

深圳市艾汇科技有限公司
Shenzhen Aihui Technology Co., LTD

天线测试报告

Test report

2024年06月24日

June 24, 2024

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1、项目信息 (Model Information)

SP5705						
主板 mainboard						
主天线 main antenna 三合一 three-in-one	频段 Frequency band		Antenna state 天线状态	Antenna form 天线形式	Design area 设计区域	Match change 匹配改动
	GSM	850/900/1800/1900	FPC	PIFA	内壳	/
	WCDMA LTE	W2/W5/W8 B2/B4/B7/B8/ B28-A/B28-B				
	WIFI	GPS/BT				

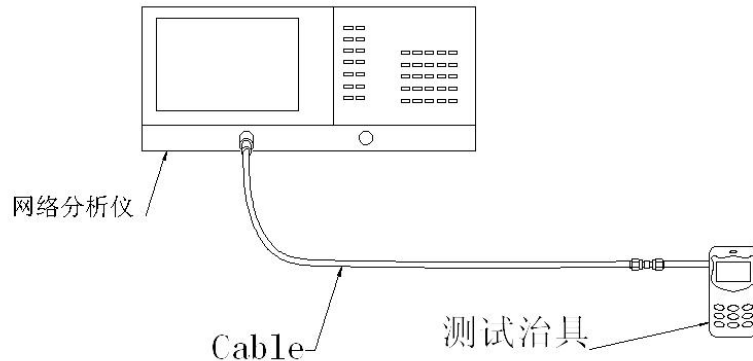
2、无源驻波及匹配 (Passive and Matching)

2.1 无源测试示意图 Passive test diagram

S11 Test Method Description Test equipment:

Network Analyzer (E5071C 30k-8.5Ghz) Test method:

Using a 50 ohm CABLE exported from the instrument test port, record the return loss and standing wave ratio corresponding to the relevant frequency points using the SMA connector of the connected sample mechanism after calibration.



2.2有源测试示意图 Active test diagram

3D测试系统: 屏蔽暗室

测试环境: 温度 $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$, 湿度 $50\% \pm 15\%$

测试设备: 测试无源数据时, 使用网络分析仪 **Agilent E5071C**

测试有源数据时, 使用综测仪8960/CMW500****

3D test system: shielded darkroom test environment:

Temperature $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$, humidity $50\% \sim 15\%$

Test equipment: When testing passive data, use network analyzer Agilent E5071C

When testing active data, use integrometer 8960/CMW500

总全向辐射功率 (TIRP)

$$TIRP \equiv \frac{\pi}{2NM} \sum_{i=1}^{N-1} \sum_{j=0}^{M-1} [Eirp_{\theta}(\theta_i, \phi_j) + Eirp_{\phi}(\theta_i, \phi_j)] \sin(\theta_i)$$

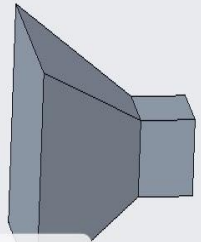
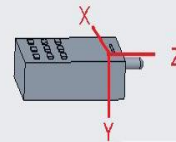
总全向辐射灵敏度 (TIRS)

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

E1: XZ的切面 PHI=0

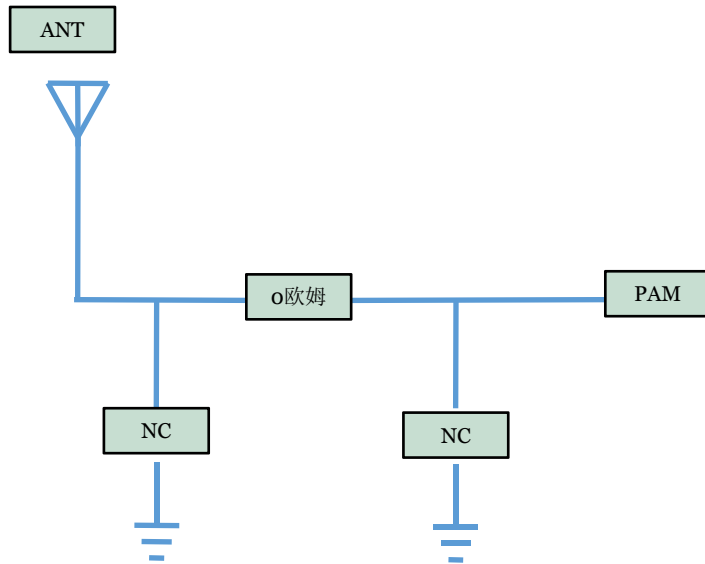
E2: YZ的切面 PHI=90

H: XY的切面 Theta=90



以喇叭天线为参考

2. 3天线匹配 (Matching Circuit)



主板匹配没有做更改。

Motherboard matching has not been changed.

