

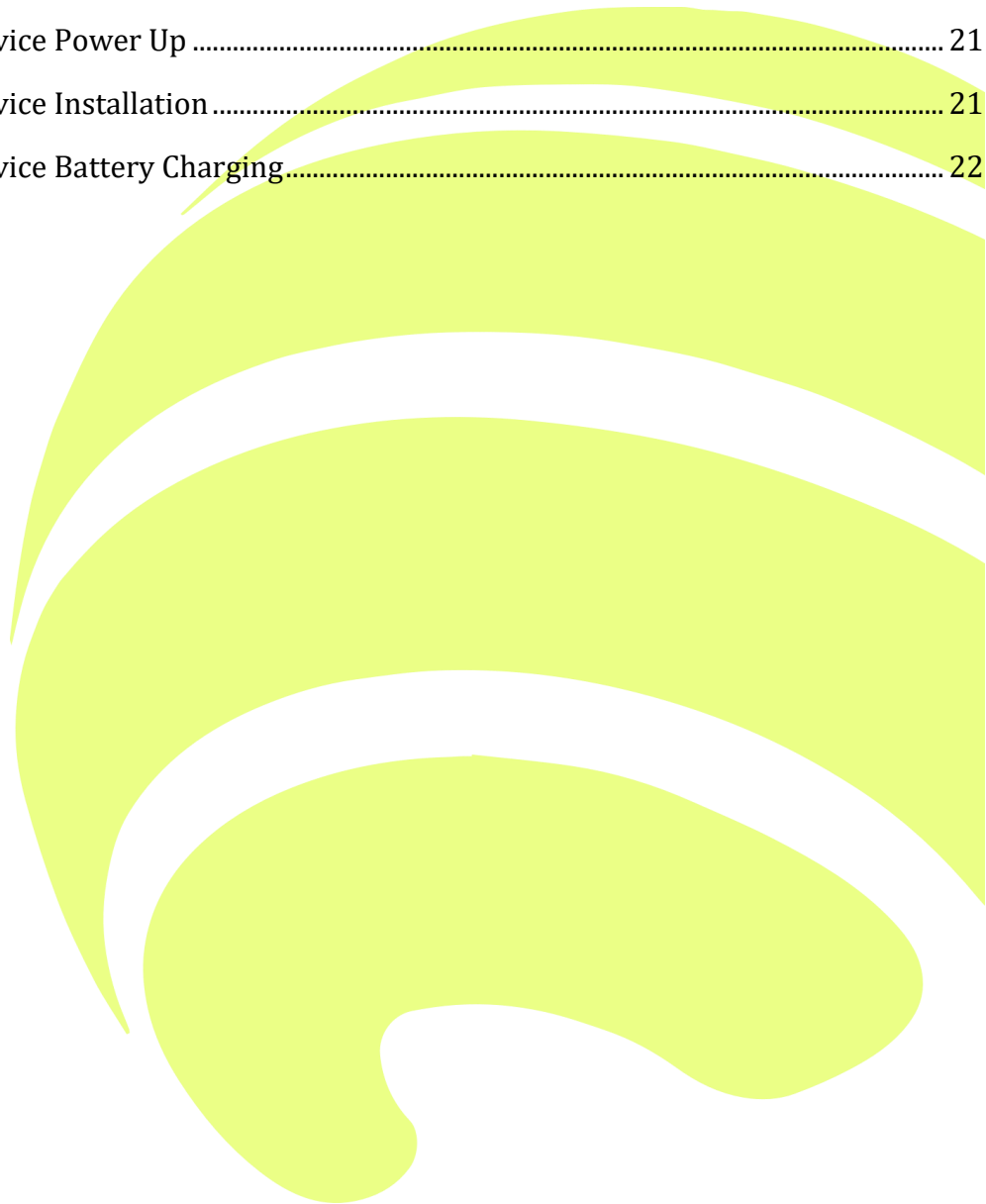


TMY10 USER MANUAL

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TMX10 User Manual

1. Preface

This guide provides the user with an overview of the features available on the TMX10 device. In this manual, Platform means the ThingsMatrix Service Platform.

2. Introduction

2.1 Overview

TMX10 is an IoT data transmission terminal. It works with iButton and other temperature and humidity sensors to achieve remote real-time monitoring and recording of the environment temperature and humidity on the site. It is applied to industries such as cold chain logistics vehicles, cold storage, medical refrigerators, and frozen food cabinets.

