

1W Industrial Four Channels

4-20mA Input and Output Remote Control RF Switch Module

Product Specification



Catalogue

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Note: Revision History

| Revision | Date | Comment |
|----------|---------|--------------------------------|
| V1.0 | 2018-1 | First release |
| V1.1 | 2018-8 | Revised some parameters and PC |
| V1.2 | 2019-10 | Add Circuit Diagram |
| V1.3 | 2020-7 | Modify Block Diagram |
| V1.4 | 2020-11 | Update description |
| | | |

1. Overview

SK106 series is Industrial Level remote wireless analog(4~20mA) and switch control module, which includes SK106-TX and SK106-RX. SK106-TX provides four Digital signal input Interface & four current analog input Interface, SK106-RX provides four switch control interface & four current analog output interface. The parameters can be modified by PC software / UART command. DIP switch on the module can be used to change operating frequency (maximum 16 group), operation mode, Group ID etc. Using this module, user can replace wired device with the wireless connection, which significantly reduces the cost and saves much time.

SK106 strictly uses lead-free process for production and testing, and meets RoHS and Reach standards.

2. Features

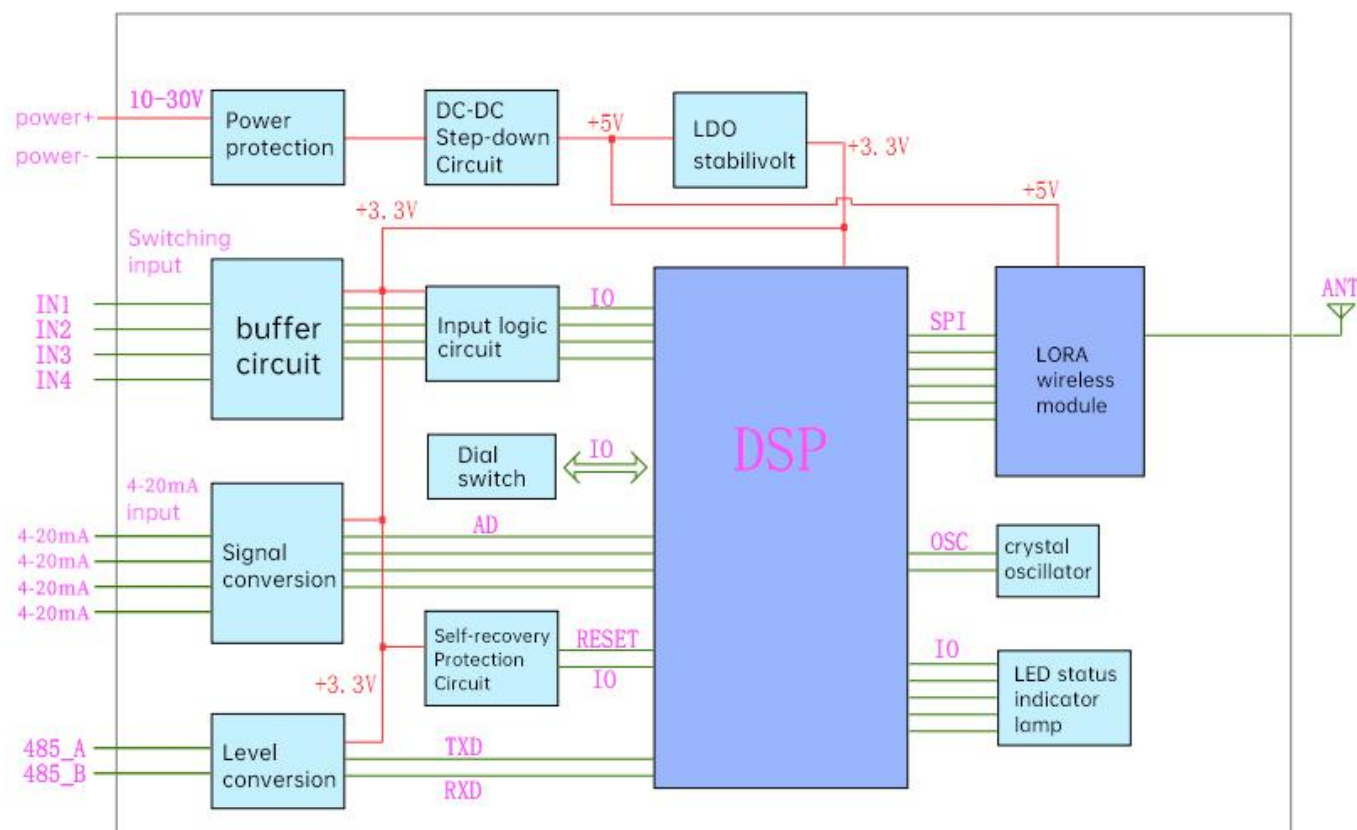
- Up to 5Km line-of-sight in open area
- 16 predefined channels
- LoRa Spread Spectrum Modulation Mode
- Switch and analog combination control
- Real-Time/Timing Mode options
- 485 Interface Configure parameter
- Input/Output: 4~20mA current
- Sensitivity up to 132 dBm
- Maximum output power: 1.5W
- Working voltage 10~30 V
- Working temperature range: -40 ~ +85 °C
- Weight: 143g