注：原串0欧姆，从天线-----串0欧姆
电阻 -----PA

Note: Original string 0 ohms, from the antenna ----- string 0 ohms
resistance -----PA

4.1 天线有源测试数据 Antenna active test data

Frequency Band	GSM850			900		
channel	L	M	H	L	M	H
TRP	25.63	25.12	25.05	24.33	24.15	24.28
TIS			-102.56			-102.34
Frequency Band	1800			1900		
channel	L	M	H	L	M	H
TRP	23.56	24.27	25.01	26.71	26.85	26.91
TIS			-103.25			-102.69

4.1 天线有源测试数据 Antenna active test data

Frequency Band	WCDMA-W2			W5		
channel	L	M	H	L	M	H
TRP	19.28	19.56	19.48	17.12	17.05	16.12
TIS			-102.78			-102.12
Frequency Band	W8			LTE-B2		
channel	L	M	H	L	M	H
TRP	15.23	15.02	14.97	18.86	19.19	19.67
TIS			-102.41			-90.47
Frequency Band	B4			B7		
channel	L	M	H	L	M	H
TRP	16.22	16.57	17.13	17.13	17.18	17.42
TIS			-91.47			-88.72
Frequency Band	B8			B28-A		
channel	L	M	H	L	M	H
TRP	15.22	15.01	14.83	15.83	16.15	16.83
TIS			-87.53			-88.68

4.1 天线有源测试数据 Antenna active test data

Frequency Band	LTE-B28-B					
channel	L	M	H			
TRP	16.04	16.29	16.88			
TIS			-88.96			

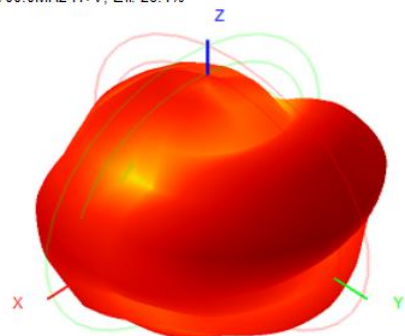
Frequency Band	2.4WiFi-B模			G模		
channel	L	M	H	L	M	H
TRP	10.09	11.54	10.46	8.12	9.82	8.71
TIS			-78.24			-66.57
Frequency Band	N模			5.8WiFi-A模		
channel	L	M	H	L	M	H
TRP	8.41	9.33	8.62	9.14	9.27	9.55
TIS			-67.08			-69.44

4.2 天线无源测试数据

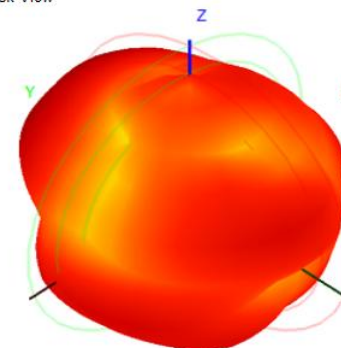
主天线

Gain&Efficiency 增益和效率			
frequency 频率(Hz)	gain 增益(dBi)	efficiency 效率(dB)	efficiency 效率
700M	0.86	-3.11	28.10%
730M	0.73	-3.06	28.38%
760M	0.85	-2.91	30.16%
790M	1.1	-2.76	32.96%
820M	0.93	-2.65	35.66%
850M	1.04	-2.68	32.64%
880M	1.09	-2.85	30.26%
910M	0.92	-3.25	28.36%
940M	0.56	-3.83	25.96%
970M	0.43	-3.92	24.62%

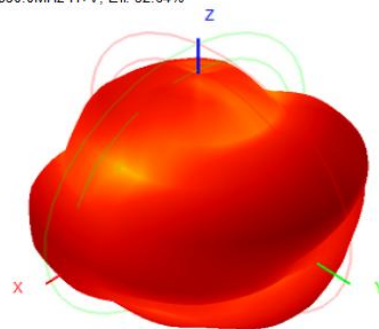
700.0MHz H+V, Eff. 28.1%



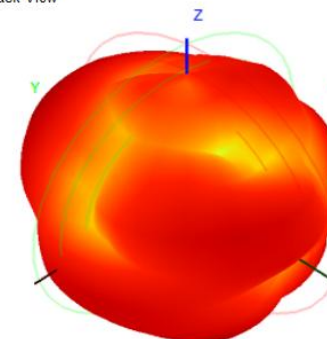
Back View



850.0MHz H+V, Eff. 32.64%



Back View

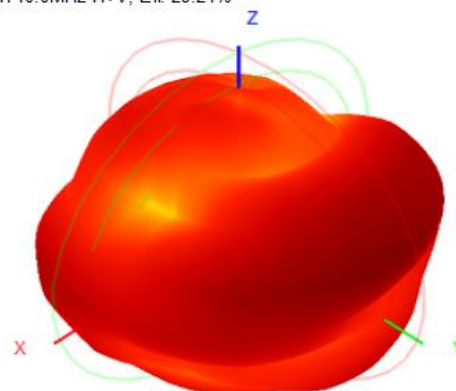


4.2 天线无源测试数据

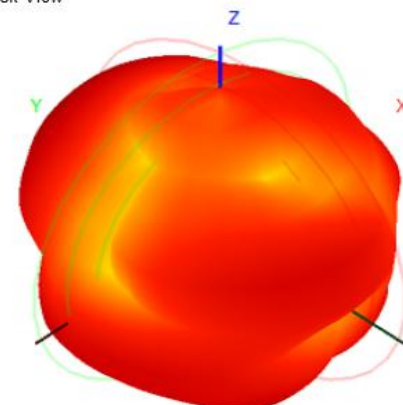
主天线

Gain&Efficiency 增益和效率			
frequency 频率(Hz)	gain 增益(dBi)	efficiency 效率(dB)	efficiency 效率
1710M	1.04	-4.06	29.24%
1743M	1.2	-4.07	31.16%
1777M	1.05	-3.87	33.99%
1811M	1.16	-4.08	35.10%
1845M	1.51	-4.27	32.38%
1878M	1.3	-3.94	36.34%
1912M	1.73	-3.72	35.45%
1946M	1.77	-3.94	37.38%
1980M	1.51	-3.86	37.08%
2014M	1.64	-3.45	32.19%
2047M	1.36	-3.65	33.18%
2081M	1.18	-3.62	36.49%
2115M	1.2	-3.35	32.28%
2149M	1.45	-3.8	33.72%
2183M	0.89	-4.56	34.98%

