
Sovard antenna debugging report

Customer name: Lan Chen

Project name: N1 4 JPL (1 4 inch plastic shell-Microstep main
board-9560 module)

Date: April 18, 2024

Project contact information

Customer Contact:

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E-mail:

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Projectdescription

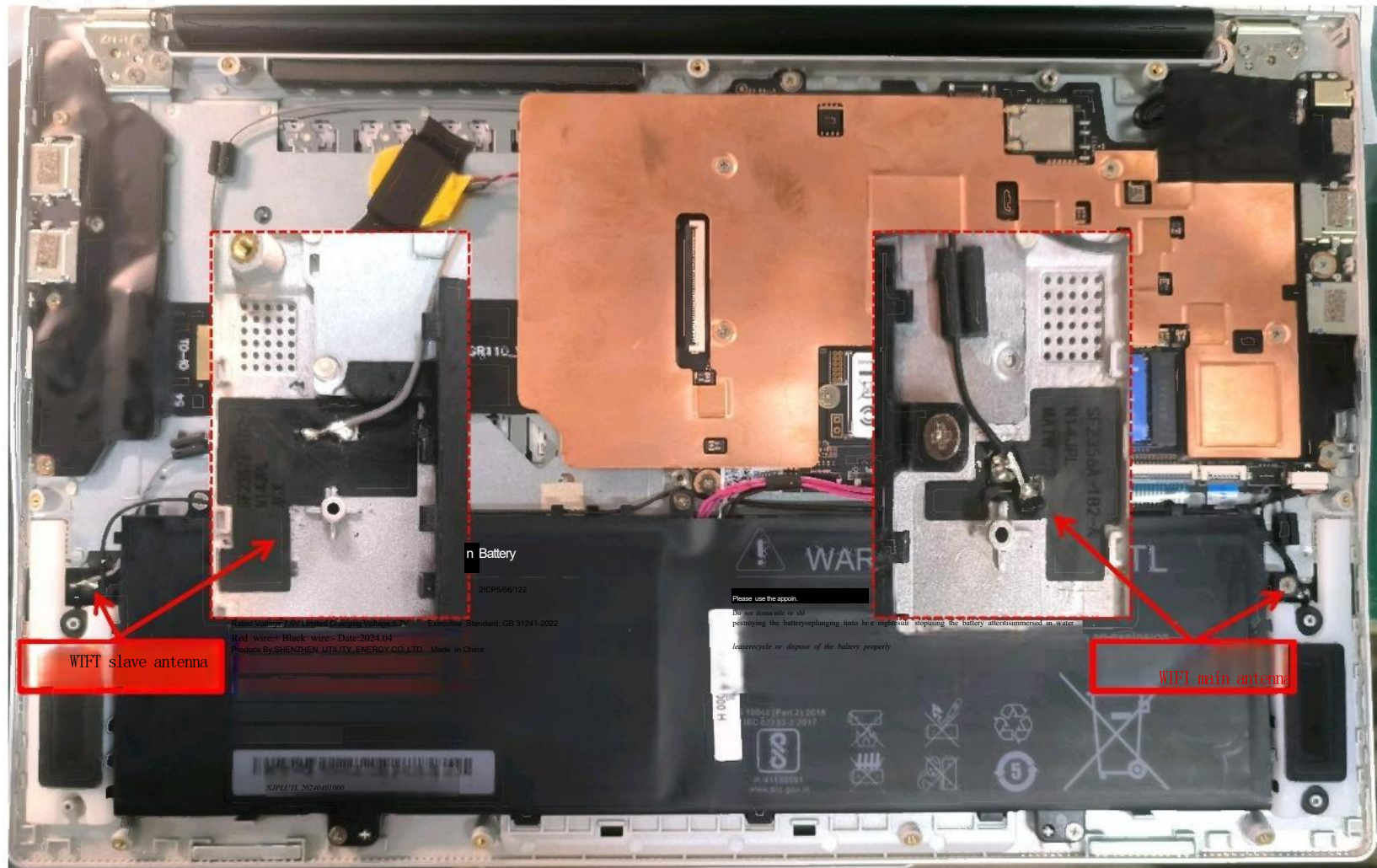
1. Project description

Number of antennas on the project	Machine type
2	WIFI jotter
Whole machine shell material: 14 inch plastic shell	

2. Brief description of the antenna

Antenna number	name	Operating frequency band /MHz	Material / structure
1	WIFI&BT&5Gwi fi	2400MHz~2500MHz & 5.8GHz	FPC
2	WIFI&BT&5Gwi fi	2400MHz 2500MHz & 5.8GHz	FPC

