Lanner

Industrial Communication Platforms

Energy Management and Industrial Cyber Security Solutions

LEC-6041
User Manual

Version: 1.1

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About this Document

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

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

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

Conventions & Icons

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

Font Conventions

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

Icon Descriptions

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

Online Resources

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

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

Technical Support

In addition to contacting your distributor or sales representative, you could use other available methods to get support from Lanner:

Submitting a Ticket

Visit the **Lanner Technical Support** page at http://www.lannerinc.com/technical-support where you can fill in a support ticket to our technical support department.

Calling Us

A toll-free phone support is offered to our customers in the United States and Canada, it is:

+1-855-852-6637

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Documentation Feedback

Your feedback is valuable to us, as it will help us continue to provide you with more accurate and relevant documentation. To provide any feedback, comments or to report an error, please email to contact@lannerinc.com, Thank you for your time.

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Acknowledgment

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.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

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.

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 trained electrician or only by an electrically trained person who knows all Installation and Device Specifications which are to be applied.
- Do not carry the handle of power supplies when moving to another place.
- Please conform to your local laws and regulations regarding safe disposal of lithium BATTERY.

- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- Leaving a battery in an extremely high temperature surrounding environment can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.

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

Environment:

- Do not install and/or operate this unit in any place that flammable objects are stored or used in.
- If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- Installation of the equipment (especially in a rack) should consider the ventilation of the system's intake (for taking chilled air) and exhaust (for emitting hot air) openings so that the amount of air flow required for safe operation of the equipment is not compromised.
- To avoid a hazardous load condition, be sure the mechanical loading is even when mounting.
- Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable earthing should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Installation & Operation:

- The installation of this product must be performed by trained specialists; otherwise, a non-specialist might create the risk of the system's falling to the ground or other damages.

- Lanner Electronics Inc. shall not be held liable for any losses resulting from insufficient strength for supporting the system or use of inappropriate installation components.

Electrical Safety Instructions

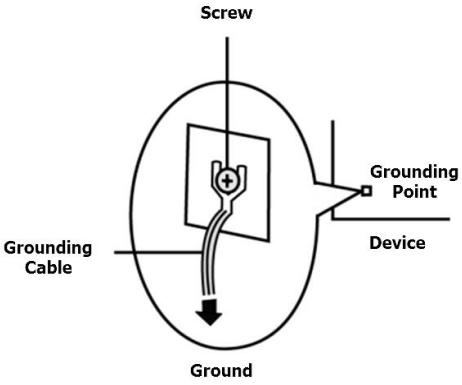
Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect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

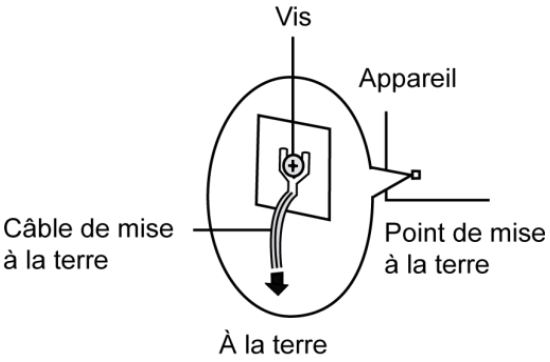
Grounding Procedure for DC Power Source

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



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

- Desserrez la vis du terminal de mise à la terre.
- Branchez le câble de mise à la terre à la terre.
- L'appareil de protection pour la source d'alimentation CC doit fournir 30 A de courant.
- Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation CC.



- This equipment must be grounded. The power cord for the 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 has installation instructions by a skilled person (for Fan side).
  Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.

Table of Contents

CHAPTER 1: PRODUCT OVERVIEW

Lanner's LEC-6041, being the successor of LEC-6021, is designed to protect the communication in both IT and OT domains. LEC-6041 Series is empowered by Intel Atom x7-E3950 or x5-E3930 for low power consumption and high processing performance. As a rugged firewall deployed in challenging environments, LEC-6041 comes with IEC 61850-3 and IEEE 1613 certification, as well as 1.5 KV magnetic isolation protections for LAN port and 15KV ESD Protection for I/O ports. The system can operate in a wide range of operating temperature from -40°C to 70°C. All of the hardware designs assure that the security gateway LEC-6041 will never have downtime while operating in hazardous surroundings such as OT environment.

Package Content

Your package contains the following items:

- 1x LEC-6041 Fanless Box PC
- 1x Power Terminal Block + 4 Disk Screw
- 1x Ear Bracket + 4x Ear Bracket Screw
- 1x SATA Cable
- 1x Heat Sink
- 2x Thermal Pad +2x Module Screw + 2x Heat Sink Screw

Ordering Information

SKU No.	Main Features
LEC-6041A	IEC 61850-3 Wide Temperature ICS Cyber Security Gateway with Intel Atom x5-E3930 processor
LEC-6041B	IEC 61850-3 Wide Temperature ICS Cyber Security Gateway with Intel Atom x7-E3950 processor

System Specifications

Processor System	CPU	Intel Atom x7-E3950 or x5-E3930
	Frequency	Atom x5-E3930: 1.3 GHz, Atom x7-E3950: 1.6 GHz
	Core Number	Atom x5-E3930: 2, Atom x7-E3950: 4
	BIOS	AMI SPI Flash BIOS
	Chipset	SoC
Fanless		Yes
System Memory	Technology	DDR3L, up to 1866 MHz
	Max. Capacity	8 GB
	Socket	1x 204-pin SODIMM
Graphic	Controller	Intel HD 505 Graphics
	Interface	1x HDMI
Ethernet	Controller	Intel i210
	Speed	RJ45: 10/100/1000Mbps, SFP: 1 Gbps
	Interface	5x RJ45 + 2 x SFP
	Bypass	1 pair Bypass
	Magnetic Isolation Protection	1.5 KV built-in
Storage	Type	SATA
	Installation	1x SATA connector with 2.5" drive bay
	Type	mSATA
	Installation	1x optional mSATA socket
Expansion	mini-PCIe	1x mini-PCIe with 1 SIM card for 4G LTE module (USB & PCIe signal) I/O
I/O	Serial Port	2x RS-232, DB9 male
	Isolation Protection	Digital Isolation Protection with 15KV ESD Protection
	USB	2x USB 3.0 type A
	Power-On/Reset Button	Internal reset button
	LED	HDD,STA,PWR,L1~L5,F1~F2,C1~C2,LTE
Watchdog Timer		Watchdog timer 256 level time interval system reset, software programmable
Power	Power Supply Voltage	Dual 20-54 Vdc
	Connector	Phoenix contact 6-pin connector with lock
	Power Consumption (Idle)	TBD
	Power Consumption (Full Load)	TBD
	Power Adaptor	None
Environment	Operating Temperature	-40 ~ 70°C
	Storage Temperature	40 ~ 85°C
	Relative Humidity	5% ~ 95%, non-condensing
Mechanical	Dimension(W x H x D)	160 x 166 x 53.5 mm
	Construction	Aluminum + SGCC
	Weight	SKU A: 1.6 kg
	Mounting	DIN rail or Wall mount
Driver Support	Microsoft Windows	Windows 10 64 bit
	Linux	Linux Kernel 4.X
Certification	FCC, CE, IEC61850-3, IEEE1613	

Front Panel

No.	Description	
F1	HDMI	1x HDMI port
F2	SFP Port	2x 1G SFP port
F3	RJ45	5x RJ45 port (LAN1 & LAN2 with LAN Bypass support)
F4	USB Port	2x USB 3.0 port
F5	LED Indicators	 **HDD**: Hard disk activity **STA**: System status **PWR**: system power **L1~L5**: LAN ports activity **F1~F2**: Fiber ports activity **C1~C2**: COM port status **LTE**: 4G/LTE connection status
F6	COM Port	2x DB9 RS-232 with isolation
F7	Grounding Point	For grounding cable to connect with ground
F8	DC-in Jack	1x 6-pin terminal block for 2 sets of 20~54Vdc direct power input

Note

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

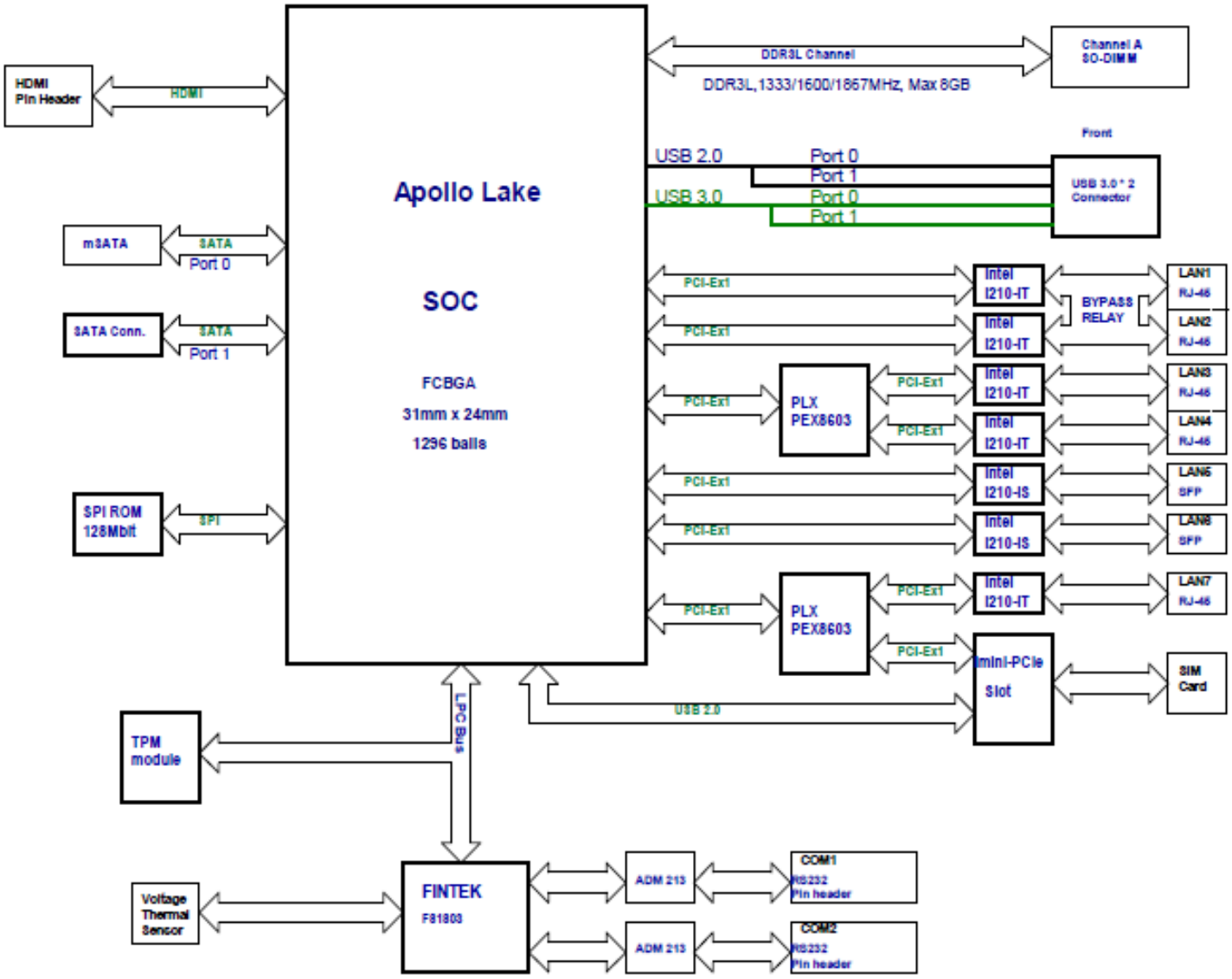
Rear Panel

No.	Description	
R1	DIN Rail Bracket	
R2	Reset Button	For software reset

Motherboard Information

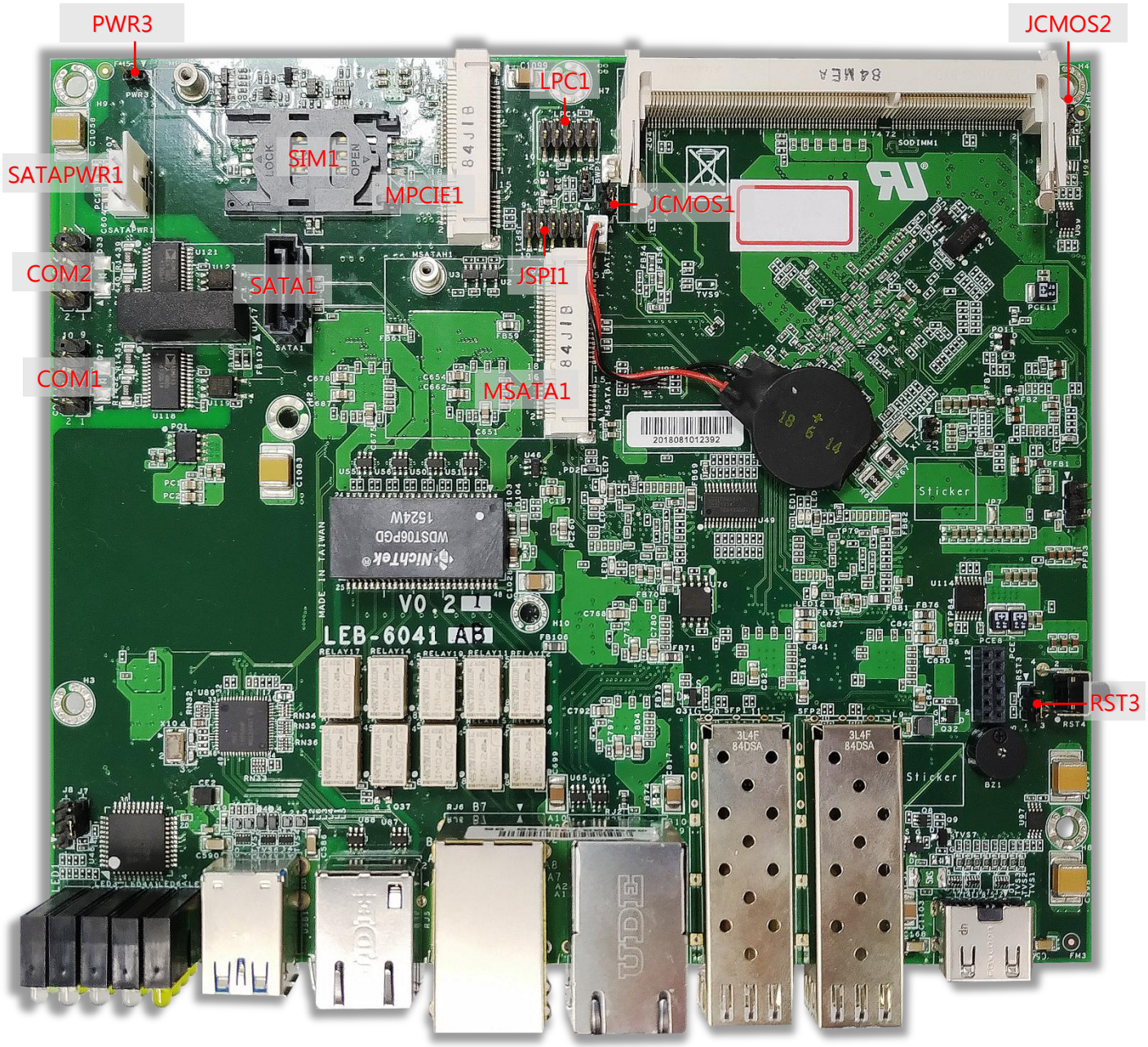
Block Diagram

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



Motherboard Layout

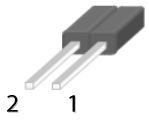
The motherboard layout shows the connectors and jumpers on the board. Refer to the following picture as a reference of the pin assignments and the internal connectors.



