# Ai-WB2-01S Specification

Version V1.0.1

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# Document resume

| Version | Date | Develop/revise content | Edition | Approve |
|---|---|---|---|---|
| V1.0.0 | 2022.9.1 | First Edition | Jingran Xiao | NingGuan |
| V1.0.1 | 2022.10.31 | Add RF OTA parameters | Jingran Xiao | NingGuan |
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# 3. Appearance size

Front Back

**Figure 3 External view (for reference only)**

**Figure 4 Dimension diagram（unit: mm）**

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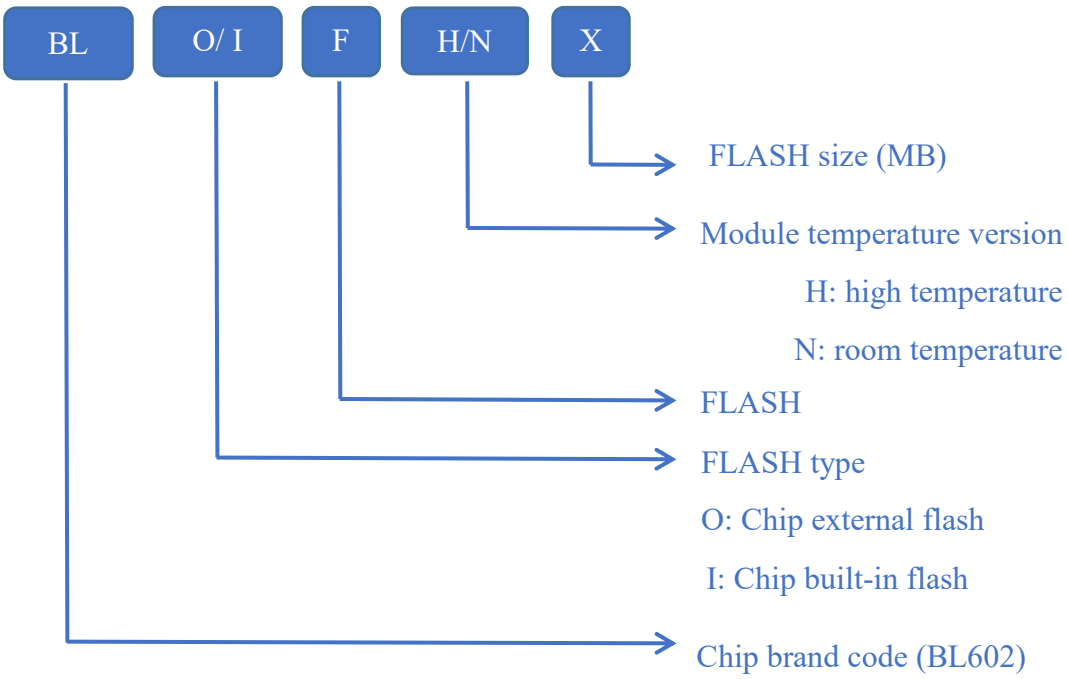


**Figure 5 the representative information of screen printing of Shield**

# 4. Pin definition

Ai-WB2-01S module is connected with a total of 8 pins, as shown in the pin schematic diagram, pin function definition table is the interface definition.

Front

**Figure 6 pin diagram**

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**Table 6 Definition table of pin functions**

| No. | Name | Description |
|---|---|---|
| 1 | GND | Ground |
| 2 | IO4 | GPIO4/SPI_MOSI/MISO/IIC_SCL/PWM_CH4/ADC_CH4 |
| 3 | IO8/NC | NC, unavailable. If you need to use it, please contact Ai-Thinker. Bootstrap/GPIO8/SPI_MOSI/MISO/IIC_SCL/PWM_CH3 |
| 4 | RX | RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 |
| 5 | TX | TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 |
| 6 | EN/NC | By default, it is enabled as a chip and is effective at a high level |
| 7 | RST/NC | The default NC is unavailable |
| 8 | 3V3 | 3.3V power supply. It is recommended that the output current of the external power supply be higher than 500mA |
| Note:<br>1.At the moment of power-on,if Bootstrap GPIO8 is high, the module enters the programming mode;if Bootstrap GPIO8 is low, the module starts normally. | | |

