

Lierda Science & Technology Group Co.,Ltd

利尔达科技集团股份有限公司

---

Operation Manual  
for Wireless IoT Transceiver



Product Name: SX1278 Wireless Transceiver

Product Number: LSD4RF-29717N10

Revision : V1.0

### Document History

Product Name	SX1278 Wireless Transceiver	Product Number		LSD4RF-2F917N10	
Checker	刘建	Submission Date		20160721	
No.	Revise History	Checker	Approver	Revision	Submission Date
1	First FINAL document version	刘建	孙香涛	V1.0	2016-07-21



# Contents

1	General Description.....	4
2	Technical requirement specifications.....	6
3	Module Mechanical Drawing & Pin Description.....	7
4	Operating Description.....	8
5	Additional information.....	9
6	Antenna specification.....	10
	Important Notes:.....	11



## 1 General Description

The LSD4RF-2F917N10 module is a high-performance RF transceiver with a highly integrated SX127X. Using Semtech's patented LoRa™ modulation technique can greatly increase the communication distance, which is widely applied to various occasions of short distance IoT wireless communication field. It has small size, low power consumption, long transmission distance, strong immunity from interference and other characteristics. The user can be free to choose different antenna , consequently, is easy to second development and its popularization.

### KEY PRODUCT FEATURES

- Supply voltage: DC 2.4 ~ 3.6 V
- Operating Frequency: 900~925MHz
- RF output power: 19±1 dBm(max)
- High sensitivity: -136±1dBm (@250bps)
- Ultra effective communication distances: 5Km@250bps (Urban road environment, not the desert environment)
- Using spread spectrum modem, which is capable of achieving significantly longer range than existing systems based on FSK or OOK modulation. It provides significant advantages ,especially in the terrible noise environment (eg. nearby the strong interference sources and in the natural shielding environment)
  - High confidentiality, using LoRa™ modulation , traditional wireless devices can not capture and parse.
  - High concealment, it still can normal communication when average power under Digital Noise Floor, wireless monitoring equipment unable to listen to.
  - Support LoRa™, FSK, GFSK, MSK, GMSK and OOK modulation
  - Low power consumption: current in receive mode  $\leq 13\text{mA}$ ; current in sleep mode  $\leq 2\mu\text{A}$ ; Provide CAD functions which separate the calculation and reception, further optimize the power consumption of waking up the window. (the calculating current is about half of receiving current).

---

- SPI communication interface, it can be connected directly to all kinds of microcontroller, the software programming is very convenient.

## APPLICATIONS

- Automated Meter Reading for water meter, gas meter, electricity meter, thermal meter
- Ultra-long range communication
- Home and Building Automation
- Industrial remote sensing, telemetering communication
- Industrial Monitoring and Control, Wireless Alarm and Security Systems
- Active RFID



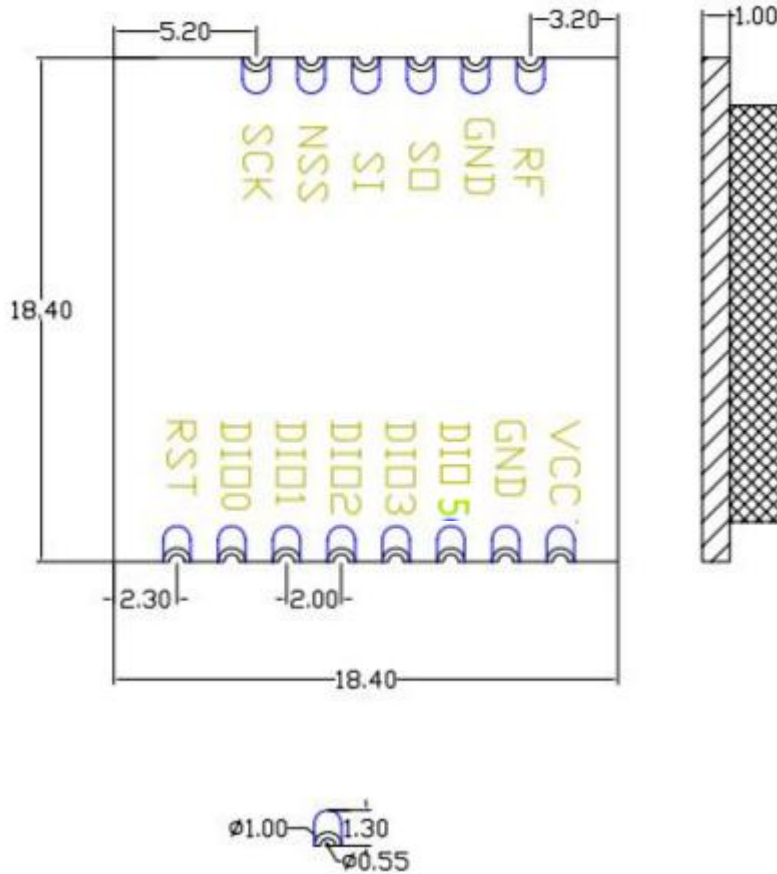
## 2 Technical requirement specifications

