

Kastenwagenantenne FTS 96341 Testergebnisse

一、description

Antenna type	FTS 96341	fre	GPS:1570-1580MHz 5G: 700-960MHz; 1700-2700MHz;3300-3800MHz WiFi:2400-2500MH; 5300-5800MHzMHz DVBT:470-500MHz
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1.test purpose

Test over view

FTS 96341 is a four channel combination antenna, Channel 1 GPS: operating frequency 1570-1580MHz, Channel 2, 3, 4, and 5 5G (primary and secondary), operating frequency 700-960MHz; 1700-2700MHz; 3300-3800MHz, channels six and seven WiFi-1, WiFi-2, operating frequencies 2400-2500MHz, 5300-5800MHz; Channel 8: 174 -230MHz und 470MHz -500MHz;. The demand for satellite positioning, wireless communication, and enhanced wireless signals is characterized by small size, low power consumption, and is suitable for various

vehicle terminals, communication boxes, cabinets, and other outdoor communication equipment. It has good moisture-proof and waterproof characteristics and can provide good communication and positioning functions.

1.2test standard

Electrical Parameter

Electrical Parameter				
Fre (MHz)	GNSS	5G	WIFI	DAB
	1570-1580MHZ	700-960MHz; 1700-2700MHz 5300-5800MHz	2400-2500MH; 5300-5800MHz	470-500MHz
VSWR(max)	≤2.5	≤5	≤5	≤7
polarization	RHCP	vertical	vertical	vertical
impedance	50Ω			

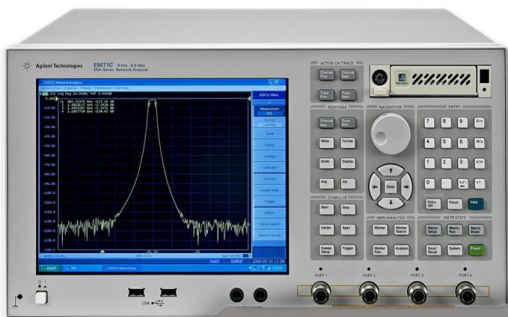
LNA

LNA parameter	detail
gain (no cable)	28±2dB
Noise Figure	≤2dB (LNA)
Output VSWR	≤2.5
impedance	50Ω

Pass band ripple	$\pm 2.0\text{dB}$ (LNA)
Out of band inhibition	$F_0 \pm 100\text{MHz} : 20\text{dBc}$
Output 1dB compression point	$\geq -10\text{dBm}$
voltage	3~5V
current	$\leq 20\text{mA}$



2.test solution



Agilent analyzer



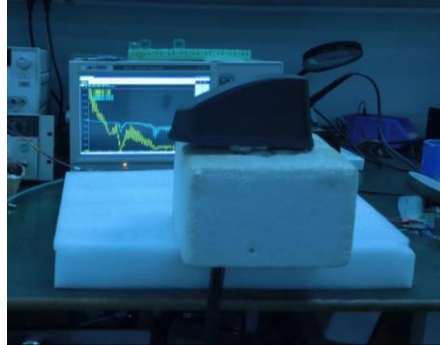
40GHz Test darkroom

2.1 test environment

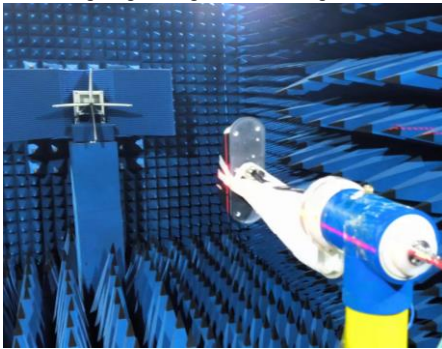
Test device:

400MHz-40GHz antenna far-field testing darkroom

Measurement site of Beidou GPS antenna on the rooftop of the company's building for satellite reception



Hexin Xingtong testing board+testing software



2.2 test method

Antenna performance testing: According to antenna technical requirements, the antenna performance is tested in a testing darkroom, mainly to test technical indicators such as antenna pattern, total antenna gain, axial ratio, efficiency, etc.

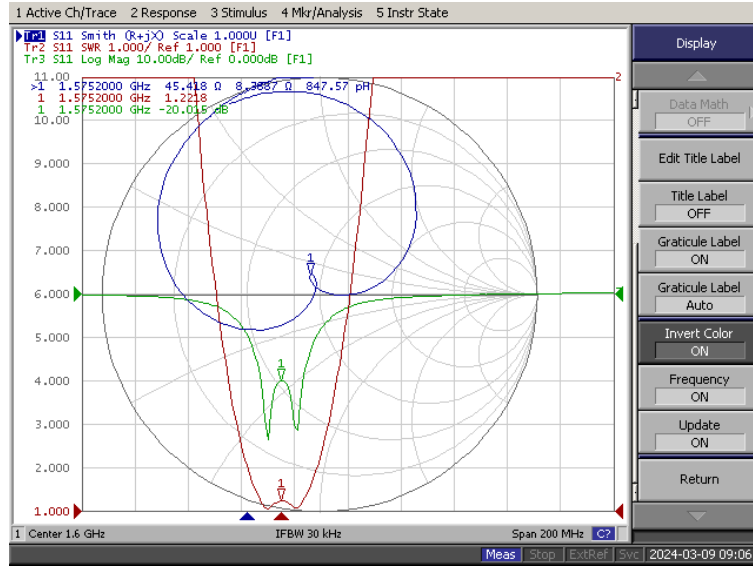
2.3 test method

Antenna receiving satellite test: After the antenna performance test is completed, according to the customer's requirements and actual usage environment, test the performance of the Beidou GPS satellite receiving antenna in actually receiving satellite signals, record and analyze the data of receiving satellite test, and ensure that the antenna can achieve good results in actual use.

