E103-W01 User Manual

ESP8266EX UART to WiFi Module



Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Contents

1 GENERAL INTRODUCTION 2
1.1 BRIEF INTRODUCTION 2
1.2 FEATURES 2
1.3 APPLICATION 2
2 SPECIFICATION AND PARAMETER 3
2.1 LIMIT PARAMETER 3
2.2 OPERATING PARAMETER 3
3 SIZE AND PIN DEFINITION 4
4 RECOMMENDED CONNECTION DIAGRAMS 5
5 PACKAGE REQUIREMENTS 6
6 QUICK START 6
6.1 CONNECTED TO TCP SERVER AS CLIENT 7
6.2 MODULE BUILD TCP SERVER TO CONNECT TO PC AS AP 16
6.3 USAGE OF SMART CONFIG 18
6.4 USAGE OF GPIO 19
6.5 USAGE OF ADC 19
6.6 MODIFY UART BAUD RATE 20
7 SPECIFICATION FOR NETWORKING 20
7.1 NETWORKING ROLE 20
7.2 NETWORKING MODEL 21
8 AT COMMAND 23
9 HARDWARE DESIGN 24
10 FAQ 25
10.1 COMMUNICATION RANGE IS TOO SHORT 25
10.2 MODULE IS EASY TO DAMAGE 25
10.3 BER(BIT ERROR RATE) IS HIGH 25
11 PRODUCTION GUIDANCE 26
11.1 REFLOW SOLDERING TEMPERATURE 26
11.2 REFLOW SOLDERING CURVE 26
12 E103 SERIES 27
13 PACKAGE 27
REVISION HISTORY 28
ABOUT US 28

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1 General Introduction

1.1 Brief Introduction

E103-W01 is 100mW UART to wi-fi module with competitive price. Small-size, embedded PCB antenna, operate at 2.4~2.4835GHz frequency band, with all those features, E103-W01 is 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 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 reach100m;
- 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;
- The AT command allows the module to enter the WeChat AirKiss configuration mode;
- 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;
- Onboard PCB antenna.

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.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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

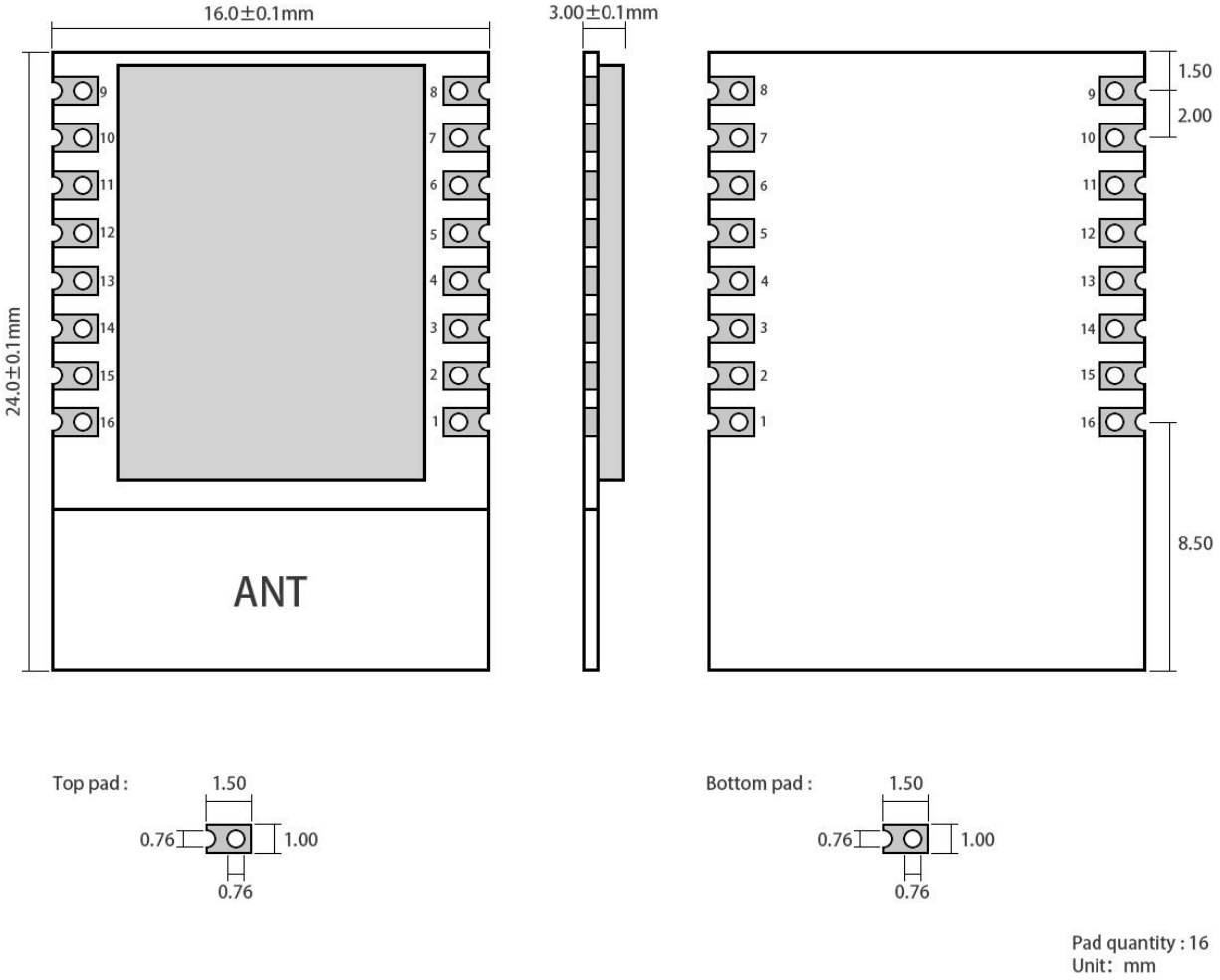
Main parameter	Performance			Remark
	Min	Type	Max	
Operating voltage（V）	3.0	3.3	3.6	≥3.3 V ensures output power
Communication level （V）	-	3.3	-	For 5V TTL, it may be at risk of burning down
Operating temperature （℃）	-40	-	+85	Industrial grade
Operating frequency（MHz）	2402	-	2483	Support ISM band
Max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

