UC-8540 Series Hardware User Manual

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www.moxa.com/products

UC-8540 Series Hardware User Manual

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1. Introduction

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

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

✏️ **NOTE**

Notify your sales representative if any of the above items are missing or damaged

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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
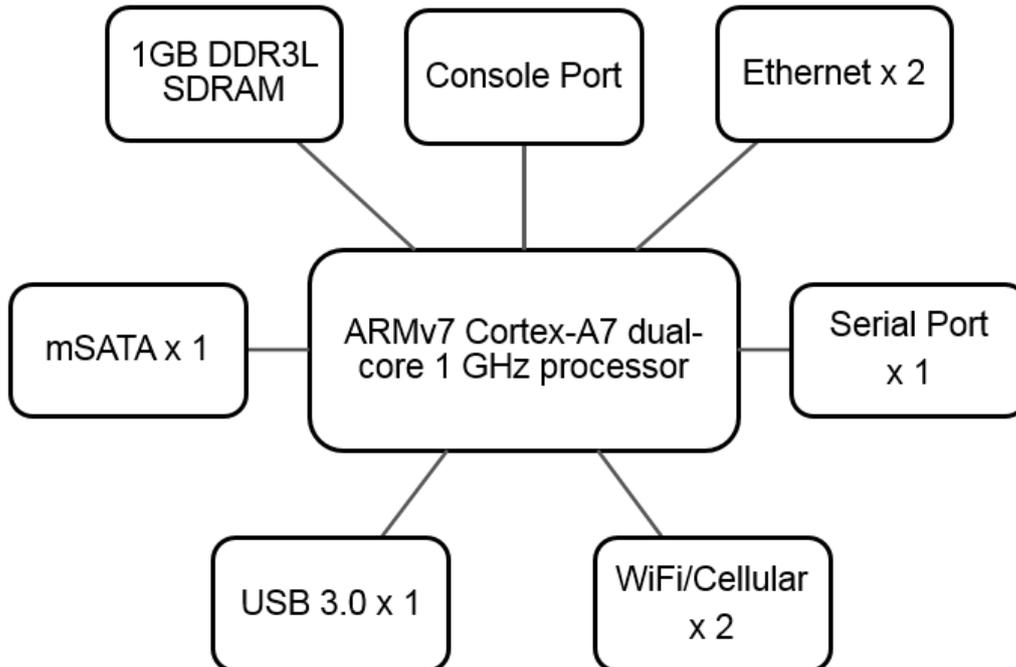- TPM 2.0 (HW V1.1.0 and later)

Hardware Specifications

✎ **NOTE**

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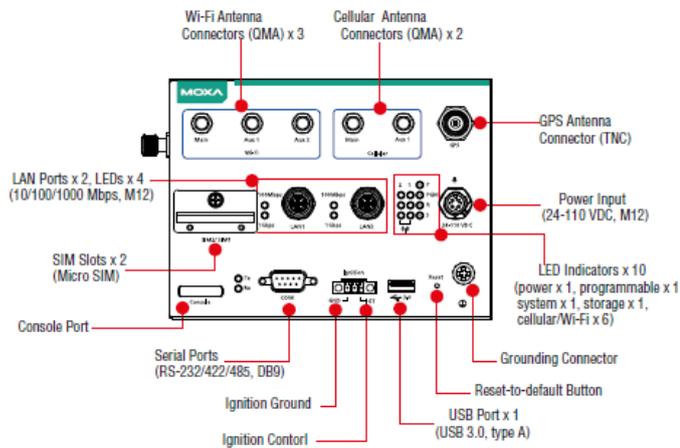

