



Lanner

Network Appliance Platform

Hardware Platforms for Network Computing

NCR-1510 User Manual

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About this Document

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

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

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



Conventions & Icons

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

Font Conventions

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

Icon Descriptions

Icon	Usage
 Note or Information	This mark indicates that there is something you should pay 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 visit our [Lanner Technical Support](#) page to submit a support ticket to our technical support department.

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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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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 the battery is replaced by an incorrect type.
- ▶ Dispose of used batteries according to the instructions.
- ▶ Installation should be conducted only by a trained electrician or only by an electrically trained person who knows all installation procedures 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 environment can result in an explosion or the leakage of flammable liquid or gas.
- ▶ A battery subjected to extremely low air pressure may result in an explosion or the leakage of flammable liquid or gas.

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 Precautions

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

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

Installation & Operation

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

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.



CAUTION: TO DISCONNECT POWER, REMOVE ALL POWER CORDS FROM UNIT.

注意：要断开电源，请将所有电源线从本机上拔下。

WARNING: Wenn Sie das Gerät zwecks Wartungsarbeiten vom Netz trennen müssen, müssen Sie beide Netzteile abnehmen.

ATTENTION: DÉBRANCHER LES TOUT CORDONS D'ALIMENTATION POUR DÉCONNECTER L'UNITÉ DU SECTEUR.



Important

Instruction for the installation of the conductor to building earth by a skilled person.



Note

This product is intended to be used with a UL Listed Optical Transceiver product. Laser Class 1.

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CHAPTER 1: PRODUCT OVERVIEW

NCR-1510 is a wide-temperature fanless network appliance optimized for SD-WAN or uCPE. This new offering will allow service providers to deploy the SD-WAN services in demanding environment and critical infrastructure. Powered by Intel® Atom® C3000 (codenamed Denverton) CPU, the NCR-1510 features solid performance and Intel's QuickAssist Technology running up to 10Gbps, offering cryptographic acceleration and industrial-grade LAN functions in a compact form factor. It is the optimal fanless desktop network appliance for SD-WAN, uCPE or edge security gateway for enterprises.

Package Content

Your package contains the following items:

- ▶ 1x NCR-1510 Network Security Platform
- ▶ 1x Mini USB Console Cable
- ▶ 4x Rubber Foot

Optional Kits

- ▶ 1U Rackmount Kit
- ▶ HDD Kit
- ▶ Wall Mount Kit

Ordering Information

SKU No.	Main Features
NCR-1510A	C3308, 6x GbE RJ45 w/ 1 Pair of Gen3 Bypass, 1x 260-pin DDR4 SODIMM
NCR-1510B	C3508, 6x GbE RJ45, w/ 1 Pair of Gen3 Bypass, 2x 260-pin DDR4 SODIMM
NCR-1510C	C3708, 4x GbE RJ45, 2x GbE SFP, w/ 1 Pair of Gen3 Bypass, 2x 260-pin DDR4 SODIMM
NCR-1510D	C3308, 6x GbE RJ45 w/ 1 Pair of Gen3 Bypass, 1x 260-pin DDR4 SODIMM, 1x Optional removable PGN-300/600 Caddy
NCR-1510E	C3508, 6x GbE RJ45, w/ 1 Pair of Gen3 Bypass, 2x 260-pin DDR4 SODIMM, 1x Optional removable PGN-300/600 Caddy
NCR-1510F	C3708, 4x GbE RJ45, 2x GbE SFP, w/ 1 Pair of Gen3 Bypass, 2x 260-pin DDR4 SODIMM, 1x Optional removable PGN-300/600 Caddy
PGN-300	4G LTE Radio Modem with LTE Cat-6 embedded module, certified with PTCRB, AT&T, Verizon.
PGN-600	4G LTE-Advanced Pro Radio Modem with LTE Cat-12 embedded module, certified with PTCRB, AT&T.

System Specifications

Form Factor		Desktop
Platform	Processor Options	Intel® Atom® C3308/C3508/C3708 (Denverton)
	CPU Socket	Onboard
	Chipset	SoC
	Security Acceleration	Intel® QuickAssist Technology
BIOS		AMI SPI Flash BIOS
System Memory	Technology	DDR4 up to 2400MHz ECC/non-ECC DIMM
	Max. Capacity	SKU A/D: 32GB SKU B/C/E/F: 64GB
	Socket	SKU A/D: 1x 260-pin SODIMM SKU B/C/E/F: 2x 260-pin SODIMM
Networking	Ethernet Ports (By SKU)	4x GbE RJ45 Intel® SoC Integrated MAC+ 2x SFP Intel® i210 (SKU C) or 2x GbE RJ45 Intel i210 (SKU A/B)
	Bypass	1 Pair of Gen3
	NIC Module Slot	N/A
LOM	IO Interface	N/A
	OPMA slot	N/A
I/O Interface	Reset Button	1
	LED	Power/Status/Storage
	Power Button	1x Power Switch
	Console	1x Mini USB
	USB	2x USB 3.0
	LCD Module	N/A
	Display	N/A
Storage	Power Input	1x 2-pin terminal block
	HDD/SSD Support	1x 2.5" Internal Bay
	Onboard Slots	1x M.2 (w/ LTE support)
Expansion	M.2	1x M.2 B key 3042 for LTE, 2242 SSD with Nano-SIM or 1x optional removable PGN-300/600 caddy
	mini-PCIe	SKU A/B/D/E: 1x Mini-PCIe for Wi-Fi/LTE w/ Nano-SIM SKU C/F: 2x Mini-PCIe for Wi-Fi/LTE w/ Nano-SIM
Miscellaneous	Watchdog	Yes
	Internal RTC with Li Battery	Yes
	TPM	Onboard TPM 2.0
Cooling	Processor	Passive CPU Heatsink
	System	Fanless
Environmental Parameters	Temperature	-40~70°C Operating -40~85°C Ambient storage
	Humidity (RH)	5~90% Operating 5~ 95% Non-Operating
System Dimensions	(WxDxH)	310 x 240 x 44 mm
	Weight	3 kg
Package Dimensions	(WxDxH)	45.2 x 32.8 x 13.7
	Weight	TBD
Power	Type/Watts	12V, 5A
	Input	9~54V DC
Approvals and Compliance		RoHS, CE/FCC Class A

Front Panel (NCR-1510A/B/C)



No.	Description	
F1	Console Port	1x Mini USB Console Port
F2	LED Indicator	Power Status/System Status/Storage Activity
F3	GbE Port	6x 10/100/1000Mbps Ethernet ports 4x 10/100/1000Mbps Ethernet ports
F4	SFP Port	2x SFP Port with LED Indicator
F5	USB Port	2x USB 3.0 Port (SKU B/C)

Front Panel (NCR-1510D/E/F)

NCR-1510D



NCR-1510E



NCR-1510F



No.	Description	
F1	Console Port	1x Mini USB Console Port
F2	LED Indicator	Power Status/System Status/Storage Activity
F3	GbE Port	6x 10/100/1000Mbps Ethernet ports 4x 10/100/1000Mbps Ethernet ports
F4	SFP Port	2x SFP Port with LED Indicator
F5	USB Port	2x USB 3.0 Port (SKU B/C)
F6	Module Slot	1x PGN Module Slot

Rear Panel



No.	Description	
R1	Power Switch	1x Power Button
R2	Reset Button	For software reset
R3	DC Jack	1x DC Power Jack
R4	Antenna Port	4x Reserved antenna port for Wi-Fi / LTE module

Side Panel



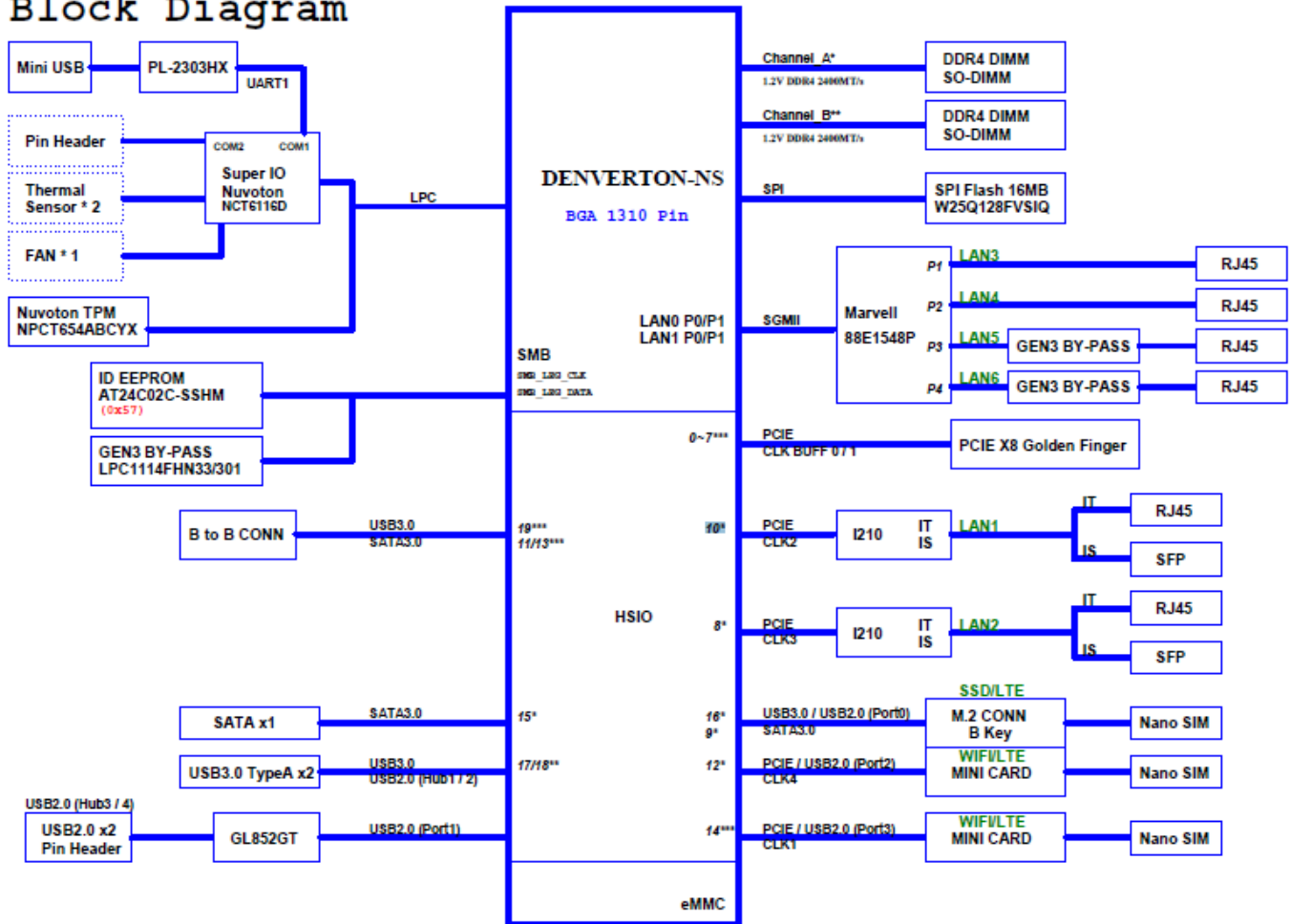
No.	Description	
S1	SIM Slot	1x SIM Slot for accommodation of 2x Nano SIM

CHAPTER 2: MOTHERBOARD INFORMATION

Block Diagram

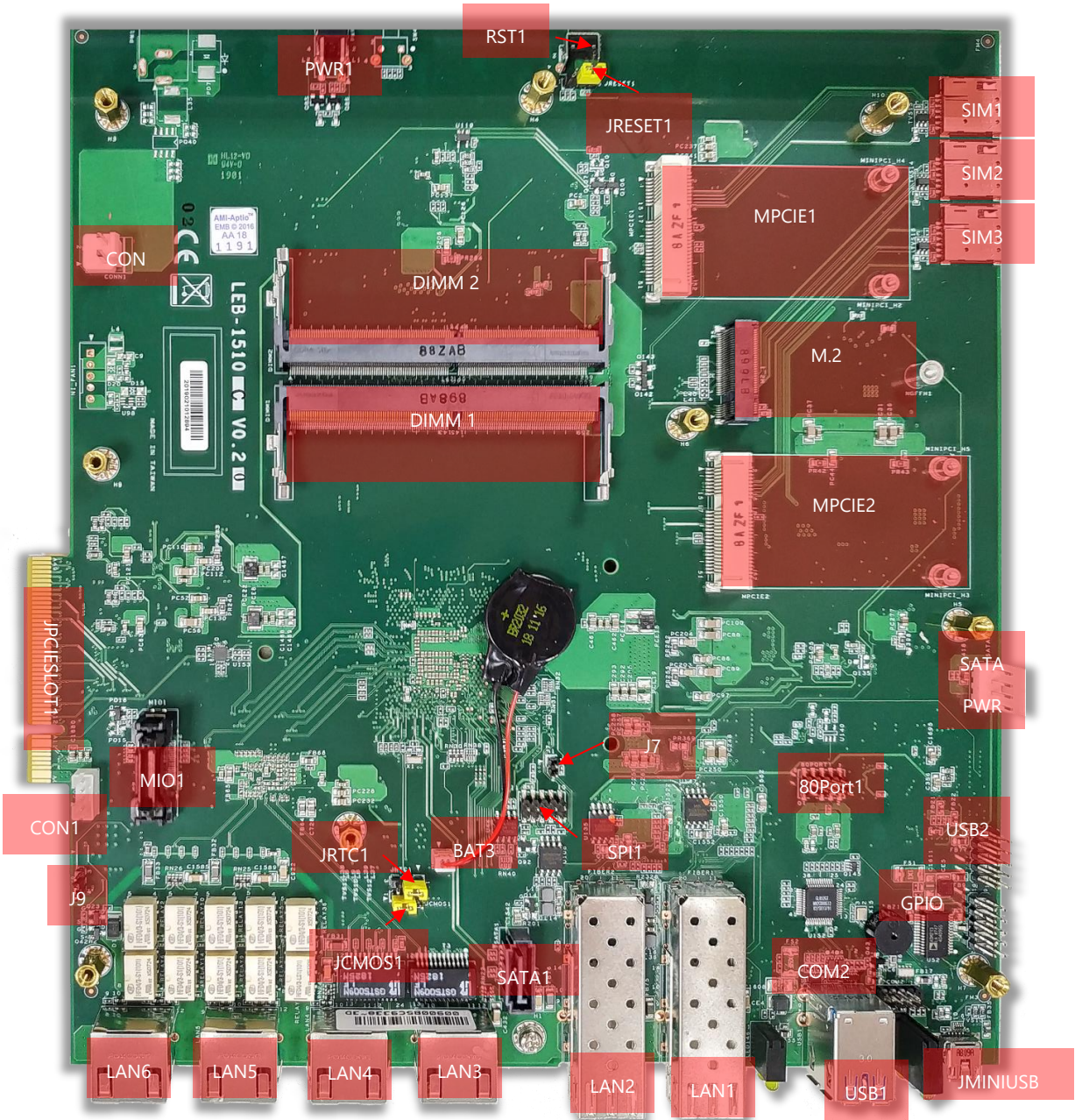
The block diagram indicates how data flows among components on the motherboard. Please refer to the following figure for your motherboard's layout design.

Block Diagram



Motherboard Layout

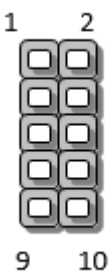
This layout shows the connectors and jumpers on the board, as a reference of the pin assignments and the internal connectors.



Internal Jumper & Connectors

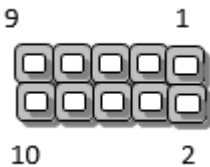
◆ **USB2:** USB2.0

Pin	Signal	Pin	Signal
1	P5V_USB2	2	NC
3	USB20_N1_L	4	NC
5	USB20_P1_L	6	NC
7	USBGND1	8	NC
9	USBGND1	10	NC



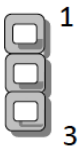
◆ **80PORT1:** Debug Conn

Pin	Signal	Pin	Signal
1	LPC_CLKOUT0	2	LPC_LAD1
3	80PORT_RST#	4	LPC_LAD0
5	LPC_FRAME_N	6	P3V3_S
7	LPC_LAD3	8	
9	LPC_LAD2	10	GND



◆ **JRTC1:** Clear RTC

Pin	Signal
1	NC
2	SOC_SRTCST_N
3	GND



◆ **JCMOS1:** Clear CMOS

Pin	Signal
1	NC
2	SOC_RTEST_N
3	GND



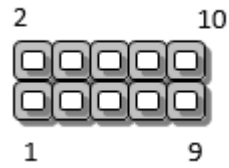
◆ **GPIO1:** EXT GPIO header

Pin	Signal	Pin	Signal
1	NC	2	GPI_B_1
3	SOC_RTEST_N	4	GPI_B_2
5	GND	6	GPI_B_3
7	GPO_B_4	8	GPI_B_4
9	GND	10	GND



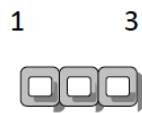
◆ **SPI1:** Flash BIOS

Pin	Signal	Pin	Signal
1	SPI_HD1#	2	NC
3	SOC_SPI_CS0_R	4	P3V3_SB_SPI
5	SOC_SPI_MISO_R	6	SOC_SPI_IO3_R
7	NC	8	SOC_SPI_CLK_R
9	GND	10	SOC_SPI_MOSI_R



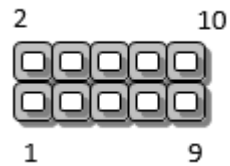
◆ **JRESET1:** Reset

Pin	Signal
1-2	HW Reset
2-3	SW Reset



◆ **COM2:** COM Port

Pin	Signal	Pin	Signal
1	NDCD2-	2	NDSR2-
3	NRXD2	4	NRTS2-
5	NTXD2	6	NCTS2-
7	NDTR2-	8	NRI2-
9	GND	10	NC



