



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: 美迪飞*

*MN: S31*

*RF: 关巍*

*MD: 黄清清*

*MP: 15112592483*

*Date: 2022. 06. 16.*

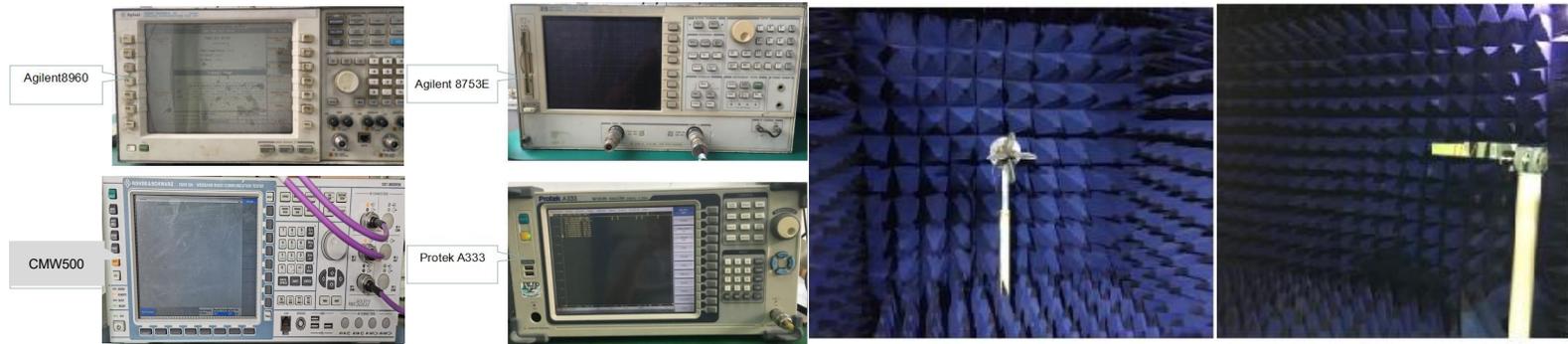
*REV :V1. 0*



## 测试环境

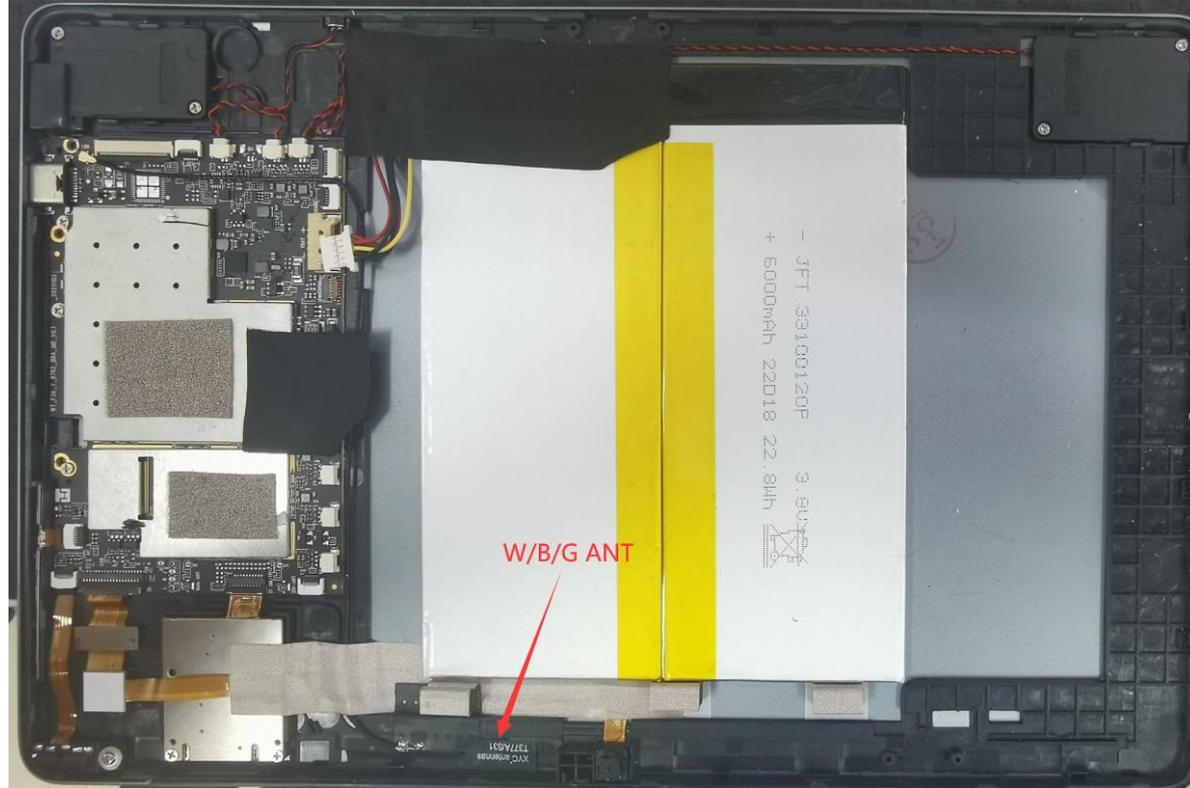
### Test environment

	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



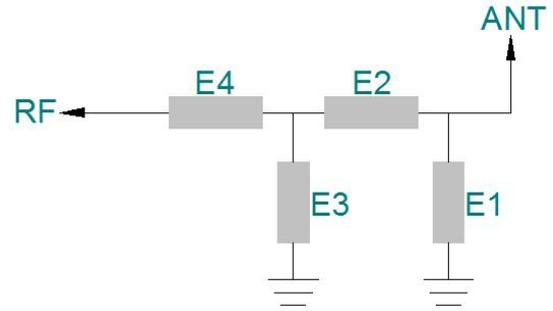


天线位置  
