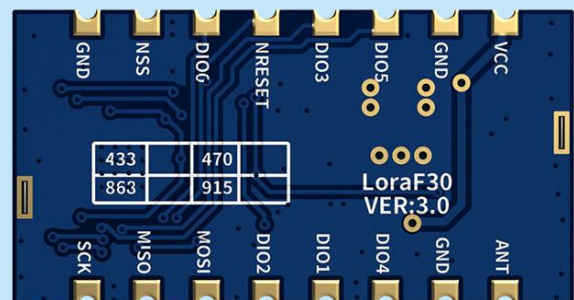


1W High Power

Wireless Transceiver Module

Product Specification



Catalogue

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Note: Revision History

Revision	Date	Comment
V1.0	2016-4-21	First release
V2.0	2016-11-7	Power supply modification
V2.1	2017-06	Logo updated
V2.2	2018-12-14	Update Pin photo
V3.0	2020-8-19	Update PCB version V3.0
V3.1	2020-11-30	Update catalogue and format
V3.2	2025-02	Modify the Pin definition photo & frequency band

1. Overview

LoRa1278F30 is a 1W high power wireless transceiver module, which integrates Semtech RF transceiver chip SX1278. It adopts LoRa Spread Spectrum modulation frequency hopping technique. The features of long distance and high sensitivity (-139 dBm) make this module perform better than FSK and GFSK module. Multi-signal won't affect each other even in crowd frequency environment; it comes with strong anti-interference performance.

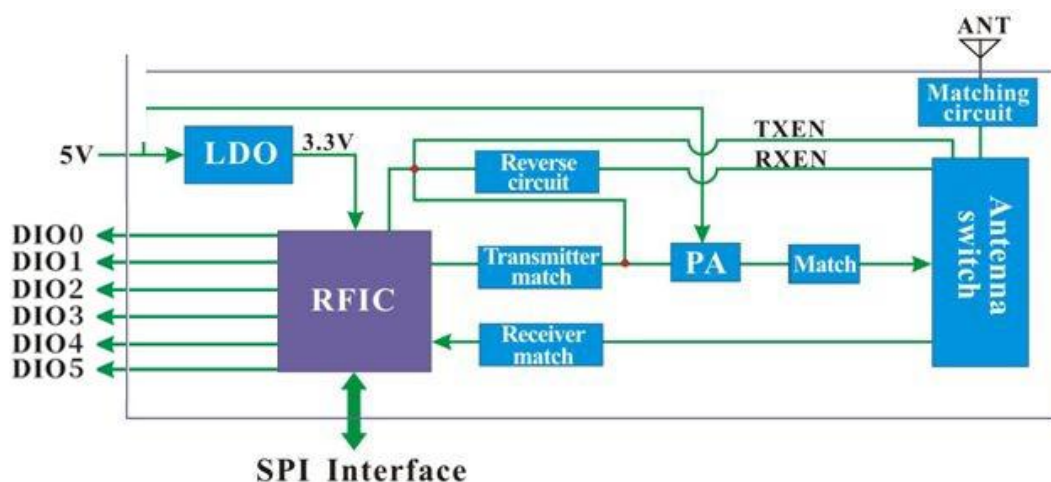
2. Feature

- Frequency Range: 433-460MHz/470-510MHz
- Sensitivity : -139 dBm
- Maximum output power: 30dBm
- 13mA@receiver mode
- Sleep current <10uA
- Data transfer rate: 1.2-300Kbps@FSK
- 0.018-37.5Kbps@LoRa
- LoRa ,MSK,GFSK Modulation mode
- 127 dB Dynamic Range RSSI
- Packet engine up to 256 bytes with FiFo and CRC
- Hopping frequency
- Operating Temperature Range: -40 ~ + 85 °C
- Built-in temperature sensor and low battery indicator
- 3.0-6.5 V Power supply
- Excellent blocking immunity

3. Application

- Remote control
- Remote meter reading
- Home security alarm and remote keyless entry
- Industrial control
- Home automation remote sensing
- Individual data records
- Toys control
- Sensor network
- Tire pressure monitoring
- Health monitoring
- Wireless PC peripherals
- Tag reading and writing

