

APPROVAL SHEET

客户名称 CUSTOMER : 博特朗

名 称 NAME : 4G/GPS 内置天线

物料代码 PART CODE :

规格型号 MODEL NO :

日 期 DATE : 2022. 12. 06

客户承认 Customer Approve

审 核 check	批 准 approved	承 认 approval

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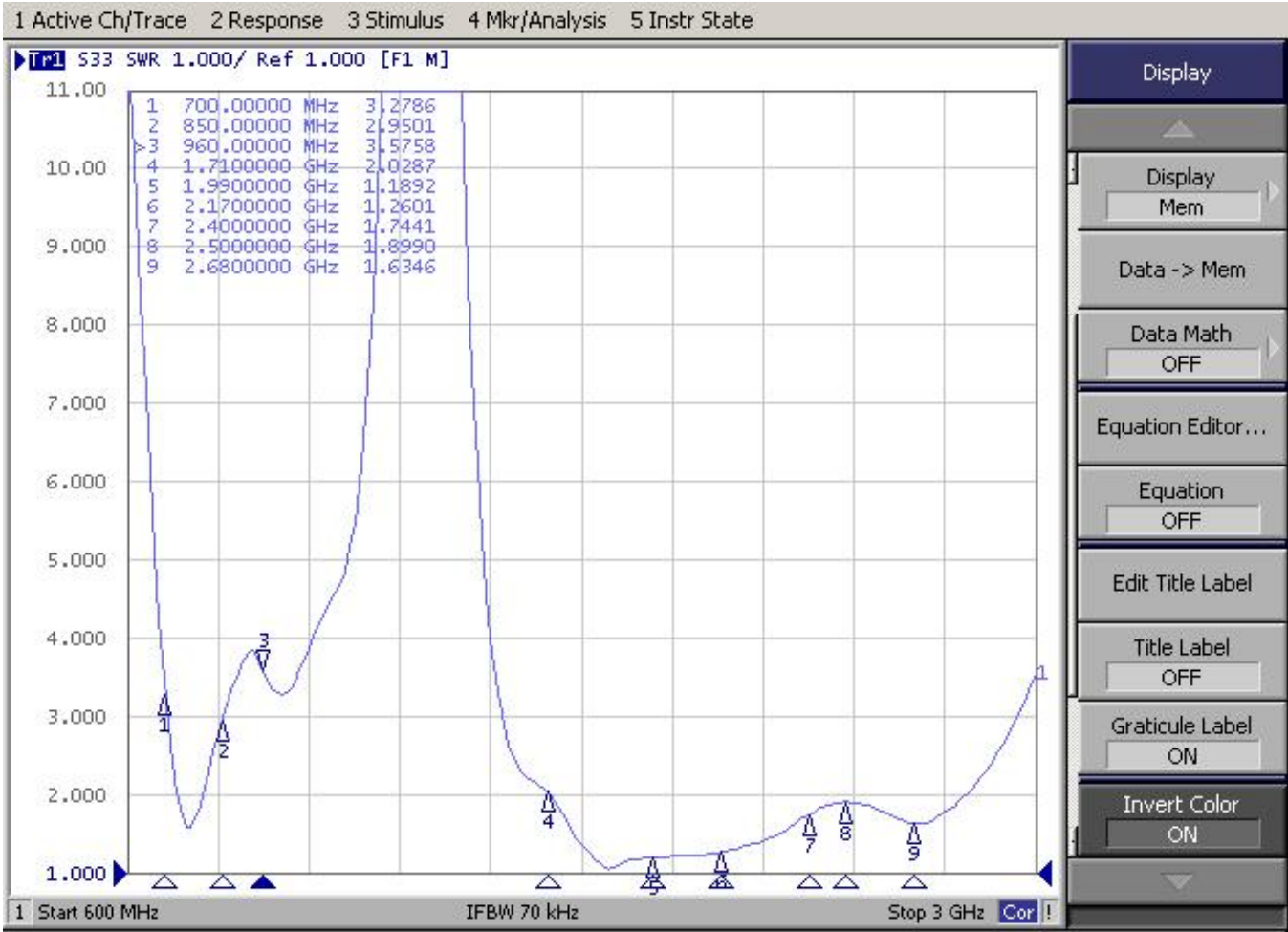
八、产品包装规范 Code for product packaging

