

## AW869A

### Dual band WiFi6 Module Spec

拟制 Design	审核 Check	批准 Approve	版本 Version	日期 Date
			V1.0	2021.04.27

## 更改记录

### Reversion History

版本 Version	日期 Date	更改内容 Modification
1.0	2021.04.27	First release



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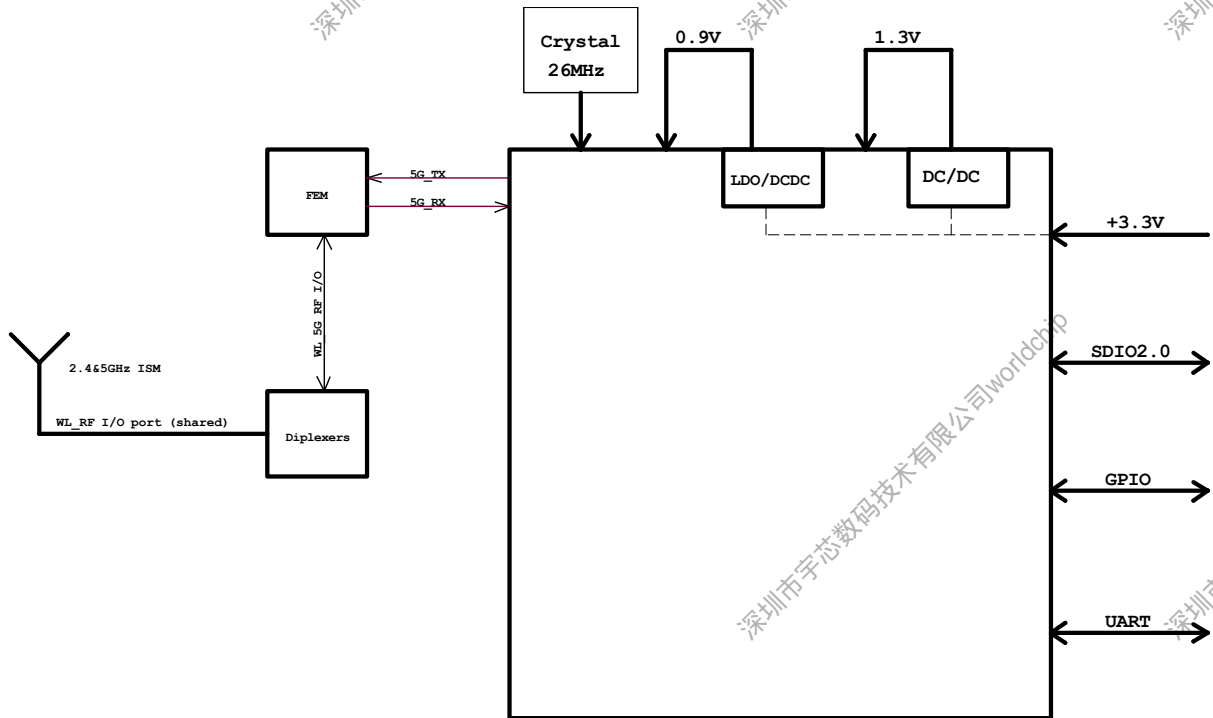
## 1. Overview

The AW869A is a highly integrated module with Dual band WiFi6; combination solution to support 1 × 1 IEEE 802.11b/g/n/ac/ax WLAN standards enabling seamless integration of WLAN technology.

## 2. Features

- Supports a low-power SDIO 2.0 interface for WLAN
- Provides a highly integrated WLAN system-on-chip (SoC) for 2.4&5.8 GHz 802.11ax
- Supports WLAN 2.4&5.8 GHz , 20 MHz/40 MHz
- Supports a single-ended RF port for cleaner and lower cost design
- Supports STA,AP,WiFi Direct modes concurrently
- Supports WiFi6 TWT
- Supports MU-MIMO,OFDMA

### 3. Block Diagram



### 4. General Specification

Model	AW869A
Product Name	WLAN 802.11a/b/g/n/ac/ax SDIO2.0 1T1R
Major Chipset	Allwinner
Standard	802.11a/b/g/n/ac/ax
Modulation Method	BPSK/ QPSK/ 16-QAM/ 64-QAM/256-QAM/1024-QAM
Frequency Band	Dual band 2.4&5.8GHz ISM
WiFi Interface	SDIO2.0
Interface	UART
Operating Temperature	-20° C ~ 70° C
Storage Temperature	-20° C ~ 125°C
Humidity	5% to 90% maximum
Dimension	12x12x1.8 (LxWxH) ±0.2mm

