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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Content

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 ⩽ 800uA), it is convenient for IoT application vendors to quickly verify solutions and deploy applications.
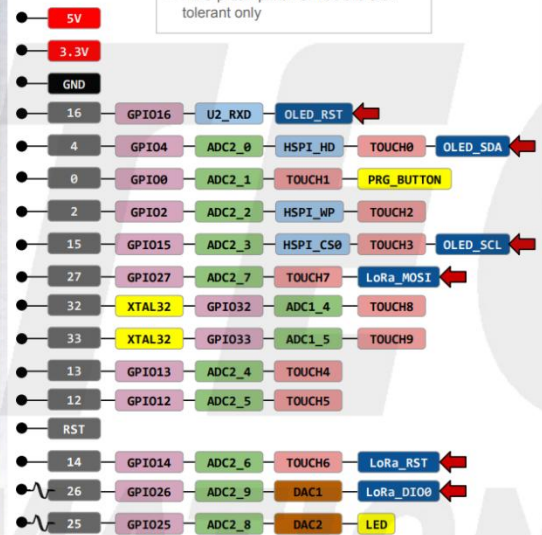
2. Pin Definition

2.1   Pin assignment
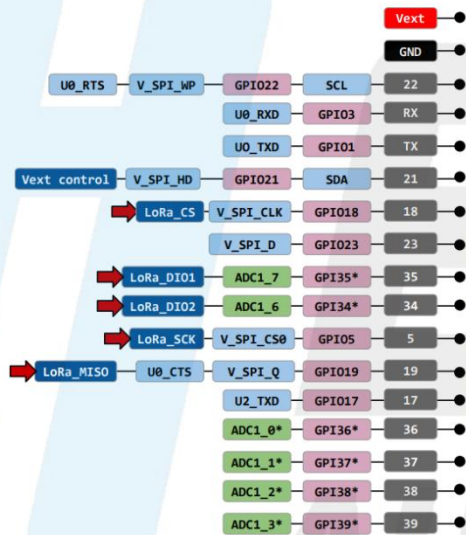
2.2   Pin description

● **Header J2**

Table 2-2-1 Pin description

No.	Name	Type	Function
1	GND	P	Ground.
2	5V	P	5V Power Supply.
3	Ve	P	Output 3.3V, power supply for external sensor.
4	Ve	P	Output 3.3V, power supply for external sensor.
5	RX	I/O	GPIO44, U0RXD, connected to CP2102 TXD.
6	TX	I/O	GPIO43, U0RXD, connected to CP2102 RXD.
7	RST	I	CHIP_PU, connect to RST switch.
8	0	I/O	GPIO0, connect to PRG switch.

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9	36	I/O	GPIO36, SPIIO7, FSPICLK, SUBSPICLK, Vext Ctrl.
10	35	I/O	GPIO35, SPIIO6, FSPID, SUBSPID, LED Write Ctrl.
11	34	I/O	GPIO34, SPIIO5, FSPICS0, SUBSPICS0.
12	33	I/O	GPIO33, SPIIO4, FSPIHD, SUBSPIHD.
13	47	I/O	GPIO47, SPICLK_P_DIFF, SUBSPICLK_P_DIFF.
14	48	I/O	GPIO48, SPICLK_N_DIFF, SUBSPICLK_N_DIFF.
15	26	I/O	GPIO26, SPICS1.
16	21	I/O	GPIO21, OLED RST.
17	20	I/O	GPIO20, U1CTS, ADC2_CH9, CLK_OUT1, USB_D+[1].
18	19	I/O	GPIO19, U1RTS, ADC2_CH8, CLK_OUT2, USB_D-[2].

Header J3

Table 2-2-2 Pin description

No.	Name	Type	Function
1	GND	P	Ground.
2	3V3	P	3.3V Power Supply.
3	3V3	P	3.3V Power Supply.
4	37	I/O	GPIO37, SPIDQS, FSPIQ, SUBSPIQ.
5	46	I/O	GPIO46.
6	45	I/O	GPIO45.
7	42	I/O	GPIO42, MTMS.
8	41	I/O	GPIO41, MTDI.
9	40	I/O	GPIO40, MTDO.
10	39	I/O	GPIO39, MTCK.
11	38	I/O	GPIO38, FSPIWP, SUBSPIWP.
12	1	I/O	GPIO1, ADC1_CH0[3], TOUCH1, Read VBAT Voltage.
13	2	I/O	GPIO2, ADC1_CH1, TOUCH2.
14	3	I/O	GPIO3, ADC1_CH2, TOUCH3.

