



A67W项目 天线射频系统开发报告

Antenna RF System Development Report

+ 思讯射频：温工



深圳市思讯通信技术有限公司

业界顶尖的射频技术与天线解决方案提供商

项目开发环境

项目开发简介

各天线匹配电路及无源参数

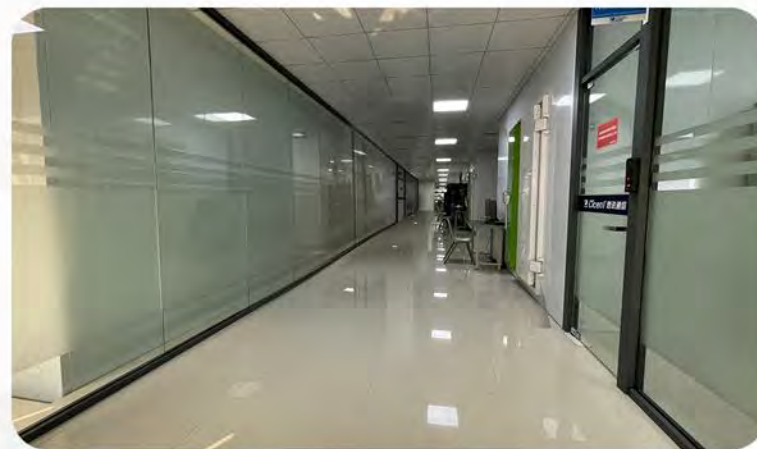
有源测试数据

GPS实测效果

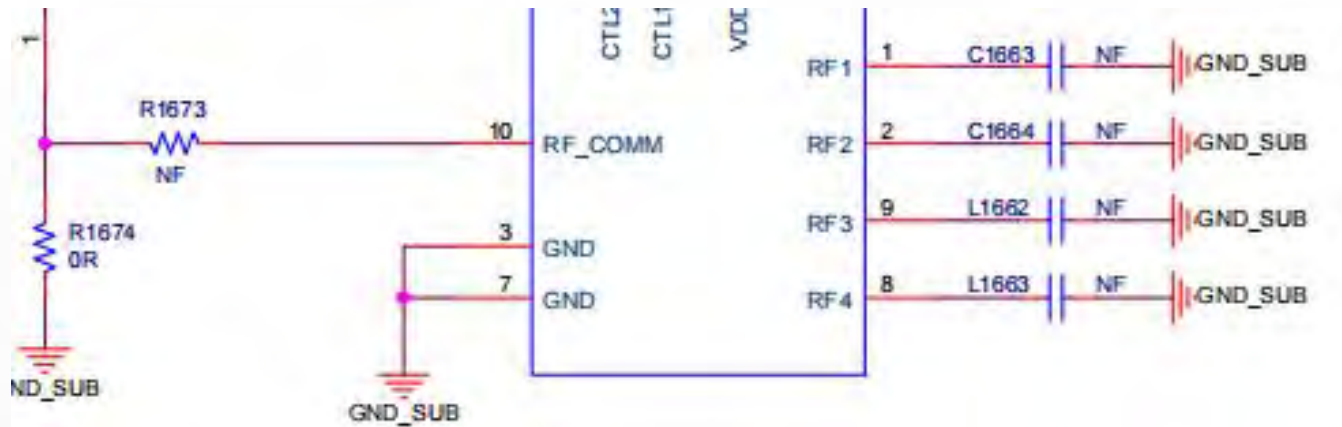
射频环境处理

调试过程风险提示

附加说明

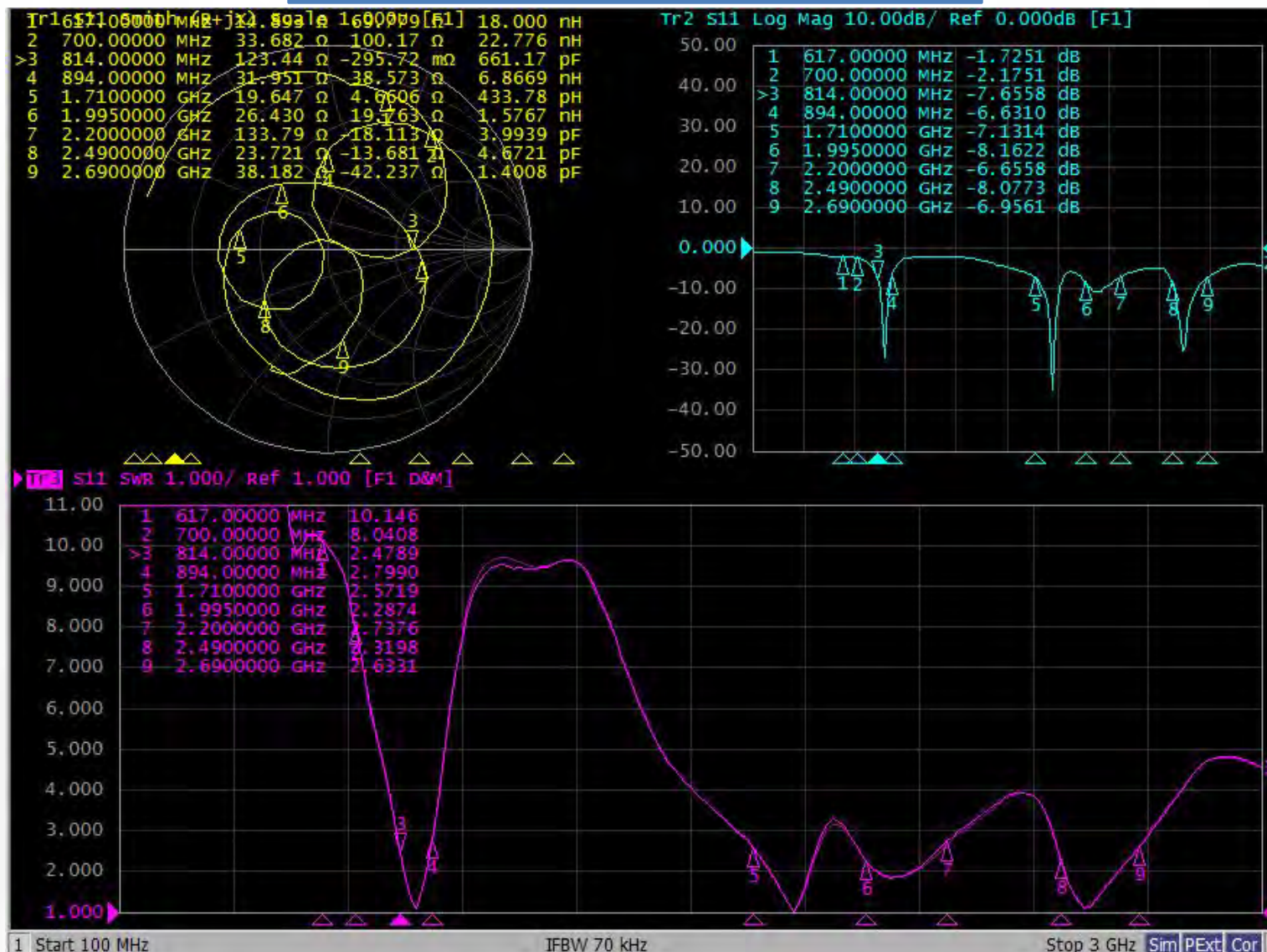


主天线	频段		天线状态	天线形式	设计区域	匹配改动
	2G	B2/5	FPC样品	PIFA	手机底部	有
	3G	B2/4/5				
	4G	B2/4/5/12/17/41/66/71				
其他天线	BT/WIFI	2.4GHz	FPC样品	PIFA	手机顶部	无
	GPS	1575MHz	FPC样品	PIFA	手机顶部	无
	分集	B2/4/41/66	FPC样品	PIFA	手机顶部	无
样机状态	试产样机		环境处理	有9处修改		

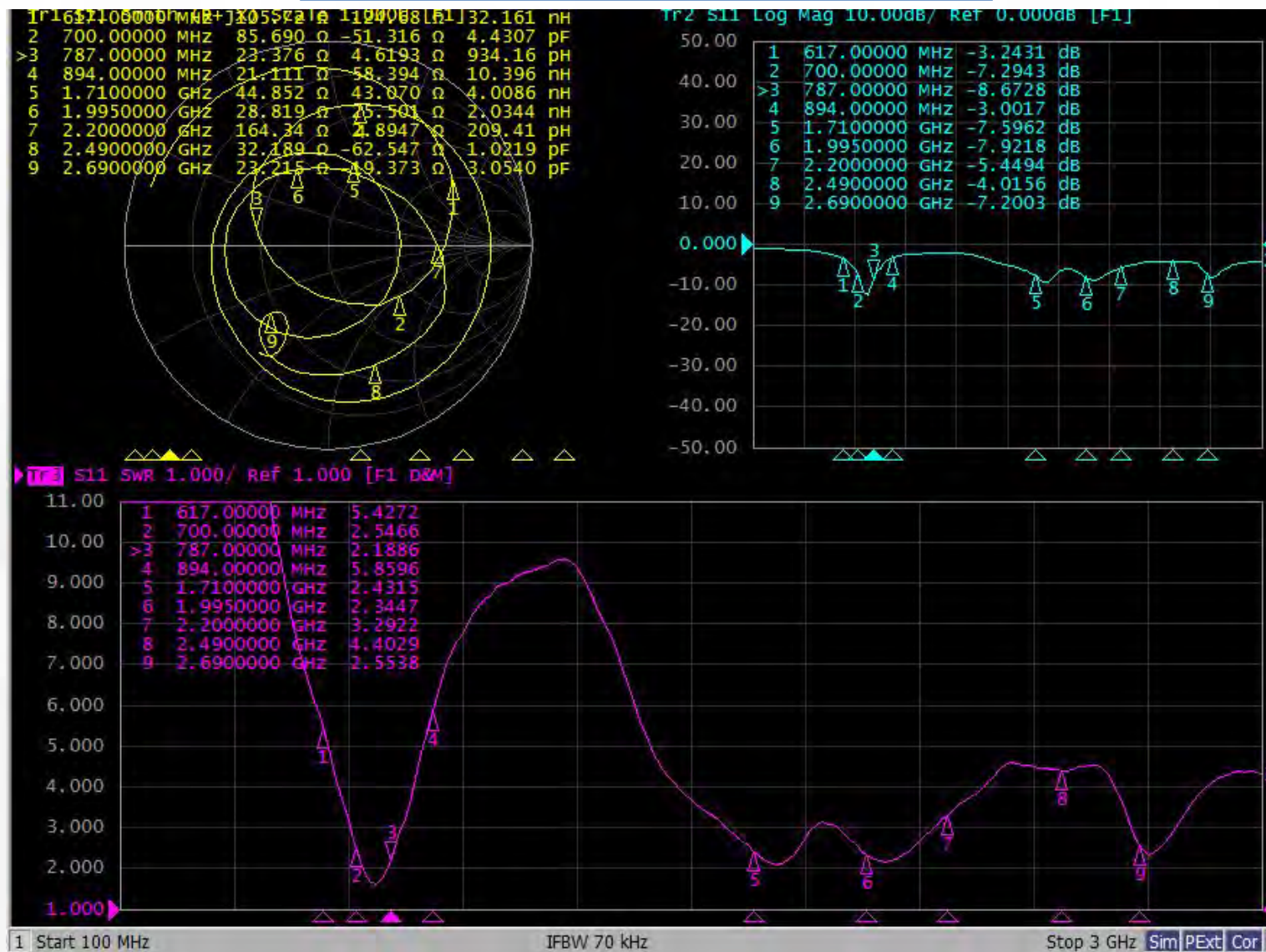


开关逻辑电路			
RF开关	物料编号	匹配值	频段
RF1	C1663	3.3nH	GSM850/PCS W850/W1700/W1900 B2/4/5/66
RF2	C1664	12nH	B12/17
RF3	L1662	33nH	B71
RF4	L1663	N/A	B41

