

# LW008-MT Getting Started Guide for AWS IoT Core Device Location

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# 1 Document Information

## 1.1 Naming Conventions

The term “downlink device” or “endpoint device” is used in this document to refer to a LoRaWAN device that connects to a LoRaWAN “Gateway”. The “Gateway” in turn, connects to AWS IoT Core for LoRaWAN.

## 1.2 Revision History (Version, Date, Description of change)

Version	Description	Editor	Date
1.0	Initial version	Allen	2023-10-10

# 2 About AWS IoT Core Device Location

Refer to the AWS online documentation for information about [AWS IoT Core Device Location](#) and how it works.

## 3 Overview

LW008-MT series are small size LoRaWAN Trackers that can be used for indoor and outdoor positioning, for building construction, logistics tracking or other asset tracking.

Due to the smaller size, LW008-MT series can be used to track smaller size vehicles and assets than traditional trackers. For example, small precious assets tracking, shared balance bikes tracking, shared bicycles tracking, etc.



# 4 Hardware Details

## 4.1 DataSheet

Categories	Parameter	Value
------------	-----------	-------

LoRa Wireless Specification	LoRa Protocol	LoRaWAN V1.0.3
	Lora Frequency	EU868/AU915/US915/AS923/IN865/KR920/EU433/CN470/CN779/RU864/AS923-1/AS923-2/AS923-3/AS923-4
	Tx Power	Max 21dBm
	Sensitivity	-137dBm@SF12 300bps
	LoRa Communication Distance	Up to 7 km (in urban open space)
BLE Wireless Specification	Bluetooth® (BLE)	5.0
	TX Power	Max 8 dBm
	BLE Communication Distance	Up to 50m in free space
Physical Parameter	Dimension	51.6mm×94.6mm×22.8mm
	Shell Material	ASA+PC
Power Consumption	Power Supply	Around 2000mAH available (2100mAH no-chargeable battery)
	Operating Current	< 180mA
	Sleep Current	< 12uA
Application Parameter	Operating Temperature	-40 ~ + 80℃ (To be tested)
	Operating Humidity	5%-95% (No condensation)
	IP Rating	IP67
	Certification	CE/FCC/Reach/RoHS

**Note:** For more detailed product specifications, pls contact the corresponding MOKO sales or send email to support\_lora@mokotechnology.com.

## 4.2 Standard Kit Contents

Package Information:

Item	Qty	Remark
LW008-MT	1	
double-sided adhesive	1	Used for adhesive mounting
Installation screws	2	Includes nut, spacer
Ejection Pin	1	Used for power on/off device

For reference details, please visit <https://www.mokosmart.com/lorawan-tracker-lw008-mt-mtp/>

## 4.3 User Provided items

1. You will need to provide a LoRaWAN gateway. We recommend using an AWS IoT Core for LoRaWAN qualified device (you can find one in the [AWS Partner Device Catalog](#)) or buy MKGW2-LW LoRaWAN gateway from MOKOSMART.
2. A mobile phone with the MKLoRa app (Can be download in Google Play Store or IOS APP Store) installed to configure the product parameters.

## 4.4 3<sup>rd</sup> Party purchasable items

*Not Applicable*

## 4.5 Additional Hardware References

*Not Applicable*

# 5 Setup AWS

If you don't have an AWS account, refer to the instructions in the guide [here](#). The relevant sections are [Sign up for an AWS account](#) and [Create an administrative user](#).

If you have an AWS account and administrative user already set up, proceed with the steps below.

## 6 Set up and onboard your gateway to AWS

Set up your [qualified gateway](#) following documentation provided for the gateway. Once the gateway has been set up, onboard it to AWS IoT Core for LoRaWAN following the [online instructions](#).

## 7 Set up your location tracker device

### 7.1 Device Keys

The LW008-MT is in OTAA mode in default, user can get device's DEVEUI and region/subnet from the label on the boxes, like the following picture:



And the default AppEUI of device is 70 B3 D5 7E D0 02 6B 87, the default AppKey of device is 2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F 3C.

## 7.2 Device Configuration

User can configure the parameters (Include location function switch, report interval change, etc...) via MKLoRa app. MOKOSMART will provide the LW008-MT APP guide for refer. Pls contact the corresponding MOKO sales or send email to support\_lora@mokotechnology.com.

## 8 Provision the location tracker device in AWS

### 8.1 Prerequisites

There should be enough information available about the device to provision it into the AWS IoT Core for LoRaWAN service. Steps to provision the tracker are detailed below. For additional details, refer to the AWS [LoRaWAN developer guide](#).

For the list of valid device classes and versions supported by AWS IoT Core for LoRaWAN, refer to [LoRaWAN version](#), [Activation modes](#) and [Device classes](#). You can choose any combination that is valid for your device.

