

Wireless Modem

User Manual

E103-W12 Product User Manual

DA16200 Ultra-low power WiFi serial port module

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1. Overview

1.1 Brief introduction

E103-W12 series is a support IEEE 802.11b/g/n ultra-low power WiFi module developed by Chengdu Yibaite Electronics Co., Ltd. based on Dialog DA16200 SoC chip, built-in high-performance ARM Cortex-M4 processor, working in the 2.4~2.4835GHz frequency band, wireless maximum transmission power up to 20dBm.

In terms of function, the module supports IEEE802.11 b/g/n standard, the module supports AP and STA modes, supports TCP/UDP/HTTP/MQTT multiple network transmission protocols, and can maintain WIFI connection in here mode.





E103-W12X E103-W12C

1.2 Features:

- Support IEEE802.11 /b/g/n standard, working in the 2.4GHz frequency band;
- Three low-power modes are available, with a minimum current of 0.2uA.
- ◆ Support AP, STA, AP+STA 3 working modes;
- Support WEP/WPA/WPA2/WPA3 multiple WIFI security authentication methods;
- Support TCP/UDP/HTTP/MQTT network communication protocols;
- Support up to 7 socket connections;
- ◆ AP access point supports 6-channel STA device connection;
- Support SNTP network time acquisition (under the premise of Internet access);
- ◆ MQTT and MQTTS network protocols (Alibaba Cloud, Baidu Cloud, OneNet, Amazon Cloud)
- ◆ 支持 HTTP Client;
- ◆ TCP SERVER/TCP CLIENT, UDP COMMUNICATION MODE;
- Support AT command configuration;
- Support static IP address allocation and DHCP dynamic allocation;
- Supports scanning of nearby AP information;
- Support WIFI fast connection;
- Support low-power mode to maintain WIFI connection;

◆ Support PWM output, ADC acquisition, GPIO control;

1.3 Application scenarios

- Medical and health care
 Multi-parameter patient monitor
 Electrocardiogram (ECG)
 Hospital electronic bed and bed control system
 Telemedicine system
- Construction & Home Automation:
 HVAC systems and thermostats
 Video surveillance, video doorbell, and low-power cameras
 Building security systems and low-power electronic locks
- Smart appliances
- Smart wearables
- Asset tracking
- Factory automation
- Grid infrastructure

2. Specifications

2.1 RF parameters

PE percentang	unit	Mode1		memorale.
RF parameters	unit	E103-W12X	E103-W12C	remark
WiFi protocol	_	IEEE 802	.11b/g/n	
Antonno form	_	TDEV	Ceramic	The characteristic impedance is
Antenna Iorm		IFEA	antennas	about 50 ohms
		The antenna gain is 5dBi, and		
Reference distance	М	M 500 300 the module communi the device	the module communicates with	
				the device
Dond	CUr	2.4		Supports the global license-free
Dallu	UUZ			ISM 2.4GHz band

2.2 Electrical parameters

			Мос	lel	romonik								
ĸ	r paramete	rs	E103-W12X E103-W		E103-W12C	I emark							
0		t a z a	V	9 1	2 CV	Permanently burns out the							
Ope	erating vol	tage	V	2.1-	3.00	module over 3.5V							
Comm	winication	1	V	0	9	There is a risk of burnout with							
Comm	unication	Ievel	v	٥.	3	5V TTL							
	Transmi	t power	dBm	2	0								
	Emission	current	but	20	00								
	Receive	current	but	4	6								
		Sleep1	U	0.	2	Shut off completely							
power consump tion Sleep		U	3		It can be timed to wake up or pin								
	Sleep2				to wake up, Wake up can be								
					connected to WiFi within 200ms.								
					WIFI keeps connected,								
				TCP/UDP/MQTT can keep									
	Current	Sleep3											connected, can receive data,
			U	100-	100-200	send data needs to pass through							
						the wake-up module, power							
						consumption is related to the							
						router and network quality.							
tempera	Opera	ating		-40~	~+85	Industrial grade							
turo	temper	rature	°C	40	.00								
ture	Storage te	emperature		-40~	+125								

2.3 Hardware parameters

Hardware parameters	Мо	del	noment		
	E103-W12X	E103-W12C	remark		
chip	DA16200				
Flash	4MB		4MB		Customizable 16MB/8MB
Encapsulation	Patches				
size	16*13*2. 7mm		The error size is ± 0.1 mm		
weight	3.5g	3.4g	The error is ± 0.1 g		

3. Mechanical dimensions and pin definitions

3.1 E103-W12X pin diagram



3.2 Pin diagram of E103-W12C



E103-W12C&E103-W12X Pin Definitions:

Pin sequ ence numb er	Pin name	Pin type	Pin Usage		
1	GND	_	Ground, connected to the power reference ground		
2	NC	-	-		
3	WAKE_UP	_	sleep2/sleep3 external wake up feet		
4	PWR_KEY	-	The power supply enable pin, high level enabled, low level shutdown is in sleep1 mode		
5	VDD_DI01	I/0	GPIOA1-GPIOA11 power supply 1.8v-3.3V, GPIO output voltage is the same		
6	GPI03	I/0	General-purpose IO port, ADC channel3 can be reused		
7	GPIOAO	I/0	General-purpose IO port, ADC channel0 can be reused		
8	GPIOA2	I/0	General-purpose IO port, ADC channel2 can be reused		
9	GPIOA1	I/0	General-purpose IO port, ADC channel1 can be reused		
10	GPIOA5	I/0	AT command serial port UART_RX		

11	GPI07	I/0	General-purpose I/O port
12	GPIOA10	I/0	Universal I/O port, multiplexable PWM output
13	CPIOA11	τ/0	General-purpose I/O port, receive data notification pin in
15	OI IOAII	170	sleep3 mode
14	GPIOA6	I/0	General-purpose I/O port
15	GPIOA4	I/0	AT command serial port UART1_TX
16	GPI08	I/0	General-purpose I/O port
17	GPIOA9	I/0	General-purpose I/O port
18	RTC_WAKE_UP2	I/0	Pull-down grounding
19	GND	I/0	Ground, connected to the power reference ground
20	VDC	I/0	Module powered, 3.3V
21 000 0102		GPIOC6-GPIOC8 power supply 1.8v-3.3V, GPIO output voltage is	
21	VDD_D102	2 1/0	the same
22	UARTO_TXD	I/0	Debugging the serial port TX, users don't need to care
23	UARTO_RXD	I/0	Debugging the serial port RX, users don't have to care
24	GPIOC6	I/0	General-purpose I/O port
25	GPIOC7	I/0	General-purpose I/O port
26	GPIOC8	I/0	General-purpose I/O port
27	JTAG_TCLK	_	JTAG emulation burning pin
28	JTAG_TMS	_	JTAG emulation burning pin

4. Wiring diagrams are recommended



Note:

1. The power supply must be guaranteed to be $2.1 V^3.6 V$, in order to ensure the stable operation of the module, it is recommended to choose an LDO power supply with a power supply capacity greater than 500mA.

