



E103-W05C User Manual

W600 2.4GHz SMD Low Cost Wi-Fi Module



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1. Overview

1.1 Brief Introduction

E103-W05C is a SMD module under the E103-W05 series (for the convenience of the following description, collectively referred to as E103-W05 or W05 below), this module product is a low-cost, cost-effective 100mW (20dBm) Wi-Fi Module, small size, PCB antenna, working in 2.4~2.483GHz frequency band, low power consumption, fast data stream transmission, the module can use the serial port for data transmission and reception, plus AT command related parameter setting. Secondly, E103-W05 AT

command is mostly compatible with the E103-W01 module, making it easy to use and quick to get started, both for loyal and new users, and it is a good data transmission partner in the Internet of Things.

The E103-W05 module is based on the W600 chip from Winner Micro which is developed by Chengdu Ebyte Electronic Technology Co., Ltd. The module integrates the transparent transmission function, ready to use, it supports serial AT command set, server AT command set, users can use the network access function through the serial port, and 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

- Support power on transparent transmission, automatic connection when disconnected;
- Support multiple baud rates;
- Support SmartConfig function;
- Support TCPServer, TCPClient, UDP;
- Three working modes STATION, AP, STATION&AP;
- Support 14mA low-power data reception;
- Support serial transparent transmission;
- Support multiple encryption methods;
- Support module serial port AT command configuration;
- Built-in watchdog, never crash;
- Parameter memory, auto-save after power failure.

1.3 Application

- Wireless meter reading;
- Wireless sensing;
- Smart home;
- Industrial remote control and telemetry;
- Intelligent buildings and intelligent architecture;

- High-voltage line detection;
- Environmental Engineering;
- Highway;
- Small weather station;
- Automated data collection;
- Consumer Electronics;
- Robots;
- Street light control.

2. Specification and parameter

2.1 Limit parameter

Table 2-1 Limit parameter table

Main parameter	Performance		Remark
	Min.	Max.	
Power supply (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
Operating temperature (°C)	-40	+85	Industrial grade

2.2 Operating parameter

Table 2-2 Working parameter table

Main parameter	Performance			Remark	
	Min.	Typ.	Max.		
Operating voltage (V)	3.0	3.3	3.6	≥3.3V ensures 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 (°C)	-40	-	+85	Industrial design	
Operating frequency (MHz)	2400	-	2484	802.11 b/g/n	
Power consumption	TX current (mA)	-	230	Instantaneous power consumption	
	RX current (mA)	-	95	-	
	Sleep current (nA)	-	5.0	-	
Max TX power (dBm)	-	-	20.00	802.11 b channel 11	
Receiving sensitivity (dBm)	-	-89	-	OFDM, 6 Mbps	
Communication rate	Network (bps)	1.0M	-	54.0M	802.11 b/g/n
	Serial port (bps)	600	-	2.0M	User programmable customization

Main parameter	Description	Remark
Distance for reference	150m	Test condition: in clear and open area, antenna height: 2.5m
Working frequency	80MHz	-
Modulation	-	DSSS(DBPSK,DQPSK,CCK) and OFDM(BPSK,QPSK,16QAM,64QAM)
Package	SMD	-
Communication Interface	UART	600bps~2Mbps
Dimensions	24*16*2.5mm(±0.2)	PCB antenna, same package as E103-W01
RF interface	PCB	-
Product weight	8.19±0.1	unit: g

