Testing Report

Customer Name: Shenzhen Absen Optoelectronic Co., Ltd

Product Name: LED Multimedia Processor

Sample Model: Absen X4K-BOX

Reference Standard: *GB/T 9410-2008; ANSI/IEEE Std149-1979*

Issue Date: 2024.12.5

Engineer:	Zkris	Date:	2024.12.4
Auditor:	Eason	Date:	2024.12.5
Approver:	Aaron	Date:	2024.12.5

Version

Version No.	Date	Description	Formulate	Approval
A0	2024.12.5	For the first time, formulate	Zkris	Eason

Contents

1.General Information 4
1.1 General information of testing institutions 4
1.2 Testing principle 4
1.3 Test equipment 5
1.4 Test environment 5
1.5 Statement 5
2.Sample Information 6
2.1 Client information 6
2.2 Description of EUT(S) 6
2.3 EUT appearance 7
2.4 EUT setup photo of free space OTA testing 7
3.Test Results 8
3.1 Test standard 8
3.2 Test uncertainty 8
3.3 Test data(1#) 9
3.3.1 VSWR parameters 9
3.3.2 VSWR data 9
3.3.3 Typical free space efficiency and gain 9
3.3.4 Typical free space radiation pattern 10
3.4 Test data(2#) 12
3.4.1 VSWR parameters 12
3.4.2 VSWR data 12
3.4.3 Typical free space efficiency and gain 12
3.4.4 Typical free space radiation pattern 13
3.5 Test data(3#) 15
3.5.1 VSWR parameters 15
3.5.2 VSWR data 15
3.5.3 Typical free space efficiency and gain 15
3.5.4 Typical free space radiation pattern 16
3.6 Test data(4#) 18
3.6.1 VSWR parameters 18

3.6.2 VSWR data 18
3.6.3 Typical free space efficiency and gain 18
3.6.4 Typical free space radiation pattern 19
3.7 Test data(5#) 21
3.7.1 VSWR parameters 21
3.7.2 VSWR data 21
3.7.3 Typical free space efficiency and gain 21
3.7.4 Typical free space radiation pattern 22
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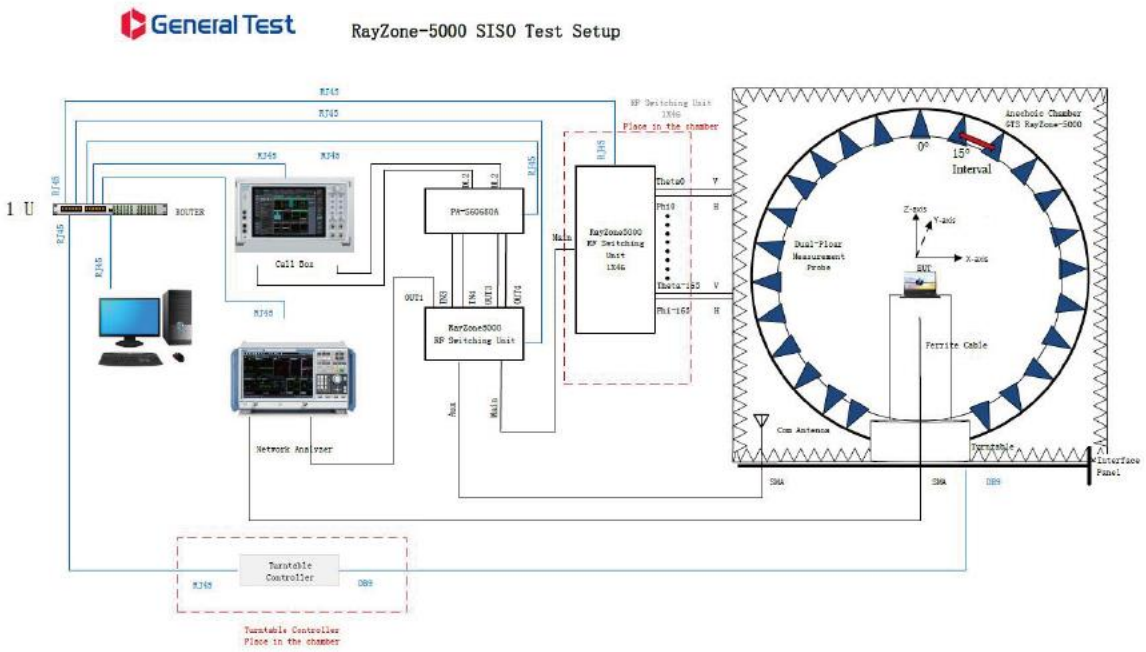
1.General Information

1.1 General information of testing institutions

Name	Shenzhen RFI-LAB Communication Technology Co., Ltd.
Address	103 Building 1 Tingwei Industrial Park,No.6, Liufang Road, Zone 67Xingdong,Xin'an Subdistrict,Bao'an District, Shenzhen, Guangdong, China
Tel	13682621346
E-mail	rfi-lab_cs@tech-now.com
Equipment	All the equipment used in the report is fixed in 103 Building 1 Tingwei Industrial Park,No.6, Liufang Road, Zone 67Xingdong,Xin'an Subdistrict,Bao'an District, Shenzhen, Guangdong, China

1.2 Testing principle



1.3 Test equipment

Equipment	Model No.	Serial No.	Manufacturer	Calibration date	Next calibration date
OTA Test System	RayZone-5000	RFI-LAB-RF-D00	GTS	2023.3.14	2025.3.13
Network Analyzer	E5071C	RFI-LAB-RF-D01	KEYSIGHT	2024.5.6	2025.5.5
Network Analyzer	E5071C	RFI-LAB-RF-C02	KEYSIGHT	2024.5.6	2025.5.5

1.4 Test environment

Temperature	23.9℃
Humidity	58%RH
Pressure	100.20kPa

1.5 Statement

(1) The test results in the report are only applicable to the tested samples and the tested samples work under the environment described in the report.

(2) Only Shenzhen RFI-LAB Communication Technology Co., Ltd. have the right to modify the report, and the modification information shall be annotated in the revision form.

(3) Any objection to this report shall be raised within 30 days after formal confirmation of the report.

(4) This report is invalid if there is any evidence that the sample information provided is falsified.

(5) The report is invalid without the signature of the auditor and approver.

2.Sample Information

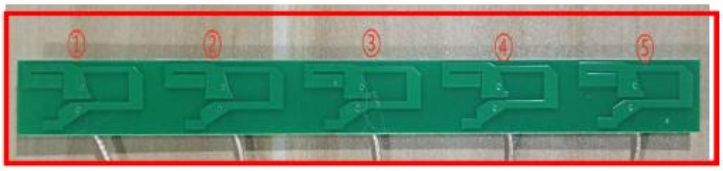
2.1 Client information

Name	Shenzhen Absen Optoelectronic Co., Ltd
Address	18-20/F, Tower A, Building 3, Phase I, Tian An Cloud Park, NO.2018, Xuegang Rd, Bantian, Longgang District, Shenzhen, Guangdong, P.R. China
Contacts	Victoria
Tel	13232574625
E-mail	zhuyl@sz-ctc.com.cn
Factory	Huizhou Absen Optoelectronic Limited.
Factory's Address	No. 03, Donghua South road, Dongjiang Hi-tech Industry Park, Huizhou. Guangdong, China

2.2 Description of EUT(S)

Product Name	LED Multimedia Processor
Sample Model	Absen X4K-BOX
Antenna Size	/
Serial No.	/
Antenna Type	PCB Antenna
Test Item	VSWR;Antenna gain; Efficiency; Radiation pattern
Frequency Range	2400-2500MHz;5000-6000MHz
Received Date	2024.12.3
Test Date	2024.12.4
Remark	/