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# 5. Schematic

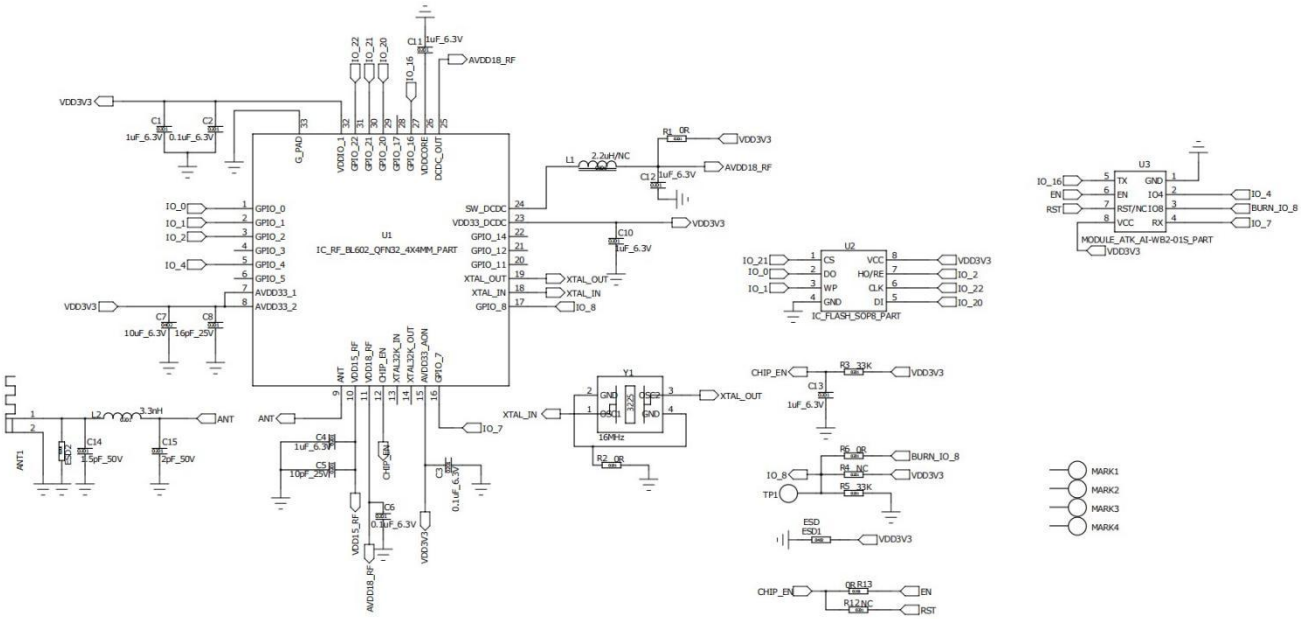


**Figure 7 schematic diagram**

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# 6. Antenna parameters

## 6.1. Antenna Test prototype

**Figure 8 antenna Test prototype sketch Map**

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## 6.2. Antenna S parameters

