



深圳市凯普深通讯科技有限公司
Shenzhen cape deep communication technology co., LTD

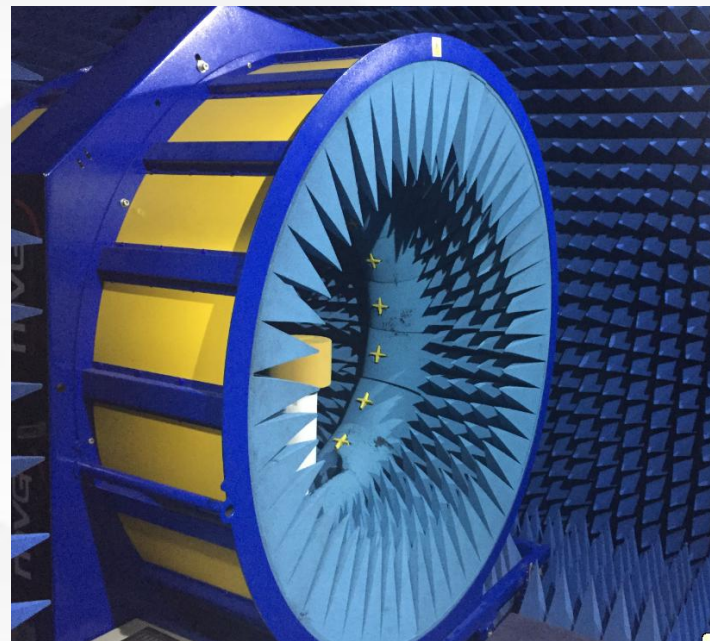
天线调试报告

test report

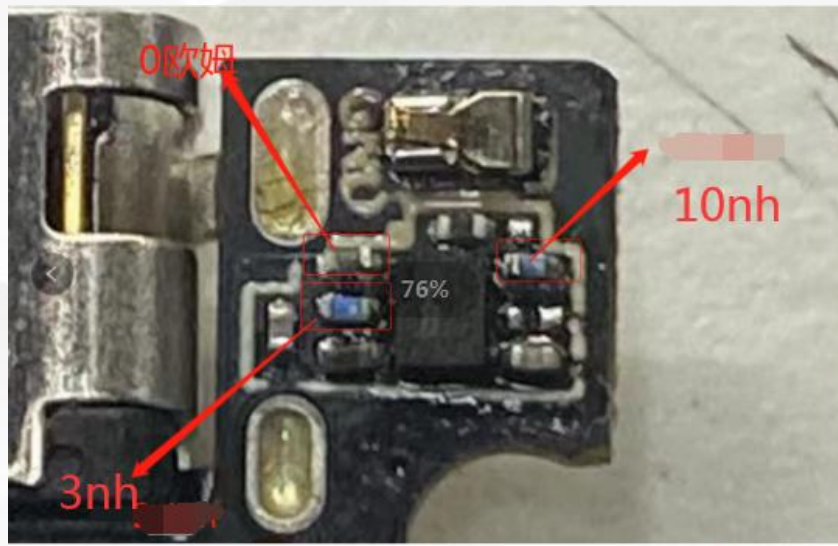
客 户：图高
项目名：Y20-S5
射 频：江长兴
日 期：2023.7.11
版 本：03



实验室测试环境及设备 Laboratory testing environment and equipment



测试项目/Test items	测试设备/Test equipment
S11、S12、VSWR、LOSS	网络分析仪E5071B、E5062A
Efficiency、Gain 3D Radiation Pattern	Satimo SG16暗室、GP7*4*3暗室、E5071B
TRP、TIS	Satimo SG16暗室、GP7*4*3暗室、8960、 CMW500、MT8820C、E4438C、





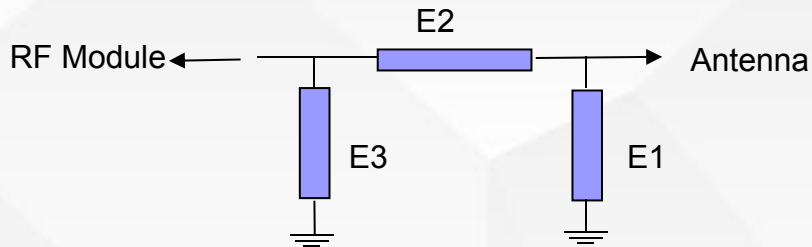
主天线开关匹配电路

Main antenna switch matching circuit

单刀四掷开关		匹配	逻辑对应频段
	RF1	0欧姆	GSM900
	RF2	3NH	GSM850/1800/1900 W2/W5 LTE2/4/5/7/38/66
	RF3	10NH	28AB
	RF4		

分集天线匹配电路

Diversity antenna matching circuit

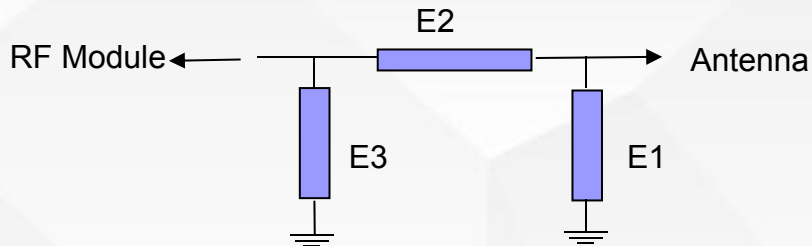


	Element	Value	附图说明
分集天线	E1(0402)		主板原匹配
	E2(0402)		
	E3(0402)		



三合一天线匹配电路

Three-in-one antenna matching circuit



三合一天线	Element	Value	附图说明
	E1(0402)		主板原匹配
	E2(0402)		
	E3(0402)		