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Main parameter	Description	Remark
Reference distance	100m	clear and open area, antenna gain: 5dBi， antenna height: 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	PCB Onboard Antenna	50 ohm impedance
Weight	1.3±0.1g	

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

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5	GPIO14	IO	PWM1/GPIO14			
6	GPIO12	IO	PWM0/GPIO12			
7	GPIO13	IO	GPIO13			
8	VCC	-	VDC:3.0V~3.6V（above 300mA）			
9	GND	-	GND pin			
10	GPIO15	I	GPIO15	GPIO2★	GPIO0	Boot
11	GPIO2	I	0	1	1	Boot from FLASH
12	GPIO0	I	0	1	0	Download firmware from UART
13	GPIO4	IO	PWM2/GPIO4			
14	GPIO5	IO	PWM3/GPIO5			
15	RXD	I	UART input pin, support AT command			
16	TXD	O	UART output pin, support AT command			

★ GPIO2 is already been internal pulled up

 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.

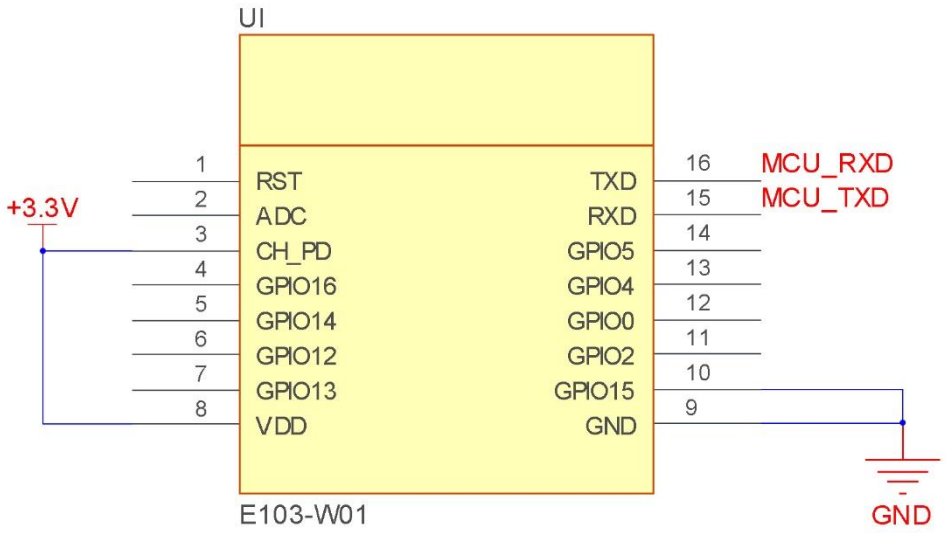
 LED indication when module works in power-on transparent transmission mode：

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.

4 Recommended connection diagrams



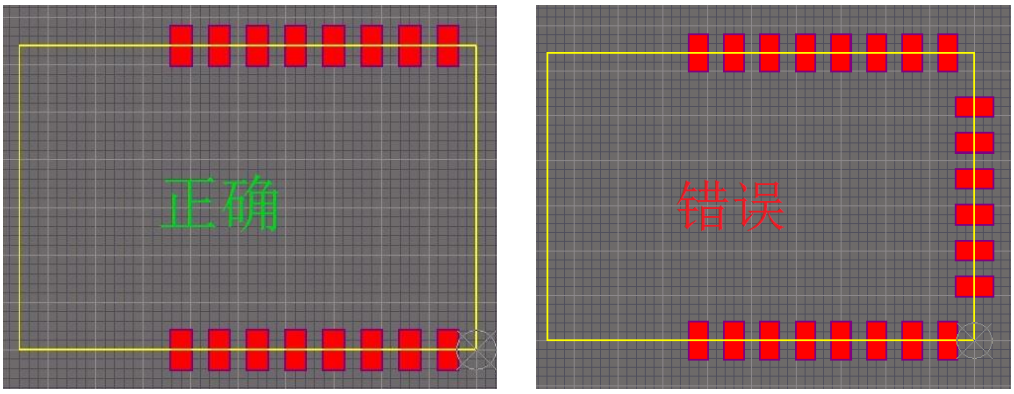
- Note：supply voltage is 3.0V~3.6V. 500mA LDO is recommended for steady operation of module.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5 Package requirements

- Note: Please try to use the package in the product package. When making the E103-W01 chip package, do not place the pads under the non-functional pins!



