ThingsMatrix: TMX-200225

TMY09 USER MANUAL

TMY09 User manual

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1. Preface

This guide provides the user with an overview of the features available on the TMY09 device. In this manual, Platform means the ThingsMatrix Service Platform.

2. Introduction

2.1 Overview

TMY09 supports LTE Cat M1 and NB1 cellular technologies as well as integrated acceleration and optical sensors to provide quick, dependable motion along with tamper detection.

Additional details are as follows:

- Easy installation without wires
- Built-in disposable lithium-ion battery with a working temperature range of -20°C to +60°C. It has an ultra-low, self-discharge rate and extremely wide temperature capability
- Ultra-low power consumption
- Compared to similar products available on the market, TMY09 is small and ideal to be easily hidden
- Integrated optical sensor to provide a tamper alert
- Supports global connectivity with embedded 4G module

2.2 Specifications

More detailed specifications are as follows:

Table 1 – TMY09 Specifications

Category	Specification	Description
Cellular Network	EDGE/GSM/GPRS	850/900/1800/1900MHz
	Cat M1/Cat NB1	B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28
Electrical	Power Supply	Non-Rechargeable Battery
	Battery	3000mAh, 3V
		8 days @ 1 report/10min 1.5 years @ 1 report/day
Physical	Size	92x58x8.4mm
	Embedded Sensors	Optical sensor
		Accelerometer
Data Transfer	Cat M1	375kbps DL; 375kbps UL
	Cat NB1	32kbps DL; 70kbps UL
	EDGE	296kbps DL; 236.8kbps UL
	GPRS	107kbps DL; 85.6kbps UL
Location	LBS	Supported
	GPS	Supported
	BeiDou	Supported
	GLONASS	Supported
	Sensitivity	Cold Start -146dbm
	Accuracy	<2.5m CEP
Environmental	Temperature	-20℃ ~ +60℃
	Humidity	95%RH
Antenna/SIM	GPS Antenna	Internal
	Cellular Antenna	Internal
	SIM Form Factor	Micro-SIM (3FF)
Certification	FCC	No
	CE	No
	PTCRB	No
Device Management	Data Monitoring	Supported
	Device Configuration	Supported
	Firmware Upgrade	Supported

2.3 Main Features and Use Cases

Table 2 – TMY09 Features

Supported Features	Configuration on the Platform required?
Intelligent Tracking	Yes
Wake-up Mechanisms	Yes
Position Monitor	No
LBS	No
Blind Zone Compensation	No
Battery Power Detection	Yes, if battery level alert is needed
Optical Sensor	No

2.3.1 Intelligent Tracking

Always On Mode can be set on the Platform in case of an emergency (e.g. theft) so that the real-time location of the device can be monitored. Upon receiving the tracking command from the Platform, the device switches into Always On Mode. In this mode, the device periodically reports the location information to the platform following a pre-configured reporting interval until a stop tracking command is received. For more details, please refer to **Chapter 3.4.1 Introduction.**

2.3.2 Multiple Wake-up Mechanisms

TMY09 supports multiple wake-up mechanisms:

- The user can set a wake-up interval on the Platform to awake the device periodically.
- The user can modify the device wake-up time schedule on the Platform in order to wake-up the device at a fixed time. A device can be configured for one wake-up time point, which is used for more accurate positioning and for a better connection to the server.
- The wake-up feature must be set and enabled from the Platform.

2.3.3 Position Monitor

The Position Monitor feature is enabled by default, which means the TMY09 will report location information in every report. The information includes: Position fix technology (LBS/GPS), longitude and latitude, cellular signal strength, battery voltage, cell ID, etc. All the device information reported is displayed on the Platform.

For further information, please refer to **Assets Management Service - Device List** section in ThingsMatrix Service Platform User Guide.

2.3.4 LBS

LBS provides the location information by utilizing the carrier network signal. It is enabled when the TMY09 does not have a GPS location information. *Please note that LBS is largely dependent on distance to surrounding network cell towers, which could be up to a few miles away in worst-case scenarios. It is not as accurate as GPS.*

This feature is enabled by default. The LBS data is displayed on the Platform. Please refer to **Assets Management Service - Device List** section in ThingsMatrix Service Platform User Guide to get further information.

