

UC-8580 Series Hardware User's Manual

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www.moxa.com/product



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UC-8580 Series Hardware User's Manual

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Introduction

Thank you for using Moxa's UC-8580 Series computer. The UC-8580 Series computer is a programmable communication-centric gateway offering a rich variety of communication interfaces such as Ethernet, serial, and digital inputs/outputs. 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 802.11b/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.

The UC-8580 comes in two front-panel models to support two different types of antenna connectors (SMA and QMA) for wireless modules.

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-8580 Series consists of the following models:

- **UC-8580-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting up to 4 wireless modules with SMA connectors, and a -25 to 55°C operating temperature range
- **UC-8580-T-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting up to 4 wireless modules with SMA connectors, and a -40 to 70°C operating temperature range
- **UC-8580-T-CT-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting up to 4 wireless modules with SMA connectors, and a -40 to 70°C operating temperature range, and conformal coating
- **UC-8580-Q-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting up to 4 wireless modules with QMA connectors, -25 to 55°C operating temperature range
- **UC-8580-T-Q-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting up to 4 wireless modules with QMA connectors, -40 to 70°C operating temperature range
- **UC-8580-T-CT-Q-LX:** Programmable multiple-wireless computing platform for rail onboard applications, supporting up to 4 wireless modules with QMA connectors, with -40 to 70°C operating temperature range and conformal coating

The UC-8580 Series computer is shipped with the following items:

- UC-8580 Series computer
- 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-8580 Series computer includes the following features:

- ARMv7 Cortex-A7 dual-core 1 GHz processor
- 1 GB DDR3L SDRAM
- 4 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
- Up to 4 PCIe mini slots (1 PCIe/USB 2.0 and 3 USB 2.0 signals)
- Isolated power input with a wide range of 24 to 110 VDC

Hardware Specifications

Hardware Specifications

Computer

CPU: ARMv7 Cortex-A7 dual-core 1GHz processor

USB: USB 3.0/2.0 host x 1 (type A connector)

DRAM: 1 GB DDR3L SDRAM

OS (pre-installed): Debian ARM 8 (Kernel 4.1)

Storage

Expansion: 1 mSATA slot for storage expansion

Ethernet Interface

LAN: 2 auto-sensing 10/100/1000 Mbps ports (M12)

Magnetic Isolation Protection: 1.5 kV built-in

Serial Interface

Serial Standards: 2 RS-232/422/485 ports, software-selectable (5-pin terminal block connector)

Console Port: RS-232 (TxD, RxD, GND), 4-pin pin header (115200, n, 8, 1)

Serial Communication Parameters

Data Bits: 5, 6, 7, 8

Stop Bits: 1, 1.5, 2

Parity: None, Even, Odd, Space, Mark

Flow Control: XON/XOFF, ADDC® (automatic data direction control) for RS-485

Baudrate: 921600 bps (max.)

Serial Signals

RS-232: TxD, RxD, RTS, CTS, GND

RS-422: TxD+, TxD-, RxD+, RxD-, GND

RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND

RS-485-2w: Data+, Data-, GND

Digital Input/Output

Digital input: 3 (terminal block)

Input Voltage: 0 to 30 VDC at 25 Hz

Digital Input Levels for Dry Contacts:

Logic level 0: Close to GND

Logic level 1: Open

Digital Input Levels for Wet Contacts:

Logic level 0: 0 to 3 V

Logic level 1: +10 V to +30 V (COM to DI)

Output Channels: 3, sink type

DO Default Value: High-Z

DO IO Type: Open drain

Maximum Output Current: 200 mA per channel

On-State Voltage: 24 VDC nominal, open collector to 30 VDC

Isolation: 3 KV optical isolation

Connectors: 10-pin terminal blocks with CAGE CLAMP® connection, COM, DIs x 3, IGT (Ignition Control), Ignition Ground, DOs x 3, GND

GPS Module

Module: U-Blox NEO-M8Q-0

Antenna Type: Passive/Active

Connector Type: SMA/TNC (based on the model)

LEDs

System: power x 1, system ready x 1

LAN: 100/1000 M x 4

Programmable: Diagnostics x 1

Serial: Tx x 2, Rx x 2

Storage: storage x 1

Cellular/Wi-Fi: Cellular/Wi-Fi x 12

Button

Reset: Reset the device to factory defaults button x 1

Physical Characteristics

Housing: AI 5052 + ADC 12

Weight: 2.2 kg (4.86 lb)

Dimensions:

220 x 134 x 88.3 mm (8.66 x 5.28 x 3.48 in) without wall mount ear

270 x 134 x 88.3 mm (10.63 x 5.28 x 3.48 in) with wall mount ear

Mounting: wall

Environmental Limits

Operating Temperature:

Wide Temp. Models: -40 to 70°C (-40 to 158°F)

Wide Temp. Models: -40 to 70°C (-40 to 158°F), with the LTE accessory installed

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Anti-Vibration: 7.9 m/s² @ EN 50155 random wave, 5-150 Hz, 5 hr per axis

Anti-Shock: 50 m/s² @ EN 50155, half sine wave, 30 ms

Power Requirements

Input Voltage: 24 to 110 VDC (2-pin M12, V+, V-)

Input Current: 1.66 A @ 24 VDC

Power Consumption: Less than 40 W (with external loading on USB port and PCIe mini card)

Standards and Certifications

Safety: UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1

EMC: EN 55022 Class A, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class A

Rail Certification: EN 50155, EN 50121-4, NFPA 130

Green Product: RoHS, CRoHS, WEEE

Reliability

Alert Tools: External RTC (real-time clock)