Additional details are as follows:

- Built-in a higher capacity rechargeable battery with a working temperature range of -20°C to +60°C
- Ultra-low power consumption
- Long battery life, working hours up to 150 hours
- Support 4G LTE Cat M1/NB/2G global frequency band
- Support terminal parameters configuration through SMS
- Support TCP/IP, UDP connection
- Support SSL/TLS encrypted transmission protocol
- Support GPS/BeiDou/GLONASS/QZSS positioning and LBS positioning

2.2 Specification

More detailed specifications are as follows:

Table 1 – TMY10 Specification

Specification Category	Specification	Description
Cellular Network	EDGE/GSM/GPRS	850/900/1800/1900MHz
	Cat M1/Cat NB1	LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28 LTE TDD: B39 (Cat.M1 Only)
Electrical	Power Supply	Rechargeable Battery
	Battery	10350mAh@3.6V Voltage range: 4.5V~18V, Max. Current 2A.
		30 days@1 report/10min
Physical	Size	94*60*35mm
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
	Galileo	Supported
	QZSS	Supported
	GPS Cold/Hot start	40s/3s
	Sensitivity	Cold Start -146dbm
	Accuracy	<2.5m CEP
Environmental	Working Temperature	-20°C ~ +60°C
	Storage Temperature	-10°C ~ +45°C
	Humidity	95%RH
Hardware	CPU	Microchip 16bit
	Charging Port	USB Type-C
	iButton Sensor Socket	RJ11
	iButton Adaptation	DS1922, DS1923
	GPS Antenna	Internal
	Cellular Antenna	Internal
	SIM Form Factor	Micro-SIM (3FF)
Protocol	TCP/UDP	Supported
Device Management	Data Monitoring	Supported

	Device Configuration	Supported
	Firmware Upgrade	Supported

Notes:

TMY10 currently only supports ibutton sensor model name: DS1922 and DS1923.

2.3 Main Features and Use Cases

Table 2 – TMY10 Feature

Supported Features	Configuration on the Platform required?
Location	No
LBS	No
Blind Zone Compensation	No
Battery Level Detection	Yes if battery level alert needs to be changed.
iButton Temperature and Humidity Reading	No

2.3.1 Location

The Location feature is enabled by default, which means the TMY10 will report location information in every data reporting. The information includes: Position fix technology (LBS/GPS), longitude and latitude, Cellular Signal Strength, battery voltage, Cell ID, temperature, humidity, etc. All the device information reported is displayed on the Platform. For example, the user can view temperature and humidity information in the device's Status and Statistics tabs on the Platform.

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

2.3.2 LBS

The LBS provides the location information by utilizing the carrier network signal. It is enabled when the TMY10 does not have GPS location information. *Please note that LBS is largely dependent on distance to surrounding network cell sites, 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.

2.3.3 Blind Zone Compensation

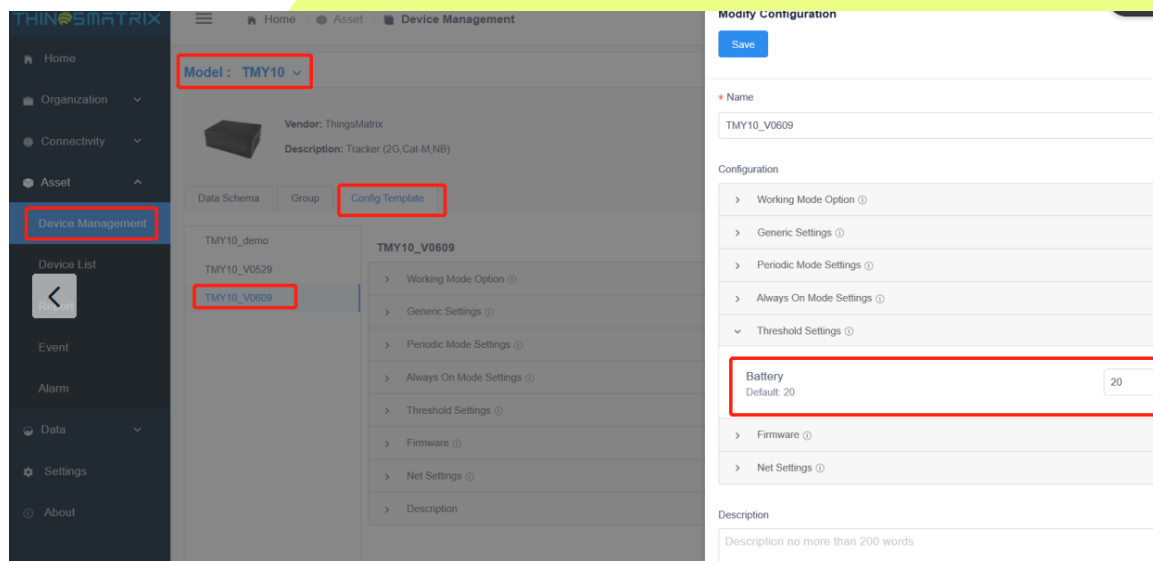
When the device enters a GPRS blind zone (limited or no cellular coverage), it will store the collected data, according to the preconfigured reporting frequency, and will upload this data to the Platform once the GPRS signal is recovered. The maximum number of blind zone compensation data is 4096.

