UC-8540 Series Hardware User's Manual

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www.moxa.com/product

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Technical Support Contact Information

www.moxa.com/support

Moxa Americas
Toll-free: 1-888-669-2872
Tel: +1-714-528-6777
Fax: +1-714-528-6778

Moxa Europe
Tel: +49-89-3 70 03 99-0
Fax: +49-89-3 70 03 99-99

Moxa India
Tel: +91-80-4172-9088
Fax: +91-80-4132-1045

Moxa China (Shanghai office)
Toll-free: 800-820-5036
Tel: +86-21-5258-9955
Fax: +86-21-5258-5505

Moxa Asia-Pacific
Tel: +886-2-8919-1230
Fax: +886-2-8919-1231

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Introduction

Thank you for using Moxa's UC-8540 Series computer. The UC-8540 Series computer is a programmable communication-centric gateway offering a rich variety of communication interfaces such as Ethernet, wireless, and serial ports. This EN 50155-compliant computer is built for rail applications and comes with multiple wireless WAN gateway interfaces making it an ideal choice for building wireless communication infrastructure with 802.11 a/b/g/n/ac, and for LTE data collection and transmission.

This computer runs on the Debian Linux operating system, providing a powerful communication platform without generating too much heat, even when loaded with heavy application tasks. In addition, the mSATA socket helps you easily expand the storage capacity for large-scale data acquisition.

This chapter describes the product package checklist, product features, and hardware specifications.

The following topics are covered in this chapter:

❑ **Model Descriptions and Package Checklist**
❑ **Product Features**
❑ **Hardware Specifications**
❑ **Hardware Block Diagram**

Model Descriptions and Package Checklist

The UC-8540 Series consists of the following models:

- **UC-8540-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting Wi-Fi and LTE modules, with a -25 to 55°C operating temperature range

- **UC-8540-T-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting Wi-Fi and LTE modules, with a -40 to 70°C operating temperature range

- **UC-8540-T-CT-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting Wi-Fi and LTE modules, with a -40 to 70°C operating temperature range, and conformal coating

The UC-8540 Series computer is shipped with the following items:

- UC-8540 Series computer
- Mounting kits
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Quick Installation Guide (printed)
- Warranty card

Product Features

The UC-8540 Series computer includes the following features:

- Armv7 Cortex-A7 dual-core 1 GHz processor
- 1 GB DDR3L SDRAM
- 8 GB eMMC for OS
- 1 mSATA slot for expansion storage
- 2 auto-sensing 10/100/1000 Mbps Ethernet M12 ports
- 1 USB 3.0/2.0 host with Type A connector
- 2 PCIe mini slots (1 PCIe/USB 2.0 and 1 USB 2.0 signals)
- Isolated power input with a wide range of 24 to 110 VDC
- TPM 2.0 (HW V1.1.0 and later)

Hardware Specifications

NOTE The latest specifications for Moxa's products can be found at https://www.moxa.com.

