

Shanghai Sunnyway Communication Technology Limited Company

Skyline Acknowledgement Book

Customer: SUNMI		The project: P2 LITE SE	
Operating frequency band: GSM850/ 900/1800/1900 +WCDMA1/2/5/8+LTE Band 1/2/3/4/5/7/12/17/28+TDD Band/38/41			
Motherboard version: P2 LITE SE-MB-V1.2			
Shangyuan material specifications			
Specifications and models	Shangyuan material number	Customer part number	

The record of project changes			
Date of preparation/change	Changes	Change of person	version

Sunnyway counter-signature bar				
Research and development	ME:	Auditor:	QE:	Approver:
	RF:	Auditor:		
Client Counter-signature bar				
EE	PM	RF	QE	

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1. Project information

Machine information



Antenna information

	Antenna version
MAIN	SY-P2 LITE SE-MAIN-V1.7

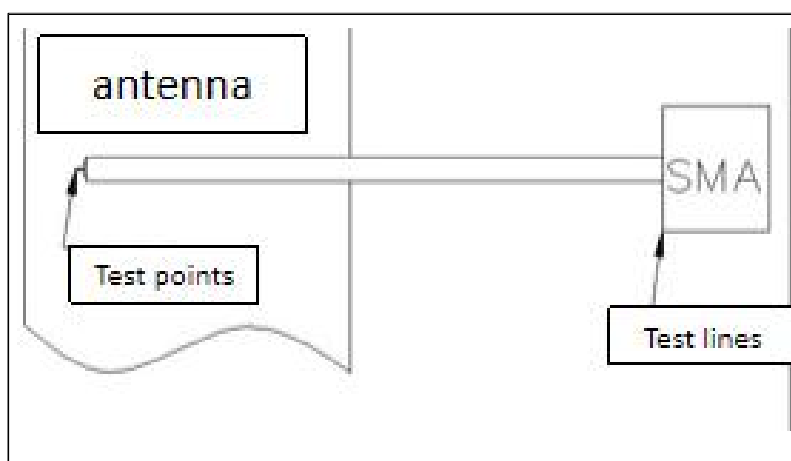


Note: The customer finally verified that the antenna performance prototype was retained in our company for at least one year, which is convenient for analysis and solution to abnormal situations in antenna mass production.
Ensure antenna shipment quality.

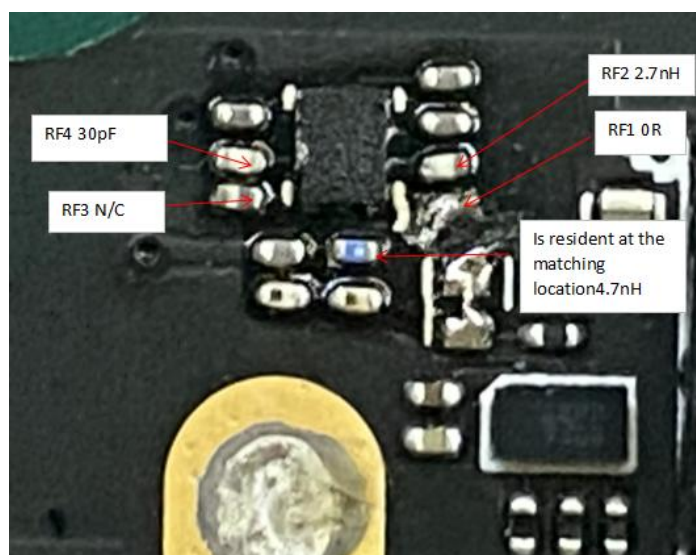
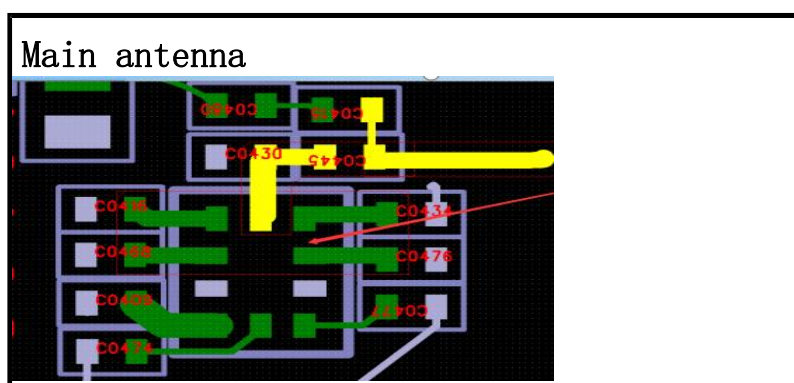
2. Test fixtures

Purpose: To test the passive parameters of the antenna as accurately as possible.

