BW16 Datasheet

Version V1.2

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Change History of Revision

Version	Date	Contents of Revision Change	Compilation	Verify
V0.9	2019.06.15	Initial release	Yang Xiaofei	Hong Xu
V1.0	2019.10.29	Updated	Xie Yiji	Hong Xu
V1.1	2021.02.05	Updated flash	Xie Yiji	Hong Xu
V1.2	2023.08.30	Updated temperature picture	Li xiaocheng	Hong Xu

目录

Ⅰ. Product overview

BW16 is a dual-frequency Wi-Fi Bluetooth SoC module based on RTL8720DN. BW16 supports dual-frequency (2.4ghz or 5ghz) WLAN and low-power Bluetooth 5.0; it integrates ARM V8 (compatible with Cortex-M4F) high-performance MCU, ARM V8M (compatible with Cortex-M0) low-power MCU, WLAN(802.11 a / b / g / n), MAC, Bluetooth baseband and RF baseband) and provides a set of configurable GPIO ports for the control of different peripherals.
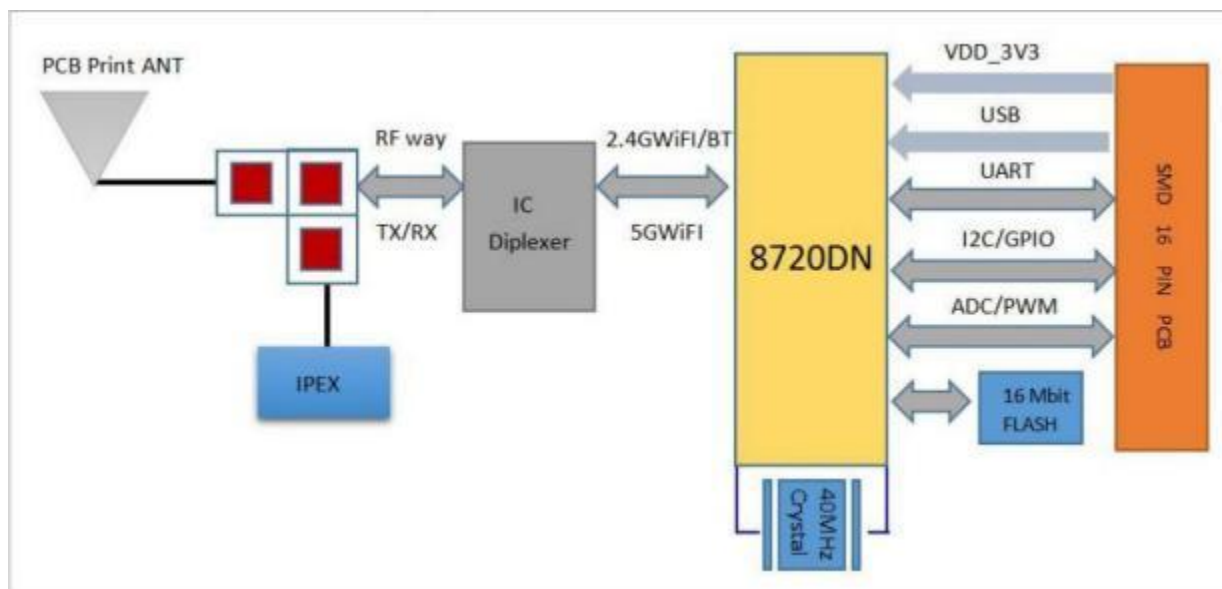
Features

■ Support 802. 11a/b/g/n 1x1 ， 2.4GHz or 5GHz.

■ Support HT20/HT40 mode .

■ Support for low power beacon listening mode, low power reception mode and low power pending mode.

■ Embedded AES / DES / SHA hardware engine.

■ Support TrustZone-M and safed start up.

- ■ Support SWD debug port access protection and prohibition mode.

- ■ Support BLE5.0

- ■ Bluetooth supports high power mode （7dBm ，share the same PA with WiFi）

- ■ Wi-Fi and BT share the same antenna.

