G-NiceRF

LoRa1276-C1

100mW Long Range Spread Spectrum Modulation
Wireless Transceiver Module

Product Specification

Catalogue

Note: Revision History

Revision	Date	Comment
V1.0	2017-3	First release
V1.1	2017-06	Logo updated
V1.2	2018-12-15	Update PIN photo

1. Overview

Lora1276-C1 integrates Semtech RF transceiver chip SX1276, which 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. This module is 100mW and ultra small size, widely used in AMR,remote industrial control filed.

2. Features

- Frequency Range: 868 / 915 MHz (Customizable:137~1020MHz)
- Sensitivity up to -139dBm @Lora
- Maximum output power: 20 dBm
- 13mA@receiver mode
- Sleep current <200 nA
- Data transfer rate: @FSK,1.2-300 Kbps
- @Lora TM, 0.018-37.5 Kbps
- Lora TM, FSK, GFSK & OOK Modulation mode

- Built-in ESD Protection
- 127 dB Dynamic Range RSSI
- Packet engine up to 256 bytes with FIFO and CRC
- Hopping frequency
- Built-in temperature sensor and low battery indicator
- Excellent blocking immunity
- Operating Temperature Range：-40 ~ + 85 ℃

3. Applications

- Remote meter reading
- Industrial control
- Home automation remote sensing
- Toys control

- Sensor network
- Tire pressure monitoring
- Health monitoring
- Wireless PC peripherals

4. Electrical Characteristics

Parameter	Min	Typ.	Max.	Unit	Condition
Operation condition					
Working voltage	1.8	3.3	3.7	V	
Temperature range	-40		85	℃	
Current consumption					
RX current		10.8		mA	
TX current		120		mA	@20dBm
Sleep current		<0.2		uA	
RF parameter					
Frequency range	800	868	900	MHz	@868MHZ
	900	915	1000	MHz	@915MHZ
Modulation rate	1.2		300	Kbps	FSK
	0.018		37.5	Kbps	LoraTM
Output power range	-1		20	dBm	
Receiving sensitivity		-123		dBm	@FSK data=1.2kbps, Fdev=10kHZ
		-139		dBm	@Lora BW=125KHz_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: 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)

