



E103-W04 Datasheet



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1.overview

1.1. Product Introduction

E103-W04 is a high-performance, highly reliable WiFi data transmission module developed by Chengdu Yibaite Electronic Technology Co., Ltd., the module integrates the transparent transmission function, which can be used immediately to realize serial port (TTL) data through WiFi Realize device networking data interaction. Support IEEE802.11 b/g/n standard, support 4-way Socket connection; Support Alibaba Cloud, Baidu Cloud, OneNet, standard MQTT protocol; Support TCP/UDP/HTTP/MQTT multiple network communication protocols.

The module is small in size, with PCB on-board antenna, working in the 2.4GHz band, low power consumption, fast data transmission, the module can use the serial port for data transmission and reception and AT command related parameter settings. Widely used in smart home appliances, smart home, wireless audio and video, smart toys, medical monitoring, industrial control and other Internet of Things applications.

Typical applications:

- Wireless meter reading
- Wireless sensing
- Smart home
- Industrial remote control and telemetry
- Intelligent buildings and intelligent buildings
- High voltage line monitoring
- Environmental Engineering
- Highway
- Small weather stations
- Automated data collection
- Consumer electronics
- Intelligent robots
- Street light control

Module features:

- Support simultaneous TCP/UDP/HTTP/MQTT multiple network communication protocol communication
- Support up to 4 simultaneous Socket communication;
- Supports Alibaba Cloud, Baidu Cloud, OneNet, and standard MQTT protocols
- Support for Modbus protocol conversion (RTU and TCP);
- Support modbus storage gateway/configuration gateway/multi-master gateway
- Support transparent transmission multiplexing protocol transmission and broadcast transmission;
- Support custom registration package and custom heartbeat package functions;
- Support host computer, AT command configuration;
- Support automatic reconnection when disconnected;
- Support high-speed continuous transmission;
- Support IEEE802.11 b/g/n standard;

- Support 2.4G frequency band;
- Support AP and STA working mode;
- Support WPA2 WIFI security authentication mode;
- Support dynamic DNS, DHCP network service package;
- Built-in watchdog, never dies
- Parameter memory, power down saving

2. Get started quickly

Note: The quick start is mainly used to quickly verify the basic functions of the module, and this chapter is described using the test baseboard. For the peripheral design of the module, please refer to the recommended design.

2.1. Preparation before configuration

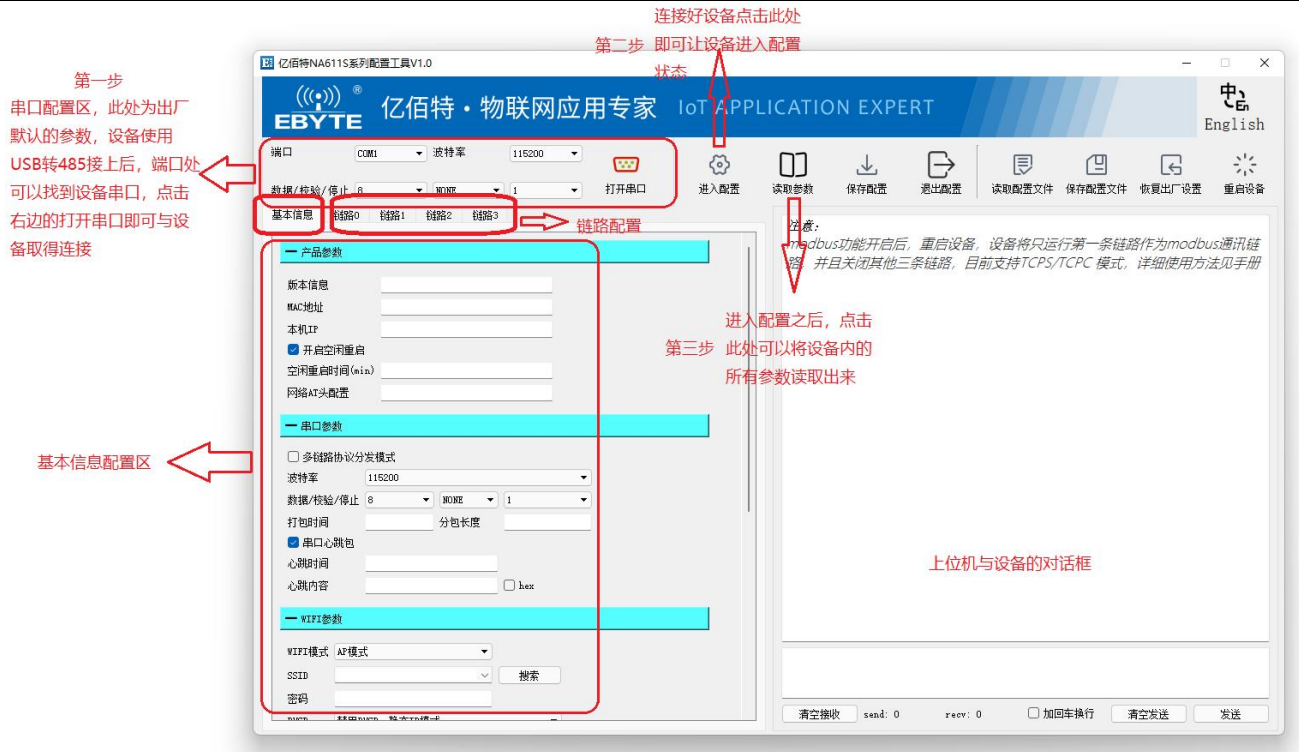
Hardware to be used:	
1	E103-W04-TB test base plate (E103-W04B needs to be soldered by yourself, E103-W04 comes with default and only antenna differences).
2	Office computers
3	1 router (can be replaced by mobile Wi-Fi hotspot).
The software that will be used (all can be downloaded from the official website).	
1	Serial port debugging assistant XCOM
2	TCP & UDP testing tools
3	Host computer parameter setting software

2.2. Hardware connection

Connect the USB to the computer and turn on the connecting antenna.

