



AB-01 Specification

VERSION V1.0

COPYRIGHT ©2019

Disclaimer and copyright notice

The information in this article, including the URL address for reference, is subject to change without prior notice. The Documentation is provided "as is" without any warranty, including any warranties of merchantability, fitness for a particular purpose, or non-infringement, and any warranties mentioned in the proposal, specification or sample. This document is not responsible for any infringement of any patent rights arising out of the use of the information in this document. No license, express or implied, by estoppel or otherwise, is hereby granted.

The test data obtained in this paper are all obtained by Ai-Thinker laboratory, and the actual results may be slightly different. The Wi-Fi alliance membership mark is owned by the Wi-Fi alliance.

All trade mark names, trademarks and registered trademarks mentioned herein are the property of their respective owners and are hereby declared.

The final interpretation right is owned by Shenzhen Ai-Thinker Technology Co., Ltd.

Note

The contents of this manual may be changed due to the version upgrade of the product or other reasons. Shenzhen Ai-Thinker Technology Co., Ltd. reserves the right to modify the contents of this manual without any notice. This manual is only used as a guide, and Shenzhen Ai-Thinker Technology Co., Ltd. makes every effort to provide accurate information in this manual, but Shenzhen Ai-Thinker Technology Co., Ltd. does not ensure that the contents of the manual are completely true, All statements and information in this manual, and the recommendations do not constitute for any warranty, express or implied.

Change History of Revision

Version	Date	Develop / revise content	Maker	Approval
V0.9	2019.05.05	First developed	Xiaofei Yang	
V1.0	2019.10.30	Data update	Yiji Xie	

Contents

一、 Product Overview.....	5
二、 Electrical parameters.....	7
三、 Appearance size.....	10
四、 Pin definition.....	10
五、 Schematics.....	11
六、 Design Guidance.....	12
七、 Reflow Welding Curve.....	14
八、 Package Information.....	15
九、 Contacts.....	15

一、 Product Overview

AB-01 is a general-purpose Bluetooth module designed by Ensign Technology for the Internet of Things. widely. It can be used for other smart appliances such as smart lights, smart sockets, smart air conditioners. The core of this module is Loda AB1611 chip, which has the characteristics of abundant peripherals and low power consumption. The processor has a 32-Bit Andes architecture, and the clock frequency can be adjusted from 16MHz to 72MHz. Built-in 512Kbyte programmable Flash, 64Kbyte SRAM. A 16-bit 16kHz ADC can be used for audio data acquisition.

The AB-01 module complies with BT 5.0 and SIG Mesh specifications. It can form a Mesh network directly through a smartphone, and can also be connected to smart speakers such as Tmall Genie and Xiao Ai. It is suitable for a variety of smart home application scenarios.

Features

- 32-bit MCU, main frequency 16MHz – 72MHz adjustable
- 512 Kbyte on-chip programmable flash
- 64 Kbyte SRAM on one side
- Compliant with BT 5.0 protocol specifications
- Compliant with SIG Mesh protocol specifications
- Maximum transmit power can reach 10dBm
- It can be connected with smart speakers such as Tmall Elf and Xiao Ai
- DIP pin design for easy application on smart lights

Main Specification

List 1 specification

Model Name	AB-01
Packaging	DIP-10
Size	26.0*18.2*3.0(±0.2)MM
Output power	10±2dBm
Sensitivity	-94dBm
Consumption (typical)	Tx@9.5dBm : 27.9mA Tx@0dBm : 11.44mA Rx@9.5 dBm :11.8mA Rx@0 dBm :8.4mA Sleep: 4uA Deep-Sleep : 0.6uA
Work Temperature	-20 °C ~ 70 °C
Storage Temperature	-40 °C ~ 125 °C , < 90%RH
Voltage	2.7V ~ 3.6V, default 3.3V
IO Quantity	5
Certification	SRRC

二、Electrical parameters

Electrical character

Absolute Maximum Rating (Any exceeding the following absolute maximum ratings may cause damage to AB1611)

Item	Min	Max	Unit
I / O power supply voltage(VCCIO)	-0.3	3.6	V
Analog / RF supply voltage (VCCANA, VCCRF)	-0.3	2.0	V
Work Temperature	-40	+85	°C
Storage Temperature	-40	+125	°C