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S11图

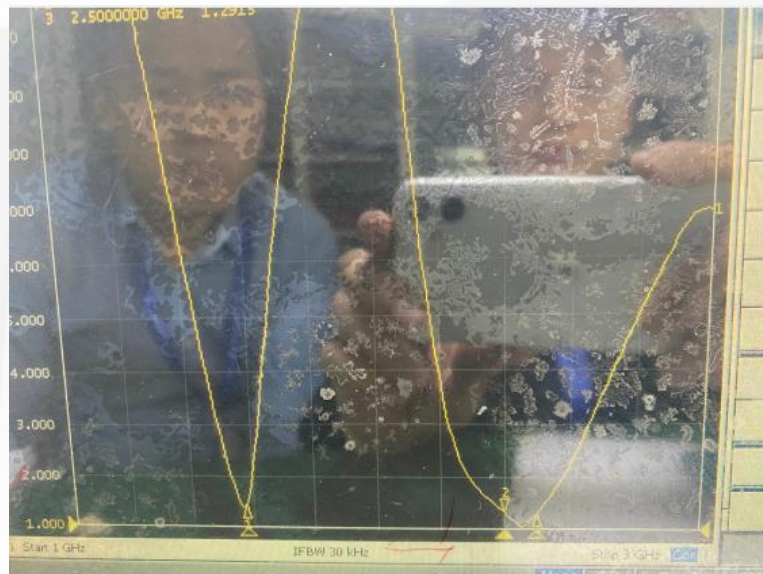


主天线开关工作后S11图

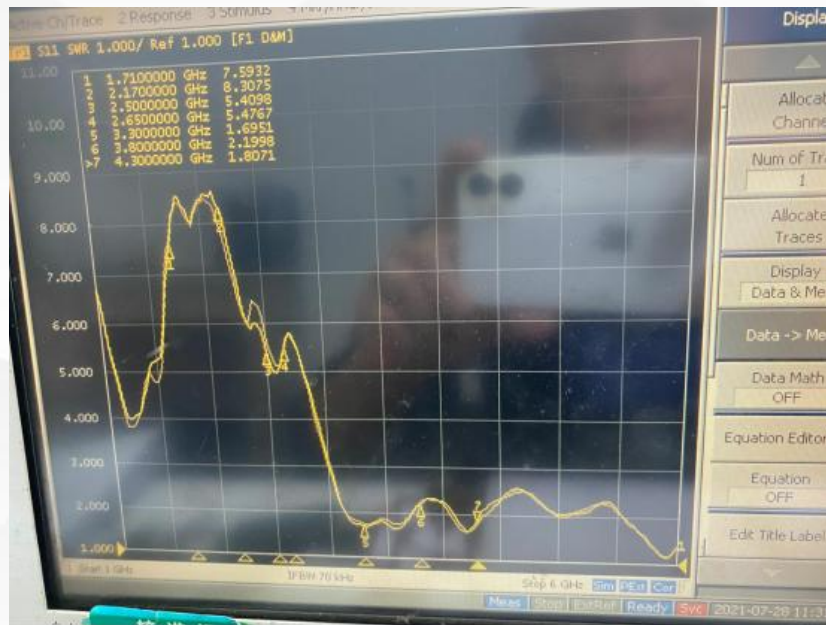


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S11图



三合一驻波图



分集天线驻波图



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无源测试数据

Passive testing dataset for LTE

Passive Test For 低频													
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHIS (%)	Max (dB)	Min (dB)	irectivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)	
700	19.25	-7.16	-3.4	-5.55	10.656	8.592	-3.4	-15.67	3.75	30	43.52	42.93	
710	20.93	-6.79	-2.77	-4.92	11.365	9.566	-2.77	-13.85	4.02	30	43.67	43.2	
720	20.83	-6.81	-3.1	-5.25	11.759	9.074	-3.1	-14.54	3.71	30	43.79	43.33	
730	17.4	-7.6	-4.1	-6.25	9.983	7.413	-4.1	-14.83	3.49	0	43.33	42.92	
740	16.02	-7.95	-4.84	-6.99	9.484	6.539	-4.84	-13.96	3.11	30	43.4	43	
750	16	-7.96	-4.99	-7.14	9.538	6.467	-4.99	-13.27	2.96	30	43.93	43.6	
760	31.79	-4.98	-1.48	-3.63	20.25	11.541	-1.48	-14.67	3.49	60	51.69	51.86	
770	30.9	-5.1	-1.45	-3.6	19.83	11.072	-1.45	-15.24	3.65	60	51.72	51.89	
780	32.5	-4.88	-1.34	-3.49	21.117	11.38	-1.34	-16.07	3.54	60	51.63	51.83	
790	28.46	-5.46	-1.95	-4.1	18.562	9.897	-1.95	-17.85	3.51	60	51.28	51.41	
800	30.26	-5.19	-1.46	-3.61	19.643	10.619	-1.46	-18.78	3.73	90	51.55	51.67	
810	30.35	-5.18	-1.41	-3.56	19.335	11.018	-1.41	-19.47	3.77	60	51.94	52.07	
820	20.83	-6.81	-3.1	-5.25	11.759	9.074	-3.1	-14.54	3.71	30	43.79	43.33	
830	26.26	-5.81	-2.05	-4.2	10.754	15.503	-2.05	-19	3.76	60	49.56	49.53	
840	23.71	-6.25	-2.35	-4.5	9.455	14.252	-2.35	-18.16	3.9	60	49.66	49.73	
850	22.67	-6.45	-2.38	-4.53	8.813	13.859	-2.38	-18.66	4.07	60	49.91	49.96	
860	24.14	-6.17	-2.12	-4.27	9.108	15.032	-2.12	-20.32	4.05	60	50.31	50.31	
870	23.86	-7.58	-5.17	-7.32	8.008	5.852	-5.17	-14.85	3.41	0	44.41	44.16	
880	22.38	-7.07	-5.42	-7.57	6.976	5.403	-5.42	-15.05	3.65	0	44.54	44.28	
890	21.68	-7.33	-5.71	-7.86	6.403	5.273	-5.71	-15.14	3.61	0	44.64	44.34	
900	16.28	-7.88	-3.36	-5.51	10.64	5.643	-3.36	-17.75	4.52	60	52.74	52.54	
910	15.98	-7.96	-3.54	-5.69	10.325	5.657	-3.54	-17.91	4.42	60	53.04	52.94	
920	15.27	-8.16	-3.83	-5.98	9.799	5.473	-3.83	-18.24	4.33	60	53.05	53	
930	14.67	-8.34	-4.04	-6.19	9.411	5.254	-4.04	-19.3	4.3	60	53.08	53.08	
940	14.33	-8.44	-4.11	-6.26	9.205	5.122	-4.11	-20.12	4.33	60	53.28	53.38	
950	15.29	-8.16	-3.86	-6.01	9.718	5.568	-3.86	-20.33	4.3	0	53.59	53.7	
960	13.53	-8.69	-4.68	-6.83	8.42	5.111	-4.68	-21.86	4.01	0	53.42	53.66	
690.00MHz - 960.00MHz Gain									2	3.74	0	54.05	54.25