This feature is enabled by default on the Platform.

2.3.4 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. The battery level information is displayed 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, it can be changed by configuring parameter on the Platform. Please refer to the **Data Management** section within the ThingsMatrix Service Platform User Guide.



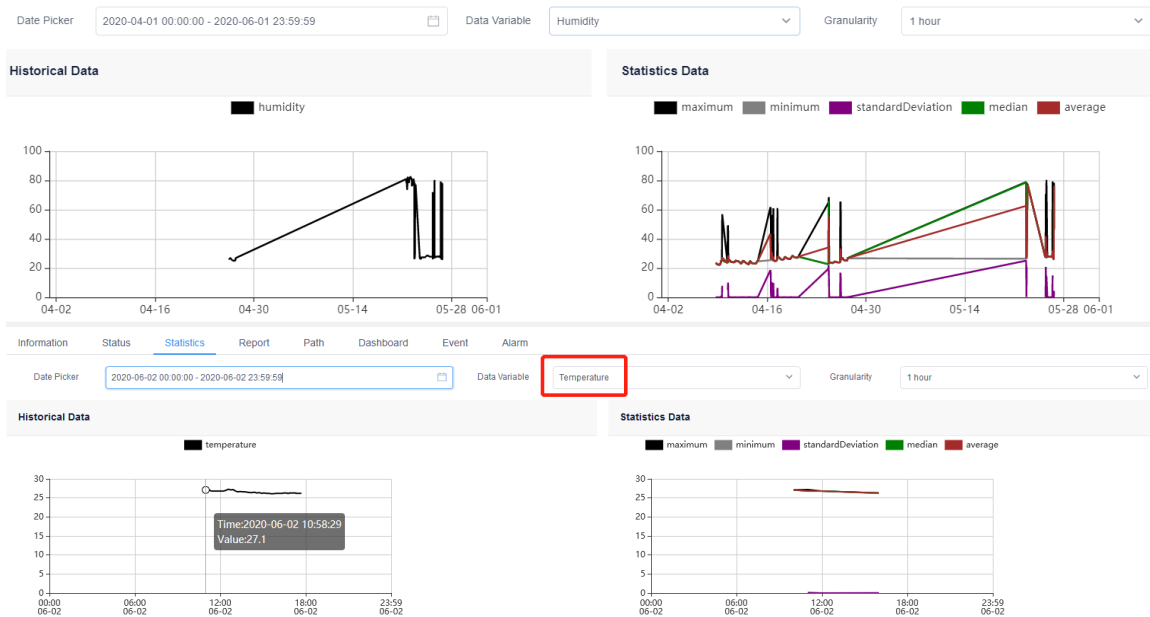
2.3.5 iButton Temperature and Humidity Reading

When iButton sensor is connected to device's RJ11 port (refer to the screenshot below), it reads temperature and humidity data following device's data transmission parameter setting. The device sends the data to Platform. When login to the account, the data can be accessed through below path: Asset >> Device List>> Status. Select the device, and the temperature and humidity data are displayed on the "Extra data" column shown as below screenshot.



Information	Status	Statistics	Report	Path	Dashboard	Event	Alarm
Status							
> Device Info							
> Device Data							
> Network Info							
v Extra Data							
① Battery on Reset Alarm							0
① Humidity							-
① Temperature							26.2C

Besides the above column, the data will also be displayed at “Statistics” column. Select the time frame at “Date picker” and then select “Temperature” at “Data Variant”. Then there will be two charts “Historical Data” and “Statistic Data” to display the information.



3 Working Mode

3.1 Introduction

The TMY10 device works at two working mode, Always on and Periodic.

3.2 Usage Table

Table 3 – TMY10 Usage

Working Mode	Use Case
Always On Mode	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.
Periodic Mode	Periodic Mode means the device will report the data according to fixed report interval.

3.3 Parameter Table

From the Device Management tab, by selecting TMY10, we can find the “Config Template”, clicking the editing button, it shows detailed configuration of below parameter table.

