

UC-4400A Series Hardware User Manual

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UC-4400A Series Hardware User Manual

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1. Introduction

The UC-4400A Series computing platform is designed for embedded data acquisition applications. The UC-4400A computers come with two or four RS-232/422/485 serial ports and dual 10/100/1000 Mbps Ethernet LAN ports, as well as M.2 and Mini PCIe sockets to support cellular and Wi-Fi modules. These versatile communication capabilities let users efficiently adapt the UC-4400A Series to a variety of complex communications solutions.

Package Checklist

Before installing a UC-4400A computer, verify that the package contains the following items:

- 1 x UC-4400A Series embedded computer
- 1 x Quick installation guide (printed)
- 1 x Warranty card (printed)



NOTE

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

Product Features

- Arm Cortex-A53 quad-core 1.6 GHz with 4GB RAM
- Ready for ISA/IEC 62443-4-2 Security Level 2 certification with Moxa Industrial Linux 3 Secure
- Moxa Industrial Linux with 10-year superior long-term support
- Integrated 5G Sub-6GHz NR module with dual SIM and AT&T certification
- Industrial-grade CE/ FCC/UL certifications
- Optional Wi-Fi 6E and 4G LTE Cat.4 accessory
- 2 auto-sensing 10/100/1000 Mbps Ethernet ports
- CAN bus and serial port with 2 kV isolation protection
- microSD socket for storage expansion
- -40 to 75°C wide temperature range and -40 to 70°C with cellular enabled

Product Specifications



NOTE

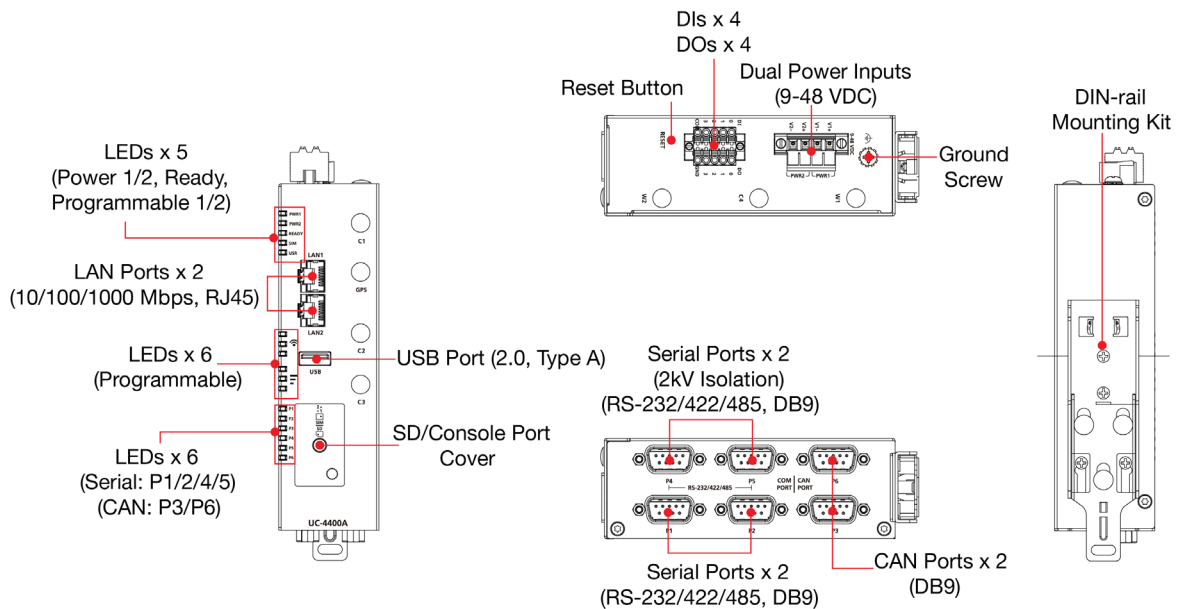
The latest specifications for Moxa's products can be found at <https://www.moxa.com>.

2. Hardware Introduction

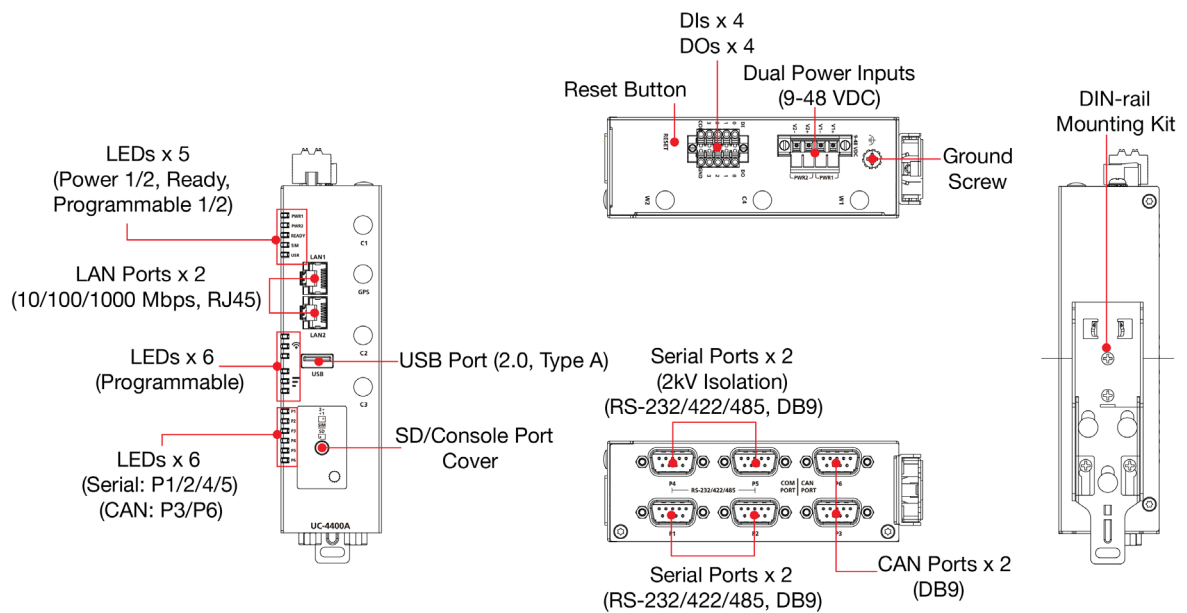
The UC-4400A embedded computers are compact and rugged, making them suitable for industrial applications. The LED indicators allow you to monitor device performance and quickly identify issues, and the multiple ports can be used to connect a variety of devices. The UC-4400A Series comes with a reliable 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-4410A-T



