500m-1.5km
2km-5km
5km-10km

Wireless transmission ...

SPI
TTL ~ (UART)
~ RS232 serial port
~ RS485 serial port
Computer ~ USB

Accessories - Series

antenna
Data line
Power Adapter
ECG Pulse Accessories
Other Accessories

Development Boards

Baby Leaderboard

Sales Collection

number


500MW remote
¥ 200.00
It has sold 42 pieces


BLE4.0 low-power
¥ 20.00
It has sold 36 pieces


MANET MESH
¥ 80.00
It has sold 30 pieces


Sx1278 3-5km
¥ 35.00
It has sold 27 pieces


Wireless MESH
¥ 120.00
It has sold 22 pieces

See more Baby

Need to buy Sx1278 open is ready (with MCU) module can be used directly, please contact customer service!

I. Product Overview

YL-1278RF is a high-performance, low-power, long-range micro-power wireless spread spectrum encoding module, internal automatic spreading computing and hardware verification process, users do not need to understand too complex RF knowledge, and hardware tone, just We need to debug the underlying SPI communication, and understanding of the significance of good function. You can easily apply YL_1278RF spreading module. YL_1278RF modules are ideal for long-range, low volume of data and low power applications.

RF module RF chip based on spread spectrum frequency-hopping technology, the stability, anti-interference ability and receiver sensitivity are beyond existing GFSK RF module.

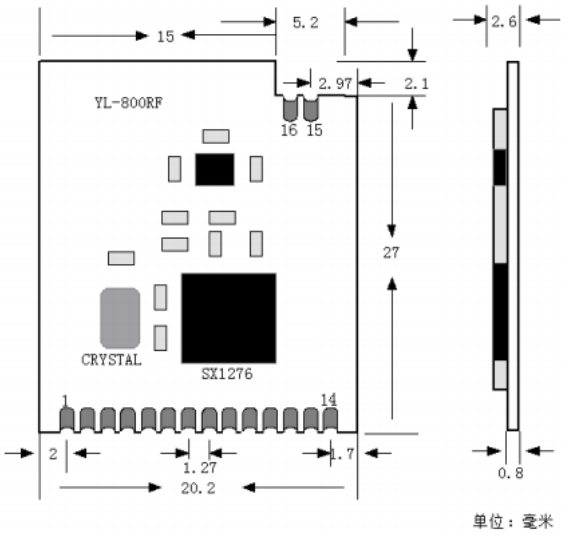
Second, product characteristics

> > LoRaTM based spread spectrum modulation techniques.
> > half-duplex communication, standard SPI communication control.
> > 420 ~ 450MHz Free application band, other frequency bands can be customized.
> > Production Free debugging, 2.1-3.6V wide voltage range.
> > Micro-power transmission, standard 100mW, set the power register.
> > receiver sensitivity up to -148dBm, the maximum transmit power + 20dBm.
> > hardware testing, and hardware spreading code, you can customize FM mechanism.
> > receive, transmit, CAD detection, sleep and other models, but any change.
> > SMD package, enabling customers to embed their own PCB.
> > C language function package directly into the function interface.
> > nested shield cover protection, increased robustness.

Third, the application areas

- ✓· smart home, intelligent transportation, sensing network;
- ✓· industrial automation, agricultural modernization, intelligent building;
- ✓· water, electricity, gas and heating meter automatic meter reading system;
- ✓· water, oil, mines, weather and other information collection equipment;
- ✓· street lighting control, power monitoring, wind and solar systems;
- ✓· Industrial Equipment wireless data transmission and industrial environmental monitoring ;
- ✓· handheld data acquisition, data transmission and embedded devices;
- ✓· all other wireless instead of wired communication needs of the situation.

Fourth, the size of the structure



Fifth, the pin definitions

引脚符号	引脚功能	引脚说明
GND	电源地	GND
TX	射频开关脚控制	发射接收时用来控制射频开关，用法见后面详细解说。
RX	射频开关脚控制	发射接收时用来控制射频开关，用法见后面详细解说。
REST	模块复位脚	用以复位模块，和初始化寄存器。
GPIO0	模块普通IO口	用户可自定义使用，用法见后面详细解说。
GPIO1	模块普通IO口	用户可自定义使用，用法见后面详细解说。
GPIO2	模块普通IO口	用户可自定义使用，用法见后面详细解说。
GPIO3	模块普通IO口	用户可自定义使用，用法见后面详细解说。
GPIO5	模块普通IO口	用户可自定义使用，用法见后面详细解说。
SCK	SIP时钟输入	SPI通信，用来接收MCU的时钟。
MISO	SIP数据输出	SPI通信，模块发射数据给MCU。
MOSI	SPI数据输入	SPI通信，模块接收MCU的数据。
NSS	SPI使能控制	SPI通信，使能模块的SPI接口。
VCC	供电电源	电源范围2.1V-3.6V