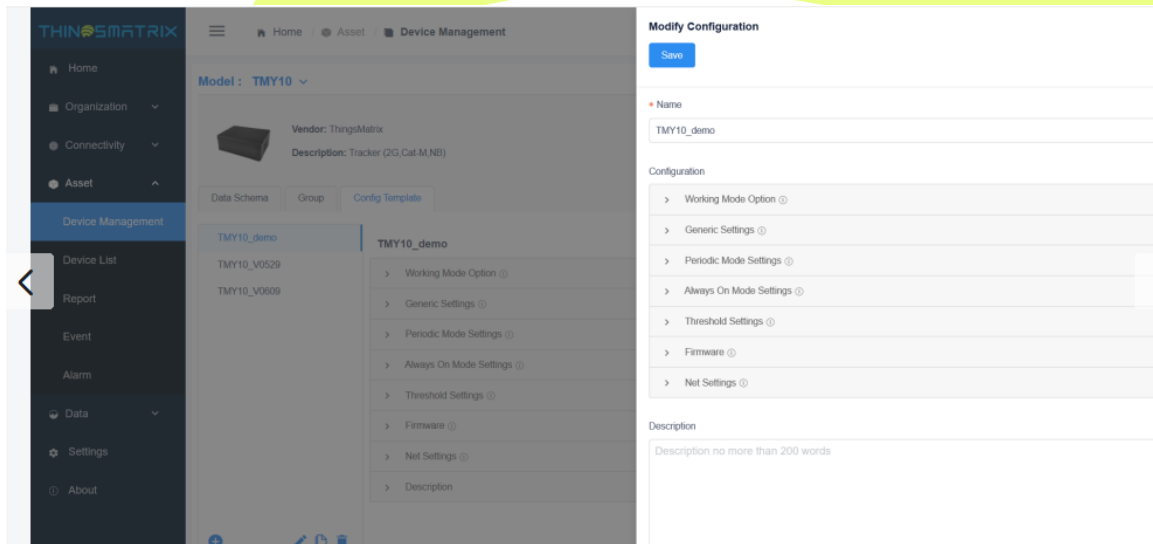
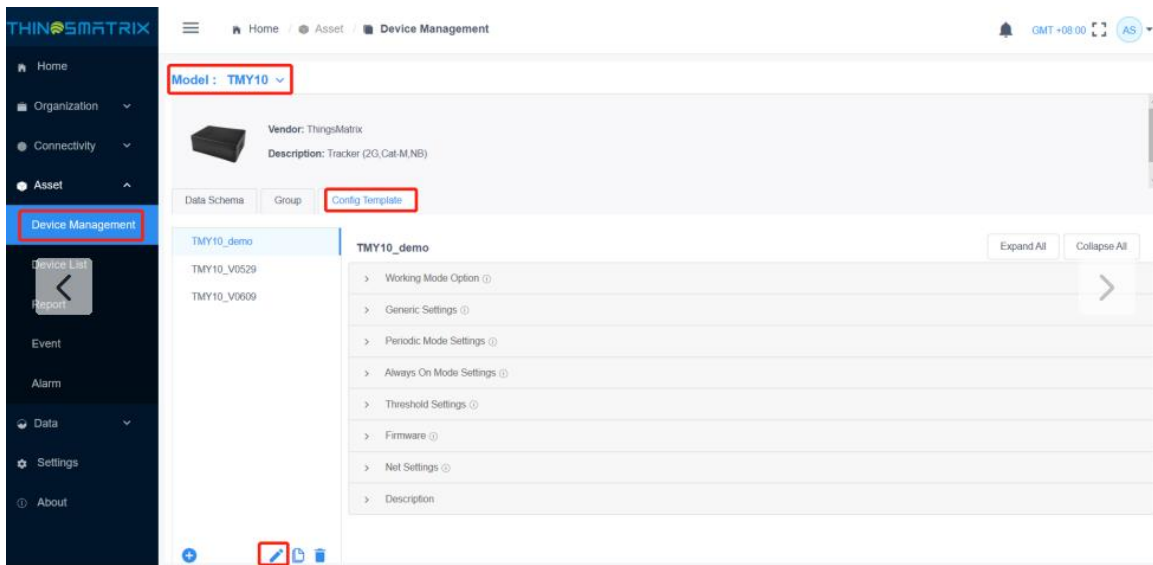


Table 4 – TMY10 Parameter

Parameter Category	Parameter	Definition	Remark
Working Mode	Periodic	Periodic mode	Users can select the required working mode through the drop-down box
	Always On	Always On mode	Users can select the required working mode through the drop-down box
Generic Setting	Heartbeat Timer	TCP Keep alive Timer	
Always on Mode setting	Report Interval		
Periodic Mode Setting	Report Interval	Report Interval	Data sending timer
	Sleep Duration	Hibernation Timer	
	Working Duration	Working Timer	
	Fixed Wakeup Timer	Device wake up time	Can specify the device wake-up time and next wake-up time
	Timezone		

firmware	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
Threshold Setting	Battery	Battery	
net_settings	net_mode	net mode	Four options: supporting 2G and CAT-M1 supporting CAT-M1 only supporting NB1 only supporting All modes

3.4 Device Working logic and Configuration

3.4.1 Introduction

The device is working in Periodic and Always On mode in most of the case, and if customer worry the asset transportation is not in planned route, the Track Now feature can help customer to have a real time monitoring with GPS position of the device.