Antenna position





## 匹配电路 Matching circuit



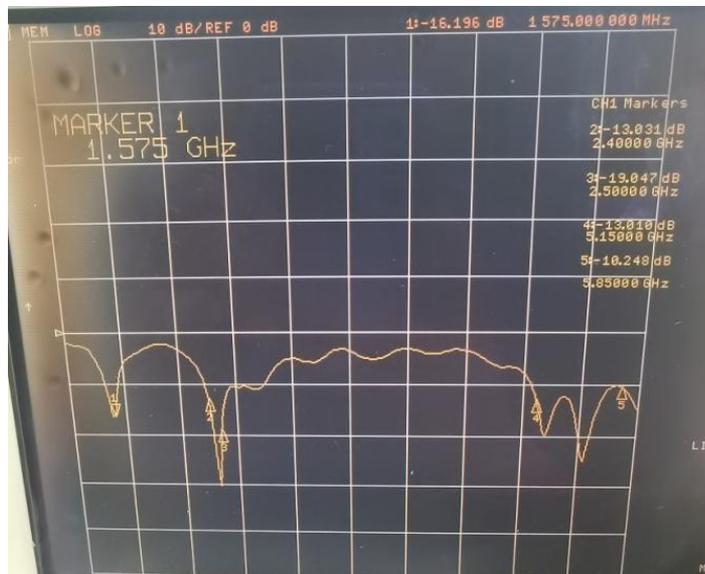
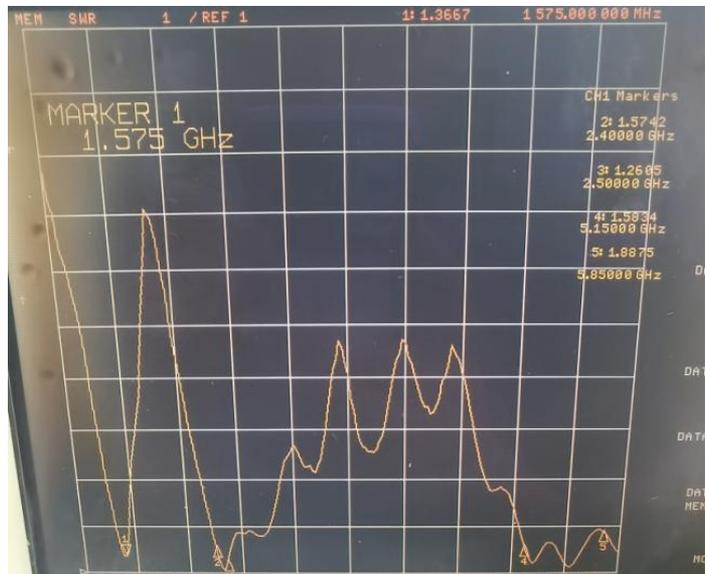
匹配电路原理图&位号图

	电容 (PF)	电感 (NH)
E1(0402)		
E2(0402)		
E3(0402)		
E4(0402)		



## 无源测试数据 Passive test data

### ANT S11-VSWR&Return Loss



Frequency(MHZ)	1575	2400	2500	5150	5850
VSWR	1.36	1.57	1.26	1.58	1.88
Return Loss(DB)	-16.19	-13.03	-19.04	-13.01	-10.24