# Hardware Block Diagram

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.
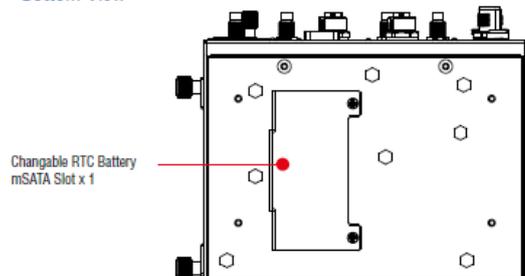
Appearance
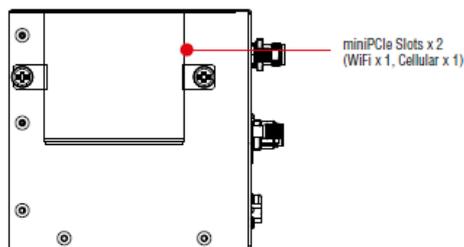
Dimensions

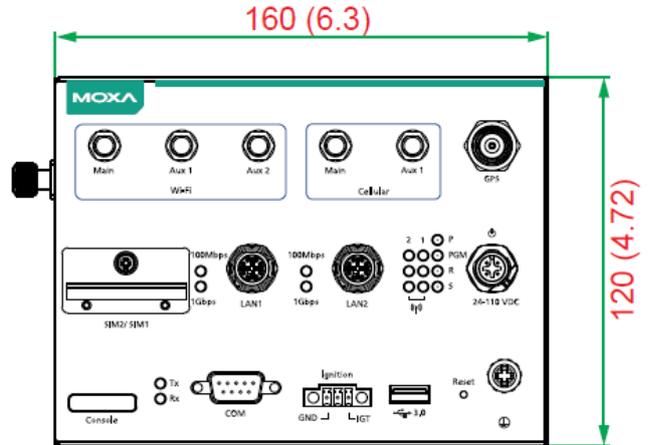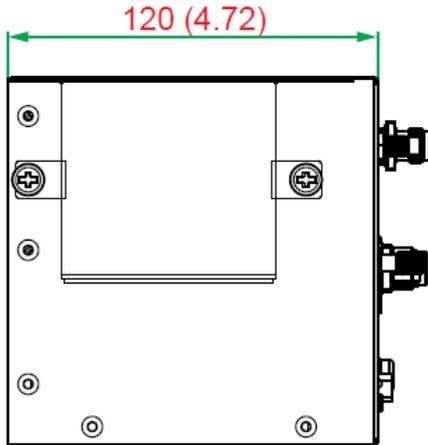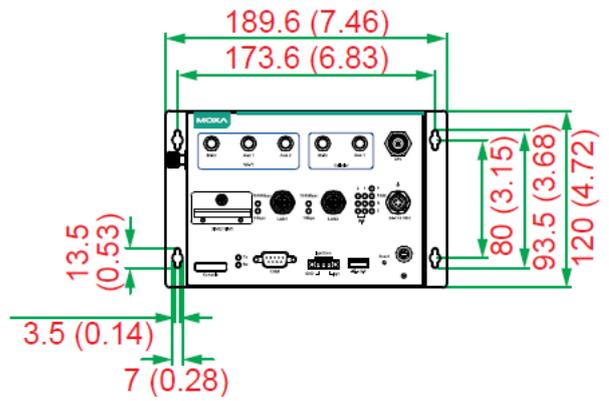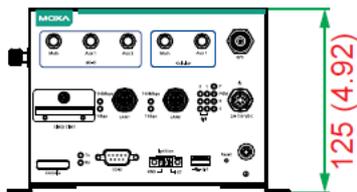**Unit = mm (inch)**

Mounting Type
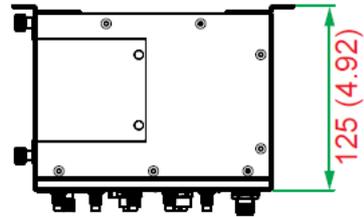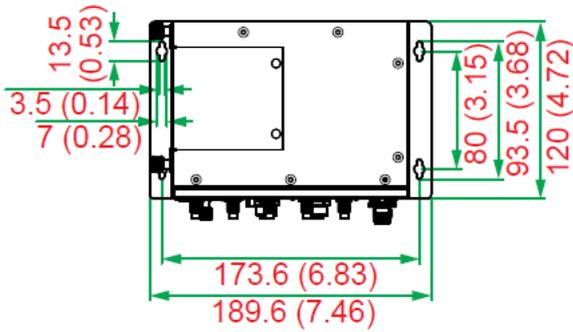
LED Indicators