2.3.5 Blind Zone Compensation

When the device enters a cellular connectivity/coverage blind zone (limited or no cellular signal), it will store the collected data according to the preconfigured reporting frequency, and will upload this data to the Platform once the cellular signal is recovered. The maximum number of blind zone compensation data reports is 4096.

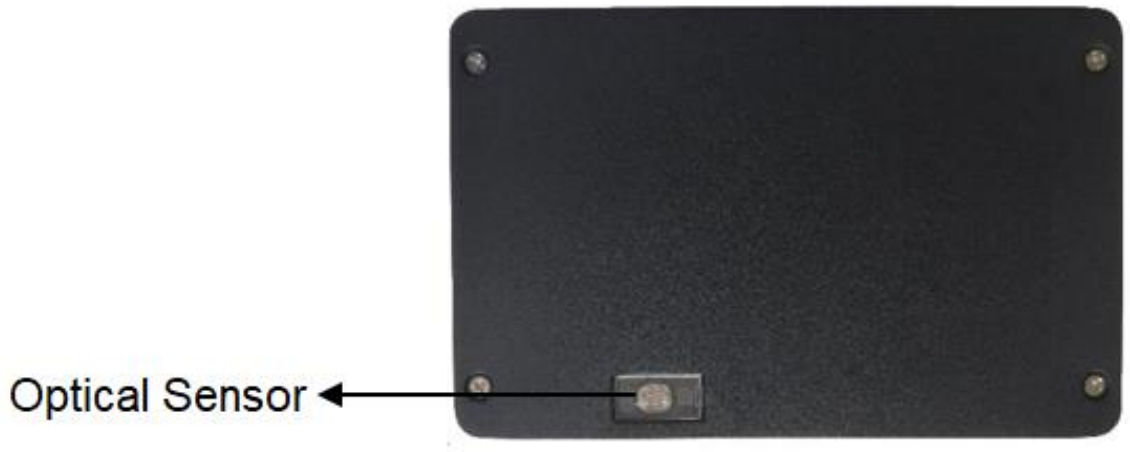
This feature is enabled by default on the Platform.

2.3.6 Battery Level Detection

The device will upload the battery level status together with the location coordinates. The battery level will be displayed on the Platform.

The device, by default, reports power information without any additional configuration on the Platform. Please refer to **Assets Management Service - Device List** section in the ThingsMatrix Service Platform User Guide to get further details. The device will report the low battery alarm to the platform when the battery power is lower than 20%. If the user wants to change the battery level alert, this can be done by configuring a policy on the Platform. Please refer to the **Data Management Service - Policy** section within the ThingsMatrix Service Platform User Guide.

2.3.7 Optical Sensor



The TMY09 has a built-in optical sensor. When the device is removed after installation and the sensor is exposed to light, it will be activated immediately and the TMY09 will send a "DEVICE_REMOVED" alarm message to the Platform, together with the current location data.

Information relevant to the "DEVICE_REMOVED" alarm is displayed on the Platform (including alert icon, alert record, etc.). Please refer to **Assets Management Service - Device List** section in ThingsMatrix Service Platform User Guide to get more details.

3 Working Modes

3.1 Introduction

The TMY09 has four working modes: Always On, Periodic, Flight, and Motion.

User can select the working mode according to a specific use scenario (refer to **Table 3**).

3.2 Usage Table

Table 3 – TMY09 Usage

Working Mode	Use Case
Always On	1. Always On Mode is used when the device needs to be active all the time and upload the location data according to the interval preconfigured by the user. 2. Always On Mode is active all the time, preventing the device to enter sleep mode, and thus increasing battery consumption.

Flight	1. Flight Mode is used for a device that will be transported on an airplane, since it will have no need for an active communication link or to report data. When Flight Mode is active and the accelerometer detects that the device is in continuous motion, it will shut down all communications until the device is in static state. At this point it will return to the timing report state. 2. The difference between Flight mode and Motion Mode is the data reporting when in continuous motion.
Motion	1. The device's default mode is Motion Mode, which is mostly used for fixed location assets (usually kept static). The report interval needs to be set according to the Motion/Static Mode. 2. The difference between Flight mode and Motion Mode is the data reporting when in continuous motion.
Periodic	Periodic Mode means the device will report the data according fixed report interval. The default value is 5 minutes.