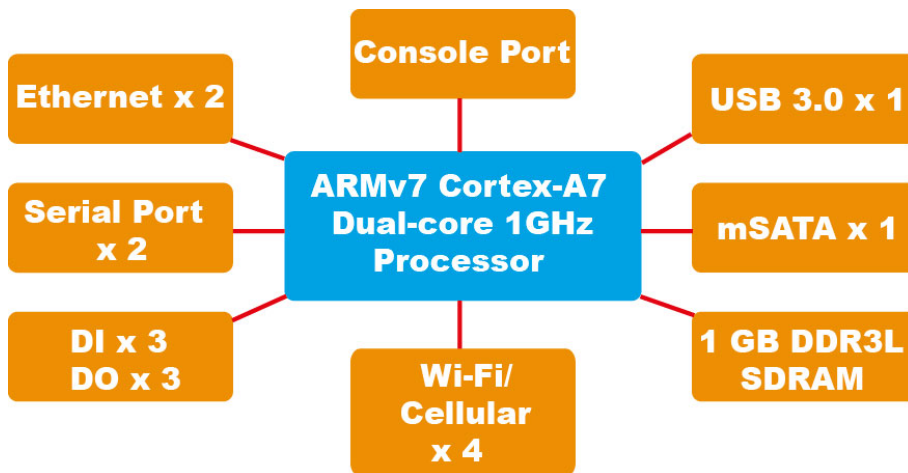
Automatic Reboot Trigger: External WDT (watchdog timer)

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

Hardware Block Diagram



Hardware Introduction

The UC-8580 computer is compact and designed to be rugged enough for industrial applications. This chapter provides information on the appearance and dimensions of the UC-8580 and describes the LED indicators, reset button, and RTC that can help you monitor system performance and identify issues. The multiple serial ports on the UC-8580 allow you to connect different devices for wireless operation, and the reliable and stable hardware platform lets you devote your attention to developing your applications.

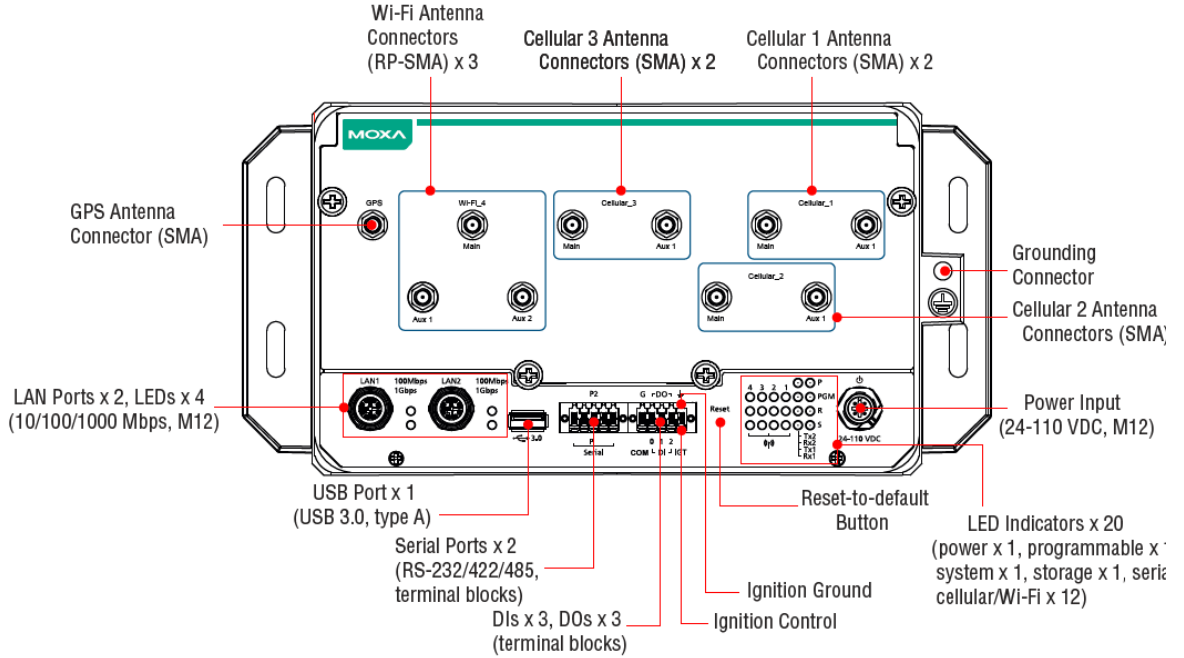
The following topics are covered in this chapter:

- **Appearance**
- **Dimensions**
- **LED Indicators**
- **Reset Button**

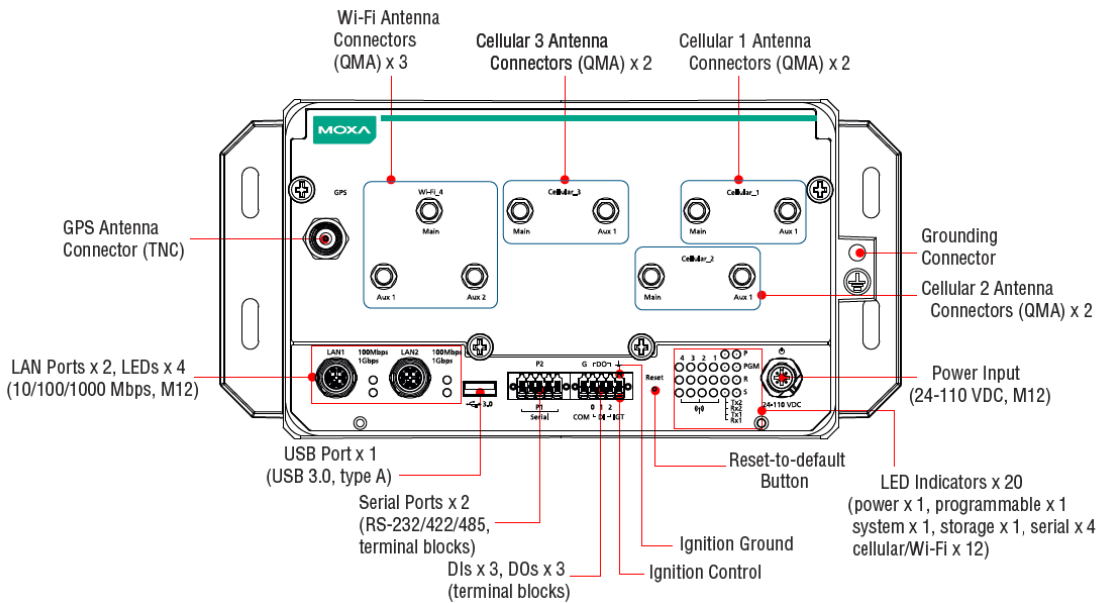
Appearance

Front View

SMA Model

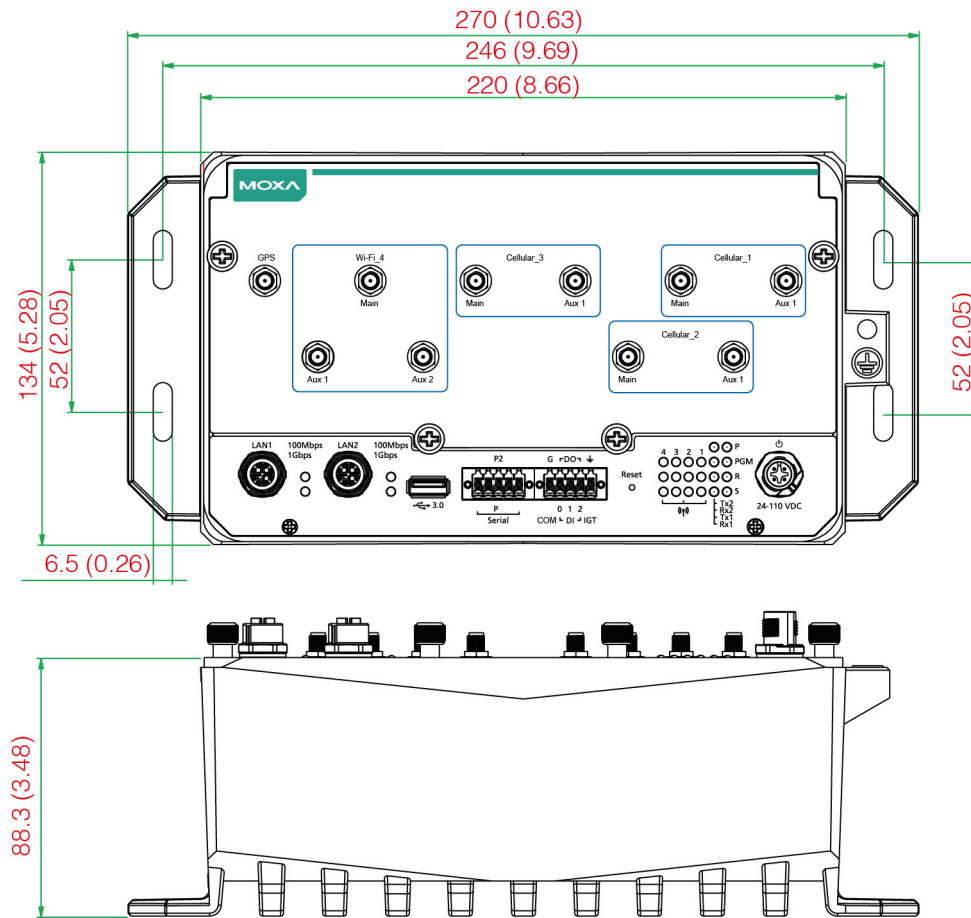


QMA Model




Dimensions

Unit = mm (in)

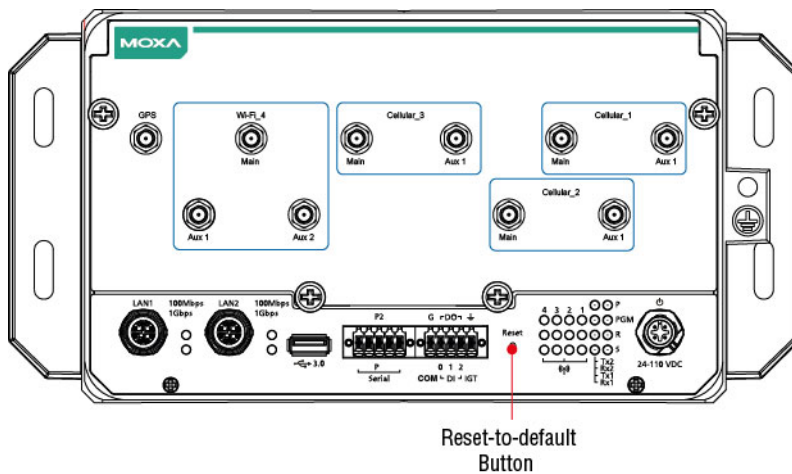


LED Indicators

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, 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 cable is not connected
Serial Tx2 Rx2 Tx1 Rx1	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-8580 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. The illustration below shows an SMA model.



Hardware Connection Description

In this chapter, we show how to connect the UC-8580 computer to the network and to various devices.

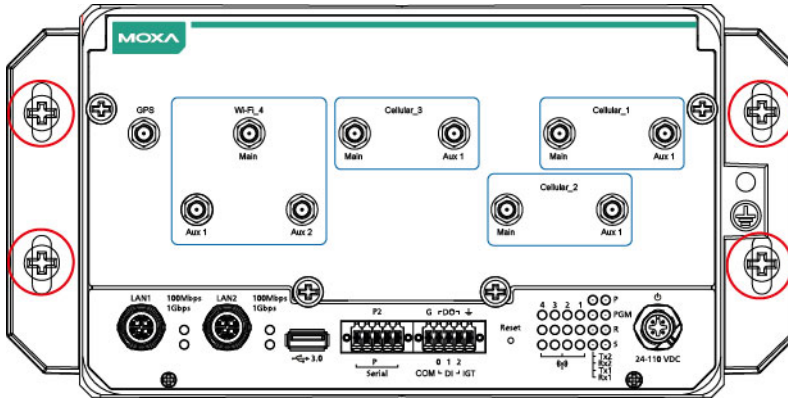
The following topics are covered in this chapter:

- ❑ **Installing the UC-8580 Series**
- ❑ **Wiring Requirements**
 - Connecting the Power
 - Grounding the Unit
- ❑ **Connecting Data Transmission Cables**
 - Connecting to an Ethernet Network
 - Connecting a Serial Device
 - Connecting Digital Input/ Output Devices
 - Connecting a USB Device
- ❑ **Connecting Wi-Fi/Cellular Modules and Installing Antennas**
- ❑ **Installing SIM Cards for the Cellular Modules**
- ❑ **Installing the mSATA Module**

Installing the UC-8580 Series

Wall or Cabinet Mounting

Use two screws per side to mount the UC-8580 computer on to a wall or in a cabinet. The illustration below shows an SMA model.



