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# TRO610 Series Cellular Field Area Network Routers

## Hardware Reference


*1Variant visualization for illustration purposes only.*

# Revisions

| Rev. | Date | Summary of Changes |
|---|---|---|
| 0 | 06/2022 | Initial version |
| 1 | 03/2023 | Updates, measurements from the actual device. |

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# 1 Notices

## 1.1 Copyright Notice



The information in this guide may change without notice. Hitachi Energy assumes no responsibility for any errors that may appear in this guide.

## 1.2 FCC Notice to Users and Operators

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.

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 their own expense. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by using one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.

This Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any changes or modification to could void the user's authority to operate this device.

The Federal Communications Commission (FCC) with its action in ET Docket 96-8 has adopted a safety standard for human exposure to RF electromagnetic energy emitted by FCC certified equipment. The TRO610 meets the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this device according to the instructions found in this manual will result in user exposure that is substantially below the FCC recommended limits.

To comply with FCC RF exposure safety requirements the antennas for this device must be installed to provide a separation distance of at least 20 cm from persons and shall not be co-located with other transmitting antennas except as shown in FCC multi-transmitter guidelines.

## 1.3 Industry Canada Notice to Users and Operators

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. 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.

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des réglements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) cet dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

This device has been designed to operate with the antennas having a gain no greater than 3.96 dBi for the cellular (LTE) radio and 2.24 dBi for the Bluetooth radio. The required antenna impedance is 50 Ohms.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme à Industrie Canada une licence standard RSS exonérés (s). Son fonctionnement est soumis aux deux conditions suivantes:

1. Cet appareil ne doit pas provoquer d'interférences
2. Cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant provoquer un fonctionnement indésirable de l'appareil.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication.

Radiation Exposure Statement: This equipment complies with the IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Énoncé d'exposition aux rayonnements: Cet équipement est conforme aux limites d'exposition aux rayonnements ioniques RSS-102 Pour un environnement incontrôlé. Cet équipement doit être installé et utilisé avec un Distance minimale de 20 cm entre le radiateur et votre corps.

## 1.4 Required Labeling

The Federal Communications Commission (FCC) and Industry Canada (IC) require equipment to have a label on the outside of the product that shows the FCC and IC ID numbers. The label should identify one or more of the following:

For the Telit LE910 (LTE Cat-4) module：
contains FCC ID：RI7LE910CXWWX
contains IC：5131A-LE910CXWWX

For TRO610 Bluetooth (in advanced models only):
FCC ID：P9J-TRO600B1
IC：4751A-TRO600B1

Note: there is no requirement for FCC/IC labelling for the IoT  product (D2, with Telit ME310 NB-IoT/LTE-M modem).

## 1.5 European Union WEEE Notice

For EU member countries, this symbol means: Do not dispose of this equipment as unsorted municipal waste. This equipment must be collected separately.

The return and collection of this product has not been defined at this time, please contact Hitachi Energy for return and/or collection.

It is important for users of this equipment to participate in reuse, recycling, and other forms of recovery. The potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment are a waste of natural resources and cause pollution.

## 1.6 European Union CE labeling

All the TRO610 product variants are marked with the CE, are tested against and come with UE declaration of conformity (CE), in the required areas of:

- Low-Voltage (2014/35/EU)
- Electromagnetic Compatibility (2014/30/EU)
- Radio Equipment (2014/53/EU)
- Safety (EN/IEC 62368-1)
- RoHS 3 (2015/863/EU)
- WEEE (2012/19/EU)

Declaration of conformity (CE) is available for interested parties on request.

# 2 Safety instructions

Follow these guidelines to ensure safe operation of the router:

## 2.1 RF Exposure

Compliance with FCC radio frequency (RF) exposure limits require antennas for this product should be located a minimum of  7.9 in. (20 cm) or more from the body of all persons.

- Do not touch or move the antennas while the unit is transmitting or receiving.
- Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- Do not operate the radio or attempt to transmit data unless the antenna is connected; otherwise, the radio may be damaged.

## 2.2 Use in specific environments

- TRO610 is intended for installation in an enclosure. The enclosure shall provide physical security through a lock or similar.

- The use of wireless devices on airplanes is governed by the relevant aviation authority, for example the Federal Aviation Administration (FAA), or the European Union Aviation Safety Agency (EASA).
- The use of wireless devices in hospitals is restricted to the limits set forth by each hospital.

### 2.3 Power Supply

The TRO610 shall be installed by a trained and qualified technician.

To have a safe installation of the TRO610, a switch or circuit breaker must be included in the setup. Be sure the switch or circuit breaker is suitably located, easily reached and marked as the disconnecting device for the equipment.

The TRO610 shall be connected to an appropriate IEC 60950 or IEC 62368 compliant power supply.

The TRO610 must be grounded.

# 3 Product Series and System concept

## 3.1 Product Series Introduction

TRO610 Series are cost-effective small form-factor cellular routers. They provide industry-standard local interfaces and cellular backhaul for Utility, Smart City, Oil & Gas, Mining and Industrial applications.

The TRO610 is ideal for connecting one or two local client devices. It is tailored for large scale industrial IoT deployments, within an extended fleet ecosystem.

TRO610 provides a wide variety of local protocol options over serial and Ethernet IP, routing those over several cellular options.

Security is incorporated throughout both hardware and software design – firmware images are delivered encrypted and authenticated prior to loading. With device certificates, Integrated zone-based firewall and VPN tunnel options, TRO610 provides critical infrastructure grade security.

