Wireless Multi-Function Sensor

User Guide

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1. QUICK START

To start using your sensor, simply go to:

https://console.radiobridge.com

From here you can register your device and immediately start receiving messages from the sensor.

The sensor configuration, message monitoring, and setting up alerts is usually self-explanatory through the user interface. For further explanations of any sensor features, you may refer to this user guide.

2. OVERVIEW

2.1. Sensor Overview

The wireless sensors designed and manufactured by Radio Bridge provide full sensor to cloud solutions for Internet of Things (IoT) applications. The multi-function sensor can be configured for door/window open/close events, acceleration-based movement, ambient light, temperature, water sensing, and more. When an event is detected, an alert is sent over the wireless network. Versions of the sensor support the major LPWAN standards such as Sigfox, LoRa/LoRaWAN, and SubGig.

Features include:

- Built-in radio that talks directly with the wireless network. Standards include:
  - Sigfox
  - LoRa/LoRaWAN
  - SubGig®
- Two types of tamper detection: enclosure tamper and wall mount tamper
  - Enclosure tamper detects if the packaging of the sensor itself is opened or broken
  - Wall mount tamper detects if the sensor has been removed from the wall or mounting point
- 20,000-1M+ transmissions on a single battery and a 5-10 year battery life depending on usage (see Battery section)
- Fully integrated internal antenna
- Over the air sensor configuration in the field
- Automatic low battery reporting and supervisory messages

2.2. Revision History

Table 1 Revision History

Revision	Date	Description
1.0	April 2018	Initial release of the document
1.1	August 2018	Updated protocol definitions

2.3. Document Conventions

Table 2 Document Conventions

Font / Icon	Meaning
	Important notes
	Warnings and cautions

2.4. Part Numbers

Table 3 Part Numbers

Part Number	Wireless Standard	Region
RBS101-XXX-RCZ2	Sigfox	North America
RBS201-XXX-315	SubGig	North America
RBS301-XXX-US	LoRa	North America

3. TECHNICAL SPECIFICATIONS

3.1. Absolute Maximum Ratings

Table 4 Absolute Maximum Ratings

Parameter	Rating	Units
Operating ambient temperature	-30 to +70	°C
Storage ambient temperature	-40 to +100	°C

4. BATTERY LIFE

The sensor uses a lithium non-rechargeable battery and is capable of 20,000 to 1,000,000+ total messages depending on the wireless standard and usage. For an accurate estimate of battery life, please refer to the "Sensor Battery Estimator.xlsx" spreadsheet on the Radio Bridge website. This spreadsheet combines usage information such as average number of messages per day and estimates the battery life for a particular sensor.

Refer to the spreadsheet "Sensor Battery Estimator.xlsx" on the Radio Bridge website for specific battery life estimates.

The power required for a message transmission is much greater than the "sleep current" (the power consumed when the sensor is inactive) for high power radio technologies such as Sigfox and LoRaWAN. This means that the battery life for most sensors is primarily dependent on the number of transmissions per day.

Different battery types will deplete over time with different voltage profiles. For instance, a lithium battery will maintain a relatively high voltage for the life of the battery and then experience a rapid drop near the end, whereas an alkaline battery will experience a more gradual reduction in voltage over time. Radio Bridge sensors are shipped with lithium batteries, and these are recommended when the battery needs to be eventually replaced.

Temperature also plays a role in battery life. The battery life estimates in the online spreadsheet assume room temperature, but temperatures close to the maximum and minimum ratings will have a negative impact on battery life. For example, battery voltage tends to be lower in cold temperatures and the internal circuitry needs a certain minimum voltage to operate properly before it will shut down. Thus, battery life will tend to be shorter when running the sensor in

col

Battery voltage will be lower in cold temperatures and thus battery life will be reduced in cold environments.

d environments.

The battery voltage is reported by the supervisory messages as well as a low battery indicator. See the section on Message Protocol for more detail.

5. MESSAGE PROTOCOL

This section defines the protocol and message definitions for the sensor.

	Radio Bridge provides a web-based console at console.radiobridge.com to configure and monitor sensors. Usage of this console is highly recommended for most customers rather than implementing the protocols defined in this section.

I f the standard Radio Bridge console (console.radiobridge.com) is not used, refer to this section to decode the sensor data and configure the sensor through downlink messages.

5.1. Common Messages

There are common messages across all wireless sensors that are defined in the document "Common Sensor Messages" which is available on the Radio Bridge website.

	Refer to the document "Common Sensor Messages" for definitions of all common messages. Common messages are not defined in this document.

C ommon messages include basic error messages, tamper, supervisory, and downlink ack. It is important to refer to that document prior to decoding the messages defined in this section.

5.2. Uplink Messages

The uplink message (sensor to web application) specific to the sensor is defined in the associated user guide. See the guide specific to your sensor configuration for more information.