三、 Test data

3.1. Test Record (1.0 meter line length)

GPS passived antenna

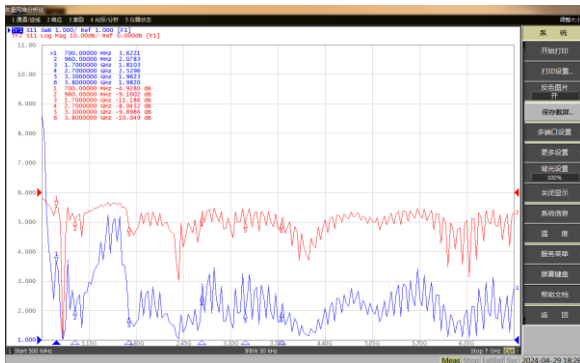


DVBT antenna

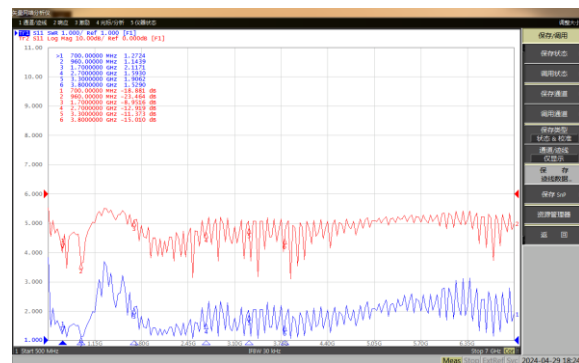


5G-1 antenna

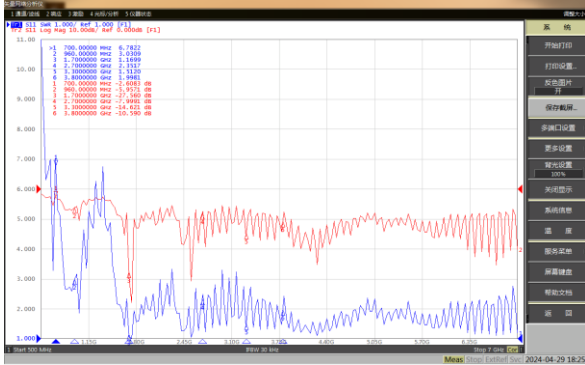
5G-2 antenna



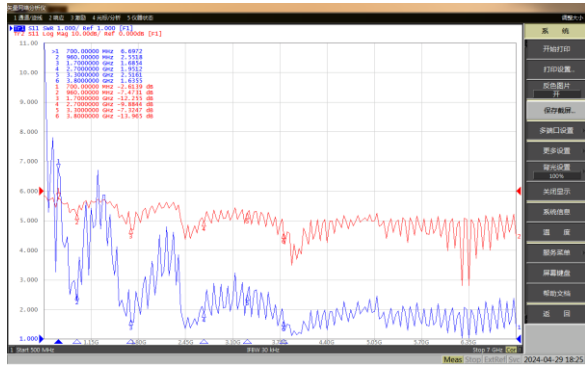
5G-3 antenna



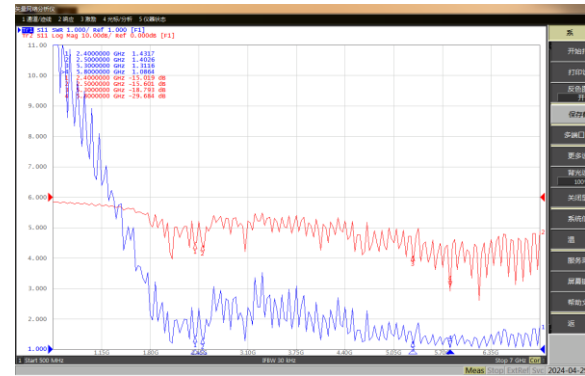
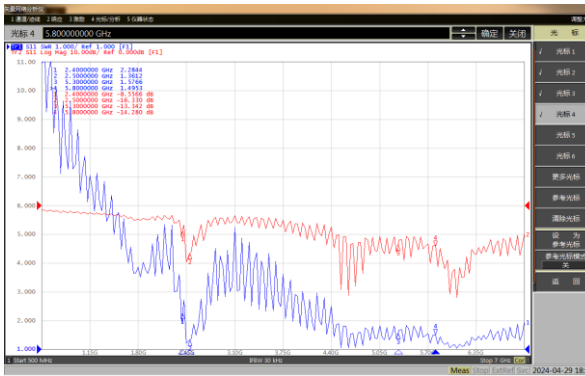
5G-4 antenna



WiFi-1 antenna



WiFi-2 antenna



GPS passived antenna	
fre	1575MHz
vswr	1.22
5G-1 antenna	

fre	700MHz	960MHz	1700MHz	2700MHz	3300MHz	3800MHz
VSWR	3.62	2.07	1.81	2.52	1.96	1.98
5G-2 antenna						
fre	700MHz	960MHz	1700MHz	2700MHz	3300MHz	3800MHz
VSWR	1.27	1.14	2.11	1.59	1.90	1.52
5G-3 antenna						
fre	700MHz	960MHz	1700MHz	2700MHz	3300MHz	3800MHz
VSWR	6.78	3.03	1.16	2.35	1.51	1.99
5G-4 antenna						
fre	700MHz	960MHz	1700MHz	2700MHz	3300MHz	3800MHz
VSWR	6.69	2.55	1.68	1.95	2.51	1.63
WIFI-1 antenna						
fre	2400MHz	2500MHz	5300MHz	5800MHz	/	
VSWR	2.28	1.36	1.57	1.49	/	
WIFI-2 antenna						
fre	2400MHz	2500MHz	5300MHz	5800MHz	/	
VSWR	1.43	1.40	1.31	1.08	/	

