# UC-2100 Series Hardware User Manual

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# UC-2100 Series Hardware User Manual

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## Technical Support Contact Information

**www.moxa.com/support**

# Table of Contents

# 1. Introduction

The UC-2100 series computing platform is designed for embedded data acquisition applications. The computer comes with one or two RS- 232/422/485 serial ports and dual 10/100 Mbps or 10/100/1000 Ethernet LAN ports, as well as a mini PCIe socket to support cellular modules. These versatile communication capabilities let users efficiently adapt the UC-2100 computers to a variety of complex communications solutions.

## Overview

The UC-2100 Series computing platform is designed for embedded data acquisition and processing applications. The computer comes with up to two software-selectable RS-232/422/485 full-signal serial ports and single or dual Ethernet LAN ports. In addition, the RISC computing platform is available in various models that can fulfill diverse interface requirements, such as single and dual serial, LAN ports, and Gigabit Ethernet and wireless connections. These versatile communication capabilities let users efficiently adapt the palm-sized UC-2100 computing platform to a variety of complex communications solutions.

## Model Descriptions

The UC-2100 Series includes the following models:

- **UC-2101-LX**: Palm-sized industrial computing platform with 1 serial port, 1 Ethernet port, -10 to 60°C operating temperature
- **UC-2102-LX**: Palm-sized industrial computing platform with 2 Ethernet ports, -10 to 60°C operating temperature
- **UC-2104-LX**: Palm-sized industrial computing platform with 1 mini PCIe socket for wireless module, 1 Ethernet port, -10 to 70°C operating temperature
- **UC-2111-LX**: Palm-sized industrial computing platform with 2 serial ports, 2 Ethernet ports, Micro SD socket, -10 to 60°C operating temperature
- **UC-2112-LX**: palm-sized industrial computer with 1 GHz processor, 2 serial ports, 2 Ethernet ports (1 gigabit Ethernet), Micro SD socket, -10 to 60°C operating temperature
- **UC-2112-T-LX**: Palm-sized industrial computing platform with 1 GHz processor, 2 serial ports, 2 Ethernet ports (1 gigabit Ethernet), Micro SD socket, -40 to 75°C operating temperature

## Package Checklist

Before installing a UC-2100 computer, verify that the package contains the following items:

- UC-2100 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.

# Product Features

- Armv7 Cortex-A8 600 1000 MHz processor
- 1 to 2 auto-sensing 10/100 Mbps Ethernet ports (Gigabit Ethernet supported on UC-2112 models)
- Up to 2 software-selectable RS-232/422/485 ports supporting all signals
- Moxa Industrial Linux with 10-year superior long term support
- Mini PCIe socket for Wi-Fi/cellular module (UC-2104)
- Micro SD socket for storage expansion (UC-2111/UC-2112)
- -40 to 75°C wide-temperature models available

