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CT 3600 Reefer
Container
Monitoring
Device

ORBCOMM CT 3600 Reefer Container Monitoring Device User Guide

Contents

ORBCOMM CT 3600 Reefer Container Monitoring Device

Product Information

Specifications

- Model: CT 3600
- Certifications: ISED (Canada), FCC (USA), CE MARK (Europe), RoHS
- Compliance: Directive 2014/53/EU
- Manufacturer: ORBCOMM Inc.
- Version: GJD122-Ecert, Version 01

Product Usage Instructions

Product Overview

The CT 3600 is a versatile device designed for various applications. Refer to Figure 1 for a visual representation of the product.

Compliance

The device has received certifications from ISED (Canada), FCC (USA), and CE MARK (Europe), and complies with RoHS standards.

For detailed information on compliance and certifications, contact your Account Manager or visit the provided link for EU declaration of conformity.

EU Declaration of Conformity

FAQ

Q: Where can I find more information on the RoHS compliance of the CT 3600?

A: The European Union's Directive 2002/95/EEC on Restriction of Hazardous Substances (RoHS) in Electronic and Electrical Equipment can be accessed through the provided link or by contacting ORBCOMM Inc.

CONTACT AND LEGAL INFORMATION

Visit ORBCOMM Online

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PREFACE

Purpose

This guide contains product information about the CT 3600. The intended audiences for this guide include field support personnel, product evaluators, and certified third-party personnel. It is particularly intended for personnel who are responsible for system installation and activation.

Notation

Hardware components and hardware labels in this document might not be exactly as shown and are subject to change without notice.

CAUTION: This safety symbol warns of possible hazards to personnel, equipment, or both. It includes hazards that will or can cause personal injury, property damage, or death if the hazard is not avoided.

Note: A note indicates information with no potential hazard. A note indicates points of interest or provides supplementary information about a feature or task. Bulleted lists highlight information where order or sequence is

not crucial.

Battery Safety Warnings

- CAUTION: DO NOT short circuit or expose the battery to temperatures above the maximum rated temperature.
- CAUTION: Always follow local disposal guidelines to properly dispose of the Lithium-ion battery and the device.
- CAUTION: Store in a cool, well-ventilated area. Elevated temperatures will result in shortened battery life.
- CAUTION: DO NOT throw the internal battery or the device into fire.
- CAUTION: DO NOT replace the battery. Changing the battery without ORBCOMM's permission could violate regulatory conformity.
- CAUTION: If Shipping the device, contact your local shipping carrier for safe shipping guidelines.

PRODUCT OVERVIEW

The CT 3600 (Model Number: CT3600) is a low-cost device capable of tracking, monitoring, and controlling refrigerated containers (reefers) both on land and at sea for total intermodal asset visibility. It pairs information read from the reefer controller with data from onboard sensors such as location and temperature and sends messages over cellular networks The CT 3600 utilizes a rugged enclosure that houses all electronics and power control. External interfaces for power, communication, and antenna are available through rugged external connectors. It is designed to be mounted inside the reefer controller cabinet with cabled antenna mounted to the inside of the reefer door. The device can be powered externally through the main connector or through the internal rechargeable battery. The batteries are charged when power is available from the external connector.

Figure 1: CT 3600

The CT 3600 includes the following features and functionality:

- RS-232 Reefer Communications Port
- Motion detection accelerometer
- Advanced accelerometer for shock, rollover detection, etc.
- Tri-color LED to indicate overall health
- Internal rechargeable battery
- Global cellular module with factory installed SIM card
- GNSS with support for GPS, GLONASS, BeiDou, Galileo, and QZSS
- Connectors for direct integration with reefer controllers
- Magnet switch
- Bluetooth Low Energy (BLE)

- Temperature sensor to measure internal temperature

COMPLIANCE

The device has received the following certifications, unless noted otherwise. Contact your Account Manger for updates.

