

PRODUCT TEST REPORT

of Four-star and Full-range Measurement Antenna

LCY4N75A

Version: LCY4N75A. C01-V0.1

Compose/ Date:

Audit / Date:

Approve/Date:

1. Passive Antennas Performance

1.1 GNSS Antenna Performance

1.1.1 Antenna Pattern Performance

Test environment:

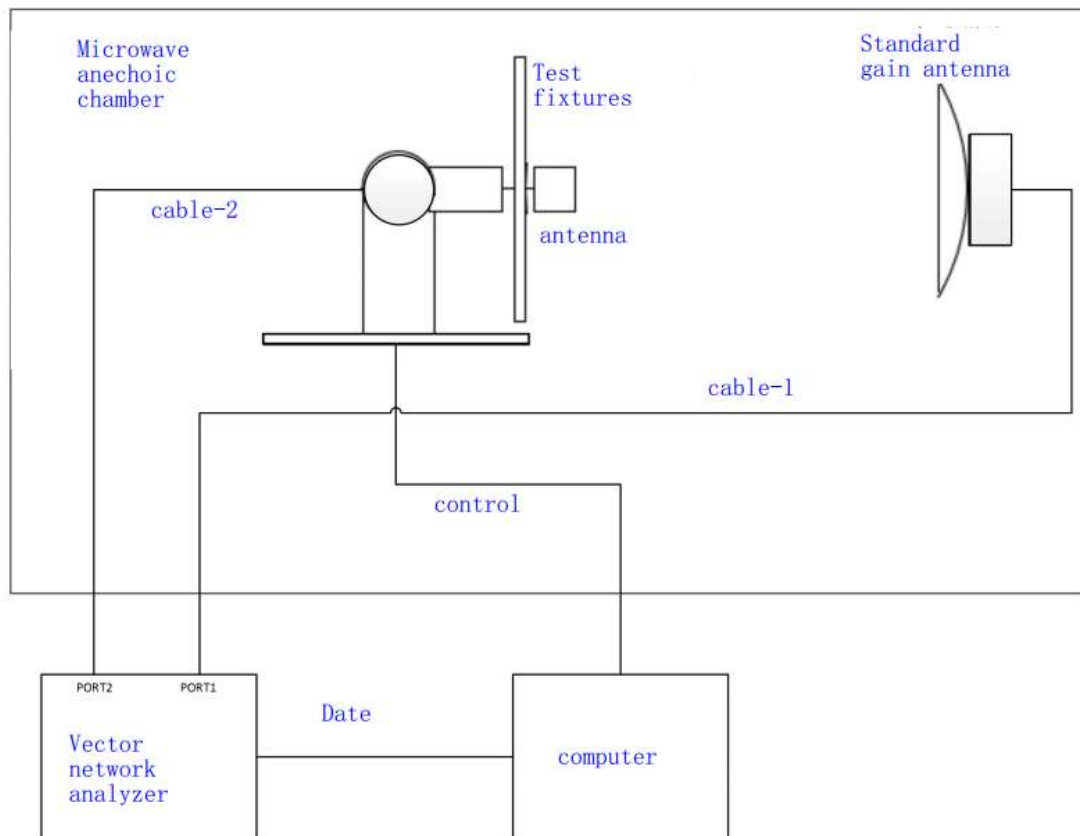


Figure 1: Antenna pattern Test schematic

Test equipment: Far-field microwave anechoic chamber

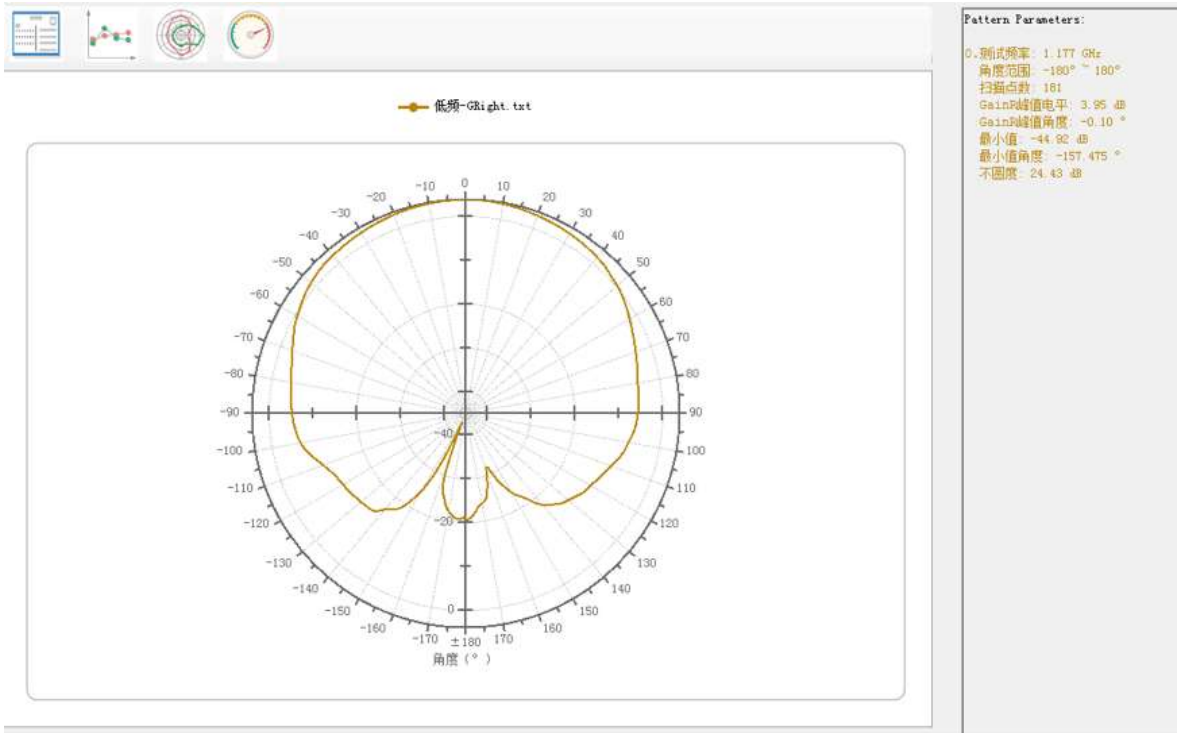
Test Method:

- 1) Calibrate the gain standard data of 1.15GHz-1.3GHz and 1.5GHz-1.65GHz in advance in the microwave anechoic chamber environment, and store them in the test system;
- 2) Set up the test environment as shown in Figure 1, connect Cable-2 to the passive antenna port to be tested, and connect the other ports to 50 ohm load;
- 3) Set the swept frequency range through the antenna test software;
- 4) During the test, the test software automatically completes the collection and storage of the test data of the passive antenna under test, Savings and calculations.

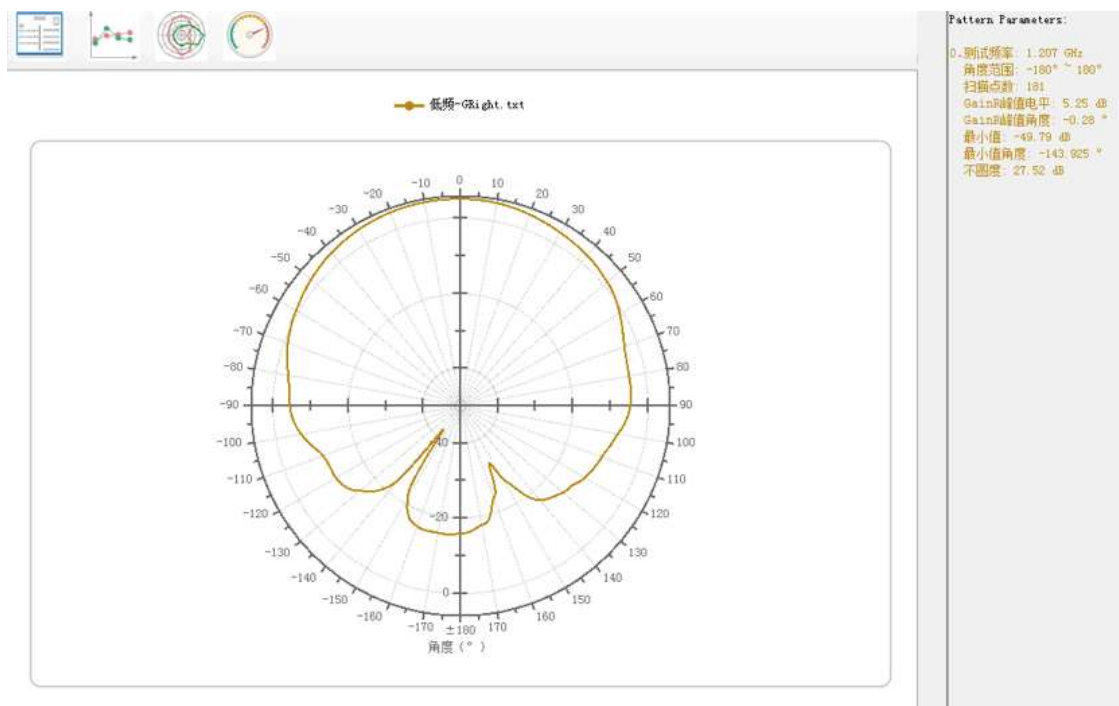
Test results:

