

# AIG-302 Series

*Advanced IIoT gateways with Arm® Cortex™-A7 dual-core 1 GHz processor, Azure IoT Edge software, -40 to 70°C operating temperature*



## Features and Benefits

- Supports generic MQTT client to facilitate MQTT connections via built-in device SDKs tailored for Azure cloud integration
- Supports Modbus RTU/ASCII/ TCP Client and TCP Server
- Supports Azure IoT Edge (LTS version)
- Built-in network traffic monitoring and diagnostic tool for easy troubleshooting
- Provides robust OTA function to prevent system failure during software upgrades
- Equipped with Secure Boot to prevent malicious software-injection attacks
- LTE Cat. 4 US, EU, and APAC models available
- Compliance with IEC 62443-4-2 Security Level 2 requirements
- EN 18031-1 compliant wireless cybersecurity
- -40 to 70°C operating temperature range

## Certifications



## Introduction

The AIG-302 Series advanced IIoT gateways connect Modbus RTU/ASCII/TCP devices to platforms such as Azure cloud and MQTT. The gateways support the Modbus TCP server mode, enabling simultaneous transmission of data to cloud platforms and your local SCADA system.

### Boost Edge Computing Capabilities With Azure IoT Edge

AIG-302 supports Azure IoT Edge to bring in a multitude of benefits, including edge computing capabilities, reduced bandwidth costs, flexibility and scalability, seamless integration with Azure services, and ease of management and update. Specifically, with the AIG-302 processing data locally, it not only offers rapid responses and low latency but also effectively reduces network bandwidth usage, thereby cutting costs. Additionally, the modular design of the AIG-302 and Azure IoT Edge support make your system both flexible and easily expandable. At the same time, its seamless integration with Azure cloud services allows you to effortlessly extend cloud capabilities to edge devices.

### Built-in Ready-to-use Data Preprocessing Functions, No Coding Required

Energy Management Systems collect energy data such as average power generation and energy efficiency. This data is then used to display on-site conditions, observe the energy trend, and optimize energy usage. Most energy management systems require meaningful data and hence edge gateways are expected to preprocess data collected at field sites before transfer to cloud applications. Some applications may require certain actions to be performed within a short time frame on the preprocessed data. AIG-302 ready-to-run IIoT gateways come with value-added functions and an intuitive UI that simplify data preprocessing and distributed device management to just a few clicks.