Recommended operating conditions

Item	Min	Typical	Max	Unit
Voltage (VBAT)	2.7	3.3	3.6	V
Analog voltage (VCCANA)		1.5		V
RF voltage (VCCRF)		1.7/1.9		V
I/O voltage (VCCIO)	1.7		3.6	V

Output power

Item	Min	Typical	Max	Unit	
Average power	-	9	-	dBm	
In-band scattering	≥ 3MHz	-	3	dBm	
	+2MHz	-	-30	dBm	
	-2MHz	-	-20	dBm	
	≤-3MHz	-	-30	dBm	
Modulation	Δ f1avg	225	-	275	KHz

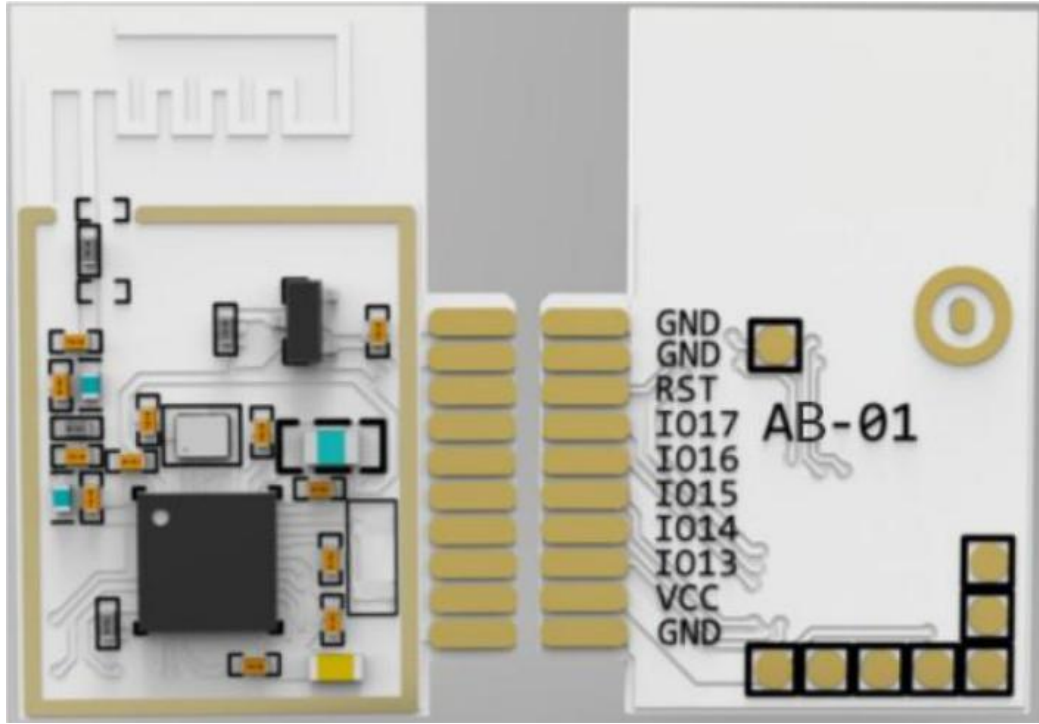
characteristics	Percent of $\Delta f_{2max} > 185kHz$	99.9	-	100	%
	$\Delta f_{2avg} / \Delta f_{1avg}$	-	1	-	
Center frequency deviation, F_n ($n=0,1,2,\dots,k$)		-150	-	+150	KHz
Frequency offset, $ F_0-F_n $ ($n=0,1,2,\dots,k$)		-50	-	+50	KHz
Initial frequency offset, $ F_1-F_0 $		-20	-	+20	KHz
Maximum frequency offset rate, $ F_n-F_{n-5} $ ($n=6,7,8,\dots,k$)		-20	-	+20	KHz/ 50us
Harmonics (cable mode)		-	-45	-	dBm

