



规格承认书

Approval Sheet

客户名称 和裕智慧

(Customer Name)

产品名称 PCB-4G

(Specification)

客户料号

(Customer P/N)

产品料号

(O/I)

送样日期 2022-11-23

(Date)

Frequency band	PCB-4G		
Version	A		
RF	陈美队	Confirm	
Structural Engineer	杨学忠		
Customer confirmation			
Date			

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1. Project image (for reference only)

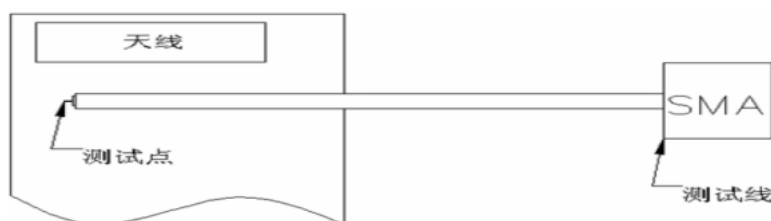


4G Antenna

2. Passive Test

Purpose: To test the passive parameters of the antenna as accurately as possible.

Method: This fixture uses a 50 ohm coaxial cable, with one end connected to the test point at the back end of the matching circuit (RF test hole front section) of the mobile phone motherboard, and the other end connected to the SMA connector. As shown in the following figure:



The following table presents the performance test indicators for PCB-4G antennas:

4G Antenna				
	Frequency (MHz)	VSWR	Frequency (MHz)	VSWR
Frequency band	Transmitting end		Receiving end	
GSM850	824-849	≤ 4	869-894	≤ 4
GSM900	880-915	≤ 4	925-960	≤ 4
DCS1800	1710-1785	≤ 3.5	1805-1880	≤ 3.5
PCS1900	1850-1910	≤ 3.5	1930-1990	≤ 3.5
WCDMA-B1	1990-2025	≤ 3.5	2035-2170	≤ 3.5
LTE-TDD-B38	2580-2610	≤ 3.5	2580-2610	≤ 3.5
LTE-TDD-B39	1890-1910	≤ 3.5	1890-1910	≤ 3.5
LTE-TDD-B40	2310-2390	≤ 3.5	2310-2390	≤ 3.5
LTE-TDD-B41	2506-2593	≤ 3.5	2506-2593	≤ 3.5

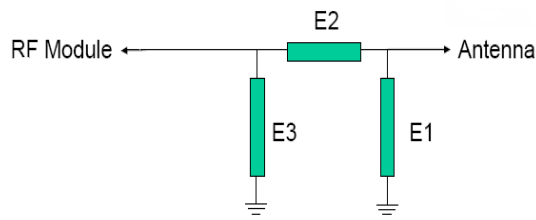
深圳市德仕勤科技有限公司

Dosking MicroElectronics Co.,Ltd

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3. Matching circuit



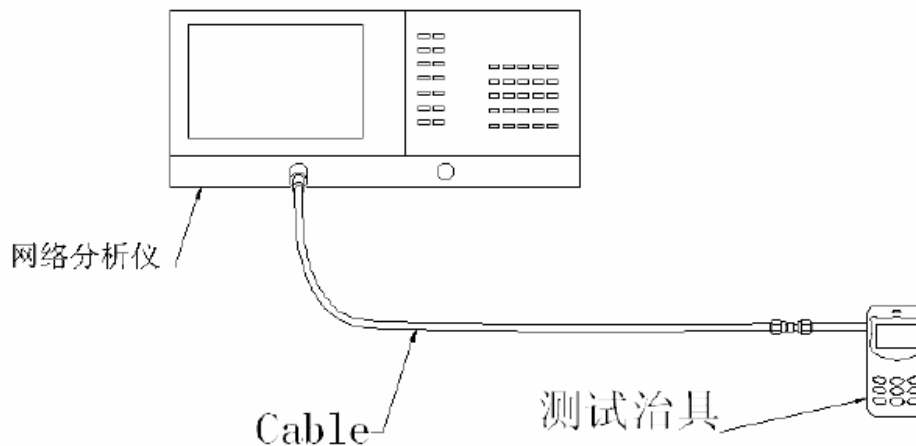
Element	Matching Value
E1	
E2	
E3	

4. S11Test

4.1 S11Test Method Description Specification Standards

VSWR The testing devices are sequentially connected as follows : E5071B Network analyzer → 50Ω Coaxial line → 120mm Copper tube → Test fixture.

Treatment of testing fixture: Use a hard cable to lead out the SMA-J connector from the 50 ohm test point of the antenna on the mobile phone PCB, connect it to a copper pipe with a choke ring, and then connect other devices in sequence.



