

Lanner

Vehicle Computing

Rugged Platforms for Vehicles and Railway Computing

ICS-R373 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.

Icons Description

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

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

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Technical Support

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

Documentation Feedback

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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.
- ▶ Avoid wearing loose clothing or jewelry that could catch in the chassis. Secure ties, scarves, and roll up 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.
- ▶ Turn off and unplug the power 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.
- ▶ This product is intended to be supplied by an UL Listed Power Adapter rated 24-60 Vdc, min. 5-2A, min. 70 degree C, 5000 m, with mating connector.

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.
- ▶ Ce produit doit être alimenté par un adaptateur secteur certifié UL, avec une sortie de 12/24 Vcc, minimum 27,7/13,89 A, température minimale de 65 °C, à une altitude maximale de 5000 m, avec connecteur compatible.

Lithium Battery Caution

- ▶ There is risk of Explosion if Battery is replaced by an incorrect type.
- ▶ Dispose of used batteries according to the instructions.
- ▶ Installation only by a skilled person who knows all Installation and Device Specifications which are to be applied.
- ▶ Do not carry the handle of power supplies when moving to another place.
- ▶ Please conform to your local laws and regulations regarding safe disposal of lithium BATTERY.
- ▶ Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- ▶ Extreme heat can cause a battery to explode or leak 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 wrist strap with good skin contact. If unavailable, ground yourself by touching the chassis's metal part.
- ▶ 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.
- ▶ Only trained specialists should install this product to avoid the risk of it falling or causing damage.
- ▶ 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, the ambient temperature may exceed room temperature. Ensure the environment is 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 - Ensure the equipment is mounted in the rack to prevent hazardous conditions from uneven mechanical loading.
- ▶ Circuit Overloading - Ensure the equipment's connection to the supply circuit does not overload it, affecting overcurrent protection and supply wiring. Refer to the equipment nameplate ratings for guidance.
- ▶ Reliable Grounding - Reliable grounding of rack mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Installation & Operation

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

Warning

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

Avertissement

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

Electrical Safety Instructions

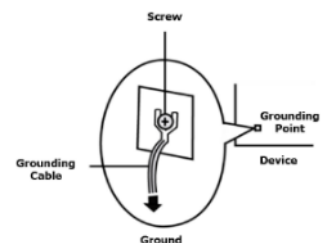
Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect the ground wire after turning off the power. A ground wire is required and the part connecting the conductor must be greater than 0.75 mm² or 18 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 0.75 mm² ou 18 AWG.

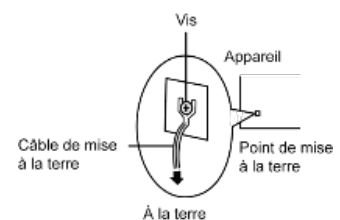
Grounding Procedure for Power Source

- ▶ Loosen the screw of the earthing point.
- ▶ Connect the grounding cable to the ground.
- ▶ The protection device for the power source must provide 5 A current.
- ▶ This protection device must be connected to the power source before power.
- ▶ The cable should 18 AWG.



Procédure de mise à la terre pour source d'alimentation

- ▶ Desserrez la vis du terminal de mise à la terre.
- ▶ Branchez le câble de mise à la terre à la terre.
- ▶ L'appareil de protection pour la source d'alimentation doit fournir 5 A de courant.
- ▶ Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation.
- ▶ Le câble doit 18 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 TOUS LES CORDONS D'ALIMENTATION POUR DÉCONNECTER L'UNITÉ DU SECTEUR.

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CHAPTER 1: PRODUCT OVERVIEW

The ICS-R373 series features a cost-effective embedded system incorporating an Intel® Atom® C3000 series CPU, housed in an IP40 rated fanless enclosure. This industrial computer delivers high-quality performance with low power consumption, catering to Industrial Cybersecurity and Flexible SDWAN applications across various sectors such as Vehicle, Railway, and Power Substation Security. The product serves as a system monitor for industrial cybersecurity, supporting a power input range of DC 24-60V within an operational temperature range of -40°C ~ 70°C.

Package Content

Your package contains the following items:

- ▶ 1x ICS-R373 Industrial Computer
- ▶ 2x 3-Pin Terminal Block for Power Input
- ▶ 1x 2x10 Terminal Block
- ▶ 1x GPS Antenna



Note: If you should find any components missing or damaged, please contact your dealer immediately for assistance.

Ordering Information

SKU No.	Description
ICS-R373A	Intel Atom™ C3708 Processor, DDR4 non-ECC 16GB, eMMC 128GB ,4x GbE RJ45, 2x 2.5GbE RJ45 w/ bypass, TPM2.0, GPS, OOB, DC 24-60V w/ Ignition power input
ICS-R373B	Intel Atom™ C3708 Processor, DDR4 non-ECC 8GB, eMMC 32GB ,4x GbE RJ45, 2x 2.5GbE RJ45, TPM2.0, GPS, OOB, DC 24-60V w/ Ignition power input
ICS-R373C	Intel Atom™ C3308 Processor, DDR4 non-ECC 4GB, eMMC 32GB ,4x GbE RJ45, TPM2.0, GPS, DC 24-60V w/ Ignition power input

Optional Accessories

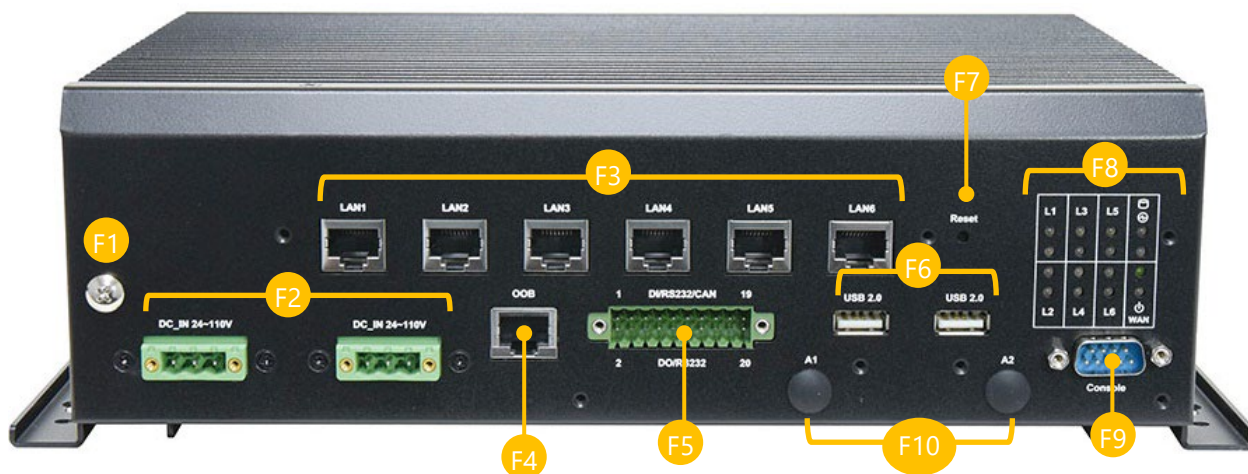
Model	Description
5G Kit	5G Module Kit with thermal pads, screws, internal antenna cables, external antennas
Wi-Fi Kit	Wi-Fi Module Kit with thermal pads, screws, internal antenna cables, external antennas
080W000783000 Cable Kit	Console Cable Kit
DIN Rail Kit	DIN Rail Kit with brackets and screws
VESA Mount Kit	VESA Mount Kit with brackets and screws
098W000231000 IP51 Kit	IP51 Kit with brackets and screws

System Specifications

Processor System	CPU	Intel® Atom™ C3708/C3508/C3308 (Denverton)
	Frequency	1.7 GHz/1.6 GHz/1.6GHz
	Core Number	8/4/2
	BIOS	AMI SPI Flash BIOS
	Chipset	SoC
Fanless		Yes
Memory	Technology	1x OR 2x DDR4 SODIMM w/ ECC/Non-ECC, up to 2133/1866Mhz
	Max. Capacity	Up to 64GB/32GB (By SKU)
Ethernet	Controller	Intel® i226IT & MARVELL_88E1548
	Speed	10/100/1000 Mbps
	Interface	4x 1GbE RJ45 Ports, 2x 2.5GbE RJ45 Ports
	Bypass	1 Pair Gen3 for 2.5GbE (SKU A Only)
Storage	Type & Installation	1x M.2 2242/2280 M-Key for SATA; 1x Mini-PCIe Slot for SATA; 1x 128GB/32GB eMMC TLC Onboard (By SKU)
I/O	GPS	u-blox NEO-M9V/SL869L-V2 (BY SKU); 4 GNSS (GPS/QZSS, Galileo, GLONASS, BeiDou), default GPS + GLONASS Dual Band
	G-sensor	Included in GPS Module
	DIO/Serial/CAN Bus Port	2x 10-Pin Terminal Block Connector: 2x DI (Support PNP/NPN/Dry Contact), 2x DO (Support Dry/Sink); 1x RS232 (Option for CAN 2.0b or CAN J1939); 1x RS232 (Cannot be used simultaneously with the Console Port);
	USB Port	2x USB 2.0 Type A Ports
	OOB Port	1x RJ45 OOB Port (SKU A/B Only)
	LED Indicator	Power/Status/Storage/Cellular, refer to Appendix A
	Reset Button	1x Reset Button
	Console Port	1x DB9 Console Port
	Antenna Hole	11x SMA Antenna Holes (include 1x GPS Antenna)
Expansion Interface	M.2	2x M.2 3042/3050/3052 B-Key for LTE/5G; 1x M.2 2230 E-Key for Wi-Fi 6/6E or BT
	SIM Card Slot	1x Nano-SIM (for each 5G/LTE Module); 1x eSIM (for each 5G/LTE Module) (Optional)
Cooling	Processor	Passive CPU heatsink
	System	IP40/Fanless System (Optional IP51 Kit)
Power	Input	24~60 Vdc, 5-2A
	Connector	2x 3-Pin Terminal Block (+, -, Ignition)
	Power Consumption (Idle)	28.72W (SKU A); 23.22W (SKU B); 21.22W (SKU C)
	Power Consumption (Full)	35.28W (SKU A); 29.78W (SKU B); 27.78W (SKU C)
	Power Adapter	N/A
Environment	Operating Temperature	-40~70°C / -40~158°F
	Storage Temperature	-40~85°C / -40~185°F
	Relative Humidity	5%~90% Operating; 5%~95% Non-Operating
Mechanical	Dimension (WxHxD)	280 x 83 x 196 mm
	Package Dimension (WxHxD)	379 x 300 x 191 mm (inner); 421 x 400 x 330 mm (2 in 1)
	Weight	4.2 KG
	Protection Class	IP40 (Optional IP51)

	Mounting	Wall mount; DIN Rail (Optional), VESA Mount (Optional)
Driver Support	Microsoft Windows	Win 10 IoT
	Linux	Debian 10 (Pre-installed)
Certification	EMC	E24, CE Class A, FCC Class A, RoHS
	Certified	MIL-STD-810G, EN 50125-3, EN 50124-1
	Compliance	C1D2 (SKU A Only), UL/IEC 62368-1, EN 50155, EN 50121-3-2, EN 50121-4, EN 45545-2, IEC-61850-3, IEEE 1613
Miscellaneous	Hardware Monitoring	Yes
	Internal RTC w/ Li Battery	Yes
	TPM	TPM 2.0 Onboard

Front Panel

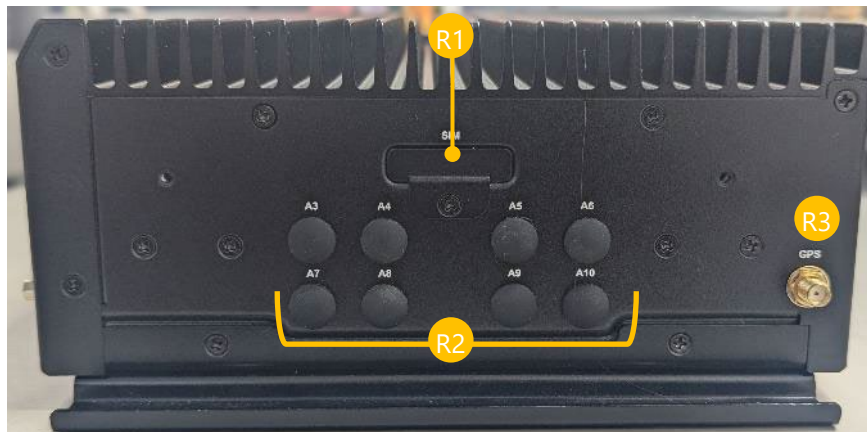


No.	Description	
F1	Ground Hole	1x Semi-shearing hole for grounding
F2	Power Input	2x 3-Pin Terminal Block (+,-,Ignition)
F3	LAN Port	4x 1GbE RJ45 Ports; 2x 2.5GbE RJ45 Ports
F4	OOB Port	1x RJ45 for Out-of-Band (OOB) Management Port (SKU A/B Only)
F5	DIO/COM/CANBus	2x 10-Pin Terminal Block Connector: 2x DI, 2x DO, 2x RS232
F6	USB 2.0 Port	2x USB 2.0 Type A Ports
F7	Reset Button	1x Reset Button
F8	LED Indicators	Storage/Power/LNK/ACT/Speed, refer to Appendix A
F9	Console Port	1x DB9 Console Port
F10	Antenna Port	2x SMA Antenna Holes (For Wi-Fi Module)

Rear Panel



Right Side Panel



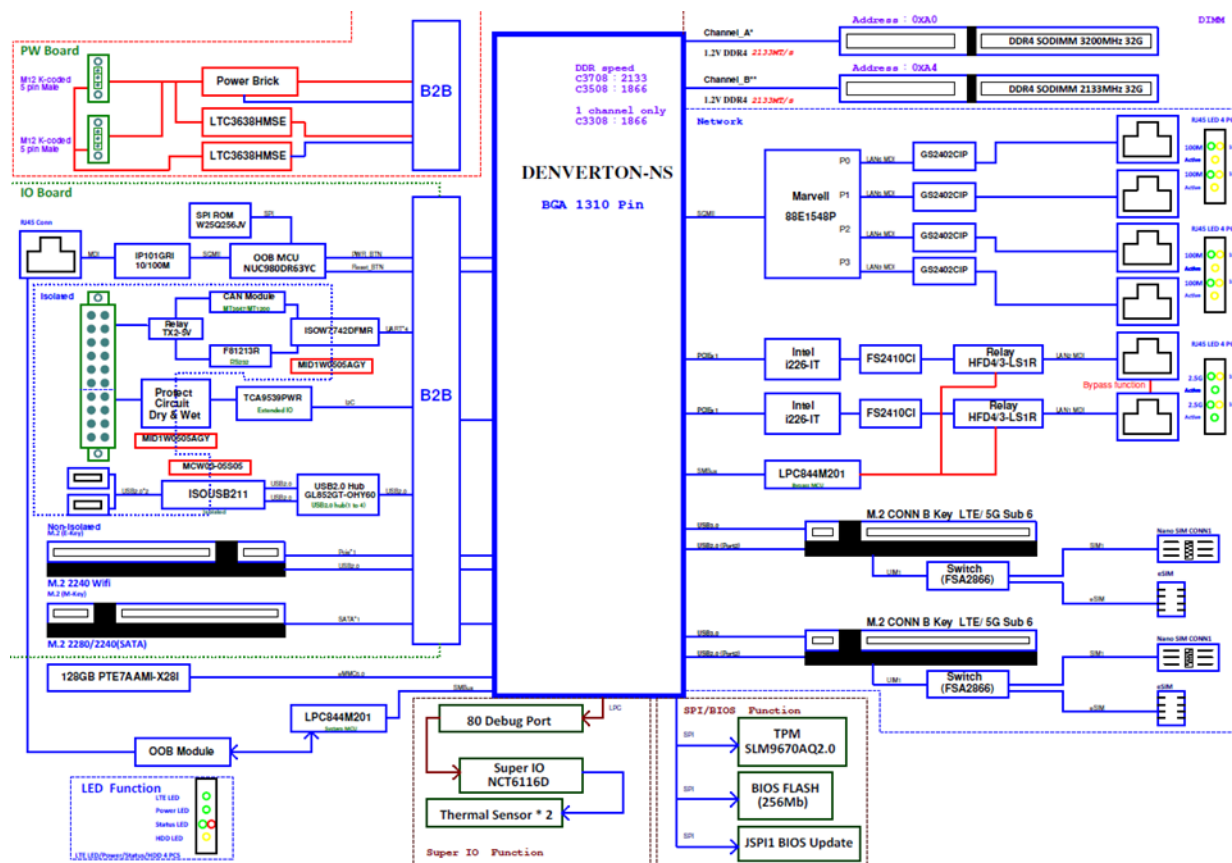
No.	Description	
R1	SIM Card Cover	2x Nano-SIM Card Slots
R2	Antenna Port	8x SMA Antenna Holes (For 5G/LTE Module)
R3	GPS Antenna Port	1x GPS Antenna Hole