2.3. Upper computer configuration

First of all, understand the functions of each area of the upper computer, all the function settings are based on the understanding of the upper computer, the upper computer is to use AT to interact with the device quickly, the user can directly configure the device through AT, the effect is consistent with the upper computer.



The basic information area ----- product parameters

Version information/MAC address are device-specific parameters that can only be read by the user

The local IP is a parameter that will only be valid for querying after the device is connected to wifi, reflecting the IP of the device itself

Idle restart If it is checked, it is enabled for idle restart, and the device will restart the device if there is no network information interaction and 485 information exchange during the idle restart time. **The idle restart time** is in minutes

Network AT header configuration The default network AT header of the device is NETEbyte That is to say, the data sent up and down the network, if it is with this header, will be regarded as an AT command, will not be treated as information, this header can be configured by the user himself, can not be Chinese, the length is in Between 3-23 English characters and numbers, for example, after setting up network communication later, the sending NETEbyteAT+VER\r\n device will reply to your relevant device information through the network (r\n For carriage returns, line feeds, not strings), for more AT commands, see the device's AT manual.

The basic information area ----- serial port parameters (effective after the configuration restarts).

Multilink Protocol Distribution Mode If checked, for example, you have created two links to connect to two TCPS servers, the message sent by the TCPS server will be transmitted through 485 with a specific header, and the head length is 5 bit, the content from the header to see the protocol transmission part of the content behind, and whether you check this option or not, send a message to 485, upload to the network, the information can have a header, such as the header specifies that it is a link 1 is sent, then only link 1 will send this piece of information out, and the specific rules of the header check the protocol transmission part behind

Baud rate/data/checksum/stop bit represents the properties of the 485 serial port of the device, if changed, then after restarting the device, the host computer must change the top The serial port properties are the content you change, and then open the serial port to perform normal communication

Packing time/subpackage length The default is 50/1024 which means that 50ms is the minimum interval between two packets of data, for example, the interval between your two packets of data sending to 485 is very small, only

30ms (less than 50ms), then the two packets of data will be combined into one packet of data, and will not be distinguished, and the subpackage length of 1024 means that if the length of a packet of data is very long, up to 1300 bytes (greater than 1024), then it will be sent in two packets of data.

Serial port heartbeat bag / serial port heartbeat package time / serial port heartbeat package content This function is turned off by default, and the user needs to be able to open it by himself (check the serial heartbeat package option), **serial port heartbeat package time** The unit is seconds, the heartbeat content is the content that will be sent through 485,

and the hex check on the right means that the heartbeat content will be converted to hex format (hex The format is applied less, and if checked, content in HEX format will be sent). After opening, every other serial port heartbeat time device will send serial port heartbeat information out through 485.

The basic information area ----- the WiFi parameter area (effective after the configuration is restarted).



WiFi mode/SSID/password represents the parameters of wifi, such as AP mode, ssid is test, and password is 12345678, then the device is a hotspot, which can be connected via wifi, the hotspot name is test, and the password is 12345678. If you set the STA mode, SSID to test, and password to 9876543210, the device will be 9876543210 after rebooting Such a password goes to connect to a router (hotspot) called test.

DHCP/Static IP/Subnet Mask/Routing Address The DHCP selection section can select both dynamic IP and static IP mode (STA mode), if it is a dynamic IP, it is easy to understand, that is, after the device is connected to the router (hotspot), the IP of the device is determined by the router (hotspot Dynamically assigned to the device, so the device's address may change each time the device is reset or the WiFi is reconnected. If it is a static IP mode, the following static IP field can fill in the IP address you want to fix, but note that this cannot be filled in randomly, it must remain in the same network segment and this address is not assigned to other devices, such as your router

192.168.3.XXX the network segment, your static IP can only be filled in, such as 192.168.3.52, not across network segments, the following subnet mask generally does not need to be changed, the routing address is the router IP address, if set correctly, every time the device is connected to the router, it will be this static IP.

DNS address Resolution addresses generally do not need to be changed

The basic information area ----- modbus parameter area (effective after the configuration restarts).



The working mode of Modbus can be set to five types: simple protocol conversion/multi-host/storage/configuration/active upload The default is disabled, that is, do not open the modbus ribbon, change the option to any type, that is, open, note: after opening, modbus gateway will work on link one, only support TCP interaction, and will actively close the other three links, Do not use the other three links. Here are a few gateway modes:

Simple protocol conversion: That is, the most commonly used, simple TCP-RTU conversion

Multi-host mode: that is, for example, both hosts of A/B will access the device information through modbus, if A/B initiates an access request at the same time, then for example, A has already accessed, modbus It will enter the busy state, B's access information will be stored, wait for the interaction of host A to end, and then perform the interaction of host B, thus avoiding the information conflict of multiple host modbus buses

Storage gateway: Because the interaction speed of the 485 interactive end is slower than the network end, many bus waits are from the slow end, and the storage gateway, such as the host accessing an instruction, then the device as a modbus gateway will "remember" This command, and constantly polling, will save the polling result in the device, then the next time the host accesses this data again, the device as a modbus gateway will not go 485 to

send the inquiry information, waiting for the content to return, The process of returning the content to the network side, but directly returning the polling content stored in the device to the host, so that the interaction speed flows smoothly.

