

672-WIIF

Customer: 剑桥

Designer: ZW

Date: 2025/05/06



Professional, Stringent & Innovation
Antenna Manufacturer
for WiFi WiMAX & RFID

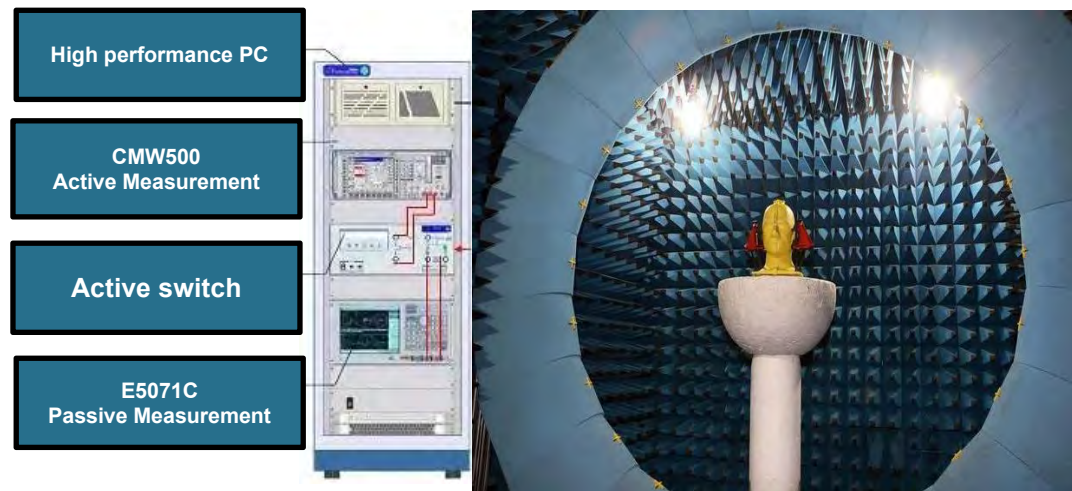


OUTLINE

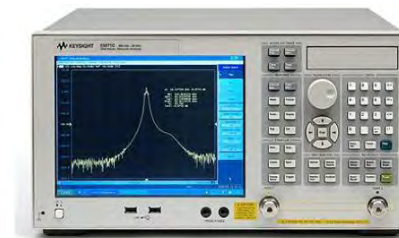
1. Benchmark
2. S-Parameters (VSWR&isolation)
3. Antenna Efficiency& Peak Gain
4. Radiation patterns
5. Summary

JingHong 3D Chamber Structure

- EMT-24 Series System Components
- Chambers
- EMT Quest Software
- Positioning Systems
- Chamber Room Size: L*W*H=5*5*5 M

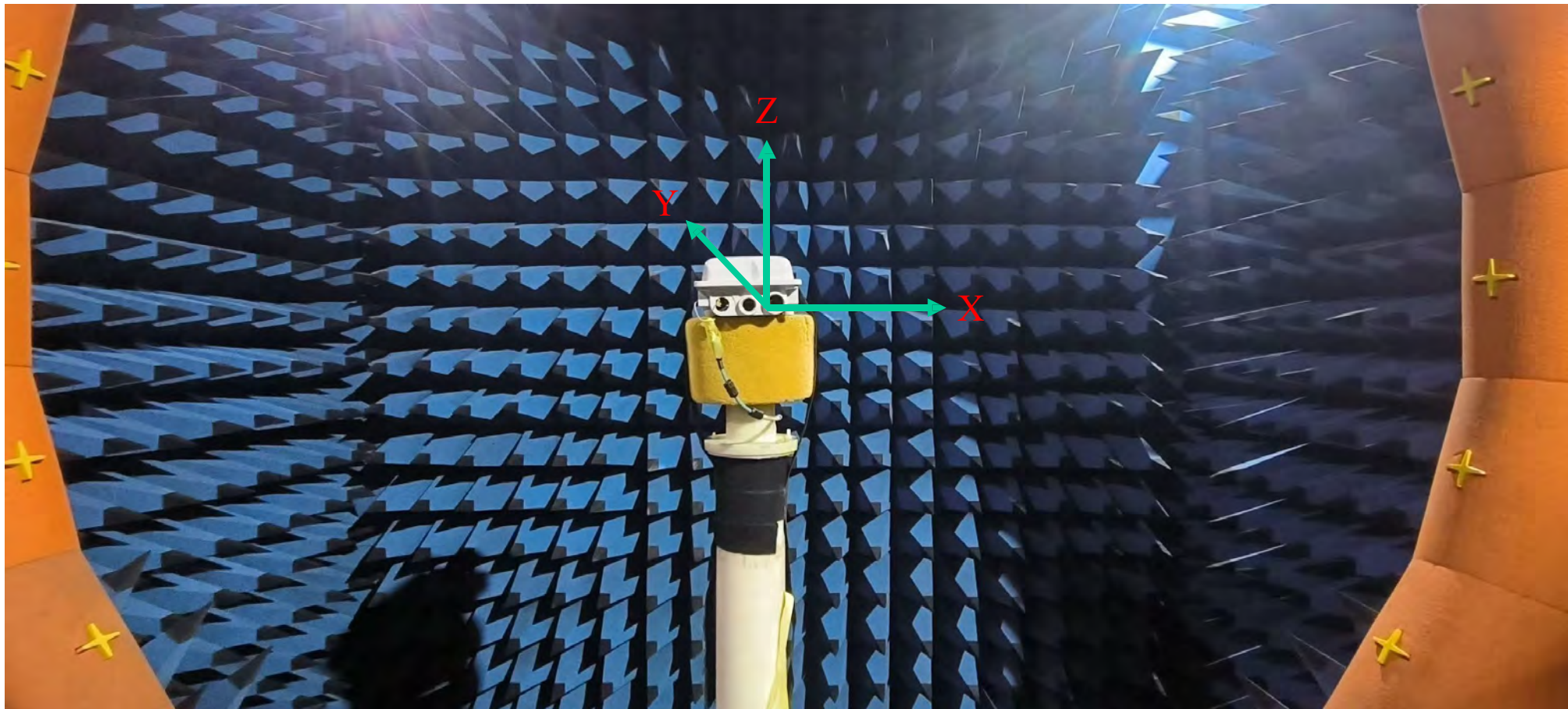


VSWR were performed using a keysight S-parameter Network Analyzer.

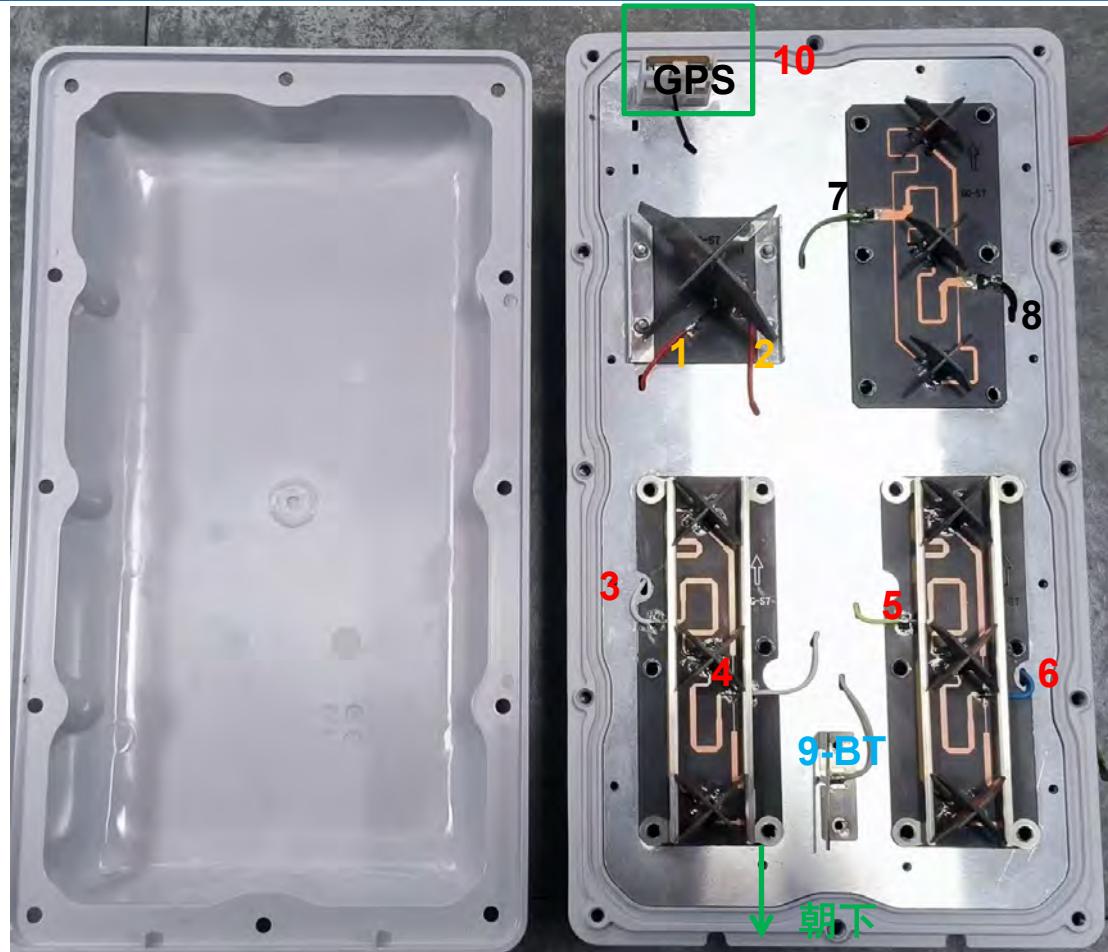


E5071C

1. Benchmark

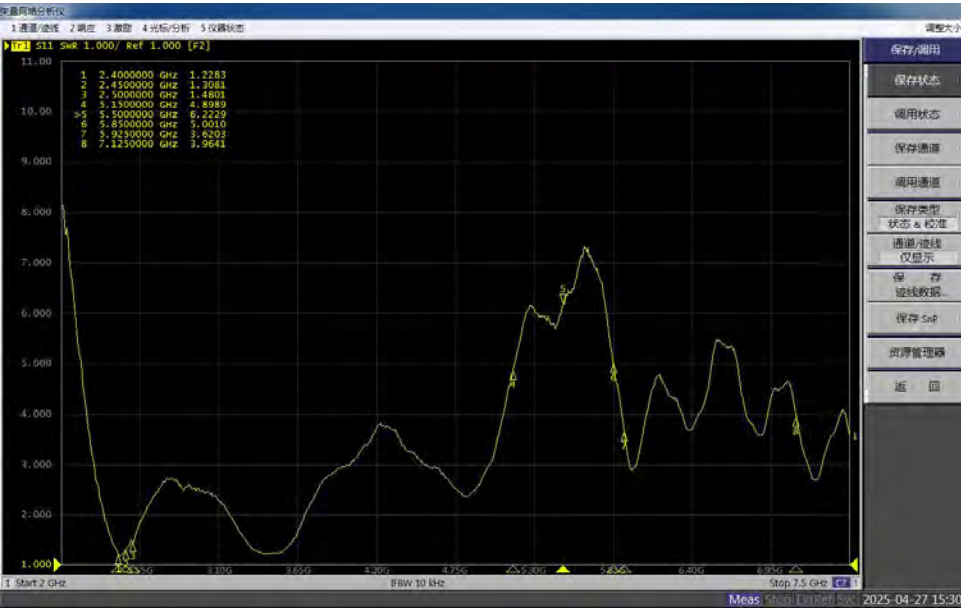


1. Benchmark

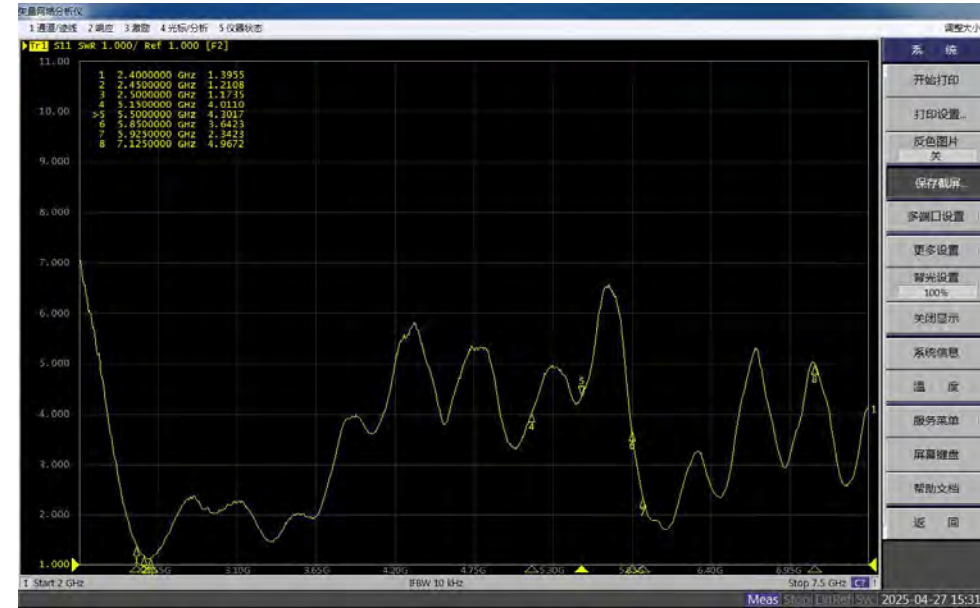


1/2/9: 2400-25000MHz
 3/4/5/6: 5150-5850MHz
 7/8: 5925-7125MHz
 10: 1575MHz
 极化: $\pm 45^\circ$

