SPECIFICATION

IEEE 802.11 b/g/n 2.4GHz 1T1R WiFi with Bluetooth2.1 /3.0/4.0,with SDIO INTERFACE, and HS-UART MIXED INTERFACE

RL-SM02BD (Realtek RTL8723BS) Combo Module

Version 1.0

PRODUCT DESCRIPTION

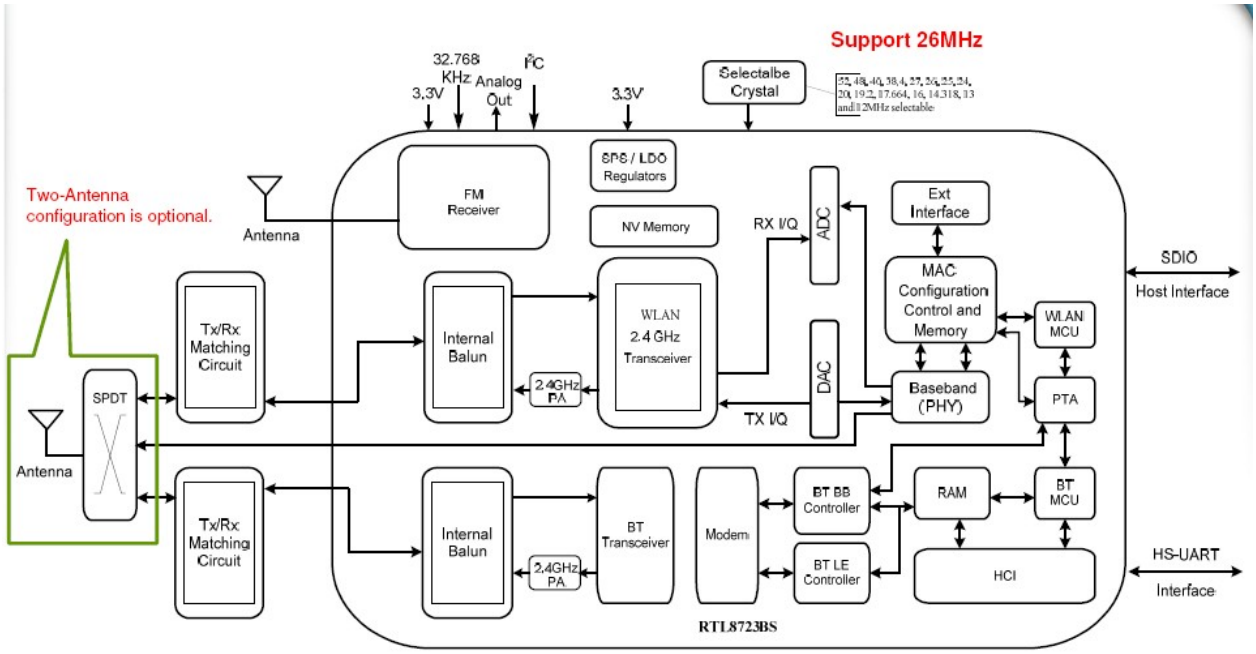
SM02BD is a small size and low profile of WiFi+BT combo module with LGA (Land-Grid Array) footprint, board size is 12mm*12mm with module height of 2mm. It can be easily manufactured on SMT process and highly suitable for tablet PC, ultra book, mobile device and consumer products. It provides GSPI/SDIO interface for WiFi to connect with host processor and high speed UART interface for BT. It also has a PCM interface for audio data transmission with direct link to external audio codec via BT controller. The WiFi throughput can go up to 150Mbps in theory by using 1x1 802.11n b/g/n MIMO technology and Bluetooth can support BT2.1+EDR/BT3.0 and BT4.0.

SM02BD uses Realtek RTL8723BS, a highly integrated WiFi/BT single MODULE based on advanced COMS process. RTL8723BS integrates whole WiFi/BT function blocks into a chip, such as SDIO/UART, MAC, BB, AFE, RFE, PA, EEPROM and LDO/SWR, except fewer passive components remained on
PCB.