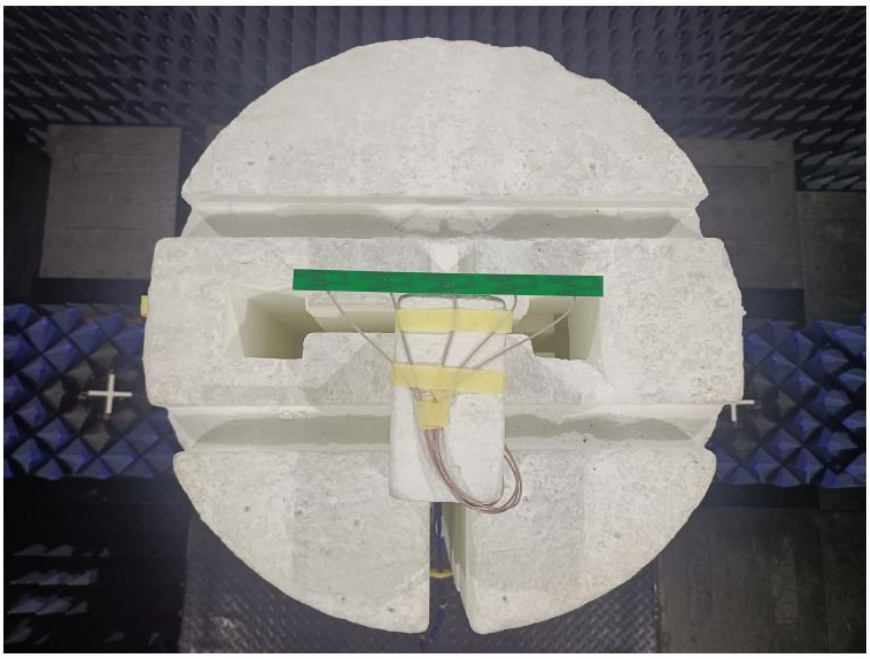
2.3 EUT appearance



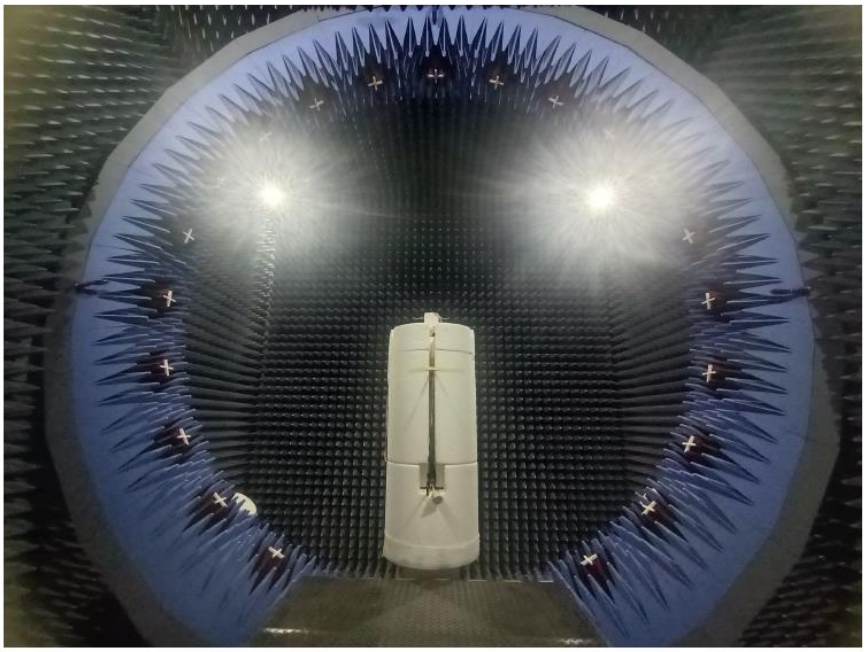
Antenna size:
216mm*15mm

2.4 EUT setup photo of free space OTA testing

Planform



Front view



3.Test Results

3.1 Test standard

Name	Parameter	Method	Standard no.
Mobile communication antenna	Antenna gain	Generic specification for antennas used in the mobile communications	GB/T 9410-2008
	Radiation pattern		
	VSWR		
Antenna	Radiation efficiency	IEEE Standard Test Procedures for Antennas	ANSI/IEEE Std 149-1979
	Gain and directivity		

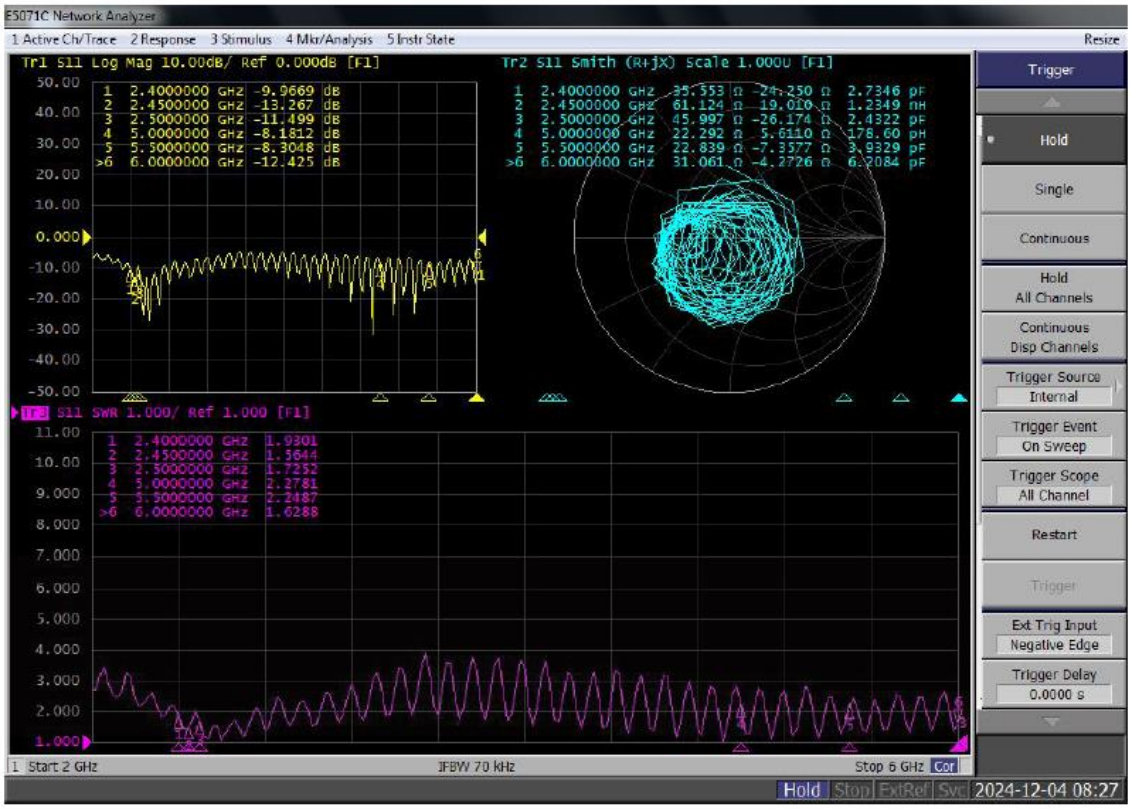
3.2 Test uncertainty

The uncertainty was calculated on the basis of the GUM published by ISO, using the inclusion factor of K=2 and the 95% confidence level to express the extended uncertainty.