电性能指标 Electrical Performance Index

电 器 性 能 指 标		Electrical Specifications	
频率范围		700-960/1710-1990/2300-2700MHZ	
电压驻波比	≤3.0	VSWR	≤3.0
增益	700-960MHz : ≤2.2DBI 1700-2700MHz : ≤1.3DBI	GAIN	700-960MHz : ≤2.2DBI 1700-2700MHz : ≤1.3DBI
辐射方式	全向	Radiation	OMNI
极化方式	线极化	Polarizatin	LINEAR
输入阻抗	50 Ω	Input Impedance	50 Ω
机 械 性 能 指 标		Mechanical Specifications	
接口形式		Input connector	
天线材质	FPC	Antenna materia	FPC
工作温度	-40℃~+85℃	Working Tempera ture	-40℃~+85℃
工作湿度	40~85%	Working Humidit y	40~85%
电 性 能 指 标		Electrical Specifications	
频率范围	1575.42MHz	Frequency Range	1575.42MHz
电压驻波比	≤1.5	VSWR	≤1.5
增益	≤1.1 DBI	GAIN	≤1.1 DBI
辐射方式	全向	Radiation	OMNI
极化方式	垂直	Polarizatin	LINEAR
输入阻抗	50 Ω	Input Impedance	50 Ω
机 械 指 标		Mechanical Specifications	
接口形式		Input connector	
天线材质	ABS & COPPER	Antenna materia	ABS & COPPER
工作温度	-30℃~+80℃	Working Temperature	-30℃~+80℃
工作湿度	40~85%	Working Humidity	40~85%