Left Side Panel



Motherboard Information

Block Diagram



Jumper Setting and Internal Connector

JRTC1S: RTC Reset

2-3: Clear CMOS for SRTC

Pin	Signal
1	NC
2	SOC_SRTCST#
3	GND

JCMOS1: RTC Reset

2-3: Clear CMOS for RTC

Pin	Signal
1	NC
2	SOC_RTCST#
3	GND

AT & ATX Mode:

1-2: ATX Mode (for MCU BTN)

2-3: AT Mode (for SIO Internal BTN)

Pin	Signal
1	+P3V3_STBY
2	AT_ATX_SEL
3	GND

PBT1: OOB BTN for Debug

Pin	Signal
1	+P3V3_MCU
2	MCU_CLK

PBT2: System BTN for Debug

Pin	Signal
1	+P3V3_MCU
2	MCU_CLK

Reset1:

1-2: Hardware Reset

2-3: Software Reset

Pin	Signal
1	FP_RST_BTN#
2	GND
3	SW_RST_GP#

Reset1:

1-2: Hardware Reset

2-3: Software Reset

Pin	Signal
1	+P3V3
2	W_DIS2#_OE
3	GND

JTAG1: For Program SMCU (Debug / Burn-in code), ISP Programming Selection

1-2: Program Mode

2-3: ISP Mode (Default)

Pin	Signal
1	MCU_ISP_MODE_H
2	LPC844_MODE
3	GND

JTAG2: Program SMCU Conn

Pin	Signal
1	+P3V3_ISMCU
2	MCU_UART_RX_ISP
3	MCU_UART_TX_ISP
4	GND

CON1: For SMCU FW Debug

Pin	Signal
1	+P3V3_ISMCU
2	IGN_SWDCLK
3	IGN_SWDIO
4	GND

SW5: For SMCU Debug

1~3 OFF: Normal Operate (via MCU's Ignition)

1 ON: Detected by Power Good

2-3: ISP Mode (Default)

2 ON: Enable Low Power Detect

3 ON: Enable Watch Dog (By Customer App) (Default OFF)

Pin	Signal	Pin	Signal
1	PIO0_9	8	+P3V3_ISMCU
2	PIO0_8	7	+P3V3_ISMCU
3	PIO1_5	6	+P3V3_ISMCU
4	NC	5	NC

SW4: SMCU Program & Normal Status

1~3 ON: Normal Status

2~3 ON: Program Status (Default)

Pin	Signal	Pin	Signal
1	IMCU_RX	8	UART6_TXD
2	IMCU_TX	7	UART6_RXD
3	IMCU_RX	6	MCU_UART_RX_ISP
4	IMCU_TX	5	MCU_UART_TX_ISP

JTAG3: For Program Bypass MCU (Debug / Burn-in Code)

ISP Programming Selection

1-2: Program Mode

2-3: ISP Mode (Default)

Pin	Signal
1	MCU_ISP_MODE_PU
2	MCU_PROG
3	GND

JTAG4: Program Bypass MCU Conn

Pin	Signal
1	+P3V3_MCU
2	MCU_UART_RX
3	MCU_UART_TX
4	GND

CON2: For SMCU Firmware Debug

Pin	Signal
1	+P3V3_MCU
2	MCU_CLK
3	MCU_DIO
4	GND

EM9x91 Module 1 Control Pin

Pin	Signal	Pin	Signal
1	5G1_PCIE_DIS	2	+P1V8_5G1
3	5G1_VBUS_SENSE	4	+P3V3_5G1
5	5G1_EM9x9x_VCC1	6	+P3V3_5G1
7	5G1_EM9x9x_VCC2	8	+P3V3_5G1
9	5G1_EM9x9x_VCC3	10	+P3V3_5G1

EM9x91 Module 2 Control Pin

Pin	Signal	Pin	Signal
1	5G2_PCIE_DIS	2	+P1V8_5G2
3	5G2_VBUS_SENSE	4	+P3V3_5G2
5	5G2_EM9x9x_VCC1	6	+P3V3_5G2
7	5G2_EM9x9x_VCC2	8	+P3V3_5G2
9	5G2_EM9x9x_VCC3	10	+P3V3_5G2

CN1: For OOB I2C Sensor

Pin	Signal
1	+P3V3_STBY
2	OOB_I2C_DAT
3	OOB_I2C_CLK
4	GND

B2B1

Pin	Signal	Pin	Signal
1	+P12V_AUX	2	GND
3	+P12V_AUX	4	GND
5	+P12V_AUX	6	GND
7	+P12V_AUX	8	GND
9	+P12V_AUX	10	GND

B2B2

Pin	Signal	Pin	Signal
P1	+P5V_STBY	P2	+P5V_STBY
1	PCIE_HTX_WiFiRX_P0	31	GD
2	PCIE_HTX_WiFiRX_N0	32	UART5_TXD
3	GND	33	UART5_RXD
4	PCIE_HRX_WiFiTX_P0	34	UART5_RTS#
5	PCIE_HRX_WiFiTX_N0	35	UART5_CTS#
6	GND	36	GND
7	CLK100_WIFI_P0	37	UART3_TXD
8	CLK100_WIFI_N0	38	UART3_RXD
9	GND	39	UART3_RTS#
10	SATA_HRX_M.2TX_P4	40	UART3_CTS#
11	SATA_HRX_M.2TX_N4	41	GND
12	GND	42	UART1_TXD
13	SATA_HTX_M.2RX_N4	43	UART1_RXD
14	SATA_HTX_M.2RX_P4	44	UART1_RTS#
15	GND	45	UART1_CTS#
16	USB20_P1	46	GND
17	USB20_N1	47	SOC_SLP_S3#
18	GND	48	GND
19	USB20_P2	49	GND
20	USB20_N2	50	GND
21	GND	51	OOB_SYS_RST#
22	USB_HUB_RST#	52	nRESET_SYS
23	WIFI_RST#	53	OOB_PWR_BTN#
24	SATA_LED#	54	GPIO_PA0
25	RELAY_SW	55	OOB_I2C_DAT
26	CANM_RST#	56	OOB_I2C_CLK
27	CAN2M_RST#	57	GND
28	MCU_I2C_CLK	58	IGN_DI0_IN
29	MCU_I2C_DAT	59	IGN_DI1_IN
30	GND	60	GND
P2	+P3V3_STBY	P4	+P3V3_STBY
PAD1	B2B_GND	PAD2	B2B_GND

B2B3

Pin	Signal	Pin	Signal
1	+P3V3_AUX	2	+P3V3_AUX
3	+P3V3_AUX	4	I2C_SDA_HWM_SMCU
5	GND	6	I2C_SCL_HWM_SMCU
7	GND	8	IGNOUT
9	GND	10	GND

B2B4

Pin	Signal	Pin	Signal
1	+P3V3_AUX	2	+P3V3_AUX
3	+P3V3_AUX	4	GND
5	GND	6	GND
7	GND	8	+P5V_AUX
9	+P5V_AUX	10	+P5V_AUX

JSPI1

Pin	Signal	Pin	Signal
1	SPI_HD1#	2	NC
3	SOC_SPI_CS0_R	4	+P3V3_STBY_SPI
5	SPI0_IO1_MISO_R	6	SOC_SPI_IO3_R
7	NC	8	SOC_SPI_CLK_R
9	GND	10	SOC_SPI_MOSI_R

J80PORT1

Pin	Signal	Pin	Signal
1	LPC_CLKOUT0	2	LPC_LAD1
3	80PORT_RST#	4	LPC_LAD0
5	LPC_FRAME#	6	+P3V3
7	LPC_LAD3	8	NA
9	LPC_LAD2	10	GND

ATX1

Pin	Signal	Pin	Signal
1	+P12V_AUX	2	GND
3	+P12V_AUX	4	GND
5	+P12V_AUX	6	GND
7	+P12V_AUX	8	GND
9	+P12V_AUX	10	GND

B2B1

Pin	Signal	Pin	Signal
1	+P3V3_AUX	2	+P3V3_AUX
3	+P3V3_AUX	4	I2C_SDA_HWM_SMCU
5	GND	6	I2C_SCL_HWM_SMCU
7	GND	8	IGNOUT
9	GND	10	GND

PWR1 (24-60V)

Pin	Signal
1	+P24V~60V_DCIN_A
2	DC_GNDA1
3	IGN_EN1

PWR2 (24-60V)

Pin	Signal
1	+P24V~60V_DCIN_B
2	DC_GNDA1
3	IGN_EN2

B2B1

Pin	Signal	Pin	Signal
P1	+P5V_STBY	P2	+P5V_STBY
1	PCIE_HTX_WiFiRX_P0	31	GD
2	PCIE_HTX_WiFiRX_N0	32	UART5_TXD
3	GND	33	UART5_RXD
4	PCIE_HRX_WiFiTX_P0	34	UART5_RTS#
5	PCIE_HRX_WiFiTX_N0	35	UART5_CTS#
6	GND	36	GND

7	CLK100_WIFI_P0	37	UART3_TXD
8	CLK100_WIFI_N0	38	UART3_RXD
9	GND	39	UART3_RTS#
10	SATA_HRX_M.2TX_P4	40	UART3_CTS#
11	SATA_HRX_M.2TX_N4	41	GND
12	GND	42	UART1_TXD
13	SATA_HTX_M.2RX_N4	43	UART1_RXD
14	SATA_HTX_M.2RX_P4	44	UART1_RTS#
15	GND	45	UART1_CTS#
16	USB20_P1	46	GND
17	USB20_N1	47	SOC_SLP_S3#
18	GND	48	GND
19	USB20_P2	49	GND
20	USB20_N2	50	GND
21	GND	51	OOB_SYS_RST#
22	USB_HUB_RST#	52	nRESET_SYS
23	WIFI_RST#	53	OOB_PWR_BTN#
24	SATA_LED#	54	GPIO_PA0
25	RELAY_SW	55	OOB_I2C_DAT
26	CANM_RST#	56	OOB_I2C_CLK
27	CAN2M_RST#	57	GND
28	MCU_I2C_CLK	58	IGN_DI0_IN
29	MCU_I2C_DAT	59	IGN_DI1_IN
30	GND	60	GND
P2	+P3V3_STBY	P4	+P3V3_STBY
PAD1	B2B_GND	PAD2	B2B_GND

B2B2

Pin	Signal	Pin	Signal
1	+P3V3_AUX	2	+P3V3_AUX
3	+P3V3_AUX	4	GND
5	GND	6	GND
7	GND	8	+P5V_AUX
9	+P5V_AUX	10	+P5V_AUX

CN1: CAN Module1

Pin	Signal	Pin	Signal
1	#1_BAT_12V_24V	2	#1_K_LINE
3	C_DO1	4	NC
5	GND	6	GND
7	ISO_CANM_RST#	8	#1_J1850+/J1708+
9	CAN1_M_TX	10	#1_J1850-/J1708-
11	CAN1_M_RX	12	CAN1_H/J1939+
13	+P5V_IO_C	14	CAN1_L/J1939-

CN2: CAN Module 2

Pin	Signal	Pin	Signal
1	#2_BAT_12V_24V	2	#2_K_LINE
3	C_DO2	4	NC
5	GND	6	GND
7	ISO_CAN2M_RST#	8	#2_J1850+/J1708+
9	CAN2_M_TX	10	#2_J1850-/J1708-
11	CAN2_M_RX	12	CAN2_H/J1939+
13	+P5V_IO_C	14	CAN2_L/J1939-

USB3: For OOB Program Firmware

Pin	Signal
1	+P5V_VBUS
2	USB0_DM
3	USB0_DP
4	NC
5	GND

J1: OOB Power USB Connection & System Power

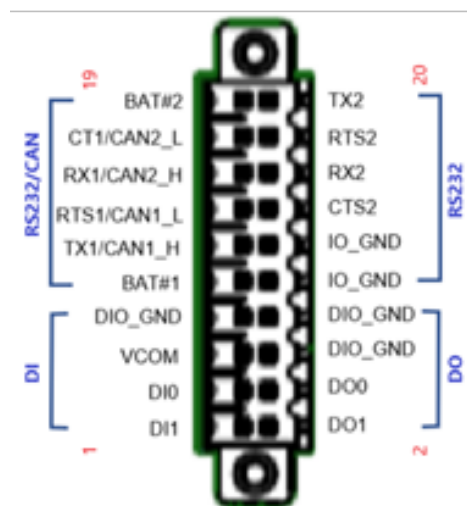
Pin	Signal	Pin	Signal
1	+P3V3_AUX	2	+P3V3_OOB
3	+P3V3_USB_OOB	4	

J2: OOB UART For Debug

Pin	Signal
1	UART0_TX
2	GND
3	UART0_RX

IO1: RS232/CAN/DIO Function

Pin	Function	Signal	Pin	Function	Signal
19	RS232/CAN	#2_BAT_12V_24V_T	20	RS232	RS232_CONN_TX2
17		COMM_CTS1_CAN2_L	18		RS232_CONN_RTS#2
15		COMM_RX1_CAN2_H	16		RS232_CONN_RX2
13		COMM_RTS1_CAN1_L	14		RS232_CONN_CTS#2
11		COMM_TX1_CAN1_H	12		IO_GND
9		#1_BAT_12V_24V_T	10		IO_GND
7	DI	DIO_GND	8	DO	DIO_GND
5		+PDIO_COM	6		DIO_GND
3		DI_0	4		DO_0
1		DI_1	2		DO_1



CHAPTER 2: HARDWARE SETUP

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

Open the Bottom Chassis

To install the M.2 storage expansion, Wi-Fi module, or LTE/5G module, first open the system's bottom chassis.

