USR-C322

- Low Power Minisize WiFi Module User Manual

V1.3

- Support Wi-Fi@2.4 GHz 802.11 b/g/n wireless standards
- Support WEP-A、WPA/WPA2 security mode
- Support AP/STA working mode
- Based on ARM Cortex-M4 kernel running frequency of 80 MHZ
- Fully integrated serial port turn wireless TCP/UDP transmission function,the rate of serial port up to 3M bps
- Search in local area network (LAN) and wireless parameters setting function
- Support TCP/UDP Client registered packet mechanism
- Support Simplelink/usrlink Networking configuration
- Support similar RFC2217 automatic baud rate adaptation function
- Support AT+ simple instruction set configuration
- Single 3.3 V power supply
- Ultra low power mode, support deep dormancy
- Support Internal/External(I-PEX) Antenna Option
- Minisize:18.22mm*26.65mm*2.8mm SMT
- FCC/CE Certificated

Catalogue

1、Module Overview

1.1 Module Overview

USR - C322 is a low-cost module of the series wifi module C32x.The module is a low-power 802.11 b/g/n modules that design for achieving the application of the embedded system, wireless network communication. Through the module, the customer can set a physical device connected to a wifi network, so as to realize the control and management of the Internet of iot.

The hardware of module integrate MAC, baseband chip, rf transceiver unit, as well as the power amplifier; Adopting CC3200 chip of TI company, the kernel of industrial-grade ARM architecture (M4 kernel, running frequency of 80 MHZ. The internal ultra-low power operation mechanism, can run effectively low-power module; Support WiFi protocol and TCP/IP protocol, the user only needs simple configuration, can achieve the function of UART devices connected to the Internet.

Small size, easy to welding in the customer product veneer of hardware circuit. And the module can choose the application of the internal or external antenna, supplying customers multiple choices.

Module size: 18.22 mm * 26.65 mm * 2.8 mm SMT assembly

The basic function of the module is described below:

➢ Can work in AP mode for other WIFI devices access communication, can also work in the STA mode, access to the wireless router to realize communication
➢ With a Socket communication links, can be set to the TCP Server, TCP Client, and UDP Server, UDP Client communication; The Socket in the TCP Server mode, can support up to four TCP Client connection
➢ Module supports UART translate, can use AT commands to arbitrary switching.

1.2 Characteristics of Module

● Support Wi-Fi@2.4 GHz 802.11 b/g/n wireless standards
● Support   WEP-A、WPA/WPA2 security mode
● Support AP/STA working mode
● Based on ARM Cortex-M4 kernel running frequency of 80 MHZ
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1.3 Product Feature

Module parameters

| classify	parameter	value
Wireless Parameter	Certification	FCC/CE
	Wlan Standard	802.11 b/g/n
	Transmit Power	17.0 dBm @ 1 DSSS 17.25 dBm @ 11 CCK 13.5 dBm @ 54 OFDM
	Receive Sensitivity	–94.7 dBm @ 1 DSSS –87.0 dBm @ 11 DSSS –73.0 dBm @ 54 OFDM
	Antenna	External:I-PEX Internal:On-board antenna
Hardware	Data Interface	UART 300-3M bps
	Working Voltage	3.0V~3.6V
	Working Current	（voltage 3.3 V） Continue to send:~75mA normal mode:average: ~18mA，top: 200mA In the web:3.5mA Standby:lowest 25uA
	Working Temperature	-40℃- 85℃
	Storage Temperature	-45℃- 125℃
	Size	18.22mm*26.65mm*2.8mm
	Footprint	SMT
Software	Wireless Network Type	AP/STA
	Security Regime	WEP-A/WPA-PSK/WPA2-PSK
	Encryption Type	TKIP,AES,TKIP/AES
	Networking Protocol	IPv4, TCP/UDP
	User Configuration	AT+ instruction set Web

1.4 Application Area

- Cloud Connected
- Home Automation
- Household Appliances

- Access Control
- Security and Protection System
- Smart Energy
- Industrial Control
- Intelligent Electrical Outlet Box/Instrument Measurement
- IPNetwork Sensor Nodes
- Wireless Printer

2、Hardware Description

2.1 Pin Definitions
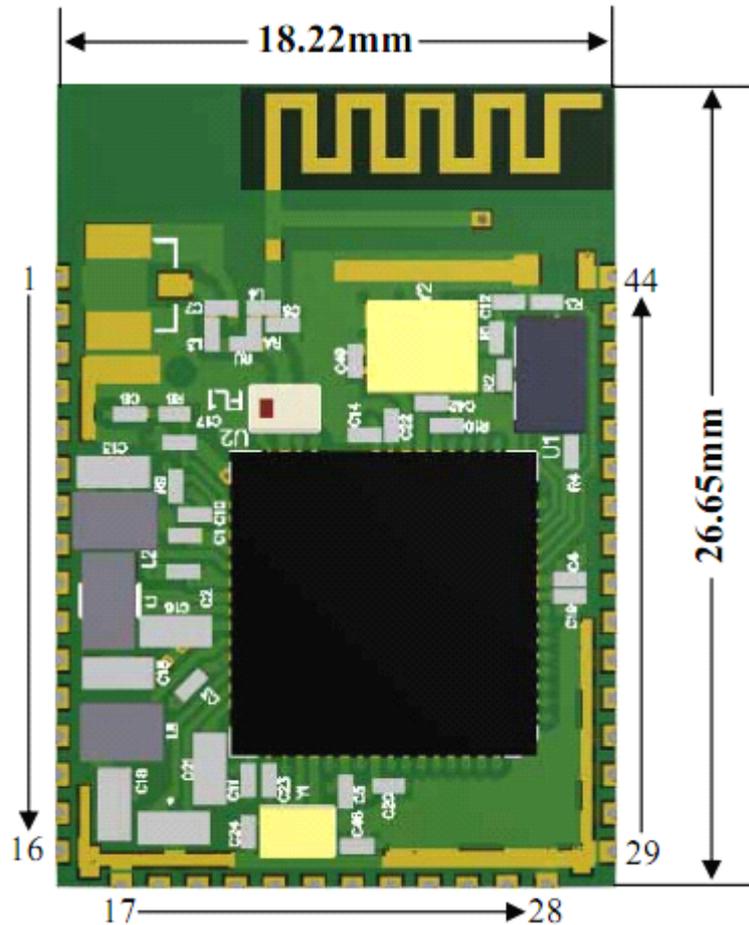
The module pin

Pin	Net Name	Functional Description
1	GND	GND
2	GPIO_26	General GPIO
3	GPIO_27	General GPIO
4	nReset	Module reset pin, low level effectively
5	SOP2	Start the choice, default NC
6	SOP1	Start the choice, default NC
7	SOP0	Start the choice,default NC
8	ANA DC-DC	The RF power output pin, hung up
9	NC	NC
10	NC	NC
11	GND	GND
12	GND	GND
13	VBT_CC	Power input pin, please connect + 3.3 V
14	VDD_ANA2	RF Power input pin, please connect + 3.3 V

15	GPIO_30	General GPIO
16	NC	NC
17	GND	GND
18	GPIO_00	General GPIO
19	UART TX	UART TX for module
20	UART RX	UART RX for module
21	nReload	Module factory default pin, low level effectively，simplelink start
22	nReady	Work instructions pin of module, low effective, connect an external LED
23	nLink	WiFi link pin of module, low effective, connect an external LED
24	UART CTS	A serial port flow control pin CTS
25	UART RTS	A serial port flow control pin RTS
26	GPIO_08	General GPIO
27	GPIO_09	General GPIO
28	GND	GND
29	GND	GND
30	GPIO_10	General GPIO
31	GPIO_11	General GPIO
32	GPIO_12	General GPIO
33	SPI IRQ	SPI the request of sending pins
34	SPI_CLK	SPI CLK
35	SPI_MISO	SPI MISO
36	SPI_MOSI	SPI MOSI
37	SPI_CS	SPI CS
38	GPIO_22	General GPIO
39	JTAG_TDI	JTAG
40	JTAG_TDO	JTAG
41	GPIO_28	General GPIO
42	JTAG_TCK	JTAG
43	JTAG_TMS	JTAG
44	GND	GND

