

HK NATER TECH LIMITED

RL-AM05-9331-V2.0 Specification

Customer: _____

Description: RL-AM05-9331-V2.0 V0.20

Customer P/N: _____

Date: _____

Customer		
Approve	Auditing	Admit

Provider		
Approve	Auditing	Admit

Customer:

Add:

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SPECIFICATIONS

IEEE 802.11 b/g/n 2.4GHz

for AP and Router

RL-AM05-9331-V2.0

Version: V2.0

1.General Description

The Atheros AR9331 is a highly integrated and cost effective IEEE 802.11n 1x1 2.4 GHz System-on-a-Chip (SoC) for wireless local area network (WLAN) AP and router platforms.

In a single chip, the AR9331 includes a MIPS 24K processor, five-port IEEE 802.3 Fast Ethernet Switch with MAC/PHY, one USB 2.0 MAC/PHY, and external memory interface for serial Flash, SDRAM, DDR1 or DDR2, I²S/SPDIF-Out audio interface, SLIC VOIP/PCM interface, UART, and GPIOs that can be used for LED controls or other general purpose interface configurations.

The AR9331 integrates two Gbit MACs plus a five-port Fast Ethernet switch with a four-traffic class Quality of Service (QoS) engine.

The AR9331 integrates an 802.11n 1x1 MAC/BB/radio with internal PA and LNA. It supports 802.11n operations up to 72 Mbps for 20 MHz and 150 Mbps for 40 MHz channel respectively, and IEEE 802.11b/g data rates. Additional features include on-chip one-time programmable (OTP) memory.

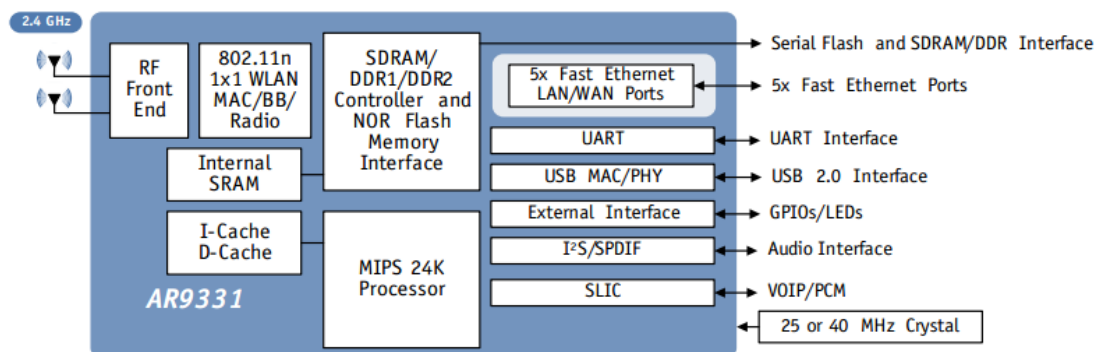
Features

<ul style="list-style-type: none">◆ Complete IEEE 802.11n 1x1 AP or router in a single chip◆ MIPS 24K processor operating at up to 400 MHz◆ External 16-bit DDR1, DDR2, or SDRAM memory interface◆ SPI NOR Flash memory support◆ No external EEPROM needed◆ 4 LAN ports and 1 WAN port IEEE 802.3 Fast Ethernet switch with auto-crossover, auto polarity, and auto-negotiation in PHYs◆ Four classes of QoS per port	<ul style="list-style-type: none">◆ Fully integrated RF front-end including PA and LNA◆ Optional external LNA/PA◆ Switched antenna diversity◆ High-speed UART for console support◆ I²S/SPDIF-out audio interface◆ SLIC for VOIP/PCM◆ USB 2.0 host/device mode support◆ GPIO/LED support◆ JTAG-based processor debugging supported◆ 25 MHz or 40 MHz reference clock input◆ Advanced power management with dynamic clock switching for ultra-low power modes
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2.General Specification

