产 品 性 能 与 规 格 书

玛 雅 天 线 研 发 部

物料名称：GQ8000

样品颜色：

样品种类：FPC

客户型号：

■开模样品　　□其它

供应商：深圳市玛雅通讯设备有限公司　　版本：R.A

拟制	结构	品质	批准	送样日期

客 户：冠群

部门	确认	日期	状态	签字盖章
电子				
结构				
品质				
项目				

1、保密要求：深圳市玛雅通讯设备有限公司已拥有该产品专有技术，未经深圳市玛雅通讯设备有限公司书面同意不允许透露给任何公司或个人。

2、特别提示：各方签订本文件前务必仔细阅读“特别条款”及目录所载内容，双方代表人签署后视为对本文件内容达成合意并无异议，双方愿共同遵守。

特别条款

1、关于性能及结构确认部分

★请您在签字确认承认书之前对产品的外观及性能进行有效的确认。

★请您在量产前务必将最终量产的试产机器提供给我司或者拿回我司验证。

★由于此承认书的产品属于高灵敏度物件，请您务必保留测试金机，以便后续追溯。

★由于本产品属于定制物件，使用的针对性较强，客户在进行物料更换或者用于非指定项目时，请务必将更改的物料或非指定项目的机器寄回我司验证射频性能，否则，可能会导致使用状态与设计状态不符的严重隐患，对我司封存调试样机做功能确认，确保我司调试样品功能完全正常，防止功能不正常对天线性能引起的天线性能误差。

2、关于产品存储问题

★由于本产品表面印刷油墨、背面贴有背胶、有电镀物件，请您在存储或运输过程中务必确认温度在 23℃-27℃之间，相对湿度 60%以下，无强酸、无硫、无氧的环境下存储或运输。

★由于本产品背胶对环境要求较为苛刻，请客户务必在收到产品后,在产品最优使用期限内进行组装，确保产品的可靠性。

3、关于产品使用约定

★由于本产品结构较为特殊，请在使用本产品时务必要与被粘贴物件充分接触，且被粘贴物件务必不能残留化学药剂（脱模剂等）或者尽量不要使用带有脱模剂的原材料，为保证产品使用状态，请在使用本产品前对被粘贴物件表面进行清洗，确保被粘贴物件表面无任何化学药剂残留。

4、关于本产品的质量声明

★本产品因受前述因素影响，建议最优使用期为 12 个月内，逾期将会影响产品使用效果，我司对该产品提供终身咨询及有偿更换服务。

★本产品属于特殊定制器件，请收到产品后务必在 7 日内对产品外观、数量、性能等参照本《产品性能与规格承认书》约定标准进行检验，逾期，视为本产品质量符合双方约定标准。

★验证方式：对照承认书工程封样。

目录

1.客户天线调试设计需求频段

频率	频段
2G	850/900/1800/1900　BC0/1/10
3G	WCDMA-1 24 5 6 8 19
4G	LTE-1/2/3/4/5/7/8/12/13/17/18/19/20/25/26/28/34/38/39/40/41/66/71
5G	NR-1/2/3/5/7/8/20/25/28/38/40/41/66/71/77/78/79
其它	GPSWIFIBT NFC

2.产品图

产品图

3. 电性能

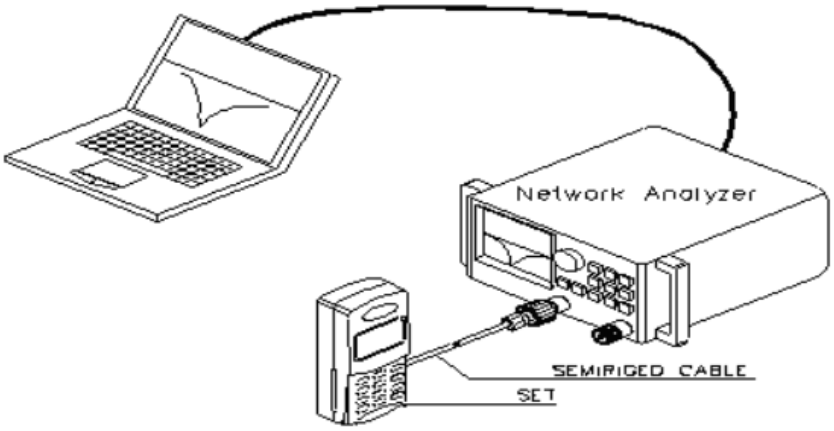
3.1 测试方法说明与数据

设备名	用途
Vector Network Analyzer	S11/Impedance/ Passive Test
Agilent 8960 SP6010 R&S CMU200	包含 GSM、 GPRS、 EDGE、 CDMA2000、 1xEV-DO、 TD-SCDMA、 WCDMA、HSDPA 的手机移动通信设备测试
R&S CMW500 MT8820C	包含 TD-SCDMA、 WCDMA、 HSDPA、LTE、WIFI、GPS 的手机移动通信设备测试
SP9500E	包含 5G、SA、NSA
Agilent E4438C	测试有源 GPS
MVG Chamber	Passive Test / OTA active Test / Efficiency/Gain

3.2 Passive Test Report（无源测试报告）

测试设备：网络分析仪

测试方法：用一根 50 欧姆 CABLE 电缆从仪器测试端口导出，使用校准件校准后连接手机制具的 SMA 接头，记录相关频点对应的回波损耗或驻波比等数据。



测试示意图

3.3 Active Test Report（有源测试报告）

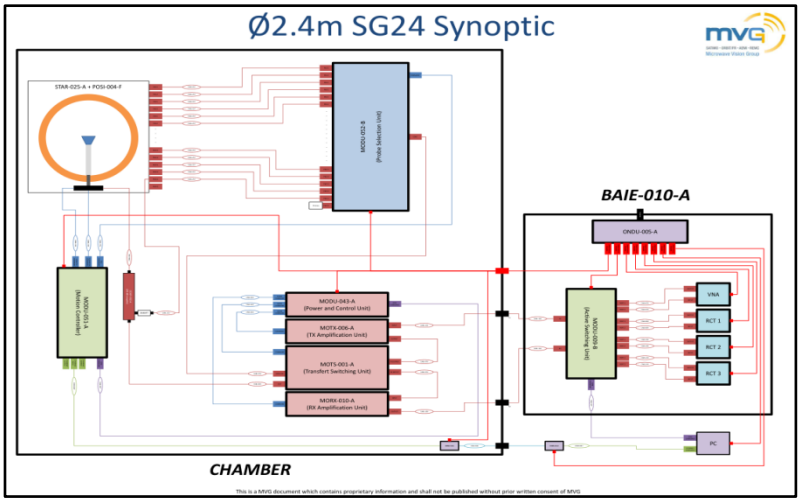
TRP/TIS

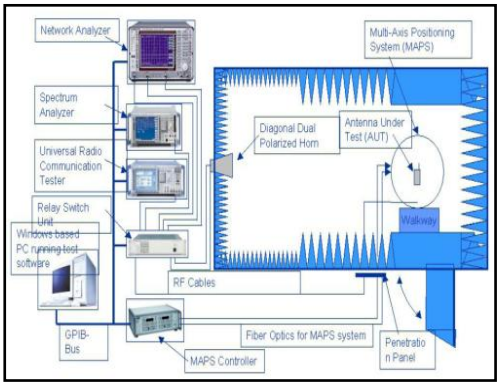
测试工具：综测仪、网络分析仪、全电波远场 ETS，法国 MVG SG24LT（Satmio）近场 3D 微波暗室，高精度定位系统及其控制器和带自动测试程序的电脑测试环境: 温度 22℃ ±3℃，湿度 60%±15%测试方法：运用 EST 或 Satimo 24LT 系统软件 TRP 的测试方法及计算在进行 TRP 测试时，DUT(Device Under Test)处于最大的发射功率状态，选择高中低三个信道进行测试，通过定位系统控制 DUT 的位置，以 15 度为步长，测量三维空间各点的有效辐射功率(EIRP)，通过积分计算球面上的平均值，计算公式如下：

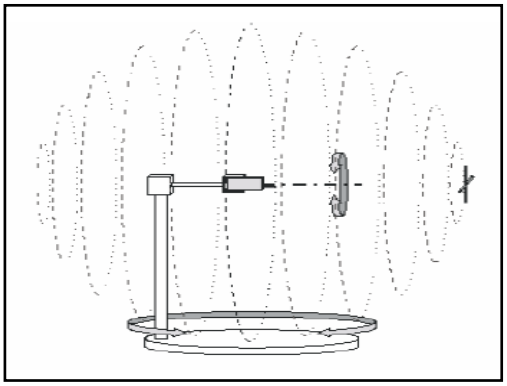
$$TRP \cong \frac{\pi}{2NM}\sum_{i=1}^{N-1}\sum_{j=0}^{M-1}\left[EiRP_{\theta}(\theta_i,\phi_j)+EiRP(\theta_i,\phi_j)\right]\sin(\theta_i)$$