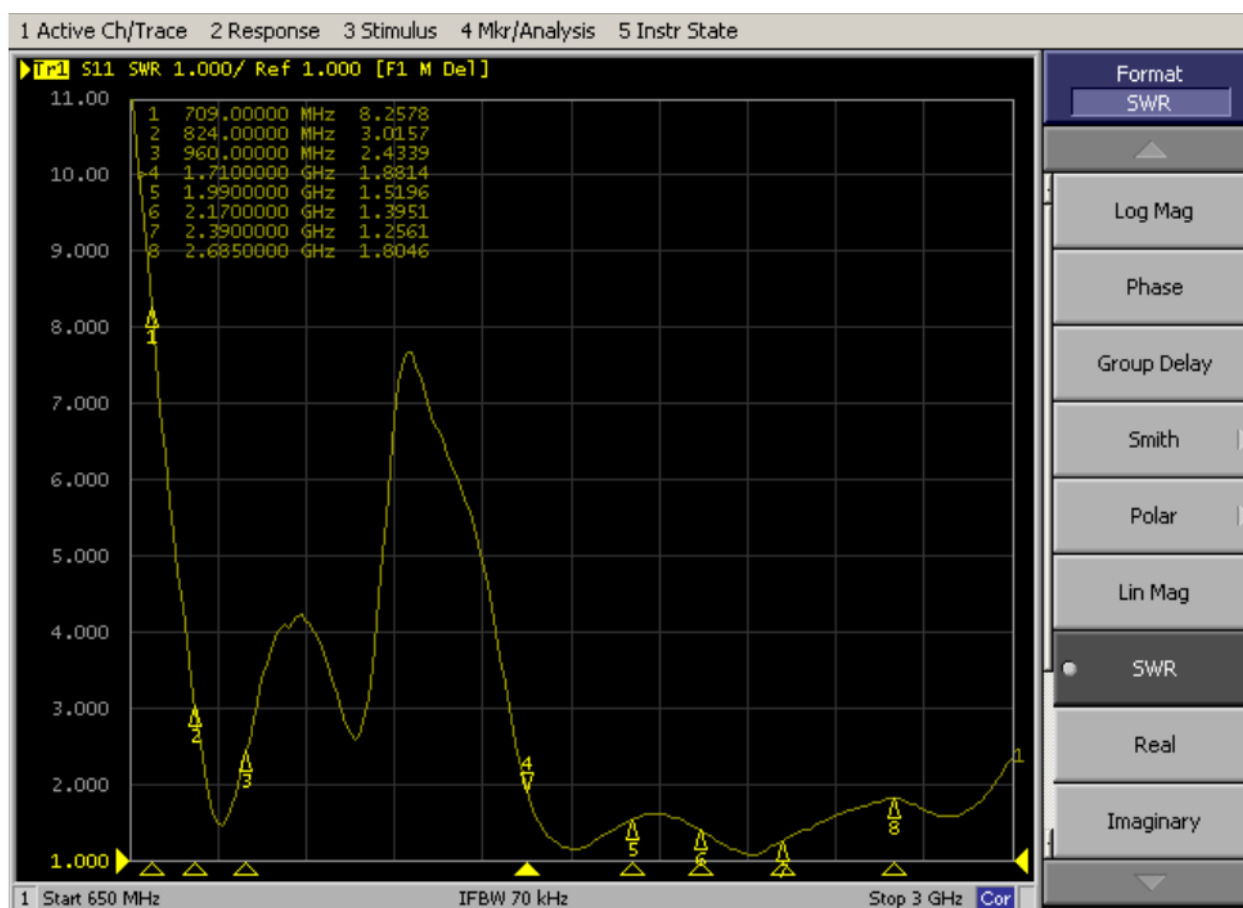
Test diagram

4.2 S11 parameters

The following table shows the standing wave ratio values at the edge frequency points of the operating frequency band of the PCB-4G antenna. The waveform diagrams related to Return Loss and VSWR obtained from the test are shown in the attachment.

	PCB-4G Antenna				
Frequency(MHz)	824	960	1710	2170	2685
Free space	3.0	2.4	1.88	1.39	1.8

4.3 S11 parameter image



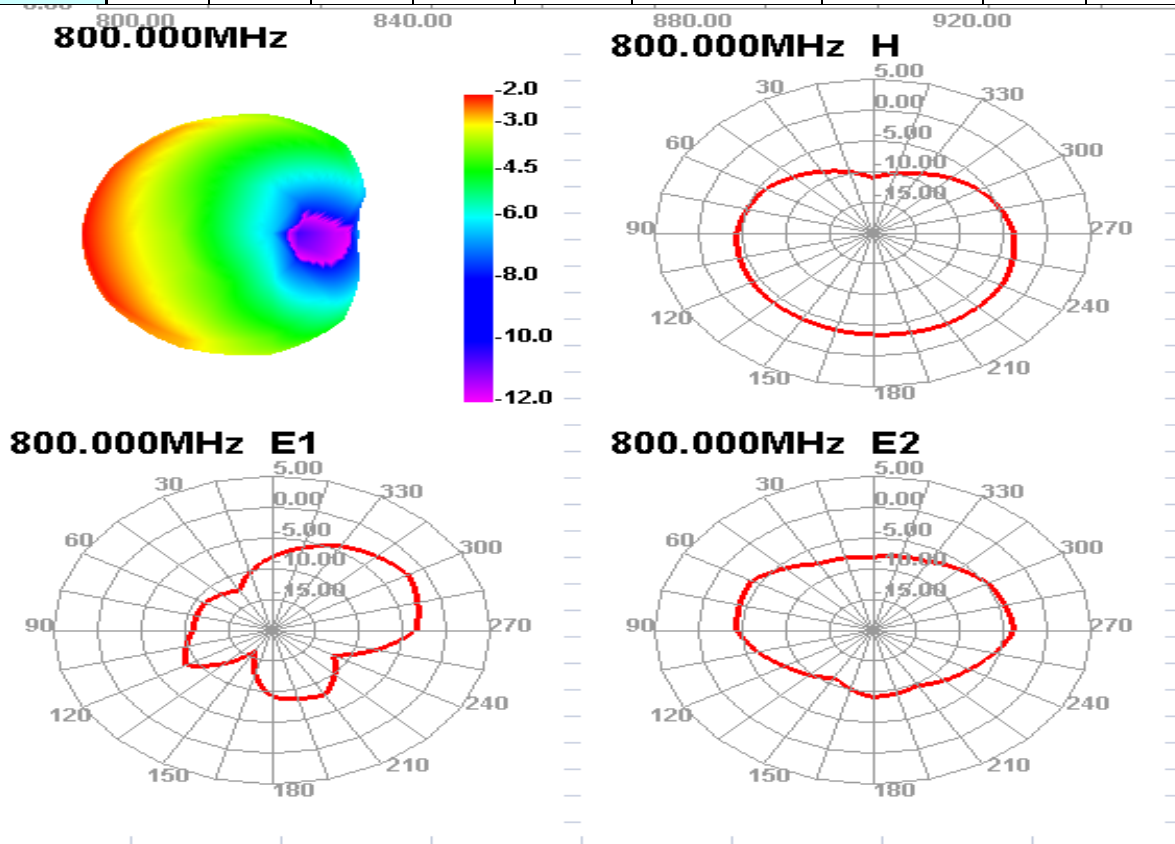
S11 SWR

5.Summary of Passive Electrical Performance

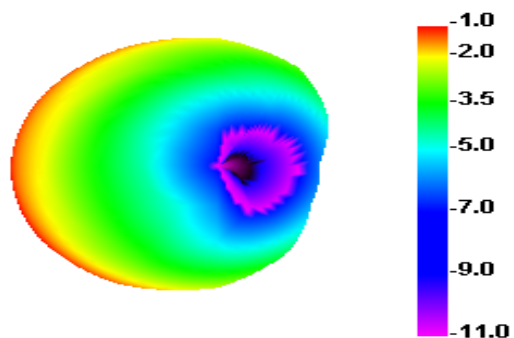
Electrical Specifications	
频率范围 Frequency range (MHz)	4G full network connectivity
极化方式 Polarization	Vertical polarization
增益 Gain (dBi)	0.6/1.2/1.5dBi
输入阻抗 Input Impedance (Ω)	50 Ω
电压驻波比 VSWR (5800MHZ)	≤ 4
最大功率 Maximum input power (W)	2W
机械参数 Mechanical Specifications	
接头类型 Input connector type	IPX
天线尺寸 Dimensions-mm (Height/Width/Depth)	13.5*95mm
包装尺寸 Packing size (mm)	Customer specified
天线罩材料 Radome material	PCB
天线罩颜色 Radome color	Black
工作温度 Operating temperature ($^{\circ}\text{C}$)	-30~60
极限风速 Rated Wind Velocity (m/s)	60