Internal Jumper & Connectors

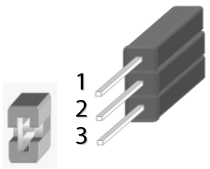
PWR3: Power Button

Jumper	Description
1-2	Power ON/OFF system
NC (Default)	Normal



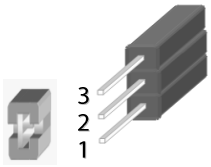
RST3: HW/SW Reset Selection

Jumper	Description
1-2	Software reset
2-3 (Default)	Hardware reset



JCMOS1/2: Clear CMOS

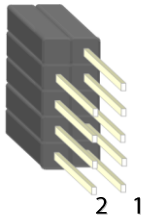
Jumper	Description
1-2 (Default)	Normal
2-3	Clear CMOS



Connector Pin Assignment

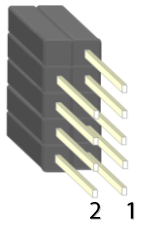
COM1: Serial Port 1 Connector

Pin No.	Description	Pin No.	Description
1	NC	2	NC
3	COM1_R_RXD	4	NC
5	COM1_R_TXD	6	NC
7	NC	8	NC
9	COM1_2_GND		



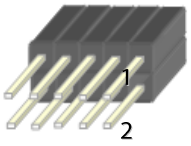
COM2: Serial Port 2 Connector

Pin No.	Description	Pin No.	Description
1	NC	2	NC
3	COM2_R_RXD	4	NC
5	COM2_R_TXD	6	NC
7	NC	8	NC
9	COM1_2_GND		



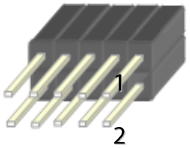
JSPI1: SPI ROM Connector (For RD debug)

Pin No.	Description	Pin No.	Description
1	HOLD#	2	NC
3	CS#	4	+1.8V
5	MISO	6	NC
7	NC	8	CLK
9	GND	10	MOSI



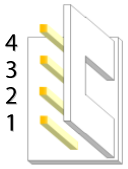
LPC1: LPC Connector (For RD debug)

Pin No.	Description	Pin No.	Description
1	CLK_24M_P80	2	L_AD1
3	PLTRST_P80_N	4	L_AD0
5	L_FRAME_N	6	P3V3S
7	L_AD3	8	GND
9	L_AD2	10	GND



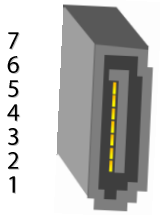
SATAPWR1: SATA Power Connector

Pin No.	Description
1	V12_S
2	GND
3	GND
4	V5_S



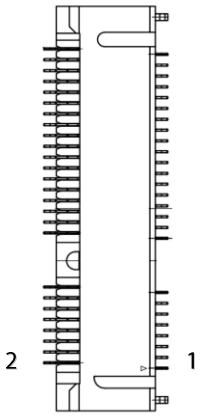
SATA1: SATA Connector

Pin No.	Description	Pin No.	Description
1	GND	5	SATA_RXN1_C
2	SATA_TXP1_C	6	SATA_RXP1_C
3	SATA_TXN1_C	7	GND
4	GND		



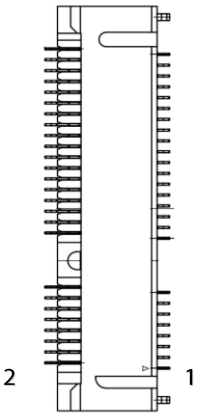
MSATA1: MSATA Connector

Pin No.	Description	Pin No.	Description
1	NC	2	V3P3_S
3	NC	4	GND
5	NC	6	NC
7	NC	8	NC
9	GND	10	NC
11	NC	12	NC
13	NC-	14	NC
15	GND	16	NC
Mechanical Key			
17	NC	18	GND
19	NC	20	NC
21	GND	22	NC
23	SATA_RXP0_C	24	V3P3_S
25	SATA_RXN0_C	26	GND
27	GND	28	NC
29	GND	30	NC
31	SATA_TXN0_C	32	NC
33	SATA_TXP0_C	34	GND
35	GND	36	NC-
37	GND	38	NC
39	V3P3_S	40	GND
41	V3P3_S	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	V3P3_S



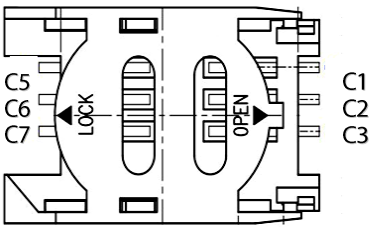
MPCIE1: MPCIE Connector

Pin No.	Description	Pin No.	Description
1	WAKE#	2	V3P3_S
3	NC	4	GND
5	NC	6	V1P5_S
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	CLK_MPCIE_DN	12	UIM_CLK
13	CLK_MPCIE_DP	14	UIM_RESET
15	GND	16	NC
Mechanical Key			
17	NC	18	GND
19	NC	20	W_DISABLE#
21	GND	22	PERST#
23	MPCIE_RXN	24	V3P3_S
25	MPCIE_RXP	26	GND
v27	GND	28	V1P5_S
29	GND	30	NC
31	MPCIE_TXN	32	NC
33	MPCIE_TXP	34	GND
35	GND	36	USB2_DN4
37	GND	38	USB2_DP4
39	V3P3_S	40	GND
41	V3P3_S	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	NC	46	NC
47	NC	48	V1P5_S
49	NC	50	GND
51	NC	52	V3P3_S



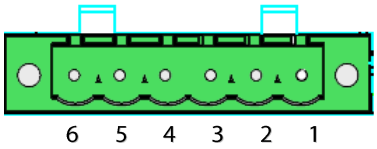
SIM1: SIM Card Socket

Pin No.	Description	Pin No.	Description
C1	UIM_PWR	C5	GND
C2	UIM_RST#	C6	NC
C3	UIM_CLK	C7	UIM_DATA



Input Power connector: Dual power input

Pin No.	Description
1	DC2+
2	DC2-
3	ALARM1
4	ALARM2
5	DC1+
6	DC1-



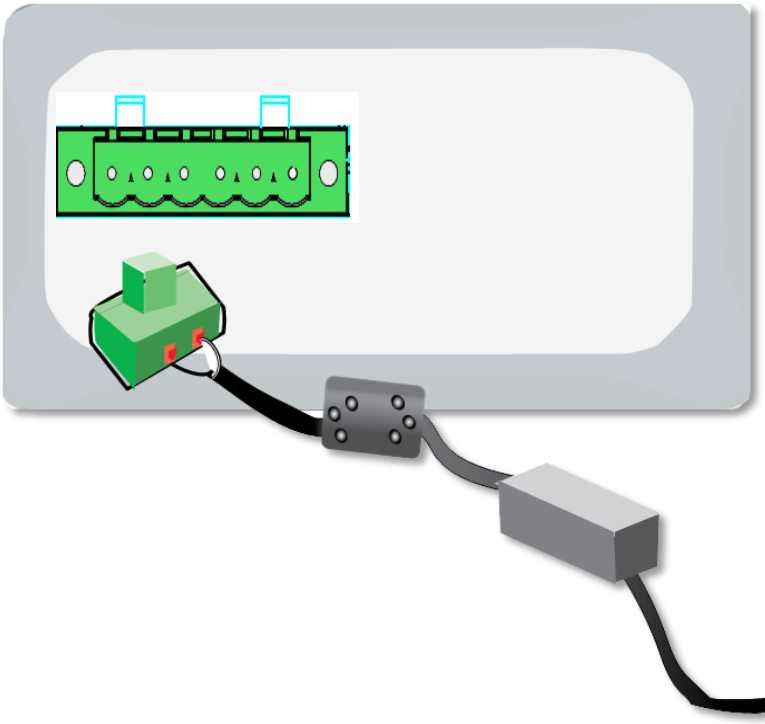
Note

The failure of either power (DC1 or DC2) will cause both Alarm1 and Alarm2 to short-circuit.

CHAPTER 2: HARDWARE INSTALLATION

Connecting Power

Connect the device to a 20~54 VDC power source. The power source comes from the AC/DC Adapter through a Phoenix contact. This power socket is specially designed to guard against a fault in power contact, i.e., the reverse of the electrical polarity will not damage the system.



1x **Phoenix Contact Terminal Block**

Note

The failure of either power (DC1 or DC2) will cause both Alarm1 and Alarm2 to short-circuit.

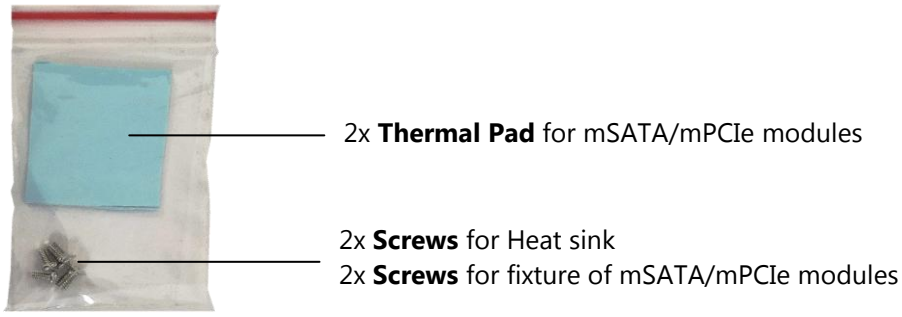
Installing Key Components

1. To install the key components including the SIM card, the **mPCIe** module, **mSATA** module and **DDR2**, loosen the screws indicated below so that the chassis cover can be removed.

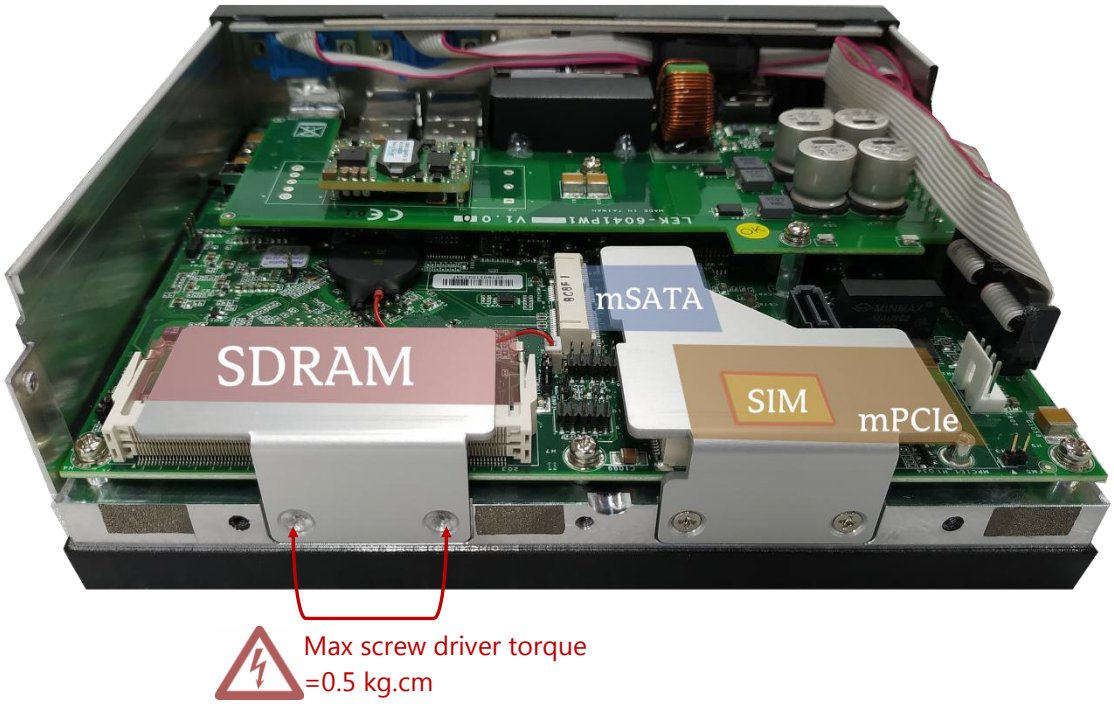
2. With some pressure, slide the cover away from the system as shown in the picture.

3. Insert the modules into the corresponding sockets.

- For the DDR2, please handle the heat sink screws with a torque screwdriver to ensure the tightening to a torque of 0.5 kg.cm.
- For the mSATA module and the mPCIe module, secure them onto the motherboard using the provided screws, and attach a thermal pad to the surface of each. Please note, it is recommended to purchase the mSATA module and the mPCIe module from Lanner, for the thermal pads that come with the package were specifically chosen to fit into the gap between the selected modules and the heat sink. If you prefer to use other modules, their thicknesses are very likely to differ from those of Lanner-supplied ones (mSATA: 3.7mm / mPCIe: 2.5mm), which means you may have to replace the provided thermal pads with suitable ones.

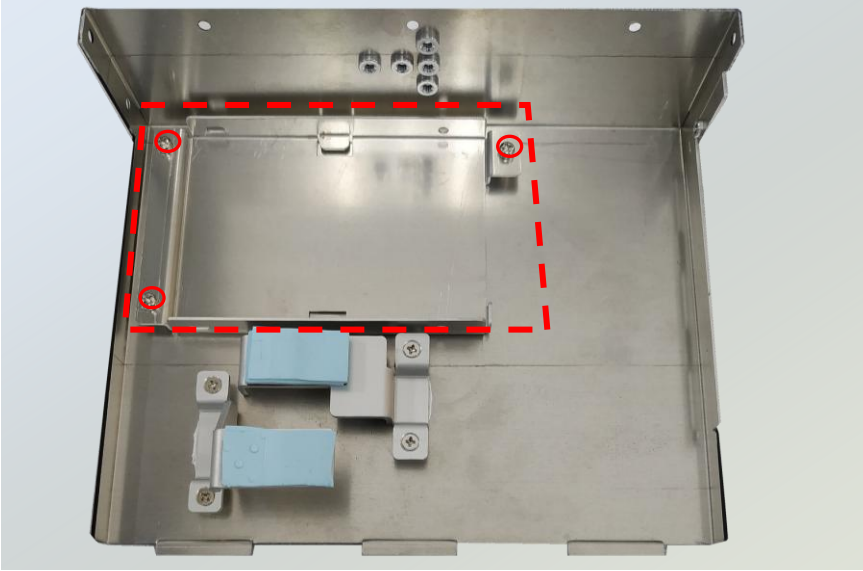


4. Make sure you secure the heat sink onto the chassis with the provided screws.



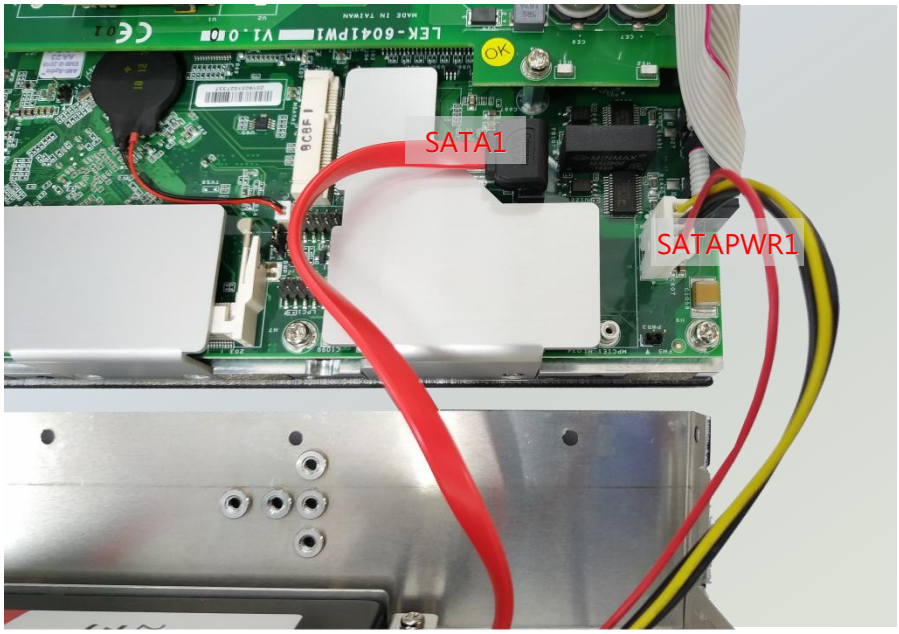
Installing the Hard Disk

1. Remove the empty Disk Tray which can accommodate a 2.5" disk from the chassis cover by loosening the three screws on it.



2. Install the disk onto the tray using four provided disk screws, and then fix the tray onto the chassis cover. Insert one end of the SATA cable to the SATA contact on the disk.

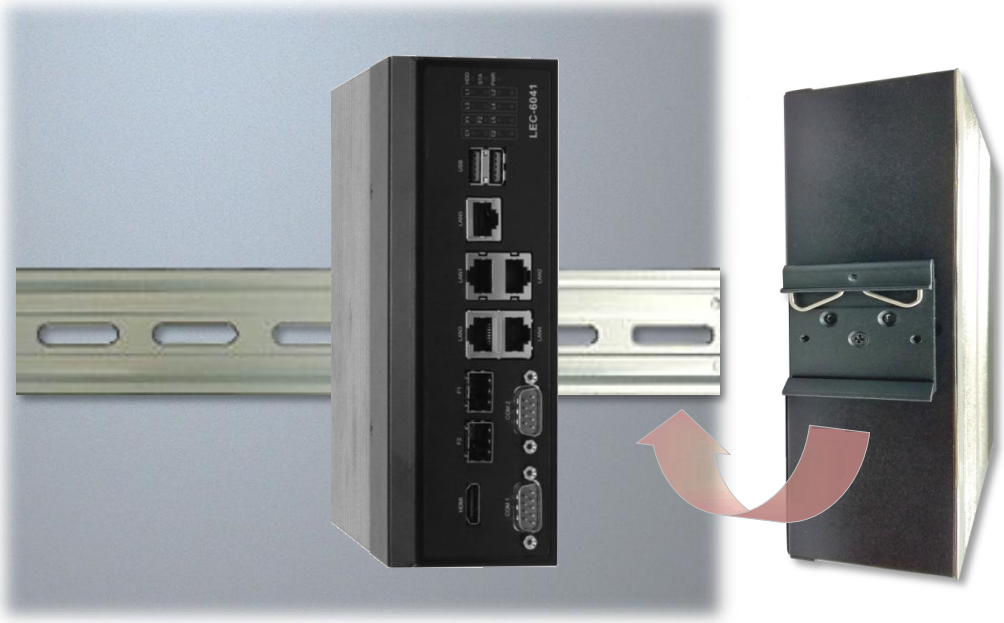
3. Insert the other end of the SATA data cable to **SATA1** port on the motherboard, and the end of the SATA power cable to **SATAPWR1** port. Arrange the cables and route them neatly to avoid them from getting tangled.



Wall-Mounting the System

The system can be mounted to a wall with a DIN Rail Bracket.

