HSIP™
宏佳电子
www.hjsip.com.cn

HJ-LORA-68 Based On LLCC68 Ultra-small (7.5mmx7.5mmx1.35mm) Chip-level High-performance LORA Wireless Module DateSheet

Version：V1.0

Module model：   HJ-LORA-68(68)

Version History

Table 1-1 Revision History

No.	Version Number	Release Time	Reviser	Checker	Description
1	V1.0	20220317	LMY	LJH	First edition

CATALOG

Overview

HJ-LORA-68(68) is a chip-level LORA module based on LLCC68 solution. The working frequency supports two specifications: 410MHZ - 525MHZ or 800MHZ - 950MHZ. The maximum transmit power is +22dBm. The external interface is the SPI port, and the user can connect the IO or SPI of the MCU to it to realize the sending and receiving of wireless data.

1、Features of the module

（一）Features

- Optional 410MHZ - 525MHZ or 800MHZ - 950MHZMaximum transmit power +22dBm
- Single power supply wide voltage power supply 1.8V-3.7V
- RX peak current(DCDC)<5mA; TX peak current(20dBm)<90.0mA；
- Ultra small size：7.5mm * 7.5mm * 1.35mm
- @BW500/SF11(@+22dBm)，the longest launch distance is 1500m
- In ultra-low power mode <1uA

（二）Application field

- Smart home wireless remote control, data transmission
- Wireless POS machine
- Industrial control, three-meter wireless communication
- Other wireless, low-power applications

2、Electrical Characteristics

2.1、Absolute Maximum Range

Table 2-1 Absolute maximum ratings

Parameter	MIN	MAX	Unit
Power Supply Voltage (VCC)	1.8	3.9	V
IO Supply Voltage	0	VCC	V
Operating Temperature	-40	+105	°C
Storage Temperature	-55	+125	°C

2.2、Recommended Operating Conditions

Table 2-2 Recommended operating conditions

Parameter	MIN	TYP	MAX	Unit
Power Supply Voltage (VCC)	1.8	3.3	3.7	V
IO Supply Voltage	0	3.3	VCC	V
Dormant working current		<1		uA
Maximum Operating Current @+20dBm		~90		mA
Operating Temperature	-40	+25	+85	°C

2.3、RF Features

Table 2-3   RF Features

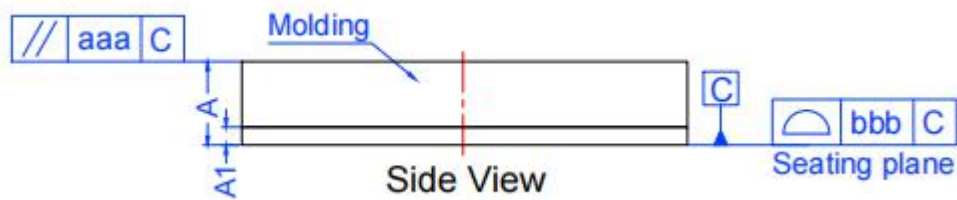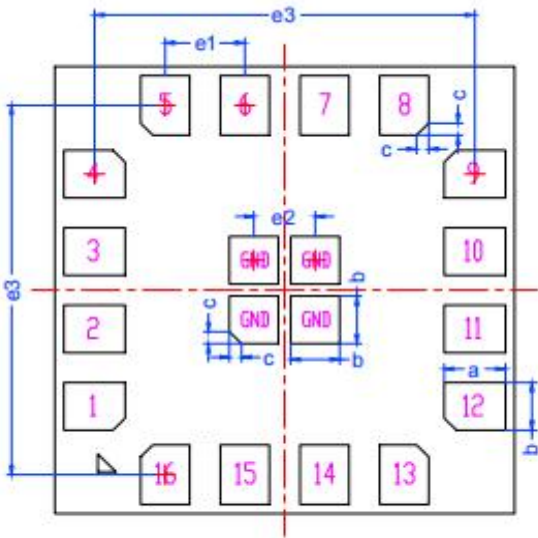| Attribute	Value	Remarks
Wireless modulation method	GFSK、FSK、LORA	
Frequency range	410-525Mhz Or 800-950Mhz	
Air speed	0.6Kbps - 300Kbps	
Transmit Power	MAX . +22dbm	
Receive sensitivity	MAX.-129dbm	
Antenna	External antenna	