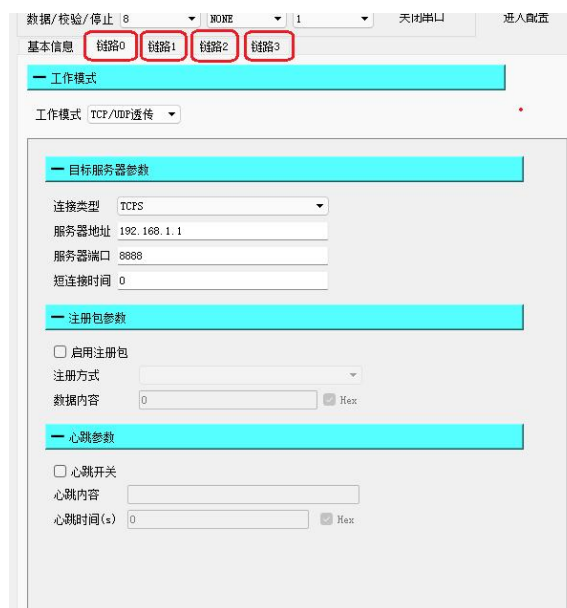
Configuration gateway: Similar to storage gateway, but you can configure commonly used query instructions to the device in advance, which is equivalent to allowing the device to remember these instructions directly without the host being issued, and the workflow is the same as that of the storage gateway

Active upload: In the modbus command configuration, you can configure the instruction (this command configuration area is the configuration of the configuration gateway and the configuration used by the traditional one on the active one), after configuration, just like the configuration gateway, the device acts as modbus gateway. The gateway will send the inquiry information through 485, but after getting the query result here, it will be returned to the host directly through the network.

Server Hex: This parameter is not supported at the moment

TCP Modbus: Support not checking this option when selecting multi-host, and check it the rest of the time, which is a common usage, representing that the default network side runs TCP type data, and then the device acts as a modbus gateway to slave RTU data for terminal running.

Link configuration area



Working mode: When you select None, the link is down, and the above interface is selected when TCP/UDP is passed, and you can also choose HTTP mode or different MQTT mode.

When TCP/UDP passthrough:

Connection type: You can choose TCPS/TCPC/UDPC/UDPS, representing the different roles of the device in network communication, when it is in TCPS/UDPS, the client connects up, and the device will remember the client socket (up to eight records), which can be passed. The AT command queries the information of the currently connected client, the specific instruction can be viewed in the AT manual, and the interactive communication with the client also supports protocol transmission, you can specify to send information to a certain client, you can also choose to broadcast

Server address/destination address: When in TCPS/UDPS, fill in 192.168.1.1 (can not fill in the blank, in fact, in server mode this parameter does not work, the device defaults to itself IP on server), when in client mode (TCPC/UDPC), this is the destination IP address to which the client wants to connect

Server port/destination port: When in server mode, this is the open port of the server, and when in client mode, this is the port opened by the target server.

Short connection time: this parameter does not care, only in TCPC mode will be useful, the default is 0 means that the short connection is closed by default, such as you are in TCPS mode and set the short link time here to 5, then this TCPC. After the link is connected to the server, after the data is exchanged, the link will be closed after 5S and the connection to the server will be disconnected (if the interaction is carried out within 5S). 5S re-timer)

Registration package parameters (only useful on the client): Check to enable the registration package to enable the registration package function, the registration method is divided into two types, one is that a package of registration

package will be sent after the link is connected, and there will be no more registration package sent later, and the other is that all data sent later will have this registration package as a header, and the following data content part is the content of the registration package, on the right HEX mode is generally not checked, if checked, the data content will be converted to HEX mode.

Heartbeat packet parameters (only useful on the client): Select the heartbeat switch to enable the heartbeat packet function, the heartbeat content is the sending content of the heartbeat packet, and the heartbeat time is the heartbeat sending interval, such as 60, then this link is every 60S A heartbeat packet will be sent to the server (if there is normal data interaction during this period, the heartbeat time is reset).

When in HTTP mode

The screenshot shows the '工作模式' (Work Mode) section set to 'HTTP传输' (HTTP Transmission). Below it, the 'HTTP参数' (HTTP Parameters) section includes:

- HTTP传输模式: GET
- HTTP URL内容: http://api.heclouds.com/devices/50f
- HTTP域名: [Empty]
- HTTP端口: [Empty]
- HTTP 包头内容: 14Yo6EAQ=\r\nHost: api.heclouds.com 回复带包头

Below the parameters, there are two test result boxes:

- POST方法数据:**

```
183.230.40.33/80 HTTP服务器信息
POST /devices/505619290/datapoints HTTP/1.1
api-key:SlxhH3MCLvuuvXJ0N=a14Yo6EAQ=
Host:api.heclouds.com
Content-Length: 66
{"datastreams":[{"id":"test_stream","datapoints":[{"value":28}]]}
```
- GET方法数据:**

```
GET http://api.heclouds.com/devices/505619290/datapoints?datastream_id=test_stream HTTP/1.1
api-key:SlxhH3MCLvuuvXJ0N=a14Yo6EAQ=
Host:api.heclouds.com
```

HTTP transmission mode: divided into POST and GET methods, when the HTTP information is set, directly write the information in the information area, and the device will automatically seal the packet before uploading it to the network.

HTTP URL content: The URL part that represents the HTTP information body, such as the HTTP content part of the test above

(POST method URL).

