ORBCOMM®

CONNECTING THE WORLD'S ASSETS

PT 7000

Installation Guide

PT107, Version 02

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ABOUT THIS GUIDE

Disclaimer

This guide contains information about the PT 7000 system. No representations or warranties are made as to the accuracy or completeness of the information contained herein. No representations or warranties are made as to the completeness and compliance of any installations that are performed using this guide.

Purpose

This guide contains product information for the PT 7000 system. 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. In addition, and as is appropriate, this manual may be used for customer training.

Safety Symbols & Cautionary Terminology

Table 1 describes the symbols that may be included in this manual and on equipment labels.

Table 1: Manual and Equipment Safety Symbols

Symbol	Definition
	DANGER/WARNING/CAUTION: Risk of electric shock.
	DANGER/WARNING/CAUTION: Refer to instruction guide.
	CAUTION: Uncovered high temperature components. Take extra precautions.
	CAUTION: Undesired temperature changes may occur.

The severity level of a potential hazard varies. Refer to Table 2 for descriptions of these levels.

Table 2: Description of Cautionary Terms

Term	Definition
DANGER	Indicates the presence of an extreme hazard that will cause death or severe personal injury. Hazards of this kind MUST be avoided.
WARNING	Indicates the presence of a hazard that can cause death or severe personal injury. Hazards of this kind MUST be avoided.

Term	Definition
CAUTION 	Indicates the presence of a hazard that can or will cause minor personal injury or property damage if the hazard is not avoided. The Caution indicator is also used for property-damage-only accidents, such as those that may result by failing to maintain the required cargo temperature. The Caution indicator may be used to warn against potential equipment damage and service interruption.

Cautions Concerning Servicing the PT 7000

 The equipment must be turned off when service work is required.
On equipment equipped with a master disconnect switch, the switch must be *open* when installation or service activities are performed.

Remove the cable from the negative terminal of the equipment battery and secure the cable to prevent accidental contact before performing any installation or service procedure. Only trained service personnel should perform the procedures outlined in this installation manual. These procedures may allow exposure to high electrical energy that could result in electric shock and injury to untrained personnel during servicing, maintenance, and installation of the unit.

To avoid personal injury, the equipment battery should be disabled by disconnecting the negative terminal cable prior to installation or servicing.

 Be aware of your working environment. Take appropriate steps to ensure that the PT 7000 cable harness and especially its connectors are not exposed to soil, water, or other contaminants that may be present at the installation site.

1 INSTALLATION OVERVIEW

The following steps outline the overall procedure to follow when installing and field commissioning the PT 7000:

1. Gather the required tools
2. Identify the system components
3. Plan the installation
4. Disconnect the equipment battery
5. Mount the antennas and the PT 7000
6. Install the main harness
7. Reconnect the equipment battery
8. Activate the PT 7000

Approximate Completion Time

The approximate completion time will vary greatly depending on the specific type of equipment involved. Typical install time is 1-2 hours. Additional options require extra installation time.

Recommended Antenna Installation

The antenna should be placed as high as possible and away from areas that are exposed to falling debris.

In some harsh environments it is appropriate to mount the antenna to the inside surface of a fixed window. In these situations, the top surface of the antenna should be facing outwards, and the antenna cable should be routed in such a way to protect it from damage.

2 GATHER THE REQUIRED TOOLS

Table 3 lists the tools that are required for a standard installation.

Table 3: Required Tools

Quantity	Description
1	Heavy-duty electric drill
1	1/8-inch drill bit
1	5/16-inch socket
1	3/8-inch socket
1	5/16-inch driver to mount on drill
1	3/8-inch ratchet wrench
1	Set of appropriate 3/8” sockets
1	Set of appropriate wrenches
1	Digital multimeter
1	Wire cutters
1	Wire crimpers
1	Wire snake
1	T10 Torx driver
1	Small flat head screwdriver
1	Phillips head screwdriver
2	Appropriate ladder
1	Flood lamp and appropriate extension cord (Optional)

3 IDENTIFY THE SYSTEM COMPONENTS

	PT 7000 transponder
	Combination GSM/GPS antenna (also available with an overmold plate or a surface mount plate)
	OGi antenna

4 PLAN THE INSTALLATION

The installation of the PT 7000 will vary widely depending on the type of equipment and the operational environment.