3.3 Parameter Table

Table 4 – TMY09 Parameters

Category	Parameter	Definition	Remark
Working Mode	Mode	Work Mode	*Users can select the required working mode through the drop-down box.* *There are four options: Always On, Periodic, Flight, Motion.* For example, selecting the "Always On" option will cause the device to activate the "Always On" mode.
Generic Settings	Heartbeat timer	TCP Keepalive Timer	*Unit: second; Range: 60~14400. The default value is 120.* For example, setting the parameter "Heartbeat timer: 300" will cause the device to send a heartbeat packet to the platform every 5 minutes to notify the platform that the device is still online.
Periodic Mode Settings	Report Interval	Time interval for position information	*Unit: second. The default value is 300.* For example, setting the parameter "Report Interval: 300" will cause the device to report data every 300 seconds when the device works continuously.
	Sleep Duration	Hibernation Timer	*Unit: second. The default value is 86400.* For example, setting the parameter "Sleep Duration: 86400" will cause the device to wake up every 24 hours.
	Working Duration	Working Timer	*Unit: second. The default value is 150.* For example, setting the parameter "Working Duration: 150" will cause the device to work continuously for 150 seconds after waking up.
	Fixed Wakeup Time	Specify the next wake-up time	*Parameter format: "HH: mm".* For example, setting the parameter to "08:00" will cause the device to wake up at 8:00 and report data.
	Time zone	Time zone	Set the time zone according to the current device location. For example, setting the parameter to "UTC +08:00" will set the time zone to UTC +08:00.
Flight Mode Settings	Report Interval	Time interval of position information	*Unit: second. The default value is 300.* For example, setting the parameter "Report Interval: 300" will cause the device to report data every 300 seconds.
Always On Mode Settings	Report Interval	Time interval of position information	*Unit: second. The default value is 300.* For example, setting the parameter "Report Interval: 300" will cause the device to report data every 300 seconds.
Motion Mode Settings	Report Interval on Motion	Time interval of position information	*Unit: second. The default value is 60.* For example, setting the parameter "Report Interval on Motion: 60" will cause the device to report data every 60 seconds in Vibration Mode.

	Static Duration	Time interval of position information	*Unit: second. The default value is 150.* For example, setting the parameter "Static Duration: 150" will cause the device to report data every 150 seconds in Static Mode.
Threshold Settings	Battery	Low battery alarm boundary value	*The default value is 20.* For example, setting the parameter "battery: 30" will cause the device to report a low battery alarm to the platform when the battery power reaches 30%.
Firmware Settings	Version	Version	*Default: v1.0*
	Server	Server	*Default: ftp.thingsmatrix.io*
	Port	Port	*Default: 21*
	Username	Username	*Default: user*
	Password	Password	*Default: 123456*
	Filename	Filename	*Default: filename*
Cellular Settings	Network mode	Network Mode	*Users can select the required net mode through the drop-down box.* *There are four options: 2G and CAT-M1, CAT-M1 only, NB1 only, and All modes.* For example, setting to the "supporting CAT-M1 only" option will cause the device to activate the "CAT-M1 only" network.
Geofence	Lat	Latitude of center point of Geofence (in degrees)	*Default: 0* For example, setting the parameter "Lat: 22.490102" will set the Geofence Latitude to 22.490102 degrees.
	Lng	Longitude of center point of Geofence (in degrees)	*Default: 0* For example, setting the parameter "Lng: 113.798123" will set the Geofence Longitude to 113.798123 degrees.
	Radius	Radius of Geofence	*Default: 0ff* For example, setting the parameter "Radius: 300" will set the radius of the Geofence to 300 meters. The lat and lng parameters need to be set at the same time. If the device is outside this preset area, it will report a "POSITION_ALERT".