How to make: The prototyping mechanism is made of a 50 ohm coaxial cable, one end is connected to the test point at the back of the matching circuit of the prototype motherboard (the front of the RF test hole), and the other end is connected to the SMA connector. The schematic diagram is as follows:



3. Matching circuits



LA	Value	Frequency band
RF1	0Ω	GSM:900TRP /1800/1900 WCDMA:B1/B2/B4/B8 LTE:B1/B2/B3/B4/B7/B41
RF2	2.7nH	GSM:850/WCDMA:B5/ LTE:B5
RF3	NA	LTE:B12/B17/B28
RF4	30pF	900Tis
常驻位	4.7nH	

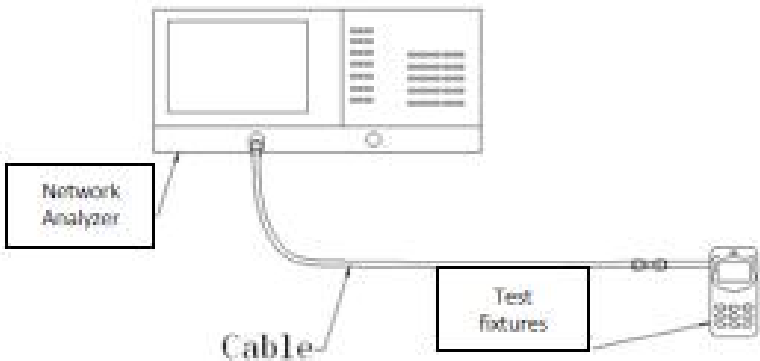
4. S11 test

4. 1S11 Test Method Description

Test Equipment: Network Analyzer (E5071C)

Test method: A 50 ohm CABLE cable is derived from the instrument test port, and the SMA connector of the prototype is connected after calibration using the calibrator to record the return loss and standing wave ratio corresponding to the relevant frequency point.

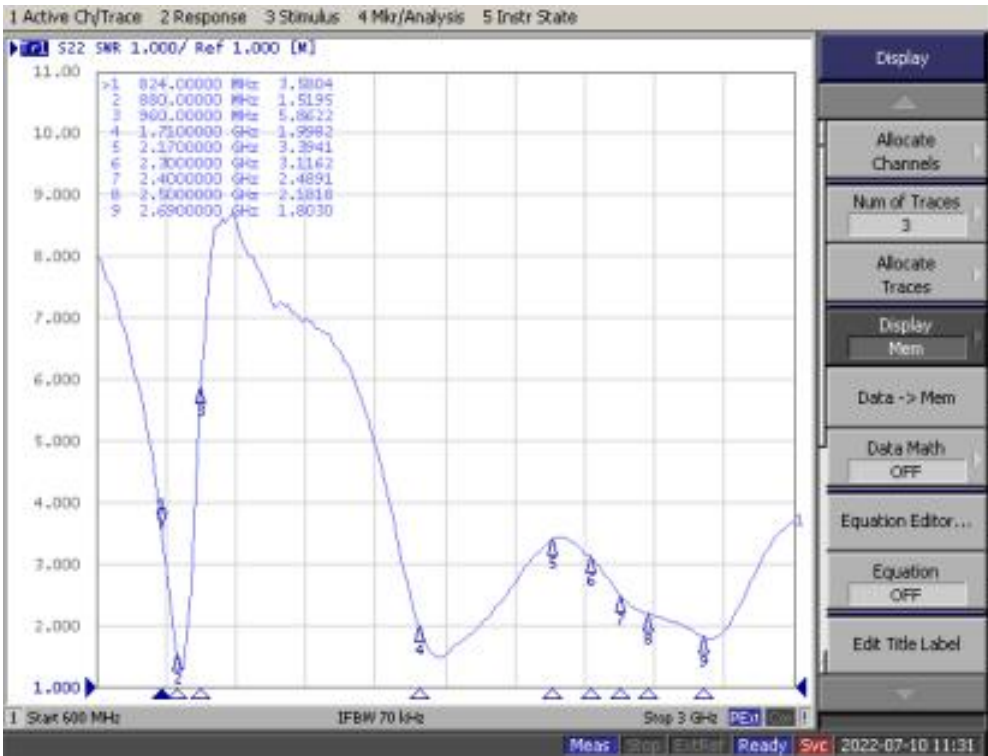
The test diagram is as follows:



Test the schematic

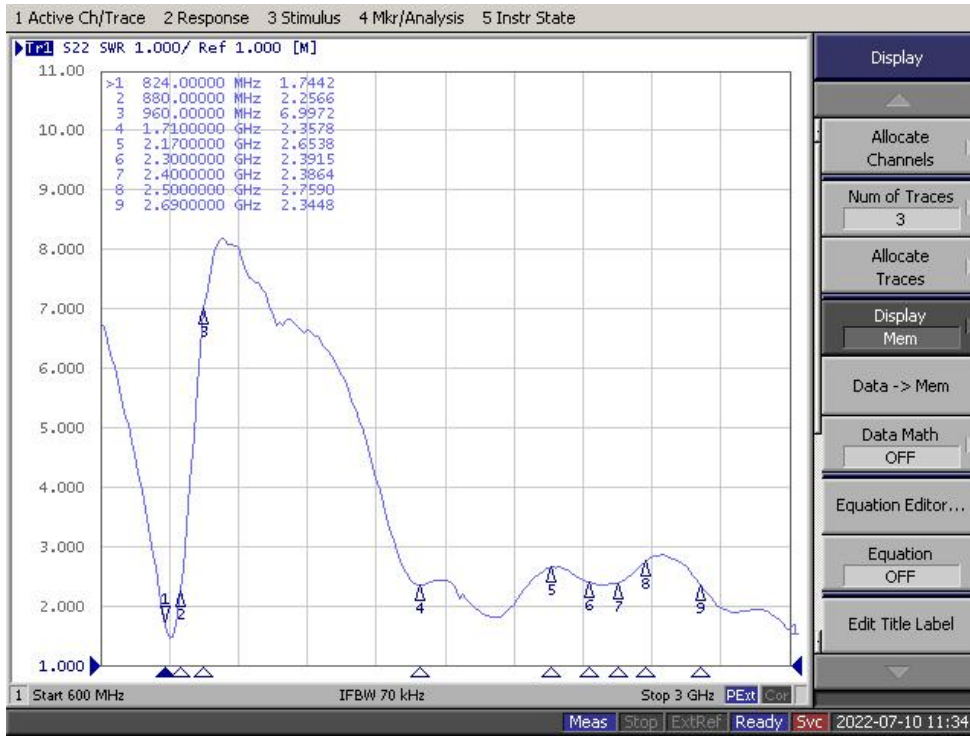
4.2 S11 parameter

Primary antenna/RF1



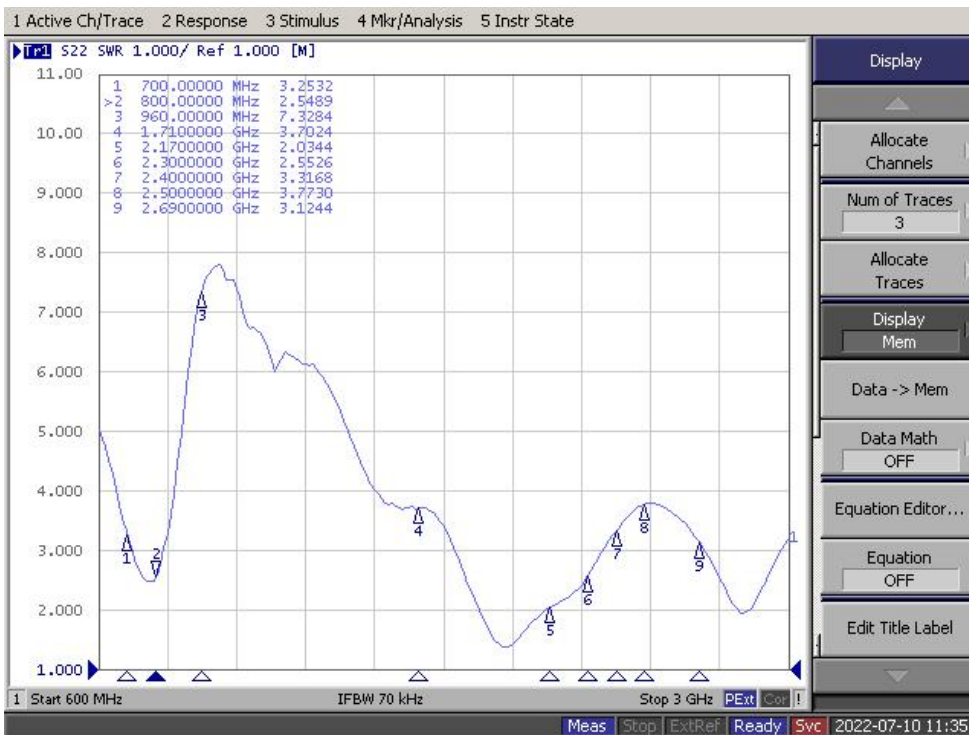
MAIN	RF1
frequency (MHz)	SWR
824	3.58
880	1.51
960	5.86
1710	1.99
2170	3.39
2300	3.11
2400	2.48
2500	2.18
2690	1.80