Each installation situation must be individually planned.

1. Determine the appropriate antenna mounting location. Ideally the antenna should be mounted high and in a protected area. In some applications, the antenna can be mounted on top of the equipment, but in other situations it might be best to mount on the inside of the cabin on the dashboard, or the inside surface of the windshield.

   Note: Do not mount in areas that are exposed to heat or potential damage from falling debris and impact.

2. Locate the electrical connections. In most installations there will be only three (3) connections required:

Description	Color	Connection
Battery power	RED	To a constant source of 9-32 VDC positive (+).
Ground	BLACK	To a source of equipment ground, typically the chassis or a ground bus connection.
Run Signal	GREEN	To a source of power, NOT GROUND, that is hot only when the engine is running. It is best that this signal is synchronized with the engine hour meter so that the readings will match. Common sources include: • Engine hour meter (verify that this is *positive* and not *ground* when the engine is running. • Alternator stator connection – will typically give a pulsed DC signal that is about 70% of battery voltage. • Ignition key *on* signal – this is the worst choice because you would get readings when the key is on, but the engine is not running. Sometimes the equipment hour meter is connected to the key, in this case, this is a viable choice.

3. Determine where to mount the transponder based on where the antenna is mounted, the location of the electrical connections, and the available locations on the equipment. The best place to mount the transponder is in a dry and clean area. Often this will be where other electronic modules are located.

5 DISCONNECT THE EQUIPMENT BATTERY

WARNING: Risk of Electric Shock

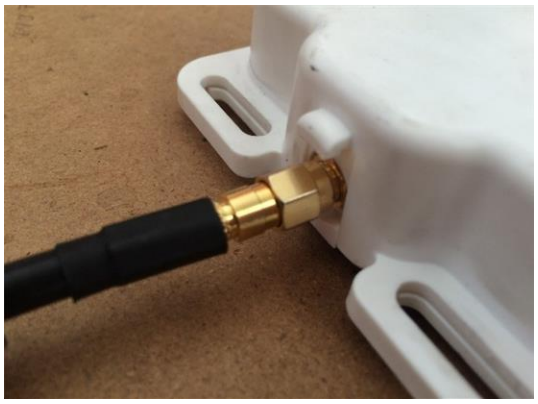
Before you continue with the installation, remove the cable from the negative terminal of the equipment battery. Only trained service personnel should perform the procedures outlined in this installation manual. These procedures may allow exposure to high electrical energy that could result in electric shock and injury to untrained personnel during unit servicing, maintenance, and installation.

1. Remove the cable from the negative terminal of the equipment battery.

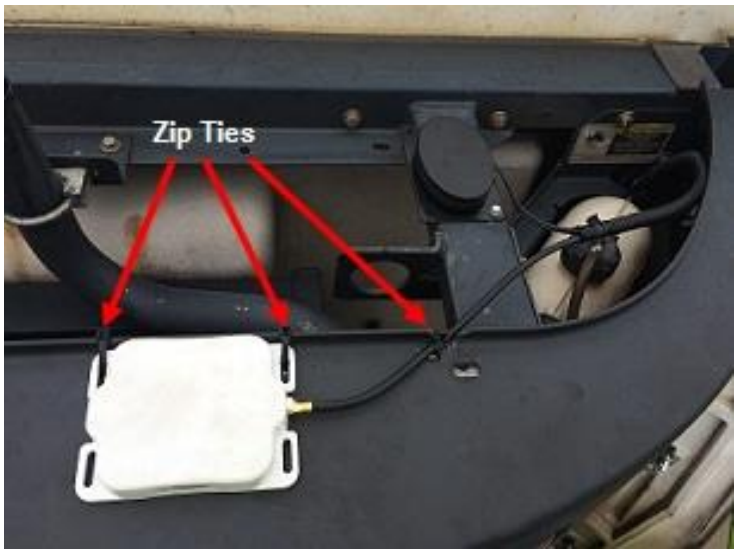
6 MOUNT THE ANTENNAS AND THE PT 7000

For applications that use the OGi antenna:

1. Thread the cable SMA connector into the mating antenna SMA connector by hand, until finger tight. Use a small wrench to rotate the connector nut 45-degrees, to apply the proper torque (10-12 in-lb).



