E103-W05 User Manual

W600 20dbm WIFI Module



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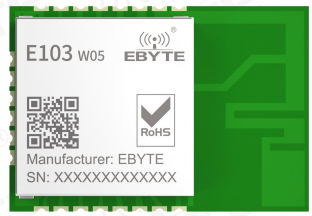
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1. Overview

1.1 Brief introduction

E103-W05 is a cost-effective 100mW (20dBm) wifi module. It works in the 2.4~2.483GHz frequency band, the module is small, has an onboard PCB antenna and low power consumption, and the data transmission is fast. The module can use the serial port to send and receive data and use AT commands to set parameters which are mostly compatible with the E103-W01 module. Both former and new users can quickly use it, making it a good data transmission partner in IoT applications.



The E103-W05 module was developed by Ebyte based on the WinnerMicro W600 chip. The module integrates transparent transmission function, ready to use supports serial AT command set, server AT command set, users can use the Internet through the serial port. This module is widely used in IoT applications such as smart appliances, smart homes, wireless audio and video, smart toys, medical monitoring, industrial control, etc.

1.2 Features

- Support transparent transmission at boot, automatic connection when disconnected
- Support multiple baud rates
- Support SmartConfig configuration function
- Support TCPServer, TCPClient, UDP
- Three working modes STATION, AP, STATION&AP
- Support serial port transparent transmission
- Support multiple encryption methods
- Support module serial AT command configuration
- Built-in watchdog, never crash
- Parameter memory, save after power off

1.3 Applications

- Wireless meter reading
- Wireless sensing
- Smart home
- Industrial remote control and telemetry
- Intelligent buildings and intelligent buildings
- High-voltage line monitoring
- Environmental Engineering
- Highway

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- Small weather station
- Automated data collection
- Consumer Electronics
- smart robot
- Street light control

1.4 Connection Mode

NO.	Connection	Description
0	Module to Module	Module 1 is set to AP mode as a TCP or UDP server. Module 2 is set to STATION mode and connected to AP No. 1 for communication, through TCP or UDP Client mode.
1	Module to Server	The Wi-Fi module is connected to the Internet through a wireless router, and communicates with servers on the network (LAN or Internet) via TCP Client or UDP. To connect to the Internet server, users need to configure the correct port mapping on the wireless router.
2	Module to Client	The Wi-Fi module connects to the Internet through a wireless router to establish a TCP or UDP Server to listen for connection signals. The Client module communicates with the module server by connecting to it.
For more usage methods, please refer to Section 5 Networking Instructions.		

1.5 Parameters

No.	Name	Value	Note
1	RF chip	W600	Beijing WinnerMicro
2	Dimensions	19*13*2.5mm	(L*W*H)
3	PCB process	2 layers	Impedance debugging
4	Working frequency	2.4~2.4835 GHz	-
5	Production Process	Immersion gold process, half hole process, machine SMT	Wireless products must be machine-attached to ensure batch consistency and reliability
6	Interface Type	1.27mm	Stamp hole
7	Supply voltage	3.0 ~ 3.6V DC	Voltage higher than 3.6V will cause permanent damage to the module
8	Communication level	3.6(max)	The voltage difference should be less than 0.3V to reduce power consumption
9	Tested range	120m	open and clear sky, no obstacles, maximum power, antenna height 1.6m
10	Transmit power	20dBm	100mW
11	AT support	Built-in intelligent processing	Can be read by AT command
12	Wi-Fi version	802.11 b/g/n	-
13	Communication Interface	UART serial port	-
14	RF interface	PCB onboard antenna	50Ω characteristic impedance
15	Operating temperature	-40 ~ +85℃	Industrial grade
16	Working humidity	10% ~ 90%	Relative humidity, no condensation
17	Storage temperature	-40 ~ +125℃	Industrial grade
18	product weight	0.8±0.1g	-