在进行 TIS 测试时， DUT 处于最大的发射功率状态，选择高中低三个信道进行测试，通过控制 DUT 的位置，以 30 度为步长，测量三维空间各点的接收灵敏度，通过积分计算球面上的平均值，计算公式如下：

$$TIS \cong \frac{2NM}{\pi\sum_{i=1}^{N-1}\sum_{j=0}^{M-1}\left[\frac{1}{EIS_{\theta}(\theta_i,\phi_j)}+\frac{1}{EIS_{\phi}(\theta_i,\phi_j)}\right]\sin(\theta_i)}$$




Network Analyzer
Multi-Axis Positioning System (MAPS)
Spectrum Analyzer
Diagonal Dual Polarized Horn
Antenna Under Test (AUT)
Universal Radio Communication Tester
Relay Switch Unit
Windows based PC running test software
RF Cables
GPIB-Bus
Fiber Optics for MAPS system
Penetration Panel
MAPS Controller



3.4 有源 OTA TRP/TIS 数据

GSM	TRP	TIS
GSM900	26.14	
	26.45	
	26.22	-101.17
GSM850	26.86	
	27.03	
	26.94	-102.94
DCS1800	25.11	
	25.18	
	25.5	-104.9
PCS1900	25.09	
	24.16	
	24.19	-104.66

WCDMA	TRP	TIS
W1	18.16	
	17.94	
	18.58	-107.28
W2	17.86	
	17.51	
	17.84	-107.29
W4	18.38	
	18.14	
	18.13	-107.23
W5	16.61	
	16.9	
	16.57	-104.17

WCDMA	TRP	TIS
W6	16.36	
	16.68	
	17.14	-106.03
W8	16.28	
	16.45	
	16.31	-102.8
W19	16.42	
	17.35	
	16.83	-105.98

CDMA	TRP	TIS
BC0	16.57	
	16.61	
	16.79	-103.01
BC1	16.72	
	17.01	
	17.13	-104.12
BC10	16.35	
	16.57	
	16.62	-103.07

LTE	TRP	TIS
B1 (10M)	18.26	
	18.5	
	19.14	-95.92
B2 (10M)	18.14	
	17.69	
	18.02	-95.21
B3 (10M)	18.83	
	18.51	
	18.55	-95.29
B4 (10M)	18.73	
	18.62	
	18.7	-96.19
B5 (10M)	17.29	
	17.58	
	17.69	-91.4
B7 (10M)	18.8	
	18.5	
	18.37	-93.17
B8 (10M)	17.16	
	17.34	
	17.28	-89.92

LTE	TRP	TIS
B12 (10M)	16.29	
	16.48	
	16.38	-94.58
B13 (10M)		
	16.65	-92.42
B17 (10M)	16.25	
	16.42	
	16.65	-95.17
B18 (10M)	16.97	
	17.19	
	17.26	-93.02
B19 (10M)	17.52	
	17.66	
	17.72	-91.54
B20 (10M)	17.68	
	17.65	
	17.8	-92.46
B25 (10M)	18.35	
	17.91	
	18.22	-92.15

LTE	TRP	TIS
B26 (10M)	17.09	
	17.42	
	17.73	-91.55
B28 (10M)	16.33	
	16.45	
	16.43	-93.12
B34 (20M)	18.6	
	18.6	
	18.54	-94.52
B38 (20M)	19.64	
	19.83	
	19.86	-92.95
B39 (20M)	17.46	
	17.51	
	17.77	-92.3
B40 (20M)	18.27	
	17.64	
	16.98	-90.34
B41 (20M)	20.06	
	20.24	
	20.03	-92.15

LTE	TRP	TIS
B66 (10M)	17.8	
	17.62	
	17.72	-94.3
B71 (10M)	14.42	
	14.56	
	15.14	-88.69

NR	TRP	TIS
N1 (20M)	18.73	
	19.02	
	19.23	-92.29
N2 (20M)	18.65	
	18.28	
	19.33	-92
N3 (20M)	18.27	
	18.49	
	18.77	-93.08
N5 (20M)	17.24	
	17.54	
	17.8	-90.06
N7 (20M)	17.78	
	17.41	
	17.93	-91.11
N8 (20M)	17.16	
	17.22	
	17.51	-88.54
N20 (20M)	17.27	
	17.56	
	18.02	-89.42

NR	TRP	TIS
N25 (20M)	18.27	
	18.12	
	18.42	-92.11
N28 (20M)	15.35	
	15.67	
	16.39	-91.24
N38 (20M)	20.42	
	20.12	
	20.05	-92.86
N40 (20M)	18.69	
	18.82	
	17.48	-90.56
N41 (100M)	19.7	
	20.41	
	20.39	-85.79
N66 (20M)	19.32	
	19.11	
	18.4	-93.42
N71 (20M)	15.51	
	15.76	
	17.13	-86.94

NR	TRP	TIS
N77 (100M)	20.42	
	20.37	
	20.65	-88.01
N78 (100M)	20.39	
	20.67	
	20.29	-88.54
N79 (100M)	19.82	
	20.64	
	20.37	-89.27

WIFI	TRP	TIS
B	12.22	
	12.77	
	12.54	-82.45
A	13.53	
	13.6	
	13.86	-71.34
BT	5.27	
	5.62	
	5.21	-89.43
GPS		
	40.05	-154.3

3.5 无源(Passive Test)数据

Efficiency Gain

ANT0 主路12nH

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
820000000	17.21%	-7.64146	8.2E+08	-2.65046
834000000	17.23%	-7.63839	8.34E+08	-2.69658
848000000	24.18%	-6.16494	8.48E+08	-1.2004
862000000	27.14%	-5.66462	8.62E+08	-0.76571
876000000	36.17%	-4.41596	8.76E+08	0.547446
890000000	34.90%	-4.57231	8.9E+08	0.334867
904000000	39.98%	-3.98175	9.04E+08	1.374844
918000000	30.95%	-5.09276	9.18E+08	-0.01179
932000000	29.14%	-5.35475	9.32E+08	0.015811
946000000	21.64%	-6.64684	9.46E+08	-1.86266
960000000	18.14%	-7.41466	9.6E+08	-2.93159

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
1700000000	37.98%	-4.20449	1.7E+09	2.230311
1750000000	31.38%	-5.03412	1.75E+09	1.365691
1800000000	22.89%	-6.40306	1.8E+09	-0.94222
1850000000	22.74%	-6.43165	1.85E+09	-1.00057
1900000000	24.45%	-6.11692	1.9E+09	-1.08327
1950000000	26.88%	-5.70599	1.95E+09	-0.81382
2000000000	29.79%	-5.25959	2E+09	-0.74171
2050000000	29.36%	-5.32178	2.05E+09	0.647905
2100000000	33.26%	-4.7802	2.1E+09	0.068268
2150000000	34.12%	-4.66964	2.15E+09	-0.00341
2200000000	36.26%	-4.40589	2.2E+09	0.8874
2250000000	40.37%	-3.93888	2.25E+09	1.583992
2300000000	41.28%	-3.84225	2.3E+09	2.439108
2350000000	42.83%	-3.68212	2.35E+09	2.457945
2400000000	40.96%	-3.87651	2.4E+09	2.339394
2450000000	38.29%	-4.16942	2.45E+09	2.01541
2500000000	35.33%	-4.51819	2.5E+09	0.996134
2550000000	34.62%	-4.60669	2.55E+09	0.231761
2600000000	33.74%	-4.7183	2.6E+09	0.231749
2650000000	29.82%	-5.25557	2.65E+09	-0.06433
2700000000	27.11%	-5.66891	2.7E+09	-0.16896

18nH状态

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
650000000	14.33%	-8.43821	650000000	-3.36149
665500000	16.17%	-7.91352	665500000	-0.83175
681000000	15.52%	-8.09178	681000000	-3.04026
696500000	26.31%	-5.79816	696500000	-0.74047
712000000	28.00%	-5.52869	712000000	-0.69932
727500000	43.11%	-3.65413	727500000	2.012283
743000000	49.69%	-3.03754	743000000	2.331599
758500000	40.10%	-3.96862	758500000	1.569964
774000000	45.80%	-3.39175	774000000	1.053774
789500000	40.90%	-3.88318	789500000	1.299573
805000000	41.59%	-3.81019	805000000	1.207545
820500000	48.89%	-3.10781	820500000	1.784594
836000000	40.34%	-3.943	836000000	1.200889
851500000	38.25%	-4.17408	851500000	0.215076
867000000	42.26%	-3.74062	867000000	1.141848
882500000	33.60%	-4.73723	882500000	0.162201
898000000	32.33%	-4.90389	898000000	0.230118
913500000	30.07%	-5.21926	913500000	0.042891
929000000	22.95%	-6.39201	929000000	-1.70771
944500000	23.26%	-6.33376	944500000	-1.18579
960000000	21.26%	-6.72518	960000000	-1.37925