◆ **J9:**

Pin	Signal
1	P3V3_AUX
2	PIO0_1
3	GND



◆ **CON1:**

Pin	Signal
1	P3V3_AUX
2	PIO1_6_RXD
3	GND
4	PIO1_7_TXD

◆ **CONN1:**

Pin	Signal
1	P12V_SB
2	GND

◆ **M2_1:**

Pin	Signal	Pin	Signal
1	NC	2	P3V3_AUX
3	GND	4	P3V3_AUX
5	GND	6	P1V8_A
7	USB20_P0	8	NC
9	USB20_N0	10	NC
11	GND	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	NC	20	NC
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	USB3_HRX_L_DTX_N16	30	UIM1_VPP
31	USB3_HRX_L_DTX_P16	32	UIM1_RST
33	GND	34	UIM1_CLK
35	USB3_HTX_L_DRX_N16	36	UIM1_DAT
37	USB3_HTX_L_DRX_P16	38	UIM1_PWR
39	GND	40	NC
41	SATA_HRX_C_DTX_P9	42	NC
43	SATA_HRX_C_DTX_N9	44	NC
45	GND	46	NC
47	SATA_HTX_C_DRX_N9	48	NC
49	SATA_HTX_C_DRX_P9	50	NGFF_PCI_RST#
51	GND	52	NC
53	NC	54	NC
55	NC	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	NC
67	NC	68	SUSCLK_R
69	NC	70	P3V3_AUX
71	GND	72	P3V3_AUX
73	GND	74	P3V3_AUX

75	NC		
----	----	--	--

◆ **MPCIE1:**

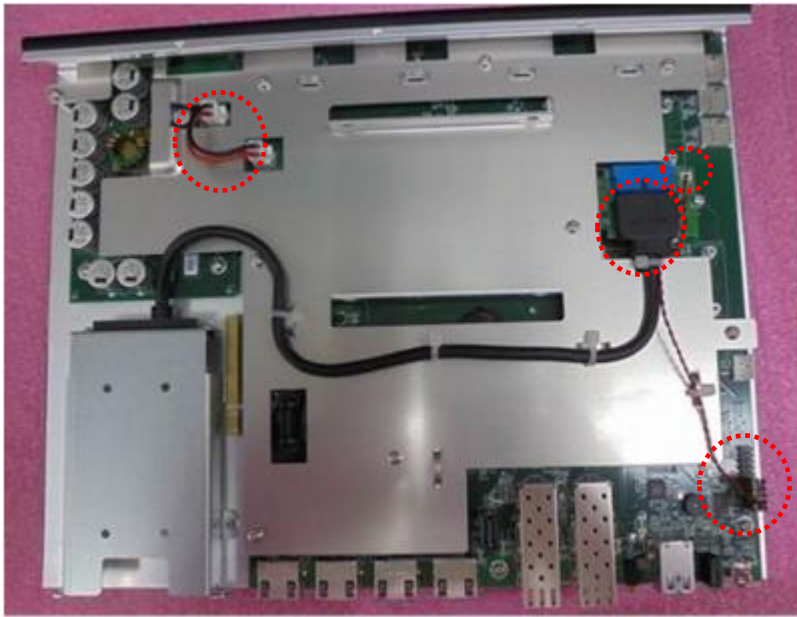
Pin	Signal	Pin	Signal
1	NC	2	P3V3_AUX
3	NC	4	GND
5	NC	6	P1V5_A
7	NC	8	UIM2_PWR
9	GND	10	UIM2_DAT1
11	CLK100_PCIE_SLOT2_N4	12	UIM2_CLK1
13	CLK100_PCIE_SLOT2_P4	14	UIM2_RST1
15	GND	16	UIM2_VPP1
17	NC	18	GND
19	NC	20	W_DISABLE_B_N
21	GND	22	MINI_PCI_RST#
23	PCIE_HRX_WLAN2TX_N12	24	P3V3_AUX
25	PCIE_HRX_WLAN2TX_P12	26	GND
27	GND	28	P1V5_A
29	GND	30	SMB_MPCIE2_CLK
31	PCIE_HTX_C_WLAN2RX_N12	32	SMB_MPCIE2_DATA
33	PCIE_HTX_C_WLAN2RX_P12	34	GND
35	GND	36	USB20_N2
37	GND	38	USB20_P2
39	P3V3_AUX	40	GND
41	P3V3_AUX	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	P1V5_A
49	NC	50	GND
51	NC	52	P3V3_AUX
53	NC	54	GND
55	NC	56	NC
57	NC	58	NC

CHAPTER 3: HARDWARE SETUP

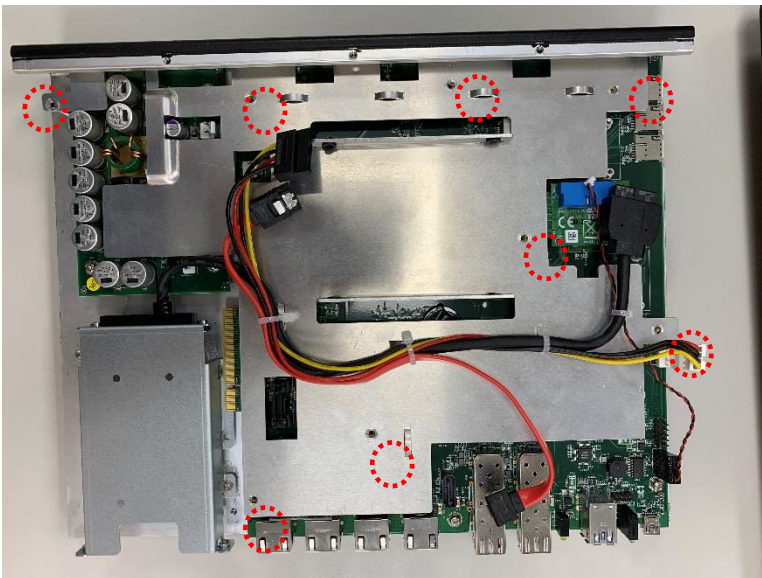
To reduce the risk of personal injury, electric shock, or damage to the system, please remove all power connections to shut down the device completely. Also, please wear ESD protection gloves when conducting the steps in this chapter

Remove Partition

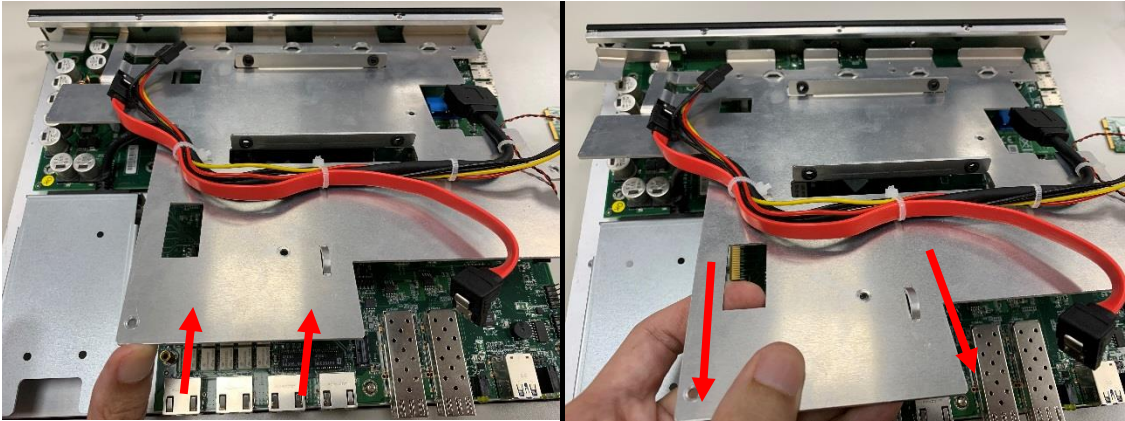
Please remove the partition board on top of the motherboard to install key parts and SSD drive. First, disconnect the Power Cable and USB/2-Pin Cable (SKU D/E/F).



Then remove the eight screws on the partition.



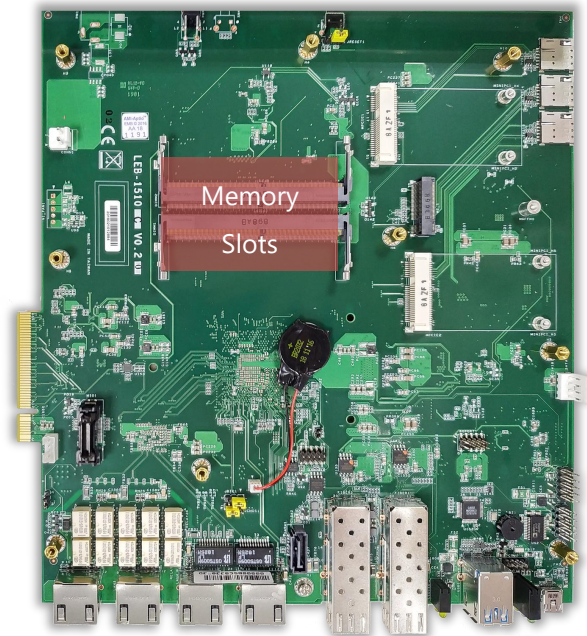
Unmount the partition by tilting it a bit and sliding it out.



Installing System Memory

The motherboard supports DDR4 registered DIMM memory for heavy-duty operations. Please follow the steps below to install the DIMM memory modules.

1. Locate the memory slots on the motherboard



2. Align the notch of the module with the socket key in the slot. Tilt the end of the golden fingers down while carefully inserting the card into the slot.

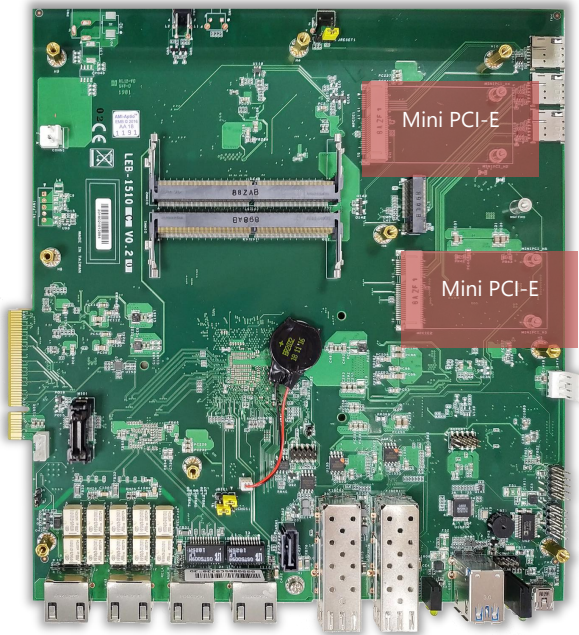


3. Press vertically on the other end of the card until it clicks into place.

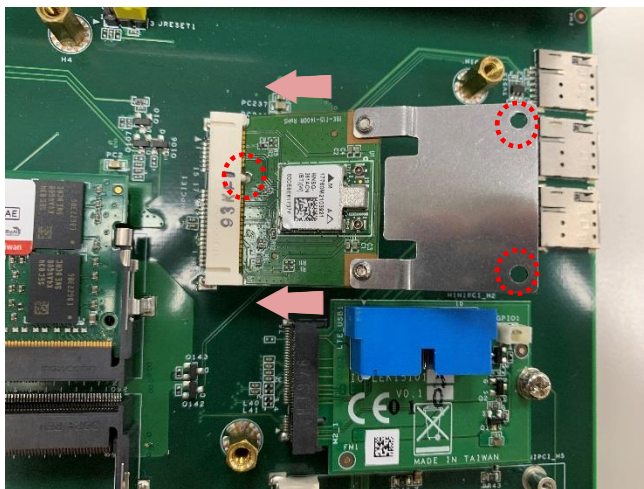


Installing Mini PCI-E Module

1. Locate the Mini PCI-E module slot on the motherboard.



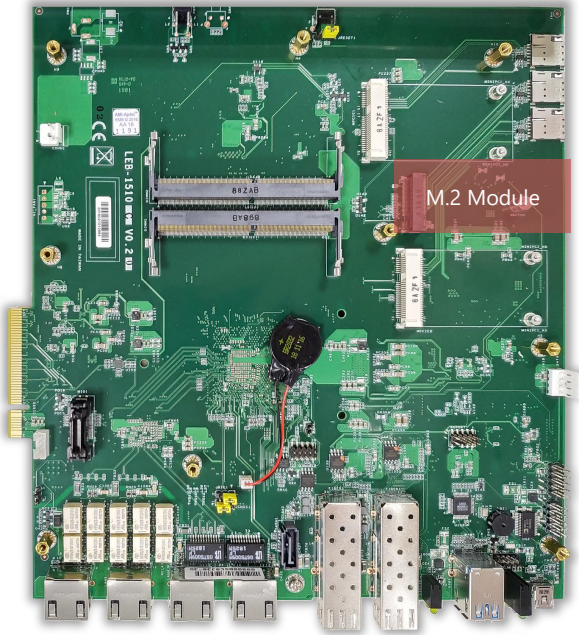
2. Align the notch of the module with the socket key in the slot. Tilt the end of the golden fingers down while carefully inserting the card into the slot.



3. Press vertically on the other end of the card until it clicks into place. Lock the module to the motherboard in the circle area.

Installing M.2 Module

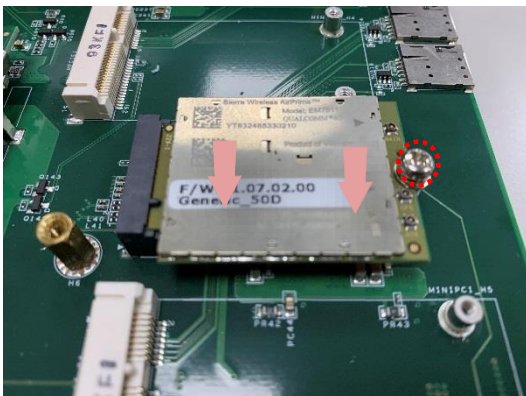
1. Locate the M.2 module slot on the motherboard.



2. Align the notch of the module with the socket key in the slot. Tilt the end of the golden fingers down while carefully inserting the card into the slot.



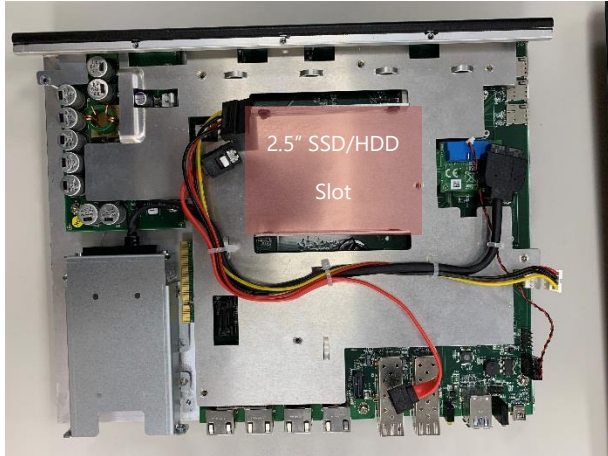
3. Press vertically on the other end of the card until it clicks into place. Lock the module to the motherboard in the circle area.



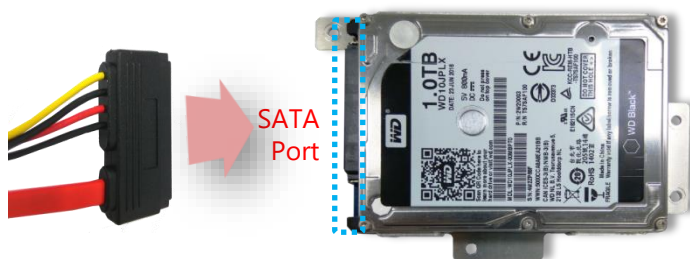
Note: NCA-1510 SKU D/E/F, the IO-LEK1510 module is onboard as default to connect the PGN module. If you want to use your own M.2 module. Please remove the module accordingly.

Installing 2.5" Hard Disk

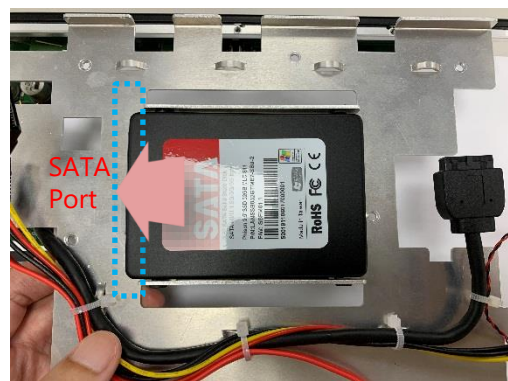
1. Mount your SSD drive on the partition **BEFORE** you mount it on top of the motherboard.
2. Locate the SSD drive slot on the partition



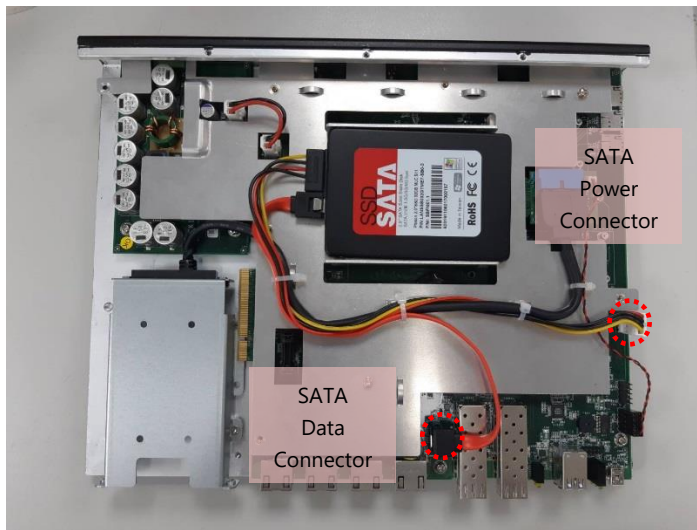
3. Connect the SATA cable to the hard disk.



4. Mount the disk onto the empty partition with the provided disk screws. Please mind the direction of the SATA port, which should be handled as shown in the photo.

