



OFLYCOMM

欧飞信科技

O9101UB

Wi-Fi Dual-band 1x1
802.11ax + Bluetooth5.3
Module Datasheet

Cover of Approval Sheet

PRODUCT NAME	Part No.	Description
O9101UB		WQ9101 USB 3.3V 1T1R 15*13*2.3mm 11ax WIFI 11ax BT5.3 External 2antenna Shield CAN

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

Maker Information:

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Revision History

Version	Date	Description	Draft	Approved
V0.1	2023-06-12	-Preliminary Project version	CCJ	Turbo
V0.2	2023-07-18	Update some RF parameters	CCJ	Turbo

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CONTENTS

1.1 INTRODUCTION	5
1.2 FEATURES	5
1.3 BLOCK DIAGRAM	5
1.4 GENERAL SPECIFICATION	6
1.5 RECOMMENDED OPERATING RATING	6
2. RF SPECIFICATION	6
2.1 WI-FI RF SPECIFICATION	6
2.2 BT RF SPECIFICATION	8
3. PIN ASSIGNMENTS	9
3.1 PIN OUTLINE	9
3.2 PIN DEFINITION	9
4. DIMENSIONS	11
4.1 PHYSICAL DIMENSIONS AND MODULE PHOTO	11
4.2 MODULE PHYSICAL DIMENSIONS	11
5. REFERENCE DESIGN	12
5.1 REFERENCE SCHEMATIC	12
5.2 EXTERNAL ANTENNA	12
5.3 REAL-WORLD TESTING	12
6. RECOMMENDED REFLOW PROFILE	13
7. PACKAGE	14
7.1 REEL	14
7.2 STORAGE TEMPERATURE AND HUMIDITY	14

1. Overview

1.1 Introduction

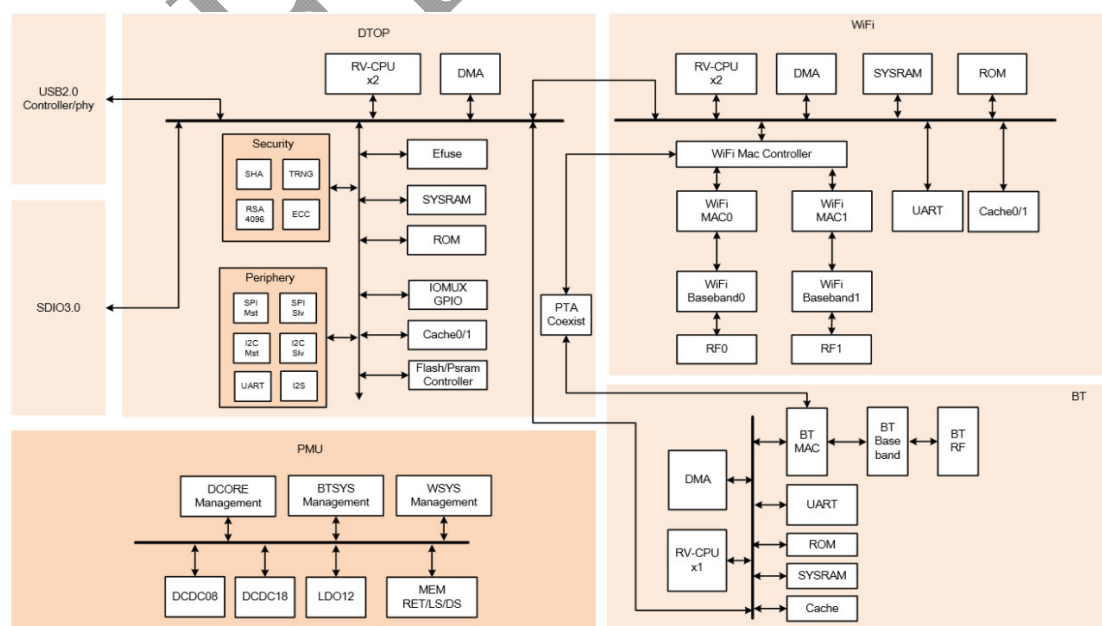
The O9101UB device is a highly integrated module supporting 802.11ax Wi-Fi and Bluetooth 5.3. The O9101UB device supporting simultaneous operation on 2.4 GHz and 5 GHz, also known as Dual Band Simultaneous (DBS).

The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax standard and it can achieve up to a speed of 900Mbps (5G 80MHz 11ax + 2.4G 40MHz 11ax DBS). The integrated module provides USB2.0 interface for Wi-Fi and Bluetooth.