3.4.2 Working Logic

The principle of this working logic is to ensure that data is reported according to the data transmission interval which is preferred by customer

After Device power on, at the point of timing of **Report Interval** set value, device will upload one data report, this report includes:

1. GPS/LBS location
2. Basic Device information
3. iButton Data (Temperature/Humidity)

Example with configured Value:

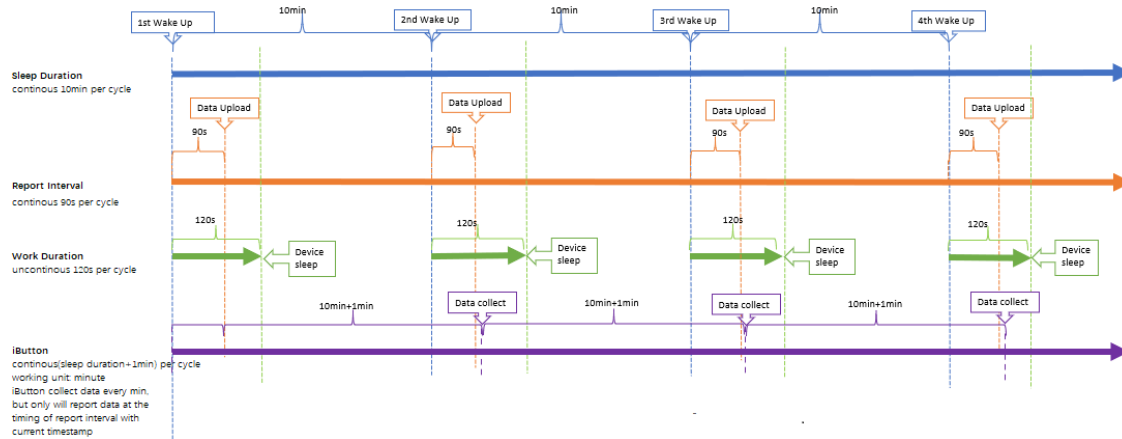
Mode: Periodic

Heartbeat Timer:600s

Report Interval:90s

Sleep Duration:10min

Working Duration:120s



Note:

The Sleep Duration clock is hard clock, it will keep continuous running, but Report Interval clock is soft clock, which is limited to Sleep Duration clock, once Sleep Duration clock triggered device wake up, the Report Interval clock will be reset and run according to the set value.

The device Work Duration Clock is a soft clock as well.

How does the iButton works with Device

Firstly, the iButton always works passively in the level of data reporting, it only reports data when device requested data. But it will keep collecting data itself actively in its own frequency. To avoid the iButton report two data within a sleep duration, the working timer must be set following "**Sleep Duration+1 min**".

Secondly, the iButton always collects data at the frequency of "Sleep timer/60s+1min", which means at the "+1min" point of timing, the iButton collects the data if there is no sudden request from device.

Once the device reached to the point of timing to upload the data, the device will stop iButton mission task, and it will check the iButton ID, if the iButton ID is same as previous one, device will upload the buffer data(if there was) and the real time data collected by iButton requested by device. If the iButton ID is not identical with previous iButton ID, the device will clear all buffer data, and request iButton to provide its new real time data.

Once data uploading completed, iButton will resume working IMMEDIATELY at next xx h:xx min:01. The iButton works and reports data within a period of Minute, not second. The calculation will start from the report timer.

The iButton's forced conversion is only executed when no mission is in progress.

About the BOR alarm of iButton

If the iButton has performed a power-on Reset. It indicates that the iButton has experienced a shock big enough to interrupt the internal battery power supply. The iButton can still appear functional, but it has lost its factory calibration. Any data found in the data-log memory should be disregarded.

End user can find below information from platform.

The screenshot displays the THINGSMATRIX web interface. On the left is a dark sidebar with navigation options: Home, Organization, Connectivity, Asset, Device Management, Device List (selected), Report, Event, Alarm, Command, and Data. The main content area is titled 'Device List' and shows a table of devices. The selected device is 'TMY10' with status 'Offline'. Below the table, the 'Status' tab is active, showing various data points: Signal Strength (-65dBm), IP Address (12.153.230.171), Area Code (9339), Network Type (GSM), and Extra Data. The 'Extra Data' section includes 'Battery on Reset Alarm' (highlighted with a red box and value 0), Humidity (-), and Temperature1 (-). A map on the right shows the device's location in a city.