5.1 Test Data

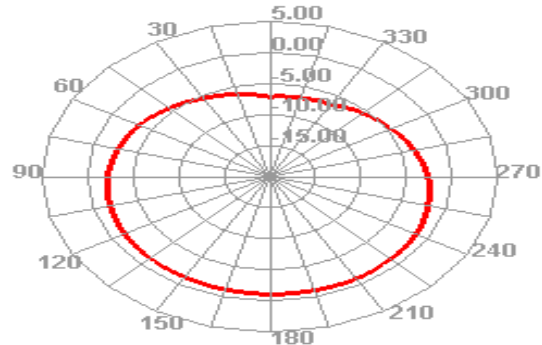
Passive Test For 800-960									
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
800	23.45	-6.3	-1.96	-1.96	-16.13	6.3	60	39.15	38.4
810	23.9	-6.22	-1.78	-1.78	-17.1	6.22	60	39.06	38.34
820	23.89	-6.22	-1.94	-1.94	-16.68	6.22	60	38.77	38.08
830	25.12	-6	-1.81	-1.81	-14.58	6	30	38.93	38.3
840	26.03	-5.85	-1.93	-1.93	-13.07	5.85	60	38.69	38.12
850	28.84	-5.4	-1.75	-1.75	-12.16	5.4	30	38.54	38.03
860	27.86	-5.55	-1.88	-1.88	-12.26	5.55	30	38.28	37.88
870	29.42	-5.31	-1.52	-1.52	-12.73	5.31	30	38.16	37.92
880	31	-5.09	-1.04	-1.04	-12.67	5.09	30	38.19	38.11
890	34.93	-4.57	-0.54	-0.54	-12.08	4.57	30	38.12	38.2
900	38.06	-4.2	-0.04	-0.04	-12.11	4.2	30	38.12	38.37
910	38.73	-4.12	-0.11	-0.11	-12.44	4.12	30	38.25	38.64
920	41.68	-3.8	0.19	0.19	-12.29	3.8	30	38.2	38.71
930	40.54	-3.92	-0.06	-0.06	-12.12	3.92	30	38.26	38.85
940	42.62	-3.7	0.17	0.17	-11.85	3.7	60	38.35	39.01
950	42.96	-3.67	0.18	0.18	-11.84	3.67	60	38.22	38.93
960	44.5	-3.52	0.38	0.38	-11.94	3.52	30	38.26	38.98