0.00



无源测试数据

Passive testing dataset for LTE

Passive Test For 中高频												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)	irectivit (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
1690	14.11	-8.51	-4.64	-6.79	6.432	7.675	-4.64	-23.45	3.87	30	46.42	46.51
1700	27.65	-5.58	-1.97	-4.12	12.528	15.121	-1.97	-20.59	3.61	30	49.12	49.21
1710	28.82	-5.4	-2.04	-4.19	12.881	15.936	-2.04	-21.11	3.36	30	48.95	49.08
1720	31.32	-5.04	-1.73	-3.88	13.68	17.644	-1.73	-19.98	3.31	30	49.28	49.27
1730	34.12	-4.67	-1.25	-3.4	14.682	19.436	-1.25	-18.12	3.42	90	49.29	49.42
1740	34.01	-4.68	-1.16	-3.31	14.582	19.424	-1.16	-17.05	3.52	90	49.54	49.45
1750	31.4	-5.03	-1.19	-3.34	13.54	17.857	-1.19	-17.98	3.85	90	49.06	49.02
1760	30.8	-5.11	-1.27	-3.42	13.285	17.516	-1.27	-21.58	3.85	90	49.21	49.16
1770	27.05	-5.68	-1.71	-3.86	11.585	15.47	-1.71	-24.7	3.97	90	49.02	48.79
1780	29.4	-5.32	-1.46	-3.61	12.438	16.966	-1.46	-22.56	3.86	90	49.33	49.25
1790	27.47	-5.61	-1.76	-3.91	11.436	16.037	-1.76	-20.67	3.85	90	49.31	49.22
1800	26.26	-5.81	-2.05	-4.2	10.754	15.503	-2.05	-19	3.76	60	49.56	49.53
1810	23.71	-6.25	-2.35	-4.5	9.455	14.252	-2.35	-18.16	3.9	60	49.66	49.73
1820	22.67	-6.45	-2.38	-4.53	8.813	13.859	-2.38	-18.66	4.07	60	49.91	49.96
1830	24.14	-6.17	-2.12	-4.27	9.108	15.032	-2.12	-20.32	4.05	60	50.31	50.31
1840	24.11	-6.18	-2.15	-4.3	8.968	15.145	-2.15	-22.52	4.02	60	50.22	50.37
1850	24.76	-6.06	-2.27	-4.42	9.152	15.612	-2.27	-24.43	3.79	60	50.15	50.17
1860	25.63	-5.91	-2.2	-4.35	9.511	16.122	-2.2	-27.83	3.71	60	50.02	50.04
1870	26.66	-5.74	-1.57	-3.72	9.841	16.819	-1.57	-29.19	4.17	60	50.16	50.33
1880	27.19	-5.66	-1.36	-3.51	9.916	17.275	-1.36	-29.04	4.29	60	50.46	50.32
1890	25.04	-6.01	-1.32	-3.47	8.902	16.134	-1.32	-27.01	4.69	60	50.61	50.67
1900	21.6	-6.66	-1.31	-3.46	7.349	14.248	-1.31	-23.9	5.34	60	50.85	50.62
1910	20.94	-6.79	-1.49	-3.64	7.023	13.915	-1.49	-21.46	5.3	60	50.6	50.5
1920	21.39	-6.7	-1.48	-3.63	7.274	14.115	-1.48	-20.27	5.22	30	50.58	50.48
1930	21.64	-6.65	-0.96	-3.11	7.551	14.085	-0.96	-21.44	5.68	30	50.68	50.53
1940	22.88	-6.41	-0.52	-2.67	8.091	14.788	-0.52	-21.37	5.89	30	50.67	50.65
1950	23.22	-6.34	-0.14	-2.29	8.422	14.799	-0.14	-23.78	6.2	30	51.13	51.07
1960	23.36	-6.32	-0.11	-2.26	8.667	14.691	-0.11	-24.56	6.21	30	51.14	51.11
1970	22.09	-6.56	-0.28	-2.43	8.461	13.625	-0.28	-23.91	6.28	0	51.34	51.28
1980	21.39	-6.7	-0.53	-2.68	8.385	13.002	-0.53	-21.32	6.17	0	51.33	51.27
1990	20.39	-6.91	-0.75	-2.9	8.217	12.174	-0.75	-19.27	6.16	0	51.46	51.39



