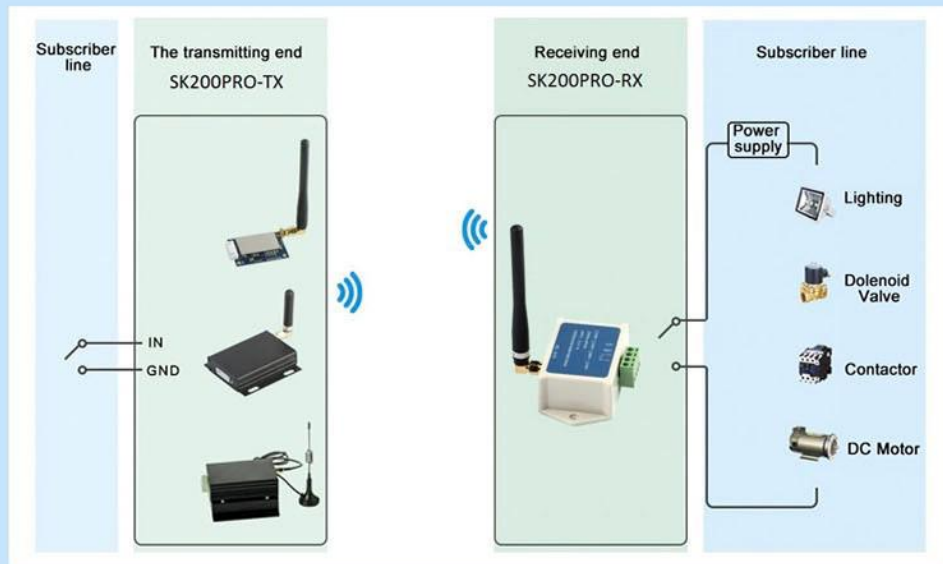LoRa, Industrial /Anti interference/
wireless single channel switch control module

Product Specification

Catalogue

Note: Document revision history

Revision	Date	Comment
V1.0	2019-11	First release
V1.1	2020-12	Update description

1. Overview

SK200PRO is an industrial wireless single switch control module. It consists of SK200PRO-TX (transmitter module) and SK200PRO-RX (receiver module). The transmitter can choose a module with a power of 100mW, 1W or 5W as required. The wireless design uses LoRa technology, which has highly efficient receiving sensitivity and strong anti-interference performance. Its communication distance and receiving sensitivity are better than FSK and GFSK modulation. In the one-to-many working mode, in cooperation with the MESH ad hoc network that comes with the receiving end, it can form a network transmission without blind spots and distance restrictions.

The module provides single signal input and single control output interface. It has the characteristics of simple interface and reliable operation. Users can combine our PC interface to configure and modify the internal parameters of the module. The parameters of the receiver can be wirelessly configured by the transmitter, which is convenient for online changes. Multi-pair simultaneous communication will not interfere with each other, and it is flexible and convenient to use.

SK200PRO strictly uses lead-free process for production and testing, and meets RoHS and Reach standards.

2. Features

- MESH network function
- Working frequency band: 433/490/868/915 MHz optional
- Sensitivity up to -132 dBm
- Built-in software watchdog algorithm
- Built-in hardware anti-crash protection circuit
- Transceiving frequency can be arbitrarily configured
- Multiple working modes

- Anti-overcurrent, overvoltage, rever connection protection circuit
- Built-in hardware reset protection circuit
- Built-in anti-static protection circuit
- LoRa modulation mode
- Transmitter power is selectable: (100mW～5W)
- Support wireless modification parameters
- Operating temperature range: -40 ~+85 ° C

3. Application

- Digital remote control
- Security system

- Wireless pump control
- Wireless remote access control

4. Performance parameter

The electrical parameters of SK200PRO-TX module are as follows:

Model	SK200PRO-TX-100mW	SK200PRO-TX-1W	SK200PRO-TX-5W
Image			
Transmit power	20dBm	29.5dBm	37dBm
Working voltage (range)	5V(3.3V～6.5V)	5V(3.3V～6.5V)	12V(9V～30V)
Sleep current	200uA	250uA	7mA
Quiescent Current	15mA	16mA	18mA
Emission current	130mA	600mA	1.8A
Size (mm)	49.5*32.2*3.2	61.5*59*14	90*104*46.2
Range of working temperature	-40℃～85℃		

The electrical parameters of SK200PRO-RX module are as follows:

Parameter	Smallest	Typical	Largest	Unit	Condition
Operating conditions					
Working voltage range	5	12	30	V	
Relay load		< 10		A	@220V
Radio frequency parameter					
Receive current		< 10		mA	@12V
Receiving sensitivity		-132		dBm	