2. Dry and clean the mounting location with the supplied alcohol wipes. Use the included adhesive foam and zip ties to mount the OGi antenna.



For applications that use the black GSM/GPS antenna:

1. Thoroughly clean the mounting surfaces with the included alcohol prep pad.
2. When dry, use the included adhesive foam to mount the GSM/GPS antenna to the desired mounting surface, and apply moderate pressure evenly across the device for 30 seconds. If using a mounting plate, use screws to ensure the plate is securely attached to the mounting surface.
3. Route the two antenna wires in such a way that they avoid moving and hot parts. Make sure that the cables are run through sealed holes so that water cannot pass through.
4. Route the two cables to the desired PT 7000 mounting location.

   Note: Do not damage or get dirt into the antenna connectors.

Note: Do not allow the antenna cables to be compressed or crushed – this will block the radio (RF) signal.

5. Remove the antenna connector cover with a T10 Torx driver and plug in the two or three (depending on the application) FAKRA connectors.

   The FAKRA connectors are color-coded and keyed so that they can go in only one way.

6. Replace the antenna connector cover.
7. Mount the PT 7000 in the desired location. Mount it with the antenna connectors face downward (not upward), to prevent water from collecting inside.

8. Plug the main harness connector into the PT 7000, so that it locks into place.

7 INSTALL THE MAIN HARNESS

1. Install the main harness making sure to secure it firmly.
2. Incorporate drip loops where necessary to prevent water from migrating down the cable.

8 RECONNECT THE EQUIPMENT BATTERY

After all hardware and wiring is installed, power may be applied to the PT 7000 for the first time.

Verify that all cable and individual wiring connections are properly connected and weather-sealed before reconnecting the negative terminal of the battery.

1. Reconnect the equipment battery.

   When the cable is reconnected to the negative terminal, the PT 7000 will power up.

9 ACTIVATE THE PT 7000

As a minimum the Installer requires the following information to activate the PT 7000:

- Customer name and contact information
- PT 7000 serial number
- Equipment make, model, and type
- Engine hour meter reading at time of installation

The PT 7000 is shipped in a pre-installation state, which turns off the cellular and satellite modems. Activating the terminal turns on these modems and allows the terminal to communicate with the ORBCOMM server.

The PT 7000 can be activated at any time, but it is recommended activation be done shortly before or immediately following installation.

You can exit ship mode by turning on the vehicle's ignition after the PT 7000 has successfully been installed or by following the instructions below and using the magnet.

The magnet can be a useful tool for diagnostics and operational confirmation during the installation process.

Figure 1: Magnet Tool

Using the Magnet Tool

1. Place the magnet to the left of the letter O, of the ORBCOMM logo.

Figure 2: Magnet Placement

2. Hold the magnet over this location for at least 5 seconds and then remove it. If the terminal is in a pre-install or shipping mode state, this action places the PT 7000 in RUN mode, queues a short status message, and then blinks the LEDs.

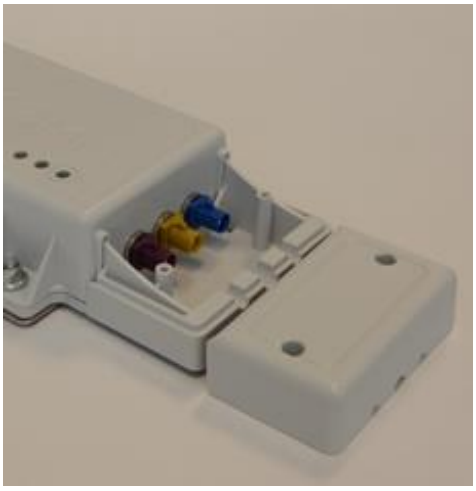
10 HARDWARE SPECIFICATIONS

This section provides some PT 7000 hardware specifications. For full hardware specifications refer to the PT 7000 Hardware Guide.

10.1 Connectors

Removing the connector cover allows access to the antenna FAKRA connectors. The connector compartment provides antenna cable strain relief once the cover is replaced.

Figure 3: FAKRA Antenna Connectors[1]



10.1.1 Pin Designations

The external connector and harness provide access to the terminal's various interfaces and I/Os. The custom connector and harness can be ordered and designed to meet your specific requirements. Contact your ORBCOMM Account Representative for additional details.

