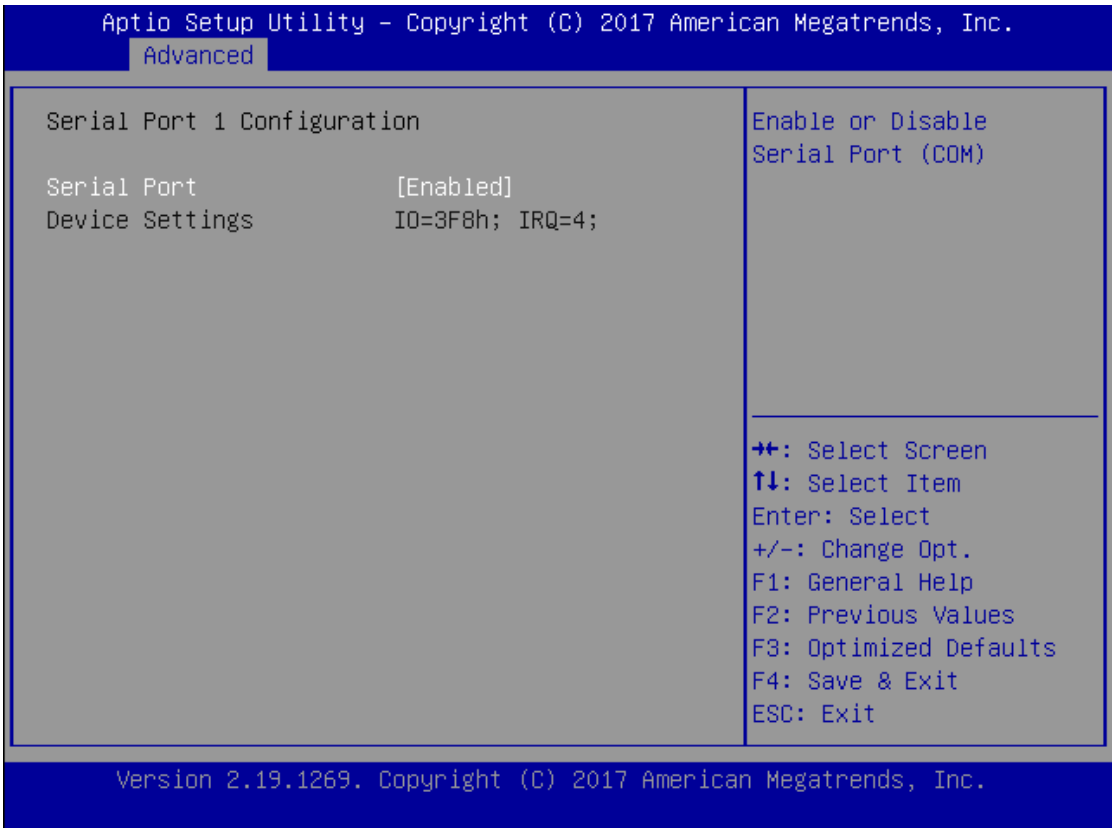



| Feature | Options | Description |
|---|---|---|
| Security Device Support | Enabled<br>Disabled | Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |
| SHA-1 PCR Bank | Enabled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

## Super IO Configuration

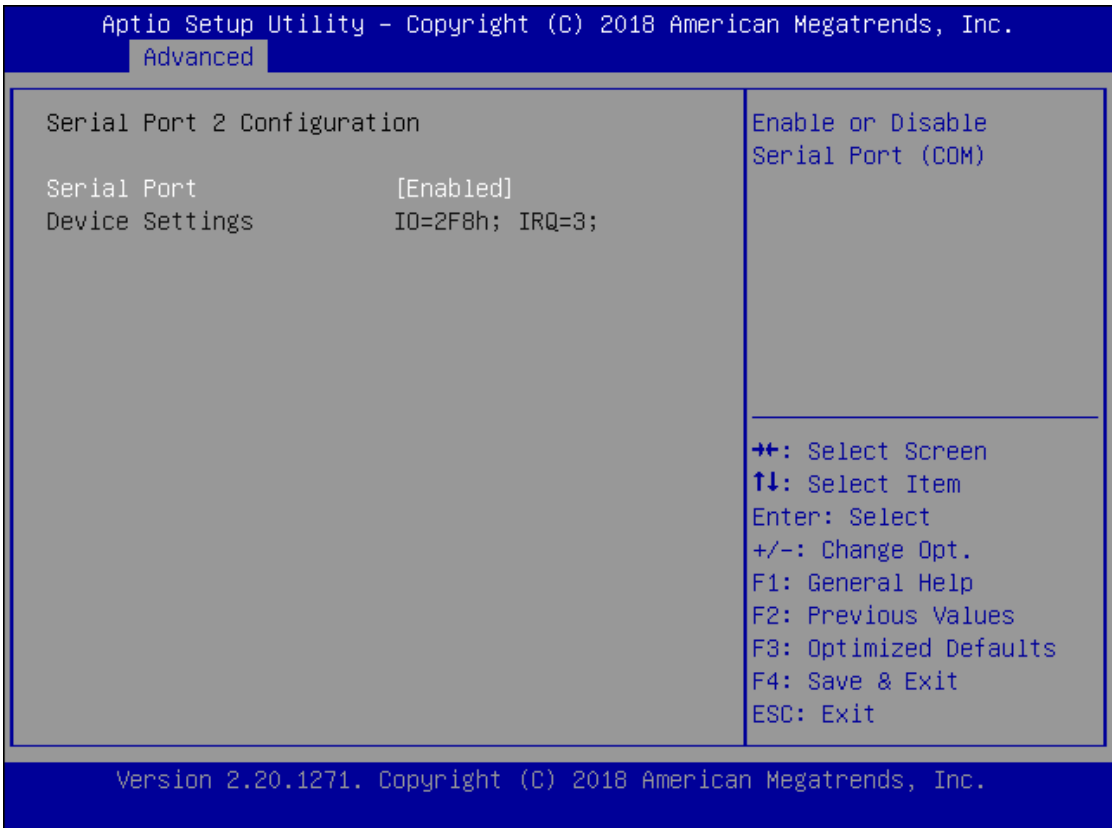


## Serial port 1 Configuration



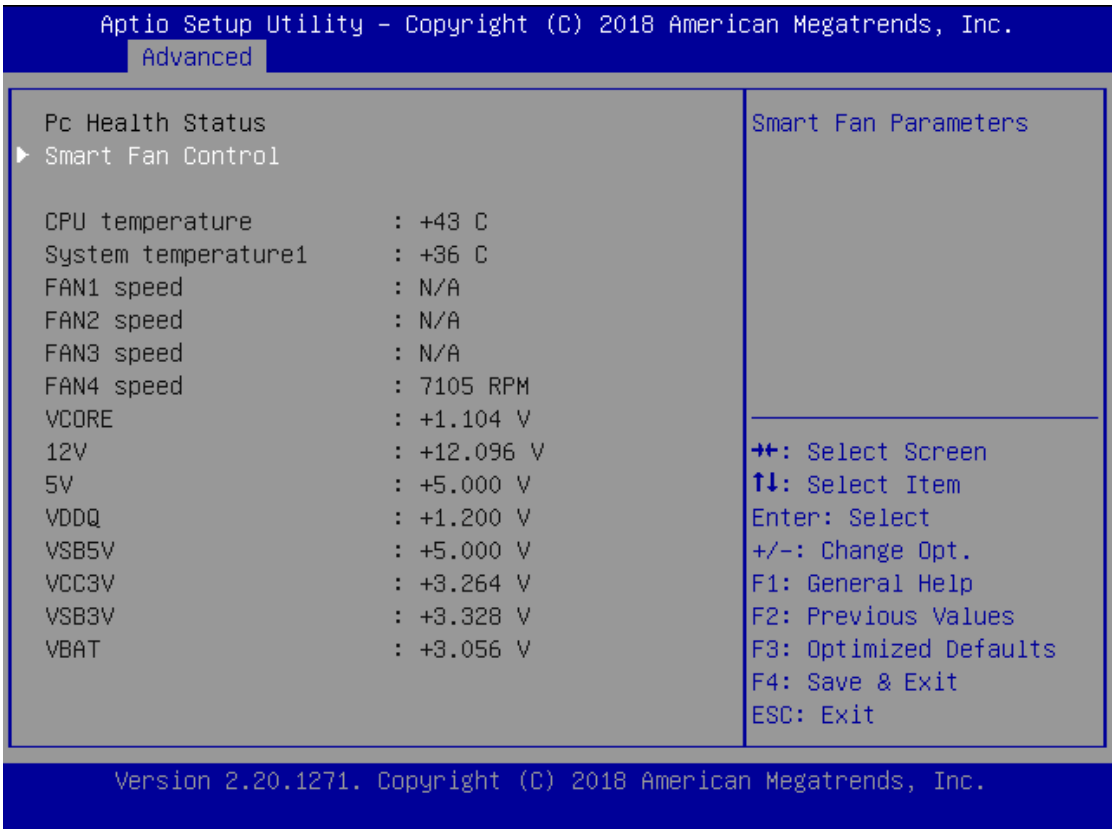

| Feature | Options | Description |
|---|---|---|
| Serial Port | Enabled<br>Disabled | Enables or disables Serial Port 1. |
| Device Settings | NA | IO=3F8h; IRQ = 4 |

## Serial port 2 Configuration



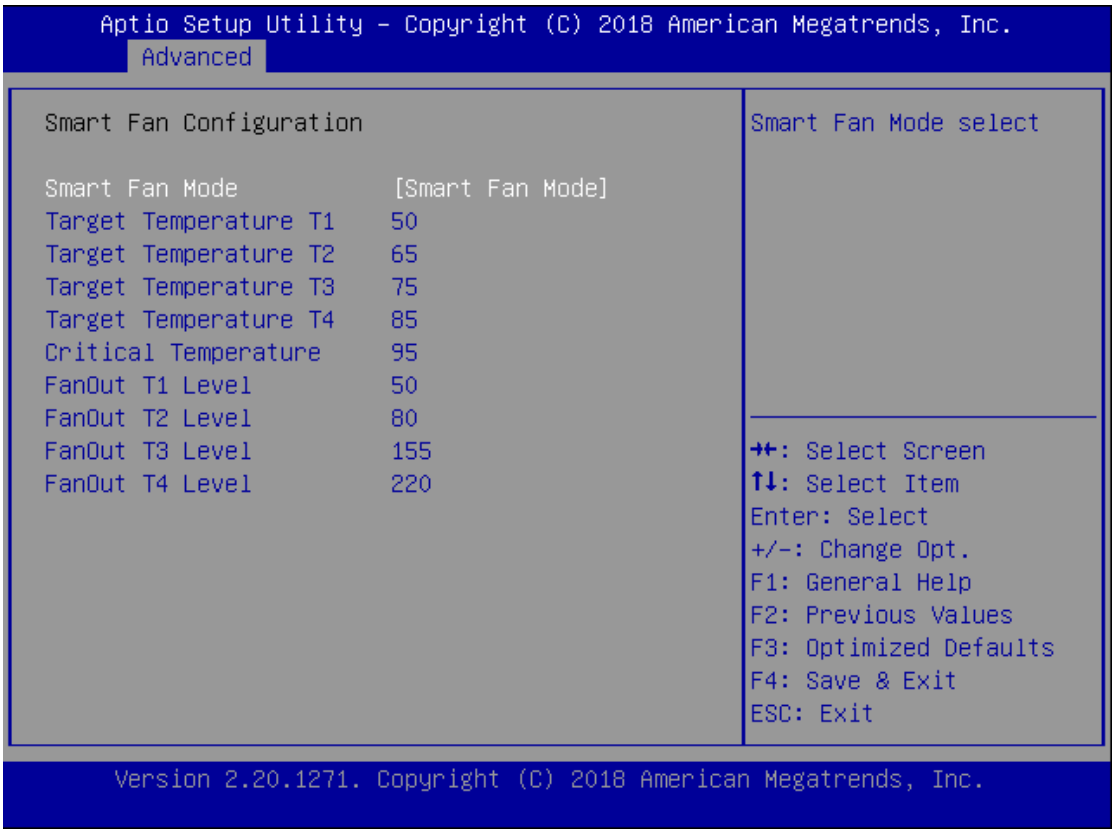

| Feature | Options | Description |
|---|---|---|
| Serial Port | Enabled<br>Disabled | Enables or disables Serial Port 2. |
| Device Settings | NA | IO=2F8h; IRQ = 3 |

## H/W Monitor



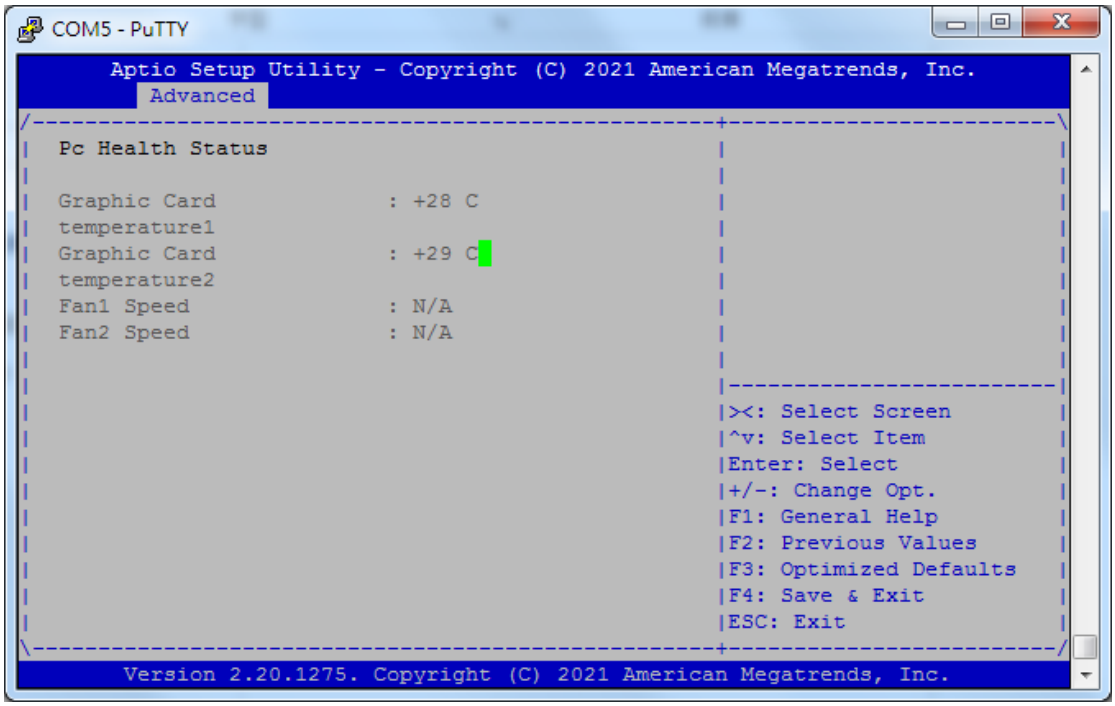

| Feature | Options | Description |
|---|---|---|
| Smart Fan Control | None | Smart Fan Parameters |

