

USR-K2 Super Port

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USR-K2 is the high performance-cost version of Super Port .It is an embedded serial networking module, whose function is to realize bidirectional transparent transmission between UART TTL and Ethernet .The amazing part of K2 lies in its Ethernet port integration design .You can apply K2 to your products to realize networking communication .User can directly process data interaction through network and device to realize remote data acquisition, remote control and management.

USR-K2,Using core M0 series the parameters is close to K1,] function than K1 more, on the basis of K1 increased upgrade firmware via network,DHCP, DNS, WEBSET.

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1. Product Introduction

1.1. Brief Intro

USR-K2 is the high performance-cost version of Super Port. It is an embedded serial networking module, whose function is to realize bidirectional transparent transmission between TTL and Ethernet. The amazing part of K2 lies in its Ethernet port integration design. You can apply K2 to your products to realize networking communication. User can directly process data interaction through network and device to realize remote data acquisition, remote control and management.

K2 is compatible with the of protocol K1, you can use it as K1. Its protocol is similar to K3. K3 protocol can be used to make a little change.

1.2. Function Features

- Support DHCP, Dynamic Host Configuration Protocol.
- Support DNS, Domain Name System;
- WEBSET: Setting parameters through web ;
- 10/100M auto detect interface;
- Support AUTO MDI/MDIX, Can use a crossover cable or parallel cable connection;
- Serial com port bound rate can set up from 300 to 961200, and None, Odd, Even, Mark, Space five check bits;
- Work mode TCP Server, TCP Client, UDP, UDP Server;
- Working model related parameters can be set via a serial port or network;
- 3.3 V TTL level compatible;
- Small Size
- Virtual serial port supported;
- Unique heartbeat package mechanism to ensure that the connection is reliable, put an end to connect feign death;
- Under UDP mode, Packet Broadcast is prohibited, with stronger anti-interference ability;
- Across the gateway, across switches, routers;
- Can work in LAN, also can work on the Internet (external network);
- upgrade firmware via network.

1.3. Product Characteristics

- 32 bits ARM CPU inside;
- LAN : 10/100Mbps; protect: Built-2KV isolated electromagnetic;
- Serial port baud rate: from 600 to 961.2 KBPS can be set up;
- Network protocol: ETHERNET ARP IP UDP TCP ICMP, DNS, DHCP;
- Software tool: configuration software, TCP/UDP test soft, RS232 debug soft;
- Configuration method: serial com port or via Ethernet, free software available;

- Operating temperature: -25~75°C;
- Storage environment: -40~85°C, 5~95%RH.
- Compact type

1.4. Order Symbol

Name	Part Numbers	Description Remarks
Super Port	USR-K2	

Diagram 1-1 order symbol

1.5. Electrical Characteristics

Model Number	Power Supply DC	Current
USR-K2	3.3V	140mA

Diagram 1-2 Electrical Characteristics

2. Module Test

If you have any question, please contact us the in the client support center:

<http://h.usriot.com/index.php?c=frontTicket&m=sign>

2.1. Hardware Connection

1. You can using” USR-TCP232-EVB V2.0”. It's easier to test. USR-TCP232-EVB is power for DC 5V@200mA.



Diagram 2-1 USR-K2 Connection diagram

2. If you don't have "USR-TCP232-EVB", please refer to 5.4

2.2. Test With Default Parameter

1. Keep default parameter set up your pc.

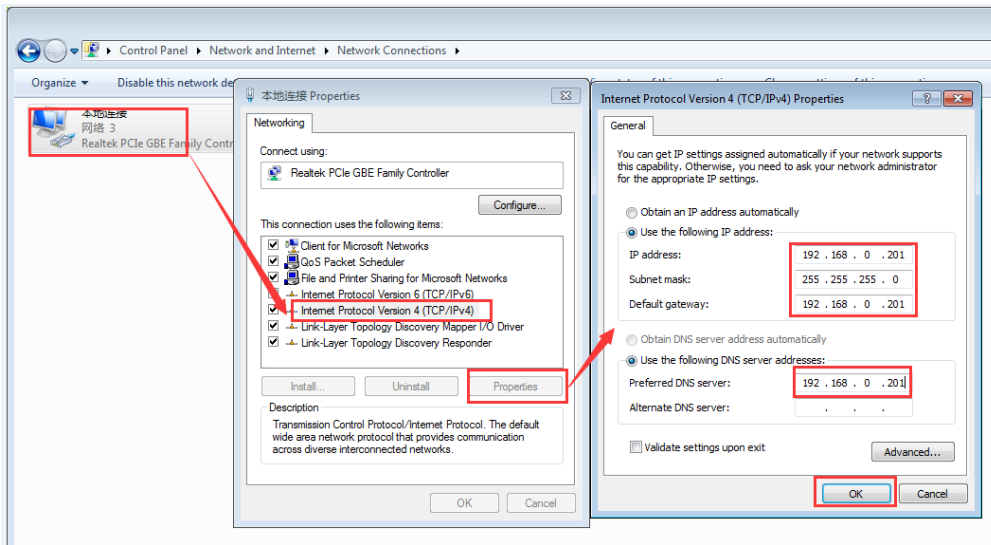


Diagram 2-2pc parameter

2. Default Parameter List

Classes	Details
IP Address	192.168.0.7
Subnet Mask	255.255.255.0
The Default Gateway	192.168.0.1
Baudrate	115200
Parity/Data/Stop	None, 8, 1
Local Port	20108
Remote IP	192.168.0.201
Remote Port	8234
User Name	admin
Password	admin

Diagram 2-3 pc parameter

3. Open a browser, type and Login above IP address <http://192.168.0.7>, you will enter module's setup webpages. There will be a windows login verify dialog.

User name and password are both “admin”, this can be modified after login into the system.

After you login, you can see webpage as follow,

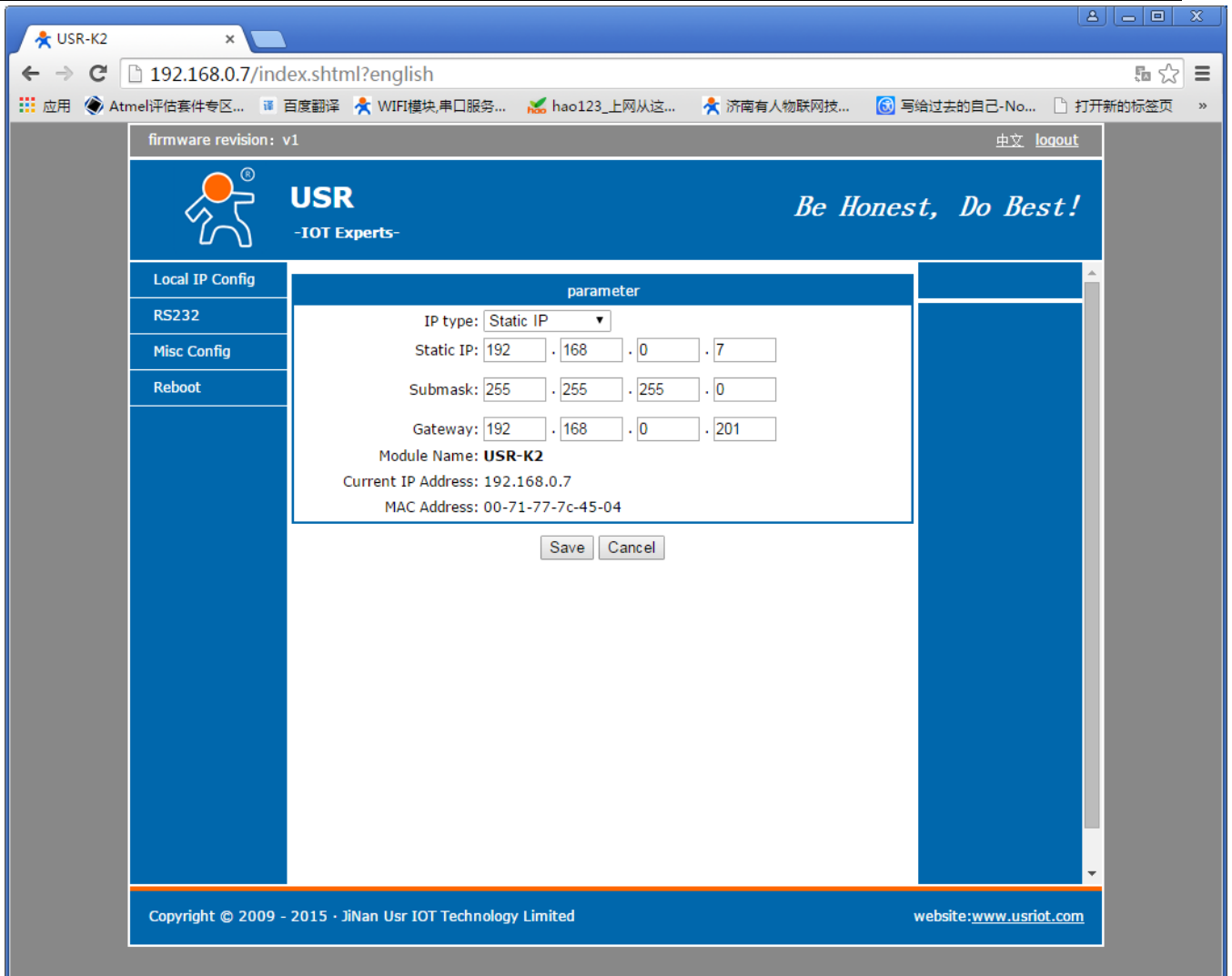


Diagram 2-4 USR-TCP232-Test Parameter

- Local IP Config: the module's ip address, submask and gateway parameter
- RS232: the module's serial to ethernet parameter
- Web to Serial: web to serial data transparent
- Misc Config: some parameter such as user name and password parameter
- Reboot: user can reboot/restart module from here

4. Received and transmitted

To test briefly in default working mode, on the foundation of the hardware connection, use the matched software USR-TCP232-Test to make transmitting and receiving test. The left side is serial port, use software default settings, the right side is the network part, set to TCP Client and server to be IP 192.168.0.7, port 20108.

This illustration shows the 10 ms two-way simultaneous automatically transmit screenshots. As the allocated memory of the display control is limited, in order to test large amount of data transceiver, here will suspend the receive display, only statistical data. Below is the effect after testing for a few hours, and transmitting millions of bytes. Stable and reliable, without a byte loss.