1.2 Features

- Dual Band Simultaneous (DBS), up to 900Mbps data rate (5G 80MHz 11ax + 2.4G 40MHz 11ax DBS).
- Dual-band 2.4 GHz/5 GHz support.
- 20MHz/40MHz channel bandwidth for 2.4 GHz and 20MHz/40MHz/80MHz channel bandwidth for 5 GHz.
- Support uplink MU-OFDMA TX and downlink MU-OFDMA RX.
- Support uplink MU-MIMO TX and downlink MU-MIMO RX.
- Support WPA、WPA/WPA2/WPA3、WEP、WAPI.
- Supports IEEE 802.11k /v/r protocol.
- Support P2P GO/GC mode.
- DBS supports STA+AP, STA+ P2P GO, and STA+ P2P GC.
- Fully compatible with Bluetooth 5.3 protocol.
- Support BLE Audio .
- Support BR/EDR/LE-1M/LE-2M/LE-500k/LE-125k modulation mode.
- Support SCO over I2S.
- Intelligent AFH channel selection strategy is supported

1.3 Block Diagram



1.4 General Specification

Model Name	O9101UB
Product Description	Support WiFi6+BT5.3
Dimension	L x W x H: 15 x 13 x 2.3 (typical) mm
Wi-Fi Interface	USB2.0
BT Interface	USB2.0
Operating temperature	TBD
Storage temperature	TBD

1.5 Recommended Operating Rating

Feature		Minimum	Type	Maximum	Units
Operating Temperature		TBD	25	TBD	°C
VCC		TBD	3.3	TBD	V
Power Consumption (Type VCC)	TX (2.4G HE40)	TBD			
	RX (2.4G HE40)	TBD			
	TX (5G HE80)	TBD			
	RX (5G HE80)	TBD			
	Power Up	TBD			
	BT TX (1M@7dBm)	TBD			
	BT RX	TBD			

2. RF Specification

2.1 Wi-Fi RF Specification

2.4GHz RF Specification			
Feature		Description	
Operating Frequency		2.400~2.4835GHz	
Standards		Wi-Fi: IEEE 802.11b/g/n/ac/ax & Wi-Fi compliant	
Operating Channel		2.4GHz : Ch1~14	
Modulation		802.11b : CCK 802.11 g/n/ac/ax : OFDM /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK	
PHY Data rates		Wi-Fi:802.11b:11,5.5,2,1Mbps 802.11g:54,48,36,24,18,12,9,6Mbps 802.11n: up to 135Mbps 802.11ac: up to 180Mbps 802.11ax:up to 900Mbps data rate (2.4G HE40+5G HE80 11ax)	
Output Power, tolerance ± 1.5 dB			
Protocol Standard	Data Rate	Spec.(dBm)	EVM(dB)
802.11b	@11Mbps	21.5	≦-9
802.11g	@54Mbps	18.5	≦-25
802.11n	@HT40 MCS 7	17.5	≦-28

802.11ac	@vHT40 MCS 9	16	≧-32
802.11ax	@HE40 MCS 11	15	≧-35
Receiver Sensitivity, CCK modulation PER≧8%、OFDM modulation PER≧10%			
Protocol Standard	Data Rate	Spec.(dBm)	
802.11b(20MHz)	1Mbps	-82	
	11Mbps	-76	
802.11g(20MHz)	6Mbps	-82	
	54Mbps	-64	
802.11n(20MHz)	MCS 0 NSS1	-82	
	MCS 7 NSS1	-64	
802.11n(40MHz)	MCS 0 NSS1	-79	
	MCS 7 NSS1	-61	
802.11ac(20MHz)	MCS 0 NSS1	-82	
	MCS 9 NSS1	-59	
802.11ac(40MHz)	MCS 0 NSS1	-79	
	MCS 9 NSS1	-57	
802.11ax(20MHz)	MCS 0 NSS1	-82	
	MCS 11 NSS1	-52	
802.11ax(40MHz)	MCS 0 NSS1	-79	
	MCS 11 NSS1	-49	
5GHz RF Specification			
Feature	Description		
Operating Frequency	5G:5.15 GHz ~ 5.845 GHz (5.0 GHz ISM Band)		
Standards	Wi-Fi: IEEE 802.11 a/n/ac/ax Wi-Fi compliant		
Modulation	802.11 a/n/ac/ax: OFDM /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK		
PHY Data rates	Wi-Fi: 802.11a:54,48,36,24,18,12,9,6Mbps 802.11n: up to 135Mbps 802.11ac: up to 400Mbps (5G VHT80) 802.11ax:up to 900Mbps data rate (2.4G HE40+5G HE80 11ax)		
Output Power, tolerance ± 1.5 dB			
Protocol Standard	Data Rate	Spec.(dBm)	EVM(dBm)
802.11a	@54Mbps	18	≧-25
802.11n	@HT40 MCS 7	16.5	≧-28
802.11ac	@vHT80 MCS 9	15.5	≧-32
802.11ax	@HE80 MCS 11	14.5	≧-35
Receiver Sensitivity,OFDM modulation PER≧10%			
Protocol Standard	Data Rate	Spec.(dBm)	
802.11a(20MHz)	6Mbps	-82	
	54Mbps	-64	
802.11n(20MHz)	MCS 0 NSS1	-82	