- ■ Support STA/AP/STA+AP operating mode

- ■ Support the Smart Config（APP）/AirKiss(wechat) of Android 、IOS (One-click distribution network

- ■ Support serial port local upgrade and remote firmware upgrade （FOTA）

Parameters

Figure 1 Main Parameter

Model	BW16
Package	SMD-16
Size	24*16*3(±0.2)MM
Antenna	PCB or IPEX antenna
Frequency range	2400-2483.5MHz or 5180-5825MHz
Bluetooth	BLE 5.0
Bluetooth frequency range	2.402GHz - 2.480GHz
Operating temperature	-40 ℃ ˜ 85 ℃
Storage Environment	-40 ℃ ˜ 125 ℃ ，< 90%RH
Power supply	Voltage 3.0V ˜ 3.6V, Typ:3.3V, current >450mA
Interface	UART/GPIO/ADC/PWM/IIC/SPI/SWD
Certification	RoHS、FCC、CE、SRRC
FLASH	Default 16Mbit (Support 16Mbit/32Mbit/64Mibt/128Mbit)

II. Electrical parameter

Noted：

　　BW16 module is an electrostatic sensitive device, which needs special ESD precautions.When usd ESD protective devices should be added. The correct ESD processing and packaging must be adopted in the transportation, operation and use of BW16 modules. Do nottouch the module by hand or weld with a non-antistatic soldering iron to avoid damage to the module.

Parameter	Min	Typ	Max	Unit
DC 3.3V (with internal regulator and integration CMOS PA)	3.0	3.3	3.6	V
Figure I/O supply voltage	1.76	1.8-3.3	3.3	mA
DC_IO_33 (3.3V I / O rated current)			50	mA
Electrostatic protection（VESD）			2000	V

Radio Performance

Description	Typ	Unit
Operating frequency	2400-2483.5 or 5180-5825	MHz
Output Power		
11a mode, PA output power	14±2	dBm
11n mode, PA output power	14±2	dBm
11g mode, PA output power	15±2	dBm
11b mode, PA output power	16±2	dBm
Bluetooth output power	7±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
Bluetooth Sensitivity	<=-92	dBm

III. Appearance size
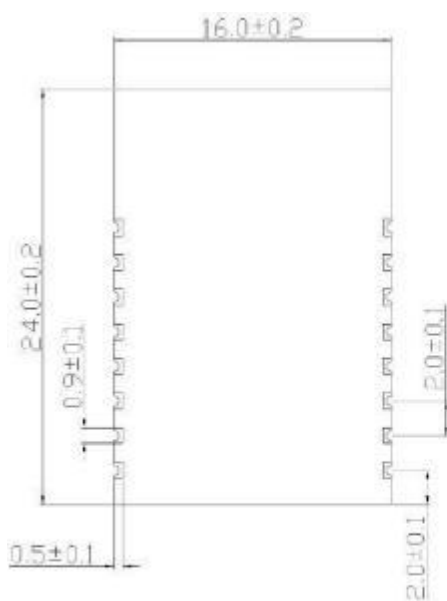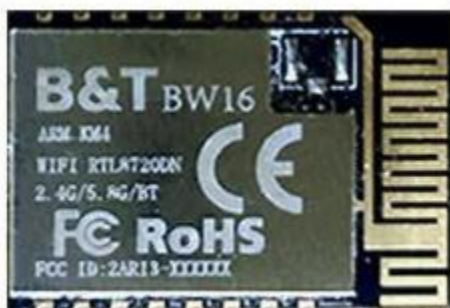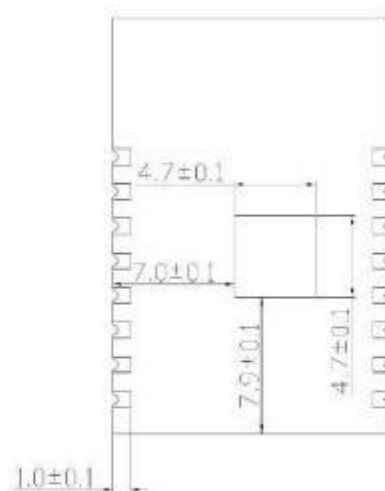
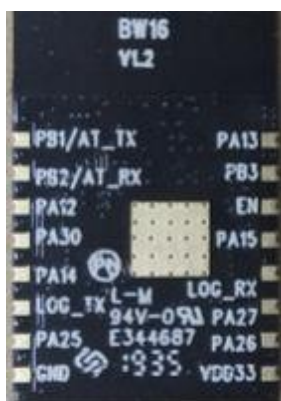正面　　　　　　　　　　　　　　　　背面

IV. Pin definition

BW16 has 16 interface，refer to following Pin diagram ，table 2.2 is definition of interfaces.