Antenna layout



WIFI main antenna S11



WIFI secondary antenna S11



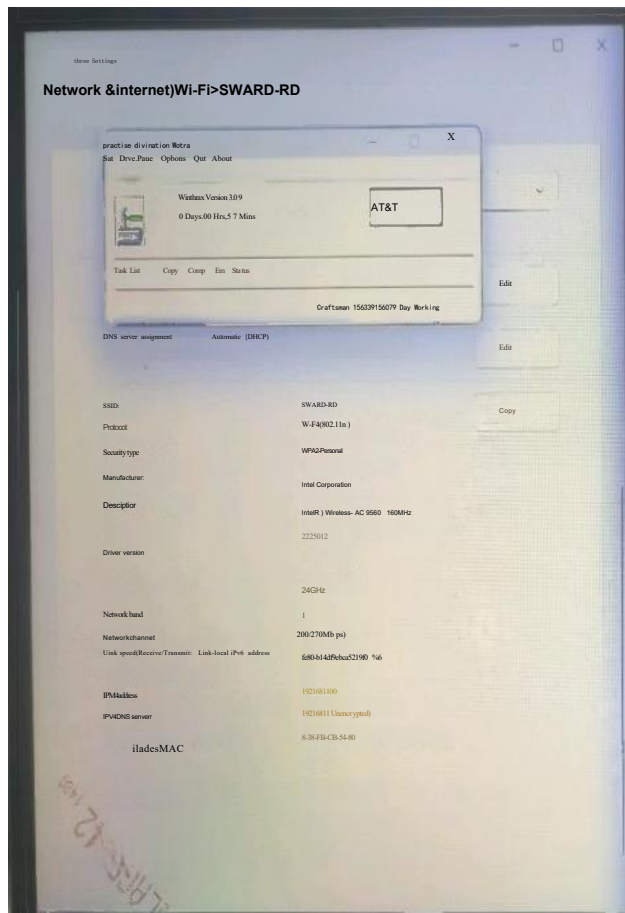
WiFi throughput capacity

Iperf throughput test						
type	N14 JPL -Microstep motherboard	module	9560 module	software release	Windows_Iperf	
Model number	frequency range	distance	Test Angle	Test data (TX) mean value 1 min	Test data (RX) 1 min mean	Remarks (number of switchovers)
1	2.4G	2.4 G WIFI (R&D test 15m)	0°	113 Mbps	129 Mbps	0
			90°	125 Mbps	115 Mbps	0
			180°	109 Mbps	121 Mbps	0
			270°	134 Mbps	122 Mbps	0
	5G					
		5 F WIFI (R&D test 15m)	0°	770 Mbps	624 Mbps	0
			90°	600 Mbps	601 Mbps	0
			180°	703 Mbps	640 Mbps	0
			270°	653 Mbps	639 Mbps	0



WIFI antenna throughput test (test image)

Test data 2.4 Gwifi/5.8Gwifi (corresponding connection rate of 270/1733 Mbps)



```
Activity for Command Prompt +

[364]50.0-51.0 sec 17.3 Mbytes 145 Mbits/sec
[364]51.0-52.0 sec 17.1 Mbytes 143 Mbits/sec
[364]52.0-53.0 sec 13.8 Mbytes 116 Mbits/sec
[364]53.0-54.0 sec 15.5 Mbytes 130 Mbits/sec
[364]54.0-55.0 sec 17.0 Mbytes 143 Mbits/sec
[364]55.0-56.0 sec 16.3 Mbytes 137 Mbits/sec
[364]56.0-57.0 sec 13.3 Mbytes 112 Mbits/sec
[364]57.0-58.0 sec 13.1 Mbytes 110 Mbits/sec
[364]58.0-59.0 sec 16.0 Mbytes 134 Mbits/sec
[364]59.0-60.0 sec 15.9 Mbytes 133 Mbits/sec
[364]60.0-61.0 sec 96.7 Mbytes 134 Mbits/sec

(ID) Interval Transfer Bandwidth

c:\> iperf.s.exe -s
```

```
Server listening on TCP port 5001
TCP window size:64.0 KByte(d: fault)
```