测试报告 Test report

1. 4G 天线驻波图天线效率

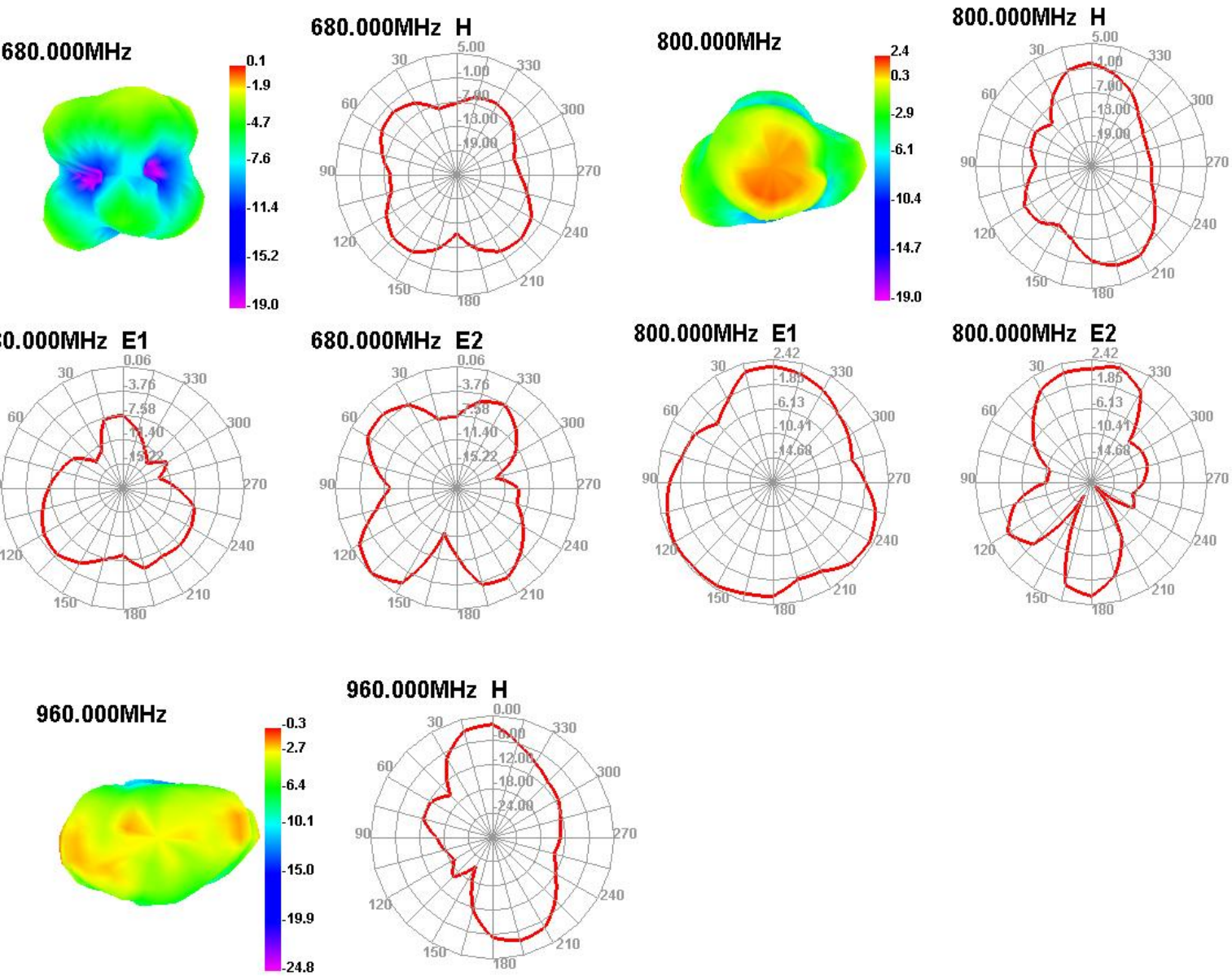


2. 天线效率

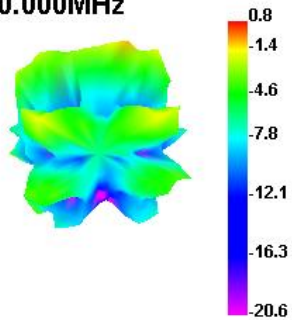
Passive Test For 600-960										
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)	Attenut Hor	Attenut Ver
600	24.09	-6.18	-1.46	-3.61	7.794	16.299	-1.46	-28.71	39.92	39.44
620	31.03	-5.08	-0.14	-2.29	9.711	21.32	-0.14	-19.22	40.26	39.97
640	32.75	-4.85	0.29	-1.86	10.244	22.509	0.29	-19.19	40.1	40.03
660	36.06	-4.43	0.71	-1.44	12.175	23.886	0.71	-15.31	40.12	40.01
680	34.07	-4.68	0.06	-2.09	11.91	22.162	0.06	-19.04	40.38	39.72
700	33.08	-4.8	-0.49	-2.64	12.756	20.32	-0.49	-15.72	40.42	39.69
720	30.61	-5.14	-1.22	-3.37	12.985	17.627	-1.22	-14.23	40.17	39.22
740	35.06	-4.55	-1.37	-3.52	15.792	19.269	-1.37	-18.15	40.65	39.28
760	40.84	-3.89	0.86	-1.29	18.705	22.137	0.86	-19.63	40.24	39.69
780	44.46	-3.52	1.71	-0.44	19.857	24.604	1.71	-19.34	40.06	39.44
800	51.6	-2.87	2.42	0.27	22.594	29.008	2.42	-18.96	40.37	39.76
820	39.66	-4.02	1.25	-0.9	17.52	22.14	1.25	-17.82	39.52	38.88
840	40.13	-3.97	1.1	-1.05	18.173	21.952	1.1	-18.1	39.59	38.87
860	39.53	-4.03	1.16	-0.99	17.752	21.778	1.16	-26.44	40.12	39.6
880	32.87	-4.83	0.78	-1.37	14.985	17.883	0.78	-23.81	39.85	39.82
900	33.77	-4.71	1.07	-1.08	15.683	18.086	1.07	-23.88	39.76	39.62
920	25.28	-5.97	0.44	-1.71	10.851	14.429	0.44	-25.26	39.63	39.69
940	27.05	-5.68	0.34	-1.81	12.406	14.647	0.34	-29.29	39.71	39.59
960	25.65	-5.91	-0.26	-2.41	12.917	12.729	-0.26	-24.83	39.78	39.78

