

UC-5100 Series Hardware User Manual

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MOXA®

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UC-5100 Series Hardware User Manual

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1. Introduction

The UC-5100 Series embedded computers are designed for industrial automation applications. The computers feature 4 RS-232/422/485 full-signal serial ports with adjustable pull-up and pull-down resistors, dual CAN ports, dual LANs, 4 digital input channels, 4 digital output channels, a SD socket, and a mini PCIe socket for wireless module in a compact housing with convenient front-end access to all these communication interfaces.

Overview

The UC-5100 Series embedded computers are designed for industrial automation applications. The computers feature 4 RS-232/422/485 full-signal serial ports with adjustable pull-up and pull-down resistors, dual CAN ports, dual LANs, 4 digital input channels, 4 digital output channels, a SD socket, and a mini PCIe socket for wireless module in a compact housing with convenient front-end access to all these communication interfaces.

Model Descriptions

The UC-5100 Series includes the following models:

- **UC-5101-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, 4 DI, 4 DO, -10 to 60°C operating temperature range
- **UC-5102-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, mini PCIe socket, 4 DI, 4 DO, -10 to 60°C operating temperature range
- **UC-5111-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, 2 CAN ports, 4 DI, 4 DO, -10 to 60°C operating temperature range
- **UC-5112-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, mini PCIe socket, 2 CAN ports, 4 DI, 4 DO, -10 to 60°C operating temperature range
- **UC-5101-T-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, 4 DI, 4 DO, -40 to 85°C operating temperature range
- **UC-5102-T-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, mini PCIe socket, 4 DI, 4 DO, -40 to 85°C operating temperature range
- **UC-5111-T-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, 2 CAN ports, 4 DI, 4 DO, -40 to 85°C operating temperature range
- **UC-5112-T-LX:** Industrial computing platform with 4 serial ports, 2 Ethernet ports, SD socket, 2 CAN ports, mini PCIe socket, 4 DI, 4 DO, -40 to 85°C operating temperature range



NOTE

The operating temperature range of the wide temperature models is:

- -40 to 70°C with an LTE accessory installed.
- -10 to 70°C with a Wi-Fi accessory installed.

Package Checklist

Before installing a UC-5100 computer, verify that the package contains the following items:

- UC-5100 Series computer
- Console cable
- Power jack
- Quick Installation Guide (printed)
- Warranty card



NOTE

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



NOTE

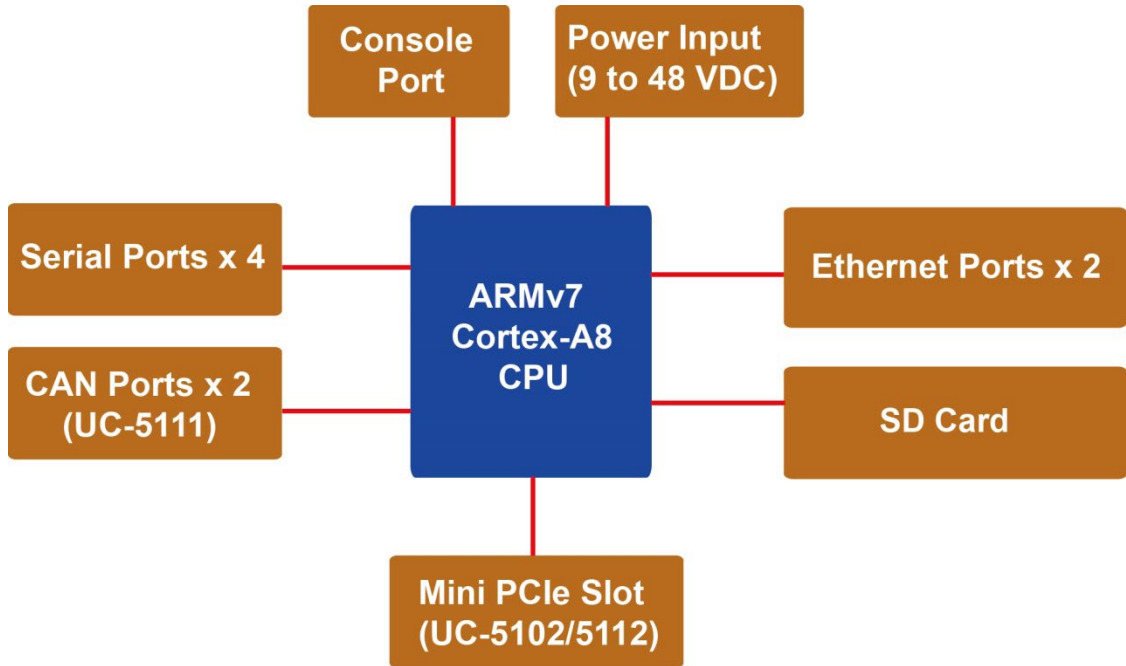
The console cable and power jack can be found beneath the molded pulp cushioning inside the product box.

Product Features

- Armv7 Cortex-A8 1000 MHz processor
- Dual auto-sensing 10/100 Mbps Ethernet ports
- 4 software-selectable RS-232/422/485 ports supporting all signals
- Dual Industrial CAN 2.0 A/B protocol supported
- Moxa Industrial Linux with 10-year superior long term support
- Mini PCIe socket for Wi-Fi/Cellular module
- Micro SD socket for storage expansion
- -40 to 85°C wide temperature range and -40 to 70°C with LTE enabled

For a complete set of specifications, refer to the product datasheet available on the Moxa Website.

