



## CapSule Sensor V3

-Tiny fun IoT Device





## 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 tiny portable LoRa/LoRaWAN device based on ESP32-S3 and SX1262. Modular design allows it to adapt to different sensors, so you can easily build applications without being an expert in IoT.

Thanks to WirelessBoot<sup>1</sup> technology, Capsule Sensor V3 is small, stylish, waterproof, and has a 250mA rechargeable battery, making it perfect for complex environments.

Whether you want to build your applications or run open-source programs like Meshtastick<sup>2</sup>, Capsule Sensor V3 is a great choice.

Capsule Sensor are available in two product variants:

Table 1.1: Product model list

No.	Model	Description
1	Capsule Sensor - 433	For 433MHz LoRa frequency
2	Capsule Sensor - 470to510	For 470~510MHz working LoRa frequency, used for China mainland (CN470) LPW band.
3	Capsule Sensor - 863to870	For EU868, IN865 and other LPW networks with operating frequencies between 863~870MHz.
4	Capsule Sensor - 902to928	For US915, AU915, AS923, KR920 and other LPW networks with operating frequencies between 902~928MHz

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

<sup>2</sup> We programmed Meshtastick to be low power and equipped with a 'Type-C to magnetic suction' charging cable.



## 1.2 Product features

- ESP32-S3 + SX1262.
- Wireless communication method include Wi-Fi, Bluetooth and LoRa.
- Modular design, with a BTB interface reserved at the bottom, capable of connecting and replacing different sensors.
- Touch pad and LED indicator light.
- Built in 250mAh rechargeable battery, magnetic suction charging port.
- Built in LoRa and Wi-Fi/BLE antennas, stylish appearance, compact and light.
- High strength plastic, IP65 waterproof.
- Support Heltec Wireless Boot system, download firmware, exchange information, and print logs through Wi-Fi.
- Meshtastic project compatible.
- Secondary development can be done through Arduino, Platform.io, etc.

## 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;
- [Meshtastick](#);
- 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	433MHz, 470~510MHz, 863~870MHz, 902~928MHz
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

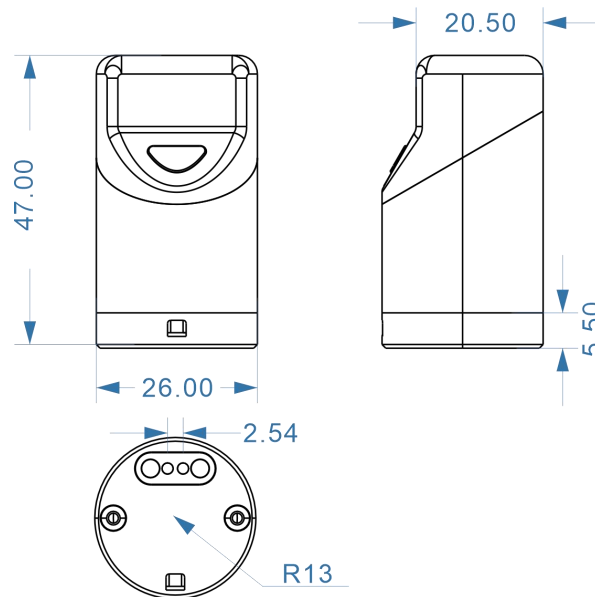
Capsule supports LoRaWAN frequency channels and models corresponding table.

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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