

Antenna Testing Report

Customer: apical Technology

Project Name: SP20A

Report Number: SZ25439IB77/SZ25439IA54

Manufacturer: Sunnyway Technology(CHINA)

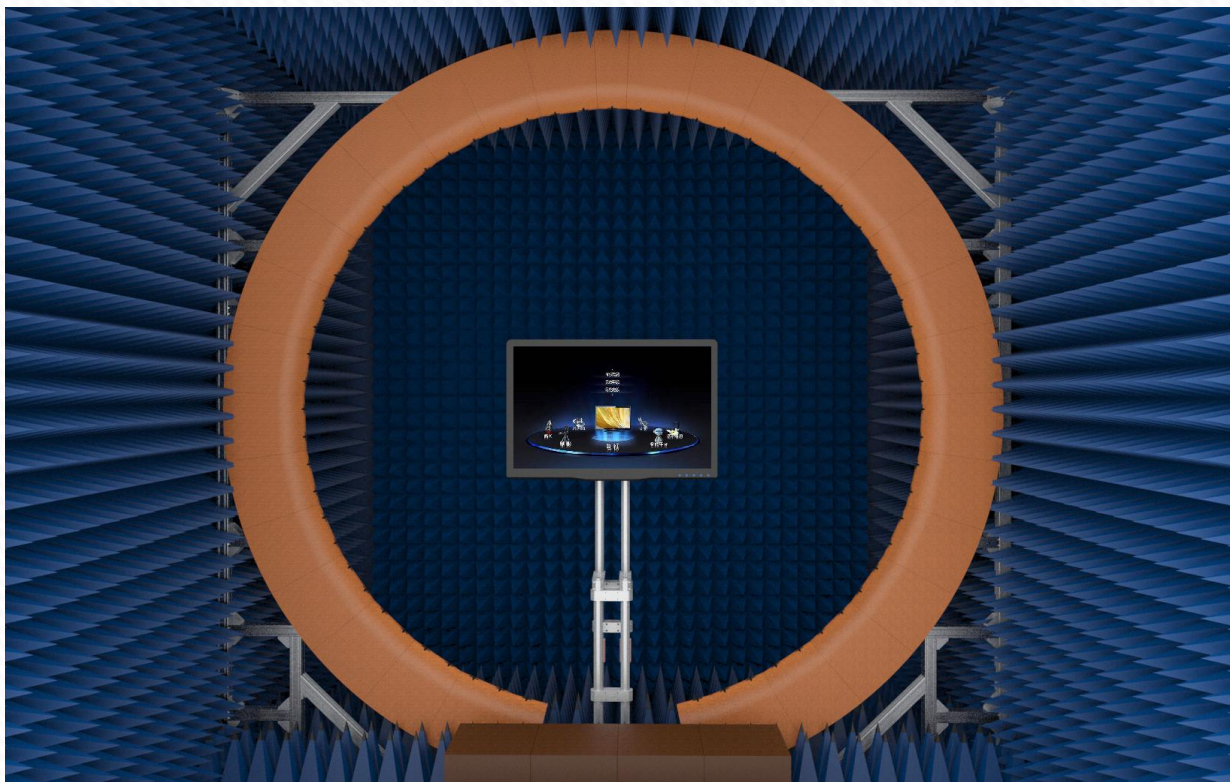
Address: Floor 6, Building 5, Nam Tai Inno Park, Guangming District,
Shenzhen

Report version: 2026/1/4

Version	Time	Update Notes
A0	2026/1/4	Latest test data
A1		
A2		
A3		
A4		
A5		
A6		
A7		
A8		
A9		

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4. Matching circuit.....	
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6. LORA antenna-related data.....	
7. Complete machine environmental handling.....	
8. Summary	

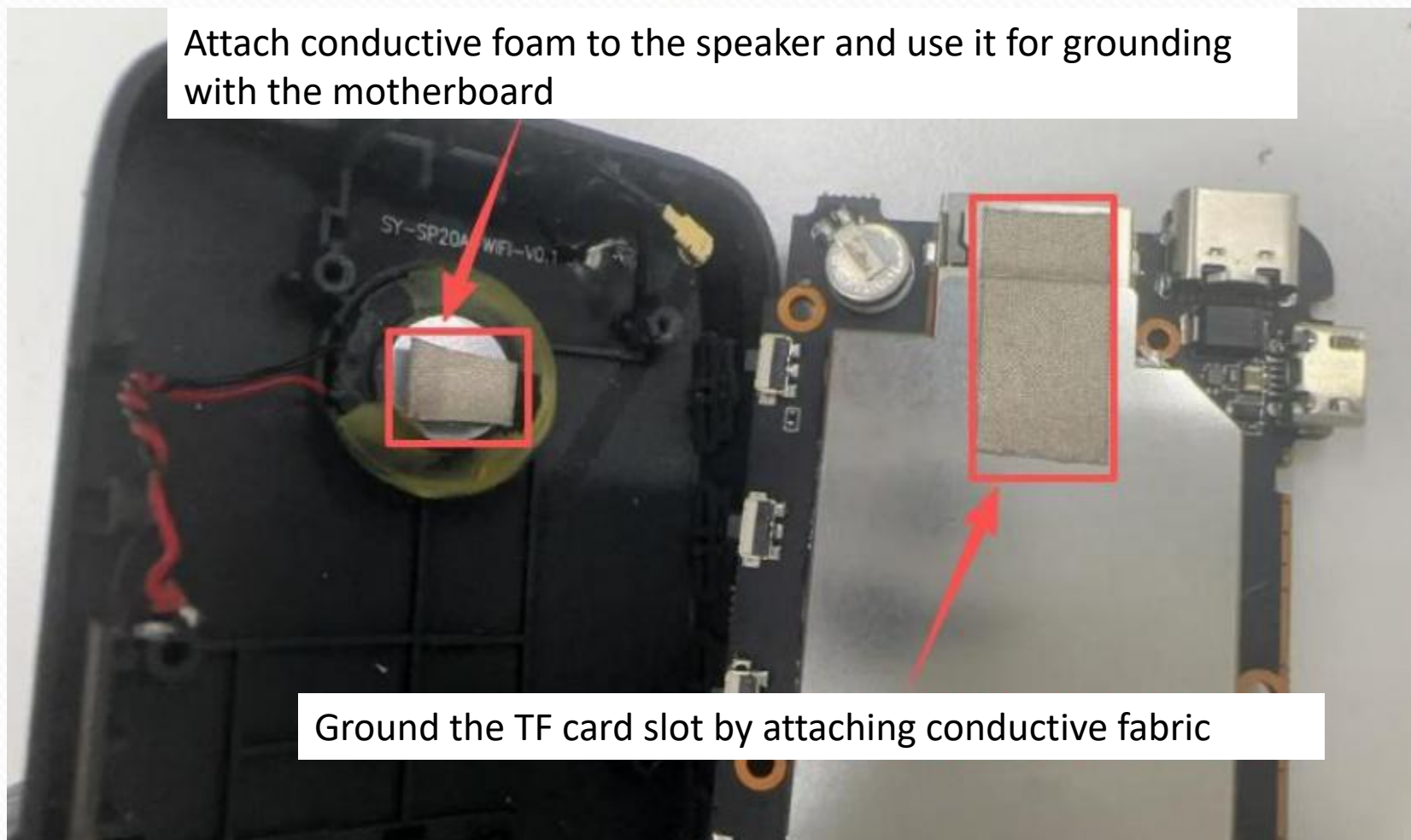
Prototype status	Active machine	Project Prototype Diagram: 
Product Type	Temperature and humidity sensor	
Number of antennas	WIFI Antenna, GNSSAntenna	
Antenna frequency band	GPS	
	WIFI 2.4	
Structural form	FPC/Ceramics	
Environmental management	No changes made	
Matching circuit	No changes made	



