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# IOTACOMM DUAL-BAND GATEWAY

## User Guide

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# 1 Product Description

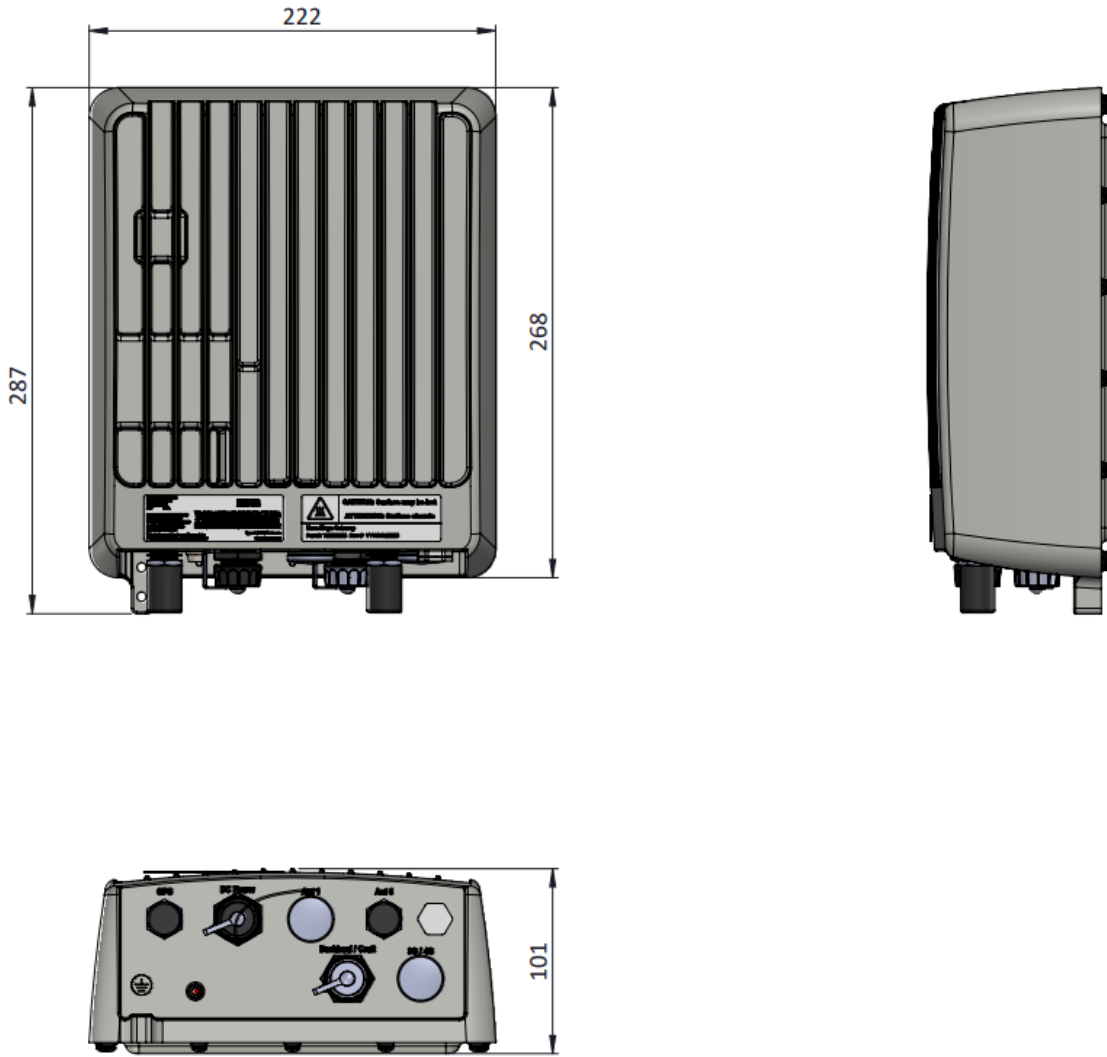
## 1.1 Overview

The IotaComm Dual-Band Gateway is a custom gateway that addresses the request from IotaComm for a solution to implement a Low Power Wide Area Network (LPWAN) using licensed 800 MHz Private Land Mobile Radio (PLMR) band spectrum. Additionally, it supports the full range of US915 LoRa WAN channels. The Kona platform is designed to support a multitude of deployment configurations in an outdoor environment. The hardware architecture supports two antennas, a GPS antenna, direct DC input power or Power over Ethernet (PoE), and backhaul options including copper Ethernet and 3G/4G wireless. Table 1 presents the currently available IotaComm Dual-Band Gateway models.