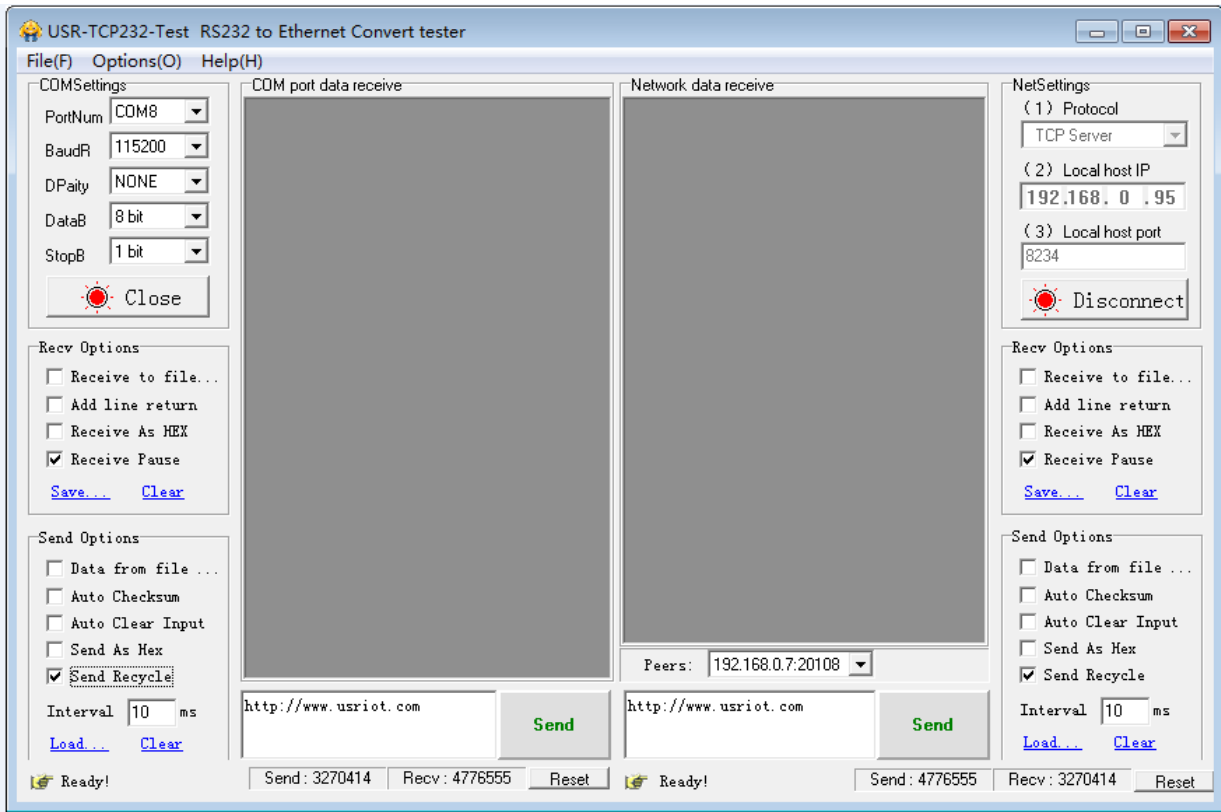


Diagram 2-4 USR-TCP232-Test Parameter

3. Module Work Mode

3.1. Structure Chart



Diagram 3-1 structure chart

3.2. UDP Mode

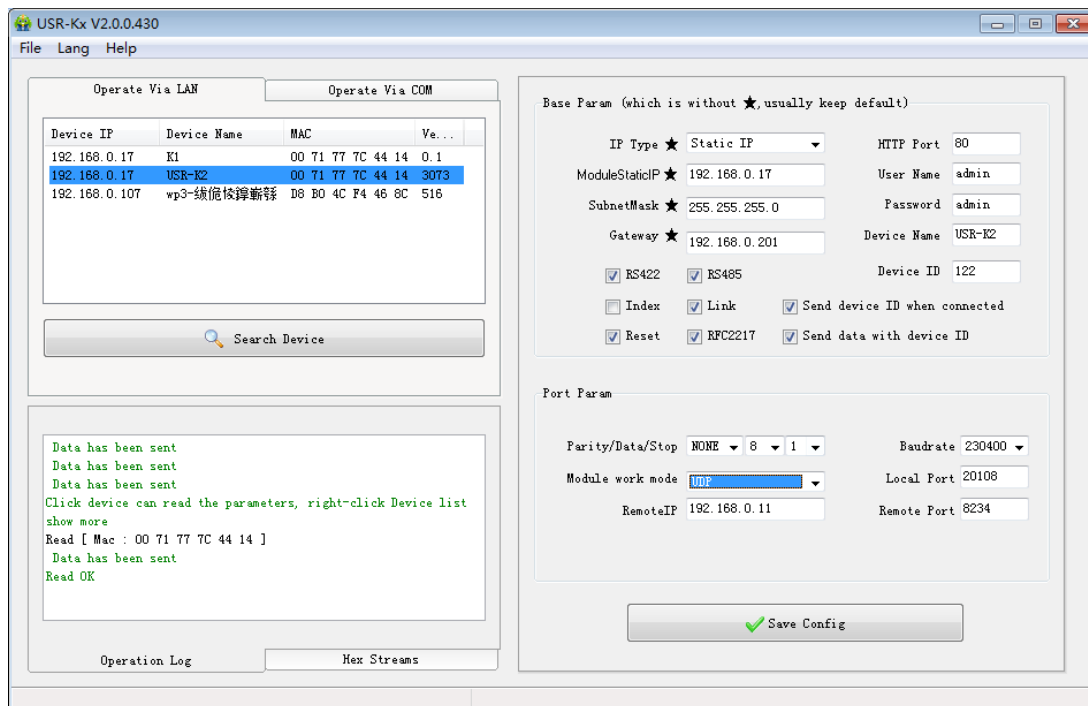


Diagram 3-2 UDP Mode

In UDP mode, after the module is powered on, module listen on specific port, not take the initiative to establish a connection, when module receive data from net ,send to the serial port, when a serial port receives the data sent over the network to the IP and port module Settings.

3.3. TCP Client

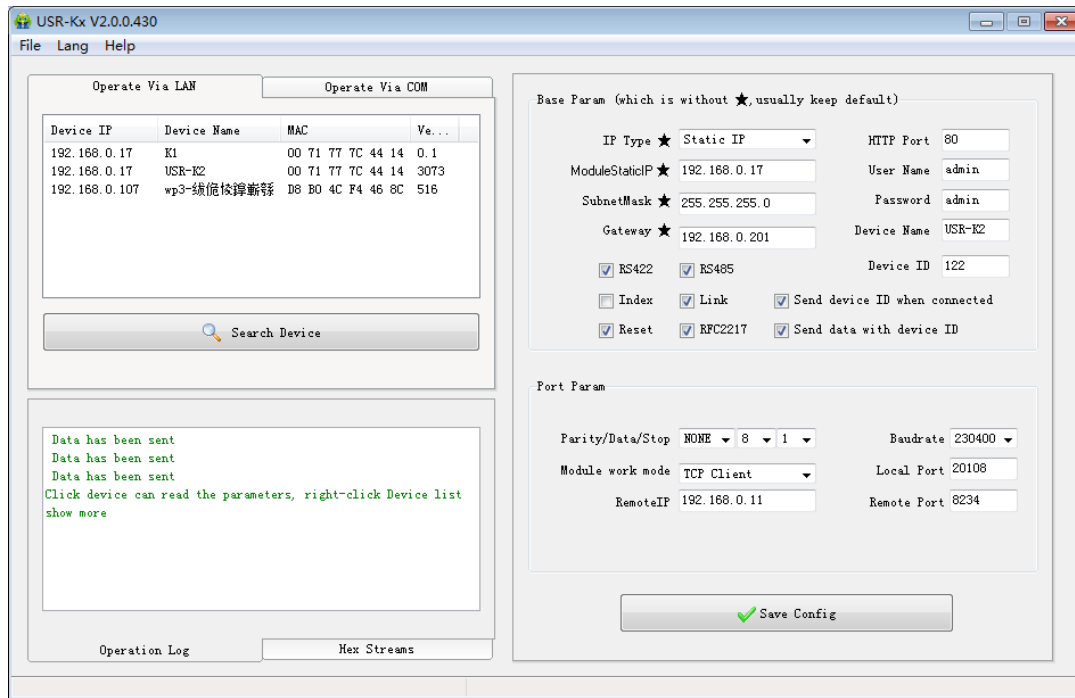


Diagram 3-3 TCP Client

In TCP client mode, after power on module according to their own Settings active TCP server to connect to the server, and then establish a long connection, data transparent transmission on this mode.