## 3.2 TRO610 Product Summary

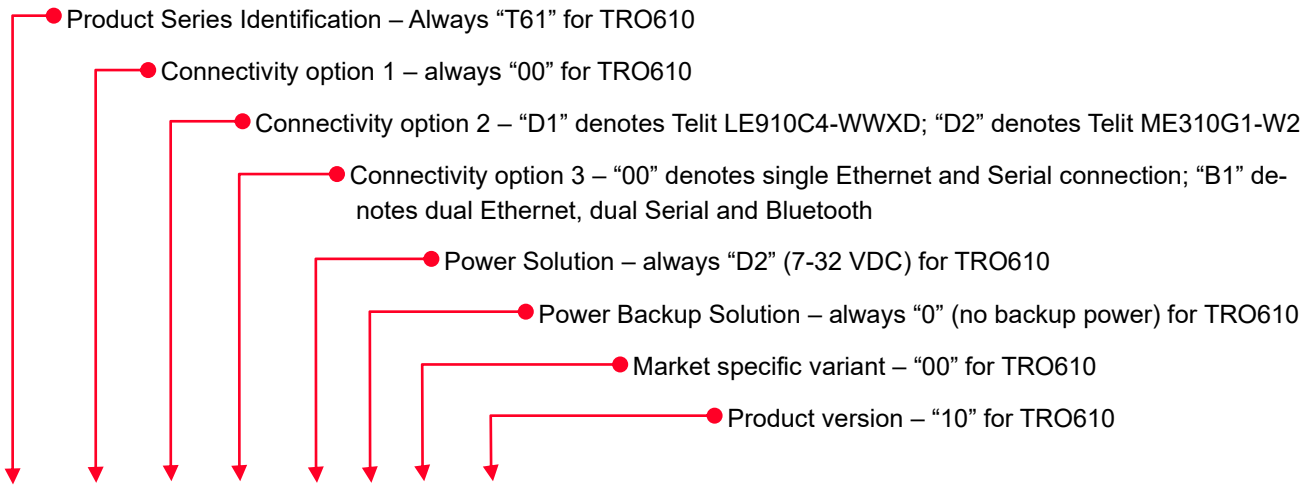
TRO610 router has the following characteristics:

- One or two Ethernet Ports (10/1000/1000bT)
- One or two serial ports (RS232 and/or RS485, three-wire), supporting multiple protocols (RAW data mode, terminal connection, P2P, DNP3, Modbus, PGE2179, P2P UDP Mirror Bits – MB8)
- Cellular connectivity, depending on the modem
    - 4G/LTE Cat-4 (3GPP Release 10), UMTS, GSM/EDGE
        - Including support for Anterix networks (B8)
    - 4G/LTE Cat-M1/Cat-NB2 (3GPP Release 14)
        - Including support for 410-450MHz spectrum (in bands B31, B72, B87/B88)
    - Dual SIM support
- GNSS/GPS for accurate location information

- Bluetooth LE gateway (future)
- Battery voltage monitor
- Dry Contact Closure input (e.g. for cabinet door monitoring)

### 3.2.1 TRO610 variants – Part Number Structure

A TRO610 Part Number fully identifies the TRO610 variant. It can be broken down as follows:




There are four orderable TRO610 variants. The table below identifies the characteristics of each variant

| Local Connections | Cellular modem | Part Number |
|---|---|---|
| One 10/100/1000bT Ethernet<br>One RS232 Serial | LTE Cat-4 / UMTS / GSM EDGE<br>(Telit LE910C4-WWXD) | T6100D100D200010 |
| | LTE Cat-M1 / Cat-NB2<br>(Telit ME310G1-W2) | T6100D200D200010 |
| Two 10/100/1000bT Ethernet<br>One RS232 Serial<br>One RS232 / RS485 Serial<br>Bluetooth | LTE Cat-4 / UMTS / GSM EDGE<br>(Telit LE910C4-WWXD) | T6100D1B1D200010 |
| | LTE Cat-M1 / Cat-NB2<br>(Telit ME310G1-W2) | T6100D2B1D200010 |

## 3.3 Local Connections

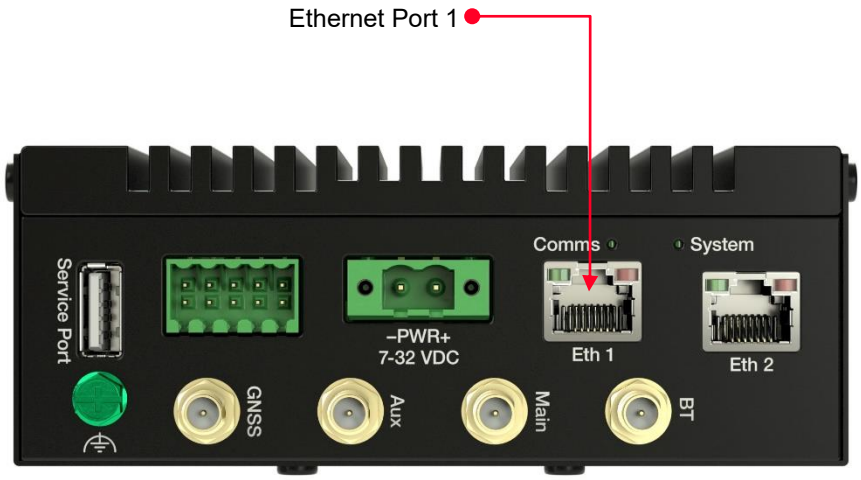
### 3.3.1 Ethernet port 1

Ethernet port 1 is available on all TRO610 variants as an RJ45 port supporting 10/100/1000BASE-T IEEE 802.3.

Speed and duplex mode are automatically negotiated. LEDs indicate link status and activity.

The RJ45 Ethernet port neither accepts nor delivers Power over Ethernet.

