AW869A

Dual band WiFi6 + BT5.0 Module Spec

拟制 Design	审核 Check	批准 Approve	版本 Version	日期 Date
			V1.3	2022.03.24

更改记录

Reversion History

| 版本 Version	日期 Date	更改内容 Modification
1.0	2021.04.27	First release
1.1	2021.09.24	Updata Bluetooth version ，release 5G band RF performance
1.2	2021.12.14	Delete PCM description
1.3	2022.03.24	Modify description

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1. Overview

The AW869A is a highly integrated module with Dual band WiFi6,BT5.0; combination solution to support 1 × 1 IEEE 802.11a/b/g/n/ac/ax WLAN standards and BT 5.0 enabling seamless integration of WLAN/BT and low-energy technology.

2. Features

■ Supports a low-power SDIO 2.0 interface for WLAN and a HS-UART interface for BT

■ 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 BT 5.0, BLE, and ANT+ and backward compatibility with BT 1.x and BT 2.x+ Enhanced Data Rate

■ 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
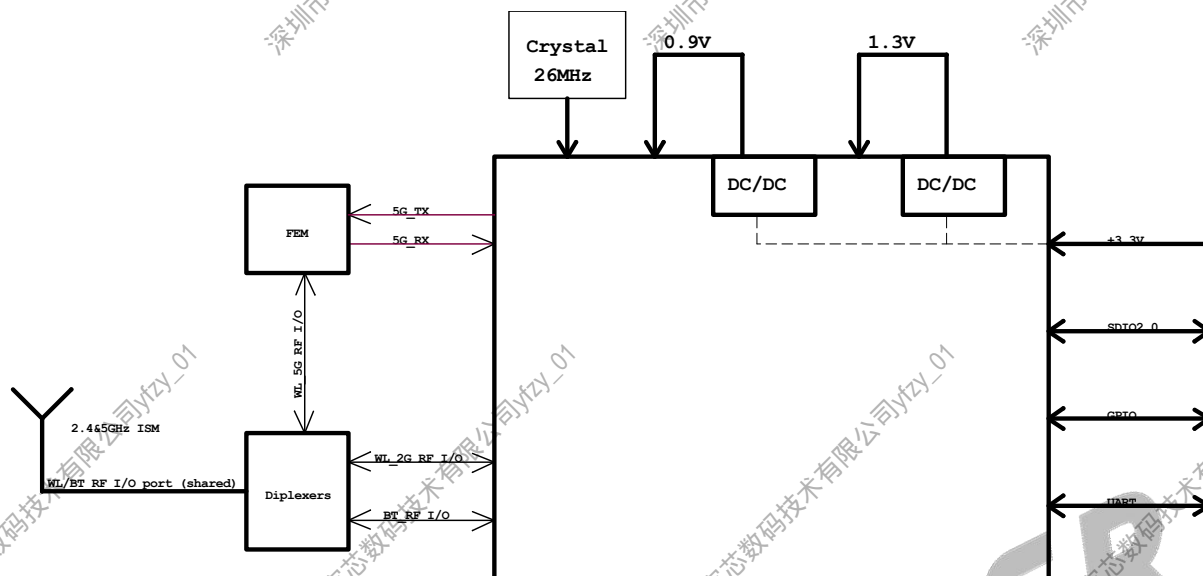
4. General Specification

Model	AW869A
Product Name	WLAN 802.11a/b/g/n/ac/ax SDIO2.0 1T1R + Bluetooth 5.0 module
Major Chipset	AIC8800D
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
BT Interface	UART
Operating Temperature	-20° C ~ 70° C
Storage Temperature	-20° C ~ 125°C
Humidity	5% to 90% maximum
Dimension	12x12x1.7 (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
	- MCS=7	PER @ -67 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	Small antennas with 0~2 dBi peak gain	