2. S-Parameters(VSWR)

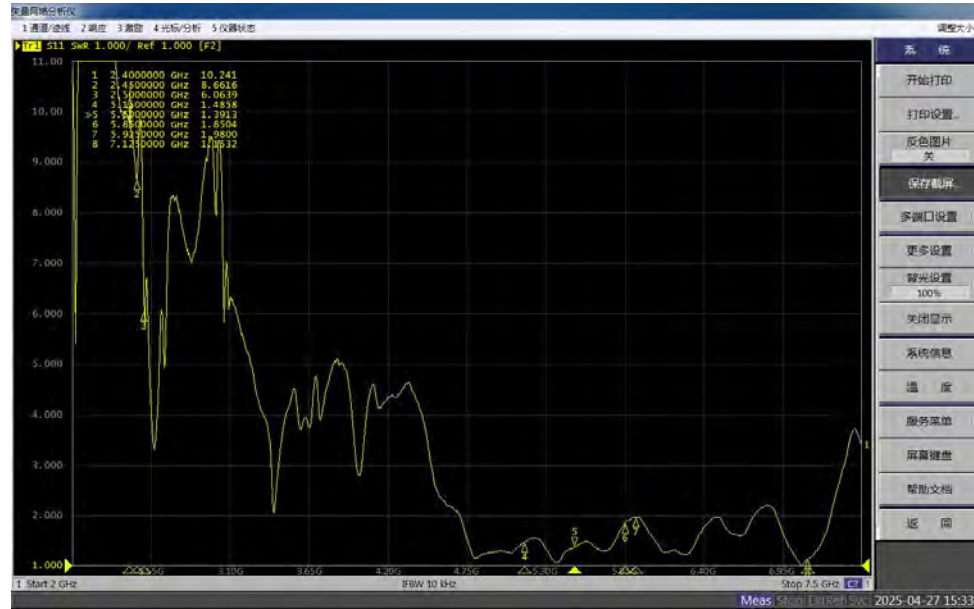


2G-1

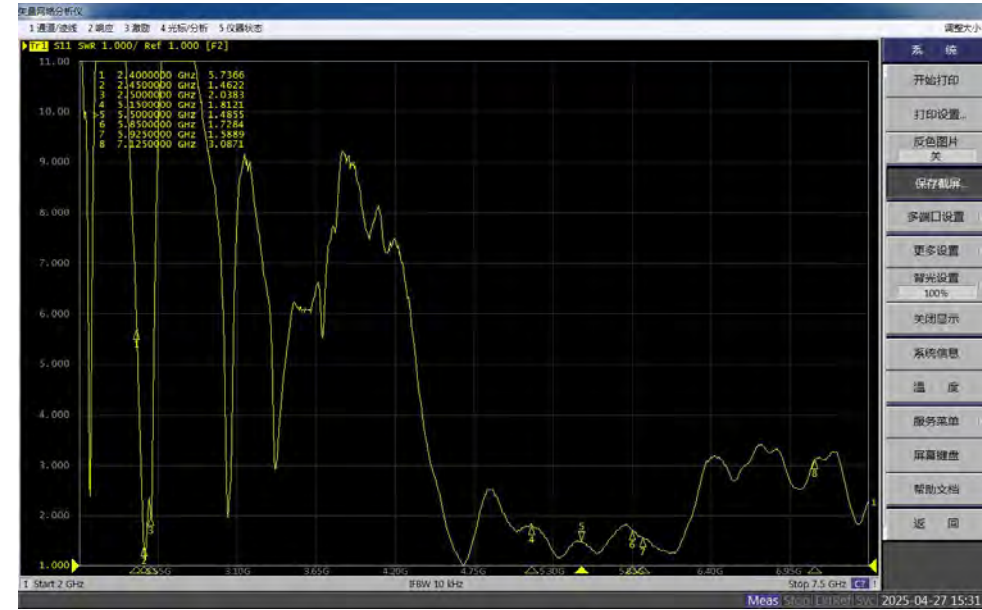


2G-2

2. S-Parameters(VSWR)

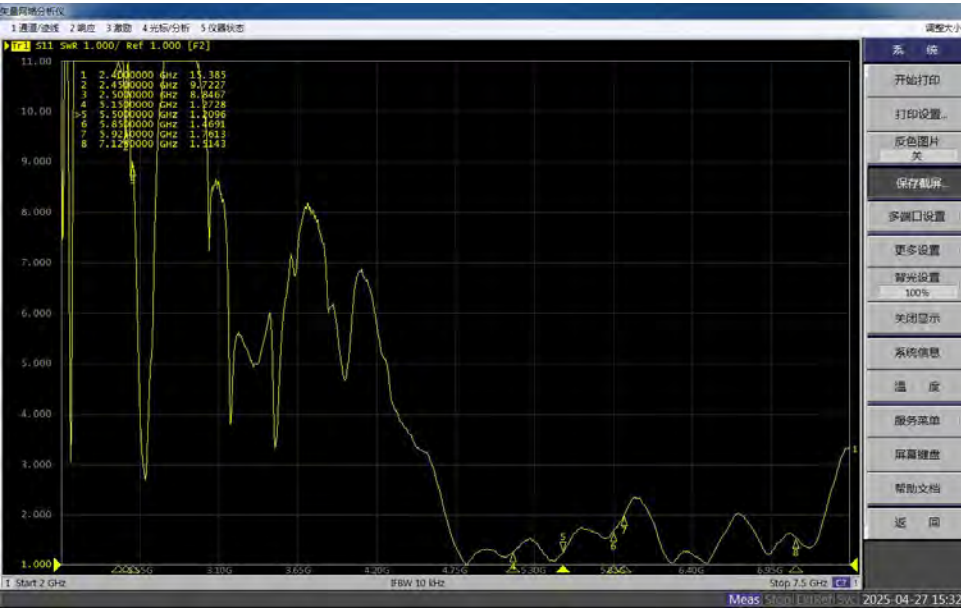


5G-3

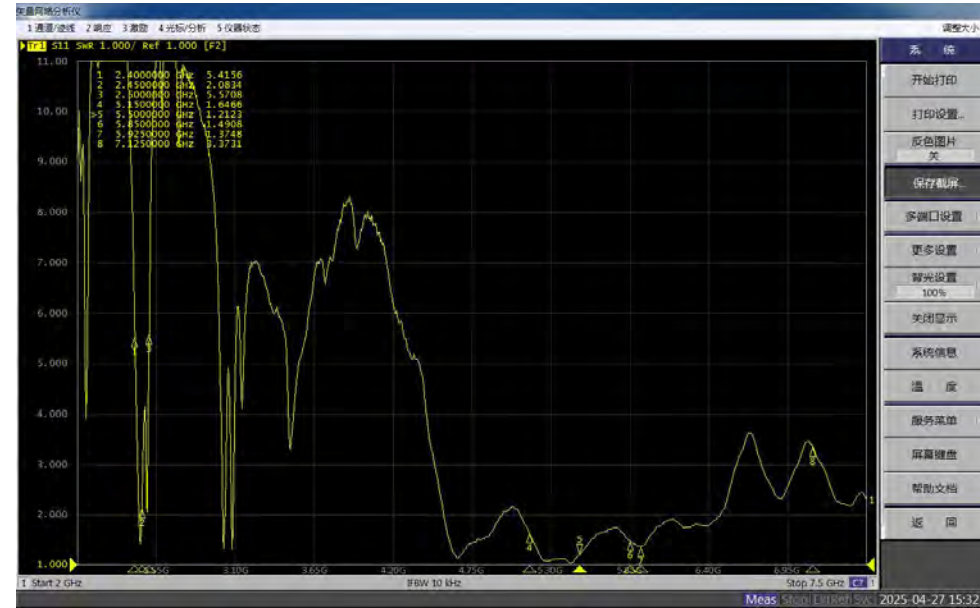


5G-4

2. S-Parameters(VSWR)



5G-5

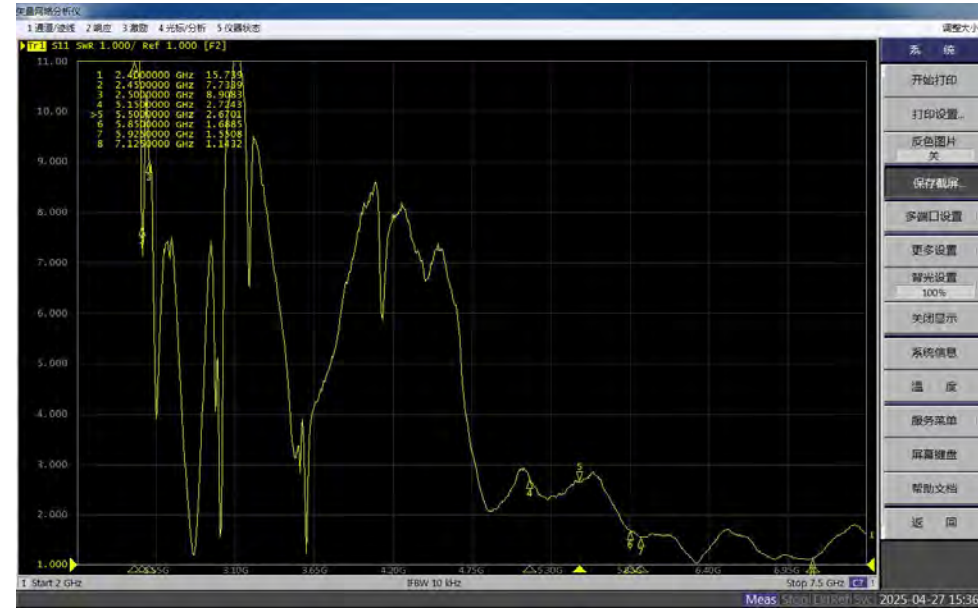


5G-6

2. S-Parameters(VSWR)



6G-7

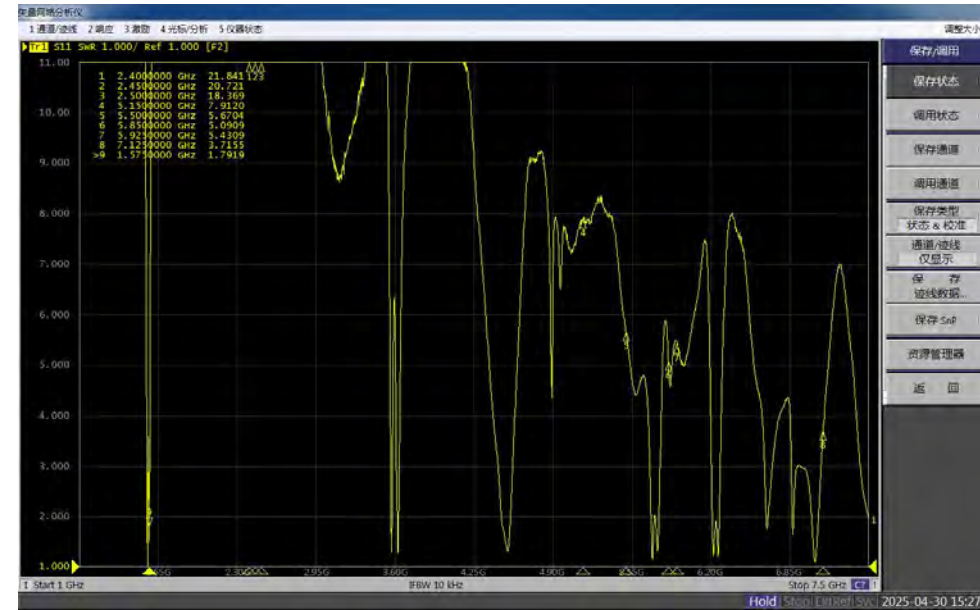


6G-8

2. S-Parameters(VSWR)



2G-9 BT



10 GPS

2. S-Parameters(isolation)



1&2



1&3

2. S-Parameters(isolation)

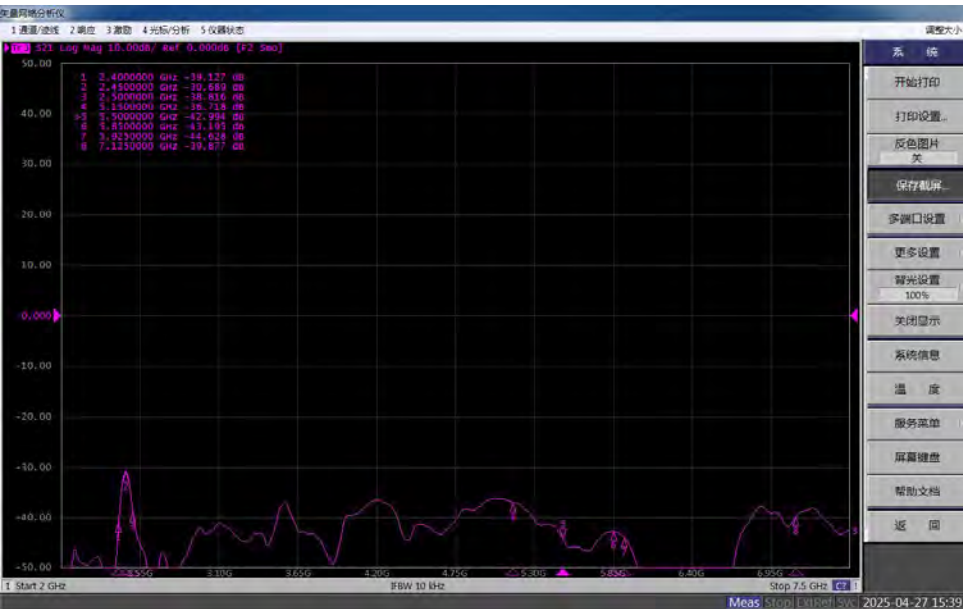


1&4



1&5

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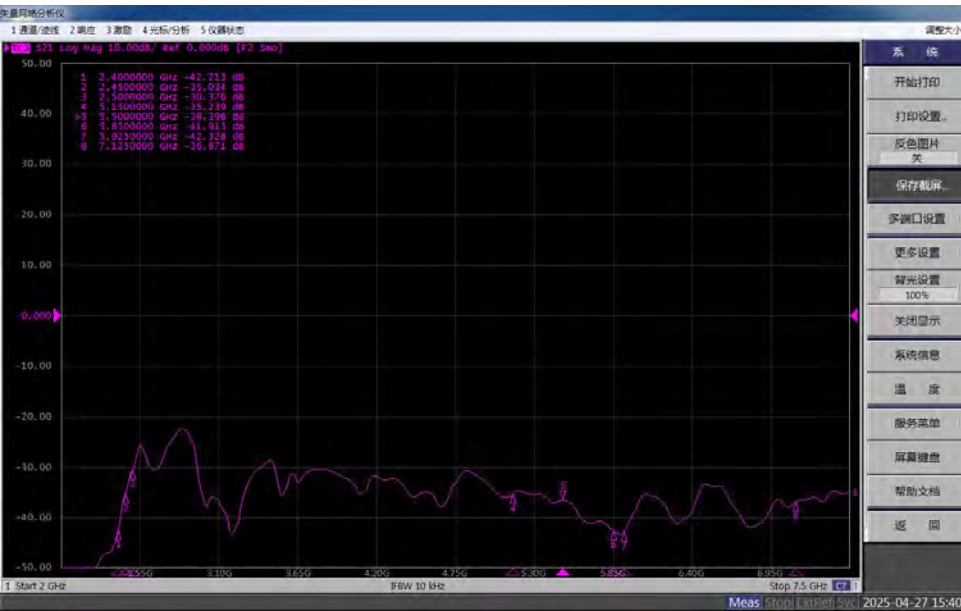


