

# **SPECIFICATION**

**IEEE 802.11 b/g/n 2.4GHz 1T2R WiFi**

**RL-SM05-4004-V1.1 (QCA4004)  
SDIO Module**

Version 1.1

# 1.PRODUCT DESCRIPTION

The QCA4004 is an intelligent platform for the Internet of Everything that contains a low-power Wi-Fi connectivity solution on a single chip. It includes a number of TCP/IP-based connectivity protocols along with SSL, enabling a low-cost, low-complexity system to obtain full-featured internet connectivity and reliable information exchange.

The QCA4004 provides two interfaces for connecting to local system controllers. A UART-based host interface can be used for rapid development and deployment of simple data streams between the local device and the internet cloud. An SPI slave interface is available for applications that require more advanced connectivity to the network.

The QCA4004 Wi-Fi link is a full-featured, dual-band, single stream 802.11n solution. The Wi-Fi link is highly integrated, and includes an energy efficient on-board power amplifier and LNA. For the 2.4 GHz band, RF switches are also integrated. The QCA4004 Wi-Fi link is optimized for low system cost, and minimizes the number and cost of any components required to achieve a reliable Wi-Fi link.

## 2. Features

### 2.1 Wi-Fi Link features:

- IEEE 802.11n, Single Stream 1x1
- IEEE 802.11b/g/n 2.4 GHz
- Integrated PA, LNA, with support for external PA and external LNA
- Supports single or dual Rx front end for antenna diversity
- Green Tx power saving mode
- Low power listen mode
- Data rates up to 150 Mbps
- Full security support: WPS, WPA, WPA2, WAPI, WEP, TKIP

### 2.2 System cost optimization

- Highly-Integrated Wi-Fi solution incorporating a single crystal, antenna, and the matching components required to complete the RF link.
- Integrated IPv4/IPv6 TCP/IP Stack
- Integrated Network services such as HTTP, DNS, FTP
- QCA4004 patch firmware is stored and automatically loaded from a low cost serial flash memory

### 2.3 Manufacturing Interface

- USB 2.0 device interface, providing a simplified, high-speed, and scalable manufacturing test and configuration interface for QCA4004-based systems, using an integrated controller and PHY

## 2.4 Host Interfaces

- SPI Slave interface  
Allows for simplified connection to local host microcontrollers.  
Host driver source code and programming API is available.
- UART/SPI host interfaces allow simple interfacing to microcontrollers
- UART with an AT style command set

