

# HJSIP<sup>®</sup>

## **HJ-LPWE5 Hardware Design Manual**

**Based on ST SEM32WLE5**

**32-bit Arm Cortex-M4 architecture**

**7.5mmx7.5mmx1.1mm chip level**

**High-performance LORA wireless SOC module**

Version: V1.6

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## Preface

Thanks for using the wireless data transmission module provided by HJSIP. HJ-LPWE5 series standard chip-level module, is a high-performance LOT data transceiver based on STM32WLE5. The module adopts LGA package and provides external antenna interface. The product also has the characteristics of low power consumption, small size, strong anti-interference ability, etc., suitable for a variety of application scenarios.

This module is mainly used for data communication, and the company does not assume responsibility for property losses or personal injuries caused by improper operations of users. Please develop the product according to the technical specifications and reference design in the manual. At the same time, pay attention to the general safety matters that should be concerned about when using mobile products.

Before the announcement, the company has the right to modify the content of this manual according to the needs of technological development.

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## Version History

Version	Date	Change Description	Reviser	Reviewer
V1.0	2024/09/05	Initial Version	LMY	LJH
V1.1	2025/02/14	updated parameter	WYW	LMY
V1.2	2025/03/27	Modify the pin description table :1\27\28 is changed to NC, see 2.5	WYW	LMY
V1.3	2025/05/16	1) Add the 5.1 reference schematic diagram; 2) Update the 2.1 functional block diagram; 3) Cover and Preface: Add the description of the core chip.	WYW	LMY
V1.5	2025/08/15	1) 5.1: Update the reference schematic; 2) Table 2-2: The RST reset duration should be greater than 1 second; 3) Table 3-2: Modify the maximum operating current; 4) The working frequency is adjusted to: 420-530 MHz, 750-935 MHz.	WYW	LMY
V1.6	2025/11/13	Add product images.	WYW	LMY

## Applicable module selection

No.	Module type	Type	Description
1	HJ-LPWE5-P400	STM32WLE5, 420MHZ-530MHZ, Passive 32MHZ crystal oscillator	The core uses the STM32WLE5 scheme, the radio frequency is matched to the frequency range of 420-530MHZ, passive crystal oscillator
2	HJ-LPWE5-P800	STM32WLE5, 750MHZ-935MHZ, Passive 32MHZ crystal oscillator	The core uses the STM32WLE5 scheme, the radio frequency is matched to the frequency range of 750-935MHZ, and the passive crystal oscillator
3	HJ-LPWE5-A400	STM32WLE5, 420MHZ-530MHZ, Active TCXO thermocompensating oscillator 32MHZ	The core uses the STM32WLE5 scheme, the radio frequency is matched to the frequency range of 420-530MHZ,Active TCXO thermocompensating oscillator
4	HJ-LPWE5-A800	STM32WLE5, 750MHZ-935MHZ, Active TCXO thermocompensating oscillator 32MHZ	The core uses the STM32WLE5 scheme, the radio frequency is matched to the frequency range of 750-935MHZ,Active TCXO thermocompensating oscillator

## 1 Introduction

The HJ-LPWE5 is a general-purpose LPWAN SoC based on the single-core Arm Cortex-M4 architecture that supports LoRa communication.

The module specifications support two types: ordinary passive crystal style and TCXO temperature compensation crystal style.

The RF (Radio Frequency) transceiver operates at two different frequency ranges: 420MHz - 530 MHz or 750 MHz - 935 MHz.

Ideally, the sensitivity can reach -148dBm, the maximum transmission power +22dBm, and the user can control the internal MCU through ARM programming and development software such as KEIL etc. to achieve wireless data transmission and receiving. Please refer to STM32WLE5 datasheet for more details.



Figure 1.1: HJ-LPWE5 images

## 2 Product overview

### 2.1 Key features

Table 2-1: HJ-LPWE5 key characteristics

Characteristic	Description
function	- Built-in 256KB FLASH and 64KB RAM - 32MHz passive crystal oscillator or TCXO is available internally - Contains 32.768KHz crystal oscillator
frequency range	Free frequency bands 420MHZ-530MHZ or 750MHZ-935MHZ are available without application
Modulation Mode	Support LoRa, (G)FSK, (G)MSK and BPSK
transmitting power	Max. +22dBm
sensitivity	-148dBm @10.4kHz SF12
supply voltage	Single power supply with wide voltage range: 1.8V - 3.6V
operating current	-TX peak current(LoRa): 15mA @+10dBm,87mA @+20dBm -RX peak current: 4.82 mA
low-power dissipation	Low power standby: 360nA (32KB RAM reserved, RTC not turned off) 31nA in ultra-low power mode (RF/MCU function removed, RTC off)
Size	7.5mm * 7.5mm * 1.1mm (L*W*H)
Package	LGA61
Operating temperature	-40 ~ +85°C

### 2.2 Application scenarios

- Smart home wireless remote control, data transmission
- Wireless POS machine
- Industrial control, three types of instruments wireless communication
- Other wireless, low power applications
- LoRaWAN,LinkWAN application