4. Block Diagram



5. Electrical Characteristics

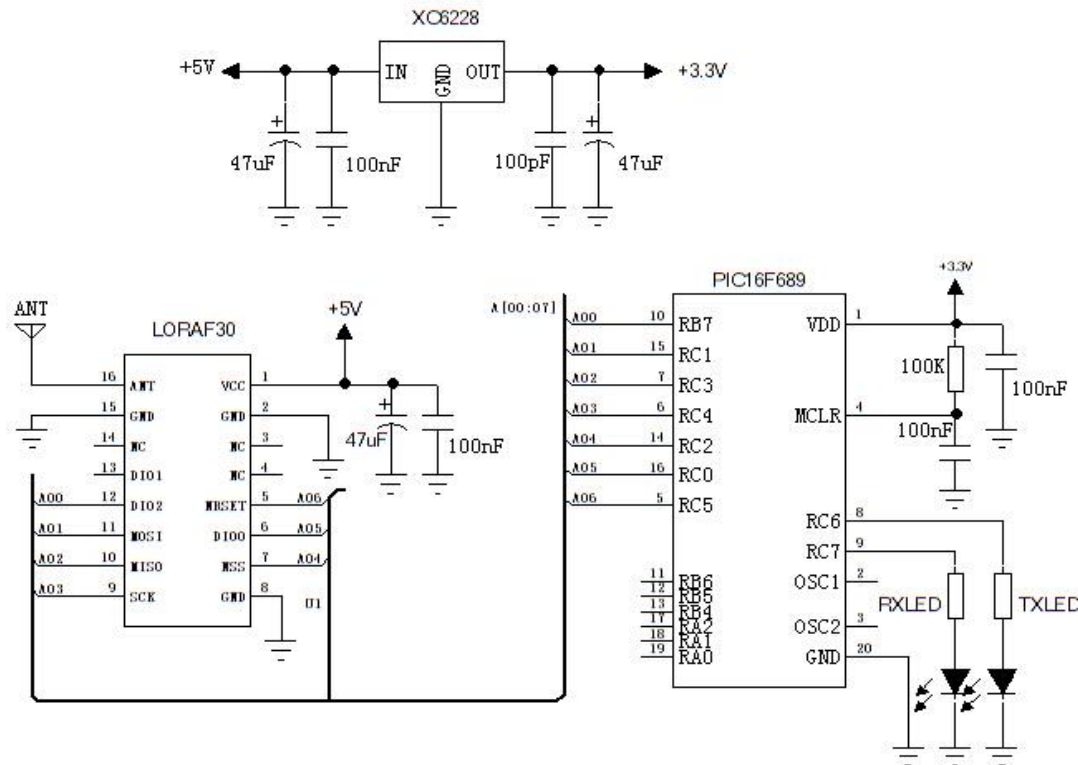
Note: LoRa1278F30(433/470MHz) is 1W power.

Parameter	Min.	Typ.	Max.	Unit	Condition
Working Condition					
Working voltage range	3	5	6.5	V	
Temperature voltage	-40		85	°C	
Current Consumption					
RX current		< 13		mA	@5V
TX current	550	600	650	mA	@30dBm
Sleep current		< 10		uA	
RF Parameter					
Frequency range	400	433	460	MHz	@433MHz
	470	490	510	MHz	@470MHz
Data rate	1.2		300	Kbps	FSK
	0.018		37.5	Kbps	LoRa
Output power	25	30	30.5	dBm	@433~470 MHz
Receiving sensitivity		-122		dBm	@FSK data=1.2 Kbps Fdev=50 KHz
		-139		dBm	@LoRa BW=125 KHz SF = 12 CR=4/5

Note: According to the design of the module, the maximum bit of register 0x09 must be set as 1. PaSelect must be set 1;

RegPaConfig (0x09)	7	PaSelect	rw	0x00	Selects PA output pin 0 → RFO pin. Output power is limited to +14 dBm. 1 → PA_BOOST pin. Output power is limited to +20 dBm
	6-4	MaxPower	rw	0x04	Select max output power: $P_{max}=10.8+0.6*MaxPower$ [dBm]
	3-0	OutputPower	rw	0x0f	$P_{out}=P_{max}-(15-OutputPower)$ if PaSelect = 0 (RFO pin) $P_{out}=17-(15-OutputPower)$ if PaSelect = 1 (PA_BOOST pin)

