

5W TTL/RS232/RS485 Interface

Up to 1Mbps in the air

High Power Long-Distance Range

Wireless Transceiver Data Transmission Module

Product Specification



Catalog

1. Overview.....	- 3 -
2. Feature.....	- 3 -
3. Application.....	- 3 -
4. Block Diagram.....	- 4 -
5. Electrical Characteristics	- 4 -
6. Operation.....	- 5 -
1) Power on Reset.....	- 5 -
2) Sleep mode	- 5 -
3) Working Mode.....	- 5 -
4) Setting mode.....	- 8 -
5) Communication Protocol	- 10 -
6) RSSI index	- 11 -
7) Parameters Description:	- 11 -
7. Application circuit.....	- 14 -
8. Pin definition.....	- 15 -
9. Accessories.....	- 16 -
10. Mechanical dimension(Unit:mm).....	- 17 -
11. Order information	- 17 -
12. FAQ	- 18 -

Note: Revision History

Revision	Date	Comment
V1.0	2019-6-18	First release

1. Overview

SV6500PRO is an ultra long distance & highly-integrated RF transceiver module, which adopts the high performance Si4463 from Silicon Labs and industrial micro-controller. TTL / 232 /485 can be chosen corresponding to SV6500PRO-TTL / SV6500PRO-232 / SV6500PRO-485.

SV6500PRO has good sensitivity and 1W output power to achieve long RF range and reliable RF communication. To avoid the interference, SV6500PRO provides 40 frequency channels and configurable Net ID. SV6500PRO is flexible but easy to use, it comes with many parameters, such as: frequency, data rate, output power, Net ID, Node ID. Users can configure the parameters through PC or customer's own device.

SV6500PRO is manufactured and tested strictly using lead-free process and complies with RoHS and Reach standards.

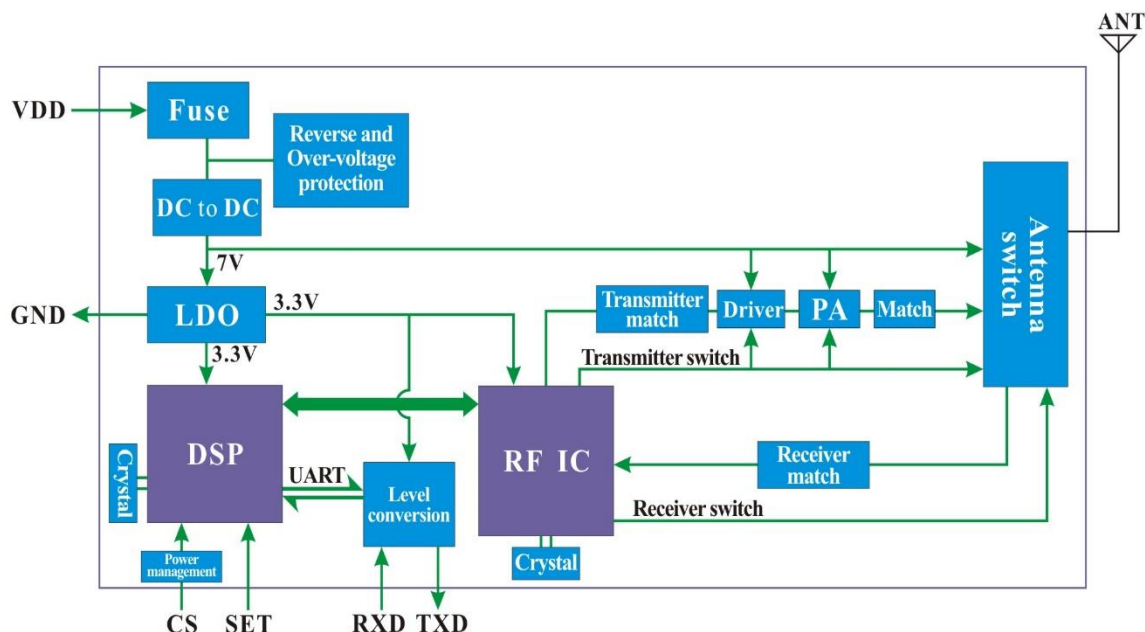
2. Feature

- Frequency:433/490 /868/915MHz
- Industrial class
- 40 channels
- 4 bytes Net ID & 2 bytes Node ID
- Series Data Rate: 1200 ~ 115200 bps
- Air Data Rate: 1200 ~ 1M bps
- FSK modulation
- RSSI
- Parameters save automatically
- ESD protection
- Hardware watch dog
- Over voltage protection and polarity protection
- Interface: TTL/RS232/RS485
- Bi-directional & Half duplex
- Sensitivity: -121 dBm
- Max output power: 5W (+37 dBm)
- Working voltage: 9~30.0V
- Working temperature: -40 ~ +85 ℃
- Weight: 160 g

3. Application

- Remote control telemetry
- Security system
- Industrial data acquisition
- Home automation
- Wireless data communication
- Access system
- Robot control
- Wireless PC peripherals

