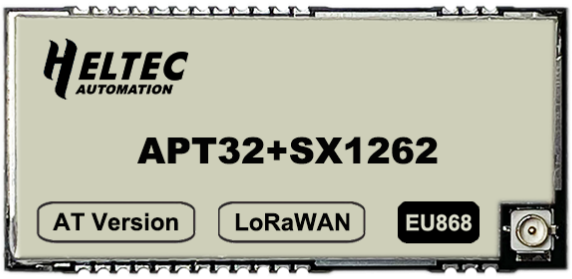
HTIT-Wsh_V3

LoRa module



Document version

Version	Time	Description	Remark
Rev. 1.0	2022-8-16	Preliminary version	肖鸿
Rev. 1.1	2022-9-17	Typographic modification	Aaron

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Content

1. Description

1.1 Overview

HTIT-Wsh(Wireless shell) is a long communication range, high receive sensitivity, low power consumption(9uA) and low cost LoRa node module. The HTIT-Wsh is composed up of an MCU (ESP32-S3FN8) and Semtech LoRa Transceivers (SX1262). 38.4 x 16.1 x 3.2(mm) size with 1.27mm stamp holes package makes it can be assembled into your PCB or products directly.

HTIT-Wsh is provide Wi-Fi, BLE and LoRa solution, perfectly support Arduino®. Users can easily carry out secondary development and application.

The V3 version is upgraded as follows：

Table 1.1-1: Version comparison

	HTIT-Wsh_V1/V2	**HTIT-Wsh_V3**
MCU	ESP32-D0	ESP32-S3
LoRa Chip	SX1276	SX1262
Crystal Oscillator	Ordinary crystal oscillator	High precision temperature compensated crystal oscillator
Low power features in deep sleep	30uA	<10uA
Other		Better impedance matching of RF circuits.

HTIT-Wsh are available in two product variants:

Table 1.1-2: Product model list

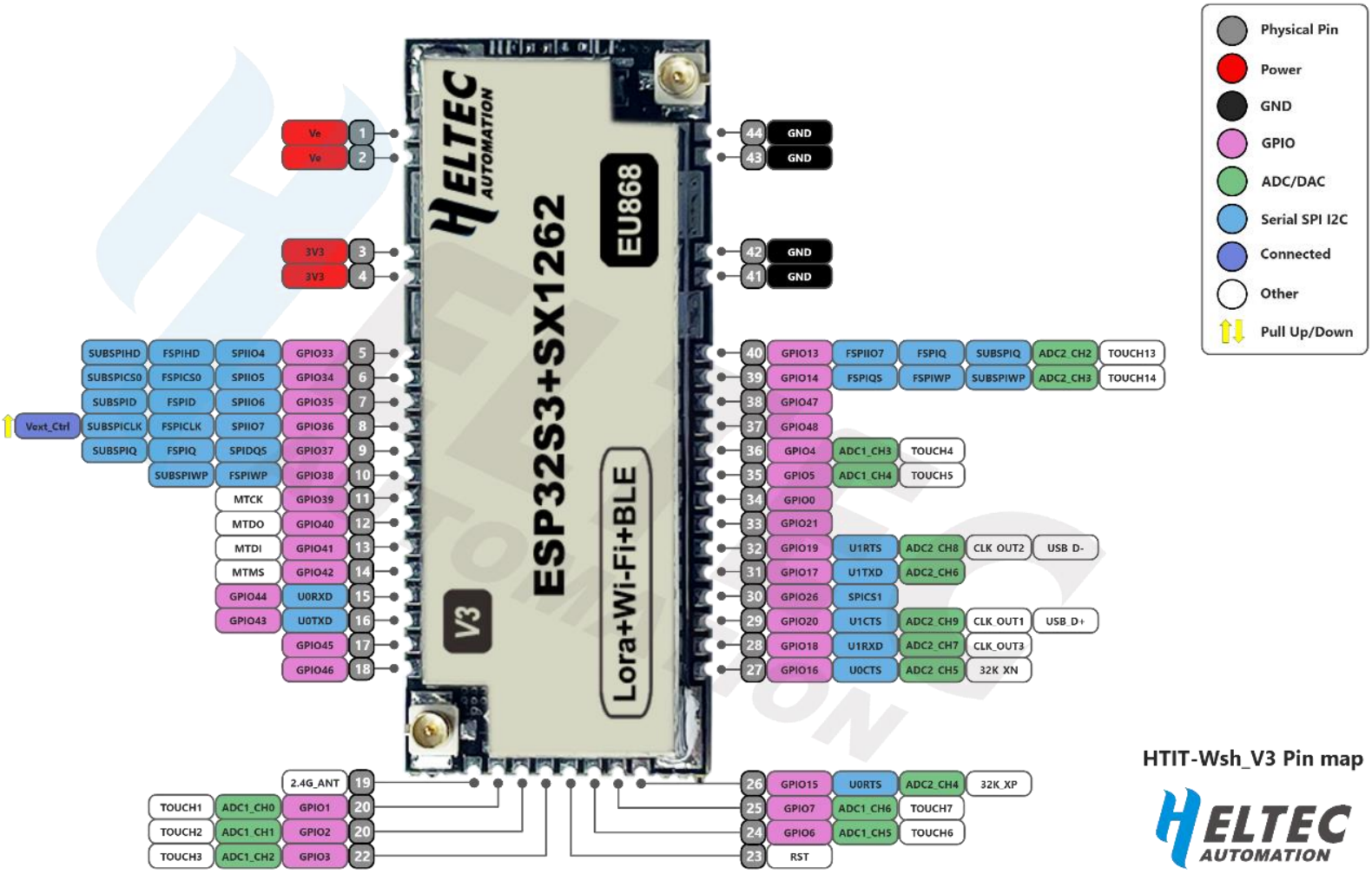
No.	Model	Description
1	HTIT-Wsh-LF	470~510MHz working LoRa frequency, used for China mainland (CN470) LPW band.
2	HTIT-Wsh -HF	For EU868, IN865, US915, AU915, AS923, KR920 and other LPW networks with operating frequencies between 863~928MHz.

