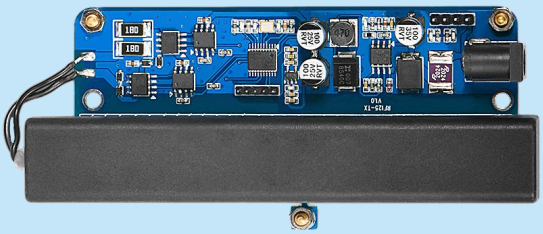
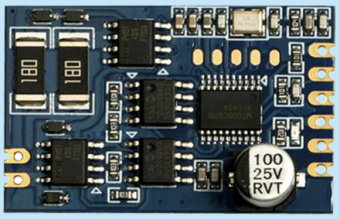
- Low Power
- 125KHz Wireless
- Air Wake-up and Data Transceiver and receiver module.

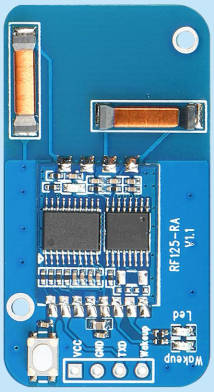
Product Specification



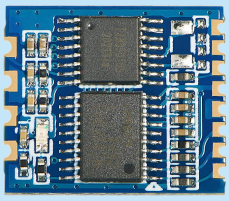
RF125-TX



RF125-TX2



RF125-RA



RF125-RX

Catalogue

Note: Revision History

Revision	Date	Comment
V1.0	2021-1	First release
V1.1	2021-11	Add RF125-TX2
V1.2	2022-12	Update pictures
V1.3	2023-11	Add RF125-RA size
V1.4	2024-1	Update the pinout silkscreen for the RF125-RA

1. Overview

The RF125-TX module, combined with our RF125-RX module, 125K wireless air wake-up and data transmission, can be applied to PKE keyless access control, campus access control, etc.

For RF125-TX, the transmitter ID, transmission data content, and transmission time interval can be set through the serial port.

RF125-RX, the receiver has low power consumption and wireless wake-up, can wake itself up in the air and wake up the connected device at the same time, the receiver serial port outputs the received wireless data. It can work in pairing mode or broadcast mode. The communication distance is 5-8 meters, far exceeding the same type of products.

RF125-RA is a full-featured wireless wake-up module that integrates RF125-RX, 125KHz antenna, pairing button, and coin cell for battery. Just insert the battery and start to use.

2. Features

- Transmitter RF125-TX wide voltage input: 6-30V
- Transmitter RF125-TX2 voltage input: 9-12V
- Transmitter operating temperature range: -40 ~85℃
- The transmitter can send default data or customize data content
- Transmitter ID can be modified
- The transmission time interval can be modified
- Transmitter built-in overvoltage protection
- Transmitter built-in overcurrent protection
- Transmitter built-in reverse connection protection
- Receiver wakes up connected device
- The receiver supports pairing mode and broadcast mode
- Receiver ultra-low power consumption
- Small receiver size
- Long communication distance (far beyond products of the same type)
- High receiving performance
- Receiver working voltage: 2.5~3.6V
- Receiver operating temperature range: -40 ~85℃
- Receiver carrier frequency range: 15-150KHz
- Low-power three-channel low-power ASK receiver
- Receive and wake up sensitivity: 80uVRMS
- The lowest power consumption in the listening state of the receiver in low power consumption mode: <9uA
- Receiver 1/2/3 channel independent operation
- Programmable sensitivity adjustment range
- False trigger counter
- Support RTC wake-up timing
- The receiver supports three wake-up modes: frequency detection/pattern recognition/ location recognition
- 32-bit programmable Manchester wake-up mode

3. Applications

- Campus access card
- Industrial data collection
- BRT platform gate system
- PKE keyless access control

4. Electrical Characteristics(@Vcc=3.3V ANT connected to 50 ohm load）

RF125-TX / RF125-TX2					
Parameters	Min.	Typ.	Max.	Unit	Condition
Temperature Parameter					
Temperature range	-40	25	85	℃	When working
	-40	25	125	℃	When storing
Voltage Parameter					
Operating Voltage	12		30	V	
		9	12		
Current Parameter					
Working current	-	<300	-	mA	@12V
Radio Frequency Parameters					
Communication distance		>5		m	Cooperate with our receiver
RF125-RX / RF125-RA					
Parameters	Min.	Typ.	Max.	Unit	Condition
Temperature Parameter					
Temperature range	-40	25	85	℃	When working
	-40	25	125	℃	When storing
Voltage Parameter					
Operating Voltage	2.5	3.3	3.6	V	
Current Parameter					
Receive current	-	<3	-	mA	Close to the transmitter
	-	<9	-	uA	No transmission
Radio Frequency Parameters					
Receiving sensitivity	-	80		uvRMS	
Communication distance		>5		m	Cooperate with our transmitter

5. Operation Description

1. Transmitter configuration mode

The parameters of the transmitter can be modified through the serial port, including: setting the content of transmission data, modifying the transmitter ID, setting the transmission time interval, and reading the transmitter ID. The format of the serial port is 9600, 8, N, 1, and the data content is (HEX) hexadecimal, with 0x0D 0x0A as the end sign. The minimum interval between two consecutive setting commands is 100ms.