Receiving sensitivity

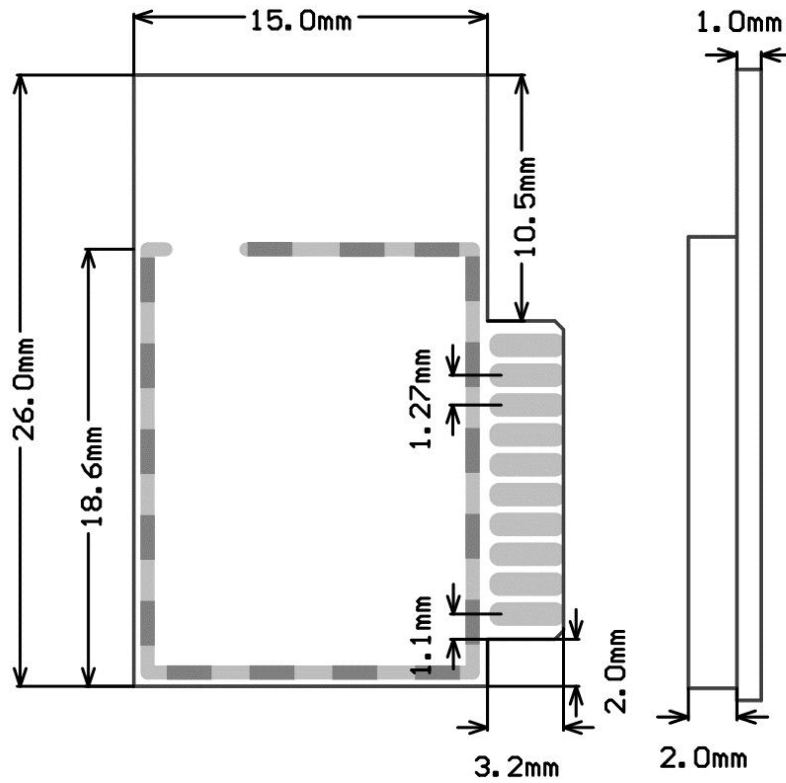
Item		Min	Typical	Max	Unit
Sensitivity		-	-94	-	dBm
Maximum input level		-	-10	-	dBm
Co-channel interference, C / I		-	-	21	db
Adjacent channel interference, C / I	$F = F_0+1MHz$	-	-	3	db
	$F = F_0-1MHz$	-	-	-30	db
	$F = F_0+2MHz$	-	-	-20	db
	$F = F_0-2MHz$ (image+1)	-	-	-30	db
	$F = F_0+3MHz$	-	-	-27	db
	$F = F_0-3MHz$ (image)	-	-	-9	db
Intermodulation		-50	-	-	dBm
blockade	30-2000 MHz	-30	-	-	dBm
	2003-2399 MHz	-35	-	-	dBm
	2484-2997 MHz	-35	-	-	dBm
	3000-12750 MHz	-30	-	-	dBm

PER report Integrity	-	50	-	%
----------------------	---	----	---	---

Appearance

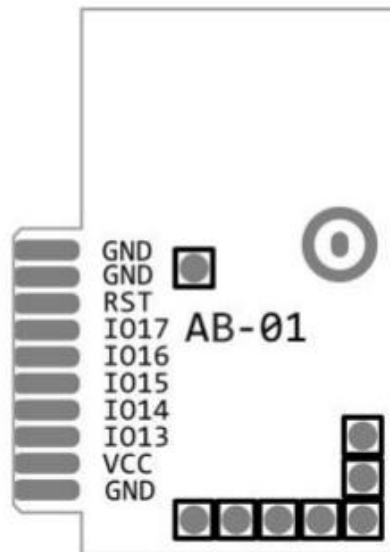


三、Appearance size



四、Pin definition

The AB-01 module has a total of 10 interfaces. As the pin diagram, the pin function definition table is the interface definition.