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 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11a /54Mbps : 14 dBm ± 2 dB @ EVM ≤ -25dB 802.11n HT20 /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11n HT20 /MCS7 : 13 dBm ± 2 dB @ EVM ≤ -28dB 802.11n HT40 /MCS0 : 16 dBm ± 2 dB @ EVM ≤ -5dB 802.11n HT40 /MCS7 : 13dBm ± 2 dB @ EVM ≤ -28dB 802.11ac VHT20 /MCS0 : 15 dBm ± 2 dB @ EVM ≤ -5dB 802.11ac VHT20 /MCS8 : 12 dBm ± 2 dB @ EVM ≤ -30dB 802.11ac VHT40 /MCS0 : 15 dBm ± 2 dB @ EVM ≤ -5dB 802.11ac VHT40 /MCS9 : 12 dBm ± 2 dB @ EVM ≤ -32dB 802.11ax HE0(20M) : 15 dBm ± 2 dB @ EVM ≤ -5dB 802.11ax HE11(20M) : 11 dBm ± 2 dB @ EVM ≤ -32dB 802.11ax HE0(40M) : 15 dBm ± 2 dB @ EVM ≤ -5dB 802.11ax HE11(40M) : 11 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

	- MCS=7	PER @ -72 dBm, typical
Receive Sensitivity (11n,40MHz) @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 (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	Small antennas with 0~2 dBi peak gain	

5.3   Bluetooth Section

Feature	Description
General Specification	
Bluetooth Standard	Bluetooth V5.0 of 1, 2 and 3 Mbps.
Host Interface	UART
Antenna Reference	Small antennas with 0~2 dBi peak gain
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	BR/EDR :79 channels;BLE:40 channels
Modulation	FHSS, GFSK, DPSK, DQPSK
RF Specification	
Output Power, tolerance±2dBm	
BDR Output Power	7 dBm
EDR Output Power	7 dBm
BLE Output Power	7 dBm
Sensitivity, tolerance±2dBm	

Sensitivity @ BER=0.1% for GFSK(1Mbps)	-96 dBm
Sensitivity @ BER=0.01% for π/4-DQPSK(2Mbps)	-91 dBm
Sensitivity @ BER=0.01% for 8DPSK(3Mbps)	-89 dBm
Sensitivity @ BLE=30.8% for LE(1Mbps)	-100 dBm
Sensitivity @ BLE=30.8% for LE(2Mbps)	-90 dBm
Maximum Input Level	GFSK(1Mbps): -20 dBm
	π/4-DQPSK(2Mbps): -20 dBm
	8DPSK(3Mbps): -20 dBm