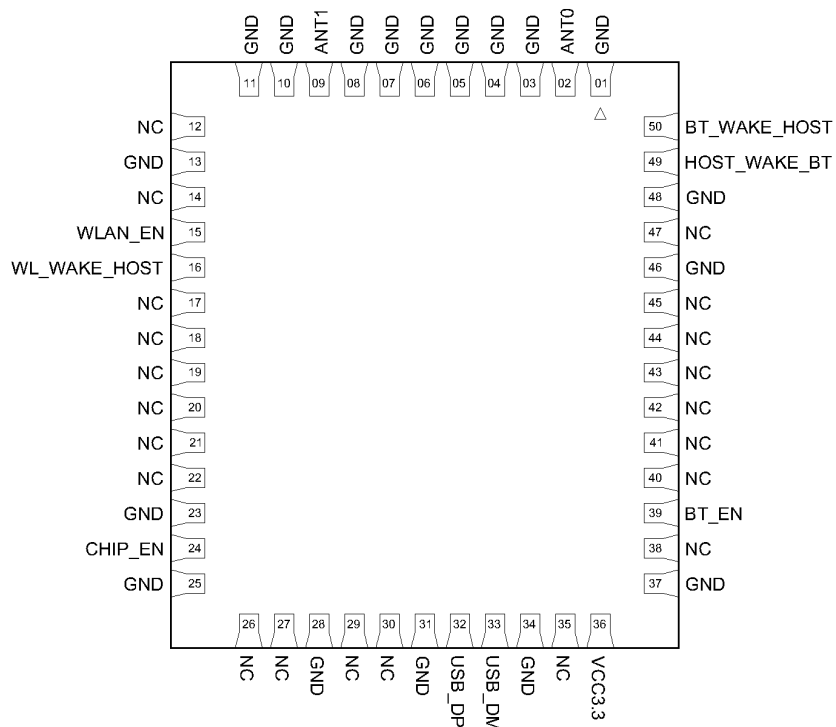
	MCS 7 NSS1	-64
802.11n(40MHz)	MCS 0 NSS1	-79
	MCS 7 NSS1	-64
802.11ac(20MHz)	MCS 0 NSS1	-82
	MCS 9 NSS1	-57
802.11ac(40MHz)	MCS 0 NSS1	-79
	MCS 9 NSS1	-54
802.11ac(80MHz)	MCS 0 NSS1	-76
	MCS 9 NSS1	-51
802.11ax(20MHz)	MCS 0 NSS1	-82
	MCS 11 NSS1	-52
802.11ax(40MHz)	MCS 0 NSS1	-79
	MCS 11 NSS1	-49
802.11ax(80MHz)	MCS 0 NSS1	-76
	MCS 11 NSS1	-46

2.2 BT RF Specification

Feature	Description		
Operating Frequency	2.402~2.480GHz		
Number of Channels	79 channels		
Standards	Bluetooth V5.3		
Modulation	8DPSK, $\pi/4$ DQPSK, GFSK		
PHY Data rates	Supports 2Mbps Bluetooth Low Energy(BLE),BLELong Range		
Output Power	Min(dBm)	Typical(dBm)	Max(dBm)
		TBD	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		TBD	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		TBD	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		TBD	