5. Schematic
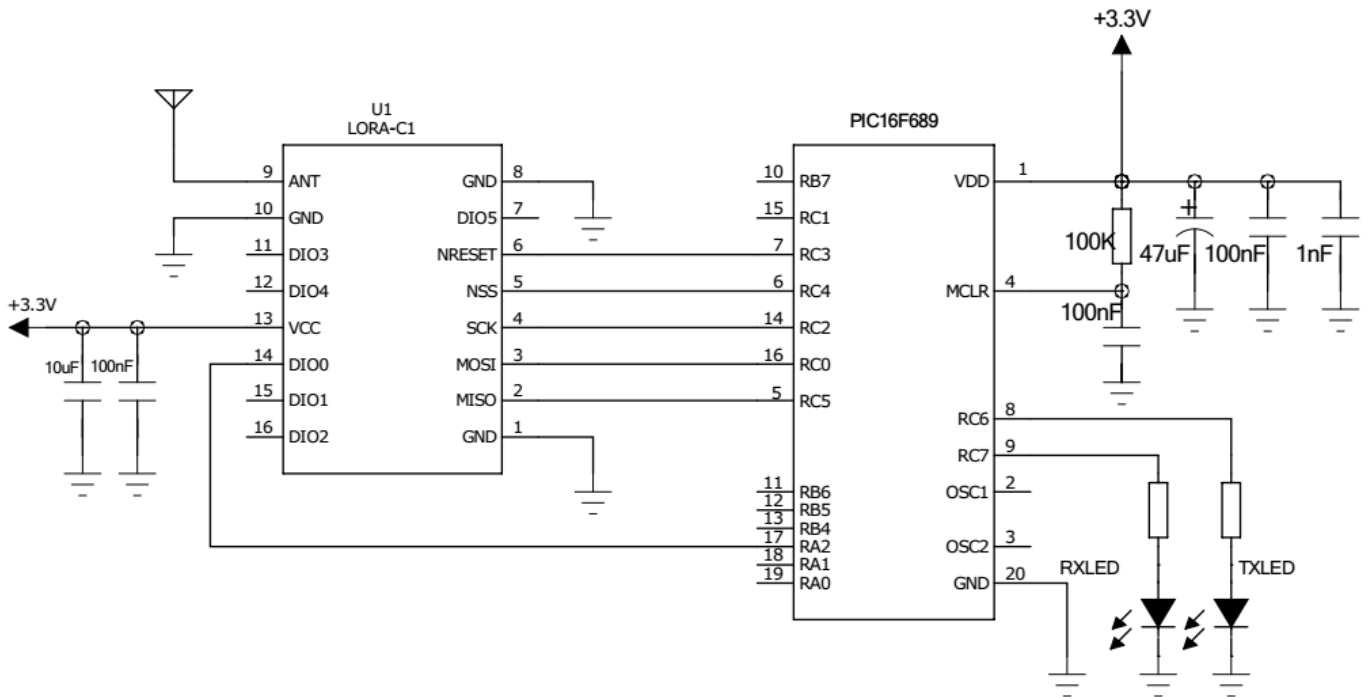
6. Speed rate correlation table

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

7. Pin definition
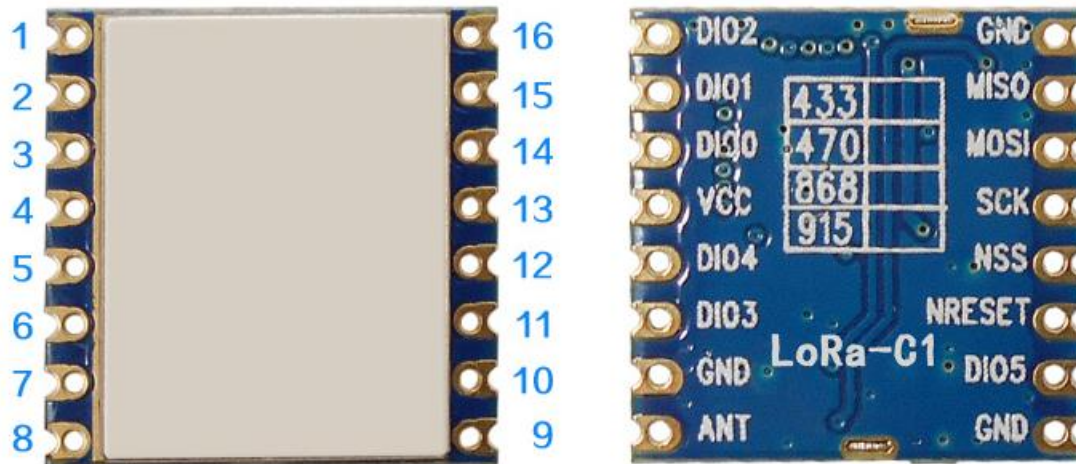
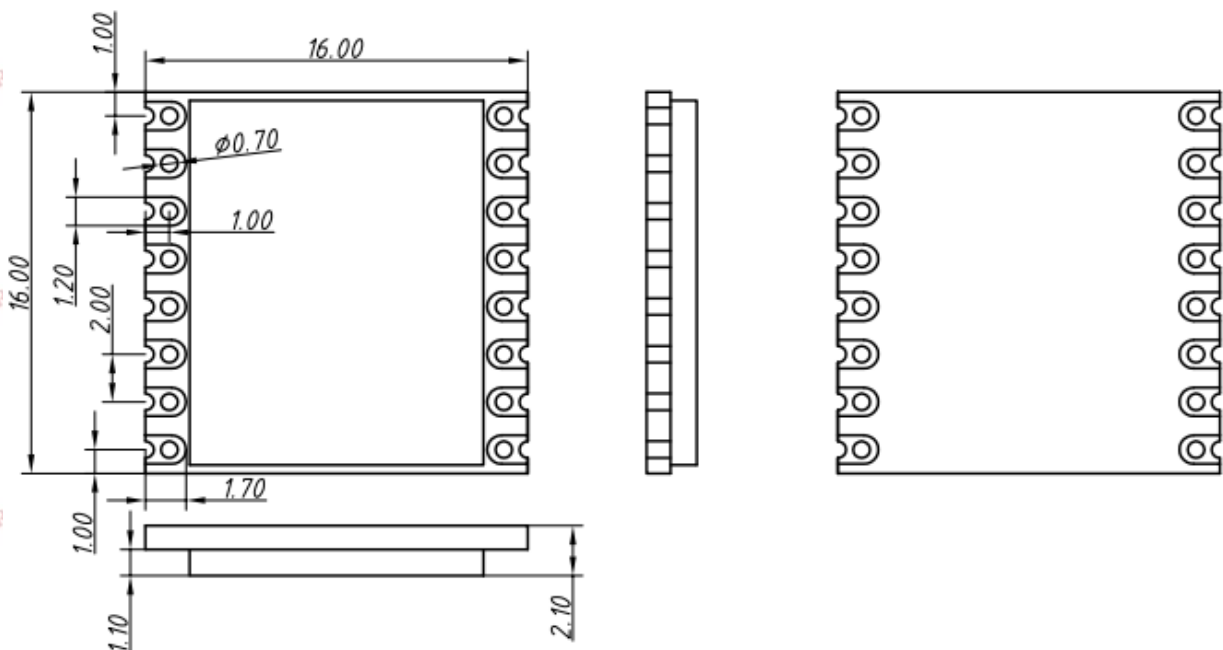| Pin NO.	Pin name	Description
1	GND	Power ground
2	MISO	SPI Output for SPI data
3	MOSI	SPI Input for SPI data
4	SCK	Serial clock for SPI interface
5	NSS	SPI enable
6	NRESET	Reset input
7	DIO5	Digital I/O
8	GND	Power ground
9	ANT	Connect with 50 ohm coaxial antenna
10	GND	Power ground
11	DIO3	Digital I/O
12	DIO4	Digital I/O
13	VCC	Power supply（default3.3V）
14	DIO0	Digital I/O
15	DIO1	Digital I/O
16	DIO2	Digital I/O