10.2 LED

The LEDs are enabled by triggering the magnetic sensor, even if the terminal is asleep. Each activation resets a timer to 60 seconds. There are three LEDs to indicate various states within the terminal.

Color	Category	Pattern	Description
Red	Power Status	On	Externally powered
		Blinking	Battery powered
		Off	Power failure (battery dead)

[1] Actual hardware may not be exactly as shown.

Color	Category	Pattern	Description
Green	GPS	On	Last position update was successful
		Blinking	Searching for satellites or antenna fault
		Off	Power failure or LED timeout expired (when on battery power)
Yellow	Communication	On	Transmit queue empty (previous communication attempts were successful).
		Blinking	Transmit queue not empty (continued blinking likely means a communication fault)
		Off	Power failure or LED timeout expired (when on battery power)

APPENDIX A PT 7000 OVERMOLDED CONNECTOR CABLE

The cable shipped with the PT 7000 has a connector at the PT 7000 end, is blunt cut at the other, and is environmentally robust.

Figure 4: Overmolded Connector Cable

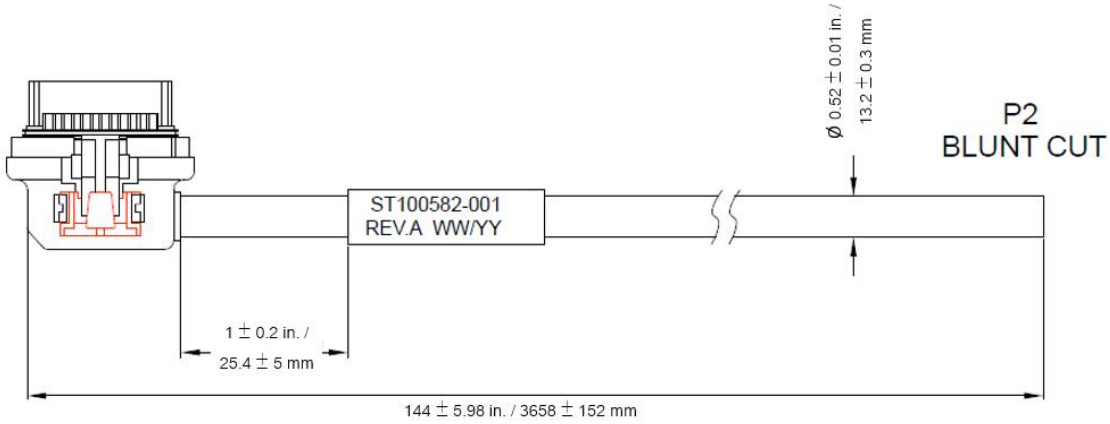


Figure 5: Delphi Female Connector - Rear View of the Connector

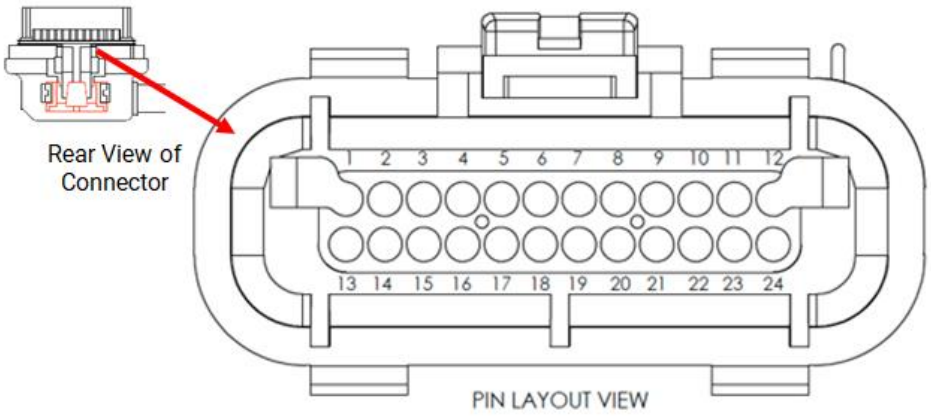


Table 4: Delphi Female Connector Pin Descriptions

Pin #	Signal	Color	Description	Direction / Comment
1	GND	Brown	Ground	Not Used
2	GND	Orange	Ground	Not Used
3	GND	Yellow	Ground	Not Used

