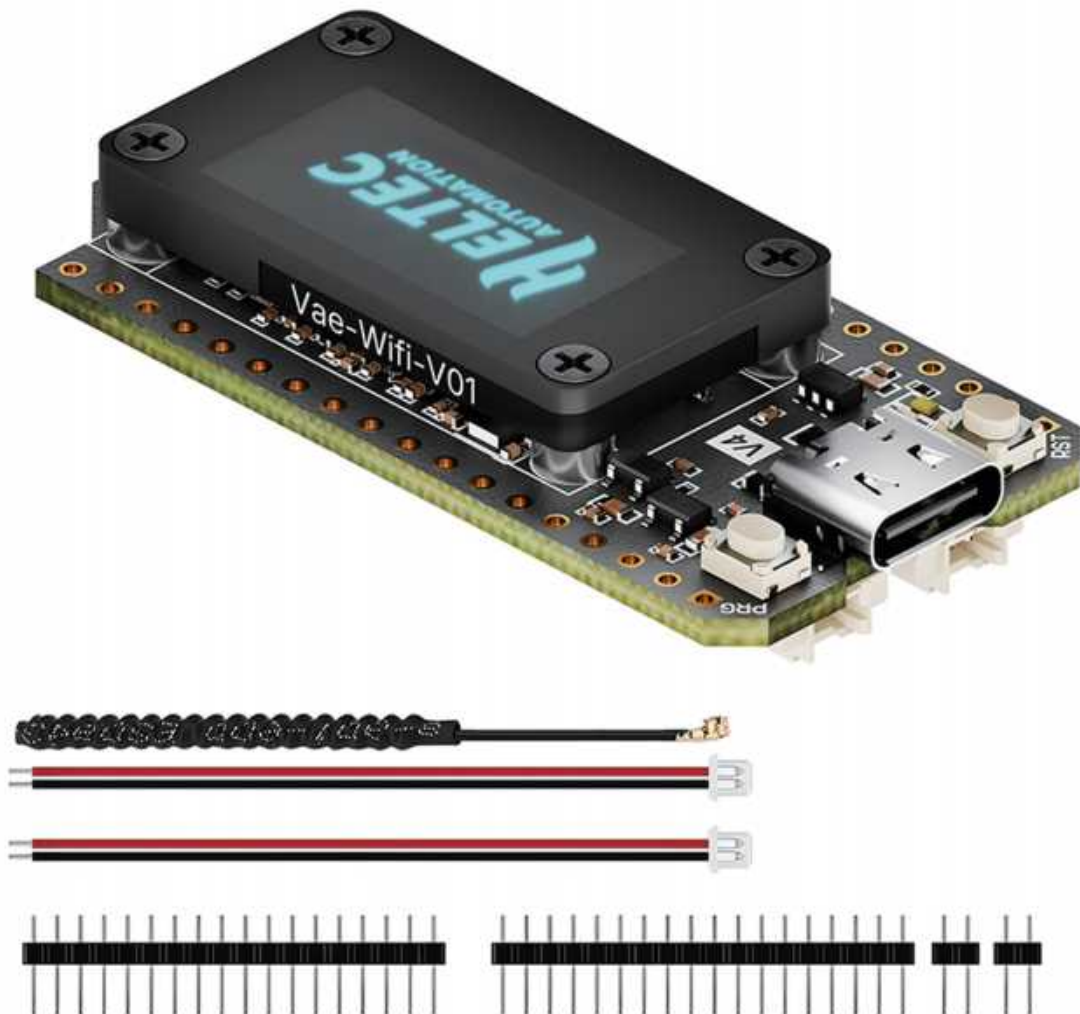


ESP32 LoRa 32 V4 Development Board



catalogue

Product introduction	1
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Product introduction

The WiFi LoRa 32 V4 is a complete upgrade to the classic LoRa development board. Since its launch, this product series has been highly favored by developers and manufacturers. Building upon the powerful features of its predecessor, the V4 version has undergone comprehensive optimization in transmit power, power management, scalability, and other hardware design aspects. It is suitable for a variety of IoT applications, such as smart cities, agricultural monitoring, smart homes, industrial control, security systems, and wireless meter reading, providing developers with a more efficient and flexible development experience.