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
1400000000	15.69%	-8.04412	1400000000	-2.37291
1430000000	25.20%	-5.98615	1430000000	1.009317
1460000000	31.87%	-4.96633	1460000000	2.332824
1490000000	35.19%	-4.53541	1490000000	2.451356
1520000000	33.32%	-4.77252	1520000000	1.70285
1550000000	34.35%	-4.64064	1550000000	1.849881
1580000000	36.78%	-4.34402	1580000000	1.932968
1610000000	36.46%	-4.38167	1610000000	1.838481
1640000000	36.72%	-4.35057	1640000000	2.218996
1670000000	37.94%	-4.20846	1670000000	2.965324
1700000000	36.75%	-4.34695	1700000000	3.390461

ANT1 主路12nH

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
800000000	22.81%	-6.419	800000000	-1.48661
810000000	23.69%	-6.25443	810000000	-1.58856
820000000	24.52%	-6.10485	820000000	-1.6325
830000000	26.19%	-5.81932	830000000	-1.12876
840000000	22.60%	-6.45963	840000000	-2.14199
850000000	28.69%	-5.42316	850000000	-1.207
860000000	37.04%	-4.31271	860000000	0.054979
870000000	39.83%	-3.99737	870000000	0.364352
880000000	39.59%	-4.02397	880000000	0.270204
890000000	38.07%	-4.19454	890000000	0.231696
900000000	34.77%	-4.58851	900000000	0.162121
910000000	28.29%	-5.48373	910000000	-0.6181
920000000	25.21%	-5.98505	920000000	-1.19022
930000000	22.90%	-6.40111	930000000	-1.66985
940000000	20.69%	-6.84258	940000000	-1.29533
950000000	19.22%	-7.16316	950000000	-0.94894
960000000	18.21%	-7.39688	960000000	-1.07403

1	15nH		1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
650000000	11.33%	-9.45678	650000000	-3.96729
665000000	12.26%	-9.11592	665000000	-2.95124
680000000	19.88%	-7.01607	680000000	-1.52301
695000000	29.61%	-5.28551	695000000	0.823267
710000000	33.38%	-4.76486	710000000	0.970882
725000000	57.30%	-2.41826	725000000	3.077177
740000000	47.14%	-3.26649	740000000	2.183476
755000000	62.53%	-2.03929	755000000	3.103037
770000000	48.77%	-3.11821	770000000	2.650249
785000000	49.69%	-3.0371	785000000	1.999298
800000000	42.90%	-3.67576	800000000	0.554194

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
1700000000	42.12%	-3.75487	1700000000	1.397467313
1750000000	39.99%	-3.9808	1750000000	1.500265098
1800000000	43.57%	-3.60813	1800000000	2.533312
1850000000	41.71%	-3.79787	1850000000	2.378565551
1900000000	34.91%	-4.57106	1900000000	1.962114911
1950000000	31.67%	-4.99291	1950000000	1.554763071
2000000000	30.10%	-5.21364	2000000000	0.899271399
2050000000	32.06%	-4.94085	2050000000	0.590374745
2100000000	33.69%	-4.72459	2100000000	1.462407732
2150000000	34.50%	-4.62167	2150000000	1.283289099
2200000000	32.48%	-4.88384	2200000000	0.323366679
2250000000	29.51%	-5.30099	2250000000	-0.036944797
2300000000	27.56%	-5.59736	2300000000	-0.268532504
2350000000	29.41%	-5.31446	2350000000	0.148090639
2400000000	29.59%	-5.2887	2400000000	0.391329583
2450000000	29.32%	-5.32812	2450000000	0.312095765
2500000000	29.35%	-5.32331	2500000000	-0.008367573
2550000000	28.82%	-5.40328	2550000000	-0.371996104
2600000000	27.59%	-5.59178	2600000000	-0.8326088
2650000000	25.27%	-5.97411	2650000000	-1.284182152
2700000000	25.24%	-5.97947	2700000000	-1.488880282

1	B12状态		1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
1400000000	8.95%	-10.4838	1400000000	-5.28798928
1450000000	15.37%	-8.13366	1450000000	-3.730758914
1500000000	28.31%	-5.48068	1500000000	-0.39294239
1550000000	40.17%	-3.96115	1550000000	1.143923444
1600000000	43.12%	-3.65356	1600000000	1.489238424
1650000000	40.01%	-3.97826	1650000000	1.32283969
1700000000	38.26%	-4.17304	1700000000	1.447778571

ANT2

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
3300000000	42.35%	-3.73141	3300000000	4.255571
3385000000	39.94%	-3.9862	3385000000	4.068727
3470000000	40.17%	-3.96123	3470000000	4.527839
3555000000	34.45%	-4.62788	3555000000	4.092135
3640000000	31.78%	-4.97841	3640000000	3.889264
3725000000	35.19%	-4.53546	3725000000	3.899773
3810000000	35.96%	-4.44197	3810000000	3.356099
3895000000	31.55%	-5.01031	3895000000	2.15914
3980000000	24.40%	-6.12568	3980000000	1.347179
4065000000	23.88%	-6.21938	4065000000	1.094237
4150000000	25.45%	-5.94262	4150000000	0.766303
4235000000	27.21%	-5.65292	4235000000	0.770921
4320000000	25.16%	-5.99361	4320000000	0.309069
4405000000	23.58%	-6.27381	4405000000	0.236402
4490000000	25.33%	-5.96286	4490000000	1.202334
4575000000	28.42%	-5.46381	4575000000	1.947696
4660000000	30.07%	-5.21845	4660000000	2.087066
4745000000	26.75%	-5.72756	4745000000	2.373011
4830000000	23.69%	-6.25366	4830000000	2.202186
4915000000	23.80%	-6.23422	4915000000	2.628433
5000000000	27.38%	-5.62564	5000000000	3.282143

1			1	
Frequency	Efficiency	Efficiency .dB	Frequency	Gain .dB
1700000000	18.38%	-7.355388688	1700000000	1.321370481
1750000000	22.06%	-6.564411753	1750000000	1.929589669
1800000000	21.63%	-6.648459476	1800000000	2.111965174
1850000000	17.89%	-7.474231041	1850000000	1.091582421
1900000000	15.41%	-8.122632379	1900000000	0.105629941
1950000000	14.99%	-8.242665287	1950000000	-0.244253022
2000000000	15.31%	-8.148934367	2000000000	-0.200797344
2050000000	14.71%	-8.323381964	2050000000	-0.624107612
2100000000	13.59%	-8.668146233	2100000000	-1.345083965
2150000000	13.80%	-8.601154588	2150000000	-0.764365388
2200000000	15.01%	-8.234870524	2200000000	-0.326784487
2250000000	17.39%	-7.596948399	2250000000	0.84949133
2300000000	20.45%	-6.892981175	2300000000	2.254980432
2350000000	24.55%	-6.1000675	2350000000	3.061649971
2400000000	27.09%	-5.672704418	2400000000	3.27467239
2450000000	28.57%	-5.440375985	2450000000	3.00208328
2500000000	28.93%	-5.386586059	2500000000	3.020936906
2550000000	29.31%	-5.330283101	2550000000	3.450076278
2600000000	26.19%	-5.817859665	2600000000	3.290776781
2650000000	23.75%	-6.243843538	2650000000	2.6315494
2700000000	24.75%	-6.064446442	2700000000	2.611954896