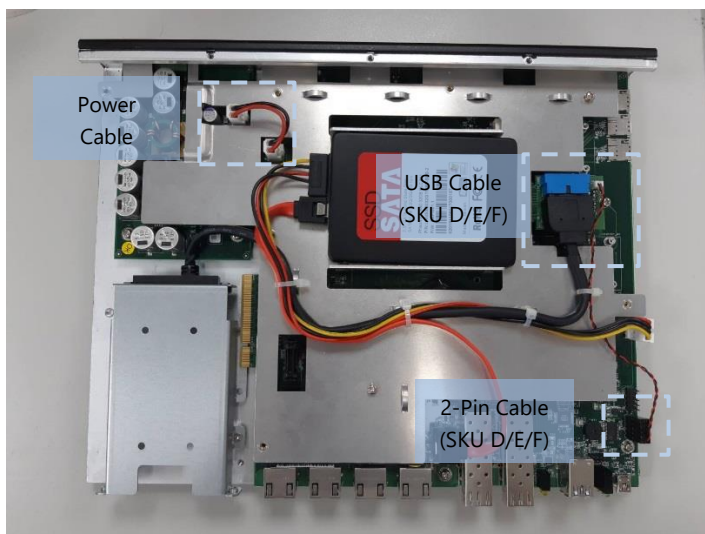


5. Mounting the partition* and your drive back to the device. Plug the data/power connector of the SATA cable into the corresponding port on the motherboard.



***Note:** As you need to mount the partition on the motherboard, please make sure you have installed all key parts you need on the motherboard beforehand.

6. Also remember to re-connect the power, USB/2-pin cable at the same time.



PGN Module Installation

Installing the PGN Module

Remove the front panel and slide in the PNG Module



Installing the SIM Card

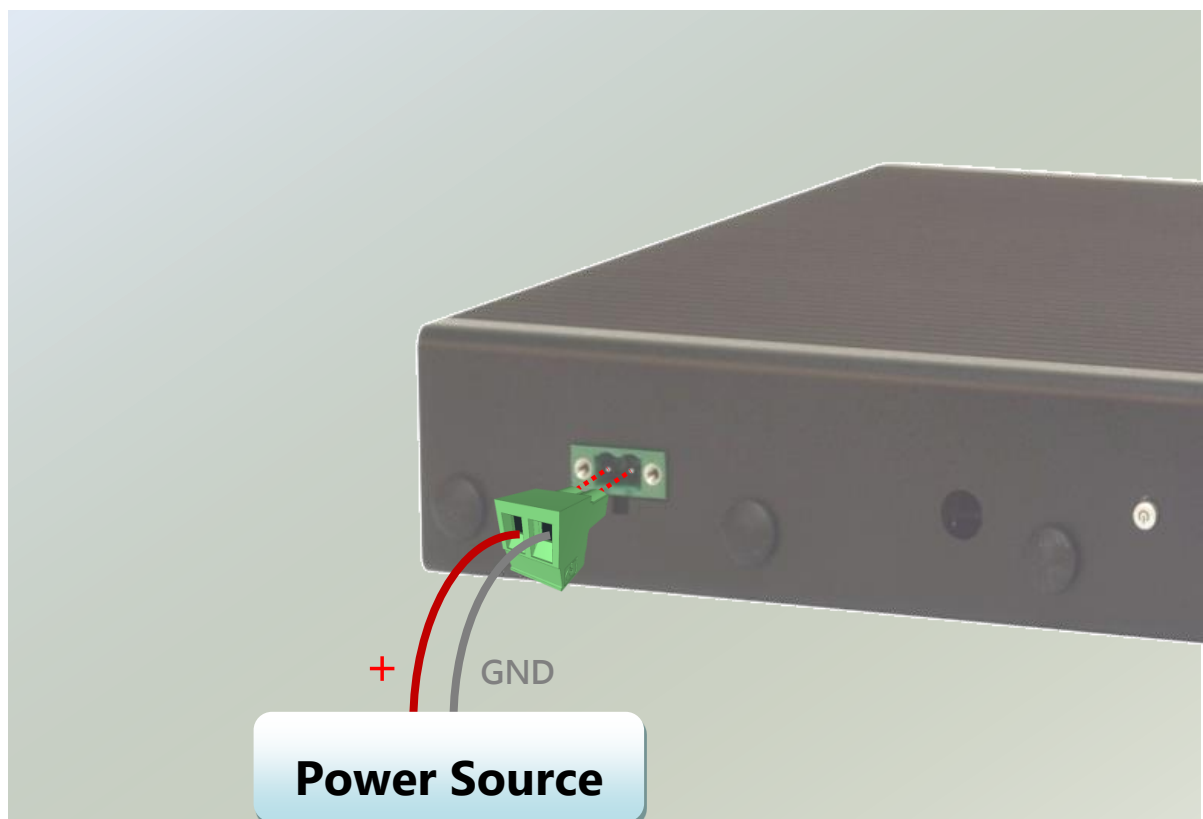
1. Slide the SIM card holder to the open position, and then carefully lift it up.
2. Insert the SIM card with the gold metal side facing outwards as shown in the picture.
3. Fold down the SIM card holder and slide it back into place.



DC Power Supply Installation

Follow the instructions below to connect the DC power source to the DC-in socket on the system. This instruction is for the installation of the conductor to build earthing by a skilled person.

1. Insert the 2-pin terminal block comes provided in the package.
2. Respectively attach fix the two cables to the connectors: the red cable to the left (Positive Pole) and the black cable to the right (Ground Pole).
3. Connect the power cables to the power source.



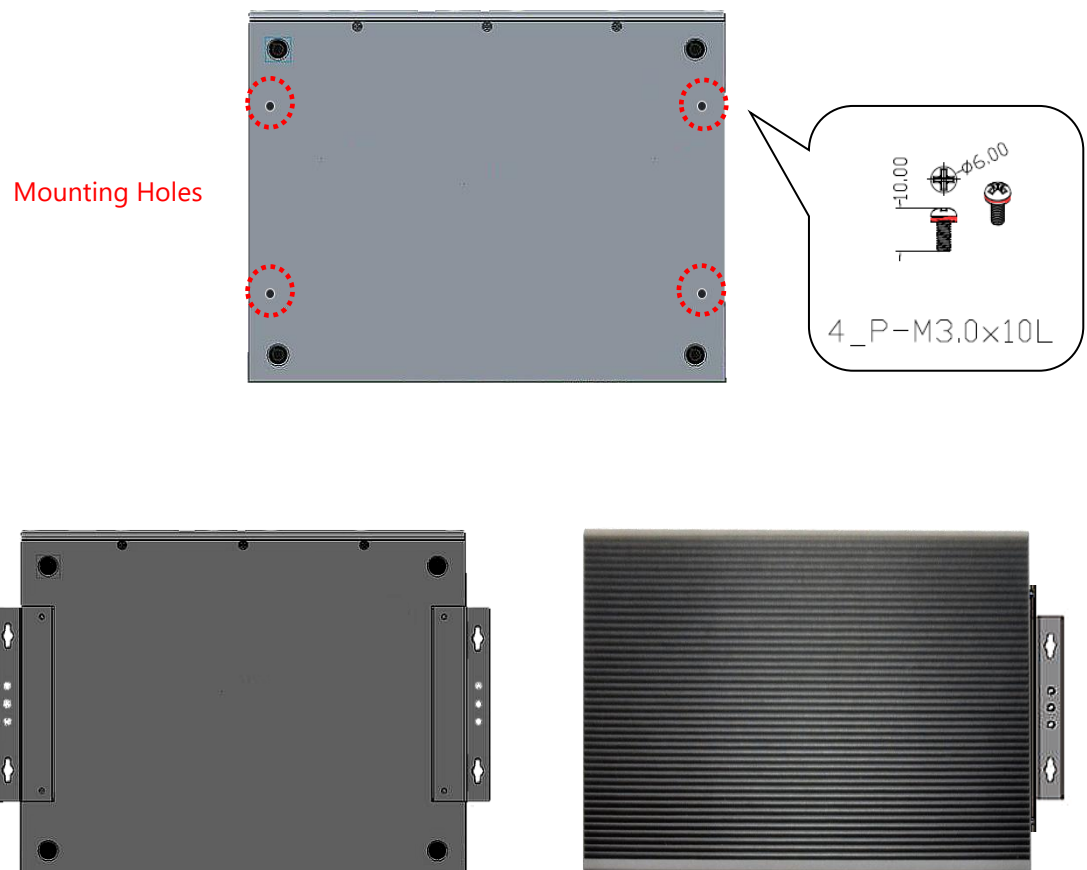
This product is intended to be supplied by a listed power adapter or DC power source, rated 9-54Vdc, 7.8-1.3A minimum, Tma = 70 degree C.

If you need further assistance with purchasing the power source, please contact to Lanner Electronics Inc. for further information.

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.

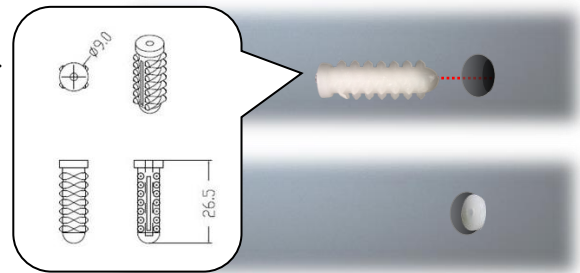
1. Fix the wallmount brackets onto the system bottom by securing them with **four** provided screws.



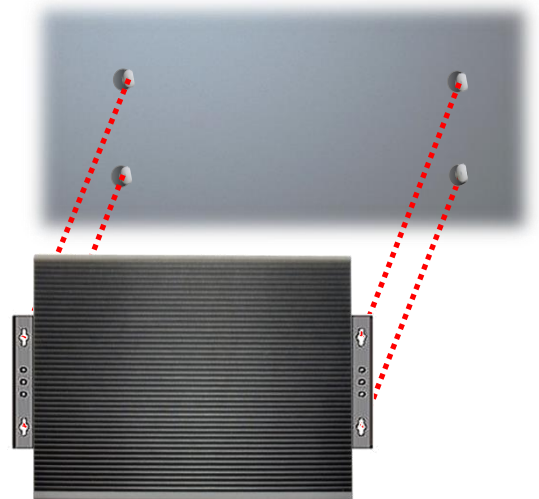
2. On the wall, measure the exact place where you want to hang the system, and drill four holes that match the four mounting holes on both brackets.



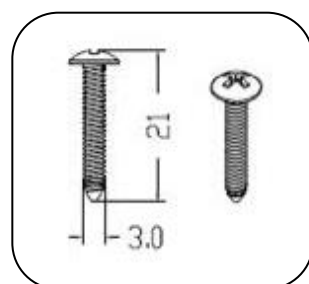
3. Insert **four** anchoring bolts into the holes.



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 4: BIOS SETUP

Enter BIOS Setup

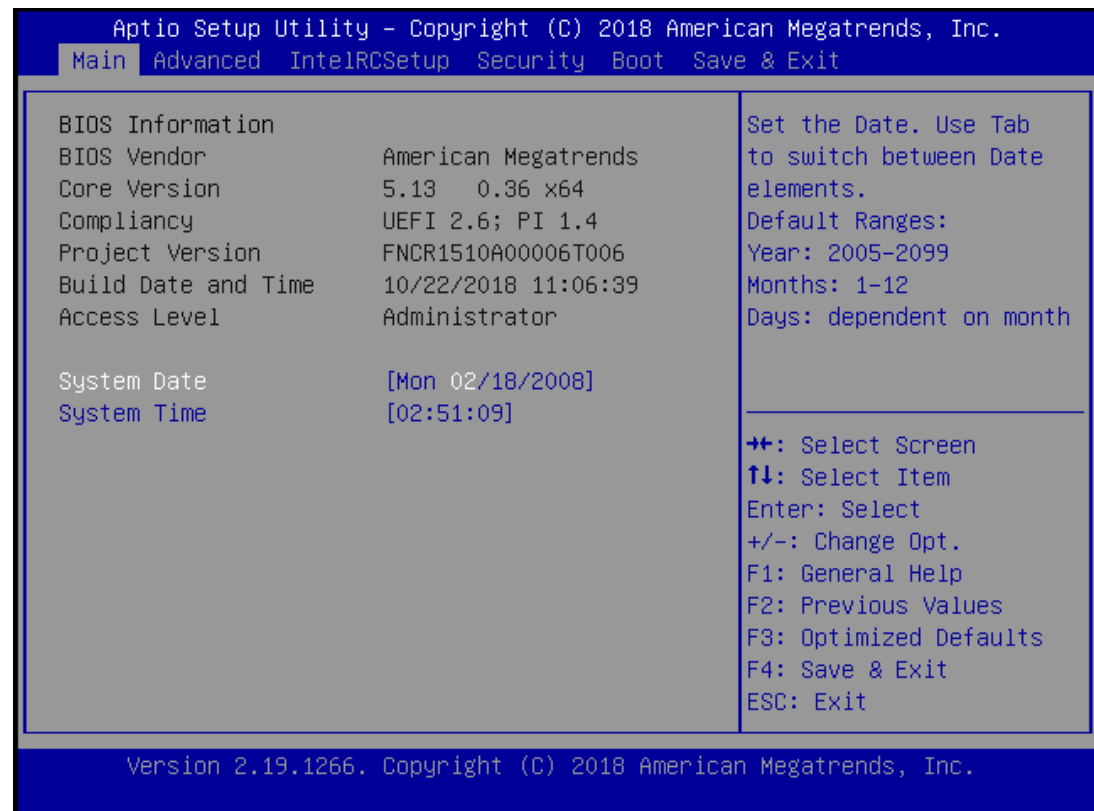
To enter the BIOS setup utility, simply follow the steps below:

1. Boot up the system.
2. Press **<Delete>** during the boot-up if you connect a keyboard to this unit. But if you connect a PC to this unit through console USB/Serial connection, then press **<Tab>**. Your system should be running POST (Power-On-Self-Test) upon booting up.
3. Then you will be directed to the BIOS main screen.
4. Instructions of BIOS navigations:

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

Main Page

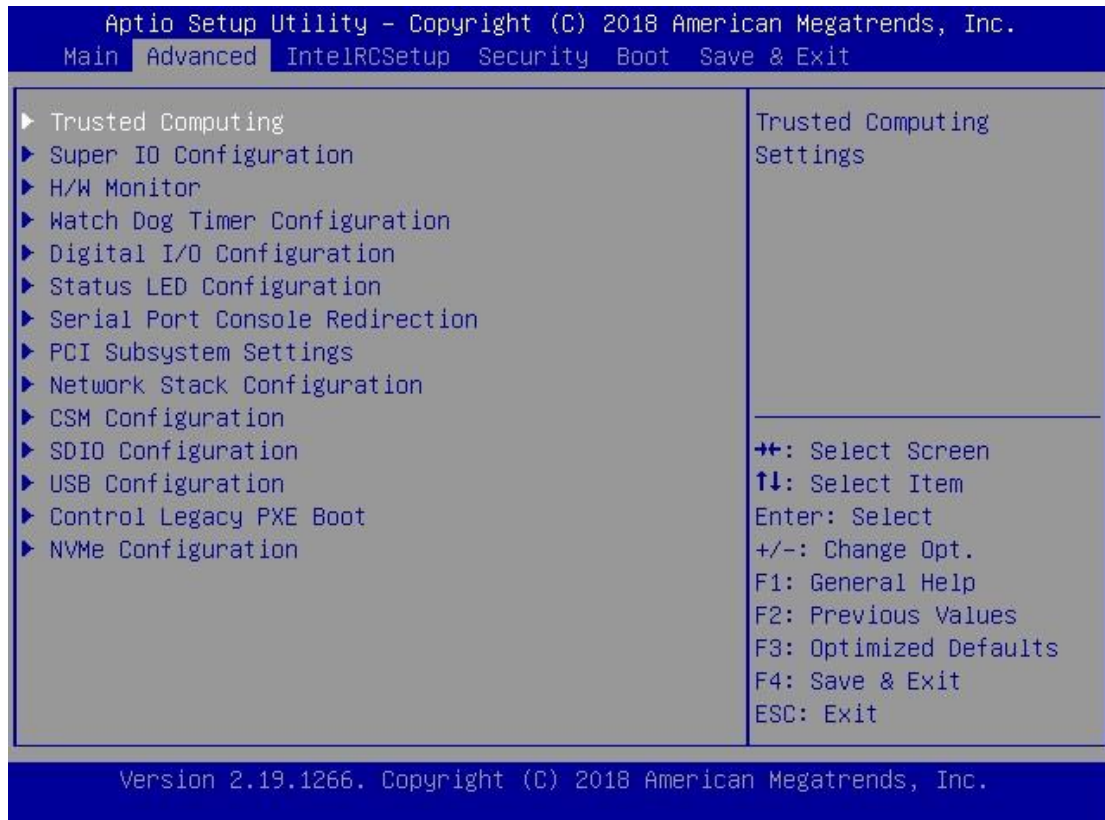
Setup main page contains BIOS information and project version information.



