LW009-SM
User Manual

Version 1.0

MOKO TECHNOLOGY LTD.

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1 Overview

LW009-SM wireless surface-mounting vehicle detector is a wireless sensor that meet LoRaWAN long-distance wireless standard, it integrated with geomagnetic sensor and microwave radar sensor.

Using effective dual-mode joint algorithm, the detector realizes precise parking spot detecting function and can be widely used in intelligent traffic, smart community, smart parking and other applications.

It is compatible with LoRaWAN protocol, can communicate with gateway which compatible with LoRaWAN protocol.

The data collected by the detector and transferred to application platform can be explained, detailed information please refer to *LW009-SM application protocol*.

2 Product Features

- High detection precision, adjustable detection threshold
- Build-in intelligent procession, Automatic drift compensation, stable and reliable performance
- Long wireless transmission distance
- Transmission parameters can be set optional
- Parameters can be configured by app via Bluetooth
- Low power consumption, long battery life
- Compact size, easy to install
- In built Temperature and Humidity sensor to measure if the road is frozen
- Optional - External mounting cradle available for using glue to mounting the unit on the road to avoid drilling hole
- Optional - Reflective warning stickers to increase the visibility of the sensor to avoid any inattention accident happen

3 Main Function

- Report parking state timely
- Low power prompt
- Detector failure alarm
- Report working states regularly
- OTA supported via Bluetooth
- Support reset and calibration automatically or manually

4 Application Scenarios

- Industrial parks
- On road parking space
- Commercial parking slot
- Other public parking slot

Note: *The strong magnetic field or the field where magnetic varies greatly are not suitable for the detector use.*