8. 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
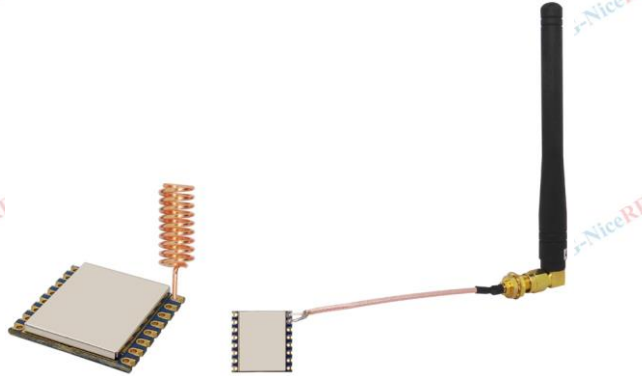
★To ensure modules get the best performance, user must obey the following principles when using the antennas：

➢ 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.

9. Mechanical Dimensions（Unit:mm）

10. Order information

LoRa1276-C1-868

Product name   Frequency

For example: If the customer needs 868MHz Frequency, the order no. shall be LoRa1276-C1-868.

Here are the product types：

Product Name	Description
LoRa1276-C1-868	SX1276 chip,Working frequency 868MHz
LoRa1276-C1-915	SX1276 chip,Working frequency 915MHz

11. FAQ:

a) Why module can not communicate properly?

    1) Check if the band, channel, rate has set to the same;

    2) Check if there is power connection error;

    3) Check if the antenna connection is not correct;

    4) Check if the module is damaged.

b) Why transmission distance is not far as it should be?

    1) Power supply ripple is too large;

    2) The antenna types do not match, or not properly installed;

    3) The surrounding environment is harsh, strong interference sources;

    4) Surrounding co-channel interference;

Appendix 1：SMD Reflow Chart

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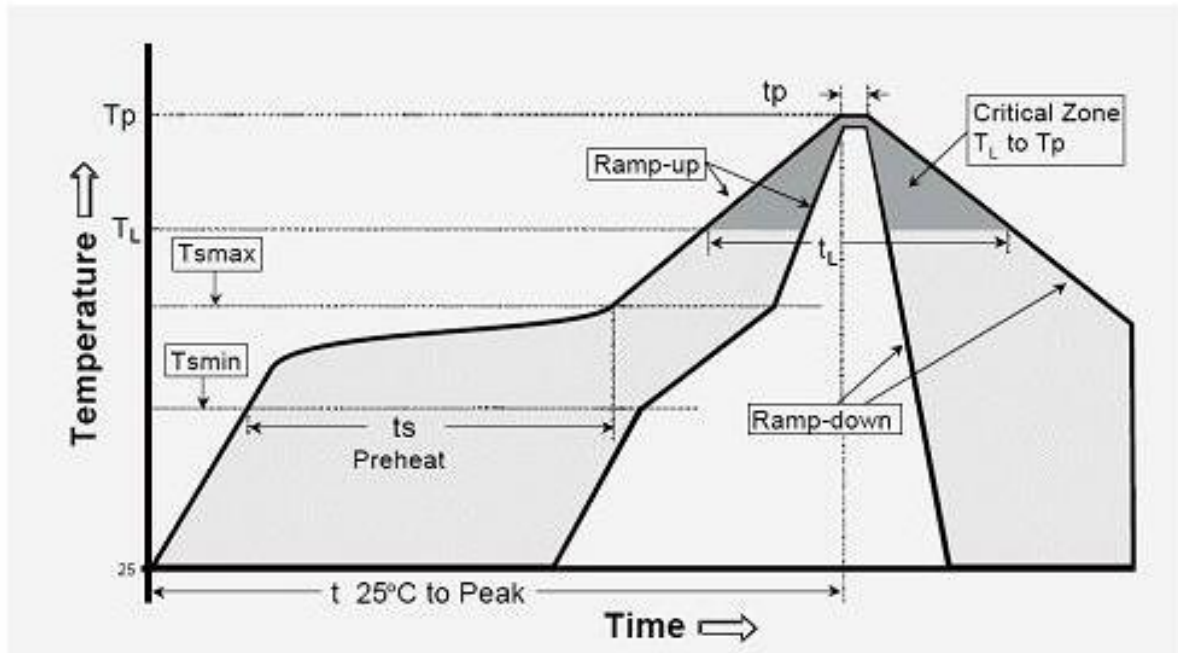
IPC/JEDEC J-STD-020B the condition for lead-free reflow soldering	big size components (thickness >=2.5mm)
The ramp-up rate (Tl to Tp)	3℃/s (max.)
preheat temperature - Temperature minimum (Tsmin) - Temperature maximum (Tsmax) - preheat time (ts)	 150℃ 200℃ 60~180s
Average ramp-up rate(Tsmax to Tp)	3℃/s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