Frequency (MHz)	Gain dBi	Axial ratio dB
1176	3.95	0.97
1207	5.25	0.86
1227	5.66	0.32
1246	5.57	0.08
1268	4.65	0.67
1561	5.5	1.09
1575	6.02	0.74
1602	5.59	0.36

Antenna Gain patterns :



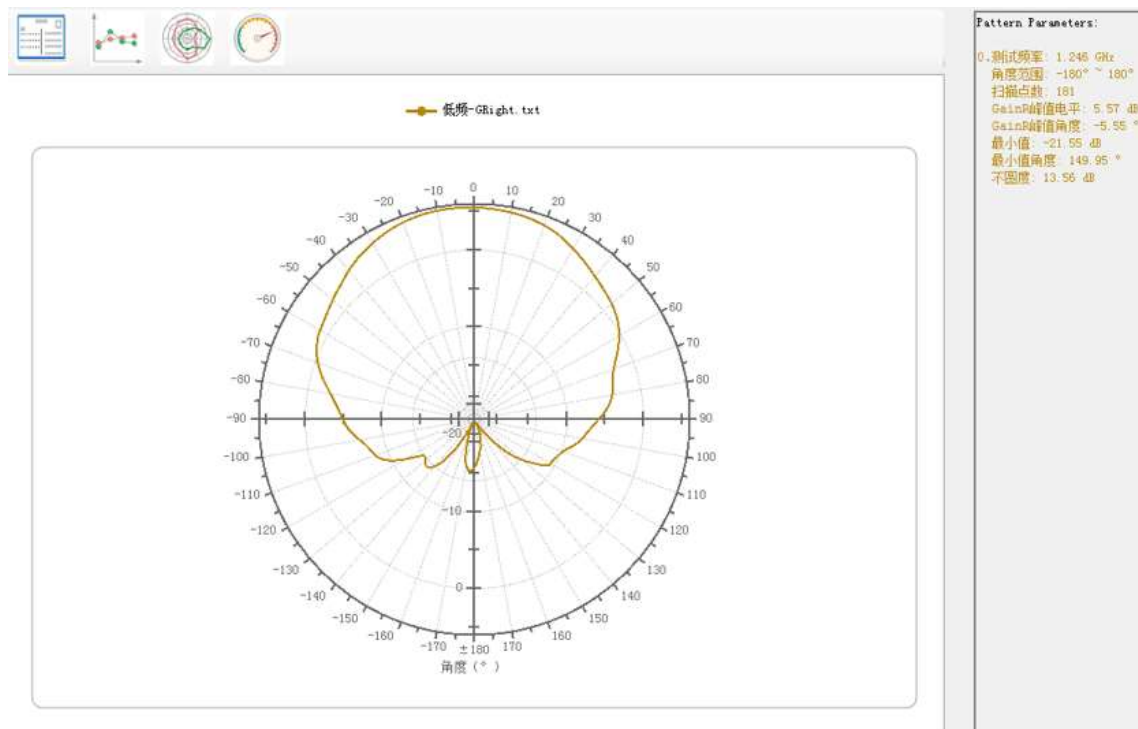
1176MHz: Gain



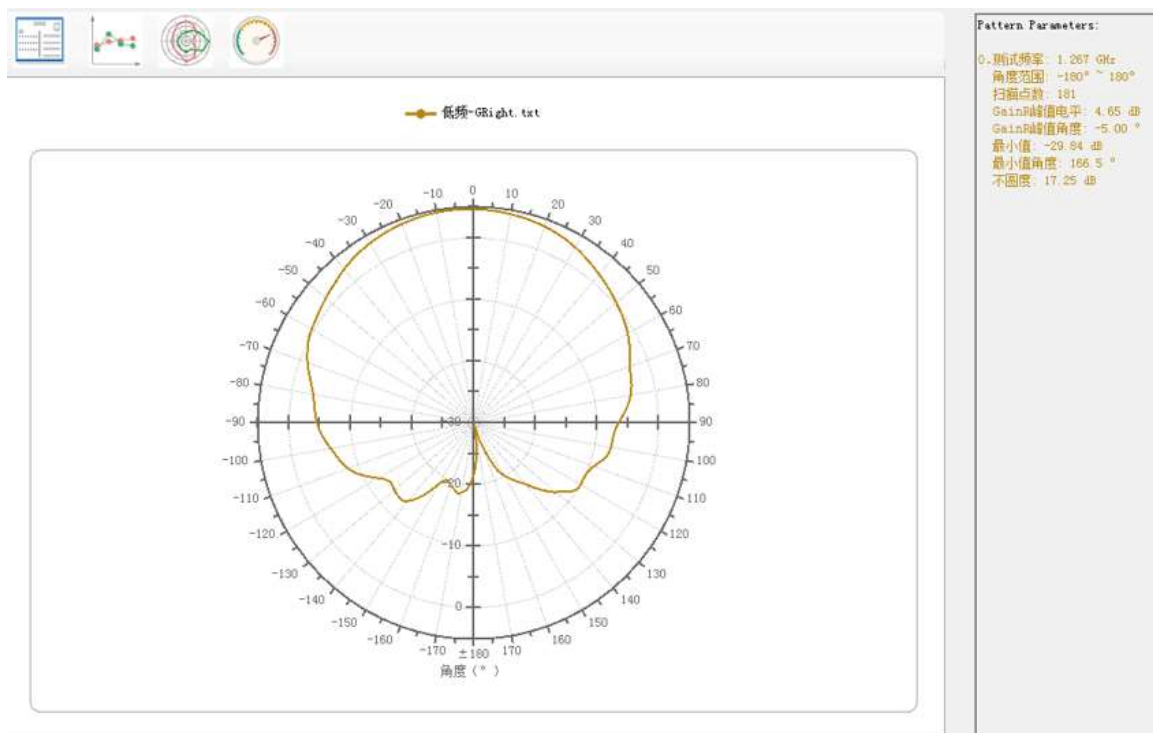
1207 MHz: Gain



1227 MHz: Gain