3.4. UDP Server Mode

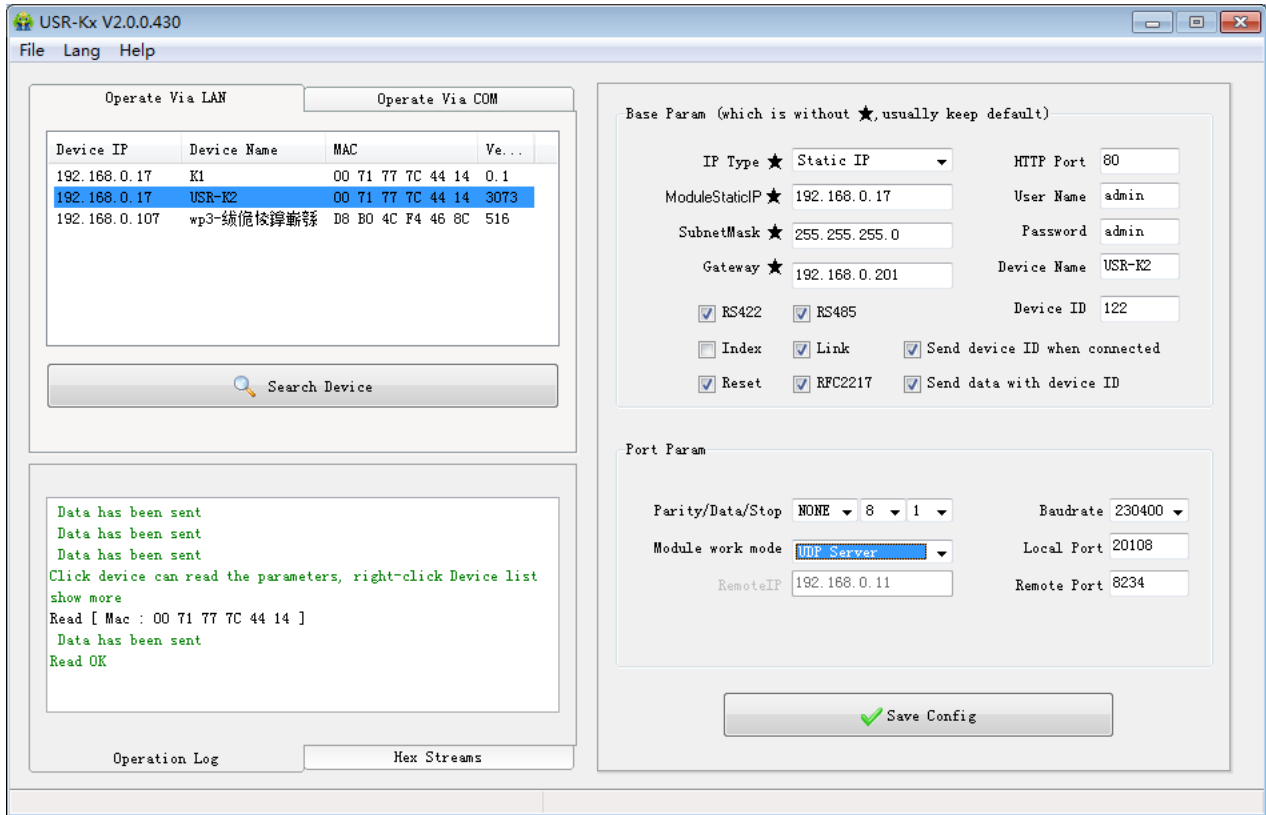


Diagram 3-4 UDP Server Mode

UDP server refers to the normal UDP are not validated on the basis of the source IP address, destination IP instead of the UDP packets are received data source IP, similar to TCP server functionality.

In this mode, the module by default record a destination IP and destination port, when a serial port data, to record the IP to send data, at the same time, the module at the server status, to accept the network packets sent to module, and adjust the target IP IP for the data source, suitable for multiple IP working mode for the module.

Use computer end program and UDP mode is exactly the same, no need to change.

Note:UDP mode, UDP server mode with a single maximum length of 1472 bytes should be controlled at or below.

3.5. TCP Server Mode

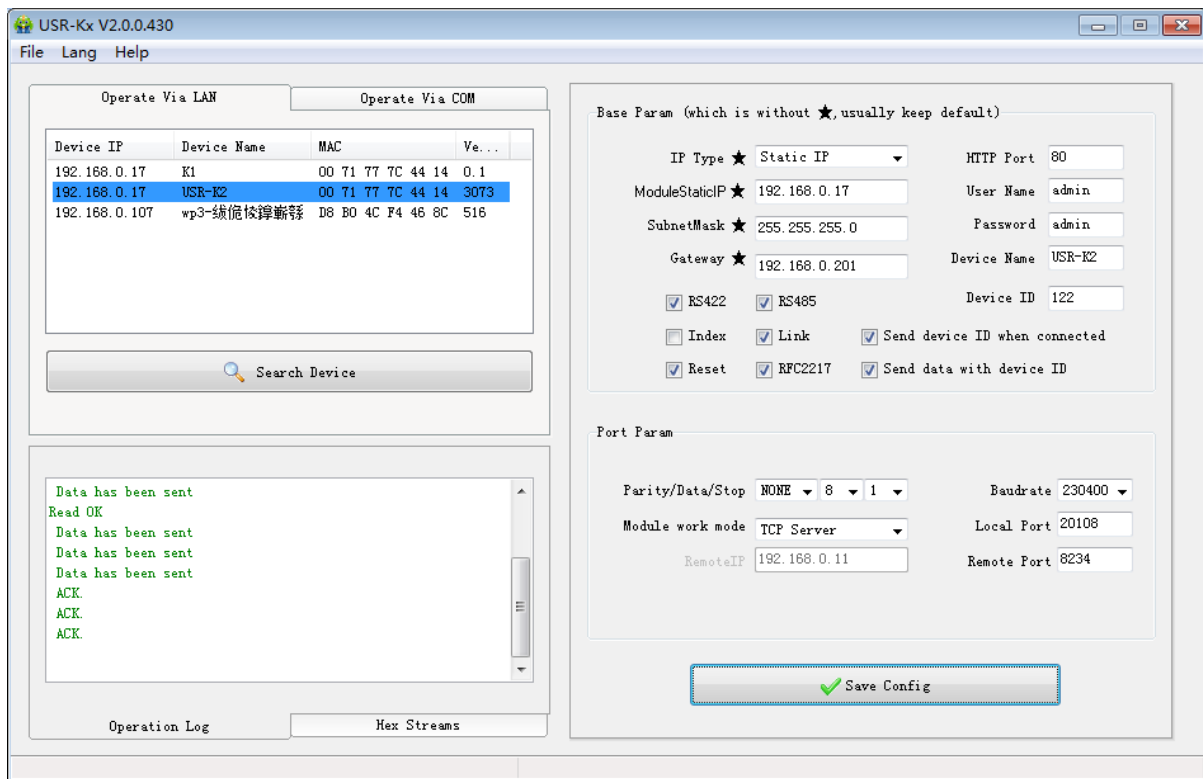


Diagram 3-5 TCP Server Mode

In TCP Server mode, module and gateway trying to communication first, and then monitor set up local port, there is connection request response and create a connection, can exist at the same time up to 4 links, a serial port after receipt of the data will be sent to all at the same time of establishing links with network module device.

USR-TCP232-SETUP software, set the Index function can be achieved when to establish a multi-channel connection, the module can identify communications equipment, and with the specified device to communicate.

3.6. Virtual COM Mode

Virtual COM means to convent data TCP connected to data of a COM within PC for transparent transmission. Take TCP Client mode for example:

Loading <http://www.usriot.com/Download/31.html>

1. Disable firewall and antivirus program
2. Install Virtual COM
3. Setting TCP Server

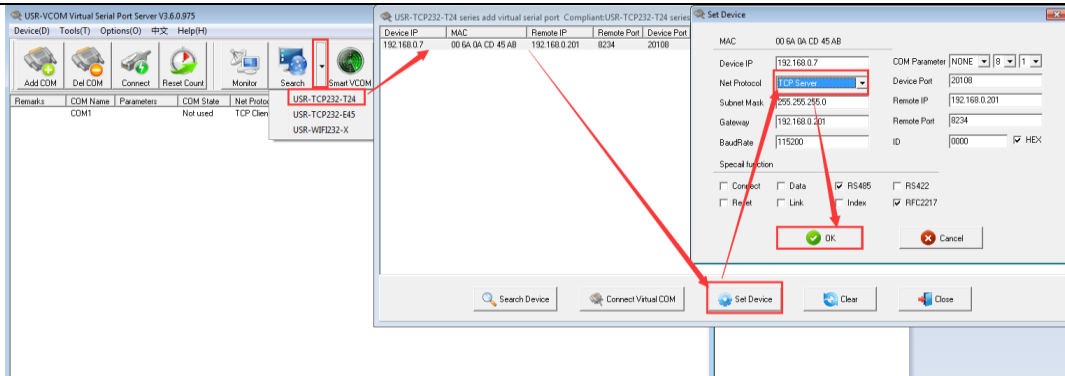


Diagram 3-6 Virtual COM

4. Connect a com

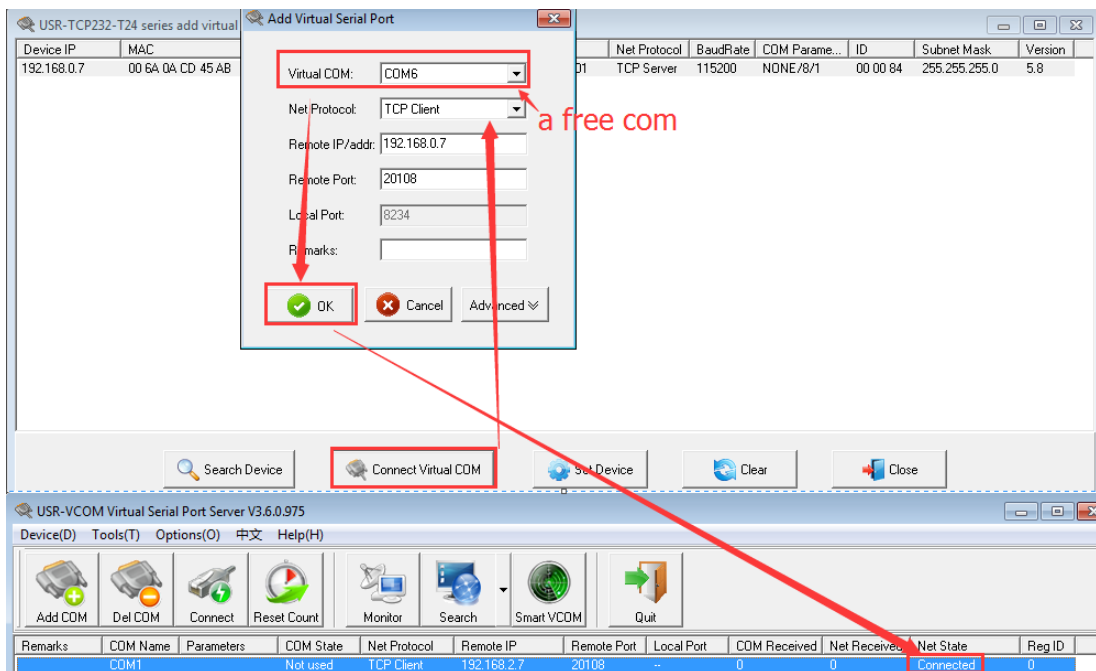


Diagram 3-7 Virtual COM

4. Parameters configuration

4.1. Web Page

Usually, this module is configured through web pages.

- (1) Open a browser, type and Login above IP address <http://192.168.0.7>, you will enter module's setup web pages. There will be a windows login verify dialog.