2.2 Antenna Shows

Module has two antenna version, internal antenna and external IPEX interface respectively:
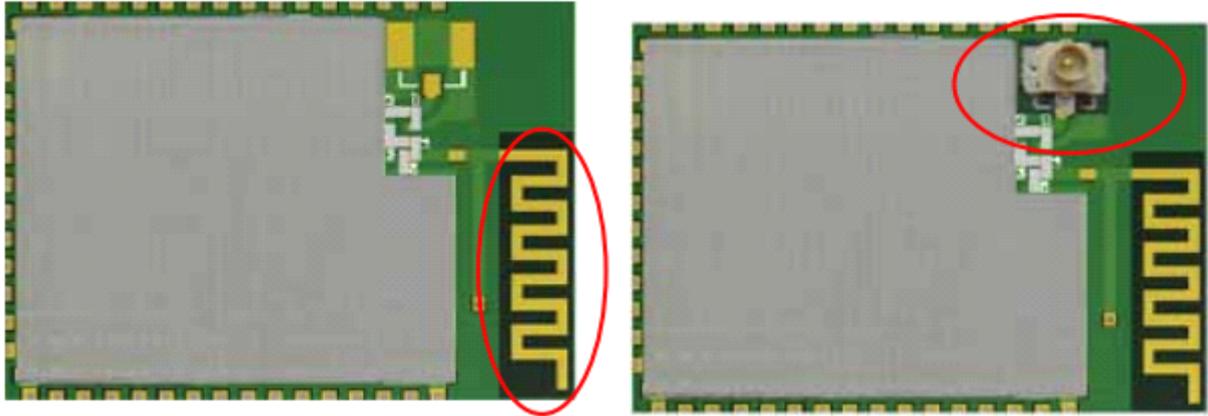
Internal Antenna   External:I-PEX

2.3 Size and Layout Recommendations

Module size as shown:
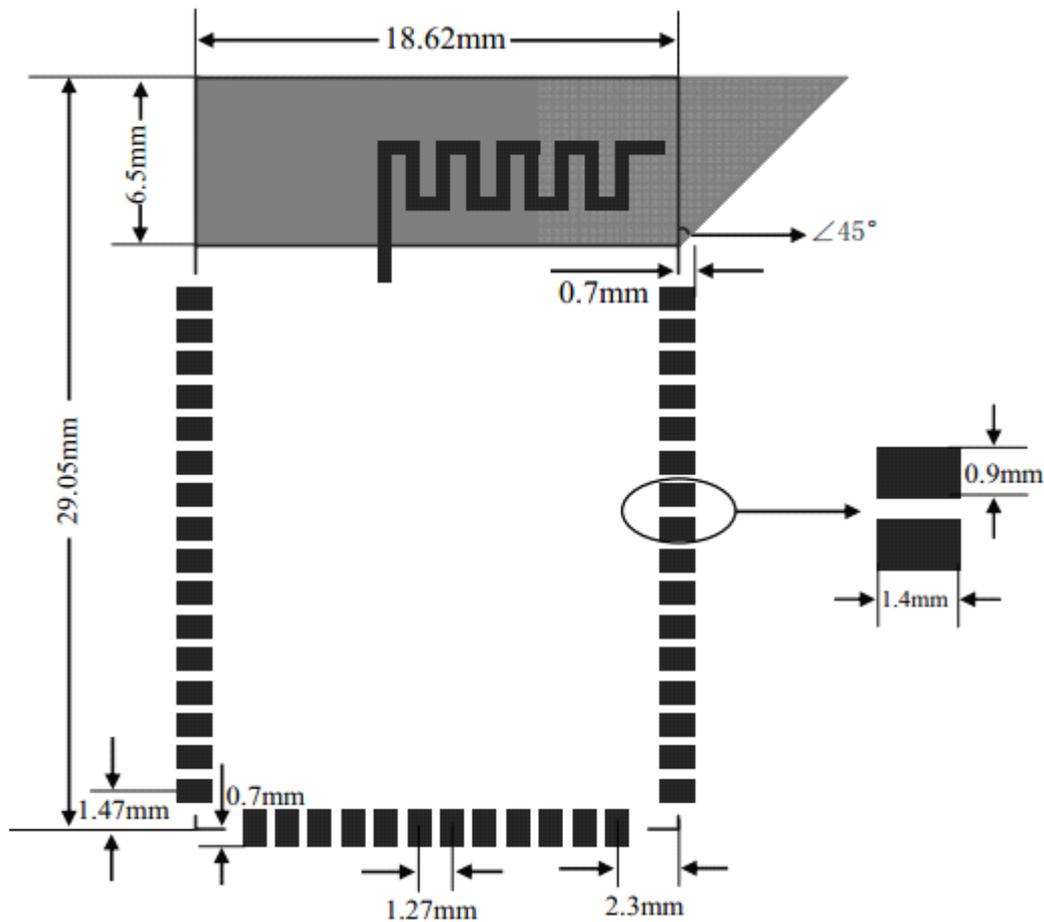
Cloth plate specification:

1) Internal Antenna

Customers to use the internal antenna, the need to abide by the following considerations and internal antenna module placed general rules:

On the user's PCB, and grey shaded area above the corresponding area cannot be

placed components and GND.

> Antennas away from the metal, at least distance with high components around more than 10 mm;

> Antenna part cannot be metal shell, plastic shell need at least more than 10 mm away from the antenna;

It is suggested that module is placed in the following areas of the user's board as far as possible, to reduce the influence of the antenna and wireless signal, and at the same time, please consult someone technical support staff to assist the placement of modules and related areas of the Layout design.
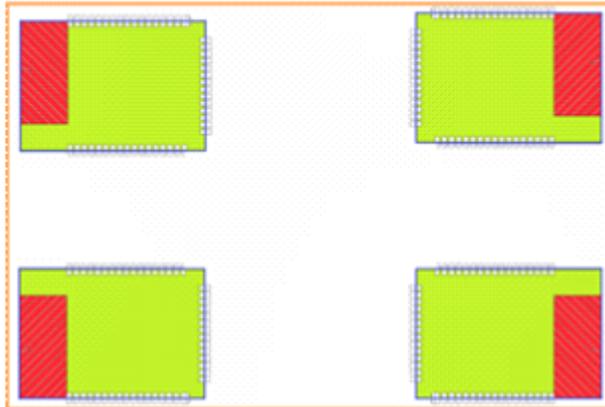
2) external antenna

Customers to use external antenna lead, according to the requirement of the IEEE802.11 b/g/n standard, need to connect the 2.4 g external antenna. External antenna using IPEX interface. The parameters of the external antenna requirements in the table below details.

item	paramter
frequency range	2.4~2.5GHz
impedance	50 Ohm
VSWR	2 (Max)
Return Loss	-10dB (Max)
Connection Type	IPEX

2.4 The Hardware Circuit Design Reference

The hardware design considerations:

> Need to add more than 200uf capacitance module power supply pin.

> SOP0、SOP1、SOP2 no connect.

> Reset、Reload need to pick up on the 4.7 K resistor.

> nLink,nReady Effective for low level output.
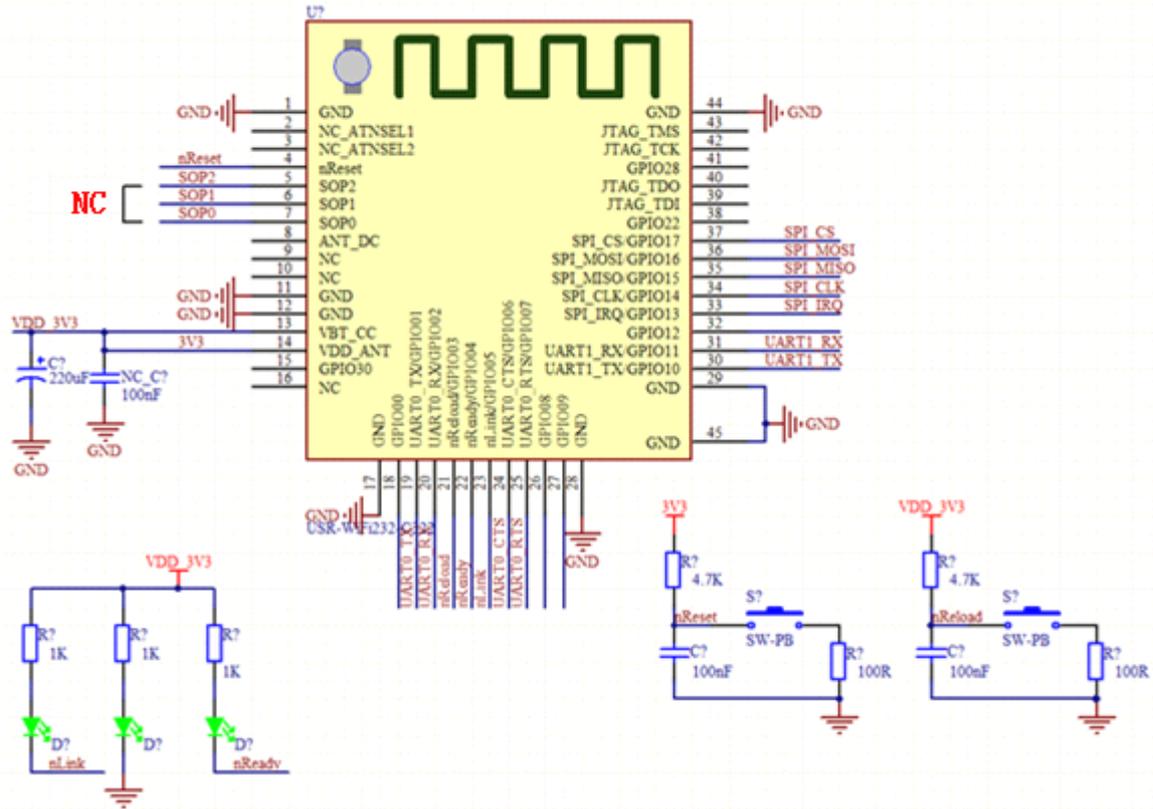
3、Product Function

