E103-W05A User Manual

W600 2.4GHz DIP Cost-effective WIFI module



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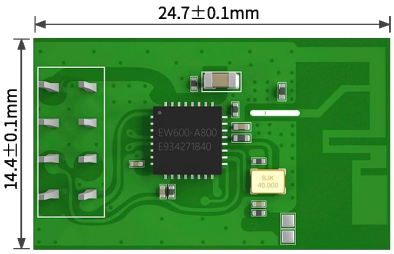
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Chapter 1 Overview

1.1 Introduction



E105-W05A is a DIP module under the E103-W05 series (for the convenience of the following description, collectively referred to as E105-W05 or W05 below), it is a low-cost, cost-effective 100mW (20dBm) wireless Module, small size, with PCB antenna, working in the 2.4~2.483GHz, low power consumption, fast data stream transmission. The module can use the serial port for data transmission and reception and AT command related parameter setting. Secondly, E103-W05 AT command is large Partially compatible with the E103-W01 module, making it easy to use and quick to use, both for old and new users, and is a good data transmission partner in the Internet of Things.

The E103-W05 module is developed by Chengdu Ebyte Electronic Technology Co., Ltd. based on the W600 chip of Winner Micro. The module integrates transparent transmission function, ready to use, supports serial AT command set, server AT command set, users can use the network access function through the serial port, and it is widely used in smart home appliances, smart homes, wireless audio and video, smart toys, IoT application fields such as medical monitoring and industrial control.

1.2 Features

- Transparent transmission when booting, and automatic connection when disconnected;
- Multiple baud rates;
- Smart Config configuration function;
- TCP Server, TCP Client, UDP;
- Three working modes: STATION, AP, STATION&AP;
- Serial transparent transmission;
- Multiple encryption methods;
- Module serial port AT command configuration;

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- Built-in watchdog, never crash;
- Parameter memory, save when power off.;

1.3 Application scenarios

- Wireless meter reading;
- Wireless sensing;
- Smart home;
- Industrial remote control and telemetry;
- Smart buildings;
- High-voltage line detection;
- Environmental engineering;
- Highway;
- Small weather station;
- Automated data collection;
- Consumer Electronics;
- Smart robot;
- Street light control;

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Chapter 2 Specifications

2.1 Limit parameters

Main parameters	Performance		Remark
	Min	Max	
Power supply voltage (V)	3.0	3.6	Over 3.6V will permanently burn the module
Blocking power (dBm)	-	20	It is less likely to burn when used at close range
Working temperature (℃)	-40	+85	Industrial grade

2.2 Operating parameter

Main parameter		Performance			Remark
		Min	Type	Max	
Operating voltage（V）		3.0	3.3	3.6	≥3.3V can guarantee output power
Communication level (V)		-	3.3	3.6	It is recommended that the difference between the supply voltage and the supply voltage is less than 0.3V to reduce power consumption
Operating temperature （℃）		-40	-	+85	Industrial design
Operating frequency （MHz）		2400	-	2484	802.11 b/g/n
Power consumption	Emission current (mA)	-	230	-	Instantaneous power consumption
	Receiving current (mA)	-	95	-	-
	Sleep current (μA)	-	5.0	-	-
Maximum transmit power (dBm)		-	-	20.00	802.11 b Faith 11
Receiving sensitivity (dBm)		-	-89	-	OFDM, 6 Mbps
Communication	Network (bps)	1.0M	-	54.0M	802.11 b/g/n

