



深圳市星源创科技有限公司

SHENZHEN Xingyuanchuang TECHNOLOGY CO., LTD

天线测试报告

Antenna Test Report

TC: 长城

MN: WM891SK

RF: 戴进平

MD: 黄菁菁

MP: 19918388579

Date: 2023. 10. 23

REV :V1. 0



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测试信息

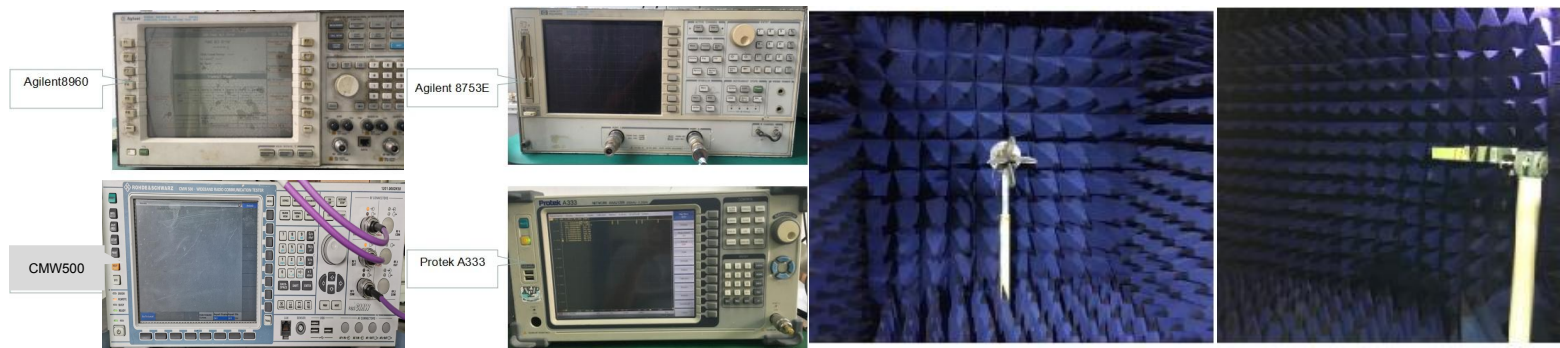
Test information

Antenna band		Antenna state	Antenna form	Match changes	Note
Main ANT	2G				
	3G			NO	
	4G				
AUX ANT	BT/WIFI	2.4/5G	铜皮	PIFA	NO
	GPS	1.575G	铜皮	PIFA	NO
	DIV				NO

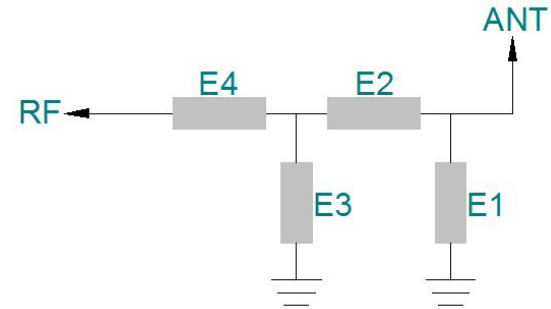
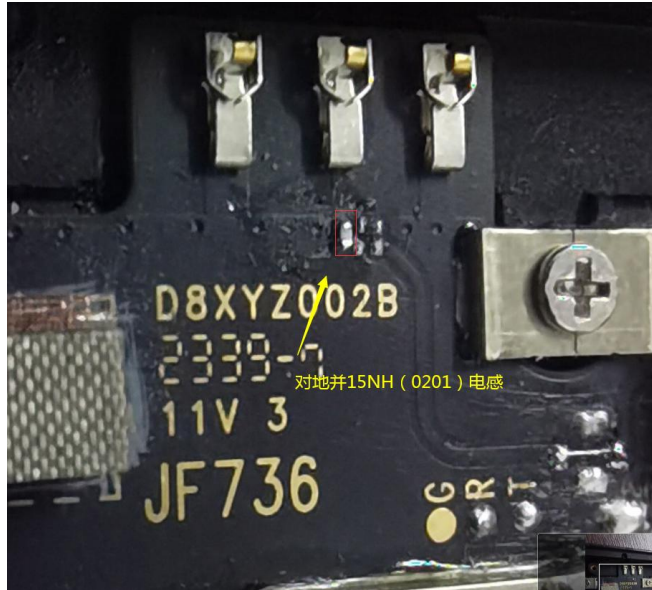
测试环境

Test environment

	测试项目	测试设备
S参数 (S-parameter)	1. 电压驻波比 (VSWR) 2. 回波损耗 (Rrtun Loss)	网络分析仪: Agilent8753ES
2. 有源测试 (Active)	1. 发射功率 (TRP) 2. 接收灵敏度 (TIS) 3. 屏灭/屏亮	1. 暗室: 5*3*3m (3D) Chamber 2. 综测仪: Agilent8960 CMW500
3. 无源测试 (Passive)	1. 天线增益 (Gain) 2. 天线效率 (Efficiency)	1. 暗室: 5*3*3m (3D) Chamber 2. 网络分析仪: Agilent 8753ES



