



欧飞信科技

O9201SB

Wi-Fi Dual-band 2x2
802.11ax + Bluetooth5.4
Module Datasheet

Cover of Approval Sheet

PRODUCT NAME	Part No.	DescriptionBlock Diagram
O9201SB	FWAAO9201SB10	WQ9201S SDIO 3.3V 2T2R 13*15*2.5mm 80MHz 11ax WIFI+BT5.4-UART External 3antenna Shield CAN

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

Maker Information:

OFEIXIN TECHNOLOGY LIMITED

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Revision History

Version	Date	Description	Draft	Approved
V1.0	2025-05-07	-Preliminary Project version	EJX	Ben·Chen
V1.1	2025-05-27	Update module photos	EJX	Ben·Chen

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1. Overview

1.1 Introduction

The O9201SB is a dual-mode chip, support 2x2 2.4G + 5G dual-frequency concurrent Wi-Fi function and Bluetooth function. Wi-Fi Da We supports Wi-Fi protocol IEEE 802.11ax and backward compatibility protocol 802.11a/b/g/n/ac. The Bluetooth subsystem supports the Bluetooth system Protocol 5.4 with low-power audio.

The O9201SB chip integrates five high-performance RISC-VCPUs, high-speed interfaces (USB2.0/SDIO3.0), and rich Peripheral interfaces (UART, SPI, I2S, I2C, and GPIO, etc.). The chip supports a good radio frequency with very low power consumption And baseband performance.

1.2 Features

- Supported for the IEEE 802.11 a / b / g / n / ac / ax protocol.
- Dual-band 2.4 GHz/5 GHz support.
- Integrated with a high-performance iPA.
- Support for 2x2 MIMO.
- Support for dual-frequency concurrency: 2.4 GHz and 5 GHz for simultaneous 1T1R transmission.
- 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 WFA、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 5.4 protocol.
- Support for BT / BLE dual-mode.
- Support BLE Audio.
- Support BR/EDR/LE-1M/LE-2M modulation mode.
- Support SCO over I2S.
- Intelligent AFH channel selection strategy is supported.
- Ensemble PA/LNA/Balun.

1.3 General Specification

Model Name	O9201SB
Product Description	Support WiFi6+BT5.4
Dimension	L x W x H: 15 x 13 x 2.5 (typical) mm
Wi-Fi Interface	SDIO3.0
BT Interface	UART/PCM
Operating temperature	-25 to 85°C
Storage temperature	-40 to 125°C

1.4 Recommended Operating Rating

Feature		Minimum	Type	Maximum	Units
Operating Temperature		-25	25	85	°C
VDD33		3.15	3.3	3.45	V
Power Consumption (Type VDD33)	TX (2.4G HE40)	508mA			
	RX (2.4G HE40)	288mA			
	TX (5G HE80)	465mA			
	RX (5G HE80)	332mA			
	BT TX (1DH5)	117mA			
	BT RX	113mA			

2. RF Specification

2.1 Wi-Fi RF Specification

2.4GHz RF Specification		
Feature	Description	
Operating Frequency	2412~2462MHz,2422~2452MHz	
Standards	Wi-Fi: IEEE 802.11b/g/n/ax & Wi-Fi compliant	
Operating Channel	2.4GHz : Ch1~11	
Modulation	802.11b : CCK 802.11 g/n/ax : OFDM /OFDMA/1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK	
Receiver Sensitivity, CCK modulation PER ≤ 8%、OFDM modulation PER ≤ 10%		
Protocol Standard	Data Rate	Spec.(dBm)
802.11b(20MHz)	1Mbps	-85
	11Mbps	-82
802.11g(20MHz)	6Mbps	-85
	54Mbps	-68
802.11n(20MHz)	MCS 0 NSS1	-85
	MCS 7 NSS1	-67
802.11n(40MHz)	MCS 0 NSS1	-82
	MCS 7 NSS1	-64
802.11ac(20MHz)	MCS 0 NSS1	-85
	MCS 9 NSS1	-60