1.2 Product features

- CE Certificate;
- Microprocessor: ESP32-S3FN8 (Xtensa ® 32-bit LX7 dual core processor, five stage pipeline rack Structure, main frequency up to 240 MHz), with LoRa node chip SX1262;
- RF shielding (contain a shield shell) and other protection measures;
- Integrated WiFi, LoRa, Bluetooth network connections, both of them are IPEX socket;
- 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: 9uA theoretically), it is convenient for IoT application vendors to quickly verify solutions and deploy applications.

2. Pin Definition

2.1 Pin assignment



HTIT-Wsh_V3 Pin map

2.2 Pin description

Table 2.2: Pin description

No.	Name	Type	Function
1	VEXT	P	Output 3.3V, power supply for external sensor.
2	VEXT	P	Output 3.3V, power supply for external sensor.
3	3V3	P	3.3V Power Supply.
4	3V3	P	3.3V Power Supply.

5	33	I/O	GPIO33, SPIIO4, FSPIHD, SUBSPIHD.
6	34	I/O	GPIO34, SPIIO5, FSPICS0, SUBSPICS0.
7	35	I/O	GPIO35, SPIIO6, FSPID, SUBSPID.
8	36	I/O	GPIO36, SPIIO7, FSPICLK, SUBSPICLK, connected to external power (3.3V) control pin.
9	37	I/O	GPIO37, SPIDQS, FSPIQ, SUBSPIQ.
10	38	I/O	GPIO38, FSPIWP, SUBSPIWP.
11	39	I/O	GPIO39, MTCK.
12	40	I/O	GPIO40, MTDO.
13	41	I/O	GPIO41, MTDI.
14	42	I/O	GPIO42, MTMS.
15	RXD	I/O	GPIO44, U0RXD.
16	TXD	I/O	GPIO43, U0TXD.
17	45	I/O	GPIO45.
18	46	I/O	GPIO46
19	ANT_2.4G	O	2.4G ANT Output.
20	1	I/O	GPIO1, ADC1_CH0, TOUCH1.
21	2	I/O	GPIO2, ADC1_CH1, TOUCH2.
22	3	I/O	GPIO3, ADC1_CH2, TOUCH3.
23	EN	I	CHIP_PU.
24	6	I/O	GPIO6, ADC1_CH5, TOUCH6.
25	7	I/O	GPIO7, ADC1_CH6, TOUCH7.