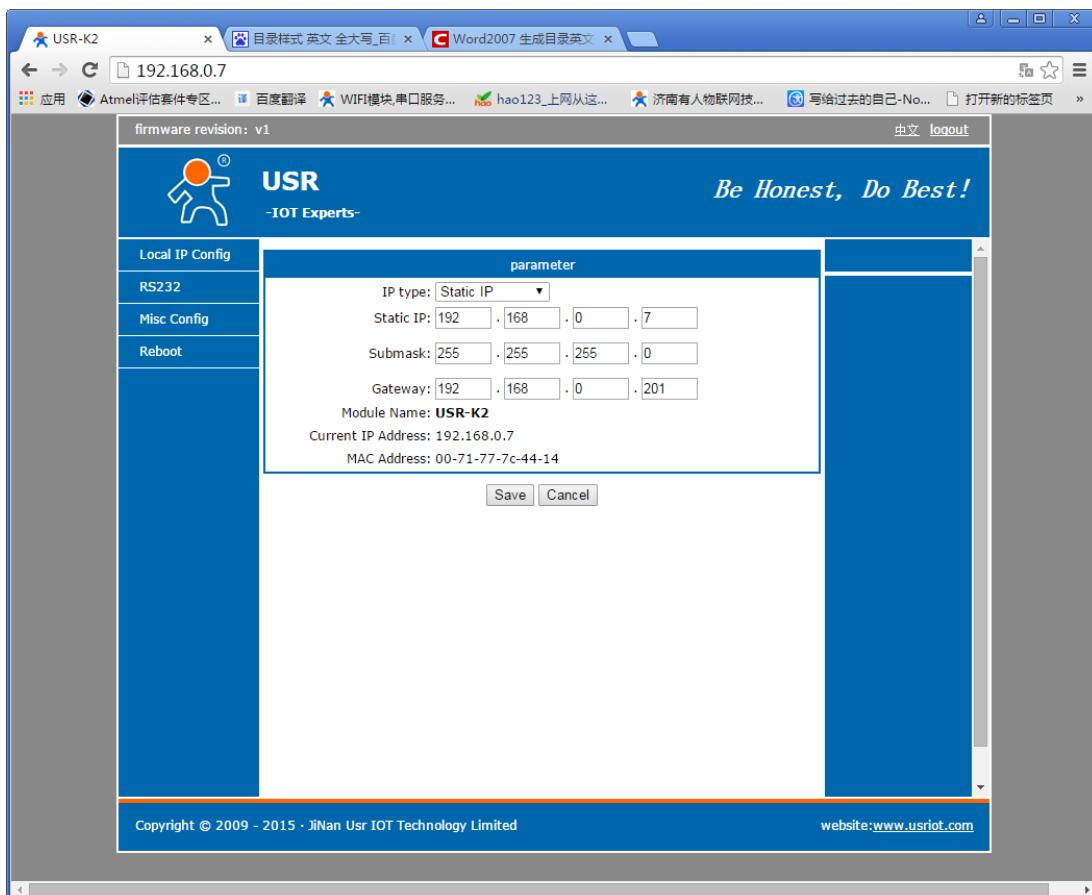


Diagram 4-1 Web--IP

- (2) Setting IP Config, input your parameters and click "Save", click "Reset module" or click "RS232" continue to Setting