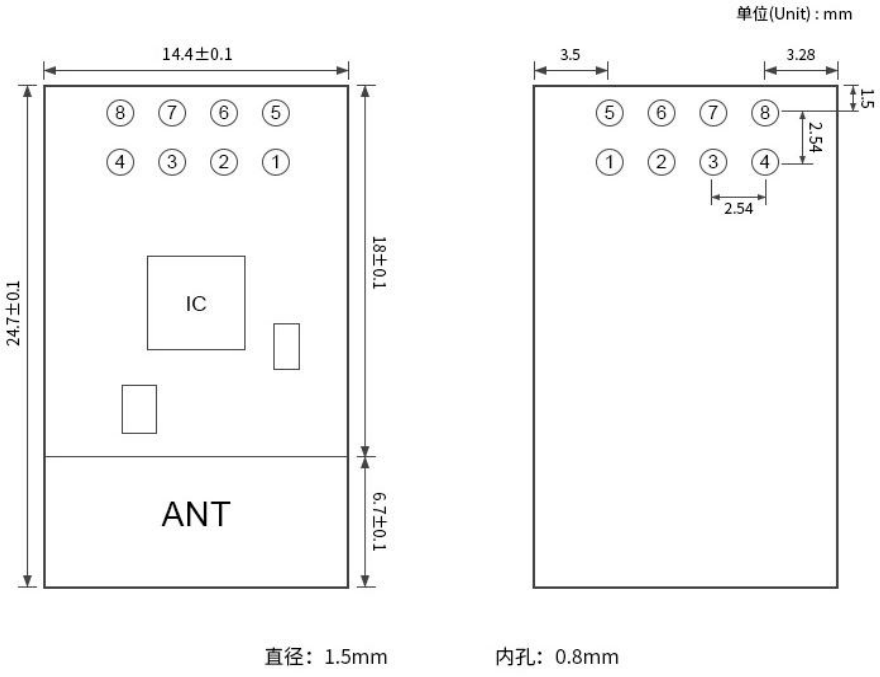
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rate	Serial port (bps)	600	-	2.0M	User programmable customization

Main parameter	Description	Remark
Reference distance	130M	Clear and open, 2.5 meters high
Operating frequency	80MHz	-
Modulation	-	DSSS(DBPSK,DQPSK,CCK) and OFDM(BPSK,QPSK,16QAM,64QAM)
Package	DIP	-
Communication Interface	Serial port	600bps～2.0Mbps
Dimensions	24.7*14.4*11.2mm （±0.2mm）	PCB onboard antenna + DIP
RF interface	PCB	The default PCB antenna, the equivalent impedance is about 50Ω
Weight	1.20±0.1	Unit：g

Chapter 3 Size and pin definition



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No.	Pin item	Direction	Application
1	GND	P	Ground wire, connected to the power reference ground
2	NC	IO	Floating, GPIO0 of the internal chip, programming enable pin, low level enable
3	NC	IO	Floating, GPIO16 of the internal chip can be used as input and output pins
4	RXD	I	Serial port receiving pin, support AT command
5	TXD	O	Serial port sending pin, support AT command
6	NC	IO	Floating, WAKE pin of the chip, high level wake up
7	RST	I	Hardware reset pin, low level reset
8	VCC	P	Power supply, range 3.0～3.6V (standard 3.3V)
Note: I:input; O:output; P:power supply			

Chapter 4 Basic Operation

4.1 Hardware design

- It is recommended to use a DC stabilized power supply to supply power to the module. The power supply ripple factor should be as small as possible, and the module should be grounded reliably.;
- 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 it is between the recommended supply voltages. If the maximum value is exceeded, the module will be permanently damaged;
- Please check the stability of the power supply, the voltage should not fluctuate greatly and frequently;
- When designing the power supply circuit for the module, it is often recommended to reserve more than 30% margin, because the whole machine is conducive to long-term stable operation;
- The module should be as far away as possible from the power supply, transformer, high-frequency wiring and other parts with large electromagnetic interference;
- High-frequency digital wiring, high-frequency analog wiring, and power wiring must avoid the bottom of the

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module. If it is necessary to pass under the module, assuming that the module is soldered to the Top Layer, lay copper on the top layer of the contact part of the module (all copper And well grounded), it must be close to the digital part of the module and routed in the Bottom Layer；

- Assuming that the module is soldered or placed on the Top Layer, it is also wrong to randomly route the wires on the Bottom Layer or other layers, which will affect the stray and receiving sensitivity of the module to varying degrees；
- Assuming that there are devices with large electromagnetic interference around the module, it will greatly affect the performance of the module. According to the intensity of the interference, it is recommended to stay away from the module. If the situation permits, proper isolation and shielding can be done.；
- Assuming that there are traces with large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power wiring), it will also greatly affect the performance of the module. According to the intensity of the interference, it is recommended to stay away from the module. Isolation and shielding；