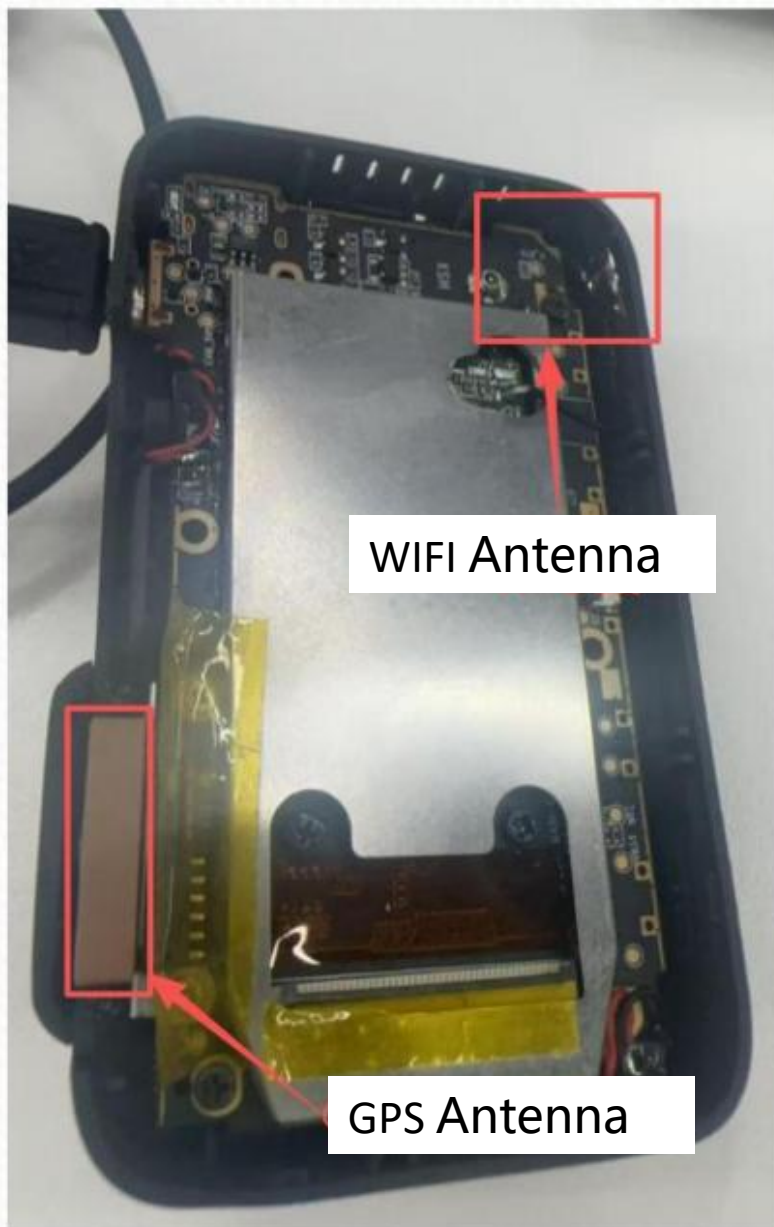
The industry's top 64 sensors OTA
chamber Frequency range: 400MHz-11GHz
Device Llimitation: 2M
Load-bearing limitation:100KG

Equipments Items	Total Quantity	Quantity for Shanghai R&D	Quantity for Shenzhen R&D	Quantity for ChongQing R&D
OTA chamber	10	4	5	1
5G Tester (SP9500-CTS)	3	1	1	1
R&S Tester (high configuration CMW500)	6	3	2	1
Japan Anritsu Tester (Dual Channel 8820)	4	2	2	--
NB-IoT Tester (SP8315)	3	1	1	1
Agilent Tester (8960)	9	4	4	--
Agilent Network Analyzer (E5062A)	7	3	3	1
Agilent Network Analyzer (E5071C 8.5GHZ)	11	5	5	1
Agilent Network Analyzer (E5071B 8.5GHZ)	7	3	3	1
R&S Network Analyzer (ZND)	9	4	4	1
R&S Network Analyzer (ZVB)	3	1	1	1
OTA head hand / ear hand / arm hand	5	2	2	1
GPS/WIFI active test equipment	5	2	2	1