1. Attach the Bracket to the rear of the system with 3 screws.
2. Hang the system onto a rail by engaging the hook of the Bracket into the DIN Rail until it is totally fixed.



Rack-Mounting the System

With the short ear brackets provided in the Ear Bracket Accessory Pack, the system can be mounted onto a desktop rack stand, or an adjustable rack the width of which can fit this system.

1. To start, remove the screws (indicated in the picture) on both sides of the system, and fix the two ear brackets onto the system using the provided black screws.

2. Hold the system with its back facing you, lift and carefully insert the system into the rack. Secure the brackets onto the posts with rack-mounting screws and/or retainer nuts.

CHAPTER 3 SOFTWARE SETUP

Lanner SDK

To meet today's security requirements, Lanner SDK derives unique platform identity design and integrates TPM software stack 2.0 on optional base. By leveraging Lanner SDK, the application development can be shortened, and time-to-market can be easily met, download the SDK package and instruction guide from http://www.lannerinc.com/products/firmware-and-software/platform-sdk

BIOS Setup

BIOS is a firmware embedded on an exclusive chip on the system' s motherboard. Lanner's BIOS firmware offering including market-proven technologies such as Secure Boot and Intel Boot Guard technology deliver solid commitments for the shield protection against malware, uncertified sequences and other named cyber threats. BIOS update for Lanner systems are available for download at http://www.lannerinc.com/products/firmware-and-software/securityenhanced-bios

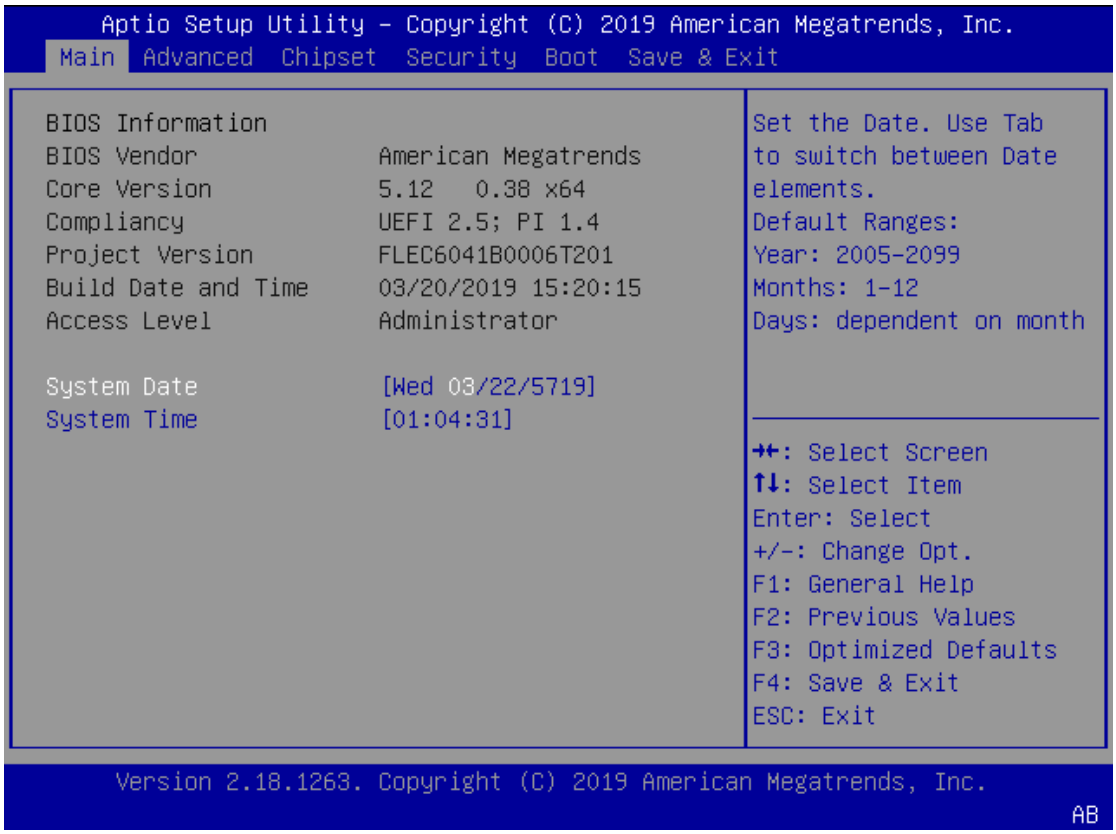
Main Setup

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

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

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

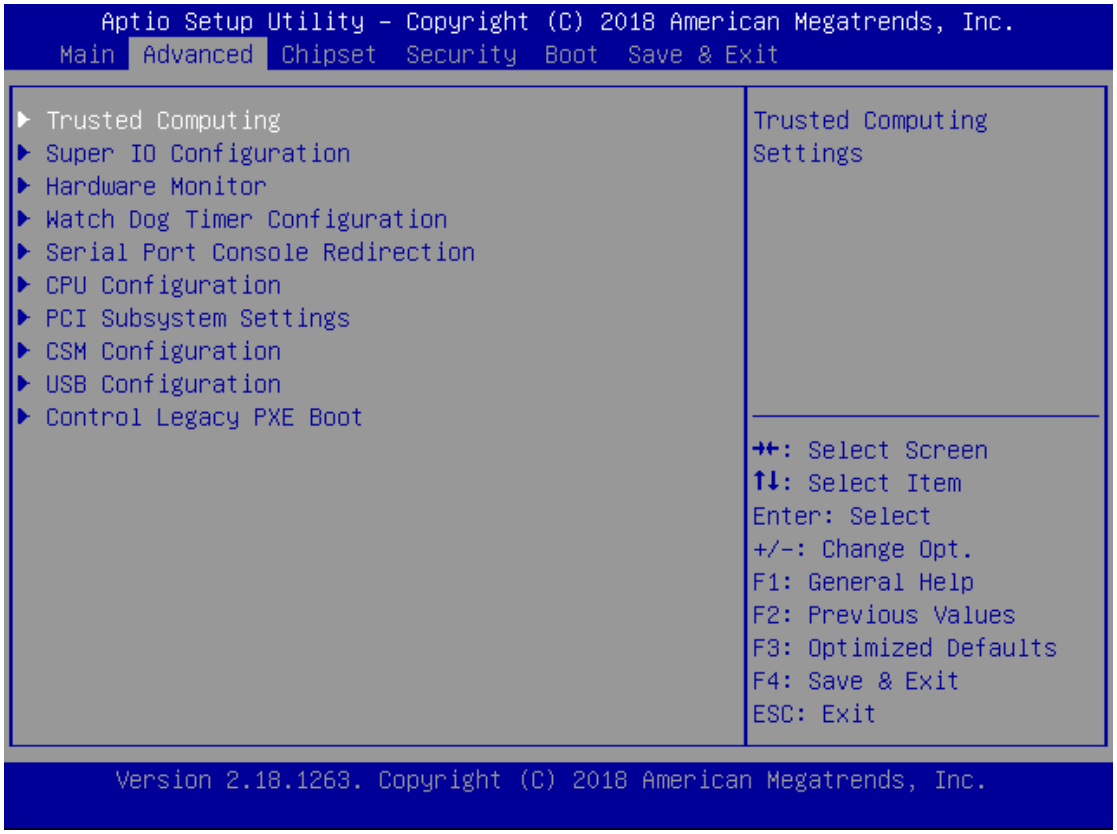
Setup main page contains BIOS information and project version information.



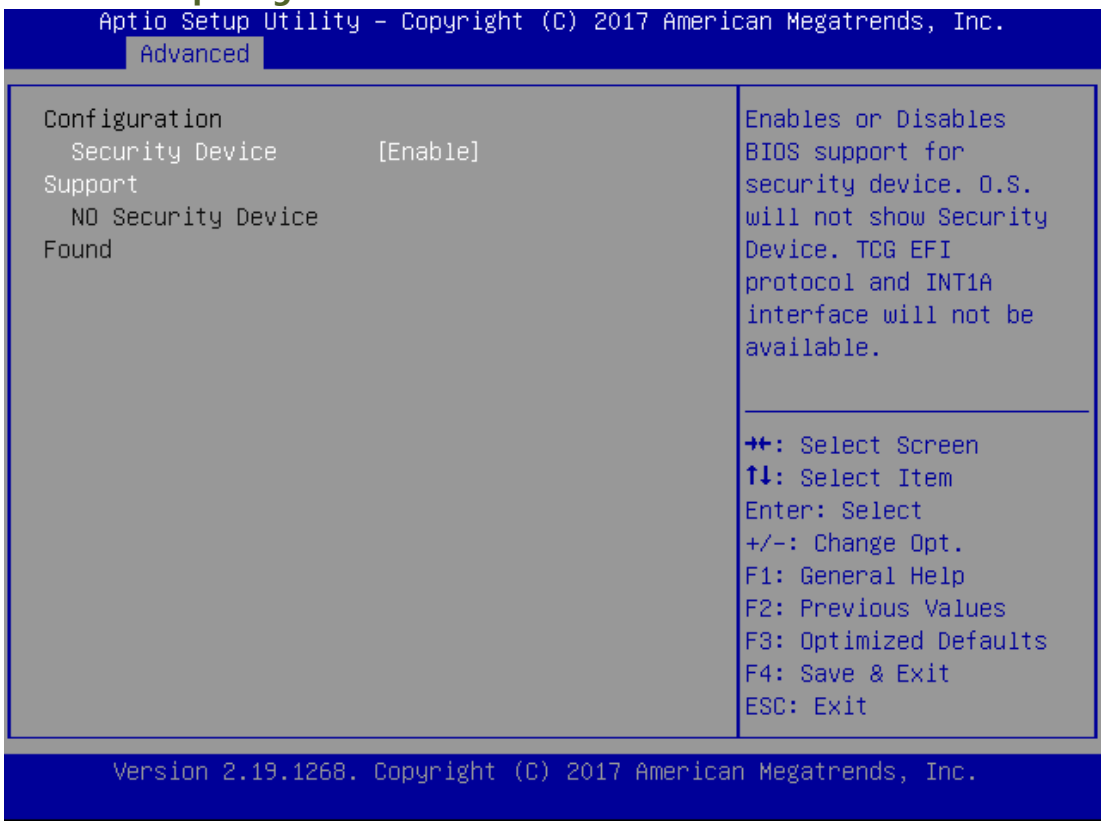
Feature	Description
BIOS Information	BIOS Vendor : American Megatrends Core Version : AMI Kernel version, CRB code base, X64 Compliancy : UEFI version, PI version Project Version : BIOS release version Build Date and Time : MM/DD/YYYY Access Level: Administrator / User
System Date	To set the Date, use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

Advanced Page

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

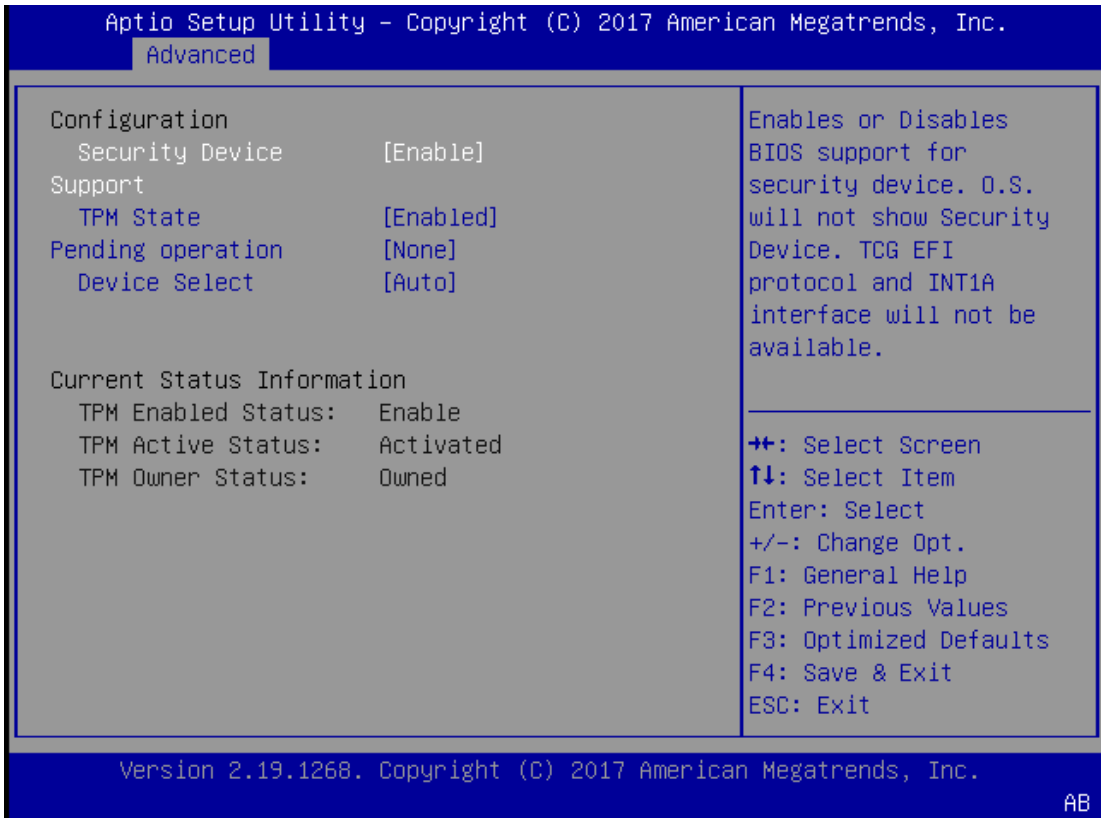


Trusted Computing



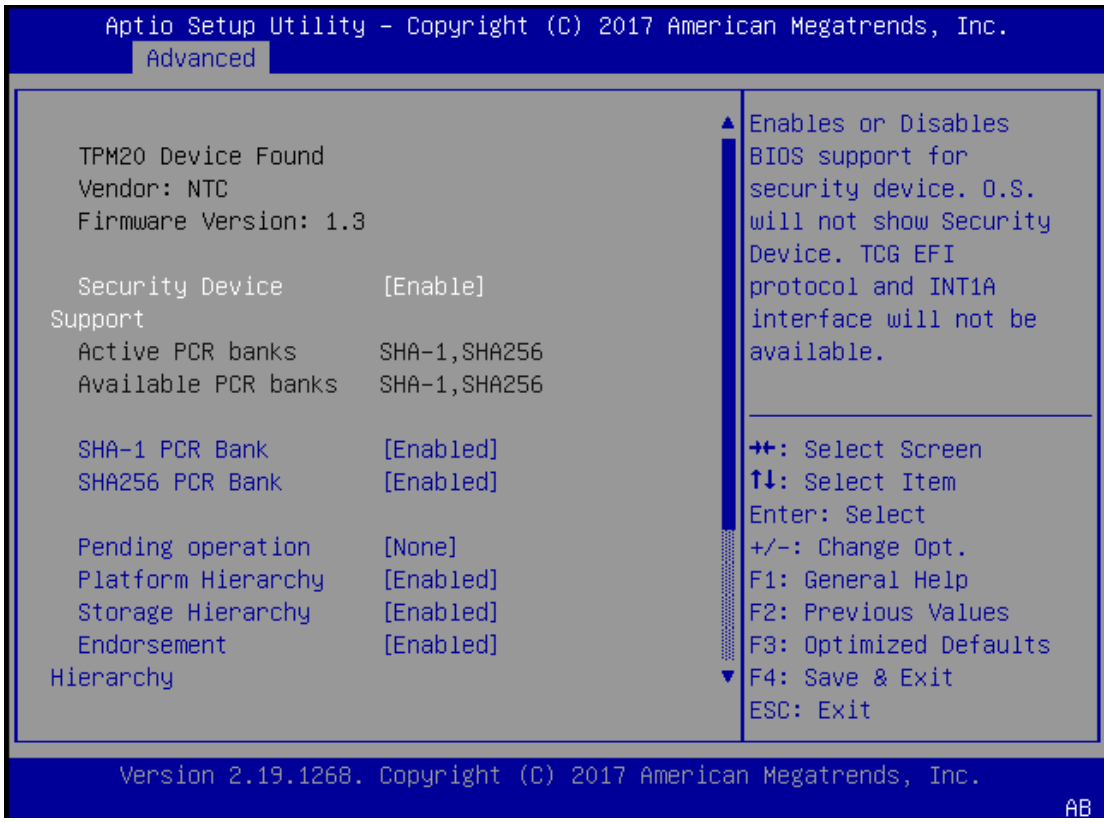
Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