### 8.2 Create a Device Profile

Device profiles define the device capabilities and boot parameters that the network server uses to set the LoRaWAN radio access service. It includes selection of parameters such as LoRa frequency band, LoRa regional parameters version, and MAC version of the device.

The instructions below use the AWS CLI. If you prefer, you can use the AWS console to create a device profile. Refer to [Add device profiles](#).

Ensure that the RF region (e.g., US915) of your device matches the gateway's RF region.

First create the file *device-profile.json* with the appropriate settings. An example is shown below for an OTAA 1.0.3 Class A device

```
% cat device-profile.json
{
  "LoRaWAN": {
    "FactoryPresetFreqsList": [],
    "MacVersion": "1.0.3",
    "MaxDutyCycle": 10,
    "MaxEirp": 15,
    "RegParamsRevision": "RP002-1.0.1",
    "RfRegion": "US915",
    "RxDataRate2": 8,
    "RxDelay1": 1,
    "RxDrOffset1": 0,
    "RxFreq2": 9233000,
    "Supports32BitFCnt": true,
    "SupportsClassB": false,
    "SupportsClassC": false,
    "SupportsJoin": true
  },
  "Name": "testDeviceProfile"
}
```

Use the AWS CLI to create the device profile.

```
% aws iotwireless create-device-profile --cli-input-json file://device-profile.json
```

Sample output:

```
{
  "Arn": "arn:aws:iotwireless:your-account-id:your-account-id:DeviceProfile/your-device-profile-id",
  "Id": "your-device-profile-id"
}
```

Save the value of *your-device-profile-id* for later use.

### 8.3 Create a Service Profile

Create a service profile with `AddGwMetadata=true` so that you will receive additional gateway metadata such as RSSI and SNR for each payload.

```
% aws iotwireless create-service-profile --lorawan AddGwMetadata=true --name "testServiceProfile"
```

Sample output:

```
{
  "Arn": "arn:aws:iotwireless:your-region:your-account-id:ServiceProfile/your-service-profile-id",
  "Id": "your-service-profile-id"
}
```

Save the value of *your-service-profile-id* for later use.

### 8.4 Create uplink and location destinations

An AWS IoT Core for LoRaWAN destination allows you to either define an AWS IoT rule that processes a device's messages for use by AWS services, or send the message directly to an MQTT topic. In the steps below, we will send the message directly to an MQTT topic. Refer to the [online guide](#) for more details.

Create the following two destinations:

1. An uplink destination to route the raw messages from the device and publish it to the topic *testUplinkTopic*
2. A location destination to route the solved location data from the service to the topic *testLocationTopic*.

To create the destinations, you first need an IAM role – follow the instructions in the section [Create an IAM role](#) below.

#### 8.4.1 Create an IAM role

AWS IoT Core for LoRaWAN destinations require IAM roles (you can use the same role for both destinations) that give AWS IoT Core for LoRaWAN the permissions necessary to send data to the destination topic.

To create this IAM role, follow the instructions in the sections **To create an IAM policy for your AWS IoT Core for LoRaWAN destination role**, and **To create an IAM role for an AWS IoT Core for LoRaWAN destination** as detailed online at [Create an IAM role for your destinations](#).

For **Role name**, use *testDestinationRoleName*. Once the role has been created, save the ARN associated with this role for later use.

#### 8.4.2 Create the uplink and location destinations

Using the AWS CLI, create the uplink destination:

```
% aws iotwireless create-destination --name "testUplinkDestination" --expression-type "MqttTopic" --expression "testUplinkTopic" --role-arn "arn:aws:iam::your-account-id:role/testDestinationRoleName"
```

Sample output:

```
{
  "Arn": "arn:aws:iotwireless:your-region:your-account-id:Destination/testUplinkDestination",
  "Name": "testUplinkDestination"
}
```

Using the AWS CLI, create the location destination, using the same role:

```
% aws iotwireless create-destination --name "testLocationDestination" --expression-type "MqttTopic" --expression
"testLocationTopic" --role-arn "arn:aws:iam::your-account-id:role/testDestinationRoleName"
```

Sample output:

```
{
  "Arn": "arn:aws:iotwireless:your-region:your-account-id:Destination/testLocationDestination",
  "Name": "testLocationDestination"
}
```

### 8.4.3 Create the device in AWS IoT

The device can now be created using the above resources.

While creating the device, you have to specify the configuration for the tracker and specify the geolocation frame port (Fport), which is used by AWS IoT Core for LoRaWAN to pass the Wi-Fi / GNSS scan data to the AWS IoT Core Device Location service.