**Table 1: IotaComm Dual-Band Gateway Models**

Product Code	Region	Ch. Plan	Description	GPS Ant.	Direct DC Power	Copper Eth.	3G/4G Ant.	LoRa Ant.
T0007754	NA	US915 + IOTA Band	IOTA 64 Module, 2x LoRa, OPTION #3	1	1	1	0	2
T0007752	NA	US915 + IOTA Band	IOTA 64 Module, 2x LoRa, 3G/4G, OPTION #4	1	1	1	1	2

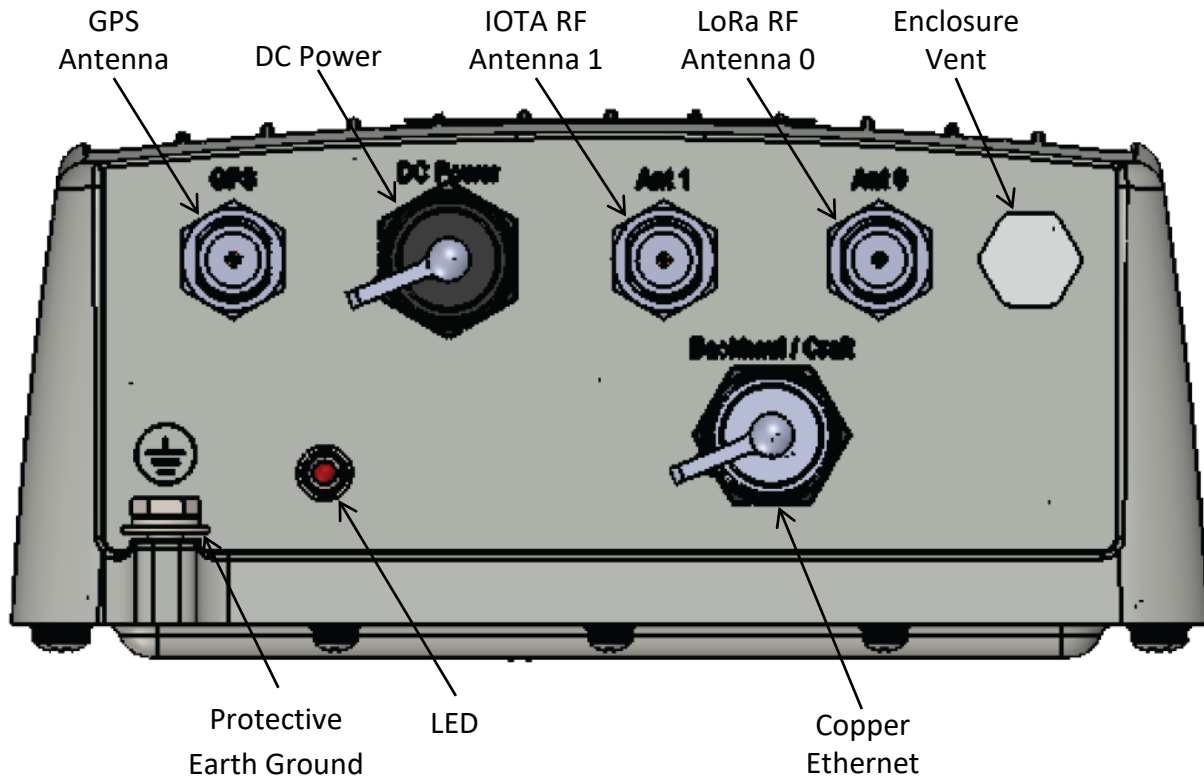
Figure 1 illustrates the common Gateway external form-factor. The differences between the options are limited to the bulkhead field.



