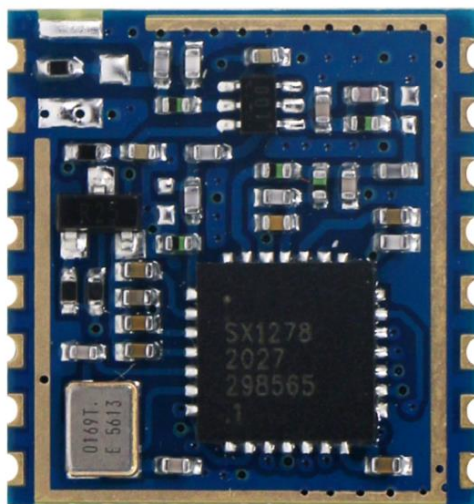


LoRa1278 Remote Spread Spectrum Wireless Module
433Mhz LoRa Module with SPI interface

SPECIFICATION

Model No.: M-SX1278S2

Version: V1.0



1. Module introduction

1.1 Brief introduction

M-SX1278S2 wireless module is designed with Semtech's LoRa spread spectrum chip SX1278, which is an upgraded version of our S1 module (DL-RTS1278). The module adopts spread spectrum modulation technology to solve the communication distance problem that cannot be achieved by traditional FSK modulation communication technology. The module's radio frequency index has a single-chip built-in power amplifier, and its receiving sensitivity is far superior to the same type of FSK and GFSK two-way chips in the industry. It is configured with different spreading factors to minimize the impact of co-frequency interference and has super anti-interference. This module is designed with an output power of 100mw and is very compact. It can be widely used in industries such as wireless meter reading and remote industrial control.

1.2 Features

- Frequency range: 433/470/868/915 MHz (137-1020 MHz can be customized)
- Sensitivity up to -139dBm @Lora
- Maximum output power: 20 dBm
- Low receiving current: 10.3 mA
- Standby current <200 nA
- Data transmission rate: 1.2-300 Kbps @FSK; 0.018-37.5 Kbps @ Lora,
- LoRa, FSK, GFSK and OOK modulation modes
- Built-in antenna electrostatic protection
- 127dB dynamic range RSSI
- 256 bytes FIFO and CRC frequency hopping function
- Built-in temperature sensor and low battery indicator
- Signal is not blocked
- Operating temperature range: -40 ~ +85 °C

1.3 Typical application

- ISM band data communication
- Home security
- Wireless remote control
- Wireless sensor network
- Remote meter reading
- Energy control and management
- Building Automation
- AMR
- Smart buildings

1.4 Technical Parameter

Parameter	Min	Typical	Max	Unit	Conditions
Operating conditions					
Working voltage range	1.8	3.3	3.6	V	
Working temperature range	-40		85	°C	
Current consumption					
Receive current		10.8		mA	
Emission current		120		mA	@20dBm
Standby current		<0.2		uA	
RF parameters					
Frequency Range	403	433	463	MHZ	@433MHZ
	470	490	510	MHZ	@470MHZ
	800	868	900	MHZ	@868MHZ
	900	915	1000	MHZ	@915MHZ
Modulation frequency	1.2		300	Kbps	FSK
	0.018		37.5	Kbps	LoRa
Transmit power range	-1			dBm	
Receive sensitivity		-123		dBm	@FSKdata=1.5kbps, Fdev=10KHZ
		-139		dBm	@LoraBW=125KHz_S F=12_CR=4/5

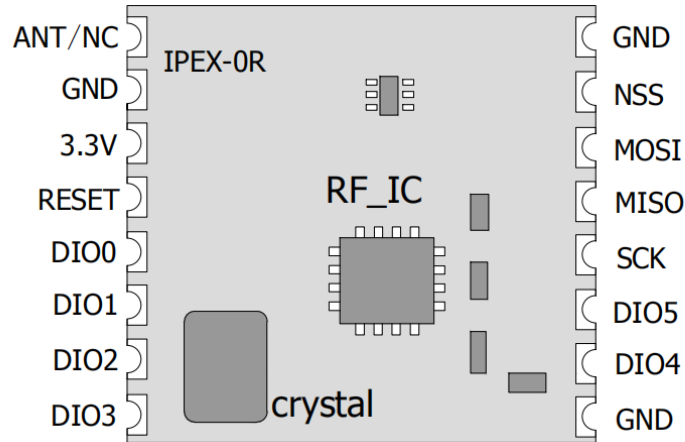
Note: Please refer to the chip register setting instructions; To ensure that the PA of the module is turned on, so as to work at the maximum power, the highest bit 'PaSelect' of the 0x09 register must be set to 1.