## 5. RF Specification

### 5.1 2.4 GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n/ax WiFi compliant
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz : Ch1 ~ Ch14
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11 ax : OFDMA /1024-QAM,256-QAM, 64-QAM, 16-QAM, QPSK, BPSK
Output Power	802.11b / 1Mbps : 17dBm ± 2 dB @ EVM ≤ -10dB
	802.11b /11Mbps : 17dBm ± 2 dB @ EVM ≤ -15dB
	802.11g / 6Mbps : 17dBm ± 2 dB @ EVM ≤ -5dB
	802.11g /54Mbps : 15 dBm ± 2 dB @ EVM ≤ -28dB
	802.11n /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11n /MCS7 : 14 dBm ± 2 dB @ EVM ≤ -30dB
802.11ax /HE0(20/40M) : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11ax /HE11(20/40M) : 13 dBm ± 2 dB @ EVM ≤ -32dB	
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -93 dBm, typical
	- 2Mbps PER @ -90 dBm, typical
	- 5.5Mbps PER @ -88 dBm, typical
	- 11Mbps PER @ -86 dBm, typical
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -91 dBm, typical
	- 9Mbps PER @ -89 dBm, typical
	- 12Mbps PER @ -86 dBm, typical
	- 18Mbps PER @ -83 dBm, typical
	- 24Mbps PER @ -80 dBm, typical
	- 36Mbps PER @ -77 dBm, typical
	- 48Mbps PER @ -74 dBm, typical
- 54Mbps PER @ -72 dBm, typical	
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90 dBm, typical
	- MCS=1 PER @ -87 dBm, typical
	- MCS=2 PER @ -84 dBm, typical
	- MCS=3 PER @ -81 dBm, typical
	- MCS=4 PER @ -78 dBm, typical

	- MCS=5 PER @ -75 dBm, typical
	- MCS=6 PER @ -72 dBm, typical
	- MCS=7 PER @ -70 dBm, typical
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm, typical
	- MCS=1 PER @ -84 dBm, typical
	- MCS=2 PER @ -81 dBm, typical
	- MCS=3 PER @ -78 dBm, typical
	- MCS=4 PER @ -75 dBm, typical
	- MCS=5 PER @ -72 dBm, typical
	- MCS=6 PER @ -69 dBm, typical
Receive Sensitivity (11ax,20MHz) @10% PER	- HE=0 PER @ -90 dBm, typical
	- HE=1 PER @ -88 dBm, typical
	- HE=2 PER @ -86 dBm, typical
	- HE=3 PER @ -84 dBm, typical
	- HE=4 PER @ -81 dBm, typical
	- HE=5 PER @ -79 dBm, typical
	- HE=6 PER @ -76 dBm, typical
	- HE=7 PER @ -73 dBm, typical
	- HE=8 PER @ -70 dBm, typical
	- HE=9 PER @ -68 dBm, typical
Receive Sensitivity (11ax,40MHz) @10% PER	- HE=0 PER @ -88 dBm, typical
	- HE=1 PER @ -86 dBm, typical
	- HE=2 PER @ -83 dBm, typical
	- HE=3 PER @ -80 dBm, typical
	- HE=4 PER @ -77 dBm, typical
	- HE=5 PER @ -74 dBm, typical
	- HE=6 PER @ -72 dBm, typical
	- HE=7 PER @ -69 dBm, typical
	- HE=8 PER @ -66 dBm, typical
- HE=9 PER @ -64 dBm, typical	
Maximum Input Level	802.11b : -10 dBm
	802.11g/n/ax : -20 dBm
Antenna Reference	FPC antenna max gain 2.81dBi, Rod antenna max gain 2.83dBi.