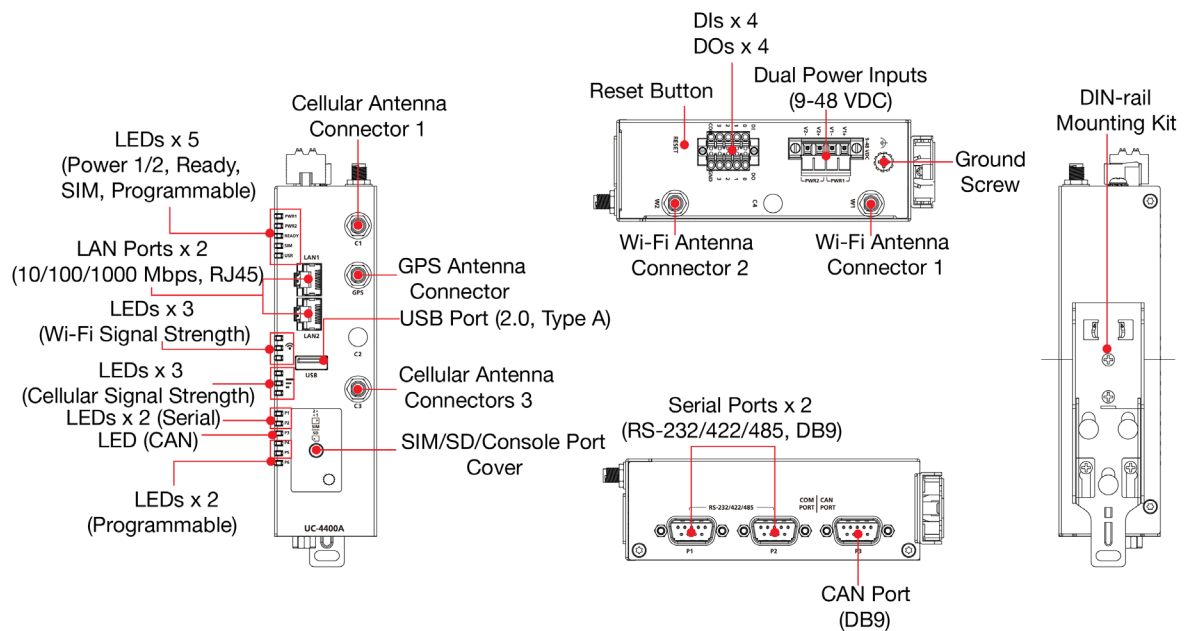
UC-4414A-I-T



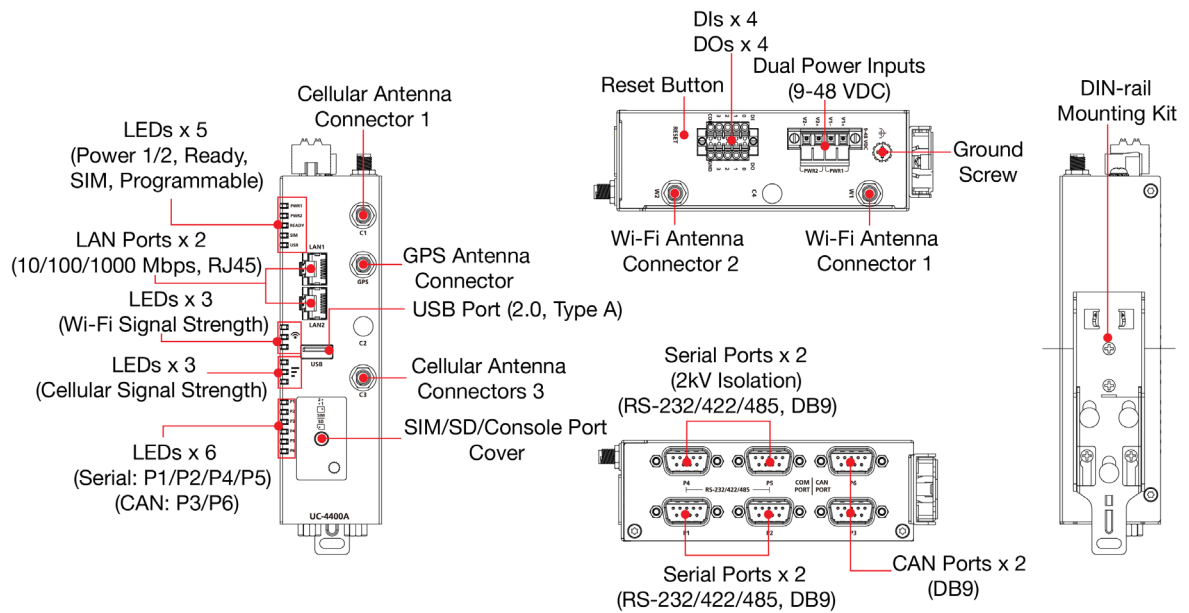
NOTE

P4 and P5 serial ports come with built-in 2kV isolation.

UC-4430A-I



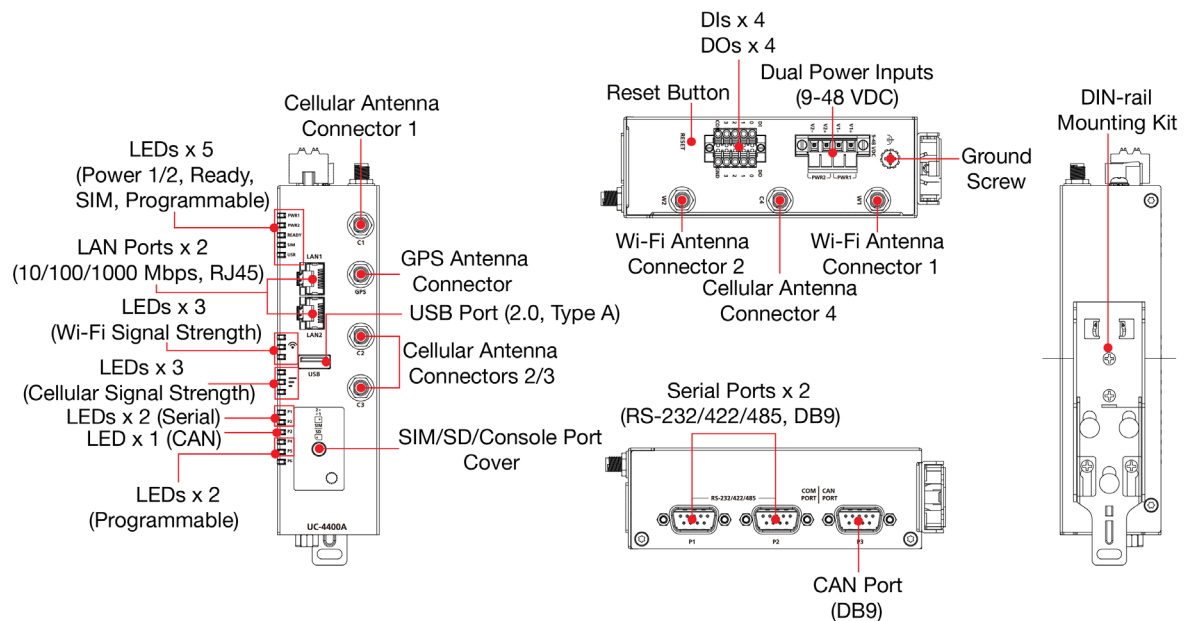
UC-4434A-I-T



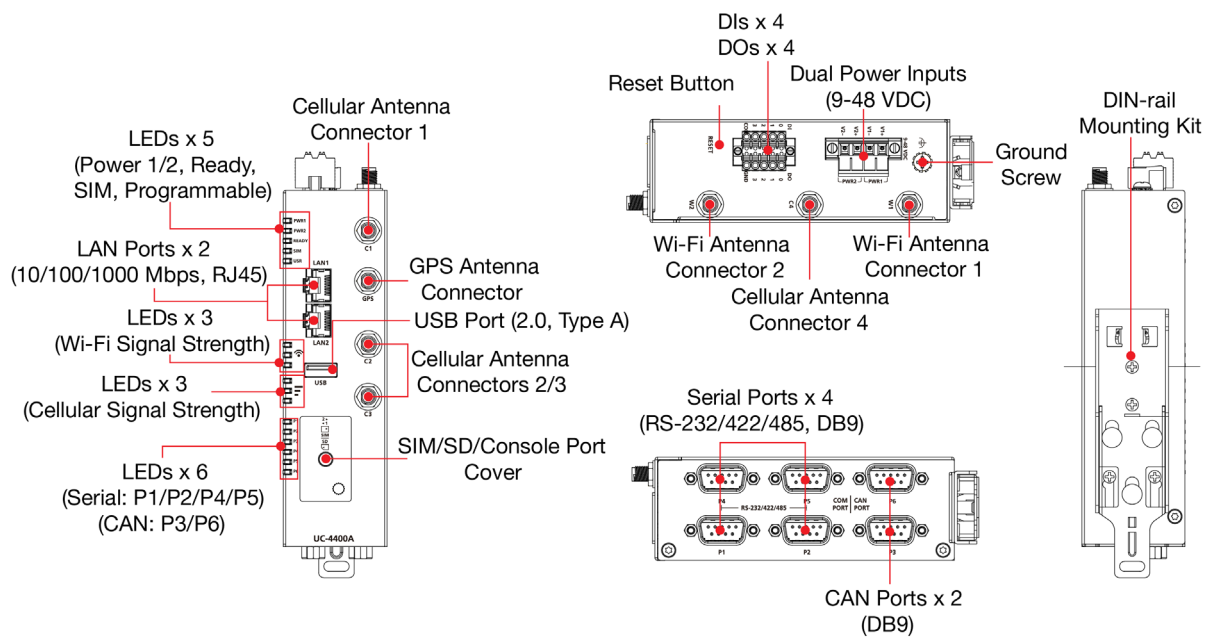
NOTE

P4 and P5 serial ports come with built-in 2kV isolation.