6 Quick Start

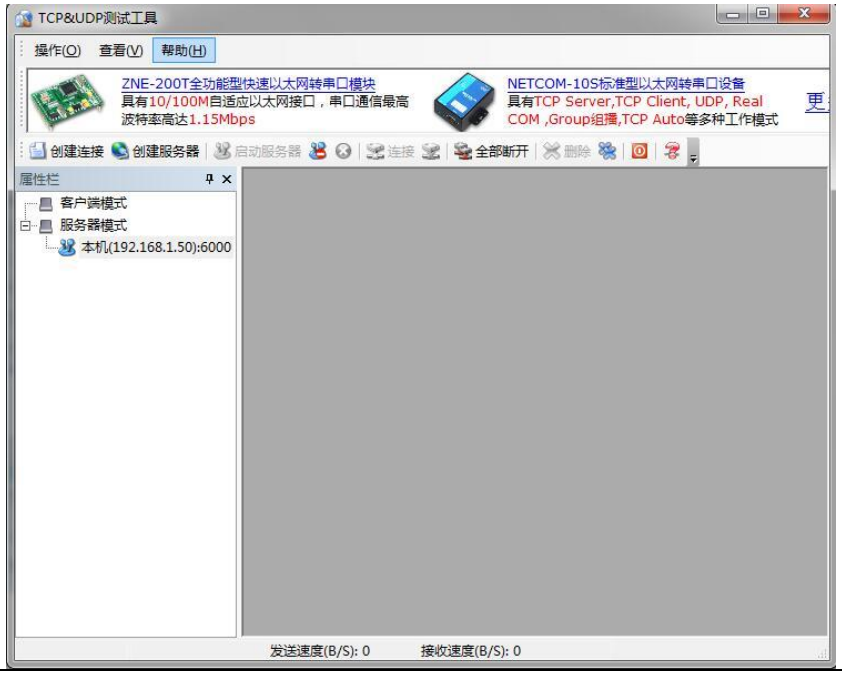
- E103-W01 module is easy to use. In order to allow users to quickly familiarize themselves with the module, this section will guide the user through simple setup to achieve configuration and communication in various modes.
- The test process uses AT commands. For quick connection, we have developed 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
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

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6.1 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. 
3	【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：COM30. AP mode is the default mode for E103-W01, which is equivalent to Wi-Fi router. Cellphone or PC can search

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

	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. 
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.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

<table>
<tr><td></td><td>
</td></tr>
<tr><td>5</td><td>【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).

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

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

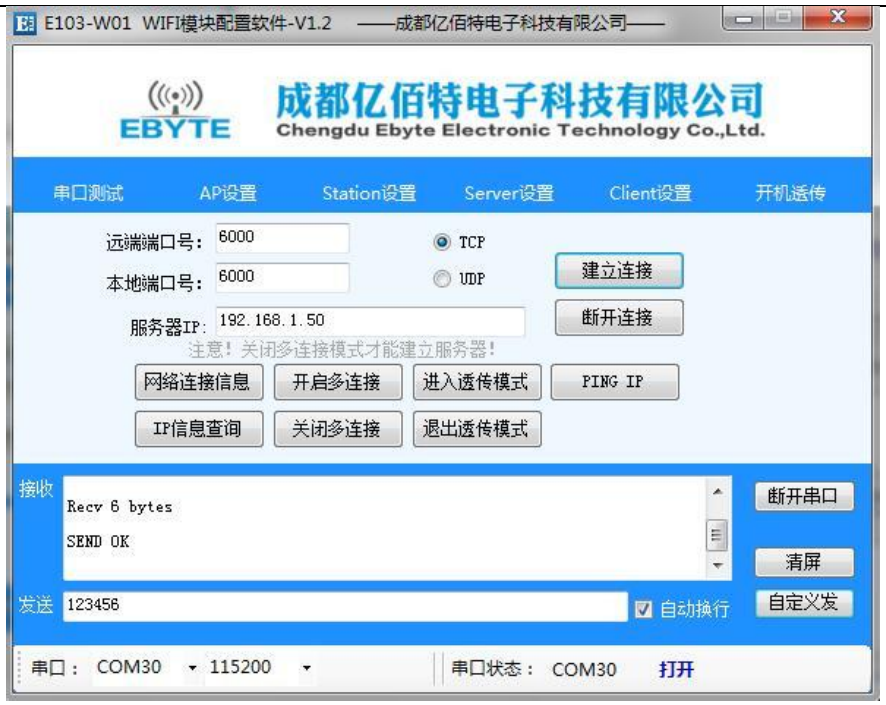
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

<table>
<tr><td></td><td>
</td></tr>
<tr><td>6</td><td>【Transmitting】：
Use AT+CIPSEND command to transmit data, first send AT+CIPSEND=6 to specify the length of 6 bytes.


