ESP-01D specification

Version V1.0

Disclaimer and Copyright Notice

Information in this document, including URL references, is subject to change without notice. The documentation is

provided "as is" without any warranty of any kind, including any warranties of merchantability, fitness for a particular purpose, or non-infringement, and any warranties mentioned elsewhere in any proposal, specification, or sample. This document disclaims any responsibility, including liability for infringement of any patent rights arising out of the use of the information in this document. No license, express or implied, to any intellectual property right is hereby granted by this document, whether by estoppel or otherwise.

The test data obtained in this article are all obtained from Anxinke laboratory tests, and the actual results may be slightly different.

The Wi-Fi Alliance Membership Mark is owned by the Wi-Fi Alliance. All

trade names, trademarks and registered trademarks mentioned herein are the property of their respective owners and are hereby declared. The final interpretation right belongs to Shenzhen Anxinke Technology Co., Ltd.

Notice

Due to product version upgrades or other reasons, the contents of this manual may change. Shenzhen Anxinke Technology Co., Ltd. reserves the right to modify the contents of this manual without any notice or prompt. This manual is only used as a guide. Shenzhen Anxinke Technology Co., Ltd. does its best to provide accurate information in this manual, but Shenzhen Anxinke Technology Co., Ltd. does not guarantee that the content of the manual is completely error-free. All statements and information in this manual Nor do they constitute any express or implied warranty.

Document development/revision/revocation resume

Version	date	Develop/revise content	Develop approval	
V0.9	2015.08.10	First formulated	Yang Xiaofei	
V1.0	2019.10.30	Information update	Xie Yiji	

Table of contents

1. Product overview

ESP-01D is a Wi-Fi module developed by Anxinke Technology. The core processor of this module is ESP8285 in a smaller size

Integrates the industry-leading Tensilica L106 ultra-low power 32-bit micro MCU with 16-bit precision

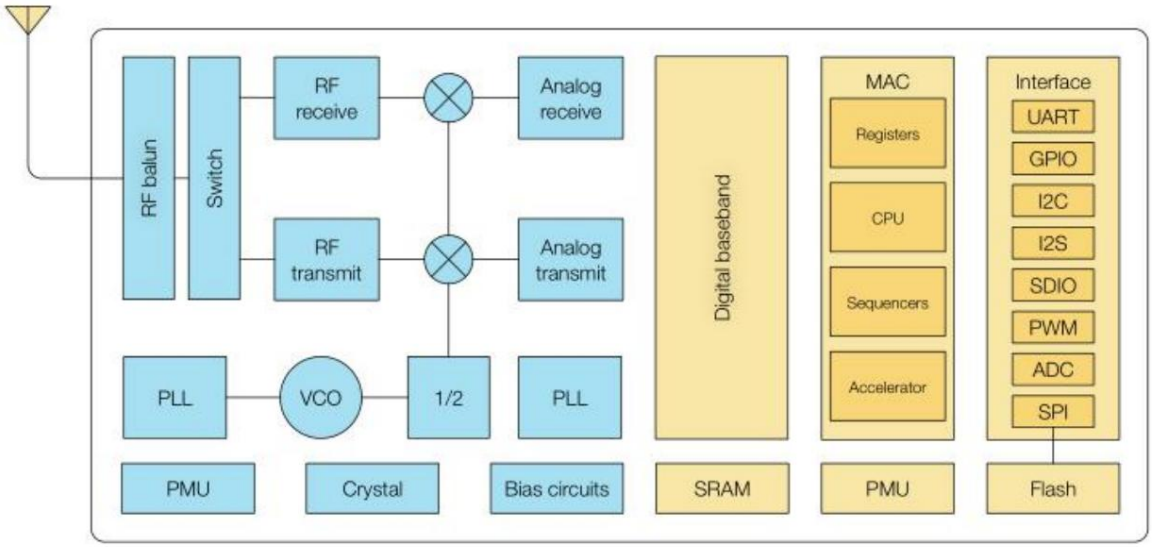
Simple mode, the main frequency supports 80 MHz and 160 MHz, supports RTOS, and integrates Wi-Fi MAC/BB/RF/PA/LNA.

