

SWARD Antenna Debugging Report

Customer Name: Bmorn

Project name: N15EPG-6252 WIFI module

Date: 2024. 09. 19

Manufacturer: Shenzhen Sovod Communication Technology Co., Ltd

Address: Building B, Hexi Hangcheng Industrial Zone, No. 135 Qianjin No. 2 Road, Baoan District, Shenzhen

Project Contact Information

Customer contact:
Phone number:
Email:

Sward structure:
Phone number:
Landline number: 0755-29985185
Email: yangwende@szsward.com

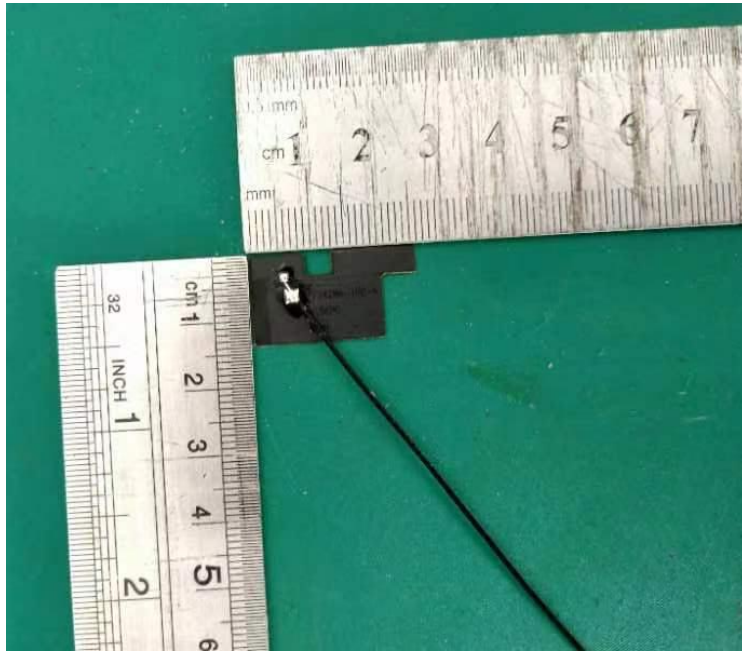
Sward RF: Yangwende
Phone number: 176 7457 9060
Landline number: 0755-29985185
Email: yangwende@szsward.com

Project Introduction

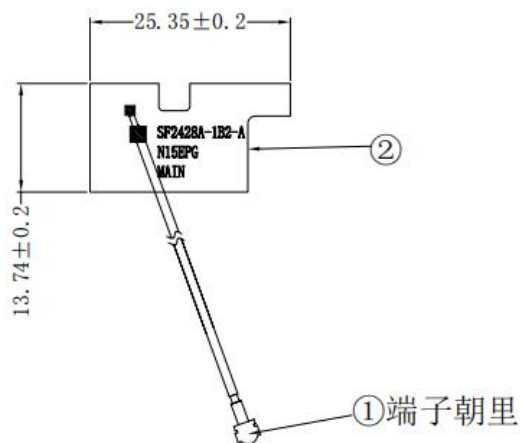
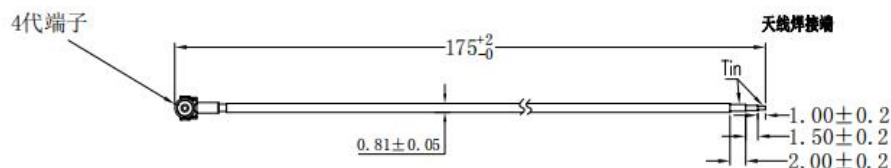
Antenna Overview

Name	Working frequency band/MHZ	Material
FPC Antenna 1	BT/5G WIFI	FPC
FPC Antenna 2	2.4G/5G WIFI	FPC

Antenna Dimension Drawing FPC Antenna 2 (MAIN)



Antenna Dimension Drawing FPC Antenna 2 (MAIN)

