

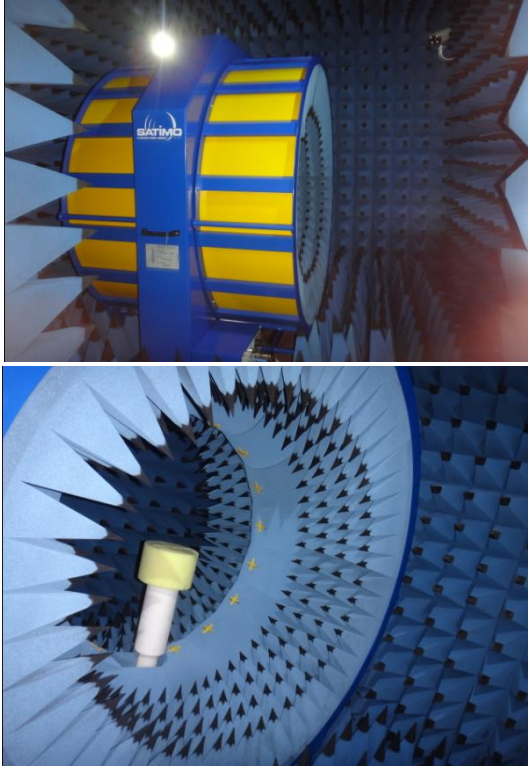
Antenna Test Report



Customer name	Ciontek Technology Corp	Project name	CM30
Band	2G/3G/4G	MD Type	FPC
RF	Chen Shiyang	MD	Du Qiang
Antenna Type	PIFA	Date	2023-12-28

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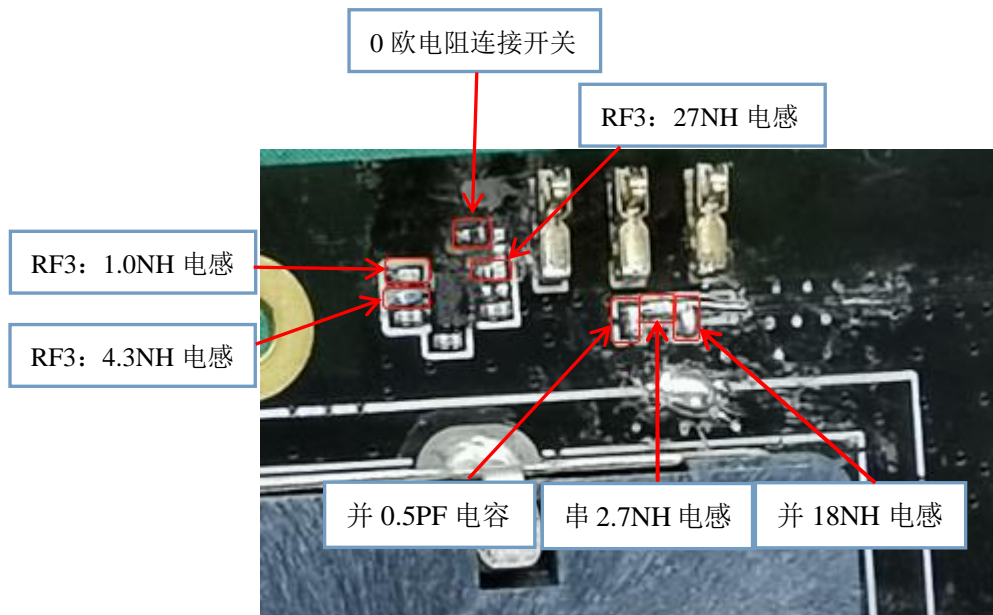
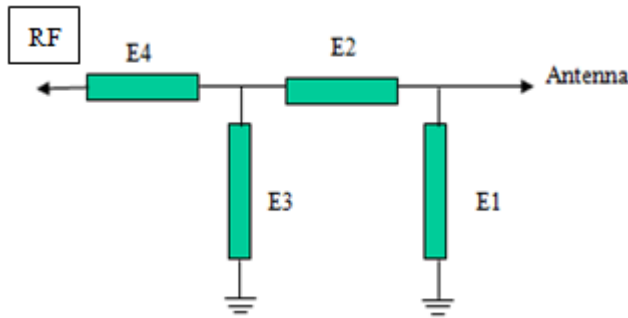
原装进口法国 SATIMO 公司 StarLab 3D 实验室, 能精确快速的测试手机、平板电脑和笔记本等通信终端产品的 TRP、TIS、效率、增益、苹果图、方向图等参数数据。

Imported from France SATIMO company StarLab 3d laboratory, can accurate、rapid test communications terminal products .such as mobile phones, PC of TRP, TIS, efficiency, gain, apple figure, directional diagram

Main antenna matching circuit

Element	E1	E2	E3	E4
Value	0.5PF	2.7 NH	18 NH	

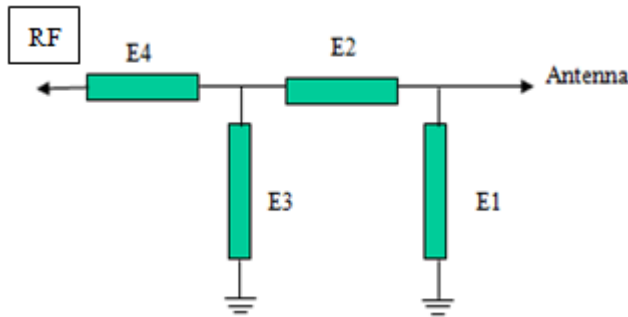
Our company has made changes to the main antenna matching circuit !