26	15	I/O	GPIO15, UORTS, ADC2_CH4, XTAL_32K_P.
27	16	I/O	GPIO16, UOCTS, ADC2_CH5, XTAL_32K_N.
28	18	I/O	GPIO18, U1RXD, ADC2_CH7, CLK_OUT3.
29	20	I/O	GPIO20, U1CTS, ADC2_CH9, CLK_OUT1, USB_D+.
30	26	I/O	GPIO26, SPICS1.
31	17	I/O	GPIO17, U1TXD, ADC2_CH6.
32	19	I/O	GPIO19, U1RTS, ADC2_CH8, CLK_OUT2, USB_D-.
33	21	I/O	GPIO21.
34	0	I/O	GPIO0.
35	5	I/O	GPIO5, ADC1_CH4, TOUCH5.
36	4	I/O	GPIO4, ADC1_CH3, TOUCH4.
37	48	I/O	GPIO48, SPICLK_N_DIFF, SUBSPICLK_N_DIFF.
38	47	I/O	GPIO47, SPICLK_P_DIFF, SUBSPICLK_P_DIFF.
39	14	I/O	GPIO14, ADC2_CH3, TOUCH14, FSPIDQS, SUBSPIWP, FSPIWP.
40	13	I/O	GPIO13, ADC2_CH2, TOUCH13, FSPIIO7, SUBSPIQ, FSPIQ.
41	GND	P	Ground.
42	GND	P	Ground.
43	GND	P	Ground.
44	GND	P	Ground.

3. Specifications

3.1 General specifications

Table 3.1: General specifications

Parameters	Description
Master Chip	ESP32-S3FN8(Xtensa®32-bit lx7 dual core processor)
LoRa Chipset	SX1262
Frequency	470~510MHz, 863~928MHz
Max TX Power	21±1dBm
Max. Receiving sensitivity	-139dBm
WiFi	802.11 b/g/n, up to 150Mbps
Bluetooth	Bluetooth LE: Bluetooth 5, Bluetooth mesh
Hardware Resource	7*ADC1+8*ADC2; 9*Touch; 3*UART; 2*I2C; 2*SPI; etc.
Memory	384KB ROM; 512KB SRAM; 16KB RTC SRAM; 8MB SiP Flash
Interface	LoRa ANT(IPEX1.0); 2.4G ANT (IPEX1.0); 1.27 spacing Stamp hole.
Power consumption	9uA
Operating temperature	-40~85℃
Dimensions	38.4 * 16.1* 2.8 mm
Package	Tape & Reel Packaging

3.2 Electrical characteristics

3.2.1 Power supply

Table 3.2.1: Power supply

Power supply mode	Minimum	Typical	Maximum	Company
3V3 pin (≥150mA)	2.7	3.3	3.5	V

3.2.2 Power characteristics

Table3.2.2: Power characteristics

Mode	Condition	Min.	Typical	Max.	Company
WiFi Scan	3.3V powered		100		mA
WiFi AP	3.3V powered		140		mA
BT	3.3V powered		105		mA
TX	868MHz, 3.3V powered, 14dBm		200		mA
	868MHz, 3.3V powered, 17dBm		220		mA
	868MHz, 3.3V powered, 22dBm		235		mA
RX	868MHz, 3.3V powered		75		mA
Sleep	3.3V powered		9		μA

3.3 RF characteristics

3.3.1 Transmit power

Table3.3.1: Transmit power

Operating frequency band (MHz)	Maximum power value/[dBm]
470~510	21 ± 1

863~870	21 ± 1
902~928	21 ± 1

3.3.2 Receiving sensitivity

The following table gives typically sensitivity level of the HTIT-Wsh.

Table3.3.2: Receiving sensitivity

Signal Bandwidth/[KHz]	Spreading Factor	Sensitivity/[dBm]
125	SF12	-139
125	SF10	-130
125	SF7	-124