5. Feature description

This module can be divided into Access Point, which is commonly referred to as AP access point, and Station, which is commonly referred to as a site, can be divided into TCP Server, TCP Client, UDP, MQTT, HTPP client from the transmission module and service category.

5.1 Job Roles

Job roles are defined based on the perspective of the WiFi physical layer.

5.2 Access Point(AP mode)

Access Point is referred to as AP mode, which is similar to a router, allowing wireless devices to connect and establish TCP/IP-based server, client, and UDP communication. In this mode, 6 stations can be connected, and a maximum of 7 TCP socket transmissions are supported. command AT+CWMODE=1 to configure the module to work in the AP role.

5.3 Station(STA mode)

Station mode is referred to as STA, the module does not provide connection under this role, can only be connected to the Access Point or router, this module supports TCP server, TCP client, UDP under the Station role, and supports up to 8 sockets. MQTT and HTTP clinet are also supported. Command AT+CWMODE=0, S is set in STA mode.

5.4 Network Capabilities

This module supports TCP server, TCP cliet, UDP, MQTT, HTTP client and other functions. All network functions can be used at the same time, such as TCP server can be enabled and TCP client can be used to connect to other servers at the same time.

5.4.1 TCP server

Let the module work as a TCP server. Use the command: AT+CIPSERVER to set the TCP server with the corresponding ip and port. Up to 8 servers can be opened, and each server can connect to 7 clients. After 8 servers are enabled, TCP client and UDP functions cannot be used.

5.4.2 TCP client

Let the module work as a TCP client. Use the AT+CIPSTART command to start the TCP client and connect to the corresponding server. A maximum of 8 clients can be enabled to connect to the server, and the TCP server and UDP functions cannot be used after the 8 clients are enabled.

5.4.3 UDP

The module uses UDP to communicate, and uses the AT+CIPUDP=<local_port> command to enable the local UDP port number. You can create up to 8 local udp port numbers, and you cannot use TCP client or TCP server after the maximum number is reached.

5.4.4 MQTT

The module supports IoT platforms such as Alibaba Cloud, Baidu Cloud, and OneNet in MQTT mode. The service parameters created by the platform can be added to the module for communication.

5.4.4.1 Alibaba Cloud

For network communication based on the Alibaba Cloud platform, you need to log in to Alibaba Cloud to obtain relevant parameters, including product key, device name, client ID, and other information.

5.4.4.2 Baidu Cloud

For network communication based on Baidu Cloud platform, you need to log in to Baidu Cloud to obtain relevant parameters, mainly including device name, user name, password and other confidence, see Chapter 7 Baidu Cloud Configuration Tutorial for details.

5.4.4.3 Onenet

For network communication based on the OneNet cloud platform, you need to log in to OneNet to obtain relevant parameters, including device ID, product ID, and authentication information, as detailed in Chapter 7 of the OneNet Configuration Tutorial.

5.4.4.4 Amazon Cloud

For Amazon Cloud-based network communication, you need to log in to Amazon Cloud to obtain relevant parameters, which mainly contain AmazonRootCA1.pem, xxxxx-certificate.pem.crt, and xxxxx-private.pem.key. For details, see Chapter 7 of the Amazon Cloud Configuration Tutorial.

5.4.5 HTTP Client

When using this function, you only need to configure the corresponding server resource URL and start a trigger request to obtain the resources that the server responds to, without worrying about the complex HTTP protocol layer, as detailed in Chapter 7 HTTP Client Configuration Tutorial.

5.5 Low power consumption

This module has three low-power modes: sleep1, sleep2, sleep3 mode. The Sleep1 mode supplies power to the shutdown module, and the current is about 0.2ua. The Sleep2 mode RTC is working, and it can be woken up at a timed or pinned out, with a current of about 3ua. Sleep3 mode wifi is keep-alive can receive TCP, UDP, MQTT data, send data needs to wake up the module through pins and commands to send data, after sending instructions into sleep.

5.6 Scans for nearby APs

When this module works in STA mode, you can use the AT command to scan nearby AP information, and if so, print out the AP information through the serial port in the following format:

Fixed head	MAC(BSSID)	frequency	RSSI	flag	ssid
+CWSCAN:	70:5d:cc:32:15:32	2422	-30	[WPA2-PSKCCMP]	TEST
				[WPS] [ESS]	

1. Scanning nearby APs can only be in STA mode.

2. Each parameter is separated by a comma '\t' and ends with <LF>. MAC addresses (BSSID) are separated by a semicolon ':'.

6. Use the tutorial

This module has a variety of functions, and you need to configure the relevant parameters before using it before it can work properly.

In the following tutorial, add * is the operation that must be performed, and please set it according to your own needs when using other modes.

6.1 Basic TCP/UDP data transfer

6.1.1 Communication with the PC side

6.1.1.1 The module does STA communicate with the TCP server of the PC

To communicate with the PC under the STA role, the module and the module block need to be on the same LAN. Here we do the STA to communicate with the PC's TCP server, and the next module is to communicate with the PC's TCP client.

1. Set the module to STA mode, and then restart to take effect: AT+CWMODE=0, restart: AT+RST.

2. Connect to the router in the network segment where the computer is located: AT+CWJAPA=TST-2.4G,

TST12345678, after the connection is successful, the wifi name and the assigned IP address will be printed.

3. Open the network debugging assistant and open a TCP server. The local IP address of the Network Debugging Assistant must be on the same network segment as the IP address of the module.

	网络调试助手	×□-∫₩
网络设置 (1)协议类型	数据日志	NetAssist V5.0.3 @ Q
TCP Server 👻		A
(2)本地主机地址 192.168.2.25 <u>-</u>		
(3)本地主机端口 ⁸⁰⁸⁰		
关闭		
接收设置		
☑ 按日志模式显示		
▶ 接收区自动换行		
□ 接收数据不显示		
□ 援收保存到又件…		
自动波展 遺跡接收		
自动应答界面主题		
批重发送 分包设置		
数据波形 校验计算		
LASCIT/末 占数打賞		
● ASULI ● AEA ● 基义符指令解析 ①		
▶ 自动发送附加位	It ben IVW 1 who have a second	
「打开文件数据源	数据发送 客户端: All Connections (0)▼ _ ◆ 断开	
□ 循环周期 1000 ms	http://www.cmsoft.cn	42.54
快捷指令历史发送		友広
☞ 就绪!	0/0 RX:0	TX:0 复位计数