Sixth, the module parameters

Spread spectrum modulation LoRaTM
Operating frequency: 420 ~ 450MHz (can be customized)
Transmit power: 20dBm
Receiving sensitivity: -148dBm
Operating voltage: 2.1 ~ 3.6V (Output 20dBm)
Emission current: ≤120mA (transmit power 20dBm)
Receiving Current: ≤9.9mA
Sleep mode: ≤1uA
Working temperature: -40 ~ + 80 ℃ (industrial grade)
Humidity: 10% to 90% relative humidity, non-condensing
NOTE: The power ripple factor inputs to be controlled within 50mV, and provide instant pulse current 300MA above, the pulse width is greater than 800MS.

Seven, SPI Timing Specifications

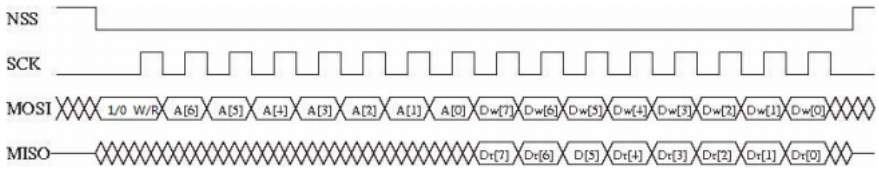
YL_1278RF spread spectrum wireless module is a standard 4-wire SPI interface, customers can use the MCU IO port simulation, you can use built-in MCU SPI interface for

communication. If the analog IO use, high speed MCU in the above note delay. SPI module provides three kinds of reading and writing.

1: An address followed by a data, NSS from the write address to (write / read) data is low. Until the data is complete.

2: an address followed by N data, after the data is written address will also increase until the data corresponding to the last. NSS data from address to complete the operation are low.

3: FIFO address operation, after writing FIFO address, data is written to or read after the address does not increase, just inside the store or output FIFO address.



此图是 SPI 单地址时序图

Eight, the application circuit

Wireless Spread Spectrum module and user MCU connection shown in Figure 8 .1， the need to pay attention to common ground connection, otherwise the module may not function properly

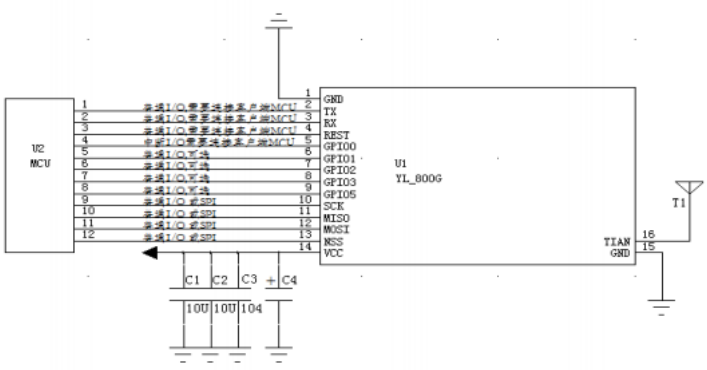


Figure 8 .1 wireless module and user MCU link graph

Note: When you draw the schematic to note, TX, RX, REST, GPIO0, SCK, MISO, MOSI, NSS these pins must be connected to the customer MCU above, and is preferably connected GPIO0 interrupt pin.

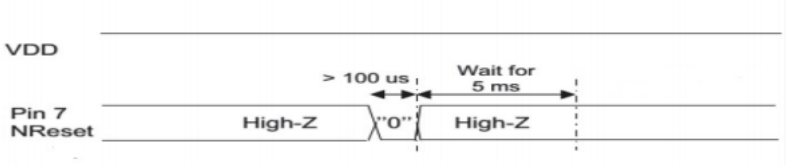
Nine, TX, RX control

TX, RX pin is mainly used to switch RF switch, the transmit and receive mode switching RF switch. According YL-1278RF Wireless Spread Spectrum module hardware principle, in the transmission and reception mode control form below.