3、Mechanical Dimensions
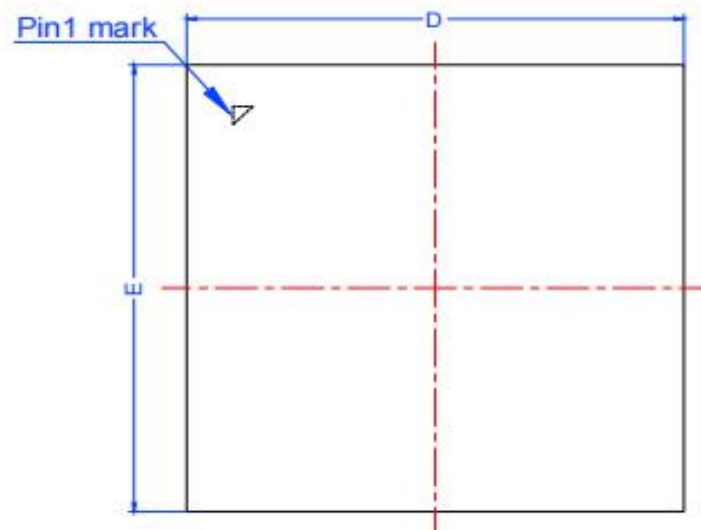
Figure 3-1 Top view

Figure 3-2 Side view

Bottom Side View

Figure 3-3 Bottom view

DIMENSIONAL REFERENCES   Units:mm

SYMBOL	DIMENSIONAL REQMTS			SYMBOL	Tolerance of Form & Position
	MIN	NOM	MAX	aaa	0.10
A	1.36	1.40	1.44	bbb	0.10
A1	0.27	0.30	0.33		
D	7.40	7.50	7.60		
E	7.40	7.50	7.60		
a	0.95	1.00	1.05		
b	0.75	0.80	0.85		
c	0.15	0.20	0.25		
e1	1.30REF.				
e2	1.00REF.				
e3	6.20REF.				

Note:

