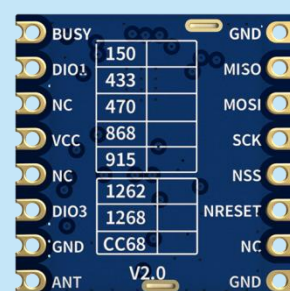
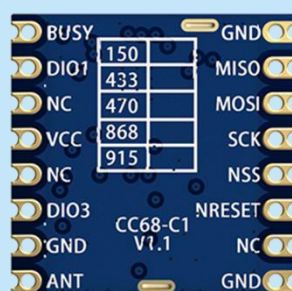


Spread spectrum wireless transceiver module

Ultra-low power 160mw

Product Specification



Catalogue

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Note: Revision History

Revision	Date	Comment
V1.0	2021-06	First release
V1.1	2021-10	Add FCC and CE certificate
V2.0	2022-5	Add C1 version, modify pin definition
V2.1	2022-7	Add C1 pin definition of LoRaCC68-C1
V3.0	2022-11	Description updated
V3.1	2025-02	Modify the Pin definition photo & frequency band

1. Overview

LoRa-CC68 wireless module adopts Semtech's LLCC68 device and Industrial high-precision crystal oscillator, which make the module having ultra-low receiving current, low sleep current and good sensitivity -129dBm. It can wake up the external micro-controller periodically under low power consumption with built-in 64KHz oscillator. Antenna switch of the module is integrated and controlled by the RF chip, which saves the resources of the external MCU. Moreover, Lora-CC68 has compact size and 22dBm (160mW) output power, which have great advantages in IoT and battery-powered applications.

LoRa-CC68 is produced and tested strictly using lead-free processes, and comply with RoHS and Reach standards. Also,LoRa-CC68 is CE certified @ 868MHz and FCC@915MHz.

The product list of LoRa-CC68 series as below:

P/N	Frequency Band	Crystal	Certification	Remark
★CC68-C1-433	Center 433MHz 410-810 MHz Customizable	10ppm Industrial grade crystal oscillator	NO	Shield
LoRa-CC68-433-TCXO		0.5ppm TCXO crystal oscillator	NO	
★CC68-C1-470	Center 490MHz 410-810 MHz Customizable	10ppm Industrial grade crystal oscillator	NO	
LoRa-CC68-470-TCXO		0.5ppm TCXO crystal oscillator	NO	
★CC68-C1-868	Center frequency 868 and 915 common	10ppm Industrial grade crystal oscillator	CE & FCC	
LoRa-CC68-868-TCXO	Center 868 MHz	0.5ppm TCXO crystal oscillator	CE	
LoRa-CC68-915-TCXO	Center 915 MHz		FCC	
LoRa-CC68-X1	Center 433/470/868/915MHz	10ppm Industrial grade crystal oscillator	NO	No shield,small size
Lora-CC68	150-960MHz Customizable		868-CE, 915-FCC	Shield

2. Features

- Frequency Band: 433/470/868/915 MHz (customizable 150-960 MHz)
- Sensitivity: -129dBm @LoRa
- Maximum output power: 22 dBm (160mW)
- Industrial grade high precision crystal oscillator
- LoRa,(G)FSK
- 255 bytes FiFo
- Data rate: 0.6-300 Kbps @FSK
1.76-62.5 Kbps @Lora

3. Applications

- Industrial meter reading
- Parking lot sensor management
- Industrial automation
- Agricultural sensor
- Smart city
- Remote control
- Street lights
- Logistics management
- Environmental sensor
- Health products
- Security products
- Warehouse management

