E103-W01-IPX User Manual

ESP8266EX 2.4GHz 100mW SMD Wireless Module



Chengdu Ebyte Electronic Technology Co.,Ltd.

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1 General Introduction

1.1 Brief Introduction

E103-W01-IPX is 100mW (20dBm) UART wi-fi module with competitive price. It is small-size with both IPX and ceramic antenna, operating at 2.4~2.4835GHz, The module can use the serial port for data transmission and reception, and very easy for user to operate.



E103-W01 is Ebyte based on ESP8266EX from Espressif, transparent transmission is available, easy for user to operate, supports AT command, server AT command. User can connect with internet by UART, which enable the module are widely used in wearable electronics, home automation, home application, smart plugs and lights and industrial wireless control.

E103-W01-IPX supports standard ieee802.11b/g/n protocol and complete TCP / IP protocol stack, supports STA/AP/STA+AP mode, supports Smart Config, transparent transmission, IO control, transparent transmission on power-up, PWM output, AD detection etc. Network connection can be achieved after easy configuration, which saving operation and develop time for user.

1.2 Features

- The measured communication distance can reach 100m;
- Maximum transmission power of 100mW，software multi-level adjustable;
- Support the global license-free ISM 2.4GHz band;
- 210ms boot transparent transmission, dropped automatically connected;
- Three operating mode: STATION、AP、STATION&AP;
- Support TCPServer、TCPClient &UDP;
- Support SmartConfig configuration function;
- Support 3.0V~3.6V power supply,，power supply over 3.3Vcan guarantee the best performance;
- Industrial grade standard design, support -40 ~ 85 °C for working over a long time;
- Support Ceramic and IPEX interface, users can choose according to needs.

1.3 Application

- Home security alarm and remote keyless access;
- Security system, positioning system;
- Wireless alarm security system;
- Building automation solutions;
- Wireless Industrial Remote Controller;
- Health care products;
- Advanced Metering Infrastructure(AMI);
- Automotive industry applications.

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2 Specification and parameter

2.1 limit parameter

Main parameter	Performance		Remark
	Min	Max	
Power supply （V）	0	3.6	Voltage over 3.6V will cause permanent damage to module
Blocking power（dBm）	-	10	Chances of burn is slim when modules are used in short distance
Operating temperature（℃）	-40	85	

2.2 Operating parameter

Main parameter	Performance			Remark
	Min	Type	Max	
Operating voltage（V）	3.0	3.3	3.6	≥3.3 V ensures output power
Communication level （V）		3.3		For 5V TTL, it may be at risk of burning down
Operating temperature （℃）	-40	-	85	Industrial grade
Operating frequency（MHz）	2402	-	2483	Support ISM band
Max TX power（dBm）	19.6	20.0	20.5	
WiFi version	-	802.11		b/g/n
Tx802.11b,CCK11Mbps,POUT=+17dBm	165	170	180	mA
Tx802.11g,OFDM54Mbps,POUT=+15dBm	135	140	150	mA
Tx802.11n,MCS7,POUT=+13dBm	115	120	130	mA
Rx802.11b,1024bytesPacket length,-80dBm	18	20	23	mA
Rx802.11g,1024bytesPacket length,-70dBm	53	56	65	mA
Rx802.11n,1024bytesPacket length,-65dBm	53	56	65	mA
Partial sleep	13	15	18	mA
Sleep	0.8	0.9	1.1	mA
Deep sleeping	9	10	11	uA
Shut down	0.4	0.5	0.6	uA

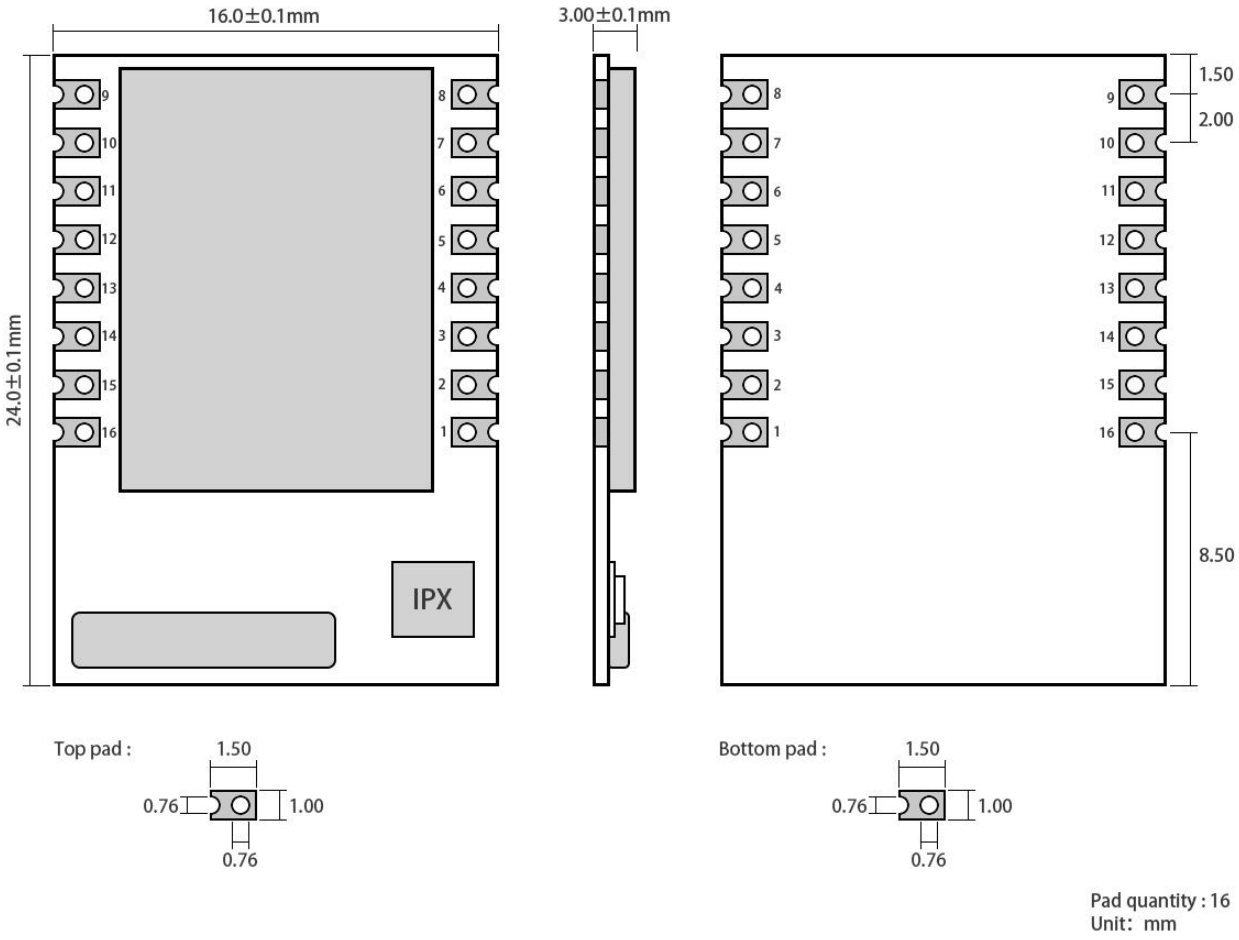
Main parameter	Description	Remark
Reference distance	100m	clear and open area, antenna gain: 5dBi， antenna height:

