
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:

Mobile phone:

E-mail:

Sovard structure: Sovard RF: Xiao Chunyan

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Projectdescription

1. Project description

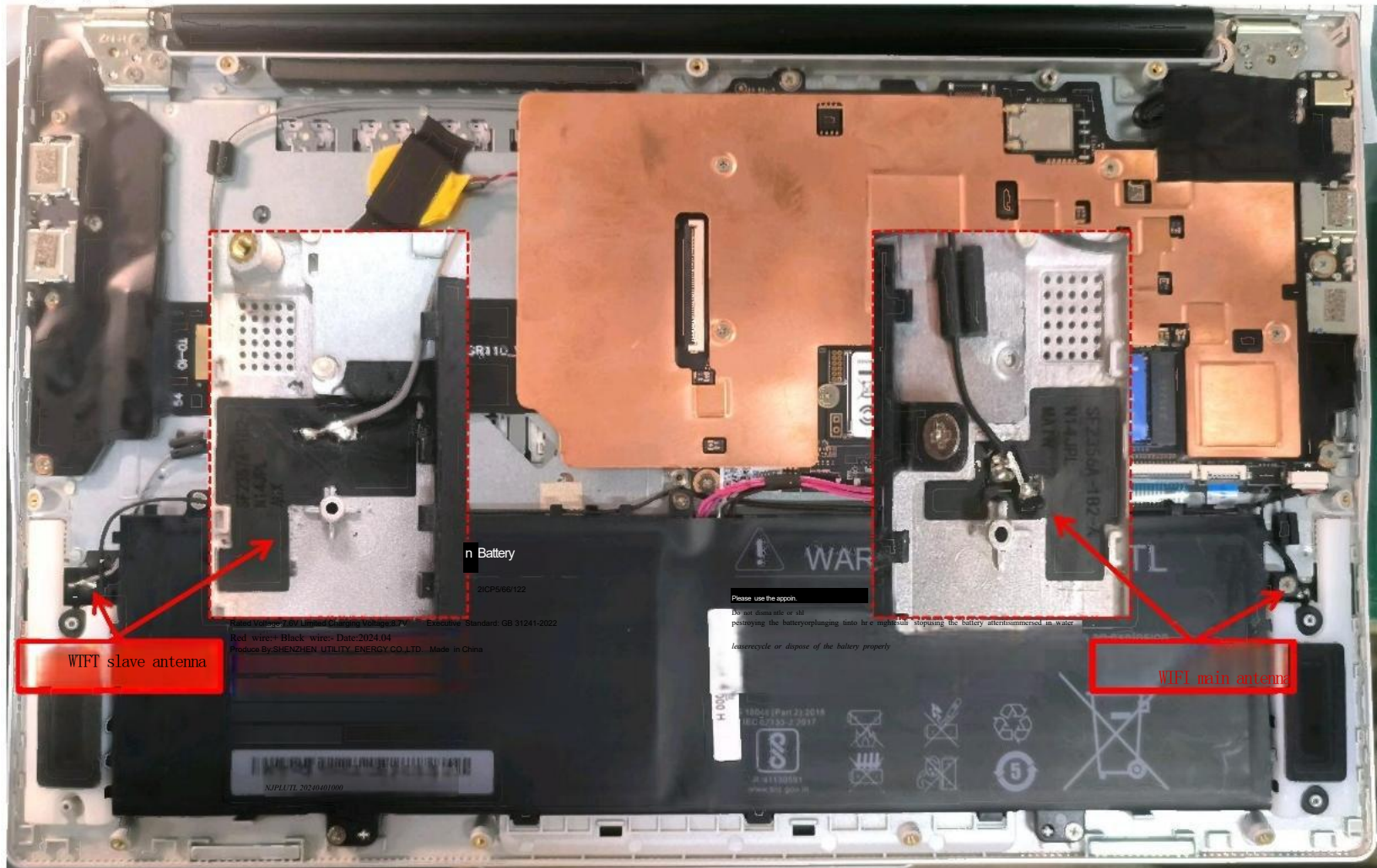
Number of antennas on the project	Machine type
2	WIFI jotter
Whole machine shell material: 14 inch plastic shell	

2. Brief description of the antenna

Antenna number	name	Operating frequency band /MHz	Material / structure
1	WIFI&BT&5Gwi fi	2400MHz~2500MH z &5. 8GHz	FPC
2	WIFI&BT&5Gwi fi	2400MHz 2500MHz &5. 8GHz	FPC



