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contact@lansitec.com

## 1. General Introduction

This tracker is designed based on GPS, BLE and LoRa technology. With the advanced LoRa technology and build-in G-sensor, the tracker employs ultra-long standby time compared with the traditional GPRS based solution. Indoor tracking with BLE and outdoor tracking with GNSS technology is supported. The position acquisition period, heartbeat period, LoRa work mode are adjustable according to your use case.

Highlights:

- LoRaWAN 1.02 compliant
- Maximum 6-month standby time
- Build-in G-sensor for motion detection
- Build-in alert button
- 1200mAh chargeable lithium-ion battery
- Multi battery optimization setting

## 2. Abbreviation

- BLE: Bluetooth Low Energy
- CLAA: China LoRa Application Alliance
- CRC: Cyclic Redundancy Check
- OTAA: Over the Air Activation
- RSSI: Received Signal Strength Indicator

## 3. Product Specifications

Table 1: Product Specifications

<b>Positioning Mode</b>	BLE/GPS
<b>Positioning Precision</b>	2.5m
<b>Protocol</b>	LoRaWAN
<b>Frequency</b>	CN433/EU433/CN470/EU868/US915/AS923
<b>Sensitivity</b>	-142.5dBm
<b>Operating Current</b>	40uA@sleep mode
	Max 140mA@20dBm
<b>Standby Time</b>	6 months
<b>Power Supply</b>	1200mAh Li-Po
<b>Operating Temperature</b>	-5 ~ +60°C
<b>Storage Temperature</b>	-40 ~ +85°C

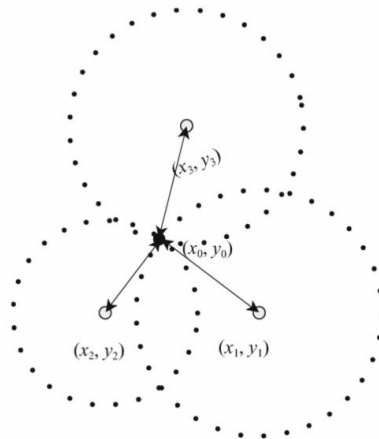
<b>Operating Humidity</b>	5% ~ 95%
<b>Dimension</b>	58*60*28mm
<b>Charge Mode</b>	DC 5V
<b>Communication Distance</b>	>1.5km in urban area
<b>Application Context</b>	Scooter, public bike, vehicle tracking, asset management

## 4. Application Information

### 4.1 Function

The tracker supports OTAA and Class A mode. DEVEUI, APPEUI and APPKEY are stored in the tracker and are necessary for joining a network. DEVEUI is labeled at the back of the device. Lansitec will help to configure these parameters before shipping if necessary.

The tracker supports both BLE and GPS location. To support BLE location, the BLE beacons need to be deployed around the tracker, the tracker gets its position by scanning the BLE signal. The fundamental is trilateration. The positions of the beacons are already known, tracker can calculate the distance to the three beacons, then tracker can calculate the position according to the Pythagoras Theorem.



If no beacon signal is scanned, the tracker will turn on GNSS module to get satellite signal, vice versa, if beacon signal is scanned, GNSS will be turned off.

It can be configured by CS to work in three modes:

- Periodically report mode
- Autonomous working mode
- On demand mode

### 4.2 On/Off

The tracker can be turned on/off by long period pressing the power button for 3 seconds. When push the button to power off the tracker, the red light will last for several seconds then turn off, when push

the button to power on the tracker, the red light will flash for several times then turn on.

Press the button to check whether the tracker is working, if the green "S" status light blinks, it indicates the tracker is working. The red battery light flashes during charging, and sustains when charging completed.

### 4.3 Application Scenarios

The tracker is managed with the following general rules:

- When registration request is received from the tracker,
  - If CS only wants the tracker to work in default mode, CS ignores the registration message and waits for the periodically coordinate report.
  - Or CS should record the first-time configuration, acknowledge the request. If CS contains some history configuration of the tracker and mismatch occurred, CS should send the new configuration to tracker. Then tracker updates and starts to work with these new parameters.
  
- After registration, configuration of the tracker may be changed by user. CS needs to save the new parameters and CRC16 of the parameters. In case of receiving registration when tracker reset or periodical heartbeat message, CS needs to check if any configuration mismatch occurred. If necessary, CS should send the new configuration to tracker in next downlink window.
  
- If alarm was received from tracker, CS must reply with acknowledge message to confirm.

### 4.4 Position Track

For applications, which only need the latest position of each tracker, the server can configure the tracker to report position periodically. Then when tracker reports the position, it tries three times, if fails it discards the track point and try to report new position in next period. This mode is power efficient.

### 4.5 On Demand Track

For applications only need the tracker position when user triggers the request, "on demand mode" via ONEOFF bit in tracker configuration message should be enabled from the server. In this case, other position report related configuration will be ignored.

When user triggers the position request, CS sends position request to tracker. Tracker replies firstly then enables GPS function. When coordinate is retrieved, tracker reports it to CS and CS should confirm the report.

## 5. Mechanical structure

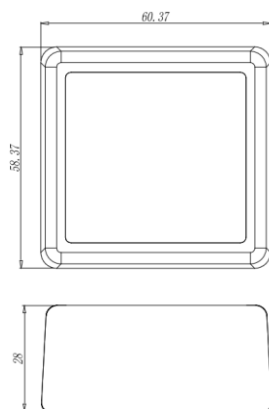


Figure 1: Dimension