3.4 Operation frequencies

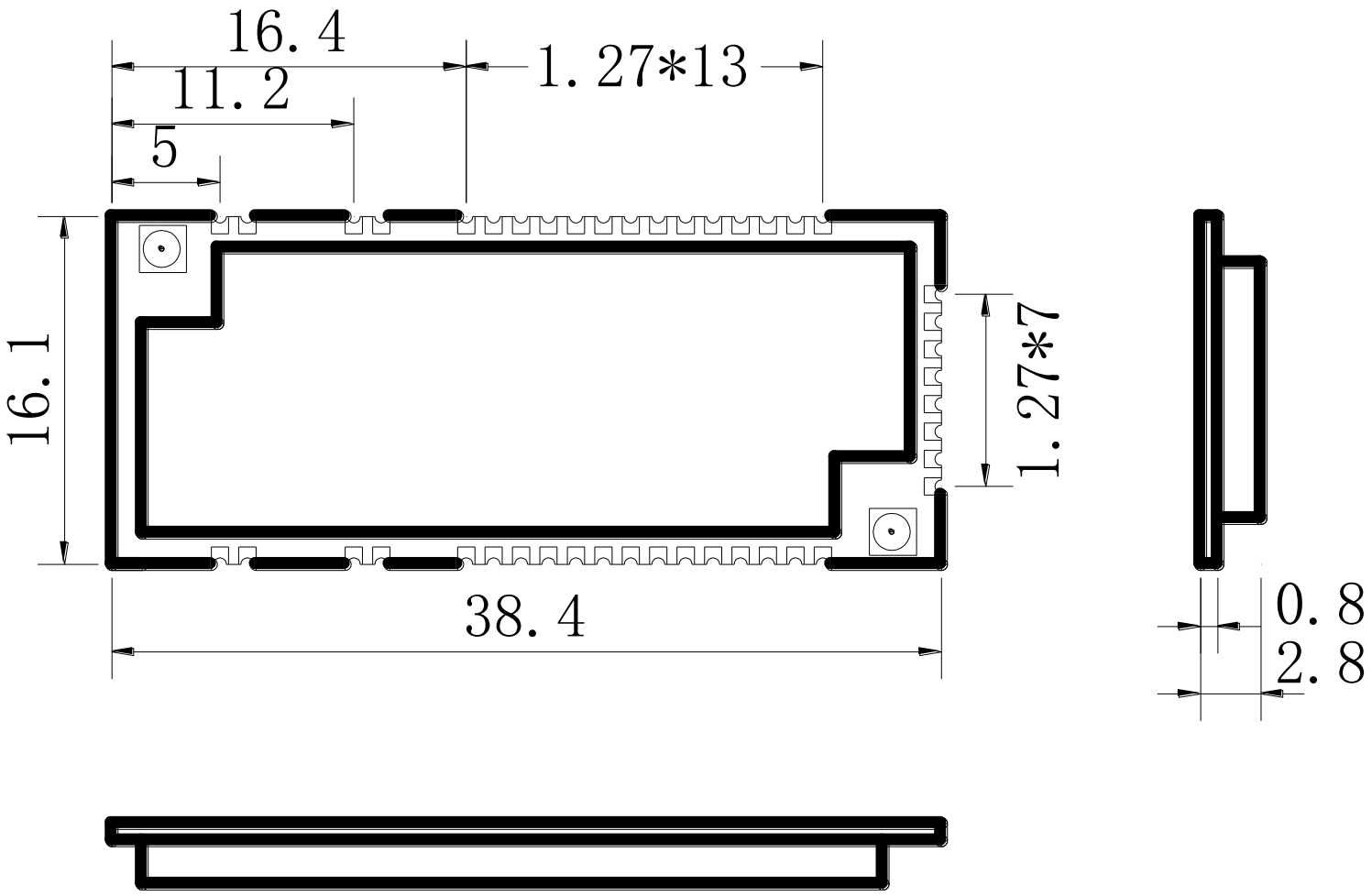
HTIT-Wsh supports LoRaWAN frequency channels and models corresponding table.

Table3.4: Operation frequencies

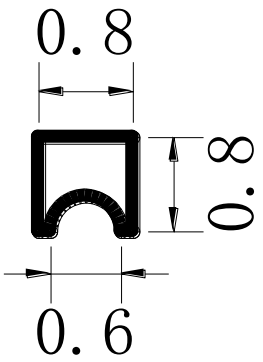
Region	Frequency (MHz)	Model
EU433	433.175~434.665	HTIT-Wsh-LF
CN470	470~510	HTIT-Wsh-LF
IN868	865~867	HTIT-Wsh-HF
EU868	863~870	HTIT-Wsh-HF
US915	902~928	HTIT-Wsh-HF
AU915	915~928	HTIT-Wsh-HF
KR920	920~923	HTIT-Wsh-HF
AS923	920~925	HTIT-Wsh-HF

4. Hardware resource

4.1 Physical dimensions



PAD



5. Resource

5.1 Relevant Resource

- Source Code
  - Heltec ESP (ESP32 & ESP8266) framework (Already included Heltec ESP32 LoRaWAN library)
  - Heltec ESP32 library
- Recommend hardware design
- Pin map
- Downloadable resource
- Footprint

5.2 Contact Information

Heltec Automation Technology Co., Ltd

Chengdu, Sichuan, China

Email: support@heltec.cn

Phone: +86-028-62374838

https://heltec.org