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		2.5m
AT Support	Built-in intelligent processing	Can be read by AT command
Communication interface	UART Serial port	-
Package	SMD	-
Interface	2.00mm	-
Size	16 * 24 mm	-
Antenna	Ceramic antenna / IPEX	50 ohm impedance

3 Size and pin definition



Pin	Name	Type	Function
1	RST	I	External reset signal (Low voltage level: Active)
2	ADC	I	ADC input pin
3	CH_PD	I	Module enable, need be pulled up
4	GPIO16	I	module wake up(from deep sleep state), high level effectively
5	GPIO14	IO	PWM1/GPIO14

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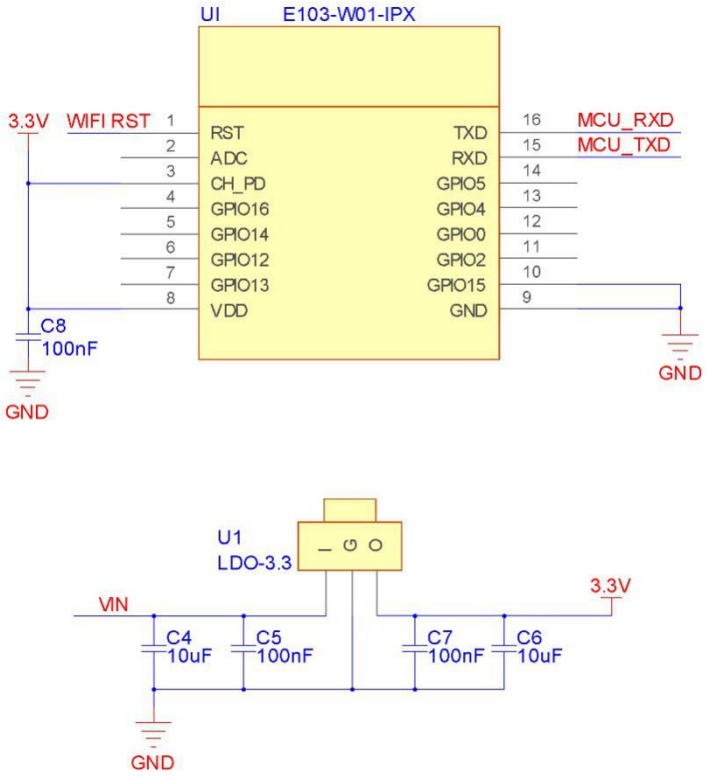
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<table>
<tr><td>6</td><td>GPIO12</td><td>IO</td><td colspan="4">PWM0/GPIO12</td></tr>
<tr><td>7</td><td>GPIO13</td><td>IO</td><td colspan="4">GPIO13</td></tr>
<tr><td>8</td><td>VCC</td><td>-</td><td colspan="4">Power supply VDC:3.0V—3.6V（above 300mA）</td></tr>
<tr><td>9</td><td>GND</td><td>-</td><td colspan="4">GND pin</td></tr>
<tr><td>10</td><td>GPIO15</td><td>I</td><td>GPIO15</td><td>GPIO2★</td><td>GPIO0</td><td>Boot</td></tr>
<tr><td>11</td><td>GPIO2</td><td>I</td><td>0</td><td>1</td><td>1</td><td>Boot from FLASH</td></tr>
<tr><td>12</td><td>GPIO0</td><td>I</td><td>0</td><td>1</td><td>0</td><td>Download firmware from UART</td></tr>
<tr><td>13</td><td>GPIO4</td><td>IO</td><td colspan="4">PWM2/GPIO4</td></tr>
<tr><td>14</td><td>GPIO5</td><td>IO</td><td colspan="4">PWM3/GPIO5</td></tr>
<tr><td>15</td><td>RXD</td><td>I</td><td colspan="4">UART input pin, support AT command</td></tr>
<tr><td>16</td><td>TXD</td><td>O</td><td colspan="4">UART output pin, support AT command</td></tr>
<tr><td colspan="7">★ GPIO2 is already been internal pulled up</td></tr>
<tr><td colspan="7">□ In transparent-transmission on power-up mode, GPIO2 will indicate the status of module. The module has connected a led to this pin. Users can get the status of the module by observing LED. Besides, you may connect GPIO2 to the external MCU.</td></tr>
<tr><td colspan="7">□ LED indication when module works in power-on transparent transmission mode：
Intermittent double flash：cannot connect to AP access point.
Intermittent single flash：connect to AP access point, but cannot connect to TCP server.
Quench：connect to AP access point and TCP server.</td></tr>
</table>

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4 Recommended connection diagram



- Note：supply voltage is 3.0V~3.6V. 300mA LDO is recommended for steady operation of module.

5 Quick Start

- E103-W01-IPX module is easy to use. In order to allow users to quickly familiarize themselves with the module, this section will guide the user through simple setup to achieve configuration and communication in various modes.
- The test process uses AT commands. For quick connection, we have developed quick configuration software for users.
- This section of the test uses the configuration software to operate, the module will echo the currently issued instructions, so that users can quickly understand the usage of the AT command (Note: you need to add a line break after each AT command).
- Of course, after the user is familiar with the AT command, the AT command can be manually sent using the serial debugging assistant without using the configuration software. It is also possible to use an external controller (MCU) to directly connect to the module UART for AT command communication without using the backplane.

Hardware：	
1	E103-W01*1
2	E103-W01 baseboard*1

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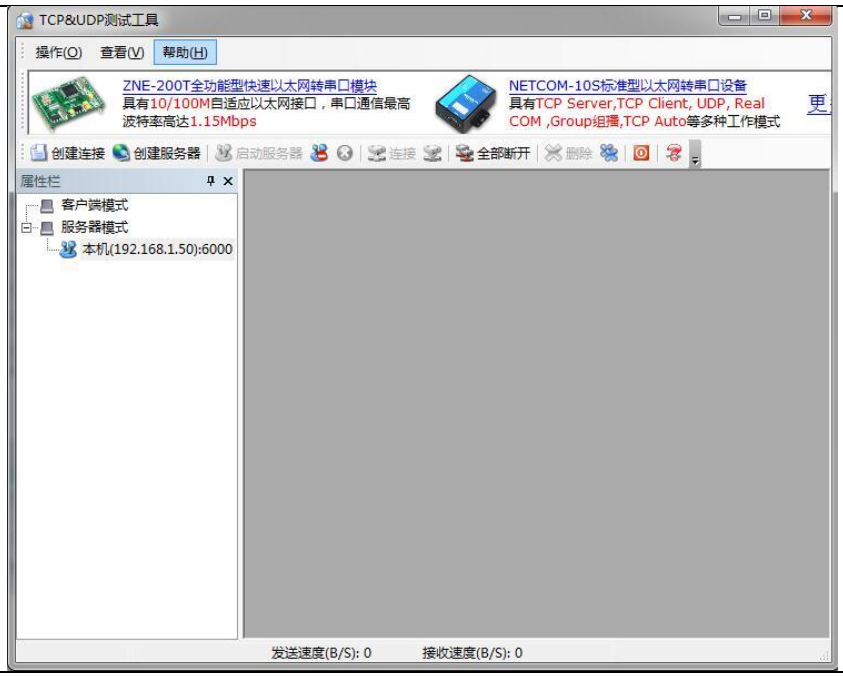
3	PC with wi-fi
4	Router*1（Mobile wi-fi hotspots）
Software（download from our official website）	
1	E103-W01 configuration software
2	TCP&UDP testing tool
3	Accessport 1.3

5.1 Connected to TCP server as Client

No.	Remarks
1	【Network connection】: Computer connected to router, and the router named H60-L02(configurable for user) Noted the IP address as 192.168.1.50 
2	【Built TCP server】: Open TCP&UDP test tool to build a TCP server: port6000 (configurable for user). Click to start the server, then TCP server from PC starts to listen to port6000, and other network devices can connect and communicate with it.