### Secure Remote Access Reduces Maintenance Costs

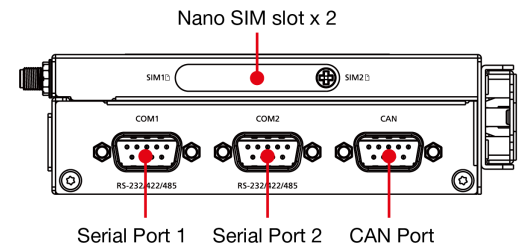
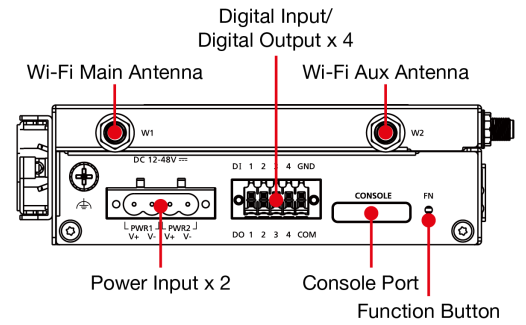
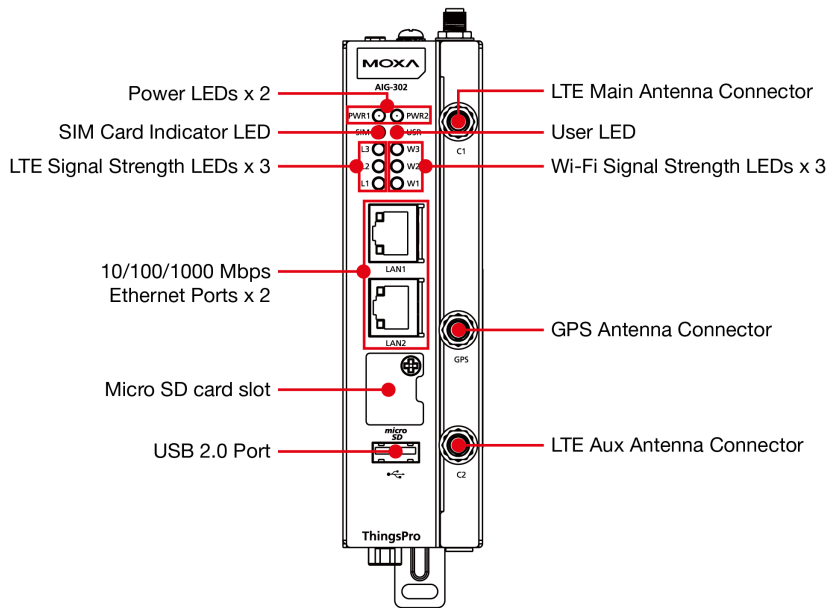
The AIG-302 comes with powerful troubleshooting tools to diagnose issues with protocol statuses and capture and analyze traffic packets, enabling engineers to identify the root cause of issues and quickly bring the operation back to normal. Moreover, AIG-302 provides secure remote access allowing maintenance engineers to fix issues remotely, saving time and effort as well as reducing the downtime in energy management systems. External connections can be encrypted using OpenVPN or TLS, ensuring secure communication.

### Security Dashboard Optimized for Detecting Security Issues

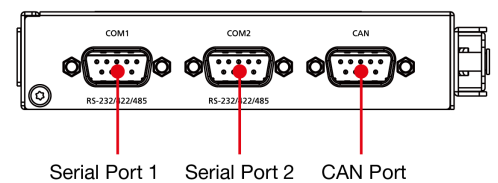
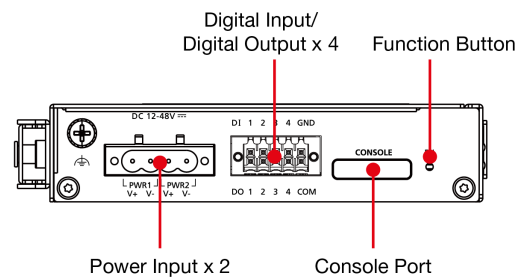
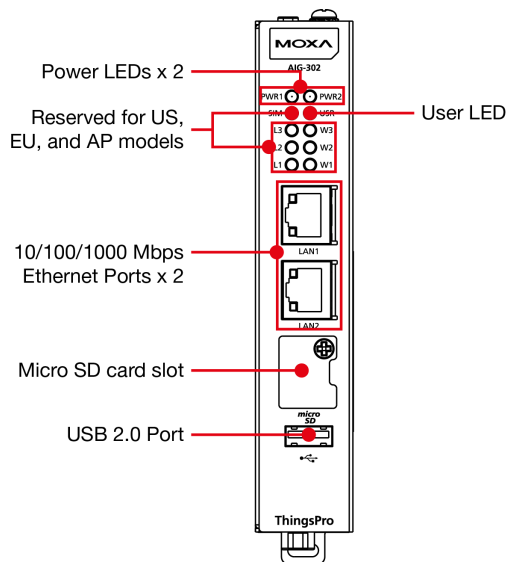
A security dashboard utilizes device scans to identify potential cybersecurity threats from multiple angles, such as during account settings management, application networking, application resource usage monitoring, product certificates deployment, service settings modifications, and system status checks. Upon detecting threats, a mitigation plan is recommended to resolve issues.