Item	Uncertainty
VSWR	±0.3
Antenna gain	±0.72dB
Radiation efficiency	±0.72dB

3.3 Test data(1#)

3.3.1 VSWR parameters



3.3.2 VSWR data

Frequency/MHz	2400	2450	2500	5000	5500	6000
VSWR	1.9301	1.5644	1.7252	2.2781	2.2487	1.6288

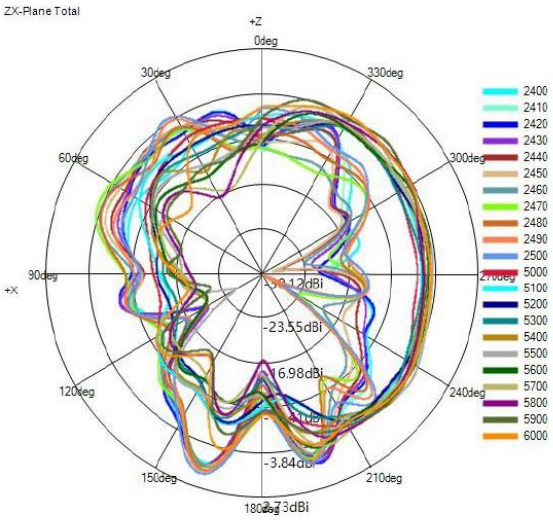
3.3.3 Typical free space efficiency and gain

Frequency/MHz	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain/dBi	1.72	1.73	1.44	0.96	0.80	0.76	1.06	1.64	1.63	1.50	1.72
Efficiency/%	23.17	25.07	26.29	26.15	25.92	24.97	24.03	24.02	23.89	26.10	30.11

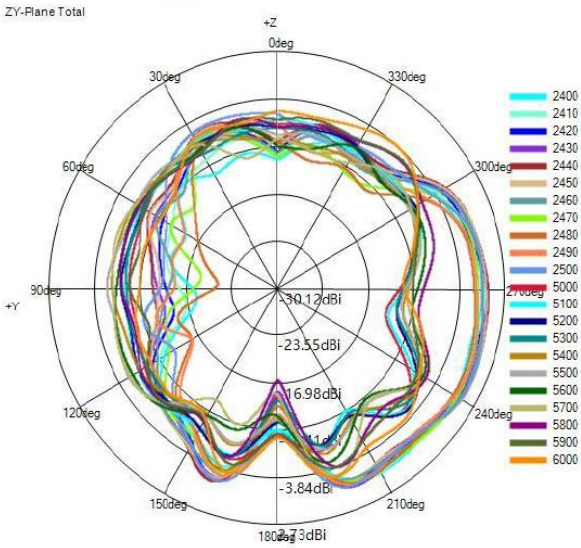
Frequency/MHz	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000
Peak Gain/dBi	-3.82	-3.33	-3.40	-3.67	-2.60	-1.49	-0.47	1.03	1.50	1.38	1.95
Efficiency/%	18.16	18.97	18.44	17.08	18.78	20.63	20.59	20.31	20.87	21.74	22.66

3.3.4 Typical free space radiation pattern

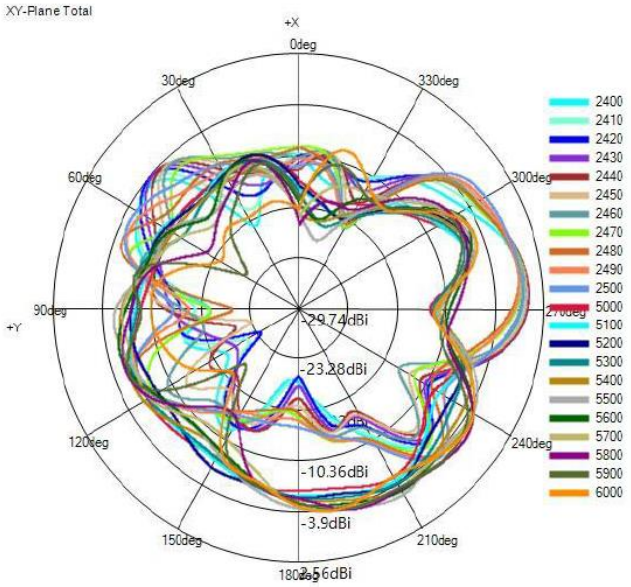
(1) X-Z Plane(unit:dBi):



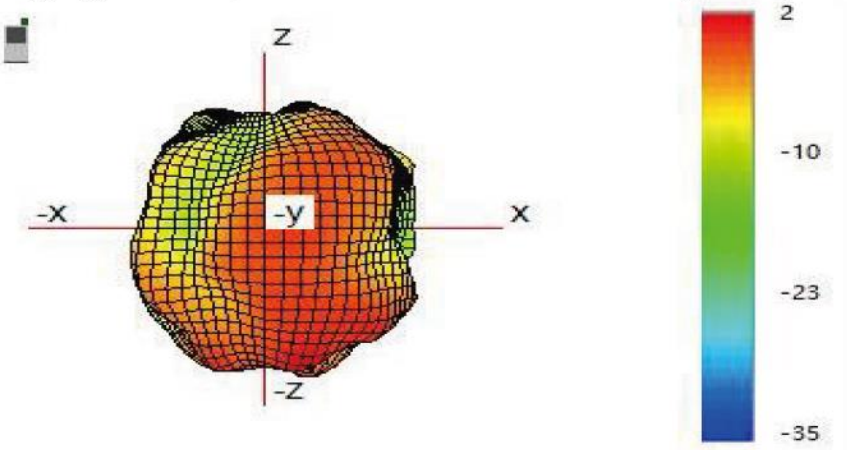
(2) Y-Z Plane(unit:dBi):



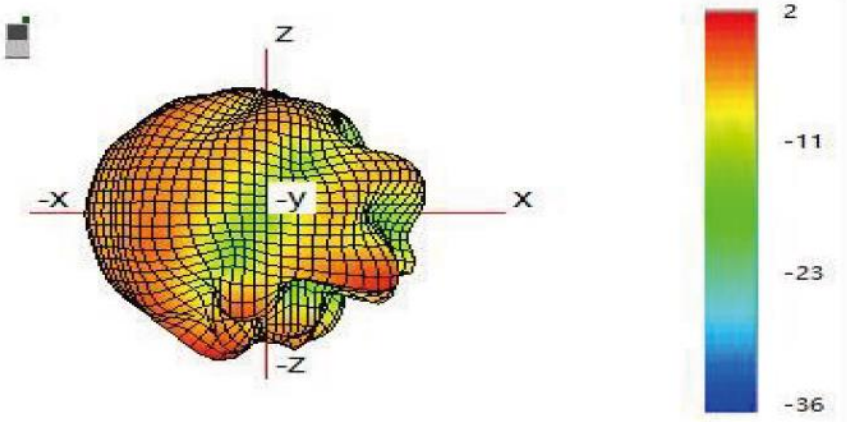
(3) X-Y Plane(unit:dBi):



(4) Typical Free Space 3D Radiation Pattern at 2.41GHz(unit:dBi):

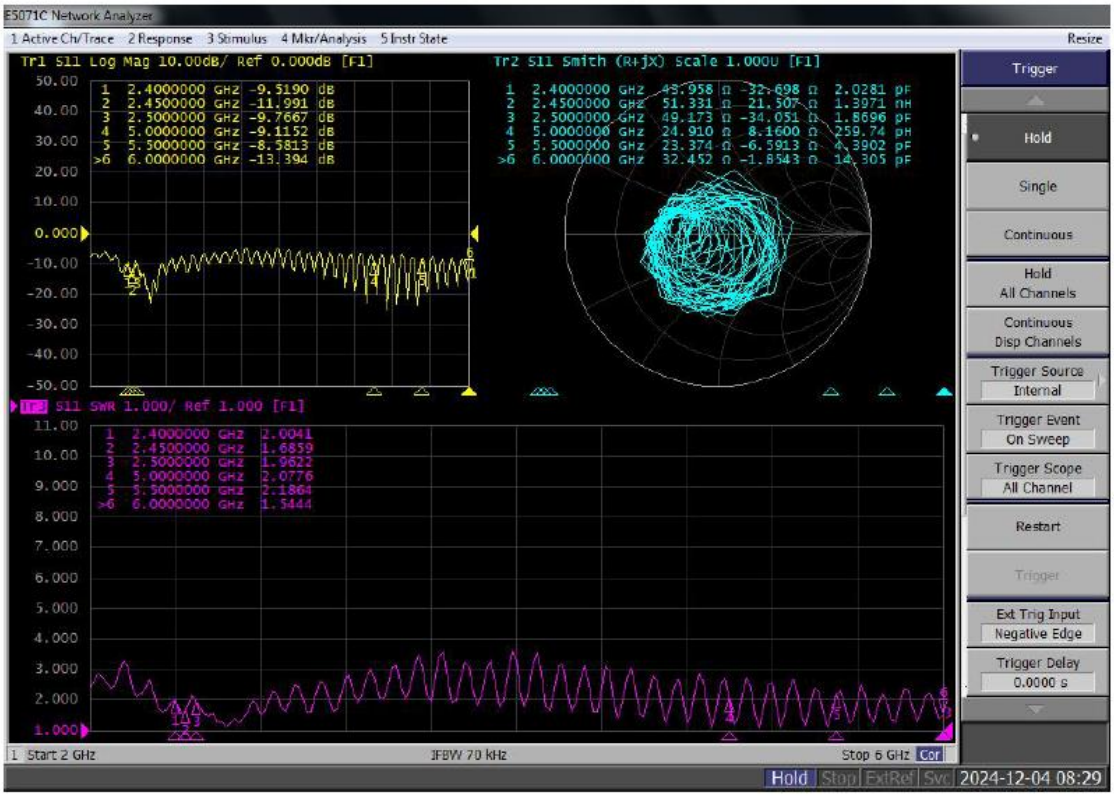


(5) Typical Free Space 3D Radiation Pattern at 6GHz(unit:dBi):