3.1 Work Mode

Module consists of two work modes: translate mode and command mode

- **Translate Mode**

    In this mode, the module realizes the UART and transparent transmission between network, realize common serial data transfer between devices and network equipment.

- **Command Mode**

    In this mode, the user can through the AT command to UART module and query and network parameters Settings. When using the AT + ENTM exit command mode, the default back to translate mode.

3.1.1 Translate Mode

1. Translate Mode

UART interface can transparent transmission mode has the advantage of UART interface and network communication of the plug and play, which reduce the complexity of the user to a great extent. Modules to work in a transparent transmission mode, the users only need to configure the necessary parameters, UART interface and network communication can be realized. After power on, module automatically connected to the wireless network and server configured.

Transparent transmission mode is fully compatible with your own software platform, reducing the workload of integration of wireless data transmission software development. Users need to preset parameters usually include:

- ➢ Wireless network parameters
    - ◆ SSID
    - ◆ security mode
    - ◆ secret key
- ➢ TCP/UDP parameter
    - ◆ protel
    - ◆ connection type
    - ◆ destination port
    - ◆ destination address
- ➢ UART parameter
    - ◆ Baud rate
    - ◆ data bits
    - ◆ stop bit
    - ◆ parity bit
    - ◆ Hardware flow control

2. UART Frame Scheme

Module in the receiving UART data, will continue to check the time interval of two adjacent bytes. If the time interval is greater than the set packing time (default 10 ms, can

be set up by the AT + UARTTE), argues that the end of a frame, or has been receiving data, in command mode is greater than 1 k bytes are discarded the received data, in translate mode is greater than 1 k bytes are sent packing.

3.1.2 Command Mode

In command mode, the module will no longer work to translate, UART port AT this time for receiving the AT command, the user can through UART port to send AT commands to module, UART for querying and setting module, network and other related parameters.

3.2 Wireless Network Mode

There are two kinds of wireless module WIFI working mode: the STA and AP, can provide users with flexible network mode and the network topology method.
< Nouns that >
AP:The wireless access point, is the center of a wireless network node. Commonly used wireless router is an AP, other wireless terminal can be interconnected by AP
STA: wireless site, is a wireless network terminal. Such as notebook computer, PDA, etc.

3.2.1 Module As a STA

Module as the STA is one of the most commonly used network mode, and is composed of a router AP and many STA, the following figure. Its characteristic is AP in a central position, communication between the STA forward by AP.
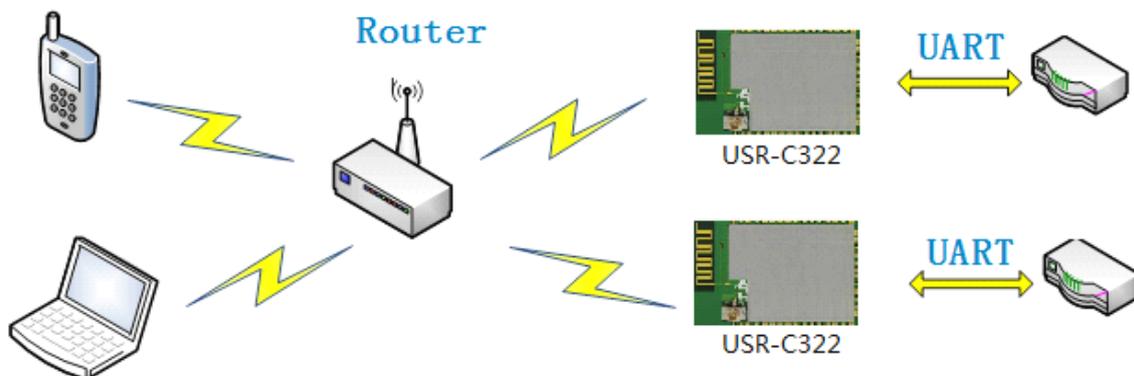
3.2.2 Module As a AP

Modules as AP mode, can achieve phone/PAD/computer without any configuration, fast access module for data transmission. In addition, you can login module internal web page to set parameters

USR-C322
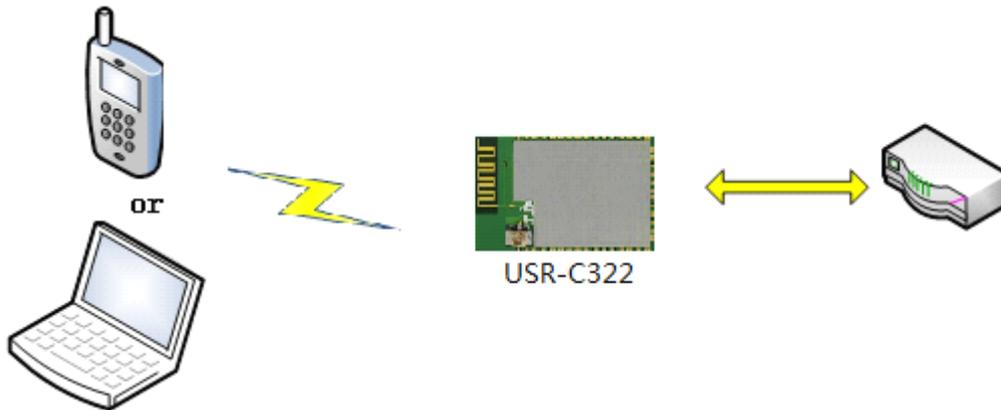
< note > : module in AP mode, can support only 1 STA access devices.

3.2.3 Encryption Type

Encryption is scrambling to message data, ensure the security of data transmission, increase the security of communication. Support multiple wireless network encryption methods, including:

- ➢ WEP-A
- ➢ WPA-PSK/TKIP
- ➢ WPA-PSK/AES
- ➢ WPA2-PSK/TKIP
- ➢ WPA2-PSK/AES

3.3 Socket Communication

- ➢ The module has a TCP Socket. When the module in translate mode, to write the data of the UART interface module, module will automatically send a Socket; Module through the Socket received data, send out through the UART interface.
- ➢ Socket works include: the TCP Server, the TCP Client, UDP Client, and UDP Server, please refer to the AT command set method in the AT + SOCKA instruction set or through a web page Settings.
- ➢ When a TCP Server Socket set, can support up to four TCP Client TCP link connection. In a multiple TCP link connection mode, from the TCP transport data will be forwarded to them one by one on the UART interface. Come from the UART interface data will be copied into a more, in every TCP forwarding a link. Specific data flow diagram shown below:
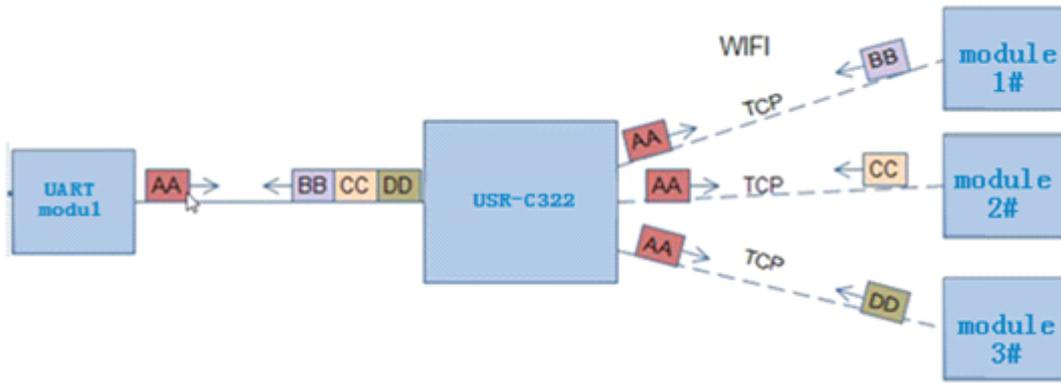
- ➤ When the Socket set to UDP Server, if a serial port receives data first, module sends the data to the already set IP, port (AT + SOCKA set), if the UDP Server receives data, data source address, the module will remember after a serial port, after receipt of the data module will be transmitted to the address data.