## Appearance

### AIG-302-T US, EU, AP Models



### AIG-302-T-AZU-LX



## Specifications

### Computer

|                       |                                                  |
|-----------------------|--------------------------------------------------|
| CPU                   | Arm7 Cortex-A7 dual-core 1 GHz                   |
| DRAM                  | 2 GB DDR3L                                       |
| Storage Pre-installed | 32 GB eMMC                                       |
| Pre-installed OS      | Moxa Industrial Linux (Debian 11, kernel 5.10.x) |
| No. of Tags Supported | 3000                                             |

### Computer Interface

|                |                                                                    |
|----------------|--------------------------------------------------------------------|
| Ethernet Ports | Auto-sensing 10/100/1000 Mbps ports (RJ45 connector) x 2           |
| Serial Ports   | RS-232/422/485 ports x 2 (software-selectable, DB9 male connector) |

|                            |                                              |
|----------------------------|----------------------------------------------|
| CAN Ports                  | CAN 2.0 A/B x 1 (DB9 male connector)         |
| Digital Input              | DIs x 4                                      |
| Digital Output             | DOs x 4                                      |
| USB                        | USB 2.0 hosts x 1, type-A connectors         |
| Wi-Fi Antenna Connector    | RP-SMA x 2 (excluding AIG-302-T-AZU-LX)      |
| Cellular Antenna Connector | SMA x 2 (excluding AIG-302-T-AZU-LX)         |
| GPS Antenna Connector      | SMA x 1 (excluding AIG-302-T-AZU-LX)         |
| Expansion Slots            | mPCIe slots x 1 (excluding AIG-302-T-AZU-LX) |
| SIM Format                 | Nano<br>(excluding AIG-302-T-AZU-LX)         |
| Number of SIMs             | 2                                            |
| Buttons                    | Reset button<br>Reset to factory default     |
| TPM                        | TPM v2.0                                     |

#### Ethernet Interface

|                                            |                   |
|--------------------------------------------|-------------------|
| Magnetic Isolation Protection              | 1.5 kV (built-in) |
| 10/100/1000BaseT(X) Ports (RJ45 connector) | 2                 |

#### Ethernet Software Features

|                       |                                                                                  |
|-----------------------|----------------------------------------------------------------------------------|
| Industrial Protocols  | Modbus TCP Client / Server<br>Generic MQTT<br>Azure IoT Device<br>Azure IoT Edge |
| Configuration Options | Web Console (HTTPS)<br>RESTful APIs<br>AIG QuickON                               |
| Time Management       | NTP Client<br>GPS                                                                |
| Security              | OpenVPN Client<br>SSH<br>HTTPS/SSL<br>TLS<br>Firewall                            |

#### Serial Interface

|              |                              |
|--------------|------------------------------|
| No. of Ports | 2                            |
| Connector    | DB9 male                     |
| Bitrate      | 300 bps to 921.6 kbps        |
| Data Bits    | 7, 8                         |
| Stop Bits    | 1, 2                         |
| Parity       | None, Even, Odd, Space, Mark |
| Flow Control | RTS/CTS, XON/XOFF            |
| Console Port | 1 x 4-pin header             |

## Serial Signals

|           |                                        |
|-----------|----------------------------------------|
| RS-232    | TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND |
| RS-422    | Tx+, Tx-, Rx+, Rx-, GND                |
| RS-485-2w | Data+, Data-, GND                      |

## Serial Software Features

|                      |                         |
|----------------------|-------------------------|
| Industrial Protocols | Modbus RTU/ASCII Master |
|----------------------|-------------------------|

## CAN Interface

|                      |                                              |
|----------------------|----------------------------------------------|
| No. of Ports         | 1                                            |
| Connector            | DB9 male                                     |
| Bitrate              | 10 to 1000 kbps                              |
| Industrial Protocols | CAN 2.0A<br>CAN 2.0B                         |
| Signals              | CAN_H, CAN_L, CAN_GND, CAN_SHLD, CAN_V+, GND |
| Isolation            | 2 kV (built-in)                              |

