ARTS-4770

Fanless In-Vehicle Surveillance with Intel® Core i7-3517UE

User's Manual

Version 1.0

C E

RoHS
VERIFIED

Revision History

Version	Release Time	Description
1.0	May 2014	Initial release

Copyright Notice

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Declaration of Conformity
CE

The CE symbol on the computer indicates that it is in compliance with the directives of the Union European (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's manual.

    e.   The equipment has been dropped or damaged.

    f.   The equipment has obvious signs of breakage.

11. Keep this User's 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's manual first at:
ftp://ftp.arbor.com.tw/pub/manual

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

> http://www.arbor.com.tw

> E-mail:info@arbor.com.tw

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

- **Fanless and rugged design**
- Build-in Intel® Core™ i7-3517UE 1.7G Hz Processor
- Wide Range DC Power Input (9~36V)
- Support Smart Ignition for vehicle
- Power on/off delay and low voltage protection
- 4-channel POE
- Mini PCIe expansion slots with 2*SIM holders for LTE and HSUPA
- Two Removable 2.5" SSD trays
- 12VDC output

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.

1.3. Specifications

System	
CPU	Soldered onboard Intel® Core™ i7-3517UE 1.7GHz
BIOS	AMI BIOS
Chipset	Intel® QM77
Graphic	Integrated Intel® HD Graphics 4000
Memory	1 x 204-pin SO-DIMM sockets, supporting DDR3 1333/1600 MHz, up to 8GB SDRAM
Storage	• One internal mSATA. • Two external SATA SSD.
Ethernet	• One Intel® 82579LM GbE controller • Five Intel® i210IT Gigabit Ethernet controller
Watchdog Timer	1 ~ 255 levels reset
I/O Ports	
Serial Port	• 1 x RS-232 and 1 x RS-232/422/485 with DB-9 male connector, isolation protection
USB Port	• 4 x USB 3.0 ports with type A connector (2 ports: front, 2 ports: rear)
LAN Port	• 2 x RJ-45 ports for Gigabit Ethernet, front side • 4 x RJ-45 ports for Gigabyte Ethernet and support IEEE802.3af PoE (Max. 60W), rear side
Video Port	1 x DB-15 female connector for Analog RGB 1 x DVI-D female connector for Digital Video output
Audio	Mic-in/ Line-out
Expansion Bus	• 1 x Mini-PCIe slot for optional Wi-Fi/Bluetooth module • 1 x Mini-PCIe slot interconnected with SIM card socket for optional LTE module • 1 x Mini-PCIe slot interconnected with SIM card socket for optional HSUPA module • 2 x SIM sockets (outside accessible)
Storage	
Type	• Two 2.5" drive bays for SATA SSD • One mSATA socket for mSATA Disk.

Qualification	
Certification	CE, FCC Class A, E13 Mark
Environment	
Operating Temp.	-20~55°C (-4~131°F), ambient w/ air flow
Storage Temp.	-40~80°C (-40 ~ 185°F)
Relative Humidity	5 ~ 95% @ 55°C (non-condensing)
Vibration	3Grms/5~500Hz/random operation, with SSD
Shock	Operating 40G (11ms), Non-operating 60G with SSD
Mechanical	
Construction	Aluminum alloy
Mounting	Support wall-mount
Weight	4.65 Kg (10.25 lb)
Dimensions (W x D x H)	260 x 180 x 80 mm (10.6" x 7.08 x 3.14")
Power Requirement	
Power Input	DC 9~36V input, w/ 3-pin terminal block
Power Consumption	Max. 90W

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:

Fanless In-Vehicle Surveillance PC

ARTS-4770

One Driver CD
One User's Manual

1.5. Ordering Information

ARTS-4770	Vehicle Barebone System w/ Intel® Core™ i7-3517UE, w/o memory and storage
ARTS-4700-16S4G	Vehicle BOX System w/ Intel® Core™ i7-3517UE, w/ 16GB mSATA and 4GB memory

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-B120W-FSP	19V/6.32A 120W AC/DC adapter kit

1.5.2. Configure-to-Order Service

Make the computer more tailored to your needs by selecting one or more components from the list below to be fabricated to the computer.

| SSD-25032	Memoright 2.5" 32GB SATAII SSD kit
SSD-25016	Memoright 2.5" 16GB SATAII SSD kit
GPS-UART Kit	U-BLOX GPS Kit
WIFI-AT2350	Atheros AR9462 WiFi module w/ 20cm & 30cm internal wiring
ANT-D11	1 x WiFi Dual-band 2.4G/5G antenna
HSPA-SI1400	HSUPA 3.75G module kit & internal wiring
MM-3I-4G	Industrial-grade DDR3-1333 4GB SDRAM
MK-3I-8G	Industrial-grade DDR3-1600 8GB SDRAM

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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.
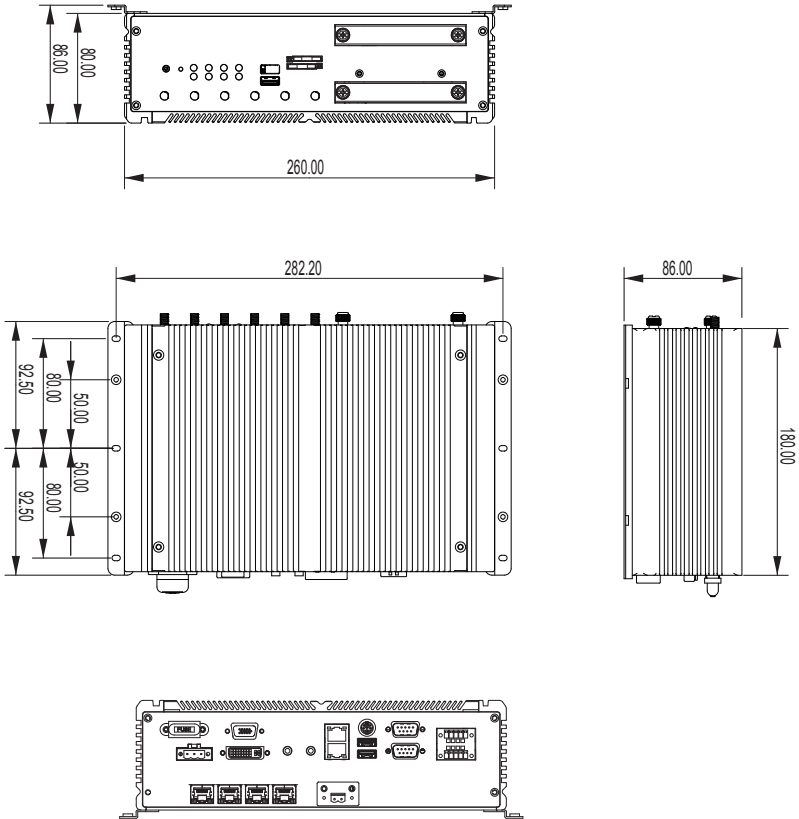
2.2. Take A Tour

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

⑤ **Antenna holes stopped up by plugs**
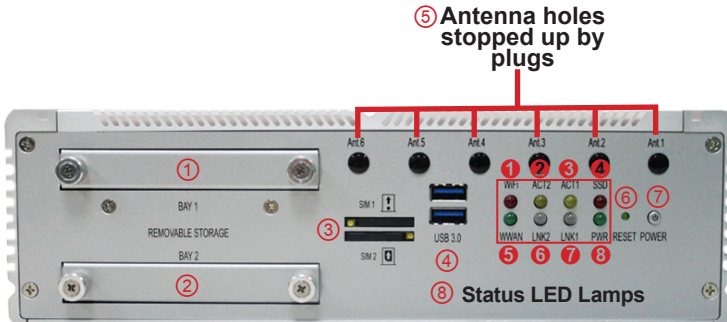
⑧ **Status LED Lamps**

• **I/O**

No.	Description	No.	Description
①	SSD tray 1	⑤	Antenna holes stopped up by plugs
②	SSD tray 2	⑥	Reset button (accessible with a pin)
③	SIM1/2 card slots	⑦	Power button
④	USB 3.0 port	⑧	LED Indicator

• **Status LED Lamps:**

No.	LED Color	Description
❶	Red	This LED lights red when WiFi is on.
❷	Yellow	This LED lights yellow when LAN2 port is streaming data.
❸	Yellow	This LED lights yellow when LAN1 port is streaming data.
❹	Red	This LED lights red when SSD is being accessed.

❺	Green	This LED lights green when 3G is on.
❻	Green	This LED lights green when LAN2 port is connected to 100M bit/s network equipment.
	Orange	This LED lights orange when LAN2 port is connected to 1000M bit/s network equipment.
❼	Green	This LED lights green when LAN1 port is connected to 100M bit/s network equipment.
	Orange	This LED lights orange when LAN1 port is connected to 1000M bit/s network equipment.
❽	Green	This LED lights when power is on.

Rear View
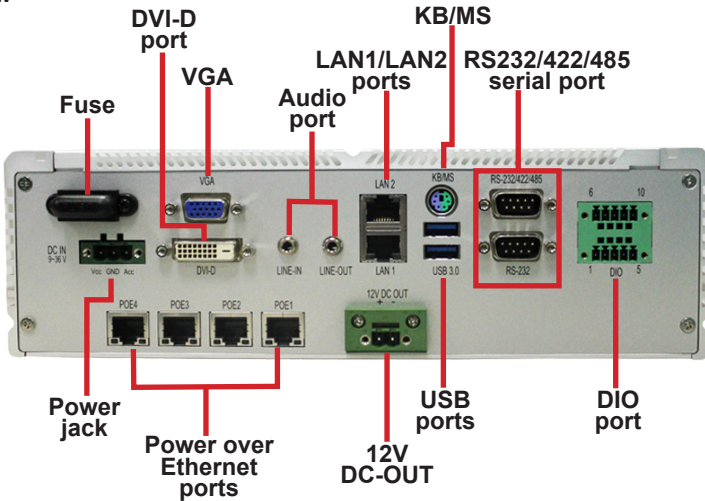
2.3. Driver Installation Notes

The computer supports the operating systems of Windows 7. Find the necessary device drivers on the CD that comes with your purchase. DO follow the sequence below to install the drivers to prevent errors:

<div align="center">

Chipset→VGA→Audio→Ethernet→ME

</div>

Paths to find device drivers on CD:

Windows 7	
Device	**Driver Path**
Chipset	\Chipset\ (infinst_autol_V9.4.0.1026.exe)
VGA	32Bit : \VGA\32Bit\ (Win32_15338.exe)
	64Bit: \VGA\64Bit\ (Win64_15338.exe)
Audio	32Bit : \Audio\Win7_8_Vista\ (32bit_Win7_Win8_Win81_R273.exe)
	64Bit: \Audio\Win7_8_Vista\ (64bit_Win7_Win8_Win81_R273.exe)
Ethernet	32Bit : \ Ethernet\Win7\ (PROWin32.exe)
	64Bit: \ Ethernet\Win7\ (PROWinx64.exe)
Intel® Management Engine	\ME (Setup.exe)
USB3.0	\USB3.0\ (Setup.exe)

Windows 8.1	
Device	**Driver Path**
Chipset	\Chipset\ (infinst_autol_V9.4.0.1026.exe)
VGA	32Bit : \VGA\32Bit\ (Win32_15338.exe)
	64Bit: \VGA\64Bit\ (Win64_15338.exe)
Audio	32Bit : \Audio\Win7_8_Vista\ (32bit_Win7_Win8_Win81_R273.exe)
	64Bit: \Audio\Win7_8_Vista\ (64bit_Win7_Win8_Win81_R273.exe)
Ethernet	32Bit : \ Ethernet\Win8\ (PROWin32.exe)
	64Bit: \ Ethernet\Win8\ (PROWinx64.exe)
Intel® Management Engine	\ME (Setup.exe)
USB3.0	\USB3.0\ (Setup.exe)

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Chapter 3

System Configuration

3.1. Board Layout

The engine of the computer is constructed by a CPU board and a carrier board.Following in this section you will be guided through the CPU boards and carrier board of the computers.
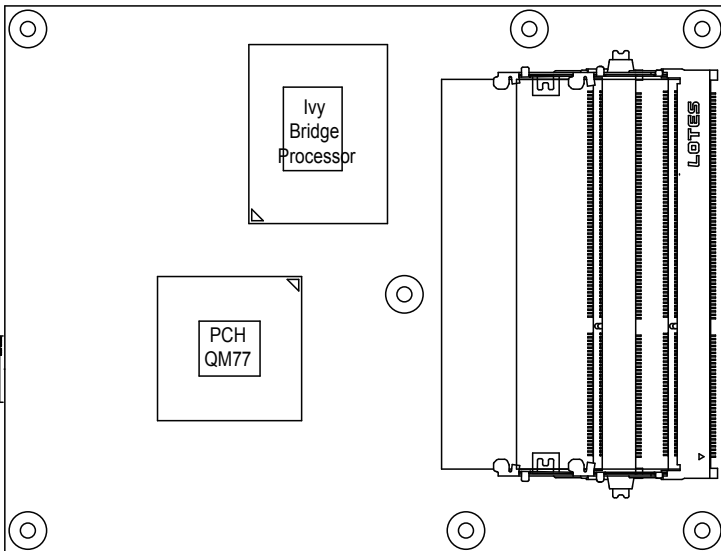
3.1.1. CPU Boards

The CPU board for ARTS-4770 is EmETXe-i77M2-3517UE.