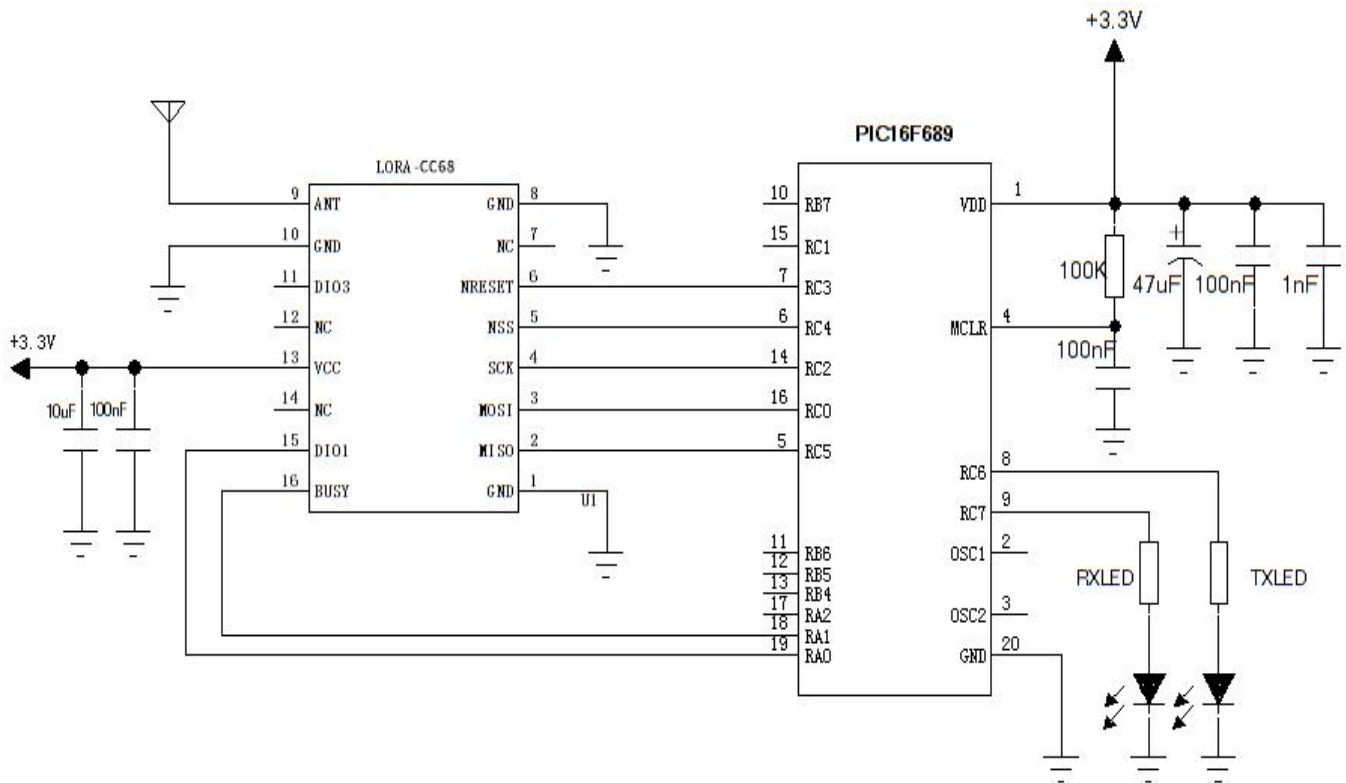
4. Electrical Characteristics

★Note: The default shipping module uses 10ppm Industrial crystal oscillator, the TCXO crystal oscillator is optional for special requirement:

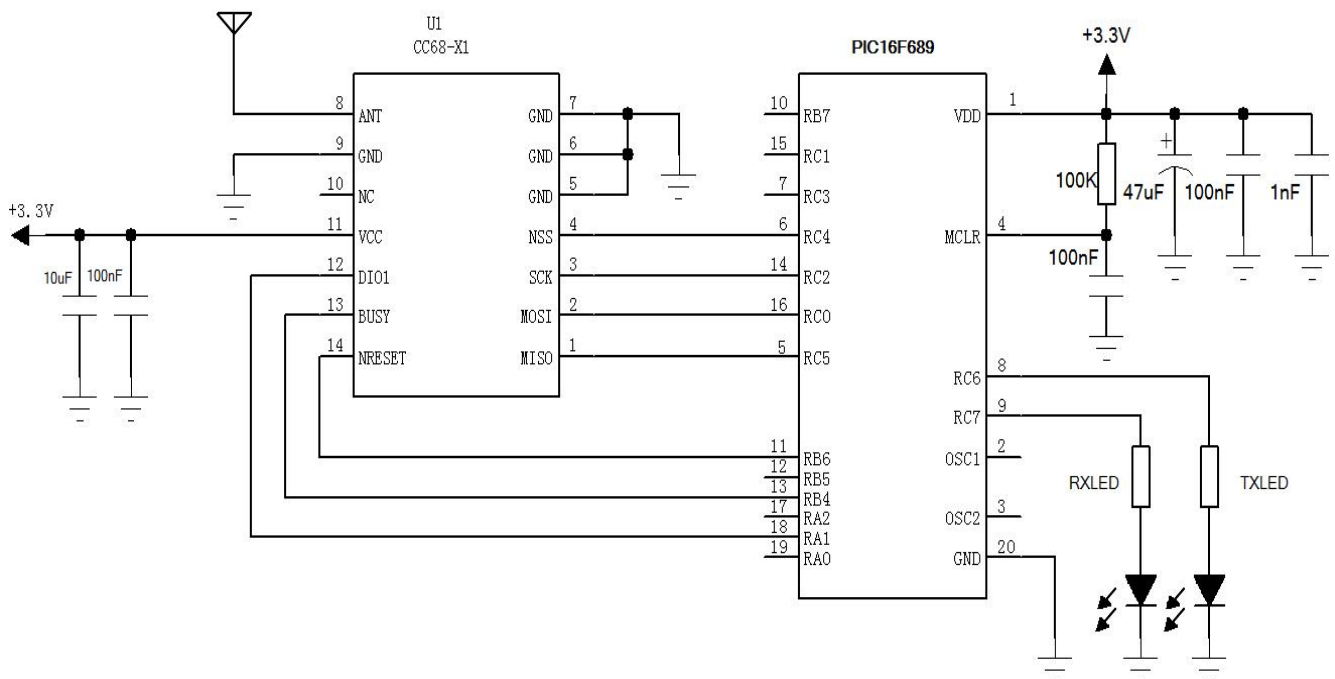
Parameter	Min.	Typ.	Max.	Unit	Condition
Operation Condition (Vcc=3.3V, ANT @ 50 ohm)					
Working voltage	1.8	3.3	3.7	V	
Temperature range	-40	25	85	°C	
Current Consumption					
RX current		< 5		mA	@ 10ppm crystal oscillator
		< 6.5		mA	@ TCXO crystal
TX current		< 130		mA	@868MHz @915MHz
		< 110		mA	@433MHz @470MHz
Sleep current		1.9		uA	OFF mode (SLEEP mode with cold start) All blocks off
		2.3		uA	SLEEP mode (SLEEP mode with warm start) Configuration retained
		2.9		uA	SLEEP mode (SLEEP mode with warm start) Configuration retained + RC64k
		0.56		mA	STDBY_RC mode , RC13M, XOSC OFF
		2.35		mA	STDBY_XOSC mode , XOSC ON
RF Parameter					
Frequency range	400	433	450	MHz	@433MHz
	470	490	510	MHz	@470MHz
	848	868	888	MHz	@868MHz
	900	915	940	MHz	@915MHz
Output power	-15	22		dBm	
Receiving sensitivity		-129		dBm	@LoRa BW=250KHz_SF = 10_CR=4/5