**Figure 1: IotaComm Dual-Band Gateway Common Dimensions**

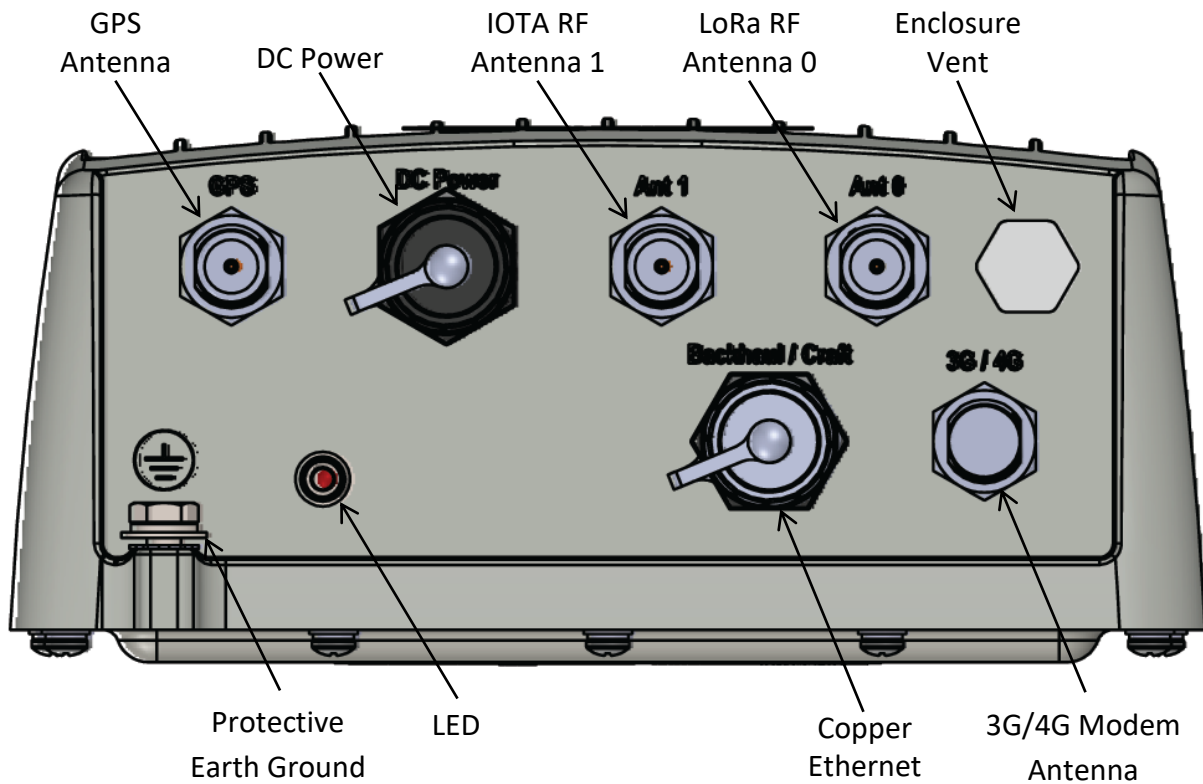
## 1.2 Bulkhead Layout

The IotaComm Dual-Band Gateway bulkhead component fields are detailed in the following figures.



**Figure 2: IotaComm Dual-Band Gateway Option #3 Bulkhead Field**





**Figure 3: IotaComm Dual-Band Gateway Option #4 Bulkhead Field**

All Kona Gateway module interconnect is located on the bottom facing bulkhead. The RF connectors are water proof while un-mated but all other connectors must be terminated with mating connectors or covered with the supplied protective cap when not in use in order to be water tight. Connector types and their mating connectors are listed in Table 2.