Model	RL-AM05-9331-V2.0
Product Name	WLAN 11b/g/n AP module
Major Chipset	AR9331
Standard	WIFI: IEEE802.11n 、 IEEE 802.11g、 IEEE 802.11b
Data Transfer Rate	1,2,5.5,6,11,12,18,22,24,30,36,48,54,60,90,120 and maximum of 150Mbps
Modulation Method	DSSS, CCK and OFDM (BPSK/QPSK/16-QAM/ 64-QAM)
Frequency Band	2.400GHz ~ 2.4835 GHz
Spread Spectrum	IEEE 802.11b: DSSS (Direct Sequence Spread Spectrum) ,CCK(Complementary Code Keying) IEEE 802.11g/n:OFDM (Orthogonal Frequency Division Multiplexing)
Operation Range	Up to 180 meters in open space
Security	WEP, TKIP, AES, WAPI
Operating Channel	WiFi 2.4GHz: 11: (Ch. 1-11) – United States; 13: (Ch. 1-13) – Europe ; 14: (Ch. 1-14) – Japan
Power Consumption	3.3 V \pm 0.2V I/O supply voltage
Operating Temperature	0 ~ +60° C ambient temperature
Storage Temperature	-20 ~ 70°C ambient temperature
Humidity	5 to 90 % maximum (non-condensing)
Dimension	40.5 x 27.5 x 2.95mm (L*W*H) \pm 0.2MM

3. System Block Diagram



4.Power Supply DC Characteristics

DC Characteristics

Module	Voltage	Current Consumption (linking)
RL-AM05-9331-V2.0	3.3V	(上网或者看电影时的功耗)

5.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≤83 dBm@8%)	-83 dBm			
Freq Err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (17±2 dBm)		17		dBm
EVM (≤-10)		-10		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≤67 dBm@10%)	-67 dBm			
Freq Err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (13±2dBm)		13		dBm
EVM (≤-25)		-25		dB

3) RF Characteristics for IEEE802.11n (BW20_MCS7)

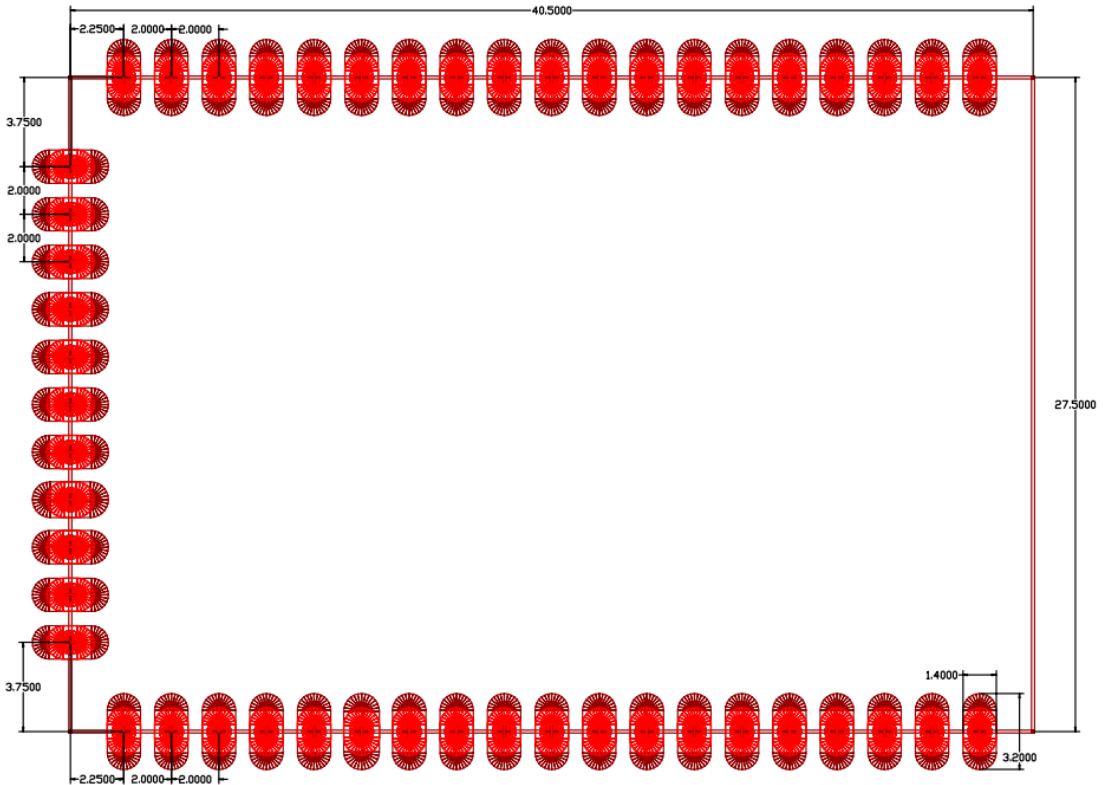
Items	Contents			
Specification	IEEE802.11n (BW20_MCS7)			
Mode	OFDM 65 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤64 dBm@10%)	-64 dBm			
Freq Err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (12±2 dBm)		12		dBm
EVM (≤-27)		-27		dB