For a complete set of specifications, refer to the product datasheet available on the Moxa Website.
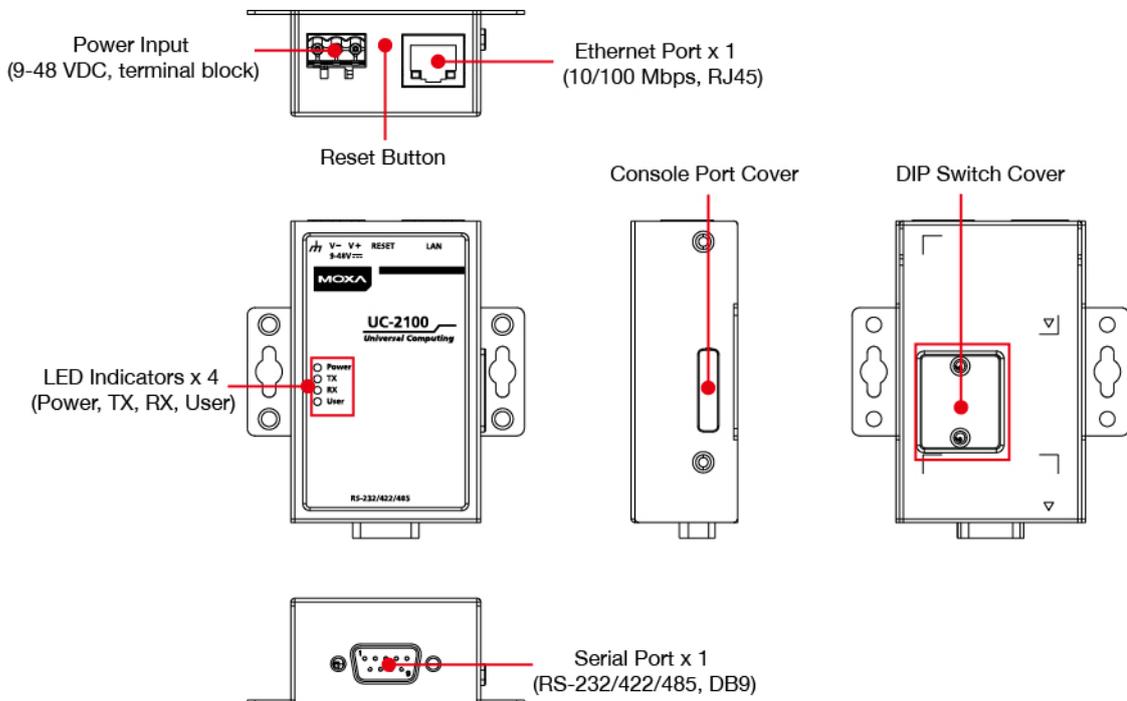
# Hardware Block Diagram
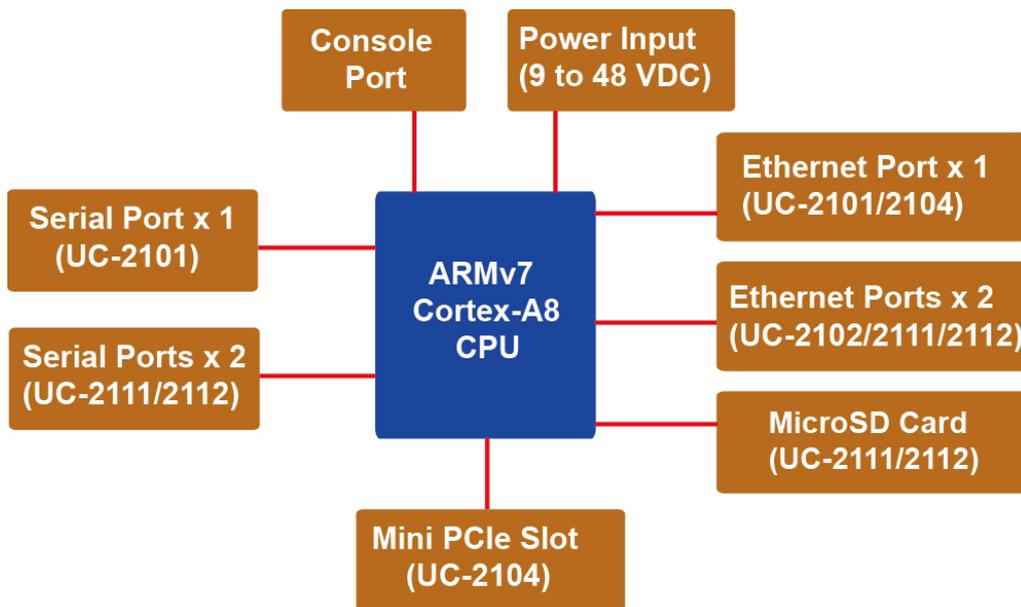
# 2.  Hardware Introduction