Passive Test For 4G高频										
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)	Attenut Hor	Attenut Ver
1700	23.5	-6.29	0.76	-1.39	11.292	12.209	0.76	-20.61	46.6	47.14
1750	33.23	-4.78	0.34	-1.81	18.3	14.93	0.34	-20.59	47.22	47.71
1800	34.39	-4.64	1.16	-0.99	20.283	14.104	1.16	-20.84	47.59	47.51
1850	33.49	-4.75	1.39	-0.76	18.811	14.683	1.39	-28.96	47.93	47.57
1900	24.75	-6.06	0.44	-1.71	12.761	11.99	0.44	-20.52	47.8	47.6
1950	24.65	-6.08	0.7	-1.45	12.09	12.564	0.7	-26.99	46.62	47.86
2000	19.72	-7.05	-0.67	-2.82	9.715	10.009	-0.67	-25.91	47.25	47.67
2050	15.45	-8.11	-0.72	-2.87	8.011	7.44	-0.72	-20.3	47.6	47.77
2100	19.88	-7.02	0.2	-1.95	11.876	8.005	0.2	-24.79	48.8	49.22
2150	19.5	-7.1	0.17	-1.98	11.827	7.671	0.17	-21.53	48.31	48.26
2200	23.09	-6.37	0.31	-1.84	11.73	11.361	0.31	-35.51	49.05	48.57
2250	20.53	-6.88	-0.06	-2.21	10.542	9.986	-0.06	-25.61	50.06	49.57
2300	23.94	-6.21	1.31	-0.84	14.709	9.228	1.31	-29.06	49.85	49.77
2350	22.72	-6.44	1.1	-1.05	13.015	9.701	1.1	-28.36	50.53	50.83
2400	10.16	-9.93	-2.66	-4.81	5.201	4.96	-2.66	-32.23	49.53	49.95
2450	9.22	-10.35	-3.19	-5.34	5.601	3.619	-3.19	-28.51	50.1	50.01
2500	10.85	-9.65	-3.17	-5.32	7.158	3.689	-3.17	-32.72	50.42	50.26
2550	13.18	-8.8	-2.49	-4.64	8.118	5.06	-2.49	-19.09	51.13	51.11
2600	14.25	-8.46	-2.13	-4.28	9.362	4.893	-2.13	-22.16	50.76	50.77
2650	16.71	-7.77	-1.74	-3.89	10.089	6.62	-1.74	-24.36	51.35	50.92
2700	13.72	-8.63	-1.29	-3.44	8.752	4.97	-1.29	-24.28	51.83	51.74

