AW869A

Dual band WiFi6 11ax+ BT5.4 Module Spec

（SDIO3.0, BW40M, 1-PIN antenna type, Shielding)

拟制 Design	审核 Check	批准 Approve	版本 Version	日期 Date
			V1.0	2024.07.22

更改记录

Reversion History

版本 Version	日期 Date	更改内容 Modification
1.0	2024.07.22	First release

目录

Contents

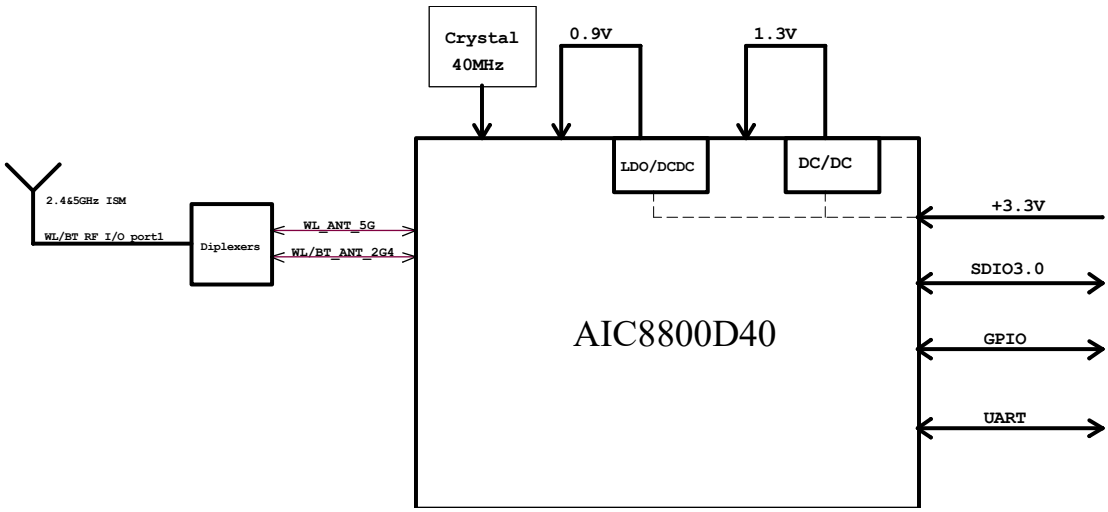
1. Overview

The AW869A is a highly integrated module with Dual band WiFi6,BT5.4; combination solution to support 1 × 1 IEEE 802.11a/b/g/n/ac/ax WLAN standards and BT 5.4 enabling seamless integration of WLAN/BT and low-energy technology.

2. Features

- Supports a low-power SDIO 3.0 interface for WLAN and a UART/PCM interface for BT
- Provides a highly integrated WLAN system-on-chip (SoC) for 5 GHz 802.11ac, or 2.4 GHz/5 GHz 802.11n WLAN applications
- Supports WLAN 2.4GHz and 5GHz , 20 MHz/40 MHz
- Supports BT 5.4, 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 SDIO3.0 1T1R + Bluetooth 5.4 module
Major Chipset	AIC8800D40
Standard	802.11a/b/g/n/ac/ax
Modulation Method	BPSK/ QPSK/ 16-QAM/ 64-QAM/256-QAM/1024-QAM
Frequency Band	Dual band 2.4GHz&5GHz ISM
WiFi Interface	SDIO3.0
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 ≤ -34dB
	802.11ax /HE0(20/40M) ：16 dBm ± 2 dB @ EVM ≤ -5dB 802.11ax /HE11(20/40M) ：13 dBm ± 2 dB @ EVM ≤ -34dB
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
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

