



Wireless Stick

LoRa Node Development Kit





Document version

Version	Time	Description
V1.0	2020-09-24	Documents creating
V1.1	2020-12-02	Document structure update



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1. Description

1.1 Overview

In order to meet the user's requirements for high performance and small size, we designed this product. On the basis of [WiFi LoRa 32](#), it's has a smaller size, 0.49" OLED display, and better RF characteristics.

Wireless Stick are available in two product variants:

Table 1.1 Product model list

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

1.2 Product features

- CE Certificate;
- Microprocessor: [ESP32](#) (dual-core 32-bit MCU + ULP core), with LoRa node chip SX1276/SX1278;
- Micro USB interface with a complete voltage regulator, ESD protection, short circuit protection, RF shielding, and other protection measures;
- Onboard SH1.25-2 battery interface, integrated lithium battery management



system (charge and discharge management, overcharge protection, battery power detection, USB / battery power automatic switching);

- Integrated WiFi, LoRa, Bluetooth three network connections, onboard Wi-Fi, Bluetooth dedicated 2.4GHz metal 3D antenna, reserved IPEX (U.FL) interface for LoRa use;
- Onboard 0.49-inch 64*32 dot matrix OLED display, which can be used to display debugging information, battery power, and other information;
- Integrated CP2102 USB to serial port chip, convenient for program downloading, debugging information printing;
- Support the [Arduino development environment](#);
- (Exclusive) Supports the Arduino version of the [ESP32 + LoRaWAN](#) protocol routine provided by Heltec. This is a standard LoRaWAN protocol that can communicate with any gateway/base station running the LoRaWAN protocol (requires serial number activation, only the development of the company) The board is available, the serial number can be queried on [this page](#));
- With good RF circuit design and basic low-power design (sleep current $\leq 800\mu\text{A}$), it is convenient for IoT application vendors to quickly verify solutions and deploy applications.



9	35	I/O	GPIO35, ADC1_7, LoRa_DI01
10	34	I/O	GPIO34, ADC1_6, LoRa_DI02
11	5	I/O	GPIO5, V_SPI_CS0, LoRa_SCK
12	19	I/O	GPIO19, V_SPI_Q, U0_CTS, LoRa_MISO
13	17	I/O	GPIO17,U2_TXD
14	36	I/O	GPIO36,ADC1_0*
15	37	I/O	GPIO36,ADC1_1*
16	38	I/O	GPIO36,ADC1_2*
17	21	I/O	GPIO36,ADC1_3*

Header J3

Table 2-2-2 Pin description

No.	Name	Type	Function
1	5V	P	5V Power Supply.
2	3.3V	P	3.3V Power Supply.
3	GND	P	Ground.
4	16	I/O	GPIO16, U2_RXD, OLED_RST.
5	4	I/O	GPIO4, ADC2_0, HSPI_HD, TOUCH0, OLED_SDA
6	0	I/O	GPIO0, ADC2_1, TOUCH1, PRG_BUTTON
7	2	I/O	GPIO2, ADC2_2, HSPI_WP, TOUCH2
8	15	I/O	GPIO15, ADC2_3, HSPI_CS0, TOUCH3, OLED_SCL
9	27	I/O	GPIO27, ADC2_7, TOUCH7, LoRa_MOSI
10	32	I/O	XTAL, GPIO32, ADC1_4, TOUCH8.
11	33	I/O	XTAL, GPIO33, ADC_1_5, TOUCH9.
12	13	I/O	GPIO13, ADC2_4, TOUCH4.
13	12	I/O	GPIO12, ADC2_5, TOUCH5.
14	RST	I/O	RST

¹ DP pin connectable to USB socket, solder R29

² DN pin connectable to USB socket, solder R3

³ ADC1_CH0 is used to read the lithium battery voltage, the voltage of the lithium battery is:

$$VBAT = 100 / (100+390) * VADC_IN1$$



15	14	I/O	GPIO14, ADC2_6, TOUCH6, LoRa_RST.
16	26	I/O	GPIO26, ADC2_9, DAC1, LoRa_DIO0..
17	25	I/O	GPIO25, ADC2_8, DAC2, LED

3. Specifications

3.1 General specifications

Table 3- 1: General specifications

Parameters	Description
Master Chip	ESP32 (240MHz Tensilica LX6 dual-core+1 ULP, 600 DMIPS)
LoRa Chipset	SX1276
USB to Serial Chip	CP2102
Frequency	470~510 MHz, 863~923 MHz
Max TX Power	19d B ± 1d B
Receiving sensitivity	-135 d Bm
Wi-Fi	802.11 b/g/ n (802.11n up to 150 Mbps)
Bluetooth	Bluetooth V4.2 BR/ EDR and Bluetooth LE specification
Hardware Resource	UART x 3; SPI x 2; I2C x 2; I2S x 1; 12-bits ADC input x 18; 8-bits DAC output x 2; GPIO x 22 , GPI x 6
Memory	4MB(32M-bits) SPI FLASH; 520KB internal SRAM
Interface	Micro USB x 1; LoRa Antenna interface(IPEX) x 1; 17 x 2.54 pin x 2
Battery	3.7VLithium(SH1.25 x 2 socket)

<https://heltec.org>



Operating temperature	-20 ~ 70 °C
Dimensions	59.3 x 24.8 x 8 mm
Low Power	Deep Sleep 800µA
Display Size	0.49-inch OLED

3.2 Power supply

Except when USB or 5V Pin is connected separately, lithium battery can be connected to charge it. In other cases, only a single power supply can be connected.