4) RF Characteristics for IEEE802.11n (BW40_MCS7)

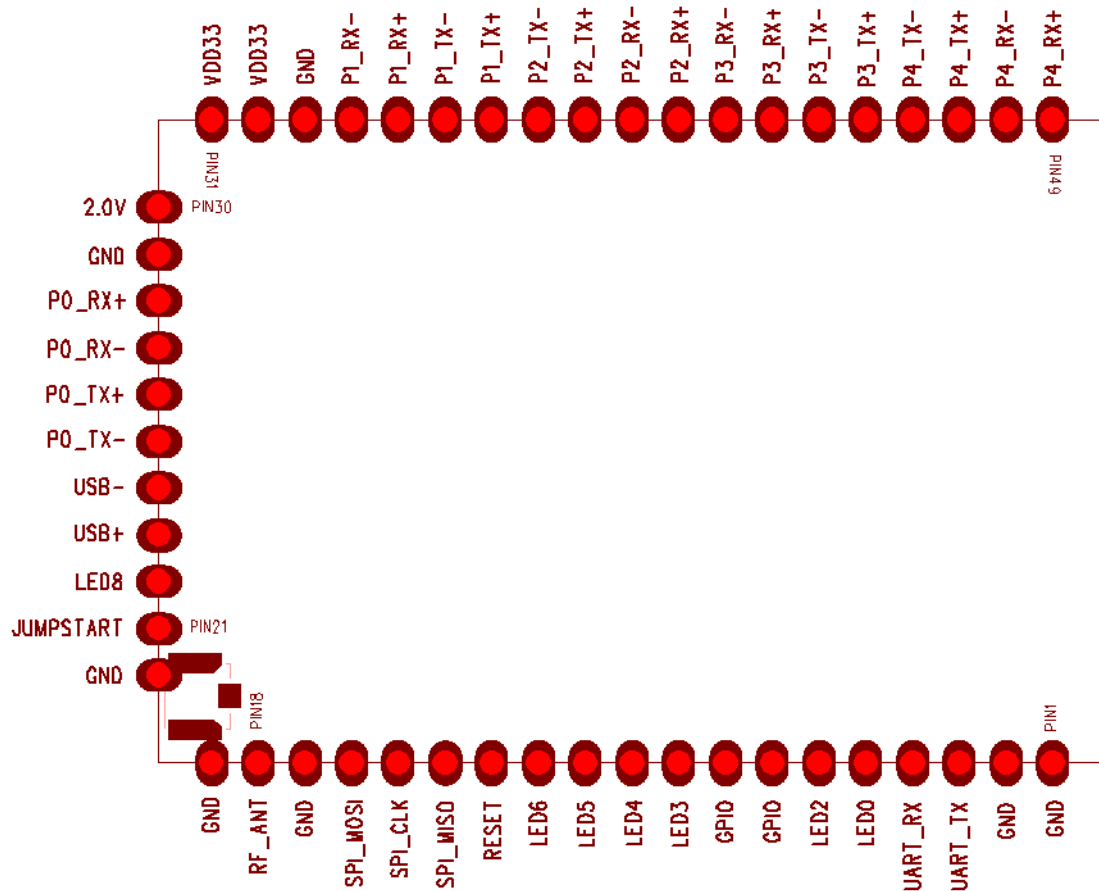
Items	Contents			
Specification	IEEE802.11n (BW40_MCS7)			
Mode	OFDM 135 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤64 dBm@10%)	-64 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (12±2 dBm)		12		dBm
EVM (≤-27)		-27		dB