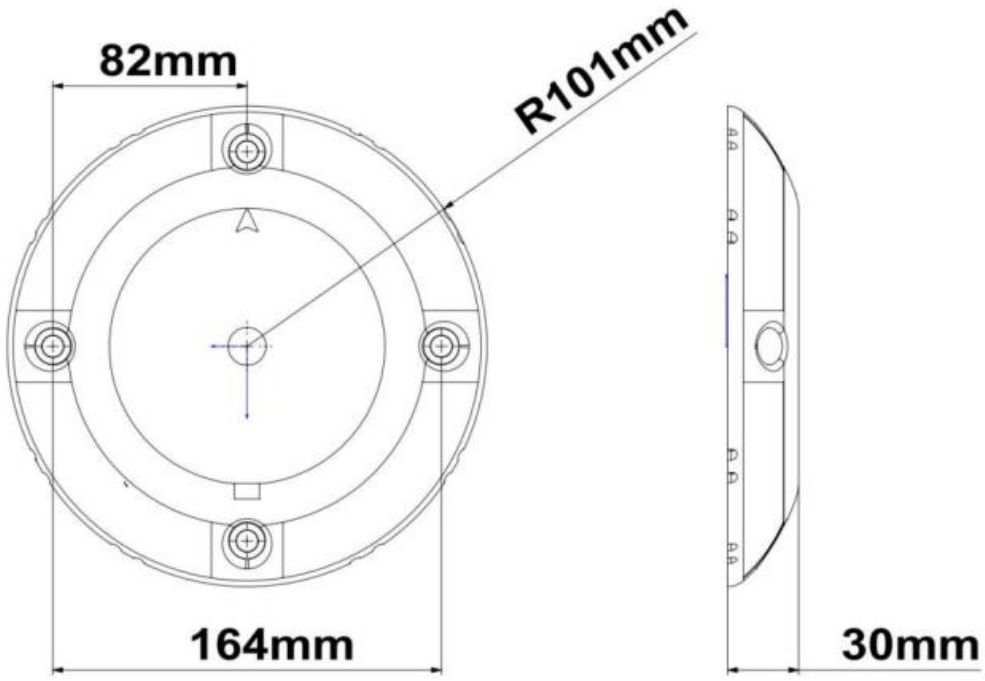
5 Product Specifications

Categories	Parameter	Value
LoRa Wireless Specification	LoRa Protocol	LoRaWAN V1.0.3 Class A
	Lora Frequency	EU868/AS923
	Spreading Factor	125 kHz ~ 500 kHz
	Tx Power	Max 17dBm
	Sensitivity	-135 dBm （SF12, 125KHz）
	LoRa Communication Distance	Up to 500m ~1000m (Depends on actual environment)
Performance Specification	Detection Accuracy	>99%
	Detection Algorithm	Dual mode -Three-axis joint detection algorithm and Radar
	Installation Method	Surface-Mounting Type
	Upgrade Method	Remote Wireless upgrade
	State Monitor	Low voltage alarm, hardware error alarm, Strong magnetic disturbance alarm
	Power Supply	Built-in 3.6V Lithium battery, 20Ah
	Bluetooth switch	Magnetic trigger
	Life Duration	5 years under typical scenarios
Physical Specification	Protection level	IP68
	Dimension	Φ: 202mm, H: 30mm
	Weight	600g
	Force Resistance	10 tons
Application Specification	Power Switch	Wake-up via Bluetooth
	Operation Temperature/ Storage Temperature	-40℃ ~ 85℃
	Operation Humidity	10%~90%

	Operating Environment Requirement	No ferromagnetic materials, No strong magnetic field nearby; No metal shield covers the detector

Note: Typical scenario means the device report information every 12 hours, there are 5 times for vehicles come in and go out to a parking space a day.

6 Product Appearance



7 Working Principle

The frame and shell of a car are made of ferromagnetic material (various types of steel), which will make disturbance to surrounding magnetic field. According to this characteristic, LW009-SM determines whether there is a car in the parking space.

With build-in dual-sensors (geomagnetic sensor and microwave radar sensor), powerful signal analysis and processing algorithm. The product can work out redundant enhanced information, especially acquire complementary and optimization to the reverse sensitivity characteristic s of chassis with different height.

Compared to traditional parking sensor with single sensor, LW009-SM greatly improved the detection accuracy and reduced information loss.

8 Installation Guide

8.1 Installation Preparation

1.Please try to install the device on the daytime and finish the installation as soon as possible.

2.Please pay attention to road safety and wear reflective clothes for safety.

3.Installation Tool Preparation:

- ✧ Ruler: Measure the installation position
- ✧ Marking pen: mark the installation position
- ✧ Coring bit
- ✧ Blower: blow away the powder

4. Product installation orientation requirements

The direction of the arrow above the device should be at 90 degrees angle to the front of the vehicle, as shown in following figure, both mounting directions are recommended. Geomagnetic The detector must be installed in the required direction, otherwise there may be a possibility of false alarms.

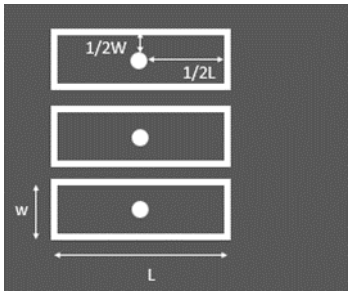
8.2 Installation Steps

Step 1: Product Check

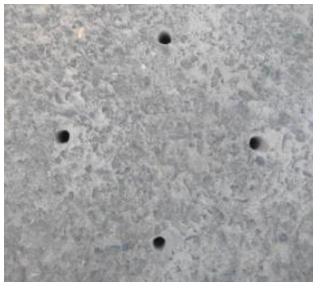
Take out the product and make sure appearance is not damaged. Check if the label pastes tight on the product and label information (include the DevEUI and other parameters which used to device registration) is clear.

Step 2: Drill Hole

Find and mark the center of the desired detector location.



Drill four holes (Depth: around 60 mm; Diameter: around 8 mm) into the road.



Step 3: Install Expansion Bolts

Install the four expansion bolts separately to the device.

Step 4: Place the Device

Place the LW009-SM face up with the 4 expansion bolts aligned with the 4 mounting holes in Figure 3. Press the 4 expansion bolts into these 4 mounting holes so that the bottom surface of the LW009-SM is tight against the road surface and there is no gap between the underside of the bolt cap and the device, then lock the bolts with an Allen screwdriver.

9 Quick Start Guide

To facilitate the configuration and use of the LW009-SM, the product can be configured and calibrated using the corresponding configuration APP (Moko will provide APK of configuration APP).