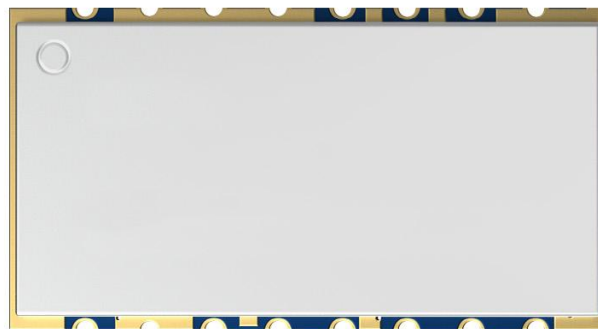
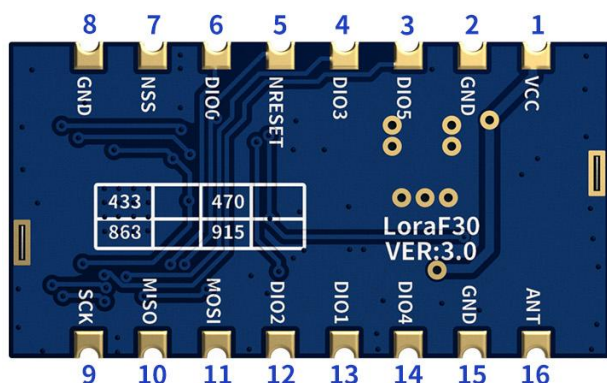
6. Schematic



7. Speed rate correlation table

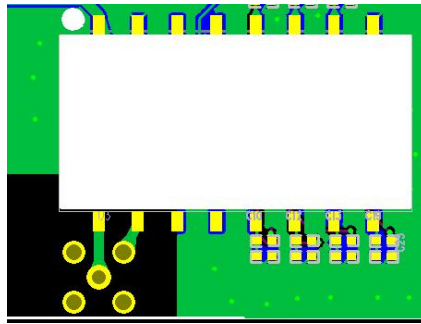
SingnalBandWidth	SpreadingFactor	Sensitivity(dbm)	ActualBandRate(bps)
62.5kHz	SF=7	-126	2169
62.5kHz	SF=8	-129	1187
62.5kHz	SF=9	-132	656
62.5kHz	SF=10	-135	296
62.5kHz	SF=11	-137	164
62.5kHz	SF=12	-139	91
125kHz	SF=7	-123	4338
125kHz	SF=8	-126	2375
125kHz	SF=9	-129	1312
125kHz	SF=10	-132	733
125kHz	SF=11	-133	328
125kHz	SF=12	-136	183
250kHz	SF=7	-120	8676
250kHz	SF=8	-123	4750
250kHz	SF=9	-125	2624
250kHz	SF=10	-128	1466
250kHz	SF=11	-130	778
250kHz	SF=12	-133	366
500kHz	SF=7	-118	17353
500kHz	SF=8	-121	9501
500kHz	SF=9	-124	5249
500kHz	SF=10	-127	2932
500kHz	SF=11	-129	1557
500kHz	SF=12	-130	830

