ESP-15F Specification

Version V1.0

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Change History of Revision

Version	Date	Contents of Revision Change	Compilation	Verify
V1.0	2019.11.15	Initial release	Xie Yiji	

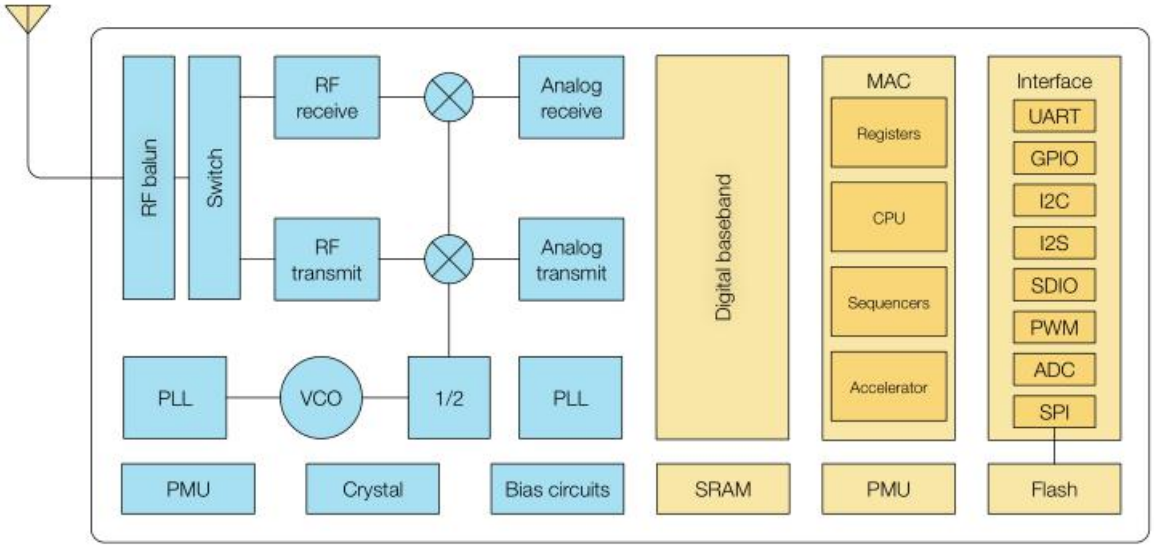
Contents

一、 Product overview

The ESP-15F WiFi module was developed by Ai-Thinker Technology. The core processor of the module ESP8266 integrates the industry-leading Tensilica L106 ultra-low-power 32-bit micro MCU in a smaller package with 16-bit reduced mode. The main frequency supports 80 MHz and 160 MHz, supports RTOS, and integrates Wi-Fi MAC / BB / RF / PA / LNA.

The ESP-15F WiFi module supports the standard IEEE802.11 b/g/n protocol, a complete TCP/IP protocol stack. Users can use this module to add networking capabilities to existing devices or to build separate network controllers.

The ESP8266 is a high-performance wireless SOC that offers maximum utility at the lowest cost and unlimited possibilities for embedding WiFi functionality into other systems.



ESP8266 has a complete and self-contained Wi-Fi network function, which can be used independently or run as a slave on other host MCUs. When ESP8266 is applied independently, it can be started directly from external flash. The built-in cache memory helps improve system performance and optimizes the storage system.

Another case is that ESP8266 can be used as a Wi-Fi adapter only through SPI / SDIO interface or UART interface, and can be applied to any microcontroller-based design.

ESP8266's powerful on-chip processing and storage capabilities make it possible to integrate sensors and other application-specific equipment through the GPIO port, greatly reducing the cost of early development.

Features

- Complete 802.11b / g / n Wi-Fi SoC module
- The core is Tensilica L106 low power 32-bit MCU, frequency supports 80 MHz and 160 MHz, supports RTOS
- Built-in 10-bit high-precision ADC
- Only support UART interface
- Using the PH2.54 connector/DIP-8 package
- Integrated Wi-Fi MAC/ BB/RF/PA/LNA
- Support multiple sleep modes, the standby power consumption as low as 1.0mW
- UART baud speed up to 4Mbps
- Embedded Lwip protocol stack
- Support STA/AP/STA+AP operation mode
- Smart Config (APP) / AirKiss (WeChat) support for Android and IOS
- Support serial port local upgrade and remote firmware upgrade（FOTA）
- General AT commands can be used easy and quickly
- Support for second development, integration of Windows、Linux development environment
- Support 5V power supply