/devices/505619290/datapoints

(GET method URL).

http://api.heclouds.com/devices/505619290/datapoints?datastream_id=test_stream

HTTP domain name: represents the IP address of the target HTTP server, such as 183.230.33.80 of the above test content

HTTP port: represents the port number of the target HTTP server, such as 80 for appeal, and the HTTP port number is generally 80 port

HTTP header content: represents the header part of HTTP, as appealed

api-key:SlxhH3MCLvuuvXJ0N=a14Yo6EAQ=\r\nHost:api.heclouds.com

After configuring the HTTP message, send {"datastreams":[{"id":"test_stream","datapoints":[{"value":28}]]} (post message content) to HTTP The server POST message can be sent datastream_id=test_stream from the HTTP server Information

When in MQTT mode:

Supports connection to MQTT servers such as Alibaba Cloud, Baidu Cloud, ONENET, and custom private clouds

The following is how to use Alibaba Cloud as an example

The screenshot shows the '工作模式' (Work Mode) section set to '阿里云' (Alibaba Cloud) and 'MQTT'. Below it, the 'MQTT连接参数' (MQTT Connection Parameters) section includes:

- 产品密钥: [Input field]
- 设备名: [Input field]
- 设备密钥: [Input field]
- 地址: [Input field]
- 端口: [Input field]
- 消息等级: [Input field]
- 订阅: a11/0000000900000094411/sub 0
- 发布: a11/0000000900000094411/sub 0

First create products and devices on the Alibaba Cloud IoT platform, if you can't view the official website operation method or Baidu, many tutorials on the Internet, the operation is simple, and then find the device you created at the device, click View on the right, and then click the MQTT link parameter item to get the following interface.



Fill the above mqttHostUrl into the address bar above, and fill the port field above with post. But clientID and other above three columns do not matter, because this is a sealed parameter, and our equipment will automatically help you encapsulate, so the product key, device name, device key three columns fill in the following content, product fill in the device name column Productkey is filled in the product key field, and DeviceSecret is filled in the device key field.



Then check the subscription/publish option below, fill in the subscription and publishing topics, select your project in the product column and click View, and then find the content you want to subscribe and publish in the Topic class list.



Simple device configuration

(1)、 Select the corresponding serial port, and correctly configure the baud rate parameters, the factory default baud rate is 115200, 8 data bits, 1 stop bit, no check digit (NONE);

(2)、 Select the device working mode, factory default AP mode, the following test is carried out using factory

parameters, if not factory parameters, it is recommended to restore the factory (after the device enters the configuration according to the previous three steps and connects with the host computer, click the upper right to restore factory settings) after proceeding;

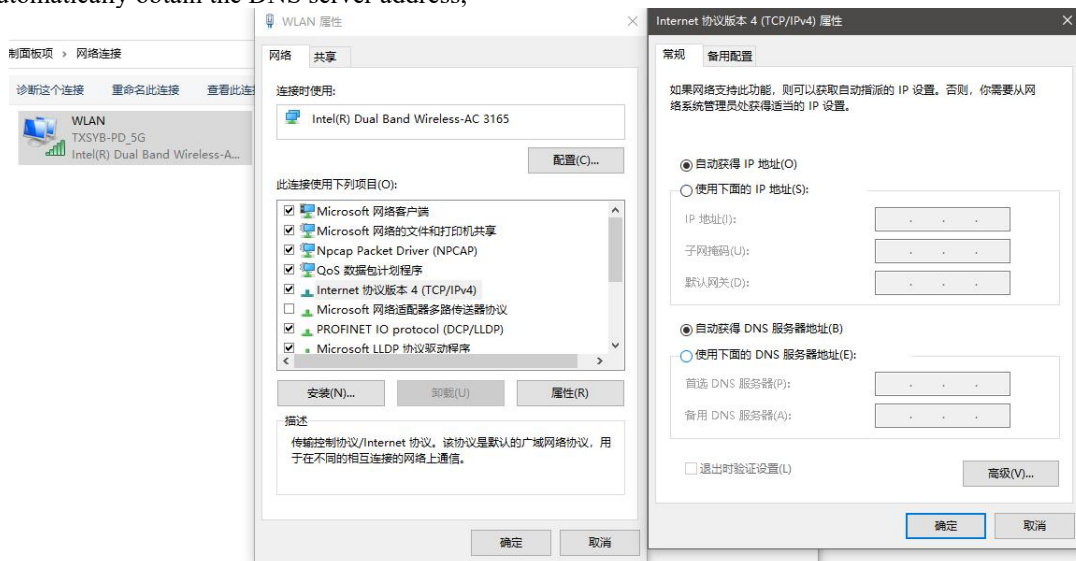
- (3)、Configure the SSID (local factory default: NA611-S) and Password (local factory default: 88888888) of the device, which are not modified here and only queried Parameters of WiFi;



- (4)、Configure the link parameters, factory default to server mode (TCPS), default IP (192.168.). 1.1), port 8 888;
- (5)、Turn off other advanced modes, factory default off;

2.4. AP mode communication test

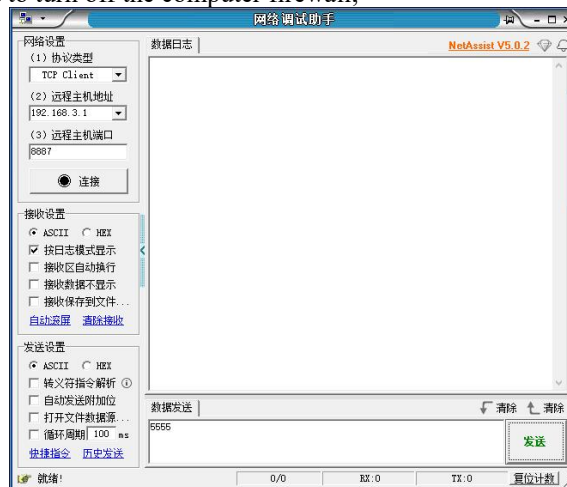
- (1)、Configure the computer Ethernet network in the following ways, modify the ip v4 to automatically obtain the ip and automatically obtain the DNS server address;