## Digital Inputs

|                         |                                     |
|-------------------------|-------------------------------------|
| Connector               | Spring-type Euroblock terminal      |
| Sensor Type             | Wet contact (NPN)<br>Dry contact    |
| Dry Contact             | Off: open<br>On: short to GND       |
| Wet Contact (DI to COM) | On: 10 to 30 VDC<br>Off: 0 to 3 VDC |
| Isolation               | 3K VDC                              |

## Digital Outputs

|                |                                             |
|----------------|---------------------------------------------|
| Connector      | Spring-type Euroblock terminal              |
| Current Rating | 200 mA per channel                          |
| I/O Type       | Sink                                        |
| Voltage        | 24 VDC<br>nominal, open collector to 30 VDC |

## Cellular Interface

|                    |                                                                                                                                                                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cellular Standards | LTE Cat. 4                                                                                                                                                                                                                                                             |
| Band Options (US)  | 4G:<br>Band 2 (1900 MHz)/ Band 4 (1700 MHz)/ Band 5 (850 MHz)/ Band 12 (700 MHz)/ Band 13 (700 MHz)/ Band 14 (700 MHz)/ Band 66 (1700 MHz)/ Band 71 (600 MHz)<br>3G:<br>Band 2 (1900 MHz)/ Band 4 (1700 MHz)/ Band 5 (850 MHz)<br><br>Carrier Approvals: Verizon, AT&T |

|                     |                                                                                                                                                                                                                                                                                        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Band Options (EU)   | 4G:<br>Band 1 (2100 MHz)/ Band 3 (1800 MHz)/ Band 7 (2600 MHz)/ Band 8 (900 MHz)/ Band 20 (800 MHz)/ Band 28A (700 MHz)<br>3G:<br>Band 1 (2100 MHz)/ Band 3 (1800 MHz)/ Band 8 (900 MHz)                                                                                               |
| Band Options (APAC) | 4G:<br>Band 1 (2100 MHz)/Band Band 3 (1800 MHz)/ Band 5 (850 MHz)/ Band 8 (900 MHz)/ Band 9 (1800 MHz)/ Band 18 (850 MHz)/Band 19 (850 MHz)/ Band 26 (850 MHz)/ Band 28 (700 MHz)<br>3G:<br>Band 1 (2100 MHz)/ Band 5 (850 MHz)/ Band 6 (850 MHz)/ Band 8 (900 MHz)/ Band 19 (850 MHz) |

#### GPS Interface

|                          |                                                                        |
|--------------------------|------------------------------------------------------------------------|
| Receiver Types           | GPS/GLONASS/BeiDou/Galileo/QZSS                                        |
| Accuracy                 | Position: 2.0 m @CEP50                                                 |
| Time to First Fix (TTFF) | Hot start: 1.1 s<br>Warm start: 22.1 s<br>Cold start: 29.9 s           |
| Sensitivity              | Cold starts: -145 dBm<br>Acquisition: -147.0 dBm<br>Tracking: -160 dBm |
| Update Rate              | 1 Hz                                                                   |

#### Azure IoT Edge

|                        |                                                                                                  |
|------------------------|--------------------------------------------------------------------------------------------------|
| Versions Supported     | v1.5.21                                                                                          |
| Authentication Methods | Manual / Connection String<br>DPS / Symmetric Encryption<br>DPS / X.509 Certificate<br>DPS / TPM |
| Azure Direct Methods   | Reboot<br>Software Upgrade<br>Remote API Invocation                                              |
| Azure Module Twin      | Device Configuration                                                                             |
| Moxa Functions         | Custom Payload<br>Message Group                                                                  |

#### Generic MQTT Client

|                        |                                                                     |
|------------------------|---------------------------------------------------------------------|
| Versions Supported     | v3.1.1<br>v3.1                                                      |
| QoS Levels             | 0, 1, 2                                                             |
| Authentication Methods | Username and password                                               |
| Secure Transmission    | TLS 1.0<br>TLS 1.1<br>TLS 1.2                                       |
| Native Capabilities    | Keep Alive<br>Retain Message<br>Clean Session<br>Will and Testament |
| Moxa Functions         | Store and Forward<br>Custom Payload<br>Remote API Invocation        |