Parameters

Figure 1 Main Parameter

Model	ESP-15F
Package	PH2.54 connector /DIP-8 package
Size	41.3*24.1*6.6(±0.2)MM（L*W*H，the height is subject to the discharge of the needle）
Antenna	PCB antenna/IPEX external antenna
Frequency Range	2400 ~ 2483.5MHz
Operating Temperature	-20 ℃ ~ 70 ℃
Storage Environment	-40 ℃ ~ 125 ℃ , < 90%RH
Power supply range	Voltage supply 5V，Current supply >800mA
Support Interface	Only support UART
IO	3（reserved ）
UART Baut	Support 110 ~ 4608000 bps ， default 115200 bps
Security	WEP/WPA-PSK/WPA2-PSK
SPI Flash	Default 32Mbit

二、 Electrical parameter

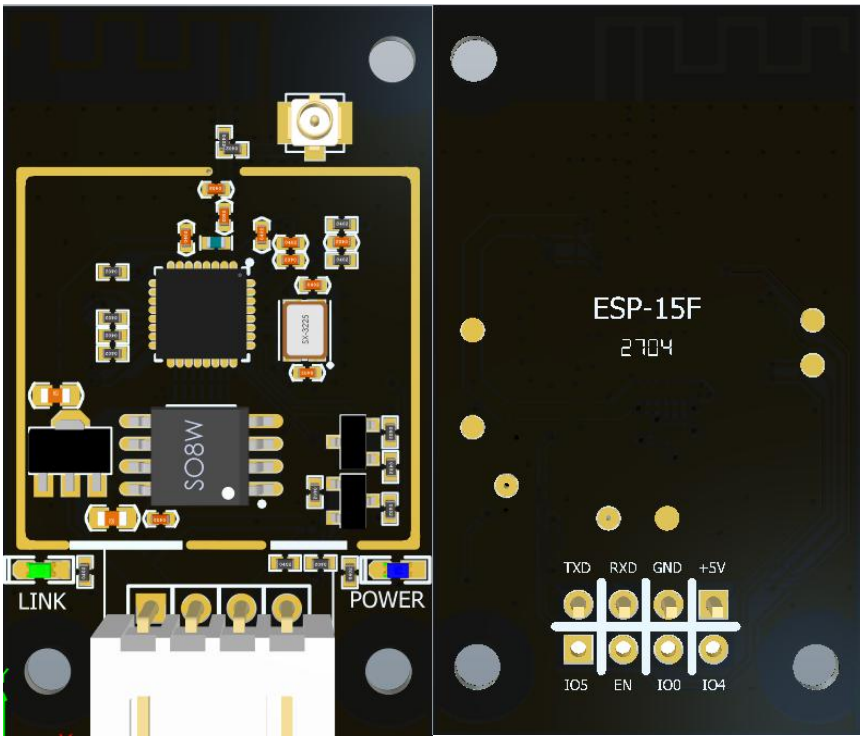
Electrical Characteristics

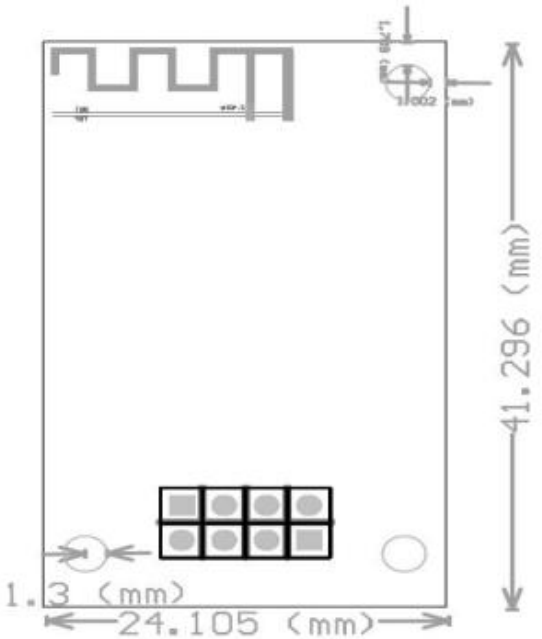
Parameter		Symbol	Min	Typ	Max	Unit
Storage temperature		VDD	3.0	3.3	3.6	V
I/O	V_{IL}/V_{IH}	-	-0.3/0.75VIO	-	0.25VIO/3.6	V
	V_{OL}/V_{OH}	-	N/0.8VIO	-	0.1VIO/N	V
	I_{MAX}	-	-	-	12	mA