ANT3

1			1		1			1	
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB
2500000000	23.96%	-6.20581	2500000000	2.033058034	3300000000	45.57%	-3.41328211	3300000000	3.757348
2520000000	23.99%	-6.19909	2520000000	2.450783155	3385000000	43.40%	-3.624946803	3385000000	3.189311
2540000000	23.94%	-6.20886	2540000000	2.638237447	3470000000	41.85%	-3.782752863	3470000000	3.80174
2560000000	26.32%	-5.79724	2560000000	3.031293032	3555000000	38.82%	-4.109094961	3555000000	3.650984
2580000000	26.96%	-5.69303	2580000000	3.140504645	3640000000	38.63%	-4.131295253	3640000000	3.575226
2600000000	28.49%	-5.45361	2600000000	3.447266696	3725000000	41.07%	-3.865106354	3725000000	3.068576
2620000000	29.36%	-5.32202	2620000000	3.446506806	3810000000	40.83%	-3.890626777	3810000000	3.132158
2640000000	31.04%	-5.08106	2640000000	3.558841221	3895000000	35.98%	-4.439443945	3895000000	2.61128
2660000000	33.28%	-4.77806	2660000000	3.71763562	3980000000	31.54%	-5.01146695	3980000000	2.020048
2680000000	35.90%	-4.44964	2680000000	3.911693546	4065000000	32.23%	-4.916931171	4065000000	2.271625
2700000000	38.90%	-4.10017	2700000000	4.036973479	4150000000	34.12%	-4.669791296	4150000000	2.432199
					4235000000	34.07%	-4.676826265	4235000000	2.855677
					4320000000	30.05%	-5.221552291	4320000000	2.2117
					4405000000	27.76%	-5.566175213	4405000000	1.450915
					4490000000	29.15%	-5.354060971	4490000000	1.428419
					4575000000	32.20%	-4.920947947	4575000000	2.154806
					4660000000	32.05%	-4.942265544	4660000000	3.285923
					4745000000	27.29%	-5.640346979	4745000000	2.715468
					4830000000	24.29%	-6.145088761	4830000000	2.092186
					4915000000	24.66%	-6.079693896	4915000000	2.473025
					5000000000	28.40%	-5.467290928	5000000000	3.132947

ANT4

1			1		1			1	
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB
1700000000	42.37%	-3.72991	1700000000	2.643909	3300000000	29.73%	-5.267979102	3300000000	1.929110261
1750000000	38.22%	-4.17722	1750000000	2.776578	3385000000	32.53%	-4.876955131	3385000000	2.350064169
1800000000	32.38%	-4.89688	1800000000	1.856803	3470000000	34.14%	-4.66744617	3470000000	2.50075685
1850000000	28.34%	-5.4759	1850000000	0.365044	3555000000	30.79%	-5.115637729	3555000000	2.657786391
1900000000	25.68%	-5.90333	1900000000	-0.67869	3640000000	30.94%	-5.094175388	3640000000	2.983758411
1950000000	24.89%	-6.03917	1950000000	-1.14126	3725000000	29.28%	-5.333790596	3725000000	2.628883204
2000000000	23.73%	-6.24682	2000000000	-1.53662	3810000000	24.84%	-6.049326064	3810000000	1.587359475
2050000000	24.78%	-6.05863	2050000000	-1.59591	3895000000	19.86%	-7.020912414	3895000000	1.158854608
2100000000	24.83%	-6.0503	2100000000	-0.90499	3980000000	18.25%	-7.386452287	3980000000	2.19717864
2150000000	21.36%	-6.70311	2150000000	-2.00405	4065000000	19.20%	-7.165892635	4065000000	2.47117096
2200000000	14.30%	-8.44621	2200000000	-3.47827	4150000000	20.43%	-6.897211262	4150000000	3.110488207
2250000000	10.58%	-9.75694	2250000000	-4.24626	4235000000	22.48%	-6.481760171	4235000000	4.178045872
2300000000	11.56%	-9.36966	2300000000	-2.95957	4320000000	22.78%	-6.424084908	4320000000	4.142522869
2350000000	21.14%	-6.74976	2350000000	0.800824	4405000000	19.93%	-7.003935107	4405000000	3.286020072
2400000000	31.89%	-4.96287	2400000000	2.406665	4490000000	17.70%	-7.519469074	4490000000	3.24962833
2450000000	37.38%	-4.27318	2450000000	2.924223	4575000000	16.80%	-7.747163586	4575000000	3.33802797
2500000000	37.96%	-4.20632	2500000000	2.770299	4660000000	18.28%	-7.3797881	4660000000	3.74180161
2550000000	42.07%	-3.75983	2550000000	3.497157	4745000000	20.64%	-6.851939529	4745000000	4.385165213
2600000000	44.17%	-3.5492	2600000000	3.376741	4830000000	23.15%	-6.35469598	4830000000	4.653366636
2650000000	44.96%	-3.47207	2650000000	2.90659	4915000000	22.02%	-6.572534233	4915000000	3.682860535
2700000000	45.81%	-3.39082	2700000000	2.770577	5000000000	18.87%	-7.242675805	5000000000	2.801304018

ANT5

1			1		1			1	
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB
3300000000	46.20%	-3.35375	3300000000	4.44887	2500000000	23.68%	-6.256564489	2500000000	1.510291801
3385000000	43.73%	-3.5918	3385000000	3.935815	2520000000	23.56%	-6.278713807	2520000000	1.698360274
3470000000	42.03%	-3.76476	3470000000	4.422829	2540000000	23.56%	-6.278268844	2540000000	1.345218681
3555000000	38.40%	-4.15708	3555000000	3.312066	2560000000	25.91%	-5.864507163	2560000000	1.042350552
3640000000	37.02%	-4.31614	3640000000	3.124798	2580000000	26.43%	-5.778985742	2580000000	0.634495481
3725000000	39.02%	-4.08704	3725000000	2.488974	2600000000	28.24%	-5.490961996	2600000000	0.894183958
3810000000	38.29%	-4.16956	3810000000	2.743282	2620000000	29.36%	-5.322983581	2620000000	0.80630294
3895000000	35.16%	-4.53987	3895000000	2.836107	2640000000	31.01%	-5.085202745	2640000000	0.663652524
3980000000	31.69%	-4.99078	3980000000	2.6808	2660000000	33.04%	-4.809430801	2660000000	1.032077243
4065000000	33.63%	-4.73284	4065000000	2.812927	2680000000	35.19%	-4.535970136	2680000000	1.454495842
4150000000	36.01%	-4.43528	4150000000	2.747612	2700000000	37.06%	-4.310578709	2700000000	1.870239
4235000000	35.57%	-4.48951	4235000000	3.150944					
4320000000	32.69%	-4.85587	4320000000	3.118286					
4405000000	31.81%	-4.97438	4405000000	3.247687					
4490000000	32.59%	-4.8687	4490000000	3.339622					
4575000000	34.86%	-4.57716	4575000000	3.725779					
4660000000	34.12%	-4.66991	4660000000	4.150218					
4745000000	29.78%	-5.26117	4745000000	3.211777					
4830000000	27.95%	-5.53571	4830000000	2.696898					
4915000000	29.08%	-5.36438	4915000000	2.867002					
5000000000	32.85%	-4.83429	5000000000	3.779757					