## Smart Fan Control

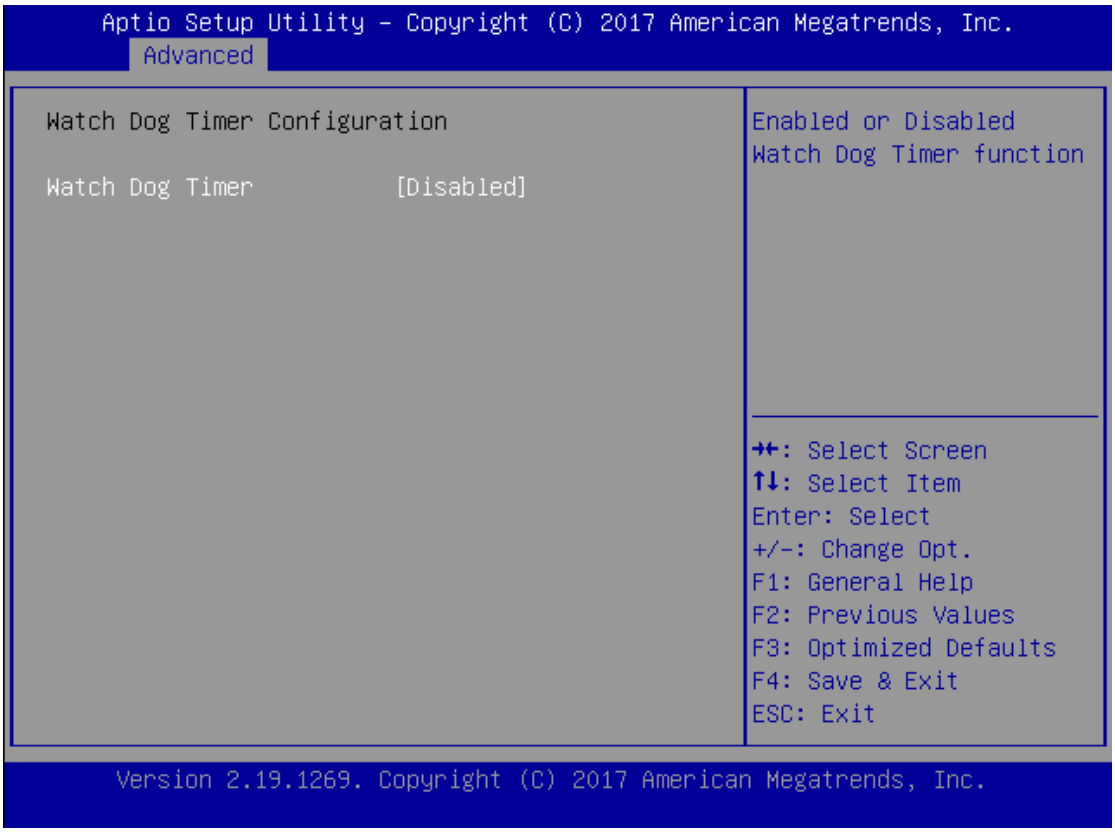



| Feature | Options | Description |
|---|---|---|
| Smart Fan Mode | Manual Mode<br>Smart Fan Mode | Smart Fan Mode select |
| Target Temperature T1 | 50 | Input Target Temperature (Range:0 - 127) |
| Target Temperature T2 | 65 | Input Target Temperature (Range:0 - 127) |
| Target Temperature T3 | 75 | Input Target Temperature (Range:0 - 127) |
| Target Temperature T4 | 85 | Input Target Temperature (Range:0 - 127) |
| Critical Temperature | 95 | Input Target Temperature (Range:0 - 127) |
| FanOut T1 Level | 50 | Input Target Fan Out |
| FanOut T2 Level | 80 | Input Target Fan Out |
| FanOut T3 Level | 155 | Input Target Fan Out |
| FanOut T4 Level | 220 | Input Target Fan Out |

## Raiser Card Hardware Monitor

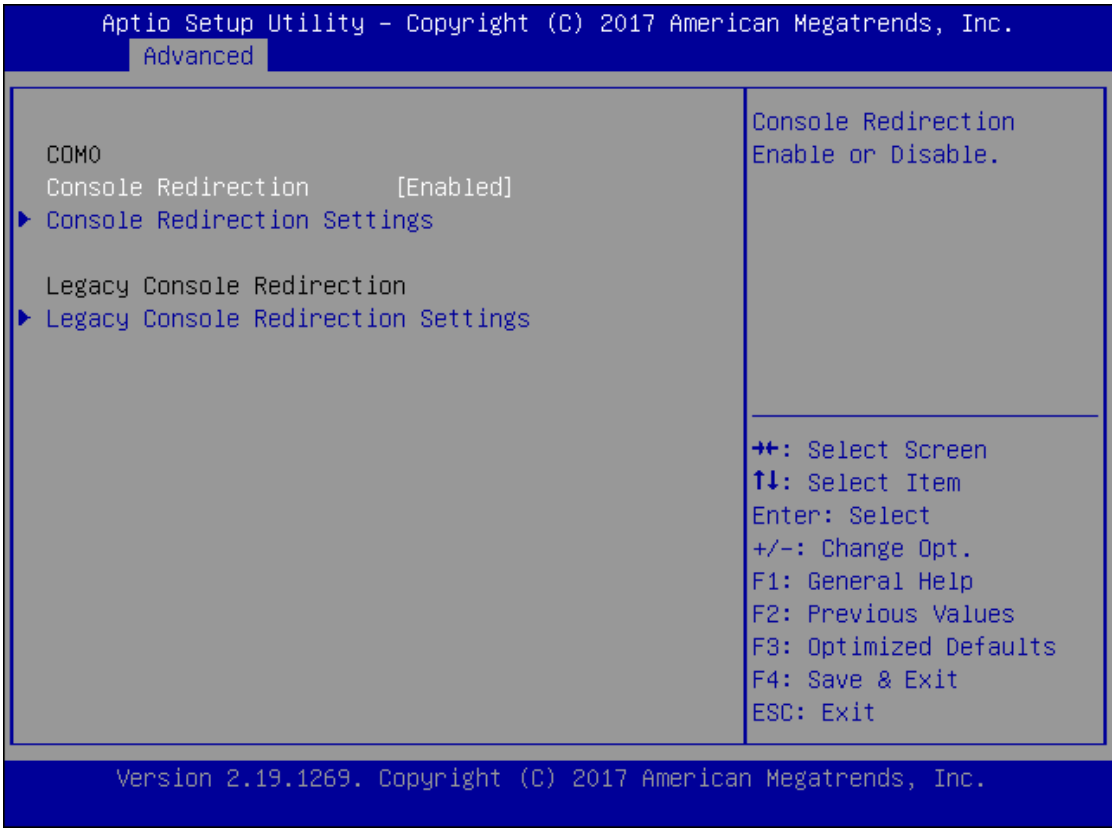


## Watch Dog Timer Configuration



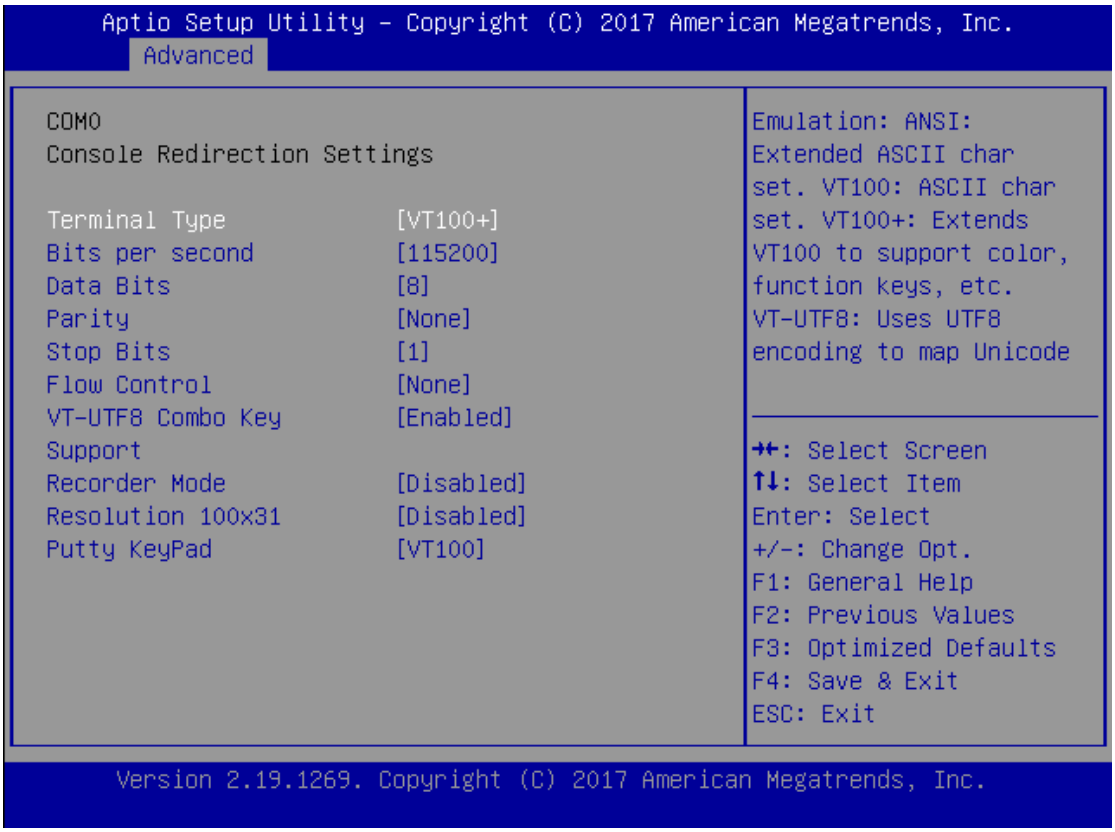

| Feature | Options | Description |
|---|---|---|
| Watch Dog Timer | Enabled<br>Disabled | Enables or disables Watch Dog Timer function |

### 2.3.1 Serial Port Console Redirection




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

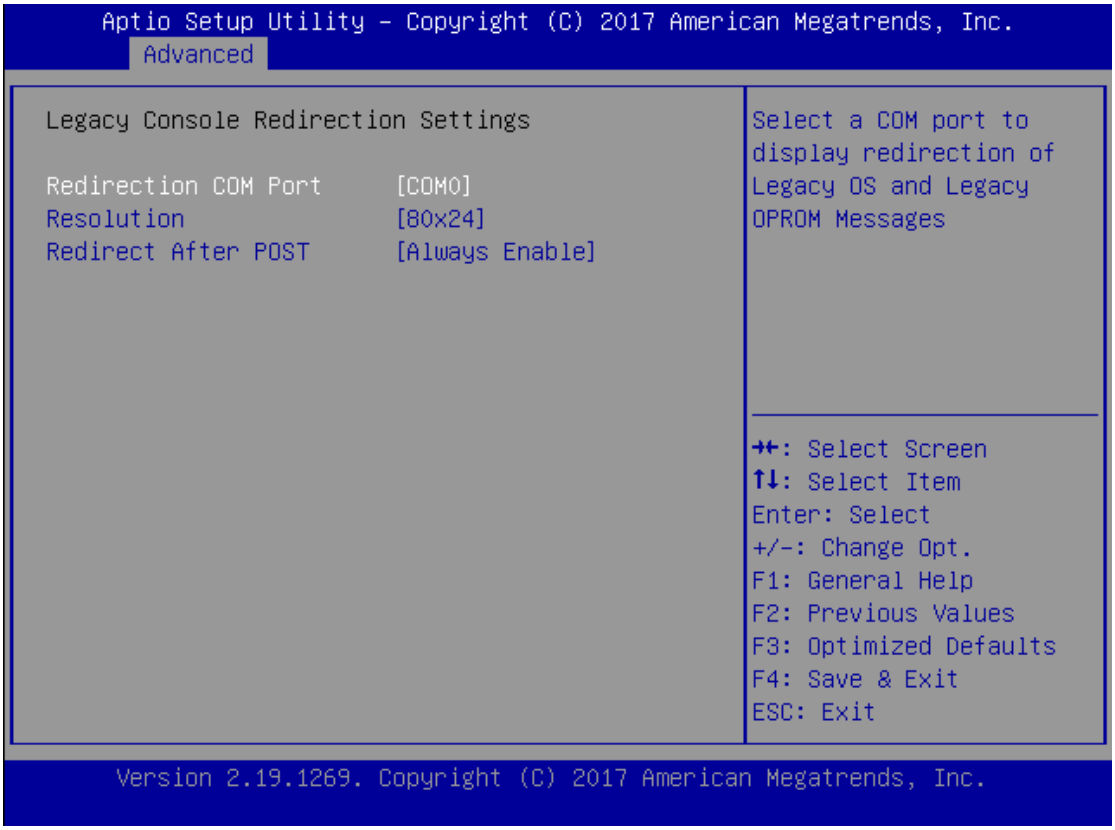
## Console Redirection Settings




| Feature | Options | Description |
|---|---|---|
| Terminal Type | VT100<br>VT100+<br>VT-UTF8<br>ANSI | **VT100**: ASCII char set<br>**VT100+**:Extends VT100 to support color, function keys, etc.<br>**VT-UTF8**:Uses UTF8 encoding to map Unicode chars onto 1 or more bytes<br>**ANSI**: Extended ASCII char set |
| Bits per second | 9600<br>19200<br>38400<br>57600<br>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<br>8 | Data Bits |
| Parity | None<br>Even<br>Odd<br>Mark<br>Space | A parity bit can be sent with the data bits to detect some transmission errors. |
| Stop Bits | 1<br>2 | Indicates the end of a serial data packet. |

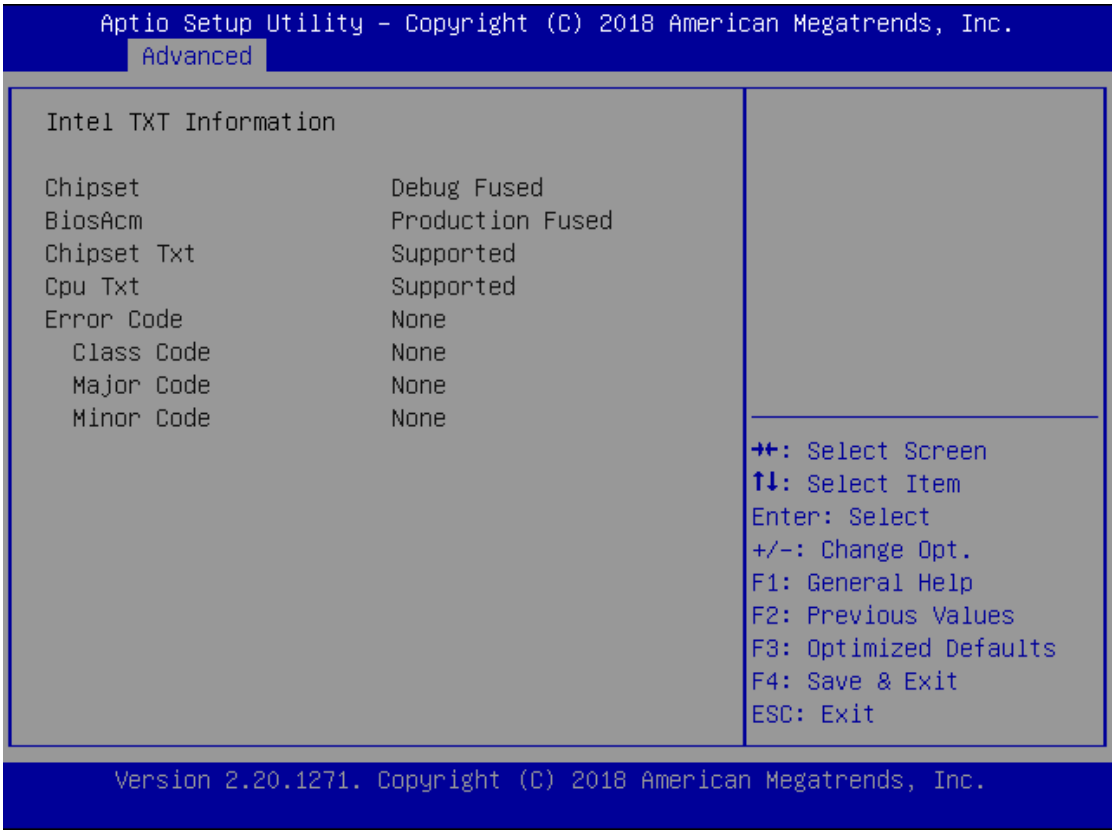
| | | |
|---|---|---|
| Flow Control | None<br>Hardware<br>RTS/CTS | Flow Control can prevent data loss from buffer overflow. |
| VT-UTF8 Combo Key Support | Disabled<br>Enabled | Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals |
| Recorder Mode | Disabled<br>Enabled | With this mode enabled, only text will be sent. This is to capture Terminal data. |
| Resolution 100x31 | Disabled<br>Enabled | Enables or disables extended terminal resolution |
| Putty KeyPad | VT100<br>LINUX<br>XTERM86<br>SCO<br>ESCN<br>VT400 | Selects FunctionKey and KeyPad on Putty. |

## Console Redirection Settings

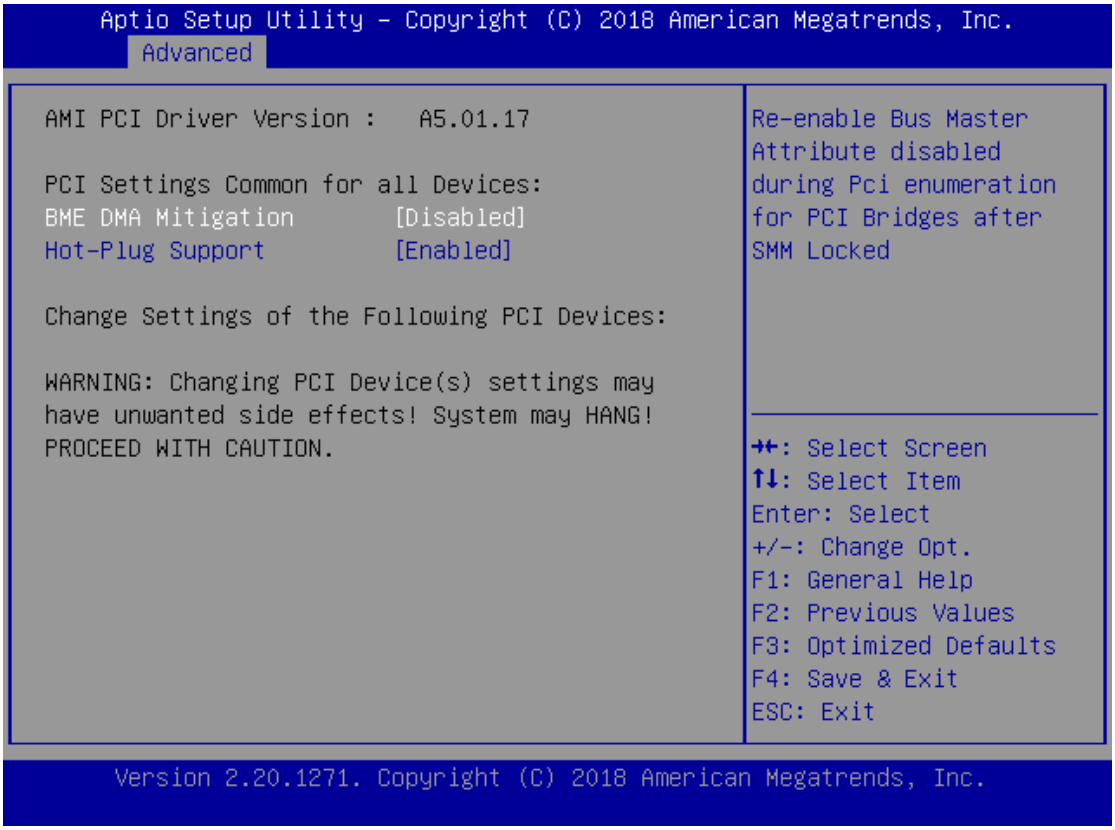



| Feature | Options | Description |
|---|---|---|
| Redirection COM Port | COM0 | Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages. |
| Resolution | 80x24<br>80x25 | On Legacy OS, the Number of Rows and Columns supported redirection. |
| Redirection After BIOS POST | Always Enable<br>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**. |