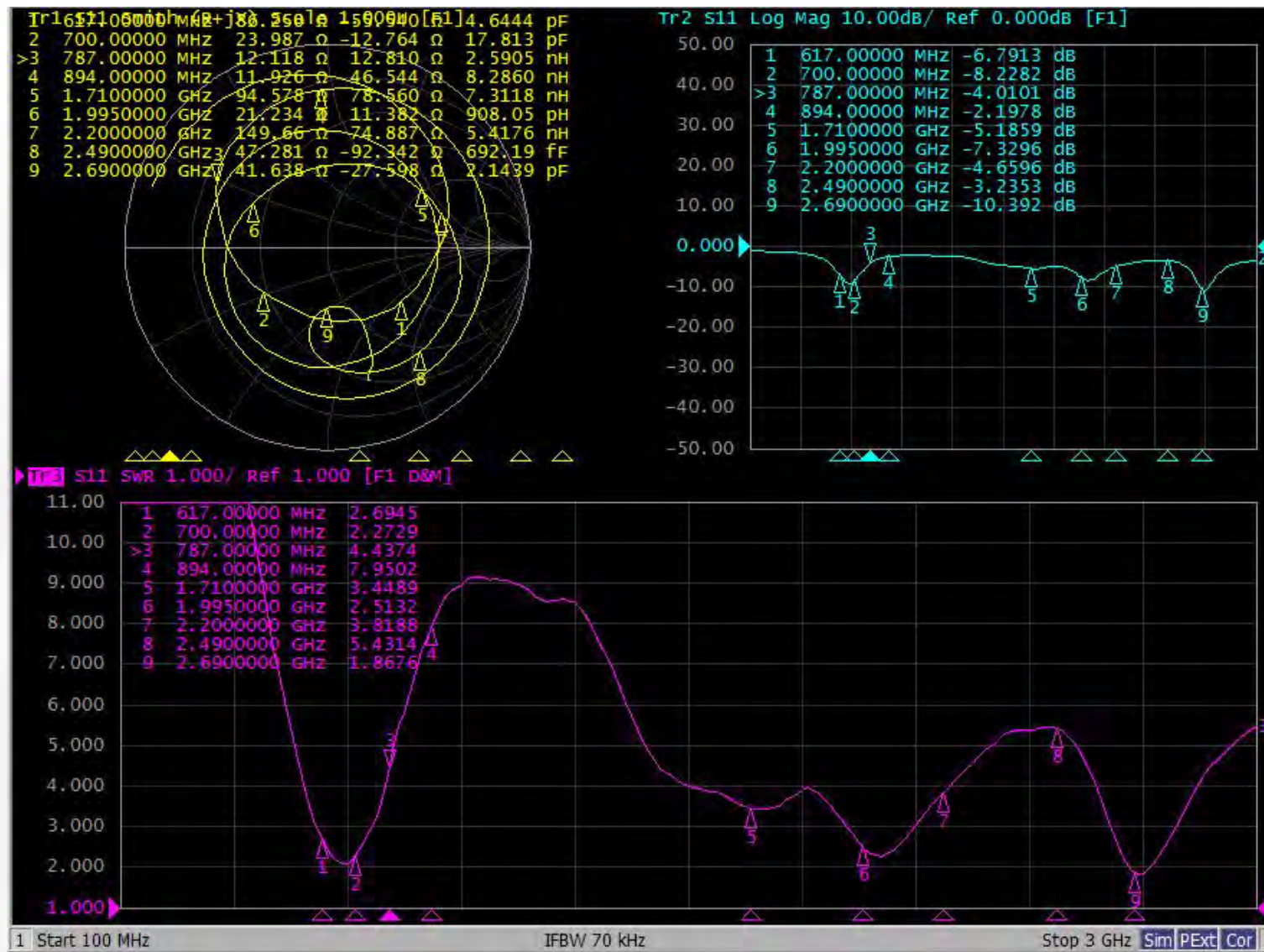
主天线S参数 (RF1路)



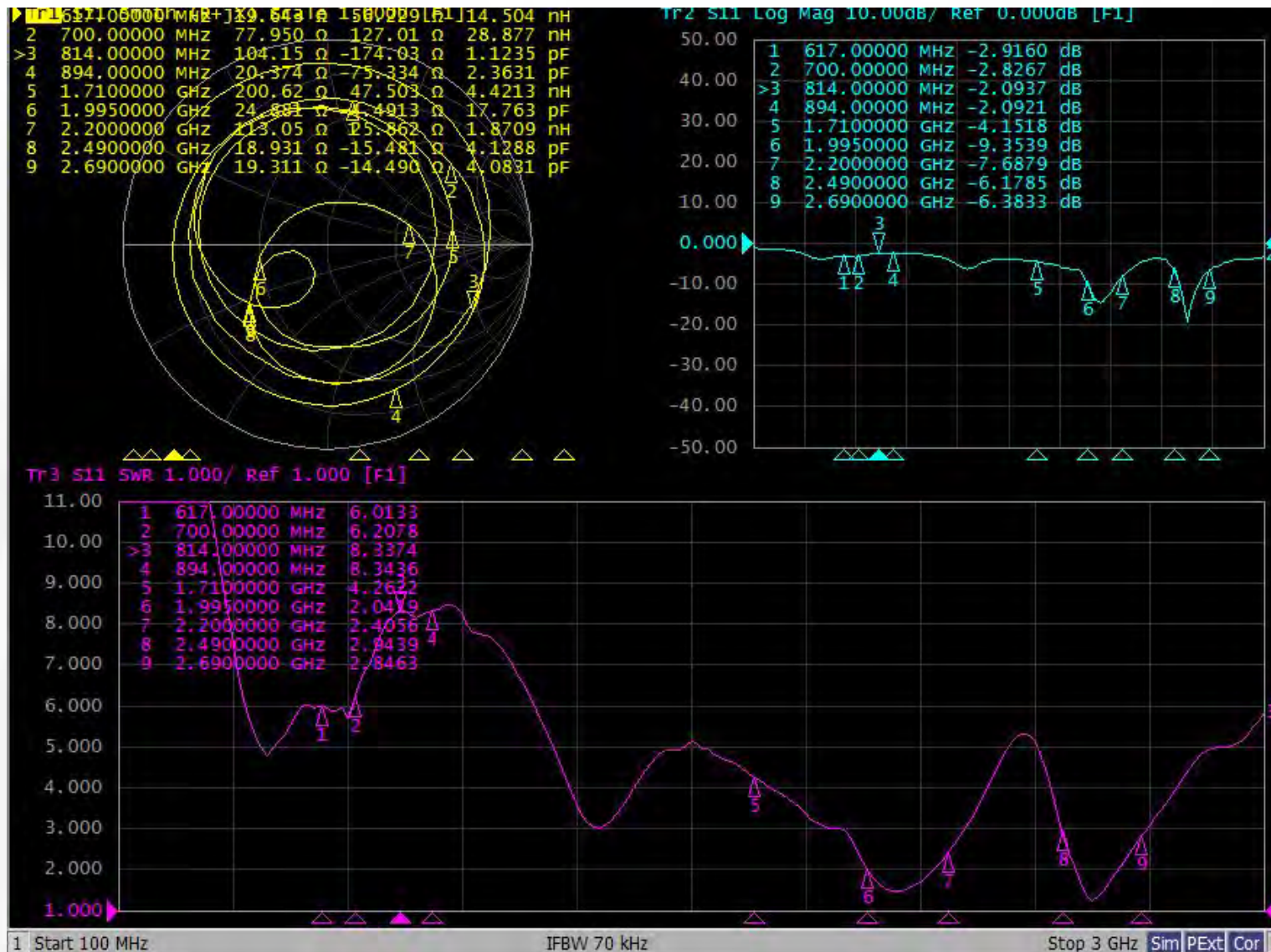
主天线S参数 (RF2路)



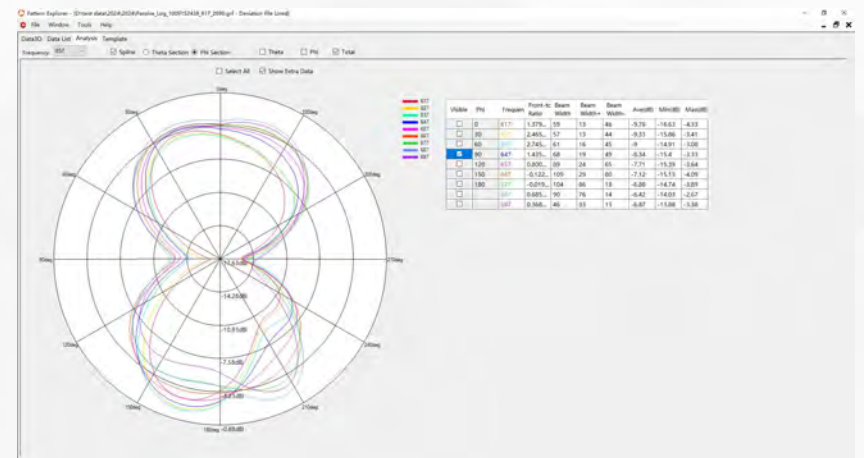
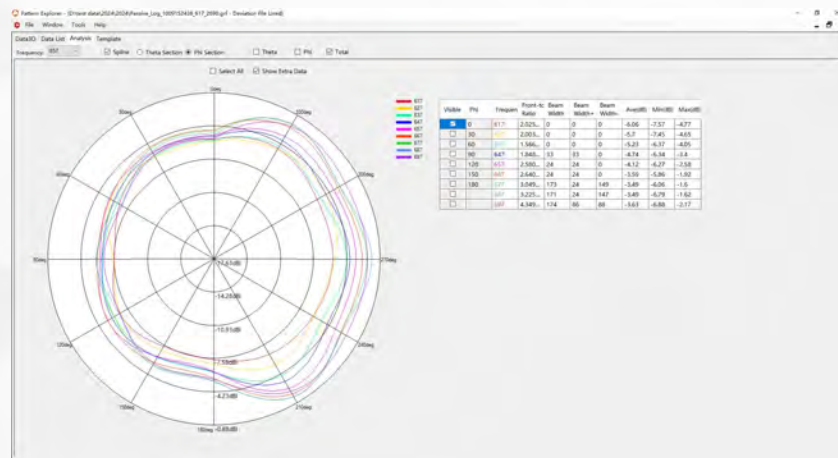
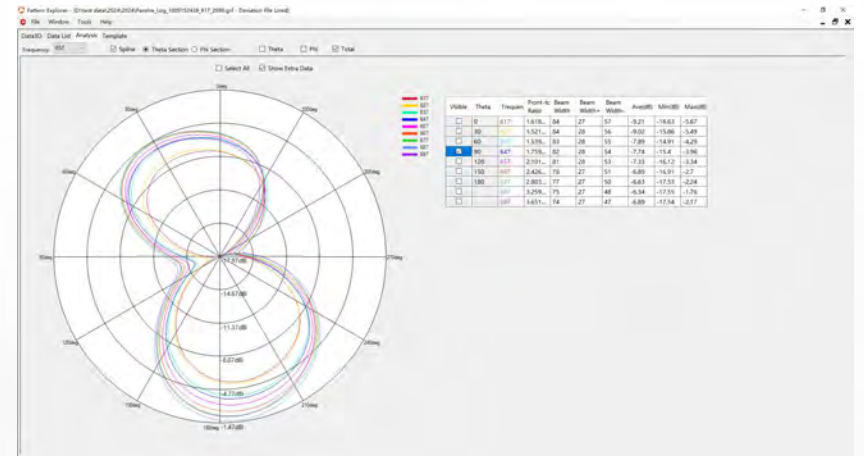
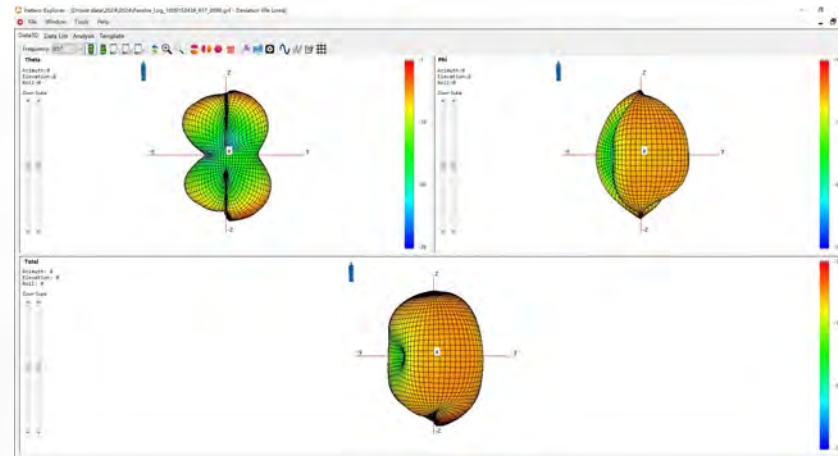
主天线S参数 (RF3路)