6.Mechanical

Dimensions (mm)	Length	Width	Height
	40.5 (Tolerance:±0.2mm)	27.5 (Tolerance:±0.2mm)	2.95 (Tolerance:±0.2mm)



8.Module Pin Assignment

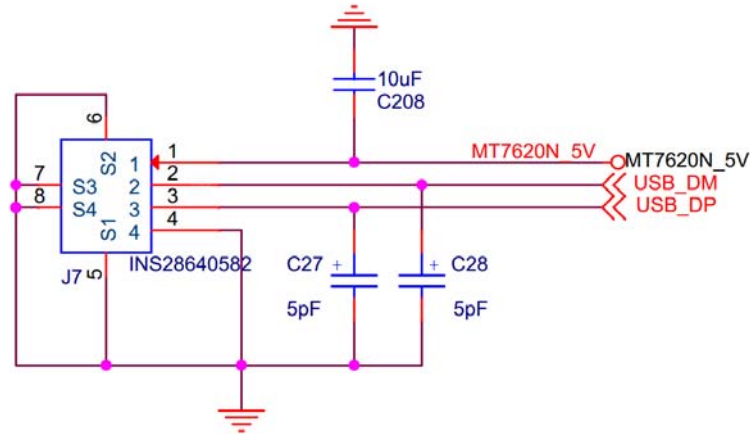


Pin	Function	IC对应脚位	Description
1	GND		Ground
2	GND		Ground
3	UART_TX	A79	UART_TX
4	UART_RX	B68	UART_RX
5	LED0	A78	WLAN LED1
6	LED2	B66	Ethernet switch LED1
7	GPIO	B23	GPIO
8	GPIO	B24	GPIO
9	LED3	A76	Ethernet switch LED2
10	LED4	B65	Ethernet switch LED3
11	LED5	A75	Ethernet switch LED4
12	LED6	B64	Ethernet switch LED5
13	RESET	A56	For an external push button switch; resets the firmware to its default configuration when pushed
14	SPI_MISO	B50	SPI_MISO

15	SPI_CLK	B51	SPI_CLK
16	SPI_MOSI	A57	SPI_MOSI
17	GND		PCM input
18	RF_ANT		RF_ANT
19	GND		Ground
20	GND		Ground
21	JUMPSTART	B48	Multiplexed function for Jumpstart
22	LED8	A51	LED
23	USB+	B43	USB+
24	USB-	A50	USB-
25	P0_TX-	B38	Ethernet port 0 transmit pair
26	P0_TX+	A42	Ethernet port 0 transmit pair
27	P0_RX-	B37	Ethernet port 0 receive pair
28	P0_RX+	A41	Ethernet port 0 receive pair
29	GND		Ground
30	2.0V	A48	Regulated 2.0 V power supply; connects to the external PNP collector.
31	VDD33		3.3 V power supply
32	VDD33		3.3 V power supply
33	GND		Ground
34	P1_RX-	A40	Ethernet port 1 receive pair
35	P1_RX+	B35	Ethernet port 1 receive pair
36	P1_TX-	A39	Ethernet port 1 transmit pair
37	P1_TX+	B34	Ethernet port 1 transmit pair
38	P2_TX-	B33	Ethernet port 2 transmit pair
39	P2_TX+	A37	Ethernet port 2 transmit pair
40	P2_RX-	B32	Ethernet port 2 receive pair
41	P2_RX+	A36	Ethernet port 2 receive pair
42	P3_RX-	A35	Ethernet port 3 receive pair
43	P3_RX+	B30	Ethernet port 3 receive pair
44	P3_TX-	A34	Ethernet port 3 transmit pair
45	P3_TX+	B29	Ethernet port 3 transmit pair
46	P4_TX-	B28	Ethernet port 4 transmit pair
47	P4_TX+	A32	Ethernet port 4 transmit pair
48	P4_RX-	B27	Ethernet port 4 receive pair
49	P4_RX+	A31	Ethernet port 4 receive pair