BW16 Pin diagram

Table 2.2 Pin function definition

No.	Name	Function
1	PA13	LP_PWM1/SPI1_MISO
2	PB3	ADC/SWD_CLK
3	CHIP_EN	Chip enable port
4	PA15	SPI1_CS
5	PA8	UART_LOG_RXD
6	PA27	SWD_DATA
7	PA26	LP_I2C_SDA/LP_PWM5
8	VDD_3V3	3.3V (VDD) ; Max: 450mA
9	GND	Ground
10	PA25	LP_I2C_SCL/LP_PWM4
11	PA7	UART_LOG_TXD
12	PA14	SPI1_CLK
13	PA30	LP_PWM1
14	PA12	SPI1_MOSI/LP_PWM0
15	PB2	LP_UART_RXD
16	PB1	LP_UART_TXD

V. Schematics
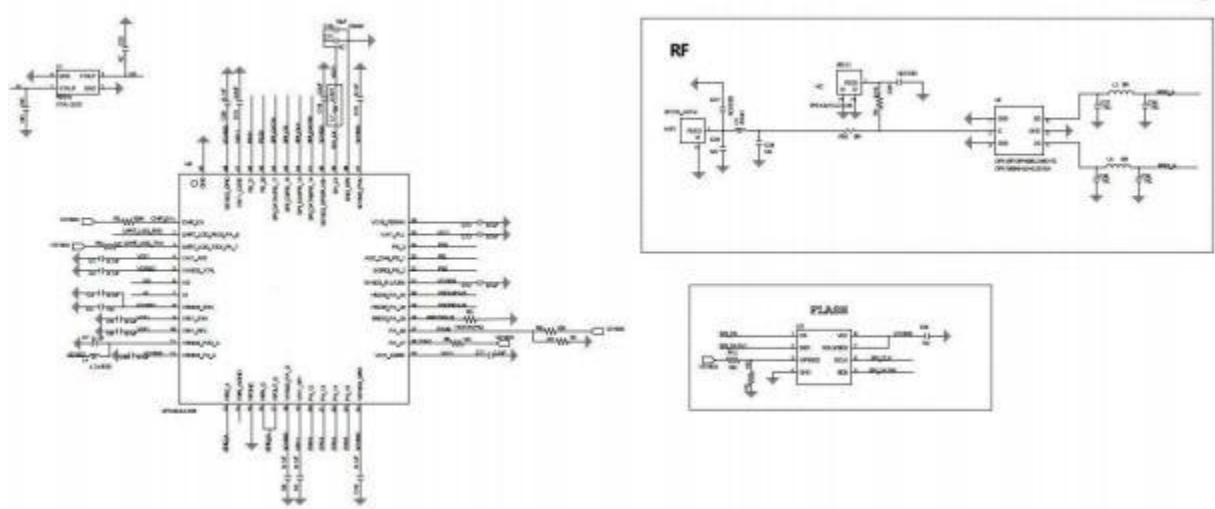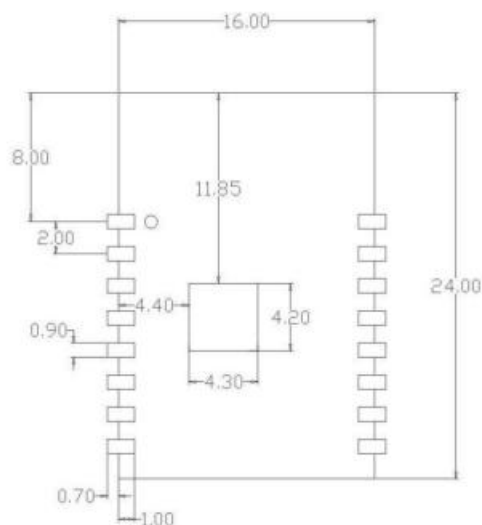

# VI. Design Guidance

1、Application Circuit