## 2.5 Wakeup manager

- Non-volatile 8 KB RAM
- Suspend/resume timer

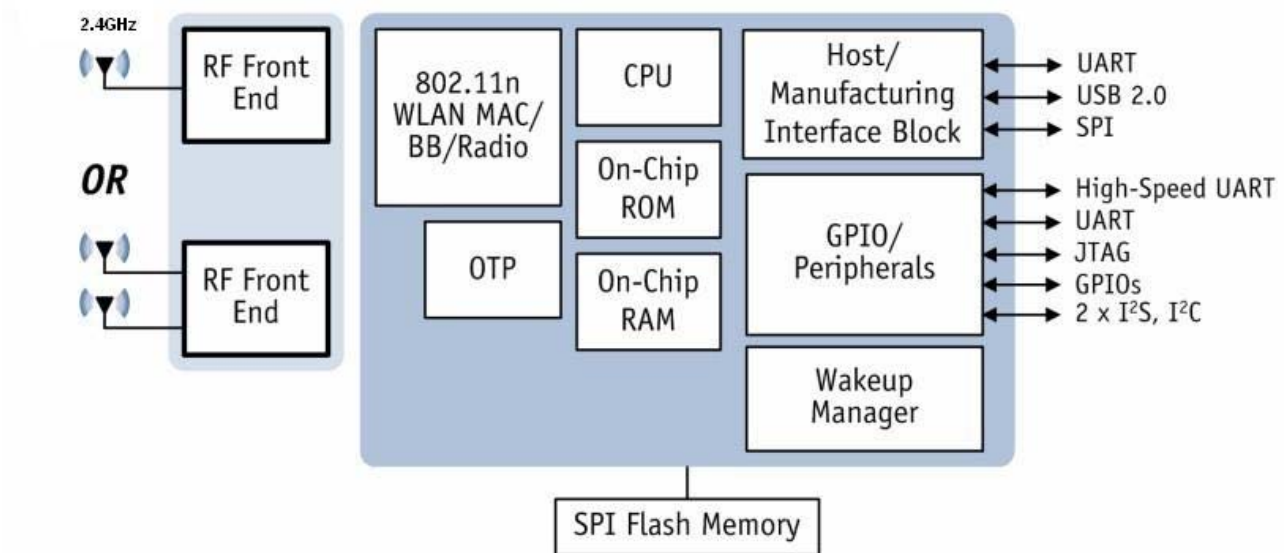
## 3.PRODUCT SPECIFICATIONS

Main chipset :WiFi Single Chip: QCA4004

Functional Specifications

<b>Standards</b>	EEE 802.11 b/g/n
<b>Bus Interface</b>	UART ; SPI ; USB2.0
<b>Data Rate</b>	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
<b>Modulation Techniques</b>	802.11b: CCK, DQPSK, DBPSK 802.11g: 64 QAM, 16 QAM, QPSK, BPSK 802.11n: 64 QAM, 16 QAM, QPSK, BPSK
<b>Network Architecture</b>	Ad-hoc mode (Peer-to-Peer ) Infrastructure mode Software AP WiFi Direct
<b>Operating Channel</b>	<b>WiFi 2.4GHz:</b> 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan
<b>Frequency Range</b>	2.400GHz ~ 2.4835 GHz
<b>Security</b>	WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i
<b>OS supported</b>	Linux/Android

## 4. QCA4004 System Block Diagram



## 5.Power Supply DC Characteristics

### DC Characteristics

Module	Voltage	Current Consumption (linking)
RL-SM05-4004-V1.1	3.3V	230mA（看电视或者上网时的功耗）

## 6.Electrical Specifications

### 1) RF Characteristics for IEEE802.11b （11Mbps mode unless otherwise specified）

Items	Contents			
Specification	IEEE802.11b			
Mode	CCK 11 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX （per≤85 dBm@8%）	-85 dBm			
Freq err limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level （17±2 dBm）		17		dBm
EVM (≤-18)		-18		dB

## 2) RF Characteristics for IEEE802.11g ( 54Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM 54 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤70 dBm@10%)	-70 dBm			
Freq err limit	± 13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (14±2dBm)		14		dBm
EVM (≤-27)		-27		dB

## 3) RF Characteristics for IEEE802.11n (BW20\_MCS7)

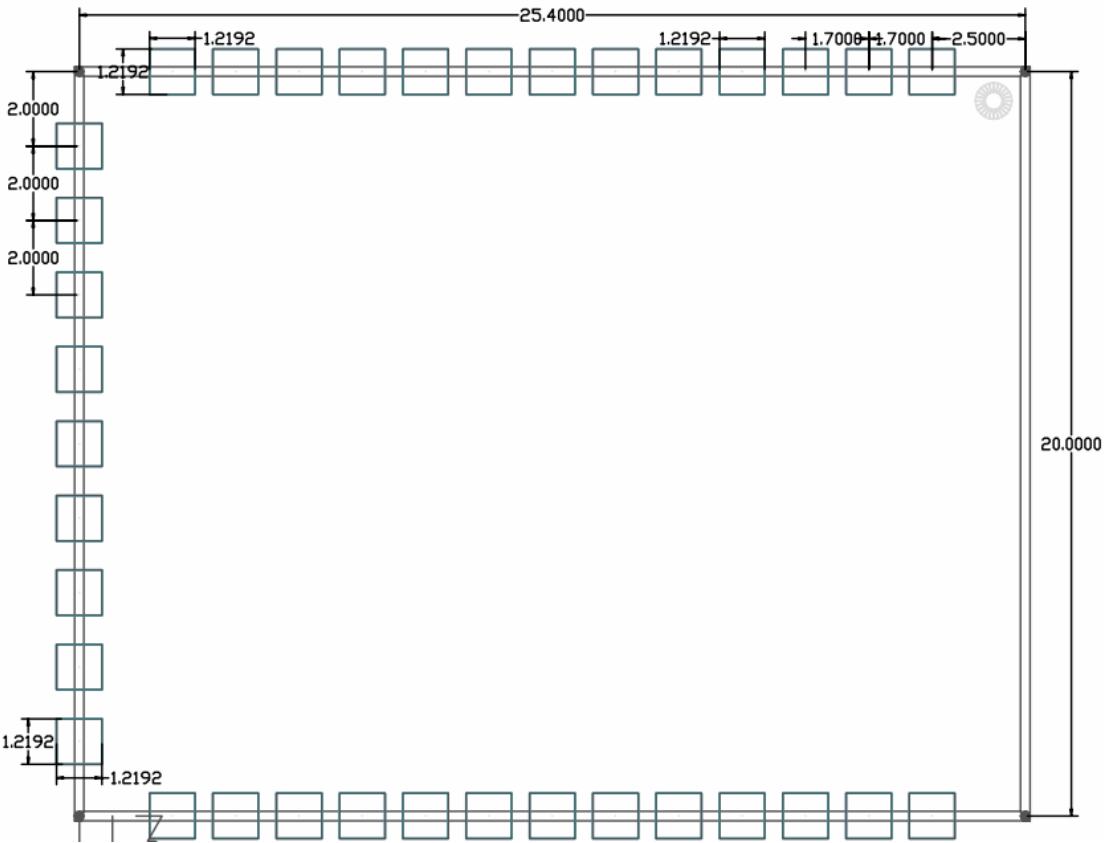
Items	Contents			
Specification	IEEE802.11n (BW20_MCS7)			
Mode	OFDM 65 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤65 dBm@10%)	-65 dBm			
Freq err limit	± 13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (13±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