1. All dimensions are in mm

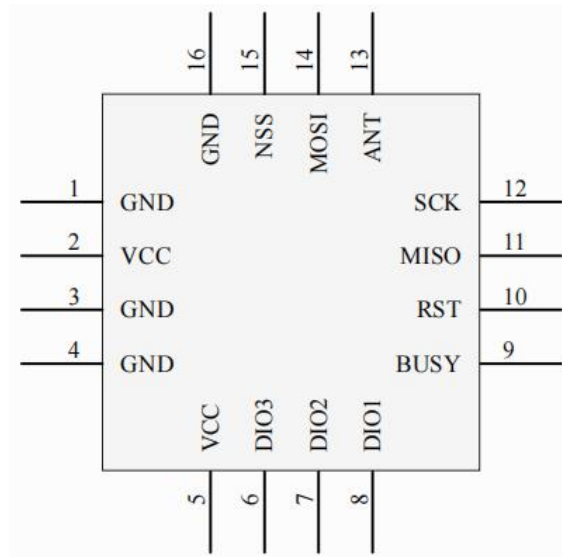**Figure 3-4 Dimensions picture**
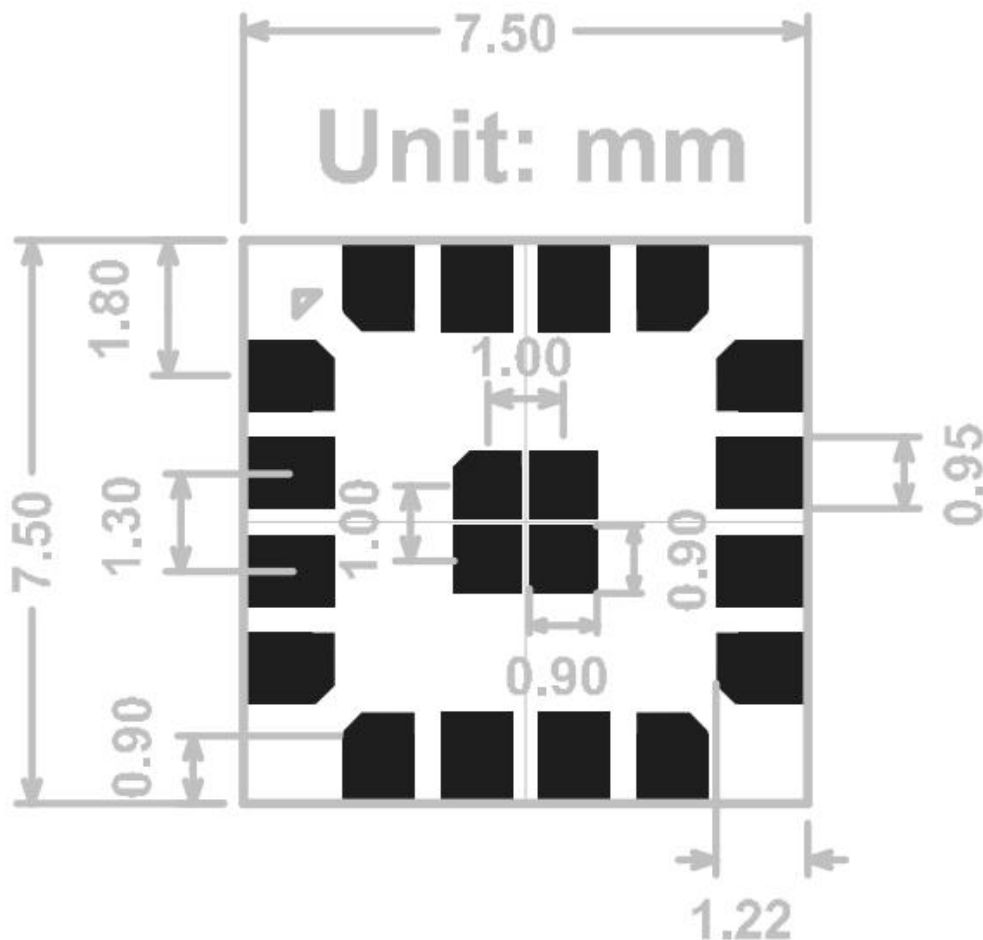
4、Pin Definition

Figure 4-1 Pin definition

Figure 4-2 Recommended package size

Table 4-1　Pin definition

Pin #	Name	Type	Description	Remark
1	GND	POWER	Power GND	
2	VCC	POWER	Power Input	1.8-3.7V
3	GND	POWER	Power GND	
4	GND	POWER	Power GND	
5	VCC	POWER	Power Input	1.8-3.7V
6	DIO3	IO	User-defined functions	The corresponding function can be realized by programming the internal registers of the module
7	DIO2	IO	User-defined functions	The corresponding function can be realized by programming the internal registers of the module
8	DIO1	Output	Interrupt Flag	When the function corresponding to IRQ is enabled and the IRQ is triggered, the IRQ will output the corresponding interrupt level.
9	BUSY	Output	BUSY Flag	Note: In low power sleep mode, this pin will be pulled high by LLCC68
10	RST	Reset	Reset Pin	When the low level is connected for more than 100us, the module will reset;
11	MISO	Output	For the chip, it is the serial data output DOUT pin!	Corresponding to the MISO connected to the MCU
12	SCK	Input	SPI interface synchronization clock input port	
13	ANT	RF out	External antenna output	Connect an external antenna
14	MOSI	Input	For the chip, it is the serial data input DIN pin!	Corresponding to the MOSI connected to the MCU
15	NSS	Input	SPI interface chip select interface	When the SEL is pulled low, the module is locked and can perform SPI data transmission; in the low-power sleep stage, pulling the SEL low will cause the module to wake up.
16	GND	POWER	Power GND	