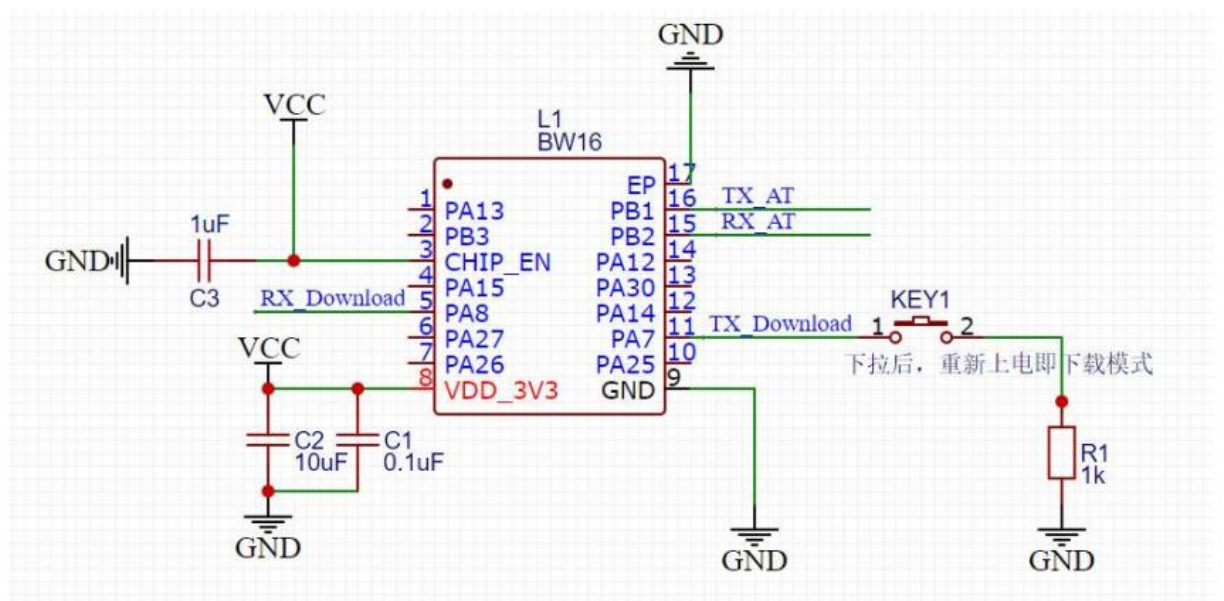
2、Dimension

3、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.
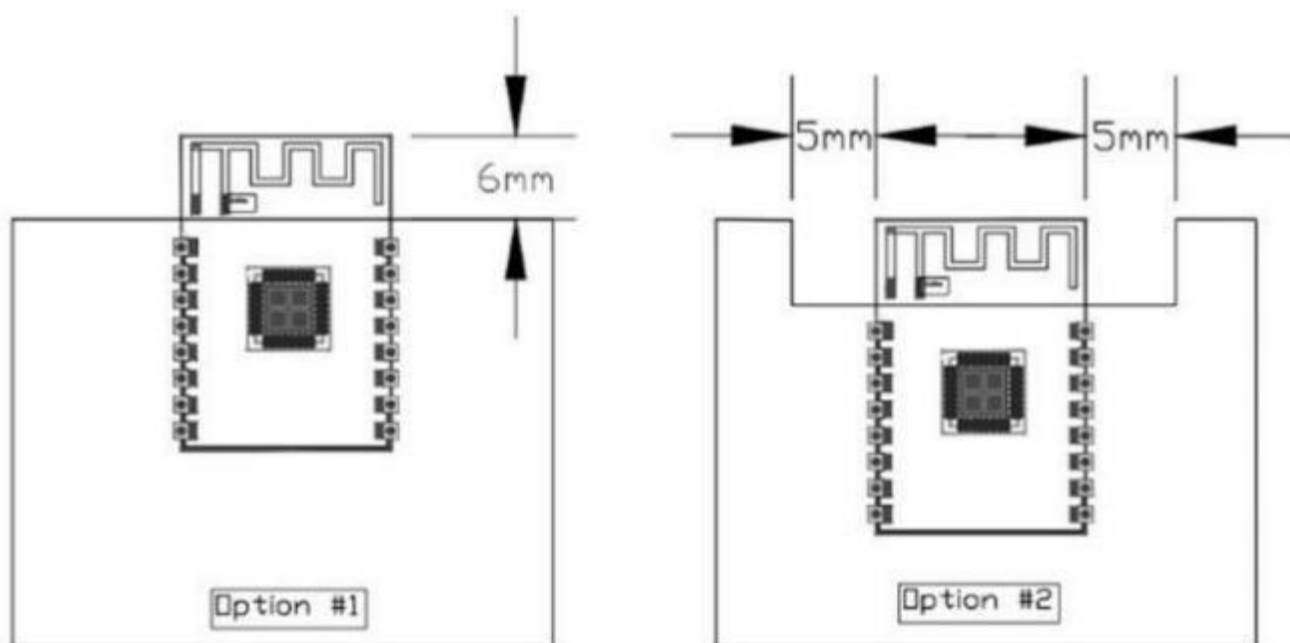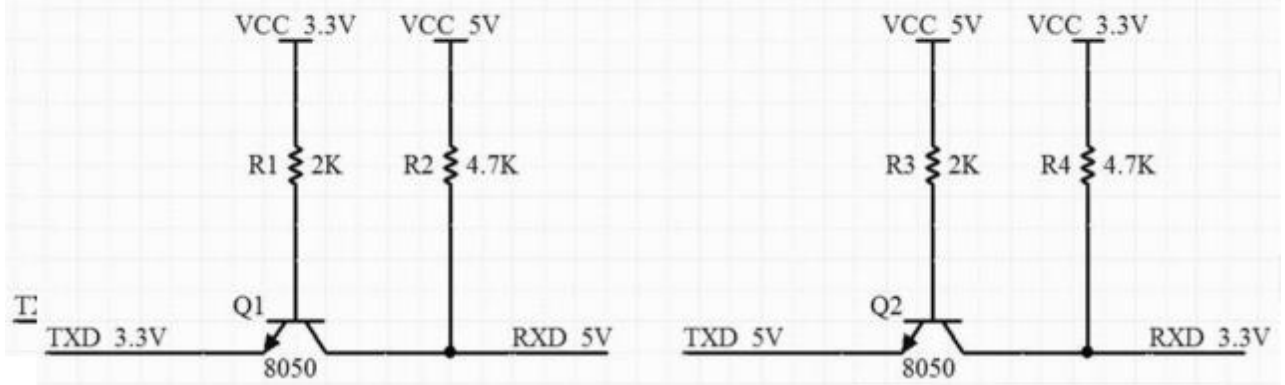

4、Power Supply

(1) Recommended voltage 5V, Peak:Current over 500mA .