## 4) RF Characteristics for IEEE802.11n (BW40\_MCS7)

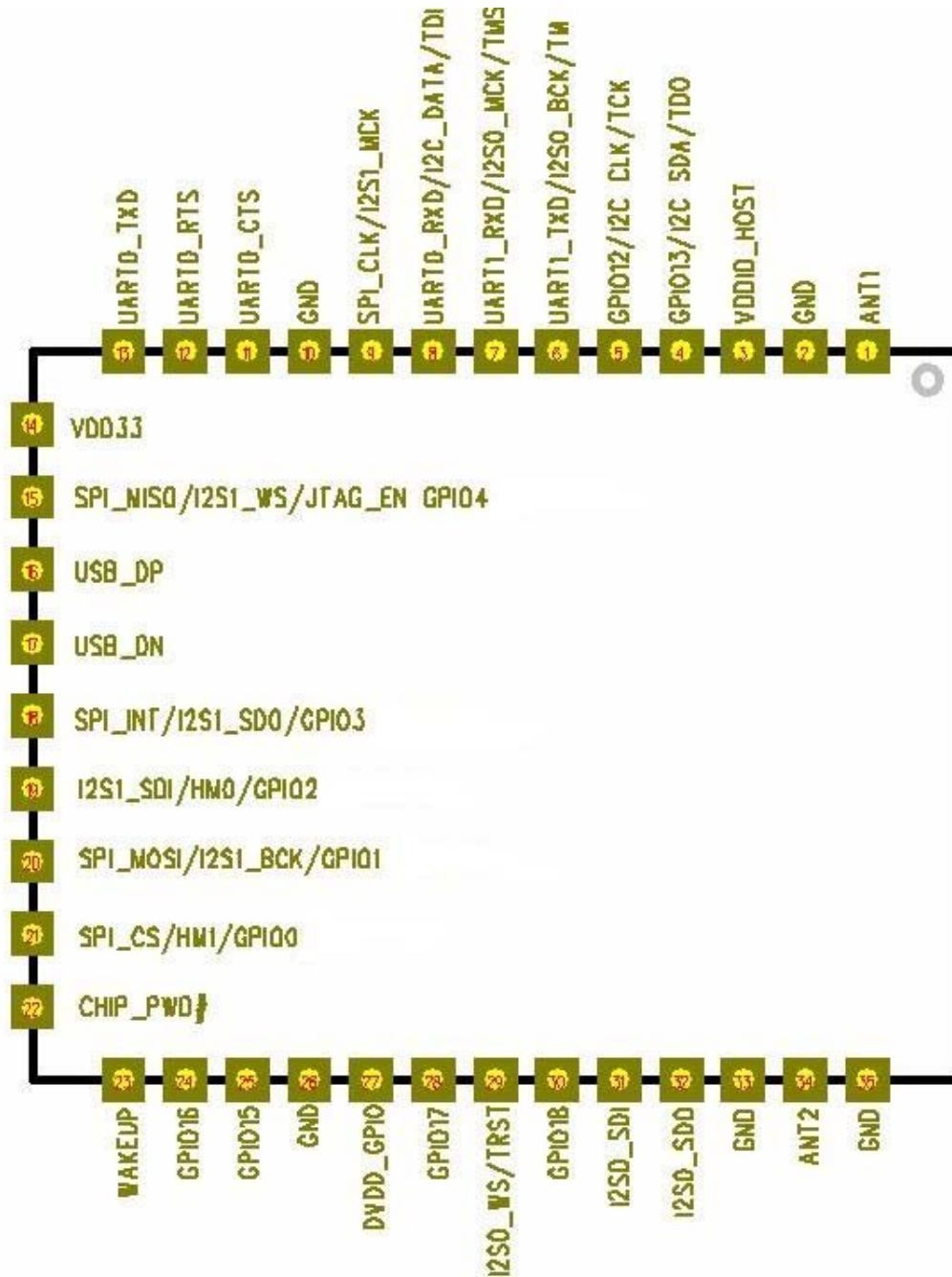
Items	Contents			
Specification	IEEE802.11n (BW40_MCS7)			
Mode	OFDM 135 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤65 dBm@10%)	-65 dBm			
Freq err limit	± 13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (13±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