1&6



1&7

2. S-Parameters(isolation)



1&8



1&9

2. S-Parameters(isolation)

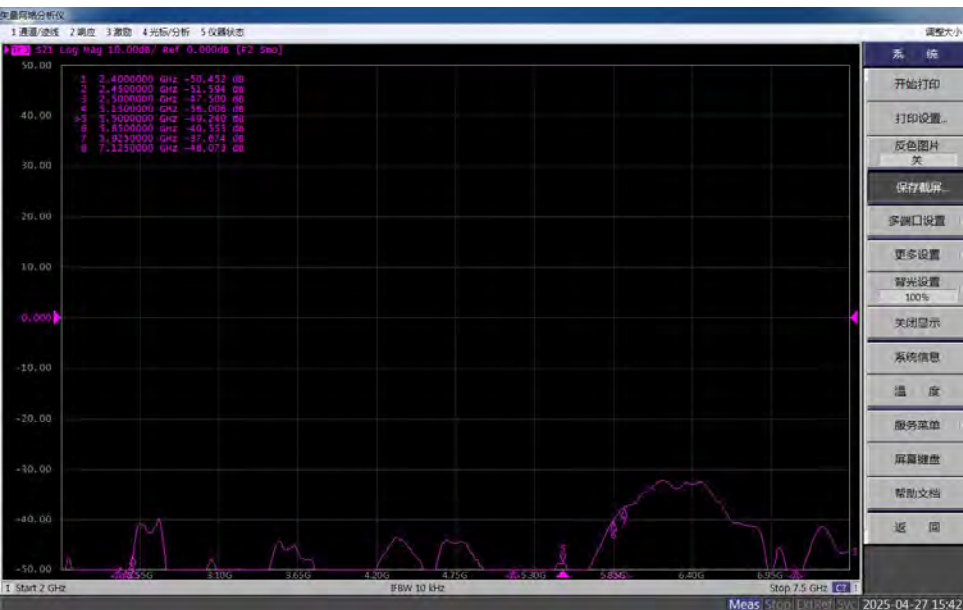


2&3



2&4

2. S-Parameters(isolation)



2&5

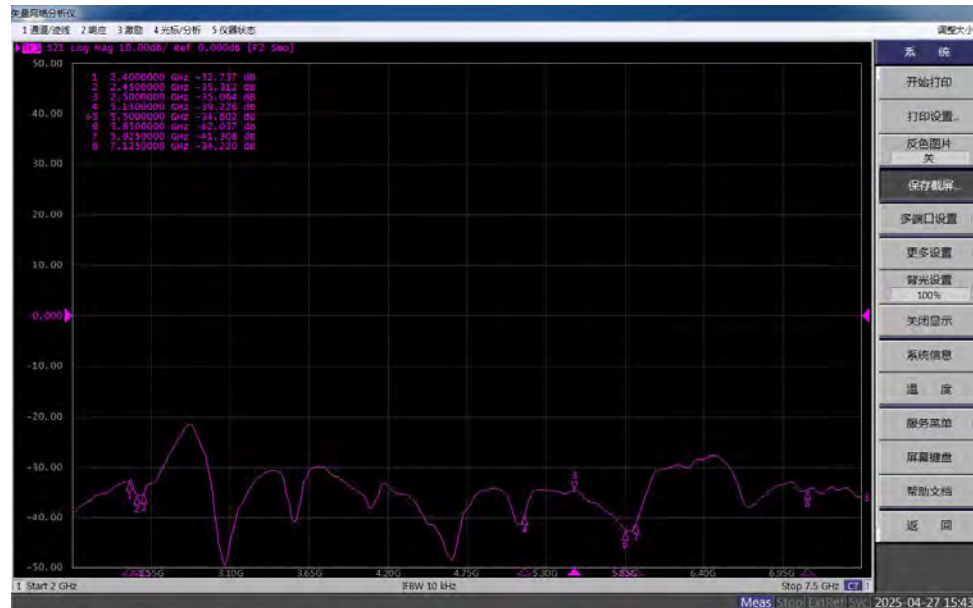


2&6

2. S-Parameters(isolation)



2&7



2&8

2. S-Parameters(isolation)



2&9



3&4

2. S-Parameters(isolation)

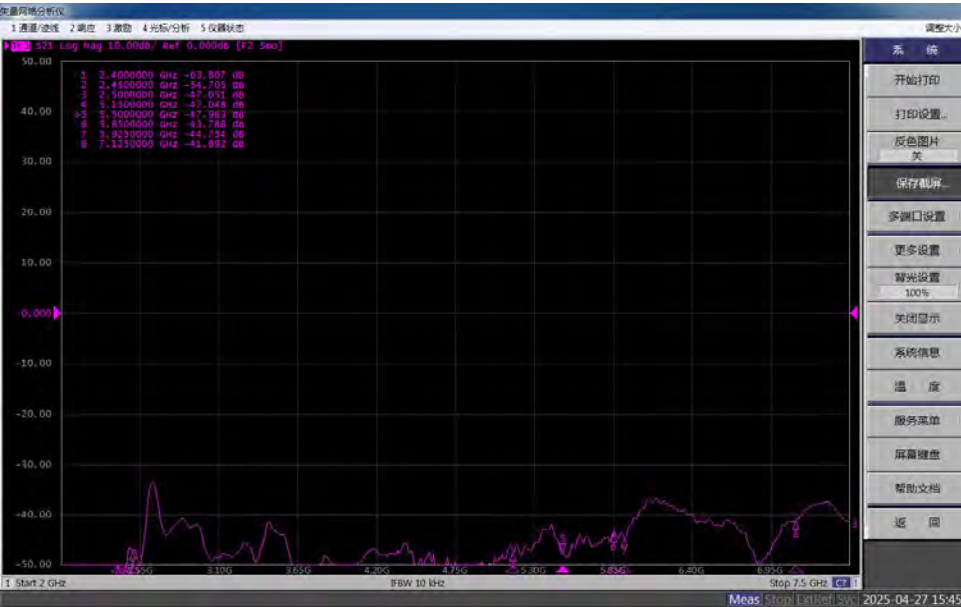


3&5

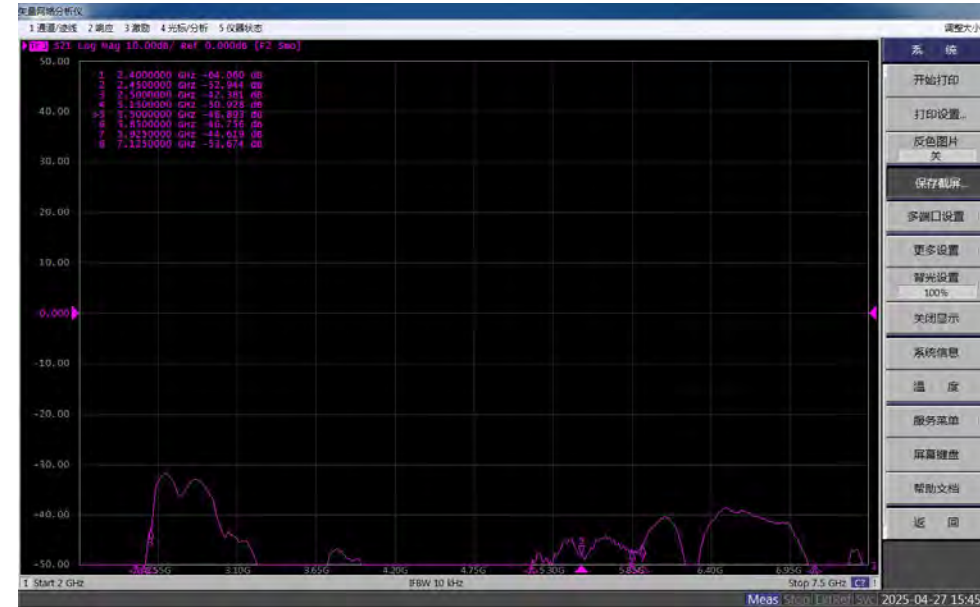


3&6

2. S-Parameters(isolation)



3&7



3&8

2. S-Parameters(isolation)



3&9

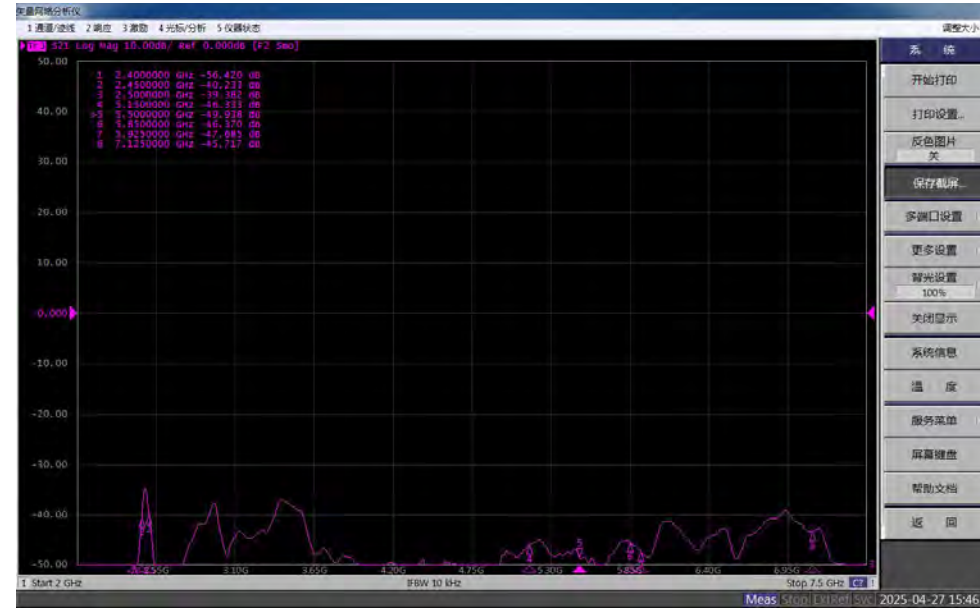


4&5

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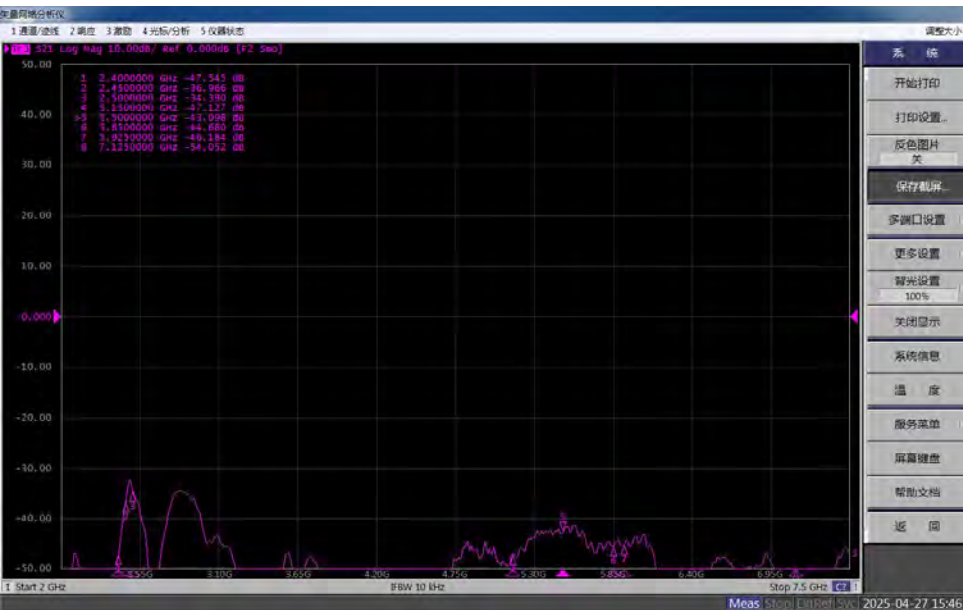


4&6



4&7

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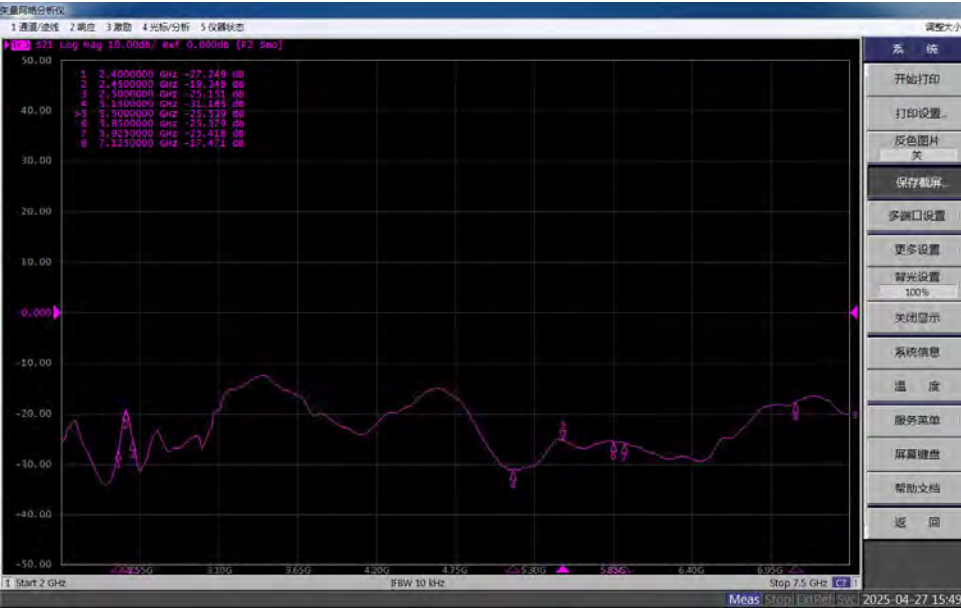


4&8



4&9

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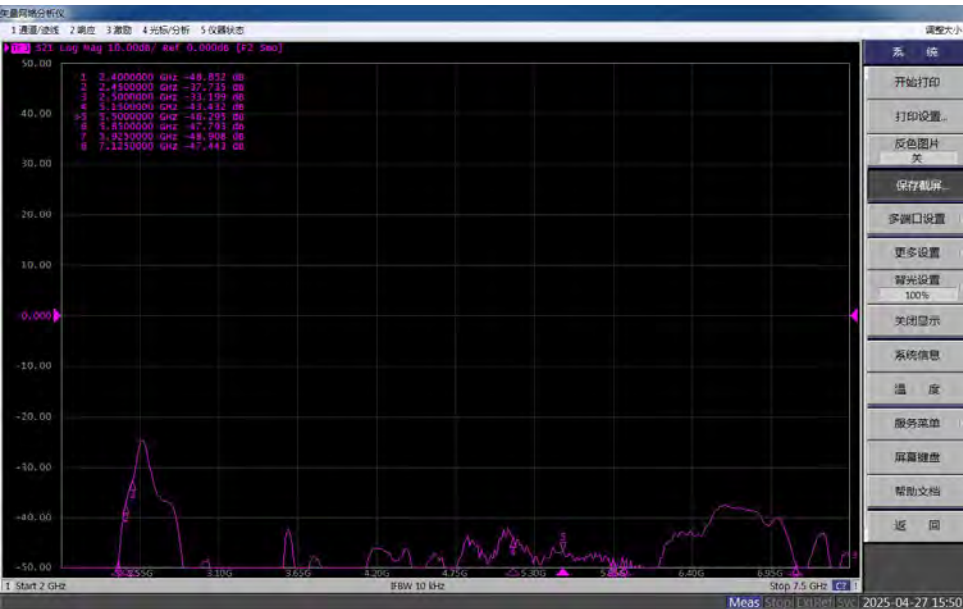


5&6



5&7

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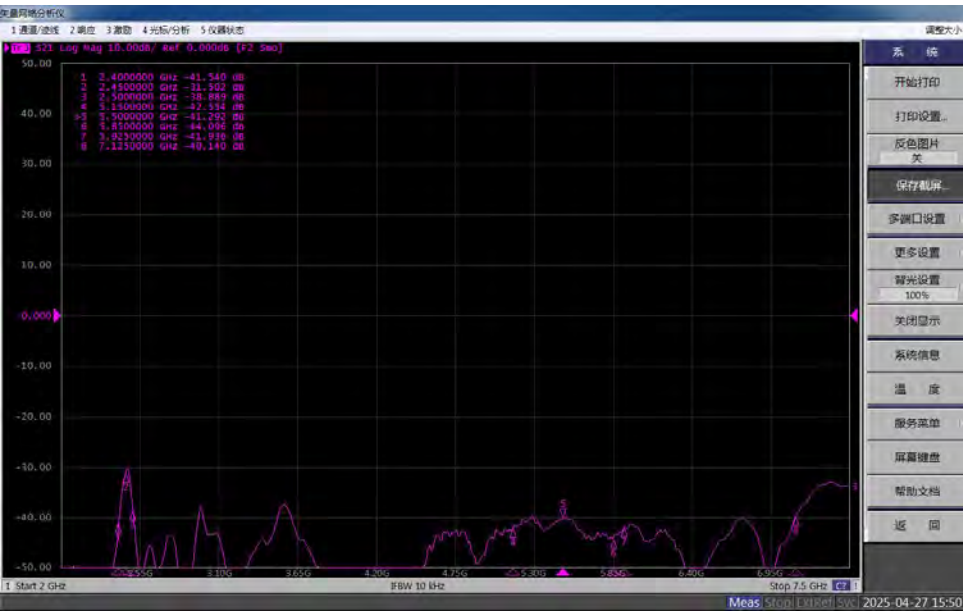