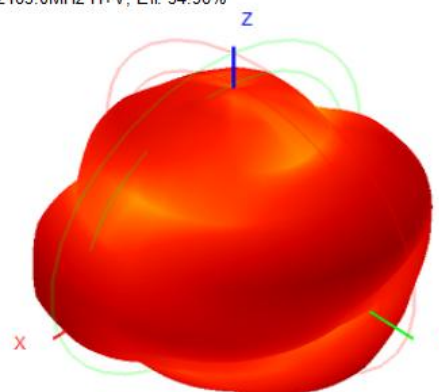
1710.0MHz H+V, Eff. 29.24%



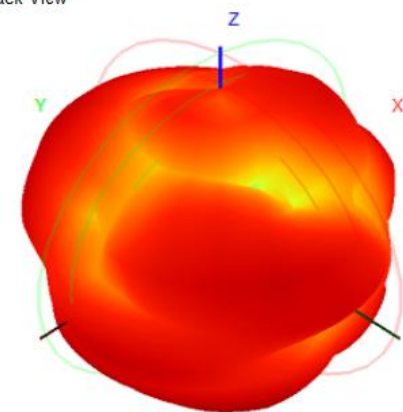
Back View



2183.0MHz H+V, Eff. 34.98%



Back View

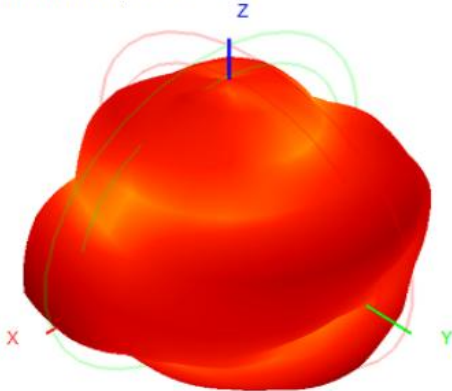


4.2 天线无源测试数据

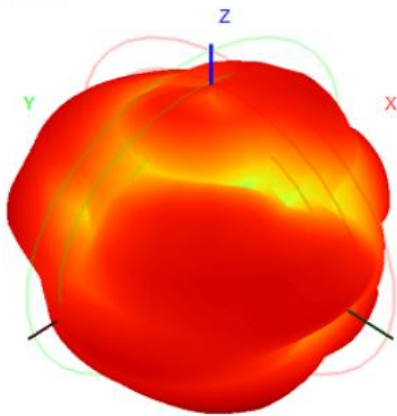
主天线

Gain&Efficiency			
增益和效率			
frequency	gain	efficiency	efficiency
频率(Hz)	增益(dBi)	效率(dB)	效率
2500M	0.83	-3.95	36.24%
2520M	0.86	-3.9	34.72%
2540M	1.39	-4.13	37.65%
2560M	1.25	-4.23	35.73%
2580M	0.92	-4.31	34.10%
2600M	0.83	-4.65	35.25%
2620M	1.39	-4.13	36.65%
2640M	1.25	-4.23	37.73%
2660M	1.02	-4.31	37.1%
2680M	0.83	-4.65	34.25%

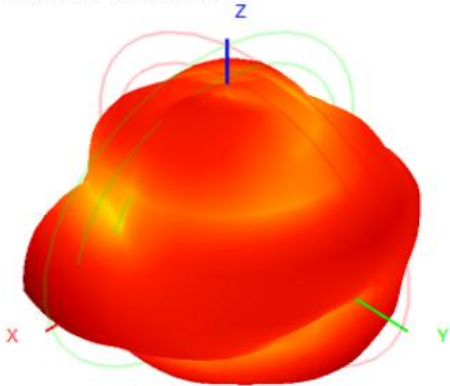
2500.0MHz H+V, Eff. 36.24%



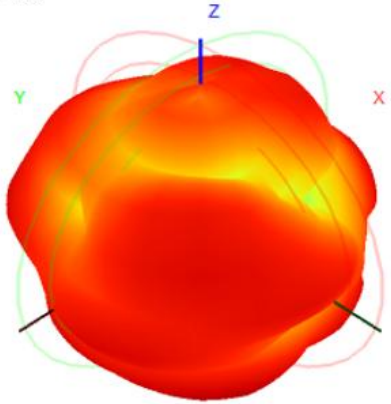
Back View



2680.0MHz H+V, Eff. 34.25%



Back View

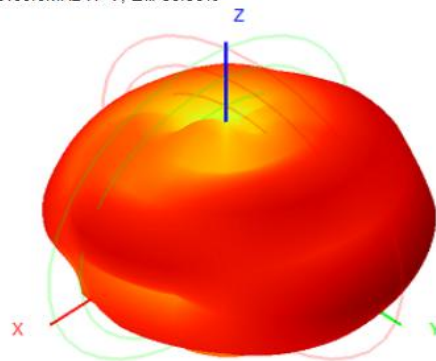


4.2 天线无源测试数据

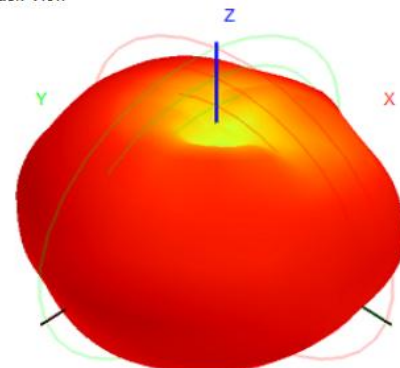
三合一天线

Gain&Efficiency 增益和效率			
frequency 频率(Hz)	gain 增益(dBi)	efficiency 效率(dB)	efficiency 效率
2400M	1.14	-3.96	38.36%
2410M	0.89	-3.88	39.58%
2420M	1.03	-3.93	41.11%
2430M	1.31	-3.97	43.21%
2440M	1.86	-3.85	42.03%
2450M	1.3	-3.84	45.63%
2460M	1.15	-3.96	44.28%
2470M	0.96	-3.92	42.11%
2480M	1.44	-3.91	43.63%
2490M	1.23	-4.25	40.85%
2500M	1.34	-4.16	37.32%