3. Applications

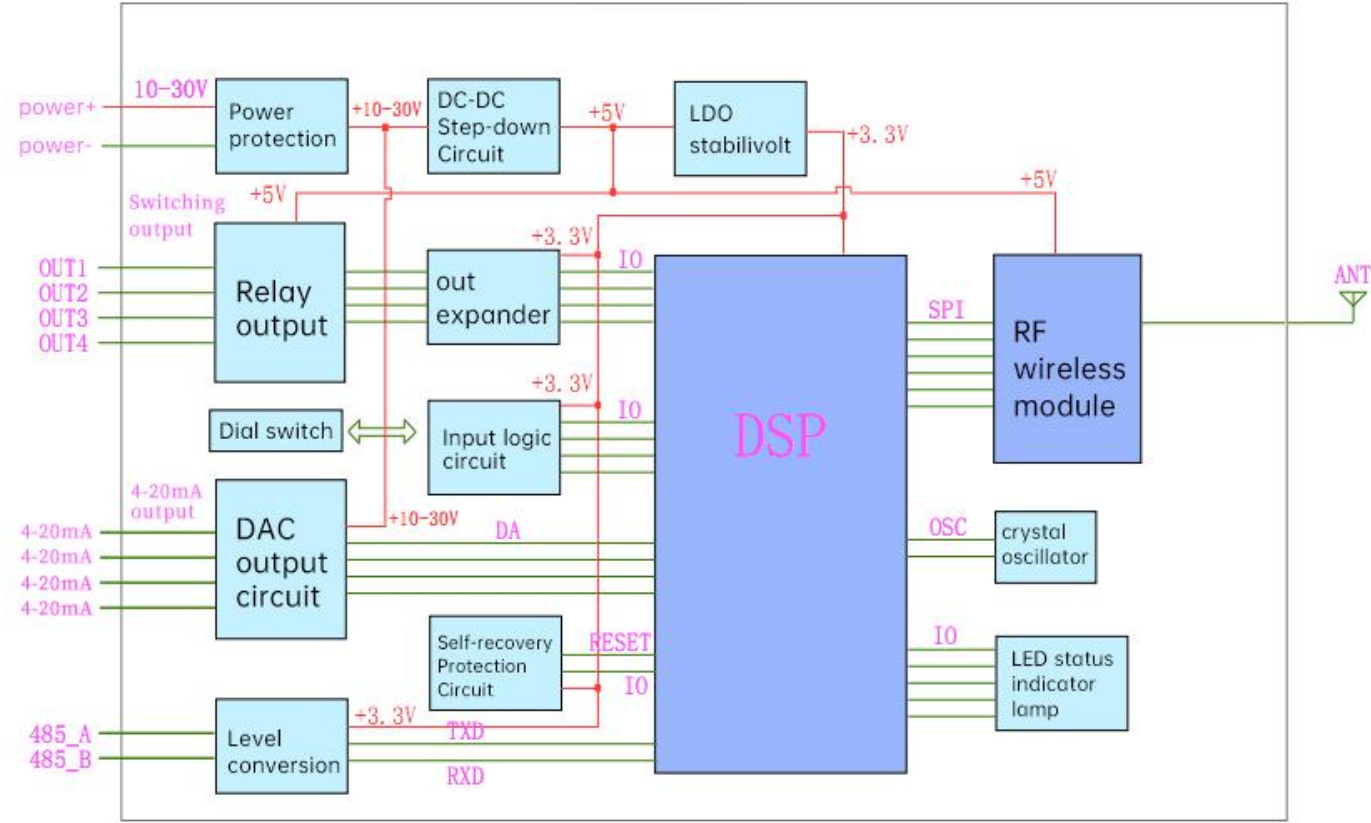
- Industrial field sensors, Transmitter signal acquisition
- Automated data acquisition system
- Building automation, security, equipment room wireless monitoring, access control system
- Traffic, Oil drilling, and alarm. can be widely used for real-time monitoring of displacement, speed, temperature, pressure, flow, and water level.