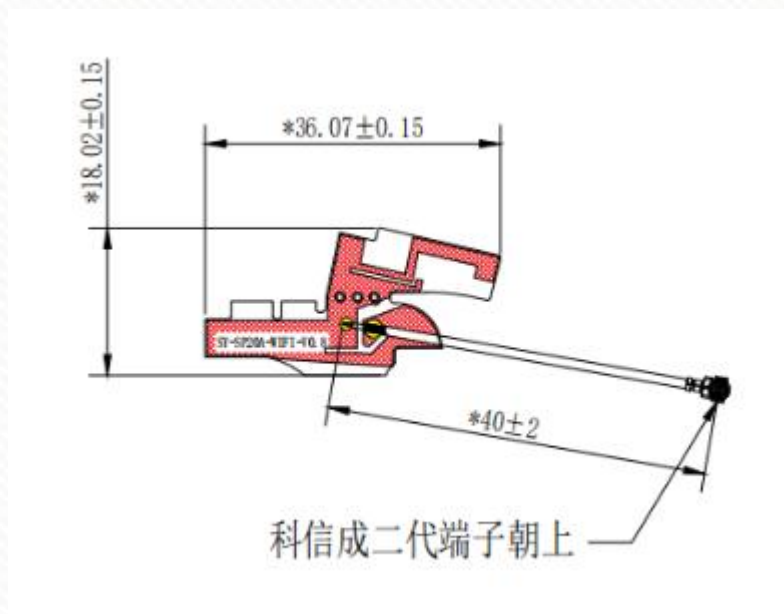
Attach conductive foam to the speaker and use it for grounding with the motherboard