Antenna layout



WIFI main antenna S11



WIFI secondary antenna S11



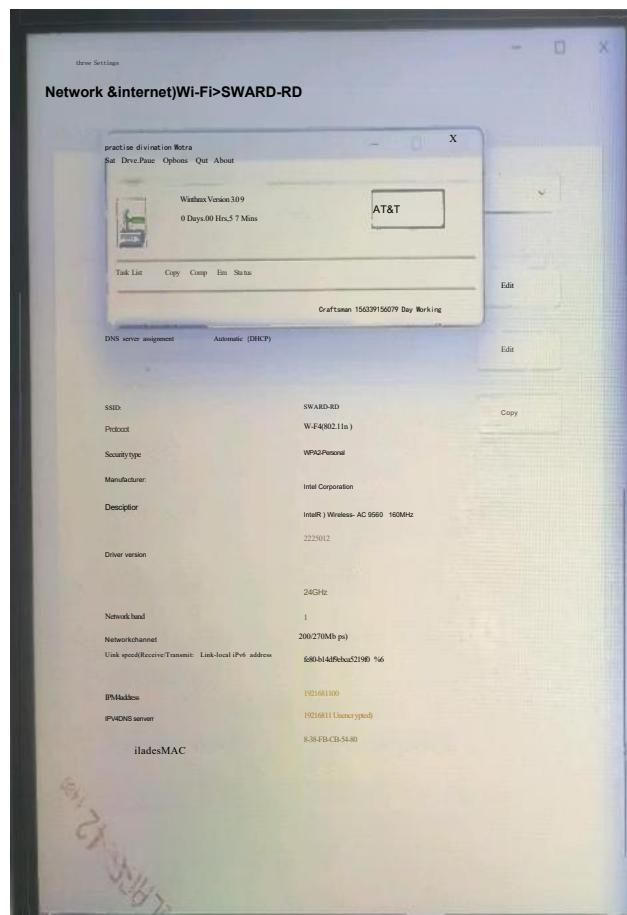
WiFi throughput capacity

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)



Activities for Command Pipe									
364 50.0-51.0		sec	17.3	Mytes	145	Mbits/sec			
364 51.0-52.0			17.1	MyBytes	143	Mbits/sec			
364 52.0-53.0		sec	13.8	MyBytes		Mbit/sec	00		
364 53.0-54.0			15.5	MyBytes	156	Mbit/sec			
364 54.0-55.0		sec	17.0		130	Mbit/sec			
364 55.0-56.0			16.3		143	Mbit/sec			
		sec			137				
364 56.0-57.0	sec	13.3	MyBytes	112	Mbit/sec				
364 57.0-58.0	a sec	13.1	MyBytes	110	Mbits/sec				
364 58.0-59.8	sec	16.0	Mbytes	124	Mbitsec				
364 59.0-60.0 sec		15.9	MyBytes	133	Mbits/sec				
364 0.0-60.1 sec		95.7	Mbytes	124	Mbits/sec				
						[I] Interval	Transfer	Bandwidth	

```
c:\> iperf_s.exe -5
```

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

416]	0.0-68.0	sec	192.168.1.188	port	5001	connected	with	(ID)Interval	Transfer	Bandwidth	
420]	0.0-68.8	sec	192.168.1.180	port	5001	connected	with	(ID)Interval	Transfer	Bandwidth	192.168.1.
428]	0.0-68.8	sec	824	Mbytes	115	Mbits/sec					
384]	0.0-68.2	sec	871	Mbytes	121	Nbits/sec		(ID)Interval	Transfer	Bandwidth	
384]	0.0-60.2	sec	871	Mbytes	121	Nbits/sec		(ID)Interval	Transfer	Bandwidth	192.168.1.
440]	0.0-68.8	sec	875	Mbytes	122	Hbits/sec		(ID)Interval	Transfer	Bandwidth	
460]	0.0-68.0	sec	875	Mbytes	122	Hbits/sec		(ID)Interval	Transfer	Bandwidth	192.168.1.
460]	0.0-68.0	sec	875	Mbytes	122	Hbits/sec					192.168.1.
460]	0.0-68.0	sec	875	Mbytes	122	Hbits/sec					192.168.1.