Radio Performance

Description	Typ	Unit
Operating frequency	2400 - 2483.5	MHz
Output Power		
11n mode，PA output power	13±2	dBm
11g mode，PA output power	14±2	dBm
11b mode，PA output power	16±2	dBm
Sensitivity		
CCK, 1 Mbps	<=-90	dBm
CCK, 11 Mbps	<=-85	dBm
6 Mbps (1/2 BPSK)	<=-88	dBm
54 Mbps (3/4 64-QAM)	<=-70	dBm
HT20 (MCS7)	<=-67	dBm

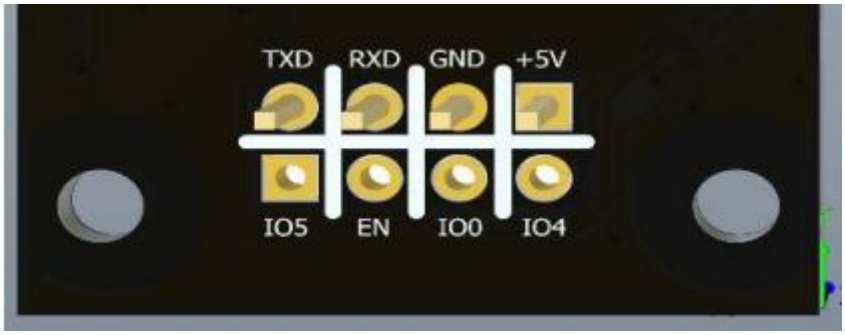
三、 Appearance size





四、 Pin definition

ESP-15F has eight interface，where uart is a regular interface ，IO0/IO4/IO5/EN used as a reserved interface.Refer to following Pin diagram，table 2.2 is definition of interfaces.



ESP-15F Pin diagram

Table 2.2 Pin function definition

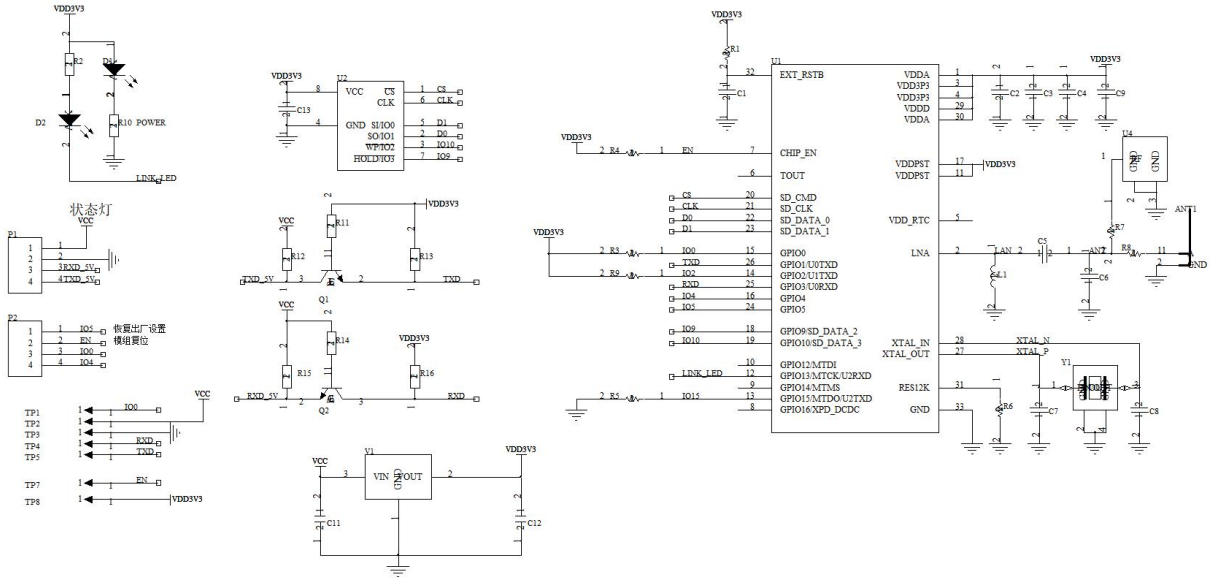
No.	Name	Function	Note
1	TXD	UART0_TXD(default 5V)	General interface
2	RXD	UART0_RXD(default 5V)	General interface
3	GND	Ground	General interface
4	VCC	5 VDD；output current of external power supply is recommended over 800mA	General interface
5	IO4	GPIO4	Reserved interface
6	IO0	GPIO0; download mode:external pull down, running mode: floating or external pull up	Reserved interface
7	EN	Chip Enabled Pin, Active High	Reserved interface
8	IO5	GPIO5	Reserved interface