The UC-2100 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-2100 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.
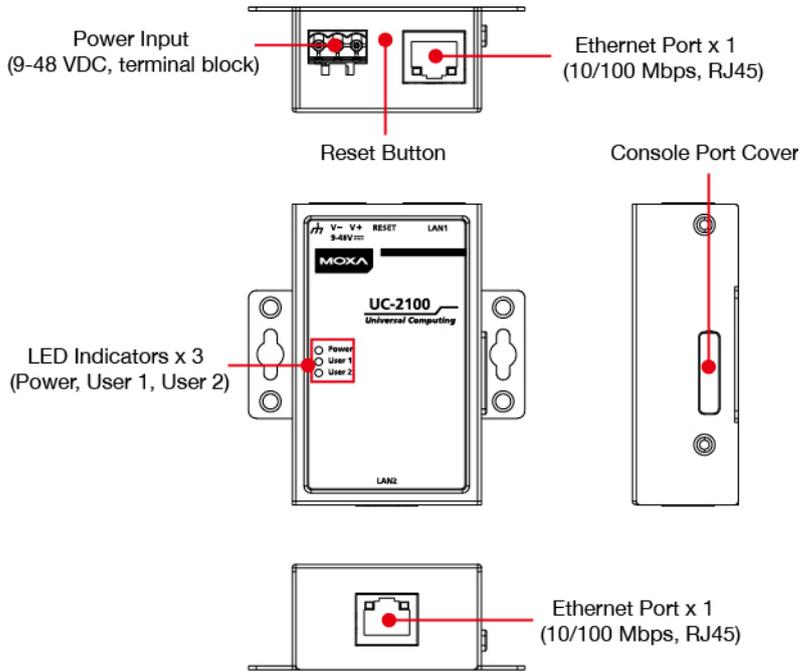
# Appearance

## Front View

### UC-2101

**UC-2102**



Power Input
(9-48 VDC, terminal block)

Ethernet Port x 1
(10/100 Mbps, RJ45)

Reset Button

Console Port Cover

LED Indicators x 3
(Power, User 1, User 2)

Ethernet Port x 1
(10/100 Mbps, RJ45)

**UC-2104**



Power Input
(9-48 VDC, terminal block)

Ethernet Port x 1
(10/100 Mbps, RJ45)

Reset Button

Console Port/SIM Card
Cover

LED Indicators x 4
(Power, Signal Strength)

Mini PCIe Socket Cover
(Wireless Module)

Cellular Antenna
Connectors x 2

**UC-2111**

Power Input
(9-48 VDC, terminal block)

Ethernet Ports x 2
(10/100 Mbps, RJ45)

Reset Button

Console Port/MicroSD Card
Cover

LED Indicators x 6
(Power, TX, RX, User)

DIP Switch Cover

Serial Ports x 2
(RS-232/422/485, DB9)

**UC-2112**

Ethernet Port x 1
(10/100/1000 Mbps, RJ45)

Power Input
(9-48 VDC, terminal block)

Ethernet Port x 1
(10/100 Mbps, RJ45)

Reset Button

Console Port/MicroSD Card
Cover

LED Indicators x 6
(Power, TX, RX, User)