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<table>
<tr><td></td><td>
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<tr><td>3</td><td>【Module installation】:
Substrates VCC short jumper, GPIO0 jumper disconnected.
Plug E103-W01 into test baseboard.
Plug the baseboard into PC by USB connector (Please download CP1202 driver if the PC cannot recognize baseboard).
USB port number for testing：COM300
AP mode is the default mode for E103-W01, which is equivalent to Wi-Fi router. Cellphone or PC can search to the wi-fi name as EBT_XXXXXX (XXXXXX is last three-byte for MAC address).
If the MAC address for module is “1a:fe:34:ed:a6:68”， then SSID is “EBT_EDA668”.
No password for default.

</td></tr>
</table>

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4	【STATION mode configuration】: Open Wi-Fi configuration software, select port number in the left corner, then the serial port open automatically. Serial port status changes to open now, click “STATION” button to enter configuration interface. The test router name as Ebyte, password is e30e31e32. Click “enter Sta mode” to change the mode to STATION. Click “connect to router”, and wait a few seconds to see the interface shown in the figure below, which means module is connected to the router successfully. Then user can click “IP information query” to query IP information. 
5	【TCP Client configuration】: Click “Client configuration” to modify the remote port as 6000(corresponding to TCP server), and modify server IP as 192.168.1.50（refer to PC IP）, then click “built connection” button. See below figure：“CONNECT OK” means connection for TCP server is done. At present server shows the connection is ok for device which IP address is 192.168.1.70(IP address is assigned by router).

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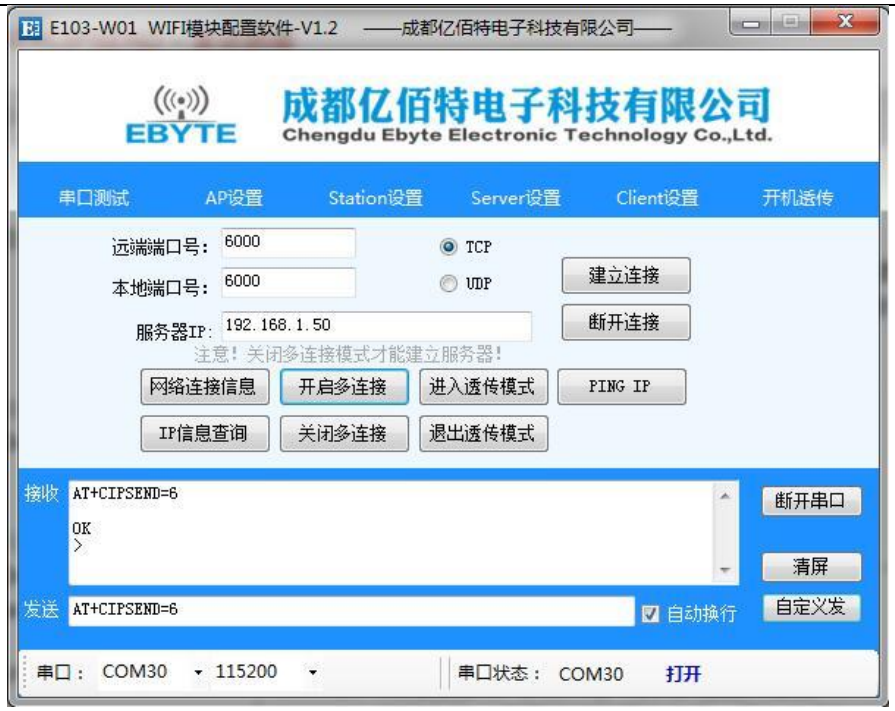




6	【Transmitting】: Use AT+CIPSEND command to transmit data, first send AT+CIPSEND=6 to specify the length of 6 bytes.

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After “>” symbol shows, transmit data “123456”, user can see the TCP server receive data "123456". Data communication completed..



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7

【Transparent transmission】:

After the configuration, module can transmit data to TCP server directly without AT protocol.

Configuration： click “enter transparent transmission mode”(AT+CIPMODE=1) after connected to server, then input AT+CIPSEND to enter transparent transmission mode.



Notes: module no longer receive AT command, transmit the data from UART to server directly.

If user continue to transmit data AT+CIPSEND, module will treat AT+CIPSEND as data and transmit it to TCP server directly.

Data sent by server is also output directly from the module.

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<table>
<tr><td></td><td>
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<tr><td>8</td><td>【Transparent transmission on power-up】:
Advantage: save the complicated operation steps for user, once the configuration for transparent transmission on power-up is done, transparent transmission can be achieved on power-up.
After using this function, user only need to configure the connection between router and TCP once.
When module re-start or re-power, it will connect with router automatically, then connect with specified TCP server automatically. User only need to wait the completion of TCP connection (wi-fi indicator goes out), then transmit data directly.
Click “transparent transmission on power-up” and input corresponding wi-fi name and password, then click “wi-fi”, see below interface means configuration is down.</td></tr>
</table>

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Input server IP address, port number, and choose TCP mode, then click “transparent transmission on power-up”, see below interface means configuration is done



After click “re-start” or re-power the module, it will connect to the router and address automatically and the connection status can be judged by wi-fi indicator (GPIO2).

After the connection to TCP server, transmitting and receiving can be done. See below

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Wi-Fi indicator(GPIO2) specification：

Intermittent double flash：cannot connect to AP access point.