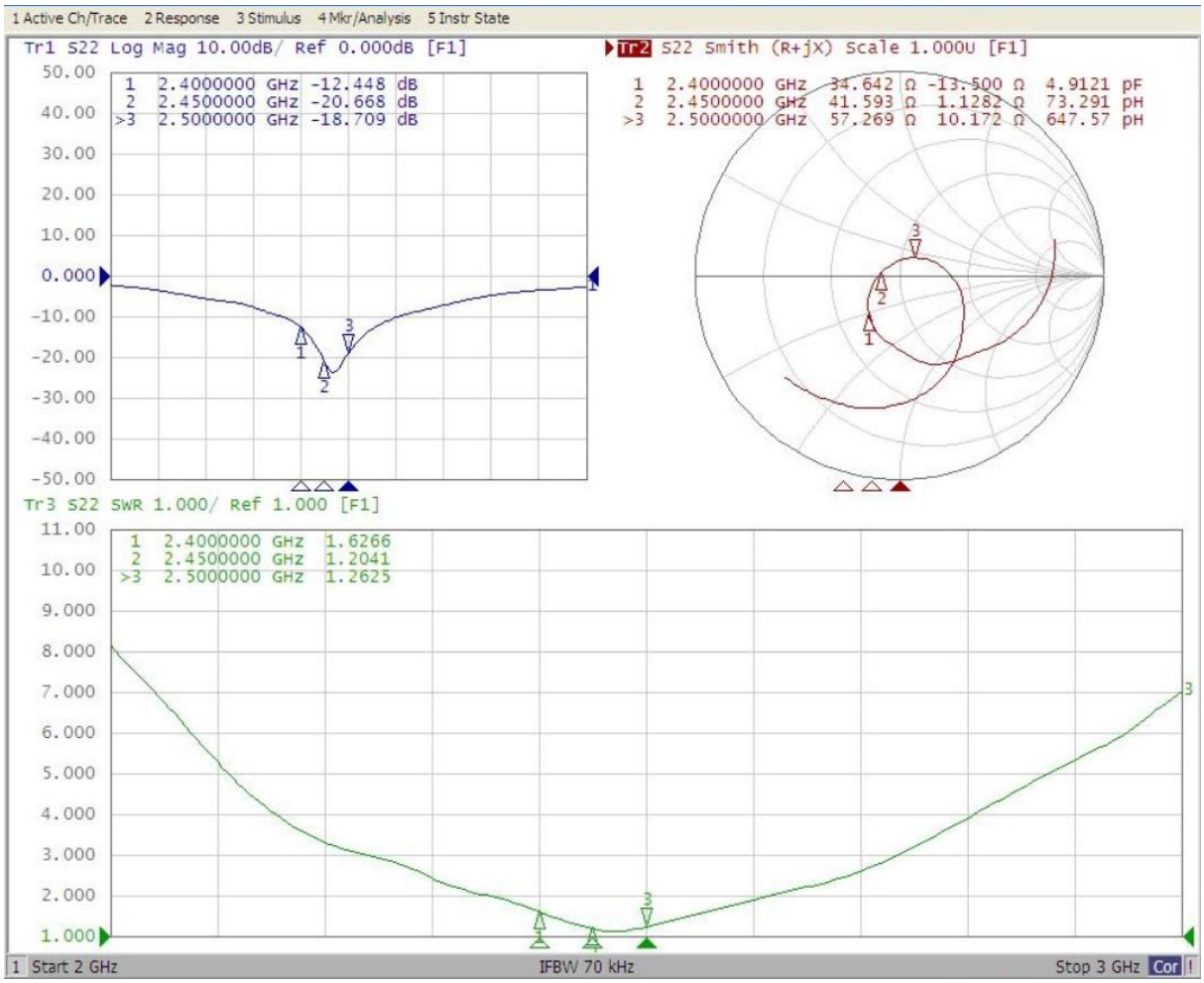


**Figure 9 antenna S parameters**

## 6.3. Antenna gain and efficiency

**Table 7 antenna gain and efficiency**

| Frequency ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency(MHz) | 2400 | 2410 | 2420 | 2430 | 2440 | 2450 | 2460 | 2470 | 2480 | 2490 | 2500 |
| Gain (dBi) | 0.22 | 0.46 | 0.84 | 1.21 | 1.39 | 1.61 | 1.71 | 1.72 | 1.67 | 1.70 | 1.84 |
| Efficiency (%) | 41.43 | 42.58 | 44.95 | 47.63 | 49.55 | 53.10 | 54.63 | 55.26 | 55.00 | 54.57 | 54.22 |