DIP Switch Cover

Serial Ports x 2
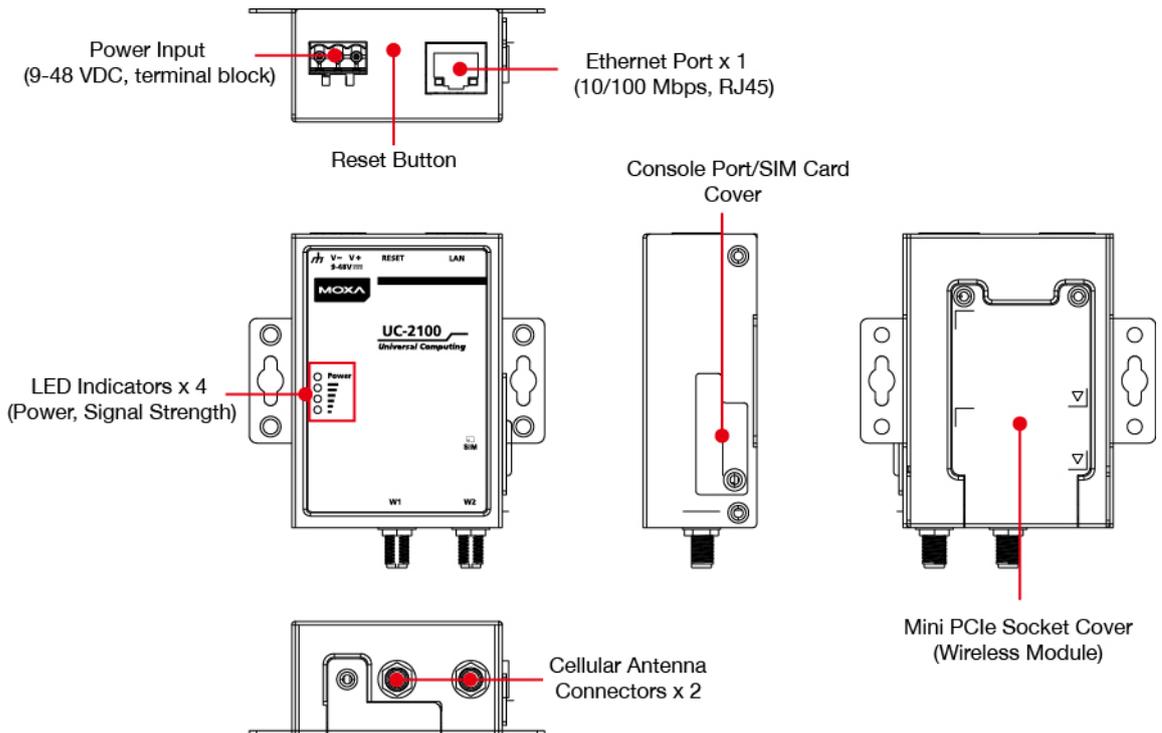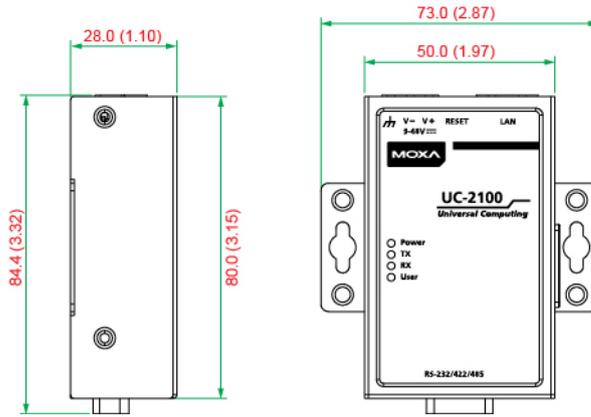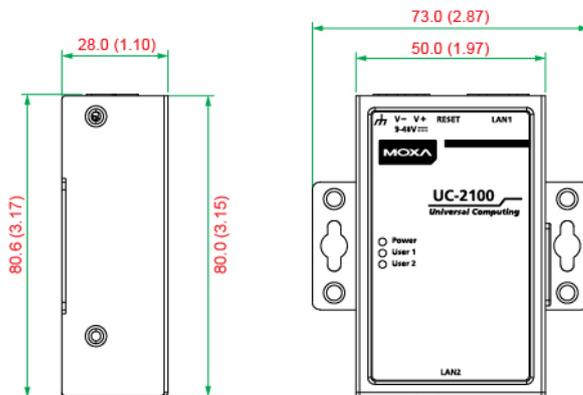(RS-232/422/485, DB9)