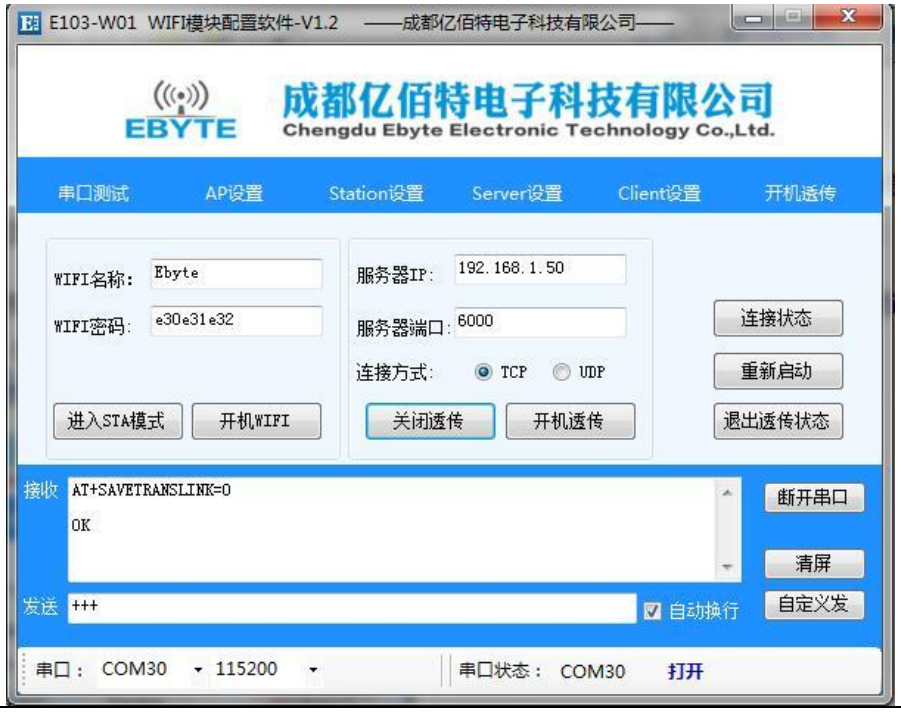
Intermittent single flash：connect to AP access point, but cannot connect to TCP server.

Quench：connect to AP access point and TCP server.

It’s only need 210ms for E103-W01 to connect to internet.

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<table>
<tr><td></td><td>
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<tr><td>9</td><td>【Exit transparent transmission】:
Send “+++” to exit transparent transmission mode and re-enter AT mode.
After exiting transparent transmission mode, user can use AT command to exit transparent transmission on power-up mode. See below,
Click “exit transparent transmission” (send “+++” without line break) to enter AT command mode. Click “turn off transparent transmission” to see below interface.
After the configuration, module will not works at transparent transmission mode automatically after rebooting.

</td></tr>
</table>

5.2 Module build TCP SERVER to connect to PC as AP

No	Remarks
1	In factory mode, module’s IP address is 192.168.4.1 when act as AP. Check network status of PC, see below information means the connection between PC and module is ok. AT command can be used to restore the factory state if user ever changed module’s parameter.

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<table>
<tr><td></td><td>
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<tr><td>2</td><td>【Module recommends TCP server】:
Make sure PC is connected to the modules, then click "server settings" button.
Click “open multiple connections”(exiting transparent transmission mode is necessary) first, then click “built server” to see below information.

</td></tr>
<tr><td>3</td><td>【PC connected with TCP server of module to transmit data】:
PC uses TCP&UDP test tool to build TCP server, target IP:192.168.4.1, port：1001.
Click “connect” button, then the module should output as shown below: "0, CONNECT" (0 means connection ID), indicating that clients (up to 5) are connected to the module.
PC transmits data, module outputs “+IPD,0,15:XXXXXXXX” (+IPD：command 0:connection ID 15：data package length XXXXXX：data)
Specified connection ID is necessary during transmitting：AT+CIPSEND=0,10 means transmitting 10-byte data to connection 0.</td></tr>
</table>

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5.3 Usage of Smart Config

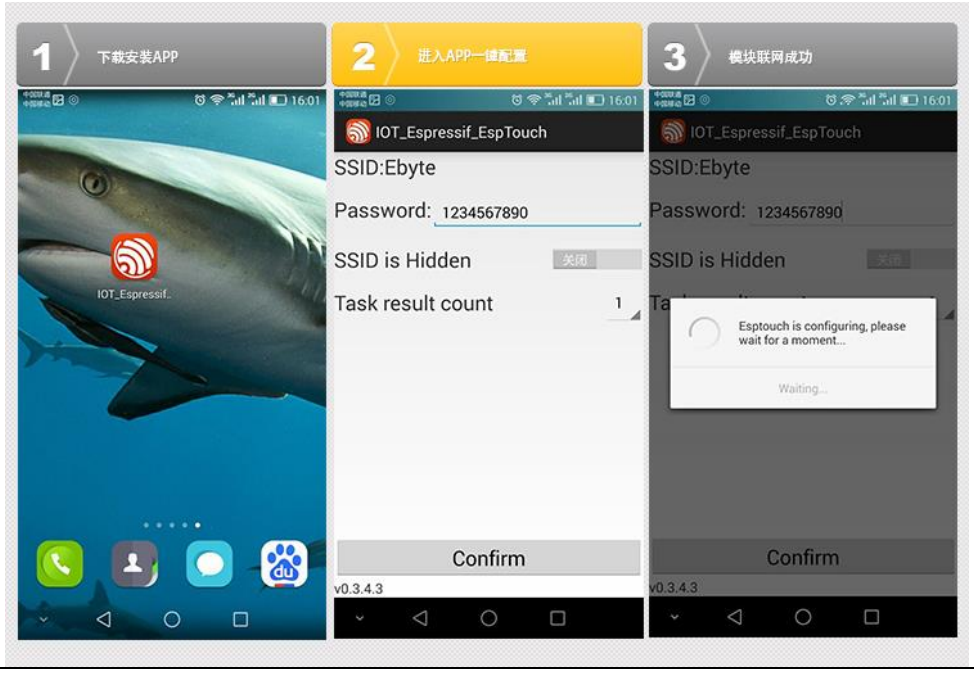
No.	Remark
1	Smart Config enable user to use phone APP to configure module and connected with network with fast-speed. When module works at STATION mode, send“AT+CWSTARTSMART” to enter Smart Config mode，then the configuration for module can be done by cellphone. User only need to start EspTouchAPP（download from Expressif systems） on cellphone, then input router

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password on the APP to make connection between module and router.