802.11ac(40MHz)	MCS 0 NSS1	-82
	MCS 9 NSS1	-57
802.11ax(20MHz)	MCS 0 NSS1	-85
	MCS 11 NSS1	-55
802.11ax(40MHz)	MCS 0 NSS1	-82
	MCS 11 NSS1	-52
5GHz RF Specification		
Feature	Description	
Operating Frequency	5G: 5150 ~ 5250MHz,5725~5850MHz	
Standards	Wi-Fi: IEEE 802.11 a/n/ac/ax Wi-Fi compliant	
Modulation	802.11 a/n/ac/ax : OFDM/OFDMA /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK	
Receiver Sensitivity,OFDM modulation PER≤10%		
Protocol Standard	Data Rate	Spec.(dBm)
802.11a(20MHz)	6Mbps	-85
	54Mbps	-68
802.11n(20MHz)	MCS 0 NSS1	-85
	MCS 7 NSS1	-67
802.11n(40MHz)	MCS 0 NSS1	-82
	MCS 7 NSS1	-64
802.11ac(20MHz)	MCS 0 NSS1	-85
	MCS 9 NSS1	-60
802.11ac(40MHz)	MCS 0 NSS1	-82
	MCS 9 NSS1	-57
802.11ac(80MHz)	MCS 0 NSS1	-79
	MCS 9 NSS1	-54
802.11ax(20MHz)	MCS 0 NSS1	-85
	MCS 11 NSS1	-55
802.11ax(40MHz)	MCS 0 NSS1	-82
	MCS 11 NSS1	-52
802.11ax(80MHz)	MCS 0 NSS1	-79
	MCS 11 NSS1	-49

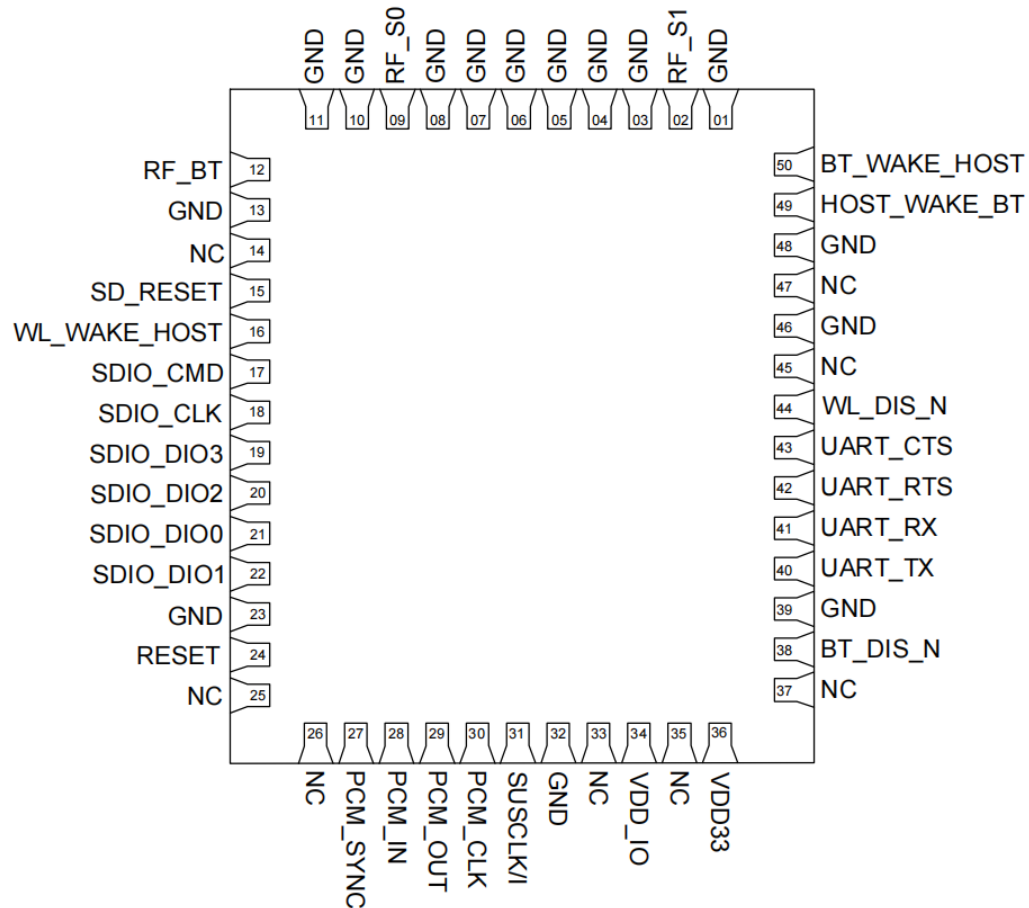
2.2 BT RF Specification

Feature	Description
Operating Frequency	2402~2480MHz
Number of Channels	79 channels 40 channels(Bluetooth Low Energy(BLE))
Standards	Bluetooth V5.4
Modulation	8DPSK, $\pi/4$ DQPSK, GFSK
PHY Data rates	Supports 2Mbps Bluetooth Low Energy(BLE), BLE Long Range
Maximum Transmitting	BT: 12.21 dBm