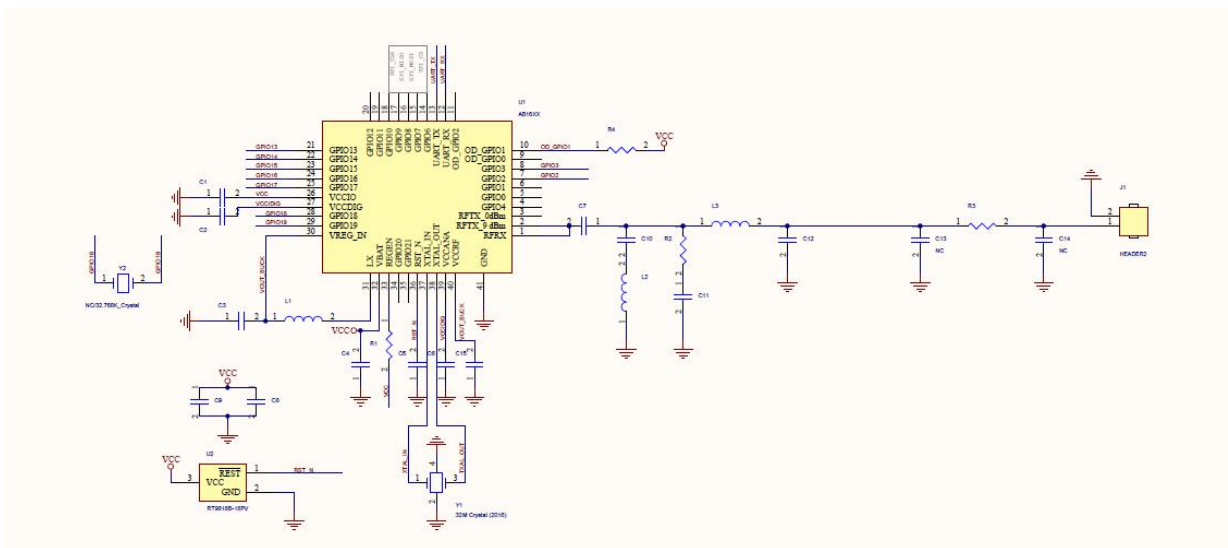


AB-01 Pin diagram

List Pin function definition

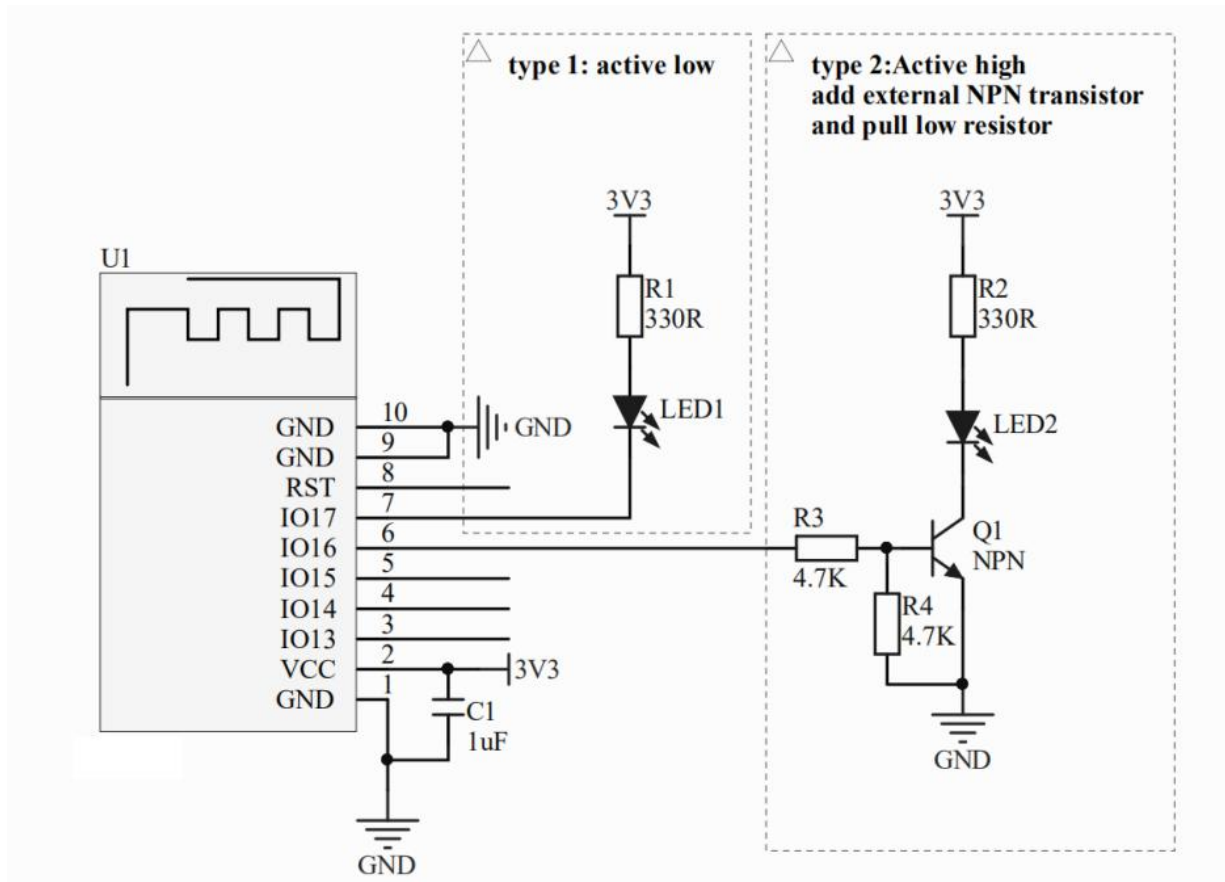
Pin No.	Name	Function description
1	GND	Ground
2	VCC	Power supply, 3.3V typical
3	IO13	GPIO13
4	IO14	GPIO14
5	IO15	GPIO15
6	IO16	GPIO16
7	IO17	GPIO17
8	RST	Reset
9	GND	Ground
10	GND	Ground