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-8580 computer.

Wiring Caution!

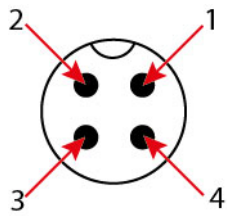
Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Temperature Caution!

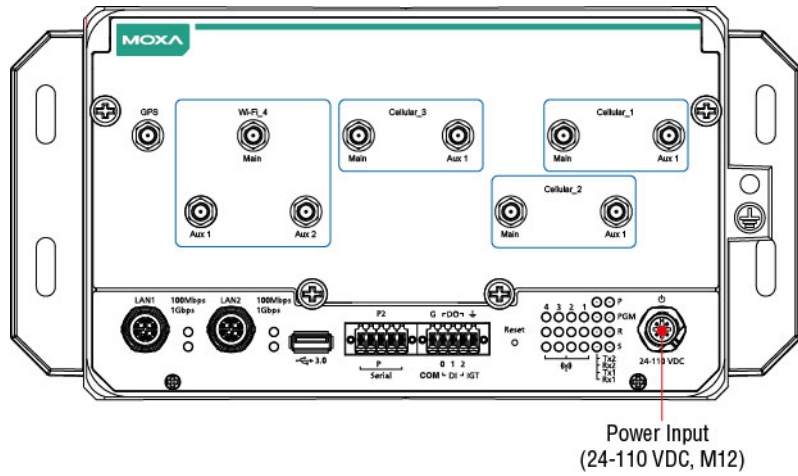
Be careful when handling the unit. When the unit is plugged in, the internal components generate heat, and consequently the outer casing may feel hot to the touch.

Connecting the Power

Connect the 24 to 110 VDC power line with M12 A-coded connector to the UC-8580 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

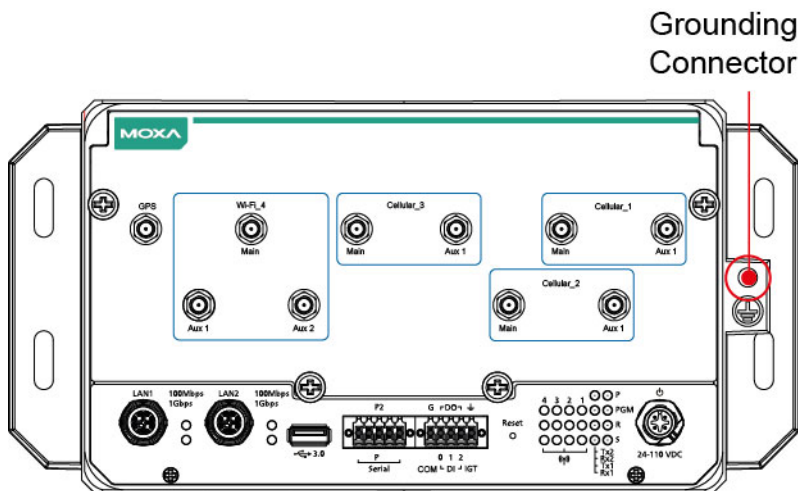
Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting the power.



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.



Connecting Data Transmission Cables

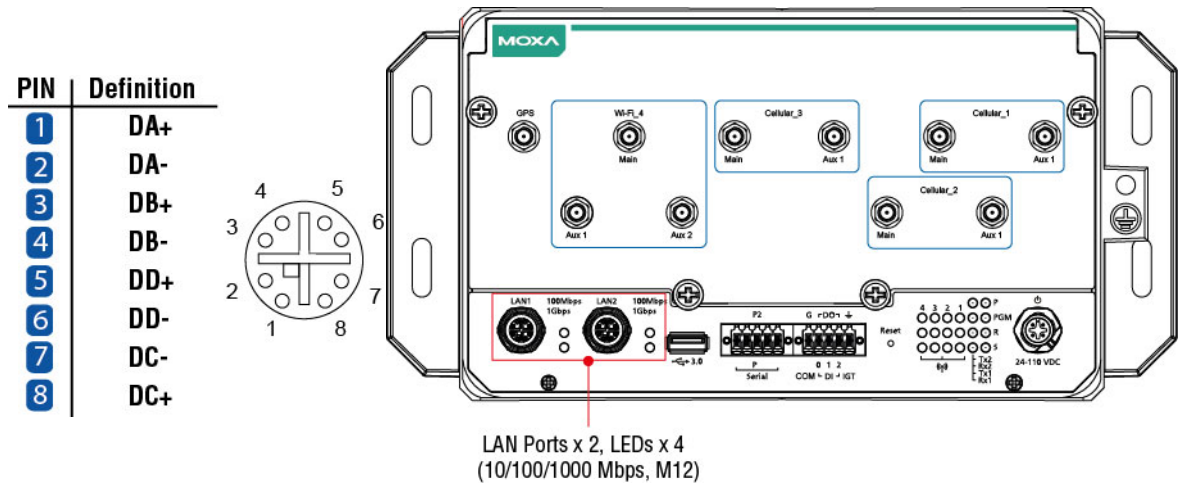
In this section, we describe how to connect the UC-8580 embedded computer to a network and serial devices.

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.