8. Pin definition

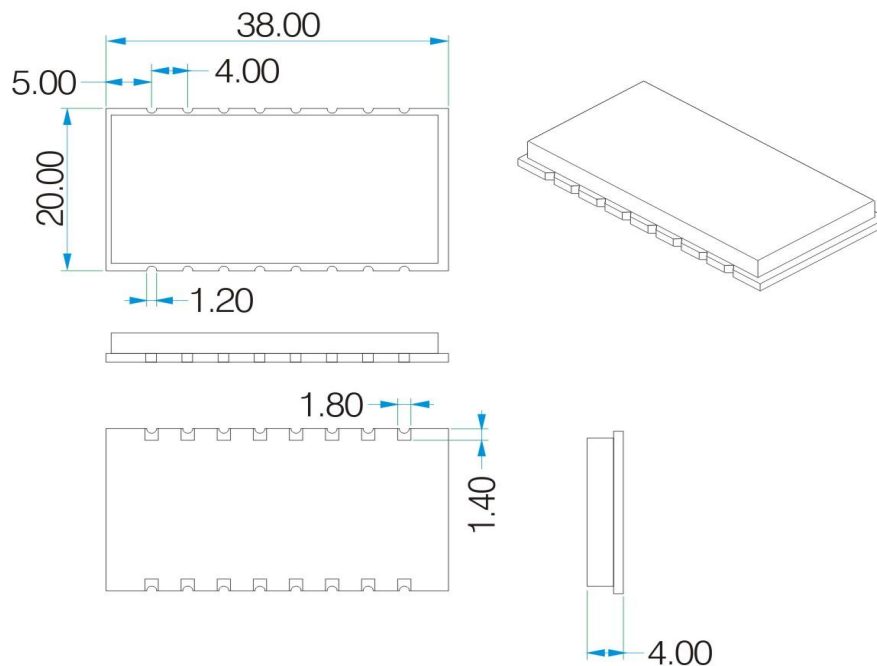


Pin NO.	Pin name	Description
1	VCC	Connected power supply
2	GND	power ground
3	DIO5	Digital I/O
4	DIO3	Digital I/O
5	NRESET	Reset input
6	DIO0	Digital I/O
7	NSS	SPI enable
8	GND	power ground
9	SCK	Serial clock for SPI interface
10	MISO	SPI Output for SPI data
11	MOSI	SPI Input for SPI data
12	DIO2	Digital I/O
13	DIO1	Digital I/O
14	DIO4	Digital I/O
15	GND	Antenna ground
16	ANT	Connect with 50 ohm coaxial antenna

Note: Pin 15 (ANT GND) is connected to the ground of antenna, do not connect to the ground of power supply. The routing between antenna pad and antenna shall be as short as possible, and thickness larger than 1mm, shown as below:



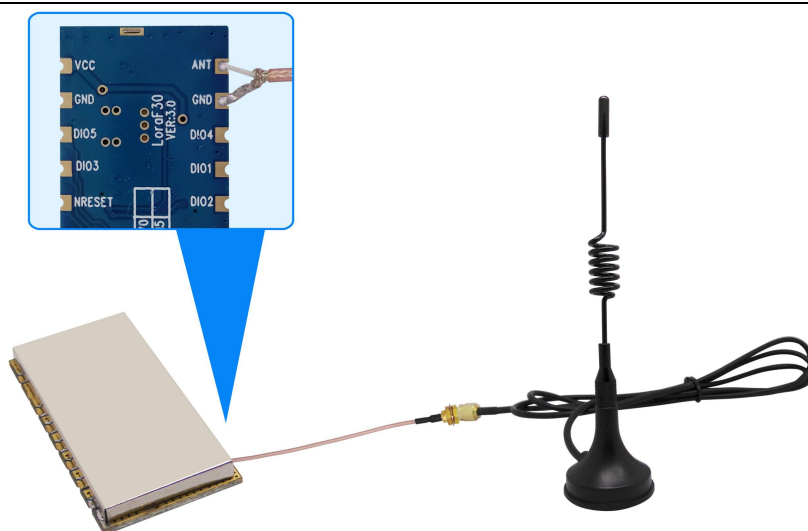
9. Mechanism Dimensions (Unit:mm)



10. Accessories

1)Antenna

antenna is very important for RF communication, its performance will affect the communication directly. Module needs antenna in 50ohm. Common antenna has rubber straight/ elbow/ foldable rod and sucker antenna and etc. Users can order accordingly. To ensure module in the best performance, we suggest to use the our antenna.



★ To ensure modules get the best performance, user must obey the following principles when using the antennas:

- Put the antenna away from the ground and obstacles as possible as you could;
- If you choose the sucker antenna, pull straight the lead wire as possible as it can be, the sucker under arches should be attached on the metal object.