5&8



5&9

2. S-Parameters(isolation)



6&7



6&8

2. S-Parameters(isolation)



6&9



7&8

2. S-Parameters(isolation)

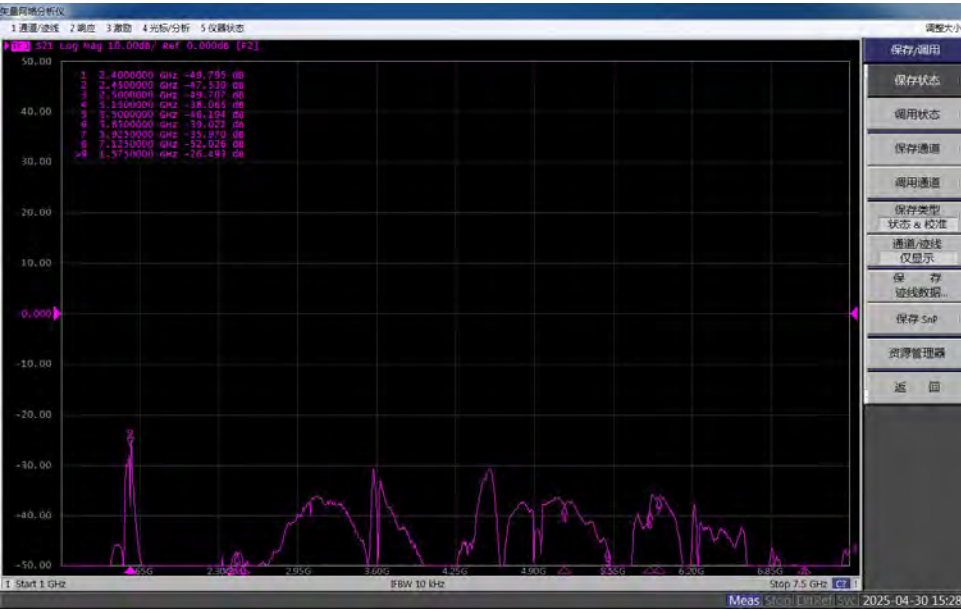


7&9

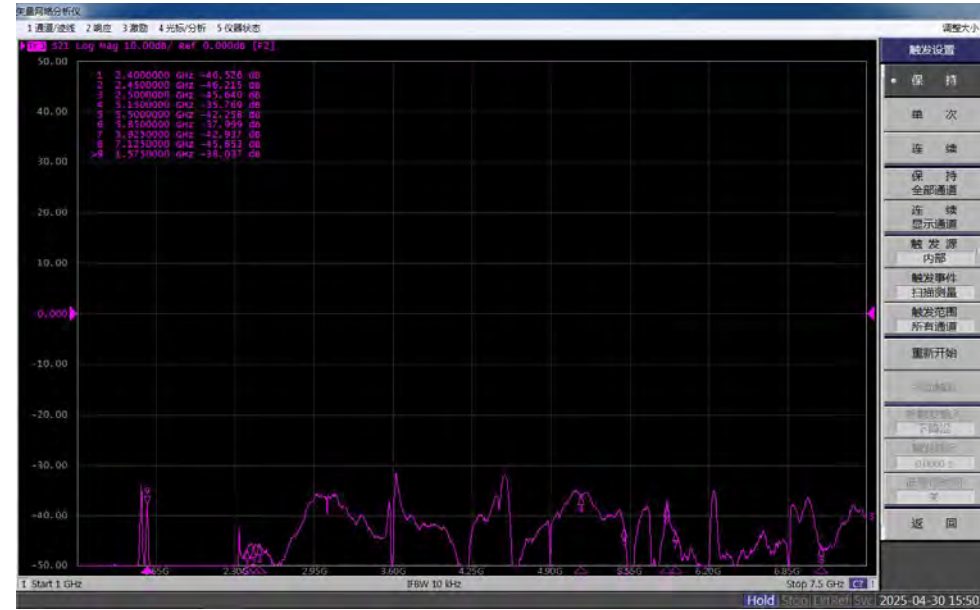


8&9

2. S-Parameters(isolation)



1&10



2&10

2. S-Parameters(isolation)



3&10



4&10

2. S-Parameters(isolation)

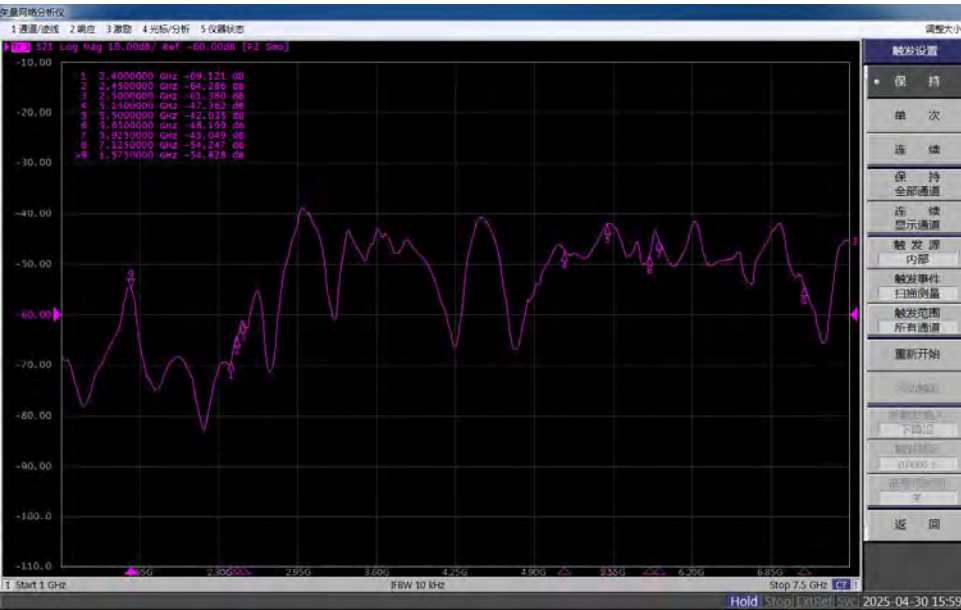


5&10



6&10

2. S-Parameters(isolation)



7&10



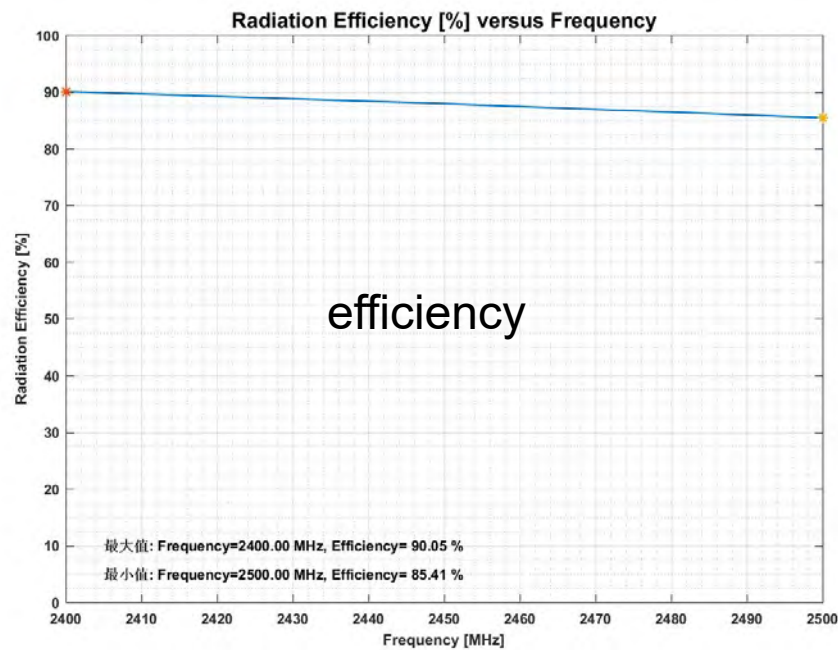
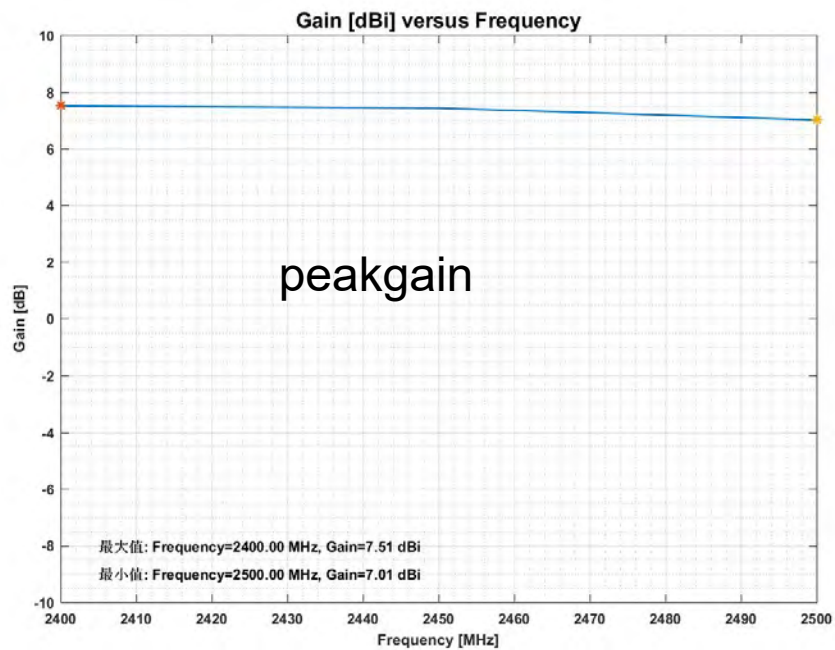
8&10

2. S-Parameters(isolation)

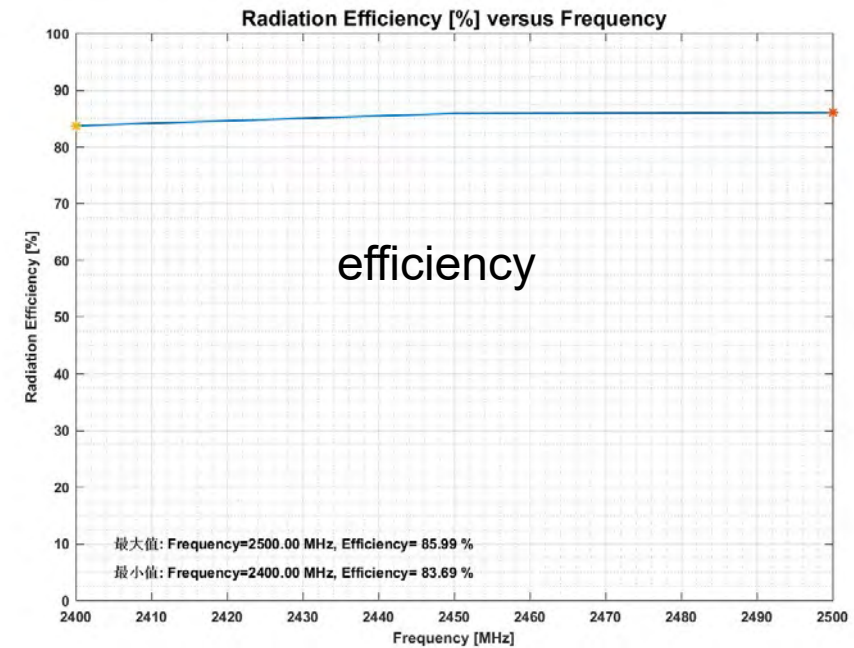
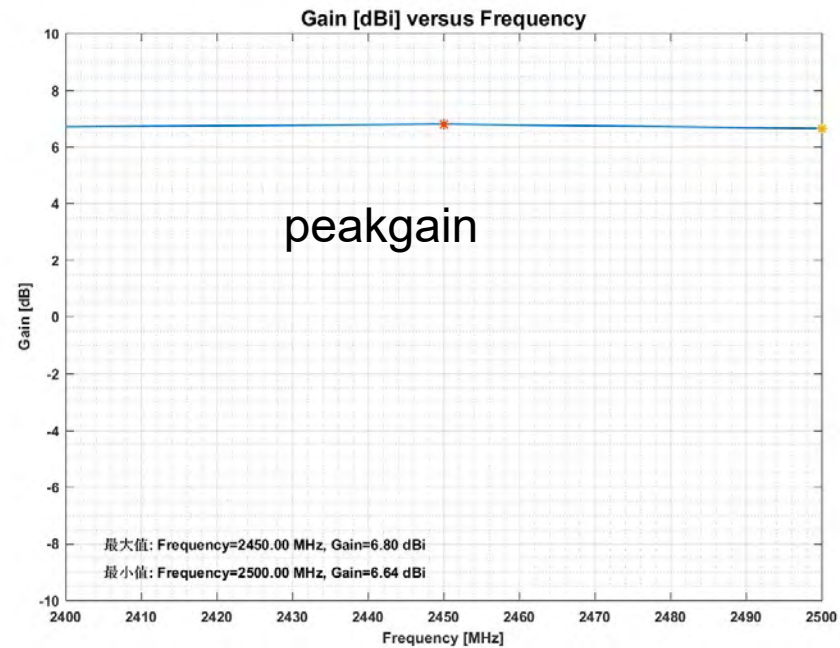


9&10

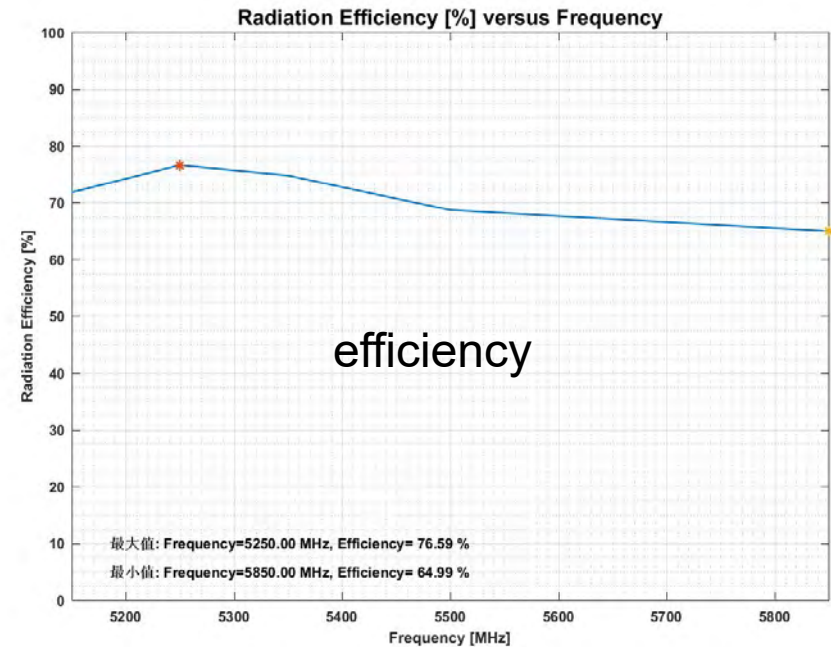
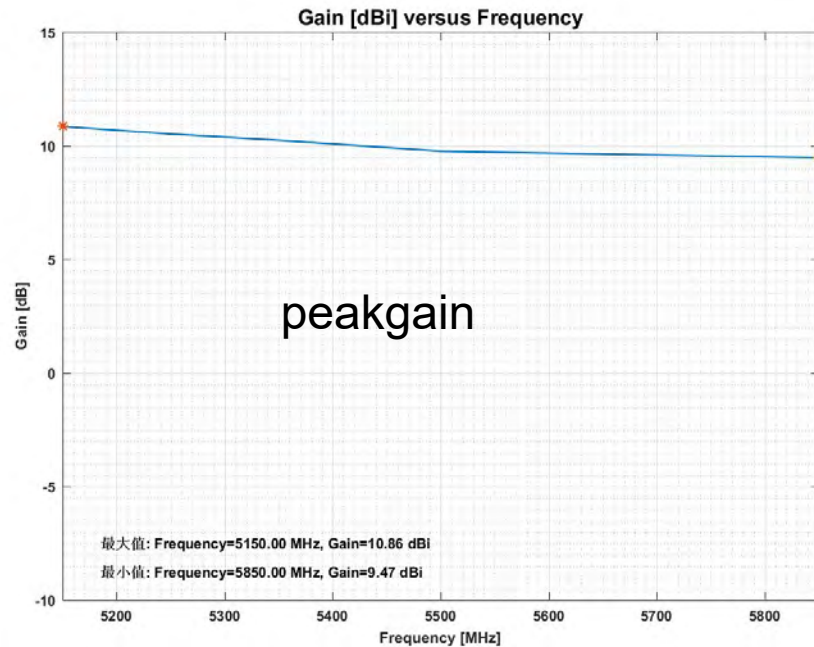
3. Antenna Efficiency& Peak Gain(2G-1)



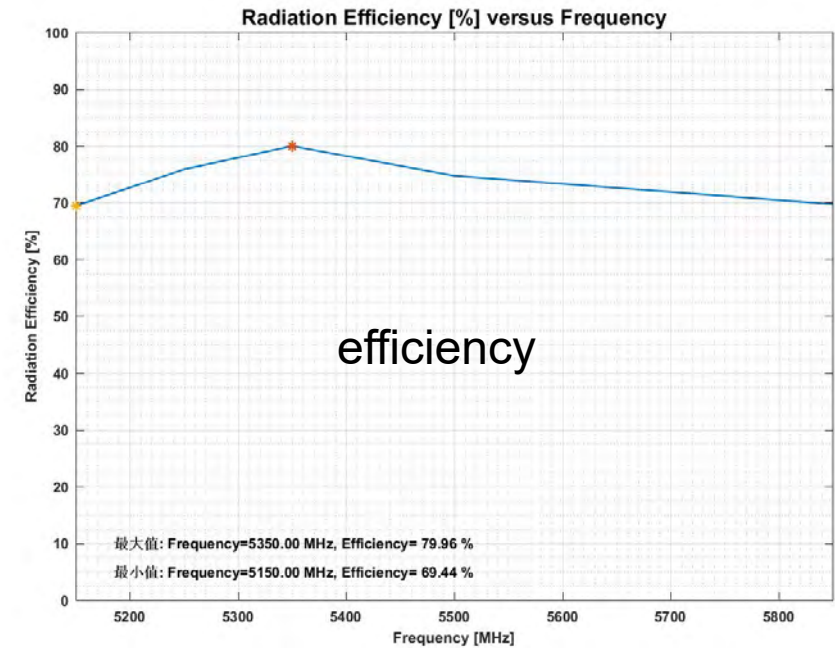
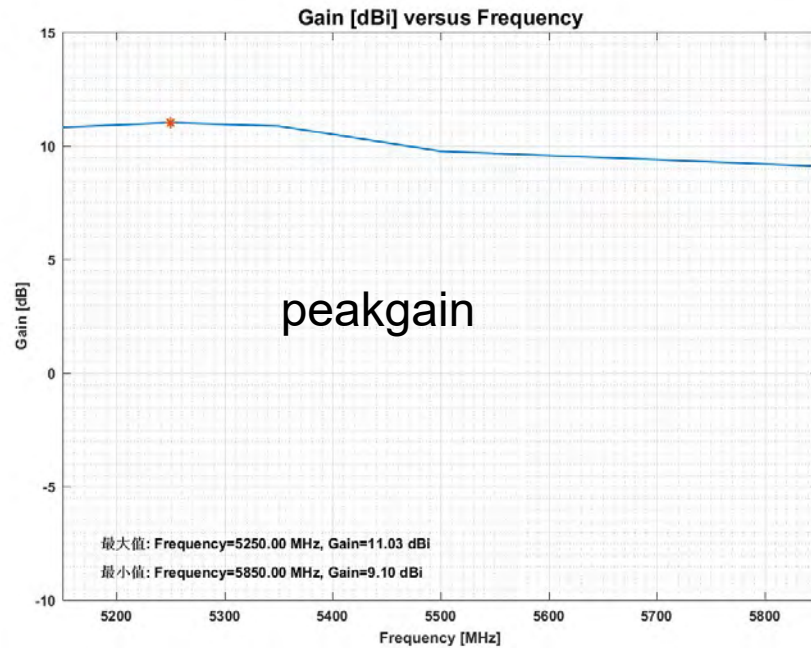
3. Antenna Efficiency& Peak Gain(2G-2)



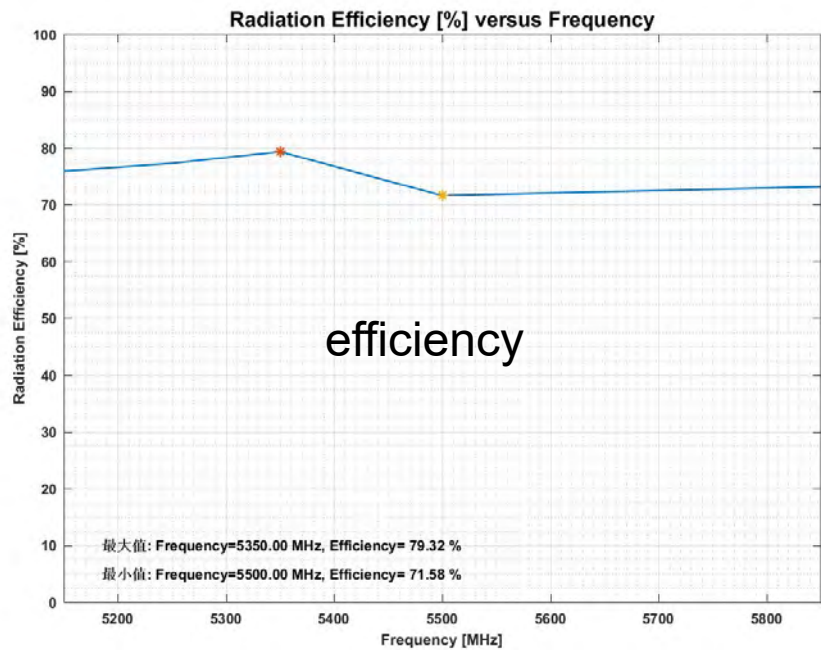
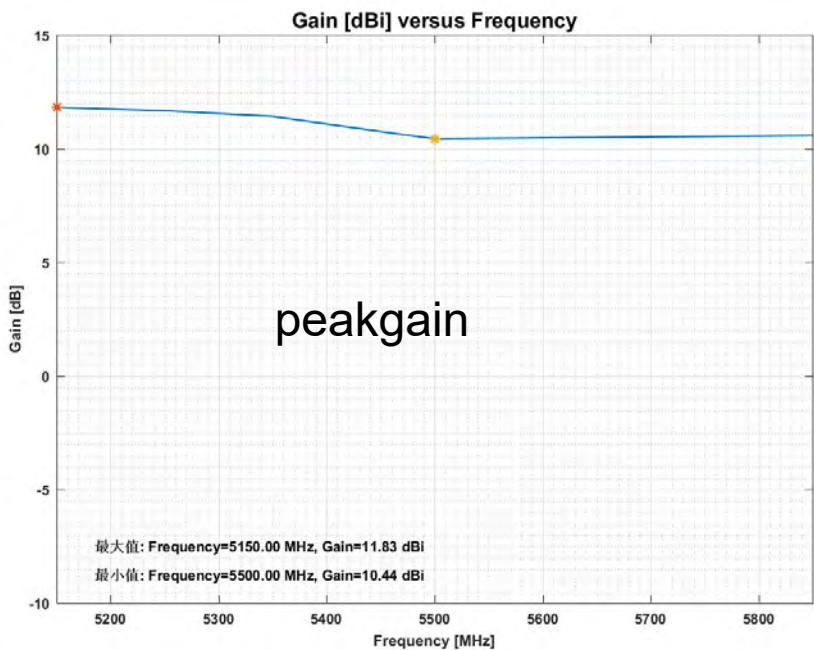
3. Antenna Efficiency & Peak Gain (5G-3)