**Table 2: IotaComm Dual-Band Gateway Interface Connector Types**

<b>Interface</b>	<b>Connector Type</b>	<b>Mating Connector</b>
LoRa Antenna	N-Type female	Industry standard N-Type male
IOTA Antenna	N-Type female	Industry standard N-Type male
Cellular Antenna	N-Type female	Industry standard N-Type male
GPS Antenna	N-Type female	Industry standard N-Type male
Copper Ethernet (CPC connector)	Circular plastic threaded, RJ-45	Shenzhen Chogori Technology Co., Ltd. Approved mating connector (p/n 33000111-02 or equivalent)
DC Power Input (CPC connector)	Circular plastic threaded, 2 contact, DC power	Shenzhen Chogori Technology Co., Ltd. Approved mating connector (p/n 23002211-02 or equivalent)
Earth Ground	1/4 - 20 UNC double hole	Industry standard 2-hole lug, 1/4 x 0.75" spacing

### 1.3 Specifications

The IotaComm Dual-Band Gateway specifications are listed in Table 3.

**Table 3: IotaComm Dual-Band Gateway Specifications**

<b>Attribute</b>	<b>Specification</b>
Dimensions	222.2mm (8.7") wide x 101mm (4.0") deep x 287.3mm (11.3") tall
Weight	5.1 kg (11.3 lbs)
Operating Temperature	-40°C to 60°C (-40°F to 140°F) at sea level Including solar loading.
Relative Humidity	10% to 100%
Operating Altitude	-60 m to 4,000 m (-197 ft to 13,123 ft)
Power Input, Direct DC	48 VDC nominal, 37 to 57 VDC operating range (after 42 V maximum start-up threshold). Positive or negative ground referenced feed. SELV & LPS source required. Maximum 10A input overcurrent protection.
Power Input, PoE	IEEE 802.3bt Class 7 at over all four pairs (Mode A + Mode B) required
Power Consumption	35 W maximum
Weather Tightness	UL Type 6 (IP-67)
Regulatory Compliance	CSA/UL/EN 62368-1, CSA/UL/EN 60950-1, CSA/UL/EN 60950-22CE FCC Pt. 15 Class B
Surge Protection	All interfaces are protected to primary levels except for the 3G/4G modem antenna port which supports local antenna mounting only or requires an external surge suppressor.

## 2 Installation

### 2.1 Safety Precautions

- Installation, operation, and maintenance of the IotaComm Dual-Band Gateway must only be performed by a professionally trained service technician who is aware of all hazards involved.
- The IotaComm Dual-Band Gateway must be installed in a restricted access location (such that touching of the Gateway by non-service persons is not likely).
- The IotaComm Dual-Band Gateway may become hot to the touch during normal operation at elevated ambient temperatures. The surface temperature of the Gateway may reach 90°C.
- The IotaComm Dual-Band Gateway has no internal field serviceable parts. The Gateway module must only be opened by an approved TEKTELIC service center.
- All installation practices must be in accordance with the local and national electrical codes.
- Do not work on the system during periods of lightning activity.
- The IotaComm Dual-Band Gateway is considered permanently connected equipment. The Protective Earth Ground connection (that is, the two-hole lug to chassis ground) is always required.
- Ensure the IotaComm Dual-Band Gateway Protective Earth Ground connection is properly terminated prior to the connection of any other interfaces.
- The IotaComm Dual-Band Gateway contains primary lightning surge suppression on the Direct DC power port, the Copper Ethernet port, the GPS antenna port and the LoRa RF antenna ports. The primary lightning protectors have the ability to bridge the interface isolation boundary during over-voltages. Ensure that the Protective Earth Ground connection is always in place.
- Ensure that the IotaComm Dual-Band Gateway, its antennas and supporting structures are properly secured to eliminate any physical hazard to people or property. The Gateway must be securely mounted according to the mounting instructions prior to any cable connection and operation.
- The IotaComm Dual-Band Gateway does not contain a power supply disconnection device; a readily accessible disconnection device must be incorporated external to the IotaComm Dual-Band Gateway.