Table 1 Module Specifications

Parameter	Performance Requirements		Remarks
Supply Voltage	DC 2.4 ~ 3.6 V		
Operating Temperature	-40 ~ 85 °C		
Operating Humidity	10%~90%		non-condensing
Operating Frequency	900~925 MHz		Programmable
Power Consumption	Transmit mode	≤100 mA	Conditions: 900~925 MHz, Pout=17 dBm
	Receiver mode	≤17mA	Conditions: 900~925 MHz, LoRa™ Modem
	Sleep mode	≤2uA	
RF output power	19 ± 1dBm		Programmable
Modulations	LoRa™\2-FSK\GFSK\OOK		Recommended: LoRa™
Bit Rate Range	OOK: 1.2~32.768Kbps		Programmable
	LoRa™: 0.2~37.5Kbps		Recommended: use LoRa™ at low bit rate (<5kbps)
interface type	stamp hole		Pitch: 2.0mm
communication interface	SPI		
Module Size (without antenna)	18.4 × 18.4 (GB/T1804-c)		Unit: mm
Static Level			Refer to chapter 5
Interface Selection			Refer to chapter 5

### 3 Module Mechanical Drawing & Pin Description

As shown in the bottom view of Figure 1, the LSD4RF-2F917N10 connects to the host board via solder pads on the module.



Unit: mm

Figure 1 LSD4RF-2F917N10 Module Mechanical Drawing

Table 2 shows Pin Description :

Table 2 LSD4RF-2F917N10 Pin Description

Number	Name	Description
1	VCC	Supply voltage
2	GND	Ground
3	SI	SPI Data input
4	SCK	SPI Clock input

5	SO	SPI Data output
6	DIO1	RxTimeout、 CadDetected
7	DIO2	
8	NSS	SPI enabled
9	DIO0	Required, RxDone、 TxDone、 CadDone
10	RST	Required, Reset trigger input
11	GND	Ground
12	RF	RF input / output
13	DIO5	ModeReady、 ClkOut
14	DIO3	ModeReady、 ClkOut

For more information about DIOx that can be found in the chapter 5.

## 4 Operating Description

The LSD4RF-2F917N10 module is soldered to the applications main board and communication with micro-controller by SPI interface. Figure below shows a typical SPI single access to a register. To get the detail description, please consult the latest data sheet of SX1278.

The figure below shows a typical SPI single access to a register.