Primary antenna/RF2



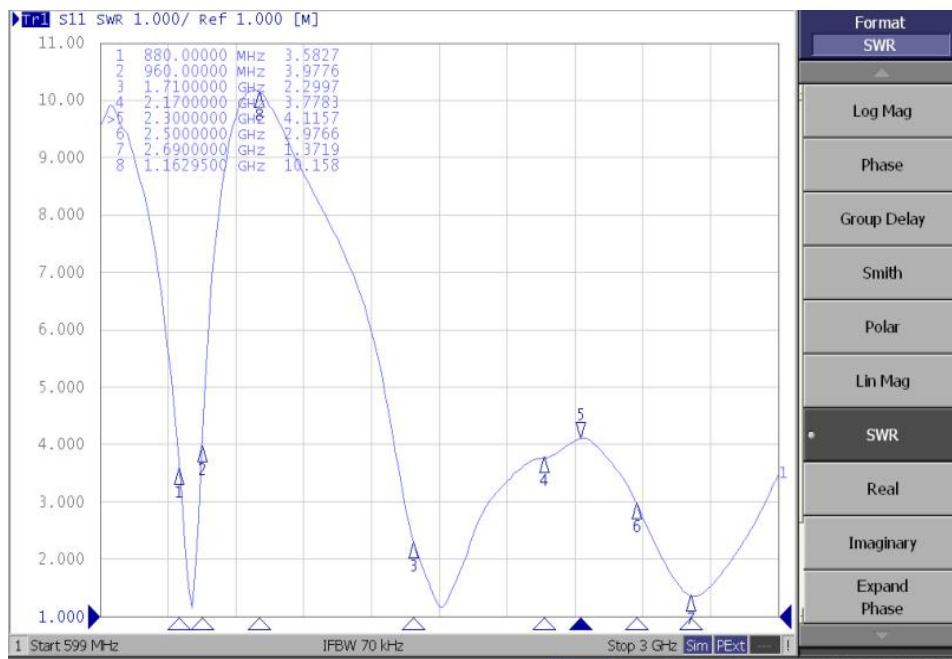
MAIN	RF2
frequency (MHz)	Log Mag
824	1.74
880	2.25
960	6.99
1710	2.35
2170	2.65
2300	2.39
2400	2.38
2500	2.75
2690	2.34

Primary antenna/RF3



MAIN	RF3
frequency (MHz)	Log Mag
700	3.25
800	2.54
960	7.32
1710	3.70
2170	2.03
2300	2.55
2400	3.31
2500	3.77
2690	3.12

Primary antenna/RF4



MAIN	RF4
frequency (MHz)	Log Mag
880	3.58
960	3.97
1710	2.29
2170	3.77
2300	4.11
2500	2.97
2690	1.37

5 Darkroom test data

Test system: Shielded darkroom

Test environment: temperature $22^{\circ}\text{C}\pm 3^{\circ}\text{C}$, humidity $50\%\pm 15\%$

Test equipment: When testing passive data, use the Network Analyzer Agilent E5062C