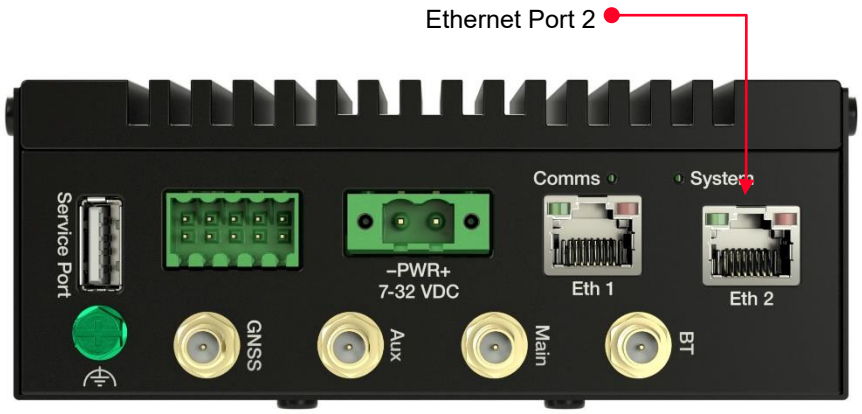
Note: Ethernet ports in TRO610 are routed (and not running in switch mode) therefore putting a high traffic may impact the general router performance.




### 3.3.2 Ethernet port 2 (in expanded models only)

Ethernet Port 2 has the same characteristics as Ethernet Port 1.

Note: either of the Ethernet ports can be used as a rescue interface, that allows a local laptop connected over RJ45 cable to access the router web interface (Tropos Configuration Utility).




### 3.3.3 Serial port 1

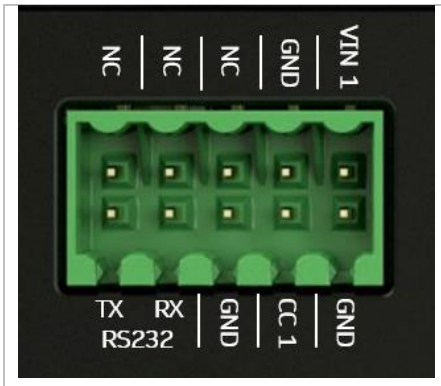
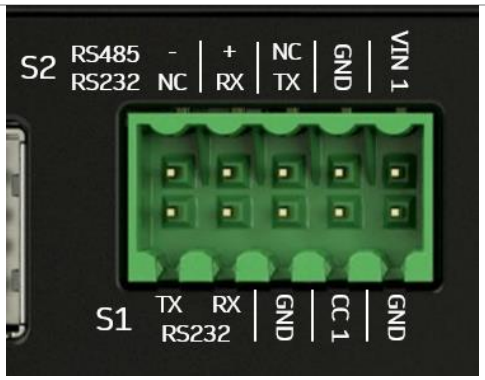
Serial port 1 is available on all variants. It is implemented on the …

| Parameter | Value | Comments |
|---|---|---|
| Serial port speeds | 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 bps | |
| Parameters | 7 or 8 bits data, Odd/Even/No parity | |
| RS-232 port characteristics | 3-wire interface: TX, RX and GND connection | Same characteristics for second RS-232 (option in expanded version) |
| RS-485 port characteristics | 3-wire interface, +, - and GND connection | In expanded version only, as Serial port 2. |

### 3.3.4 Serial port 2 (in expanded models only)

Serial port 2 has the same characteristics as Serial Port 1 and additionally it can support RS-485

| Serial Port(s) pins layout |
|---|

| | |
|---|---|
|  |  |
| In D1/D2 base models:<br>- single RS232 port<br>- single voltage input port (see below)<br>- single contact closure port (see below) | In D1/D2 expanded models:<br>- 2 x RS232 ports or RS232 + RS485<br>- single voltage input port (see below)<br>- single contact closure port (see below) |

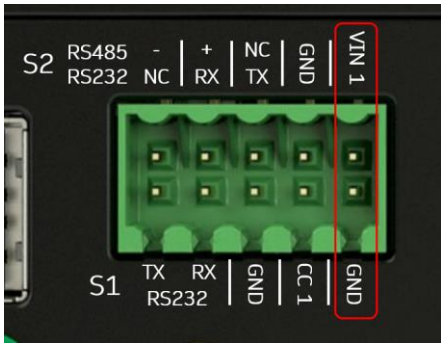
**Note:** NC pin stands for Not Connected and shall not be used.

### 3.3.5 Bluetooth (expanded models only)

Expanded model comes already with a dedicated BT antenna connector but the feature delivery is part of the future product roadmap). Enabling the feature will be through a software update (when available).

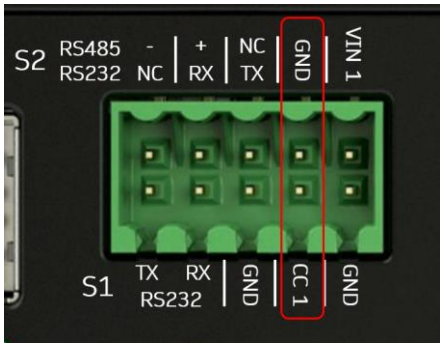
### 3.3.6 Analog and digital inputs

TRO610 comes equipped with battery voltage monitor input and contact closure input.




One battery voltage monitor input:

- Input voltage range of 1-50V DC to common ground, with a resolution of 0.1V
- Configurable voltage reporting interval (in range of 0 to 60 minutes with 1 minute step)
- Configurable critical voltage threshold




Contact closure input:

- Input open (0V DC) or closed (5V DC) to common ground

- Configurable reporting for transitions

Note: Information from analog and digital inputs is delivered by SNMP traps (e.g. to Supros network management solution).

Please note the voltage monitor or contact closure measure the voltage vs the common ground (it's not galvanically isolated).

### 3.3.7 Service port (USB)

TRO610 is equipped with a USB A (version 2.0) service port.

Note: this port is for service purposes only and currently does not support any other kind of communication.