4.2 Software writing

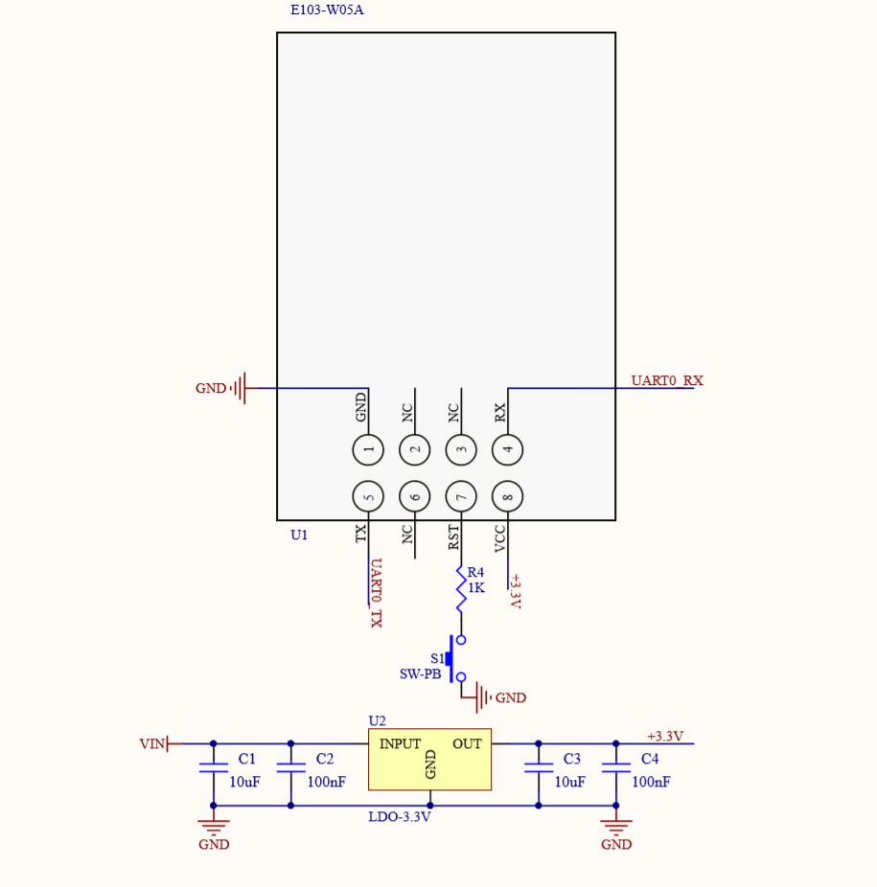
- The module chip solution is Winner Micro W600, and its driving method is completely equivalent to W600, and users can operate according to the W600 chip book;
- The GPIO15 and GPIO16 of the internal chip (external 2 and 3 pins) are general-purpose I/O ports, and the related AT commands can be used for pins;

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Chapter 5 Basic Application

5.1 Basic circuit



5.2 Basic usage

No.	How to use	Descriptions
0	Module to module communication	Module 1 is set to AP mode and establishes a TCP or UDP server, module 2 is set to STATION mode and connected to AP 1, and communicates with module 1 through TCP or UDP Client
1	Module and Server communication	The Wi-Fi module is connected to the network through a wireless router, and communicates with a server on the network (LAN or Internet) through TCP Client or UDP.
2	Module and Client communication	If you need to connect to the Internet server, you need to configure the corresponding port mapping on the router.

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Chapter 6 Quick Start

The E103-W05 module is easy to use and easy to access the network, and is compatible with most E103-W01 AT commands in this section. Therefore, when using our E103-W05, you can also use the E103-W01 host computer to easily achieve For the parameter settings of E103-W05, users are guided to use the product through communication examples between the module and the module, the module and the server, and the module and the client.

When the user configures the parameters of the module, first of all, the user needs to ensure that the working voltage of the module is 3.0~3.6V (typical value is 3.3V), the serial port pins have been correctly connected to the relevant serial port tools and can communicate normally.