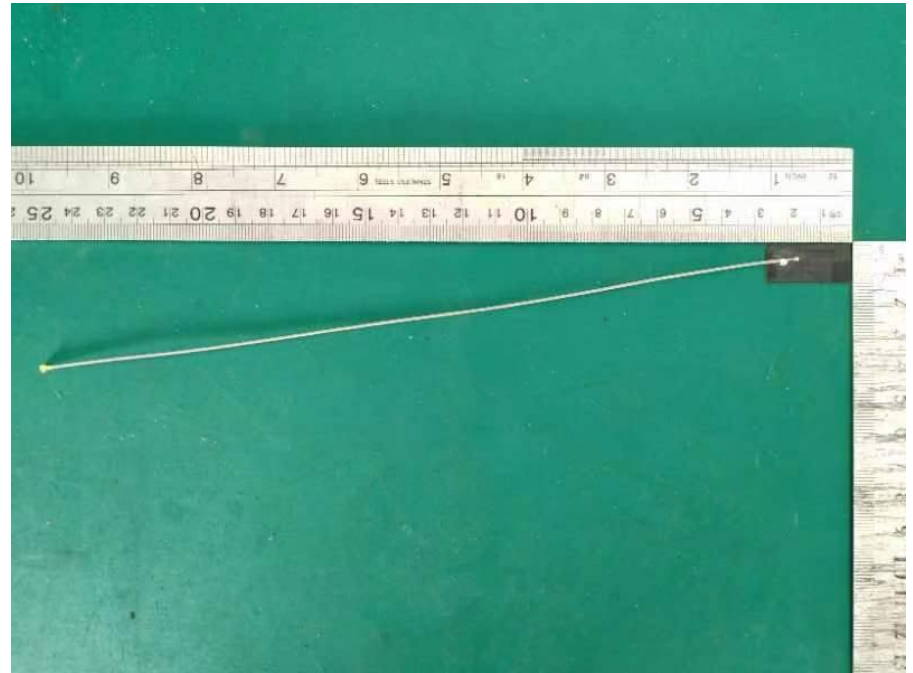
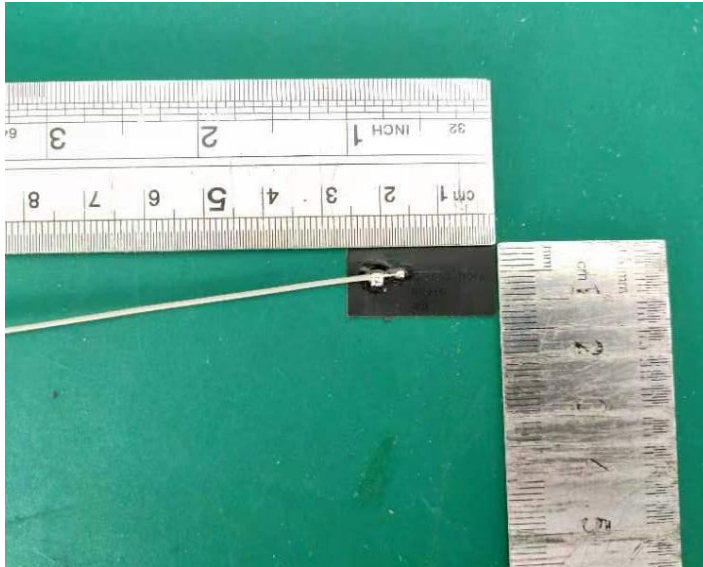


技术要求:

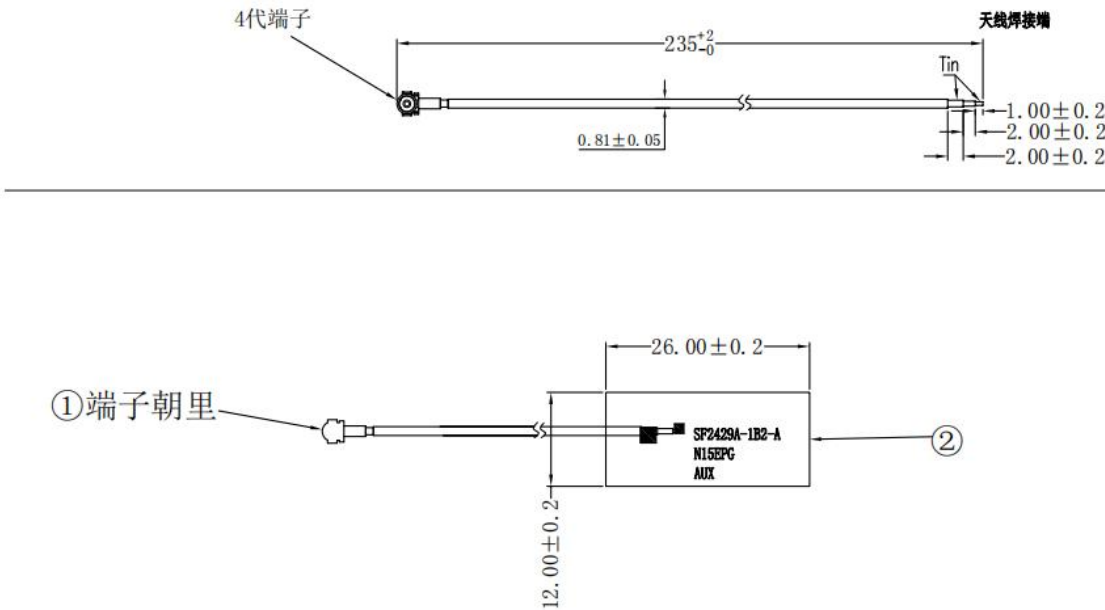
1. 打*为重点尺寸;
2. 尺寸符合图纸要求;
3. 焊点无虚焊、假焊。要求圆润、饱满。
4. 网分测试通过(出现指定波形)。
5. 线形尺寸未注公差按照SJ/T 10628 1995 6级, 公差值由上下偏差均分;

5												SWARD				SF2428A-1R24B-175-A		
4																		
3							签名	年月日	量产	签名	年月日	阶段标记			比例			
2	FPC		黑色	1	SF2428A-1B2-A	RD	ZYA	2024. 9. 19	Q C			1			A		1 : 1	ROHS
1	同轴线	4代端子	黑色	1	φ=0.81mm	RF												
序号	名称	材料	颜色	数量	描述	审核			批准			共 1 张		第 1 张				