## 3.4 RF Connectors for antennas (GNSS/BT/Cellular modem)

| **Connector [distance*]** | **D1, Base** | **D1, Expanded** | **D2, Base** | **D2, Expanded** |
|---|---|---|---|---|
| **Cellular capabilities** | 2G/3G/4G Cat-4 | | Cat-M1 / Cat-NB2 | |
| **Connectors layout** |  |  |  |  |
| **GNSS [26]** | female SMA | female SMA | female SMA | female SMA |
| **Cellular Aux/Diversity [48]** | female SMA | female SMA | - | - |
| **Cellular Main [68]** | female SMA | female SMA | female SMA | female SMA |
| **BT [88]** | - | female RP-SMA | - | female RP-SMA |

*Distance in [mm] as measured from the left side of the TRO610 body to the connector center

Female SMA comes with outside thread and center hole.

Female RP-SMA (Reversed Polarity SMA) comes with outside thread and center pin.

## 3.5 Cellular connectivity band support

| Model | 3GPP Release and category | Bands supported |
|---|---|---|
| **TRO610 D1** | 3GPP Rel 10, LTE Cat-4 | B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B19, B20, B26, B28<br>B8 with Anterix support |
| | UMTS | B1, B2, B4, B5, B8, B19 |
| | GSM/EDGE | B2, B3, B5, B8 |
| **TRO610 D2** | 3GPP Rel 14, LTE Cat-M1/Cat-NB2 | B1, B3, B8, B20, B28, B31, B72, B87 |

Model D1 works with Power Class 3 (200 mW, 23dBm).

Model D2 (narrowband/IoT) works at 21dBm, Power Class 5 (in B1, B3, B8, B20, B28), 26dBm (as Cat-M1 in B31, B72), 23dBM (as NB-IoT in B31, B72) and 23dBm (in B87).

### 3.5.1 Dual SIM slots

TRO610 is equipped with two SIM slots (3FF, micro-SIM) as the router supports dual-sim configuration for the cellular link:

- SIM 1 (upper slot as seen from the right side of the router) is corresponding to SIM 1 as seen in Tropos Configuration Utility
- SIM 2 (lower slot as seen from the right side of the router) is corresponding to SIM 2 as seen in Tropos Configuration Utility


It is possible to setup prioritization of these physical slots in TCU:

- SIM 1 over SIM 2
- SIM 2 over SIM 1
- No priority (use the SIM of the first working network).

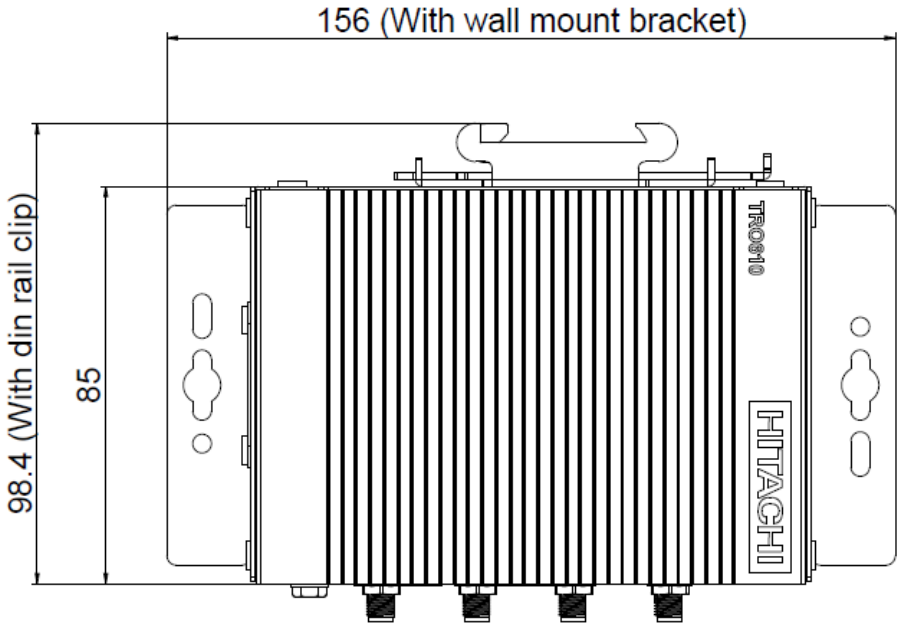
## 3.6 Physical characteristics

### 3.6.1 Weights and dimensions

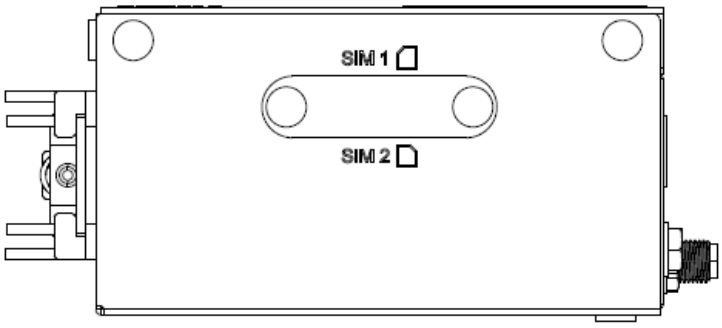
Dimensions table:

| Version | Options | Weight [g] | Width [mm] | Height [mm] | Depth [mm] |
|---|---|---|---|---|---|
| D1 | Base | 488 | 120 | 46<br>47<br>(with wall mount bracket) | 84<br>(w/o antenna sockets)<br>92<br>(with antenna sockets)<br>98.4 (w/o antenna sockets, but with DIN mount clip)<br>107 (/w antenna sockets and DIN mount clip) |
| D1 | Base, DIN rail | 528 | | | |
| D1 | Expanded | 498 | | | |
| D1 | Expanded, DIN rail | 538 | | | |
| D2 | Base | 480 | | | |
| D2 | Base, DIN rail | 520 | | | |
| D2 | Expanded | 500 | | | |
| D2 | Expanded, DIN rail | 540 | | | |