ANT6

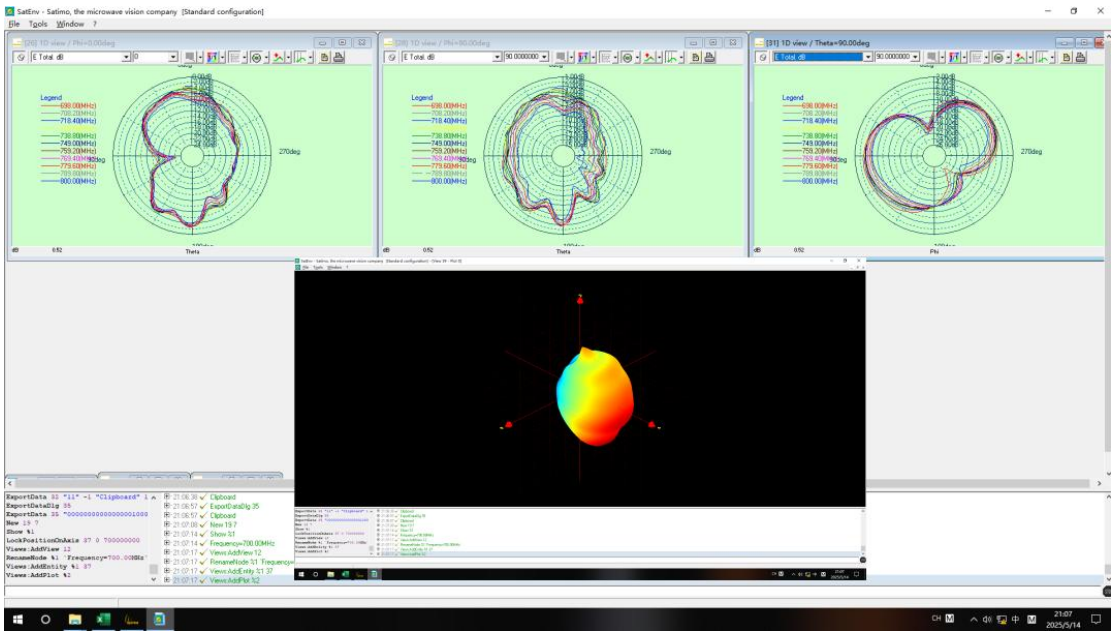
1			1		1			1	
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB
1560000000	41.18%	-3.85287	1560000000	2.511415	4915000000	22.63%	-6.45368	4915000000	4.175131
1564500000	40.74%	-3.90017	1564500000	2.276931	4969250000	23.12%	-6.36088	4969250000	4.343441
1569000000	41.71%	-3.79709	1569000000	2.639218	5023500000	22.04%	-6.56754	5023500000	4.367209
1573500000	41.71%	-3.79715	1573500000	2.438709	5077750000	23.17%	-6.35048	5077750000	5.184935
1578000000	42.30%	-3.73668	1578000000	2.826581	5132000000	24.45%	-6.11766	5132000000	5.662959
1582500000	41.15%	-3.85598	1582500000	2.493326	5186250000	25.08%	-6.00725	5186250000	5.867528
1587000000	40.36%	-3.94019	1587000000	2.647337	5240500000	24.91%	-6.03693	5240500000	5.755848
1591500000	40.97%	-3.87484	1591500000	2.513191	5294750000	25.32%	-5.96603	5294750000	5.598527
1596000000	41.46%	-3.82366	1596000000	2.690469	5349000000	23.48%	-6.29304	5349000000	5.003912
1600500000	40.35%	-3.94204	1600500000	2.434144	5403250000	23.08%	-6.36857	5403250000	4.180924
1605000000	38.87%	-4.10427	1605000000	2.359687	5457500000	21.98%	-6.58046	5457500000	3.276227
					5511750000	22.33%	-6.51019	5511750000	3.58226
1			1		5566000000	22.61%	-6.45757	5566000000	3.948304
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	5620250000	23.63%	-6.26542	5620250000	4.372987
2400000000	44.07%	-3.55818	2400000000	5.145964	5674500000	23.68%	-6.25545	5674500000	4.088189
2410000000	44.22%	-3.54359	2410000000	5.028664	5728750000	22.76%	-6.42788	5728750000	4.421525
2420000000	44.67%	-3.49956	2420000000	4.914051	5783000000	23.11%	-6.36246	5783000000	4.736972
2430000000	44.77%	-3.4905	2430000000	4.783978	5837250000	24.45%	-6.11725	5837250000	5.013612
2440000000	44.47%	-3.51962	2440000000	4.588928	5891500000	25.20%	-5.98682	5891500000	5.332253
2450000000	44.63%	-3.50341	2450000000	4.445274	5945750000	27.59%	-5.59325	5945750000	5.878923
2460000000	45.07%	-3.46113	2460000000	4.352567	6000000000	26.75%	-5.72718	6000000000	5.51544
2470000000	45.09%	-3.45947	2470000000	4.222271					
2480000000	44.27%	-3.53927	2480000000	3.97875					
2490000000	43.43%	-3.62249	2490000000	3.703841					
2500000000	42.38%	-3.72833	2500000000	3.445737					

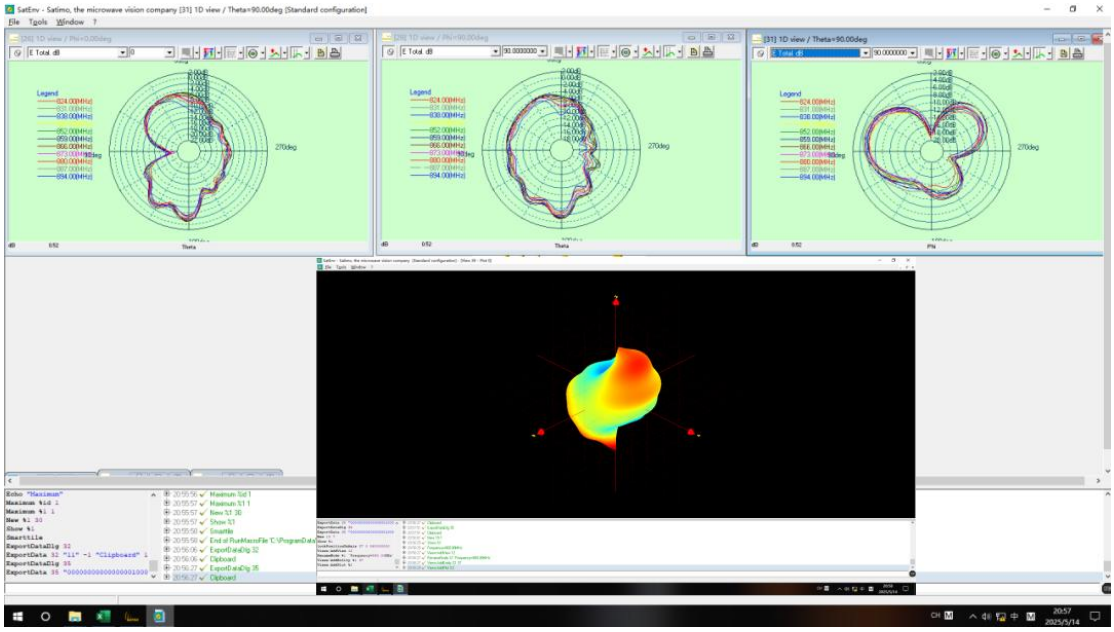
ANT7

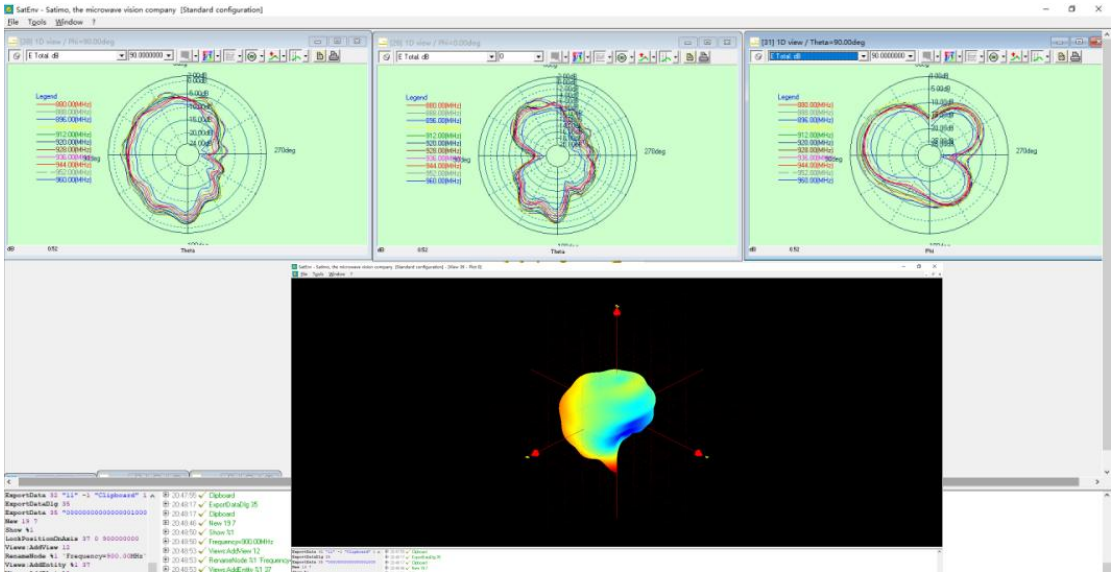
1			1		1			1	
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB
1170000000	28.94%	-5.38562	1170000000	0.735325	4915000000	28.79%	-5.40751	4915000000	4.89523
1171000000	29.84%	-5.25246	1171000000	1.059436	4969250000	29.33%	-5.32691	4969250000	5.013452
1172000000	30.79%	-5.1153	1172000000	1.377076	5023500000	25.83%	-5.87917	5023500000	4.358621
1173000000	31.44%	-5.02538	1173000000	1.585709	5077750000	24.62%	-6.08648	5077750000	4.064251
1174000000	31.52%	-5.01399	1174000000	1.573415	5132000000	24.60%	-6.08988	5132000000	4.590149
1175000000	30.83%	-5.11062	1175000000	1.166296	5186250000	25.27%	-5.97461	5186250000	5.295844
1176000000	30.08%	-5.2175	1176000000	0.878063	5240500000	25.68%	-5.90335	5240500000	5.655994
1177000000	29.39%	-5.31767	1177000000	0.617257	5294750000	27.03%	-5.68158	5294750000	5.89031
1178000000	29.05%	-5.36786	1178000000	0.517041	5349000000	27.77%	-5.56474	5349000000	5.450075
1179000000	29.20%	-5.34579	1179000000	0.588936	5403250000	28.69%	-5.42243	5403250000	5.006909
1180000000	29.63%	-5.28213	1180000000	0.808004	5457500000	28.67%	-5.42558	5457500000	4.767832
					5511750000	28.54%	-5.4453	5511750000	4.101295
1			1		5566000000	27.02%	-5.68361	5566000000	3.559329
Frequency	Efficiency	Efficiency . dB	Frequency	Gain . dB	5620250000	26.35%	-5.79179	5620250000	3.598097
2400000000	37.46%	-4.2646	2400000000	2.395407	5674500000	26.24%	-5.80968	5674500000	3.354976
2410000000	38.67%	-4.12649	2410000000	2.246373	5728750000	26.63%	-5.74693	5728750000	3.691655
2420000000	40.51%	-3.92437	2420000000	2.232692	5783000000	27.48%	-5.61033	5783000000	4.156222
2430000000	41.43%	-3.82692	2430000000	2.186096	5837250000	29.63%	-5.28305	5837250000	4.525314
2440000000	41.97%	-3.77024	2440000000	2.238924	5891500000	30.04%	-5.22316	5891500000	4.627906
2450000000	42.97%	-3.66803	2450000000	2.277617	5945750000	32.92%	-4.82572	5945750000	5.374546
2460000000	44.04%	-3.56181	2460000000	2.279113	6000000000	31.70%	-4.98921	6000000000	5.215977
2470000000	44.26%	-3.53968	2470000000	2.190036					
2480000000	43.51%	-3.61377	2480000000	2.37796					
2490000000	42.87%	-3.6781	2490000000	2.640248					
2500000000	42.02%	-3.76515	2500000000	2.859687					

