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V3 Capsule
Sensor

HELTEC AUTOMATION V3 Capsule Sensor Instruction Manual

Contents

HELTEC AUTOMATION V3 Capsule Sensor

Specifications

- Product Name: Capsule Sensor V3
- Type: IoT Device
- Manufacturer: Chengdu Heltec Automation Technology Co.,Ltd.
- Wireless Technology: LoRa/LoRaWAN
- Microcontroller: ESP32-S3
- Transceiver: SX1262
- Battery: 250mA rechargeable battery
- Features: Tiny, waterproof, WirelessBoot technology

Product Usage Instructions

Overview

The Capsule Sensor V3 is a portable IoT device based on ESP32-S3 and SX1262. It is designed to work with various sensors for building IoT applications easily.

Features

- Modular design for sensor adaptability
- WirelessBoot technology for easy setup
- Compact and stylish design
- Waterproof construction
- Rechargeable battery for portability

Product Variants

The Capsule Sensor V3 is available in two variants:

1. **Capsule Sensor – 433:** For 433MHz LoRa frequency.
2. **Capsule Sensor – 470to510:** For 470~510MHz working LoRa frequency, suitable for China mainland (CN470) LPW band, EU868, IN865, and other LPW networks.

Battery Charging
To charge the 250mA rechargeable battery, use the provided charging cable and connect it to a power source. The device should be powered off during charging.

Document version

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

Description

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 WirelessBoot1 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 Meshtastic2 , 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

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.
- 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 compatible.
- Secondary development can be done through Arduino, Platform.io, etc.

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.

Specifications

General specifications

Table 2-1: General specifications

Parameters	Description
MCU	ESP32-S3FN8
LoRa Chip	SX-1262
Memory	384KB ROM; 512KB SRAM; 16KB RTC SRAM; 8MB SiP
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
Charging	5V, Magnetic 2P-2.54mm
Battery	150mAh
Protection grade	IP65
Operating temperature	-20 ~ 60℃
Dimensions	47mm * 26mmφ

Flash Partitions

Name	Type	SubType	Offset	Size
nvs	data	nvs	0x009000	0x005000
otadata	data	ota	0x00e000	0x002000

app	app	ota_0	0x010000	0x250000
flashApp	app	ota_1	0x260000	0x0A0000
spiffs	data	spiffs	0x300000	0x100000
factory	app	factory	0x400000	0x100000
secondApp	app	ota_2	0x500000	0x2D0000

Electrical Characteristics

Table 2-2: Power supply

Parameter		Typical	Unit
Power Supply	Charging	5	V
	Battery	3.0~4.2	V
Consumption	LoRa Sending	230	mA
	LoRa Receiving	90	mA
	Sleep	18	uA

LoRa RF Characteristics

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

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

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

Physical Dimensions
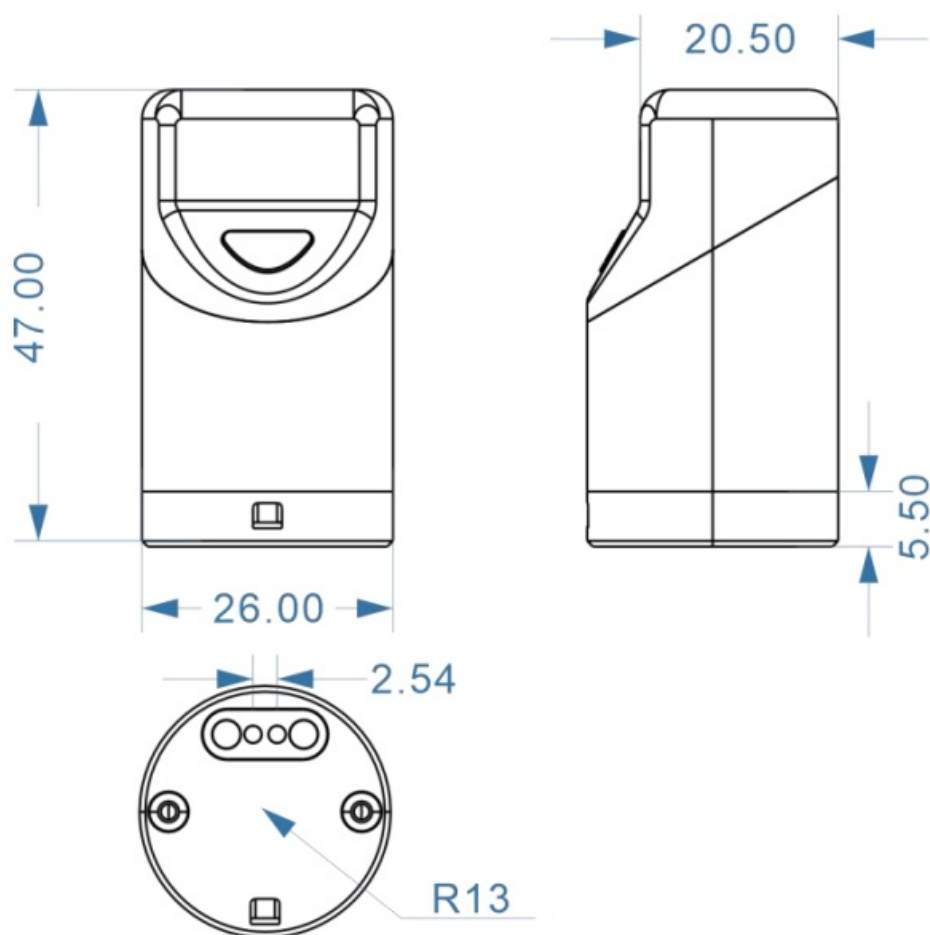
Resource

Relevant Resource

- Heltec ESP32 framework (Already included Heltec ESP32 LoRaWAN library)
- Heltec LoRaWAN test server based on TTS V3
- User Manual Document
- Wireless Boot instructions

Contact Information
Heltec Automation Technology Co., Ltd
Chengdu, Sichuan, China

Email: **support@heltec.cn**

Phone: +86-028-62374838
https://heltec.org

Frequently Asked Questions (FAQ)

Q: Can I use Capsule Sensor V3 in extreme weather conditions?
A: Yes, the Capsule Sensor V3 is waterproof and suitable for use in various environments, including extreme weather conditions.

Q: How do I switch between different sensor modules?
A: To switch between sensor modules, carefully detach the current module and attach the new one following the provided instructions in the user manual.

Q: Is Capsule Sensor V3 compatible with third-party IoT platforms?
A: Yes, Capsule Sensor V3 can work with open-source IoT platforms like Meshtastic for enhanced functionality and connectivity.

Documents / Resources
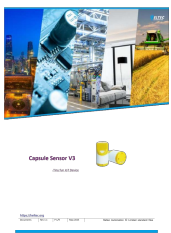
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V3 Capsule Sensor, Capsule Sensor, Sensor

References

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