Hardware Block Diagram

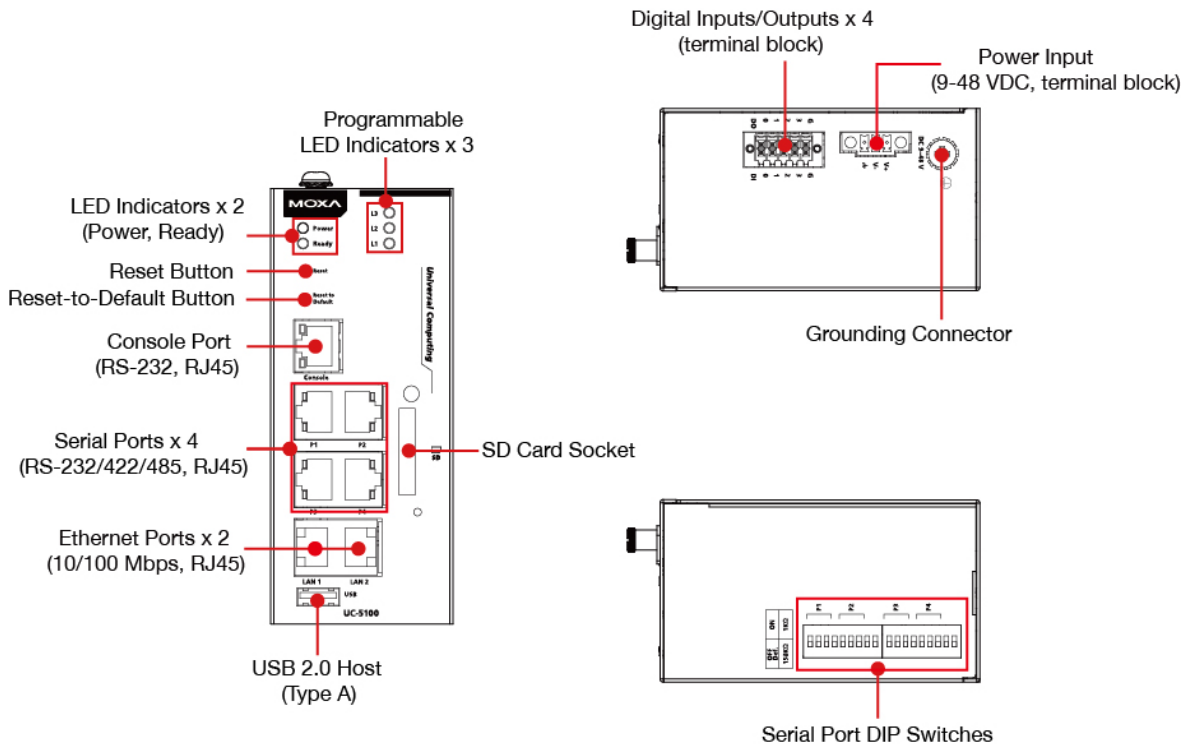


2. Hardware Introduction

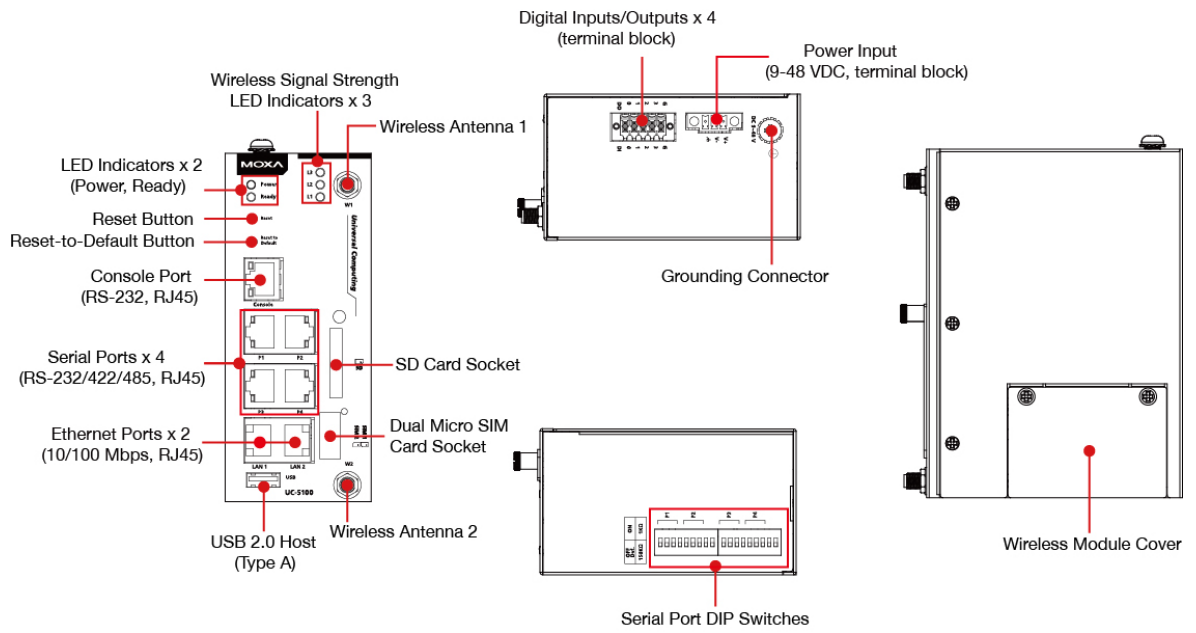
The UC-5100 embedded computers are compact and rugged, making them suitable for industrial applications. The LED indicators allow you to monitor performance and identify trouble spots quickly, and the multiple ports can be used to connect a variety of devices. The UC-5100 Series comes with a reliable and stable hardware platform that lets you devote the bulk of your time to application development. In this chapter, we provide basic information about the embedded computer's hardware and its various components.