4. The module is connected to the TCP server: AT+CIPSTART=192.168.2.25,8080, and return: +CIPSTART:1 OK.

5. Use the command to send data to the TCP server: AT+CIPSEND=1, 10, 192. 168. 2. 25, 8080, 123456789.

6. Looking at the Network Debugging Assistant and seeing that the data was received:



7. The network debugging assistant sends data to the module, and the module receives the data and prints it:



8. The whole operation steps.

XCOM V2.6		- 🗆 X		网络调试助手	₩ - □ ×
[2023-10-30 15:48:01.031] TX: AT *070002-0 [2023-10-30 15:48:01.222] KX: C2023-10-30 15:48:04.174] TX: AT *0707AA*TST-2.46.TST12346678 [2023-10-30 15:48:07.097] KX: C2023-10-30 15:48:07.097] KX: C2023-10-30 15:48:33.709] KX: CTSTART:1 OK [2023-10-30 15:48:33.709] KX: CTSTART:1 OK [2023-10-30 15:48:33.709] KX: CTSTART:1 OK [2023-10-30 15:48:33.709] KX: CTSTART:1 OK [2023-10-30 15:51:31.107] TX: AT *CTSTART:1 OK [2023-10-30 15:51:31.107] TX: AT *CTSTART:1 OK [2023-10-30 15:51:31.119] KX: C2023-10-30 15:51:2.431] KX: C2023-10-30 15:51:2.431] KX: C2023-10-30 15:51:2.431] KX: C2023-10-30 15:51:2.431] KX: C2023-10-30 15:51:2.431] KX: C2023-10-30 15:51:2.431] C2023-10-30 15	. 01	 串口选择 QUES3: USB-SERIAL CR34 ◇ 波特案 115200 ◇ 停止位 1 ◇ 旋指位 8 ◇ 校验位 None ◇ 串口操作 ※ 关闭串口 保存窓口 新時換收 16进制提示() TR 201 215 215 210 25 	「時後景 (1) 防波类型 「TCF Server ▼ (2) 本地主机地址 「S2:168.2.25 ▼ (3) 本地主机地山 「D000 ● 美術 「御坂役置 「安正」○ MEX 「 指数の保存到文件 自法定理 憲法地政 自主法定理 憲法地政 自主法定理 憲法地政 自主法定理 憲法地政 出版公言 其面主 地域保存到文件 自法定理 憲法地政	bigHgH.k [2023-10-30 15:48:35 104]# Client 192.168.2.30:354 [2023-10-30 15:51:31.017]# KECV ASCII FROM 192.166 [2023-10-30 15:51:31.017]# KECV ASCII FROM 192.166 [2023-10-30 15:53:12.304]# SEND ASCII TO ALL> http://www.emsoft.cn	NetAtiit V5.0.3 (*) (*) 153 getz online. 1.2.30:354653)
AT+RESTORE AT+UTETART=192 168 1 128.0080	50 AT+VER 51 AT+GPEIOSTART=2, 1 c0, 1 52 AT+GPEIORE=2, 1 c0, 1 53 AT+GPEIORE=2, 1 c0, 1	55 ● 发送新行 56 16进制发送 57 ○ 关联数字键盘	 − 发送设置 ・ ASCII C HEX ・ レーン・レーン・レーン・レーン・レーン・レーン・レーン・レーン・レーン・レーン・		● 断开 「 清除 ~ 清除
 □ **CIFSEND=1, 10, 192. 168. 2. 25, 8080, 123456789 页码 6/8 移除此页 添加页码 首页 	⁰³ AT + CMB022+0 上一页 下一页 尾页 页段 1 跳转 P-131 TC=0.DSP=0.DCD=/ 単純面中部 45	00 □ 目切循环友送 59 周期 100 ms 导入导出条目	□ 11 开义汗颈强浪 □ 循环周期 1000 ms 快捷指令 历史发送 ■ 就绪!	http://www.omsoft.on 1/1 RX:9	发送 TX:24 复位计数

6.1.1.2 The module communicates with the TCP client of the PC by the AP

- 1. Set the module to AP mode: AT+CWMODE=1.
- 2、Reset module: AT+RST.
- 3、Set the IP address of the AP: AT+CIPIP=1, 192. 168. 10. 1, 255. 255. 255. 0, 192. 168. 10. 1.
- 4. Set the DHCP server: AT+CWDHCPS=1, 192. 168. 10. 2, 192. 168. 10. 10, 1800.
- 5、Set the soft AP to AT+CWSAP=MY_SSID, 3, 1, 1, 12345678, 1, CN.

6. AP created by the PC connection module:



After the connection is successful, the module prints the MAC address of the computer:

[2023-10-30	16:54:40.488]
RX:	
+CWCST:f0:d4	4:15:92:3a:0b

7、Create a TCP server in the module: AT+CIPSERVER=8080.

8. The network debugging assistant connects the TCP client to the module, and the module prints the IP address and port number of the PC after the connection is successful.

```
[2023-10-30 17:02:40.693]
RX:
+TRCTS:0,192.168.10.2,50004
```

9、The module sends data to the network debugging assistant: AT+CIPSEND=0,10,192.168.10.2,50004,1234567890.

- -网络调试助手 - U × 网络设置 数据日志 NetAssist V5.0.3 🗇 📿 (1) 协议类型 TCP Client $\overline{\mathbf{T}}$ [2023-10-30 17:08:59.345]# RECV ASCII> 1234567890 (2) 远程主机地址 Ŧ 192.168.10.1 [2023-10-30 17:13:37.637]# SEND ASCTT> (3) 远程主机端口 http://www.cmsoft.cn ● #新开 接收设置 ▼ 按日志模式显示 ▶ 接收区自动换行 接收数据不显示 接收保存到文件. 自动滚屏 清除接收 自动应答 界面主题 批量发送 分包设置 数据波形 校验计算 占攀打掌 ASCIT/表 发送设置 ☑ 转义符指令解析 ① 自动发送附加位 数据发送 √清除 1 清除 打开文件数据源。 E http://www.cmsoft.cn 循环周期 1000 ms 发送 快捷指令 历史发送 就绪! 2/3 RX:20 TX:66 复位计数
- 10. The network debugging assistant receives the data, and the network debugging assistant sends:

```
[2023-10-30 17:13:37.754]
RX:
+TRDTS:0,192.168.10.2,50004,22,http://www.cmsoft.cn
```

6.1.1.3 UDP transmission

The above has introduced the use of the module as an AP or STA to connect to TCP, here we will only communicate in STA mode.

1. Set the setting mode to STA mode: AT+CWMODE=0.

2、Reset: AT+RST.

3、Connect to the router (the IP of the module needs to be in the same network segment as the computer): AT+CWJAPA=TST-2.4G, TST12345678.

- 4、 OPEN A LOCAL UDP PORT: AT+CIPUDP=8081.
- 5. The Network Debugging Assistant creates a UDP session.

6. The module sends data to the Network Debugging Assistant, and the Network Debugging Assistant sends data to the module.