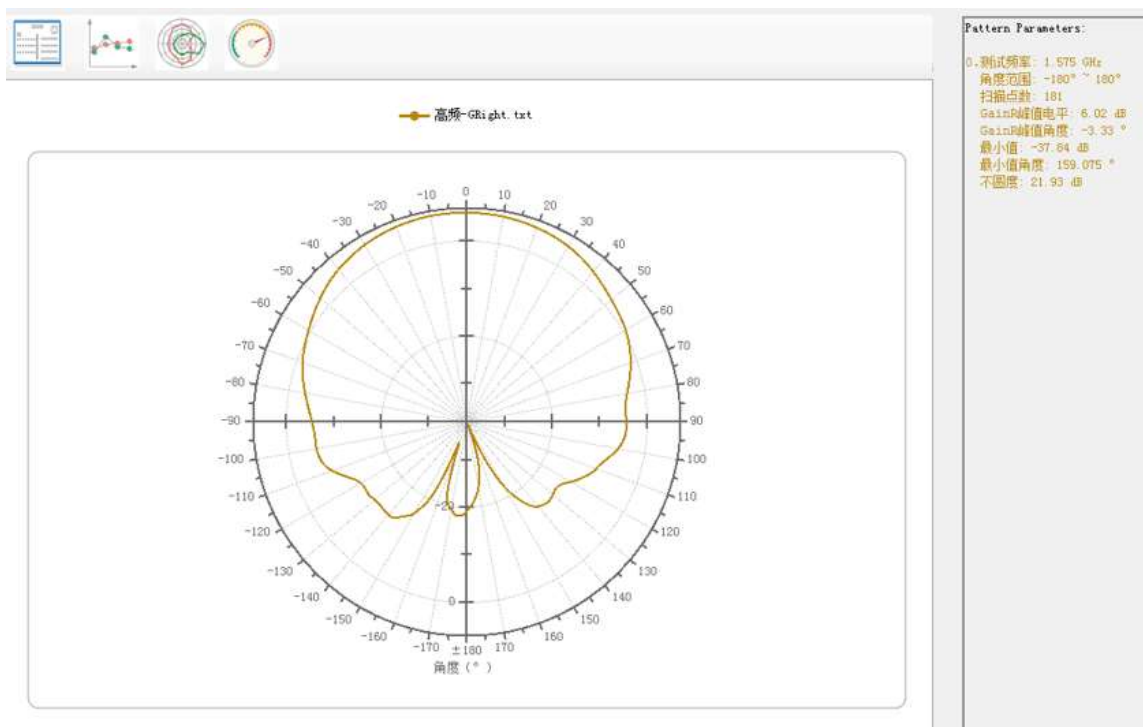
1246 MHz: Gain



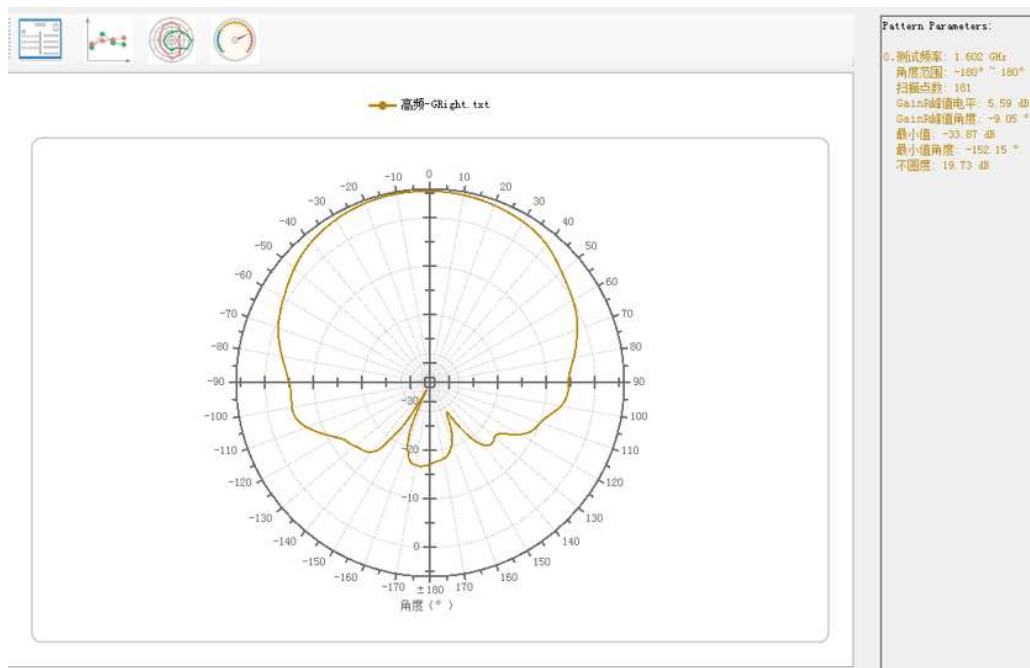
1268 MHz: Gain



1559 MHz: Gain

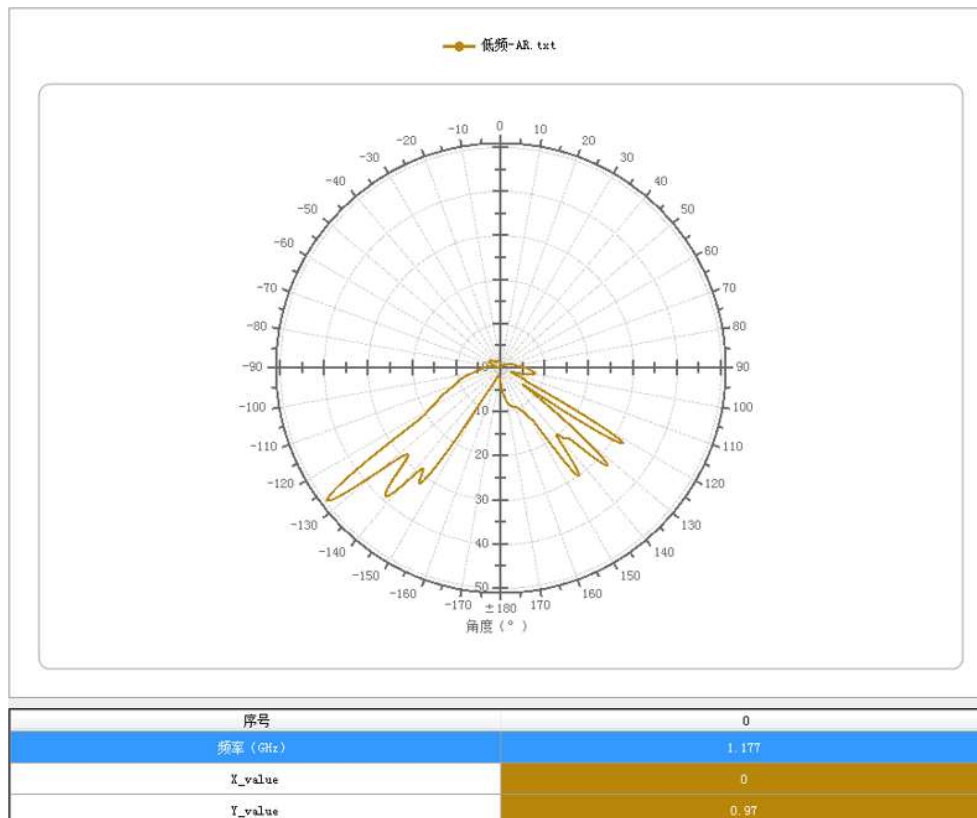


1575 MHz: Gain

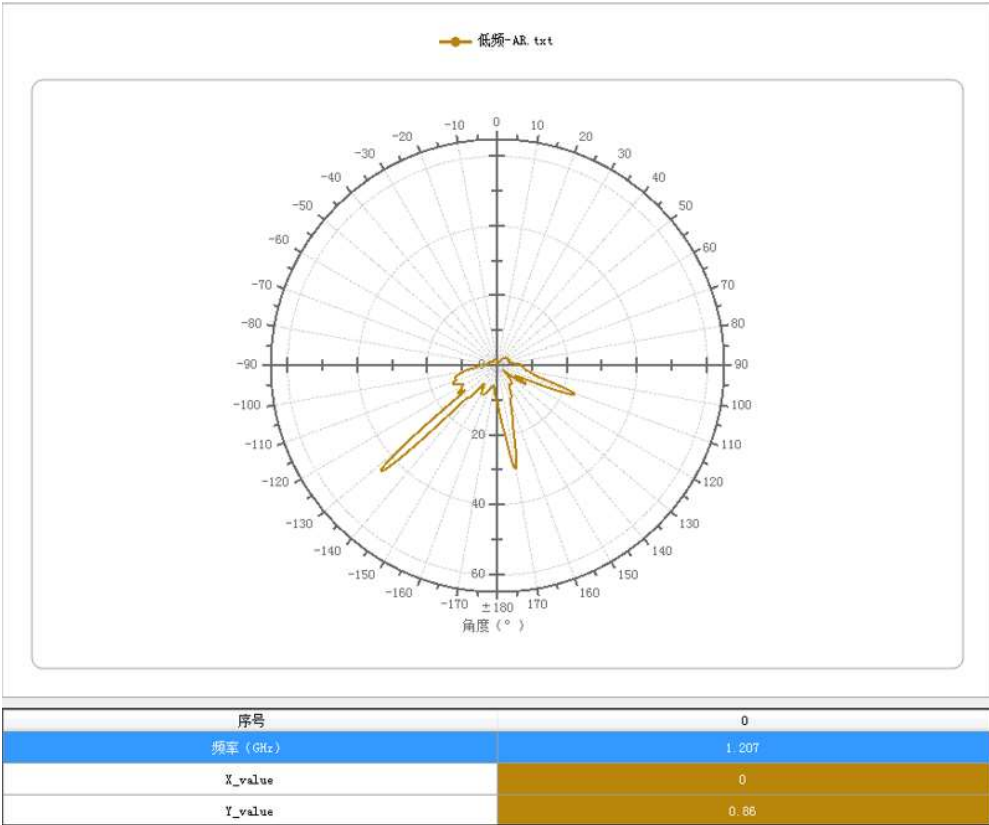


1602 MHz: Gain

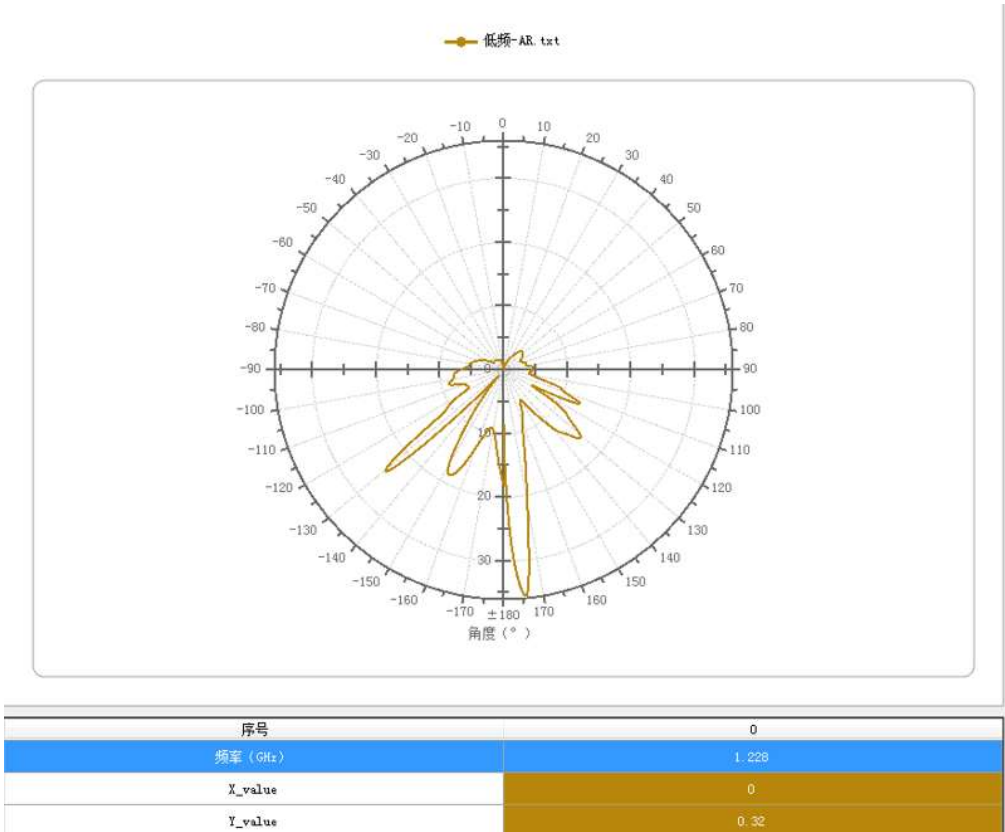
Antenna Axial ratio patterns:



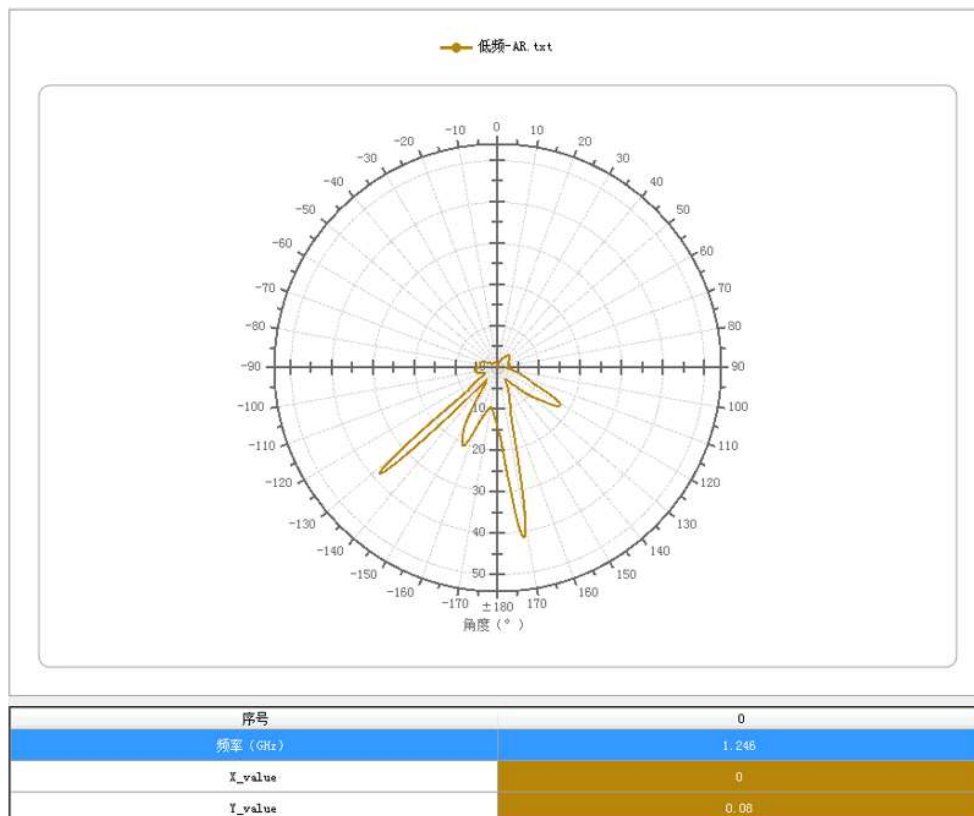
1176 MHz: Axial ratio



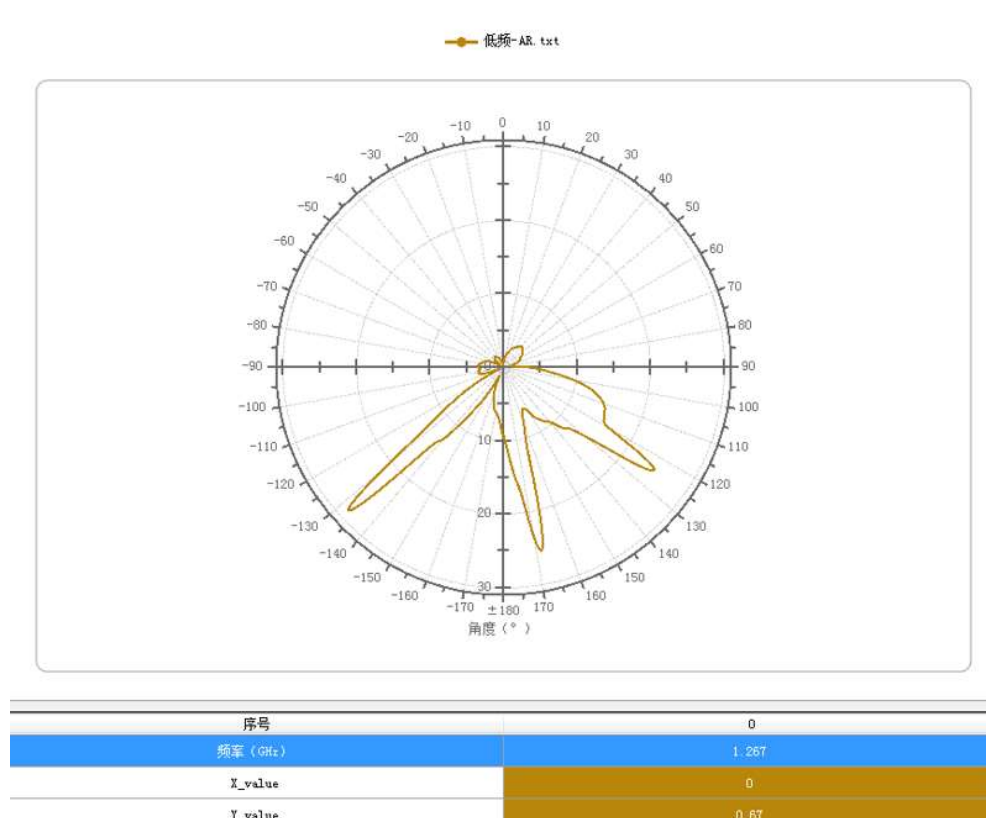
1207 MHz: Axial ratio



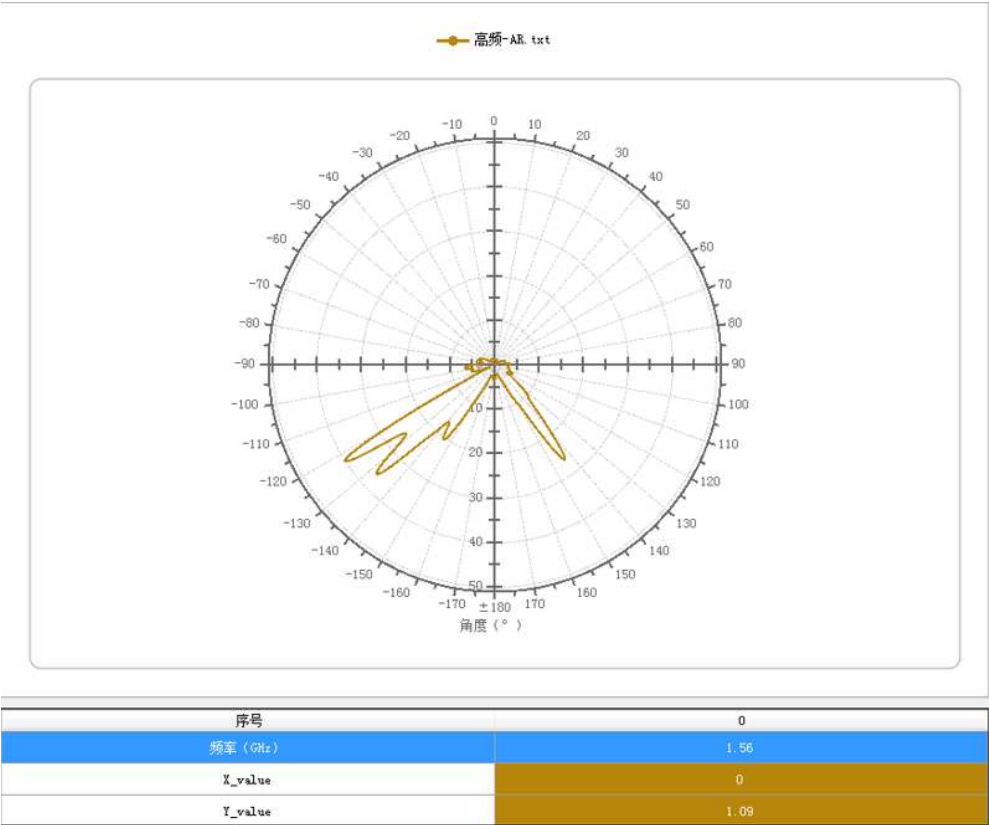
1227 MHz: Axial ratio



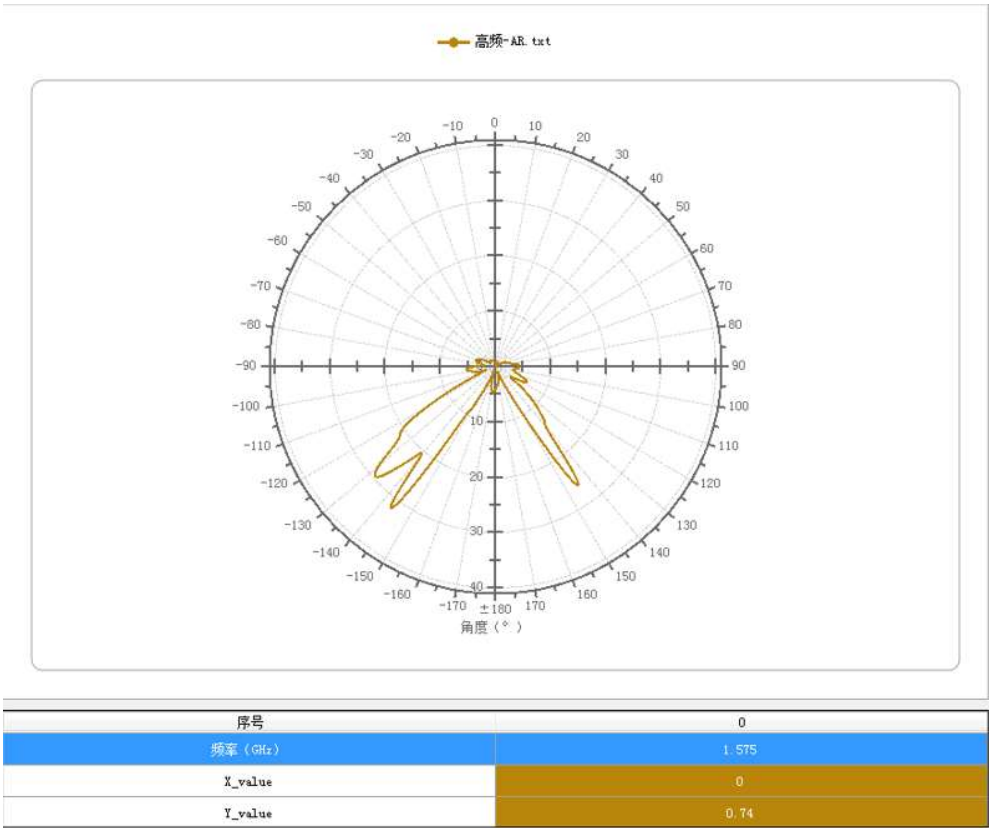
1246 MHz: Axial ratio



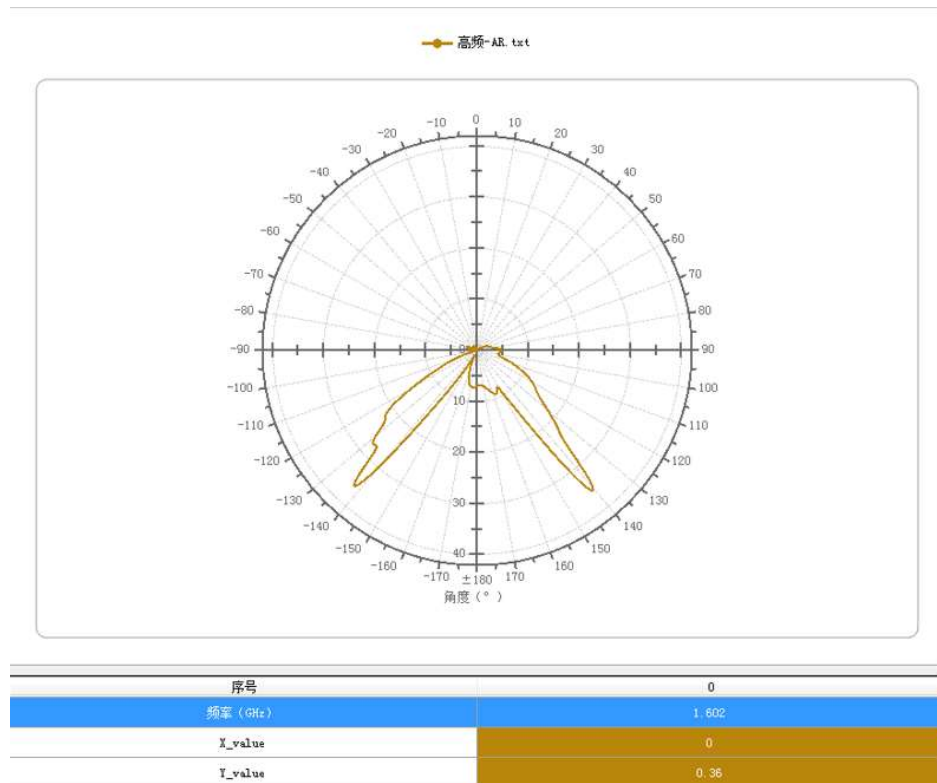
1268 MHz: Axial ratio



1561 MHz: Axial ratio



1575 MHz: Axial ratio



1602 MHz: Axial ratio

1.1.2 Antenna VSWR Performance

Test environment:

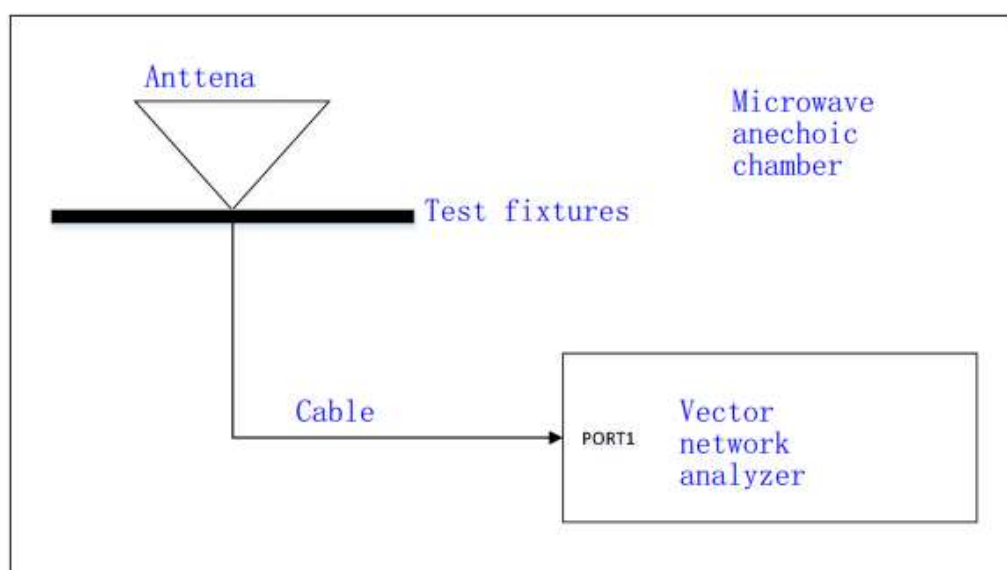


Figure 2: Antenna VSWR Test schematic

Test equipment: E5071C

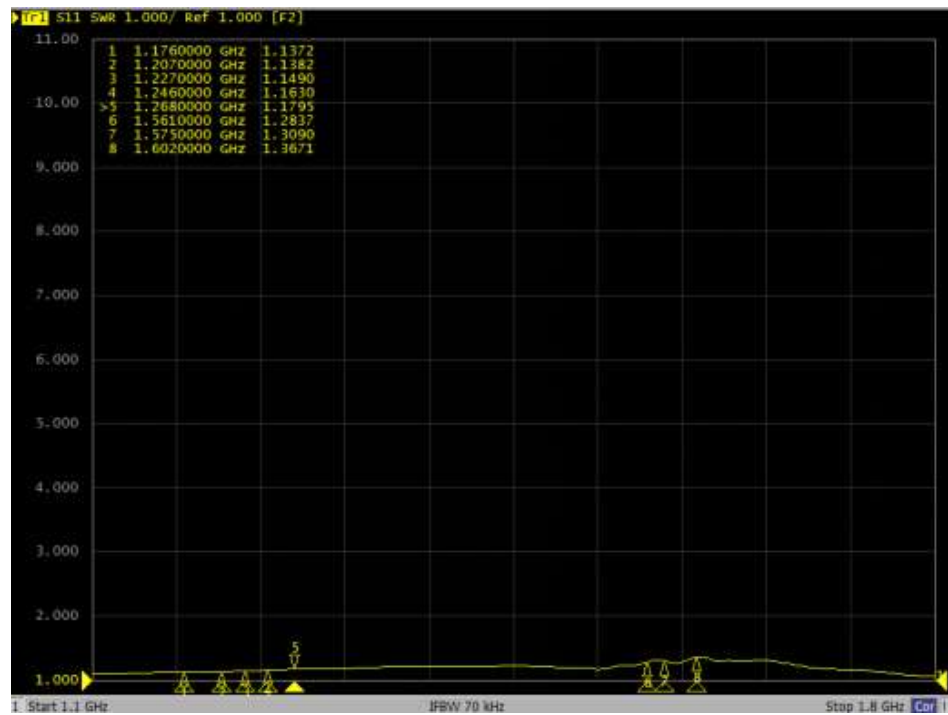
Test Method:

- 1) Set the vector network analyzer to S11 test mode, and the display mode is SWR;
- 2) Set the frequency range of the vector network analyzer to 1100MHz~1800MHz, together with the RF cable Calibrate VSWR;
- 3) As shown in Figure 2, in a microwave anechoic chamber environment, connect the L1 or L2 ports of the antenna under test and other test equipment, and connect the other ports of the passive antenna to a 50 Ω load;
- 4) Read the VSWR of the vector network analyzer at the corresponding frequency, and fill in the test results in Table B.2 of Appendix B to confirm whether the index requirements are met.