#### Azure IoT Device

|                                |                                                              |
|--------------------------------|--------------------------------------------------------------|
| Connection Protocols Supported | MQTT<br>MQTT over WebSockets<br>AMQP<br>AMQP over WebSockets |
| Authentication Methods         | Symmetric Key<br>X.509 Certificate                           |
| Azure Direct Methods           | Reboot<br>Software Upgrade<br>Remote API Invocation          |

#### AWS IoT Core

|                             |                                                     |
|-----------------------------|-----------------------------------------------------|
| QoS Levels                  | 0,1                                                 |
| Authentication Methods      | X.509 Certificate<br>Private Key<br>Trusted Root CA |
| Native Capabilities         | Keep Alive                                          |
| Moxa Functions              | Store and Forward<br>Custom Payload<br>Shadow       |
| Commands Invokable Via Jobs | Reboot<br>Software Upgrade<br>Remote API Invocation |

#### Sparkplug B Client

|                      |                                     |
|----------------------|-------------------------------------|
| Versions Supported   | v2.2                                |
| Node Commands (NCMD) | Next Broker<br>Reboot<br>Rebirth    |
| Moxa Functions       | Store and Forward<br>Custom Payload |

#### Modbus RTU/ASCII

|                              |                              |
|------------------------------|------------------------------|
| Mode                         | Client (Master)              |
| Functions Supported          | 1, 2, 3, 4, 5, 6, 15, 16, 23 |
| Max. No. of Commands         | 256 per port                 |
| Max. No of Connected Devices | 62                           |

#### Modbus TCP

|                                |                              |
|--------------------------------|------------------------------|
| Mode                           | Client/Server                |
| Functions Supported            | 1, 2, 3, 4, 5, 6, 15, 16, 23 |
| Max. No. of Server Connections | 64                           |
| Max. No. of Client Connections | 4                            |
| Max. No. of Commands           | 3000                         |

## LED Indicators

|                          |                                                 |
|--------------------------|-------------------------------------------------|
| System                   | Power x 2<br>User x 1<br>SIM card indicator x 1 |
| LAN                      | 2 per port (10/100/1000 Mbps)                   |
| Wireless Signal Strength | Cellular/Wi-Fi x 6                              |

## Power Parameters

|                     |                       |
|---------------------|-----------------------|
| No. of Power Inputs | Redundant dual inputs |
| Input Voltage       | 12 to 48 VDC          |
| Input Current       | 1 A @ 12 VDC          |
| Power Consumption   | 12 W                  |
| Power Connector     | 4-pin terminal block  |

## Reliability

|                          |                               |
|--------------------------|-------------------------------|
| Automatic Reboot Trigger | External WDT (watchdog timer) |
|--------------------------|-------------------------------|

## Physical Characteristics

|              |                                                                                                                              |
|--------------|------------------------------------------------------------------------------------------------------------------------------|
| Housing      | Metal<br>SECC                                                                                                                |
| IP Rating    | IP30                                                                                                                         |
| Weight       | AIG-302-T-AZU-LX: 560 g (1.23 lb)<br>All other models: 750 g (1.65 lb)                                                       |
| Dimensions   | AIG-302-T-AZU-LX: 141.5 x 120 x 27 mm (5.7 x 4.72 x 1.06 in)<br>All other models: 141.5 x 120 x 39 mm (5.7 x 4.72 x 1.54 in) |
| Installation | DIN-rail mounting<br>Wall mounting (with optional kit)                                                                       |

## Environmental Limits

|                                        |                                                                                                 |
|----------------------------------------|-------------------------------------------------------------------------------------------------|
| Operating Temperature                  | AIG-302-T-AZU-LX: -40 to 85°C (-40 to 185°F)<br>All other models: -40 to 70°C (-40 to 158°F)    |
| Storage Temperature (package included) | -40 to 85°C (-40 to 185°F)                                                                      |
| Ambient Relative Humidity              | 5 to 95% (non-condensing)                                                                       |
| Shock                                  | IEC 60068-2-27                                                                                  |
| Vibration                              | 2 Grms @ IEC 60068-2-64, random wave, 5 to 500 Hz, 1 hr per axis (without USB devices attached) |