Ground the TF card slot by attaching conductive fabric



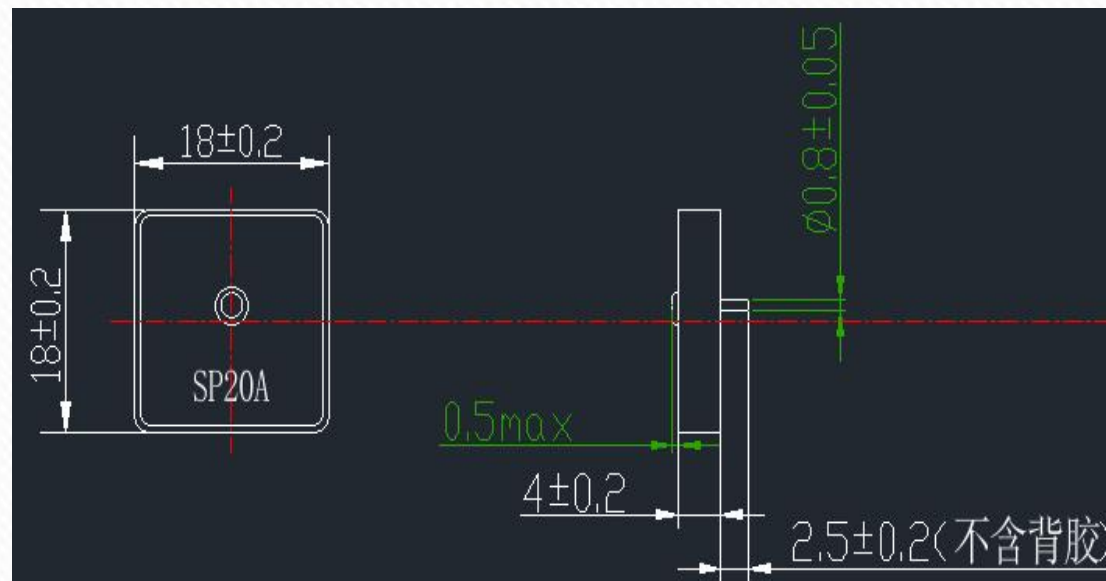
WI FI antenna/Antenna size



WI FI Antenna type: FPC

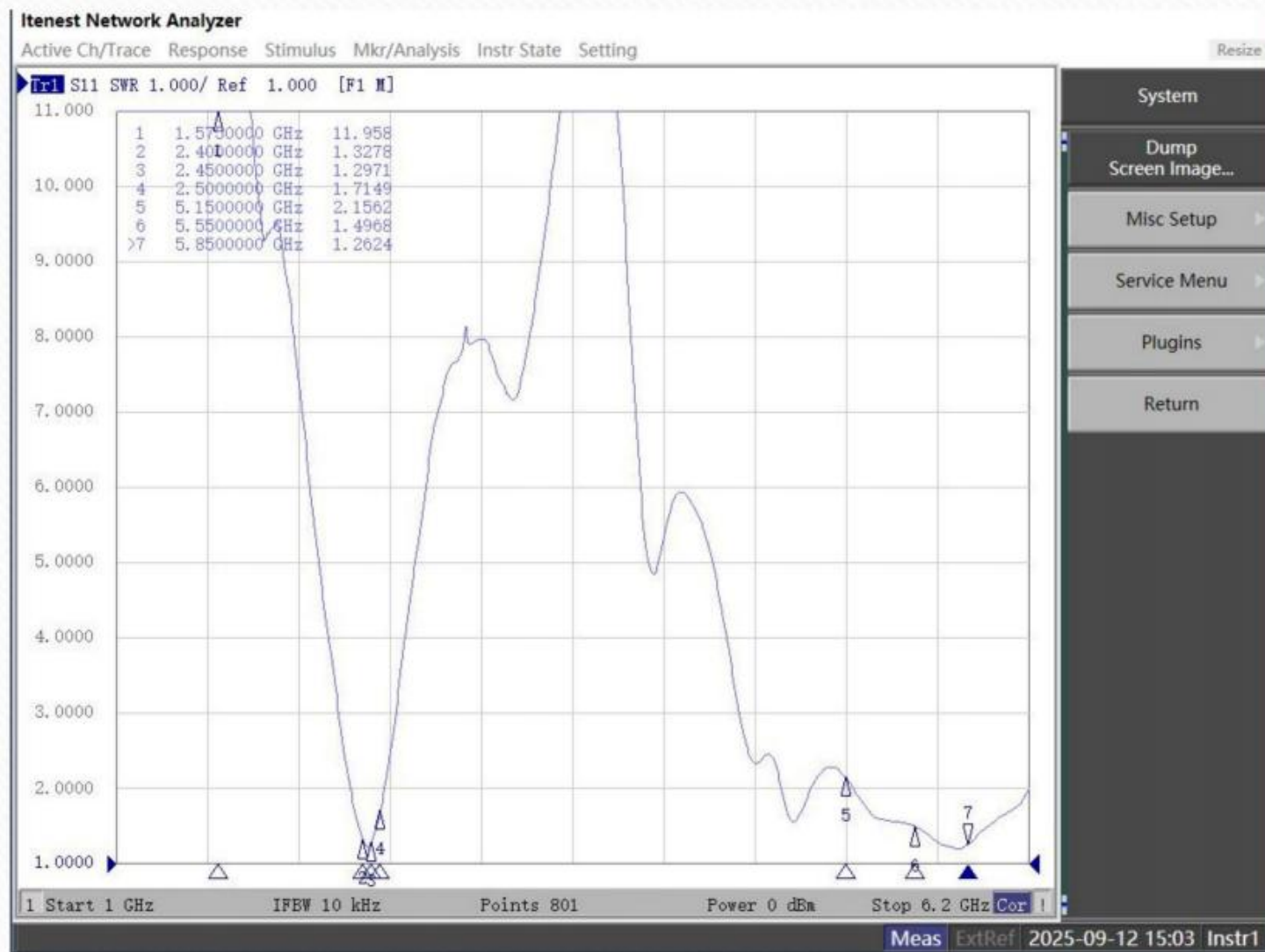
WI FI Antenna model: SZ25439IB77

GPS antenna/Antenna size



GPS Antenna type: Ceramics

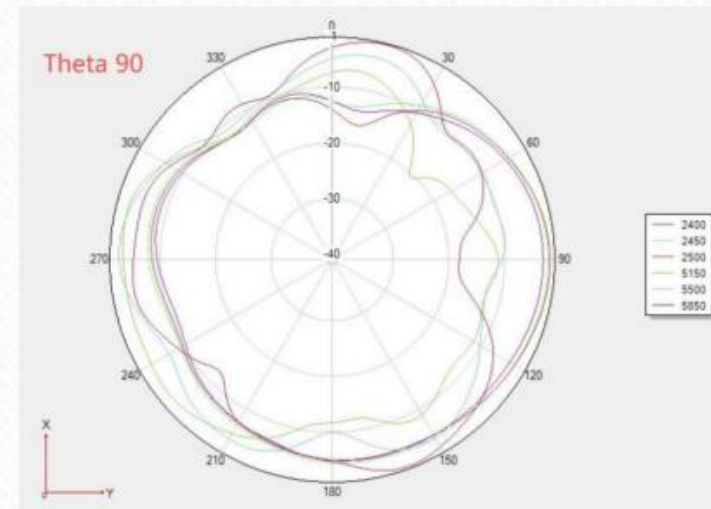
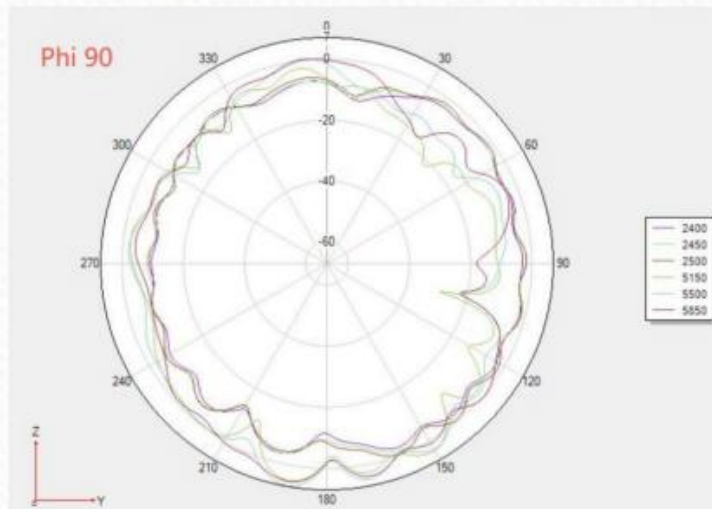
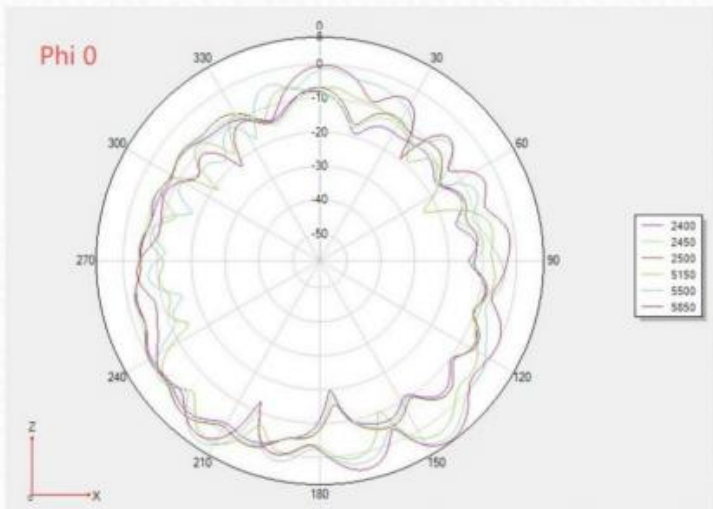
GPS Antenna model: SZ25439IB77