3.Pin Assignments

3.1 Pin Outline



3.2 Pin Definition

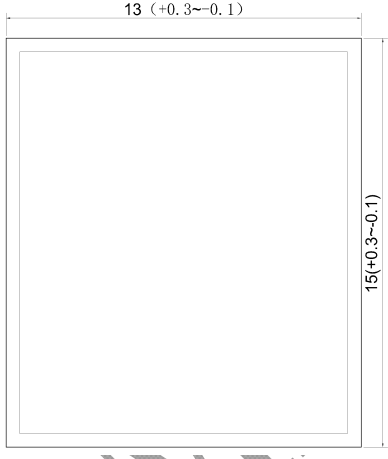
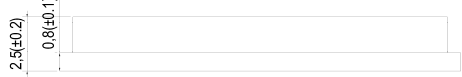
PIN	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	ANT0	I/O	RF I/O port for BT	
3~8	GND	—	Ground connections	
9	ANT1	I/O	RF I/O port for Wi-Fi	
10~11	GND	—	Ground connections	
12	NC	—	Not connected	
13	GND	—	Ground connections	13
14	NC	—	Not connected	
15	WLAN_EN	I	Enable pin for WLAN device ON: pull high ; OFF: pull low	3.3V
16	WL_WAKE_HOST	O	WLAN to wake-up HOST	3.3V
17~22	NC	—	Not connected	

23	GND	—	Ground connections	
24	CHIP_EN	I/O	Enable pin for chipset. Pull low to shut down	3.3V
25	GND	—	Ground connections	
26~27	NC	—	Not connected	
28	GND	—	Ground connections	
29~30	NC	—	Not connected	
31	GND	—	Ground connections	
32	USB_DP	I/O	USB2.0 differential pair D+ for WLAN and Bluetooth	
33	USB_DM	I/O	USB2.0 differential pair D- for WLAN and Bluetooth	
34	GND	—	Ground connections	
35	NC	—	Not connected	
36	VCC33	P	Main power input 3.3V	3.3V
37	GND	—	Ground connections	
38	BT_EN	I	Enable pin for Bluetooth device ON: pull high ; OFF: pull low	3.3V
39	GND	—	Ground connections	
40~45	NC	—	Not connected	
46	GND	—	Ground connections	
47	NC	—	Not connected	
48	GND	—	Ground connections	
49	HOST_WAKE_BT	I	HOST to wake-up Bluetooth device	3.3V
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST	3.3V

4. Dimensions

4.1 Physical Dimensions and Module Photo

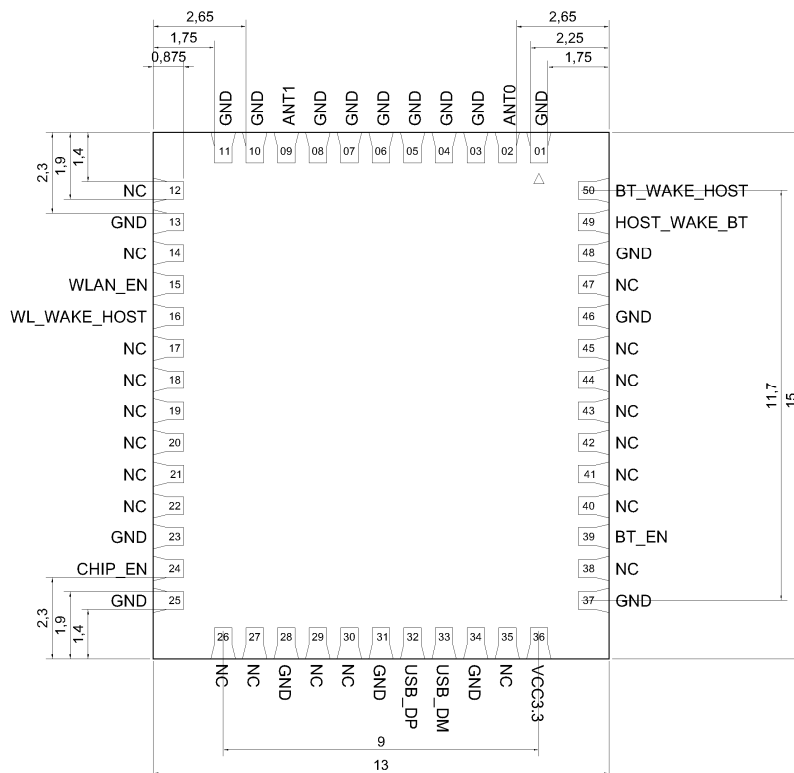
(Unit: mm)