# Dimensions [units: mm (in)]

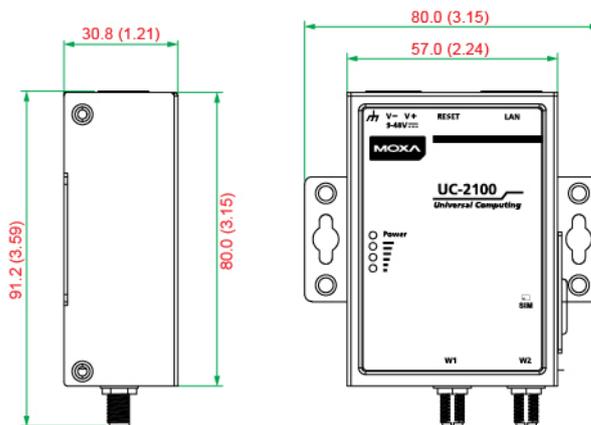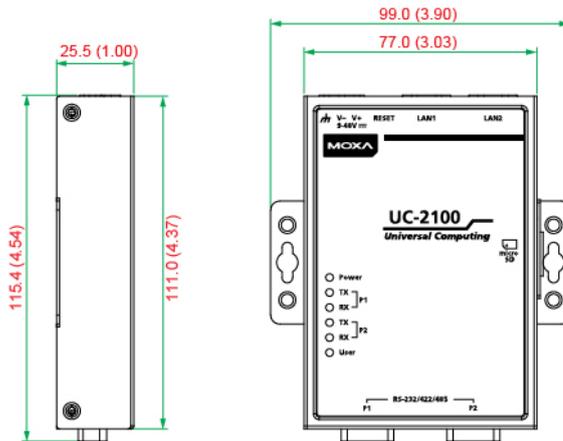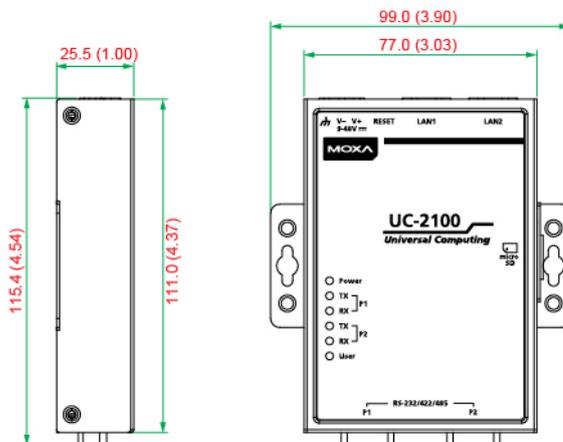### UC-2101



### UC-2102



### UC-2104

**UC-2111**



**UC-2112**



# LED Indicators

Refer to the following table for information about each LED.

| LED Name | Status | Function |
|---|---|---|
| Power | Green | Power is on, and the device is functioning normally |
| | Off | Power is off |
| Ethernet | Yellow | Steady On: 10 Mbps Ethernet link<br>Blinking: Data transmission is in progress |
| | Green | Steady On: 100 Mbps Ethernet link<br>Blinking: Data transmission is in progress |
| | Off | Speed lower than 10 Mbps or the cable is not connected |
| | Green<br>(UC-2112 only) | Steady On: 100 Mbps Ethernet link<br>Blinking: Data transmission is in progress |
| | Yellow<br>(UC-2112 only) | Steady On: 1000 Mbps Ethernet link<br>Blinking: Data transmission is in progress |
| 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 |
| User | Green/Yellow | User Programmable |
| LEDs that indicate the Wireless signal strength | Yellow | The number of glowing LEDs indicates the signal strength<br>3 LEDs: Excellent<br>2 LEDs: Good<br>1 LED: Poor |
| | Off | Wireless module not detected |

# Reset Button

The UC-2100 panel computer is provided with a reset button, which is located on the top panel of the computer. To reboot the computer, press the reset button for 1 second. Press and hold the reset button between 7 to 9 seconds to reset the computer to the factory default settings. When the reset button is held down, the **User** LED (the first signal LED on UC-2104) will blink once every second. The **User** 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.

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⚠️ **ATTENTION**

**Reset to Default preserves user's data**

The **Reset** to Default function will NOT format the user directory and erase the user's data. Using the Reset to default function will only load the configuration file. The rest of the user's data stored in the Flash ROM will remain intact.

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# Real Time Clock

The UC-2100'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.

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⚠️ **WARNING**

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

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# Placement Options

There are two sliders on the back of the unit for DIN-rail and wall mounting.

## Wall or Cabinet Mounting

Mounting UC-2100 on the wall requires 2 screws. The heads of the screws should be less than 7.0 mm in diameter, the shafts should be less than 3 mm in diameter, and the length of the screws should be more than 8 mm, as shown in the figure at the bottom.