Antenna Dimension Drawing FPC Antenna 1 (AUX)



Antenna Dimension Drawing FPC Antenna 1 (AUX)



技术要求:
1. 打*为重点尺寸;
2. 尺寸符合图纸要求;
3. 焊点无虚焊、假焊。要求圆润、饱满。
4. 网分测试通过 (出现指定波形)。
5. 线形尺寸未注公差按照SJ/T 10628 1995 6级, 公差值由上下偏差均分;

5												
4												
3												
2	FPC		黑色	1	SF2429A-1B2-A	RD	ZYA	2024.9.19	Q C			
1	同轴线	4代端子	灰色	1	φ=0.81mm	RF						
序号	名称	材料	颜色	数量	描述	审核			批准			

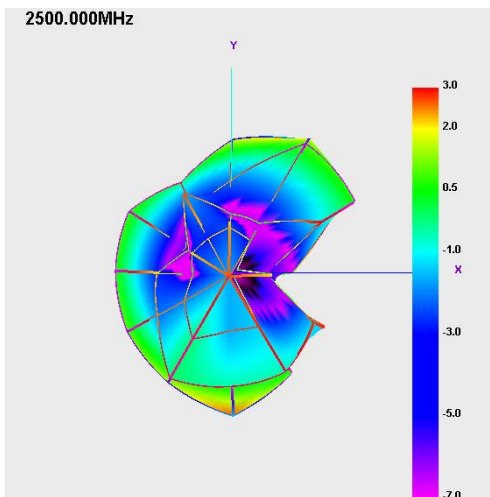
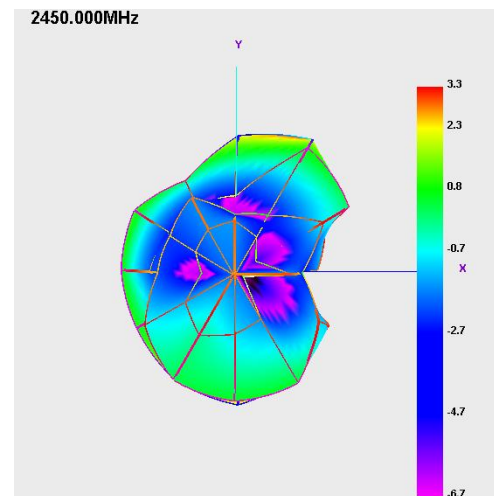
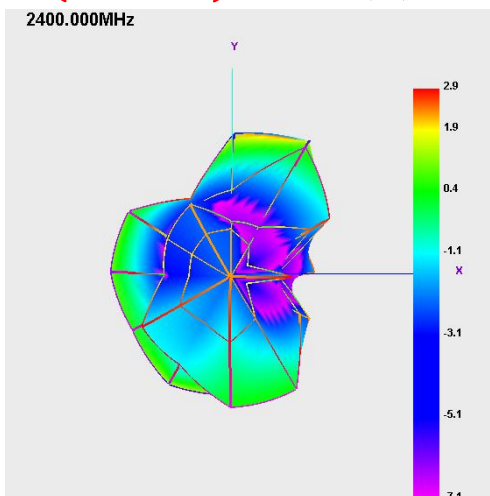
<u>SWARD</u>					索沃德通讯技术有限公司	
					SF2429A-1L24G-235-A	
阶段标记			比例			
1			A	1 : 1		
共 1 张		第 1 张				

WIFI&BT FPC Antenna 2 (MAIN) S11



WIFI&BT FPC Antenna 2 (MAIN) Passive data

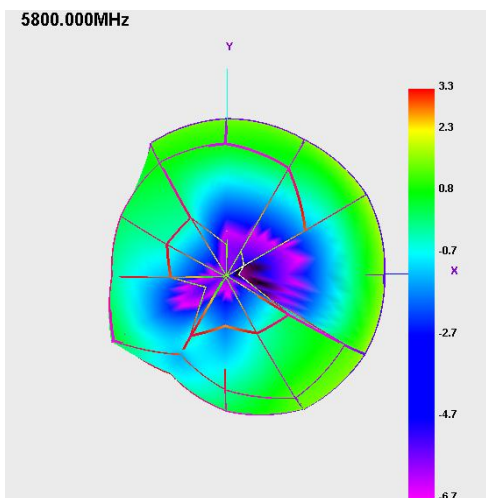
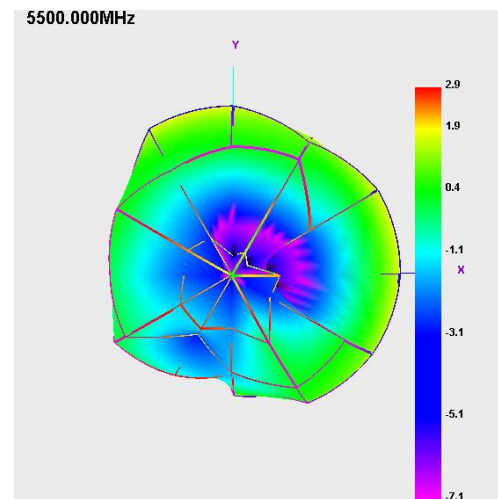
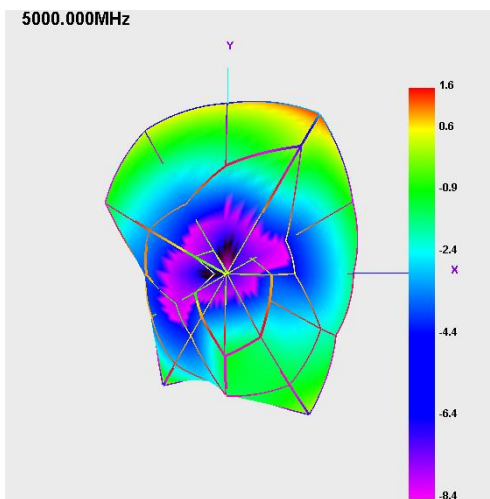
Passive Test For 2.4G			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	40.05	-3.97	2.9
2410	40.88	-3.89	3.02
2420	43.07	-3.66	3.25
2430	47.08	-3.27	3.63
2440	48.14	-3.18	3.58
2450	43.39	-3.63	3.33
2460	42.51	-3.71	3.33
2470	37.16	-4.3	2.56
2480	39.21	-4.07	2.68
2490	41.58	-3.81	2.84
2500	45.88	-3.38	3.02