ISED (Canada)

- IC: 11881A-CT3600; CONTAINS IC: 10224A-2022EG21 GL
- ICES-003; RSS-170; RSS-102
- IC compliance statement

This device contains licensed transmitter(s)/receivers) that comply with Innovation, Science and Economic

Development Canada's licensed RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.
- This device complies with the Canadian ICES-003 Class B specifications. CAN ICES-003(B) / NMB-003 (B).

FCC (USA)

- FCC ID: XGS-CT3600
- CONTAINS FCC ID: XMR202212EG21GL
- CFR 47 Part 25
- CFR 47 Part 15
- FCC compliance statement

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."

CE MARK (Europe)

- RED 2014/53/EU
- EU Declaration of Conformity

Hereby, ORBCOMM Inc. declares that the radio equipment types listed in this document comply with Directive 2014/53/EU.
The full text of the EU declaration of conformity is available from **http://www2.orbcomm.com/eudoc**.

RoHS

- Restriction of Hazardous Substances (RoHS) '

REACH

WARNING:

- The minimum 20 cm (8 in.) separation distance from the device is required for RF exposure safety for all persons.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and

Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1) This device may not cause interference. (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Ingress Protection

- Antenna: IP54
- CT 3600: 1P54

Environmental

Parameter	Description
Vibration	The device meets all its specifications during exposure to random vehicular vibration levels per AAR-S- 9401, section 3.2.4.2.
Humidity	The device meets all its specifications during exposure to 90% relative humidity at +85° C (185°F), per the test methodology of SAE J1455, section 4.2.3 (8-hour humidity cycle per figure 4a)
Mechanical Shock	The device meets all its specifications after exposure to positive and negative saw tooth shock pulses with peaks of 40 G and durations of 11 ms as specified in MIL-STD-81 OH , section 516.8, Procedure I, section 2.3.1.
Thermal Shock	The device meets all of its specifications after a thermal shock test as detailed in SAE J 1455, section 4.1.3.2
Handling Drop	The device meets all its specifications after a handling drop test as specified in SAE J14 55, section 4.11.3.1.
Transit Drop	The device meets all of its specifications after a transit drop test as specified in SAE J14 55, section 4.11.3.2.
Ingress – Solid Foreign Objects	The enclosure provides protection against ingress of solid foreign objects of IP5X as specified in IEC- 60529, section 13.5, Category 2.
Ingress – Water	The enclosure provides protection against ingress of water of IPX4 as specified in IEC-6 0529, section 14.2.4.
Salt Spray Atmosphere	The device meets all of its specifications after a salt spray test as detailed in SAE J1455, section 4.3.3.1.

Parameter	Description
Exposure to Chemicals and Oils	The device meets all of its specifications after a light to moderate splash test as detailed in SAE Jl 455 section 4.4.3.2, for the following chemicals: Window Washer Solvent Gasoline Diesel Fuel Fuel Additives Alcohol Antifreeze Water Mixture Degreasers Soap and Detergents Steam Waxes Kerosene Freon Spray Paint Paint Strippers Ether Dust Control Agents (magnesium chloride) Moisture Control Agents (calcium chloride) Ammonia Aluminum brightener (acid wash)
Fungus	The device meets all of its specifications after a fungus test as detailed in SAE Jl 455, section 4.6.3.
ESD	The device meets all its specifications after exposure of the enclosure to 6 kV ESD air discharge per IEC61000-4-2, level 3.

SPECIFICATIONS

Temperature

Parameter	Value
Operating temperature range	-40°c to +85°C (-40°F to +185°F) Temperatures below-20°C (-4°F) or above +60°C (140°F) result in limited functionality.
Recommended storage temperature range	-40°c to +85°C (-40°F to +185°F) Storage for extended periods of time outside of -20°C to+ 60°C (-4°F to+ 140°F) can result in non-recoverable battery capacity loss.

Internal Battery Temperature

Parameter	Value
Battery operating temperature range	-40°c to +70°c (-40°F to +185°F)
Battery charging temperature range	-2o·c to +60°c (-4°F to+ 158°F)

Electrical Specifications

The main power source for the CT 3600 is external power provided by the refrigerated container. While operating on external power, the input power also charges the device's internal backup battery. When external power is removed the device operates using its internal battery at a somewhat reduced feature set.