3. Size and pin definition

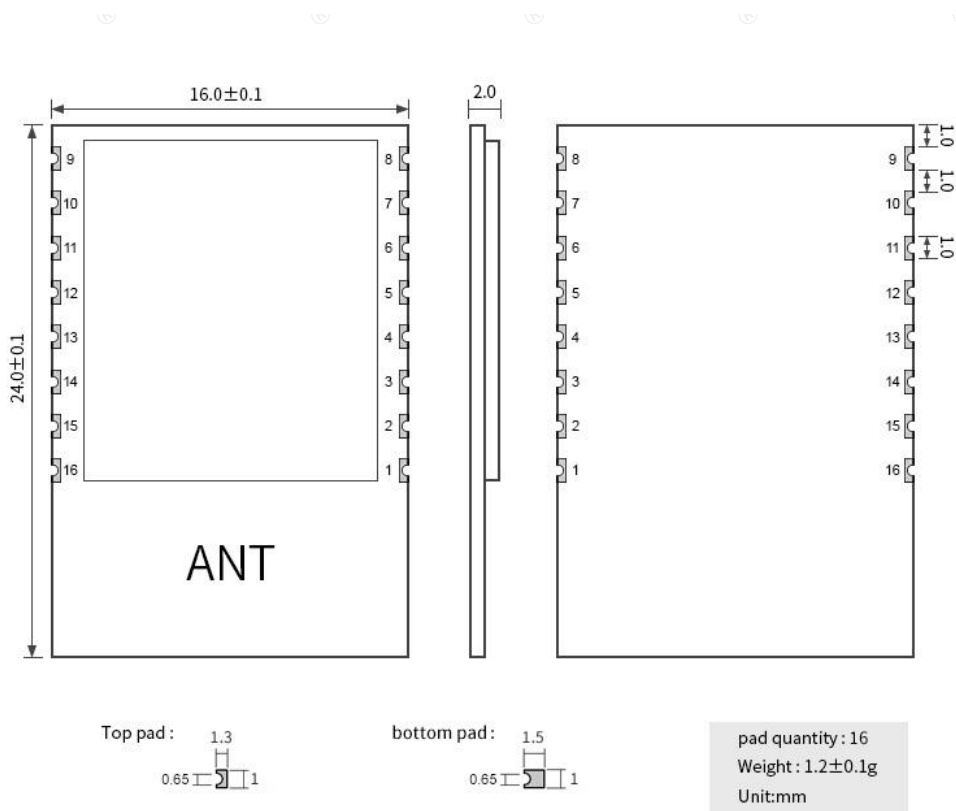


Figure 3-1 Mechanical size and pin definition

Table 3 Pin definition table

Pin No.	Pin item	Pin direction	Pin application
1	RST	I	Hardware reset pin, low electrical level reset
2	NC	IO	Floating, GPIO14 of the internal chip can be used as input and output pins
3	NC	I	Floating, WAKE pin of internal chip, high electrical level wake up
4	NC	IO	Floating, GPIO15 of the internal chip can be used as input and output pins
5	NC	IO	Floating, GPIO16 of the internal chip can be used as input and output pins
6	NC	IO	Floating, GPIO17 of the internal chip can be used as input and output pins
7	NC	IO	Floating, GPIO18 of the internal chip can be used as input and output pins
8	VCC	P	Power supply, range 3.0~3.6V (standard 3.3V)
9	GND	P	Ground wire, connected to the power reference ground
10	NC	IO	Floating, GPI06 of the internal chip can be used as input and output pins
11	NC	IO	Floating, GPI07 of the internal chip can be used as input and output
12	NC	IO	Floating, GPI08 of the internal chip can be used as input and output
13	NC	IO	Floating, GPI09 of the internal chip can be used as input and output
14	NC	IO	Floating, GPI10 of the internal chip can be used as input and output
15	RXD	I	Serial port receiving pin, support AT command

16	TXD	O	Serial port receiving pin, support AT command
Note: I=input; O=output; P=power supply			

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 coefficient is as small as possible, and the module needs to 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 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, and 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% 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 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 under the module. If it is necessary to pass under the module, assume that the module is soldered to the Top Layer, and the top layer of the contact part of the module is covered with copper (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 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

- This module chip scheme is from W600 of Winner Micro, and its driving method is completely equivalent to W600, and users can operate according to W600 manual;
- The GPIO port of the internal chip is a general I/O port, which can be controlled by the relevant AT command.

5. Basic operation

5.1 Basic circuit

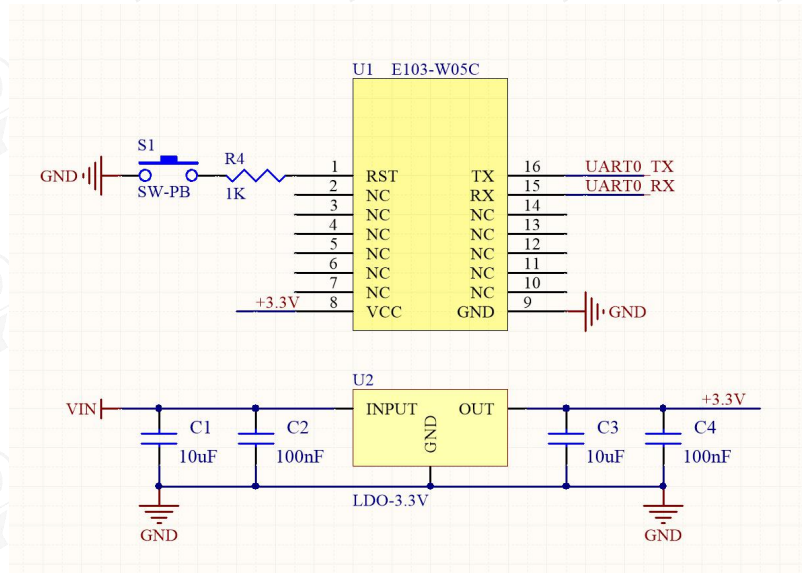


Figure 5-1 Circuit diagram

5.2 Methods of application

No.	Methods	Description
0	Module to module communication	Module 1 is set to AP mode and establishes 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. If you need to connect to an Internet server, you need to configure the corresponding port mapping on the router.
2	Module and Client communication	The Wi-Fi module connects to the network through a wireless router and establishes a TCP or UDP Server to listen to the connection signal. Client communicates with it through the connection module server.