无源测试数据  
Passive test data

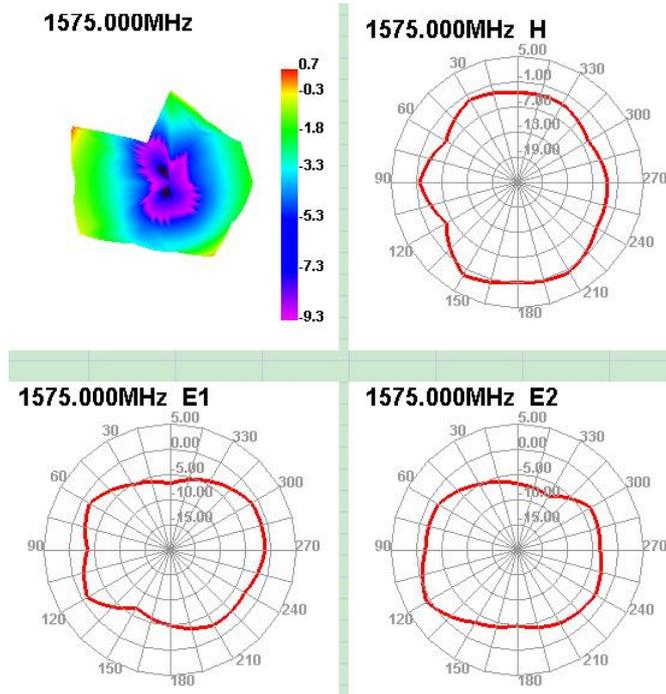
ANT GAIN&Efficiency-GPS 1.575G

1570	47.24	-3.26	0.29	-1.86	20.83	26.406	0.29	-9.57	3.55	90	41.29	40.82
1575	51.35	-2.89	0.71	-1.44	22.746	28.603	0.71	-9.71	3.61	60	41.49	41.04
1580	53.88	-2.69	0.91	-1.24	23.927	29.954	0.91	-9.9	3.59	60	41.61	41.18



无源测试数据  
Passive test data

ANT Direction of figure(1.575G)





无源测试数据

Passive test data

ANT GAIN&Efficiency-WIFI2.4G/BT

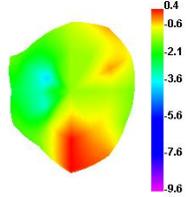
Passive Test For WIFI2.4												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
2400	42.45	-3.72	0.41	-1.74	25.058	17.397	0.41	-19.49	4.13	60	45.79	46.02
2410	41.54	-3.82	0.5	-1.65	24.267	17.276	0.2	-19.8	4.01	60	46	46.28
2420	40.06	-3.97	-0.1	-2.25	23.091	16.966	-0.1	-18.81	3.87	60	45.66	45.93
2430	41.26	-3.84	-0.12	-2.27	23.331	17.931	-0.12	-17.58	3.72	60	45.82	46.17
2440	43.31	-3.63	-0.14	-2.29	23.932	19.375	-0.14	-16.75	3.5	30	45.92	46.28
2450	43.6	-3.61	-0.17	-2.32	23.519	20.08	-0.17	-15.73	3.43	30	45.95	46.38
2460	42.72	-3.69	-0.39	-2.54	22.584	20.138	-0.39	-15.42	3.3	30	45.93	46.31
2470	43.63	-3.6	-0.31	-2.46	22.725	20.91	-0.31	-14.58	3.29	30	46.24	46.64
2480	43.55	-3.61	-0.23	-2.38	22.379	21.171	-0.23	-15.45	3.38	30	46.17	46.56
2490	42.6	-3.71	-0.33	-2.48	21.676	20.927	-0.33	-16.35	3.38	30	46.38	46.78
2500	38.72	-4.12	-0.83	-2.98	19.553	19.164	-0.83	-16.85	3.29	30	46.26	46.65



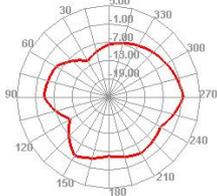
无源测试数据  
Passive test data

ANT Direction of figure(2.4/BT)