1. Turn the system over so the bottom is facing up. Then, remove the ten (10) screws on the sides and bottom panels as below:



Bottom Side

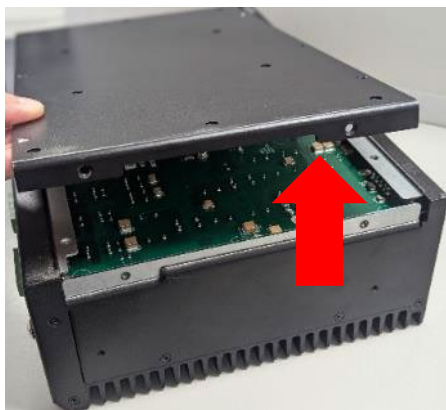


Left Side



Right Side

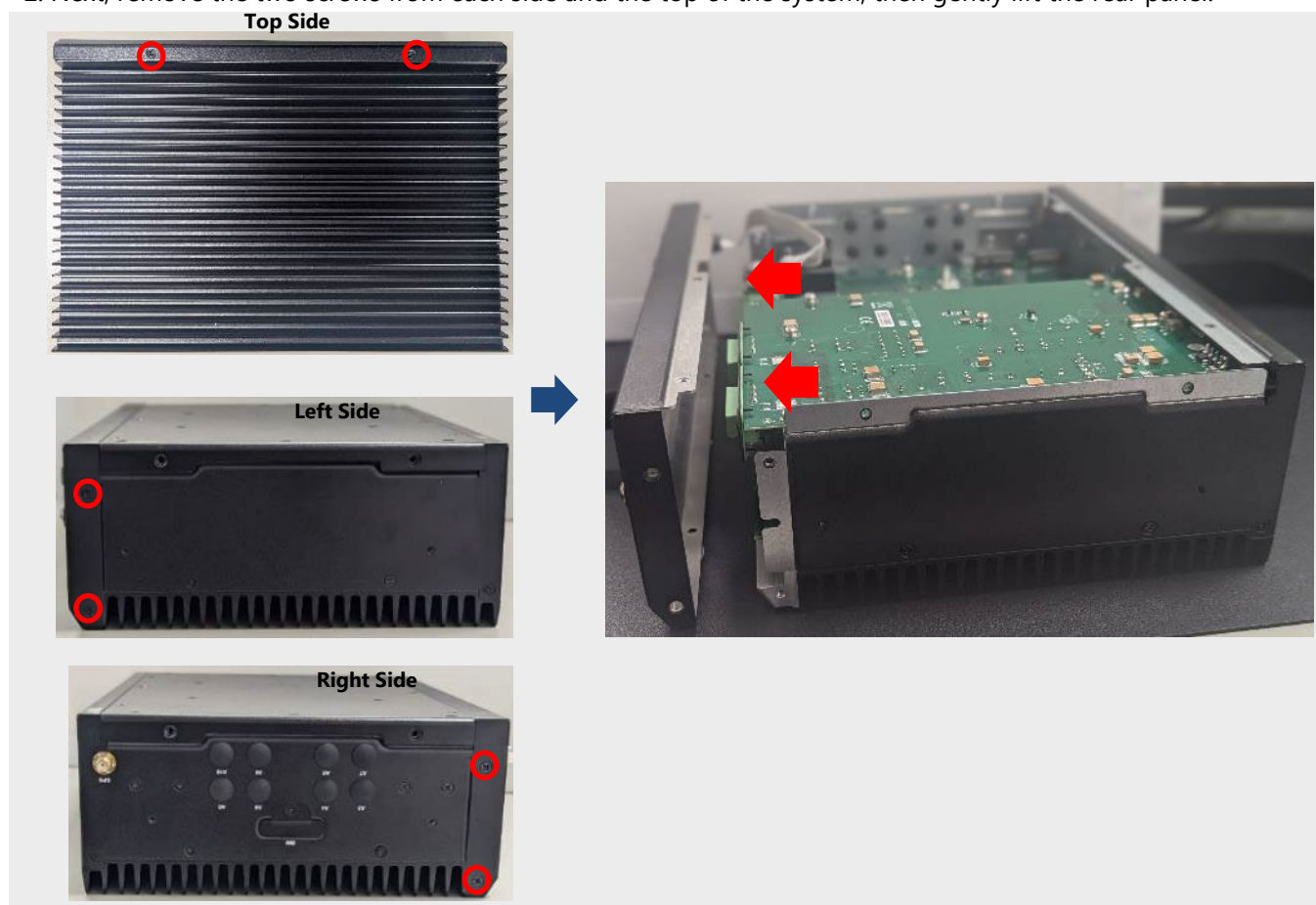
2. Lift up the bottom chassis cover.



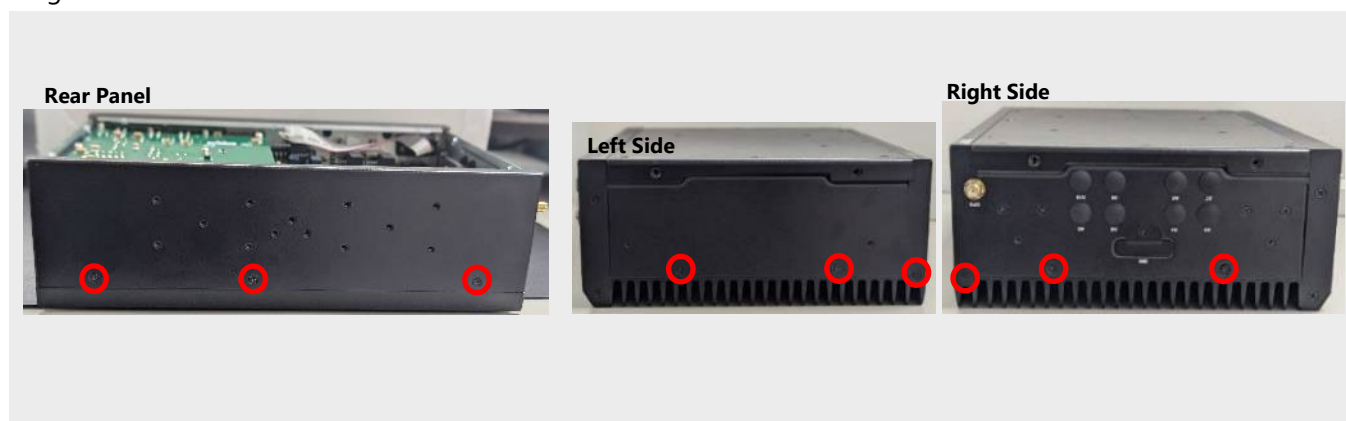
Access the Main System Board

The system is triple tiered, comprising of one main system board (bottom) and two daughterboards on top. The main system board holds slots for DDR4 SODIMM memory, and Mini-PCle Storage slot. To access the main system board, first need to detach the daughterboards and metal partitions.

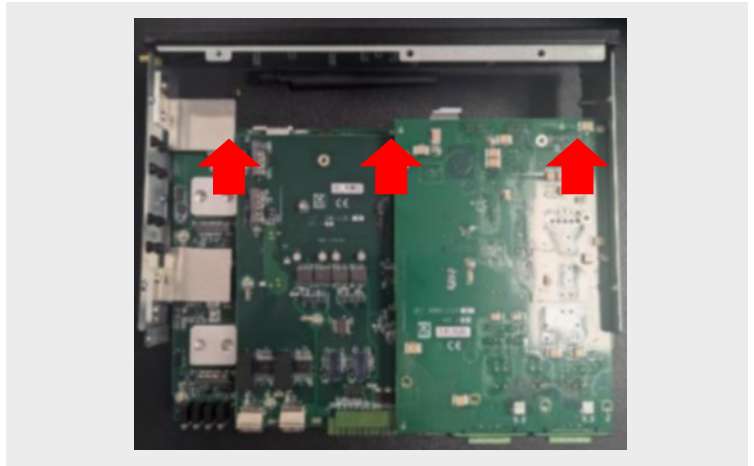
1. Power off the system and open the bottom chassis cover.
2. Next, remove the two screws from each side and the top of the system, then gently lift the rear panel.



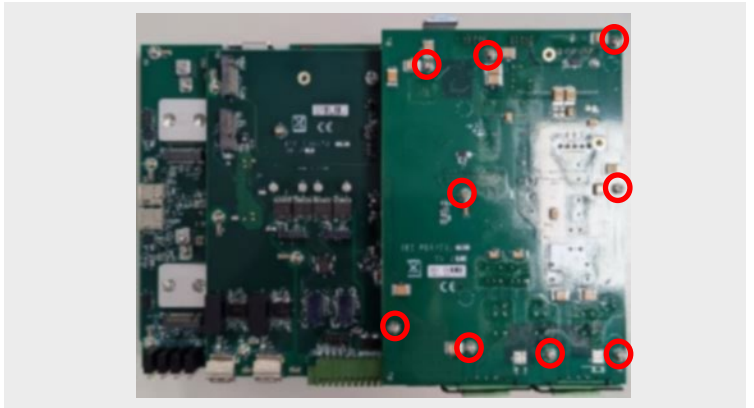
3. Then, remove three (3) screws on the Rear panel, three (3) on the Left side, and three (3) screws on the Right side.



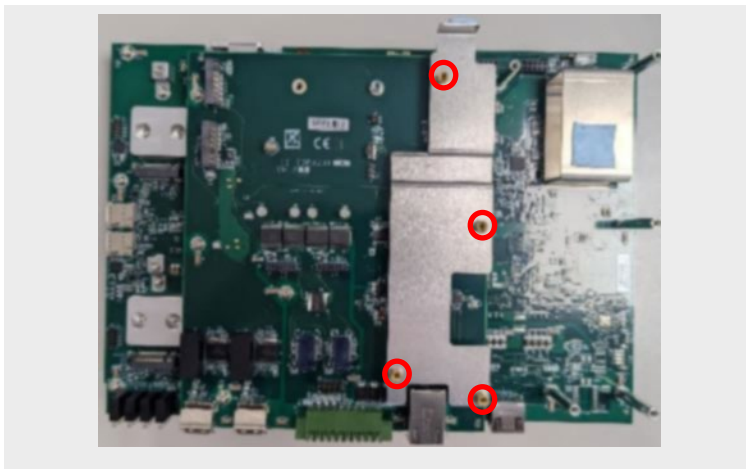
4. Gently lift up the chassis cover.



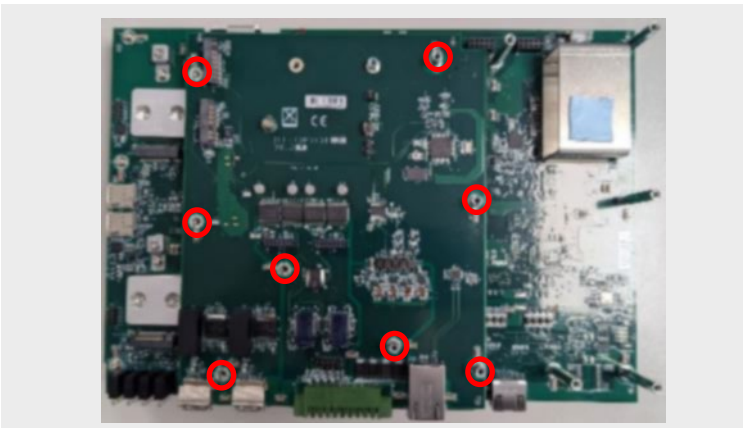
5. Then, unscrew the nine (9) screws on the upper daughter board and lift up to remove the upper daughter board from the lower daughter board.



6. Next, unscrew the four (4) mini-pillars on the metal partition. Then gently lift up to remove.



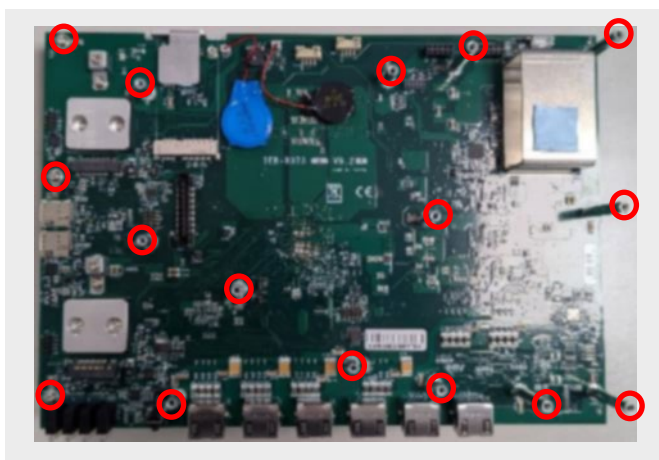
7. Unscrew the eight (8) screws on the lower daughterboard, and gently lift up to remove.



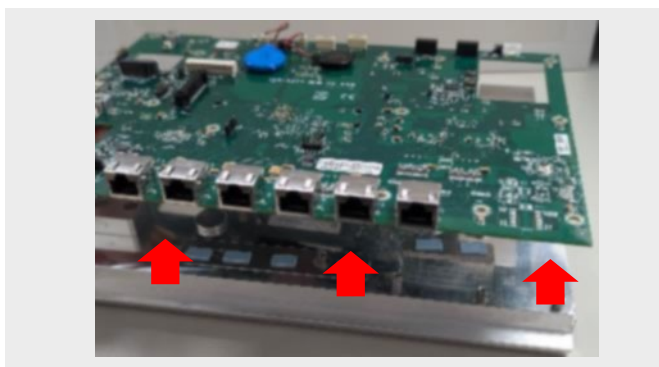
Installing the System Memory

The system supports additional two DIMM DDR4 memory slot (SKU A/B) or one SODIMM DDR4 memory slot (SKU C), please follow the steps for installation.

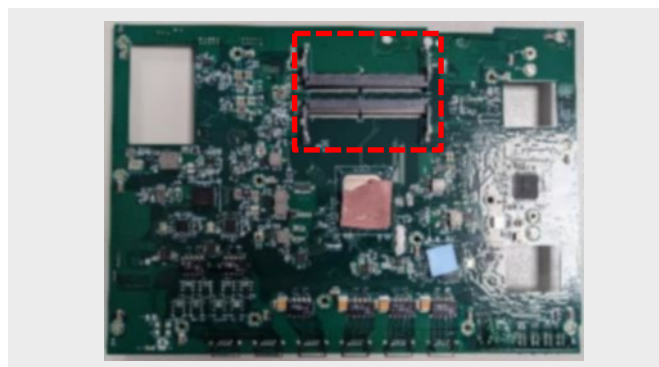
1. Power off the system, and open the bottom chassis cover, and access the main system board.
2. The DIMM DDR4 memory slots are located on the bottom side of the main system board. Unscrew the sixteen (16) screws and metal pillars on the main system board.



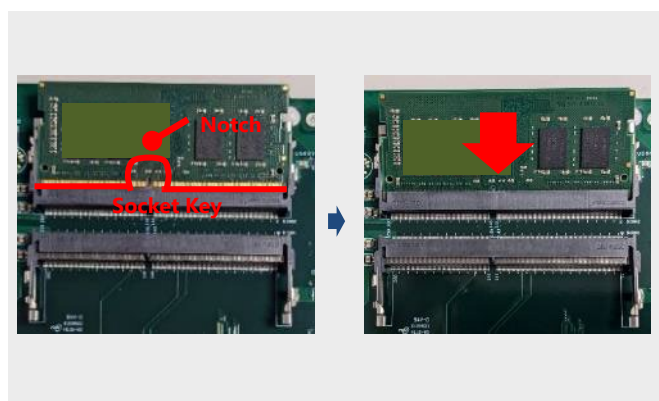
3. Gently lift up the main system board, and detach from the bottom metal chassis.



4. Turn the main system board around and locate the SODIMM socket on the board.



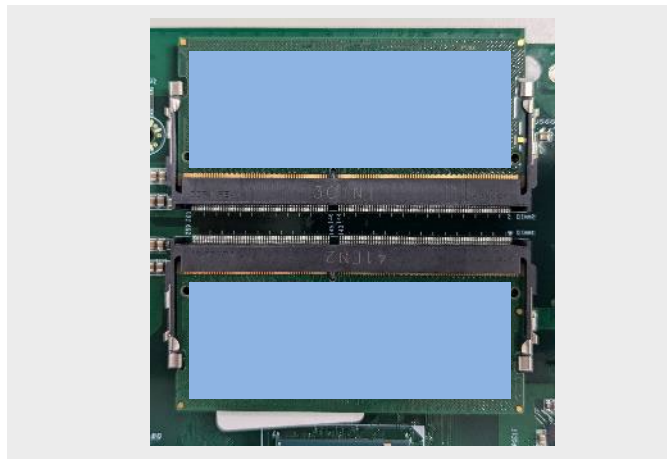
5. Align the notches of the SODIMM module with the Socket Key in the pin slot.
6. Insert the module into the slot at a diagonal angle.