6. Related configuration

6.1 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 can only use GPIO15 and GPIO16. 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

6.1.1 AT+CIOMODE to set the working mode of GPIO

Instruction format:

AT+CIOMODE =<pin>,<mode>

<pin>: pin label;

<mode>: working mode;

1: Output mode

0: input mode

6.1.2 AT+CIOWRITE to set GPIO electrical level

Instruction format:

AT+CIOWRITE=<pin>,<level>

<pin>: pin label;

<level>: working mode;

1: High level

0: low level

6.1.3 AT+CIOREAD to read GPIO electrical level

Instruction format:

<pin>: pin label;

6.1.4 Pin application example

①Use GPIO18 as output attribute and output low electrical level

AT+CIOMODE=18,1

AT+CIOWRITE=18,0

②Use GPIO18 as input attribute and read out electrical level

AT+CIOMODE=18,0

AT+CIOREAD=18

6.2 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 upper computer, the 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.

7. FAQ

7.1 Communication range is too short

- 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 power register setting is wrong, the air speed setting is too high (the higher the air speed, the closer the distance);
- 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 easy to damage

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, the module will be permanently damaged.
- 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.
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

7.3 Cautions

7.3.1 The relationship between AP&STA&Server&Client

During the 2 network access processes in the above quick user manual, 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 only modules connected to the network. One of the working modes of the module, and TCP Server, TCP Client and UDP can create network links in any mode of the module.

7.3.2 Caution 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 use AT+CIPSEND to activate the transparent transmission. If the user wants to boot for transparent transmission, you need to use the AT command "AT+SAVETRANSLINK" for related settings. For details, please refer to the AT command manual.

7.3.2 The maximum number of connections between AP connection and server connection

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, and when the module is working in TCP Server mode, it can be connected by at most 5 TCP Clients. Therefore, it is recommended to use when the customer performs short packet data or does not consider packet loss. UDP carries out relevant communication.

7.3.2 AT command

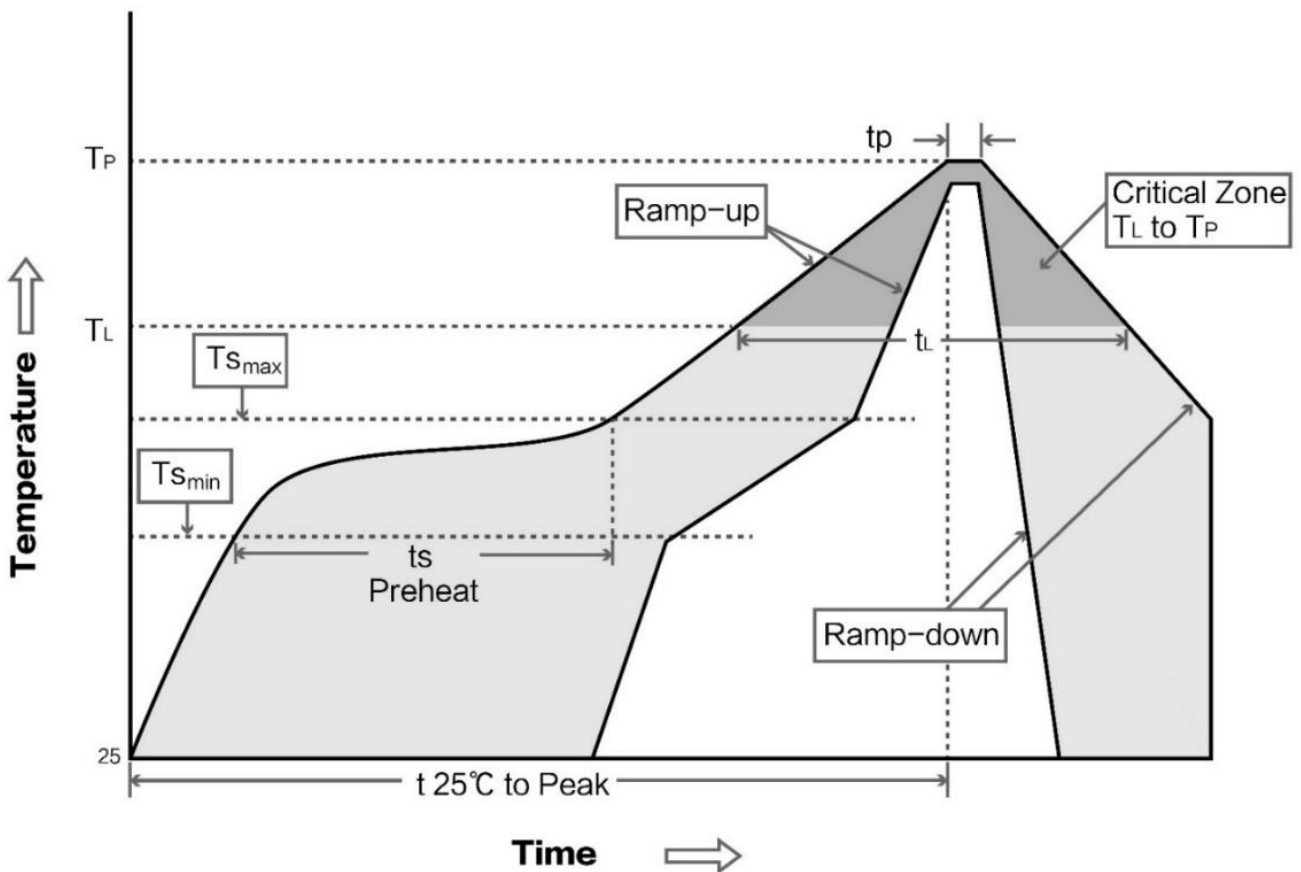
The AT commands used by the E103-W05 series sub-modules (E103-W05A, E103-W05B, E103-W05C) can be used mutually, but users must make relevant settings according to the electrical characteristics of their own modules. In addition, due to different electrical characteristics, E103- W05 series modules are 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-W05 AT Commands" Collection Guide.