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

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000





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.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



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

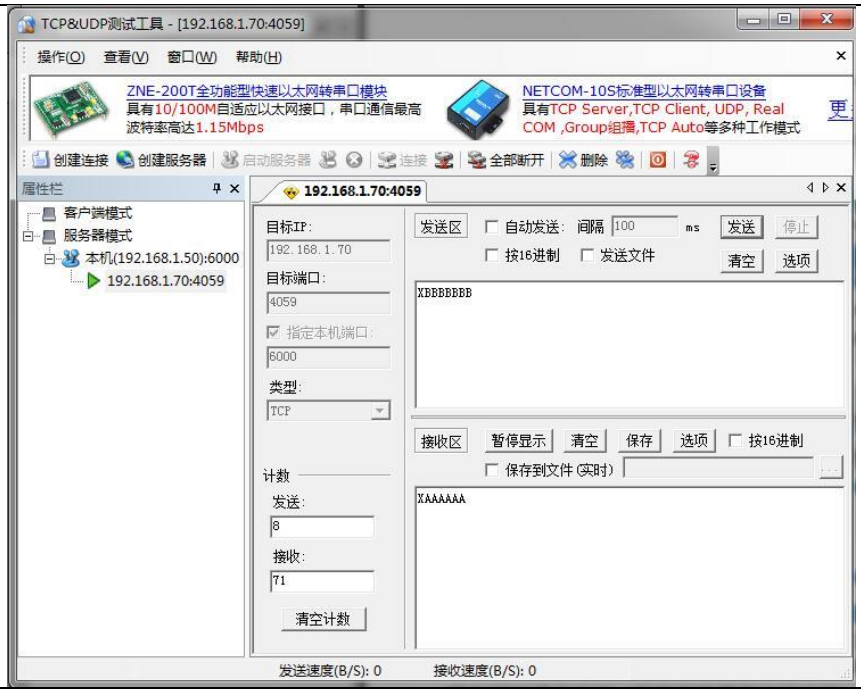
If user continue to transmit data AT+CIPSEND, module will treat AT+CIPSEND as data and transmit it to TCP server directly.

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



Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



8

【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.



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

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



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,



Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



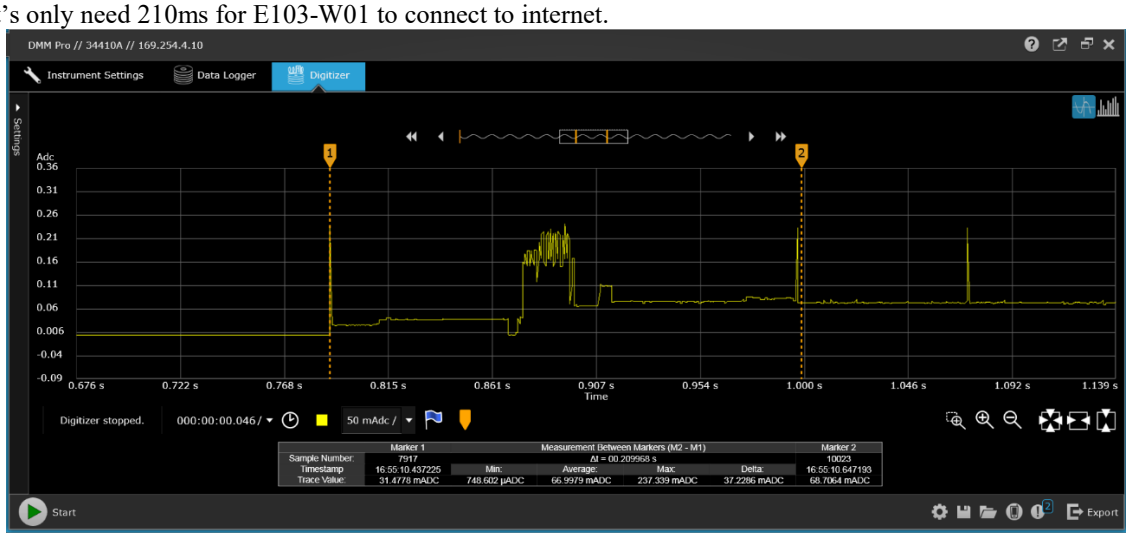
Wi-Fi indicator(GPIO2) specification：

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.