Hardware Block Diagram
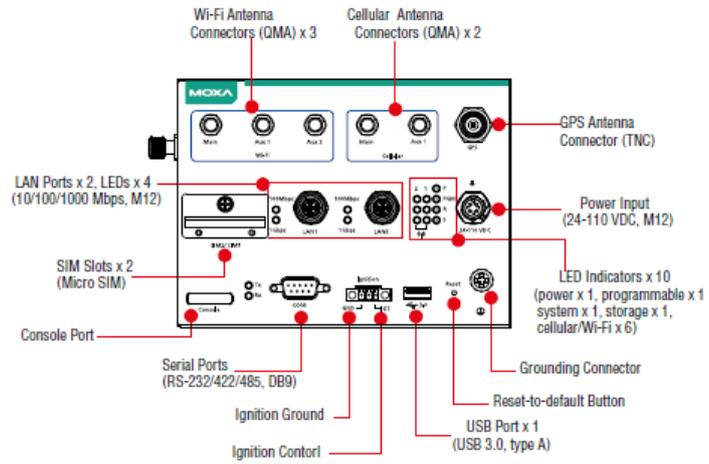
2
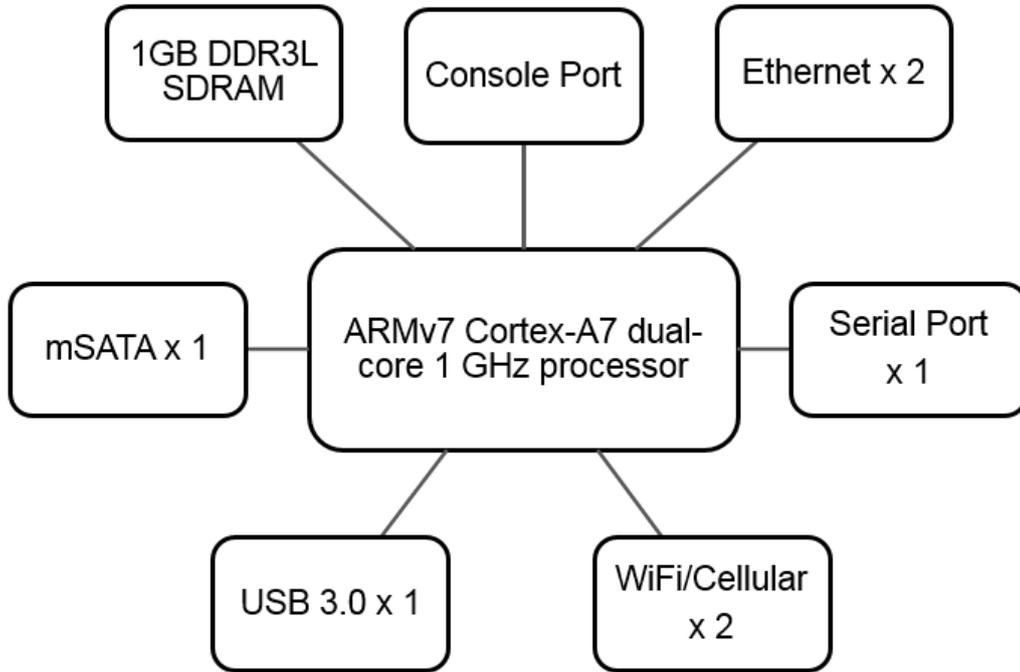
Hardware Introduction

The UC-8540 computer is compact and designed to be rugged enough for industrial applications. This chapter provides information on the appearance and dimensions of the UC-8540 and describes the LED indicators, reset button, and RTC that can help you monitor system performance and identify issues. The serial ports on the UC-8540 allow you to connect different devices, and the reliable and stable hardware platform lets you devote your attention to developing your applications.
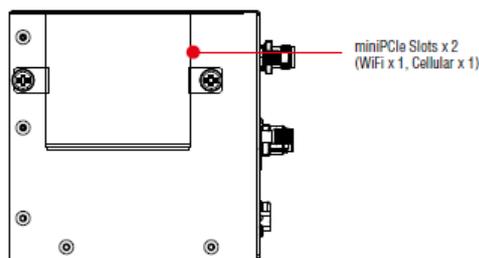
The following topics are covered in this chapter:

❒ **Appearance**
❒ **Dimensions**
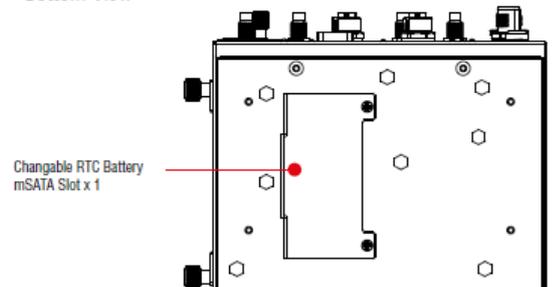❒ **LED Indicators**
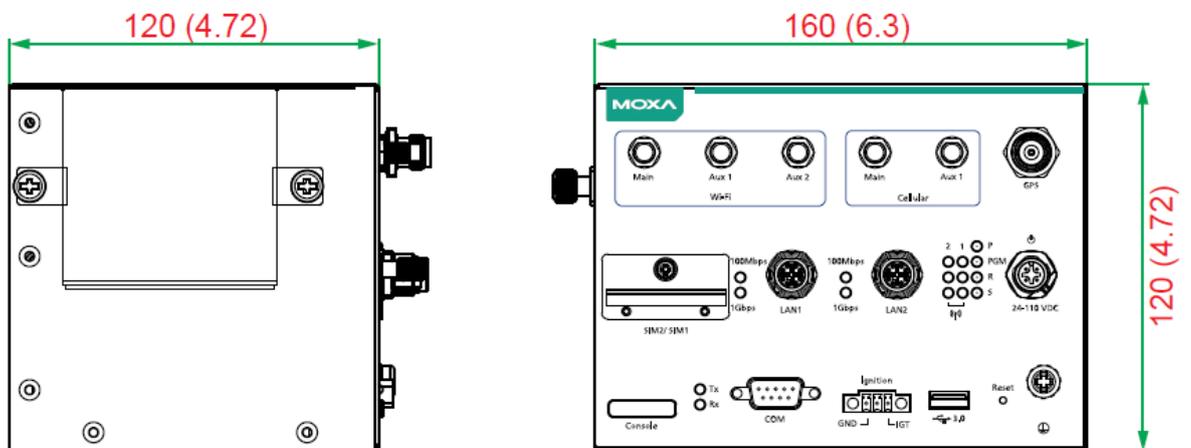❒ **Reset Button**