PRODUCT FEATURES

- Operate at ISM frequency bands (2.4GHz)
- GSPI/SDIO for WiFi and UART for Bluetooth
- IEEE standards support: IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i
- Fully Qualified for Bluetooth 2.1 + EDR specification including both 2Mbps and 3Mbps modulation mode
- Fully qualified for Bluetooth 3.0
- Fully qualified for Bluetooth 4.0 Dual mode
- Full –speed Bluetooth operation with Piconet and Scatternet support.
- Enterprise level security which can apply WPA/WPA2 certification for WiFi.
- WiFi 1 transmitter and 1 receiver allow data rates supporting up to 150 Mbps downstream and 150 Mbps upstream PHY rates
- For WiFi/BT, it uses fixed path for WiFi and BT, which means one antenna assigned for WiFi and the other is assigned for BT.
- Support Bluetooth adaptive power management mechanism
- Full-featured software utility for easy configuration and management
- RoHS compliance
- Low Halogen compliance

Diagram



Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-55	+125	℃
Ambient Operating Temperature	0	70	℃
Junction Temperature	0	125	℃

PRODUCT SPECIFICATIONS

Main chipset :WiFi/BT Single Chip: Realtek RTL8723BS

Functional Specifications

Standards	***WiFi:*** EEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i ***BT:*** V2.1+EDR/BT v3.0/BT v3.0+HS/BT v4.0
Bus Interface	***WiFi:*** GSPI/SDIO ***BT:*** UART
Data Rate **Media Access Control**	**802.11b:** 11, 5.5, 2, 1 Mbps **802.11g:** 54, 48, 36, 24, 18, 12, 9, 6 Mbps **802.11n:** MCS 0 to 7 for HT20MHz MCS 0 to 7 for HT40MHz **BT:** 1 Mbps for Basic Rate 2,3 Mbps for Enhanced Data Rate 6,9,12,18,24,36,48,54 Mbps for High Speed **WiFi:** CSMA/CA with ACK **BT:** AFH, Time Division
Modulation Techniques	**802.11b:** CCK, DQPSK, DBPSK **802.11g:** 64 QAM, 16 QAM, QPSK, BPSK **802.11n:** 64 QAM, 16 QAM, QPSK, BPSK **BT:** 8DPSK, π/4 DQPSK, GFSK
Network Architecture	**WiFi:** Ad-hoc mode (Peer-to-Peer) Infrastructure mode Software AP WiFi Direct **BT:** Pico Net Scatter Net
Operating Channel	**WiFi 2.4GHz:**

<table>
<tr><td></td><td colspan="3">11: (Ch. 1-11) – United States
13: (Ch. 1-13) – Europe
14: (Ch. 1-14) – Japan

BT 2.4GHz:
Ch. 0 ~78</td></tr>
<tr><td>Frequency Range</td><td colspan="3">2.400GHz ~ 2.4835 GHz</td></tr>
<tr><td rowspan="5">Transmit Output Power – 1x1 (Tolerance:±1.5dBm)