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1.6 Electronic Parameters

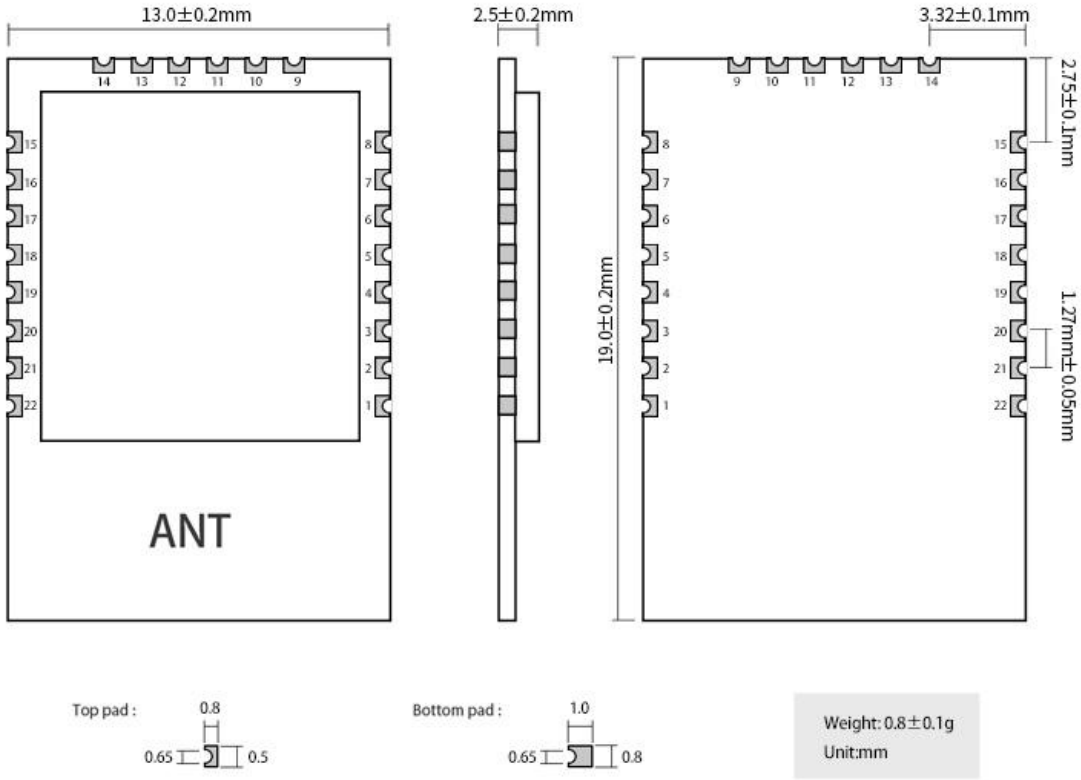
Para.		Condition	Min	Typical	Max	Unit
Storage temperature range		-	-40	Normal temperature	125	℃
Welding temperature		IPC/JEDECJ-STD-020	-	-	260	℃
working Voltage		-	3.0	3.3	3.6	V
Any IO	VIL/VIH	-	-0.3/0.75VIO	-	0.25VIO/3.6	V
	VOL/VOH	-	N/0.8VIO	-	0.1VIO/N	
	IMAX	-	-	-	12	mA
Electrostatic discharge (human body model)		TAMB=25℃	-	-	2	KV
Electrostatic discharge (machine model)		TAMB=25℃	-	-	0.5	KV

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2. Hardware Parameters

2.1 Pin Definition



Pin No.	Name	I/O	Function
1	GND	P	GND pin
2	GND	P	GND pin
3	VCC	P	Power supply VDC: 3.0V-3.6V (above 350mA)
4	PA0/GPIO0	IO	I/O pins
5	PA1/GPIO1	IO	I/O pins
6	PA4/GPIO4/TX	O	TXD pin, used as UART serial port output pin, support AT command
7	PA5/GPIO5/RX	I	RXD pin, used as UART serial input pin, support AT command
8	PB13/GPIO13	IO	I/O pins
9	PB14/GPIO14	IO	I/O pins
10	PB15/GPIO15	IO	I/O pins
11	PB16/GPIO16	IO	I/O pins
12	PB17/GPIO17	IO	I/O pins
13	PB18/GPIO18	IO	I/O pins
14	PB6/GPIO6	IO	I/O pins
15	PB7/GPIO7	IO	I/O pins
16	PB8/GPIO8	IO	I/O pins
17	PB9/GPIO9	IO	I/O pins
18	PB10/GPIO10	IO	I/O pins
19	PB11/GPIO11	IO	I/O pins