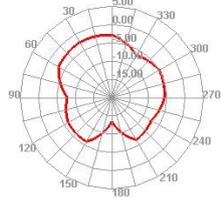
2400.000MHz



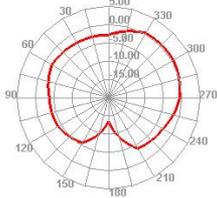
2400.000MHz H



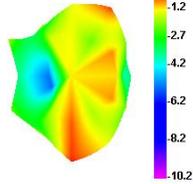
2400.000MHz E1



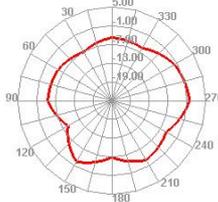
2400.000MHz E2



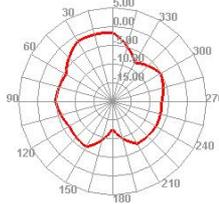
2450.000MHz



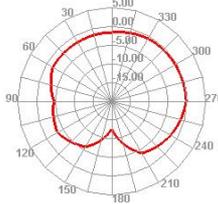
2450.000MHz H



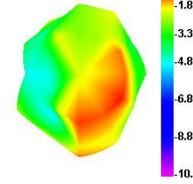
2450.000MHz E1



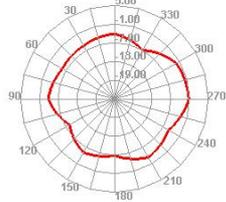
2450.000MHz E2



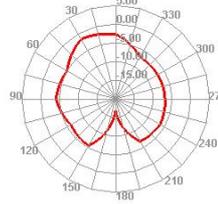
2500.000MHz



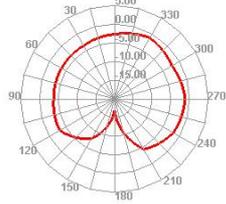
2500.000MHz H



2500.000MHz E1



2500.000MHz E2





## 无源测试数据 Passive test data

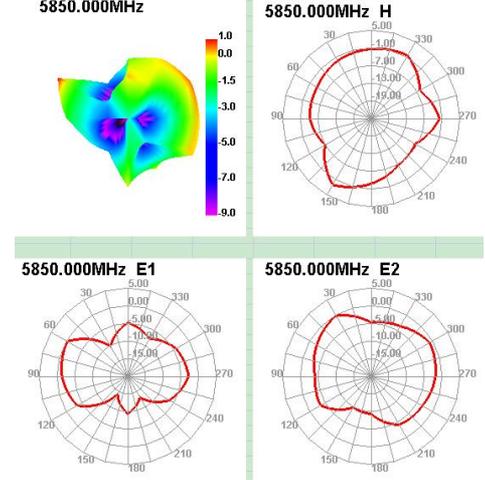
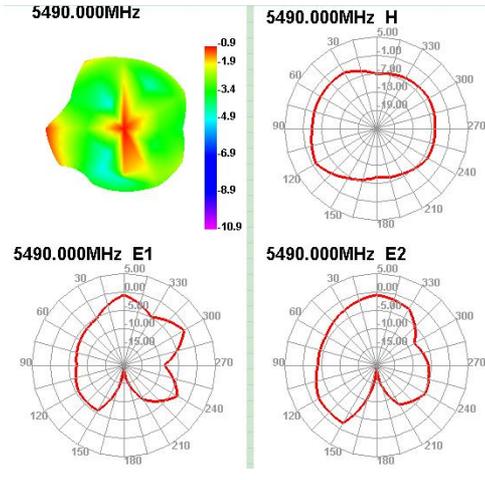
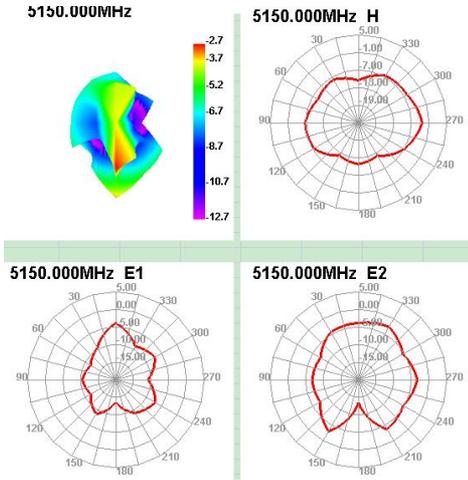
## ANT GAIN&Efficiency-WIFI 5G

Passive Test For WIFI5G												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHIS (%)	Max (dB)	Min (dB)	irectivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
5150	17.66	-7.53	-2.72	-4.87	8.88	8.783	-2.72	-14.28	4.81	0	50.12	49.7
5170	20.08	-6.97	-2.56	-4.71	10.126	9.957	-2.56	-13.62	4.41	0	50.36	50
5190	21.37	-6.7	-2.65	-4.8	10.794	10.577	-2.65	-14.85	4.05	0	50.7	50.23
5210	23.26	-6.33	0.5	-1.65	11.748	11.517	-2.35	-14.15	3.98	0	50.57	50.18
5230	25.08	-6.01	-1.73	-3.88	12.676	12.405	-1.73	-14.46	4.28	30	50.51	50.17
5250	25.02	-6.02	-1.52	-3.67	12.802	12.215	-1.52	-17.24	4.5	30	50.39	50.09
5270	27.56	-5.6	-1.35	-3.5	14.132	13.424	-1.35	-19.47	4.24	30	50.63	50.38
5290	29.5	-5.3	-0.75	-2.9	14.969	14.53	-0.75	-24.87	4.55	30	50.7	50.48
5310	29.53	-5.3	-0.35	-2.5	15.01	14.517	-0.35	-26.43	4.95	30	50.43	50.35
5330	29.35	-5.32	-0.35	-2.5	15.001	14.354	-0.35	-18.13	4.98	30	50.85	50.78
5350	31.31	-5.04	-0.09	-2.24	15.881	15.432	-0.09	-15.05	4.95	30	50.95	50.94