Receiver Sensitivity

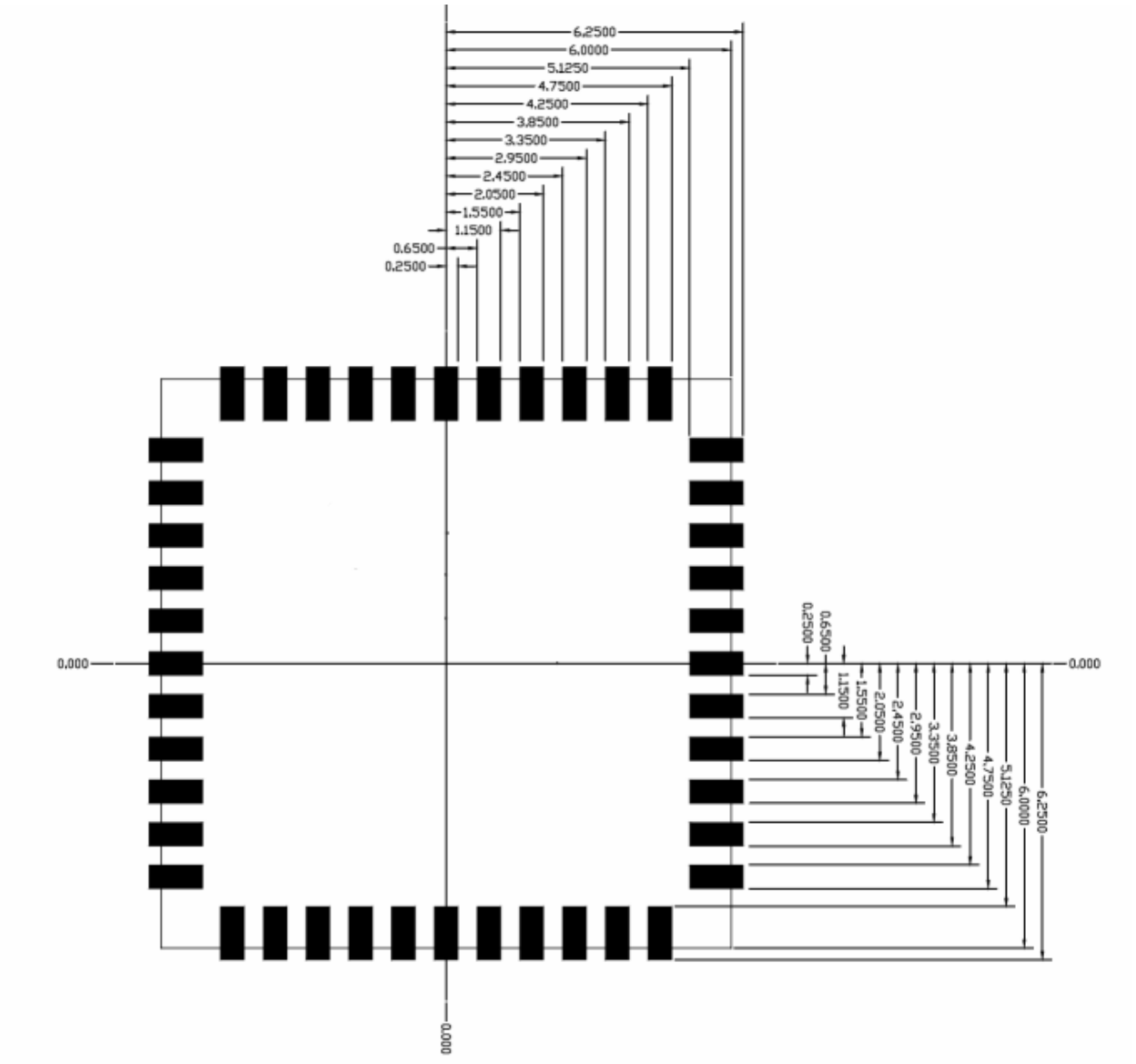
Security

Operating Voltage
OS supported</td><td>802.11b@11Mbps
16dBm</td><td>802.11g@6Mbps
15dBm
802.11g@54Mbps
14dBm</td><td>802.11n
13dBm (MCS 0_HT20)
13dBm (MCS 7_HT20)
12dBm (MCS 0_HT40)
12dBm (MCS 7_HT40)</td></tr>
<tr><td colspan="3">BT:
Max +10dBm</td></tr>
<tr><td>802.11b@11Mbps
-82dBm</td><td>802.11g@54Mbps
-71dBm</td><td>802.11n
-67dBm (MCS 7_HT20)
-64dBm (MCS 7_HT40)</td></tr>
<tr><td colspan="3">BT:
-89dBm@1Mbps, -90dBm@2Mbps, -83dBm@3Mbps</td></tr>
<tr><td colspan="3">WiFi :
WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i

