TG-12F Specification

Version V1.1

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Document development/revision/revocation resume

Version	Date	Revised content	Edition	Approve
V1.0	2020.10.15	First Edition	Yuan Nannan	Guan Ning
V1.1	2020.10.26	Update	Xu Hong	Xu Hong

CONTENT

一、 Product Overview

TG-12F is a module based on Tmall TG7100C WiFi+ BLE chip, which is designed with 2.4 G frequency band, WiFi 802.11b/g/n and BLE5.0 baseband/MAC designed, with high performance, low cost, quick and easy development characteristics. Suitable for low power consumption and high performance application development, and is also an integrated solution that can connect Tmall Genie directly.

The micro controller subsystem consists of low power 32-bit RISC CPU、 cache and memory. It can control low power mode through power management unit. At the same time, it can support AES 256 bit encryption engine and has many security characteristics.

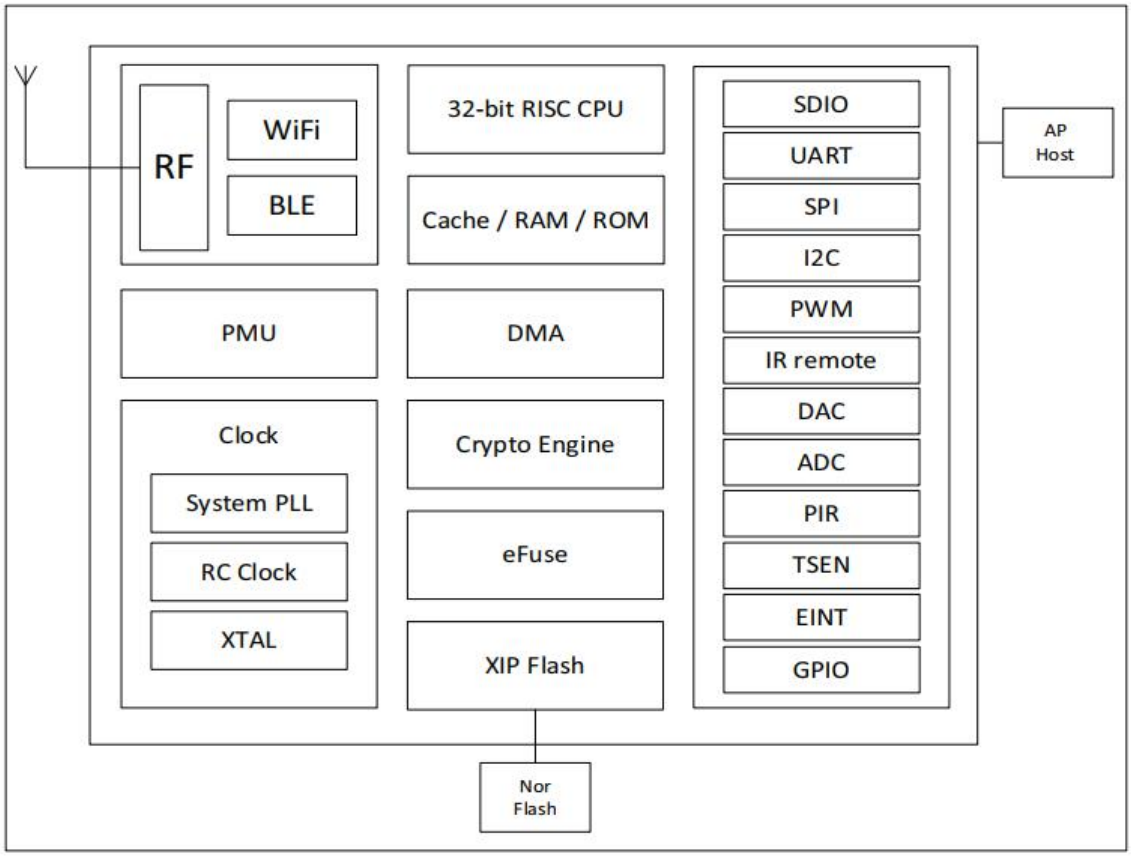
For Software, pre-integrated Tmall Giene standard firmware , support customizable SDK, and to assist terminal products through the Tmall giene control certification.

This chip Built-in 276 KB SRAM,128KB ROM. TG-12F support a variety of low-power working states, can meet the power consumption requirements of various application scenarios.

TG-12F provide rich peripheral interfaces, including DSIO、SPI、I2C、IR remote、PWM、ADC、DAC、PIR and GPIO interfaces

TG-12F has a variety of unique hardware security mechanisms. The hardware encryption accelerator supports AES 128/192/256 bit encryption engine and SHA-1/224/256, support

Real random number generator (TRNG), public key accelerator (PKA) and so on, can be perfectly applied to various encryption products.



Characteristics

- Complete 802.11b/g/n Wi-Fi + BLE SoC module, data rate up to 150Mbps
- TG-12F chip is 32-bit RISC CPU with FPU (floating point unit), operating frequency up to 192 MHz. The chip has built-in 276 KB SRAM and 128 KB ROM.
- Support SDIO/SPI/UART/I2C/IR remote/PWM/ADC/DAC/PIR/GPIO interface.
- SMD-22 package
- Integrated Wi-Fi MAC/ BB/RF/PA/LNA
- Support multiple sleep modes, deep sleep current is less than 30uA
- Support UART port local upgrade and remote firmware upgrade (FOTA)
- General AT commands can be quick and easy use
- Support secondary development, integrated Linux development environment

Main parameters

Table 1 main parameter descriptions

Model Name	TG-12F
Package	SMD-22
Size	24.0*16.0*3.0(±0.2)MM
Antenna	On-board PCB antenna/IPEX
Frequency Range	2400 ~ 2483.5MHz
Operating Temperature	-40 ℃ ~ 85 ℃
Store Temperature	-40 ℃ ~ 125 ℃ , < 90%RH
Power supply range	Voltage: 3.0V ~ 3.6V, electrical current: >500mA
Support Interface	SDIO/SPI/UART/I2C/IR remote/PWM/ADC/DAC/PIR/GPIO
IO	Support 110 ~ 4608000 bps , default 115200 bps
Security	AES/SHA/PKA
SPI Flash	2MB

二、 Electrical parameters

Electrical characteristics

Parameters		Conditions	Min	Typ	Max	Unit
Supply voltage		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

RF parameters

Description	Typical values	Unit
Operating frequency	2400 - 2483.5	MHz
Output power		
11n mode HT20, PA output power	15±2	dBm
11g mode, PA output power	16±2	dBm
11b mode, PA output power	18±2	dBm
Receiving sensitivity		
CCK, 1 Mbps	<=-97	dBm
CCK, 11 Mbps	<=-88	dBm

6 Mbps (1/2 BPSK)	<=-92	dBm
54 Mbps (3/4 64-QAM)	<=-75	dBm
HT20 (MCS7)	<=-72	dBm

Power consumption

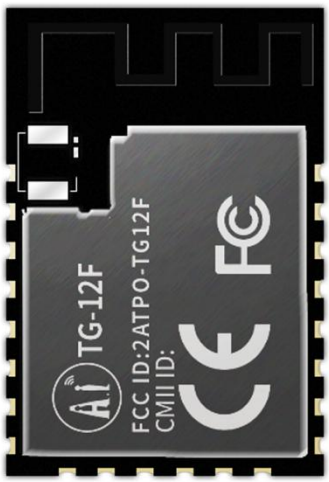
The following power consumption data are based on a 3.3 V power supply ,25° C ambient temperature and measured using an internal voltage regulator.

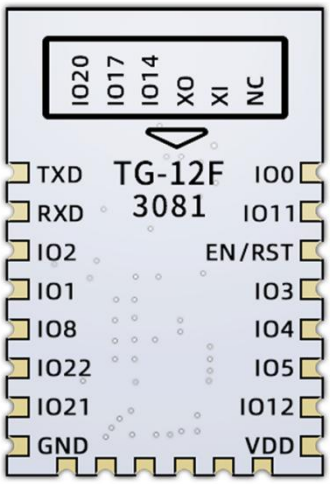
- All measurements were completed at the antenna interface without SAW filters
- All emission data are based on a duty cycle of 90%, measured in the mode of continuous emission.

Mode	Min	Typ	Max	Unit
Tx 802.11b, CCK 1Mbps, POUT=+21dBm	-	180	320	mA
Tx 802.11g, OFDM 54Mbps, POUT =+18dBm	-	145	250	mA
Tx 802.11n, MCS7, POUT =+17dBm	-	135	250	mA
Rx 802.11b,1024 byte, -80dBm	-	40	-	mA
Rx 802.11g,1024 byte, -70dBm	-	40	-	mA
Rx 802.11n,1024 byte, -65dBm	-	40	-	mA
Deep-Sleep③	-	30	-	μA
Power Off	-	1	-	μA

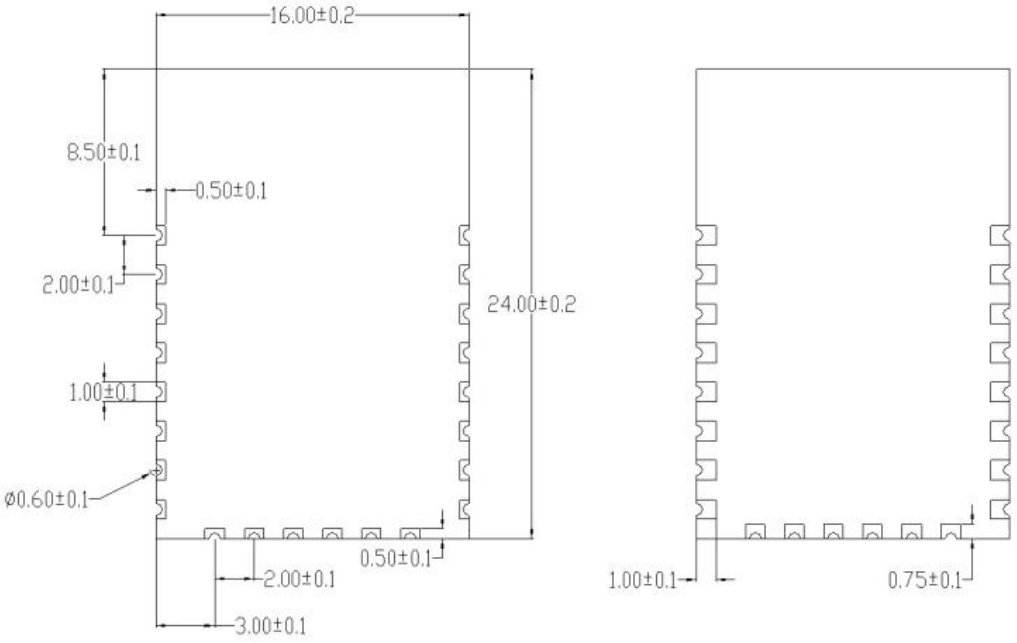
三、 Appearance dimensions

TG-12F Appearance Image





((Picture and label printing are for reference only, subject to physical object))



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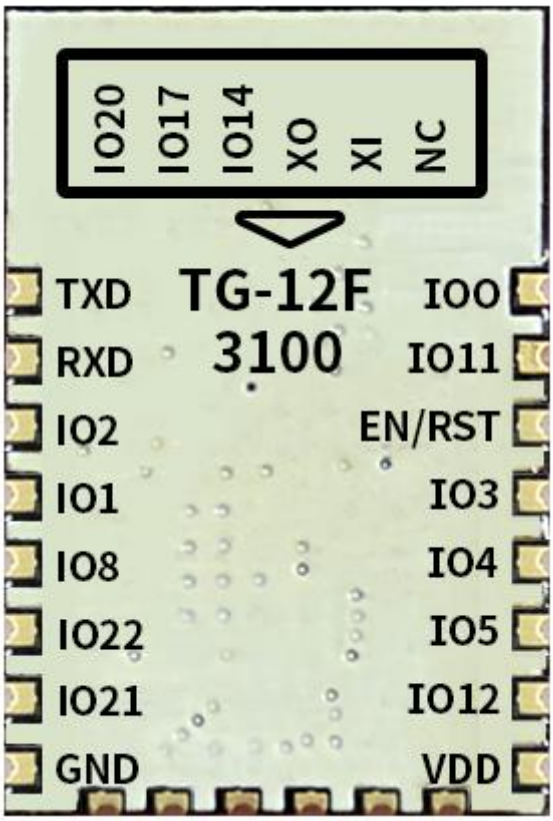
四、 Pin definition



((Picture and label printing are for reference only, subject to physical object))

TG-12F module is connected to 22 interfaces, refer to pin diagram, pin function definition table is interface definition.

TG-12F Pin diagram

Table Pin function definition

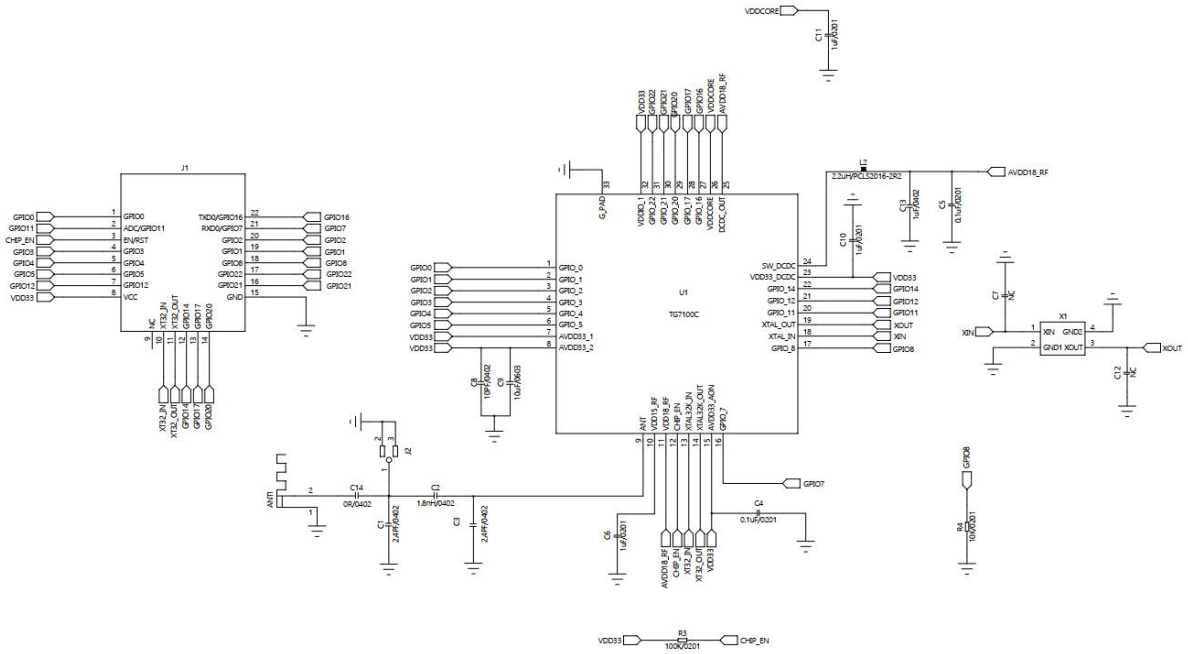
No.	Name	Function
1	IO0	SDIO,SFLASH,SPI,I2C,UART,PWM,GPIO
2	IO11	SPI,I2C,UART,PWM,AUXADC,GPIO
3	EN/RST	Chip enable

4	IO3	SDIO,SPI,I2C,UART,PWM,GPIO
5	IO4	SDIO,SPI,I2C,UART,PWM,GPIO
6	IO5	SDIO,SPI,I2C,UART,PWM,GPIO
7	IO12	SPI,I2C,UART,PWM,AUXADC,GPIO
8	VDD	VDD
9	NC	Empty Pin
10	XI	Crystal oscillator Input 32.768KHz
11	XO	Crystal oscillator Input 32.768KHz
12	IO14	SPI,I2C,UART,PWM,AUXADC,GPIO
13	IO17	SFLASH,SPI,I2C,UART,PWM,GPIO
14	IO20	SFLASH,SPI,I2C,UART,PWM,GPIO
15	GND	GND
16	IO21	SFLASH,SPI,I2C,UART,PWM,GPIO
17	IO22	SFLASH,SPI,I2C,UART,PWM,GPIO
18	IO8	SPI,I2C,UART,PWM,AUXADC,GPIO
19	IO1	SDIO,SFLASH,SPI,I2C,UART,PWM,GPIO
20	IO2	SDIO,SFLASH,SPI,I2C,UART,PWM,GPIO
21	RXD	SPI,I2C,UART,PWM,AUXADC,GPIO
22	TXD	SPI,I2C,UART,PWM,GPIO

Table Module Start-up Mode Description

System start-up mode			
Pin	Default	SPI Start-up mode	Download Start-up Mode
EN/RST	Pull up	1	0
IO8	Drop-down	N/A	0

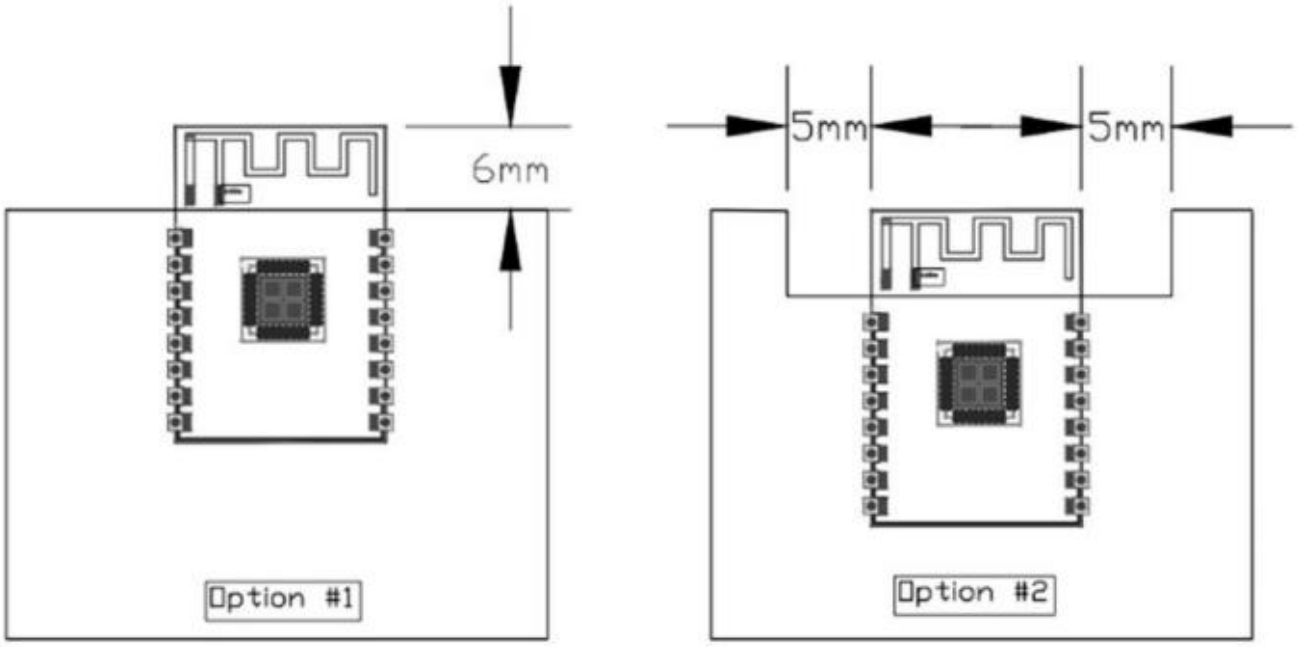
五、 Schematic diagrams



六、 Design guidance

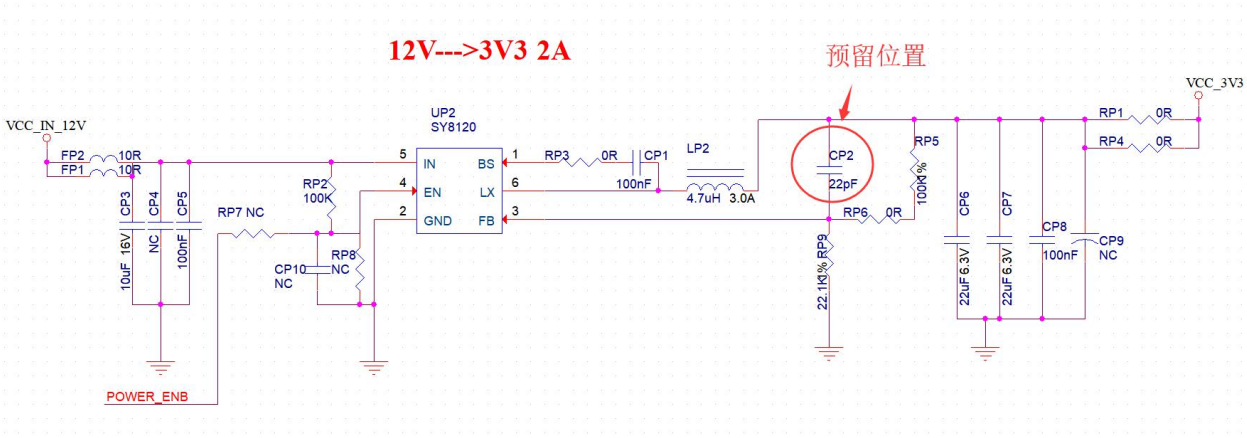
1、Antenna layout requirements

（1）、The installation position on the motherboard is recommended in the following two ways:
Scheme 1: put the module on the edge of the motherboard, and the antenna area extends out of the edge of the motherboard.
Scheme two: put the module on the edge of the motherboard, the edge of the motherboard in the antenna position to make an empty area.
（2）、In order to meet the performance of on-board antenna, metal parts are forbidden to be placed around the antenna, away from high frequency devices.



2、Power supply

（1）、Recommend 3.3V voltage, peak current above 50mA
（2）、It is recommended to use LDO for power supply; if DC-DC is used, the ripple is recommended to be controlled within 30mV.
（3）、DC-DC the power supply circuit, it is suggested to reserve the position of output ripple can be optimized when the load changes greatly.
（4）、It is recommended to add ESD devices to the 3.3V power interface.



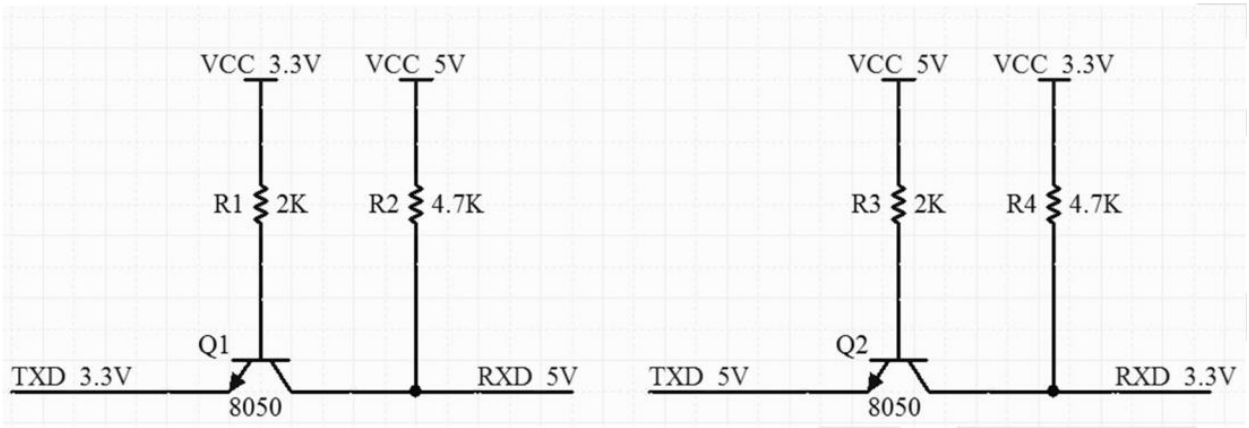
3、GPIO Interface

（1）、The module periphery leads to some GPIO ports, such as the recommended resistance of 10-100 Ohms in series on the IO port. This can suppress overshoot, to ensure both sides of the level more stable. helpful for both EMI and ESD.

（2）、 For special IO, please refer to the specification, which will affect the starting configuration of the module.

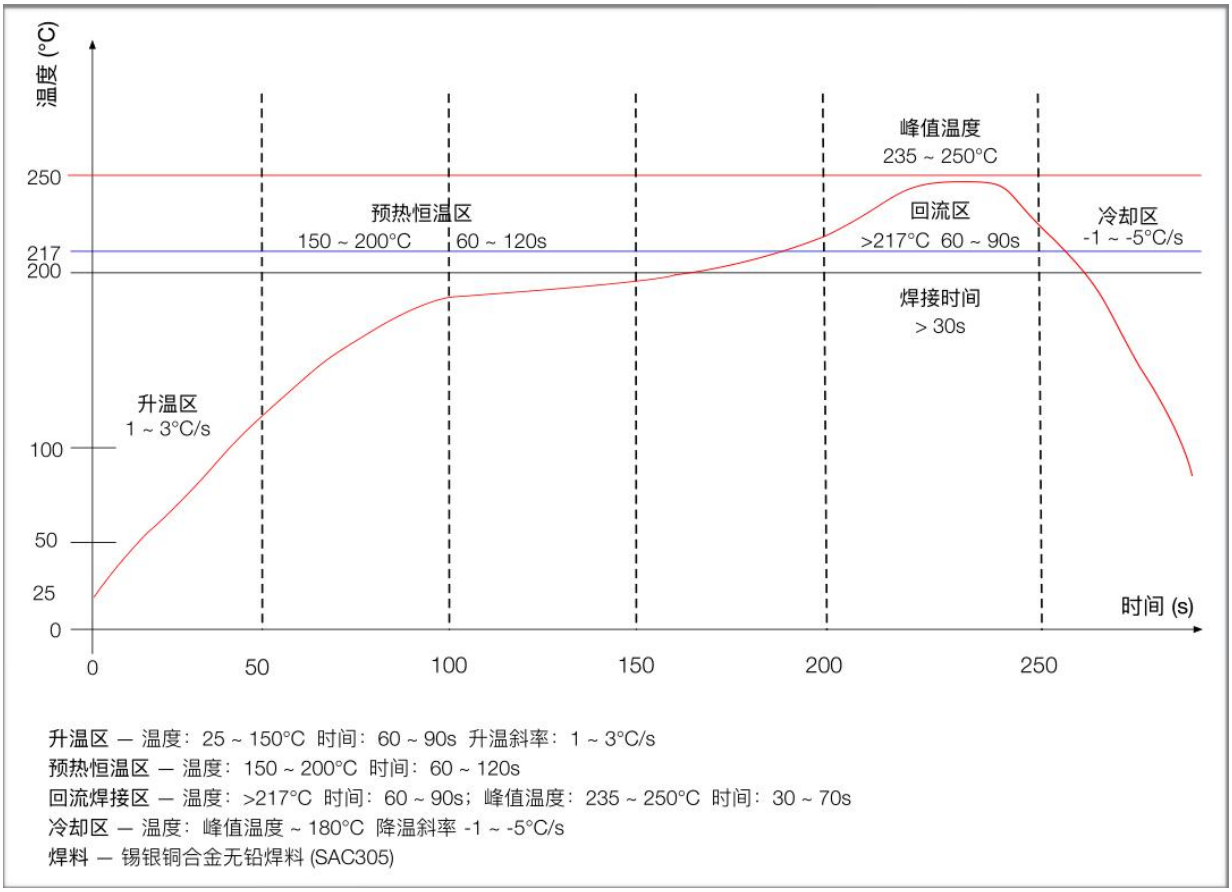
（3）、The IO port of the module voltage is 3.3 V, if the main control does not match the IO level of the module, require to add the level conversion circuit.

（4）、 When the IO port is connected directly to the peripheral interface, or the pin header and other terminals, it is recommended to reserve ESD device near the terminal.



Electrical level conversion circuit

七、 Reflow soldering



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、 Packaging information

Refer to below image, the TG-12F package is in Tape/Reel.

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

Development DOCS : http s : //d ocs.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: Building C, Huafeng Intelligent Innovation Port, Xixiang, Baoan District, Shenzhen

Tel :0755-29162996