## Intel TXT Information

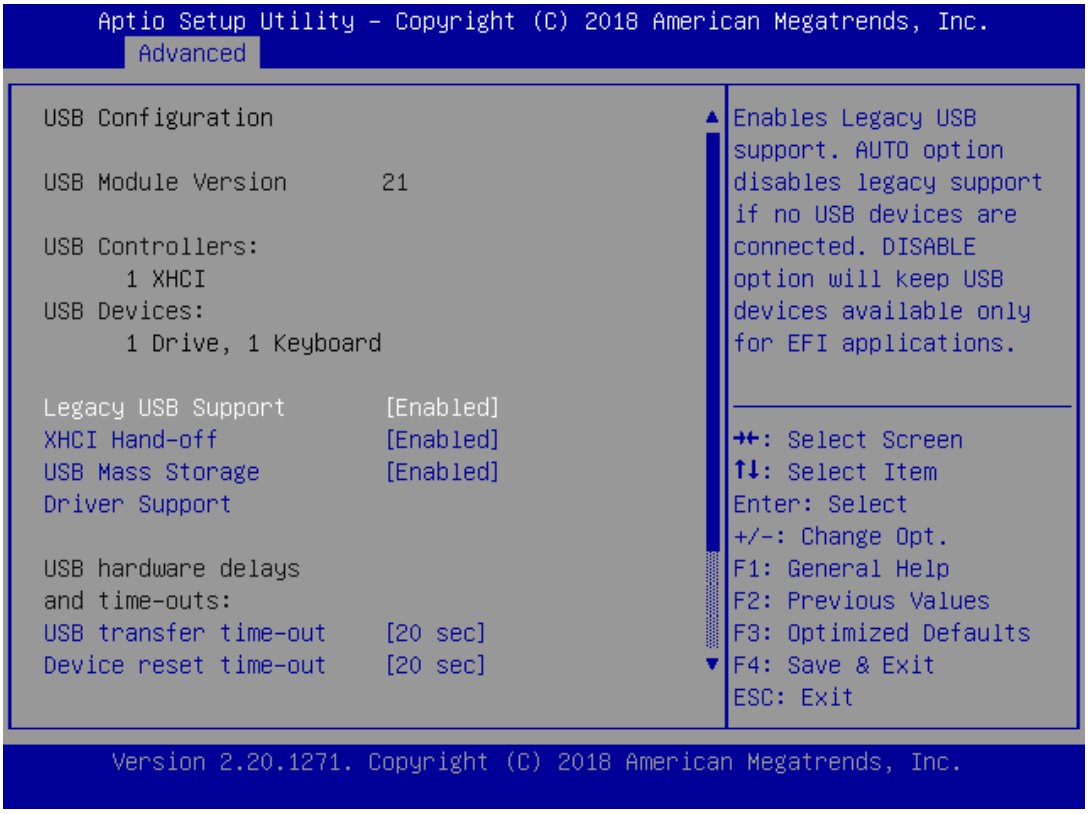


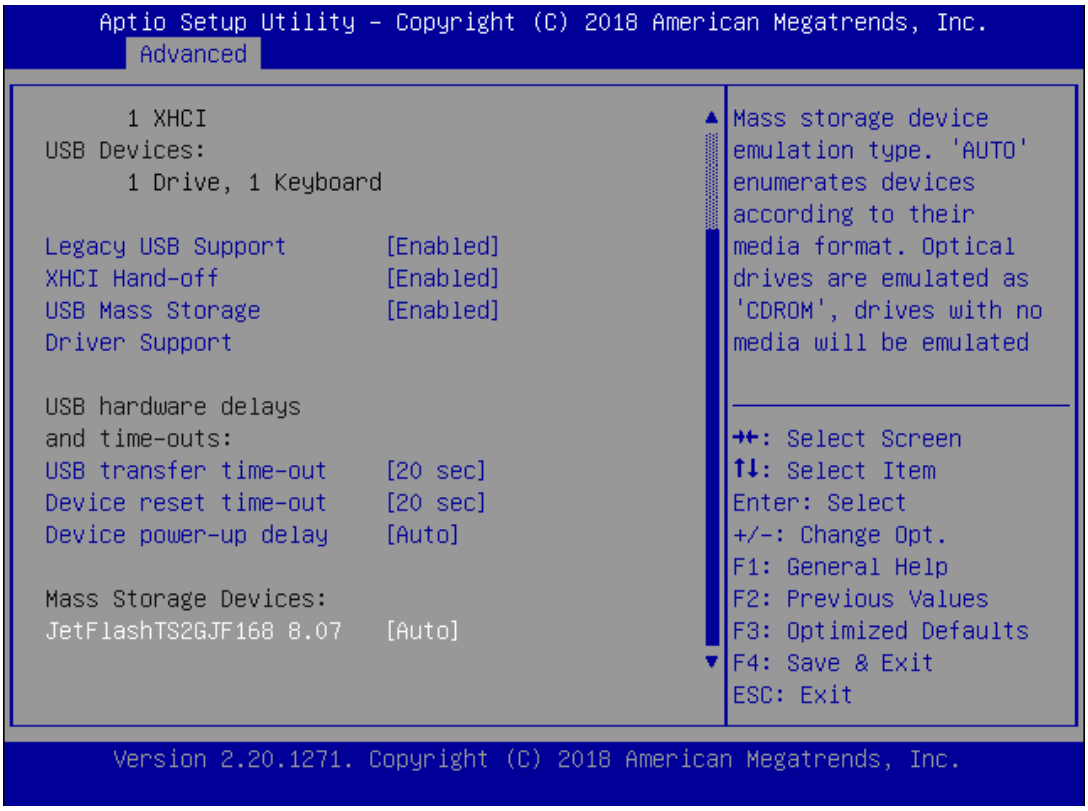
## PCI Subsystem Settings




| Feature | Options | Description |
|---|---|---|
| BME DMA Mitigation | Disabled<br>Enabled | Re-enable Bus Master Attribute disabled during Pci enumeration for PCI Bridges after SMM Locked |
| Hot-Plug Support | Disabled<br>Enabled | Globally Enables or Disables Hot-Plug support for the entire System. If System has Hot-Plug capable Slots and this option set to Enabled, it provides a Setup screen for selecting PCI resource padding for Hot-Plug. |

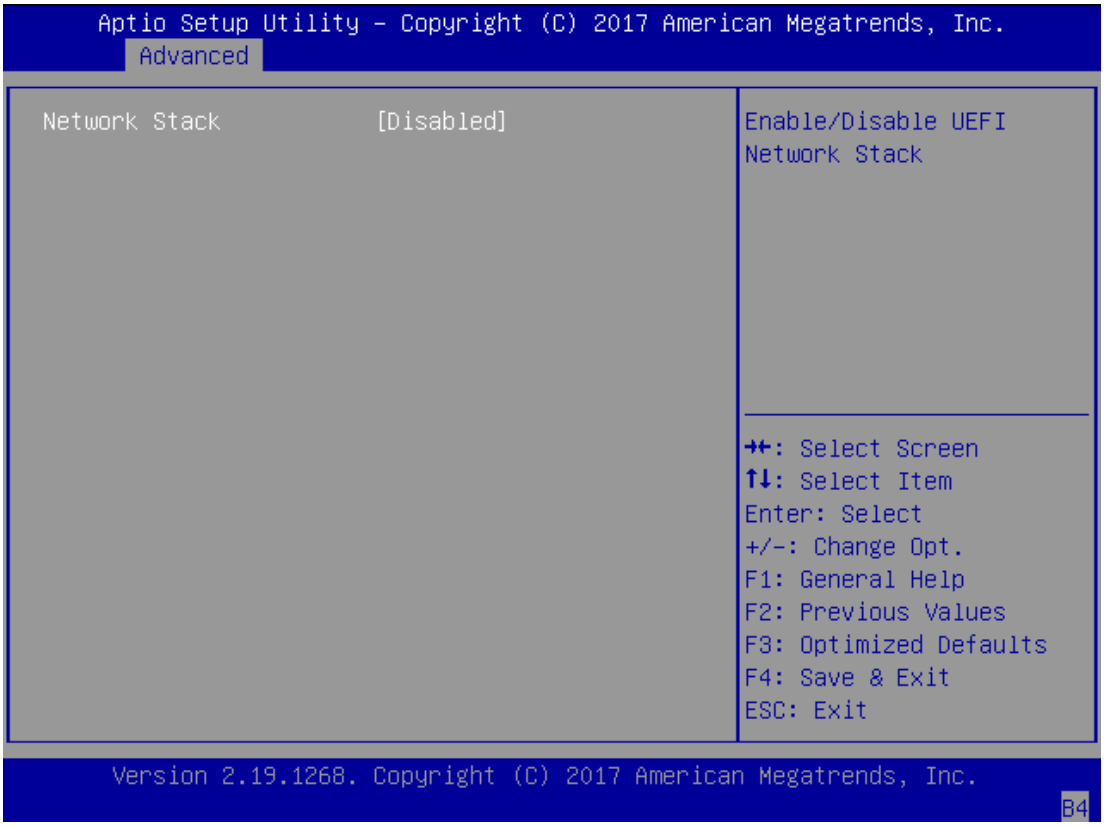
## USB Configuration



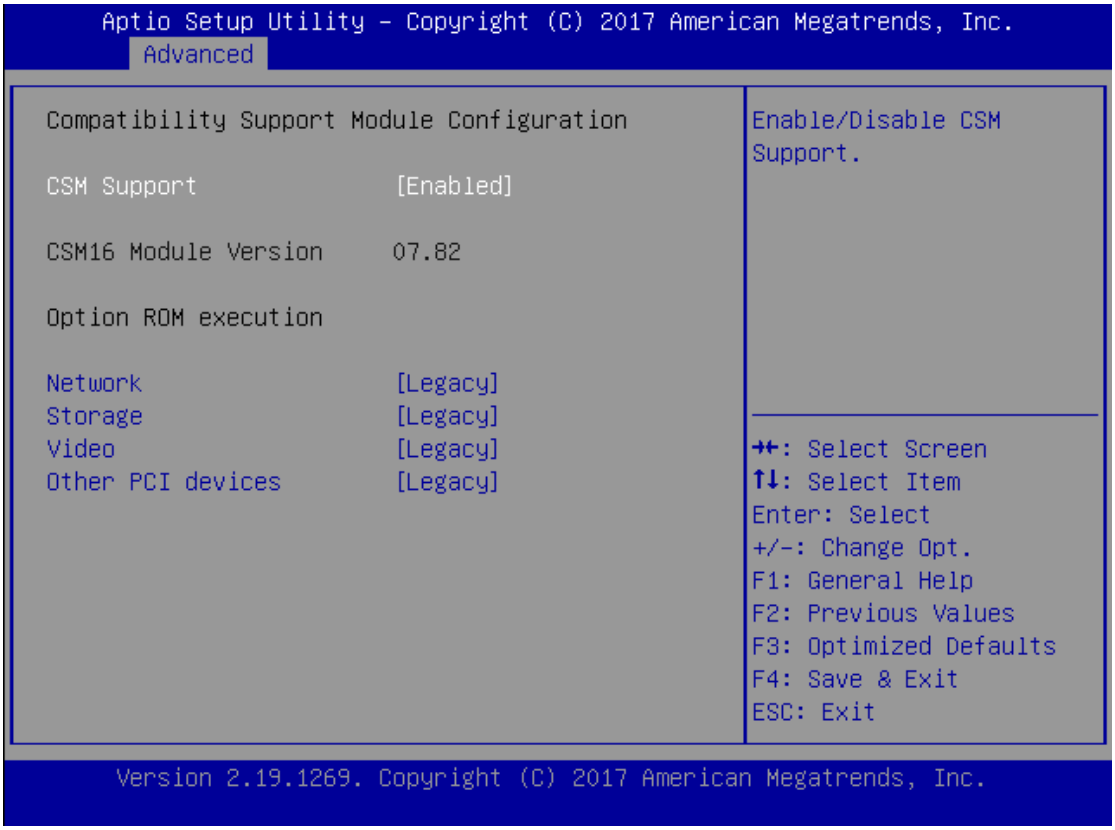
| Feature | Options | Description |
|---|---|---|
| Legacy USB Support | Enabled<br>Disabled<br>Auto | Enables Legacy USB support.<br>**Auto** option disables legacy support if no USB devices are connected;<br>**Disabled** option will keep USB devices available only for EFI applications. |
| XHCI Hand-off | Enabled<br>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<br>Disabled | Enables or disables USB Mass Storage Driver Support. |
| USB transfer time-out | 1 sec<br>5 sec<br>10 sec<br>20 sec | The time-out value for Control, Bulk, and Interrupt transfers |
| Device reset time-out | 1 sec<br>5 sec<br>10 sec<br>20 sec | USB mass storage device Start Unit command time-out |
| Device power-up delay | Auto<br>Manual | Maximum time the device will take before it properly reports itself to the Host Controller. **Auto** uses default value: for a Root port, it is 100 ms, for a Hub port the delay is taken from Hub descriptor. |

## Network Stack Configuration



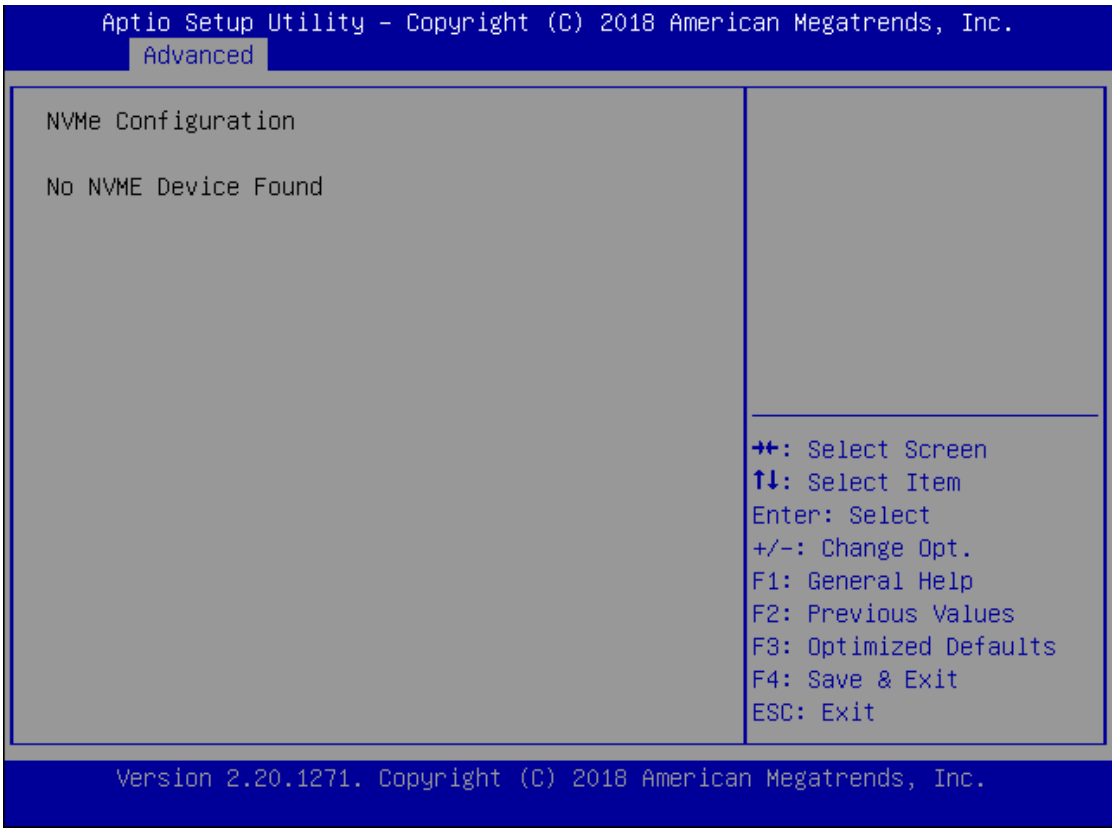

| Feature | Options | Description |
|---|---|---|
| Network Stack | Disabled<br>Enabled | Enables or disables UEFI Network Stack |