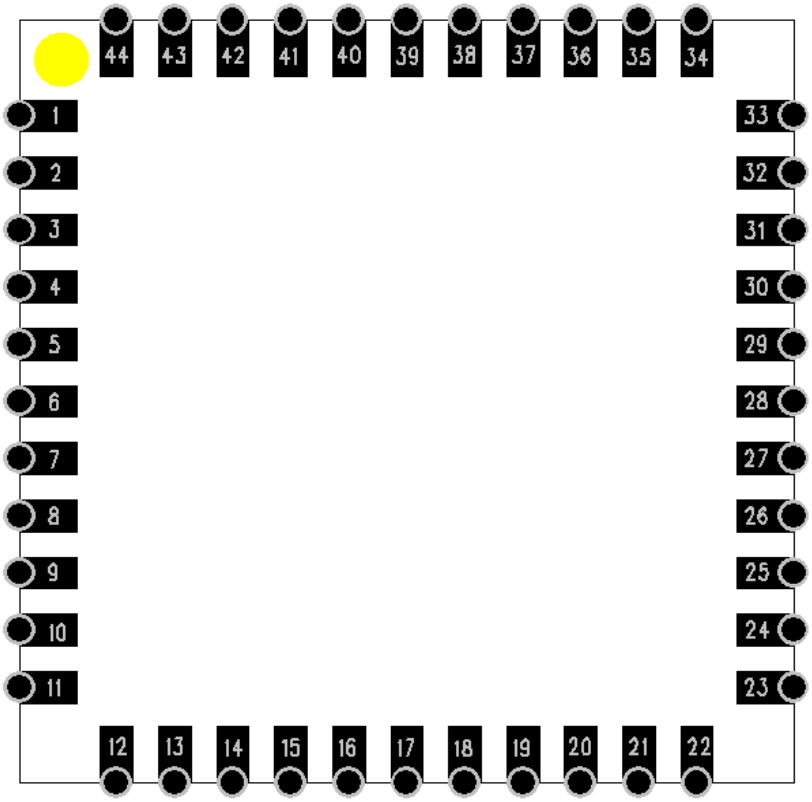
BT:
Simple Paring</td></tr>
<tr><td>Operating Voltage</td><td colspan="3">3.3 V ±9% I/O supply voltage</td></tr>
<tr><td>OS supported</td><td colspan="3">Linux/Android</td></tr>
<tr><td>Power Consumption (3.3V) (Typical)</td><td colspan="3">WiFi only
TX Mode: (Conituous mode)
85mA (MCS7/BW40/13dBm)
RX Mode: (Conituous mode)
75mA (MCS7/BW40/-60dBm)
Associated Idle with DTIM=1
2.1mA
Unassociated Idle:
0.1mA
RF disable Mode:
0.1mA
BT :
Inquiry & Page Scan:
0.9 mA
ACL no traffic:
7.5mA
SCO HV3:
15mA</td></tr>
</table>

Mechanical

Dimensions (mm)	Length	Width	Height
	12 (Tolerance:±0.2mm)	12 (Tolerance:±0.2mm)	1.6 (Tolerance:±0.2mm)



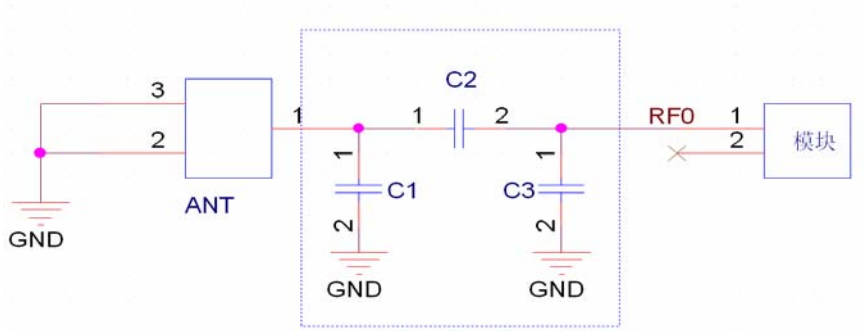
MODULE PIN ASSIGNMENT



PIN	Function	Description
1	GND	Grond
2	WIFI/BT_ANT	WIFI/BT_ANT
3	NC	NC
4	NC	NC
5	NC	NC
6	BT_WAKE	HOST wake-up Bluetooth device
7	BT_HOST_WAKE	Bluetooth device to wake-up HOST
8	NC	NC
9	VABT	3.3V±0.1V(Main power voltage source input)
10	NC	NC

11	NC	NC
12	WL_DSI#	Shared with GPIO9 This Pin Can Externally Shutdown the RTL8723BS WLAN function when BT_DISn is Pulled Low. When this pin deasserted, SDIO interface will be disabled. This pin can also support the WLAN Ra dio-off function with host interface remaining connected.
13	WL_HOST_WAKE	WLAN to wake-up HOST
14	SD_D2	SDIO data line 2
15	SD_D3	SDIO data line 3
16	SD_CMD	SDIO command line
17	SD_CLK	SDIO CLK line
18	SD_D0	SDIO data line 0
19	SD_D1	SDIO data line 1
20	GND	Grond
21	NC	NC
22	VDD_IO	3.3V±0.1V
23	NC	NC
24	SUSCLK_IN	Shared with GPIO6. External 32K or RTC clock input with 1.8V ~ 3.3V swing. This clock source is configured by BT and WL FW, respectively.
25	PCM_DOUT	PCM Data output
26	PCM_CLK	PCM Clock
27	PCM_DIN	PCM data input
28	PCM_SYNC	PCM sync signal
29	NC	NC
30	26MHz_IN	Reference clock input 26MHz Active Crystals (or if pin10/11 input ,pin30 NC)
31	GND	Grond
32	NC	NC
33	GND	Grond
34	BT_DIS#	General Purpose Input/Output Pin
35	NC	NC
36	GND	Grond
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC
41	GND	Grond
42	UART_OUT	HOST Data output
43	UART_IN	HOST Data input
44	UART_CTS	HOST_CTS