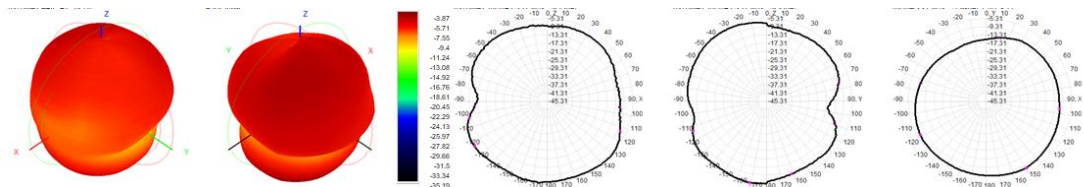
3.2 Darkroom test data

5G-1 antenna gain efficiency

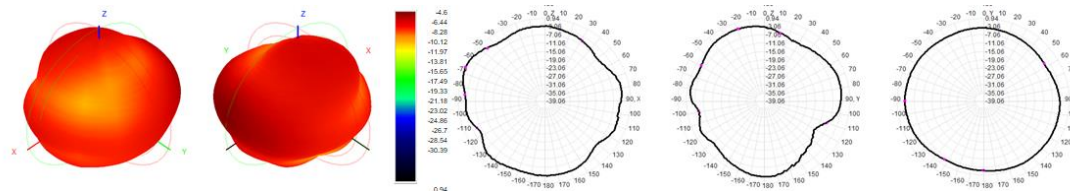
5G-1

Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12	13
Frequency (MHz)	700.0	740.0	780.0	820.0	860.0	900.0	940.0	980.0	1700.0	1800.0	1900.0	2000.0	2100.0
Gain (dBi)	-3.87	-3.14	-2.89	-2.65	-1.30	0.23	0.93	0.94	-0.11	0.10	-1.33	1.49	1.78
Efficiency (%)	15.73	18.98	21.16	23.54	28.25	33.87	32.88	37.18	33.00	33.38	28.44	44.43	45.45
Frequency ID	14	15	16	17	18	19	20	21	22	23	24	25	
Frequency (MHz)	2200.0	2300.0	2400.0	2500.0	2600.0	2700.0	3300.0	3400.0	3500.0	3600.0	3700.0	3800.0	
Gain (dBi)	2.18	0.96	2.85	0.88	1.63	-1.31	0.31	1.12	2.95	3.67	2.17	3.02	
Efficiency (%)	47.70	48.24	41.15	34.78	30.23	38.66	38.20	34.57	37.14	39.87	26.80	32.43	

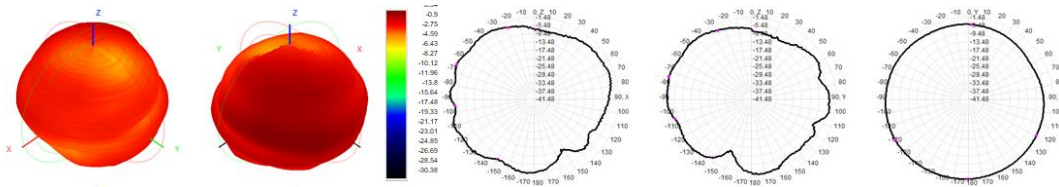
700MHz:



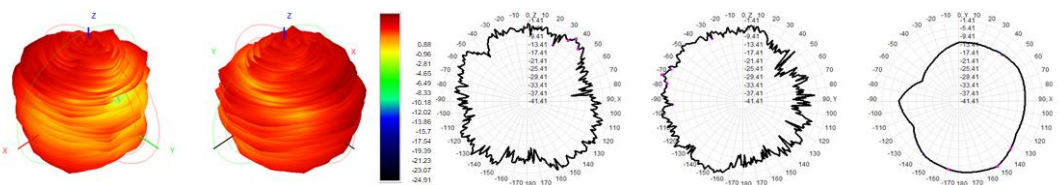
980 MHz:



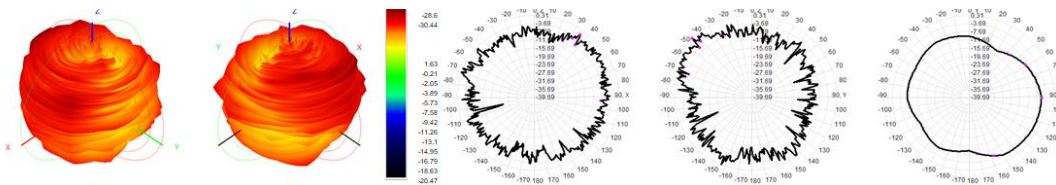
1700 MHz:



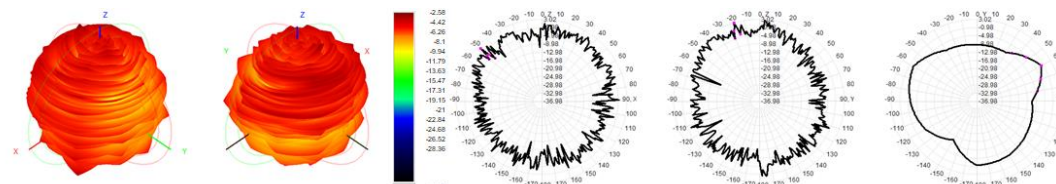
2700 MHz:



3300 MHz:



3800 MHz:

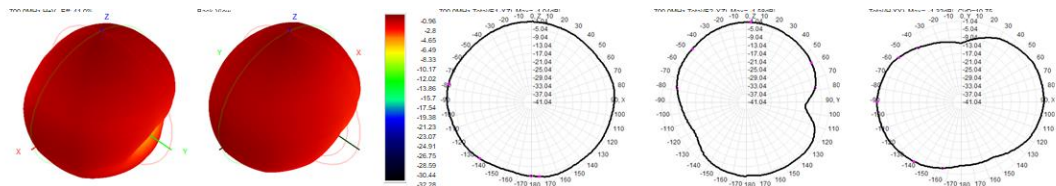


5G-2 antenna gain efficiency

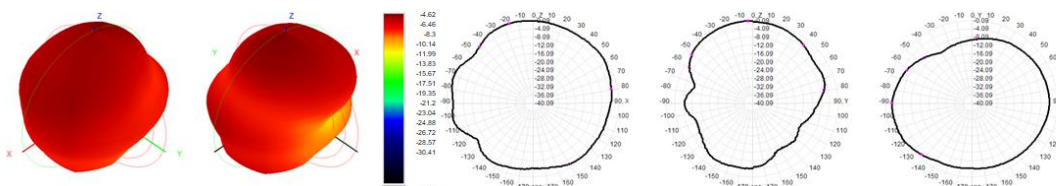
5G-2

Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12	13
Frequency (MHz)	700.0	740.0	780.0	820.0	860.0	900.0	940.0	980.0	1700.0	1800.0	1900.0	2000.0	2100.0
Gain (dBi)	-0.96	-0.58	0.06	0.54	0.47	-1.57	0.91	0.26	1.88	2.43	1.18	3.36	3.47
Efficiency (%)	40.99	36.46	41.27	41.64	40.31	26.26	33.85	33.29	35.76	41.95	39.85	67.26	67.97
Frequency ID	14	15	16	17	18	19	20	21	22	23	24	25	
Frequency (MHz)	2200.0	2300.0	2400.0	2500.0	2600.0	2700.0	3300.0	3400.0	3500.0	3600.0	3700.0	3800.0	
Gain (dBi)	2.54	3.83	2.96	3.18	2.97	2.11	1.02	2.68	3.75	3.60	2.90	2.45	
Efficiency (%)	52.89	63.91	53.19	50.24	59.44	40.94	33.83	43.10	48.87	49.26	36.29	37.87	

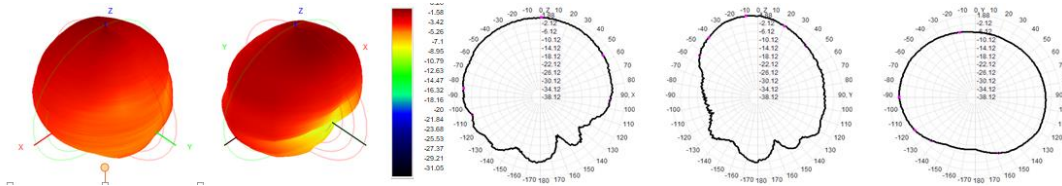
700 MHz:



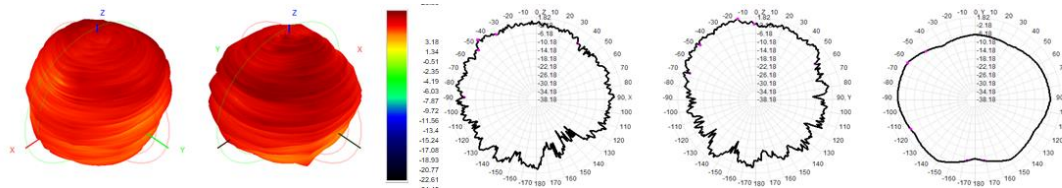
980 MHz:



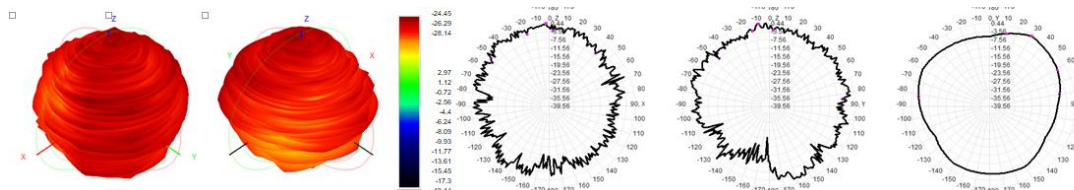
1700 MHz:



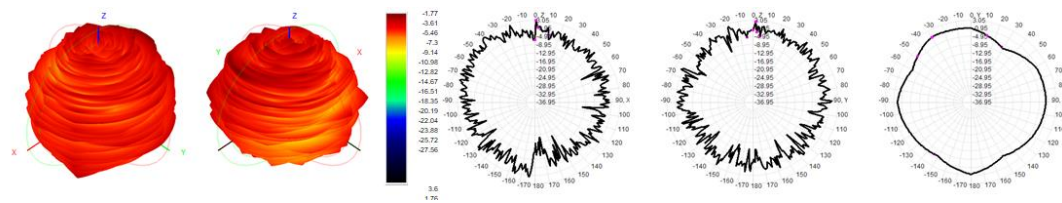
2700 MHz:



3300 MHz:



3800 MHz:

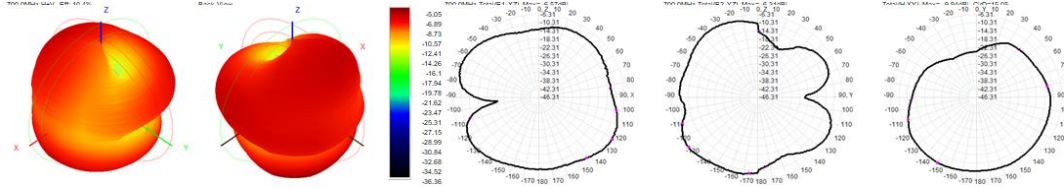


5G-3 antenna gain efficiency

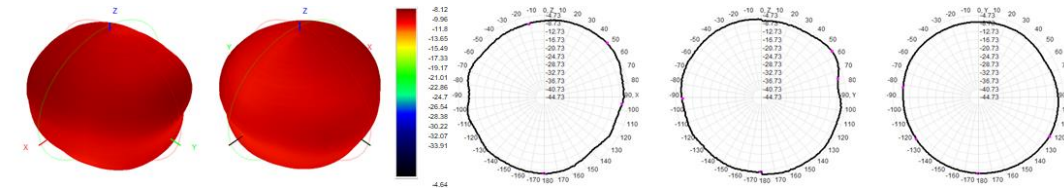
5G-3

Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12	13
Frequency (MHz)	700.0	740.0	780.0	820.0	860.0	900.0	940.0	980.0	1700.0	1800.0	1900.0	2000.0	2100.0
Gain (dBi)	-5.05	-5.19	-4.81	-4.63	-3.68	-2.78	-2.59	-4.64	0.05	-0.28	-0.69	1.81	-0.75
Efficiency (%)	10.37	11.06	13.97	16.45	20.06	19.59	20.01	18.30	35.31	36.15	29.39	48.99	32.37
Frequency ID	14	15	16	17	18	19	20	21	22	23	24	25	
Frequency (MHz)	2200.0	2300.0	2400.0	2500.0	2600.0	2700.0	3300.0	3400.0	3500.0	3600.0	3700.0	3800.0	
Gain (dBi)	-1.34	-0.47	1.21	2.19	2.38	-1.88	1.13	3.11	2.76	2.76	1.21	2.14	
Efficiency (%)	27.11	19.99	36.86	40.99	34.10	17.41	29.18	42.32	44.10	36.03	27.33	36.80	

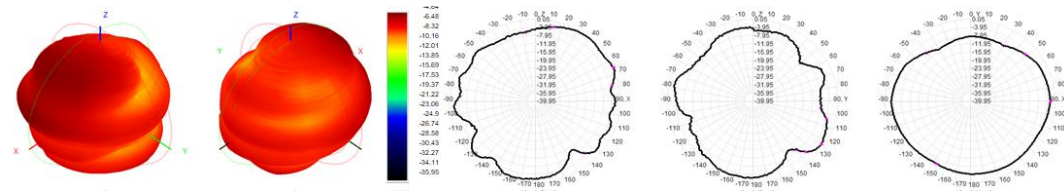
700 MHz:



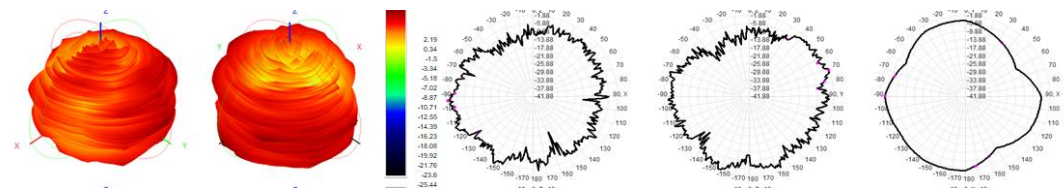
980 MHz:



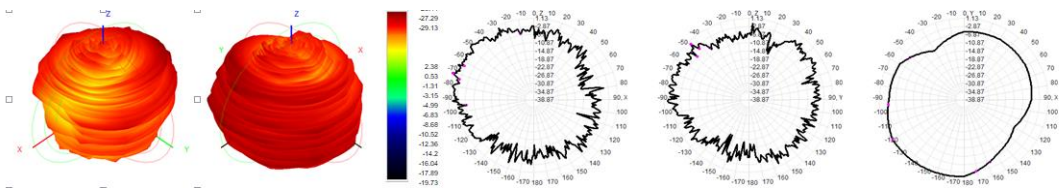
1700 MHz:



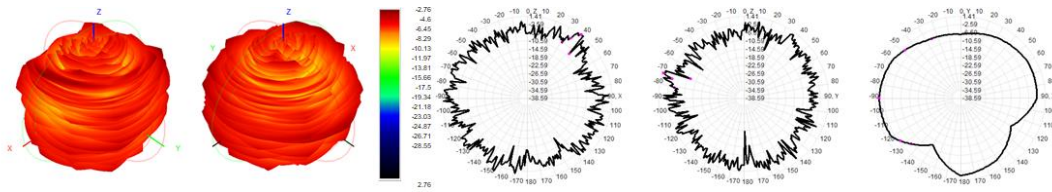
2700 MHz:



3300 MHz:



3800 MHz:

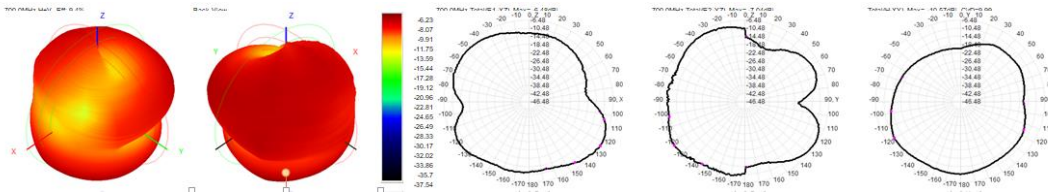


5G-4 antenna gain efficiency

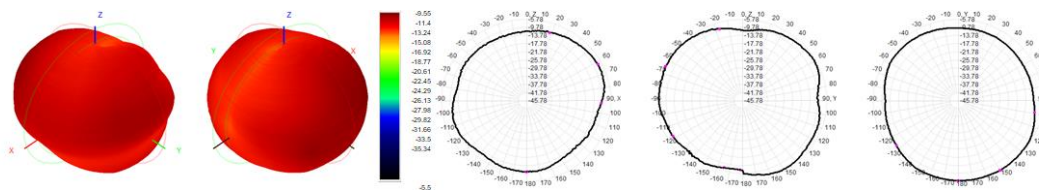
5G-4

Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12	13
Frequency (MHz)	700.0	740.0	780.0	820.0	860.0	900.0	940.0	980.0	1700.0	1800.0	1900.0	2000.0	2100.0
Gain (dBi)	-6.23	-6.58	-6.06	-6.07	-5.27	-4.30	-4.03	-5.50	-0.61	0.44	-0.04	-0.05	-2.18
Efficiency (%)	9.44	8.67	9.64	10.27	12.15	12.39	12.71	13.43	29.98	35.83	31.06	30.75	21.30
Frequency ID	14	15	16	17	18	19	20	21	22	23	24	25	
Frequency (MHz)	2200.0	2300.0	2400.0	2500.0	2600.0	2700.0	3300.0	3400.0	3500.0	3600.0	3700.0	3800.0	
Gain (dBi)	-2.70	-2.92	1.74	1.99	0.04	-0.55	0.06	3.64	3.09	2.40	1.41	4.05	
Efficiency (%)	13.21	11.42	33.12	40.46	29.76	23.64	21.72	35.97	36.75	33.11	25.19	34.99	

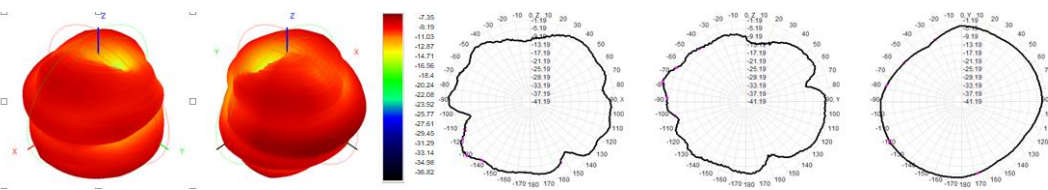
700 MHz:



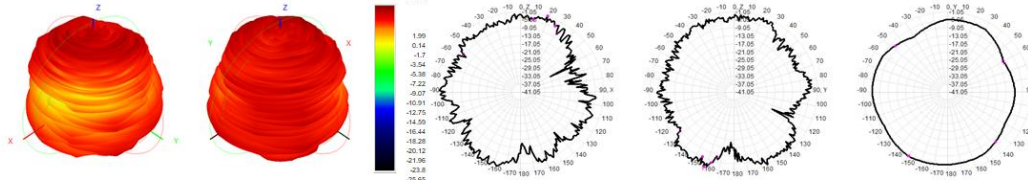
980 MHz:



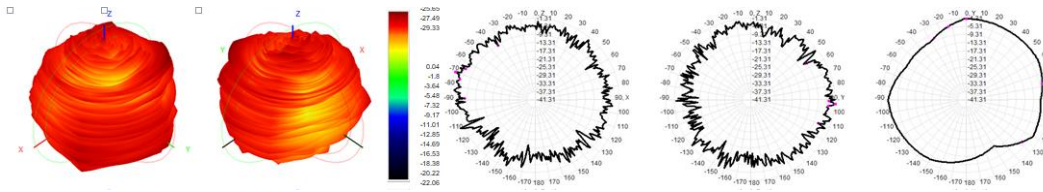
1700 MHz:



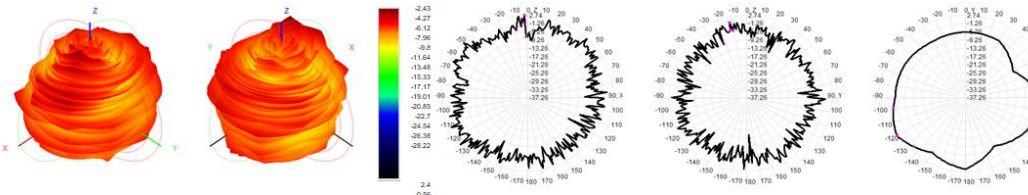
2700 MHz:



3300 MHz:



3800 MHz:

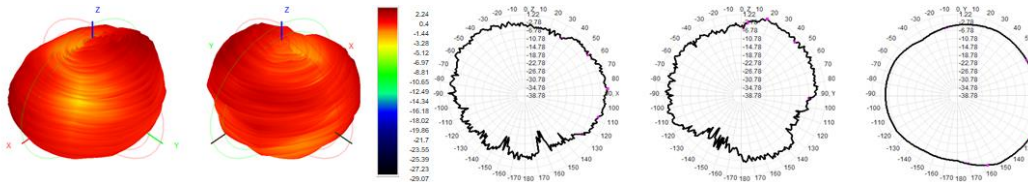


WiFi-1 antenna gain efficiency

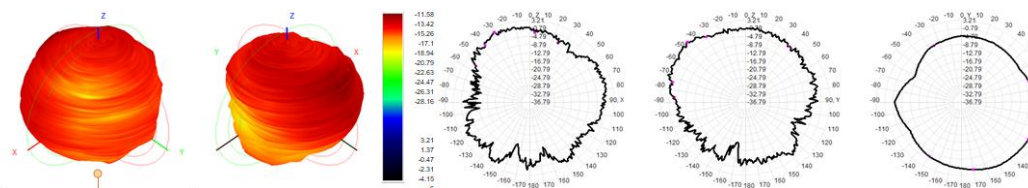
WiFi-1

Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12
Frequency (MHz)	2400.0	2420.0	2440.0	2460.0	2480.0	2500.0	5300.0	5400.0	5500.0	5600.0	5700.0	5800.0
Gain (dBi)	2.24	1.99	1.56	2.07	3.16	3.21	3.52	3.24	3.94	3.11	3.49	4.40
Efficiency (%)	42.80	36.76	38.95	41.43	42.93	43.29	32.90	48.04	48.48	45.99	47.93	58.91

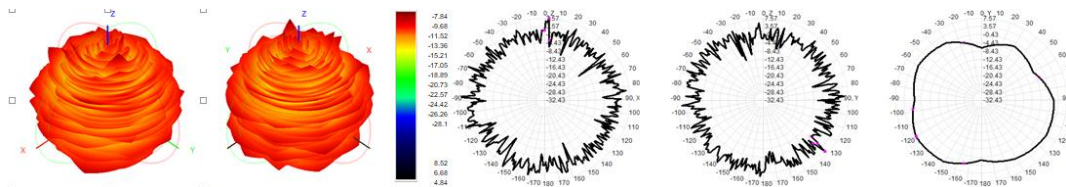
2400 MHz:



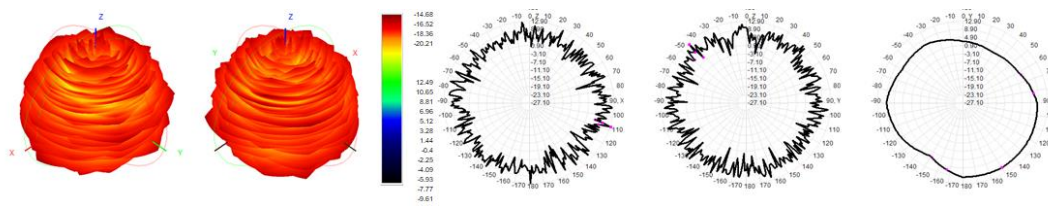
2500 MHz:



5300 MHz:



5800 MHz:

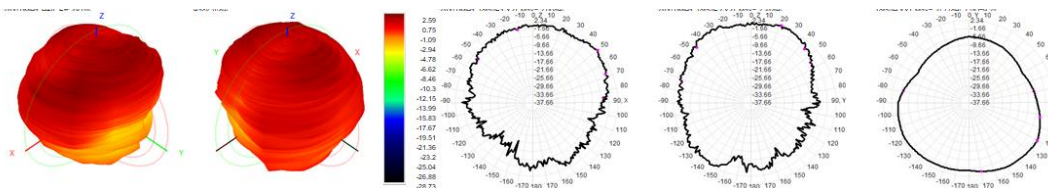


WiFi-2 antenna gain efficiency

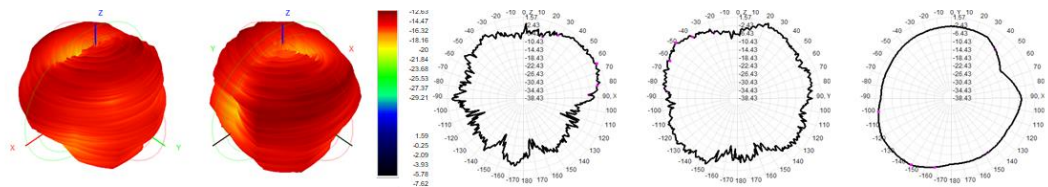
WIFI-2

Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12
Frequency (MHz)	2400.0	2420.0	2440.0	2460.0	2480.0	2500.0	5300.0	5400.0	5500.0	5600.0	5700.0	5800.0
Gain (dBi)	2.59	2.31	2.77	2.51	2.11	2.59	3.91	3.76	3.84	3.26	3.62	3.61
Efficiency (%)	47.95	40.89	44.26	43.53	46.23	42.57	40.07	46.90	43.26	44.20	45.66	48.65

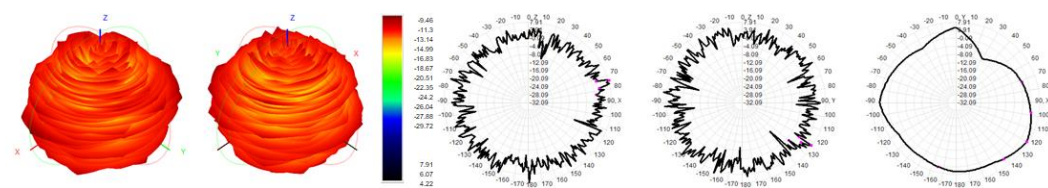
2400 MHz:



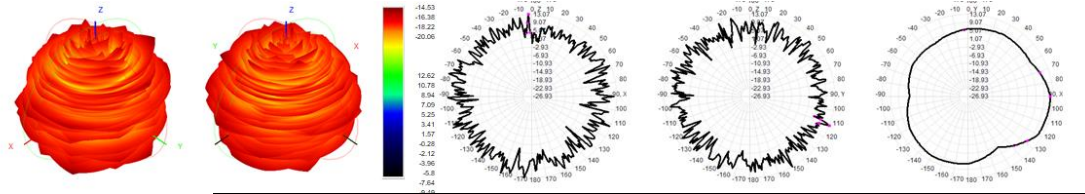
2500 MHz:



5300 MHz:



5800 MHz:



5G-1 antenna						
fre	700M Hz	980MHz	1700MHz	2700MHz	3300MHz	3800MHz
gain	-3.87	0.94	-0.11	-1.31	0.31	3.02
efficiency	15.73	37.18	33.00	18.66	18.20	32.43
5G-2 antenna						
fre	700M Hz	980MHz	1700MHz	2700MHz	3300MHz	3800MHz
gain	-0.96	0.26	1.88	2.11	1.02	2.45
efficiency	40.99	33.29	35.76	40.94	33.83	37.87
5G-3 antenna						
fre	700M Hz	980MHz	1700MHz	2700MHz	3300MHz	3800MHz
gain	-5.05	-4.64	0.05	-1.88	1.13	2.14
efficiency	10.37	18.30	35.31	17.41	29.18	36.80

5G-4 antenna						
fre	700M Hz	980MHz	1700MHz	2700MHz	3300MHz	3800MHz
gain	-6.23	-5.50	-0.61	-0.55	0.06	4.05
efficiency	9.44	13.43	29.98	23.64	21.72	34.99
WIFI-1 antenna						
fre	2400 MHz	2500MHz	5300MHz	5800MHz	/	
gain	2.24	3.21	3.52	4.40	/	
efficiency	42.80	43.29	32.90	58.91	/	
WIFI-2 antenna						
fre	2400 MHz	2500MHz	5300MHz	5800MHz	/	
gain	2.59	2.59	3.91	3.61	/	
efficiency	47.95	42.57	40.07	48.65	/	

3.3 Star receiving test

Test environment and configuration

Test weather: cloudy

Test date: May 3rd, 2024

Testing location: rooftop of company building

Testing software: Hexin Xingtong testing software

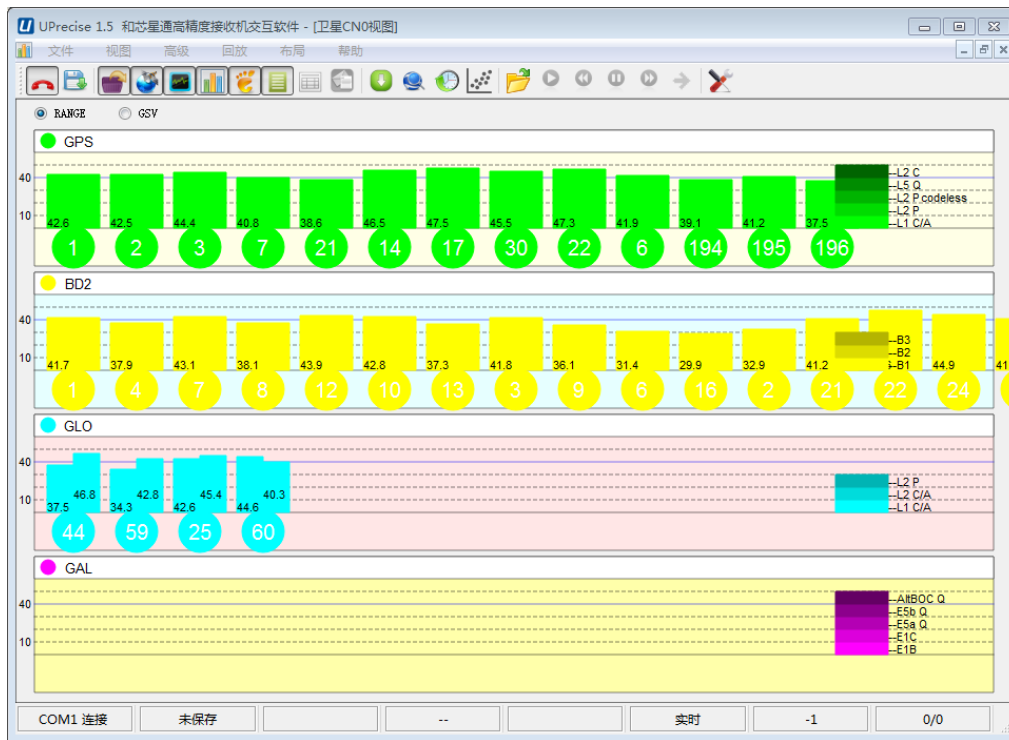
Testing method:

Firstly, install the antenna in the required position of the prototype, with the antenna facing upwards. Connect the antenna to the

demodulation receiver module and confirm that the satellite receiving data can be read normally



Top floor test results (for reference only)



fre	C/N data
s GPS	<p>47.5、47.3、46.5、46.1、45.5、44.4、42.6、42.5、41.9</p> <p>41.2、40.8</p>

The samples were tested on the rooftop with GPS data of over 40 and received around 11 stars, with a highest receiving star of 47.5, indicating excellent testing results.