匹配电路 Matching circuit



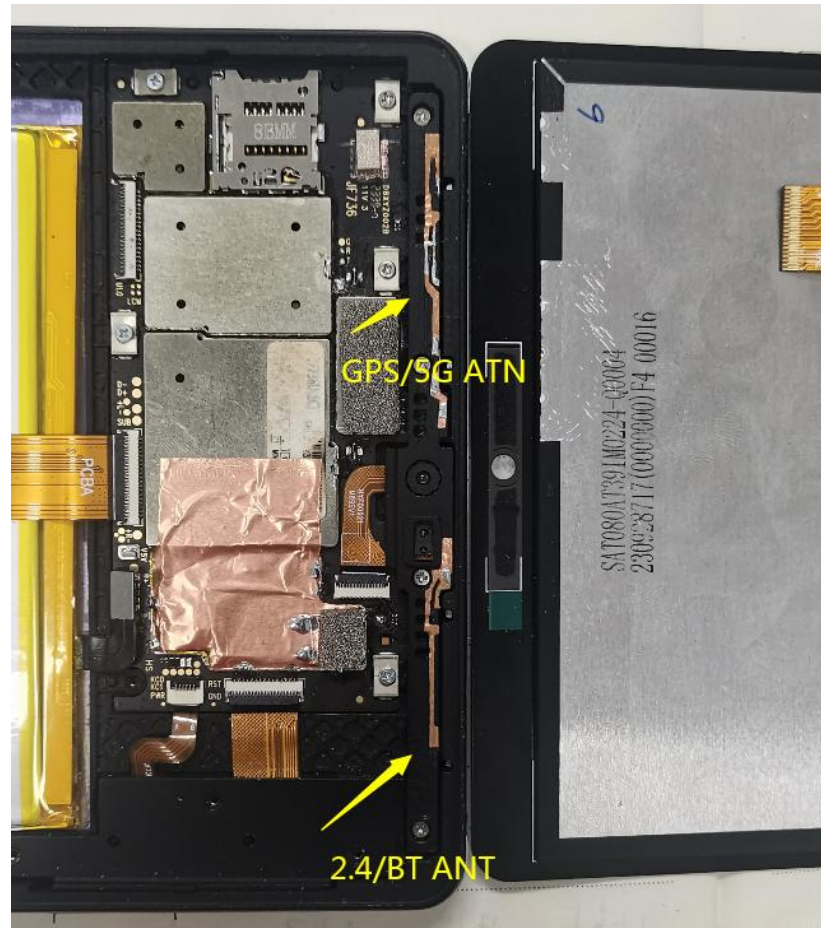
	电容 (PF)	电感 (NH)	电阻 (Ω)
E1(0402)		15NH	
E2(0402)			0R
E3(0402)			NC
E4(0402)			

匹配电路原理图&位号图



天线位置

Antenna position





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有源测试数据
Active test data

802.11b	Frequency	TRP		TIS	
	2412	CH1 11Mbps	10.40	CH1 11Mbps	-81.51
	2437	CH6 11Mbps	11.72	CH6 11Mbps	-81.75
	2467	CH11 11Mbps	10.88	CH11 11Mbps	-80.72
802.11a		TRP		TIS	
	5180	CH36 54Mbps	9.24	CH36 54Mbps	-71.03
	5300	CH60 54Mbps	10.80	CH60 54Mbps	-72.23
	5805	CH161 54Mbps	7.48	CH161 54Mbps	-69.04



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GPS搜星测试

GPS star search test

GPS冷启动实测效果以下:

CN值40以上3颗

CN值35以上5+颗

实际定位8+颗

备注:

GPS搜星测试。会因时间段及地域而存在差异. 以上数据为我司测试（空旷地带）最佳数据





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Wifi/BT天线实测

Wifi Antenna test

WIFI

测试环境：开放空间

测试工具：Wifi Analytical Assistant

测试距离：10m

信号强度：2.4G :-48dBm 5G:-57dBm

测试结果如右图

名称	设备	强度	频率	信道
ChinaNet 100a	00:6b:6f:5f:7e:e8	-38	5180	36
—	08:79:8c:1d:57:4c	-40	5180	36
—	08:79:8c:1d:57:48	-46	2412	1
—	00:6b:6f:5f:7e:e4	-48	2437	6
< Hidden SSID >	08:79:8c:1d:57:4f	-40	5180	36
< Hidden SSID >	72:85:c4:53:7d:ad	-41	2432	5
KVC2022	TP-LINK	-42	2442	7
KVC2023	70:85:c4:73:7d:ad	-43	2432	5
< Hidden SSID >	08:79:8c:1d:57:4b	-46	2412	1
TP-LINK_4160	TP-LINK	-48	2437	6
KVC2022-5G	TP-LINK	-50	5180	36
ChinaNet 100a	ca:50:e9:9b:7b:62	-55	2412	1
TP-LINK_5G_4160	TP-LINK	-57	5785	157
TP-LINK_5G2_9660	TP-LINK	-58	5745	149
HUAWEI	02:4a:6a:6e:05:96	-59	2412	1
—	02:4a:6a:6e:05:9a	-59	5805	161
HUAWEI_Wi-Fi5	02:4a:6a:6e:05:a5	-59	5805	161
GAOFEI	9c:2b:a6:cf:a9:e7	-62	2412	1
DESKTOP-6HATVNH 0660	2a:6b:35:62:87:61	-70	2412	1
MOSH	3c:6a:48:67:cb:ec	-71	2462	11
—	3c:6a:48:67:cb:ee	-86	5765	153
DESKTOP-UUJAVCB 8317	2a:6b:35:55:ce:04	-71	2462	11
augrape-5G	08:79:8c:24:48:00	-71	5180	36
—	00:6b:6f:67:4c:34	-79	5180	36
augrape	08:79:8c:24:47:fc	-72	2462	11
< Hidden SSID >	00:6b:6f:67:4c:30	-74	2462	11
TAS	08:79:8c:24:48:03	-73	5180	36
—	d8:59:82:66:7b:b8	-75	2437	6
Xiaomi_C502_5G	a0:36:79:2c:89:ec	-75	2462	11
ZH技术员	a4:39:b3:b5:c5:04	-75	5785	157
TP-LINK_87FB	MERCURY	-76	2412	1
GAOFEI-5G	TP-LINK	-76	2437	6
ZH888	9c:2b:a6:cf:a9:e8	-80	5240	48
GKW_5G	TP-LINK	-81	2462	11
< Hidden SSID >	c4:70:ab:1d:26:fb	-88	5745	149
GKW_Wi-Fi5	92:70:ab:1d:26:fa	-88	5745	149
GKW	e2:e0:18:f1:d8:2a	-89	5180	36
HUAWEI-RTCGD1502	22:e5:94:46:8a:a6	-89	5180	36
< Hidden SSID >	7e:77:24:70:ee:33	-89	5785	157
—	—	-94	5180	36

BT

测试环境：开放空间(通道)

测试工具：蓝牙音响

测试距离：15+m

结果：播放音乐流畅，无杂音。



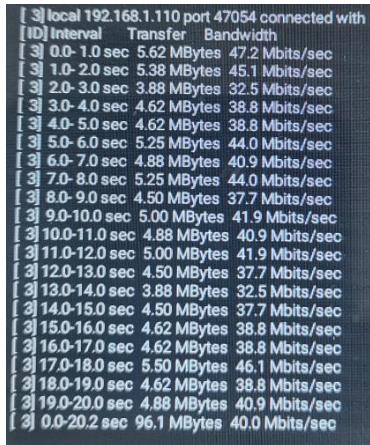
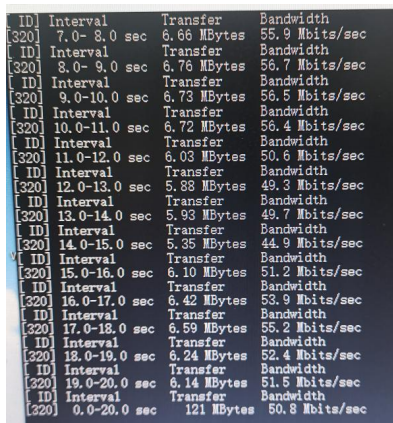
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吞吐量测试

Throughput test

2.4G wifi 吞吐量测试			
上行	50.5M	下行	50.8M
图片		图片	
备注			



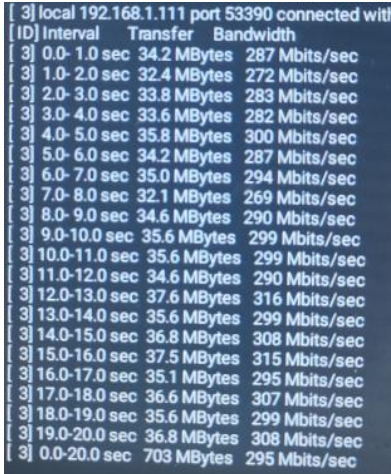
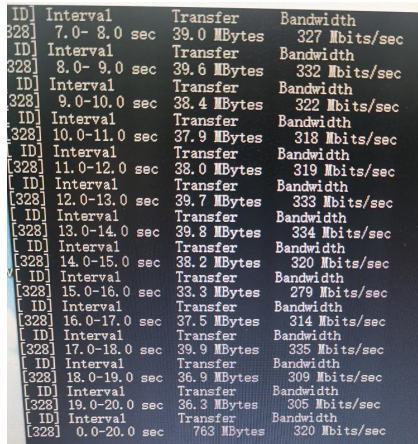
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吞吐量测试