8.Mechanical

Dimensions (mm)	Length	Width	Height
	25.4 (Tolerance: ±0.2mm)	20 (Tolerance: ±0.2mm)	1.6 (Tolerance: ±0.2mm)



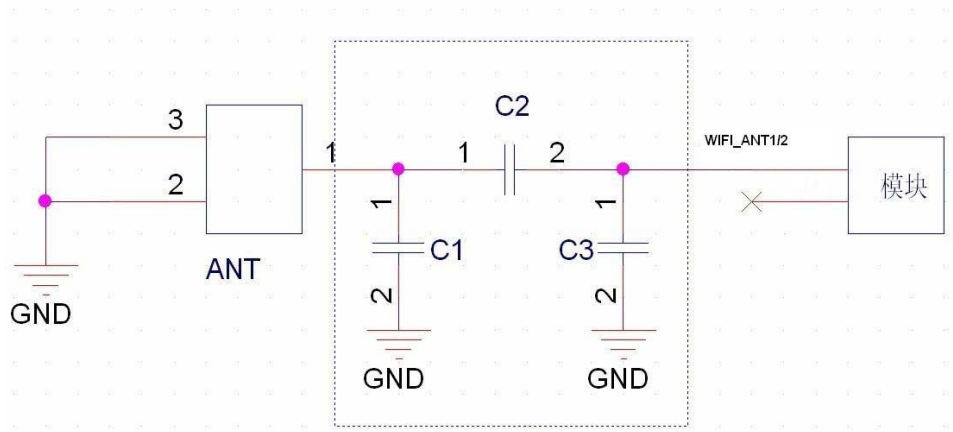
## 9.MODULE PIN ASSIGNMENT



PIN	Function	Description
1	ANT1	MAIN ANT
2	GND	Ground
3	VDDIO_HOST	3.3 V supply
4	GPIO13 / I2C SDA / TDO	GPIO13 / I2C SDA / TDO
5	GPIO12 / I2C CLK / TCK	GPIO12 / I2C CLK / TCK
6	UART1_TXD / I2S0_BCK / TM	UART1_TXD / I2S0_BCK / TM
7	UART1_RXD / I2S0_MCK / TMS	UART1_RXD / I2S0_MCK / TMS
8	UART0_RXD / I2C_DATA / TDI	UART0_RXD / I2C_DATA / TDI
9	SPI_CLK / I2S1_MCK	SPI_CLK / I2S1_MCK
10	GND	Ground
11	UART0_CTS	UART0_CTS
12	UART0_RTS	UART0_RTS
13	UART0_TXD	UART0_TXD
14	VDD33	Analog 3.3 V power supply
15	SPI_MISO / I2S1_WS / JTAG_EN GPIO4	SPI_MISO / I2S1_WS / JTAG_EN GPIO4
16	USB_DP	USB D+
17	USB_DN	USB D-
18	SPI_INT / I2S1_SDO / GPIO3	SPI_INT / I2S1_SDO / GPIO3
19	I2S1_SDI / HM0 / GPIO2	I2S1_SDI / HM0 / GPIO2
20	SPI_MOSI / I2S1_BCK / GPIO1	SPI_MOSI / I2S1_BCK / GPIO1
21	SPI_CS / HM1 / GPIO0	SPI_CS / HM1 / GPIO0
22	CHIP_PWD#	Chip power-down control
23	WAKEUP	Wakeup Control. While in SUSPEND state, the QCA4004 monitors this pin, and if a falling edge or rising edge is detected, the resume from SUSPEND sequence is started
24	GPIO16	GPIO
25	GPIO15	GPIO
26	GND	Ground
27	DVDD_GPIO	Connect to 3.3 V host IO supply or 1.8 V peripheral IO supply
28	GPIO17	GPIO
29	I2S0_WS / TRST	I2S0_WS / TRST
30	GPIO18	GPIO
31	I2S0_SDI	I2S0_SDI
32	I2S0_SDO	I2S0_SDO
33	GND	Ground
34	ANT2	Antenna Subreflector (RX)
35	GND	Ground