ESP-01D Wi-Fi module supports standard IEEE802.11 b/g/n protocol and complete TCP/IP protocol stack.

Users can use this module to add networking capabilities to existing devices, or to build a stand-alone network controller.

ESP8285 is a high-performance wireless SoC that provides maximum utility at minimum cost, embedding other

The system offers endless possibilities.



ESP8285 has a complete and self-contained Wi-Fi network function, which can be used independently or as a slave

The machine is equipped with other host MCUs to run. ESP8285 has built-in 1MB/2MB Flash, and the external circuit design is simple. built-in

A high-speed cache memory is beneficial to improve system performance and optimize the storage system.

In another case, ESP8285 can be used as Wi-Fi only through SPI/SDIO interface or UART interface

Adapter, applied to any microcontroller-based design.

The powerful on-chip processing and storage capabilities of ESP8285 enable it to integrate sensors and other application

Specific equipment, greatly reducing the cost of early development.

characteristic

ÿ Complete 802.11b/g/n Wi-Fi SOC module ÿ Built-in Tensilica

L106 ultra-low power consumption 32-bit micro MCU, main frequency supports 80 MHz and 160 MHz, supports Support

RTOS ÿ Support GPIO/PWM interface

ÿ Built-in Flash

ÿ Packaged in DIP-6

ÿ Integrated Wi-Fi MAC/ BB/RF/PA/LNA

ÿ Support multiple sleep modes

ÿ Embedded Lwip protocol stack

ÿ Support STA/AP/STA+AP working mode

ÿ Support Smart Config (APP)/AirKiss (WeChat) for Android and IOS, one-click network configuration ÿ Support remote firmware upgrade (FOTA) ÿ Universal AT commands can be used quickly

ÿ Support secondary development, integrated Windows, Linux development environment

The main parameters

Table 1 Description of main parameters

Module model ESP-01D	
encapsulation	DIP-6
size	13.5*8.5*2.6(±0.2)MM
Antenna form external connection	
Spectrum Range 2400	~ 2483.5MHz
Working temperature -40 ÿ	~ 85 ÿ
Storage environment -40 ÿ	~ 125 ÿ < 90%RH
Power supply range Power supply voltage 3.0V	~ 3.6V, supply current>500mA
Support interface GPIO/PWM	
Number of IO ports3	
The serial port rate supports 110	~ 4608000 bps, default 115200 bps
safety	WEP/WPA-PSK/WPA2-PSK
SPI Flash	16Mbit (chip built-in)

2. Electrical parameters

electrical characteristics

parameter		condition	minimum value	Typical Value	Maximum Unit	
supply voltage		VDD	3.0	3.3	3.6	IN
I/O	WANT/WITH		-0.3/0.75VIO		0.25VIO/3.6V	
	VOL/VOH		N/0.8VIO		0.1VIO/N	IN
	IMAX			-	12	mA

RF performance

describe	typical value	unit
working frequency	2400 - 2483.5	MHz
Output Power		
In 11n mode, the PA output power is	13±2	dBm
In 11g mode, the PA output power is	14±2	dBm
In 11b mode, PA output power	16±2	dBm
Receiver sensitivity		
CCK, 1 Mbps	ÿÿ-90	dBm
CCK, 11 Mbps	ÿÿ-85	dBm
6 Mbps (1/2 BPSK)	ÿÿ-88	dBm
54 Mbps (3/4 64-QAM)	ÿÿ-70	dBm
HT20 (MCS7)	ÿÿ-67	dBm

power consumption

The following power consumption figures are based on a 3.3V supply, an ambient temperature of 25°C, and are measured using the internal voltage regulator. ÿ All measurements are done at the antenna interface without a SAW filter. ÿ All transmit data is based on 90% duty cycle, measured in continuous transmit mode.