5370	30.08	-5.22	-0.39	-2.54	14.907	15.176	-0.39	-13.55	4.83	30	50.78	50.82
5390	28.46	-5.46	-0.59	-2.74	14.009	14.449	-0.59	-13.49	4.87	30	50.6	50.57
5410	32.36	-4.9	-0.38	-2.53	16	16.359	-0.38	-14.23	4.52	0	51.24	51.15
5430	28.48	-5.45	-1.31	-3.46	14.186	14.291	-1.31	-16.51	4.15	0	50.81	50.82
5450	31.16	-5.06	-0.95	-3.1	15.521	15.636	-0.95	-15.89	4.12	0	50.78	50.92
5470	28.41	-5.47	-1.31	-3.46	14.172	14.237	-1.31	-17.23	4.16	0	51.02	50.92
5490	31.31	-5.04	-0.87	-3.02	15.674	15.638	-0.87	-20.98	4.17	0	51.11	50.98
5510	30.28	-5.19	-1.28	-3.43	15.337	14.945	-1.28	-21.52	3.91	0	51.07	51.05
5530	32.12	-4.93	-1.28	-3.43	16.331	15.784	-1.28	-18.52	3.65	60	51.51	51.37
5550	32.17	-4.93	-1.42	-3.57	16.463	15.707	-1.42	-17.86	3.5	60	51.7	51.57
5570	32.94	-4.82	-1.37	-3.52	16.999	15.942	-1.37	-18.53	3.45	60	51.5	51.41
5590	31.99	-4.95	-1.54	-3.69	16.717	15.271	-1.54	-15.4	3.41	60	51.59	51.64
5610	33.61	-4.74	-1.15	-3.3	18.146	15.461	-1.15	-15.69	3.59	120	51.19	51.24
5630	30.52	-5.15	-1.07	-3.22	17.009	13.516	-1.07	-16.5	4.08	0	51.19	51.18
5650	36.33	-4.4	0.06	-2.09	20.617	15.711	0.06	-16.73	4.46	0	51.27	51.35
5670	35.21	-4.53	0.05	-2.1	20.107	15.105	0.05	-19.99	4.58	0	51.87	52.03
5690	37.17	-4.3	0.28	-1.87	21.566	15.606	0.28	-21.01	4.58	0	51.65	51.78
5710	37.11	-4.31	0.46	-1.69	21.984	15.124	0.46	-19.13	4.77	0	51.72	51.82
5730	40.46	-3.93	0.49	-1.66	24.17	16.292	0.99	-18.71	4.92	0	51.44	51.54
5750	41.11	-3.86	0.5	-1.65	24.508	16.598	1	-18.73	4.87	0	51.34	51.37
5770	41.48	-3.82	0.16	-1.99	24.752	16.73	1.16	-17.4	4.98	0	51.02	51.06
5790	39.29	-4.06	0.01	-2.14	23.475	15.813	1.01	-16.25	5.06	60	51.25	51.33
5810	41.22	-3.85	0.22	-1.93	24.652	16.566	1.22	-14.92	5.07	30	51.4	51.47
5830	39.89	-3.99	0.01	-2.14	23.648	16.246	1.01	-14.55	5	30	51.9	51.91
5850	40.42	-3.93	0.04	-2.11	23.824	16.594	1.04	-15.11	4.97	30	51.77	51.94