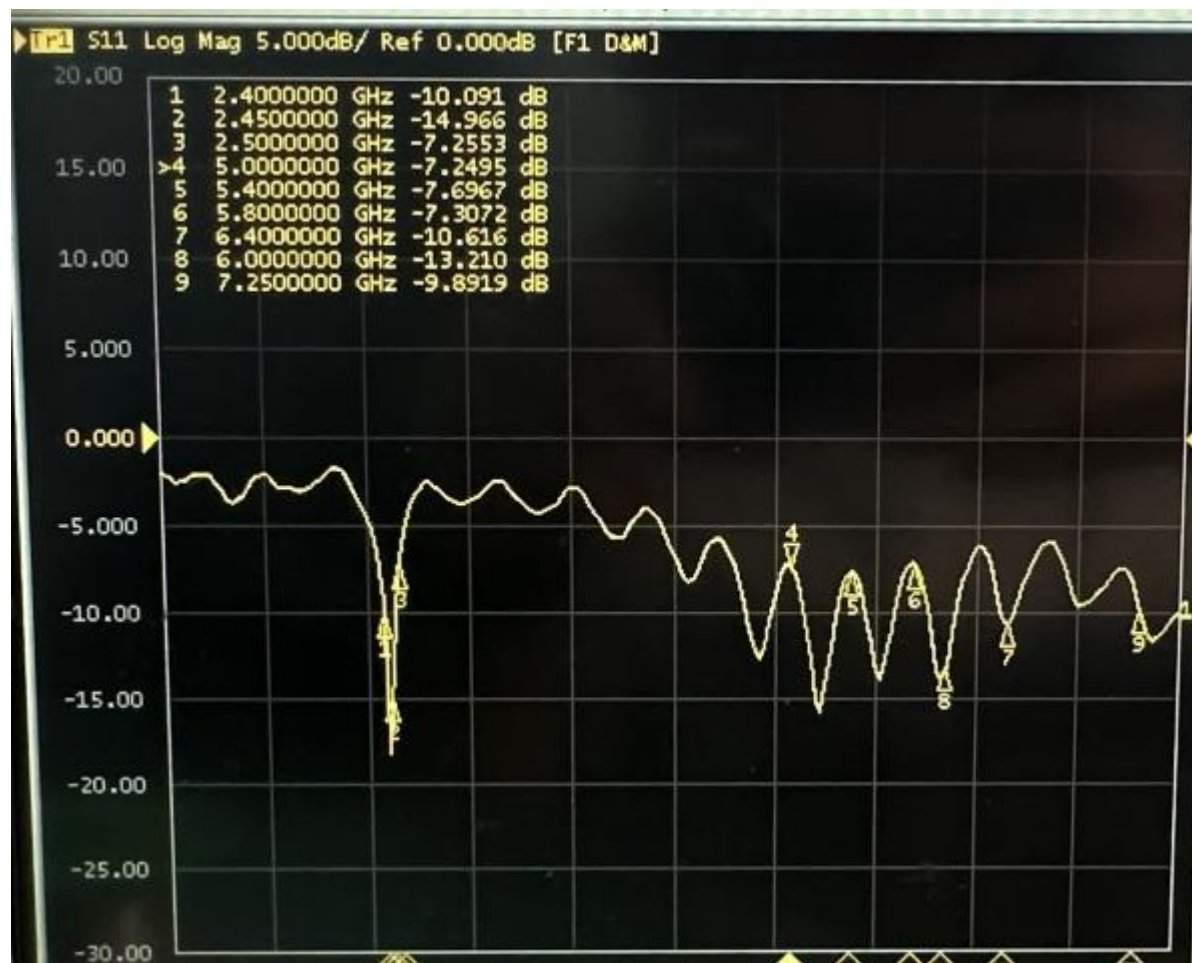
5GWIFI FPC Antenna 2 (MAIN) Passive data