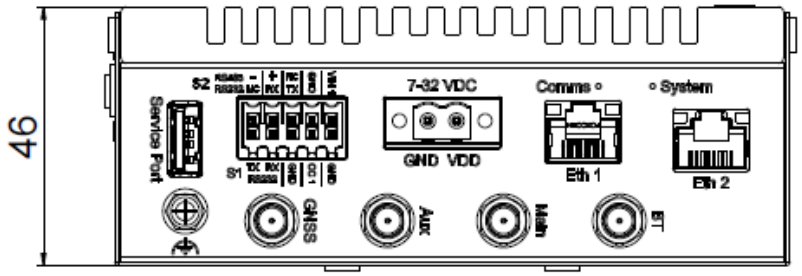
Top view dimensions (with wall mount and DIN rail brackets):



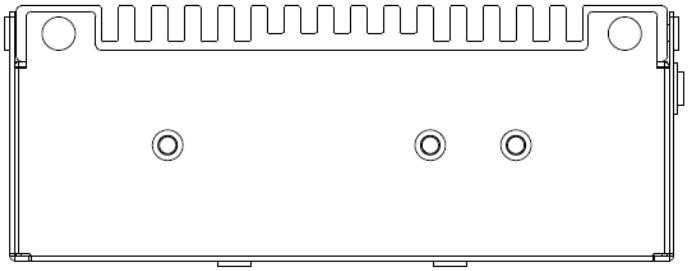

Left side view with SIM slots placement:




Front view with ports and connectors positions:




Back view with DIN rail clip mounting holes:



### 3.6.2 Environmental Characteristics

- Operating temperature range: -40°C to 70°C / -40°F to 158°F
- Storage temperature range: -40°C to 85°C / -40°F to 185°F
- IP30 rated enclosure: UL579/IEC 60529
- Shock & vibration: IEC 61373 (for rail rolling stock equipment – shock and vibration tests) for Category 1, Class B, Location F (components mounted into subassemblies which are in turn mounted into a cubicle which is in turn fixed to the car body).

- Up to 95% relative humidity (non-condensing) with a max temperature of 70°C

### 3.6.3 Electromagnetic characteristics

Conformance with FCC (Part 15 Subpart B) and IC (ICES-003) – D1 model only.

Conformance with CE requirements (D1 and D2) for:

- Safety (EN/IEC 62368-1)
- EMC (Directive 2014/30/EU)
- Radio Equipment Directive (RED) 2014/53/EU
- Low Voltage Directive (LVD) 2014/35/EU

Conformance with communication networking devices in electric power stations:

- IEEE 1613
- EN 61850 (environmental part)

### 3.6.4 Material characteristics

RoHS3 compliance (2015/863/EU)

WEEE compliance (2012/19/EU)

### 3.6.5 Power supply

Input voltage range: 7-32 Voltage DC

Note: TRO610 comes with a separate battery voltage monitor input (1-50 VDC).

Following table lists typical power consumption of TRO610 working in different modes:

| TRO610 model | Idle | Typical | High | Max (bootup) |
|---|---|---|---|---|
| **Cellular only models (Base)** | 1.5 W | 2.2 W | 3.5 W | 4.6 W |
| **Cellular + BT models (Expanded)** | 1.5 W | 2.3 W | 3.7 W | 4.7 W |

Note: TRO610 comes with a common ground of serial ports/IO ports. This should be taken into account when installing the router with a DC battery.

### 3.6.6 Grounding

TRO610 provides a grounding lug on a front panel. For more information about proper grounding of the router please see the chapter about installation.

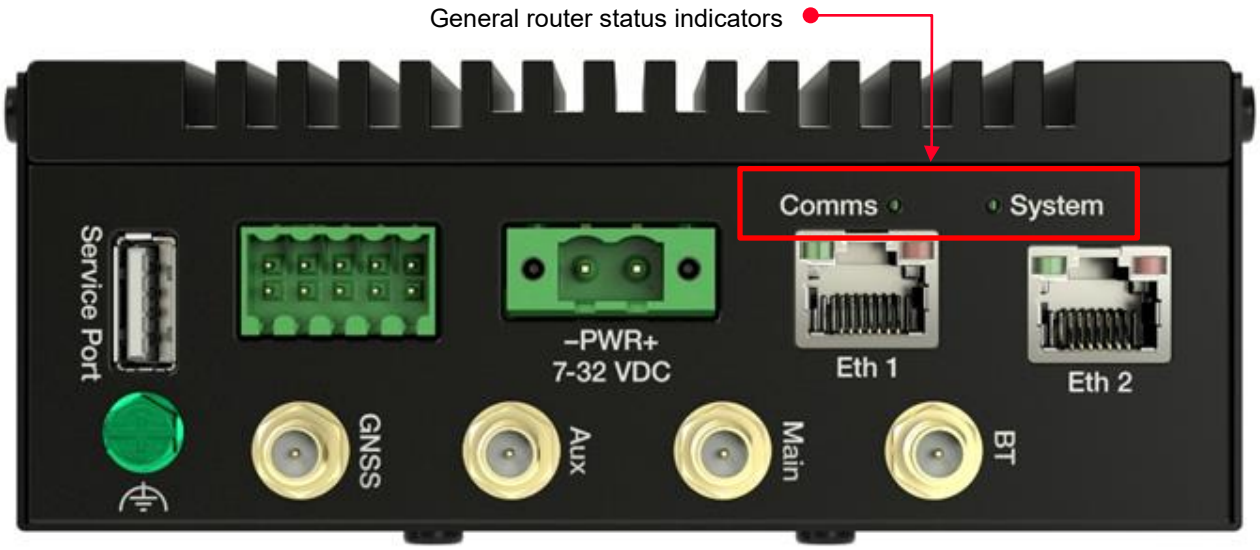
### 3.6.7 Indicators

#### 3.6.7.1 General Indicators

TRO610 router is equipped with two general status indicators:

- Comms – status of the WAN cellular link

- System – general status of the router




| LED Label | Color | Status | Description |
|---|---|---|---|
| System | RED | Powering on | Boot sequence in progress |
| System | GREEN | Up & running | Boot sequence completed. TRO610 is operational |
| Comms | GREEN (blinking) | Cellular network unattached | Searching for cellular network |
| Comms | GREEN (solid) | Cellular network attached | Attached to cellular network |

### 3.6.7.2 Ethernet Port Indicators

TRO610 provides port status (standard LED form) indicators for the following Ethernet ports:

- Eth1 (available in all TRO610 variants)
- Eth2 (available in expanded models only)

| Eth Indicator | Color | Status/speed | Description |
|---|---|---|---|
| Left | Amber (blinking) | Link established and network activity | |
| Left | Amber | Link established but no network activity (idle) | |
| Left | Off | No link established | |
| Right | Green | 1000Mbps | |
| Right | Orange | 100Mbps | |

| | | | |
|---|---|---|---|
| Right | Off | 10Mbps | Up to 10Mbps (if Left is Green/Flashing) or no transfer (if Left is off). |

## 3.7 Functions overview

### 3.7.1 First-time access

**Prepare for cellular connection (optional)**

Locate the SIM Slot cover plate on the side of the TRO610. Remove the cover plate using a Phillips (cross-head) screw driver.

Insert a cellular SIM into the SIM slot 1 located at the side of the router. A second SIM can also be inserted into SIM slot 2. Re-attach the SIM cover plate.

Attach at least one appropriate cellular antenna to the SMA jack marked “Main”. Antennas are not included with the router.

**Connect to the power supply**

NOTE: The installer must be a trained technical professional.

Connect the TRO610’s power supply connector block to a DC power supply. The power supply should provide at least 20 Watts with a voltage between 7 VDC and 32 VDC. Turn on power.

The System LED should indicate that the router is now receiving power (red while it’s booting, green when it completes the boot process)

**Access the configuration utility**

Connect a Cat-5 or better Ethernet cable with RJ45 connectors between the computer’s Ethernet interface and Ethernet Port 1 on the TRO610. The Ethernet inter-face on the computer should be configured to accept a DHCP assigned IPv4 address and Default Gateway from the TRO610.

Open a browser (IE, Chrome, or Safari) and type in the following URL to access the TRO610’s Configuration Utility:

https://192.168.167.166

The browser will warn for invalid certificate authority – this is expected. Proceed past the warning.

At the login prompt, type in the username and default password (as specified in a quick start guide).

NOTE: The default password must be changed before the configuration utility can be accessed.

Configure the cellular connection

NOTE: In some situations, no additional configuration is required, and the “default” APN option will allow the SIM to attach to the cellular network to acquire an IP address.

A. Using the configuration utility, navigate to Configuration -> Interfaces -> Cellular.

If a specific APN is required for network connectivity, configure the appropriate APNs for the respective SIM card:

Add a profile to the profile list with the specific APN. If needed, add type, network mode and authentication information.

Click the “Store” button at the upper right corner. Commit the added pro-file using the “Commit” menu item from the top bar. Once the commit is done – you can pick the added profile in the SIM configuration.

B. Wait a couple of minutes and confirm that the cellular interface has received an IP address from the cellular network and the Comms LED is lit (with green).

NOTE: if there are some connectivity issues at this stage – try mounting the antenna to the connector marked Main.

The router’s dashboard will also show relevant information regarding the cellular connection such as the status of the connection and the acquired IP address. You may notice some UL/DL network traffic statistics getting refreshed.

C. In the case of a dual SIM configuration, where both SIM slots have a SIM inserted, check the IP address assignment, APN configuration, and connectivity for each SIM to establish that they are operating correctly and can ac-quire an IP address.

NOTE: with SIM-pin enabled both SIMs has to be unlocked to establish cellular connectivity.

D. Once the cellular interface has been assigned an IP address, verify network connectivity to a well-known Internet address such as 8.8.8.8 or to a corporate IP address that is known to be reachable from the TRO610 router.

This can be done via: Administration -> Troubleshooting -> Diagnostics -> Ping (with a sample IP: 8.8.8.8, ping count:10, packet size:64, timeout:15, source address can be left blank). It can take up to a minute to see the output report.

Once the IP address is assigned and connectivity has been established, proceed with additional router configuration as required.

### 3.7.2 Location/positioning

TRO610 comes with GNSS receiver, that supports following location technologies:

- GPS (1575.42MHz)
- GLONASS (1602MHz)
- Beidou (1561.098MHz)
- Galileo (1575.42MHz)
- QZSS (1575.42MHz)

Once enabled, with GNSS antenna properly integrated, TRO610 shall obtain the position in up to 32s (from a cold start). Location reporting accuracy is <2m (for 50% of cases) and <5m (for 90% of cases).

### 3.7.3 TRO610 processing environment

• Main CPU: Single core operating at 600 MHz, 32-bit ARM-processor

• Operating Memory: 1 GB DRAM

• Storage: 4 GB Flash

## 3.8 Accessories and antenna recommendations

### 3.8.1 Serial and power supply connector blocks

TRO610 comes equipped with two connector blocks:

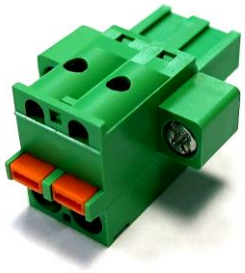


*Figure 2 TRO610 power supply VDC connector block (or equivalent)*

*Figure 3 TRO610 serial 10-pin connector block (compression based) (or equivalent)*

### 3.8.2 Power Supply

The TRO610 requires a 7-32 VDC power supply, with at least 20W of power.