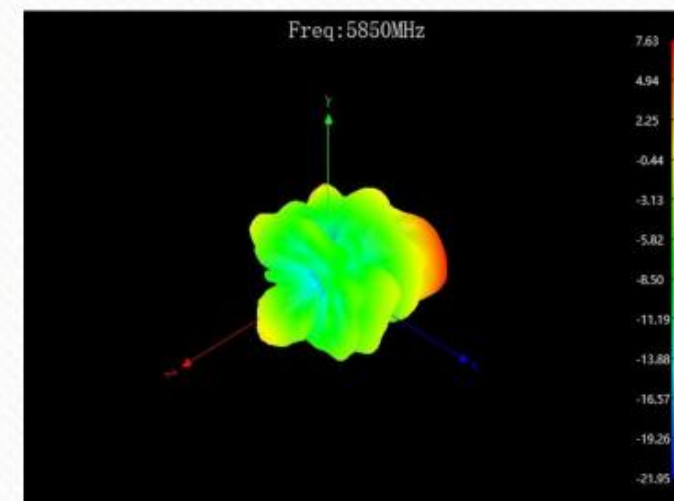
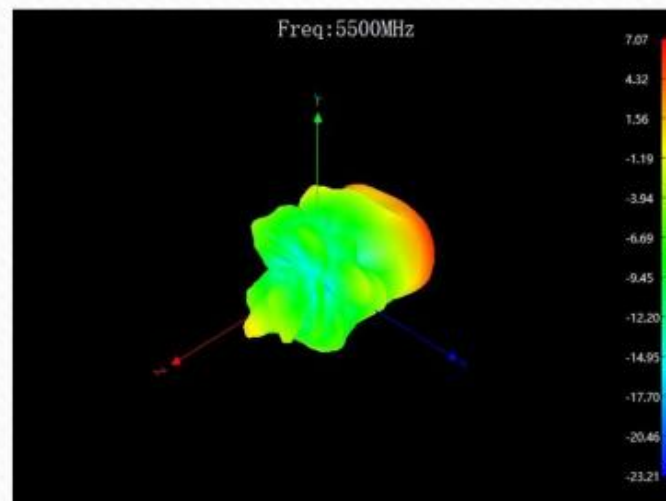
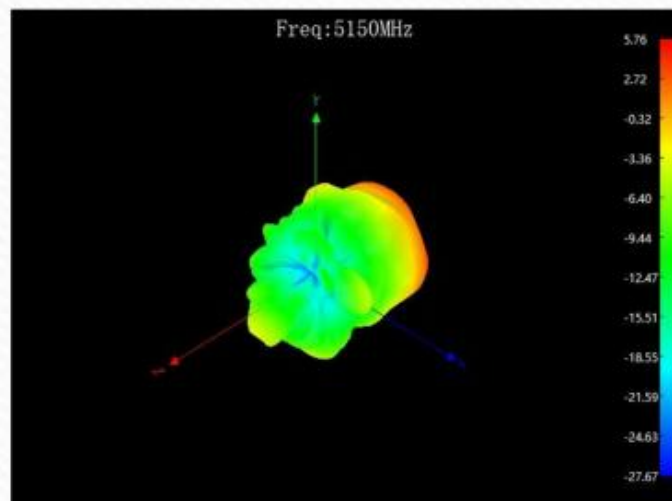
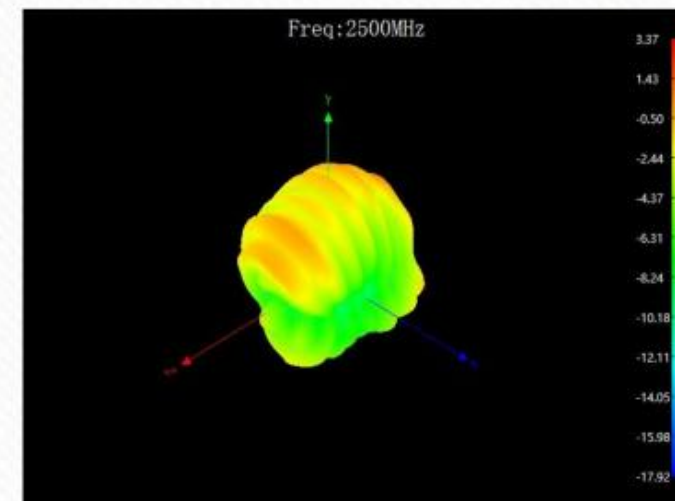
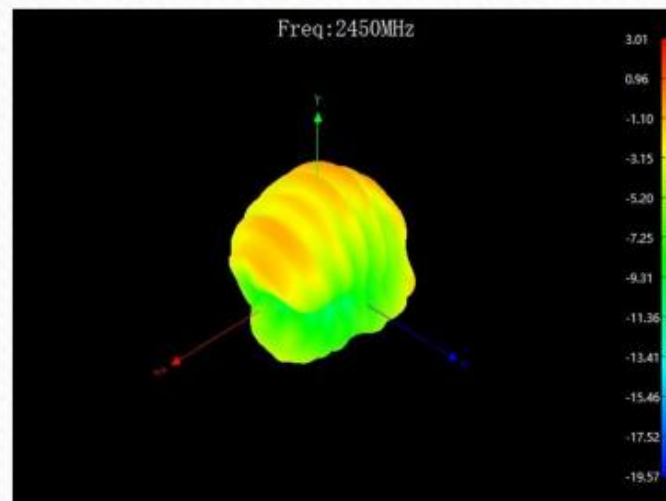
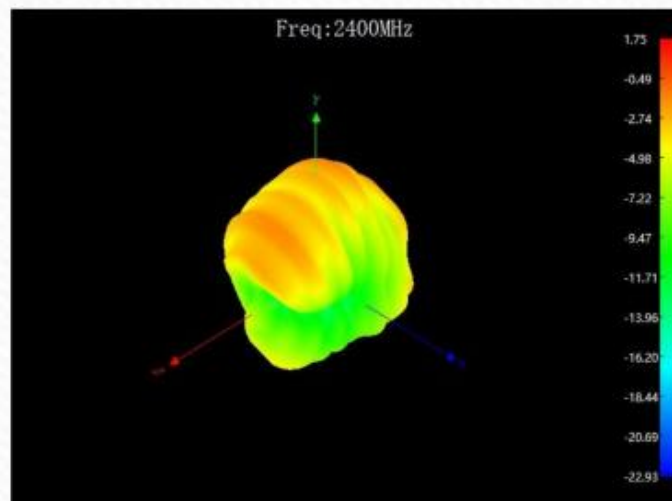