Create a file with the name *wireless-device.json* and specify the configuration in the file as shown below. Note that “Positioning” must be set to “Enabled”, and FPort must be 199.

```
% cat wireless-device.json
```

```
{
  "ClientRequestToken": "1234",
  "Description": "Device qualification testing",
  "DestinationName": "testUplinkDestination",
  "LoRaWAN": {
    "DevEui": "your-DevEui",
    "DeviceProfileId": "your-device-profile-id",
    "ServiceProfileId": "your-service-profile-id"
  },
  "FPorts": {
    "Applications": [
      {
        "DestinationName": "testLocationDestination",
        "FPort": 199,
        "Type": "SemtechGeolocation"
      }
    ]
  },
  "OtaaV1_0_x": {
    "AppEui": "...", // received after claiming the device
    "AppKey": "...", // received after claiming the device
  },
  "Name": "Qualification Test Device",
  "Positioning": "Enabled",
  "Type": "LoRaWAN"
}
```

```
}
```

Using the AWS CLI, create the wireless device.

```
% aws iotwireless create-wireless-device --cli-input-json file://wireless-device.json
```

Sample output:

```
{
  "Arn": "arn:aws:iotwireless:your-region:your-account-id:WirelessDevice/your-wireless-device-id",
  "Id": "your-wireless-device-id"
}
```

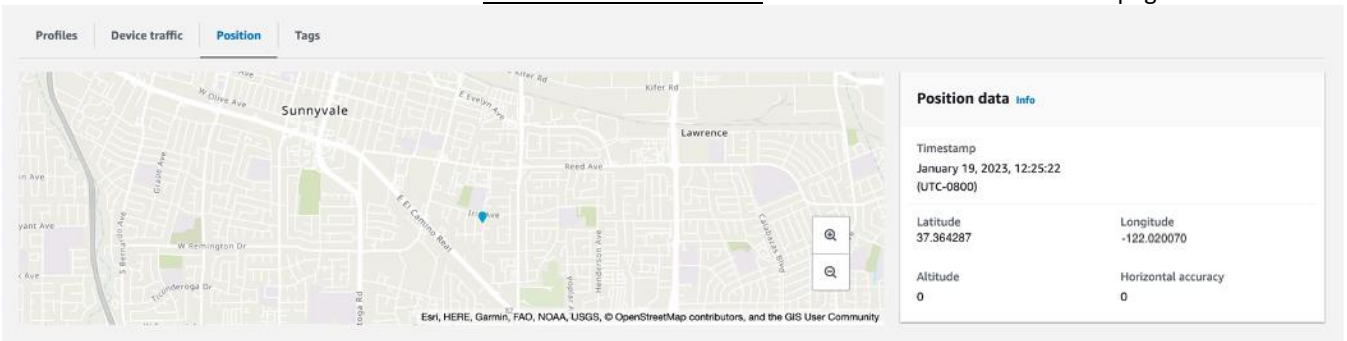
Save the value of *your-wireless-device-id* for later use.

Check that the device has connected successfully using the instructions at [Check device connection status using the console](#).

## 9 Verify Operation with AWS IoT Core Device Location

### 9.1 Check the location via AWS Console map

The device location can be visualized on the [AWS IoT Wireless console](#) in the Position tab of the device page:



### 9.2 Check the location using AWS CLI

Once the device location is solved, the last known position of the device is updated and invoking the [get-resource-position](#) command will yield the coordinates, along with any accuracy value.

The command should specify the resource-identifier of your wireless device. Use the value of *your-wireless-device-id* from the section [Create the device](#) or determine it using the [list-wireless-devices](#) command.

```
% aws iotwireless list-wireless-devices
```

Sample output:

```
{
  "WirelessDeviceList": [
    {
      "Name": "myLoRaWANDevice",
      "DestinationName": "IoTWirelessDestination",
      "Id": "your-wireless-device-id",
      "Type": "LoRaWAN",
      "LoRaWAN": {
        "DevEui": "ac12efc654d23fc2"
      }
    }
  ],
}
```



```

    "Arn": "arn:aws:iotwireless:us-east-1:123456789012:WirelessDevice/your-wireless-device-id"
  }
}

```

The output of the `get-resource-position` command will be in GeoJSON format and will need to be stored in an output file.

```
% aws iotwireless get-resource-position --resource-identifier your-wireless-device-id --resource-type
WirelessDevice outfile.geojson
```

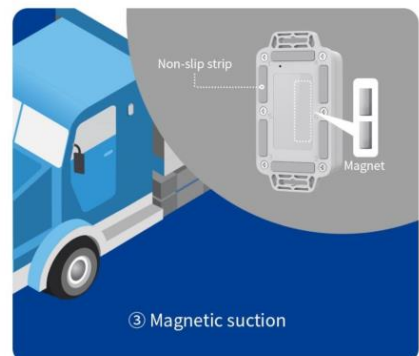
```
% cat outfile.geojson | jq
{
  "coordinates": [
    -122.020070,
    37.364287,
    0
  ],
  "type": "Point",
  "properties": {
    "verticalAccuracy": 0,
    "horizontalAccuracy": 0,
    "timestamp": "Thu Jan 19 20:25:22 UTC 2023"
  }
}