- ➤ When the module is set to the UDP Client module only to have set the IP and port to send data, and receive only has set the IP and port address data (AT + SOCKA Settings), other address to send more data is not forwarded to the UART.

3.4 Search in local area network

Module support within the local area network (LAN) search function, that is, when the module is connected to a wireless router, the user can through to a fixed port sends UDP broadcast way, to get the IP address of the module of the current, in order to realize the search and communications equipment. SEARCH the port and keyword can be set by the AT + SEARCH commands, default: 48899, www.usr.cn.

Search tool operation process:

1. Through the UDP broadcast (broadcast address: xx. Xx. Xx. 255, port: 48899) to send a password, the default password is: "www.usr.cn", the longest can be set up 20 bytes.

2. Module after receiving the password, if the password is correct, the module to enter configuration mode, to the address (unicast, source port) send the local IP address, MAC address, the module name, version number. (IP, MAC, MID, ver 10.10.100.254, D8B04CFC0000, USR - C322, 01.01.10). Module to enter configuration mode set if not received within 30 seconds after the command, the module will exit the configuration mode, the user needs to send search command word, enter configuration mode.

3. Users can through the network to the port to send AT commands to set up and read the module working state, the AT command format with a serial port the AT command.

Note: search tools and modules must be within the same LAN, if multiple STA even on a router, run the search tools of the computer and even on the router. This search tool to search all of the STA.

3.5 TCP/UDP Client Registration Packet Mechanism

When the module working in TCP or UDP Client Client mode, the user can open registration packet mechanism, in order to realize the server to the distinction between the data source, data of different equipment monitoring. MAC and ID registration packet is divided into two kinds, MAC is 6 bytes, ID 0-65535, ID value can be set. Registration packet ID is mainly used for the D2D software of the company..

Registered packet opened and closed by AT + REGENA.

Registered packet implementation mechanism is as follows:

➢ TCP Client: There are two kinds of TCP Client: registration mechanism:

① Just send a registration packet, when the module is connected to the TCP Server module will send TCP Server MAC (6 bytes) or ID (4 bytes), Server by MAC or ID to distinguish between different devices.

② Every packet of data has registration information, TCP Client after the link to the server, a serial port receives each packet of data to increase MAC or ID, to distinguish between equipment. ID or MAC choice, can be set by the AT + REGENA.

➢ UDP Client: each module on the sending UDP packets, MAC or ID will increase in each packet header information, and then send.

3.6 Fast Access Wi-Fi(usrlink)

When one module works in AP mode, it opens a UDP port used to receive fast access Wi-Fi commands, the port number is 49000. The phone PDA can directly connect to Wi-Fi network of the module, send commands to search router list and set SSID and password. After the completion of set up, module will automatically restart, connected to the router, work in the STA mode at this time.

Protocol format:

Searching command

No	Name	Num of Bytes	Description
1	head	1	fixed value:0xFF
2	length	2	Sum of data bytes from length bytes to check byte(not contain length bytes and check byte).
3	cmd	1	Command type, 0x01
4	check	1	Sum of bytes from head (not contained) byte to check byte (not contained).

Response for searching

No	Name	Num of Bytes	Description
1	head	1	fixed value:0xFF
2	length	2	Sum of data bytes from length bytes to check byte(not contain length bytes and check byte).
3	cmd	1	Command type, 0x81
4	AP num	1	The number of AP what module scans
5	SSID1	Unsized	The SSID of router 1
6	separator	1	Separator of SSID1, fixed value:0x00
7	Signal strength1	1	Signal strength of router 1,0~100:0%~100%
8	separator	2	Separator of signal strength1, fixed value: 0x0D,0x0A
…	…	…	………
M	SSID n	Unsized	The SSID of router n
M+1	separator	1	Separator of SSID n, fixed value:0x00
M+2	Signal strength	1	Signal strength of router n,0~100:0%~100%
M+3	separator	2	fixed value:0x0D,0x0A
M+4	check	1	Sum of bytes from head (not contained) byte to check byte (not contained).

Example:

Data from phone PDA to module (HEX): FF 00 01 01 02

Data from module to phone PDA (HEX): FF 00 14 81 02 54 45 53 54 31 00 40 0D 0A 54 45 53 54 32 00 37 0D 0A 1F

Explanation:

The phone PDA send searching command to module, the response from module is: SSID of router1 is "TEST1", signal strength of router1 is 64%; SSID of router2 is "TEST2", signal strength of router2 is 55%.

Note: The information of routers is ordered by signal strength.

a) Setting Command

No	Name	Num of Bytes	Description
1	head	1	fixed value:0xFF
2	length	2	Sum of data bytes from length bytes to check byte (not contain length bytes and check byte).
3	cmd	1	Command type, 0x02
4	reserve	1	fixed value:0x00
5	SSID	Unsized	SSID of router
6	separator	2	fixed value:0x0D,0x0A
7	password	Unsized	Password of router
8	check	1	Sum of bytes from head (not contained) byte to check byte (not contained).

Response for Setting

No	Name	Num of Bytes	Description
1	head	1	fixed value:0xFF
2	length	2	Sum of data bytes from length bytes to check byte(not contain length bytes and check byte).
3	cmd	1	Command type, 0x82
4	Check for SSID	1	If the SSID set by PDA exist, check value is 0x01, otherwise is 0x00.
5	Check for password	1	If the form of password set by PDA is correct, check value is 0x01, otherwise is 0x00.
6	check	1	Sum of bytes from head (not contained) byte to check byte (not contained).

Example:

Data from phone PDA to module (HEX): FF 00 0F 02 00 54 45 53 54 31 0D 0A 31 32 33 34 35 36 CE

Data from module to phone PDA (HEX): FF 00 03 82 01 01 87

Explanation:

The phone PDA send setting command to module, SSID is set to "TEST1", password is set to "123456". The response from module is that the "TEST1" Wi-Fi network exist, the form of password is correct.

3.7 Simplelink Configuration

Simplelink function main realization module of intelligent network, namely the quick connect to the AP. Modules work in STA and AP mode, lower Reload pin 0 to 3 seconds, the module get into the Smartconfig configuration, at this time Ready pin output high and low level of 0.5 Hz. The handheld device connected to the module to connect to the AP, open the APP, enter the password, click on "start". Module will automatically restart after successfully connect to the AP.

Note: when using the AT + WSTA AP information query module is connected, password show SAFE, password is not visible.

3.8 RFC2217 Automatic Baud Rate Function

3.8.1 RFC2217 Functional Description

1. RFC2217 is an instant change via Ethernet equipment serial port parameters of a standard protocol, this device supports a similar RFC2217 agreement, not a standard RFC2217, realize the same function, but the deal easier.
2. Sends a command to the device after this agreement, if do set serial port parameters meet the requirements, not return anything, if the calibration error or agreement is wrong, will be as a common packet via a serial port forwarding.
3. TCP Client, TCP Server, UDP Client, and UDP Server, and broadcast the several patterns are support this function.
4. This command changes take effect immediately, do not need to restart, when effective, not save, power is lost.

3.8.2 RFC2217 Protocol Specification

Protocol length is 8 bytes, specific agreement content as follows, for example the value for the HEX format:

designation	Header	Bps	Data bit	Check
length(bytes)	3	3	1	1
explain	reduce misjudgment	baud rate value, high in the former	Different bits to represent different meanings, see table	Sum of the front four
Example (115200,N,8,1)	55 AA 55	01 C2 00	83	46
Example (9600,N,8,1)	55 AA55	00 25 80	83	28

Attachment: a serial port parameters meaning a bit

Bit num	Explain	Data	describe
1:0	Data bits	00	5 bits
		01	6 bits
		10	7 bits
		11	8 bits
2	Stop bit	0	1 bit
		1	2 bits
3	Enabled check	0	Disable check
		1	Enable check
5:4	Check type	00	ODD
		01	EVEN
		10	Mark
		11	Clear
7:6	NC	00	Write 0

3.9 Sleep Mode Introduction

Modules can open low power mode. In module under normal condition, if the network and uart port for certain time 10-240 seconds (AT + SLPTYPE Settings) does not data communication module into low power mode. The user can choose different sleep mode (0 to 4).