UC-4450A-T-5G



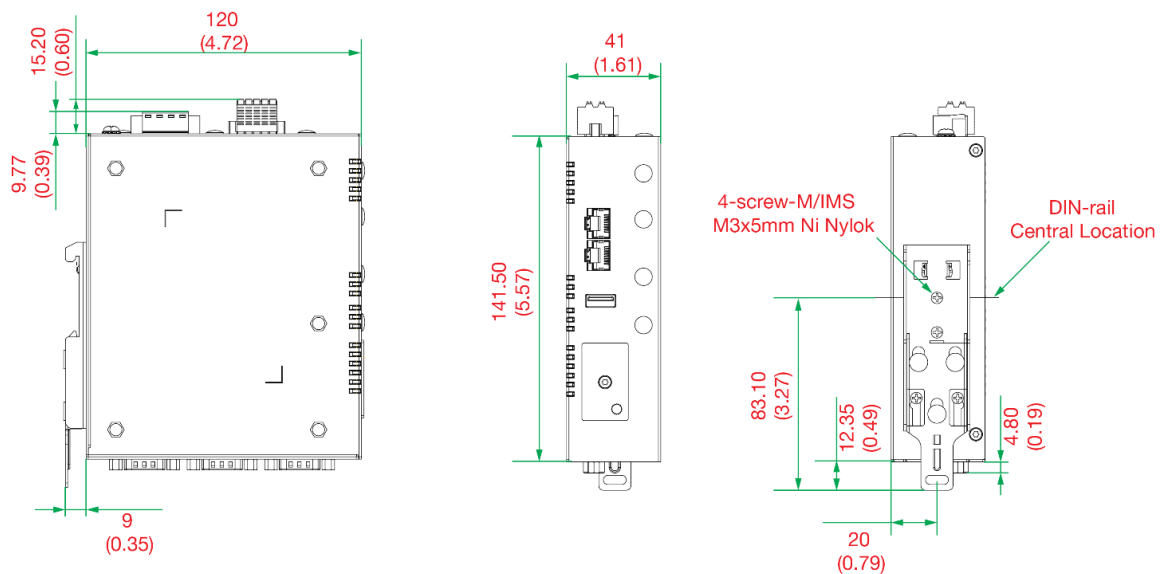
UC-4454A-T-5G



Dimensions

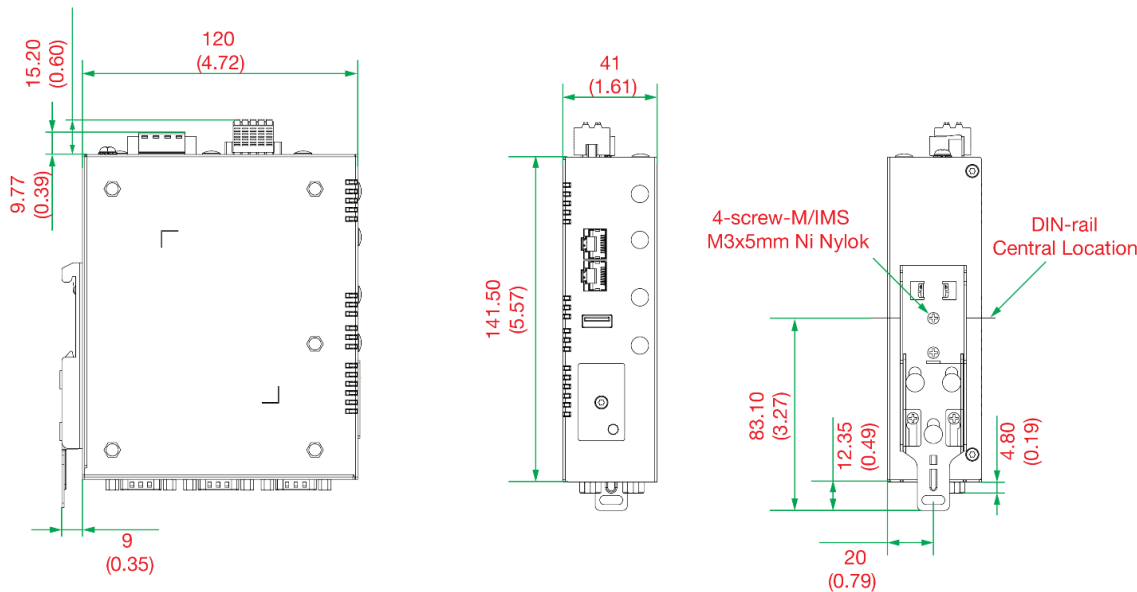
UC-4410A-T

Unit: mm (inch)



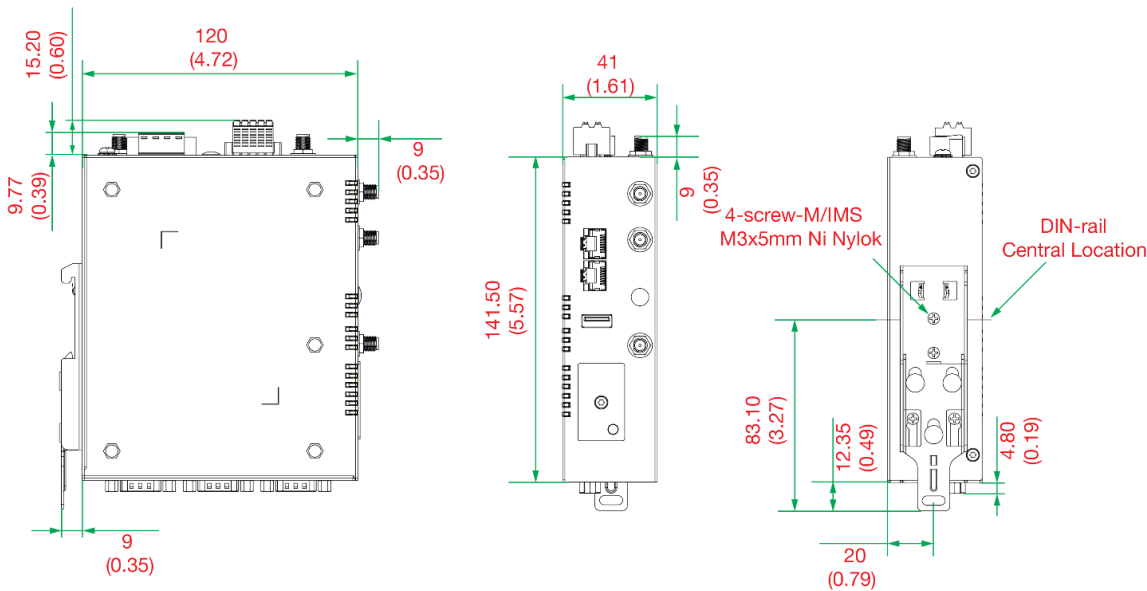
UC-4414A-I-T

Unit: mm (inch)



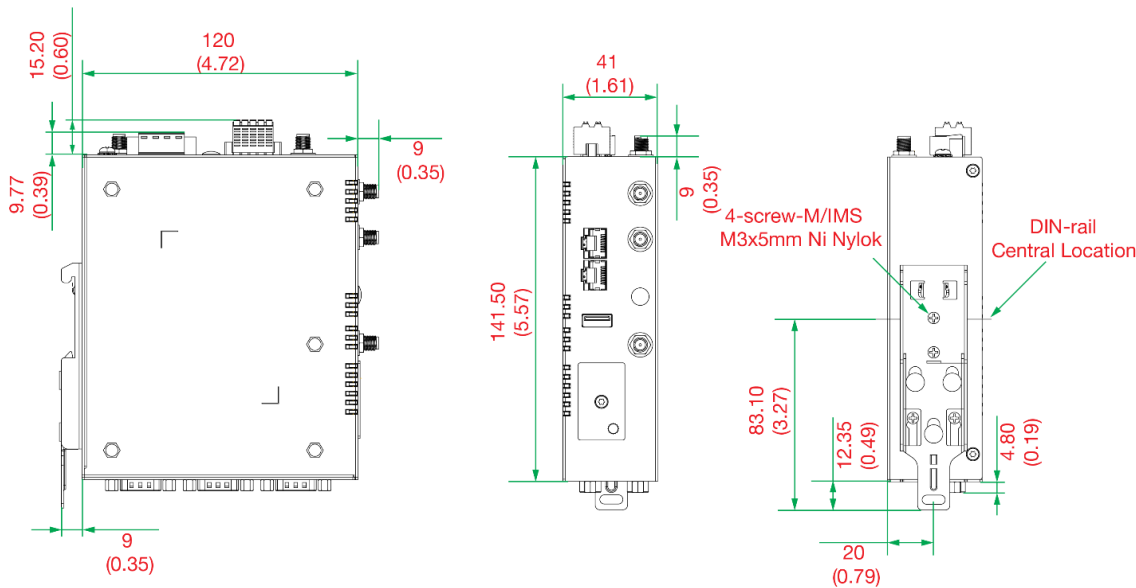
UC-4430A-T

Unit: mm (inch)