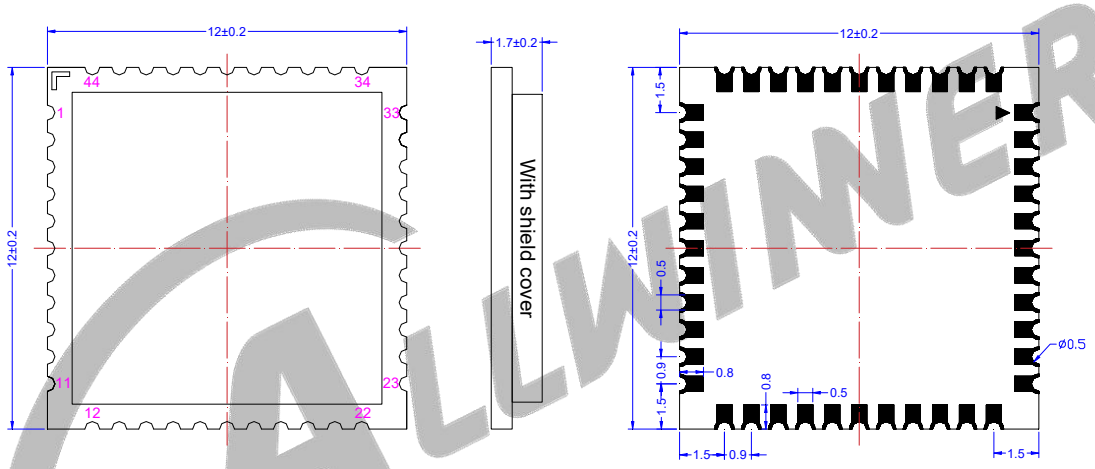
Feature	Description
General Specification	
Bluetooth Standard	Bluetooth V5.4 of 1, 2 and 3 Mbps.
Host Interface	UART
Antenna Reference	Small antennas with 0~2 dBi peak gain
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	BR/EDR :79 channels;BLE:40 channels
Modulation	FHSS, GFSK, DPSK, DQPSK
RF Specification	
Output Power, tolerance±2dBm	
BDR Output Power	8 dBm
EDR Output Power	8 dBm
BLE Output Power	8 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

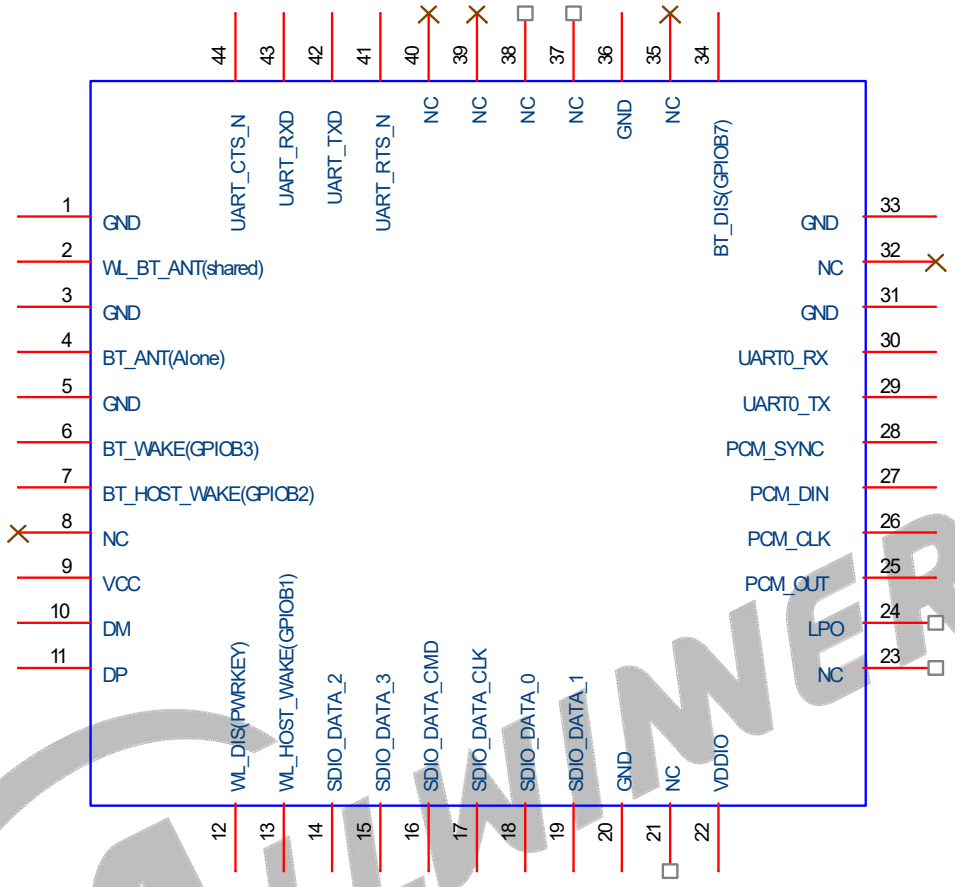
symbol	Parameter	Minimum	Typical	Maximum	Units
VDD	3.3V supply voltage	3.0	3.3	3.6	V
VDDIO	I/O supply voltage	1.7	1.8	1.9	V
Current	3.3V rating current	--	--	450	mA