WiFi Antenna efficiency

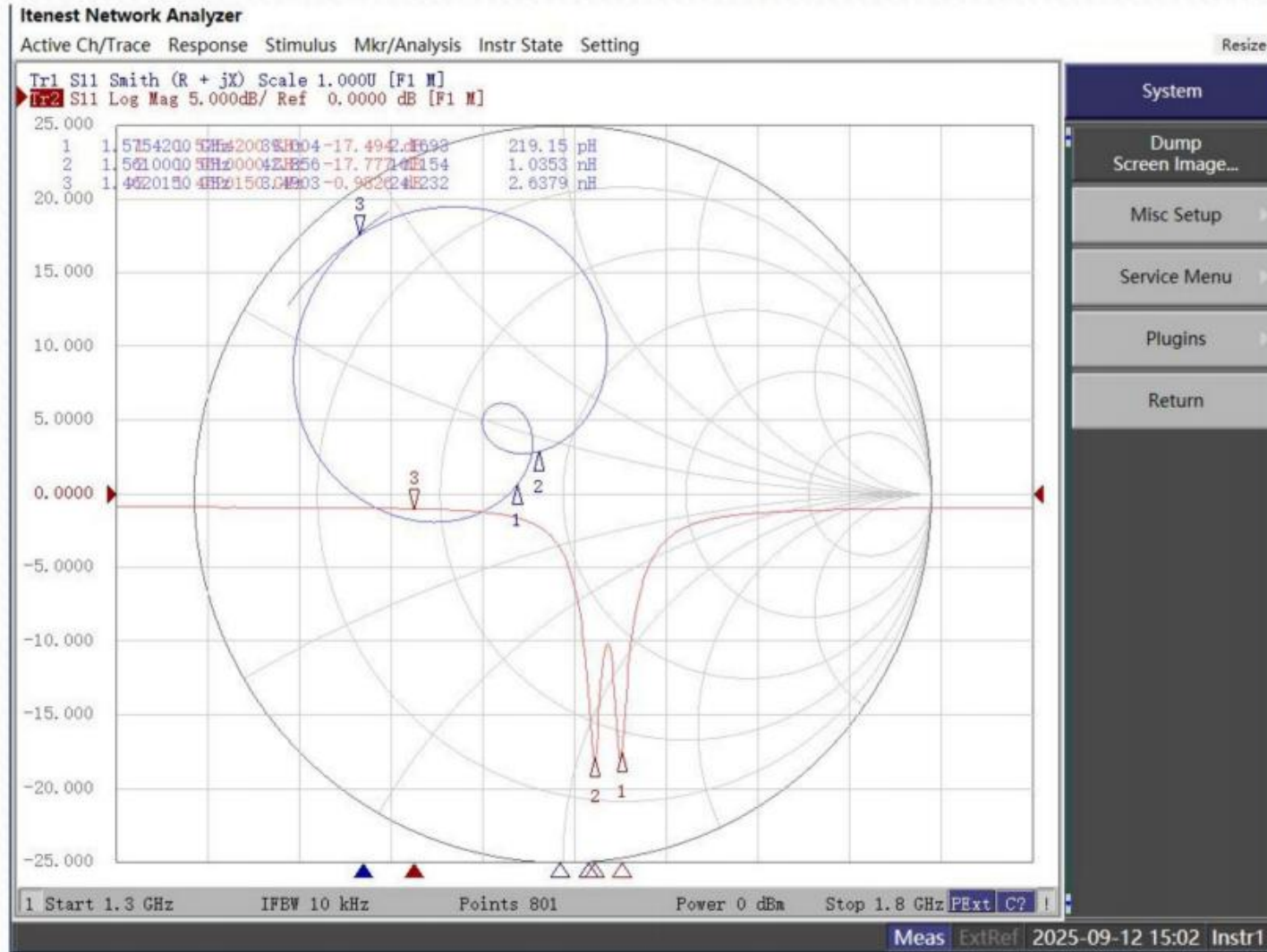
Frequency/Mhz	Efficiency / dB	Efficiency / %	MaxGain/dBi
2400	-4.58	34.83	1.75
2410	-4.11	38.82	2.6
2420	-5.02	31.48	1.32
2430	-4.9	32.36	1.91
2440	-4.76	33.42	2.02
2450	-4.12	38.73	3.01
2460	-4.44	35.97	2.71
2470	-4.33	36.9	3.04
2480	-4.21	37.93	3.21
2490	-4.26	37.5	3.36
2500	-4.42	36.14	3.37