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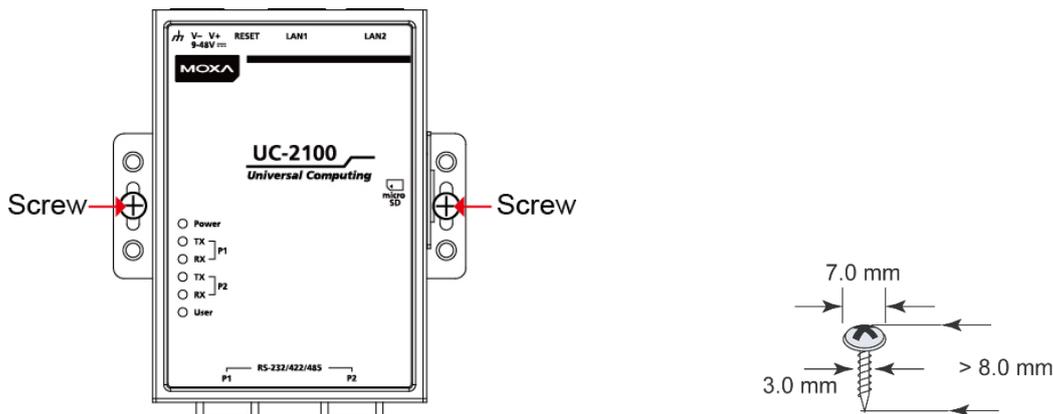
✏️ **NOTE**

Before tightening the screws into the wall, make sure the screw head and shank size are suitable by inserting the screw into one of the keyhole-shaped apertures of the wall mounting plates.

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# DIN-Rail Mounting (Optional)

The UC-2100 comes with an optional DIN-rail mounting kit for users to install the computer onto a DIN rail. Install the DIN-rail mounting kit on the computer's two mounting ears, then install the computer onto a DIN-rail rack.
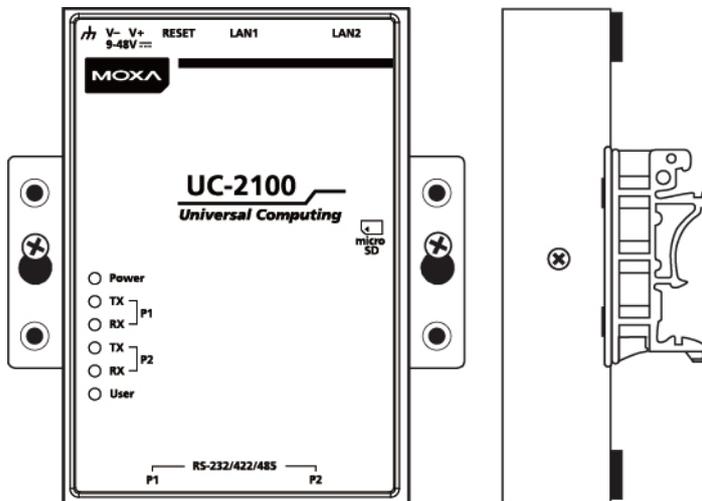
# 3. Hardware Connection Description

In this chapter, we describe how to connect the UC-2100 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. You should heed the following 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.

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✏ **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.

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- You can 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.
- When necessary, it is strongly advised that you label wiring to all devices in the system.

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⚠ **ATTENTION**

**Safety First!**

Be sure to disconnect the power cord before doing installations and/or wiring.

**Electrical Current 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.
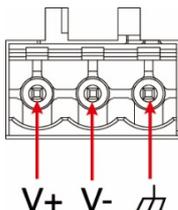
If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

**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.

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# Connecting the Power

### Terminal Block



Connect the 9 to 48 VDC power line to the terminal block connector on the UC-2100 Series computer. If the power is supplied properly, the "Power" LED will glow a solid green. The power input location and pin definition are shown in the adjacent diagram.
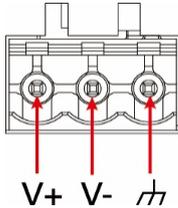
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# Grounding the Unit

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.