- The direct DC powered IotaComm Dual-Band Gateway shall be supplied through an input overcurrent protection device rated not more than 10 A. The overcurrent protection must have the appropriate current interrupt capacity for the power source and must be incorporated into the non-earthed conductor(s) of the IotaComm Dual-Band Gateway DC supply.
- For the direct DC power feed option, the DC positive pin must be at positive potential relative to the DC negative pin. If the polarity is reversed, the unit will not sustain damage but will not operate until the connection polarity is corrected.
- Although the IotaComm Dual-Band Gateway can be powered through either a direct DC input or through power over Ethernet (PoE), simultaneous application of power to both inputs may result in unexpected operation and shall be avoided.
- The IotaComm Dual-Band Gateway power source must meet SELV requirements.

## 2.2 Unpacking and Inspection

The following should be considered during the unpacking of a new IotaComm Dual-Band Gateway.

1. Inspect the shipping carton and report any significant damage to TEKTELIC.
2. Unpacking should be conducted in a clean and dry location when possible.
3. Do not discard the shipping box or foam inserts as they will be required if a unit is returned for repair or re-configuration.

## 2.3 Required Equipment for Installation

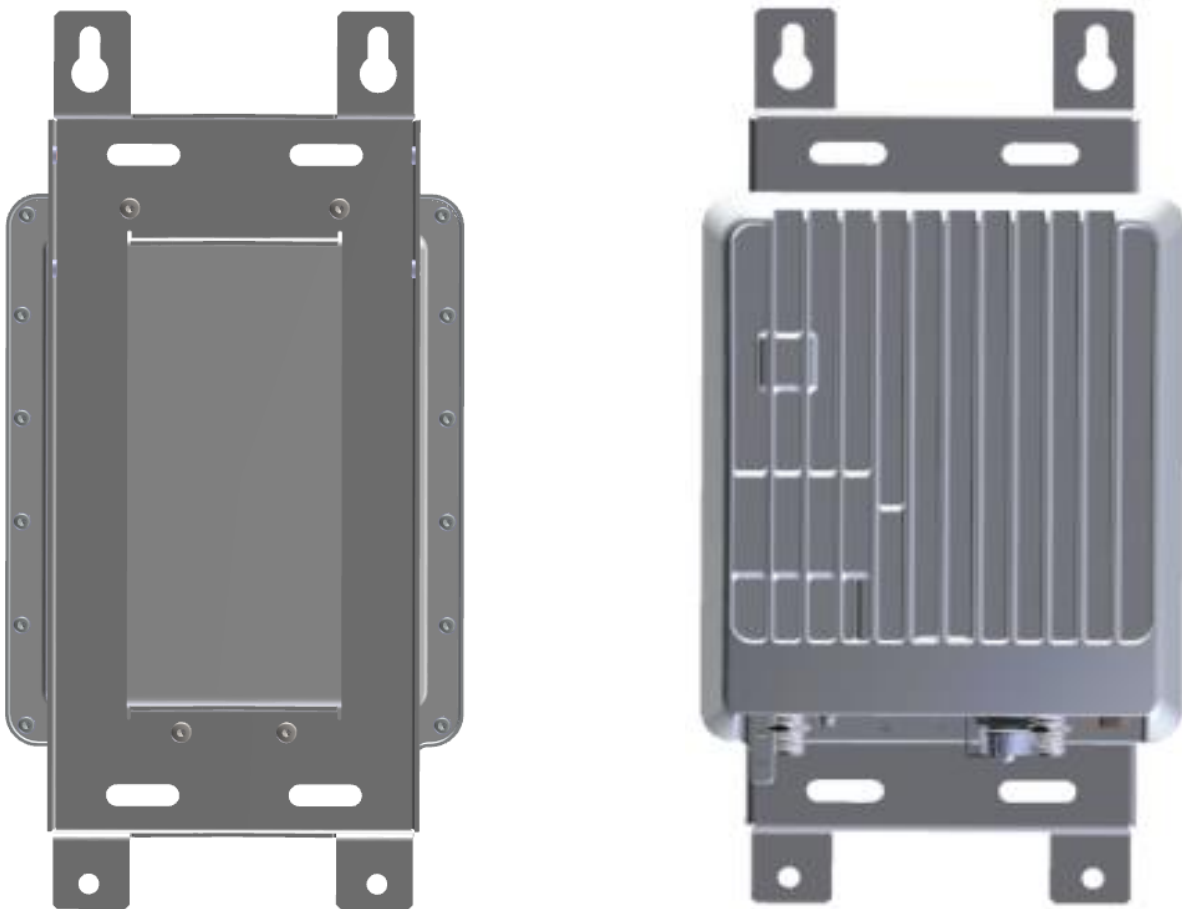
The following tools are required to install the IotaComm Dual-Band Gateway module:

1. A 6 point metric socket set and torque wrench drive.
2. Anti-oxidant compound (NO-OX-ID, Penetrox, Noalox, Ox-Gard or equivalent).
3. A small wire brush.
4. A clean cloth.
5. Weatherproofing tape kit for the RF connectors (Scotch Wireless Weatherproofing Kit, WK-101 recommended).
6. Appropriately sized pipe clamps for pole mounting or appropriate screws or bolts (four sized M8) with any required anchors according to the wall construction for wall mounting.

## 2.4 IotaComm Dual-Band Gateway Mounting

IotaComm Dual-Band Gateway is designed to be mounted to a vertical pole or wall using a mounting bracket. The mounting bracket is a single part that bolts to the back surface of the Gateway using supplied hardware (four M6x1.0 - 14 mm bolts with flat and star lock washers) as illustrated in Figure 4. The Gateway module must be oriented with the connector bulkhead facing down, towards earth.

Ensure that the structure to which the Gateway is being mounted is secure and able to support a dead load of at least 136 kg (300 lbs). The area below must be free of any obstructions to cable ingress.



**Figure 4: Kona Module with Mounting Bracket**

The IotaComm Dual-Band Gateway wall mounting procedure is as follows:

1. Bolt the wall mounting bracket to the Gateway module using the supplied bolts and washers.

2. Install 2 site supplied M8 bolts into the wall at 139.7 mm (5.5") center spacing, leaving the bolt heads protruding with a 2mm gap from the wall surface.
3. Hang the IotaComm Dual-Band Gateway with bracket from the two bolts by inserting the keyhole slots at the top of the bracket onto the 2 bolts and tightening the bolts.
4. Insert and tighten two additional site supplied M8 bolts through the holes at the bottom of the bracket.

The IotaComm Dual-Band Gateway pole mounting procedure is as follows:

1. Bolt the wall mounting bracket to the Gateway module using the supplied bolts and washers.
2. While temporarily supporting the Gateway with bracket, install the two site supplied pipe clamps, one through each of the upper and lower slotted clamp mounting points.

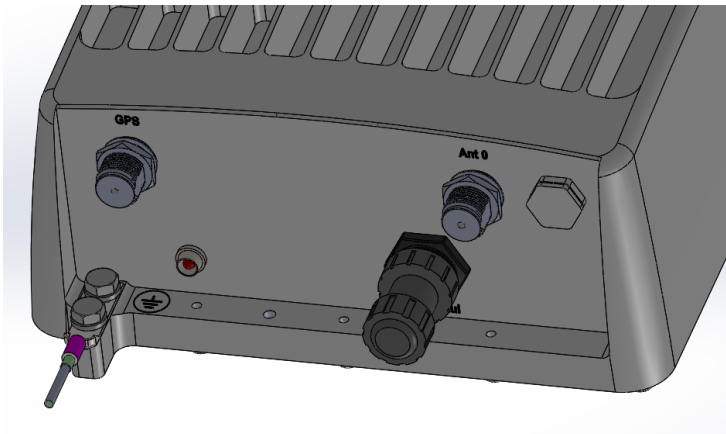
## 2.5 Ground Cable Installation

The IotaComm Dual-Band Gateway is considered Permanently Connected Equipment and requires a permanently connected Protective Earth Ground (PEG) conductor. The Protective Earth Ground connection is made through a 1/4 x 0.75" on center double hole lug to the ground termination point illustrated in Figure 5. The ground cable gauge shall be #10 AWG minimum.