4. Block Diagram

SK106-TX



SK106-RX



5. Electrical Characteristics

Note: Below parameters base on 12V power supply/ 25°C testing environment.

| | Parameters |
|---------------------------|--|
| Voltage rang | 433MHz/470MHz/868MHz/915MHz |
| Analog channel(4~20mA) | 4AI (SK106-TX) 、 4AO (SK106-RX) |
| Switch channel | 4DI (SK106-TX) 、 4DO (SK106-RX) |
| Analog input/Output range | Current: 0-20mA |
| Distinguish | 12Bit |
| Accuracy | ±0.1% |
| Configration interface | RS-485 |
| Channel | Standard 16 channel, the user can use Dip Switch to change the channel |

SK106-TX:

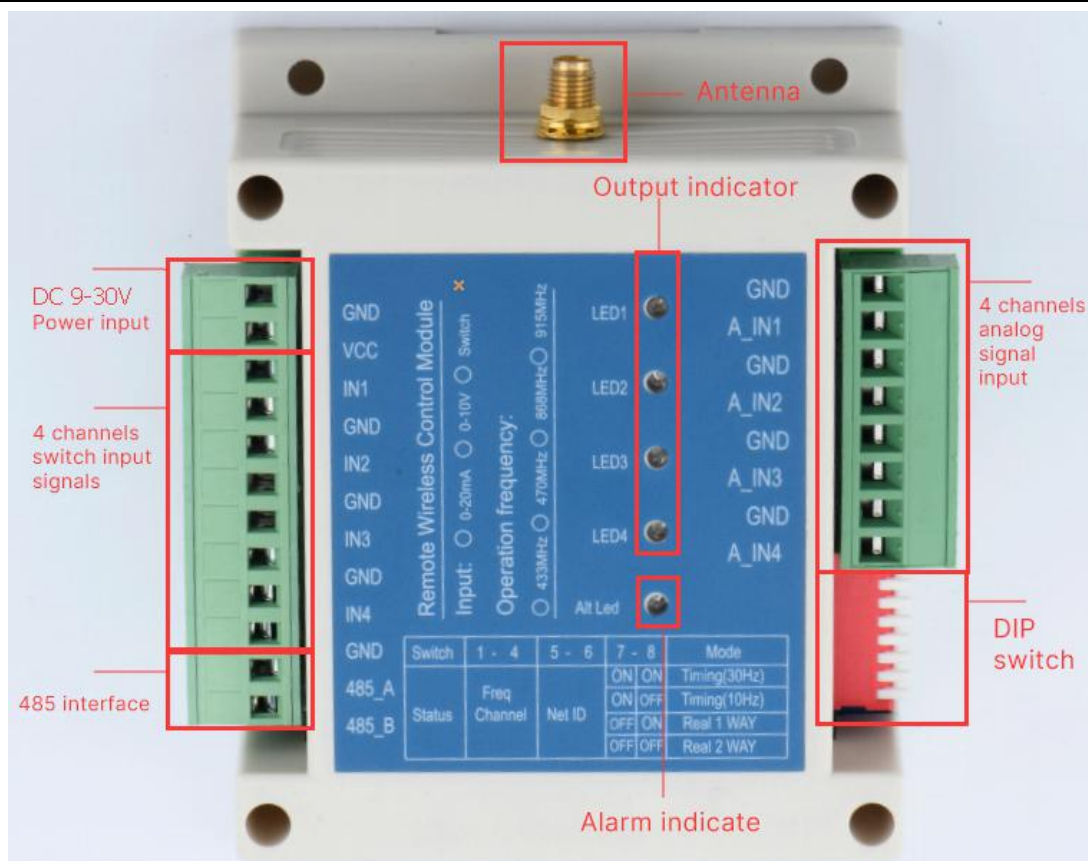
| Parameters | Min | Typ. | Max. | Unit | Condition |
|----------------------------|------|--------|------|------|-----------------|
| Working condition | | | | | |
| Voltage range | 10 | 12 | 30 | V | |
| Working temperature range: | -40 | 25 | 85 | °C | |
| Current consumption | | | | | |
| Rx current | | < 50 | | mA | |
| Tx current | | < 350 | | mA | |
| RF parameters | | | | | |
| Output power | > 30 | 31 | 32 | dBm | @433MHz, 490MHz |
| | | 27 | | dBm | @868MHz, 915MHz |
| Sensitivity | | < -132 | | dBm | |

SK106-RX:

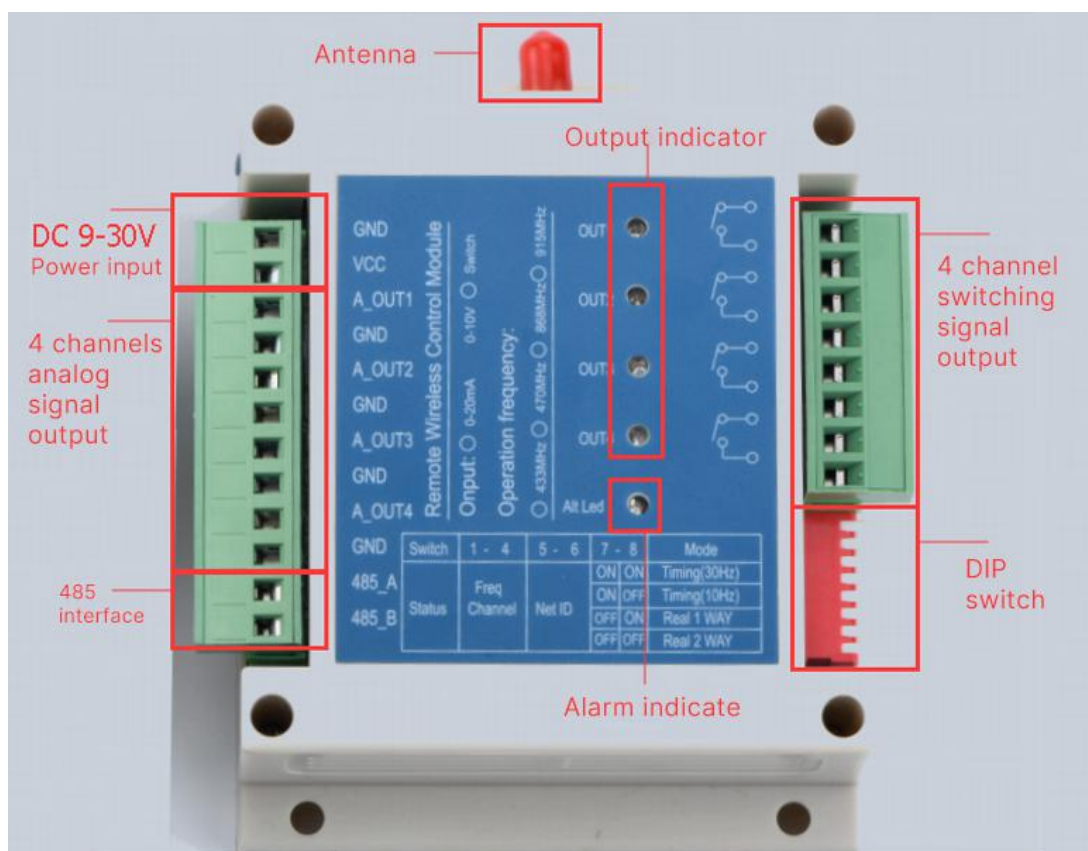
| Parameters | Min | Typ. | Max. | Unit | Condition |
|----------------------------|------|--------|------|------|-----------------|
| Working condition | | | | | |
| Voltage range | 10 | 12 | 30 | V | |
| Working temperature range: | -40 | 25 | 85 | °C | |
| Current consumption | | | | | |
| Rx current | | < 40 | | mA | |
| Tx current | | < 300 | | mA | |
| RF parameters | | | | | |
| Output power | > 30 | 31 | 32 | dBm | @433MHz, 490MHz |
| | | 27 | | dBm | @868MHz, 915MHz |
| Sensitivity | | < -132 | | dBm | |

6. Interface Definition

SK106-TX interfaces as below:



SK106-RX interfaces as below:



7. DIP Definition

Dip switch Settings (valid when power on again)

1) DIP7~DIP8 —— Normal working mode selection

DIP7 ON and DIP8 ON: Timing mode (30Hz)

DIP7 ON and DIP8 OFF: Timing mode (10Hz)

DIP7 OFF and DIP8 ON: Real-time mode

DIP7 OFF and DIP8 OFF: Real-time mode+4second Timinig Mode






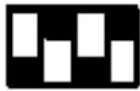










2) DIP5~DIP6 —— Communication ID

SK106-Tx and SK106-Rx can talk with each other only when both ID are same.

3) DIP1~DIP4 —— Working frequency channel selection

Total 16 channels(default channel interval: 0.5M), frequency is configurable through PC software / UART

Command. Relationship between DIP switch and working frequency channel:

| DIP NO. | Channel No. | DIP NO. | Channel No. | DIP NO. | Channel No. | DIP NO. | Channel No. |
|---|-------------|---|-------------|---|-------------|---|-------------|
|  | 1 |  | 5 |  | 9 |  | 13 |
|  | 2 |  | 6 |  | 10 |  | 14 |
|  | 3 |  | 7 |  | 11 |  | 15 |
|  | 4 |  | 8 |  | 12 |  | 16 |

8. Working Mode

Module can work in the following three modes:

| | Communication | Alarm | Status after Alarmed | |
|--------------------------------|---------------|---------|--|---|
| | | | SK106-TX | SK106-RX |
| Timing Mode | One-way | One-way | Continuous Transmite No alarm | Relay off Analog output disconnected |
| Real-time mode | Two-way | One-way | Stop working Sync every minute Signal contact receiver | Keep output No alarm |
| Real-time +4second Timing Mode | Two-way | Two-way | Stop working Sync every minute Signal contact receiver | Relay off Analog output disconnected |

1) Real-Time Mode

In the Real-Time mode, once the input changes (switching value or input current changes), SK106-TX will synchronize the change signal to SK106-RX, the system is bidirectional communication. When SK106-RX loses contact, SK106-TX will send 4 synchronization signals to try to contact SK106-RX again. At this time, if the SK106-RX response is still not received, the SK106-TX will stop working and keep the alarm light. The SK106-TX can be restored to work by changing the switching value status or the DIP switch state.

SK106-TX waits for the response signal of SK106-RX every time when it transmits the signal to SK106-RX. If there is no response signal received within 20s, SK106-TX will turn into an alarm status.