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	--	--	450	mA

7. Physical Dimensions

(Unit: mm)
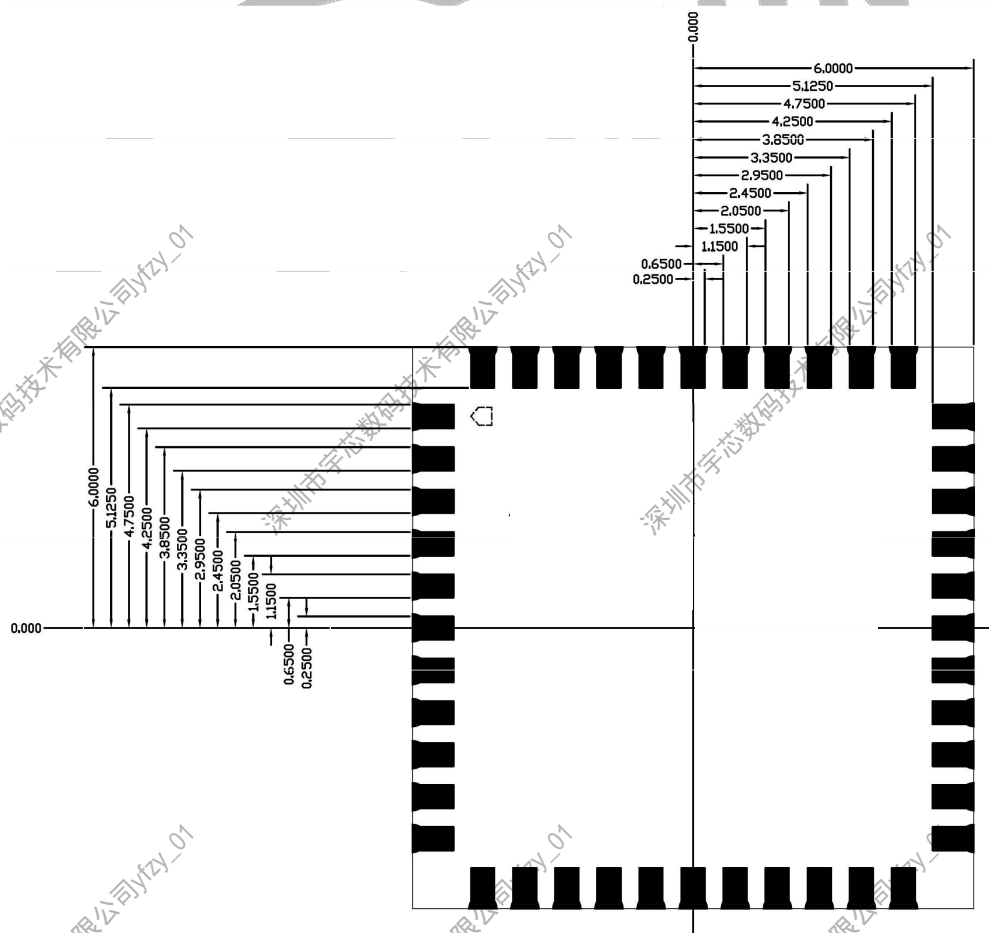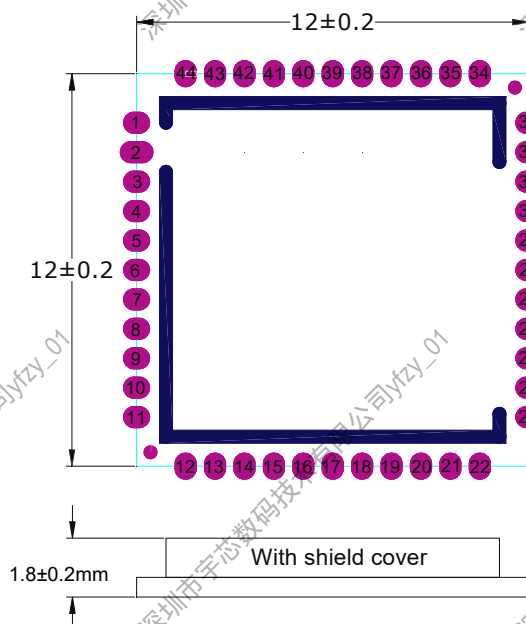
8. Pin Description
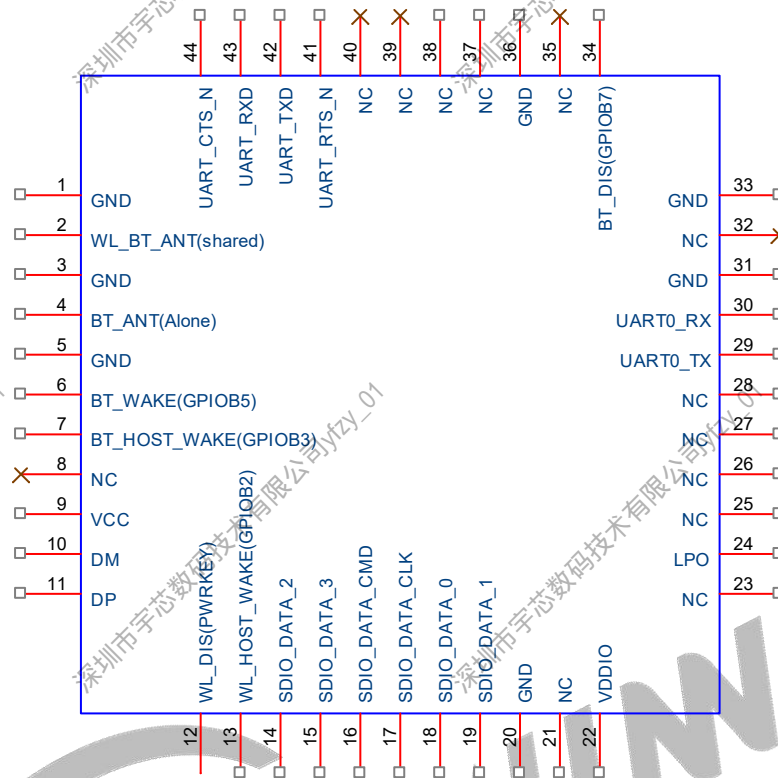
NO.	Name	Type	Description
1	GND	—	Ground connections
2	RF	I/O	WL_BT RF I/O port (2.4/5GHz)
3	GND	—	Ground connections
4	BT_ANT	I/O	NC(BT_RF_BT Alone)
5	GND	—	Ground connections
6	Host wake BT	I	Host wake BT(GPIOB5)
7	BT wake host	O	BT wake host (GPIOB3)
8	NC	—	No connect, keep floating
9	VDD	P	3.3V INPUT
10	NC	—	No connect, keep floating
11	NC	—	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
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	BT_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