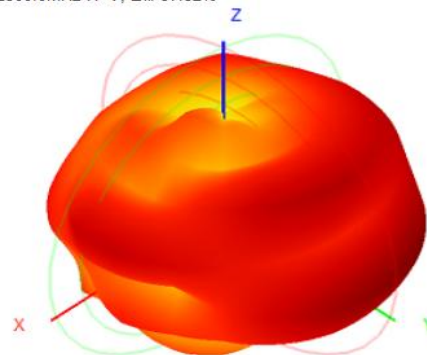
2400.0MHz H+V, Eff. 38.36%



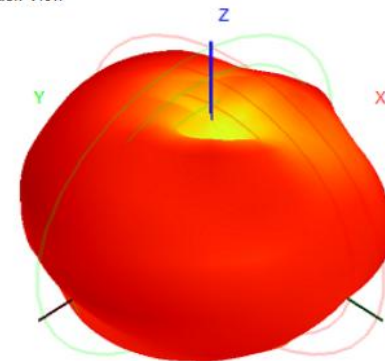
Back View



2500.0MHz H+V, Eff. 37.32%



Back View

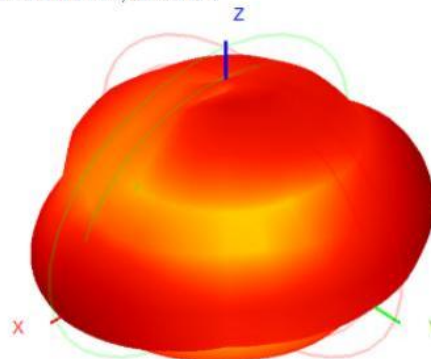


4.2 天线无源测试数据

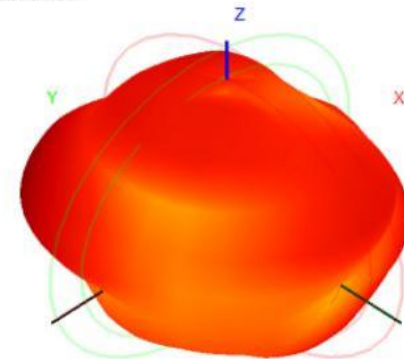
三合一天线

Gain&Efficiency 增益和效率			
frequency 频率(Hz)	gain 增益(dBi)	efficiency 效率(dB)	efficiency 效率
1565M	0.98	-4.23	36.68%
1575M	0.86	-4.33	38.79%
1585M	0.93	-4.16	36.39%
1595M	0.83	-4.38	35.42%

1575.0MHz H+V, Eff. 38.79%



Back View

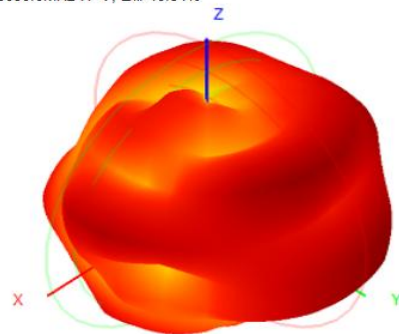


三合一天线

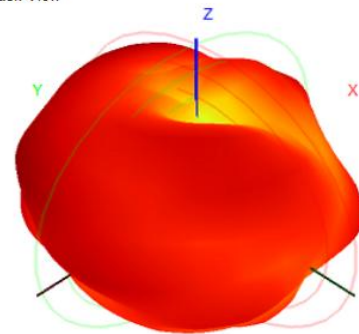
4.2 天线无源测试数据

Gain&Efficiency			
frequency 频率(Hz)	gain 增益(dBi)	efficiency 效率(dB)	efficiency 效率
5050M	1.56	-3.47	48.34%
5100M	1.62	-3.43	47.45%
5150M	1.44	-3.86	49.29%
5200M	1.36	-3.17	50.43%
5250M	1.51	-2.97	52.42%
5300M	1.61	-3.13	51.47%
5350M	1.63	-3.55	50.33%
5400M	1.35	-3.02	52.14%
5450M	1.47	-3.34	50.17%
5500M	1.43	-3.43	51.19%
5550M	1.58	-3.24	48.69%
5600M	1.57	-3.61	49.51%
5650M	1.37	-3.88	48.13%
5700M	1.8	-3.79	50.87%
5750M	1.74	-4.1	52.09%
5800M	1.64	-4.22	49.34%
5850M	1.49	-4.31	50.19%