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[2023-10-30 17:35:15.406] TX: AT*CTFSRM=2,10,192,166.2.29,8080,123456789	网络设置 (1) 执动类型	数据曰志 NetAssi
[2023-10-30 17:36:15.522] RX: OK	(1) 加快量 (2) 本地主机地址 [192,168,2,29 平	[2023-10-30 17:35:15.505]# RECV ASCII FROM 192.168.2.30 :8080> 123456789
[2023-10-30 17:35:24.959] RI: *TRUUS:2,192.168.2.29,8080,22,http://www.emsoft.on	(3) 本地主机端口 coco	[2023-10-30 17:35:24.845]# SEND ASCII TO 192.168.2.30 :8080> http://www.cmsoft.cm
	↓ · · · · · · · · · · · · · · · · · · ·	

7, All operations are shown in the figure below



6.1.1.4Transparent transmission mode

Currently, the transparent transmission mode can only be used in non-low-power mode, and supports TCP client and udp modes, and the sending of data needs to end in a line break. In transparent transmission mode, only one socket connection can be established, and multiple connections cannot be made. 1. Connect to the router AP (the ip of the module needs to be in the same network segment as the computer): AT+CWJAPA=TST-2.4G, TST12345678.

2. Open the network debugging assistant and open a TCP server, and the local address of the network debugging assistant needs to be in the same network segment as the IP address of the module.

3. The module is connected to the TCP server: AT+CIPSTART=192.168.2.101,8080.

- 4. Enter the transparent transmission: AT+CIPTRANSLINK=0 //0 is tcp, and 1 is udp.
- 5. Send data to each other without any problem, such as: 123456789.

IDM ACOINT V2.0	^		网络视觉助手 一一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一	1 ×
[2023-10-01 10:24:53.892] TX: 1234567890	串口选择 COM53:USB-SERIAL CH34 ~	─网络设置 (1)协议类型 TCP Server ▼	数据日志 <u>NetAssist V5.0.3</u>	4
[2023-10-31 10:24:54.964] TX: 1234567890	波特率 115200 ~ 停止位 1 ~	(2)本地主机地址 192.168.2.101 <u>*</u>	[2023-10-3] 10:24-55.000]# MEY ASILI HEM 102.100.2.10 .40100 [2023-10-3] 10:24-55.000]# MEY ASILI FROM 192.168.2.20 :46188)	
[2023-10-31 10:25:00.759] &X: http://www.omsoft.om	数据位 8 🗸	(3)本地主机端口 8080	1234667890	
[2023-10-31 10:25:01.289] RX: http://www.emsoft.on	校验位 None ✓ 串口操作 ● 关闭串口	美 关闭	http://www.omsoft.on	
[2023-10-31 10:25:01.816] MX: http://www.omsoft.om	保存窗口 清除接收	·接收设置 ・ ASCII C HEX	[2023-10-31 10:25:00.875]# SEND ASCII TO ALL> http://www.omsoft.om	
[2022-10-31 10:25:03.618] TX: 1234667890	 □ 16进制显示□ DTR □ RTS □ 自动保存 ■ Pti同部 □ 100 	 ▼ 接收区自动换行 □ 接收数据不显示 	[2023-10-31 10:25:01.690]# SEND ASCII TO ALL> http://www.omsoft.on	
[2023-10-31 10:25:03.835] TX: 1234567890	adielan 100 wa	□ 接收保存到文件 自动流展	[2023-10-31 10:25:07.162]# RECV ASCII FROM 192.168.2.20 :46188>	
[2022-10-31 10:25:12:964] TX: 1234567890		自动应答 累面主题 批型发送 分包设置 数据成形 校验计算 ASCII/法 占赞打赏	1234667800 [2023-10-31 10:25:10.396]# RECY ASCII FROM 192.168.2.20 :46188> 1234667800 [2023-10-31 10:25:13.283]# RECY ASCII FROM 192.168.2.20 :46188> 1234667890	

10. Send +++ and exit the transparent transmission mode // This should also be newlined.

6.1.1.5High-speed transmission of instructions

In high baud rates, packets may be lost when using AT commands or transparent transmission when sending quickly. We can send a command to enter data mode first, and then send the data. < the value of the ESC > is 0x1b, and the instructions are described in the AT Command Manual.

发送格式: <ESC>H<cid>, <length>, <remote_ip >, <remote_port >

Data: < data>

1. Connect to the router AP (the ip of the module needs to be in the same network segment as the computer): AT+CWJAPA=TST-2.4G, TST12345678.

2. Open the network debugging assistant and open a TCP server, and the local address of the network debugging assistant needs to be in the same network segment as the IP address of the module.

- 3. The module is connected to the TCP server: AT+CIPSTART=192.168.2.101,8080.
- 4. Enter data mode: < ESC>H1, 10, 0, 0.
- 6. If the data specified above is sent, it will wait until the length is insufficient, for example, 1234567890.

```
[2023-10-31 10:52:27.475]

TX: □H1,10,0,0

[2023-10-31 10:52:27.583]

RX:

OK

[2023-10-31 10:52:33.402]

TX: 1234567890

[2023-10-31 10:52:33.517]

RX:

OK
```

6.1.2 MQTT

MQTT supports v3.1 and v3.1.1, as long as the MQTT cloud platform supports these two versions, it can be connected. In this summary, Alibaba Cloud, Baidu Cloud, ONNET, and Amazon Cloud will be used as instances to connect and launch data. This section only explains the basic operations on the module side, and the registration and operation of the cloud platform are described in another document.

6.1.3 Alibaba Cloud

- 1. The module connects the STA to a router that can access the external network.
- 2. Go to Alibaba Cloud > IoT Platform > Device Management > Device Information > MQTT Connection Parameters to obtain the required connection parameters.

MQTT 连接参数

clientId	k02pt.getter.device1 securemode=2,signmethod=hmacsha256,timestamp=1698665924 663
username	device1&k02pkjC3UkL
passwd	r5777254u9ee7cd8bf44ad0d0e72a4f571bd139f255bc17 🚅 📭 🖓 👬
mqttHostUrl	iot-062000นบุธี2วe54v.กฤณฑ 🖿 🖦.aliyuncs.com
port	1883



х

3. Set the MQTT Client ID:

4. Set the MQTT broker address and port number:

AT+MQTTBR=a1***.iot-as-mqtt.cn-shanghai.aliyuncs.com, 1883.

5. If you subscribe to a topic, you can find the topic format in Alibaba Cloud - > IoT Platform - >

Device Management - > Products - > Topic List - > Custom Topic List.