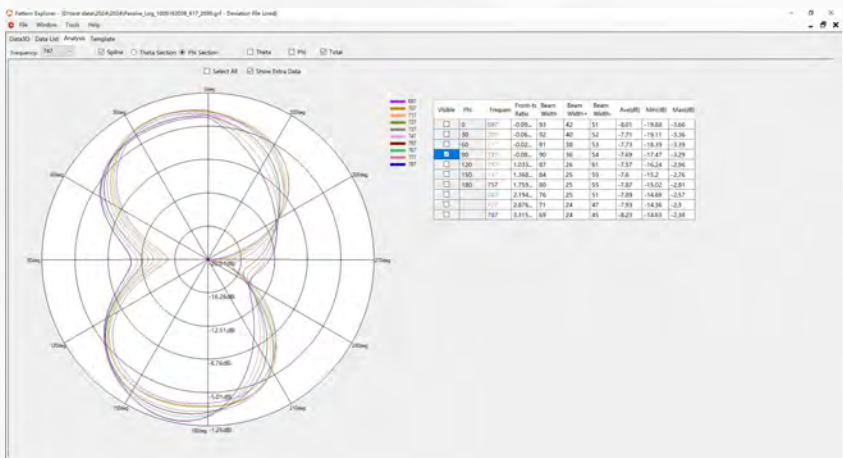
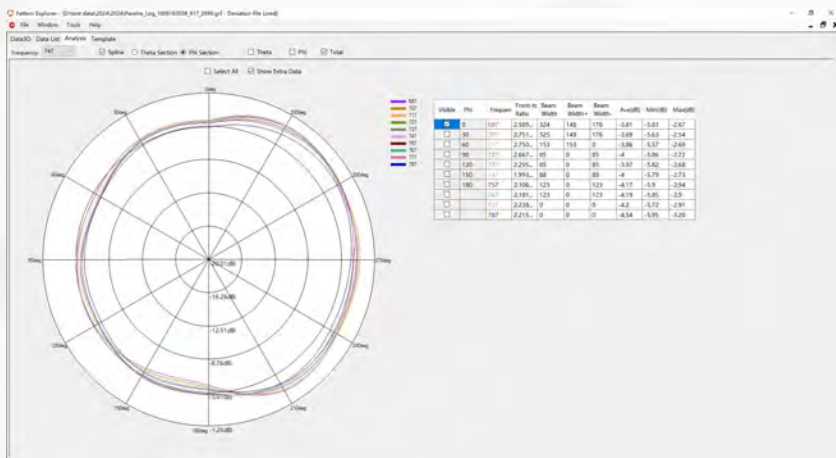
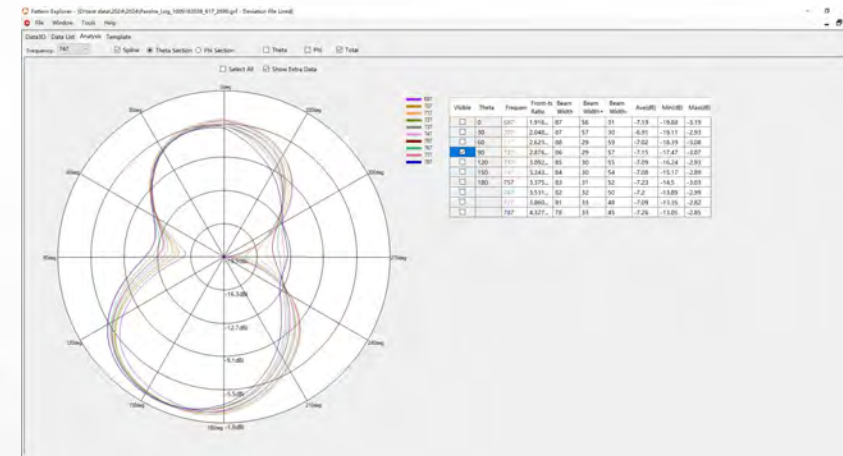
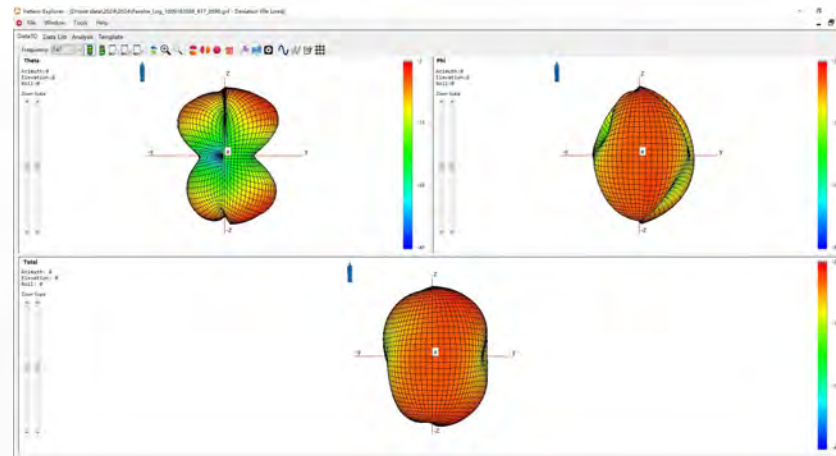
主天线S参数 (RF4路)



617-697MHz			
频点MHz	效率%	效率(dB)	增益(dBi)
617	16.46	-7.83	-4.33
627	18.32	-7.37	-3.21
637	20.34	-6.92	-2.64
647	22.32	-6.51	-2.25
657	25.24	-5.98	-1.75
667	27.97	-5.53	-1.51
677	28.36	-5.47	-1.60
687	29.02	-5.37	-1.62
697	27.30	-5.64	-2.17
平均值	23.9	-6.3	-2.3



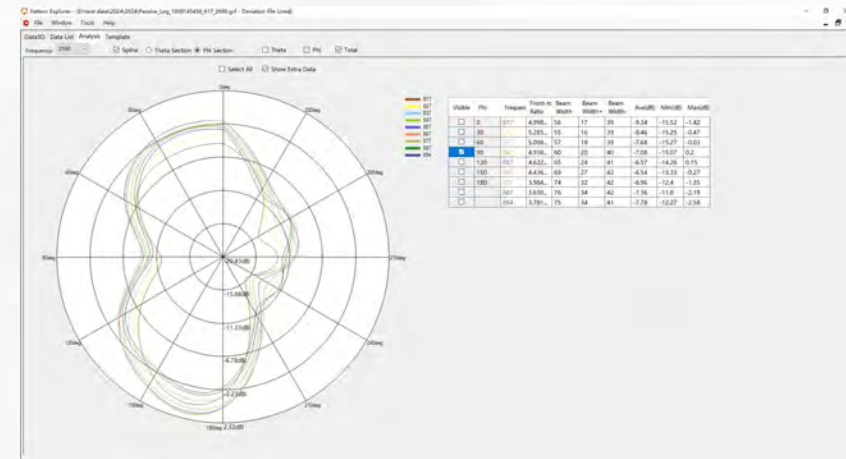
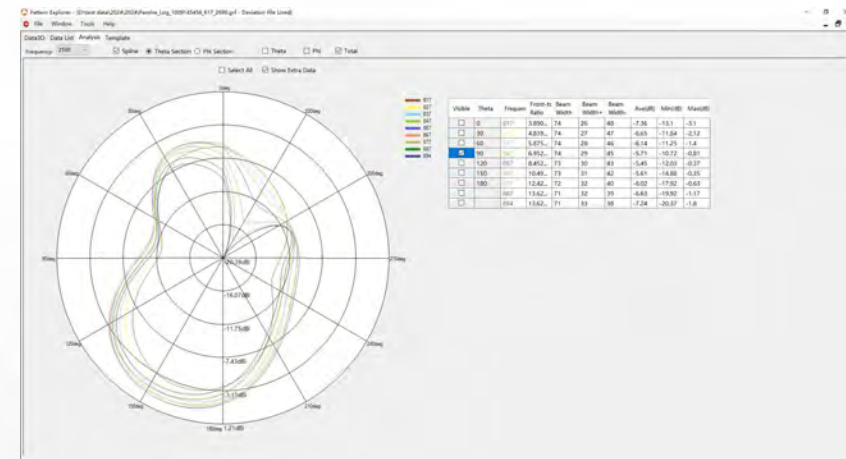
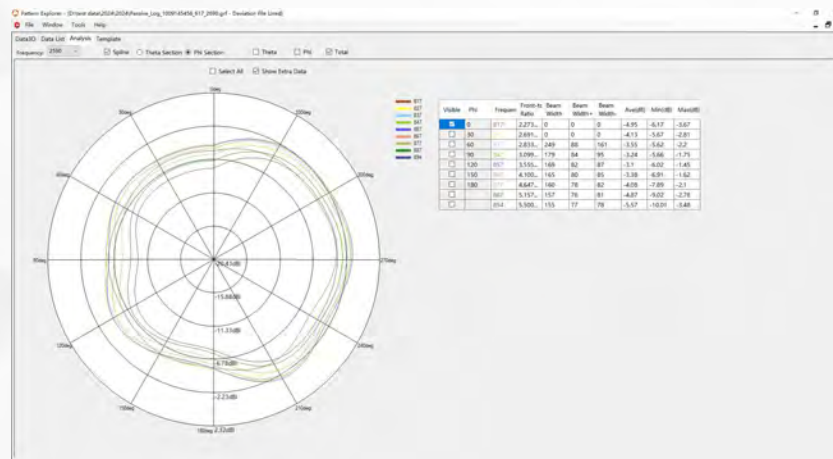
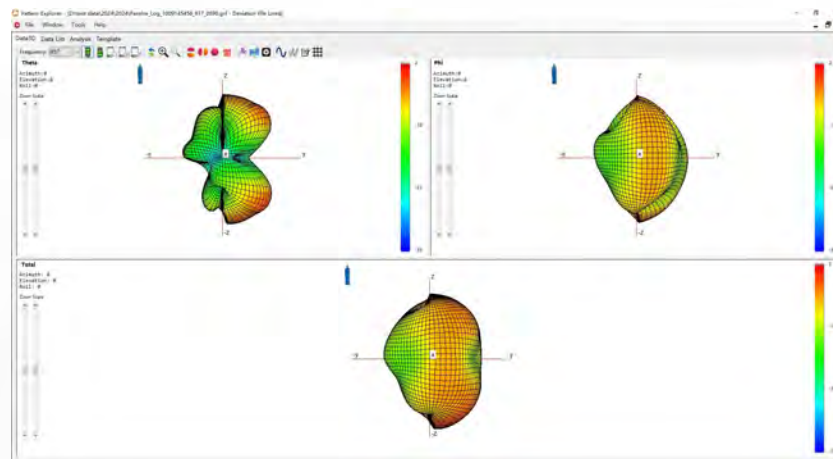
697-787MHz			
频点MHz	效率%	效率(dB)	增益(dBi)
697	25.42	-5.95	-2.67
707	26.68	-5.74	-2.54
717	26.29	-5.80	-2.69
727	26.03	-5.85	-2.72
737	26.84	-5.71	-2.53
747	26.92	-5.70	-2.49
757	25.88	-5.87	-2.52
767	25.87	-5.87	-2.26
777	26.02	-5.85	-1.91
787	24.43	-6.12	-1.90
平均值	26.1	-5.8	-2.4



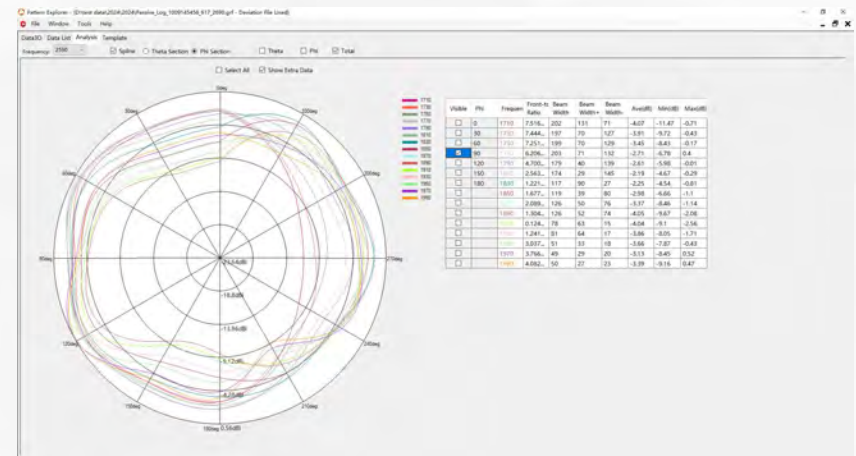
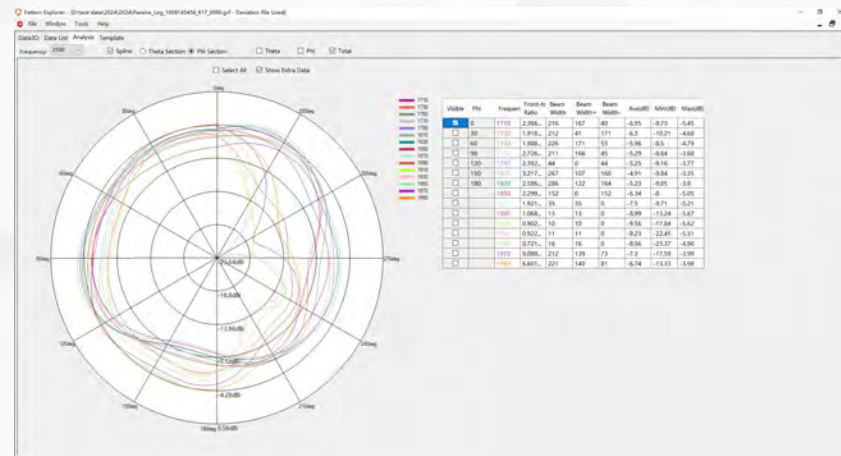
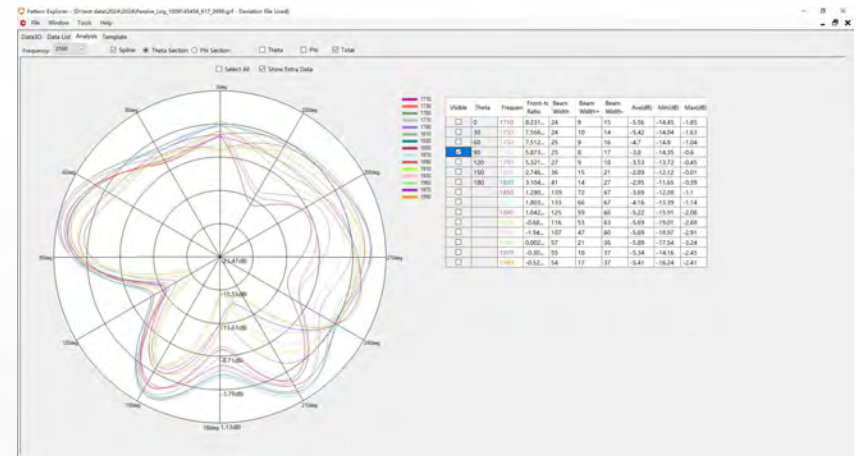
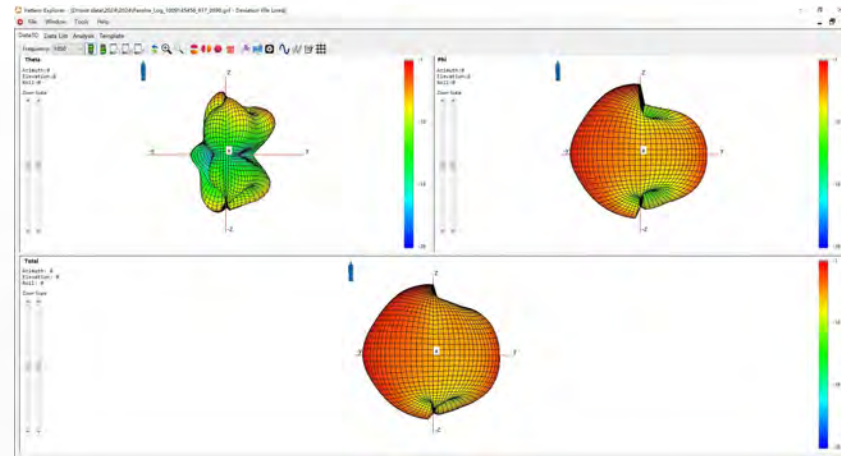
主天线S无源效率

