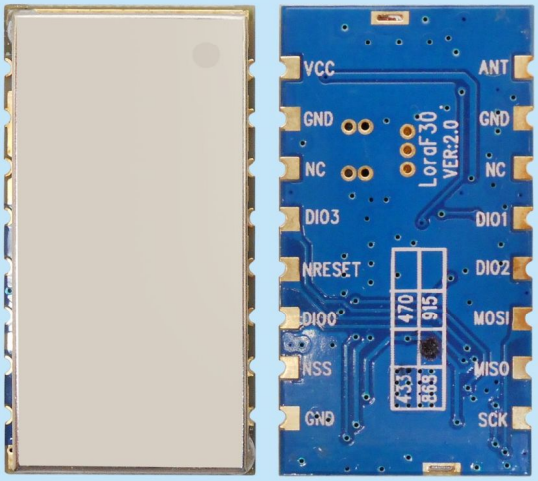
NiceRF Wireless Technology Co., Ltd.

Product Datasheet V2.0

500mW

High Power Wireless Transceiver Module

Lora1276F30



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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

1. Overview

Lora1276F30 is a 500mW high power wireless transceiver module, which integrates Semtech RF transceiver chip SX1276. It adopts LoRa TM 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.

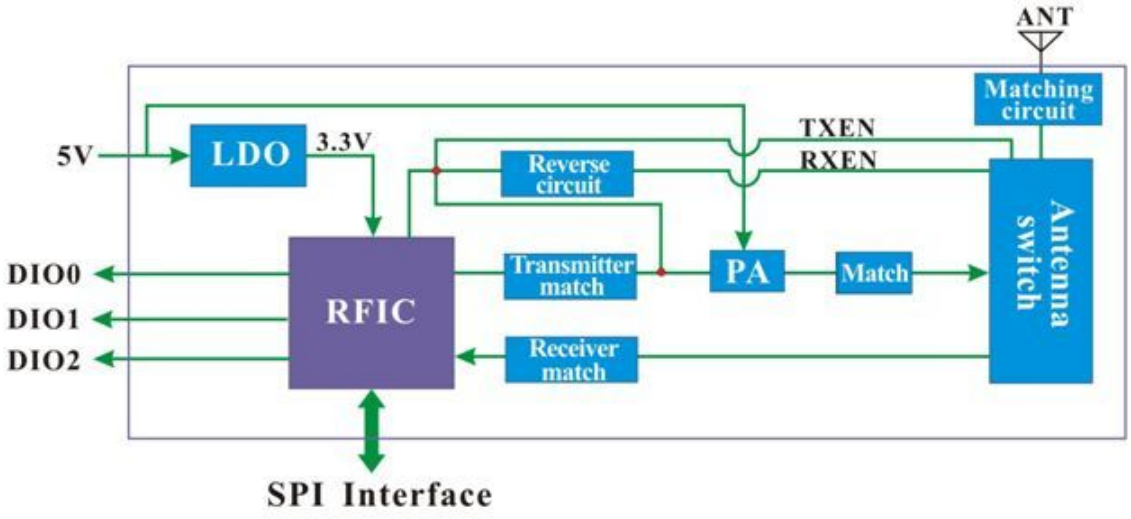
2. Feature

- Frequency Range: 868/915MHz
- Sensitivity up to -139 dBm
- Maximum output power: 27dBm
- 13mA@receiver mode
- Sleep current <10uA
- Data transfer rate：@FSK,1.2-300kbps
- @Lora TM，0.018-37.5kbps
- Lora TM,MSK,GFSK and OOK 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