Pin #	Signal	Color	Description	Direction / Comment
4	D_IN_1	Green	Digital 1	Input, Ignition key ON
5	D_IN_2	Blue	Digital 2	Optional Input
6	D_IN_3	Purple	Digital 3	Optional Input
7	CANL_0	Gray	Primary Can Bus Low-level	Input and Output
8	CANL_1 / EXT_TX	White	External RS-232 / Secondary Can Bus Low-level	Output (External RS-232) / Both (Secondary Can Bus)
9	CANH_1 / EXT_RX	Pink	External RS-232 / Secondary Can Bus High-level	Input (External RS-232) / Both (Secondary Can Bus)
10	D_IN_4	Light Blue	Digital 4	Optional Input
11	ANALOG_4	White/Black	Analog 4	Optional Input
12	ANALOG_3	White/Red	Analog 3	Optional Input
13	ANALOG_2	Green/Yellow	Analog 2	Optional Input
14	PULL_UP_2	Black/White	Digital pull-up 2 to 9V/12V	Optional Output
15	PULL_UP_1	Brown/White	Digital pull-up 1 to 9V/12V	Optional Output
16	ANALOG_1	Red/White	Analog 1	Optional Input
17	PULL_DWN_2	Orange/White	Digital pull-down 2	Optional Output
18	CANH_0	Yellow/White	Primary Can Bus High-level	Input and Output
19	GND	Green/White	Ground	Not Used
20	CONSOLE_RS232_TX	Blue/White	Console RS-232	Output
21	CONSOLE_RS232_RX	Purple/White	Console RS-232	Input
22	PULL_DWN_1	Gray/White	Digital pull-down 1	Optional Output
23	GND	Black	Ground	System Ground – connect to chassis
24	EXT_PWR	Red	External Power	Input Power – 12-24 VDC Requires external 5 A fuse

APPENDIX B MECHANICAL DIMENSIONS

B.1 PT 7000

Figure 6: PT 7000 Top View Dimensions (inches)

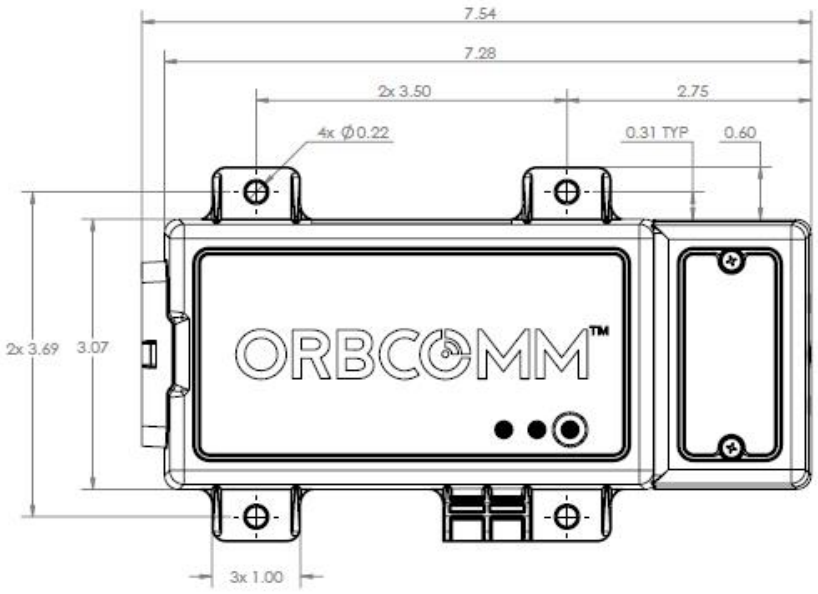
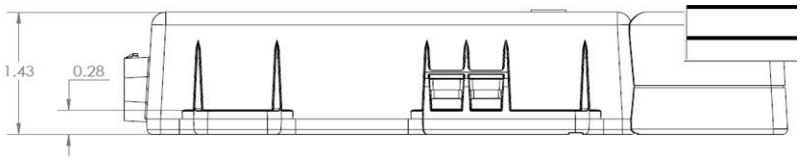