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)

2. Rate comparison table

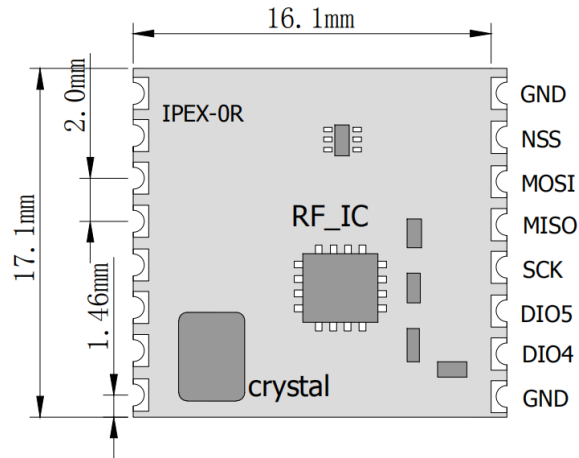
Signal Band Width	Spreading Factor	Sensitivity (dbm)	Actual Band Rate (pbs)
62.5KHz	SF=7	-126	2169
62.5KHz	SF=8	-129	1187
62.5KHz	SF=9	-132	656
62.5KHz	SF=10	-135	296
62.5KHz	SF=11	-137	164
62.5KHz	SF=12	-139	91
125KHz	SF=7	-123	4339
125KHz	SF=8	-126	2375
125KHz	SF=9	-129	1312
125KHz	SF=10	-132	733
125KHz	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

3. Pin Definitions



No	Definitions	Description
1	ANT/NC	OR jumper antenna output PIN, IPEX direct output
2	GND	Connect to power ground
3	VDD 3.3V	Power Supply
4	NRESET	Reset trigger input
5	DIO0	Value I/O, can be defined by yourself
6	DIO1	Value I/O, can be defined by yourself
7	DIO2	Value I/O, can be defined by yourself
8	DIO3	Value I/O, can be defined by yourself
9	GND	Connect to power ground
10	DIO4	Value I/O, can be defined by yourself
11	DIO5	Value I/O, can be defined by yourself
12	SCK	SPI Serial Clock input
13	MISO	SPI Master Input Slave Output
14	MOSI	SPI Master Output Slave Input
15	NSS	SPI Chip Selection
16	GND	Connect to power ground

4. Module size & SMT



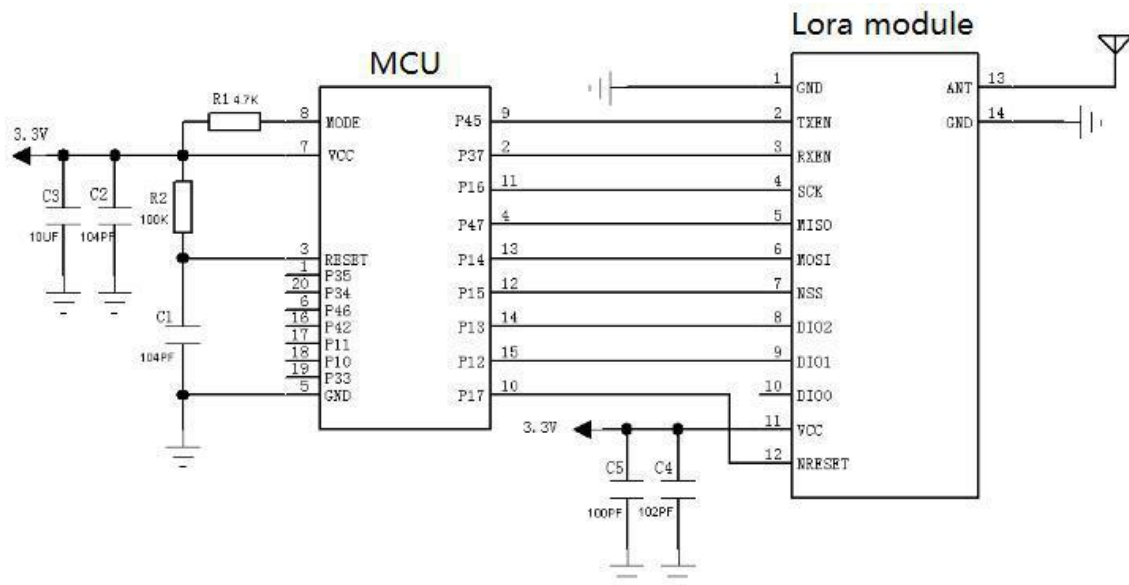
Please apply for module packaging from our technical support: SMT patch package, DIP in-line package file (refer to schematic diagram)