Diversity antenna matching circuit

Element	E1	E2	E3	E4
Value				

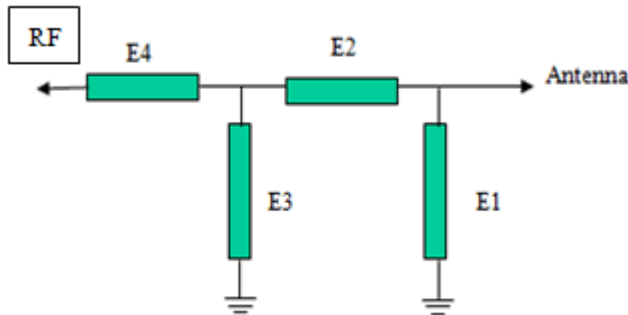
Our company has made changes to the diversity matching circuit



GPS/WIFI antenna matching circuit

Element	E1	E2	E3	E4
Value				

Our company has not made any changes to the GPS/WIFI antenna matching circuit !



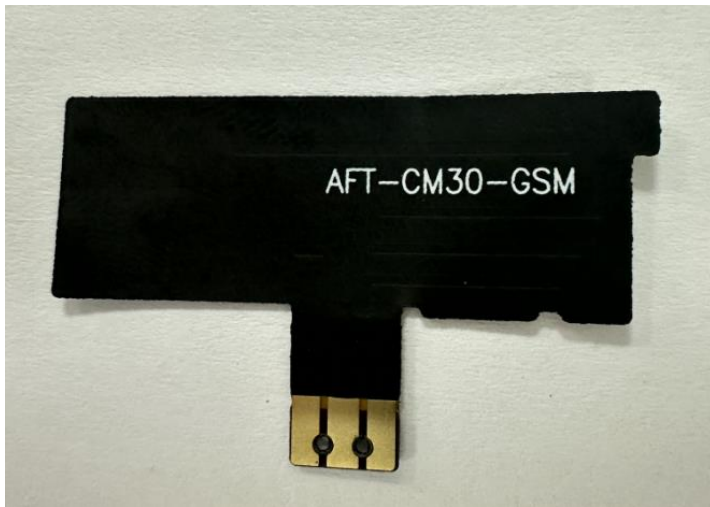
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AFT tech Electronic Co., Ltd. (Shenzhen)

Antenna manufacturer: AFT tech Electronic Co., Ltd. (Shenzhen)

Antenna model: CM30

Antenna size and image:

Main antenna: 36.76*22.47*0.12mm



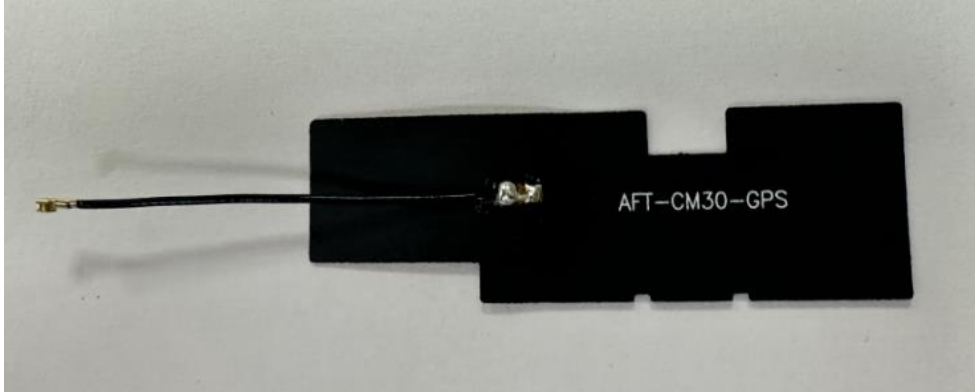
WIFI antenna: 27.80*21.57*0.12mm



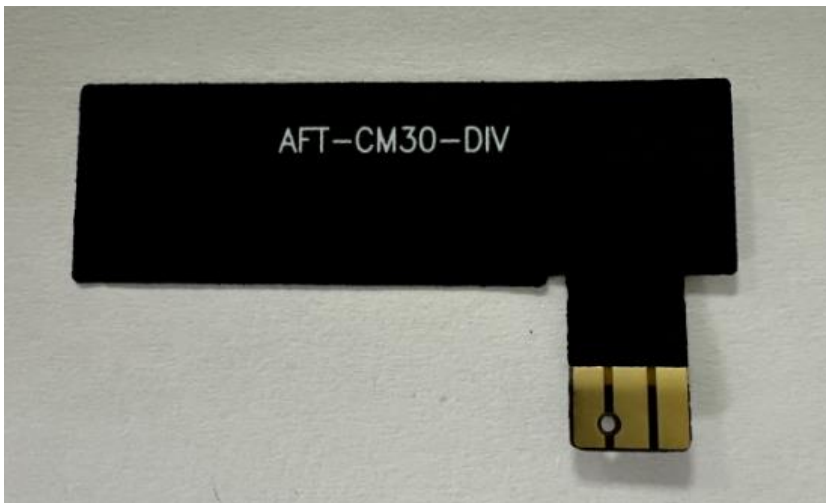
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GPS antenna:

FPC: 53.80*17.10*0.12mm, coaxial line Total length: 45mm



Diversity antenna: 39.70*21.17*0.12mm

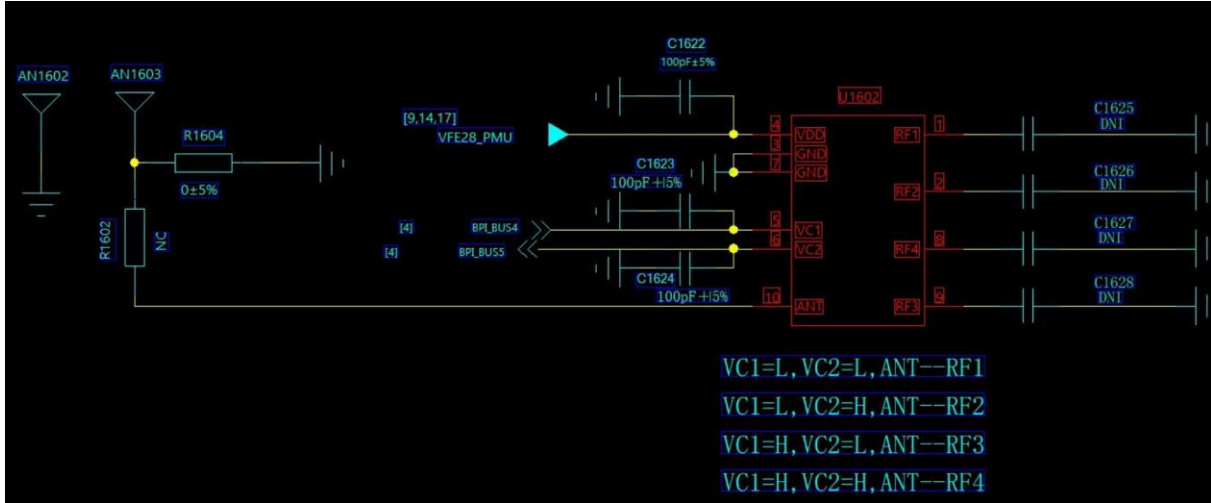


External antenna(LTE/GPS/WIFI) size:

sucker base:30*28mm, Antenna pole length:289mm

cable length: 1000mm(RG174)





RF1, paste a 1.0NH resistor here, antenna debugging frequency band GSM: 900, 1800, 1900

W: B1, B2, B4, B8 4G: B1, B2, B3, B4, B7, B8, B38, B39, B40, B41

RF2, paste a 4.3NH inductor here, antenna debugging frequency band GSM: 850 W: B5 4G: B5, B20

RF3, paste a 27NH inductor here, antenna debugging frequency band 4G: B12, B17, 28B

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Antenna FS OTA:

Band	Channel	TRP(dBm)	TIS(dBm)	Band	Channel	TRP(dBm)	TIS(dBm)
GSM 850	L	26.2		GSM 900	L	26.9	
	M	26.6			M	26.7	
	H	26.7	-92.5		H	26.6	-91.3
DCS 1800	L	25.8		PCS 1900	L	25.3	
	M	25.9			M	25.6	
	H	25.1	-102.5		H	25.2	-102.6
WCDMA 850	L	18.5		WCDMA 900	L	18.9	
	M	17.3			M	18.9	
	H	17.5	-91.5		H	18.7	-85.1
WCDMA 1700	L	18.9		WCDMA 1900	L	17.6	
	M	18.9			M	18.2	
	H	18.4	-102.2		H	18.6	-105.2
WCDMA 2100	L	18.4		LTE-B1 (10M)	L	18.6	
	M	18.2			M	18.3	
	H	18.0	-104.4		H	17.5	-91.7
LTE-B2 (10M)	L	18.8		LTE-B3 (10M)	L	17.3	
	M	18.6			M	17.4	
	H	18.1	-94.4		H	16.8	-91.2
LTE-B4 (10M)	L	17.4		LTE-B5 (10M)	L	17.0	
	M	17.5			M	17.3	
	H	17.5	-91.8		H	16.7	-90.5
LTE-B7 (10M)	L	16.9		LTE-B8 (10M)	L	17.5	
	M	17.1			M	16.8	
	H	16.7	-95.1		H	16.5	-88.1
LTE-B12 (10M)	L	15.4		LTE-B17 (10M)	L	14.7	
	M	15.5			M	15.5	
	H	15.3	-82.8		H	15.2	-81.4
LTE-B20 (10M)	L	16.3		LTE-B28A (10M)	L	15.3	
	M	16.7			M	15.3	
	H	16.9	-88.2		H	15.5	-83.5
LTE-B28B (10M)	L	15.2		LTE-B38 (20M)	L	17.2	
	M	15.3			M	17.1	
	H	15.1	-85.8		H	16.9	-90.7

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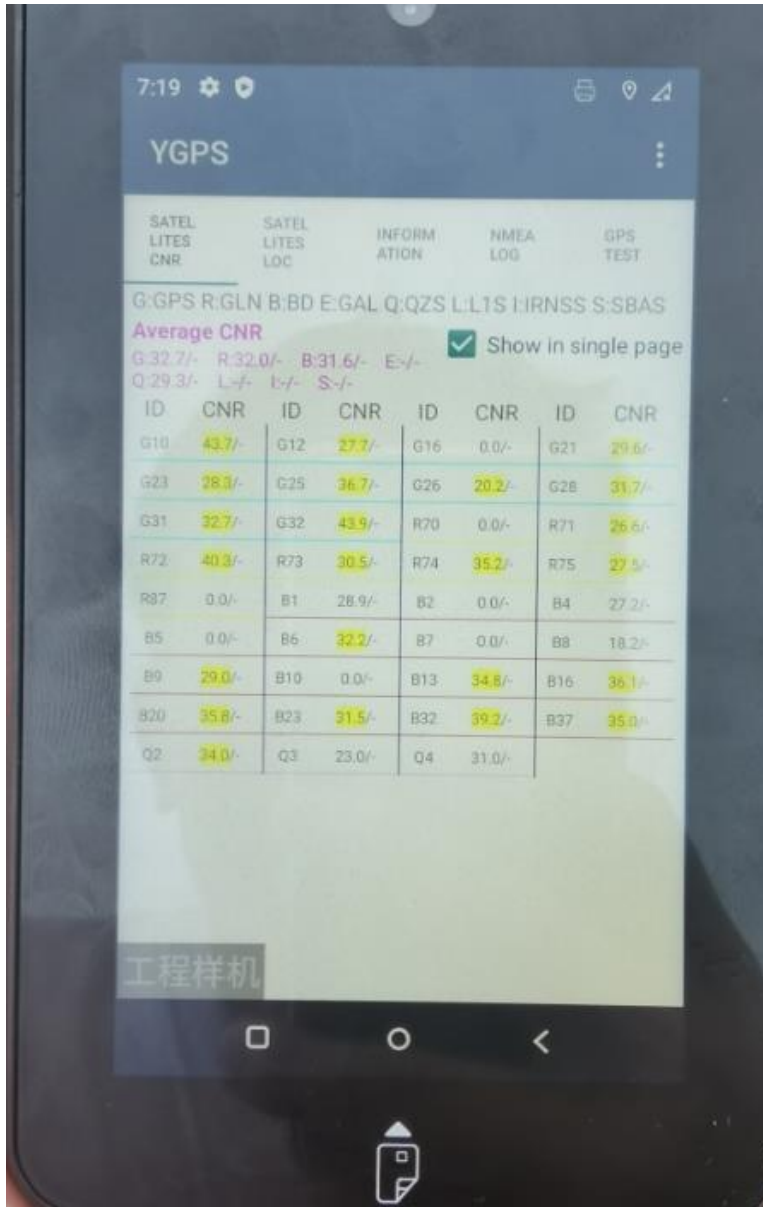
LTE-B40 (20M)	L	19.2		LTE-B41 (20M)	L	18.1	
	M	18.0			M	17.7	
	H	18.5	-89.5		H	16.7	-88.3