### 3.8.3 Antenna recommendations

#### 3.8.3.1 Cellular antenna

The requirement is to use the cellular antenna with gain no bigger than 3dBi.

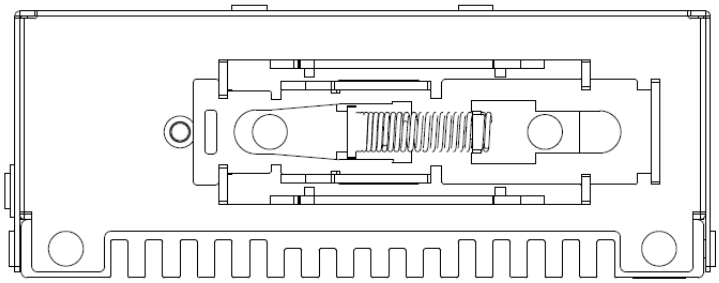
#### 3.8.3.2 Bluetooth antenna

Bluetooth antenna is applicable only to advanced models (that come equipped with Bluetooth capabilities) The requirement is to use the Bluetooth antenna with gain no bigger than 2.2dBi. For standard compliance purposes a PIFA antenna was used for Bluetooth.

### 3.8.4 Router Mounting kits

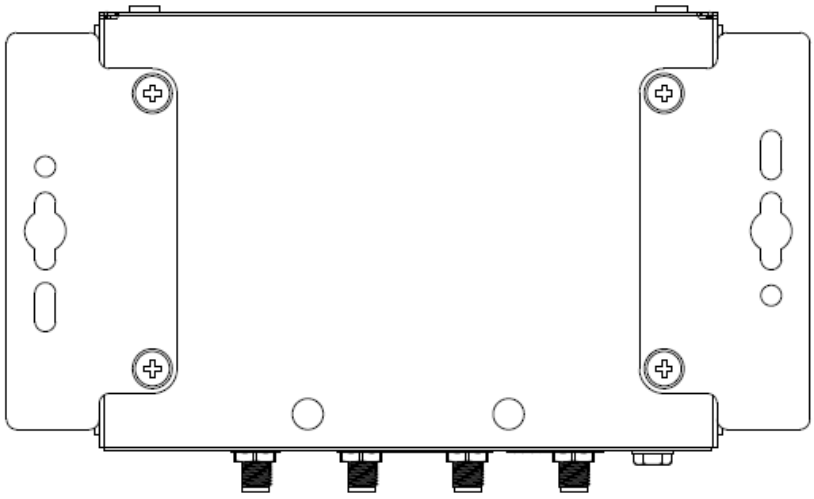
**DIN Rail clip**

All the necessary parts to mount the TRO610 on a DIN rail are already included in a basic TRO610 package.



**Wall mount brackets (T61-WALLMTKIT1)**

The kit comes with two wall mount brackets (mounted to TRO610 from the bottom – as on the diagram below) and for enclosure screws.



- **Installing the wall mount ：**

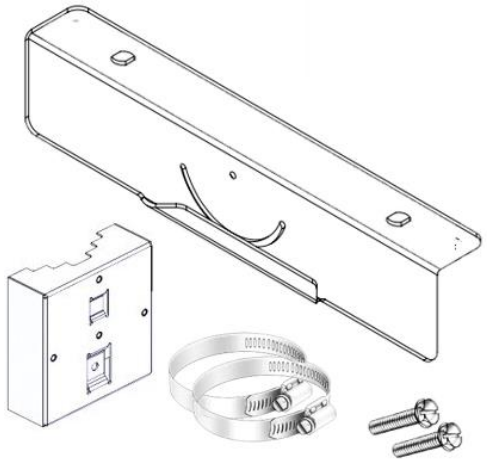
**Please align the wall mount brackets with screw holes and secure the wall mount brackets to the device using the screws.**

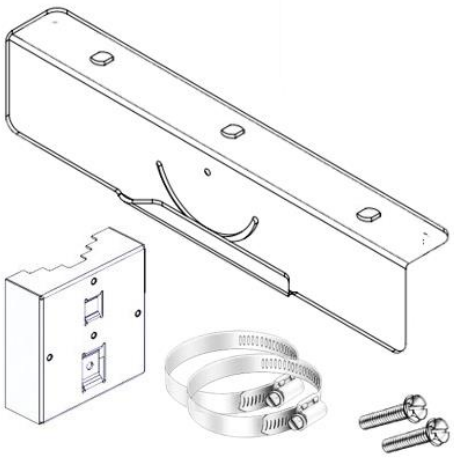
- Wall Mount Screw and dimension：

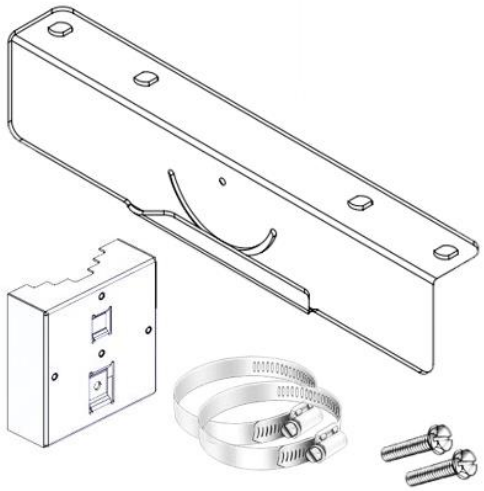
**Length： 7.00 ± 0.10 mm**

**Diameter：7.70 ± 0.20 mm**

### 3.8.5 Remote antenna mounting kits

| Remote mount 2-antenna bracket kit (MBKIT004) | |
|---|---|
| The kit contains:<br>• One Bracket for 2 Antennas (152255-00)<br>• One Pole Mount Cleat (151093-01)<br>• Two Hose Clamps 1 7/8 to 5 Inch (100255-01)<br>• Two Hex Slotted Machine Screws (100231-00) |  |