Table 3-2: Power supply

Power supply mode	Minimum	Typical	Maximum	Company
USB powered(≥500mA)	4.7	5	6	V
Lithium battery(≥250mA)	3.3	3.7	4.2	V
5V pin(≥500mA)	4.7	5	6	V
3V3 pin(≥150mA)	2.7	3.3	3.5	V

3.3 Power output

Table 3-3: Power output

Output Pin	Minimum	Typical	Maximum	Company
3.3V Pin			500	mA
5V Pin (USB Powered only)		Equal to the input current		
Vext Pin			350	mA



3.4 Power characteristics

Table 3-4: Power characteristics

Mode	Condition	Min.	Typical	Max.	Company
WiFi Scan	USB powered		115		mA
WiFi AP	USB powered		135		mA
Power Consumption(mA)	LoRa 10d B output		50		mA
	LoRa 12d B output		60		mA
	LoRa 15d B output		110		mA
	LoRa 20d B output		130		mA

3.5 LoRa RF characteristics

3.5.1 Transmit power

Table3-5 Transmit power

Operating frequency band	Maximum power value/[dBm]
470~510	19 ± 1
867~870	19 ± 1
902~928	19 ± 1

3.5.2 Receiving sensitivity

The following table gives typically sensitivity level of the Wireless Stick-(L/ H).

Table3-6: Receiving sensitivity

Signal Bandwidth/[KHz]	Spreading Factor	Sensitivity/[dBm]

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125	SF12	- 135
125	SF10	- 130
125	SF7	- 124

3.6 Operation Frequencies

Wireless Stick(F) supports LoRaWAN frequency channels and models corresponding table.

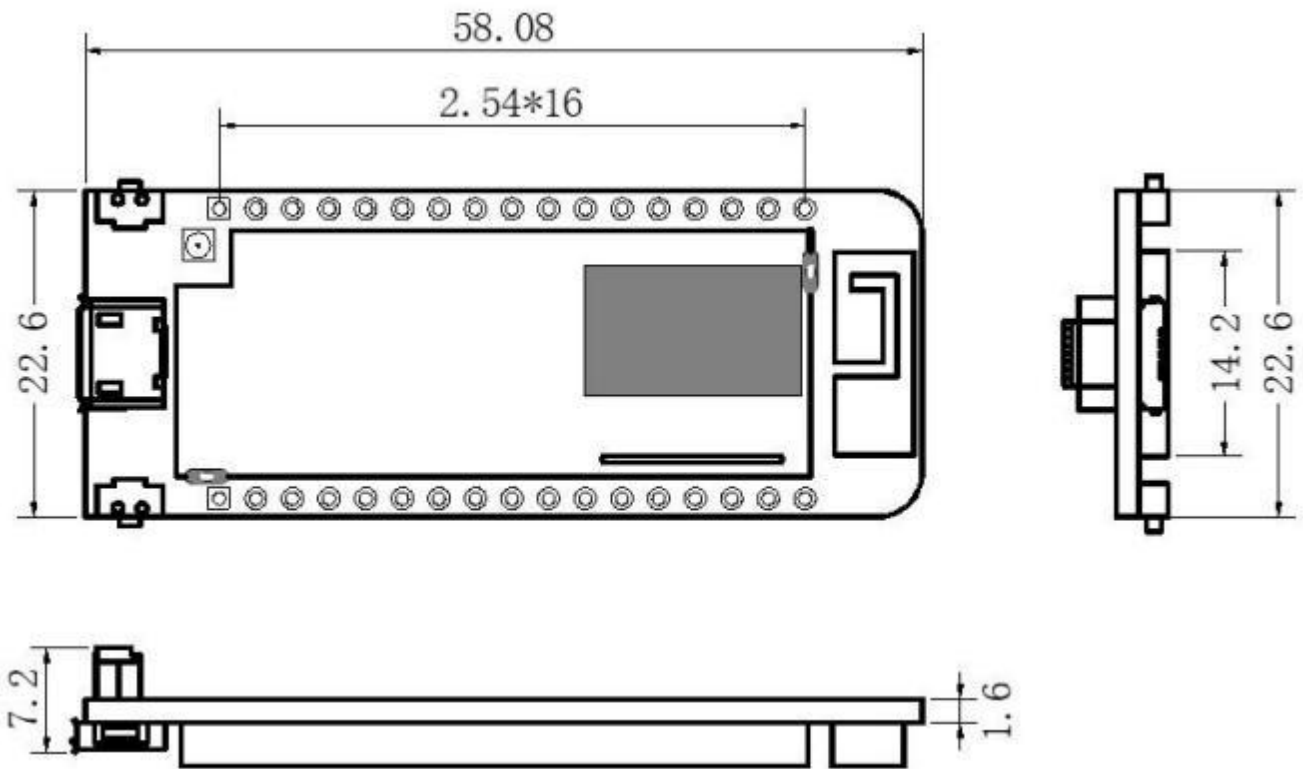
Table3-7: Operation Frequencies

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



4. Hardware resource

4.1 Physical dimensions





5. Resource

5.1 Relevant Resource

- Source Code
 - [Heltec ESP \(ESP32 & ESP8266\) framework](#) (Already included Heltec ESP32 LoRaWAN library)
 - [Heltec ESP32 library](#)
- [Schematic diagram](#)
- [Pin map](#)
- [Downloadable resource](#)

5.2 Contact Information

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