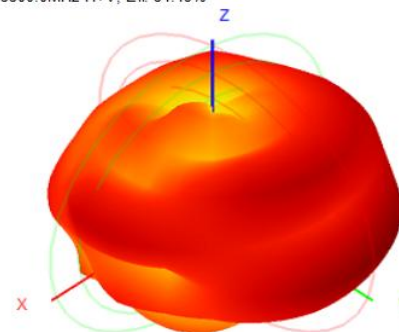
5050.0MHz H+V, Eff. 48.34%



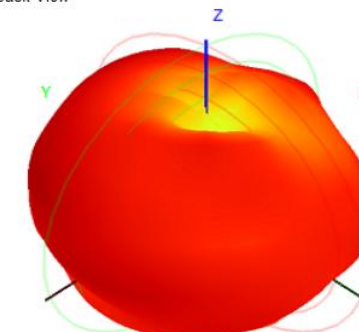
Back View



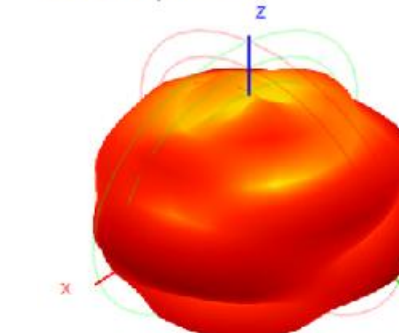
5500.0MHz H+V, Eff. 51.19%



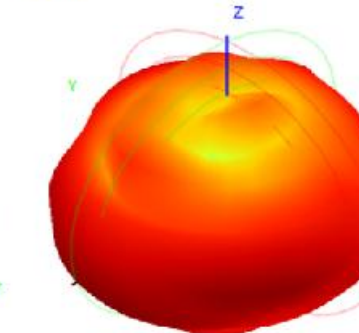
Back View



5650.0MHz H+V, Eff. 50.19%



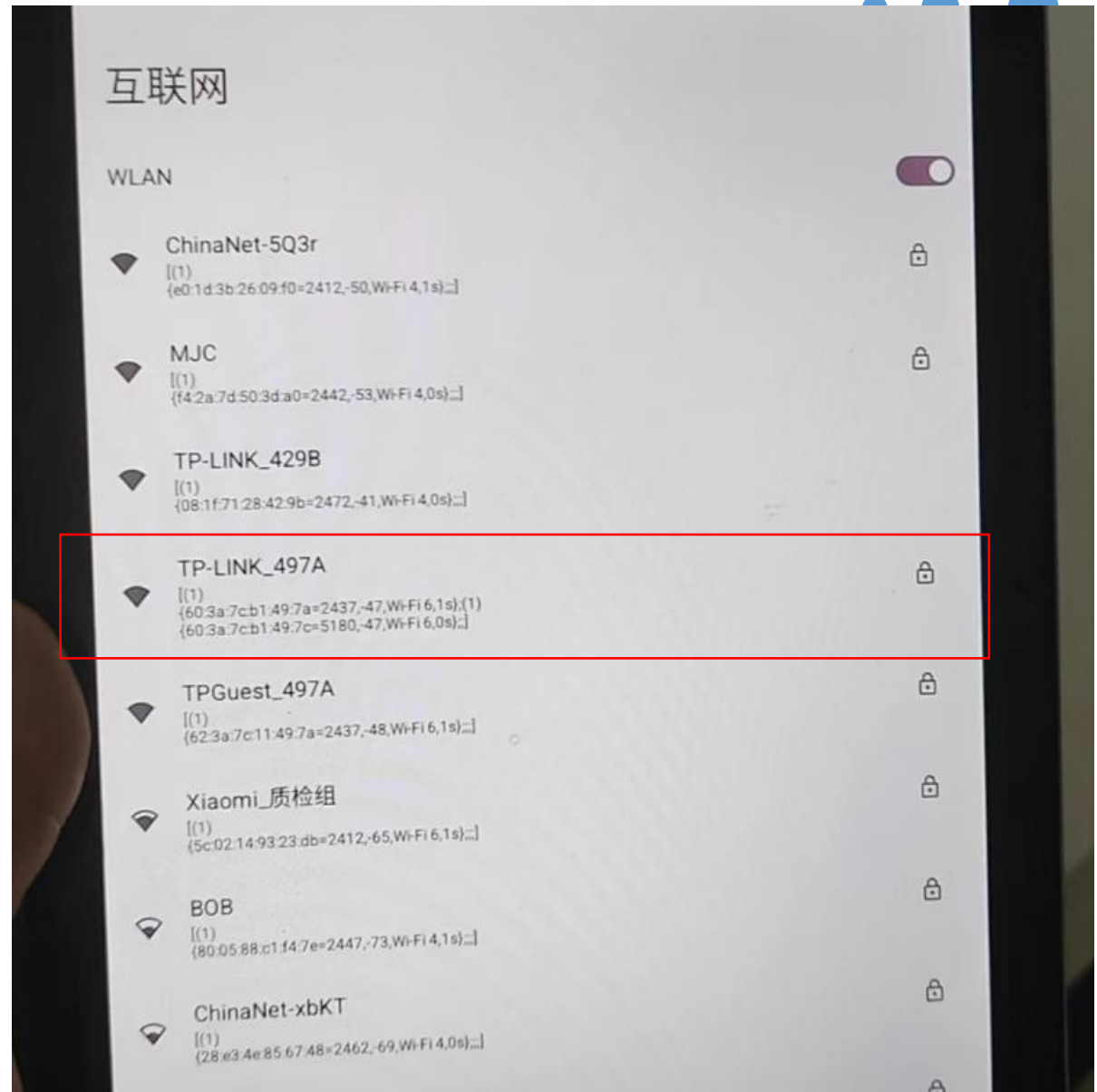