Appearance

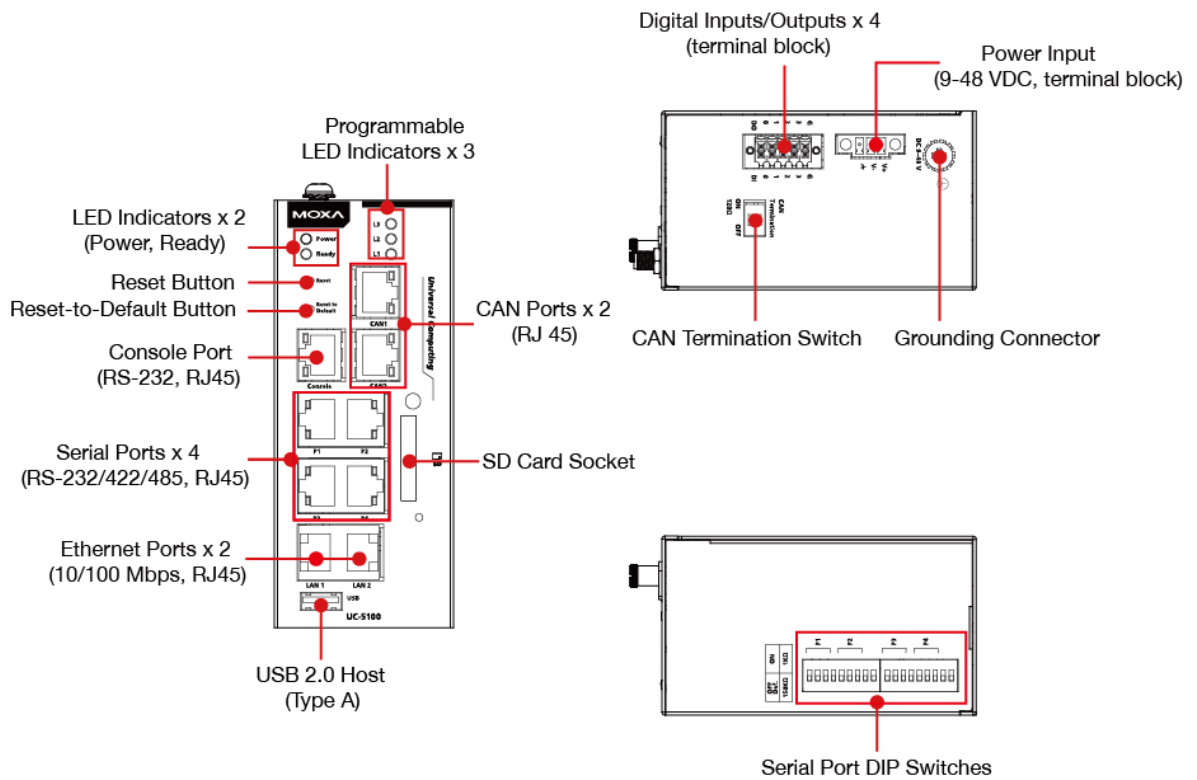
UC-5101



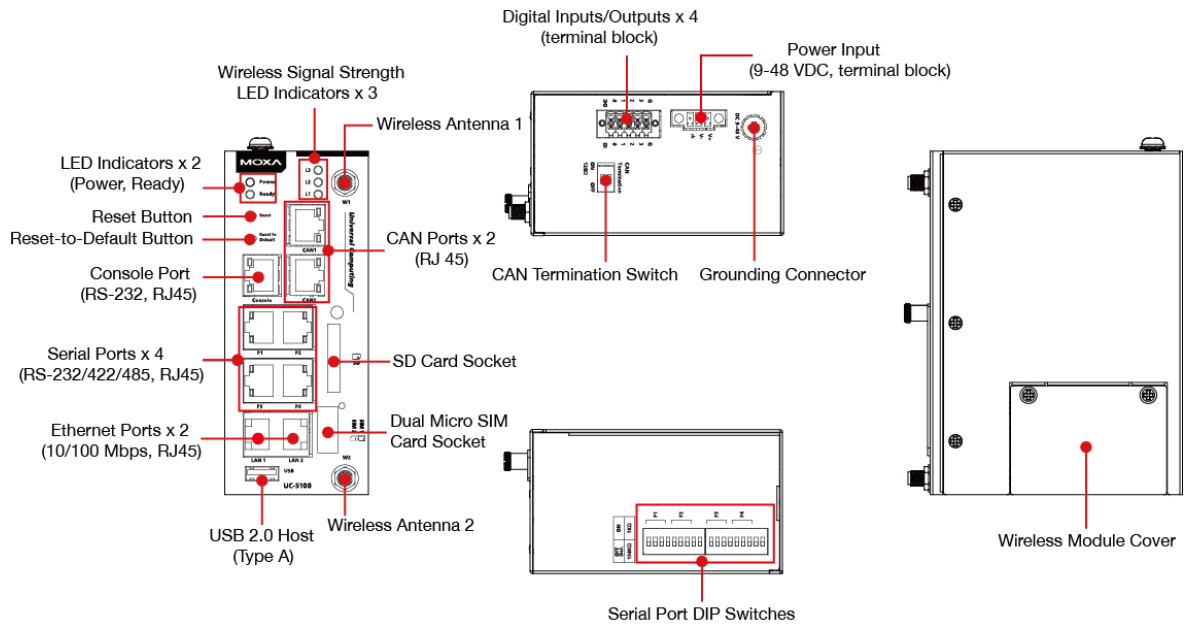
UC-5102



UC-5111



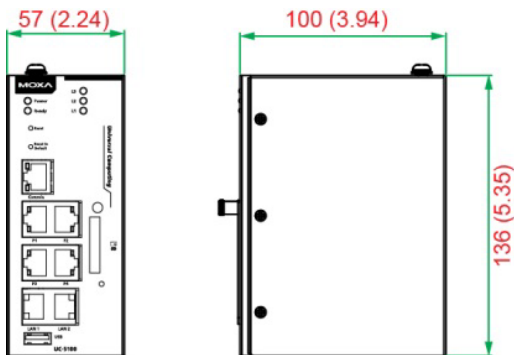
UC-5112



Dimensions

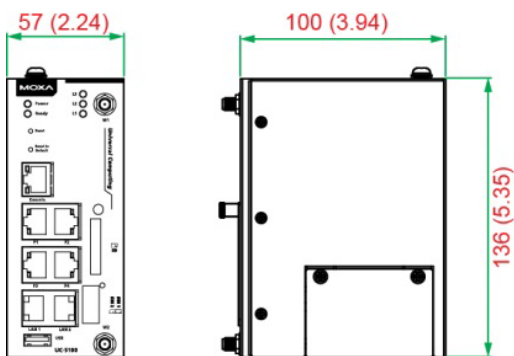
UC-5101

Units: mm (in)



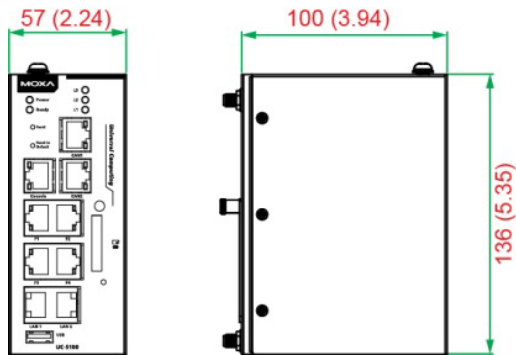
UC-5102

Units: mm (in)



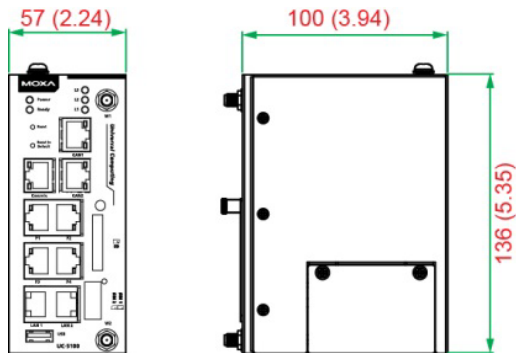
UC-5111

Units: mm (in)



UC-5112

Units: mm (in)



LED Indicators

The function of each LED is described in the table below:

LED Name	Status	Function
Power	Green	Power is on, and the device is functioning normally
	Off	Power is off
Ready	Yellow	OS has been successfully enabled and the device is ready
Ethernet	Yellow	Steady On: 10 Mbps Ethernet link Blinking: Data transmission is in progress
	Green	Steady On: 100 Mbps Ethernet link Blinking: Data transmission is in progress
	Off	Transmission speed below 10 Mbps or the cable is not connected
Serial (Tx)	Green	Serial port is transmitting data
	Off	Serial port is not transmitting data
Serial (Rx)	Yellow	Serial port is receiving data
	Off	Serial port is not receiving data
L1/L2/L3 (UC-5102/5112)	Yellow	The number of glowing LEDs indicates the signal strength. All LEDs: Excellent L1 & L2 LEDs: Fair L1 LED: Poor L1 LED Blinking: Very Poor
	Off	No connection or no wireless module detected
L1/L2/L3 (UC-5101/5111)	Yellow/Off	Programmable LEDs defined by users

Reset Button

The UC-5100 computer is provided with a **Reset** button, which is located on the front panel of the computer. To reboot the computer, press the reset button for 1 second.

Reset to Default Button

The UC-5100 is also provided with a **Reset to Default** button which can be used to reset the operating system back to the factory default status. Press and hold the **Reset to Default** button between 7 to 9 seconds to reset the computer to the factory default settings. When the reset button is held down, the **Ready** LED will blink once every second. The **Ready** LED will become steady when you hold the button continuously for 7 to 9 seconds. Release the button within this period to load the factory default settings.

Real-time Clock

The UC-5100's real time clock is powered by a non-chargeable battery. We strongly recommend that you do not replace the lithium battery without help from a qualified Moxa support engineer. If you need to change the battery, contact the Moxa RMA service team.