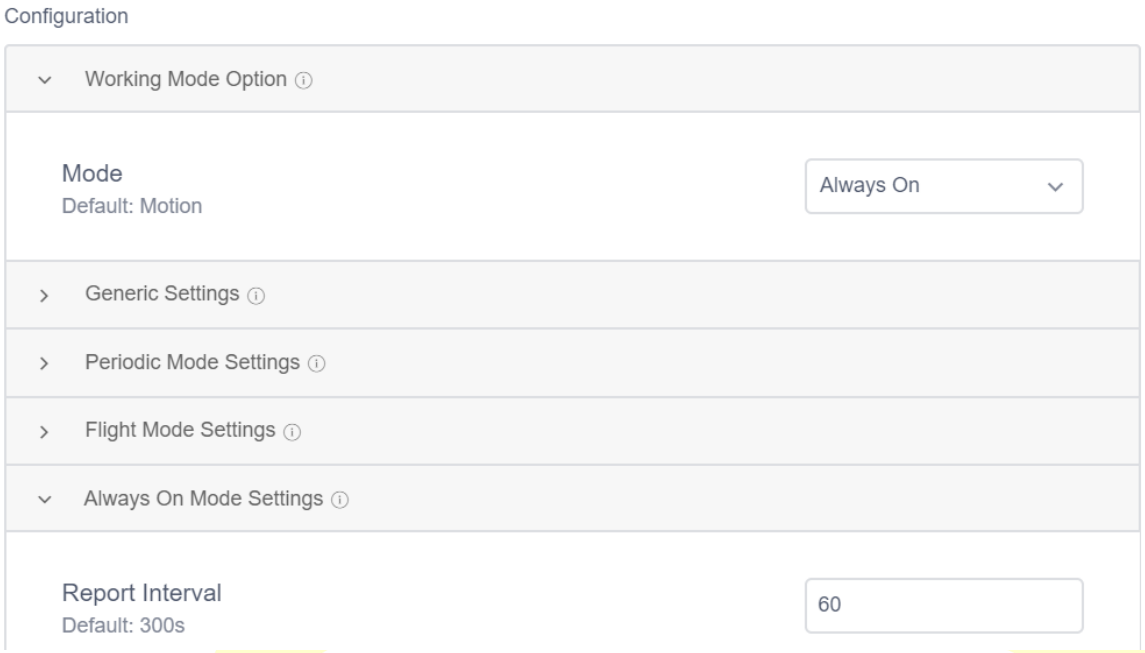
3.4 Always On Mode

3.4.1 Introduction

Always On Mode is used when the device needs to be active at all times and location data is uploaded according to the interval preconfigured by the user.

3.4.2 Configuration Example

If the device is required to report data once every 60s, then the user must select Always On Mode. The parameters of Always On Mode can be configured on the platform as shown below:



3.5 Motion Mode

3.5.1 Introduction

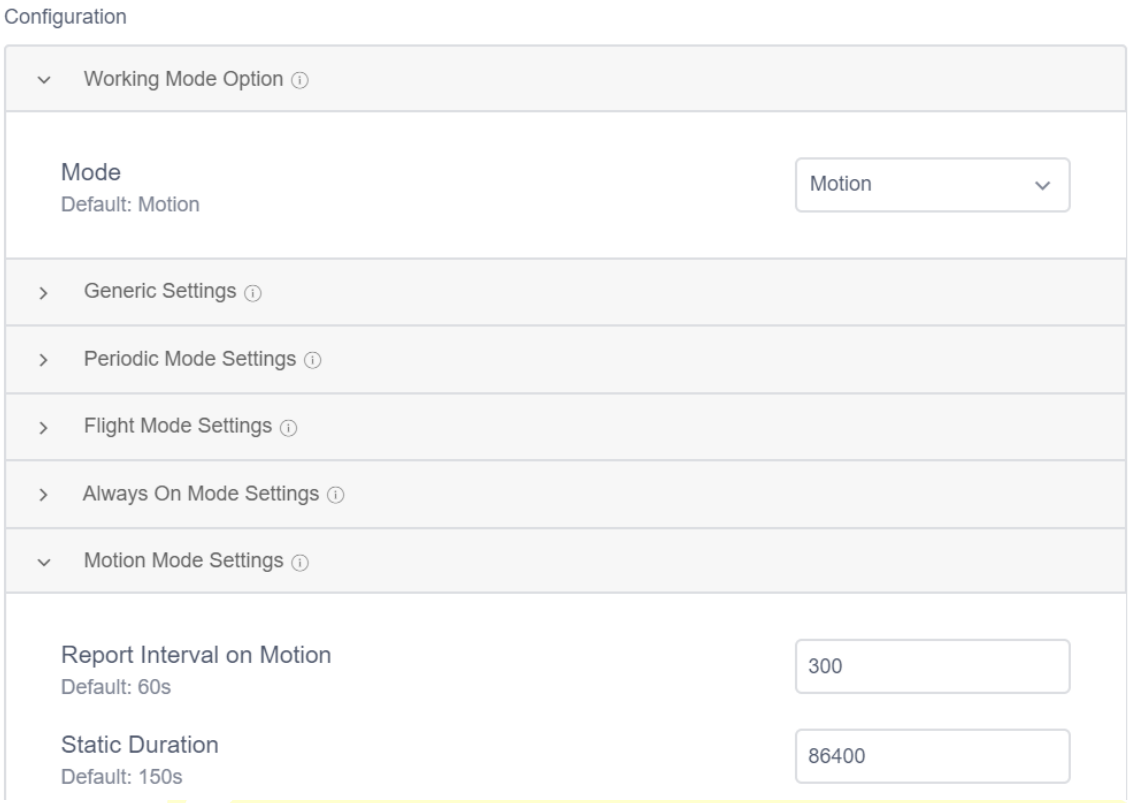
Motion Mode is used when the reporting interval needs to be changed based on an asset's mobility or fixed status.

When the device wakes up in Motion Mode and continuous vibration/motion is detected, it will report data according to the preset reporting interval.

If not moving, the device will go back to sleep.

3.5.2 Configuration Example

If the device needs to report data once every 5 minutes while in motion and once every 24 hours otherwise, the user can turn on Motion Mode and set the following parameters:



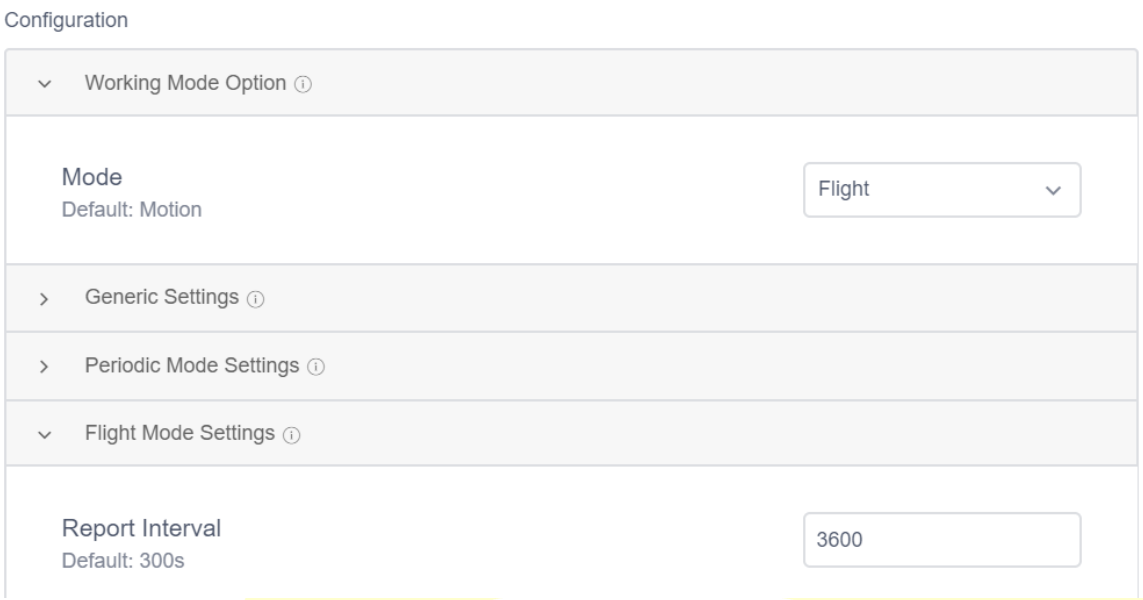
3.6 Flight Mode

3.6.1 Introduction

Flight Mode is used when a device will be transported on an airplane. If continuous motion is detected, it will shut down all communications until the device is in a static state, at which point it will return to the timing report state.