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	NC	I/O	No connect, keep floati
5	GND	—	Ground connections
6	Host wake BT	I	Host wake BT(GPIOB3)
7	BT wake host	O	BT wake host (GPIOB2)
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 (GPIOB1)
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	PCM OUT	O	PCM data output
26	PCM CLK	I/O	PCM CLK
27	PCM DIN	I	PCM data input
28	PCM SYNC	I	PCM sync signal
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

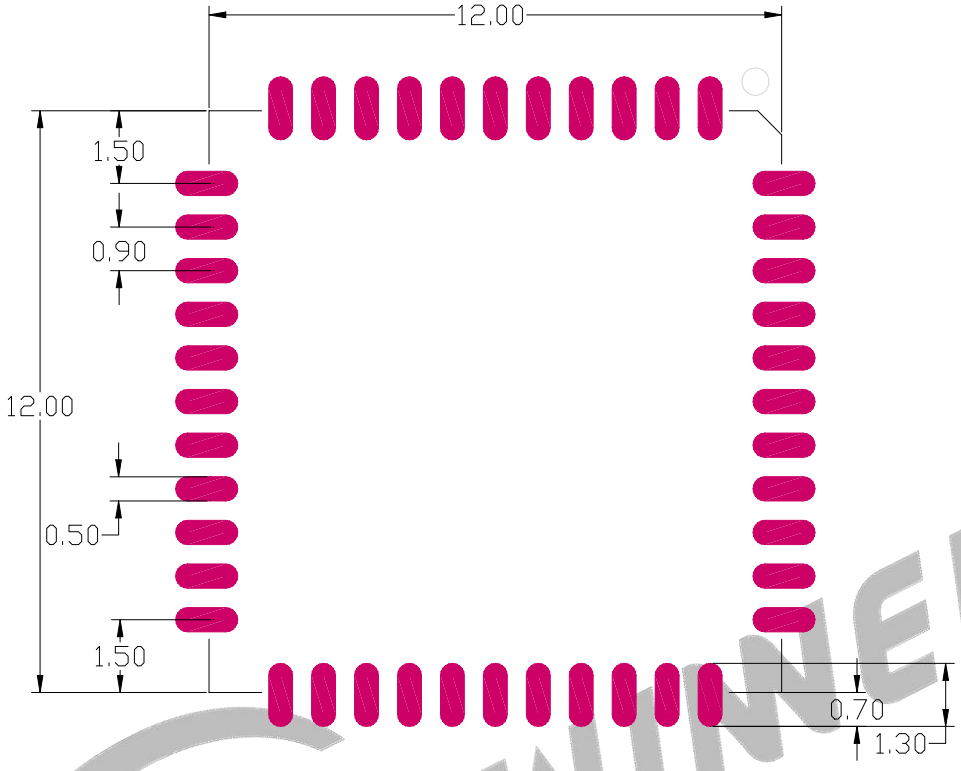
9. Supplier

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	AIC
RF FEM	SAMSUNG /EYANG
RF switch	UniOhm /YAGEO
Capacitance	A,O,I,
Resistance	UniOhm /YAGEO
PCB(12x12x0.5mm)	A,O,I,F,D,T

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. Warpage

翘曲（间隙）的检验标准：

将模组放在水平大理石上，用 0.1mm 厚度的塞尺测量模组底部与大理石之间的间隙，要求 gap≤0.12mm。

13. Baking & Storage Temperature & Recommended Reflow Profile

（烘烤，储存温度和推荐炉温）

13.1 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.