发射模式	TX管脚	RX管脚	接收模式	TX管脚	RX管脚
	H(高电平)	L(低电平)		L(低电平)	H(高电平)

Ten, REST pin

REST reset pin is mainly YL-1278RF wireless spread spectrum module, low active, high-level operation. Note that this pin is typically operate at initialization time, after the successful initialization Do not use this pin must be held high REST pins.



REST Pin Operation Timing Diagram

Eleven, GPTO pin

YL-1278RF Wireless Spread Spectrum module has five ordinary GPIO, these IO ports function features can be set through the register module.

寄存器控制管脚对应表格

地址	bit	控制管脚	地址	bit	控制管脚
0X40	7~6	GPIO0	0X41	保留	
	5~4	GPIO1		5~4	GPIO5
	3~2	GPIO2		保留	
	1~0	GPIO3		保留	

管脚功能对应表适应所有模式

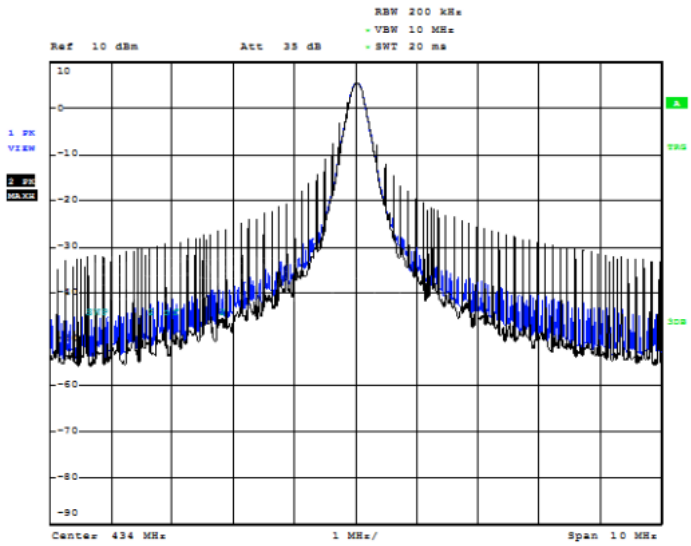
寄存器值	GPIO0	GPIO1	GPIO2	GPIO3	GPIO5
00 (bit)	RxDone	RxTimeout	FhssChangeChannel	CadDone	ModeReady
01 (bit)	TxDone	FhssChangeChannel	FhssChangeChannel	ValidHeader	ClkOut
10 (bit)	CadDone	CadDetected	FhssChangeChannel	PayloadCrcError	ClkOut
11 (bit)	保留	保留	保留	保留	保留

Twelve, spreading parameters Commentary

A few basic parameters spreading module, and traditional GFSK modules have a different understanding. Here we devoted to a few basic parameters of the module.

1) carrier frequency

In this frequency reference carrier frequency is spread, if no data is sent, then that is a carrier signal.



Carrier frequency spectrum

Note: When setting the carrier frequency of multiple frequencies to avoid 32M, 32M if the frequency is set multiples of the

module's receive sensitivity are low, it will affect the distance (this is the factory chip features, please avoid these frequencies).

2 **) spreading factor**

Spreading factor is an essential part of the CDMA chip rate = symbol rate * spreading factor, spreading factor used so that the symbol rate of the channel TD greater selectivity for QOS guarantees strong support, spreading factor also determines the number of available access terminal. The size of the spreading factor determines the size of a user's actual data rate (note here that the actual data, for example, we have this data transmission 11111111, A represents 1 in 11, then his actual data is 1111, while the B by 1111 is 1, then his actual data is 11, so the probability of error of B than A small, but his data rate is also smaller than A) but because of the presence of orthogonal codes from the base station point of view, to improve the spreading factor, the actual data rate of a user is reduced, but the number of users more available (spreading code) as a whole did not change the actual data rates.

3 **)** Spread Spectrum Bandwidth

Spreading bandwidth simply is modulated at is your fundamental frequency signal is much wider frequency reference. The figure is the bandwidth of 125K and 250K spread chart (purple line is the hold line, the yellow line is the modulation signal line). Spreading bandwidth settings also depend on the accuracy of the crystal is supported, we recommend a minimum of spreading bandwidth 125K.