五、Schematics



六、Design Guidance

1、Application circuit



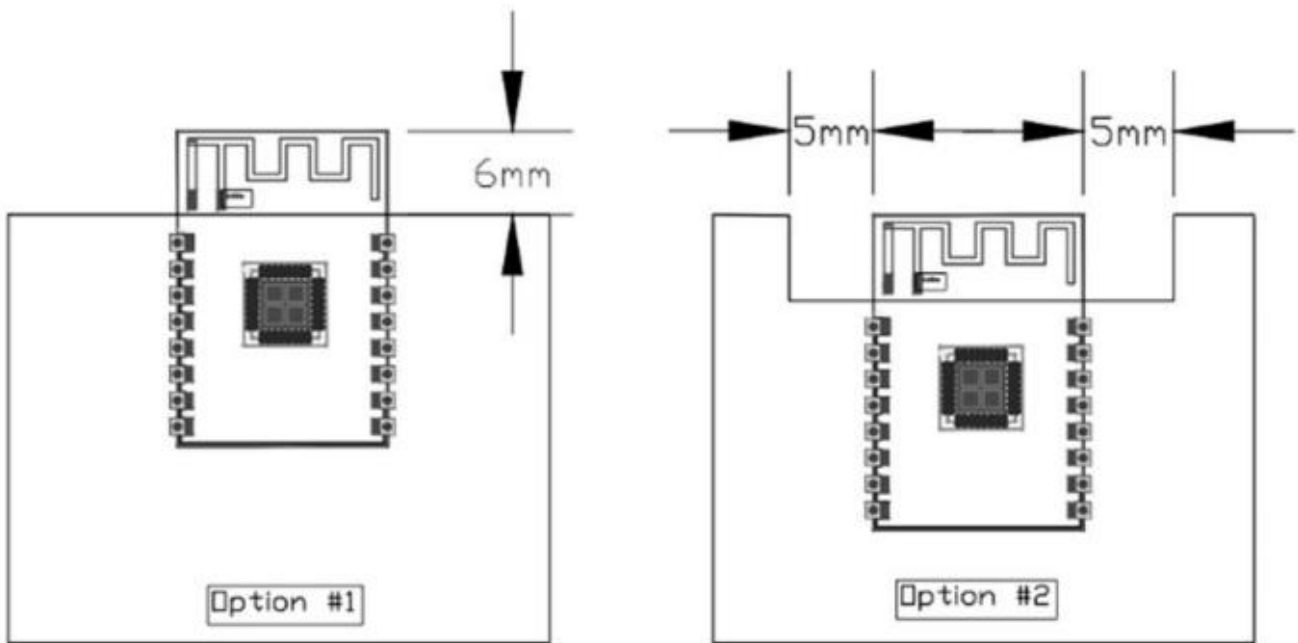
2、Antenna layout requirements

For the installation position on the motherboard, the following two methods are recommended:

Solution 1: Place the module on the edge of the motherboard, and the antenna area extends beyond the edge of the motherboard.