Appearance

Front View

Wi-Fi Antenna Connectors (QMA) x 3
Cellular Antenna Connectors (QMA) x 2
GPS Antenna Connector (TNC)
LAN Ports x 2, LEDs x 4 (10/100/1000 Mbps, M12)
Power Input (24-110 VDC, M12)
SIM Slots x 2 (Micro SIM)
LED Indicators x 10 (power x 1, programmable x 1 system x 1, storage x 1, cellular/Wi-Fi x 6)
Console Port
Grounding Connector
Serial Ports (RS-232/422/485, DB9)
Reset-to-default Button
Ignition Ground
USB Port x 1 (USB 3.0, type A)
Ignition Contorl

Side View

miniPCIe Slots x 2 (WiFi x 1, Cellular x 1)

Bottom View

Changable RTC Battery
mSATA Slot x 1

Dimensions

Unit = mm (in)

120 (4.72)

160 (6.3)

120 (4.72)

Mounting Type

LED Indicators

LED Name	Status	Function
P	Green	Power is on
	Off	No power input or any other power-input error
R	Green	System is ready
	Off	System is booting up, OS boot-up failure, or any other system initialization error
Ethernet (located next to the Ethernet ports)	Green	Steady On: 100 Mbps Ethernet link Blinking: Data transmission is in progress
	Yellow	Steady On: 1000 Mbps Ethernet link Blinking: Data transmission is in progress
	Off	Data transmission speed at 10 Mbps or the data cable is not connected
Serial	Green	Tx: Data transmission is in progress
	Yellow	Rx: Receiving Data
	Off	No operation on the serial ports
S	Green	Data is being accessed from either the eMMC or the mSATA module
	Off	No data is being accessed
PGM	Red	Programmable LED for user-defined function
Wireless ((•))	Green	The number of glowing LEDs indicate the wireless signal strength as follows: 3 Green: Excellent 2 Green: Good 1 Green: Poor

	Off	No wireless signal

Reset Button

Press the **Reset** button on the front panel of the UC-8540 computer to set the system to the factory default values and reboot the system automatically. The **R** LED will flash for 5 seconds and then maintain a steady glow when the system has rebooted. All system configurations will be reset to the factory default once the computer restarts.

3
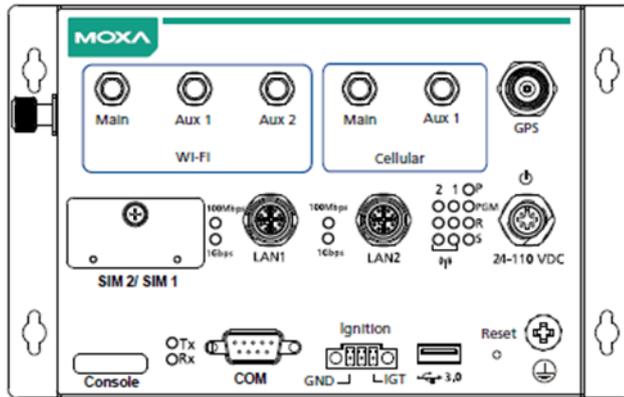
Hardware Connection Description

In this chapter, we show how to connect the UC-8540 computer to the network and to various devices.