	
H: 2.5(±0.2)mm	
Weight	7.5g

4.2 Module Physical Dimensions

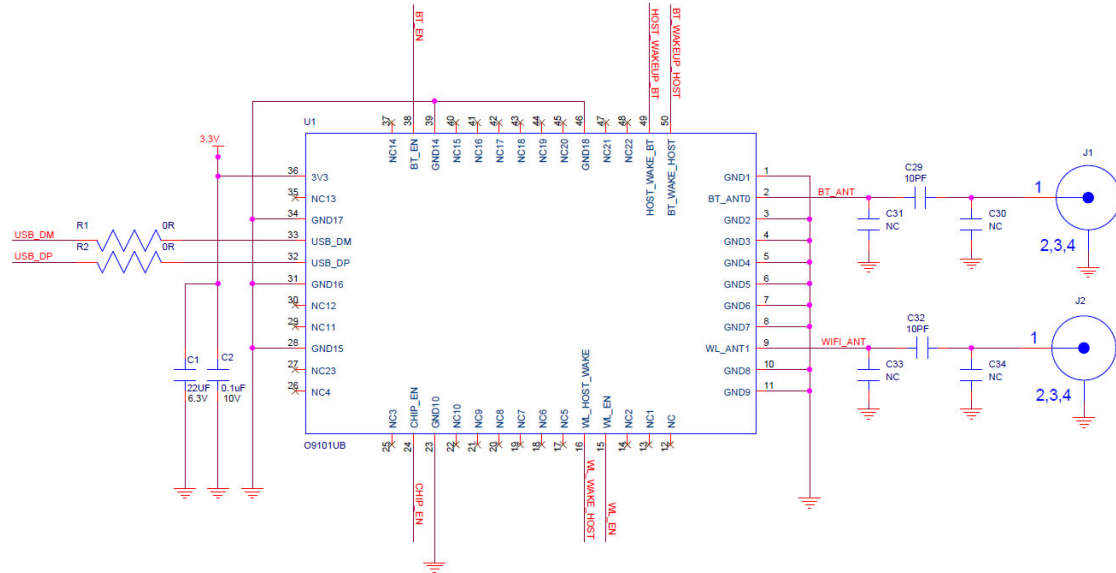
(Unit: mm)

< TOP VIEW >



5 Reference Design

5.1 Reference schematic



Note:

- C1, C2 should be closed to host.
- The power supply "3.3V" ripple is less than 100 mV.
- USB differential signals should be followed 100 Ohm impedance.

5.2 External Antenna

When the customer selects an external antenna, the external antenna selected must meet the parameter requirements specified ,Impedance 50Ω

5.3 Real-world Testing

2.4G Real-world Testing					
Protocol Standard		channel	Power (dBm)	EVM(dB)	Rx Sensitivity (dBm)
802.11g(54Mbps)	ANT1	2412	TBD	TBD	TBD
		2437	TBD	TBD	TBD
		2472	TBD	TBD	TBD
802.11ax(HE20_MCS11)	ANT1	2412	TBD	TBD	TBD
		2437	TBD	TBD	TBD
		2472	TBD	TBD	TBD
802.11ax(HE40_MCS11)	ANT1	2422	TBD	TBD	TBD
		2462	TBD	TBD	TBD
5G Real-world Testing					
Protocol Standard		channel	Power (dBm)	EVM(dB)	Rx Sensitivity

					(dBm)
802.11a(54Mbps)	ANT1	5180	TBD	TBD	TBD
		5600	TBD	TBD	TBD
		5825	TBD	TBD	TBD
802.11ax(HE20_MCS11)	ANT1	5180	TBD	TBD	TBD
		5500	TBD	TBD	TBD
		5825	TBD	TBD	TBD
802.11ax(HE80_MCS11)	ANT1	5290	TBD	TBD	TBD
		5690	TBD	TBD	TBD
		5775	TBD	TBD	TBD