LED Name	Status	Function
P	Green	Power is on
	Off	No power input
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.
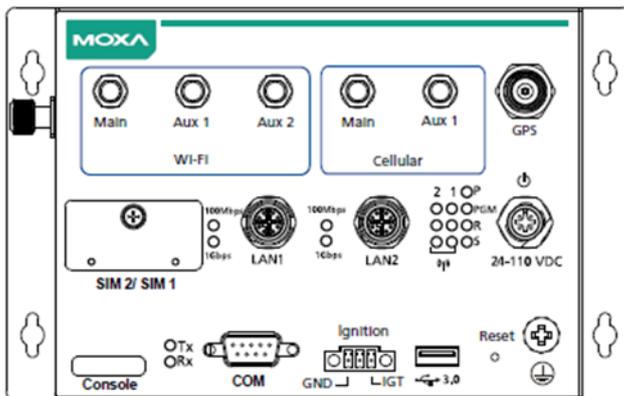
3. Hardware Connection Description

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

Installing the UC-8540 Series

Wall or Desk Mounting

After attaching the mounting kit to the computer, use two screws per side to mount the UC-8540 computer on to a wall or desk.

Wall Mounting
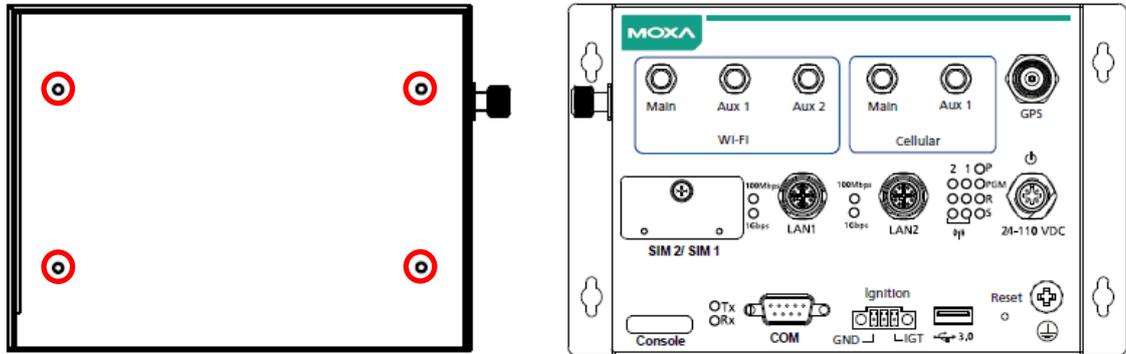
Fasten 4 M3 screws(included in the package) on the back side of the UC-8540 to attach the mounting kit.

Desk Mounting

Fasten 4 M3 screws (included in the package) on the bottom side of UC-8540 to attach the mounting kit.

Wiring Requirements

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

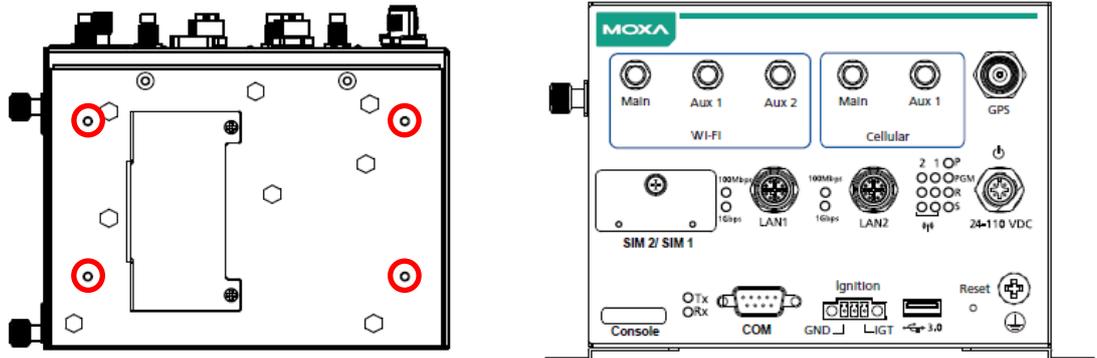- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