The following topics are covered in this chapter:

❒ **Installing the UC-8540 Series**
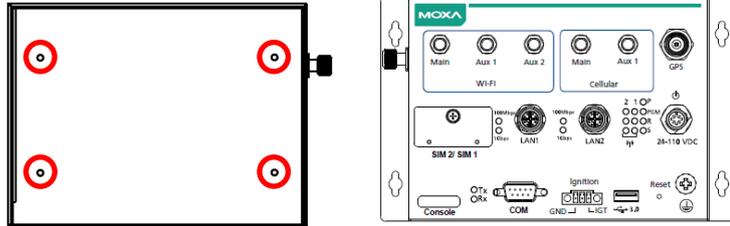
❒ **Wiring Requirements**

   ➢ Connecting the Power

   ➢ Grounding the Unit

   ➢ Connecting Data Transmission Cables

   ➢ Connecting Wi-Fi/Cellular Modules and Antennas

   ➢ Installing SIM Cards for the Cellular Modules

   ➢ Installing the mSATA Module

   ➢ Replacing the RTC Battery

Installing the UC-8540 Series

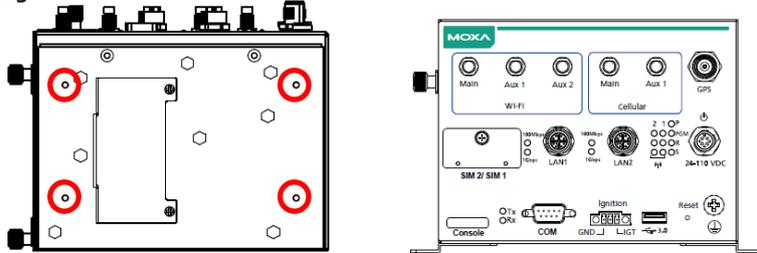<u>**Wall or Desk Mounting**</u>

Use two screws per side to fasten the mounting kits on to the UC-8540 computer and then mount the computer on to a wall or desk.

Wall Mounting

Fasten the screws to the back panel of the UC-8540

Desk Mounting

Fasten the screws to the bottom panel of the UC-8540

Wiring Requirements

Be sure to read and follow these common safety precautions before proceeding with the installation of any electronic device:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

NOTE	Do not run signal or communication wiring together with power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- Use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- It is advisable to label the wiring to all devices in the system for easy identification.

> ⚠️ **ATTENTION**
>
> **Safety First!**
>
> Be sure to disconnect the power cord before installing and/or wiring your UC-8540 computer.
>
> **Wiring Caution!**
>
> Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.
>
> **Temperature Caution!**
>
> Be careful when handling the unit. When the unit is plugged in, the internal components generate heat, and consequently the outer casing may feel hot to the touch.

Connecting the Power

Connect the 24 to 110 VDC power line with M12 A-coded connector to the UC-8540 Series computer. If the power is supplied properly, the **P** LED will glow a solid green after a 25 to 30-second delay. The power input location and pin definition are shown in the following figures:
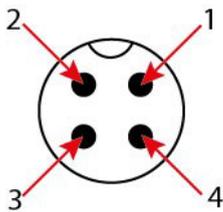
PIN	Definition
1	V+
2	N.C.
3	V-
4	N.C.
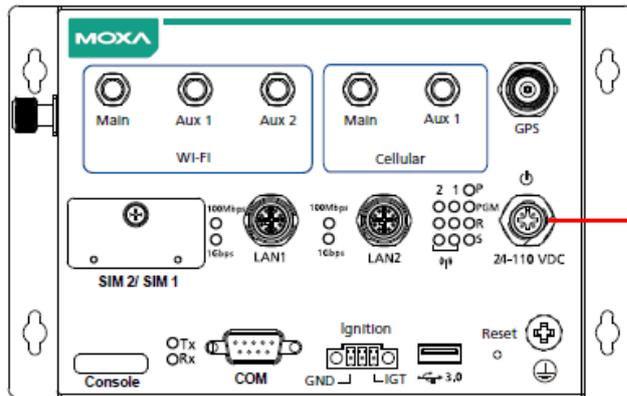
Power Input
(24-110 VDC, M12)

Grounding the Unit

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting the power.