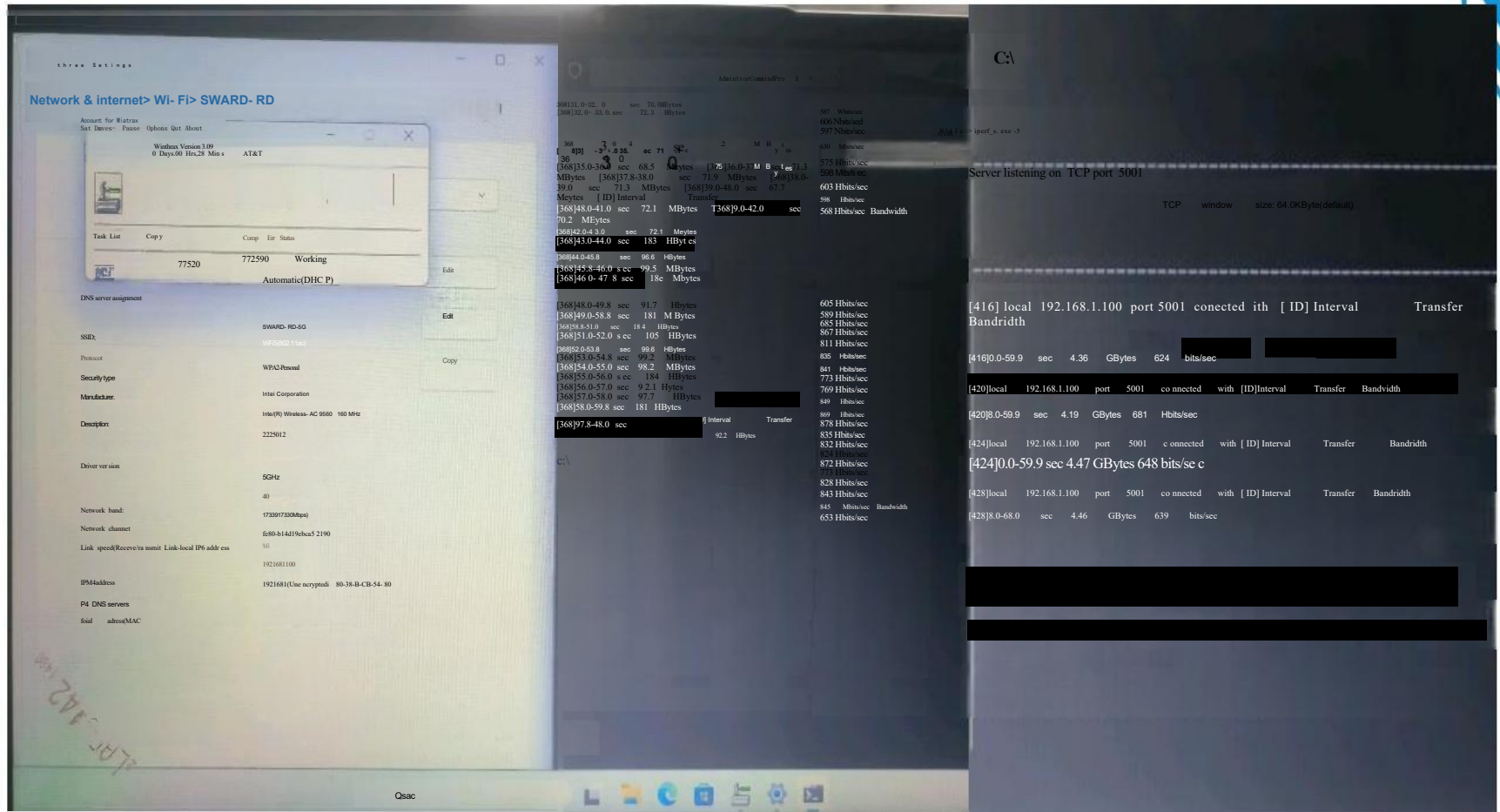
```
[416]local 192.168.1.188 port 5001 connected with [ID]Interval Transfer Bandwidth
[416]0.0-68.0 sec 925 Mbytes 129 Mbits/sec
[420]local 192.168.1.188 port 5001 connected with [ID]Interval Transfer Bandwidth 192.168.1.
[420]0.0-68.8 sec 824 Mbytes 115 Mbits/sec
[364]local 192.168.1.188 port 5001 connected with [ID]Interval Transfer Bandwidth
[364]0.0-60.2 sec 871 Mbytes 121 Mbits/sec
[448]local 192.168.1.100 port 5001 connected with [ID]Interval Transfer Bandwidth 192.168.1.
[448]0.0-68.8 sec 875 Mbytes 122 Mbits/sec
[460]local 192.168.1.100 port 5001 connected with [ID]Interval Transfer Bandwidth 192.168.1.
[460]0.0-68.0 sec 875 Mbytes 122 Mbits/sec
```

```
odCommand Pts

[364]17.0-18.0 sec 17.1 Mbytes 145 Mbytes 143 Hbits/sec
[364]18.0-19.0 sec 16.0 Mbytes 134 Mbytes 137 Hbits/sec
[364]19.0-20.0 sec 15.5 Mbytes 133 Mbits/sec
[364]20.0-21.0 sec 16.3 Mbytes 137 Mbits/sec
[364]21.0-22.0 sec 13.8 Mbytes 116 Mbits/sec
[364]22.0-23.0 sec 15.5 Mbytes 130 Mbits/sec
[364]23.0-24.0 sec 17.0 Mbytes 143 Mbits/sec
[364]24.0-25.0 sec 16.3 Mbytes 137 Mbits/sec
[364]25.0-26.0 sec 13.3 Mbytes 112 Mbits/sec
[364]26.0-27.0 sec 13.1 Mbytes 110 Mbits/sec
[364]27.0-28.0 sec 16.0 Mbytes 134 Mbits/sec
[364]28.0-29.0 sec 15.9 Mbytes 133 Mbits/sec
[364]29.0-30.0 sec 96.7 Mbytes 134 Mbits/sec
[364]30.0-31.0 sec 16.3 Mbytes 137 Mbits/sec
[364]31.0-32.0 sec 15.2 Mbytes 135 Mbits/sec
[364]32.0-33.0 sec 16.6 Mbytes 142 Hbits/sec
[364]33.0-34.0 sec 16.6 Mbytes 142 Hbits/sec
[364]34.0-35.0 sec 16.8 Mbytes 143 Hbits/sec
[364]35.0-36.0 sec 16.8 Mbytes 143 Hbits/sec
[364]36.0-37.0 sec 15.2 Mbytes 137 Mbits/sec
[364]37.0-38.0 sec 17.4 Hbytes 16.9 Mbytes
[364]38.0-39.8 sec 17.4 Hbytes 16.9 Mbytes
[364]39.0-40.0 sec 15.2 Mbytes 137 Mbits/sec
[364]40.0-41.8 sec 15.7 Hbytes 15.2 Hbytes
[364]41.0-42.0 sec 17.3 Hbytes 15.5 Hbytes
[364]42.0-43.0 sec 17.4 Hbytes 17.0 Hbytes
[364]43.0-44.0 sec 17.4 Hbytes 17.0 Hbytes
[364]44.0-45.0 sec 17.4 Hbytes 17.0 Hbytes
[364]45.0-46.0 sec 17.4 Hbytes 17.0 Hbytes
[364]46.0-47.0 sec 17.0 Hbytes 16.8 Hbytes
[364]47.0-48.0 sec 17.0 Hbytes 16.8 Hbytes
```