## 5.2 5 GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac/ax WiFi compliant
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)
Number of Channels	5.0GHz : Please see the table
Modulation	802.11a : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11n : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11ac : OFDM /256-QAM 802.11ax: OFDMA/1024-QAM
Output Power	802.11a / 6Mbps : 15 dBm ± 2 dB @ EVM ≤ -5dB 802.11a /54Mbps : 12 dBm ± 2 dB @ EVM ≤ -25dB
	802.11n HT20 /MCS0 : 14 dBm ± 2 dB @ EVM ≤ -5dB 802.11n HT20 /MCS7 : 11 dBm ± 2 dB @ EVM ≤ -28dB
	802.11n HT40 /MCS0 : 14 dBm ± 2 dB @ EVM ≤ -5dB 802.11n HT40 /MCS7 : 11dBm ± 2 dB @ EVM ≤ -28dB
	802.11ac VHT20 /MCS0 : 14 dBm ± 2 dB @ EVM ≤ -5dB 802.11ac VHT20 /MCS8 : 10 dBm ± 2 dB @ EVM ≤ -30dB
	802.11ac VHT40 /MCS0 : 14 dBm ± 2 dB @ EVM ≤ -5dB 802.11ac VHT40 /MCS9 : 10 dBm ± 2 dB @ EVM ≤ -32dB
	802.11ax HE0(20M) : 13 dBm ± 2 dB @ EVM ≤ -5dB 802.11ax HE11(20M) : 9 dBm ± 2 dB @ EVM ≤ -32dB
	802.11ax HE0(40M) : 13 dBm ± 2 dB @ EVM ≤ -5dB 802.11ax HE11(40M) : 9 dBm ± 2 dB @ EVM ≤ -32dB
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -93dBm, typical
	- 9Mbps PER @ -90 dBm, typical
	- 12Mbps PER @ -87 dBm, typical
	- 18Mbps PER @ -84 dBm, typical
	- 24Mbps PER @ -81 dBm, typical
	- 36Mbps PER @ -78 dBm, typical
	- 48Mbps PER @ -76 dBm, typical
- 54Mbps PER @ -74 dBm, typical	
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -92 dBm, typical
	- MCS=1 PER @ -89 dBm, typical
	- MCS=2 PER @ -86 dBm, typical
	- MCS=3 PER @ -83 dBm, typical
	- MCS=4 PER @ -80 dBm, typical
	- MCS=5 PER @ -77 dBm, typical
	- MCS=6 PER @ -74 dBm, typical



Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7 PER @ -72 dBm, typical
	- MCS=0 PER @ -90 dBm, typical
	- MCS=1 PER @ -87 dBm, typical
	- MCS=2 PER @ -84 dBm, typical
	- MCS=3 PER @ -81 dBm, typical
	- MCS=4 PER @ -78 dBm, typical
	- MCS=5 PER @ -75 dBm, typical
	- MCS=6 PER @ -72 dBm, typical
	- MCS=7 PER @ -70 dBm, typical
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -91 dBm, typical
	- MCS=1, NSS1 PER @ -88 dBm, typical
	- MCS=2, NSS1 PER @ -85 dBm, typical
	- MCS=3, NSS1 PER @ -82 dBm, typical
	- MCS=4, NSS1 PER @ -79 dBm, typical
	- MCS=5, NSS1 PER @ -76dBm, typical
	- MCS=6, NSS1 PER @ -73 dBm, typical
	- MCS=7, NSS1 PER @ -70 dBm, typical
	- MCS=8, NSS1 PER @ -68 dBm, typical
Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -89 dBm, typical
	- MCS=1, NSS1 PER @ -86 dBm, typical
	- MCS=2, NSS1 PER @ -83 dBm, typical
	- MCS=3, NSS1 PER @ -80 dBm, typical
	- MCS=4, NSS1 PER @ -77 dBm, typical
	- MCS=5, NSS1 PER @ -74 dBm, typical
	- MCS=6, NSS1 PER @ -71 dBm, typical
	- MCS=7, NSS1 PER @ -68 dBm, typical
	- MCS=8, NSS1 PER @ -65 dBm, typical
- MCS=9, NSS1 PER @ -63 dBm, typical	
Receive Sensitivity (11ax,20MHz) @10% PER	- HE=0 PER @ -89 dBm, typical
	- HE=1 PER @ -86 dBm, typical
	- HE=2 PER @ -83 dBm, typical
	- HE=3 PER @ -80 dBm, typical
	- HE=4 PER @ -77 dBm, typical
	- HE=5 PER @ -74 dBm, typical
	- HE=6 PER @ -71 dBm, typical
	- HE=7 PER @ -68 dBm, typical

	- HE=8	PER @ -65 dBm, typical
	- HE=9	PER @ -63 dBm, typical
Receive Sensitivity (11ax,40MHz) @10% PER	- HE=0	PER @ -87 dBm, typical
	- HE=1	PER @ -84 dBm, typical
	- HE=2	PER @ -81 dBm, typical
	- HE=3	PER @ -78 dBm, typical
	- HE=4	PER @ -75 dBm, typical
	- HE=5	PER @ -72 dBm, typical
	- HE=6	PER @ -69 dBm, typical
	- HE=7	PER @ -66 dBm, typical
	- HE=8	PER @ -63 dBm, typical
	- HE=9	PER @ -61 dBm, typical
Maximum Input Level	802.11a/n/ac/ax : -20 dBm	
Antenna Reference	FPC antenna max gain 3.13dBi, Rod antenna max gain 1.46dBi.	