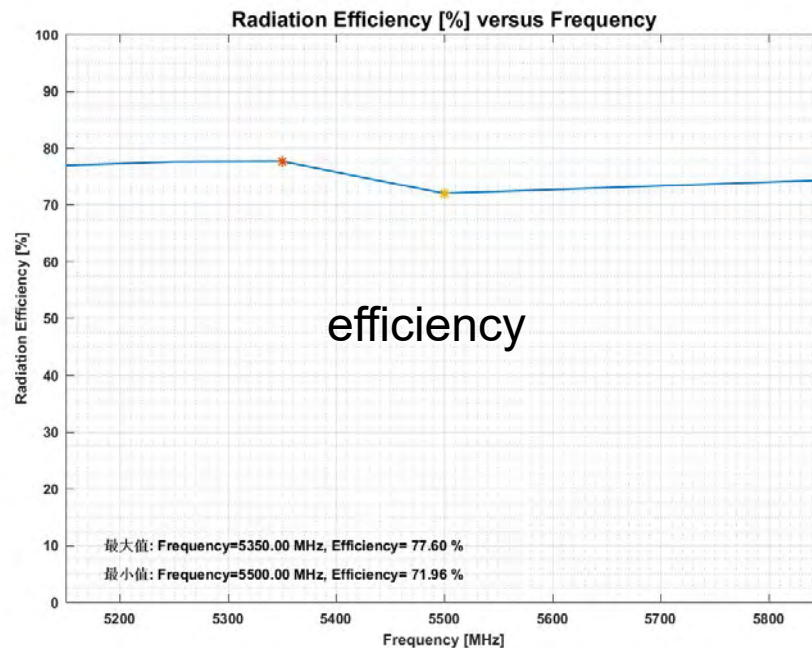
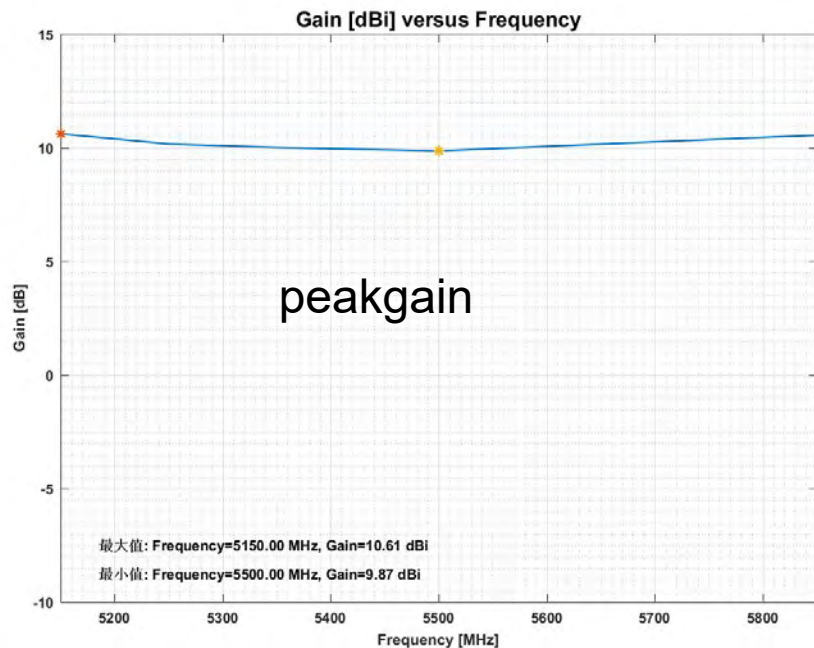
3. Antenna Efficiency& Peak Gain(5G-4)



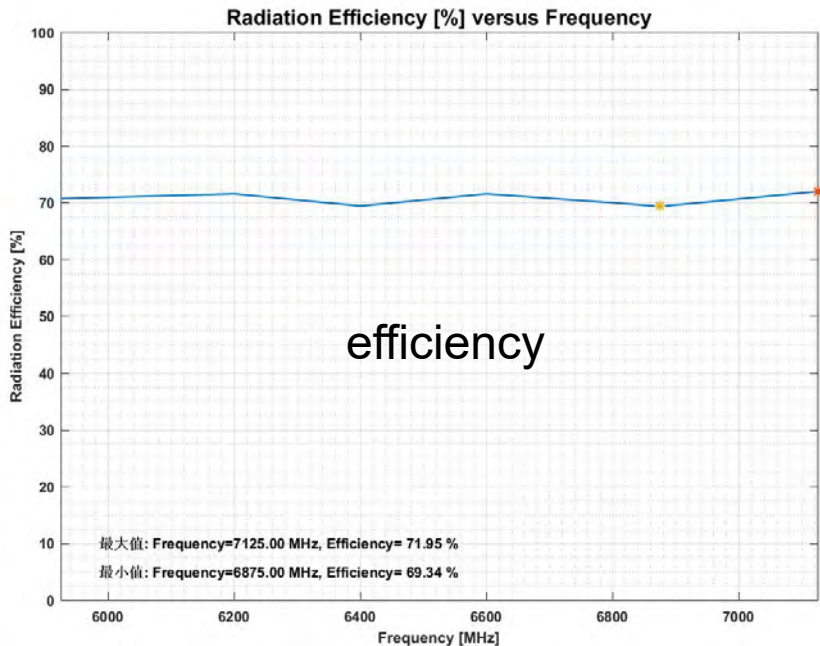
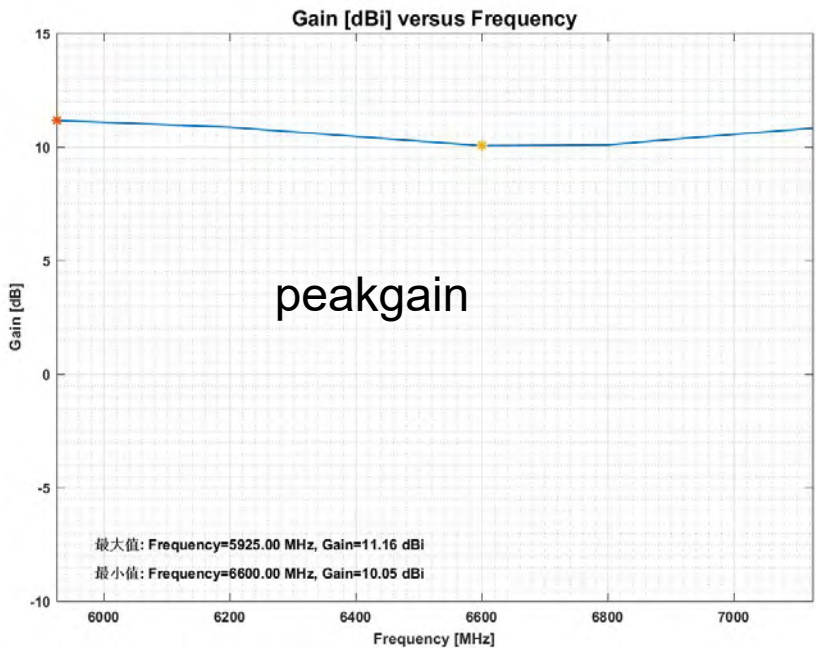
3. Antenna Efficiency& Peak Gain(5G-5)



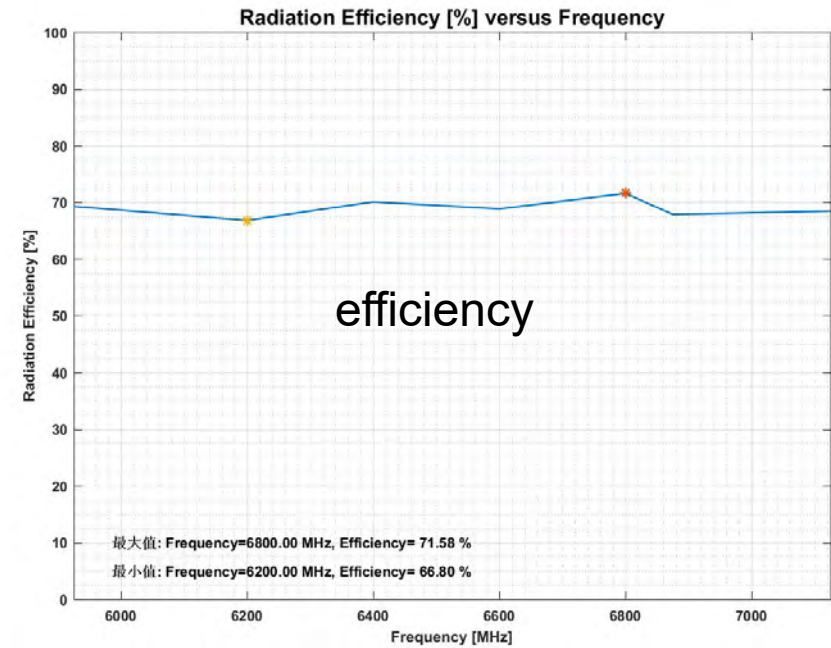
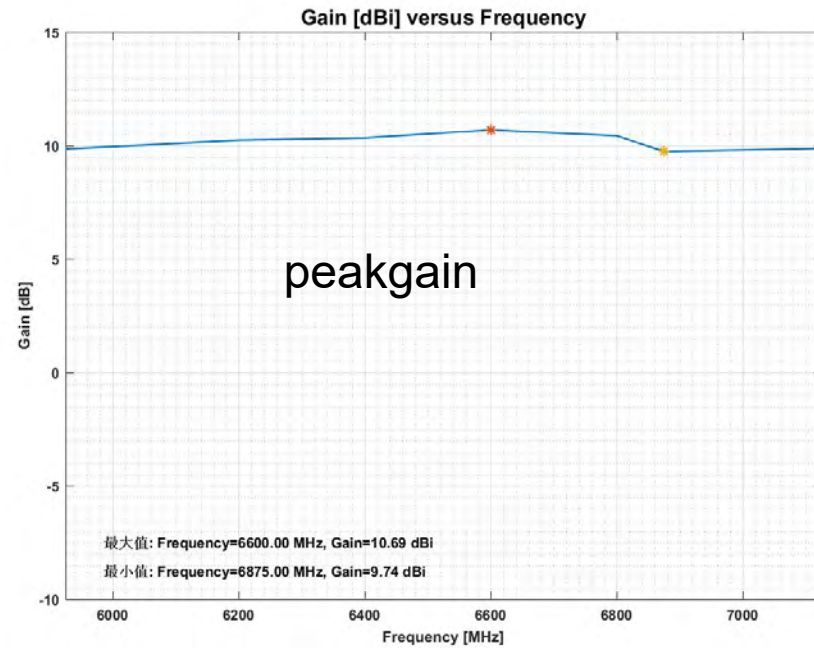
3. Antenna Efficiency& Peak Gain(5G-6)



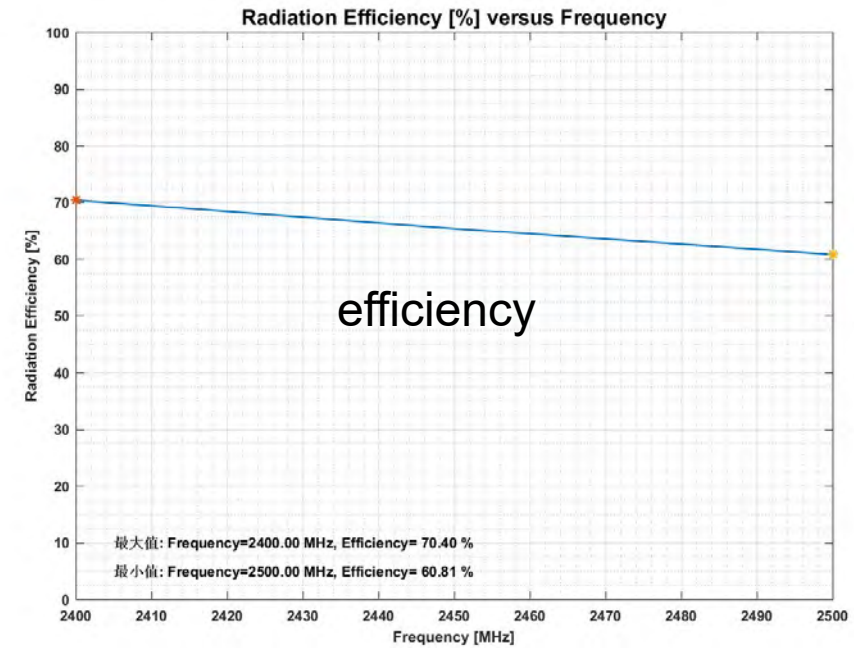
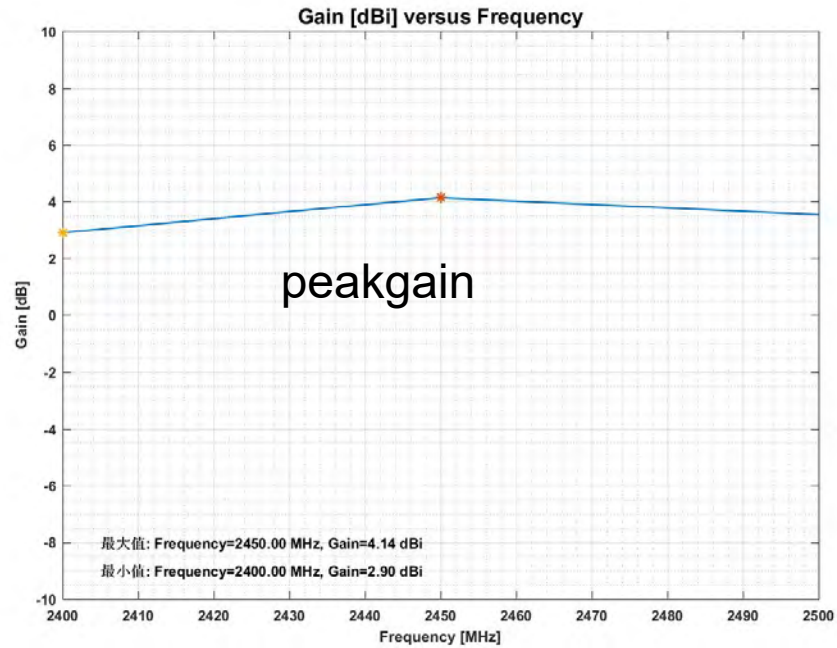
3. Antenna Efficiency& Peak Gain(6G-7)



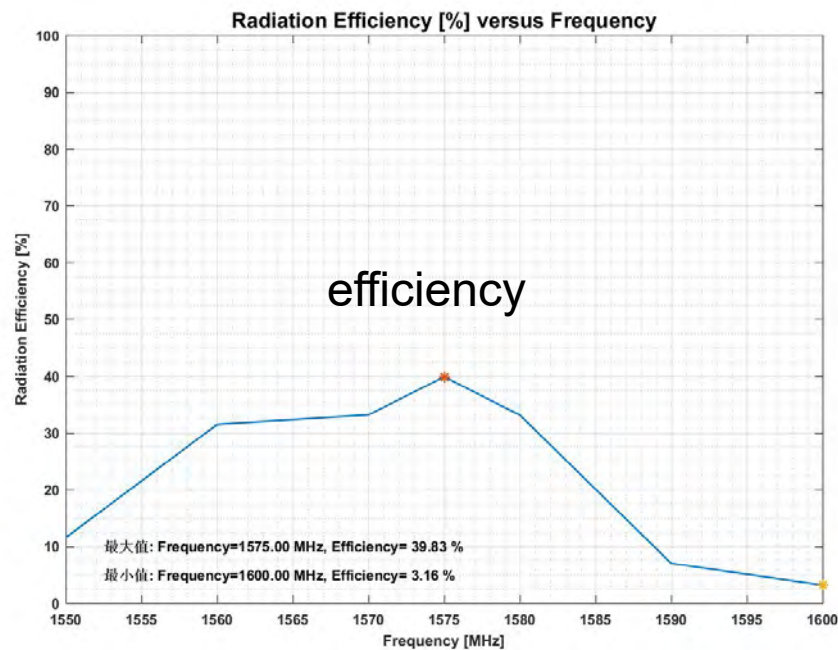
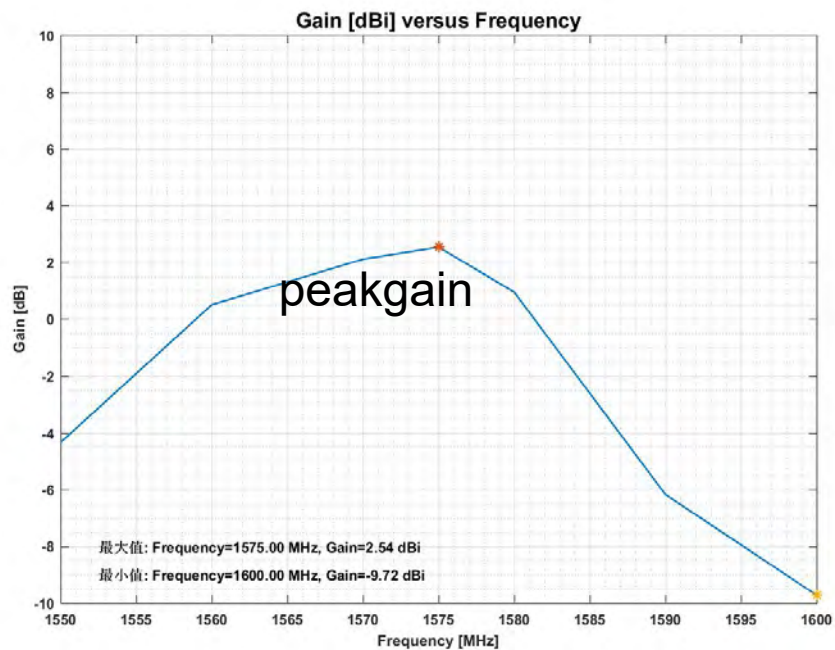
3. Antenna Efficiency & Peak Gain (6G-8)