## CSM Configuration

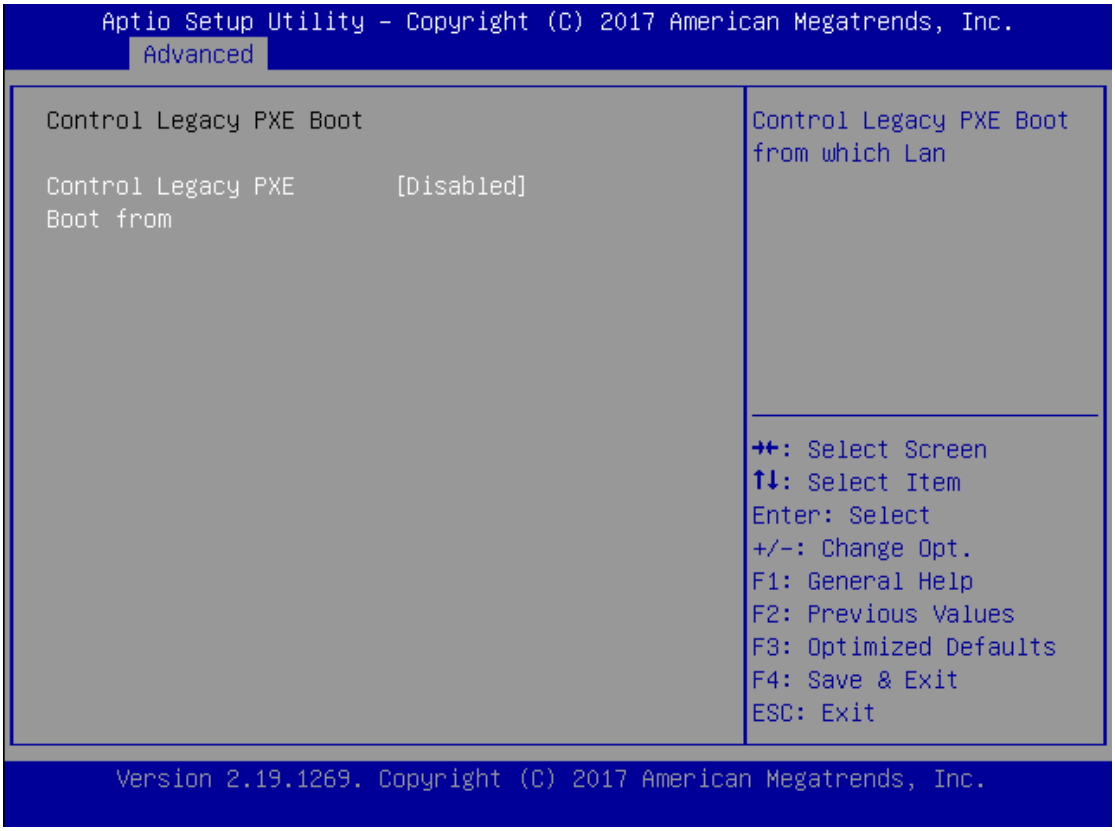



| Feature | Options | Description |
|---|---|---|
| CSM Support | Disabled<br>Enabled | Enables or disables CSM Support |
| Network | Do Not Launch<br>UEFI<br>Legacy | Controls the execution of UEFI and Legacy PXE OpROM |
| Storage | Do Not Launch<br>UEFI<br>Legacy | Controls the execution of UEFI and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

## NVMe Configuration



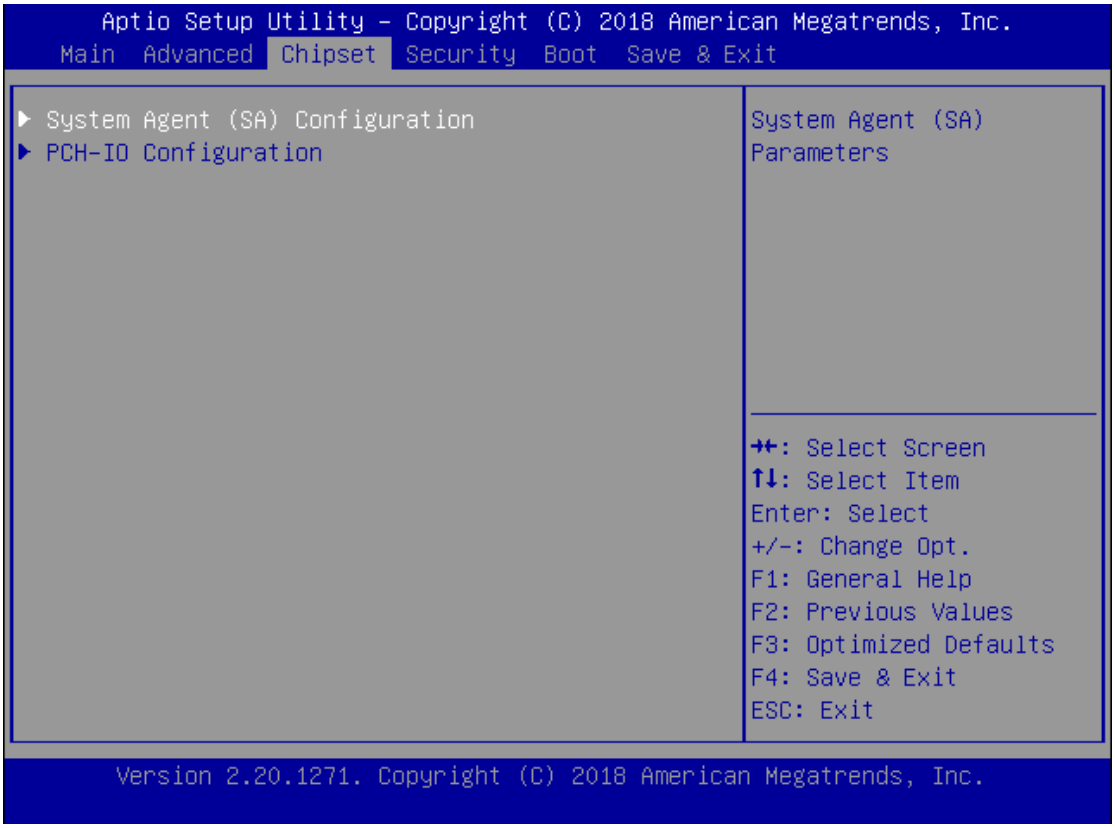
## Control Legacy PXE Boot



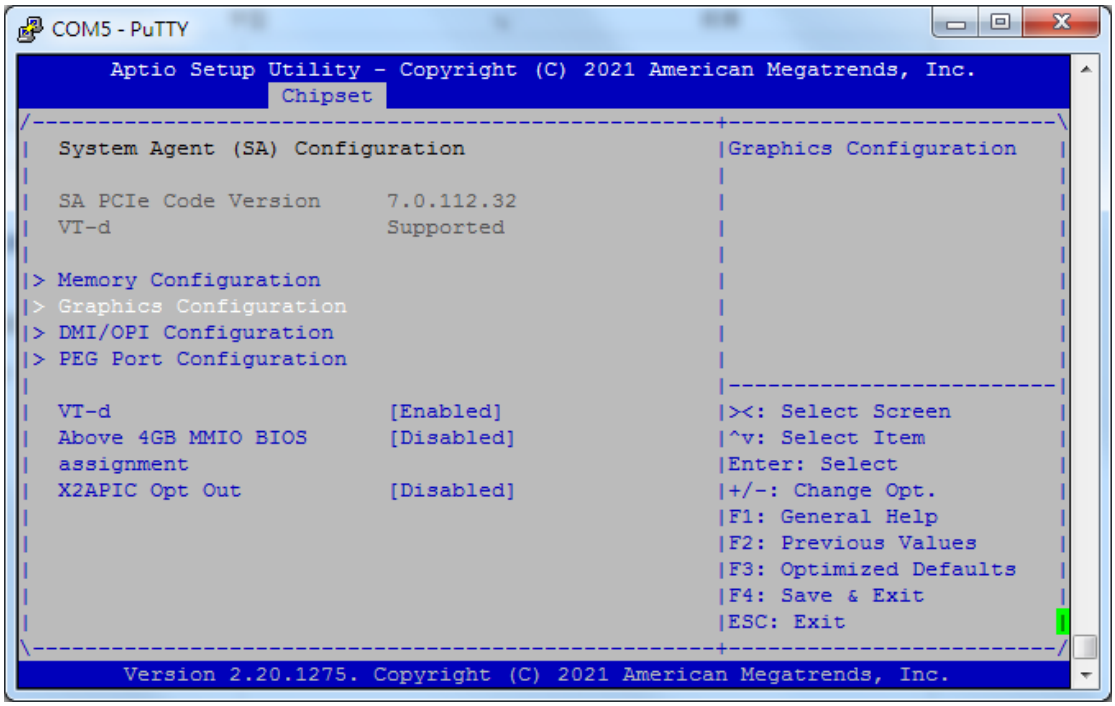

| Feature | Options | Description |
|---|---|---|
| Control Legacy PXE Boot from | Disabled<br>MGMT Lan1<br>MGMT Lan2 | Control Legacy PXE Boot from which Lan |

# Chipset

Select the Chipset 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.

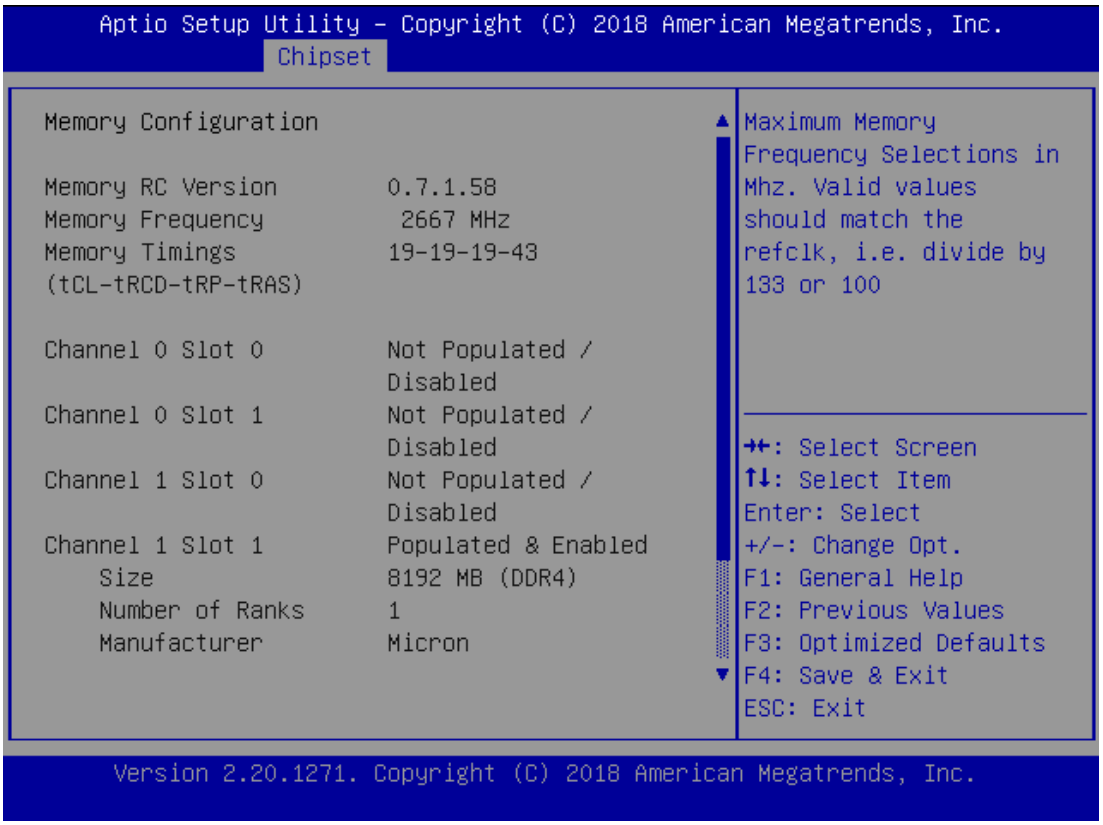


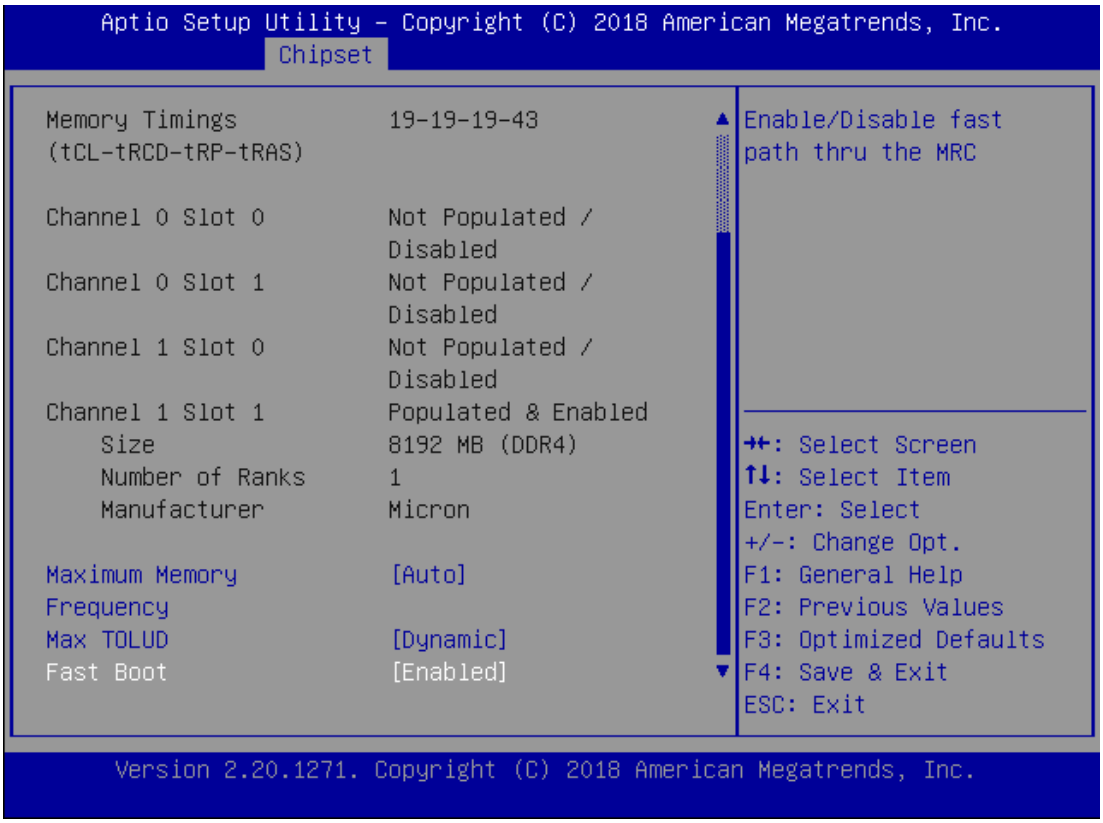
## System Agent (SA) Configuration




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

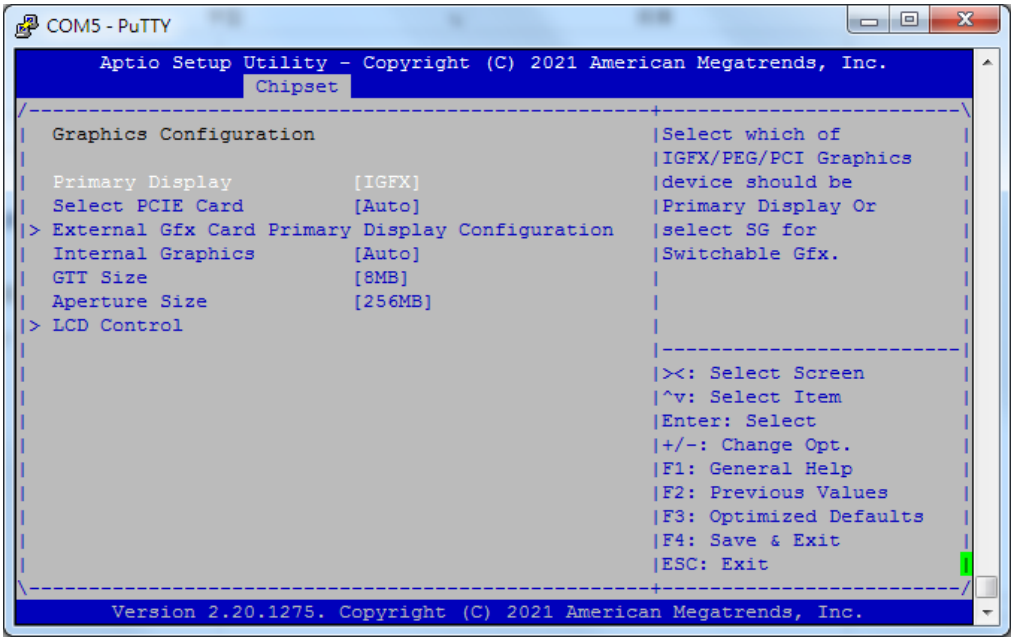
## Memory Configuration



| Feature | Options | Description |
|---|---|---|
| Maximum Memory Frequency | Auto<br>1067<br>~<br>3200 | Maximum Memory Frequency Selections in Mhz. Valid values should match the refclk, i.e. divide by 133 or 100 |
| Max TOLUD | Dynamic<br>1 GB<br>~<br>3.5GB | Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller |
| Fast Boot | Disabled<br>Enabled | Enable/Disable fast path thru the MRC |