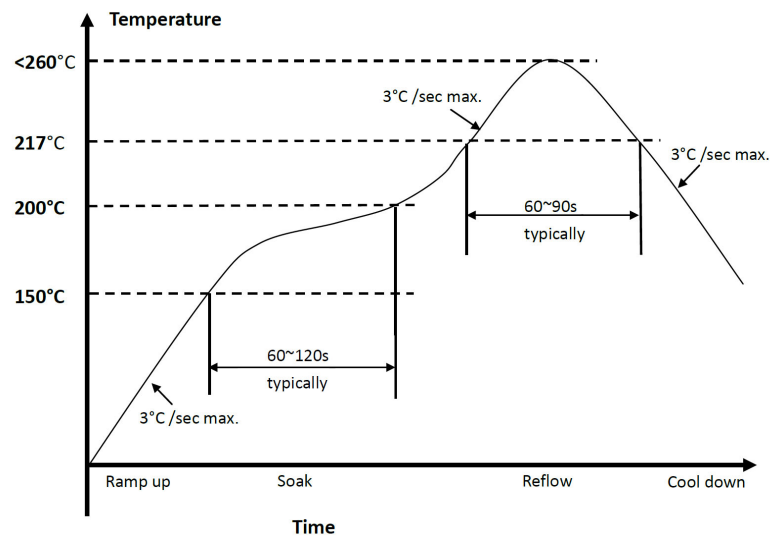
Description: The test environment is: temperature 25 °C humidity 60%

6 Recommended Reflow Profile

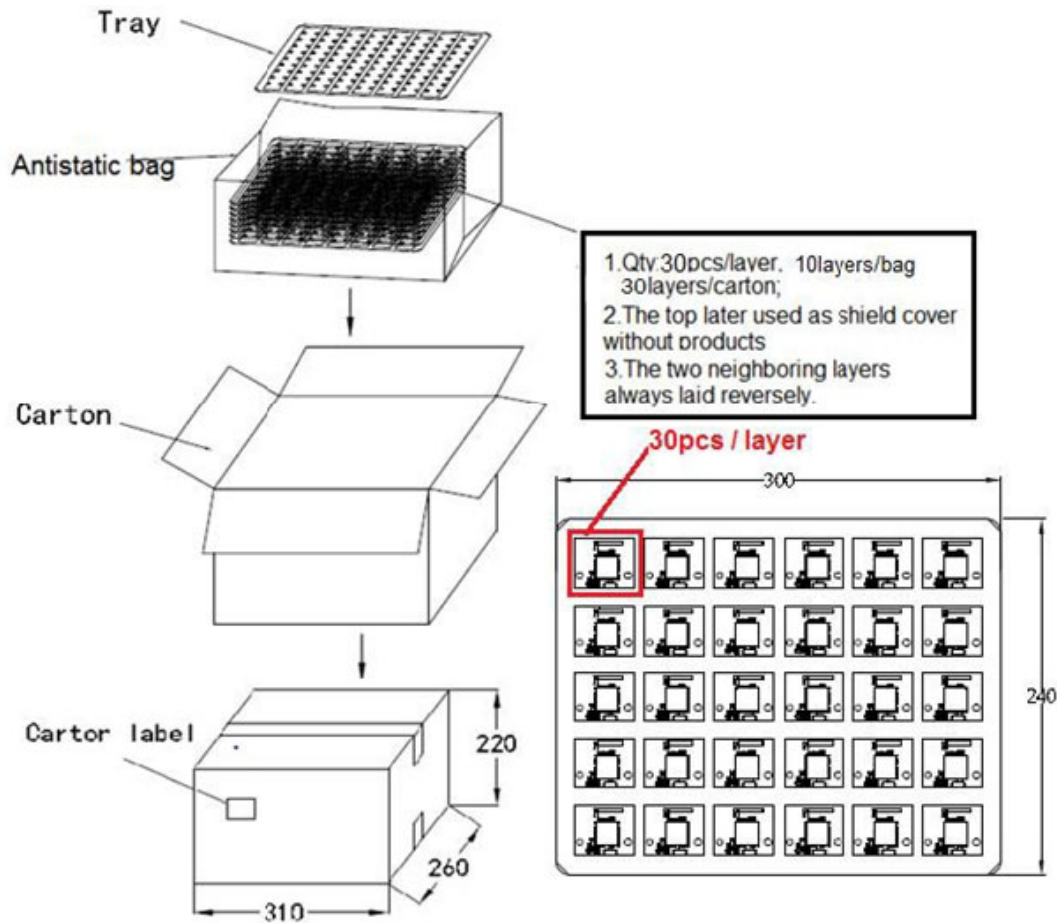
Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

Number of Times : 2 times max



7 Package



7.2 Storage Temperature And Humidity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

- Calculated shelf life in sealed bag: 12 months at $<40^{\circ}\text{C}$ and $<90\%$ relative humidity (RH).
- Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5.
- The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition.
- "IPC/JEDEC J-STD-033A paragraph 5.2" is respected.
- Baking is required if conditions b) or c) are not respected.
- Baking is required if the humidity indicator inside the bag indicates 10% RH or more.

THE END