817-894MHz

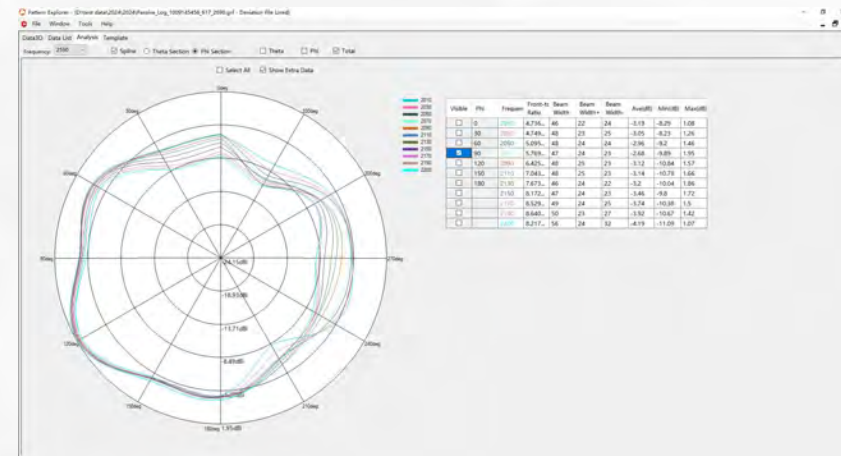
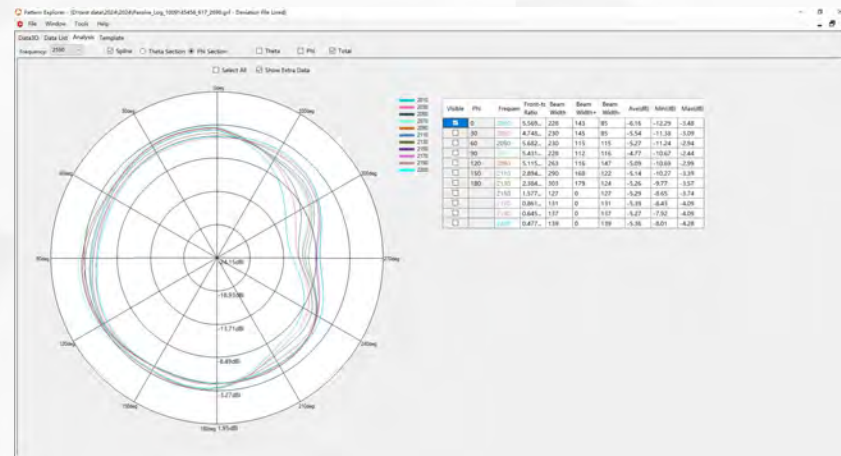
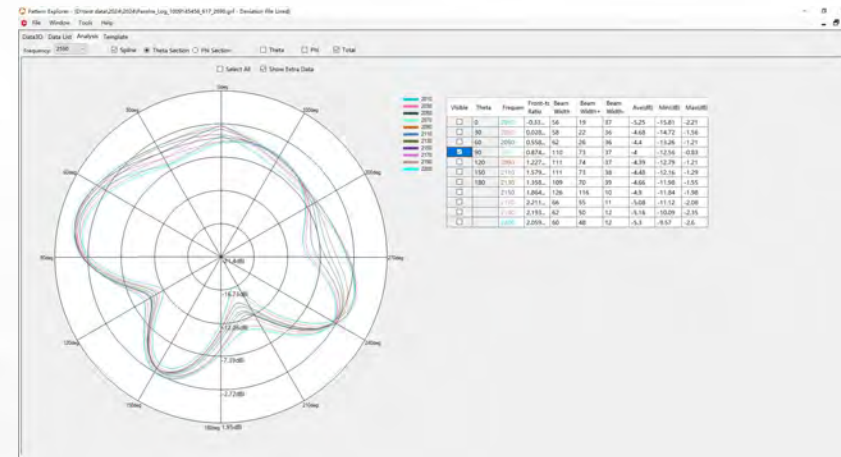
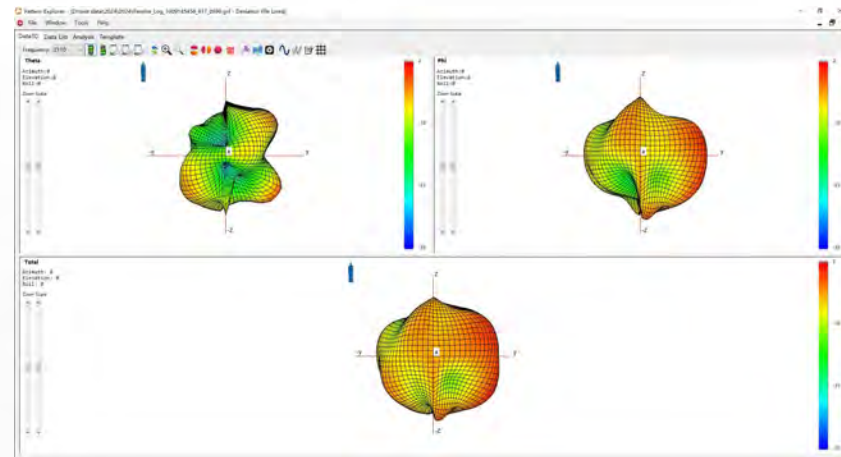
频点MHz	效率%	效率(dB)	增益(dBi)
817	16.10	-7.93	-2.51
827	19.02	-7.21	-1.72
837	22.05	-6.57	-1.04
847	25.48	-5.94	-0.31
857	29.86	-5.25	0.43
867	31.55	-5.01	0.83
877	28.93	-5.39	0.36
887	25.34	-5.96	-0.36
894	22.36	-6.50	-0.99
平均值	24.5	-6.2	-0.6



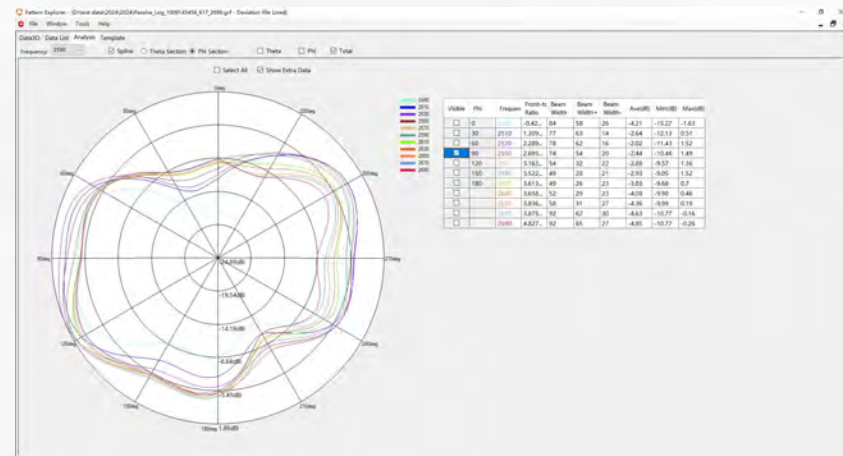
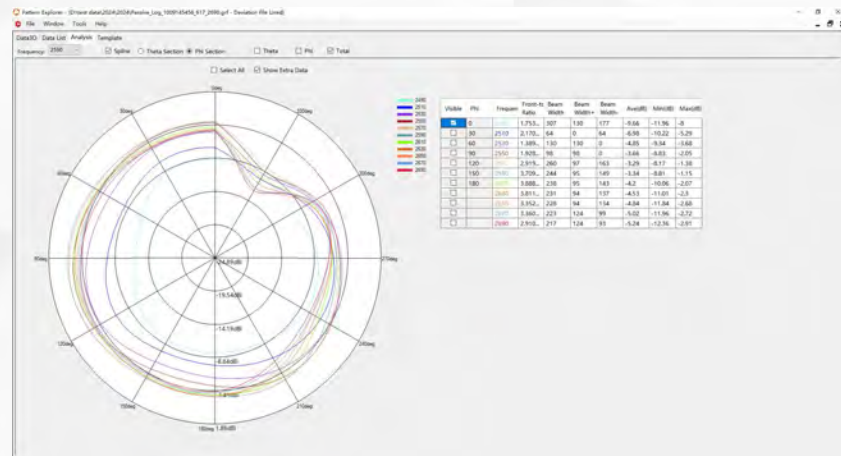
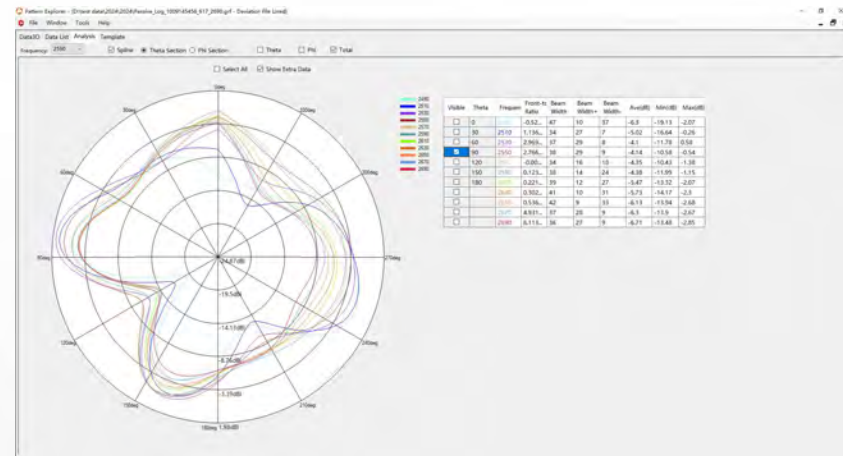
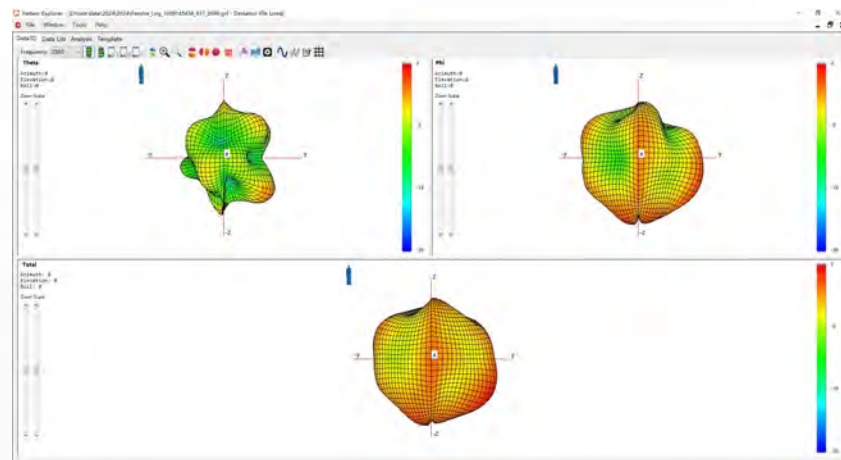
1710-1990MHz			
频点MHz	效率%	效率(dB)	增益(dBi)
1710	31.15	-5.06	-0.71
1730	33.36	-4.77	-0.43
1750	36.58	-4.37	-0.17
1770	42.76	-3.69	0.40
1790	43.58	-3.61	-0.01
1810	47.44	-3.24	-0.01
1830	46.15	-3.36	-0.37
1850	38.19	-4.18	-1.10
1870	33.40	-4.76	-1.14
1890	27.16	-5.66	-2.08
1910	25.59	-5.92	-2.50
1930	25.96	-5.86	-1.71
1950	26.99	-5.69	-0.43
1970	30.95	-5.09	0.52
1990	30.49	-5.16	0.47
平均值	34.65	-4.69	-0.62



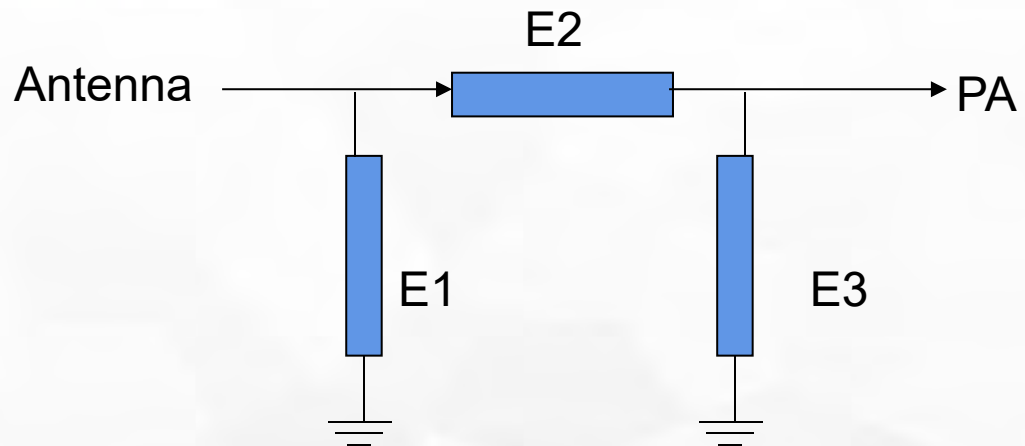
2010-2200MHz			
频点MHz	效率%	效率(dB)	增益(dBi)
2010	32.69	-4.86	1.08
2030	34.80	-4.58	1.26
2050	35.92	-4.45	1.46
2070	38.93	-4.10	1.95
2090	35.84	-4.46	1.57
2110	36.05	-4.43	1.66
2130	35.47	-4.50	1.86
2150	34.36	-4.64	1.72
2170	33.36	-4.77	1.50
2190	33.23	-4.78	1.42
2200	31.96	-4.95	1.07
平均值	34.78	-4.59	1.51