5. Typical application circuit

➤ **CC68-C1 & LoRa-CC68 :**



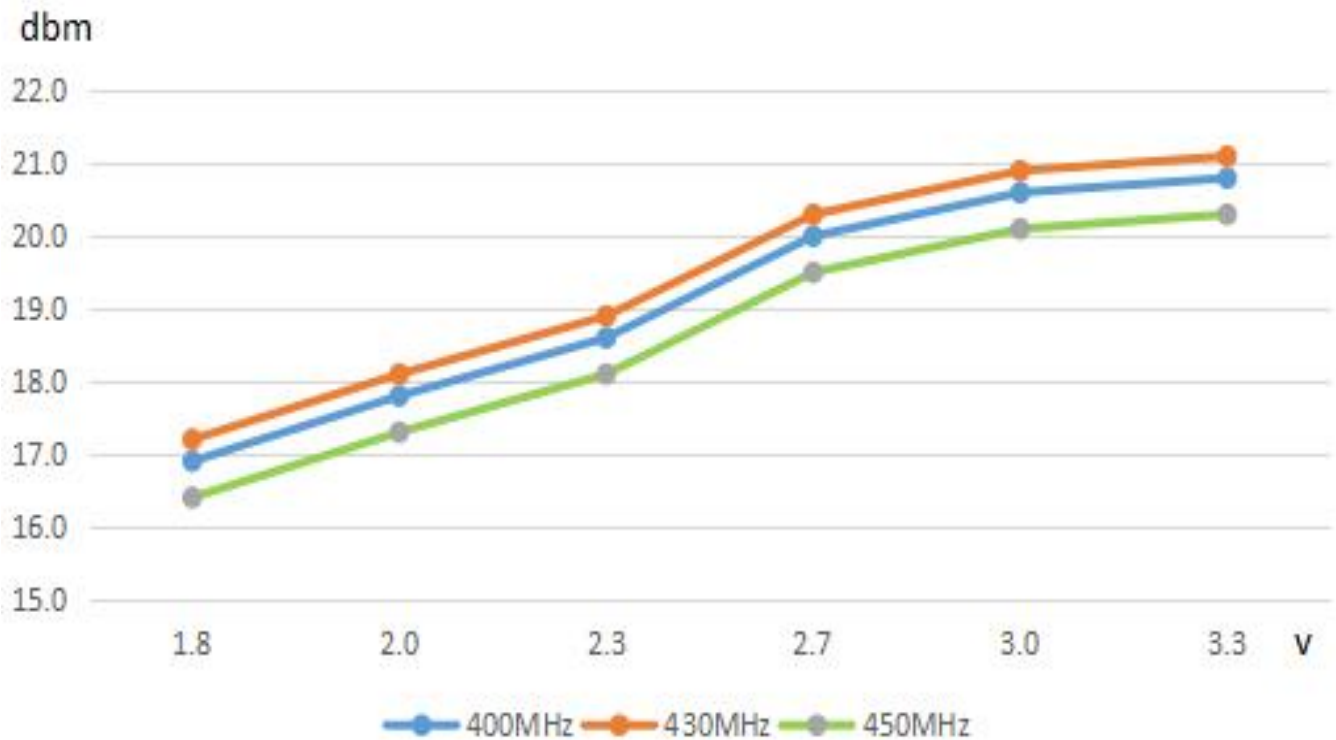
➤ **LoRa-CC68-X1:**



6. Performance

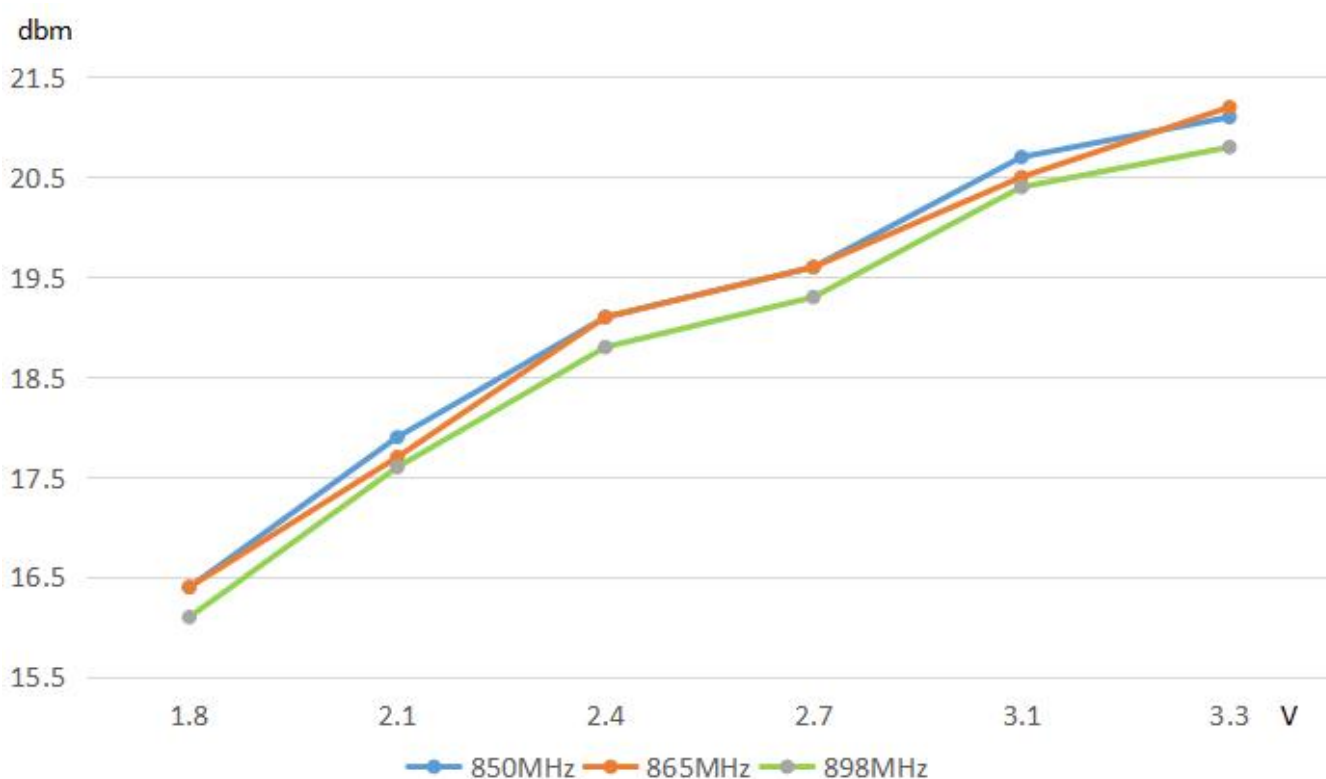
➤ Below table is the output power and current consumption when working in 433MHz or 470MHz

Frequency band	Power level	Current (mA)	Power (dBm)	Register value
CC68-C1 LoRa-CC68 LoRa-CC68-X1 @ 433MHz @ 470MHz	9	98	21.2	22
	8	80	17.8	19
	7	64	14.2	16
	6	54	11.5	13
	5	44	8.7	10
	4	37	6.0	7
	3	32	3.0	4
	2	26	0	1
	1	22	-2.5	-2
	0	20	-5	-5



➤ Below table is the output power and current consumption when working in 868MHz or 915MHz