无源测试数据  
Passive test data

ANT Direction of figure(5G)





## 有源测试数据 Active test data

Frequency	TRP		TIS		
	2412	CH1 11Mbps	12.52	CH1 11Mbps	-80.07
2437	CH6 11Mbps	12.53	CH6 11Mbps	-80.23	
2467	CH11 11Mbps	12.17	CH11 11Mbps	-80.62	
802.11a	TRP		TIS		
	5180	CH36 6Mbps	6.5	CH36 54Mbps	-66.3
	5300	CH60 6Mbps	6.8	CH60 54Mbps	-66.5
	5805	CH161 6Mbps	7.5	CH161 54Mbps	-68.06



## WIFI天线实测 WIFI Antenna test

测试环境：办公区域

测试工具：WIFI分析助手

测试距离：10m

测试结果如右图





BT天线实测    BT  
Antenna test

测试环境：走廊通道

测试工具：蓝牙音箱

测试距离：20M（播放音乐流畅无卡顿）



## 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4+颗  
实际定位30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





## 吞吐量测试 Throughput test

2.4G wifi 吞吐量测试			
上行		下行	
图片	<pre>[ ID] Interval  Transfer  bandwidth [ 3] 0.0- 1.0 sec  7.50 MBytes 62.9 Mbits/sec [ 3] 1.0- 2.0 sec  6.12 MBytes 51.4 Mbits/sec [ 3] 2.0- 3.0 sec  6.75 MBytes 56.6 Mbits/sec [ 3] 3.0- 4.0 sec  6.88 MBytes 57.7 Mbits/sec [ 3] 4.0- 5.0 sec  6.38 MBytes 53.5 Mbits/sec [ 3] 5.0- 6.0 sec  7.12 MBytes 59.8 Mbits/sec [ 3] 6.0- 7.0 sec  6.88 MBytes 57.7 Mbits/sec [ 3] 7.0- 8.0 sec  6.25 MBytes 52.4 Mbits/sec [ 3] 8.0- 9.0 sec  7.25 MBytes 60.8 Mbits/sec [ 3] 9.0-10.0 sec  6.38 MBytes 53.5 Mbits/sec [ 3] 10.0-11.0 sec 7.88 MBytes 66.1 Mbits/sec [ 3] 11.0-12.0 sec 7.50 MBytes 62.9 Mbits/sec [ 3] 12.0-13.0 sec 6.88 MBytes 57.7 Mbits/sec [ 3] 13.0-14.0 sec 7.38 MBytes 61.9 Mbits/sec [ 3] 14.0-15.0 sec 7.50 MBytes 62.9 Mbits/sec [ 3] 15.0-16.0 sec 7.50 MBytes 62.9 Mbits/sec [ 3] 16.0-17.0 sec 6.88 MBytes 57.7 Mbits/sec [ 3] 17.0-18.0 sec 7.00 MBytes 58.7 Mbits/sec [ 3] 18.0-19.0 sec 7.25 MBytes 60.8 Mbits/sec [ 3] 19.0-20.0 sec 7.62 MBytes 64.0 Mbits/sec [ 3] 0.0-20.1 sec 141 MBytes 58.9 Mbits/sec</pre>	图片	<pre>[ ID] Interval  Transfer  Bandwidth [304] 7.0- 8.0 sec  7.42 MBytes 62.3 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 8.0- 9.0 sec  7.63 MBytes 64.0 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 9.0-10.0 sec 7.17 MBytes 60.2 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 10.0-11.0 sec 7.46 MBytes 62.6 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 11.0-12.0 sec 7.04 MBytes 59.0 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 12.0-13.0 sec 7.55 MBytes 63.3 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 13.0-14.0 sec 7.63 MBytes 64.0 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 14.0-15.0 sec 7.63 MBytes 64.0 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 15.0-16.0 sec 7.56 MBytes 63.4 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 16.0-17.0 sec 7.12 MBytes 59.7 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 17.0-18.0 sec 7.02 MBytes 58.9 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 18.0-19.0 sec 6.96 MBytes 58.4 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 19.0-20.0 sec 7.48 MBytes 62.8 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 0.0-20.0 sec 145 MBytes 60.9 Mbits/sec</pre>
备注			