3.4 Test data(2#)

3.4.1 VSWR parameters



3.4.2 VSWR data

Frequency/MHz	2400	2450	2500	5000	5500	6000
VSWR	2.0041	1.6859	1.9622	2.0776	2.1864	1.5444

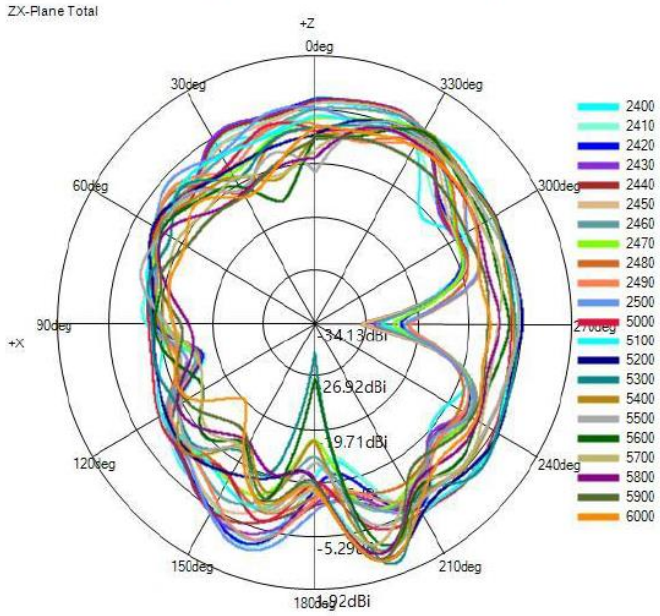
3.4.3 Typical free space efficiency and gain

Frequency/MHz	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain/dBi	-0.74	-0.40	-0.17	-0.34	-0.38	-0.70	-1.23	-1.77	-1.92	-0.75	0.22
Efficiency/%	21.45	24.43	25.98	25.42	24.53	22.84	20.41	17.34	14.44	18.53	25.13

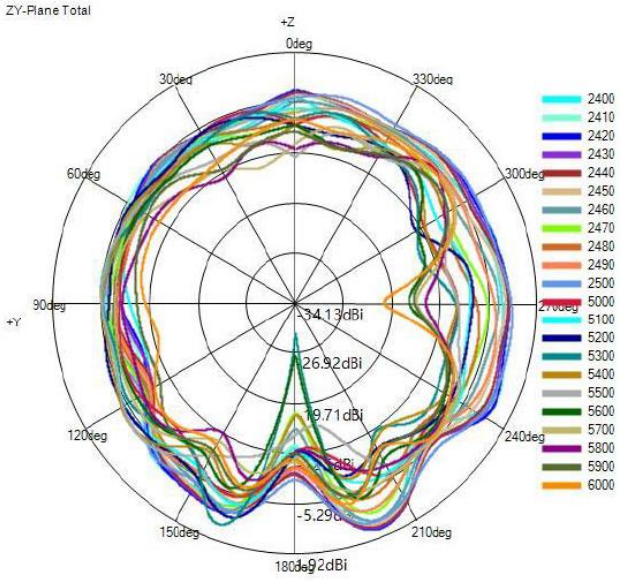
Frequency/MHz	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000
Peak Gain/dBi	0.48	0.60	-1.06	-1.44	0.28	-1.76	-0.46	0.29	1.38	1.58	0.57
Efficiency/%	16.98	18.15	17.62	15.84	15.05	14.84	12.98	12.34	10.33	9.34	10.52

3.4.4 Typical free space radiation pattern

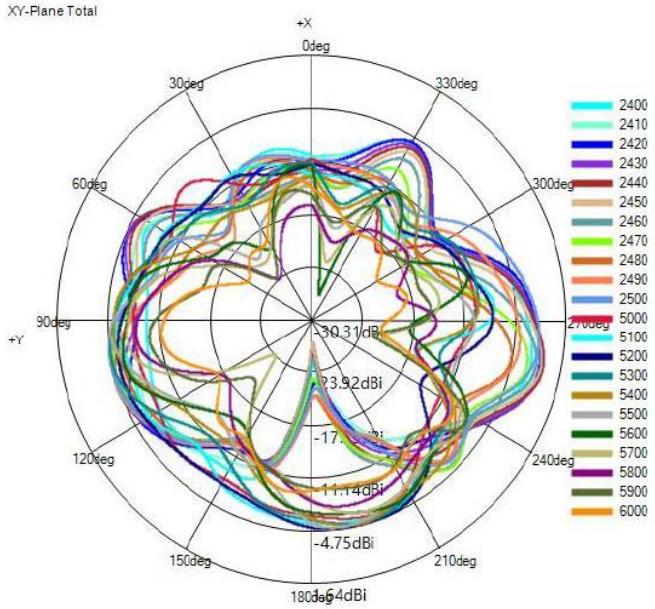
(1) X-Z Plane(unit:dBi):



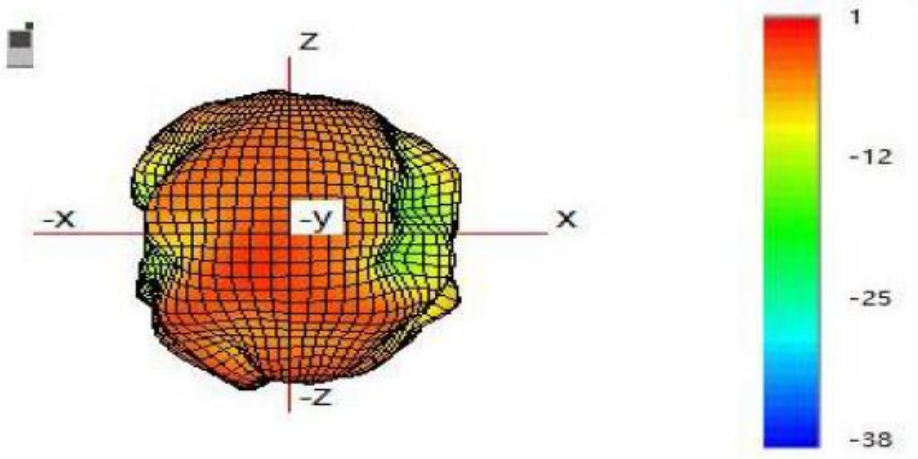
(2) Y-Z Plane(unit:dBi):



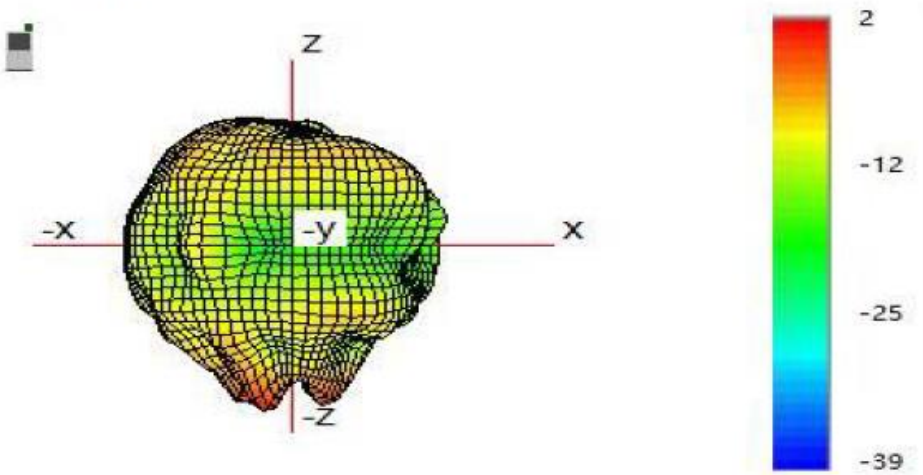
(3)X-Y Plane(unit:dBi):