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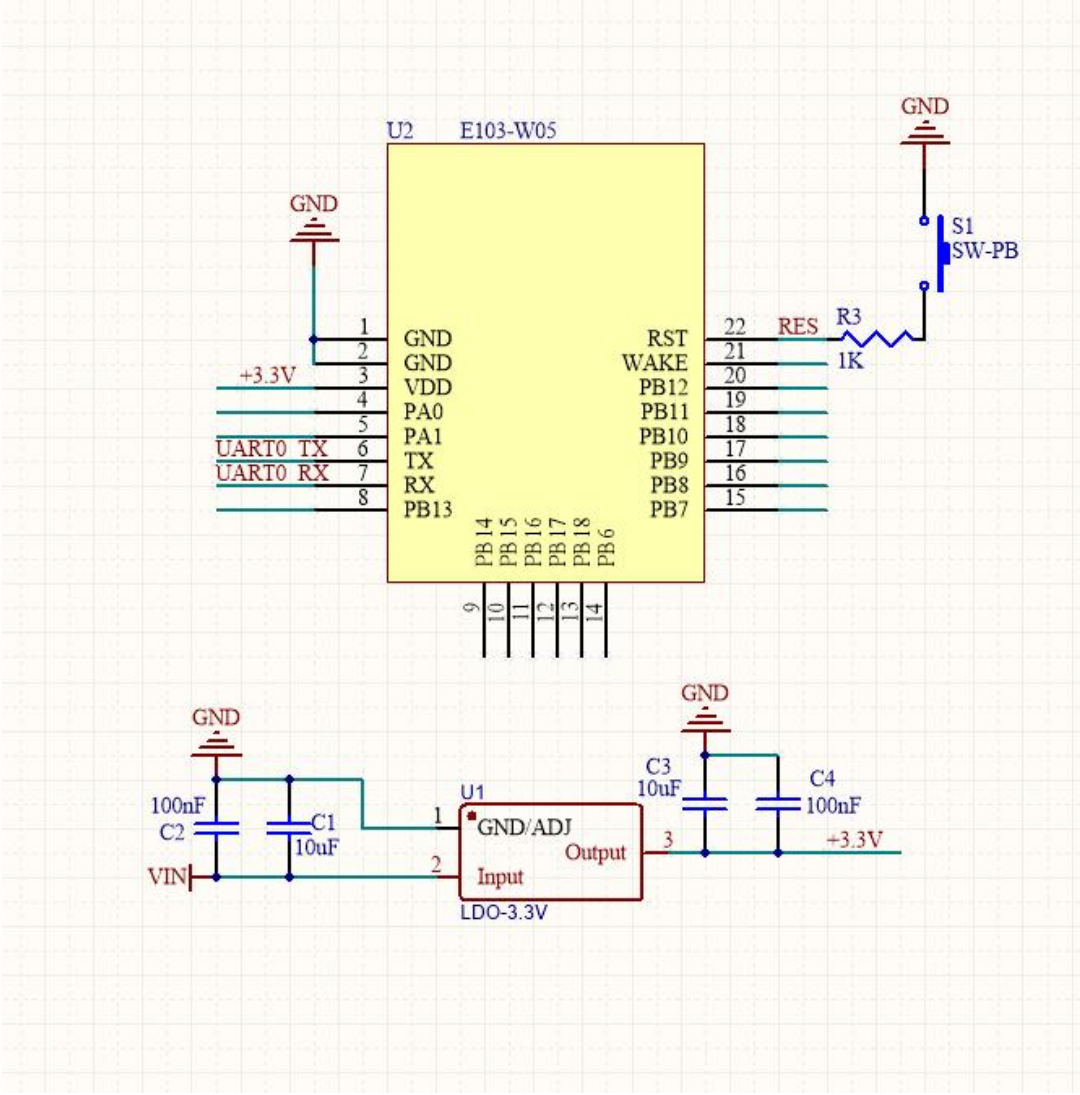
20	PB12/GPIO12	IO	I/O pins
21	WAKE	I	Wake up pin, high level will wake up the chip to work
22	RST	I	Reset pin, low level will reset

I = input, O = output, P = power

2.2 Power Consumption

Mode	Min	Typical	Max	Unit
Tx802.11b,CCK 11Mbps,POUT=+19dBm	-	230	-	mA
Tx802.11g,OFDM 54Mbps,POUT=+13.5dBm	-	210	-	mA
Tx802.11n,MCS7,POUT=+12dBm	-	210	-	mA
IEEE802.11b/g/n receivig	-	100-110	-	mA

2.3 Diagram



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3. Quick Start

The E103-W05 module is simple, easy to use, and easy to access the network. It is compatible with most AT commands of E103-W01 so that it can use E103-W01 controller to easily set the parameters of E103-W05. Users can refer to several working modes of the module to use the module: module to module, module to server, module to client.