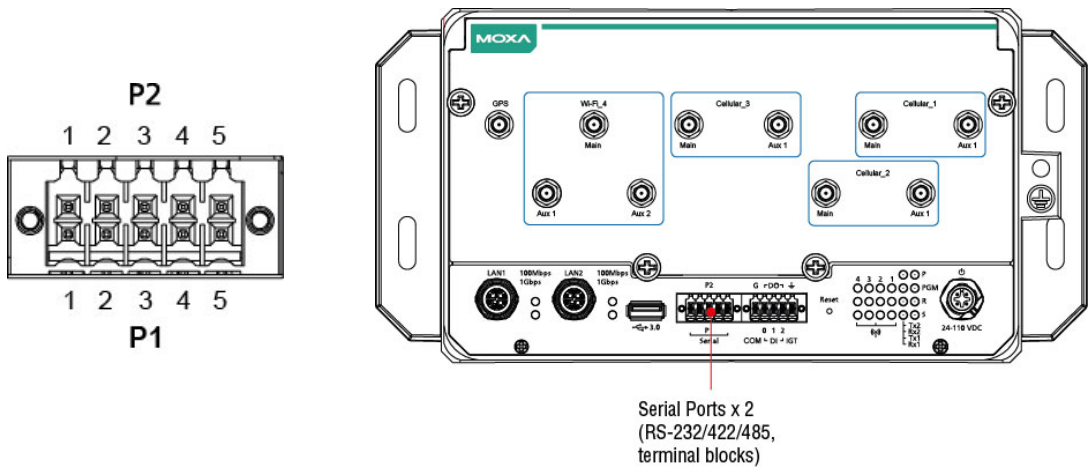
Two 10/100/1000 Mbps Ethernet ports with M12 X-coded connectors are located on the rear panel of the UC-8580 computer. See the following figure for the location of the Ethernet ports and the pin assignments. The figure is based on the SMA model.

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.



Connecting a Serial Device

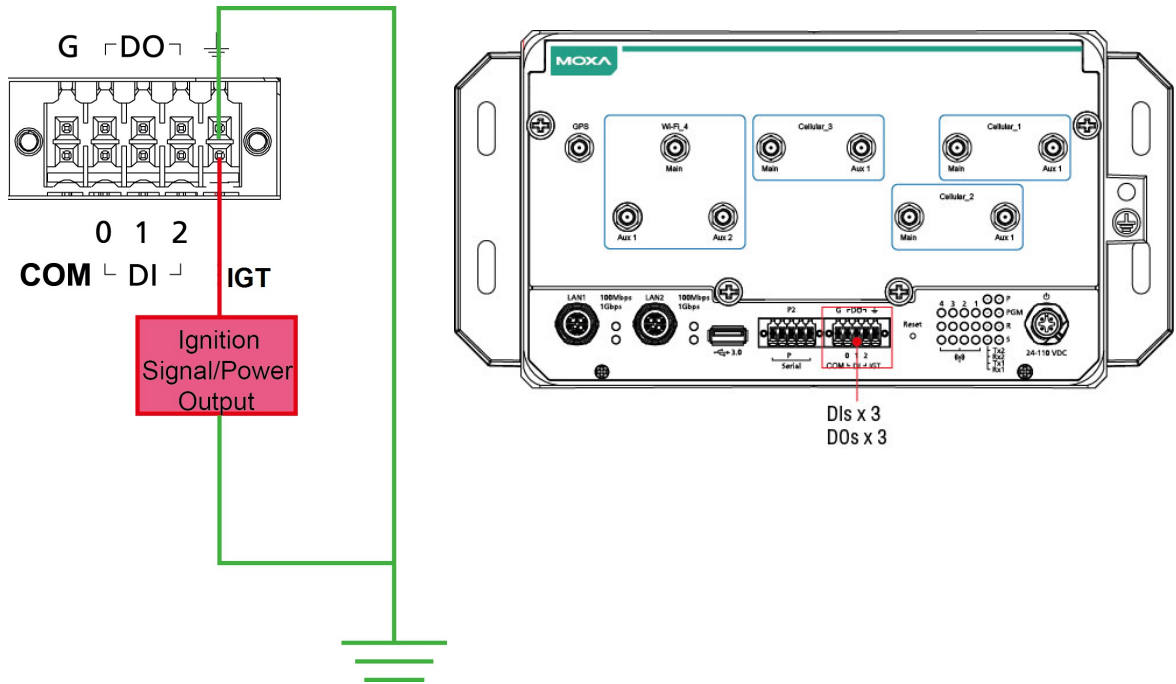
Use serial cables to connect your serial devices to the computer’s serial ports. Serial ports P1 and P2 have terminal blocks and can be configured for RS-232, RS-422, or RS-485 communication. The pin location and assignment of the serial ports are shown in the following diagrams. The diagrams are based on the SMA model.



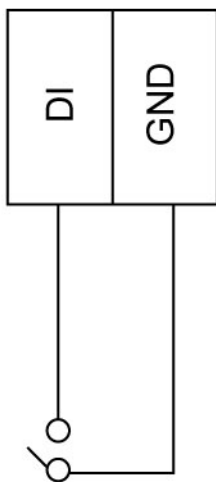
Pin	1	2	3	4	5
RS-232	TxD	RxD	RTS	CTS	GND
RS-422	TxD+	TxD-	RxD+	RxD-	GND
RS-485	--	--	DATA+	DATA-	GND

Connecting Digital Input/ Output Devices

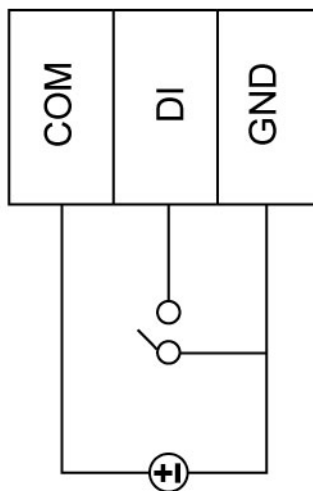
The UC-8580 computer comes with a 3-channel digital input and 3-channel digital output terminal block that you can use to connect your digital devices. The DI/O pin assignments and wiring methods are shown below:



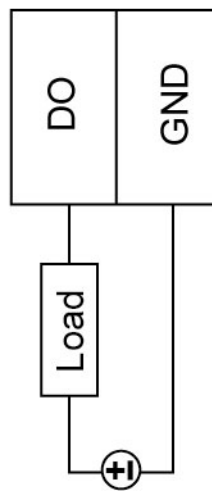
DI Dry Contact



DI Wet Contact

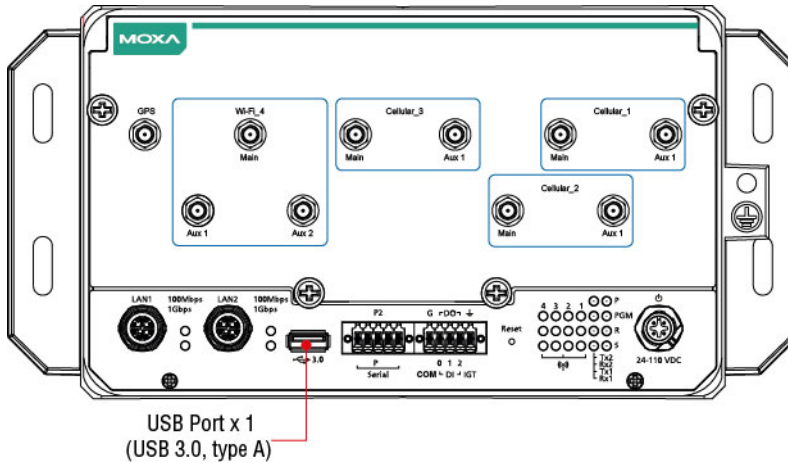


DO Contact Sink



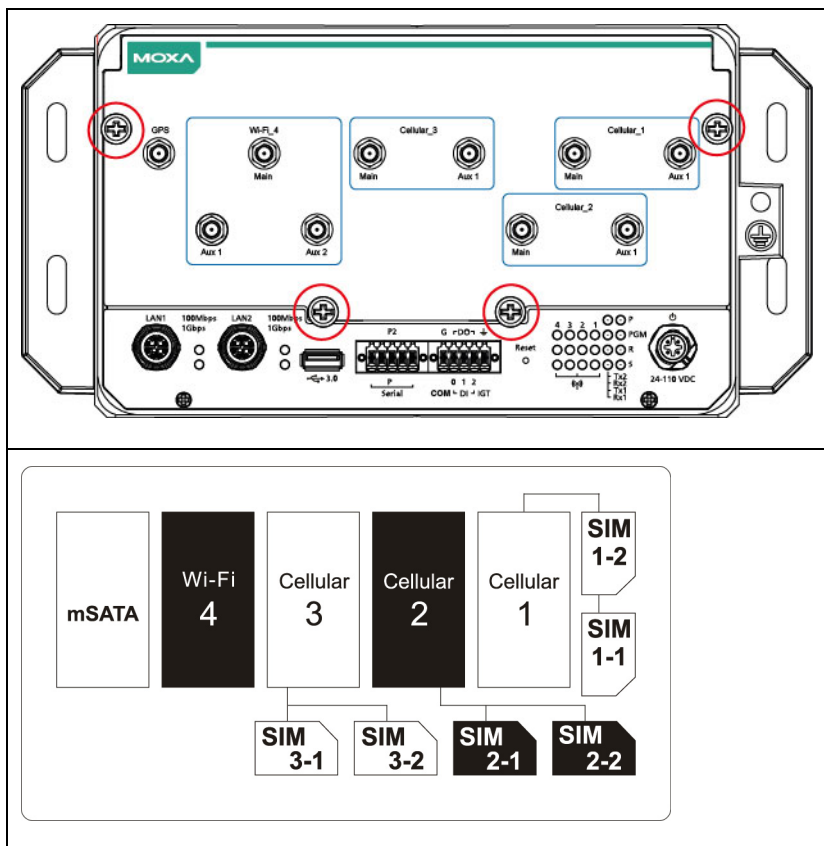
Connecting a USB Device

The UC-8580 computer is provided with a USB 3.0 port on the front panel for connecting a USB device.



Connecting Wi-Fi/Cellular Modules and Installing Antennas

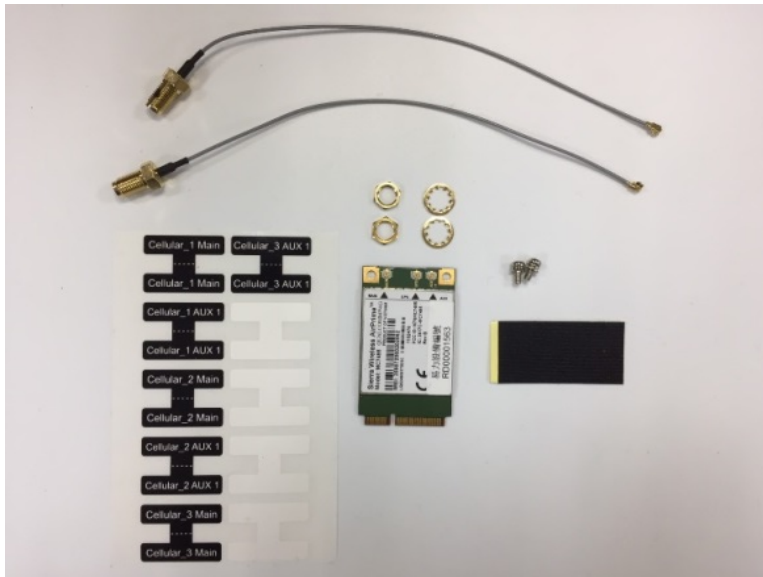
The UC-8580 computer is provided with four sets of antenna holes for installing antennas for the Wi-Fi and cellular modules. Unfasten the four screws on the front panel and lift up the panel to check the location of the Wi-Fi/cellular module sockets. The illustration below shows an SMA model.