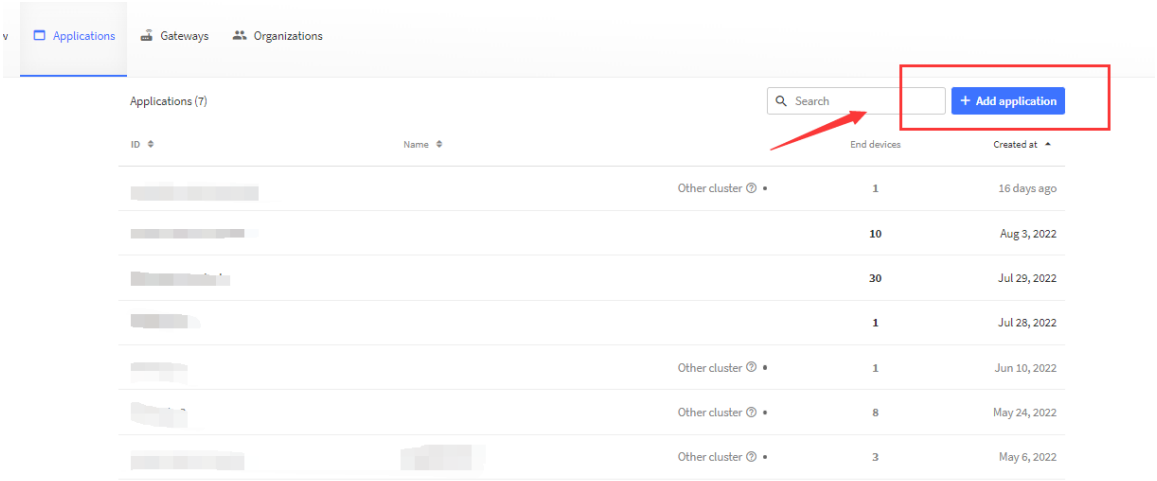
Note: After the successful installation of the APP, the APP will request some mobile phone permissions, such as Bluetooth access permissions. Please click "OK", otherwise the APP will not work well.

9.1 Register the Device on Network Server

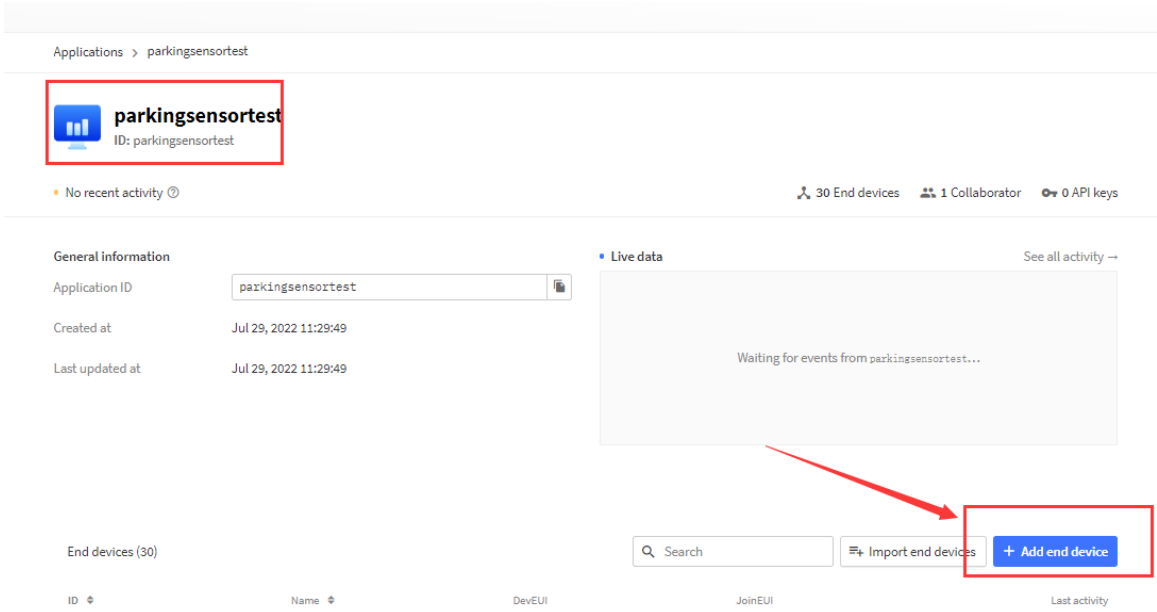
The TTN server is used here as an example

Step 1: The LoRaWAN mode of LW009-SM is OTAA mode in default. MOKO will provide the LoRaWAN access parameters, which includes DEVEUI, DEVADDR, AppSkey and NwkSKey.

Stpe2: Open TTN page, then register the applications



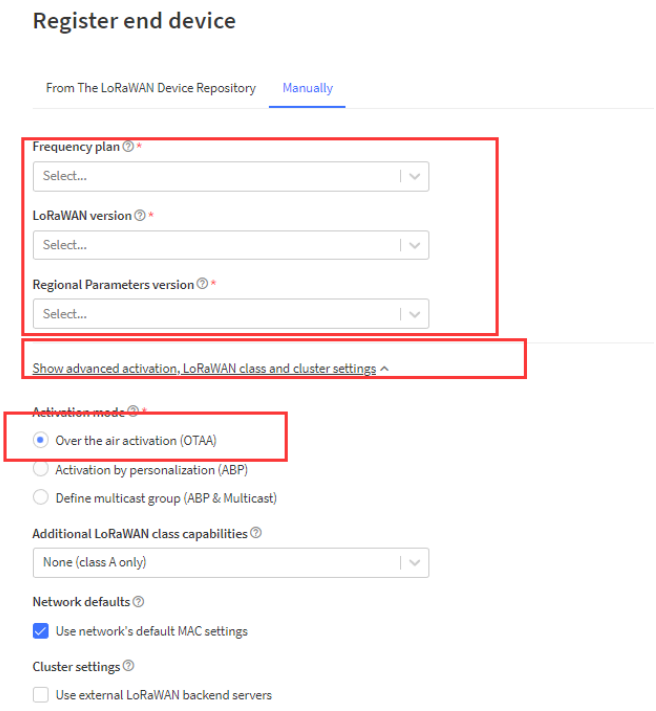
Step 3: Click “Add end device” on application page.



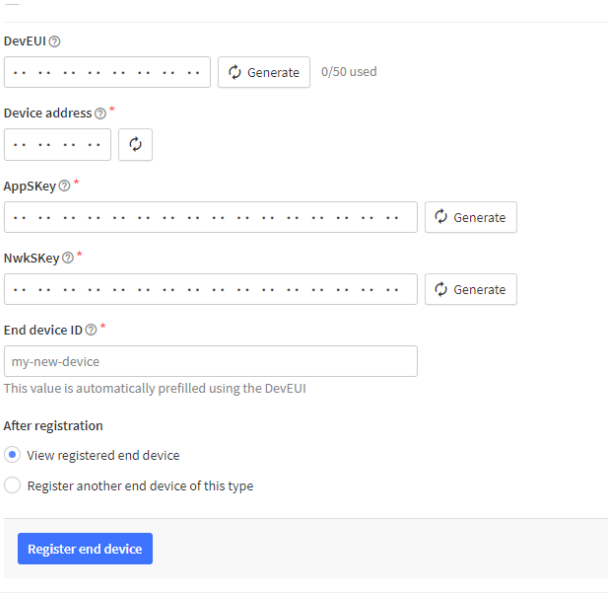
And select “Manually” on register interface.

Then select the corresponding frequency band, choose ABP mode on activation mode and the LoRaWAN version is V1.0.3.

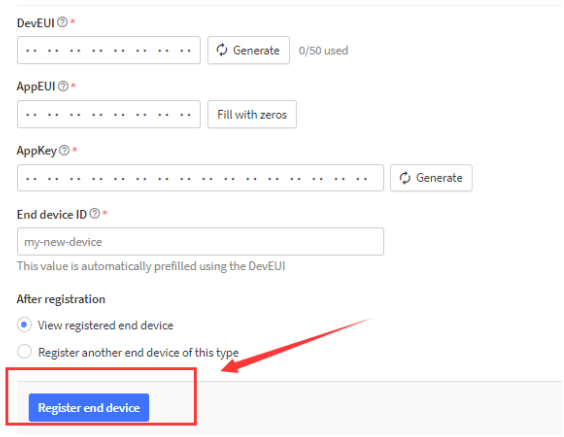
Note: *If you use EU868, pls select Europe 863-870 MHz (SF12 for RX2).*



Step 4: According to the information obtained from Step1, fill in the corresponding LoRaWAN access parameters.



