

670G-WIFI-Antenna

Customer:Actiontec

Designer: ZW

Date:2025/10/21



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

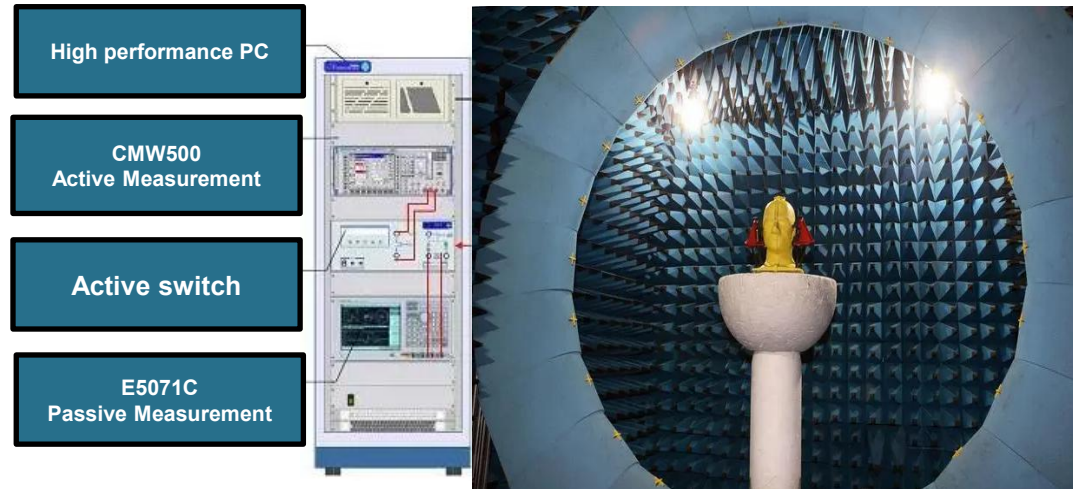


OUTLINE

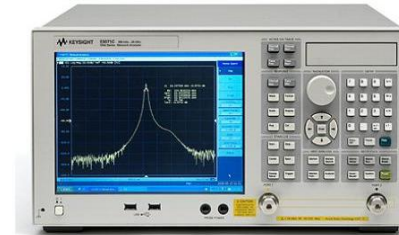
1. Benchmark
2. S-Parameters (VSWR&isolation)
3. Antenna Efficiency& Peak Gain
4. Radiation patterns
5. Summary

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

The “great circle” cut method, whereby the Measurement Antenna remains fixed and the EUT is rotated about two axes in sequential order. The radiated RF performance of the Equipment Under Test (EUT) is measured by sampling the radiated transmit power of the mobile at various locations surrounding the device. A three-dimensional characterization of the 'transmit' performance of the EUT is pieced together by analyzing the data from the spatially distributed measurements.

Data points taken every 15 degrees in the theta and in the phi axes are deemed sufficient to fully characterize the EUT's Far-Field radiation pattern and total radiated power All of the measured power values will be integrated.

Test Condition	Test Engineer	Test Environment(° C/%)	Test Dste
Radiated	Lean.ni	20-24/45-60	10.21.2025
Band(MHz)		Test Frequency(MHz)	
2400-2500		2400/2450/2500	
5150-5850		5150/5500/5850	
Testing Location			
Galtronics	Shanghai,EM Testing		

Instrument	Manufacturer	Model NO.	Asset No	Cali.Interval	Cali.Due Date
ENA Network Analyzer	Keysight	E5071B	HLW-SC-19	1 Year	2025/2/27
RF Switch Box	EMT	NA	NA	NA	NA
EMT Chamber	EMT	EMT-24	HLW-SC-21	1 Year	2025/9/10
Horn Antenna	EMT	0.8-6GHz	NA	1Year	2025/9/10

Because the antennas are fixed in location within the device the directional antenna gain for MIMO is calculated over a sphere using the raw spatial data taken at 15 degree steps of theta and phi for each antenna using the equations from KDB 662911 D01. The raw antenna data is located in the appendix of this report.

The correlated antenna gain was calculated using KDB 662911 D01, F(2)(d)(i). The uncorrelated antenna gain was calculated using KDB 662911 D01, F(2)(d)(ii).

The uncorrelated and correlated gains were calculated for each point in the spatial data, and the highest values reported.

Note :

KDB 662911 D01, F(2)(d)(i)

$$\text{Correlated Gain} = 10 \log \left[\left(10^{\frac{G_1}{20}} + 10^{\frac{G_2}{20}} + \dots + 10^{\frac{G_n}{20}} \right)^2 / N_{Ant.} \right] \text{ dBi}$$

KDB 662911 D01, F(2)(d)(ii)

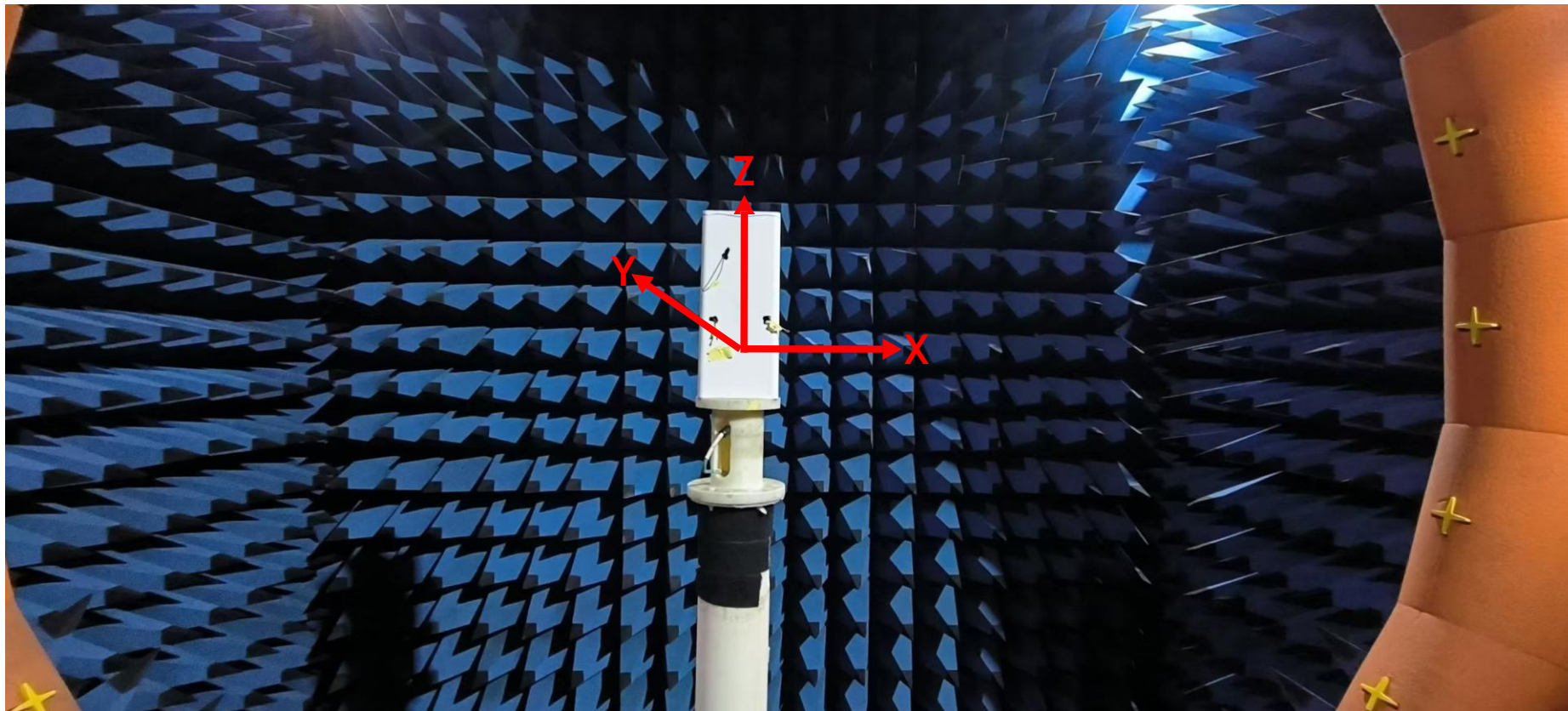
$$\text{Uncorrelated Gain} = 10 \log \left[\left(10^{\frac{G_1}{10}} + 10^{\frac{G_2}{10}} + \dots + 10^{\frac{G_n}{10}} \right) / N_{Ant.} \right] \text{ dBi}$$

$N_{Ant.}$: Number of antenna

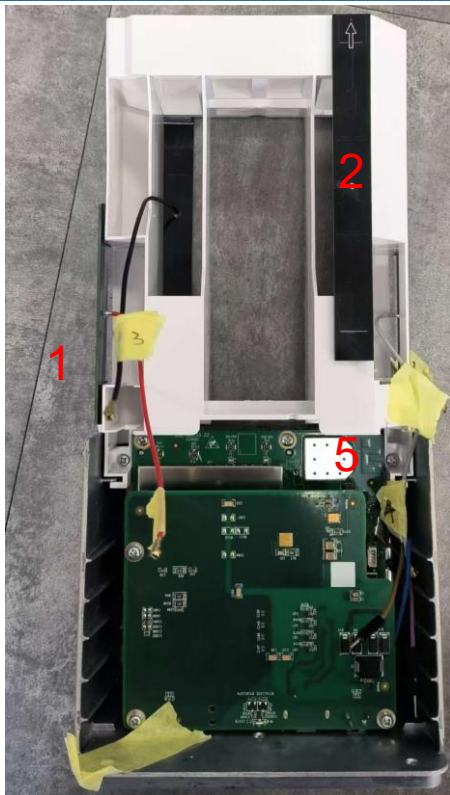
G_n : Gain of antenna

激活 Windows

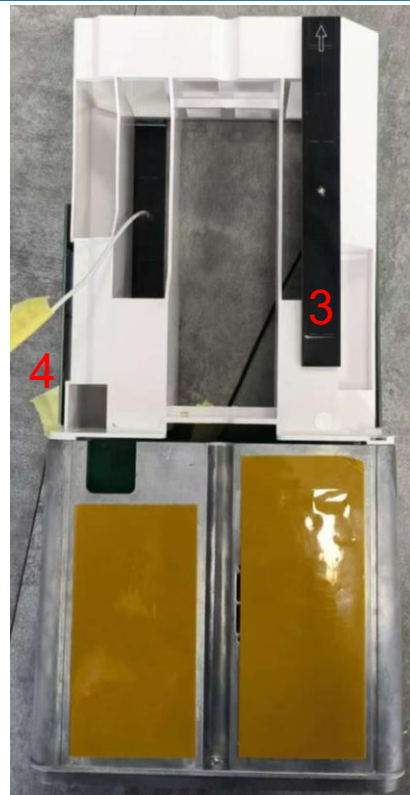
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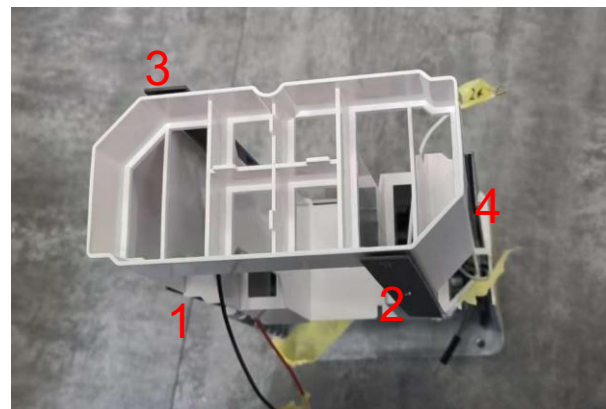
1. Benchmark