V+ V- ⏚

SG: The Shielded Ground (sometimes called Protected Ground) contact is the right-most contact of the 3-pin power terminal block connector when viewed from the angle shown here. Connect the SG wire to an appropriate grounded metal surface.

> ⚠️ **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-2100'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 when the system cannot boot up.

| Serial Console Port & Pinouts | | Serial Console Cable |
|---|---|---|

| Pin | Signal |
|---|---|
| 1 | TxD |
| 2 | RxD |
| 3 | NC |
| 4 | GND |



# Connecting to the Network

The Ethernet ports are located on the top or bottom panel of the UC-2100 computers. The pin assignments for the Ethernet port are shown in the following figures. 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.
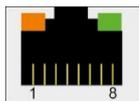


The LED indicator on the upper right corner glows a solid green color when the computer establishes a connection with a 100 Mbps Ethernet network.
The LED will flash on and off when Ethernet packets are being transmitted or received.
The LED indicator in the upper left corner glows a solid orange color when the computer establishes a connection with a 10 Mbps Ethernet network.
The LED will flash on and off when Ethernet packets are being transmitted or received.

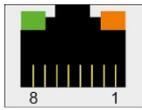| Pin | Signal |
|---|---|
| 1 | ETx+ |
| 2 | ETx- |
| 3 | ERx+ |
| 4 | – |
| 5 | – |
| 6 | ERx- |
| 7 | – |
| 8 | – |

For the UC-2112 model, refer to the following Gigabit Ethernet pin definitions.

The LED indicator in the upper left corner glows a solid green color when the computer establishes a connection with a 100 Mbps Ethernet network.

The LED will flash on and off when Ethernet packets are being transmitted or received.

The LED indicator in the upper right corner glows a solid orange color when the computer establishes a connection with a 1000 Mbps Ethernet network.

The LED will flash on and off when Ethernet packets are being transmitted or received.

| Pin | Signal |
|-----|--------|
| 1 | MDI0+ |
| 2 | MDI0- |
| 3 | MDI1+ |
| 4 | MDI2+ |
| 5 | MDI2- |
| 6 | MDI1- |
| 7 | MDI3+ |
| 8 | MDI3- |

# Connecting to a Serial Device

The serial ports are located on the bottom panel of the UC-2100 computer. Use a serial cable to connect your serial device to the computer's serial port. These serial ports have male DB9 connectors and can be configured for RS-232, RS-422, or RS-485 communication. The pin location and assignments are shown in the following table.

**DB9 Connector**
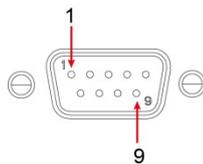
**RS-232/422/485 Pinouts**

| 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 | – | – | – |

# Inserting the SIM Card

You will need to install a SIM card on your UC-2104 computer. Follow these steps to install the SIM card.

1. Remove the screw on the cover located on the right panel of the UC-2104.

2. Insert the SIM card into the socket. Make sure you place the chip-side on the bottom.
3. To remove the SIM card, push in the SIM card and then release it to allow the card to pop out.

⚠️ **ATTENTION**

The UC-2100 does not support SD hot swap and PnP (Plug and Play) functionality. You must remove the power source first before inserting or removing the SD card.

# Inserting a MicroSD Card (UC-2111/2112 Only)

Both the UC-2111 and UC-2112 computers come with a storage socket that allows users to install one MicroSD card. Follow these steps to install the MicroSD card:

1. The MicroSD socket is located below the right panel of the computer. Unfasten the screw and remove the right panel cover.



2. Insert the MicroSD 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 MicroSD card, push the card in and release it to allow the card to pop out.

# Installing the Cellular/Wi-Fi Module and Antenna

The UC-2104 computer comes with one mini PCIe socket for installing either a cellular module or a Wi-Fi module. Unfasten the two screws on the rear panel and one screw on the bottom panel to remove the cover and find the location of the socket.