The module automatically verifies the input command. If the command is correct, the hexadecimal return "OK\r\n" is 0x4F 0x4B 0x0D 0x0A. The error return "ERROR\r\n" hexadecimal is 0x45 0x52 0x52 0x4F 0x52 0x0D 0x0A

Users can directly connect the module to the PC through our USB adapter board, and use the serial port assistant to operate.

(1) Set transmission data content

Set sending data:

CMD (1Byte)	Length(1Byte)	Payload(Length Byte)
0x57		

CMD: 1 byte, 0x57

Length: 1 byte, the length of the data packet, excluding the command word and this byte. The range is 0~0x2D (a packet can transmit maximum 45 (0x2D) bytes)

Payload: data content

Example:

0x57 0x05 0x01 0x02 0x03 0x04 0x05 0x0D 0x0A

Return: 0x4F 0x4B 0x0D 0x0A

CMD: 0x57

Length: 0x05

Payload: 0x01 0x02 0x03 0x04 0x05

(2) Modify transmitter ID:

ID is greater than 0x7F as an error

CMD (1Byte)	ID(7Bit)
0x58	

CMD: 1 byte, 0x58

ID: 7 Bits, the range is 0~0x7F, more than 0x7F is regarded as an error

Example:

Set the ID of the transmitter to 0x01

0x58 0x01 0x0D 0x0A

Return: 0x4F 0x4B 0x0D 0x0A

(3) Read transmitter ID, return transmitter ID (1Byte)

CMD（1Byte）
0x52

Example: The ID of the transmitter is 0x01

0x52 0x0D 0x0A

Return:0x01 0x0D 0x0A

(4) Set the transmission time interval (ms) of the transmitter not to be less than 250ms (0x00FA), if it is less than 250ms, it will be automatically set

CMD(1Byte)	TIME_H(1Byte)	TIME_L(1Byte)
0x53		

CMD: 0x53

TIME_H: the upper 8 bits of the time

TIME_L: the lower 8 bits of the time

Example:

Set the interval of 1000ms, 1000 to hexadecimal is 0x03e8

The command is: 0x53 0x03 0xe8 0x0D 0x0A

Return: 0x4F 0x4B 0x0D 0x0A

2. Function description

RF125-TX worked with RF125-RX, and the receiver can work in pairing mode or broadcast mode.

2.1 The transmission time for one packet: [32.5 + (data packet length +3) *8]ms

For example: the time required to send 45 bytes is: 416.5ms

2.2 The receiver wakes up the external device

The module will verify the content of the received data, and if the verification is correct, it will output a 50ms high pulse to wake up the external device. If the check fails, there is no pulse

output.

Check content:

➢ Pairing mode: check whether the ID matches the machine, the length of the data packet, and the CRC check the data packet.

➢ Broadcast mode: data packet length, CRC check data packet.

Figure 1 is the time taken by the receiver to receive 15 data, Wake_Up is the wake-up pulse of the receiver, and Uart_Data is the data output through the serial port.