产品信息 Topic 类列表 功能定义 消息解析	服务端订阅 设备开发	文件上传配置				
基础通信 Topic 物模型通信 Topic 自定义 Topic	5					
● 自定义Topic中流转的数据可以保存到时序存储中,点击配置						
定义 Topic 关 请输入 Topic	Q					
自定义 Topic	操作权限	是否开启代理订阅	压缩/解压缩	描述	操作	
/== _ki 5bDgb/\$(deviceName)/user/get	订阅				编辑 删除	
/kT5bDgb/\${deviceName}/user/update	发布和订阅		未开启		编辑 删除	
A	发布	ā		7	编辑 删除	

AT+MQTTTS=1, /a******/\${deviceName}/user/update

6、 Post Topics:

AT+MQTTTP=/a******/\${deviceName}/user/update

7. Set the device name and login password:

AT+MQTTLI=username, password

8. Start connecting to MQTT:

AT+MQTTCL=1

```
[2023-10-30 20:47:11.654]

TX: AT+MQTTCL=1

[2023-10-30 20:47:11.763]

XX:

JK

[2023-10-30 20:47:12.318]

XX:

+MQTTCL:1
```

Response+MQTTCL:1The connection is successful, if it fails, the topic may be set incorrectly. 9、Post MQTT message:

AT+MQTTMSG=hello, /a******/\${deviceName}/user/update

Since we have the same subject as a publisher and subscriber, we receive the message sent.

```
[2023-10-30 20:53:05.799]
TX: AT +MQTTMSG=hello, /k* ] * C3UkL/device1/user/update
[2023-10-30 20:53:06.017]
RX:
OK
+MQTTMSGSND:1
[2023-10-30 20:53:06.224]
RX:
+MQTTMSG:hello, /****:C3UkL/device1/user/update, 5
```

6.1.3.1Baidu Cloud

The module connects the STA to a router that can access the external network.

1. After Baidu Cloud registers the device, the connection parameters are IoTCoreId, DeviceKey, and DeviceSecret.

连接信息	
loTCoreld:	anqdrpz 📋
DeviceKey:	device1
DeviceSecret:	********** ~ 重置
服务端根证:	查看详情

It is inconsistent with the actual MQTT connection parameters, we want to use this provided by Baidu Cloud<u>Online tools</u>Calculate our actual connection parameters:

https://iotcore-dev-tool.gz.bcebos.com/mqtt-sign/			
填写设备信息(*为必填项	页)		
*IoTCoreld	必填项		
地域	广州		
*DeviceKey	必填项		
*DeviceSecret	必填项		
时间戳 (秒)		填入当前时间戳	填入0
加密方式	MD5		
	使用当前时间戳则密码有效期为10min,更安全;使用0则密码 点击计算	长期有效,建议仅在测试	环境使用。
结果 (MQTT 连接信息)			
Broker 地址			
MQTT 用户名			
MQTT 密码			
ClientID		推荐值	

The input information here is the connection parameter we obtained above, and we can generate our actual connection parameters by clicking on the calculation. Note that this timestamp is only 10 minutes. The timestamp must be set to 0 or much greater than the current time.

2. The rest of the operations are the same as those of Alibaba Cloud.

6.1.3.2 OneNet

Onenet is similar to Alibaba Cloud and Baidu Cloud in that it uses the parameters and calculation tools of the cloud platform to generate the final connection parameters: broker address, username, password, and clientID. It should be noted that the current MQTT version of OneNet is V3.1.1, and the version setting is incorrect, and the connection cannot be successful.

6.1.3.3 Amazon Cloud

Amazon Cloud connects in the form of certificates, and we get several certificates after signing up for Amazon Cloud's MQTT service. The certificates we need are the suffixes in the figure below.

名称	修改日]
а 策略证书	2023/8
🖙 0a7b1d69255594606ed69a4424109783cf41cdbde9967ad412a1fc634a21ef18-certificate.pem.crt	2023/8
0a7b1d69255594606ed69a4424109783cf41cdbde9967ad412a1fc634a21ef18-private.pem.key	2023/8
0a7b1d69255594606ed69a4424109783cf41cdbde9967ad412a1fc634a21ef18-public.pem.key	2023/8
AmazonRootCA1.pem	2023/8
AmazonRootCA3.pem	2023/8

1. To flash the certificate to the module, we need to burn the root certificate, the client certificate and the private key, open our certificate above in a notepad way, and then copy it.

	cmd.txt	teraterm.log	teraterm.log	AmazonRootCA1.pem	×	+	-	×
文件	编辑	查看						63
 MIII b24 b302 ca9 9061 JFAC VOu 93Fc jg5 AYY, A4II U5PN N+gE 0/ut 5Ms15 Ms15 Ms17 Ca9 F 0/ut	BEGIN Cf QTCCAimg/ SMQswCQYDV Um9vdCBDC SAIUEBHMCY gQGEgMTCCL igFB0fW7Y1 II8c+62f11 SbHrQgLKm+ WSH5SNz/SAQCY8jda MQYDVR00E AQCY8jdaC ICCjjmCXP1 S63PYACC CQJVtMVT8(t-END CER1	RTIFICATE wIBAgITBmyfz5m/jAo54vB4ikPmljZbyjANBgkqł QQGEwJVUZEPMA0GA1UEChMGQW1hem9uMRkwFwYDV SAxMB4XDTE1MDUJNJAwMDawMFoXDTM4MDExNZAw VMxDZANBgNVBAoTBkFtYXpvbjEZMBcGAIUEAxMQV Aku29J1o91ghYP10hAEvrAItht0gQ3p0sqTQNrobN Rn4SWiw3te5djgdYZ6k/oIZpeVKVuRF4fn9tBb6c a/sRxmPUDgH3KKHOVj4utWp+UhnMJbu1Hheb4mjU egwLX0tdHA114gk957EWW67c4CXBJGKLho+rcdc z1kr1A4b9v7LWIbxcceV0F34GfID5yHI9Y/QCB/J wEAAaNCMEAwDwYDVR0TAQH/BAUwAwEB/ZAOBgNV BYEFIQYIU07LWIJQuCFmcx7IQTgoIMA0GCSqGZ CfGsV2USggNiM0ruYou6r41K5IpDB/G/wkjUu0) 6T53iHTfIUJrU6adTrCC2qJeHZERxh1bI1Bjjt/r xVy8MWy7Vu33PqUXHeeE6V/Uq2V8viT096LXFvkl tPHRhsjrdRPSHca2XV4cdFyQzR1b1dZwgJzJmkLnoC 4q5WTP468SQvvG5 IFICATE	IkiG9w0BAQsF /QQDExBBbWF6 DDAwHFowOTEL W1hem9uIFJv LJ4gHHKeNXj /o3b5MgHFzZM JNqcmzU5L/qw JcAwhmahRWa6 isq08p8Kb11L IIDEgEw+0yQm 408BAf8EBAMC SIb3DQEBCwUA /KGX9rbxenDI nsv0tadQ1wUs UJDYK8U90vv zyMZFo6IQ6XU JdeXeGADbkpy					

Example:

AT+MQTTCA=O, ' -----BEGIN CERTIFICATE-----

MIIDQTCCAimgAwIBAgITBmyfz5m/jAo54vB4ikPm1jZbyjANBgkqhkiG9w0BAQsF ADA5MQswCQYDVQQGEwJVUzEPMAOGA1UEChMGQW1hem9uMRkwFwYDVQQDExBBbWF6 b24gUm9vdCBDQSAxMB4XDTE1MDUyNjAwMDAwMFoXDTM4MDExNzAwMDAwMFowOTEL MAkGA1UEBhMCVVMxDzANBgNVBAoTBkFtYXpvbjEZMBcGA1UEAxMQQW1hem9uIFJv b3QgQ0EgMTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBALJ4gHHKeNXj ca9HgFB0fW7Y14h29J1o91ghYP10hAEvrAItht0gQ3p0sqTQNroBvo3bSMgHFzZM 906II8c+6zf1tRn4SWiw3te5djgdYZ6k/oI2peVKVuRF4fn9tBb6dNqcmzU5L/qw IFAGbHrQgLKm+a/sRxmPUDgH3KKHOVj4utWp+UhnMJbu1Hheb4mjUcAwhmahRWa6 VOujw5H5SNz/OegwLXOtdHA114gk957EWW67c4cX8jJGKLhD+rcdqsq08p8kDi1L 93FcXmn/6pUCyziKr1A4b9v7LWIbxcceVOF34GfID5yHI9Y/QCB/IIDEgEw+OyQm jgSubJrIqgOCAwEAAaNCMEAwDwYDVROTAQH/BAUwAwEB/zAOBgNVHQ8BAf8EBAMC AYY wHQYDVR00BBYEFIQYz1U07LwM1JQuCFmcx7IQTgoIMA0GCSqGSIb3DQEBCwUAPProvember 2012 and 2012 aA4IBAQCY8jdaQZChGsV2USggNiMOruYou6r41K5IpDB/G/wkjUuOyKGX9rbxenDI U5PMCCjjmCXPI6T53iHTfIUJrU6adTrCC2qJeHZERxhlbI1Bjjt/msv0tadQ1wUs N+gDS63pYaACbvXy8MWy7Vu33PqUXHeeE6V/Uq2V8viT096LXFvKW1JbYK8U90vv o/ufQJVtMVT8QtPHRh8jrdkPSHCa2XV4cdFyQzR1b1dZwgJcJmApzyMZFo6IQ6XU 5MsI+yMRQ+hDKXJioaldXgjUkK642M4UwtBV8ob2xJNDd2ZhwLnoQdeXeGADbkpy rqXRfboQnoZsG4q5WTP468SQvvG5

-----END CERTIFICATE-----'

The content of the certificate must be enclosed in single or double quotation marks.

```
[2023-10-31 11:14:58.746]
TX: AT +MQTTCA=0, ' ----BEGIN CERTIFICATE-----
[2023-10-31 11:14:58.898]
RX :
0K
[2023-10-31 11:15:31.901]
TX: AT +MQTTCA=0, '----BEGIN CERTIFICATE-
MIIDQTCCAimgAwIBAgITBmyfz5m/jAo54vB4ikPmljZbyjANBgkqhkiG9wOBAQsF
ADA5MQswCQYDVQQGEw_TVUzEPMAOGA1UEChMGQW1hem9uMRkwFwYDVQQDExBBbWF6
b24gUm9vdCBDQSAxMB4XDTE1MDUyNjAwMDAwMFoXDTM4MDExNzAwMDAwMFowOTEL
MAkGA1UEBhMCVVMxDzANBgNVBAoTBkFtYXpvbjEZMBcGA1UEAxMQQW1hem9uIFJv
b3QgQOEgMTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBALJ4gHHKeNXj
ca9HgFBOfW7V14h29Jlo91ghVPlOhAEvrAItht0gQ3pOsqTQNroBvo3bSMgHFzZM
906II8c+6zf1tRn4SWiw3te5djgdYZ6k/oI2peVKVuRF4fn9tBb6dNqcmzU5L/qw
IFAGbHrQgLKm+a/sRxmPUDgH3KKHOVj4utWp+UhnMJbulHheb4mjUcAwhmahRWa6
VOujw5H5SNz/OegwLXOtdHA114gk957EWW67c4cX8jJGKLhD+rcdqsqO8p8kDi1L
93FcXmn/6pUCyziKrlA4b9v7LWIbxcceVOF34GfID5yHI9Y/QCB/IIDEgEw+OyQm
jgSubJrIqgOCAwEAAaNCMEAwDwYDVROTAQH/BAUwAwEB/zAOBgNVHQ8BAf8EBAMC
AYYWHQYDVROOBBYEFIQYzIUO7LwMLJQuCFmcx7IQTgoIMAOGCSqGSIb3DQEBCwUA
A4IBAQCY8jdaQZChGsV2USggNiMOruYou6r4lK5IpDB/G/wkjUuOyKGX9rbxenDI
USPMCCjjmCXPI6T53iHTfIUJrU6adTrCC2qJeHZERxhlbI1Bjjt/msvOtadQ1wUs
N+gDS63pYaACbvXy8MWy7Vu33PqUXHeeE6V/Uq2V8viT096LXFvKWlJbYK8U90vv
o/ufQJVtMVT8QtPHRh8jrdkPSHCa2XV4cdFyQzRibldZwgJcJmApzyMZFo6IQ6XU
5MsI+yMRQ+hDKXJioaldXgjUkK642M4UwtBV8ob2xJNDd2ZhwLnoQdeXeGADbkpy
rqXRfboQnoZsG4q5WTP468SQvvG5
     END CERTIFICATE ______
[2023-10-31 11:15:32.095]
RX :
OK
```

 $2\ensuremath{\cdot}$ Next, follow this method to burn the client certificate and private key.

3. Since Amazon Cloud wants to verify the current time, we need to enable the SNTP network to obtain the time: AT+CIPSNTP=1, pool.ntp.org, 86400.

4. Set the time zone, the default is UTC time and China time difference of 8 hours: AT+TZONE=28800.

5、Restart and look at the query time: AT+TZONE=28800, AT+RST, AT+TIME.

[2023-10-31 11:27:35.353] TX: AT+TZONE=28800 [2023-10-31 11:27:35.539] RX : OK [2023-10-31 11:27:41.284] TX: AT+RST [2023-10-31 11:27:41.393] RX : OK [2023-10-31 11:27:42.632] RX : +INIT: DONE, O [2023-10-31 11:27:44.177] RX: +CWJAP:1, 'TP-LINK_6C35', 192.168.1.115 [2023-10-31 11:27:47.309] TX: AT +TIME [2023-10-31 11:27:47.427] RX : +TIME:2023-10-31, 11:27:49 OK

- 10. Set the MQTT broker address and port number: AT+MQTTBR=a-ats.iot.us-east-1.amazonaws.com,8883.
- 11, Enable TLS: AT+MQTTTLS=1.
- 12. When Amazon Cloud tests MQTT, the topic can be customized, and here we define the topic name as test.