7. Gently press down until it is firmly seated by the clips on both sides.



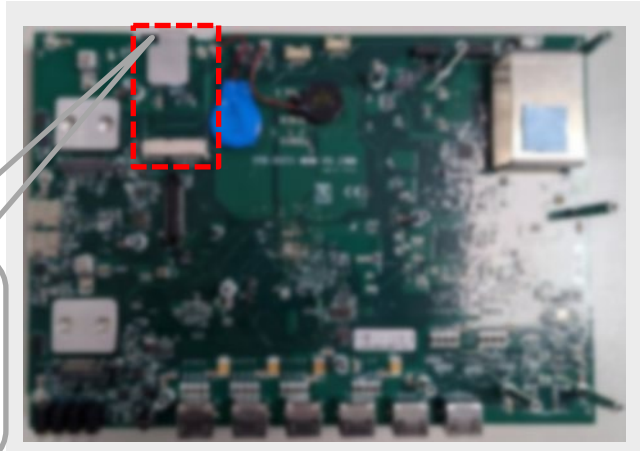
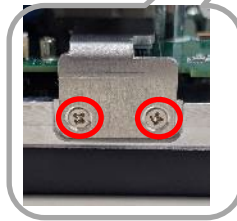
8. Lastly, thermal pad placement. Remove the protective film on the thermal pad (included in the accessory pack) and gently place on top (on each side) of the module.



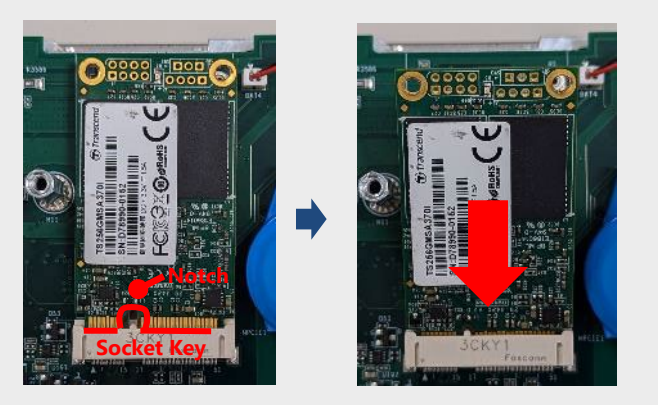
Installing the Mini-PCle Storage Module (Optional)

The system supports one mSATA slot. Follow the procedures below for installing a mSATA storage module card.

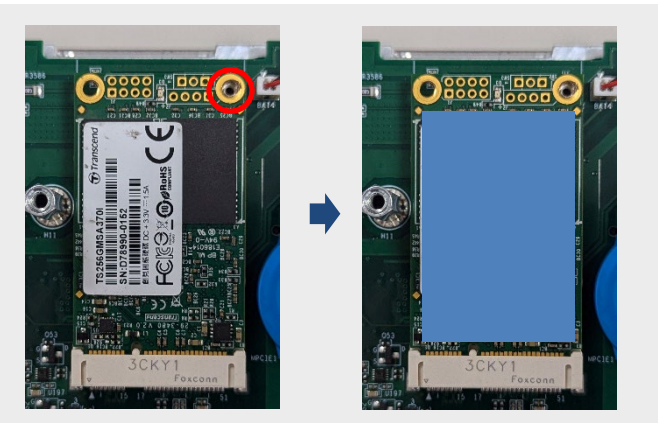
1. Power off the system, and open the bottom chassis cover, and access the main system board.
2. Locate the metal partition over the mSATA socket on the motherboard. Unscrew the two (2) screws on the side (as in photo below) to remove the metal partition.



3. Align the notch of the mSATA storage card with the socket key in the slot.
4. Insert at 30 degrees into the socket until it is fully seated in the connector.



5. Push down on the storage card and secure it with one (1) screw.
6. Lastly, thermal pad placement. Remove the protective film on the rectangular thermal pad (included in the accessory pack), and gently place on top of the storage module.
7. Place the metal partition back on and secure with two (2) original screws.



Installing the M.2 Storage Module (Optional)

The system supports one M.2 M-Key SATA storage slot expansion. Please follow the steps for installation.

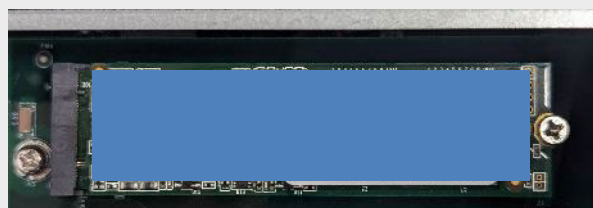
1. Power off the system, and open the bottom chassis cover.
2. Locate the M.2 slot on the motherboard.



3. Align the notch of the storage card with the socket key in the pin slot.
4. Insert at 30 degrees into the socket until it is fully seated in the connector.



5. Vertically push down on the storage card and secure it with one (1) screw.
6. Next, thermal pad placement. Remove the protective film on the rectangular thermal pad (included in the accessory pack), and gently place on top, cover the storage module.



Installing the Wi-Fi Module (Optional)

The motherboard provides one M.2 E-Key slot for a Wi-Fi 6 or BT module card. Wi-Fi module will require two antennas. Please follow the procedures for installation.

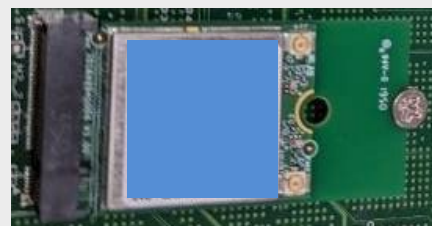
1. Power off the system, and open the bottom chassis cover.
2. Locate the M.2 slot on the motherboard.



3. Align the notch of the module card with the socket key in the slot.
4. Insert at 30 degrees into the socket until it is fully seated in the connector.



5. Push down on the module card and secure it with one (1) screw.
6. Next, thermal pad placement. Remove the protective film on the thermal pad (included in the accessory pack) and gently place on the top, covering the Wi-Fi Module card.



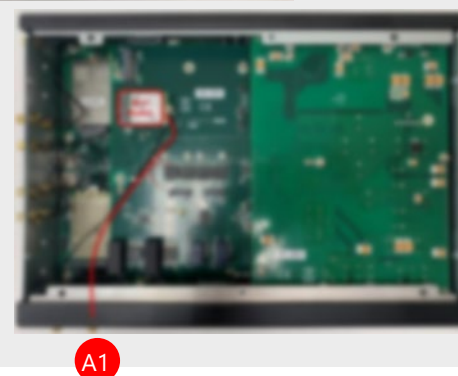
Installing Wi-Fi Antennas



1. Locate the two (2) antenna hole placements (A1, A2) on the front panel of the system. Locate the two (2) IPEX connectors on the Wi-Fi module card.



2. Connect RF cables to the Wi-Fi module card IPEX connector.



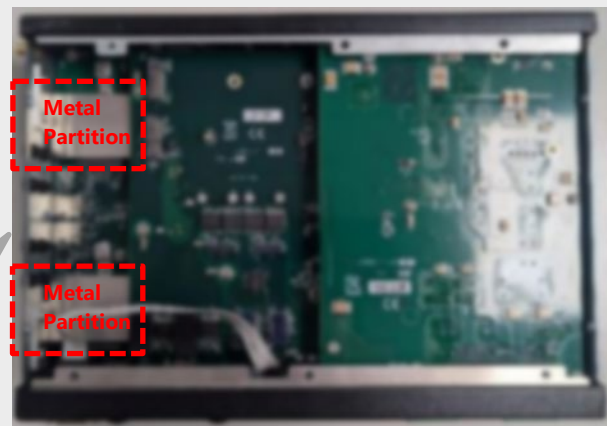
4. Then, secure two (2) antennas to the front panel of the system.



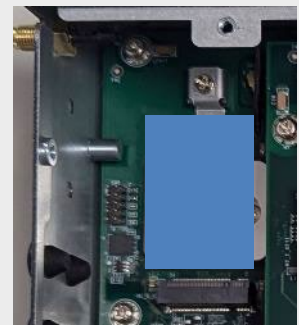
Installing the M.2 LTE/5G Module (Optional)

The system supports two M.2 B-Key for LTE/5G module card expansion. LTE module will require two (2) antennas, while the 5G module requires four (4) antennas. Follow the installation procedures.

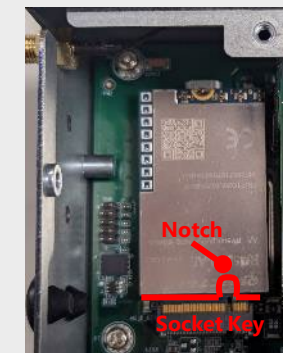
1. Power off the system, and open the bottom chassis cover.
2. Locate the M.2 slots on the motherboard, and remove the metal partitions by removing the two (2) screws on the side panel.



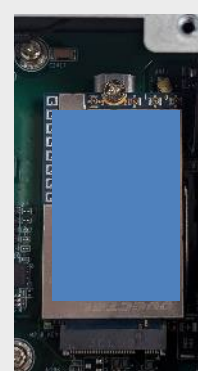
3. After removing the metal partitions, we need to add the bottom thermal pad. Remove the protective film on the thermal pad (included in the accessory pack), and gently place on the motherboard.



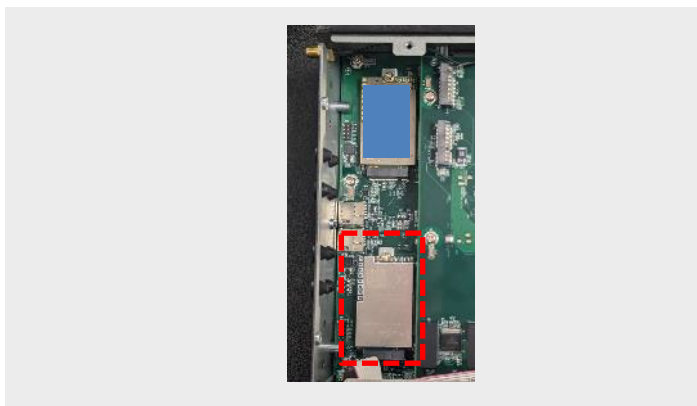
4. Align the notch of the LTE/5G module card with the socket key in the slot.
5. Insert at 30 degrees into the socket until it is fully seated in the connector.



6. Push down on the LTE/5G module card and secure it with one (1) screw.
7. Next, thermal pad placement. Remove the protective film on the thermal pad (included in the accessory pack), and gently place on top, covering the LTE/5G module card.



8. Repeat same steps if installing a second LTE/5G module card. And remember to secure the metal partitions after installing the antennas.



Installing 5G Antennas

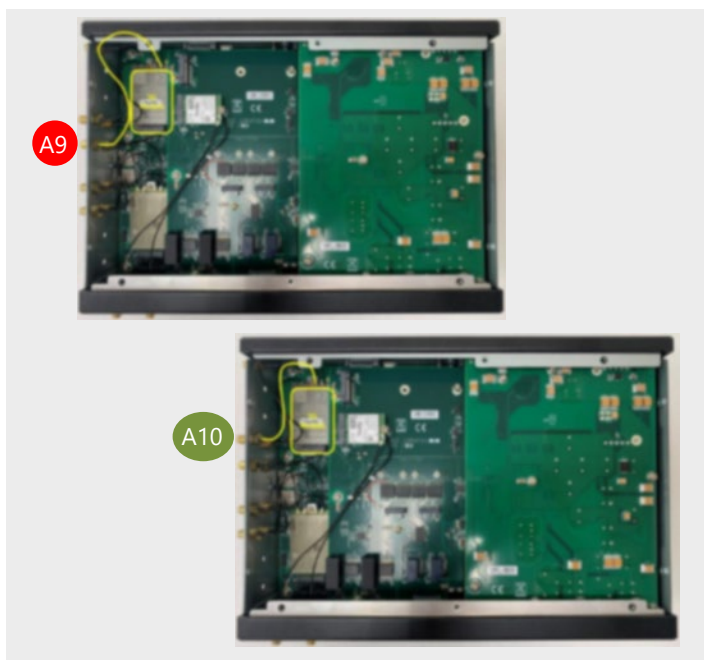


1. Locate the four (4) antenna hole placements (A5, A6, A9, A10) on the side panel. Locate the four (4) IPEX connectors on the 5G module card. [Pls note IPEX connector placement will vary based on 5G module.]



2. Connect RF cables to the IPEX connects on the 5G module card and screw the other end of the cables in the antenna holes.





3. Repeat for the second 5G module card (if adding). Then, screw on the four (4) antennas (each) to the system.



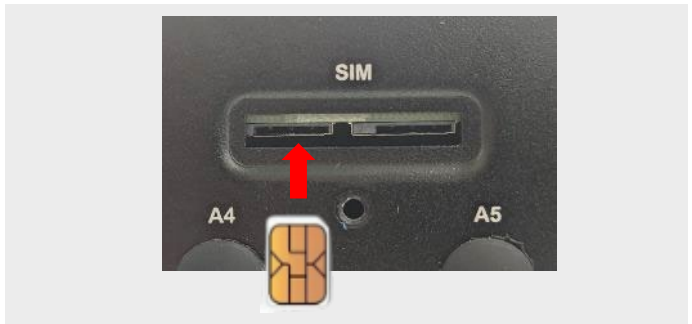
Installing SIM Card (Optional)

The system supports Nano-SIM cards x1 for each LTE/5G module. Follow the installation procedures.

1. Power off the system and turn the system to its side.
2. Locate the Nano-SIM card cover on the side panel and remove the one (1) screw. Gently remove the Nano-SIM card cover.



2. Insert and push the SIM cards all the way in until it clicks into place.



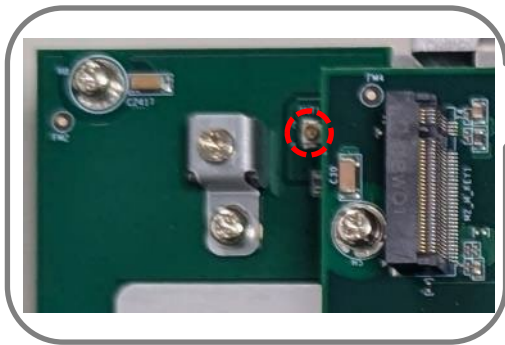
3. To remove the card, push it once, to have the card automatically eject.
4. Place the cover door back and tighten the one (1) screw.

Installing GPS Antenna

On the side panel of the system, there is an antenna hole for GPS GNSS (GPS, Galileo, GLONASS, BeiDou) support.



1. Locate the antenna hole on the rear panel, and locate the IPEX connector on the motherboard.



2. Connect antenna RF cables to the IPEX connector.



3. Screw on the antenna to the system.



Wall Mounting

With the wall-mount kit, you can fix this system onto a flat wall surface.