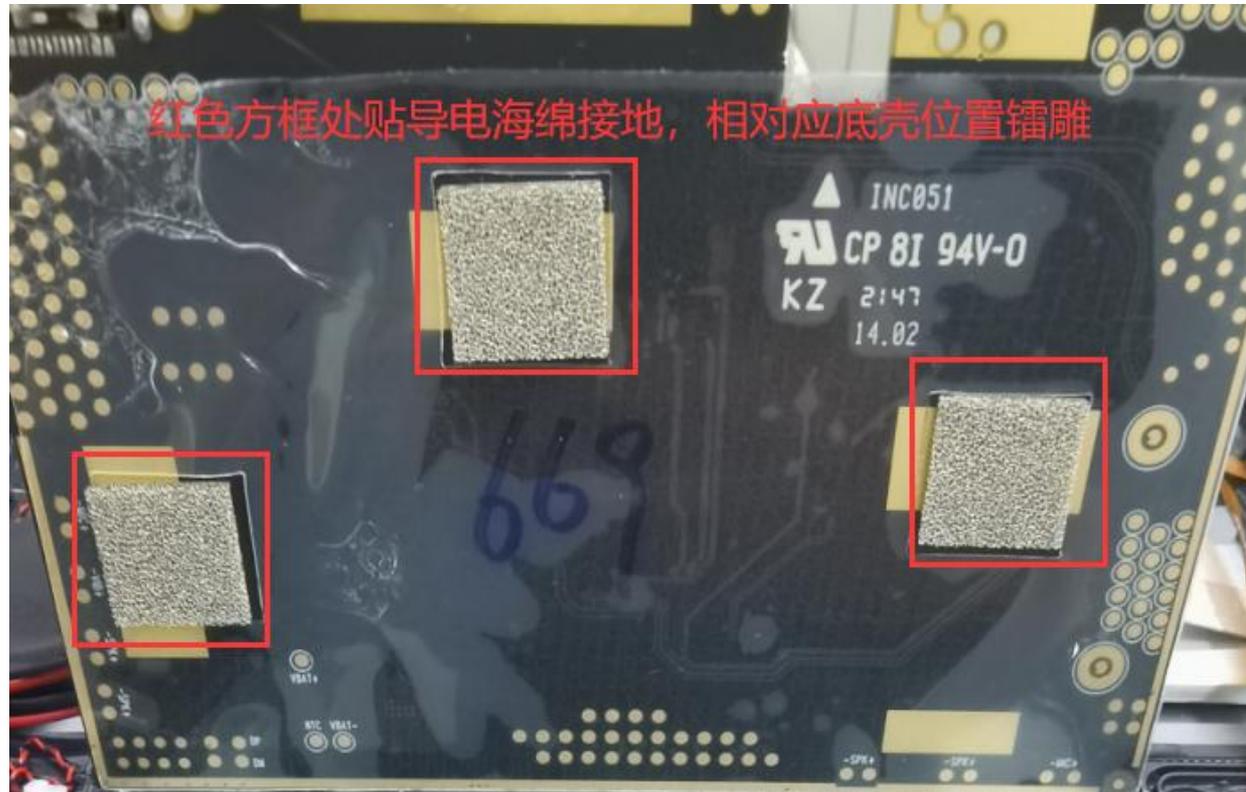
## 吞吐量测试 Throughput test

5G wifi 吞吐量测试			
上行		下行	
图片	<pre>[ ID] Interval  Transfer  Bandwidth [ 3] 0.0- 1.0 sec  21.1 MBytes  177 Mbits/sec [ 3] 1.0- 2.0 sec  28.2 MBytes  237 Mbits/sec [ 3] 2.0- 3.0 sec  25.4 MBytes  213 Mbits/sec [ 3] 3.0- 4.0 sec  27.1 MBytes  228 Mbits/sec [ 3] 4.0- 5.0 sec  28.0 MBytes  235 Mbits/sec [ 3] 5.0- 6.0 sec  29.8 MBytes  250 Mbits/sec [ 3] 6.0- 7.0 sec  29.1 MBytes  244 Mbits/sec [ 3] 7.0- 8.0 sec  26.8 MBytes  224 Mbits/sec [ 3] 8.0- 9.0 sec  24.0 MBytes  201 Mbits/sec [ 3] 9.0-10.0 sec  26.6 MBytes  223 Mbits/sec [ 3] 10.0-11.0 sec  26.5 MBytes  222 Mbits/sec [ 3] 11.0-12.0 sec  25.5 MBytes  214 Mbits/sec [ 3] 12.0-13.0 sec  30.8 MBytes  258 Mbits/sec [ 3] 13.0-14.0 sec  36.1 MBytes  303 Mbits/sec [ 3] 14.0-15.0 sec  32.5 MBytes  273 Mbits/sec [ 3] 15.0-16.0 sec  34.2 MBytes  287 Mbits/sec [ 3] 16.0-17.0 sec  33.2 MBytes  279 Mbits/sec [ 3] 17.0-18.0 sec  33.5 MBytes  281 Mbits/sec [ 3] 18.0-19.0 sec  36.0 MBytes  302 Mbits/sec [ 3] 19.0-20.0 sec  35.8 MBytes  300 Mbits/sec [ 3] 0.0-20.0 sec  590 MBytes  247 Mbits/sec</pre>	图片	<pre>[ ID] Interval  Transfer  Bandwidth [304] 7.0- 8.0 sec  38.4 MBytes  322 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 8.0- 9.0 sec  38.9 MBytes  326 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 9.0-10.0 sec  39.4 MBytes  331 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 10.0-11.0 sec  38.7 MBytes  325 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 11.0-12.0 sec  38.5 MBytes  323 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 12.0-13.0 sec  38.7 MBytes  325 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 13.0-14.0 sec  39.1 MBytes  328 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 14.0-15.0 sec  37.7 MBytes  317 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 15.0-16.0 sec  38.2 MBytes  321 Mbits/sec [ ID] Interval  Transfer  Bandwidth NK1[304] 16.0-17.0 sec  38.4 MBytes  322 Mbits/sec 882 [ ID] Interval  Transfer  Bandwidth [304] 17.0-18.0 sec  37.6 MBytes  315 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 18.0-19.0 sec  35.6 MBytes  298 Mbits/sec [ ID] Interval  Transfer  Bandwidth WPC[304] 19.0-20.0 sec  38.9 MBytes  326 Mbits/sec [ ID] Interval  Transfer  Bandwidth [304] 0.0-20.0 sec  762 MBytes  319 Mbits/sec</pre>
备注			