## 10.WIFI 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.

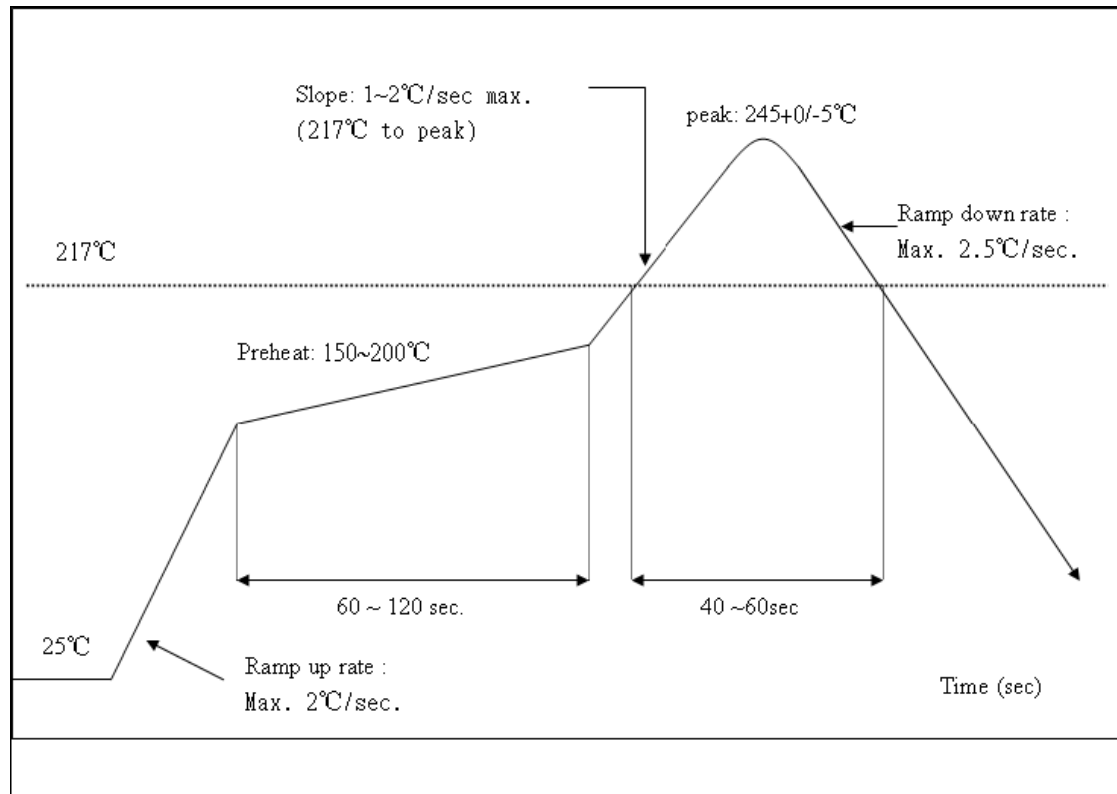
Note: The RF part layout must do 50  $\Omega$  impedance., can't get the line go 90°, can't get the line longer than 15 mm.

## 12.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

### 13.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  $\leq 20\%RH$ .If :30%~40%(pink)or greater than 40%(red).Labeling module has moisture absorption.

① Mounthed within 168 hours at factory conditions of:  $t \leq 30\%^{\circ}C$ ,  $\leq 60\%RH$ .

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. The actual number of module vacuum packing which is based on the actual number of packages to the customer requirements.

#### 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. The actual number of module reel packing which is based on the actual number of packages to the customer requirements.

#### 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.The actual number of module pallet packing which is based on the actual number of packages to the customer requirements.

### 13.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:  $\leq 30\%^{\circ}C$ ,  $\leq 60\%RH$ .

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.模块真空包装数量以客户要求的实际包装数量为准.

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. 模块卷盘包装以客户要求的实际包装数量为准.

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, 模块托盘包装以客户要求的实际包装数量为准.

注: 以上包装方式根据客户要求而定, 包装以实际出货为准.