Socket Name	Usage
Cellular_1	Cellular module
Cellular_2	Cellular module
Cellular_3	Cellular module
Wi-Fi_4	Wi-Fi module

You will need to install the SIM cards for the cellular modules in the designated SIM-card slots. For the cellular module in socket 1, insert SIM cards in the SIM 1-1 and SIM 1-2 slots. The SIM cards for the cellular module in socket 3 should be inserted in the SIM 3-1 and SIM 3-2 slots.

The Wi-Fi/cellular module package includes 1 wireless (Wi-Fi or cellular) module, 2 or 3 antenna cables and connectors, 1 black tape, 1 tag sheet, 2 screws, 2 locking washers, and 2 nuts.



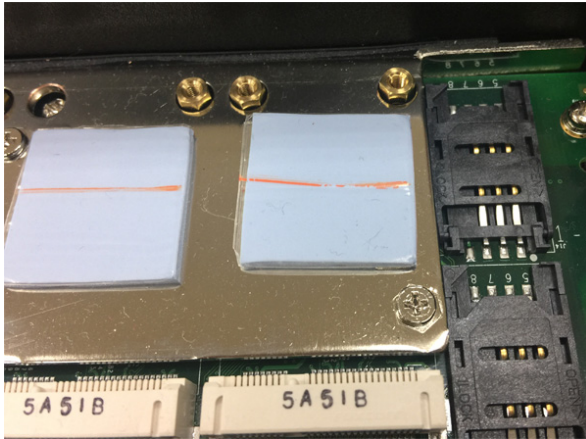
Accessories for the SMA Model



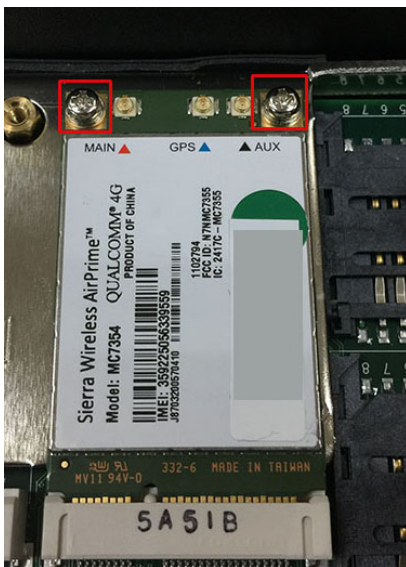
Accessories for the QMA Model

Follow these steps to install a wireless (Wi-Fi/cellular) module.

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



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



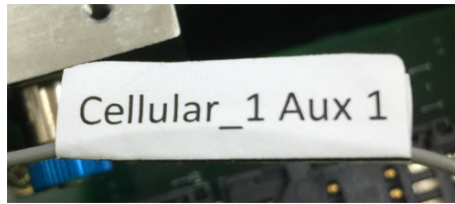
3. Attach the flat end of the antenna cable to the connector marked **MAIN** on the module and insert the other end of the cable with the connector tube into the antenna hole marked **MAIN** on the front panel of the computer.

You must first remove the black cover on the antenna hole and insert the connector tube through the back side of the front panel before you can attach the antenna cable.

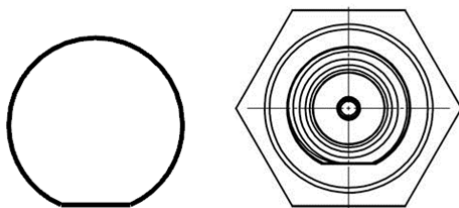
Follow the procedure described above to attach the AUX antenna cable.



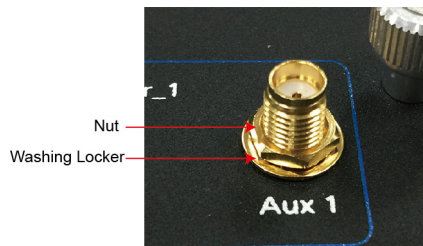
4. Use the black tape provided in the package to secure the antenna cables to the module.
Attach tags (also provided in the package) to the cables to help identify them easily as shown in the picture below:



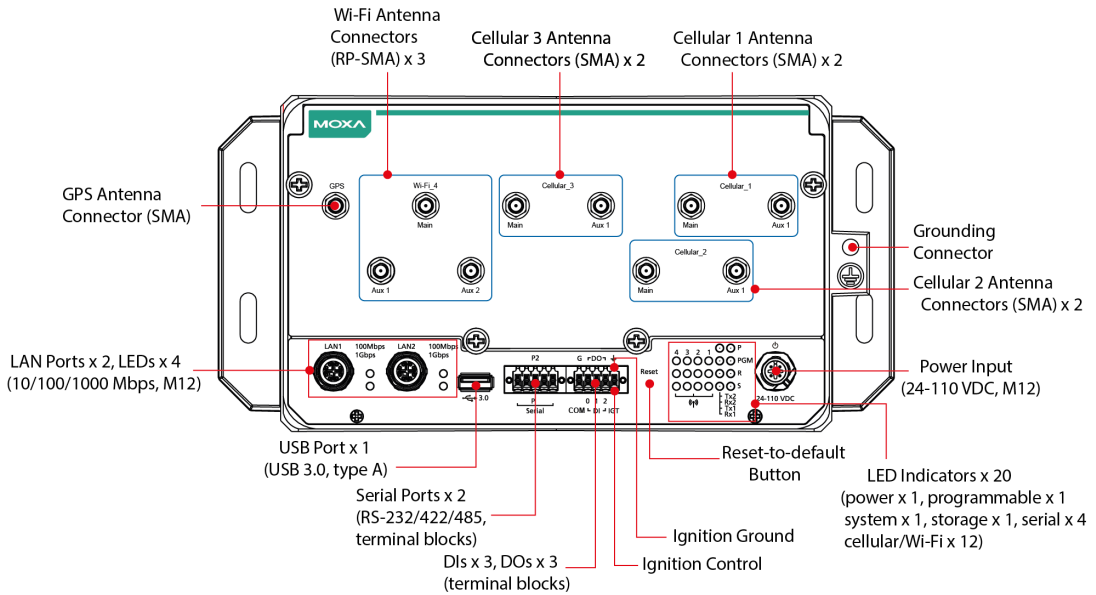
5. Insert the antenna connectors through the D-shaped antenna holes on the front panel. Be sure to align the D shaped connector tube with the antenna hole before you do so.