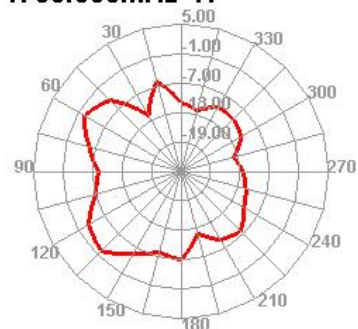
3. antenna pattern



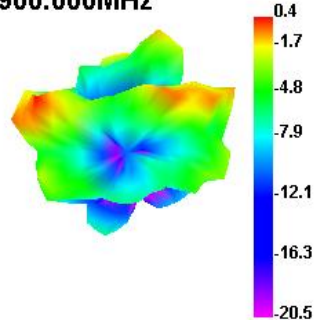
1700.000MHz



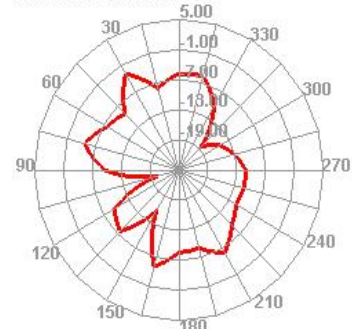
1700.000MHz H



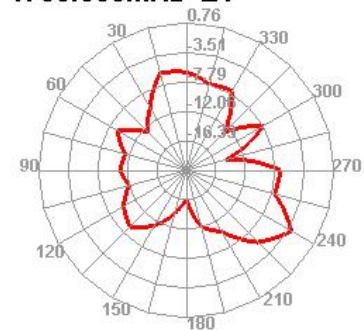
1900.000MHz



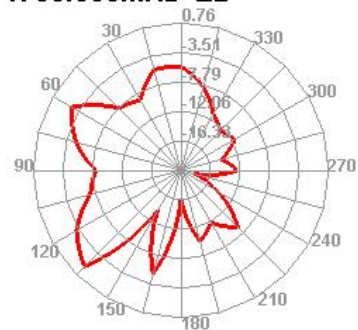
1900.000MHz H



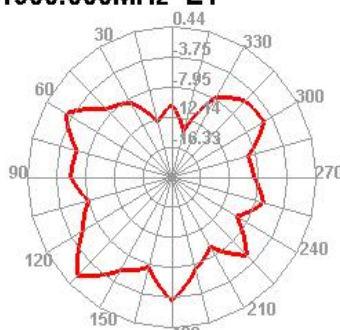
1700.000MHz E1



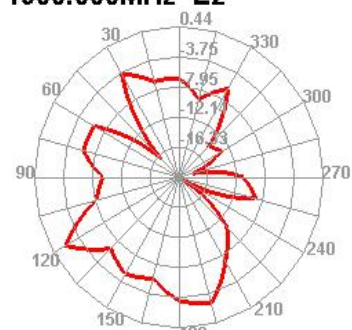
1700.000MHz E2