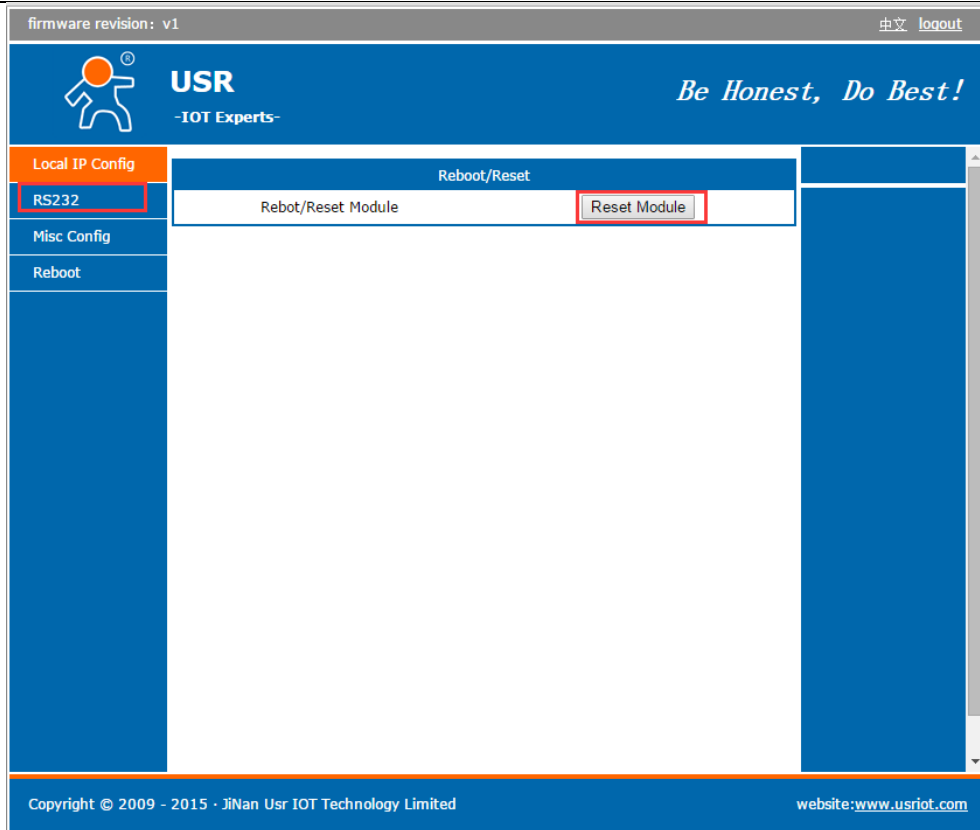


Diagram 4-2 Web--reset

(3) Setting RS232 click RS232

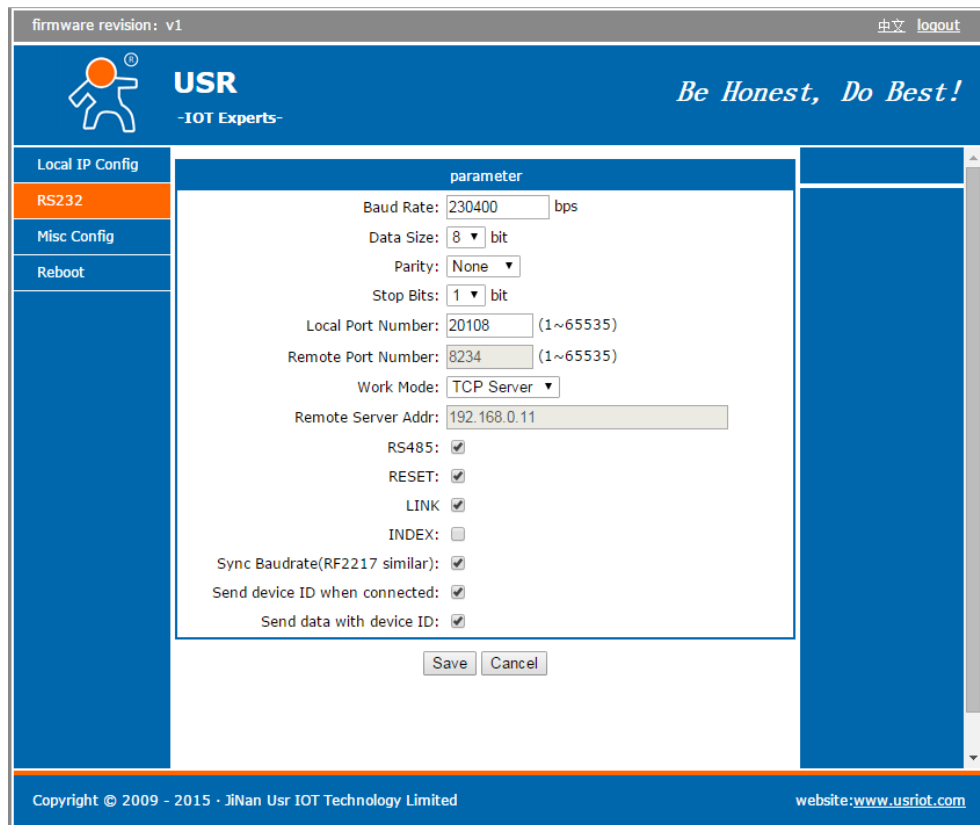


Diagram 4-3 Web—RS232

(4) Setting Misc Congfig

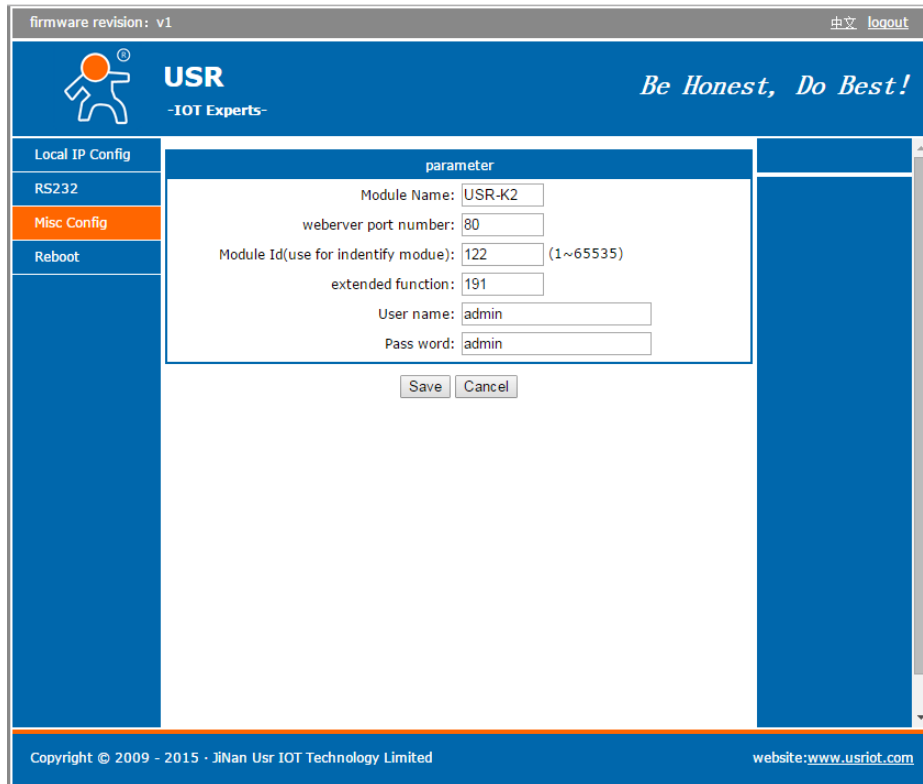


Diagram 4-4 Web--Misc

(5) Reset

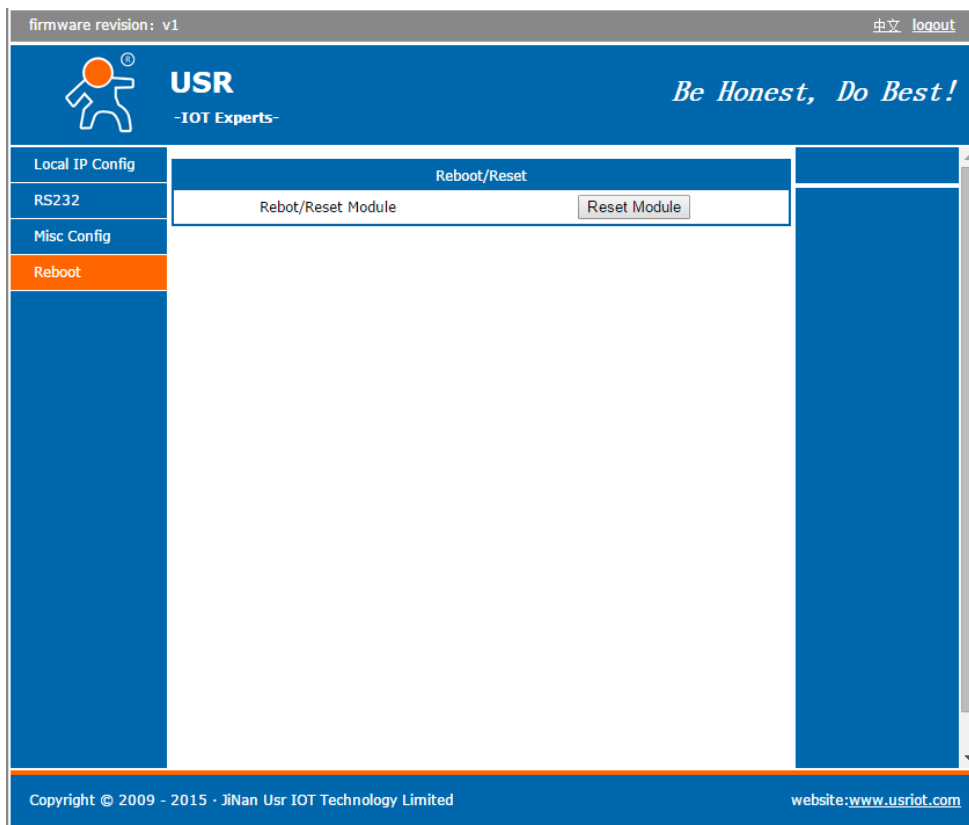


Diagram 4-5 Web--Reboot

4.2. Network command(setup software)

1. through software USR-Kx;
2. Network command(need to ask for protocol).
3. Down below is the Setup, <http://www.usriot.com/Download/237.html>

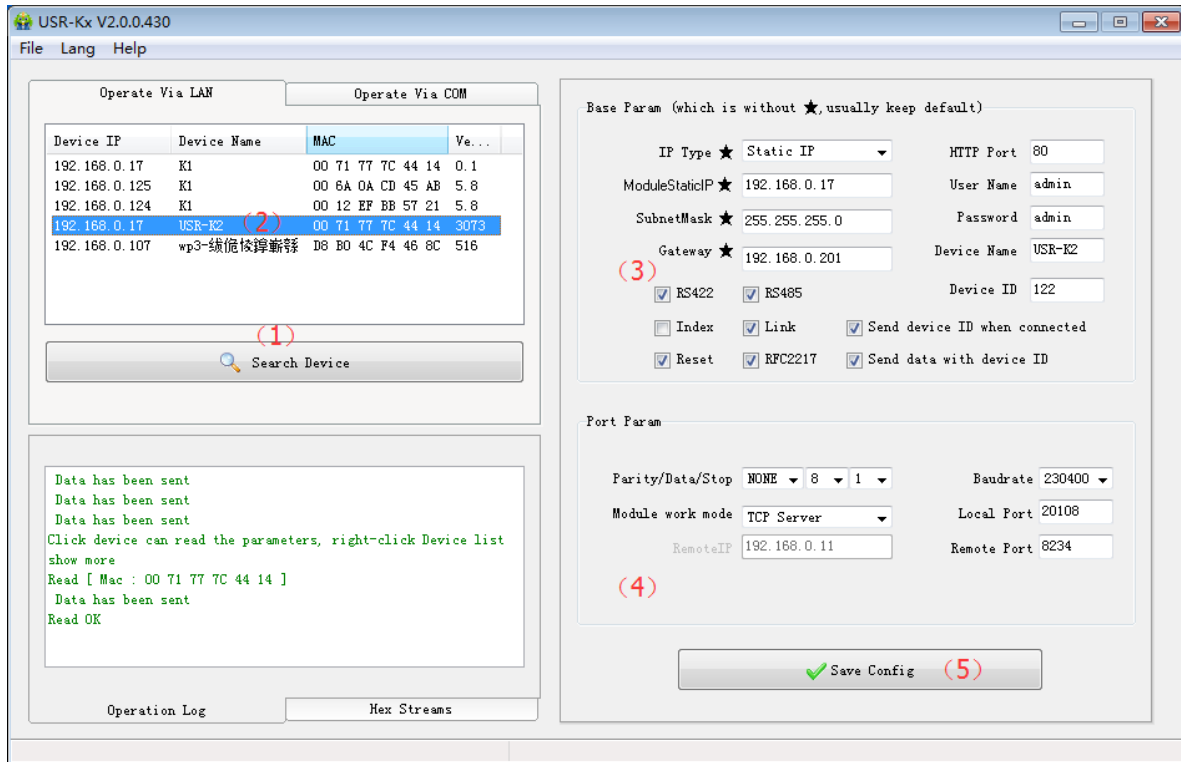


Diagram4-9 Setting Software

- (1) Click 'Search Device';
- (2) Select device in search list;
- (3) Setting Base paramters
- (4) Setting Port paramters
- (5) Click 'Save Config', the paramters will take effect;

4.3. Firmware Upgrade

- (1) right clicking module's IP,click" Firmware Upgrade"