6.1 Preparation before configuration

Hardware used in this section ：	
1	E103-W05 Wi-Fi module
2	E103-W05 model Wi-Fi module test board
3	Office computer
4	1 router (can be replaced by mobile phone Wi-Fi hotspot)
Software used in this section (all available for download on the official website):	
1	Serial debugging assistant AccessPort/XCOM
2	TCP&UDP test tool
3	Airkiss related app "AirkissDebug"
4	PC software of E103-W01

6.2 Application of TCP Server under AP

6.2.1 Application description

We search for the hot spots of the E103-W05 module through the computer and connect, establish a TCP Client on

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the PC and connect to the port monitored by the TCP Server of the module, and realize the communication process.

6.2.2 Network Model



6.2.3 Parameter configuration

①Open the E103-W01 configuration software, select the serial port number and baud rate (default 115200), query the version information, and check whether there is version-related data in the receiving box. If there is, it means the communication is normal. As shown below:

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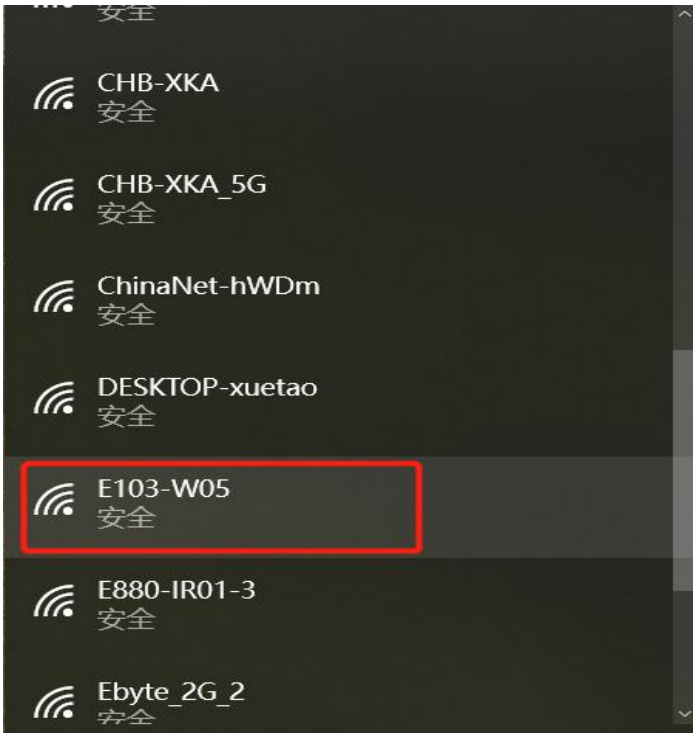
②Set the working mode of the module to AP, and set related AP parameters, such as AP name, password, encryption method, channel number, etc.



③After the setting is successful, we can search through the WIFI in the lower right corner of the computer to find our module and connect it.

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④When connected, the module will print the following information, showing the MAC address of the connected STA and the assigned IP address.



⑤Now we create TCP Server in the module and listen on the port

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⑥ We build a client on the PC and connect to the client of the module, and then we can send data. Here, if the server needs to send data to the client, we can send it through the AT+CIPSEND command. Here, users can download the AT instruction manual of E103-W05 in the data download.



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6.3 The application of the TCP Client module working under STA

6.3.1 Application description

We use the E103-W05 module as the STA working mode to search for nearby WIFI and connect. At the same time, the computer is also connected to the same WIFI, so that the E103-W05 and the computer are in the same local area network. Create a TCP Client on the module side and create it on the computer side. TCP server, and then communicate.

6.3.2 Network Model



6.3.3 Parameter configuration

①Set the module to STA mode and connect to the relevant WIFI hotspot (router). When the connection is successful, the following information will be displayed in the receiving data box. At this time, we can query the assigned IP information through IP information query.