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无源测试数据

Passive testing dataset for LTE

2000	21.07	-6.76	-0.87	-3.02	8.758	12.311	-0.87	-18.11	5.9	0	51.74	51.83
2010	20.02	-6.99	-1.45	-3.6	8.726	11.291	-1.45	-17.24	5.54	60	52.17	52.05
2020	33.25	-4.78	-1.53	-3.68	19.494	13.759	-1.53	-13.24	3.25	60	50.67	50.65
2030	33.91	-4.7	-1.44	-3.59	20.119	13.795	-1.44	-13.67	3.26	60	51.13	51.07
2040	35.28	-4.52	-1.22	-3.37	21.093	14.186	-1.22	-14.19	3.3	60	51.14	51.11
2050	35.13	-4.54	-1.32	-3.47	21.026	14.102	-1.32	-13.74	3.22	60	51.34	51.28
2060	33.57	-4.74	-1.37	-3.52	20.223	13.351	-1.37	-12.87	3.37	60	51.33	51.27
2070	31.83	-4.97	-1.58	-3.73	19.316	12.511	-1.58	-12.13	3.39	60	51.46	51.39
2080	34.25	-4.65	-1.07	-3.22	21.179	13.073	-1.07	-11.31	3.58	60	51.74	51.83
2090	33.62	-4.73	-1.28	-3.43	21.023	12.593	-1.28	-11.12	3.45	60	52.17	52.05
2100	34.98	-4.56	-1.05	-3.2	22.237	12.74	-1.05	-10.57	3.51	60	52.37	52.54
2110	33.06	-4.81	-1.3	-3.45	21.079	11.979	-1.3	-11.15	3.5	60	52.6	52.58
2120	33.25	-4.78	-1.24	-3.39	21.35	11.904	-1.24	-12.02	3.54	60	52.47	52.58
2130	31.72	-4.99	-1.59	-3.74	20.447	11.274	-1.59	-13.14	3.4	60	52.33	52.38
2140	33.92	-4.7	-1.4	-3.55	21.99	11.933	-1.4	-13.3	3.3	60	52.48	52.63
2150	32.76	-4.85	-1.51	-3.66	21.311	11.452	-1.51	-14.06	3.33	60	52.36	52.46
2160	35.06	-4.55	-1.32	-3.47	22.785	12.27	-1.32	-14.12	3.23	60	52.54	52.78
2170	35.19	-4.54	-1.14	-3.29	22.71	12.481	-1.14	-14.09	3.39	60	52.54	52.71
2180	36.56	-4.37	-1.03	-3.18	23.381	13.178	-1.03	-13.68	3.34	60	52.4	52.65
2190	35.55	-4.49	-1.2	-3.35	22.604	12.942	-1.2	-13.41	3.29	60	52.29	52.43
2200	31.82	-4.97	-1.54	-3.69	20.194	11.624	-1.54	-13.82	3.43	60	51.79	52.04
2210	28.46	-5.46	-1.95	-4.1	18.562	9.897	-1.95	-17.85	3.51	60	51.28	51.41
2220	30.26	-5.19	-1.46	-3.61	19.643	10.619	-1.46	-18.78	3.73	90	51.55	51.67
2230	30.35	-5.18	-1.41	-3.56	19.335	11.018	-1.41	-19.47	3.77	60	51.94	52.07
2240	33.12	-4.8	-0.89	-3.04	20.793	12.331	-0.89	-18.88	3.91	60	52.14	52.24
2250	29.13	-5.36	-1.62	-3.77	18.124	11.003	-1.62	-18.72	3.74	30	51.87	51.86
2260	29.16	-5.35	-1.65	-3.8	18.333	10.826	-1.65	-18.25	3.7	30	51.98	51.96
2270	27.32	-5.63	-1.95	-4.1	17.413	9.91	-1.95	-18.19	3.68	30	52.16	52
2280	28.75	-5.41	-1.87	-4.02	18.604	10.149	-1.87	-17.4	3.54	60	52.63	52.57
2290	29.54	-5.3	-1.64	-3.79	19.169	10.371	-1.64	-16.59	3.66	60	53.15	52.95
2300	24.61	-6.09	-2.56	-4.71	15.982	8.623	-2.56	-16.71	3.53	60	52.58	52.38
2310	22.79	-6.42	-3	-5.15	14.655	8.134	-3	-16.02	3.42	60	52.7	52.56
2320	19.78	-7.04	-3.41	-5.56	12.702	7.081	-3.41	-15.71	3.62	60	52.36	52.24



无源测试数据

Passive testing dataset for BT/WIFI/GPS

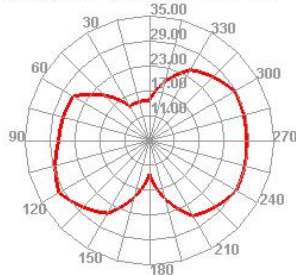
5	1505	14.98	-8.24	-3.12	2400	25.73	-5.9	-0.97	-3.12					
6	1510	17.58	-7.55	-2.81	2410	27.75	-5.57	-0.66	-2.81					
7	1515	15.77	-8.02	-2.59	2420	29.78	-5.26	-0.44	-2.59					
8	1520	16.05	-7.95	-2.29	2430	32.01	-4.95	-0.14	-2.29					
9	1525	16.68	-7.78	-1.79	2440	36.75	-4.35	0.36	-1.79					
10	1530	20.61	-6.86	-1.56	2450	39.47	-4.04	0.59	-1.56					
11	1535	22.04	-6.57	-1.71	2460	40.02	-3.98	0.44	-1.71					
12	1540	21.82	-6.61	-1.83	2470	39.86	-3.99	0.32	-1.83					
13	1545	23.72	-6.25	-1.91	2480	40	-3.98	0.24	-1.91					
14	1550	26.05	-5.84	-1.85	2490	41.52	-3.82	0.3	-1.85					
15	1555	28.7	-5.42	-1.98	2500	41.62	-3.81	0.17	-1.98					
16	1560	26.23	-5.81	-1.98	2300.00MHz - 2500.00MHz Gain									
17	1565	26.31	-5.8	-1.91										
18	1570	25.23	-5.98	-1.85	5.00									
19	1575	25.21	-5.99	-1.85										
20	1580	22.56	-6.47	-2.1										
21	1585	20.04	-6.98	-2.1										
22	1590	19.49	-7.1	-2.5										
23	1595	18.06	-7.43	-3.1										
24	1600	17.48	-7.58	-3.2										
25	1500.00MHz - 1600.00MHz													
26	0.00													
27														
28														



