ARTS-1550 Series

Fanless In-Vehicle Box PC with Intel® Amston Lake, Featuring 4 x PoE+ 2.5GbE Ports

User Manual

Version 1.0

P/N: 4012155000100P

2025.10

Revision History

Version	Release Time	Description
1.0	October, 2025	Initial release

Copyright Notice

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

Declaration of Conformity

CE

The CE symbol on the computer indicates that it is in compliance with the directives of the European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

Warning
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE:
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Important Safety Instructions

Read these safety instructions carefully

1. Read all cautions and warnings on the equipment.
2. Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage
3. Make sure the correct voltage is connected to the equipment.
4. For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.
5. Keep this equipment away from humidity.
6. The openings on the enclosure are for air convection and protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
8. Never pour any liquid into opening. This may cause fire or electrical shock.
9. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
10. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user manual.
    e. The equipment has been dropped or damaged.
    f. The equipment has obvious signs of breakage.
11. Keep this User Manual for later reference.

Product Heat

The computer generates heat during operation. Contact the computer's chassis with your body could cause discomfort or even a skin burn.

Warning

The Box PC and its components contain very delicately Integrated Circuits (IC). To protect the Box PC and its components against damage caused by static electricity, you should always follow the precautions below when handling it:

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

Replacing Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user manual first at:

http://www.arbor-technology.com

Please do not hesitate to call or e-mail our customer service when you still cannot find out the answer.

http://www.arbor-technology.com

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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Chapter 1

Introduction

1.1. Product Highlights

- Intel® Amston Lake x7433RE processor
- Rugged - 40°C to 70°C fanless operation
- Support single DDR5 slot up to 16GB
- 4x PoE+ 2.5GbE ports via RJ45/M12 X-coded w/ 60W power budget
- 2 x Isolated CAN2.0(A/B), Isolated 2KV 4-DI/4-DO, 2 x COM
- 1 x M.2 B Key (USB3.0+USB2.0) w/SIM slot for 4G/5G/LTE module
- 1 x M.2 B Key (SATA+USB2.0) for storage or GNSS module
- 1 x full-size mini-PCIe (PCIe x1+USB 2.0) w/SIM for Wi-Fi/BT/LTE module
- Outside accessible 1x 2.5” HDD tray and 1x SD card slot
- Dual-Display for 2 x HDMI
- E-Mark compliant & MIL-STD-810H Shock / Vibration certified
- Support dTPM2.0 & Windows® 11

1.2. About this Manual

This manual is meant for the experienced users and integrators with hardware knowledge of personal computers. If you are not sure about the description herein, consult your vendor before further handling.

We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

The ARTS-1550 series includes the following models:

	Outlook	Description
ARTS-1550-P4		Intel® Atom® Processor x7433RE w/ 4 x PoE+ 2.5GbE LAN ports via RJ45
ARTS-1550-M4		Intel® Atom® Processor x7433RE w/ 4 x PoE+ 2.5GbE LAN ports via M12 X-coded

1.3. Specifications

System	
CPU	Intel® Atom x7433RE processor (Quad-Core SoC, 3.4GHz, TDP 9W)
Memory	1 x DDR5 SO-DIMM sockets, support 4800MHz up to 16GB
LAN Chipset	4 x Intel® i226-IT 2.5GbE controller
Watchdog Timer	1~255 levels reset
TPM	Support dTPM 2.0
I/O Ports	
Serial Port	1 x RS-232/422/485 by DB-9 Connector (non-isolated) 1 x RS-485 by DB-9 Connector (non-isolated)
USB Port	2 x USB-A 3.2 Gen2 (10Gbps) port 4 x USB-A 2.0 port
LAN Port	**ARTS-1550-P4:** • 4 x PoE+ 2.5GbE ports by RJ45 (P4) with LED (PoE) **ARTS-1550-M4:** • 4 x PoE+ 2.5GbE ports by M12 X-coded (M4) with LED (Link, PoE, Active)
PoE	4 x 802.3af or 2x 802.3at w/ 60W power budget
Display	2 x HDMI 2.0, resolution up to 3840x2160@60Hz
Audio	2 x 3.5mm Audio Jack for Mic-in and Line-out
Expansion Bus	• 1 x M.2 B-Key 2242/3052 (USB 3.0 + USB 2.0) w/ SIM slot for 4G/5G/LTE module *Outside accessible SIM slot *Support Dual SIM (optional) • 1 x full-size mini-PCIe (PCIe x 1 + USB 2.0) w/ SIM slot for Wi-Fi/BT/LTE module *Outside accessible SIM slot
Digital I/O	4 x DI & 4 x DO w/ 2kV isolation by DB-15 connector
CAN Bus	2 x Isolated CAN2.0(A/B) in 1 x DB-9 connector
Others	• Support accelerometer(G-Sensor) and Gyroscope • 5 x Antenna holes
Storage	
Type	• 1 x outside accessible drive tray for 2.5” SATA SSD / HDD up to 9.5mm height (SATA3) • 1 x outside accessible SD card socket • 1 x M.2 B-Key 2242/2280 (SATA + USB 2.0) for storage or GNSS module

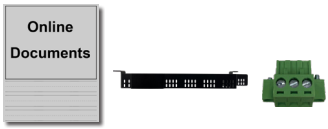
Power Requirement	
Power Inpu	DC 9~36V input, 3-Pin Terminal Block type with IGN PWR control (V+, V-, IGN)
Power Consumption	Max. 100W
Environmental	
Operating Temp.	-40°C ~ 70°C (-40°F ~ 158°F)
Storage Temp.	-40°C ~ 85°C (-40°F ~ 185°F)
Operating Humidity	10% ~ 95% @ 70°C (non-condensing)
Vibration	Operating, MIL-STD-810H, Method 514.8, Category 4
Shock	Operating, MIL-STD-810H, Method 516.8, Procedure I, functional shock=20g
Mechanical	
LED indicator	• 1 x Green LED indicator for WWAN and WLAN • 1 x Red LED indicator for SATA (2.5" SATA SSD and M.2 SATA SSD)
Button	• 1 x Power Button with dual LED color (Red in standby, Green in Power-on) • 1 x Reset Button (accessible only with a tip)
Construction	Aluminum alloy
Mounting	Desktop (default) / Wall-mount (optional)
Weight	2.4 kg
Dimensions (W x D x H)	210 x 58 x 190 mm
Qualification	
Certification	CE, FCC Class A, E-Mark
OS Support	
Operating System	Windows® 10 IoT / Windows® 11 IoT / Linux Ubuntu 22.04

1.4. Inside the Package

Upon opening the package, carefully inspect the contents. If any of the items is missing or appears damaged, contact your local dealer or distributor. The package should contain the following items:

ARTS-1550 Series

Fanless In-Vehicle Box PC:
ARTS-1550-P4 or ARTS-1550-M4



Accessory Box that contains the following items:
- 1 x Online documentation
- 1 x Cable-Lock Bracket
- 1 x 3-pin plug for terminal block

1.5. Ordering Information

ARTS-1550-P4	Intel® Atom® Processor x7433RE w/ 4 x PoE+ 2.5GbE LAN ports via RJ45
ARTS-1550-M4	Intel® Atom® Processor x7433RE w/ 4 x PoE+ 2.5GbE LAN ports via M12 X-coded

1.5.1. Optional Accessories

The following items are normally optional, but some vendors may include them as a standard package, or some vendors may not carry all the items.

PAC-120W6B-FSP-ES	19V/6.3A, 120W AC/DC Adapter Kit	
PAC-180W6C-FSP-ES	24V/7.5A, 180W AC/DC Adapter Kit	
DDR5 8G/16G RAM	DDR5-5600 8G/16G SO-DIMM Module	
WiFi-AT4550	Atheros QCNFA324 mPCIe Wi-Fi+BT Module Kit (w/ 2 x 30cm RF Cable)	
WiFi-MT1440	MediaTek MT7921AUN M.2 3042 B-KEY Wi-Fi 6E + BT 5.2 Module Kit (w/ 2 x 25cm RF Cable)	
LTE-4450	Quectel EG25-G mPCIe LTE Cat 4 Module Kit (for Global, w/ 1 x 25cm RF Cable)	
ANT-T15	1 x Wi-Fi 6E Tri-band 2.4G/5G/6G Dipole Antenna Kit	
ANT-H11	1 x 2dBi HSUPA Antenna Kit	
WMK-1973	Wall Mounting Bracket Kit for ARTS-155X Series	

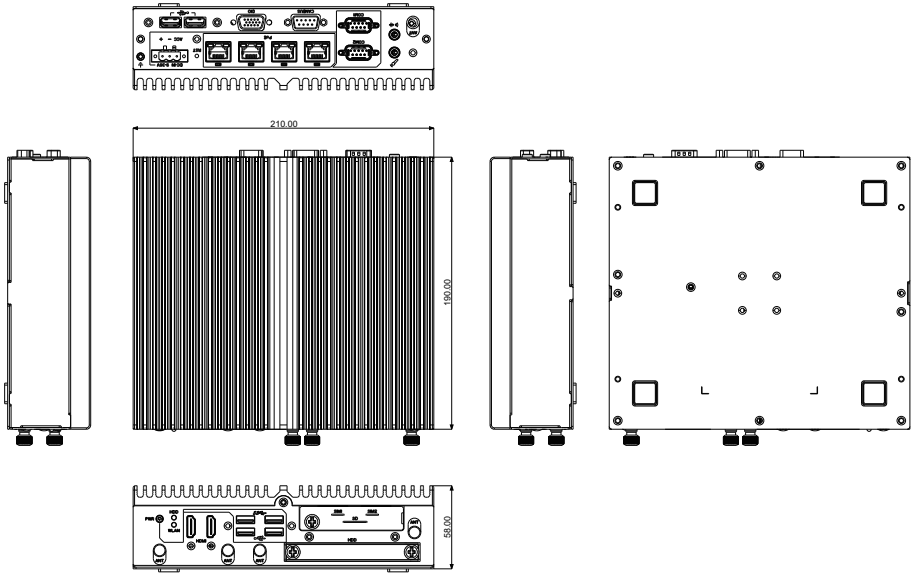
Chapter 2

Getting Started

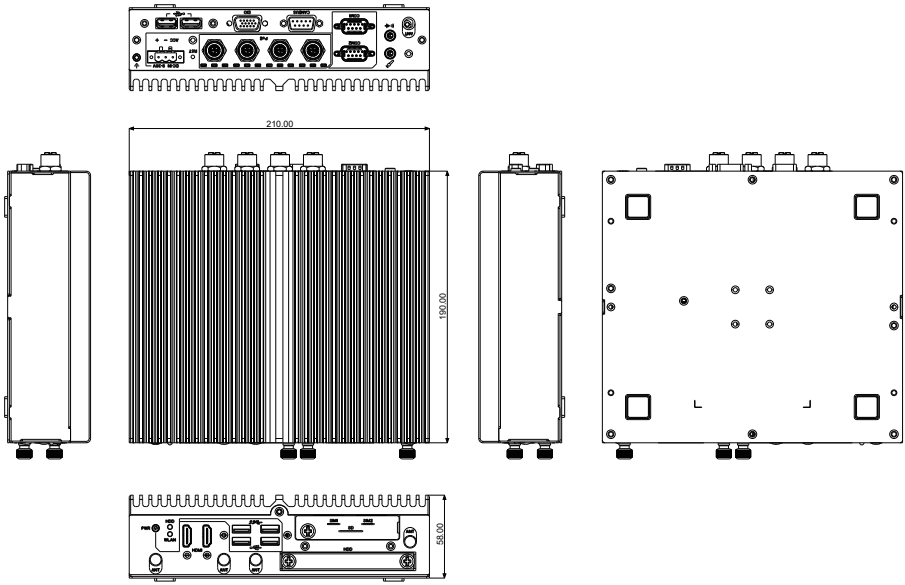
2.1. Dimensions

The following illustration shows the dimensions of the computer, with the measurements in width, depth, and height called out. (Unit: mm)

ARTS-1550-P4



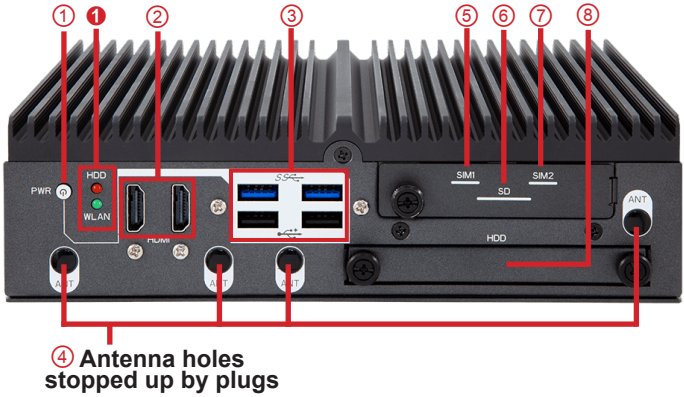
ARTS-1550-M4



2.2. Take A Tour

The computer has some I/O ports, status LED light and controls on the front and rear panel. The following illustrations show all the components called out .

Front View



- **I/O**

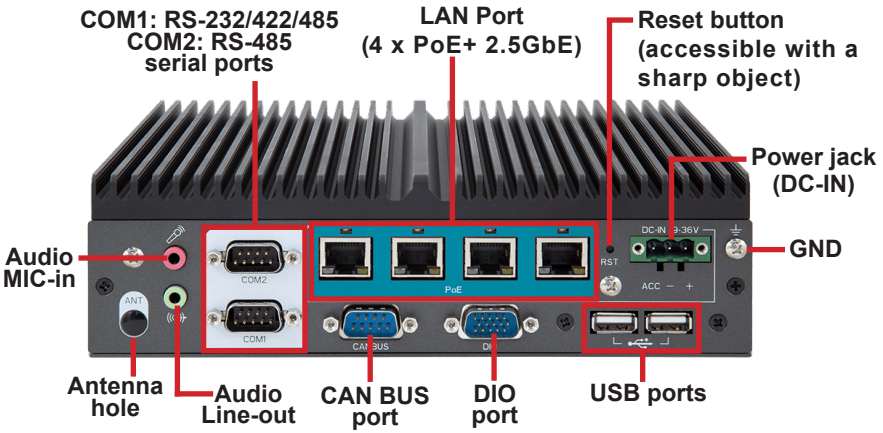
No.	Description	No.	Description
①	Power button	⑤	SIM1 card slots (accessible by open the cover plate)
②	HDMI ports	⑥	SD card slot (accessible by open the cover plate)
③	USB 2.0/3.0 ports (Blue: 3.0 port / Black: 2.0 port)	⑦	SIM2 card slots (accessible by open the cover plate)
④	Antenna holes stopped up by plugs	⑧	HDD/SSD slot (accessible by open the HDD drawer)

- **Status LED Lamps:**

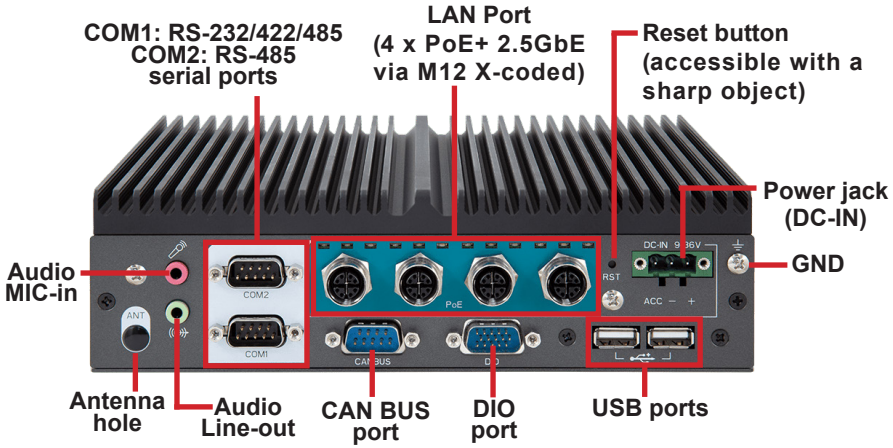
No.	LED Color	Description
❶	Red	This LED flashes red when SSD/HDD is being accessed.
	Green	This LED lights/flashes green when WiFi is on/communicating.

Rear View

ARTS-1550-P4



ARTS-1550-M4



2.3. Driver Installation Notes

To install the drivers, please visit our website at **www.arbor-technology.com** and download the driver pack from the **Download Center**.

Chapter 3

System Configuration

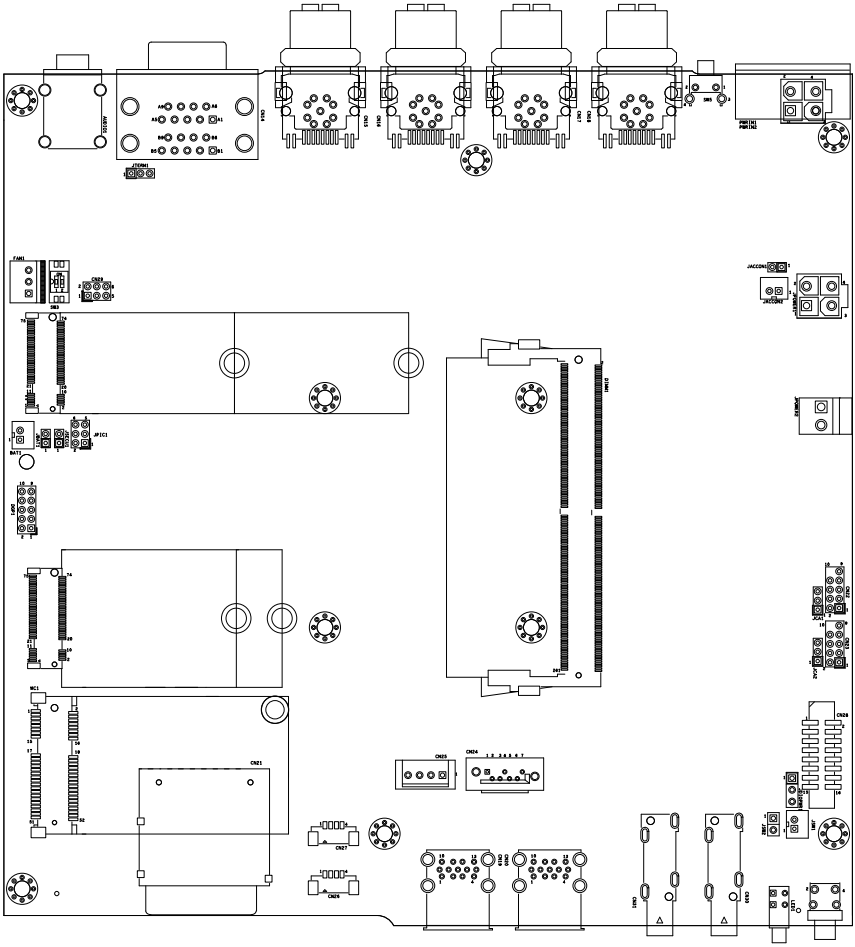
3.1. Board Layout

The engine of the computer is constructed by a main board, FMB-i2A22 Following in this section you will be guided through the main boards of the computer. This section will use ARTS-1550-M4 as the board example.