(4)Typical Free Space 3D Radiation Pattern at 2.5GHz(unit:dBi):

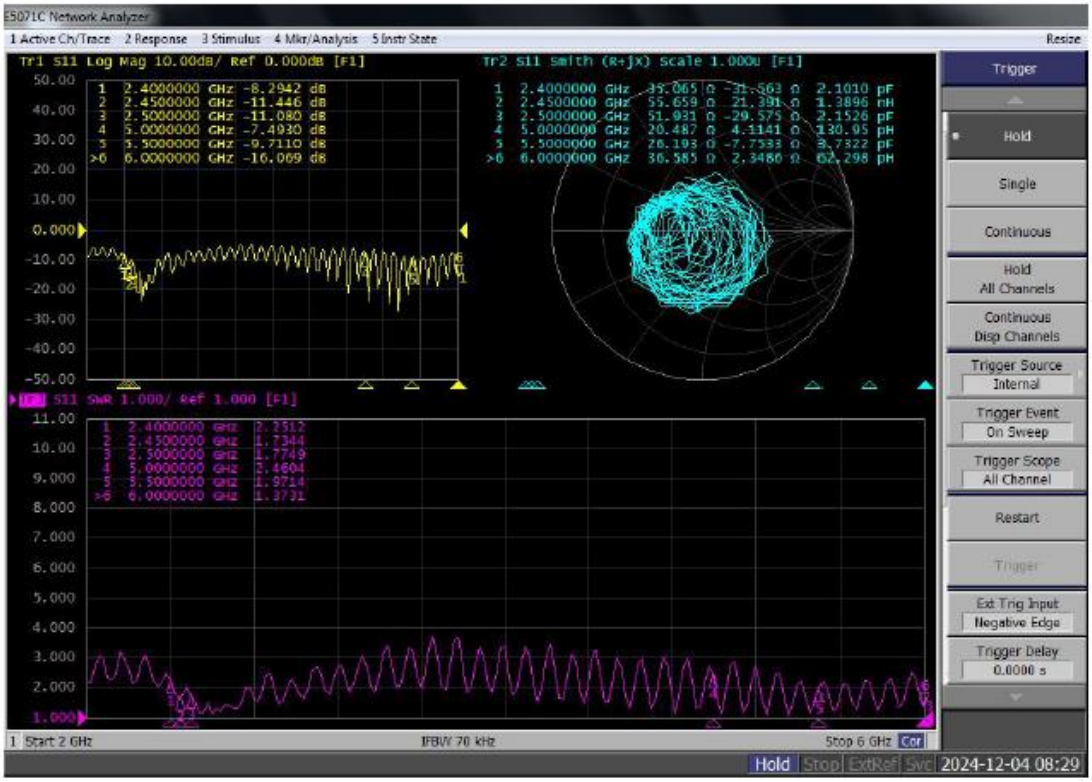


(5)Typical Free Space 3D Radiation Pattern at 5.9GHz(unit:dBi):



3.5 Test data(3#)

3.5.1 VSWR parameters



3.5.2 VSWR data

Frequency/MHz	2400	2450	2500	5000	5500	6000
VSWR	2.2512	1.7344	1.7749	2.4604	1.9714	1.3731

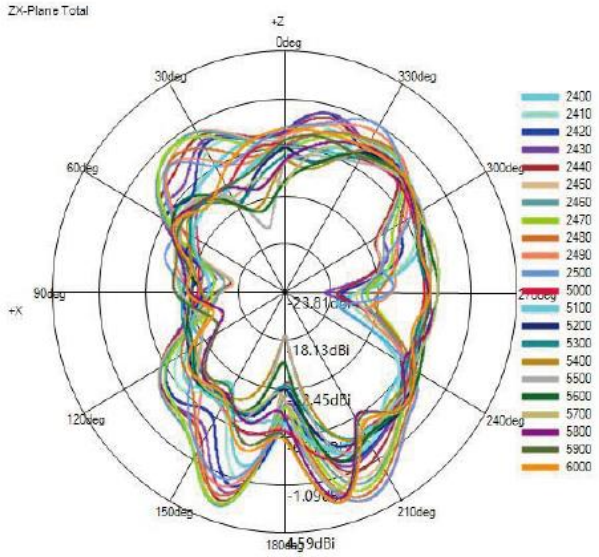
3.5.3 Typical free space efficiency and gain

Frequency/MHz	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain/dBi	0.74	1.49	2.25	2.74	2.98	2.98	2.49	1.74	0.85	1.54	1.52
Efficiency/%	24.78	24.80	26.40	26.81	27.81	28.81	28.86	28.56	27.46	28.62	32.25

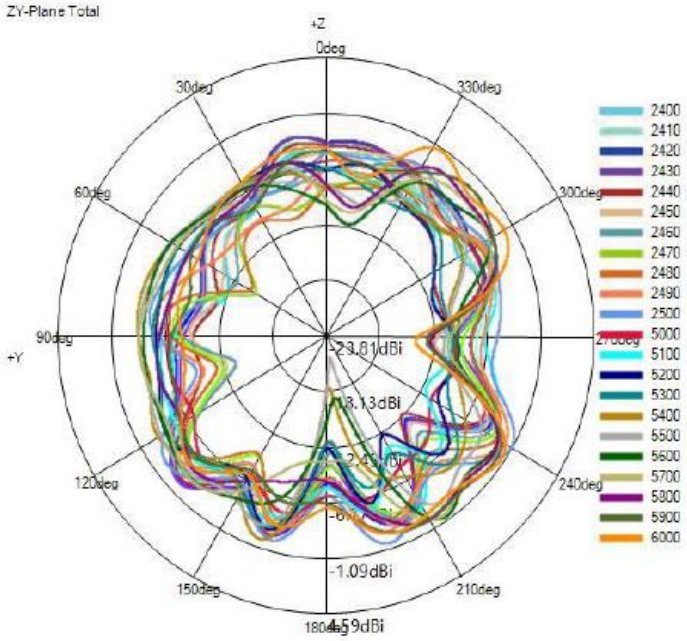
Frequency/MHz	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000
Peak Gain/dBi	-2.36	-2.47	-3.31	-2.92	-2.42	-2.42	-1.70	0.15	1.39	2.11	3.30
Efficiency/%	17.41	17.80	18.49	18.20	19.57	20.77	22.12	23.06	22.66	23.25	24.63

3.5.4 Typical free space radiation pattern

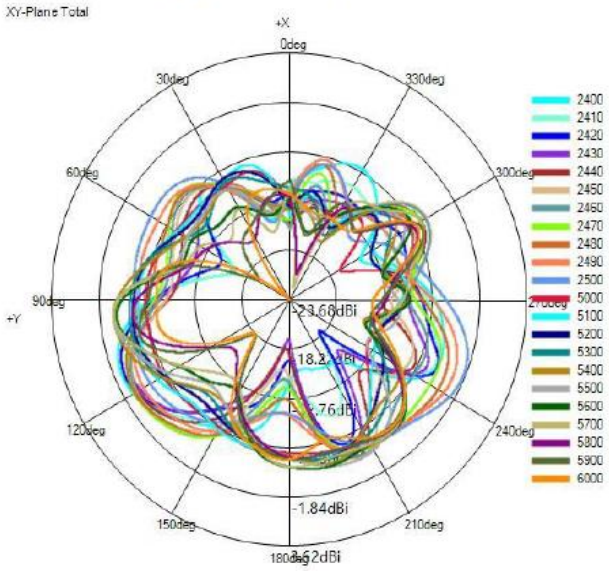
(1) X-Z Plane(unit:dBi):