You will need the following to install a cellular module. The cellular module package consists of 1 cellular module and 2 screws. You must purchase the cellular antennas separately based on your installation requirements.
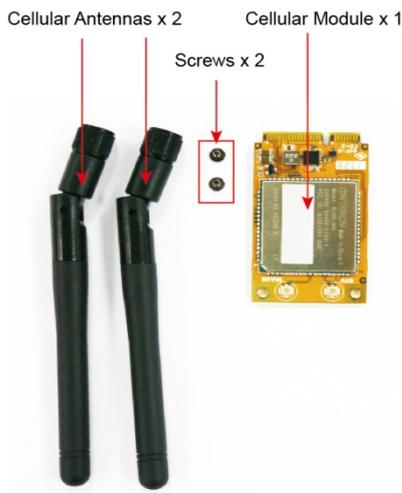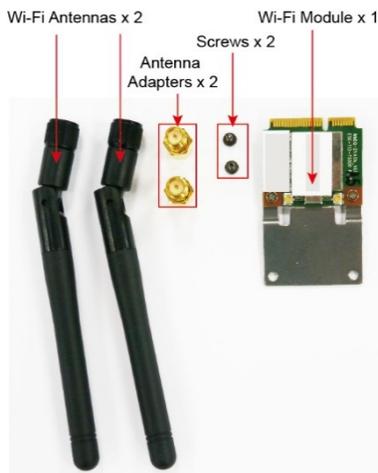
Follow these steps to install the cellular module.

1. Set the antenna cables aside and clear the wireless module socket as shown in the figure for convenience of installation.



2. Insert the cellular module into the socket and fasten two screws (in the package) on to the top of the module
3. Connect the free ends of the two antenna cables next to the screws as shown in the image.
4. Replace the cover and secure it using the three screws.
   (We recommend using tweezers to install and remove the module.)



5. Antenna connectors are located on the top panel of the computer. Connect the cellular antennas to the connectors.



You will need the following to install a Wi-Fi module. The Wi-Fi module package consists of 1 Wi-Fi module and 2 screws. You must purchase the Wi-Fi antennas separately based on your installation requirements.



Follow these steps to install a Wi-Fi module.

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 the two screws (in the package) on to the top of the module.
3. Connect the free ends of the two antenna cables next to the screws as shown in the image.
4. Replace the cover and secure it with the three screws.
   (We recommend using tweezers to install and remove the module.)
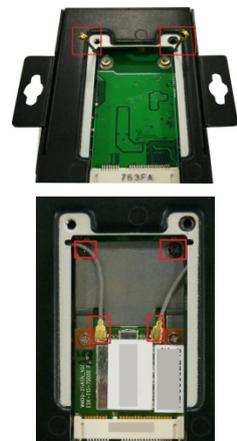
5. Connect the antenna adapters to the connectors on the top panel of the computer.
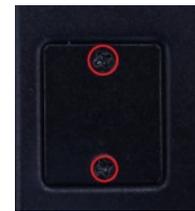
6. Connect the Wi-Fi antennas to the antenna adapters.

# Adjusting the DIP Switch

The UC-2101, UC-2111, and UC-2112 Series computers come with one DIP switch for users to adjust the serial port parameters. To set up the DIP switch, do the following:
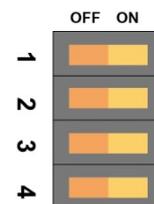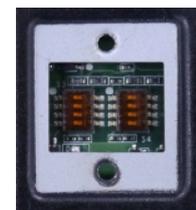
1. Remove the screws on the DIP switch cover located on the rear panel of the computer.

2. Remove the thin film on the DIP switch and adjust the settings as required.

   Refer to the table below for the DIP switch settings. The default value is OFF.

| SW | 1 | 2 | 3 | 4 |
|-----|-------|-------|--------|-----|
|     | Low   | High  | Term.  | N/A |
| ON  | 1 KΩ  | 1 KΩ  | 120 Ω  | N/A |
| OFF | 150 KΩ | 150 KΩ | N/A   | N/A |

# 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.