



## CapSule Sensor V3

-Tiny fun IoT toy





## Document version

| Version | Time       | Description        | Remark  |
|---------|------------|--------------------|---------|
| V1.0    | 2024-01-16 | Documents creating | Richard |

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# 1. Description

## 1.1 Overview

**CapSule Sensor V3** is a IoT tiny toy based on ESP32S3 and SX1262. It has excellent expansibility, and we provides a variety of compatible sensor modules and uploading the relevant code for it, using these resources, even if you are not an expert in IoT development, you can easily build many interesting applications or directly run some open source programs like Meshtastick.

Benefit from WirelessBoot<sup>1</sup> technology, high-strength plastic, and a built-in 250mA rechargeable battery, **Capsule Sensor V3** is very small and fashionable, and has good waterproof performance, which makes it perform very well in some complex places.

Capsule Sensor are available in two product variants:

Table 1.1: Product model list

| No. | Model               | Description  |
|-----|---------------------|--|
| 1   | Capsule Sensor - LF | 470~510MHz working LoRa frequency, used for China mainland (CN470) LPW band.                                       |
| 2   | Capsule Sensor - HF | For EU868, IN865, US915, AU915, AS923, KR920 and other LPW networks with operating frequencies between 863~928MHz. |

<sup>1</sup> You can understand it as a special OTA program, but it can running in the devices' Boot loader





## 1.2 Product features

- ESP32-S3+SX1262, supports Wi-Fi, Bluetooth, LoRa.
- Strong expansibility, can realize a variety of applications by replacing the sensor module.
- LED indicator light, touch switch, magnetic suction charging port.
- Stylish appearance, compact and light.
- High strength plastic, IP65 waterproof.
- Wireless Boot: download firmware, exchange information, and print logs through Wi-Fi.
- Supports Meshtastic.
- Supports the Arduino.

## 1.3 Application scenarios

CapSule's application is mainly realized by replacing the sensor module, and here are just some typical application scenarios.

- Environmental monitoring;
- Data converter;
- Asset/pet/person tracking;
- Children education;
- [Meshtastic](#);
- As a common Arduino development board.



## 2. Specifications

### 2.1 General specifications

Table 2-1: General specifications

| Parameters            | Description                               |
|-----------------------|---|
| MCU                   | ESP32-S3FN8                               |
| LoRa Chip             | SX1262                                    |
| Sensor                | Custom                                    |
| Frequency             | 470~510MHz, 863~928MHz                    |
| Max TX Power          | 21 ± 1dBm                                 |
| Receiving sensitivity | -135dBm                                   |
| Wi-Fi                 | 802.11 b/g/n                              |
| Bluetooth             | Bluetooth LE: Bluetooth 5, Bluetooth mesh |
| Button                | Touch switch                              |
| Charging              | 5V, Magnetic suction 2P-2.54mm            |
| Battery               | 250mAh                                    |
| Protection grade      | IP65                                      |
| Operating temperature | -20 ~ 60°C                                |
| Dimensions            | 47mm * 26mm φ                             |



## 2.2 Electrical Characteristics

Table 2-2: Power supply

| Parameter    |                | Typical | Unit |
|--------------|----------------|---------|------|
| Power Supply | Charging       | 5       | V    |
|              | Battery        | 3.0~4.1 | V    |
| Consumption  | LoRa Sending   | 230     | mA   |
|              | LoRa Receiving | 90      | mA   |
|              | Sleep          | 25      | uA   |

## 2.3 LoRa RF characteristics

### 2.3.1 Transmit power

Table2-3-1: Transmit power

| Operating frequency band | Maximum power value/[dBm] |
|--------------------------|---------------------------|
| 470~510                  | 21 ± 1                    |
| 867~870                  | 21 ± 1                    |
| 902~928                  | 21 ± 1                    |



### 2.3.2 Receiving sensitivity

The following table gives typically sensitivity level of the CapSule Sensor.

Table2-3-2: Receiving sensitivity

| Signal Bandwidth/[KHz] | Spreading Factor | Sensitivity/[dBm] |
|------------------------|------------------|-------------------|
| 125                    | SF12             | -135              |
| 125                    | SF10             | -130              |
| 125                    | SF7              | -124              |

### 2.3.3 Operation Frequencies

Capsule supports LoRaWAN frequency channels and models corresponding table.

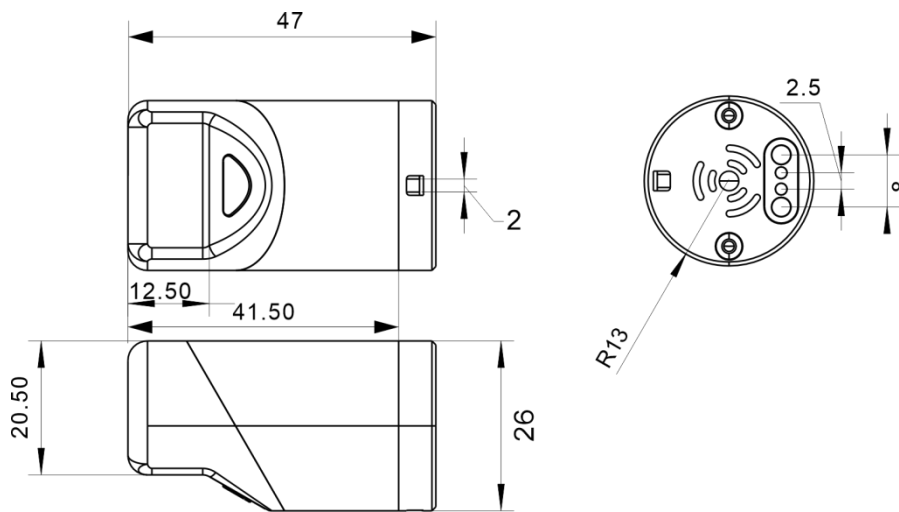
Table2-3-3: Operation Frequencies

| Region | Frequency (MHz) |
|--------|-----------------|
| EU433  | 433.175~434.665 |
| CN470  | 470~510         |
| IN868  | 865~867         |
| EU868  | 863~870         |
| US915  | 902~928         |
| AU915  | 915~928         |
| KR920  | 920~923         |
| AS923  | 920~925         |





### 3. Physical Dimensions



### 4. Resource

#### 4.1 Relevant Resource

- [Heltec ESP \(ESP32 & ESP8266\) framework](#) (Already included Heltec ESP32 LoRaWAN library)
- [Heltec LoRaWAN test server based on TTS V3](#)
- [User Manual Document](#)
- [Wireless Boot instructions](#)

#### 4.2 Contact Information

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