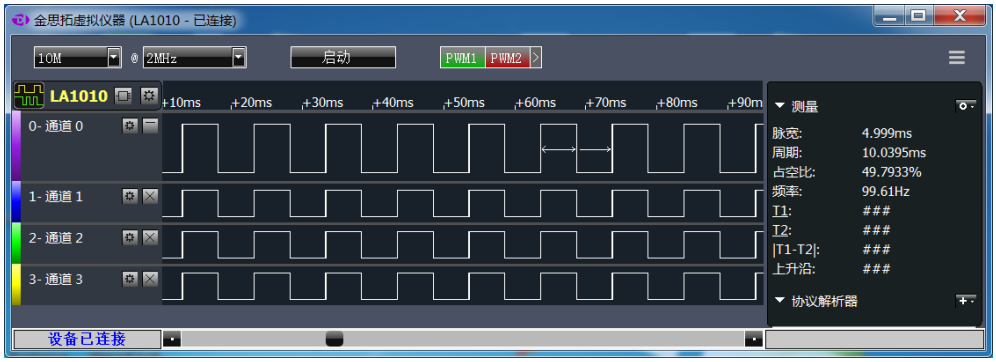
5.4 Usage of PWM

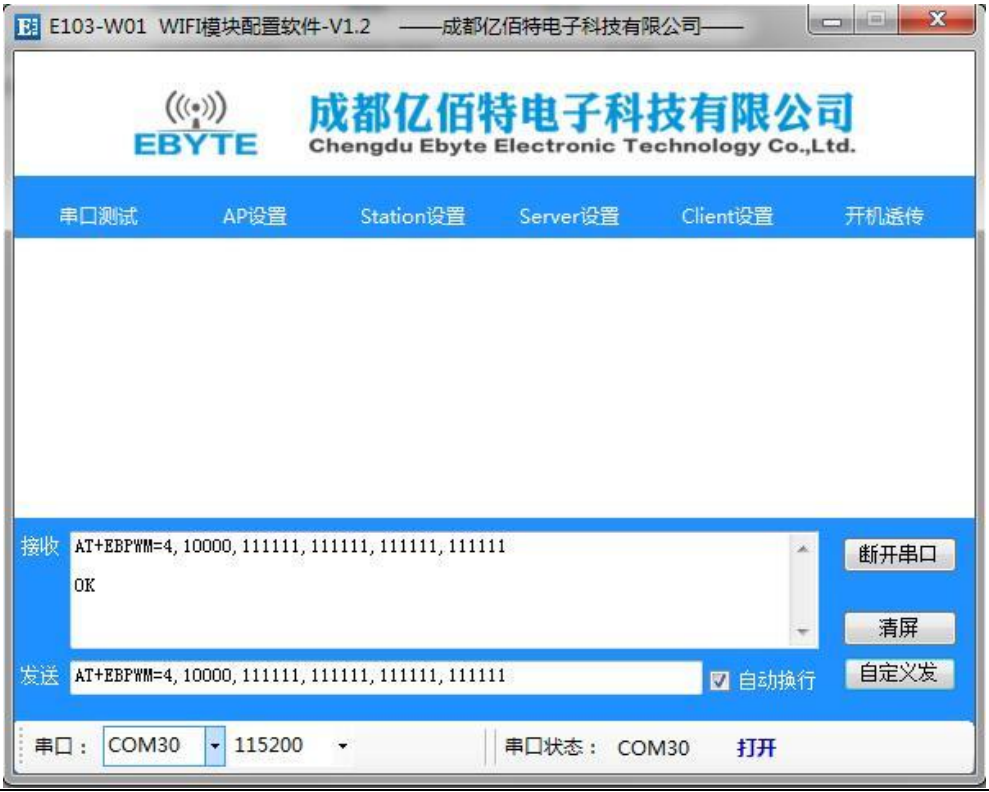
Steps	
E103-W01-IPX supports 4 channel PWM output, can be configured through the AT instruction to fast PWM cycle (1~10ms) and duty cycle, Steps: enter "peripheral control option" to configure parameters:	
1	Period range 1000~10000 corresponds to 1ms~10ms

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2	Adjustment for duty cycle value Range of 0~222222 corresponding to 0ms~10ms (high level time≈value*45ns)
3	Channel number range 1~4 indicates the number of currently enabled PWM channels, increasing from PWM0, for example channel number is equal to 2, then PWM0 and PWM1 are enabled(channel number cannot be changed after the first transmission)
Notes	
1	The actual duty cycle = adjustment value for duty cycle *45ns/ cycle The following figure shows the cycle for opening four channel is 10ms, the duty cycle is 50% for PWM.
2	Calling PWM command once again to modify the duty cycle.
Click “PWM output” after parameter-setting (AT+EBPWM=4, 10000, 111111, 111111, 111111, 111111). （Please refer to the AT chapter for AT command）	
Click “PWM output” one more time after parameter-setting to modify PWM output. But channel number cannot be changed after the first setting. Channel number after modifying other parameters must keep the same as the first set, otherwise the error is returned.	
Notes: PWM channel cannot be closed after opening. It can be reset by reset command or re-power.	

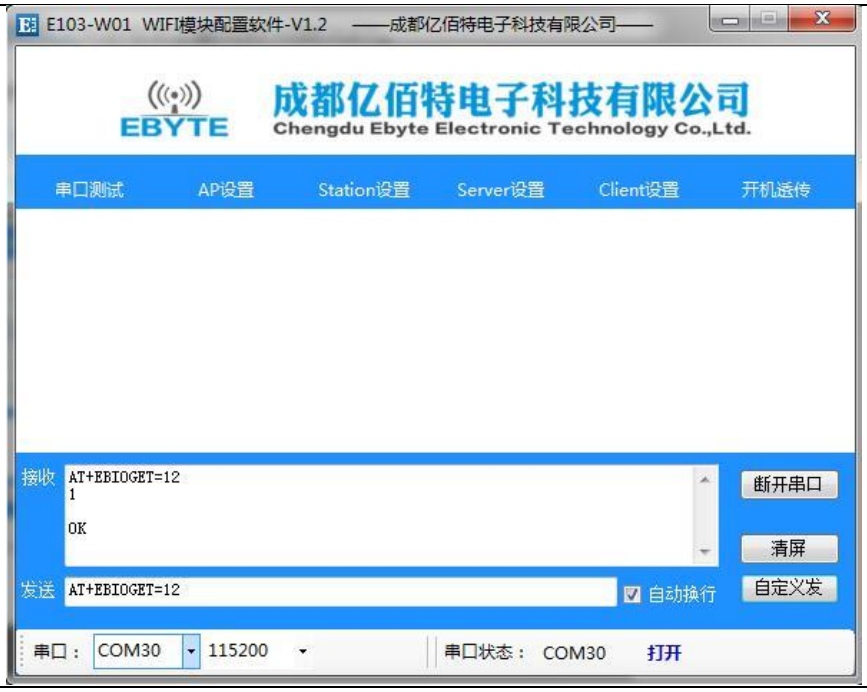




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5.5 Usage of GPIO

No.	Remark
1	E103-W01-IPX provide 5 GPIO interfaces:GPIO4\GPIO5\GPIO12\GPIO13\GPIO14，and GPIO4\GPIO5\GPIO12\GPIO14 and PWM pin cannot use at the same time. For example, when PWM pin is operating, the GPIO is inoperable.
2	User can do pin's status-setting (AT+EBIOSET) and obtain pin's status (AT+EBIOGET) by using AT command.
3	Click "PIN_State_Set" to set pin's status; Click "PIN_State_Get" to get pin's status.
	

5.6 Usage of ADC

No.	Remark
1	E103-W01-IPX provides one ADC with 10-byte precision, with which 0.0V ~ 1.0V voltage can be detected.
2	User can get current ADC value by AT command (AT+EBADC), then obtain the real voltage by calculation.
3	Input voltage=ADC value/1024 For example ADC value is 45, so the really voltage is equal to45/1024=0.044V.