Note: The current threshold can be changed by writing parameters on PC software. Once the changes of the detected current exceeds the threshold, SK106-TX send message to SK106-Rx, and SK106-Rx will output the same current

2) Timing Mode

In the timing mode, SK106-TX will periodically send a synchronization signal to SK10-RX. After receiving the signal, SK106-RX will update the output signal status in the real time. Its transmission frequency includes 10Hz and 30Hz. When the slave does not receive the master signal within 0.5s, the

slave makes the alarm light always on, and resets the output signal at the same time (the relay is off, the analog output is 0mA).

In this mode, SK106-TX is only used as the transmitter and SK106-RX is only used as the receiver. The system is one-way communication mode.

3) Real-Time + 4 Second Timing Mode

In this mode, when the signal changes, the SK106-TX immediately sends the signal change information and sends the status signal to the SK106-RX every 4seconds. This is the one-way communication mode. If the SK106-TX signal cannot be received within 5s, SK106-RX disconnects the Analog and switch output, the alarm light is always on.

SK106-TX waits for the response signal of SK106-RX every time when SK106-TX transmits a signal.

If there is no response signal received within 20s, SK106-TX will turn into an alarm status.

4) Calibration Mode

The calibration mode can calibrate the current input of SK106-TX and the current output of SK106-RX, which can be entered through its upper computer software.

When the SK106-TX is in calibration mode, the 20mA stable current should be connected to the four analog inputs, and the four lights should be lit. At this point, the calibration mode is completed and Module restart in effect.

When SK106-RX is in calibration mode, external device outputs four stable currents. By reading the current values of the four channels and correspondingly inputting to the upper computer software, click the button **SET CALIBRATION PARAMETERS** to make the calibration mode complete and Module restart in effect.

5) Configuration mode

In configuration mode, user can configure the parameters by PC software. The configurable parameters include NET ID, Current change threshold value (only for analog input module), 16 groups frequency channels, and the configuration of the calibration mode, etc.. modules can communicate with each other when parameters matched. PC software show as below:

SK106-TX :

G-NiceRF 深圳市思为无线科技有限公司
NiceRF Wireless Technology Co., Ltd
TEL: 0755-23550616 www.nicerf.com

Version

Frequency MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz

Other Parameters
 Net ID
 Threshold mA

SET
 READ
 Enter Calibration mode

Start the calibration

Device Found!

frequency set
 Only ID consistency can communicate
 Numerical value of change of analog quantity
 After the configuration is successful, click SET
 readparam

SK106-RX :

G-NiceRF 深圳市思为无线科技有限公司
NiceRF Wireless Technology Co., Ltd
TEL: 0755-23550616 www.nicerf.com

Version

Frequency MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz
 MHz MHz

Other Parameters
 Net ID

SET
 READ
 Enter Calibration mode
 Set Calibration parameters

Start the calibration
 Fill in the read value and click

Device Found!

frequency set
 Only ID consistency can communicate
 After the configuration is successful, click SET
 readparam

✧ **NET ID**

This parameter is 1byte,it is the network ID. This parameter should be the same for all modules.

✧ **THRESHOLD**

The current change threshold, it is used on Real-time mode and Real-time alarm mode, ranges from 0 to 1 mA.

✧ **CHANNEL**

Each module has 16 frequency channels, users can choose one of the channels to use via DIP switch, the corresponding frequency of the 16 channels can be modified via PC software. We suggest users using the default frequency value, or set the frequency value near the centre frequency to get better performance.

✧ **ENTER CALIBRATION MODE**

Enter the calibration mode, the module has been calibrated parameters before shipment, user can ignore this function if no special circumstances.

✧ **SET CALIBRATION PARAMETERS**

Setting calibration parameters is only valid for analog SK106-RX.

✧ **READ**

Read module's parameters, including version number, NET_ID, communication frequency, current change threshold (only analog input) and other parameters.

✧ **SET**

Set module's parameters, including version number, NET_ID, communication frequency, current change threshold (only analog input) and other parameters.

9. Application connection

After powered on SK106-TX, it will actively associate SK106-RX that has the corresponding parameter (network ID,communication ID,frequency,working mode,the Dip Switch status is consistent), and send a signal to contact SK106-RX.If there is no SK106-RX response within 20 seconds after power-on, SK106-TX lights the alarm lamp and stops working.