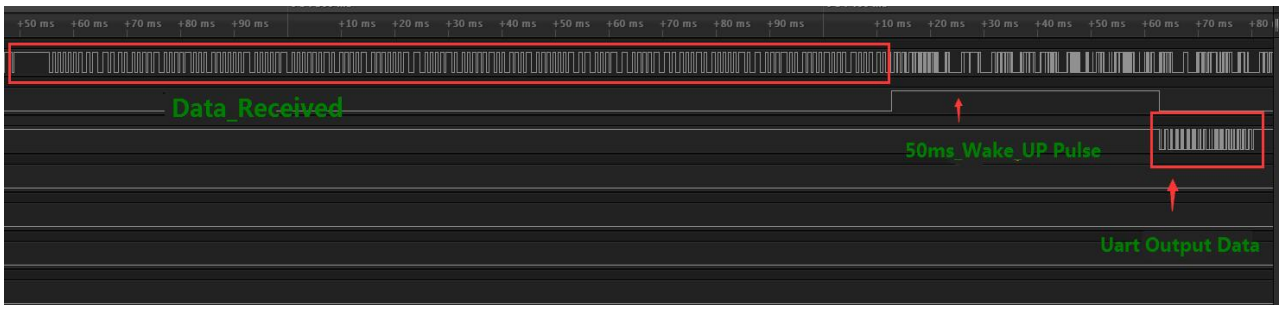


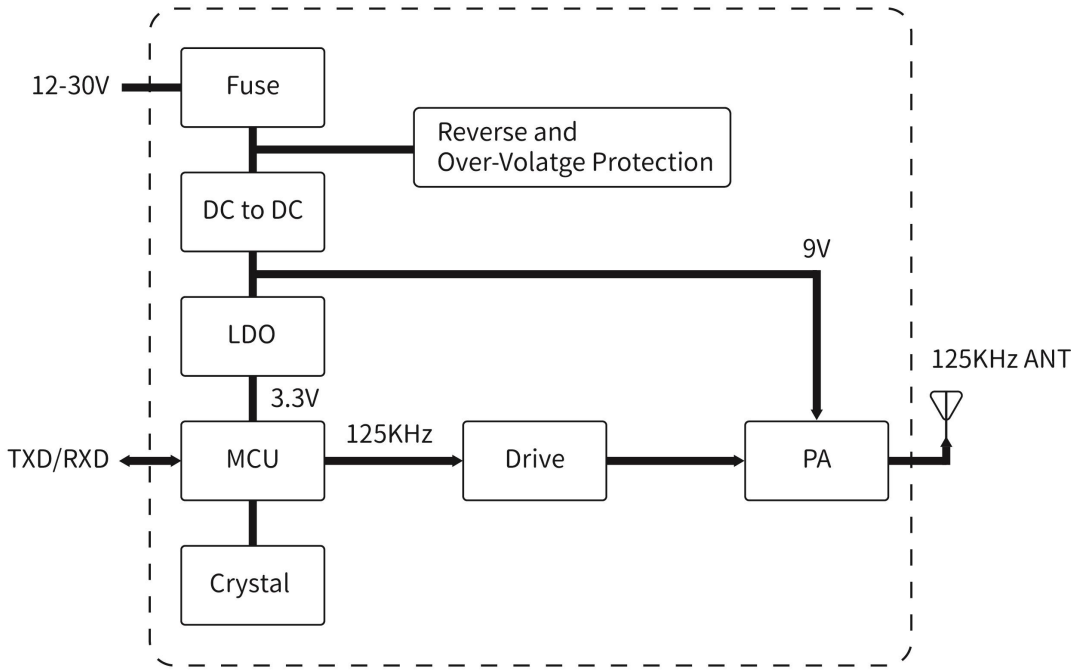
Figure 1

2.3 Wake-up indication:

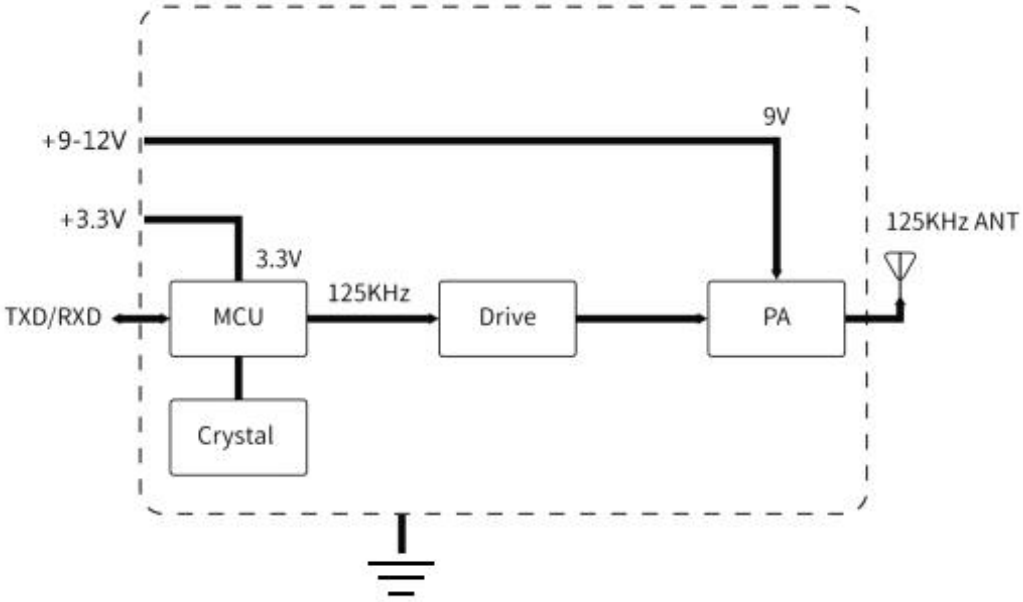
RF125-RX will automatically wake up the external device after receiving the correct data, and the blue LED will flash once.