Passive pattern

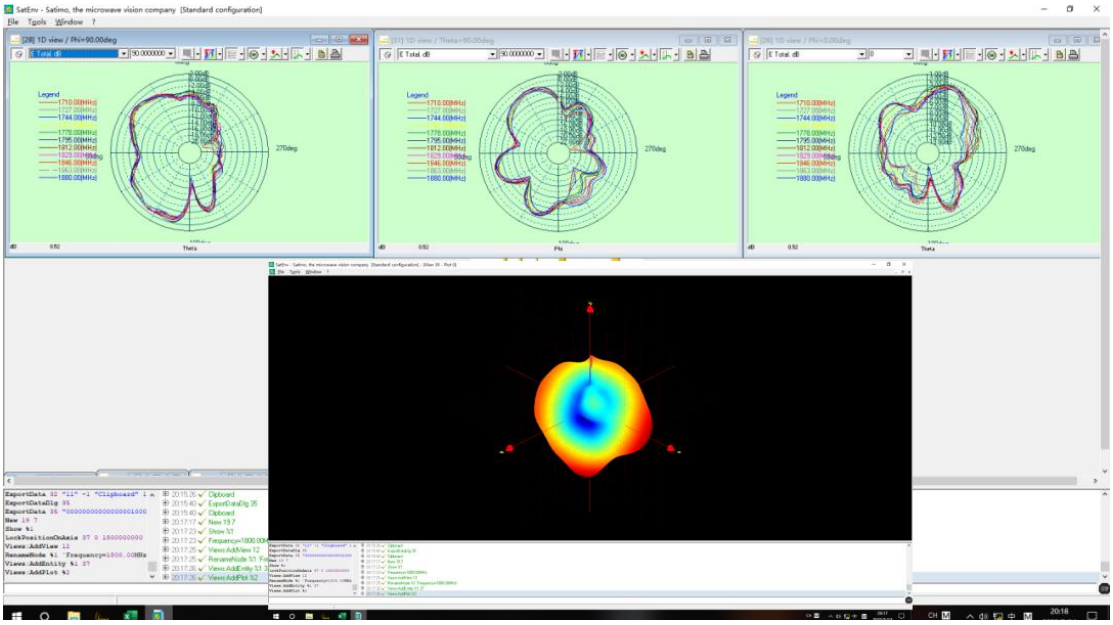
650-960MHz



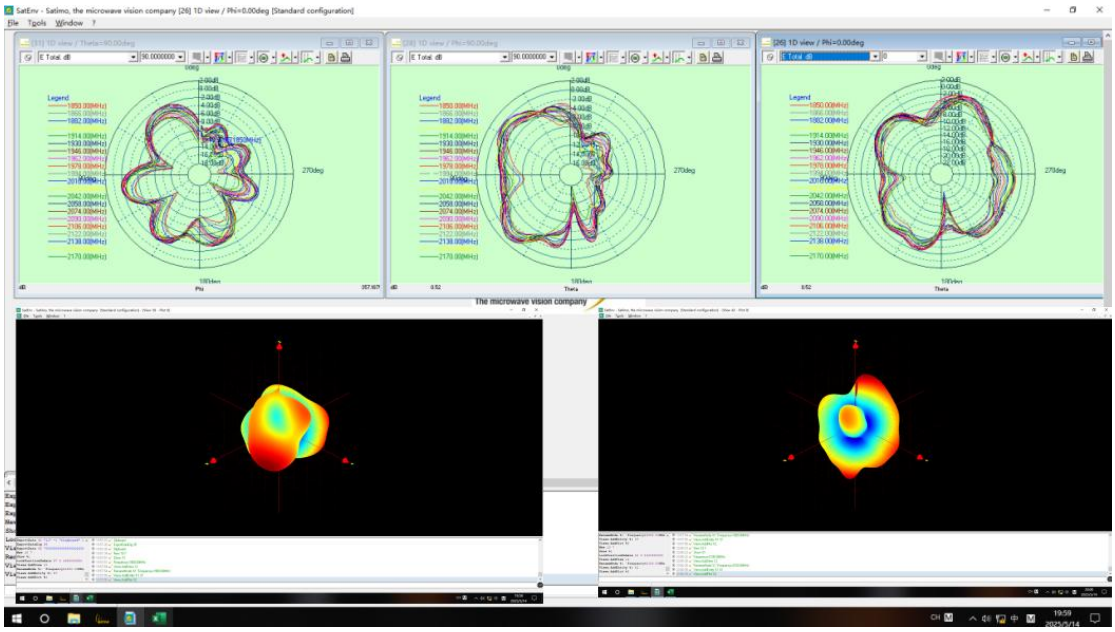




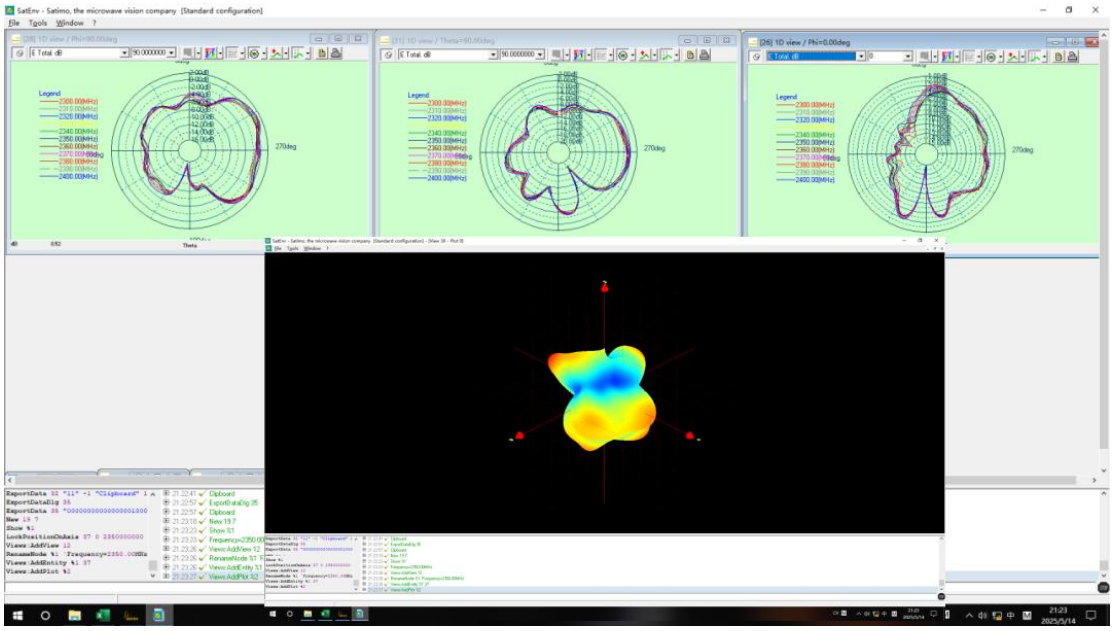
1710-1880MHz



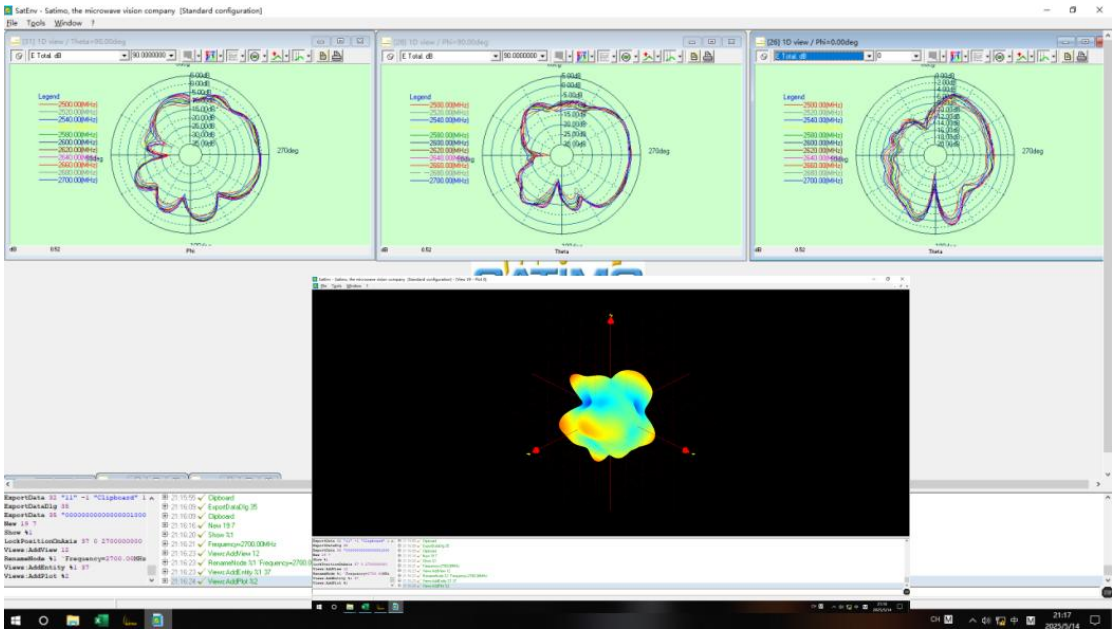
1850-2170MHz



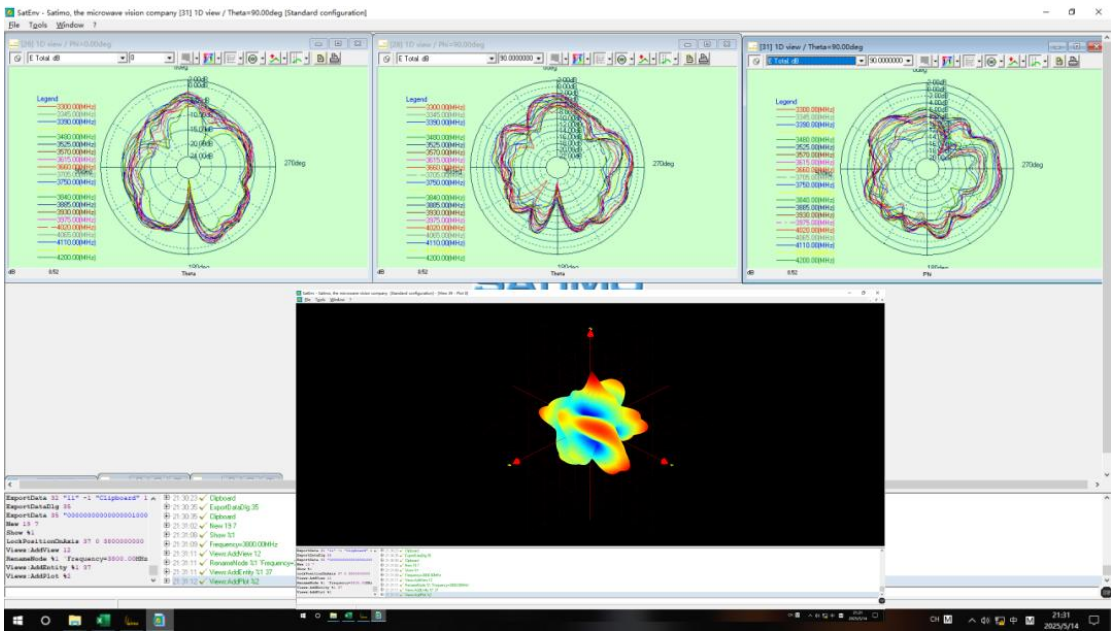
2300-2400MHz



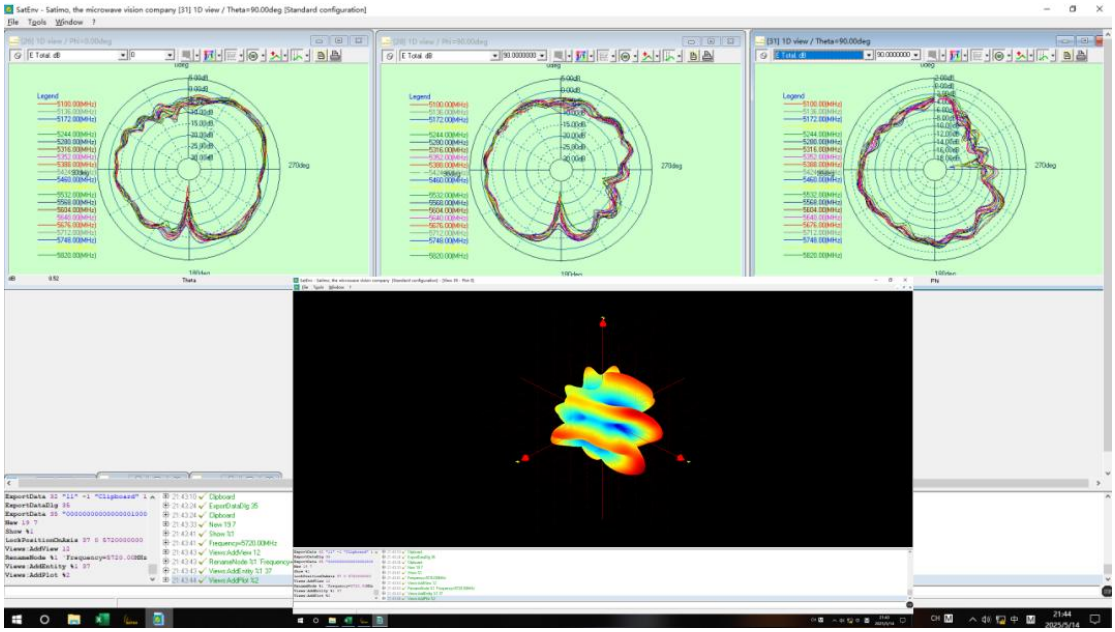
2500-2700MHz



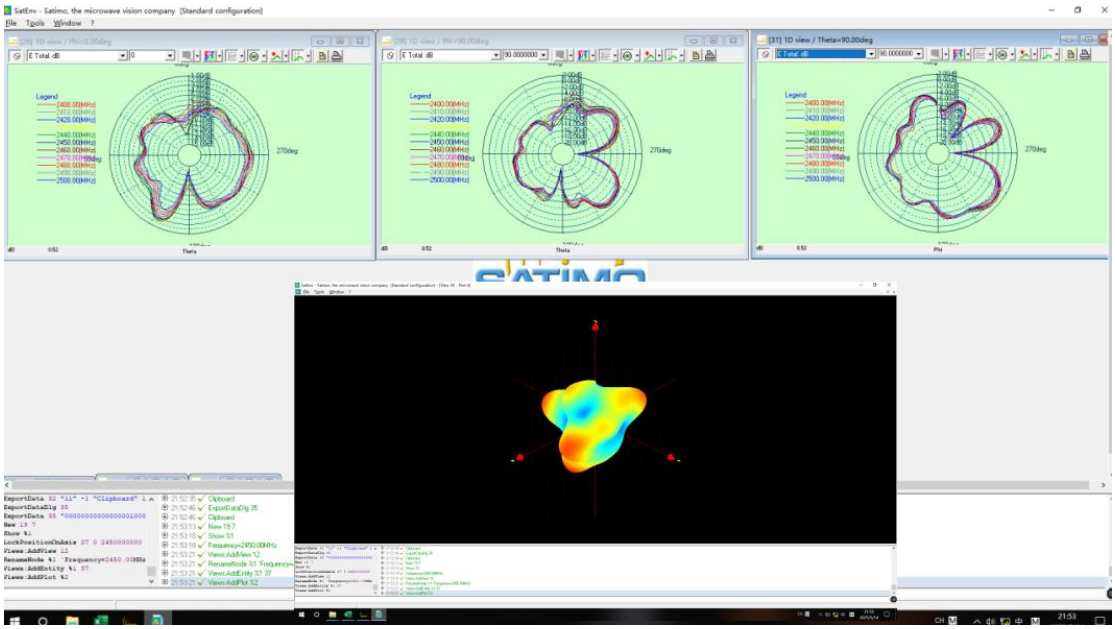
3300-5000MHz



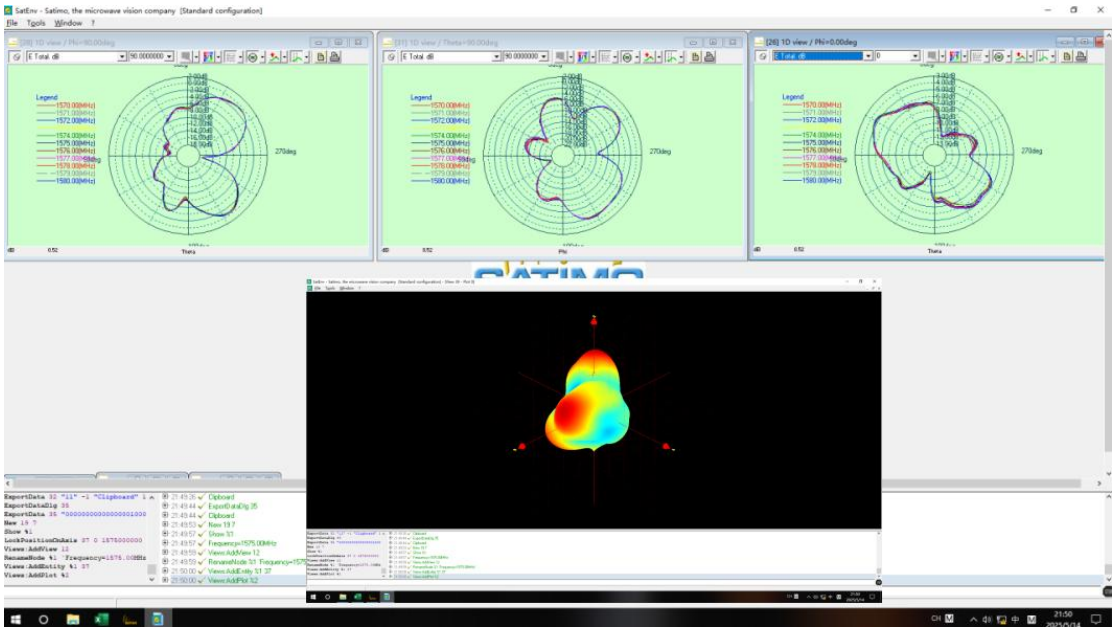
WIFI-5.8G



WIFI-2.4G/BT



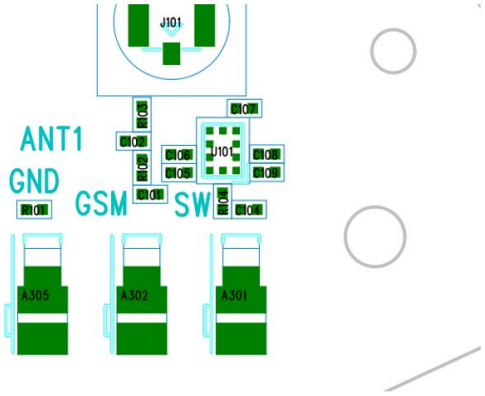
GPS-1575MHz



4.匹配电路说明

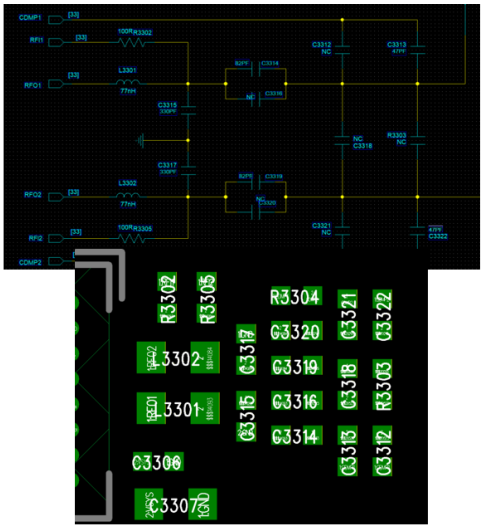
ANT0天线匹配电路有更改。
C102-9.1nH，R101/R103-0欧姆，R102-2.7nH，C101-1.0pF.