WIFI antenna throughput test (test image)

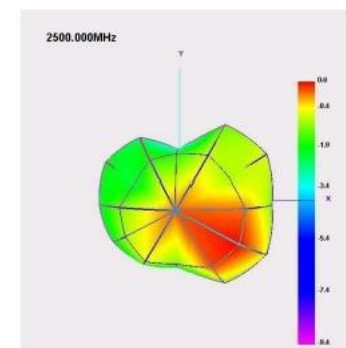
Test data 2.4Gwifi/5.8Gwifi (corresponding connection rate of 141/1733 Mbps)



Measured distance of BT antenna

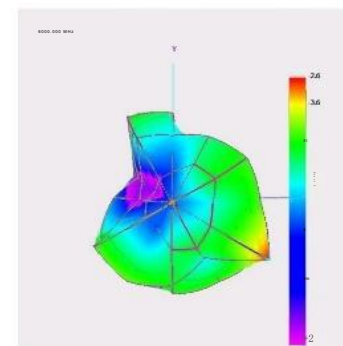
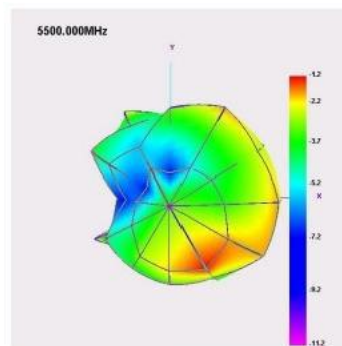
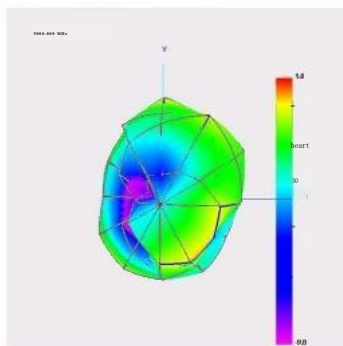
Actual results	
Model number	1
testing environment	Sovad R & D Center
testing facility	华为 AM 08
measuring distance	> 10 meters