正面



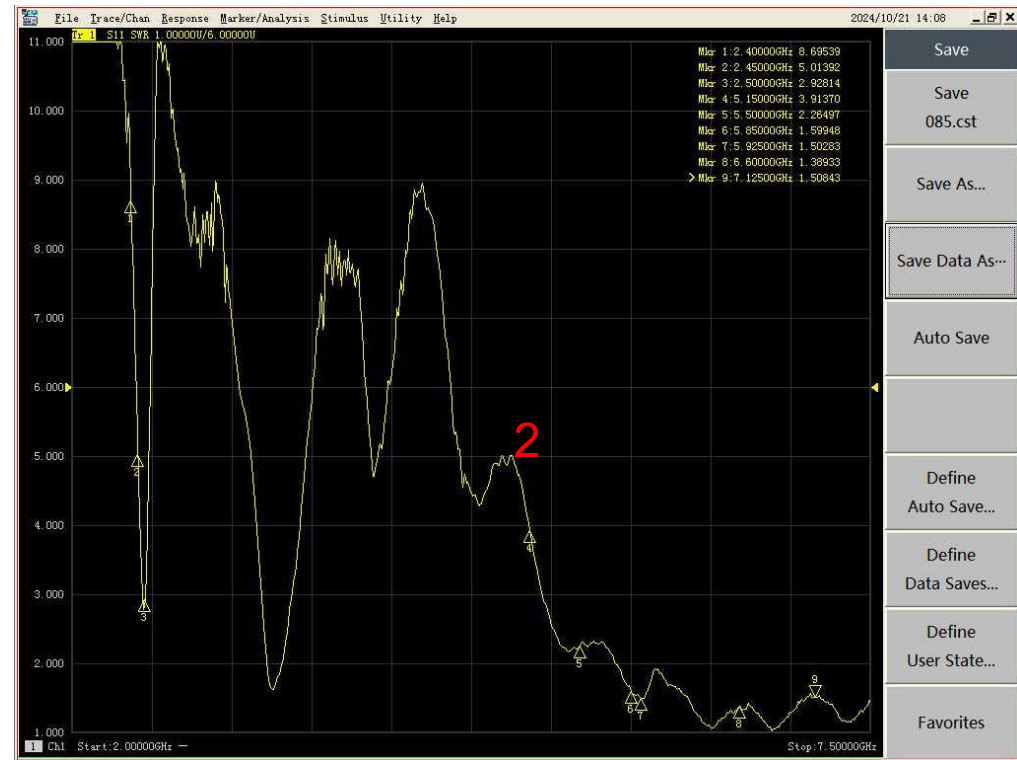
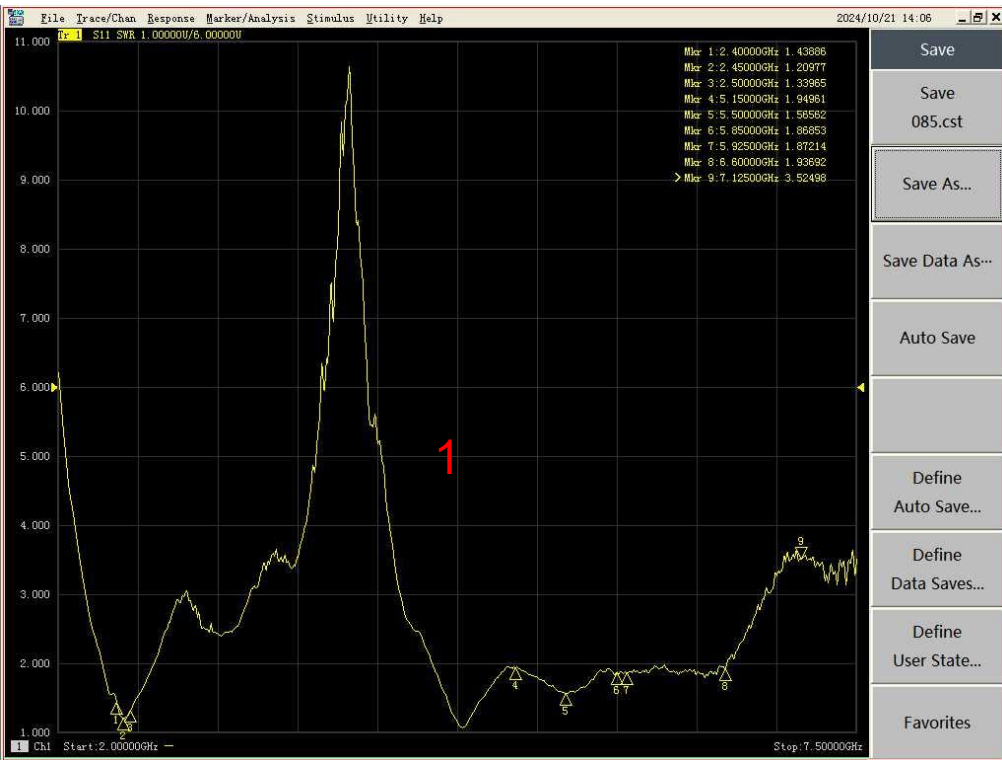
背面



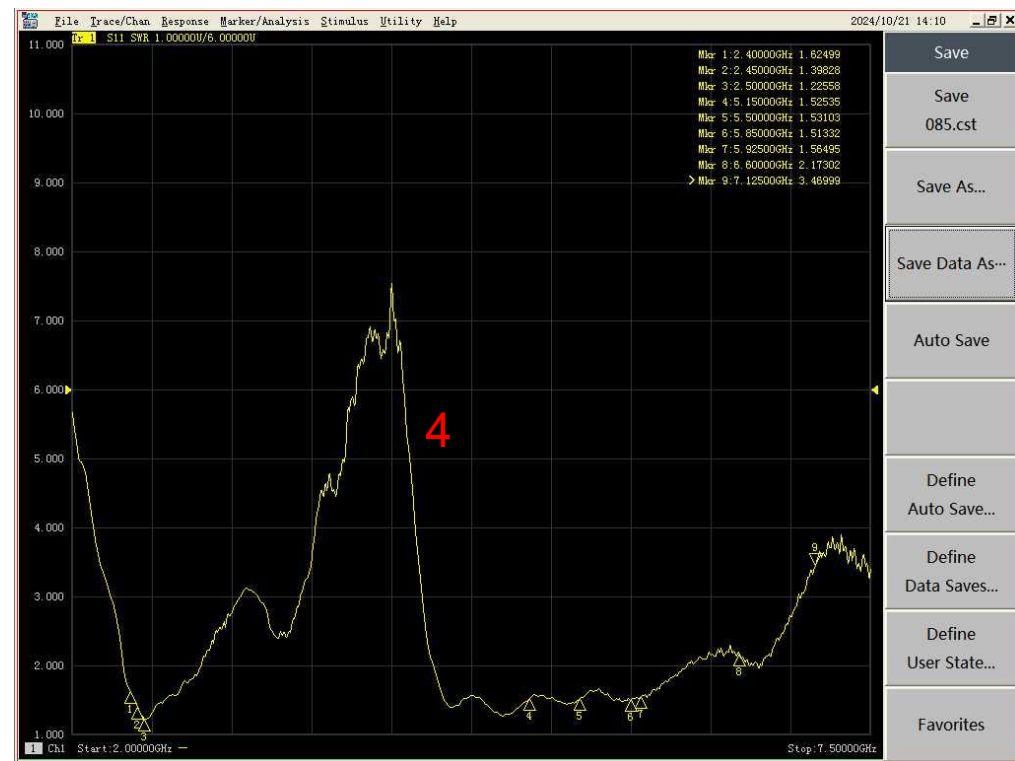
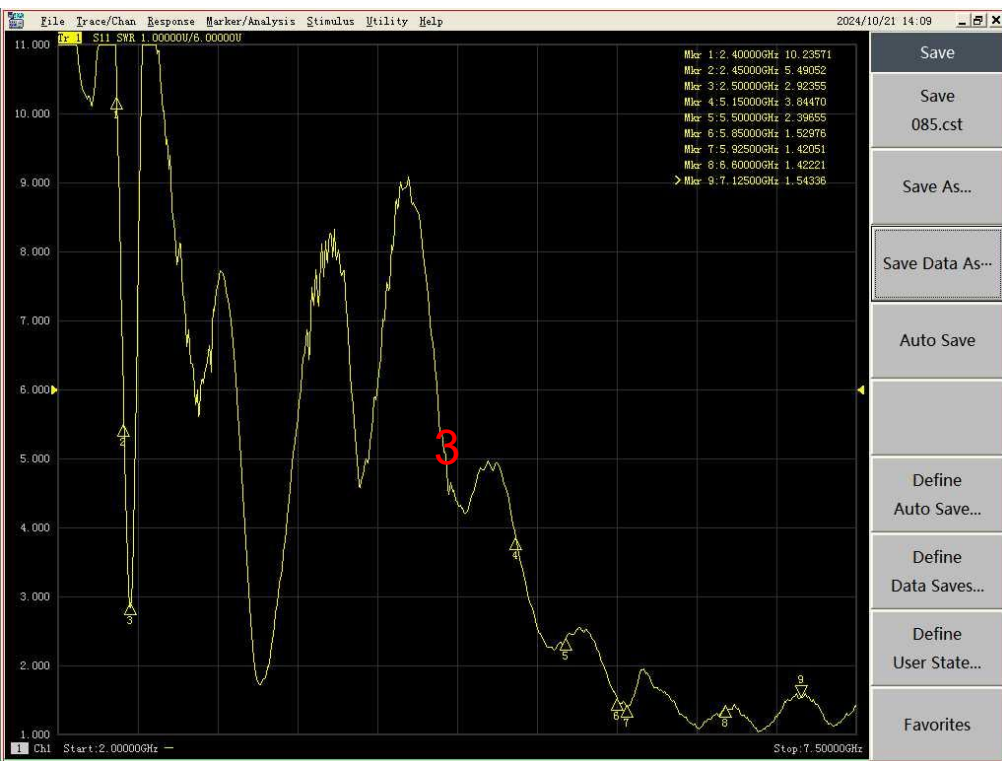
1/4:2400-2500/5150-5850MHz
2/3:5925-7125MHz
5: BT 2400-2500MHz

Antenna polarization: vertical

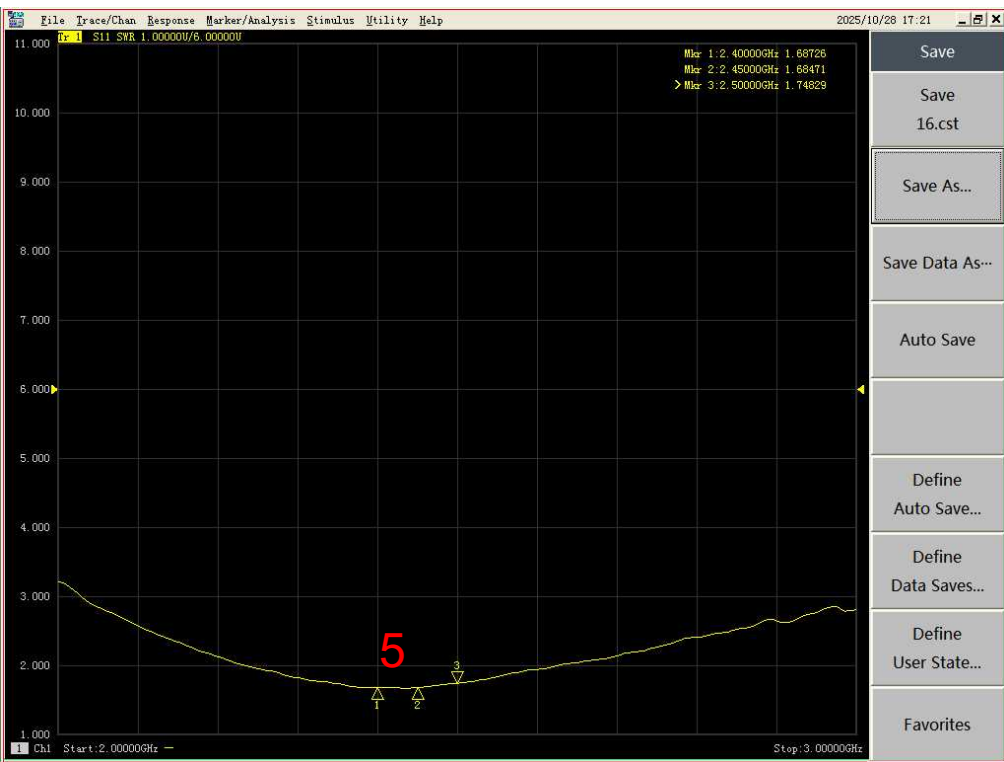
2. S-Parameters(VSWR)