5. Product Function Description

1) Input and output

CS pin of the transmitter is the input. With a built-in pull-up, disconnected CS pin or given a high level (3.3V) means high level input, Short the CS pin to the ground GND means low level input, and the relay of the receiver module will correspondingly be open or close.
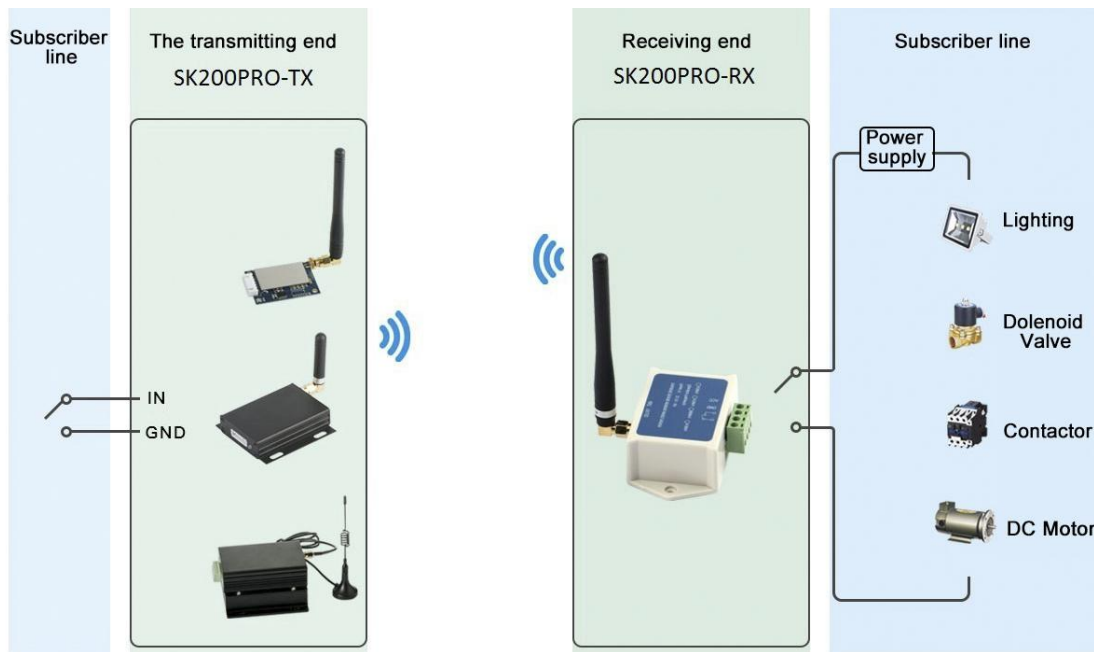
CS of Transmitter	Receiver relay
0 (Low level)	*Close
1 (High level)	*OPEN

Note1: You can contact us to get the relay to reverse state

Note2: After power on reset of the receiver, the default state of the relay is close. (User can change the default state with our PC software)

2) Operating mode

There are several working mode for user to choose through our PC software.

Real Time Mode:

In this mode, both the transmitter and receiver are ready all the time. The receiver will synchronize the relay out immediately when the input state of the transmitter is changed. Every 60s, the transmitter will send synchronize signal to the receiver, the receiver is lost link and the relay of receiver will change to default state after no synchronize signal received for consecutive 3 times. User can set this 60s to other time period with our PC software.

Low Power Mode:

In this mode, the transmitter can work in low power mode. Most of the time, the transmitter is sleeping to save power consumption. It will be awaken and send signal out once the input state (CS Pin) is changed. In this mode, no lost link indication in the receiver.

Transmitter working mode	Receiver Working mode	Transmitter without trigger	Transmitter input level changes	[*1] Lost link (receiver)	power save mode (transmitter)	Method of switching working modes
[*5]**Real time mode**	[*4]Must be the same as the transmitter	[*2]Send sync signal at set time interval	Send sync signal immediately	Yes	No	Via PC software
Low power mode		sleep		No this function	Yes	

Note:[*1] **The relay state when lost link can be changed by PC software**

[*2] **Time interval can be modified by PC software**

[*3] **The lost link function is available in real time mode only. In order to prevent the receiver from working uncontrollably and causing the equipment to work abnormally, the receiver will open or close the relay automatically if it does not receive the synchronization signal within a specified time.**

*4 Transmitter and receiver must work in the same mode.

*5 Factory default working mode is Real Time mode.