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5.7 **Modify UART baud rate**

No.	Remark
1	E103-W01-IPX module supports 10 standard UART baud rate. The user must not set the baud rate out of the effective range, or there will be an issue when debugging . If so, please reload the firmware or contact us for help.
2	User can modify UART baud rate by sending AT+UART command. For example: AT+UART=115200,8,1,0,0
3	For specific instructions, please refer to the AT command set.
Supporting baud rate	9600
	19200
	38400
	57600
	115200
	230400
	256000
	460800
	921600
Parity	NONE (default)
	EVEN
	ODD
Data length	5 bits
	6 bits
	7 bits
	8 bits
Stop bit	1 bit

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	2 bits

6 Specification for networking

6.1 **Wi-fi role**

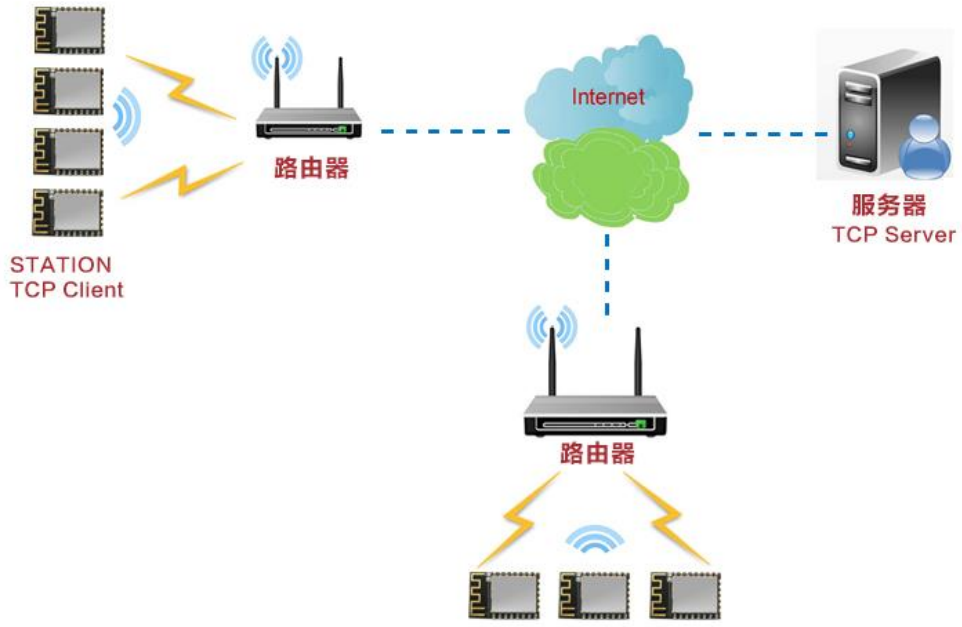
No.	Remark
1	E103-W01-IPX supports AP mode (router) and STATION mode (wi-fi equipment). At most 3 wi-fi devices can be supported when module works at AP mode.
2	E103-W01-IPX including TCP Server、TCP Client and UDP as Socket. At most 5 sockets can be connected when module works at TCP Server mode. Based on TCP connection mechanism, if long time connection is needed, please use TCP heartbeat bag.

6.2 Networking model

Module build TCP Client to connect with remote server when works at STATION mode(classic)
Can be used for home LOT, meter-reading, real-time monitoring etc. Module can communicate with network server for real-time data. User can operate module by real-time communication.

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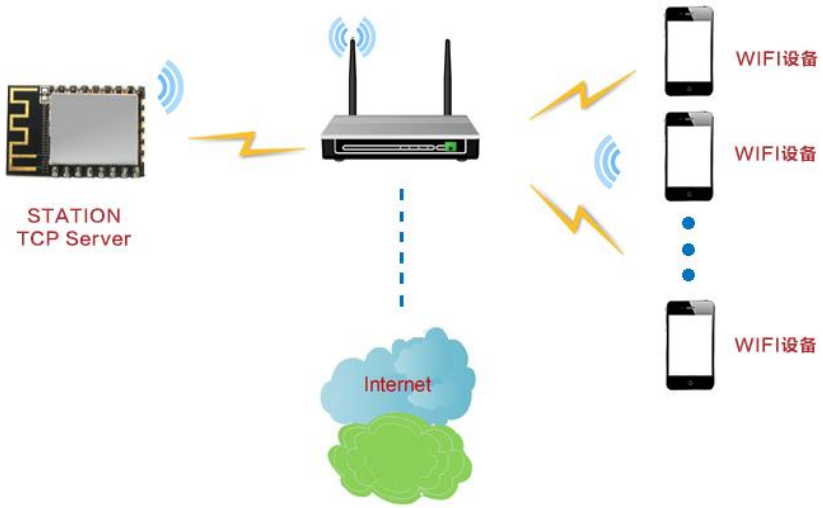


Module build TCP Client to connect with wi-fi device when works at STATION mode

The same as type one, only difference is module build TCP server instead of TCP Client when works at STATION mode.
At most 5 remote devices can be connected when module connects with network.

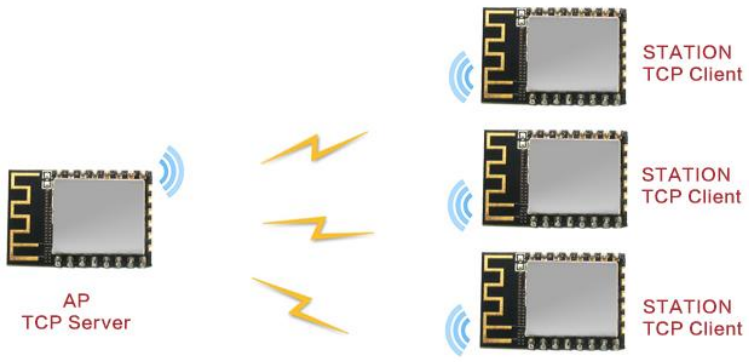
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One module build TCP Server when works at AP mode, and the other module build TCP Client when works at STATION mode to communicate with it.

The network model can be referred to as intra-module networking. A module in an AP mode can connect up to three STATIONs, that is, up to four module devices in the network. The TCP Server can be established on any module under the condition of completing the internal networking, and the remaining three modules can communicate with it using the TCP Client.



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7 AT command

<table>
<tr><td colspan="3">Only list some special AT command for your reference, more AT command please refer to the official datasheet.</td></tr>
<tr><td rowspan="4">1</td><td colspan="2">AT+EBPWM-PWM Set or modify</td></tr>
<tr><td>T+EBPWM=<channel_num>,<period>,<duty0>[,<duty1>][,<duty2>][,<duty3>]</td><td>Parameter specification：
channel_num：channel number
period：cycle（1000~10000corresponding to1~10ms）
duty0~duty3：PWM0~PWM3Duty cycle setting（high level time=duty*45ns）
Duty number should keep the same with channel number.
Response:
First transmission response：PWM Start!
Non-first transmission response：OK
Error response：ERROR</td></tr>
<tr><td colspan="2">Example: Set PWM0 duty cycle 25% PWM1 duty cycle 50% cycle 10ms
AT+EBPWM=2,10000,55555,111111</td></tr>
<tr><td colspan="2">Notes：PWM cannot be closed after booting, and channel number cannot be modified.</td></tr>
<tr><td rowspan="4">2</td><td colspan="2">AT+EBIOGET to get IO input status</td></tr>
<tr><td>AT+EBIOGET=<gpio_num></td><td>Parameter specification：
gpio_num：GPIO number, 4,5,12,13 and 14 are available.
Response：
0 or 1
OK</td></tr>
<tr><td colspan="2">Example：AT+EBIOGET=4</td></tr>
<tr><td colspan="2">Notes： The pins which could been used to be the PWM output, is not suitable for this command.</td></tr>
<tr><td rowspan="4">3</td><td colspan="2">AT+EBIOSET to configure IO output status</td></tr>
<tr><td>AT+EBIOSET=<gpio_num>，<value></td><td>Parameter specification：
gpio_num：GPIO number, 4,5,12,13 and 14 are available.
Value: Pin status can be configure to 0,1
Response：OK</td></tr>
<tr><td colspan="2">Example：AT+EBIOSET=4，1</td></tr>
<tr><td colspan="2">Notes：The pins which could been used to be the PWM output, is not suitable for this command.</td></tr>
<tr><td rowspan="3">4</td><td colspan="2">AT+EBADC to get ADC value</td></tr>
<tr><td>AT+EBADC</td><td>Parameter specification：
Range of input voltage：DC 0.0V~1.0V
Response：
45（real voltage=45/1024）
OK</td></tr>
<tr><td colspan="2">Example：AT+EBADC</td></tr>
<tr><td>5</td><td colspan="2">AT+EBSTATE register GPIO13 as Wi-Fi indicator</td></tr>
</table>

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	AT+EBSTATE=<en>	Parameter specification： en: Setting to 1 indicates set GPIO13 as wi-fi status indicator. Setting to 0 indicates cancel for set GPIO13 as wi-fi status indicator. Response：OK
	Example：AT+EBSTATE=1	
	Notes：After setting GPIO13 as wi-fi indicator, the IO operation is forbidden.	