Performance characteristics:

1. Based on ESP32-S3R2 and SX-1262, supports Wi-Fi b/g/n, BLE, and LoRa communication.
2. 2MB PSRAM and 16MB external flash memory, better suited for UIs and complex systems.
3. High-power version, LoRa transmit power increased to $28\pm 1\text{dBm}$.
4. Form factor and pinout compatible with WiFi LoRa 32 V3.
5. PC housing protects the screen and integrates an FPC 2.4G antenna.
6. Added SH1.25-2P solar panel interface.
7. Optimized lithium battery management.
8. Added SH1.25-8Pin GNSS interface.
9. USB Type-C interface with integrated voltage regulation, ESD protection, short-circuit protection, and RF isolation design; low power consumption less than $20\mu\text{A}$.

Parameter description:

Main control chip: ESP32-S3R2

LoRa chip: SX-1262

Frequency: 433~510 MHz, 863~928 MHz

Maximum transmit power: $21\pm 1\text{dBm}$, $28\pm 1\text{dBm}$

Maximum receive sensitivity: -137 dBm

Wi-Fi: 802.11 b/g/n, up to 150Mbps

Bluetooth: Bluetooth LE, Bluetooth 5, Bluetooth mesh

OLED: SSD1315 (0.96-inch, 128*64 resolution)

Power supply: 5V@USB/Solar, 3.3-4.2V@Battery

Hardware resources: 7*ADC1+2*ADC2, 7*Touch, 3*UART, 2*I2C, 2*I2S, 4*SPI, etc.

Storage: 384KB ROM; 512KB SRAM; 16KB RTC-SRAM; 16MB Flash Memory; 2MB PSRAM

Interfaces: USB Type-C; SH1.25-2P lithium battery interface; SH1.25-2P solar panel interface; 2*IPEX1.0 ANT (LoRa and 2.4G); 2*18*2.54 connector pins, 2*2*2.54 connector pins

Operating Temperature: -40~85°C (OLED operating temperature: -40~70°C)

Dimensions: 51.7*25.4*10.7mm

Application scenarios:

Environmental Sensors

Industrial Internet of Things

Asset Tracking

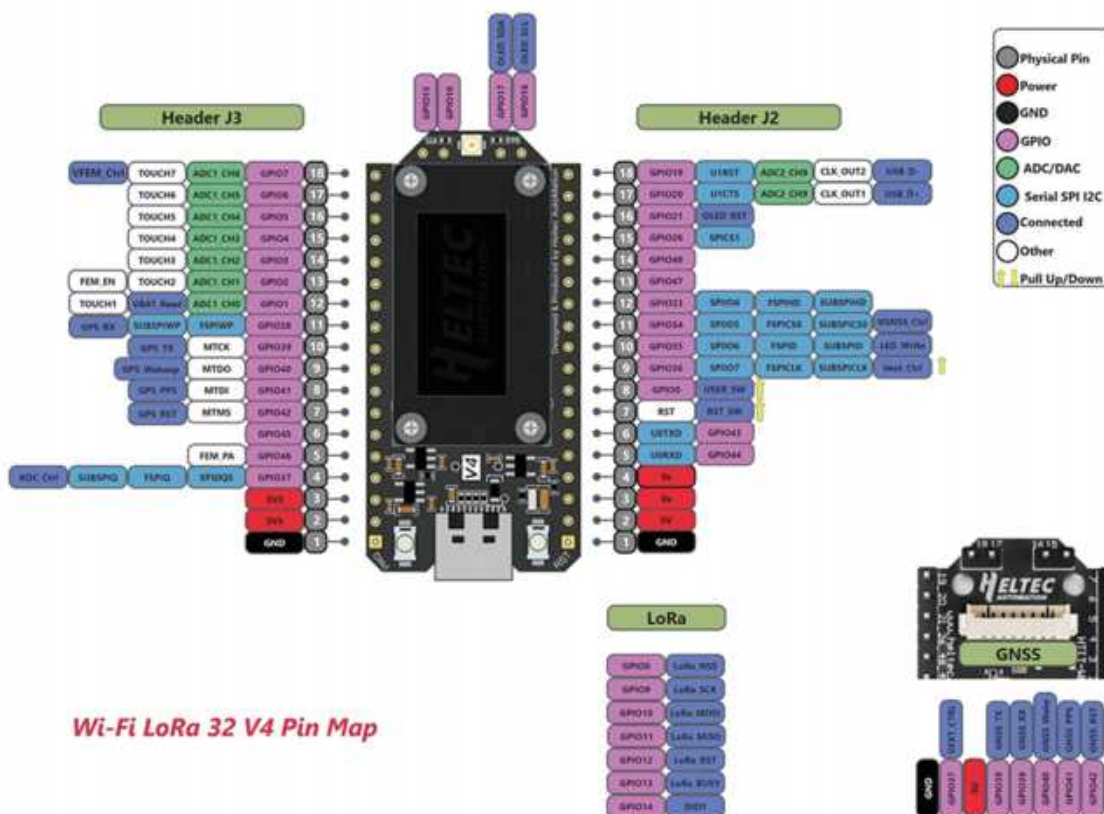
Remote Meter Reading

Smart Agriculture

Wireless Alarms

Innovative Projects and Geek Applications

Product Pin Specifications



No.	Name	Type				Function
1	GND	G				Ground
2	5V	P				5V Power Supply
3	Ve	P				Output 3.3V
4	Ve	P				Output 3.3V
5	RX	I/O			IO MUX	GPIO44 , U0RXD
6	TX	I/O			IO MUX	GPIO43 , U0TXD
7	RST	I				CHIP_PU, Reset Button
8	0	I/O			IO MUX	GPIO0 , PRG Button
9	36	I/O			IO MUX	GPIO36 , SPIIO7, FSPICLK, SUBSPICLK, Vext_Ctrl
10	35	I/O			IO MUX	GPIO35 , SPIIO6, FSPID, SUBSPID, LED
11	34	I/O			IO MUX	GPIO34 , SPIIO5, FSPICS0, SUBSPICS0
12	33	I/O			IO MUX	GPIO33 , SPIIO4, FSPICHD, SUBSPICHD
13	47	I/O			IO MUX	GPIO47 , SPICLK_P_DIFF, SUBSPICLK_P_DIFF
14	48	I/O			IO MUX	GPIO48 , SPICLK_N_DIFF, SUBSPICLK_N_DIFF
15	26	I/O			IO MUX	GPIO26 , SPICS1
16	21	I/O		RTC	IO MUX	GPIO21 , OLED RST
17	20	I/O	Analog	RTC	IO MUX	GPIO20 , U1CTS, ADC2_CH9, USB_D+
18	19	I/O	Analog	RTC	IO MUX	GPIO19 , U1RTS, ADC2_CH8, USB_D-

2.2.2 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		IO MUX	GPIO37 , SPIDQS, FSPIQ, SUBSPIQ, ADC Ctrl
5	46	I/O		IO MUX	GPIO46
6	45	I/O		IO MUX	GPIO45
7	42	I/O		IO MUX	GPIO42 , MTMS, GNSS_RST
8	41	I/O		IO MUX	GPIO41 , MTDI, GNSS_PPS
9	40	I/O		IO MUX	GPIO40 , MTDO, GNSS_Wakeup
10	39	I/O		IO MUX	GPIO39 , MTCK, GNSS_TX
11	38	I/O		IO MUX	GPIO38 , FSPIWP, SUBSPIWP, GNSS_RX
12	1	I/O	Analog	RTC	IO MUX GPIO1 , ADC1_CH0 , TOUCH1 , VBAT_Read ¹
13	2	I/O	Analog	RTC	IO MUX GPIO2 , ADC1_CH1 , TOUCH2
14	3	I/O	Analog	RTC	IO MUX GPIO3 , ADC1_CH2 , TOUCH3
15	4	I/O	Analog	RTC	IO MUX GPIO4 , ADC1_CH3 , TOUCH4
16	5	I/O	Analog	RTC	IO MUX GPIO5 , ADC1_CH4 , TOUCH5
17	6	I/O	Analog	RTC	IO MUX GPIO6 , ADC1_CH5 , TOUCH6
18	7	I/O	Analog	RTC	IO MUX GPIO7 , ADC1_CH6 , TOUCH7 , V_FEML_Control