WARNING

There is a risk of explosion if the battery is replaced with an incorrect type.

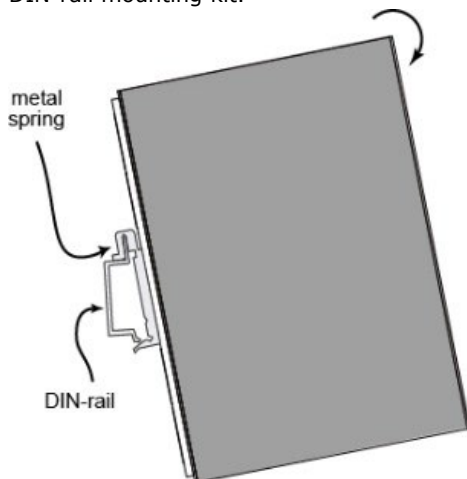
Installation Options

DIN-rail Mounting

The aluminum DIN-rail attachment plate is already attached to the product's casing. To mount the UC-5100 on to a DIN rail, make sure that the stiff metal spring is facing upwards and follow these steps.

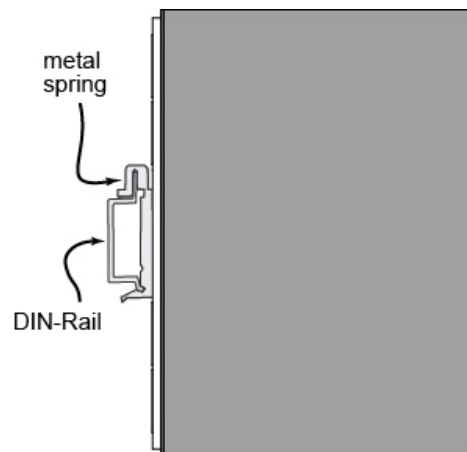
Step 1:

Insert the top of the DIN rail into the slot just below the stiff metal spring in the upper hook of the DIN-rail mounting kit.



Step 2:

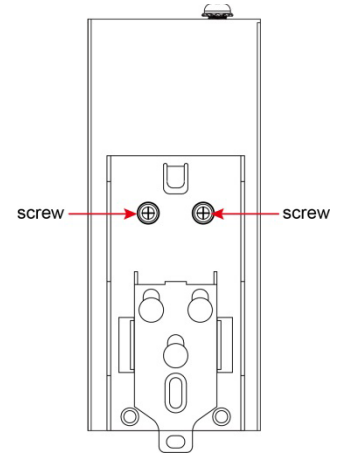
Push the UC-5100 towards the DIN rail until the DIN-rail attachment bracket snaps into place.



Optional DIN-rail Mounting Kit

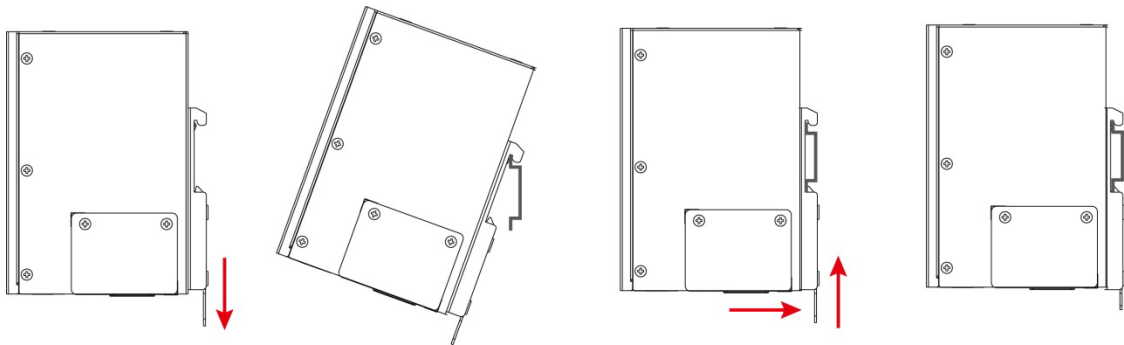
The UC-5100 can also be mounted using an optional DIN-rail mounting kit. Follow these steps for the installation.

1. Attach the optional DIN-rail mounting kit on the rear panel with two screws.
2. Pull down the slider of the DIN-rail bracket located at the back of the unit.
3. Insert the top of the DIN rail into the slot just below the upper hook of the DIN-rail bracket.
4. Latch the unit firmly on to the DIN rail as shown in the illustrations below.
5. Once the computer is mounted properly, you will hear a click and the slider will rebound back into place automatically.



NOTE

This optional DIN-rail mounting kit should be purchased separately.



3. Hardware Connection Description

In this chapter, we describe how to connect the UC-5100 to a network and various devices for first time testing purposes.

Wiring Requirements

In this section, we describe how to connect various devices to the embedded computer. 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 and 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 strongly advised that you label wiring to all devices for easy identification.



ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your UC-5100 Series computers.

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. This equipment is intended to be supplied by a certified External Power Supply, the output of which meets SELV and LPS regulations.

- The wiring for the input terminal block must be installed by qualified and experienced professionals.
 - Wire Type: Cu, FW2.
 - Use 28-14 AWG wire size and a torque value of 0.2 N-m.
- Use only one conductor in a clamping point between the DC power source and the power input.