3.1.1.1. ARTS-4770 - EmETXe-i77M2-3517UE

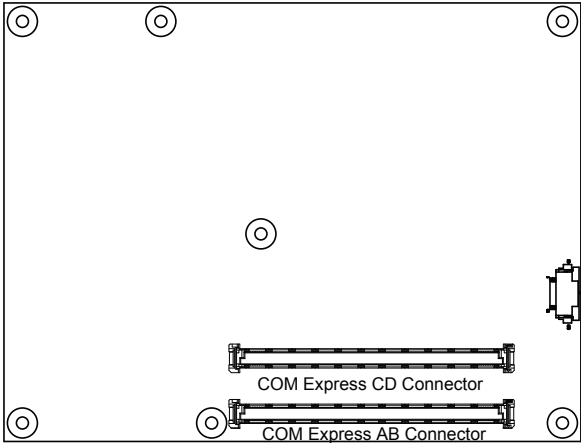The CPU board for ARTS-4770 is EmETXe-i77M2-3517UE, with Intel® Core™ i7-3517UE.

Top View

Bottom View
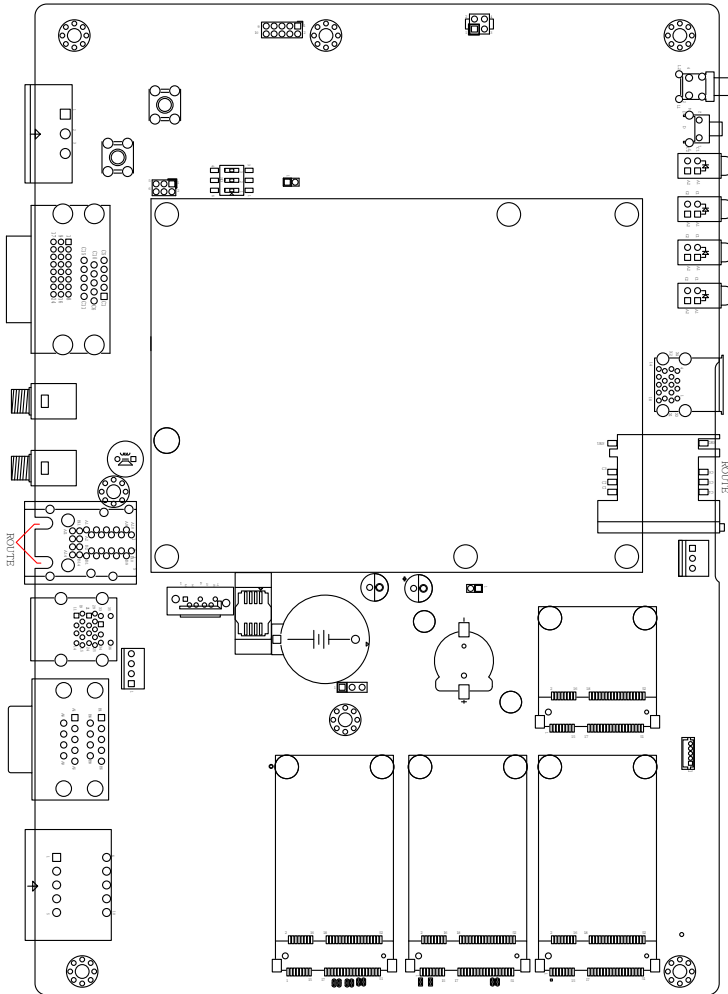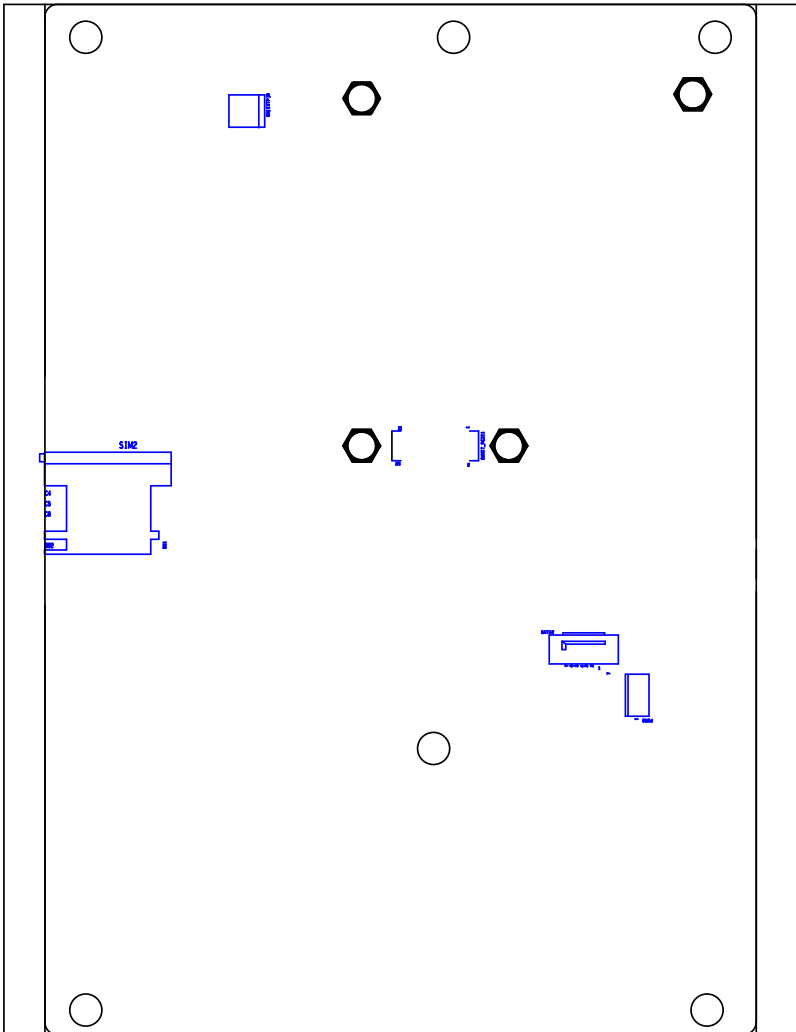
COM Express® AB Connector
COM Express® CD Connector

COM Express CD Connector
COM Express AB Connector

3.1.2. Carrier Board

PBC-1916 is the carrier board.

PBC-1916: Board Top

PBC-1916: Board Bottom

3.2. Jumpers and Connectors

The carrier board PBC-1916 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

JBAT1

Function: CMOS Setting
Jumper Type: Onboard 2.54mm-pitch 1x3-pin header
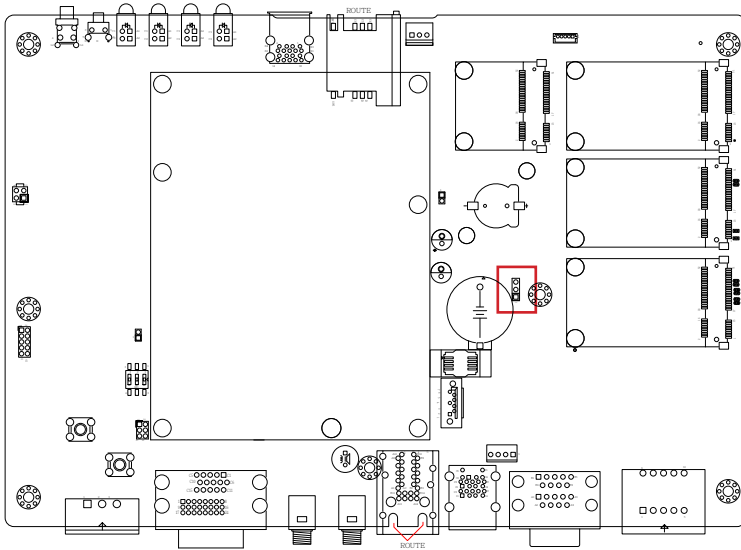
Setting: Short pin 1 and pin 2 to keep CMOS.
                 (The default setting.)

                 Short pin 2 and pin 3 to clear CMOS.

Board Top

JACON1

Function: Vehicle Acc mode selection

1 ▢○

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

Setting: Open: for Vehicle (default), without jumper

Close: for Automation, with jumper

Board Top
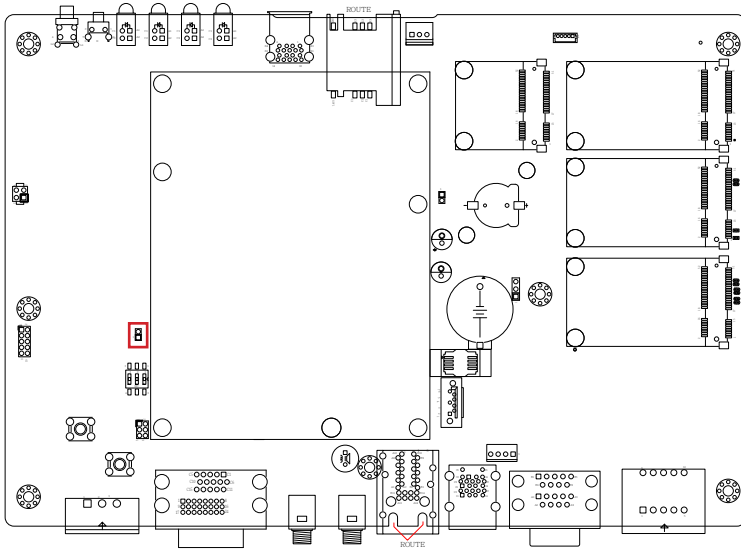
SW1

Function: Battery Type Selection
Switch Type:

Setting: (1-6) ON 24V

(2-5) ON 12V

(3-4) ON 9~36V (default)
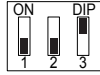
Board Top
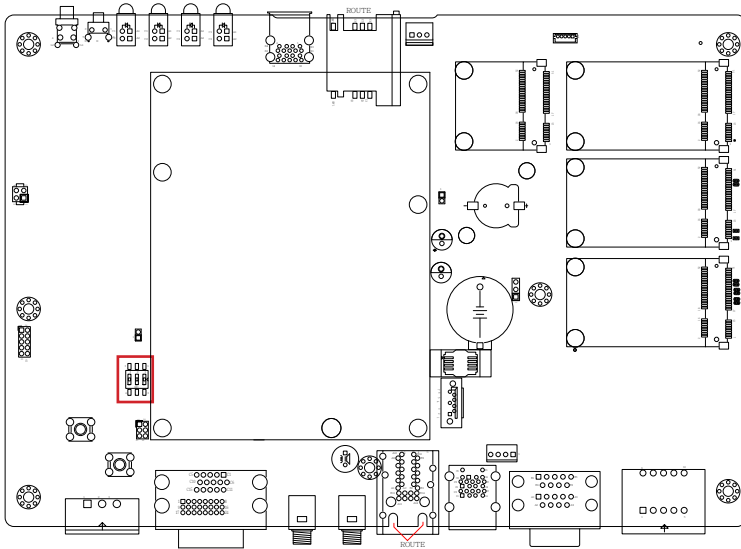
3.2.2. Connectors

CN5(RSTB)1

Function: Power And Reset Button
Connector Type: Onboard 2.54 mm-pitch 2x2-pin header

Setting: 1. Reset Button
         2. GND
         3. Power Button
         4. GND

Board Top
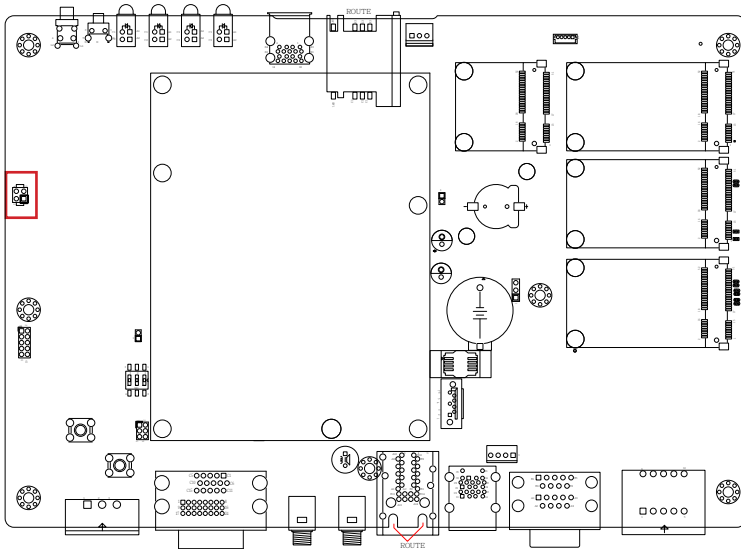
JPIC1

Function: PIC MCU Update Port
Connector Type: Onboard 2.00mm-pitch 2x3-pin header

Setting: 1. PIC_TX
2. Clock
3. Data
4. GND
5. 5V
6. Reset

Board Top
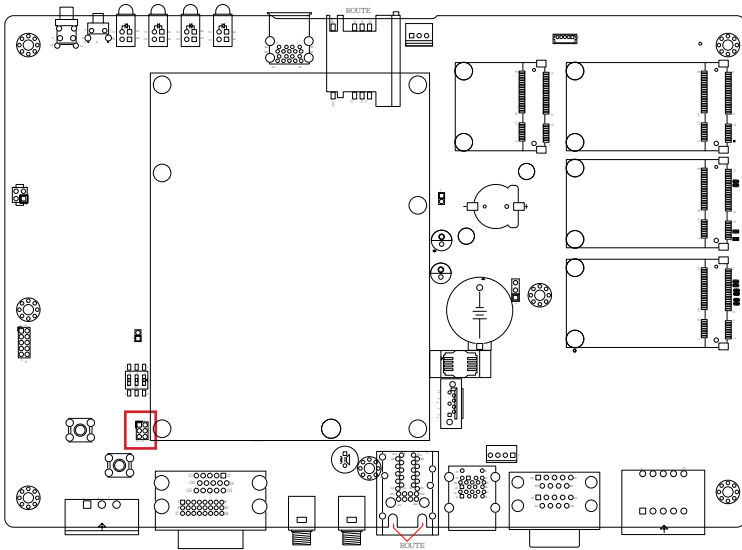
PWRIN1

Function: Power Input Connector
Connector Type: Onboard 2.54mm-pitch 1x3-pin header
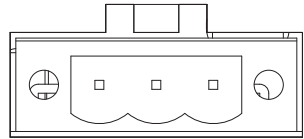
Pin	Description
1	VCC_IN 9~36V
2	GND
3	ACC