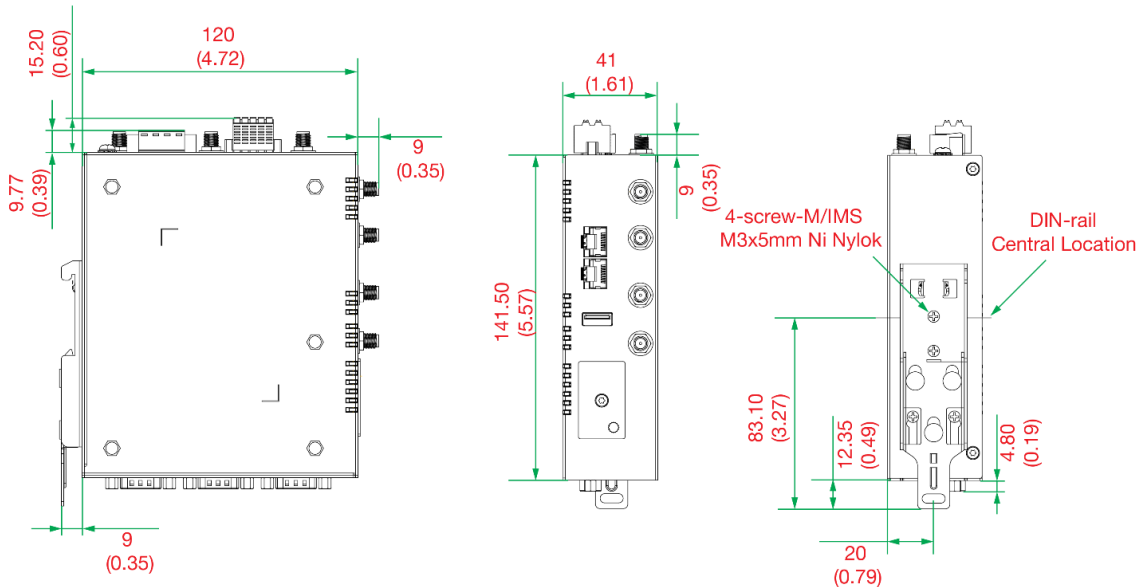
UC-4434A-I-T

Unit: mm (inch)



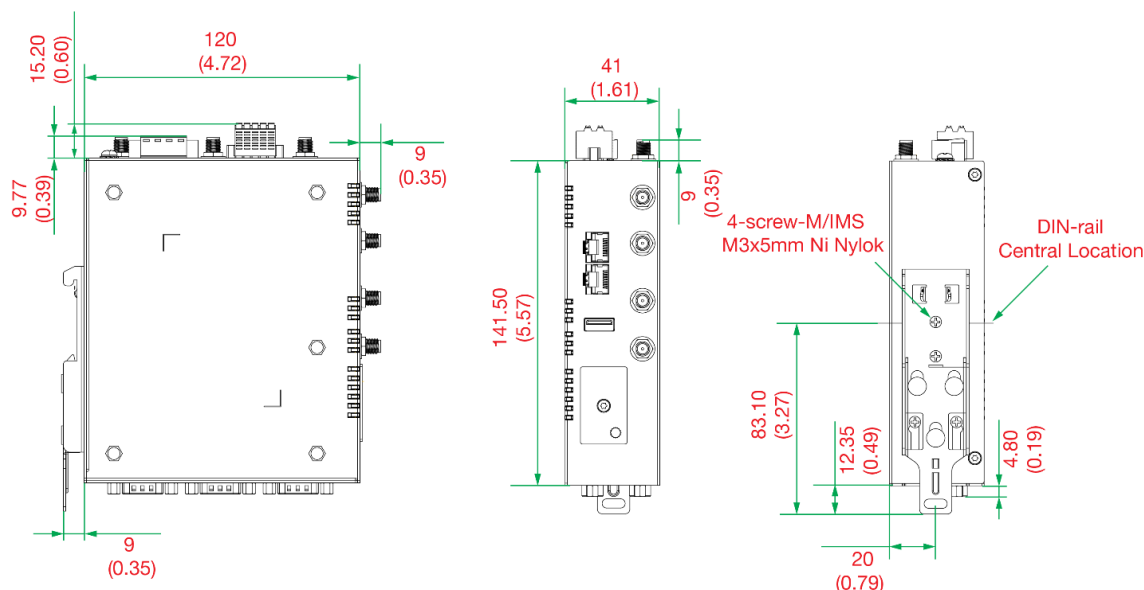
UC-4450A-T-5G

Unit: mm (inch)





UC-4454A-T-5G

Unit: mm (inch)



LED Indicators

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

| LED Name | Status | Function |
|---|------------------|--|
| PWR1/PWR2 | Green | Power is on |
| | Off | No power |
| READY | Green | Steady on: The device has successfully booted and all services are initialized Blinking: Device is in the process of booting up |
| | Red | Device boot failure, which occurs if any service fails to initialize |
| | Off | The device remains in the bootloader stage and has not yet booted into the kernel |
| SIM | Green | SIM2 is the active slot, with a functional SIM card inserted |
| | Yellow | SIM1 is the active slot, with a functional SIM card inserted |
| USR | Green/ Yellow | User programmable |
|  (Cellular Signal Strength) | Green | Three LEDs steady on: Good or excellent Two LEDs steady on: Fair One LED steady on: Poor One LED blinking: Very poor |
| | Off | Disconnected |
|  (Wi-Fi Signal Strength) | Green | Three LED steady: 61% to 100% Two LED steady: 41% to 60% One LED steady: 21% to 40% One LED blinking: 0% to 20% |
| | Off | Disconnected |
| LAN1/LAN 2 (RJ45 connector) | Green | Steady ON: 10M/100M link established Blinking: Receive or transmitting data |
| | Yellow | Steady ON: 1000M link established Blinking: Receive or transmitting data |
| | Off | No Ethernet connection |

| LED Name | Status | Function |
|---|--------------|---|
| P1/P2 (Serial Port) | Green | Blinking: Serial port is transmitting data |
| | Yellow | Blinking: Serial port is receiving data |
| | Off | Serial port is not transmitting or receiving data |
| P4/P5 (Serial ports only available on the UC-4414A/34A/54A models) | Green | Blinking: Serial port is transmitting data |
| | Yellow | Blinking: Serial port is receiving data |
| | Off | Serial port is not transmitting or receiving data |
| P3 (CAN port) | Light Yellow | Blinking: CAN port is transmitting data |
| | Yellow | Blinking: CAN port is receiving data |
| | Off | CAN port is not transmitting or receiving data |
| P6 (CAN port only available on the UC-4414A/34A/54A models) | Light Yellow | Blinking: CAN port is transmitting data |
| | Yellow | Blinking: CAN port is receiving data |
| | Off | CAN port is not transmitting or receiving data |