[64][17.0-18.0 sec		17.1 MBytes	16.4 Fbytes	143 Fbits/sec
36	18.0-19.0 sec	15.7 MBytes Transfer		137 Mbits/sec
36a	19.0-20.0 sec	16.0 MBytes ICS Mbytes		131 Mbits/sec
	D Interval	15.5 MBytes		129 Mbits/sec
		16.3 MBytes		
[364]20.0-21.0 sec				138 Mbits/sec
[364]21.0-22.0 sec				130 Mbits/sec
[364]22.0-23.0 sec				137 Mbits/sec
[364]23.0-24.0 sec				136 Mbits/sec
[364]24.0-25.0 sec				135 Mbits/sec
[364]25.0-26.0 sec				127 Mbits/sec
[364]26.0-27.0 sec				128 Mbits/sec
[364]27.0-28.0 sec				136 Mbits/sec
[364]28.0-29.0 sec				143 Hbits/sec
[364]29.0-30.0 sec				144 Hbits/sec
[364]30.0-31.0 sec				134 Hbits/sec
[364]31.0-32.0 sec				142 Hbits/sec
		16.1 MBytes		
		15.2 MBytes		
		15.3 MBytes		
		16.3 MBytes		
		17.0 NBytes		
		17.1 HBytes		
		16.0 MBytes		
		15.2 MBytes		
				Bandwidth
				132 Hbits/sec
				127 Hbits/sec
		16.7 MBytes		145 Hbits/sec
[364]32.0-33.0 sec	sec		16.6 MByte	130 Nbits/sec
[364]33.0-34.0 sec	sec		16.1 MBytes	
[364] 34.0-35.0 sec	sec		16.8 HBytes	146 Hbits/sec
[364] 35.0-36.0 sec				143 Hbits/sec
[364] 36.0-37.0 sec	sec	15.2 MBytes		
[364] 37.0-38.0 sec	sec	16.8 HBytes		
[364] 38.0-39.8 sec		17.4 HBytes		
[364]39.0-40.0 sec	sec	16.7 MBytes		
[ID]Interval		1.6 sec		
[364]40.0-41.8 sec	sec	15.7 HBytes		
[364]41.0-42.0 sec		15.2 HBytes		
[364]42.0-43.0 sec	sec	17.3 HBytes		
		15.5 HBytes		
[364]44.0-45.0 sec	sec	16.3 HBytes		
[364]45.0-46.0 sec	sec	17.4 HBytes		
[364]46.0-47.0 sec		17.0 HBytes		
[364]47.0-48.0 sec	sec	16.8 HBytes		

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

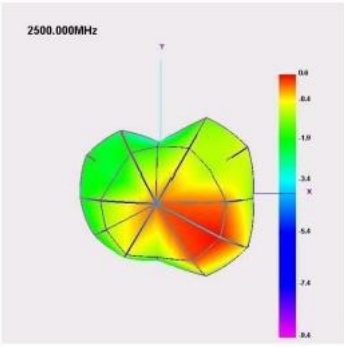
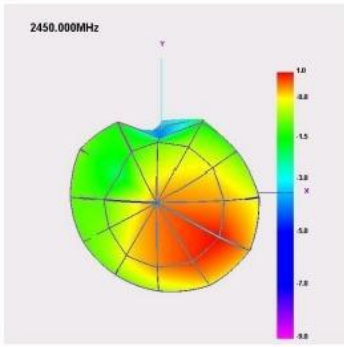
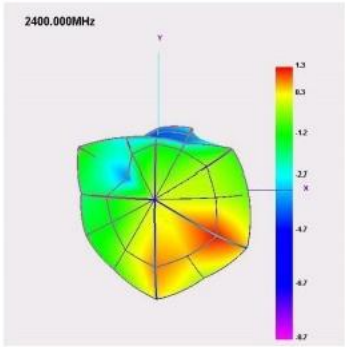


Measured distance of BT antenna

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

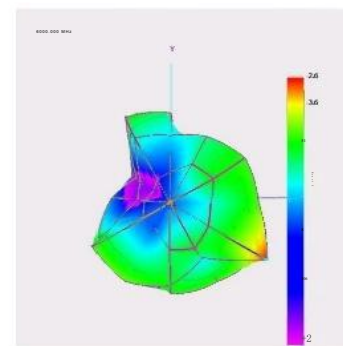
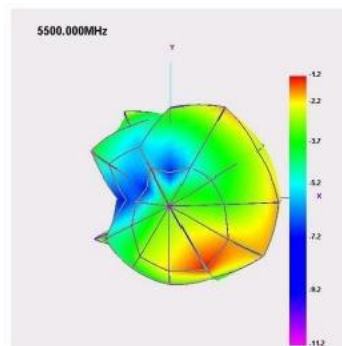
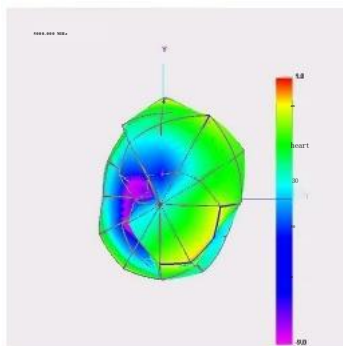
WIFI&BT antenna efficiency——main antenna