Board Top
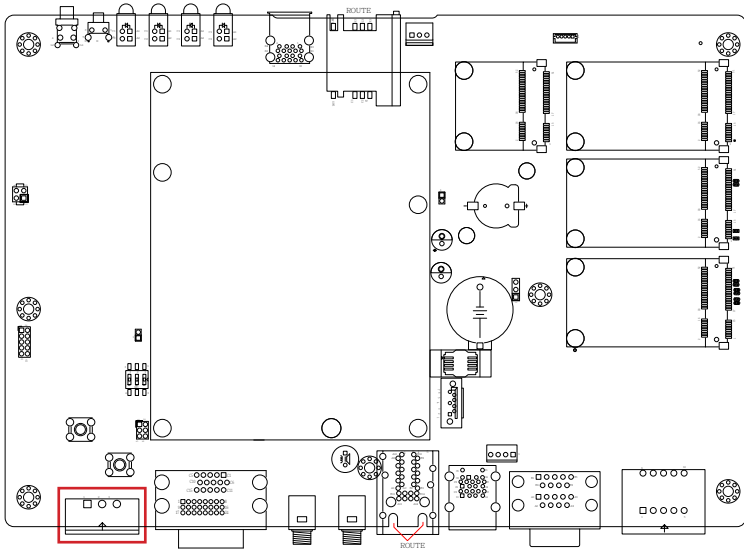
JGPS1

Description: GPS Port Connector(USB interface)
Connector Type: Onboard 2.00mm pitch 5-pin wafer connector

Pin	Description
1	5VCC
2	Data-
3	Data+
4	3.3V GPS VBackup
5	GND
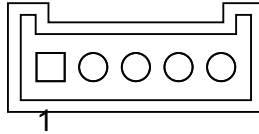
Board Top
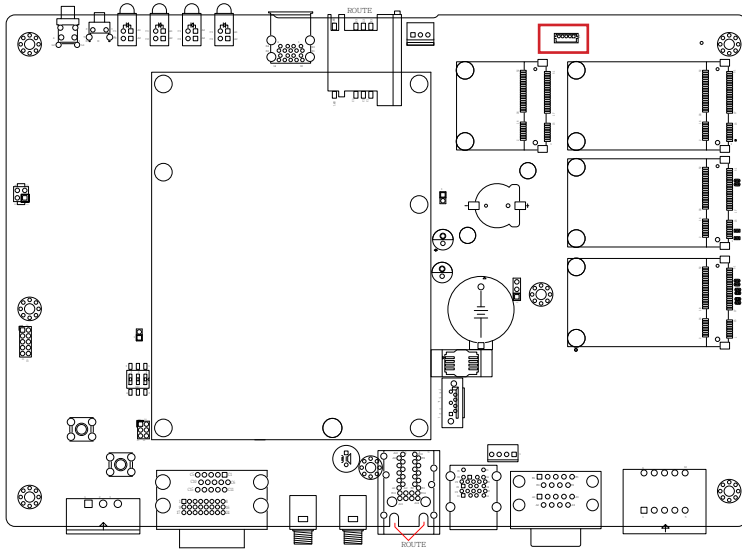
PWR1 & PWR2

Description: SATA1 And SATA2 Power connector
Connector Type: Onboard 3.96mm-pitch 4-pin wafer connector

Pin	Description
1	VCC5
2	GND
3	GND
4	VCC12
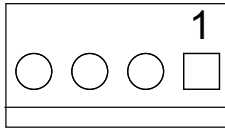
Board Top
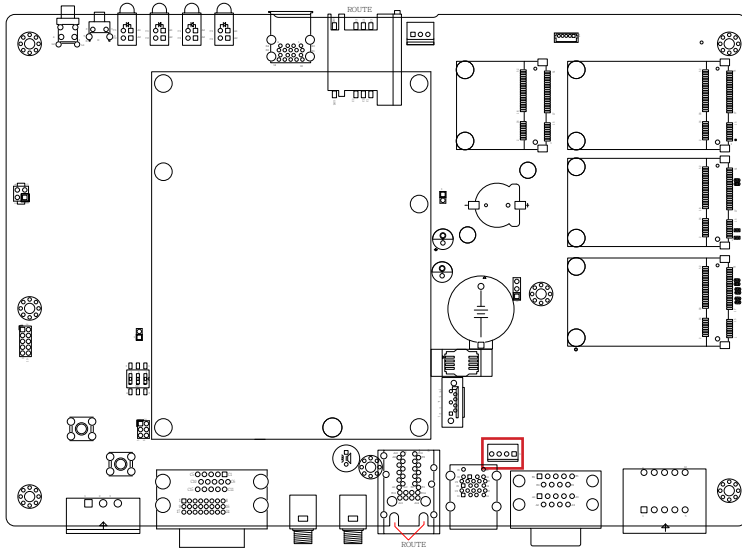
Board Bottom
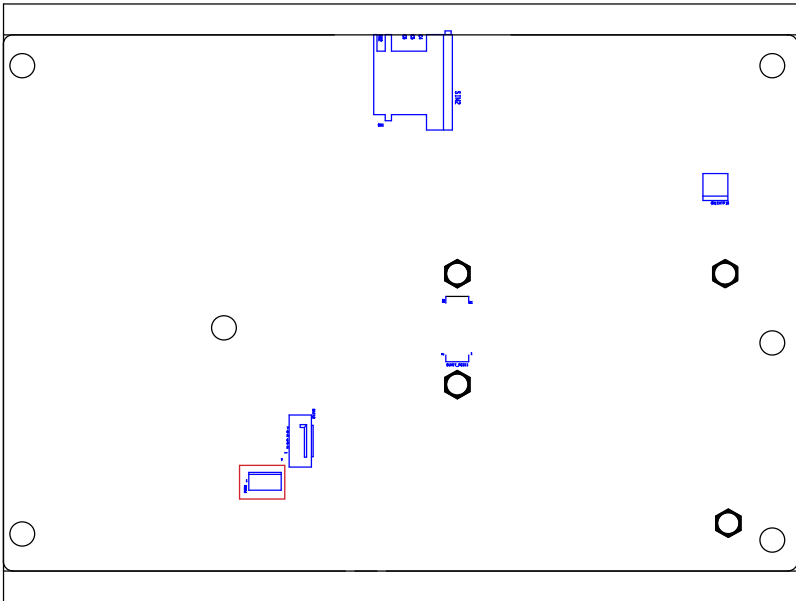
COM1& COM2

Function: RS-232 Port (COM1), RS-232/422/485 (COM2)
Connector Type: External 9-pin D-sub male connector
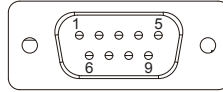
Board Top
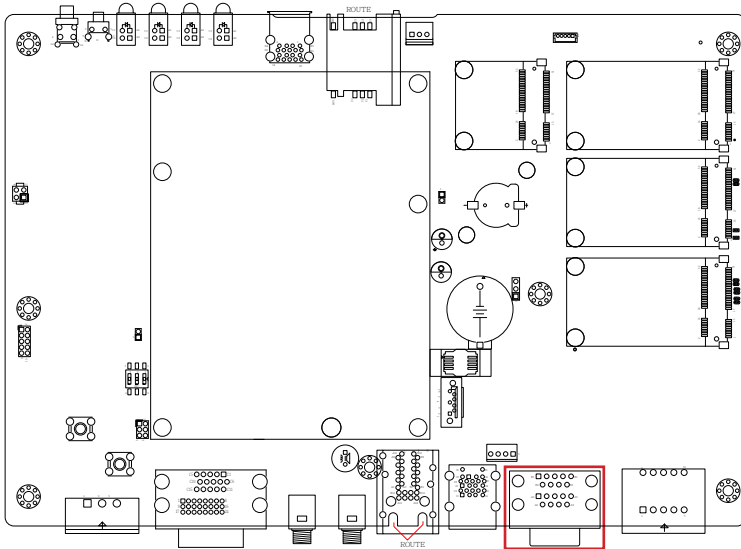
CN10

Description: DIGITAL SINGAL INPUT AND OUTPUT
Connector Type:
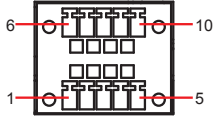
Pin	Description	Pin	Description
1	Digital Input 1	6	Digital Output 1
2	Digital Input 2	7	Digital Output 2
3	Digital Input 3	8	Digital Output 3
4	Digital Input 4	9	Digital Output 4
5	Ground		

Board Top
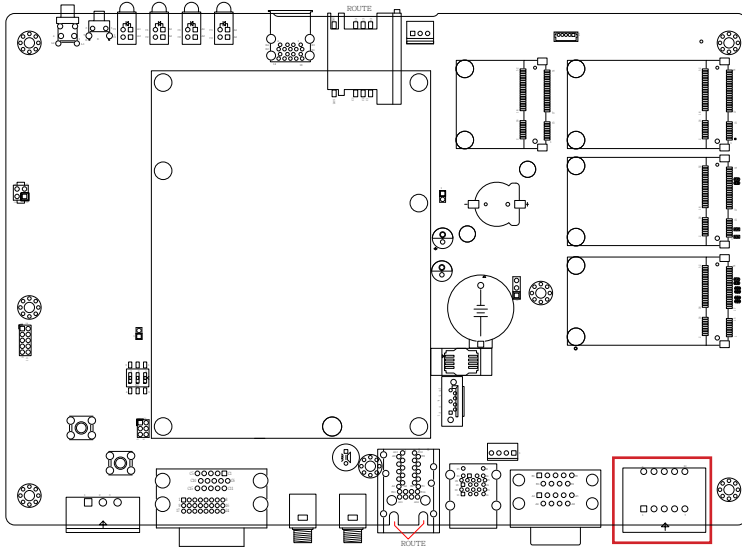
CN3(P80)1

Description: Port 80 Output
Connector Type:

Pin	Description	Pin	Description
1	PCI_CLK	2	GND
3	LPC_FRAME#	4	LPC_LAD0
5	PLTRST	6	PLTRST
7	PLC_LAD3	8	PLC_LAD2
9	VCC3	10	PLC_LAD1
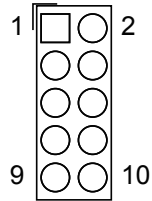
Board Top
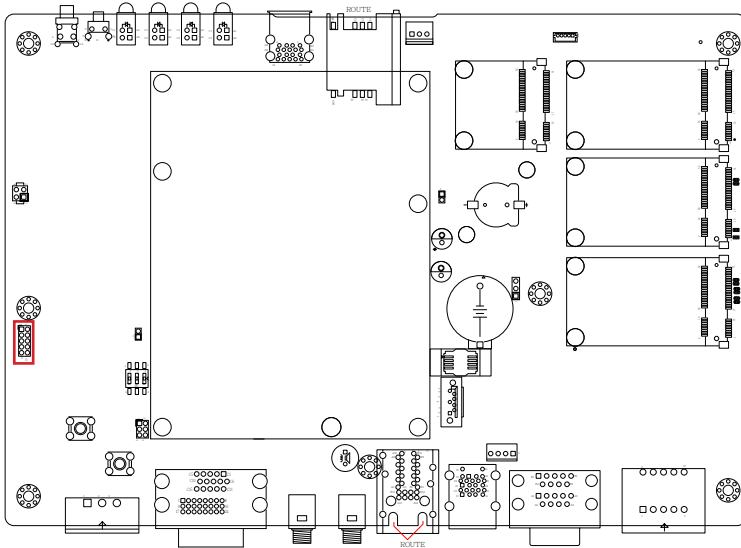
CN(EXTP)6

Description: External Power Connector
Connector Type: Onboard 3.96mm-pitch 2-pin wafer connector

Pin	Description
2	GND
1	DCIN_VCC
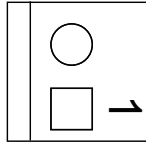
Board bottom
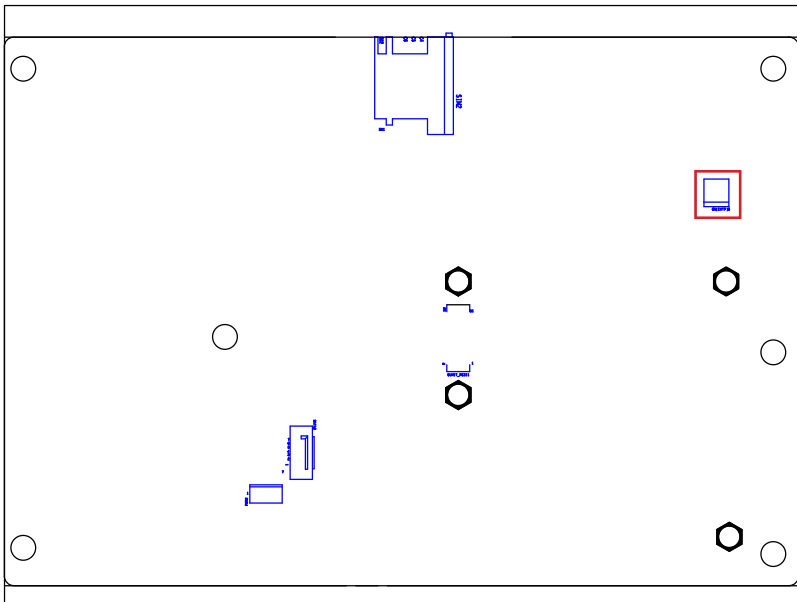
SATA1

Description: Serial ATA connectors for storage devices
Connector Type: 7-pin serial ATA connector