Figure 7: PT 7000 Side View Dimensions (inches)



B.2 External IDP Standard Satellite Antenna

Figure 8: IDP Satellite Antenna - Bottom View (mm/inches)

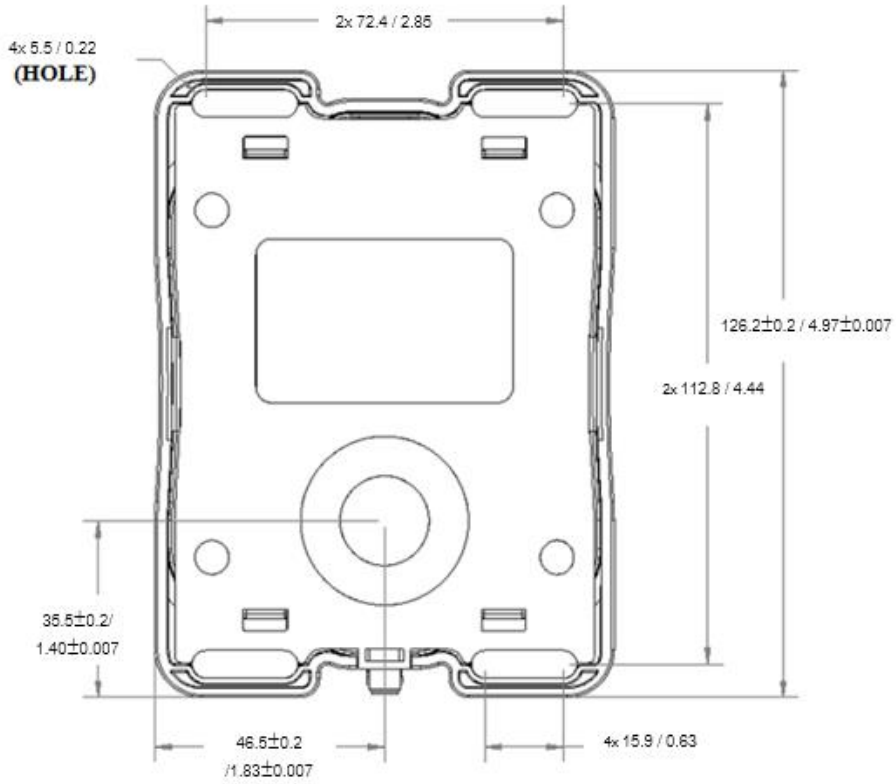
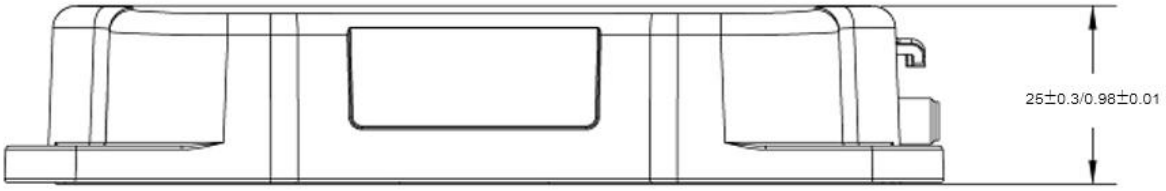


Figure 9: IDP Standard Satellite Antenna -Side View (mm/inches)