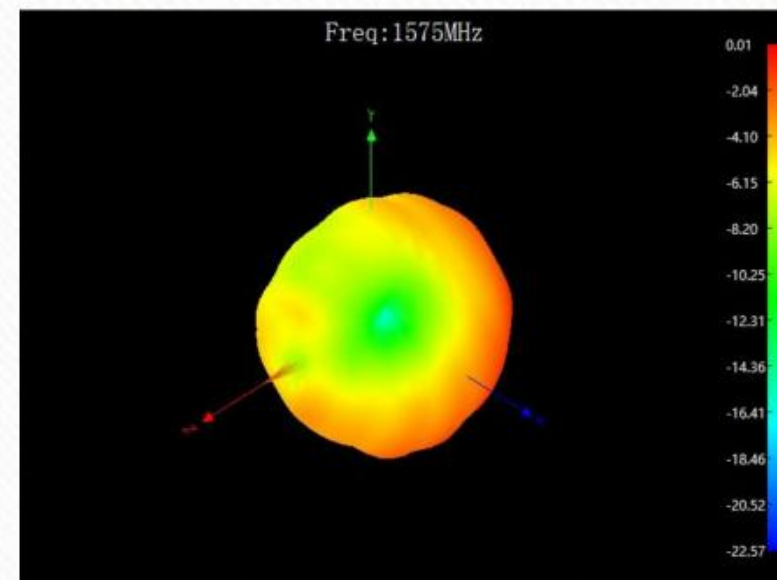
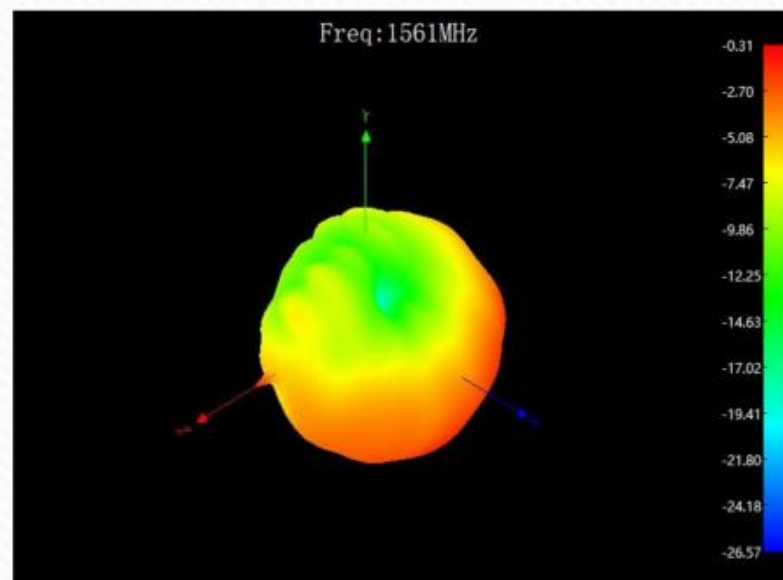
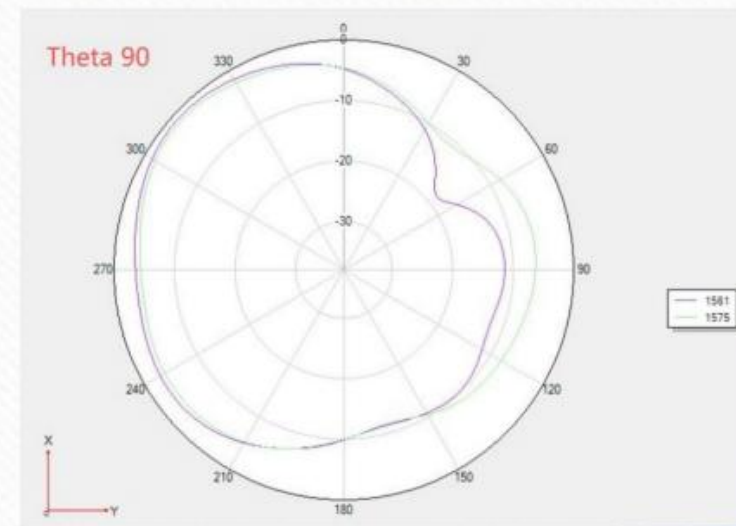
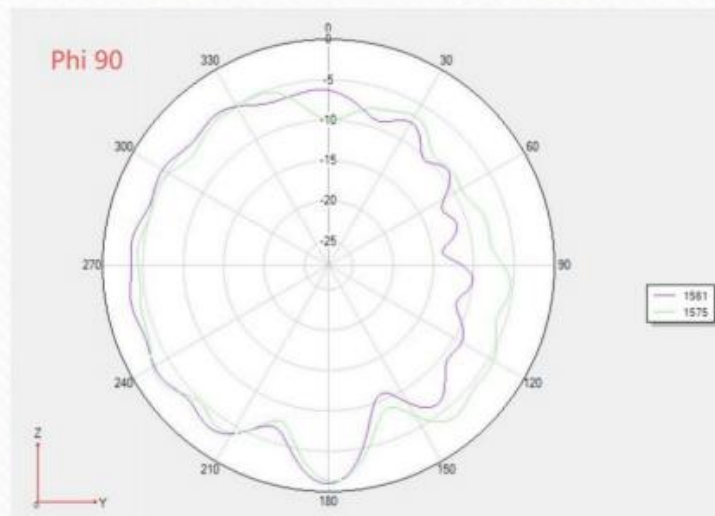
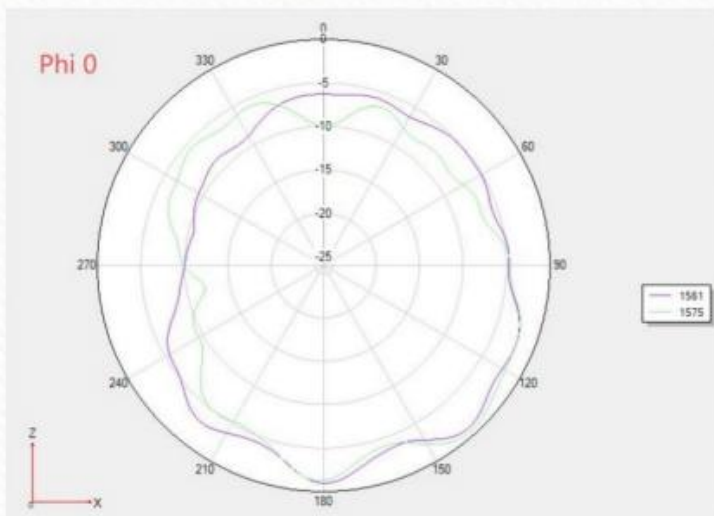
Frequency/Mhz	Efficiency / dB	Efficiency / %	MaxGain/dBi
5150	-4.34	36.81	5.76
5200	-4.47	35.73	5.84
5250	-4.12	38.73	6.23
5300	-3.91	40.64	6.54
5350	-3.97	40.09	6.55
5400	-3.22	47.64	7.26
5450	-3.3	46.77	7.06
5500	-3.05	49.55	7.07
5550	-2.85	51.88	7.17
5600	-2.87	51.64	7.07
5650	-2.56	55.46	7.45
5700	-2.8	52.48	7.43
5750	-2.66	54.2	7.85
5800	-2.63	54.58	7.74
5850	-2.89	51.4	7.63