Real-time Clock

The UC-4400A'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

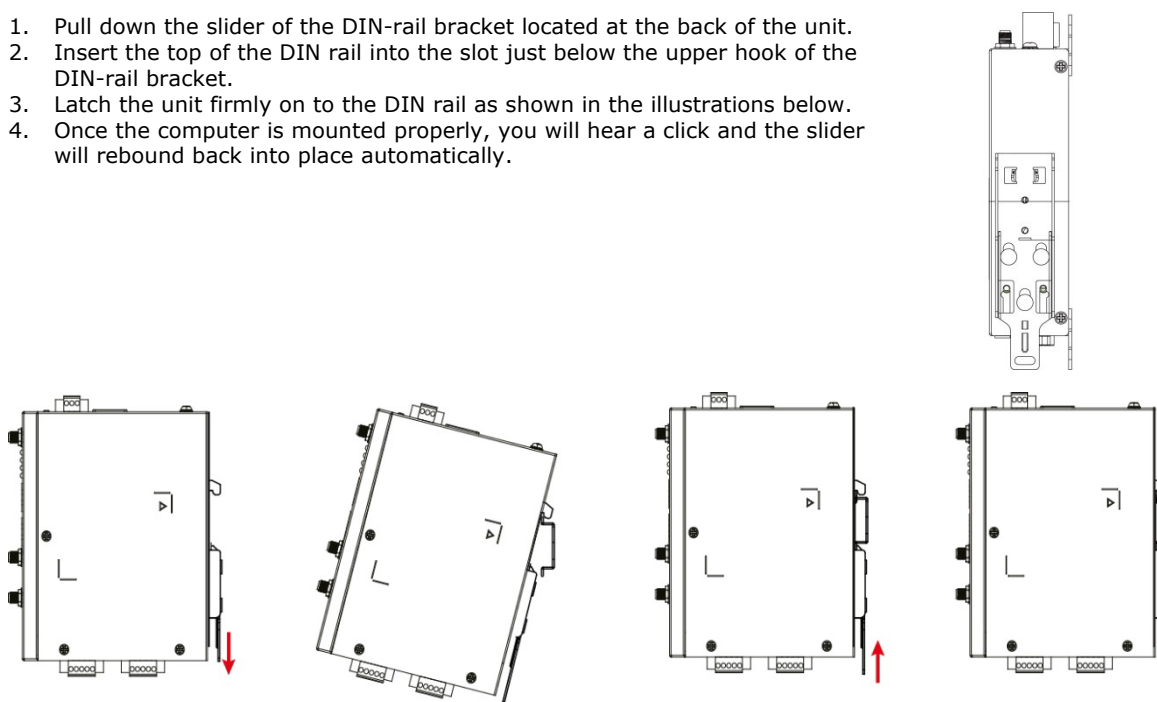
There is a risk of explosion if the battery is replaced with an incorrect type.

Installation Options

DIN-rail Mounting

The aluminum DIN-rail attachment plate is already attached to the product's casing. To mount the UC-4400A on to a DIN rail, make sure that the stiff metal spring is facing upwards and follow these steps.

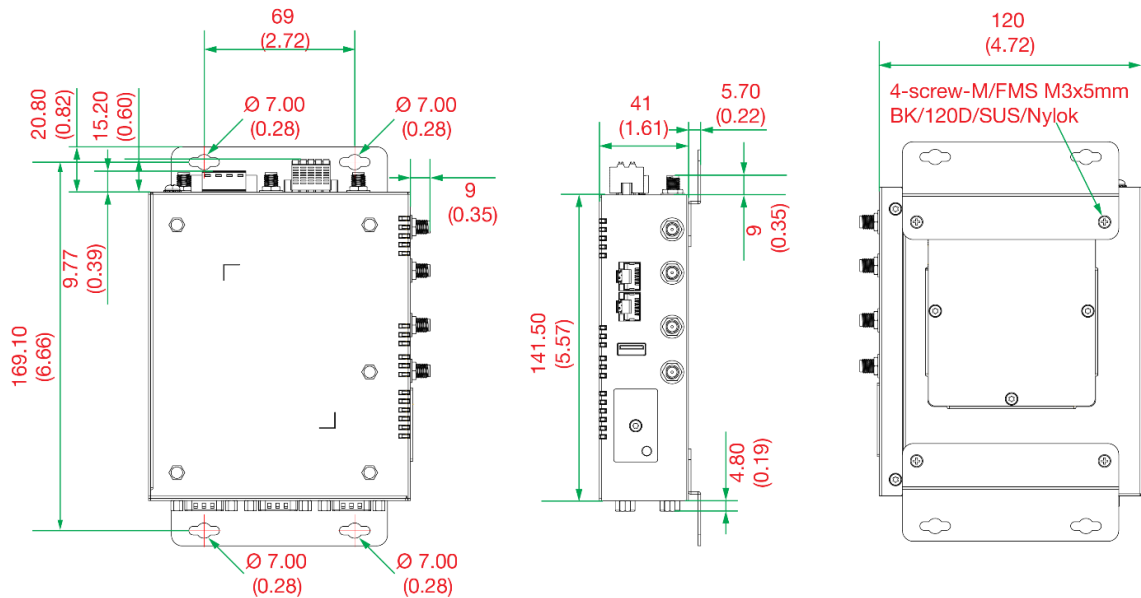
1. Pull down the slider of the DIN-rail bracket located at the back of the unit.
2. Insert the top of the DIN rail into the slot just below the upper hook of the DIN-rail bracket.
3. Latch the unit firmly on to the DIN rail as shown in the illustrations below.
4. Once the computer is mounted properly,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



Wall Mounting (optional)

The UC-4400A Series can be mounted on to a wall using a wall-mounting kit as shown in the following illustrations. The optional wall-mounting kit is not included in the product package and should be purchased separately.

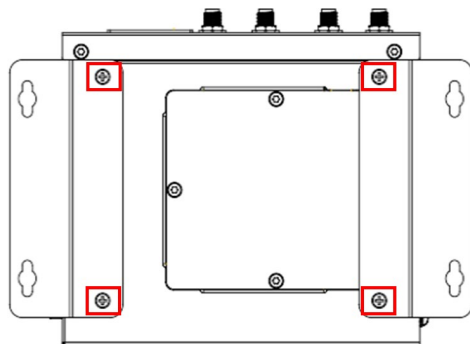
Unit: mm (inch)



Follow these steps to mount the computer on to a wall:

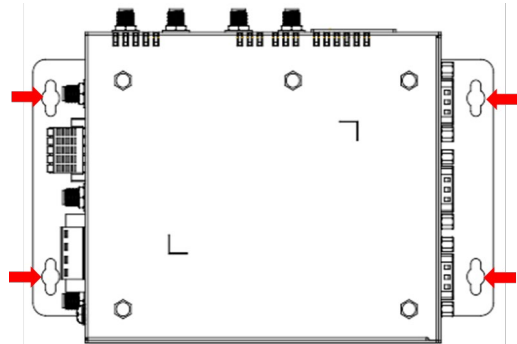
Step 1

Use the four screws (M3 x 5 mm) in the package to fasten the wall-mounting brackets to the computer.



Step 2

Use another four screws (M3 x 6 mm) to mount the computer on to a wall or in a cabinet.



Recommended Fastening torque: 4.5 ± 0.5 kgf-cm.

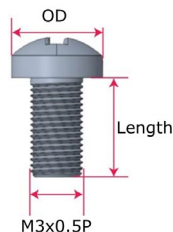
The additional four screws in Step 2 are not included in the wall-mounting kit package and must be purchased separately. The specifications of the additional screws required are as follows:

Head Type: Pan/Doom

Head Diameter $5.2 \text{ mm} < \text{OD} < 7.0 \text{ mm}$

Length $> 6 \text{ mm}$

Thread Size: M3 x 0.5P





NOTE

- Test the screw head and shank size by inserting the screws into one of the keyhole shaped apertures of the wall-mounting plates before attaching the plate to the wall.
- Do not drive the screws in all the way—leave a space of about 2 mm to allow room for sliding the wall mount panel between the wall and the screws.

3. Hardware Connection Description

In this chapter, we describe how to connect the UC-4400A to a network and various devices.

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.

- 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.



ATTENTION

Safety First!

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

Electrical Current Caution!

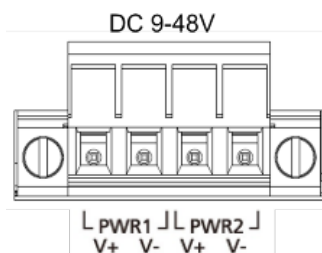
Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

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.

Connecting the Power



Connect the power jack (in the package) to the UC-4400A Series' DC terminal block (located on the top panel), and then connect the power adapter. It takes about 10 to 30 seconds for the system to boot up. Once the system is ready, the Power LED will light up. All models support dual power inputs for redundancy.



WARNING

The wiring for the input terminal block should be installed by a skilled person. The wire type should be copper (Cu), wire size should be 14 AWG to 16 AWG (2.08 to 1.31 mm²), and a torque of 0.19 n-m should be used for V+, V-, and GND connections. The wire size of the power input and earthing conductor should be the same.