model	Min Typ Max Unit			
Transmit 802.11b, CCK 11Mbps, POUT=+17dBm		170		mA
Transmission 802.11g, OFDM 54Mbps, POUT =+15dBm		140		mA
Transmit 802.11n, MCS7, POUT =+13dBm		120		mA
Receive 802.11b, packet length 1024 bytes, -80dBm		50		mA
Receive 802.11g, packet length 1024 bytes, -70dBm		56		mA
Receive 802.11n, packet length 1024 bytes, -65dBm		56		mA
Modem-Sleepÿ		20		mA
Light-Sleepÿ		2		mA
Deep-Sleepÿ		20		uA
Power Off		0.5	-	uA

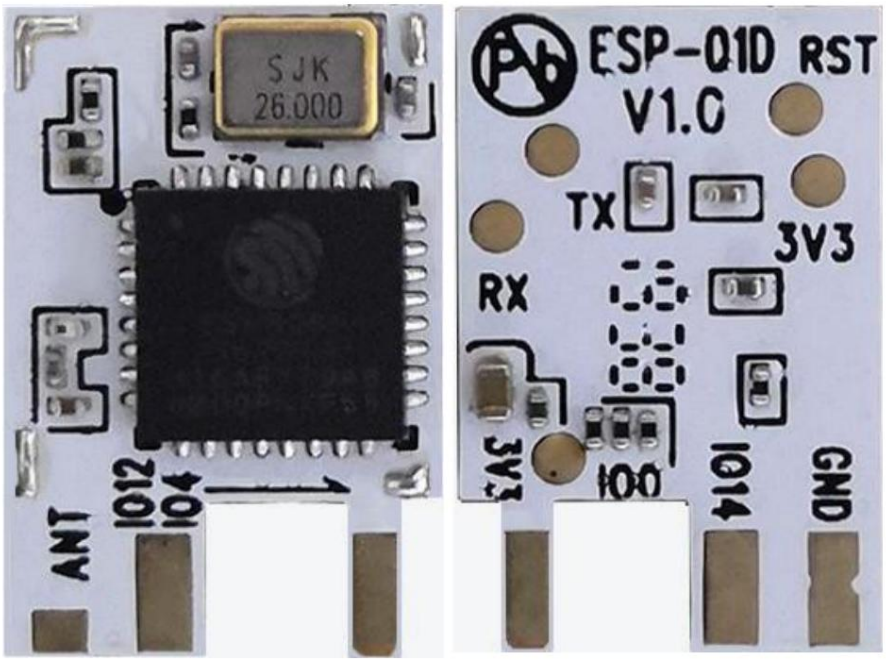
illustrate:

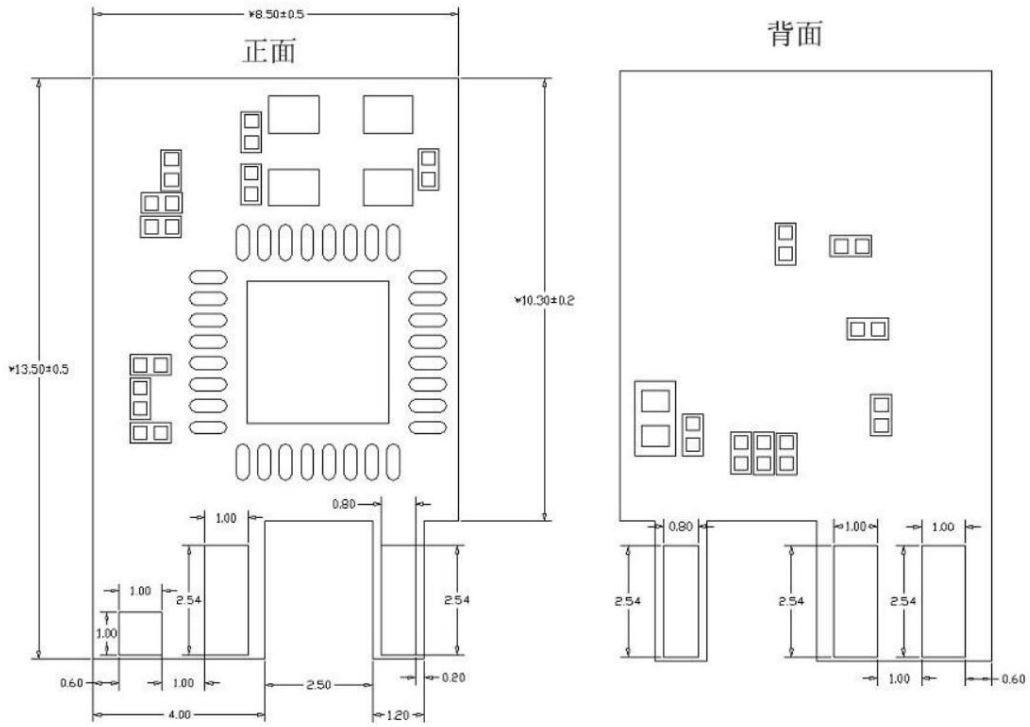
ÿ Modem-sleep is used for applications that require the CPU to be in working state all the time, such as PWM or I2S applications. exist When maintaining a Wi-Fi connection, if there is no data transmission, it can be turned off according to the 802.11 standard (such as U-APSD) Wi-Fi Modem circuit to save power. For example, at DTIM3, every sleep 300 ms, wake up 3 ms to receive AP Beacon package, etc., the overall average current is about 20 mA.