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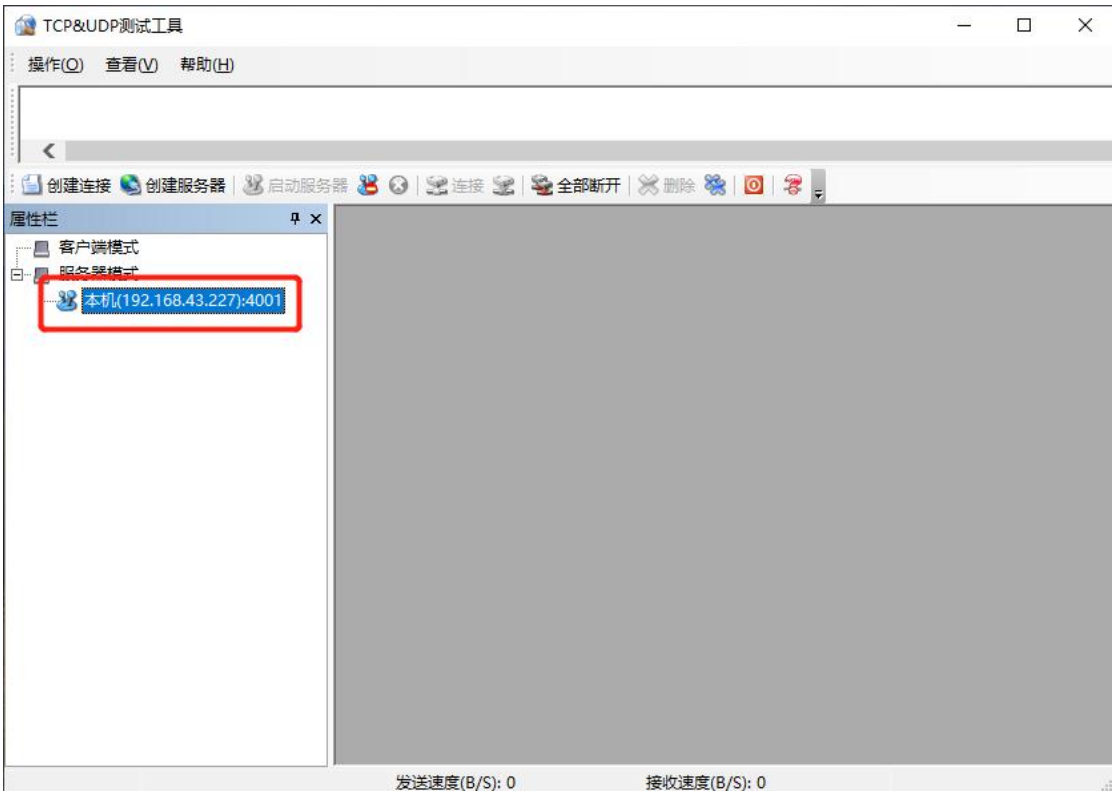
②. At this time, also connect our computer to the same wifi as the module, so that they are in a local area network.

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③On the computer, create a server and monitor the relevant ports.



④Set up the module and connect to the server. When the connection is successful, the receiving box will have the

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following prompt message.



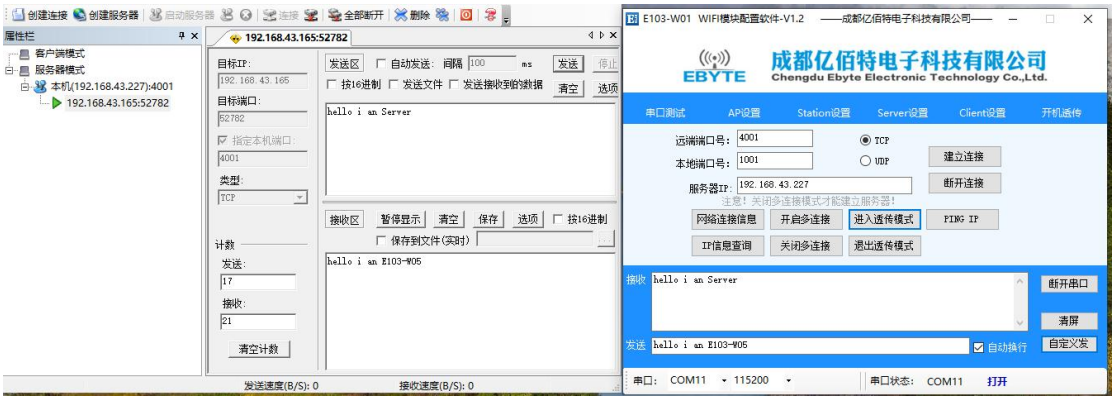
⑤After successfully connecting to the server, we can perform data communication between the server and the client, but here, in order to achieve simple data transmission, we need to make some settings to enter the transparent transmission mode, so that we can avoid sending data every time. The awkward operation of specifying the width. After the client connects to the server, perform the following operations to enter the transparent transmission.