Check the kit contents for the following items:

- ▶ 1x pair of Wall Brackets
- ▶ 6x Screws (for the wall brackets)

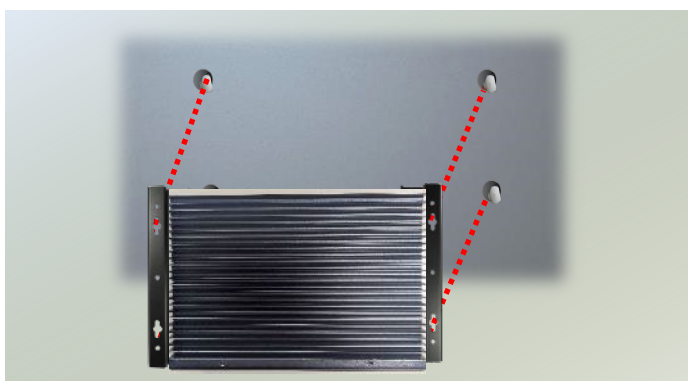


1. Turn the system over so the bottom is facing up; fix both wall brackets onto the system bottom with six (6) screws.

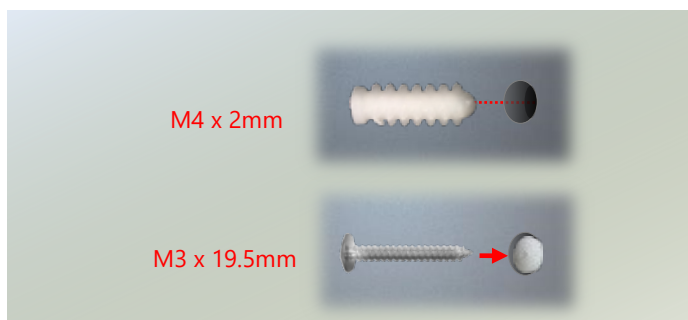


2. On the wall, measure the exact place where you want to hang the system and drill four holes.

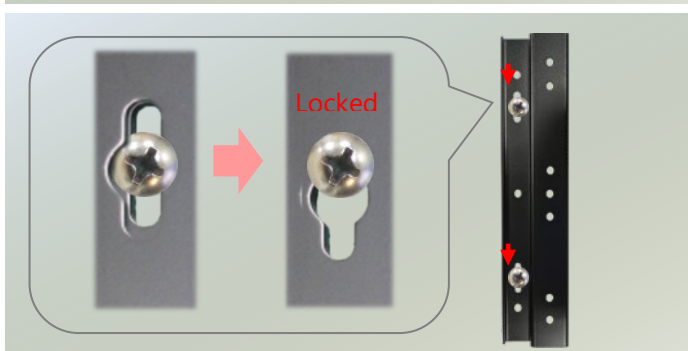
NOTE: The demonstrated screw type can fit in general drywall or shelves. Please identify the wall type and select the suitable fixing approach to secure this system to the wall, and consult a qualified trained person if you are unsure.



3. Insert the expansion anchor bolts into the holes, and then insert the long screws into the wall screws.



4. Align the four screw holes on the system's wall brackets with the four long screws you just installed on the wall.
5. Engage the four screws in the bracket holes, and push the system downwards to lock the screws into position.



CHAPTER 3: SOFTWARE SETUP

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.

Main Page Setup

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

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

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

Main Page

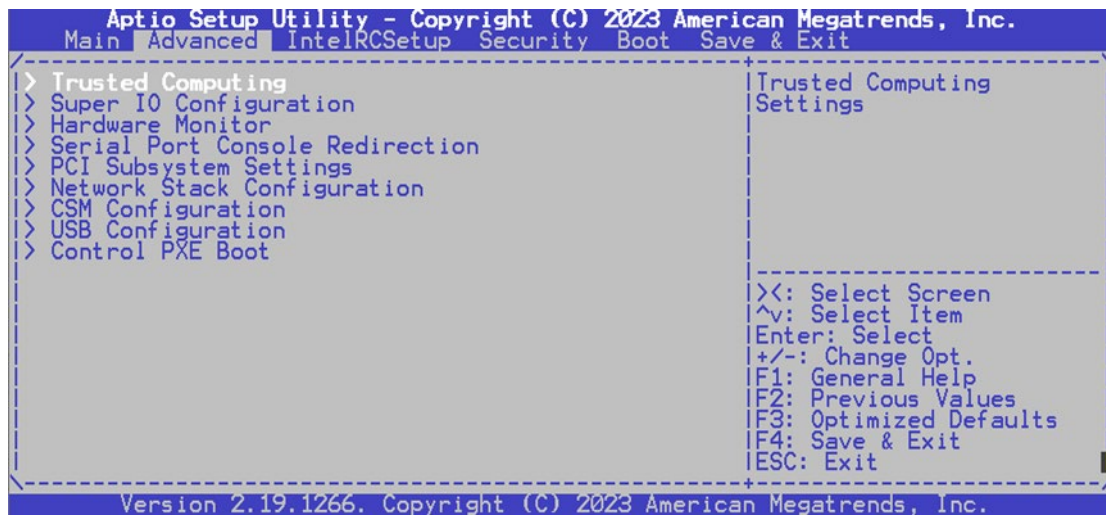
Setup main page contains BIOS information and project version information.



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

```

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.
  Advanced
+-----+
| TPM20 Device Found                                     ^| Enables or Disables
| Vendor: IFX                                           *| BIOS support for
| Firmware Version: 13.11                             *| security device. O.S.
|                                                       *| will not show Security
| Security Device [Enable]                             *| Device. TCG EFI
| Support                                               *| protocol and INT1A
| Active PCR banks  SHA-1,SHA256                      *| interface will not be
| Available PCR banks SHA-1,SHA256                    *| available.
|                                                       *|
| SHA-1 PCR Bank   [Enabled]                          *| -----
| SHA256 PCR Bank  [Enabled]                          *| ><: Select Screen
|                                                       *| ^v: Select Item
| Pending operation [None]                            *| Enter: Select
| Platform Hierarchy [Enabled]                       +| +/-: Change Opt.
| Storage Hierarchy [Enabled]                       +| F1: General Help
| Endorsement       [Enabled]                       +| F2: Previous Values
| Hierarchy                                                 +| F3: Optimized Defaults
|                                                       v| F4: Save & Exit
|                                                       |ESC: Exit
+-----+
Version 2.19.1266. Copyright (C) 2020 American Megatrends, Inc.

```

```

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.
  Advanced
+-----+
| Active PCR banks  SHA-1,SHA256                       ^| Select to Tell O.S.
| Available PCR banks SHA-1,SHA256                     +| to support PPI Spec
|                                                       +| Version 1.2 or 1.3.
| SHA-1 PCR Bank   [Enabled]                           +| Note some HCK tests
| SHA256 PCR Bank  [Enabled]                           +| might not support 1.3.
|                                                       *|
| Pending operation [None]                             *|
| Platform Hierarchy [Enabled]                         *|
| Storage Hierarchy [Enabled]                         *|
| Endorsement       [Enabled]                         *| -----
| Hierarchy                                                 *| ><: Select Screen
| TPM2.0 UEFI Spec  [TCG_2]                             *| ^v: Select Item
| Version                                                  *| Enter: Select
| Physical Presence [1.3]                               *| +/-: Change Opt.
| Spec Version      *| F1: General Help
| TPM 20            *| F2: Previous Values
| InterfaceType     v| F3: Optimized Defaults
|                                                       v| F4: Save & Exit
|                                                       |ESC: Exit
+-----+
Version 2.19.1266. Copyright (C) 2020 American Megatrends, Inc.

```

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.

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

Serial Port 3 Configuration



Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port 3.
Device Settings	NA	IO=3E8h; IRQ = 11

Serial Port 4 Configuration



Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port 4.
Device Settings	NA	IO=2E8h; IRQ = 11

Serial Port 5 Configuration



Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port 5.
Device Settings	NA	IO=2E0h; IRQ = 11

Serial Port 6 Configuration

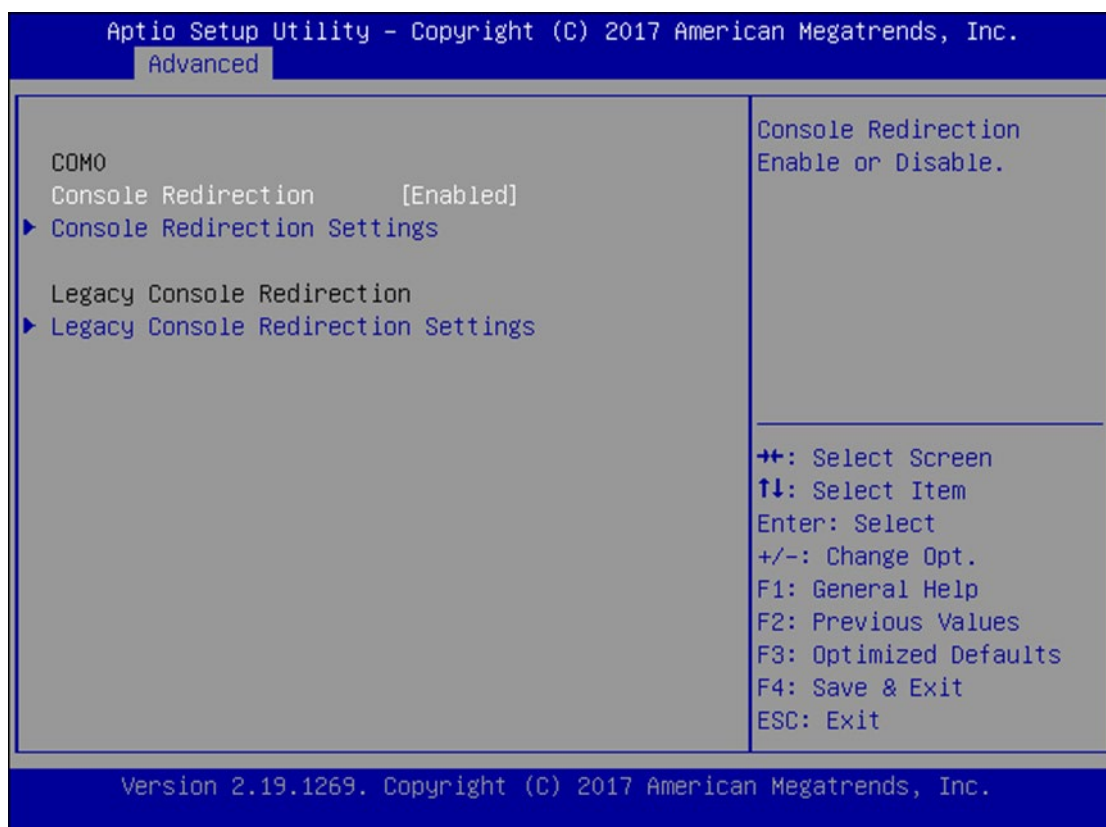


Feature	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port 6.
Device Settings	NA	IO=2F0h; IRQ = 11

Hardware Monitor

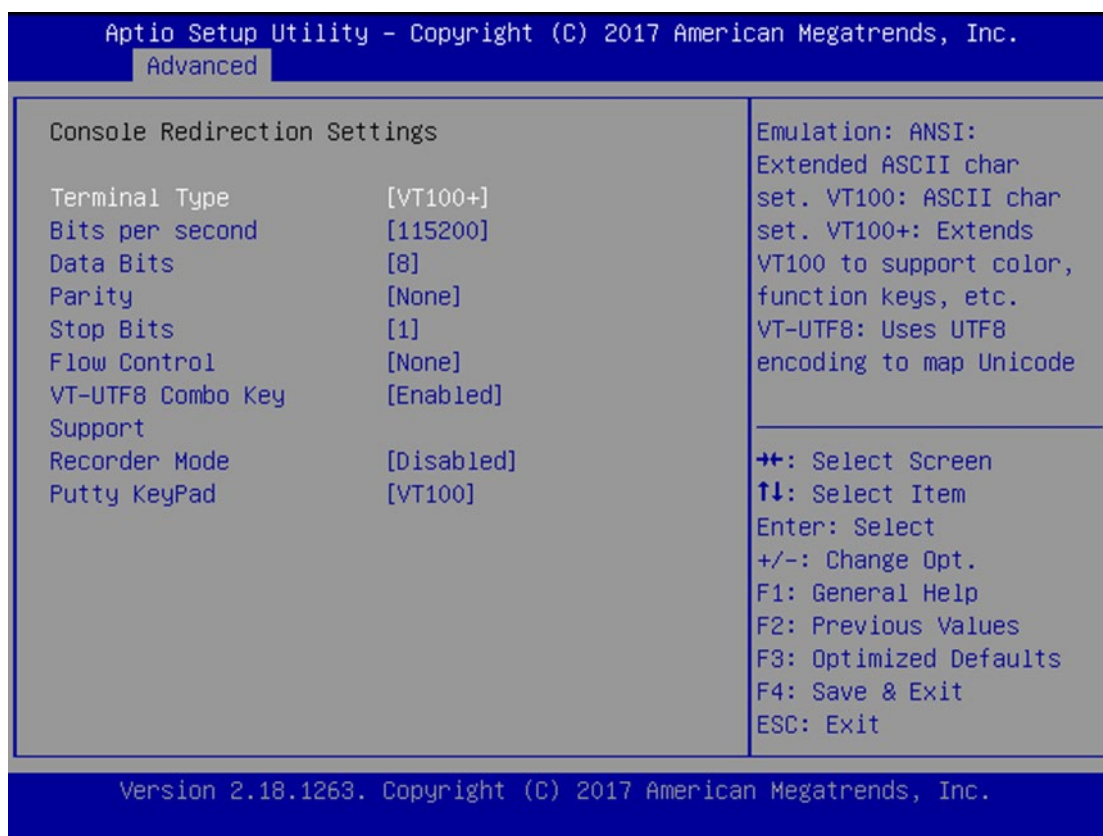
```
Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.
  Advanced
-----+-----
Pc Health Status
SYS1 Temp      : +29 C
SYS2 Temp      : +23 C
12V            : +11.904 V
VSB5V          : +4.979 V
VDIMM          : +1.200 V
VSB3.3V        : +3.360 V
CPU VCORE      : +0.872 V
3.3V           : +3.360 V
VBAT           : +3.120 V
-----+-----
|><: Select Screen
|^v: Select Item
|Enter: Select
|+/-: Change Opt.
|F1: General Help
|F2: Previous Values
|F3: Optimized Defaults
|F4: Save & Exit
|ESC: Exit
-----+-----
Version 2.19.1266. Copyright (C) 2020 American Megatrends, Inc.
```

Serial Port Console Redirection



Feature	Options	Description
COM0 Console Redirection	Enabled Disabled	Console Redirection Enable or Disable.