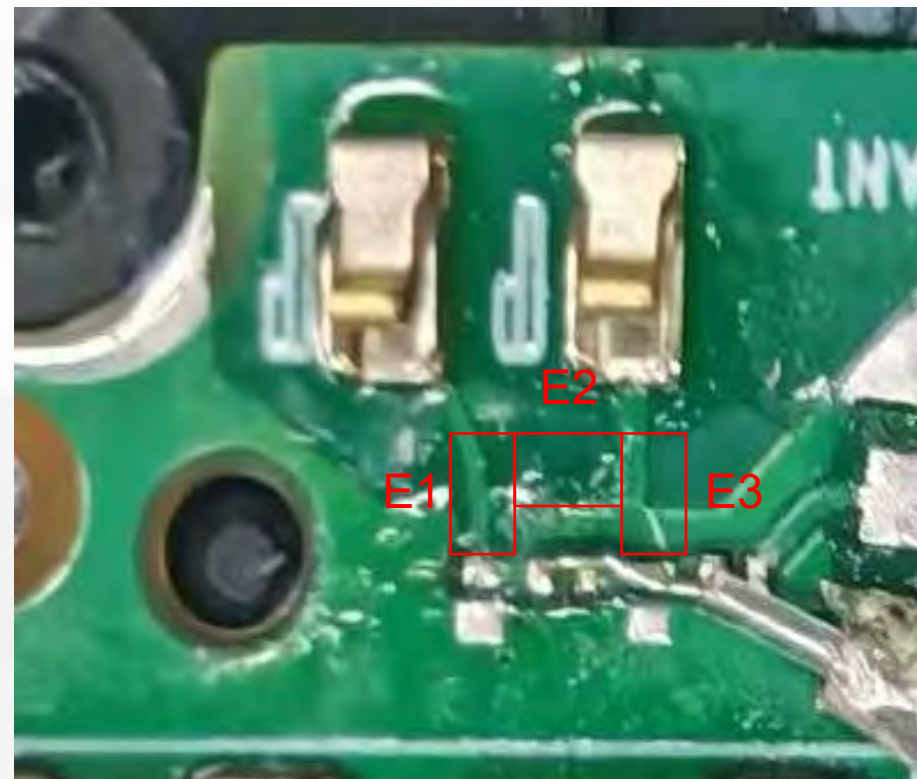
2490-2690MHz			
频点MHz	效率%	效率(dB)	增益(dBi)
2490	20.37	-6.91	-1.63
2510	27.18	-5.66	0.51
2530	33.58	-4.74	1.52
2550	36.22	-4.41	1.49
2570	37.32	-4.28	1.36
2590	37.84	-4.22	1.52
2610	31.52	-5.01	0.70
2630	29.94	-5.24	0.46
2650	28.41	-5.47	0.19
2670	26.81	-5.72	-0.16
2690	25.29	-5.97	-0.26
平均值	30.4	-5.2	0.5



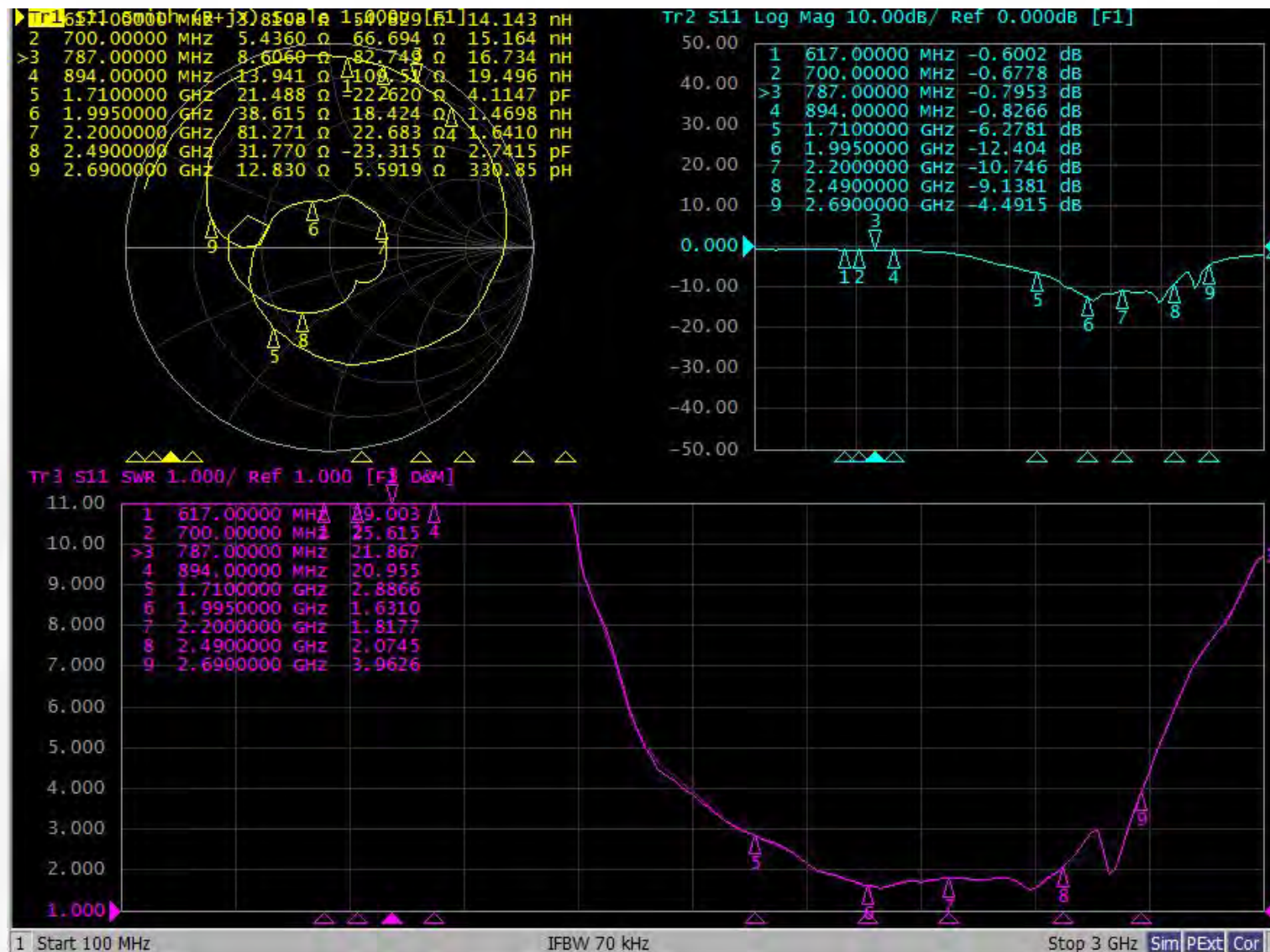
分集天线匹配电路



图示编号	匹配值
E1	N/A
E2	0Ω
E3	N/A

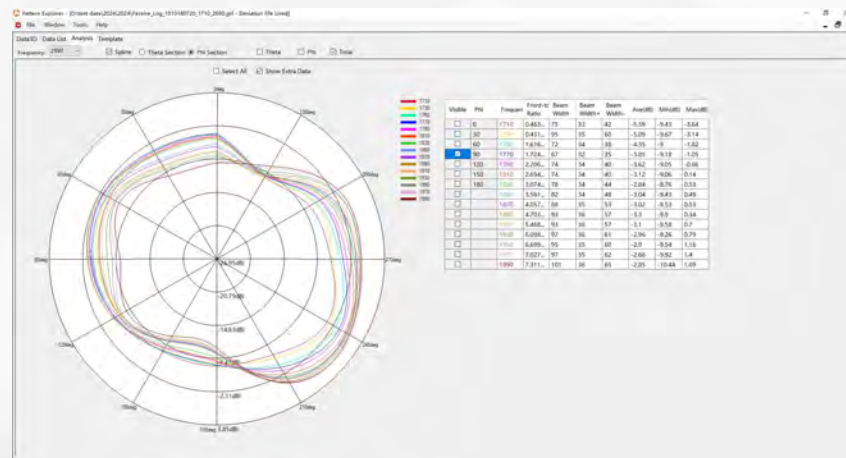
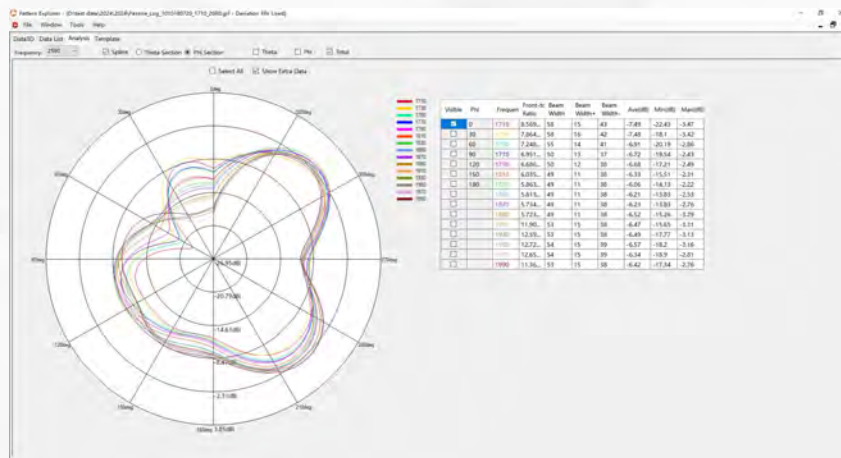
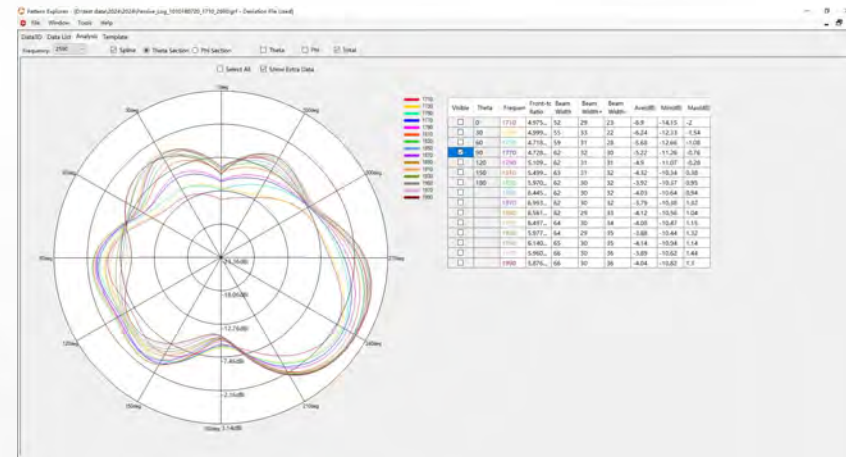
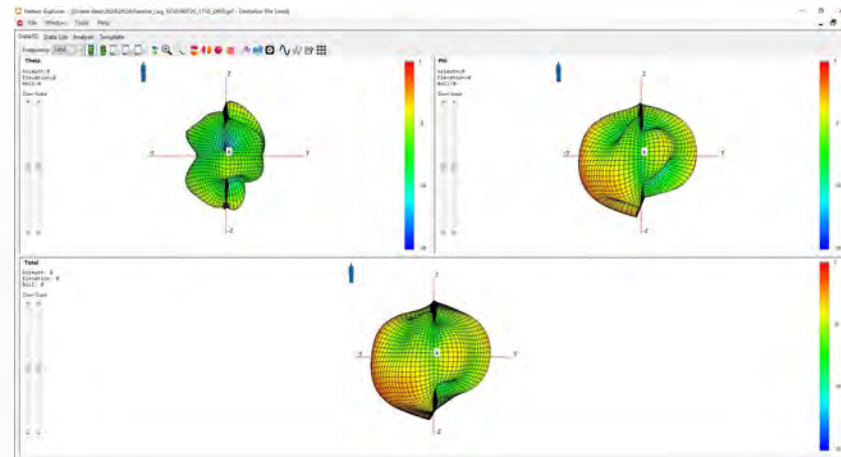