ÿ Light-sleep is used for applications where CPU can be suspended, such as Wi-Fi switch. While maintaining a Wi-Fi connection, such as If there is no data transmission, according to the 802.11 standard (such as U-APSD), turn off the Wi-Fi Modem circuit and temporarily Stop the CPU to save power. For example, in DTIM3, every sleep 300 ms, wake up 3 ms to receive AP Beacon package, etc., the overall average current is about 2 mA.

ÿ Deep-sleep is used for applications that do not need to maintain a Wi-Fi connection all the time and only send a data packet for a long time, such as A sensor that measures the temperature every 100s. For example, it takes 0.3s after every 300s to wake up 1s to connect to AP to send If data is sent, the overall average current can be much less than 1 mA. The current value of 20 ÿA is measured at 2.5V.

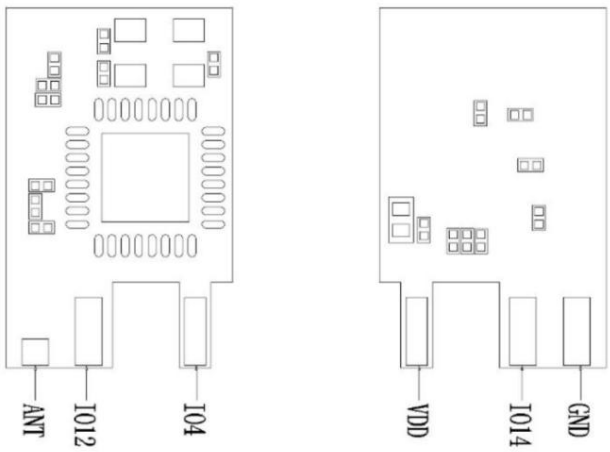
3. Dimensions





4. Pin definition

The ESP-01D module has a total of 6 interfaces, such as the pin diagram, and the pin function definition table is the interface definition.