Throughput test

5G wifi 吞吐量测试			
上行	295M	下行	320M
图片	 <pre> [3] local 192.168.1.111 port 53390 connected with [ID] Interval Transfer Bandwidth [3] 0.0- 1.0 sec 34.2 MBytes 287 Mbits/sec [3] 1.0- 2.0 sec 32.4 MBytes 272 Mbits/sec [3] 2.0- 3.0 sec 33.8 MBytes 283 Mbits/sec [3] 3.0- 4.0 sec 33.6 MBytes 282 Mbits/sec [3] 4.0- 5.0 sec 35.8 MBytes 300 Mbits/sec [3] 5.0- 6.0 sec 34.2 MBytes 287 Mbits/sec [3] 6.0- 7.0 sec 35.0 MBytes 294 Mbits/sec [3] 7.0- 8.0 sec 32.1 MBytes 269 Mbits/sec [3] 8.0- 9.0 sec 34.6 MBytes 290 Mbits/sec [3] 9.0-10.0 sec 35.6 MBytes 299 Mbits/sec [3] 10.0-11.0 sec 35.6 MBytes 299 Mbits/sec [3] 11.0-12.0 sec 34.6 MBytes 290 Mbits/sec [3] 12.0-13.0 sec 37.6 MBytes 316 Mbits/sec [3] 13.0-14.0 sec 35.6 MBytes 299 Mbits/sec [3] 14.0-15.0 sec 36.8 MBytes 308 Mbits/sec [3] 15.0-16.0 sec 37.5 MBytes 315 Mbits/sec [3] 16.0-17.0 sec 35.1 MBytes 295 Mbits/sec [3] 17.0-18.0 sec 36.6 MBytes 307 Mbits/sec [3] 18.0-19.0 sec 35.6 MBytes 299 Mbits/sec [3] 19.0-20.0 sec 36.8 MBytes 308 Mbits/sec [3] 0.0-20.0 sec 703 MBytes 295 Mbits/sec </pre>	图片	 <pre> [ID] Interval Transfer Bandwidth [328] 7.0- 8.0 sec 39.0 MBytes 327 Mbits/sec [ID] Interval Transfer Bandwidth [328] 8.0- 9.0 sec 39.6 MBytes 332 Mbits/sec [ID] Interval Transfer Bandwidth [328] 9.0-10.0 sec 38.4 MBytes 322 Mbits/sec [ID] Interval Transfer Bandwidth [328] 10.0-11.0 sec 37.9 MBytes 318 Mbits/sec [ID] Interval Transfer Bandwidth [328] 11.0-12.0 sec 38.0 MBytes 319 Mbits/sec [ID] Interval Transfer Bandwidth [328] 12.0-13.0 sec 39.7 MBytes 333 Mbits/sec [ID] Interval Transfer Bandwidth [328] 13.0-14.0 sec 39.8 MBytes 334 Mbits/sec [ID] Interval Transfer Bandwidth [328] 14.0-15.0 sec 38.2 MBytes 320 Mbits/sec [ID] Interval Transfer Bandwidth [328] 15.0-16.0 sec 33.3 MBytes 279 Mbits/sec [ID] Interval Transfer Bandwidth [328] 16.0-17.0 sec 37.5 MBytes 314 Mbits/sec [ID] Interval Transfer Bandwidth [328] 17.0-18.0 sec 39.9 MBytes 335 Mbits/sec [ID] Interval Transfer Bandwidth [328] 18.0-19.0 sec 36.9 MBytes 309 Mbits/sec [ID] Interval Transfer Bandwidth [328] 19.0-20.0 sec 36.3 MBytes 305 Mbits/sec [ID] Interval Transfer Bandwidth [328] 0.0-20.0 sec 763 MBytes 320 Mbits/sec </pre>
备注			