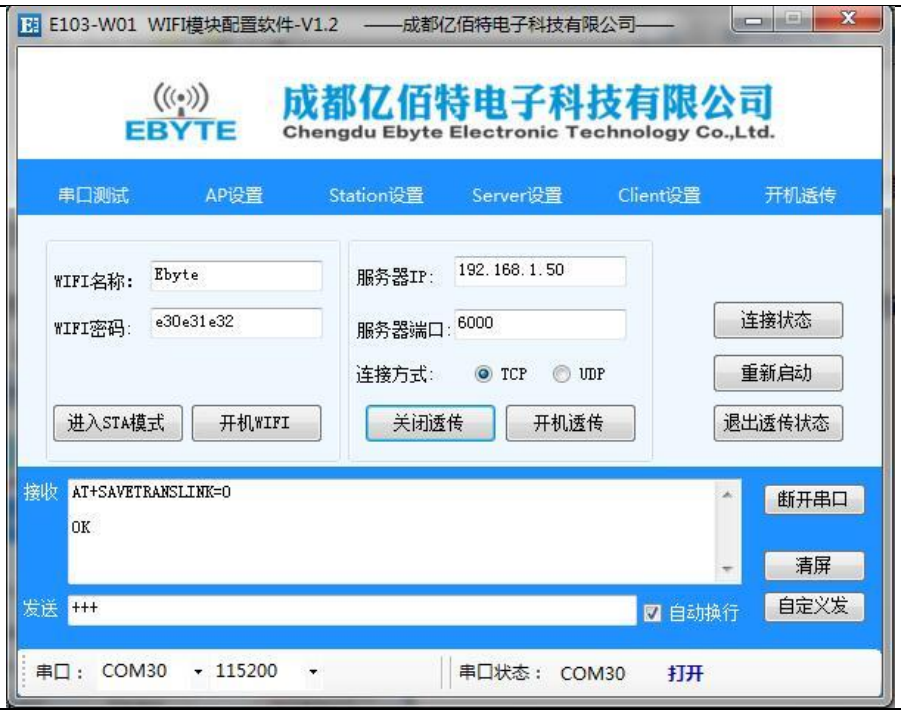
It’s only need 210ms for E103-W01 to connect to internet.



9	【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.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6.2 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. 
2	【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.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



3

【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.



Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

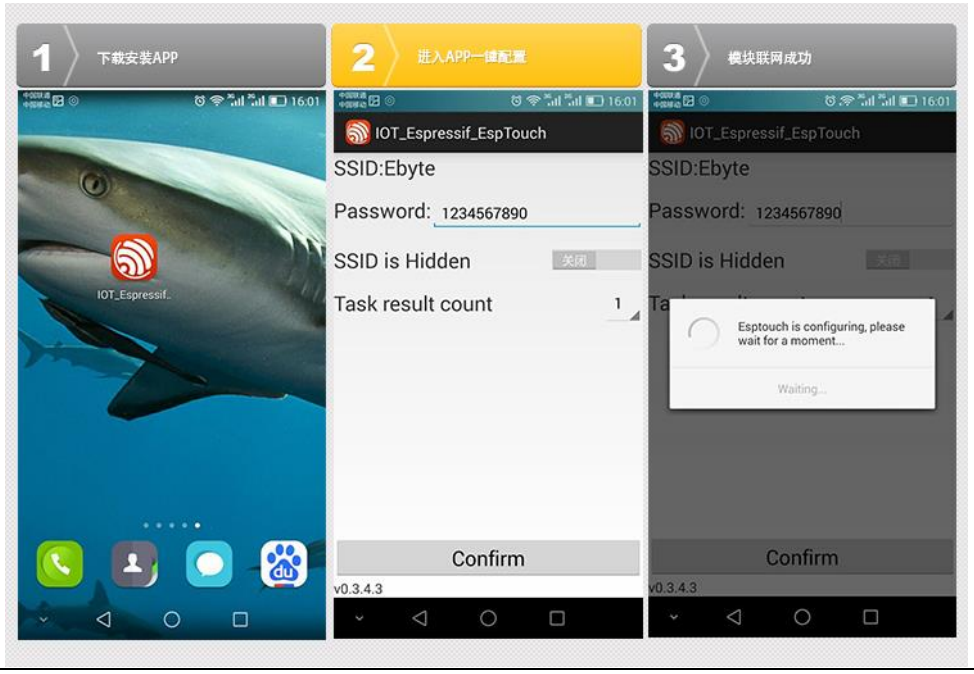
	

6.3 Usage of Smart Config

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

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



6.4 Usage of GPIO

No.	Remark
1	E103-W01 provides 5 GPIOs: GPIO4\GPIO5\GPIO12\GPIO13\GPIO14.
2	The user can set the pin through the AT+SYSIO series of instructions, the instructions are as follows: AT+SYSIOSETCFG: Set the IO working mode; AT+SYSIOGETCFG: Query working mode; AT+SYSGPIODIR: Set GPIO work as input and output; AT+SYSGPIOWRITE: Set the output level of GPIO; AT+SYSGPIOREAD: Read the level status of GPIO;

6.5 Usage of ADC

No.	Remark
1	E103-W01 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+SYSADC?), 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 to 45/1024=0.044V.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6.6 Modify UART baud rate

No.	Remark
1	E103-W01 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
	EVEN
	ODD
Data length	5 bits
	6 bits
	7 bits
	8 bits
Stop bit	1 bit
	2 bits