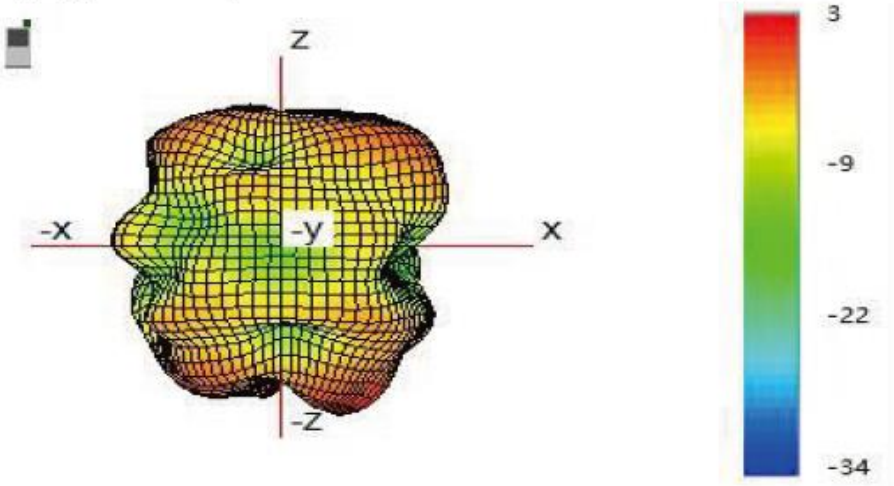
(2) Y-Z Plane(unit:dBi):



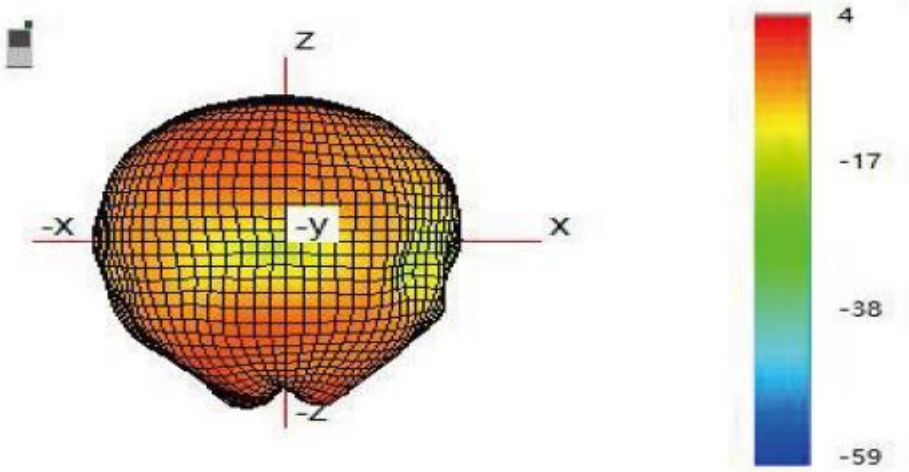
(3)X-Y Plane(unit:dBi):



(4)Typical Free Space 3D Radiation Pattern at 2.45GHz(unit:dBi):

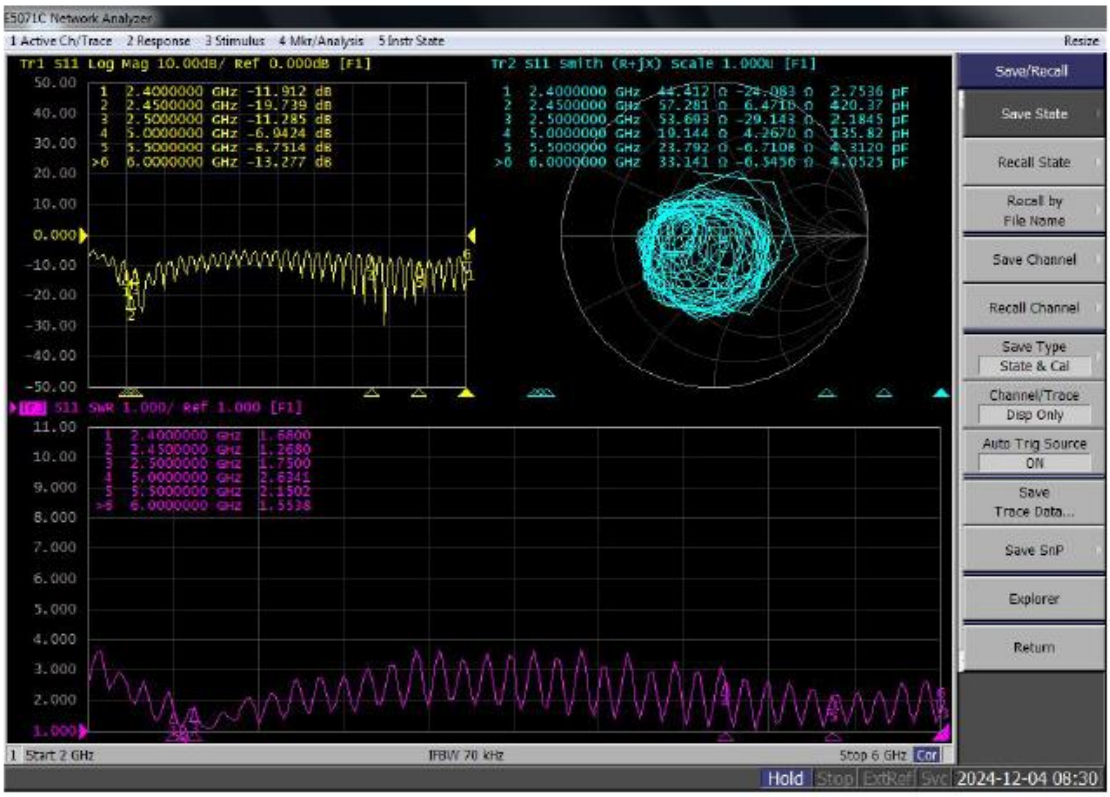


(5)Typical Free Space 3D Radiation Pattern at 6GHz(unit:dBi):



3.6 Test data(4#)

3.6.1 VSWR parameters



3.6.2 VSWR data

Frequency/MHz	2400	2450	2500	5000	5500	6000
VSWR	1.6800	1.2680	1.7500	2.6341	2.1502	1.5538

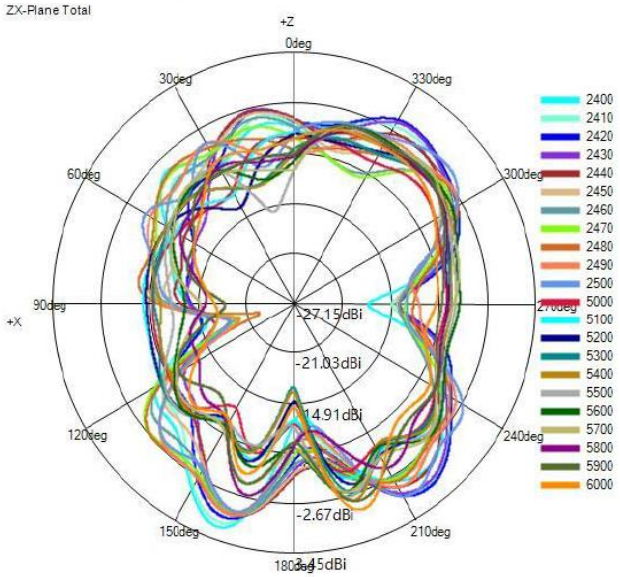
3.6.3 Typical free space efficiency and gain

Frequency/MHz	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain/dBi	0.91	2.50	2.98	2.66	1.87	0.87	1.14	1.32	1.40	1.94	2.88
Efficiency/%	22.28	28.31	31.56	31.62	29.94	27.04	25.67	25.56	25.46	25.05	26.95