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## 6.4. Antenna pattern

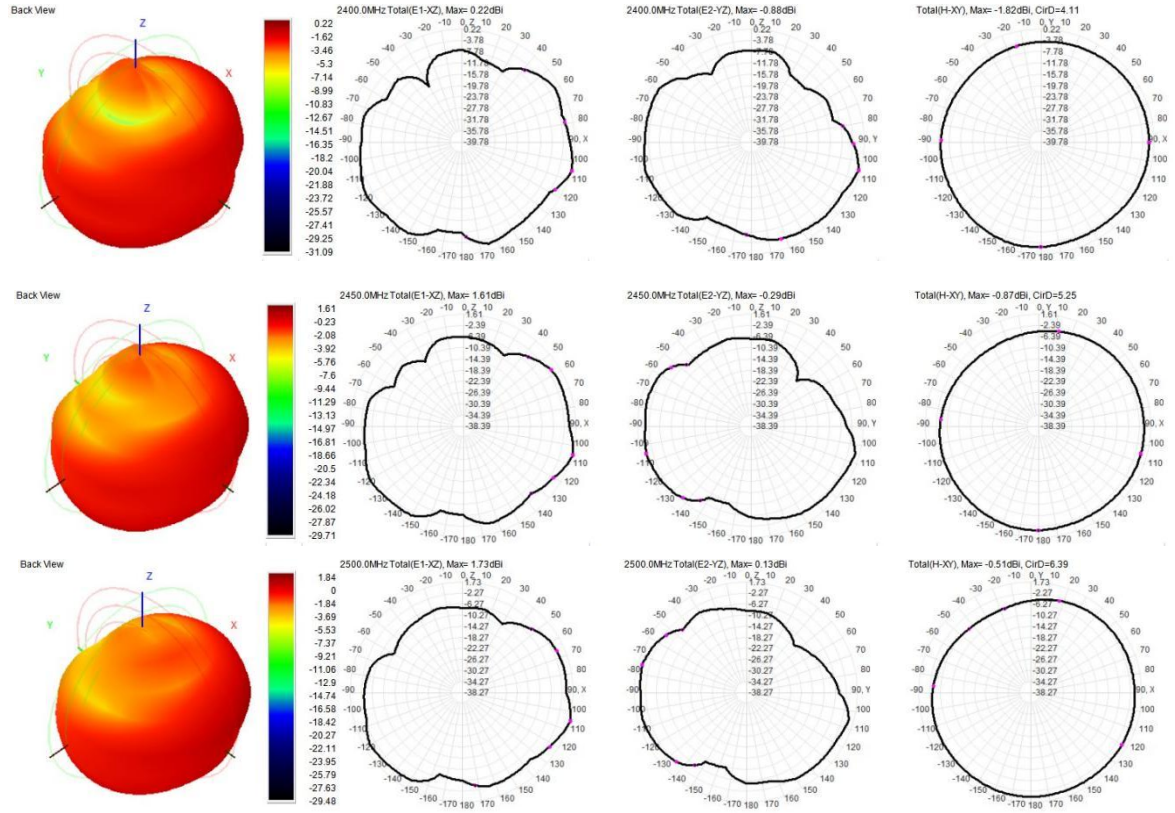


**Figure 10 Antenna pattern**

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## 6.5. RF OTA parameters

**Table 8 RF OTA parameters**

| Item | Mode | Rate(Mbps) | Channel | Fre.(MHz) | Data(dBm) |
|---|---|---|---|---|---|
| TRP | 11b | 11 | 1 | 2412 | 13.92 |
| | | | 6 | 2437 | 13.97 |
| | | | 13 | 2472 | 13.49 |
| | 11g | 54 | 1 | 2412 | 11.7 |
| | | | 6 | 2437 | 11.69 |
| | | | 13 | 2472 | 11.23 |
| | HT20 | MCS7 | 1 | 2412 | 11.61 |
| | | | 6 | 2437 | 11.68 |
| | | | 13 | 2472 | 11.47 |
| TIS | 11b | 11 | 1 | 2412 | -85.02 |
| | | | 6 | 2437 | -83.16 |
| | | | 13 | 2472 | -84.78 |
| | 11g | 54 | 1 | 2412 | -70 |
| | | | 6 | 2437 | -70.42 |
| | | | 13 | 2472 | -70.35 |
| | HT20 | MCS7 | 1 | 2412 | -65.52 |
| | | | 6 | 2437 | -65.79 |
| | | | 13 | 2472 | -64.12 |