2.2.3 Additional Pins

Table 2.2.3: Additional Pin

No.	Name		Type		Function	
1	18	I/O	Analog	RTC	IO MUX	GPIO18, OLED_SCL
2	17	I/O	Analog	RTC	IO MUX	GPIO17, OLED_SDA
3	16	I/O	Analog	RTC	IO MUX	GPIO16, XTAL_32K_N
4	15	I/O	Analog	RTC	IO MUX	GPIO15, XTAL_32K_P

2.1.1 Peripherals (I2C/SPI/UART/I2S/PHI/etc.)

ESP32-S3 can integrates a rich set of peripherals. To learn more about on-chip components, please refer to ESP32-S3 MCU Datasheet.

Owing to the GPIO Matrix and IOMUX capabilities, the vast majority of GPIO pins can be configured for functions such as I2C, SPI, I2S, PWM or UART. For specific pin assignments and IOMUX correspondences, please refer to the list of pins marked with IOMUX functionality in Appendix Tables 2.2.1 and 2.2.2.

Note: The original functionality of the reconfigured pins will be affected. Please select appropriate pins for your application. Such as OLED has occupied one I2C interface, while LoRa and Flash have each utilized a separate SPI interface.

3.1 Power Supply

USB or 5V can only be connected to one of them. When either USB or 5V input is connected, the solar panel and lithium battery can be connected simultaneously.

Table 3.2: Power supply

Power Supply Mode	Minimum	Typical	Maximum	Company
Type-C USB($\geq 500\text{mA}$)	4.7	5	6	V
Lithium battery($\geq 250\text{mA}$)	3.3	3.7	4.2	V
5V pin($\geq 500\text{mA}$)	4.7	5	6	V
3V3 pin($\geq 150\text{mA}$)	2.7	3.3	3.5	V
Solar Panel	4.7	5	6	V

3.2 Power Output

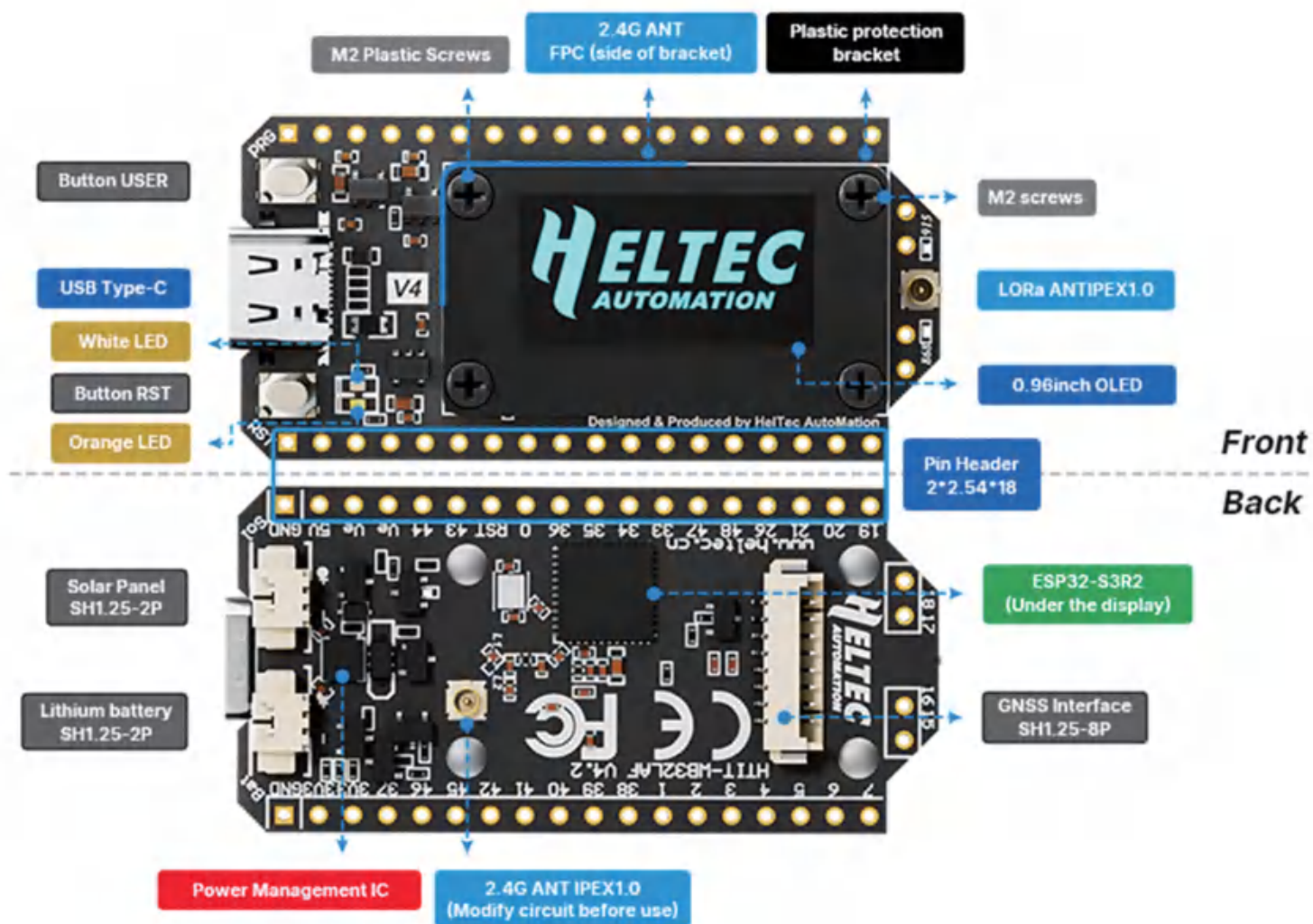
When using VE for external power supply, the VextCtrl(GPIO36) pin needs to be pulled high.