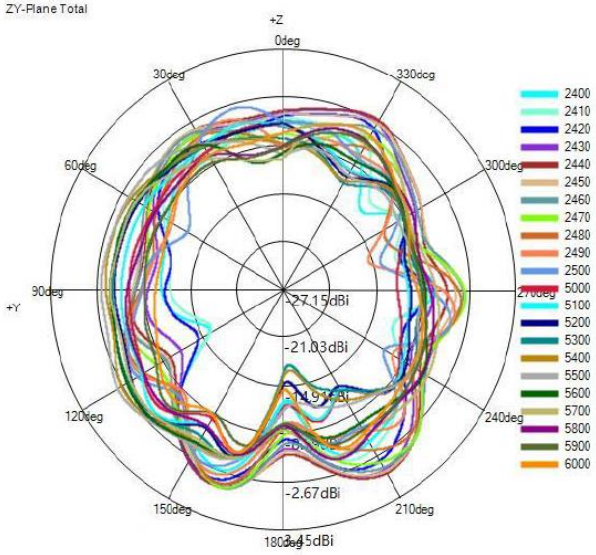
Frequency/MHz	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000
Peak Gain/dBi	-3.08	-3.23	-3.10	-2.89	-2.24	-1.86	-0.47	0.85	1.00	0.29	-0.23
Efficiency/%	15.87	18.17	18.56	18.04	18.51	19.53	19.04	19.33	16.67	15.23	14.06

3.6.4 Typical free space radiation pattern

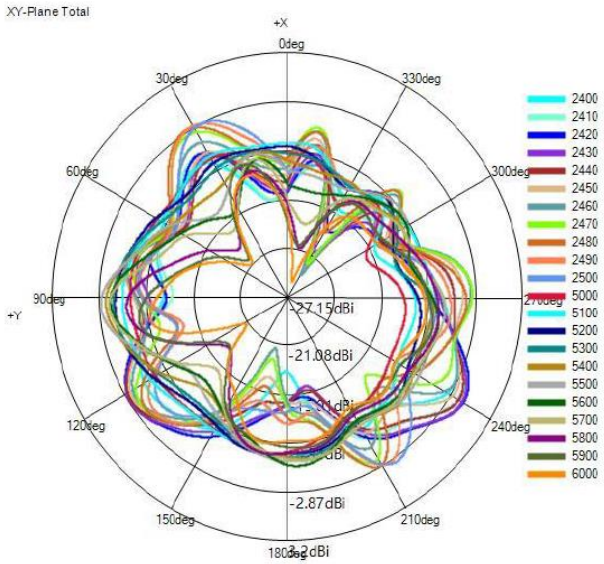
(1) X-Z Plane(unit:dBi):



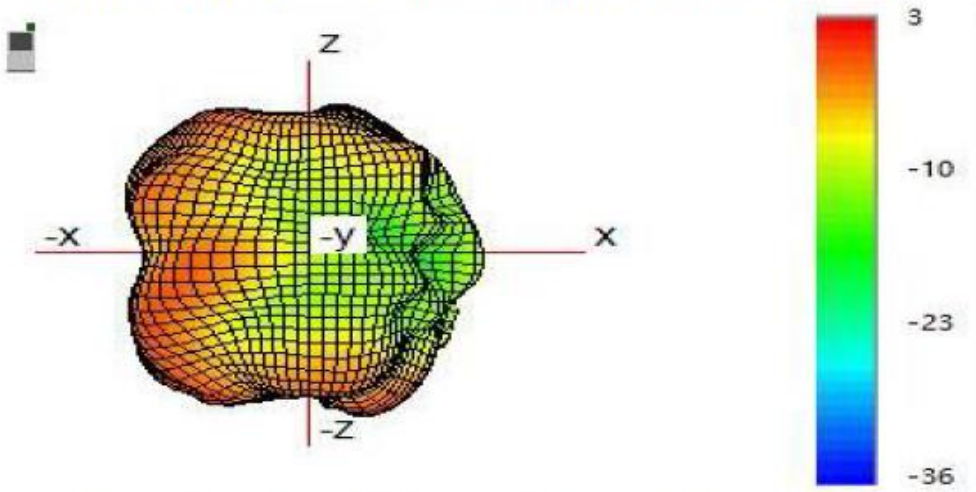
(2) Y-Z Plane(unit:dBi):



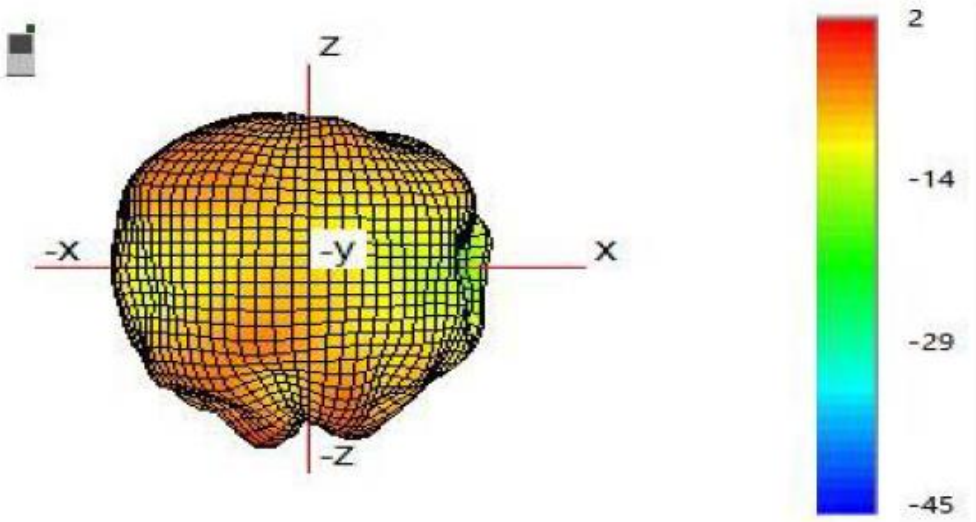
(3)X-Y Plane(unit:dBi):



(4)Typical Free Space 3D Radiation Pattern at 2.42GHz(unit:dBi):

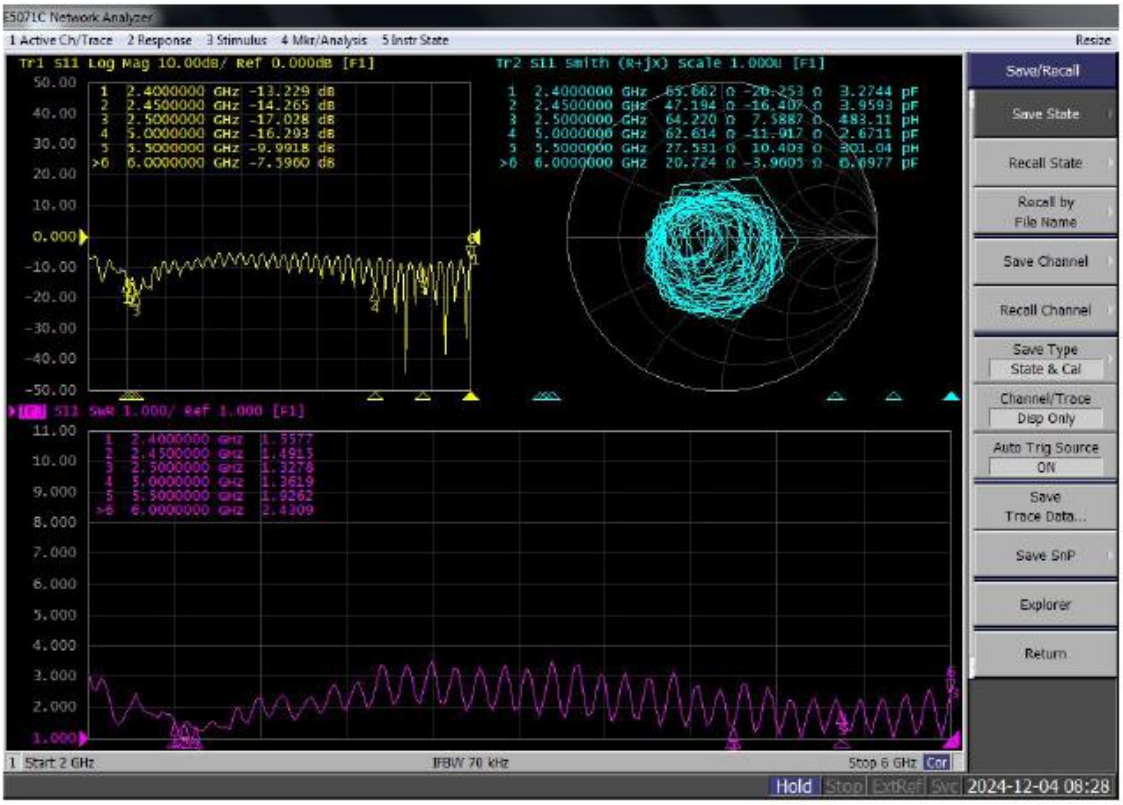


(5)Typical Free Space 3D Radiation Pattern at 5.8GHz(unit:dBi):