Input Range

The device is designed to operate on 24 VAC power commonly provided by reefer containers.

Parameter	Value
Power supply voltage (DC)	9 Vto 32 V
Power supply voltage (AC)	15 V to 36 V, 50 Hz to 60 Hz
Over-voltage protection	Upto200V

Power Consumption

Mode	Power
Cellular transmit (pulsed)	7.2W
Battery charge	800mW
Cellular transmit plus battery charge	8W

RF Specs

External Antenna

The antenna (part number ST101651-001) is in a rugged enclosure with a bottom side RF FAKRA (Bordeaux) cable. It supports LTE and GNSS in a single RF feed.

Parameter	Value
Frequency	698 to 2690 MHz
Impedance	SQQ
GNSS VSWR (1561MHz – 1602MHz)	Minimum 3:1
Peak gain	698 to 960 MHz: 2.8 dBi 1710to 2170 MHz: 3.7 dBi 2300 to 2690 MHz: 1.3 dBi
IP rating (enclosure)	IP54

Antenna cable specifications:

Parameter	Value
Cable length	1.2 m / 4foot
IP rating	IP54

Integrated BLE Antenna

Parameter	Value
Frequency	2400 to 2480 MHz
Impedance	SQQ
VSWR	::;2.2
Gain (realized gain)	3.64 dBi maximum 2400 MHz 3.73 dBi maximum 2440 MHz 3.72 dBi maximum 2480 MHz
Efficiency	88%

Bluetooth Low Energy (BLE)

The device includes a dedicated serial link to a Bluetooth Smart module (also known as Bluetooth Low Energy or BLE). The BLE module is a low power short range wireless protocol using the 2.4 GHz frequency band. BLE is not compatible with standard Bluetooth. The BLE allows the device to communicate as a peripheral with a mobile phone or other BLE enabled host for configuration and some debug logging. It allows the device to communicate as a host to local wireless sensors. The BLE system is capable of operating in both the host and peripheral modes at the same time.

The BLE characteristics are:

Parameter	Min.	Typical	Max.	Units
Frequency	2360		2500	MHz
Bluetooth version compliance		5.3		
Receive sensitivity	95			dBm
TX power			+8	dBm

BLE External Memory

The device includes 16 Mbit of nonvolatile onboard flash storage for data for use with the BLE subsystem. The flash is capable of 100,000 write-erase cycles over its operating life.

BLE RF Interface

The BLE includes an internal BLE antenna.

Cellular

The device includes a cellular module cable of global cellular communication. The table shows the specifications.

Parameter	Value
LTE category	Catl
LTE bands	1,2,3,4,5, 7,8, 12, 13, 18, 19,20,25,26,28,38,39,40,41
UMTS/HSPA+ Bands	1,2,4,5,6,8, 19
GSM Bands	2,3,5,8

Maximum RF Outout Power:

Parameter	Max RF Output Power
LTE	23 dBm ±2 dB
GSM	33 dBm ±2 dB
WCDMA	23 dBm ±2 dB

Battery

Battery Voltage Measurement

The device can measure the input voltage over the range 2.5 V to 4.2 V.

Internal Battery

The device includes a long life, rechargable internal battery capable of operating the device when reefer power is disconnected. The battery is charged when external power is available. When external power is removed, the device automatically switches to battery power, and goes back to operating on external power when external power is restored.

The electrical specifications for the battery are below.

Parameter	Min.	Typical	Max.	Units
Capacitor	2300			mAh
Voltage (nominal)		3.6		V
Current output	3			A
Discharge temperature	-40 / -40		70 / 158	℃/ °F
Charge temperature	-20 / -4		60 / 140	℃/ °F
Charge current		400		mA

Battery Life Expectancy

During normal operation, the device is expected to last 6 months while reporting twice per day on a single charge.

GNSS

The GNSS provides a cold start of 35 s and assisted in 15 s. The horizontal position accuracy is 2.5 m.