aws III 服务	Q Search		[Alt+S]			24	0 4	۲	弗吉尼亚北部 ▼	ЕВУТЕ 🔻
AWS IoT	×	您可以使用 MQTT 测试客户端来监 程序。您可以使用 MQTT 测试客户	砚在您的 AWS 账户中传递的 MQTT消息 講来订阅 MQTT 消息主题,并将 MQTT	,设备会发布由主题标识的 MQTT 消息,以将其状态作 消息发布到主题。	专达给 AWS loT。AWS loT 也?	È发布 Μ(QTT 消息,	以将更改	和事件传达给设备	和应用
监控		▶ 连接详细信息 您可以通过选择"断开连接"来更新	G连接详细信息,然后在"建立连接以继续"页面。	进行更新。					Øi	己连接
连接 连接一台设备 ▶ 连接多台设备		订阅主题 发布到:	主题							
测试 ▶ Device Advisor MQTT 测试客/ 设备位置 新增	1號	主题确选条件 偏聲 主题确选条件描述您想订阅的主题。 test ▶ 其他配置	主题筛选条件和以包括 MQTT 通配符。							
管理 ▶ 所有设备		订阅								
▶ Greengrass 设行 ▶ LPWAN 设备	ž	订阅	test			暂	停	清除	导出	辑
 软件包新增功 ▶ 远程操作 ▶ 消息路由 	<u>s.</u>	test 🗢 🗙	消息负载 { "message": "Hello from AWS IoT cor	sole"						
保留的消息 ▶ 安全性 ▶ 实例集 Hub			} ▶ 其他配置			h				
D CloudShell	v		发布		© 2023. Amazon We	h Services	Inc. 或其关	联公司.	際私 条款	Cookie 首选语

13. Module subscription topic, module publishing topic: AT+MQTTTS=1, test;AT+MQTTTP=test1.

14. Start the connection MQTT: AT+MQTTCL=1.

```
[2023-10-31 11:44:32.851]
TX: AT+MQTTCL=1
[2023-10-31 11:44:32.959]
RX:
OK
[2023-10-31 11:44:35.877]
RX:
+MQTTCL:1
```

The connection is successful.

14. Modules send messages to AWS, and messages with line breaks or commas need to be enclosed in double quotation marks or single boots:

```
AT+MQTTMSG=' { "message": "hello"}', test
```

▶ 其他配置	[2023-10-31 13:37:27.844] TX: AT+MQTTMSG=' {"message":"hello"}',test1
发布	[2023-10-31 13:37:28.010] RX: OK
▼ test1	+MQTTMSGSND:1 [2023-10-31 13:37:38.858] TX: AT+MQTTMSG=' {"message": "hello w12"}', test1
{ "message": "hello w12" }	[2023-10-31 13:37:39.009] RX: OK +MQTTMSGSND:1

15, Amazon MQTT is issued

订阅主题 发布到主题	[2023-10-31 13:37:28.010] RX: OK -MQTIMISGSND:1
主题名称 主题名称标识消息。消息负载将以服务质量(QoS) 0 发布到此主题。	[2023-10-31 13:37:38.868] TX: AT 4M0TTMISG="{"message":"hello w12"}', test1 [2023-10-31 13:37:39.009]
Q test	EX : OK
肖息负载	+MQTTMSGSND: 1
{ "message": "hello aws" }	[2023-10-31 13:38:41.138] EX: *MQTINEG: ["message": "hello ews"], test, 28 [2023-10-31 13:38:51.418] EX:
▶其他配置	HQTINEG: { "message": "hello aws"}, test, 28 [2023-10-31 13:38:52.075] EX: HQTINEG: { "message": "hello aws"}, test, 28
	[2023-10-31 13:38:52.286] XX: +MQTIMSG: { "message": "hello aws"}, test, 28
गोंधो test1	A CONTRACTOR OF A CONTRACTOR O

6.1.4 HTTP Client

Use AT+HTTPC to get the corresponding http information, here is an example of httpbin.org: AT+HTTPC=https://httpbin.org/get,get。

```
[2023-10-31 10:56:48.074]
TX: AT+HTTPC=https://httpbin.org/get,get
[2023-10-31 10:56:48.194]
RX:
OK
[2023-10-31 10:56:49.580]
RX: HTTP/1.1 200 OK
Date: Tue, 31 Oct 2023 02:56:50 GMT
Content-Type: application/json
Content-Length: 297
Connection: close
Server: gunicorn/19.9.0
Access-Control-Allow-Origin: *
Access-Control-Allow-Credentials: true
{ "args": {},
                 "headers": {
                                 "Accept": "*/*",
                                                       "Host": "httpbin.org",
                                                                                  "User-Agent":
                                                              "X-Amzn-Trace-Id": "Root=1-65406cf2-
"lwIP/2.1.2 (http://savannah.nongnu.org/projects/lwip)",
653c5eb5453c413e410e19d8″},
                                "origin": "112.54.89.224",
                                                              "url": "https://httpbin.org/get"}
+HTTPCSTATUS:0
```

6.2 Low power usage

6.2.1 sleep1 mode

Sleep1 is the shutdown mode, which enters sleep1 mode when the PWR_KEY is pulled down, and exits when it is pulled up.

6.2.2 sleep2 mode

The RTC in Sleep2 mode is working, and the wake-up mode is when the time is up or WAKE_UP the falling edge wake-up;

AT+SETDPMSLPEXT=10,0 // Enter sleep2 mode, automatically wake up when the time is up in 10s, and you can also wake up by WAKE_UP feet.

6.2.3 sleep3 mode

Keep wifi connection in sleep3 mode, sleep3 mode can only be in sta mode, and need to be connected to AP, after failing to connect successfully and failing for many times, it will enter abnormal low-power mode and need to be re-powered on (can be achieved through PWR_KEY), and cannot send data to the serial port when it is not awakened. Here we take the low-power mode as an example as a TCP client.

1. Connect to AP:

AT+CWJAPA=TST-2.4G, TST12345678

2. The IP of the computer is in the same network segment as the module, open the network debugging assistant to open a TCP server.

	网络调试助手	₩ <u></u> ×
网络设置	数据日志	NetAssist V5.0.3 🗇 🗘
TCP Server		
(2)本地主机地址 192.168.2.101 💌		
(3)本地主机端口 [8080		
· 美闭		

3. The module is connected to the TCP server on the PC side:

AT+CIPSTART=192. 168. 2. 101. 8080

4. Save the current state and prepare for low power:

AT+CIPSAVE

5. Enter Low Power Consumption:

AT+DPM=1



6. When entering sleep3 mode, the module will periodically wake up to receive data and report it once in a period of time. Under normal circumstances, the average power consumption is about 150UA, but the WiFi frame of some routers will make the module answer and cause the power consumption to be very large, about 1MA, and the average power consumption will also increase when the AP network quality is not good. Here we are using a router with TP-LINK, with an average power consumption of about 150ua, and you can also use your mobile phone to open a hotspot for verification.