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⑥Start transparent data transmission.



6.3 The use of one-key distribution network (AIRKISS)

The E103-W05 module has a smart network configuration function. The user can use the relevant mobile phone APP to configure the module to quickly connect to the network. When the module is in STA mode, click SmartC Open to enter the one-key network configuration mode.

When the match is successful, the module will access the same target WIFI as the mobile phone without entering

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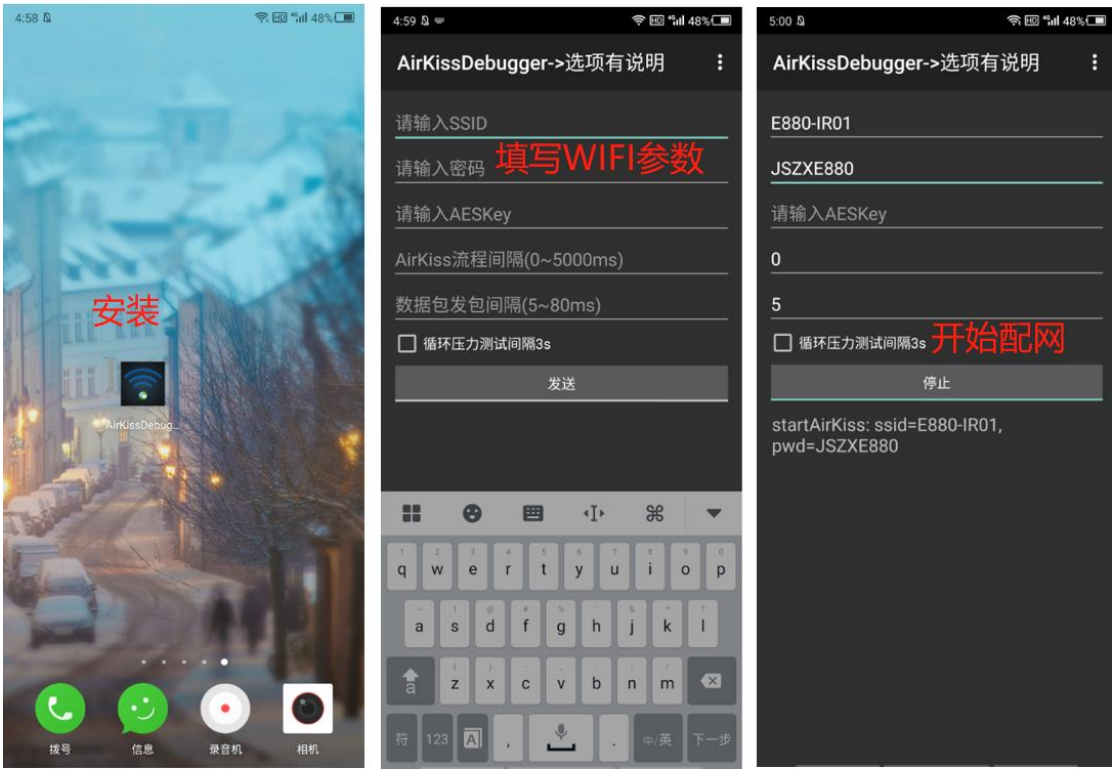
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the password and SSID.

Next, we will use AIRKISS to guide users to access the network.

6.3.1 Network distribution preparation

The mobile phone needs to download the AIRKISS debugging APP officially provided by WeChat, and the user can download and install it on the official website of Ebyte.



6.3.2 Host computer configuration

On the module side, we click SmartC Open on the host computer to start the network configuration. After the configuration is successful, the module is connected to the same WIFI as the mobile phone, and the following information will be printed in the receiving

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box.

6.4 GPIO configuration

In the E103-W05 series of modules, GPIO0/1/6/7/8/9/10/11/12/13/14/15/16/17/18 are used as ordinary GPIO, among which, E103-W05A Only GPIO15 and GPIO16 can be used. When we want to control the output level of the relevant pin through the AT command, or read the relevant level status, we can use the following commands.