Ways there are to awaken the network side and serial port: network side refers to establish the wifi connection, to establish a socket connection with module and send data to the socket, a serial port end points to a serial port to send data.

For example: set up AT + SLPTYPE = 2,200

When the module network end (refer to the socket end) and a serial port for 200 seconds didn't receive the data, the module into Deepsleep mode (mode 2).

3.9.1 Mode Introduction

Mode 0: Active Mode

The Active mode, the system clock is 80 MHZ. Module running various peripherals. Corresponding mode 0, that is, normal work mode, the module optimal performance.

Mode 1: Sleep Mode

Sleep mode, the system clock to 80 MHZ. Through a serial port or network packets, gpio port output, module after awakening from entering hibernation continues to run, wake up the response time shorter than deepsleep mode. Corresponding mode 1.

Mode 2: Deepsleep Mode

Module into deepsleep dormancy, reduced to 40 MHZ system clock. Might wake up via a serial port or network packets, gpio port output, module after awakening from entering hibernation continues to run, wake up the response time a bit longer than the sleep mode. Than the normal operation of the lower power consumption about 5 ma. The corresponding mode 2.

Mode 3: LPDS Mode

Module into LPDS mode, network part keep running, module gpio port output is high impedance state. Via a serial port or network packets wake up, wake up after the restart operation module. Corresponding mode 3.

Mode 4: Hibernate Mode

Module into the hibernate mode, network and MCU are entering sleep mode, gpio port output high impedance state, only through a serial port data. Module after the restart. Power consumption can be achieved the uA level. Corresponding mode 4.

3.9.2 Power Reference Table

No data transmission module, the power consumption mode reference is as follows:

Power mode	UART、GPIO、network	Wake up mode	STA	AP
0	UART、GPIO、network working	none	18 mA	74 mA
1	UART、GPIO、network working	Uart,network	13 mA	71 mA
2	UART、network working	Uart,network	9 mA	70 mA
3	UART、network working	Uart,network	3.5 mA	70 mA
4	GPIO（RXD）working	Uart(RXD)	24 uA	24 uA

The mode to distinguish the table:

Power mode	Still working						Wakeup source		
	Run frequency	MCU	WIFI	UART	GPIO	network	UART	GPIO	network
0	80M	✓	✓	✓	✓	✓			
1	80M	✓	✓	✓	✓	✓	✓	RXD	✓
2	40M	✓	✓	✓	✓	✓	✓	RXD	✓
3	32.768Khz	✓	✓	✓	✓	✓	✓	RXD	✓

4	32.768Khz	✓	/	RXD	/	/	RXD	RXD	/

The difference between all modules, low power consumption mode is as follows:

◆ Wake up the response time: from mode 0 to 4, wake up the response time increases gradually.

◆ Power consumption: from mode 0 to 4, gradually reduce the power consumption.

Example: low power consumption

1、 Wifi module online, various peripherals work is normal, the data transmission between the interval of a few seconds, use "pattern 1".

2、 Wifi module online, various peripherals working frequency decline or does not work, you can use "mode 2" Deepsleep model.

3、 Module to keep online, can through the remote wireless equipment, occasionally translate data, suit to use "mode 3" Lpds mode, remote equipment after wake up the module, the module to establish the connection with the remote device, sending and receiving data.

4、 When the user equipment does not need to be online for a long time, only occasionally arouse initiative to send data to the server, you can use "mode 4" Hibernate mode. A frame to a serial port to send data, wake up module, the module will be according to set the wifi, TCP socket parameters, the active link to the server, translate data, translate is completed according to set the time to sleep.

< note > : serial awakens the module, in Lpds mode, Hibernate mode, practical for the RXD pin. So must contain 0 8 bits of data, namely the need to guarantee the RXD pin has a low level, this packetjust wake up module, data packet loss, not translate.

4、 Parameter Setting

The parameters of the module configuration page configuration, AT + command configuration in two ways, behind will detail the use of two ways.

4.1 Web Page Configuration

4.1.1 The Web Management Page

When using the module for the first time, need some configuration on the module. By PC connection module AP interface, the user can use the web management page configuration.

By default, the module of AP interface SSID, IP address, user name and password are as follows:

parameter	default setting
SSID	USR-C322
IP address	192.168.1.1
mask	255.255.255.0
user name	admin

key	admin

4.1.2 Open Management Web Page

Link with PC wireless card first, after waiting for connection is good, open the IE browser, in the address bar enter 192.168.1.1, carriage return, the login page, the default login as admin, the password for the admin. Web support switch in both Chinese and English, can through the web page top right corner "Chinese | English" switch, also can through the at command set.

Then the web management page will appear. Management page including "system state" and "WiFi parameters" "translate parameters" "additional features" "account management" "return to restart Settings" "about someone.

1）The System Status Page

Mainly for the module operation parameters, including: MAC address, MID number, version and WiFi link state.

中文 | English

Sys Statue	
sys run time	0 days 00:00:24
module MAC	54:4A:16:2E:3C:BA
module MID	USR-C322
module ver	01.03.10
wifi Statue	
wifi mode	Access Point
AP IP	192.168.1.1
AP channel	6
AP ssid	USR-C322
AP secure	Open

Sys status
WiFi Set
Trans Set
Extra function
Account Set
Reload Restar
About USR

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2）WiFi Parameter Setting:

　①　Wifi Mode Select:

　　Wifi model can choose the model of the STA and AP, click save Settings, res tart to take effect.

　②　AP Parameter Setting:

Setting module in AP mode SSID and password (AP mode password for 8-63), encryption mode is WPA2PSK by default mode, click save Settings, restart to take effect.

③ STA Parameter Setting:

Setting module in the STA mode needs to connect AP SSID and password (adaptive encryption module), DHCP is enabled. When the connection of the AP is no encryption, set the password to none. DHCP automatically obtain IP enabled, the module will automatically get the IP, DHCP can ban, through input the IP, subnet mask, gateway, and obtain a static IP, restart to take effect.

Note: when the network name and password does not support the double quotes, comma, and, or, greater than, less than and other special characters.

中文 | English

WiFi Mode Select

| WiFi Work Mode | AP mode ∨ |

Save

AP mode

Network Name(SSID) (1-32 bytes)	USR-C322
Password(8-63 bytes),NONE is Open	NONE
IP address	192.168.1.1
Mask	255.255.255.0

Save

STA mode

Router SSID(Note: case sensitive)	USR-C322
STA Password,Set NONE is Open	NONE
DHCP auto get IP	Enable ∨

Save

Sys status
WiFi Set
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3）Trans Setting:

Peripherals parameters set mainly set serial port, serial port baud rate can be set to 300-3000000, data bits can set 5-8 bits, parity bit can be set to no check, odd parity, parity, stop bits can be set to 1 to 2, a serial port flow control can be set to enabled, the can, take effect after restart.