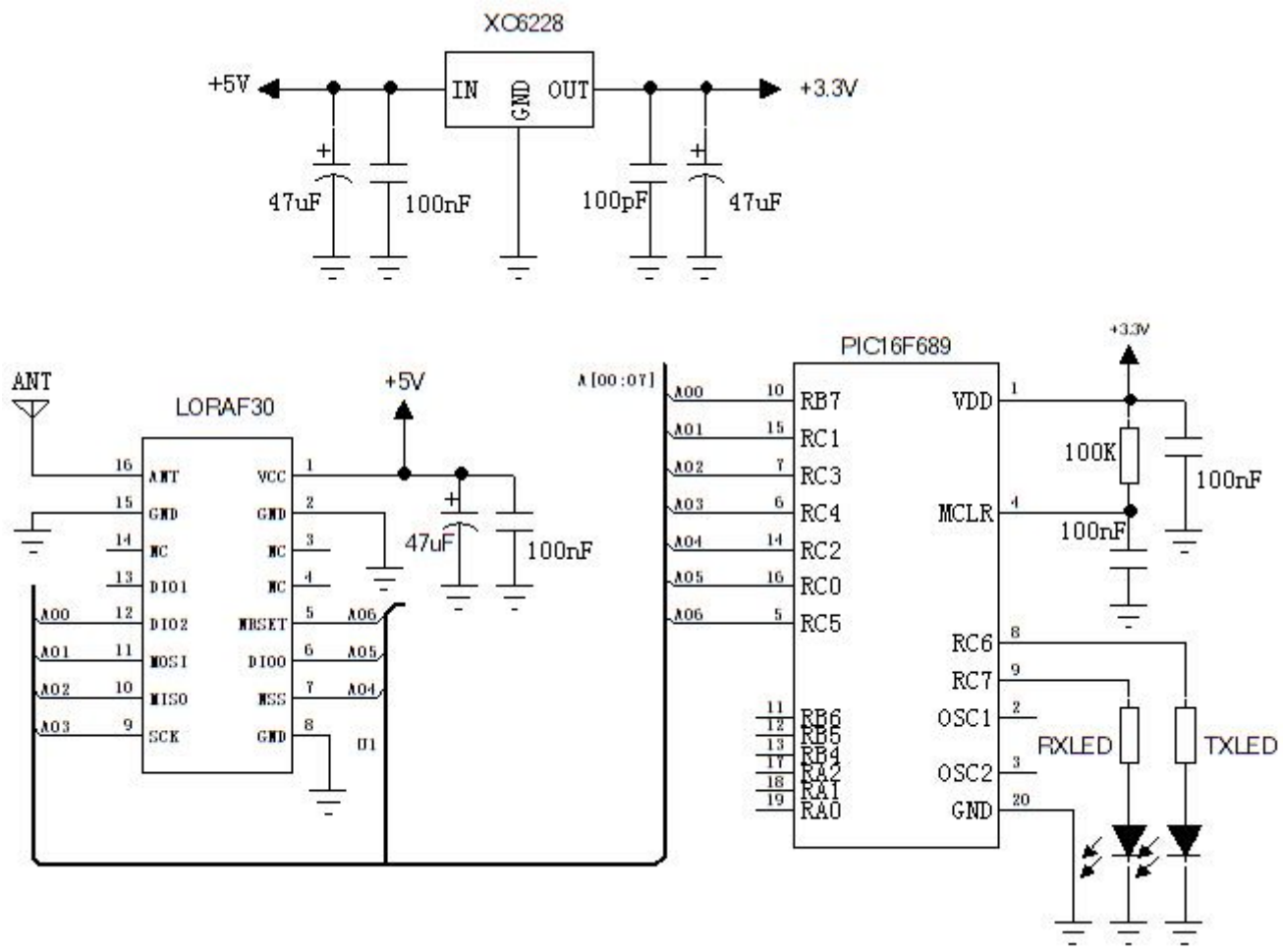


5. Electrical Characteristics

Note: Lora1276F30(868/915MHz) is 500mW power.

Parameter	Min	Typ.	Max.	Unit	Condition
Working condition					
Working voltage range	3	5	6.5	V	
Temperature voltage	-40		85	℃	
Current consumption					
RX current		< 13		mA	@5V
TX current		400	450	mA	@27dBm@868 MHz
Sleep current		< 10		uA	
RF parameter					
Frequency range	840	868	920	MHZ	@868MHz
	840	915	920	MHZ	@915MHz
Modulation rate	1.2		300	Kbps	FSK
	0.018		17.353	Kbps	LoraTM
Output power range	21		27	dBm	
Receiving sensitivity		-122		dBm	@FSK data=1.2 Kbps Fdev=50 KHz
		-139		dBm	Lora BW=62.5 KHz SF = 12 CR=4,

6. Schematic



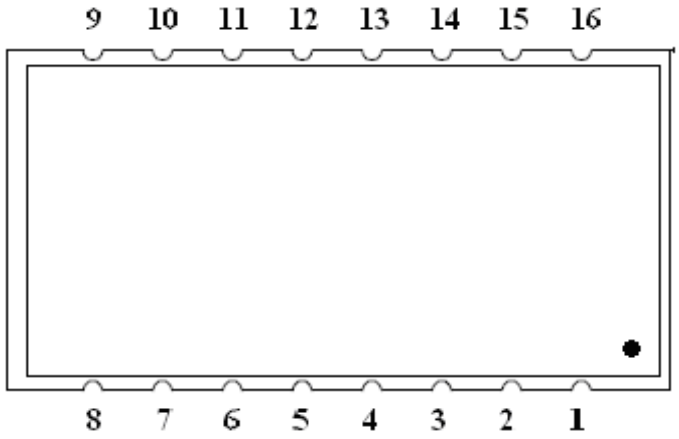
Note: According to the design of the module, the maximum bit of register 0x09 must be set as 1. PaSelect must be set 1;