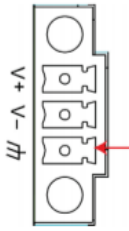
Temperature Caution!

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.

This equipment is intended for installation in Restricted Access Locations.

Connecting the Power

Terminal Block



Connect the 9 to 48 VDC power line to the terminal block, which is connector to the UC-5100 Series computer. If the power is supplied properly, the "Power" LED will glow a solid green light. The power input location and pin definition are shown in the adjacent diagram.

SG: The Shielded Ground (sometimes called Protected Ground) contact is at the bottom contact of the 3-pin power terminal block connector when viewed from the angle shown here. Connect the wire to an appropriate grounded metal surface or through the grounding screw on top of the device.



NOTE

The input rating of UC-5100 Series is 9 to 48 VDC, 0.95 to 0.23 A.



ATTENTION

The product is intended to be supplied by a UL Listed Power Supply suitable for use at $T_{ma} = 85^{\circ}\text{C}$ whose output meets ES1 and PS2/LPS rated 9 to 48 VDC, 0.95 A (min.), or 48 VDC, 0.23 A (min).



ATTENTION

Altitude Requirement

This product and the listed power supply (LPS) adapter(s) used with it are UL-certified for operation at 2,000 meters. Although the product is tested at 5,000 meters, it is not UL-certified for this altitude. For reliable performance of the product in high-altitude installations of over 2,000 meters (e.g., 5,000 meters), use a suitable adapter that is tested and certified at the altitude (i.e., 5,000 meters).

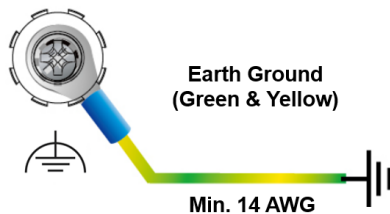
Grounding the Unit

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 devices.



ATTENTION

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Use the green-and-yellow cable type minimum with American Wire Gauge (AWG) 14 (2.5 mm²) for grounding.





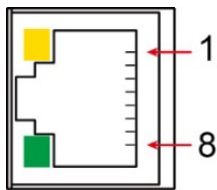
ATTENTION

A shielded power cord is required to meet FCC emission limits and also to prevent interference with nearby radio and television reception. It is essential that only the supplied power cord be used.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Connecting to the Console Port

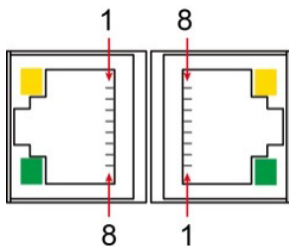
The UC-5100's console port is a 4-pin pin-header RS-232 port located on the top panel of the case. It is designed for serial console terminals, which are useful for identifying the boot up message, or for debugging system boot-up issues.



PIN	Signal
1	-
2	-
3	GND
4	TxD
5	RxD
6	-
7	-
8	-

Connecting to the Network

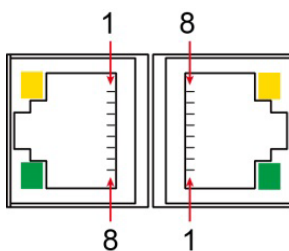
The Ethernet ports are located on the front panel of the UC-5100 computers. The pin assignments for the Ethernet port are shown in the following figure. If you are using your own cable, make sure that the pin assignments on the Ethernet cable connector match the pin assignments on the Ethernet port.



Pin	Signal
1	Tx+
2	Tx-
3	Rx+
4	-
5	-
6	Rx-
7	-
8	-

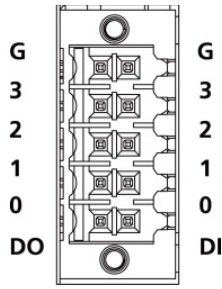
Connecting to a Serial Device

The serial ports are located on the front panel of the UC-5100 computer. Use a serial cable to connect your serial device to the computer's serial port. These serial ports have RJ45 connectors and can be configured for RS-232, RS-422, or RS-485 communication. The pin location and assignments are shown in the table below.