> ⚠️ **ATTENTION**
>
> This product is intended to be mounted on a well-grounded mounting surface, such as a metal panel.

The grounding connector is located on the front panel. Connect the grounding wire to an appropriate grounded metal surface.
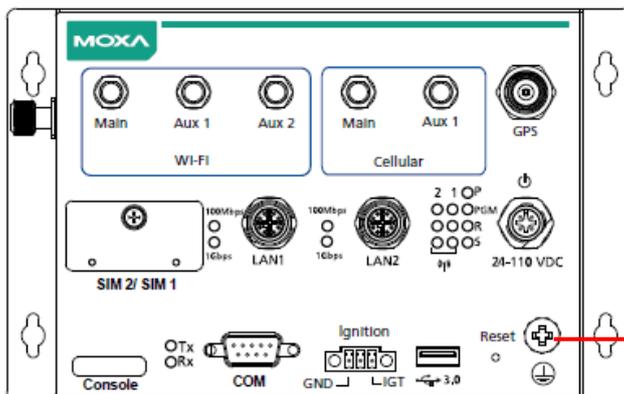
Grounding Connector

Connecting Data Transmission Cables

In this section, we describe how to connect the UC-8540 embedded computer to a network and serial devices.

Connecting to an Ethernet Network

Connect your network cable to the embedded computer's Ethernet port. The other end of the cable should be connected to your Ethernet network. When the cable is properly connected, the green LED corresponding to the Ethernet port turns on indicating a valid connection.

Two 10/100/1000 Mbps Ethernet ports with M12 X-coded connectors are located on the rear panel of the UC-8540 computer. See the following figure for the location of the Ethernet ports and the pin assignments:

NOTE   If you are using your own Ethernet cable, make sure that the pin assignment on the connector of the Ethernet cable matches the pin assignment shown below.


PIN	Definition
1	DA+
2	DA-
3	DB+
4	DB-
5	DD+
6	DD-
7	DC-
8	DC+
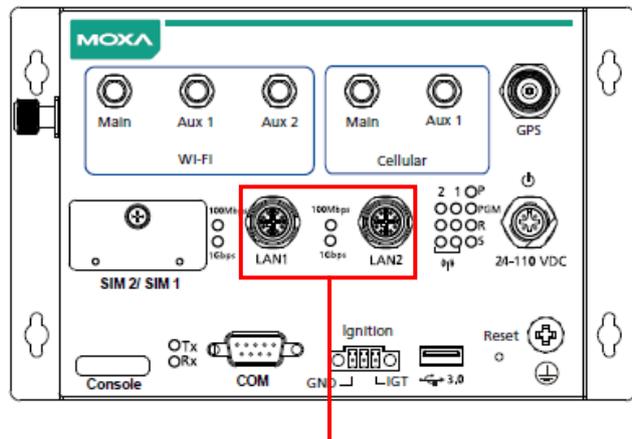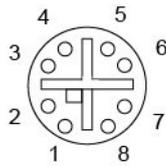
LAN Ports x 2, LEDs x 4 (10/100/1000 Mbps, M12)

Connecting a Serial Device

Use serial cables to connect your serial devices to the computer's serial ports. The serial port with DB9 interface can be configured for RS-232, RS-422, or RS-485 communication. The pin location and assignment of the serial ports are shown in the following diagrams:
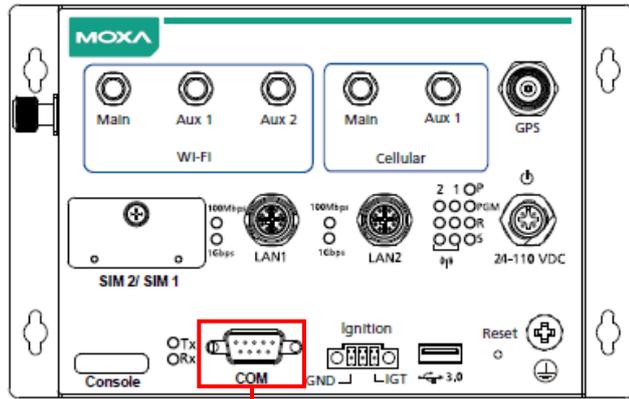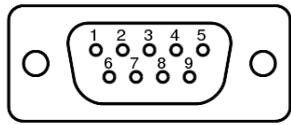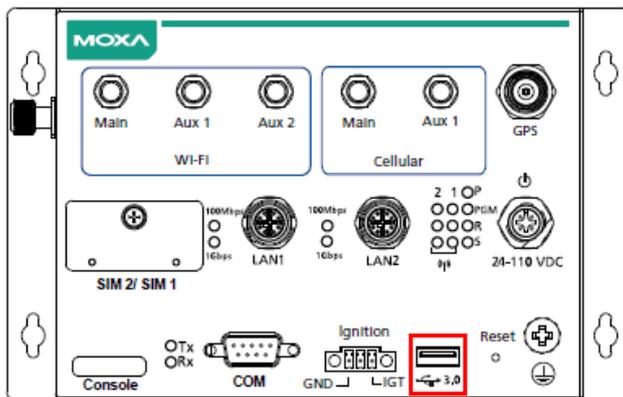
Serial Ports
(RS-232/422/485, DB9)