WIFI antenna Fs OTA:

Band	Channel	TRP (dBm)	TIS (dBm)
2.4G-B (11M)	1	9.7	-75.9
	6	9.5	-76.8
	13	9.6	-76.9

Band	Channel	TRP (dBm)	TIS (dBm)
5G-A (54M)	36	9.4	-71.0
	64	9.4	-71.0
	165	8.9	-69.5

GPS test:



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Passive Test

Main antenna :

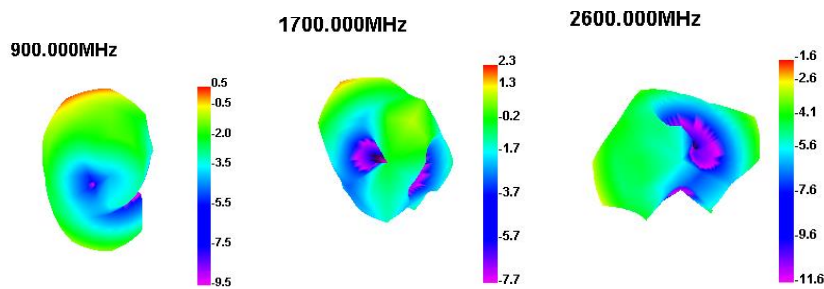
frequency 频率(MHz)	efficiency 效率(%)	gain 增益(dBi)	frequency 频率(MHz)	efficiency 效率(%)	gain 增益(dBi)
700	28.44	-3.03	1700	37.37	2.33
710	30.74	-3.05	1720	37.7	2.13
720	29.47	-3.14	1740	37.55	1.86
730	23.41	-3.86	1760	35.07	1.63
740	18.05	-4.51	1780	37.12	2
750	15.4	-4.11	1800	33.9	1.5
760	15.35	-3.7	1820	31.48	1.09
770	16.14	-2.44	1840	30.95	1.07
780	14.73	-2.98	1860	27.69	1.02
790	15.87	-3.12	1880	24.17	0.54
800	13.98	-4.22	1900	28.45	1.02
810	36.15	-0.1	1920	22.97	-0.38
820	35.41	0.49	1940	24.55	-0.26
830	36.04	0.44	1960	25.21	-0.05
840	35.47	0.37	1980	25.14	0.17
850	35.52	-0.25	2000	31.01	1
860	34.99	-0.11	2020	30.03	0.77
870	31.63	-0.35	2040	25	-0.01
880	30.58	-0.16	2060	26	0.15
890	41.79	-0.08	2080	21.05	-1.32
900	44.62	0.48	2100	22.38	-1.69
910	43.59	0.51	2120	27.2	-0.97
920	38.9	-0.11	2140	30.16	-0.99
930	32.87	-0.68	2160	28.15	-1.64
940	25.57	-1.25	2180	30.36	-1.57
950	24.78	-1.77	2200	31.06	-1.07
960	20.44	-2.42	2220	28.06	-1.19
			2240	29.58	-0.64
			2260	28.3	-0.6
			2280	25.75	-0.74
			2300	27.29	-0.31
			2320	28.69	-0.09
			2340	29.46	-0.02

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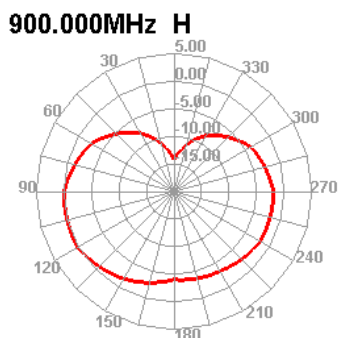
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			2360	31.89	0.38
			2380	30.54	0.24
			2400	31.13	0.08
			2420	35.58	0.3
			2440	36.93	-0.05
			2460	37.81	-0.12
			2480	39.95	0.13
			2500	35.05	-0.98
			2520	29.32	-1.55
			2540	29.4	-1.25
			2560	23.99	-1.69
			2580	25.5	-1.37
			2600	26.21	-1.55
			2620	24.28	-1.59
			2640	26.76	-0.9
			2660	27.1	-0.54
			2680	24.84	-0.61
			2700	25.72	-0.25