5、 Hardware Design Considerations

5.1 Reference schematic
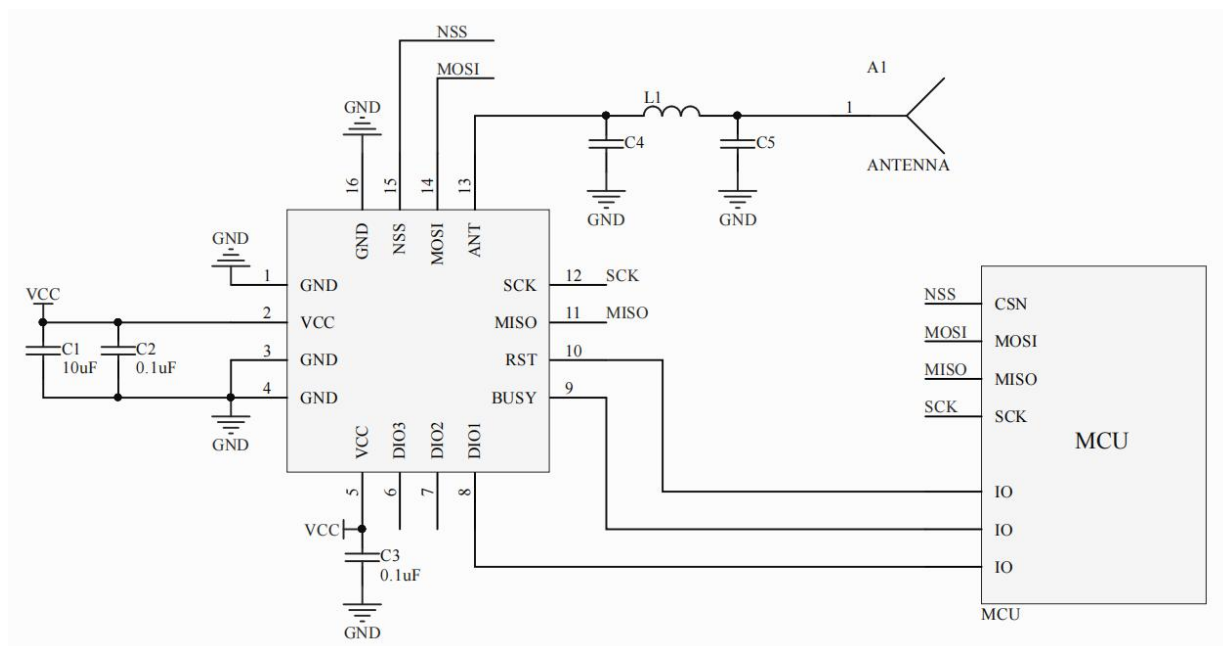
5.2 Hardware Design Notes

1、It is recommended to use a dedicated antenna that matches the specifications of the wireless frequency band, such as a spring antenna.

2、The module antenna should be placed around the edge of the circuit board. The antenna part is close to the edge or corner of the motherboard. It is best to place the module on the corner of the circuit board.

3、Try not to place other components or traces near and on the back of the wireless module antenna. If placement of components or traces will affect wireless performance.

4、All layers of the circuit board are covered with copper and connected to GND. And it is necessary to ensure that the copper area of the module is large enough, especially the antenna part.

5、Vias need to be drilled in the copper area of the entire circuit board. Especially in the copper cladding near the module and antenna, as many via holes should be made as possible.

6、When space allows, it is best to reserve a π -type filter circuit between the module and the antenna.

7、If there are high-power devices or high-voltage conversion circuits on the board. It is necessary to isolate the GND copper cladding near the module from the GND copper cladding

of other parts, connect it by single-point grounding, and punch as many vias as possible on it to reduce the interference to the RF signal.

8、The module should not be placed in a metal case, if a metal case must be used, the antenna must be pulled out.

9、In products that need to install this wireless module, some metal parts, such as screws, inductors, etc., should be kept away from the RF antenna part of the wireless module as far as possible.

10、It is recommended to use magnetic beads or inductors to filter the input power. Filter capacitors C1, C2 and C3 should be placed as close as possible to the power input pins of the module.

11、Please pay attention to check the pin diagram for all pins. Please pay attention to the IO mode and status of the IO connected to it. If there is enough space when connecting the serial port to the MCU, it is best to add a 100 ohm resistor.

12、GND must be well grounded.

**13**、Unneeded pins can be left floating.

6、RF parameter description

LLCC68(68) is actually a castrated version of SX1268, so it should be noted that the RF parameter setting of LLCC68 only supports SF5 - SF11; BW125, BW250 and BW500.
Other functions are basically the same.