Accelerometer

The device has two accelerometers to allow for dedicated functions that may require different settings. The first provides motion detections, and the second is for advanced functions such as shock and rollover detection.

Magnet Switch

The device includes a magnetic switch, on the connector face, to allow local interaction and debugging. The switch can wake the device from sleep and perform other software defined actions.

Mechanical

CT 3600 and Bracket

Parameter	Value
CT 3600 Enclosure	Rugged, impact, and chemical-resistant plastic material
CT 3600 weight	172g(6oz)
Bracket (only) weight	102g(4oz)

Units are shown in inches (millimeters)

Figure 2: CT 3600 Dimensions

3.190
[81.03]

1.125
[28.58]

6.786
[172.37]
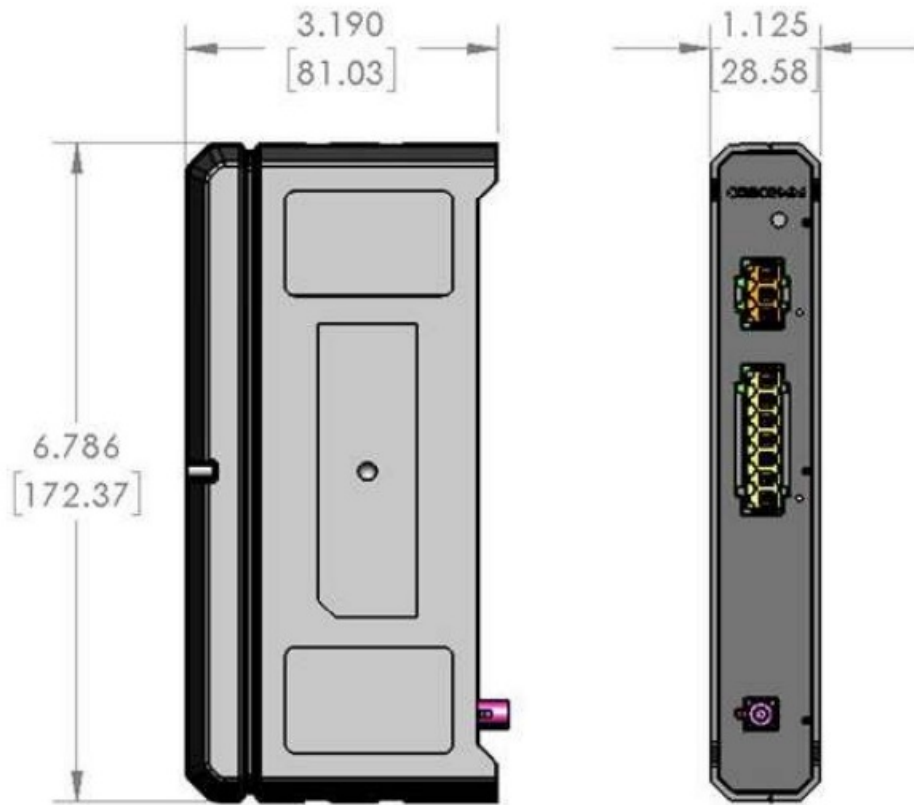
Figure 3: CT 3600 with Mounting Bracket

External Antenna

Parameter	Value
Antenna weight	67g(2oz)
Antenna enclosure rating	IP54.
Antenna dimensions	(L x W x H) 139.7 mm (5.5 in.) x 38.1 mm (1.5 in.) x 13.1 mm (0.515 in.)

Figure 4: External Antenna Dimensions
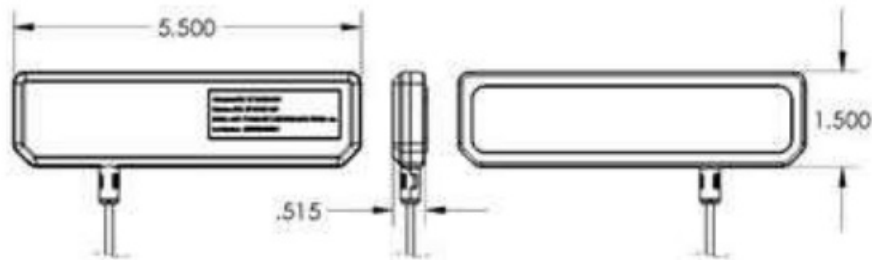
INSTALLATION

IMPORTANT

READ ALL INSTRUCTIONS CAREFULLY BEFORE INSTALLING. FAILURE TO DO SO MAY CAUSE PERSONAL INJURY OR DAMAGE TO PRODUCT AND/OR PROPERTY.