3.4.3 Device Configuration

Periodic Mode

Customers have to decide what is the data transmission interval they want, 1min, 10 min, 20 min, or 30 min etc (1 to 1140 min).

If end user prefer data transmission interval ≥ 3 minutes, we suggest to select Periodic mode as the working mode, which is the best setting value to save power. The related timer default setting in platform is following:

- Net Setting: 1, Cat-M only
- Generic Settings -> Heartbeat Timer = Default: 600s
- Report Interval = 90s (default setting)
- Sleep Duration = 10min (default setting)
- Working Duration = 120s (default setting, value range 90s < Value < 86390s)

In our device side, we can treat **sleep duration** same as data transmission interval which end users want. We suggest customer can follow below setting logic to set up their own timer:

Timer	Recommended value	Setting Logic
Sleep Duration	10min	$3\text{min} \leq \text{Value} \leq 1140\text{min}$
Working Duration	120s	$90\text{s} \sim \text{Sleep Duration} - 10\text{s}$
Report Interval	90s	$\text{Working Duration} / 2 + 6\text{s} \leq \text{Report Interval} < \text{working duration}$

Always On

If end user prefer data transmission interval 1 minute or 2 minutes, we suggest to select Always On mode. The related timer default setting in platform is following:

Net Setting: 1, Cat-M only

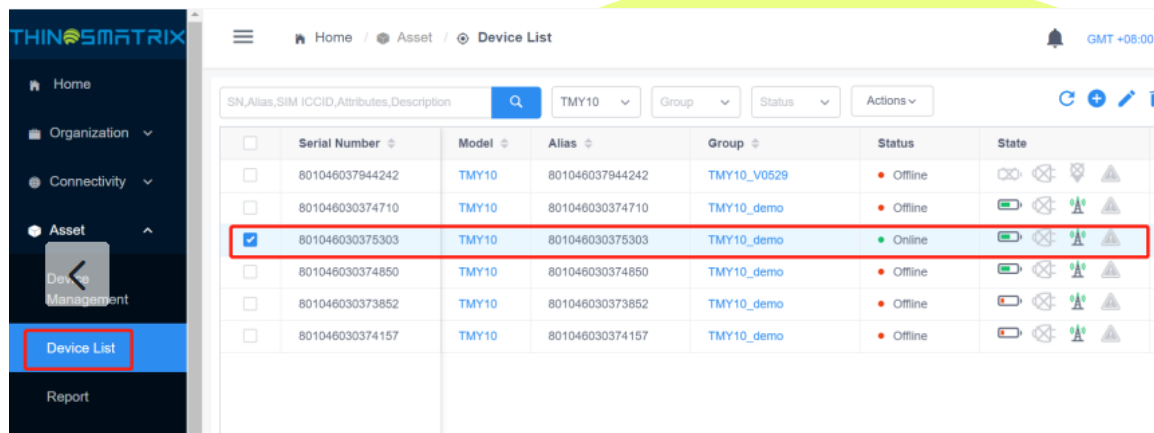
Report Interval = 2min (Default setting, value range is 1min or 2min)

In this working mode, the Report Interval is same as data transmission interval which customers want. Device will keep working and not fall into sleep. We can set up the value as below as a recommendation:

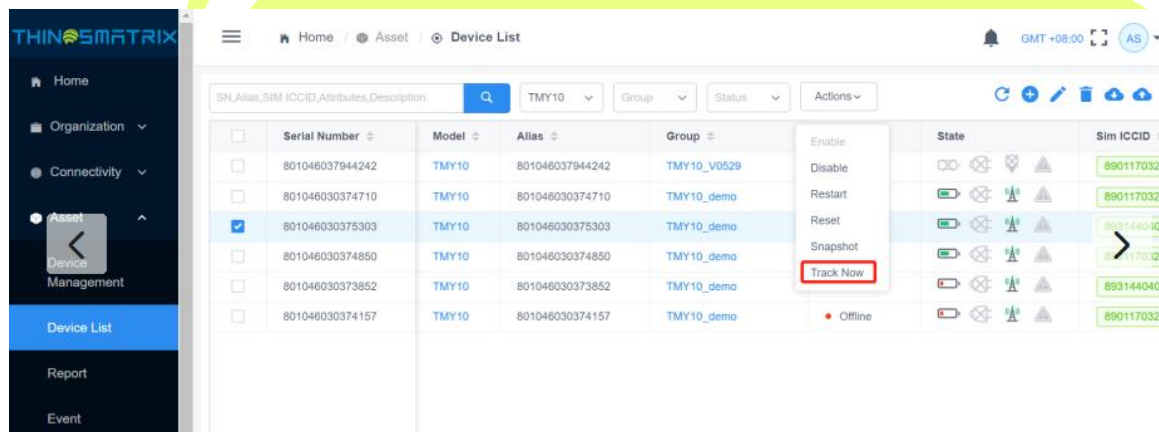
Timer	Recommended Value	Setting Logic
Report Interval	2min	1min or 2min