6.4.1 AT+CIOMODE Set the working mode of GPIO

Instruction format:

AT+CIOMODE =<pin>,<mode>

<pin>: pin label;

<mode>: working mode;

1: Output mode

0: input mode

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6.4.2 AT+CIOWRITE Set the GPIO level

Instruction format:

AT+CIOWRITE=<pin>,<level>

<pin>: pin label;

<level>: working mode;

1: High level

0: low level

6.4.3 AT+CIOREAD Read GPIO level

Instruction format:

<pin>: pin label;

6.4.5 Pin application example

①Use GPIO18 as output attribute and output low level

AT+CIOMODE=18,1

AT+CIOWRITE=18,0

②Use GPIO18 as an input attribute and read out the level

AT+CIOMODE=18,0

AT+CIOREAD=18

The module reply is as follows：

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6.5 Serial port baud rate setting

When users use E103-W05, they often set the serial port baud rate. The module supports the following baud rates: 2000000，1500000，1250000，1000000，921600，406800，230400，115200，57600，38400，19200，9600，4800，2400，1800，1200，600；

In the configuration of the host computer, 115200 and 9600 setting buttons are provided. If the user's setting requirements cannot be met, the relevant AT commands can be used to set the baud rate. After the baud rate is set, it will take effect immediately.

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Chapter 7 Frequently Asked Questions

7.1 Transmission distance is not ideal

- When there is a straight line communication obstacle, the communication distance will be attenuated accordingly;
- Temperature, humidity, and co-frequency interference will increase the communication packet loss rate;
- The ground absorbs and reflects radio waves, and the test results near the ground are poor;
- Sea water has a strong ability to absorb radio waves, so the seaside test results are poor;
- If there is a metal object near the antenna or placed in a metal shell, the signal attenuation will be very serious;
- The low voltage of the power supply at room temperature is lower than the recommended value, the lower the voltage, the lower the power output;
- The matching degree of the antenna and the module is poor or the quality of the antenna itself is problematic.

7.2 Module is easily damaged

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, it will cause permanent damage to the module;
- Please check the stability of the power supply, the voltage should not fluctuate greatly and frequently;
- Please ensure anti-static operation during installation and use, and high-frequency components are electrostatically sensitive;
- Please ensure that the humidity during installation and use should not be too high, and some components are humidity sensitive devices;
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

7.3 Precautions

7.3.1 The relationship between AP&STA&Server&Client

In the above two network access examples in Sections 6.2 and 6.3, it is not only in AP mode that TCP Server can be established. Similarly, it is not only when the module is in STA mode that TCP Client can be established. AP and STA are just modules that access the network. One of the working modes of the module, and TCP Server, TCP

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Client and UDP can create network links in any mode of the module.

7.3.2 Note for transparent transmission

The transparent transmission mode can only be used when the module is working in TCP Client and UDP. TCP Server cannot enter the transparent transmission mode. After entering the power-on transparent transmission, you must remember to manually activate the transparent transmission with AT+CIPSEND. If the user wants to start the system For transparent transmission, you need to make relevant settings in the following interface.



7.3.2 AP The maximum number of connections connected to the server

When establishing TCP Server and TCP Client, pay attention to the option of opening and closing multiple connections;

When the module is used as an AP, it can be connected by at most 5 STAs. When the module is working in TCP Server mode, it can be connected by at most 5 TCP Clients. Therefore, it is recommended for customers to use short packet data or not considering packet loss. UDP carries out relevant communication.

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7.3.2 AT command

The AT commands used by E103-W05 series sub-modules (E103-W05A, E103-W05B, E103-W05C) can be used mutually, but users must make relevant settings according to the electrical characteristics of their own modules. In addition, due to different electrical characteristics, E103- W05 series modules are not fully compatible with the AT commands of E103-W01. Therefore, some AT commands applicable to E103-W01 are not fully applicable to E103-W05. For the detailed AT command set, please refer to the manual "E103-W05AT Command Set" user's guidance".