环境处理

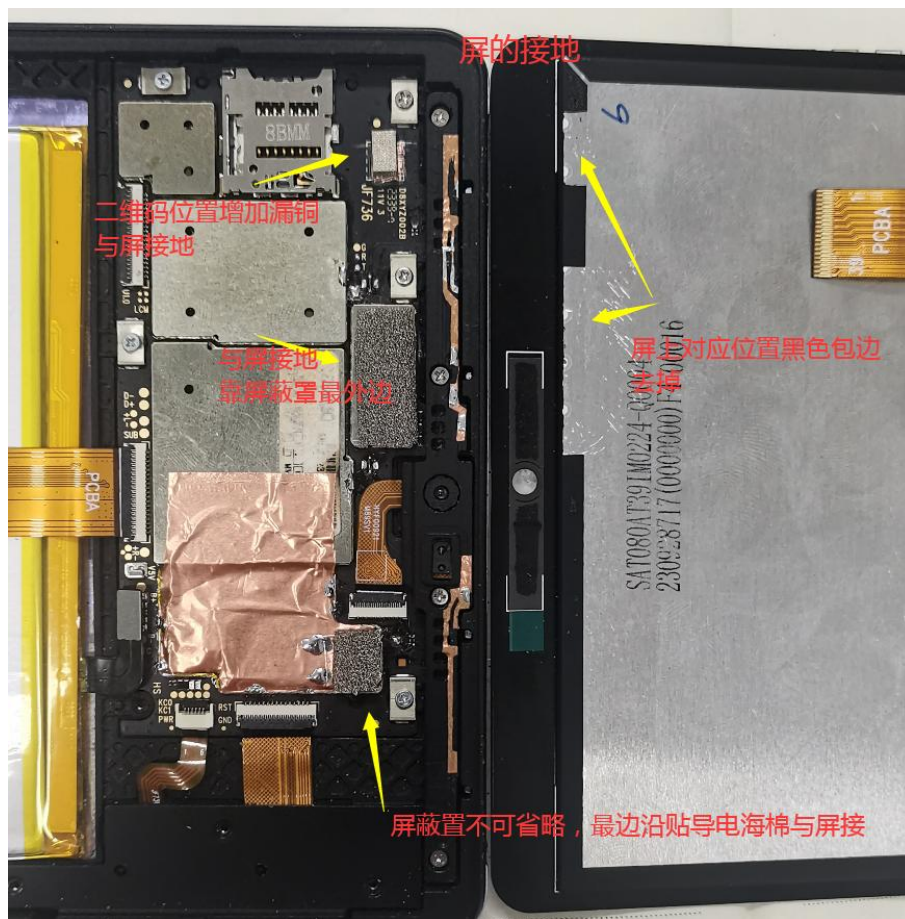
Environmental treatment



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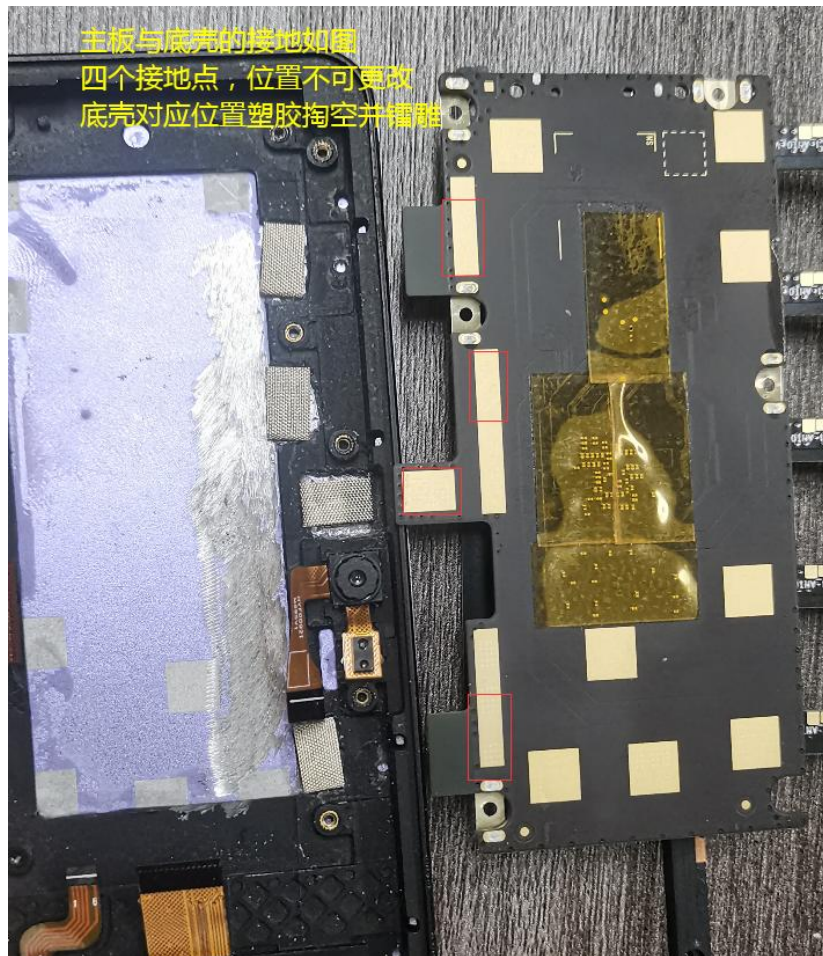
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环境处理

Environmental treatment





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环境处理

Environmental treatment



无源测试数据
Passive test data

ANT1 S11-VSWR&Return Loss

Frequency (MHZ)	1575	2400	2483	5200	5850
VSWR					
Return Loss (DB)					