✏️ **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:
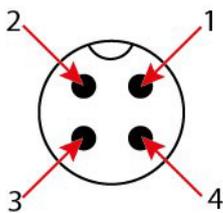
PIN	Definition
1	V+
2	N.C.
3	V-
4	N.C.
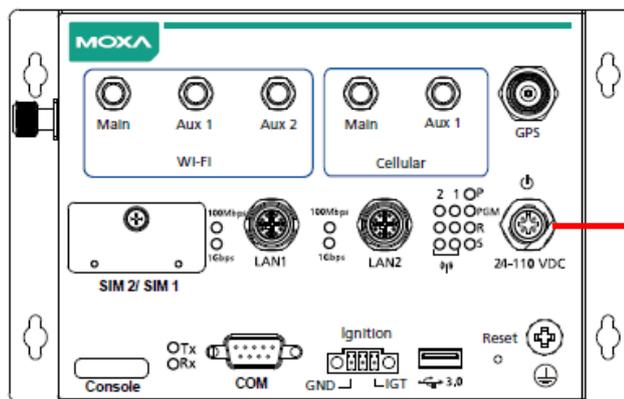
Grounding the Unit

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
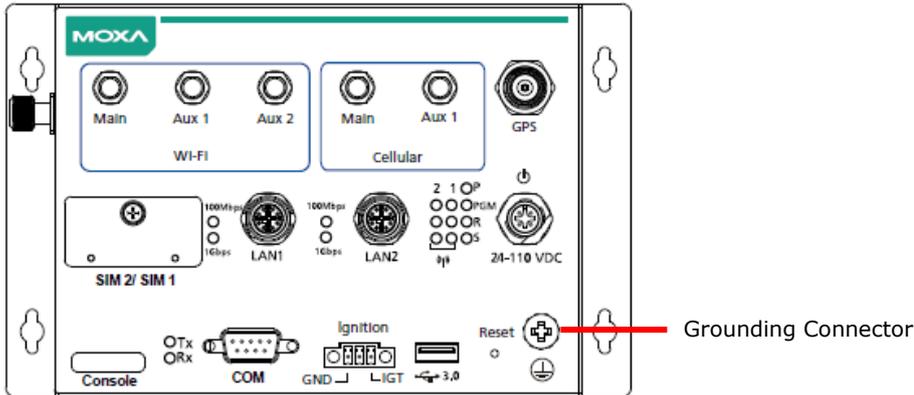
Connecting Data Transmission Cables

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

## Connecting to an Ethernet Network

Two 10/100/1000 Mbps Ethernet ports with M12 X-coded connectors are located on the rear panel of the UC-8540 computer. 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. 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 in the following figures.

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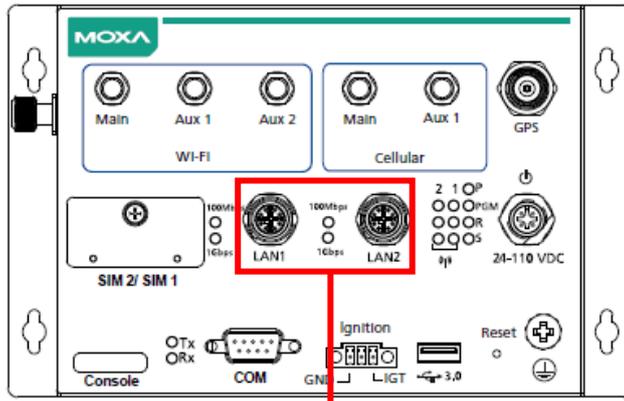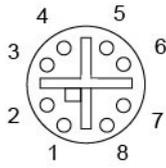
LAN Ports x 2, LEDs x 4 (10/100/1000 Mbps, M12)