6. Block Diagram

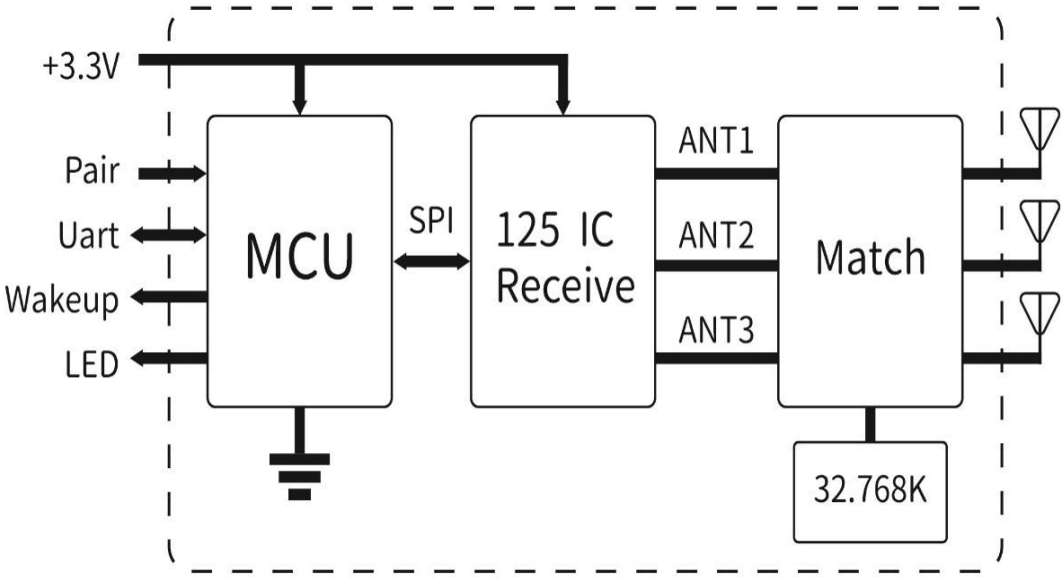
(1)RF125-TX:



(2)RF125-TX2:

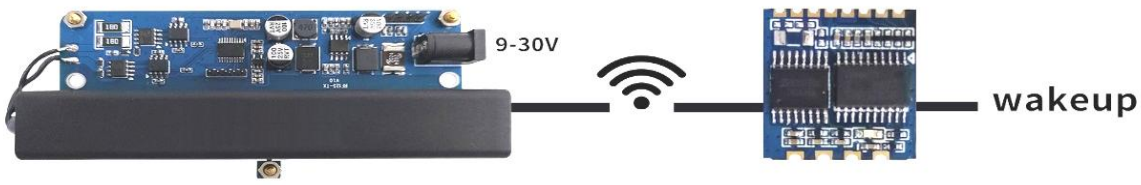


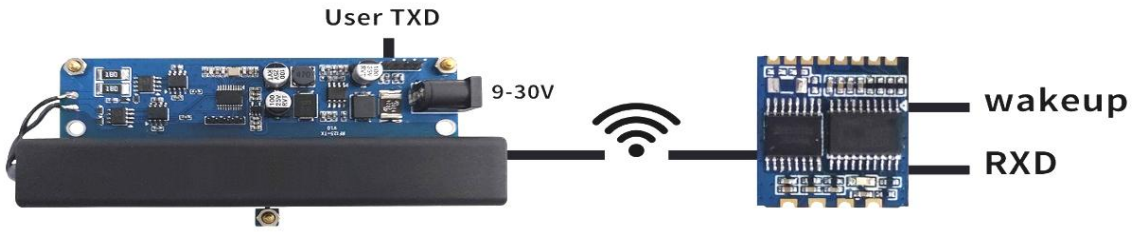
(3)RF125-RX:



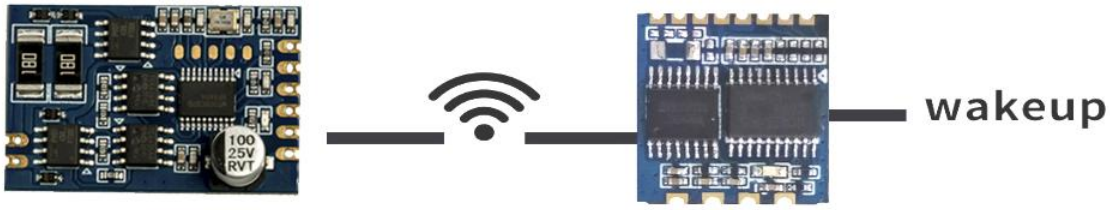
7. Typical circuit

(1)RF125-TX:

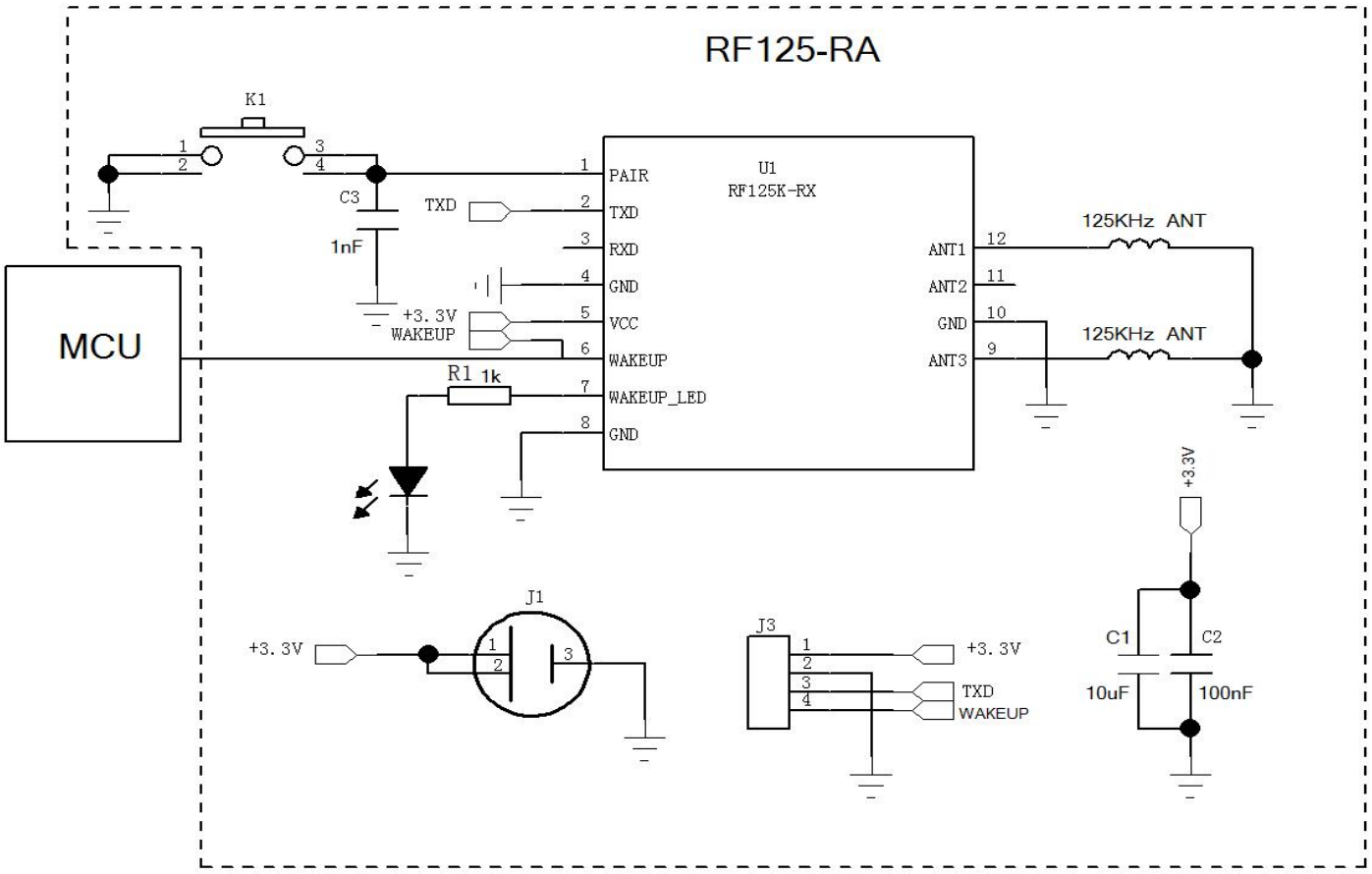




(2)RF125-TX2:

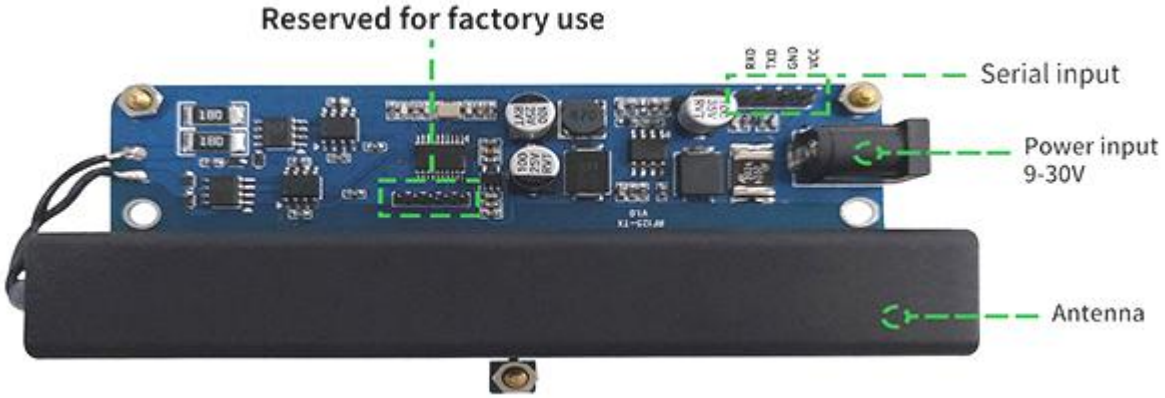


(3)RF125-RX/A Typical Application:



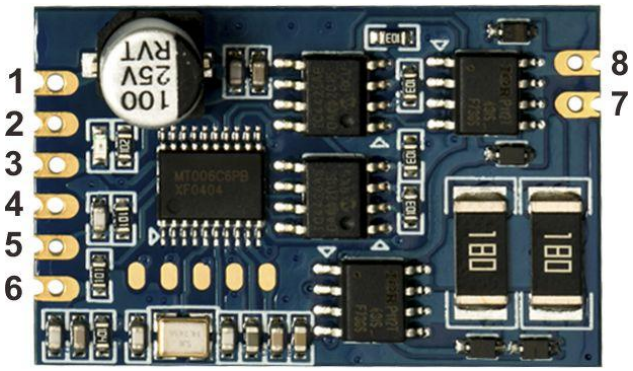
8. Pin definition

(1)RF125-TX:



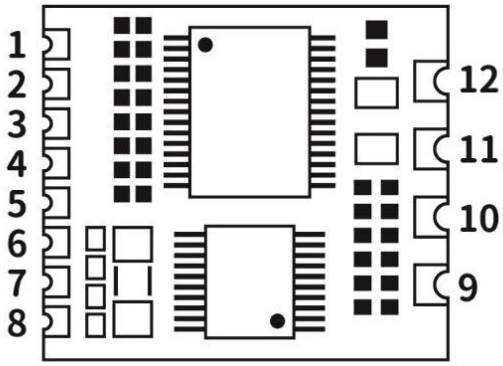
Pin definition	I/O	Voltage	Description
VCC		12-30v	Can be connected to the positive pole of 12-30V power supply
GND		0	Connect the negative pole of the power supply
TXD	O	0-3.3v	Serial output port
RXD	I	0-3.3v	Serial input port

(2)RF125-TX2:



Pin definition	I/O	Voltage	Description
1	VCC		Externally connect with DC 9-12V
2,4	GND		Externally connect with power ground
3	+3.3V		Externally connected with voltage of 2.5-3.6V
5	TXD	O	Serial output port
6	RXD	I	Serial input port
7,8	ANT	O	External 125K transmitting antenna

(2)RF125-RX:



Pin number	Pin definition	I/O	Description
1	PAIR	I	Code pairing button, pull down for more than 1 second to enter code pairing mode, usually high level
2	TXD	O	Data output port
3	RXD	I	Reserved for factory use
4,8,10	GND		Power ground
5	VCC		Can be externally connected with a positive voltage of 2.5-3.6V
6	WAKE UP	O	After receiving 125K signal, output high pulse
7	LED	O	External LED light can be connected, high level light up
9	ANT3	I	External 125K patch antenna, the inductance is 7.2mH
11	ANT2	I	External 125K patch antenna, the inductance is 7.2mH
12	ANT1	I	External 125K patch antenna, the inductance is 7.2mH

9. Communication antenna

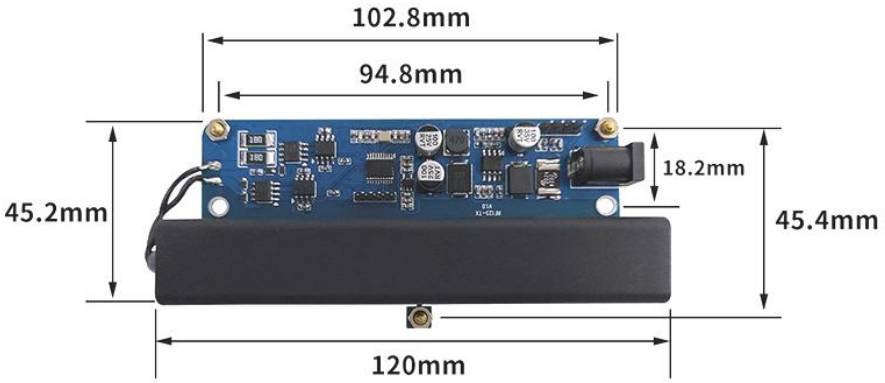
The antenna is an important part of the communication system, and its performance directly affects the indicators of the communication system. The internal matching of the module is done, and the external antenna of the RF125-RX must meet the following parameters:

(1) @125KHZ, the inductance=7.2mH %5

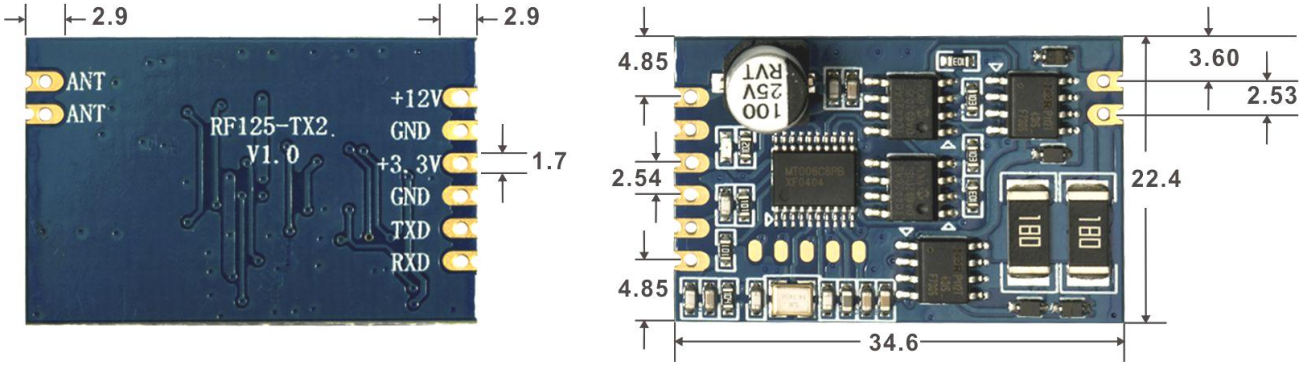
(2) Q value is greater than 30

10. Mechanical dimension(Unit: mm)

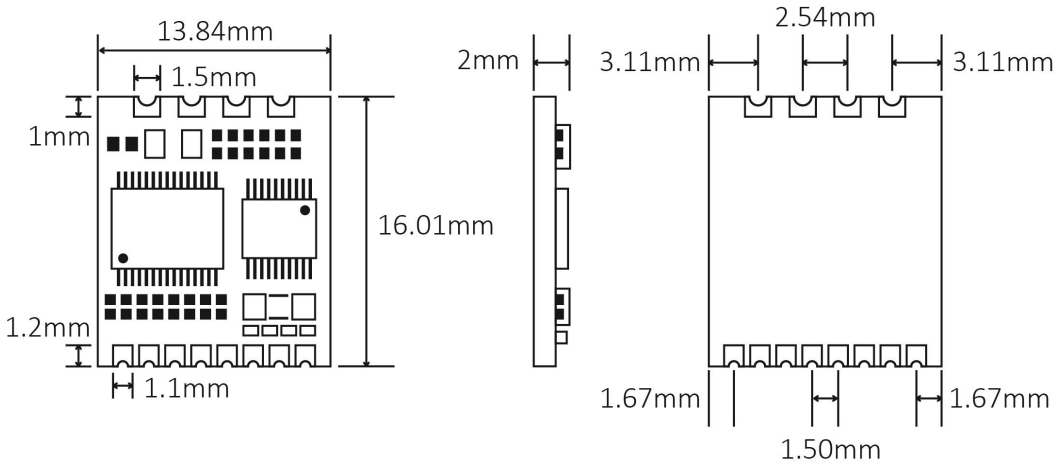
(1)RF125-TX:



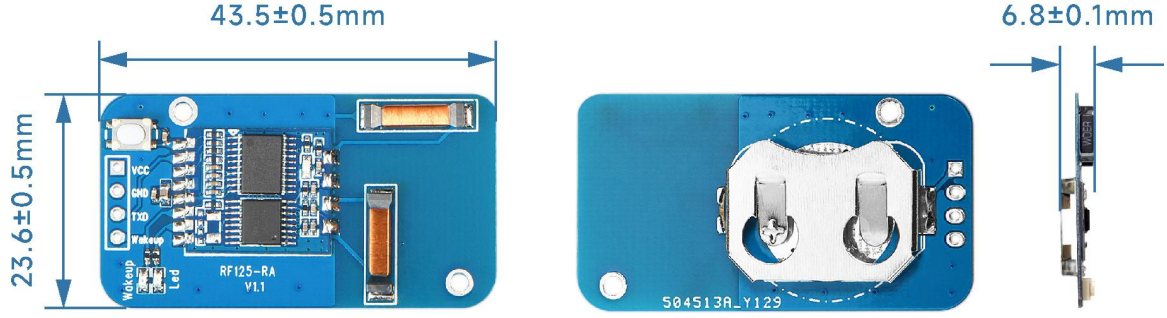
(2)RF125-TX2:



(3)RF125-RX:

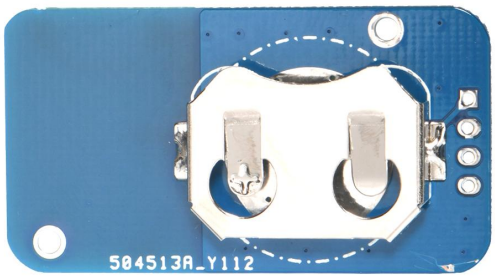


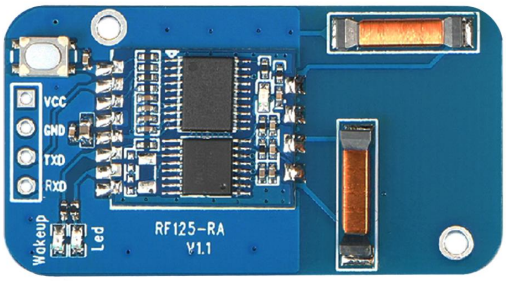
(4)RF125-RA:



11. RF125-RA operating instructions

RF125-RA is a full-featured product based on RF125-RX, which integrates RF125-RX module, two 125K antennas, battery slices, and buttons. Customers can use it directly without debugging.



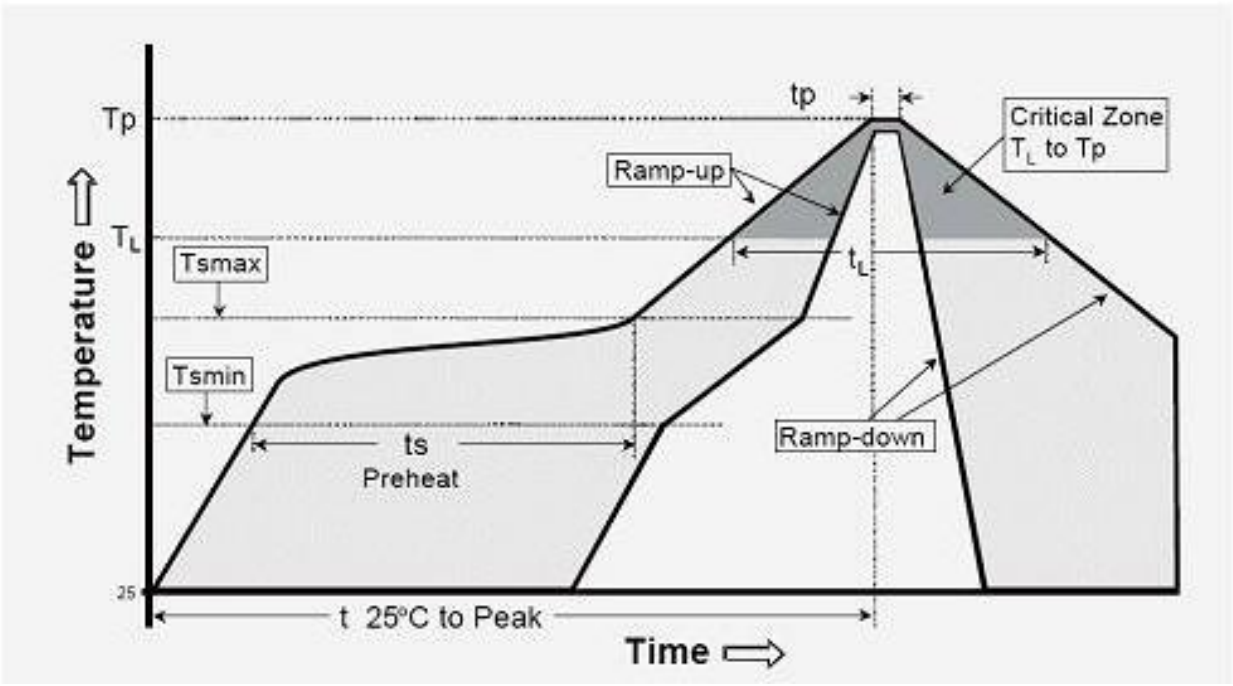


pairing mode: Press and hold the button (more than two seconds), then release it, wait and observe that the indicator light turns on, the indicator light flashes once per second, and enters the paring mode after flashing 3 times. The transmitter will pared with the receiver which received the first packet after entering the paring mode. After pared, only the data packet sent by the pared transmitter can be received.

Broadcast mode: Press and hold the button (more than two seconds), then release, wait and observe that the indicator light turns on. The indicator light flashes 2 times per second, and enters the broadcast mode after 6 flashes. In the broadcast mode, the module can receive all the data sent by the transmitter package.

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 >=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℃