Track Now

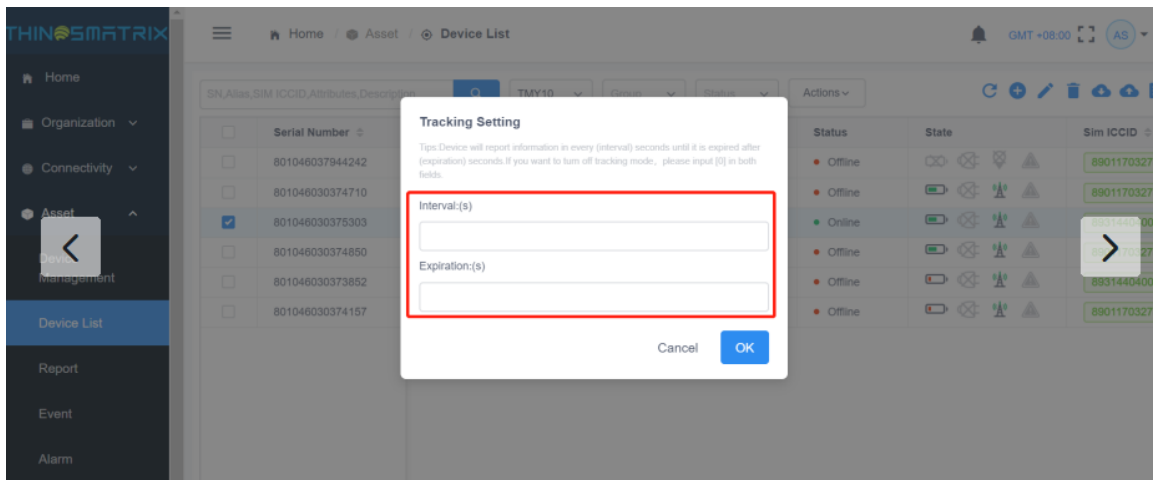
Track Now feature only happens when the device shows **online** status in the platform.



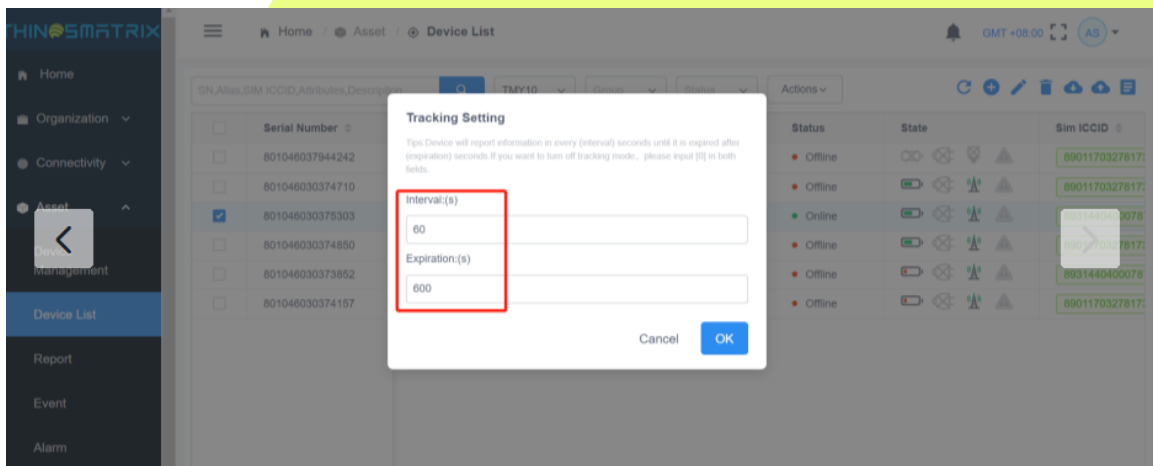
Check the device is online or not.