Connecting a Serial Device

Use serial cables to connect your serial devices to the computer's serial port. 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 port is shown in the following diagrams:
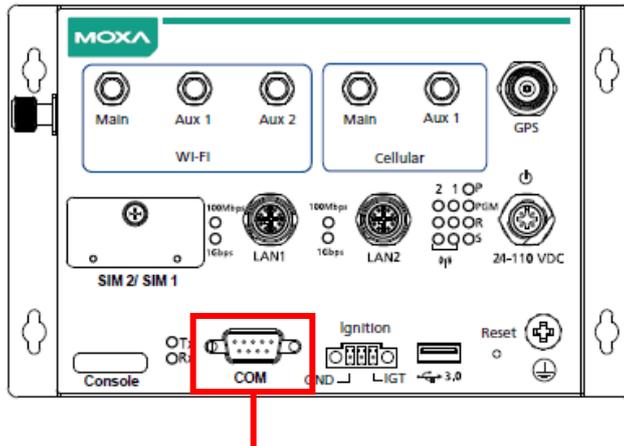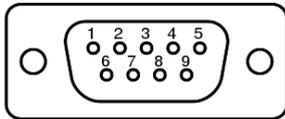
Serial Port (RS-232/422/485, DB9)

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.
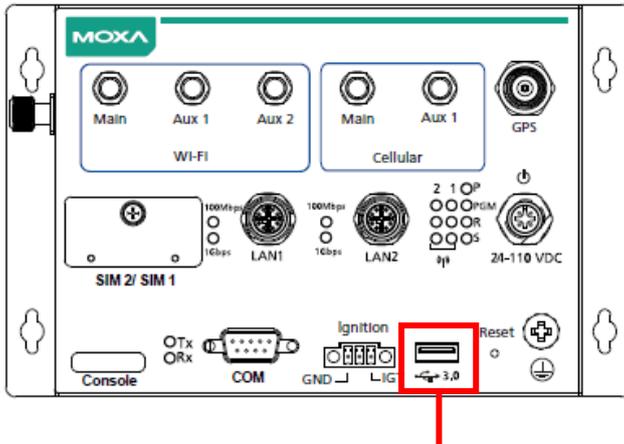
USB Port x 1 (USB 3.0, type A)

Connecting Wi-Fi/Cellular Modules and Antennas

The UC-8540 computer is provided with two sets of QMA antenna connector 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 and cellular module sockets.
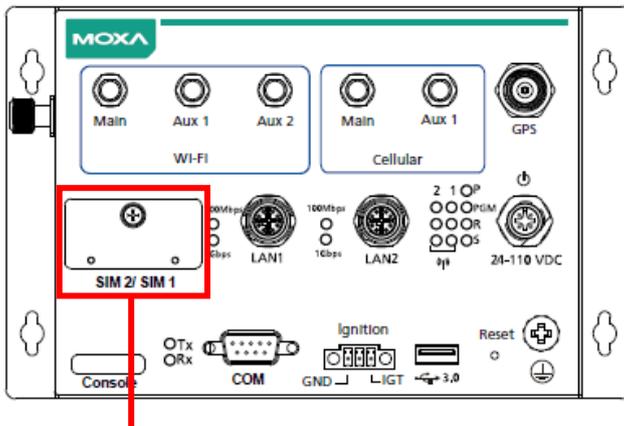
SIM Slots x 2 (Micro SIM)
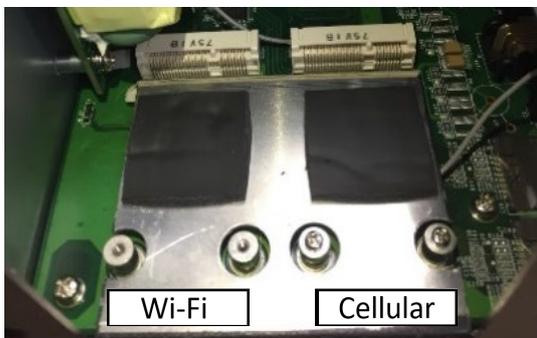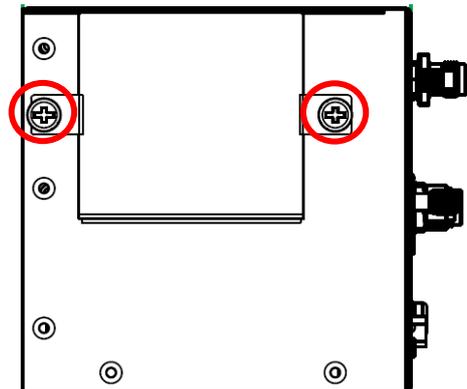
Socket Name	Usage
Cellular	Cellular module
Wi-Fi	Wi-Fi module