Conducted Output Power (Real-world Testing)	BLE:-1.88 dBm		
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-90	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-86	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-84	

3.Pin Assignments

3.1 Pin Outline



3.2 Pin Definition

PIN	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	RF_S1	I/O	RF I/O port for Wi-Fi 2G_2and Wi-Fi 5G_2	
3~8	GND	—	Ground connections	

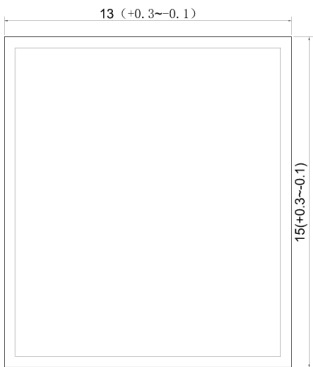
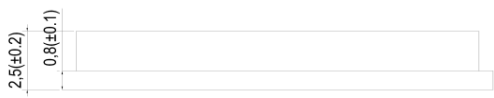
9	RF_S0	I/O	RF I/O port for Wi-Fi 2G_1and Wi_Fi 5G_1	
10~11	GND	—	Ground connections	
12	RF_BT	I/O	RF I/O port for BT	
13	GND	—	Ground connections	
14	NC	—	Not connected	
15	SD_RESET	I/PU	Reset Pin for SDIO interface ON: pull high; OFF: pull low Low for disable SDIO interface	VDDIO
16	WL_WAKE_HOST	O	WLAN to wake-up HOST	VDDIO
17	SDIO_CMD	I/O	SDIO command line	VDDIO
18	SDIO_CLK	I/O	SDIO clock line	VDDIO
19	SDIO_DIO3	I/O	SDIO data line 3	VDDIO
20	SDIO_DIO2	I/O	SDIO data line 2,	VDDIO
21	SDIO_DIO0	I/O	SDIO data line 0	VDDIO
22	SDIO_DIO1	I/O	SDIO data line 1	VDDIO
23	GND	—	Ground connections	
24	RESET	I/O	Global reset	3.3V
25	NC	—	Not connected	
26	NC	—	Not connected	
27	PCM_SYNC	I/O	PCM sync signal	VDDIO
28	PCM_IN	I	PCM data input	VDDIO
29	PCM_OUT	O	PCM Data output	VDDIO
30	PCM_CLK	I/O	PCM clock	VDDIO
31	SUSCLK	I/PD	External Low Power Clock input (32.768KHz)If not used keep NC	
32	GND	—	Ground connections	
33	NC	—	Not connected	
34	VDD_IO	P	I/O Voltage supply input 1.8V or 3.3V	1.8V or 3.3V
35	NC	—	Not connected	
36	VDD33	P	Main power input 3.3V	3.3V
37	NC	—	Not connected	

38	BT_DIS_N	I/PU	Enable pin for Bluetooth device ON: pull high; OFF: pull low External pull low to shut down BT, recommended 10K pull high.	VDDIO
39	GND	—	Ground connections	
40	UART_TX	O	Bluetooth UART interface	VDDIO
41	UART_RX	I	Bluetooth UART interface	VDDIO
42	UART_RTS	O	Bluetooth UART interface	VDDIO
43	UART_CTS	I	Bluetooth UART interface	VDDIO
44	WL_DIS_N	—	Enable pin for WLAN Radio ON: pull high; OFF: pull low External pull low to disable WLAN Radio	VDDIO
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	VDDIO
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST	VDDIO