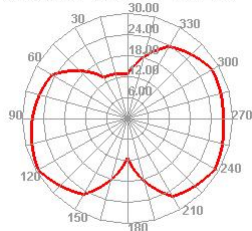
凯普深

测试数据 Testing dataset

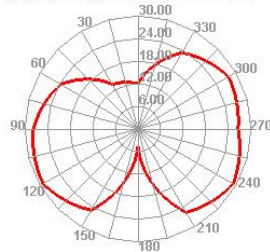
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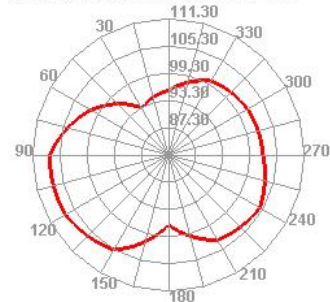
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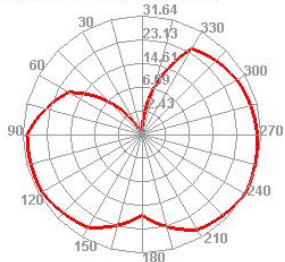
GSM850 251 TRP Phi=45



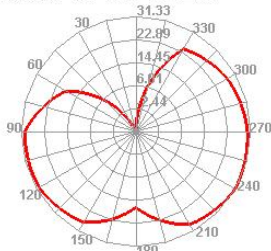
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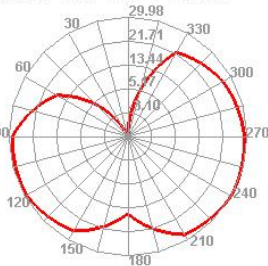
EGSM 1 TRP Phi=45