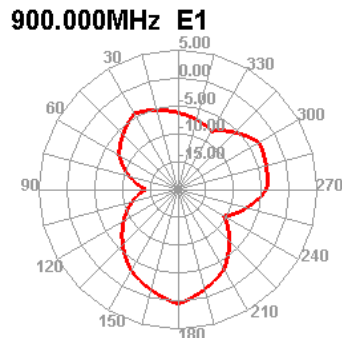
3D radiation pattern diagram



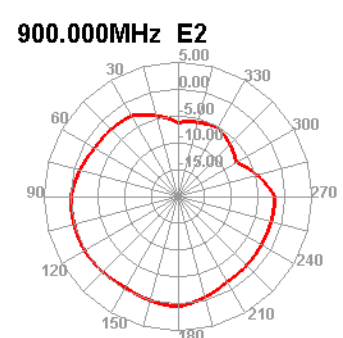
XY-plane

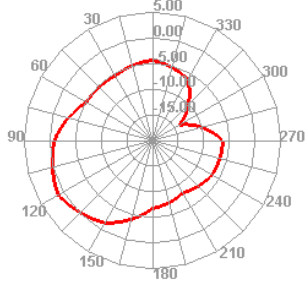
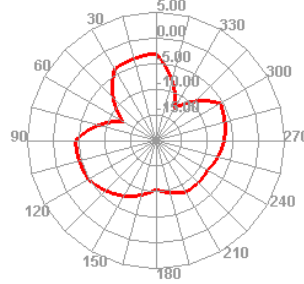
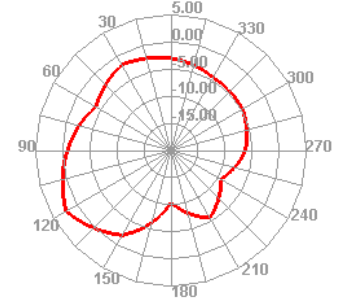
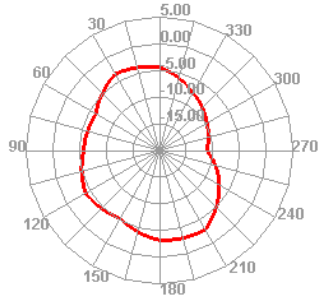
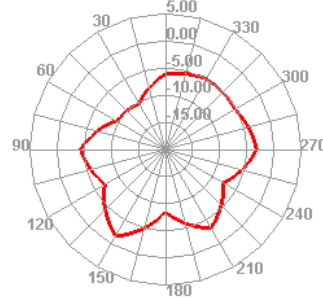
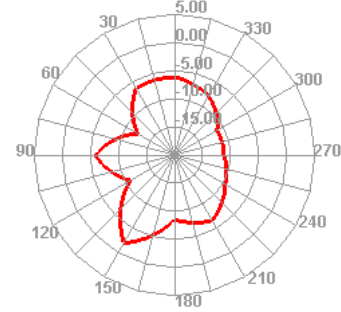


XZ-plane



YZ-plane



1700.000MHz H

1700.000MHz E1

1700.000MHz E2

2600.000MHz H

2600.000MHz E1

2600.000MHz E2


Diversity Antenna:

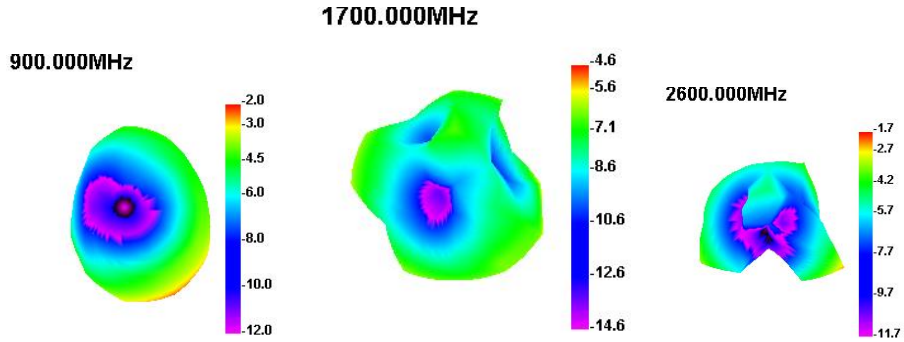
frequency 频率(MHz)	efficiency 效率(%)	gain 增益(dBi)	frequency 频率(MHz)	efficiency 效率(%)	gain 增益(dBi)
700	2.11	-14.04	1700	13.11	-4.57
710	2.11	-13.61	1720	20.8	-2.2
720	3.46	-11.52	1740	26.17	-1.33
730	4.41	-9.9	1760	37.88	0.71
740	5.23	-9.64	1780	44.22	1.17
750	5.98	-8.45	1800	40.72	0.43
760	7.7	-7.99	1820	42.65	0.05
770	9.45	-6.62	1840	43.87	1
780	13.03	-5.7	1860	39.8	1.46
790	17.57	-4.24	1880	39.9	1.94
800	16.54	-4.76	1900	41.54	1.93
810	16.68	-4.63	1920	32.66	0.07
820	18.08	-4.28	1940	29.76	-0.04
830	18.71	-4.21	1960	27.88	0.27
840	21.82	-3.04	1980	25.97	-0.08
850	24.31	-2.69	2000	28.67	0.48
860	29.33	-1.27	2020	28.08	0.58
870	30.63	-1.4	2040	23.55	-0.5
880	31.28	-0.71	2060	26.23	-0.75

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890	27.6	-1.64	2080	20.95	-2.07
900	23.38	-2.01	2100	20.22	-2.49
910	20.17	-3.16	2120	27.41	-1.53
920	16.91	-4.24	2140	27.63	-1.71
930	16	-5.02	2160	27.47	-1.5
940	17.06	-4.39	2180	30.87	-0.65
950	15.76	-4.7	2200	27.48	-0.91
960	12.54	-5.64	2220	25.6	-1.15
			2240	24.93	-1.42
			2260	19.2	-2.93
			2280	20.63	-2.37
			2300	20.16	-1.94
			2320	18.21	-2.18
			2340	19.2	-2.2
			2360	15.96	-3.25
			2380	15.41	-2.91
			2400	17.2	-2.26
			2420	19.52	-1.85
			2440	22.3	-1.85
			2460	24.94	-1.71
			2480	27.32	-1.65
			2500	25.93	-1.88
			2520	26.17	-1.47
			2540	25.49	-1.32
			2560	22.32	-1.66
			2580	22.71	-1.28
			2600	21.43	-1.67
			2620	19.19	-2.54
			2640	20.78	-1.97
			2660	20.44	-2.1
			2680	19.22	-1.72
			2700	20.8	-0.86