• Review the product package and contents prior to beginning the installation. Take care when opening the packaging and removing items. If a return is needed, you will want to return the product in its original packaging if possible. • This instruction guide is provided as a GENERAL installation guide; some assets vary dimensionally and may require additional steps. • ORBCOMM has a policy of continuous development and improvements. Therefore, products, guides, and technical information are subject to change without prior notice. • The manufacturer and / or distributors do not accept responsibility for third-party charges, labor, and / or third- party replacement modifications that are not ORBCOMM approved. Some modifications may void the factory warranty. • ORBCOMM does not accept any responsibility for installations performed by installers / third parties not approved and / or authorized by ORBCOMM. Some installations may void the factory warranty. • Exercise due diligence when installing this product. ORBCOMM does not accept any responsibility for asset damage or personal injury resulting from the installation of this product. Careless installation and operation can result in serious injury or equipment damage. • All liability for installation and use rests with the owner/operator. • Always make sure you have a clean, dry, and well-lit work area. • Always ensure products are secure during disassembly and installation. • Always take steps to protect yourself when drilling, cutting, and grinding because this may create flying particles that can cause injury. • Thoroughly inspect the area to be drilled, on both sides of material, prior to modification, and relocate any objects that may become damaged. • Always route electrical cables carefully. Avoid moving parts, parts that may become hot and rough, or sharp edges. • Make sure to fully understand the product, its intended use, and operation prior to use.

CAUTION: While ORBCOMM provides mounting hardware to assist with installations, it is the responsibility of the installer to select the proper mounting hardware for the asset's surface material where an ORBCOMM device or accessory will be mounted. Environmental Protection Waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with our local authority or retailer for recycling advice.

Environmental Protection

Gather the Required Tools and Materials

The CT 3600 kit (part number SM202884-001) includes the following:

- CT 3600 (part number CT3600-1100-H)

- CT 3600 Hardware Kit (part number ST101659) that includes:
    - Qty. 4 – M5 x 16 mm stainless steel pan head SEMS screws and hardware
    - Qty. 4 – M6 nylock stainless steel hex nut
    - Qty. 4 – 10-24 x ¾" pan head stainless steel black oxide
    - Qty. 1 – #8 x ⅜ pan head Plastite thread forming screw
- Bracket (part number MD702425-001)
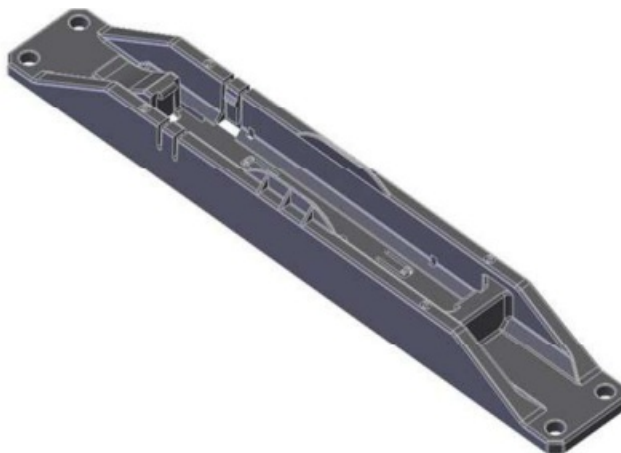
- Antenna (part number ST101651-001) with cleaning materials

You require the following additional materials that do not ship with the kit:

- #2 Phillips screwdriver or 10 mm socket (extended socket recommended) and socket wrench (depending on screws required)
- Cable ties
- To use the Field Support Tool (FST) to pair the CT 3600 with the asset, you require:
- Android or iOS device with Wi-Fi or cellular connectivity
- User/customer credentials (your credentials must authorize you to pair and unpair devices), for the platform where the CT 3600 is registered / hosted. Contact Support if you require credentials.