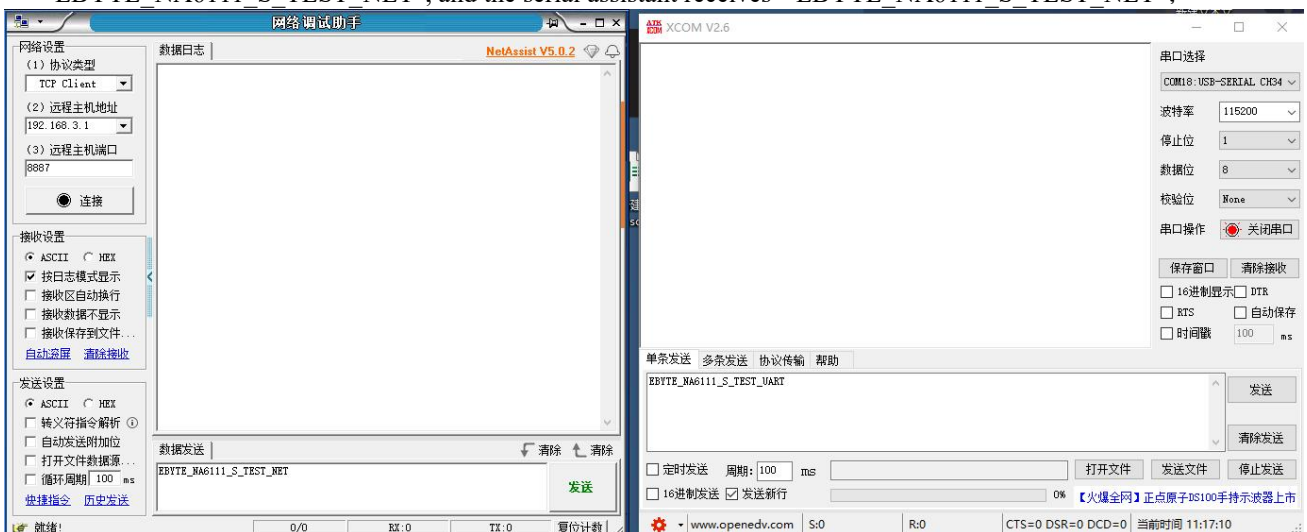
- (2)、Use the computer connection query to obtain the S SID, here N A611-S, enter the wifi password, connect the device (the connected device LINKA is always on);



- (3)、 Through the configuration of the host computer, open link 1, enable TCPS mode, default (192.168.1.1, port 8888), save parameters and exit the configuration, LINKB is always on.
- (4)、 Open Network Assistant, connect to the device server (192.168. 1.1:8888), if the above configuration cannot be connected, it is recommended to turn off the computer firewall;



- (5)、 The communication test uses the serial assistant to send "EBYTE_NA6111_S_TEST_UART", the network assistant receives "EBYTE_NA6111_S_TEST_UART", the network assistant sends "EBYTE_NA6111_S_TEST_NET", and the serial assistant receives " EBYTE_NA6111_S_TEST_NET";



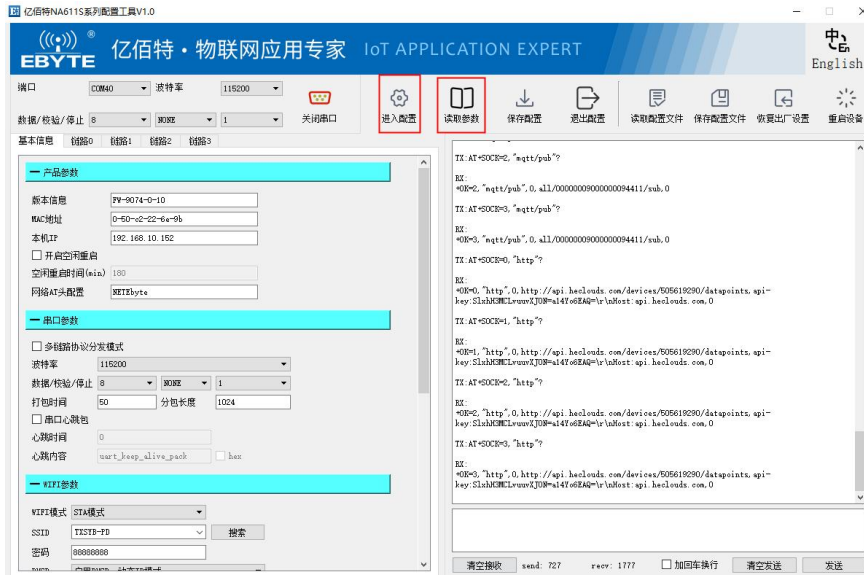
2.5. Upper computer configuration (used in STA mode).

- (1)、 Select the corresponding serial port, and correctly configure the baud rate parameters, the factory default baud rate is 115200, 8 data bits, 1 stop bit, no check digit (NONE);

亿佰特NA611S系列配置工具V1.0

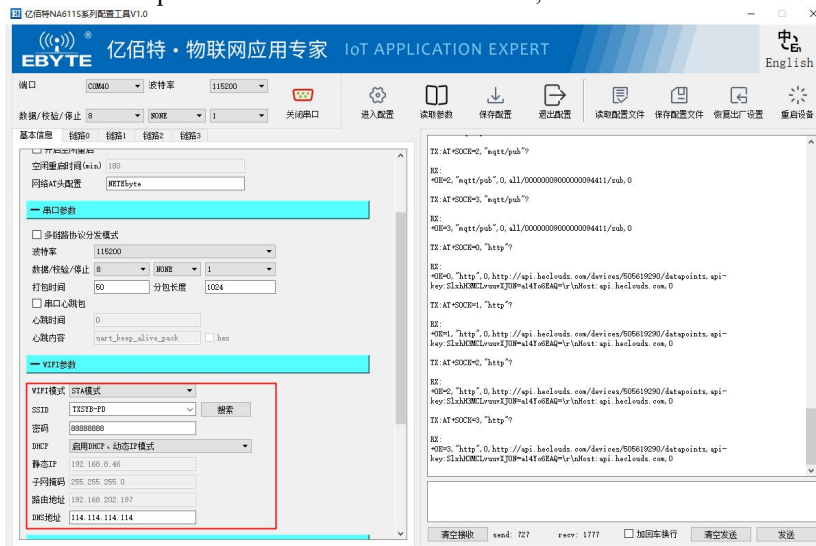


- (2)、 Click to read the parameters after entering the configuration to obtain the current configuration parameters of the device;