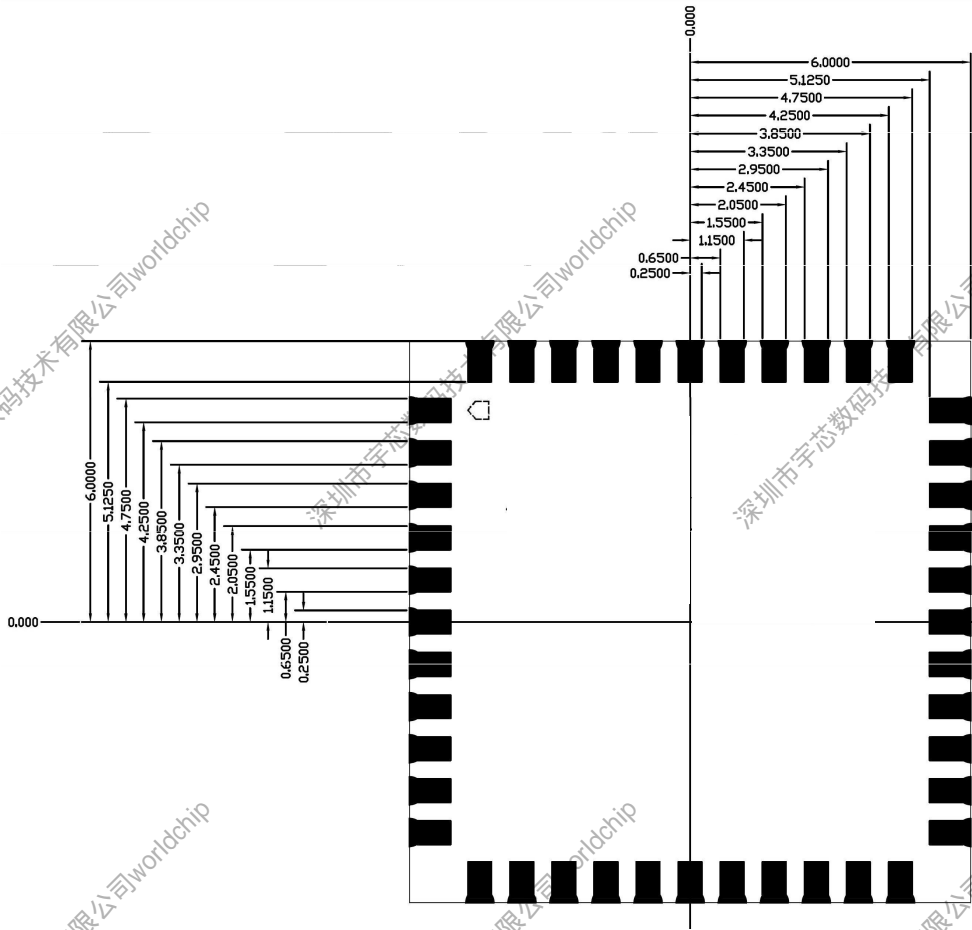
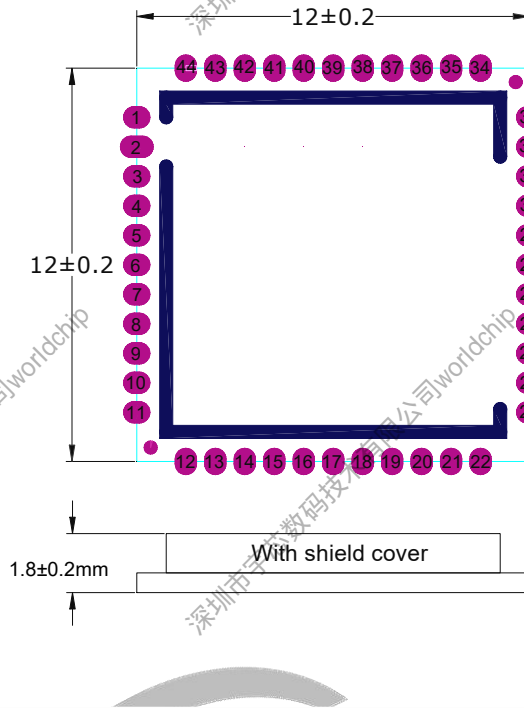