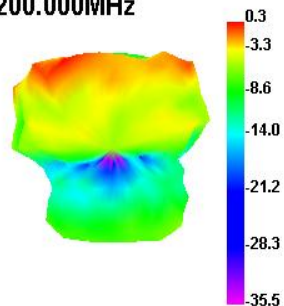
1900.000MHz E1



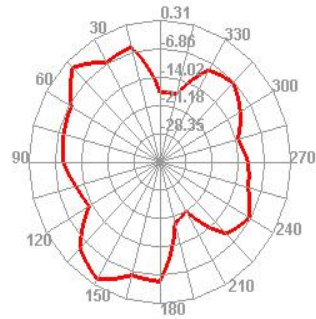
1900.000MHz E2



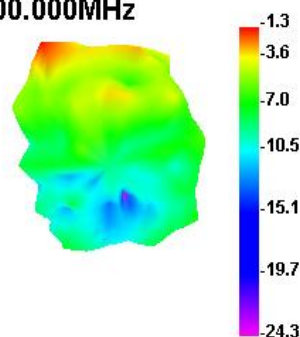
2200.000MHz



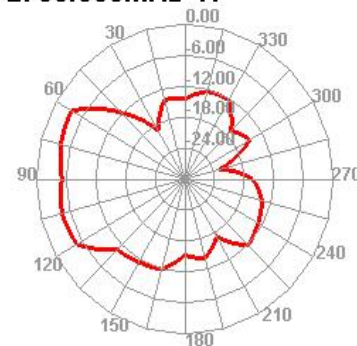
2200.000MHz H



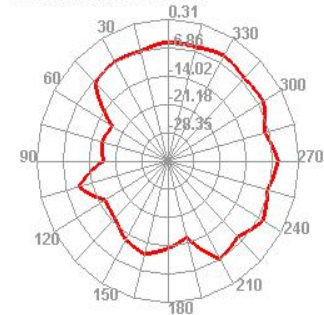
2700.000MHz



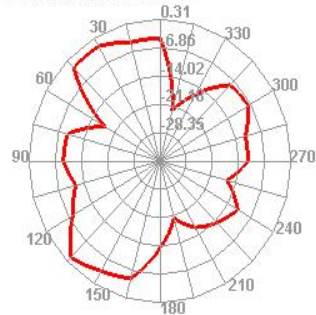
2700.000MHz H



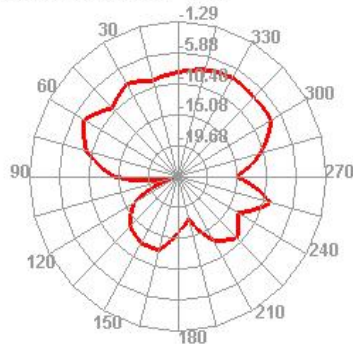
2200.000MHz E1