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND
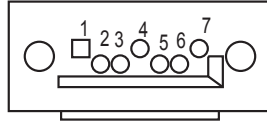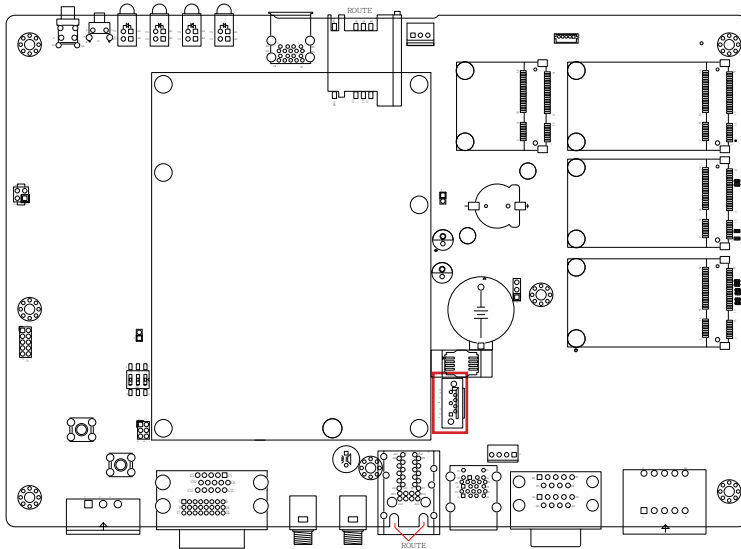
Board Top

SATA2

Description: Serial ATA connectors for storage devices
Connector Type: 7-pin serial ATA connector

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND
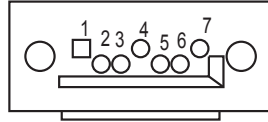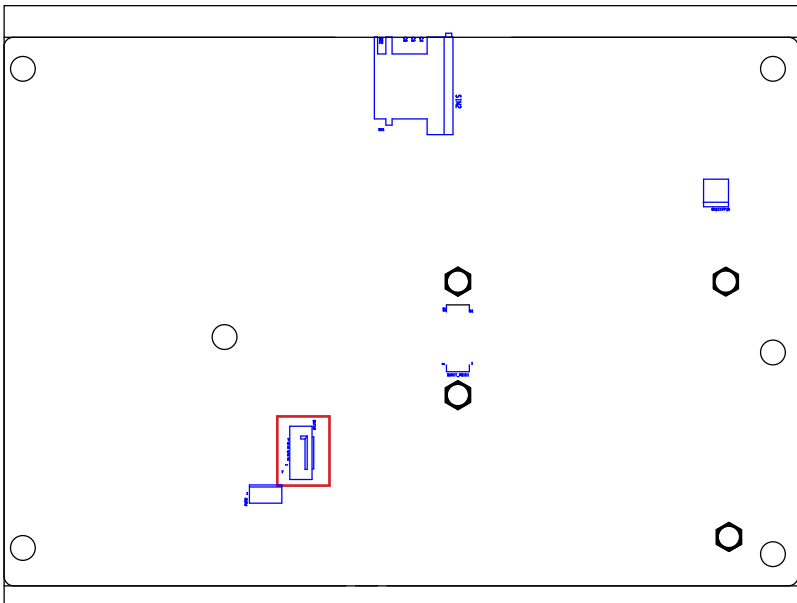
Board Top

KBUSB1

Function: Keyboard/mouse PS/2 and USB 3.0 stacked port

Connector Type: 6-pin Mini-DIN and Type A USB 3.0 stacked connectors

Pin Assignment:

Keyboard (Purple)

MS_CLK — KB_CLK
KB_VCC — KB_GND
MS_DAT — KB_DAT

A

B
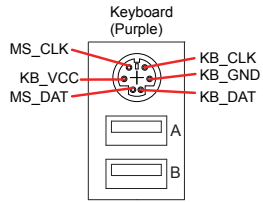
The pin assignments conform to the industry standard.

Board Top
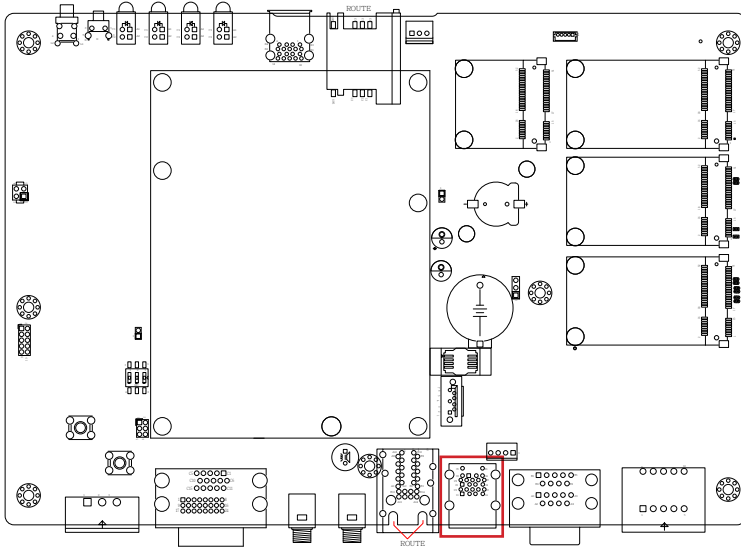
MC1 & MC2

Description: PCI Express Mini-card sockets
Connector Type: Onboard 0.8mm-pitch 52-pin edge card connector
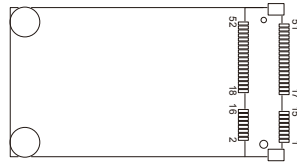
Pin	Desc.	Pin	Desc.	Pin	Desc.	Pin	Desc.
1	Wake	16	UIM_VPP				
2	+3.3V	17	UIM_C8/Reserved				
3	COEX1	18	GND	31	PETn0		
4	GND	19	UIM_C4/Reserved	32	SMB_DATA	43	GND
5	COEX2	20	W_Disable#	33	PETp0	44	LED_WLAN#
6	+1.5V	21	GND	34	GND	45	Reserved
7	CLKREQ#	22	PERST#	35	GND	46	LED_WPAN#
8	UIM_PWR	23	PERn0	36	USB_D-	47	Reserved
9	GND	24	+3.3V	37	GND	48	+1.5V
10	UIM_DATA	25	PERp0	38	USB_D+	49	Reserved
11	REFCLK-	26	GND	39	+3.3V	50	GND
12	UIM_CLK	27	GND	40	GND	51	Reserved
13	REFCLK+	28	+1.5V	41	+3.3V	52	+3.3V
14	UIM_RESET	29	GND	42	LED_WWAN#		
15	GND	30	SMB_CLK				

Board Top
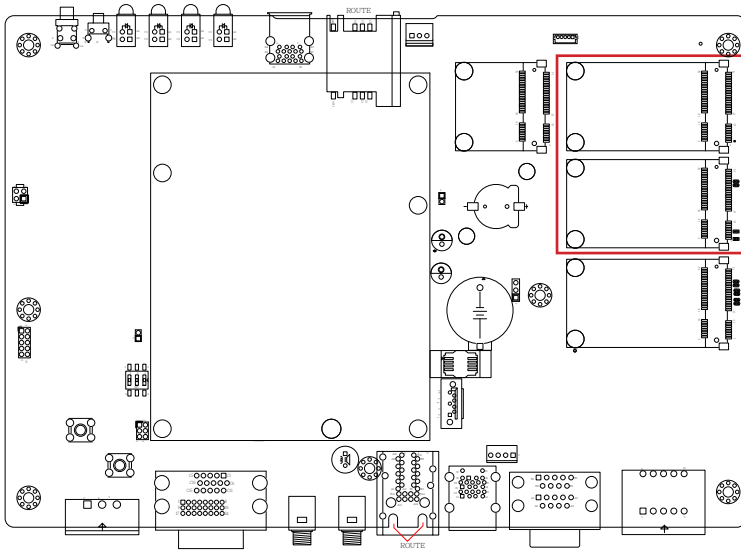
MC3

Description: PCI Express Mini-card socket
Connector Type: Onboard 0.8mm-pitch 52-pin edge card connector

Pin	Desc.	Pin	Desc.
1	WAKE#	16	N/C
2	+3.3V	17	N/C
3	N/C	18	GND
4	GND	19	N/C
5	N/C	20	W_DISABLE#
6	+1.5V	21	GND
7	CLKREQ#	22	PCIE_ARST#
8	UIM_PWR_A	23	PE_CAD3_RX-
9	GND	24	+3.3V
10	UIM_DATA_A	25	PE_CAD3_RX+
11	REFCLK-	26	GND
12	SIM_CLK_A	27	GND
13	REFCLK+	28	+1.5V
14	UIM_RST_A	29	GND
15	GND	30	SMB_CLK
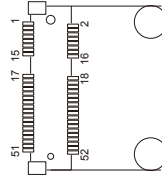
Pin	Desc.	Pin	Desc.
31	PE_CAD3_TX-	42	3G_LED_A
32	SMB_DATA	43	GND
33	PE_CAD3_TX+	44	N/C
34	GND	45	N/C
35	GND	46	N/C
36	USB_D-	47	N/C
37	GND	48	+1.5V
38	USB_D+	49	N/C
39	+3.3V	50	N/C
40	GND	51	N/C
41	+3.3V	52	+3.3V

Board Top

MSATA1

Description: mSATA socket
Connector Type: Onboard 0.8mm pitch 52-pin edge card connector

Pin	Desc.	Pin	Desc.	Pin	Desc.
1	NC	20	NC	36	NC
2	+3.3V	21	GND	37	GND
3	NC	22	NC	38	NC
4	GND	23	TX+	39	+3.3V
5	NC	24	+3.3V	40	GND
6	NC	25	TX-	41	+3.3V
7	NC	26	GND	42	NC
8	NC	27	GND	43	GND
9	GND	28	NC	44	NC
10	NC	29	GND	45	NC
11	NC	30	NC	46	NC
12	NC	31	RX-	47	NC
13	NC	32	NC	48	NC
14	NC	33	RX+	49	NC
15	GND	34	GND	50	GND
16	NC	35	GND	51	NC
17	NC			52	+3.3V
18	GND				
19	NC				
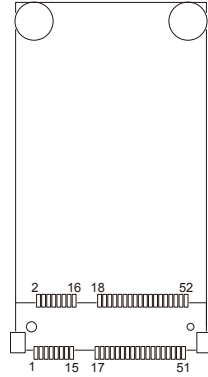
Board Top
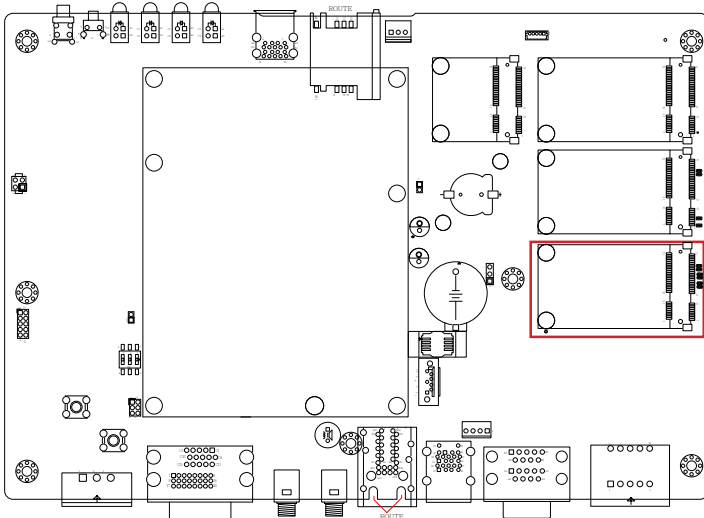
LAN1 & 2

Function: 2 x Ethernet 10/100/1000 Mbps Connectors

Connector type: RJ-45 stacked connector with LED

Pin	Description	Pin	Description
1	MDI0+	5	MDI2+
2	MDI0-	6	MDI2-
3	MDI1+	7	MDI3+
4	MDI10-	8	MDI3-

LAN2

LAN1
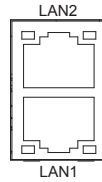
Board Top
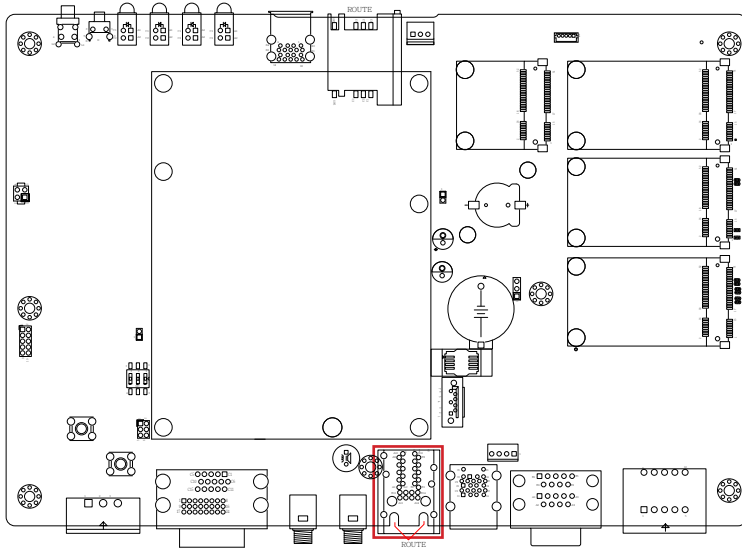
VGA1
Function: Analog RGB & DVI-D Connector

Connector type: Analog RGB (D-Sub 15-pin female type) + DVI-D (DVI-D female connector)
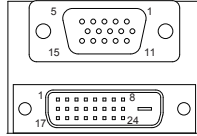
Analog RGB

DVI-D

Analog RGB Connector

Pin	Description	Pin	Description	Pin	Description
1	RED	6	GND	11	N/C
2	GREEN	7	GND	12	VDDAT
3	BLUE	8	GND	13	HSYNC
4	N/C	9	+5V	14	VSYNC
5	GND	10	GND	15	VDCLK