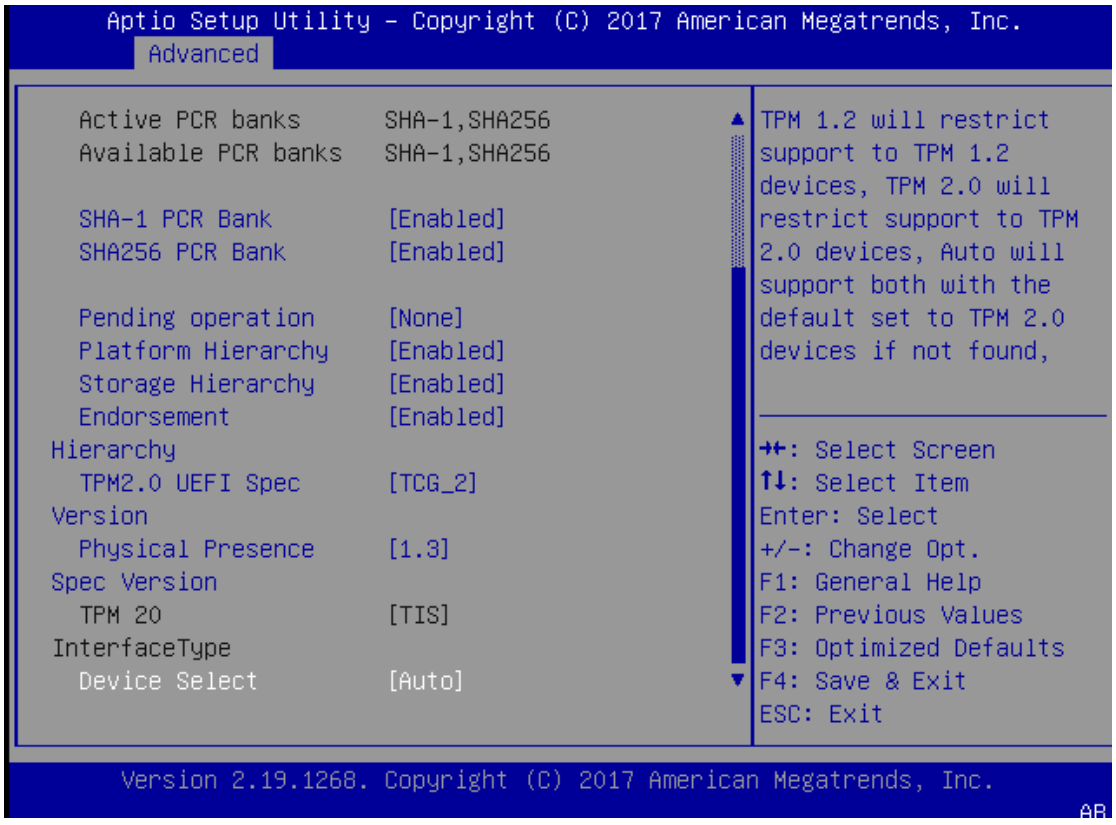
Trusted Computing (TPM1.2)



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

Trusted Computing (TPM2.0)

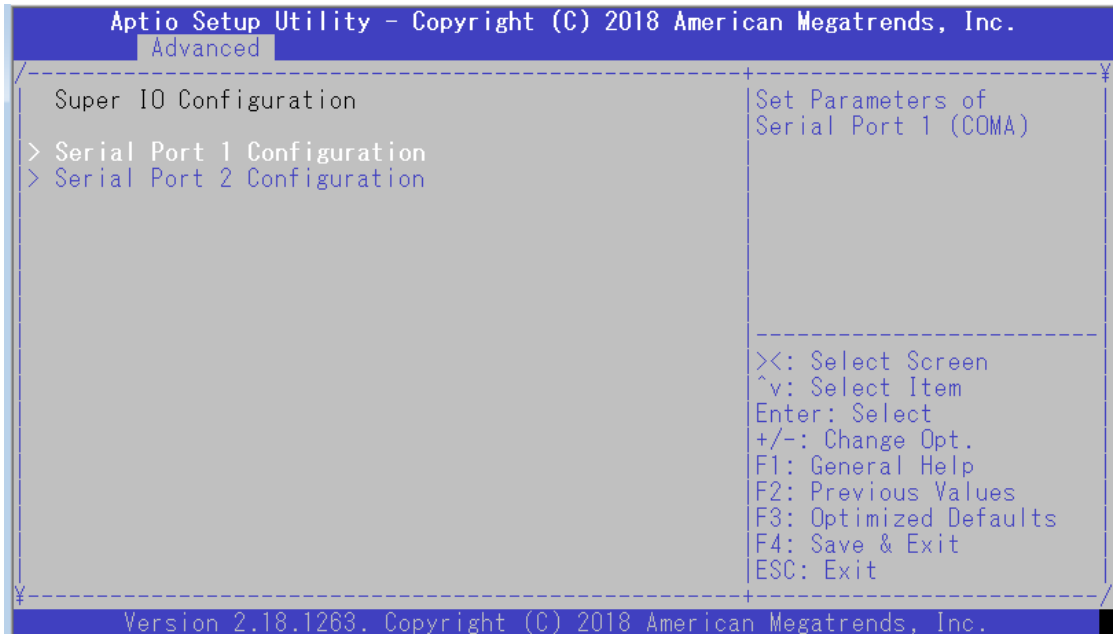




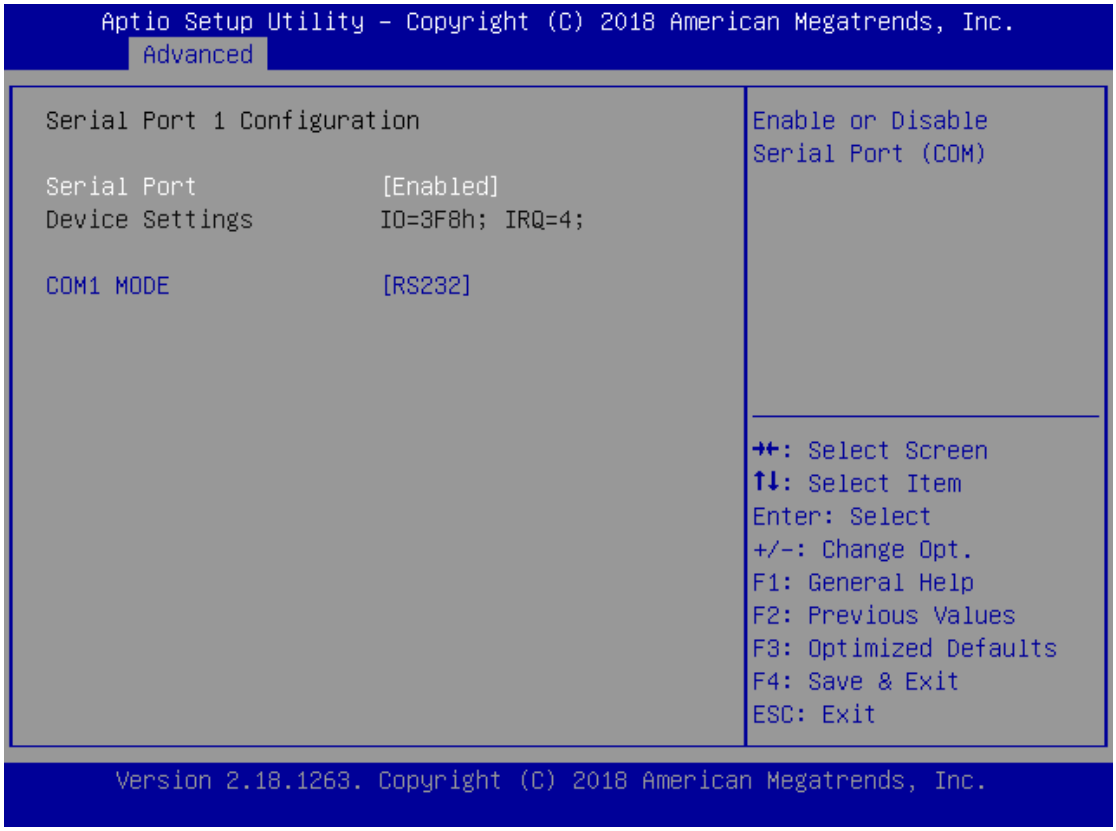
Feature	Options	Description

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

Super IO Configuration



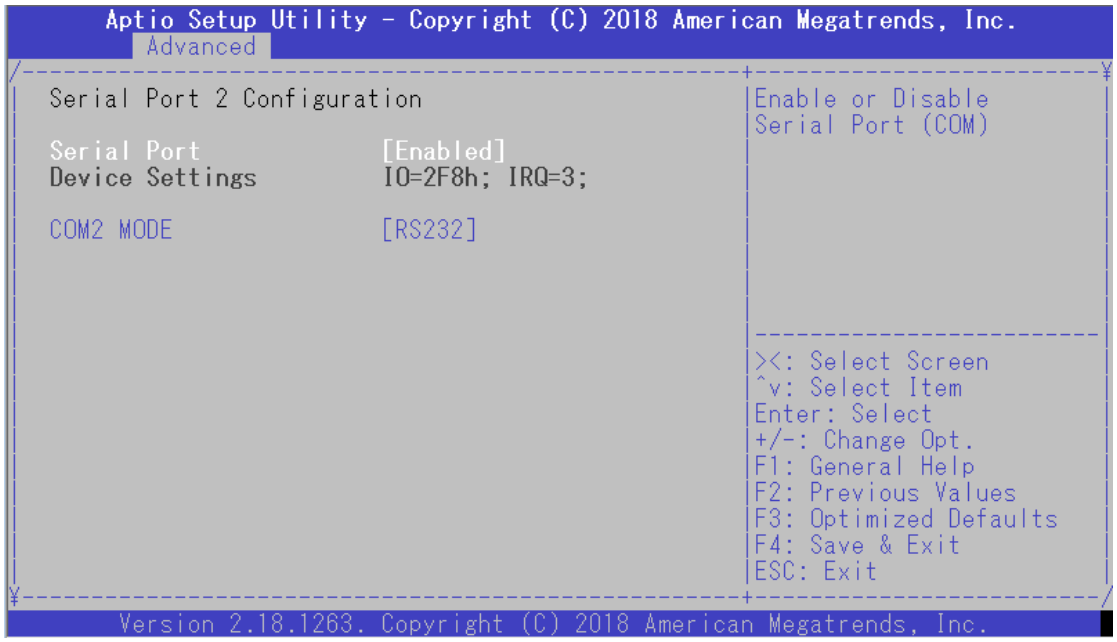
Serial port 1 Configuration



Feature	Options	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 1.
Device Settings	NA	IO=3F8h; IRQ = 4
COM1 MODE	RS232	Select Com Mode as RS232

Serial Port 1 (CPOM0)

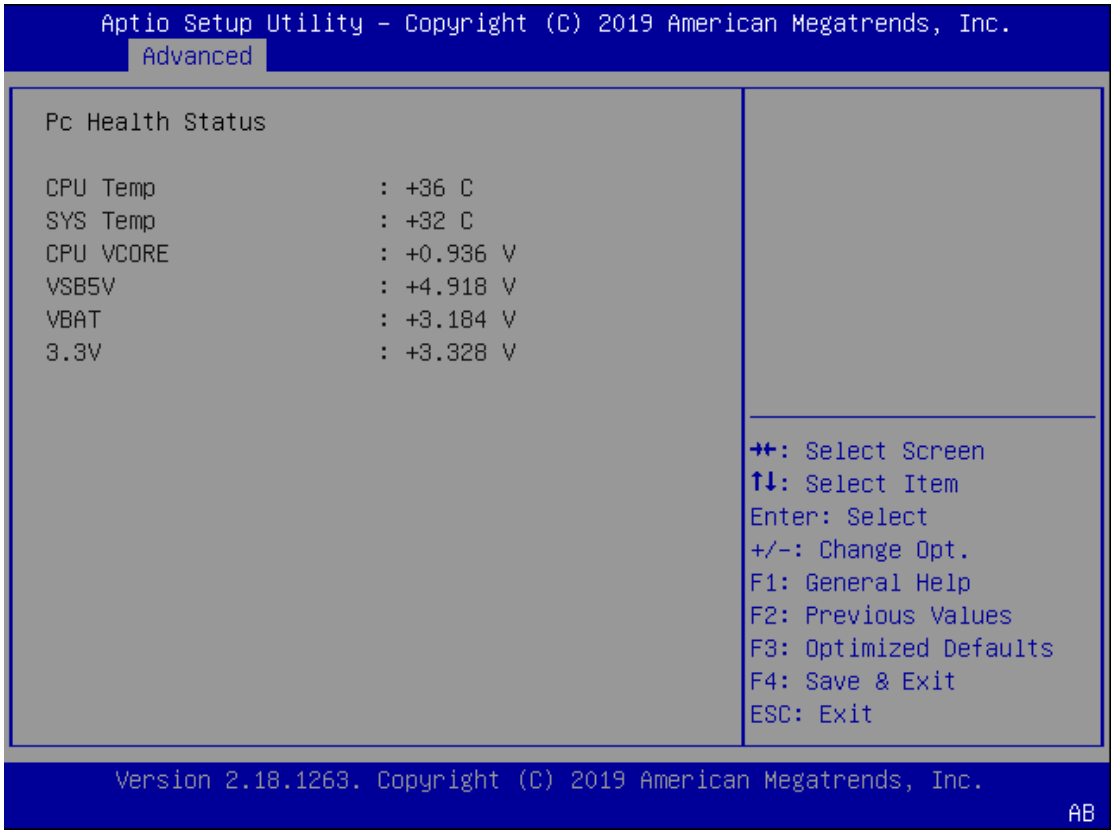
Serial port 2 Configuration



Feature	Options	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 2
Device Settings	NA	IO=2F8h; IRQ = 3
COM2 MODE	RS232	Select Com Mode as RS232

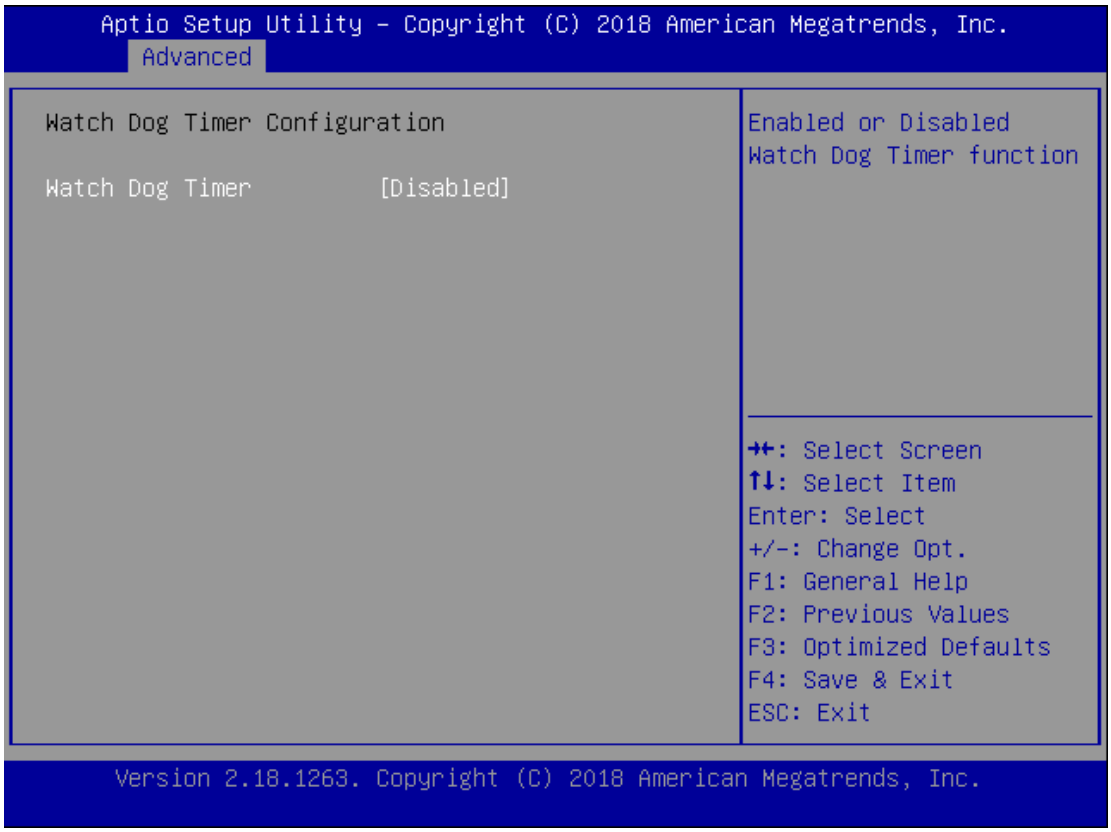
Serial Port2 (CPOM1)

Hardware Monitor



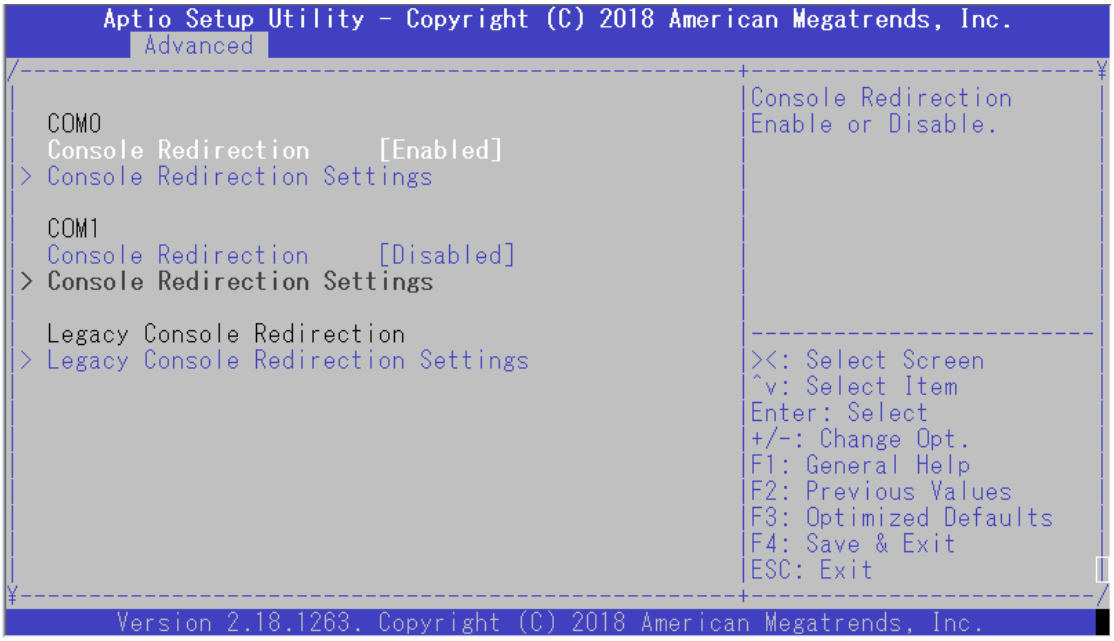
Feature	Description
CPU Temp	This value reports the CPU temperature.
SYS Temp	This value reports the System temperature.
CPU VCORE	This value reports the CPU VCORE.
VSB5V	This value reports the VSB5V Input voltage.
VBAT	This value reports the VBAT Input voltage.
3.3V	This value reports the 3.3V Input voltage.