Table Description of the ESP series module boot mode

Mode	CH_PD(EN)	RST	GPIO15	GPIO0	GPIO2	TXD0
Download mode	High	High	Low	Low	High	High
Running mode	High	High	Low	High	High	High

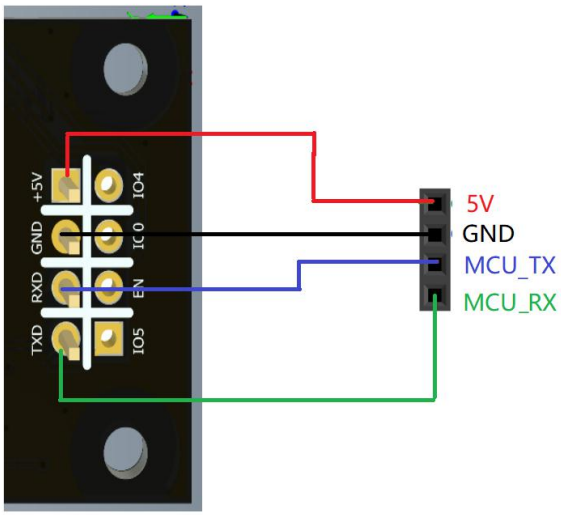
Note：Some of the pins inside the module had been pulled up or pulled down，Please refer to the schematic diagram.

五、 Schematics



六、 Design Guidance

1、Application Circuit



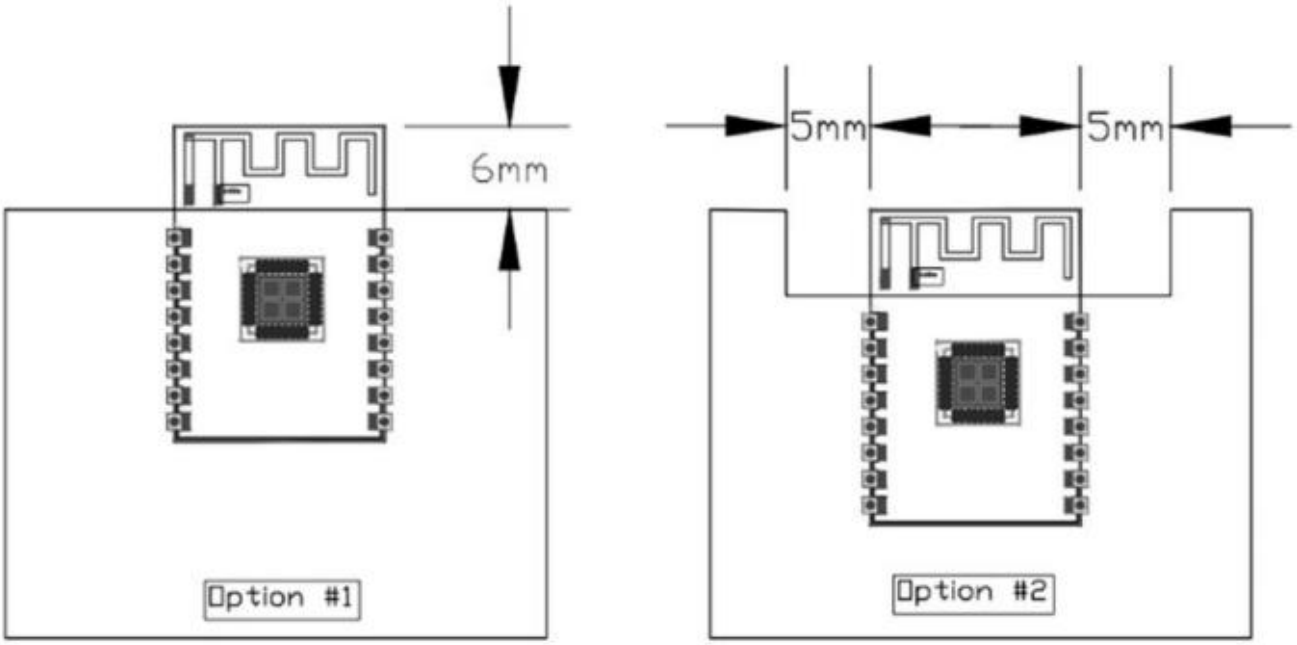
2、Antenna layout requirements

（1）、Installation position on the main board，advise for following two ways：

Option 1：The module is placed on the edge of the main board, and the antenna area is extended out of the edge of the main board.