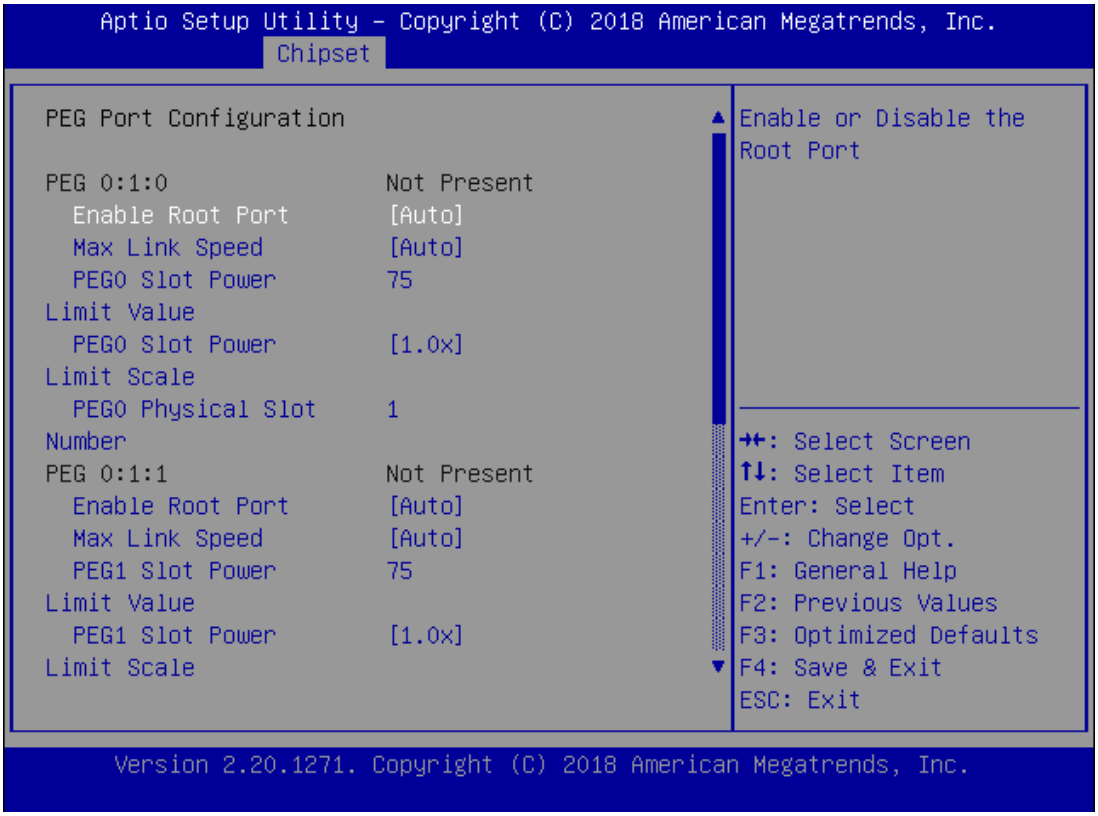
## Graphics Configuration

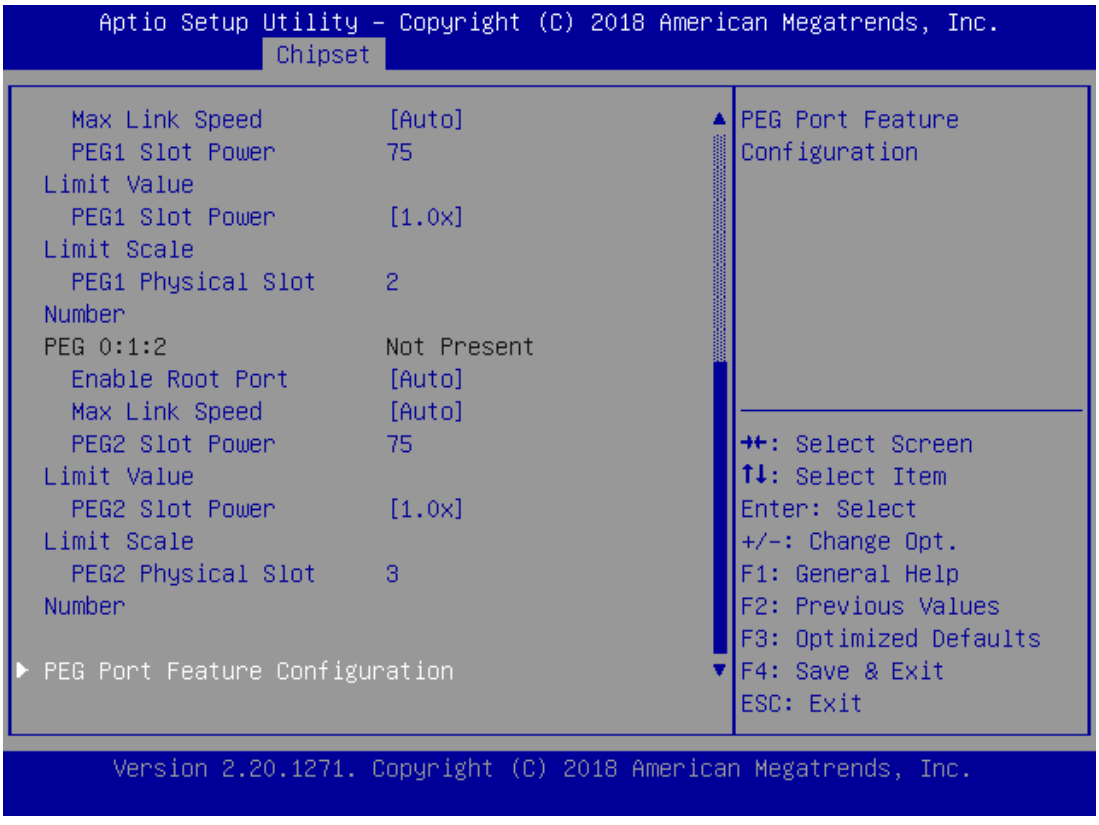



Note: if you have BMC card, and want to use KVM feature, please set Primary Display to PCI.

| Feature | Options | Description |
|---|---|---|
| Primary Display | AUTO<br>IGFX<br>PEGE<br>PCI<br>SG | Select Which of IGFX/PEG/PCI Graphics Device should be Primary Display Or select SG for Switchable Gfx |
| Select PCI card | Auto<br>Elk Creek 4<br>Peg Eval | Select the card used on the platform<br>Auto: Skip GPIO base Power Enable to DGPU<br>Elk Creek 4: DGPU Power Enable = ActiveLow<br>PEG Eval : DGPU Power |
| Internal Graphics | Auto<br>Disable<br>Enable | Keep IGFX enabled based on the setup option. |
| GTT SIZE | 2MB<br>4MB<br>8MB | Select the GTT Size. |
| Aperture Size | 128MB<br>256MB<br>512MB<br>1024MB<br>2048MB | Set Aperture Size note: Above 4GB MMIO BIOS assignment is automatically enable when selecting 2048 MB APERTUNE. To use this feature, please disable CSM support. |

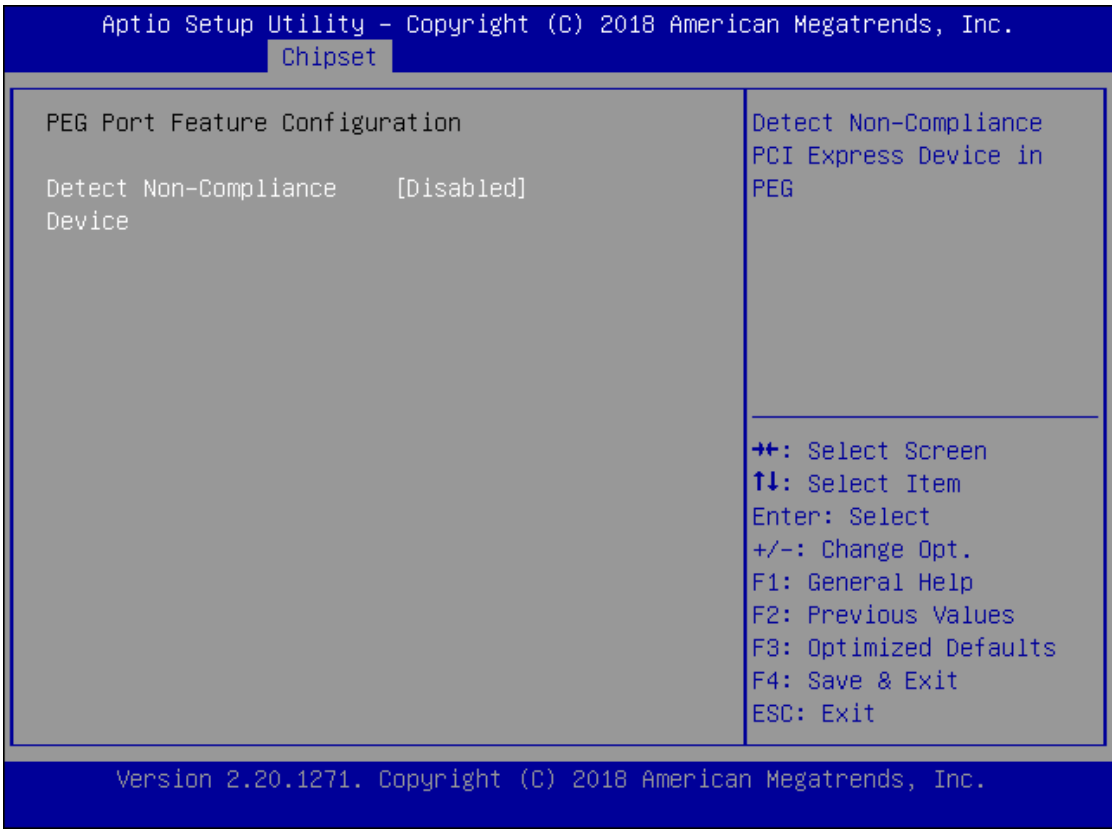
## PEG Port Configuration



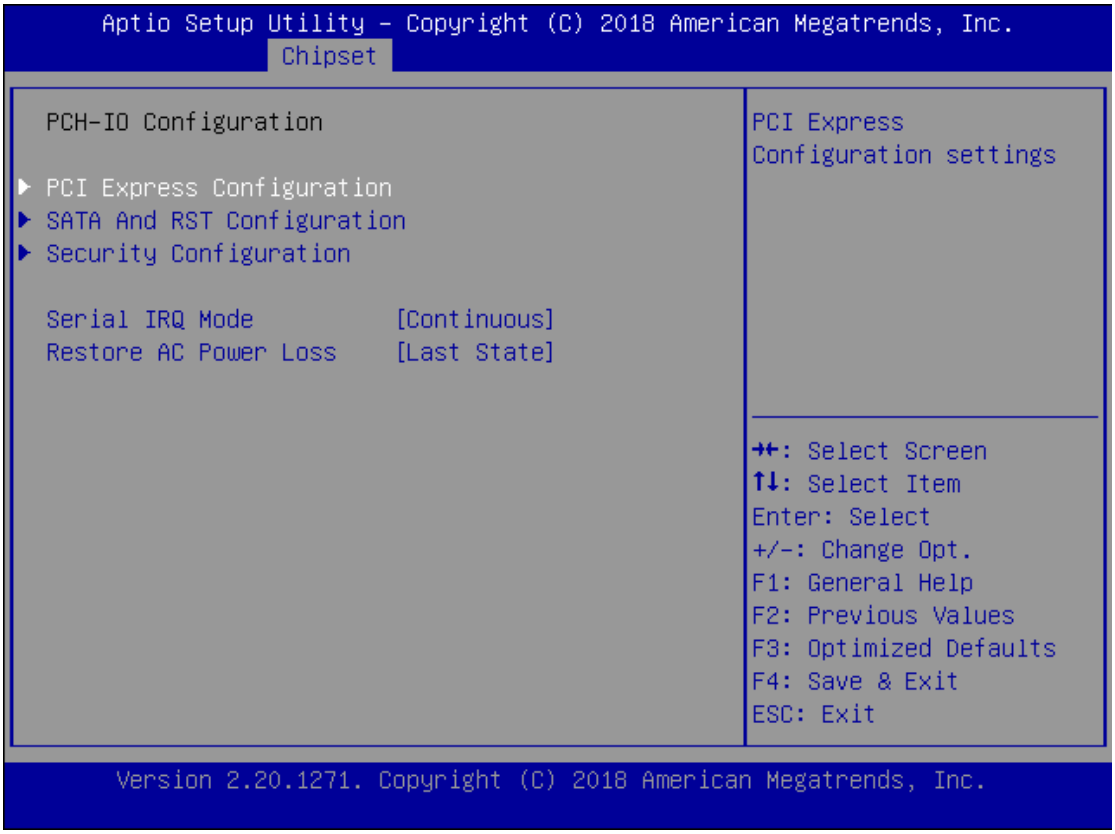
| Feature | Options | Description |
|---|---|---|
| Enable Root Port | Disabled<br>Enabled<br>Auto | Enable or Disable the Root Port |
| Max Link Speed | Auto<br>Gen1<br>Gen2<br>Gen3 | Configure PEG 0:1:0 Max Speed |
| PEG0 Slot Power Limit Value | 75 | Sets the upper limit on power supplied by slot. Power limit (in Watts) is calculated by multiplying this value by the Slot Power Limit Scale. Values 0-255 |
| PEG0 Slot Power Limit Scale | 1.0x<br>0.1x<br>0.01x<br>0.001x | Select the scale used for the Slot Power Limit Value. |
| PEG0 Physical Slot Number | 1 | Set the physical slot number attached to this Port. The number has to be globally unique within the chassis. Values 0-8191 |

## PEG Port Feature Configuration



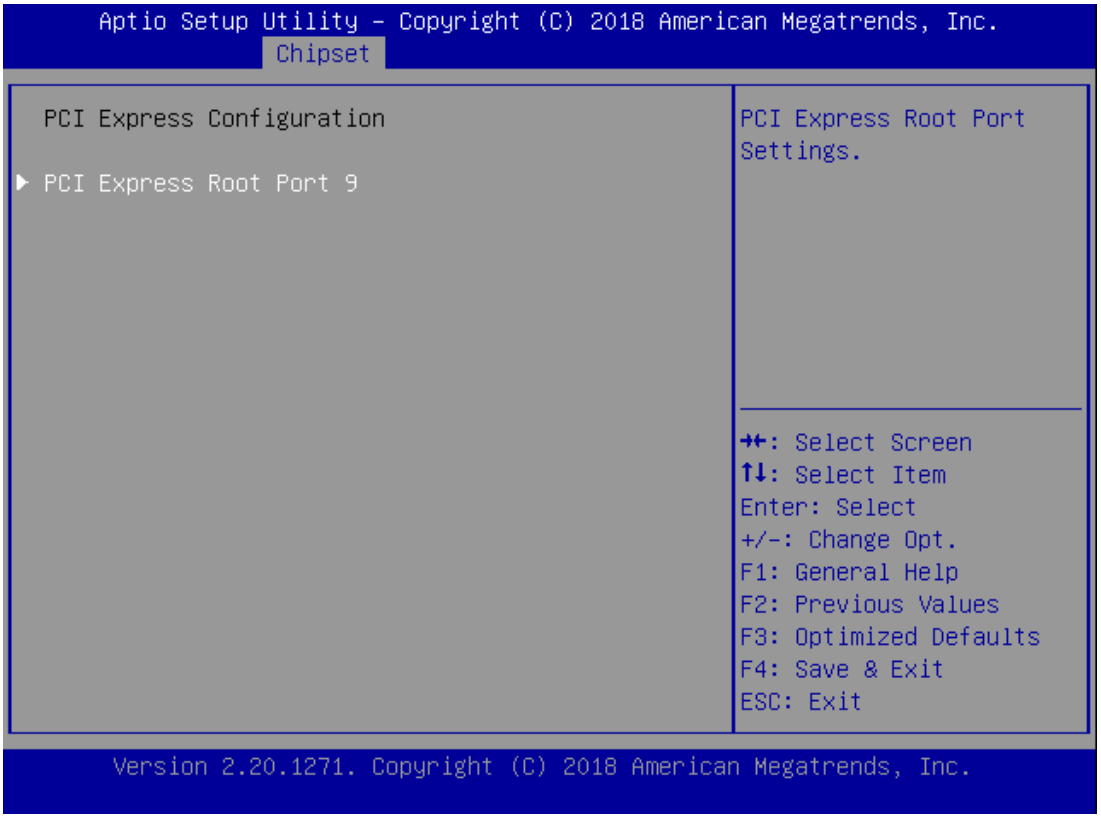

| Feature | Options | Description |
|---|---|---|
| Detect Non-Compliance Device | Disabled<br>Enabled | Detect Non-Compliance PCI Express Device in PEG |