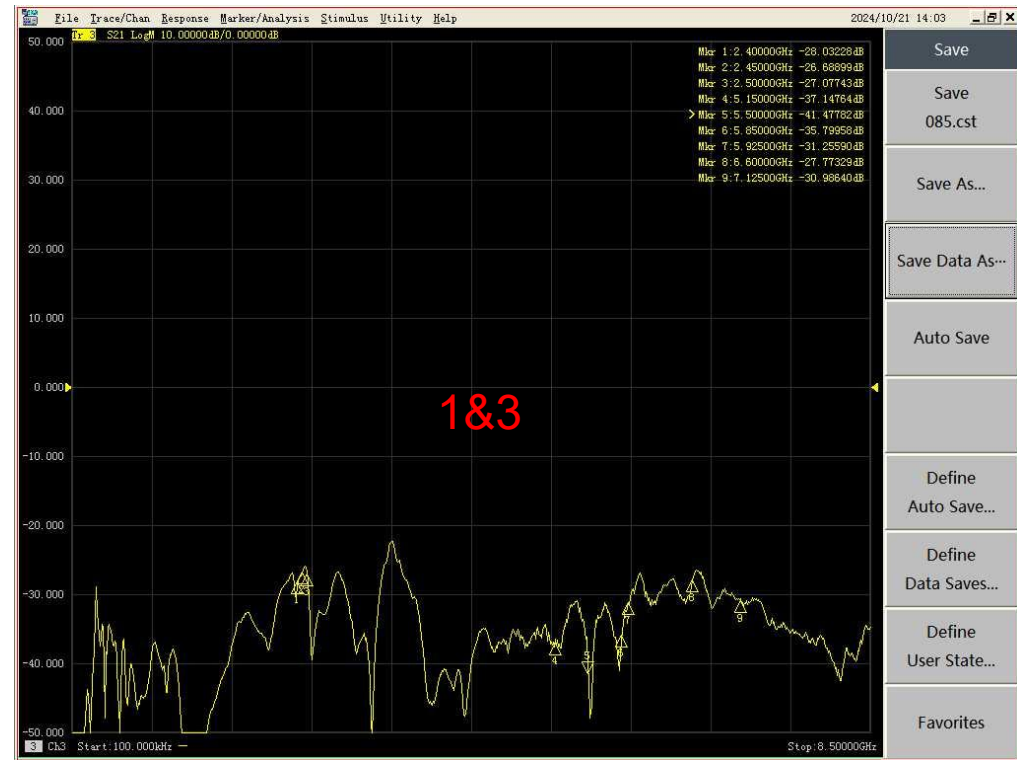
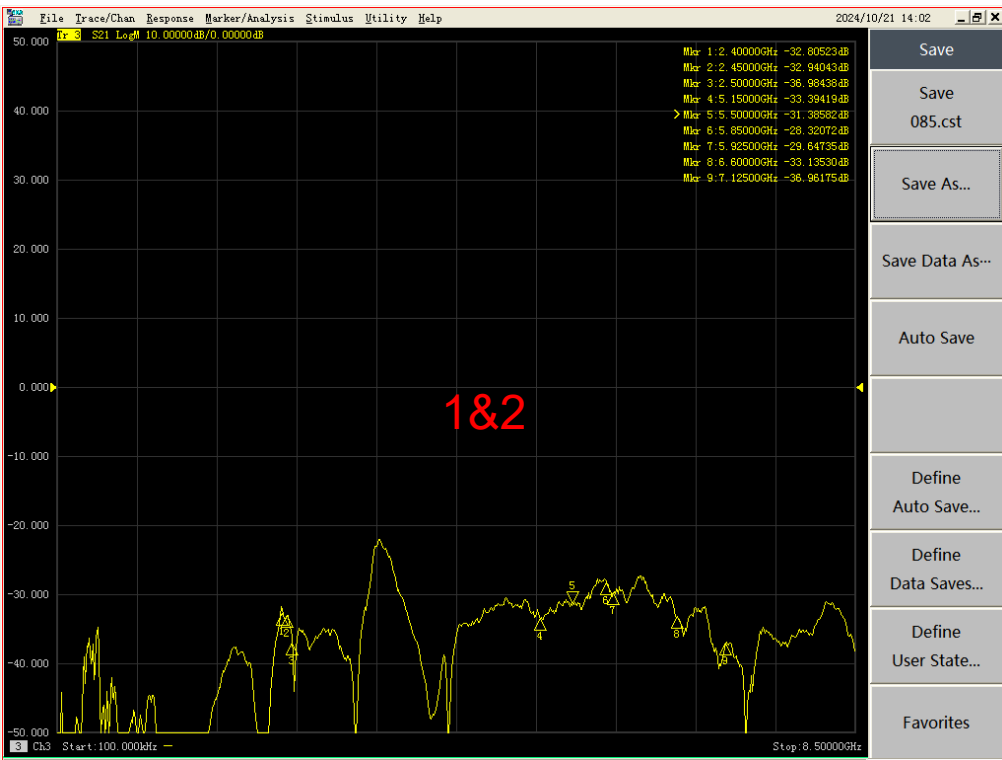
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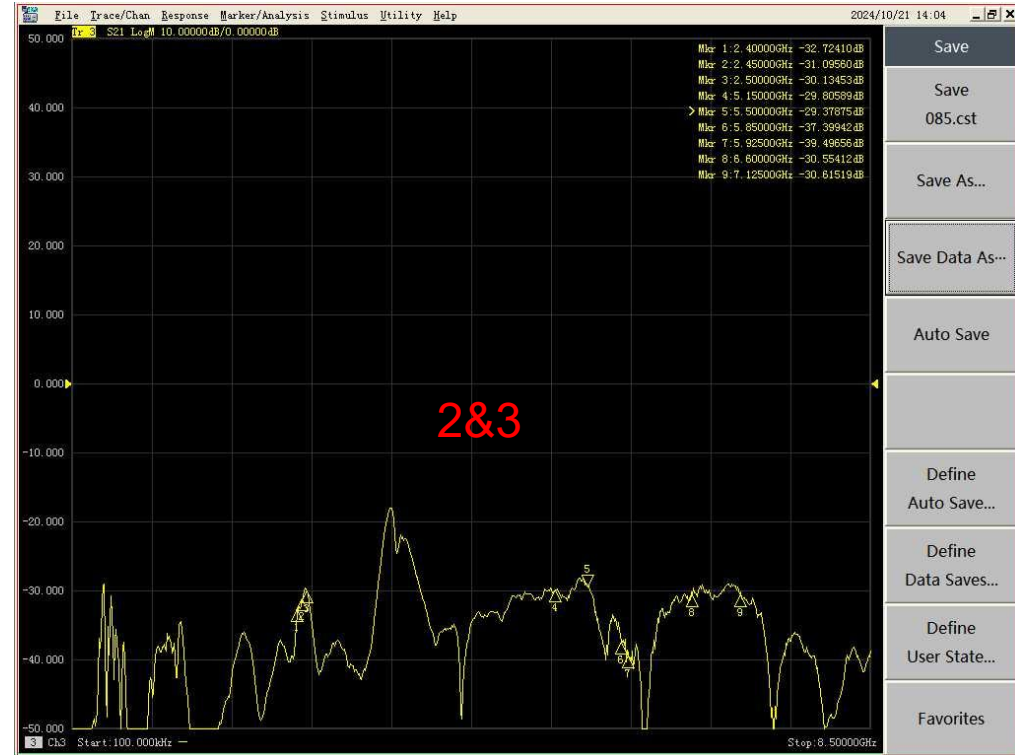
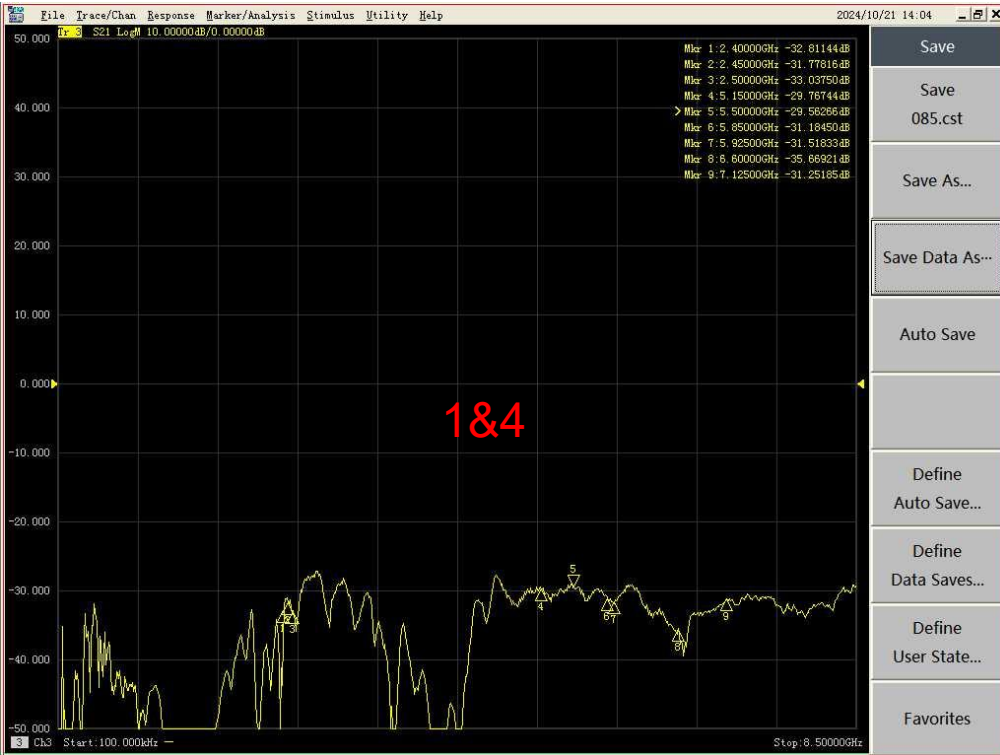
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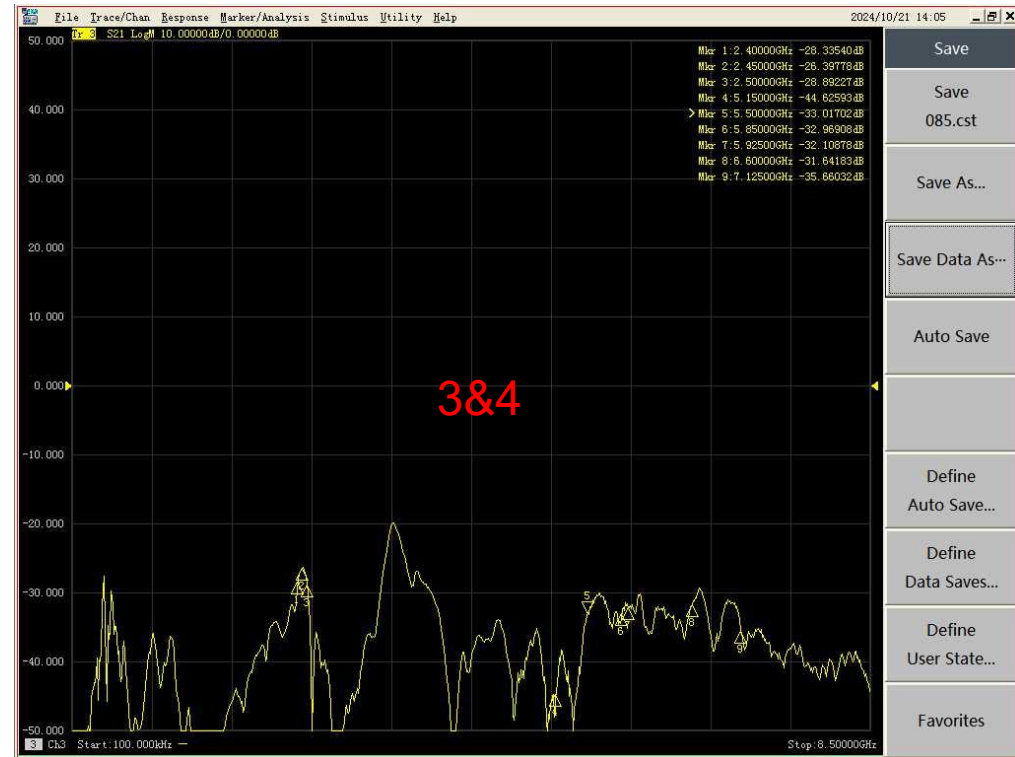
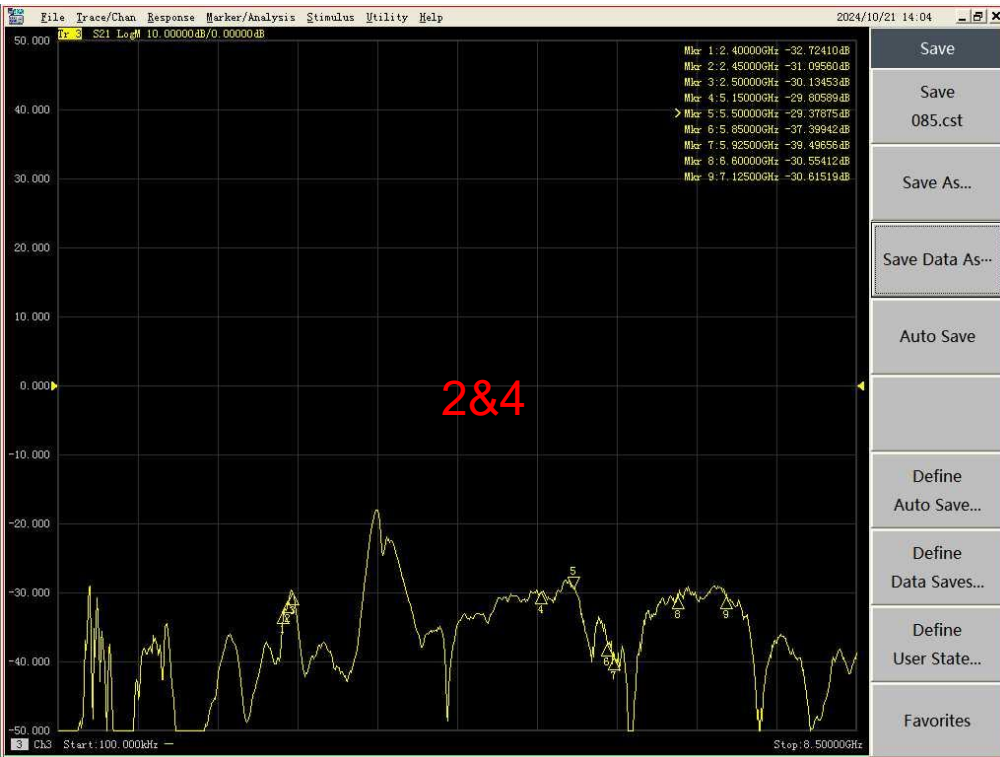
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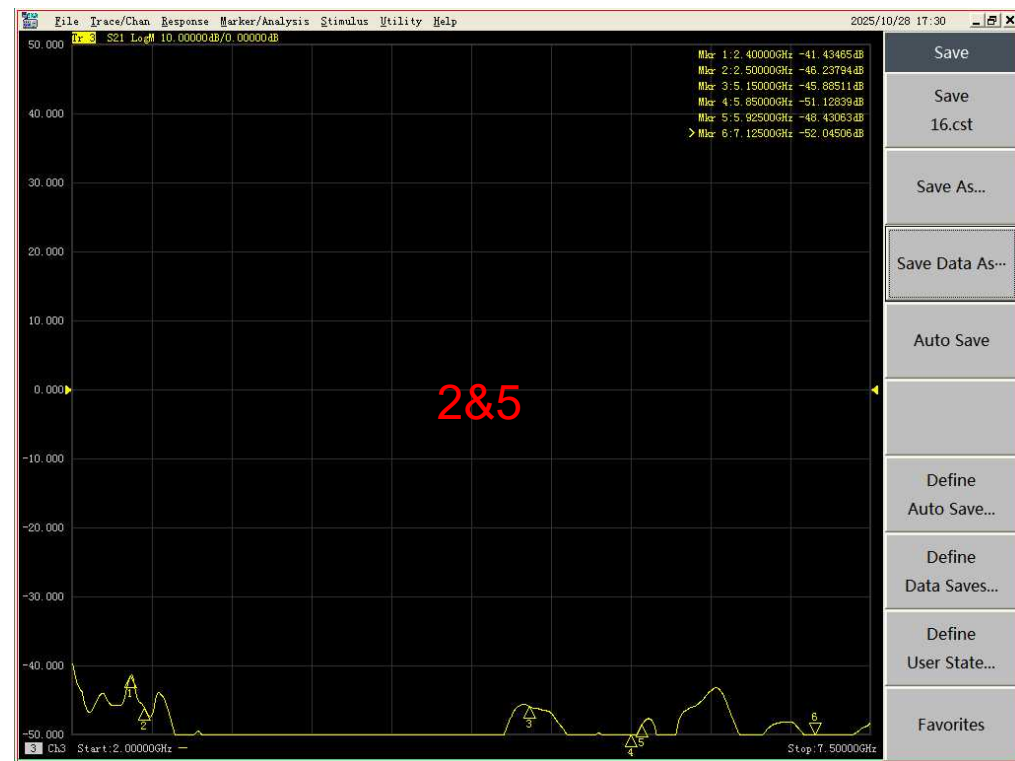
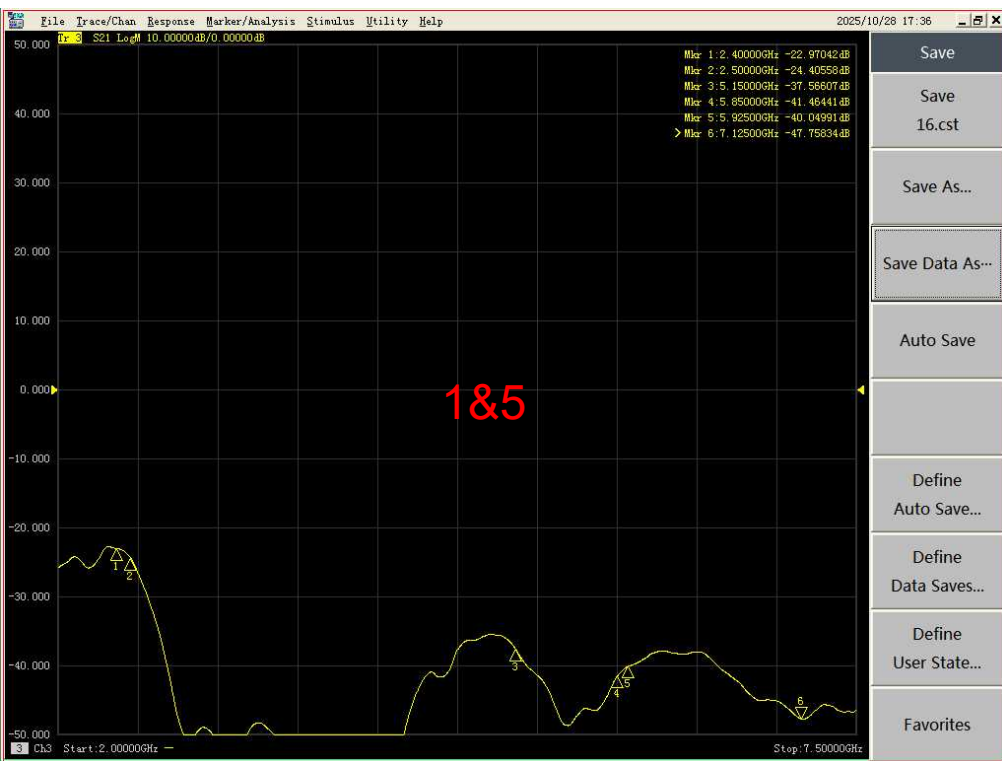
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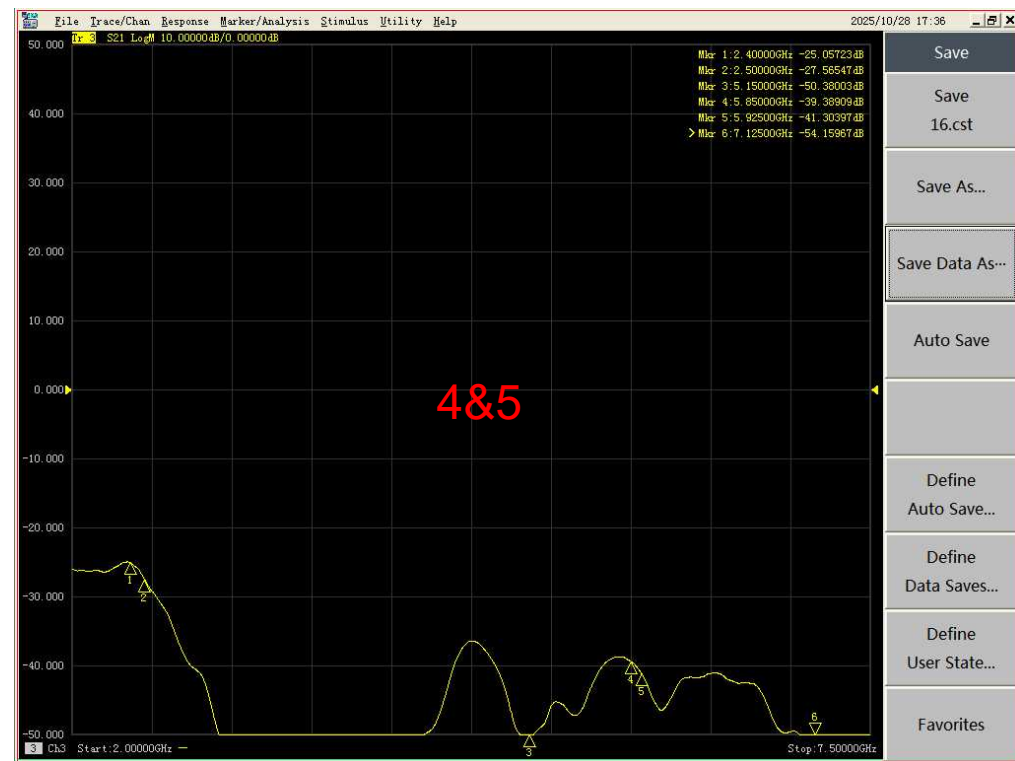
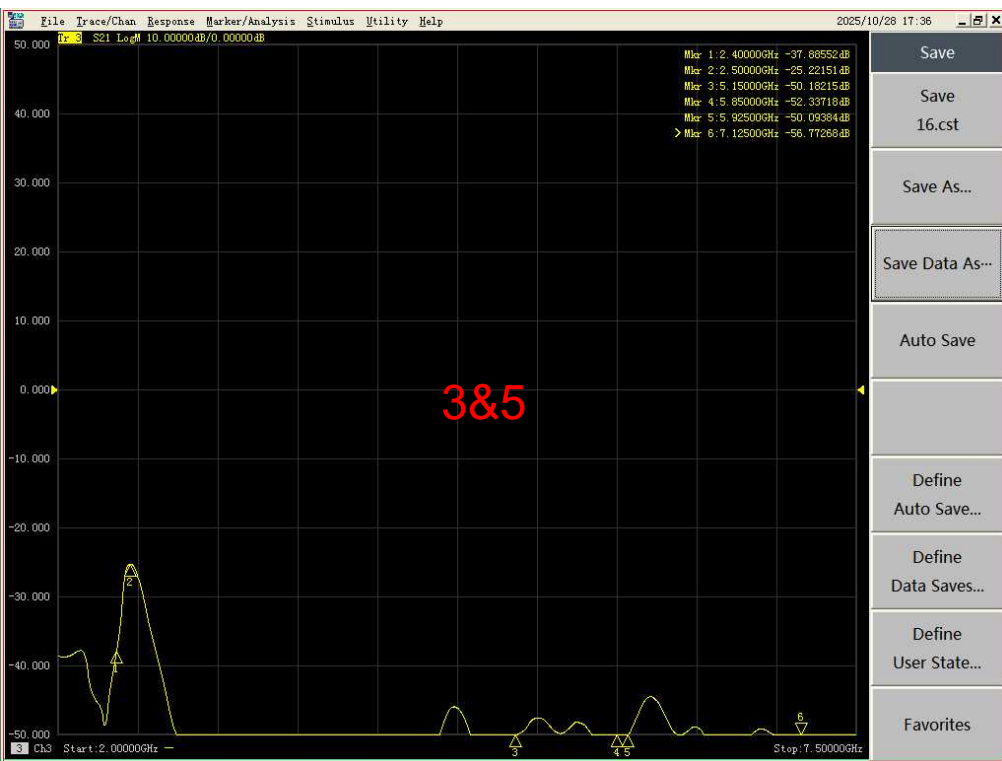
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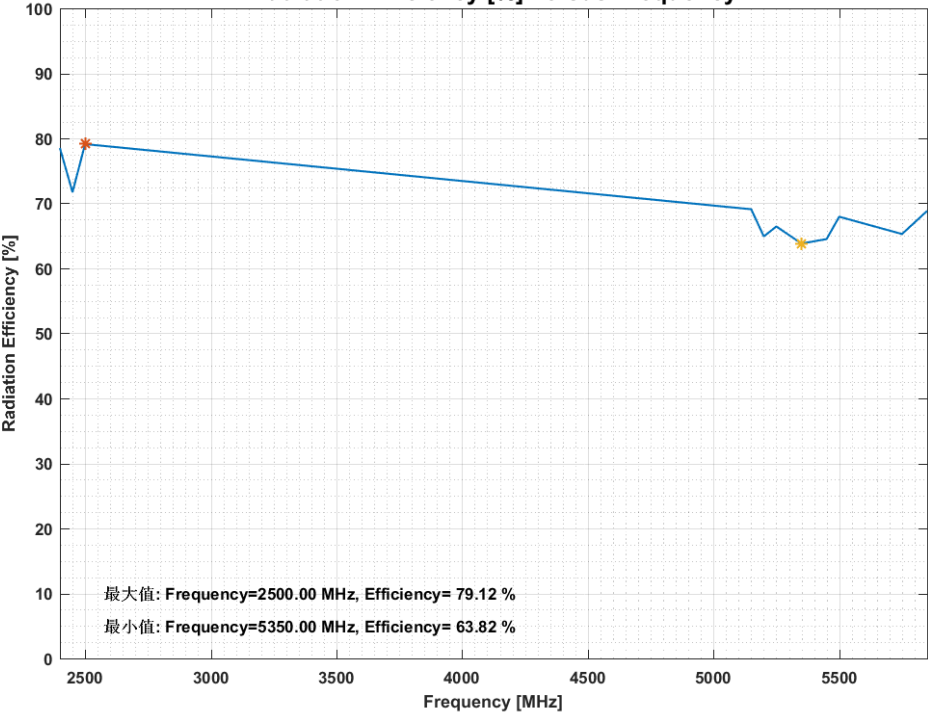