8 Hardware design

- It is recommended to use a DC stabilized power supply. The power supply ripple factor 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, reverse connection may cause permanent damage to the module.
- Please check the power supply to ensure that between the recommended supply voltage, if exceeding the maximum, the module will be permanently damaged;
- Please check the stability of the power supply. Voltage can not fluctuate greatly and frequently;
- When designing the power supply circuit for the module, it is often recommended to reserve more than 30% of the margin, so the whole machine is beneficial for long-term stable operation;
- The module should be as far away as possible from the power supply, transformers, high-frequency wiring and other parts with large electromagnetic interference;
- Bottom Layer High-frequency digital routing, high-frequency analog routing, and power routing must be avoided under the module. If it is necessary to pass through the module, assume that the module is soldered to the Top Layer, and the copper is spread on the Top Layer of the module contact part(well grounded), it must be close to the digital part of the module and routed in the Bottom Layer;
- Assuming the module is soldered or placed over the Top Layer, it is wrong to randomly route over the Bottom Layer or other layers, which will affect the module's spurs and receiving sensitivity to varying degrees;
- It is assumed that there are devices with large electromagnetic interference around the module that will greatly affect the performance. It is recommended to keep them away from the module according to the strength of the interference. If necessary, appropriate isolation and shielding can be done;
- Assume that there are traces with large electromagnetic interference (high-frequency digital, high-frequency analog, power traces) around the module that will greatly affect the performance of the module. It is recommended to stay away from the module according to the strength of the interference.If necessary, appropriate isolation and shielding can be done;
- If the communication line uses a 5V level, a 1k-5.1k resistor must be connected in series (not recommended, there is still a risk of damage);
- Try to stay away from some physical layers such as TTL protocol at 2.4GHz , for example: USB3.0;
- The mounting structure of antenna has a great influence on the performance of the module. It is necessary to ensure that the antenna is exposed, preferably vertically upward. When the module is mounted inside the case, use a good antenna extension cable to extend the antenna to the outside.

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9 FAQ

9.1 Communication range is too short

- The communication distance will be affected when obstacle exists;
- Data lose rate will be affected by temperature, humidity and co-channel interference;
- The ground will absorb and reflect wireless radio wave, so the performance will be poor when testing near ground;
- Sea water has great ability in absorbing wireless radio wave, so performance will be poor when testing near the sea;
- The signal will be affected when the antenna is near metal object or put in a metal case;
- Power register was set incorrectly, air data rate is set as too high (the higher the air data rate, the shorter the distance);
- The power supply low voltage under room temperature is lower than recommended value, the lower the voltage, the lower the transmitting power;
- Due to antenna quality or poor matching between antenna and module.

9.2 Module is easy to damage

- Please check the power supply and ensure it is within the recommended range. Voltage higher than the peak will lead to a permanent damage to the module.
- Please check the stability of power supply and ensure the voltage not to fluctuate too much.
- Please make sure anti-static measures are taken when installing and using, high frequency devices have electrostatic susceptibility.
- Please ensure the humidity is within limited range for some parts are sensitive to humidity.
- Please avoid using modules under too high or too low temperature.

9.3 BER(Bit Error Rate) is high

- Here are co-channel signal interference nearby, please be away from interference sources or modify frequency and channel to avoid interference;
- Poor power supply may cause messy code. Make sure that the power supply is reliable;
- The extension line and feeder quality are poor or too long, so the bit error rate is high.

10 Production guidance

10.1 Reflow soldering temperature

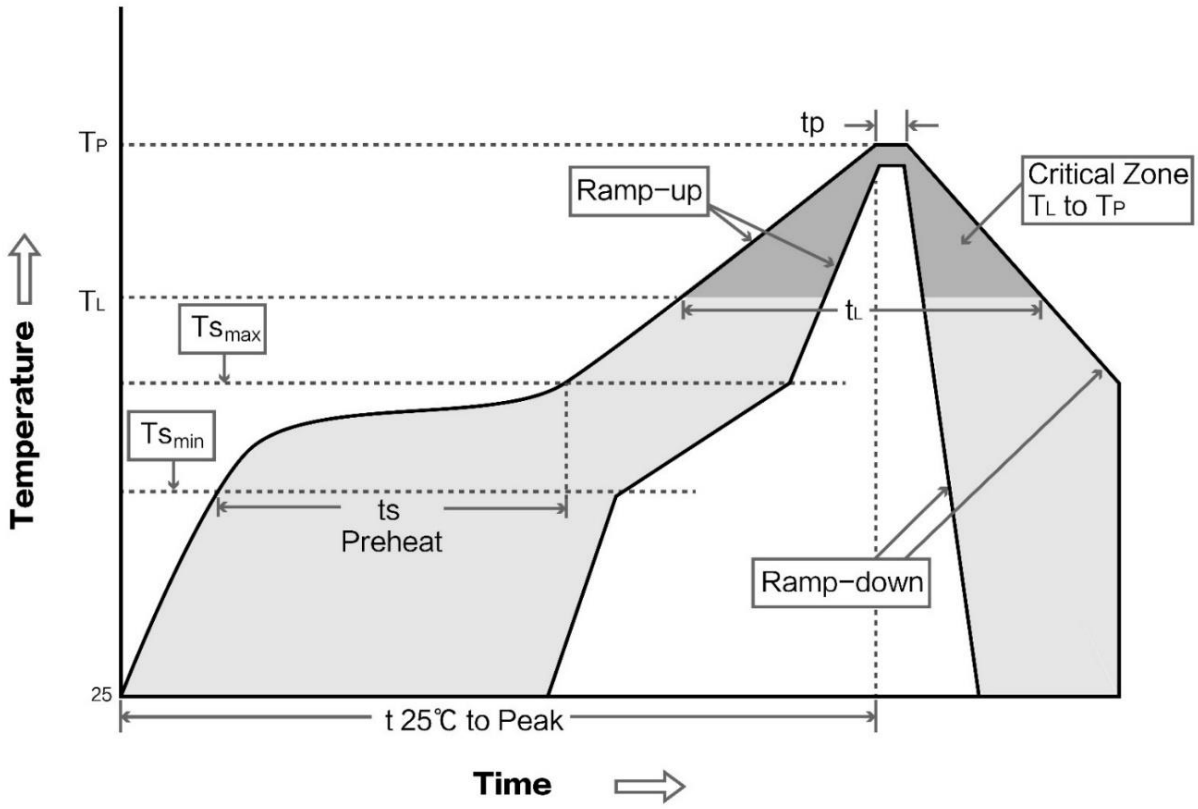
Profile Feature	Feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	Min preheating temp.	100℃	150℃
Preheat temperature max (Tsmax)	Max preheating temp.	150℃	200℃