3) MESH networking

When one transmitter controls multiple receivers, some receivers may not receive control signals due to the range. To solve this problem, SK200PRO comes with MESH networking function. The receivers can be organized as MESH network to extend the longer range.
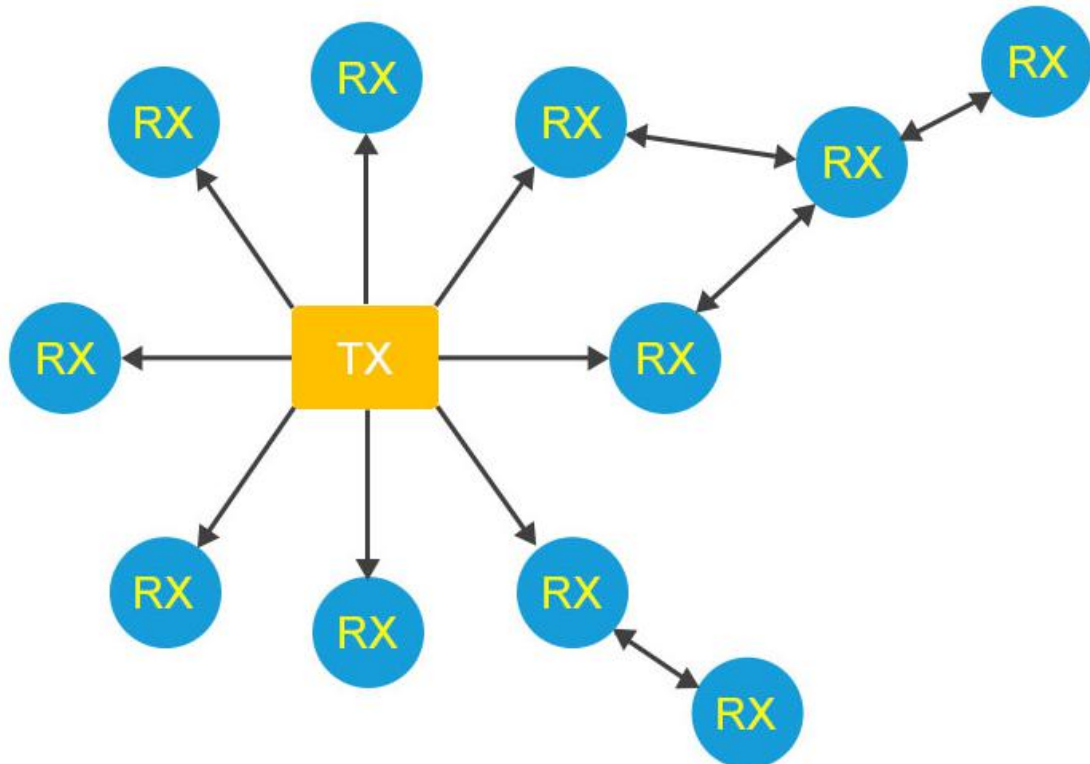
4) **AES128 data encryption**

5) In the process of wireless communication, in addition to the built-in data encryption function, SK200PRO can also be superimposed to enable AES128 encryption. Users can read or change the AES128 key of the module through our PC software. After the AES128 encryption mode is enabled, the wireless transmission delay will be slightly longer, but the protection of air data will be better. Customers can enable the AES128 encryption function of the module in applications which require high data encryption.

6) **Response delay**

Because wireless transmission takes a certain amount of time, the receiving relay will delay the response.
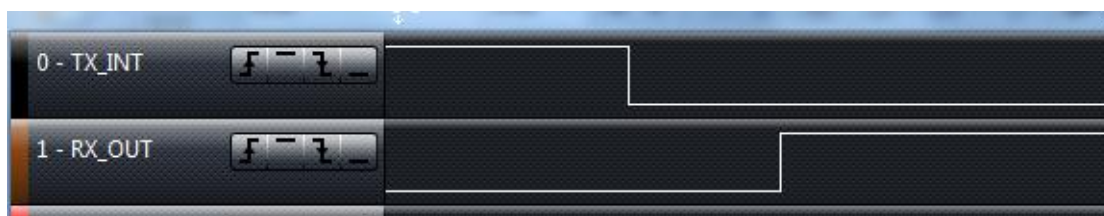
Specific response delays in the following instant modes:

Speed (bps)	91	164	296	656	830	1557	2932	4750	9501	17353
General delay	2.98s	1.61s	811ms	453m	363ms	211ms	104ms	64ms	40ms	24ms
Enable AES encryption delay	3.25s	1.80s	920ms	518m	432ms	276ms	139ms	94ms	70ms	45ms

As shown in the table above, the higher the wireless rate, the shorter the response delay. The range will be shorter with higher data rate. Users can choose the right data rate according to the applications
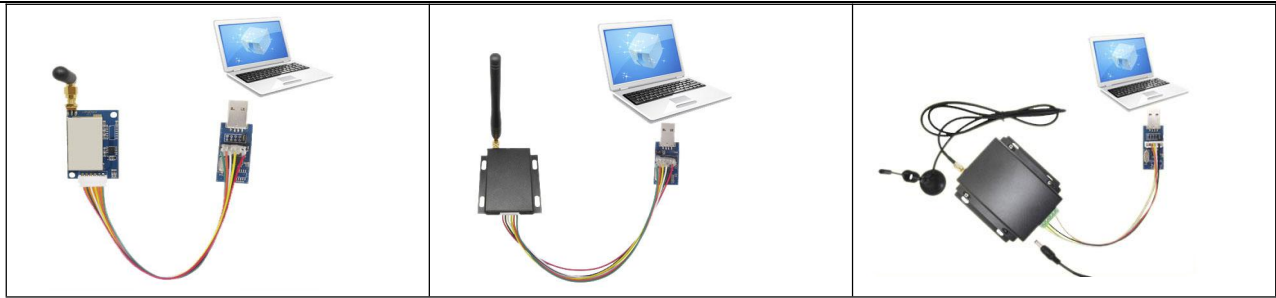
6. Parameter configuration