分集天线S参数

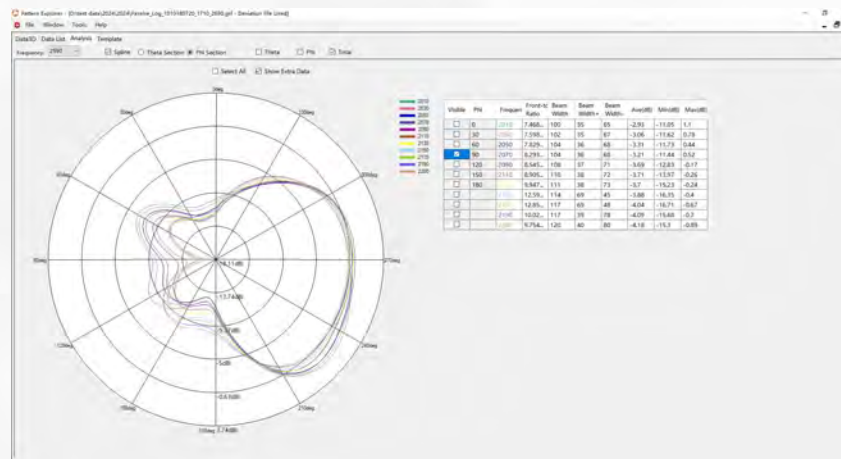
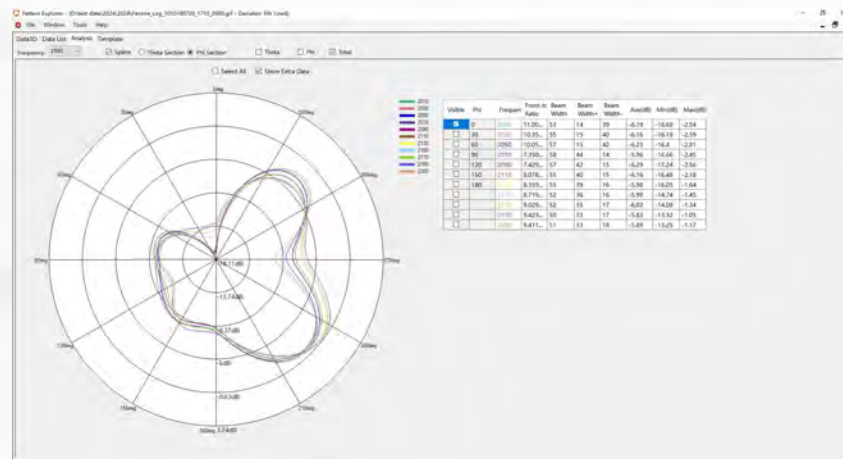
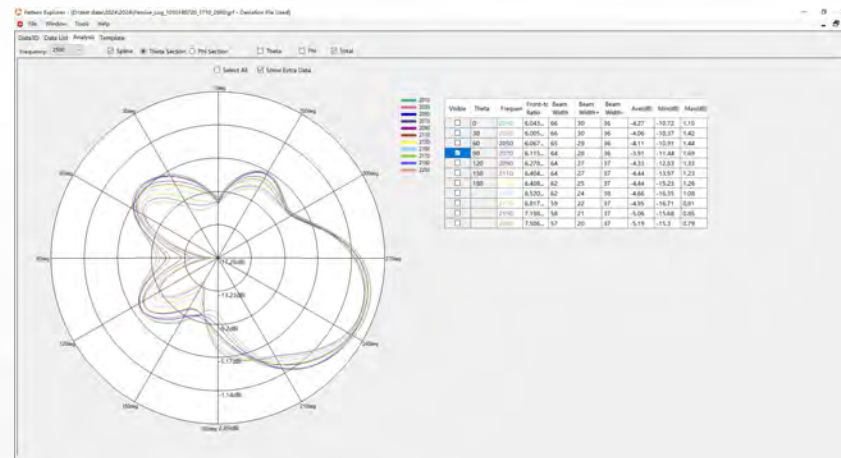
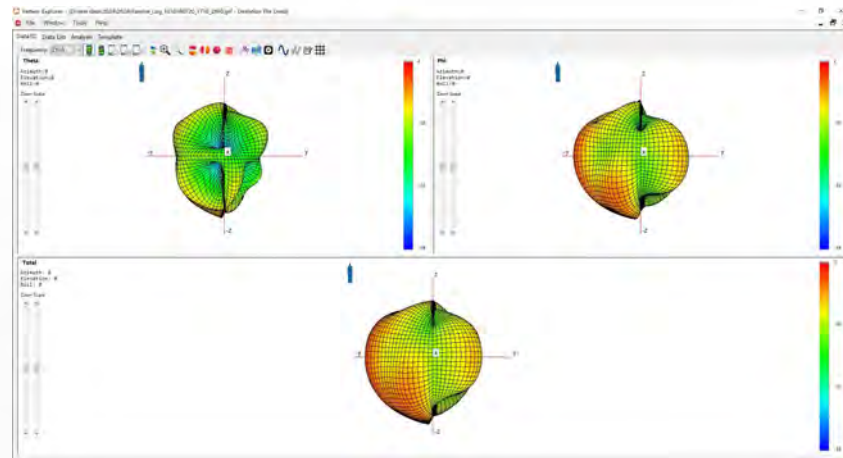


1710-1990MHz

频点MHz	效率%	效率(dB)	增益(dBi)
1710	22.48	-6.48	-1.01
1730	24.62	-6.09	-0.59
1750	28.44	-5.46	0.28
1770	31.36	-5.04	0.76
1790	32.98	-4.82	1.11
1810	37.33	-4.28	1.86
1830	40.73	-3.90	2.37
1850	40.06	-3.97	2.39
1870	41.15	-3.86	2.49
1890	39.22	-4.06	2.34
1910	40.91	-3.88	2.64
1930	42.08	-3.76	2.74
1950	42.17	-3.75	2.92
1970	44.51	-3.52	3.11
1990	42.91	-3.67	2.83
平均值	36.73	-4.44	1.75

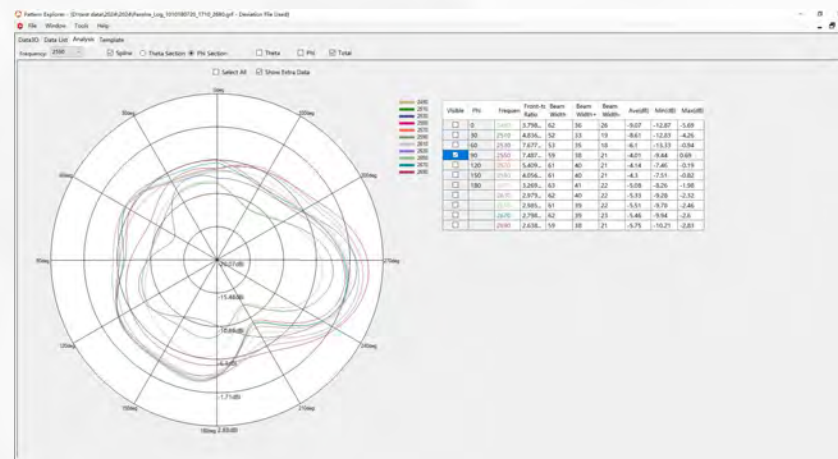
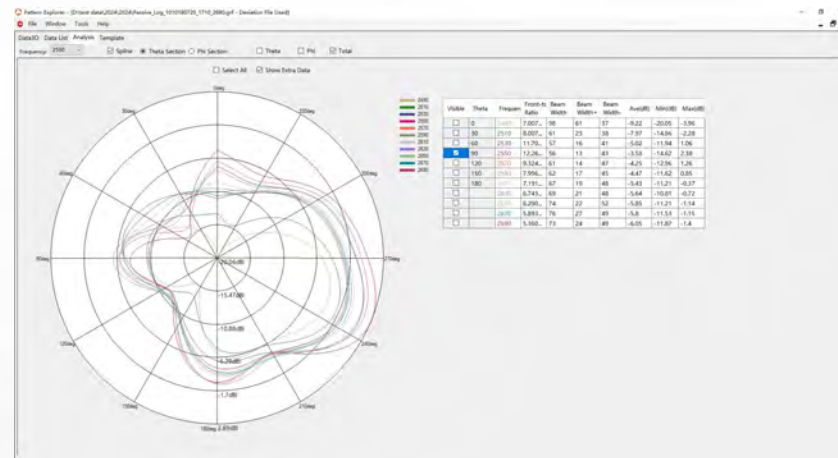
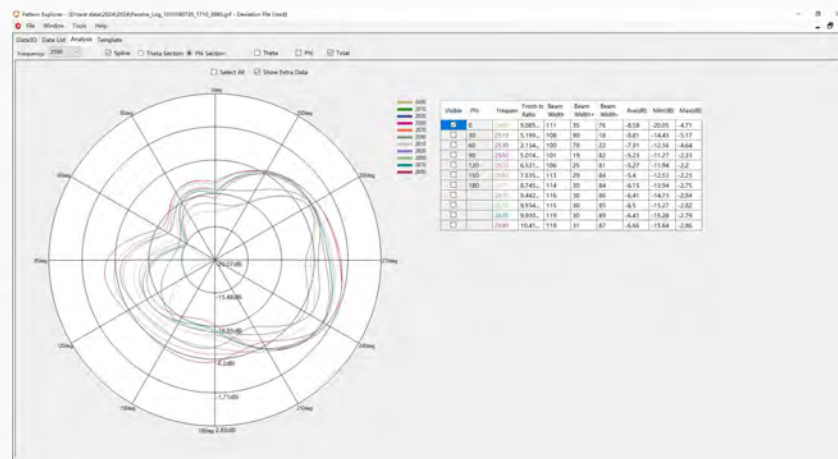
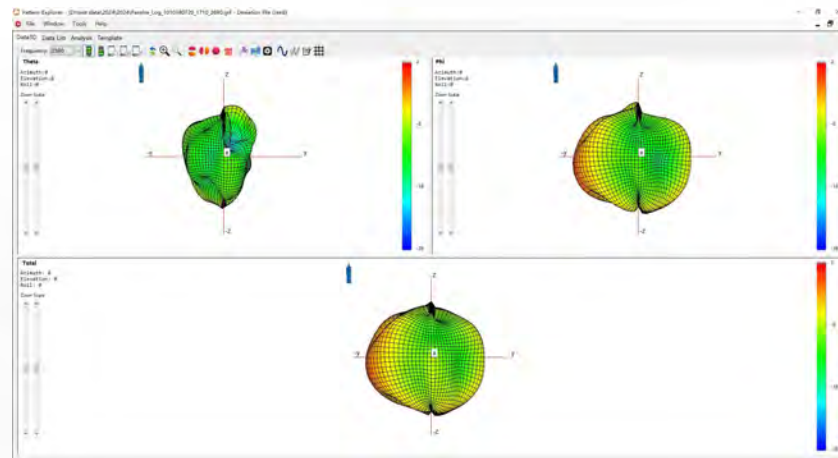


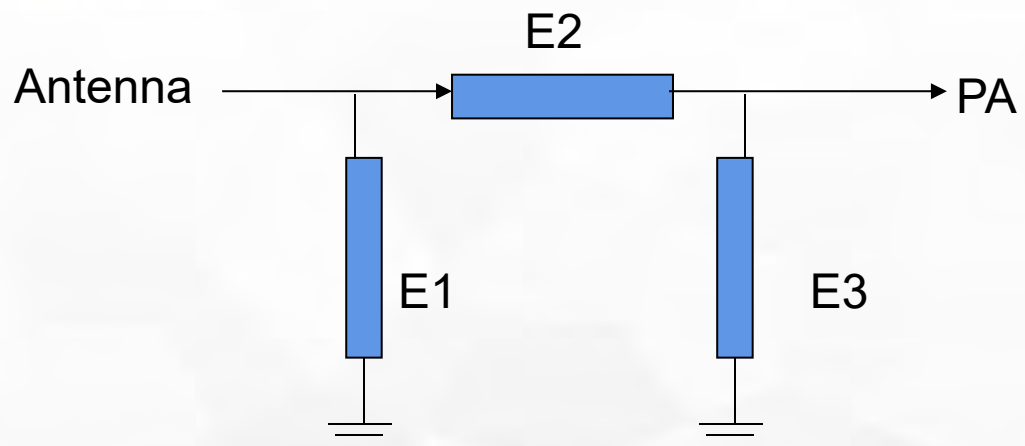
2010-2200MHz			
频点MHz	效率%	效率(dB)	增益(dBi)
2010	42.93	-3.67	2.84
2030	42.51	-3.72	2.57
2050	41.04	-3.87	2.29
2070	42.73	-3.69	2.41
2090	38.53	-4.14	1.84
2110	38.57	-4.14	1.93
2130	38.98	-4.09	1.92
2150	37.58	-4.25	1.83
2170	36.35	-4.39	1.78
2190	36.45	-4.38	1.81
2210	35.83	-4.46	1.73
平均值	39.23	-4.07	2.09



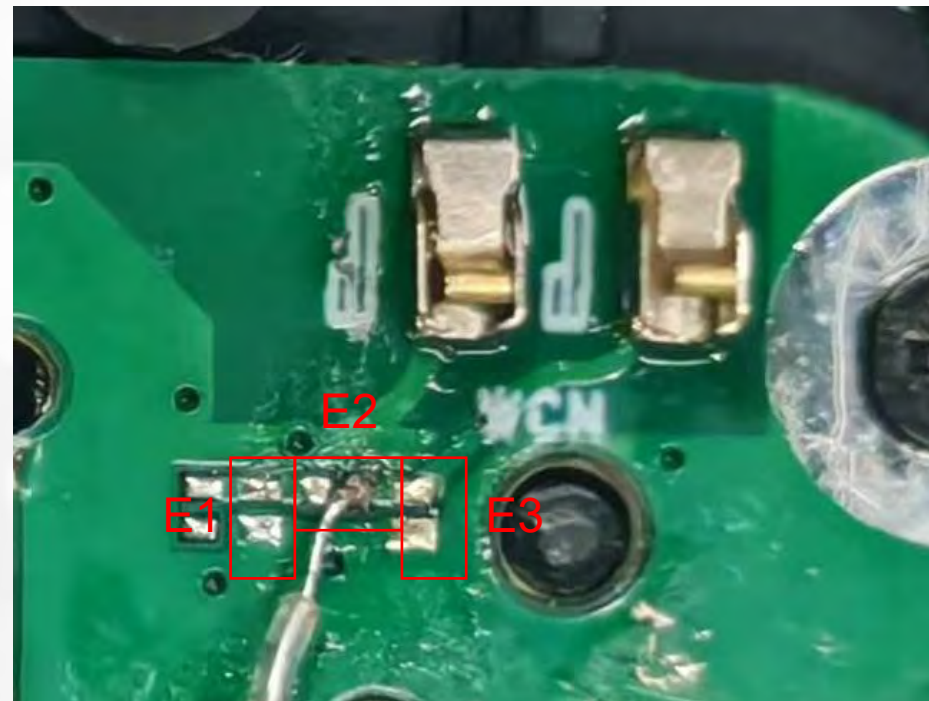
分集天线的无源效率

2490-2690MHz			
频点MHz	效率%	效率(dB)	增益(dBi)
2490	12.96	-8.87	-3.82
2510	14.43	-8.41	-2.28
2530	24.23	-6.16	1.06
2550	35.87	-4.45	2.38
2570	34.01	-4.68	1.70
2590	32.85	-4.83	1.24
2610	27.67	-5.58	0.21
2630	26.11	-5.83	-0.34
2650	25.33	-5.96	-0.84
2670	25.96	-5.86	-0.90
2690	24.31	-6.14	-1.23
平均值	25.8	-6.1	-0.3