Passive Test For 2.4Gwifi								
Freq	Effi	Effi	Gain	Gain	UHS	DHS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBi)	(%)	(%)	(dB)	(dB)
2400	38.58	-4.14	1.26	-0.89	28.267	10.314	1.26	-11.87
2410	38.75	-4.12	1.16	-0.99	28.357	10.397	1.16	-12.78
2420	40.28	-3.95	1.3	-0.85	29.488	10.794	1.3	-13.38
2430	41.31	-3.84	1.42	-0.73	30.47	10.836	1.42	-14.04
2440	41.22	-3.85	1.42	-0.73	30.579	10.64	1.42	-15.05
2450	37.2	-4.29	0.96	-1.19	27.663	9.534	0.96	-15.79
2460	36.91	-4.33	0.89	-1.26	27.42	9.493	0.89	-15.89
2470	32.96	-4.82	0.48	-1.67	24.28	8.68	0.48	-18.08
2480	33.16	-4.79	0.62	-1.53	24.103	9.057	0.62	-18.85
2490	32.56	-4.87	0.63	-1.52	23.383	9.18	0.63	-16.77
2500	33.32	-4.77	0.63	-1.52	23.614	9.702	0.63	-14.55



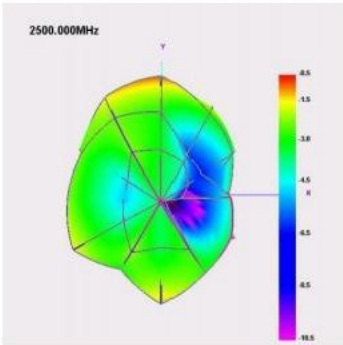
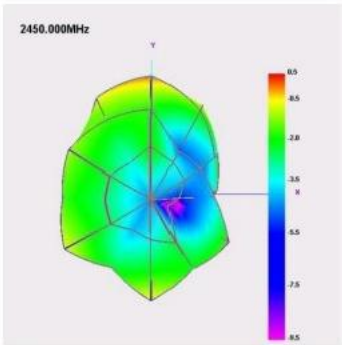
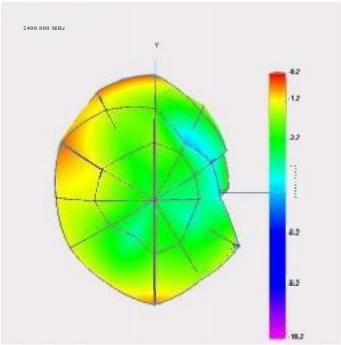
5GWIFI antenna efficiency —— main antenna

Passive Test F or 5Gwifi								
Freq	Effi	Effi	Gain	Gain	UHS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dB)	(dB)	(%)	(%)	(dB)	(dB)
5000	47.36	-3.25	1.14	-1.01	28.251	19.112	1.14	-17.75
5100	40.42	-3.93	0.45	-1.7	24.667	15.751	0.45	-13.56
5200	41.76	-3.79	1.12	-1.03	25.734	16.028	1.12	-14.73
5300	40.78	-3.9	1.07	-1.08	25.85	14.93	1.07	-15.79
5400	53.09	-2.75	2.66	0.51	33.876	19.213	2.66	-12.84
5500	43.19	-3.65	1.91	-0.24	25.251	17.935	1.91	-16.44
5600	39.24	-4.06	0.3	-1.85	22.493	16.752	0.3	-13.84
5700	32.44	-4.89	0.27	-1.88	18.194	14.247	0.27	-16.6
5800	38.97	-4.09	0.93	-1.22	20.033	18.939	0.93	-20.42
5900	23.63	-6.26	-1.31	-3.46	10.892	12.742	-1.31	-19.02
6000	23.5	-6.29	1.39	-0.76	10.063	13.432	1.39	-23.21



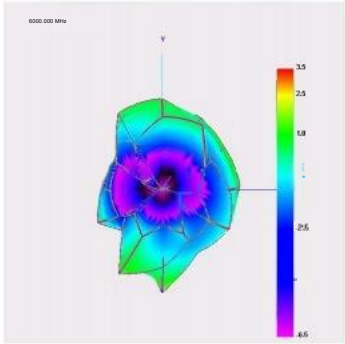
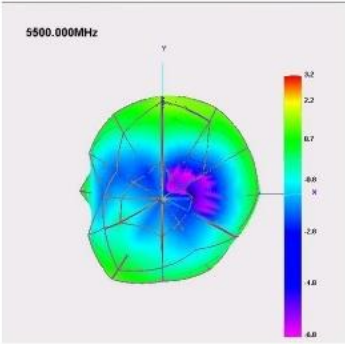
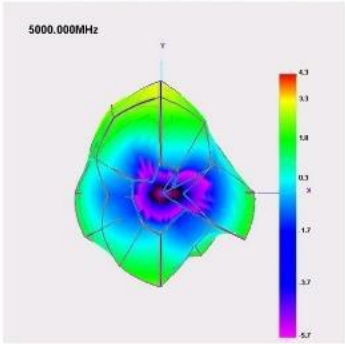
WIFI&BT antenna efficiency——secondary antenna