	Configuration method	Configurable parameters (all can be saved after power off)
The transmitter	Configuration via computer	[1]NET ID, NODE ID, working mode, sending interval, Frequency, transmit power, wireless rate, encryption enable,Key, power-on reset and alarm relay status
Receiver	Wireless configuration via transmitter	

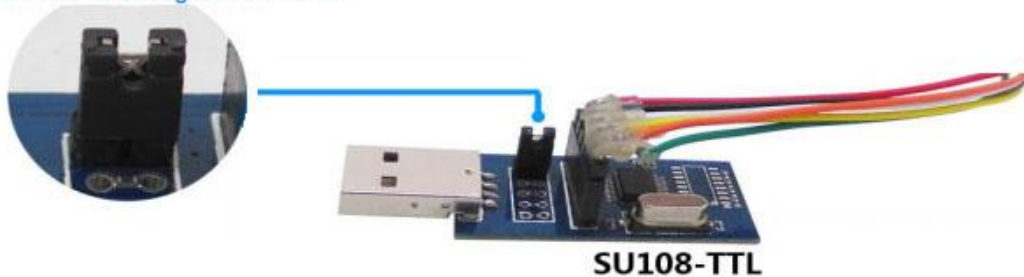***1 The transmitting and receiving parameters must be the same**

① Set the transmitter

Transmitter connection diagram:		
SK200PRO-TX-100mW	SK200PRO-TX-1W	SK200PRO-TX-5W

Transmitter configuration steps:

A) Install the USB driver

B) Put on the shorting cap on the USB bridge, connect the USB bridge (SU108-TTL) with transmitter through 6PIN cable .

C) Connect   the USB bridge with the computer, (SK200PRO_TX_5W needs external power supply, because of the high output power , the USB port can't drive this high output power)

D) The red and blue led on the transmitter will be light on to indicate the transmitter is in the setting mode

E) Open the transmitter configuration software, select the right com port, and click the "OPEN" button to open the serial port

F) Click the [READ] button to read all the current parameters

G) Modify the parameters

H) Click the [SET] button to confirm the modification

I) If necessary , Click the [DEFAULT] button to restore the parameters to the factory default values.

② Set the Receiver

User can connect the transmitter with the computer and use our special PC software to modify the receiver's parameters wirelessly.

Setup steps:

a) Connect the transmitter with the computer through the USB bridge (note that the short cap on the

USB bridge board must be removed), and open the receiver configuration software.

b) Select the right com port and click open button on the pc software.

c) Enter the Node ID of the receiver to be configured

d) Click the [READ] button to read the current parameter information of the receiver

e) Modify the parameters to be modified, click [SET] button to confirm the modification

f) If necessary, Click the [DEFAULT] button to restore the parameters on the receiver to the factory

default values.

| Important Note:	
Before configuration, you must remember the current parameters of the receiver	Frequency, rate, NET ID, NODE ID
If you accidentally forget the parameters	Contact us

③ Parameter description:

Parameter	Setting range	Description	Defaults
NET ID	0x00000000~ 0xFFFFFFFF	Module's network ID. Only modules with the same parameter settings can communicate with each other.	0x00000000
NODE ID	0x0001~0xFFFF	Module's own address ID	0x0001
MESH	Enable/ Disable	Whether to enable the MESH ad hoc network function. When enabled, the receivers can pass signals to each other for routing.	Disable
MODE	Real Time mode / Low power mode	Selection of working mode. Optional as Low power mode Or Real Time mode	Real Time mode
TX INTERVAL	1s~65535s	How often is the synchronization signal sent?	60s
Default state after POR	Open/Close	The state of the relay after the receiver is powered on and reset	Open
Lost link state	Open/Close	The state of the relay when the receiver is lost link	Open
FREUENCY	*1Note	The operating frequency of the module.	*1Note
RF RATE	91bps~17353bps	The air speed of wireless transmission. The lower the speed, the longer the communication distance, and the longer the response time.	656 bps
RF POWER	0~7	Transmit power, level 7 is the maximum power. The greater the power, the longer the communication distance.	7
ENABLE ENCRYPTION	Enable/Disable	AES encryption enabled	Disable
KEY	16 Bytes	AES encryption key.	0x000102030405060708090a0b0c0d0e0f

Note:*1The frequency setting must be within the range of the ordered frequency band to ensure the module achieves the best communication performance.

| Frequency band	433M	490M	868M	915M
Frequency Range	413M~453M	470M~510M	848M~888M	895M~935M
Default frequency	433.92M	490.92M	868.92M	915.92M