① Socket set

Transparent transmission mode, the socket protocol, the server address and port.
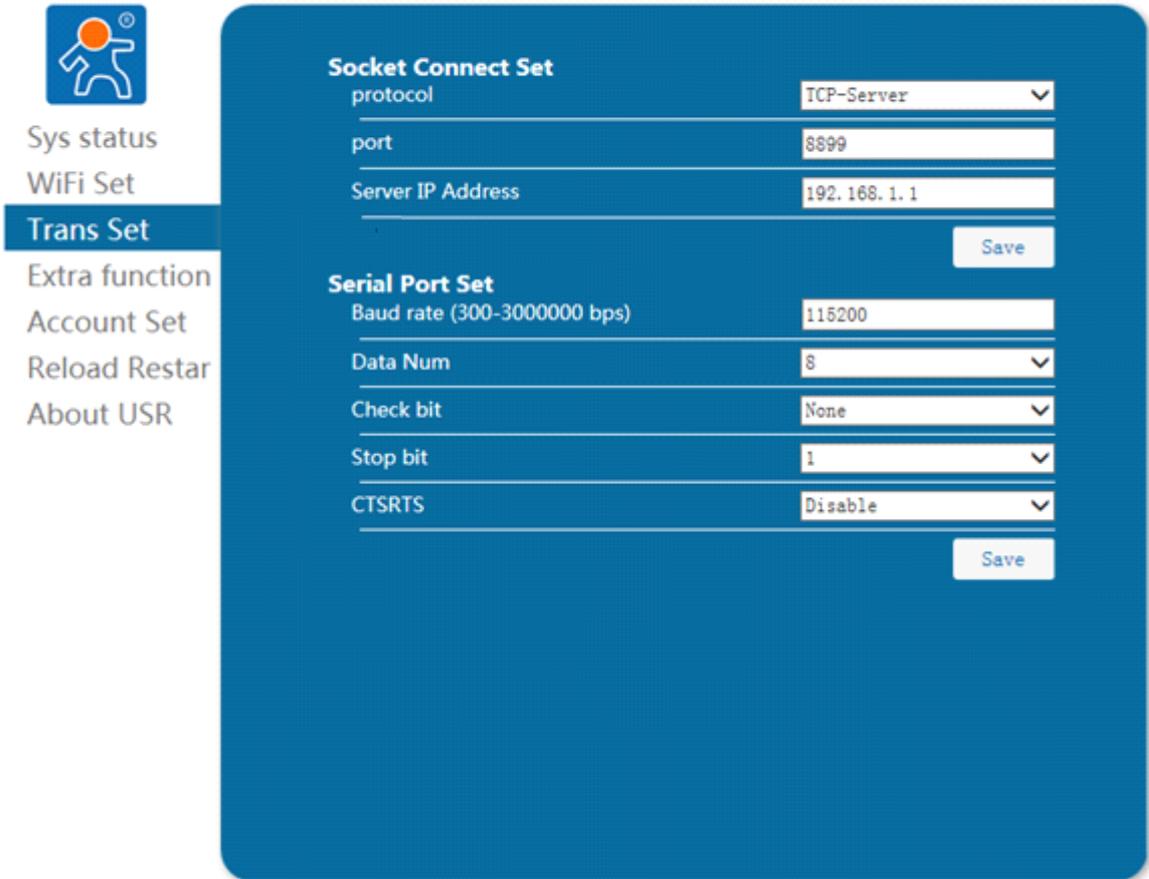
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4）Extra Function

Transparent transmission mode, the socket protocol, the server address and port.

中文 | English

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5）Account Set:

Account management can set the user name and password login page, support 1-15 bytes, click save Settings, restart to take effect.
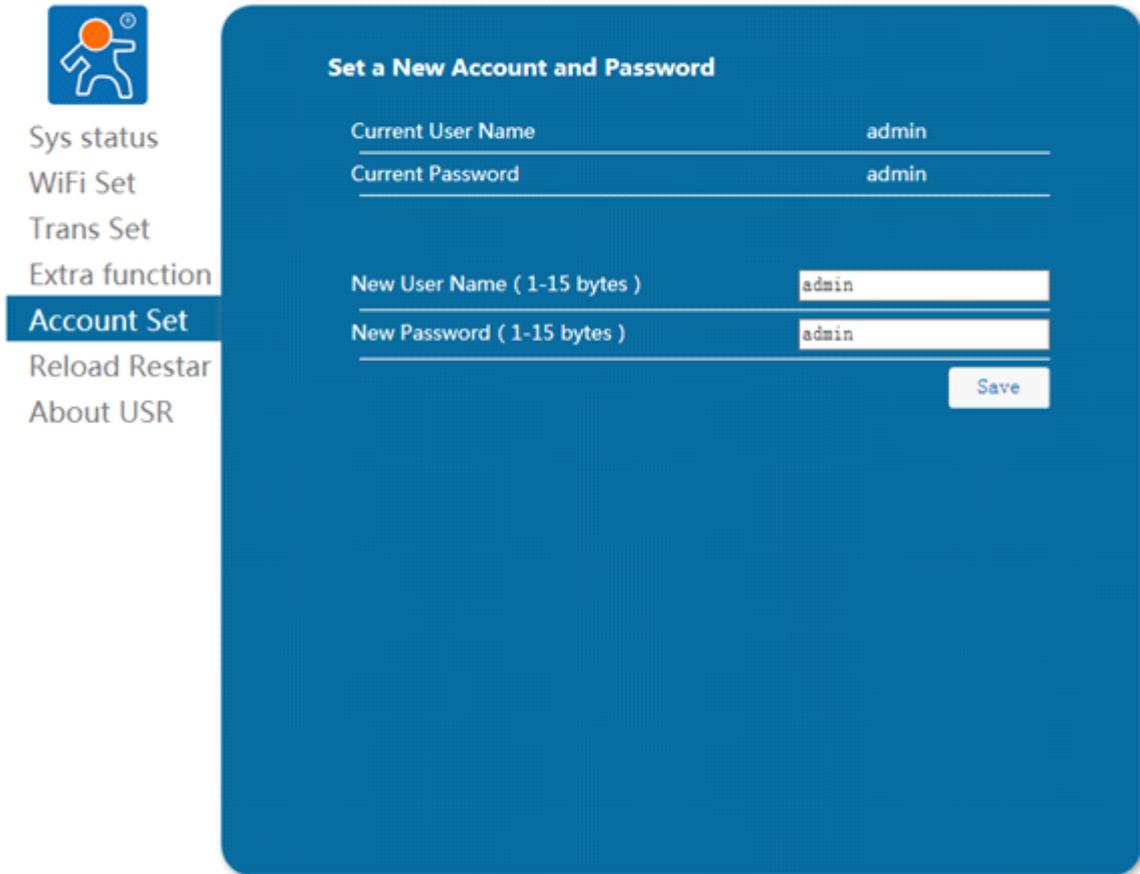
中文 | English

Set a New Account and Password

Current User Name	admin
Current Password	admin

New User Name (1-15 bytes)   admin

New Password (1-15 bytes)   admin

Save

Sys status
WiFi Set
Trans Set
Extra function
Account Set
Reload Restar
About USR

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6）Reload Restar:

This page includes the module to the factory state and restart the module function.

www.usr.so

中文 | English

IMPORTANT NOTICE :

After reload factory Settings, all user's configuration will become the default arguments when leaving the factory, you can change the configuration by the AT command serial port or log on to http://192.168.1.1 to reconfigure.

Reboot to restart equipment, if there is a new parameter Settings, restart Settings will take effect.

Set To Factory

Restart

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7） About USR:

This page is a simple introduction of Jinan USR IOT Technology Limited.

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4.2 AT+ Commands Configuration

AT+ Instruction refers to，in command mode user by module with UART and SPI command set of instructions, behind will detail the use of AT + instruction format.

After the success of the electric start, can through the UART for setting module.

Module of the default UART port parameters for: 115200 baud rate, no check, 8 data bits, one stop bit.

< explain >

The AT command debugging tools, UART interface is recommended to use SecureCRT software tools or some professional applications. The following is introduced using UART communication and SecureCRT tool demo.

From translate mode switch to the command mode to the following two steps:

➢ On the UART input "+ + +", module after receiving "+ + +" will return a verification code "a";

➢ Input validation code "a" on the UART, module after receiving the confirmation, return to the "+" OK "to confirm, enter the command mode;
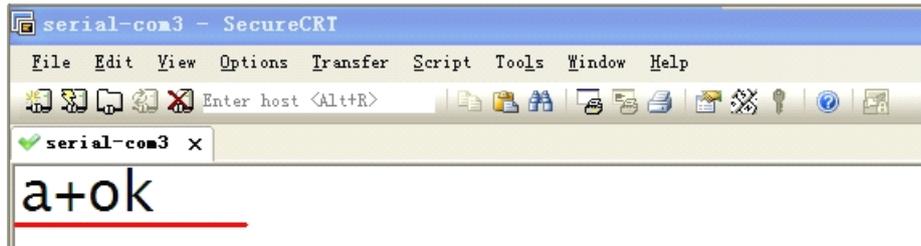
< **explain** >In the input "+ + +" and "the code" a ", no echo, as shown in the above.

Input "+ + +" and "a" needs to be done in a certain period of time, in order to reduce the probability of normal work, wrongly into command mode. Specific requirements are as follows:
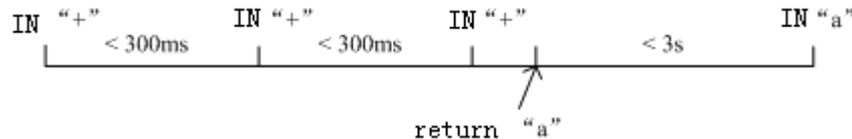
From the command mode to switch to translate mode need to adopt the AT + ENTM command, the command AT + ENTM mode input, end with a carriage return, you can switch to translate mode.

4.2.1 AT+ Summary of Instruction Set

AT+ Instructions can be directly through the super terminal serial debugger such as input, can also be programmed to input.