Passive Test For 5G-WIFI

Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
5000	37.91	-4.21	1.56
5100	40.61	-3.91	2.22
5200	38.78	-4.11	2.3
5300	42.11	-3.76	1.37
5400	50.91	-2.93	2.68
5500	43.82	-3.58	2.87
5600	45.54	-3.42	3.08
5700	46.51	-3.32	2.11
5800	57.71	-2.39	3.25
5900	41.71	-3.8	1.98
6000	50.22	-2.99	1.63

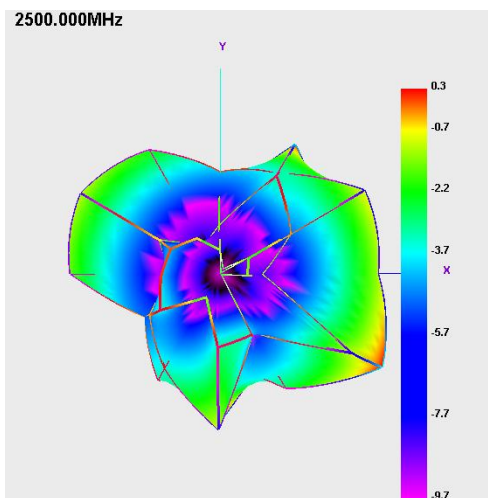
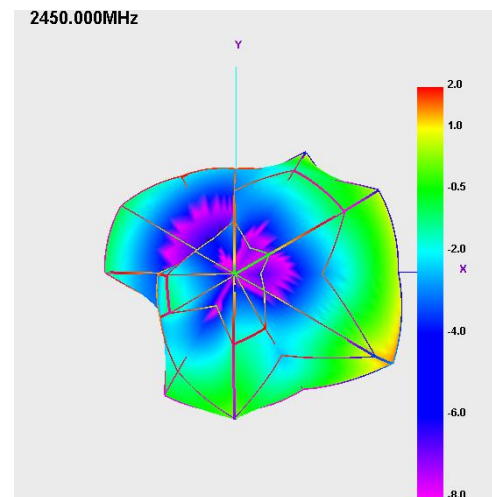
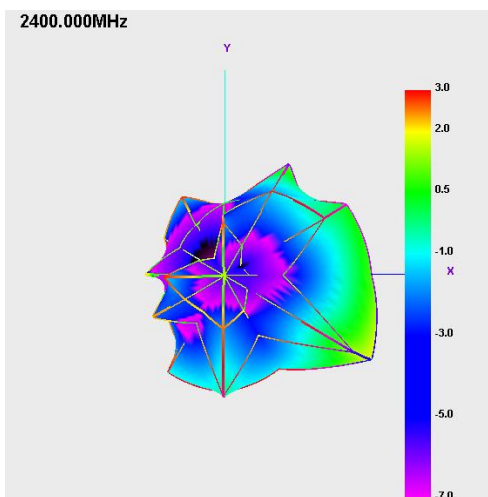


WIFI&BT FPC Antenna 1 (AUX) S11



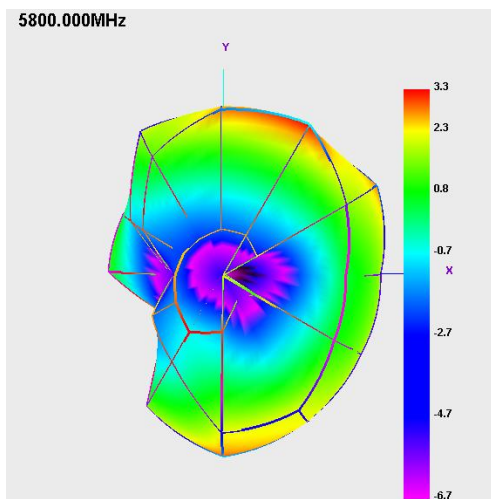
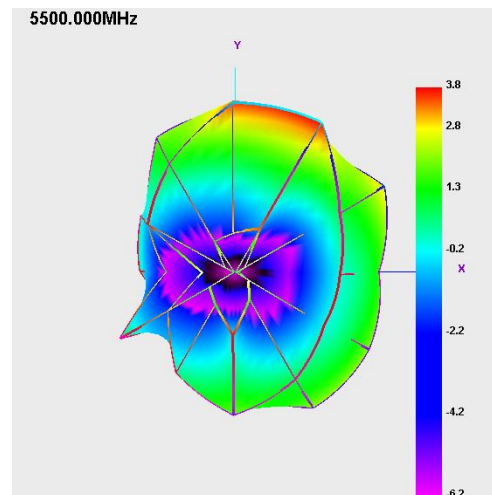
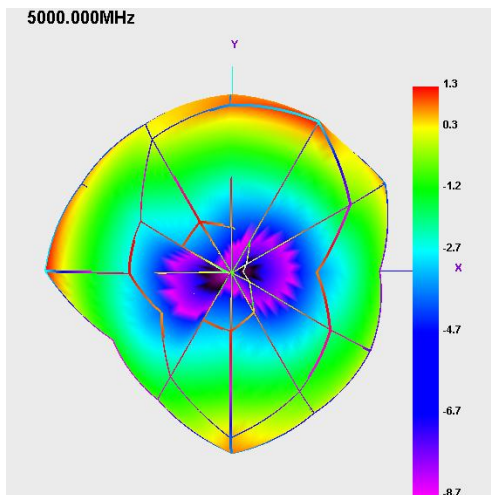
WIFI&BT FPC Antenna 1 (AUX) Passive data