Table 3.2: Power output

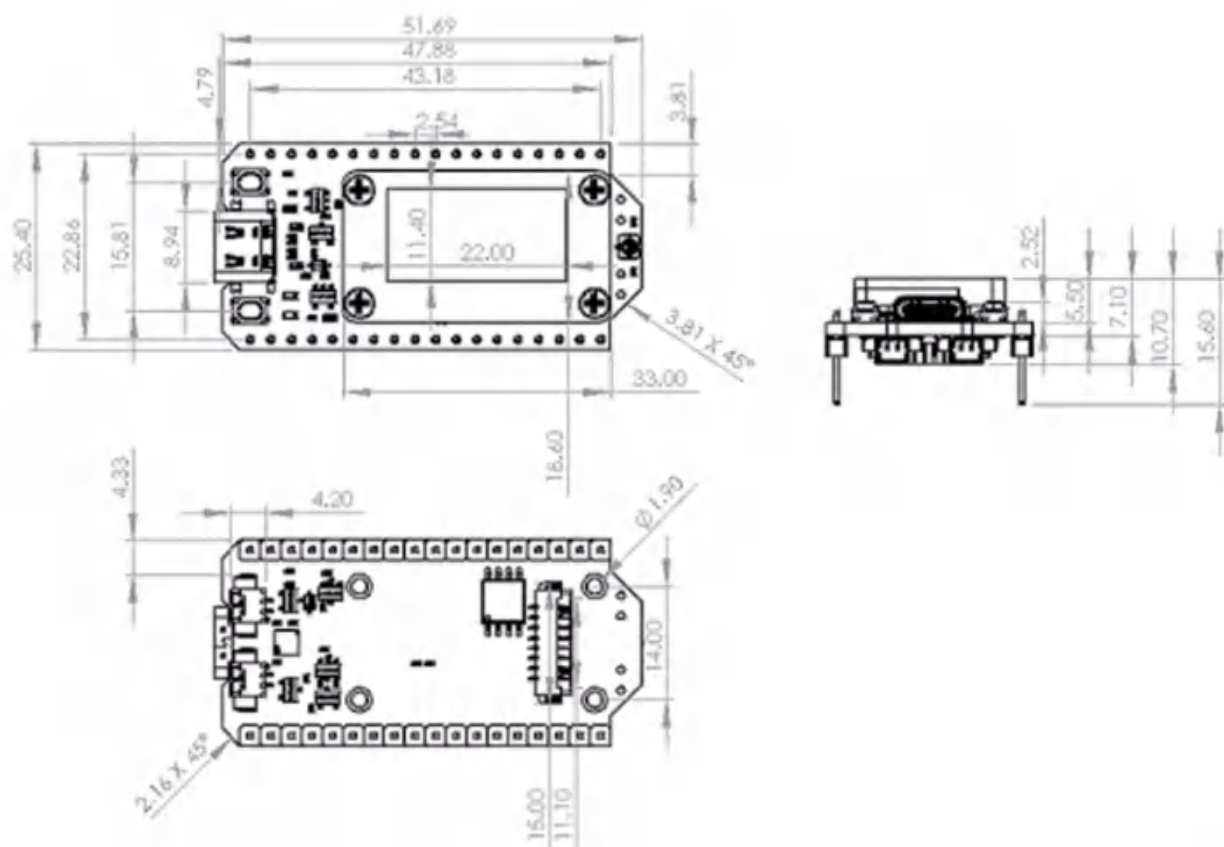
Pin	Minimum	Typical	Maximum	Company
3.3V			500	<u>mA</u>
5V@USB			500	<u>mA</u>
<u>Ve</u>			500	<u>mA</u>