### 2.3 Functional block diagram

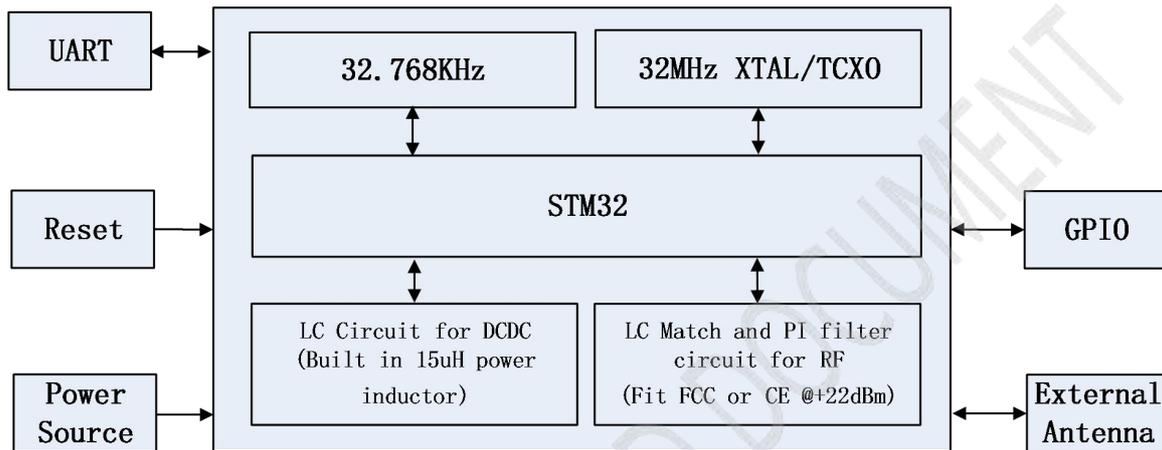


Figure 2.1: HJ-LPWE5 functional block diagram

### 2.4 Pins distribution diagram

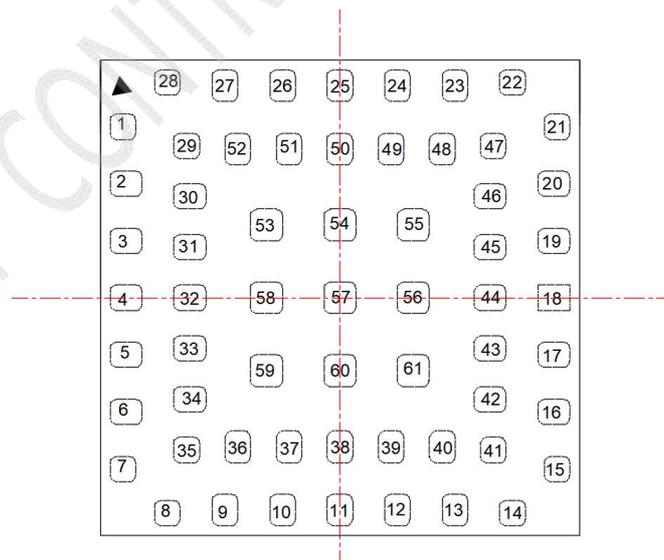


Figure 2.2: HJ-LPWE5 Pins distribution diagram

### 2.5 Pins description table

Table 2-2: HJ-LPWE5 Pins definition table

PIN	Name	Type	Description	Remarks
1	NC	/	/	/
2	PA6	IO	GPIO	/
3	VDD_ TCXO/PB0	POWER/ IO	TCXO power supply/GPIO	/
4	PA9	IO	GPIO	/
5	PB12	IO	GPIO	/
6	PB13	IO	GPIO	/
7	PA11	IO	GPIO	/
8	PA13	IO	GPIO	/
9	VBAT	POWER	Backup power input	1.55-3.6V, when VDD is not present, power the RTC/TAMP/ external 32kHz crystal and backup register.
10	OSC32_ IN/PC14	OSC32_I N/IO	32.768K crystal oscillator input/GPIO	<a href="#">An 32.768K crystal oscillator has been internally connected. No other components can be connected to it; otherwise, it will affect the oscillator's operation.</a> <a href="#">If the internal oscillator is not used, it can be utilized as a general I/O port.</a>
11	OSC32_ OUT/PC15	OSC32_O UT/IO	32.768K crystal oscillator output/GPIO	<a href="#">An 32.768K crystal oscillator has been internally connected. No other components can be connected to it; otherwise, it will affect the oscillator's operation.</a> <a href="#">If the internal oscillator is not used, it can be utilized as a general I/O port.</a>
12	VREF+	POWER	Reference voltage input	The input reference voltage of the ADC and DAC, is also the output of the internal reference voltage buffer
13	PC5	IO	GPIO	/
14	PB15	IO	GPIO	/
15	PB7	IO	GPIO	/
16	PB4	IO	GPIO	/
17	PB3	IO	GPIO	/
18	PB5	IO	GPIO	/
19	PB6	IO	GPIO	/
20	PC1	IO	GPIO	/
21	PA3	IO	GPIO	/
22	RF_PIN	RF out	RF signal output	External antenna access
23	GND	POWER	Power Supply GND	/
24	PA4	IO	GPIO	/
25	PA8	IO	GPIO	/
26	BOOT0/ PH3	IO	GPIO	/
27	NC	/	/	/
28	NC	/	/	/
29	PB11	IO	GPIO	/
30	PC4	IO	GPIO	/
31	NRST	RESET	Reset Pin	Low level effective. The duration of the low voltage should be longer than 1s.
32	PB1	IO	GPIO	/
33	PB2	IO	GPIO	/
34	PA10	IO	GPIO	/
35	PA0	IO	GPIO	/

36	PA12	IO	GPIO	/
37	PC13	IO	GPIO	/
38	PB14	IO	GPIO	/
39	PC3	IO	GPIO	/
40	PA14	IO	GPIO	/
41	PB9	IO	GPIO	/
42	PA15	IO	GPIO	/
43	PC2	IO	GPIO	/
44	PB8	IO	GPIO	/
45	PC0	IO	GPIO	/
46	PA2	IO	GPIO	/
47	GND	POWER	Power Supply GND	/
48	PA5	IO	GPIO	/
49	PA7	IO	GPIO	/
50	PB10	IO	GPIO	/
51	PC6	IO	GPIO	/
52	PA1	IO	GPIO	/
53	GND	POWER	Power Supply GND	/
54	GND	POWER	Power Supply GND	/
55	GND	POWER	Power Supply GND	/
56	GND	POWER	Power Supply GND	/
57	GND	POWER	Power Supply GND	/
58	GND	POWER	Power Supply GND	/
59	VDD	POWER	Power Input	1.8-3.6V
60	VDD	POWER	Power Input	1.8-3.6V
61	VDDA	POWER	analog power	External analog power supply for A/D, D/A converters, voltage reference buffers and comparators. 0 V to 3.6 V