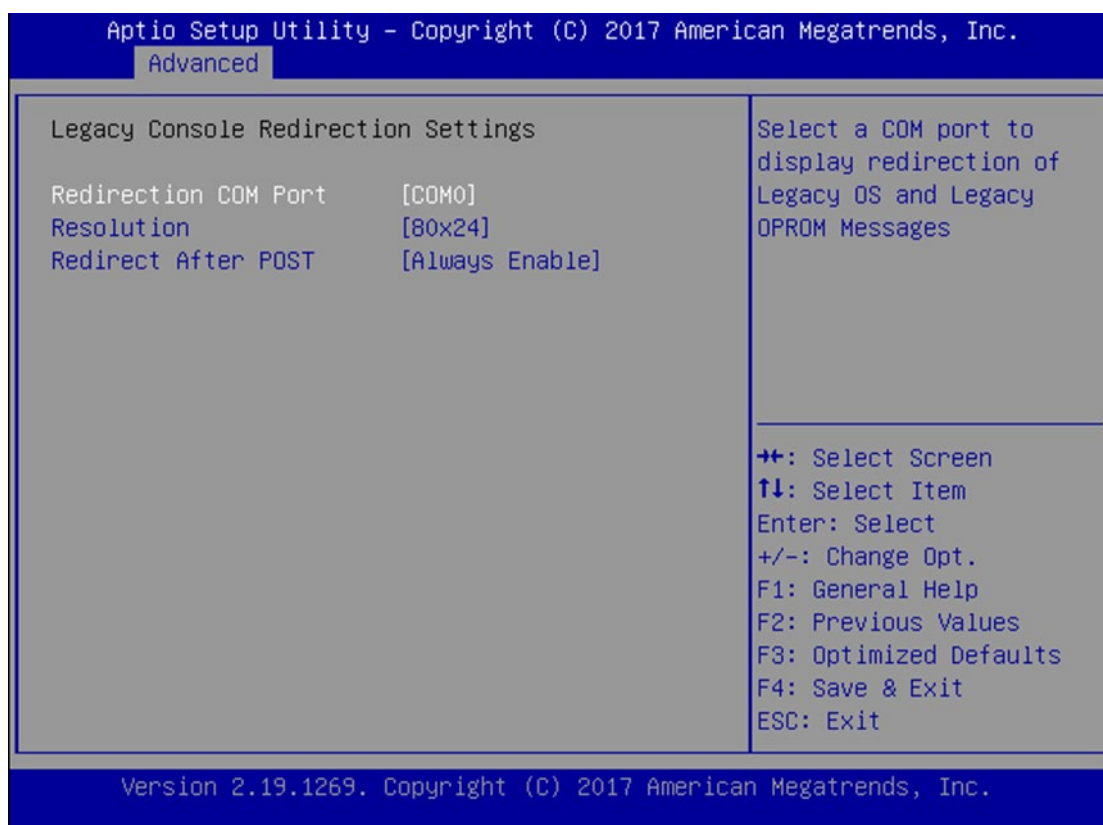
Console Redirection Setting



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

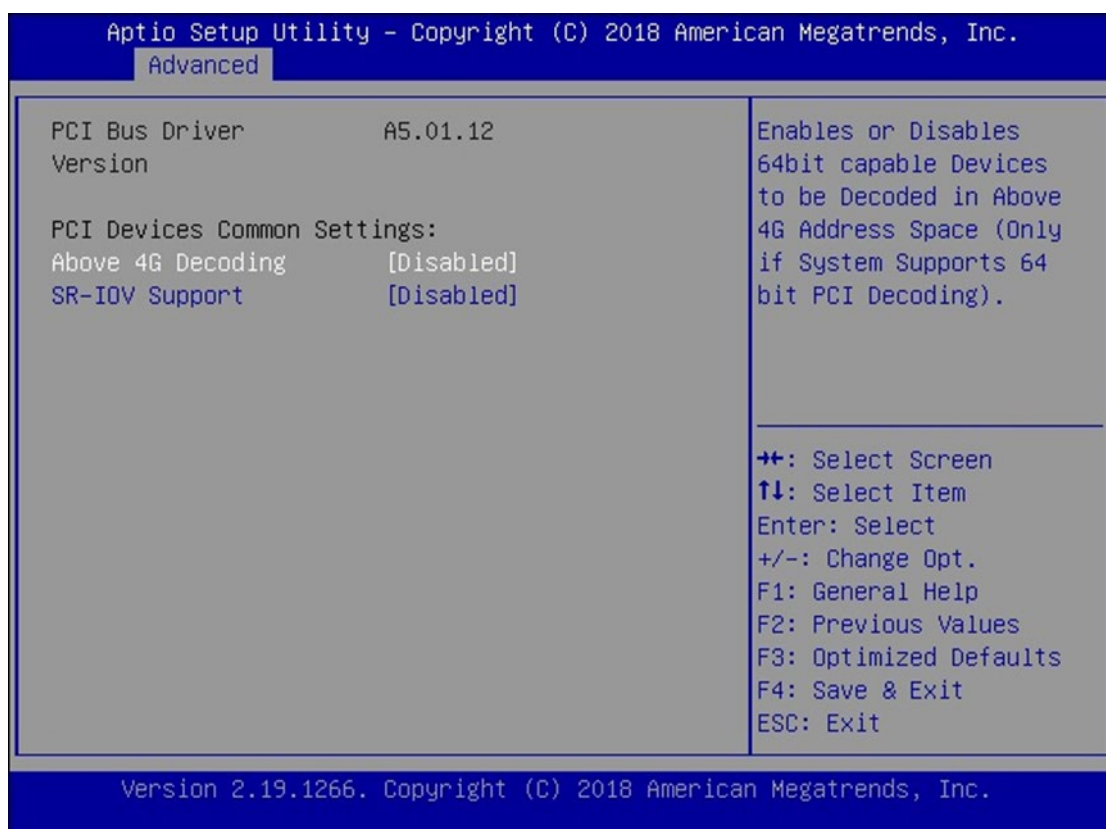
Flow Control	None Hardware RTS/CTS	Flow Control can prevent data loss from buffer overflow.
VT-UTF8 Combo Key Support	Disabled Enabled	Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	Disabled Enabled	With this mode enabled, only text will be sent. This is to capture Terminal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

Console Redirection Settings



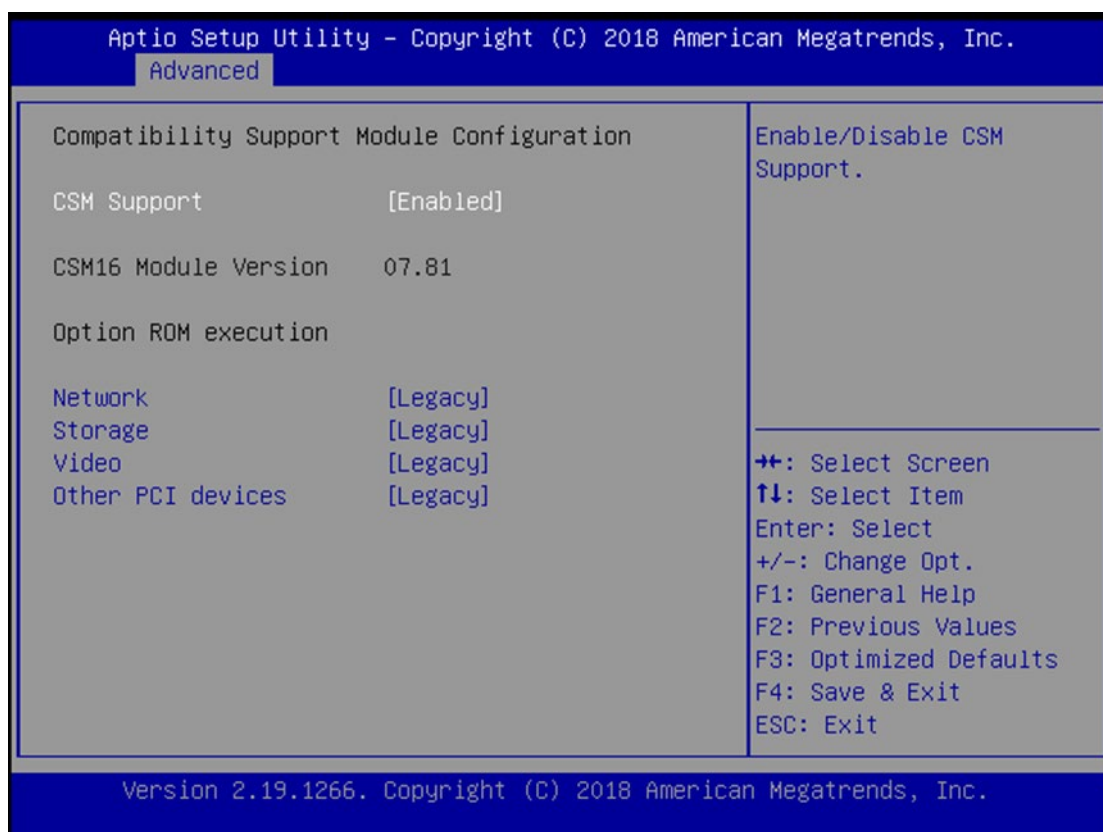
Feature	Options	Description
Redirection COM Port	COM0	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
Resolution	80x24 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
Redirection After BIOS POST	Always Enable BootLoader	When Bootloader is selected, 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



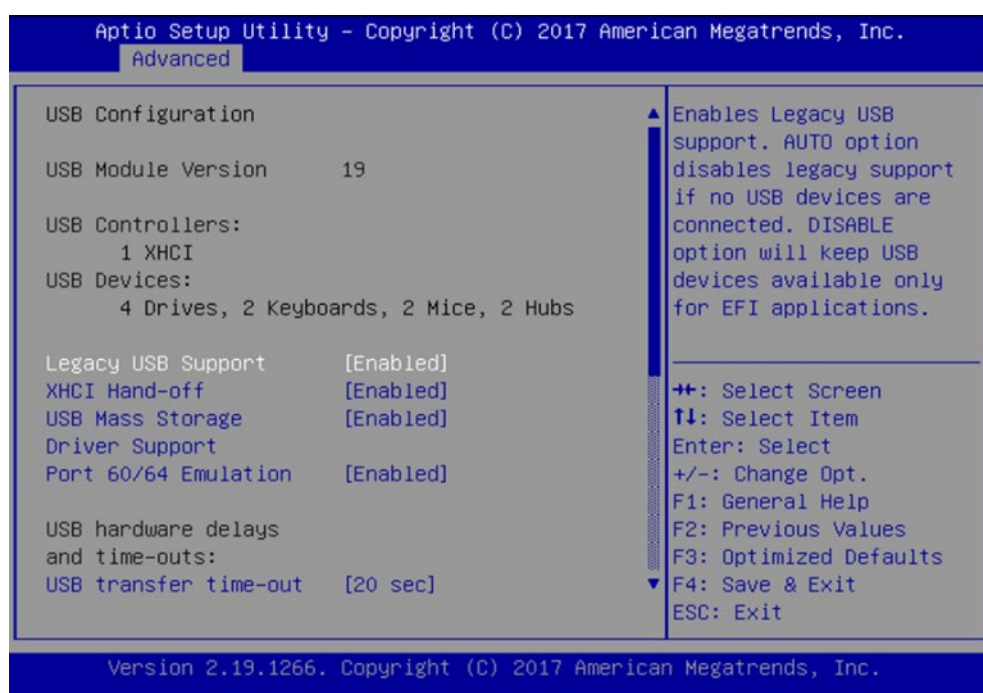
Feature	Options	Description
Above 4G Decoding	Disabled Enabled	Enable or Disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).
SR-IOV Support	Disabled Enabled	If the system has SR-IOV capable PCIe Devices, this option enables or disables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

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

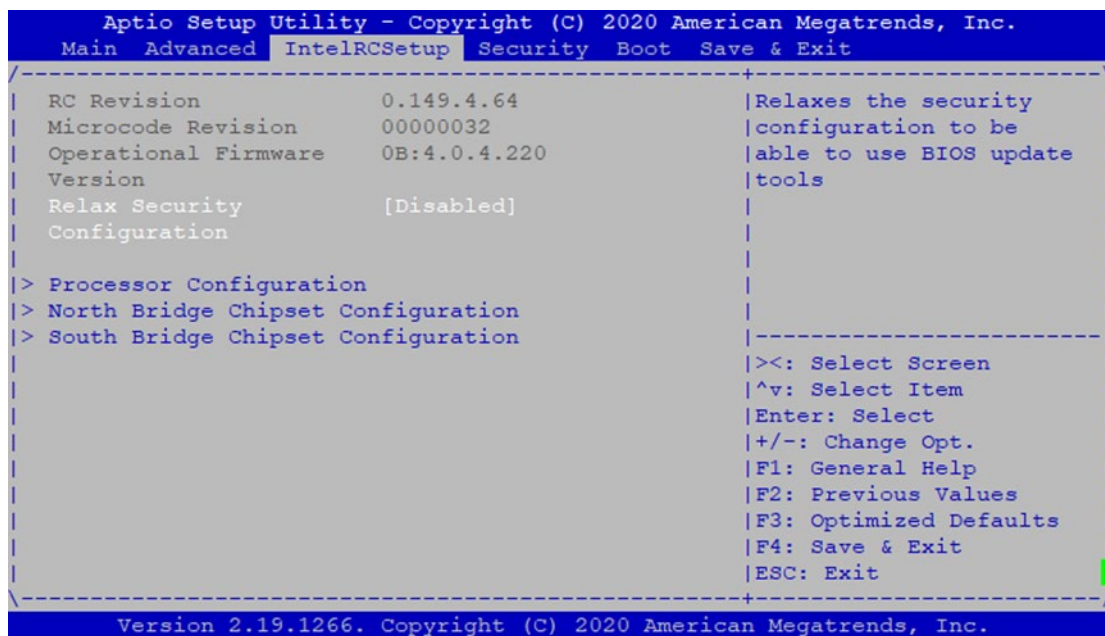
USB Configuration



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.

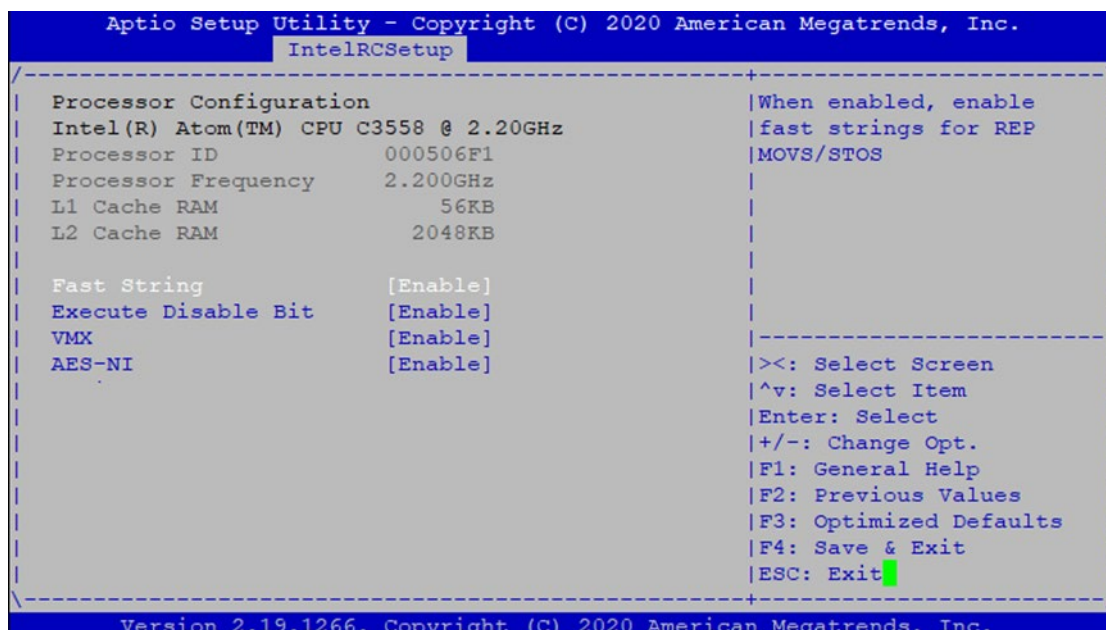
IntelRCSetup

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
Relax Security Configuration	Disable Enabled	Relaxes the security configuration to be able to use BIOS update tool.