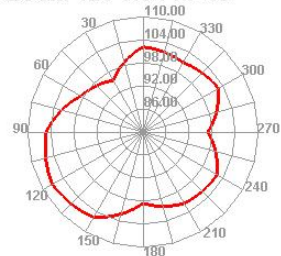
EGSM 62 TRP Phi=45



EGSM 124 TRP Phi=45



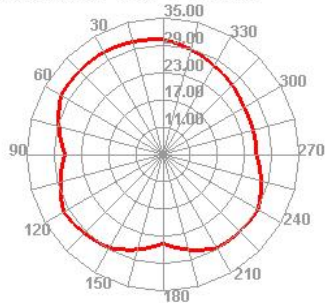
EGSM 124 TIS Phi=45



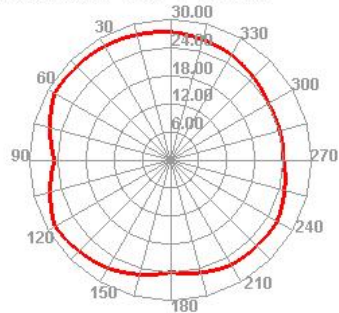


测试数据 Testing dataset

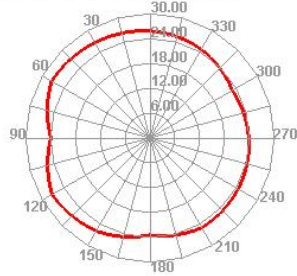
DCS 512 TRP Phi=45



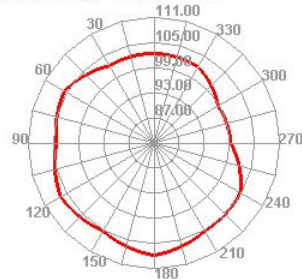
DCS 698 TRP Phi=45



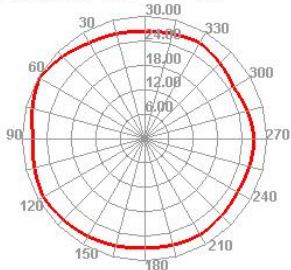
DCS 885 TRP Phi=45



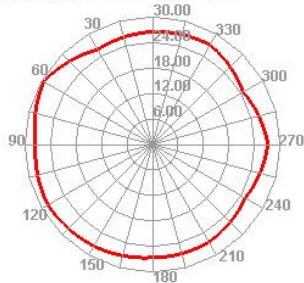
DCS 885 TIS Phi=45



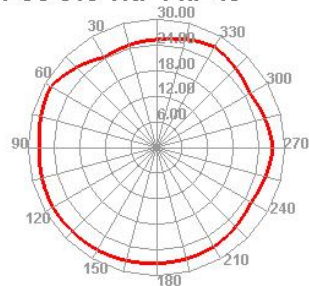
PCS 512 TRP Phi=45



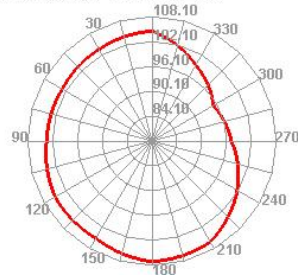
PCS 661 TRP Phi=45



PCS 810 TRP Phi=45



PCS 810 TIS Phi=45

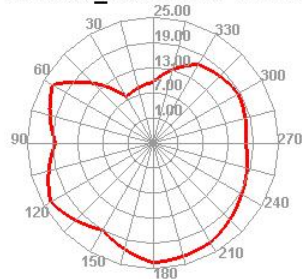




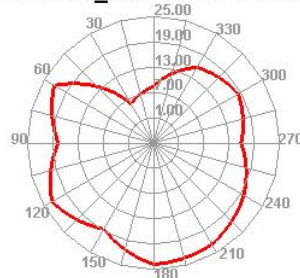
凯普深

测试数据 Testing dataset

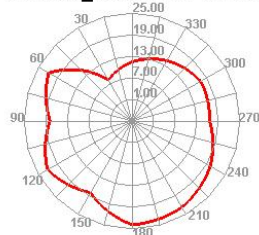
WCDMA_II 9262 TRP Phi=45



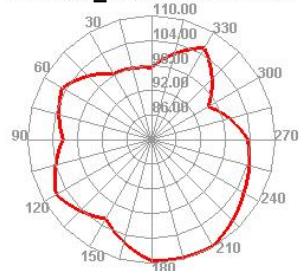
WCDMA_II 9400 TRP Phi=45



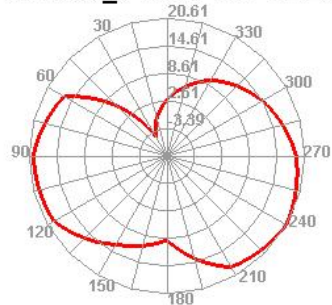
WCDMA_II 9538 TRP Phi=45



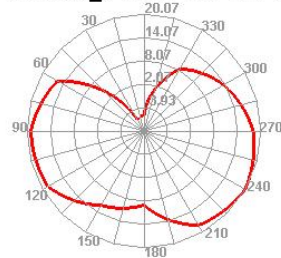
WCDMA_II 9938 TIS Phi=45



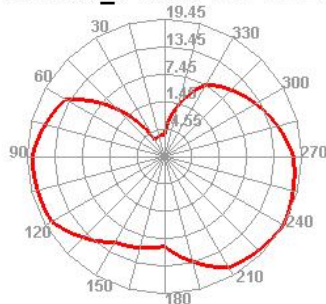
WCDMA_V 4132 TRP Phi=45



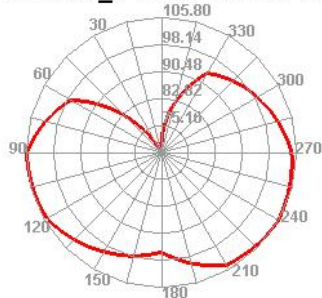
WCDMA_V 4185 TRP Phi=45



WCDMA_V 4233 TRP Phi=45



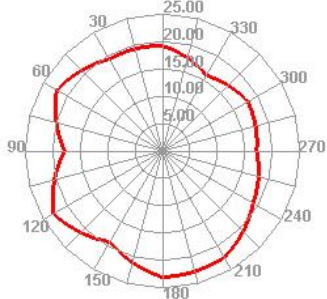
WCDMA_V 4458 TIS Phi=45



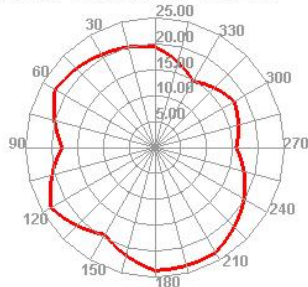


测试数据 Testing dataset

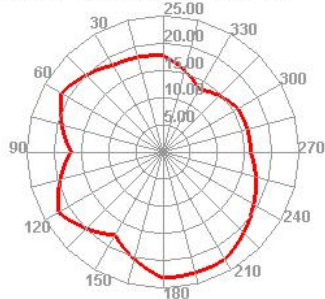
LTE2 18650 TRP Phi=45