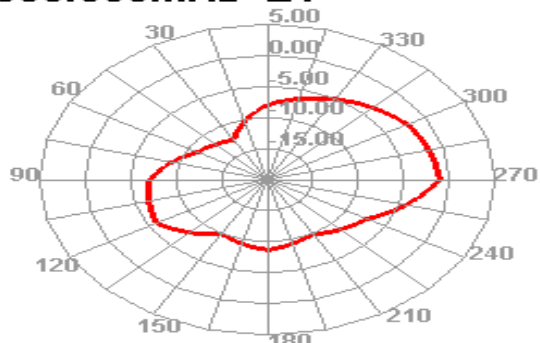
880.000MHz



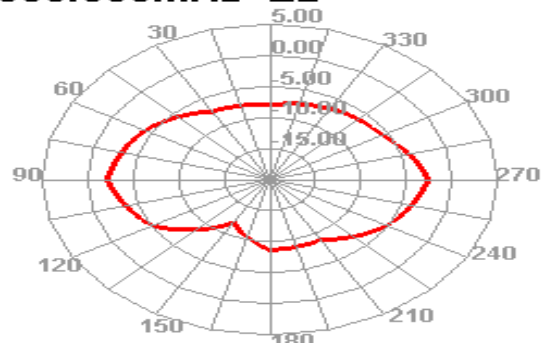
880.000MHz H



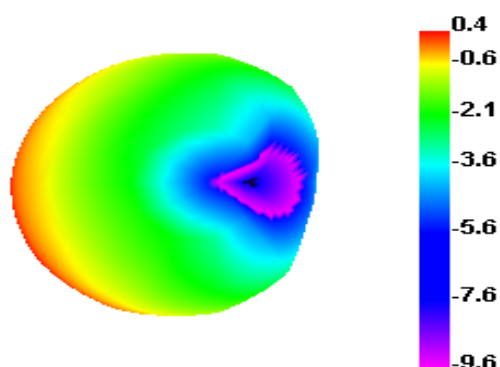
880.000MHz E1



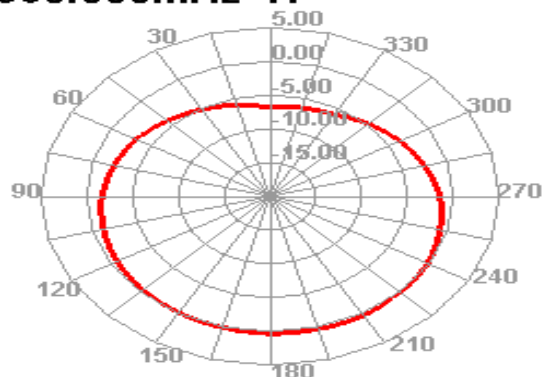
880.000MHz E2



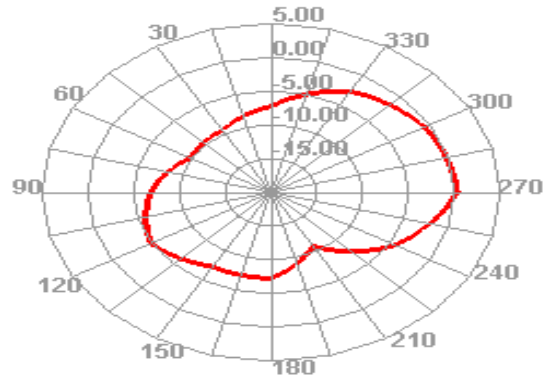
960.000MHz



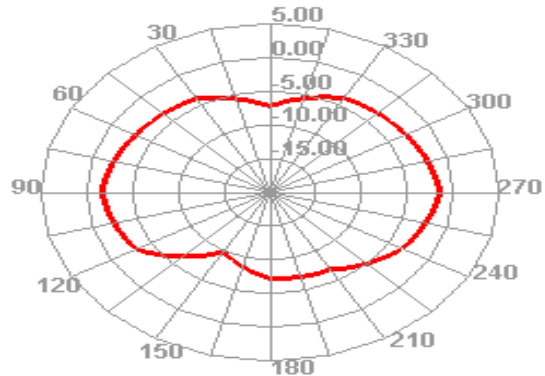
960.000MHz H



960.000MHz E1



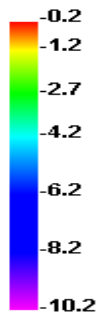
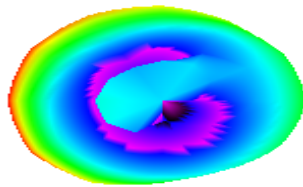
960.000MHz E2



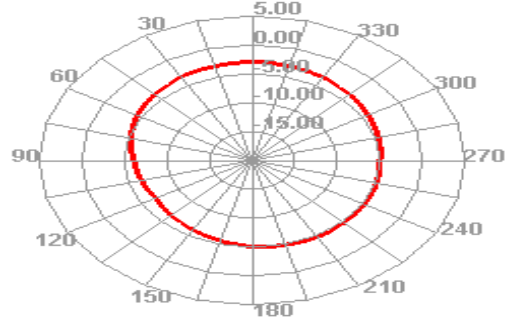
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Passive Test For 1700-2700									
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
1710	42.63	-3.7	0.15	0.15	-10.61	3.7	30	45.01	44.83
1750	45.84	-3.39	0.52	0.52	-10.57	3.39	30	44.67	44.42
1800	54.63	-2.63	1.13	1.13	-9.49	2.63	30	44.88	44.58
1850	61.22	-2.13	1.93	1.93	-7.79	2.13	30	45.33	44.99
1900	52.14	-2.83	1.08	1.08	-8.06	2.83	30	45.22	44.9
1950	49.75	-3.03	0.99	0.99	-12.7	3.03	30	46.42	46.25
2000	42.93	-3.67	0.29	0.29	-10.89	3.67	30	46.67	46.58
2050	42.96	-3.67	0.53	0.53	-14.37	3.67	30	46.78	46.99
2100	42.07	-3.76	0.72	0.72	-16.43	3.76	30	46.94	46.03
2150	32.35	-4.9	-0.7	-0.7	-16.99	4.9	30	45.76	45.79
2200	41.74	-3.79	0.15	0.15	-13.72	3.79	30	46.53	46.28
2250	50.64	-2.96	0.87	0.87	-15.79	2.96	30	46.62	46.5
2300	48.33	-3.16	0.41	0.41	-11.78	3.16	30	47.6	47.53
2350	26.73	-5.73	-2.6	-2.6	-19.14	5.73	30	48.29	48.19
2400	13.96	-8.55	-3.3	-3.3	-21.49	8.55	30	48.67	48.49
2450	30.67	-5.13	0.82	0.82	-14.77	5.13	0	49.03	48.99
2500	56.3	-2.49	3.87	3.87	-12.46	2.49	0	50.22	50.04
2550	46.54	-3.32	3.03	3.03	-12.8	3.32	0	49.67	49.48
2600	46.16	-3.36	2.92	2.92	-16.83	3.36	0	49.68	49.61
2650	50.6	-2.96	2.82	2.82	-14.22	2.96	0	50.35	50.34
2700	51.68	-2.87	2.19	2.19	-11.59	2.87	0	51.19	51.17

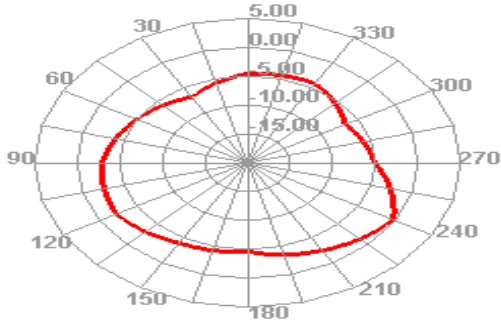
1700.000MHz



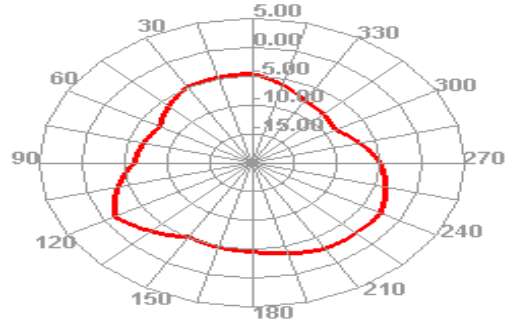
1700.000MHz H



1700.000MHz E1



1700.000MHz E2



1710.000MHz

1710.000MHz H

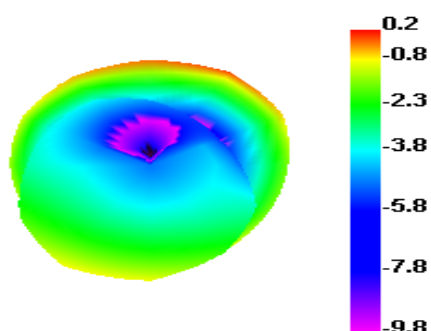
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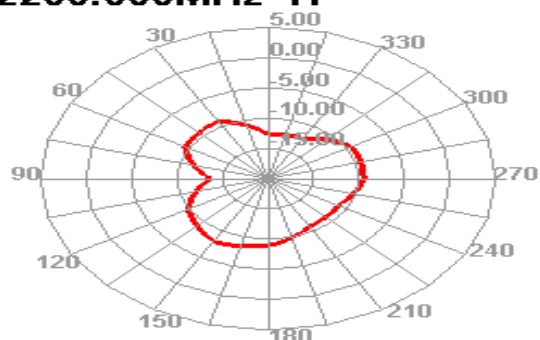
地址：深圳市南山区西丽大学城民企科技园 2 栋（港鸿基大厦）西座 403