## 6. Recommended Operating Rating

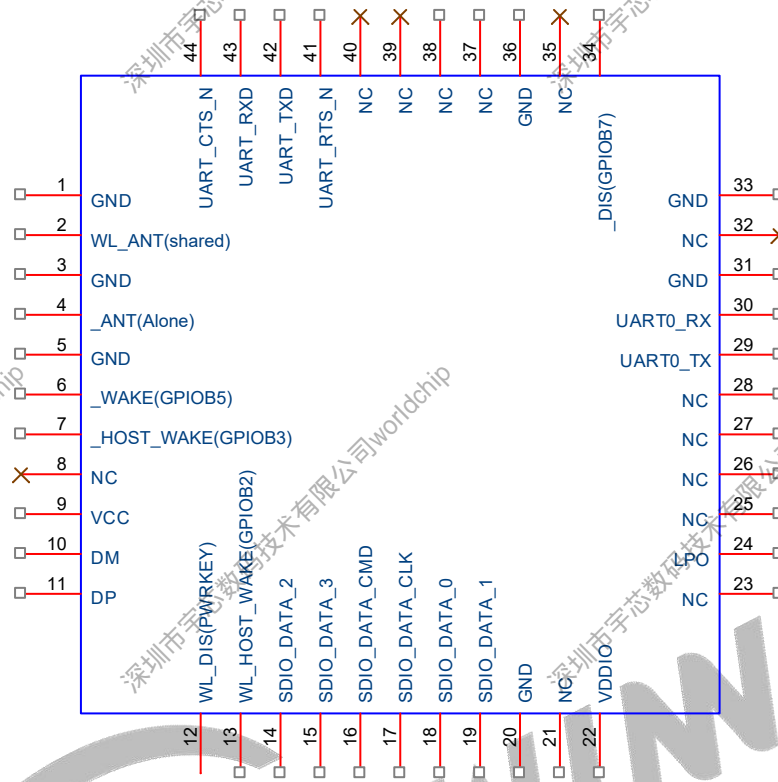
Symbol	Parameter	Minimum	Typical	Maximum	Units
VDD	3.3V supply voltage	3.0	3.3	3.6	V
VDDIO	I/O supply voltage	1.7	1.8	1.9	V
Current	3.3V rating current	--	--	400	mA

## 7. Physical Dimensions

(Unit: mm)



## 8. Pin Description



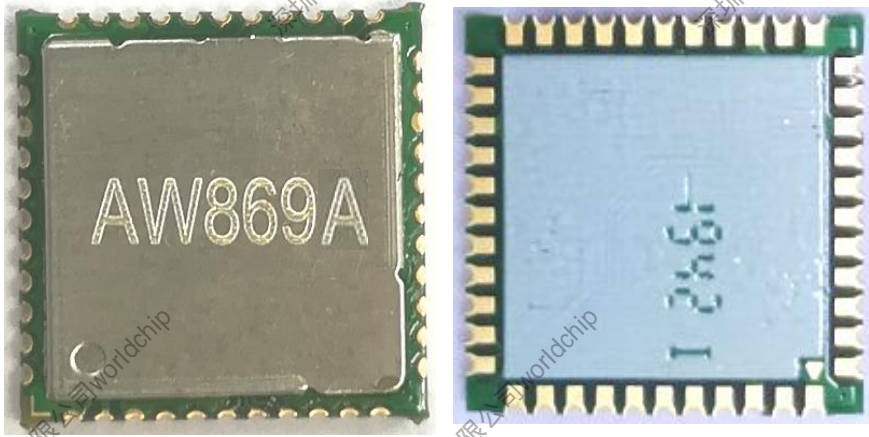
NO.	Name	Type	Description
1	GND	—	Ground connections
2	RF	I/O	WL_ RF I/O port (2.4/5GHz)
3	GND	—	Ground connections
4	_ANT	I/O	_RF (Alone)
5	GND	—	Ground connections
6	Host wake	I	Host wake (GPIOB5)
7	wake host	O	wake host (GPIOB3)
8	NC	—	No connect, keep floating
9	VDD	P	3.3V INPUT
10	USB_DM	—	No connect, keep floating
11	USB_DP	—	No connect, keep floating
12	WL_DIS	I	Power key (L=OFF, H=ON)
13	WL_Wake-up host	O	WL Wake-up host (GPIOB2)
14	SD_DAT2	I/O	SDIO DATA2
15	SD_DAT3	I/O	SDIO DATA3
16	SD_CMD	I/O	SDIO command line
17	SD_CLK	I/O	SDIO CLK
18	SD_DAT0	I/O	SDIO DATA0

19	SD_DAT1	I/O	SDIO DATA1
20	GND	—	Ground connections
21	NC	—	No connect, keep floating
22	VDDIO	P	I/O Voltage supply input 1.8V or 3.3V
23	NC	—	No connect, keep floating
24	LPO	—	No connect, keep floating
25	NC	—	No connect, keep floating
26	NC	—	No connect, keep floating
27	NC	—	No connect, keep floating
28	NC	—	No connect, keep floating
29	UART0_TX	—	No connect, keep floating(Debug pin)
30	UART0_RX	—	No connect, keep floating(Debug pin)
31	GND	—	Ground connections
32	NC	—	No connect, keep floating
33	GND	—	Ground connections
34	DIS	—	Reserved (GPIOB7)
35	NC	—	No connect, keep floating
36	GND	—	Ground connections
37	NC	—	No connect, keep floating
38	NC	—	No connect, keep floating
39	NC	—	No connect, keep floating
40	NC	—	No connect, keep floating
41	UART_RTS	O	Bluetooth UART interface
42	UART_TX	O	Bluetooth UART interface
43	UART_RX	I	Bluetooth UART interface
44	UART_CTS	I	Bluetooth UART interface