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# 7. Design Guidance

## 7.1. Application Guide circuit

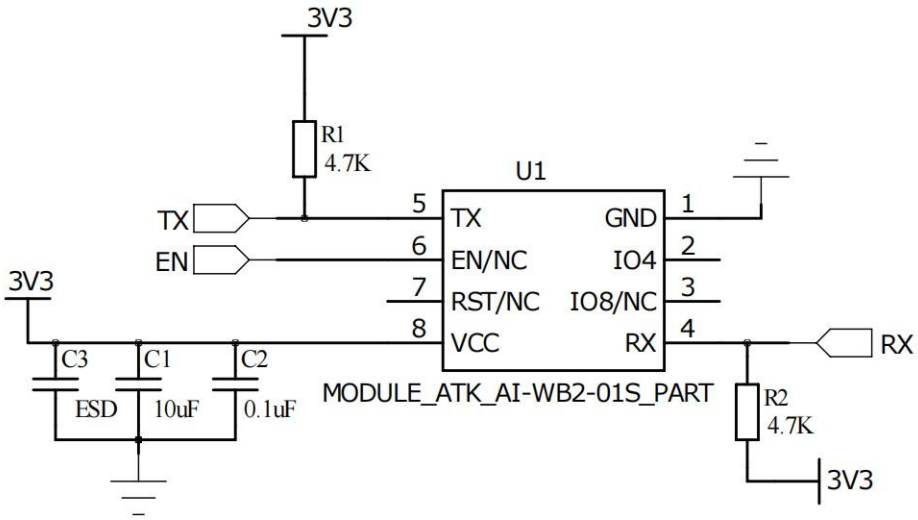


**Figure 11 Application circuit diagram**

- If the IO port is used as PWM, it is recommended to reserve a 4.7K pull-down resistor around the module. Especially in the application of light control, it can prevent the flashing light phenomenon at the moment of power-on start
- The IO8/NC, RST/NC, which are not available by default. If you need to use it, please contact Ai-Thinker

## 7.2. Recommend PCB package size

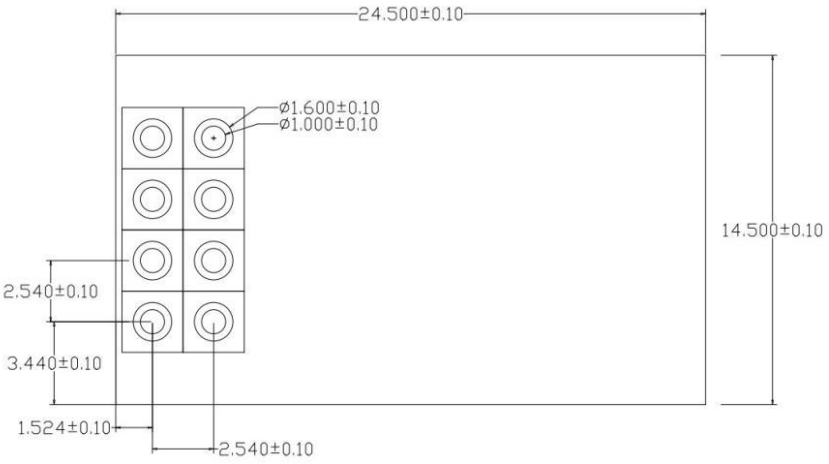


**Figure 12 recommended PCB package size (unit: mm)**

- Recommended 2.54mm 2*4 row needle base

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## 7.3. Antenna layout requirements

■ The installation position on the motherboard is recommended in the following two ways:

Option 1: put the module on the edge of the motherboard, and the antenna area extends out of the edge of the motherboard