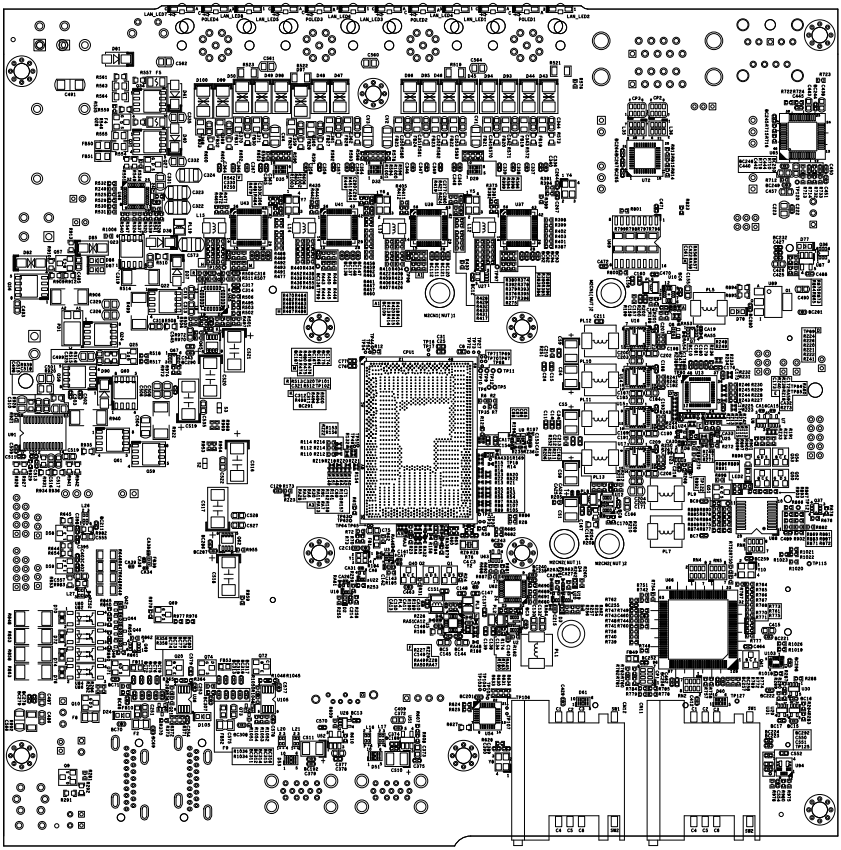
3.1.1. Main Boards

The Main board for ARTS-1550 Series is FMB-i2A22.

Board Top



Board Bottom



3.2. Jumpers and Connectors

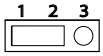
The Main board FMB-i2A22 comes with some connectors to join devices and some jumpers to alter the computer's hardware configuration. The following in this chapter will explicate each of these components.

3.2.1. Jumpers

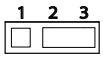
JDIOPWR1

Function: DIO power output selector
Jumper Type: Onboard 2.54mm-pitch 1x3-pin header

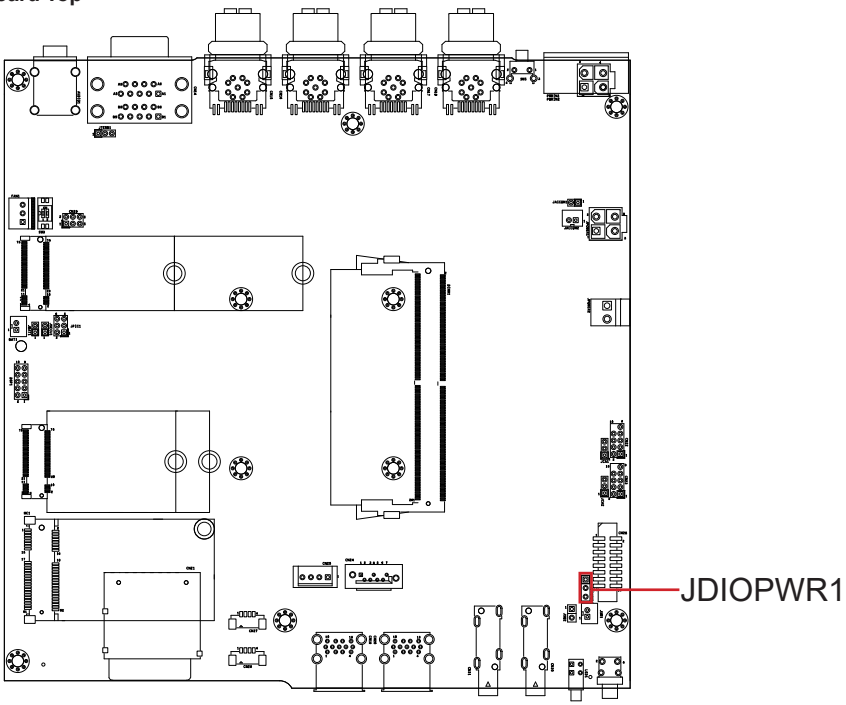
Setting: Short pin 1 and pin 2 for 5V power output. (The default setting.)



Short pin 2 and pin 3 for 12V power output.



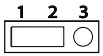
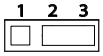
Board Top



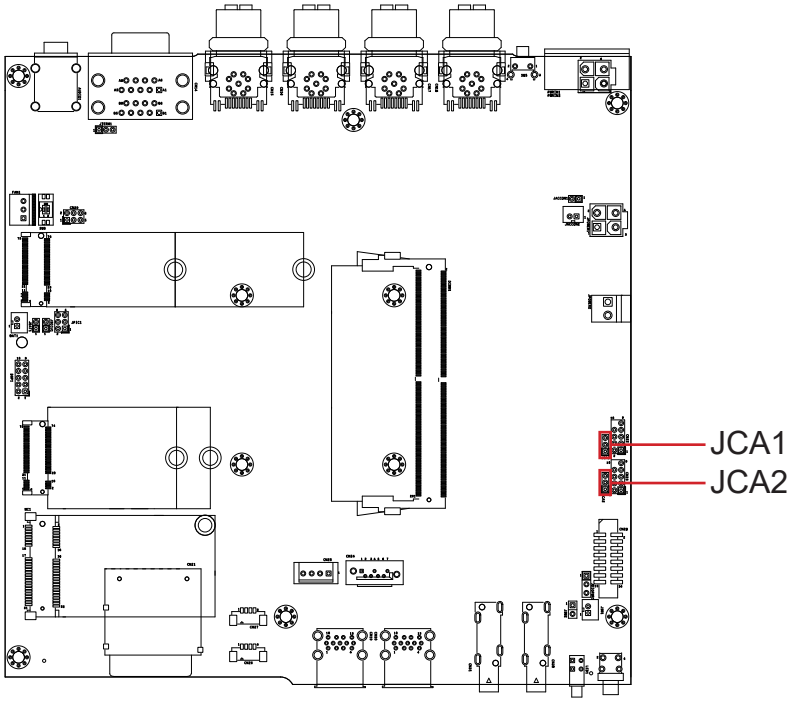
JCA1/2

Function: CAN BUS 1/2 Terminator Selector
Jumper Type: Onboard 2.00mm-pitch 1x3-pin header

Setting:

1-2	CAN BUS1/2 no terminator	
2-3	CAN BUS1/2 with 120 ohm terminator (Default)	

Board Top



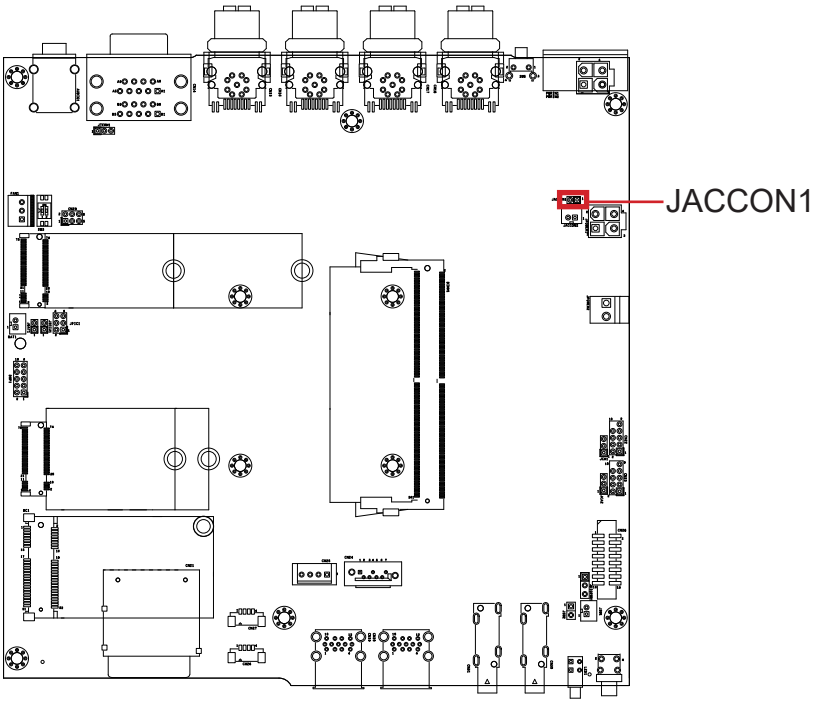
JACCON1

Function: Vehicle ACC_ON mode selection

Jumper Type: Onboard 2.00mm-pitch 2-pin header

Setting: Open: External ACC_ON input for vehicle (without jumper)

Close: Internal ACC_ON for Automation (with jumper) (Default)



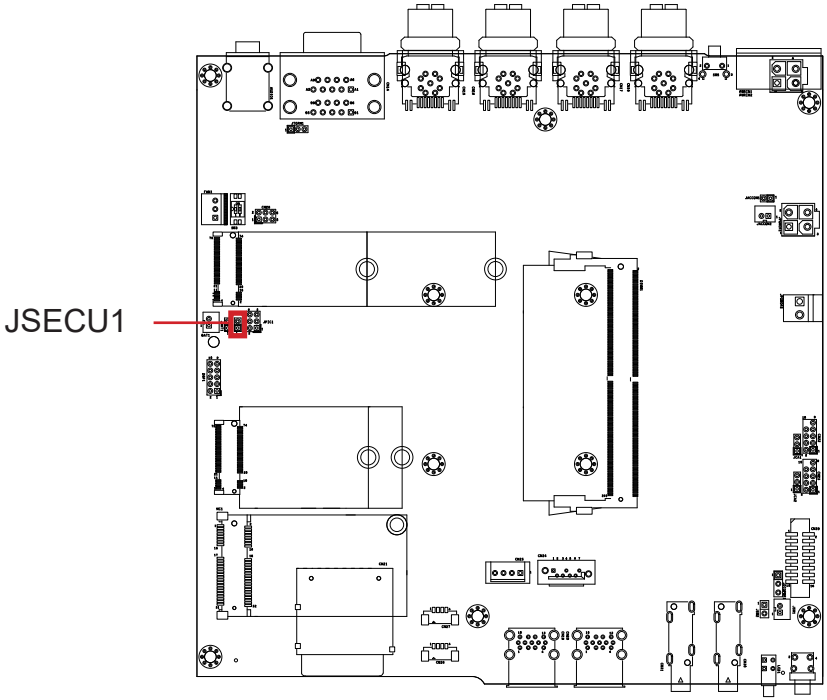
JSECU1

Function: Security overridden Selector

Jumper Type: Onboard 2.00mm-pitch 2-pin header

Setting: Open: Security not overridden (Default)

Close: Security overridden



JBAT1

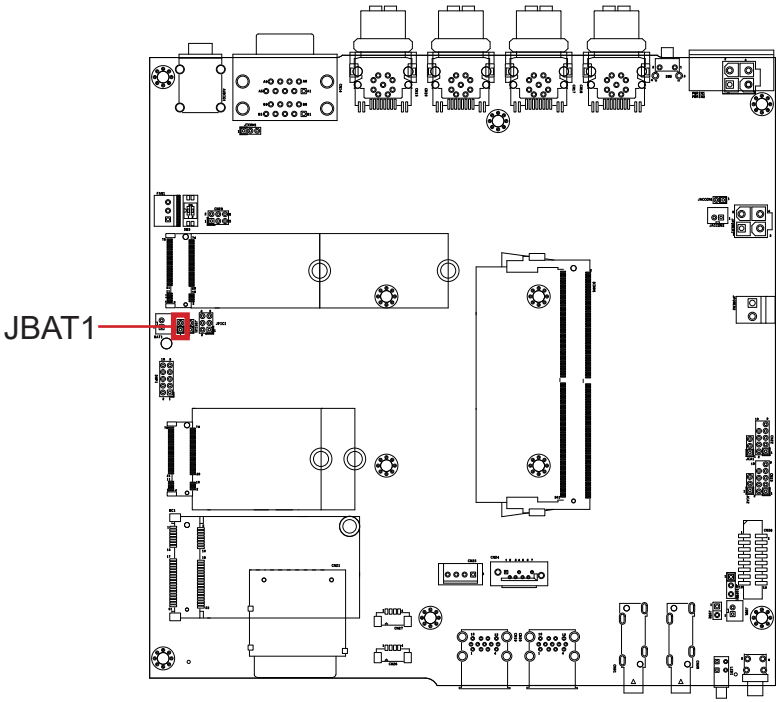
Function: COMS Setting

1

Jumper Type: Onboard 2.00mm-pitch 2-pin header

Setting: Open: Normal operation (Default)

Close: Clear CMOS

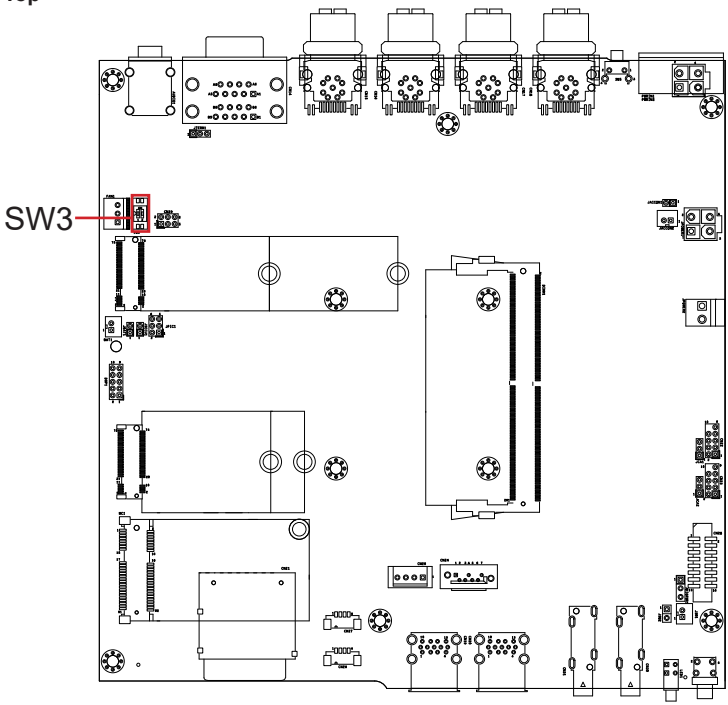


SW3

Function: External input voltage low alarm selector
Switch Type:

Setting:	1 OFF 2 OFF	No voltage detection (Default)	
	1 ON 2 OFF	Lower Than 22V will Alarm	
	2 ON 1 OFF	Lower Than 11V will Alarm	

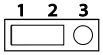
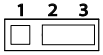
Board Top



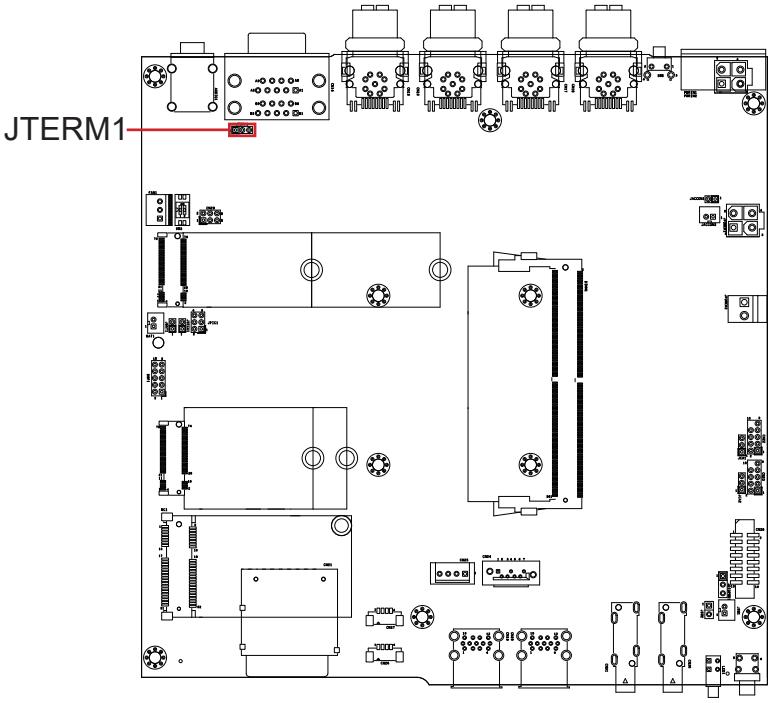
JTERM1

Function: COM2 RS485 Terminator Selector
Jumper Type: Onboard 2.00mm-pitch 1x3-pin header