Option 2：Put the module on the edge of the motherboard, and the edge of the motherboard is hollowed out in the antenna position.

（2）、In order to meet the performance of the on-board antenna, metal parts are prohibited from being placed around the antenna.



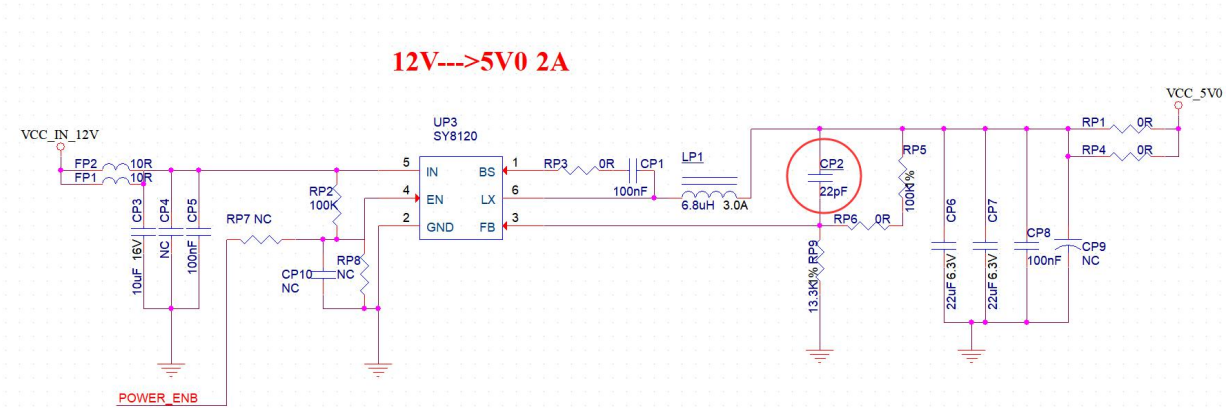
3、Power Supply

（1）、Recommended　voltage 5V, Peak:Current over 800mA .

（2）、It is recommended to use the LDO power supply；If DC-DC is used, the ripple is controlled within 30 mV.

（3）、DC-DC power supply circuit is recommended to reserve the position of the dynamic response capacitor, and the output ripple can be optimized when the load change is large.

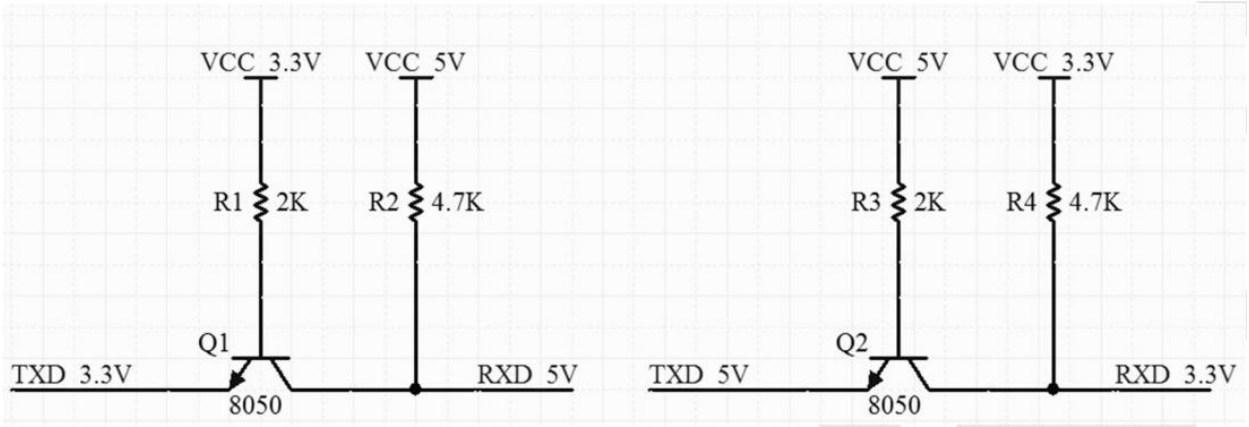
（4）、Proposed addition of ESD Devices to 5V Power supply Interface.