Option : put the module on the edge of the motherboard, the edge of the motherboard at the antenna position hollowed out an area

■ In order to meet the performance of onboard antenna, it is forbidden to place metal parts around the antenna and keep away from high frequency devices

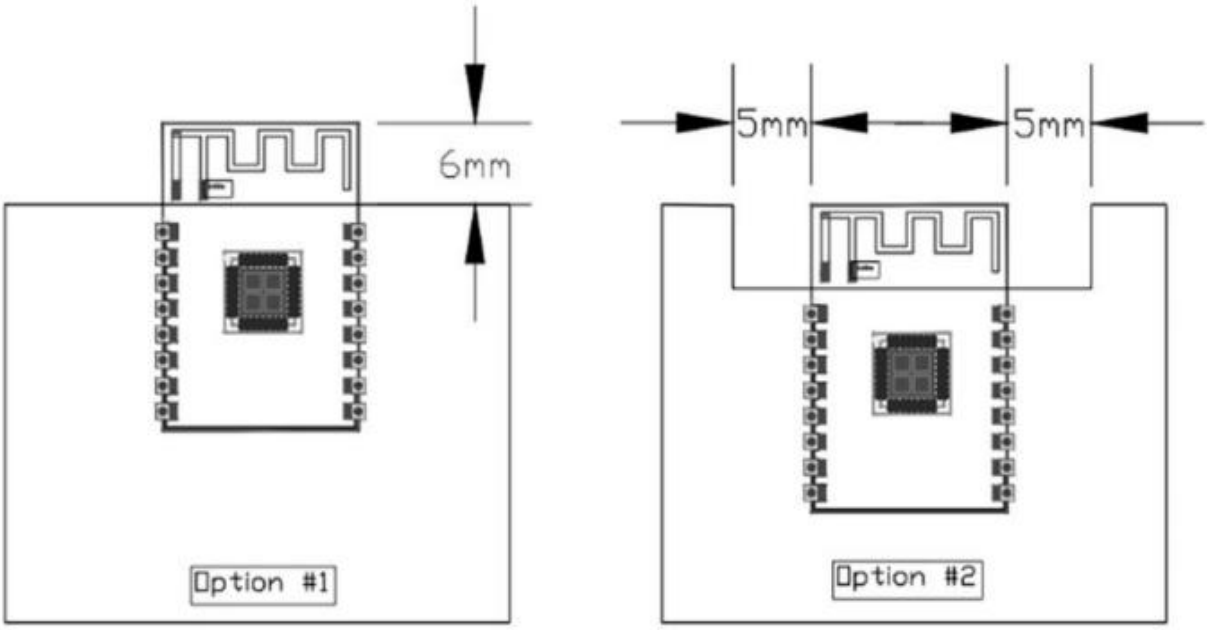


**Figure 13 Antenna layout diagram**

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## 7.4. Power supply

- Recommended 3.3V voltage, peak current over 500mA.
- We recommend that you use LDO for power supply. If you use DC-DC, we recommend that you control the ripple within 30mV.
- DC-DC power supply circuit is recommended to reserve the position of dynamic response capacitance, which can optimize the output ripple when the load changes greatly.
- It is recommended to add ESD devices to the 3.3V power interface.