Passive Test For 2.4Gwifi								
Freq	Effi	Effi	Gain	Gain	UHS	DHIS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBi)	(%)	(%)	(dB)	(dB)
2400	37.5	-4.26	-0.18	-2.33	21.784	15.717	-0.18	-17.55
2410	36.82	-4.34	-0.04	-2.19	21.178	15.643	-0.04	-16.54
2420	42.52	-3.71	0.78	-1.37	24.101	18.419	0.78	-14.88
2430	43.54	-3.61	1.02	-1.13	24.299	19.243	1.02	-14.5
2440	45.02	-3.47	1.31	-0.84	24.82	20.204	1.31	-13.84
2450	36.55	-4.37	0.51	-1.64	19.953	16.596	0.51	-14.68
2460	36.28	-4.4	0.51	-1.64	19.75	16.527	0.51	-14.79
2470	30.4	-5.17	-0.05	-2.2	16.357	14.04	-0.05	-15.14
2480	30.34	-5.18	0.09	-2.06	15.986	14.356	0.09	-14.29
2490	28.82	-5.4	-0.29	-2.44	14.955	13.869	-0.29	-14.87
2500	32.41	-4.89	-0.54	-2.69	16.947	15.463	-0.54	-15.02

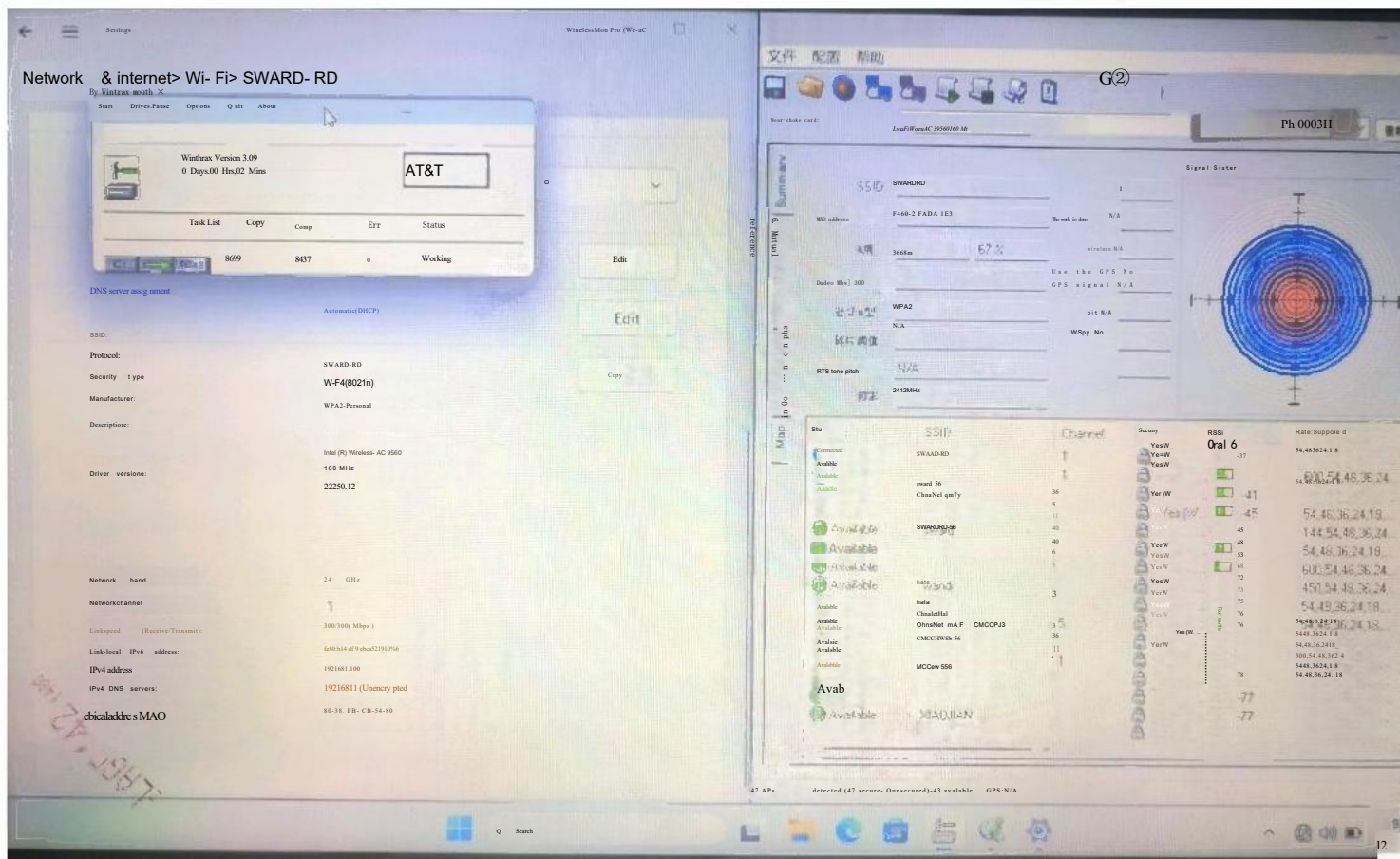


5GWIFI antenna efficiency —— secondary antenna