4. Block Diagram



5. Electrical Characteristics

Note: High quality 3.3V LDO is integrated, and Pin CS / SET is 3.3V interface. TXD/RXD is also 3.3V for SV6500PRO-TTL

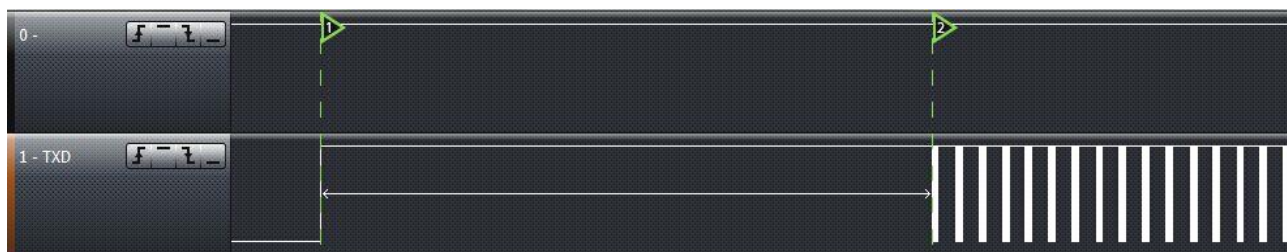
Parameters	Min.	Typ.	Max.	Unit	Condition
Working condition					
Voltage range	9	12	30	V	
Operating Temperature	-40	25	+85	°C	
Current consumption					
Rx current		< 30		mA	
Tx current		< 2		A	@37.0dBm
Sleep current		< 5		mA	@TTL level
RF parameters					
Frequency range	414.92	433.92	453.92	MHZ	@433MHz
	470.92	490.92	509.92	MHZ	@490MHz
	849.92	868.92	888.92	MHZ	@868MHz
	895.92	914.92	934.92	MHZ	@915MHz

Data rate	1.2	9.6	1000	Kbps	GFSK
Output power	26	/	+37	dBm	
Sensitivity		-121		dBm	@1.2kbps

6. Operation

1) Power on Reset

After powered on reset, the TX LED (Red) and RX LED (Blue) will blink 3 times, the total reset time is around 2s, as below:



Note: Contact us to customize if you want to shorten the POR time.

2) Sleep mode

After Power on Reset, the module enters into sleep mode when CS pin is pulled low. In this mode, the current consumption is very small. In Sleep mode, the module can't do any communication and can't be set even Set Pin is pulled low. All the parameters will be kept unchanged in Sleep mode. User can wake up the module by pulling high the CS Pin.

3) Working Mode

The CS and SET Pin is internally pulled up. Pull CS pin high or leave it open will make SV6500PRO enter into working mode.

	Sleep mode	Working mode	Setting mode
CS	0	1*	1*
SET	X	1*	0

★ 1*: connected to 3.3V or leave open. X: don't care

In working mode, SV6500PRO stay in receiving mode and wait for the series signal and RF signal. SV6500PRO can connect with any device which is standard 232/485/TTL interface.

When series signal comes, SV6500PRO will check the input series signal if there is any error, and then transmit the received data out via RF automatically if no errors found.

When RF signal comes, SV6500PRO will check the input RF signals if there is any error, and then

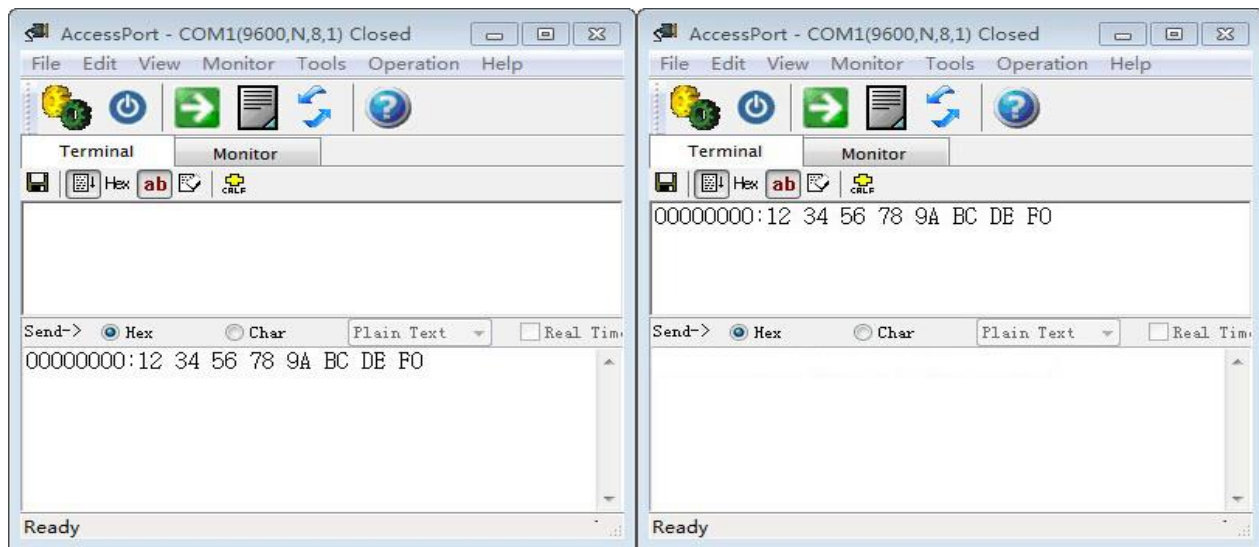
transmit the received data out via series port automatically if no errors found.