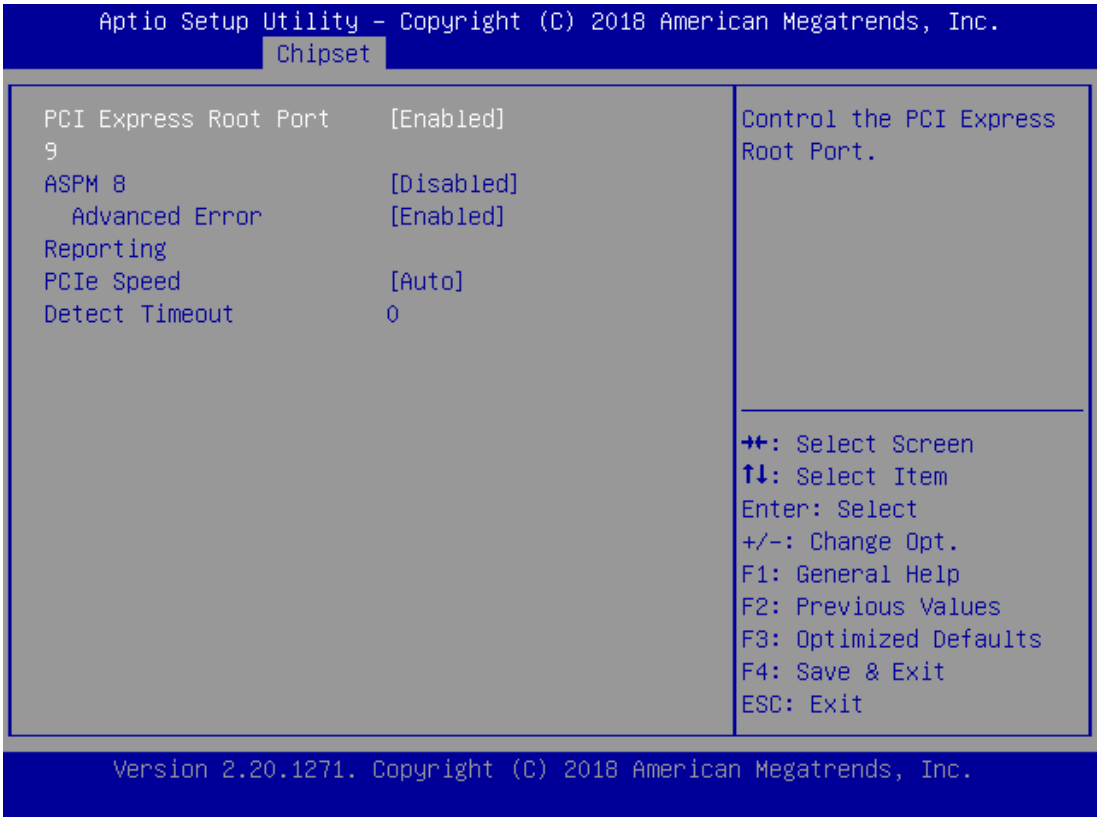
## PCH-IO Configuration




| Feature | Options | Description |
|---|---|---|
| Serial IRQ Mode | Quiet<br>Continuous | Configure Serial IRQ Mode. |
| Restore AC Power Loss | Power On<br>Power Off<br>Last State | Specify what state to go to when power is re-applied after a power failure (G3 state). |

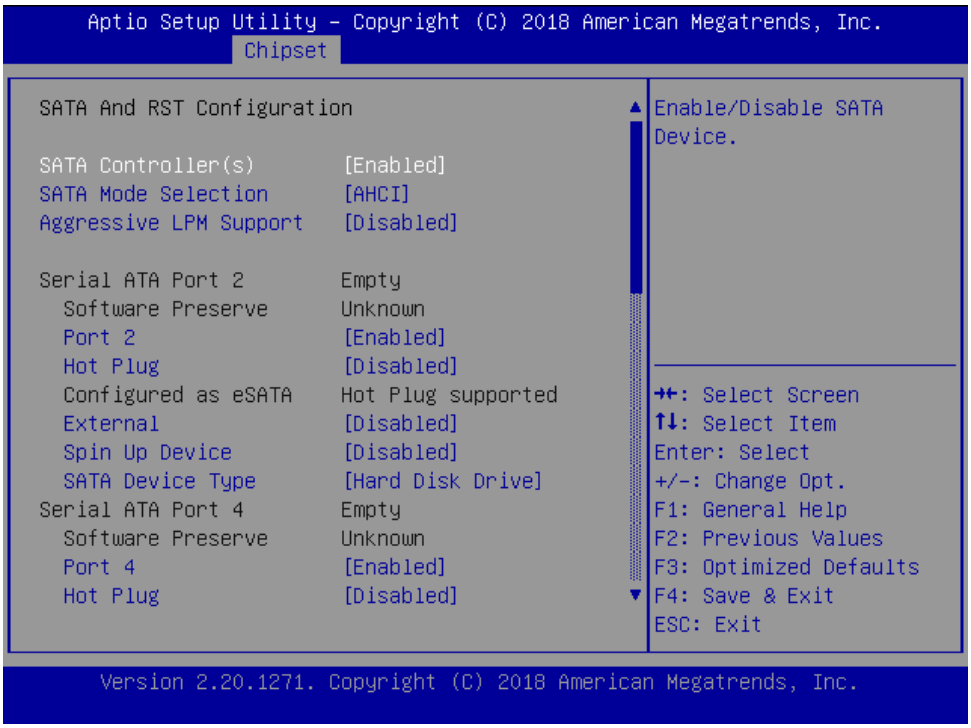
## PCI Express Configuration



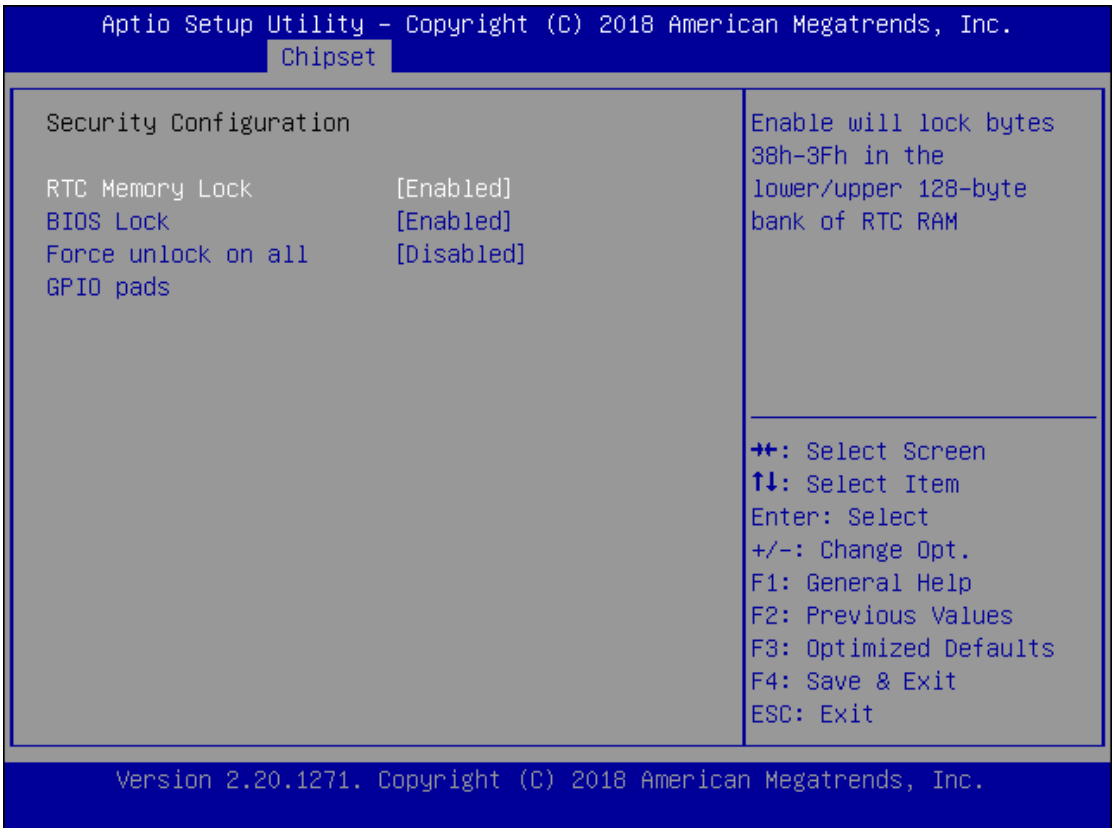
| Feature | Options | Description |
|---|---|---|
| PCI Express Root Port 9 | Disabled<br>Enabled | Control the PCI Express Root Port. |
| ASPM 8 | Disabled<br>L0s<br>L1<br>L0sL1<br>Auto | Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM |
| Advanced Error Reporting | Disabled<br>Enabled | Advanced Error Reporting Enable/Disable. |
| PCIe Speed | Auto<br>Gen1<br>Gen2<br>Gen3 | Configure PCIe Speed |
| Detect Timeout | 0 | The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port. |

## SATA And RST Configuration




| Feature | Options | Description |
|---|---|---|
| SATA Controller(s) | Enabled<br>Disabled | Enable/Disable SATA Device. |
| SATA Mode Selection | AHCI<br>Intel RST | Determines how SATA controller(s) operate. |
| Aggressive LPM Support | Enabled<br>Disabled | Enable PCH to aggressively enter link power state. |
| Port 2 | Enabled<br>Disabled | Enable or Disable SATA Port |
| Hot Plug | Enabled<br>Disabled | Designates this port as Hot Pluggable. |
| External | Enabled<br>Disabled | Marks this port as external. |
| Spin Up Device | Enabled<br>Disabled | If enabled for any of ports, Staggered Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot. |
| SATA Device Type | Hard Disk Drive<br>Solid State Drive | Identify the SATA port is connected to Solid State Drive or Hard Disk Drive |