8. Soldering guidance

8.1 Reflow soldering temperature

Profile Feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min (T _{smin})	100°C	150°C
Preheat temperature max (T _{smax})	150°C	200°C
Preheat Time (T _{smin} to T _{smax})(t _s)	60-120 sec	60-120 sec
Average ramp-up rate(T _{smax} to T _p)	3°C/second max	3°C/second max
Liquidous Temperature (TL)	183°C	217°C
Time (t _L) Maintained Above (TL)	60-90 sec	30-90 sec
Peak temperature (T _p)	220-235°C	230-250°C
Average ramp-down rate (T _p to T _{smax})	6°C/second max	6°C/second max
Time 25°C to peak temperature	6 minutes max	8 minutes max

8.2 Reflow soldering curve



9. Related models

Model No.	Chip	Antenna	Test distance	Size	Package	Interface	Remark
			m	mm			
E103-W05	W600	PCB	100	19*13*2.5mm	SMD	UART	Standard product, small size
E103-W05A	W600	PCB	130	24.7*14.4*11.2mm	DIP	UART	DIP module without shielding cover
E103-W05B	W600	IPEX	400 (3dBi+ Omnidirectional antenna)	17*16*2.5mm	SMD	UART	External antenna, long distance
E103-W05C	W600	PCB	150	24*16*2.5mm	SMD	UART	Same package as E103-W01

10. Antenna guidance

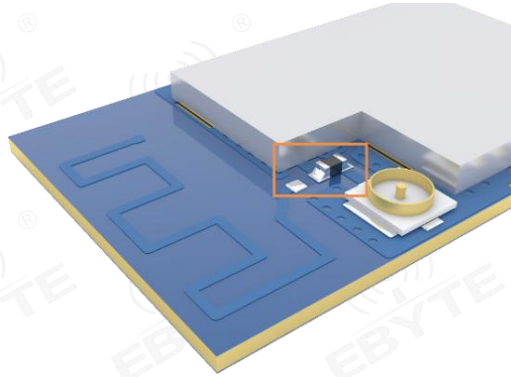
10.1 Antenna recommendation

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 Band	Gain	Size	Feeder	Interface	Features
		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 rubber, omnidirectional antenna

TX2400-JK-20	Rubber antenna	2.4G	3.0	200	-	SMA-J	Bendable rubber, omnidirectional antenna
TX2400-XPL-150	Suction antenna	2.4G	3.5	150	150	SMA-J	Small suction antenna, cost-effective

10.2 Antenna selection



Enable IPEX antenna interface

Revision history

Version	Date	Description	Issued by
1.0	2020-6-18	Original version	Roy
1.1	2021-04-26		Ren

About us

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