备注：HFP(蓝牙通话)功能硬件采用 UART 接口

# 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
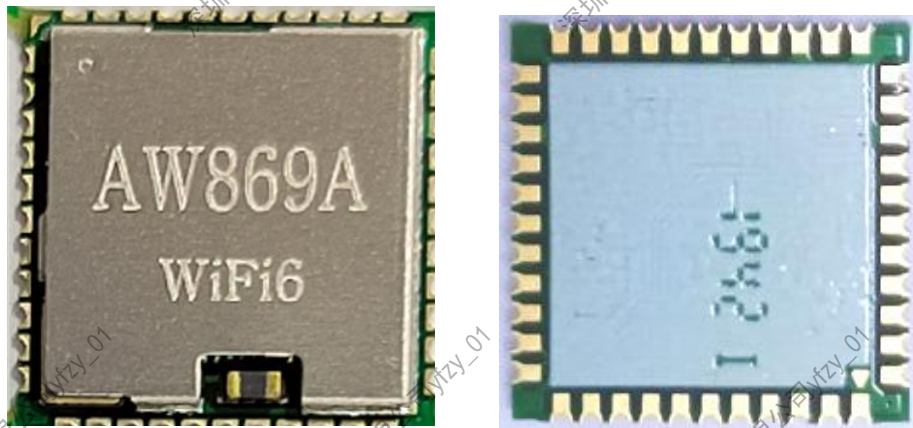
说明：PCB 不同供应商，底部丝印有微小差异

11. Layout Recommendation
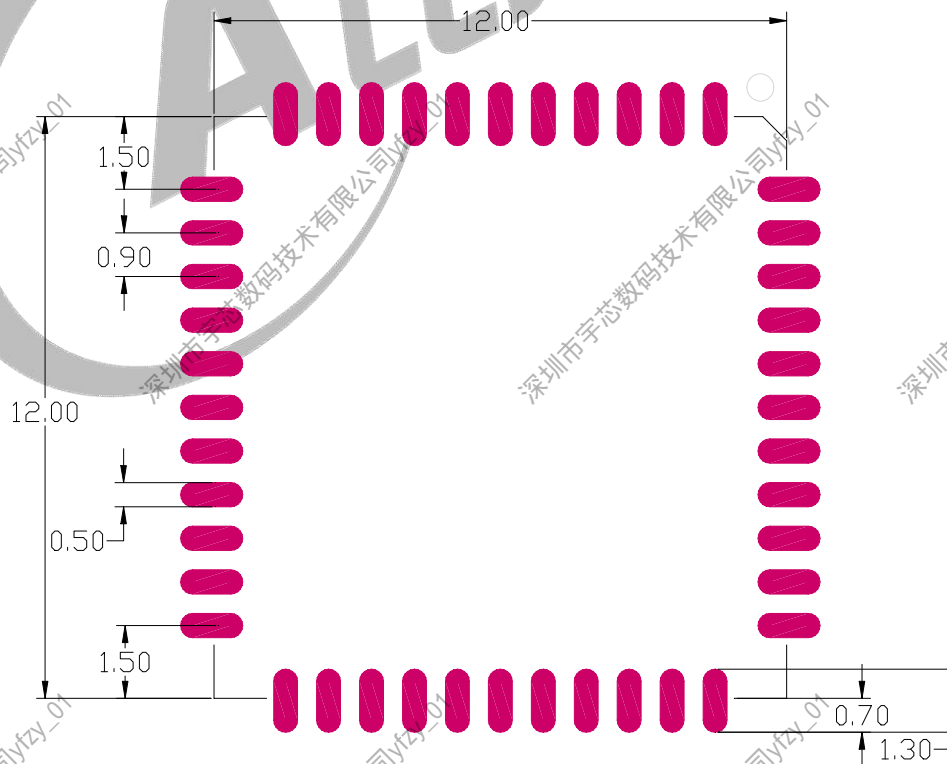
(Top view)

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:<40℃. Relative humidity:<90%R.H.

  (保存期限：12个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.)