Setting:

1-2	Normal Mode (Default)	
2-3	120 ohm terminator mode	

Board Top



3.2.2. Connectors

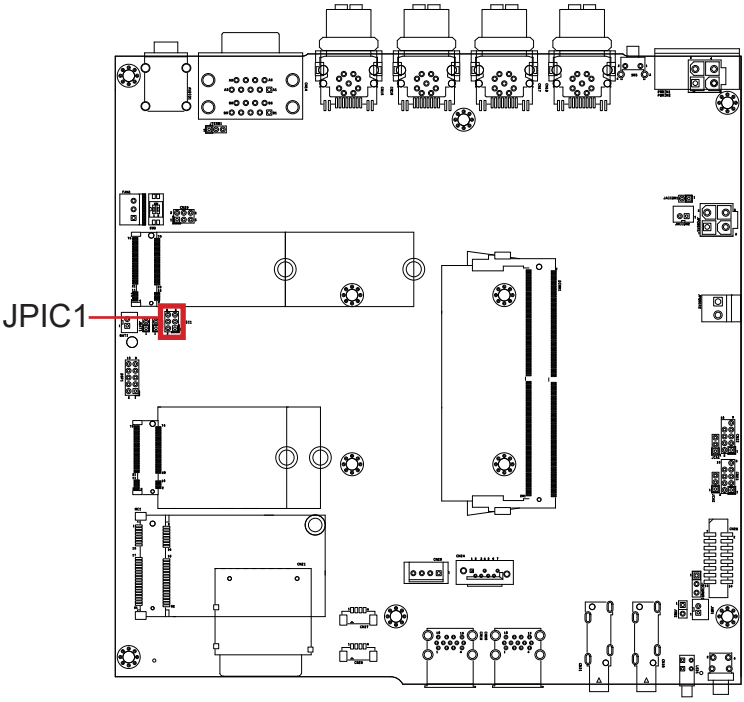
JPIC1

Function: External PIC programming pin header
Connector Type: Onboard 6-pin header

Setting:

Pin	Description	Pin	Description
1	PIC_TX	2	ICSP-CLK
3	ICSP-DAT	4	GND
5	VCC5_PIC	6	MCU_RST

Board Top

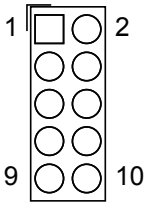


DGP1

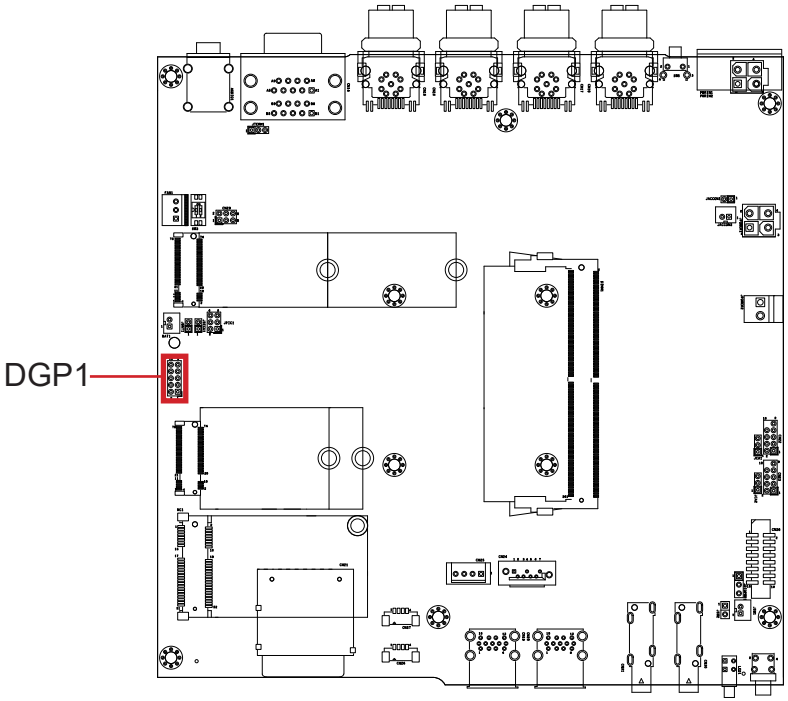
Function: Debug Port
Connector Type: Onboard 10-pin header

Setting:

Pin	Description	Pin	Description
1	ESPI_CLK	2	GND
3	ESPI_CS0#	4	ESPI_IO0
5	ESPI_RST0	6	3VSB
7	ESPI_IO3	8	ESPI_IO2
9	VCC3	10	ESPI_IO1



Board Top



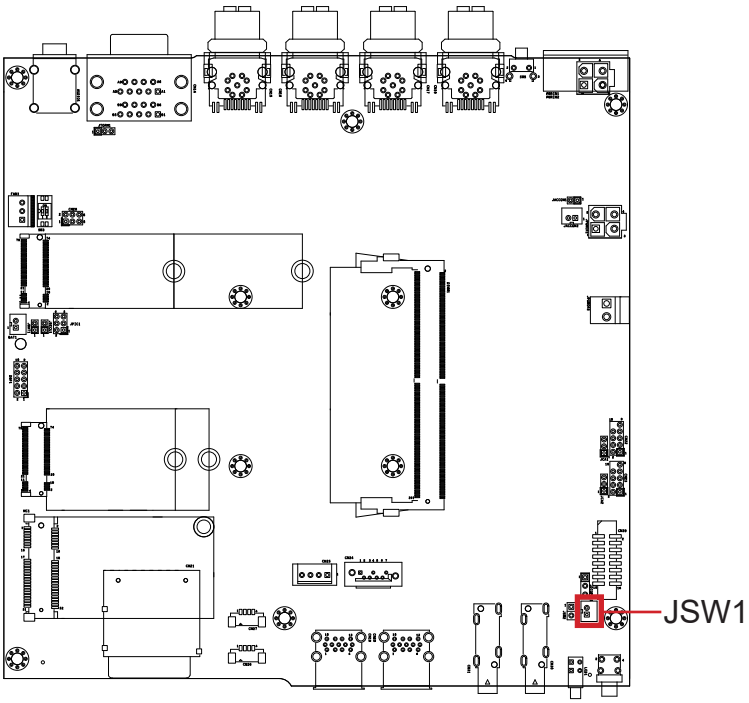
JSW1

Function: Power button

Connector Type: Onboard 2-pin wafer Connector

Setting:

Pin	Description	Pin	Description
1	PWR_IN_SW#	2	GND



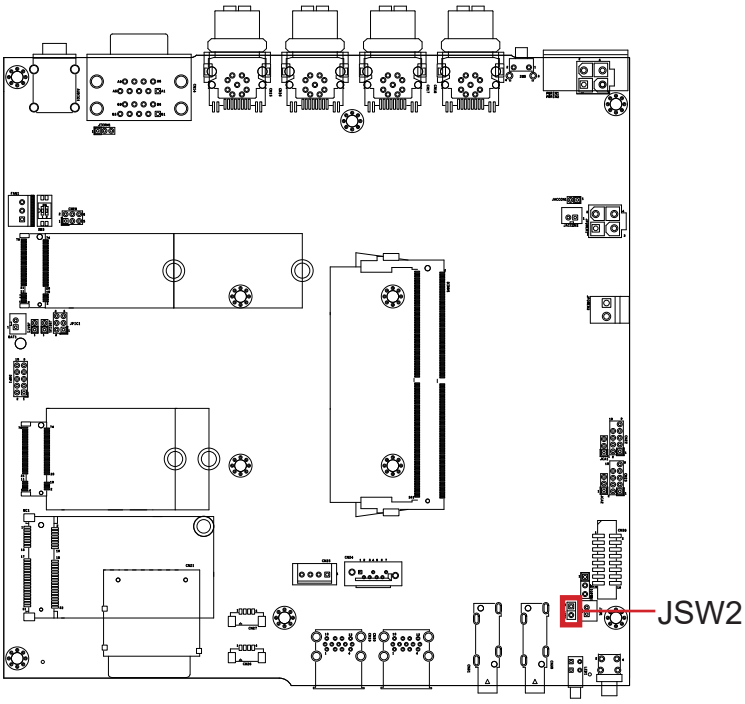
JSW2

Function: Power button

Connector Type: Onboard 2-pin header

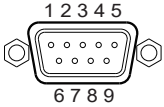
Setting:

Pin	Description	Pin	Description
1	PWR_IN_SW#	2	GND



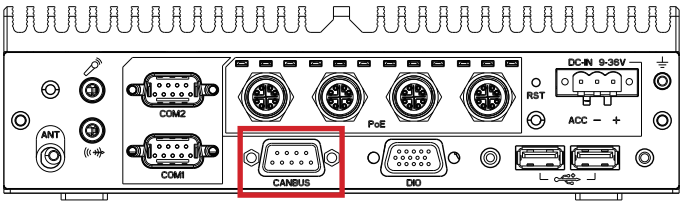
CAN BUS

Function: CAN BUS
Connector Type: DB-9 Connector (Male)



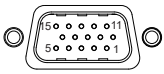
Pin	Description	Pin	Description
1	N.C.	2	CAN1_L
3	GND	4	CAN2_L
5	GND	6	N.C.
7	CAN1_H	8	N.C.
9	CAN2_H		

Rear View



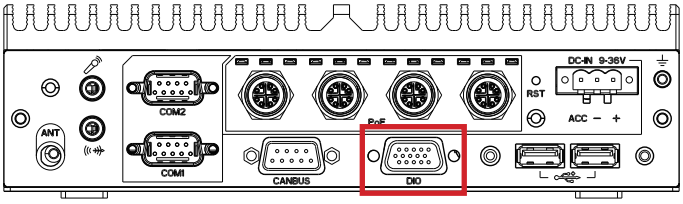
DIO

Function: Digital Singal Input and Output
Connector Type: DB-15 Connector (Male)



Pin	Description	Pin	Description	Pin	Description
1	PDI1	6	PDO1	11	VCC
2	PDI2	7	PDO2	12	VCC
3	PDI3	8	PDO3	13	VCC
4	PDI4	9	PDO4	14	GND
5	ISO_GND	10	ISO_GND	15	GND

Rear View



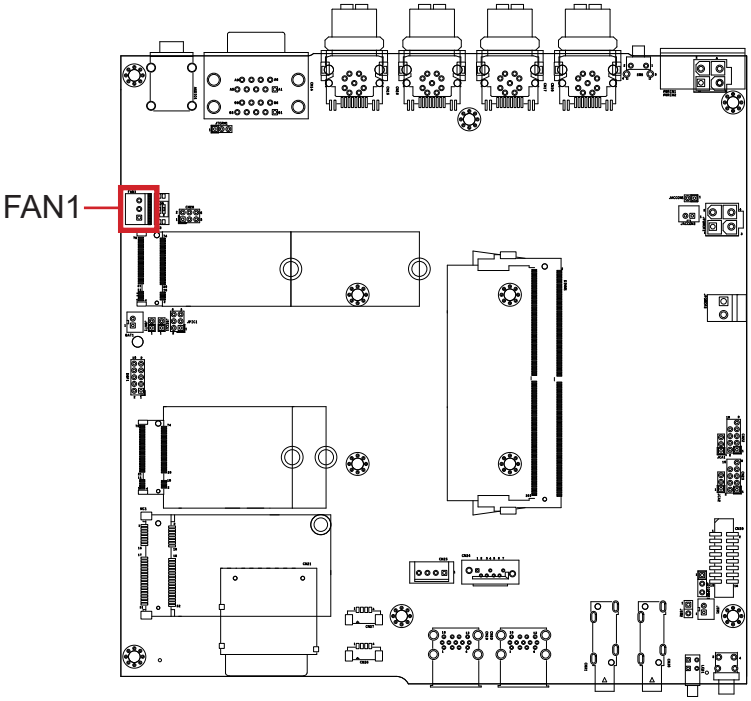
FAN1

Function: Fan Connector
Connector Type: Onboard 3-pin connector

Setting:

Pin	Description
1	GND
2	12V
3	N.C.

Board Top



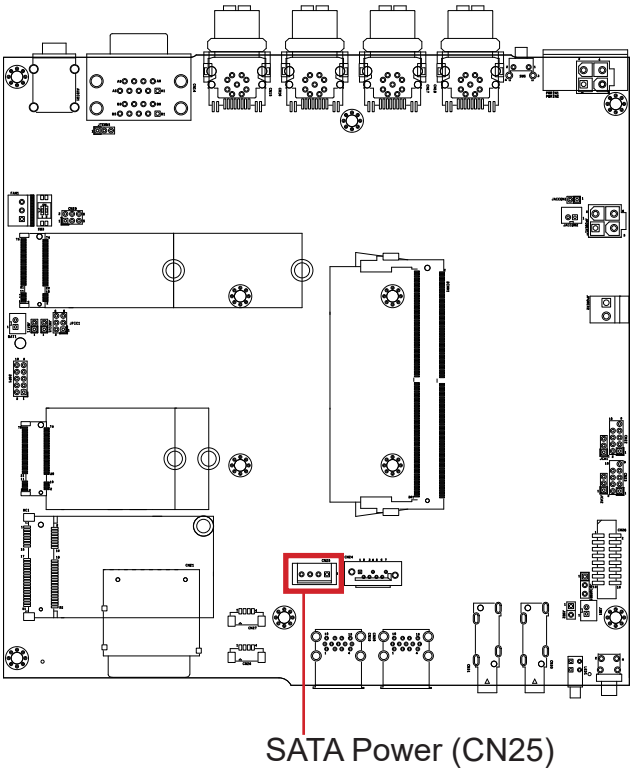
SATA Power

Function: SATA HDD Power Connector
Connector Type: Onboard 4-pin connector

Setting:

Pin	Description
1	VCC5
2	GND
3	GND
4	VCC12

Board Top



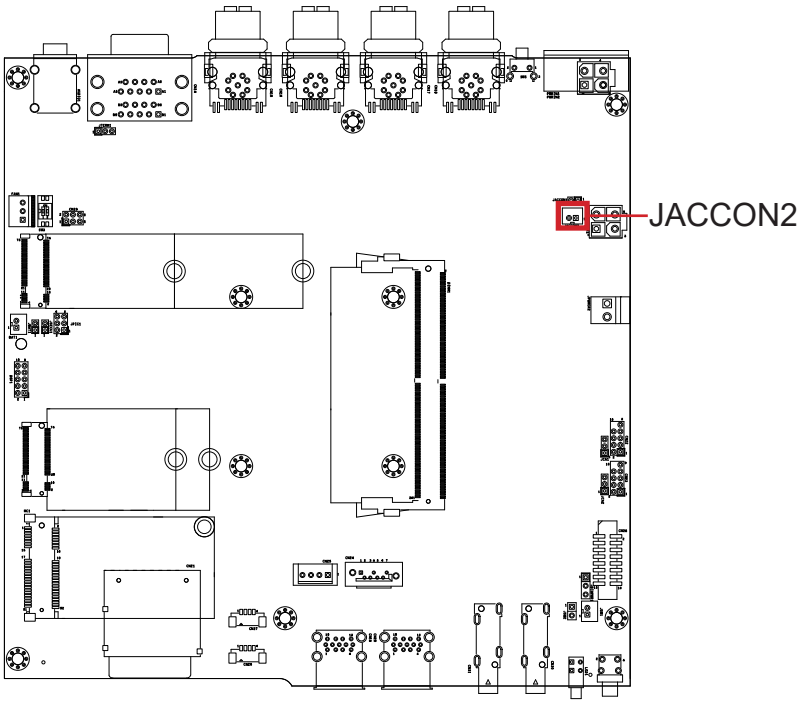
JACCON2

Function: External ACC_ON Input

Connector Type: Onboard 2-pin wafer Connector

Setting:

Pin	Description	Pin	Description
1	ACC_ON	2	GND

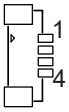


USB2.0 (CN26, CN27)

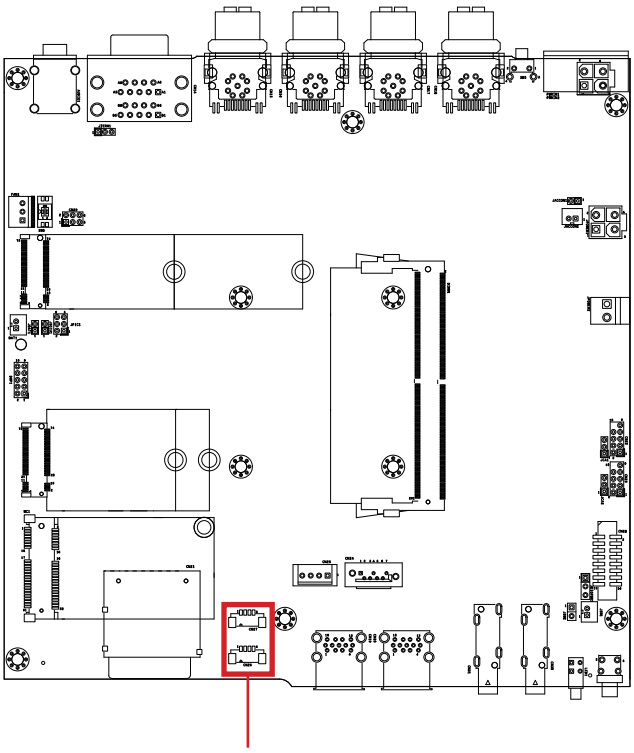
Function: USB 2.0 connector
Connector Type: Onboard 4-pin wafer connector

Setting:

Pin	Description	Pin	Description
1	VCC5	2	DATA-
3	DATA+	4	GND

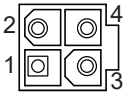


Board Top



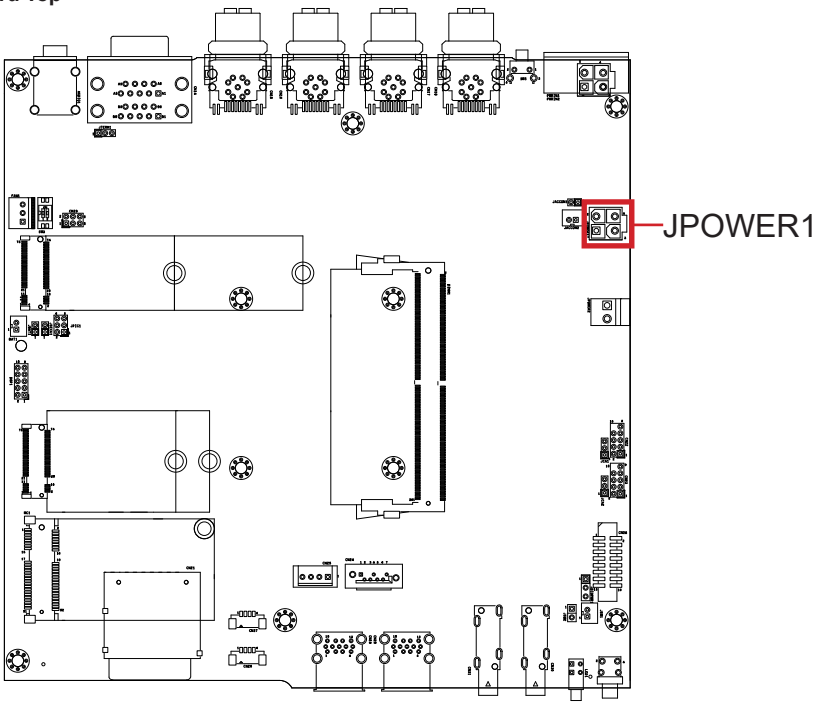
JPOWER1

Function: Power charge to super CAP connector
Connector Type: Onboard 4-pin ATX power connector



Pin	Description
1	GND
2	GND
3	DCIN
4	DCIN

Board Top



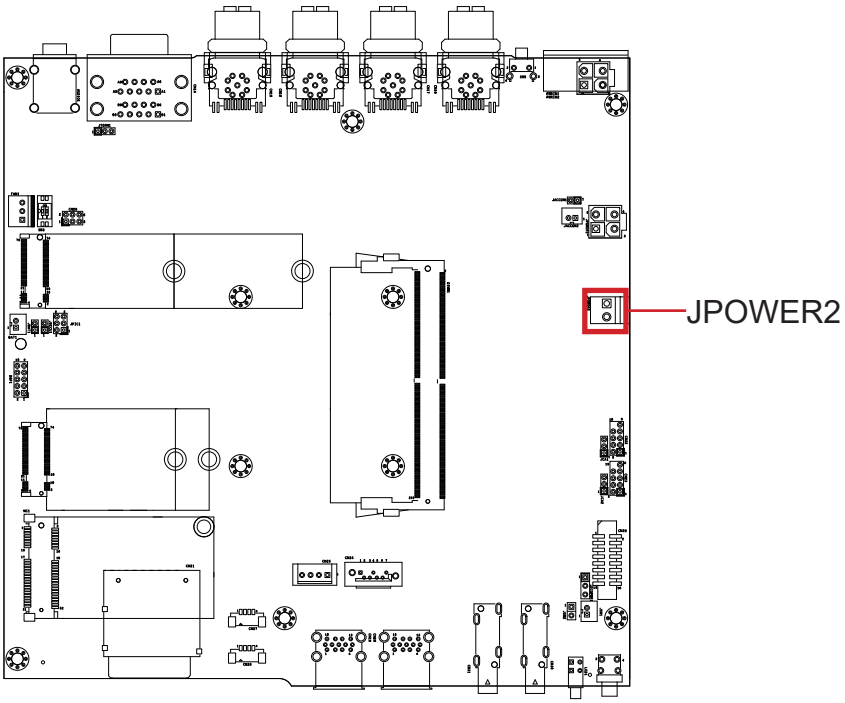
JPOWER2

Function: Power input from super CAP connector

Connector Type: Onboard 2-pin wafer Connector

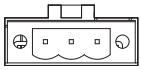
Setting:

Pin	Description	Pin	Description
1	GND	2	DCIN-VCC



PWRIN1

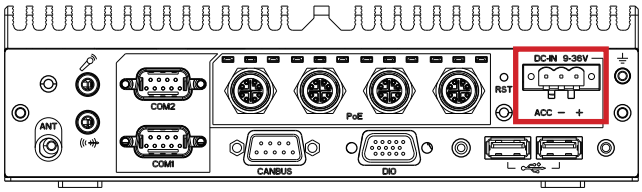
Function: Terminal Block Power Input Connector
Connector Type: Onboard 3-pin terminal block



1 2 3

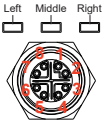
Pin	Description
1	POWERIN+
2	POWERIN-
3	ACC_ON

Rear view



LAN M12 Connector (ARTS-1550-M4)

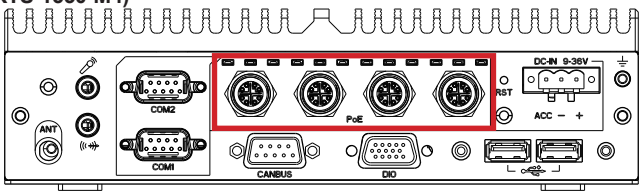
Function: LAN M12 connector
Connector Type: M12-8P X-CODING



Pin	Description	Pin	Description
1	MDI1+	5	MDI2+
2	MDI1-	6	MDI2-
3	MDI0+	7	MDI3+
4	MDI0-	8	MDI3-

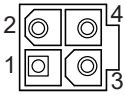
PoE Indicator	Description
Left LED	Steady Orange (2.5 GbE)
	Steady Green (1 GbE or below)
Middle LED	Steady Blue (PoE power)
Right LED	Flash Yellow (Active)

Rear view (ARTS-1550-M4)



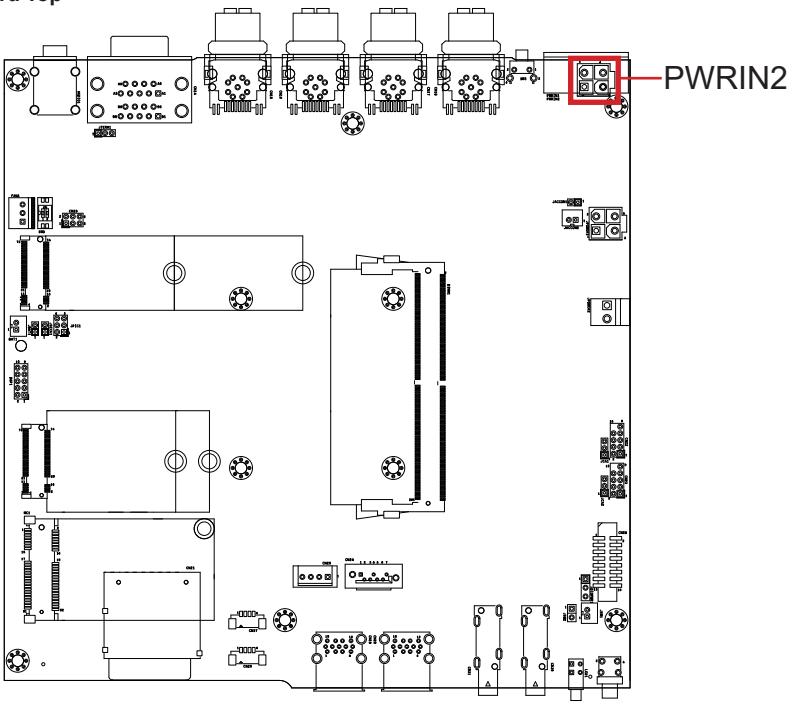
PWRIN2

Function: ATX type power input connector
Connector Type: Onboard 4-pin ATX power connector



Pin	Description
1	POWERIN-
2	POWERIN-
3	POWERIN+
4	POWERIN+

Board Top

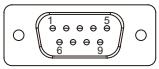


COM1 & COM2 Connector

Description: RS-232/422/485 Connector (COM1) / RS-485 (COM2)
Connector Type: DB-9 connector (Male)

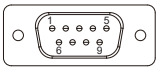
COM1 Pin Assignment:

	RS-232	RS-422	RS-485
Pin	Description	Description	Description
1	DCD	RS-422_TX-	RS-485_D-
2	RXD	RS-422_TX+	RS-485_D+
3	TXD	RS-422_RX+	N.C.
4	DTR	RS-422_RX-	N.C.
5	GND	GND	GND
6	DSR	N.C.	N.C.
7	RTS	N.C.	N.C.
8	CTS	N.C.	N.C.
9	RI	N.C.	N.C.

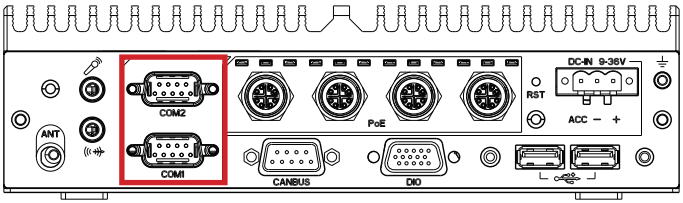


COM2 Pin Assignment:

	RS-485
Pin	Description
1	RS-485_D-
2	RS-485_D+
3	N.C.
4	N.C.
5	GND
6	N.C.
7	N.C.
8	N.C.
9	N.C.



Rear view



Chapter 4

Installation and Maintenance

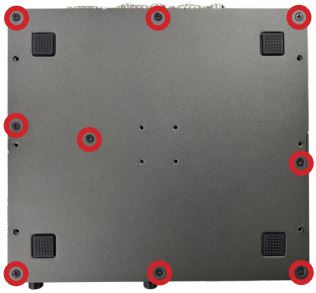
4.1. Install Hardware

The computer is constructed based on modular design to make it easy for users to add hardware or to maintain the computer. The following sections will guide you to the simple hardware installations for the computer. This section will use ARTS-1550-M4 as the installation example.

4.1.1. Open the Computer

All jumpers, connectors, M.2 B Key and PCI Express Mini-card sockets are built on the carrier board. To access these components, the computer's bottom cover has to go. Follow through the steps below to remove the bottom cover from the computer.

1. Place the computer on a flat surface. Loosen and remove the screws from the bottom cover as marked in the illustration below.



2. Dismount the bottom cover. The inside of the computer comes to view.

- To adjust jumpers or connect/disconnect devices to/from the carrier board, see 3.2.1. Jumpers on page 16 and 3.2.2. Connectors on page 23.

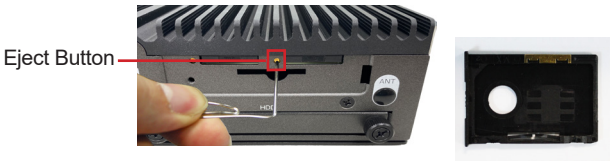
4.1.2. Install/uninstall SIM Card

The computer supports 2 SIM cards for mobile networking and comes with an outside-accessible SIM card slot. Follow through the guide below to install a SIM card to the computer.

To install a SIM card:

1. On the front panel of the computer, find the SIM card slot door. Loose the screw to open it.

2. Use a cliper to press the eject botton in the SIM card slot,and the SIM card jacket will be ejected. Pull the jacket out of the slot.



3. Put the SIM card into the slot jacket as directed in the illustration below. Push-insert the SIM card into the slot.

Push-insert the SIM card.

To uninstall the SIM card:

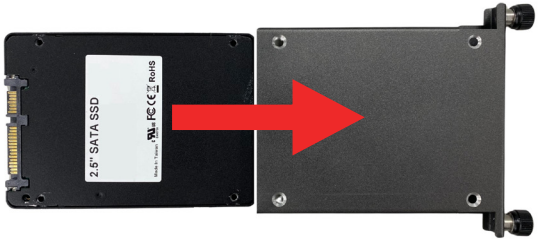
1. Use a cliper to press the eject button to eject the SIM card.
2. Pull out the SIM card.
3. Remove the SIM card jacket.
4. Insert the card jacket into the slot.

4.1.3. Install SATA SSD or HDD

The ARTS-1550 supports one 2.5-inch SSD or HDD storage devices. To install a 2.5" SSD or HDD to the computer, follow through the guide below:

1. Loose the 2 screws counterclockwise to open the accessible drive tray, and then pull out the tray.

2. Slide the SSD or HDD storage device into the tray bracket.



3. Fix the SSD/HDD with 4 screws (4 x M3*4).

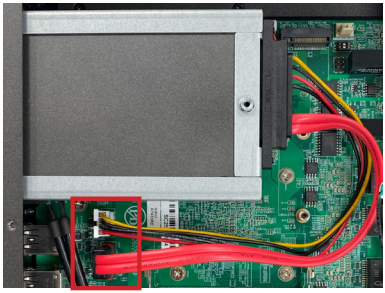
4. Push tray bracket with SSD/HDD back to the computer, rotate the two screws clockwise to lock into the position.

4.1.4. Disassemble SSD bracket

Before Wi-Fi/4G/5G/LTE module Installation, please remove the 2.5 SSD/HDD bracket.

1. Loose the two SSD/HDD bracket screws and then open the Computer bottom cover as instruction of 4.1.1. Open the Computer on page 38.

2. Unplug the SSD/HDD cables and remove the SSD/HDD bracket .

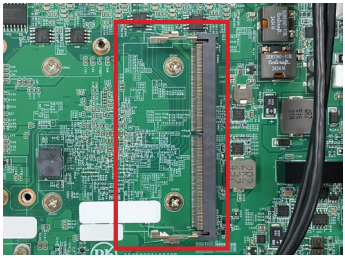


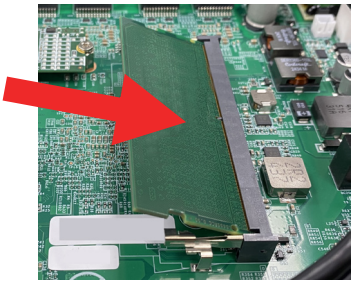
Note: To reinstall the SSD/HDD bracket, reverse the steps described above to secure it back in place

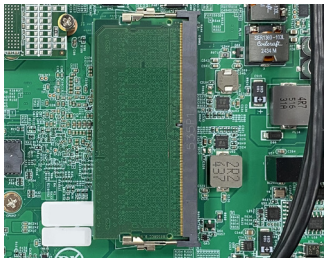
4.1.5. Install Memory Module on CPU Module

1. Open the computer as 4.1.1. Open the Computer

2. Locate the Memory module slot and insert the memory module.







3. Assemble the bottom cover when needed.

4.1.6. Insert a SD card

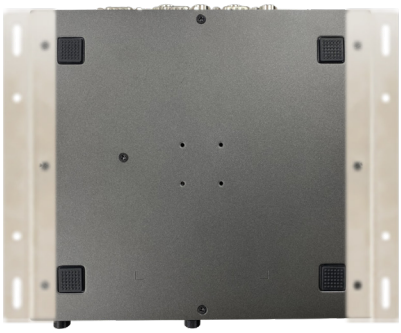
1. On the front panel of the computer, find the SIM card slot door. Loose the screw to open it.

2. Slide the SD card into the slot. You can hear a slight clicking noise, which means it has locked into place.

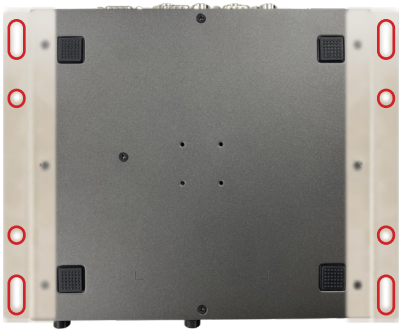
4.2. Mount the Computer

Follow through the guide below to mount the computer to a wall.:

1. Tighten the wall mountung bracket on the bottom cover as shown in the figure below:



2. Find the cutouts as marked in the illustration below, mount the computer to a wall by the said cutouts.



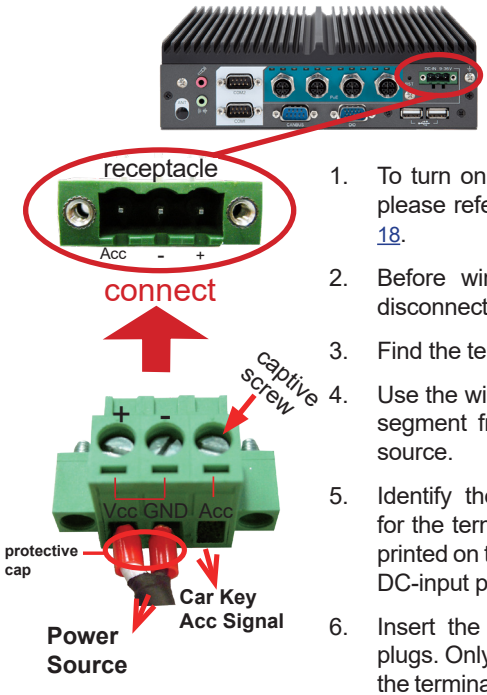
4.3. Wire DC-in Power Source

> **Warning** Only trained and qualified personnel are allowed to install or replace this equipment.

Follow the instructions below for connecting the computer to a DC-input power source.