Passive Test For 2.4G			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	36.42	-4.39	2.88
2410	37.95	-4.21	2.93
2420	38.2	-4.18	2.7
2430	39.87	-3.99	2.62
2440	39.94	-3.99	2.2
2450	43.05	-3.66	2
2460	44.45	-3.52	1.51
2470	41.39	-3.83	0.99
2480	38.74	-4.12	0.57
2490	39.2	-4.07	0.36
2500	41.65	-3.8	0.32



5GWIFI FPC Antenna 1 (AUX) Passive data

Passive Test For 5G-WIFI			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
5000	50.33	-2.98	1.33
5100	53.6	-2.71	2.04
5200	51.51	-2.88	1.61
5300	60.02	-2.22	2.68
5400	57.86	-2.38	3.59
5500	59.95	-2.22	3.77
5600	47.41	-3.24	2.76
5700	54.46	-2.64	3.31
5800	55.35	-2.57	3.35
5900	51.42	-2.89	2.52
6000	48.18	-3.17	1.76



Bluetooth test

Actual test effect	
Machine No	1
Testing environment	SWARD R&D Center
Test equipment	AM08/HUAWEI
Test distance	≥ 10 meters

WIFI Throughput testing (Test image)

2. 4Gwifi Upload/Download

```
C:\WINDOWS\system32\cmd.exe - iperf_s.exe -c 192.168.1.101
```

[372]	18.0-19.0 sec	8.41 MBytes	70.6 Mbits/sec
[372]	19.0-20.0 sec	6.66 MBytes	55.8 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[372]	20.0-21.0 sec	7.52 MBytes	63.0 Mbits/sec
[372]	21.0-22.0 sec	7.98 MBytes	67.0 Mbits/sec
[372]	22.0-23.0 sec	6.03 MBytes	50.6 Mbits/sec
[372]	23.0-24.0 sec	8.05 MBytes	67.6 Mbits/sec
[372]	24.0-25.0 sec	5.74 MBytes	48.2 Mbits/sec
[372]	25.0-26.0 sec	6.99 MBytes	58.7 Mbits/sec
[372]	26.0-27.0 sec	7.19 MBytes	60.3 Mbits/sec
[372]	27.0-28.0 sec	6.24 MBytes	52.4 Mbits/sec
[372]	28.0-29.0 sec	5.93 MBytes	49.7 Mbits/sec
[372]	29.0-30.0 sec	7.81 MBytes	65.5 Mbits/sec
[372]	30.0-31.0 sec	6.32 MBytes	53.0 Mbits/sec
[372]	31.0-32.0 sec	7.10 MBytes	59.6 Mbits/sec
[372]	32.0-33.0 sec	5.77 MBytes	48.4 Mbits/sec
[372]	33.0-34.0 sec	6.03 MBytes	50.6 Mbits/sec
[372]	34.0-35.0 sec	7.28 MBytes	61.1 Mbits/sec
[372]	35.0-36.0 sec	6.80 MBytes	57.0 Mbits/sec
[372]	36.0-37.0 sec	7.12 MBytes	59.7 Mbits/sec
[372]	37.0-38.0 sec	7.81 MBytes	65.5 Mbits/sec
[372]	38.0-39.0 sec	8.22 MBytes	68.9 Mbits/sec
[372]	39.0-40.0 sec	7.09 MBytes	59.5 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[372]	40.0-41.0 sec	6.63 MBytes	55.6 Mbits/sec
[372]	41.0-42.0 sec	8.76 MBytes	73.5 Mbits/sec
[372]	42.0-43.0 sec	6.47 MBytes	54.3 Mbits/sec
[372]	43.0-44.0 sec	6.68 MBytes	56.0 Mbits/sec
[372]	44.0-45.0 sec	7.69 MBytes	64.5 Mbits/sec

```
C:\>iperf_s.exe -c 192.168.1.101 -i 5 -w 1m -t 30
```

Client connecting to 192.168.1.101, TCP port 5001
TCP window size: 1.00 MByte

[364]	local 192.168.1.112 port 56039 connected with		
[ID]	Interval	Transfer	Bandwidth
[364]	0.0- 5.0 sec	59.9 MBytes	100 Mbits/sec
[364]	5.0-10.0 sec	55.5 MBytes	93.1 Mbits/sec
[364]	10.0-15.0 sec	52.5 MBytes	88.1 Mbits/sec
[364]	15.0-20.0 sec	52.9 MBytes	88.7 Mbits/sec
[364]	20.0-25.0 sec	36.3 MBytes	60.9 Mbits/sec
[364]	25.0-30.0 sec	49.9 MBytes	83.7 Mbits/sec
[364]	0.0-30.1 sec	307 MBytes	85.5 Mbits/sec

```
C:\>iperf_s.exe -c 192.168.1.101 -i 5 -w 1m -t 30
```