## Standards and Certifications

|               |                                                                                                                                                                                                                                            |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EMI           | CISPR 32, FCC Part 15B Class A                                                                                                                                                                                                             |
| EMC           | EN 55032/35<br>EN 61000-6-2/-6-4                                                                                                                                                                                                           |
| EMS           | IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV<br>IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m<br>IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV<br>IEC 61000-4-5 Surge: Power: 1 kV; Signal: 1 kV<br>IEC 61000-4-6 CS: 10 V<br>IEC 61000-4-8 PFMF |
| Cybersecurity | EN 18031-1                                                                                                                                                                                                                                 |

|                     |                                                              |
|---------------------|--------------------------------------------------------------|
| Hazardous Locations | Class I Division 2, ATEX                                     |
| Safety              | UL 62368-1<br>EN 62368-1                                     |
| Radio               | NCC<br>KC<br>RCM<br>TELEC                                    |
| Carrier Approvals   | AT&T<br>Verizon<br>PTCRB                                     |
| RED                 | EN 301 489-1/19/52<br>EN 301 908-1<br>EN 303 413<br>EN 62311 |
| Green Product       | RoHS, CRoHS, WEEE                                            |

#### MTBF

|           |                                                            |
|-----------|------------------------------------------------------------|
| Time      | AIG-302-T-AZU-LX: 1,772,745<br>All other models: 1,403,998 |
| Standards | Telcordia (Bellcore) Standard TR/SR                        |

#### Warranty

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| Warranty Period | 5 years                                                              |
| Details         | See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a> |