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

3.1 Before Testing

本节 Hardware needed：	
1	E103-W05 model Wi-Fi module
2	E103-W05 model Wi-Fi module test board
3	one PC
4	1 router (can be replaced by mobile Wi-Fi hotspot)
The software Needed (with download link)	
1	AccessPort/XCOM serial debugging tool
2	TCP&UDP test tool
3	"AirkissDebug" APP for Andriod
4	E103-W05 software

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3.2 Steps for Module to work in AP mode as TCP server.

3.2.1 Brief Introduction

1. The user searches the hot spot of the E103-W05 module through the computer and connects to it.
2. The user establishes a TCP Client on the PC and connects to the listening port of the module TCP Server to achieve communication.

3.2.2 Network model



3.2.3 Setting

A. Open the E103-W01 configuration software, select the serial port number(1) and baud rate(2) (default 115200), query the version information(3), and check whether the receiving box(4) has version-related data. If there is, it means that the communication is normal. As shown below:



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



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



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D. When connected, the module will display the following information, the MAC address of the access STA and the assigned IP address.



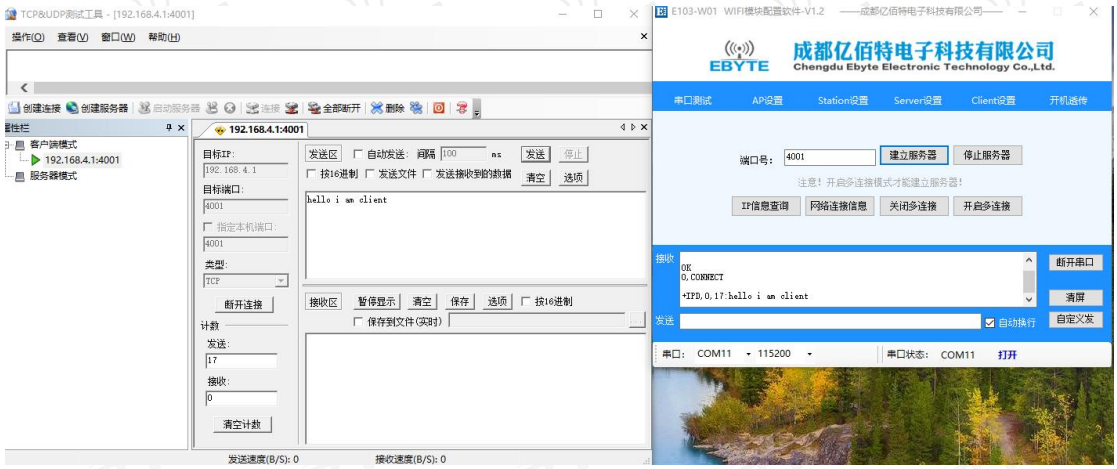
E. Now we create a TCP Server in the module, listening port



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F. We establish a client on the PC and connect the client of the module, and then can send data. Here, if the server needs to send data to the client, it can be sent by the AT+CIPSEND instruction. Here users can download the AT instruction manual of E103-W05 in the data download.



3.3 Steps for Module to work in STA mode as TCP Client.

3.3.1 Brief Introduction

We use the E103-W05 module as the STA working mode to search for nearby WIFI and connect it. 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 on the computer side TCP server, and then communicate.