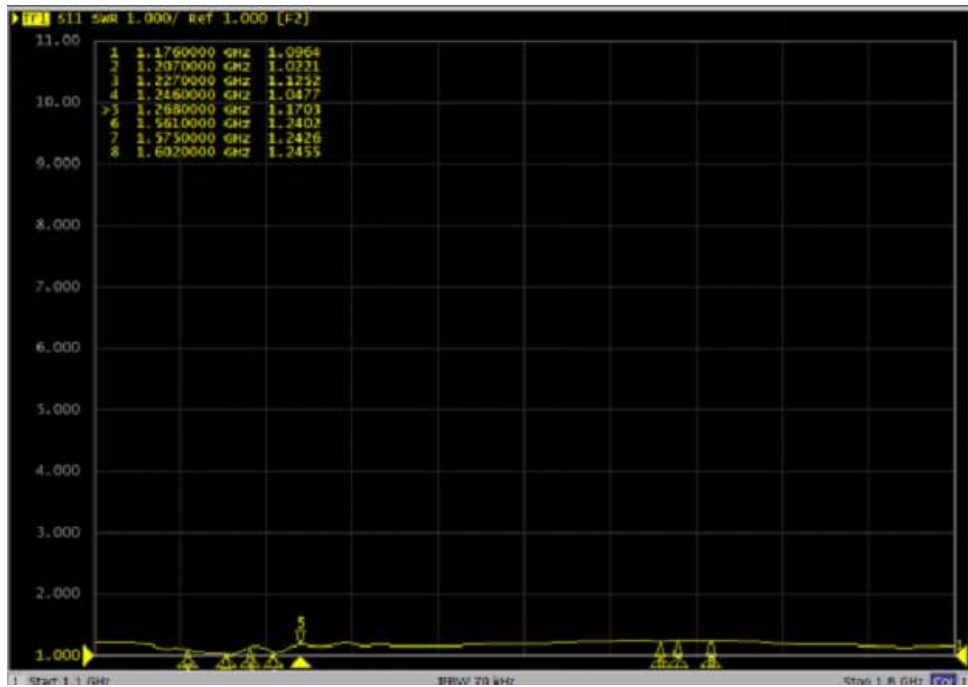
VSWR Test Result:

Frequency (MHz)	VSWR
1176	1.09
1207	1.02
1227	1.12
1246	1.04
1268	1.17
1561	1.28
1575	1.3
1602	1.36

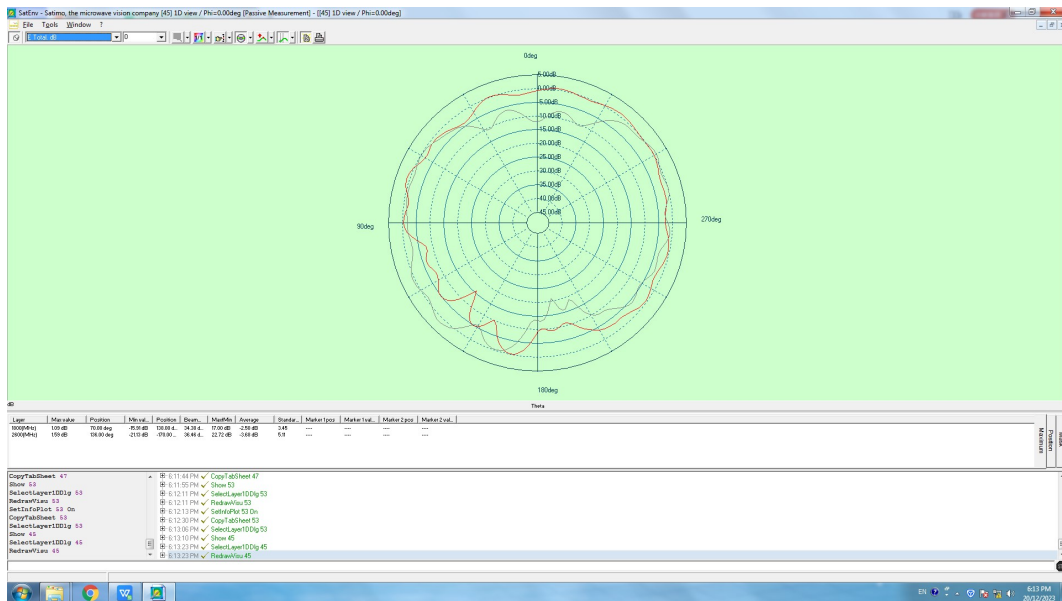
VSWR Test Screenshot:



L1: VSWR



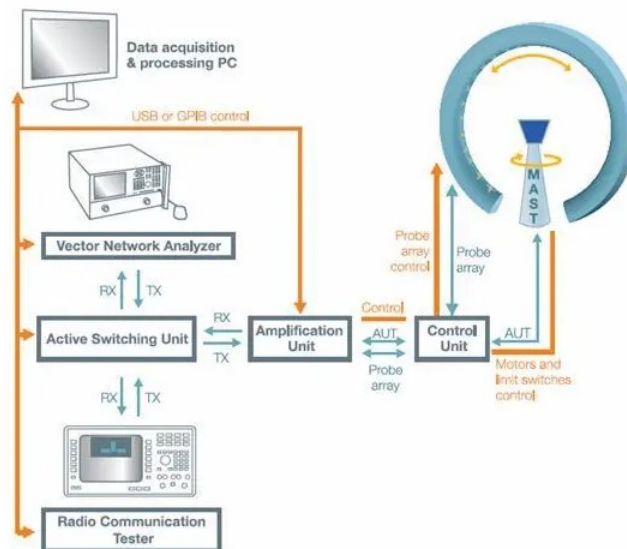
L2: VSWR



4G antenna gain pattern

1.2.2 Antenna Efficiency Performance

Test environment:



Test equipment: SATIMO SG-24

Test results:

BT antenna efficiency

Frequency/Hz	Efficiency
2.350000000	56%

2400000000	58%
2450000000	50%
2500000000	37%
2550000000	30%
2600000000	30%
2650000000	40%
2700000000	44%
2750000000	55%
2800000000	40%

4G antenna efficiency

Frequency/Hz	Efficiency
820000000	16%
840000000	22%
860000000	29%
880000000	31%
900000000	24%
920000000	7%
940000000	19%
960000000	24%
1700000000	31%
1720000000	32%
1740000000	37%

1760000000	47%
1780000000	60%
1800000000	64%
1820000000	63%
1840000000	57%
1860000000	57%
1880000000	59%
1900000000	63%
1920000000	63%
1940000000	60%
1960000000	60%
1980000000	59%
2000000000	57%
2020000000	56%
2040000000	55%
2060000000	53%
2080000000	47%
2100000000	40%
2120000000	31%
2140000000	24%
2160000000	19%
2180000000	16%

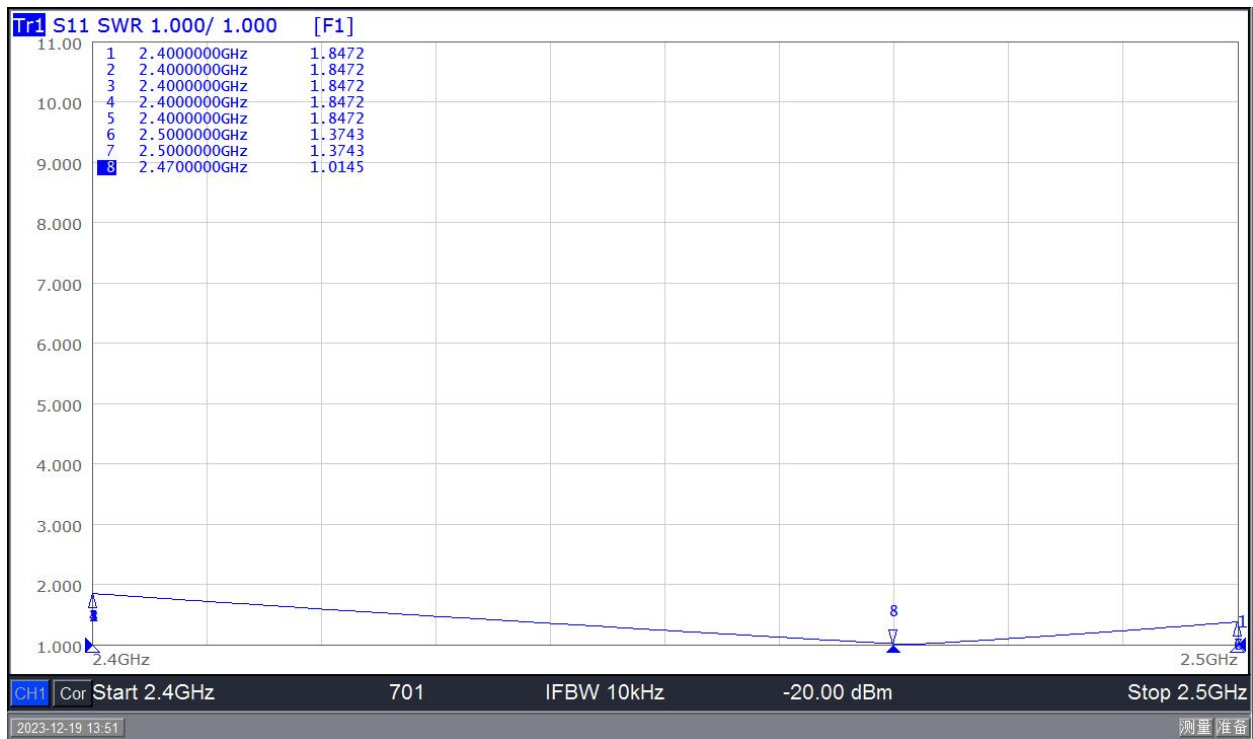
2200000000	13%
2220000000	11%
2240000000	9%
2260000000	7%
2280000000	6%
2300000000	6%
2320000000	7%
2340000000	7%
2360000000	8%
2380000000	9%
2400000000	11%
2420000000	12%
2440000000	15%
2460000000	17%
2480000000	20%
2500000000	23%
2520000000	30%
2540000000	36%
2560000000	46%
2580000000	55%
2600000000	62%
2620000000	62%