Install the Device

1. Snap the CT 3600 into the locking bracket. The orientation of the CT 3600 to the bracket does not matter.

2. Thread the provided #8 x ⅜ pan head Plastite thread forming screw through the bracket hole and into the CT 3600, and then secure it into position.
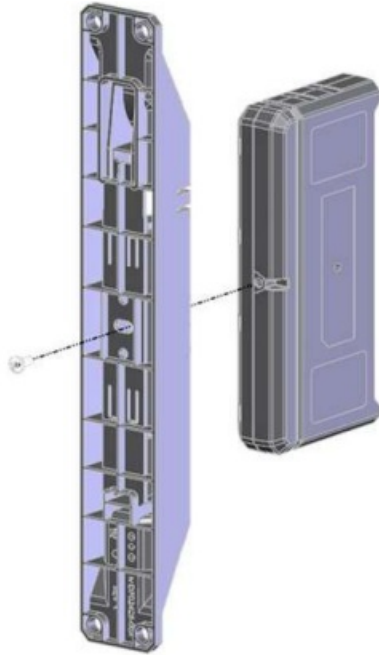
3. Open the reefer cabinet and find the mounting location (shown in red) for the CT 3600 with bracket. If present, remove any existing RMM screws.
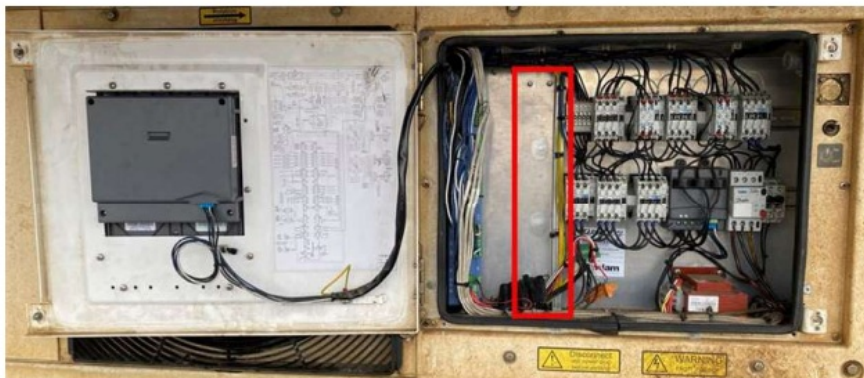
4. Use the four provided nuts to mount and secure the CT 3600 bracket into position.

Mount the Antenna

CAUTION: The CT 3600 is designed to operate with a specific ORBCOMM antenna. Using a different antenna could violate certifications, and ORBCOMM does not recommend the use of any antenna other than what is specified in this guide.

1. Find a mounting location on the inside of the reefer door, on the backside of the display panel, which ensures the antenna cable, once routed, reaches the CT 3600.

2. Prepare the mounting location for the antenna's VHB tape:

a. Use the provided scour pad to prepare the area.

    Note: Ensure that an oversized area is prepared.
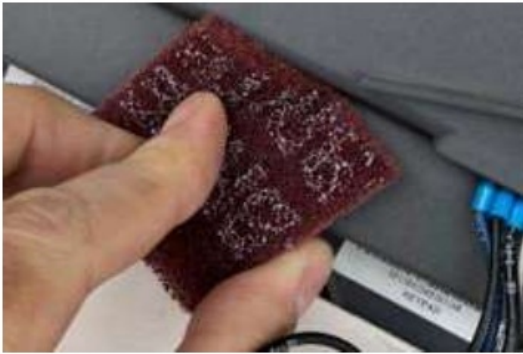
b. Clean the surface with the provided alcohol wipe.

c. Apply the provided primer to the area and wait at least 30 seconds for the primer to dry. Refer to

Inclement Weather Guidelines for details.