4. Dimensions

4.1 Physical Dimensions and Module Photo

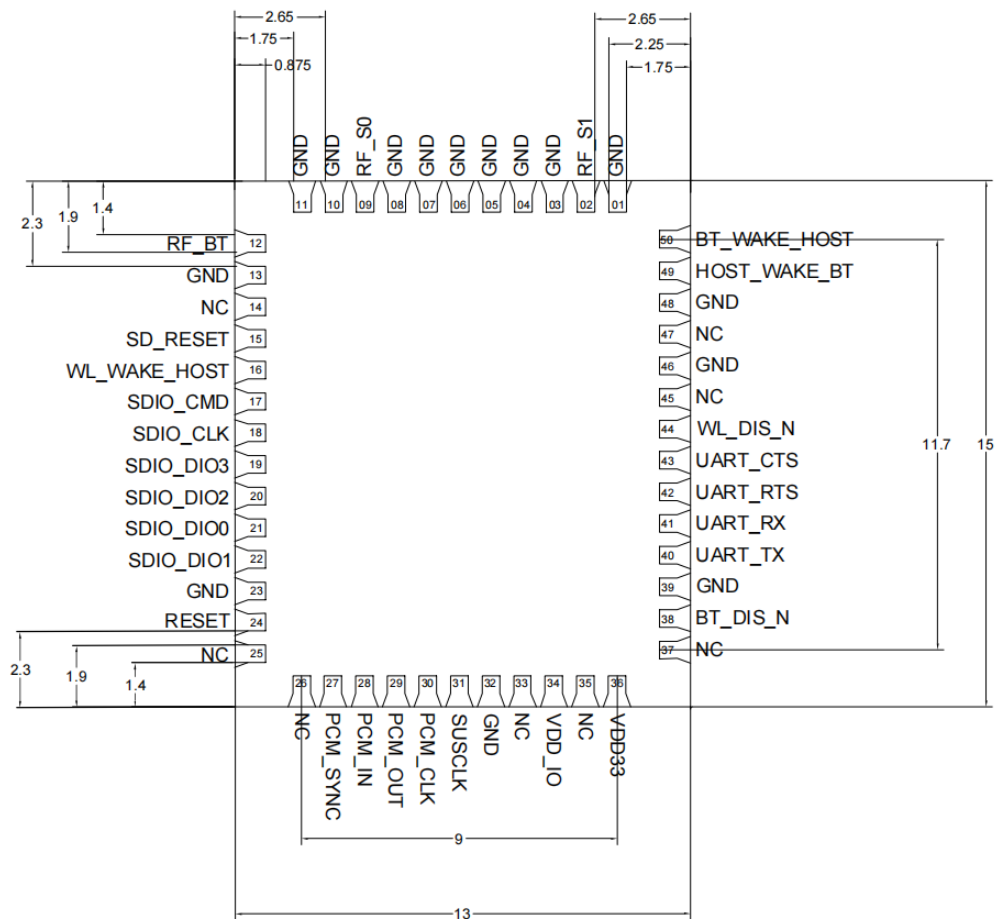
(Unit: mm)

L x W : 15 x 13 (+0.3/-0.1) mm 	
H: 2.5(±0.2)mm	

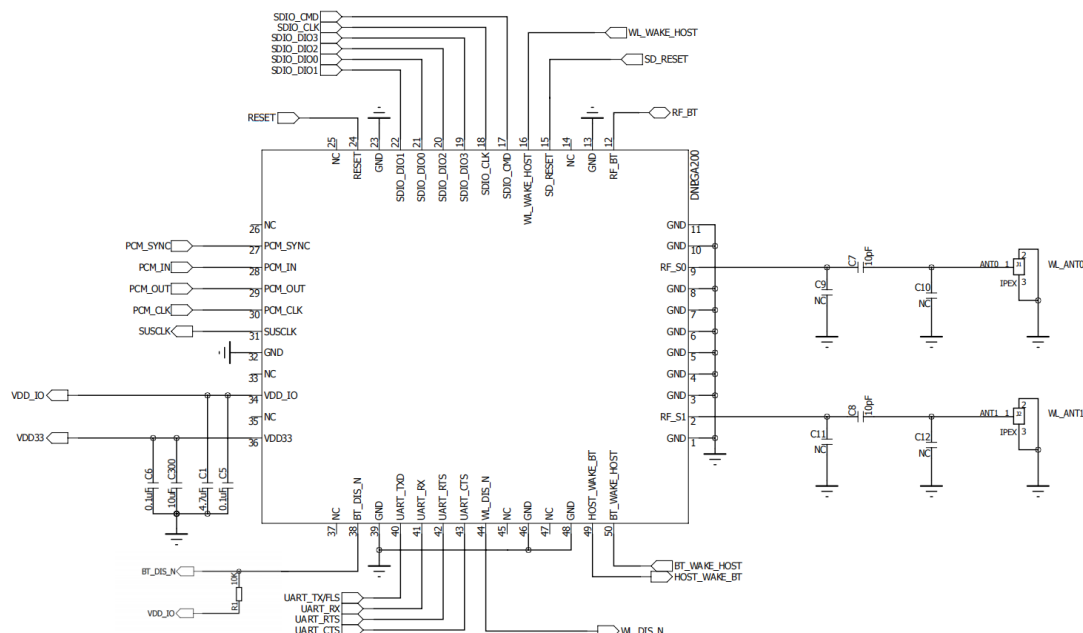
4.2 Module Physical Dimensions

(Unit: mm)