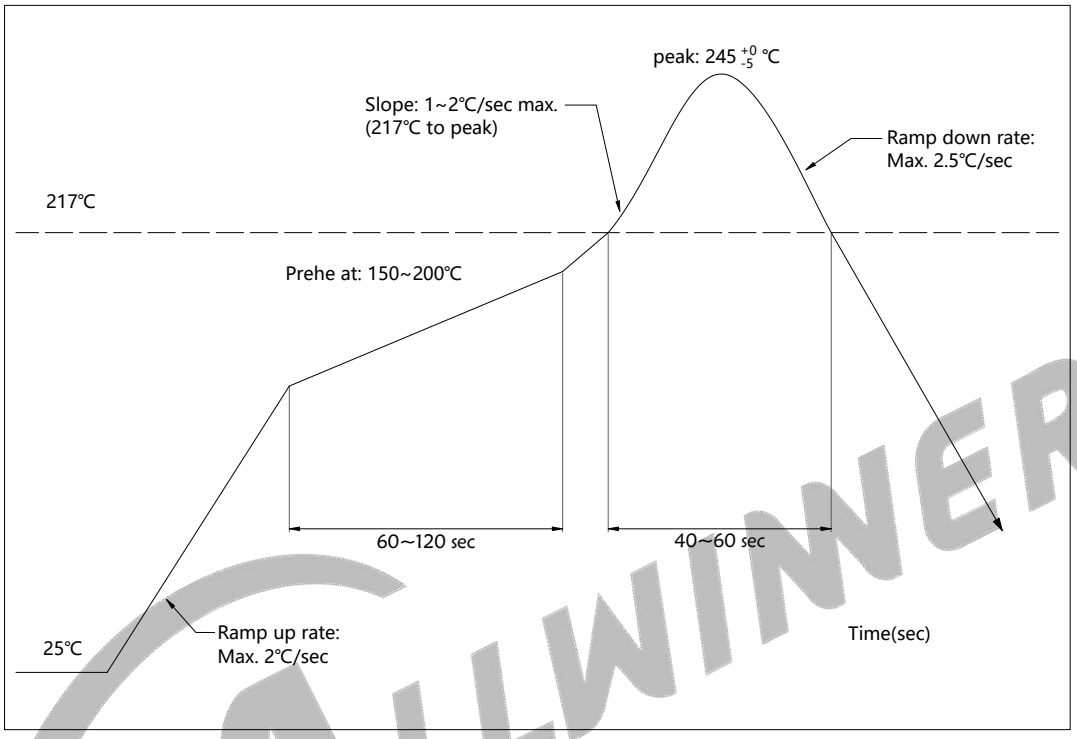
    (烘烤后，放入适量的干燥剂再密封包装)

13.2 Recommended Reflow Profile

Referred IPC/JEDEC standard.