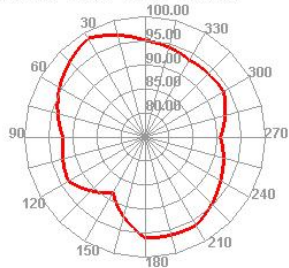
LTE2 18900 TRP Phi=45



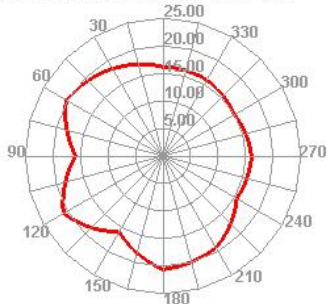
LTE2 19150 TRP Phi=45



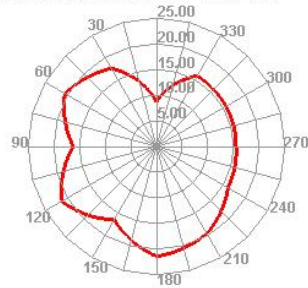
LTE2 1150 TIS Phi=45



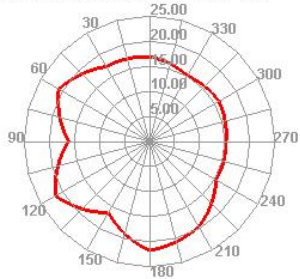
LTE4 20000 TRP Phi=45



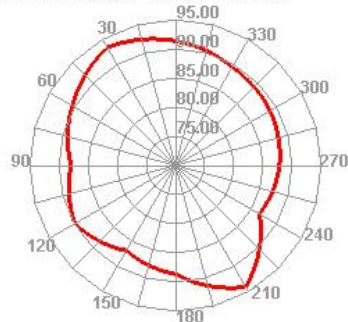
LTE4 20175 TRP Phi=45



LTE4 20350 TRP Phi=45



LTE4 2350 TIS Phi=45

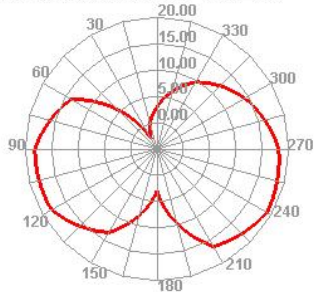




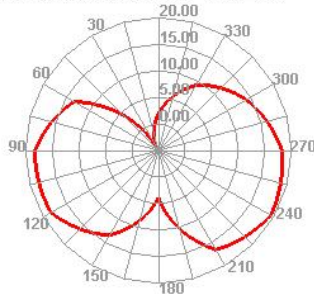
凯普深

测试数据 Testing dataset

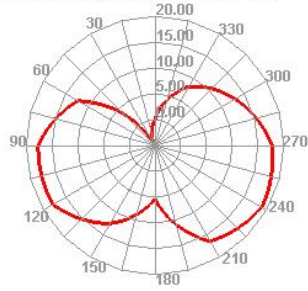
LTE5 20450 TRP Phi=45



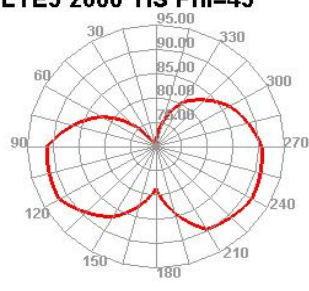
LTE5 20525 TRP Phi=45



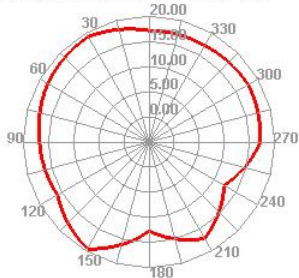
LTE5 20600 TRP Phi=45



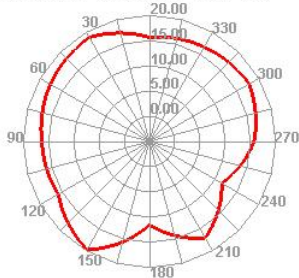
LTE5 2600 TIS Phi=45



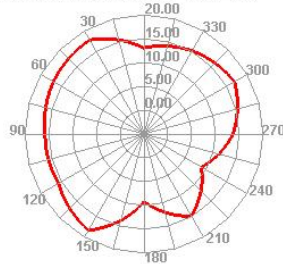
LTE7 20800 TRP Phi=45



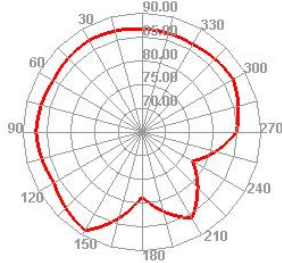
LTE7 21100 TRP Phi=45



LTE7 21400 TRP Phi=45

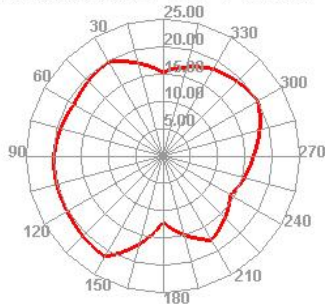


LTE7 3400 TIS Phi=45

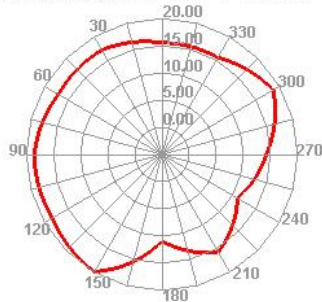


测试数据 Testing dataset

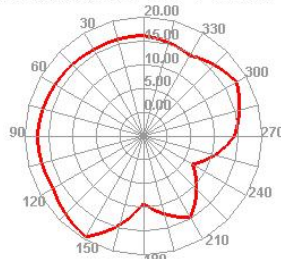
LTE38 37850 TRP Phi=45



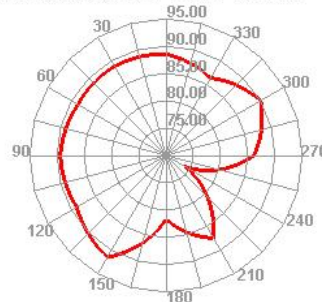
LTE38 38000 TRP Phi=45



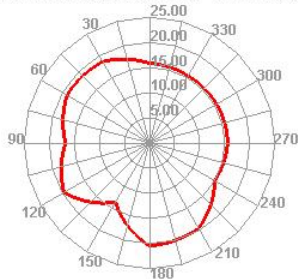
LTE38 38150 TRP Phi=45



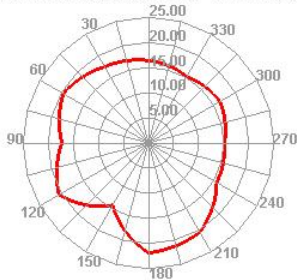
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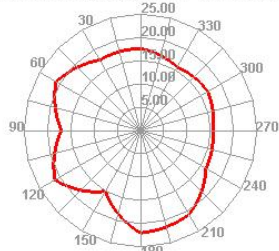
LTE66 132022 TRP Phi=45