**Table 2-3: GPIO peripheral function list**

GPIO No.	Vicarious function	Additional function
PA0	TIM2_CH1,I2C3_SMBA,I2S_CKIN,USART2_CTS,COMP1_OUT,DEBUG_PWR_REGLP1S,TIM2_ETR,CM4_EVENTOUT	TAMP_IN2/WKUP1
PA1	TIM2_CH2,LPTIM3_OUT,I2C1_SMBA,SPI1_SCK,USART2_RTS,LPUART1_RTS,DEBUG_PWR_REGLP2S,CM4_EVENTOUT	/
PA2	LSCO,TIM2_CH3,USART2_TX,LPUART1_TX,COMP2_OUT,DEBUG_PWR_LDORDY,CM4_EVENTOUT	LSCO
PA3	TIM2_CH4,I2S2_MCK,USART2_RX,LPUART1_RX,CM4_EVENTOUT	/
PA4	RTC_OUT2,LPTIM1_OUT,SPI1_NSS,USART2_CK,DEBUG_SUBGHZSPI_NSSOUT,LPTIM2_OUT,CM4_EVENTOUT	/
PA5	TIM2_CH1,TIM2_ETR,SPI2_MISO,SPI1_SCK,DEBUG_SUBGHZSPI_SCKOUT,LPTIM2_ETR,CM4_EVENTOUT	/
PA6	TIM1_BKIN,I2C2_SMBA,SPI1_MISO,LPUART1_CTS,DEBUG_SUBGHZSPI_MISOOUT,TIM16_CH1,CM4_EVENTOUT	/
PA7	TIM1_CH1N,I2C3_SCL,SPI1_MOSI,COMP2_OUT,DEBUG_SUBGHZSPI_MOSIOUT,TIM17_CH1,CM4_EVENTOUT	/

PA8	MCO, TIM1_CH1, SPI2_SCK/I2S2_CK, USART1_CK, LPTIM2_OUT, CM4_EVENTOUT	/
PA9	TIM1_CH2, SPI2_NSS/I2S2_WS, I2C1_SCL, SPI2_SCK/I2S2_CK, USART1_TX, CM4_EVENTOUT	/
PA10	RTC_REFIN, TIM1_CH3, I2C1_SDA, SPI2_MOSI/I2S2_SD, USART1_RX, DEBUG_RF_HSE32RDY, TIM17_BKIN, CM4_EVENTOUT	COMP1_INM, COMP2_INM, DAC_OUT1, ADC_IN6
PA11	TIM1_CH4, TIM1_BKIN2, LPTIM3_ETR, I2C2_SDA, SPI1_MISO, USART1_CTS, DEBUG_RF_NRESET, CM4_EVENTOUT	COMP1_INM, COMP2_INM, ADC_IN7
PA12	TIM1_ETR, LPTIM3_IN1, I2C2_SCL, SPI1_MOSI, RF_BUSY, USART1_RTS, CM4_EVENTOUT	ADC_IN8
PA13	JTMS-SWDIO, I2C2_SMBA, IR_OUT, CM4_EVENTOUT	ADC_IN9
PA14	JTCK-SWCLK, LPTIM1_OUT, I2C1_SMBA, CM4_EVENTOUT	ADC_IN10
PA15	JTDI, TIM2_CH1, TIM2_ETR, I2C2_SDA, SPI1_NSS, CM4_EVENTOUT	COMP1_INM, COMP2_INP, ADC_IN11
PB0/VDD_TCXO	COMP1_OUT, CM4_EVENTOUT	/
PB1	LPUART1_RTS_DE, LPTIM2_IN1, CM4_EVENTOUT	COMP2_INP, ADC_IN5
PB2	LPTIM1_OUT, I2C3_SMBA, SPI1_NSS, DEBUG_RF_SMPSRDY, CM4_EVENTOUT	COMP1_INP, COMP2_INM, ADC_IN4
PB3	JTDO/TRACESWO, TIM2_CH2, SPI1_SCK, RF_IRQ0, USART1_RTS, DEBUG_RF_DTB1, CM4_EVENTOUT	COMP1_INM, COMP2_INM, ADC_IN2, TAMP_IN3/WKUP3
PB4	NJTRST, I2C3_SDA, SPI1_MISO, USART1_CTS, DEBUG_RF_LDORDY, TIM17_BKIN, CM4_EVENTOUT	COMP1_INP, COMP2_INP, ADC_IN3
PB5	LPTIM1_IN1, I2C1_SMBA, SPI1_MOSI, RF_IRQ1, USART1_CK, COMP2_OUT, TIM16_BKIN, CM4_EVENTOUT	/
PB6	LPTIM1_ETR, I2C1_SCL, USART1_TX, TIM16_CH1N, CM4_EVENTOUT	/
PB7	LPTIM1_IN2, TIM1_BKIN, I2C1_SDA, USART1_RX, TIM17_CH1N, CM4_EVENTOUT	/
PB8	TIM1_CH2N, I2C1_SCL, RF_IRQ2, TIM16_CH1, CM4_EVENTOUT	/
PB9	TIM1_CH3N, I2C1_SDA, SPI2_NSS/I2S2_WS, IR_OUT, TIM17_CH1, CM4_EVENTOUT	/
PB10	TIM2_CH3, I2C3_SCL, SPI2_SCK/I2S2_CK, LPUART1_RX, COMP1_OUT, CM4_EVENTOUT	/
PB11	TIM2_CH4, I2C3_SDA, LPUART1_TX, COMP2_OUT, CM4_EVENTOUT	/
PB12	TIM1_BKIN, I2C3_SMBA, SPI2_NSS/I2S2_WS, LPUART1_RTS, CM4_EVENTOUT	/
PB13	TIM1_CH1N, I2C3_SCL, SPI2_SCK/I2S2_CK, LPUART1_CTS, CM4_EVENTOUT	ADC_IN0
PB14	TIM1_CH2N, I2S2_MCK, I2C3_SDA, SPI2_MISO, CM4_EVENTOUT	ADC_IN1
PB15	TIM1_CH3N, I2C2_SCL, SPI2_MOSI/I2S2_SD, CM4_EVENTOUT	/
PC0	LPTIM1_IN1, I2C3_SCL, LPUART1_RX, LPTIM2_IN1, CM4_EVENTOUT	/