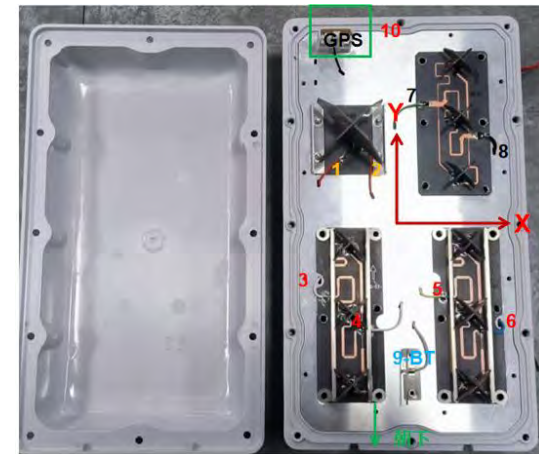
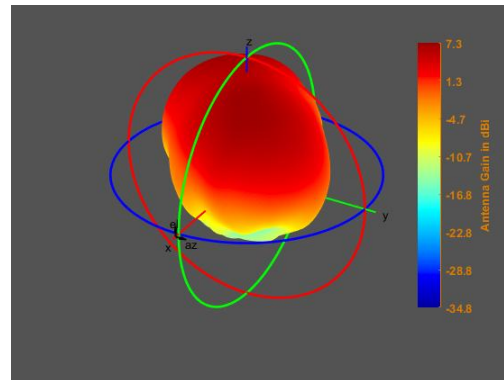
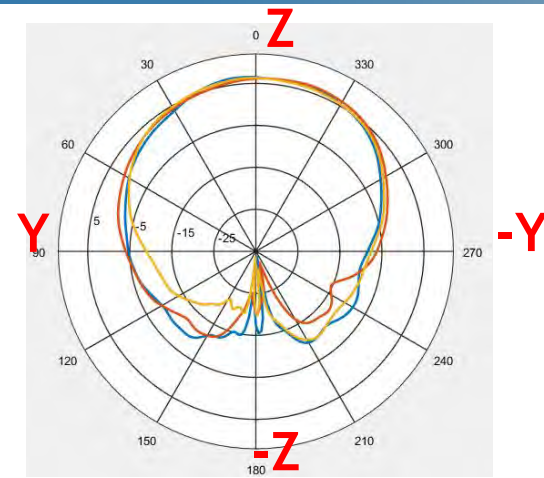
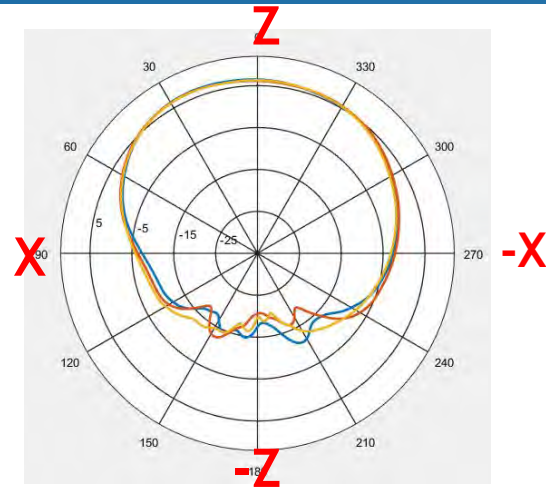
3. Antenna Efficiency& Peak Gain(BT-9)



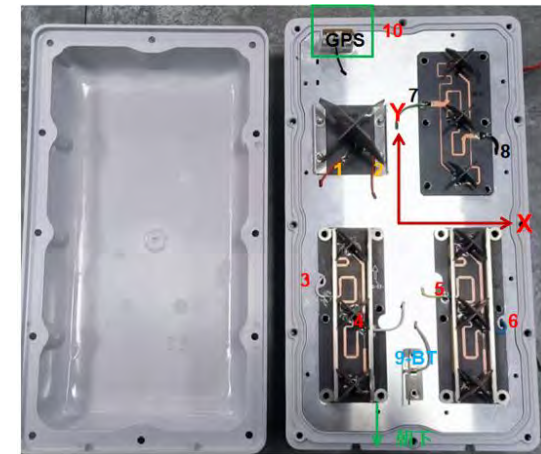
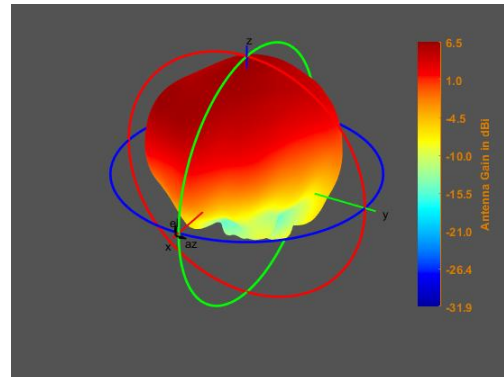
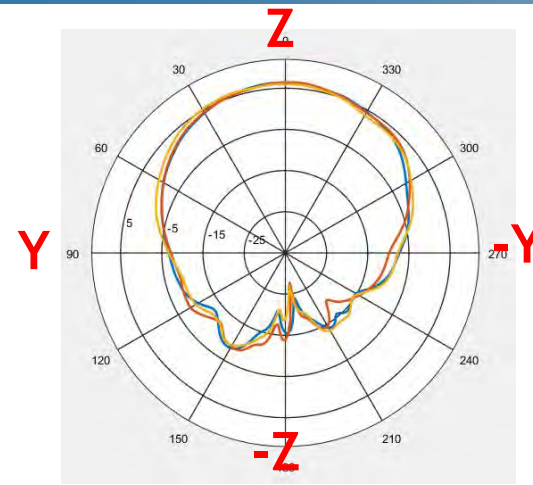
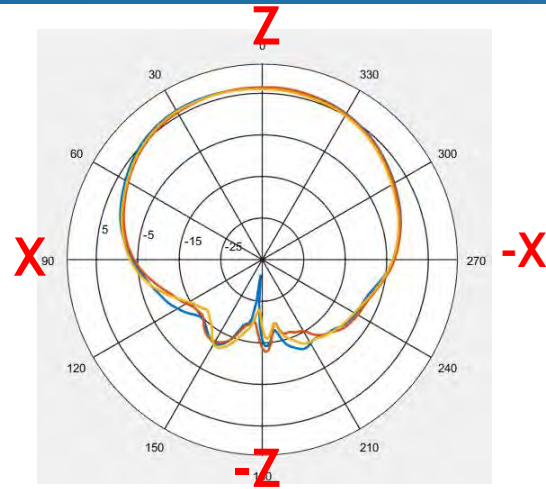
3. Antenna Efficiency& Peak Gain(gps-10)



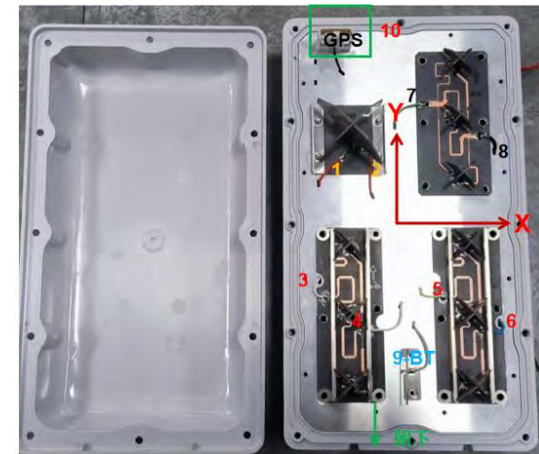
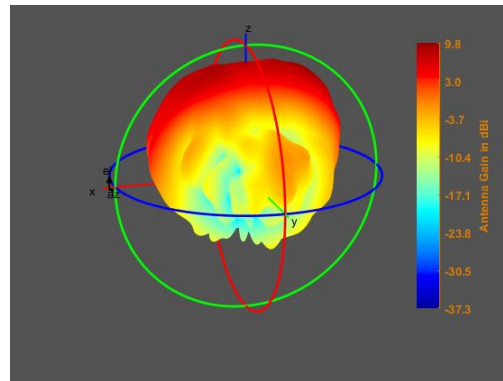
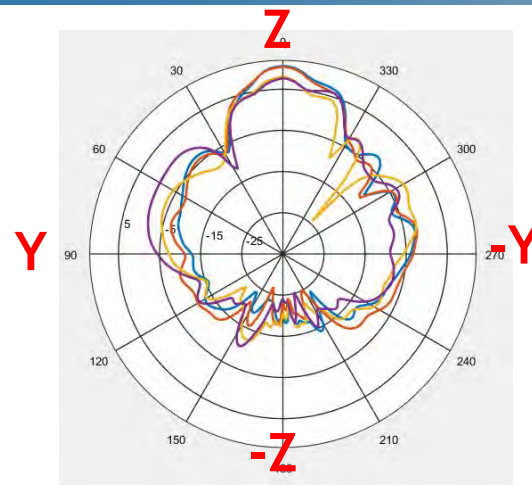
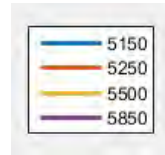
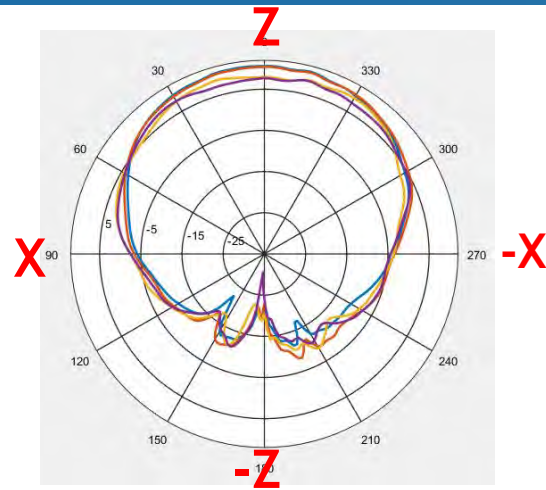
4. Radiation patterns (1-2G)



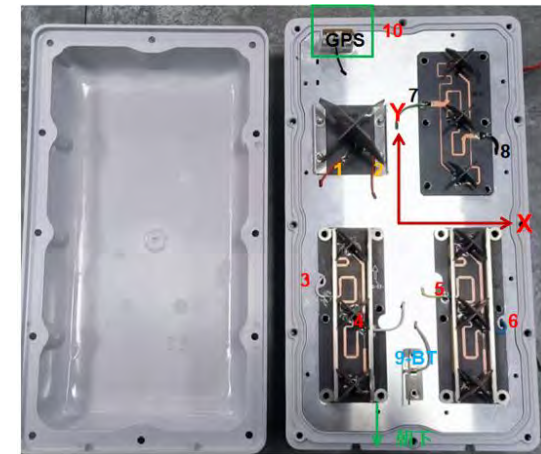
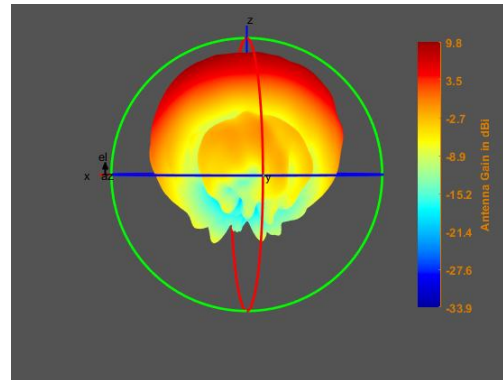
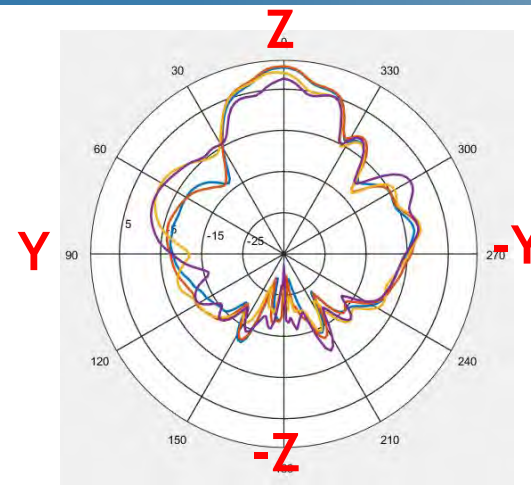
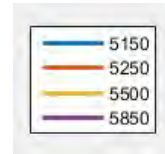
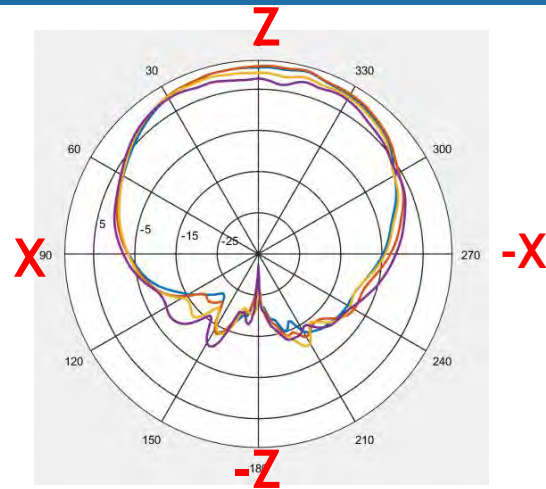
4. Radiation patterns (2-2G)



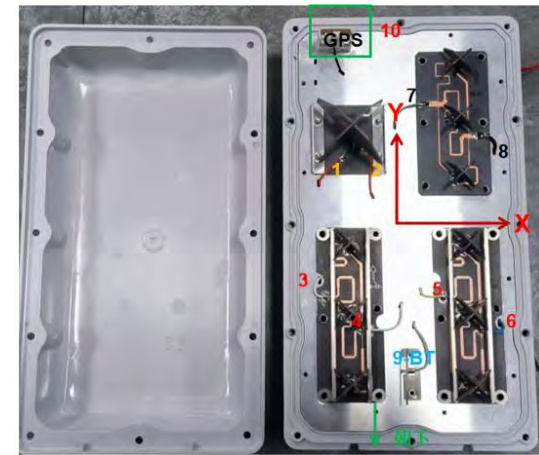
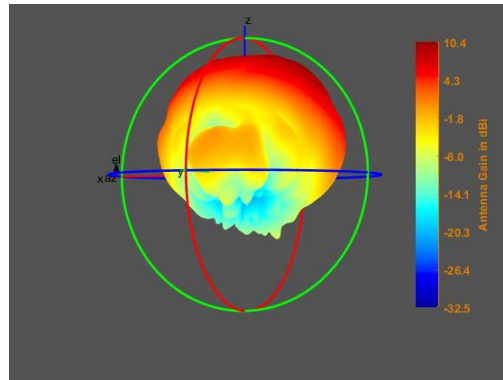
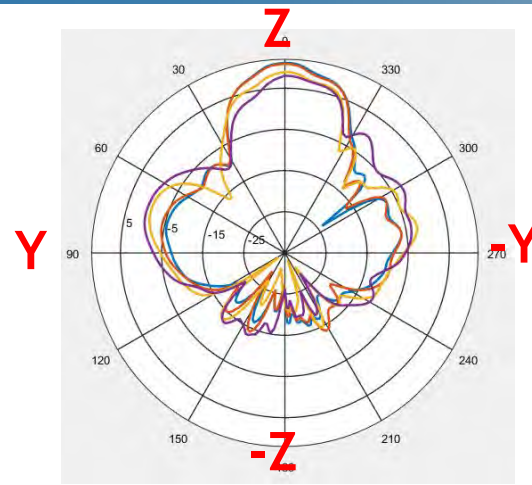
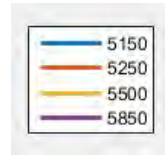
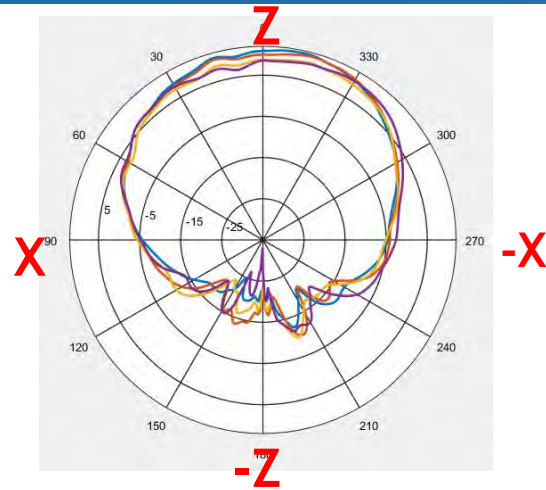
4. Radiation patterns (3-5G)



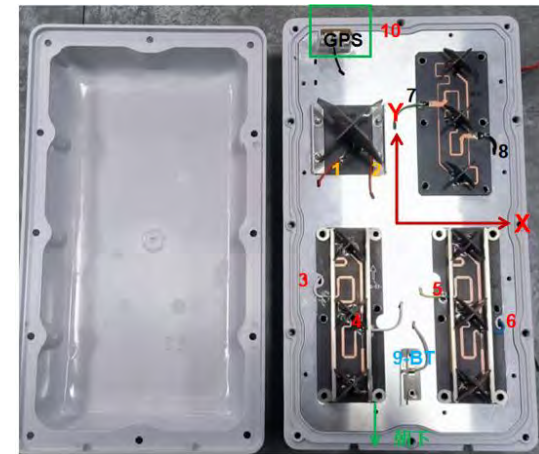
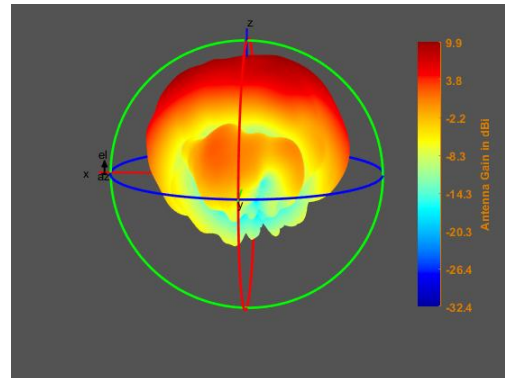
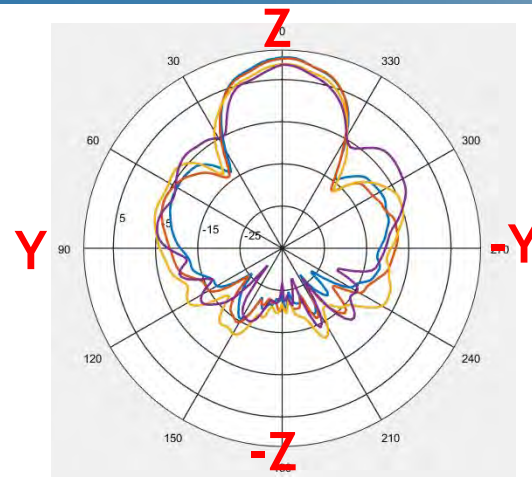
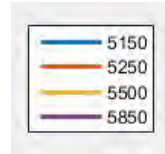
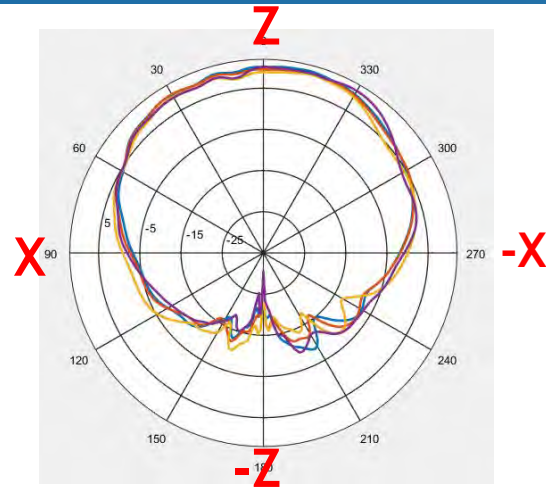
4. Radiation patterns (4-5G)

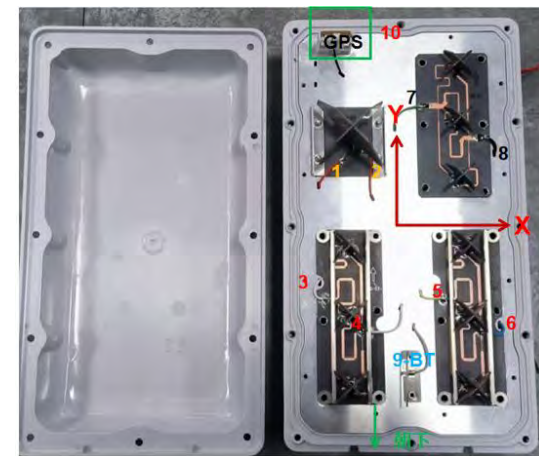
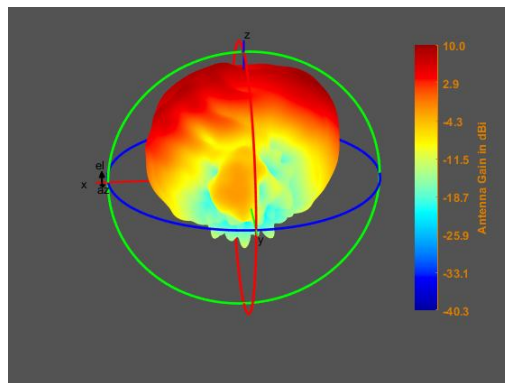
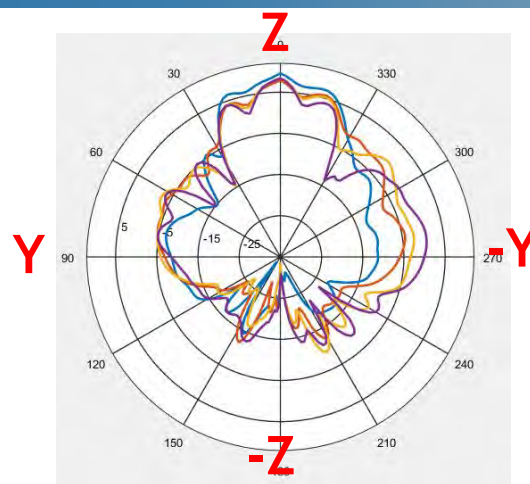


4. Radiation patterns (5-5G)

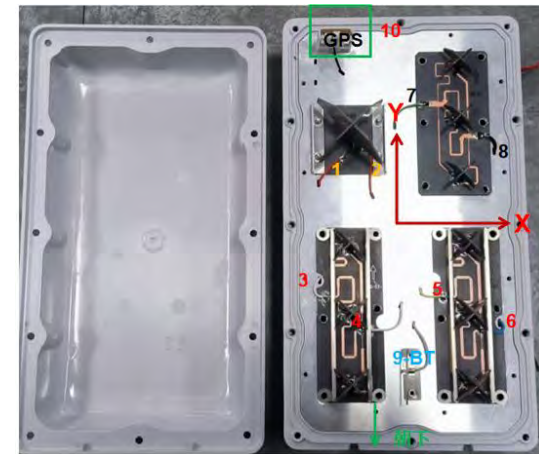
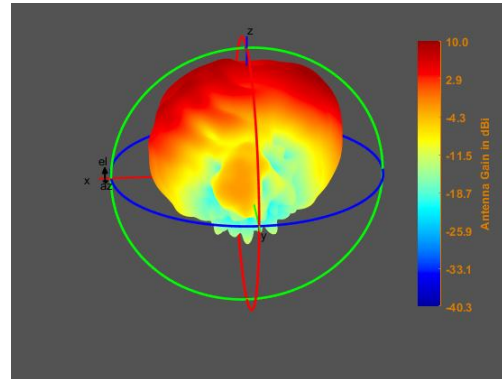
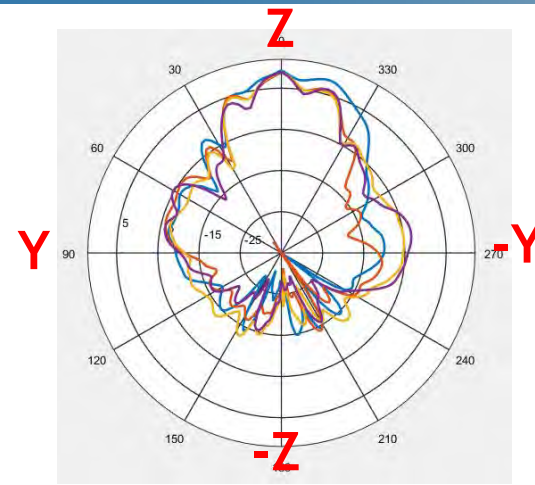
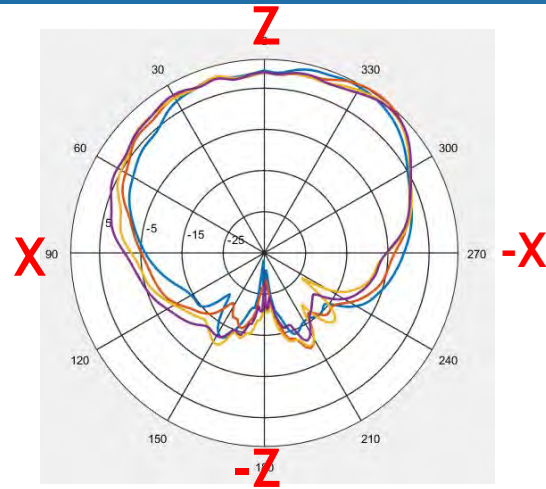


4. Radiation patterns (6-5G)

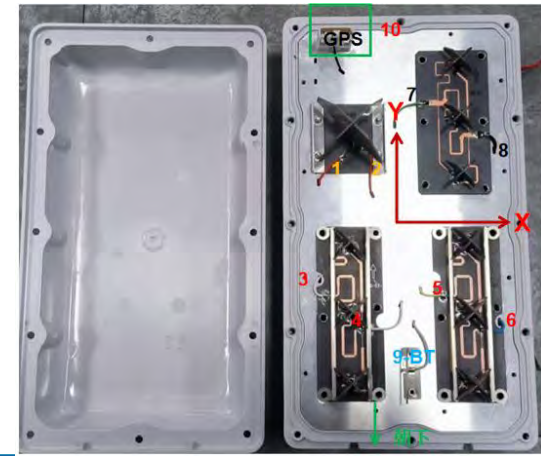
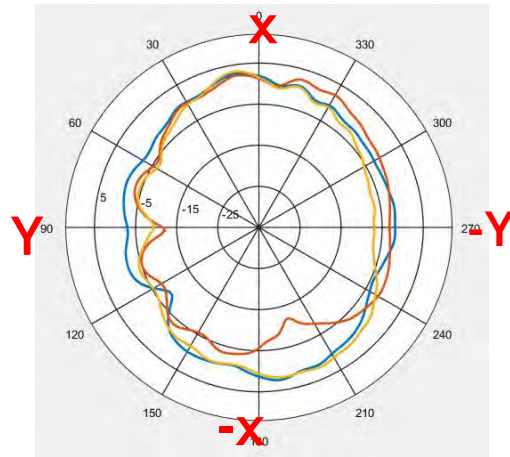
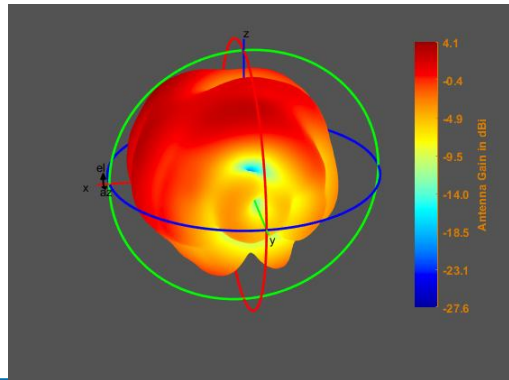
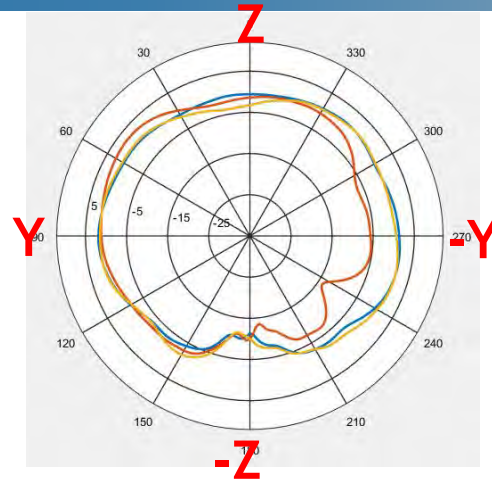
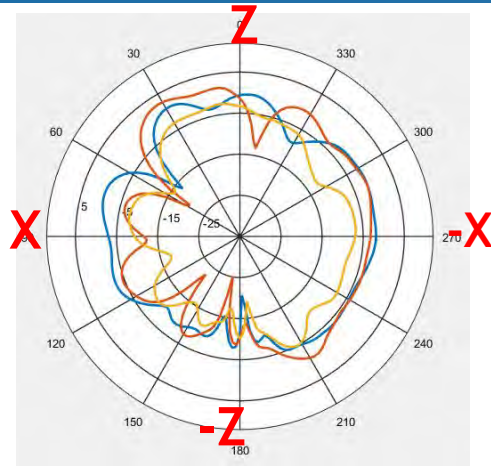




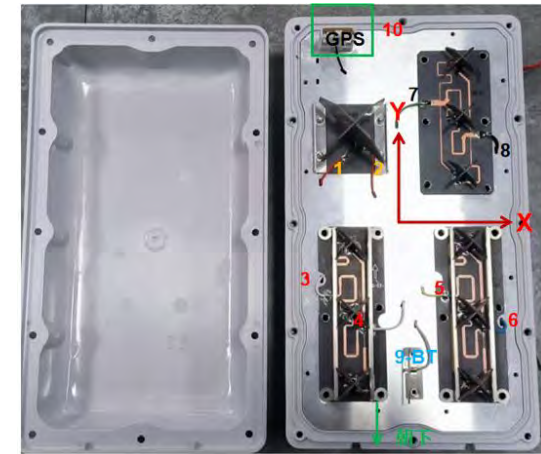
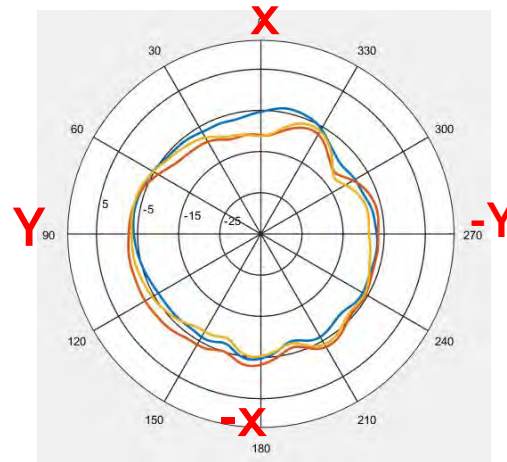
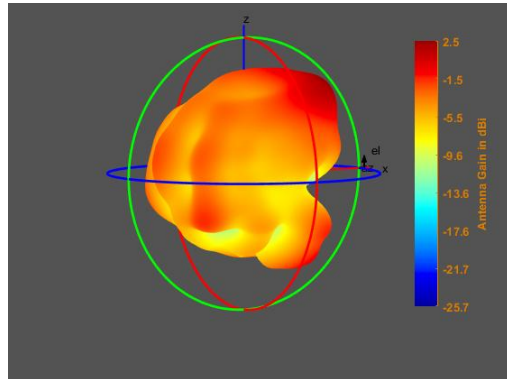
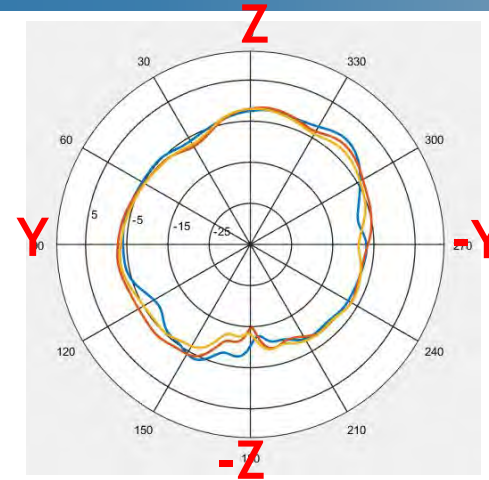
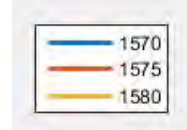
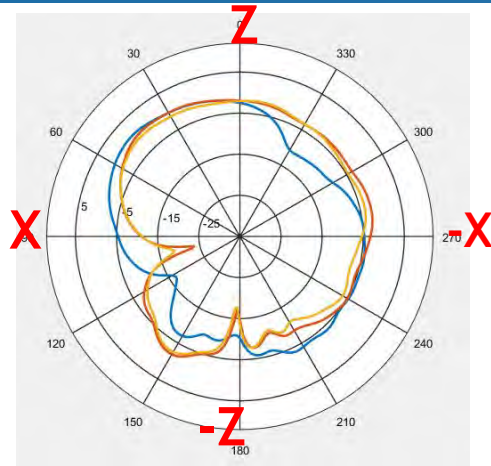
4. Radiation patterns (8-6G)



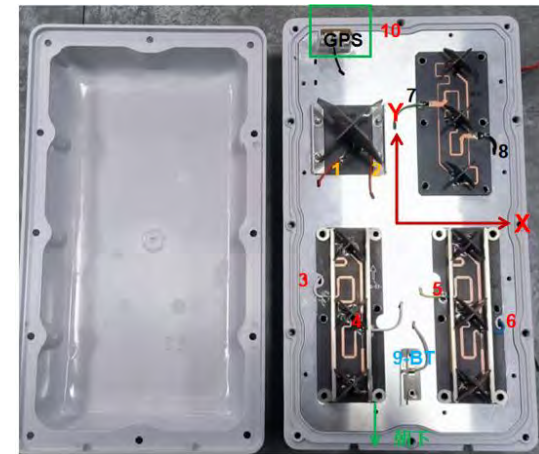
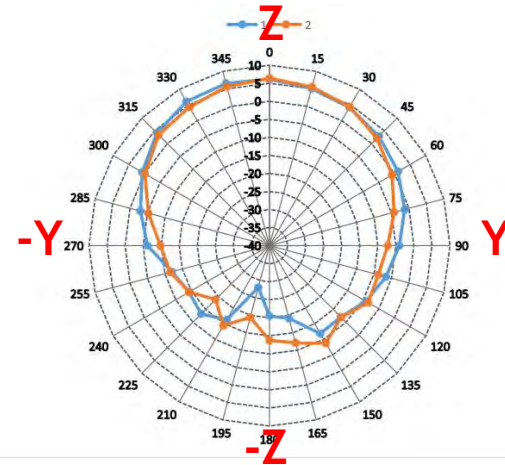
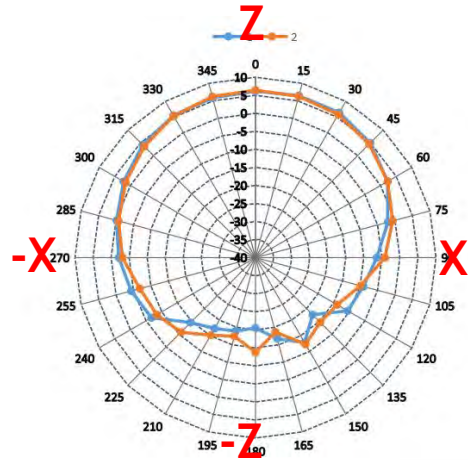
4. Radiation patterns (9-bt)