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无源测试数据

Passive test data

ANT1 GAIN&Efficiency-GPS

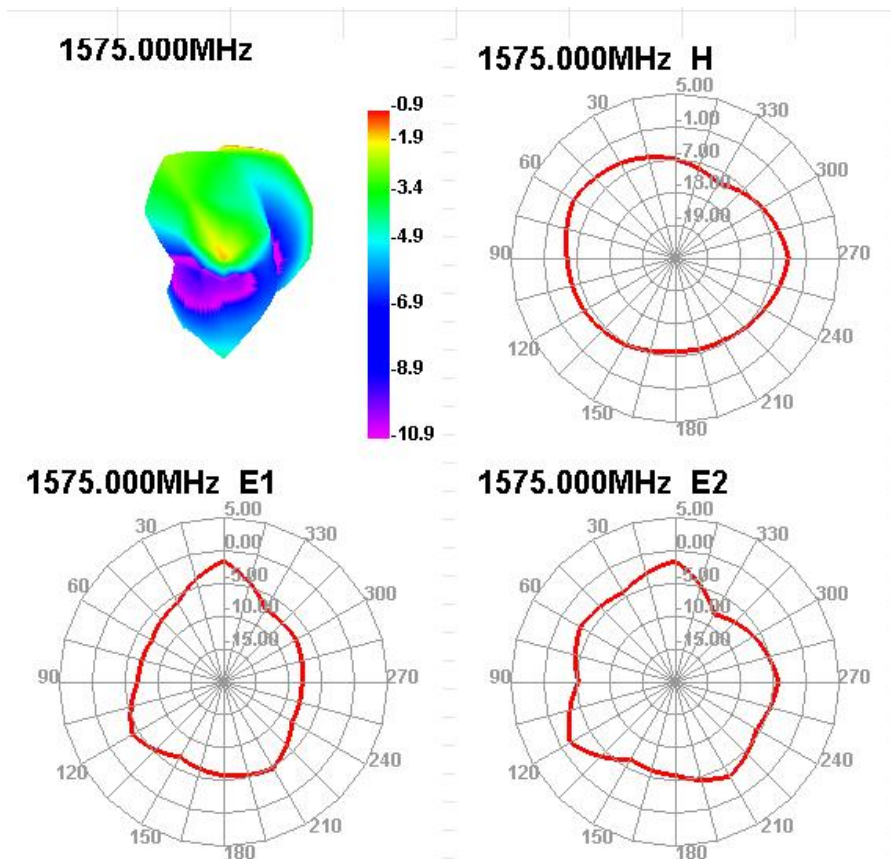
Passive Test For GPS

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
1560	25.17	-5.99	-1.82	-3.97	11.56	13.614	-1.82	-12.28	4.17	0	41.34	40.88
1565	27.68	-5.58	-1.31	-3.46	12.587	15.088	-1.31	-11.01	4.27	0	41.42	40.95
1570	28.91	-5.39	-0.91	-3.06	13.091	15.815	-0.91	-11.02	4.48	0	41.5	41.03
1575	28.3	-5.48	-0.92	-3.07	12.675	15.626	-0.92	-11.38	4.56	0	41.68	41.23
1580	28.48	-5.45	-0.99	-3.14	12.59	15.89	-0.99	-11.08	4.46	0	41.78	41.35
1585	29.63	-5.28	-0.83	-2.98	12.999	16.626	-0.83	-10.38	4.46	0	41.85	41.4
1590	31.21	-5.06	-0.64	-2.79	13.68	17.533	-0.64	-9.9	4.42	0	41.99	41.53
1595	31.42	-5.03	-0.57	-2.72	13.718	17.703	-0.57	-10.18	4.46	0	42.09	41.67
1600	29.73	-5.27	-0.68	-2.83	13.008	16.726	-0.68	-10.91	4.59	0	42.04	41.62



无源测试数据
Passive test data

ANT1 Direction of figure (GPS)