(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.
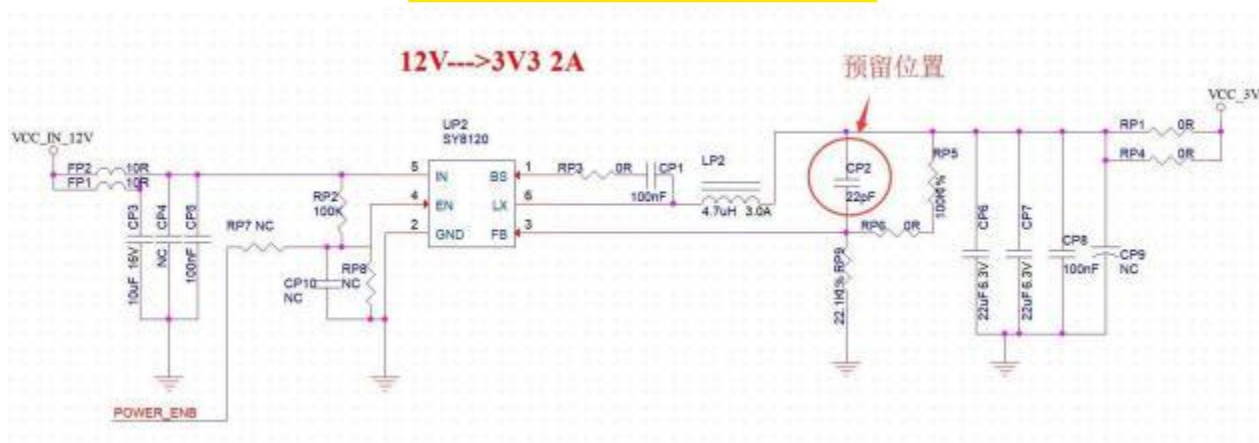
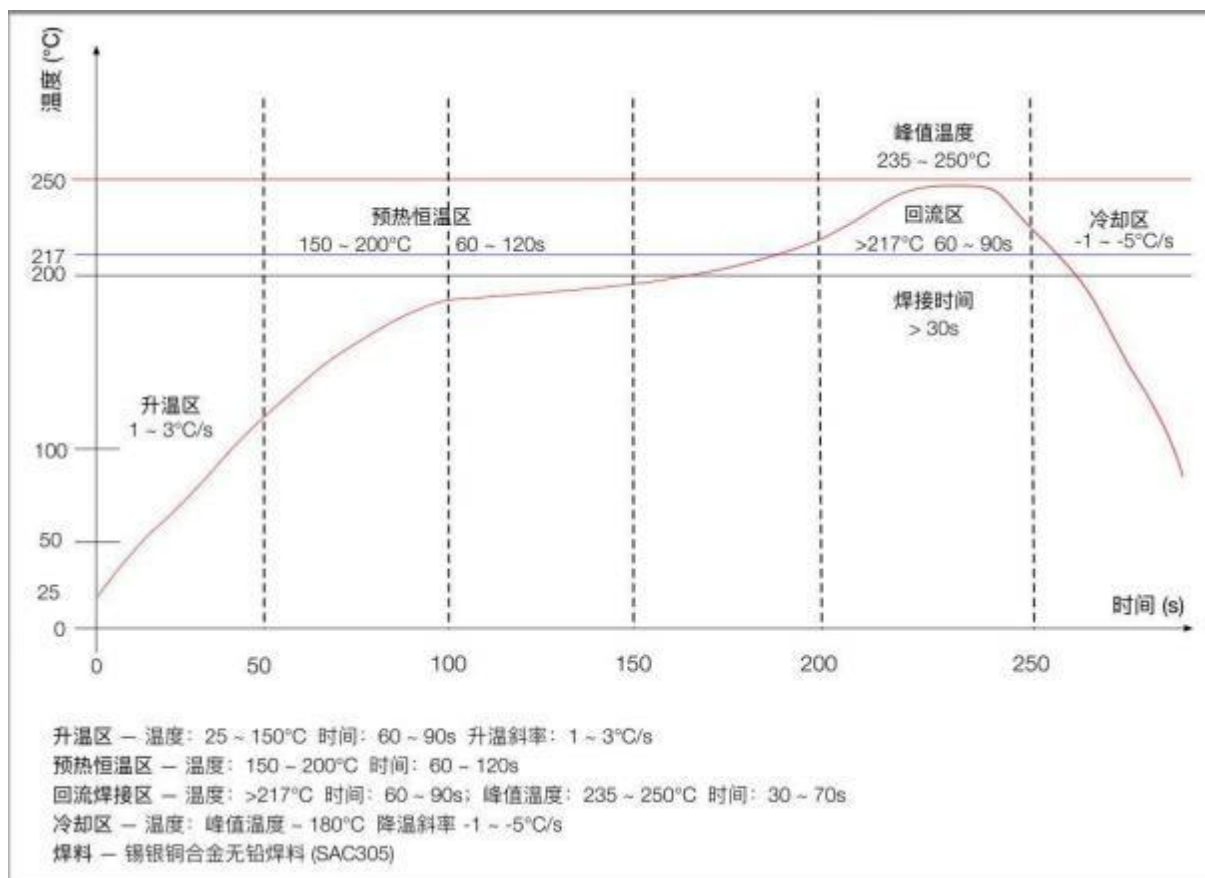
5、GPIO

(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

VII. ROLLING OF Reflow soldering

温度 (°C)

250

217
200

100

50

25
0

峰值温度
235 ~ 250°C

预热恒温区
150 ~ 200°C   60 ~ 120s

回流区
>217°C 60 ~ 90s

冷却区
-1 ~ -5°C/s

焊接时间
> 30s

升温区
1 ~ 3°C/s

时间 (s)

0   50   100   150   200   250

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)

VIII. Package Information

As shown below,the packing of BW16 is a tape.

IX. 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

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