DVI-D Connector

Pin	Description	Pin	Description	Pin	Description
1	TMDS Data 2-	9	TMDS Data 1-	17	TMDS Data 0-
2	TMDS Data 2+	10	TMDS Data 1+	18	TMDS Data 0+
3	GND	11	GND	19	GND
4	NC	12	NC	20	NC
5	NC	13	NC	21	NC
6	DDC clock	14	+5V	22	GND
7	DDC data	15	GND	23	TMDS clock+
8	NC	16	Hot plug detect	24	TMDS clock-

Board Top
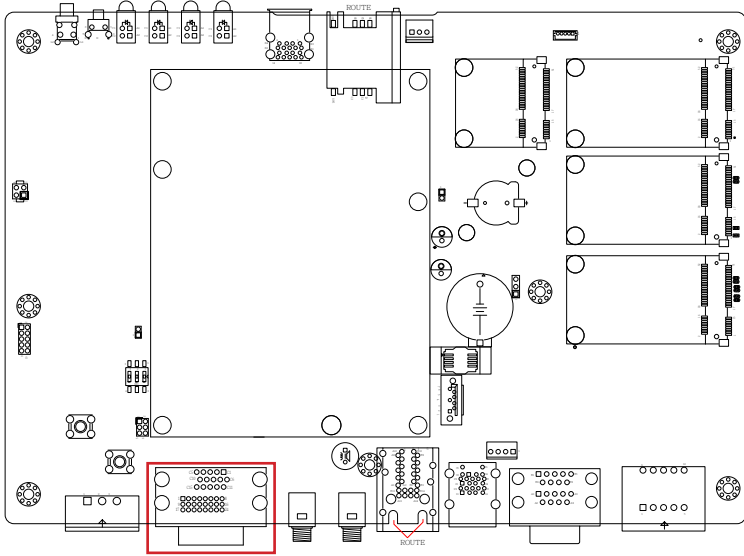
SIM1&2

Description: SIM card socket
Connector Type: 6-pin SIM card socket

Pin	Description	Pin	Description
C5	GND	C1	POWER VOLTAGE
C6	NC	C2	RESET SIGNAL
C7	I/O	C3	CLOCK SIGNAL
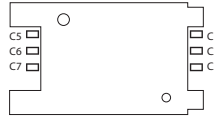
Board Top
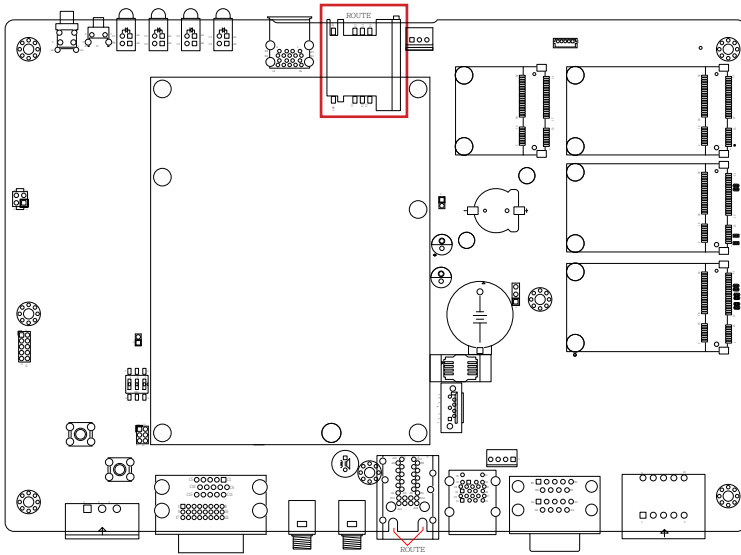
USB1

Function: Double-stacked USB ports
Connector Type: Two SuperSpeed type-A USB 3.0 connectors
Pin Assignment:

Pin	Description	Pin	Description
1	VBUS	2	D-
3	D+	4	GND
5	StdA_SSRX-	6	StdA_SSRX+
7	GND	8	StdA_SSTX-
9	StdA_SSTX+		
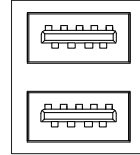
Board Top
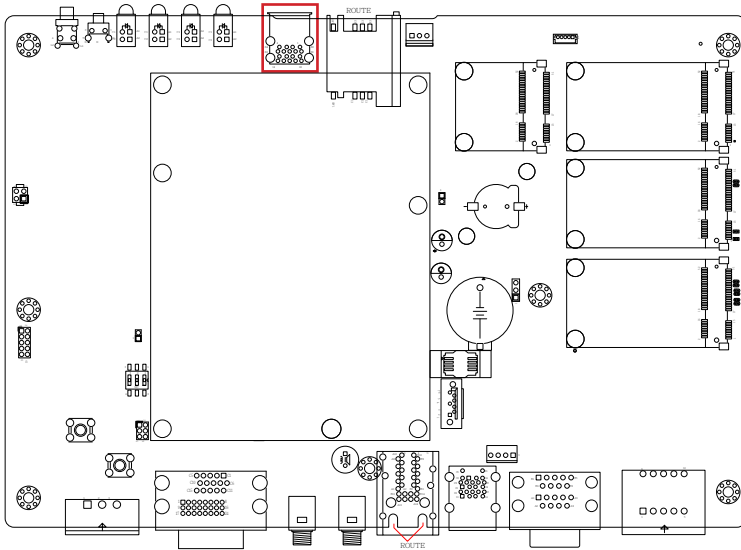
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Chapter 4

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.

4.1.1. Open the Computer

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

1. Place the computer on a flat surface. Loosen and remove the 4 screws from the top cover as marked in the illustration below.
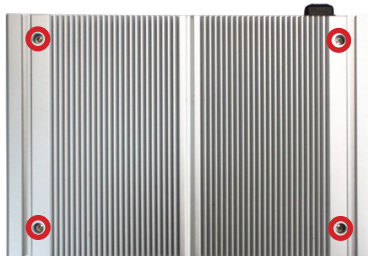
2. Dismount the top cover.

    The inside of the computer comes to view.
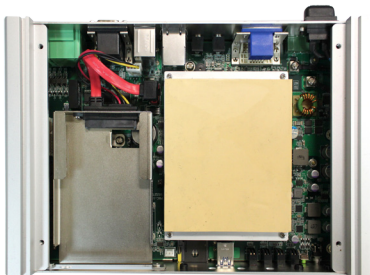
▸   To adjust jumpers or connect/disconnect devices to/from the carrier board, see 3.2.1. Jumpers on page 18 and 3.2.2. Connectors on page 21.

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.

ARTS-4770 Front

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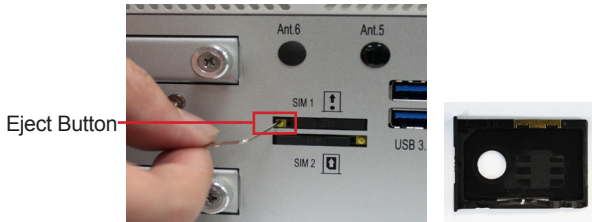
3. Put the SIM card into the slot jacket as directed in the illustration below. Push-insert the SIM card into the slot.
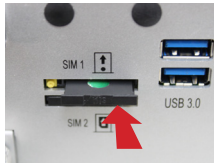
Push-insert the SIM card.

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 HDD/SSD

The ARTS-4770 supports two 2.5-inch SSD storage devices. To install a 2.5" SSD to the computer, follow through the guide below:

1. On the front panel of the computer, find the two drawer-like brackets, each has two screws to fix it.

ARTS-4770 Front

2. Loose the screws and pull out the bracket.
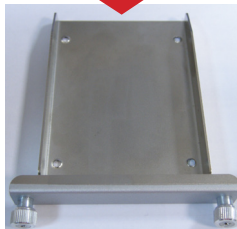
3. Slide a 2.5-inch SSD into the bracket.

4. Fix the assemblage with four screws.

Two screws on one side.

The other two screws on
the other side.
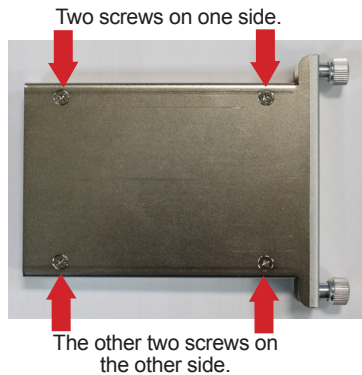
5. Plug the bracket (with the SSD) back to the computer, and fasten screws.\

4.1.4. Disassemble SSD bracket

Before Wi-Fi/3G/GPS module Installation, please remove the 2.5 drive bay bracket.

1.   Open the Computer as instruction of .
2.   Remove SSD from Bay1.

3.   Remove the SATA and SSD power cable from connectors
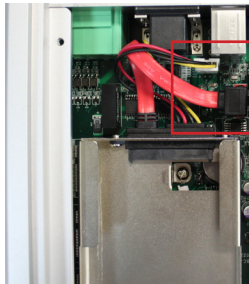
4.   Loose the screws of 2.5 drive bay bracket and remove it.
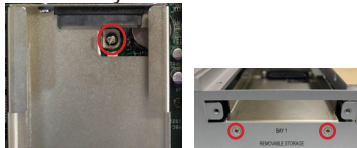
4.1.5. Install Memory Module on CPU Module

1. Open the computer as <u>4.1.1. Open the Computer</u>

2. Loose the 6 screws one the heat sink. Caution: There are two screws under the heat spreading gel.
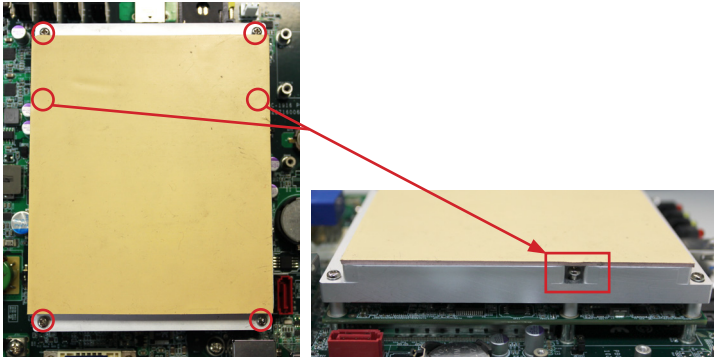
3. Locate the Memory module slot and insert the memory module.
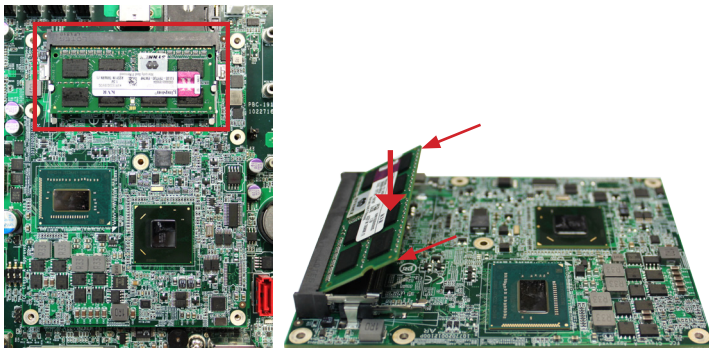
4. Put the heat sink back and fix it by fastening the 6 screws.

5. Assemble the Top cover.

4.2. Mount the Computer

Integrate the computer to where it works by mounting it to a wall in the surroundings. Such integration relies on a wall-mount kit, which comes with the computer. Follow through the guide below to assemble the kit to the computer:

1. Place the computer on a flat surface, with the bottom facing up. Find the screw holes at its bottom as marked in the red circles in the illustration below:
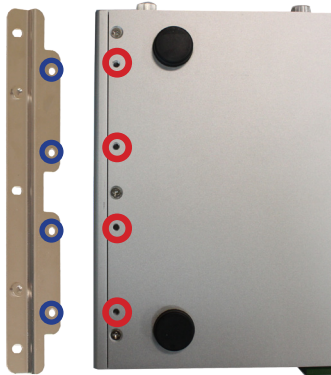
2. Have the two wall-mount brackets. Use the screws included in the wall-mount kit to assemble the brackets to the computer's bottom. (See the illustration above).

3. Use the other screw holes and cutouts on both wall-mount brackets to mount the computer to a wall. (See the green circles in the illustration below).

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.

4.31 Vehicle Application

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

Vcc GND Acc

receptacle

connect

captive screw

Vcc GND Acc

protective cap

Car Key Acc Signal
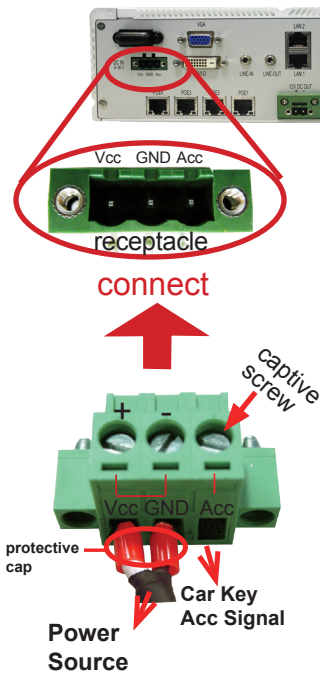
Power Source

1. To turn on the Vehicle Acc for Vehicle application, please refer to Jumper setting of

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

Vcc GND Acc

receptacle

connect

captive screw

+ -

DC-IN

terminal block

power adapter
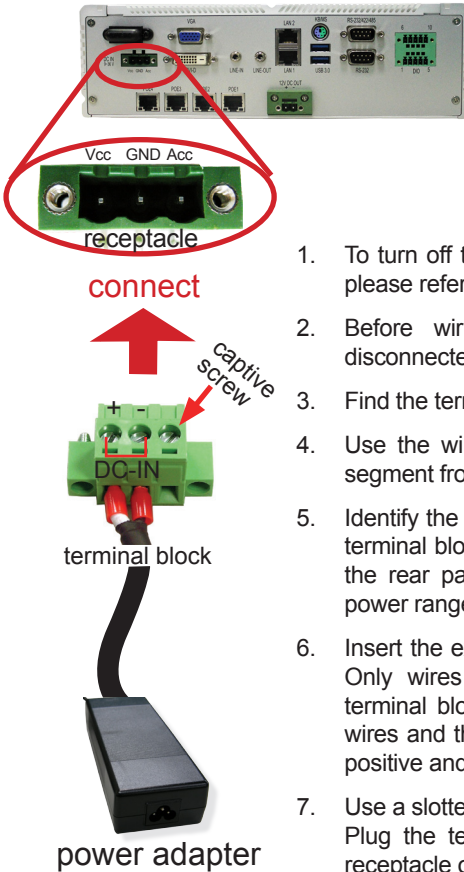
1. To turn off the Vehicle Acc for Automation application, please refer to Jumper setting of

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.