3.6.2 Configuration Example

If the device is required to run on Flight Mode and wake up every hour, then the parameters can be configured as follows:



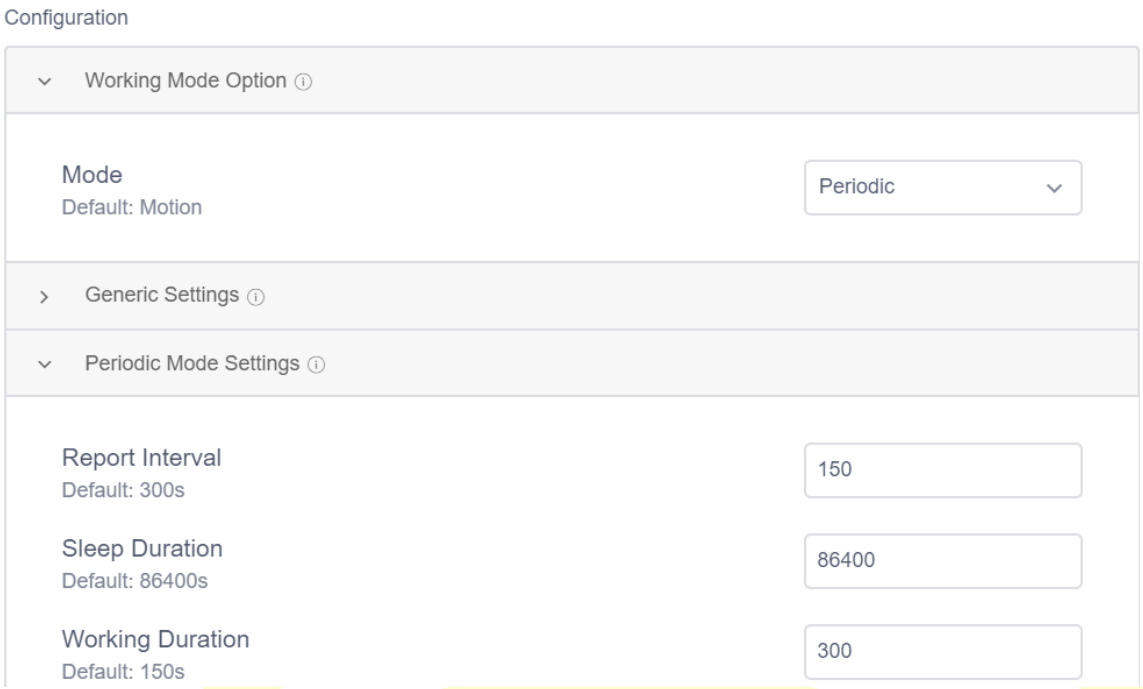
3.7 Periodic Mode

3.7.1 Introduction

In Periodic Mode the device can only report data in fixed intervals. It can be used if there are no specific requirements.

3.7.2 Configuration Example

If the device is required to wake up every 24 hours, then work continuously for 5 minutes while reporting data every 150 seconds, Periodic Mode can be configured as follows:



4 Device Data Fields

The IoT Gateway parses the data fields from the device's communication protocol and converts it to a JSON-formatted data payload. The user can view the data fields in the device's Status and Statistics tabs on the Platform or via the API. The data fields supported by the device are listed in the table below.

Table 5 – TMY09 Data Field Definitions

Field	Definition	Description
time	Time	It shows the data generated time.
lat	Latitude	It shows the latitude of the device.
lng	Longitude	It shows the longitude of the device.
altitude	Altitude	It shows the altitude of the device.
sn	Device SN	Each device will have a unique serial number for identification.
speed	Speed	It shows the speed of the device.
battery	Battery	It shows the remaining power of the battery as a percentage.
voltage	Battery Voltage	It shows the voltage of the battery.
direction	Direction	It shows the direction of the device. North begins at zero degrees clockwise.
imei	Network Module IMEI	It shows the Network Module IMEI.
iccid	SIM ICCID	It shows the SIM ICCID.
net	Network Type	It shows Mobile Network Type.
mcc	Country Code	It shows Mobile Network Country Code.
mnc	Network Code	It shows Mobile Network Code.

lac	Area Code	It shows Mobile Network Area Code.
cellId	Cell Id	It shows Mobile Network Cell ID.
signalStrength	Signal Strength (dBm)	It shows Cell Signal Strength.
gpsLocating	Location Mode	It shows the Location Mode: GPS, LBS.
firmware	Firmware Version	It shows the Firmware Version.
ipAddress	IP Address	It shows the IP Address of Connection.