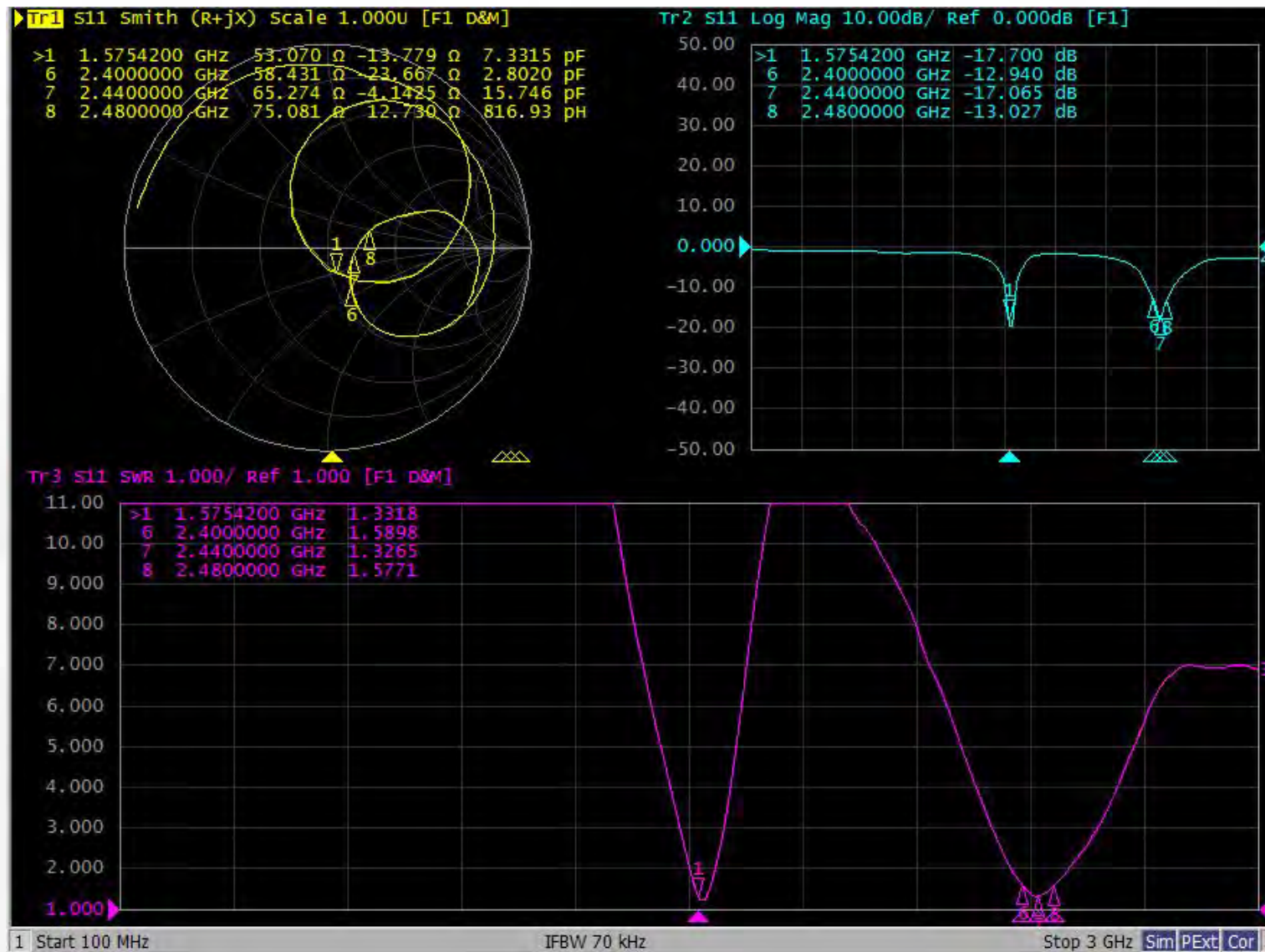




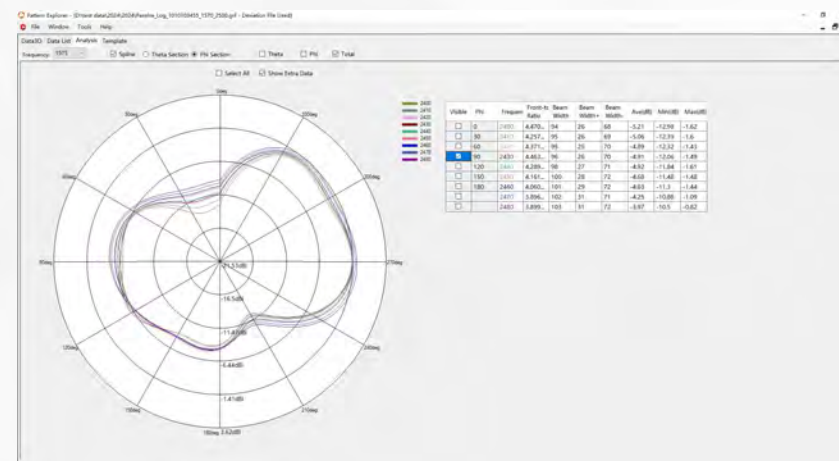
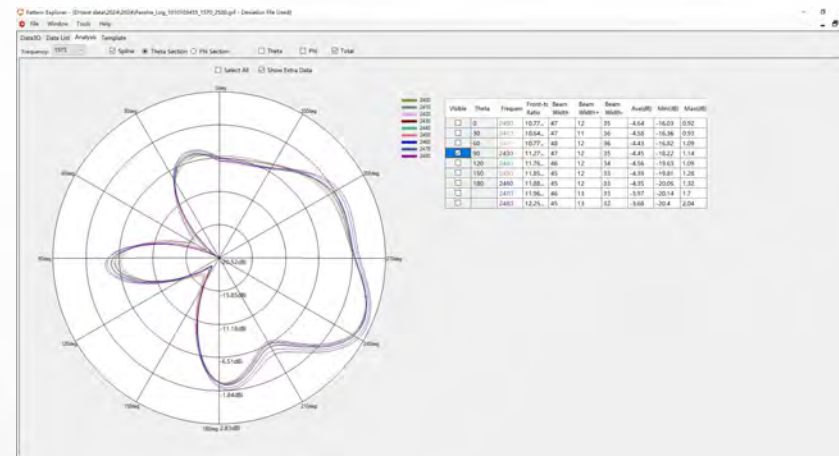
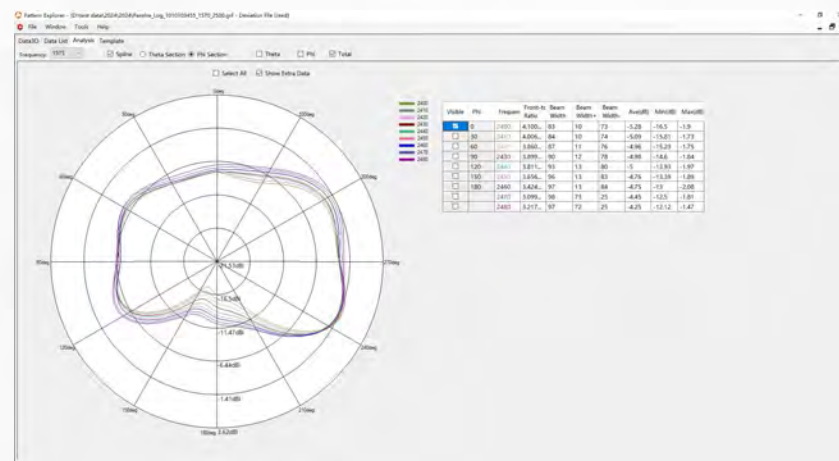
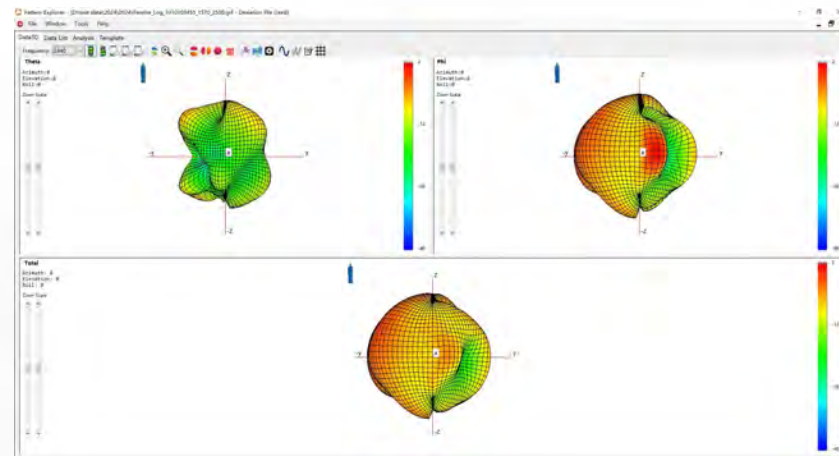
图示编号	匹配值
E1	N/A
E2	0Ω
E3	N/A



三合一天线S参数

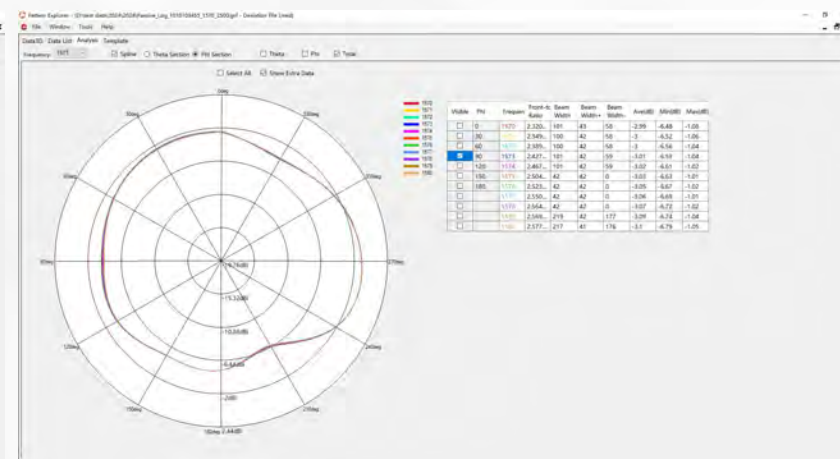
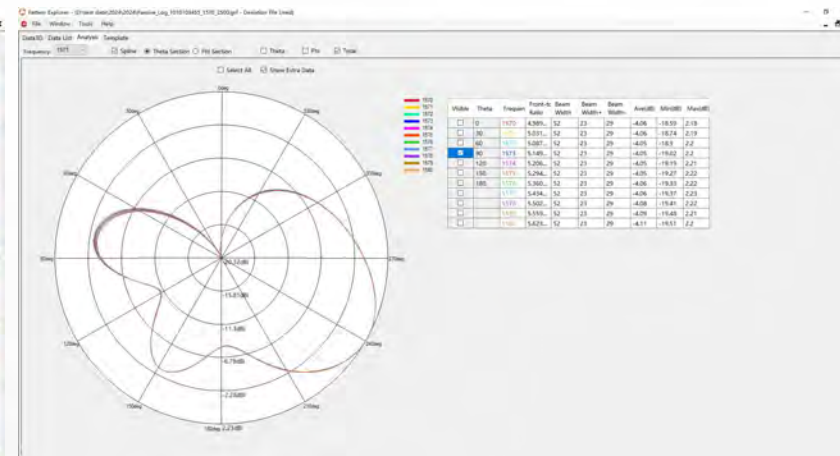
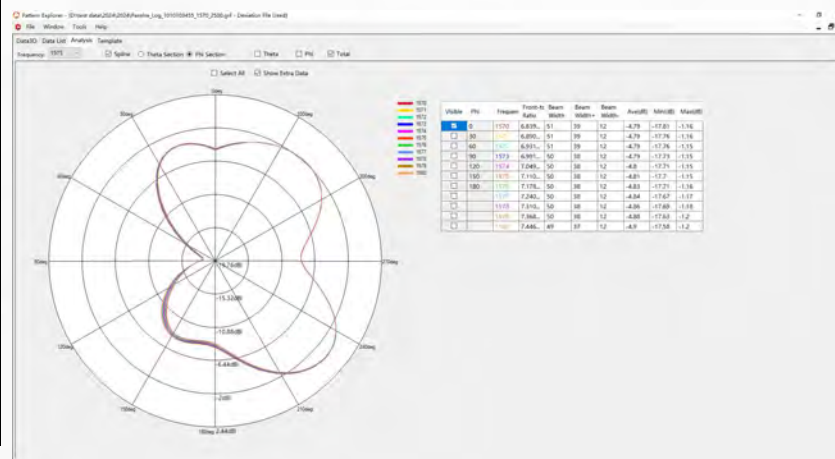
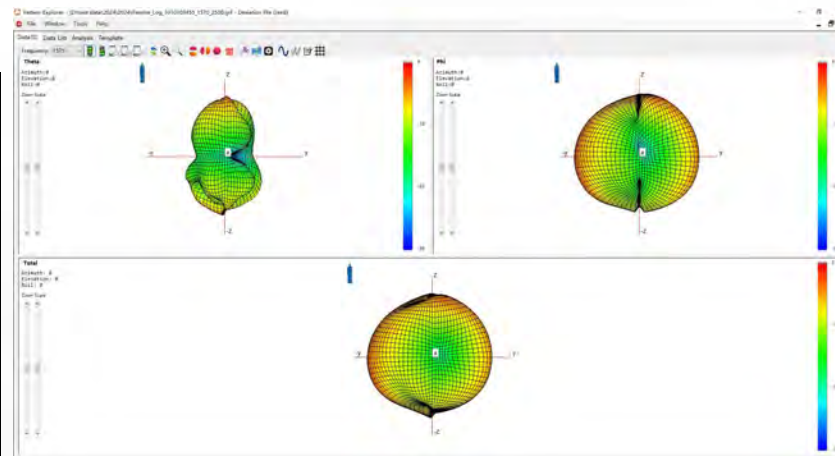