WARNING

This product is intended to be supplied by a UL Listed Power Unit marked **LPS** (Limited Power Source). The ratings for the different models in the series are as follows:

- UC-4410A and UC-4414A: 9 VDC (1.53 A min) to 48 VDC (0.21 A min) and Tma = 75°C (min)
- UC-4430A and UC-4434A: 9 VDC (2.11 A min) to 48 VDC (0.27 A min) and Tma = 70°C (min)
- UC-4450A and UC-4454A: 9 VDC (2.13 A min) to 48 VDC (0.3 A min) and Tma = 70°C (min)

If you need further information or assistance, contact a Moxa representative.



WARNING

EXPLOSION HAZARD!

Do not disconnect equipment unless the power has been removed or the area is known to be non-hazardous.



ATTENTION

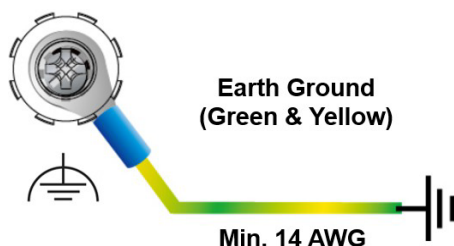
Altitude Requirement

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

There is a grounding connector located on the top panel of the computer. Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Note that this product is intended to be mounted on a well-grounded mounting surface, such as a metal panel.

The power cord adapter should be connected to a socket outlet with an earthing connection.

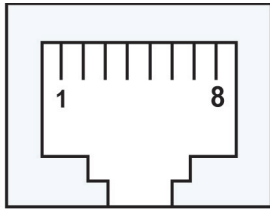


ATTENTION

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.

Connecting the Network

The two Ethernet ports are located on the front panel of the UC-4400A 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 | 10/100 Mbps | 1000 Mbps |
|-----|-------------|-----------|
| 1 | Tx+ | TRD(0)+ |
| 2 | Tx- | TRD(0)- |
| 3 | Rx+ | TRD(1)+ |
| 4 | - | TRD(2)+ |
| 5 | - | TRD(2)- |
| 6 | Rx- | TRD(1)- |
| 7 | - | TRD(3)+ |
| 8 | - | TRD(3)- |

Connecting a USB Device

The UC-4400A 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. By default, the USB storage is mounted at `/mnt/usbstorage`.

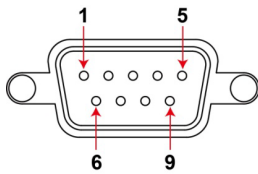


NOTE

The peripheral devices installed are recommended to be placed at least 25 mm from the UC-4400.

Connecting Serial Ports

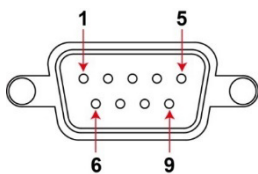
The four serial ports (P1, P2, P4, P5) use DB9 connectors. Each port can be configured by software for RS-232, RS-422, or RS-485. The pin assignments for the ports are shown in the following table:



| Pin | RS-232 | RS-422/RS-485 4w | RS-485 2w |
|-----|--------|------------------|-----------|
| 1 | DCD | TxD-(A) | - |
| 2 | RxD | TxD+(B) | - |
| 3 | TxD | RxD+(B) | Data+(B) |
| 4 | DTR | RxD-(A) | Data-(A) |
| 5 | GND | GND | GND |
| 6 | DSR | - | - |
| 7 | RTS | - | - |
| 8 | CTS | - | - |

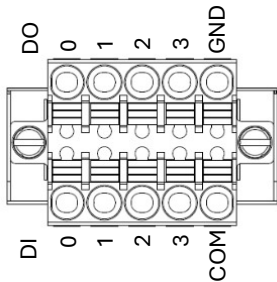
Connecting a CAN Port

One or two (P3, P6) CAN ports with DB9 interfaces are located on the bottom panel. The pin assignment is shown in the following table:



| Pin | Definition |
|-----|------------|
| 1 | - |
| 2 | CAN_L |
| 3 | CAN_GND |
| 4 | - |
| 5 | (CAN_SHLD) |
| 6 | (GND) |
| 7 | CAN_H |
| 8 | - |
| 9 | (CAN_V+) |

Connecting the Digital Inputs and Digital Outputs



There are four digital inputs and four digital outputs on the top panel. Refer to the figure on the left for detailed pin definitions.

Inserting the SIM Card

The UC-4430A-T, UC-4434A-I-T, UC-4450A-T-5G, UC-4454A-T-5G computers come with a nano-SIM card slot that can install two SIM cards for cellular communication.

To install the SIM card, do the following:

Step 1

Remove the screw securing the SIM card holder cover on the front panel of the computer.



Step 2

The SIM card tray can hold two SIM cards, one on each side.



Install the first SIM card in the SIM1 slot and the second SIM card on the opposite side of the tray.



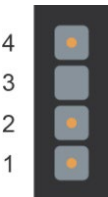
To remove the SIM card tray, press the tray inwards, then release it to eject the tray. You can then pull out the tray.

Inserting a MicroSD Card

The UC-4400A comes with a microSD socket for storage expansion. The microSD socket is located on the lower part of the front panel. To install the card, remove the screw and the protection cover to access the socket, and then insert the microSD card into the socket. You will hear a click when the card is in place. To remove the card, push the card in before releasing it.

Connecting the Console Port

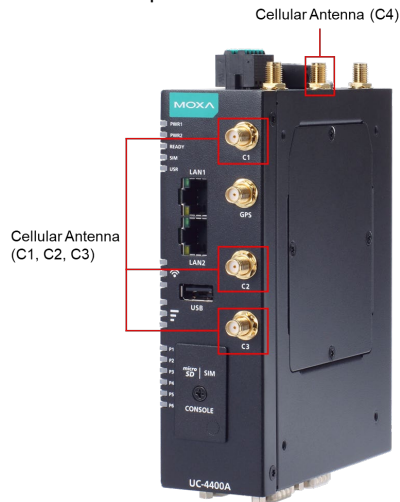
The console port is an RS-232 port located on the lower part of the front panel. To install the card, remove the screw and the protection cover to access the console port. You can connect a 4-pin pin header cable and use the port for debugging issues or system image upgrades.



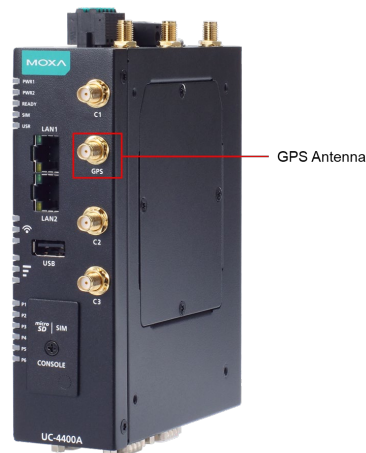
| Pin | Signal |
|-----|--------|
| 1 | TxD |
| 2 | RxD |
| 3 | NC |
| 4 | GND |

Installing the Antennas

- UC-4450A and UC-4454A models come with four cellular antenna connectors (C1 to C4) on the front and top panels.
- UC-4430A and UC-4434A come with two cellular antenna connectors (C1 and C3) on the front panel.
- UC-4434, UC-4430, UC-4454, and UC-4450 models have two Wi-Fi antenna connectors (W1 and W2) on the top panel. Both come with RP-SMA female connectors.

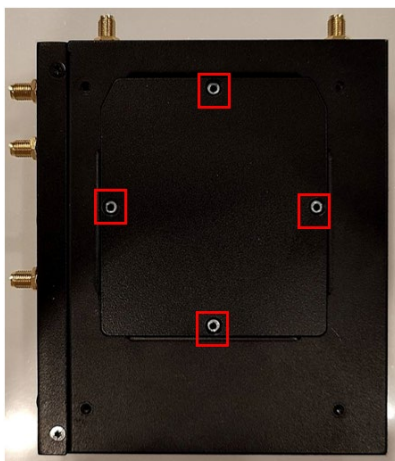


- In addition, a GPS antenna connector is provided for the GPS module. All cellular and GPS connectors are of type SMA female.