AT+ Instructions the command line, based on ASCII format is as follows:

➢ Format Specification

   < >: A part of must contain

   [ ]: the optional parts

➢ Command

  AT+<CMD>[op][para-1,para-2,para-3,para-4…]<CR>

  AT+:Command messages prefix;

  CMD:Command string;

  [op] :Instruction operator, is specified parameters to set or query;

    ◆ "=" :parameter Settings

    ◆ "NULL" :query

  [para-n] :Input parameter Settings, such as query is not required;

  <CR>:end mark，ENTER，ASCII: 0x0a or 0x0d;

➢ Response Message

  <CR><LF>+<RSP>[op] [para-1,para-2,para-3,para-4…]<CR><LF>

  +:The response message prefix;

  RSP:Response to a string, including:

    ◆ "OK" :success

    ◆ "ERR":fail

  [para-n] :The query return parameter error code or error

  <CR>:ASCII 0x0d;

  <LF>:ASCII 0x0a;

➢ Error Code

<div align="center">error code table</div>

Error Code	Description
-1	Invalid Command Format
-2	Invalid Command
-3	Invalid Operation Symbol
-4	Invalid Parameter
-5	Operation Not Permitted

4.2.2 AT Command Introduction

AT+ command

NO	Command	Description
Basic Command		
1	ENTM	Set module into transparent transition mode
2	E	Open/Close show back function
3	Z	Re-start module
4	CFGTF	Copy User Parameters to Factory Default Parameters
5	RELD	Restore to factory default setting
6	MAC	Read the MAC of module
7	SEARCH	Set/query LAN port and keyword search
8	MID	Query module ID information
9	PLANG	Web log in languages
10	WEBU	Set/query website login user name and password
11	VER	Query The module firmware version
12	PING	Network "Ping" command
13	WSCAN	Scan AP
Wifi Set		
14	WMODE	Set/Query Wi-Fi work mode (AP/STA)
15	WSTA	Set/query associated AP SSID and password;
16	WANN	Set/query STA network parameters;
17	WSLK	Query STA Wi-Fi link status
18	WAP	Set/query AP wi-fi configuration parameters;
19	CHANNEL	Channel module AP mode
20	SOCKA	Set/query network protocol parameters
21	LANN	Set the IP/query module AP mode
22	SOCKLKA	Query whether the TCP link chain has been built
23	REGENA	Can make/registration packet mechanism is prohibited
24	REGID	Registration packet ID set
25	RFCENA	Can make/ban RFC2117 function
Peripheral Parameter Settings		
26	UART	Set/query UART interface parameters
27	UARTTE	Set/query a serial port free framing intervals
28	SLPTYPE	Set the sleep mode

1) AT+ENTM

➢ Function:Exit the command mode, enter the translate mode;
➢ Format:
  ◆ Set
    AT+ENTM<CR>
    <CR><LF>+OK<CR><LF>
➢ Parameters:无
    After the command is executed correctly, module from the command mode switch to translate mode.

2) AT+E
➢ Function: Set/query module echo the at command set
➢ Format:
  ◆ Query
    AT+E <CR>
    <CR><LF>+OK=<on/off><CR><LF>
  ◆ Set
    AT+E=<on/off><CR>
    <CR><LF>+OK<CR><LF>
➢ Parameters:
  ◆ on:Open the echo, echo the AT command input command, off: the AT command mode, type the command does not echo.

3) AT+Z
➢ Function:Restart the module Format:
  ◆ Set
    AT+Z<CR>
    <CR><LF>+OK<CR><LF>
➢ Parameters:none
    After the command is executed correctly, restart the module.

4) AT+CFGTF
➢ Function:After the command is executed correctly, restart the module.
➢ Format:
  ◆ Set
    AT+CFGTF<CR>
    <CR><LF>+OK=<status><CR><LF>
➢ Parameters:
  ◆ status:Returns the operating status;
    ● SAVED:Set up the success
    ● NON-SAVED:Setup failed

5) AT+RELD
➢ Function:Recovery module configuration parameters for the user the factory configuration parameters
➢ Format:
  ◆ Set
    AT+ RELD<CR>
    <CR><LF>+OK=REBOOTING…<CR><LF>
➢ Parameters:none

The command module configuration parameters restore to the user factory Settings, and then restart automatically.

6) AT+MAC
- ➢ Function:Query MAC
- ➢ Format:
  - ◆ Query
    AT+MAC<CR>
    <CR><LF>+OK=<mac><CR><LF>
- ➢ Parameters:
  - ◆ mac:MAC of the modul（example 01020304050A）;

7) AT+SEARCH
- ➢ Function:Set/query in LAN port and search module search keywords
- ➢ Format:
  - ◆ Query
    AT+SEARCH<CR>
    <CR><LF>+OK=<port,keywords><CR><LF>
  - ◆ Set
    AT+ SEARCH <CR>
    <CR><LF>+OK =<port,keywords><CR><LF>
- ➢ Parameters:
  - ◆ port:Search module port;default:48899
  - ◆ keywords:Module search keywords.default:www.usr.cn（Up to 20 bytes）.

8) AT+MID
- ➢ Function:Set the MID/query module
- ➢ Format:
  - ◆ Query
    AT+MID<CR>
    <CR><LF>+OK=<mid><CR><LF>
  - ◆ Set
    AT+MID=<mid><CR>
    <CR><LF>+OK<CR><LF>
- ➢ Parameters:
  - ◆ mid: Set/query module mids (20 characters), MID the main models of module;
  Note: this setting, mid cannot contain a comma ", ".

9) AT+PLANG
- ➢ Function: Set/query module landing page language version
- ➢ Format:
  - ◆ Query
    AT+ PLANG <CR>
    <CR><LF>+OK=<language><CR><LF>
  - ◆ Set
    AT+ PLANG =< language ><CR>
    <CR><LF>+OK<CR><LF>
- ➢ Parameters:

◆ language:CN/EN，CN said landing page default display in Chinese; EN said landing page when the default display in English.

10) AT+WEBU
  ➢ Function:Set/query website login user name and password;
  ➢ Format:
    ◆ Query
      AT+WEBU\<CR>
      \<CR>\<LF>+OK=\<username,password>\<CR>\<LF>
    ◆ Set
      AT+WEBU\<CR>=\<username,password>\<CR>
      \<CR>\<LF>+OK\<CR>\<LF>
  ➢ Parameters:
    ◆ username:The user name, the longest support 15 characters, does not support null;
    ◆ password:Password, the longest support 15 characters;

11) AT+VER
  ➢ Function:Set/query module firmware version
  ➢ Format:
    ◆ Query
      AT+VER\<CR>
      \<CR>\<LF>+OK=\<ver>\<CR>\<LF>
    ◆ Set
      AT+VER=\<ver>\<CR>
      \<CR>\<LF>+OK\<CR>\<LF>
  ➢ Parameters:
    ◆ ver: Set/query module firmware version:
      ● AA.BB.CC;AA on behalf of the big version, BB on behalf of the minor version number, Arthur c. CC represents the hardware version

12) AT+PING
  ➢ Function:Network "Ping" command
  ➢ Format:
    ◆ Set
      AT+PING=\<IP_address>\<CR>
      \<CR>\<LF>+OK=\<STA>\<CR>\<LF>
  ➢ Parameters:
    ◆ IP_address:For IP address 192.168.1.1 or domain name www.usr.so, domain name up to 64 bytes.
    ◆ STA:returned value
      ● SUCCESS
      ● TIMEOUT

13) AT+WSCAN
  ➢ Function:Search AP :
    ◆ Query
      AT+WSCAN\<CR>

<CR><LF>+OK=<LF><CR>SSID,BSSID,Security,Indicator<LF><CR><ap_s ite_1><LF><CR><ap_site_2><LF><CR><ap_site_3><LF><CR>…<ap_site_ N><CR><LF>

➢ Parameters:
- SSID:SSID
- BSSID: MAC（11:22:33:44:AA:BB）
- Security
- Indicator RSSI

Note: in the AP mode WSCAN command, response will be slightly slower, if has established a TCP connection, the connection will be disconnected, need to restart after the connection is established.

14) AT+WMODE
➢ Function:Set the query wifi working mode
➢ Format:
◆ Query
AT+WMODE<CR>
<CR><LF>+OK=< status ><CR><LF>
◆ Set
AT+WMODE =< status ><CR>
<CR><LF>+OK<CR><LF>
➢ Parameters:
◆ status:
- AP:The module in the AP mode
- STA:The module in the STA model

15) AT+WSTA
➢ Function:Set/query associated AP SSID and password;
➢ Format:
◆ Query
AT+WSTA<CR>
<CR><LF>+OK=<AP's ssid><key><CR><LF>
◆ Set
AT+ WSTA =<AP's ssid ><key><CR>
<CR><LF>+OK<CR><LF>
➢ Parameters:
◆ AP's ssid:AP SSID (up support 32 bytes);
◆ key: AP password, the default encryption for wpa2psk, no encryption is set to NONE.
Note: the ssid and key does not support ", "special characters.