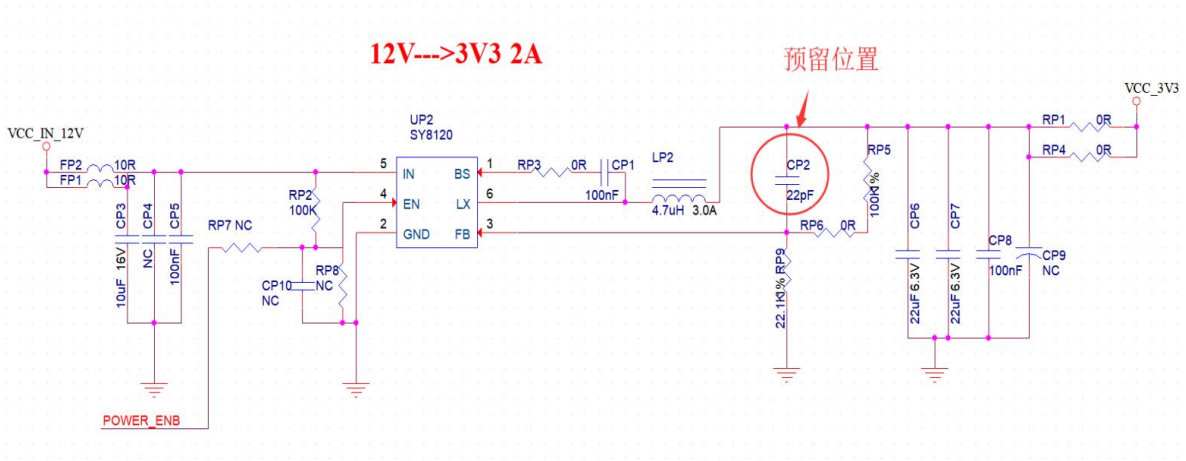


**Figure 14 DC-DC step-down circuit diagram**

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## 7.5. GPIO

- There are some IO 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 inhibits overshoot and makes both sides level more stable. It is helpful for EMI and ESD.
- For special I/O ports to be pulled up and down, refer to the direction for use in the specifications, which may affect the module start-up configuration.
- The I/O port of the module is 3.3V. If the main control does not match the I/O port level of the module, a level conversion circuit needs to be added.
- If the I/O port is directly connected to the peripheral interface, or the terminal such as the row pin, it is recommended to reserve ESD devices near the terminal of the I/O port.

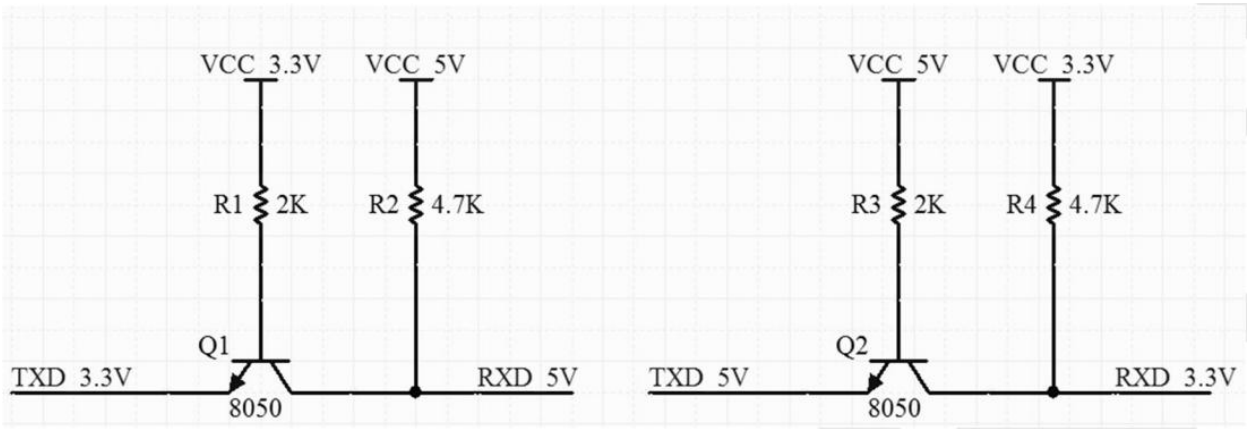


**Figure 15 level conversion circuit**

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# 8. Storage Conditions

Products sealed in moisture-proof bags shall be stored in a non-condensing atmospheric environment of <40℃/90% RH.

The humidity sensitivity level MSL of the module is Level 3.

After the vacuum bag is unpacked, it must be used up within 168 hours at 25±5℃/60%RH, otherwise it can be put on line again after baking.