ESP-01D pin diagram

Table pin function definition

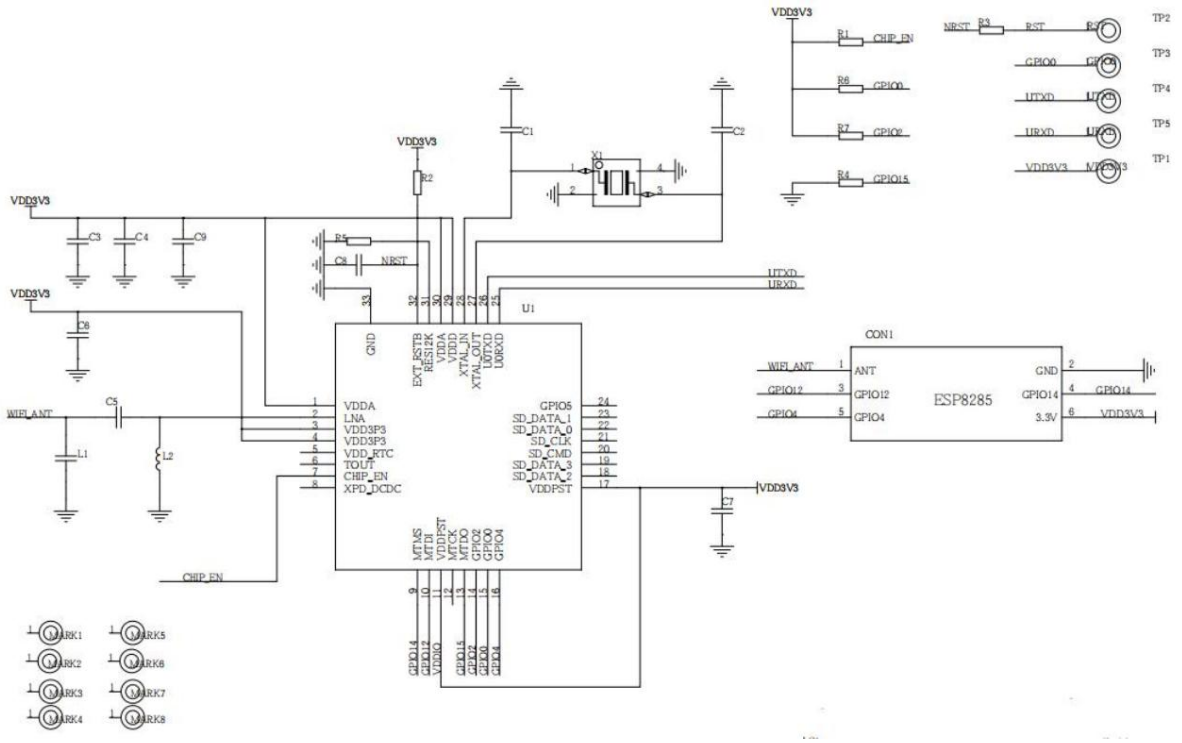
sequence	name	Function Description
1	ANT	RF antenna interface, requires an external antenna
2	IO12	GPIO12
3	IO4	GPIO4
4	VDD	3.3V power supply; the output current of the power supply is recommended to be above 500mA
5	IO14	GPIO14
6	GND	ground

Table module startup mode description

modeCH_PD(EN)	RST	GPIO15	GPIO0	GPIO2	TXD0
download mode high	high	Low	Low	high	high
run mode high	high	Low	high	high	high

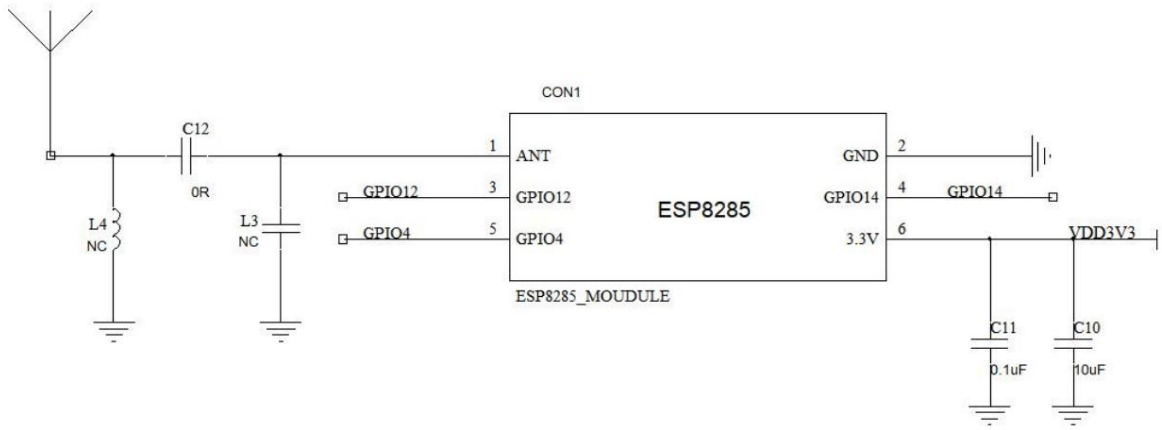
Note: Some pins have been pulled up internally, please refer to the schematic diagram