- 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 ≦ 20%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≦30%℃，≦60%R.H.

    (工厂环境温度湿度管制：≦30%℃，≦60%R.H, 168小时内。)

  ✓ Once opened, the workshop the preservation of life for168 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℃±5℃, 120 hours. (烘烤温度条件：40℃±5℃，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
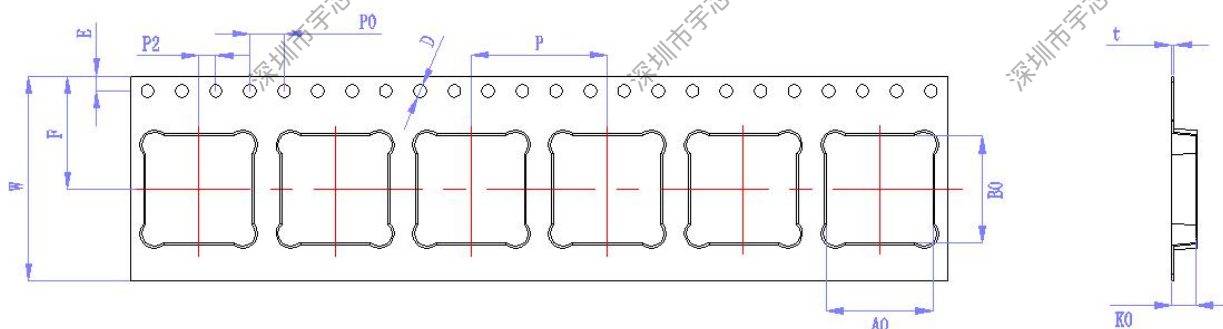
Referred IPC/JEDEC standard.
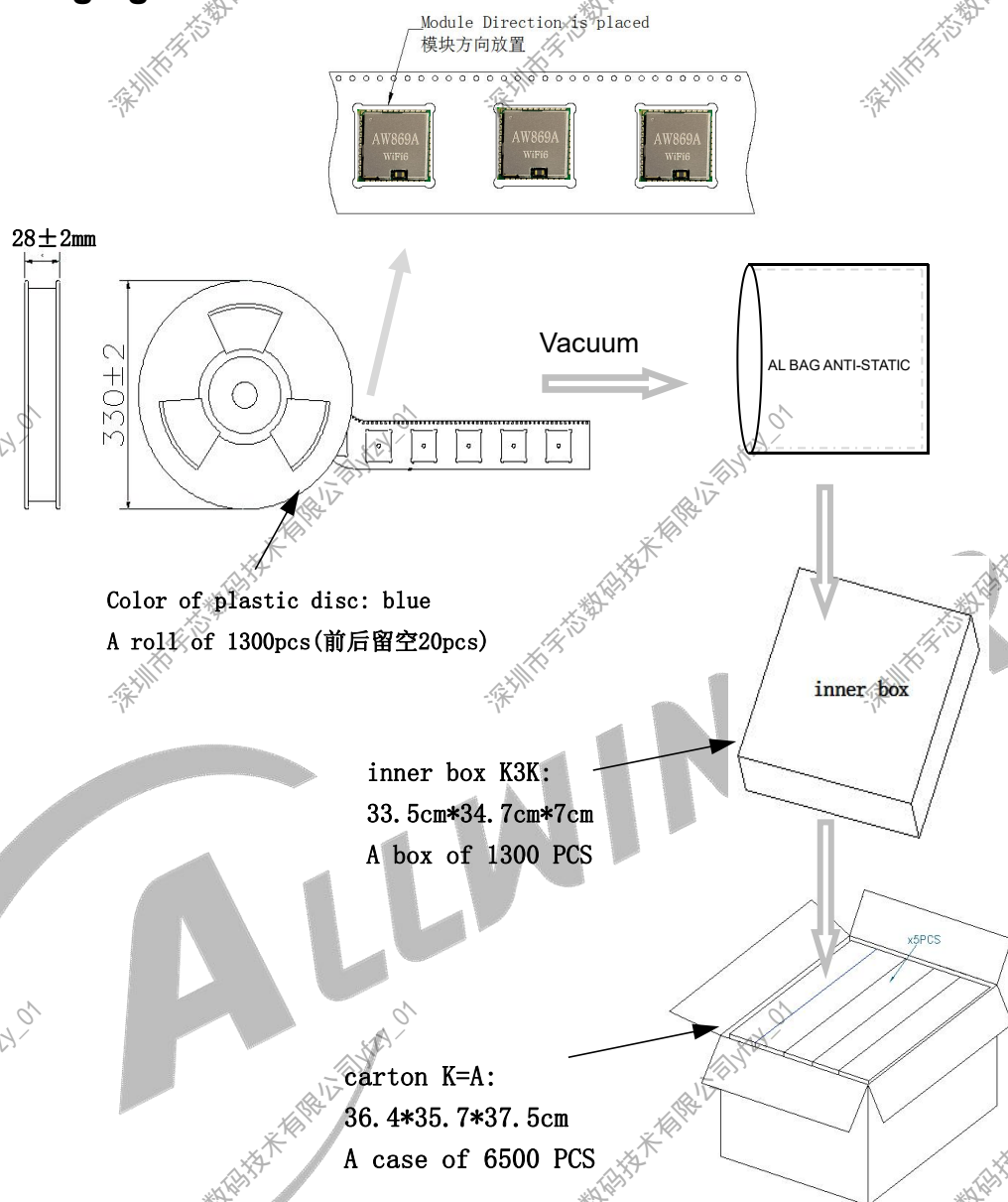
Peak Temperature : <250°C