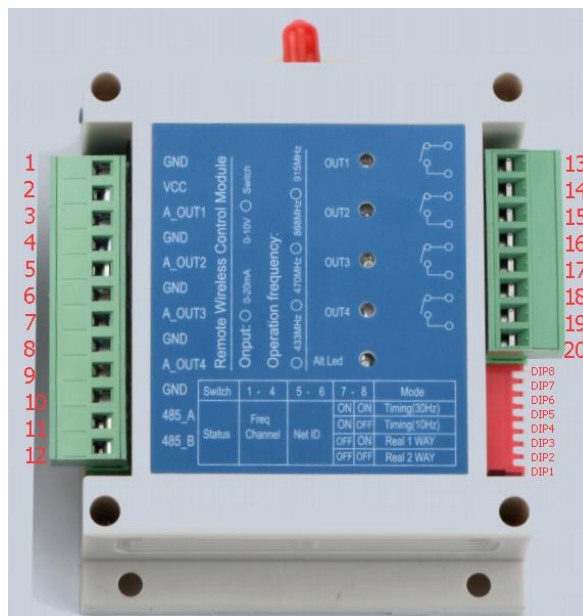
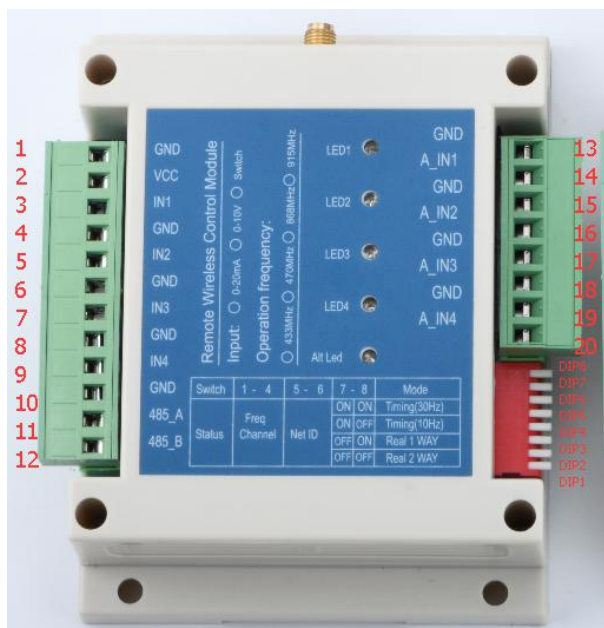
After powered on SK106-RX, it waits for the contact signal of SK106-TX . If there is no corresponding SK106-TX signal within 20 seconds, it will light the alarm lamp and stop working.

The SK106-TX's Switch interface: **DI1、DI2、DI3、DI4** & Analog interface : **AI1, AI2, AI3, AI4** corresponding to the SK106-RX's Switch interface:**DO1、DO2、DO3、DO4** & Analog interface :**AO1、AO2、AO3、AO4**.

The input port is pulled up internally, leave open or connect with 3.3V will result in high level, it is low level when connect to GND. High level will make the output of the other side short out. And low level will make the output of the other side open. The analog interface requires the user to provide a current

input of 0~20 mA, and the output terminal correspondingly outputs the same current