16) AT+WANN
➢ Function:Set/query module access to IP (DHCP/STATIC);
➢ Format:
◆ Query
AT+WANN<CR>
<CR><LF>+OK=<mode,address,mask,gateway,dns ><CR><LF>
◆ Set

AT+WANN=<mode,address,mask,gateway,dns ><CR>
<CR><LF>+OK<CR><LF>

➢ Parameters:
◆ mode:Network IP mode
● static:static IP
● DHCP:dynamic IP（address,mask,gateway，DNS are omitted）
◆ address: IP;
◆ mask:mask;
◆ gateway:gateway
◆ dns:DNS

Note: set the module to get the dynamic IP, just set up AT + WANN = DHCP < CR >

17) AT+WSLK
➢ Function:Query the STA wireless link state;
➢ Format:
◆ Query
AT+ WSLK<CR>
<CR><LF>+OK=<status,rssi><CR><LF>
➢ Parameters:
◆ status
● If there is no connection:return"Disconnected"
● If there is a connection:return"AP SSID（AP MAC）"
◆ rssi :0-100，When signal strength is required less than 10 weak signal, when the data transmission may lose data.

18) AT+WAP
➢ Function:Set/query AP wi-fi configuration parameters;
➢ Format:
◆ Query
AT+WAP<CR>
<CR><LF>+OK=< ssid,key ><CR><LF>
◆ Set
AT+ WAP =< ssid,key ><CR>
<CR><LF>+OK<CR><LF>
➢ Parameters:
◆ ssid:AP SSID;
◆ key:Set the AP encryption password (the default wpa2psk encryption, password length greater than or equal to 8 bytes), set to None is without encryption

Note: the ssid and key does not support ", "special characters.

19) AT+CHANNEL
➢ Function: Channel Settings/query module AP mode
➢ Format:
◆ Query
AT+CHANNEL <CR>
<CR><LF>+OK=<NUM><CR><LF>
◆ Set

AT+ CHANNEL =<NUM><CR>
<CR><LF>+OK<CR><LF>

➢ Parameters:
◆ NUM:channel 1-11.

20) AT+SOCKA
➢ Function:Set/query network protocol parameters
➢ Format:
◆ Query
AT+SOCKA<CR>
<CR><LF>+OK=<protocol,IP,port ><CR><LF>
◆ Set
AT+SOCKA=< protocol,IP,port ><CR>
<CR><LF>+OK<CR><LF>
➢ Parameters:
◆ Protocol:Protocol type, including
● TCPS　　TCP server
● TCPC　　TCP client
● UDPS　　UDP server
● UDPC　　 UDP client
◆ IP:When the module is set to "CLIENT", the IP address of the server
◆ Port: Protocol port, decimal number, less than 65535

21) AT+LANN
➢ Function:Set the IP query AP mode;
➢ Format:
◆ Query
AT+LANN<CR>
<CR><LF>+OK=<IP,MASK><CR><LF>
◆ Set
AT+ LANN =<IP,MASK><CR>
<CR><LF>+OK<CR><LF>
➢ Parameters:
◆ IP: ip
◆ MASK:mask

22) AT+SOCKLKA
➢ Function:Query the TCP link is established;
➢ Format:
AT+ SOCKLKA<CR>
<CR><LF>+OK=<STA><CR><LF>
➢ Parameters
◆ STA: showing if the TCP link is established
● CONNECT:　TCP connected
● DISCONNECTED: TCP Disconnected

23) AT+REGENA
➢ Function:Set the query registration packet mechanism
➢ Format:

◆ Query

AT+REGENA<CR>

<CR><LF>+OK=< status，method><CR><LF>

◆ Set

AT+REGENA =< status，method ><CR>

<CR><LF>+OK<CR><LF>

➢ Parameters:

◆ status:

● ID:packet mechanism can make can make the registration, the registry packet ID is 2 bytes

● MAC:packet mechanism can make can make the registration, the registry packet is 6 bytes MAC

● OFF:Ban can register packet mechanism

◆ method

● EVERY Increase registered before each packet of data packet

● FIRST Only link to the server sends a registered packet for the first time

24) AT+REGID

➢ Function:Set the query registration packet ID

➢ Format:

◆ Query

AT+REGID<CR>

<CR><LF>+OK=< NUM><CR><LF>

◆ Set

AT+REGID =<NUM ><CR>

<CR><LF>+OK<CR><LF>

➢ Parameters:

◆ NUM:0-65535，Decimal Format, when selecting registration packet ID, it is mainly used for the D2D software of our company.

25) AT+RFCENA

➢ Function:Enable/Disable RFC2217 Function

➢ Format:

◆ Query

AT+RFCENA<CR>

<CR><LF>+OK=< status<CR><LF>

◆ Set

AT+RFCENA =< status><CR>

<CR><LF>+OK<CR><LF>

➢ Parameters:

◆ status:

● ON:Enable RFC2217 Function

● OFF:Disable RFC2217 Function

26) AT+UART

➢ Function:Set/query UART interface parameters

➢ Format:

◆ Query :

AT+UART<CR>

<CR><LF>+OK=<baudrate,data_bits,stop_bit,parity,flowctrl><CR><LF>

◆ Set:

AT+UART=<baudrate,data_bits,stop_bit,parity,flowctrl><CR>

<CR><LF>+OK<CR><LF>

➢ Parameters:

◆ baudrate:

● 300-3000000 bit/s,

◆ data_bits:5 – 8 bits

◆ stop_bits:1,2

◆ parity:check

● NONE

● EVEN

● ODD

● Mask

● Space

◆ flowctrl:CTS RTS

● NFC:Disable hardware flow control

● FC:Enable hardware flow control

Note: when the baud rate are subject to change, will automatically change the packaging interval, see 27) AT + UARTTE.

27) AT+UARTTE

➢ Function:Set/query free framing intervals

➢ Format:

◆ Query

AT+ UARTTE<CR>

<CR><LF>+OK=<num><CR><LF>

◆ Set

AT+ UARTTE=<num ><CR>

<CR><LF>+OK<CR><LF>

➢ Parameters:

◆ num:5-250:Free framing mode the interval between two bytes ms.

Note: this parameter will automatically change when set the baud rate, If you want to change the packaging interval, please first set the baud rate:

bps <= 600，num=250ms;

bps >= 20000，num=5ms;

500 < bps < 20000，num=1000/bps*10*10.

28) AT+SLPTYPE

➢ Function:Set the query sleep mode

➢ Format:

◆ Query

AT+ SLPTYPE<CR>

<CR><LF>+OK=<MODE,TIME><CR><LF>

◆ Set

AT+ SLPTYPE=<MODE,TIME><CR>

<CR><LF>+OK<CR><LF>

➢ Parameters:
◆ MODE:0-4;

0 no sleep mode for setting module (default); 1 set the module to sleep mode; 2 set the module to deepsleep mode; 3 set the module to LPDS mode; 4 set the module to deep sleep mode;

◆ TIME:10-240 seconds.

Set the module without communication last time. When last time no data transmission module, enter the sleep mode, according to the mode patterns into different dormancy.

Note: when set to no sleep, only set **AT + SLPTYPE = 0 < CR >**

www.usr.so

Appendix A: Contact Information

Company: Jinan USR IOT Technology Limited
Address: 1-728, Huizhan Guoji Cheng, Gaoxin Qu, Jinan, Shandong, China
Web: http://www.usr.so
Email: sales@usr.cn, order@usr.cn

Appendix B: Disclaimer

This document provides information about USR-C322 modules, this document does not grant any license to intellectual property rights. Except the responsibility declared in the product sale clause, USR does not assume any other responsibilities. In addition, USR does not make any warranties for the sale and use of this product, including the suitability of the product for a particular purpose, merchantability or fitness for any patent, copyright or other intellectual property infringement, etc. USR may make changes to specifications and product descriptions without notice.

Appendix C: Update History

V 1.0   09-15-2014.   First Version
V 1.1   10-13-2014.   Add webpage setting parameter
V 1.2   02-09-2015.   Add low power mode,add domain name resolution(DNS).
V 1.3   03-05-2015.   Add simplelink fast setting.

<END>