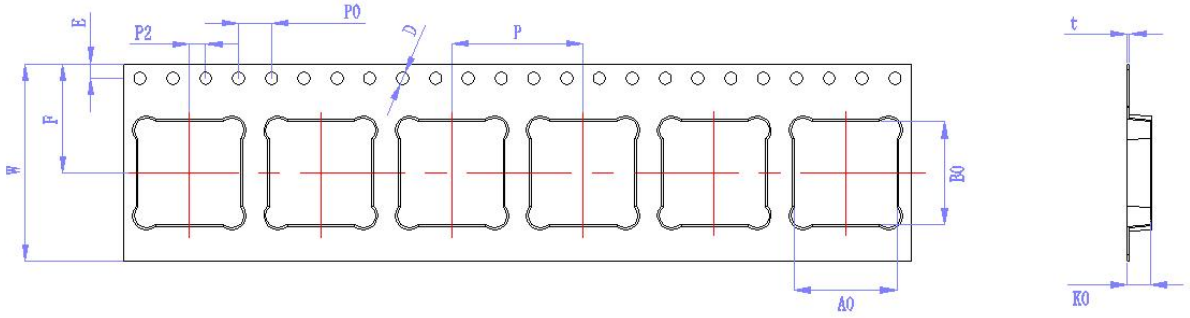
Peak Temperature : <250°C

Number of Times : 2 times



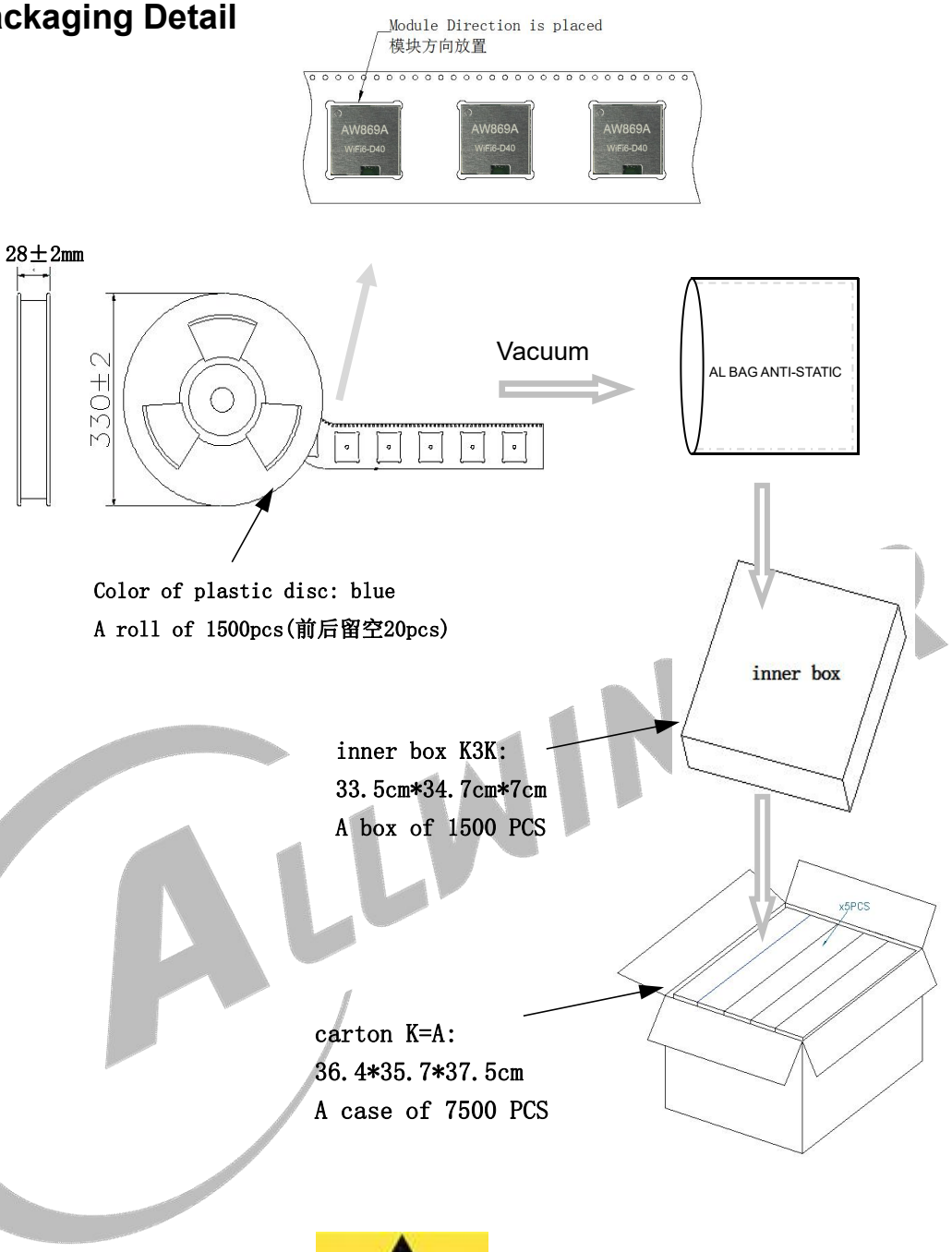
14. Packing information

14.1 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

14.2 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.