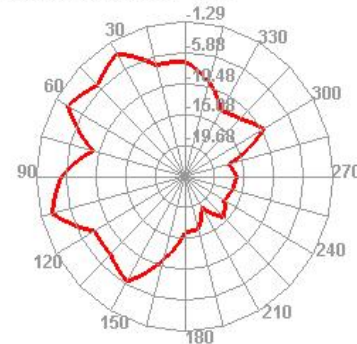
2200.000MHz E2



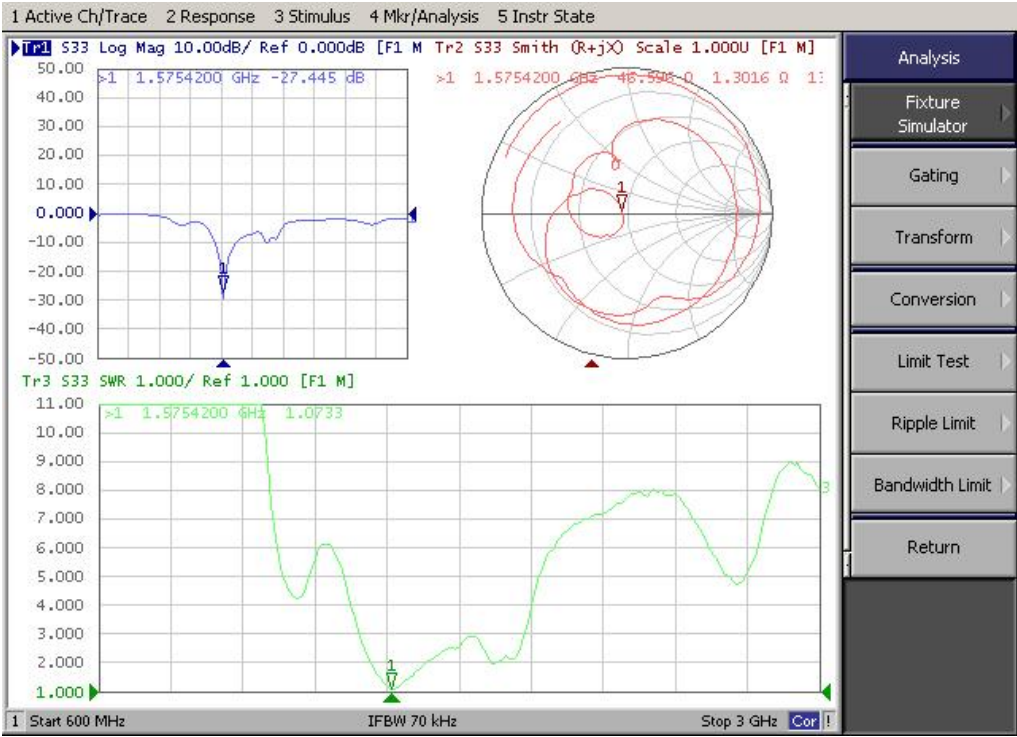
2700.000MHz E1



2700.000MHz E2



4. GPS 天线驻波图天线效率

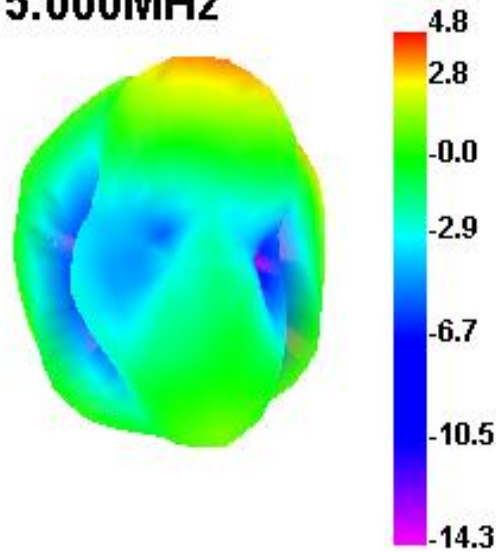


5、增益效率测试数据

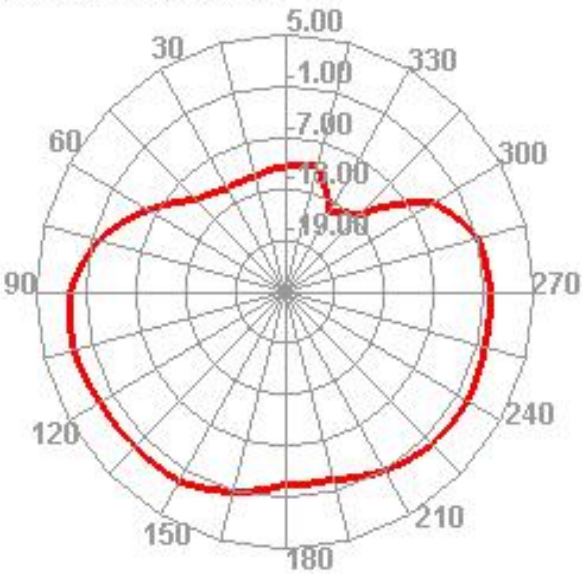
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)
1550	65.75	-0.67	2.34	0.19
1555	49.99	-1.55	1.64	-0.51
1560	64.53	-0.73	2.34	0.19
1565	61.23	-0.9	2.22	0.07