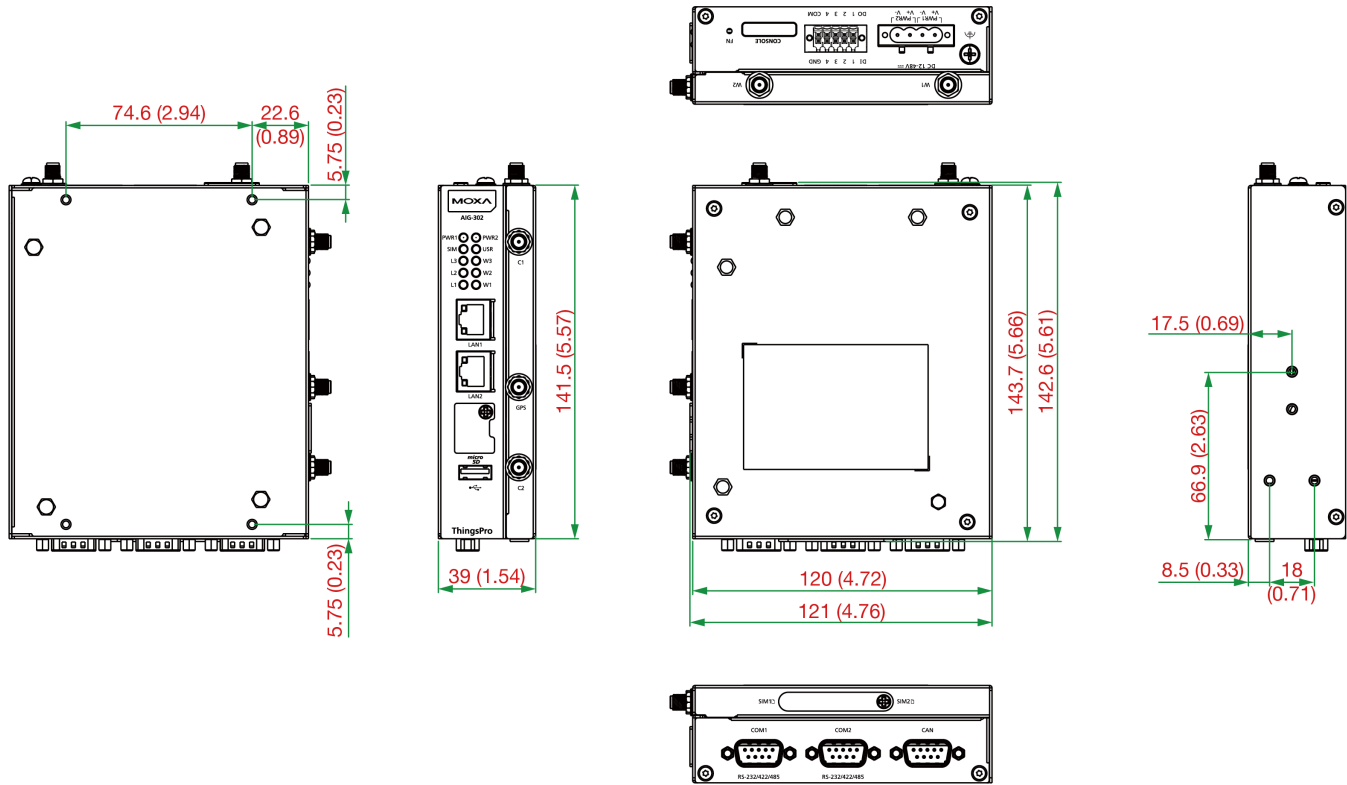
#### Package Contents

|                  |                                                   |
|------------------|---------------------------------------------------|
| Device           | 1 x AIG-302 Series advanced IIoT gateway          |
| Cable            | 1 x terminal block to power jack converter        |
| Installation Kit | 1 x DIN-rail kit                                  |
| Documentation    | 1 x quick installation guide<br>1 x warranty card |