## 9. Supplier

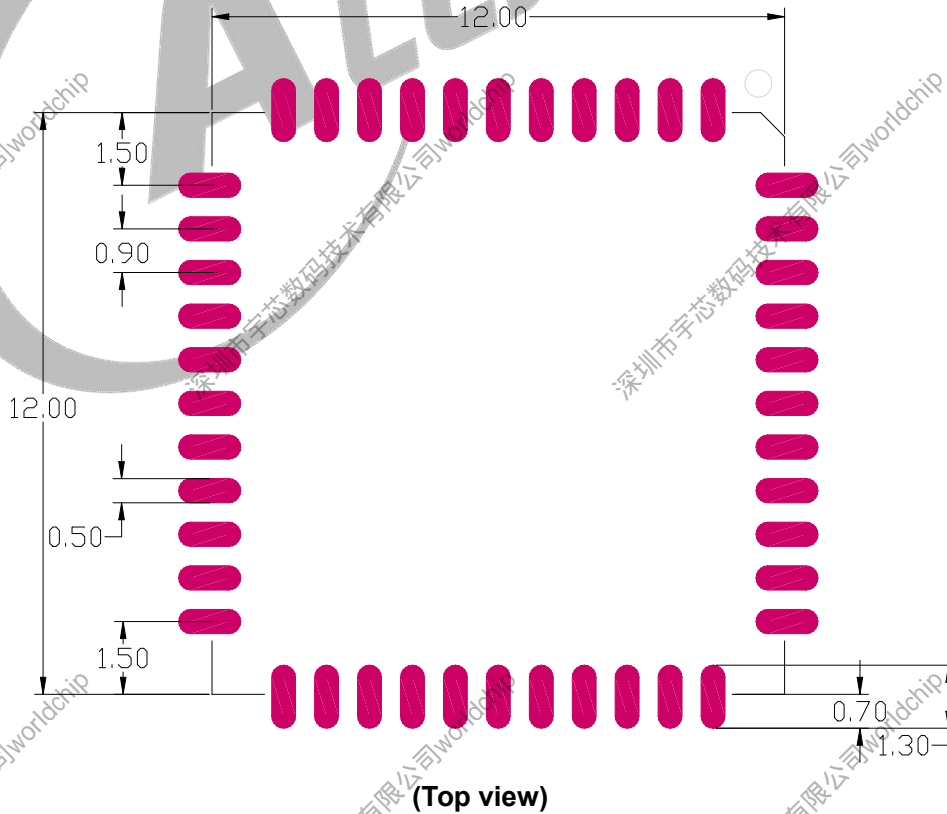
Supplier list	
Name of material	Material brand
Crystal	JWT/FK/TKD/Murata/TXC
Duplexer	ACX/GLEAD/Sunlord/Walsin
Inductor	Sunlord/ CHILISIN/ SAMWHA/Murata
Wifi chip	Allwinner
RF FEM	Chipbetter
RF switch	Richwave/Qwave/RDA/Maxscend
Capacitance	SAMSUNG /EYANG
Resistance	UniOhm /YAGEO
PCB(12x12x0.5mm)	A,O,I,F

## 10. Physical Photo



说明：PCB 不同供应商，底部丝印有微小差异

## 11. Layout Recommendation



## 12. Baking & Storage Temperature & Recommended Reflow Profile

(烘烤, 储存温度和推荐炉温)

### 12.1 Baking & Storage Temperature

- Storage life: 12 months. Storage conditions: <math>40^{\circ}\text{C}</math>. Relative humidity: <math>90\% \text{R.H.}</math>

(保存期限: 12个月, 储存环境条件: 温度在: <math>40^{\circ}\text{C}</math>, 相对湿度: <math>90\% \text{R.H.}</math>)

- After this bag is opened, devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be. (模块包装被拆后, SMT 组装之时限)

- ✓ Check the humidity card :stored at  $\leq 20\% \text{RH}$ . If :30%~40%(pink) or greater than 40%(red). Labeling module has moisture absorption. (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.)

- ✓ Mounted within 168 hours at factory conditions of:  $t \leq 30^{\circ}\text{C}$ ,  $\leq 60\% \text{R.H.}$

(工厂环境温度湿度管制:  $\leq 30^{\circ}\text{C}$ ,  $\leq 60\% \text{R.H.}$ , 168小时内.)

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

(拆封后, 车间的保存寿命为168小时.)