When one packet is transmitted successfully, the Red LED will blink once.

When one packet is received and verified with no problem, the Blue LED will blink once.

The easiest way to test the module is using computer. The corresponding PC software is “Series Debugging assistant” can be downloaded at: http://www.nicerf.com/downlist_173.html, User can use our USB bridge board (SU108 –TTL / SU108-232 /SU108-485) to connect SV6500PRO with computer.

The GUI of the software is as below:



★ To ensure the stability of communication, please notice the following tips:

a) Parameter matching

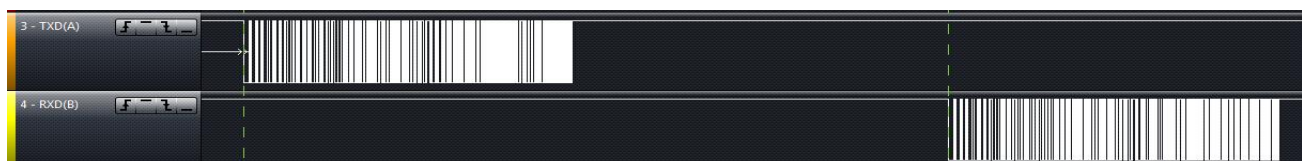
The series parameter between the device and SV6500PRO should be same,

RF parameters should be same in Tx and Rx.

The Net ID should be same in Tx and Rx.

b) Delay Time

Data delay is exist between series input of the transmitter and series output of the receiver. This Delay Time is different from the series data rate, RF data rate and payload length. Detailed value is as below:



RF rate	1200	2400	4800	9600	14400	19200	38400	57600	76800	115200
Serial baud rate	1200	2400	4800	9600	14400	19200	38400	57600	76800	115200

1byte transceiver time(ms)	178	104	54	34	28	24	19	18	17	17
115 bytes transceiver time(ms)	1958	983	496	251	171	129	69	49	39	28

1M bps RF rate, transmission time at 115200bps serial baud rate (receive data from the transmitter to output all data)



RF rate 1M bps, serial baud rate 115200bps						
Number of bytes	1	10	100	1K	1M	2M
Transmission time	15ms	18ms	34ms	155ms	91s	182s

c) Long package transmission

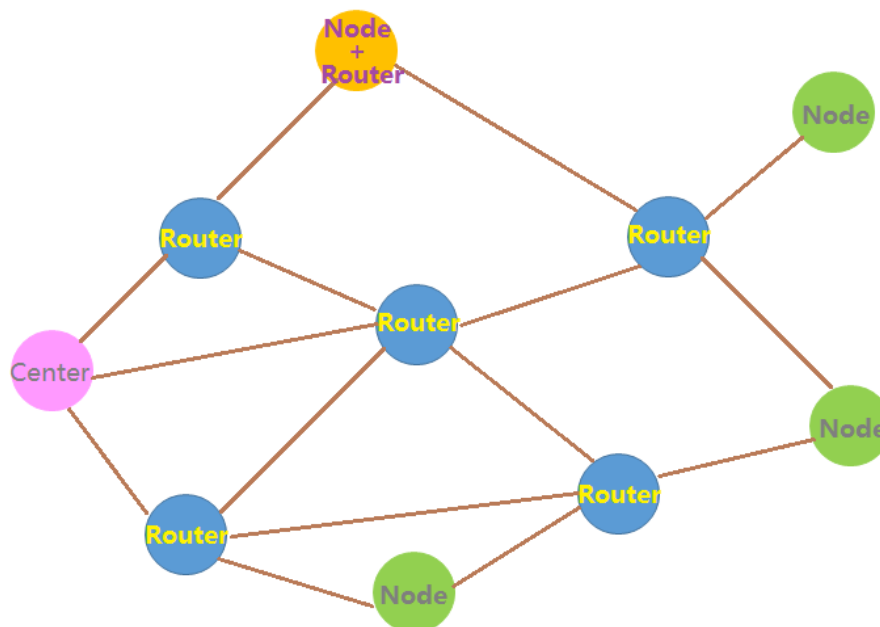
One packet more than 200 bytes is a long package. The RF data should be set higher than series data for long package transmission. The distance will be shorter with higher RF data rate.

d) MESH network transmission mode

Parameter configuration in MESH networking working mode:

Setting in frame Net parameter of PC software, and each module should have different NODE ID.