The IotaComm Dual-Band Gateway grounding system shall follow local and national electrical codes. The Protective Earth Ground conductor terminated at the double hole lug point is mandatory and must be the first connection made to the IotaComm Dual-Band Gateway during installation. Proper routing and termination of this cable is key to robust lightning withstand performance; in high susceptibility installations, every effort shall be made to minimize connection inductance and ground bed resistance.

The ground cable installation steps are as follows:

1. Lightly abrade the surface of the casting ground area with a fine wire brush to remove the oxide layer.
2. Use a clean cloth to remove any debris from this surface.
3. Immediately coat the contact surface with a thin layer of anti-oxidant compound.
4. Install the ground cable through its 2-hole lug onto the chassis ground point using the two supplied 1/4 - 20 x 1/2" bolts with flat and star lock washers, torqued to 10.4 Nm (92 in-lbs).



**Figure 5: Chassis Ground Connection**

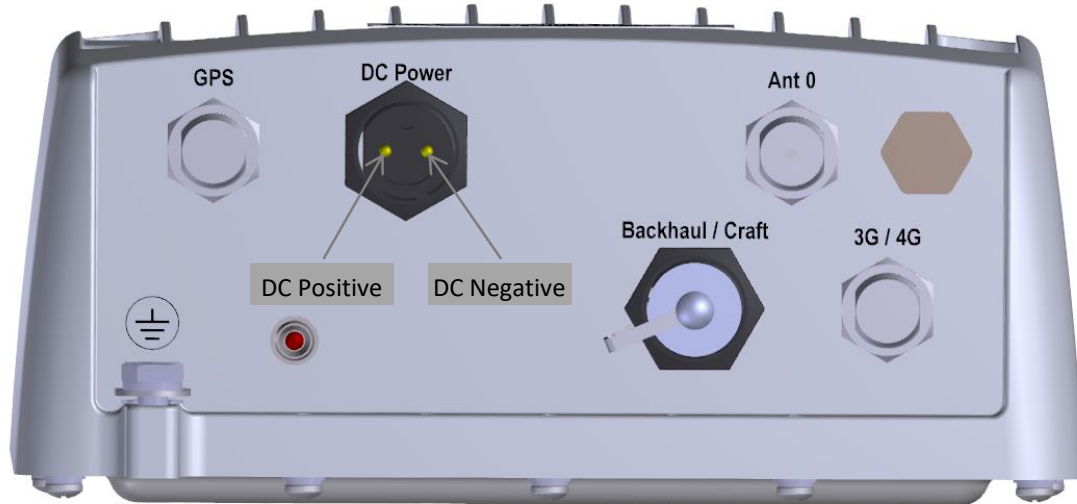
## **2.6 Direct DC Power Cable Installation**

Depending on the model, the IotaComm Dual-Band Gateway direct DC feed may terminate at a dedicated two pin circular plastic connector (CPC), a two pin M12 circular metal connector, or at a hybrid three pin DC with optical connector. In all cases the direct DC power input is isolated from chassis (earth) except for the primary surge suppressors. One lead of the DC power feed is normally earth referenced external to the IotaComm Dual-Band Gateway (usually at the power source by convention).

The DC power cable shall be rated for outdoor application and in accordance with local and national electrical codes.

The CPC DC connector shall be as specified in Table 2 and shall follow the signal polarity identified in Figure 6.