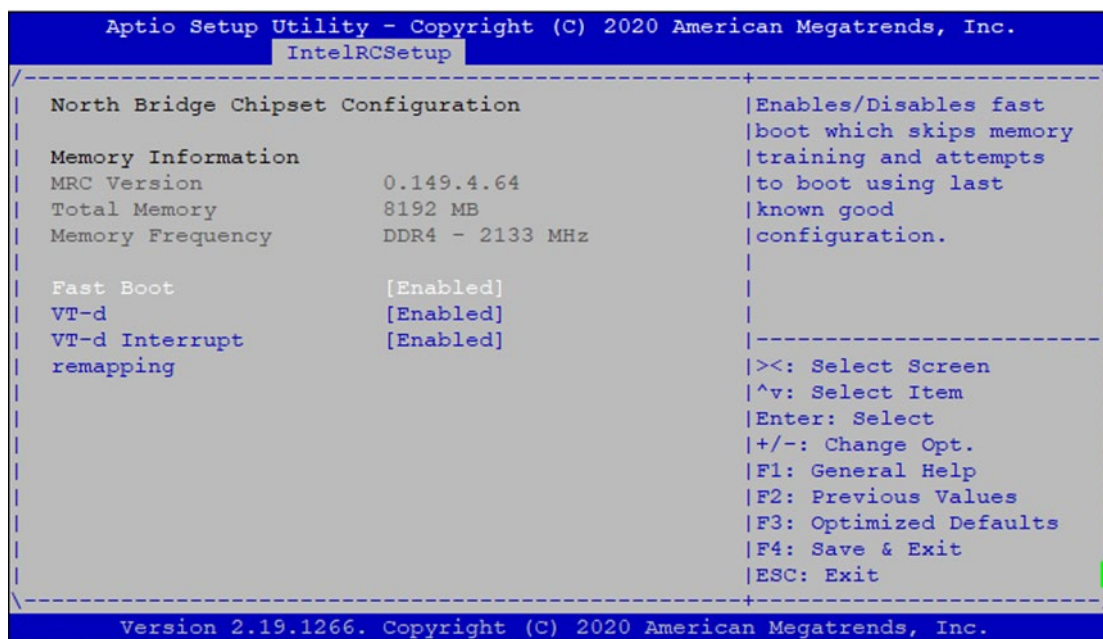
Processor Configuration



Feature	Options	Description
Fast String	Disable Enable	When enables, enable fast strings for REP MOVSt/STOS.
Execute Disable Bit	Disable Enable	When disabled, forces the XD feature flag to always return 0.
VMX	Disable Enable	Enables the Vanderpool Technology, takes effect after reboot.
AES-NI	Disable Enable	Enable/disable AES-NI support.

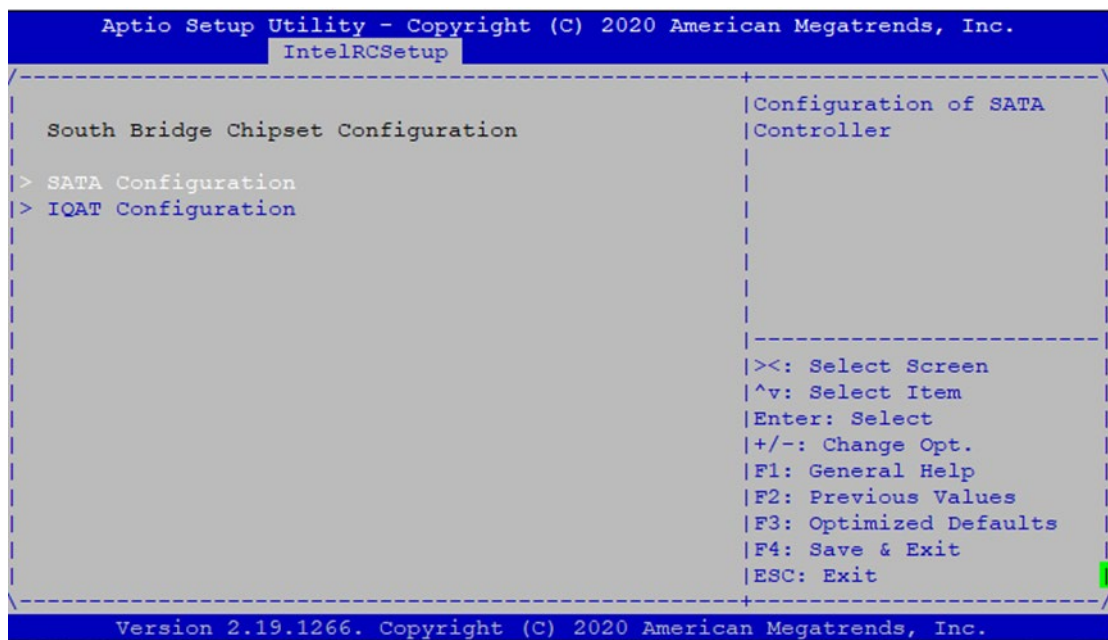
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North Bridge Chipset Configuration

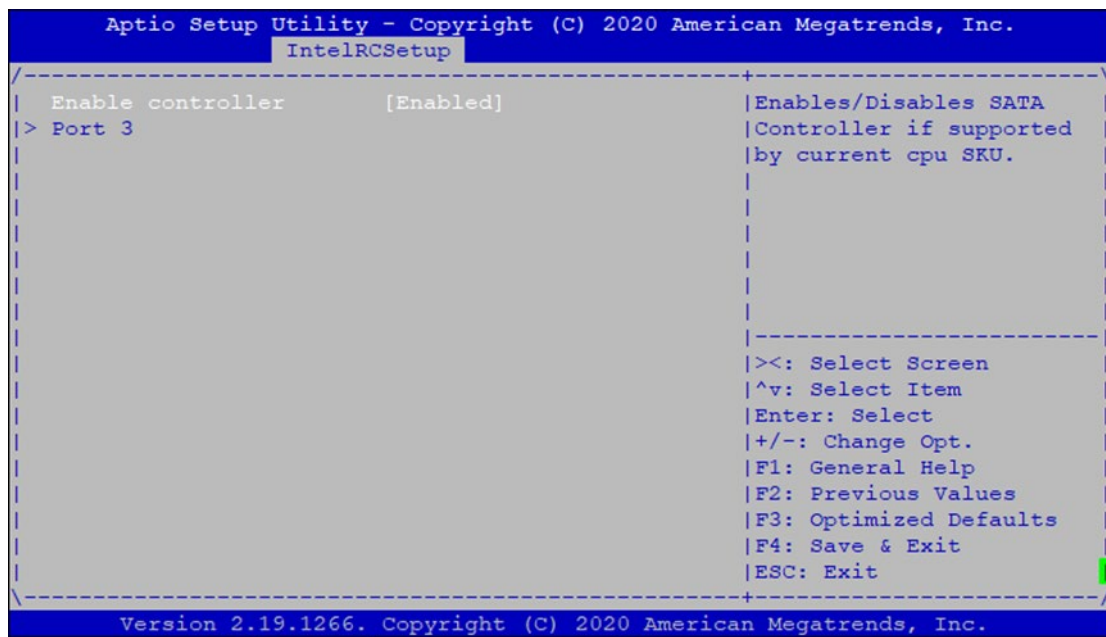


Feature	Options	Description
Fast Boot	Disabled Enabled	Enables/Disables fast boot which skips memory training and attempts to boot using fast known good configuration.
VT-d	Disable Enable	Option to enable /Disable VT-d.
VT-d Interrupt remapping	Disable Enable	Option to enable /Disable VT-d Interrupt remapping.

South Bridge Chipset Configuration

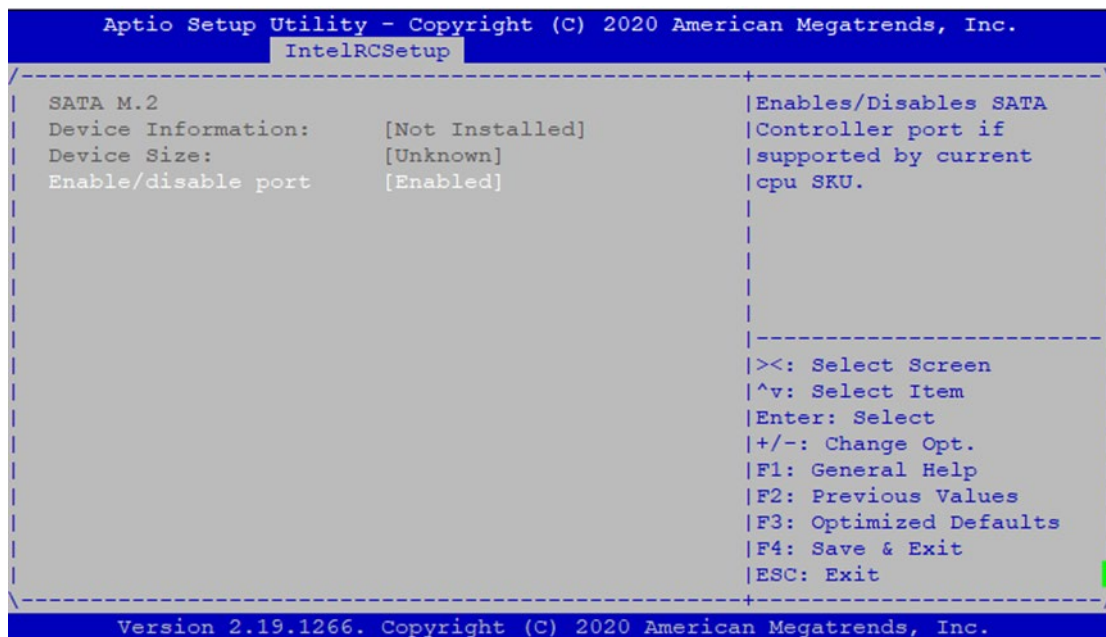


SATA Configuration



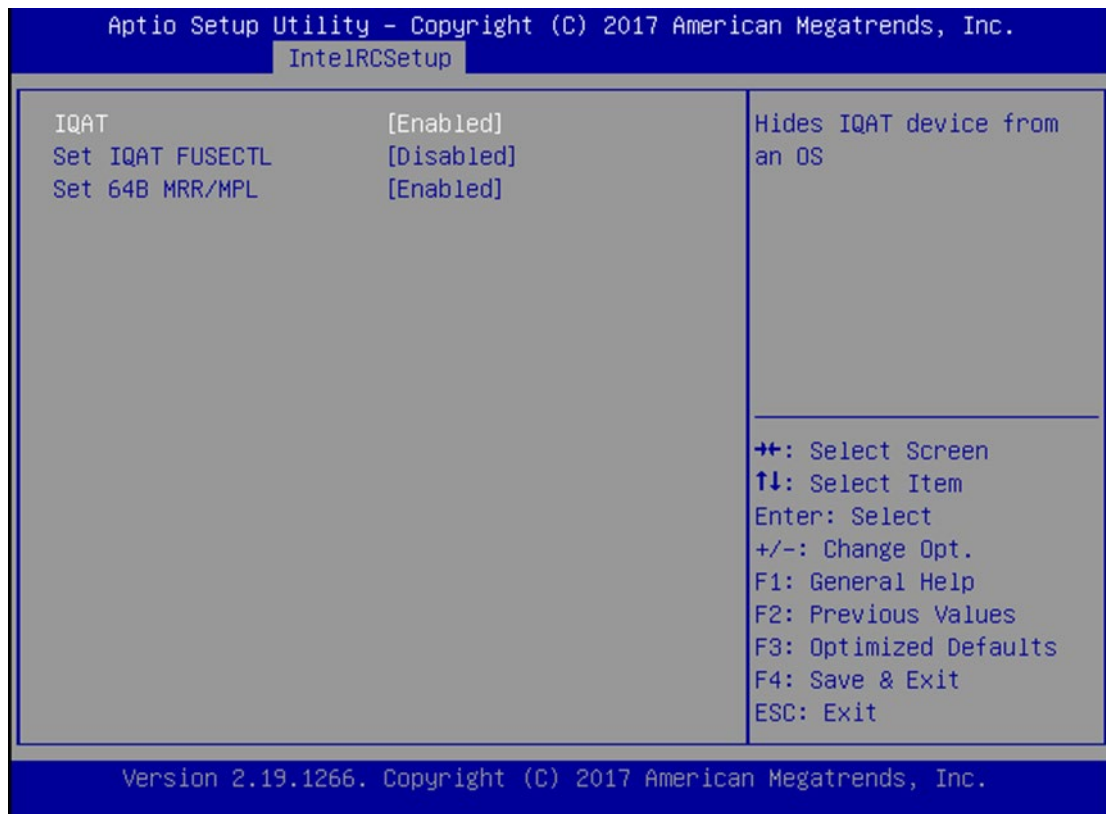
Feature	Options	Description
Enable controller	Enabled Disabled	Enables/Disables SATA Controller if supported by current CPU SKU

Port3 Configuration



Feature	Options	Description
Enable/disable port	Enabled Disabled	Enables/Disables SATA Controller port if supported by current CPU SKU.

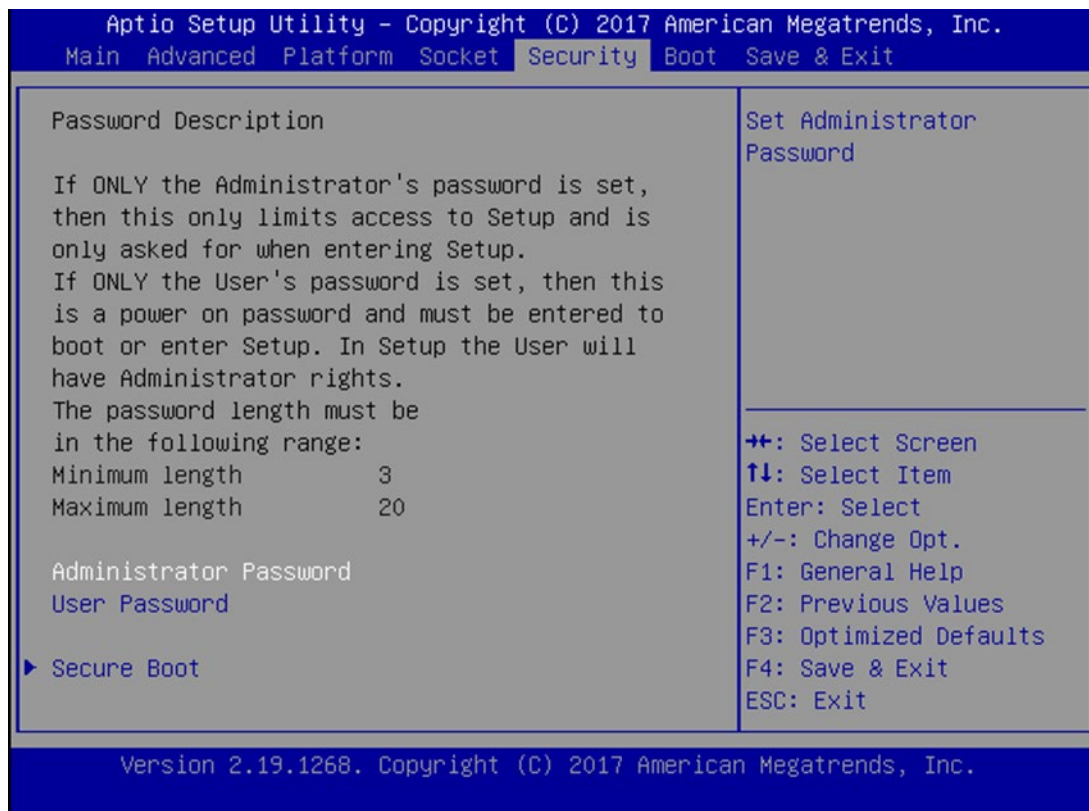
IQAT Configuration



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

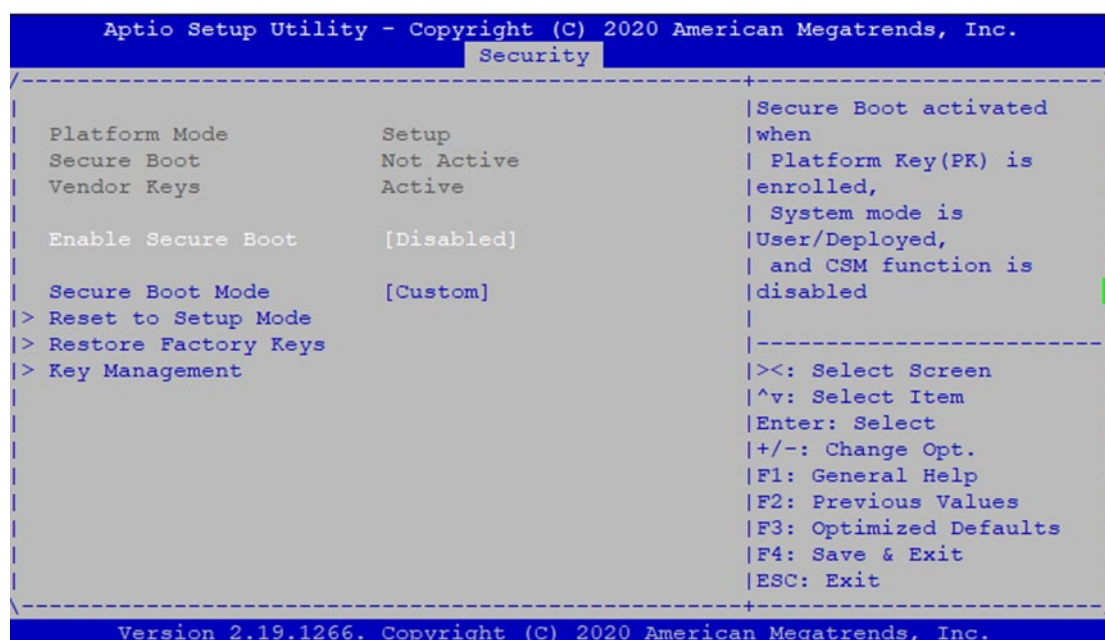
Security

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.