PC1	LPTIM1_OUT, SPI2_MOSI/I2S2_SD, I2C3_SDA, LPUART1_TX, CM4_EVENTOUT	/
PC2	LPTIM1_IN2, SPI2_MISO, CM4_EVENTOUT	/
PC3	LPTIM1_ETR, SPI2_MOSI/I2S2_SD, LPTIM2_ETR, CM4_EVENTOUT	/
PC4	CM4_EVENTOUT	/
PC5	CM4_EVENTOUT	/
PC6	I2S2_MCK, CM4_EVENTOUT	/
PC13	CM4_EVENTOUT	TAMP_IN1/RTC_OUT1 /RTC_TS/ WKUP2
PC14/OSC32_IN	CM4_EVENTOUT	OSC32_IN
PC15/OSC32_OUT	CM4_EVENTOUT	OSC32_OUT
PH3/BOOT0	CM4_EVENTOUT	BOOT0

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Table 2-4: GPIO peripheral function mapping table

Port	AF0	AF1	AF2	AF3	AF4	AF5	AF6	AF7	AF8	AF9	AF10	AF11	AF12	AF13	AF14	AF15	
	SYS_AF	TIM1/ TIM2/ LPTIM1	TIM1/ TIM2	SPI2S2/ TIM1/ LPTIM3	I2C1/ I2C2/ I2C3	SPI1/ SPI2S2	RF	USART1 / USART2	LPUART 1	-	-	-	COMP1/ COMP2/ TIM1	DEBUG	TIM2/ TIM16/ TIM17 LPTIM2	EVENOUT	
Port A	PA0	-	TIM2_ CH1	-	-	I2C3_ SMBA	I2S_ CKIN	-	USART2_ CTS	-	-	-	COMP1_ OUT	DEBUG_PWR_REGLP1 S	TIM2_ETR	CM4_EVE NTOUT	
	PA1	-	TIM2_ CH2	-	LPTIM3_ OUT	I2C1_ SMBA	SPI1_ SCK	-	USART2_ RTS	LPUART 1_RTS	-	-	-	DEBUG_PWR_REGLP2 S	-	CM4_EVE NTOUT	
	PA2	LSCO	TIM2_ CH3	-	-	-	-	-	USART2_ TX	LPUART 1_TX	-	-	COMP2_ OUT	DEBUG_PWR_LDORD Y	-	CM4_EVE NTOUT	
	PA3	-	TIM2_ CH4	-	-	-	I2S2_ MCK	-	USART2_ RX	LPUART 1_RX	-	-	-	-	-	CM4_EVE NTOUT	
	PA4	RTC_ OUT2	LPTIM1_ OUT	-	-	-	SPI1_ NSS	-	USART2_ CK	-	-	-	-	DEBUG_ SUBGHZSPI_NSSOUT	LPTIM2_ OUT	CM4_EVE NTOUT	
	PA5	-	TIM2_ CH1	TIM2_ ETR	SPI2_ MISO	-	SPI1_ SCK	-	-	-	-	-	-	DEBUG_ SUBGHZSPI_SCKOUT	LPTIM2_ ETR	CM4_EVE NTOUT	
	PA6	-	TIM1_ BKIN	-	-	I2C2_ SMBA	SPI1_ MISO	-	-	LPUART 1_CTS	-	-	-	TIM1_ BKIN	DEBUG_ SUBGHZSPI_MISOOU T	TIM16_ CH1	CM4_EVE NTOUT
	PA7	-	TIM1_ CH1N	-	-	I2C3_ SCL	SPI1_ MOSI	-	-	-	-	-	-	COMP2_ OUT	DEBUG_ SUBGHZSPI_MOSIOU T	TIM17_ CH1	CM4_EVE NTOUT
	PA8	MCO	TIM1_ CH1	-	-	-	SPI2_ SCK/ I2S2_CK	-	USART1_ CK	-	-	-	-	-	-	LPTIM2_ OUT	CM4_EVE NTOUT
	PA9	-	TIM1_ CH2	-	SPI2_NSS /I2S2_WS	I2C1_ SCL	SPI2_ SCK/ I2S2_CK	-	USART1_ TX	-	-	-	-	-	-	-	CM4_EVE NTOUT
	PA10	RTC_ REFIN	TIM1_ CH3	-	-	I2C1_ SDA	SPI2_ MOSI/ I2S2_SD	-	USART1_ RX	-	-	-	-	-	DEBUG_RF_ HSE32RDY	TIM17_ BKIN	CM4_EVE NTOUT
	PA11	-	TIM1_ CH4	TIM1_ BKIN2	LPTIM3_ ETR	I2C2_ SDA	SPI1_ MISO	-	USART1_ CTS	-	-	-	-	TIM1_ BKIN2	DEBUG_RF_ NRESET	-	CM4_EVE NTOUT
	PA12	-	TIM1_ ETR	-	LPTIM3_ IN1	I2C2_ SCL	SPI1_ MOSI	RF_ BUSY	USART1_ RTS	-	-	-	-	-	-	-	CM4_EVE NTOUT
	PA13	JTMS- SWDIO	-	-	-	I2C2_ SMBA	-	-	-	IR_OUT	-	-	-	-	-	-	CM4_EVE NTOUT
	PA14	JTCK- SWCLK	LPTIM1_ OUT	-	-	I2C1_ SMBA	-	-	-	-	-	-	-	-	-	-	CM4_EVE NTOUT
PA15	JTDI	TIM2_ CH1	TIM2_ ETR	-	I2C2_ SDA	SPI1_ NSS	-	-	-	-	-	-	-	-	-	CM4_EVE NTOUT	

Table 2-4: GPIO peripheral function mapping table (continued)