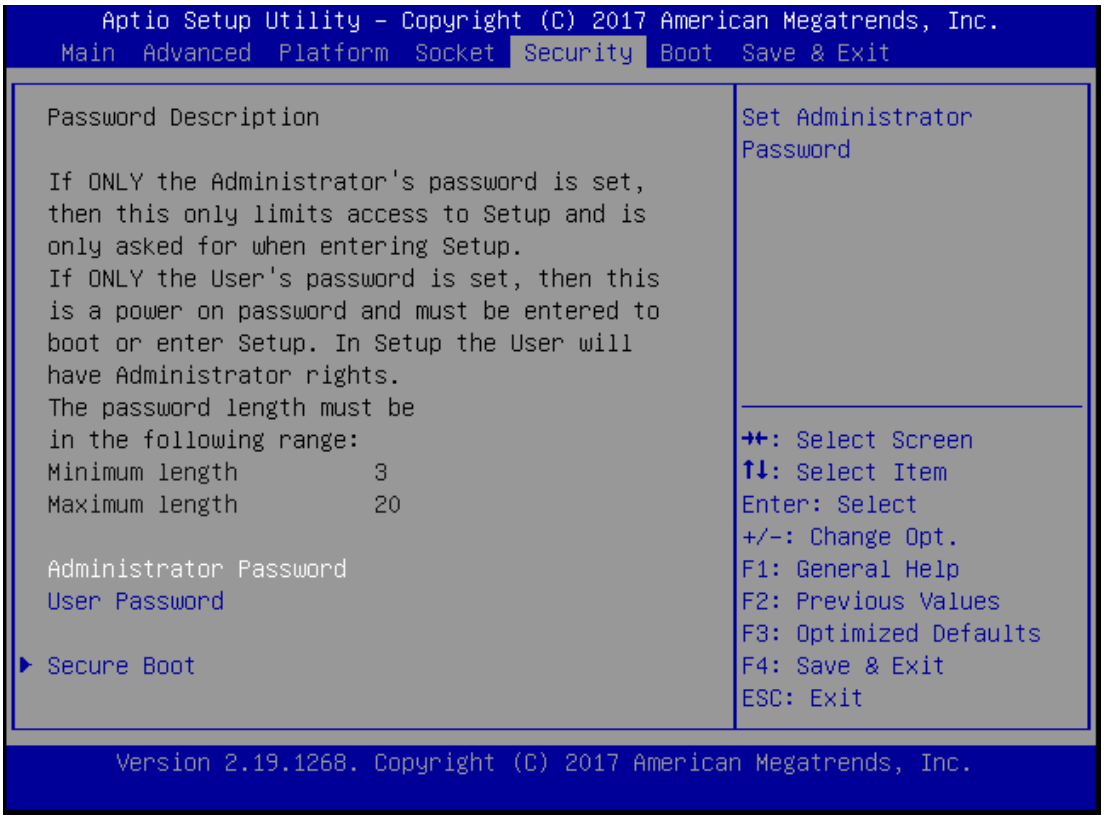
## Security Configuration




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

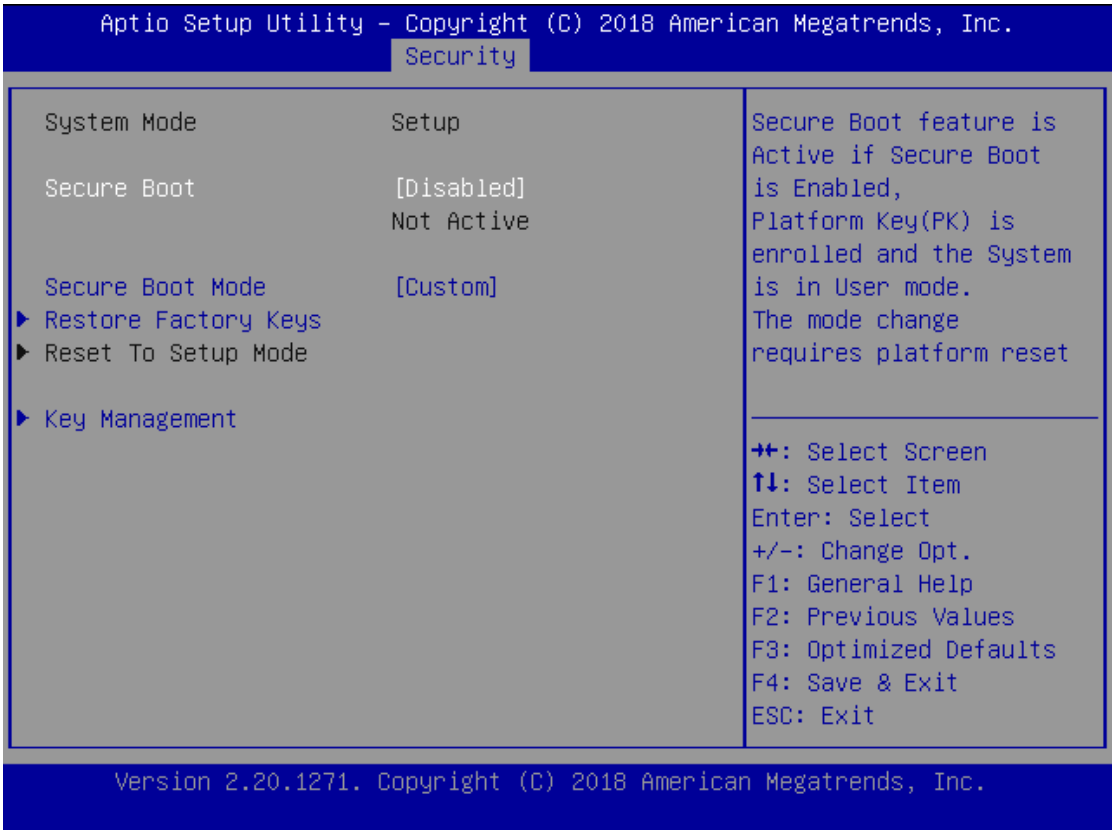
# Security

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



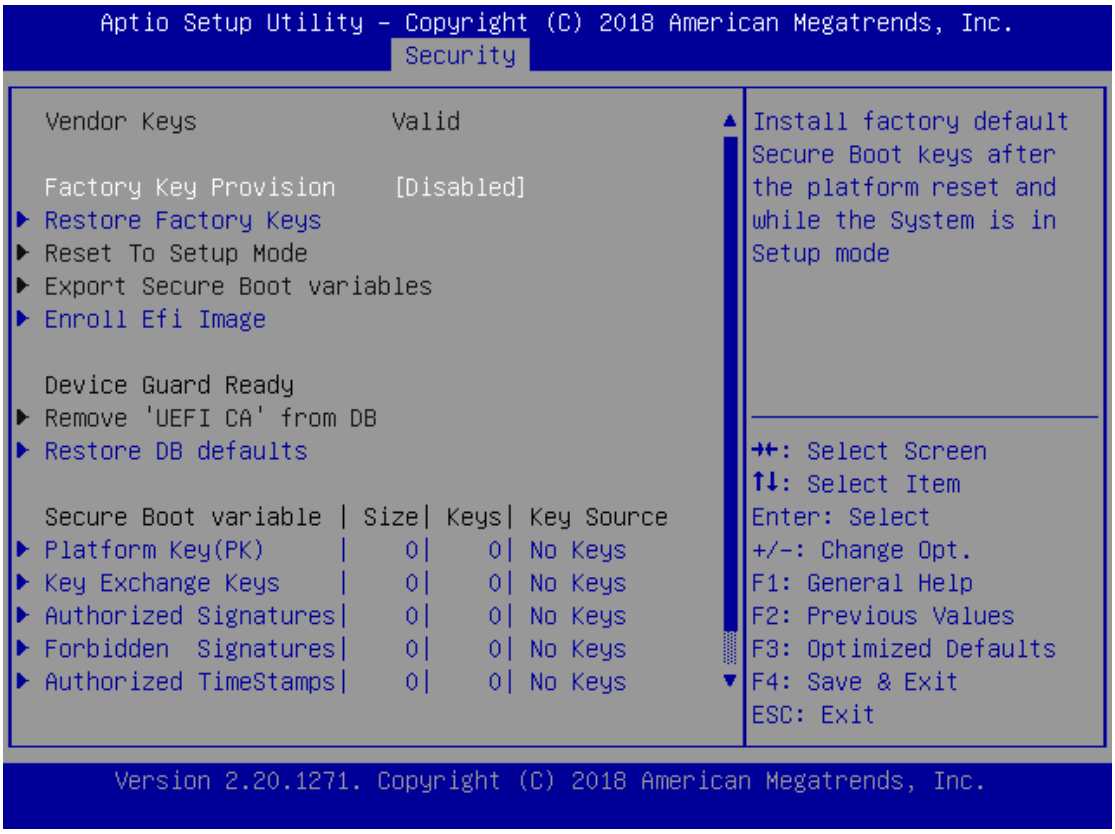

| Feature | Description |
|---|---|
| Administrator Password | If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup. |
| User Password | If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or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

## Secure Boot




| Feature | Options | Description |
|---|---|---|
| Secure Boot Enable | Disabled<br>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<br>Custom | Customizable Secure Boot mode: In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication. |

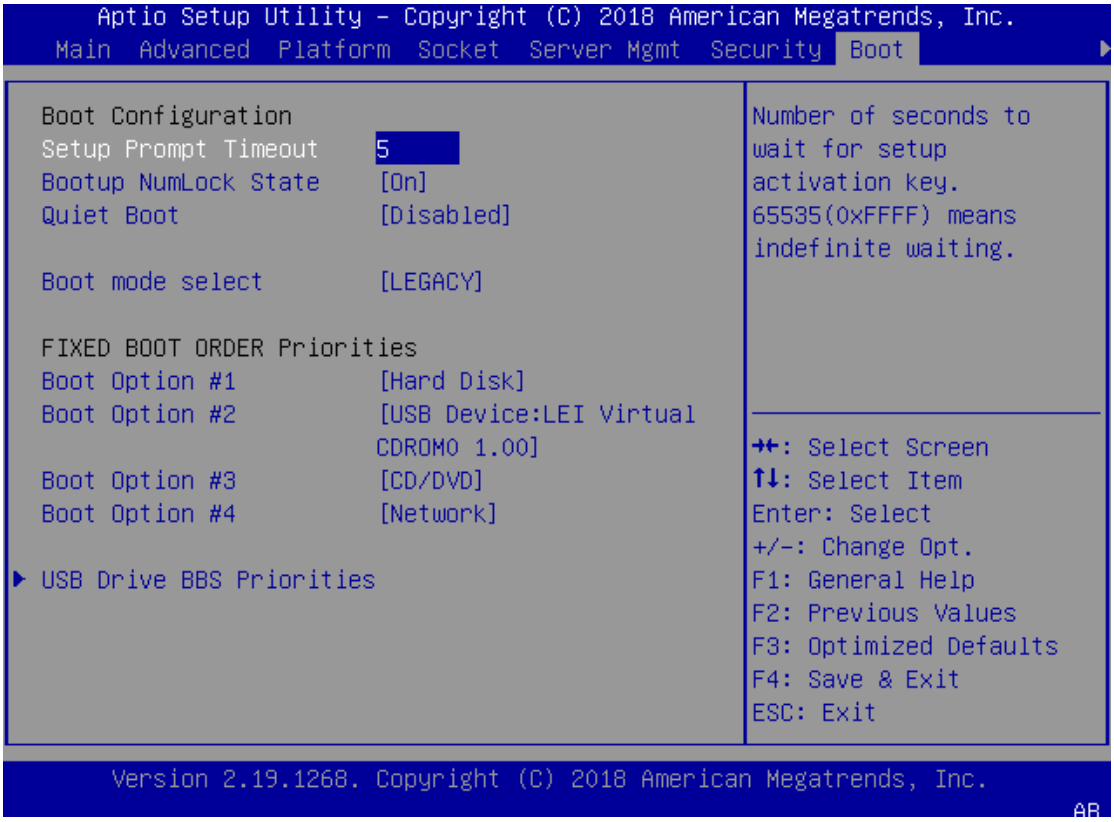
## Key Management




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

# Boot Menu

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

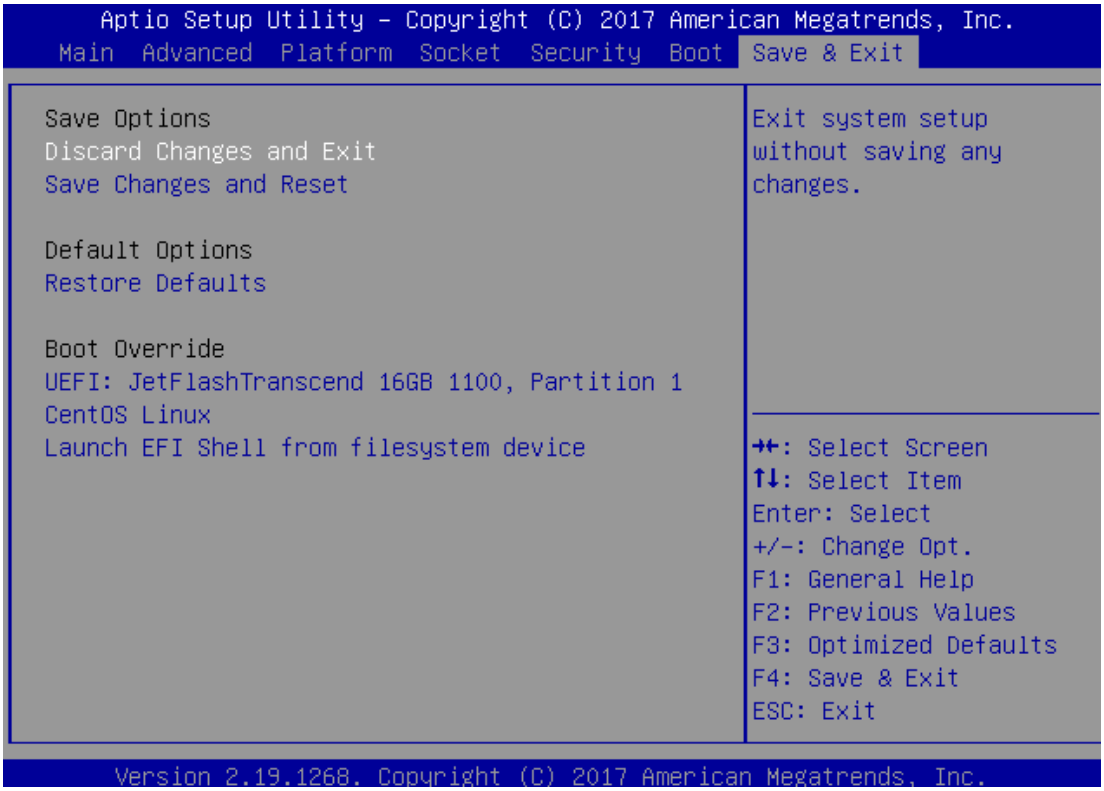



| Feature | Options | Description |
|---|---|---|
| Setup Prompt Timeout | 5 | The number of seconds to wait for setup activation key.<br>65535 means indefinite waiting. |
| Bootup NumLock State | On<br>Off | Select the keyboard NumLock state |
| Quiet Boot | Disabled<br>Enabled | Enables or disables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

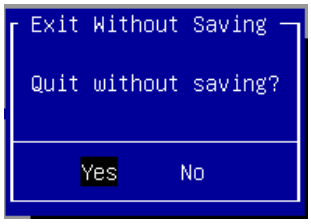
# Save and Exit Menu

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



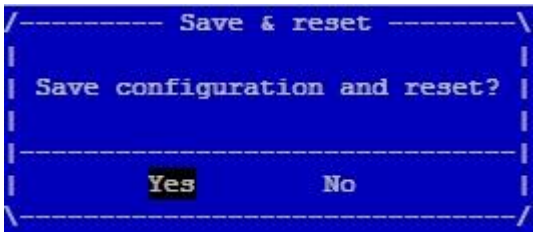

**■ Discard Changes and Exit**

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



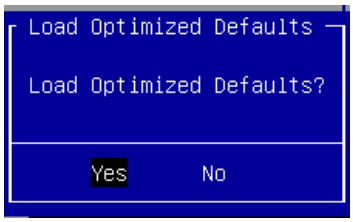
### ■ Save Changes and Reset

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




### ■ Restore Defaults

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




PS: The items under Boot Override were not same with image. It should depend on devices connect on system.

# Command Line Configuration

You can configure the value of voltage, power on delay, DI/DO and others on LEC-2290E via the MCU command line. Below are the requirements to enable the command line

1. Host communication interface: COM#7 (RS-232)
2. Support buad rate: 57600/ 8N1
3. Communication protocol: ANSI terminal.

Use below formula to set/get your command line:

*GET VariableName*

*SET VariableName value*

| MCU Command | Wirte/Read (SET/GET) | VariableName | value | |
|---|---|---|---|---|
| **Startup Voltage(mV)** | SET | STARTUP_VOLTAGE | 0(default) | 0mV |
| | GET | STARTUP_VOLTAGE | | |
| **Shutdowm Voltage(mV)** | SET | INPUT_VOLTAGE_MIN | 8500(default) | 8500mV |
| | GET | INPUT_VOLTAGE_MIN | | |
| **PowerOn Delay (Sec)** | SET | POWERON_DELAY | 4(default) | 4S |
| | GET | POWERON_DELAY | | |
| **PowerOff Delay (Sec)** | SET | SHUTDOWN_DELAY | 4(default) | 4S |
| | GET | SHUTDOWN_DELAY | | |
| **Input Voltage** | GET | INPUT_VOLTAGE | | |
| **Device ID** | GET | DEVICE_ID | LEC-2290_N | |
| **Firmware Version** | GET | VERSION | 0.07B | |
| **Ignition** | GET | IGNITION | | |
| **Digital POE** | SET | DIGITAL_POE | 15(default) | 0~15 |
| | GET | DIGITAL_POE | | |
| **Digital DO** | SET | DIGITAL_DO | 0(default) | 0~255 |
| **Digital DI** | GET | DIGITAL_DI | | |
| **Save flash** | SAVE | | | |

**Example**

**1. The minimum voltage for startup** **Setting: 6V(6000mV)**

| | |
|---|---|
| SET STARTUP_VOLTAGE 6000 | command |
| OK | response massage |
| GET STARTUP_VOLTAGE | command |
| STARTUP_VOLTAGE= 6000 | response massage |

**2. The delay time for POWERON_DELAY state** **Setting: 4 S**

| | |
|---|---|
| SET POWERON_DELAY 4 | command |
| OK | response massage |
| GET POWERON_DELAY | command |
| POWERON_DEALY= 4 | response massage |

**3. Device ID**

| | |
|---|---|
| GET DEVICE_ID | command |
| DEVICE_ID= LEC-2290_N | response massage |

**4. Firmware Version**

| | |
|---|---|
| GET VERSION | command |
| VERSION= 0.07B | response massage |

**5. Ignition state (Read only)**

| | |
|---|---|
| GET IGNITION | command |
| IGNITION= 0 | response massage (0: Ignition off / 1: ignition on) |

**6. Control the ON/OFF of each POE port**

| | |
|---|---|
| SET DIGITAL_POE 1 | command |
| OK | response massage |
| GET DIGITAL_POE | command |
| DIGITAL_POE= 1 | response massage |

---

POE1/bit0 = 1

POE2/bit1 = 2

POE3/bit2 = 4

POE4/bit3 = 8

To achieve POE1~4 enable, please entry value setting at 15.

**7. Write/Read Digital DO state Setting: DO1/DO2/DO3/DO4/DO5/DO6/DO7/DO8**

SET DIGITAL_DO 3 command
OK response massage
GET DIGITAL_DO command
DIGITAL_DO= 3 response massage

---

DO1/bit0 = 1
DO2/bit1 = 2
DO3/bit2 = 4
DO4/bit3 = 8
DO5/bit4 = 16
DO6/bit5 = 32
DO7/bit6 = 64
DO8/bit7 = 128

To achieve DO1~8 enable, please entry value setting at 255.

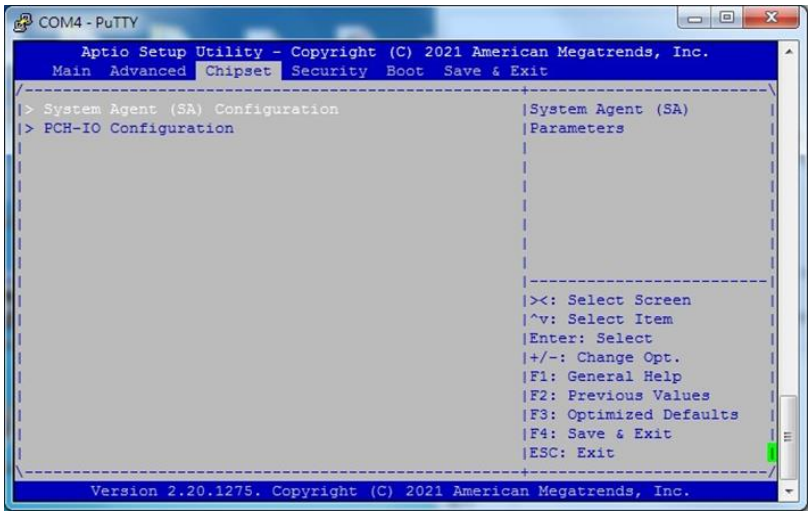
**8. Save setting**

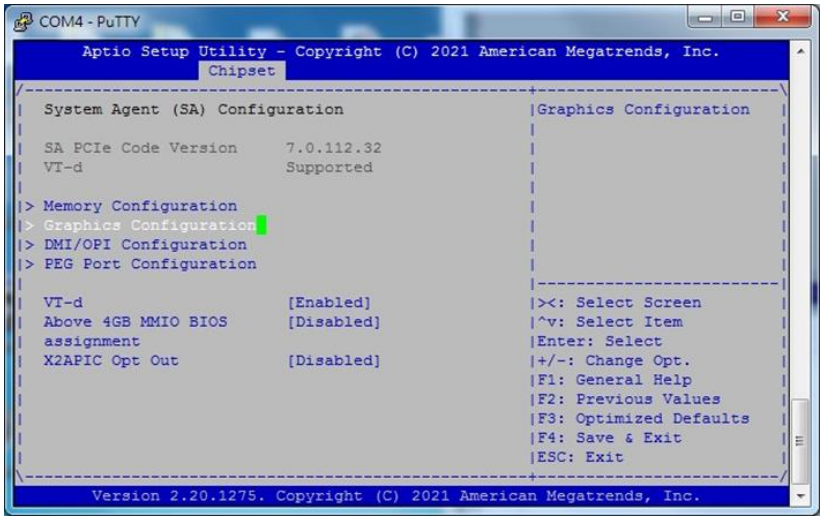
SAVE command
OK Flash Updated. response massage

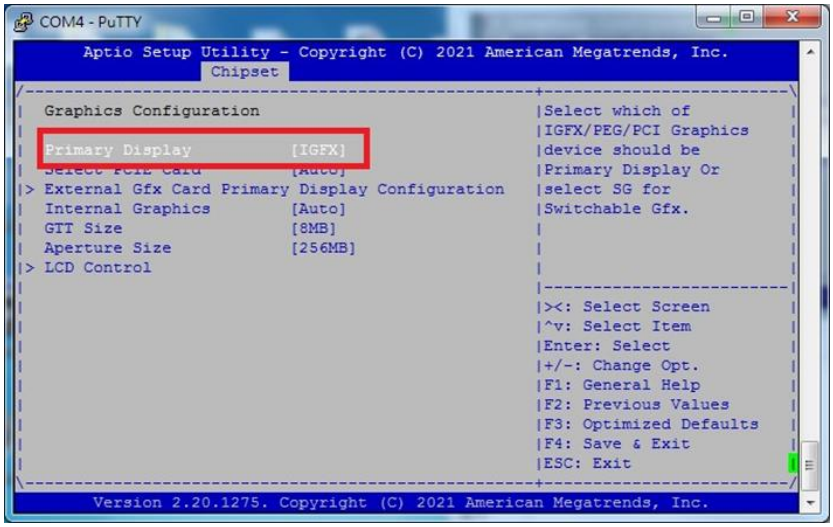
# NVIDIA EGX Installation Guide

## Enable internal HDMI

Please enter BIOS Setup Menu (<Delete> or <tab>), CHIPSET>SYSTEM Agent (SA) Configuration> Graphics Configuration>Primary Display set to **IGFX**.