Item	Measurement	Band	Channel	Total
1	TRP	WIFI_B (1M)	1	14.33
2	TRP	WIFI_B (1M)	7	14.4
3	TRP	WIFI_B (1M)	13	15.48
4	TIS(EIRP)	WIFI_B (11M)	13	-79.65
5	TRP	WIFI_G (6M)	1	14 .88
6	TRP	WIFI_G (6M)	7	15.03
7	TRP	WIFI_G (6M)	13	15.53
8	TIS(EIRP)	WIFI_G (54M)	13	-66.2
9	TRP	WIFI_ N_ ISM (6 .5 M)	1	14 .08
10	TRP	WIFI_ N_ ISM (6 .5 M)	7	14 .05
11	TRP	WIFI_ N_ ISM (6 .5 M)	13	15.33
12	TIS(EIRP)	WIFI_ N_ ISM (65M)	13	-62 .87
13	TRP	WIFI_A (6M)	36	12 .85
14	TRP	WIFI_A (6M)	149	13.49
15	TRP	WIFI_A (6M)	165	13.53
16	TIS(EIRP)	WIFI_A (54M)	165	-73.01
17	TRP	WIFI_ N_ UNII (6 .5 M)	36	11 .84
18	TRP	WIFI_ N_ UNII (6 .5 M)	149	12.9
19	TRP	WIFI_ N_ UNII (6 .5 M)	165	12. 17
20	TIS(EIRP)	WIFI_ N_ UNII (65M)	165	-69.22





Frequency/Mhz	Efficiency / dB	Efficiency / %	MaxGain/dBi
1550	-6.43	22.75	-3.55
1551	-6.31	23.39	-3.28
1552	-6.24	23.77	-3.1
1553	-6.21	23.93	-3.02
1554	-6.17	24.15	-2.94
1555	-6.08	24.66	-2.82
1556	-5.91	25.64	-2.58
1557	-5.66	27.16	-2.32
1558	-5.35	29.17	-2.09
1559	-5.02	31.48	-1.92
1560	-4.7	33.88	-1.75
1561	-4.47	35.73	-1.6
1562	-4.32	36.98	-1.44
1563	-4.22	37.84	-1.35
1564	-4.17	38.28	-1.32
1565	-4.13	38.64	-1.35
1566	-4.04	39.45	-1.38
1567	-3.89	40.83	-1.38
1568	-3.7	42.66	-1.35
1569	-3.53	44.36	-1.25
1570	-3.44	45.29	-1.33
1571	-3.45	45.19	-1.42
1572	-3.55	44.16	-1.39
1573	-3.68	42.85	-1.38
1574	-3.79	41.78	-1.31
1575	-3.84	41.3	-1.17
1576	-3.83	41.4	-0.96
1577	-3.78	41.88	-0.81
1578	-3.71	42.56	-0.76
1579	-3.67	42.95	-0.84
1580	-3.68	42.85	-1



不带金属粉壳料			
WIFI B	1	15.79	-79.25
	7	14.41	-82.45
	13	13.82	-83.43
WIFI A	36	14.48	-70.29
	149	14.6	-67.68
	165	15.02	-69.09

带金属粉壳料			
WIFI B	1	16.34	-80.61
	7	16.51	-81.71
	13	15.03	-83.42
WIFI A	36	14.93	-70.61
	149	15.09	-68.31
	165	15.87	-68.54

GPS Comparison of source data

不含金属粉壳料

Frequency/Mhz	Efficiency / dB	Efficiency / %	MaxGain/dBi
1550	-6.43	22.75	-3.55
1551	-6.31	23.39	-3.28
1552	-6.24	23.77	-3.1
1553	-6.21	23.93	-3.02
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1555	-6.08	24.66	-2.82
1556	-5.91	25.64	-2.58
1557	-5.66	27.16	-2.32
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1568	-3.7	42.66	-1.35
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1571	-3.45	45.19	-1.42
1572	-3.55	44.16	-1.39
1573	-3.68	42.85	-1.38
1574	-3.79	41.78	-1.31
1575	-3.84	41.3	-1.17
1576	-3.83	41.4	-0.96
1577	-3.78	41.88	-0.81
1578	-3.71	42.56	-0.76
1579	-3.67	42.95	-0.84
1580	-3.68	42.85	-1

含金属粉壳料

带金属粉壳料			
1550	-4.66	-1.32	34.19
1555	-3.32	-0.07	46.55
1560	-3.27	0.64	47.15
1565	-2.92	0.82	51.03
1570	-3.04	0.45	49.65
1575	-3.23	-0.25	47.51
1580	-3.40	-0.79	45.7
1585	-3.70	-1.14	42.68
1590	-4.55	-1.99	35.06
1595	-4.7	-3.26	33.86
1600	-6.15	-4.69	24.26

1. Antenna version: Verified with metal powder casing
2. Matching changes: No changes
3. Environmental processing: Changes made, see report for details
4. Current summary: The metal powder casing has no effect on the antenna

Thank You

Shanghai R&D Center: 1F, Building 4, No.99, Lane 215, Gaoguang Road, Qingpu District, Shanghai, 201799, PRC

Shenzhen R&D Center: Floor 6, Building 5, Nam Tai Inno Park, Guangming District, Shenzhen, 518057, PRC

ChongQing R&D Center: 1F, ARM Ecological Industrial Park, 19 East Datugu Road, Xiantao, Yubei District, Chongqing, 401120, PRC

Huizhou Factory: F4-6, Building 8, Xiongtao Tech Park, No.15, Qingli 2nd Rd, Huicheng Dist, Huizhou City, 516255, PRC

TEL: 021-60835368 E-mail: sales@sunnyway-iot.com

www.sunnyway-iot.com