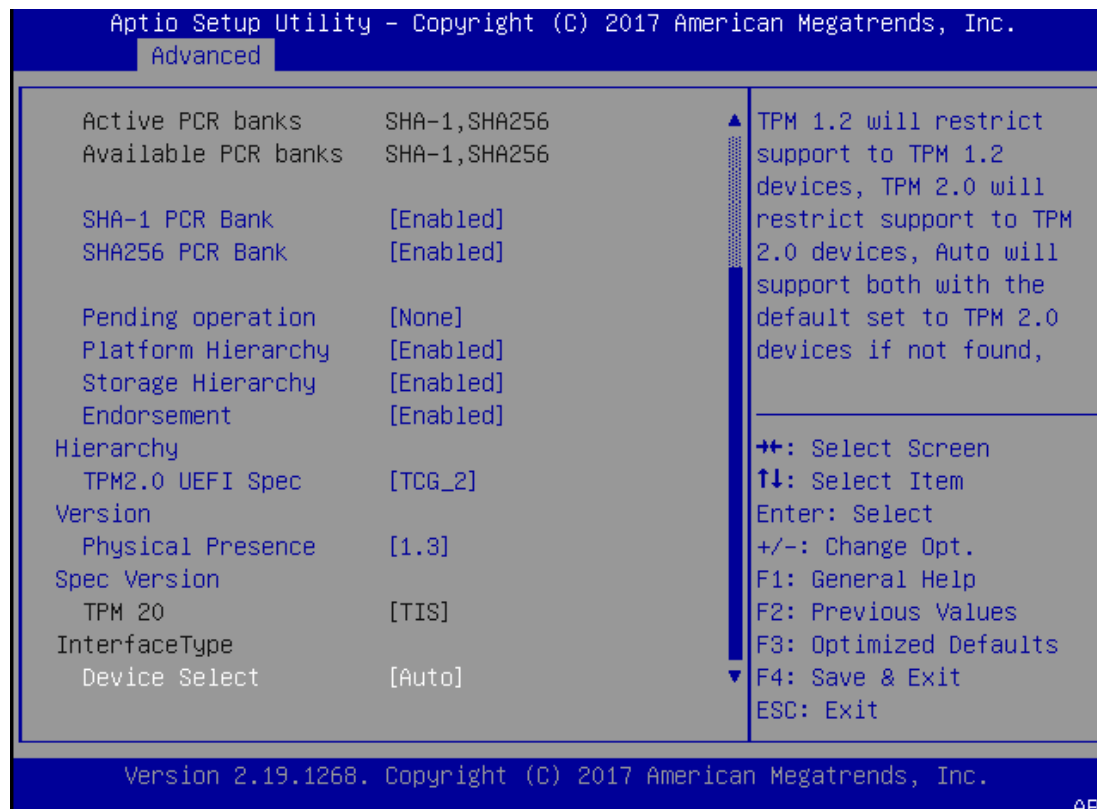
Feature	Description
BIOS Information	BIOS Vendor: American Megatrends Core Version: AMI Kernel version, CRB code base, X64 Compliancy: UEFI version, PI version Project Version: BIOS release version Build Date and Time: MM/DD/YYYY Access Level: Administrator / User
System Date	To set the Date, use <Tab>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

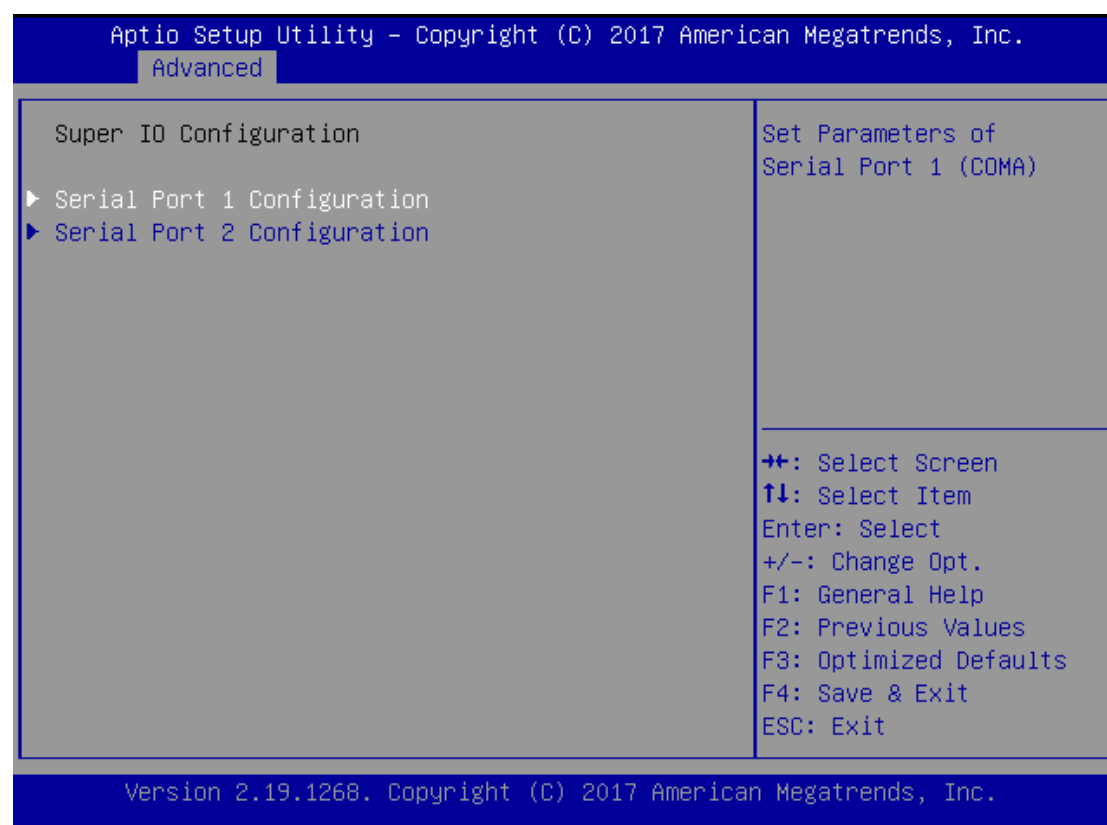


Trusted Computing

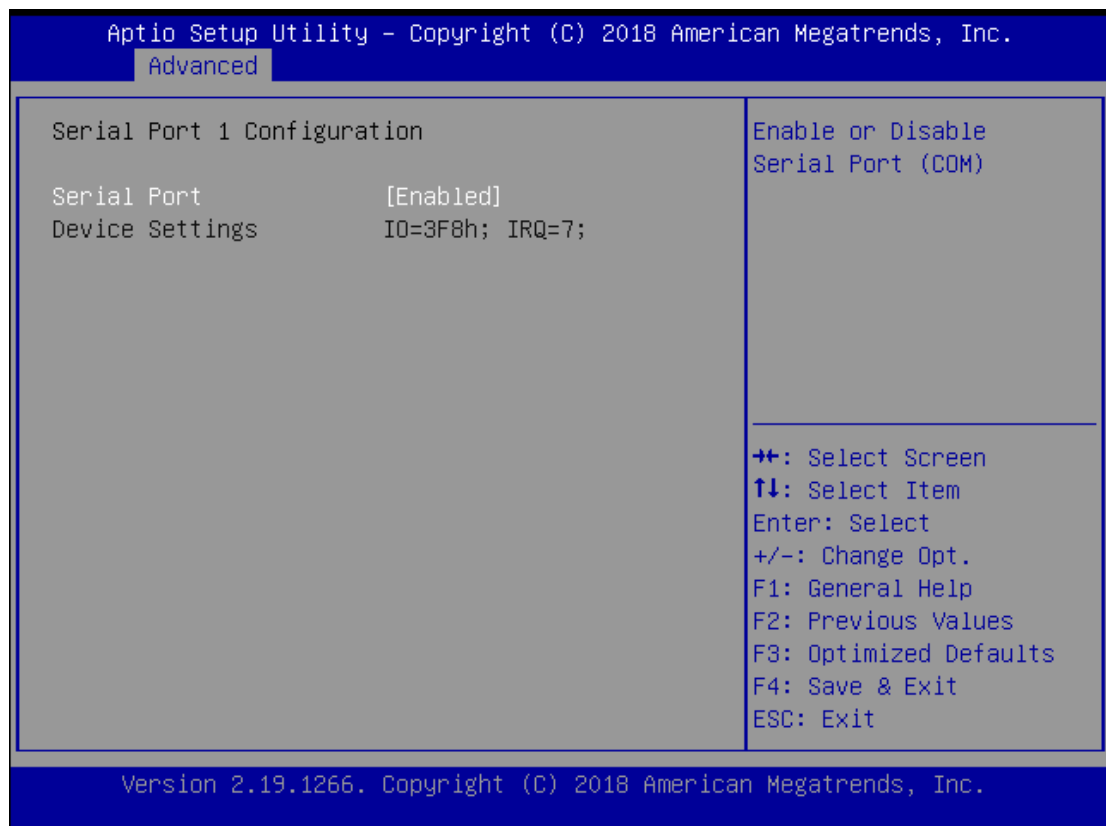


Feature	Options	Description
Security Device Support	Enabled Disable	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA-1 PCR Bank	Enabled Disabled	Enables or disables SHA-1 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

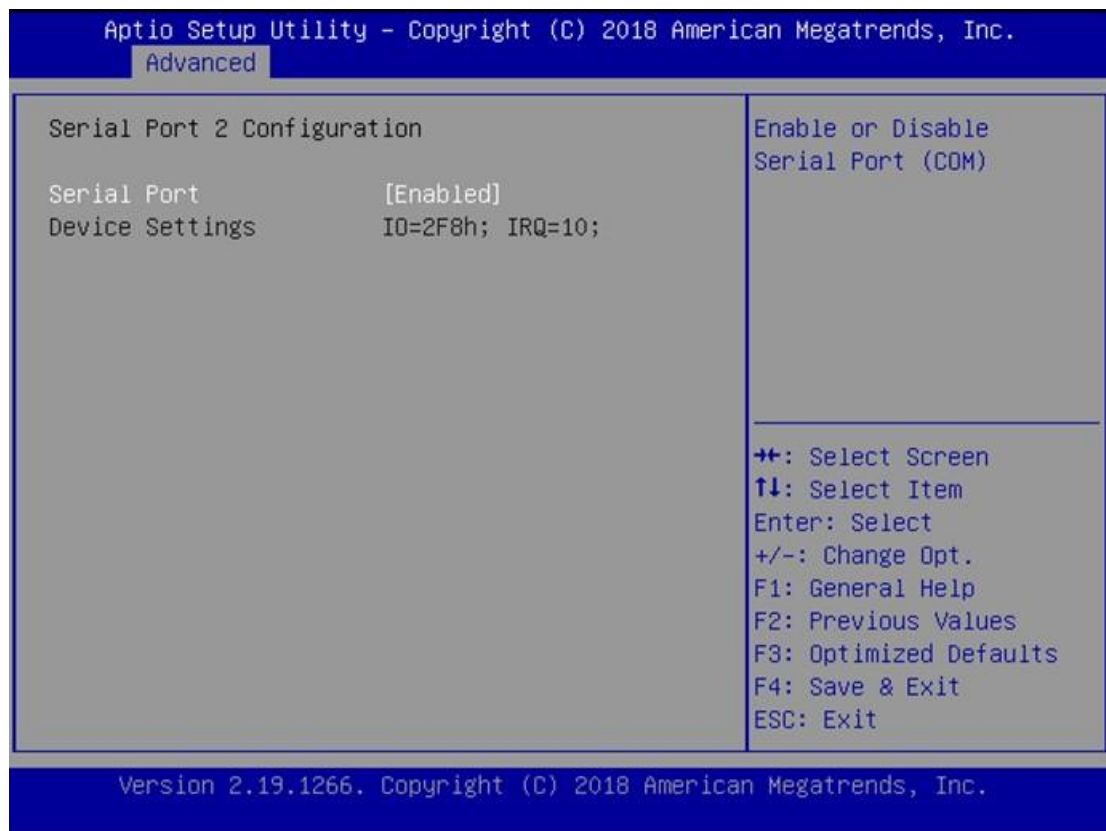


Serial port 1 Configuration



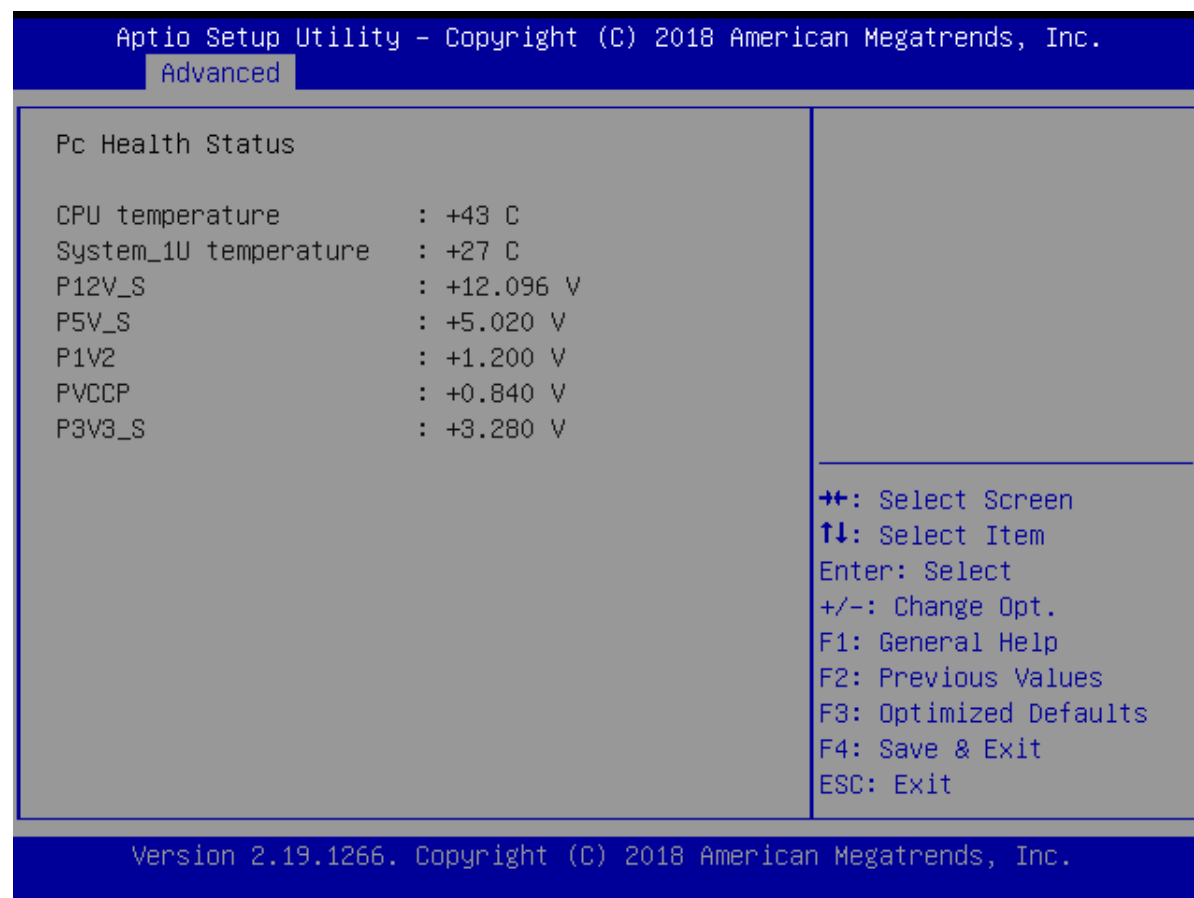
Feature	Options	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 1.
Device Settings	NA	IO=3F8h; IRQ = 4

Serial port 2 Configuration

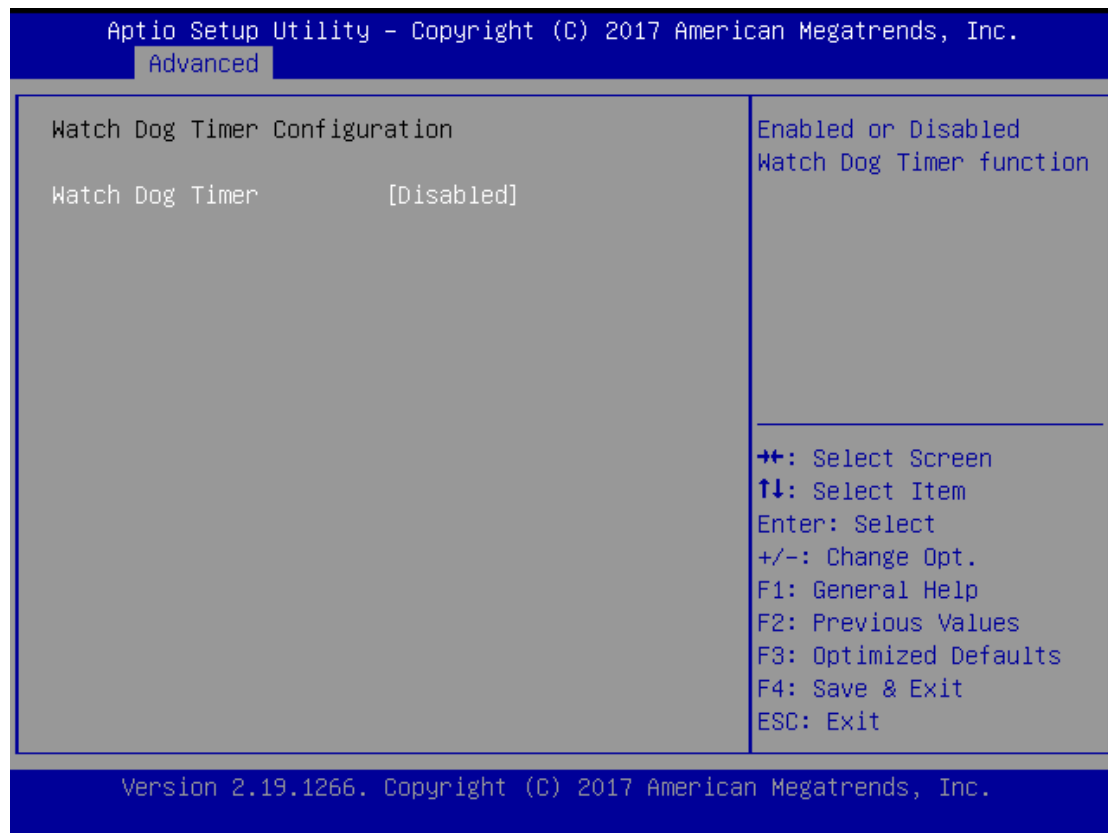


Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port 2.
Device Settings	NA	IO=2F8h; IRQ = 3