Watch Dog Timer Configuration



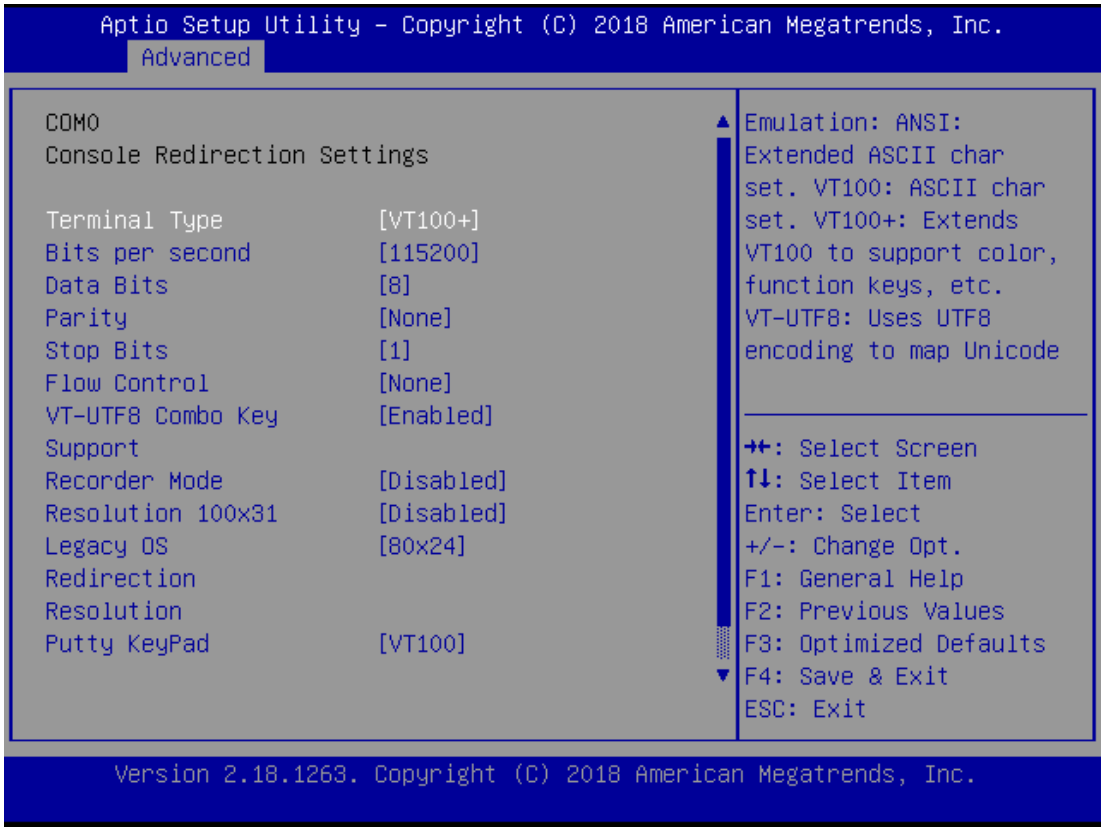
Feature	Options	Description
Watch Dog Timer	Enabled Disabled	Enables or disables Watch Dog Timer function

Serial Port Console Redirection



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

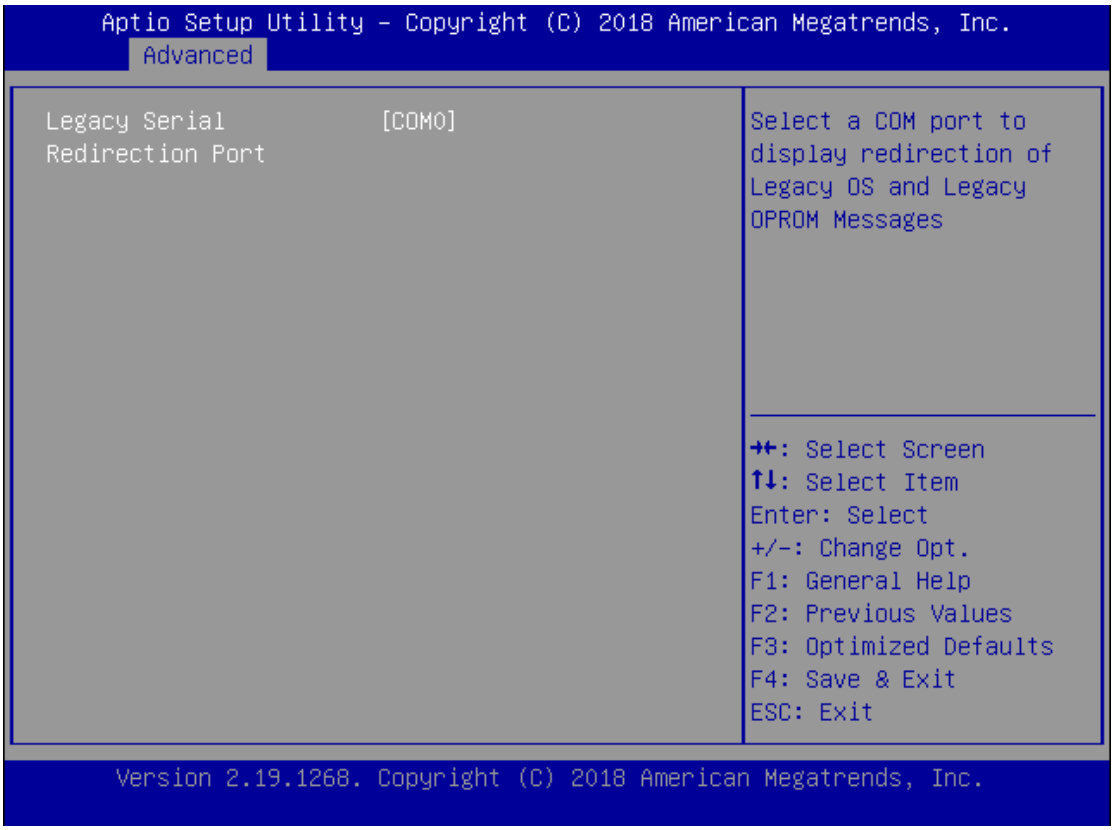
Console Redirection Settings



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

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

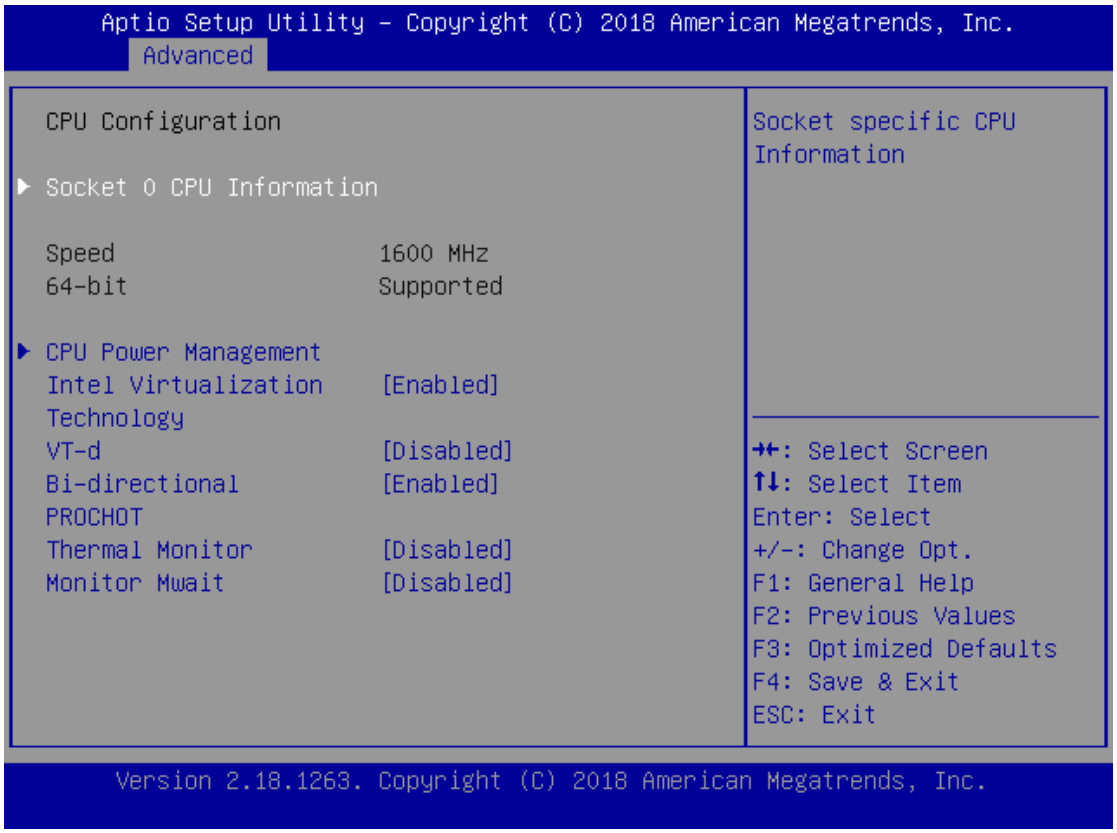
Legacy Console Redirection Settings



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

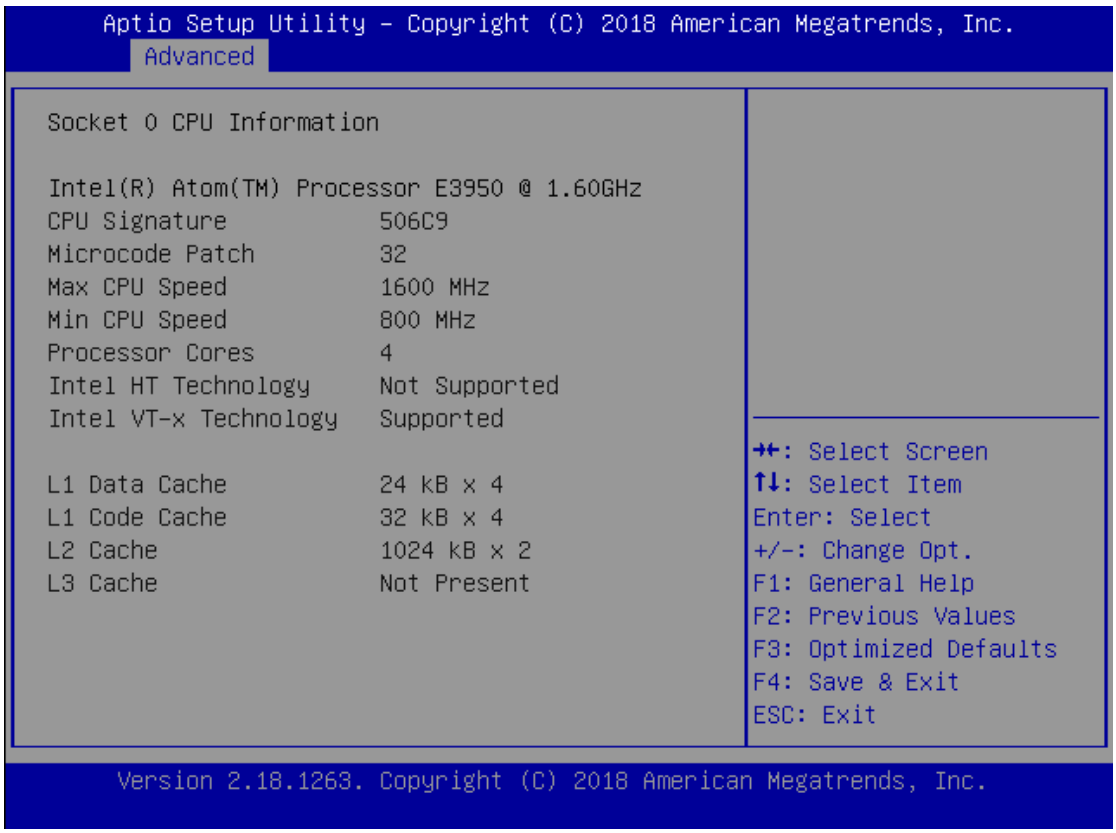
Legacy Serial Redirection Port

CPU Configuration

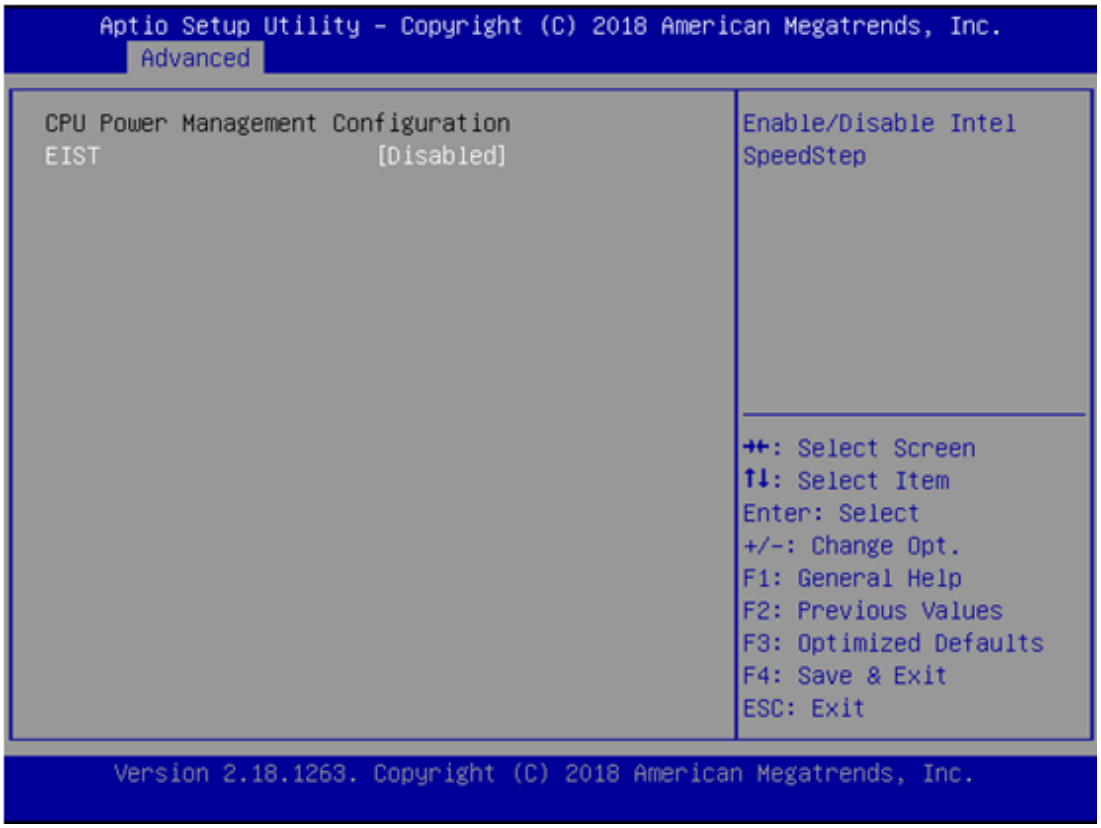


Feature	Options	Description
Intel Virtualization Technology	Disabled Enabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology
VT-d	Disabled Enabled	Enable/Disable CPU VT-d
Bi-directional PROCHOT	Disabled Enabled	When a processor thermal sensor trips (either core), the PROCHOT# will be driven. If bi-direction is enabled, external agents can drive PROCHOT# to throttle the processor.
Thermal Monitor	Disabled Enabled	Enable/Disable Thermal Monitor
Monitor Mwait	Disabled Enabled	Enable/Disable Monitor Mwait