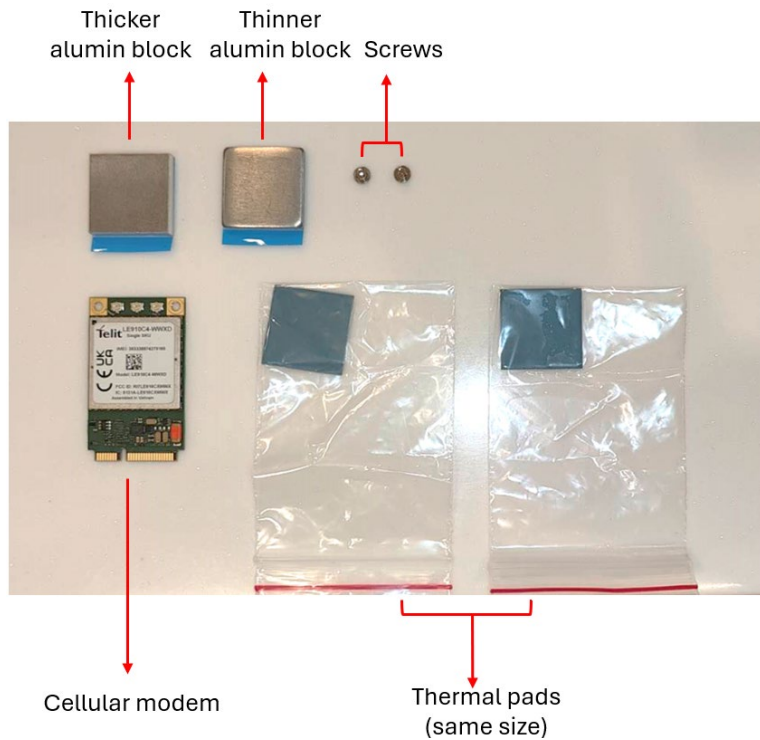
Installing the 4G Module Accessory

1. Open the wireless module door on the UC-443xA by removing the 4 Torx screws (6-point star *).



2. Take out the following items from the 4G module accessory kit:

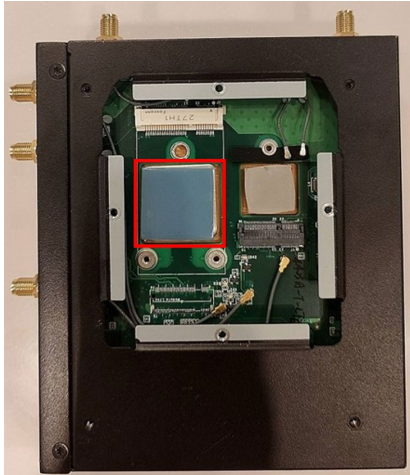
- 1 x thicker aluminum block
- 1 x thinner aluminum block
- 2 x Screws
- 1 x Cellular modem
- 2 x Thermal pads (same size)



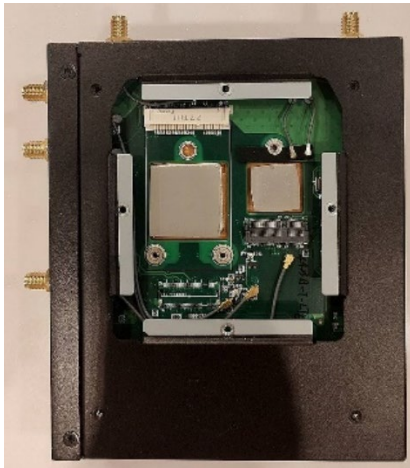
3. Take out the **thinner** alumin block, peel off the blue protective film to expose the adhesive side of the aluminum block, align it with the marked area (red box) on the UC-443xA mainboard and firmly press it into place. The adhesive side should face downward to attach the block securely to the PCB.



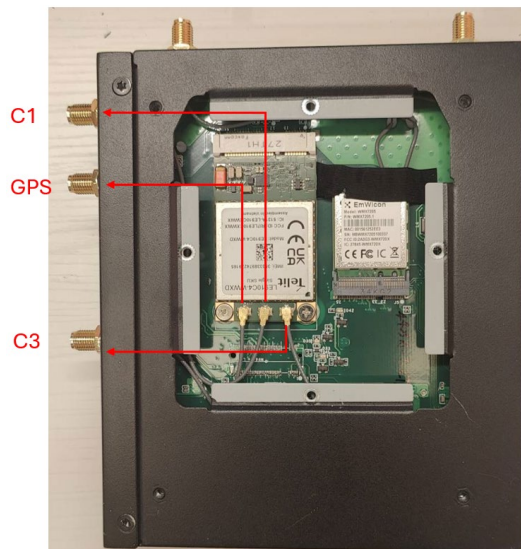
4. Take out the one of the thermal pad. It has two protective films: one blue and one clear. The clear film covers the adhesive side, which should be attached to the aluminum block.



5. Now remove the blue film.

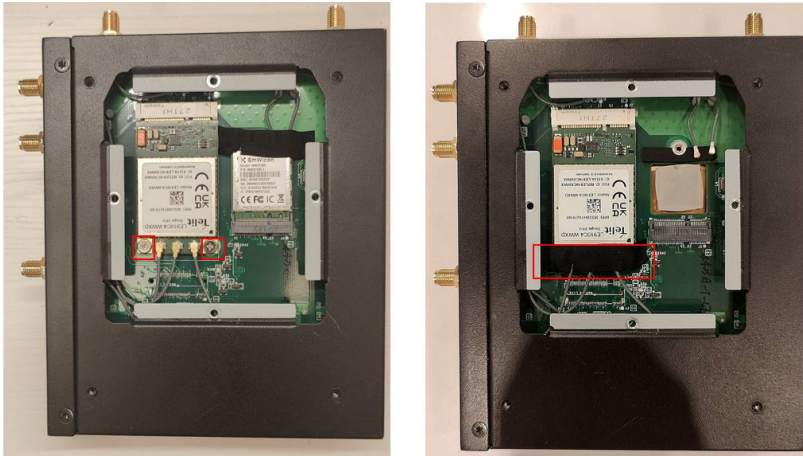


6. Insert the cellular modem into the mPCIe slot. Then, connect the antenna cables to the corresponding modem connectors as shown in the diagram:

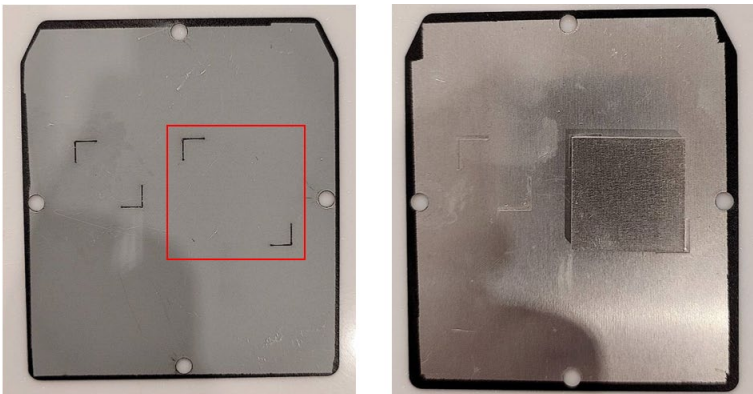


Make sure each connector is securely fastened to ensure signal integrity.

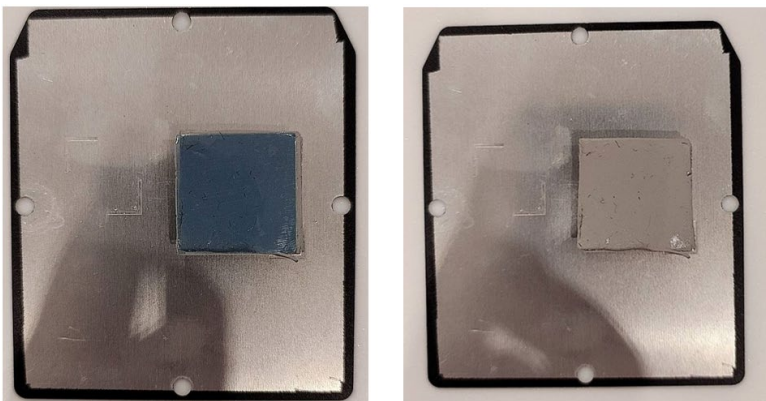
7. Fasten the 2 screws to secure the cellular modem. Then, use the black insulating tape from the accessory pack to cover the screws and antenna connectors, as shown in the image.



8. Take out the thicker alumin block, peel off the blue protective film to expose the adhesive side of the aluminum block, align it with the marked area (red box) on back of the wireless module door and firmly press it into place. The adhesive side should face downward to attach the block securely to the module door.