7. Interface definition description

a) The interface description of the receiver module SK200PRO-RX is shown in the following figure:
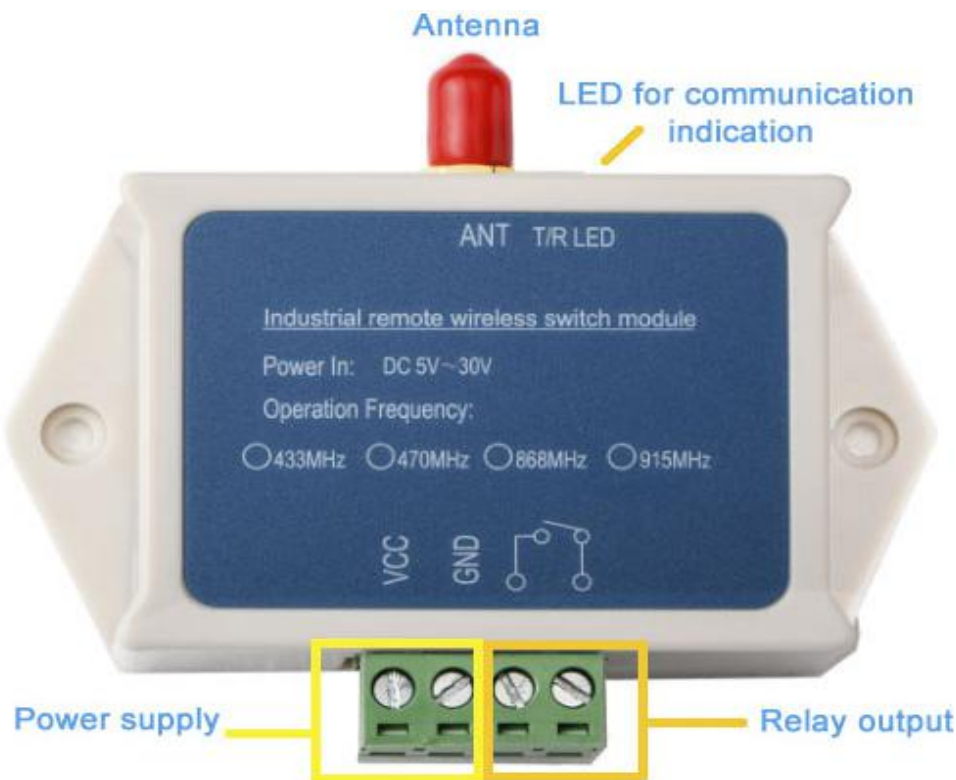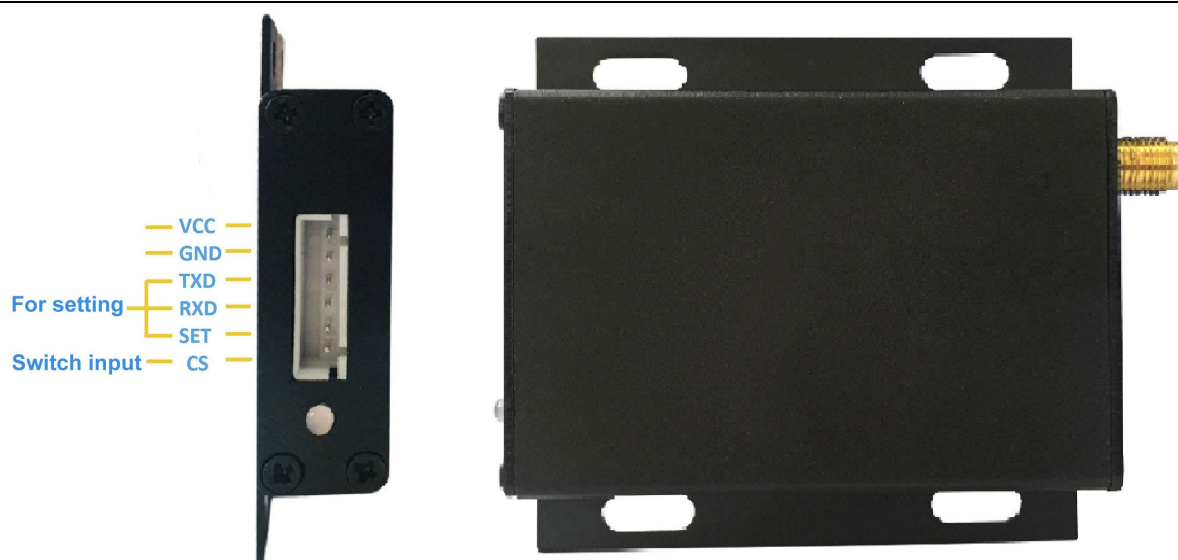

b) The interface description of the transmitter module SK200PRO-TX is shown in the following figure:

SK200PRO-TX-100mW:
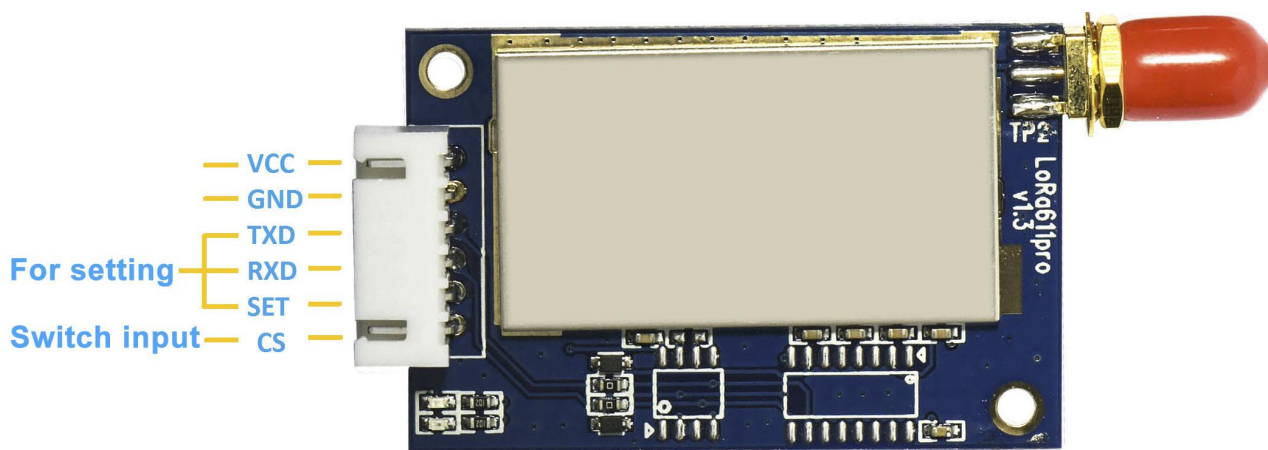
SK200PRO-TX-1W:

SK200PRO-TX-5W:

Pin definition	Description
VCC	Connect to positive pole
GND	Ground
TXD	For configuration mode parameter setting
RXD	For configuration mode parameter setting
SET	Configuration parameter enable (low level enable parameter configuration, default high level output)
CS	Switch signal input pin (with internal pull-up)

8. Peripheral accessories

The antenna is an important part of the communication system, and its performance directly affects the indicators of the communication system. The antenna impedance required by the module is 50 ohms. Common antennas include straight / elbow / folding rods, small suction cups, etc. Users can choose the antenna according to their own application environment. In order to make the module work optimally, it is recommended to use the antenna provided by our company.

| Model	Recommended antenna
SK200PRO-RX	Rod antenna, small sucker antenna
SK200PRO-TX-100mW	Rod antenna, small sucker antenna
SK200PRO-TX-1W	Small sucker antenna
SK200PRO-TX-5W	Small sucker antenna, Yagi antenna

★ During the use of the antenna, the following principles should be followed to ensure the best communication distance of the module:

➢ The antenna should not be close to the ground surface, and the surrounding area should be away from obstacles;