Socket 0 CPU Information

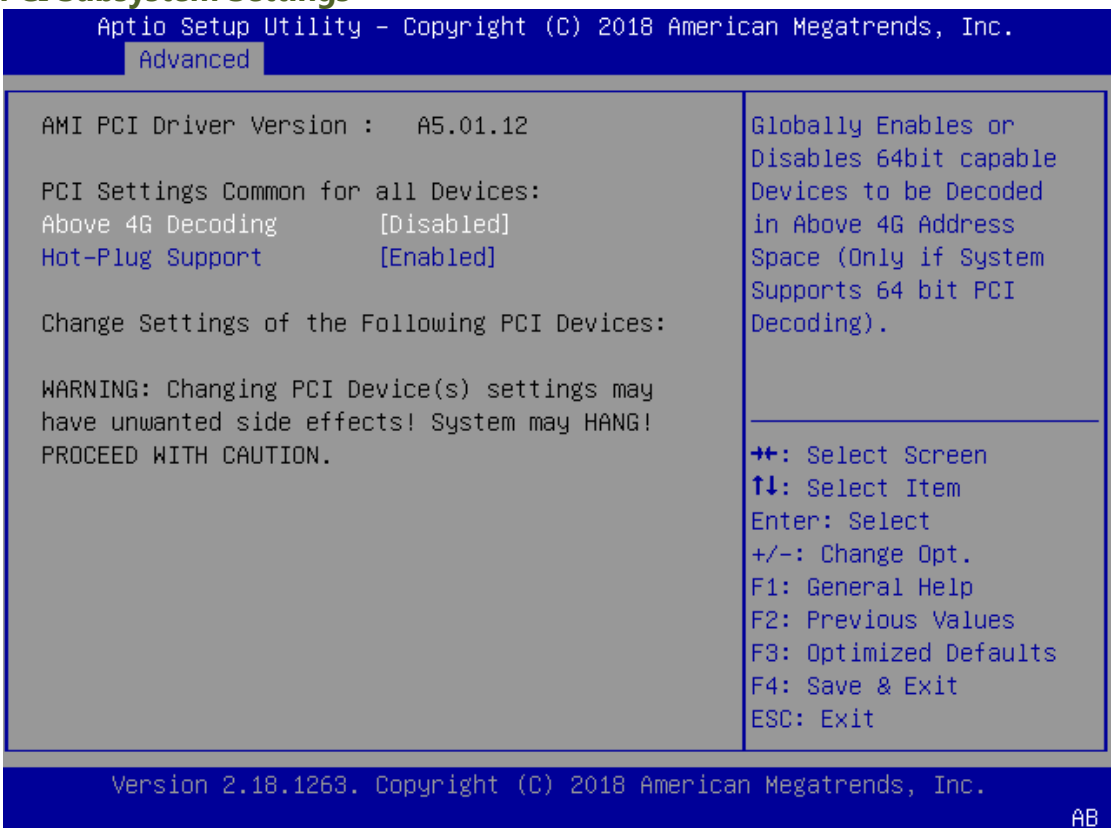


CPU Power Management



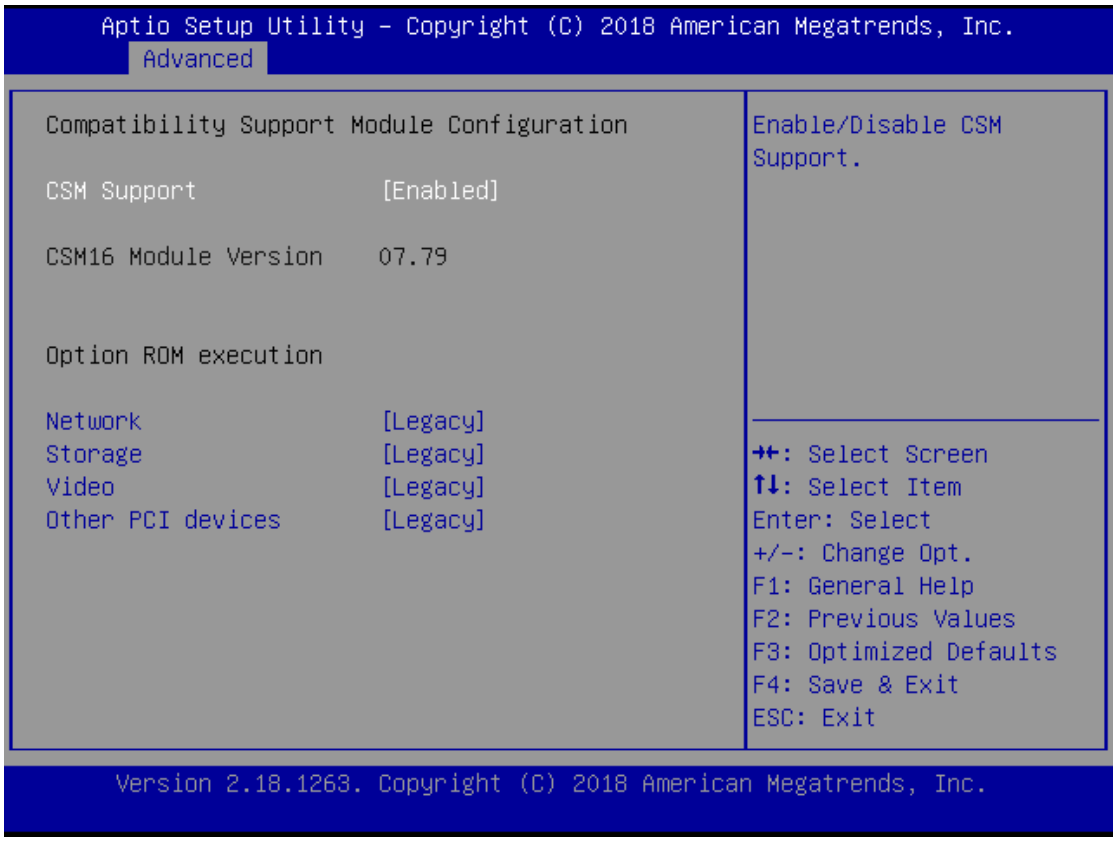
Feature	Options	Description
EIST	Disabled Enabled	Enable/Disable Intel SpeedStep

PCI Subsystem Settings



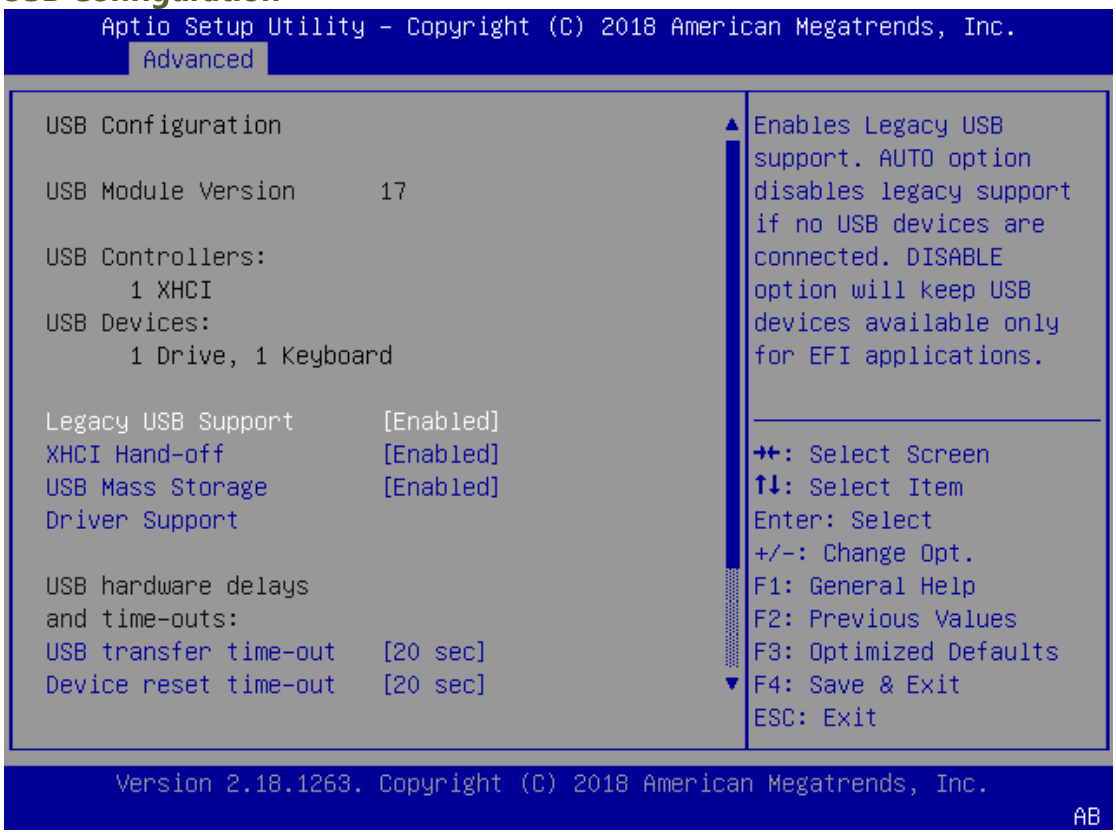
Feature	Options	Description
Above 4G Decoding	Disabled Enabled	Globally Enables or Disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).
Hot-Plug Support	Enabled Disabled	Globally Enables or Disables Hot-Plug support for the entire System. 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.

CSM Configuration



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

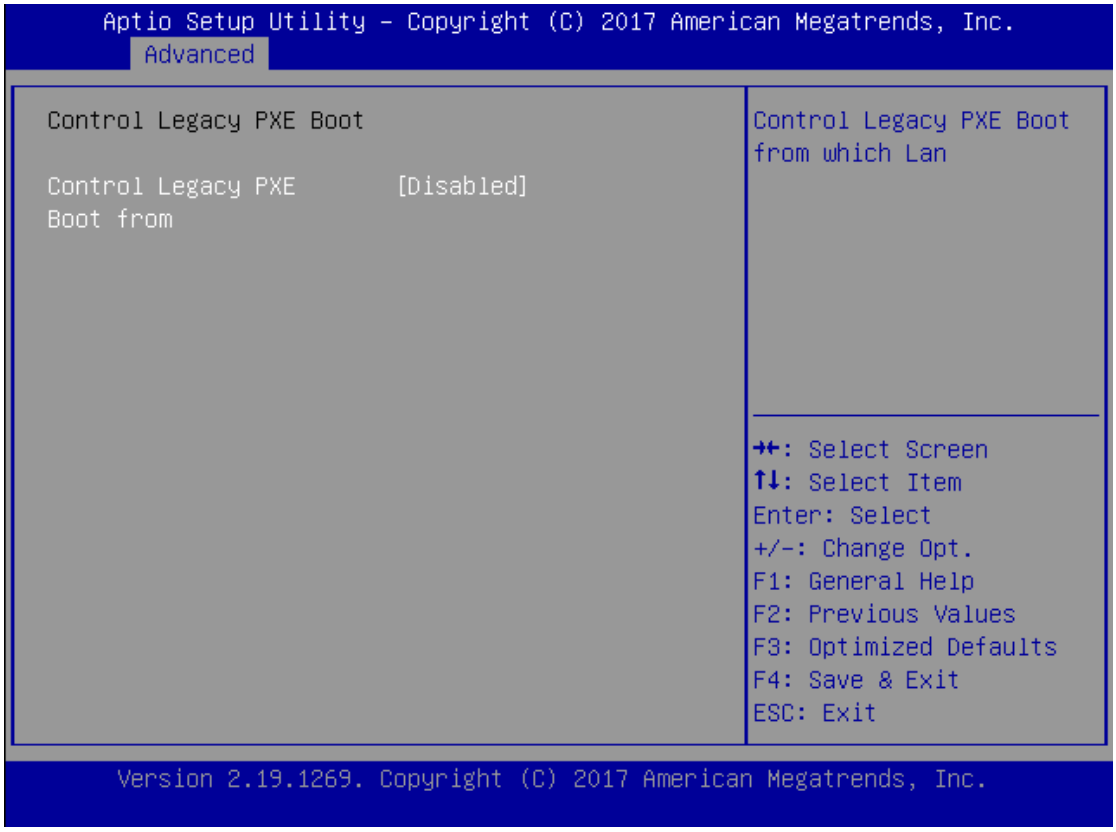
USB Configuration



Feature	Options	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB support. **Auto** option disables legacy support if no USB devices are connected; **Disabled** option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enabled Disabled	Enables or disables USB Mass Storage Driver Support.
USB transfer time-out	1 sec 5 sec 10 sec 20 sec	The time-out value for Control, Bulk, and Interrupt transfers
Device reset time-out	1 sec 5 sec 10 sec 20 sec	USB mass storage device Start Unit command time-out

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

USB Configuration

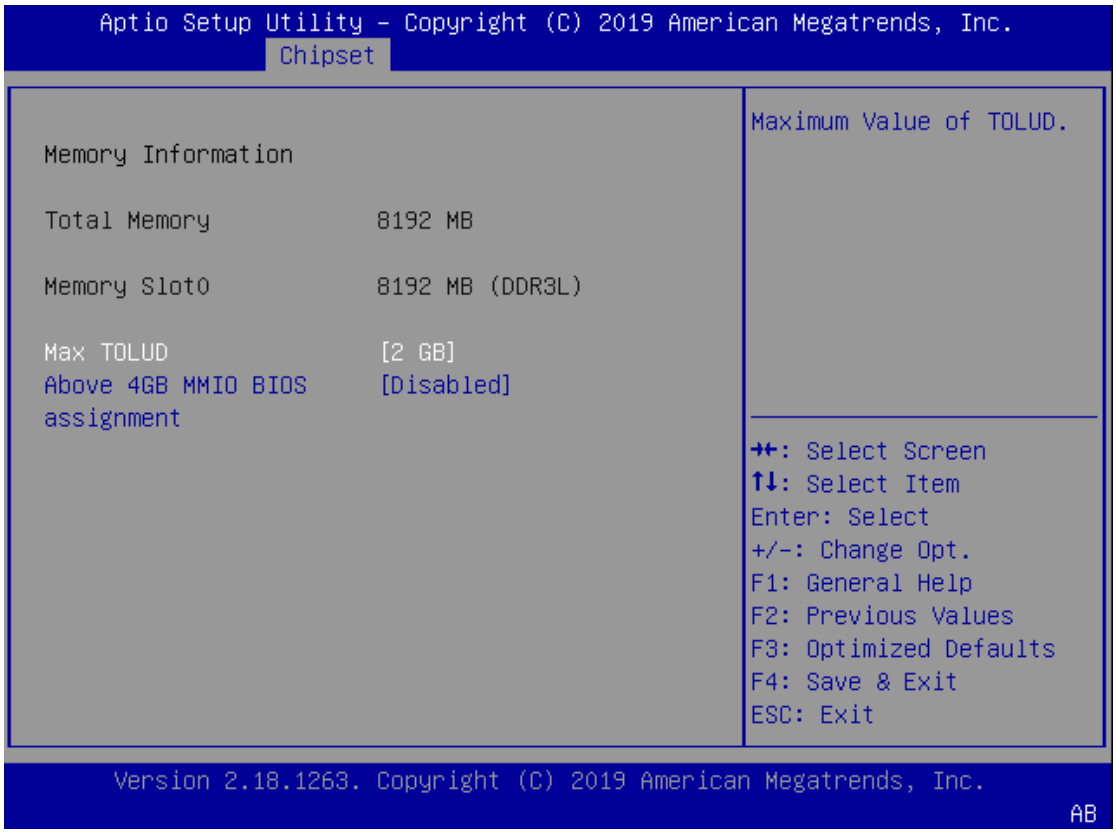


Feature	Options	Description
Control Legacy PXE Boot from	Disabled LAN1 LAN2	Control Legacy PXE Boot from which LAN

Chipset

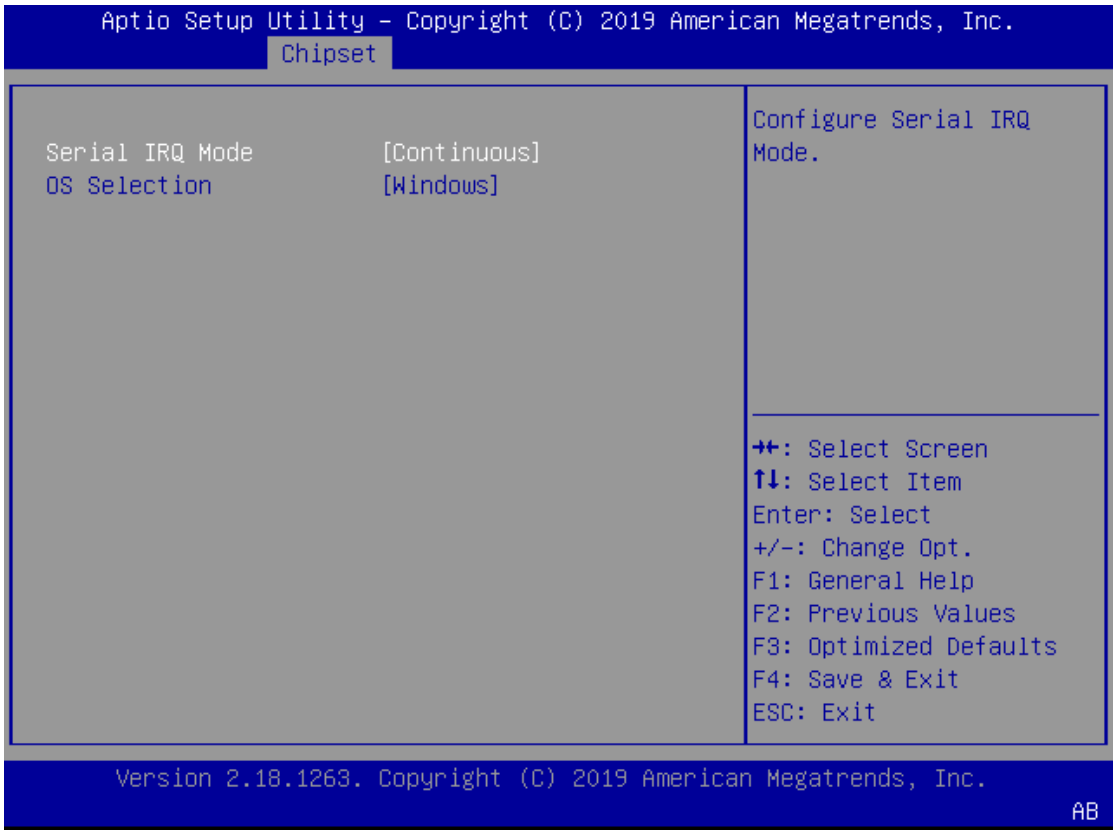
Select the **Chipset** menu item from the BIOS setup screen to enter the Platform Setup screen. Users can select any of the items in the left frame of the screen.