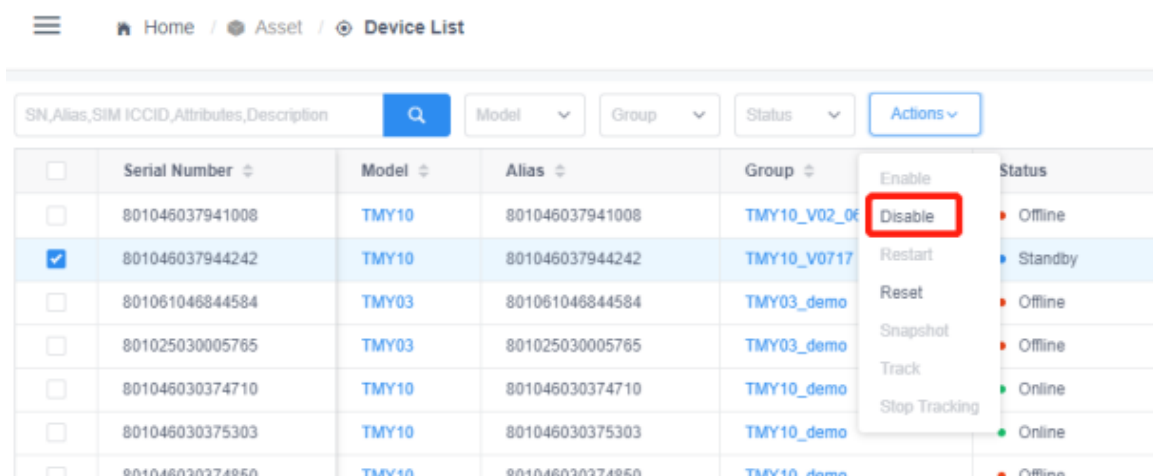
If the device is online, we can click the action button, select Track Now to do monitoring.



After clicking Track Now, end user need input the value they want.



NOTE: The DISABLE button is only used for maintenance, during the normal usage status, this button shall not be clicked.



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 – TMY10 Data Fields Definition

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. The north begins with a clockwise of 0 degree direction.
imei	Network Module IMEI	It shows the IMEI of the cellular module.
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.
temperature	Temperature	It shows the sensor's temperature reading.
humidity	Humidity	It shows the sensor's humidity reading.

5 Trouble shooting

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

5.1 Inaccurate positioning of LBS

- Problem

- Inaccurate positioning of base station.
- Possible cause
 - The location of the device's base station is automatically matched by the base station information uploaded and the location is randomly determined by the base station.
- Solution
 - Move the device around so it can acquire the GPS signal.

5.2 The device is offline

- Problem
 - The device is 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.
 - Turn off/on the power switch to wake up the device.

5.3 Unable to boot

- Problem
 - The indicator light is off when the device gets powered up.
- Possible cause
 - Power switch is turned off.
 - Battery is depleted.
- Solution
 - Turn on the power switch.
 - Recharge the battery

6 Installation Instructions

Device external views are as follows:



6.1 Getting Started

To use the device, the user needs to open the side cover by hand, insert the SIM card correctly, turn the power on, and install the device.

There are three LED indicators: the **red** LED shows the battery charge status, the **blue** LED mainly shows the GPS status, and the **green** LED mainly shows the cellular connectivity status.

Please review the following description for different LED combinations.

Battery charge **red** LED

Solid on: Charging

Off or blinking once every 350ms: charged

GPS **blue** LED

Off: GPS off

Slow blinking: During GPS positioning, BLUE LED blinks once every 1000ms.

Solid on: GPS fix successfully.

Fast blinking: BOR (Battery-on reset) alarm triggers, BLUE LED blinks once every 100ms.

Cellular Connectivity **green** LED

Off: Cellular module off

Slow blinking: After cellular module is on, GREEN LED blinks once every 1500ms.

Slow blinking: Cellular module is initialized and tries to attach to network, GREEN LED blinks once every 1000ms.

Fast blinking: After cellular module attaches to network and tries to connect to the platform, GREEN LED blinks once every 200ms.

Solid on: Successfully connects to the platform

Fast blinking: During firmware upgrade, GREEN LED blinks once every 100ms.



6.2 SIM Card Installation

Our device will embed sim card before shipment to customer, but if end user wants to replace original embedded sim card, they can open the Side cover, insert the SIM card into the SIM card holder.

Please refer to the direction of the SIM card logo and the groove to ensure that the SIM card is properly placed (The SIM card logo is faced up, and the groove is faced the upper left corner). **Otherwise, the SIM card may be locked in the SIM card holder, and in this case, the device cannot work.**



Close the Side 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 connectivity.

6.3 Device Power Up

After the SIM card is installed, move the power switch to the ON position. When the **blue** LED starts blinking, the device is powered on.

6.4 Device Installation

Close the side cover after the device is powered up.

Peel one side of the double-sided 3M tape and place it on the bottom of the device.

Peel the other side of the tape, put the device in place, and press down firmly over a clean flat surface area so that the double-sided 3M tape holds the TMX10 in place.

6.5 Device Battery Charging

1. Charge the battery after device is switched off.
2. When charging, the RED LED will be on.
3. It's recommended to use 5V2A charger.
4. Once the battery charging is completed, the RED LED will be off or blinking.

Note: Due to the protection mechanism of the design, there is random chance to see RED LED will be blinking.