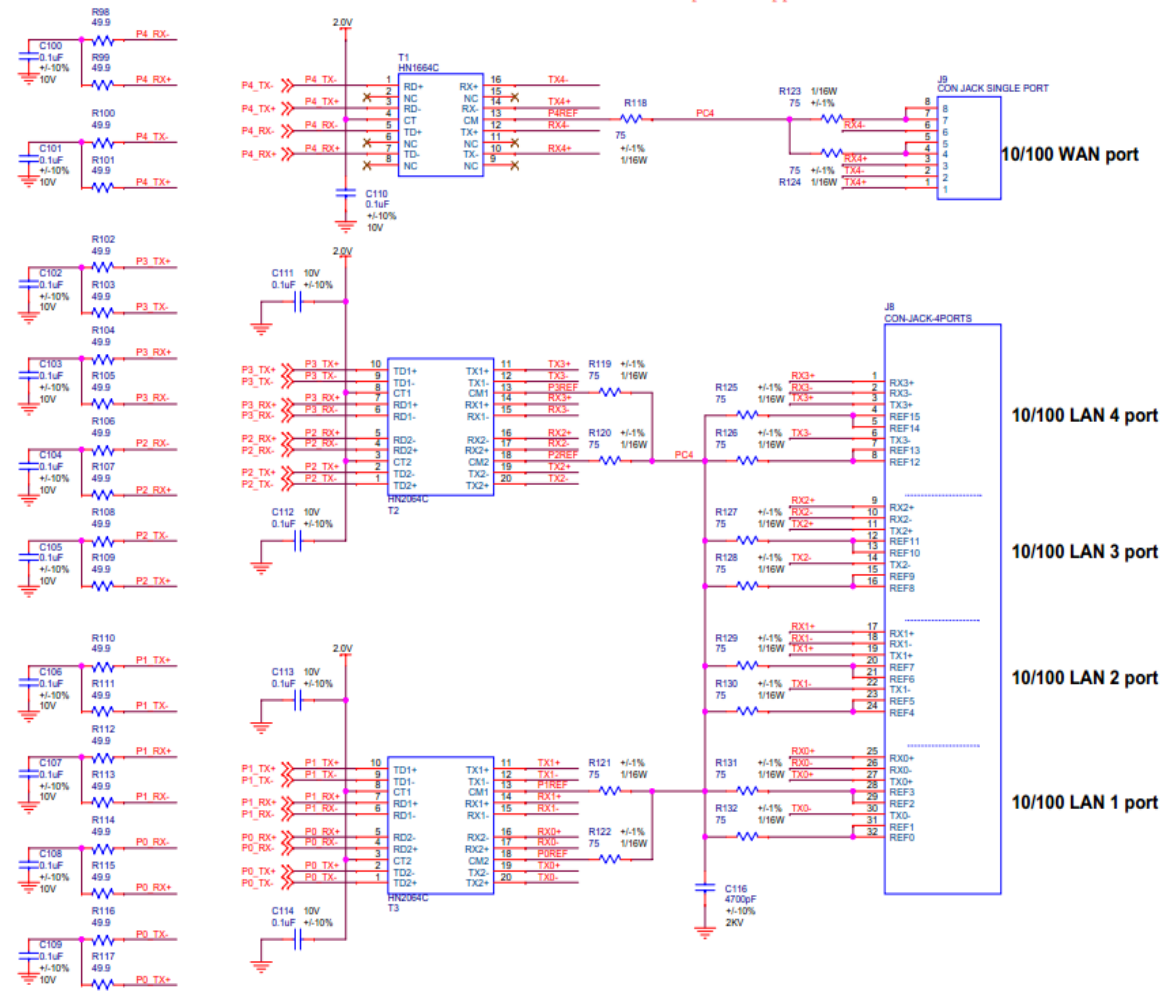
9.Circuit reference pictures

1. interface electrical characteristics



2. The Port reference design

All WAN and LAN ports support Auto-MDIX.