4、GPIO

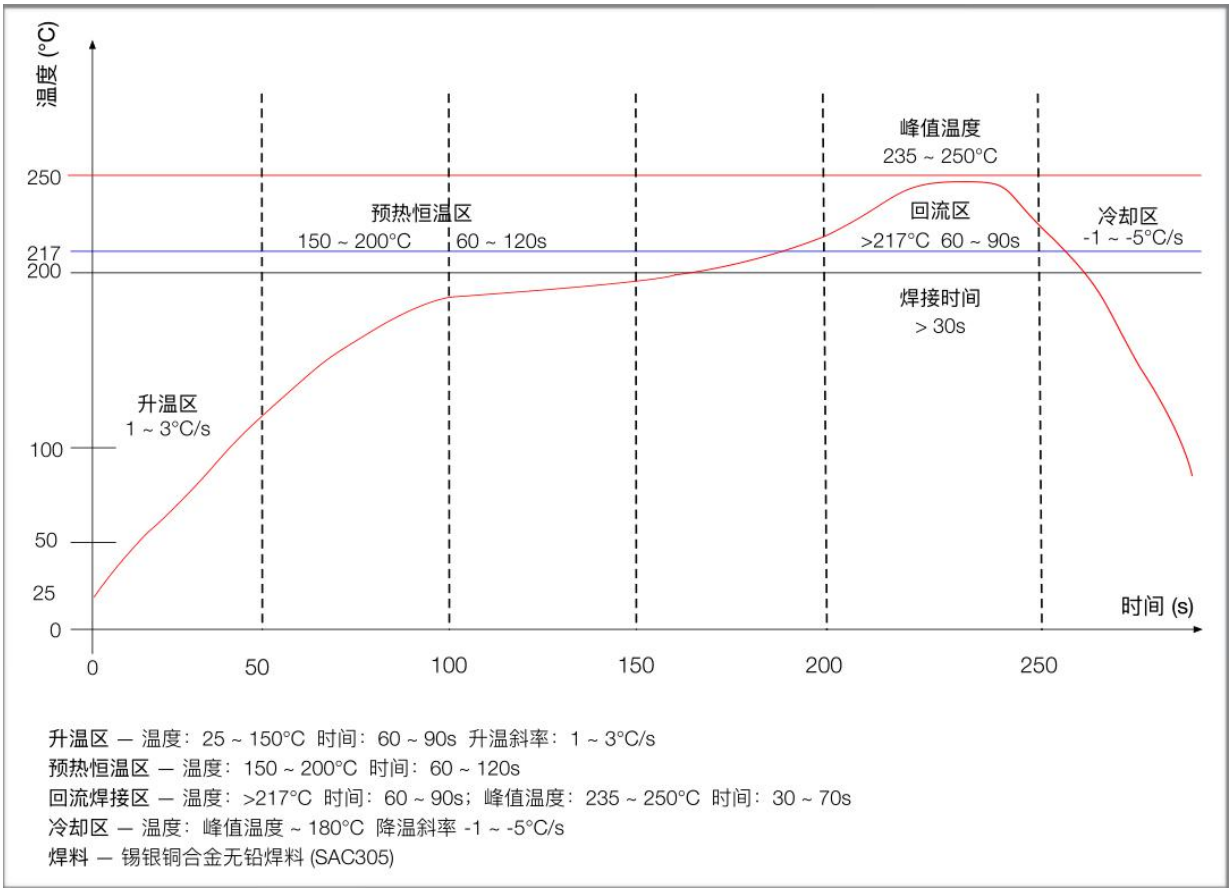
(1) At the periphery of the module, some GPIO ports are led out, and a resistance of 10-100

ohms can be connected in series on the IO port for use. This suppresses overshoot and is more stable on both sides. Help for both EMI and ESD.
(2) For the up-and-down drawing of the special io-port, reference will be made to the use description of the specification, which will affect the start-up configuration of the module.
(3) The IO port of the module is 3.3 v. If the main control does not match the io-level of the module, it is necessary to increase the level conversion circuit. (4) If the IO interface is directly connected to the peripheral interface, or the pins and other terminals, it is recommended to reserve the ESD device near the terminal at the IO trace.



Level switching circuit

七、 Reflow Welding 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)

八、 Package Information

As shown below,the packing of ESP-15F is a tray.

九、 Contacts

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

Developer Wiki：http://wiki.ai-thinker.com

Company forum：http://bbs.ai-thinker.com

Sampling purchasing：https://anxinke.taobao.com

Business cooperation：sales@aithinker.com

Technology support：support@aithinker.com

Company address：Seventh floor, Building B,xixiang street Baoan District, Shenzhen, China

Contacts：0755-29162996