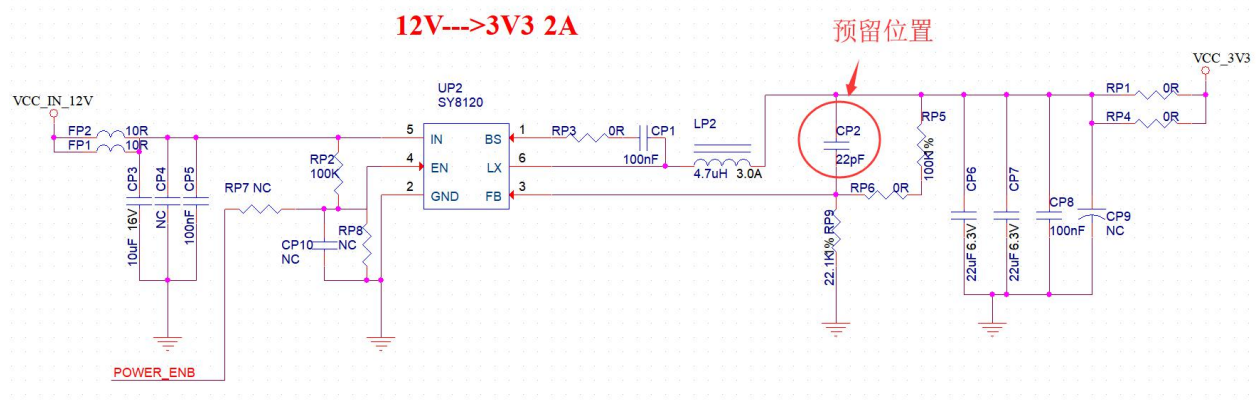
Solution 2: Place the module on the edge of the motherboard, and the edge of the motherboard hollows out an area at the antenna position.

In order to meet the performance of the on-board antenna, it is prohibited to place high-frequency devices or metal parts around the antenna.



3、Power

- (1) Recommended 3.3V voltage, peak current above 100mA
- (2) It is recommended to use LDO power supply; if using DC-DC, it is recommended to control the ripple within 30mV.
- (3) The DC-DC power supply circuit is recommended to reserve the position of the dynamic response capacitor, which can optimize the output ripple when the load changes greatly.
- (4) 3.3V power interface is recommended to add ESD devices.

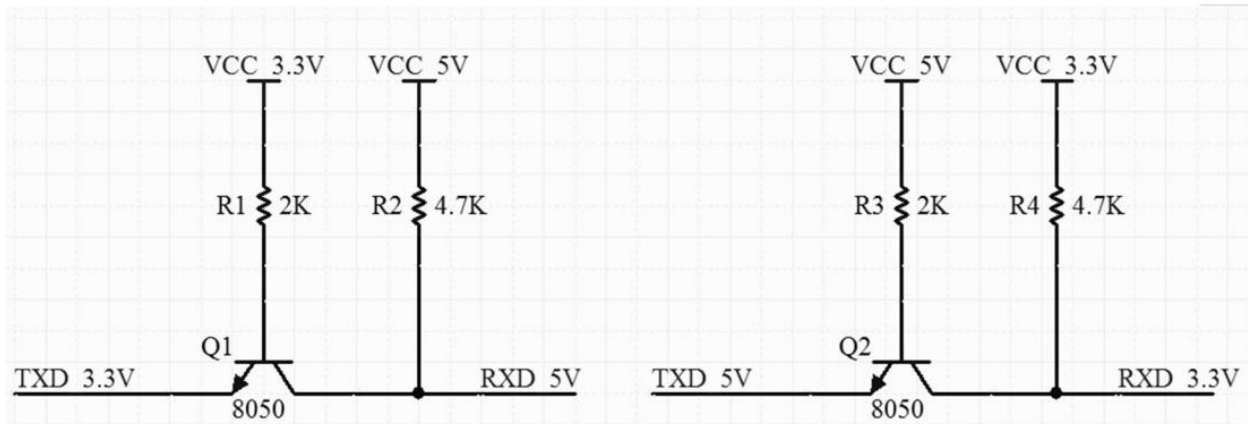


4、Use of GPIO port

- (1) There are some GPIO ports on the periphery of the module. If you need to use a 10-100 ohm resistor in series with the IO port, it is recommended. This can suppress the overshoot, make the levels on both sides more stable, and help both EMI and ESD.
- (2) The special IO port is pulled up and down, please refer to the instruction manual of the specification, this will affect the startup configuration of the module.
- (3) The IO port of the module is 3.3V. If the IO level of the main control and the module does not match, a