10. Pin definition

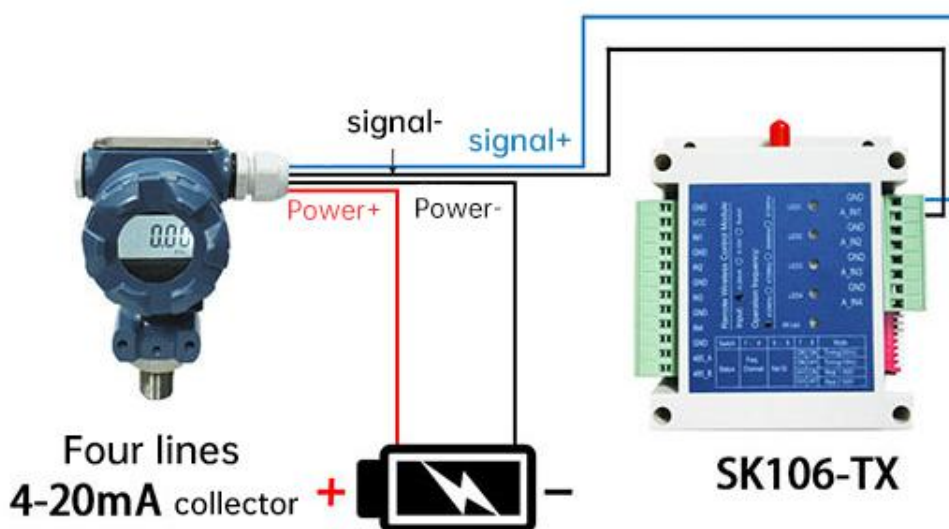
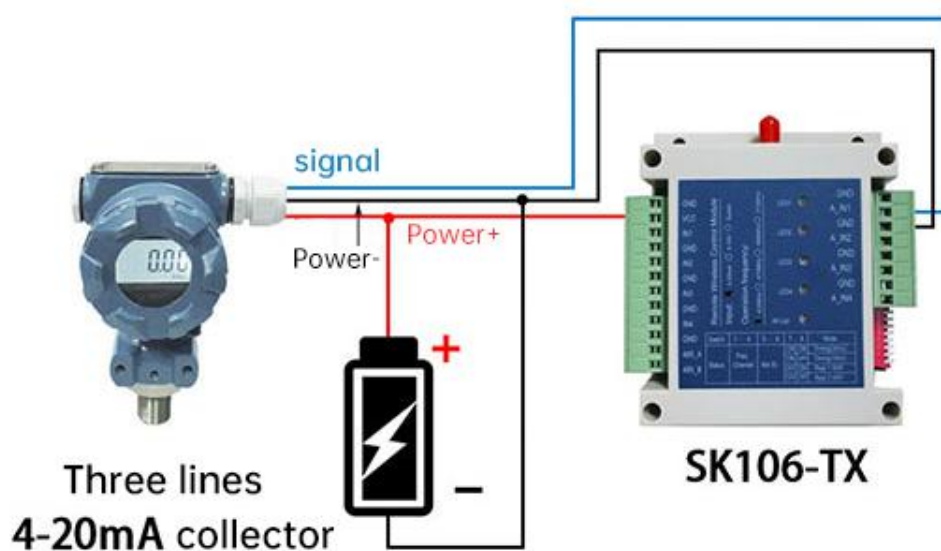
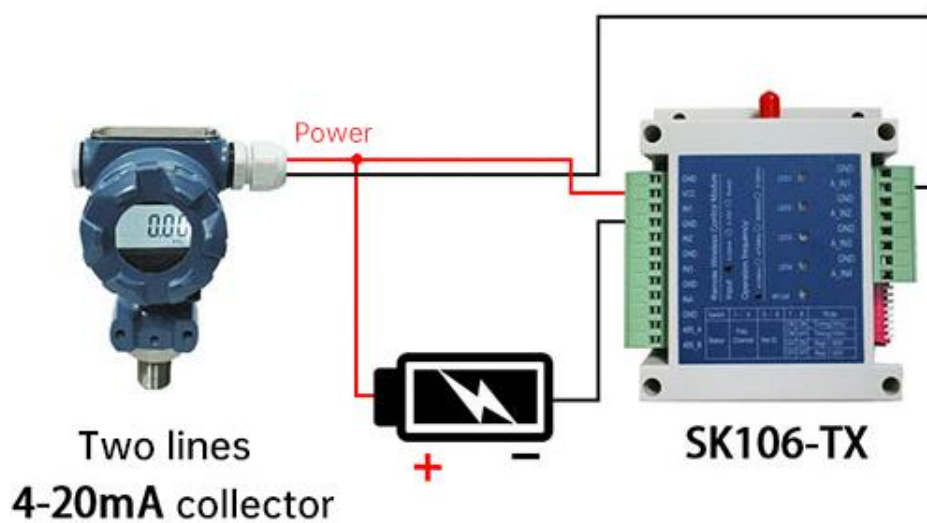


SK106-TX

SK106-RX

| Pin NO. | Pin | | Description | |
|---------|----------|----------|-----------------------------|--------------------------|
| | SK106-TX | SK106-RX | SK106-TX | SK106-RX |
| 1 | GND | GND | Connect to negative power | |
| 2 | VCC | VCC | Connect to positive power | |
| 3 | IN1 | A_OUT1 | Ch1 input, internal pull up | Ch1 analog output |
| 4 | GND | GND | | |
| 5 | IN2 | A_OUT2 | Ch1 input, internal pull up | Ch2 analog output |
| 6 | GND | GND | | |
| 7 | IN3 | A_OUT3 | Ch1 input, internal pull up | Ch3 analog output |
| 8 | GND | GND | | |
| 9 | IN4 | A_OUT4 | Ch1 input, internal pull up | Ch4 analog output |
| 10 | GND | GND | | |
| 11 | 485_A | 485_A | 485 Interface A | |
| 12 | 485_B | 485_B | 485 Interface B | |
| 13 | GND | OUT1 | Ch1 analog input | Ch1 relay control output |
| 14 | A_IN1 | | | |
| 15 | GND | OUT2 | Ch2 analog input | Ch2 relay control output |
| 16 | A_IN2 | | | |
| 17 | GND | OUT3 | Ch3 analog input | Ch3 relay control output |
| 18 | A_IN3 | | | |
| 19 | GND | OUT4 | Ch4 analog input | Ch4 relay control output |
| 20 | A_IN4 | | | |

11. Wiring Diagram For General Applications



12. Accessories

1) Antenna

The antenna is very important for RF communication, its performance will affect the communication directly. Module needs antenna in 50ohm. Commom antenna has rubber straight/ elbow/ foldable rod and sucker antenna and etc. Users can order accordingly. To ensure module in the best performance, we suggest to use the our antennas.