R104/C109-0欧姆，C104-NC，C108-15nH，C105-5.1nH，C106-27nH.
A103/102/101天线弹片保留。

ANT1天线匹配电路有更改。
C102-9.1nH，R101/R103-0欧姆，R102-2.7nH，C101-1.0pF.
R104/C109-0欧姆，C104-NC，C108-15nH，C105-5.1nH，C106-27nH.
A305/302/301天线弹片保留。



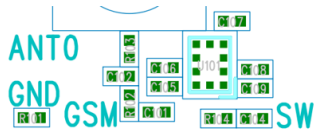
NFC匹配电路

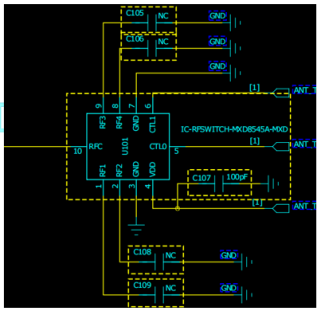
元件 Element	更改前	更改后
C3312(0201):	NC	100pF
C3321(0201):	NC	100pF
C3318(0201):	NC	22pF



ANT0天线开关逻辑

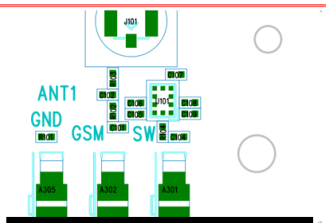
RF开关通路	匹配	控制频段
RF1(C109)	0欧姆	GSM:900/1800/1900 BC1 WCDMA:B1/2/4/8 LTE:B1/2/3/4/7/8/25/34/38/39/40/41/66 NR:N1/2/3/7/8/25/40/66
RF2(C108)	15nH	LTE:B12/13/17/28 NR:N28