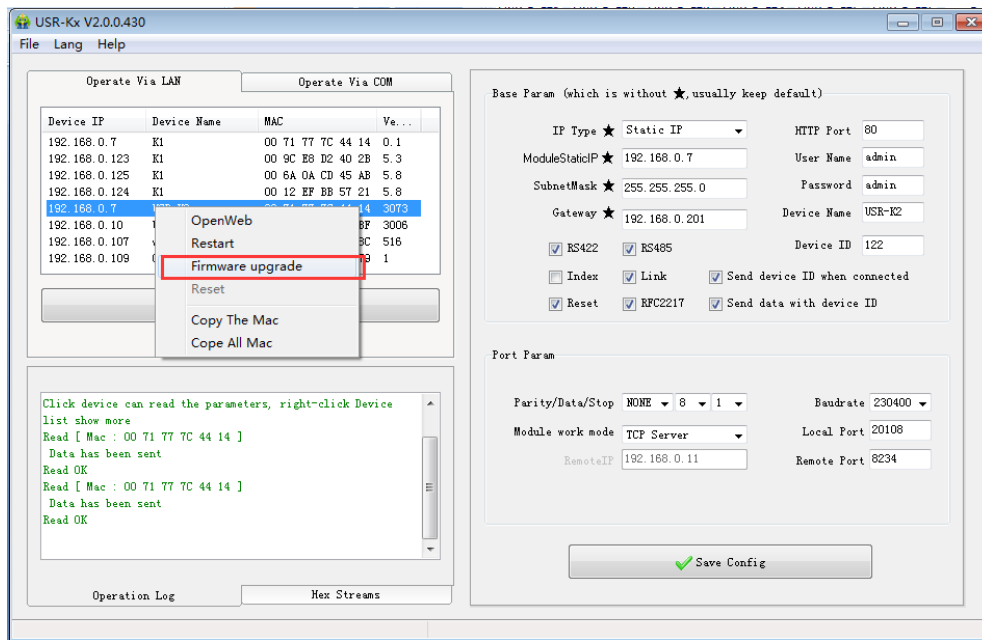


Diagram4-9 Setting Software

(2) Add document

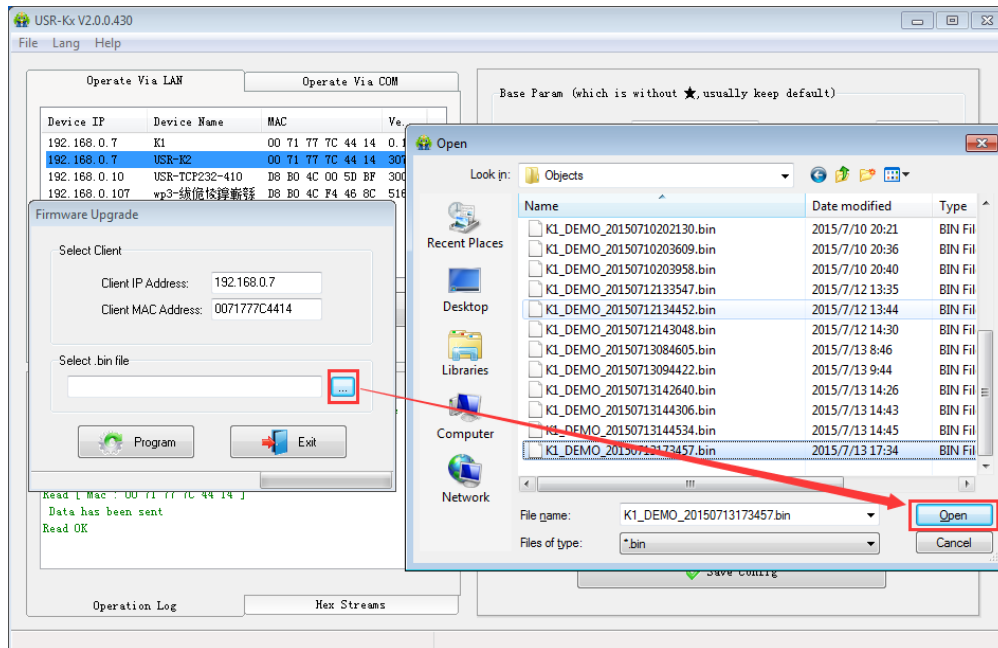


Diagram4-10 Firmware Upgrade

(3) Click program

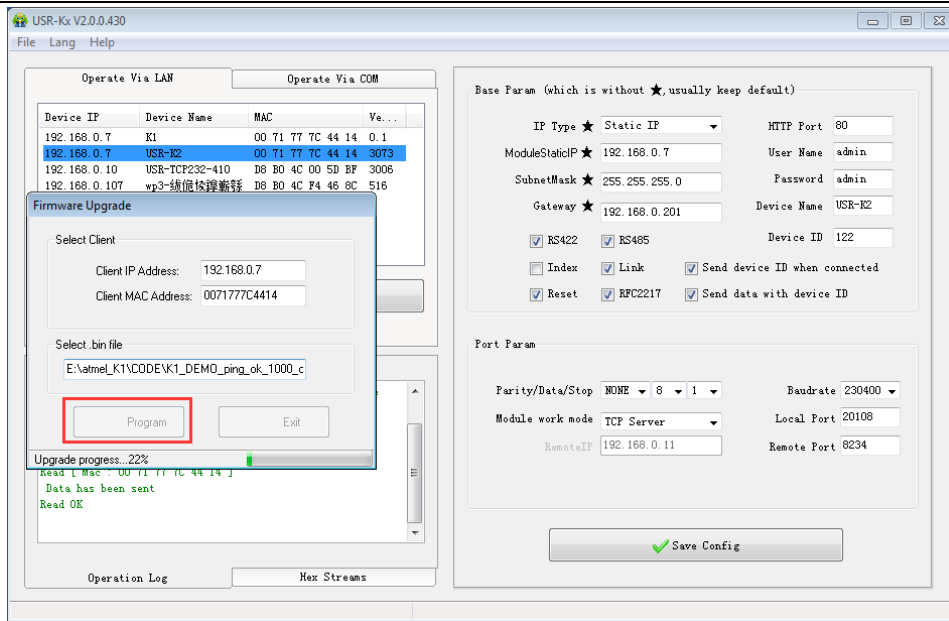


Diagram4-11 Firmware Upgrade

- (4) Successful and click “Exit”
- (5) If failed reset and again

5. Hardware Description



Diagram 5-1 USR-K2

5.1. Technical Specifications

Major characteristic	Parameter
Name	USR-K2
CPU	32bit 48MHz (Cortex-M0)
Flash	128KBit
RJ45	
Socket	1
Speed	10/100M MDI/MDIX
Net protocol	IP, TCP, UDP, ARP, ICMP
Buffer	send: 4K bytes, receive: 2K bytes
Network interface	8 pin RJ45
Serial	
Port Number	1
Interface Standard	3.3V TTL: pin type
Data Bits	5, 6, 7, 8
Stop Bit	1, 2
Check Bit	None, Even, Odd, Space, Mark
Baud Rate	600 bps ~ 921.6 Kbps
Flow Control	null
Buffer	receive: 800 bytes
RS-485 Pull-up and Pull-Down Resistor	null,reserved 485 send-receive control pin

Parameter specification	
Physical Size:	PCB size: 21.6*13.5*32.6MM (L*H*W)
Temperature and humidity range	Operating temperature: -25 to 75 ° C Storage temperature: -40 to 80 ° C Storage humidity: 5% to 95% RH

Diagram 5-2 Technical Specifications

5.2. Hardware Description

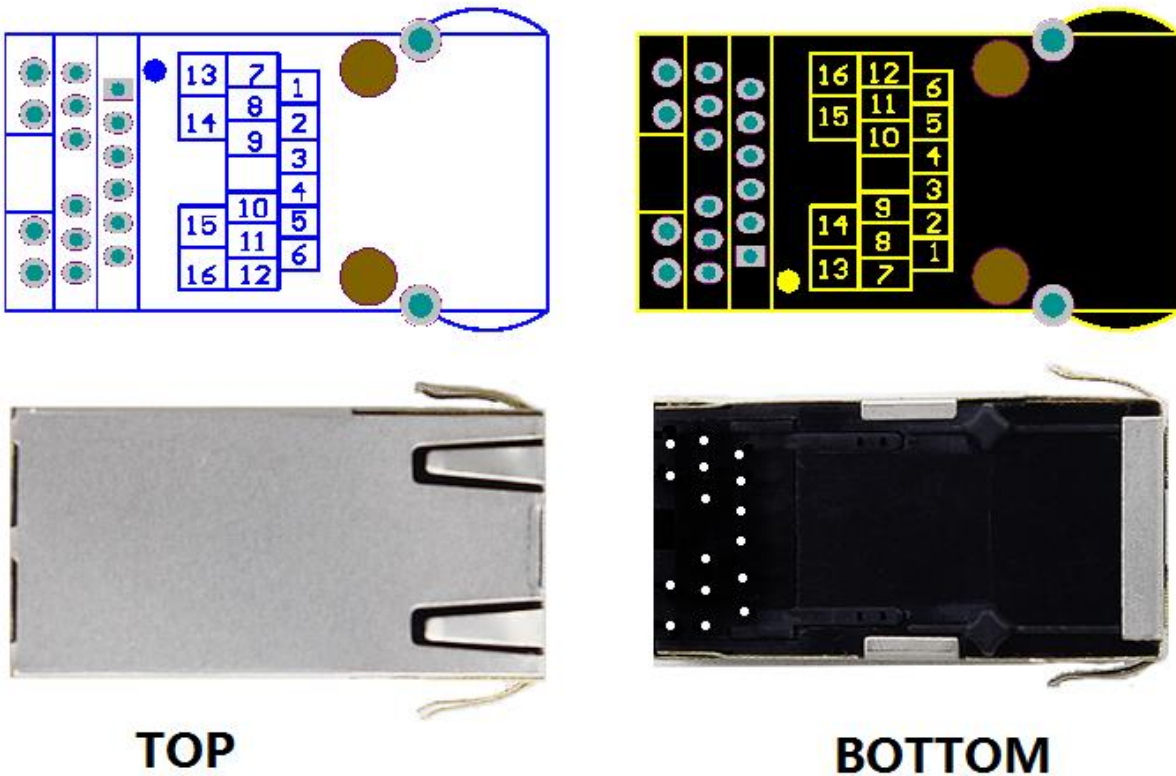


Diagram 4-3 Technical Specifications

No.	Pin	Function	Descriptions
1	N/C	N/C	N/C
2	N/C	N/C	N/C
3	LINK		Can be used as a network connection status indicator pin
4	RST	RESET	Pin received 200ms low to reset the whole module. If you do not use, Must be suspended. Note: The module is powered automatic reset, it is

			recommended that connect the MCU IO port, reset the MCU control module in a particular case.
5	485_EN	485 enable	Can be used as RS485 enable pin
6	CFG	Serial ports Configuration pins	Low, you can use the serial port module configuration. Normal working hours left floating or tied HIGH. Note: give the power module, and then pulled down the CFG pin to enter the serial configuration state.
7	LED2	Network data instructions	Connect to 13
8	RXD	Module data is received	Data receiving end of the module, TTL 3.3V microcontroller
9	TXD	Module data transmission	Data transmission end of the module, TTL level can be connected to 5V or 3.3V microcontroller
10	GND	Signal ground	GND
11	VCC	Power supply	Power supply: 3.3V @ 200mA
12	LED1	Network connection status indicator	Connect to 16
13	LED2	Network data instructions	Connect to 7
14	LED_3.3	Network led power	Power 3.3V
15	LED_3.3	Network led power	Power 3.3V
16	LED1	Network connection status indicator	Connect to 12