< TOP VIEW >



5.1 Reference schematic



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

2.4G Real-world Testing					
Protocol Standard		Frequency (MHz)	Power (dBm)	EVM(dB)	Rx Sensitivity (dBm)
802.11g(54Mbps)	ANT0	2412	22.97	-43.5	-76
		2437	22.74	-43.1	-76
		2462	22.51	-44.5	-76
	ANT1	2412	20.49	-43.3	-76
		2437	22.60	-41.5	-76
		2462	23.00	-43.5	-76
802.11ax(HE20_MCS11)	ANT0	2412	19.22	-42.9	-62
		2437	19.53	-42.5	-62
		2462	20.80	-43.9	-62
	ANT1	2412	19.63	-42.9	-62
		2437	19.62	-41.7	-62
		2462	19.28	-42.7	-62
802.11ax(HE40_MCS11)	ANT0	2422	21.51	-41.9	-62
		2452	22.16	-42.1	-62
	ANT1	2422	21.37	-42.5	-62

		2452	21.33	-42.0	-62
5G Real-world Testing					
Protocol Standard		Frequency (MHz)	Power (dBm)	EVM(dB)	Rx Sensitivity (dBm)
802.11a(54Mbps)	ANT0	5180	11.49	-40.5	-74
		5825	12.68	-39.6	-74
	ANT1	5180	11.05	-41.7	-74
		5825	12.36	-40.1	-74
802.11ax(HE20_MCS11)	ANT0	5180	11.54	-42.2	-62
		5825	12.77	-39.3	-62
	ANT1	5180	13.5	-41.3	-62
		5825	12.3	-38.8	-62
802.11ax(HE80_MCS11)	ANT0	5210	11.44	-38.9	-56
		5775	12.53	-36.4	-56
	ANT1	5210	11.59	-38.7	-56
		5775	12.81	-36.7	-56

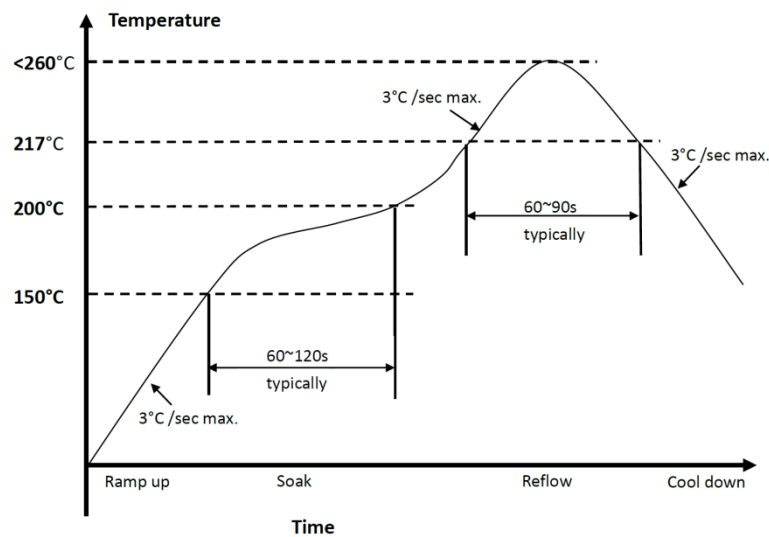
Description: The test environment is: temperature 25 °C humidity 60%