Package files format description:

- * .ASC format can be opened with Protel99se;
- * .DXF format can be opened with CAD;
- * .PCB format can be opened with PADS software;

Module packaging: SMT placement (steel mesh thickness $\geq 1.2\text{mm}$)

5. Application connection diagram



Note: This schematic diagram is for your reference. The module distinguishes the built-in

electronic switch and the external one. If you have any questions, please contact our technicians; the module S2 version TXEN and RXEN are upgraded to the built-in module

6. Problems in module application

Considering the complexity of data transmission over the air, the radio frequency modulation method of the data, and some inherent characteristics of electromagnetic waves, the following issues should be considered during the application process.

1. The electromagnetic interference of the application environment will affect the actual distance of the remote control. Electromagnetic wave interference is divided into mainboard power supply interference, TFT screen data cable interference, Flash data exchange interference; and airborne carrier frequency interference, noise interference, high-power signal source interference, etc.;
2. Factors such as product size, internal space, and coating of the shell will cause the attenuation of the wireless signal, which will affect the remote-control distance. Usually the narrow internal space of the product is not conducive to the extension of the antenna. The outer shell should avoid metal or metal plating as much as possible.
3. To choose a proper antenna is very important. The antenna is an important part of the communication system, and its performance directly affects the indicators of the communication system. We must pay attention to its performance (antenna type, antenna electrical performance) when selecting the antenna. Please feel free to contact us for consultation or recommendation, if you need.

7. Contact us

Shenzhen DreamLnk Technology Co., Ltd

★ Data collection, Smart home, Internet of Things applications, Wireless remote control technology, Remote active RFID, Antennas ★

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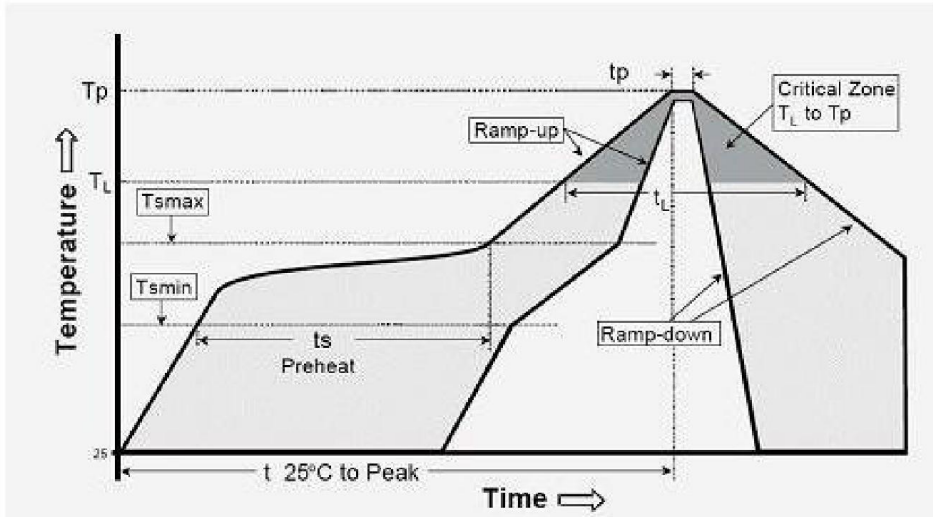
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Appendix 1: Furnace temperature curve

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})	150°C
- Temperature maximum (T _{max})	200°C
- preheat time (t _s)	60~180s
Average ramp-up rate(T _{max} to T _p)	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