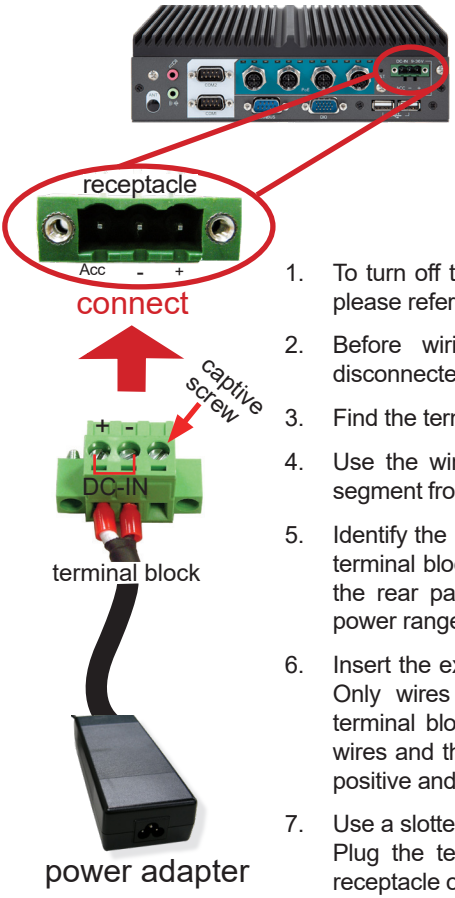
4.3.1. Vehicle Application

For Vehicle Application, DC power Input wiring pin definition is as follow,



1. To turn on the Vehicle Acc for Vehicle application, please refer to Jumper setting of JACCON1 on page 18.
2. Before wiring, make sure the power source is disconnected.
3. Find the terminal block in the accessory box.
4. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
5. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
6. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.
7. Please connect the Acc pin with your car Acc, and the device will be activated when you turn your ignition key to Acc.
8. Use a slotted screwdriver to tighten the captive screws. Plug the terminal block firmly, which wired, into the receptacle on the rear panel.

4.3.2. Automation Application



1. To turn off the Vehicle Acc for Automation application, please refer to Jumper setting of JACCON1 on page 18.
2. Before wiring, make sure the power source is disconnected.
3. Find the terminal block in the accessory box.
4. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
5. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
6. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.
7. Use a slotted screwdriver to tighten the captive screws. Plug the terminal block firmly, which wired, into the receptacle on the rear panel.

4.4. Use Cable-Lock Bracket

Using the cable-lock bracket prevents cables from detaching and protects connectors from accidental impacts.

Follow the instructions below to install the cable-lock bracket:

1. Place the computer on a flat surface. Loosen and remove the two screws, keeping them for cable-lock bracket installation.

2. Mount the cable lock bracket as shown in the figure below and re-tighten the two screws that were previously removed.

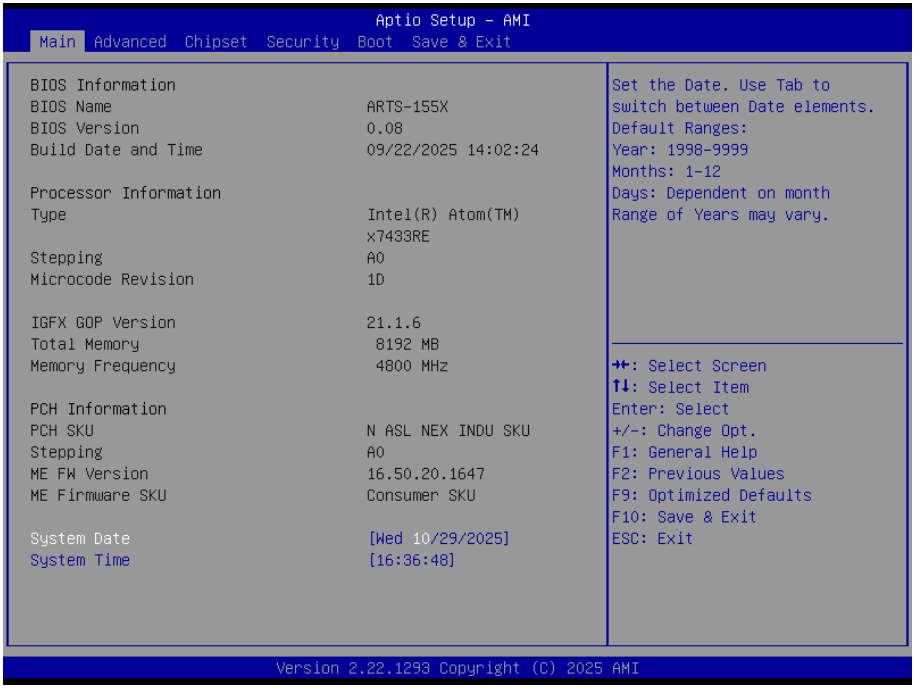
3. Secure and fix cables with straps via cable lock bracket holes.

Chapter 5

BIOS

The BIOS Setup utility for the computer is featured by American Megatrends Inc to configure the system settings stored in the system's BIOS ROM. The BIOS is activated once the computer powers on. When the computer is off, the battery on the main board supplies power to BIOS RAM.

To enter the BIOS Setup utility, keep hitting the "Delete" key upon powering on the computer.



The BIOS featured menus are:

Menu	Description
Main	See 5.1. Main on page 52
Advanced	See 5.2. Advanced on page 53
Chipset	See 5.3. Chipset on page 67
Security	See 5.4. Security on page 73
Boot	See 5.5. Boot on page 75
Savie & Exit	See 5.6. Save & Exit on page 76

Key Commands

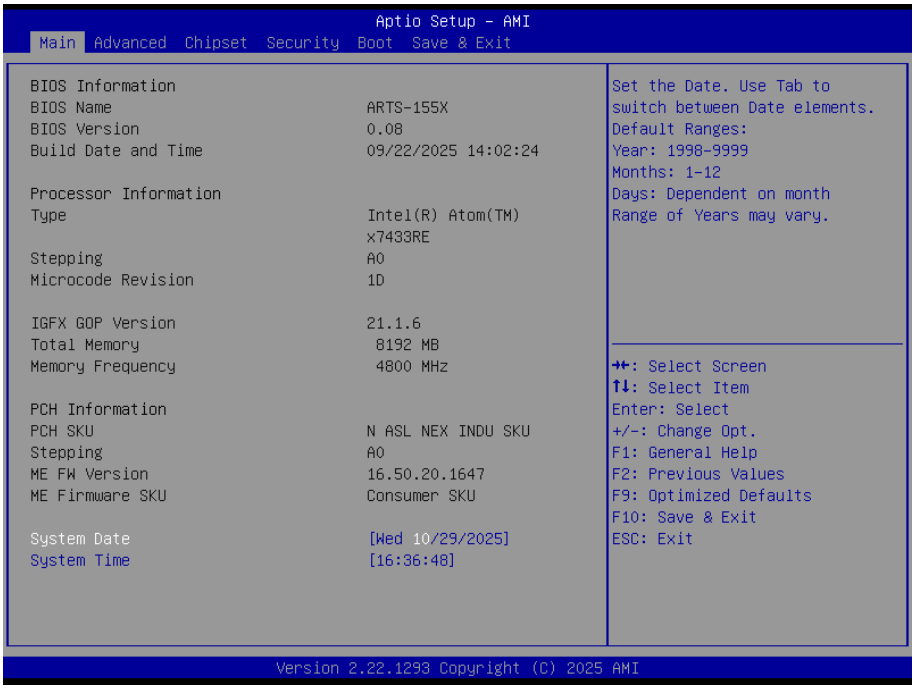
The BIOS Setup utility relies on a keyboard to receive user's instructions. Hit the following keys to navigate within the utility and configure the utility.

Keystroke	Function
← →	Moves left/right between the top menus.
↓ ↑	Moves up/down between highlight items.
Enter	Selects an highlighted item/field.
Esc	▸ On the top menus: Use **Esc** to quit the utility without saving changes to CMOS. (The screen will prompt a message asking you to select **OK** or **Cancel** to exit discarding changes.) ▸ On the submenus: Use **Esc** to quit current screen and return to the top menu.
Page Up / +	Increases current value to the next higher value or switches between available options.
Page Down / -	Decreases current value to the next lower value or switches between available options.
F1	Opens the **Help** of the BIOS Setup utility.
F2	Previous values.
F9	Load Optimized Defaults (The screen then prompts a message asking you to select **Yes** or **No** to restore to default.)
F10	Exits the utility saving the changes that have been made. (The screen then prompts a message asking you to select **Yes** or **No** to exit saving changes.)

Note:
This BIOS Setup utility is updated from time to time to improve system performance and hence the screenshots hereinafter may not fully comply with what you actually have onscreen.

5.1. Main

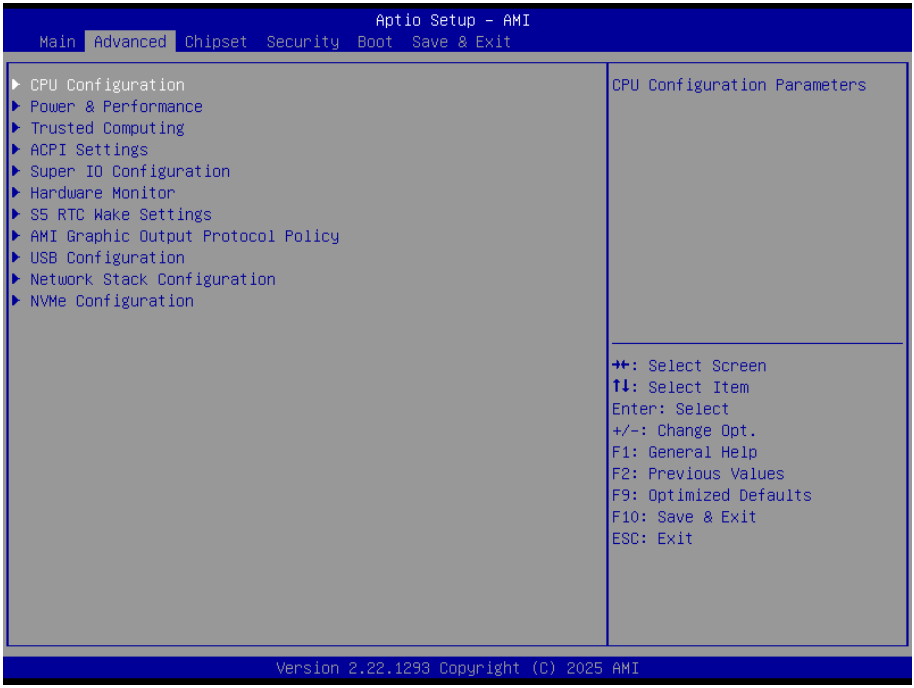
The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS and system information.



The feature settings are:

Setting	Description
System Date	Set the system date. Use Tab to switch between Date elements. Note that the 'Day' automatically changes when you set the date. ► The date format is: **Day:** Sun to Sat **Month:** 1 to 12 **Date:** 1 to 31 **Year:** 1998 to 9999
System Time	Set the system time. Use Tab to switch between Time elements. ► The time format is: **Hour:** 00 to 23 **Minute:** 00 to 59 **Second:** 00 to 59

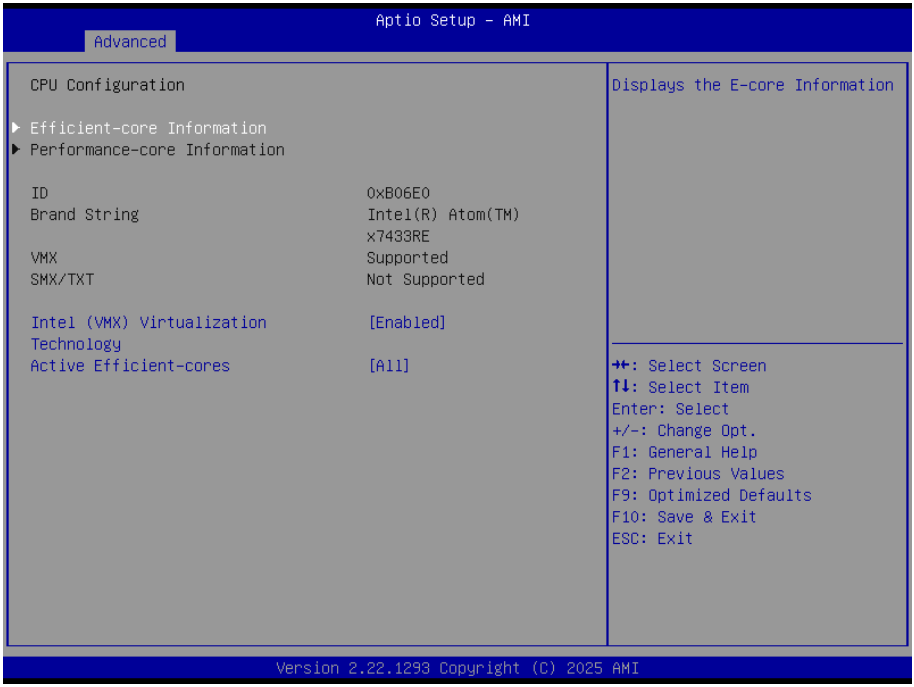
5.2. Advanced



The feature settings and submenus are:

Setting	Description
CPU Configuration	See 5.2.1. CPU Configuration on page 54.
Power & Performance	See 5.2.2. Power & Performance on page 55.
Trusted Computing	See 5.2.3. Trusted Computing on page 57.
ACPI Settings	See 5.2.4. ACPI Settings on page 58.
Super IO Configuration	See 5.2.5. Super IO Configuration on page 59.
Hardware Monitor	See 5.2.6. Hardware Monitor on page 60.
S5 RTC Wake Settings	See 5.2.7. S5 RTC Wake Settings on page 61.
AMI Graphic Output Protocol Policy	See 5.2.8. AMI Graphic Output Protocol Policy on page 62.
USB Configuration	See 5.2.9. USB Configuration on page 63.
Network Stack Configuration	See 5.2.10. Network Stack Configuration on page 65.
NVMe Configuration	See 5.2.11. NVMe Configuration on page 66.

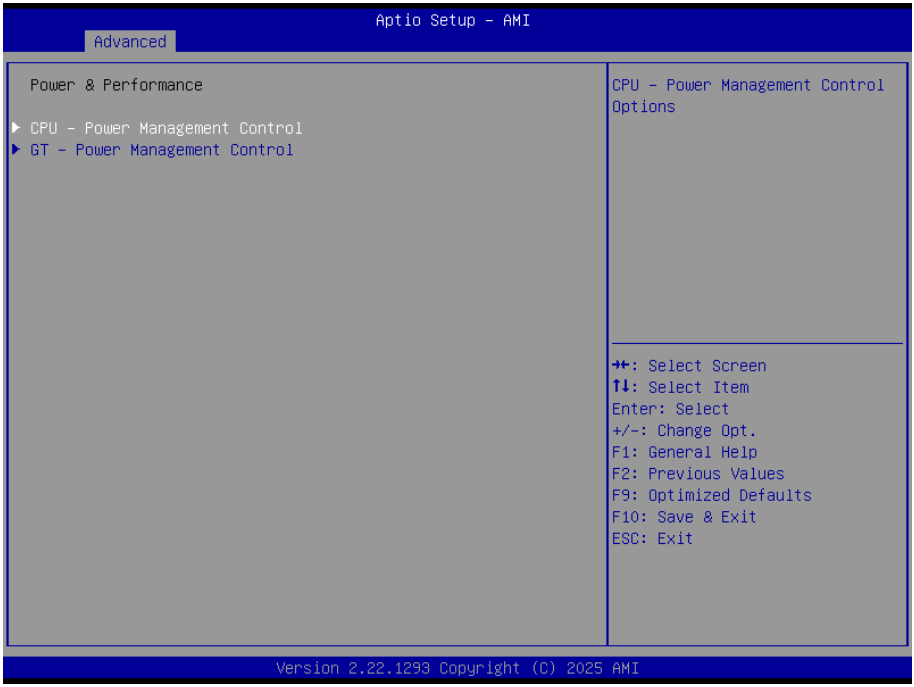
5.2.1. CPU Configuration



The feature settings are:

Setting	Description
Efficient-core Information	Displays the E-core Information.
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. ► Options: **Enabled** (default) or **Disabled**
Active Efficient-Cores	Number of cores to enable in each processor package. ► Options: **All** (default), **3**, **2**, **1**, **0**

5.2.2. Power & Performance

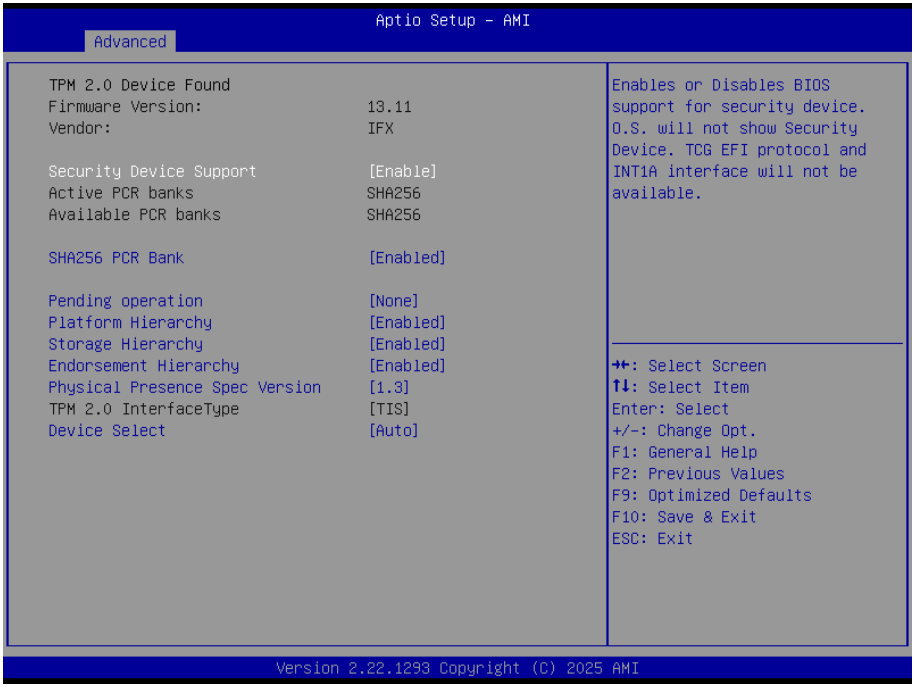


The feature settings are:

Setting	Description
CPU - Power Management Control	CPU - Power Management Control Options Boot performance mode: ► Options: Boot performance mode: **Max Battery, Max Non-Turbo Performance, Turbo Performance** Intel(R) SpeedStep(tm): ► Options: **Disabled, Enabled** Intel(R) Speed Shift Technology: ► Options: **Disabled, Enabled** Per Core P State OS control mode: ► Options: **Disabled, Enabled** Turbo Mode: ► Options: **Disabled, Enabled** View/Configure Turbo Options: ► View/Configure Turbo Ratio Limit Options C States: ► Options: **Disabled, Enabled**

GT - Power Management Control	RC6(Render Standby): Check to enable render standby ► Options: **Disabled / Enabled**(Default) Maximum GT frequency: Maxium GT frequency limited by the user. ► Options: **Default Max Frequency**(Default), **100Mhz~1200Mhz** Disable Turbo GT Frequency: Enabled/Disabled GT Frequency. ► Options: **Disabled**(Default) **/ Enabled**

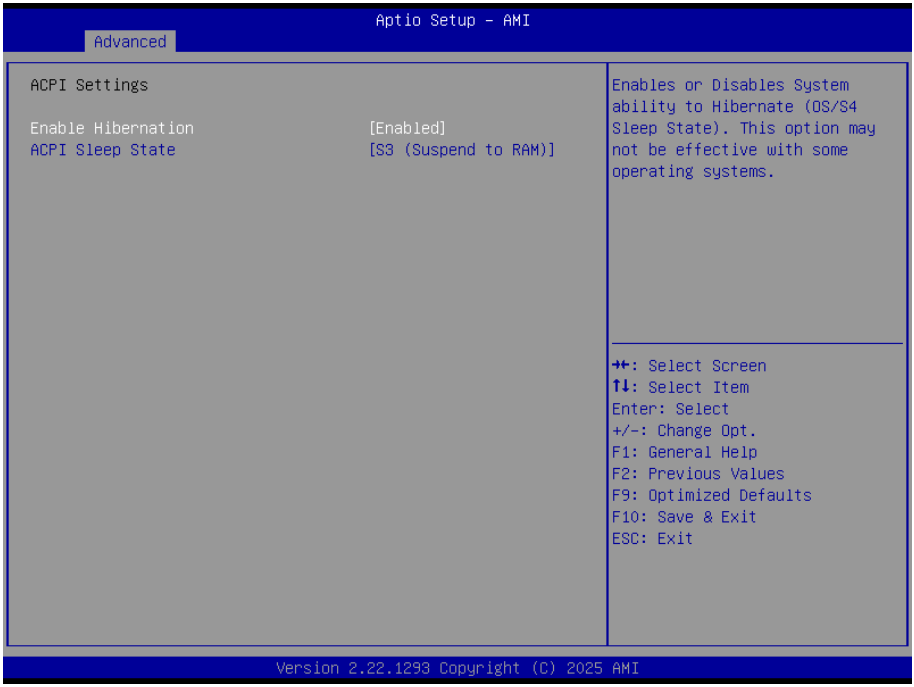
5.2.3. Trusted Computing



The feature settings are:

Setting	Description
Security Device Support	Enables or disables BIOS support for security device. OS will not show Security Device. ► Options: **Enabled** (Default) / **Disabled**
SHA256 PCR Bank	Enables or disables SHA256 PCR Bank. ► Options: **Enabled** (Default) / **Disabled**
Pending operation	Schedule an operation for the security device. ► Options: **None** (Default) / **TPM Clear**
Platform Hierarchy	Enables or disables Platform Hierarchy. ► Options: **Enabled** (Default) / **Disabled**
Storage Hierarchy	Enables or disables Storage Hierarchy. ► Options: **Enabled** (Default) / **Disabled**
Endorsement Hierarchy	Enables or disables Endorsement Hierarchy. ► Options: **Enabled** (Default) / **Disabled**
Physical Presence Spec Vision	This item select to tell O.S. to support PPI Spec Version 1.2 or 1.3. ► Options: **1.3** (Default) / **1.2**
Device Select	TPM 1.2 will restruct support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both TPM 2.0 devices and TPM 1.2 deviced. ► Options: **All** (Default) / **TPM1.2** / **TPM2.0**

5.2.4. ACPI Settings



The feature settings are:

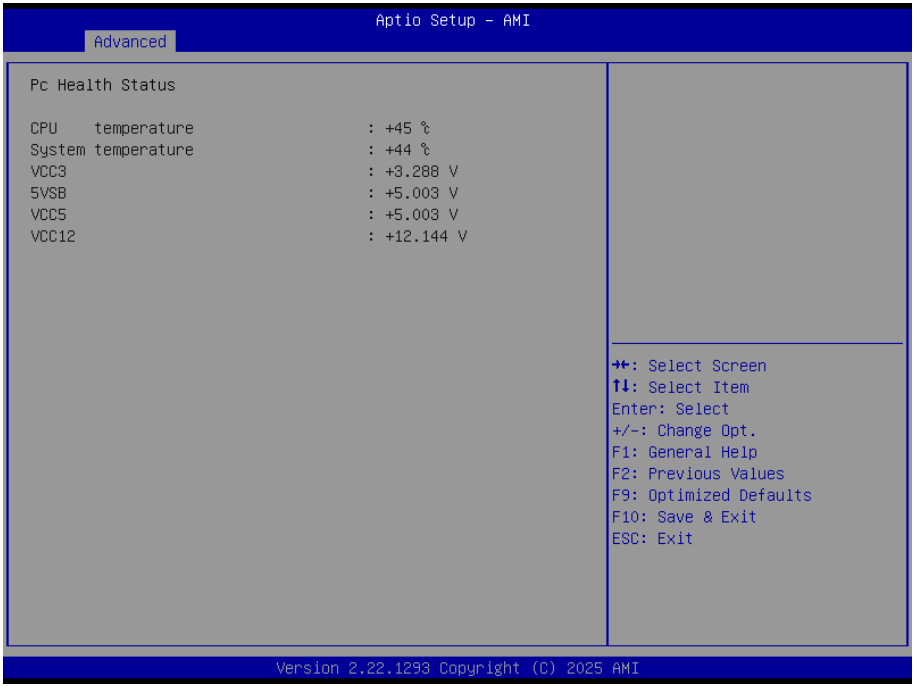
Setting	Description
Enable Hibernation	**Enables** (default) or **Disables** System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed. ► Options: **Suspend Disabled** and **S3 (Suspend to RAM)** (Default)

5.2.5. Super IO Configuration

The feature settings are:

Setting	Description
Serial Port 1 Configuration	Serial Port: Enable or disable serial port (COM) ► Options: **Disabled, Enabled** Mode Select: Select RS232 or RS-422 or RS-485 ► Options: **RS-232** (Default)**, RS-422, RS-422(Termination Resistor), RS-485, RS-485(Termination Resistor)**
Serial Port 2 Configuration	Serial Port: Enable or disable serial port (COM) ► Options: **Disabled, Enabled**

5.2.6. Hardware Monitor

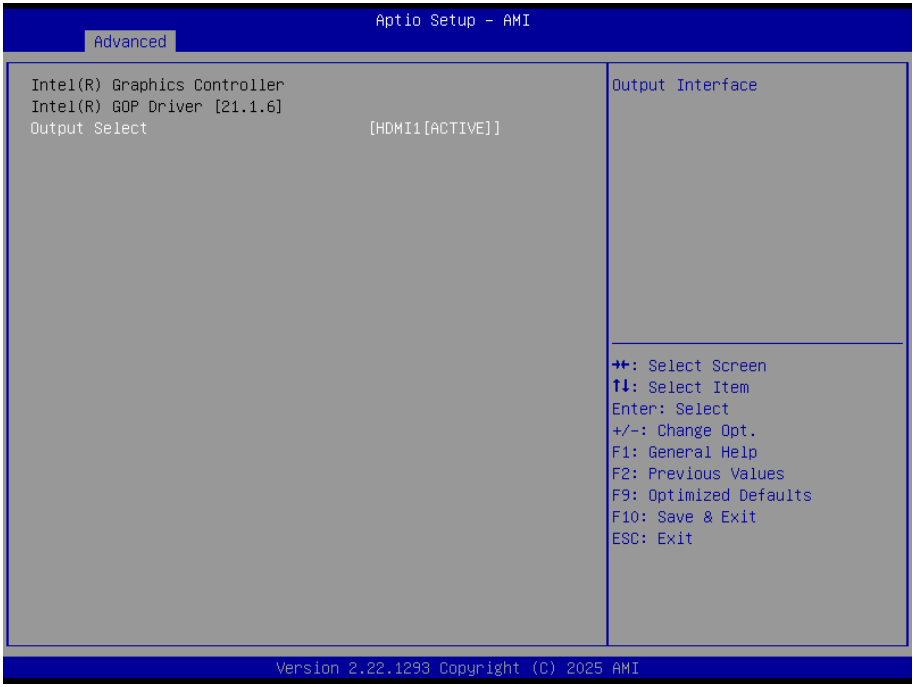


Access this submenu to monitor the hardware status.

5.2.7. S5 RTC Wake Settings

Setting	Description
Wake System from S5	**Enable** or **Disable** (default) system wake on alarm event. ► Options available are: **Disabled** (default): **Fixed Time:** System will wake on the hr::min::sec specified. **DynamicTime:** If selected, you need to set **Wake up minute increase** from 1 - 5. System will wake on the current time + increase minute(s).

5.2.8. AMI Graphic Output Protocol Policy



Setting	Description
Output Select	Output Interface selection.

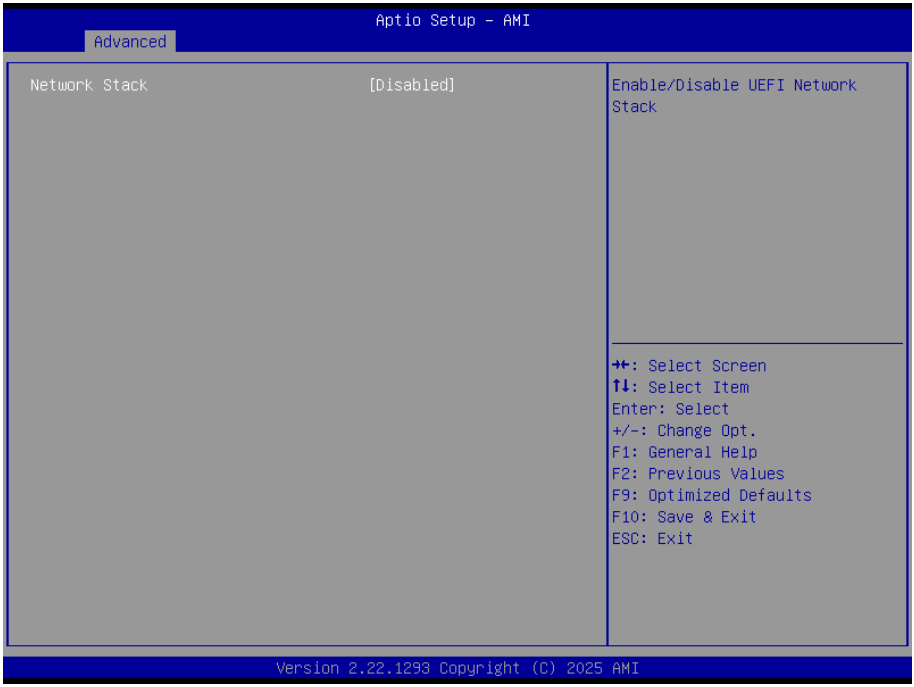
5.2.9. USB Configuration

The feature settings are:

Setting	Description
Legacy USB Support	Enables/disables legacy USB support. ► Options available are **Enabled** (default), **Disabled** and **Auto**. ► Select **Auto** to disable legacy support if no USB device are connected. ► Select **Disabled** to keep USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. ► The optional settings are: **Enabled** (default) **/ Disabled**
USB Mass Storage Driver Support	Enables/disables USB Mass Storage Driver Support. ► The optional settings are: **Enabled** (default) **/ Disabled**

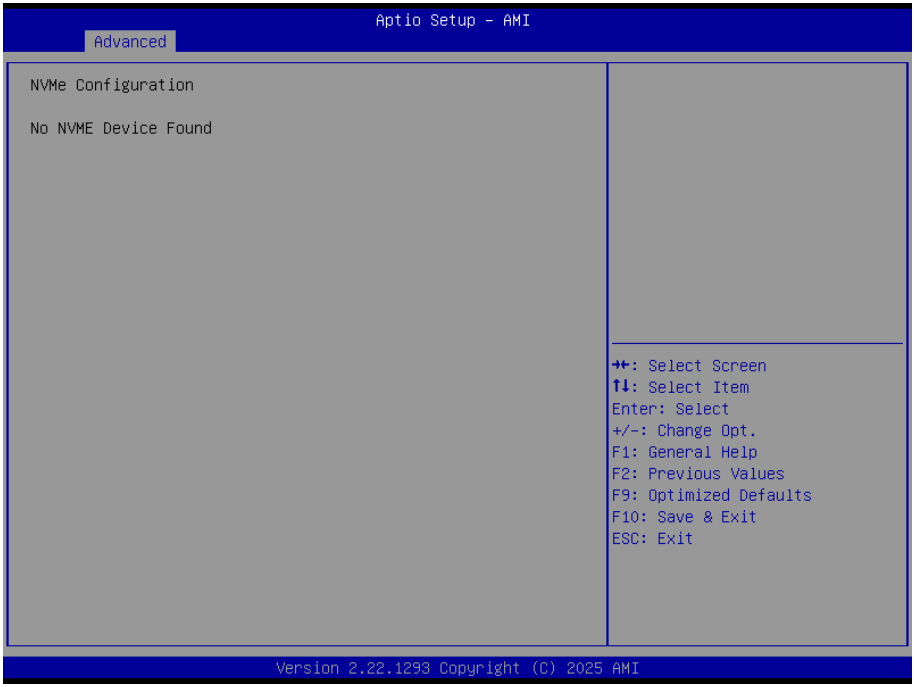
USB transfer time-out	Use this item to set the time-out value for control, bulk, and interrupt transfers. ► Options: **1 sec, 5 sec, 10 sec, 20 sec** (default)
Device reset time-out	Use this item to set USB mass storage device start unit command time-out. ► Options: **10 sec, 20 sec** (default)**, 30 sec, 40 sec**
Device power-up delay	Use this item to set 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. ► Options available are: **Auto**: Default **Manual**: Select **Manual** you can set value for the following sub-item: 'Device Power-up delay in seconds', the delay range in from 1 to 40 seconds, in one second increments.

5.2.10. Network Stack Configuration



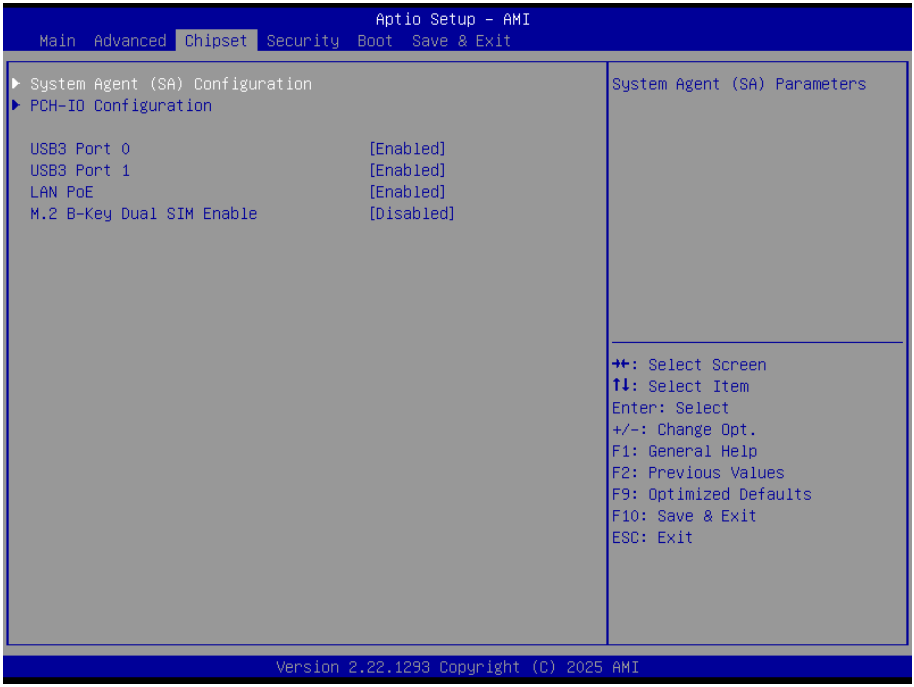
Setting	Description
Network Stack	**Enable** or **Disable** (default) UEFI network stack

5.2.11. NVMe Configuration



Access this submenu to view the NVMe controller and driver information.

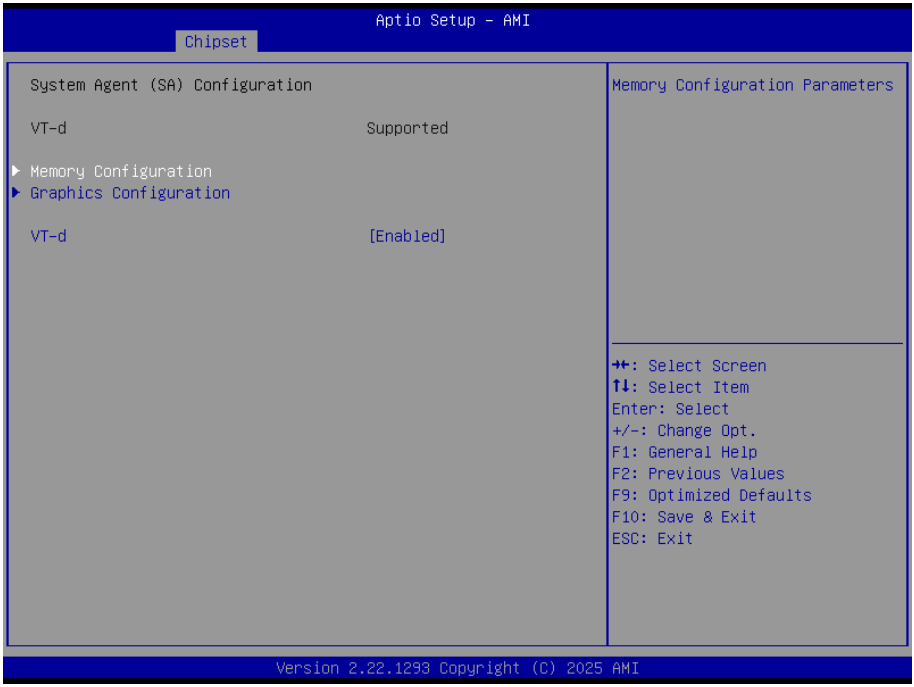
5.3. Chipset



The feature settings are:

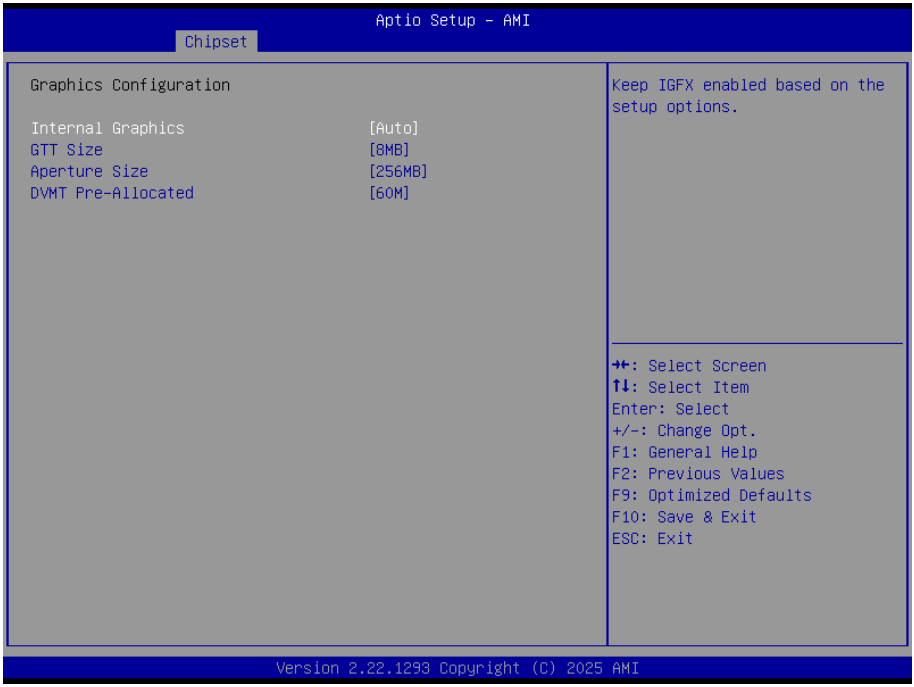
Setting	Description
System Agent (SA) Configuration	See 5.3.1. System Agent (SA) Configuration on page 68
PCH-IO Configuration	See 5.3.2. PCH-IO Configuration on page 70
USB3 Port 0	Enables/disables the USB3 port power supply. ► Options: **Enabled** (default) **/ Disabled**
USB3 Port 1	Enables/disables the USB3 port power supply. ► Options: **Enabled** (default) **/ Disabled**
LAN PoE	Enables/disables the LAN port PoE function. ► Options: **Enabled** (default) **/ Disabled**
M.2 B-Key Dual SIM Enable	Enables/disables M.2 B-Key dual SIM function. ► Options: **Enabled / Disabled** (default)

5.3.1. System Agent (SA) Configuration



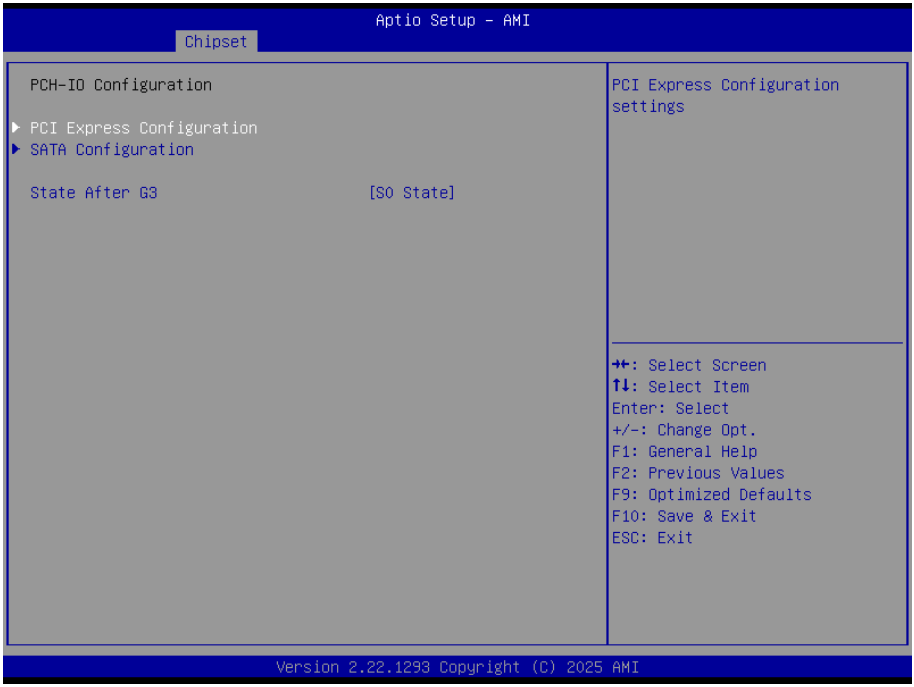
Setting	Description
Memory Configuration	Aeecss this submenu to view the memory configuration
Graphics Configuration	See 5.3.1.1. Graphics Configuration on page 69
VT-d	**Enable** (default) or **Disable** VT-d capability

5.3.1.1. Graphics Configuration



Setting	Description
Internal Graphics	Keep IGFX enabled based on the setup options. ► Options: **Auto** (default) **/ Disabled / Enabled**
GTT Size	Select the GTT Size. ► Options: **2MB / 4MB / 8MB**
Aperture Size	Select the Aperture Size. ► Options: **128MB / 256MB (default) / 512MB / 1024MB**
DVMT Pre-Allocated	Select the DVMT 5.0 Pre-Allocated (Fixed) Graphic Memory size used by the Internal Graphic Device. ► Options: **0M to 160M**

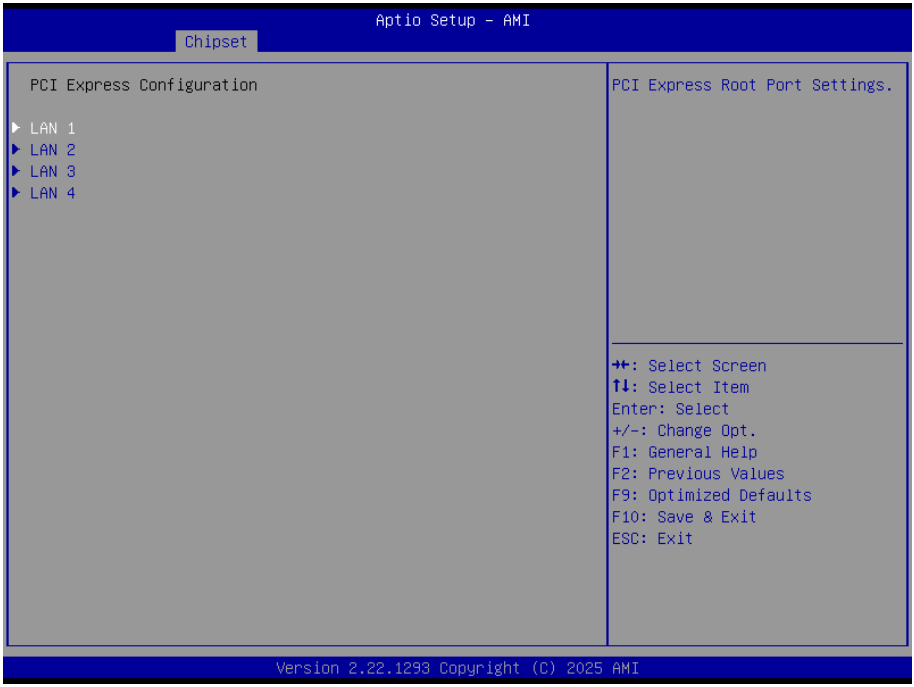
5.3.2. PCH-IO Configuration



The feature settings are:

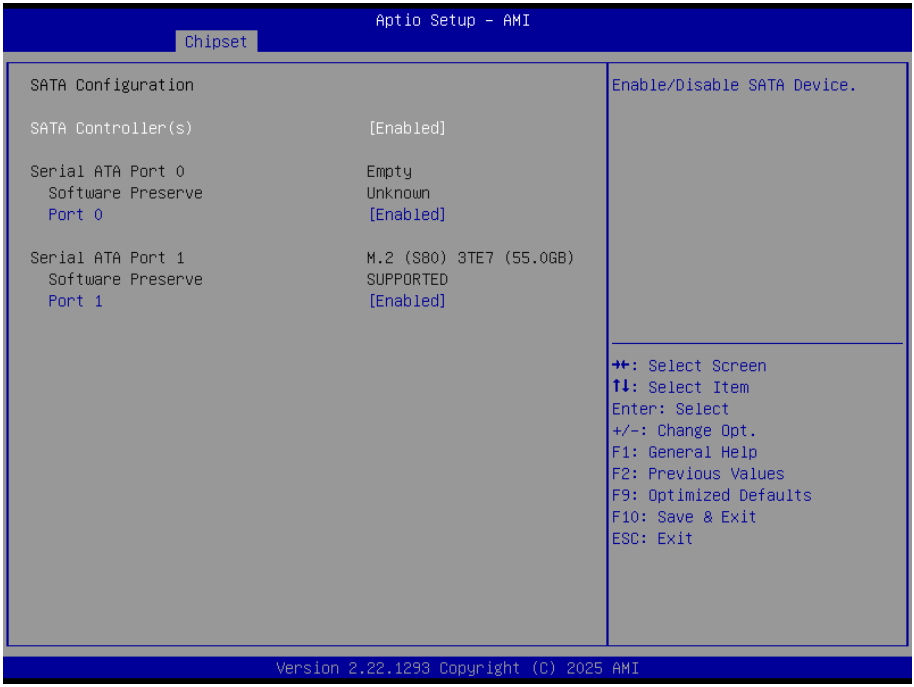
Setting	Description
PCI Express Configuration	See 5.3.2.1. PCI Express Configuration on page 71
SATA Configuration	See 5.3.2.2. SATA Configuration on page 72
State After G3	Specify what state to go to when power is re-applied after a power failure(G3 state). ► Options: **S0 State** (default), **S5 State**

5.3.2.1. PCI Express Configuration



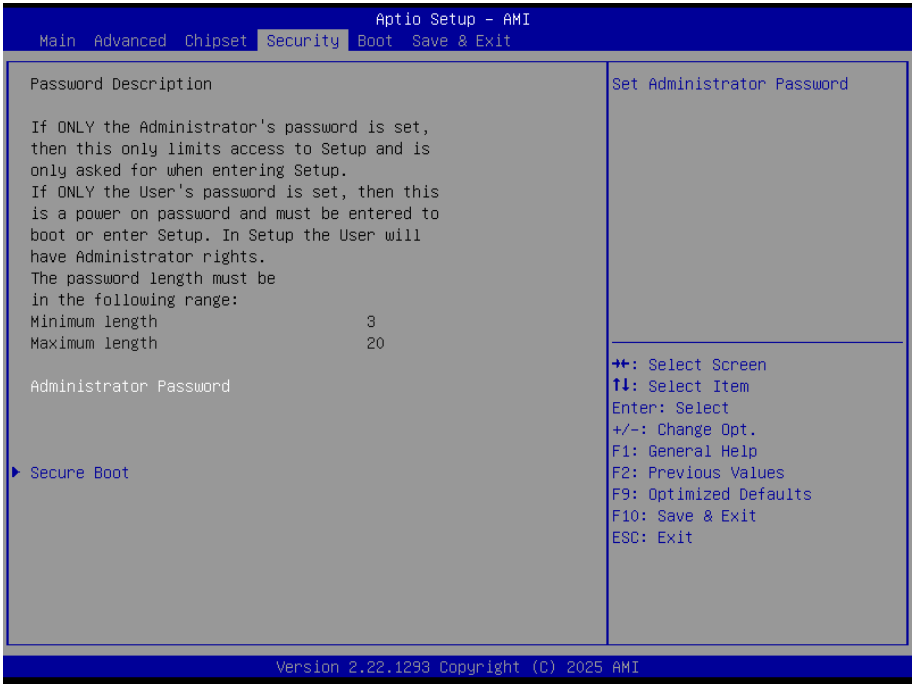
Setting	Description
LAN1 - 4	Control the PCI Express Root Port ► Options: **Enabled** (default) **/ Disabled**

5.3.2.2. SATA Configuration



Setting	Description
SATA Controller(s)	**Enables** (default) / **disables** SATA device.
Serial ATA Port 0/1	SATA device information. *Available SATA ports depend on your device.
Port 0/1	**Enables** (default) / **disables** the SATA port.

5.4. Security



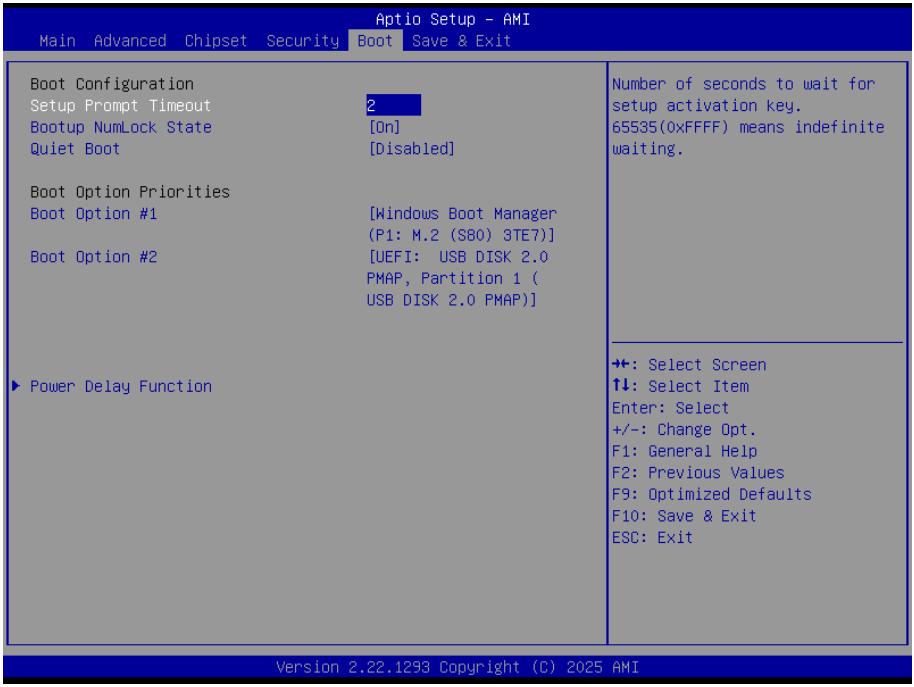
Setting	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. 2. An **Create New Password** dialog then pops up onscreen. 3. Enter your desired password that is no less than 3 characters and no more than 20 characters. 4. Hit [Enter] key to submit.
Secure Boot	See 5.4.1 Secure Boot on page 74

5.4.1 Secure Boot

The feature settings are:

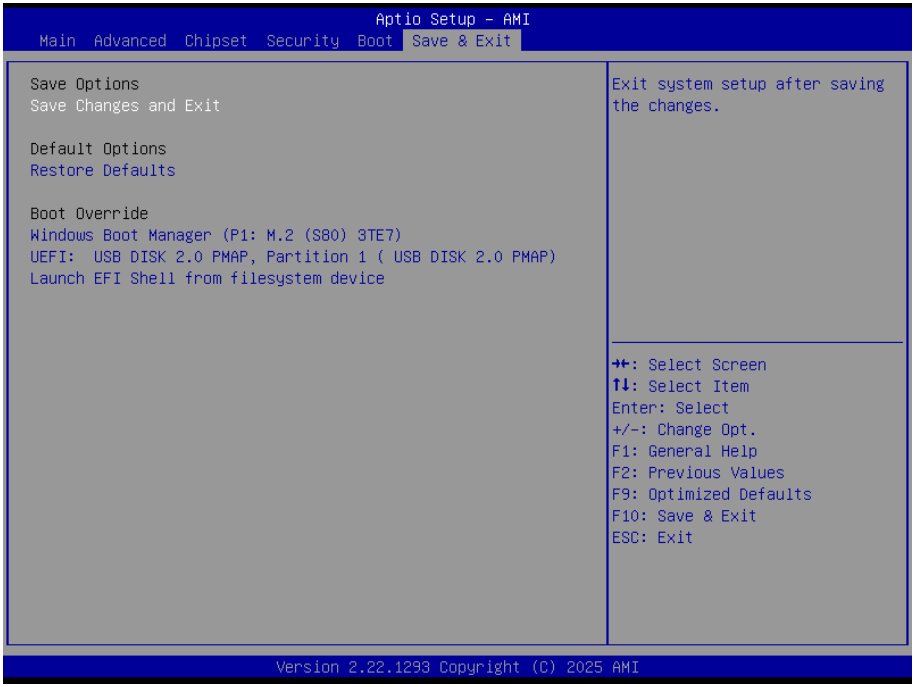
Setting	Description
Secure Boot	**Enable**/**Disable** (default) secure boot.
Secure Boot Mode	Allow users to set the secure boot selector. ► Options: **Standard** (default) / **Custom** mode.
Restore Factory Keys	Force system to restore default secure boot key database.
Reset to Setup Mode	Delete all secure boot key databases.
Expert Key Management	Allow users to modify secure variables and set key management page.

5.5. Boot



Setting	Description
Setup Prompt Timeout	Set how long to wait for the prompt to show for entering BIOS Setup. ► The default setting is **1** (sec). ► Set it to **65535** to wait indefinitely.
Bootup NumLock State	Sets whether to enable or disable the keyboard's NumLock state when the system starts up. ► Options available are **On** (default) and **Off**.
Quiet Boot	Sets whether to display the POST (Power-on Self Tests) messages or the system manufacturer's full screen logo during booting. ► Select **Disabled** to display the normal POST message, which is the default.
Boot Option Priority	Set the system boot priorities.
Power Delay Function	Sets the system support power delay function. **Enabled:** Support power delay function. **Disbaled:** Power on/off manually operated.