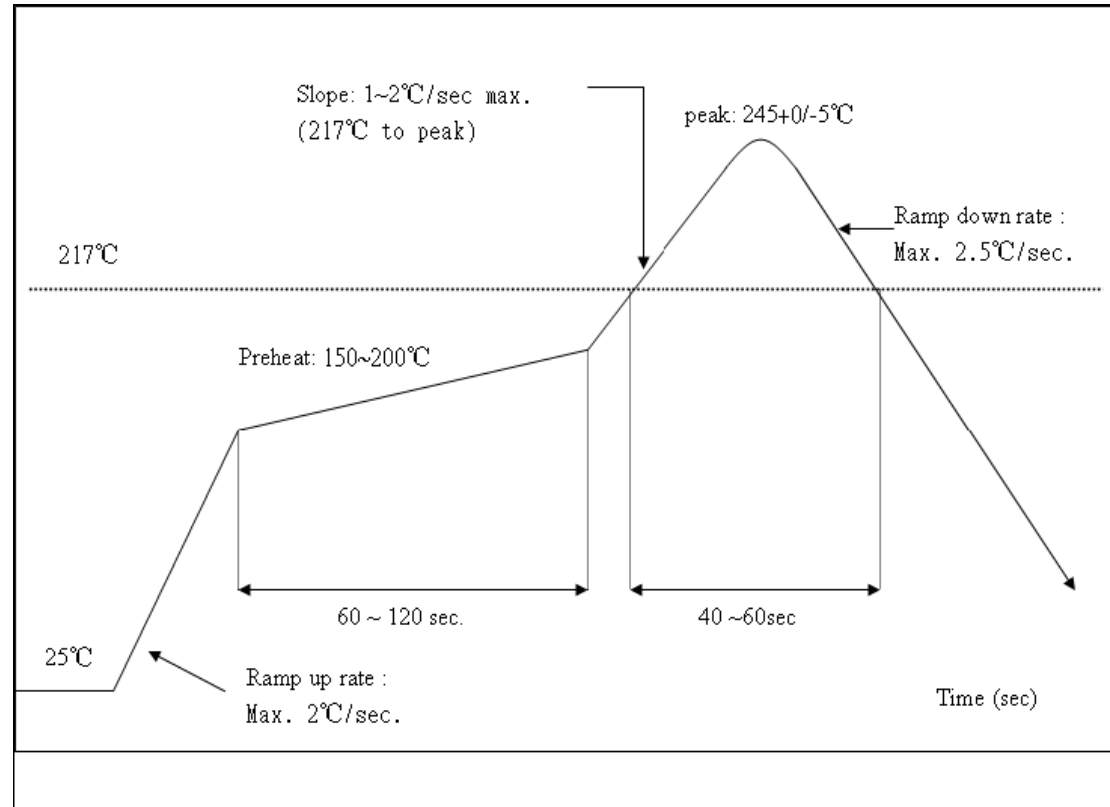


10.Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : $<250^{\circ}\text{C}$

Number of Times : ≤ 2 times



ENVIRONMENTAL

Operating

Operating Temperature: 0°C to +60 °C
Relative Humidity: 5-90% (non-condensing)

Storage

Temperature: -20°C to +70°C (non-operating)
Relevant Humidity: 5-95% (non-condensing)

MTBF caculation

Over 150,000hours

11. Wireless module before the SMT note:

■ 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.

■ 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:

3. Module of the storage life of vacuum packaging:

1-1. Storage life: 12 months. Storage conditions: <40°C. 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 Mouthed 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:

■ Modules must be to remove module moisture problem.

■ Baking temperature: $125^\circ C$, 8 hours.

■ 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°C. 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: $125^\circ C$, 8 hours.

11. 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 $250 \pm 5^\circ$, 也可以做到 $260 \pm 5^\circ$

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: $<40^\circ C$, 相对湿度: $<90\%RH$.

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.

■ 工厂环境温度湿度管制: $\leq 30^\circ C$, $\leq 60\%RH$.

■ 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:

5. 模块须重新烘烤, 以除去模块吸湿问题.

6. 烘烤温度条件: $125^\circ C$, 8 小时.

7. 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: $<40^\circ C$, 相对湿度: $<90\%RH$.

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: $125^\circ C$, 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: $<40^\circ C$, 相对湿度: $<90\%RH$.

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.

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。