Client connecting to 192.168.1.101, TCP port 5001
TCP window size: 1.00 MByte

[364]	local 192.168.1.112 port 56040 connected with		
[ID]	Interval	Transfer	Bandwidth
[364]	0.0- 5.0 sec	68.4 MBytes	115 Mbits/sec
[364]	5.0-10.0 sec	53.7 MBytes	90.1 Mbits/sec
[364]	10.0-15.0 sec	51.5 MBytes	86.5 Mbits/sec
[364]	15.0-20.0 sec	61.7 MBytes	103 Mbits/sec
[364]	20.0-25.0 sec	54.6 MBytes	91.7 Mbits/sec
[364]	25.0-30.0 sec	61.6 MBytes	103 Mbits/sec
[364]	0.0-30.0 sec	352 MBytes	98.1 Mbits/sec

WIFI Throughput testing (Test image)

5Gwifi Upload/Download

```
C:\>iperf_s.exe -c 192.168.1.101 -i 5 -w 1m -t 30
-----
Client connecting to 192.168.1.101, TCP port 5001
TCP window size: 1.00 MByte
-----
[372] local 192.168.1.112 port 56037 connected with 192.168.1.101
[ ID] Interval           Transfer     Bandwidth
[372] 0.0- 5.0 sec      139 MBytes  234 Mbits/sec
[372] 5.0-10.0 sec      142 MBytes  238 Mbits/sec
[372] 10.0-15.0 sec      137 MBytes  230 Mbits/sec
[372] 15.0-20.0 sec      136 MBytes  228 Mbits/sec
[372] 20.0-25.0 sec      135 MBytes  226 Mbits/sec
[372] 25.0-30.0 sec      138 MBytes  231 Mbits/sec
[372] 0.0-30.0 sec      827 MBytes  231 Mbits/sec
```

```
C:\>iperf_s.exe -c 192.168.1.101 -i 5 -w 1m -t 30
-----
Client connecting to 192.168.1.101, TCP port 5001
TCP window size: 1.00 MByte
-----
[380] local 192.168.1.112 port 56038 connected with 192.168.1.101
[ ID] Interval           Transfer     Bandwidth
[380] 0.0- 5.0 sec      136 MBytes  228 Mbits/sec
[380] 5.0-10.0 sec      140 MBytes  234 Mbits/sec
[380] 10.0-15.0 sec      128 MBytes  215 Mbits/sec
[380] 15.0-20.0 sec      127 MBytes  213 Mbits/sec
[380] 20.0-25.0 sec      116 MBytes  195 Mbits/sec
[380] 25.0-30.0 sec      149 MBytes  250 Mbits/sec
[380] 0.0-30.0 sec      796 MBytes  222 Mbits/sec
```

```
C:\>iperf_s.exe -c 192.168.1.101 -i 5 -w 1m -t 30
-----
Client connecting to 192.168.1.101, TCP port 5001
TCP window size: 1.00 MByte
-----
[364] local 192.168.1.112 port 50453 connected with 192.168.1.101
[ ID] Interval           Transfer     Bandwidth
[364] 0.0- 5.0 sec       9.88 MBytes  16.6 Mbits/sec
[364] 5.0-10.0 sec       139 MBytes  233 Mbits/sec
[364] 10.0-15.0 sec       255 MBytes  428 Mbits/sec
[364] 15.0-20.0 sec       260 MBytes  437 Mbits/sec
[364] 20.0-25.0 sec       263 MBytes  442 Mbits/sec
[364] 25.0-30.0 sec       260 MBytes  437 Mbits/sec
[364] 0.0-30.0 sec      1.16 GBytes  332 Mbits/sec
```

```
C:\>iperf_s.exe -c 192.168.1.101 -i 5 -w 1m -t 30
-----
Client connecting to 192.168.1.101, TCP port 5001
TCP window size: 1.00 MByte
-----
[368] local 192.168.1.112 port 50454 connected with 192.168.1.101
[ ID] Interval           Transfer     Bandwidth
[368] 0.0- 5.0 sec      155 MBytes  261 Mbits/sec
[368] 5.0-10.0 sec      251 MBytes  421 Mbits/sec
[368] 10.0-15.0 sec      266 MBytes  446 Mbits/sec
[368] 15.0-20.0 sec      262 MBytes  439 Mbits/sec
[368] 20.0-25.0 sec      255 MBytes  428 Mbits/sec
[368] 25.0-30.0 sec      262 MBytes  439 Mbits/sec
[368] 0.0-30.0 sec      1.42 GBytes  405 Mbits/sec
```