# 9. Reflow welding curve diagram

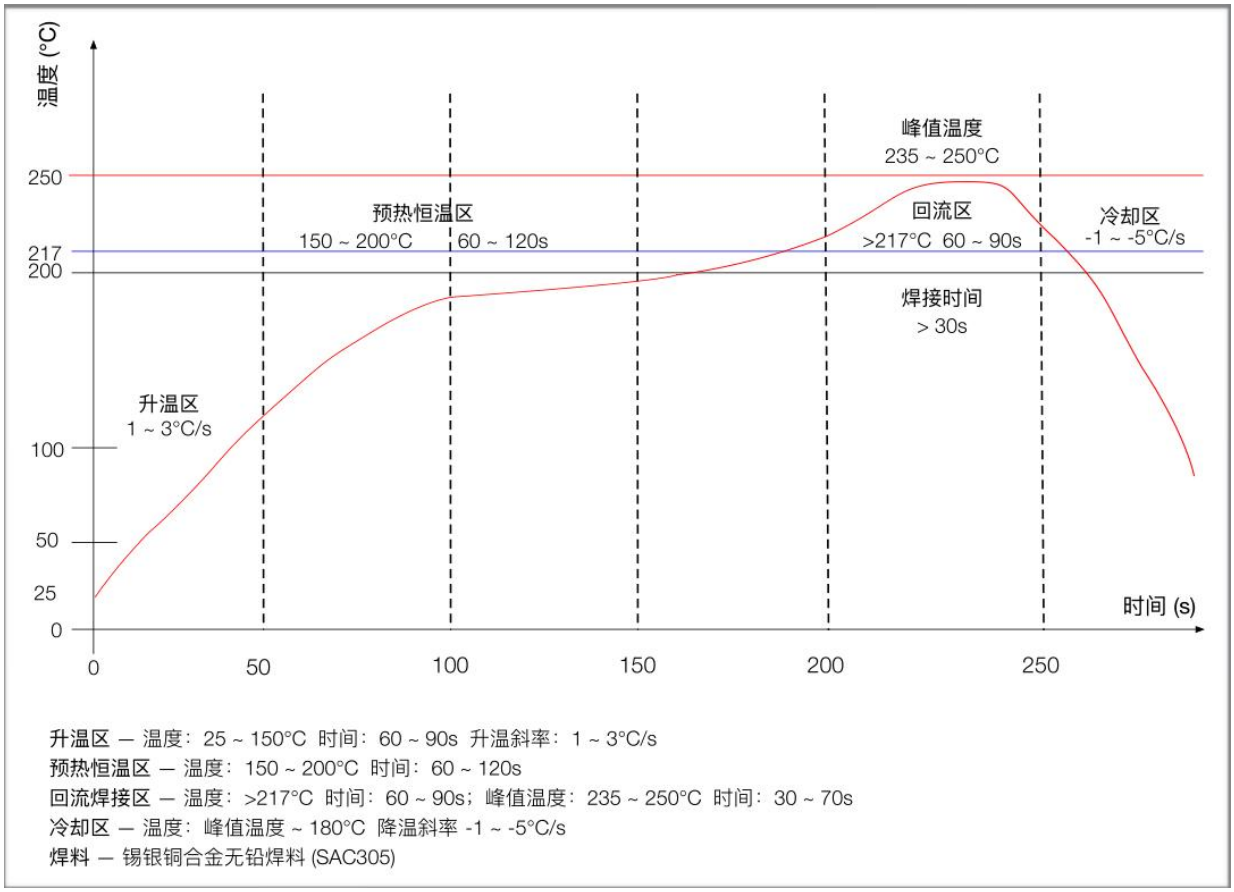


**Figure 16 reflow soldering curve**

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# 10.Product packaging information

Ai-WB2-01S module was packaged in a tape, 200pcs/reel. As shown in the below image:

**Figure 17 Package and packing diagram**

# 11.Contact us

Ai-Thinker official website　　Office forum　　Develop DOCS

LinkedIn　　Tmall shop　　Taobao shop　　Alibaba shop

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WeChat mini program

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