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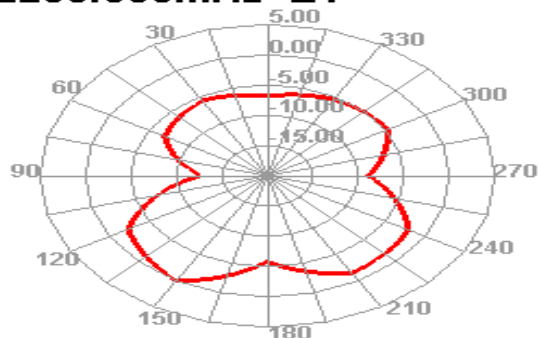
2200.000MHz



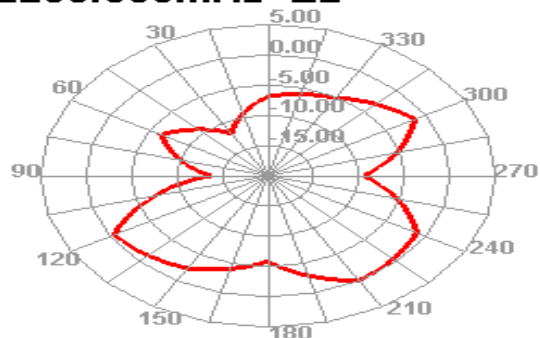
2200.000MHz H



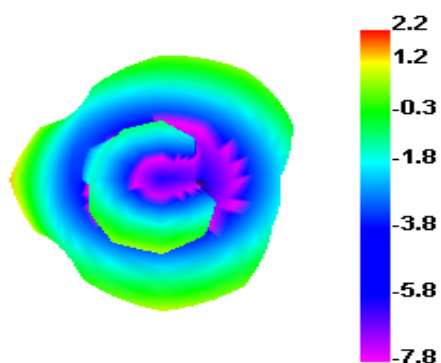
2200.000MHz E1



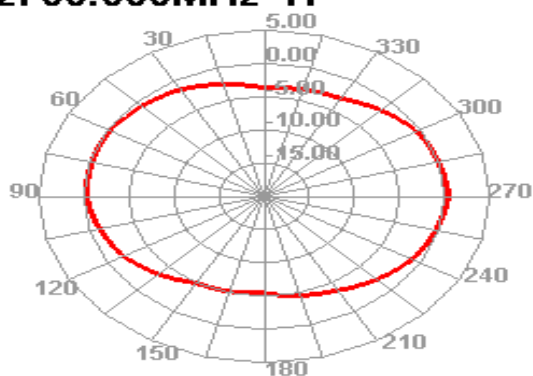
2200.000MHz E2



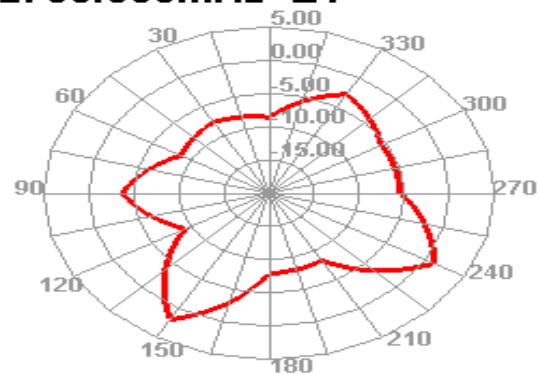
2700.000MHz



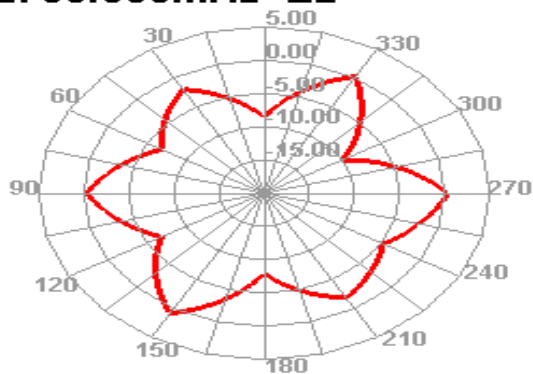
2700.000MHz H



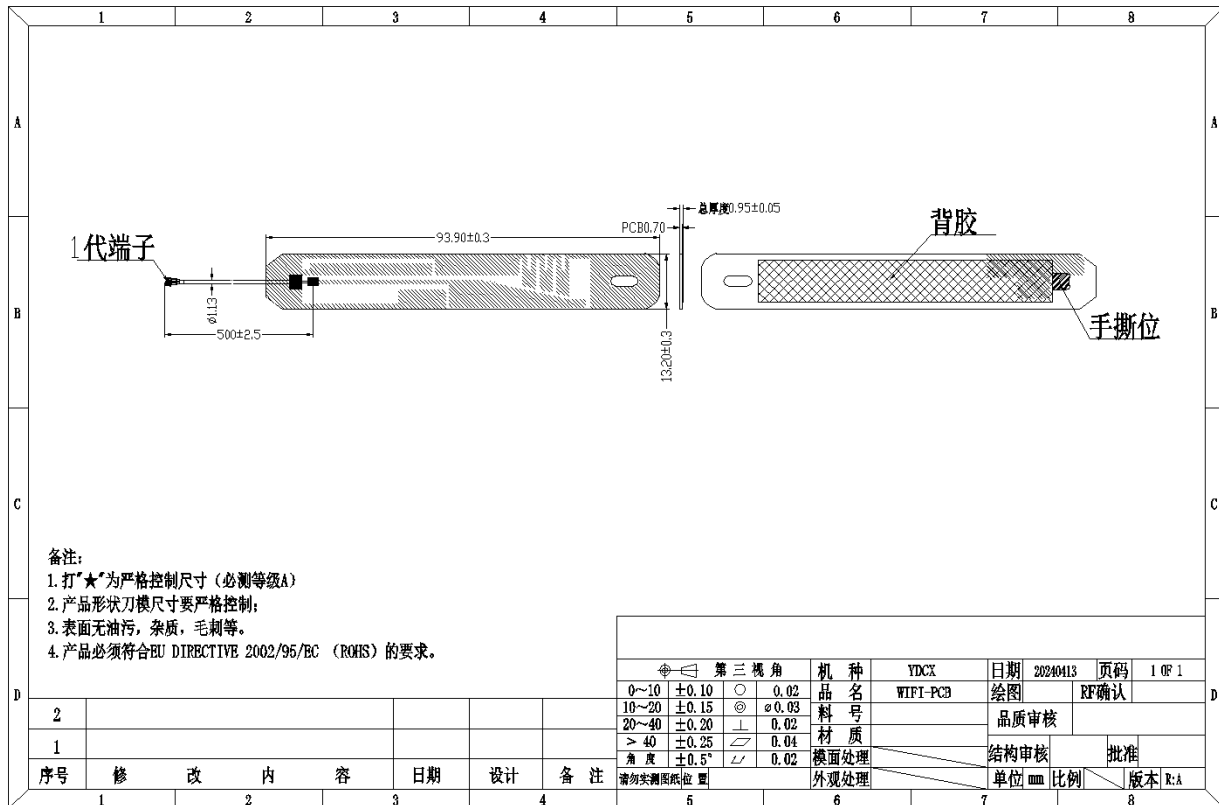
2700.000MHz E1



2700.000MHz E2



6.Structural drawings





规格承认书

Approval Sheet

客户名称 和裕智慧

(Customer Name)

产品名称 PCB - WIFI

(Specification)

客户料号

(Customer P/N)

产品料号

(O/I)

送样日期 2022-11-23

(Date)

Frequency band	PCB – Wi Fi		
Version	A		
RF	陈美队	Confirm	
Structural Engineer	杨学忠		
Customer confirmation			
Date			

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5.1 Test Data

6. Structural drawings

1. Project image (for reference only)

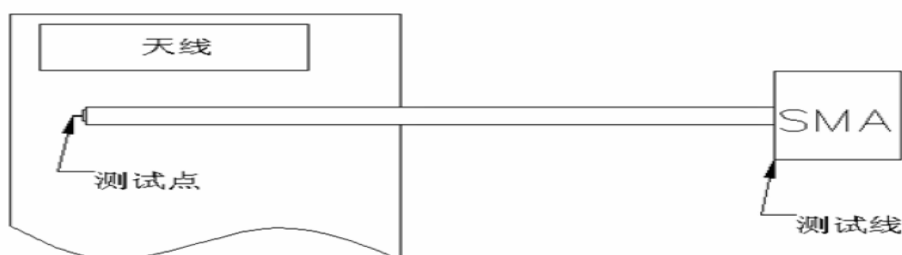


WiFi Antenna

2. Passive Test

Purpose: To test the passive parameters of the antenna as accurately as possible.

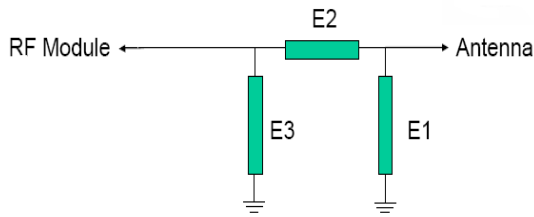