| Pin	RS-232	RS-422	RS-485 (4-wire)	RS-485 (2-wire)
1	DCD	TxDA(-)	TxDA(-)	-
2	RxD	TxDB(+)	TxDB(+)	-
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	-	-	-
7	RTS	-	-	-
8	CTS	-	-	-

Connecting a USB Device

The UC-8540 computer is provided with a USB 3.0 port on the front panel for connecting a USB device.

USB Port x 1
(USB 3.0, type A)

Connecting Wi-Fi/Cellular Modules and Antennas

The UC-8540 computer is provided with two sets of QMA antenna holes for installing antennas for the Wi-Fi and cellular modules. Unfasten the two screws on the side panel and lift up the panel to check the location of the Wi-Fi/cellular module sockets.
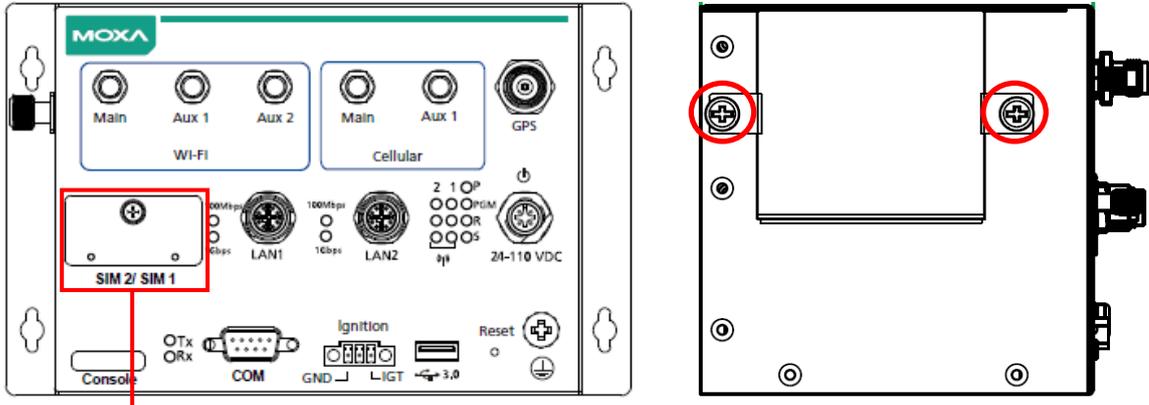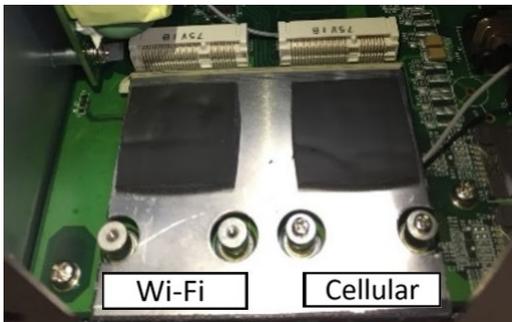

SIM Slots x 2
(Micro SIM)

Socket Name	Usage
Cellular	Cellular module
Wi-Fi	Wi-Fi Module

To install a wireless (Wi-Fi/cellular) module, do the following:

1. Remove the plastic protective film on the thermal pads.
   The thermal pads come attached to the wireless module.

2. Insert the wireless module in the designated socket and tighten the two screws on the module.


3. Attach the flat end of the antenna cable to the connector marked MAIN on the module.
    Follow the procedure described above to attach the AUX antenna cable.