3. Remove the tape liner from the back of the antenna.

    CAUTION: DO NOT touch the tape.

4. Immediately place the antenna onto the reefer door, and then press firmly on the antenna (7 kg (15 lbs) for 10 seconds) to bond the tape to the asset.

5. Plug the antenna's FAKRA connector into the CT 3600.
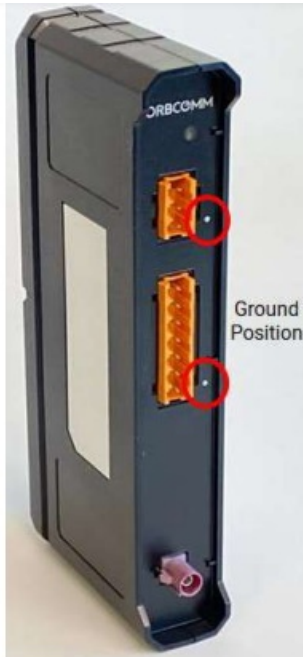

Connect and Secure the Cables

1. Secure the antenna cable with cable ties.

   CAUTION: Ensure that the cables do not get pinched when closing the reefer door.
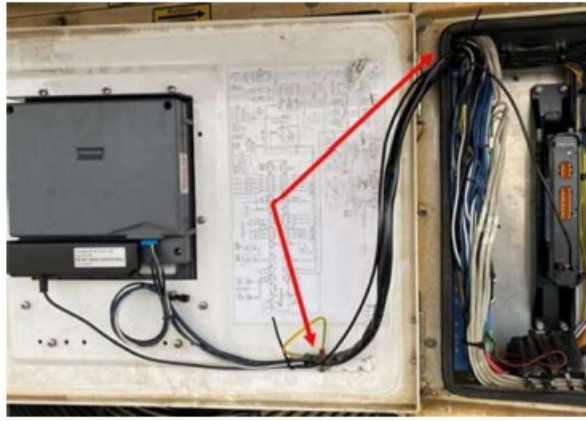
2. Connect the reefer's 3-position AC cable and the 7-position COMMS cable to the mating connectors on the CT 3600, noting the ground position on the CT 3600

Associate the Device with the Asset

1. Record the serial number of the CT 3600 and the associated asset identification number/name.
2. Use the ORBCOMM Field Support Tool (FST) to pair the CT 3600 with the asset.

APPENDIX A INCLEMENT WEATHER GUIDELINES

One method of securing the ORBCOMM device to an asset is double-sided tape. Proper tape application requires that the tape is kept warm (room temperature), and the asset surface is both clean and dry. Mandatory Guidelines for Installation in Wet Weather The installation surface on the asset must be completely clean and dry for the tape to bond. If it is raining or snowing hard enough that the surface cannot be kept dry, DO NOT proceed with the installation. Mandatory Guidelines for Installation in Cold Weather Below 15°C (60°F) the tape starts becoming firm which makes it more difficult to bond to the asset. If the guidelines below are followed correctly, the ORBCOMM device can be installed at temperatures down to -20°C (-5°F).

- At or below freezing temperatures (0°C or 32°F), both the ORBCOMM device and the tape primer must be kept at room temperature, for example, inside an idling vehicle or a warm building.
- Keep the primer warm (room temperature) until ready to apply. The primer will not dry quickly at cold temperatures however, in this situation the tape should be applied when the primer is still wet, as it improves initial bond.
- Keep the ORBCOMM device warm (room temperature until it is time to mount it to the asset.
- Press firmly on the entire top surface of the ORBCOMM device (7 kg (15 lb) for 60 seconds) to bond the tape to the asset.
- Failing to follow these guidelines will compromise the installation.

Documents / Resources

ORBCOMM CT 3600 Reefer Container Monitoring Device [pdf] User Guide
CT3600, XGS-CT3600, XGSCT3600, CT 3600 Reefer Container Monitoring Device, CT 3600, Reefer Container Monitoring Device, Container Monitoring Device, Monitoring Device, Device

References

- **User Manual**