You will need to install the SIM cards for the cellular modules in the designated SIM-card slots 1 and 2.

Installing the Cellular Module

To install the cellular module, do the following:

1. Remove the plastic protective film on the thermal pads attached to the designated socket.

2. Insert the cellular module into the socket and tighten the two M2 screws on the module.

3. Attach the flat end of an antenna cable to the connector marked MAIN on the module and insert the other end of the cable into the antenna connector hole marked MAIN on the front panel of the computer.

✎ **NOTE**

You must first remove the black cover on the antenna connector hole and insert the connector tube via the back side of the front panel.


For the AUX antenna cable, use the procedure described above and remember to insert the cable into the antenna connector hole marked AUX 1 on the front panel.

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4. Use the black tape provided in the package to secure the antenna cables to the module. Attach tags (also provided in the package) to the cables as shown in the picture below to easily identify them.

5. Secure the antenna connectors to the front panel by inserting the locking washers through the connector tube followed by the nut and then tightening the nut onto the threaded protection ring.

SMA Model   **QMA Model**
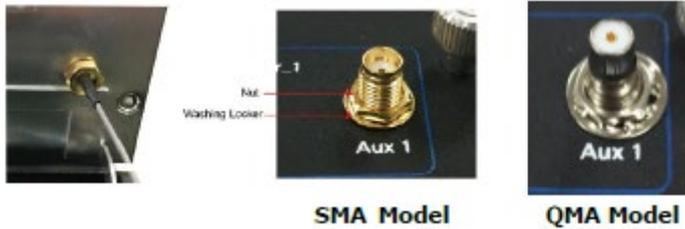
✎ **NOTE**

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.

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

Refer to the following illustration for the specific location of each antenna connector for the wireless modules.

7. Install external antennas using the connectors on the front panel.

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

✏️ **NOTE**

The GPS antenna connector is installed and secured by default. The connector type TNC is used in UC-8540's QMA model.

Installing the Wi-Fi Module

The Wi-Fi module package includes 1 Wi-Fi module, 1 bracket and 2 screws in a bag to extend the Wi-Fi module, 2 antenna cables and connectors, 2 locking washers, 2 nuts, 4 screws (2 M.2 and 2 M2.5; use the M.2 for the UC-8540 Series), 1 thermal pad, 1 black tape, and 1 tag sheet.

Accessories for the QMA Model

To install the Wi-Fi module, do the following:

✎ **NOTE**

The images in the instructions show a QMA model.

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1. Remove the plastic protective film on the thermal pad attached to the designated socket.
2. Attach the bracket to the Wi-Fi module by tightening 2 screws as shown in the image.
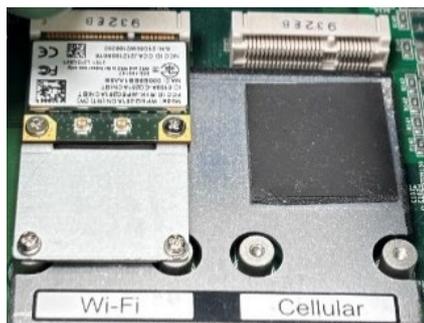

Front   Back

3. Insert the Wi-Fi module in the socket and use 2 M2 screws to secure the module to the socket.

✎ **NOTE**

The front side of the module should face upwards as shown in the image.