5. Schematic diagram

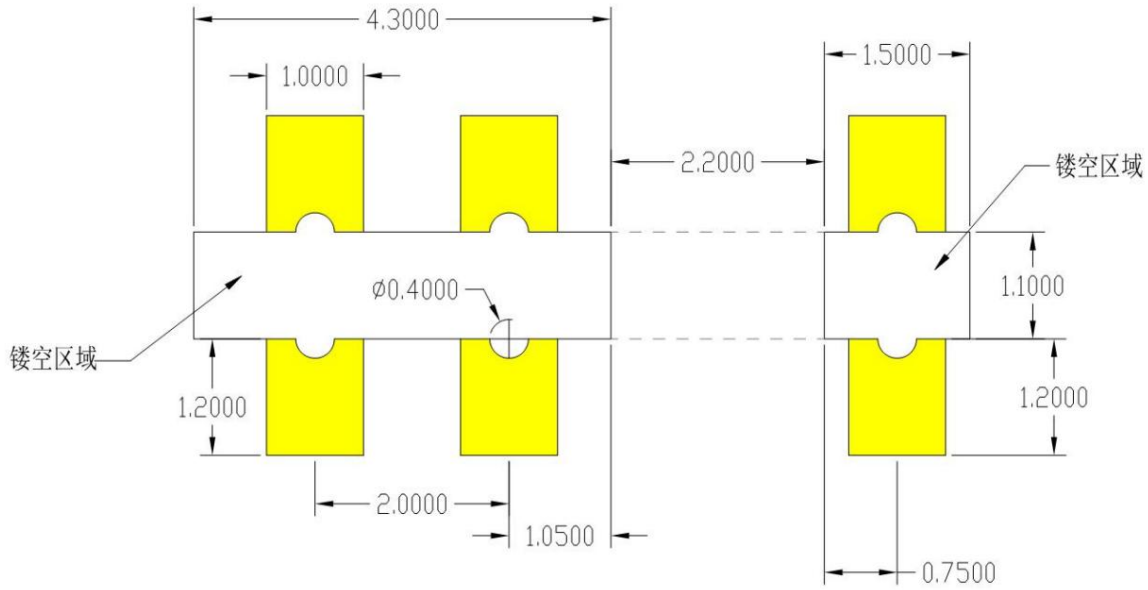


6. Design guidance

1. Application circuit



2. Recommended module package design size



Notice: This is the package diagram of the ESP-01D module. It is recommended to design the PCB board according to this diagram, so that the module can work normally on the PCB board; and when designing the pads, it is necessary to pay attention to the design of the pads on the PCB than that of the module. The pads are retracted and offset, while the expansion of the PCB pads relative to the module pads does not affect the use of the module.

3. Antenna layout requirements

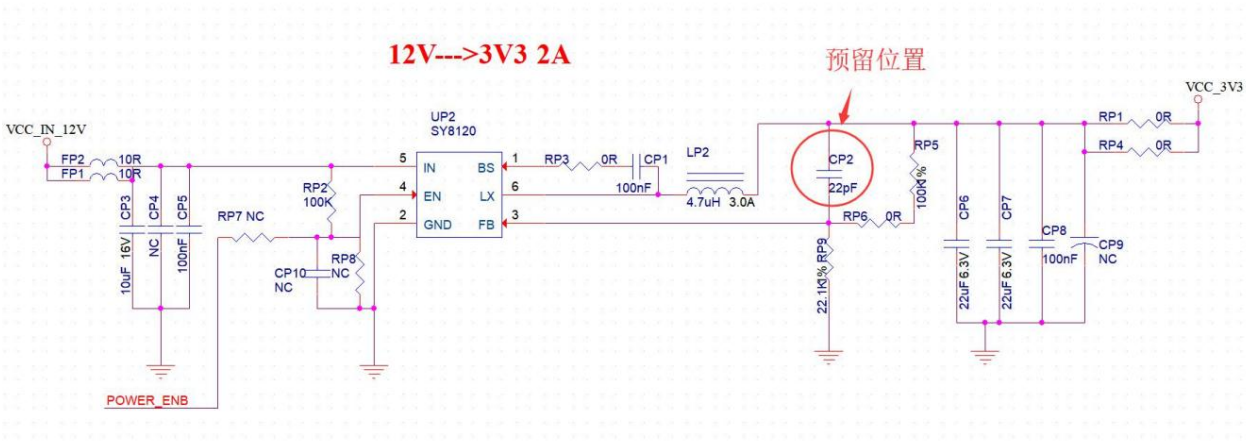
(1), ESP-01D needs to solder the antenna, and there is an antenna pad on the module. (2) In order to achieve the best effect of the antenna, the location of the antenna assembly should be far away from metal parts and high-frequency devices.