    If your UC-8540 is not a standalone GPS version, you can attach the GPS antenna cable to the connector marked GPS on the module.

Refer to the following figure provided on the front panel to identify the antenna mounting holes for the wireless modules.

4. Connect the antennas to the connectors on the front panel.

   Refer to the following figure for the specific location of each antenna connector, including a connector for a GPS antenna
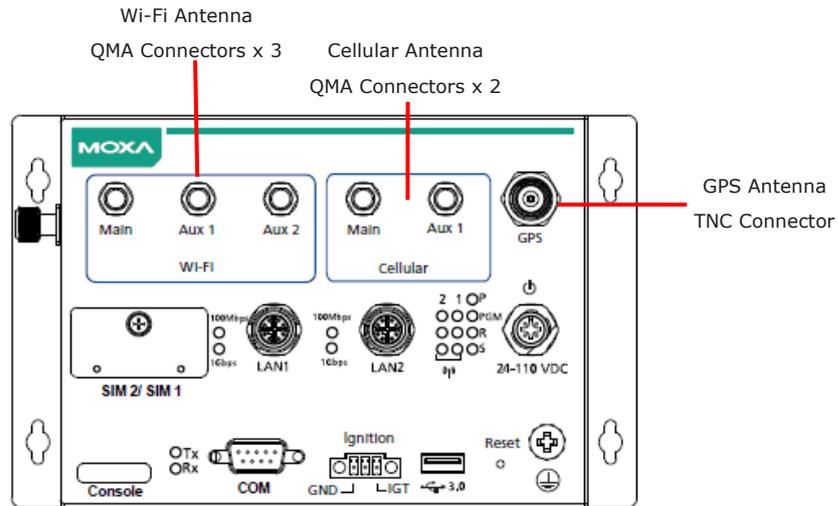
Use the procedure described above to install other Wi-Fi or cellular modules

NOTE	The Wi-Fi module installed in the socket requires three antennas. Ensure all three antennas are installed and secured properly before you use the module.

Installing SIM Cards for the Cellular Modules

The cellular module in the UC-8540 supports 2 Micro SIM cards. To install Micro SIM cards for the cellular modules, do the following:

1. Open the case of the Micro SIM card socket.

2. Insert the Micro SIM-card into the socket in the correct direction.

   To remove the SIM card, push it down to release the card.

Installing the mSATA Module

The UC-8540 computer is provided with one storage socket for installing a mSATA module.

To install the mSATA module, do the following:

1. Unfasten the screws on the cover of the mSATA socket located on the bottom panel of the UC-8540.

2. Insert the mSATA module onto the socket and fasten the two screws on the module to secure the module.
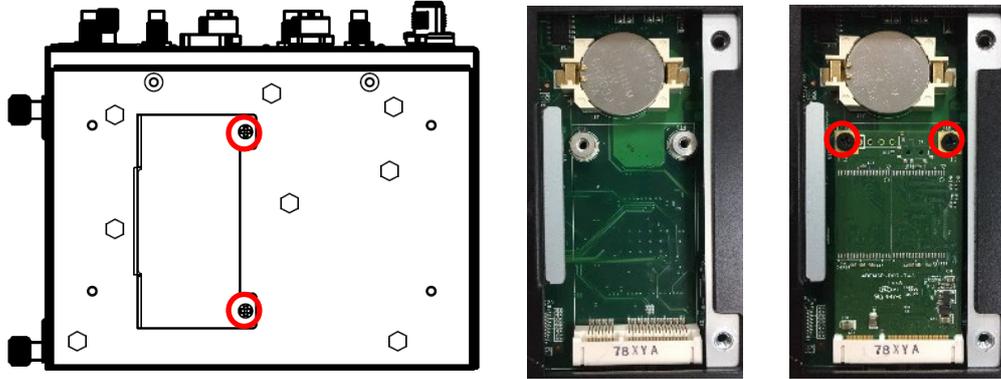
3. Replace the cover and faster the screws on the cover.

Replacing the RTC Battery

The RTC battery (BR2032) socket is located beside the mSATA socket, as shown below: