



MOKO SMART



Fill level monitoring



Environmental monitoring

Occupancy monitoring

# Product Specification

## TOF Ranging Sensor

Version 1.0



MOKO TECHNOLOGY LTD.

# Revision History

Version	Date	Notes	Contributor(s)
V1.0	May 30, 2023	Initial version	Daniel

## About document

This **product specification** was designed to help users to know the hardware overview and feature instructions of **TOF Ranging Sensor** product. Through this document, users will be initial to understand the application scenarios, hardware specifications, basic instructions as well as packaging information of product.

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# 1. Overview

This *Product specification* is mainly applicable for MOKO **TOF Ranging Sensor** product, and mainly contained below parts:

- [\*Product brief\*](#)
- [\*Application scenarios\*](#)
- [\*Hardware specifications\*](#)
- [\*Basic instructions\*](#)
- [\*Package information\*](#)

## 2. Product brief

**TOF ranging sensor**, a Bluetooth Beacon that utilizes Time-of-flight technology to achieve distance measurement by illuminating IR and observing the reflected light bounced off the obstructed objects. It is based on BLE 4.2 and designed to be compact and IP67 waterproof, making it suitable for real-time fill-level monitoring by attaching it to soap dispensers, tissue boxes, or trash cans. It can also be deployed in restrooms for real-time occupancy monitoring, reducing regular maintenance costs.

With its 600mAh large battery and periodic working mechanism, the product guarantees a lifespan of more than 3 years, making it the preferred choice for IoT-enabled smart offices, factories and plaza.



*Figure 1: Appearance overview of TOF Ranging Sensor*

### 3. Application scenarios

#### Office/Supermarket

- Trash bin fill level detection
- Paper and towel dispenser fill level detection



#### Warehouse

- Stock count
- Inventory level monitoring



#### Smart Washroom

- Occupancy detection
- Soap dispenser fill level detection

The room is occupied



## 4. Hardware specifications

### 4.1 General specifications

General specifications		
Connectivity	Bluetooth	Bluetooth 4.2(Hardware compatible with Bluetooth 5.1)
	Transmission range*	Up to 150 meters
Mechanics	Dimension	Φ38.0*14.5mm
	Color	Black
	Material	PC
	Waterproof	IP67
	Weight	17g
	Replaceable battery	Yes
	Installation	Sticker, Lanyard
TOF Ranging Sensor	Min. Ranging Distance	40mm
	Max. Ranging Distance	3m
	Ranging error	± 10mm in short range(<0.1m) ± 5% in medium range(0.1m – 1.2m) ± 1% in long range(1.2m – 3m)
	Field-of-view(FOV)	27°
Electronic	Hall effect sensor	Yes
	Accelerometer sensor	Optional
	LED	Red LED
	Battery	CR2450   600mAh
Environmental	Operating temperature	-20°C / + 60°C
	Storage temperature	-20°C / + 60°C (without battery) 10°C / + 25°C (with battery)
	Humidity	0% ~ 95% (non-condensing)
Certification	Radio	FCC   CE   RoHS   REACH   Bluetooth

**Table 1:** General specifications of TOF Ranging Sensor

\*Transmission range tested in the open area and no obstacles in the route.

### 4.2 Parameter settings

Each TOF Ranging Sensor has been pre-configured in the factory before the shipment. Here is given the parameters and default settings in the below.

Firmware configurations		
Type	Items	Default settings
Supported Adv frame	Customized – Sensor info	Single slot ADV
Connections	Connection password	Moko4321
TOF Sampling	ToF Sampling mode	Short Distance
	TOF sampling interval	10s

Firmware configurations		
Broadcasting mode	ADV interval	1s
	Tx Power	0dBm
	Working period	Always

**Table 2:** Default parameters of TOF Ranging Sensor

### 4.3 Battery consumption

Here we have described battery consumption in some common configurations which refer to different ranging mode. You can refer to below table to create the use case and estimate battery lifetime.

Battery consumption						
Ranging mode	Ranging interval	Tx Power	Broadcasting interval	Working period	Current consumption in average (uA)	Estimated lifetime*
Short Distance*	60s	0dBm	60s	8:00AM – 10:00PM	14.6uA	3.1 years
	30s		30s	8:00AM – 10:00PM	16.7uA	2.7 years
	10s		10s	8:00AM – 10:00PM	24.6uA	1.9 years
Long Distance*	120s	0dBm	120s	8:00AM – 10:00PM	25.4uA	1.7 years
	60s		60s	8:00AM – 10:00PM	38.9uA	1.1 years
	30s		30s	8:00AM – 10:00PM	66.1uA	0.7 years
	10s		10s	8:00AM – 10:00PM	174.5uA	0.3 years

**Table 3:** Battery consumption in different conditions

**Remark:**

1. The lifetime here refers to expected life cycle under the standard 23 °C environmental conditions.
2. Short Distance mode: Measuring from 0.02m to 1.2m.
3. Long Distance mode: Measuring from 0.02m to 3m.

### 4.4 LED descriptions

Here we have described the LED response status in some common situations.

LED response status		
Scenarios	LED color	Response
Power ON	Red	Blinking for 3 seconds
Device connect	Red	Blinking for 400ms
Power OFF	Red	Solid for 3 seconds
Hardware reset	Red	Solid for 3 seconds and then device reboot
Software reset	Red	Solid for 3 seconds and then device reboot
DFU upgrade	Red	Blinking during DFU upgrade, and solid for 2 seconds after finished, then device reboot
Low battery	Red	Blinking twice

**Table 4:** LED response status in various situations

**Remark:** The single blinking duration is 100ms by default.



## 5. Basic instructions

### 5.1 How to power on/off TOF Ranging Sensor?

You can power on/off the TOF Ranging Sensor through the **“Hall effect sensor”** with below operations:

- **Power ON:** Magnet approaching to the place of hall effect sensor icon for more than 3s, then the device will be power on, along with the LED rapid blinking for 3s.
- **Power OFF:** Magnet approaching to the place of hall effect sensor icon for more than 3s, then the device will be power off, along with the LED sloid for 3s.

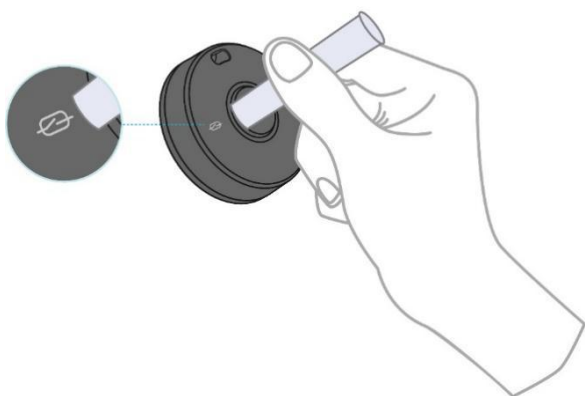


Figure 2: How to power on/off TOF Ranging Sensor?

### 5.2 How to restore factory settings?

There have two ways to restore factory settings.

- **Hall effect sensor (Hardware reset):** In power off mode, magnet approaching the place of hall effect sensor icon for 10s or more, then take the magnet away and approach to hall effect sensor again within 2s, device will proceed to factory reset.
- **Inner button (Hardware reset):** In power off mode, long press “inner button” for 10s or more, then release button and single press “inner button” again within 2s, device will proceed to factory reset.

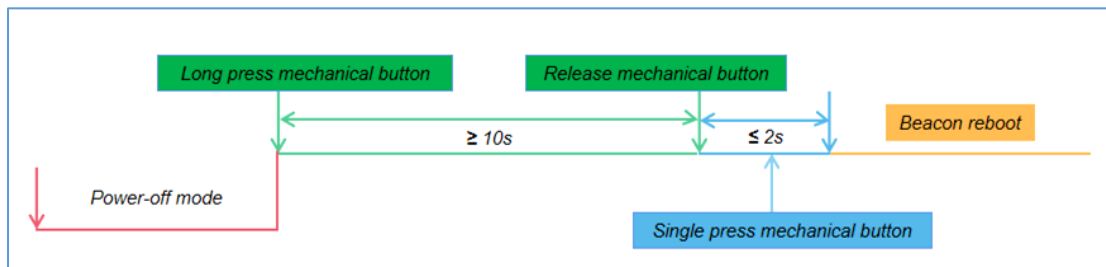
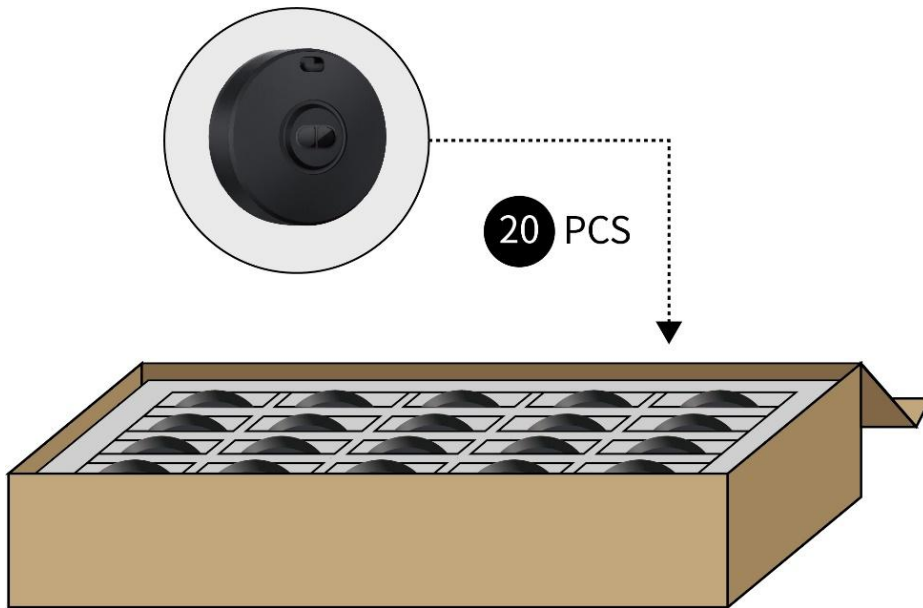


Figure 3: Hardware reset flowchart of TOF Ranging Sensor

## 6. Package information



**Figure 4:** Package information of TOF Ranging Sensor

Package information		
Item	Quantity	Remark
TOF Ranging Sensor Device	20pcs/Box	Main equipment
3M Sticker	20pcs/Box	Accessory

**Table 5:** Package information of TOF Ranging Sensor

## 7. FCC STATEMENT

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

RF warning statement:

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

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