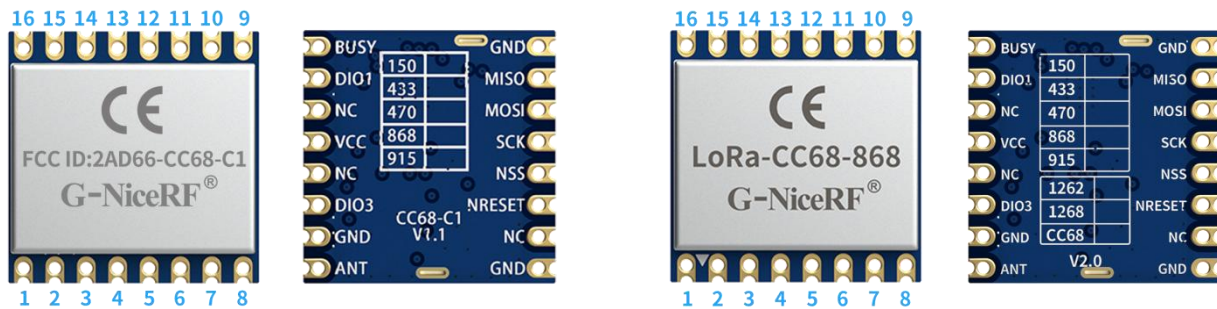
Frequency band	Power level	Current (mA)	Power (dBm)	Register value
CC68-C1 LoRa-CC68 LoRa-CC68-X1 @ 868MHz @ 915MHz	9	123.5	21.2	22
	8	110.5	18.03	19
	7	102.2	14.67	16
	6	88.7	11.79	13
	5	74.2	9.15	10
	4	62.9	6.6	7
	3	53.6	3.5	4
	2	44.2	0.53	1
	1	36.8	-2.15	-2
	0	31.7	-4.8	-5



7.Pin definition

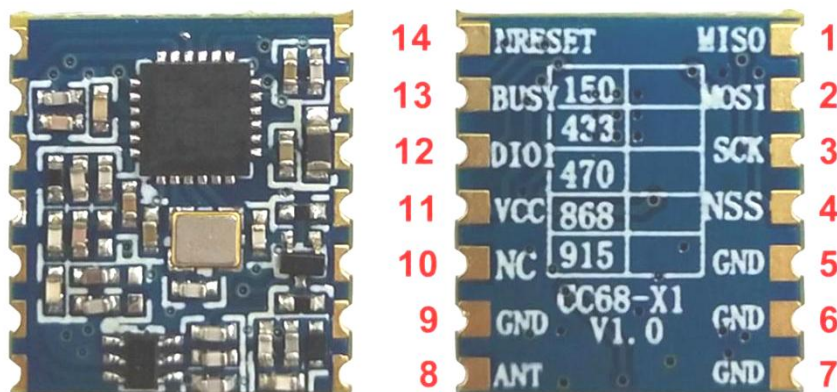
➤ CC68-C1 & LoRa-CC68 Pin definition:

1. Same size
2. Same Pin definition
3. 2 PCB Layers for CC68-C1, 4 PCB Layers for Lora-CC68



Pin NO.	Pin name	Description
1	GND	Power ground
2	MISO	SPI Output
3	MOSI	SPI Input
4	SCK	Serial clock
5	NSS	SPI enable
6	NRESET	Reset input
7、12、14	NC	Empty
8	GND	Power ground
9	ANT	Connect with 50 ohm antenna
10	GND	Power ground
11	DIO3	Can be customized as interrupt signal indication, details in chip datasheet (Note: output to control TCXO when TCXO crystal is used)
13	VCC	Power supply (default 3.3V)
15	DIO1	Can be customized as interrupt signal indication, details in chip datasheet
16	BUSY	Busy status indication, details in chip datasheet.

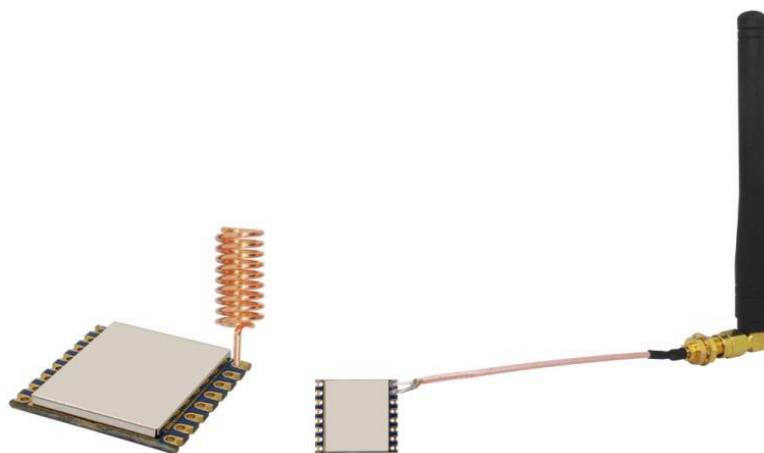
➤ LoRa-CC68-X1 Pin definition:



Pin NO.	Pin name	Description
1	MISO	SPI Output
2	MOSI	SPI Input
3	SCK	Serial clock
4	NSS	SPI enable
5、6、7、9	GND	Power ground
8	ANT	Connect with 50 ohm antenna
10	NC	Empty
11	VCC	Power supply (default 3.3V)
12	DIO1	Can be customized as interrupt signal indication, details in chip datasheet
13	BUSY	Busy status indication, details in chip datasheet.
14	NRESET	Reset input

8. Antenna

Antenna is very important for RF communication, its performance has a great impact on RF communication. 50ohm antenna is required for LoRa-CC68, Our spring antenna or antenna with SMA connector is recommended.