RF3(C105)	5.1nH	GSM:850 BC0/10 WCDMA:B5/6/19 LTE : B5/18/19/20/26 NR:N5/20
RF4(C106)	27nH	LTE:B32/71 NR:N71

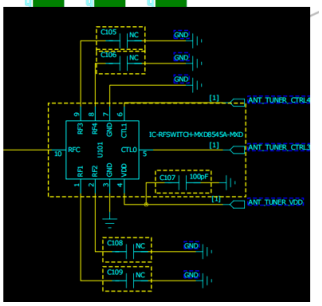




ANT1天线开关逻辑

RF开关通路	匹配	控制频段
RF1(C109)	0欧姆	GSM:900/1800/1900 BC1 WCDMA:B1/2/4/8 LTE:B1/2/3/4/7/8/25/34/38/39/40/41/66 NR:N1/2/3/7/8/25/40/66
RF2(C108)	15nH	LTE:B12/13/17/28 NR:N28
RF3(C105)	5.1nH	GSM:850 BC0/10 WCDMA:B5/6/19 LTE : B5/18/19/20/26 NR:N5/20
RF4(C106)	27nH	LTE:B32/71 NR:N71





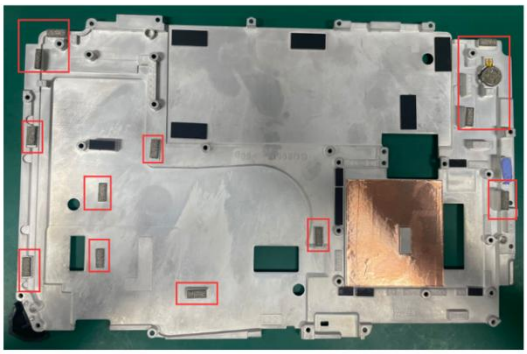
5. NFC 实测报告

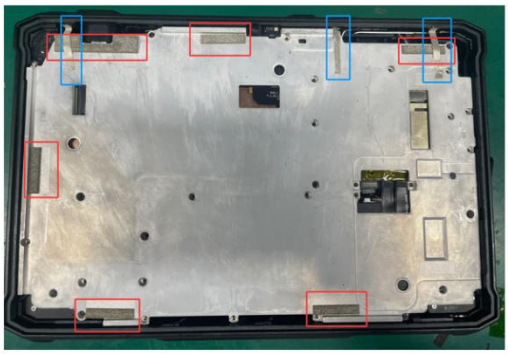
	距离
Type1	5.0cm
Type2	4.5cm
Type3	4.5cm
Type4	3.5cm
Type5	5.5cm

测试距离用的垫片

6. 环境处理和天线分布图

红框处贴导电海绵接地。蓝框处贴导电布使FPC天线接地。





天线分布图。