Port	AF0	AF1	AF2	AF3	AF4	AF5	AF6	AF7	AF8	AF9	AF10	AF11	AF12	AF13	AF14	AF15
	SYS_A F	TIM1/ TIM2/ LPTIM1	TIM1/ TIM2	SPI2S2/ TIM1/ LPTIM3	I2C1/ I2C2/ I2C3	SPI1/ SPI2S2	RF	USART1 / USART2	LPUART 1	-	-	-	COMP1/ COMP2/ TIM1	DEBUG	TIM2/ TIM16/ TIM17 LPTIM2	EVENOUT
Port B	PB0	-	-	-	-	-	-	-	-	-	-	-	COMP1_ OUT	-	-	CM4_EVENTOUT
	PB1	-	-	-	-	-	-	-	LPUART 1_ RTS_DE	-	-	-	-	-	LPTIM2 _IN1	CM4_EVENTOUT
	PB2	-	LPTIM1_ OUT	-	-	I2C3_ SMBA	SPI1_ NSS	-	-	-	-	-	-	DEBUG_RF_ SMPSRDY	-	CM4_EVENTOUT
	PB3	JTDO/ TRACE SWO	TIM2_ CH2	-	-	-	SPI1_ SCK	RF_IRQ0	USART1_RT S	-	-	-	-	DEBUG_RF_ DTB1	-	CM4_EVENTOUT
	PB4	NJTRS T	-	-	-	I2C3_ SDA	SPI1_ MISO	-	USART1_ CTS	-	-	-	-	DEBUG_RF_ LDORDY	TIM17_ BKIN	CM4_EVENTOUT
	PB5	-	LPTIM1_ IN1	-	-	I2C1_ SMBA	SPI1_ MOSI	RF_IRQ1	USART1_ CK	-	-	-	COMP2_ OUT	-	TIM16_ BKIN	CM4_EVENTOUT
	PB6	-	LPTIM1_ ETR	-	-	I2C1_ SCL	-	-	USART1_ TX	-	-	-	-	-	TIM16_ CH1N	CM4_EVENTOUT
	PB7	-	LPTIM1_ IN2	-	TIM1_ BKIN	I2C1_ SDA	-	-	USART1_ RX	-	-	-	-	-	TIM17_ CH1N	CM4_EVENTOUT
	PB8	-	TIM1_ CH2N	-	-	I2C1_ SCL	-	RF_IRQ2	-	-	-	-	-	-	TIM16_ CH1	CM4_EVENTOUT
	PB9	-	TIM1_ CH3N	-	-	I2C1_ SDA	SPI2_ NSS/ I2S2_WS	-	-	IR_OUT	-	-	-	-	TIM17_ CH1	CM4_EVENTOUT
	PB10	-	TIM2_ CH3	-	-	I2C3_ SCL	SPI2_ SCK/ I2S2_CK	-	-	LPUART 1_RX	-	-	-	COMP1_ OUT	-	CM4_EVENTOUT
	PB11	-	TIM2_ CH4	-	-	I2C3_ SDA	-	-	-	LPUART 1_TX	-	-	-	COMP2_ OUT	-	CM4_EVENTOUT
	PB12	-	TIM1_ BKIN	-	TIM1_ BKIN	I2C3_ SMBA	SPI2_ NSS/ I2S2_WS	-	-	LPUART 1_RTS	-	-	-	-	-	CM4_EVENTOUT
	PB13	-	TIM1_ CH1N	-	-	I2C3_ SCL	SPI2_ SCK/ I2S2_CK	-	-	LPUART 1_CTS	-	-	-	-	-	CM4_EVENTOUT
	PB14	-	TIM1_ CH2N	-	I2S2_ MCK	I2C3_ SDA	SPI2_ MISO	-	-	-	-	-	-	-	-	CM4_EVENTOUT
	PB15	-	TIM1_ CH3N	-	-	I2C2_ SCL	SPI2_ MOSI/ I2S2_SD	-	-	-	-	-	-	-	-	CM4_EVENTOUT

Table 2-4: GPIO peripheral function mapping table (continued)

Port		AF0	AF1	AF2	AF3	AF4	AF5	AF6	AF7	AF8	AF9	AF10	AF11	AF12	AF13	AF14	AF15	
Port		SYS_A F	TIM1/ TIM2/ LPTIM1	TIM1/ TIM2	SPI2S2/ TIM1/ LPTIM3	I2C1/ I2C2/ I2C3	SPI1/ SPI2S2	RF	USART1 / USART2	LPUART 1	-	-	-	COMP1/ COMP2/ TIM1	DEBUG	TIM2/ TIM16/ TIM17 LPTIM2	EVENOUT	
Port C	PC0	-	LPTIM1_ IN1	-	-	I2C3_ SCL	-	-	-	LPUART 1_RX	-	-	-	-	-	LPTIM2 _IN1	CM4_EVENTOUT	
	PC1	-	LPTIM1_ OUT	-	SPI2_ MOSI/ I2S2_SD	I2C3_ SDA	-	-	-	LPUART 1_TX	-	-	-	-	-	-	CM4_EVENTOUT	
	PC2	-	LPTIM1_ IN2	-	-	-	SPI2_ MISO	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT	
	PC3	-	LPTIM1_ ETR	-	-	-	SPI2_ MOSI/ I2S2_SD	-	-	-	-	-	-	-	-	LPTIM2 _ETR	CM4_EVENTOUT	
	PC4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT	
	PC5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT	
	PC6	-	-	-	-	-	-	I2S2_ MCK	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT
	PC13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT
	PC14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT
PC15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT	
Port H	PH3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CM4_EVENTOUT	

## 3 Electrical Parameters

### 3.1 Absolute Maximum Ratings

**Table 3-1: Absolute Maximum Ratings**

Parameter	MIN	MAX	Unit
supply voltage VCC	1.7	3.9	V
IO Supply Voltage	0	VCC	V
Operating Temperature	-40	+85	°C
Storage Temperature	-40	+85	°C

### 3.2 DC Characteristics

**Table 3-2: Recommended Operating Conditions**

Parameter	MIN	TYP	MAX	Unit
Supply voltage VCC	1.8	3.3	3.6	V
IO Supply Voltage	0	3.3	VCC	V
Dormant working current	/	0.36	/	uA
Maximum Operating Current@+22dBm	/	155.1mA(434-490MHz) 162.6mA(868-915MHz)	/	mA
Operating Temperature	-40	+25	+85	°C

**\*Note\***

To ensure a continuous output power of 22dBm, the supply voltage should be above 3V as possible.