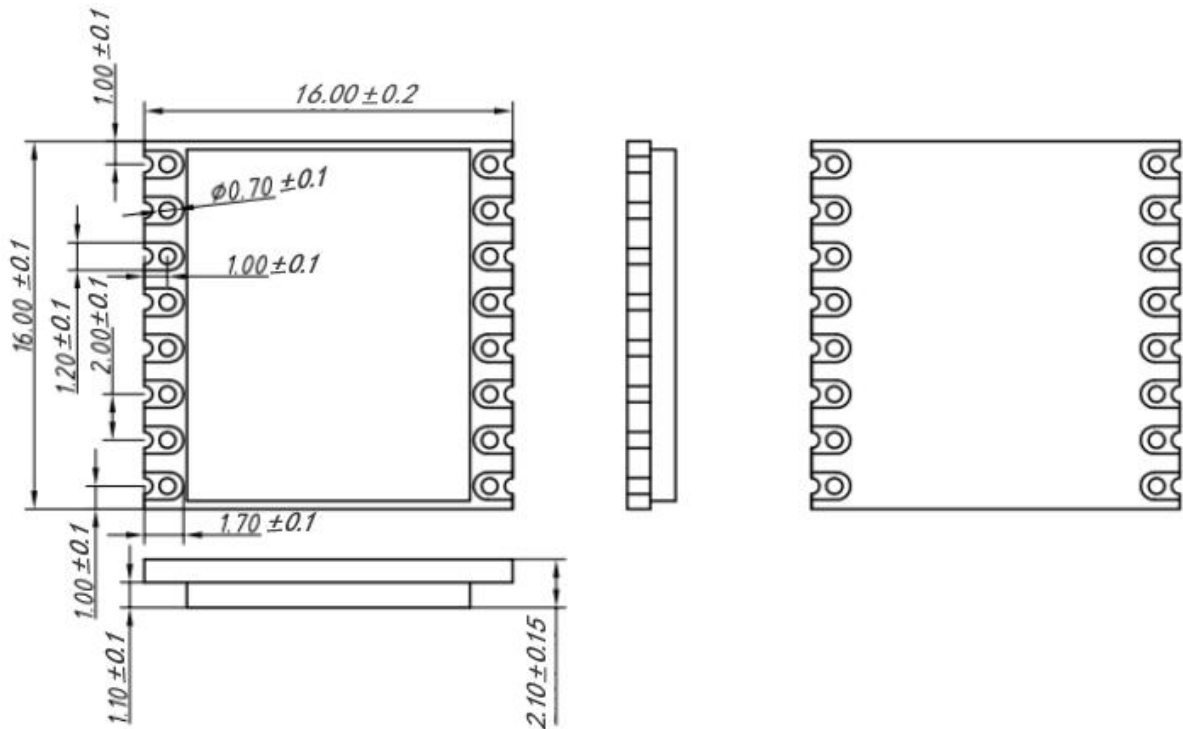


★In order to get better performance, the following principles are recommended.

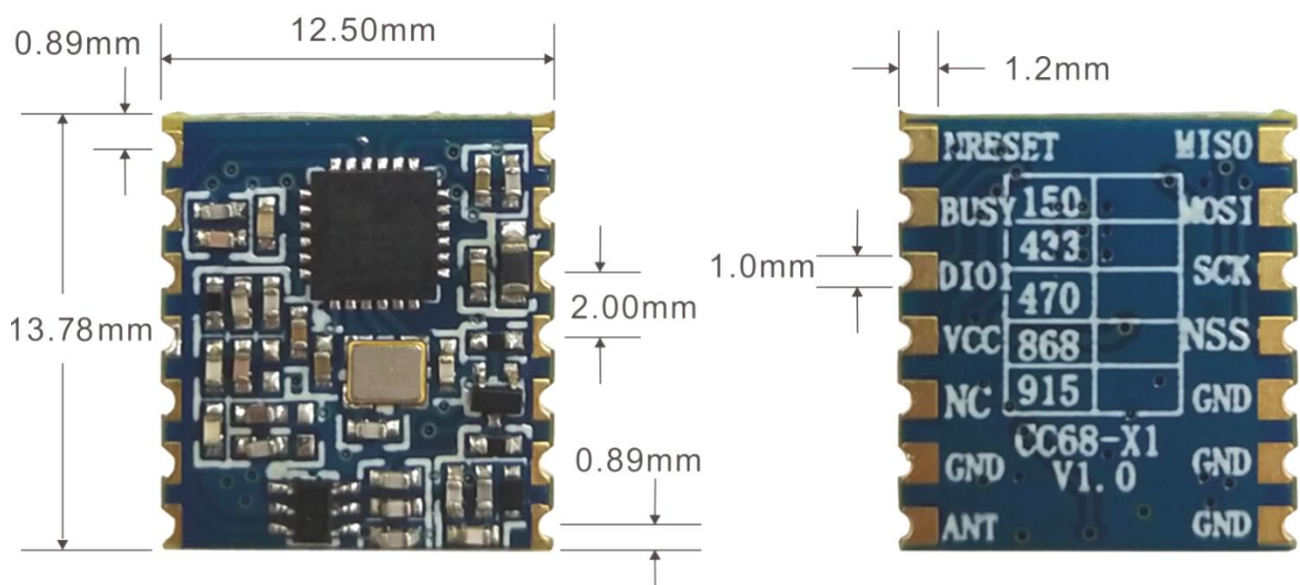
- Put the antenna away from the ground and obstacles;
- When sucker antenna is chosen, pull the lead wire straightly and attach the magnetic base to the metal object.