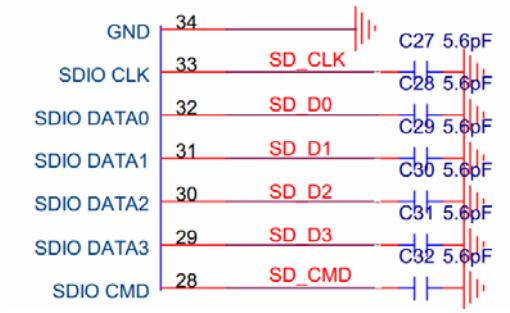
WIFI\BT RF Circuit reference pictures



注:1.以上虚线框的部分需要进行天线匹配，以实际天线匹配的电子元器件参数为准.
2.以上为 RF 走线要做 50 欧姆阻抗，走线不能走 90 度，走线长度不能超过 15mm.

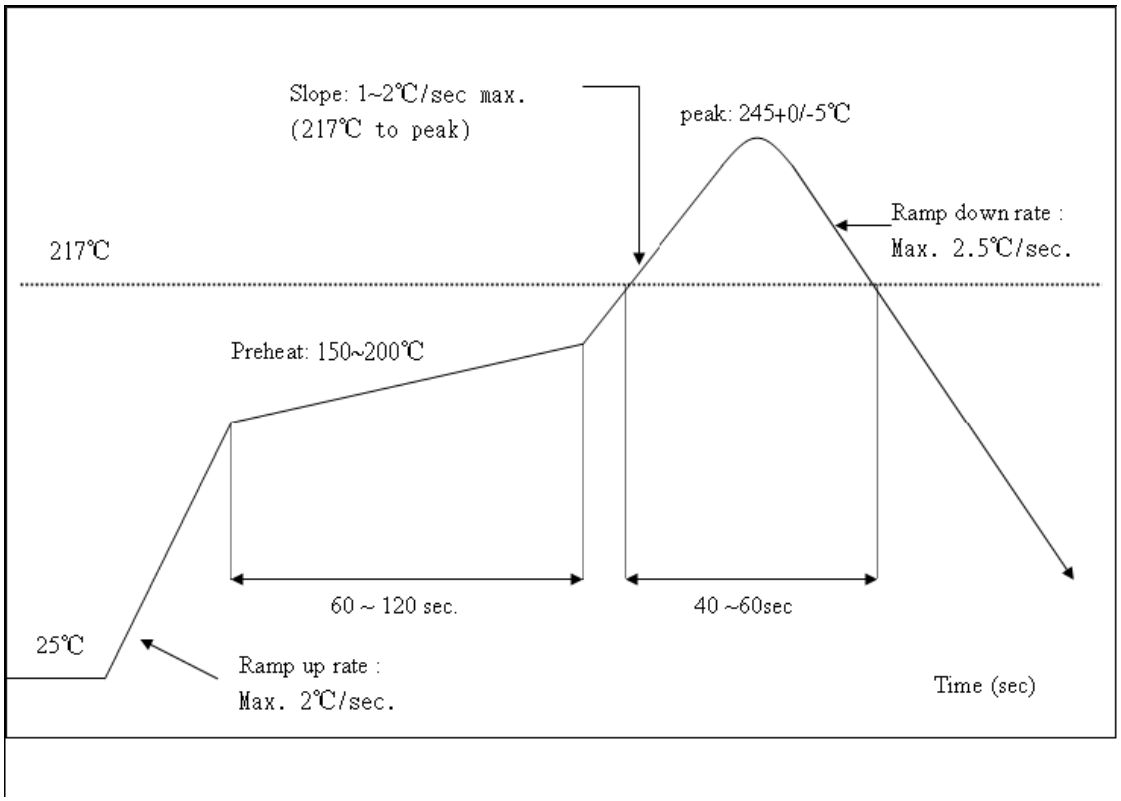
Note: The RF part layout must do 50 Ωimpedance.，can't get the line go 90°，can't get the line longer than 15 mm.