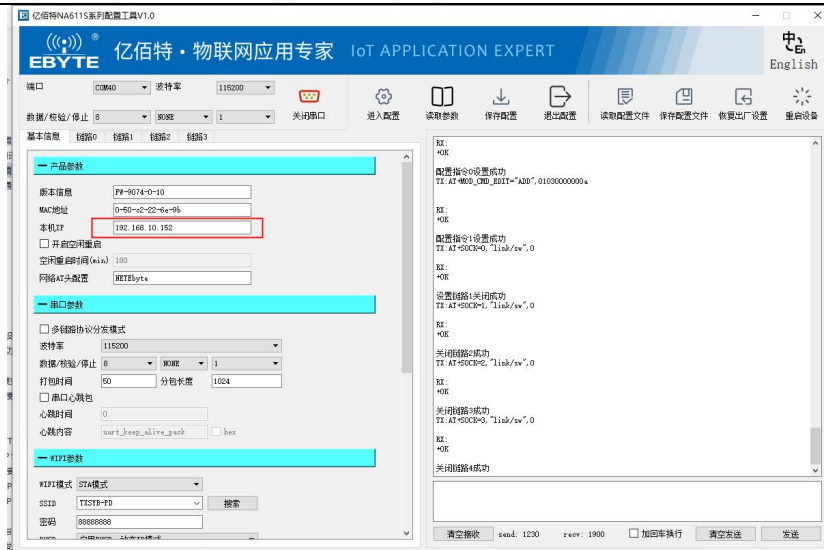


- (3)、 Select WiFi working mode, turn on STA mode, and automatically enable dynamic IP (DHCP) when the device automatically enables STA mode for the first time;

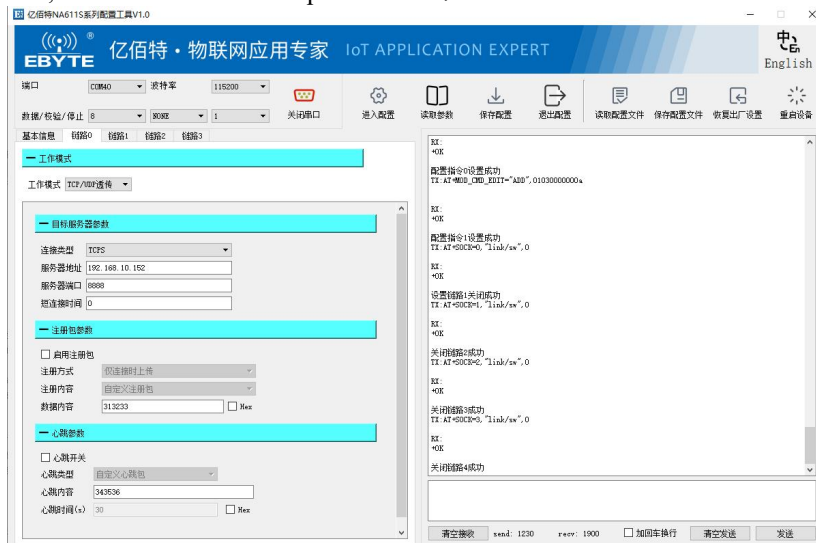
- (4)、 Configure the WiFi name and password for the device connection;



- (5)、 Save the parameters, restart the device, wait for the device restart to complete, and then read the parameters to obtain the IP address of the device;



(6)、Configure the link parameters, the factory default is server mode (TCPS), IP is the device dynamic acquisition, here it is 192.168.10.152, and the modified local port is 8888;



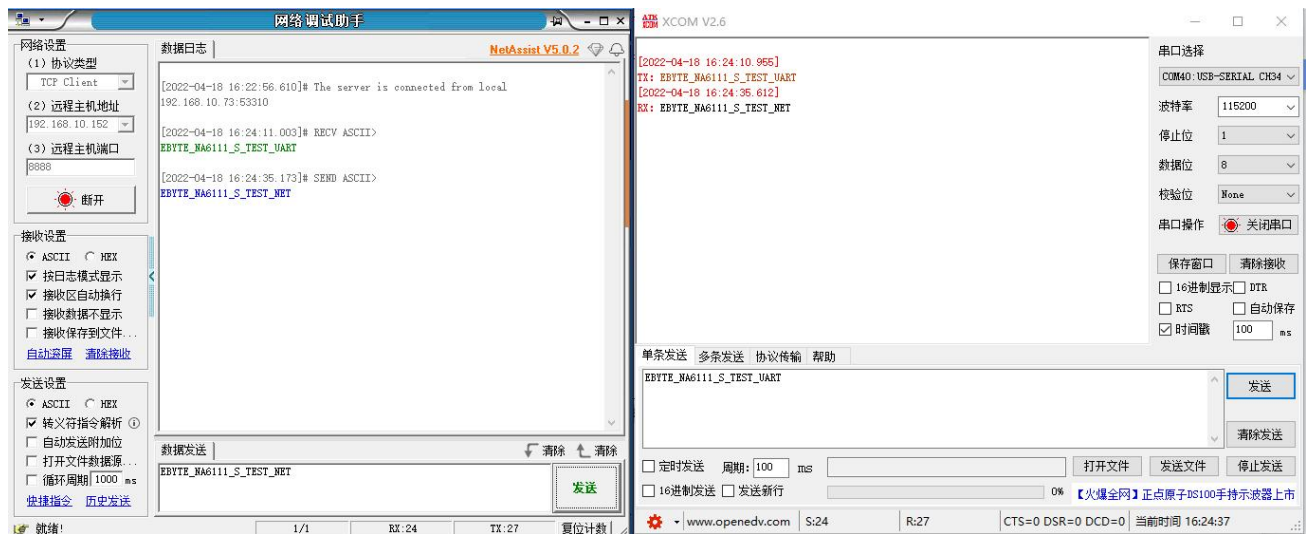
(7)、Click Save to restart the device;