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无源测试数据

Passive test data

ANT1 GAIN&Efficiency-WIFI 5G

Passive Test For WIFI5G												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBi)	UHS (%)	DHS (%)	Max (dB)	Min (dB)	irectivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
5150	22.68	-6.44	-0.73	-2.88	11.583	11.094	-0.73	-21.03	5.71	30	49.82	49.4
5170	21.77	-6.62	-0.98	-3.13	11.242	10.526	-0.98	-19.86	5.64	0	50.13	49.77
5190	24.45	-6.12	-0.81	-2.96	12.744	11.701	-0.81	-20.7	5.31	0	50.42	49.95
5210	26.2	-5.82	-0.66	-2.81	13.687	12.51	-0.66	-19.74	5.16	0	50.88	50.49
5230	26.61	-5.75	-0.66	-2.81	13.799	12.811	-0.66	-18.94	5.08	0	50.42	50.08
5250	30.28	-5.19	0.15	-2	15.519	14.762	0.15	-18.4	5.33	60	51.02	50.72
5270	29.93	-5.24	0.16	-1.99	15.35	14.581	0.16	-18.13	5.4	60	50.85	50.6
5290	31.57	-5.01	0.83	-1.32	16.016	15.556	0.83	-19.65	5.84	60	51.34	51.12
5310	28.84	-5.4	0.75	-1.4	14.431	14.406	0.75	-18.87	6.15	60	50.44	50.36
5330	29.85	-5.25	1.09	-1.06	15.105	14.747	1.09	-18.92	6.34	60	51.08	51.01
5350	30.82	-5.11	1.28	-0.87	16.085	14.736	1.28	-20.04	6.39	60	51.02	51.01
5370	30.36	-5.18	1.03	-1.12	16.238	14.117	1.03	-22.19	6.21	60	50.91	50.95
5390	29.41	-5.32	0.7	-1.45	15.764	13.645	0.7	-19.57	6.02	60	50.46	50.43
5410	36.06	-4.43	1.61	-0.54	19.307	16.748	1.61	-18.04	6.04	60	51.18	51.09
5430	35.13	-4.54	1.64	-0.51	19.005	16.12	1.64	-20.81	6.18	60	50.69	50.7
5450	37.76	-4.23	2.08	-0.07	20.924	16.84	2.08	-20.65	6.31	60	50.71	50.85
5470	37.25	-4.29	2.07	-0.08	20.977	16.271	2.07	-22.74	6.36	60	50.93	50.83
5490	36.75	-4.35	2.15	0	20.923	15.83	2.15	-20.71	6.49	90	50.92	50.79
5510	39.29	-4.06	2.42	0.27	22.404	16.887	2.42	-17.42	6.47	30	51.18	51.16
5530	38.13	-4.19	2.37	0.22	22.015	16.116	2.37	-17.27	6.56	90	51.44	51.3
5550	42.39	-3.73	2.63	0.48	24.764	17.629	2.63	-19.29	6.35	150	51.89	51.76
5570	37.56	-4.25	1.68	-0.47	21.878	15.685	1.68	-17.41	5.94	150	51.42	51.33
5590	42.59	-3.71	2.1	-0.05	24.642	17.949	2.1	-16.47	5.81	150	51.71	51.76
5610	38.21	-4.18	1.57	-0.58	22.208	16.001	1.57	-20.26	5.74	150	51.17	51.22
5630	44.84	-3.48	2.07	-0.08	26.157	18.683	2.07	-20.64	5.55	150	51.78	51.77
5650	37.07	-4.31	0.97	-1.18	21.509	15.559	0.97	-19.17	5.28	150	51.47	51.55
5670	42.94	-3.67	1.38	-0.77	24.779	18.159	1.38	-16.82	5.05	180	52.12	52.28
5690	36.9	-4.33	0.7	-1.45	21.32	15.584	0.7	-17.43	5.03	180	52.12	52.25
5710	38.99	-4.09	1.22	-0.93	22.573	16.419	1.22	-20.69	5.31	180	51.95	52.05
5730	36.72	-4.35	1.26	-0.89	21.354	15.363	1.26	-24.95	5.61	180	51.59	51.69
5750	33.37	-4.77	0.81	-1.34	19.234	14.14	0.81	-22.42	5.57	120	51.12	51.15
5770	32.32	-4.9	0.55	-1.6	18.487	13.836	0.55	-18.24	5.45	120	51.02	51.06
5790	28.79	-5.41	-0.07	-2.22	16.5	12.293	-0.07	-17.33	5.34	120	51.08	51.16
5810	27.22	-5.65	-0.29	-2.44	15.596	11.621	-0.29	-18.47	5.37	120	51.36	51.43
5830	25.26	-5.98	-0.54	-2.69	14.431	10.831	-0.54	-21.66	5.43	60	51.65	51.66
5850	24.43	-6.12	-0.46	-2.61	13.97	10.465	-0.46	-20.03	5.66	30	51.88	52.05



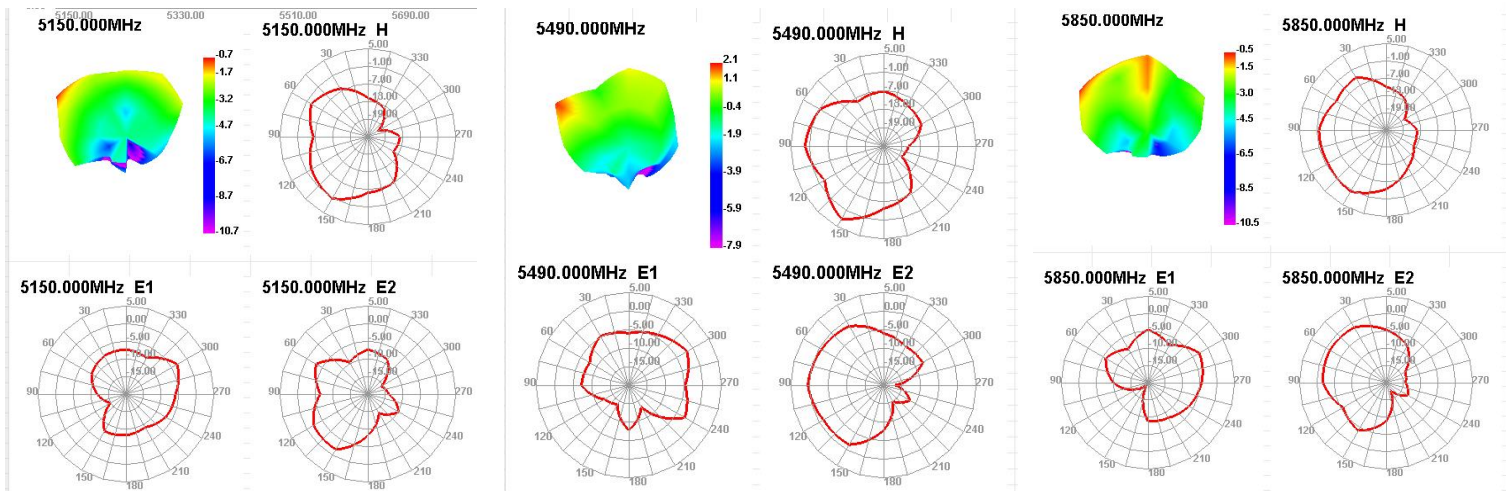
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无源测试数据
Passive test data