SDIO interface Circuit reference pictures



Recommended Reflow Profile

Referred to IPC/JEDEC standard.
Peak Temperature : <250°C
Number of Times : ≤2 times



ENVIRONMENTAL

Operating

Operating Temperature: 0°C to +70 °C
Relative Humidity: 5-90% (non-condensing)

Storage

Temperature: -40°C to +80°C (non-operating)
Relevant Humidity: 5-95% (non-condensing)

MTBF caculation

Over 150,000hours

Wireless module before the SMT note:

1.When customers Open stencil must be sure the hole bigger to the Wireless module plate, please press 1 to 1 and 0.7 mm is widened to open outward, the thickness of 0.12 mm.

2.Can't get the wifi module bare hands when needs,must we wear the gloves and static ring.

3.The furnace temperature according to the size of the customer the mainboard ,generally like to stick on a tablet standard temperature of 250 + - 5,can do 260 + - 5.

Storage and use Wifi module control should pay attention to the following matters:

1.Module of the storage life of vacuum packaging：

1-1.Storage life：12 months. Storage conditions:<40℃. Relative humidity:<90%R.H.

1-2.After this bag is opened , devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be :

1-3.Check the humidity card :stored at ≦20%RH.If :30%~40%(pink)or greater than 40%(red).Labeling module has moisture absorption.

① Mounthed within 168 hours at factory conditions of: t≦30%℃，≦60%R.H.

② Once opened, the workshop the preservation of life for 168 hours.

1-4.If baking is required,devices may be baked for:

① Modules must be to remove module moisture problem.

② Baking temperature: 125 ℃, 8 hours.

③ After baking, put proper amount of desiccant to seal packages.

1-5.Module vacuum packing 2000 PCS per disc.

2.Module reel packaging items as follows.

2-1.Storage life：12 months. Storage conditions:<40℃. Relative humidity:<90%R.H.

2-2.Module apart packing after 168 hours，To launch patch need to bake, to remove the module hygroscopic, baking temperature conditions：125℃，8hours.

2-3.Reel packing 2000 PCS or 1000 PCS per disc.

3.Module pallet packaging items as follows：

3-1.Storage life：3 months. Storage conditions:<40℃. Relative humidity:<90%R.H.

3-2.Module if not used within 48 hours, before launch the need for baking, baking temperature: 125 ℃, 8 hours.

3-3.Pallet packaging each plate is 100 PCS to 1000 PCS or 2000 PCS shipment.

Wifi 模块贴片装机前注意事项：

1.客户在开钢网时一定要将 wifi 模块焊盘的孔开大，请按 1 比 1 再向外扩大 0.7mm 比例开钢网，厚度按 0.12mm.

2.有需要拿 wifi 模块时不可以光手去拿，一定要戴上手套以及静电环.

3.过炉温度要根据客户主板的大小而定，一般像平板电脑上的标准温度为250+-5°，也可以做到260+-5°

Wifi 模块储存及使用管制应注意事项如下：

1.模块的真空包装之储存期限：

1-1.保存期限：12个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.

1-2.模块包装被拆后，SMT 组装之时限：

1-3.检查湿度卡：显示值应小于30%（蓝色），如：30%~40%(粉红色）或者大于40%（红色）表示模块已吸湿气.

① 工厂环境温度湿度管制：≦30%℃，≦60%R.H。

② 拆封后，车间的保存寿命为 168 小时.

1-4.如在拆封后的 168 个小时内未使用完，需要烘烤，烘烤条件如下：

① 模块须重新烘烤，以除去模块吸湿问题.

② 烘烤温度条件：125℃，8 小时.

③ 烘烤后，放入适量的干燥剂再密封包装.

1-5.模块真空包装每盘 2000pcs，真空包装图片<1>

2.模块卷盘包装事项如下：

2-1.保存期限：12个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.

2-2.模块拆开包装168小时后，如要上线贴片需要重新烘烤，以除去模块吸湿问题，烘烤温度条件：125℃，8小时。

2-3.卷盘包装标准为每盘 2000pcs，也可以 1000pcs.

3.模块托盘包装事项如下：

3-1.保存期限：3个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.

3-2.模块如在 48 小时内未使用，在上线之前需要进行烘烤，烘烤温度条件：125℃，8 小时。

3-3.托盘包装每盘为 100pcs，以 1000pcs 或 2000pcs 出货.