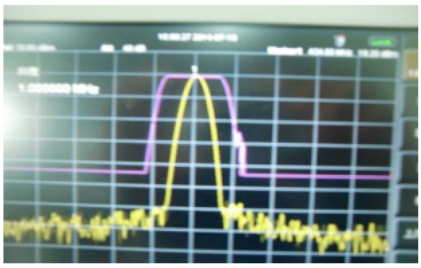


图 1 125K 扩频带宽图

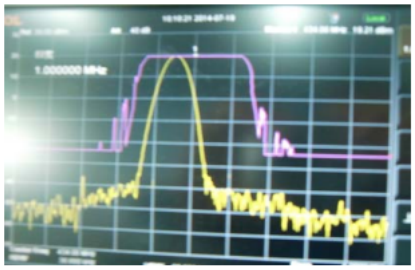


图 2 250K 扩频带宽图

Note: When communication debugging module, if the two modules to communicate, we must ensure that the module carrier frequency, spreading factor,
The same spreading bandwidth of these three parameters.

Thirteen, spreading parameter settings

1) carrier frequency

The carrier frequency is controlled by three registers in the software that has a special chapter of arrays and functions to reflect. This refers to the value of three about how to calculate the lower register.

Such as: carrier frequency is 433M. **433** 000000 / 61.035 = 0X6C4012 . So even if the register is **0x6C, 0X40 , 0x12**.

2 **)** spreading factor

Better spreading factor calculation, the software has a special variables and functions to reflect, not do too much to explain here.

3 **)** Spread Spectrum Bandwidth

Spreading bandwidth is relatively easy to calculate, the software has a special variables and functions to reflect, not do too much to explain here.

Fourth, hardware design

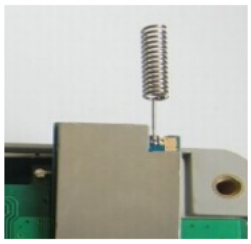
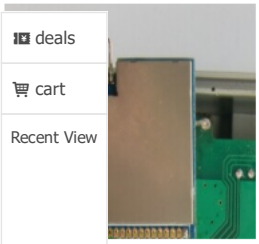
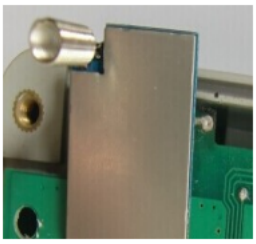
YL-1278RF Wireless Spread Spectrum module is SMD package, convenient to the client device embedded in the floor, so customers in the design of the board should be a component unit when the module design. So in terms of PCB layout and routing,

a lot of attention to the place.

1)PCB layout

When PCB layout, in conformity with the mold structure, the wireless module should stay away from power devices, field devices, such as: speakers, buzzers, inductors and other switching power supply that can produce field disturbance devices and heating devices. Stickers module within the region, PCB placed on the

As with the internal spring antenna, then ping and module placement, or vertical PCB board, or parallel to the edge of the module board. Here are a few built-in antenna placed pictures for customer reference.

If the antenna is sol the customer's PCB board above, then the antenna is not too far away from t g point modules, RF line should not go too long. Power interface as much ble in the discharge point of the capacitor member rapid response in order ct the power of instantaneous pulse.

2)PCB traces

Connect the data cable ably parallel, in the same plane, the line as long as possible. Within the hould be affixed to module alignment, try to keep the integrity of the co t. But prohibit the floor below an antenna copper, preferably emptied circ .

NOTE: The power ripple factor inp trolled within 50mV, and provide instant pulse current 300MA above, the pulse width is greater than 800MS

Other details, ple ntact customer service!

Shipping list

Wireless module * 1	Spring antenna * 1	Inst * 1	figuration se * 1	Corresponding technical support

10 yuan ordinary courier, (fu can express shipping ordinary) SF Express 23 yuan. (Over 1,000 yuan to the SF)

Antenna Selection

Antenna is an important part of the communication system, its performance has a direct impact indicators communications system, users must select the antenna must first focus on its performance. Generally there are two aspects:

(1) Antenna Type - Antenna radio coverage meets the system design requirements;

(2) Electrical properties - antenna frequency bandwidth, gain, impedance, rated power design meets the system requirements, general requirements for the impedance of the antenna is 50 ohm, VSWR less than 1.4.

Our company offers a variety of antenna solutions, users choose according to the actual situation, in order to achieve the best transmission effect