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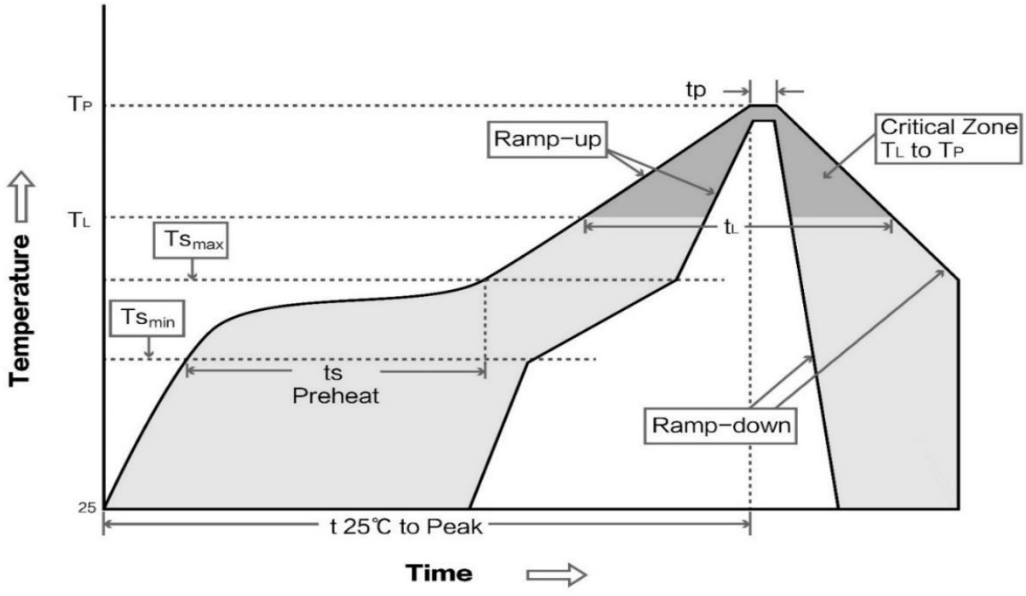
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Chapter 8 Welding Operation Guidance

8.1 Reflow temperature

Profile Feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	100℃	150℃
Preheat temperature max (Tsmax)	150℃	200℃
Preheat Time (Tsmin to Tsmax)(ts)	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	3℃/second max	3℃/second max
Liquidous Temperature (TL)	183℃	217℃
Time（tL）Maintained Above（TL）	60-90 sec	30-90 sec
Peak temperature（Tp）	220-235℃	230-250℃
Aveage ramp-down rate（Tp to Tsmax）	6℃/second max	6℃/second max
Time 25℃ to peak temperature	6 minutes max	8 minutes max

8.2 Reflow profile



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Chapter 9 Related Models

Model	IC	Antenna type	Distance m	Product Size mm	Package	Interface	Features/ Remark
E103-W05	W600	PCB	100	19*13*2.5mm	SMD	Serial port	Standard product, small size
E103-W05A	W600	PCB	130	24.7*14.4*11.2mm	DIP	Serial port	DIP module without shield
E103-W05B	W600	IPEX	400（3dBi+ omnidirectional ）	17*16*2.5mm	SMD	Serial port	External antenna, long distance
E103-W05C	W600	PCB	150	24*16*2.5mm	SMD	Serial port	Same package as E103-W01

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Chapter 10 Antenna Guide

10.1 Recommendation of Antenna

Antennas are an important role in the communication process, and often inferior antennas will have a great impact on the communication system. Therefore, our company recommends some antennas as supporting our company's wireless modules with excellent performance and reasonable prices.

Model No.	Type	Frequency	Gain	Size	Feeder	Interface	Feature
		Hz	dBi	mm	cm		
TX2400-NP-5010	Flexible Antenna	2.4G	2.0	10x50	-	IPEX	Flexible FPC antenna
TX2400-JZ-3	Rubber antenna	2.4G	2.0	30	-	SMA-J	Ultra-short straight, omnidirectional antenna
TX2400-JZ-5	Rubber antenna	2.4G	2.0	50	-	SMA-J	Ultra-short straight, omnidirectional antenna
TX2400-JW-5	Rubber antenna	2.4G	2.0	50	-	SMA-J	Fixed bending, omnidirectional antenna
TX2400-JK-11	Rubber antenna	2.4G	2.5	110	-	SMA-J	Bendable, omnidirectional antenna
TX2400-JK-20	Rubber antenna	2.4G	3.0	200	-	SMA-J	Bendable, omnidirectional antenna
TX2400-XPL-150	Sucker antenna	2.4G	3.5	150	150	SMA-J	Small sucker antenna, cost-effective

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