2. S-Parameters(isolation)



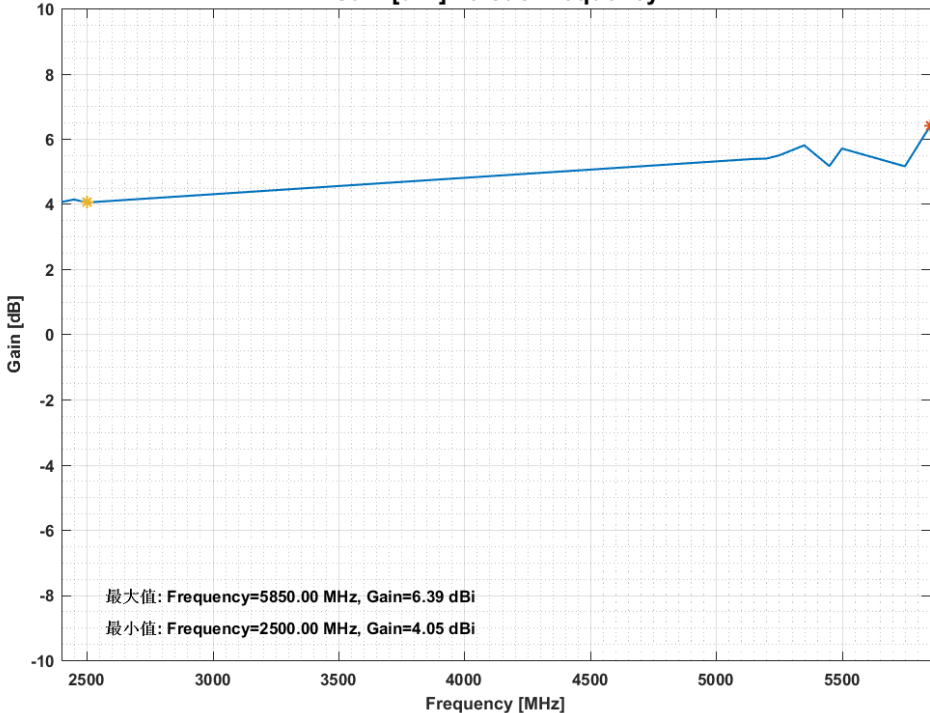
3. Antenna Efficiency& Peak Gain (1)