**Figure 6: Direct DC Power CPC Connector Connection Polarity**

## 2.7 RF Cable Installation

The Gateway installation will require connection to a GPS antenna, one or two LoRa RF antennas, and optionally a 3G/4G modem antenna. The RF cables attach to the N-Type connectors on the bottom of the IotaComm Dual-Band Gateway. Torque the connectors to 1.7 to 2.3 Nm (15 to 20 in-lbs). The N-Type connector interface to a cable is not water proof and must be taped to be used outdoors. TEKTELIC recommends taping with Scotch Wireless Weatherproofing Kit, WK-101. Follow the taping procedures outlined by the supplier of this tape system.

Note that the 3G/4G modem antenna port is not surge protected and, accordingly, the antenna must be located with the Gateway module or, if remotely located, an external surge suppressor must be provisioned.

## 2.8 Copper Ethernet Cable Installation

The IotaComm Dual-Band Gateway Ethernet port may be used on a temporary basis for commissioning and maintenance or may be permanently connected for backhaul. When the port is not in use, the weatherproof protective cap must be installed. When the port is permanently connector for backhaul, a proper water-tight mating connector specified in Table 2 must be used.

The Ethernet cable must have minimum 24 AWG conductors and shall be rated for outdoor application according to local and national electrical codes.

## 3 Radio Compliance Statements

### *Federal Communications Commission*

#### **FCC Compliance Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

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

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

#### **RF Exposure Statement**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, this equipment should be installed and operated with minimum distance 96 cm (38 inches) between the antenna and your body during normal operation. Users must follow the specific operating instructions for satisfying RF exposure compliance.

## ISED Canada

### ISED non-interference disclaimer

This device contains licence-exempt and licensed transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt and licensed RSS(s). 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 device complies with the Canadian ICES-003 Class B specifications. CAN ICES-003(B) / NMB-003 (B).

L'émetteur/récepteur exempt de licence et autorisée contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempt de licence et autorisée. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil numérique de la Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

### RF Exposure statement

This equipment complies with ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 140 cm (56 inches) between the radiator and any part of your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'exposition aux radiations ISED CNR-102 établies pour un environnement non contrôlé. Une distance de séparation d'au moins 140 cm doivent être maintenue entre l'antenne de cet appareil et toutes les personnes. Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.

### RSS-Gen Transmit antenna statement

This radio transmitter 22504-T0008765 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio 22504-T0008765 a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Under Innovation, Science and Economic Development regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by ISED. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Innovation, Sciences et Développement économique Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Innovation, Sciences et Développement économique Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Approved Antenna Types:

	Antenna for Ant0 and Ant1 Ports	Antenna for 3G/4G Port
Maximum gain:	6 dBi	2 dBi
Antenna type:	Dipole	Dipole
Radiation pattern:	Omni-Directional	Omni-Directional
Impedance:	50 Ohm	50 Ohm
Connector type:	Integral N-Female	N-J

The 3G/4G modem antenna maximum allowed gain including cable loss shall be in accordance with the following table:

Technology	Band	Frequency (MHz)	Maximum Antenna Gain (dBi)
LTE	2	1850–1910	3.0
	4	1710–1755	6.0
	5	824–849	3.0
	13	777–787	6.0
	17	704–716	6.0
	25	1850–1915	3.0
UMTS	2	1850–1910	3.0
	4	1710–1755	6.0
	5	824–849	3.0
GSM	850	824–849	3.0
	1900	1850–1910	3.0
CDMA	BC0	824–849	3.0
	BC1	1850–1910	3.0
	BC10	817–824	3.0

Le gain maximal admissible de l'antenne du modem 3G / 4G, y compris la perte de câble, doit être conforme au tableau suivant :

Technology	Band	Frequency (MHz)	Gain maximum d'antenne (dBi)
LTE	2	1850–1910	3.0
	4	1710–1755	6.0
	5	824–849	3.0
	13	777–787	6.0
	17	704–716	6.0
	25	1850–1915	3.0
UMTS	2	1850–1910	3.0
	4	1710–1755	6.0
	5	824–849	3.0
GSM	850	824–849	3.0
	1900	1850–1910	3.0
CDMA	BC0	824–849	3.0
	BC1	1850–1910	3.0
	BC10	817–824	3.0