## 4 RF Features

The module sets the external antenna interface.

**Table 4-1: RF features**

Attribute	Value	Remarks
Wireless modulation mode	LoRa, (G)FSK, (G)MSK and BPSK	/
Frequency range	420-530Mhz or 750-935Mhz	/
Air speed	0.013 - 17.4Kbps(LoRa, send and receive) 0.6 - 300Kbps (FSK, send and receive) 0.1 - 10Kbps((G)MSK, send) 100 - 600bps(BPSK, send)	/
Transmit Power	MAX. +22dbm	/
Receive sensitivity	MAX. -148dbm	@10.4kHz SF12
TX peak current	15mA @+10dBm,87mA @+20dBm	/
RX peak current	4.82 mA	/
antenna	External antenna	/

## 5 Reference design

### 5.1 Reference schematic diagram

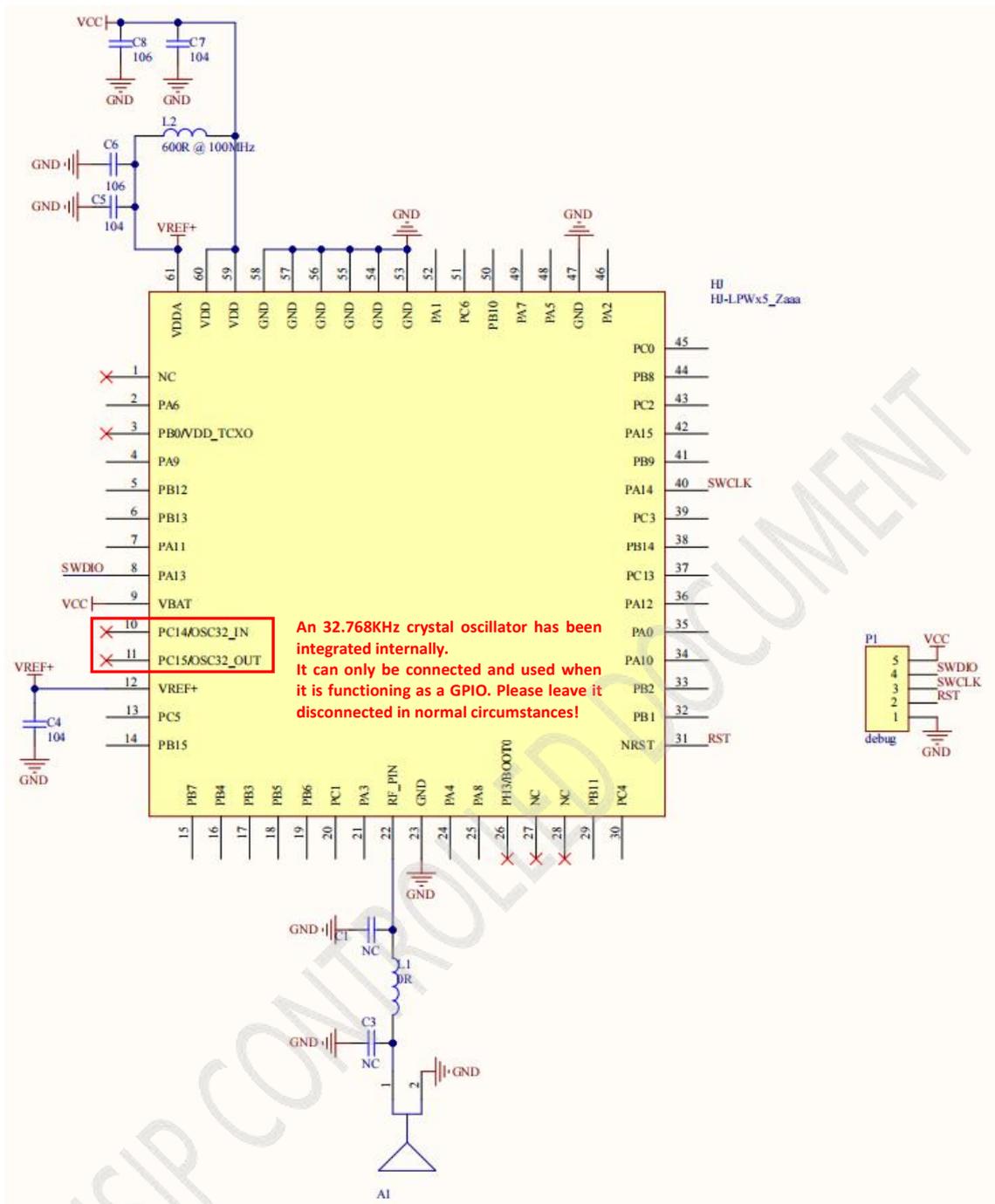


Figure 5.1: Reference schematic diagram

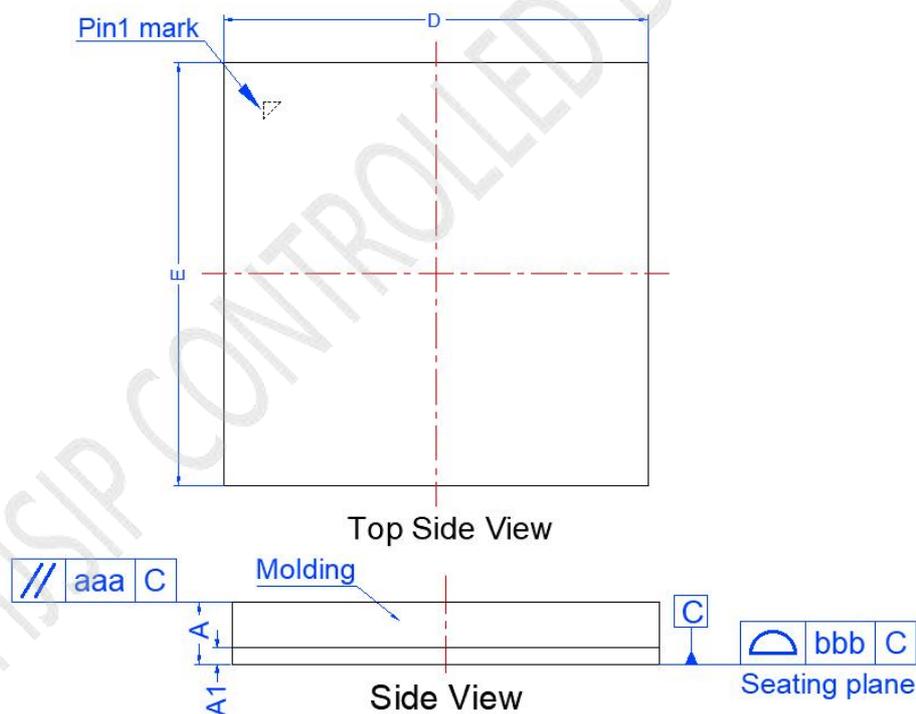
## 5.2 Notices for Hardware Design

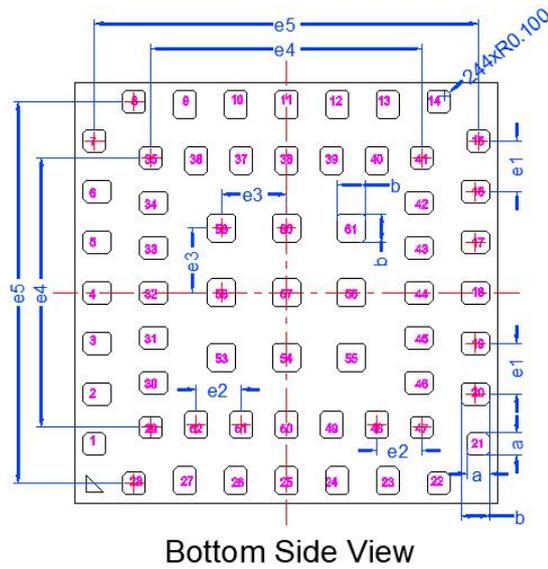
- It is recommended to use dedicated antennas that match the wireless frequency band specifications, such as spring antennas, etc.
- Drill vias in the copper-covered areas of the entire circuit board, especially in the copper-covered areas near the module and antenna, and try to drill as many vias as possible.
- If space permits, it is best to reserve a  $\pi$ -type filter circuit between the module and the antenna.
- If there are high-power devices or high-voltage conversion circuits on the circuit board, it is