2640000000	54%
2660000000	35%
2680000000	23%
2700000000	19%

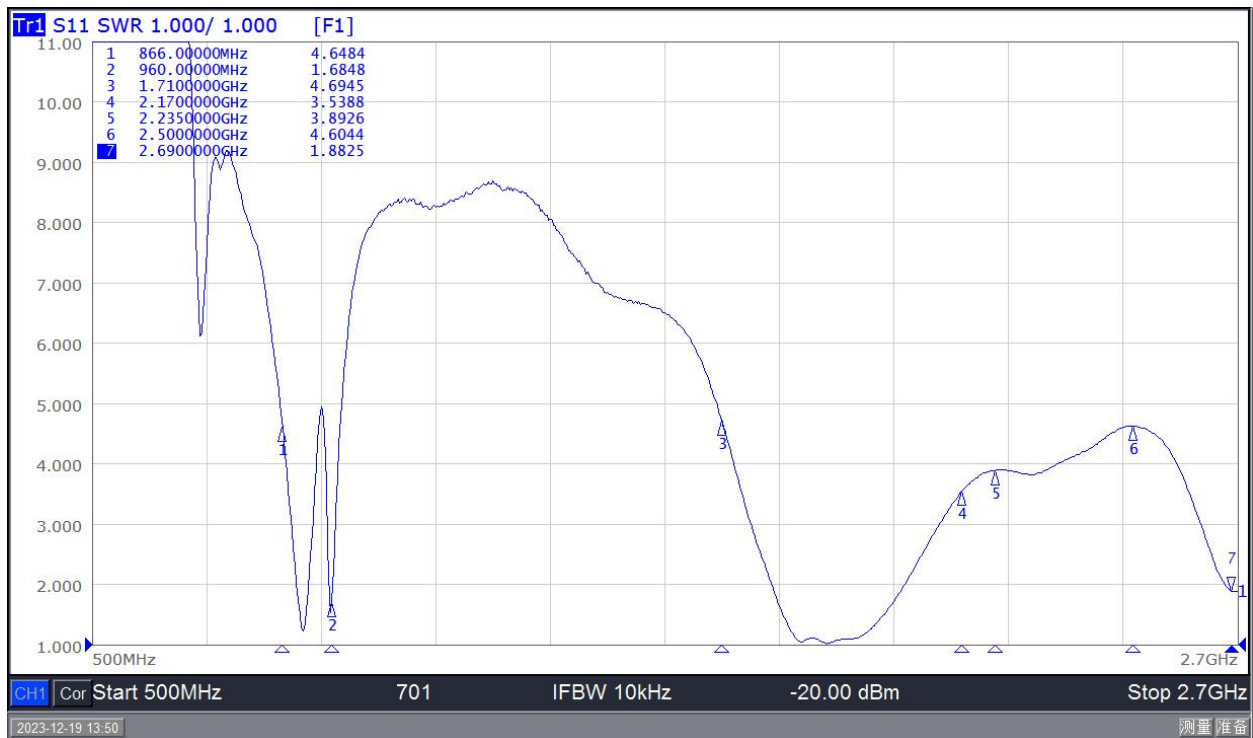
1.2.3 Antenna VSWR Performance

The test environment and test method are the same as GNSS antenna.

VSWR Test Result:



BT VSWR



4G VSWR

2. LNA Performance

2.1 Noise figure

Test environment:

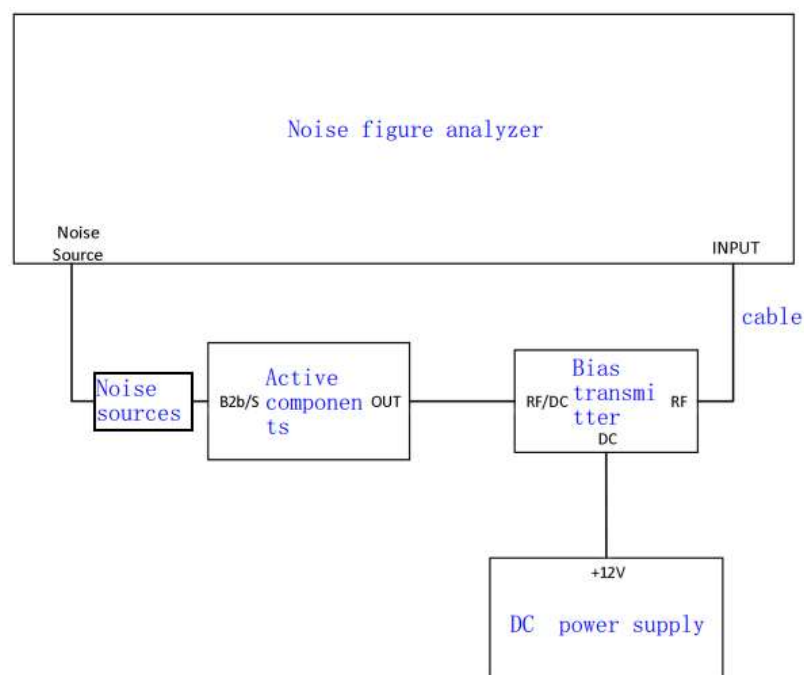


Figure 3: Noise figure Test schematic

Test equipment: Noise Figure Analyzer N8973A

Test Method:

- 1) Set the center frequency of the noise figure analyzer to 1220MHz and the bandwidth to 120MHz and calibrate it;
- 2) The output voltage of the whole DC regulated power supply is +12V;
- 3) As shown in Figure 3, set up a test environment;
- 4) Turn on the DC regulated power supply and check whether the noise figure of the frequency point on the display interface of the noise figure analyzer meets the requirements of the index;
- 5) Set the center frequency of the noise figure analyzer to 1570MHz and the bandwidth to 100MHz and calibrate it;
- 6) Turn on the DC regulated power supply and check whether the noise figure of the frequency point on the display interface of the noise figure analyzer meets the requirements of the index.

Test results:

Frequency/MHz	Noise figure/dB
1176	1.46
1207	1.58
1227	1.68
1246	1.67
1268	1.65
1561	1.86
1575	1.75
1602	1.88

frequency (GHz)	noise figure (dB)
1.166-1.278	≤ 1.8
1.559-1.605	≤ 1.9



L2: noise figure



L1: noise figure

2.2 LNA Gain test

Test method:

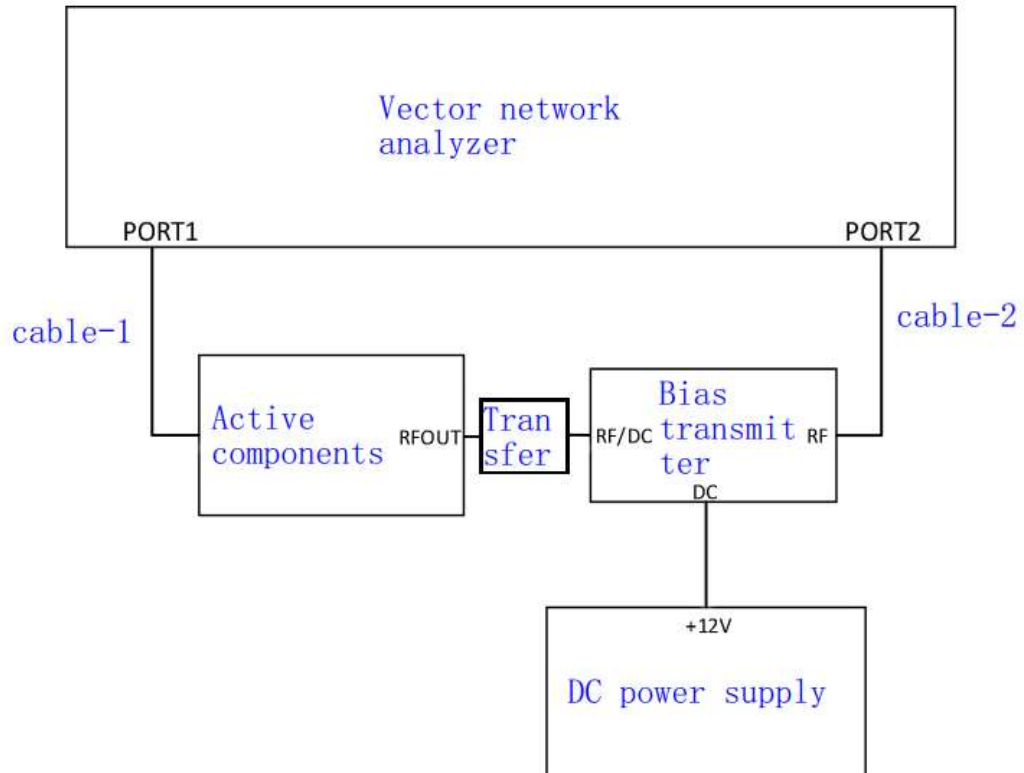


Figure 3: LNA Gain Test schematic

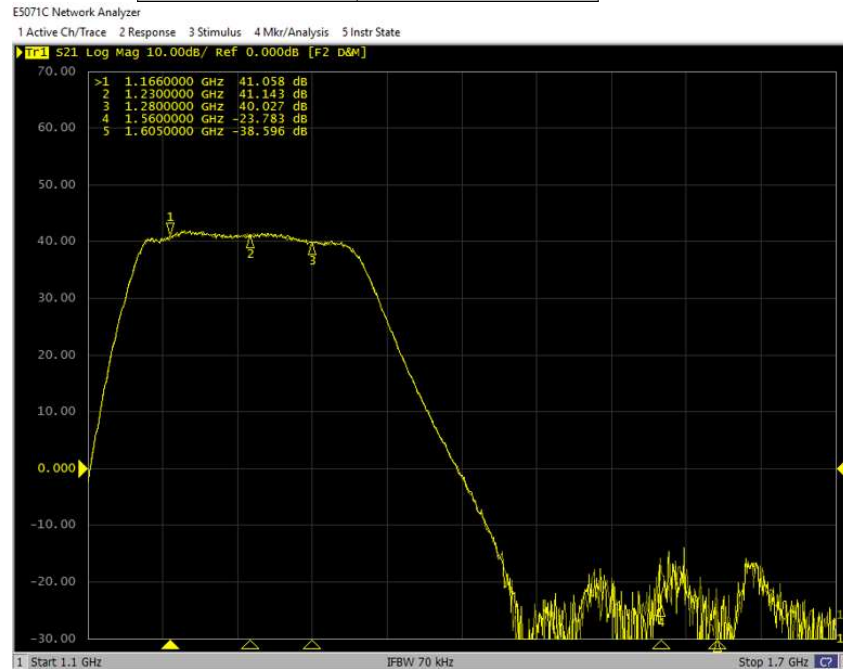
- 1) Set the testing bandwidth to 1.1GHz -1.7GHz, calibrate the network analyzer, and set the output power of the network analyzer to -50dBm to ensure that the low noise amplifier gain is not compressed;
- 2) As shown in Figure 3, connect the DC stabilized power supply and the low noise amplifier to be tested through a feeder, power on and work, and supply 5V;
- 3) Connect the network analyzer and the low noise amplifier to be tested, measure and record the maximum gain G_{max} , minimum gain G_{min} , and gain value at the center frequency point within the bandwidth range;
- 4) Test the gain of the low noise amplifier, and at the same time, the network analyzer will display the standing wave ratio of the circuit's output voltage and record it.

Test equipment: E5071C

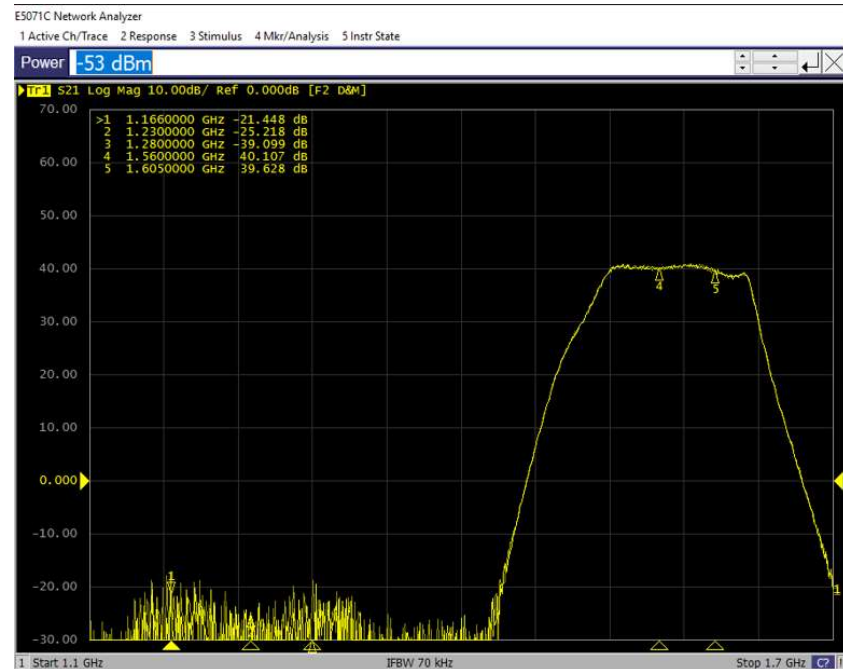
Test results:

Frequency/MHz	LNA Gain/dB
1176	41.5
1207	40.9
1227	41.1
1246	41.8

1268	41.6
1561	40.2
1575	40.9
1602	39.8



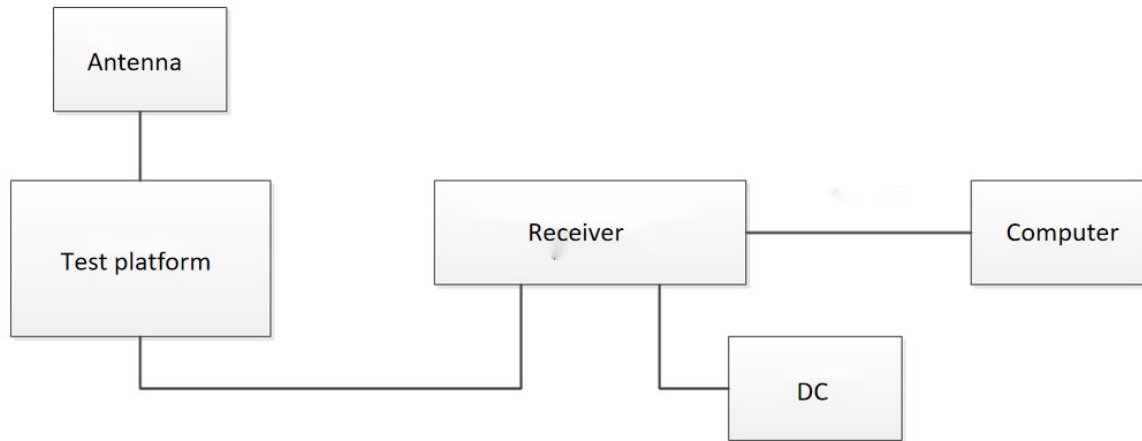
L2 LNA Gain



L1 LNA Gain

3. Complete machine Performance

Test environment:



Test equipment: GNSS Receiver

Test method:

- 1) Connect the receiver to the LCY4N75A antenna, voltage regulator, and computer;
- 2) Open the computer testing software for star search testing:

Test result:

Compass Receiver Utility [未知设备] - C:\Users\jzsc\Desktop
App 连接 接收机 电台 GNSS Rinex 窗口 帮助

功能	数据原文	信号跟踪	卫星	方位角	高度角	L1/B1	L1/B1失锁	L2/B2	L2/B2失锁	L5/B3	L5/B3失锁	备注
			G01	31	40	46	174	47	5	44	3	
			G03	114	38	41	158	46	5	41	3	
			G06	224	23	37	99	40	5	34	4	
			G07	187	31	41	180	40	5			
			G14	342	58	45	155	49	5			
			G17	311	40	41	170	43	5			
			G21	38	21	41	190	23	140			
			G30	235	49	44	161	46	5	38	3	
			C01	123	47	44	156	40	151	44	4	
			C02	234	46	40	166	40	161	43	3	
			C03	188	63	41	153	44	148	45	4	
			C04	110	33	39	164	40	167	41	2	
			C05	263	23		38		243	37	5	
			C06	199	23	38	173		39		3	
			C07	6	63	44	151	43	155	47	3	
			C08	176	47	40	160	43	156	45	4	
			C09	215	30	40	176	38	166	40	4	
			C10	341	56	43	151	43	150	44	3	
			C12	261	24	36	167	39	156	42	3	
			C13	188	39	42	167	41	161	40	4	
			C16	196	20	38	172	36	181	38	4	
			R09	327	65	51	144	49	144			
			R16	154	53	50	144	48	144			
			R19	3	42	40	150	43	148			
			R20	268	43	36	156	38	156			
			R01	122	40	44	0	41	2	36	0	
			E12	245	64	40	0	42	0	33	0	
			E31	7	72	47	0	46	1	41	0	
			E33	24	55	47	0	46	0	43	0	

Product Structure Dimensional Inspection Report											
Inspection items		Inspection standards			Actual inspection records			Measuring tool	determine		notes
size	S/N	Standard value	UCL	LCL	1	2	3		AC	RE	
	A	116.5	0.1	0.1	116.5	116.5	116.48	C	✓		
	B	104	0.3	0.3	104.1	104.1	104.12	C	✓		
	C	85	0.3	0.3	84.8	84.79	84.85	C	✓		
	D	3.2	0.15	0.15	3.18	3.22	3.25	C	✓		
	E	22.6	1	1	22.55	22.62	22.58	C	✓		
	F	6	0.2	0.2	6.05	6.04	6.05	C	✓		
	G	10	0.2	0.2	10.12	10.09	10.1	C	✓		
	H	1.2	0.1	0.1	1.18	1.15	1.17	C	✓		
	J	5.1	0.2	0.2	5.1	5.2	5.13	C	✓		
	K	2	1	0.5	1.8	2	2.05	C	✓		
	L	2.2	1	1	1.7	2	2.1	C	✓		
M	63.6	0.6	0.6	63.95	64.16	64.04	C	✓			
N	150	3	3	152	152.5	152.8	C	✓			
inspector: ZhangJie 2023.10.13								auditor:			
Final judgment: ☒ Qualified ☐ Unqualified											
research and development: QiuShigui								quality: YanJingxiang			
Measuring instrument	CMM	Coordinate Measuring Machine				C	Caliper	HG	Height Gauge		
	PG	Pin Gauge				PP	Profile Projectors				