In MESH mode, the module can be configured into nodes and routers through different modules, and form a MESH network as a whole to realize point-to-point and point-to-multipoint transmission. The node segment module configured as Node mode is similar to the standard communication terminal module. The router-based routing module forwards data in the same network to solve the problem that a single point-to-point transmission distance is insufficient in many practical applications, and there is no limit to the number of routes in the entire network.



4) Setting mode

In working mode, pull low the SET pin to force SV6500PRO into setting mode. When using USB bridge board, simply put on the short cap to enter into setting mode.

In setting mode, both blue and red LED will light on, shown as below:



Data Transceiver Module TTL Interface Diagram

- Install the USB Driver and PC software in computer.
- Connect Module with the related interface USB bridge board through 6 pins terminal wire.
- Connect Module with computer (PC Software) through USB bridge board.
- Connect module with DC 12V Power.
- Module has been into setting Mode at this time, Duplex-color light keep lighting, show as above.

In setting mode, users can set the parameters by PC software or customer's own device. The parameters will be stored and keep unchanged even powered off.

Step to set the module with PC:

- ◆ Download the PC software and USB driver at our website.
- ◆ Install the PC software and USB driver into computer.
- ◆ Connect RF module with USB Bridge, put on the short cap, and insert into the PC.
- ◆ Open the PC software, the GUI is as below:

Select the right COM port and click “OPEN” button, all the parameters stored in the module will be read out and display, the status bar will appear the message “Device Found”.

If SV6500PRO hasn't connected with PC correctly or wrong COM port is chosen, the status bar will show “Device Not Found”.

SVPRO Communication Tools

NiceRF 深圳市思为无线科技有限公司
思为无线 NiceRF Wireless Technology Co., Ltd
TEL: 0755-23080616 www.nicerf.com

Model: SV6500PRO Version: 1.1

Net Parameters

NET ID: 00000000 NODE ID: 0001

☐ Mesh
☒ Node ☐ Router ☐ Node & Router

Serial Parameters

Baud Rate: 9600 Parity: None
Data bit: 8 Stop: 1

RF Parameters

Band: 433 Data Rate: 9600
Channel: 20 Power: 7
Frequency: 433.92 MHz

COM3
CLOSE

SET
READ
DEFAULT
HELP

Device Found!

PC version: V1.1

Note: About the Net ID and Node ID

After connected with PC correctly, all the parameters can be set freely including Net ID and Node ID.

The Net ID is the group name for transmitter and receiver, all the transmitter and receiver with the same Net ID can communicate with each other. The only exception is 0000. When the Net ID is set as 0000, it can receive the signal of all the transmitter even the Net ID is not 0000.

The Node ID can be thought as the name of the module. Each module can be set with one Node ID. The Node can set and read out freely. The Node ID can be used in the application which the receiver should identify who is the transmitter. User can read out the Node ID of the module, and add the Node ID into the payload, then in Rx side, it can identify who is the transmitter.

5) Communication Protocol

Besides PC, user can set all the parameters by their own device. The communication protocol is as below:

Baud rate=9600 bps; Data bit=8 bits Stop bit:1 Parity bit: none

a) Command : Read module name and version:

Instruction format: AA FA AA

Return value is: "SV6500PRO_VERx.x\r\n"

For example:

Instruction: AA FA AA

Return: SV6500PRO_Ver1.1\r\n.

b) Command: Read out all the parameters:

Instruction format: AA FA 01

The return value in turn is:

RF channel / RF band / RF data rate / RF power / Serial data rate / Series Data bit / Series Stop bit /
Series Parity bit / NET ID / NODE ID/MESH/NODE /\r\n

c) Command : Reset to default setting

Instruction format: AA FA 02

The return value in turn is: "OK \r\n" or "ERROR \r\n"

After this command, the module will reset to default setting, which is

Frequency: Tx = Rx = CH20 = 433.92 MHz (Band = 433MHz)

RF data rate: Tx = Rx=9600 bps

RF power= 7 (Max output)

Serial: baud rate = 9600 bps Data bit= 8 Bits Stop bit = 1 Bits Parity bit=None

NET ID = 00 00 00 00 NODE ID = 00 00 MESH = 00 NODE = 00

d) Command: Set the group parameters

Length of the command is 17 bytes, set 16 bytes of the parameters into the module, and format as follows:

Instruction format: AA FA 03 RF Channel / RF Band / RF Rate / RF Power / Serial transmission date / data bits / stop bits / parity / NET ID / NODE ID /MESH/NODE

The return is: "OK \r \n" or "ERROR \r \n"

6) RSSI index

The RSSI index value can only be read out in setting mode. The real time RSSI index is updated by incoming signal.