Back View



4.3 WiFi/GPS 实测

WiFi/GPS measurement

10 meters from the router.
Full grid. Internet is normal



4.3 WiFi/GPS 实测

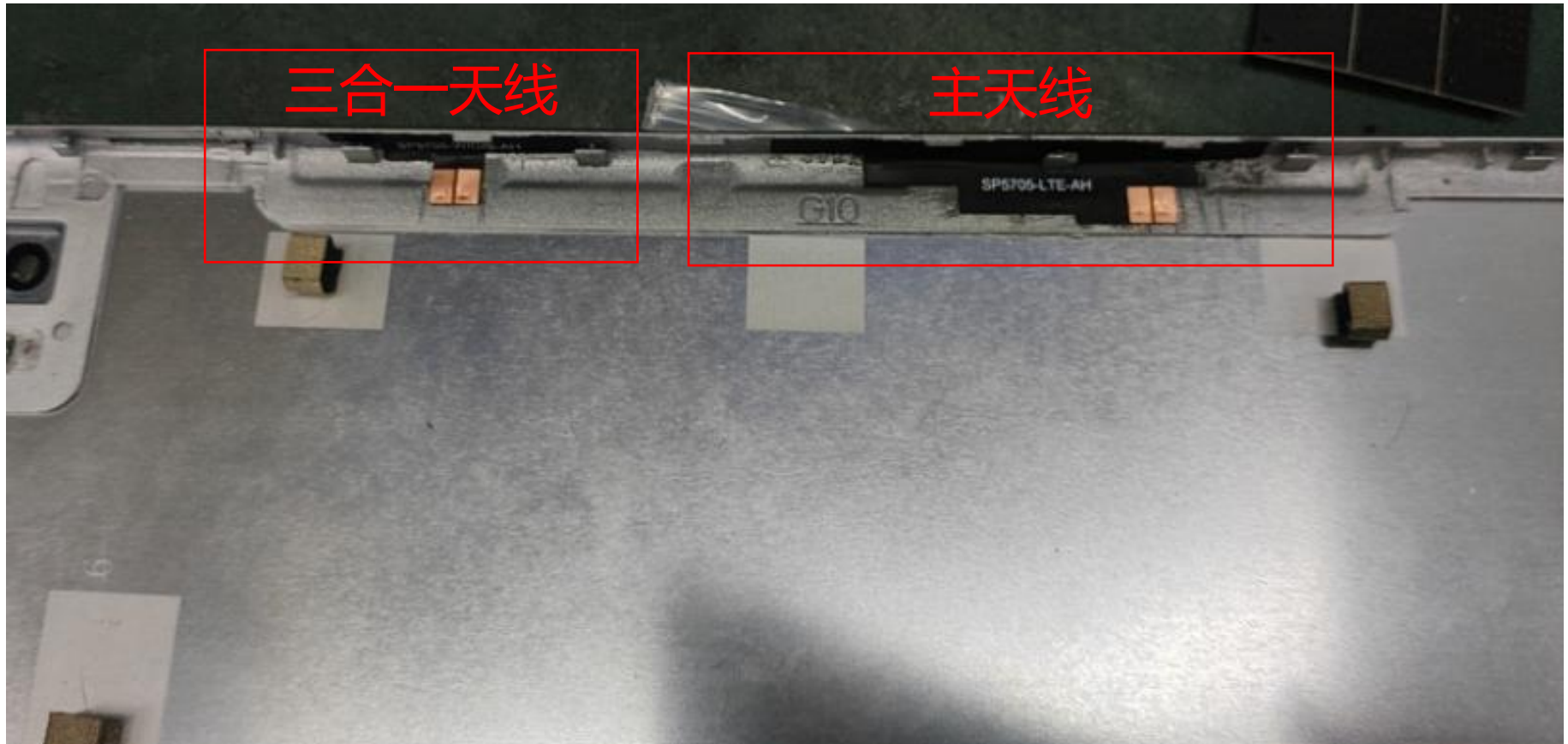
WiFi/GPS measurement

GPS search star test on the roof of our company, there are 2 stars with a star value of 40, positioning time of one minute. Sunny weather