H/W Monitor

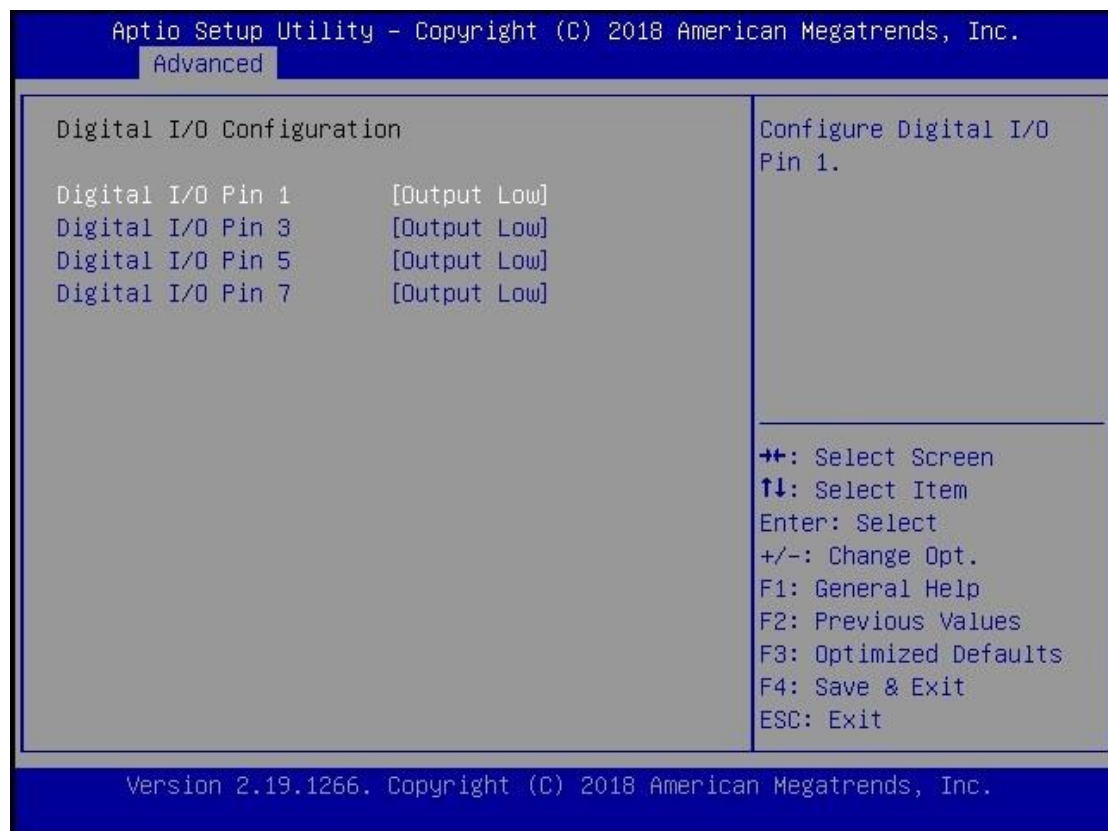


Watch Dog Timer Configuration



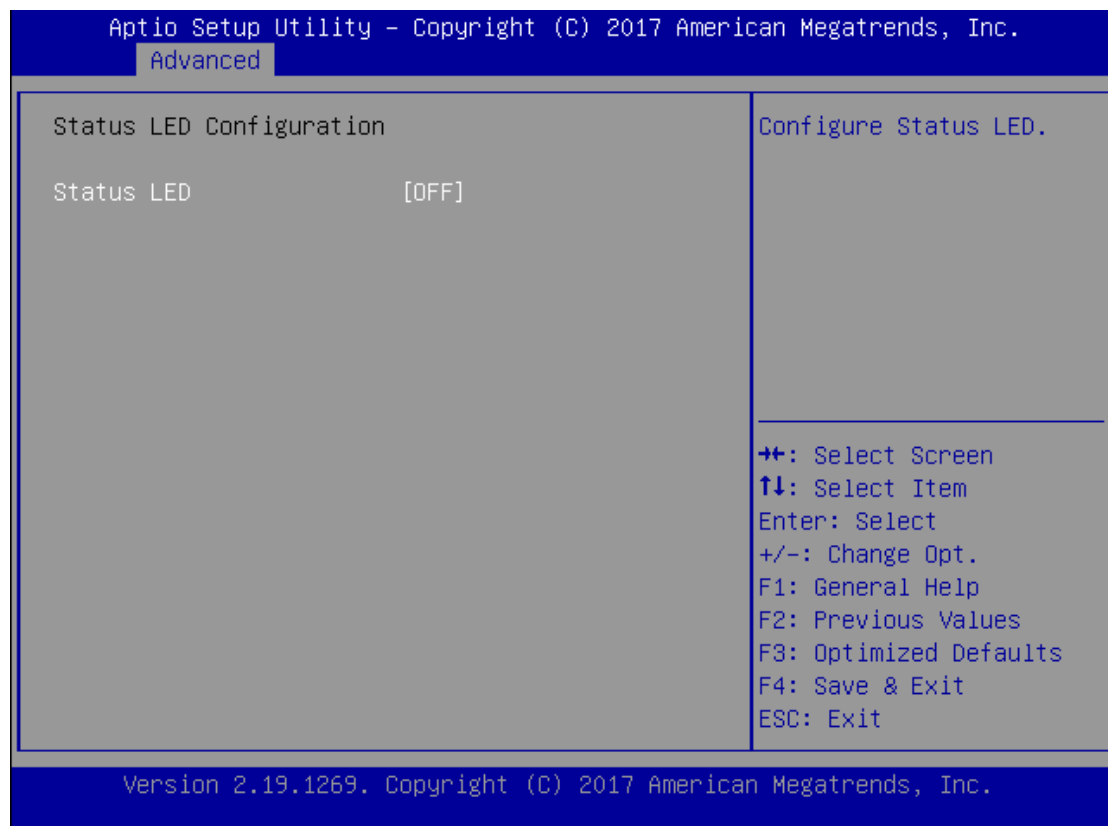
Feature	Options	Description
Watch Dog Timer	Enabled Disabled	Enables or disables Watch Dog Timer function

Digital I/O Configuration



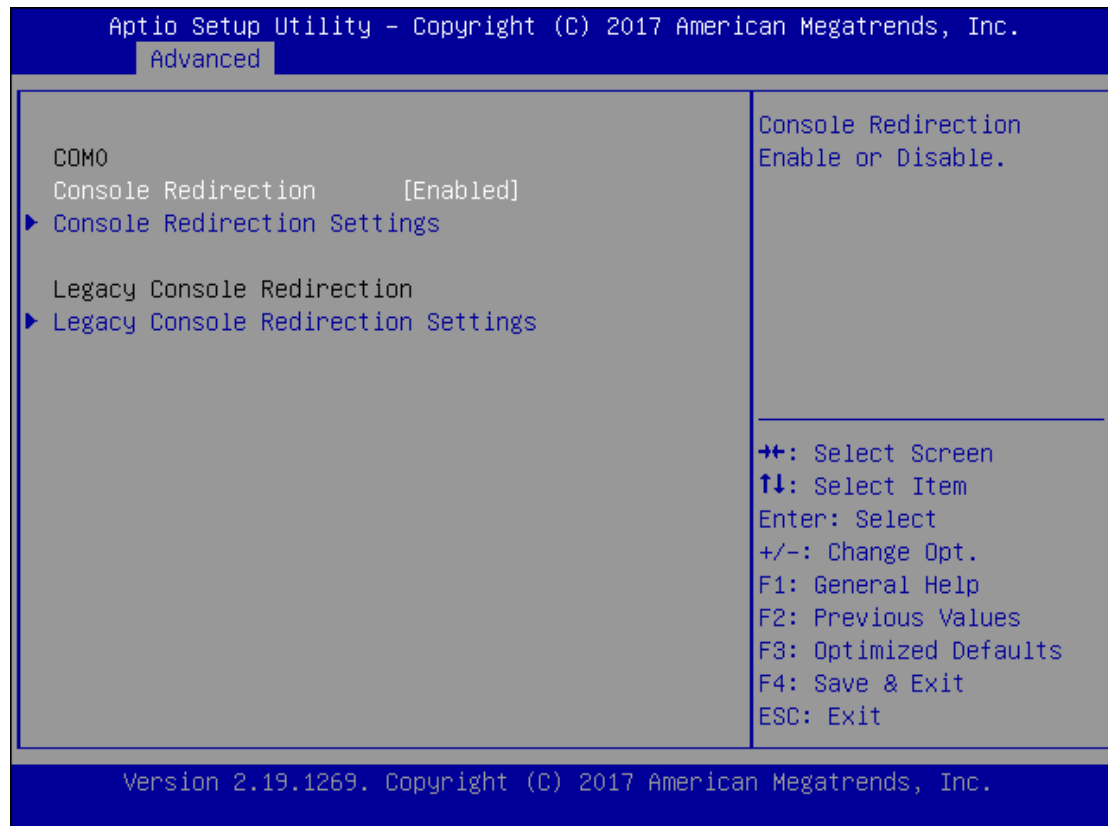
Feature	Options	Description
Digital I/O Output 1	Output Low Output High	Configure Digital I/O Pin1
Digital I/O Output 3	Output Low Output High	Configure Digital I/O Pin3
Digital I/O Output 5	Output Low Output High	Configure Digital I/O Pin5
Digital I/O Output 7	Output Low Output High	Configure Digital I/O Pin7

Status LED Configuration



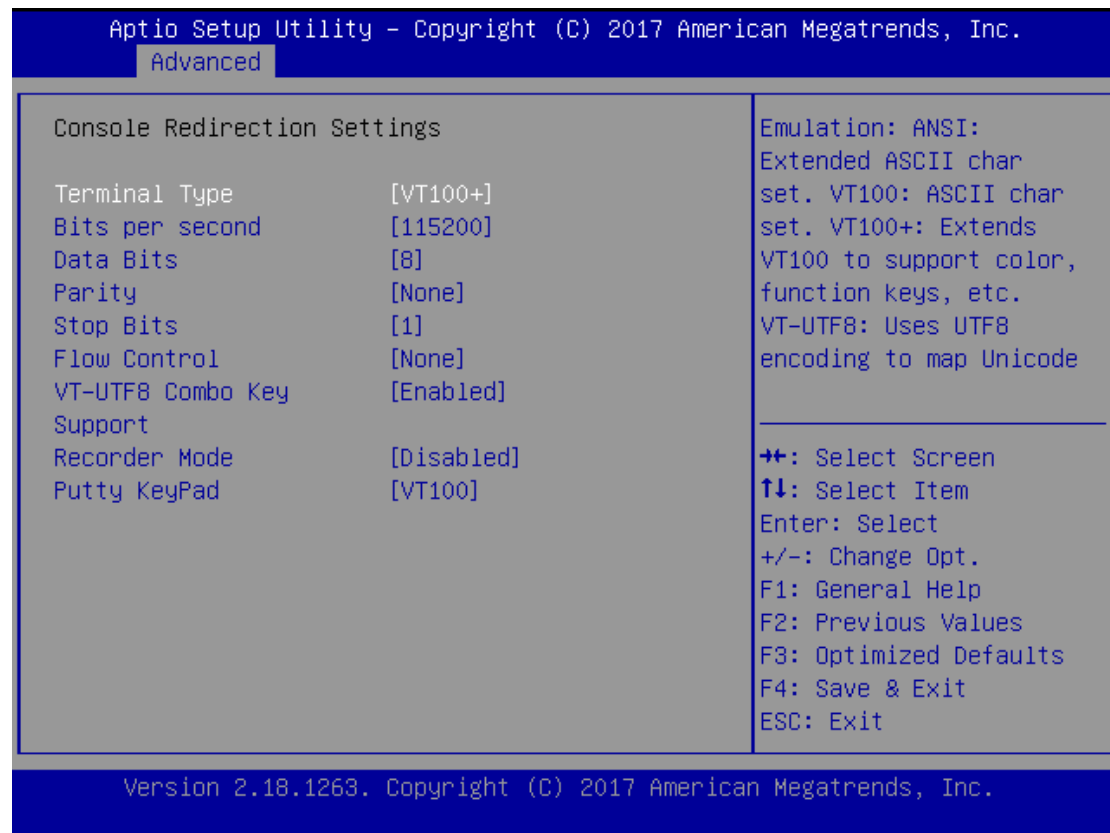
Feature	Options	Description
Status LED	OFF GREEN RED	Configures Status LED color

Serial Port Console Redirection



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

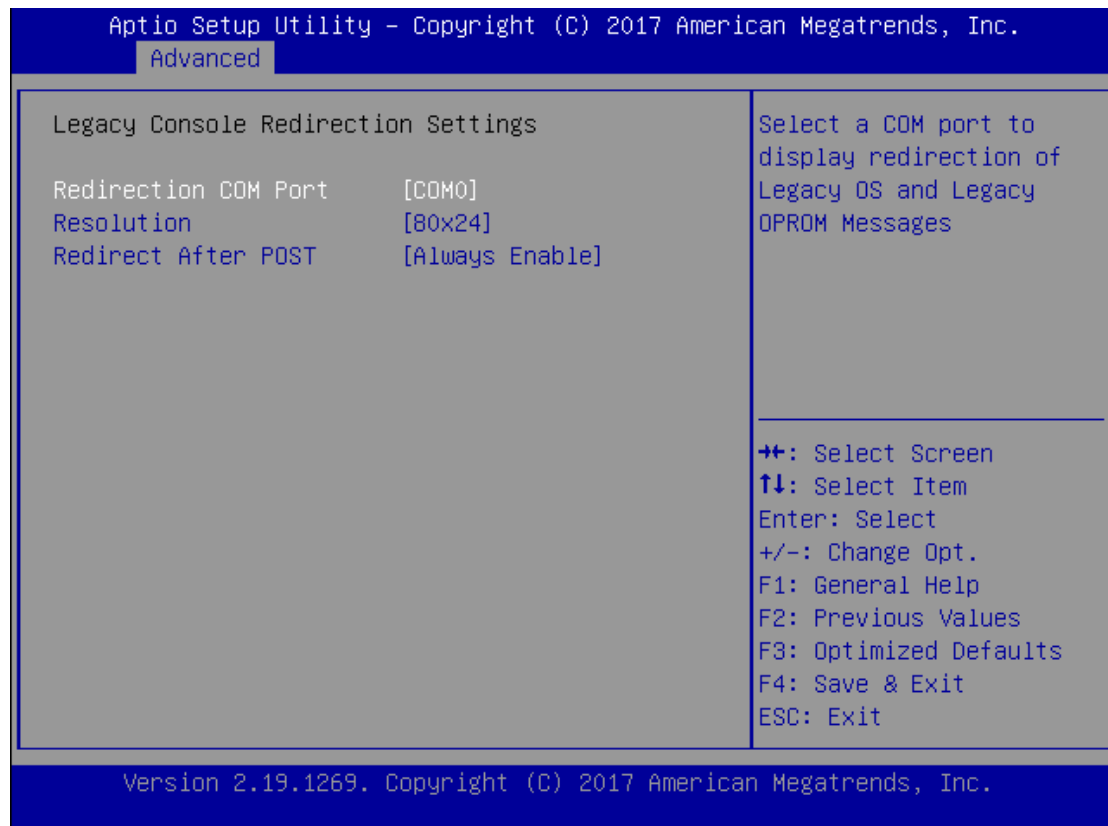
Console Redirection Settings



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	A parity bit can be sent with the data bits to detect some transmission errors.

	Mark Space	
Stop Bits	1 2	Indicates the end of a serial data packet.
Flow Control	None Hardware RTS/CTS	Flow Control can prevent data loss from buffer overflow.
VT-UTF8 Combo Key Support	Disabled Enabled	Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	Disabled Enabled	With this mode enabled, only text will be sent. This is to capture Terminal data.
Putty KeyPad	VT100 LINUX XTERM86 SCO ESCN 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 OPRM Messages.
Resolution	80x24 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
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 .

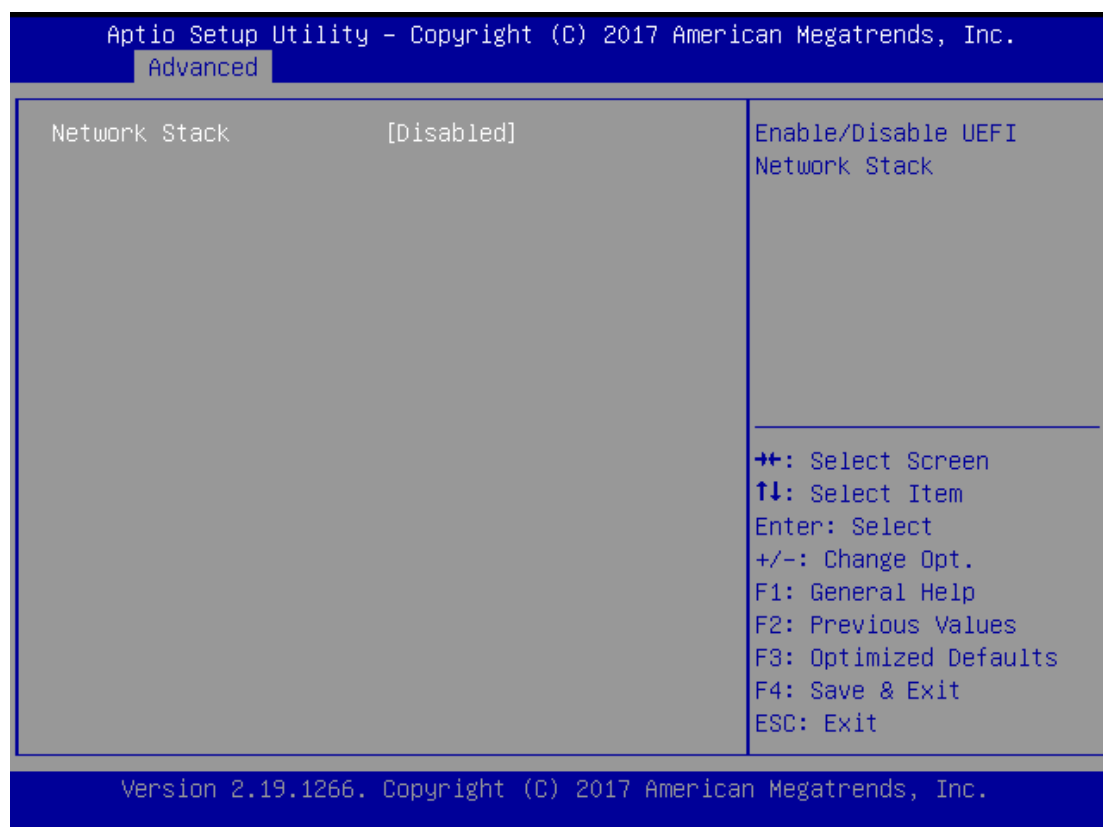
PCI Subsystem Settings



Feature	Options	Description
Above 4G Decoding	Disabled Enabled	Enable or Disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).