5.3. Downlink Messages

The downlink message (web application to sensor) specific to the sensor configuration is defined in the associated user guide. See the guide specific to your sensor configuration for more information.

6. MECHANICAL DRAWINGS

The mechanical drawings provided in this section are for the main body of the sensor. All dimensions are inches unless otherwise noted.
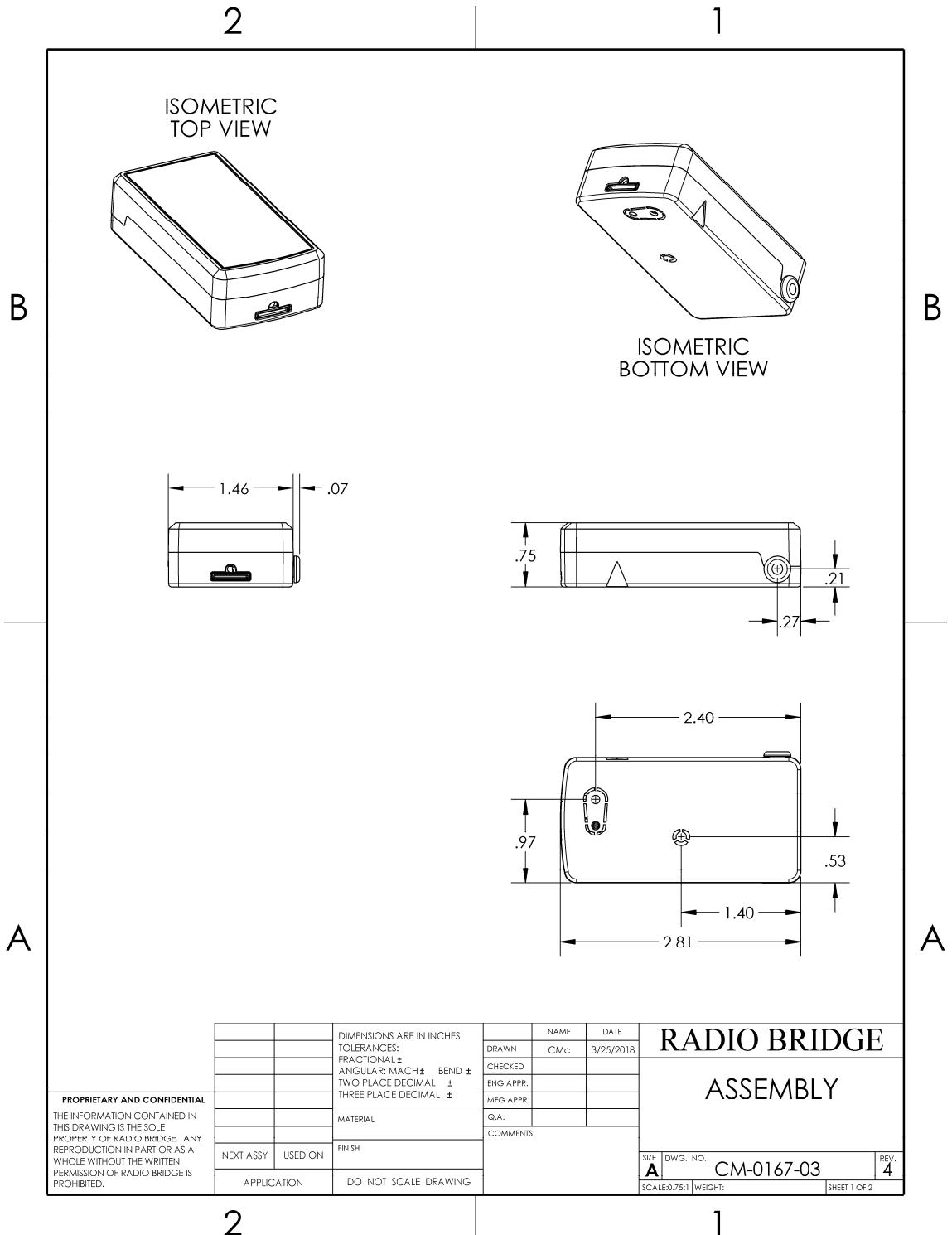
7. REGULATORY

Per FCC 15.19(a)(3) and (a)(4) 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.

Per FCC 15.21, Changes or modifications not expressly approved by Radio Bridge could void authority to operate the devices.

RBS101 (Sigfox) FCC ID: 2APNUSFM10R2

RBS301 (LoRa) FCC ID: 2APNUCMABZ

8. CUSTOMER SUPPORT

Radio Bridge offers free technical support at:

https://support.radiobridge.com

Radio Bridge also offers technical support plans and service packages to help our customers get the most out of their Radio Bridge products.

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