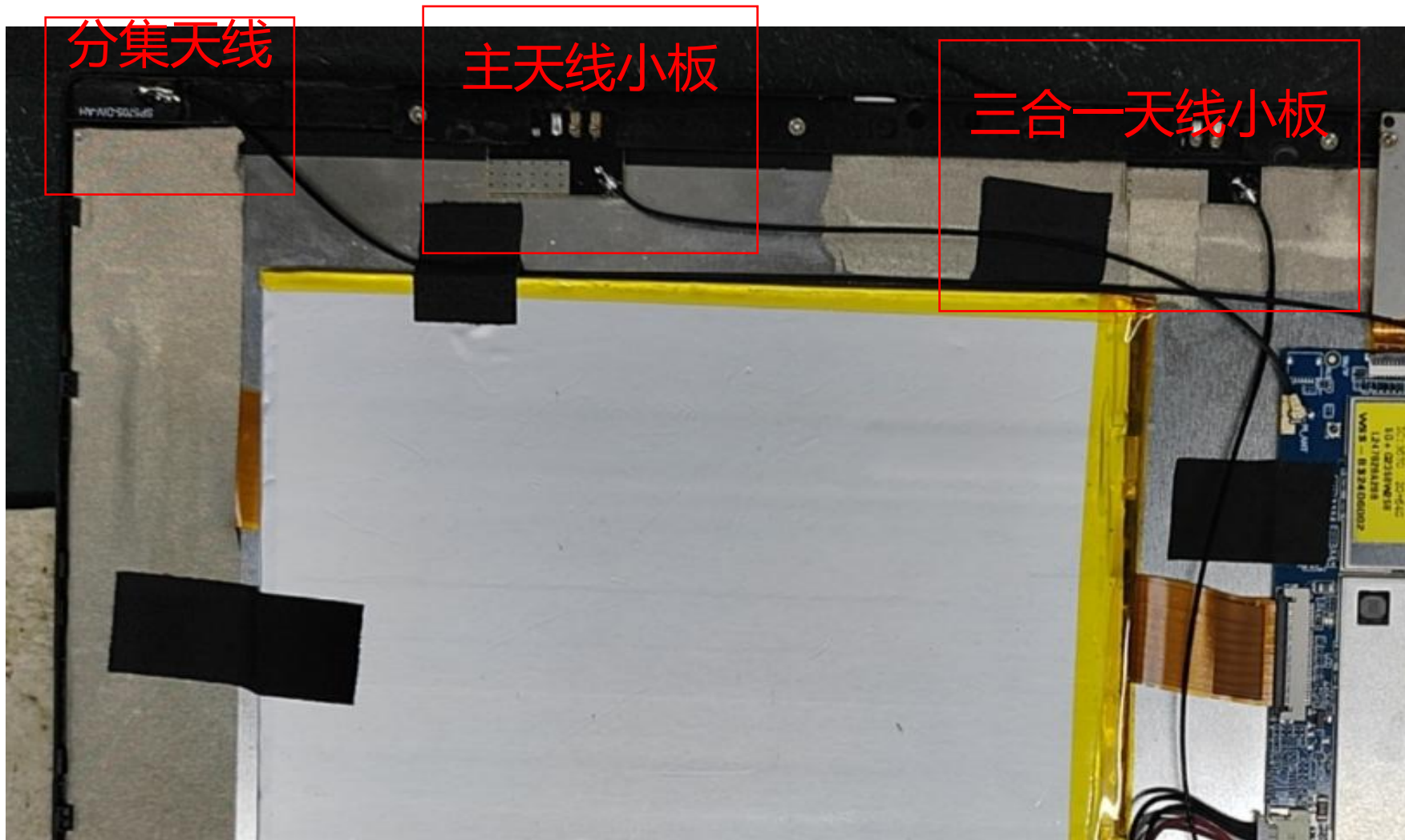




5.1 天线位置 antenna position



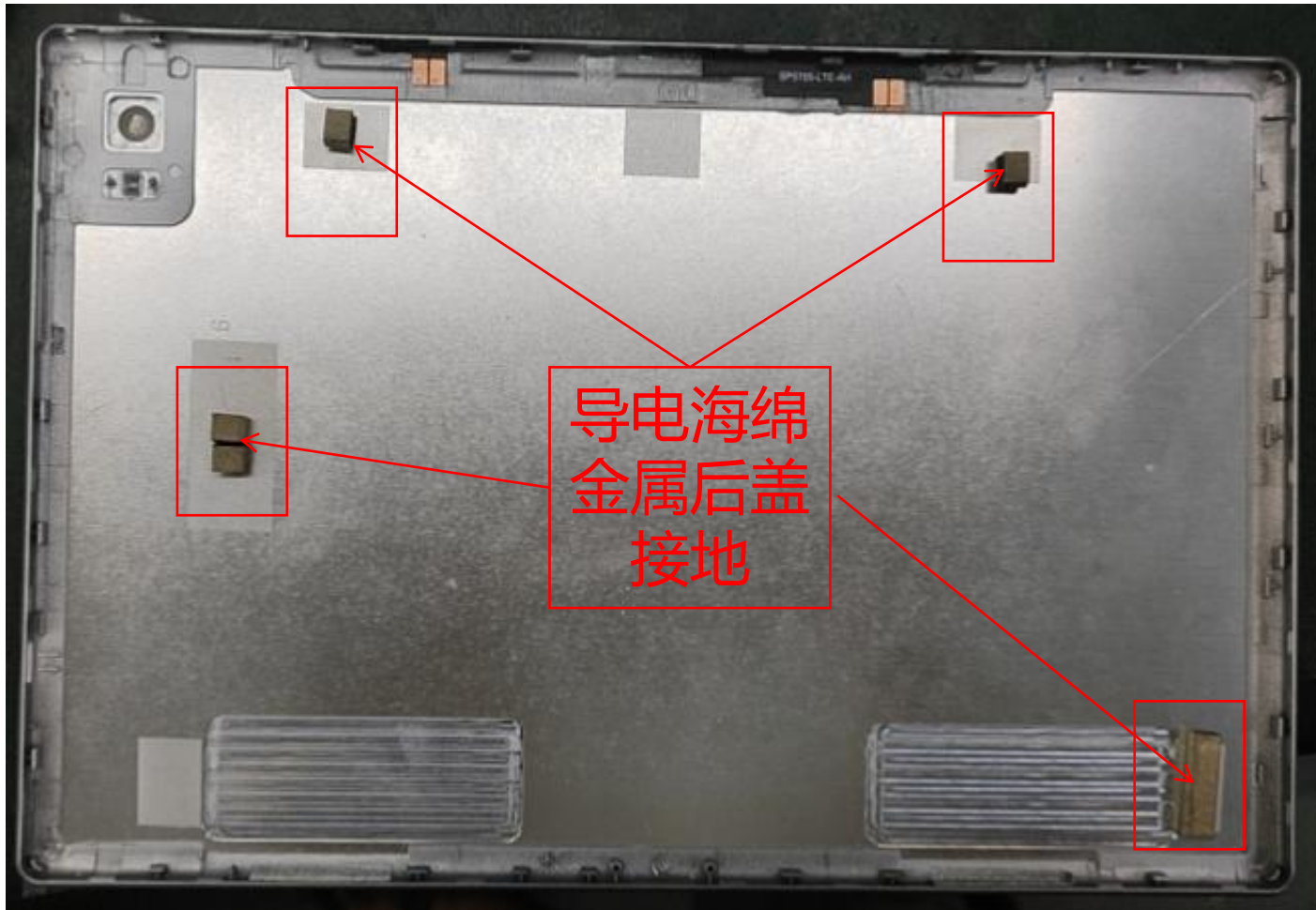
5.1 天线位置 antenna position



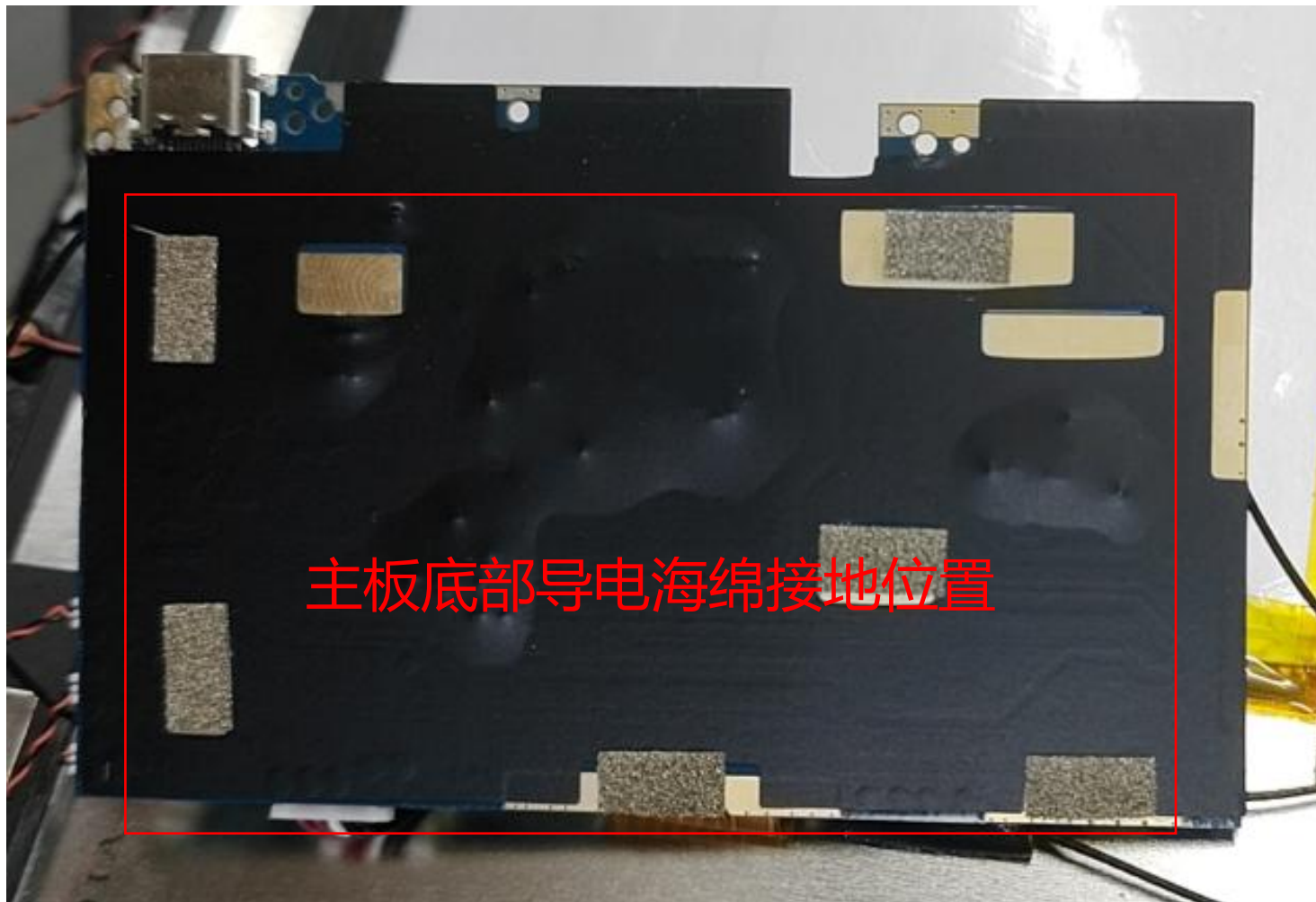
5.1 天线位置 antenna position



5.2 环境处理 environmental manipulation



5.2 环境处理 environmental manipulation



The conductive sponge at the bottom of the motherboard connects her with wisdom

深圳市艾汇科技有限公司

Shenzhen Aihui Technology Co., LTD

Note :1. This report is based on the actual commissioning and testing of the commissioning named device cannot be changed at will;
2. If there is any change in the materials used by the prototype, please timely report to our company for re-verification; 3. List of sensitive devices :TP(material, coating, wiring, etc.) Screen (amplifier circuit, LED, wiring design, etc.) Shell material (antenna assembly method, structural interference, shell material, antenna position height and area, etc.) Motherboard (motherboard conduction, RF circuit matching, PA, dual power, filter, LNA, etc.) Power circuit, etc.) Camera, battery, motor, MIC, fingerprint recognition module, etc. 4. Due to the small number of commissioning prototypes or only one, some probabilistical problems can not be completely found, it is recommended that a small batch of trial production troubleshoot the problem points (such as flashing screen, speaker noise, TP jump point, black screen death, signal diving, etc.)

Thank you