6 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

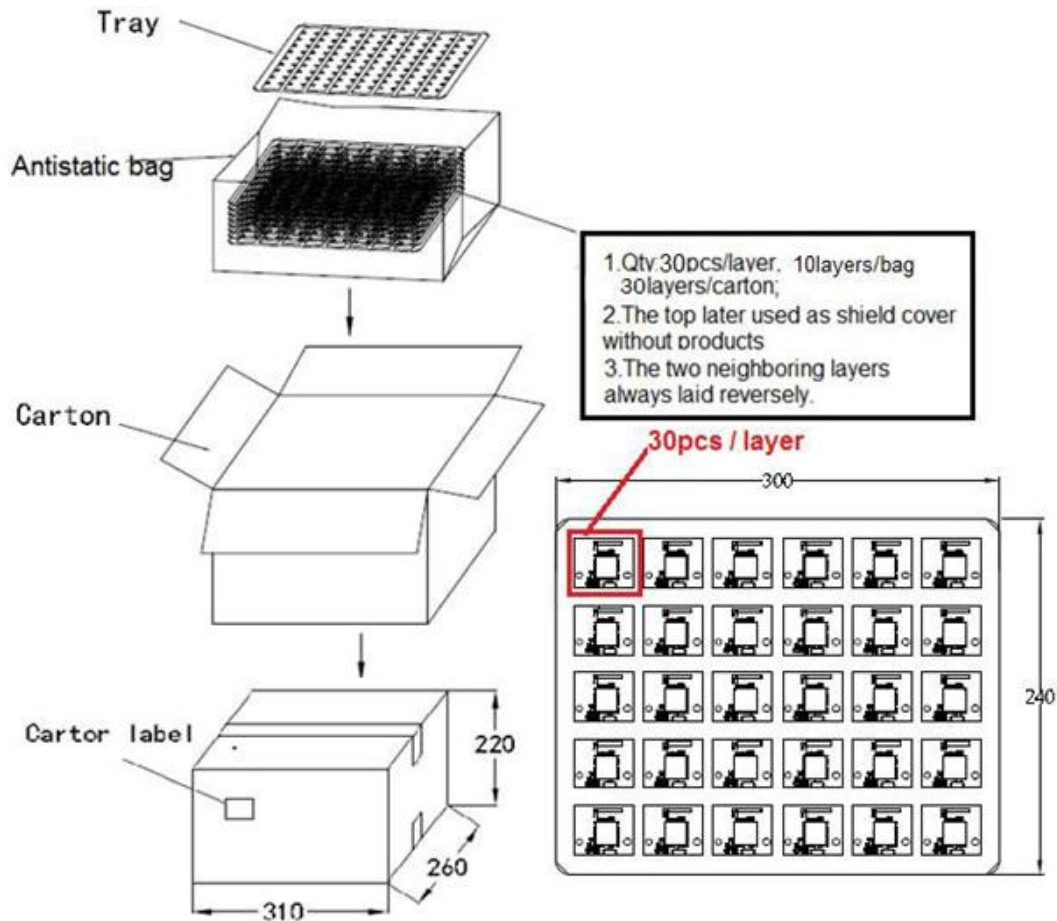
Peak Temperature : <260°C

Number of Times : 2 times max



7 Package

7.1 Reel



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.

FCC Warning

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

Regulatory integration instructions for USA market

Integration instructions for host product manufacturers.

1. General

This document refers to FCC 996369 D03 OEM Manual v01r01, and lists the requirements for module integrators.

2. List of applicable FCC rules

CFR 47 FCC PART 15.247 and FCC PART 15.407 has been investigated. It is applicable to the modular.

3. Specific operational use conditions

This module is stand-alone modular and can be used in both fix and mobile, portable devices. If the end-product will involve multiple simultaneously transmitting radios or different operational conditions for the stand-alone modular transmitter, the host manufacturer have to consult with module manufacturer for the installation method in end system.

4. Limited module procedures

Not applicable

5. Trace antenna designs

Not applicable

6. RF exposure considerations

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance of 20cm from your body.

For making a device where the distance to body is below 20 cm, it is necessary to perform a FCC SAR measurement on the complete device and using the class 2 permissive change (C2PC).

7. Antennas

This radio transmitter FCC ID: 2AT5W-O9201SB has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

For model O9201SB, the EUT using three antenna:

BLE&BT

No.	Antenna Type	Antenna Gain	Frequency Range
Antenna 2	FPC	-4.37dBi	BLE&BT: 2402-2480MHz

2.4G Wi-Fi&5G Wi-Fi

No.	Antenna Type	Antenna Gain	Frequency Range
Antenna 0	FPC	-4.37 dBi	2.4G Wi-Fi: 2412-2462MHz
Antenna 1	FPC	-4.37 dBi	
Antenna 0	FPC	1.96 dBi	5G Wi-Fi: 5150-5250 MHz
Antenna 1	FPC	1.96 dBi	
Antenna 0	FPC	1.7 dBi	5G Wi-Fi: 5725-5850 MHz
Antenna 1	PPC	1.7 dBi	

For specific information, please refer to the Antenna spec report.

8. Label and compliance information

The final end product must be labeled in a visible area with the following" Contains
FCC ID: 2AT5W-O9201SB"

9. Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

10. Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15B.

THE END