WIFI Throughput testing

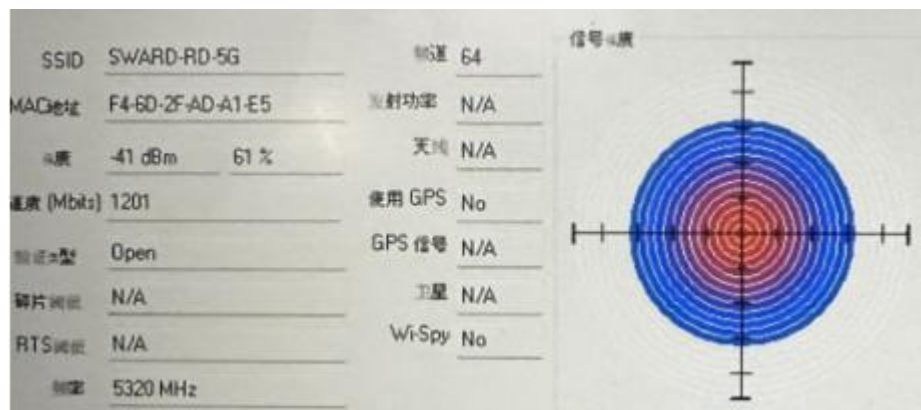
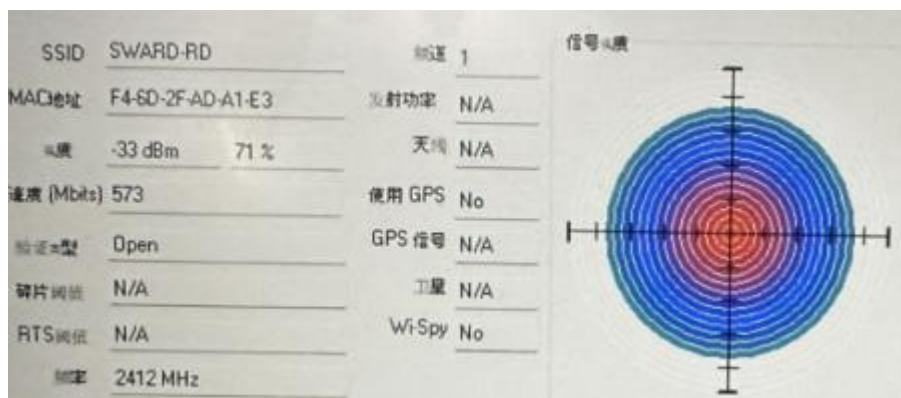
Iperf Throughput testing						
Model		WIFI module	6252	Software version		
Model number	Channel	Distance	Test angle	(TX) 1min mean value	(RX) 1min mean value	Number of packet drops
2.4GWIFI		15 meters	0°	66. 2M/S	87. 9M/S	0
			90°	66. 6M/S	88. 5M/S	0
			180°	67. 7M/S	85. 2M/S	0
			270°	60. 7M/S	86. 1M/S	0
5GWIFI		15 meters	0°	217M/S	444M/S	0
			90°	230M/S	445M/S	0
			180°	211M/S	442M/S	0
			270°	226M/S	444M/S	0

WIFI Actual measurement image of signal strength



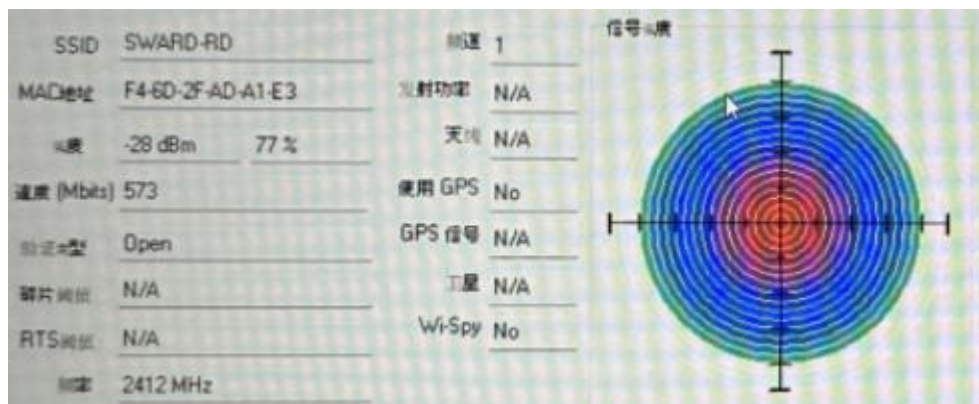
Testing location: SWARD R&D Center
Test time: 14:00-14:30
Test distance: 15 meters
Signal strength: -47dBm~-38dBm

WIFI Actual measurement image of signal strength



Testing location: SWARD R&D Center
Test time: 14:00-14:30
Test distance: 10 meters
Signal strength: -41dBm~-33dBm

WIFI Actual measurement image of signal strength



Testing location: SWARD R&D Center
Test time: 14:00-14:30
Test distance: 5 meters
Signal strength: -32dBm~-28dBm

Note:

1. This report is based on the actual debugging and testing of the prototype, including environmental treatment, antenna position, and assembly position of each component Cannot be changed arbitrarily;
2. If there are any changes in the materials used in the prototype, please promptly provide feedback to our company for further verification;
3. List of sensitive components:
TP (Material, Coating, Wiring, etc.)
Screen (amplifier circuit, LED, cable design, etc.)
Shell material (antenna assembly method, structural interference, shell material, antenna position height and area, etc.)
Motherboard (motherboard conduction, RF circuit matching, PA, dual power, filtering, LNA, power circuit, etc.)
Camera, battery, motor MIC、Fingerprint recognition module, etc
4. Due to the small number or only one sample testing machine, some probabilistic issues cannot be fully identified. It is recommended to conduct a small batch trial production before mass production to investigate the problem points (such as flashing screens, speaker noise, TP jump points, black screen crashes, signal drops, etc.)