Instructions format: AA FA 04

Return: RSSI index\r\n (hexadecimal, range: 0x00~0xff)

RSSI index range: 00 ~ FFh

For example:

Instruction format: AA FA 04

Return: 32 0D 0A

Relationship between RSSI and input power is as below

$$\text{Input power(dBm)} = (\text{RSSI}/2) - 134$$

7) Parameters Description:

a) Working Band

The working band is as below

Parameter	01	02	03	04
Frequency	433 MHz	490 MHz	868 MHz	915 MHz
	414.92 ~ 453.92	470.92 ~ 509.92	849.92 ~ 888.92	895.92 ~ 934.92

Note: Changing working band is not suggested

b) RF Channel = RF Frequency

Each frequency band is divided into 40 channels; user can select one of the 40 channels to use. The corresponding frequency is as below, Also we can customized the specified frequency which is not in the table.

频段	信道	1	2	3	4	5	6	7	8	9	10
433 (MHz)	频率	414.92	415.92	416.92	417.92	418.92	419.92	420.92	421.92	422.92	423.92
	信道	11	12	13	14	15	16	17	18	19	20
	频率	424.92	425.92	426.92	427.92	428.92	429.92	430.92	431.92	432.92	433.92
	信道	21	22	23	24	25	26	27	28	29	30
	频率	434.92	435.92	436.92	437.92	438.92	439.92	440.92	441.92	442.92	443.92
	信道	31	32	33	34	35	36	37	38	39	40
	频率	444.92	445.92	446.92	447.92	448.92	449.92	450.92	451.92	452.92	453.92
频段	信道	1	2	3	4	5	6	7	8	9	10
490 (MHz)	频率	470.92	471.92	472.92	473.92	474.92	475.92	476.92	477.92	478.92	479.92
	信道	11	12	13	14	15	16	17	18	19	20
	频率	480.92	481.92	482.92	483.92	484.92	485.92	486.92	487.92	488.92	489.92
	信道	21	22	23	24	25	26	27	28	29	30
	频率	490.92	491.92	492.92	493.92	494.92	495.92	496.92	497.92	498.92	499.92
	信道	31	32	33	34	35	36	37	38	39	40
	频率	500.92	501.92	502.92	503.92	504.92	505.92	506.92	507.92	508.92	509.92
频段	信道	1	2	3	4	5	6	7	8	9	10
868 (MHz)	频率	849.92	850.92	851.92	852.92	853.92	854.92	855.92	856.92	857.92	858.92
	信道	11	12	13	14	15	16	17	18	19	20
	频率	859.92	860.92	861.92	862.92	863.92	864.92	865.92	866.92	867.92	868.92
	信道	21	22	23	24	25	26	27	28	29	30
	频率	869.92	870.92	871.92	872.92	873.92	874.92	875.92	876.92	877.92	878.92
	信道	31	32	33	34	35	36	37	38	39	40
	频率	879.92	880.92	881.92	882.92	883.92	884.92	885.92	886.92	887.92	888.92
频段	信道	1	2	3	4	5	6	7	8	9	10
915 (MHz)	频率	895.92	896.92	897.92	898.92	899.92	900.92	901.92	902.92	903.92	904.92
	信道	11	12	13	14	15	16	17	18	19	20
	频率	905.92	906.92	907.92	908.92	909.92	910.92	911.92	912.92	913.92	914.92
	信道	21	22	23	24	25	26	27	28	29	30
	频率	915.92	916.92	917.92	918.92	919.92	920.92	921.92	922.92	923.92	924.92
	信道	31	32	33	34	35	36	37	38	39	40
	频率	925.92	926.92	927.92	928.92	929.92	930.92	931.92	932.92	933.92	934.92

c) RF data rate

The RF data rate is as below:

Parameter	0	1	2	3	4	5	6	7	8	9	10
TX/RX rate(bps)	1200	2400	4800	9600	14400	19200	38400	57600	76800	115200	1000000

d) RF output power

The output power is as below:

Set level	0	1	2	3	4	5	6	7
TX/RX power	27.4 dBm	30.85 dBm	32.25 dBm	35.20 dBm	35.84 dBm	36.12 dBm	36.42 dBm	36.42 dBm

e) Serial baud rate

Series data rate is as below: .

Parameter	0	1	2	3	4	5	6	7	8	9
TX/RX rate(bps)	1200	2400	4800	9600	14400	19200	38400	57600	76800	115200

f) Serial data bit

Series data bit is as below:

Parameter	1	2	3
Data Bits	7 bits	8 bits	9 bits

g) Serial stop bit

Series stop bit is as below:

Parameter	1	2
Stop bit	1 bits	2 bits

h) Serial parity

Series Parity bit is as below:..

Parameter	1	2	3
Parity bit	No	Odd	Even

i) NET ID:

The Net ID is 4 bytes, and range from 00 00 00 00 to FF FF FF FF

Note: if the modules' NET ID setting are different, then they can't communicate with each other except when the Net ID = 0000, it will receive all the message despite the Net ID is difference.

j) NODE ID

The Node ID is 2 bytes, range from 00 00 to FF FF. In mesh mode, each module should have different NODE ID.

k) **Working mode :**

Normal operation mode or MESH networking mode, [parameter] is 1 byte. Setting range: 00 01

Parameter	0	1
Working mode	Non MESH	MESH

Note: The module with the MESH networking function turned off and the module with the MESH networking function enabled cannot communicate. To ensure communication, the MESH networking functions in the same network should be consistent.

l) **Mode selection:**

Set the working mode in MESH mode. This option is valid only when the MESH networking function is turned on.