3.3.2 Network model



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3.3.3 Setting

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



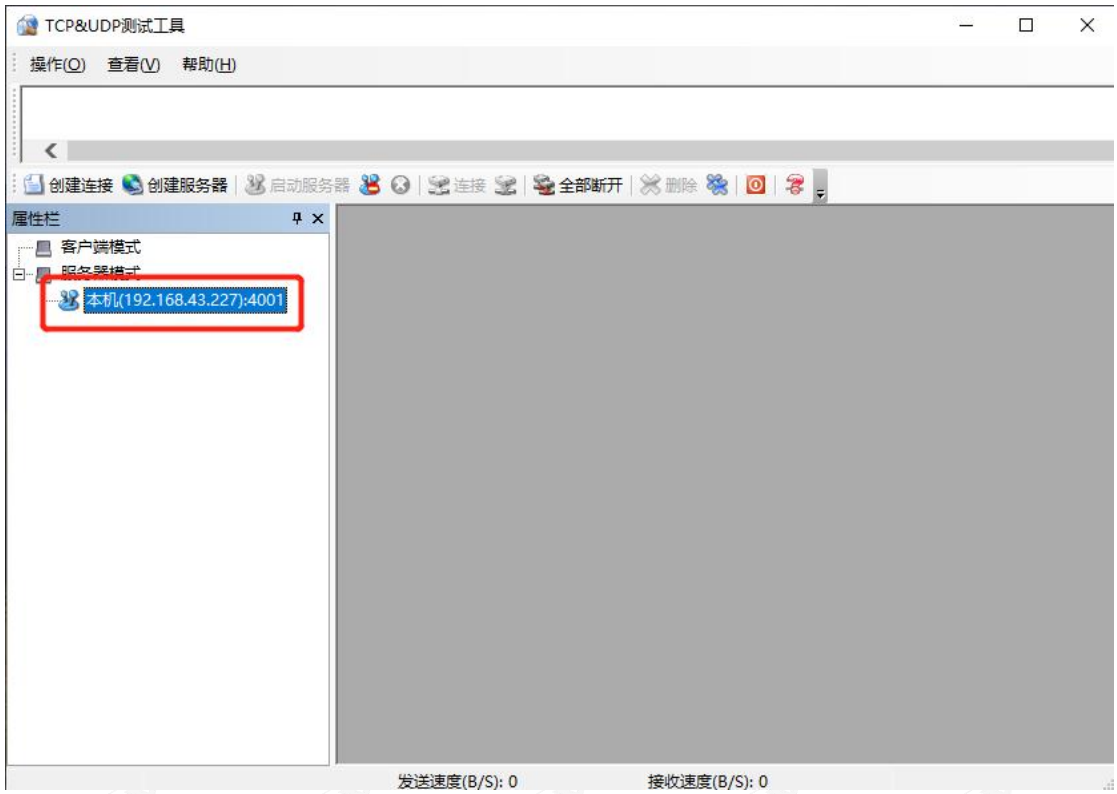
B. Connect our computer to the same wifi as the module and keep them in a local area network.



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C. Create a server on the computer and listen to the relevant port.



D.Set up the module and connect to the server. When the connection is successful, the receiving box has the following prompt information.



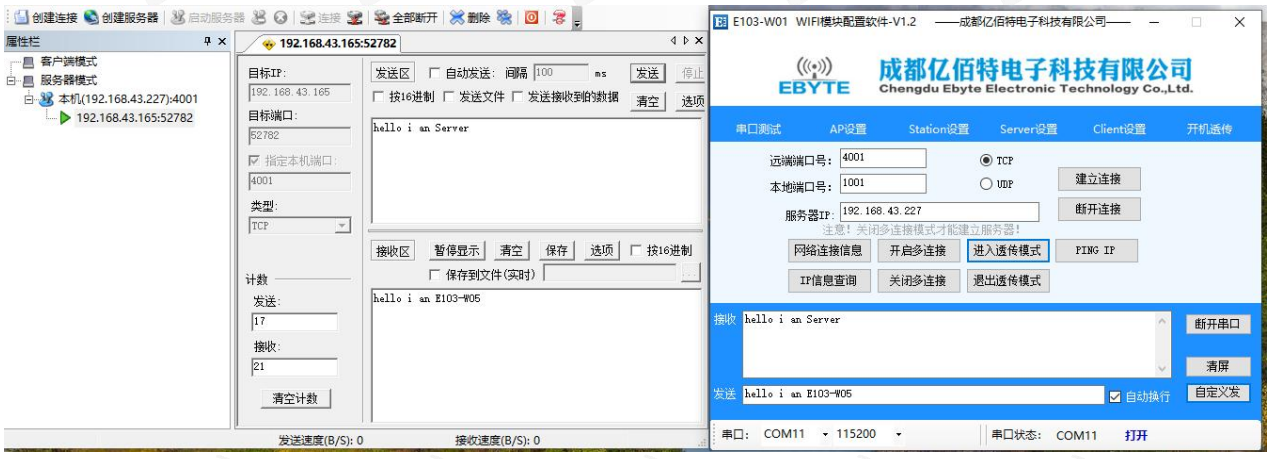
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E.After successfully connecting to the server, we can communicate data between the server and the client, but here, in order to achieve simple transparent transmission of data, we also need to make some settings to enter the transparent transmission mode, so that we can avoid specifying each time you send data Awkward operation of width. After the client connects to the server, perform the following operations to enter transparent transmission.