9. Mechanical Dimensions (Unit:mm)

- CC68-C1 & LoRa-CC68 :



- LoRa-CC68-X1(Maximum thickness 1.8mm):



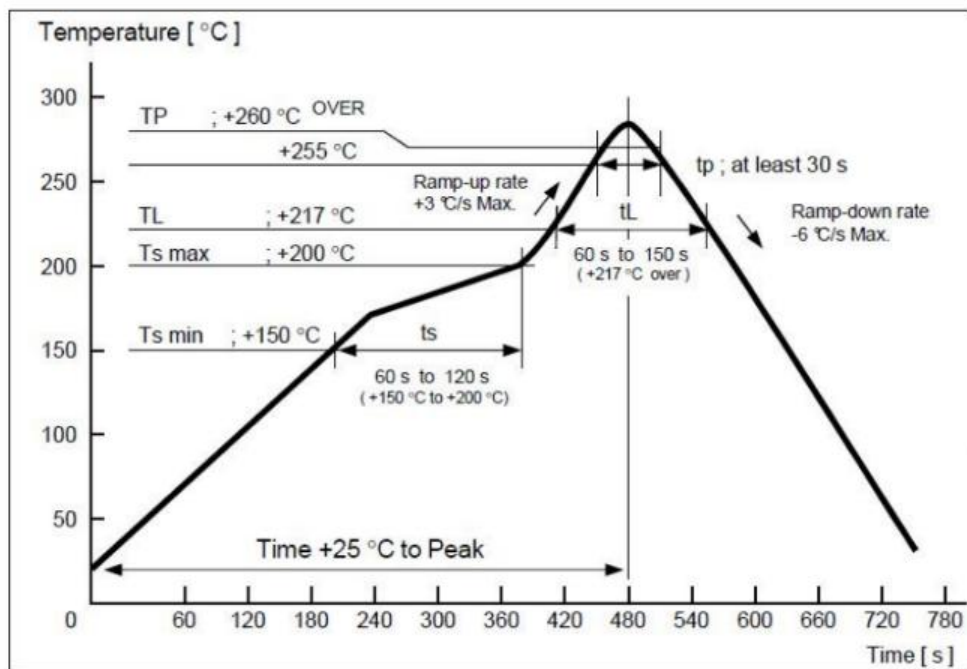
10. Product order information

For example: If the customer needs 868MHz Frequency, with shield, 10ppm Crystal, the order no. is LoRa-CC68-868.

Product Number	With shield	10ppm Crystal	0.5ppm TCXO Crystal	Center working frequency
CC68-C1-433	√	√	×	433MHz
CC68-C1-470	√	√	×	470MHz
CC68-C1-868	√	√	×	Center frequency 868MHz and 915MHz Common
LoRa-CC68-433-TCXO	√	×	√	433MHz
LoRa-CC68-470-TCXO	√	×	√	470MHz
LoRa-CC68-868-TCXO	√	×	√	868MHz
LoRa-CC68-915-TCXO	√	×	√	915MHz
LoRa-CC68-X1-433	×	√	×	433MHz
LoRa-CC68-X1-470	×	√	×	470MHz
LoRa-CC68-X1-868	×	√	×	868MHz
LoRa-CC68-X1-915	×	√	×	915MHz
LoRa-CC68-433	√	√	×	433MHz
LoRa-CC68-470	√	√	×	470MHz
LoRa-CC68-868	√	√	×	868MHz
LoRa-CC68-915	√	√	×	915MHz