- Module apart packing after 168 hours, If baking is required, devices may be baked for.

(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:)

- ✓ Modules must be to remove module moisture problem. (模块须重新烘烤, 以除去模块吸湿问题.)

- ✓ Baking temperature:  $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , 120 hours. (烘烤温度条件:  $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , 120小时).

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

(烘烤后, 放入适量的干燥剂再密封包装)

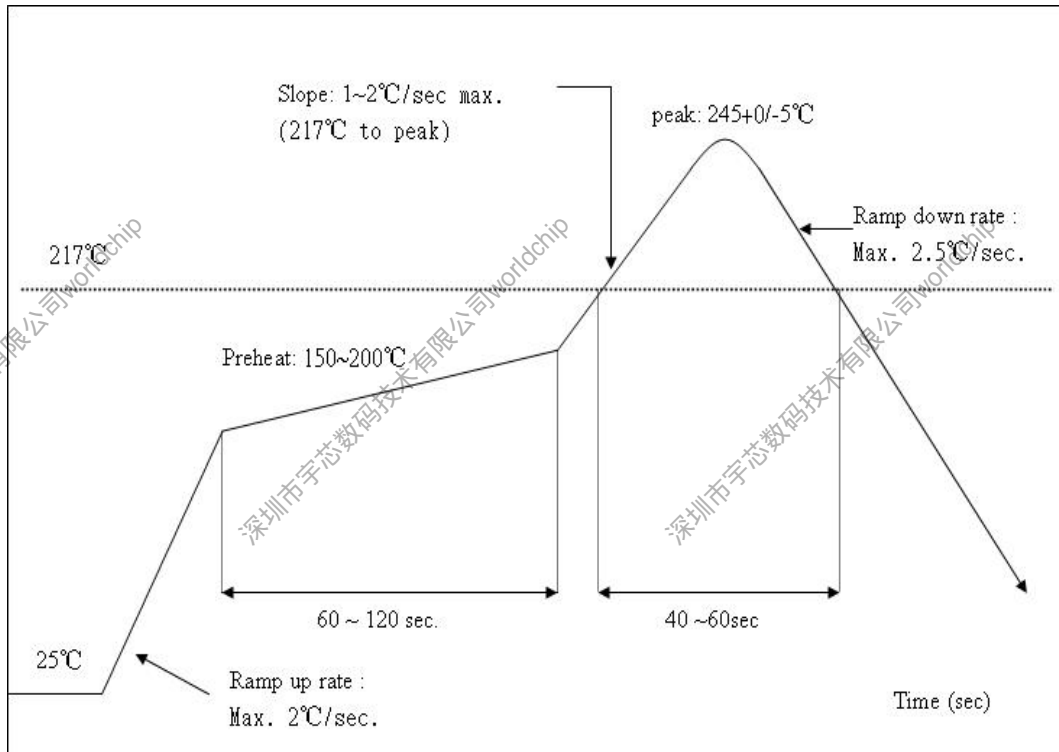


## 12.2 Recommended Reflow Profile

Referred IPC/JEDEC standard.

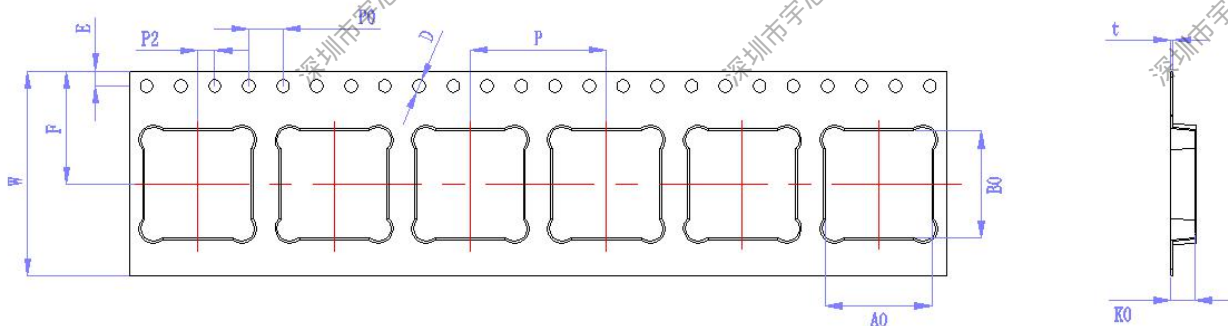
Peak Temperature : <math>\leq 250^{\circ}\text{C}</math>