⑥. Transparent Data Transceiving.



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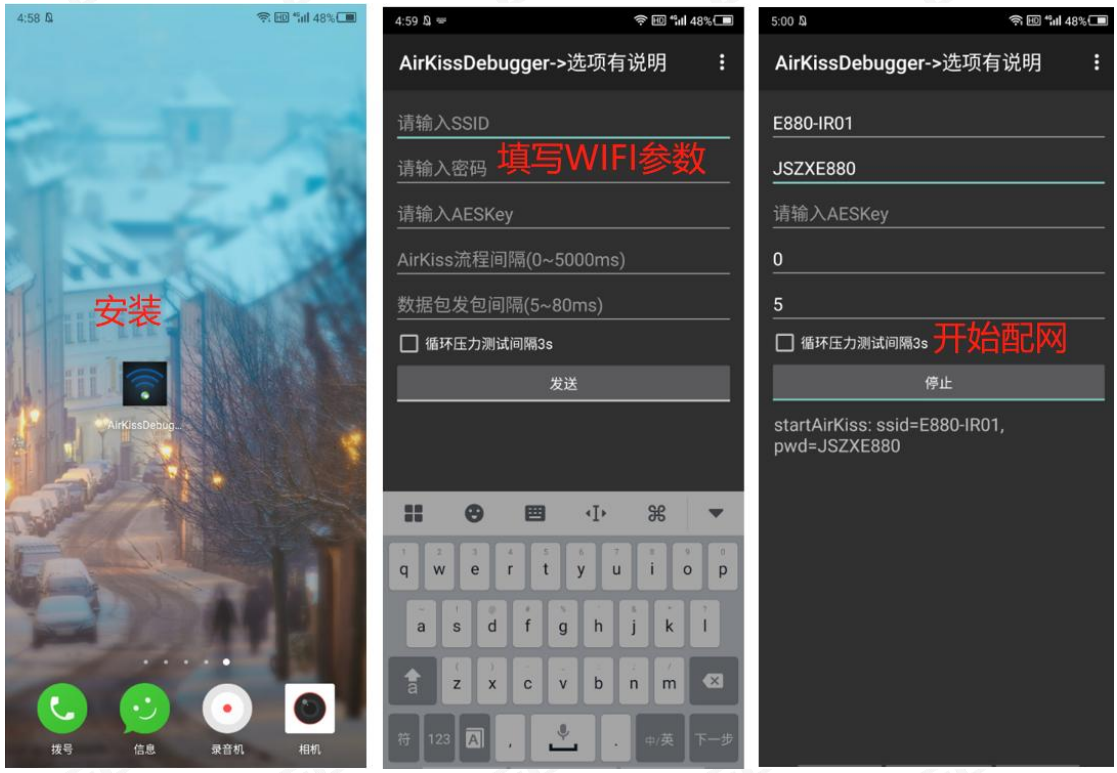
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3.4 Guide for Airkiss APP for Android

The E103-W05 module has a smart network configuration function. Users can use this function to configure the module to connect to the network quickly. When the module is in STA mode, click SmartC Open to enter the one-key network configuration mode. If the matching is successful, the module will access the same target WIFI as the mobile phone without entering the password and SSID.

3.4.1 APP Setting

Installed the Airkiss App on a Android Phone.



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3.4.2 WIFI RF Setting Software Setting

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 box.



3.5 GPIO Setting

In E103-W05, GPIO0/1/6/7/8/9/10/11/12/13/14/15/16/17/18 are used for general GPIO, when we want to open the control by AT command When reading the output level of the relevant pin, or reading the status of the relevant level, we can use the following command:

3.5.1 AT+CIOMODE to Set GPIO working mode

Command Format:

AT+CIOMODE =<pin>,<mode>

<pin>: Pin label;

<mode>: working mode;

1: output mode

0: input mode

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3.5.2 AT+CIOWRITE to set GPIO Level

Command Format:

AT+CIOWRITE=<pin>,<level>

<pin>: Pin label;

<mode>: working mode;

1: output mode

0: input mode

3.5.3 AT+CIOREAD to Read GPIO Level

Command Format:

<pin>: Pin label;

3.5.4 Pin AT Command Example

1.Use GPIO18 as output and output low level

AT+CIOMODE=18,1

AT+CIOWRITE=18,0

②. Use GPIO18 as input and read the level

AT+CIOMODE=18,0

AT+CIOREAD=18

The module replies as follows:



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3.6 Serial port baud rate setting

E103-W05 supports the following baud rates:
2000000，1500000，1250000，1000000，921600，406800，230400，115200，57600，38400，19200，9600，4800，2400，1800，1200，600；

In the setting software, we only provide 115200 and 9600 buttons. For other braud rate, users can use related AT commands to set, and the settings will take effect immediately.