4. Power supply

(1), recommended 3.3V voltage, peak current above 500mA (2), recommended to use LDO power supply; if using DC-DC, it is recommended to control the ripple within 30mV.

(3) It is recommended to reserve the position of the dynamic response capacitor for the DC-DC power supply circuit, which can optimize the output ripple when the load changes greatly.

(4) It is recommended to add ESD devices to the 3.3V power interface.



5. Use of GPIO port (1). There

are some GPIO ports on the periphery of the module. If you need to use it, it is recommended to connect a 10-100 ohm resistor in series with the IO port. This can suppress overshoot and make the levels on both sides more stable. Helps both EMI and ESD. (2) For the pull-up and pull-down of the special IO port, please refer to the instructions in the specification, which will affect the startup configuration of the module. (3) The IO port of the module is 3.3V. If the main control and the IO level of the module do not match, a level conversion circuit needs to be added. (4) If the IO port is directly connected to the peripheral interface, or terminals such as pin headers, it is recommended to reserve an ESD device near the IO wiring near the terminal.

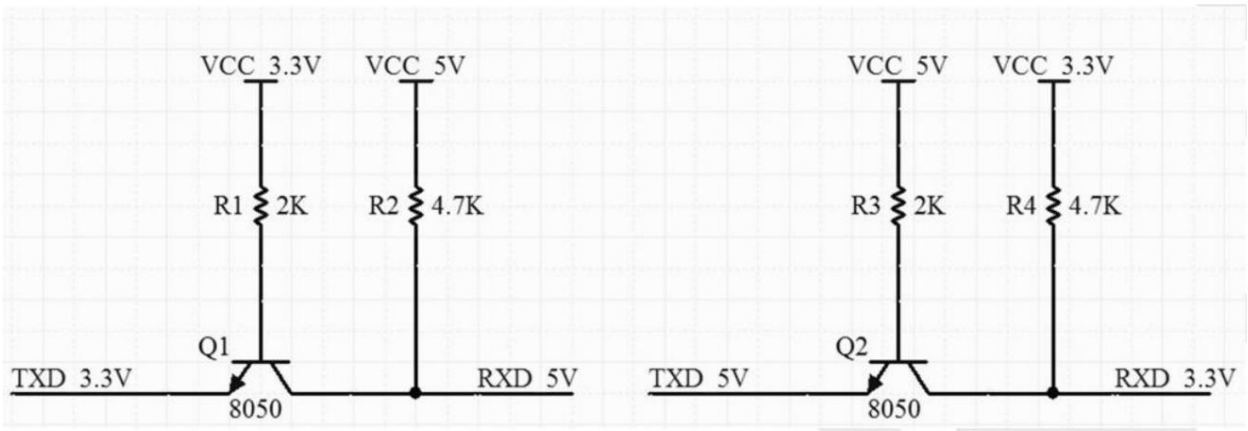
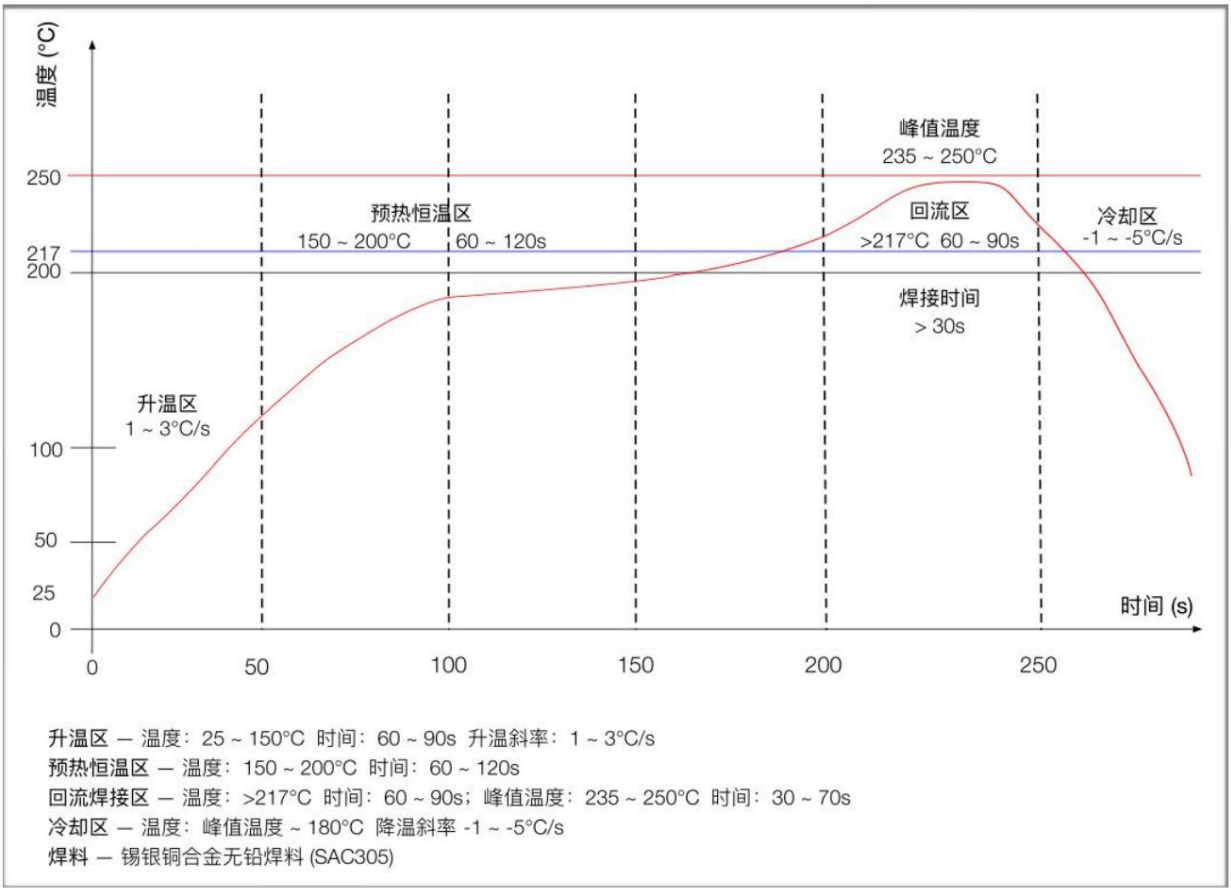


Figure level conversion circuit

7. Reflow soldering curve



升温区 — 温度：25 ~ 150°C 时间：60 ~ 90s 升温斜率：1 ~ 3°C/s
预热恒温区 — 温度：150 ~ 200°C 时间：60 ~ 120s
回流焊接区 — 温度：>217°C 时间：60 ~ 90s；峰值温度：235 ~ 250°C 时间：30 ~ 70s
冷却区 — 温度：峰值温度 ~ 180°C 降温斜率 -1 ~ -5°C/s
焊料 — 锡银铜合金无铅焊料 (SAC305)

8. Packaging information

The packaging of ESP-01D is a tray. (the image is only a reference)

9. Contact us

Official website: https://www.ai-thinker.com

Development DOCS: https://docs.ai-thinker.com

Official Forum: http://bbs.ai-thinker.com

Sample purchase: https://anxinke.taobao.com

Business cooperation: sales@aithinker.com

Technical support: support@aithinker.com

Company Address: Room 410, Building C, Huafeng Smart Innovation Port, Gushu, Xixiang, Baoan District, Shenzhen

Contact number: 0755-29162996