Wi-Fi   Cellular

4. Attach the flat end of an antenna cable to the connector marked MAIN and insert the other end of the cable from the inside out into the antenna connector hole marked MAIN on the front panel of the computer using the antenna connector.

✎ **NOTE**

Before connecting the antenna cable to the antenna connector on the front panel:

1. Remove the black cover on the antenna connector hole.
2. Insert the orange silicon rubber through the connector tube and then insert the connector tube with the rubber into the antenna connector hole through the back side of the front panel.

For the AUX antenna cable, use the procedure described above and remember to insert the cable into the antenna connector hole marked AUX 1 on the front panel.

5. Use the black tape provided in the package to secure the antenna cables to the module.

   If needed, you can also attach tags to the cable for easy identification.
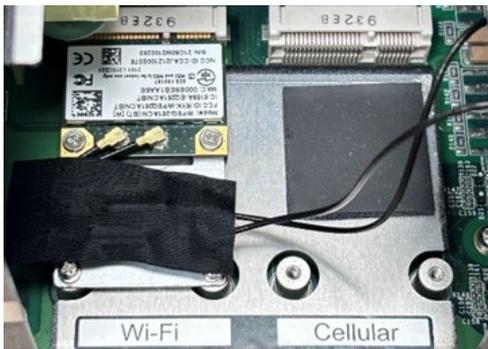
6. Secure the antenna connectors to the front panel by inserting a locking washer through connector tube and then tightening a nut onto it.
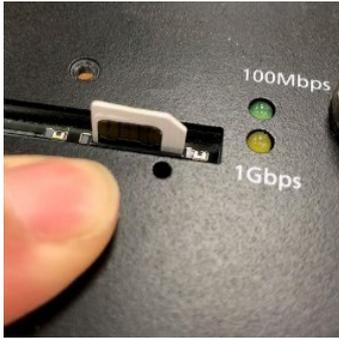

Installing SIM Cards for the Cellular Modules

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. Push down 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 & Replacing the RTC Battery

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 case on the bottom side to locate the mSATA socket.
2. Insert the mSATA module into the socket and fasten the two screws on the module to secure the module.
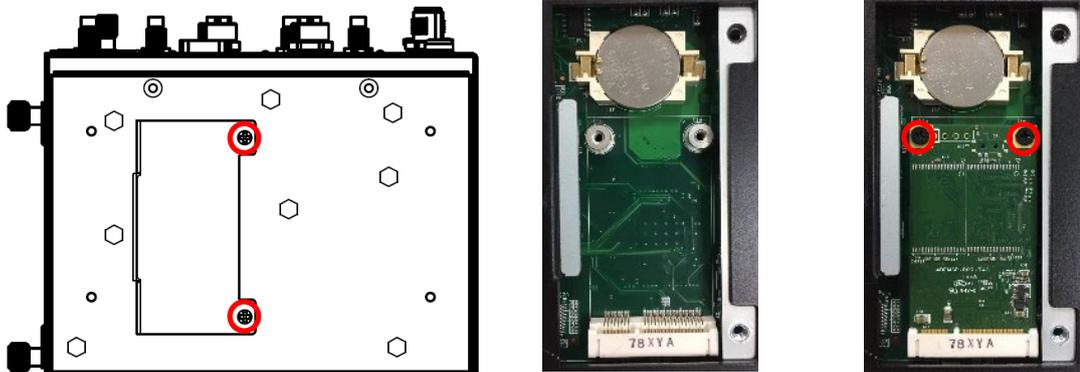
3. Replace the cover and fasten the screws on the cover.

If you need to replace the RTC battery (BR2032), the battery socket is located beside the mSATA socket.