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.

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
 Main  Advanced  Chipset  Boot  Security  Save & Exit

 BIOS Information                                    Choose the system default
 Project Version          ARTS-4770 1.02             language.
 Build Date and Time      03/03/2014 14:21:48


 System Date              [Fri 04/11/2014]
 System Time              [14:04:38]

 Access Level             Administrator
                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit


            Version 2.15.1236. Copyright  (C) 2012 American Megatrends, Inc.
```

The BIOS Setup utility features the following menus:

Menu	Description
Main	See 5.1.1. Main on page 58 .
Advanced	See 5.1.2. Advanced on page 59.
Chipset	See 5.1.3. Chipset on page 69.
Boot	See .5.1.4. Boot on page 74
Security	See .5.1.5. Security on page 76
Save & Exit	See .5.1.6. Save & Exit on page 77

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.
F10	Exits the utility saving the changes that have been made. (The screen then prompts a message asking you to select **OK** or **Cancel** to exit saving changes.)

Note: Pay attention to the "WARNING" that shows at the left pane onscreen when making any change to the BIOS settings.

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. ARTS-4770 BIOS

This section will guide you to the BIOS Setup utility featured by the ARTS-4770.

5.1.1. Main

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

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit

   BIOS Information                                      Choose the system default
   Project Version             ARTS-4770 1.02            language.
   Build Date and Time         03/03/2014 14:21:48


   System Date                 [Fri 04/11/2014]
   System Time                 [14:04:38]

   Access Level                Administrator


                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F9: Optimized Defaults
                                                         F10: Save & Exit
                                                         ESC: Exit


          Version 2.15.1236. Copyright  (C) 2012 American Megatrends, Inc.
```

The BIOS info displayed are:

Group	Info	Description
BIOS Information	**BIOS Version**	Delivers the system's BIOS version.
	Build Date and Time	Delivers the date and time while the BIOS Setup utility was created/updated.
Access Level		Delivers the level that the BIOS is being accessed at the moment. (Only **Administrator Level** is available.)

The featured settings are:

Setting	Description
System Time	Sets system time.
System Date	Sets system date.

5.1.2. Advanced

Access the **Advanced** menu to manage the computer's system configuration including the Super IO chip.

```
            Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
    Main  Advanced  Chipset  Boot  Security  Save & Exit

  ► ACPI Settings                             System ACPI Parameters
  ► S5 RTC Wake Settings
  ► CPU Configuration
  ► SATA Configuration
  ► AMT Configuration
  ► USB Configuration
  ► F71869E Super IO Configuration
  ► UART Switch Configuration
  ► H/W Monitor
  ► F81216 Second IO Configuration
  ► CPU PPM Configuration
                                            →←: Select Screen
                                            ↓ ↑: Select Item
                                            Enter: Select
                                            +/-: Change Opt.
                                            F1: General Help
                                            F2: Previous Values
                                            F9: Optimized Defaults
                                            F10: Save & Exit
                                            ESC: Exit


            Version 2.15.1236. Copyright  (C) 2012 American Megatrends, Inc.
```

The featured settings and submenus are:

Setting	Description
ACPI Settings	See 5.1.2.1. ACPI Settings on page 60.
S5 RTC Wake Settings	See 5.1.2.2. S5 RTC Wake Settings on page 60.
CPU Configuration	See 5.1.2.3. CPU Configuration on page 61.
SATA Configuration	See 5.1.2.4. SATA Configuration on page 62.
AMT Configuration	See 5.1.2.5. AMT Configuration on page 63.
USB Configuration	See 5.1.2.6. USB Configuration on page 65.
F71869E Super IO Configuration	See 5.1.2.7. F71869E Super IO Configuration on page 66.
UART switch setting	See 5.1.2.8. UART Switch Setting on page 67.
H/W Monitor	See 5.1.2.9. H/W Monitor on page 67.
F81216 Second Super IO Configuration	See 5.1.2.10. F81216 Second Super IO Configuration on page 68.
CPU PPM Configuration	See 5.1.2.11. CPU PPM Configuration on page 68.

5.1.2.1. ACPI Settings

Access this submenu to configure the system's ACPI (Advanced Configuration and Power Interface). The featured settings are:

The featured settings are:

Setting	Description
Enable Hibernation	Enables/disables the system to/from hibernation (OS/S4 Sleep State). ▶ This option may not be effective with some OS. ▶ **Enabled** is the default.

5.1.2.2. S5 RTC Wake Settings

Access this submenu to enable/disable the system to wake up on a specified time.

The featured setting is:

Setting	Description		
Wake System with Fixed Time	Sets if to awake the system at a defined moment. ▶ Options available are **Enabled** and **Disabled** (default). ▶ Enable this feature to awake the system at a defined moment in time. When enabled, the following settings become available:		
	Setting	**Description**	
	Wake up hour	Defines the (hour) time to awake the system. ▶ 0 to 23 configurable.	
	Wake up minute	Defines the (minute) time to awake the system. ▶ 0 to 59 configurable.	
	Wake up second	Defines the (second) time to awake the system. ▶ 0 to 59 configurable.	
Wake System with Dynamic TIme	Sets if to awake the system some time in the future. ▶ Options available are **Enabled** and **Disabled** (default). ▶ Enable this feature to awake the system some time from now. When enabled, the following setting becomes available:		
	Setting	**Description**	
	Wake up minute increase	Defines how long from now to awake the system. ▶ 1 to 5 minutes configurable.	

5.1.2.3. CPU Configuration

Select **CPU Configuration** to run a report of the CPU's details including the hardware version, software version, model name, processor speed, microcode revision, max./min. processor speeds, the amount of processor core(s), and CPU caches. See the depiction below:

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
    Main   Advanced   Chipset   Boot   Security   Save & Exit

    CPU Configuration

    Intel(R) Core(TM) CPU i7-3517UE @ 1.70GHz
    CPU Signature                    306a9
    Microcode Patch                  ffff0006
    Max CPU Speed                    2000 MHz
    Min CPU Speed                    800 MHz
    CPU Speed                        2200 MHz
    Processor Cores                  4
    Intel HT Technology              Supported
    Intel VT-x Technology            Supported
    Intel SMX Technology             Supported        →←: Select Screen
    64-bit                           Supported        ↓ ↑ : Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
    L1 Data Cache                    32 kB x 2        F1: General Help
    L1 Code Cache                    32 kB x 2        F2: Previous Values
    L2 Cache                         256 kB x 2       F9: Optimized Defaults
    L3 Cache                         4096 kB          F10: Save & Exit
                                                      ESC: Exit



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```

5.1.2.4. SATA Configuration

SATA Configuration delivers SATA device(s) information and configures SATA device(s).

The featured settings are:

Setting	Description
SATA Controller(s)	Enables/disables SATA device(s). ▶ **Enabled** is the default.
SATA Mode Selection	Configures how SATA controller(s) operate. ▶ Options available are **IDE** (default), **AHCI** and **RAID**.
Configure SATA as	Configures how SATA controller(s) operate. ▶ Options available are **AHCI** (default) and **IDE**. ▶ When set to **AHCI**, the following settings become available: <table><tr><th>Setting</th><th>Description</th></tr><tr><td>SATA Port 0</td><td>Enables/disables SATA port 0. Enabled is the default.</td></tr><tr><td>SATA Port 0 Hot Plug</td><td>Enables/disables the hot pluggable feature for SATA port 0. Enabled is the default.</td></tr><tr><td>SATA Port 1</td><td>Enables/disables SATA port 1. Enabled is the default.</td></tr><tr><td>SATA Port 1 Hot Plug</td><td>Enables/disables the hot pluggable feature for SATA port 1. Enabled is the default.</td></tr></table>

Sub-table for **Configure SATA as** (AHCI):

Setting	Description
SATA Port 0	Enables/disables SATA port 0. ▶ **Enabled** is the default.
SATA Port 0 Hot Plug	Enables/disables the hot pluggable feature for SATA port 0. ▶ **Enabled** is the default.
SATA Port 1	Enables/disables SATA port 1. ▶ **Enabled** is the default.
SATA Port 1 Hot Plug	Enables/disables the hot pluggable feature for SATA port 1. ▶ **Enabled** is the default.

5.1.2.5. AMT Configuration

Intel® Active Management Technology (Intel® AMT) is a hardware-based solution that uses out-of-band communication for basic management of client systems, which allows a system administrator to monitor and manage the computers and other network equipment by remote control even if the hard drive is crashed, the system is turned off or the operating system is locked.

```
            Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
    Advanced

 Intel AMT                            [Enabled]           Enable/Disable Intel (R)
 BIOS Hotkey Pressed                  [Disabled]          Active Management Technology
 MEBx Selection Screen                [Disabled]          BIOS Extension.
 Hide Un-Configure ME Confirmation    [Disabled]          Note: iAMT H/W is always
 MEBx Debug Message Output            [Disabled]          enabled.
 Un-Configure ME                      [Disabled]          This option just controls the
 Amt Wait Timer                       0                   BIOS extension execution.
 Disable ME                           [Disabled]          If enabled, this requires
 ASF                                  [Enabled]           additional firmware in the SPI
 Activate Remote Assistance Process   [Disabled]          device.
 USB Configure                        [Enabled]
 PET Progress                         [Enabled]
 AMT CIRA Timeout                     0                    →←:  Select Screen
                                                          ↑↓:  Select Item
                                                          Enter :  Select
                                                          +/-:  Change Opt.
                                                          F1:   General Help
                                                          F2:   Previous Values
                                                          F9:   Optimized Defaults
                                                          F10:  Save & Exit
                                                          ESC:  Exit

            Version 2.15.1236. Copyritght (C) 2012 American Megatrends, Inc.
```

The featured settings are:

Setting	Description
Intel AMT	Enables/disables Intel® Active Management Technology BIOS extensions. ▶ **Enabled** is the default. **Note**. iAMT hardware is always enabled. This setting only controls BIOS extension execution. When enabled, additional firmware is required in the SPI device.
BIOS Hotkey Pressed	Enables/disables BIOS Hotkey Press function ▶ **Disabled** is the default.

MEBx Selection Screen	Enables/disables MEBx Selection Screen function. ▶ **Disabled** is the default.
Hide Un-Configure ME Confirmation	Enables/disables Hide Un-Configure ME without password Configuration Prompt function. ▶ **Disabled** is the default.
MEBx Debug Message Output	Enables/disables MEBx Debug Message Output function. ▶ **Disabled** is the default.
Un-Configure ME	Enables/disables Un-Configure ME without password function. ▶ **Disabled** is the default.
Amt Wait Timer	Set time to wait before sending ASF_GET_BOOT_OPTIONS.
Disable ME	Set ME to soft Temporary Disabled function
ASF	Enables/disables Alert Specification Format, a DMTF (Distributed Management Task Force) standard for remote monitoring, management and control of computer system in both OS-present and OS-absent environments. ▶ **Enabled** is the default.
Activate Remote Assistance Process	Enables/disables CIRA (Client-Initiated Remote Access) boot. ▶ **Disabled** is the default.
USB Configure	Enables/disables USB Configure function. ▶ **Disabled** is the default.
PET Progress	Enables/disables PET events progress to receive PET event or not.
AMT CIRA Timeout	Customizes the time-out for the establishment of MPS connection. ▶ This setting is only available when **Activate Remote Assistance Process** is enabled. ▶ Set it to 0 to use the default time-out value of 60 seconds. ▶ Set it to 255 to have MEBx wait until the connection succeeds. ▶ CIRA means "Client Initiated Remote Access".

5.1.2.6. USB Configuration

Access this submenu to view the USB device(s) enabled in the system. It also configures USB-related features.

The featured settings are:

Setting	Description / Available Options
Legacy USB Support	Enables/disables legacy USB support including USB flash drives and USB hard drives. Options available are ▶ **Enabled**: To enable legacy USB support. ▶ **Disabled**: To keep USB devices available only for EFI specification, ▶ **Auto**: To disable legacy support if no USB devices are connected.
USB3.0 Support	Enables/disables USB 3.0 controller support. ▶ **Enabled** is the default.
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 / Disabled**.
EHCI Hand-off	This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver. The optional settings are: **Disabled / Enabled**.
USB Mass Storage Driver Support	Enables/disables USB Mass Storage Driver Support. The optional settings are: **Disabled / Enabled**.
USB hardware delay and time-out	This is a submenu to configure the features of USB hardware delay and time-out. The featured settings are:<table><tr><th>Setting</th><th>Description</th></tr><tr><td>**USB Transfer time-out**</td><td>Use this item to set the time-out value for control, bulk, and interrupt transfers. ▶ Options available are: **1 sec, 5 sec, 10 sec, 20 sec**</td></tr><tr><td>**Device reset time-out**</td><td>Use this item to set USB mass storage device start unit command time-out. ▶ Options available are: **10 sec, 20 sec, 30 sec, 40 sec**</td></tr><tr><td>**Device power-up delay**</td><td>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.</td></tr></table>

5.1.2.7. F71869E Super IO Configuration

This submenu opens in context with the system's serial ports, COM1 and COM2, to configure the Super IO chipset.

The featured settings are:

Submenu/Setting	Description		
Serial Port 1 Configuration	Configures the system's serial port (COM port). The featured settings are:		
	Setting	Description	
	Serial Port	Enables/disables the serial port. ▸ **Enabled** is the default.	
	Serial Port 1 Interface	▸ Options available are: **RS422** /**RS232** / **RS485**	
	Change Settings	Sets the optimal IO address and IRQ info for the serial port. ▸ Options available are: **IO=3F8h; IRQ=4** (default) **IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12**; **IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12**; **IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12**; **IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12**;	
Serial Port 2 Configuration	Configures the system's serial port (COM port). The featured settings are:		
	Setting	Description	
	Serial Port	Enables/disables the serial port. ▸ **Enabled** is the default.	
	Serial Port 2 interface	▸ Options available are: **RS422** /**RS232** / **RS485**	
	Change Settings	Sets the optimal IO address and IRQ info for the serial port. ▸ Options available are: **IO=2F8h; IRQ=3** (default) **IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12**; **IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12**; **IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12**; **IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12**;	
Power On After Power Fail	Set the power state after a power outage. Select **Power Off** for the system power to remain off after a power loss. Select **Power On** for the system power to be turned on after a power loss. ▸ Options available are: **Power On / Power Off (Default)**		

5.1.2.8. UART Switch Setting

Access this **UART Switch Setting** to set the data transmission interface for the computer's serial port COM1.

The featured setting is:

Setting	Description
Serial Port 2:	Configures the data transmission interface for the computer's serial port COM1. ▸ Options available are **RS232 Support** (default), **RS422 Support** and **RS488 Support**

5.1.2.9. H/W Monitor

H/W Monitor monitors the computer's hardware status. Select this submenu to run a report of the info including CPU/system temperatures, CPU speed and other voltage info.

```
           Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Main  Advanced  Chipset  Boot  Security  Save & Exit

     PC Health Status

     CPU Temperature              : +28 ℃
     System temperature2          : +37 ℃
     +5V                          : +5.045 V
     +1.5V                        : +1.558 V
     +12V                         : +11.968 V
     +3.3V                        : +3.312 V


                                                    →←: Select Screen
                                                    ↓ ↑: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit



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```

5.1.2.10. F81216 Second Super IO Configuration

Use this submenu to enable/disable the computer's serial ports 0~1.

The featured submenus are:

Submenu	Description		
Serial Port 0 Configuration	Configures the computer's Serial Port 0, which is fixed to RS232 and cannot be changed. The featured settings are:		
	Setting	**Description**	
	Serial Port	Enables/disables the serial port. ▶ **Enabled** is the default.	
Serial Port 1 Configuration	Configures the computer's Serial Port 1, which is fixed to RS232 and cannot be changed. The featured settings are:		
	Setting	**Description**	
	Serial Port	Enables/disables the serial port. ▶ **Enabled** is the default.	

5.1.2.11. CPU PPM Configuration

Use this submenu to enable/disable the CPU PPM Turbo mode.

Submenu	Description
Turbo Mode	Enables/disables the CPU PPM Turbo Mode. ▶ **Enabled** is the default.

5.1.3. Chipset

The **Chipset** menu controls the system's chipset, including the north bridge and the south bridge.

```
            Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit
 ▶  PCH-IO Configuration                          PCH Parameters
 ▶  System Agent (SA) Configuration


                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save & Exit
                                                  ESC: Exit

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```

The featured submenu are **System Agent (SA) Configuration** and **PCH-IO Configuration**, which are covered in the following sections:

Submenu	Description
PCH-IO Configuration	Configures the PCH. ▶ See 5.1.3.1. PCH IO Configuration on page 70 for more details.
System Agent (SA) Configuration	Configures System Agent, i.e. the north bridge. ▶ See 5.1.3.2. System Agent (SA) Configuration on page 72 for more details.

WARNING: Wrong settings in these submenus may cause system malfunction.

5.1.3.1. PCH IO Configuration

Access this submenu to configure PCH parameters.

```
            Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

      Intel PCH RC Version              1.8.0.1          PCI Express Configuration
      Intel PCH SKU Name                QM77             Settings.
      Intel PCH Rev ID                  04/C1

    ▶ PCI Express Configuration
    ▶ USB Configuration

                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F9: Optimized Defaults
                                                        F10: Save & Exit
                                                        ESC: Exit

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```

The featured submenu is:

Setting/Submenu	Description
PCI Express Configuration	See 5.1.3.1.1. PCI Express Configuration on page 71.
USB Configuration	See 5.1.3.1.2. USB Configuration on page 71.

5.1.3.1.1. PCI Express Configuration

Access this submenu for the following settings:

Setting	Description
PCI Express Root Port 1,2,3,5,6,7,8	Enables/disables PCI Express root port 0. ▸ **Enabled** is the default. ▸ ASPM Support Options are: **Disable** : disables ASPM **L0s** : force all links to L0s state **L1** : force all links to L1 state **L0sL1** : force all links to L0s+L1 state **Auto** : BIOS auto configure ▸ PCIe Speed Options are: **Auto, Gen 1**, **Gen 2** **Auto** is the default.

5.1.3.1.2. USB Configuration

Access this submenu to configure the system's USB ports.

The featured settings are:

Setting	Description
EHCI1	Enables/disables the USB EHCI (USB 2.0) functions. ▸ **Enabled** is the default.
EHCI2	Enables/disables the USB EHCI (USB 2.0) functions. ▸ **Enabled** is the default.

5.1.3.2. System Agent (SA) Configuration

Access this submenu to configure the system agent.

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
  Main   Advanced   Chipset   Boot   Security   Save & Exit

  System Agent Bridge Name          IvyBridge        Config Graphics Settings.
  System Agent RC Version           1.8.0.0
  VT-d Capability                   Supported

  ▶ Grapchics Configuration
  ▶ NB PCIe Configuration

                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F9: Optimized Defaults
                                                     F10: Save & Exit
                                                     ESC: Exit


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```

The featured settings are:

Setting / Submenu	Description
Graphics Configuration	Configures the system's graphics. See 5.1.3.2.1. Graphics Configuration on page 73 .
Memory Configuration	See 5.1.3.2.2. Memory Configuration on page 73.

5.1.3.2.1. Graphics Configuration

Access this submenu to configure the system's Graphics. Select **Graphics Configuration** to view graphics info and accesses graphics settings.
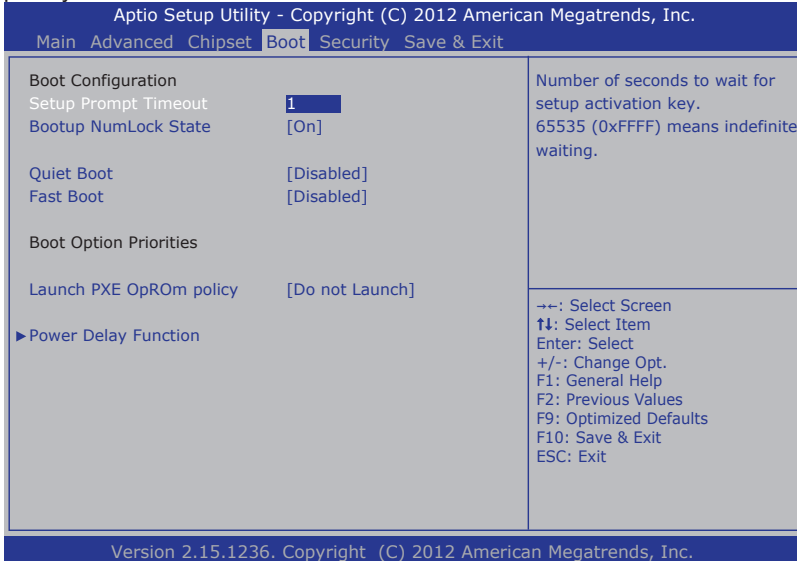
The featured settings are:

Setting	Description
Primary Display	Select which of IGFX/PEG/PCI graphic device to be the Primary Display or SG for Switch Gfx. ▶ Options available are **Auto(default), IGFX, PEG, PCI, SG**.
Internal Graphics	Keep IGD enabled based on the setup options. ▶ Options available are **Auto(default), Disabled, Enabled**.
Primary IGFX Boot Display	Sets the graphics device to activate during POST. ▶ This setting has no effect if an external graphics is present. ▶ CRT modes are only supported on the primary display. ▶ Options available are **CRT,** and **CRT+DVI(default)**.
Second IGFX Boot device	Select second display device ▶ Options available are **Disabled(default), CRT, CRT+DVI, LFP, EFP3, EFP2, LFP2.**

5.1.3.2.2. Memory Configuration

Delivers the system's memory configuration that includes memory RC version, memory frequency, total memory, DIMM presence, CAS latency and minimum delay time.

5.1.4. Boot

Access this **Boot** menu to configure how to boot up the system such as boot device priority.

```
            Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
   Main   Advanced   Chipset   Boot   Security   Save & Exit

   Boot Configuration                                      Number of seconds to wait for
   Setup Prompt Timeout            1                       setup activation key.
   Bootup NumLock State            [On]                    65535 (0xFFFF) means indefinite
                                                           waiting.
   Quiet Boot                      [Disabled]
   Fast Boot                       [Disabled]

   Boot Option Priorities

   Launch PXE OpROm policy         [Do not Launch]
                                                           →←: Select Screen
  ► Power Delay Function                                   ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Exit
                                                           ESC: Exit


            Version 2.15.1236. Copyright  (C) 2012 American Megatrends, Inc.
```

The featured settings and submenu are:

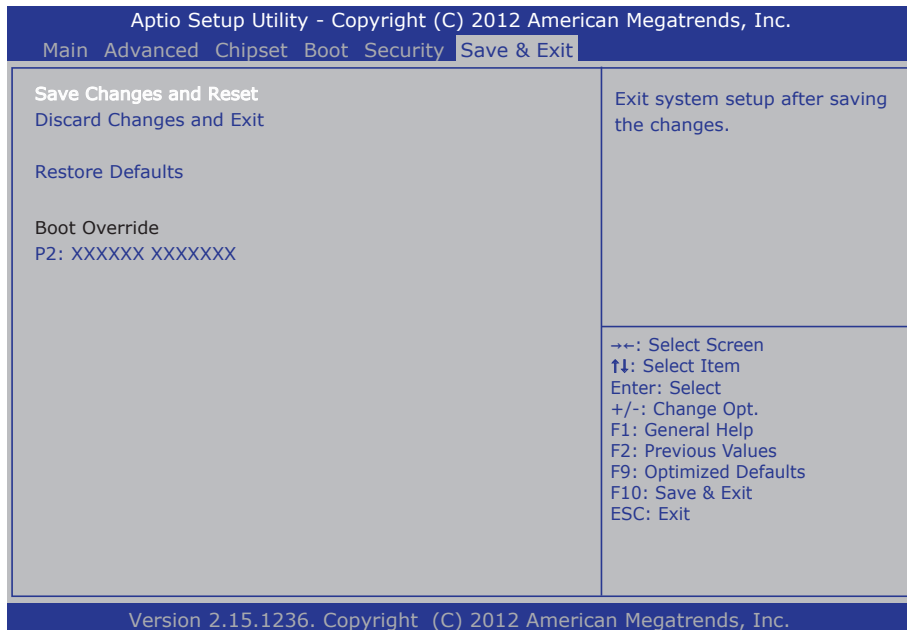| Group	Setting	Description
Boot Configuration	**Bootup NumLock State**	Sets whether to enable or disable the keyboard's NumLock state when the system starts up. ▶ Options available are **On** (default) and **Off**.
	Quiet Boot	Sets whether to display the POST (Power-on Self Tests) messages or the system manufacturer's full screen logo during booting. ▶ Leave it as **Disabled**, which is the default, to display the normal POST message.
	Fast Boot	Enables/disables initializing only a minimal set of devices required to launch the active boot options when booting up the system. ▶ **Disabled** is the default. ▶ This setting has no effect for BBS (BIOS Boot Specification) options.

Boot Option Priorities	Sets the boot priority among the available device types.
Launch PXE OpROM policy	Configures whether to launch the UEFI or legacy OpROM of PXE (Preboot eXecution Environment). ▸ Options available are **Do not launch** (default), and **Legacy only**.

Power Delay Function	Configures power delay function by the following settings:

Setting	Description
Power Delay Function	Enables/disables power delay function: ▸ **Enable** is the default. ▸ Select **Disabled** to manually power on/off..
Power on delay	Configures how much time should be delayed for the system to power on. ▸ Options available are **Immediately**, **04 Seconds** (default), **08 Seconds** and **16 Seconds**.
Power off delay	Configures how much time should be delayed for the system to power off. ▸ Options available are **Immediately** (default), **30 Seconds**, **60 Seconds** and **90 Seconds**.

5.1.5. Security

The **Security** menu sets up the password for the system's administrator account. Once the administrator password is set up, this BIOS Setup utility is limited to access and will ask for the password each time any access is attempted.

```
                 Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
    Main  Advanced  Chipset  Boot  Security  Save & Exit

    Password Description                               Set Adminstrator Password

    If ONLY the Administrator's password is set,
    then this only limits access to Setup and is
    only asked for when entering Setup.
    If ONLY the User's password is set, then this
    is a power on password and must be entered to
    boot or enter Setup. In Setup the User will
    have Administrator rights.
    The password must be
    in the following range:
                                                       →←: Select Screen
    Minimum length              3                      ↑↓: Select Item
    Maximum length              20                     Enter: Select
                                                       +/-: Change Opt.
    Administrator Password                             F1: General Help
                                                       F2: Previous Values
                                                       F9: Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit


                 Version 2.15.1236. Copyright  (C) 2012 American Megatrends, Inc.
```

The featured setting is:

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

5.1.6. Save & Exit

The **Save & Exit** menu features a handful of commands to launch actions from the BIOS Setup utility regarding saving changes, quitting the utility and recovering defaults.

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.	
Main Advanced Chipset Boot Security Save & Exit	
Save Changes and Reset Discard Changes and Exit Restore Defaults Boot Override P2: XXXXXX XXXXXXX	Exit system setup after saving the changes. →←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.	

]The featured settings are:

Setting	Description
Save Changes and Exit	Saves the changes and exits the BIOS setup. ▶ This is a command to launch action from the BIOS Setup utility rather than a setting.
Discard Changes and Exit	Quits the BIOS Setup utility without saving the change(s).
Restore Defaults	Restores all settings to factory defaults. ▶ This is a command to launch action from the BIOS Setup utility rather than a setting.
Boot Override	Shows a list of the available boot devices in the system so users can boot up the system by any of the listed devices regardless of the currently configured boot priority. ▶ This is a command to launch action from the BIOS Setup utility rather than a setting.

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Appendices

Appendix A: HSPA-SI1400 Hardware Installation

To be able to network with 3G, hardware-wise the computer needs a 3G module installed and a SIM card inserted (as described in _ on page). This appendix will guide you to install the 3G module **HSPA-SI1400**.

C.1. Install HSPA-SI1400

1. Remove the computer's top cover as described in on page .
    The inside of the computer comes to view.
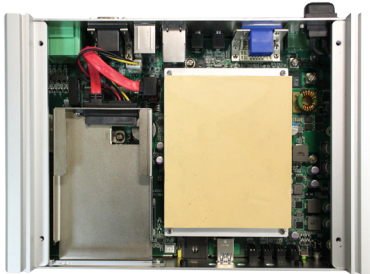
2. To remove the SSD bracket, please refer to

3. Find the two **PCI Express Mini-card** sockets for a 3G module or a WiFi module.
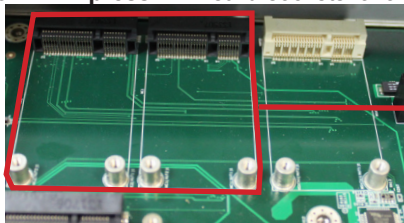
Two Mini PCIe card sockets

The socket has a break among the connector .
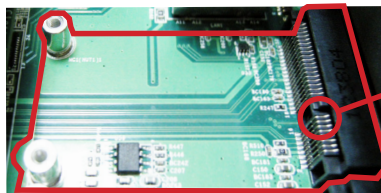
connector break

Mini-card socket

4.   Have the **HSPA-SI1400** 3G module kit. The 3G module is a full-size module of **PCI Express Mini-card** form factor, with two U.FL connectors, one is "MAIN", and the other is "AUX".

Two U.FL connectors, one is "MAIN", the other is "AUX".
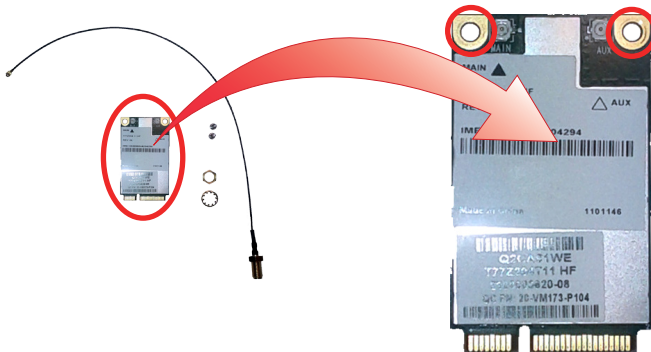
5.   Plug the 3G module to the socket's connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.

Connector break

Fully plug the module.

6.   Press down the module and fix the module in place using two screws.

7. 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.

an antenna hole w/o the plug

Antenna holes stopped up by plugs
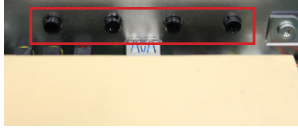
a view from the inside of the computer
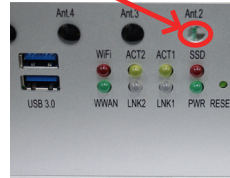
a view outside the computer

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

SMA connector
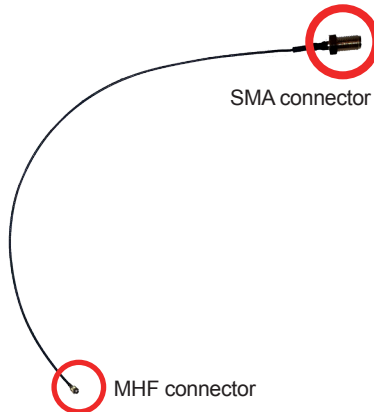
MHF connector

9. Connect the RF antenna's MHF connector to the 3G module's "MAIN" connector.

Connect the RF antenna's MHF connector to the 3G module's "MAIN" connector.

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 flattened side.

Remove the nut and washer.

Among the screw thread, there is a 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.

Arrange the flat side of the SMA connector to meet the flat side of the antenna hole.

12. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.
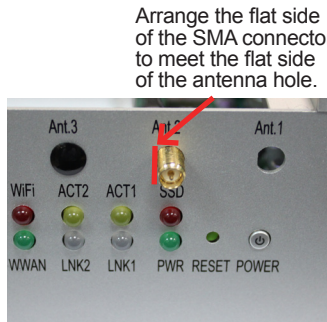
Mount the washer and the nut to the SMA connector. Tighten the nut.
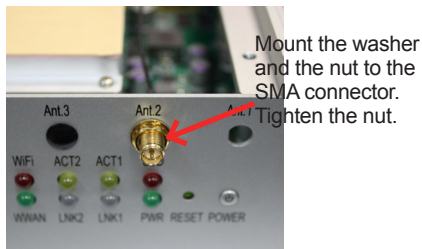
13.   Have an external antenna. Screw and tightly fasten the antenna to the SMA connector.
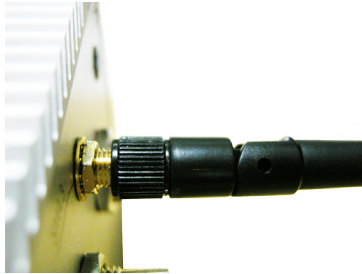
Appendix B: WIFI-AT2350 Hardware Installation

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-AT2350**.

D.1. Install WIFI-AT2350

1. Remove the computer's top cover as described in <u>4.1.1. Open the Computer</u> on page <u>44</u>.

    The inside of the computer comes to view.
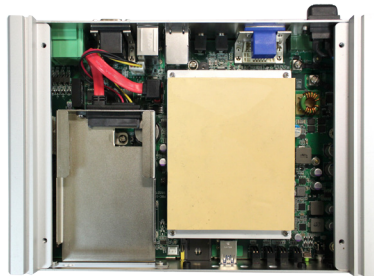
2. To remove the SSD bracket, please refer to <u>4.1.4. Disassemble SSD bracket on page 49</u>

3. Find the two **PCI Express Mini-card** sockets for a 3G module or a WiFi module.
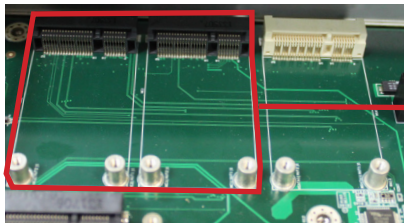
Two Mini PCIe card sockets

The socket has a break among the connector .
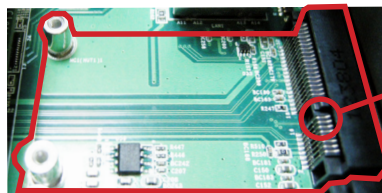
connector break

Mini-card socket

4. Prepare the **WIFI-AT2350** 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 "MAIN", and the other is "AUX".

Two U.FL connectors, one is "MAIN", the other is "AUX".
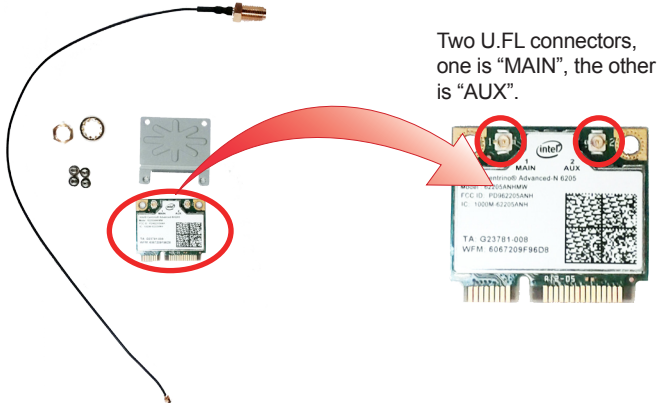
5. In order to make the half-size Wi-Fi module compatible with the **Mini-card** socket, extend the WiFi module with a "mini half bracket". Join them together by using two screws.

Position the WiFi module and the "mini half bracket" exactly as shown.

Join the WiFi module and the "mini half bracket" by using two screws.

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.

Connector break

Fully plug the module.

7. Press down the module and fix the module in place using two screws.
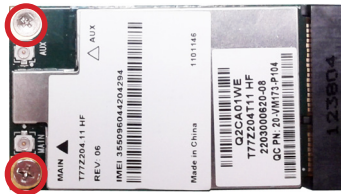
8. Remove one plastic plug from the computer's front panel to make an antenna hole. Keep the plastic plug for any possible restoration in the future.

Antenna holes stopped up by plugs
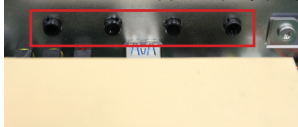
an antenna hole w/o the plug

a view from the inside of the computer
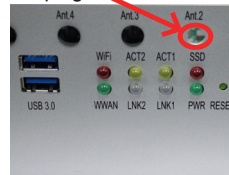
a view outside the computer

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

SMA connector
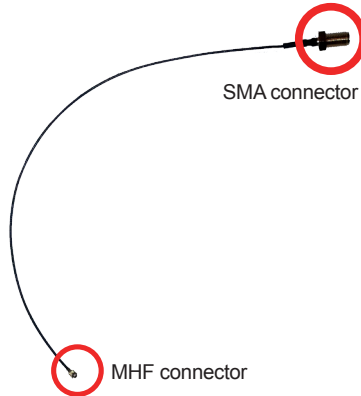
MHF connector

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

Connect the RF antenna's MHF connector to the 3G module's "MAIN" connector.

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 flat side.

Remove the nut and washer.

Among the screw thread, there is a flat 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.

Arrange the flat side of the SMA connector to meet the flat side of the antenna hole.

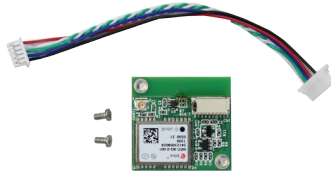13. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

Mount the washer and the nut to the SMA connector. Tighten the nut.

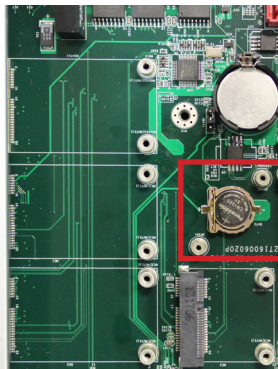14. Have an external antenna. Screw and tightly fasten the antenna to the SMA connector.
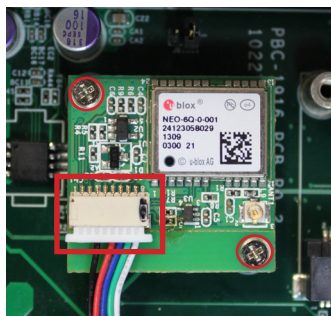
Appendix C: GPS Module Hardware Installation

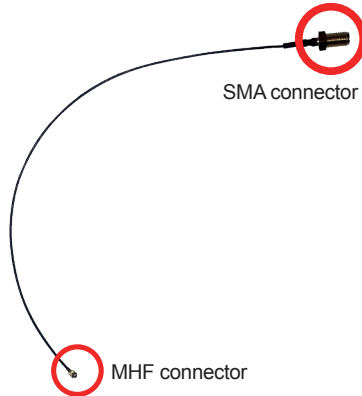1. GPS Module kit is consist of GPS module, 2 screws, and one cable.

2. Please refer to 4.1.4. Disassemble SSD bracket on page 49
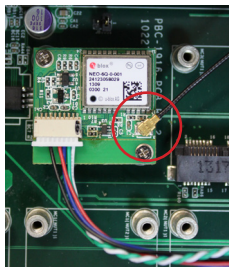3. Locate the GPS screw hole on the mainboard

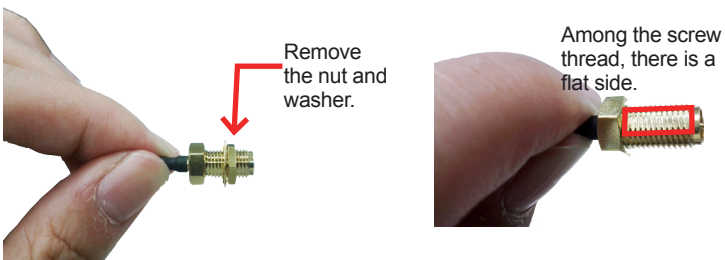4. Fasten 2 screws to fix the module and connect the cable to the connector on the module.

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

SMA connector

MHF connector

6. Connect the RF antenna's MHF connector to the GPS module's "ANT1" connector.

7. 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.

Remove the nut and washer.

Among the screw thread, there is a flat side.

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

Arrange the flat side of the SMA connector to meet the flat side of the antenna hole.
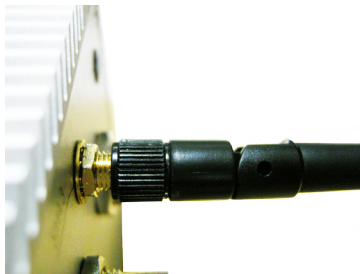
9. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

Mount the washer and the nut to the SMA connector. Tighten the nut.

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

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