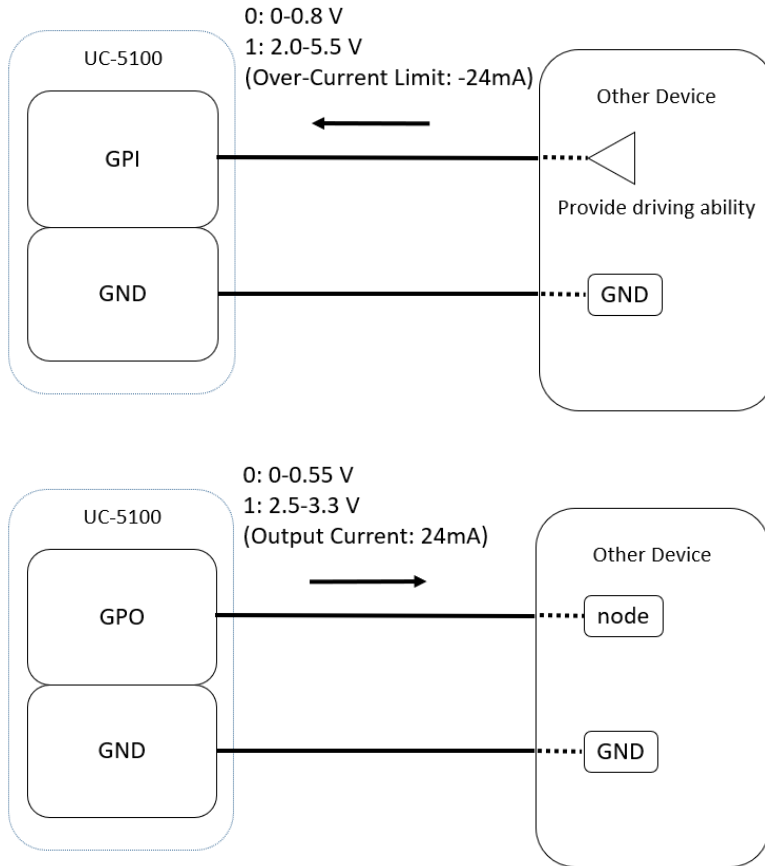


Pin	RS-232	RS-422	RS-485
1	DSR	-	-
2	RTS	TxD+	-
3	GND	GND	GND
4	TxD	TxD-	-
5	RxD	RxD+	Data+
6	DCD	RxD-	Data-
7	CTS	-	-
8	DTR	-	-

Connecting to a DI/DO Device

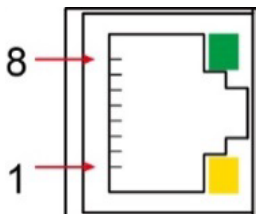


The UC-5100 Series comes with 4 general-purpose input connectors and 4 general-purpose output connectors. These connectors are located on the top panel of the computer. Refer to the diagram on the left for the pin definitions of the connectors. For the wiring method, refer to the following figures:



Connecting to a CAN Device

The UC-5111/5112 comes with 2 CAN ports, allowing users to connect CAN device. The pin location and assignments are shown in the following table:



PIN	Signal
1	CAN_H
2	CAN_L
3	CAN_GND
4	-
5	-
6	-
7	CAN_GND
8	-

Connecting to a USB Device

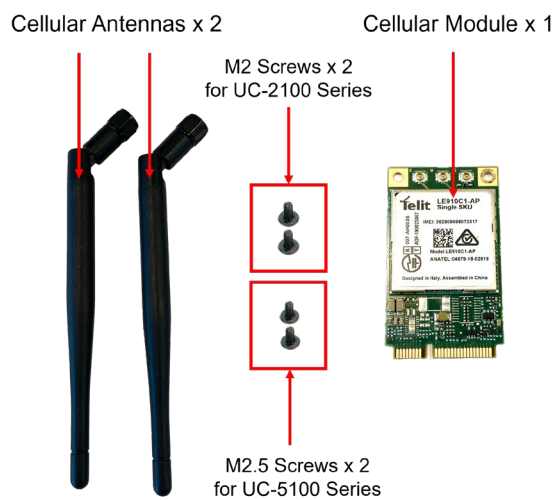
The UC-5100 Series computers come with a USB port located at the lower part of the front panel, allowing users to connect to a device with a USB interface. The USB port uses a type A connector.

Connecting the Cellular/Wi-Fi Module and Antenna

The UC-5102 and UC-5112 computers come with one Mini PCIe socket for installing one cellular or Wi-Fi module. Unfasten the two screws on the right panel to remove the cover and find the location of the socket.



The cellular module package includes 1 cellular module, and 2 screws. The cellular antennas should be purchased separately to fit your installation requirements.



To install a cellular module, do the following:

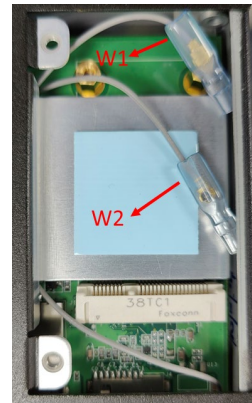
1. Insert the cellular module into the socket and fasten two screws (included in the package) on to the top of the module. We recommended using a tweezer when installing or removing the module.



2. Connect the free ends of the two antenna cables to the RX diversity antenna (labeled **D**) and the main RF antenna (labeled **M**) as shown in the figure.

You can connect the main RF antenna to either **W1** or **W2**. The W1 and W2 antenna connectors with cables attached are shown in the figure.

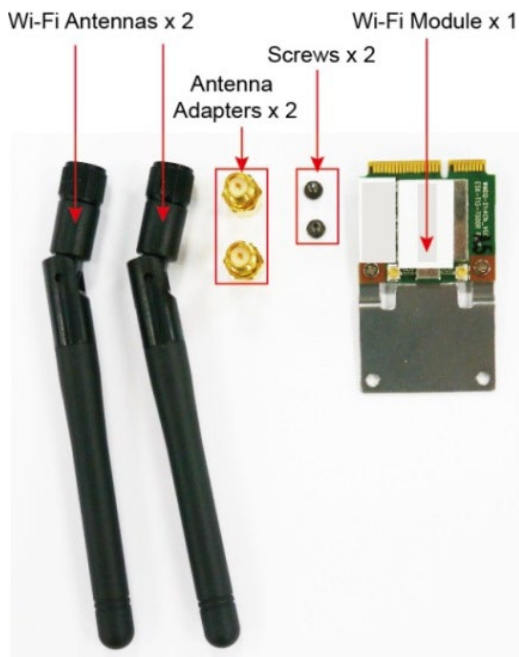
For the cellular connection to function correctly, it is mandatory to connect both antennas. A single antenna connection will not suffice for cellular network operations.