| Remote Mount 3-Antenna Bracket Kit (MBKIT005) | |
|---|---|
| The kit contains:<br>• One Bracket, 3 Antennas (153200-00)<br>• One Pole Mount Cleat (151093-01)<br>• Two Hose Clamps 1 7/8 to 5 Inch (100255-01)<br>• Two Hex Slotted Machine Screws (100231-00) |  |

| Remote Mount 4-Antenna Bracket Kit (MBKIT003) | |
|---|---|
| The kit contains:<br>• One Bracket, 4 Antennas (152944-00)<br>• One Pole Mount Cleat (151093-01)<br>• Two Hose Clamps 1 7/8 to 5 Inch (100255-01)<br>• Two Hex Slotted Machine Screws (100231-00) |  |

# 4 Installation & Maintenance

## 4.1 Mounting

TRO610 supports two recommended methods of mounting:

- On a DIN rail
- Wall mount

#### 4.1.1.1 DIN rail mounting

Accessory for the DIN rail mounting is included in the package.

#### 4.1.1.2 Wall mount (option)

See Accessories section below (T61-WALLMTKIT1).

#### 4.1.1.3 Remote antenna mounting

Sets of accessories needed:

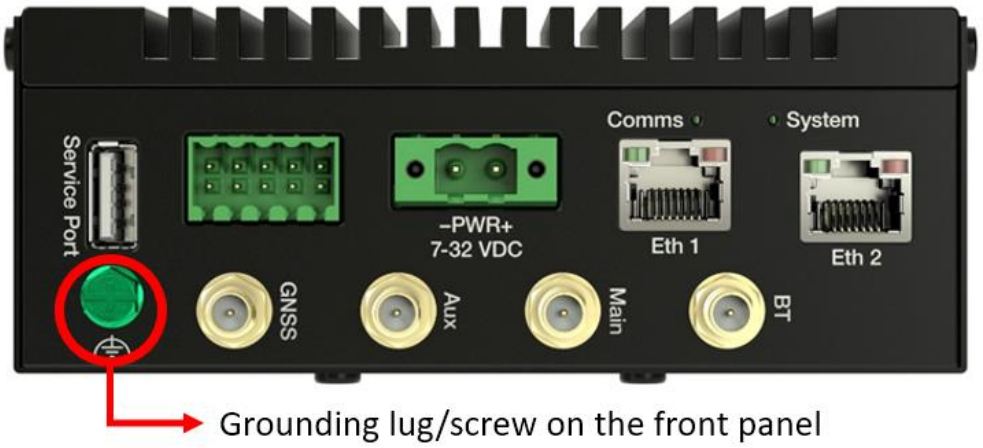
- RF Pigtails
- RF surge arrestors/protectors
- RF cables (LMR N-Male to N-Male or N-Male to SMA/RP-SMA, depending on whether RF pigtails were used)
- Remote antenna mounting kits
- Bulkhead adapters

| Accessories/Model | D1, basic | D1, expanded | D2, basic | D2, expanded |
|---|---|---|---|---|
| LTE Antennas | 2x | 2x | 1x | 1x |
| GPS Antennas | 1x | 1x | 1x | 1x |
| Bluetooth Antennas | - | 1x | - | 1x |
| RF Pigtails | 3x | 4x | 2x | 3x |
| RF surge arrestors | 3x | 4x | 2x | 3x |
| RF cables | 3x | 4x | 2x | 3x |
| Remote antenna mounting kits | **MBKIT004** | **MBKIT005** | **MBKIT004** | **MBKIT004** |
| Bulkhead adapters | 2x | 3x | 1x | 2x |

## 4.2 Grounding the Router

You must ground the DC-powered TRO610 before connecting it to power. Failing to ground the router properly might result in shock hazard.

Use a dedicated ground wire: TRO610 with a ground lug should be connected to a dedicated ground wire, separate from any other wires. This ensures that the ground connection is reliable and not compromised by other electrical signals.




Grounding lug/screw is located on the left side of the front panel of the TRO610 router, next to the service port.

The ground wire shall be selected in accordance with local electrical safety standards, like:

- For NEC-compliant grounding, use size 16 AWG (1.5mm2) or larger copper wire and a ring terminal with an inner diameter of 1/4 in. (6 to 7mm).

- For EN/IEC 60950-compliant grounding, use size 18 AWG (1 mm2) or larger copper wire.

## 4.3 Servicing the TRO610 router

The TRO610 router has no user serviceable parts. For any service-related issues contact Hitachi Energy or your partner support.

## 4.4 SIM card(s) swap

Note: hot SIM card swap is not supported by TRO610. It is recommended to plan the SIM swap operation in maintenance windows (when the router can be disabled), not to disrupt the service in an unplanned way.

## 4.5 Rescue Port/Recovery

A local LAN (via one of the Ethernet ports) connection can be used for a recovery purposes (like the access to local HMI).

Connect a Cat-5 or better Ethernet cable with RJ45 connectors between the computer's (laptop, etc.) Ethernet interface and Ethernet Port 1 on the TRO610. The Ethernet interface on the computer should be configured to accept a DHCP assigned IPv4 address and Default Gateway from the TRO610.

The browser may warn for invalid certificate authority – this is expected. Proceed past the warning and provide the login username and password (either default or already a customized one) for the admin user.

## 4.6 Power cycle during firmware upgrade or major configuration profile change

Try to avoid the power cycle (disconnecting router from the power supply) while performing a firmware upgrade (either via a local HMI – Tropos Configuration Utility or OTA from Supros) or a major configuration profile change.

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