6. antenna bearing

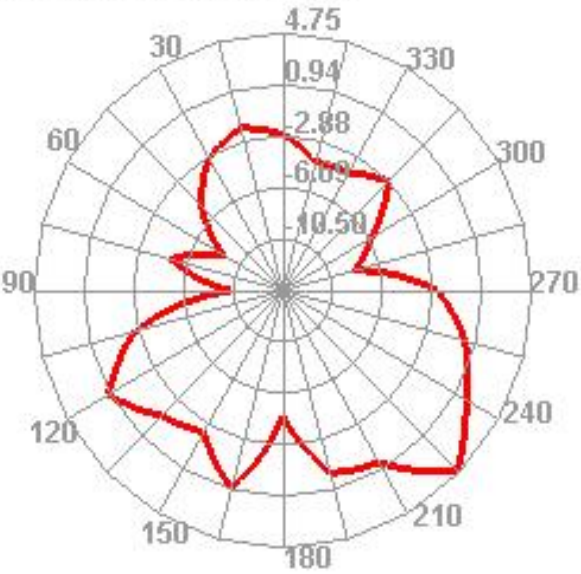
1575.000MHz



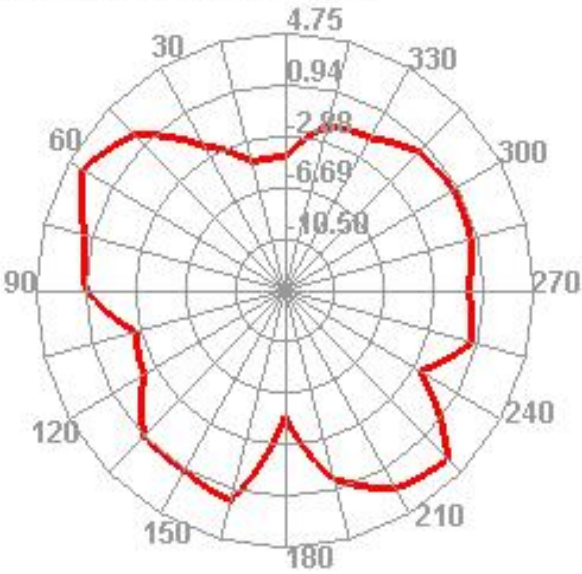
1575.000MHz H



1575.000MHz E1



1575.000MHz E2



测试设备及原理 Testing Equipment and Principle

1. 测试设备:

网络分析仪 Network Analyzers :

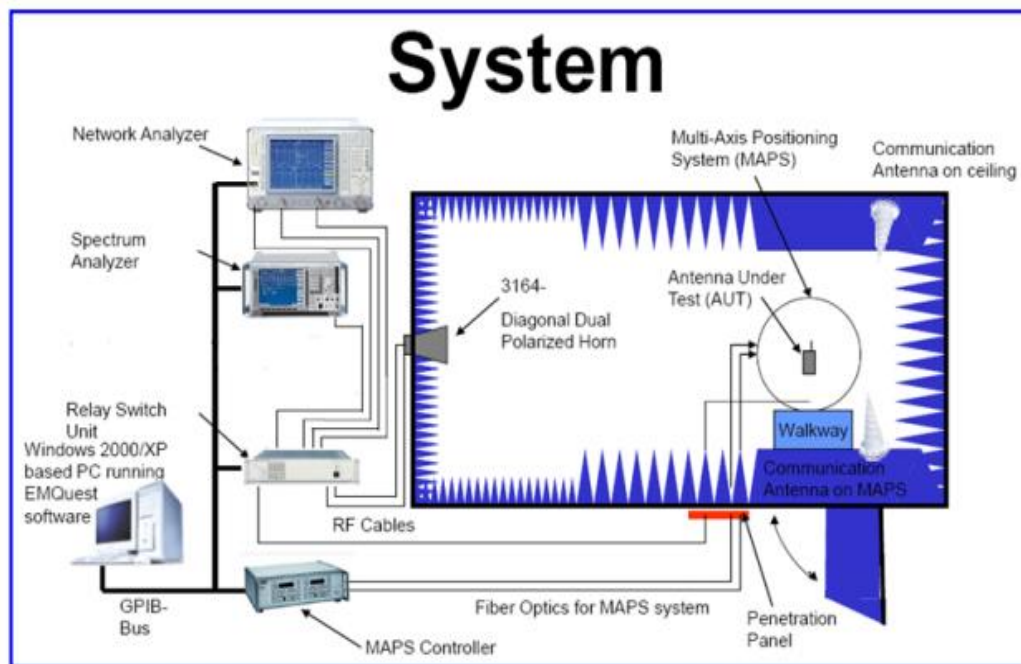
Agilent 8753D 5071B

综合测试仪 Communications Test Set:

Agilent E5515C/CMW500

3D 暗室测试系统 3D Chamber Test System:

2. 测试原理:



工程图纸 Product Drawing