3.3 Power Consumption(25°C)

Mode	Condition	Min.	Typical	Max.	Unit
WiFi Scan	USB powered		119		<u>mA</u>
WiFi AP	USB powered		170		<u>mA</u>
BT	USB powered		115		<u>mA</u>
TX	14dBm,USB powered, 868 TX		290		<u>mA</u>
	17dBm,USB powered, 868 TX		330		<u>mA</u>
	22dBm,USB powered, 868 TX		400		<u>mA</u>
	27dBm,USB powered, 868 TX		750		<u>mA</u>
RX	TX disabled; RX enabled		75		<u>mA</u>
Sleep	USB powered		2		<u>mA</u>
	Battery powered		20		<u>μ A</u>
	3.3V header powered		20		<u>μ A</u>
Charging	USB@5V		500		<u>mA</u>



Product Dimensions



Instructions for use

Docs & Resource

[Docs] — User Manual :

【<https://wiki.heltec.org/docs/devices/open-source-hardware/esp32-series/lora-32/wifi-lora-32/wifi-lora-32-v4/>】

[Attachment] — Schematic diagram

【https://resource.heltec.cn/download/WiFi_LoRa_32_V4/Schematic】

[Attachment] — 3D Model Diagram

【https://resource.heltec.cn/download/WiFi_LoRa_32_V4/3D】

[Resource] — Downloadable Resources

【https://resource.heltec.cn/download/WiFi_LoRa_32_V4/】

[Resource] — Heltec ESP32 Development Framework (Board Manager, Basic Examples)

【https://github.com/Heltec-Aaron-Lee/WiFi_Kit_series】

[Resource] — Heltec ESP32 Extension Libraries (LoRa/LoRaWAN, Sensors, etc.)

【https://github.com/HelTecAutomation/Heltec_ESP32】

Docs & Resource

[Docs] — User Manual :

【<https://wiki.heltec.org/docs/devices/open-source-hardware/esp32-series/lora-32/wifi-lora-32/wifi-lora-32-v4/>】

[Attachment] — Schematic diagram

【https://resource.heltec.cn/download/WiFi_LoRa_32_V4/Schematic】

[Attachment] — 3D Model Diagram

【https://resource.heltec.cn/download/WiFi_LoRa_32_V4/3D】

[Resource] — Downloadable Resources

【https://resource.heltec.cn/download/WiFi_LoRa_32_V4/】

[Resource] — Heltec ESP32 Development Framework (Board Manager, Basic Examples)

【https://github.com/Heltec-Aaron-Lee/WiFi_Kit_series】

[Resource] — Heltec ESP32 Extension Libraries (LoRa/LoRaWAN, Sensors, etc.)

【https://github.com/HelTecAutomation/Heltec_ESP32】

FAQ

2.4GHz Antenna

The default 2.4G FPC antenna is located on the side of the plastic screen bracket.



If you wish to use an IPEX-connected 2.4G antenna, you need to remove the inductor marked as ① in the diagram below, and add a 0-ohm resistor (or other conductive metal or cable) at the position marked ② to connect to the IPEX interface.