7 Specification for networking

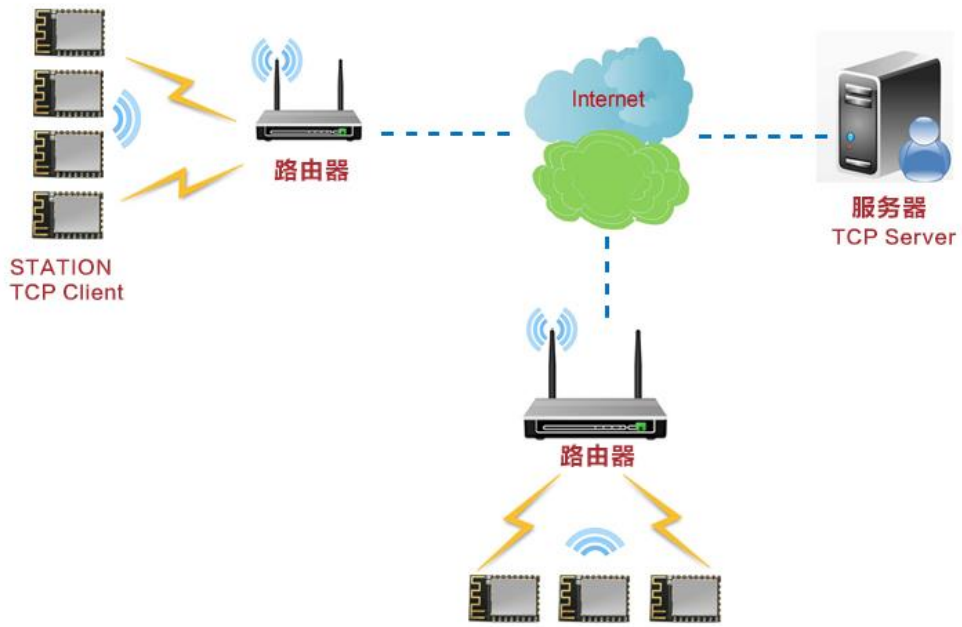
7.1 Networking role

No.	Remark
1	E103-W01 supports AP mode (router) and STATION mode (wi-fi equipment). At most 8 wi-fi devices can be supported when module works at AP mode.
2	E103-W01 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 packet.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

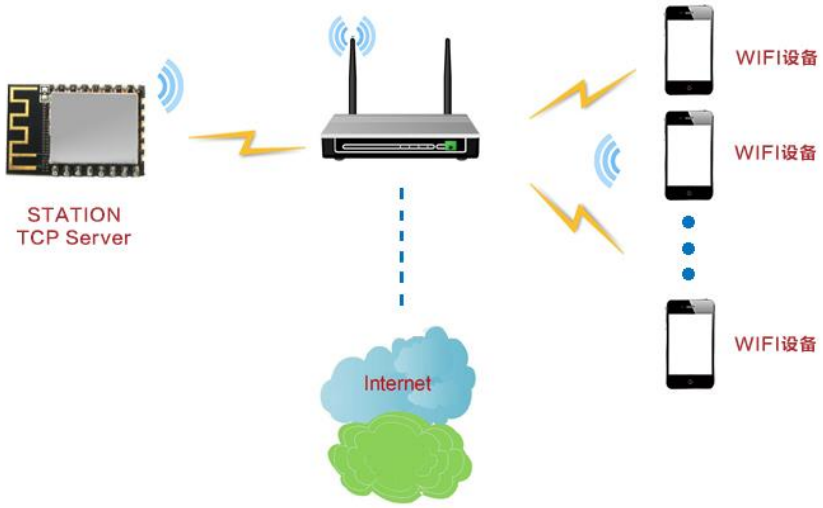
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7.2 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.

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

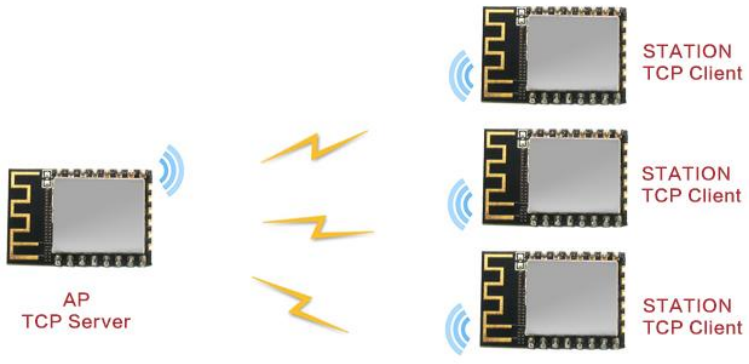
Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



One module builds 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 eight STATIONs, that is, up to nine 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 eight modules can communicate with it using the TCP Client. (However, there should be no more than 5 clients accessing the TCP server).



Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

8 AT command

<table>
<tr><td rowspan="4">1</td><td colspan="2">AT+SYSIOSETCFG- set IO working mode</td></tr>
<tr><td>AT+SYSIOSETCFG=<pin>,<mode>,<pull-up>
Response：
OK</td><td>• <pin>： IO pin No.
• <mode>： IO working day
• <pull-up>
‣ 0：Disenable
‣ 1: Enable</td></tr>
<tr><td colspan="2">AT+SYSIOSETCFG=12,3,1 //set GPIO12 working at GPIO mode</td></tr>
<tr><td colspan="2">Note：E103-W02 has GPIO4\GPIO5\GPIO12\GPIO13\GPIO14 available for user.</td></tr>
<tr><td rowspan="3">2</td><td colspan="2">AT+SYSIOGETCFG-inquiry IO working mode</td></tr>
<tr><td>AT+SYSIOGETCFG=<pin>
Response：
+SYSIOGETCFG:<pin>, <mode>, <pull-up>
OK</td><td>• <pin>： IO pin No.
• <mode>： IO working day
• <pull-up>
‣ 0：Disenable
‣ 1: Enable</td></tr>
<tr><td colspan="2">For example：AT+SYSIOGETCFG=4</td></tr>
<tr><td rowspan="3">3</td><td colspan="2">AT+SYSGPIODIR-set GPIO working as input and output</td></tr>
<tr><td>AT+SYSGPIODIR=<pin>,<dir>
Response：
• When succeed，return
OK
• if IO pins are not in GPIO mode，it reminds
NOT GPIO MODE！
ERROR</td><td>• <pin>： GPIO No.
• <dir>：
‣ 0：set GPIO as input
‣ 1：set GPIO as output</td></tr>
<tr><td colspan="2">For example：
AT+SYSIOSETCFG=12,3,1 //set GPIO12 working at GPIO mode
AT+SYSGPIODIR=12,0 //set GPIO12 as input</td></tr>
<tr><td rowspan="3">4</td><td colspan="2">AT+SYSGPIOWRITE-set GPIO output level</td></tr>
<tr><td>AT+SYSGPIOWRITE=<pin>, <level>
Response：
• When succeed，return
OK
• if IO pins are not in output mode，it reminds
NOT OUTPUT！
ERROR</td><td>• <pin>： GPIO No.
• <level>：
‣ 0：low level
‣ 1：high level</td></tr>
<tr><td colspan="2">For example：
AT+SYSIOSETCFG=12,3,1 //set GPIO12 working at GPIO mode
AT+SYSGPIODIR=12,1 //set GPIO12 as output
AT+SYSGPIOWRITE=12,1 //set GPIO12 outputting high level</td></tr>
<tr><td>5</td><td colspan="2">AT+SYSGPIOREAD- read GPIO communication level</td></tr>
</table>

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

	Response： • When succeed，return +SYSGPIOREAD:<pin>,<dir>,<level> OK • if IO pins are not in GPIO mode，it reminds NOT GPIO MODE！ ERROR	• <pin>： GPIO No. • <dir>： ‣ 0：set GPIO as input ‣ 1：set GPIO as output • <level>： ‣ 0：low level ‣ 1：high level
	For example： AT+SYSIOSETCFG=12,3,1 //set GPIO12 working at GPIO mode AT+SYSGPIODIR=12,0 //set GPIO12 as input AT+SYSGPIOREAD=12	
6	AT+SYSADC？inquire ADC value	
	Response： +SYSADC:<ADC> OK	<ADC>：inquired ADC value，unit： 1/1024V
	For example：AT+SYSADC？	

9 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;

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

- 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;
- The antenna must not be installed inside the metal case, which will cause the transmission distance to be greatly weakened.

10 FAQ

10.1 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.

10.2 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.

10.3 BER (Bit Error Rate) is high

- If there 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.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

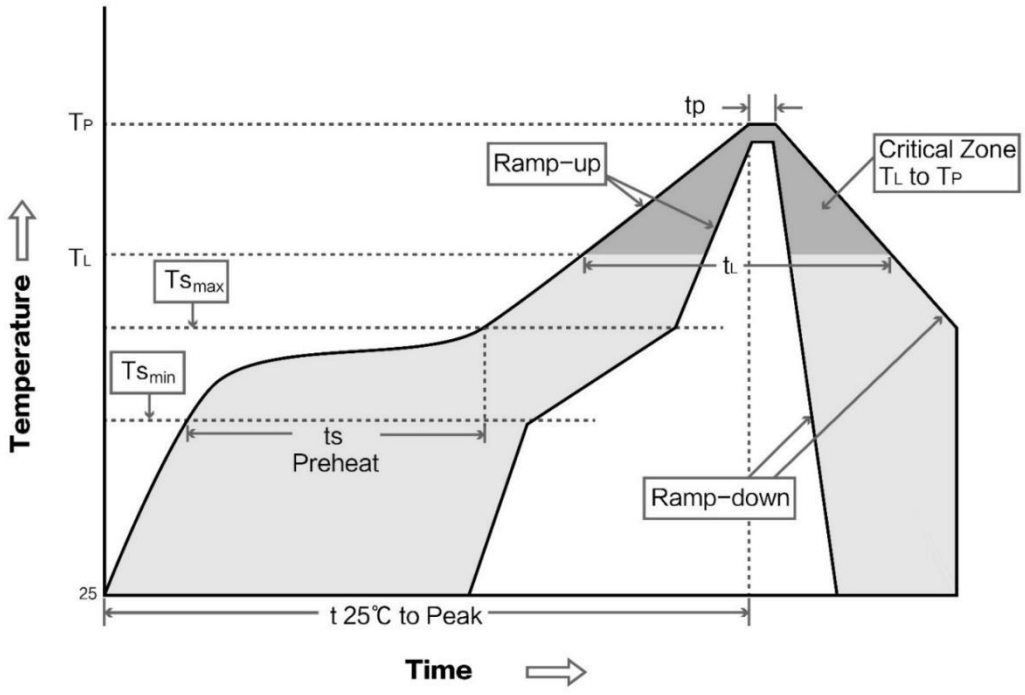
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