3. Replace the cover and secure it using two screws.
4. Connect the cellular antennas to the connectors. Antenna connectors are located on the front panel of the computer.

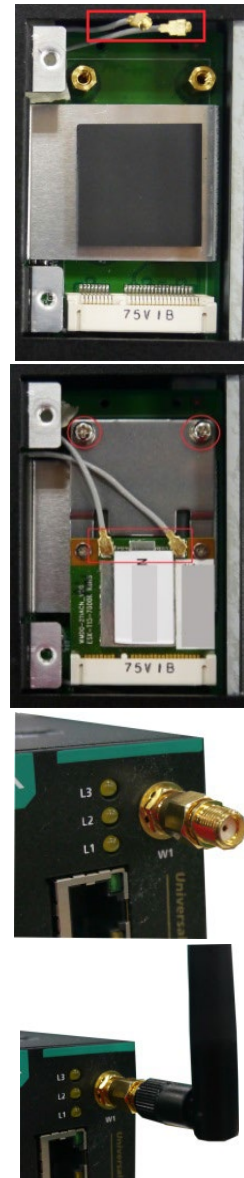


The Wi-Fi module package includes 1 Wi-Fi module, and 2 screws. The antenna adapters and Wi-Fi antennas should be purchased separately to fit your installation requirements.



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

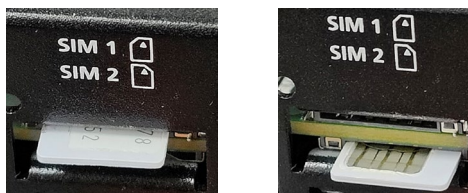
1. Set the antenna cables aside and clear the wireless module socket as shown in the figure for convenience of installation.
2. Insert the Wi-Fi module into the socket and fasten two screws (included in the package) on to the top of the module. We recommended using a tweezer when installing or removing the module.
3. Connect the free ends of the two antenna cables next to the screws as shown in the figure.
4. Replace the cover and secure it with two screws.
5. Connect the antenna adapters to the connectors on the front panel of the computer.
6. Connect the Wi-Fi antennas to the antenna adapters.



Installing Micro SIM Cards

You will need to install a Micro SIM card on your UC-5100 computer. Follow these steps to install the Micro SIM card.

1. Remove the screw on the cover located on the front panel of the UC-5100.
 2. Insert the Micro SIM card into the socket. Make sure you place the card in the right direction.
- To remove the Micro SIM card, simply push the Micro SIM card and release it.





NOTE

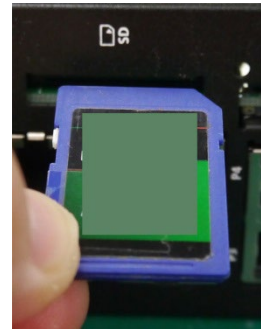
There are two Micro SIM card sockets allowing users to install two Micro SIM cards simultaneously. However, only one Micro SIM card can be enabled for use.

Installing the SD Card

The UC-5100 Series computers come with a socket for storage expansion that allows users to install an SD card. Follow these steps to install the SD card:

1. Unfasten the screw and remove the panel cover.
The SD socket is located on the front panel of the computer.
2. Insert the SD card into the socket. Ensure that the card is inserted in the right direction.
3. Replace the cover and fasten the screw on the cover to secure the cover.

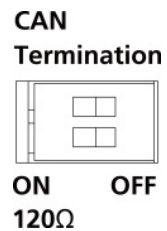
To remove the SD card, simply push the card in and release it.



Adjusting the CAN DIP Switch

The UC-5111 and UC-5112 computers come with one CAN DIP switch for users to adjust the CAN termination resistor parameters. To set up the DIP switch, do the following:

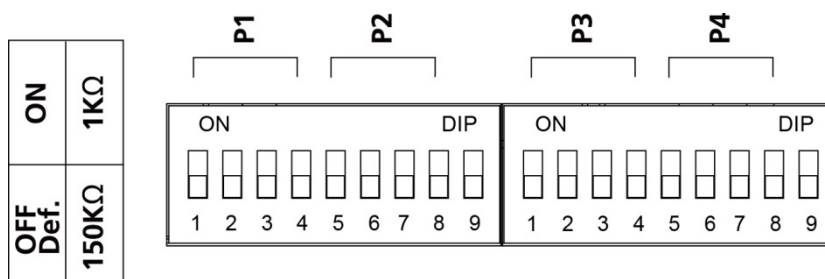
1. Find the DIP switch location on the top panel of the computer.
2. Adjust the setting as required. The ON value is 120 Ω , and the default value is OFF.



Adjusting Serial Port DIP Switch

The UC-5100 computers come with a DIP switch for users to adjust the pull-up/pull-down resistors for the serial port parameters. The serial port DIP switch is located on the bottom panel of the computer.

Adjust the setting as required. The ON setting corresponds to 1K Ω and the OFF setting corresponds to 150K Ω . The default setting is OFF.



Each port consists of 4 pins; you must switch all 4 pins of a port simultaneously to adjust the value of the port.

A. Regulatory Approval Statements



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.

Class A: FCC Warning! 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 users will be required to correct the interference at their own expense.



European Community



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.