Method: This fixture uses a 50 ohm coaxial cable, with one end connected to the test point at the back end of the matching circuit (RF test hole front section) of the mobile phone motherboard, and the other end connected to the SMA connector. As shown in the following figure:



The following table presents the performance test indicators for PCB-WiFi antennas:

WiFi Antenna				
	Frequency (MHz)	VSWR	Frequency (MHz)	VSWR
Frequency band	Transmitting end		Receiving end	
WIFI	2400-2500	≤1.5	2400-2500	≤1.5

3. Matching circuit



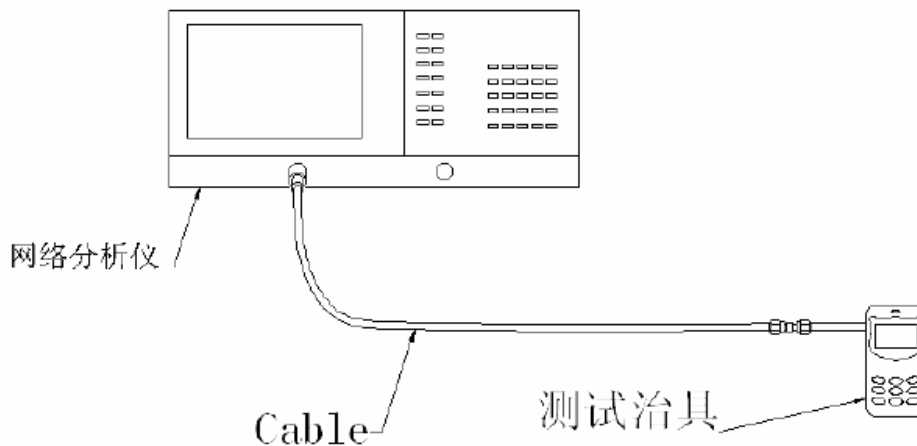
Element	Matching Value
E1	
E2	
E3	

4. S11Test

4.1 S11Test Method Description Specification Standards

VSWR The testing devices are sequentially connected as follows : E5071B Network analyzer → 50Ω Coaxial line → 120mm Copper tube → Test fixture.

Treatment of testing fixture: Use a hard cable to lead out the SMA-J connector from the 50 ohm test point of the antenna on the mobile phone PCB, connect it to a copper pipe with a choke ring, and then connect other devices in sequence.