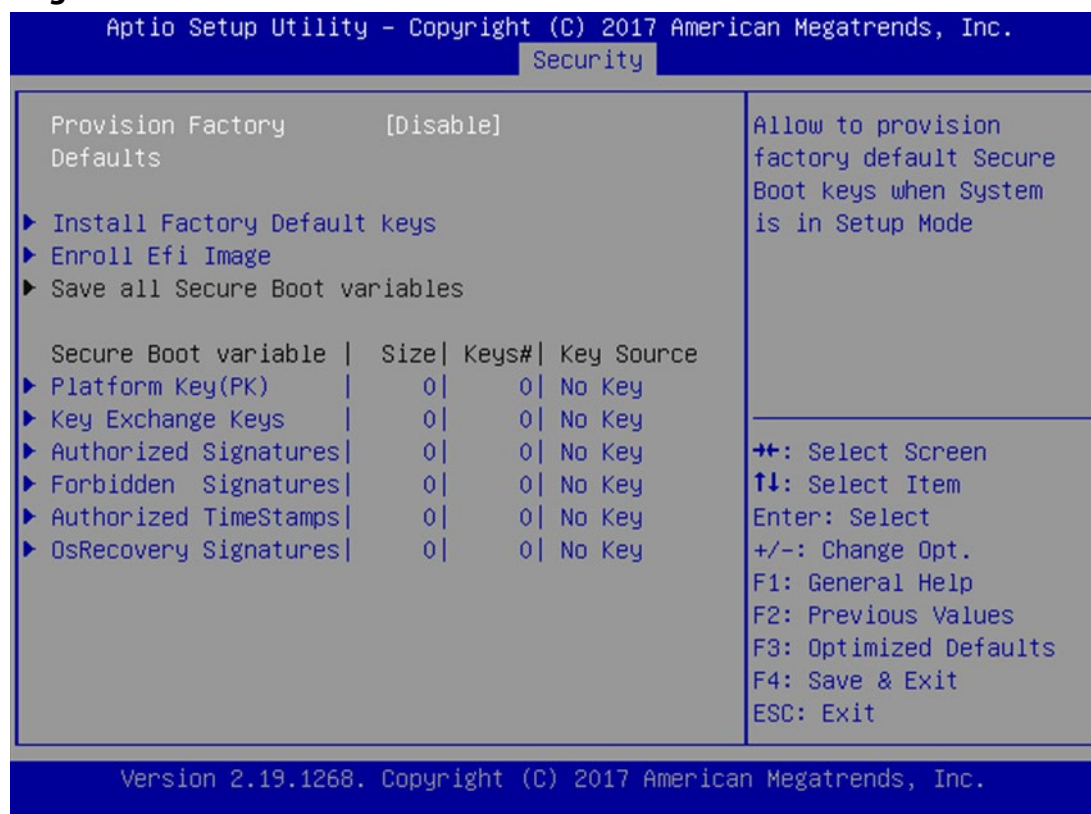
Feature	Description
Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup, the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

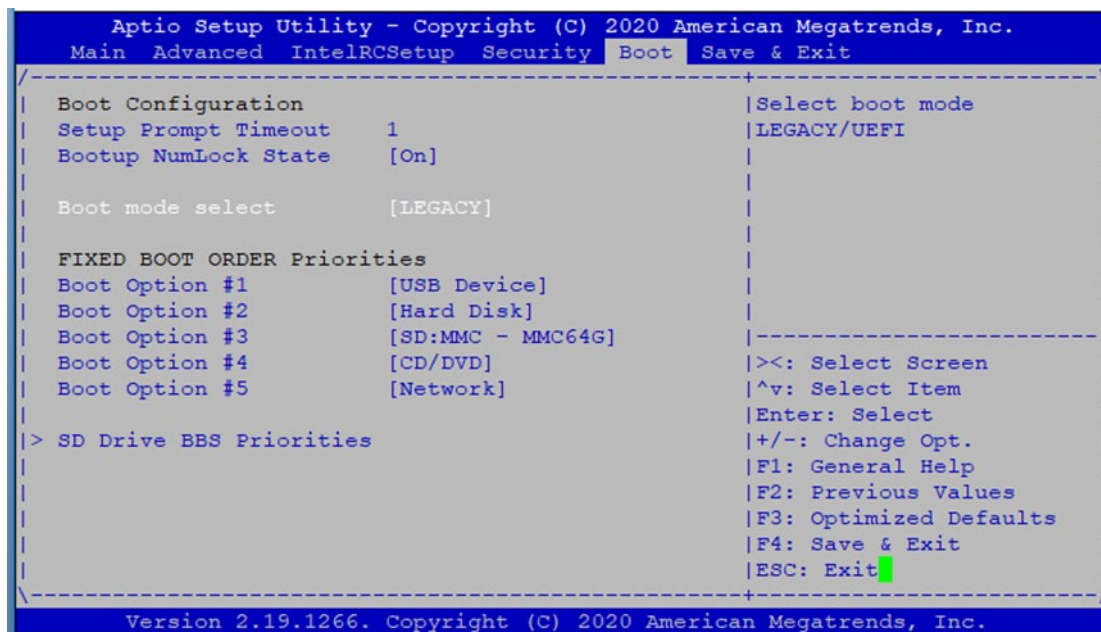
Key Management



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.

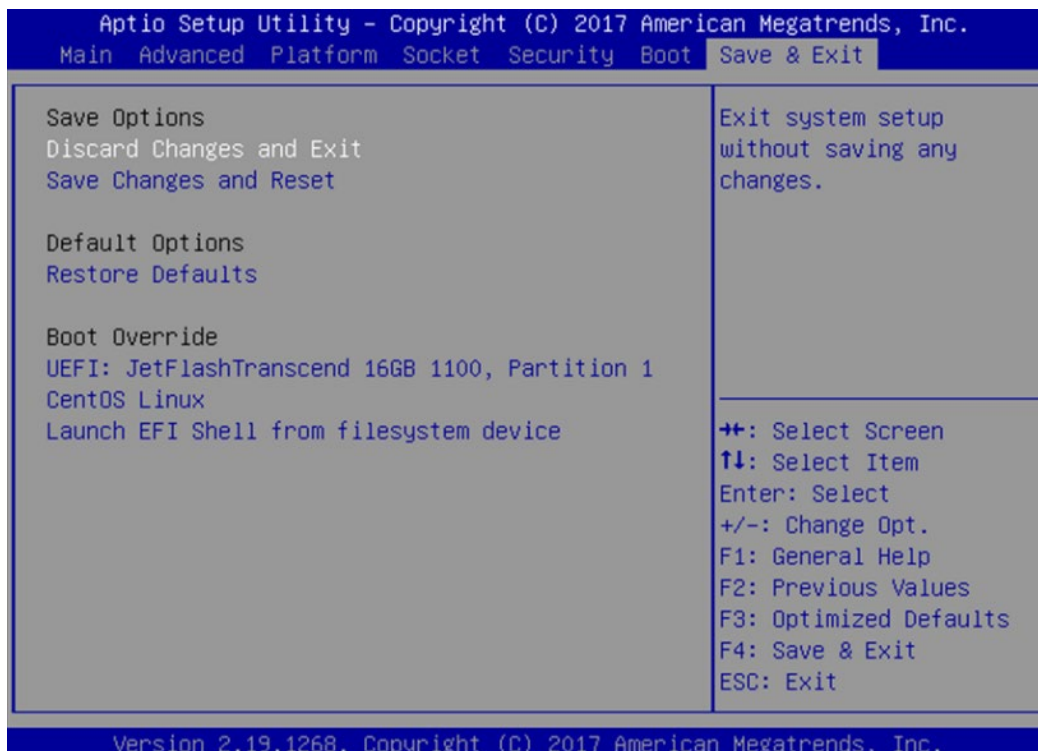


Feature	Options	Description
Setup Prompt Timeout	1	The number of seconds to wait for setup activation key. 65535 means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state
Boot mode select	LEGACY UEFI DUAL	Select boot mode for LEGACY or UEFI.

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

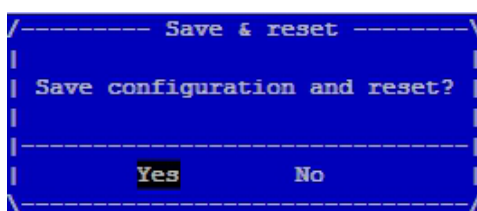
Save and Exit Menu

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.



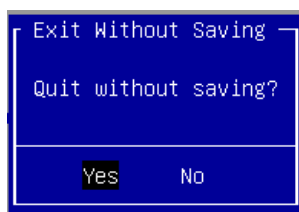
■ Save Changes and Reset

When Users have completed the system configuration changes, select this option to save the changes and 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.



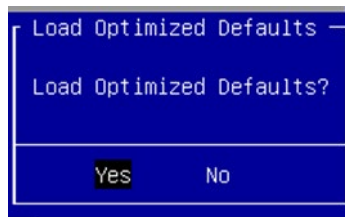
■ Discard Changes and Exit

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 image as above, as the image will depend on the actual devices connected to the system.

APPENDIX A: LED INDICATOR EXPLANATIONS



LED	COLOR	LED ACTION	DESCRIPTION
Power	Green	Steady	System On
	OFF	N/A	System Off
Status	Green/Red	Steady	Control by GPIO
	OFF	N/A	No Power ON or Power OFF
Storage	Amber	Blinking	Indicates SSD/HDD Activity [Include SATA / NVMe]
	OFF	N/A	No Data Access or No Power ON
Cellular	Yellow	Blinking	Indicates Transmission Activity [Include 4G/LTE/5G NR]
	OFF	N/A	No Data Access or No Power ON

APPENDIX B: DI/DO SPECIFICATION

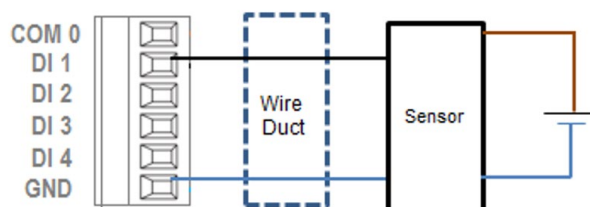
Follow IEC61131-2 Guidelines

DI Specification:

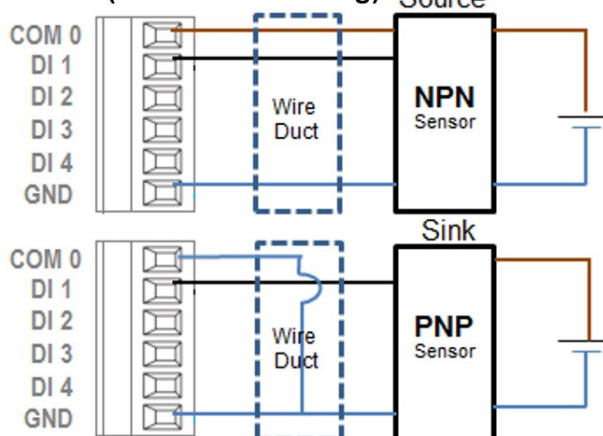
- DI with -3~5V @ 7mA, Logical Value 0; 13~30V @ 7mA, Logical Value 1 (Design Spec as Logical Value 0 for under 9V and 1 for above 9V)
- Support Dry and Wet by BIOS setting, default as Dry; Wet contact support Sink (PNP) and Source (NPN) mode

Note: DI Spec in datasheet & user manual is "4x DI with -3~5V @ 7mA, Logical Value 0; 13~30V @ 7mA, Logical Value 1 "

Dry (2-wired connecting)

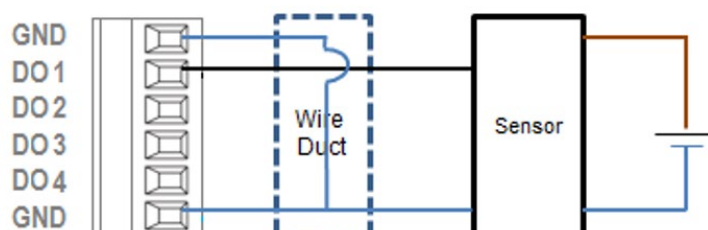


Wet (3-wired connecting)



DO Specification:

Sink DO voltage typical 24V (up to 30V) @ 200mA



APPENDIX C: TERMS AND CONDITIONS

Warranty Policy

1. All products are under warranty against defects in materials and workmanship for a period of one year from the date of purchase.
2. The buyer will bear the return freight charges for goods returned for repair within the warranty period; whereas the manufacturer will bear the after-service freight charges for goods returned to the user.
3. The buyer will pay for the repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:
 - ▶ Improper or inadequate maintenance by the customer
 - ▶ Unauthorized modification, misuse, or reverse 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 describe failure details) ☐ Testing Purpose
Company:	Contact Person:
Phone No.	Purchased Date:
Fax No.:	Apply Date:
Return Shipping Address: _____	
Shipping by: ☐ Air Freight ☐ Sea ☐ Express: _____ ☐ Others: _____	

Item	GP	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

*Problem Code:

01:D.O.A.
 02: Second Time R.M.A.
 03: CMOS Data Lost
 04: FDC Fail
 05: HDC Fail
 06: Bad Slot

07: BIOS Problem
 08: Keyboard Controller Fail
 09: Cache RMA Problem
 10: Memory Socket Bad
 11: Hang Up Software
 12: Appearance Damage

13: SCSI
 14: LPT Port
 15: PS2
 16: LAN
 17: COM Port
 18: Watchdog Timer

19: DIO
 20: Buzzer
 21: Shut Down
 22: Panel Fail
 23: CRT Fail
 24: Others (Pls specify)

Requested by

Confirmed by supplier

Authorized Signature / Date

Authorized Signature / Date