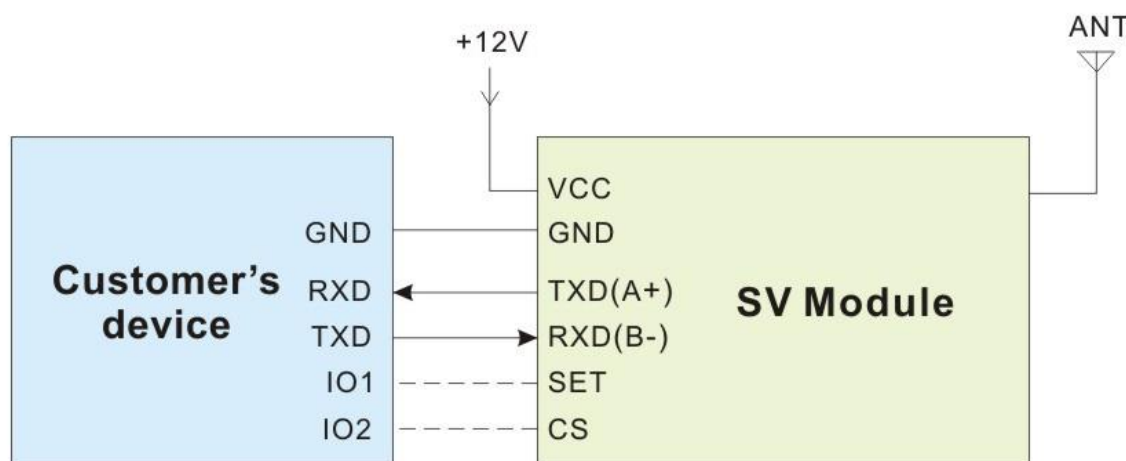
[Parameter] is 1 byte. Setting range: 0~2

Parameter	0	1	2
Working mode	Node	Router	Router + Node

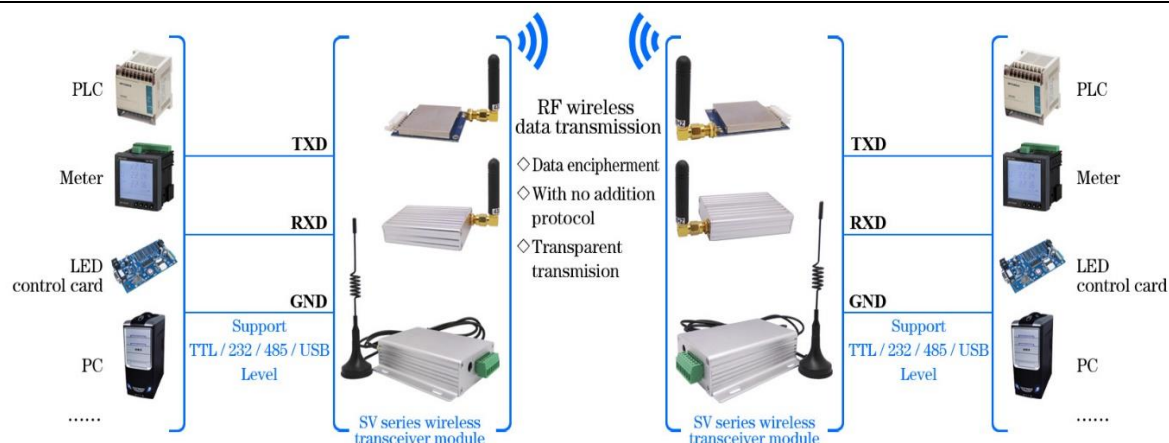
7. Application circuit

The typical schematic circuit is as below:

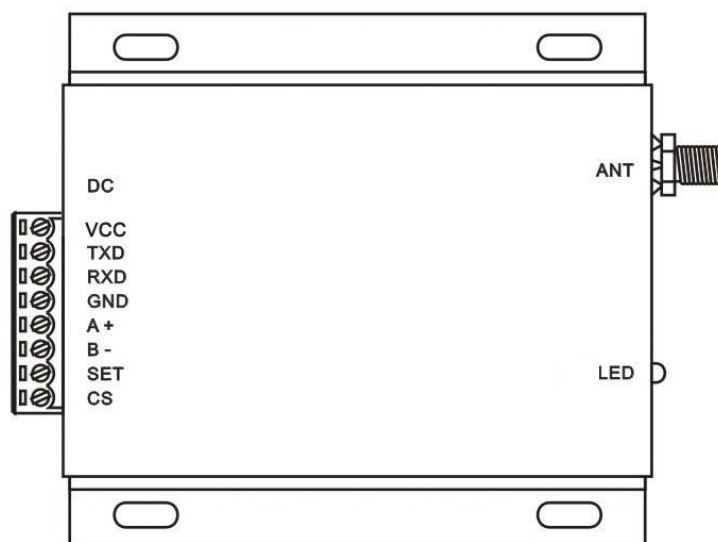
Note: The ground pin of the module and device should be connected together.