Test diagram

4.2 S11 parameters

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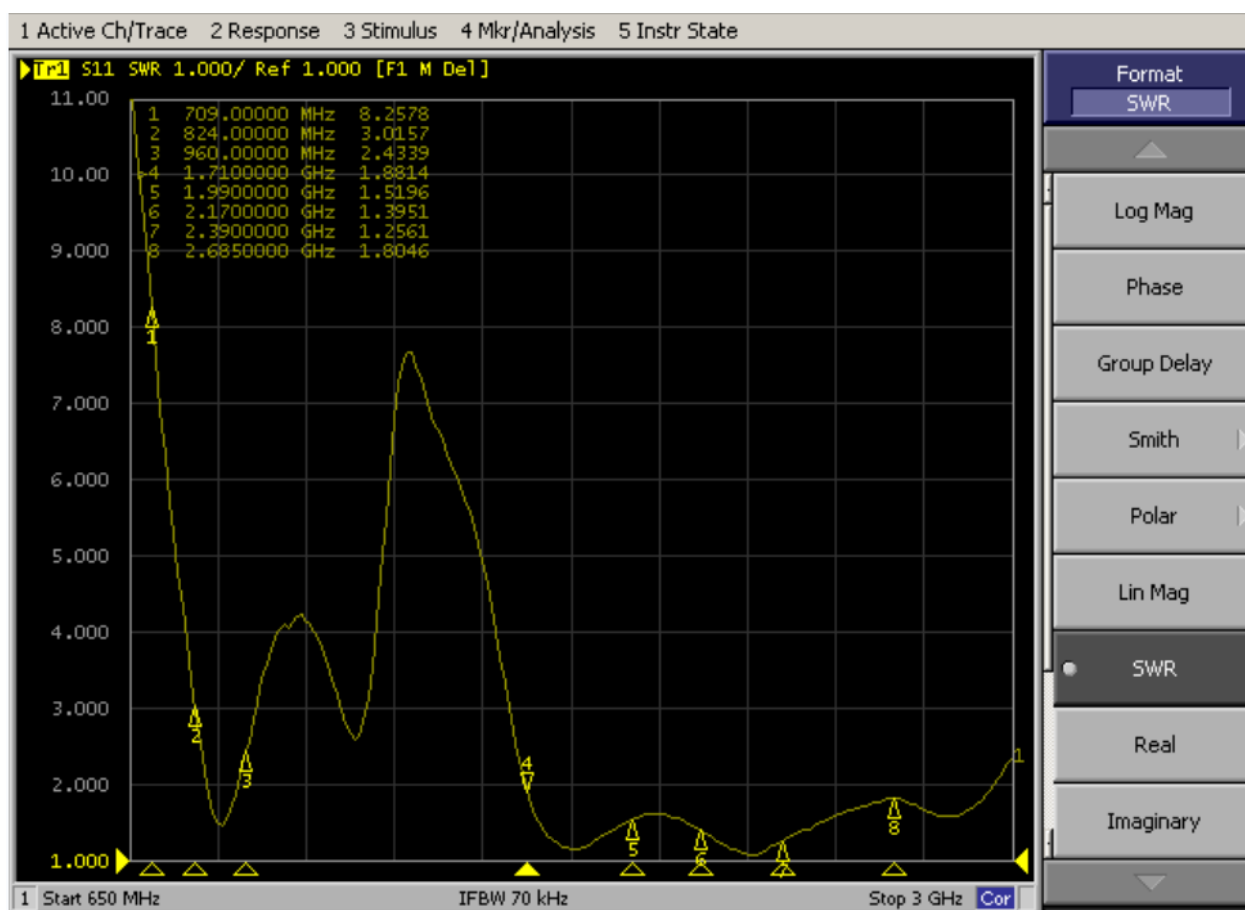
地址：深圳市南山区西丽大学城民企科技园 2 栋（港鸿基大厦）西座 403

TEL:0755-88602767 FAX:0755-82793883

The following table shows the standing wave ratio values at the edge frequency points of the operating frequency band of the PCB-WiFi antenna. The waveform diagrams related to Return Loss and VSWR obtained from the test are shown in the attachment.