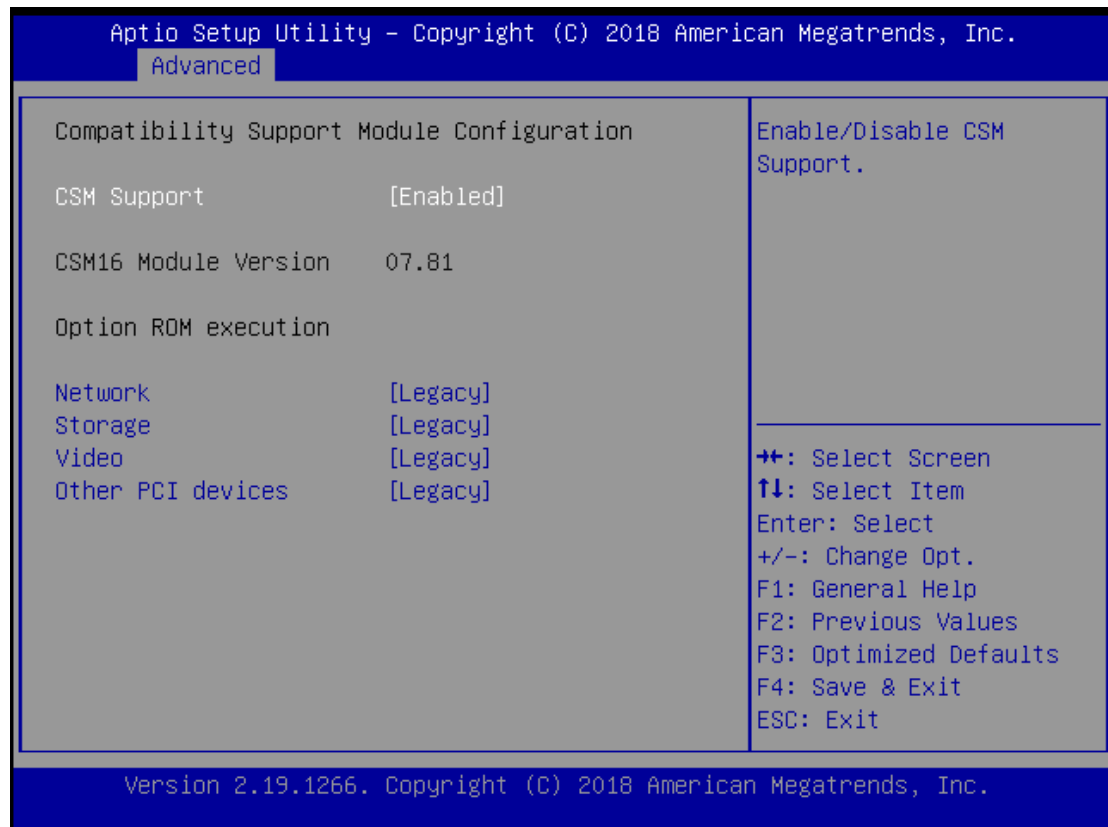
Feature	Options	Description
SR-IOV Support	Disabled Enabled	If the system has SR-IOV capable PCIe Devices, this option enables or disables Single Root IO Virtualization Support.

Network Stack Configuration



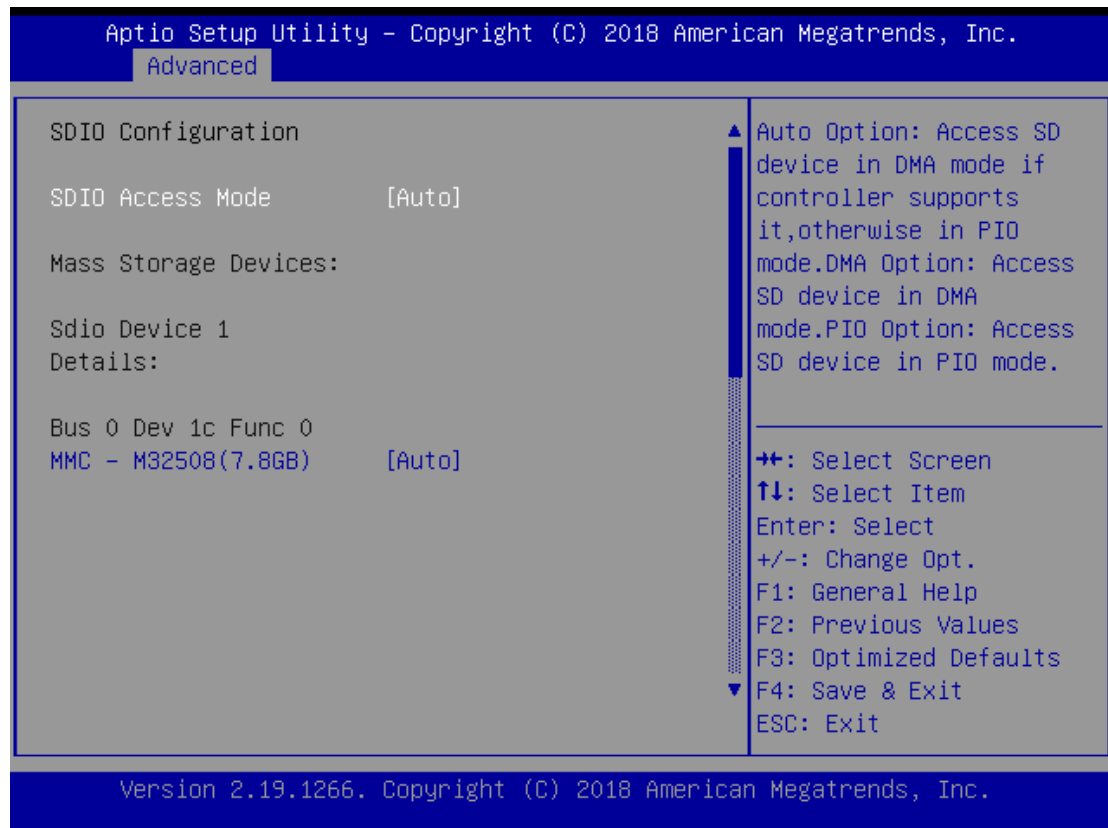
Feature	Options	Description
Network Stack	Disabled Enabled	Enables or disables UEFI Network Stack
Ipv4 PXE Support	Disabled Enabled	Enables Ipv4 PXE Boot Support. If IPV4 is disabled, PXE boot option will not be created.
Ipv4 HTTP Support	Disabled Enabled	Enables Ipv4 HTTP Boot Support. If IPV4 is disabled,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

CSM Configuration



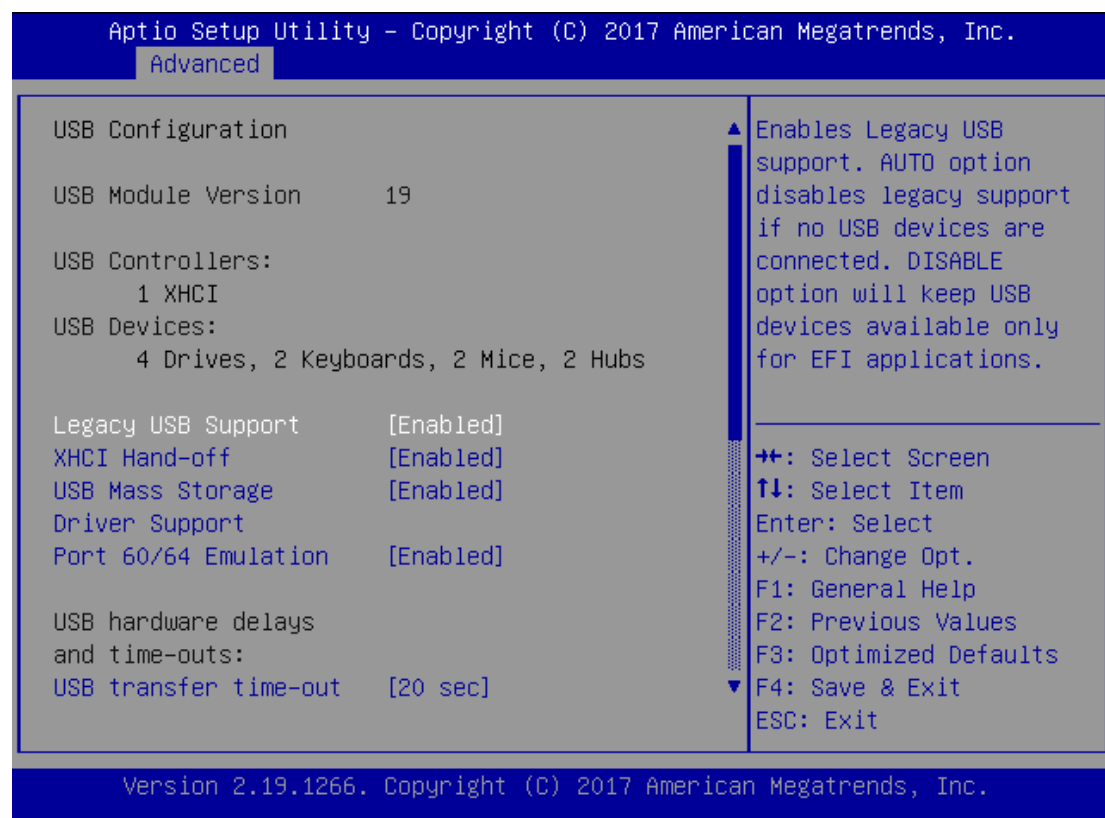
Feature	Options	Description
CSM Support	Disabled Enabled	Enables or disables CSM Support
Network	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do Not Launch UEFI Legacy	Controls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

SDIO Configuration



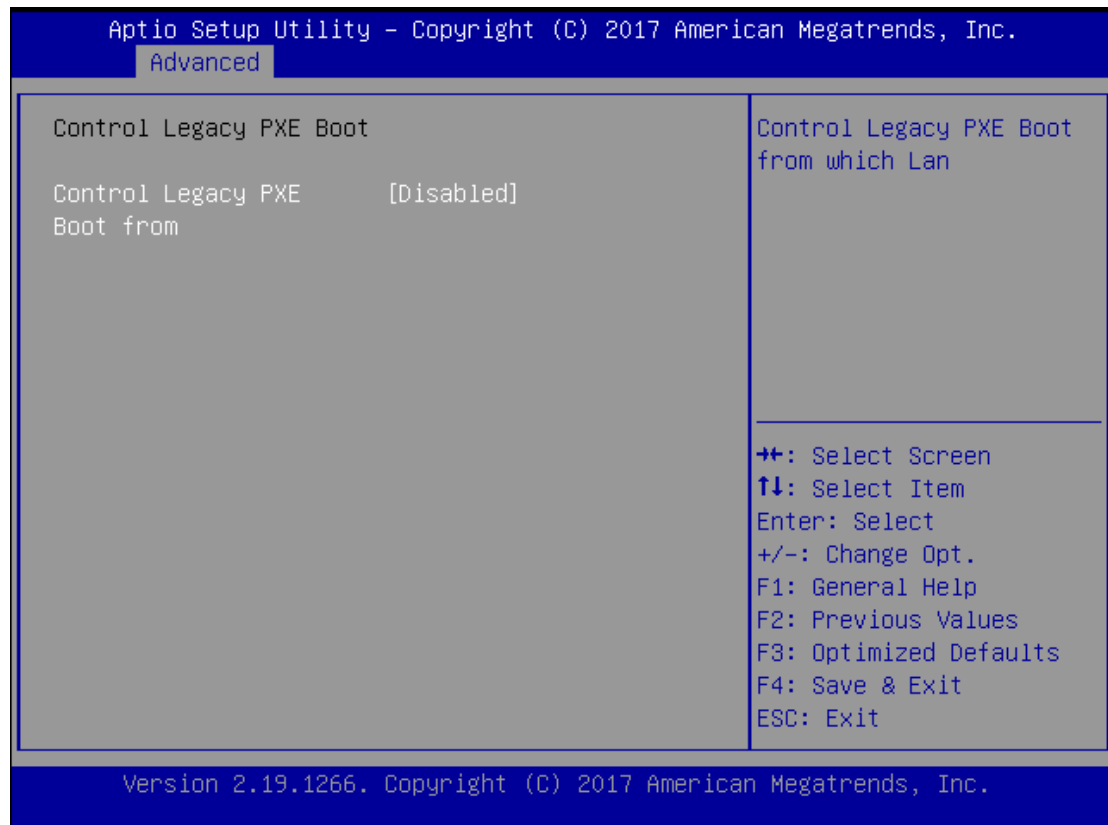
Feature	Options	Description
SDIO Access Mode	Auto ADMA SDMA PIO	Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode. DMA Option: Access SD device in DMA mode. PIO Option: Access SD device in PIO mode.

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	Enabled Disabled	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.

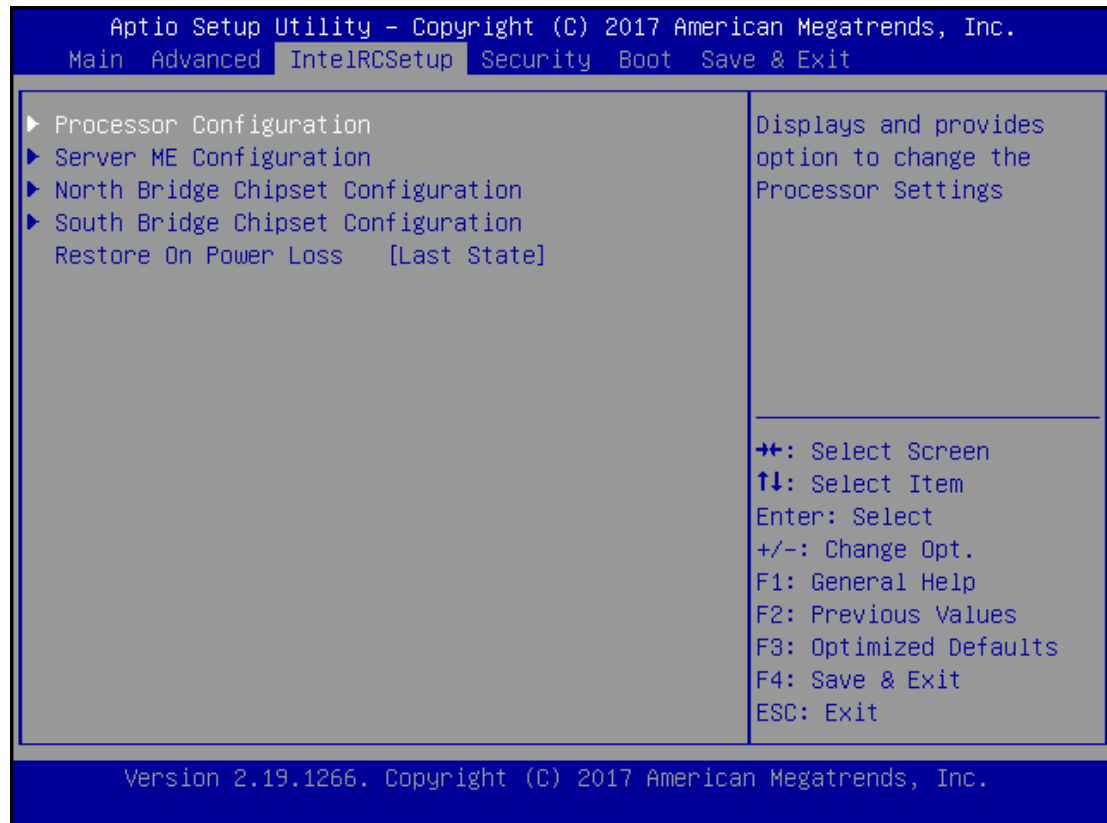
Control Legacy PXE Boot



Feature	Options	Description
Control Legacy PXE Boot From	Disabled Enabled	Control Legacy PXE Boot from which Lan.

IntelRCSetup

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



Feature	Options	Description
Restore On 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).

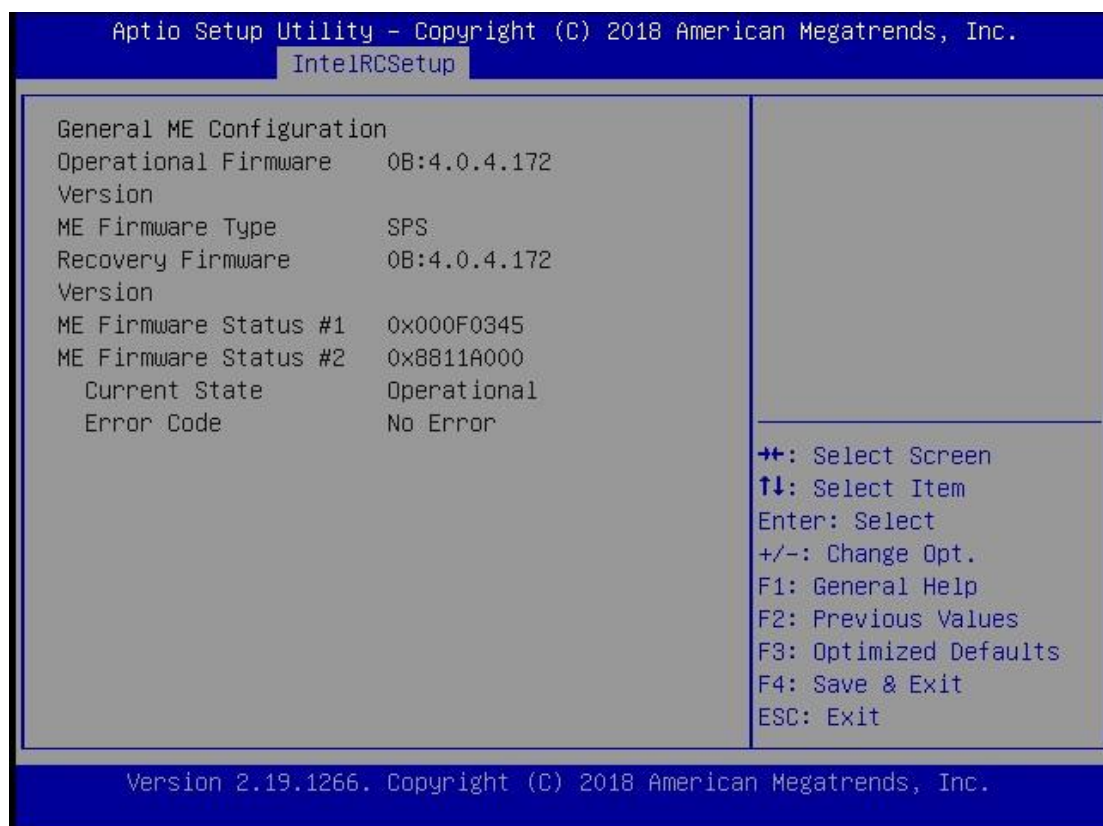
Processor Configuration

Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.		
IntelRCSetup		
Processor Configuration		▲ Enable/Disable EIST.
Processor ID	000506F1	GV3 and TM1 must be
Processor Frequency	2.200GHz	enabled for TM2 to be
CPU BCLK Frequency	100MHz	available. GV3 must be
Microcode Revision	00000020	enabled for Turbo. Auto
L1 Cache RAM	56KB	- Enable for B0 CPU
L2 Cache RAM	2048KB	stepping, all others
Processor Version	Intel(R) Atom(TM) CPU	disabled, change
	C3758 @ 2.20GHz	
EIST (GV3)	[Disable]	↔: Select Screen
BIOS Request	[Enable]	↑↓: Select Item
Frequency		Enter: Select
Turbo	[Enable]	+/-: Change Opt.
TM1	[Enable]	F1: General Help
TM2 Mode	[Adaptive Throttling]	F2: Previous Values
CPU C State	[Disable]	F3: Optimized Defaults
Package C State limit	[No Limit]	▼ F4: Save & Exit
		ESC: Exit
Version 2.19.1266. Copyright (C) 2018 American Megatrends, Inc.		