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[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:

$$VBAT = 100 / (100+390) * VADC\_IN1$$

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15	4	I/O	GPIO4, ADC1_CH3, TOUCH4.
16	5	I/O	GPIO5, ADC1_CH4, TOUCH5.
17	6	I/O	GPIO6, ADC1_CH5, TOUCH6.
18	7	I/O	GPIO7, ADC1_CH6, TOUCH7.

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	19dB $\pm$ 1dB
Receiving sensitivity	-135 dBm
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)

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Operating temperature	-20～70 ℃
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

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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 10dB output		50		mA
	LoRa 12dB output		60		mA
	LoRa 15dB output		110		mA
	LoRa 20dB 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
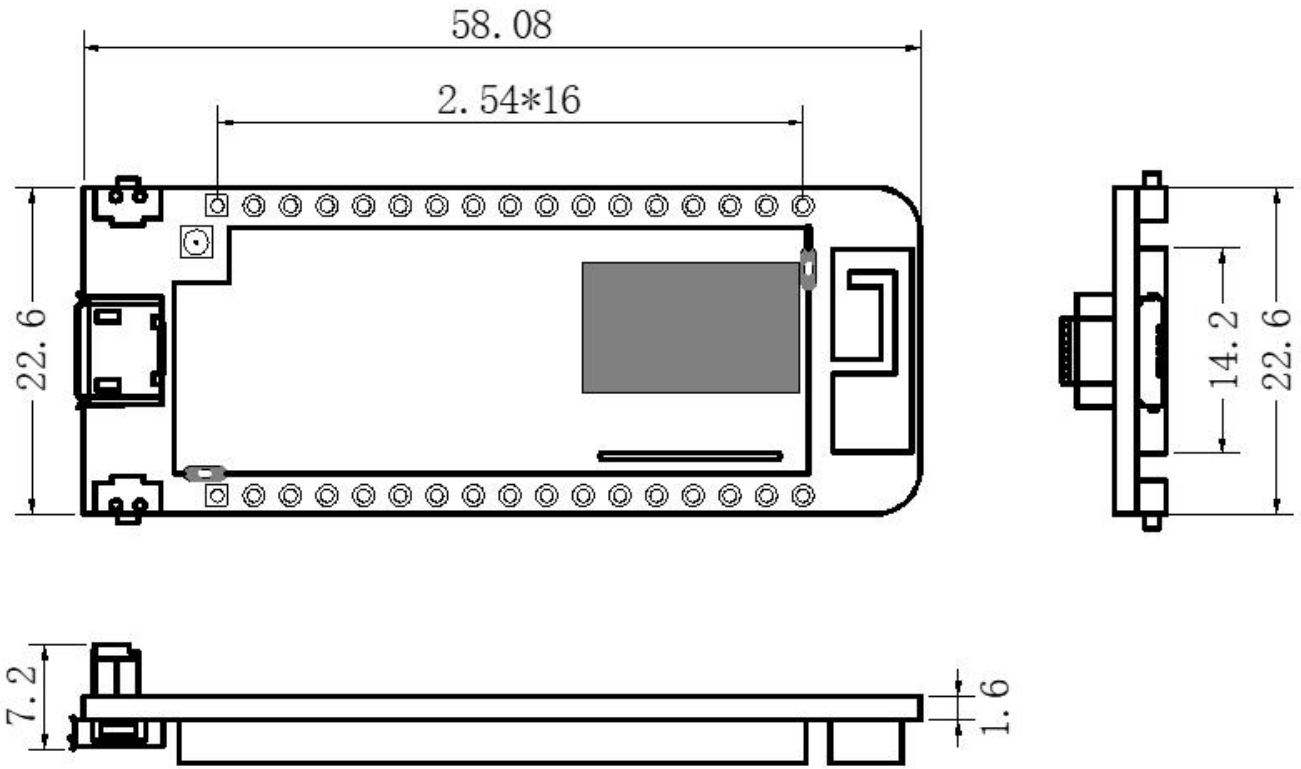
5. Resource

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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