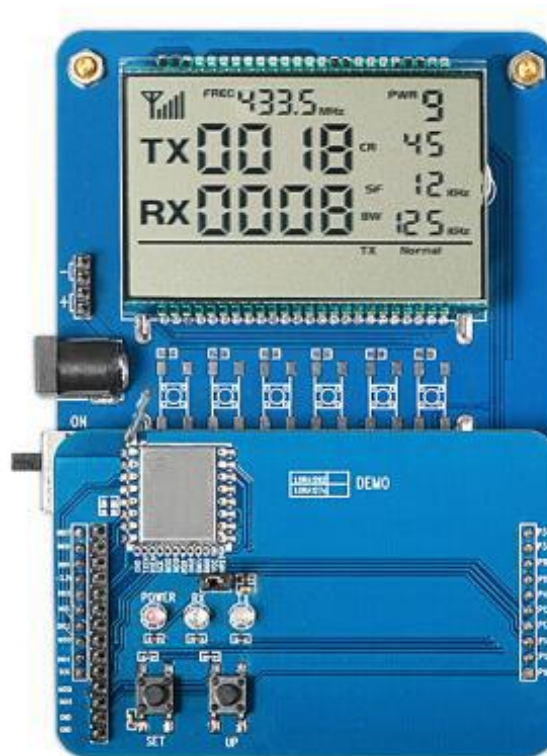
Appendix 1:SMD Reflow Chart

Below reflow profile is recommended for SMT technology:

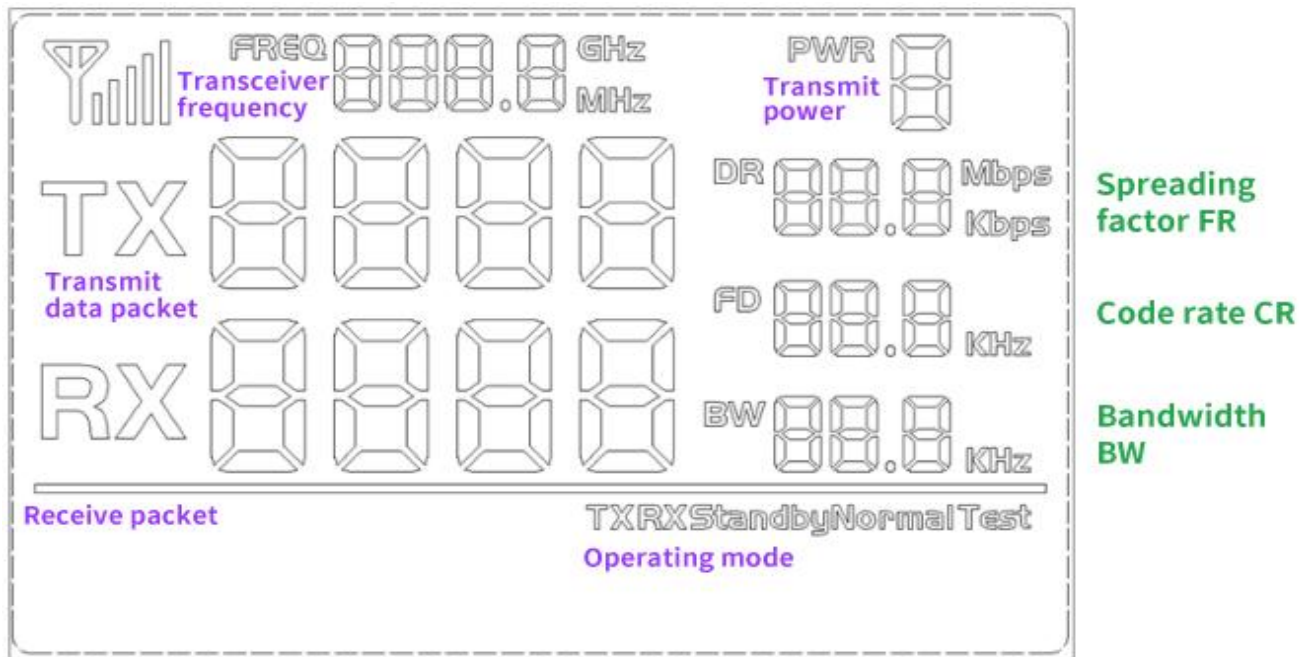


Appendix 2:Demo Kit

LoRa-CC68 is equipped with a DEMO kit for customer to debug the program and test performance including range measurement. The voltage of power supply is 3.3V~6.0V.:



The LCD Full Segment is as below:



RF parameters of LoRa-CC68 can be set easily by pressing buttons, such as frequency /transmitter power / Spreading factor / Code rate/ Bandwidth.

➤ Working Mode

There are 5 working modes can be chosen as below:

- 1) Tx normal mode: LoRa-CC68 send data packets regularly and receive ACK packets (in the setting mode, data packets will not be sent temporarily);
- 2) Rx normal mode: LoRa-CC68 receive data packets and then send back ACK packets;
- 3) Tx Test Mode: LoRa-CC68 transmit signal continuously ;
- 4) Rx Test Mode: LoRa-CC68 work in Rx Mode;
- 5) Standby Mode: LoRa-CC68 work in Standby state.

➤ Button Operation

- 1) [SET] Button

In normal mode, press the button to enter the setting mode.

In setting mode: 1.Press to select the parameters in setting mode. 2.Press to exit the setting mode after all parameters are set.

- 2) UP /Down Button

In setting mode,press to modify the value of corresponding setting parameters.

Note: The DEMO kit has FLASH memory inside, all the setting parameters will be stored automatically and keep unchanged even power-off.