```

## 10 Troubleshooting

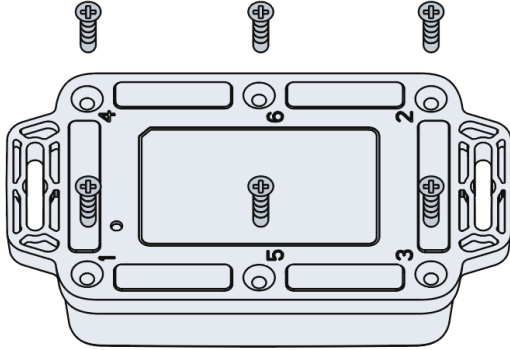
### 10.1 How to install LW008-MT Series

Multiple installation options of LW008-MT series like hanging with screws, double-sided sticker, tape or magnetic(optional) can be selected by user.



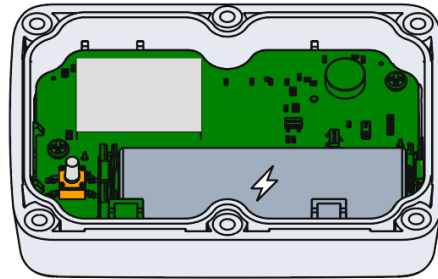
### 10.2 How to change battery

Disassemble flow:



Step1: Remove the screws on the bottom of the device by order (Start with position 1, 1-2-3-4-5-6, end with position 6).

Step2: Remove the back cover.

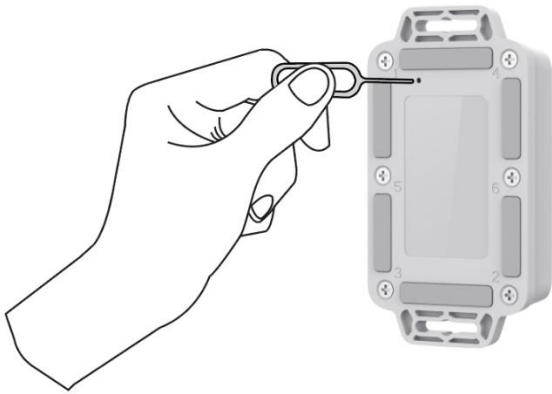


Step3: Change the battery, and must click Battery reset ([Please ask us to provide the battery reset procedure before replacing the battery](#)) via MKI oRa APP otherwise the low power prompt will be abnormal

### 10.3 How to power on LW008-MT Series

There is one way to power on LW008-MT series.

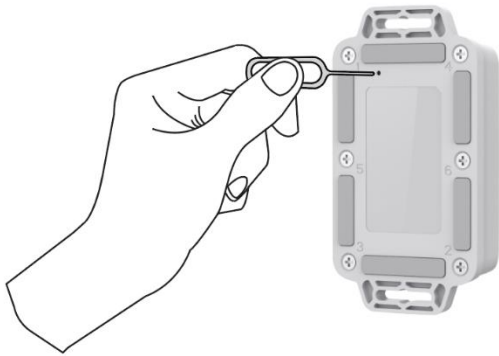
**Power button:** Users can use a non-sharp tool to press the power button on the back of the product and the device will turn on and off after 3s. (Prohibit the direct use of tweezers and other sharp tools)



## 10.4 How to power off LW008-MT Series

There are three ways to power off LW008-MT series:

1. By Power button: Users can use a non-sharp tool to press the power button on the back of the product and the device will turn on and off after 3s. (Prohibit the direct use of tweezers and other sharp tools)



2. Turn off the device via MKLoRa APP
3. Turn off the device via LoRa Downlink Command

## 10.5 How to enable Bluetooth connect function

The device can make a Bluetooth broadcast and can be connected in the following two cases.

1. Within the first N minutes after the device is turned back on.

2. LoRaWAN server sends LoRa command to turn on Bluetooth broadcast for N minutes.

**Note:** *N is the broadcast timeout time which can be set via MKLoRa APP, the unit is s, can be configured by the user. If the device is successfully connected and then disconnected, the broadcast timeout will be refreshed, and the user can choose to establish Bluetooth connection with the device again within this time.*

## 10.6 How to connect to APP and configure parameters

Please download “MKLoRa” APP from app store directly. For more configuration details, please refer to *LW008- MT series APP Guide*.

## 11 Additional Software References

Product page: <https://www.mokosmart.com/lorawan-tracker-lw008-mt-mtp/>