Radiation Efficiency [%] versus Frequency



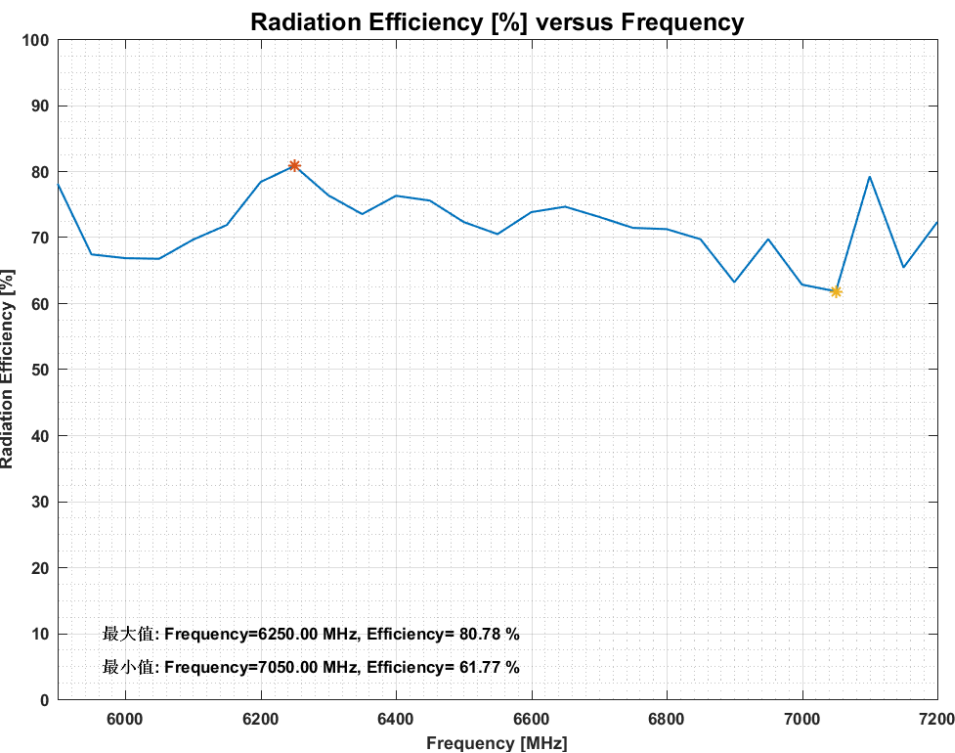
Efficiency

Gain [dBi] versus Frequency

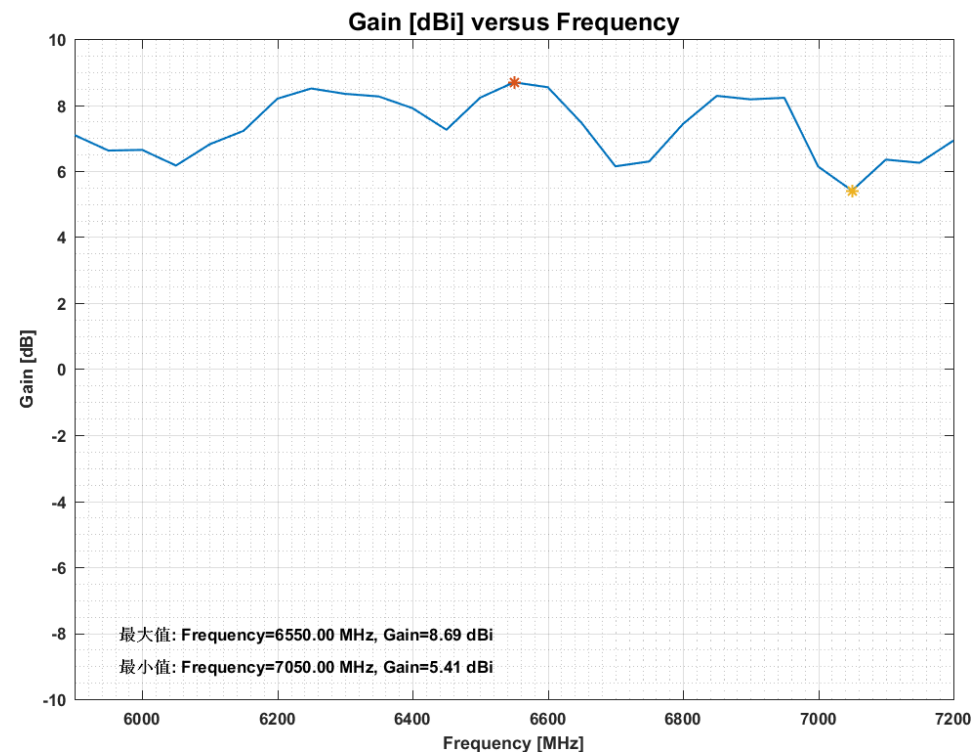


Gain

3. Antenna Efficiency& Peak Gain (2)

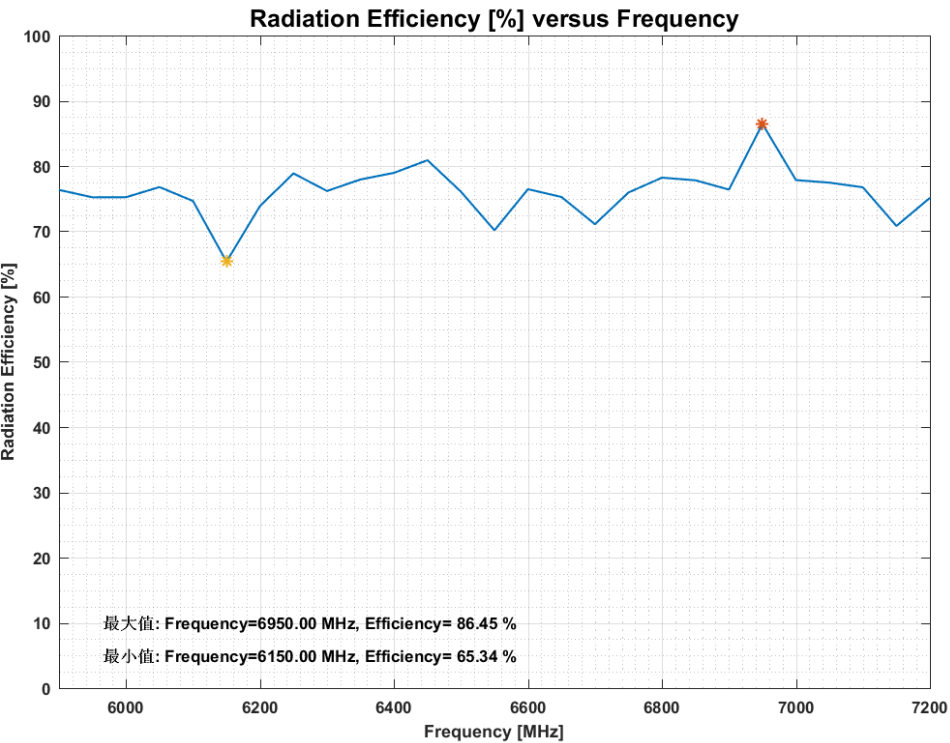


Efficiency

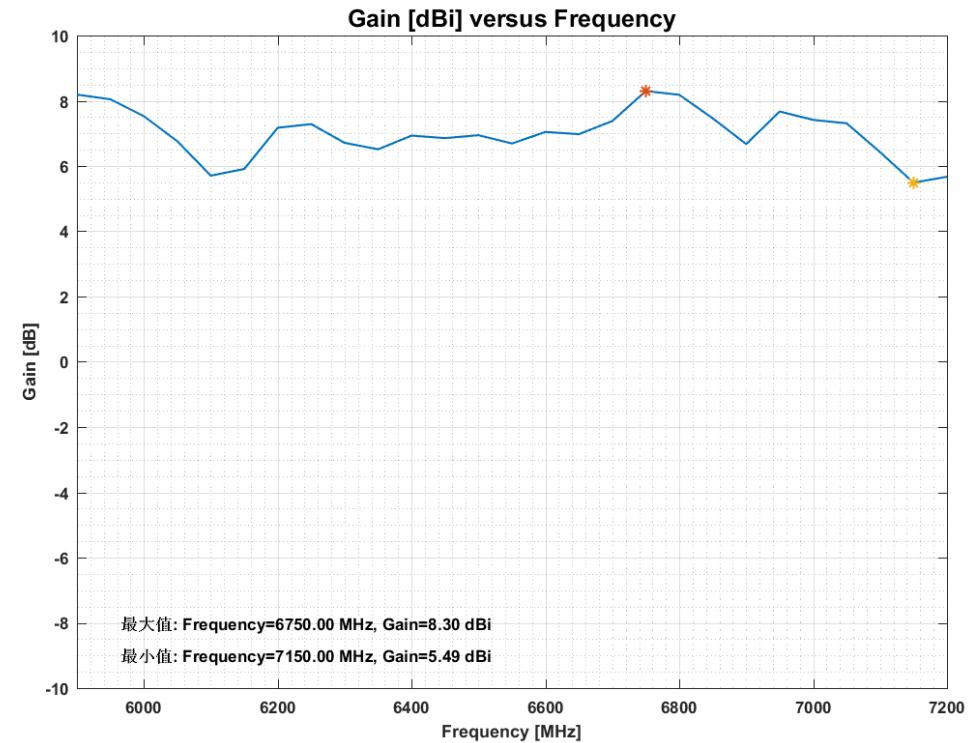


Gain

3. Antenna Efficiency& Peak Gain (3)

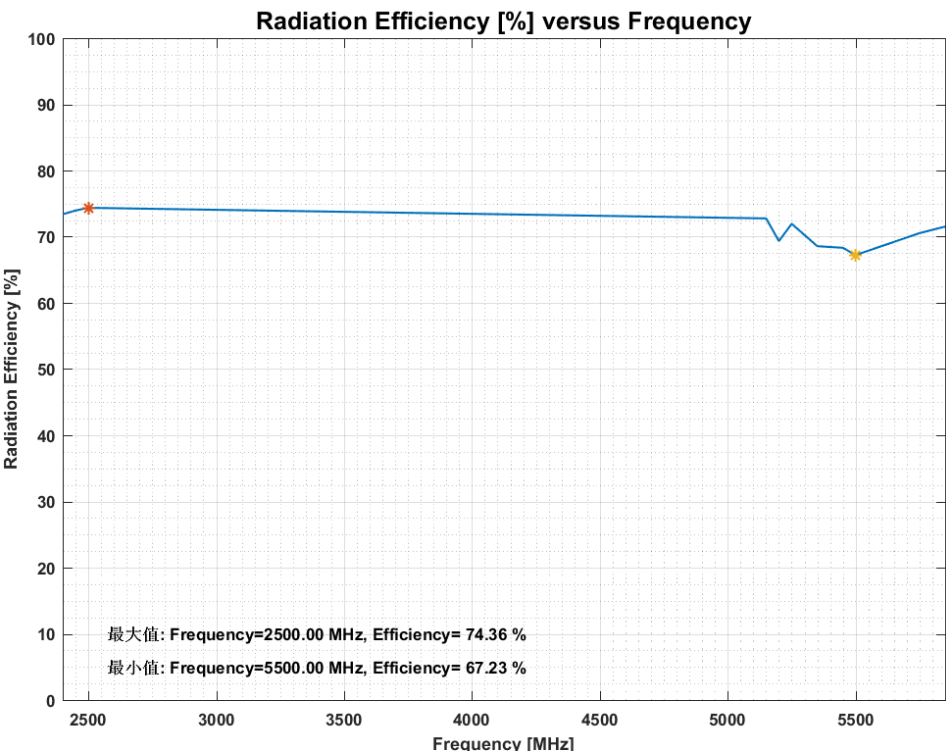


Efficiency

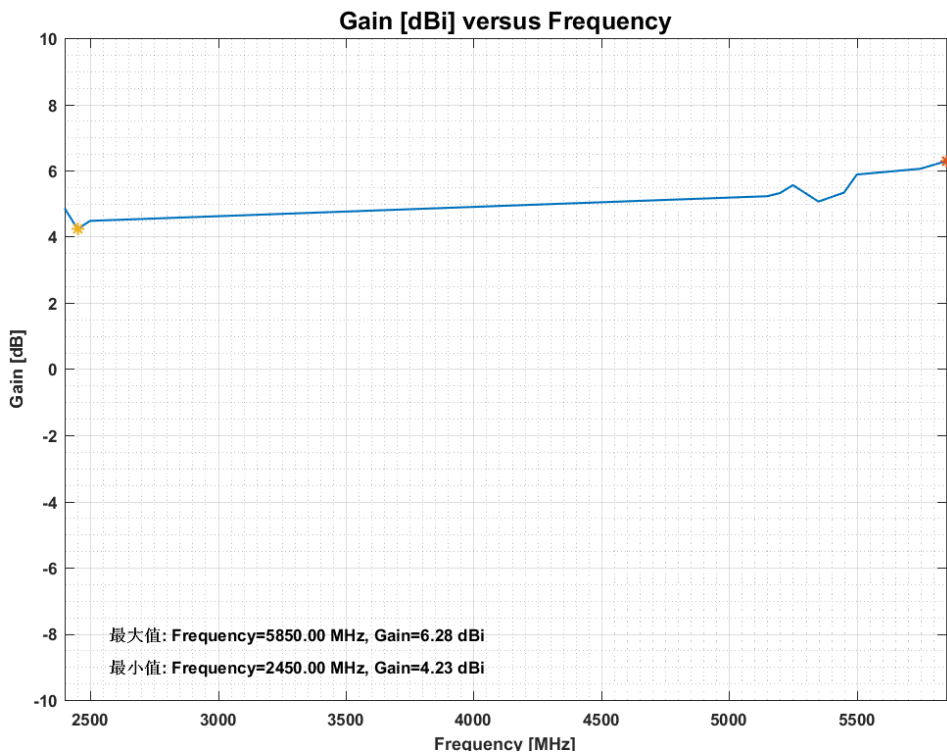


Gain

3. Antenna Efficiency& Peak Gain (4)

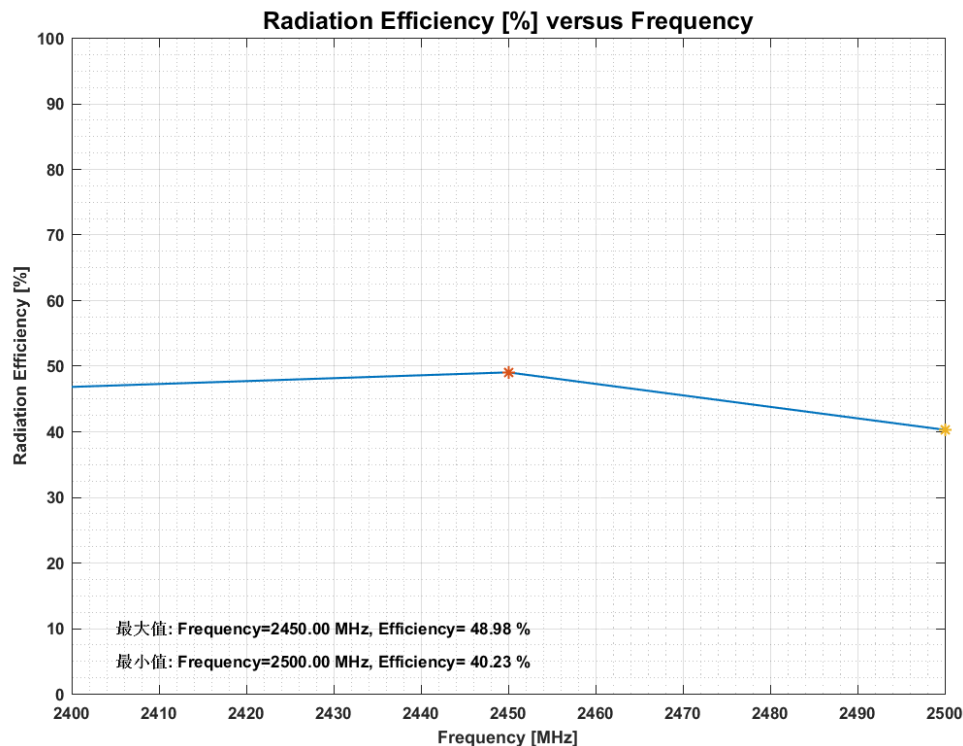


Efficiency

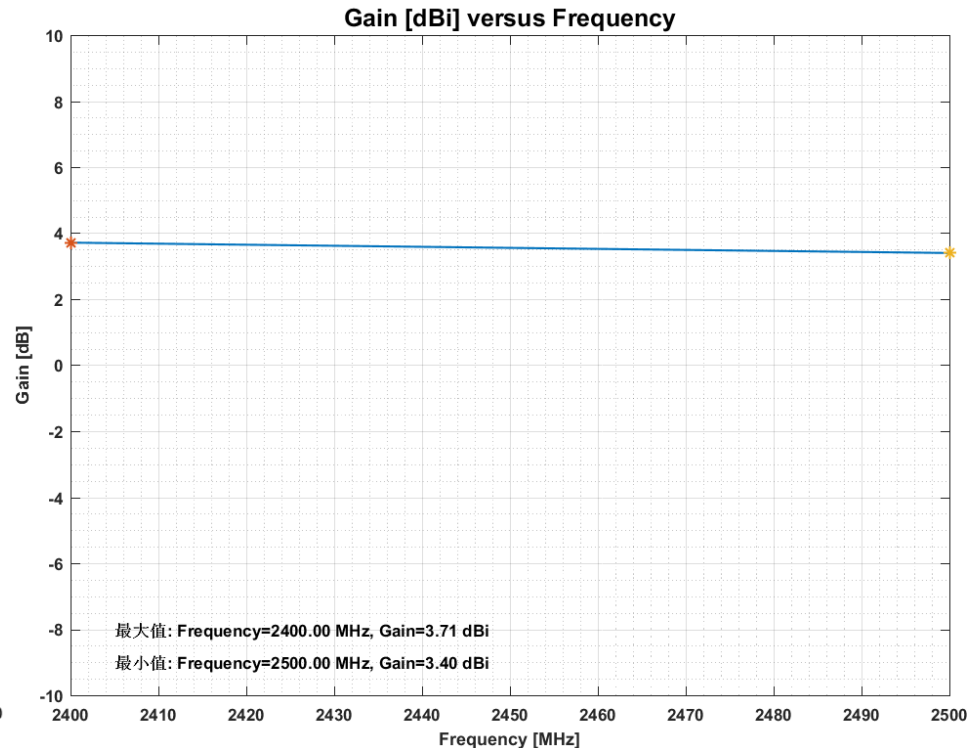


Gain

3. Antenna Efficiency& Peak Gain (5)

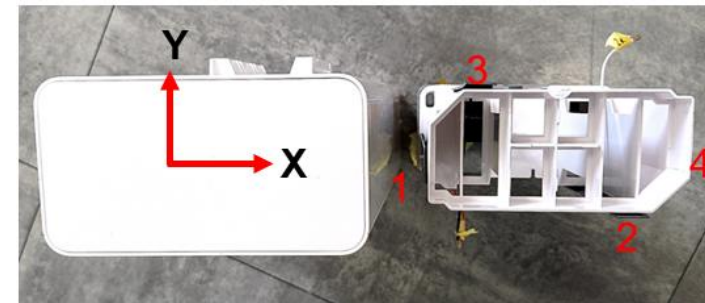
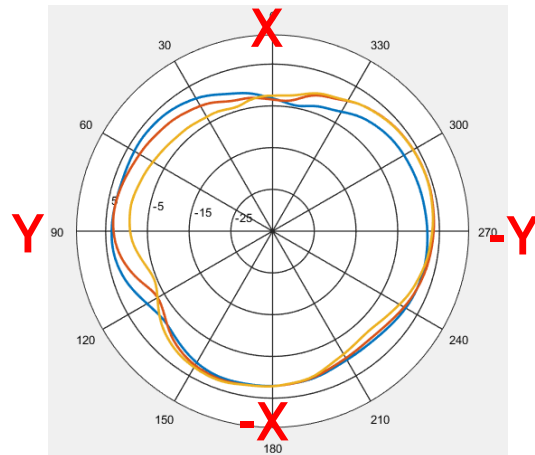
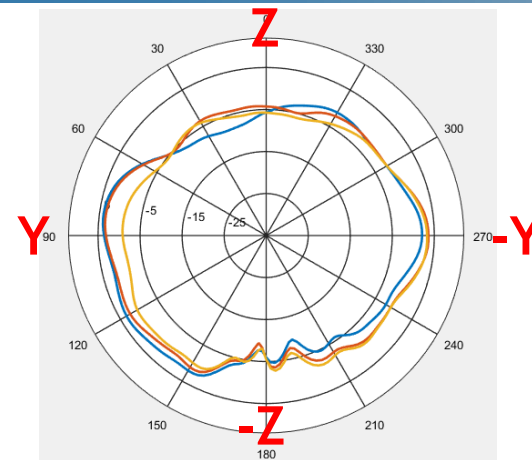
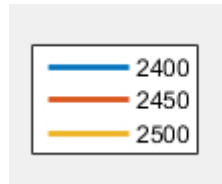
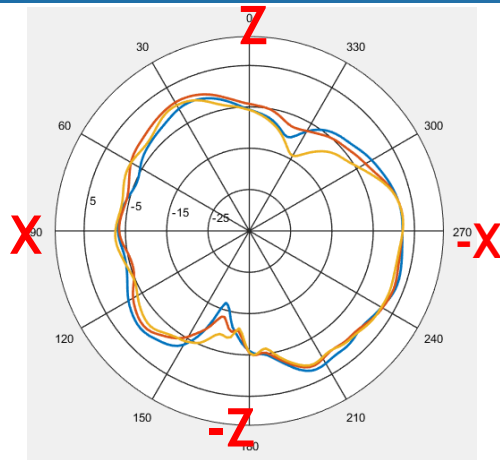


Efficiency

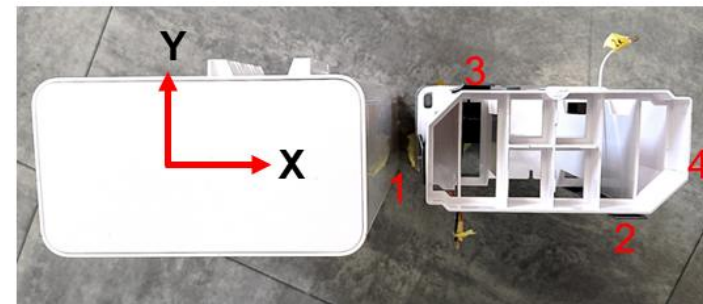
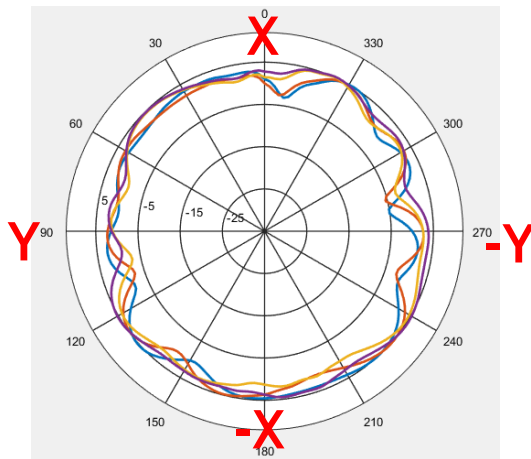
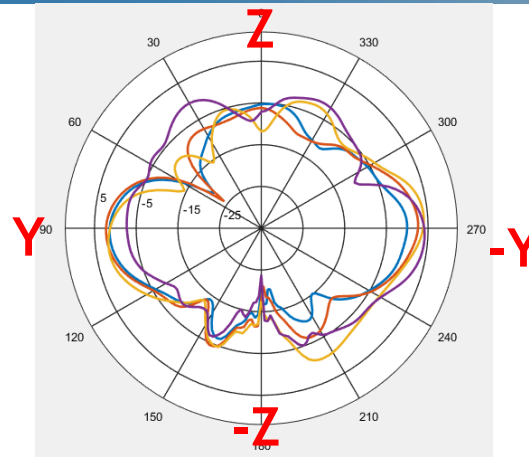
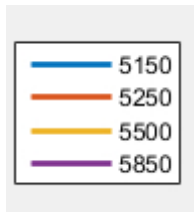
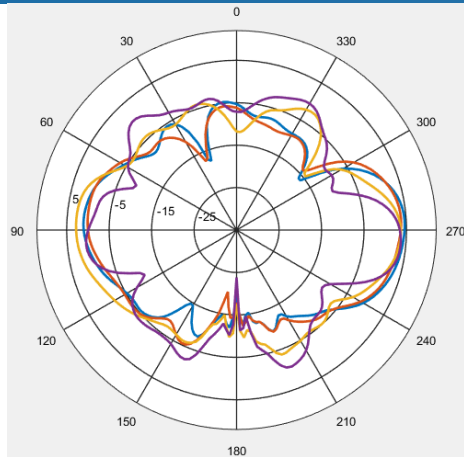


Gain

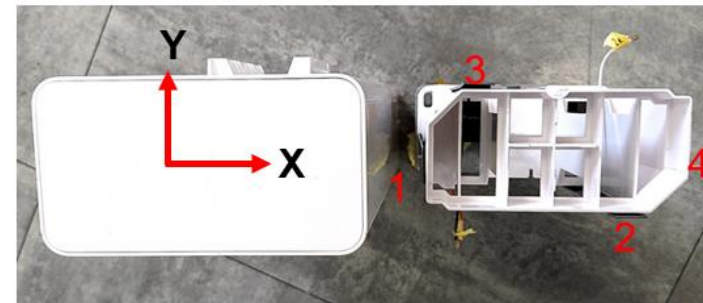
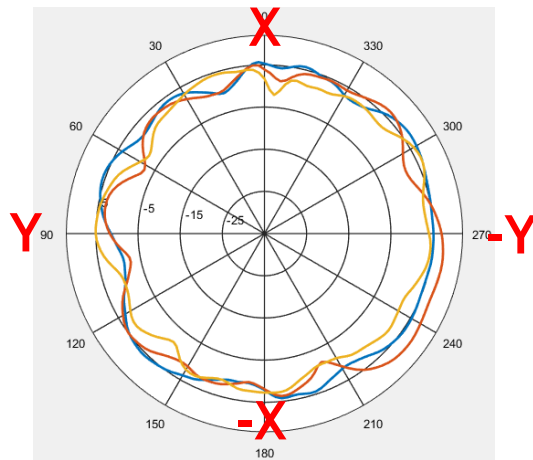
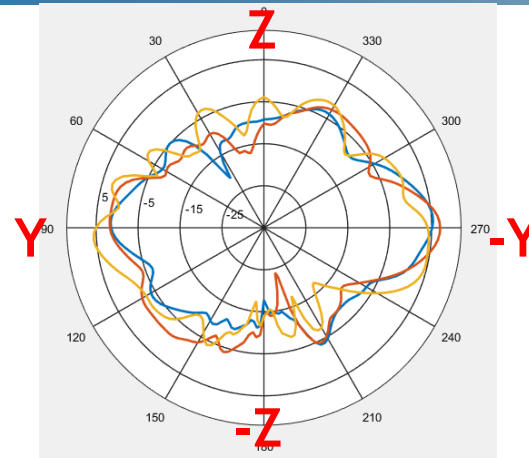
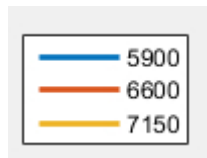
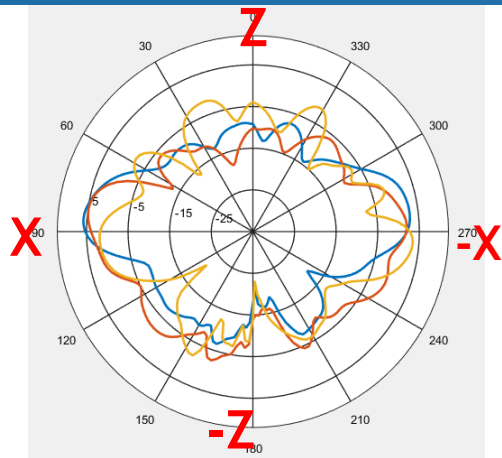
4. Radiation patterns (1-25G-2G)



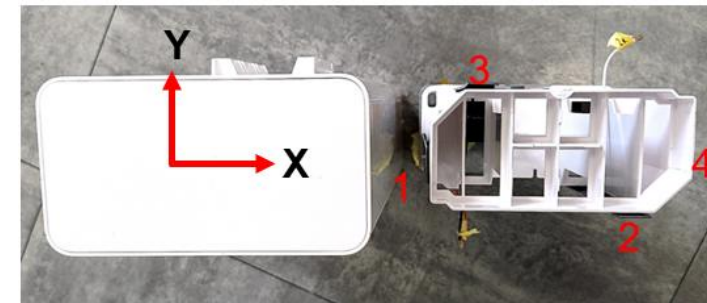
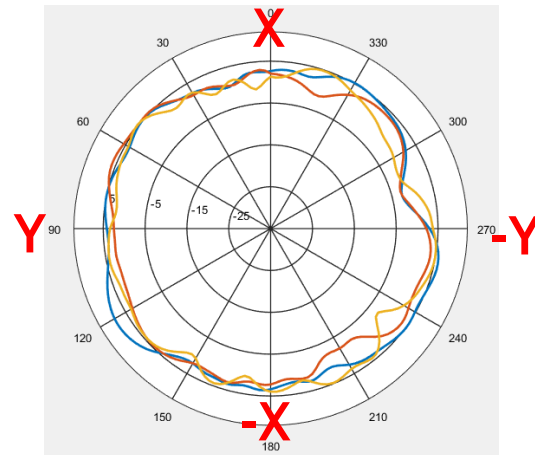
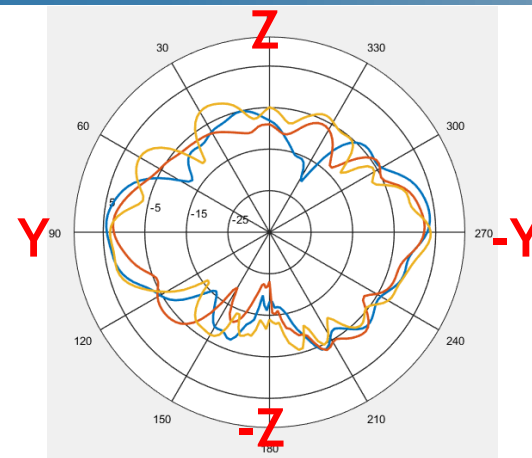
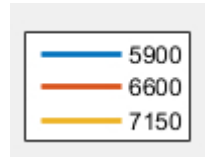
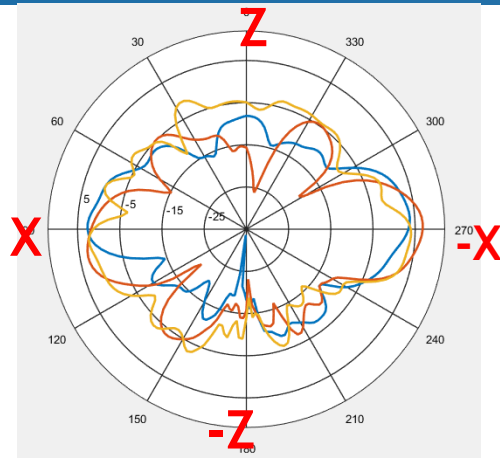
4. Radiation patterns (1-25G-5G)



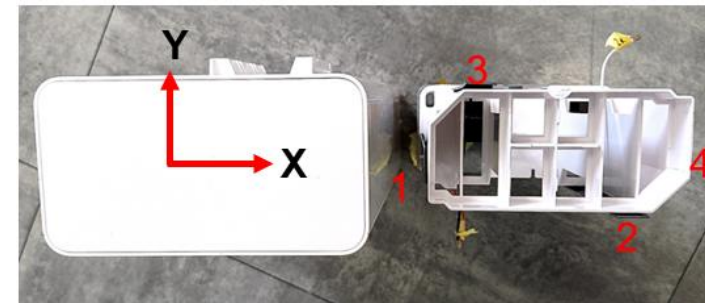
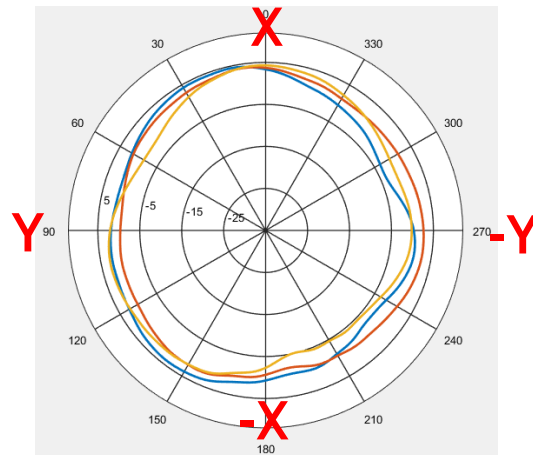
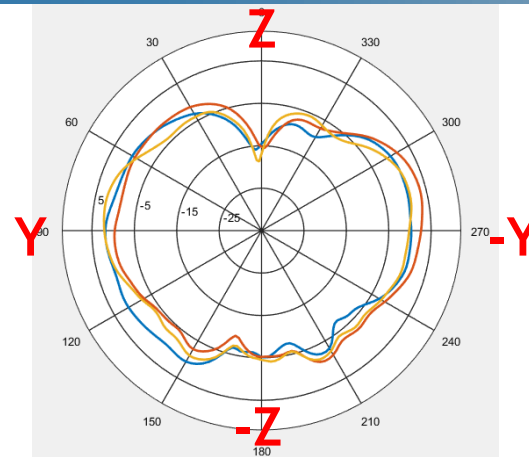
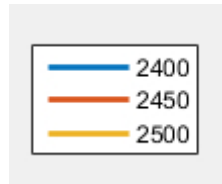
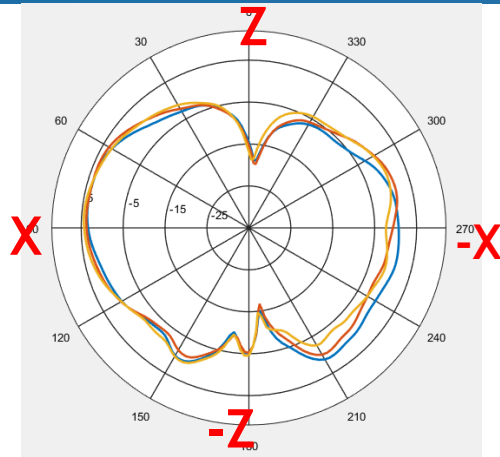
4. Radiation patterns (2-6G)



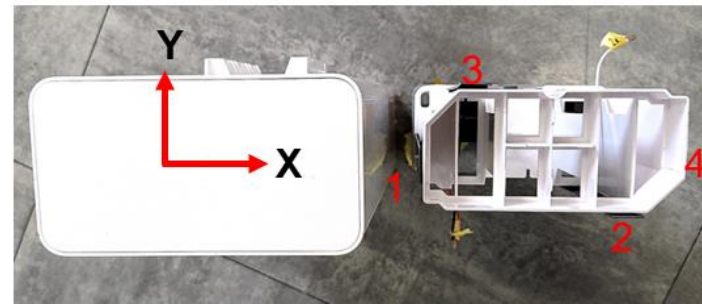
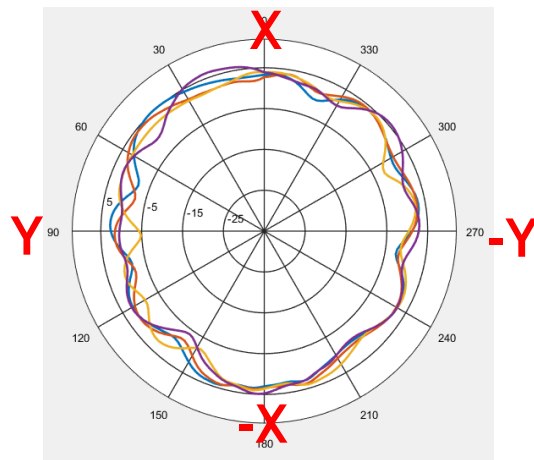
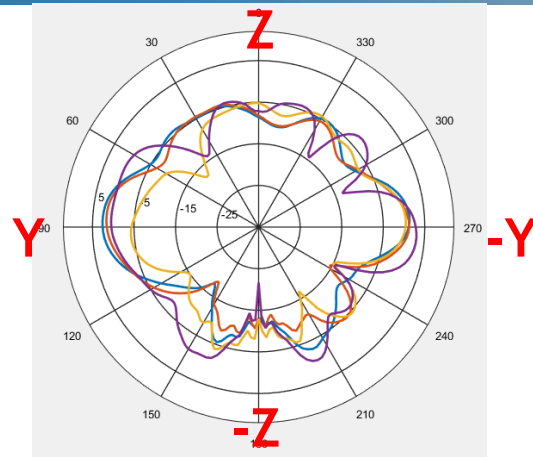
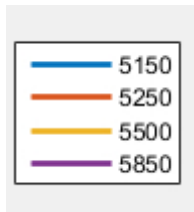
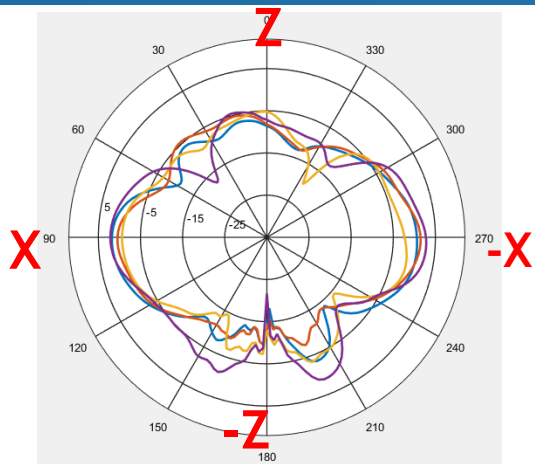
4. Radiation patterns (3-6G)



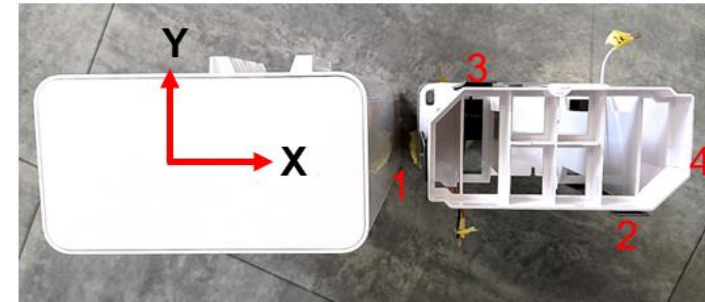
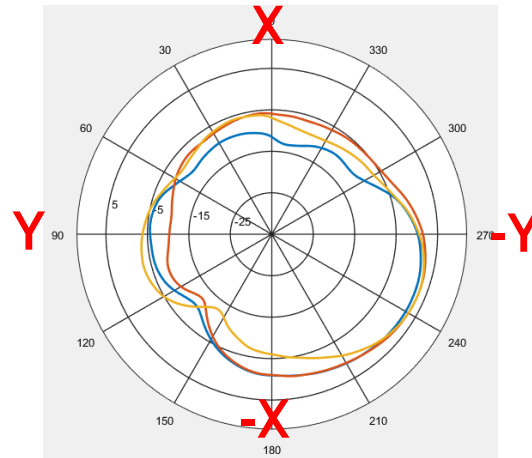
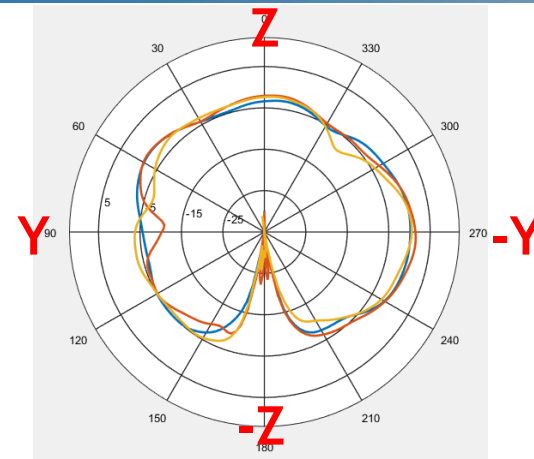
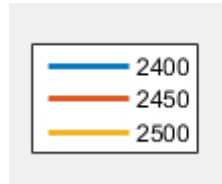
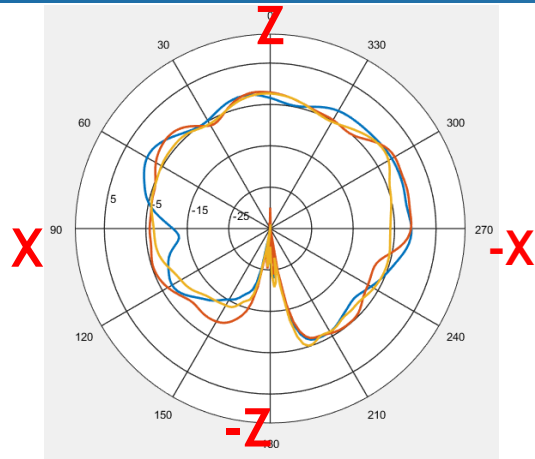
4. Radiation patterns (4-25G-2G)



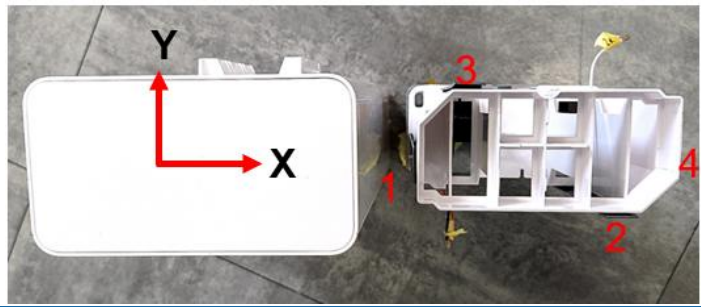
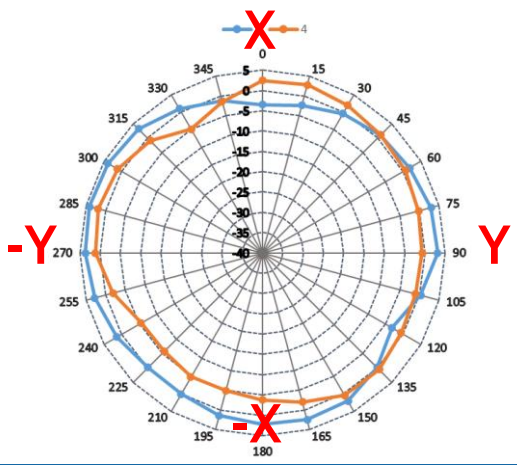
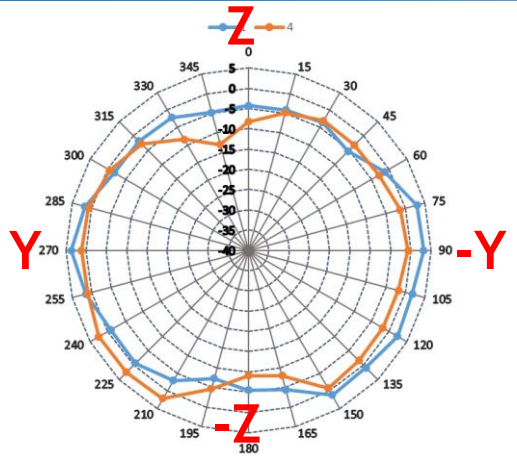
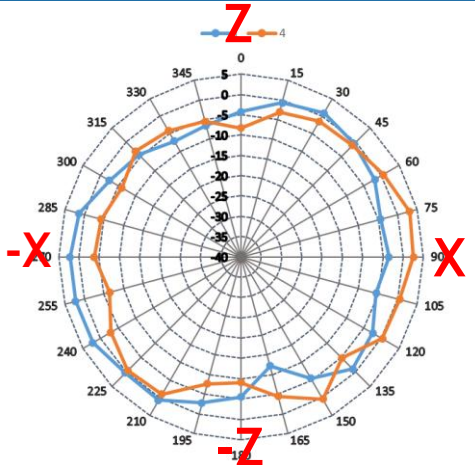
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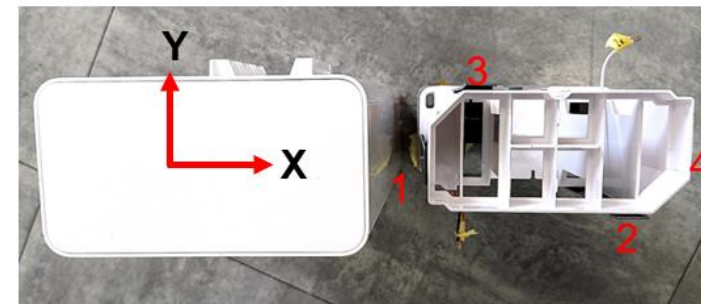
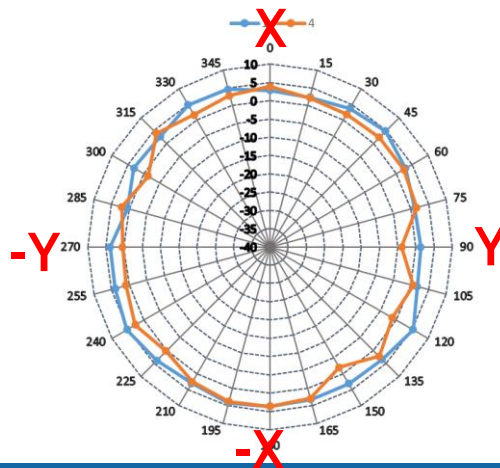
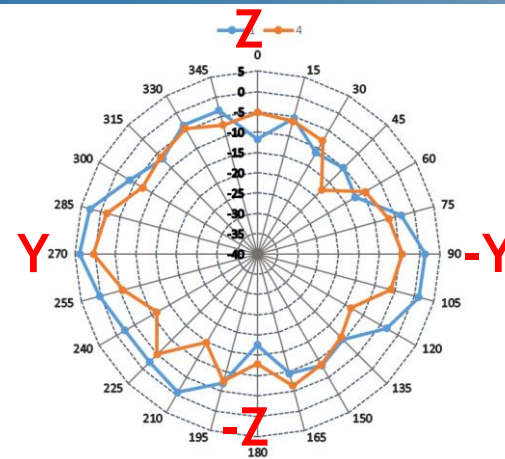
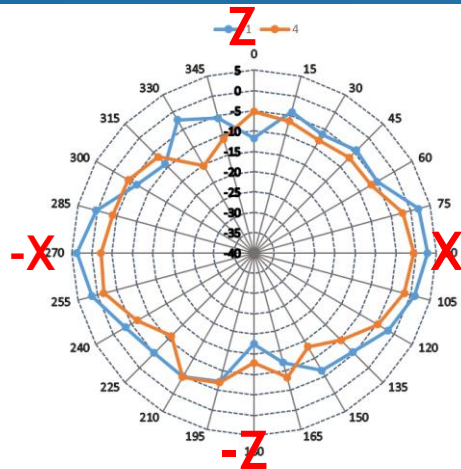
4. Radiation patterns (5-BT-2G)



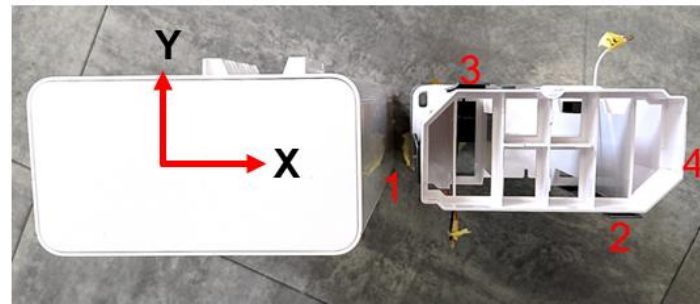
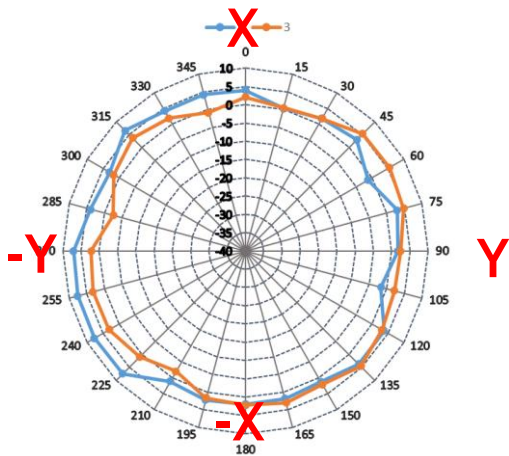
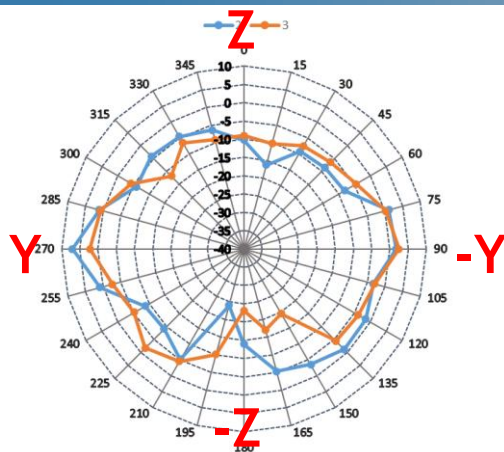
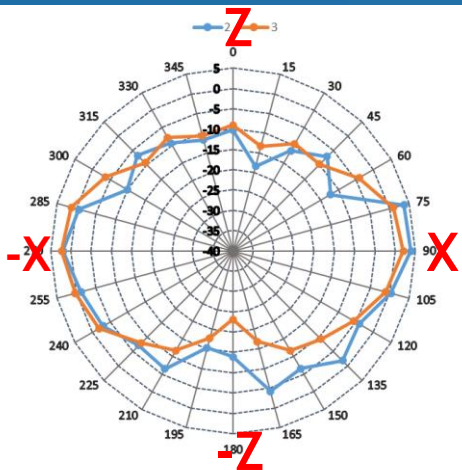
4. Radiation patterns (1&4system coverage 2.45GHz)



4. Radiation patterns (1&4system coverage 5.5GHz)



4. Radiation patterns (2&3system coverage 6.6GHz)



5. Summary

1.The measurements are as follows:

	2G					
Frequency (MHz)	Gain(dBi)			Efficiency(%)		
	1	4	5	1	4	5
2400	4.06	4.86	3.71	78.50	73.39	46.77
2450	4.14	4.23	3.55	71.71	73.95	48.98
2500	4.05	4.48	3.40	79.12	74.36	40.23

	6G			
Frequency (MHz)	Gain(dBi)		Efficiency(%)	
	2	3	2	3
5900	7.09	8.19	78.09	76.34
6600	8.54	7.04	73.78	76.45
7150	6.25	5.49	65.38	70.82

	5G			
Frequency (MHz)	Gain(dBi)		Efficiency(%)	
	1	4	1	4
5150	5.38	5.22	69.09	72.76
5500	5.70	5.88	67.95	67.23
5850	6.39	6.28	68.85	71.53

5. Summary

2.The measurements are as follows:

Frequency (MHz)5	Degree		Gain(dBi)		Correlated Gain(dBi)	Uncorrelated Gain(dBi)
	Theta(°)	Phi(°)	1	4		
2400	32	82	2.12	4.66	6.49	3.57
2450	-84	102	3.58	2.99	6.30	3.30
2500	88	156	3.02	1.52	5.32	2.33

Frequency (MHz)	Degree		Gain(dBi)		Correlated Gain(dBi)	Uncorrelated Gain(dBi)
	Theta(°)	Phi(°)	1	4		
5150	88	176	4.64	3.85	7.26	4.26
5500	-86	166	5.00	5.43	8.23	5.22
5850	94	126	4.23	0.95	7.92	4.99

Frequency (MHz)5	Degree		Gain(dBi)		Correlated Gain(dBi)	Uncorrelated Gain(dBi)
	Theta(°)	Phi(°)	2	3		
5925	88	126	4.80	8.04	9.58	6.72
6600	-94	54	7.01	4.28	8.77	5.86
7150	-92	82	4.49	4.94	7.73	4.72

5. Summary

3.The measurements are as follows:

Antenna	VSWR	Efficiency (%)	Highest Peak Gain (dBi)	E_total (avg) X-Y plane	Mutual Isolation (dBi) 6G Band		Mutual Isolation (dBi) 2G Band			Mutual Isolation (dBi) 5G Band	
					2-6G	3-6G	1-2G	4-2G	5-2G	1-5G	4-5G
1-2G	1.75	71.70	4.14	1.08				-31.77	-22.97		
2-6G	1.89	61.77	8.69	3.82		-28.71	-32.85	-29.71	-41.36	-27.65	-29.80
3-6G	1.96	65.34	8.30	3.96			-26.65	-27.92	-25.22	-31.72	-30.08
4-2G	1.65	73.39	4.86	1.24					-25.05		
1-5G	1.88	63.82	6.39	3.23	-27.04	-27.17					
4-5G	1.92	67.23	6.28	2.52	-28.72	-29.71				-29.58	
5-2G	1.75	48.98	3.71	-0.58	-43.54	-45.34				-37.56	-38.71

5. Summary

3.The measurements are as follows:

Item	Frequency	5150MHz	5200MHz	5250MHz	5900MHz	6300MHz	6500MHz	6700MHz	6900MHz
1	peakgain (elevation >30°)	-4.1	-4.4	-4.6					
2	peakgain (elevation >30°)				-3.7	-4.2	-5.2	-4.4	-4.1
3	peakgain (elevation >30°)				-3.9	-4.7	-5.3	-4.6	-4.4
4	peakgain (elevation >30°)	-4.8	-4.5	-4.1					

Maximum gain at an elevation angle of 30 degrees or more

Item	Frequency	5150MHz		5200MHz		5250MHz		5900MHz		6300MHz		6500MHz		6700MHz		6900MHz	
1&4	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)
		-1.43	-4.44	-1.44	-4.45	-1.34	-4.34										
2&3	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)
								-0.79	-3.80	-1.44	-4.44	-2.24	-5.25	-1.49	-4.50	-1.24	-4.25

Thanks!