3.7 Test data(5#)

3.7.1 VSWR parameters



3.7.2 VSWR data

Frequency/MHz	2400	2450	2500	5000	5500	6000
VSWR	1.5577	1.4915	1.3278	1.3619	1.9262	2.4309

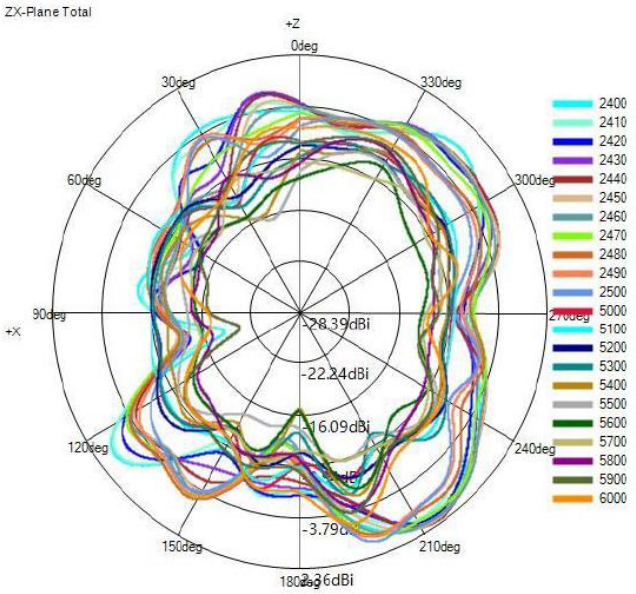
3.7.3 Typical free space efficiency and gain

Frequency/MHz	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain/dBi	1.99	1.77	2.13	2.33	2.23	2.09	1.87	1.27	1.57	1.40	1.86
Efficiency/%	33.37	31.92	32.67	33.41	33.89	34.65	35.06	34.63	34.45	34.34	33.37

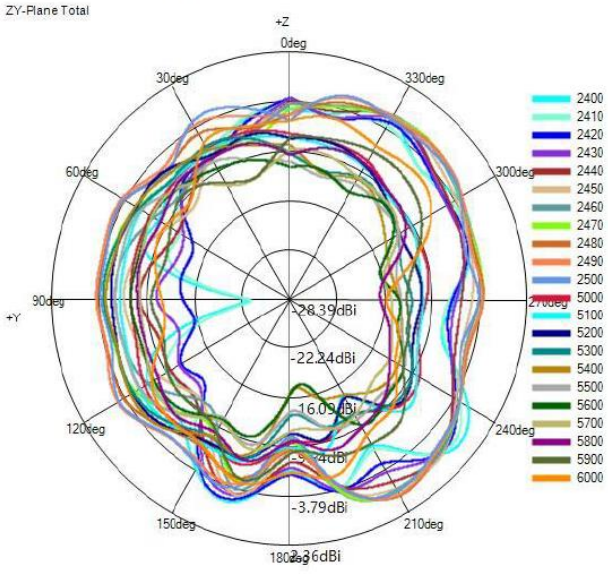
Frequency/MHz	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000
Peak Gain/dBi	-5.65	-4.82	-4.28	-4.19	-4.51	-5.65	-7.02	-3.99	-3.96	-2.11	0.23
Efficiency/%	13.17	14.14	14.26	13.14	11.19	8.79	7.50	7.58	8.93	10.06	12.49

3.7.4 Typical free space radiation pattern

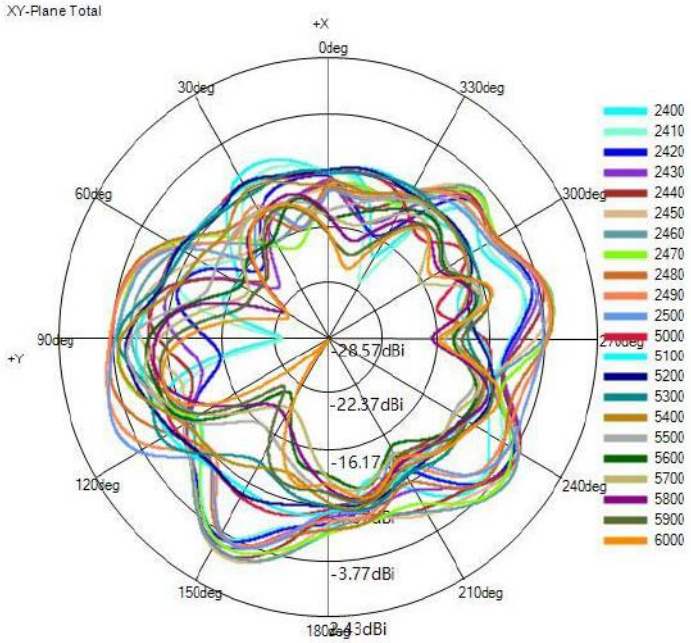
(1) X-Z Plane(unit:dBi):



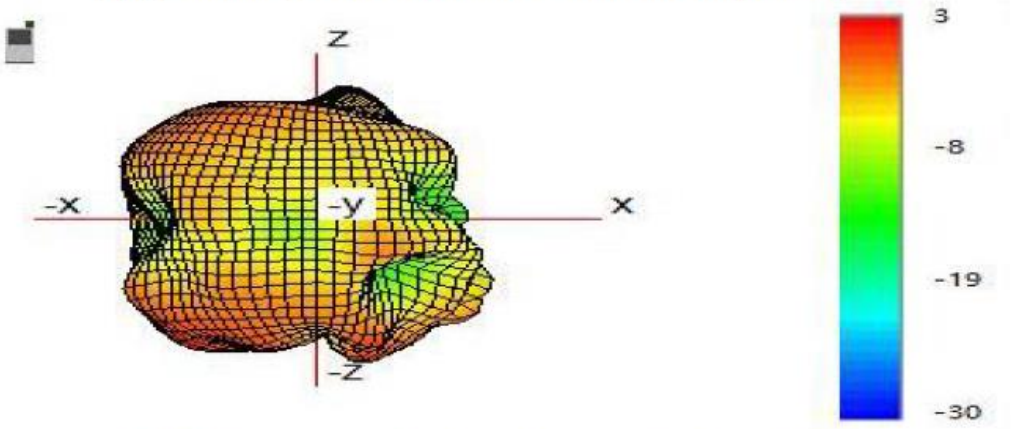
(2) Y-Z Plane(unit:dBi):



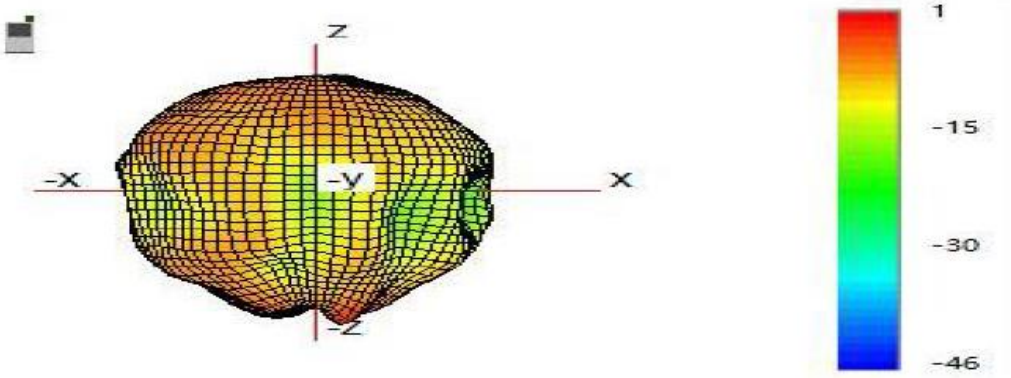
(3)X-Y Plane(unit:dBi):



(4)Typical Free Space 3D Radiation Pattern at 2.43GHz(unit:dBi):



(5)Typical Free Space 3D Radiation Pattern at 6GHz(unit:dBi):



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