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4. Notice

4.1 Relation of AP，STA and Server Client

In the process of two network access examples in 3.2 and 3.3 above, it is not only in AP mode that users can establish TCP Server. Similarly, it is not only when the module is in the STA mode that the user can establish a TCP Client. AP and STA are just a working mode for the module to access the network. TCP Server, TCP Client and UDP can create the network chain in any mode of the module.

4.2 Transparent Transmission

The transparent transmission mode can be used only when the module works in TCP Client and UDP. The TCP Server cannot enter the transparent transmission mode. After entering the transparent transmission mode, you must remember to manually use AT+CIPSEND to activate the transparent transmission. For transparent transmission, you need to make relevant settings in the following interface;



4.3 Maximum number of AP connections and server connections

When setting up TCP Server and TCP Client, pay attention to the options 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 works in TCP Server mode, it can be connected by at most 5 TCP Clients. Therefore, customers are recommended to use it when performing short packet data or not considering packet loss. UDP performs related communications.

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4.4 AT Command

Due to different parameters, the AT command of E103-W05 is not fully compatible with E103-W01 in some uses. For the detailed AT command set, please refer to the document "E103-W05 AT Command Set User Guide".

5. Hardware Notice

- It is recommended to use a DC stabilized power supply to supply power to the module. 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, such as reverse connection may cause permanent damage to the module;
- Please check the power supply to ensure that it is between the recommended power supply voltage, if exceeding the maximum value will cause permanent damage to the module;
- Please check the power supply stability, the voltage cannot fluctuate significantly and frequently;
- When designing the power supply circuit for the module, it is often recommended to reserve more than 30% of the margin, and the whole machine is conducive to long-term stable operation;
- The module should be as far away as possible from the parts with large electromagnetic interference such as power supply, transformer, high-frequency wiring;
- High-frequency digital traces, high-frequency analog traces, and power traces must be avoided under the module. If it is absolutely necessary to pass under the module, it is assumed that the module is soldered to the Top Layer, and copper is laid on the Top Layer of the module contact part (all copper And well grounded), must be close to the digital part of the module and routed at the bottom layer;
- Assuming that the module is soldered or placed on the Top Layer, it is also wrong to randomly route on the Bottom Layer or other layers, which will affect the module's spurs and receiving sensitivity to varying degrees;
- Assuming that there are devices with large electromagnetic interference around the module, it will greatly affect the performance of the module. It is recommended to stay away from the module according to the intensity of the interference. If the situation permits, appropriate isolation and shielding can be done;
- It is assumed that there are traces with high electromagnetic interference around the module (high-frequency digital, high-frequency analog, and power traces), which will greatly affect the performance of the module. It is recommended to stay away from the module according to the intensity of the interference. Isolation and shielding;
- If the communication line uses 5V level, 1k-5.1k resistance must be connected in series (not recommended, there is still a risk of damage);
- Try to stay away from the TTL protocol which is also 2.4GHz in some physical layers, for example: USB3.0;
- The antenna installation structure has a great impact on the performance of the module. Make sure that the antenna is exposed, preferably vertically.
- The antenna must not be installed inside the metal shell, which will greatly weaken the transmission distance.

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6. FAQ

6.1 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.
- Seawater 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).
- When the power supply at room temperature is lower than the recommended low voltage, the lower the voltage is, the lower the transmitting power is.
- The use of the antenna and the module is poorly matched or the quality of the antenna itself is defective.

6.2 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.

6.3 Bit error rate is too high

- When there are co-channel signal interference nearby, be away from interference sources or modify frequency and channel to avoid interference;
- Unfavorable power supply may cause code error. Make sure that the power supply is reliable.
- The quality of extension cables and feeders is poor or too long can also cause high bit error rate.

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7. Revision history

Version	Date	Description	Issued by
1.0	2020-05-15	Initial version	Xxx
1.2	2022-7-22	Bug fixes	Yan
1.3	2023-7-24	Bug fixes	Hao

8. About us

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