11 Production guidance

11.1 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℃
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

11.2 Reflow soldering curve



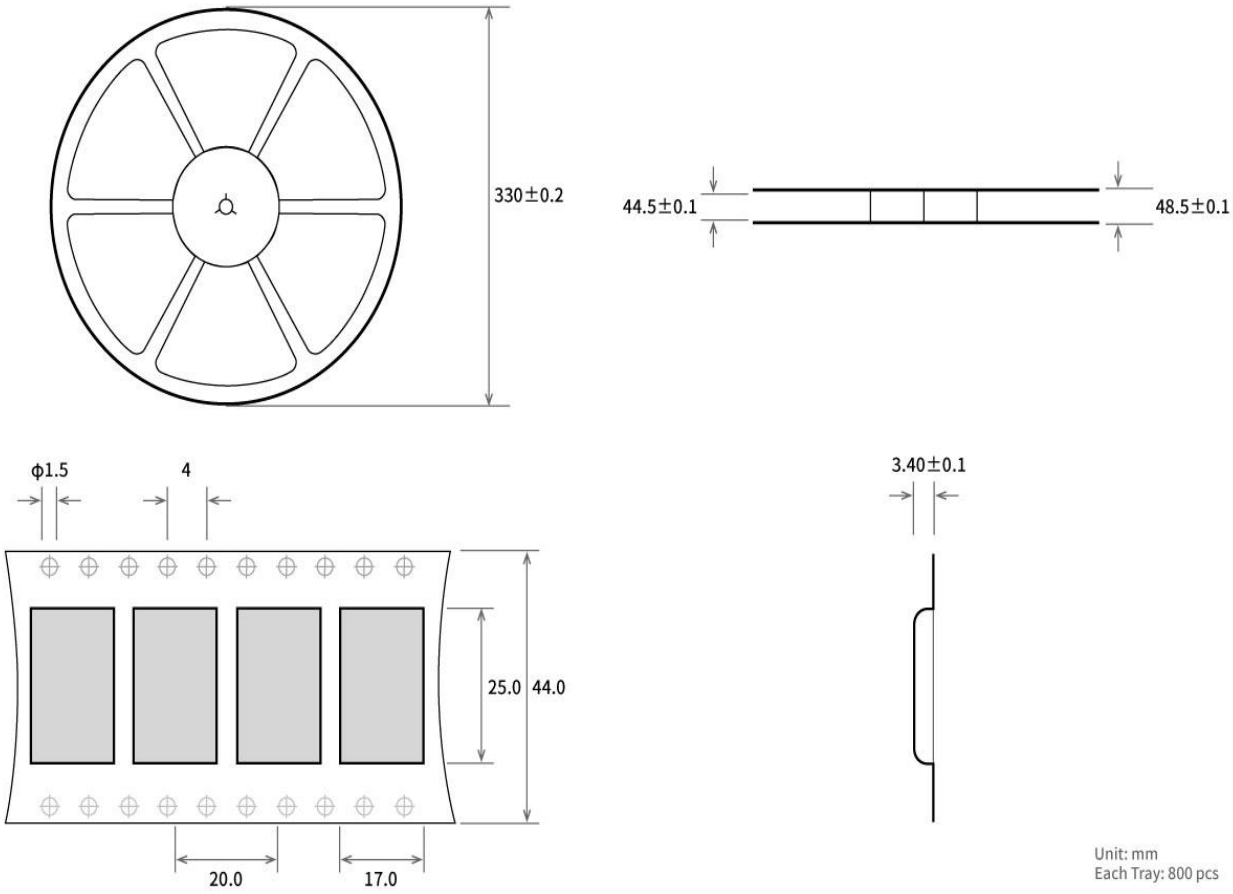
Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

12 E103 series

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

13 Package



Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Revision history

Version	Date	Description	Issued by
1.00	2017-7-1	Initial version	huaa
1.10	2018-3-12	Content update	huaa
1.3	2018-8-7	Content update	Huaa
1.4	2018-11-2	Modification	Ray
1.5	2019-3-8	Content update	-
1.6	2019-8-30	New version update	Lyl

About us

Technical support: support@cdebyte.com
Documents and RF Setting download link:： www.ebyte.com
Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com
---
Fax: 028-64146160
Phone: 86-028-61399028
Web: www.ebyte.com
Address: Innovation Center B333-D347, 4# XI-XIN Road, Chengdu, Sichuan, China

Chengdu Ebyte Electronic Technology Co.,Ltd.

Copyright ©2012–2018 Chengdu Ebyte Electronic Technology Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000