7. In low-power mode, the data sent by our network debugging assistant to the module can be received, as shown in the following figure:

第2:20-10-31 10:07:14,005] 第2:367 第4:367 10:07:11, 72:16 3280 ASCII TO ALLO 10:07:16 329 <th>[2023-10-31 10:07:14.028] RX: +TRIT:*MAZEVP.UC +TRIT:*MAZEVP.UC +TRUTC:1, 192.168.2.101, 6000, 22, http://www.emsoft.em. 停止</th> <th>选择 53: USB-SERIAL CH34 〜 室 115200 〜 位 1 〜 位 8 〜</th> <th>网络设置 (1)协议类型 TCP Server ▼ (2)本地主机地址 192.168.2.101 ▼ (3)本地主机满口</th> <th>数据日志 [2023-10-31 10:07:11.772]# SEND ASCIT TO ALL> http://www.emseft.on. [0023-10.02:16.021:16.021:16.021:17.02 ALL)</th> <th><u>NetAssist V5.0.3</u></th>	[2023-10-31 10:07:14.028] RX: +TRIT:*MAZEVP.UC +TRIT:*MAZEVP.UC +TRUTC:1, 192.168.2.101, 6000, 22, http://www.emsoft.em. 停止	选择 53: USB-SERIAL CH34 〜 室 115200 〜 位 1 〜 位 8 〜	网络设置 (1)协议类型 TCP Server ▼ (2)本地主机地址 192.168.2.101 ▼ (3)本地主机满口	数据日志 [2023-10-31 10:07:11.772]# SEND ASCIT TO ALL> http://www.emseft.on. [0023-10.02:16.021:16.021:16.021:17.02 ALL)	<u>NetAssist V5.0.3</u>
- 发送设置 -	[2023-10-31 10:07:14.216] 数据 [2023-10-31 10:07:19.145] HT +TRITE: J. 192.169.2.101, 8000, 22, http://www.emoft.em [2023-10-31 10:07:19.330] MT = 8	位 None 《 操作 《 关闭串口 存部口 清除接收 6进制显示 DTR TS (自动保存 前间戳 100 ns	©000 ● 关闭 一線收设置 ● ASCII ● HEX 「 技用志模式显示 「 接收发挥和公理示 「 接收发挥和公理示 「 接收发挥和公理示 」 接收保存和公理。 自动应答 累面主题 出型发送 分和设置 数据选择 分和设置 数据选择 公式工人差 点器打置 ● ASCII ● HEX 「 接义符指令解析 ①	to or 10 or	

8. The module needs to wake up when sending data, WAKE_UP the falling edge of the foot needs to wake up, and it needs to send AT+CLRDPMSLPEXT command within 1s to show the exit of low power consumption, otherwise it will enter a low power consumption state, and the serial port is unusable.

9. After the module wakes up, it sends data to the tcp server on the PC, and after the sending is completed, it enters the low power consumption through AT+SETDPMSLPEXT, for example:

AT+CIPSEND=1, 10, 192. 168. 2. 101, 8080, 123456789 AT+SETDPMSLPEXT

25 XCOM V2.6	- 🗆 X	1 · / (网络调试助手	×
2003-10-31 10:12:01.443] MI: *INT:*MARUP, ENT 2003-10-31 10:12:01.490] MI: 2003-10-31 10:12:01.599] MI: 2003-10-31 10:12:45.652] MI: 2003-10-31 10:12:45.770] MI: 2003-10-31 10:12:45.770] MI: 2003-10-31 10:12:54.660] MI: 2003-10-31 10:12:54.660] MI: 2003-10-31 10:12:54.660] MI: 2003-10-31 10:12:54.660] MI: 2003-10-31 10:12:54.660] MI: 2003-10-31 10:12:54.773] MI: 2003-10-31 10:12:56.146] MI: 2003-10-31 10:12:57.146] MI: 2003-10-31 10	串口法择 COMES3:USB-SERIAL CR34 → 波持案 115200 → 停止位 1 → 射振位 0 → 校验位 Bone → 相口操作 ④ 关闭里口 保存窗口 清除掛收 16进刺提示 MTR 0 16进刺提示 MTR 0 时间截 100 as	网络设置 (1) 协议类型 TCE Server (2) 本地主机地址 192.168.2.101 (3) 本地主机端口 0000 ●: 关闭 播收设置 G SATI C MI F 投出志規式显示 「 操收支目志規式显示 「 操收支目志規式显示 「 操收支目志規式 C MI 「 操攻支援 MR 元示、 「 操攻支援 不見正義王 加設置 加設置 加設置 加設置 加設置 加設置 加設置 加設置 加設置 加設工 点型 打置	株田三志 [2023-10-31 10:07:11.772]# SEND ASCII TO ALL> http://www.emsoft.on [2023-10-31 10:07:16.827]# SEND ASCII TO ALL> http://www.emsoft.on [2023-10-31 10:17:16.827]# SEND ASCII TO ALL> http://www.emsoft.on [2023-10-31 10:12:46.724]# RECV ASCII FROM 192.168.2.20 [2023-10-31 10:12:46.665]# RECV ASCII FROM 192.168.2.20 [2023-10-31 10:12:54.665]# RECV ASCII FROM 192.168.2.20	NetAssist V5.0.3 * :50205> :50205>
単杂发送 多杂发送 协议传输 帮助 AT*CIPIT=1,192,168,10.1 60 □ AT*NPM=1	85 1 1212 2547		数据发送 客户端: All Connections (3)▼ ◆ 断开 http://www.emsoft.en	▼ 「有除 七 有除 发送 75.44 年前計判」

7. Welding work instructions

7.1 Reflow soldering temperature

Reflow soldering curve characteristics		Assembled with lead	Lead-free process
		process	assembly
Preheating/keeping warm	Minimum temperature (Tsmin).	100°C	150°C
	Maximum temperature (Tsmax).	150°C	200°C
	Time (Tsmin [~] Tsmin).	60-120 seconds	60-120 seconds
Slope of heating $(T_{L^{\sim}T_{P}})$.		3 ° C/sec, maximum	3 ° C/sec, maximum
Liquid phase temperature (TL)		183℃	217℃
TL above the holding time		60~90 seconds	60~90 seconds
Peak temperature of the package $T_{\rm P}$		The user must not exceed	The user must not exceed
		the temperature indicated	the temperature indicated
		on the product's "Moisture	on the product's "Moisture
		Sensitivity" label.	Sensitivity" label.

The time (Tp) within 5° C of the specified				
grading temperature (Tc) is shown in the	20 seconds	30 seconds		
figure below				
Cooling slope (Tp [~] TL).	6° C/sec, max	6° C/sec, max		
The time from room temperature to peak	6 minutes, the longest	8 minutes, the longest		
temperature				
*The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of				
the user				

7.2 Reflow soldering curve



8. Revision History

version	Date of revision	Revision Notes	Maintainers
1.0	2023-10-31	Initial release	Create
1.1	2024-5-7	Replace the recommended schematic diagram	Нао

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