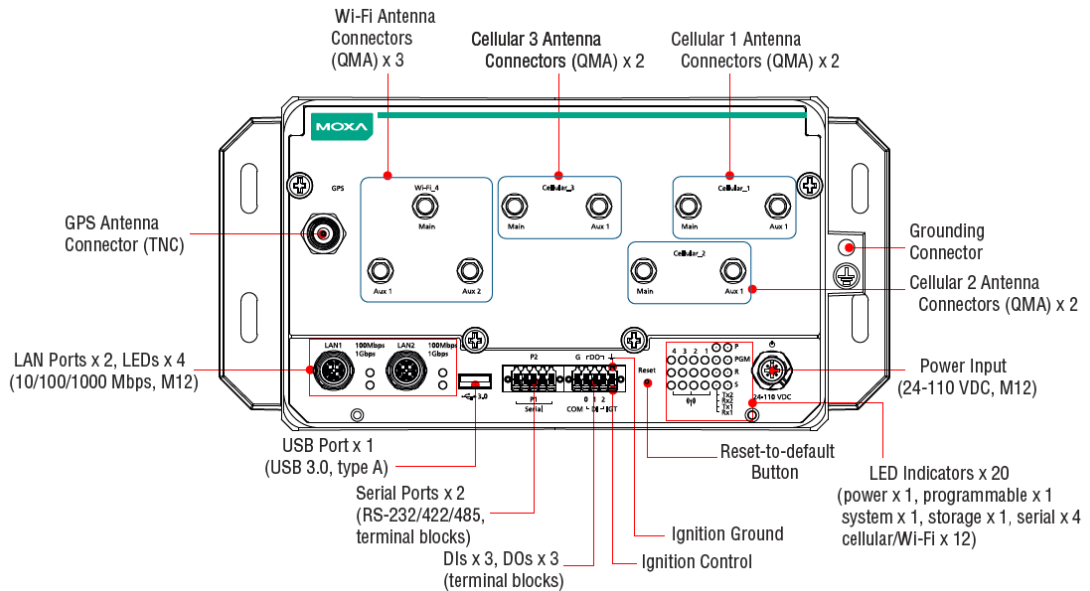
Secure the antenna connectors to the front panel by inserting the locking washers through the connector tube followed by the nut and then tightening the nut onto the threaded protection ring.



Refer to the following figures for the location of each antenna connector, including the connector for a GPS antenna.



SMA Model



QMA Model

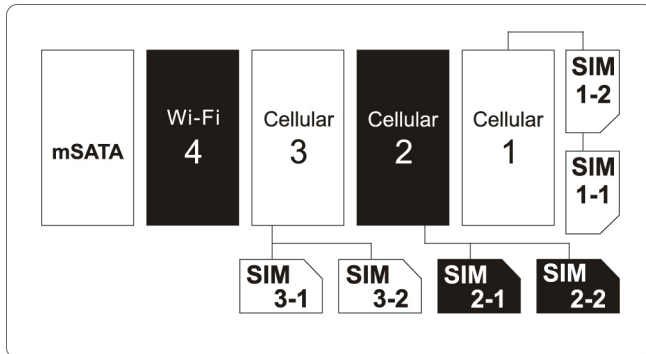
Use the procedure described above to install other Wi-Fi or cellular modules.

NOTE The Wi-Fi module installed in socket 4 requires three antennas. Make sure all three antennas are installed and secured properly before you use the module.

Installing SIM Cards for the Cellular Modules

Each cellular module supports 2 SIM cards. To install SIM cards for the cellular modules, do the following:

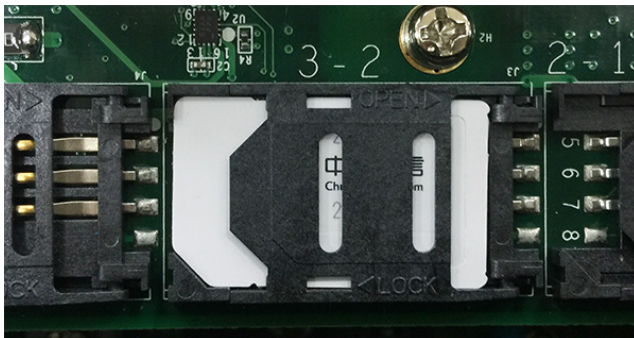
1. Find the location of the SIM card socket.



2. Pull up the SIM card holder and insert the SIM card.



3. Push down the SIM card holder until the SIM card is secured in place.

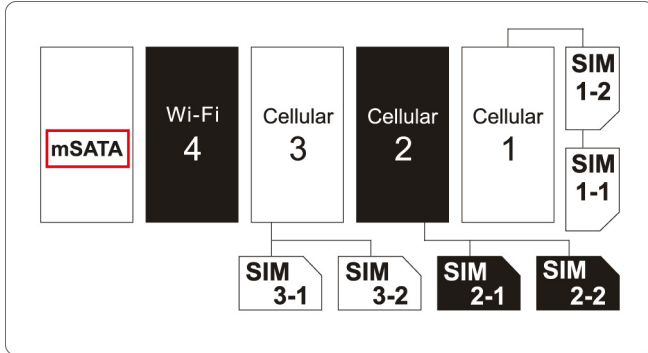


Installing the mSATA Module

The UC-8580 computer is provided with one storage socket for installing an mSATA module. To install the mSATA module, do the following:

1. Locate the mSATA socket.

It is the left most socket that you see when you open the front panel of the computer.



2. Insert the mSATA module in the socket.
3. Fasten the two screws on the module to secure the module.