North Bridge



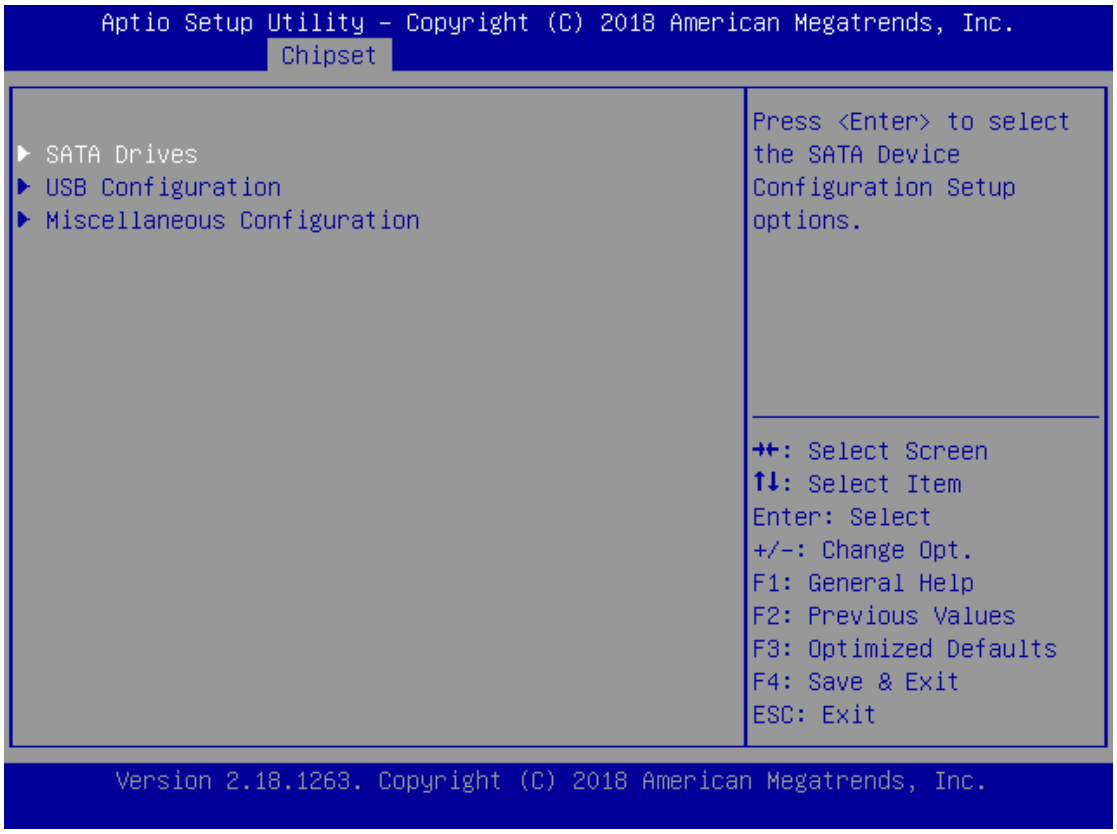
Feature	Options	Description
Max TOLUD	2 GB 2.25 GB 2.5 GB 2.75 GB 3 GB	Maximum Value of TOLUD.
Above 4GB MMIO BIOS assignment	Enabled Disabled	Enable/Disable above 4GB MemoryMappedIO BIOS assignment This is disabled automatically when Aperture Size is set to 2048MB

South Bridge



Feature	Options	Description
Serial IRQ Mode	Quiet Continuous	Configure Serial IRQ Mode.
OS Selection	Windows Android Win7 Intel Linux	Select the target OS

South Cluster Configuration

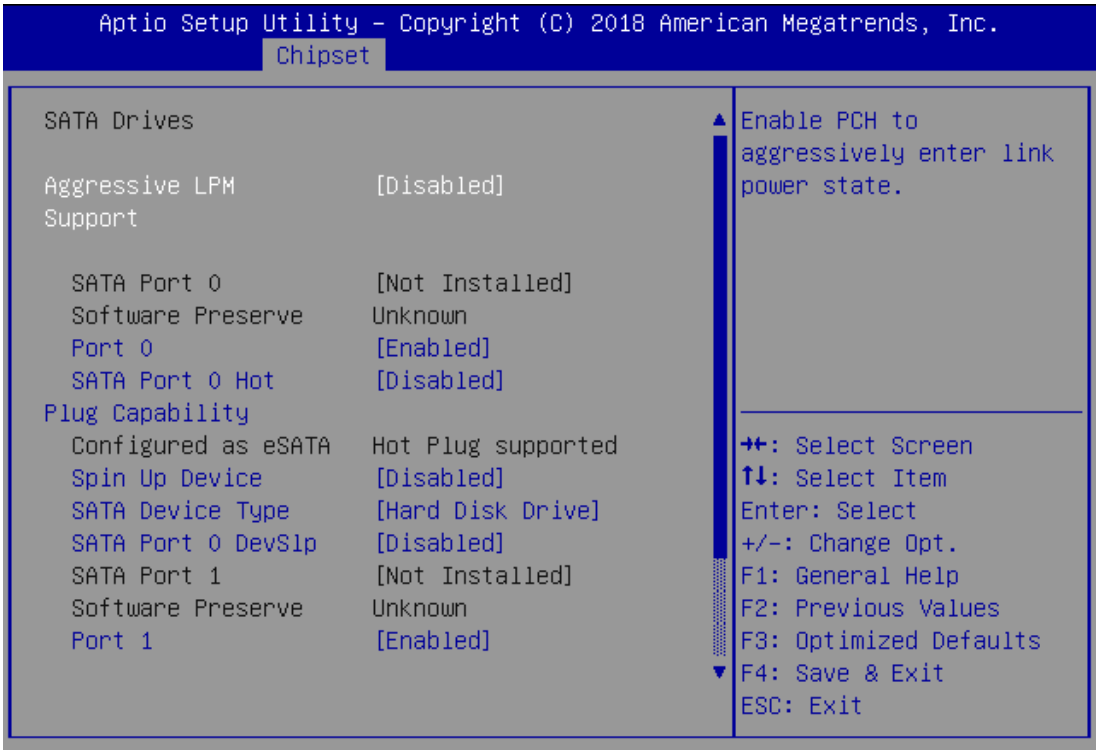


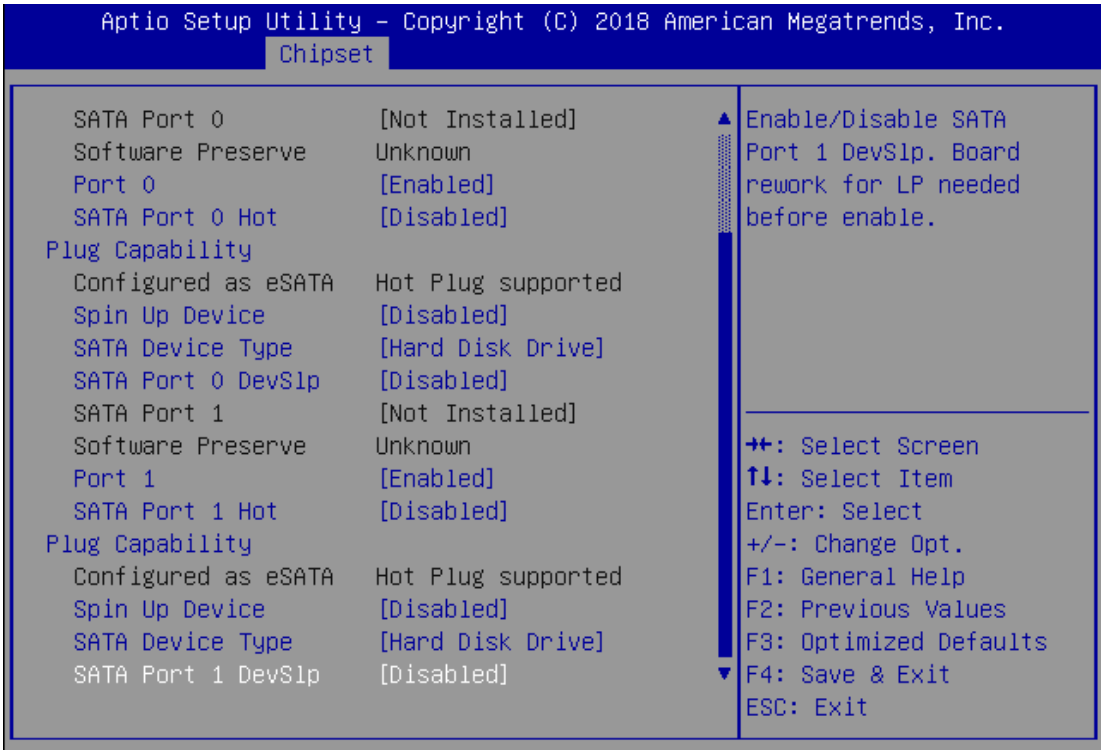
SATA Drives

Please refer to Connector Pin Assignment for the physical port location:

SATA Port0 = mSATA storage

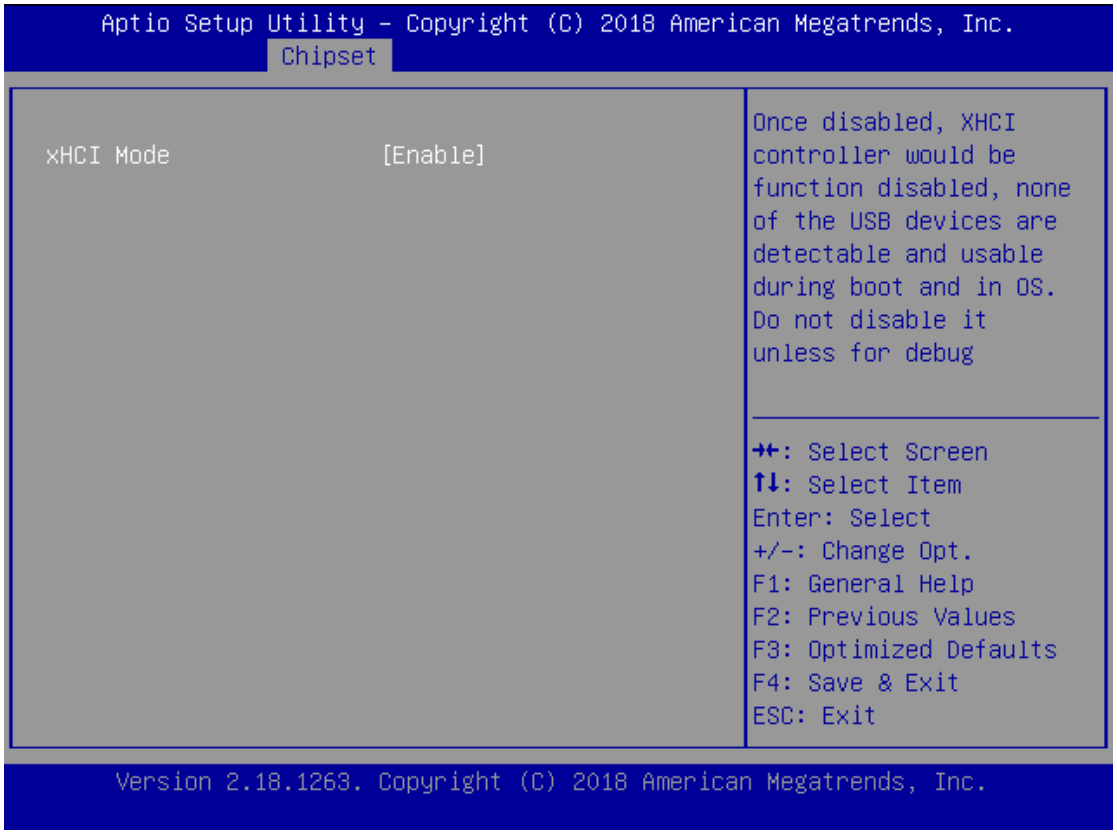
SATA Port1 = SATA1 port (on motherboard)





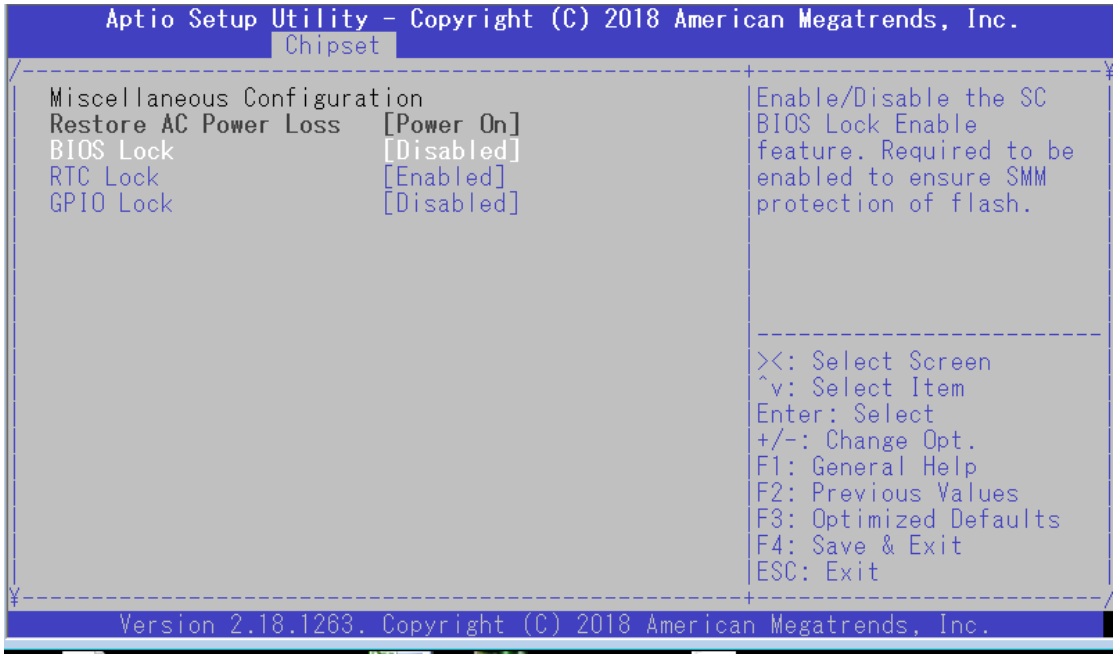
Feature	Options	Description
Aggressive LPM Support	Enabled Disabled	Enable PCH to aggressively enter link power state.
Port 0	Enabled Disabled	Enable or Disable SATA Port
SATA Port 0 Hot Plug Capability	Enabled Disabled	If enabled, SATA port will be reported as Hot Plug capable.
Spin Up Device	Enabled Disabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port 0 DevSlp	Enabled Disabled	Enable/Disable SATA Port 0 DevSlp. Board rework for LP needed before enable.
Port 1	Enabled Disabled	Enable or Disable SATA Port
SATA Port 1 Hot Plug Capability	Enabled Disabled	If enabled, SATA port will be reported as Hot Plug capable.
Spin Up Device	Enabled 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 Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port 1 DevSlp	Enabled Disabled	Enable/Disable SATA Port 1 DevSlp. Board rework for LP needed before enable.

USB Configuration



Feature	Options	Description
xHCI Mode	Enable Disable	Once disabled, XHCI controller would be function disabled, none of the USB devices are detectable and usable during boot and in OS. Do not disable it unless for debug purpose.