ANT1 Direction of figure(5G)





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无源测试数据

Passive test data

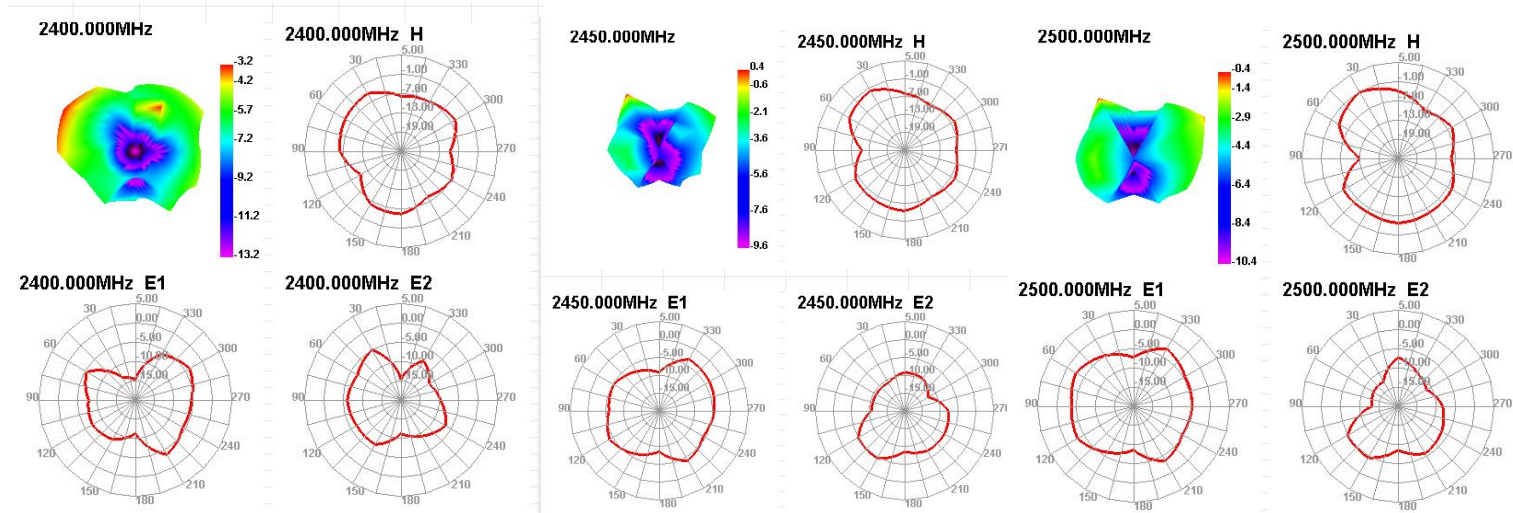
ANT1 GAIN&Efficiency-WIFI 2.4/BT

Passive Test For WIFI2.4												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
2400	23.26	-6.33	-3.15	-5.3	11.372	11.891	-3.15	-14.76	3.18	120	45.78	46.01
2410	24.13	-6.17	-2.29	-4.44	11.687	12.447	-2.29	-13.73	3.88	120	46.01	46.29
2420	25.74	-5.89	-1.35	-3.5	11.903	13.839	-1.35	-13.48	4.54	120	45.73	46
2430	27.44	-5.62	-0.56	-2.71	12.057	15.383	-0.56	-12.19	5.06	120	46.01	46.36
2440	30.11	-5.21	0.22	-1.93	12.755	17.355	0.22	-12.07	5.43	120	46.12	46.48
2450	30.42	-5.17	0.39	-1.76	12.657	17.761	0.39	-12.38	5.56	120	46.12	46.54
2460	30.88	-5.1	0.4	-1.75	12.788	18.095	0.4	-12.71	5.5	120	46.14	46.52
2470	32.91	-4.83	0.56	-1.59	13.674	19.235	0.56	-13.6	5.39	120	46.4	46.8
2480	33.94	-4.69	0.47	-1.68	14.374	19.563	0.47	-14.37	5.17	120	46.26	46.64
2490	33.59	-4.74	0.05	-2.1	14.516	19.07	0.05	-14	4.79	120	46.51	46.91
2500	33.04	-4.81	-0.36	-2.51	14.69	18.347	-0.36	-13.33	4.45	90	46.47	46.86



无源测试数据 Passive test data

ANT1 Direction of figure (2.4/BT)



合作共赢