B.3 External OG Satellite Antenna

Figure 10: OG Satellite Antenna - Top View

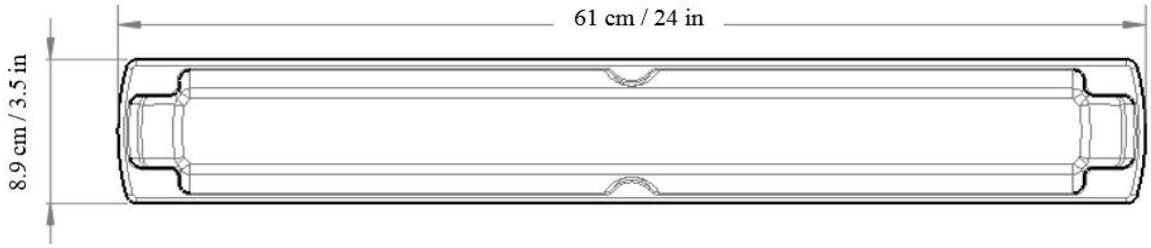
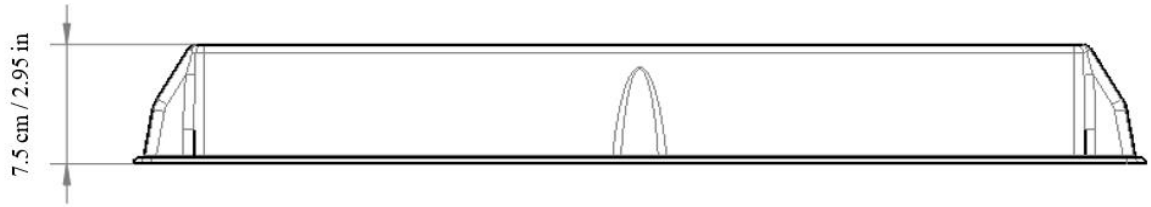


Figure 11: OG Satellite Antenna - Side View



B.4 LTE Antenna

Figure 12: LTE Antenna - Top View

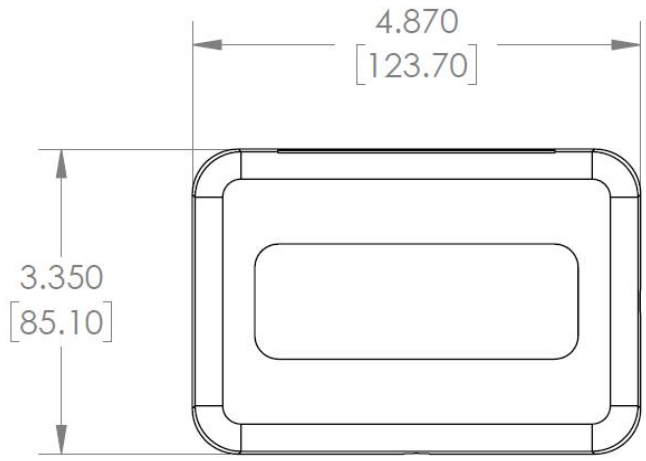


Figure 13: LTE Antenna - Side View

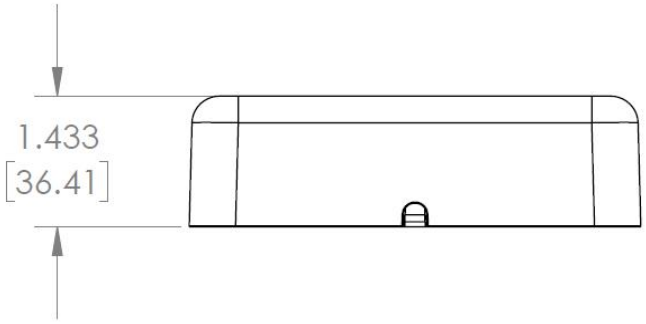


Figure 14: LTE Antenna with Overmold Plate (cables not shown)

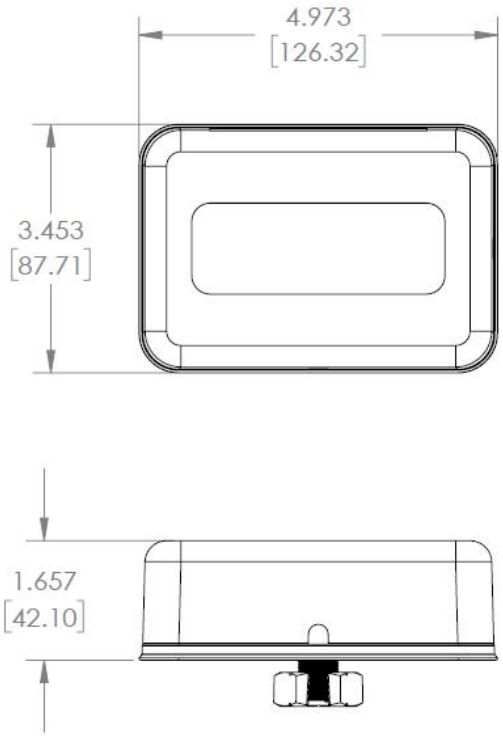


Figure 15: LTE Antenna with Surface Mount Plate (cables not shown)