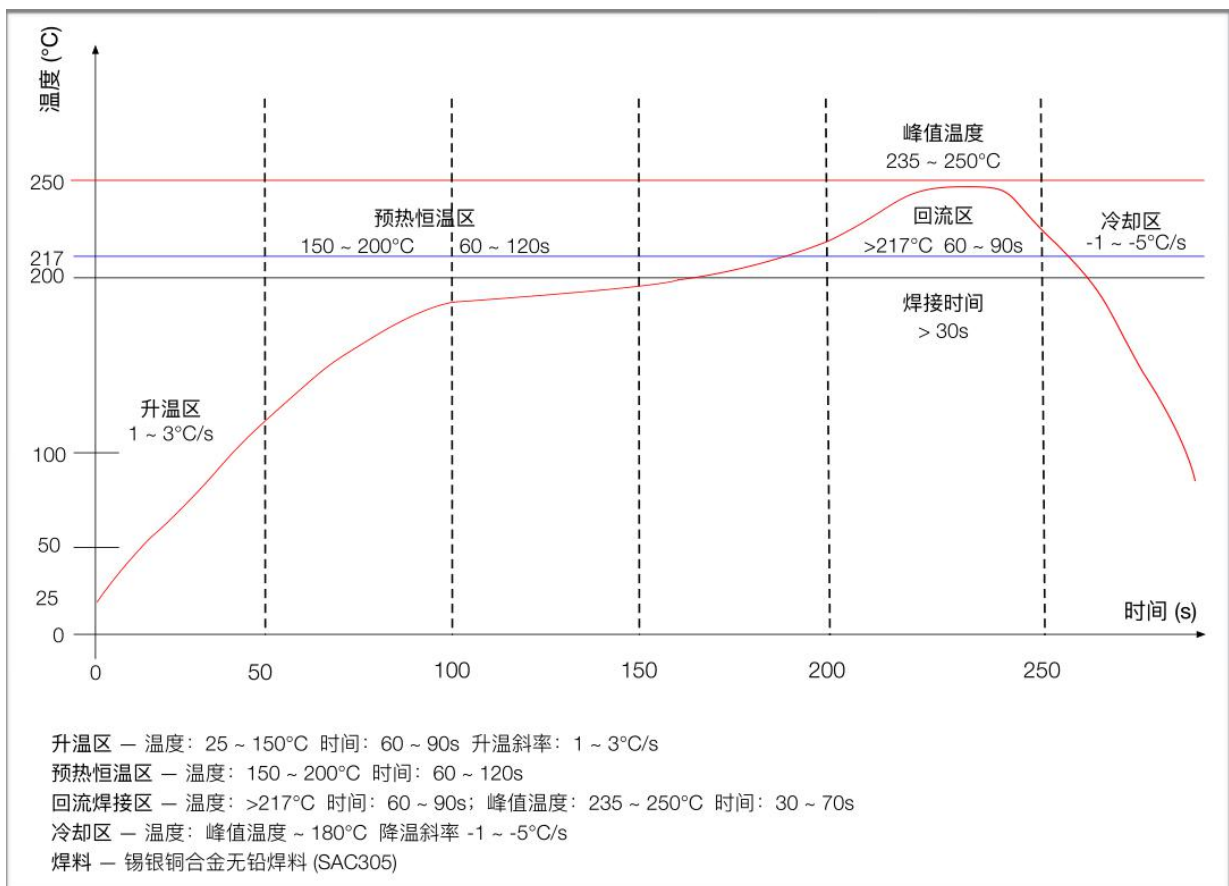
level conversion circuit needs to be added.

(4) If the IO port is directly connected to a peripheral interface, or a pin or other terminal, it is recommended to reserve an ESD device near the terminal of the IO trace.



Level-shifting circuit

七、Reflow Welding Curve



八、 Package Information

As shown below, the packaging of AB-01 is taping.



九、 Contacts

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

Developer DOCS: <https://docs.ai-thinker.com>

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

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

Business cooperation: sales@aithinker.com

Technology support: support@aithinker.com

Company address : 410, Building C, Gufeng Huafeng Smart Innovation Port, Xixiang, Baoan District, Shenzhen

Contacts: 0755-29162996