环境处理

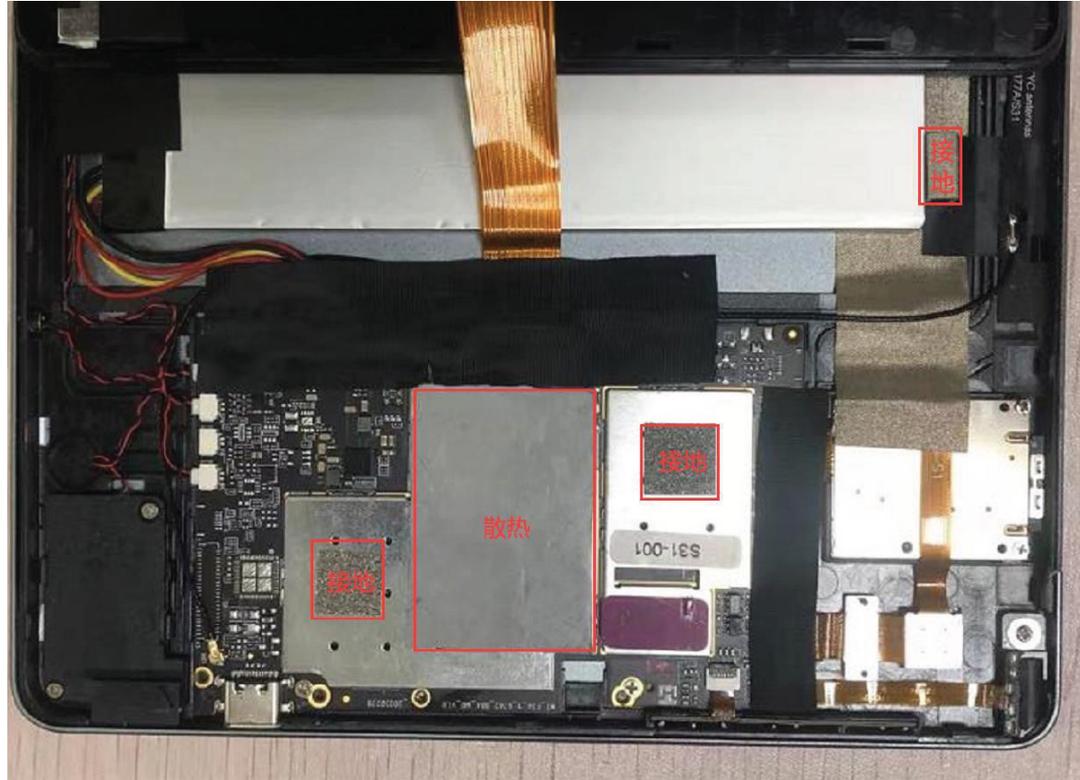
Environmental treatment





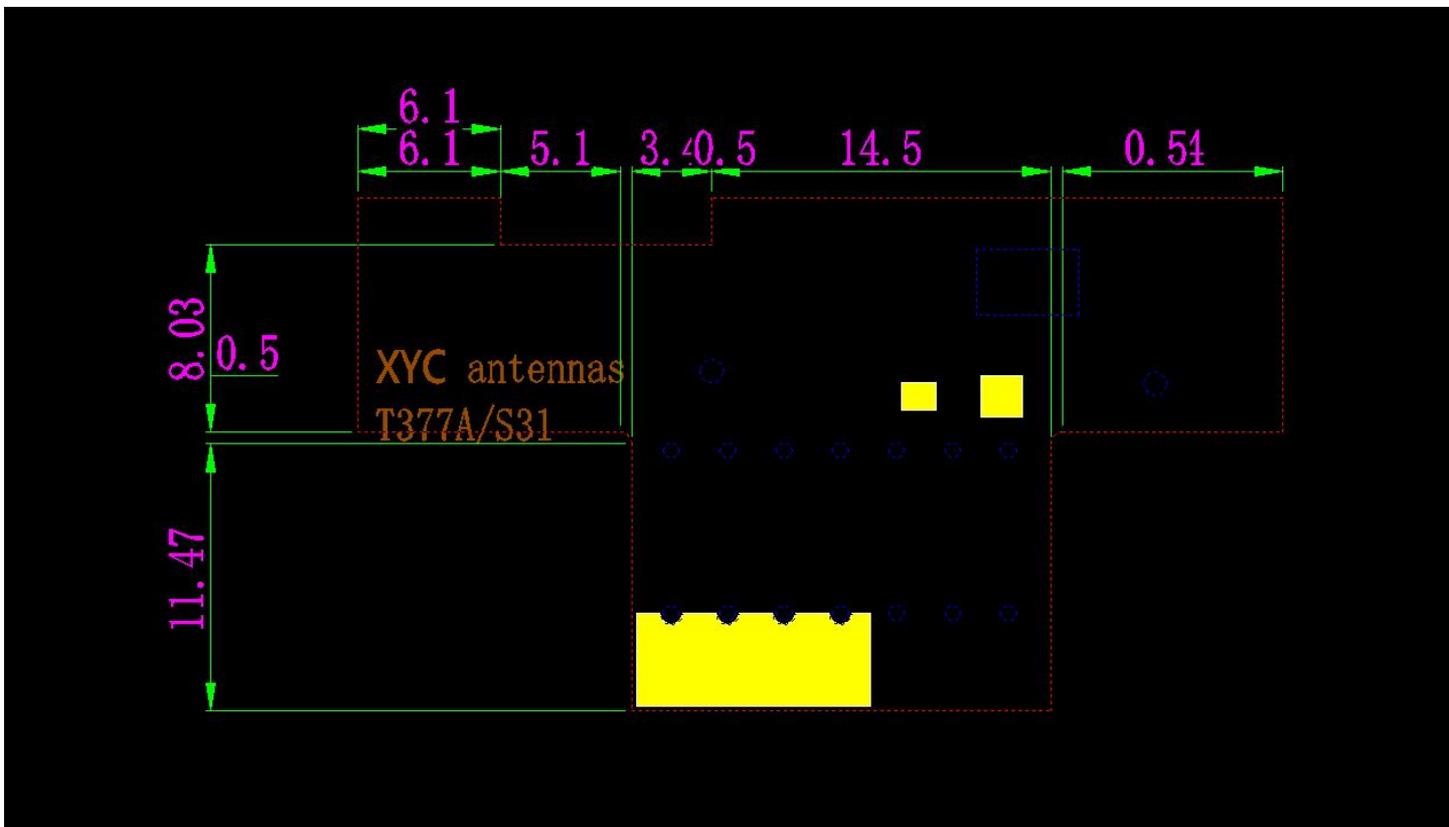
## 环境处理

Environmental treatment



# 结构

WIFI+BT+FM (三合一外形图)





## 附加说明

Additional instructions

01

报告中天线匹配电路是否改动，天线有关的环境处理是否增加，将直接影响天线性能，请仔细确认查看。

02

贵司如有最新试产或更新产品（如软件，**ESD**，物料等）请尽快提供我司进行验证，以确认天线性能是否有变化影响。

03

倘若贵司需要送第三方检测机构复测或客户测试，请务必先与我司进行天线相关测试确认，因主板·装配的一致性，以及天线组装的差异等因素，均可能导致天线参数的偏差。

合作 共赢