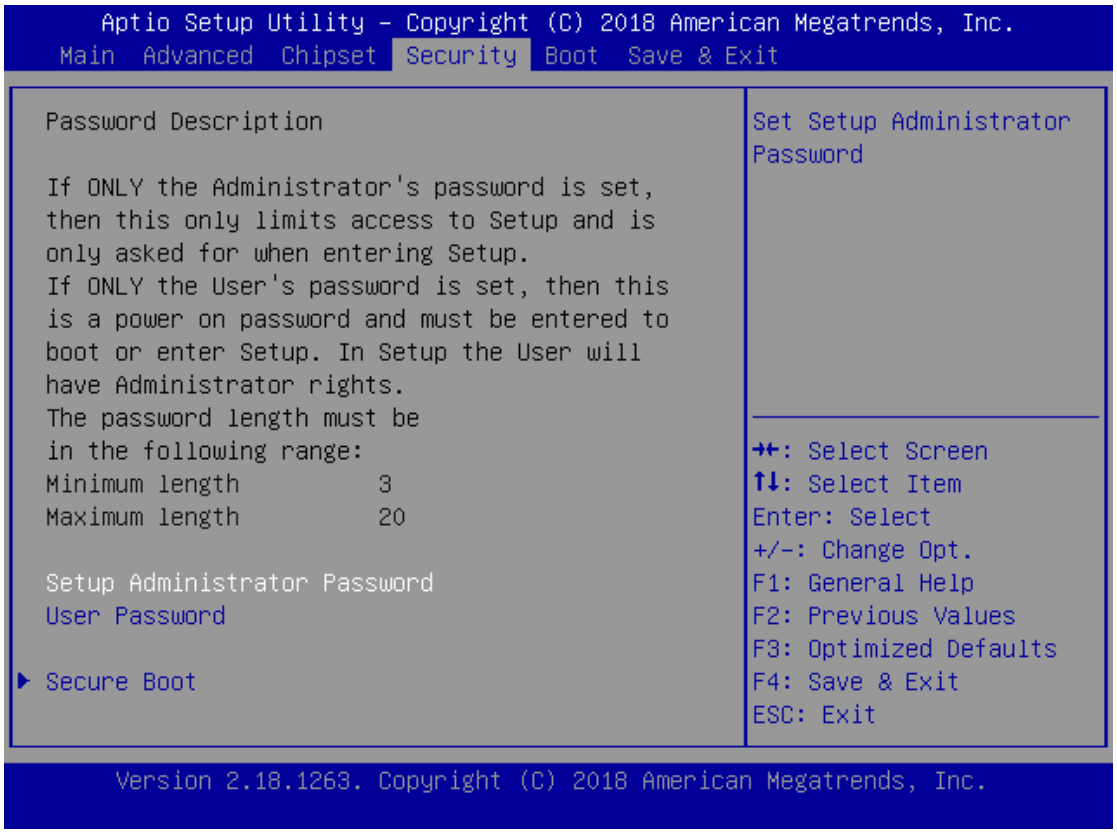
Miscellaneous Configuration



Feature	Options	Description
Restore AC Power Loss	Power On Power Off Last State	Specify what state to go to when power is re-applied after a power failure (G3 state).S0 State: System will boot directly as soon as power applied.S5 State: System keeps in power-off state until power button is pressed.
BIOS Lock	Enabled Disabled	Enable/Disable the SC BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.
RTC Lock	Enabled Disabled	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM
GPIO Lock	Enabled Disabled	Enable to set GPIO Pad Configuration Lock for security

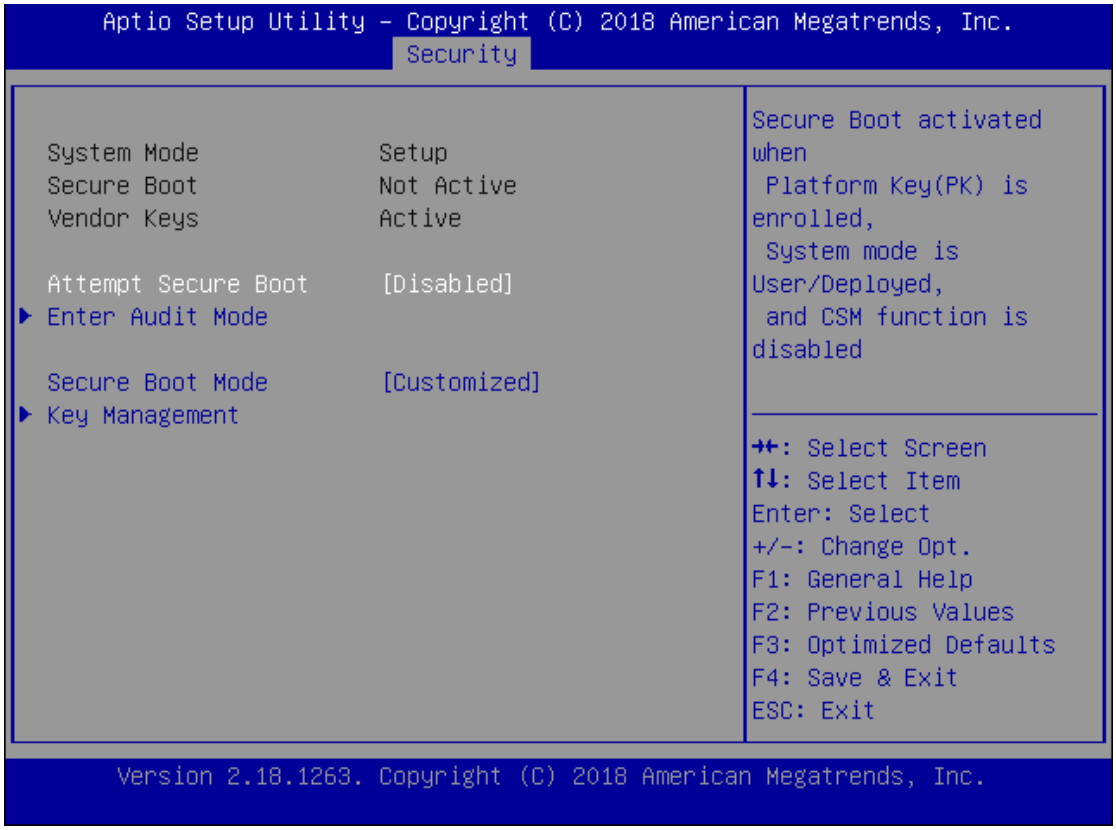
Security

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.



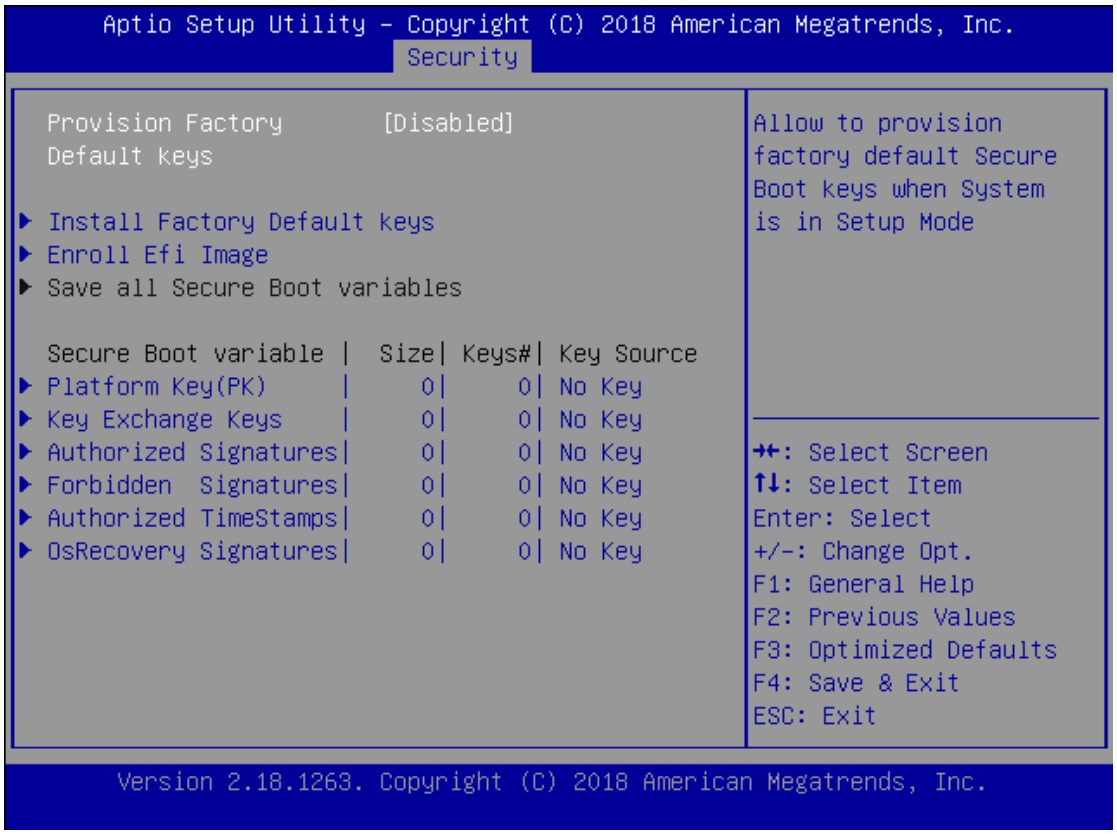
Feature	Description
Setup Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup,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

Secure Boot



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

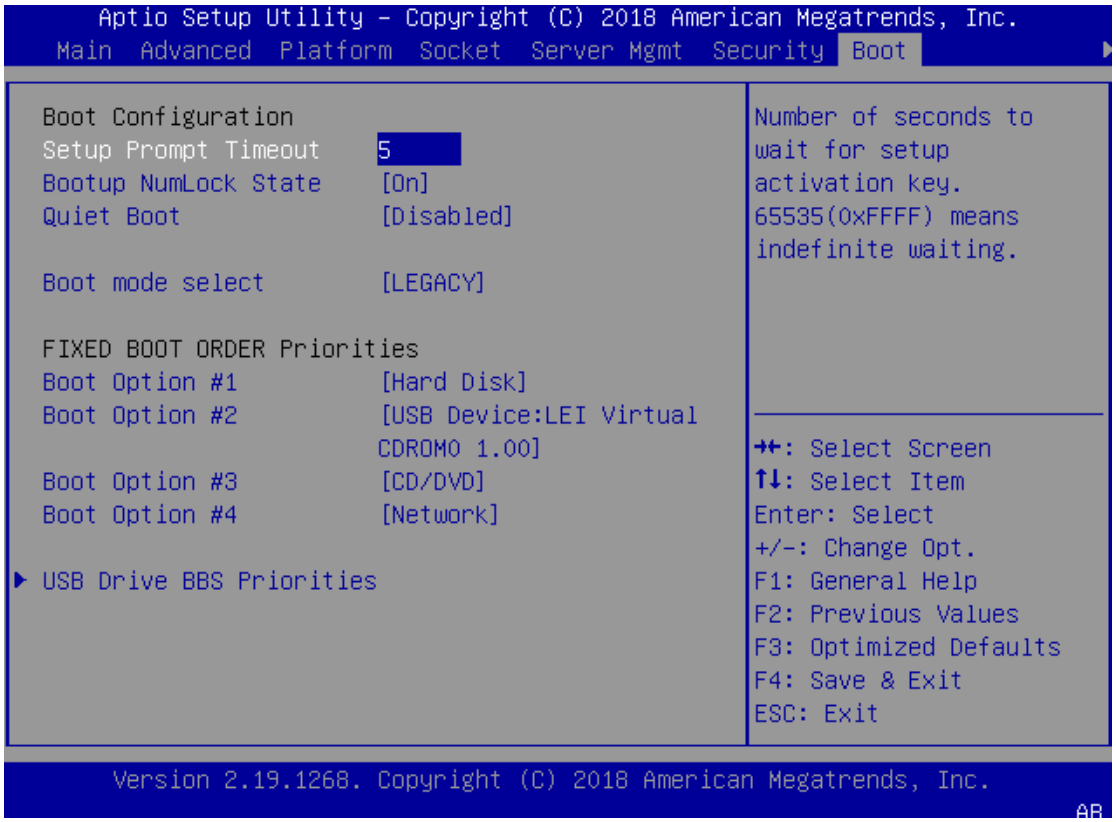
Key Management



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

Boot 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.

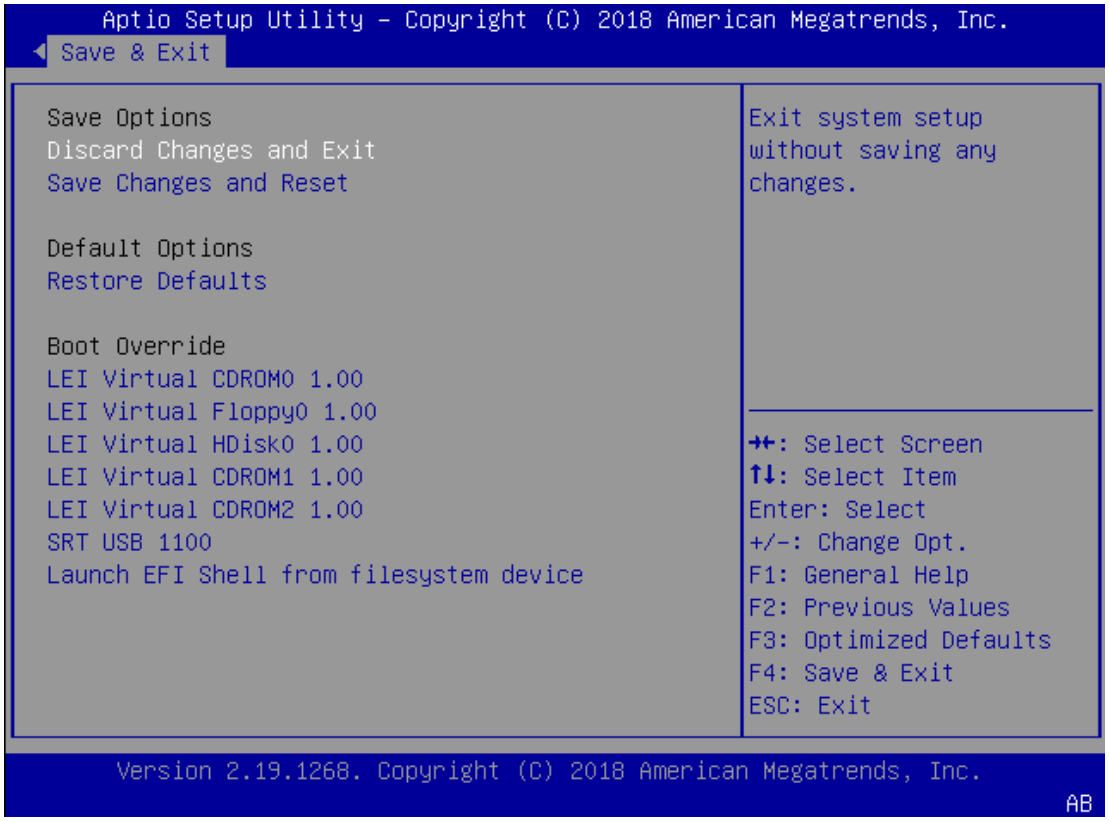


Feature	Options	Description
Setup Prompt Timeout	5	The Number of seconds to wait for setup activation key. 65535 means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state.
Quiet Boot	Disabled Enabled	Enables or disables Quiet Boot option.
Boot mode select	LEGACY UEFI DUAL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

Note: Set boot priority from boot option group

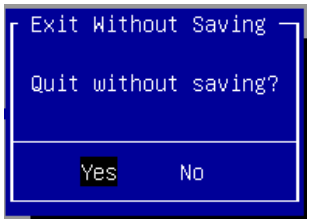
Save and Exit Menu

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



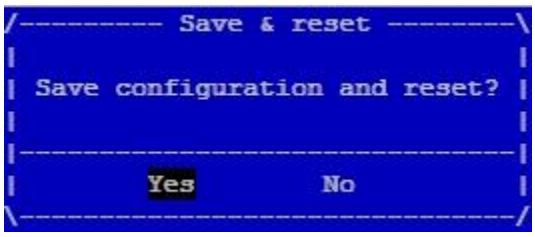
Discard Changes and Exit

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



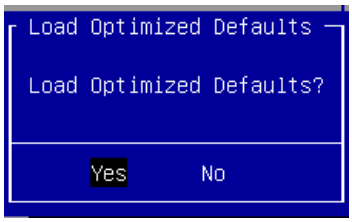
Save Changes and Reset

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



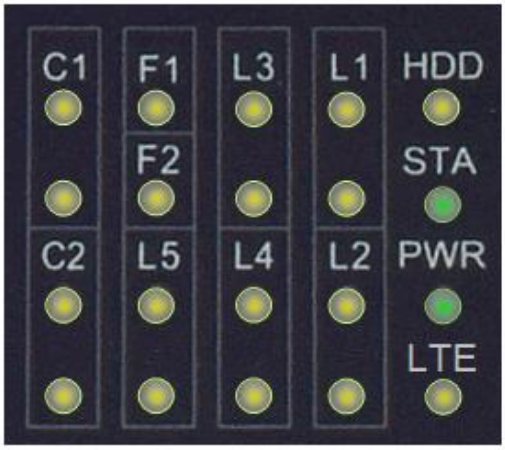
Restore Defaults

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



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

APPENDIX A: LED INDICATOR EXPLANATIONS



- **HDD Activity**

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

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

- **System Status**

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

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

- **System Power**

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

- **LTE Status**

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

- **L1-L5 LAN Port**

Link Activity

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

Speed

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

- **F1-F2 Fiber Port**

Blinking Amber	*There is fiber activity on this port*
Solid Amber	*Fiber link status*
Off	*No link is established*

- **C1-C2 COM Port**

TX Activity

Solid Amber	*Data transmitting*
Off	*No data activity*

RX Activity

Solid Amber	*Data receiving*
Off	*No data activity*

APPENDIX B: SETTING UP CONSOLE REDIRECTIONS

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

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

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

RMA Service

Requesting an RMA#

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

Note

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

RMA Service Request Form

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

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

Item	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

*Problem Code:

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

Request Party

Authorized Signature / Date

Confirmed By Supplier

Authorized Signature / Date