2.6. STA mode communication test

Keep the computer and the device connected to the same router (connection successful LINKA is always on), the computer uses dynamic IP (for configuration methods, refer to the 2.4AP mode communication test), open the network assistant, and connect to the device server (192.168.10.152:8888, according to the actual acquisition of the device IP, the connection is successful LINKB is always on), If you cannot connect according to the above configuration, it is recommended to turn off the computer firewall;



The communication test uses the serial assistant to send "EBYTE_NA6111_S_TEST_UART", the network assistant receives "EBYTE_NA6111_S_TEST_UART", the network assistant sends "EBYTE_NA6111_S_TEST_NET", and the serial assistant receives "EBYTE_NA6111_S_TEST_NET";



serial number	How to use it	description
0	Module-to-module communication	Module 1 is set to A P mode and set up a TC Por UDP server, module 2 is set to STATION mode and connect to AP 1 to communicate with module 1 via TCP or UDP client .
1	The module communicates with the Server	The Wi-Fi module connects to the network through a wireless router and communicates with servers on the network (LAN or Internet) via TCP Client or UDP. If you need to connect to an Internet server, you need to configure the corresponding port mapping on the router.
2	The module communicates with	The Wi-Fi module connects to the network through a wireless router and establishes a TCP or UDP server to listen for connection signals. The client communicates with it by connecting to the module server.

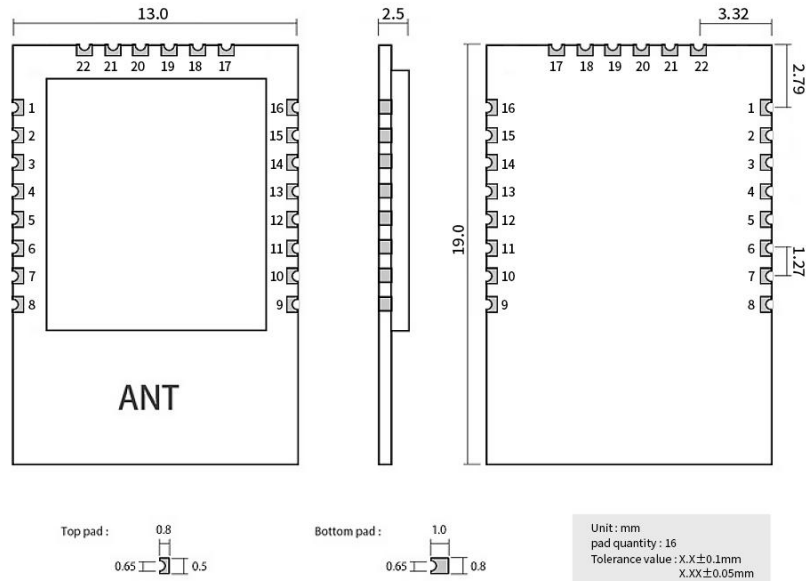
	the client	
For more information about how to use it, see Networking instructions.		

3.Product parameters

3.1. Technical parameters

serial number	Parameter name	Parameter value	exegesis
1	Product size	19x13x2.5mm	(LxWxH)
2	PCB process	2 layers	Impedance debugging
3	Operating frequency band	2.4GHz	-
4	Production process	Gold immersion process, half-hole process	Wireless products must be machine-attached to ensure batch consistency and reliability
5	Interface mode	1.27mm	Stamp hole
6	Supply voltage	DC 3.0~3.6V	Voltages above 3.6V will cause permanent damage to the module
7	Communication level	3.6(max)	It is recommended that the difference from the supply voltage be less than 0.3V to reduce power consumption
8	Measured distance	70m	Clear sky, maximum power, height 1.6m
9	Transmit power	20dBm	100mW
10	AT support	In the tank	Can be read by the AT command
11	Wi-Fi version	802.11 b/g/n	-
12	Communication interface	UART serial port	-
13	RF interface	PCB on-board antenna	50Ω characteristic impedance
14	Operating temperature	-40 ~ +85°C	Industrial grade
15	Operating humidity	10% ~ 90%	Relative humidity, non-condensing
16	Storage temperature	-40 ~ +125°C	Industrial grade
17	Product weight	0.8±0.1g	-
18	Operating current	350mA	3.3V