5.6. Save & Exit



Setting	Description
Save Changes and Exit	Saves the changes and quits the BIOS Setup utility.
Restore Defaults	Restores all settings to defaults. ► This is a command to launch an action from the BIOS Setup utility.
Boot Override	**Boot Override** presents a list in context with the boot devices in the system. ► **P0:** Select the device to boot up the system regardless of the currently configured boot priority. ► **Launch EFI Shell from filesystem device:** Attempts to launch EFI Shell Application (Shell.efi) from one of the available filesystem devices.

Appendices

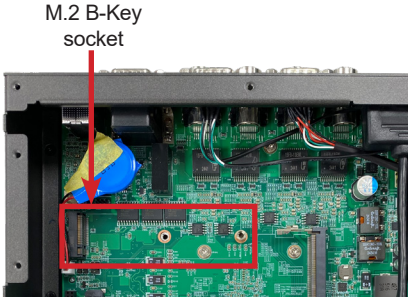
Appendix A: M.2 B-Key Module Installation

This computer has a M.2 B-Key socket for 2242/2280 (SATA+USB 2.0) for storage. This section will use a 22 x 80 form factor as the installation example.

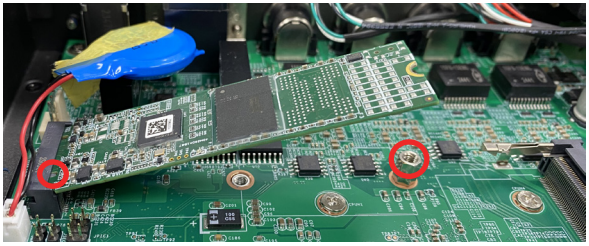
1. Remove the computer's bottom cover as described in 4.1.1. Open the Computer on page 38.

2. Remove the SSD bracket, please refer to 4.1.4. Disassemble SSD bracket on page 42

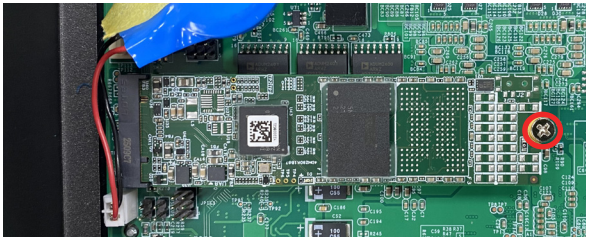
3. Find the **M.2 B-Key** sockets for a storage or GNSS module.



4. Remove the screw on the standoff, and then insert the M.2 module into the socket by aligning the notch on the module with small slot on the M.2 socket.



5. Insert and fasten the screw into the standoff.



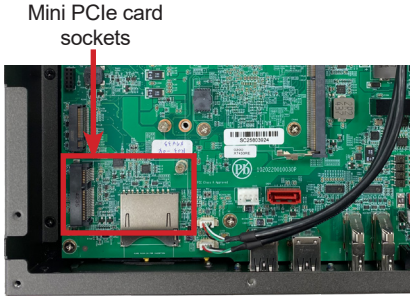
Appendix B: LTE-4450 Module Installation

To be able to network with 4G/5G/LTE, this computer needs a 4G/5G/LTE module installed and a SIM card inserted. This appendix will guide you to install the 4G/5G/LTE module **LTE-4450**.

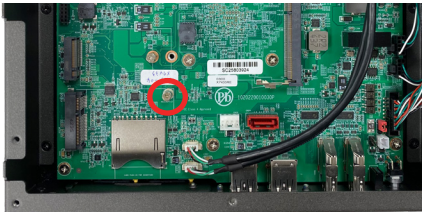
1. Remove the computer's bottom cover as described in 4.1.1. Open the Computer on page 38.
   The inside of the computer comes to view.

2. Remove the SSD bracket, please refer to 4.1.4. Disassemble SSD bracket on page 42

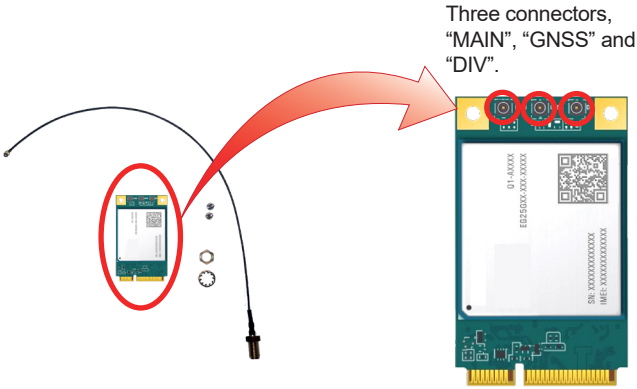
3. Find the **PCI Express Mini-card** sockets for a 4G/5G/LTE module.



4. Remove the screw on the standoff.



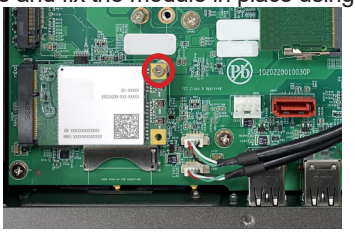
5. Have the LTE 4G module kit. The 4G module is a full-size module of **PCI Express Mini-card** form factor, with three IPEX MHF/U.FL connectors.
   SIM card can be inserted into the SIM card socket on the back of this module.



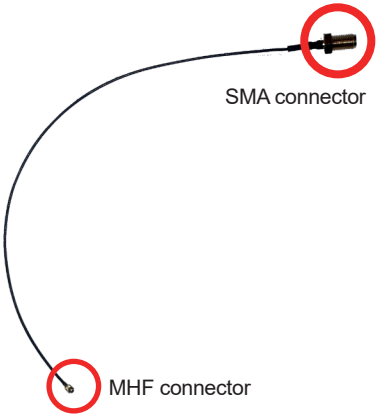
6. Plug the 4G module to the socket’s connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.

Fully plug the module.

7. Press down the module and fix the module in place using one screw.



8. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.

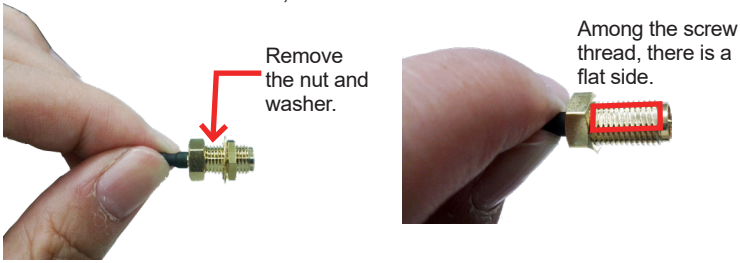


9. Connect the RF antenna's MHF connector to the 4G module's "MAIN" connector.

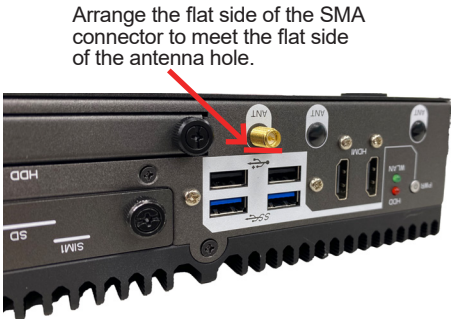
Connect the RF antenna's MHF connector to the 4G module's "MAIN" connector.

10. Remove one plastic plug from the computer's front panel to make an antenna hole. Keep the plastic plug for any possible restoration in the future.

11. From the other end of the RF antenna, which is an SMA connector, remove the washer and the nut. Save the washer and nut for later use. Note the SMA connector has the form of a threaded bolt, with one flattened side.



12. Pull the SMA connector through the above mentioned antenna hole. Note to meet the aforesaid flattened side with the antenna hole's flat side.



13. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

14. Have an external antenna. Screw and tightly fasten the antenna to the SMA connector.

15. Assemble the computer's bottom cover.

Appendix C: WiFi-AT4550 Module Installation

To use Wi-Fi, hardware-wise the computer needs a Wi-Fi module installed. This appendix will guide you to install the Wi-Fi module **WiFi-AT4550**.

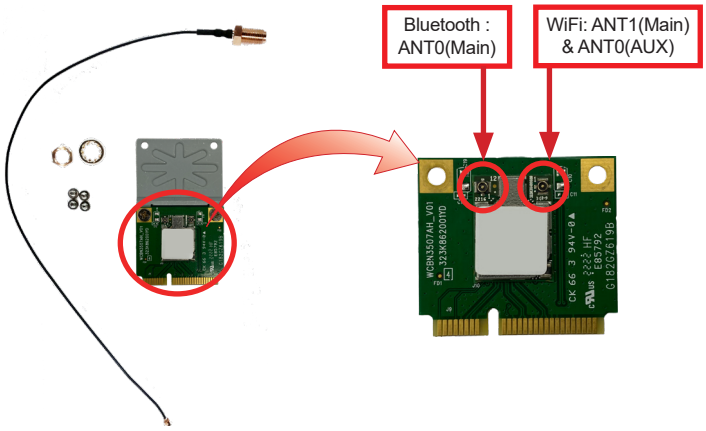
1. Remove the computer's bottom cover as described in 4.1.1. Open the Computer on page 38.

   The inside of the computer comes to view.

2. Remove the SSD bracket, please refer to 4.1.4. Disassemble SSD bracket on page 42

3. Find the **PCI Express Mini-card** socket for a WiFi module.

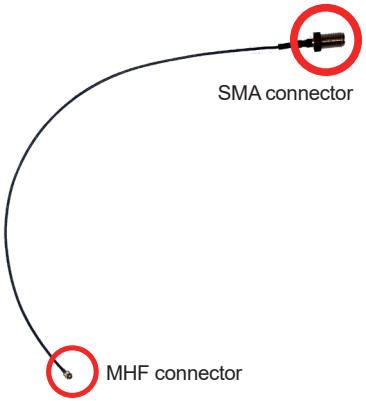
4. Prepare the **WiFi-AT4550** Wi-Fi module kit. The module is a half-size module of **PCI Express Mini-card** form factor, with two U.FL connectors, one is "1", and the other is "0". Tighten with the extension plate to expand into full-size form factor.



5. Plug the Wi-Fi module to the socket's connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.

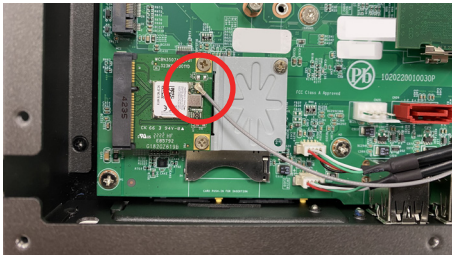
6. Press down the module and fix the module in place using one screw.

7. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.



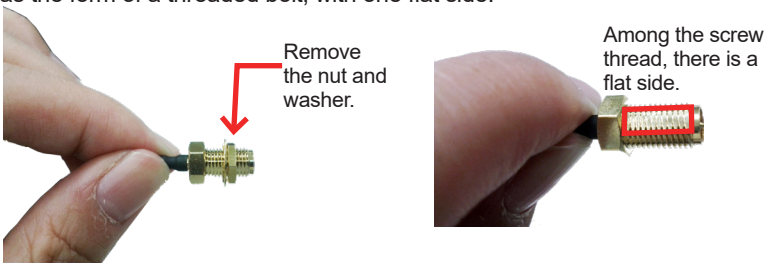
8. Connect the RF antenna's MHF connector to the Wi-Fi module's "MAIN" connector.

Connect the RF antenna's MHF connector to the WiFi module's "MAIN" connector.

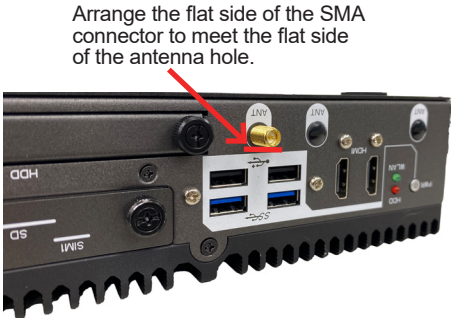


9. Remove one plastic plug from the computer's front panel to make an antenna hole. Keep the plastic plug for any possible restoration in the future.

10. From the other end of the RF antenna, which is an SMA connector, remove the washer and the nut. Save the washer and nut for later use. Note the SMA connector has the form of a threaded bolt, with one flat side.



11. Pull the SMA connector through the above mentioned antenna hole. Note to meet the aforesaid flattened side with the antenna hole's flat side.



12. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

13. Have an external antenna. Screw and tightly fasten the antenna to the SMA connector.

14. Assemble the computer's bottom cover.

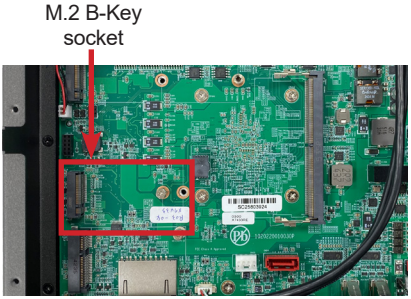
Appendix D: WiFi-MT1440 Module Installation

To use Wi-Fi, this computer needs a Wi-Fi module installed. This appendix will guide you to install the M.2 B-Key Wi-Fi module **WiFi-MT1440**.

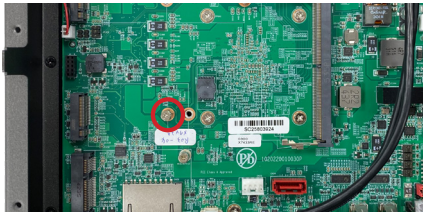
1. Remove the computer's bottom cover as described in 4.1.1. Open the Computer on page 38.
   The inside of the computer comes to view.

2. Remove the SSD bracket, please refer to 4.1.4. Disassemble SSD bracket on page 42

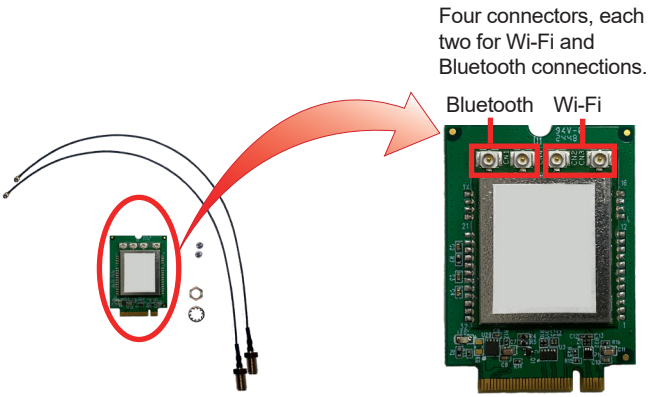
3. Find the **M.2 B-Key** socket for a Wi-Fi module.



4. Remove the screw on the standoff.



5. Prepare the **WiFi-MT1440** Wi-Fi module kit. The module is a M.2 B-Key form factor, with four U.FL connectors.

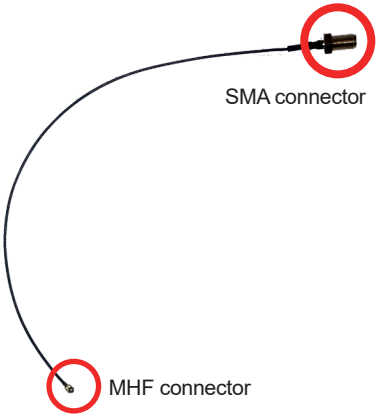


6. Plug the Wi-Fi module to the socket's connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.

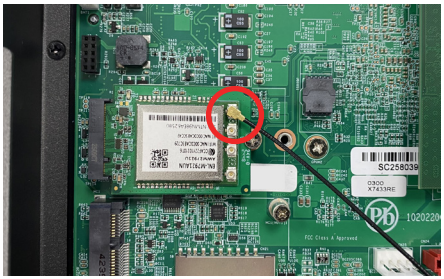
Fully plug the module.

7. Press down the module and fix the module in place using one screw.

8. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.



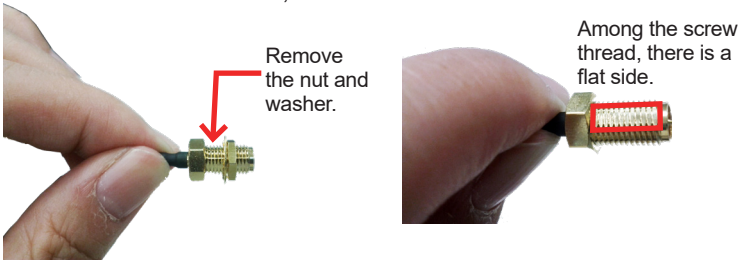
9. Connect the RF antenna's MHF connector to the Wi-Fi module's connector.



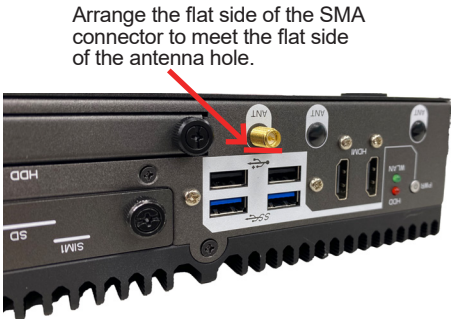
Connect the RF antenna's MHF connector to the Wi-Fi module's Wi-Fi/BT connector.

10. Remove one plastic plug from the computer's front panel to make an antenna hole. Keep the plastic plug for any possible restoration in the future.

11. From the other end of the RF antenna, which is an SMA connector, remove the washer and the nut. Save the washer and nut for later use. Note the SMA connector has the form of a threaded bolt, with one flattened side.



12. Pull the SMA connector through the above mentioned antenna hole. Note to meet the aforesaid flattened side with the antenna hole's flat side.



13. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

14. Have an external antenna. Screw and tightly fasten the antenna to the SMA connector.

15. Assemble the computer's bottom cover.