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Preheat Time (Tsmin to Tsmax)(ts)	Preheating time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average ramp-up rate	3℃/second max	3℃/second max
Liquidous Temperature (TL)	Liquid phase temp	183℃	217℃
Time（tL）Maintained Above（TL）	Time below liquid phase line	60-90 sec	30-90 sec
Peak temperature（Tp）	Peak temp	220-235℃	230-250℃
Aveage ramp-down rate（Tp to Tsmax）	Average ramp-down rate	6℃/second max	6℃/second max
Time 25℃ to peak temperature	Time to peak temperature for 25℃	6 minutes max	8 minutes max

10.2 Reflow soldering curve



11 E103 series

Model	IC	Frequency Hz	Tx power dBm	Distance km	communication protocol	Size mm	Size mm
E103-W01-IPX	ESP8266EX	2.4G	20	0.1	802.11b/g/n	16 * 24	Ceramic/IPX
E103-W02-DTU	CC3200	2.4G	0.1W	0.3	802.11 b/g/n	82*62*25	SMA-K

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E103-W02	CC3200	2.4G	20	0.3	802.11b/g/n	19 * 27	PCB/IPX
E103-W01	ESP8266EX	2.4G	20	0.1	802.11b/g/n	16 * 24	PCB

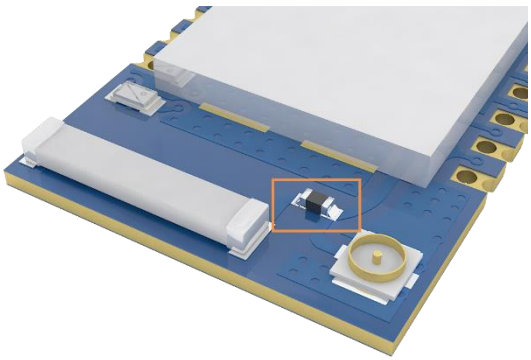
12 Antenna recommendation

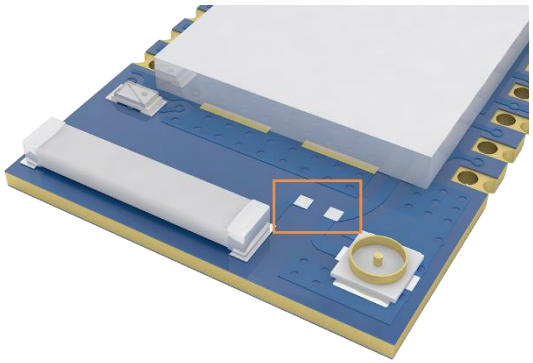
12.1 Recommendation

The antenna is an important role in the communication process. A good antenna can largely improve the communication system. Therefore, we recommend some antennas for wireless modules with excellent performance and reasonable price.

Model No.	Type	Frequency Hz	Interface	Gain dBi	Hright	Cable	Function feature
TX2400-NP-5010	Flexible Antenna	2.4G	SMA-J	2	50*10mm	-	FPC soft antenna
TX2400-XP-150	Sucker antenna	2.4G	SMA-J	3.5	15cm	150cm	High Gain
TX2400-JK-20	Rubber antenna	2.4G	SMA-J	3	200mm	-	Flexible&omnidirectional
TX2400-JK-11	Rubber antenna	2.4G	SMA-J	2.5	110mm	-	Flexible&omnidirectional
TX2400-JZ-3	Rubber antenna	2.4G	SMA-J	2	30mm	-	Short straight &omnidirectional

12.2 Antenna selection



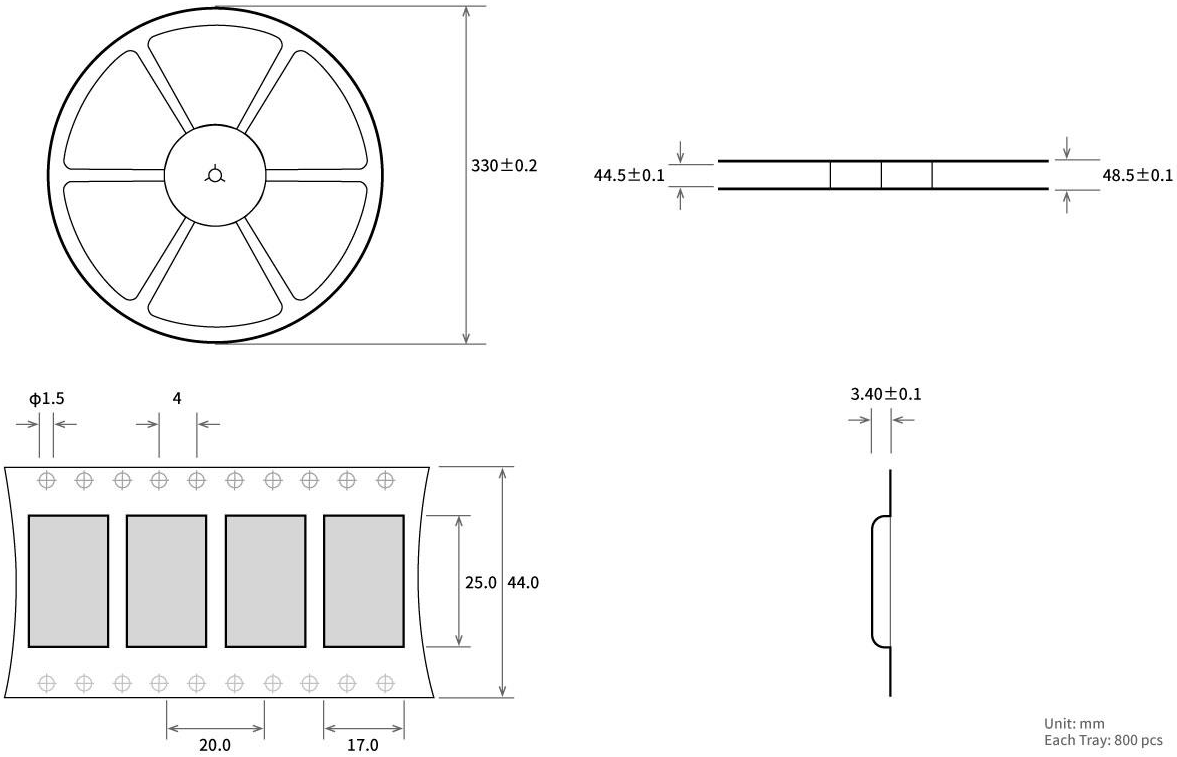


The default 0R resistor is soldered as shown above (left), and the antenna interface is ceramic antenna. If you need to change the antenna interface mode to IPEX, please change the 0R resistor to the above (right).。

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13 Package



Revision history

Version	Date	Description	Issued by
1.00	-	Initial version	huaa
1.10	2018-5-25	Content update	huaa
1.20	2018-11-2	new version update	Huaa

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