	PCB - WIFI Antenna
Frequency(MHz)	2400-2500
Free space	1.2

4.3 S11 S11 parameter image



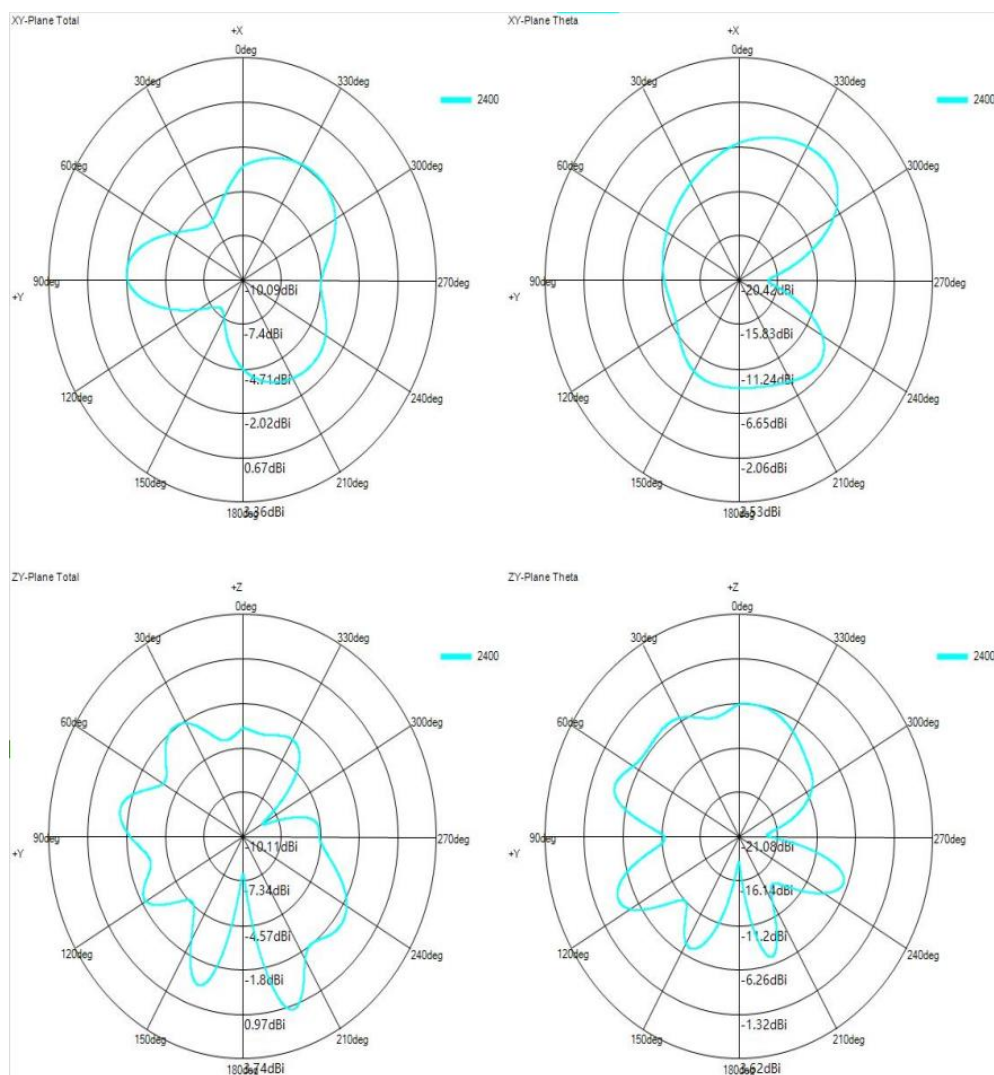
S11 SWR

5.Summary of Passive Electrical Performance

Electrical Specifications	
频率范围 Frequency range (MHz)	WiFi
极化方式 Polarization	Vertical polarization
增益 Gain (dBi)	1.5dBi
输入阻抗 Input Impedance (Ω)	50 Ω
电压驻波比 VSWR (5800MHZ)	≤ 4
最大功率 Maximum input power (W)	2W
机械参数 Mechanical Specifications	
接头类型 Input connector type	IPX
天线尺寸 Dimensions-mm (Height/Width/Depth)	13.5*95mm
包装尺寸 Packing size (mm)	Customer specified
天线罩材料 Radome material	PCB
天线罩颜色 Radome color	Black
工作温度 Operating temperature ($^{\circ}\text{C}$)	-30~60
极限风速 Rated Wind Velocity (m/s)	60

5.1 Test Data

Passive Test For 2400-2500								
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	Max (dB)	Min (dB)	irectivity (dBi)	Beamwidth (3dB)
2400	54.86	-2.61	2.95	0.8	2.95	-13.43	2.61	30
2410	51.1	-2.92	2.68	0.53	2.68	-13.88	2.92	30
2420	54.43	-2.64	2.89	0.74	2.89	-13.14	2.64	30
2430	57.18	-2.43	3.03	0.88	3.03	-13.35	2.43	30
2440	56.71	-2.46	2.86	0.71	2.86	-13.64	2.46	30
2450	51.37	-2.89	2.51	0.36	2.51	-14.57	2.89	30
2460	55.8	-2.53	2.85	0.7	2.85	-15.46	2.53	30
2470	52.62	-2.79	2.66	0.51	2.66	-16.82	2.79	30
2480	54.43	-2.64	2.72	0.57	2.72	-17.26	2.64	30
2490	59.74	-2.24	3.09	0.94	3.09	-16.15	2.24	30
2500	57.85	-2.38	2.8	0.65	2.8	-15.22	2.38	0



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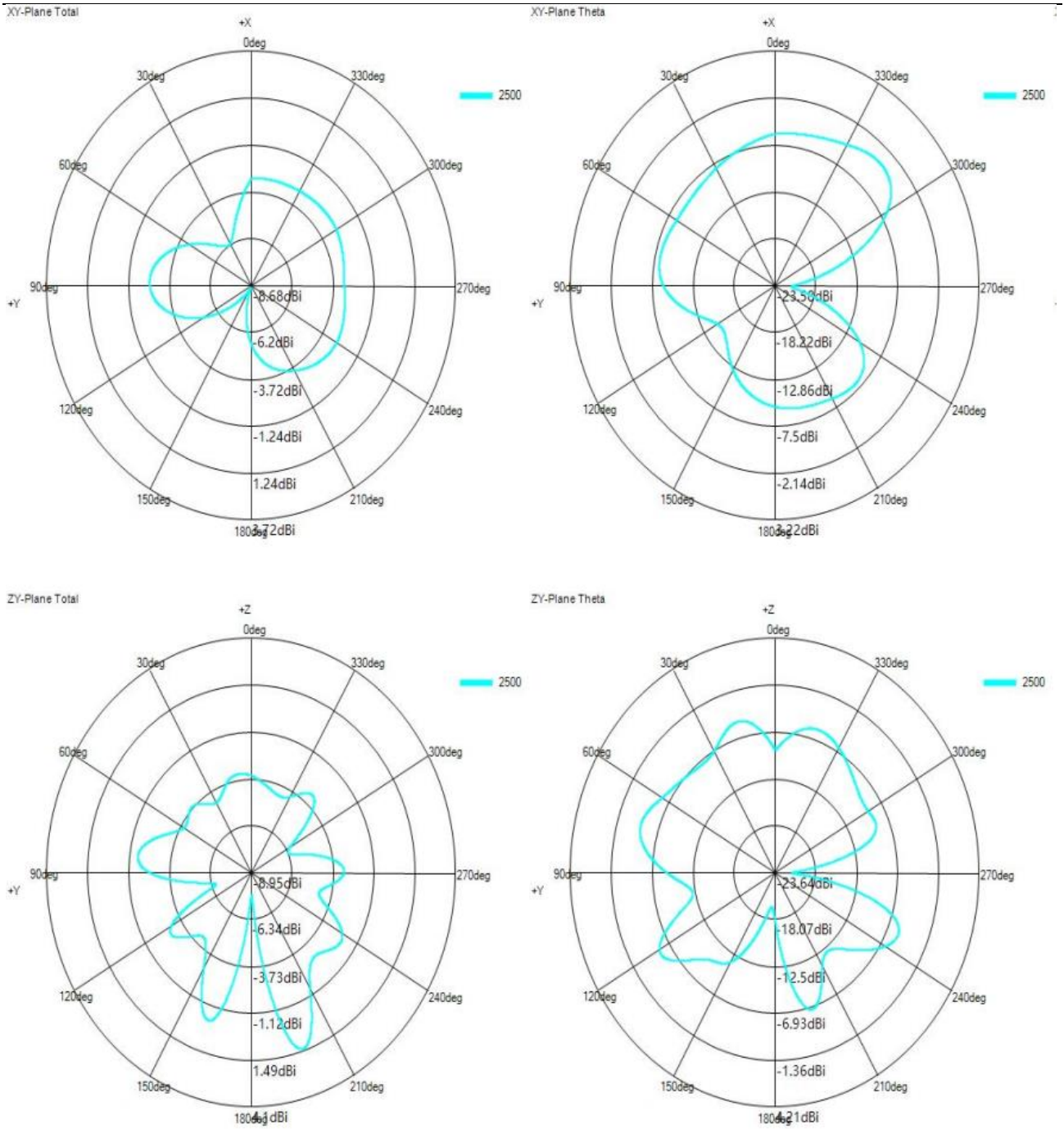
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6.Structural drawings