## Installing the Ubuntu Operating System

```
sudo nano /etc/modprobe.d/blacklist-nouveau.conf
```

Insert the following:

```
blacklist nouveau
options nouveau modeset=0
```

Now execute the below:

```
sudo update-initramfs -u
sudo reboot
```

## Installing Docker-CE

```
sudo apt-get update
sudo apt-get install -y apt-transport-https ca-certificates curl gnupg-agent software-properties-common

curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -

sudo apt-key fingerprint 0EBFCD88
sudo add-apt-repository  "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
sudo apt-get update
sudo apt-get install -y docker-ce=5:19.03.5~3-0~ubuntu-bionic docker-ce-cli=5:19.03.5~3-0~ubuntu-bionic containerd.io
```

Verify that Docker Engine - Community is installed correctly by running the hello-world image:

```
sudo docker run hello-world
```

## Installing Kubernetes

```
sudo systemctl start docker && sudo systemctl enable docker
sudo apt-get update && sudo apt-get install -y apt-transport-https curl

curl -s https://packages.cloud.google.com/apt/doc/apt-key.gpg | sudo apt-key add -

sudo mkdir -p  /etc/apt/sources.list.d/
sudo nano /etc/apt/sources.list.d/kubernetes.list
```

Add the following lines in kubernetes.list and save the file:

```
deb https://apt.kubernetes.io/ kubernetes-xenial main
```

Now execute the below:

```
sudo apt-get update
sudo apt-get install -y -q kubelet=1.17.5-00 kubectl=1.17.5-00 kubeadm=1.17.5-00
sudo apt-mark hold kubelet kubeadm kubectl
```

### Initializing the Kubernetes cluster to run as master

```
sudo swapoff -a
sudo nano /etc/fstab
```

Add a # before all the lines that start with /swap. # is a comment and the result should look something like this:

```
UUID=e879fda9-4306-4b5b-8512-bba726093f1d / ext4 defaults 0 0
UUID=DCD4-535C /boot/efi vfat defaults 0 0
#/swap.img       none    swap    sw      0       0
```

Execute the following command:

```
sudo kubeadm init --pod-network-cidr=192.168.0.0/16
```

Following the instructions in the output, execute the commands as shown below:

```
mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config

kubectl apply -f https://docs.projectcalico.org/v3.11/manifests/calico.yaml

kubectl get pods --all-namespaces
```

Output:

```
lanner@lanner:~$ kubectl get pods --all-namespaces
NAMESPACE     NAME                                   READY   STATUS     RESTARTS   AGE
kube-system   calico-kube-controllers-79bc685f4c-cf2j9   0/1     Pending    0          6s
kube-system   calico-node-zrzw6                      0/1     Init:0/3   0          6s
kube-system   coredns-6955765f44-bt6sd               0/1     Pending    0          88s
kube-system   coredns-6955765f44-r8kmd               0/1     Pending    0          88s
kube-system   etcd-lanner                            1/1     Running    0          81s
kube-system   kube-apiserver-lanner                  1/1     Running    0          81s
kube-system   kube-controller-manager-lanner         1/1     Running    0          81s
kube-system   kube-proxy-4pj2c                       1/1     Running    0          88s
kube-system   kube-scheduler-lanner                  1/1     Running    0          81s
lanner@lanner:~$
```

Execute the below:

```
kubectl get nodes
kubectl taint nodes --all node-role.kubernetes.io/master-
```

### Installing Helm

```
sudo wget https://get.helm.sh/helm-v3.1.0-linux-amd64.tar.gz
sudo tar -zxvf helm-v3.1.0-linux-amd64.tar.gz
sudo mv linux-amd64/helm /usr/local/bin/helm
```

### Installing the GPU Operator

```
helm repo add nvidia https://nvidia.github.io/gpu-operator
helm repo update
helm install --version 1.1.7 --devel nvidia/gpu-operator --wait --generate-name

kubectl get pods --all-namespaces | grep -v kube-system
```

Output:

```
lanner@lanner:~$ kubectl get pods --all-namespaces | grep -v kube-system
NAMESPACE                NAME                                                        READY   STATUS             RESTARTS   AGE
default                  gpu-operator-1626833565-node-feature-discovery-master-c44bkjfdg   1/1     Running            0          24m
default                  gpu-operator-1626833565-node-feature-discovery-worker-llrdz      1/1     Running            0          24m
default                  gpu-operator-74c97448d9-mw9wz                               1/1     Running            0          24m
default                  nvidia-smi                                                  0/1     ImagePullBackOff   0          13m
gpu-operator-resources   nvidia-container-toolkit-daemonset-zkm2q                    1/1     Running            0          24m
gpu-operator-resources   nvidia-dcgm-exporter-6b9c2                                  1/1     Running            0          24m
gpu-operator-resources   nvidia-device-plugin-daemonset-wcgx9                        1/1     Running            0          24m
gpu-operator-resources   nvidia-device-plugin-validation                             0/1     Completed          0          24m
gpu-operator-resources   nvidia-driver-daemonset-9pc2k                               1/1     Running            0          24m
gpu-operator-resources   nvidia-driver-validation                                    0/1     Completed          0          24m
lanner@lanner:~$
```

## Validating the Installation

Example 1: nvidia-smi

```
# 原本指令
# kubectl run nvidia-smi --rm -t -i --restart=Never --image=nvidia/cuda --limits=nvidia.com/gpu=1 -- nvidia-smi
kubectl run nvidia-smi --rm -t -i --restart=Never --image=nvidia/cuda:11.0.3-base-ubuntu18.04 --limits=nvidia.com/gpu=1 -- nvidia-smi
```

output:

```
lanner@lanner:~$ kubectl run nvidia-smi --rm -t -i --restart=Never --image=nvidia/cuda:11.0.3-base-ubuntu18.04 --limits=nvid
 -- nvidia-smi
Wed Jul 21 03:25:01 2021
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 440.64.00    Driver Version: 440.64.00    CUDA Version: 11.0     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|===============================+======================+======================|
|   0  Tesla T4            On   | 00000000:01:00.0 Off |                    0 |
| N/A   35C    P8     9W /  70W |      0MiB / 15109MiB |      0%      Default |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                       GPU Memory |
|  GPU       PID   Type   Process name                             Usage      |
|=============================================================================|
|  No running processes found                                                 |
+-----------------------------------------------------------------------------+
pod "nvidia-smi" deleted
lanner@lanner:~$
```

Example 2: CUDA-Vector-Add

```
sudo nano cuda-samples.yaml
```

Add the below and save it as cuda-samples.yaml:

```
apiVersion: v1
kind: Pod
metadata:
  name: cuda-vector-add
spec:
  restartPolicy: OnFailure
  containers:
    - name: cuda-vector-add
      image: "k8s.gcr.io/cuda-vector-add:v0.1"
```

Run the below command to create a sample gpu pod:

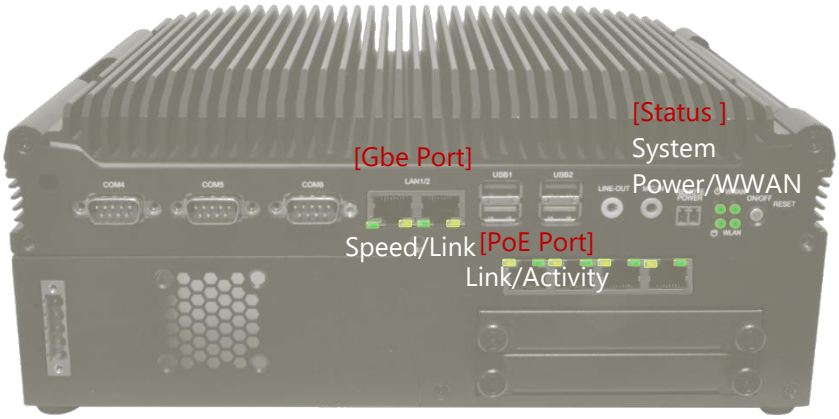
```
sudo kubectl apply -f cuda-samples.yaml
# Check if the cuda-samples pod was created:
kubectl get pods
```

Output:

```
lanner@lanner: ~
lanner@lanner:~$ kubectl get pods
NAME                                                        READY   STATUS      RESTARTS   AGE
cuda-vector-add                                             0/1     Completed   0          26s
gpu-operator-1626833565-node-feature-discovery-master-c44bkjfdg   1/1     Running     0          32m
gpu-operator-1626833565-node-feature-discovery-worker-llrdz      1/1     Running     0          32m
gpu-operator-74c97448d9-mw9wz                               1/1     Running     0          32m
```

# APPENDIX A: LED INDICATOR EXPLANATIONS

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




## Status LED

| LED | COLOR | LED ACTION | DESCRIPTION |
|---|---|---|---|
| **Power** | **Green** | Steady | System ON |
| | **OFF** | N/A | System OFF |
| **Storage** | **Green** | Blinking | Data Access Successful |
| | **OFF** | N/A | No Data Access |
| **WWAN (4G)** | Programmable LED | | |
| **WLAN (Wi-Fi)** | Programmable LED | | |

## GbE Port LED

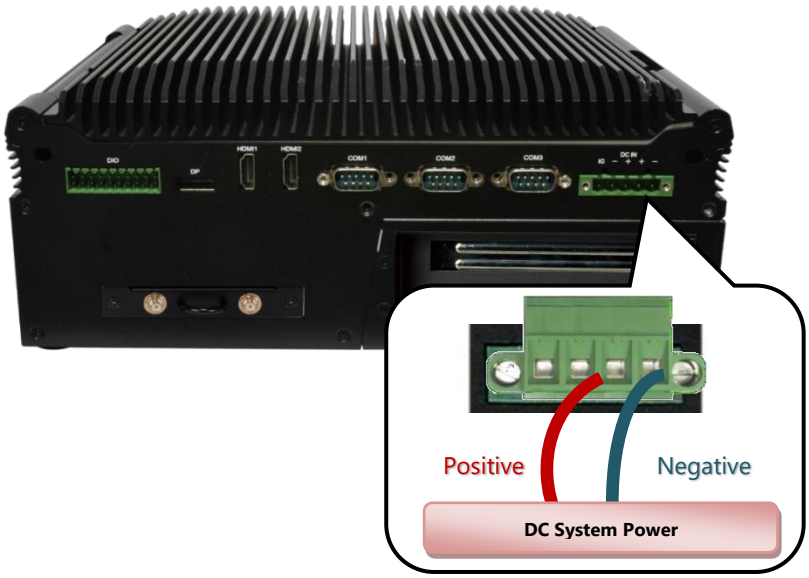
| LED | COLOR | LED ACTION | DESCRIPTION |
|---|---|---|---|
| **Link Activity** | **Amber** | Blinking | Active |
| | **Amber** | Steady | Not Active |
| | **OFF** | N/A | No Link |
| **Speed** | **Amber** | Steady | 1000Mbps Connection Successful |
| | **Green** | Steady | 100Mbps Connection Successful |
| | **OFF** | N/A | 10Mbps Connection Successful |

## PoE Port LED

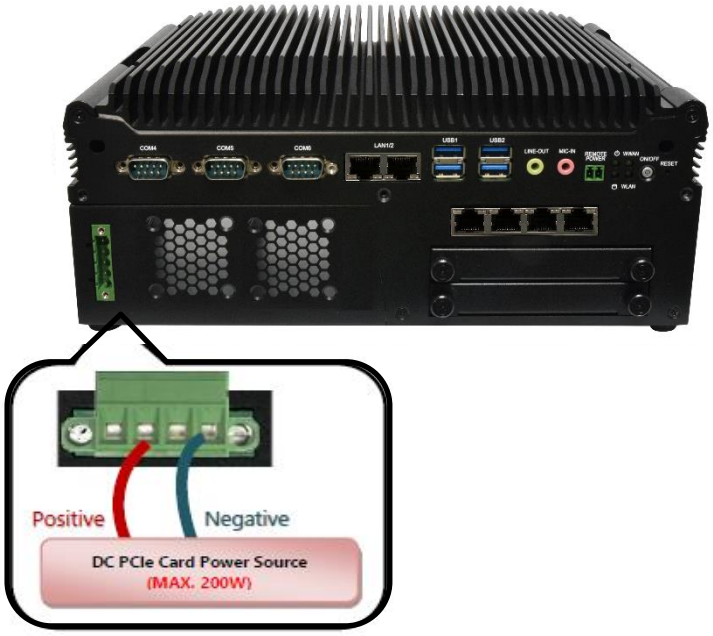
| LED | COLOR | LED ACTION | DESCRIPTION |
|---|---|---|---|
| **Link Activity** | **Amber** | Blinking | Active |
| | **Amber** | Steady | Not Active |
| | **OFF** | N/A | No Link |
| **Speed** | **Green** | Steady | 100Mbps Connection Successful |
| | **OFF** | N/A | 10Mbps Connection Successful |

# APPENDIX B: CONNECT TO DC POWER

1. Make sure your system is turned off.
2. Follow the wiring definition and illustration below to connect the power source to the system through the 4-pin terminal block connector as DC Input. Connect the two Power Wires to the Terminal Block (supplied along with the system) by respectively inserting the red wire to the Positive contact, the other wire to the Negative contact, and then secure them onto the terminal block.




3. Follow the wiring definition and illustration below to connect the power source to the PCIe card through the 4-pin terminal block connector as DC Input. Connect the two Power Wires to the Terminal Block (supplied along with the system) by respectively inserting the red wire to the Positive contact, the other wire to the Negative contact, and then secure them onto the terminal block.



# APPENDIX C: TERMS AND CONDITIONS

## Warranty Policy

1. All products are under warranty against defects in materials and workmanship for a period of one year from the date of purchase.
2. The buyer will bear the return freight charges for goods returned for repair within the warranty period; whereas the manufacturer will bear the after service freight charges for goods returned to the user.
3. The buyer will pay for the repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:
   - Improper or inadequate maintenance by the customer
   - Unauthorized modification, misuse, or reversed engineering of the product
   - Operation outside of the environmental specifications for the product.

## RMA Service

### Requesting an RMA#

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

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

# RMA Service Request Form

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

| | |
|---|---|
| **RMA No:** | Reasons to Return: ▫ Repair(Please include failure details)<br>▫ Testing Purpose |
| Company: | Contact Person: |
| Phone No. | Purchased Date: |
| Fax No.: | Applied Date: |
| Return Shipping Address: _____ | |
| Shipping by: ▫ Air Freight ▫ Sea ▫ Express_____<br>▫ Others:_____ | |

| Item | Model Name | Serial Number | Configuration |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| Item | Problem Code | Failure Status |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

*Problem Code:

| | | | |
|---|---|---|---|
| 01:D.O.A. | 07: BIOS Problem | 13: SCSI | 19: DIO |
| 02: Second Time R.M.A. | 08: Keyboard Controller Fail | 14: LPT Port | 20: Buzzer |
| | 09: Cache RMA Problem | 15: PS2 | 21: Shut Down |
| 03: CMOS Data Lost | 10: Memory Socket Bad | 16: LAN | 22: Panel Fail |
| 04: FDC Fail | 11: Hang Up Software | 17: COM Port | 23: CRT Fail |
| 05: HDC Fail | 12: Out Look Damage | 18: Watchdog Timer | 24: Others (Pls specify) |
| 06: Bad Slot | | | |

***Request Party***

**Authorized Signature / Date**

***Confirmed By Supplier***

**Authorized Signature / Date**