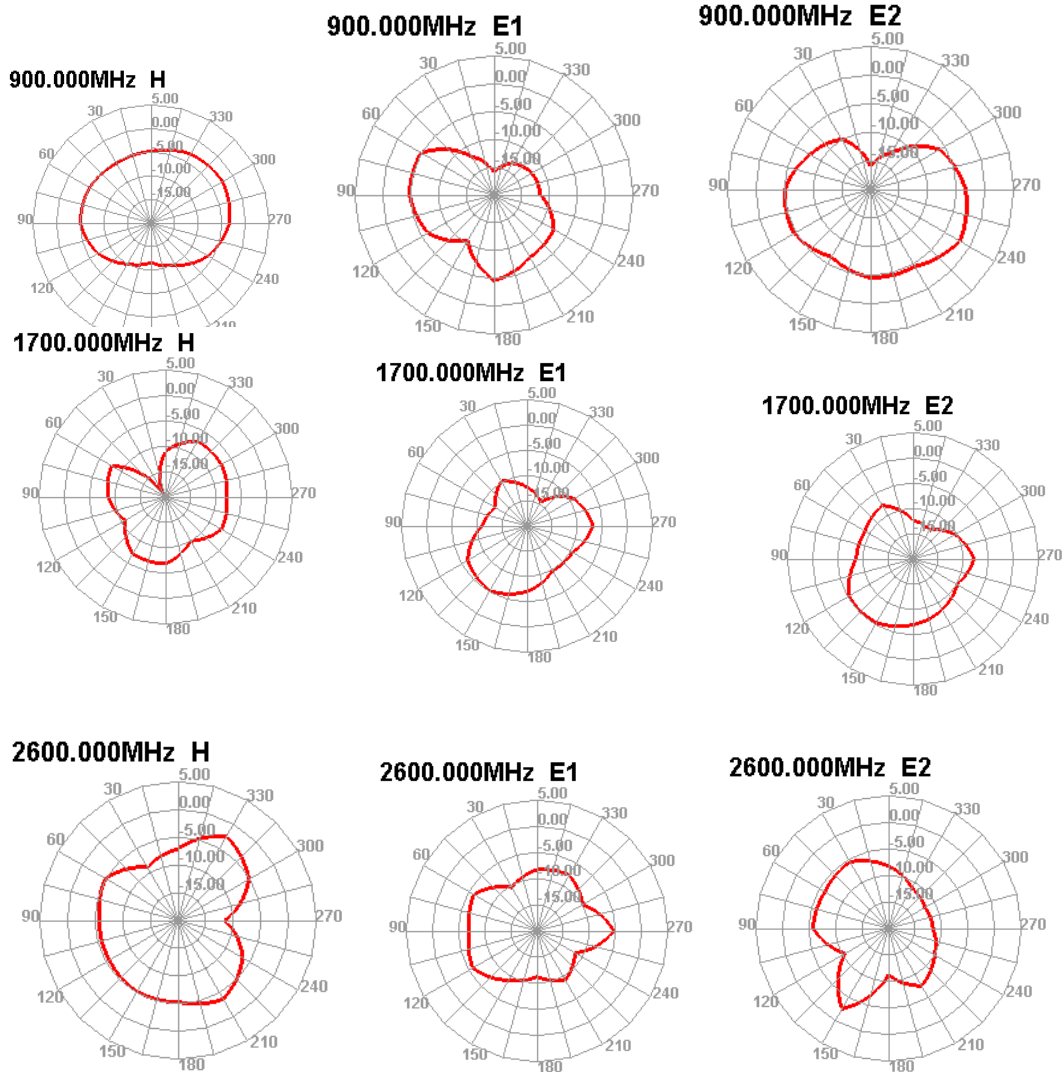
3D radiation pattern diagram



XY-plane

XZ-plane

YZ-plane

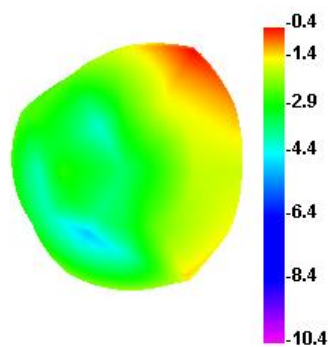


WiFi gain efficiency test:

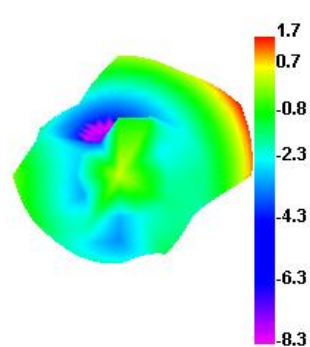
WIFI 2.4G			WIFI 5G		
frequency 频率(MHz)	efficiency 效率(%)	gain 增益(dBi)	frequency 频率(MHz)	efficiency 效率(%)	gain 增益(dBi)
2400	36.83	-0.37	5150	48.12	1.71
2410	38.48	0.03	5200	42.80	1.54
2420	39.22	0.33	5250	46.41	1.42
2430	40.88	0.54	5300	46.34	0.87
2440	41.41	1.08	5350	48.43	0.14
2450	41.36	1.55	5400	44.13	-0.81
2460	41.39	1.48	5450	43.55	-0.66
2470	39.73	1.18	5500	46.18	-1.6
2480	41.62	1.31	5550	45.44	-2.03
2490	43.14	1.32	5600	44.61	-2.45
2500	43.42	1.42	5650	39.40	-2.18
			5700	38.70	-1.23
			5750	37.01	-0.97
			5800	30.09	-1.58
			5850	30.00	-1.76