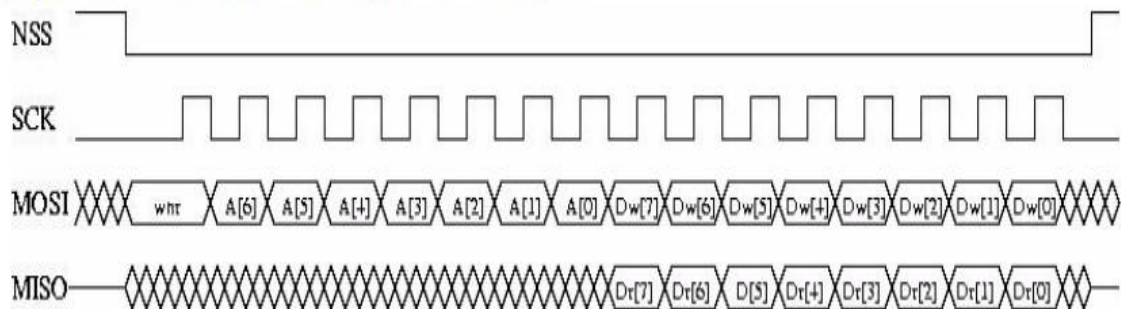


Figure 2 SPI Timing Diagram (single access)



## 5 Additional information

To maximize RF performance, the user should follow these recommendations:

### 1. Power Supply

It is recommended to use DC regulated power supply to the module, and the small power supply ripple coefficient is required. The module should be reliable grounding, and please pay attention to the correct connection power, if reverse, maybe result in permanent damage to the module.

### 2. About Antenna

Ensure that there is no component, mounting screw or ground plane near the antenna.

All these incorrect design can reduce the communication distance of module seriously.

### 3. Protection of ESD electrostatic

Modules can be static tested by connecting discharge 4 kv, air discharge 8 kv;

The arc distance module about 10 cm when air discharge;

Therefore, it shall takes all necessary ESD measures in order to avoid permanent damage to the device.

### 4. Trade-offs advice on DIOx

DIO has three functions, The first is the RF interrupt flag reflects, the other is the PLL\_Lock signal output, a third is Clock signal output of the RF module (generally do not use this function). Under the condition of without considering power consumption, can not use any DIO.

In most application scenarios (transceiver, low-power wake up), DIO0 will choose IO, other IO can choice according to the situation.

DIO0, DIO1, DIO3 contains all interrupt mapping, If you don't use this feature, DIO0, DIO3 will meet the requirements;

2F717N01 module provides DIO0,DIO1,DIO3

2F717N10 module provides DIO0,DIO1,DIO2,DIO3,DIO4

2F917N10 module provides DIO0,DIO1,DIO2,DIO3,DIO5

2F917N10 module provides DIO0,DIO1,DIO2,DIO3,DIO5

DIO mapping is shown below:

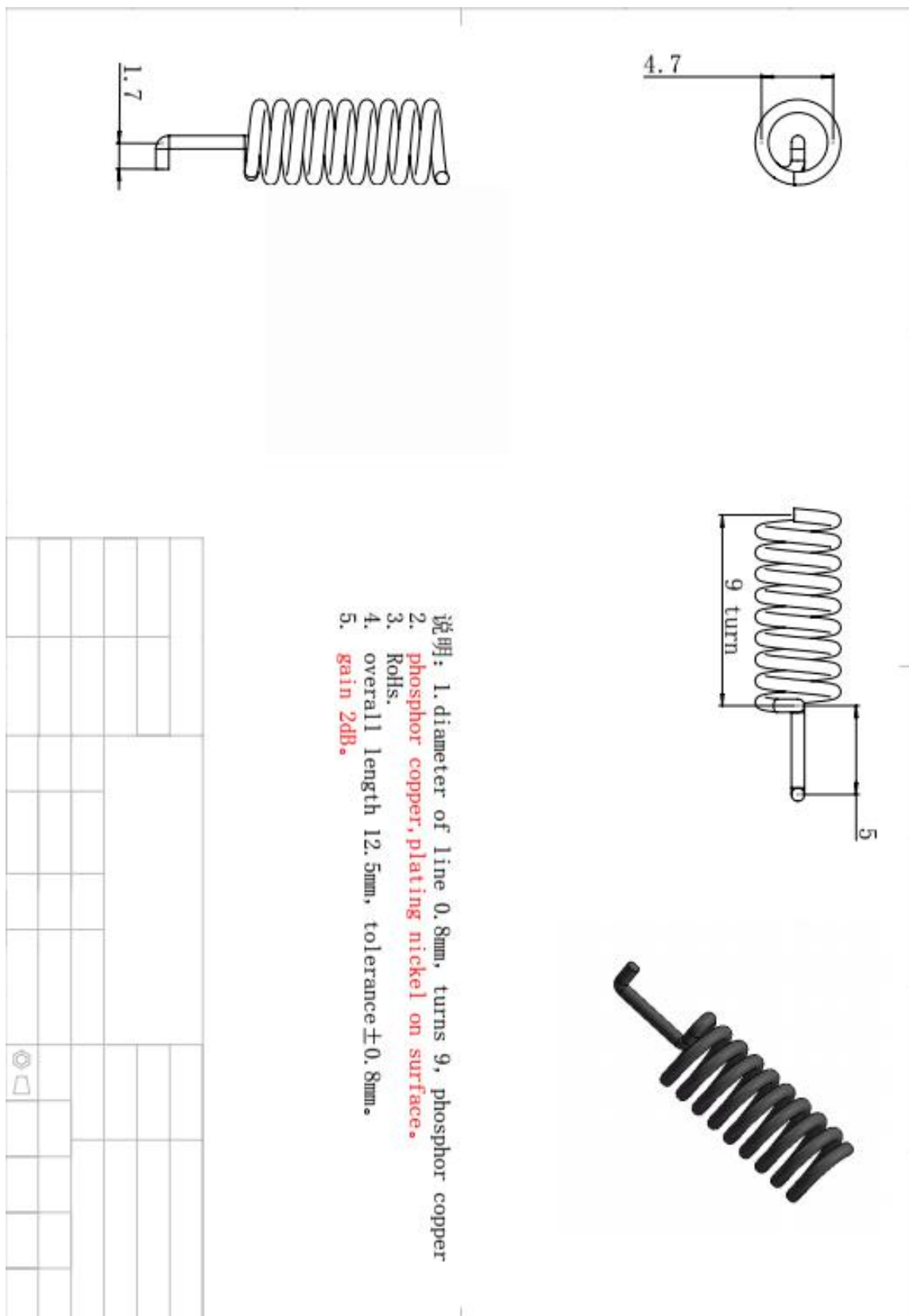
Table 15 DIO Mapping LoRa™ Mode

Operating Mode	DIOx Mapping	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
ALL	00	ModeReady	CadDetected	CadDone	FhssChangeChannel	RxTimeout	RxDone
	01	CikOut	PllLock	ValidHeader	FhssChangeChannel	FhssChangeChannel	TxDone
	10	CikOut	PllLock	PayloadCrcError	FhssChangeChannel	CadDetected	CadDone
	11	-	-	-	-	-	-



## 6 Antenna specification

antenna change may lead further evaluation on emission as per FCC part 15c.



### Important Notes:

1. Welcome to use the products of the Lierda Technology Co., Ltd.. Before using the

products of our company, please read this warning first. If you have already used the product which indicates that you have read and accepted the warning. Using the product indicates that you have read and accepted this warning.

2. The final interpretation and modification of all the information provided to this tool are reserved. No more notification will be given if the information were updated.

Publisher: Lierda Science & Technology Co.,Ltd

WSN Dept.

2016/ 07/21

**FCCID: N8NLS4RF2F917N10**

### **FCC statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

- If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

### **RF exposure warning**

- The equipment complies with FCC RF exposure limits set forth for an uncontrolled environment.

The equipment must not be co-located or operating in conjunction with any other antenna or

transmitter.

**NOTE:** Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

The module' s FCC ID is not visible when installed in the host, or If the host is marketed so that end users do not have straight forward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: Contains Transmitter Module FCC ID: N8NLS44RF2F917N10; or Contains FCC ID: N8NLS44RF2F917N10 must be used.

This device is intended for OEM integrators only.

further evaluation to the host level with regards to un-intentional spurious emission as per FCC 15B