频点MHz	效率%	效率(dB)	增益(dBi)
2400	35.51	-4.50	2.00
2410	35.18	-4.54	1.92
2420	34.72	-4.59	1.87
2430	36.29	-4.40	2.06
2440	36.08	-4.43	1.97
2450	38.51	-4.14	2.19
2460	40.23	-3.96	2.32
2470	38.55	-4.14	2.05
2480	38.09	-4.19	1.98
平均值	37.0	-4.3	2.0



GPS

频点MHz	效率%	效率(dB)	增益(dBi)
1570	40.67	-3.91	2.18
1571	40.60	-3.91	2.19
1572	40.59	-3.92	2.20
1573	40.53	-3.92	2.20
1574	40.49	-3.93	2.21
1575	40.43	-3.93	2.22
1576	40.29	-3.95	2.22
1577	40.19	-3.96	2.23
1578	40.08	-3.97	2.22
1579	39.99	-3.98	2.21
1580	39.88	-3.99	2.20
平均值	40.3	-3.9	2.2



	Channel	TRP (dBm)	TIS (dBm)
GSM850	CH 128	26.7	
	CH 190	27.2	
	CH 251	27.5	-104.0
PCS	CH 512	25.2	
	CH 661	24.6	
	CH 810	24.5	-104.2
W850	CH 4357	17.3	
	CH 4408	18.1	
	CH 4458	18.9	-105.7
W1700	CH 1312	18.6	
	CH 1412	18.6	
	CH 1513	19.1	-105.3
W1900	CH 9662	18.9	
	CH 9800	18.7	
	CH 9938	17.6	-105.3

	Channel	TRP (dBm)	TIS (dBm)
FDD B2	CH 18650	18.9	
	CH 18900	17.6	
	CH 19150	17.1	-91.6

FDD B4	CH 20000	18.0	
	CH 20175	18.1	
	CH 20350	18.3	-93.0

FDD B5	CH 20450	16.5	
	CH 20525	17.1	
	CH 20600	17.9	-91.7

	Channel	TRP (dBm)	TIS (dBm)
FDD B12	CH 23035	16.9	
	CH 23095	17.5	
	CH 23155	17.5	-93.6
FDD B17	CH 23780	16.6	
	CH 23790	16.4	
	CH 23800	16.4	-91.9

	Channel	TRP (dBm)	TIS (dBm)
LTE B41 (20M)	CH 40340	17.9	
	CH 40620	17.4	
	CH 41140	17.6	-88.9
FDD B66	CH132022	18.5	
	CH132322	18.9	
	CH132622	19.6	-93.3
FDD B71	133172	17.3	
	133297	17.4	
	133422	18.1	-91.6

三合一天线暗室数据

11M	Channel	TRP (dBm)	TIS (dBm)
WiFi B	CH 1	14.2	-82.0
	CH 6	16.1	-83.2
	CH 11	14.9	-78.1

54M	Channel	TRP (dBm)	TIS (dBm)
WiFi G	CH 1	14.1	-68.7
	CH 6	16.1	-70.4
	CH 11	14.4	-69.0

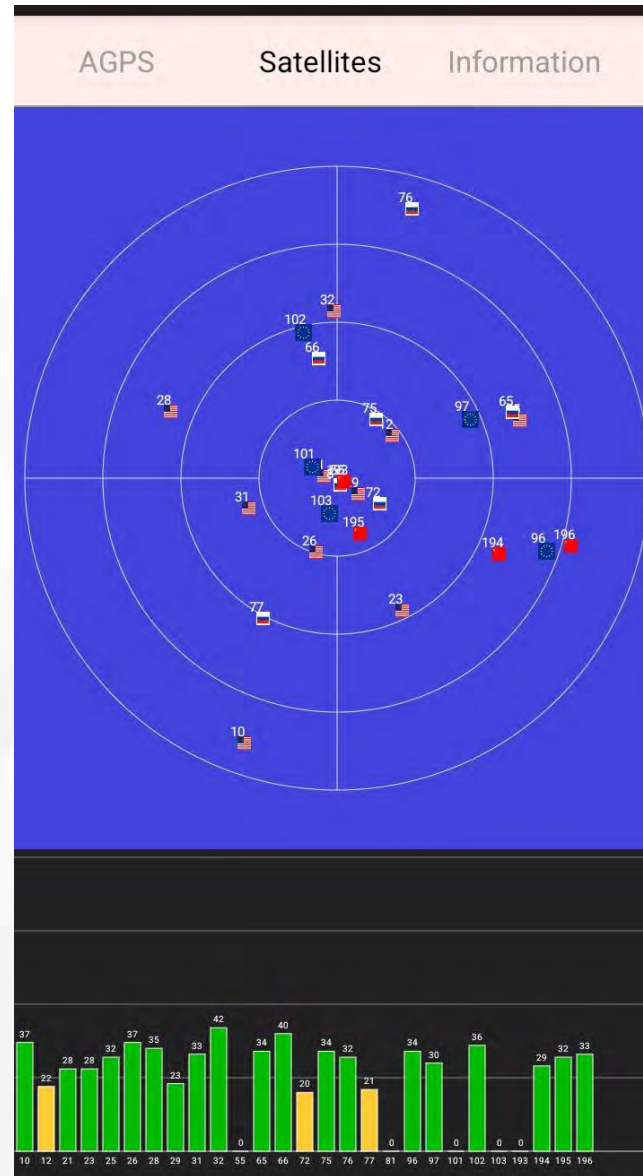
Free space	Channel	TRP (dBm)	TIS (dBm)
BT	CH 0	6.3	-87.7
	CH 39	5.2	-88.3
	CH 78	4.4	-86.2

GPS天线实测效果

测试项	测试结果
搜星总数	28
IN USE卫星数	22
最大SNR值	42
SNR≥40星数	2
冷启动定位时间	85

测试结论:性能不错

S	Satellites	Information	NMEA Lo
Provider:	gps enabled		
Status:	AVAILABLE		
TTFF:	85329 ms		
Date:	GMT -480 2024/10/11		
Time:	13:54:55		
First Latitude:	22.578501666666664		
First Longitude:	113.90734478333334		
Latitude:	22.578741333333333		
Longitude:	113.9076522		
Altitude:	40.189		
Accuracy:	5.5158057		
Heading:	30.052		
Speed:	0.51417		
Ave CN0:	<32,34><28,28><25,29><10,33> <23,34>		
GPS version:	GNSS_20A_W23.44.2 W23.44.2		
AGNSS Version:	\$(W23.38.3_V3.7.41)		
SGPS version:	v2.0.0_2019.08.30		
☐ Hot ☐ Warm ☒ Cold ☐ Factory			



主板及屏幕与板框间使用导电海绵进行接地处理，需要确保馈点附近接地完好，如图1图2所示
三合一馈脚处反面需刮开地做接地处理，否则会对GPS/WiFi产生干扰，最好是能够直接与中框接地
屏蔽罩上裸露的芯片会分集天线全频段产生干扰，需要使用铜箔焊接封闭，做好屏蔽才能避免产生干扰

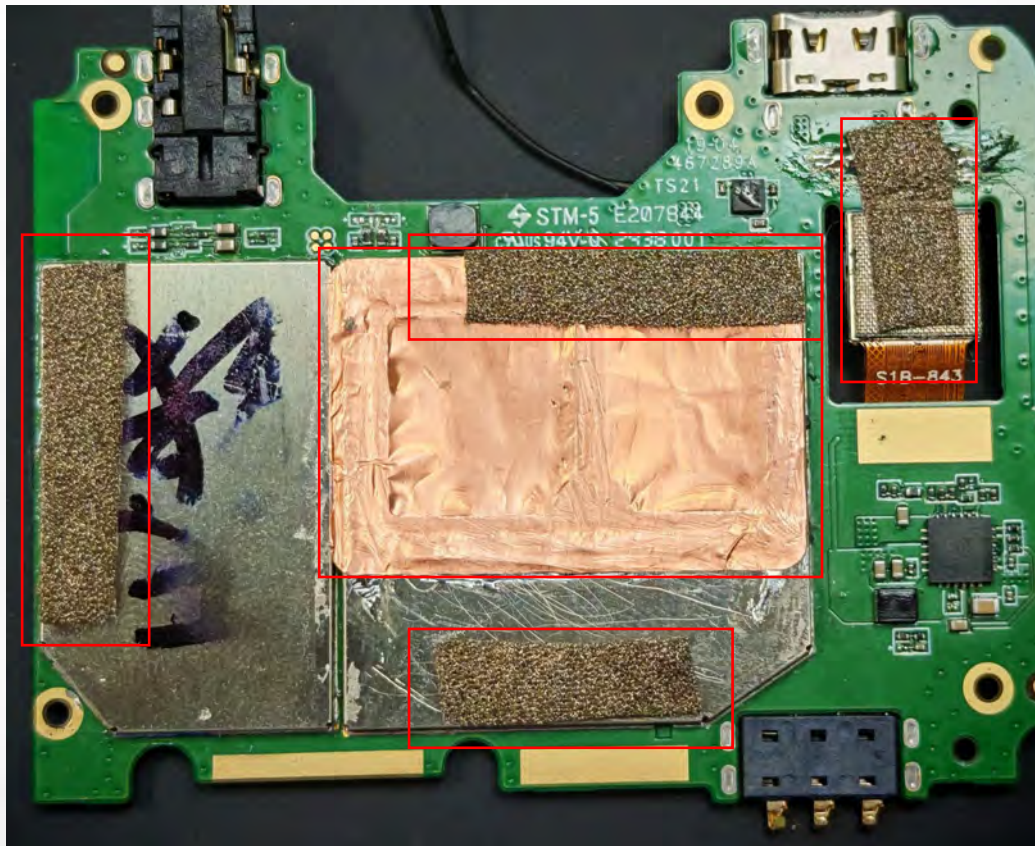


图1

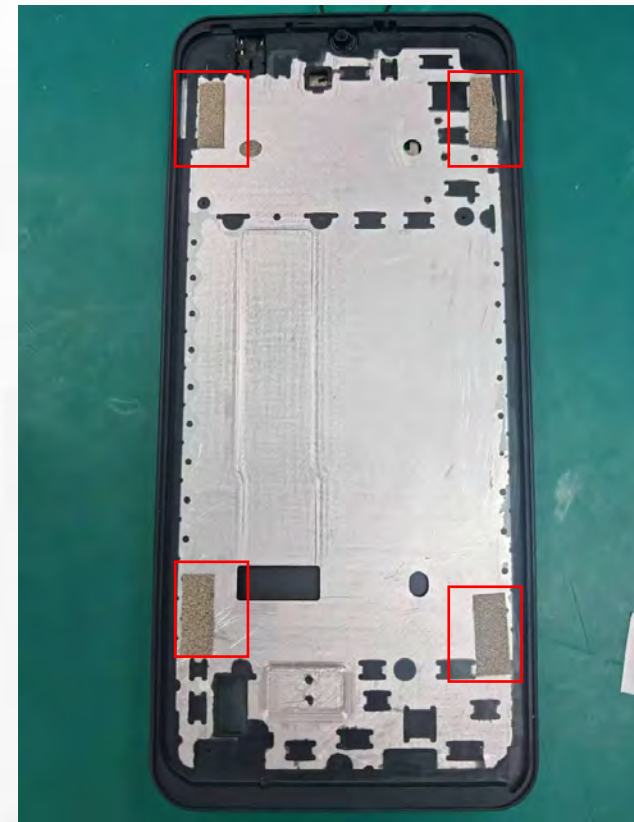


图2

在调试该项目的过程中，发现有一些异常的情况，可能会在项目的量产阶段产生一定风险，现列举如下

主板及屏幕给到的接地环境处理需保证导通良好，否则有数据异常的风险。

注：以上异常现象是我们从天线测试的角度检测出来的，其产生的原因并不一定是在天线上，如需从根本上解决，需要贵司协调相关的资源进行支持，我们会配合解决这些问题。

- 一.请仔细确认报告中提到的匹配电路是否修改、以及环境处理是否导入，这将直接影响天线性能。
- 二.报告所提供的参数仅为客户给到我司调测样机的参数，不代表贵司最终项目的最终量产状态。
- 三.倘若贵司有最新试产、或者更新状态（更换物料、更新软件、更换环境处理等）的样机，请尽快交由我司进行验证，以确认天线性能是否受到影响。
- 四.倘若贵司需要送往第三方复测或者送往客户测试，请务必将需要测试的机器交由我司进行测试确认，因为主板的一致性、装配的一致性，以及天线组装差异等因素，均可能导致天线参数的偏差。

THE END

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