Typical application::



8. Pin definition



Pin No.	Definition	Description
1	VCC	Connected to the positive power supply (typical 12V)
2	TXD	Connect to TXD for TTL or RS232 interface
3	RXD	Connect to RXD for TTL or RS232 interface
4	GND	Connected to ground
5	A+	Connect to A+ for RS485 interface
6	B-	Connect to B- for RS485 interface
7	SET	Configuration mode enable (low to enter into the setting mode, leave open or connect high level to exit setting mode) Valid when CS Pin is high or leave open.
8	CS	Module working Enable (Pull Low to make the module enter into sleep mode, Leave open or connect high level make the module enter into normal working mode)

9. Accessories

1) Antenna

The antenna is very important for RF communication. We have many kinds of antenna for customer to choose, please contact the corresponding sales engineer for help.

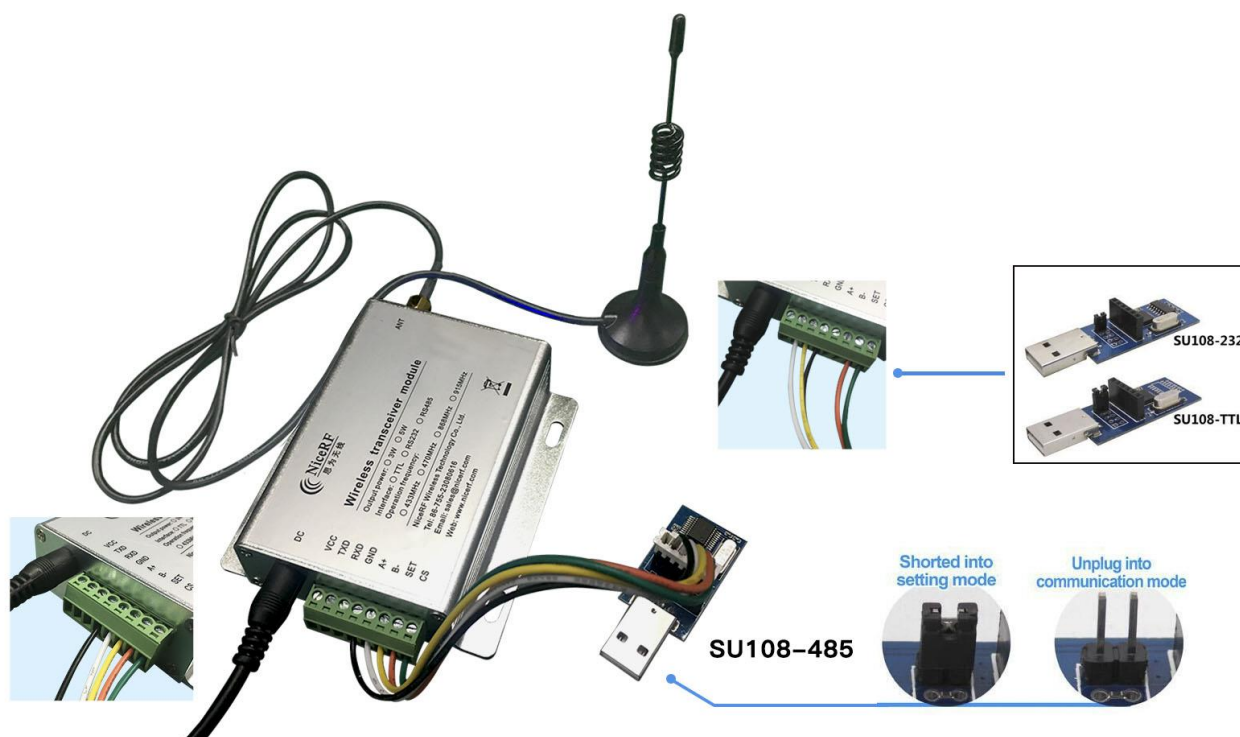


★ Tips for antenna:

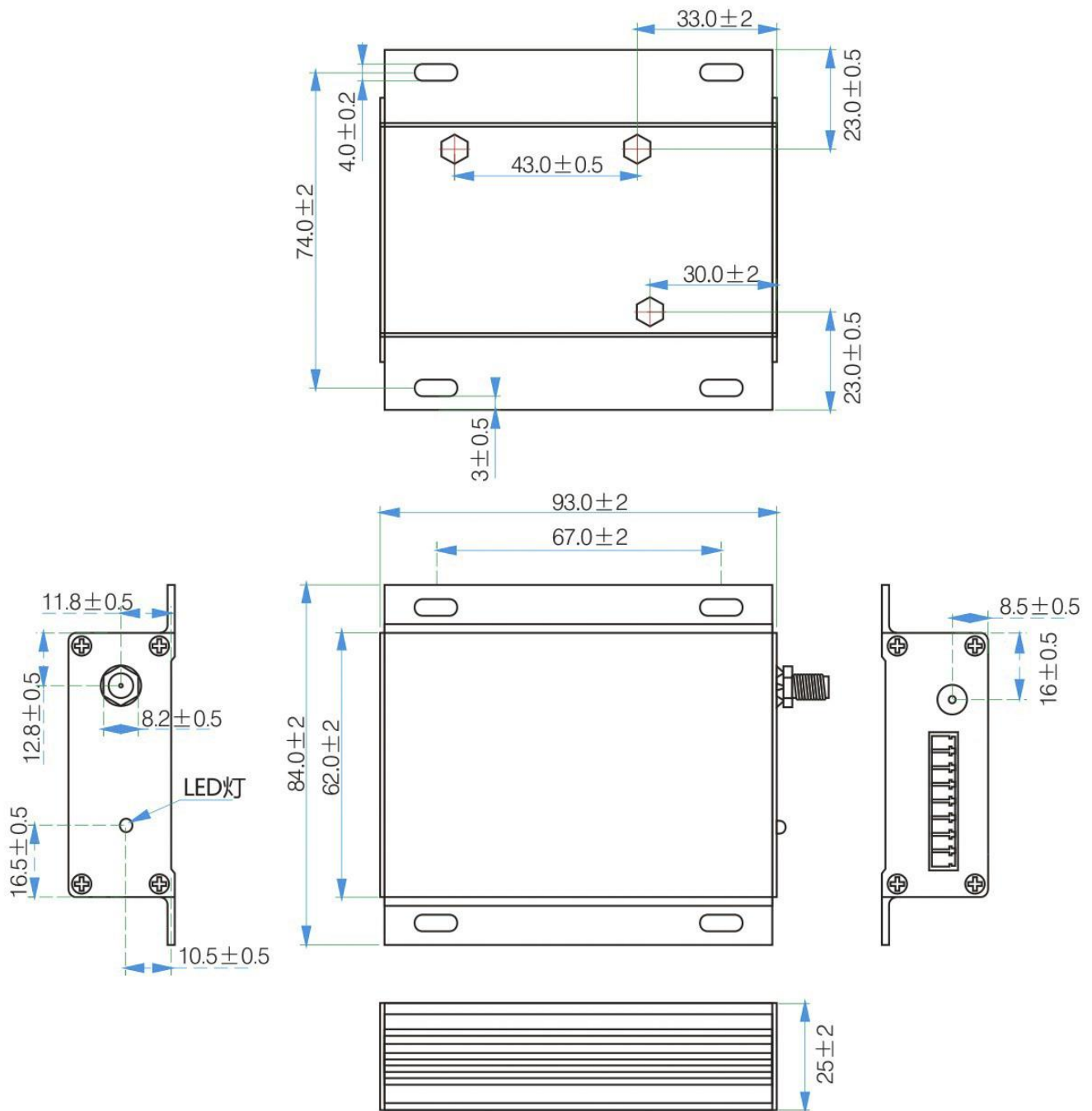
- Don't close to the ground, metal, magnet, big current;
- If you are using the sucker antenna, pull the wire as straight as possible, the sucker foundation should stick with metal

2) USB bridge board

There are 3 type of USB bridge, which is SU108-TTL/ SU108-232 / SU108-485. SU108 -TTL is for TTL Interface, SU108-232 is for 232 Interface, SU108 - 485 is for 485 Interface. User should select the right USB bridge corresponding to the RF module.



10. Mechanical dimension(Unit:mm)



11. Order information

SV6500Pro-485-433

Interface

Frequency

For example:

If the customer needs 433MHz band with 485 Interface then part number of released order shall be:

SV6500Pro-485-433

Product Name	Description
SV6500Pro-TTL-433	433MHz, TTL interface
SV6500Pro-232-433	433MHz, 232 interface
SV6500Pro-485-433	433MHz, 485 interface
SV6500Pro-TTL-490	490MHz, TTL interface
SV6500Pro-232-490	490MHz, 232 interface
SV6500Pro-485-490	490MHz, 485 interface

12. FAQ

- Why module can not communicate properly?
 - a) Check if the band, channel, rate, NET ID has set to the same;
 - b) Check if there is power connection error;
 - c) Check if the module is enabled (CS high);
 - d) Check if the antenna connection is not correct;
 - e) Check if the module is damaged.
- Why transmission distance is not far as it should be?
 - a) Power supply ripple is too large;
 - b) The antenna types do not match, or not properly installed;
 - c) The surrounding environment is harsh, strong interference sources;
 - d) Surrounding co-channel interference;
- Why receiving data incorrect?
 - a) Improper parameter settings;
 - b) Module data interface is bad.