Number of Times :　2 times
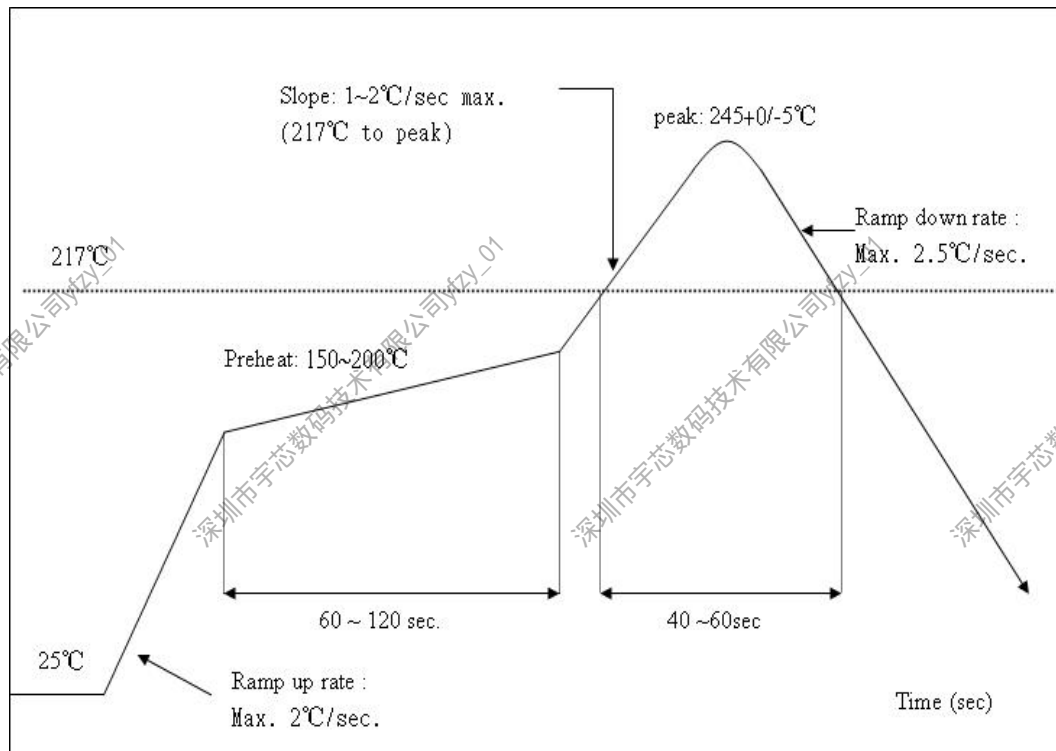
13.　Packing information

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

Module Direction is placed
模块方向放置

28±2mm

330±2

Vacuum

AL BAG ANTI-STATIC

Color of plastic disc: blue
A roll of 1300pcs（前后留空20pcs）

inner box

inner box K3K:
33.5cm*34.7cm*7cm
A box of 1300 PCS

x5PCS

carton K=A:
36.4*35.7*37.5cm
A case of 6500 PCS

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.