Dimensions

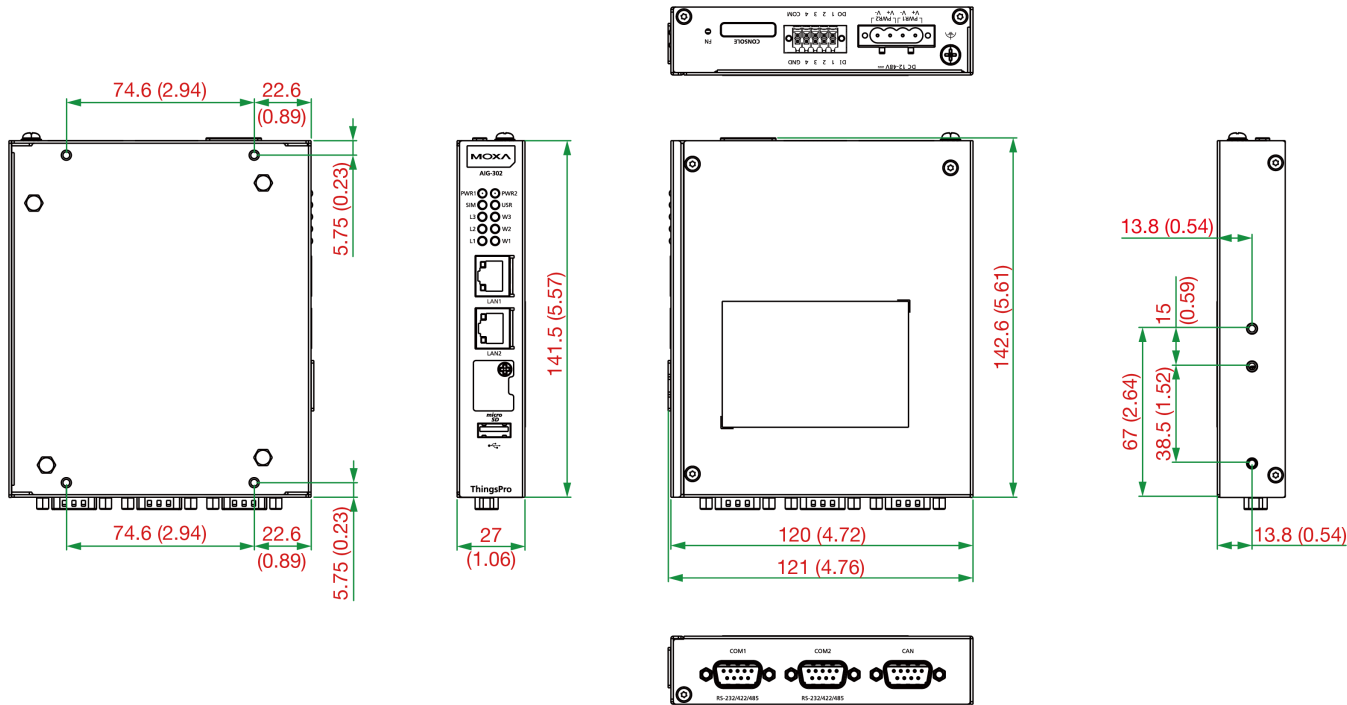
AIG-302 US, EU, and AP Models

Unit: mm (inch)



AIG-302-T-AZU-LX

Unit: mm (inch)



## Ordering Information

| Model Name          | mPCIe Slot 1 for LTE Module           | mPCIe Slot 2 for Wi-Fi Module | Operating Temperature |
|---------------------|---------------------------------------|-------------------------------|-----------------------|
| AIG-302-T-AZU-LX    | –                                     | –                             | -40 to 85°C           |
| AIG-302-T-US-AZU-LX | US region LTE module preinstalled     | Reserved                      | -40 to 70°C           |
| AIG-302-T-EU-AZU-LX | Europe region LTE module preinstalled | Reserved                      | -40 to 70°C           |
| AIG-302-T-AP-AZU-LX | APAC region LTE module preinstalled   | Reserved                      | -40 to 70°C           |

## Accessories (sold separately)

### Power Wiring

|                 |                                            |
|-----------------|--------------------------------------------|
| CBL-PJTB-10     | Non-locking barrel plug to bare-wire cable |
| Mini DB9F-to-TB | DB9 female to terminal block connector     |

### Cables

|                     |                                         |
|---------------------|-----------------------------------------|
| CBL-F9DPF1x4-BK-100 | Console cable with 4-pin connector, 1 m |
|---------------------|-----------------------------------------|

### Wi-Fi Wireless Modules

|                   |                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------|
| UC-8200-WLAN22-AC | Wireless package for UC-8200 V2.0 or later with Wi-Fi module, 2 screws, 2 spacers, 1 heat sink, 1 pad |
|-------------------|-------------------------------------------------------------------------------------------------------|

### Antennas

|                           |                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------|
| ANT-LTEUS-ASM-01          | GSM/GPRS/EDGE/UMTS/HSPA/LTE, 1 dBi, omnidirectional rubber-duck antenna                                |
| ANT-5G-OSM-04             | 4 dBi LTE/5G NR dipole antenna with SMA (male) connector                                               |
| ANT-LTE-OSM-03-3m BK      | 700-2700 MHz, multiband antenna, specifically designed for 2G, 3G, and 4G applications, 3 m cable      |
| ANT-LTE-ASM-05 BK         | 704-960/1710-2620 MHz, LTE stick antenna, 5 dBi                                                        |
| ANT-LTE-OSM-06-3m BK MIMO | Multiband antenna with screw-fastened mounting option for 700-2700/2400-2500/5150-5850 MHz frequencies |
| ANT-WDB-ARM-0202          | 2 dBi at 2.4 GHz or 2 dBi at 5 GHz, RP-SMA (male), dual-band, omnidirectional antenna                  |

### Wall-Mounting Kits

|                           |                                                |
|---------------------------|------------------------------------------------|
| UC-8200 Wall-mounting Kit | Wall-mounting kit for UC-8200 with 4 M3 screws |
|---------------------------|------------------------------------------------|

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