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: Pmax=10.8+0.6*MaxPower [dBm]
	3-0	OutputPower	rw	0x0f	Pout=Pmax-(15-OutputPower) if PaSelect = 0 (RFO pin) Pout=17-(15-OutputPower) if PaSelect = 1 (PA_BOOST pin)

7. Speed rate correlation table

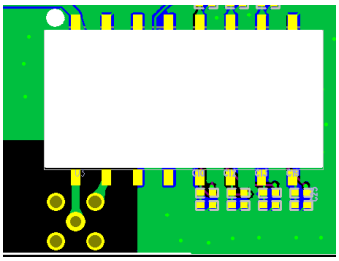
SingnalBandWidth	SpreadingFactor	Sensitivity(dbm)	ActualBandRate(pbs)
62.5kHz	SF=7	-126	2169
62.5kHz	SF=8	-129	1187
62.5kHz	SF=9	-132	656
62.5kHz	SF=10	-135	296
62.5kHz	SF=11	-137	164
62.5kHz	SF=12	-139	91
125kHz	SF=7	-123	4338
125kHz	SF=8	-126	2375
125kHz	SF=9	-129	1312
125kHz	SF=10	-132	733
125kHz	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

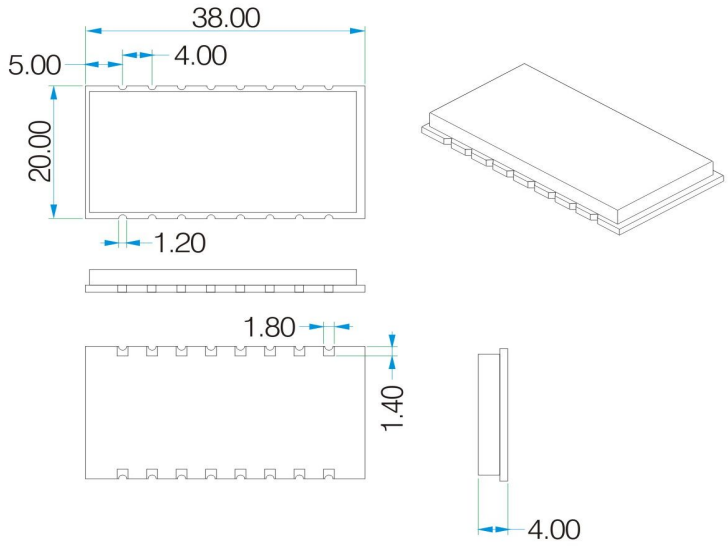


Pin NO.	Pin name	Description
1	VCC	Connected power supply
2	GND	power ground
3	NC	Vacant
4	DOI3	Digital I/O
5	NRESET	Reset input
6	DIO0	Digital I/O
7	NSS	SPI enable
8	GND	power ground
9	SCK	Serial clock for SPI interface
10	MISO	SPI Output for SPI data
11	MOSI	SPI Input for SPI data
12	DIO2	Digital I/O
13	DIO1	Digital I/O
14	NC	Vacant
15	ANT 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:



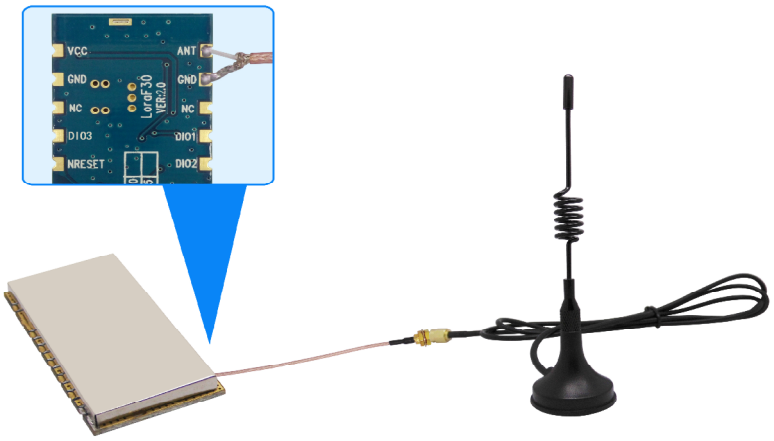
9. Mechanism Dimensions



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 antennas



★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

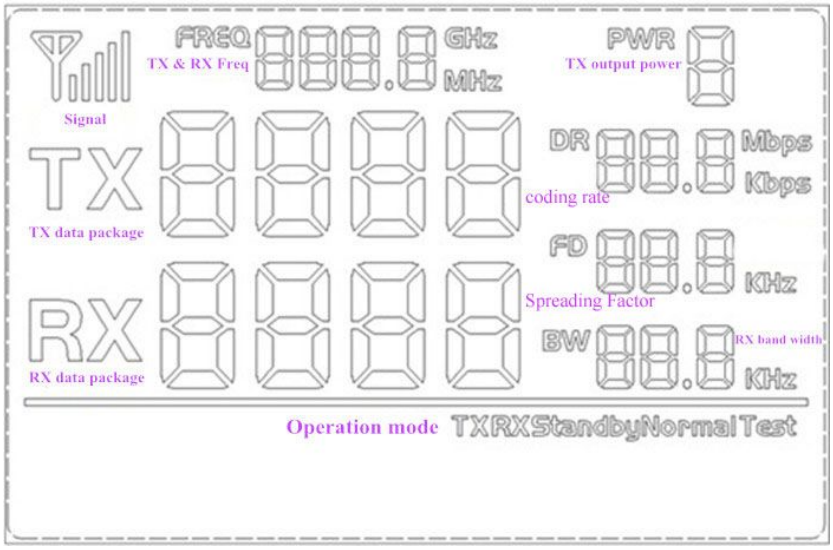
For example: If the customer needs 868MHz Frequency, the order no. shall be LoRaF30 -868.
Here are the product types :

Product Name	Description
LoRaF30-868	Working frequency is 868MHz
LoRaF30-915	Working frequency is 915MHz

12. Appendix

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)

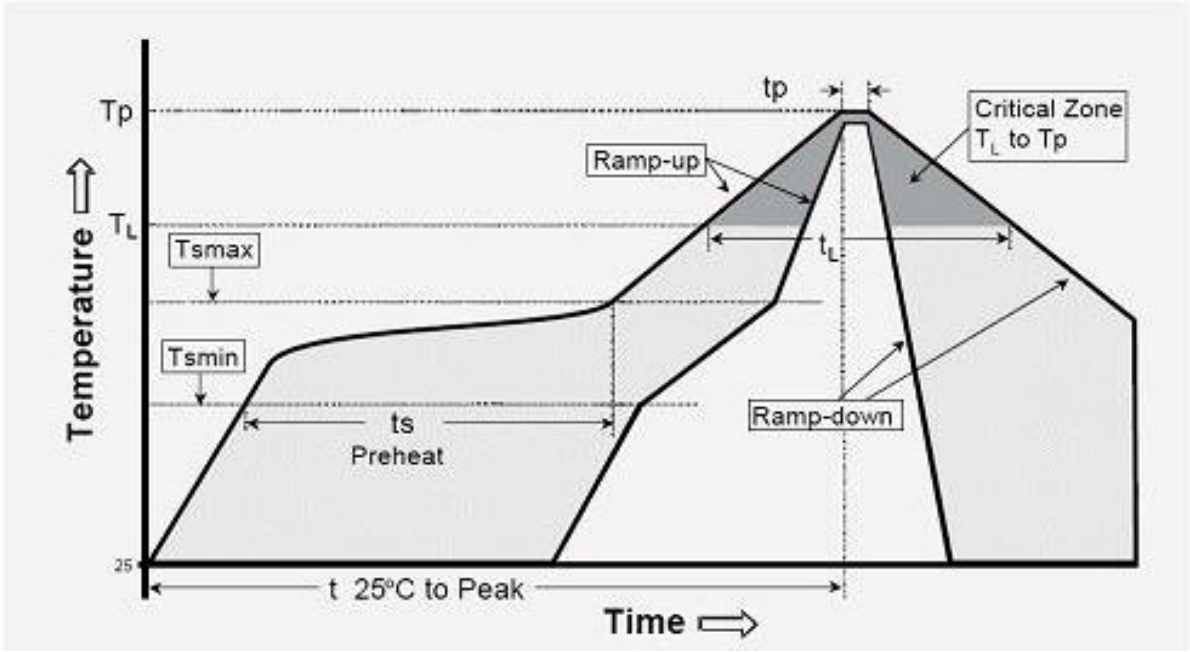
Press [set] button, the digital close to DR start to flash ,press [up]button to change the vale of coding rate (4/5,4/6,4/7,4/8)

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.

Appendix： SMD Reflow Chart



IPC/JEDEC J-STD-020B the condition for lead-free reflow soldering	big size components （thickness >=2.5mm）
The ramp-up rate (Tl to Tp)	3℃/s (max.)
preheat temperature - Temperature minimum (Tsmin) - Temperature maximum (Tsmax) - preheat time (ts)	 150℃ 200℃ 60~180s
Average ramp-up rate(Tsmax to Tp)	3℃/s (Max.)
- Liquidous temperature(TL)	217℃
- Time at liquidous(tL)	60~150 second
peak temperature(Tp)	245+/-5℃