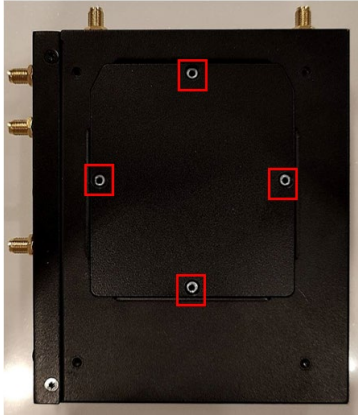
9. Take out the second thermal pad. It has two protective films: one blue and one clear. The clear film covers the adhesive side, which should be attached to the aluminum block. Once attached, remove the blue film to expose the top surface.



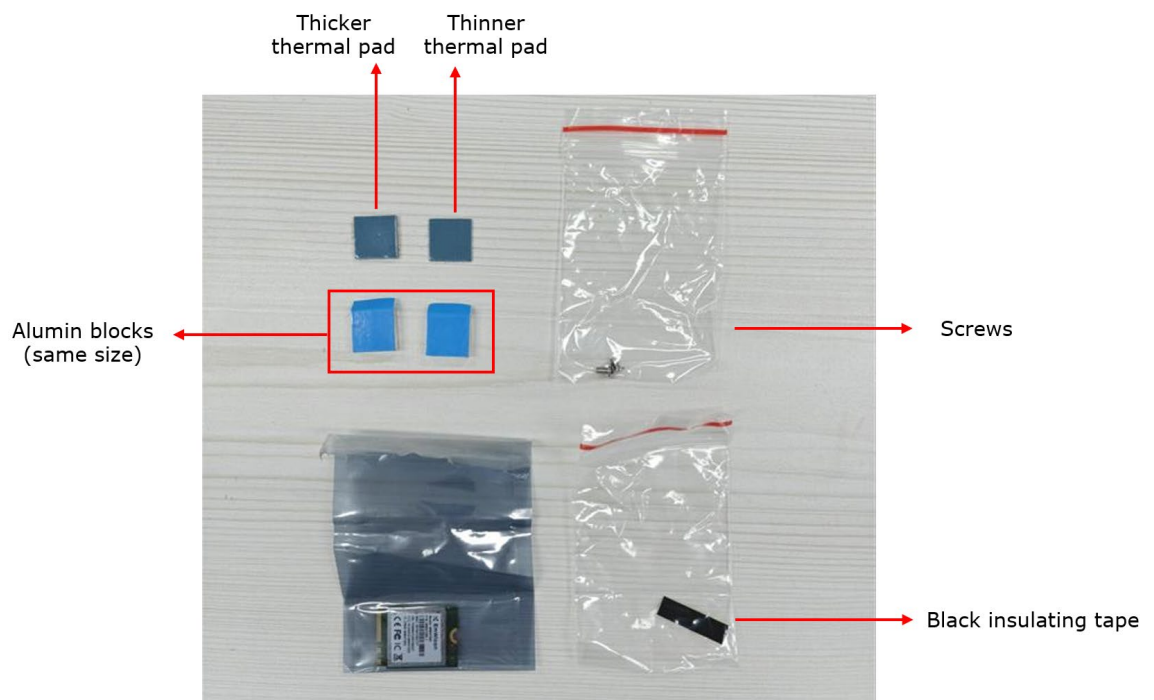
10. Reinsert the wireless module door and fasten it securely using the 4 Torx screws (6-point star *).

Installing the Wi-Fi 6E Module Accessory

1. Open the wireless module door on the UC-443xA or UC-445xA by removing the 4 Torx screws (6-point star ★).



2. Take out the following items from the Wi-Fi module accessory kit:
 - 2 x aluminum blocks (same size)
 - 1 x Thicker thermal pad
 - 1 x Thinner thermal pad
 - 2 x Screws
 - 1 x Wi-Fi modem
 - 1 x black insulating tape



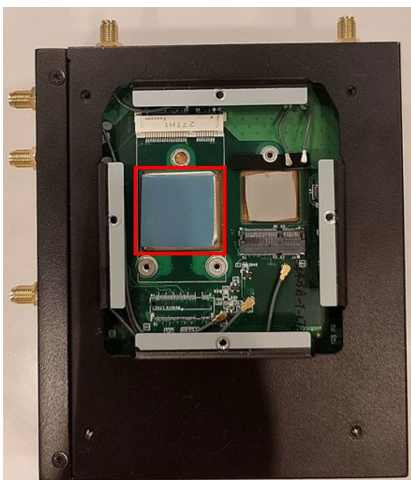
3. Take out one alumin block, peel off the blue protective film to expose the adhesive side of the aluminum block, align it with the marked area (red box) on the mainboard and firmly press it into place. The adhesive side should face downward to attach the block securely to the PCB.



4. Take out the **Thinner thermal pad**. It has two protective films: one blue and one clear. The clear film covers the adhesive side, which should be attached to the aluminum block.



5. Take out the one of the thermal pad. It has two protective films: one blue and one clear. The clear film covers the adhesive side, which should be attached to the aluminum block.



6. Now remove the blue firm.



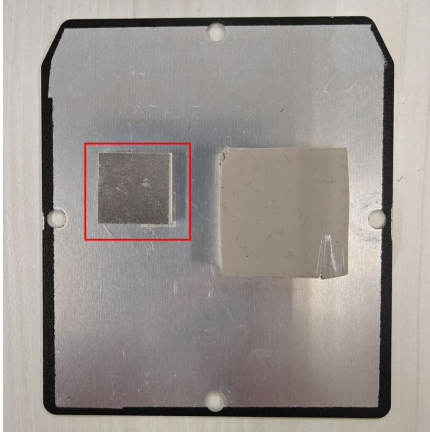
7. Insert the Wi-Fi modem into the M.2 slot. Then, connect the antenna cables to the corresponding modem connectors as shown in the diagram:



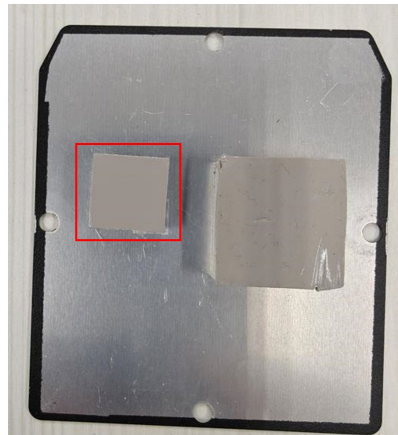
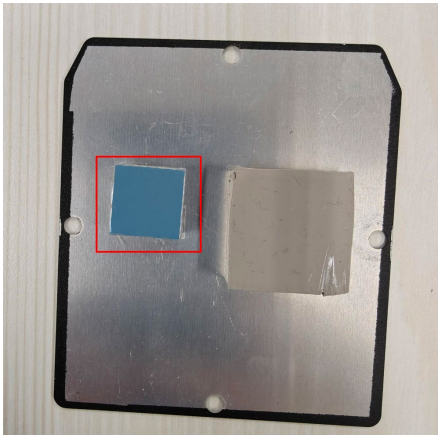
8. Cover the connector with black insulating tape.



9. Take out the other aluminum block, peel off the blue protective film to expose the adhesive side of the aluminum block, align it with the marked area (red box) on the back of the wireless module door, and firmly press it into place. The adhesive side should face downward to attach the block securely to the module door.



10. Take out the **Thicker thermal pad**. It has two protective films: one blue and one clear. The clear film covers the adhesive side, which should be attached to the aluminum block. Once attached, remove the blue film to expose the top surface.



11. Reinsert the wireless module door and fasten it securely using the 4 Torx screws (6-point star *).

A. Regulatory Approval Statements

FCC Statement

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 user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device and its antenna must not be co located or operating in conjunction with any other antenna or transmitter.



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.

IC Statement

The radiated output power of the Wireless Device is below the Innovation, Science and Economic Development Canada (ISED) radio frequency exposure limits. The Wireless Device should be used in such a manner that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown compliant with the ISED RF Exposure limits under mobile exposure conditions. (antennas are greater than 20 cm from a person's body).

La puissance de sortie rayonnée du dispositif sans fil est inférieure aux limites d'exposition aux radiofréquences d'Innovation, Sciences et Développement économique Canada (ISED). Le dispositif sans fil doit être utilisé de manière à minimiser le potentiel de contact humain pendant le fonctionnement normal.

Cet appareil a également été évalué et montré conforme aux limites d'exposition RF ISED dans des conditions d'exposition mobiles. (Les antennes sont à plus de 20 cm du corps d'une personne).