11. Order information

For example: If the customer needs a patch module small crystal 433MHz band module that order model: LoRa1278F30-433

LoRa1278F30 - 433

Module Model

Frequency

Product Name	Description
LoRa1278F30-433	Working frequency is 433MHz
LoRa1278F30-470	Working frequency is 470MHz

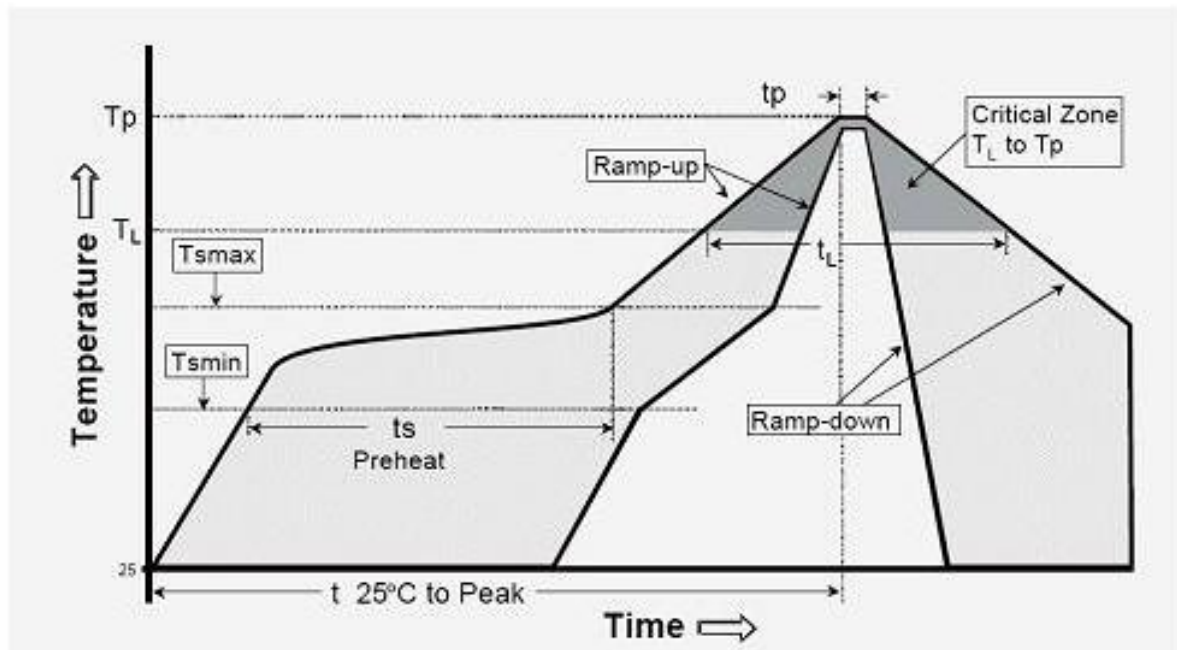
12. FAQ

- 1) Why module can not communicate properly?
 - a) Check if the band, channel, rate, set to the same;
 - b) Check if there is power connection error;
 - c) Check if the antenna connection is not correct;
 - d) Check if the module is damaged.
- 2) Why transmission distance is not far as it should be?

- e) Power supply ripple is too large;
- f) The antenna types do not match, or not properly installed;
- g) The surrounding environment is harsh, strong interference sources;
- h) Surrounding co-channel interference;

Appendix 1: SMD Reflow Chart

We recommend you should obey the IPC related standards in setting the reflow profile:



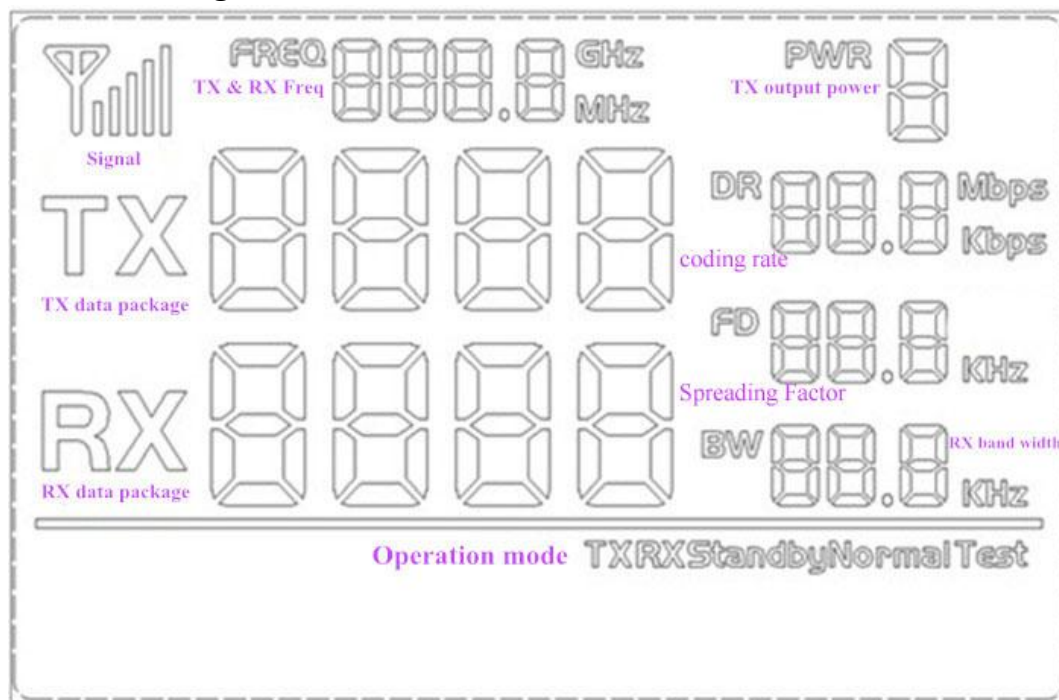
IPC/JEDEC J-STD-020B the condition for lead-free reflow soldering	big size components (thickness $\geq 2.5\text{mm}$)
The ramp-up rate (Tl to Tp)	3°C/s (max.)
preheat temperature - Temperature minimum (T _{min}) - Temperature maximum (T _{max}) - preheat time (t _s)	150°C 200°C 60~180s
Average ramp-up rate(T _{max} to Tp)	3°C/s (Max.)
- Liquidous temperature(T _L)	217°C
- Time at liquidous(t _L)	60~150 second
peak temperature(T _p)	245+/-5°C

Appendix 2: Demo Board

The module is equipped with a standard DEMO board for customer to debug the program and test distance. the power supply voltage range: 3.3V~6.0V. It shows as below:



The LCD Full Segment is as below:



Users can set the parameters of the RF module such as working mode /frequency / transmitter power / transmission data rate through the buttons, and measure the wireless communication distance.

➤ Working Mode

There are 5 working modes in the DEMO. They are: Master mode, Slave mode, Tx Test mode, Rx test mode and Standby mode. Accordingly, they are displayed on the LCD as: Tx normal / Rx normal / Tx Test / Rx test / Standby. In Tx normal and Rx normal mode, the RF module works in LoRa mode, the digital close to DR is Coding rate and the digital close to FD is the spreading factor; In Tx test and Rx

test mode, the RF module works in FSK mode, the digital close to DR is data rate and the digital close to FD is frequency deviation.

In Tx normal and Rx normal mode, when one packet is transmitted, the Red LED will reverse, the number of Tx packets will increase; when one packet is received, the Blue LED will reverse, the number of Rx packets will increase.

- 1) Master Mode: Send 1 packet per second, and waiting for the acknowledge;
- 2) Slave Mode: Stay in Rx mode to wait for the data from the master, it will send back the acknowledged signal after received the data from the master.
- 3) Tx Test Mode: RF module continuously transmit signal;
- 4) Rx Test Mode: RF module is always in Rx mode;
- 5) Standby Mode: RF module is always in standby state.

➤ **Button Operation**

1) [SET] Button

Press the [SET] button to enter setting mode if not in setting mode. In setting mode, press [SET] button to toggle between the set parameters: working mode / frequency / output power / data rate / spreading factor / Bandwidth. The related LCD ICON will flash to indicate.

2) [UP] Button

In setting mode, press the [UP] button to increase the value of flash icon.

➤ **Operation:**

Press [set] button into setting mode, press [up] button to change the flashing working mode (TX Normal, RX Normal, TX test, RX test, standby)

Press [set] button to change frequency, press [up] button to change the value , and press [Set] button to turn to next digital .Frequency range is:400MHz-510MHz

Press [set] button, the digital close to PWR start to flash, press [up] button to change the value of output power (from 0-7)

Press [set] button, the digital close to DR start to flash ,press [up] button to change the vale of coding rate (4/5,4/6,4/7,4/8)

Press [set] button, the digital close to FD start to flash, press [up] button to change Spreading Factor (6-12)

Press [set] button, the digital close to BW start to flash, press [up] button to change baud width (62.5kHz,125kHz,250kHz,500kHz)

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