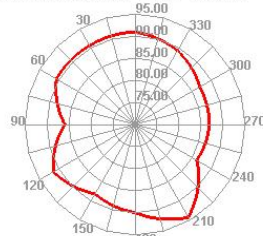
LTE66 132322 TRP Phi=45



LTE66 132622 TRP Phi=45



LTE66 67086 TIS Phi=45

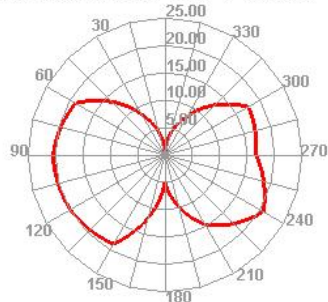




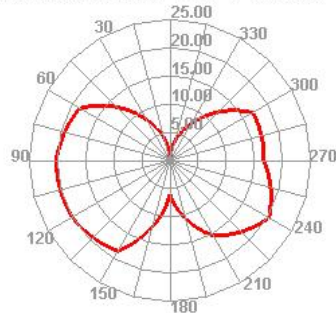
凯普深

测试数据 Testing dataset

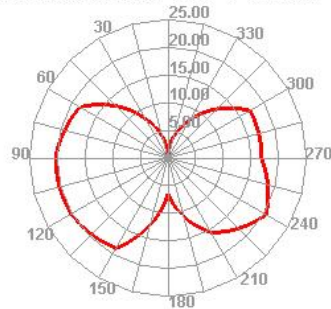
LTE28 27360 TRP Phi=45



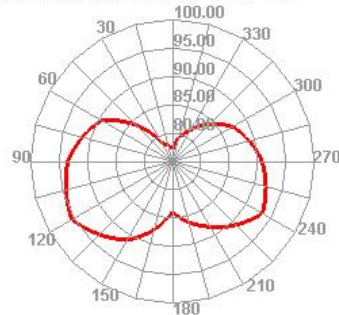
LTE28 27435 TRP Phi=45



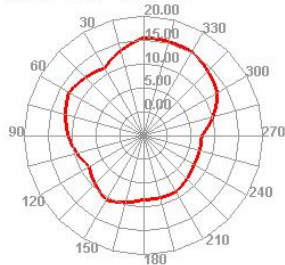
LTE28 27460 TRP Phi=45



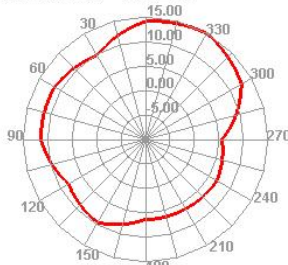
LTE28 9610 TIS Phi=45



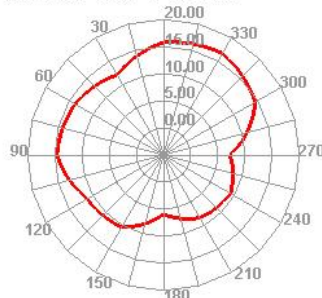
Wifi 1 TRP Phi=45



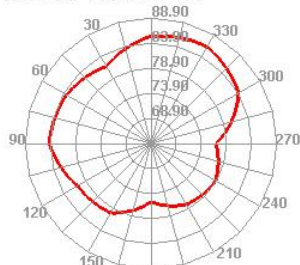
Wifi 6 TRP Phi=45



Wifi 12 TRP Phi=45



Wifi 12 TIS Phi=45





主天线测试数据

Main antenna testing dataset

Frequency band	Channel	TRP(dBm)	TIS(dBm)	Frequency band	Channel	TRP(dBm)	TIS(dBm)
EGSM 900	Low	27.7		DCS 1800	Low	25.5	
	Mid	27.3			Mid	25.6	
	Hig	26.3	-100		Hig	25.2	-104.9
GSM 850	Low	26.4		PCS 1900	Low	26.4	
	Mid	26.2			Mid	26.5	
	Hig	26.0	-101.3		Hig	26.5	-105.4
WCDMA 2	Low	18.6		WCDMA 5	Low	16.5	
	Mid	18.5			Mid	16.5	
	Hig	18.8	-105.9		Hig	16.5	-105.3



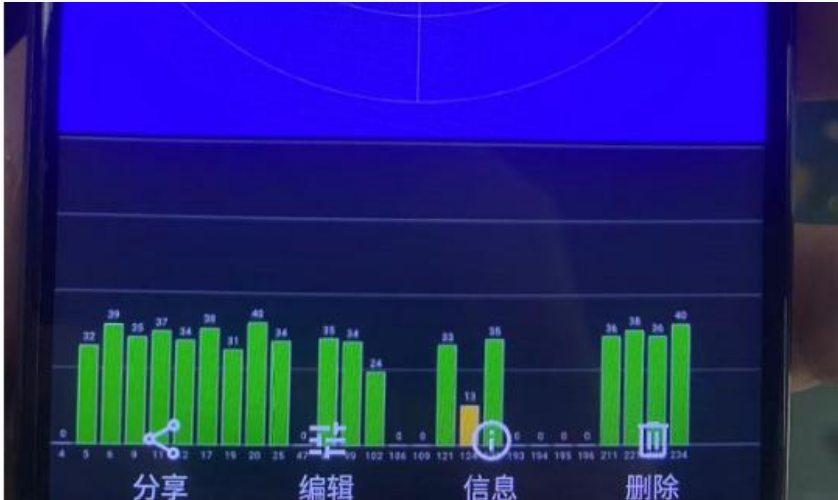
天线测试数据

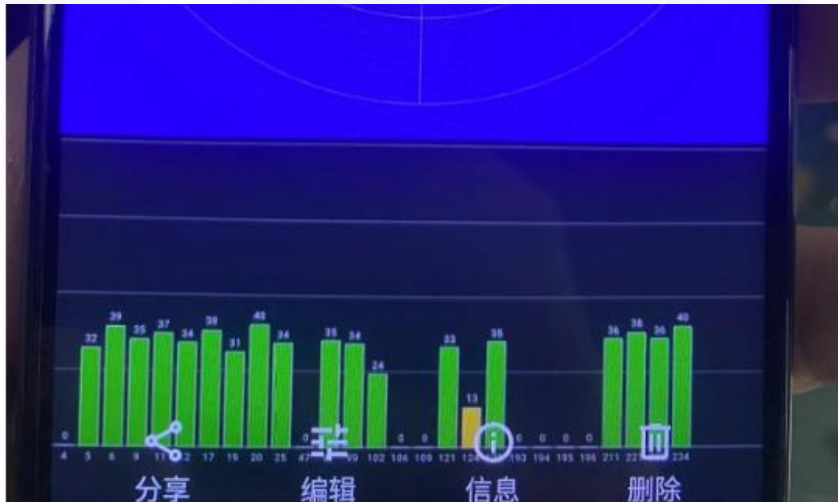
Antenna test data

Frequency band	Channel	TRP(dBm)	TIS(dBm)	Frequency band	Channel	TRP(dBm)	TIS(dBm)
LTE B2	Low	19.5		LTE B4	Low	19.0	
	Mid	19.5			Mid	19.0	
	Hig	19.2	-93.1		Hig	18.8	-88.4
LTE B5	Low	16.2		LTE b7	Low	17.6	
	Mid	16.3			Mid	17.5	
	Hig	16.4	-92.0		Hig	17.0	-89.3
LTE28A	Low	16.5		LTE28B	Low	17.2	
	Mid	16.5			Mid	17.5	
	Hig	17.0	-90.0		Hig	18.2	-89.4
LTE38	Low	18.4		LTE66	Low	18.4	
	Mid	18.2			Mid	18.5	
	Hig	17.2	-90.0		Hig	18.8	-89.0

小天线实测效果

Actual measurement effect of small antenna

GPS	最大信号强度	搜星数量	平均定位时间	天气状况	GPS实测附图
	42	16	90s	阴天	
WIFI	距WIFI路由器6m处接收信号强度		无障碍正常上网距离		
	-45dBm		25m		





WIFI 测试 数据

WIFI test data

WIFI B 11M	channle	TRP (dbm)	TIS (dbm)
	1	11.0	-78.2
	6	10.6	-78.5
	12	12.3	-81.2



联系方式

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THE END

感谢您的宝贵意见！