3D radiation pattern diagram

2400.000MHz



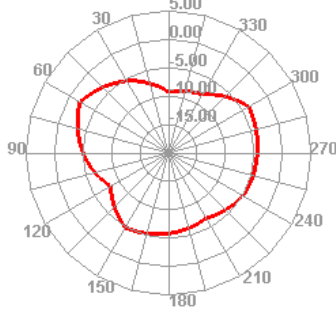
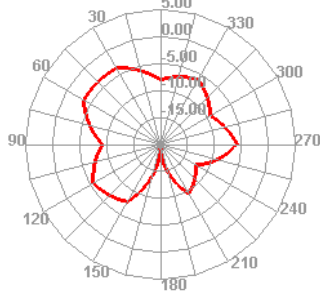
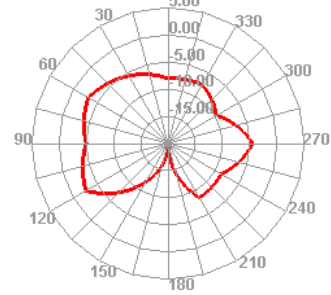
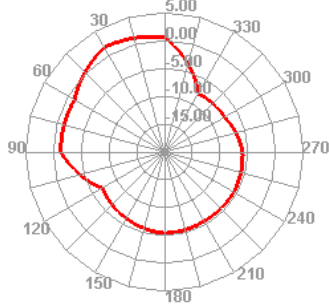
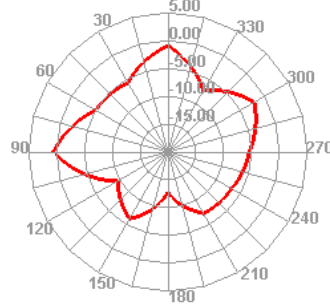
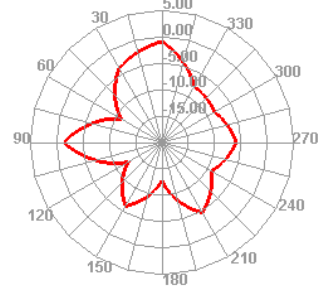
5150.000MHz



XY-plane

XZ-plane

YZ-plane

2400.000MHz H

2400.000MHz E1

2400.000MHz E2

5150.000MHz H

5150.000MHz E1

5150.000MHz E2


GPS gain efficiency test:

GPS		
frequency 频率(MHz)	efficiency 效率(%)	gain 增益(dBi)
1525	38.33	0.06
1535	40.95	0.37
1545	37.63	-0.63
1555	38.49	-0.29
1565	41.78	0.21
1575	42.52	-0.01
1585	41.26	-0.1
1595	41.34	0.02
1605	37.97	-0.61
1615	36.84	-0.98
1625	35.38	-1.24

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External main antenna FS OTA:

Band	Channel	TRP(dBm)	TIS(dBm)	Band	Channel	TRP(dBm)	TIS(dBm)
GSM 850	L	28.2		GSM 900	L	27.2	
	M	28.2			M	26.2	
	H	27.9	-104.4		H	25.8	-101.9
DCS 1800	L	24.5		PCS 1900	L	24.4	
	M	23.2			M	24.3	
	H	23.6	-101.3		H	24.0	-101.2
WCDMA 850	L	17.5		WCDMA 900	L	19.3	
	M	17.7			M	18.3	
	H	17.9	-105.6		H	17.9	-104.0
WCDMA 1700	L	17.3		WCDMA 1900	L	17.4	
	M	17.1			M	17.2	
	H	17.3	-105.4		H	17.0	-104.5
WCDMA 2100	L	17.1		LTE-B1 (10M)	L	17.5	
	M	16.3			M	16.6	
	H	16.7	-104.0		H	16.9	-88.8
LTE-B2 (10M)	L	17.8		LTE-B3 (10M)	L	16.0	
	M	17.4			M	16.4	
	H	16.7	-93.7		H	16.2	-92.2
LTE-B4 (10M)	L	15.7		LTE-B5 (10M)	L	19.1	
	M	15.8			M	19.6	
	H	16.0	-88.2		H	19.3	-94.0
LTE-B7 (10M)	L	13.1		LTE-B8 (10M)	L	18.6	
	M	14.5			M	18.3	
	H	14.3	-94.9		H	17.7	-91.1
LTE-B12 (10M)	L	19.5		LTE-B17 (10M)	L	18.3	
	M	19.4			M	18.6	
	H	18.8	-91.0		H	18.2	-92.0
LTE-B20 (10M)	L	19.3		LTE-B28A (10M)	L	18.8	
	M	19.3			M	18.4	
	H	19.3	-93.2		H	17.9	-89.8
LTE-B28B (10M)	L	18.5		LTE-B38 (20M)	L	14.5	
	M	18.1			M	14.2	
	H	18.3	-90.4		H	15.6	-85.8

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LTE-B40 (20M)	L	13.4		LTE-B41 (20M)	L	13.8	
	M	15.1			M	13.3	
	H	12.3	-86.8		H	16.4	-86.4

Gain efficiency test of external main antenna:

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
680	49.17	-3.08	0.73
760	28.21	-5.5	-0.36
840	42.25	-3.74	0.91
920	58.16	-2.35	1.76
1000	44.49	-3.52	1.52
1080	23.71	-6.25	-1.8
1160	47.47	-3.24	1.16
1240	40.98	-3.87	0.27
1320	34.62	-4.61	-0.33
1400	65.19	-1.86	2.63
1480	69.72	-1.57	4.5
1560	49.96	-3.01	3.46
1640	38.04	-4.2	0.36
1720	59.28	-2.27	1.6
1800	32.25	-4.92	-0.76
1880	37.82	-4.22	1.72
1960	22.13	-6.55	-0.39
2040	17.59	-7.55	-1.96
2120	17.94	-7.46	-2.86
2200	31	-5.09	0.08
2280	31.86	-4.97	-0.11
2360	33.29	-4.78	1.83
2440	26.73	-5.73	0.78
2520	37.87	-4.22	0.47
2600	32.22	-4.92	0.17
2680	33.15	-4.8	1.26
2760	24.06	-6.19	0.6

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External WIFI gain efficiency test:

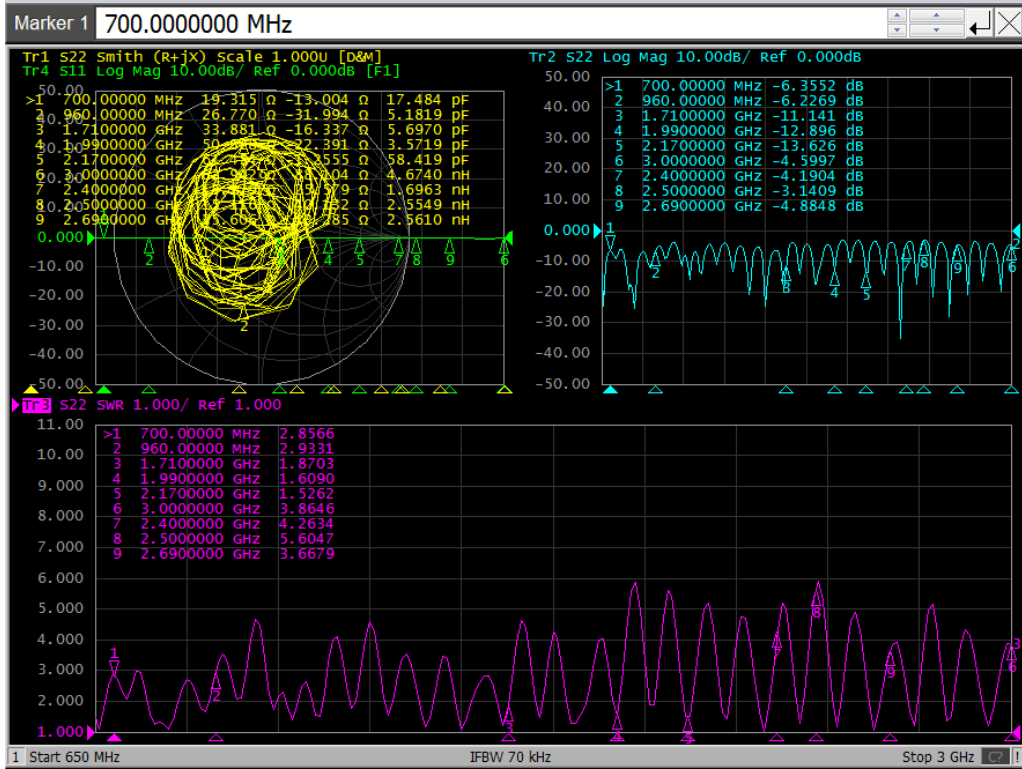
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	25.25	-5.98	0.7
2410	22.94	-6.39	0.23
2420	21.15	-6.75	-0.2
2430	19.87	-7.02	-0.68
2440	25.88	-5.87	0.21
2450	32.94	-4.82	0.98
2460	30.6	-5.14	0.37
2470	30.92	-5.1	0.06
2480	32.49	-4.88	0.08
2490	29.81	-4.83	-0.43
2500	29.67	-5.16	-0.61

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
5150	15.84	-8	-0.22
5200	15.74	-8.03	-0.17
5250	17.36	-7.6	0.16
5300	16.42	-7.85	-0.48
5350	17.58	-7.55	-0.7
5400	19.29	-7.15	-0.92
5450	20.4	-6.9	-0.82
5500	16.9	-7.72	-2.01
5550	18.94	-7.23	-1.71
5600	11.47	-9.41	-3.91
5650	10.69	-9.71	-3.84
5700	9.87	-10.06	-3.62
5750	14	-8.54	-1.66
5800	11.06	-9.56	-2.22
5850	12.77	-8.94	-1.51

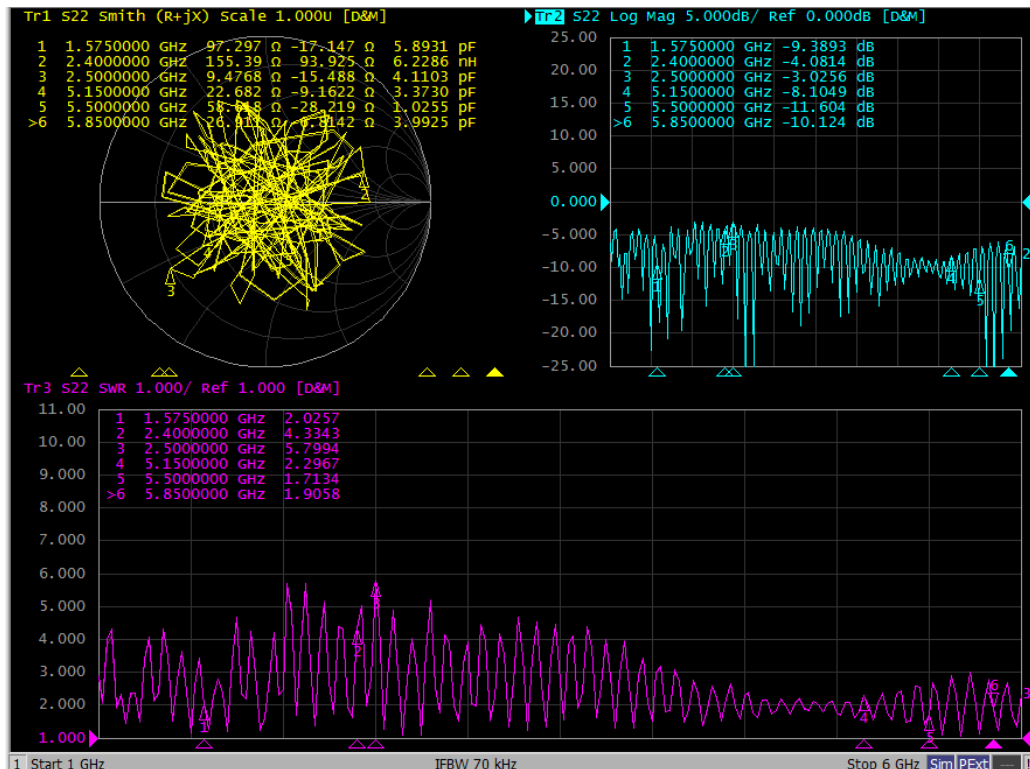
External GPS gain efficiency test:

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
1565	49.45	-3.06	3.2
1575	44.89	-3.48	2.72

S11 parameter (main antenna) :



S11 parameter (WIFI/GPS antenna) :



Environmental treatment:



Camera earthing