➢ If you choose a suction cup antenna, the leads should be as straight as possible, and the suction cup base must be attached to a metal object；
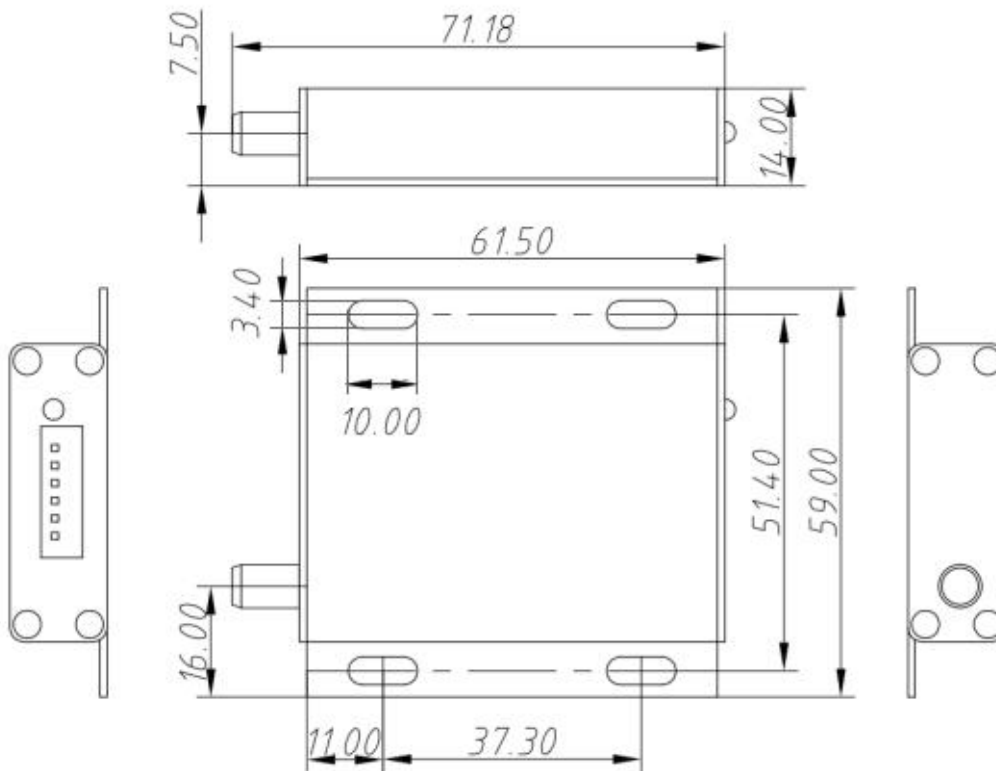
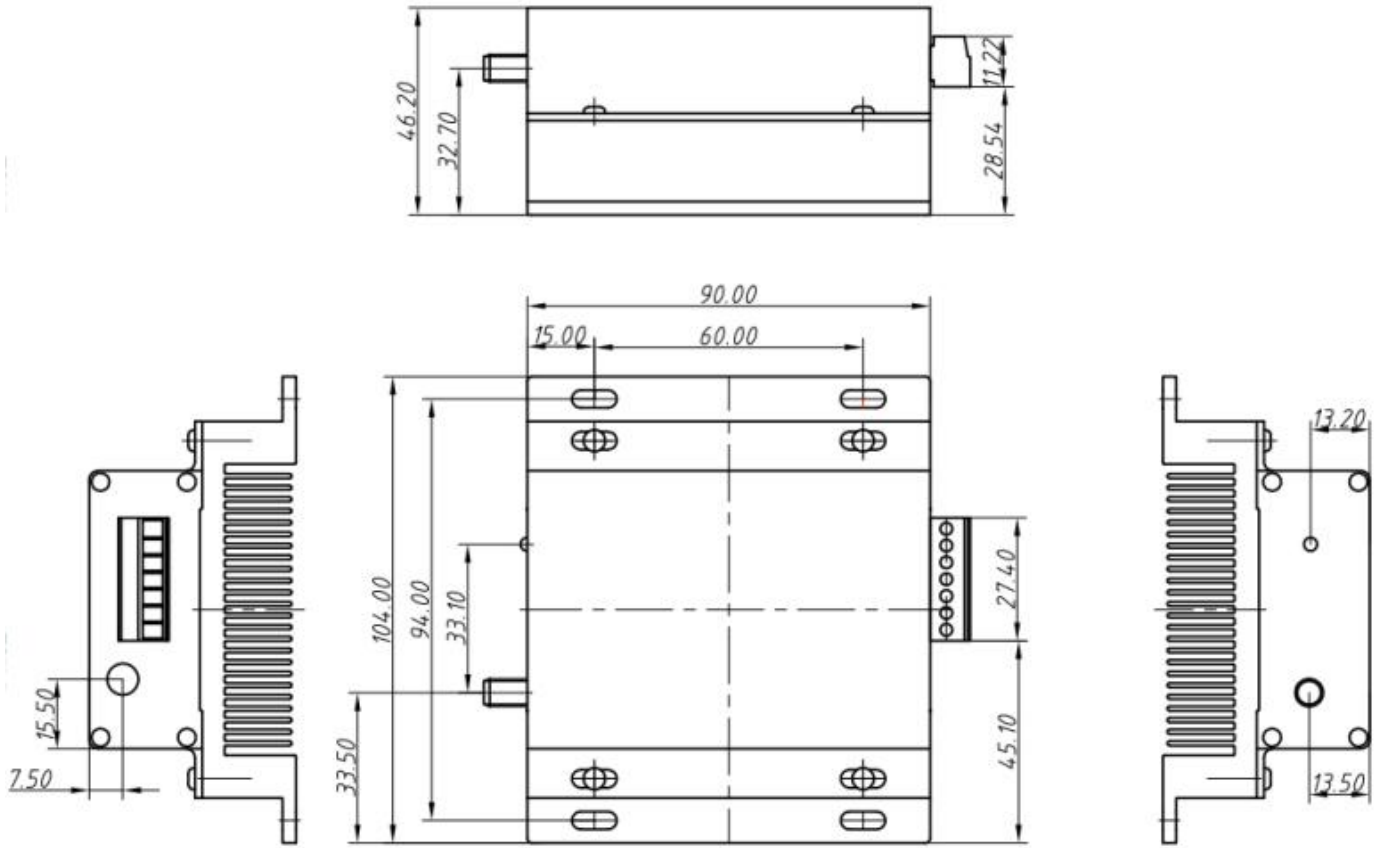## 9. Mechanical dimensions (unit: mm)