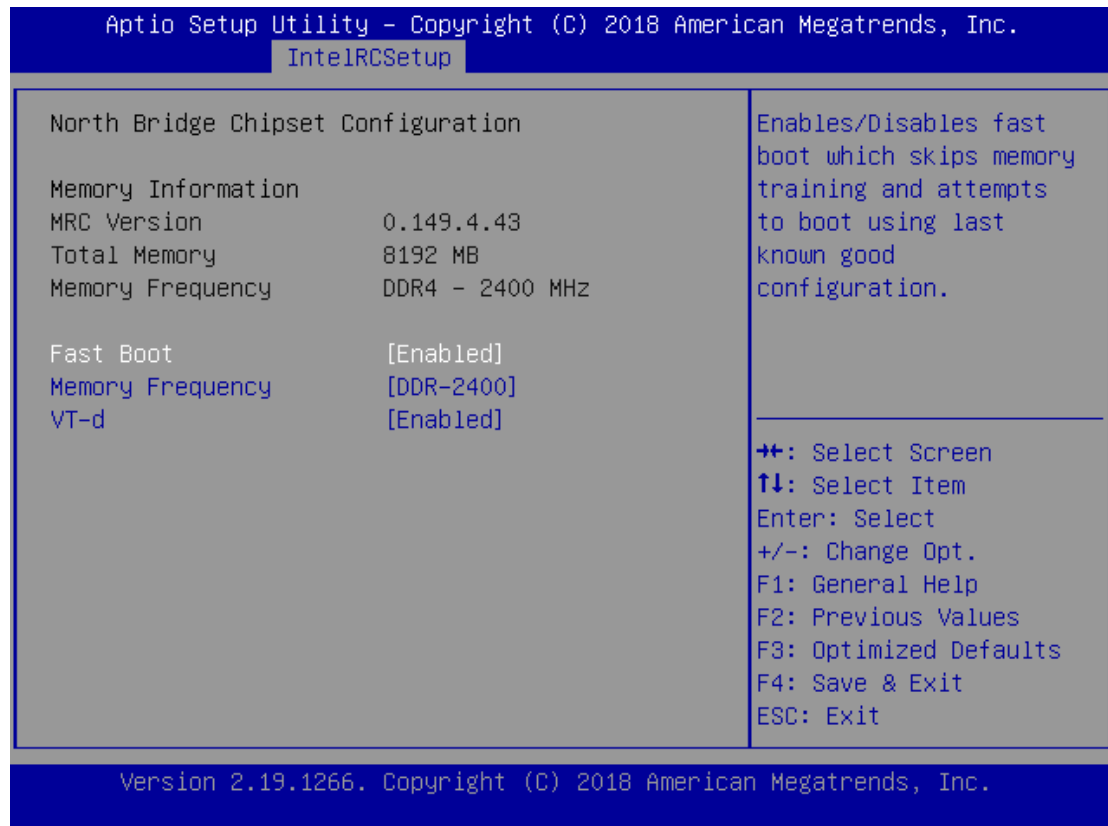
Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.		
IntelRCSetup		
TM1	[Enable]	▲ Enable/Disable CPU Flex
TM2 Mode	[Adaptive Throttling]	Ratio Programming
CPU C State	[Disable]	
Package C State limit	[No Limit]	
Max Core C-State	[C6]	
Enhanced Halt State	[Enable]	
(C1E)		
Monitor/Mwait	[Enable]	↔: Select Screen
L1 Prefetcher	[Enable]	↑↓: Select Item
L2 Prefetcher	[Enable]	Enter: Select
Machine Check	[Enable]	+/-: Change Opt.
Execute Disable Bit	[Enable]	F1: General Help
VMX	[Enable]	F2: Previous Values
Active Processor	0	F3: Optimized Defaults
Cores		▼ F4: Save & Exit
CPU Flex Ratio	[Disable]	ESC: Exit
Override		
CPU Core Ratio	24	
Version 2.19.1266. Copyright (C) 2018 American Megatrends, Inc.		

Feature	Options	Description
EIST(GV3)	Disable Enabled	Enable/Disable EIST. GV3 and TM1 must be enabled for TM2 to be available. GV3 must be enabled for Turbo. Auto - Enable for B0 CPU stepping, all others disabled, change setting to override.
CPU C State	Disable Enabled	"Enables the Enhanced Cx state of the CPU, takes effect after reboot. Auto - Enable for B0 CPU stepping, all others disabled, change setting to override.
Machine Check	Disable Enabled	Enable or Disable the Machine Check.
Active Processor Cores	0	Set the number of Active Processor Cores in the SoC. A 0 indicates all Existing Processor Cores are Active.
CPU Flex Ratio Override	Disable Enabled	Enable/Disable CPU Flex Ratio Programming.

Server ME Configuration

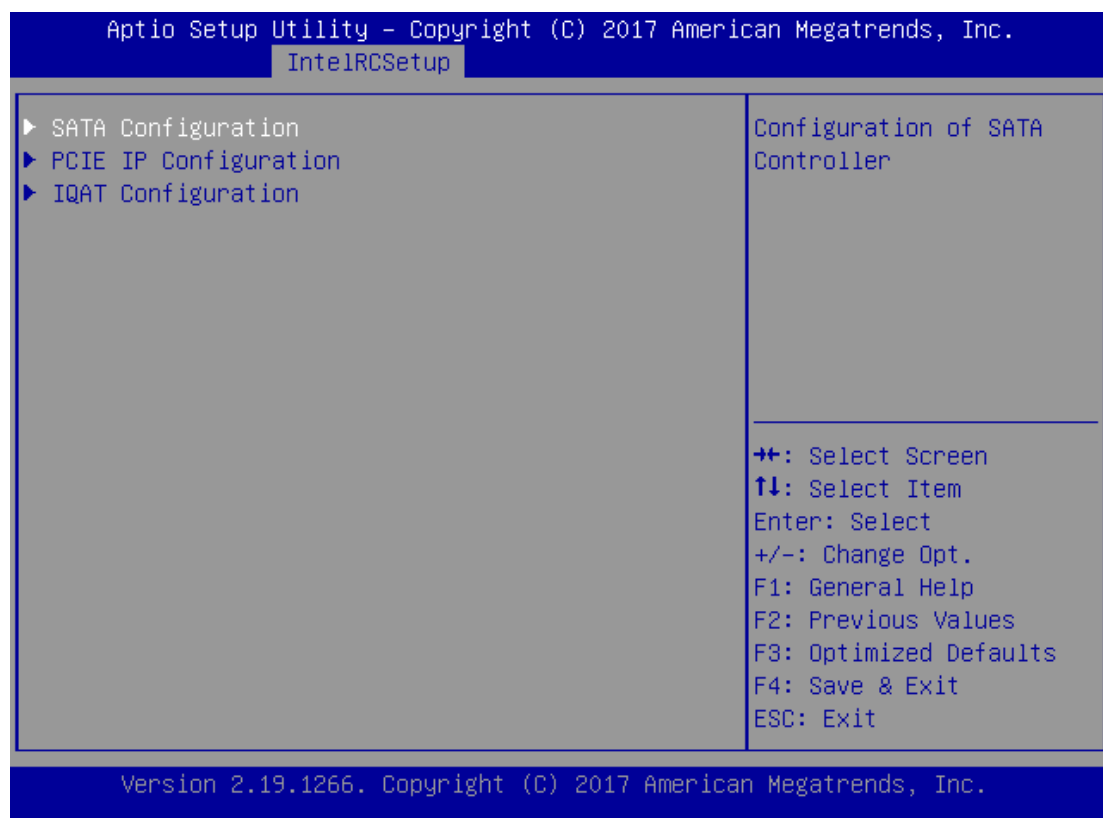


North Bridge Chipset Configuration

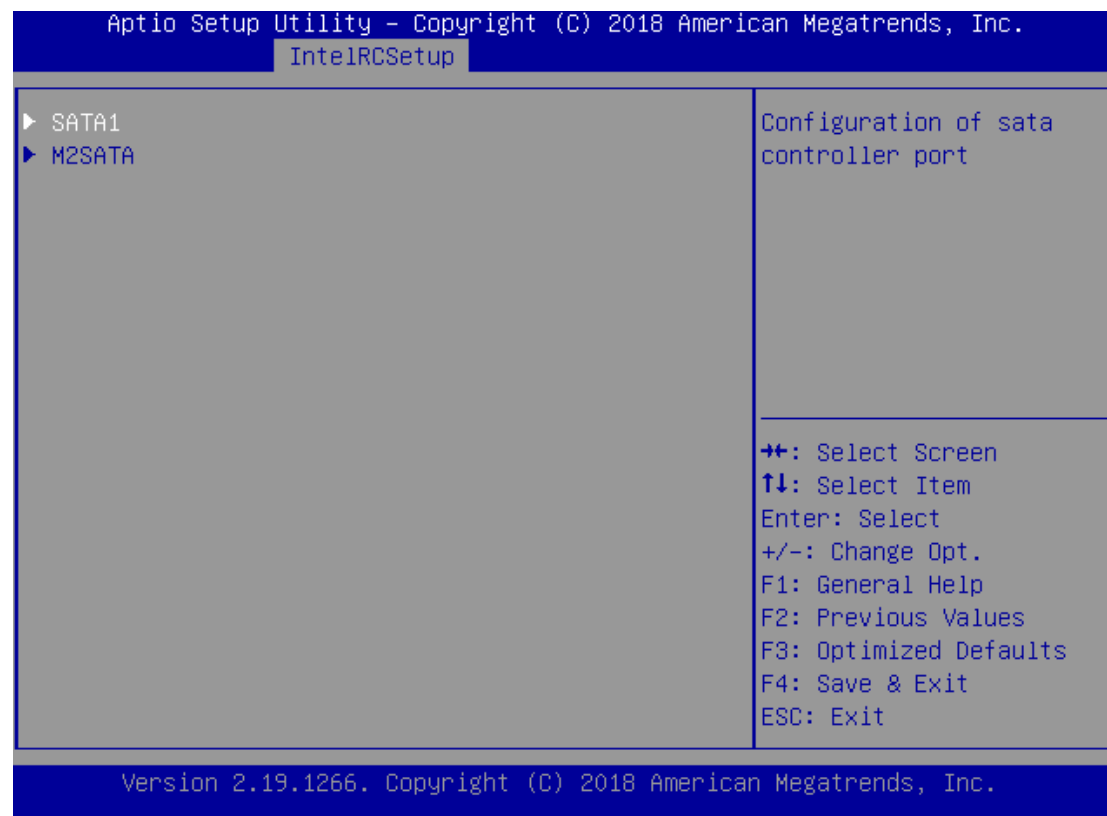


Feature	Options	Description
Fast Boot	Disabled Enabled	Enables/Disables fast boot which skips memory training and attempts to boot using fast known good configuration.
Memory Frequency	DDR-1600 DDR-1600 DDR-1867 DDR-2133 DDR-2400	DDR memory frequency: DDR4 up to DDR-2666 DDR3 up to DDR-1867.
VT-d	Disable Enable	Option to enable /Disable VT-d.

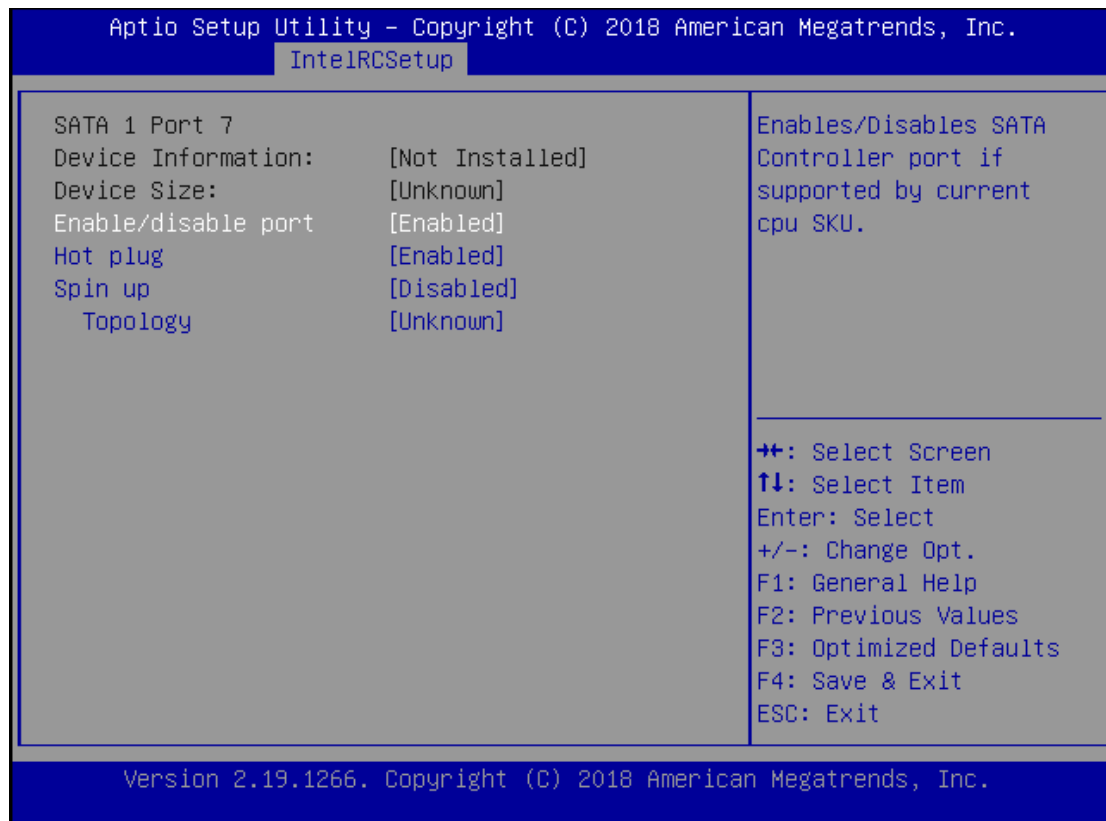
South Bridge Chipset Configuration



SATA Configuration

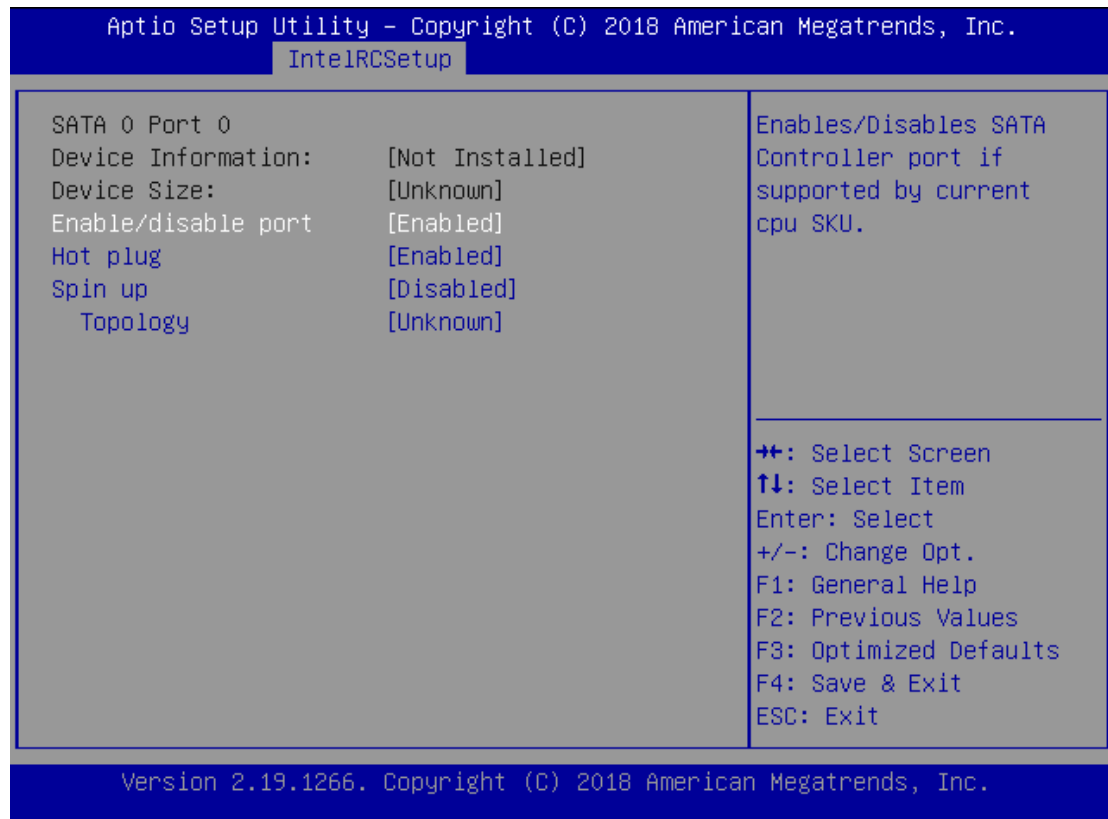


SATA1 Configuration



Feature	Options	Description
Enable/disable port	Enabled Disabled	Enables/Disables SATA Controller port if supported by current cpu SKU.
Hot plug	Enabled Disabled	Hot plug
Spin up	Enabled Disabled	Spin up
Topology	Unknown ISATA Direct Connect Flex M2	Identify the SATA Topology if it is Default or ISATA or Flex or DirectConnect or M2