Passive Test For 2.4Gwifi								
Freq	Effi	Effi	Gain	Gain	UHS	DHIS	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



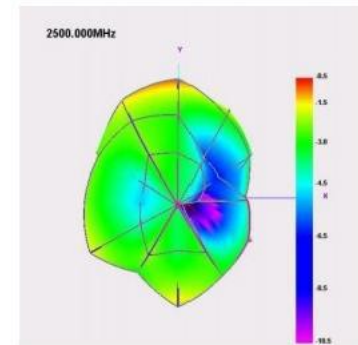
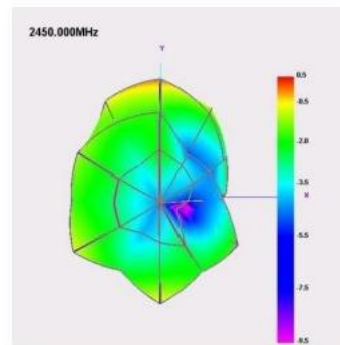
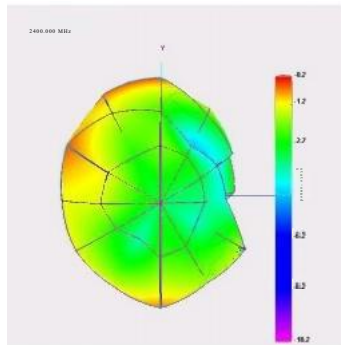
5GWIFI antenna efficiency —— main antenna

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



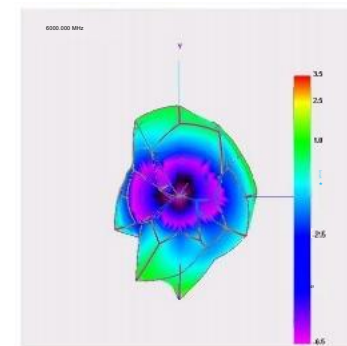
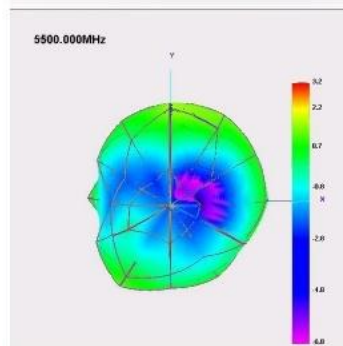
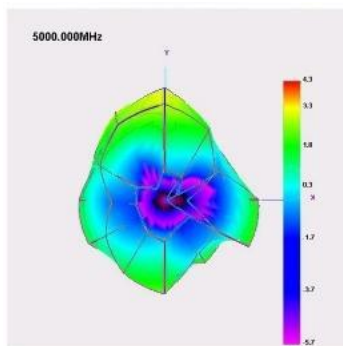
WIFI&BT antenna efficiency —— secondary antenna

Passive Test For 2.4Gwifi								
Freq	Effi	Effi	Gain	Gain	UHS	DHS	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)	(dB)	(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



The left screenshot shows the 'Network & internet > Wi-Fi > SWARD-RD' window. It displays the Winbox Version 3.09 interface. A table shows network statistics:

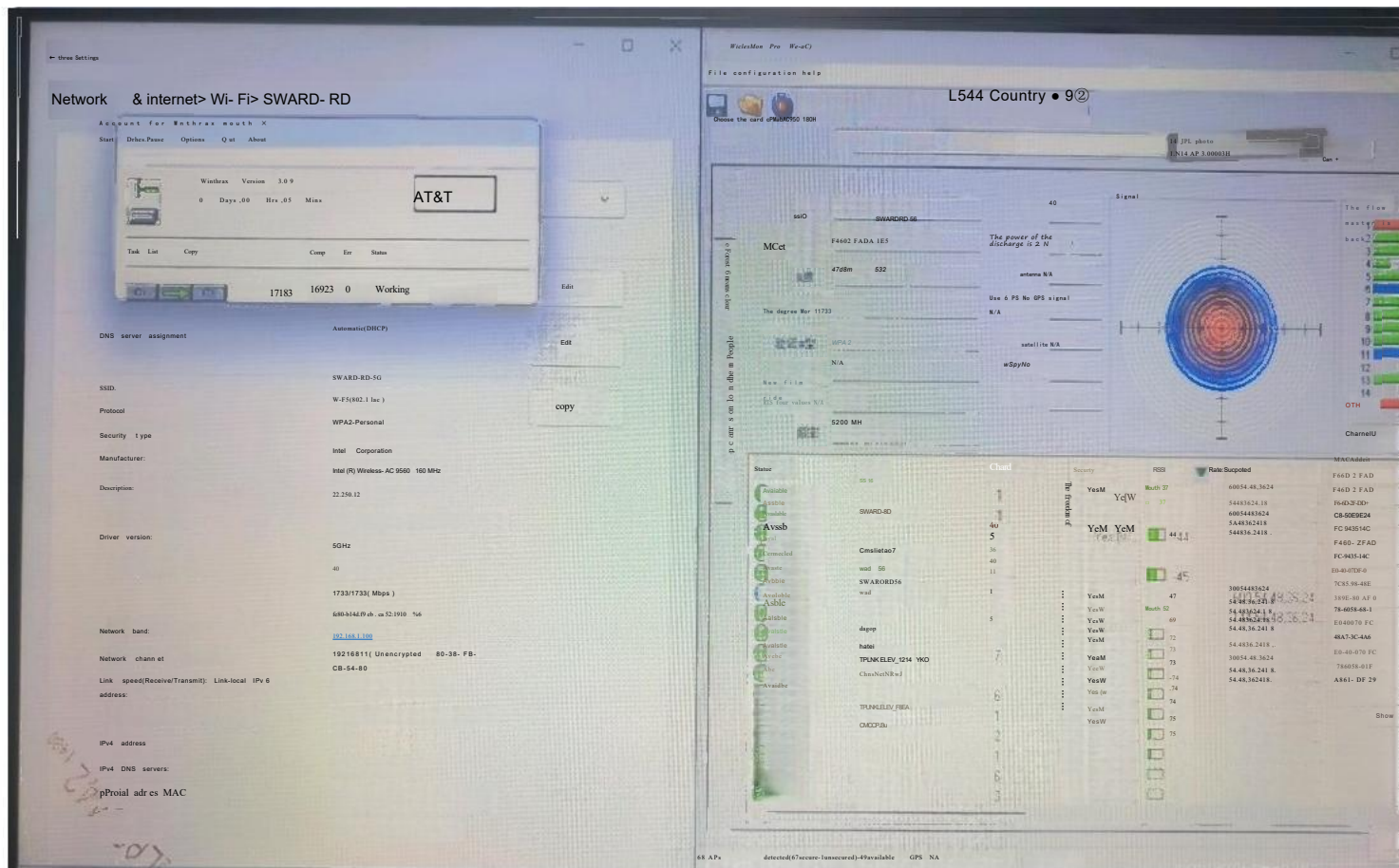
Task List	Copy	Comp	Err	Status
8699	8437	0	Working	

The right screenshot shows the 'Winbox' interface for the 'SWARD-RD' device. It displays various network parameters and a signal strength indicator. The signal strength is shown as a circular diagram with concentric rings, indicating a strong signal.

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

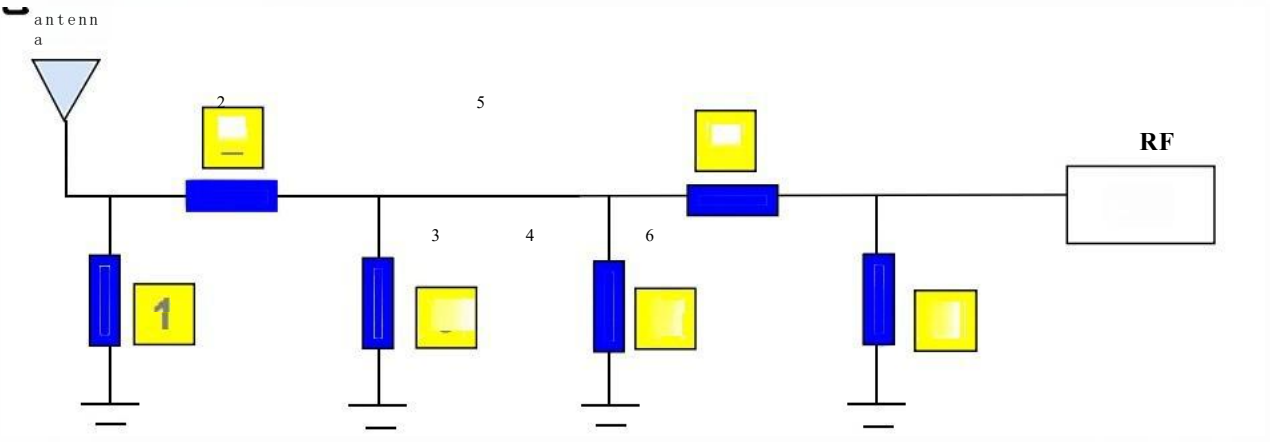
Actual measured image of WIFI antenna signal strength (data)



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

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