Passive Test F or 5Gwifi								
Freq	Effi	Effi	Gain	Gain	UHS	DHS	Max	Min
(MHz)	(%)	(dB)	(dBi)	(dBd)	(%)	(%)	(dB)	(dB)
5000	63.57	-1.97	4.35	2.2	21.244	42.328	4.35	-19.43
5100	58.88	-2.3	3.84	1.69	17.507	41.369	3.84	-18.48
5200	57.11	-2.43	3.78	1.63	16.347	40.766	3.78	-15.44
5300	47.58	-3.23	2.87	0.72	13.449	34.127	2.87	-15.43
5400	58.38	-2.34	4.15	2	16.888	41.489	4.15	-14.59
5500	47.28	-3.25	3.23	1.08	14.953	32.33	3.23	-22.15
5600	43.62	-3.6	3.16	1.01	15.41	28.207	3.16	-21.06
5700	42.32	-3.73	2.81	0.66	16.094	26.224	2.81	-17
5800	49.36	-3.07	4.37	2.22	17.547	31.808	4.37	-20.77
5900	33.35	-4.77	2.75	0.6	11.464	21.888	2.75	-21.75
6000	36.02	-4.43	3.51	1.36	12.126	23.898	3.51	-18.26



Actual measured image of WIFI antenna signal strength (data)



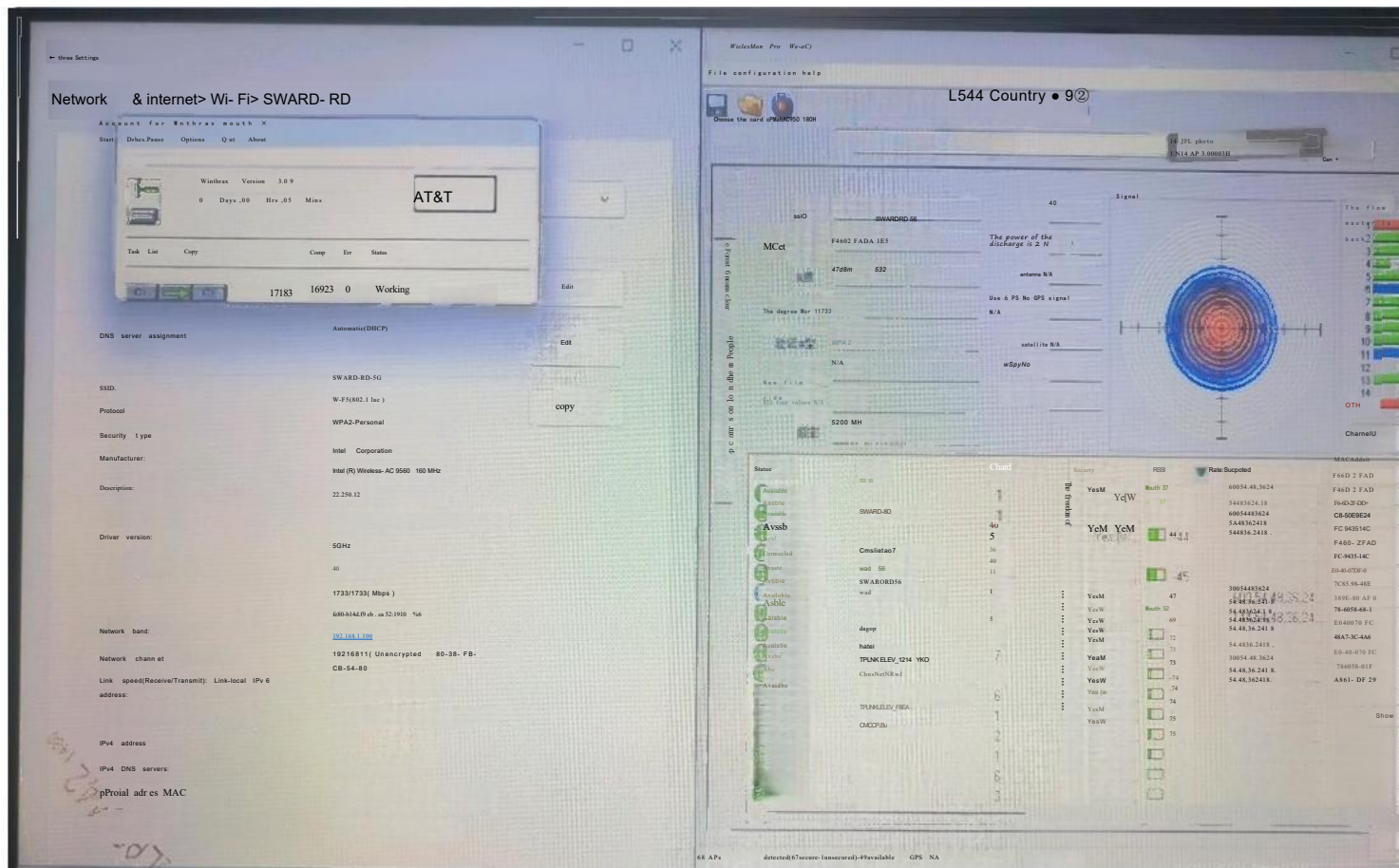
Test place: our R&D office Test time: 20:00-20:30