necessary to isolate the GND copper-covered area of the module from other parts and connect them using a single-point grounding method, and try to drill as many vias as possible to reduce interference to the RF signal.

- For products with this wireless module, metal components such as screws and inductors should be kept as far away as possible from the RF antenna part of the wireless module.
- For non-battery-powered products, and use mains power supply with voltage reduction, it is recommended to perform magnetic bead or inductor filtering on the input power supply.
- If it is capacitor-powered or the space is limited, the filter capacitor at the power input can be removed, and the filter capacitor already present in the module can be used.
- Please pay attention to check the pin diagrams for all pins, and for the connected IOs, please pay attention to the IO mode and status.
- GND must be well grounded.
- Unused pins can be left floating.

## 6 Dimension figure





DIMENSIONAL REFERENCES Units:mm

SYMBOL	DIMENSIONAL REQMTS			SYMBOL	Tolerance of Form & Position
	MIN	NOM	MAX		
A	1.06	1.10	1.14	aaa	0.10
A1	0.27	0.30	0.33	bbb	0.10
D	7.40	7.50	7.60		
E	7.40	7.50	7.60		
a	0.35	0.40	0.45		
b	0.45	0.50	0.55		
e1	0.90REF.				
e2	0.80REF.				
e3	1.15REF.				
e4	4.80REF.				
e5	6.80REF.				