5 Troubleshooting

This section provides information to help the user troubleshoot general issues with the device.

5.1 Inaccurate positioning of LBS

- Problem
  - Wrong location shown in map
- Possible cause
  - The carrier network cell tower that the device is attached to is too far
- Solution
  - Move the device around so it can acquire a GPS signal

5.2 The device is offline

- Problem
  - The device is shown as being offline
- Possible cause
  - The SIM card does not have an active subscription
  - The SIM card is inserted incorrectly
  - The device is asleep
- Solution
  - Replace the SIM card
  - Correct the SIM card installation
  - Expose optical sensor to light or turn the power off and on to wake the device up

5.3 Unable to boot

- Problem
  - The indicator light is off when the device gets powered up
- Possible cause
  - Power switch is in the OFF position
  - Battery is depleted
- Solution
  - Slide the power switch to the ON position
  - Replace the battery

5.4 No optical sensor alert

- Problem
  - The optical sensor is exposed to light but there is no LED activity and no alarm
- Possible cause
  - The light intensity is too weak
- Solution
  - Move the device to a position with more light

6 Installation Instructions

The device external appearance is as follows:

6.1 Getting Started

To use the device, the user needs to open the top cover, insert the SIM card correctly, turn the power on, and install the device in place.

The user can open the top cover by hand. There are two LED indicators under the cover: the **blue** LED shows the GPS status, and the **green** LED shows the cellular connectivity status.

Please review the following diagram for the different LED combinations.

Terminology:

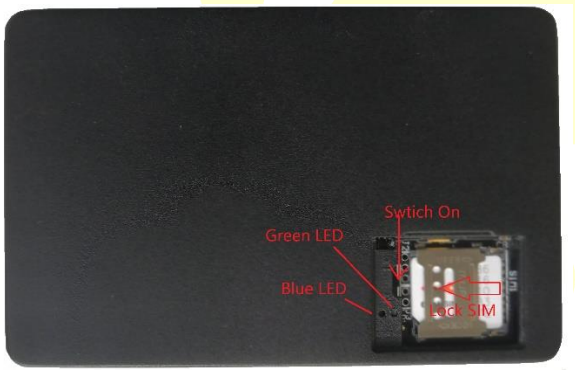
- Fast blinking: The indicator light flashes 3-5 times in 1 second
- Slow blinking: The indicator light flashes one times in 2 seconds

Green LED

- Off: Cellular module off
- Slow blinking: Acquiring cellular signal
- Fast blinking: Cellular module attached to network
- Solid On: Successfully connected to the platform

Blue LED

- Off: GPS off
- Slow blinking: Acquiring GPS location
- Solid On: GPS fix successful



6.2 SIM Card Installation

Open the SIM card holder cover, insert the SIM card into the SIM card holder.

Ensure that the SIM card is properly placed.

Close the SIM card cover.

Please take note of the ICCID on the SIM card and make sure that the SIM card has an active subscription for the required cellular network.

6.3 Device Power Up

After the SIM card is installed, move the power switch to the ON position (Please refer to the picture of section 6.1, move the power switch to the right). When the **blue** LED starts blinking, the device is powered up.

6.4 Device Installation

Close the top cover after the device is powered up.

Peel one side of the supplied 3M double sided tape and place it on the bottom of the device (optical sensor side), making sure not to cover the sensor.

Select a place where the device will be installed. Peel the other side of the tape and place it over a clean flat surface pressing down firmly.

If the device is removed, the optical sensor will be activated immediately. The Platform will display a “DEVICE_REMOVED” alarm along with the current location data.