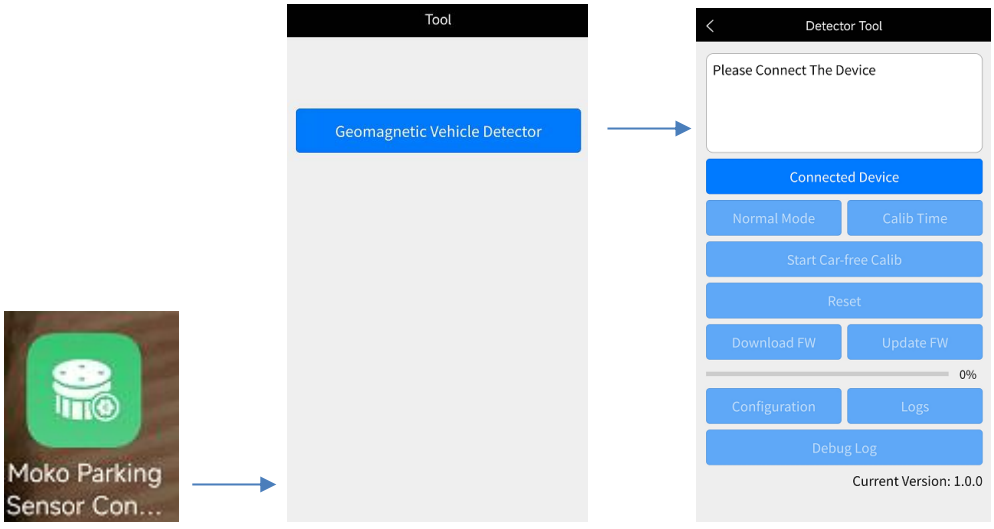
Step 5: Click “Register end device” on the bottom of page.



9.2 Activate the Device

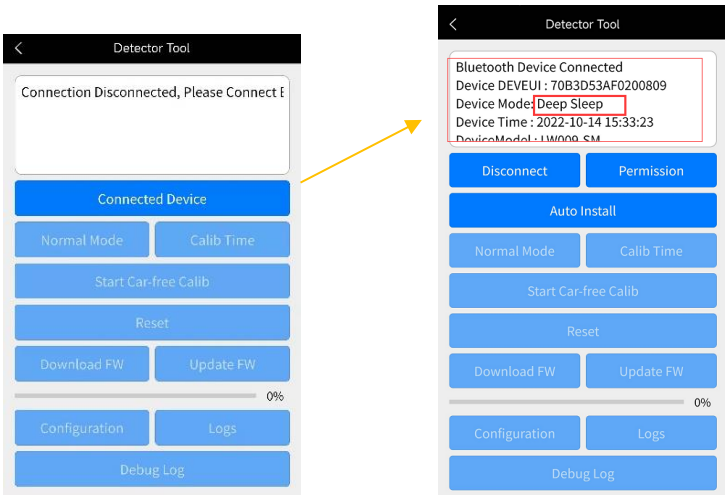
Step 1: Turn on phone’s Bluetooth function

Step 2: Open the configuration app “Moko Parking Sensor Configure Tools” and come into detector tool interface

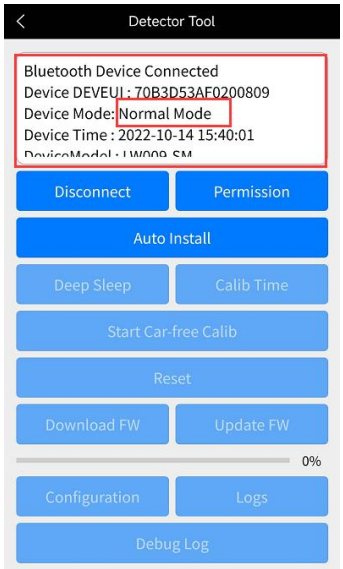


Step3: Place the magnet stripe (Put together with mounting screws in the box with the device) in the groove at the top of the device and stay for 1~5seconds, then move away and click "Connected Device" of configuration app at the same time.

Step 4: After Click "Connected Device". If connect successfully, the device's basic information will be displayed in APP interface.



Step 5: Select "Auto Install", the device will wake up and do the calibration automatically, the system time will be synchronized. The device mode will be Normal Mode.



Note: *make sure there are no vehicle and other metal material within1 meter around the device or calibration will make error before "Auto Install".*

Note: *The device can be calibrated again by click "Auto Install" again.*

10 Maintenance Instruction

1. Battery life: The battery life refers to the service life under normal conditions. When the device is used in poor LoRa network (SNR≤-12), the device function will be affected and the battery life will be shortened.

Note: Normal conditions means that the device can work normally most of the time and the wireless communication is stable.

2. Make sure that there are no vehicle and other metal material within 1 meter around the device during the calibration process, otherwise calibration will make error.

3. When the server sends calibration command to device, make sure there are no vehicle in the parking space, otherwise calibration will make error.

4. When the device works abnormally, the device can be reset through LoRaWAN downlink command.

5. If device cannot connect by blue-tooth, please try to change a magnetic stripe.

6. Re-calibration is needed once the device is moved during detecting.

11 Revision History

Version	Description	Editor	Date
1.0	Initial version	Allen	2022-4-20

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