★ To ensure modules get the best performance, user must obey the following principles when using the antennas:

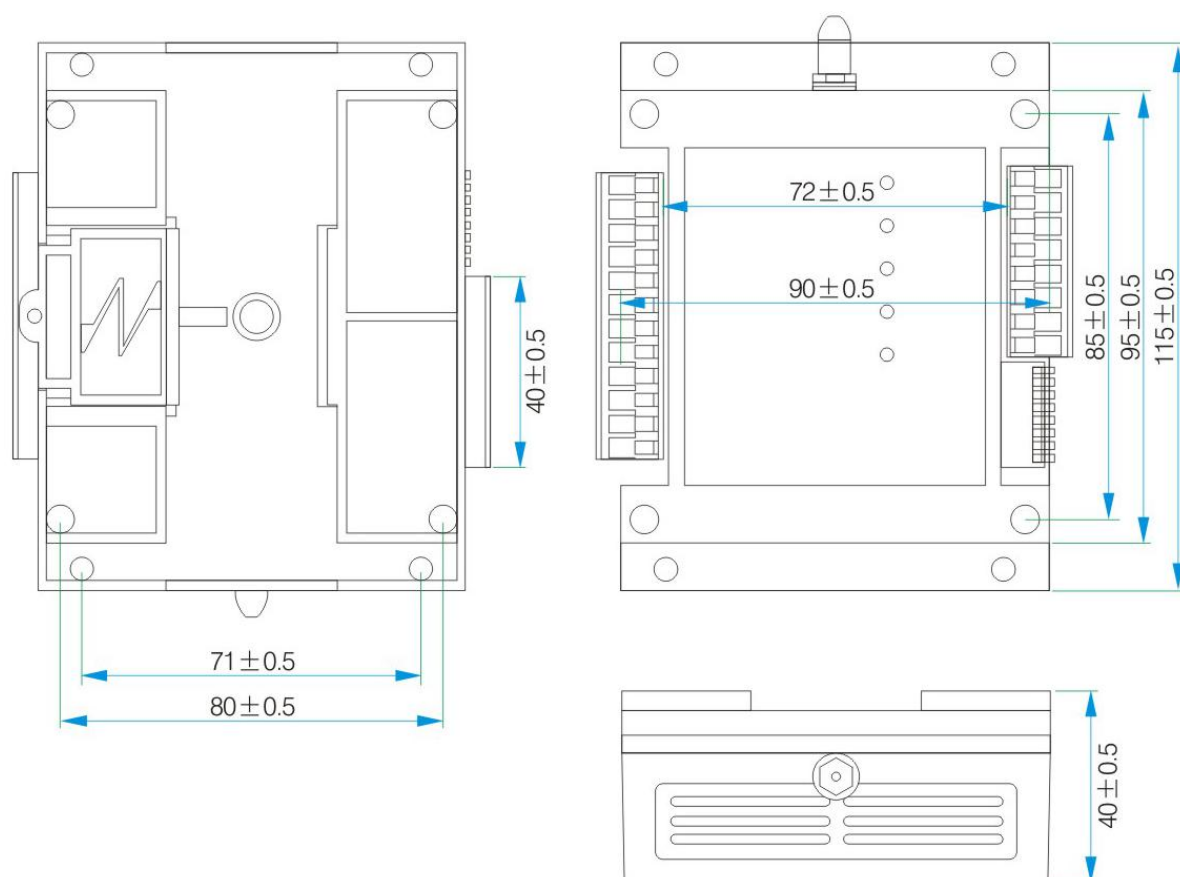
- Put the antenna away from the ground and obstacle as possible as you could;
- If you choose the sucker antenna, pull straight the lead wire as possible as it can be, the sucker under arches should be attached on the metal object;

2) Power supply

The standard power supplier for this module is DC 12V(suggest to using current in 2A or higher), module will not work when voltage is lower than 10V. Power supply is very important for this module, its performance will affect the communication. We suggest to use our standard power supply to get better performance.



13. Mechanical Measurement (Unit: mm)



14. Order Information

For example: If the customer needs 433MHz, The part number of released order shall be:

SK106-TX-C433 & SK106-RX-C433.

SK106 Transmitter has below versions:

| Item NO. | Description |
|---------------|--|
| SK106-TX-C433 | The input is a current signal, Center frequency 433MHz |
| SK106-TX-C490 | The input is a current signal, Center frequency 490MHz |
| SK106-TX-C868 | The input is a current signal, Center frequency 868MHz |
| SK106-TX-C915 | The input is a current signal, Center frequency 915MHz |

SK106 Receiver has below versions: :

| Item NO. | Description |
|---------------|---|
| SK106-RX-C433 | The output is a current signal, Center frequency 433MHZ |
| SK106-RX-C490 | The output is a current signal, Center frequency 490MHZ |
| SK106-RX-C868 | The output is a current signal, Center frequency 868MHZ |
| SK106-RX-C915 | The output is a current signal, Center frequency 915MHZ |

15. FAQ

a) Why modules can't communicate?

- 1) Check if power supply is connected correctly
- 2) Check if module in normal communication mode;
- 3) Check if the frequency ,channel, NET ID and air rate of each module are the same
- 4) Check if module is damaged (if the LED flash when powered on?)

b) Why communication distance is not so far as expected?

- 1) Check if the Power supply is stable ;
- 2) Check if the antenna well matched and install properly;
- 3) Check if the surrounding environment is good;
- 4) Check if strong same frequency interference existed;