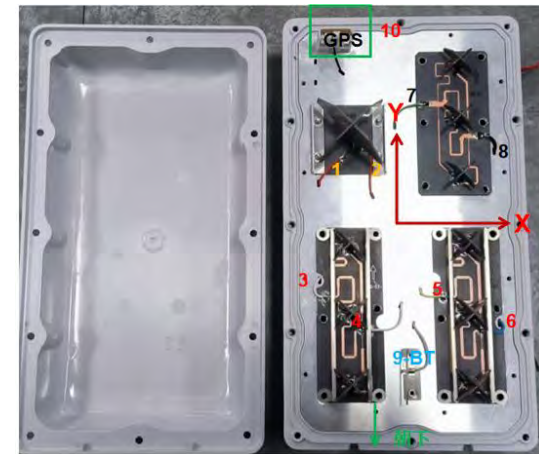
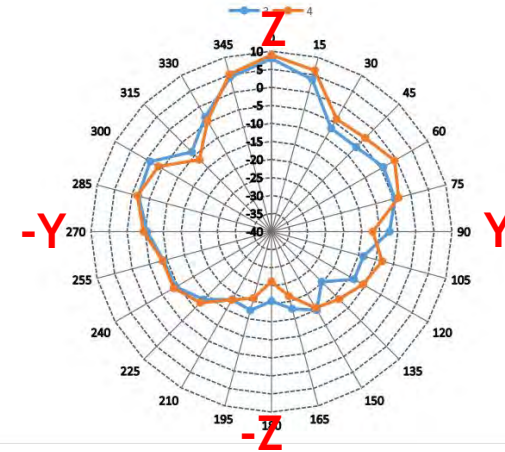
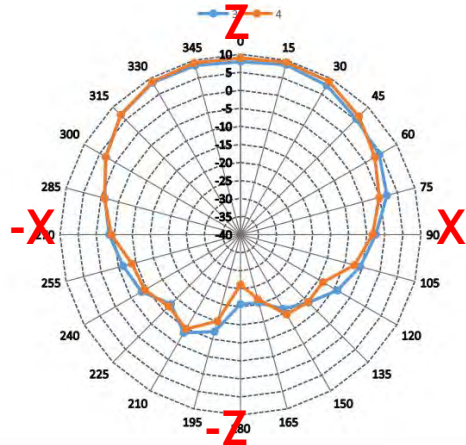
4. Radiation patterns (10-gps)



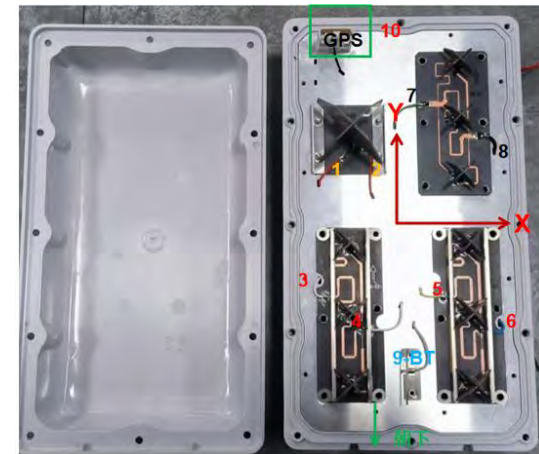
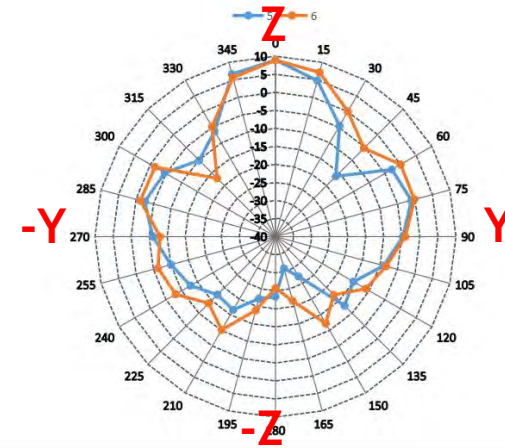
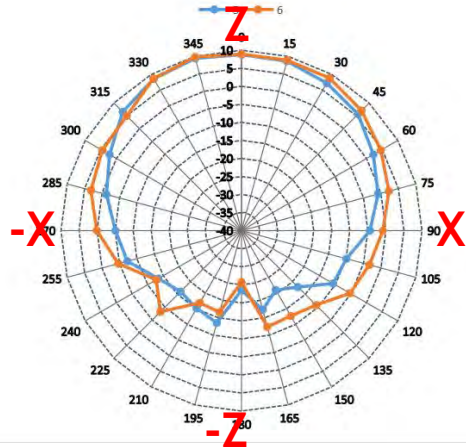
4. Radiation patterns (1&2 system coverage 2.45GHz)



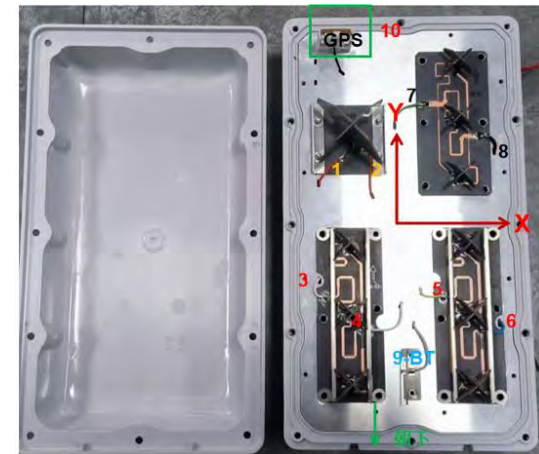
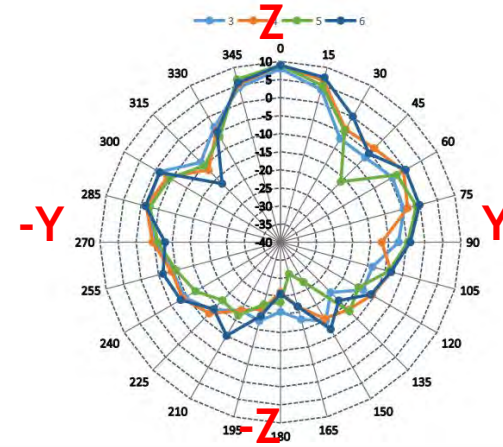
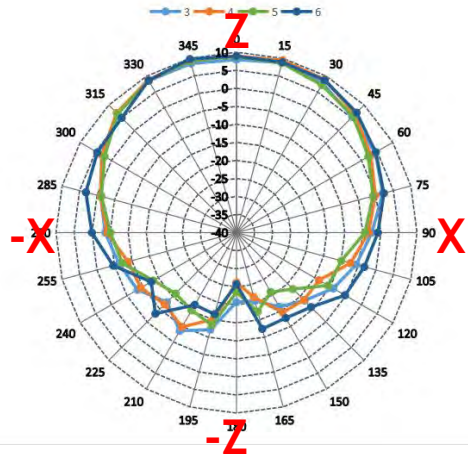
4. Radiation patterns (3&4systemcoverage 5.5GHz)



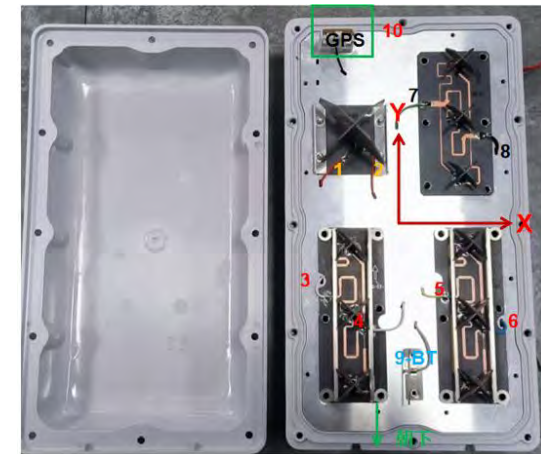
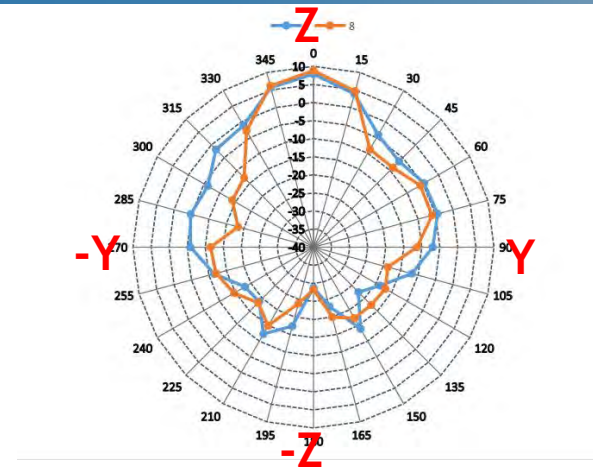
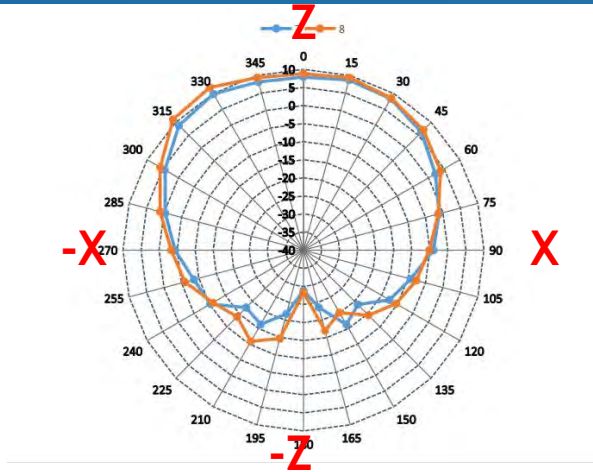
4. Radiation patterns (5&6 system coverage 5.5GHz)



4. Radiation patterns (3&4&5&6 system coverage 5.5GHz)



4. Radiation patterns (7&8 system coverage 6.6GHz)



5. Summary

1.The measurements are as follows:

Item	Frequency	1575MHz	2400MHz	2450MHz	2500MHz	5150MHz	5500MHz	5850MHz	5925MHz	6600MHz	7125MHz
1 wifi 2G	Gain(dB)		7.51	7.43	7.01						
	Efficiency		90.05	87.95	85.41						
2 wifi 2G	Gain(dB)		6.70	6.80	6.64						
	Efficiency		83.69	85.82	85.99						
3 wifi 5G	Gain(dB)					10.86	9.77	9.47			
	Efficiency					71.81	68.69	64.99			
4 wifi 5G	Gain(dB)					10.82	9.76	10.82			
	Efficiency					69.44	74.72	69.44			
5 wifi 5G	Gain(dB)					11.83	10.44	10.58			
	Efficiency					75.87	71.58	73.13			
6 wifi 5G	Gain(dB)					10.61	9.87	10.55			
	Efficiency					76.87	71.96	74.30			
7 wifi 6G	Gain(dB)								10.56	10.05	10.82
	Efficiency								70.70	71.53	71.95
8 wifi 6G	Gain(dB)								9.85	10.69	9.88
	Efficiency								69.28	68.84	68.43
9 wifi 2G-BT	Gain(dB)		2.90	4.14	3.54						
	Efficiency		70.40	65.36	60.81						
10-GPS	Gain(dB)	2.54									
	Efficiency	39.83									

5. Summary

2.The measurements are as follows:

Frequency (MHz)	Degree		Gain(dBi)		Correlated	Uncorrelated
	Theta(°)	Phi(°)	1	2	Gain(dBi)	Gain(dBi)
2400	26	20	7.36	6.34	9.88	6.88
2450	20	30	7.16	6.39	9.79	6.79
2500	28	18	6.91	6.19	9.56	6.56

Frequency (MHz)	Degree		Gain(dBi)		Correlated	Uncorrelated
	Theta(°)	Phi(°)	7	8	Gain(dBi)	Gain(dBi)
5925	26	178	11.16	9.84	13.54	10.55
6600	34	178	10.00	10.67	13.35	10.35
7125	40	178	9.60	9.87	12.75	9.74

Frequency (MHz)	Degree		Gain(dBi)		Correlated	Uncorrelated
	Theta(°)	Phi(°)	3	4	Gain(dBi)	Gain(dBi)
5150	-16	8	10.84	10.78	13.82	10.81
5500	-30	8	9.68	9.37	12.54	9.53
5850	-30	10	9.38	9.07	12.23	9.23

Frequency (MHz)	Degree		Gain(dBi)		Correlated	Uncorrelated
	Theta(°)	Phi(°)	5	6	Gain(dBi)	Gain(dBi)
5150	-14	12	11.82	10.56	14.22	11.23
5500	-16	14	10.20	9.82	13.02	10.01
5850	-32	8	10.48	10.51	13.51	10.50

Frequency (MHz)	Degree		Gain(dBi)				Correlated	Uncorrelated
	Theta(°)	Phi(°)	3	4	5	6	Gain(dBi)	Gain(dBi)
5150	-14	8	10.82	10.77	11.75	10.60	17.02	11.01
5500	-28	10	9.62	9.25	10.28	9.52	15.70	9.68
5850	-30	10	9.38	9.07	10.56	10.41	15.90	9.90

5. Summary

3.The measurements are as follows:

Item	Frequency	2400MHz	2450MHz	2500MHz	5150MHz	5500MHz	5850MHz	5900MHz	6600MHz	7200MHz
1 wifi 2G 3dB beamwidth	PHI=0	99.15	103.21	99.71						
	PHI=90	75.77	88.74	90.27						
2 wifi 2G 3dB beamwidth	PHI=0	104.05	98.72	102.43						
	PHI=90	79.35	82.47	91.76						
3 wifi 5G 3dB beamwidth	PHI=0				85.82	93.60	104.57			
	PHI=90				20.54	27.98	30.20			
4 wifi 5G 3dB beamwidth	PHI=0				88.53	93.75	99.47			
	PHI=90				29.65	27.09	25.69			
5 wifi 5G 3dB beamwidth	PHI=0				89.28	95.19	98.15			
	PHI=90				23.74	27.71	25.52			
6 wifi 5G 3dB beamwidth	PHI=0				91.33	86.01	94.23			
	PHI=90				33.55	32.66	26.90			
7 wifi 6G 3dB beamwidth	PHI=0							85.10	92.81	113.35
	PHI=90							26.74	23.90	20.19
8 wifi 6G 3dB beamwidth	PHI=0							85.20	91.83	98.65
	PHI=90							32.34	28.94	22.54

5. Summary

4.The measurements are as follows:

Antenna	VSWR	Efficiency (%)	Highest Peak Gain(dBi)	Mutual Isolation (dBi) GPS Band	Mutual Isolation (dBi) 2G Band			Mutual Isolation (dBi) 5G Band				Mutual Isolation (dBi) 6G Band	
				10-1.575G	1-2G	2-2G	9-2G	3-5G	4-5G	5-5G	6-5G	7-6G	8-6G
1-2G	1.49	85.41%	7.51	-26.49				-35.45	-32.08	-38.41	-36.72	-26.43	-34.25
2-2G	1.51	83.69%	6.79	-38.03	-26.90			-35.77	-35.58	-40.55	-43.73	-27.82	-28.89
3-5G	1.85	64.99%	10.86	-61.79	-36.90	-41.32	-25.44		-27.78	-33.82	-32.34	-35.47	-39.02
4-5G	1.81	69.44%	11.03	-53.45	-25.76	-35.41	-15.79			-30.94	-32.11	-39.28	-43.08
5-5G	1.78	71.58%	11.83	-66.19	-39.75	-47.50	-23.57				-25.53	-38.40	-38.02
6-5G	1.84	71.96%	10.61	-68.29	-30.52	-47.11	-15.01					-40.17	-35.60
7-6G	1.94	69.34%	11.16	-54.82	-32.27	-42.82	-36.43	-42.35	-45.25	-37.96	-39.87		-20.50
8-6G	1.74	66.80%	10.69	-57.63	-30.37	-32.78	-35.19	-43.27	-43.10	-42.41	-35.78		
9-BT	1.68	60.81%	4.14	-62.34	-34.73	-35.21		-25.16	-29.05	-29.57	-25.93	-43.10	-42.30
10-GPS	1.79	39.84%	2.54		-47.53	-46.21	-62.28	-45.32	-48.35	-48.13	-44.27	-42.45	-38.41

5. Summary

5.The measurements are as follows:

Item	Frequency	5150MHz	5200MHz	5250MHz	5925MHz	6300MHz	6500MHz	6700MHz	6875MHz
3	peakgain (elevation >30°)	-4.15	-4.55	-4.28					
4	peakgain (elevation >30°)	-5.91	-5.82	-4.84					
5	peakgain (elevation >30°)	-4.92	-5.30	-5.12					
6	peakgain (elevation >30°)	-6.75	-5.48	-4.81					
7	peakgain (elevation >30°)				-4.89	-6.27	-5.35	-4.28	-3.91
8	peakgain (elevation >30°)				-3.68	-4.92	-5.35	-5.12	-5.07

仰角30度以上最大增益

Item	Frequency	5150MHz		5200MHz		5250MHz		5925MHz		6300MHz		6500MHz		6700MHz		6875MHz	
3&4&5&6	peakgain (elevation >30°)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)
		0.64	-5.32	0.75	-5.26	1.26	-4.75										
3&4	peakgain (elevation >30°)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)										
		-1.98	-4.94	-2.15	-5.14	-1.55	-4.55										
5&6	peakgain (elevation >30°)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)										
		-2.78	-5.74	-2.38	-5.39	-1.95	-4.96										
7&8	peakgain (elevation >30°)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)	Correlated Gain(dBi)	Uncorrelated Gain(dBi)
								-1.25	-4.24	-2.56	-5.54	-2.34	-5.35	-1.68	-4.68	-1.46	-4.45

结论:

- 1.以上数据基于带外壳,实际测试数据. 天线2G增益在6dB以上,5G在 10 ± 1 db,6G在 10 ± 1 dB,整体效率2G可控制在80%以上,5/6G基本在60%以上.
- 2.gps天线采用陶瓷模块,放在顶部左侧,尺寸为20*20*8mm 采用塑胶支架固定在底板上
- 3.天线波束宽度（3dB）水平基本可控制在 $90 \pm 10^\circ$ 以内
- 4.主天线同频带内隔离度在-20dB以上, 5G/6G之间隔离度在-30dB以上

Thanks!