Note:  
1. All dimensions are in mm

Figure 6.1: HJ-LPWE5 Mechanical dimensional drawing

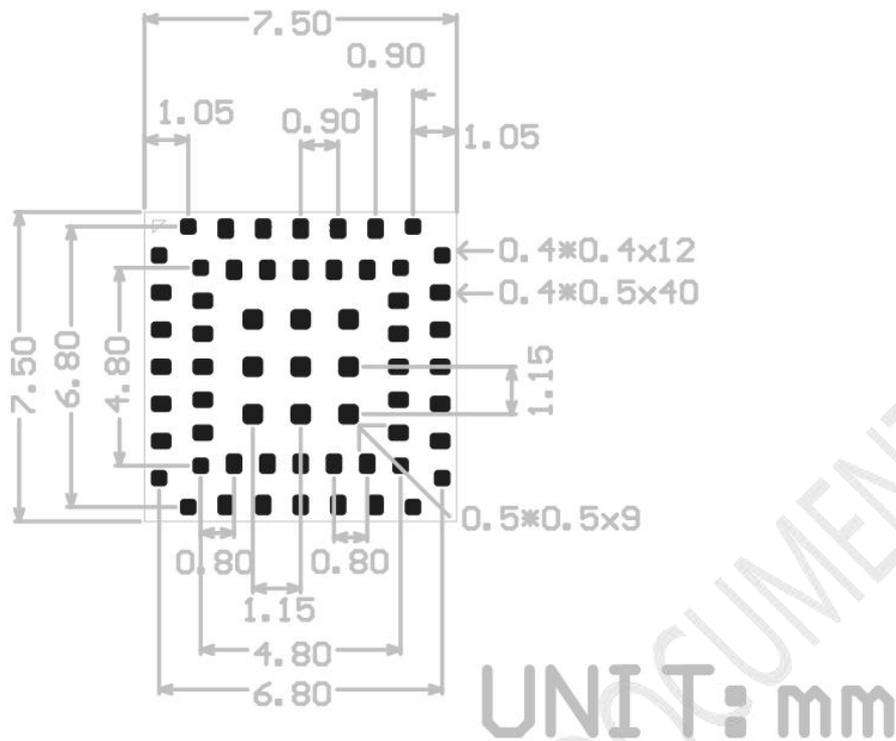


Figure 6.2: HJ-LPWE5 Package size drawing

## 7 SMT production

### 7.1 Precautions for ultrasonic welding

#### \*NOTES\*

Please carefully consider using ultrasonic welding technology. If it is necessary to use ultrasonic welding technology, please use 40KHz high frequency ultrasound welding technology. Keep the module away from the ultrasonic soldering line and the fixing column during the design method to prevent damage to the module!

For specific ultrasonic welding matters, please contact our company for technical consultation.

### 7.2 Soldering Recommendations

#### **The module is recommended to be soldered using reflow soldering.**

HJ-LPWE5 module use high temperature resistant materials, manufacturing by Lead-free Process. The maximum temperature resistance is 265°C. Ten continuous reflow soldering has no effect on properties and strength. Specific parameters as shown in Table 8-1.

Table 8-1: Reflow soldering parameters

Parameter	Value
Features	Lead-free process
Average ramp up rate( $T_{SMAX}$ to $T_p$ )	max3°C/sec. max

Temperature Min( $T_{Smin}$ )	150°C
Temperature Max( $T_{Smax}$ )	200°C
Preheat time (Min to Max) (tS)	80~100sec
Peak Temperature ( $T_P$ )	250±5°C
Ramp-down Rate	6°C/sec. max
Time 25°C to Peak Temp ( $T_P$ )	8 min. max

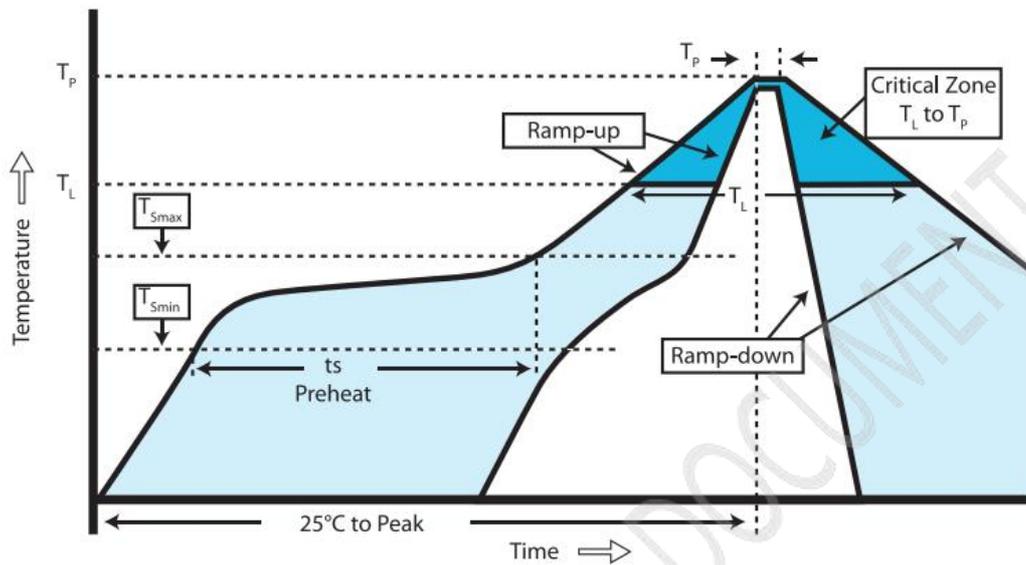


Figure 7.1: Temperature Curve of Reflow Welding

### 7.3 Humidity sensing properties

HJ-LPWE5 module has a humidity sensitivity of level 3.

If any of the following two conditions are met, the HJ-LPWE5 module should be fully baked prior before reflow soldering, otherwise the module may cause permanent damage during reflow soldering.

- After unpacking or vacuum packaging is damaged and air leaks, the module needs to be SMT within 168 hours when the temperature is less than 30 degrees and the relative humidity is less than 60%. If the above conditions are not met, bake.
- Vacuum packaging is not opened, but beyond the shelf life, also need to be baked.

## 8 Packaging

### 8.1 Packaging method

Table 8-1: Packaging method

Type	Packaging form	Pack Quantity
HJ-LPWE5-xxx	Roll tape	3000

Use chip-grade anti-static aluminum foil bags to seal and pack with braid. Each bag is put in desiccant. Industrial grade vacuum pump ensures no air leakage, moisture, water and dust (IP65).

The actual packaging effect is shown in Figure 8.1.



Figure 8.1: package figure

## 8.2 Label information

All packages are labeled with cargo information, ROHS label, anti-static label, etc.

<b>【A】</b>	Tangshan Hongjia electronic Technology Co., LTD
<b>【B】</b>	HJ-XXX-XXX
<b>【C】</b>	Pb Free Reflow(260°C)
<b>【D】</b>	Date Code:2508 HJ0218
<b>【E】</b>	Note: Must be stored in a vacuum Seal
<b>【F】</b>	Warning: Humidity sensitivity level MSL:XX
<b>【G】</b>	QTY:1500PCS SEAL DATE:20250218

Figure 8.2: Product label drawing

Table 8-2: Module information description

No.	Description
A	company name
B	product model
C	Lead-free reflow mark and reflow temperature setting value
D	Production date Example: 2508 HJ0218 represents the product produced in the 8th week of 2025, on February 18
E	Storage precautions
F	Humidity sensitivity level
G	Quantity of product + date of sale