Test distance: 10-15 meters

in 2 Road, Baoan District, Shenzhen City, Hexi Hangcheng Industrial Zone, Building 6, signal strength: -43 dBm to -38 dBm

Hexi Hangcheng Industrial Zone, No.135 Qianjin No.2 Road, Baoan District, Shenzhen

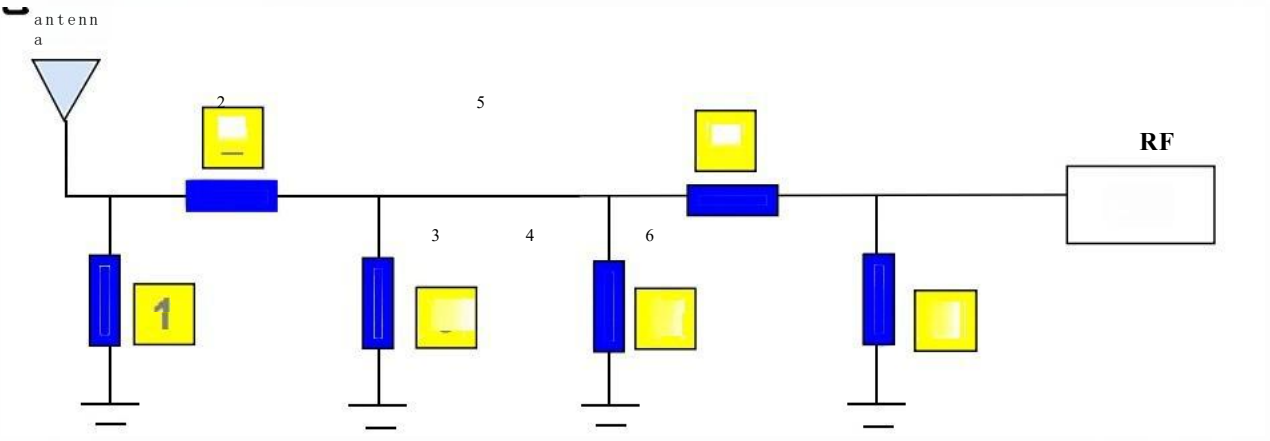
Actual measured image of WIFI antenna signal strength (data)



Test place: our R&D office Test time: 20:00-20:30
Test distance: 10m to 15m

No. 1 2 Road, Baoan District, Shenzhen City, Hexi Hangcheng Industrial Zone, Building B, 6th floor Signal strength: -43 dBm to -38 dBm
Bui Hexi Hangeheng Industrial Zone, No. 135 Qianjin No. 2 Road, Baoan District, Shenzhen

antenna loading coil



The antenna match has not been changed.

main antenna	1	2	3	4	5	6	remarks
Original match							
Change matching							

Environmental treatment and assembly instructions



The original machine environment processing has not been changed;

Note: 1. This report is based on the actual debugging and testing of the test prototype, in which the environmental treatment, antenna position and assembly position of each device cannot be changed at will;

2. If the materials used in the prototype are changed, please timely feedback to our company for further verification;

3 List of sensitive devices:

TP (material, coating, wiring, etc.)

Screen (amplification circuit, LED, wiring 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 transducer, filtering, LNA, power circuit, etc.)

Cameras, batteries, motors, MIC, fingerprint recognition modules, etc

4. Due to the small number of debugging prototypes or only one, some probabilistic problems cannot be completely found out. It is recommended to conduct small batch trial production before mass production to troubleshoot problems (such as screen flashing and screen blooming, noise from speakers, TP jump point, black screen and crash, signal dive, etc.)