a) Transmitter module

SK200PRO-TX-100mW
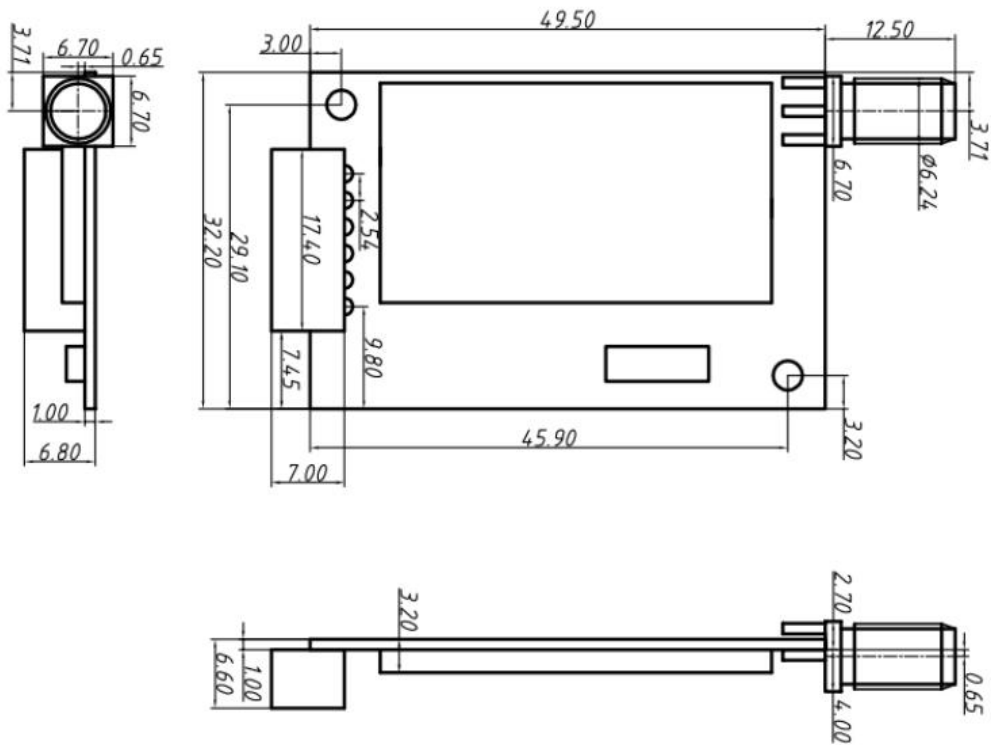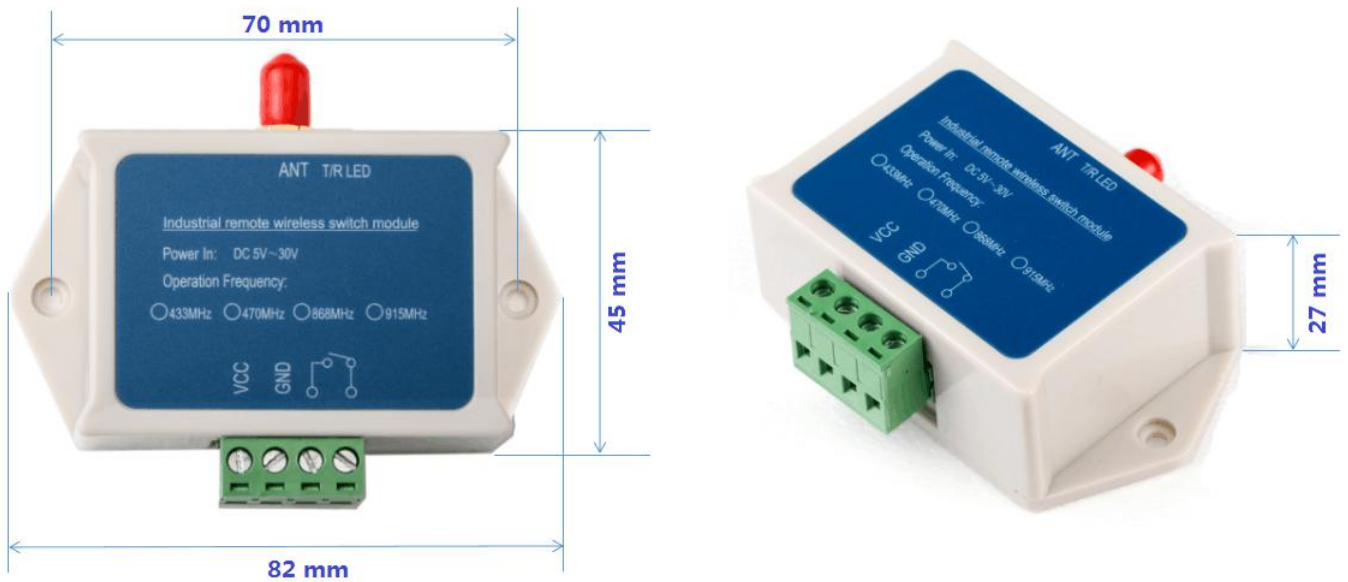

SK200PRO-TX-1W

SK200PRO-TX-5W

b)   Receiver module SK200PRO-RX

10. Common problem

a) Why can't the modules communicate normally?

   1) The power connection is incorrect, and the module is not working properly；

   2) Whether the module is in normal communication mode (SET is high)；

   3) Check whether the frequency band and channel settings of each module are consistent；

   4) Is the module damaged (will the light flash after power on?)。

b) Why is the transmission distance not far？

   1) Power supply ripple is too large；

   2) The antenna types do not match or are installed incorrectly；

   3) Peripheral co-channel interference；

   4) The surrounding environment is harsh and there are strong interference sources.