M2SATA1 Configuration



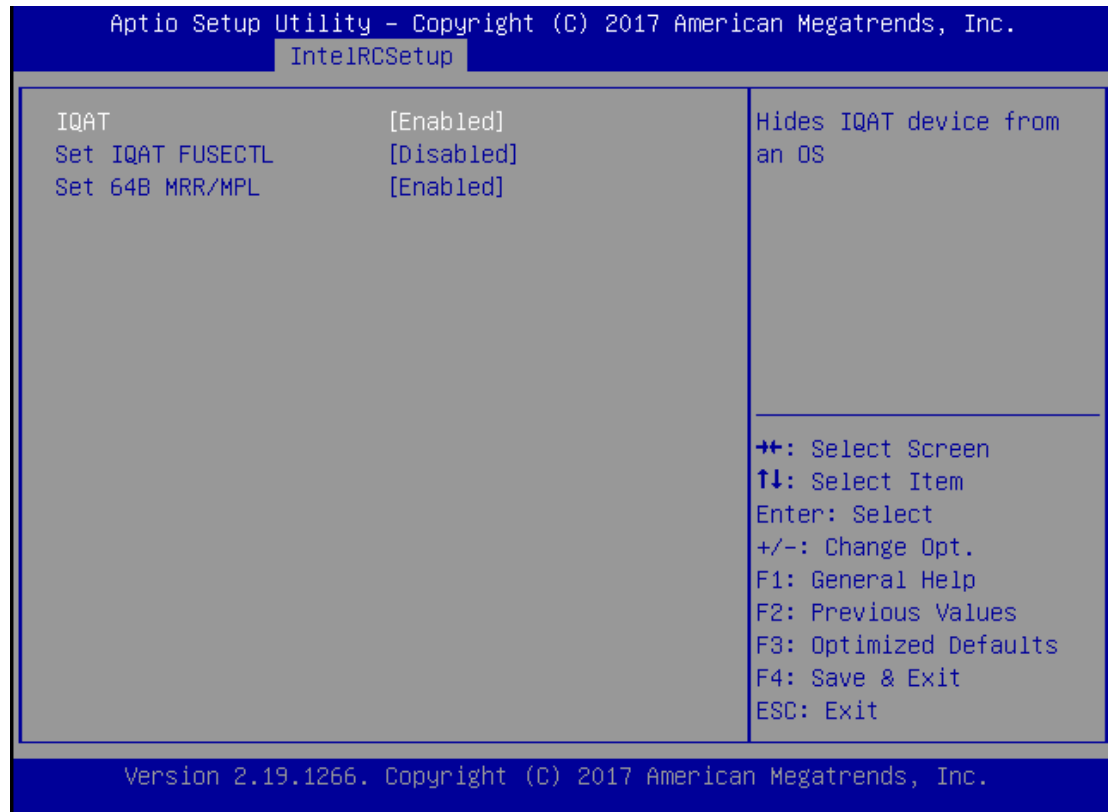
Feature	Options	Description
Enable/disable port	Enabled Disabled	Enables/Disables SATA Controller port if supported by current cpu SKU.
Hot plug	Enabled Disabled	Hot plug
Spin up	Enabled Disabled	Spin up
Topology	Unknown ISATA Direct Connect Flex M2	Identify the SATA Topology if it is Default or ISATA or Flex or DirectConnect or M2

PCIE IP Configuration



Feature	Options	Description
Bifurcation PCIE0	Auto X8 X4x4 X4x2x2 X2x2x4 X2x2x2x2	Select and force Root Complex Bifurcation Configuration regardless board or trident detection.
Bifurcation PCIE1	Auto X8 X4x4 X4x2x2 X2x2x4 X2x2x2x2	Select and force Root Complex Bifurcation Configuration regardless board or trident detection.

IQAT Configuration



Feature	Options	Description
IQAT	Enabled Disabled	Hides IQAT device from and OS.

Security

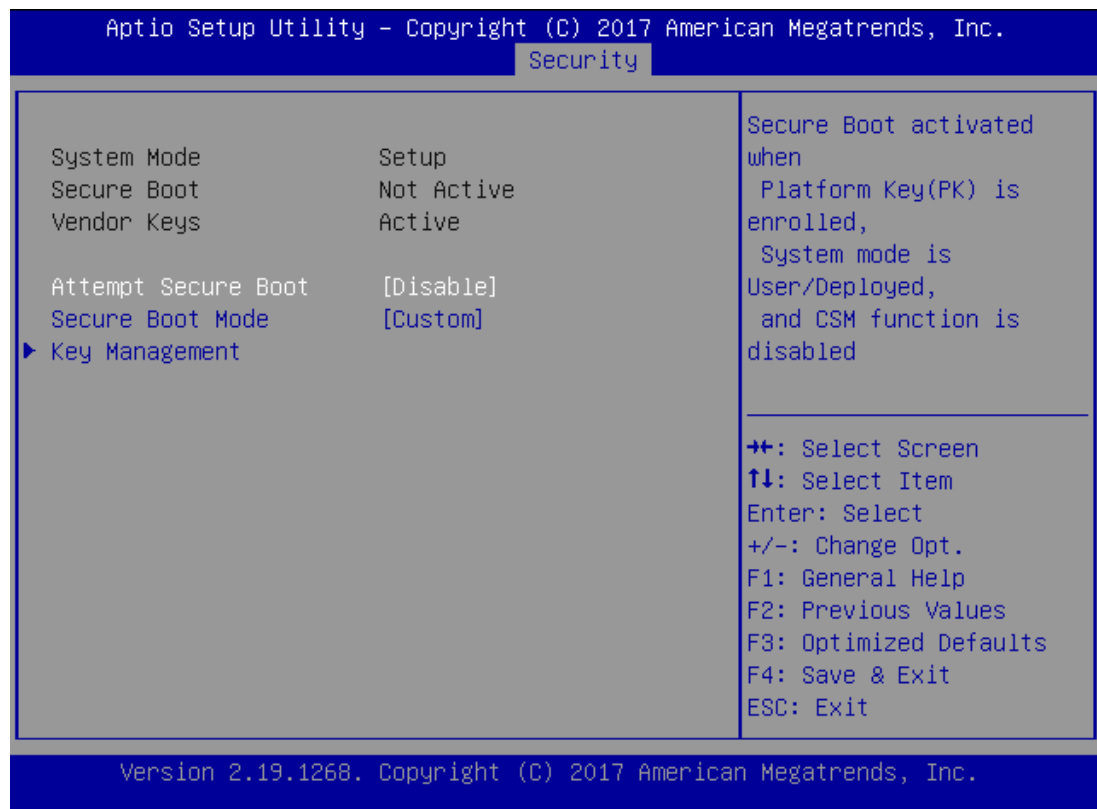
Select the Security menu item from the BIOS setup screen to enter the Security Setup screen.

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



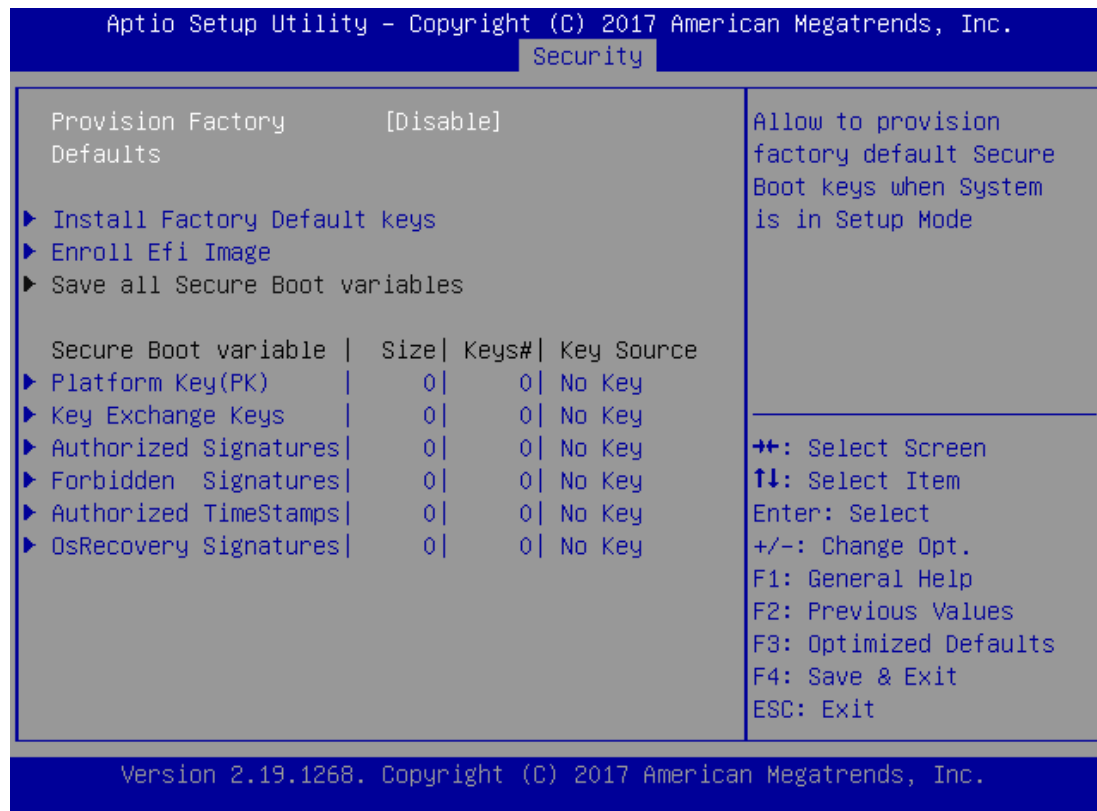
Feature	Description
Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup, the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

Secure Boot



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

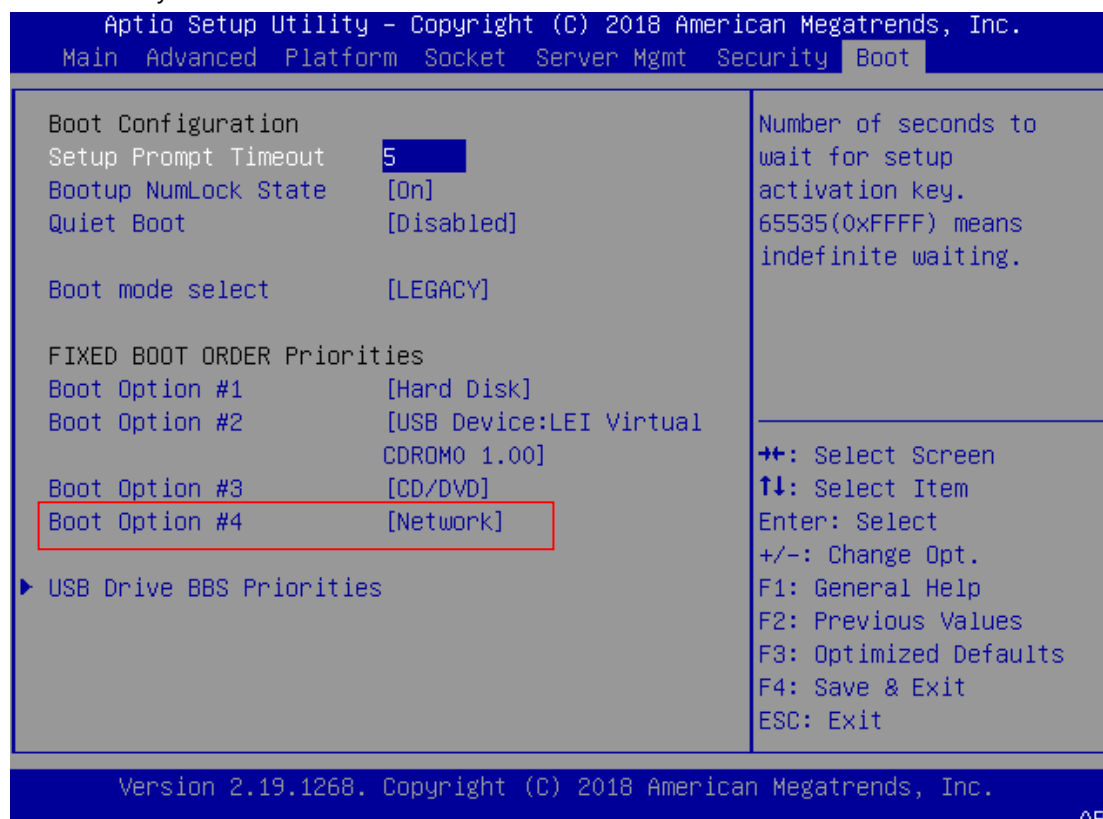
Key Management



Feature	Options	Description
Factory Key Provision	Disabled 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)

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.

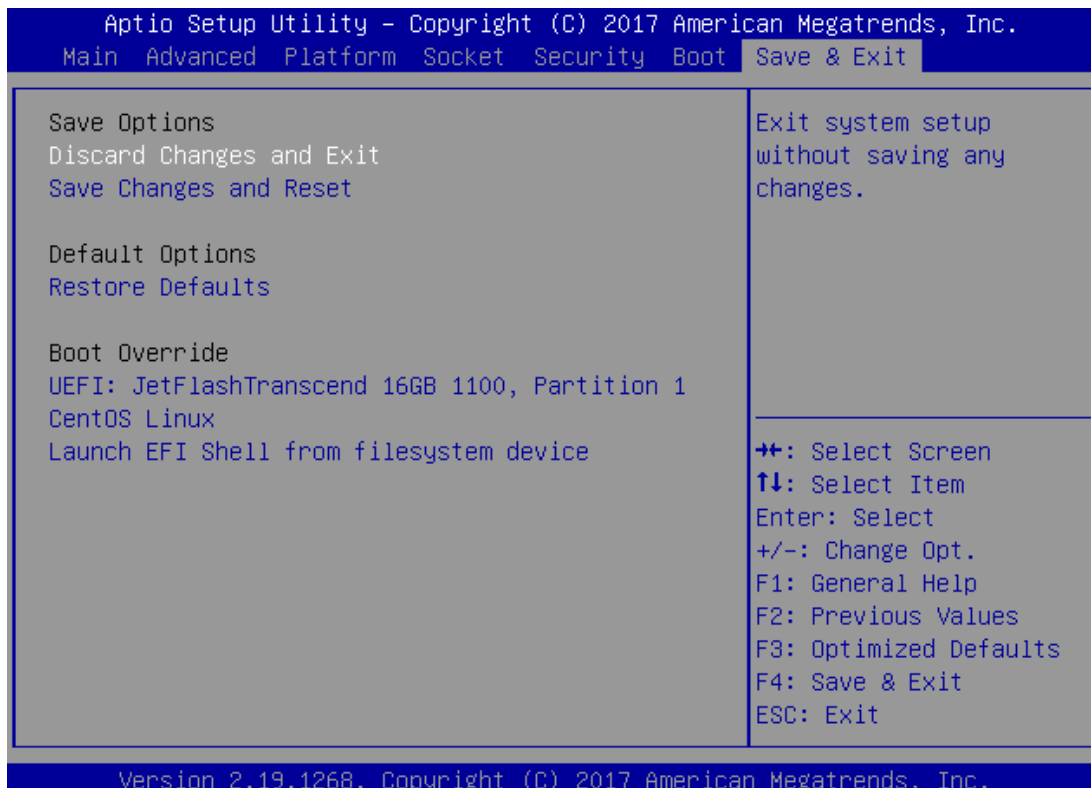


Feature	Options	Description
Setup Prompt Timeout	5	The number of seconds to wait for setup activation key. 65535 means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state
Quiet Boot	Disabled Enabled	Enables or disables Quiet Boot option.
Boot mode select	LEGACY UEFI DUAL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

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

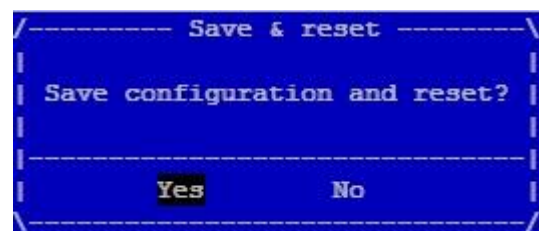
Save and Exit Menu

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.



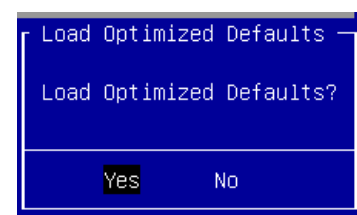
■ Save Changes and Reset

When Users have completed the system configuration changes, select this option to save the changes and exit 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 Exit"** option is selected. Select **"Yes"** to Save Changes and Exit Setup.



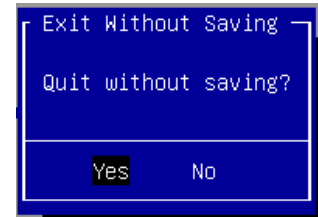
■ Discard Changes and Exit

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



■ Restore Defaults

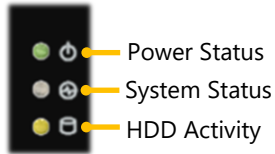
Restore default values for all setup options. Select **"Yes"** to load Optimized defaults.



Note: The items under Boot Override may not be the same images. It should depend on the devices connect on system.

APPENDIX A: LED INDICATOR EXPLANATIONS

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



► System Power

<i>Green</i>	<i>The system is powered and running</i>
<i>Off</i>	<i>The system is powered off</i>

► System Status

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

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

► HDD Activity

<i>Yellow</i>	<i>A hard disk is detected</i>
<i>Off</i>	<i>No hard disk is detected</i>

APPENDIX B: TERMS AND CONDITIONS

Warranty Policy

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

RMA Service

Requesting an RMA#

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



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

RMA Service Request Form

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

RMA No:		Reasons to Return: <input type="checkbox"/> Repair(Please include failure details)	
		<input type="checkbox"/> Testing Purpose	
Company:		Contact Person:	
Phone No.		Purchased Date:	
Fax No.:		Applied Date:	
Return Shipping Address: _____			
Shipping by: <input type="checkbox"/> Air Freight <input type="checkbox"/> Sea <input type="checkbox"/> Express _____			
<input type="checkbox"/> Others: _____			
Item	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

***Problem Code:**

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

Request Party

Confirmed By Supplier

Authorized Signature / Date

Authorized Signature / Date