3.2. Mechanical dimensions

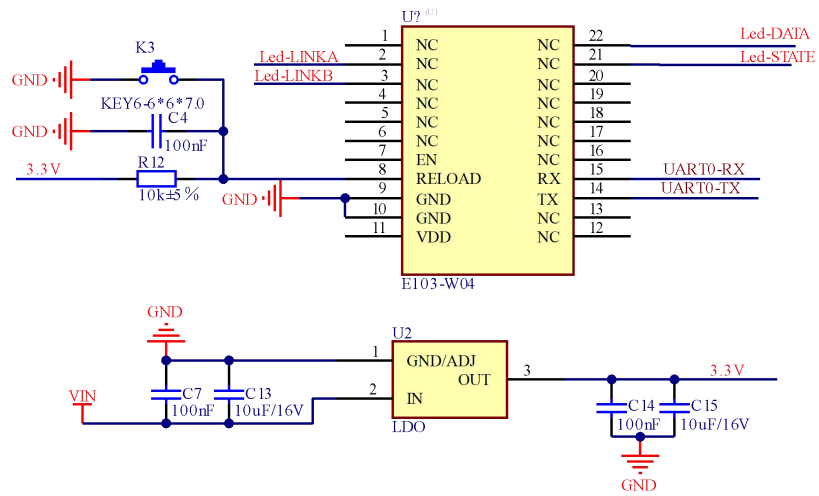


3.3. Pin definition

Pin serial number	Pin definition	Functions and instructions for use
1	NC	Unconnected
2	LED-LINKA	High: The WIFI connection is successful Low: WIFI is not connected
3	LED-LINKB	High: The device is successfully connected to the data processing server Low: The device did not successfully connect to the data processing server
4	485_EN	The external 485 chip enables pin, and the serial port sends data when it is high, and the normal is low;
5	NC	Unconnected
6	NC	Unconnected
7	EN	Wake up pin, high level wake-up chip work, built-in pull-up
8	RELOAD	Pull down the reboot and pull down the 5S device to restore to the factory
9	GND	GND pin
10	GND	GND pin
11	VDD	Equipment power supply: DC 3.0V~3.6V (350mA or more)
12	NC	Unconnected
13	NC	Unconnected
14	TX	TXD pin, used as the UART serial output pin
15	RX	RXD pin, used as the UART serial input pin
16	NC	Unconnected
17	NC	Unconnected
18	NC	Unconnected
19	NC	Unconnected
20	NC	Unconnected
21	LED-STATE	High: The device is faulty and needs to be restarted Low: The device is normal
22	LED-DATA	Fang Bo: Data sending and receiving

4.Recommended design

Recommended design drawings



5. Notes

It is recommended to use a DC regulated power supply to supply the module, the power ripple coefficient is as small as possible, and the module needs to be reliably grounded;

Please pay attention to the correct connection of the positive and negative poles of the power supply, such as reverse polarity may cause permanent damage to the module;

Please check the power supply to ensure that between the recommended supply voltages, exceeding the maximum value will cause permanent damage to the module;

Please check the stability of the power supply, the voltage cannot fluctuate greatly and frequently;

When designing the power supply circuit for the module, it is often recommended to retain more than 30% margin, which is conducive to long-term stable work of the whole machine;

The module should be as far away as possible from the power supply, transformer, high-frequency wiring and other parts with large electromagnetic interference;

High-frequency digital traces, high-frequency analog traces, and power traces must avoid the underside of the module, if it is really necessary to pass under the module, assuming that the module is welded to Top Layer, the Top Layer of the module contact part is paved with copper (all copper is paved and Good grounding), which must be close to the digital part of the module and routed at the Bottom Layer;

Assuming that the module is soldered or placed in the Top Layer, it is also wrong to route wires randomly in the Bottom Layer or other layers, which will affect the spurious and receiving sensitivity of the module to varying degrees;

Assuming that there are devices with large electromagnetic interference around the module, it will greatly affect the performance of the module, and it is recommended to stay away from the module appropriately according to the intensity of interference, and if the situation allows, appropriate isolation and shielding can be done;

Assuming that there are traces with large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power traces) will also greatly affect the performance of the module, it is recommended to stay away from the module appropriately according to the intensity of the interference, and if the situation allows, appropriate isolation and shielding can be done;

Try to stay away from the TTL protocol that is also 2.4GHz in some physical layers, such as USB3.0;

The antenna installation structure has a great impact on the performance of the module, and it is important to ensure that the antenna is exposed, preferably vertically upward.

The antenna must not be installed inside the metal case, which will greatly weaken the transmission distance.

6. frequently asked questions

6.1. The transmission distance is not ideal

When there is a straight-line communication barrier, the communication distance will be attenuated accordingly;

Temperature, humidity, and co-channel interference will lead to an increase in the communication packet loss rate;

The ground absorbs and reflects radio waves, and the test effect near the ground is poor;

Seawater has a strong ability to absorb radio waves, so the seaside test effect is poor.

If there is a metal object near the antenna, or placed in a metal case, the signal attenuation will be very serious;

the power register is set incorrectly, the air rate is set too high (the higher the air rate, the closer the distance);

The low voltage of the power supply at room temperature is lower than the recommended value, and the lower the voltage, the smaller the power;

6.2. Modules are easily damaged

Check the power supply to ensure that exceeding the maximum value between the recommended supply voltages will cause permanent damage to the module.

Please check the stability of the power supply, the voltage should not fluctuate greatly and frequently.

Please ensure that the installation and use of the process of anti-static operation, high-frequency devices electrostatic sensitivity.

Please ensure that the humidity during installation and use should not be too high, and some components are humidity sensitive devices.

If there is no special need, it is not recommended to use it at too high or too low temperature.

6.3. The bit error rate is too high

There is co-channel signal interference nearby, stay away from the interference source or modify the frequency and channel to avoid interference;

Unsatisfactory power supply may also cause garbled characters, be sure to ensure the reliability of the power supply;

Poor or long quality extension wires and feeders can also cause high bit error rates

Revision history

version	Revision date	Revision Instructions	Maintainers
1.0	2023-2-22	Initial version	Li
1.1	2023-10-31	Added 485 enabling instructions	Li
1.2	2023-12-11	Modify the pin definition	LYL

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