7、Reflow Soldering Information

HJ-LORA-68(68) module use high temperature resistant materials, manufacturing by Lead-free Process. The maximum temperature resistance is 265℃ . Ten continuous reflow soldering has no effect on properties and strength. Specific parameters are as follows.：

| Parameter	Value
Features	Lead-free process
Average ramp up rate(TSMAX to Tp)	3℃/sec. max
Temperature Min(TSmin) Temperature Max(TSmax) Preheat time (Min to Max) (tS)	150℃ 200℃ 80~100sec.
Peak Temperature (TP)	250±5℃
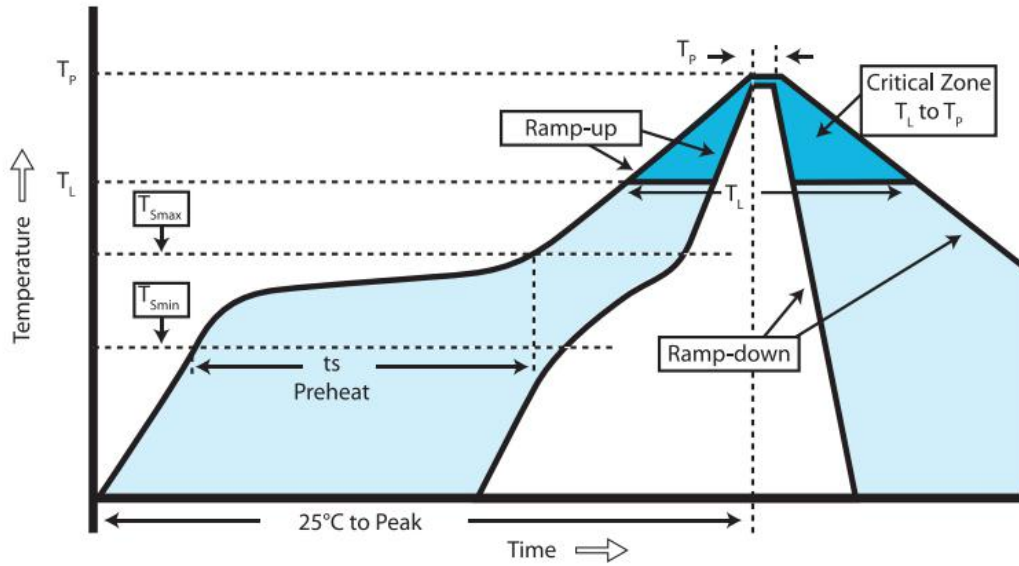
8、 Packaging rules

(Tape packaging related Figure piece and tape size information)

8.1、 Packaging with tapes and reel. Sealed with chip-level anti-static aluminum foil bag, each bag contains desiccant, use industrial grade vacuum machine to ensure airtight, moisture-proof, waterproof and dustproof (IP65).

8.2、 All packages will be labeled with goods information. All packages will be marked with the cargo information, including ROHS and anti-static signs. The production batch information in the item number is 15 bits.
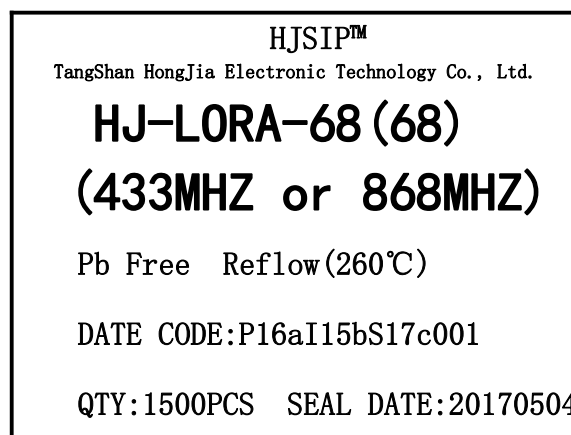
Remarks: P16a I15b S17c001 represents PCB production in January 2016, IC production in February 2015, and SMT patch in the first time in March 2017.

9、Notices for Ultrasound Welding

Warning: 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.