Diagram 5-3 I/O introduce

5.3. Hardware to RJ45 Light

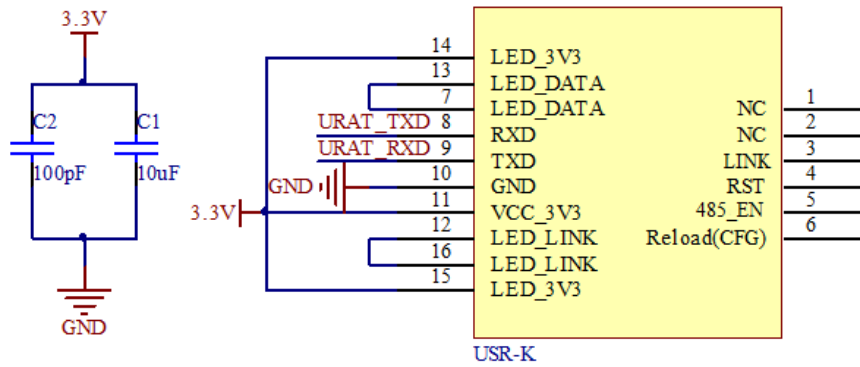
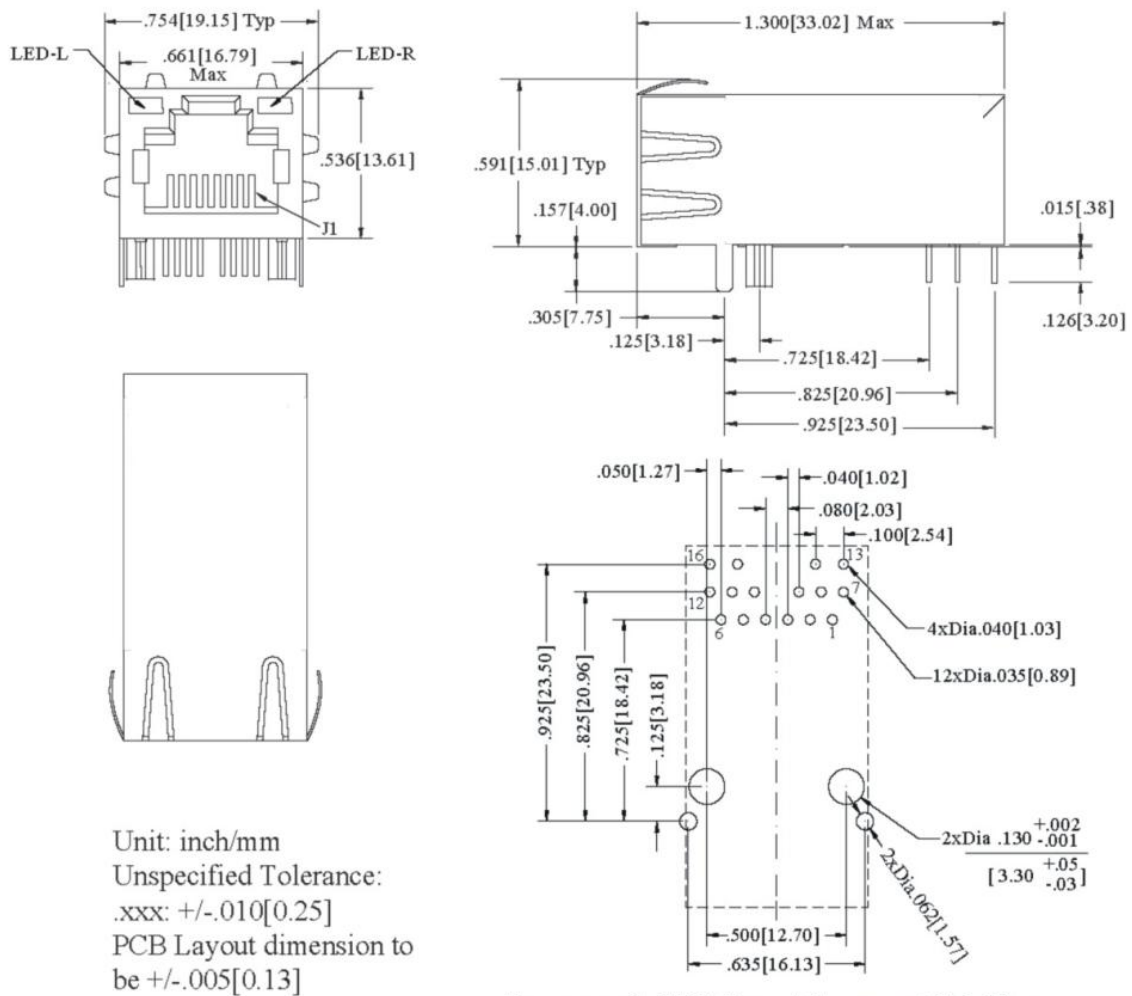


Diagram 5-4 Hardware to RJ45 light

5.4. Size



Recommended PCB Layout Component Side View

Diagram 5-5 size

6. Expand Functions

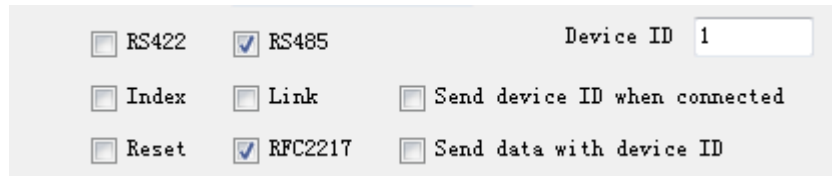


Diagram 6-1 Expand function

6.1. RS485

The "485_en" for the module to enable RS485

"485_en" for RS485, external enable control pin. Select it by default

6.2. Link

The "Link" for the module to establish a communication connection status indicates pin, establish the communication Link pin will output low level, no connection is established, output high level.

"Link" for external Link instructions .Don't select it by default

6.3. Reset

When the module as a TCP Client-side, the module will take the initiative to connect TCP SERVER. When the Reset function, the module tries to connect to TCP Server-side 30 times, still unable to establish a connection, the module will automatically restart. Don't select it by default

6.4. ID

Module as TCP Client-side ID function for TCP Server-side distinguish between data sources, to achieve the establishment of the connection or data communication process device ID will also be sent, the module ID number is set to decimal, range 0 - 65535, requires the receiving end HEX format.

1. Select "Connect" to establish a communication connection, TCP Server-side will receive the corresponding TCP Client-side ID (ID Description: The first four shows for the ID number, the last four digits of the display ID negated to authentication).
2. The following picture shows the module do TCP CLINENT establish a communication connection ID feature is enabled, the setup interface module ID number 12

Don't select it by default

The figure below shows establish a communication connection ID function, the device through the serial communication interface to the TCP Server-side:

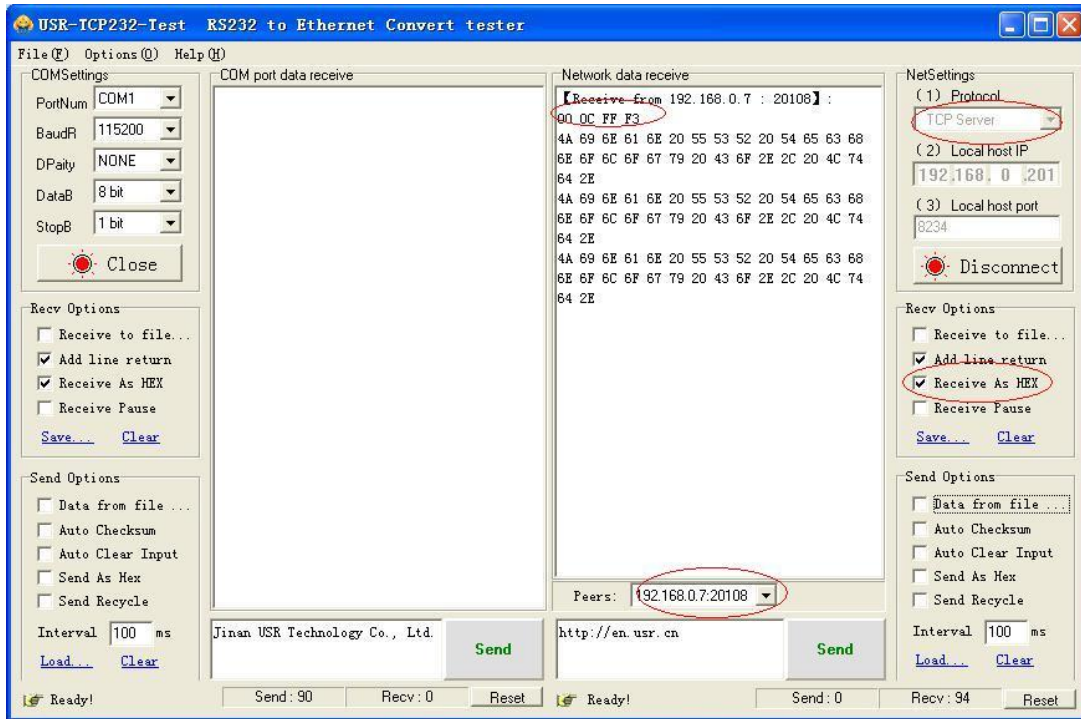


Diagram 6-2 ID

3. Select data during each data transfer, TCP Server-side will receive the corresponding TCP Client-side ID (ID Description: ID before data transmitted only display four-digit ID number).

The following picture shows the module do the TCP CLINENT ID feature is enabled, data transmission module ID number 12 setting interface:

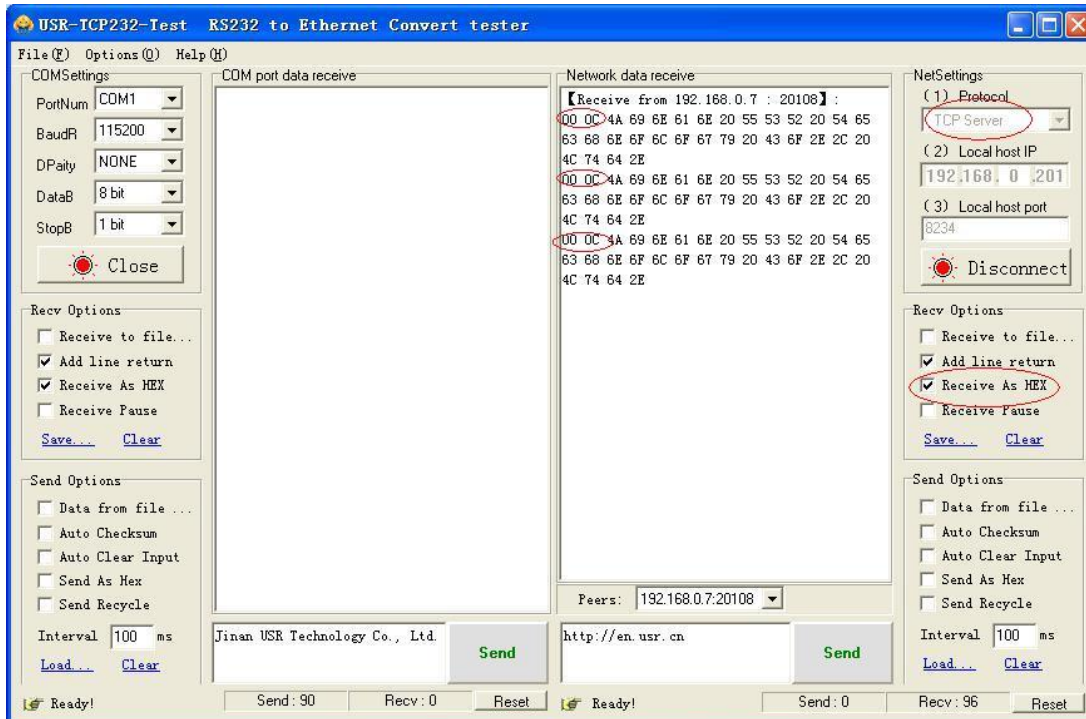


Diagram6-3 USR-TCP232-Test ID

The figure below shows the data communication ID function, the device through the serial port to TCP Server

communication interface:

6.5. Index

When module as TCP SERVER and establish four connections at most, server-side at the same time send data to four CLIENT and SERVER the receiving Client-side data can not distinguish between sources of data, the Index function can send and receive data source selection.