Number of Times : 2 times



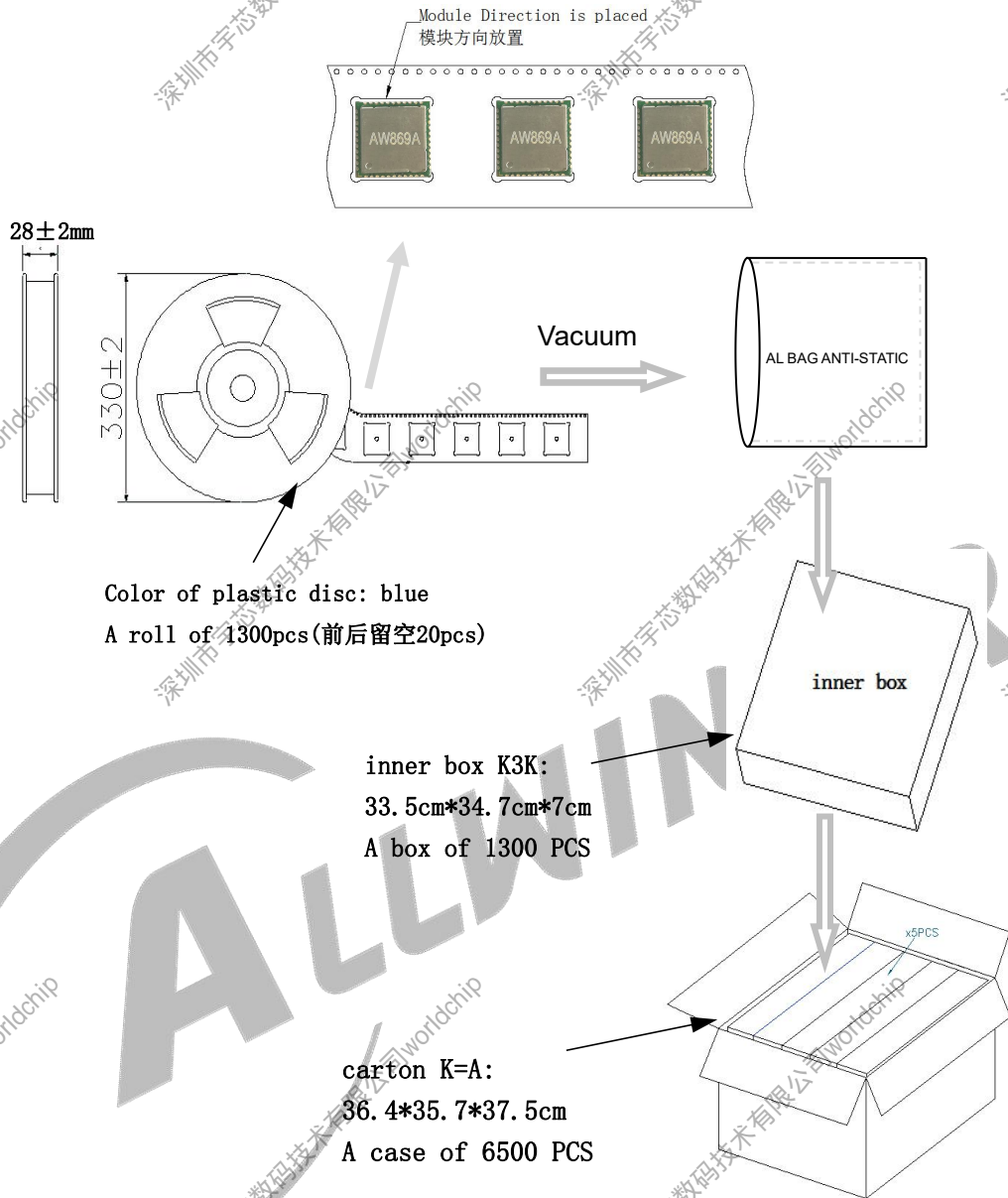
## 13. Packing information

### 13.1 Carrier Size Detail



ITEM	W	A0	B0	K0	P	F	E	D	P0	P2	T
DIM	24	12.5	12.5	2.8	16	13.25	1.75	1.50	4	2	0.3
TOLE	+0.30 -0.30	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.05 -0.05

### 13.2 Packaging Detail



**ESD CAUTION**

The AW869A module is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although AW869A module is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

## Warning & Statement

This module meets the requirements of Part 15 Subpart C, FCC CFR Title 47 Part 2.

Integration is strictly limited to fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

This module only allows connection antenna in the instruction manual. If other antennas are used, re-evaluation is required.

This module is test stand-alone, if more another modules work together with this module, please evaluation the multiple RF exposure.

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.

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

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AAHW-AW869A.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment must be installed and operated with minimum distance 20cm between radiator & your body

When the module is installed inside another device, the user manual of this device must contain below warning statements:

1. 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.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The end user manual shall include all required regulatory information/warning as shown in this manual, include:

This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.