Index function is enabled, communication data is displayed corresponding Client side device number, specific parameters are described below:

1. When receive data from Ethernet, module will send data to serial port with head 49 N ,followed by data. 49 represent incoming data, N represent client index.
2. When user MCU want send data to module serial port, start with head 4F N data... 4F represent send out, N represent which client.
3. When new TCP connection incoming, module will send 43 N M to serial port, indicating that there is current link N accessed, total link number M.
4. When link number have exceed maximum, new link requirement will lead to message 46 46.
5. When disconnect, module will send 44 N M, represent current link N is delete, left link M.

Note: The above values set are HEX format.

Don't select it by default

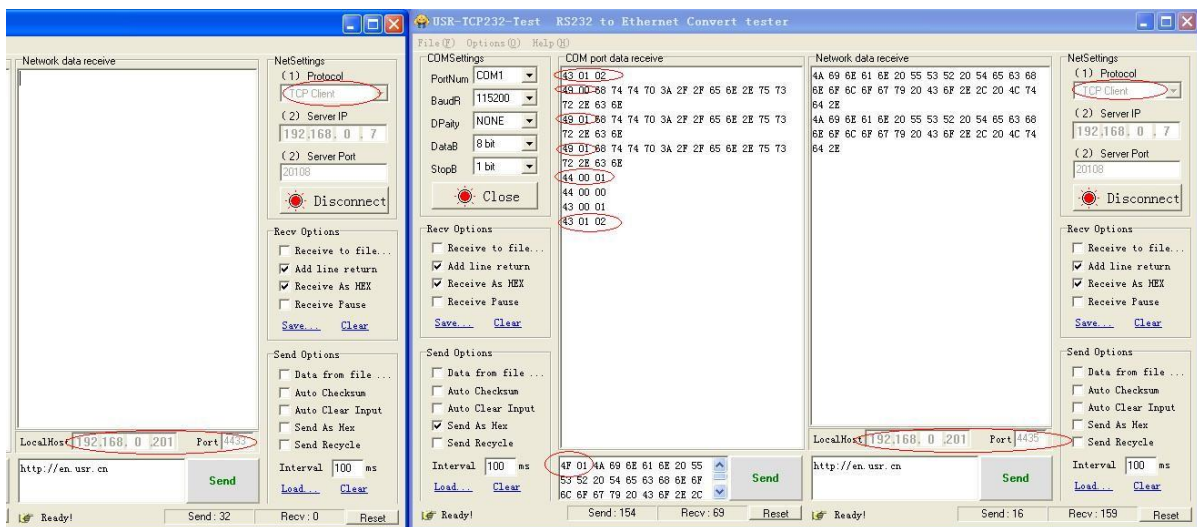


Diagram6-4 the test of index

6.6. RFC2217

RFC2217 is an agreement for setup com port settings via Ethernet by socket, Our product support an agreement like that, but not standard RFC2217, it is more sample and easy than RFC2217.

1. When module receive setup command, if is a valid command(right packet head and right checksum), the module will change self setting and answer nothing, else the data bits would be sent out at com port.
2. TCP Client, TCP Server, UDP Client, UDP Server, UDP broadcast support this function.
3. All changes will work at once, but not save to module, when power off will lose the settings.

Select it by default

The command length is 8 bits, detail as follow table. The demo bytes are in hex mode:

Name	Packet header	Band rate	UART bits setting	Check sum
Bytes	3	3	1	1
Description	Three bytes	Band rate in hex mode, High byte first.	Parity/data/stop settings, see follow table.	Check sum of last 4 bytes
For example (115200,N,8,1)	55 AA 55	01 C2 00	83	83
For example (9600,N,8,1)	55 AA 55	00 25 80	83	83

Diagram6-5 RFC2217 introduce

Appendix: UART bits setting detail.

Bit	Description	Value	Description
1:0	Data bits	00	5 bits
		01	6 bits
		10	7 bits
		11	8 bits
2	Stop bits	0	1 bits
		1	2 bits
3	Parity enable	0	Not enable Parity
		1	Enable Parity
5:4	Parity type	00	ODD
		01	EVEN
		10	Mark
		11	Clear
8:6	Not used	000	Please fill 0

Diagram6-6 UART bits setting detail

Test bits

55AA5501C2008346 For 115200 N,8,1

55AA550025808328 For 9600 N,8,1

Those two data is not transferred to serial, but the packet not conform will be transferred and revealed.

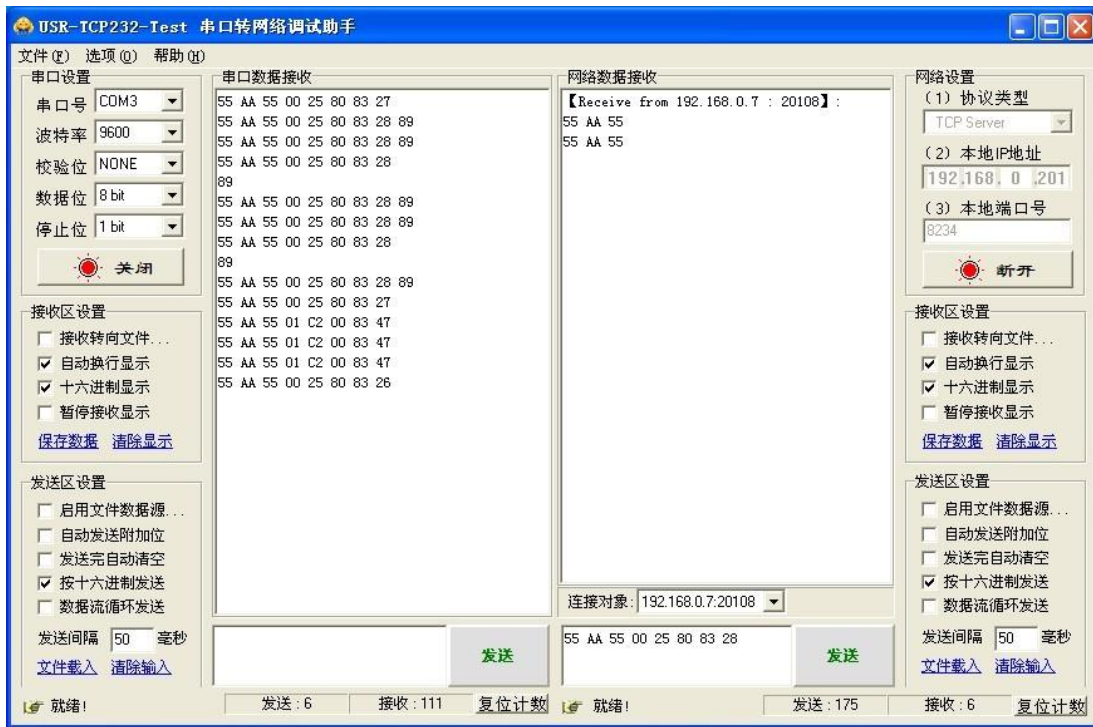


Diagram6-7 RFC2217 for test

Open this function then open RFC2217 via USR-VCOM so serial port baud rate of PC application software serial server device can be matched automatically.

7. Common Questions

7.1. Work Across Network Segment

If your USR-K2 device's IP is 192.168.0.7, and remote PC's IP is 192.168.1.7, we need to config. Subnet mask of USR-K2 device, PC, and router to 255.255.0.0, if not, USR-K2 module will not communicate normally.

7.2. More Network Cards

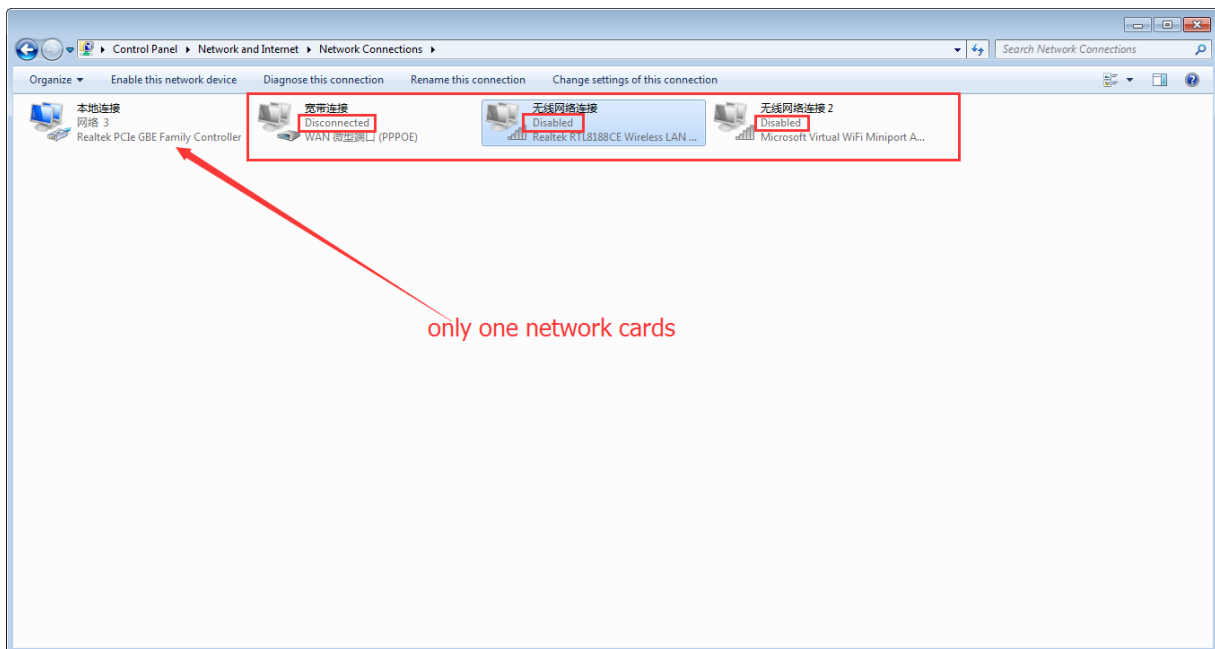


Diagram 7-1 pc

7.3. Every Period of Time, Module Dropped

1. Firewall is no disable and antivirus software isn't off.
2. The IP address conflict.
3. More network cards is open.
4. A power shortage or oversize ripple voltage.

7.4. Search Device Failure, Port Occupied

Open more one setup software ,close it.

8. Modified history

Revision history

V1.0.0 New

9. Contact Us

Company: Jinan USR IOT Technology Limited
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Support : <http://h.usriot.com>
Email: sales@usr.cn