When testing active data, the Comprehensive Tester Agilent 8960 /CMW500/E4438C is used

5.1 Passive test data

Main antenna RF1 passive efficiency

Shanghai Shangyuan Communication Technology Co., Ltd. antenna recognition

主天线 RF1		主天线 RF1		主天线 RF1		主天线 RF1	
frequency (MHz)	Efficiency (dB)	frequency (MHz)	Efficiency (dB)	frequency (MHz)	Efficiency (dB)	frequency (MHz)	Efficiency (dB)
880	-5.5	1710	-5.5	2040	-5.9	2370	-5.8
890	-5.3	1720	-5.3	2050	-5.9	2380	-5.7
900	-5.0	1730	-5.2	2060	-5.7	2390	-5.7
910	-4.5	1740	-5.0	2070	-6.2	2400	-5.8
920	-4.6	1750	-4.9	2080	-5.6	2410	-5.9
930	-4.9	1760	-4.9	2090	-5.7	2420	-5.8
940	-5.2	1770	-4.9	2100	-5.6	2430	-6.0
950	-5.4	1780	-4.8	2110	-5.3	2440	-5.7
960	-5.8	1790	-4.7	2120	-5.1	2450	-5.8
		1800	-4.4	2130	-5.6	2460	-5.6
主天线 RF2		1810	-4.5	2140	-5.8	2470	-6.0
820	-5.6	1820	-4.7	2150	-5.8	2480	-5.7
830	-5.5	1830	-4.6	2160	-6.0	2490	-5.8
840	-5.7	1840	-4.5	2170	-5.7	2500	-5.4
850	-5.5	1850	-4.4	2180	-5.8	2510	-5.4
860	-5.1	1860	-4.3	2190	-5.6	2520	-5.4
870	-5.1	1870	-4.3	2200	-5.5	2530	-5.5
880	-5.3	1880	-4.5	2210	-5.1	2540	-5.3
890	-5.0	1890	-4.6	2220	-5.2	2550	-5.2
		1900	-5.1	2230	-4.8	2560	-5.3
主天线 RF3		1910	-5.5	2240	-5.4	2570	-5.2
700	-10.4	1920	-5.4	2250	-5.2	2580	-5.2
710	-9.8	1930	-5.6	2260	-5.8	2590	-5.0
720	-9.0	1940	-5.6	2270	-5.6	2600	-5.0
730	-8.7	1950	-5.4	2280	-6.1	2610	-4.9
740	-8.7	1960	-5.6	2290	-5.9	2620	-5.2
750	-9.0	1970	-5.5	2300	-5.9	2630	-5.0
760	-9.1	1980	-5.7	2310	-5.5	2640	-4.9
770	-9.1	1990	-5.4	2320	-5.6	2650	-4.9
780	-8.0	2000	-5.8	2330	-5.5	2660	-5.0
790	-6.8	2010	-6.1	2340	-5.6	2670	-4.8
800	-7.4	2020	-6.0	2350	-5.4	2680	-5.0
810	-7.7	2030	-6.0	2360	-5.7	2690	-5.2
主天线 RF4							
880	-8.0						
890	-6.8						
900	-5.9						
910	-5.2						
920	-4.5						
930	-4.0						
940	-4.2						
950	-5.1						
960	-6.0						

Antenna gain

LA		
	Band	Gain(dBi)
GSM	GSM 850	-1.6
	GSM 900	-0.1
	GSM 1800	-0.1
	GSM 1900	-0.2
WCDMA	WCDMA UMTS I	-2
	WCDMA UMTS II	-0.1
	WCDMA UMTSIV	-1.7
	WCDMA UMTS V	-1.6
	WCDMA UMTS VIII	-0.1
FDD LTE	FDD LTE 1 (10MHz)	-2
	FDD LTE 2 (10MHz)	-0.1
	FDD LTE 3 (10MHz)	-0.1
	FDD LTE 4 (10MHz)	-1.7
	FDD LTE 5 (10MHz)	-1.6
	FDD LTE 7 (10MHz)	0.5
	FDD LTE 12 (10MHz)	-6.4
	FDD LTE17 (10MHz)	-6.4
	FDD LTE 28 (10MHz)	-0.8
TDD LTE	TDD LTE38 (20MHz)	0.5
	TDD LTE41 (20MHz)	0.5

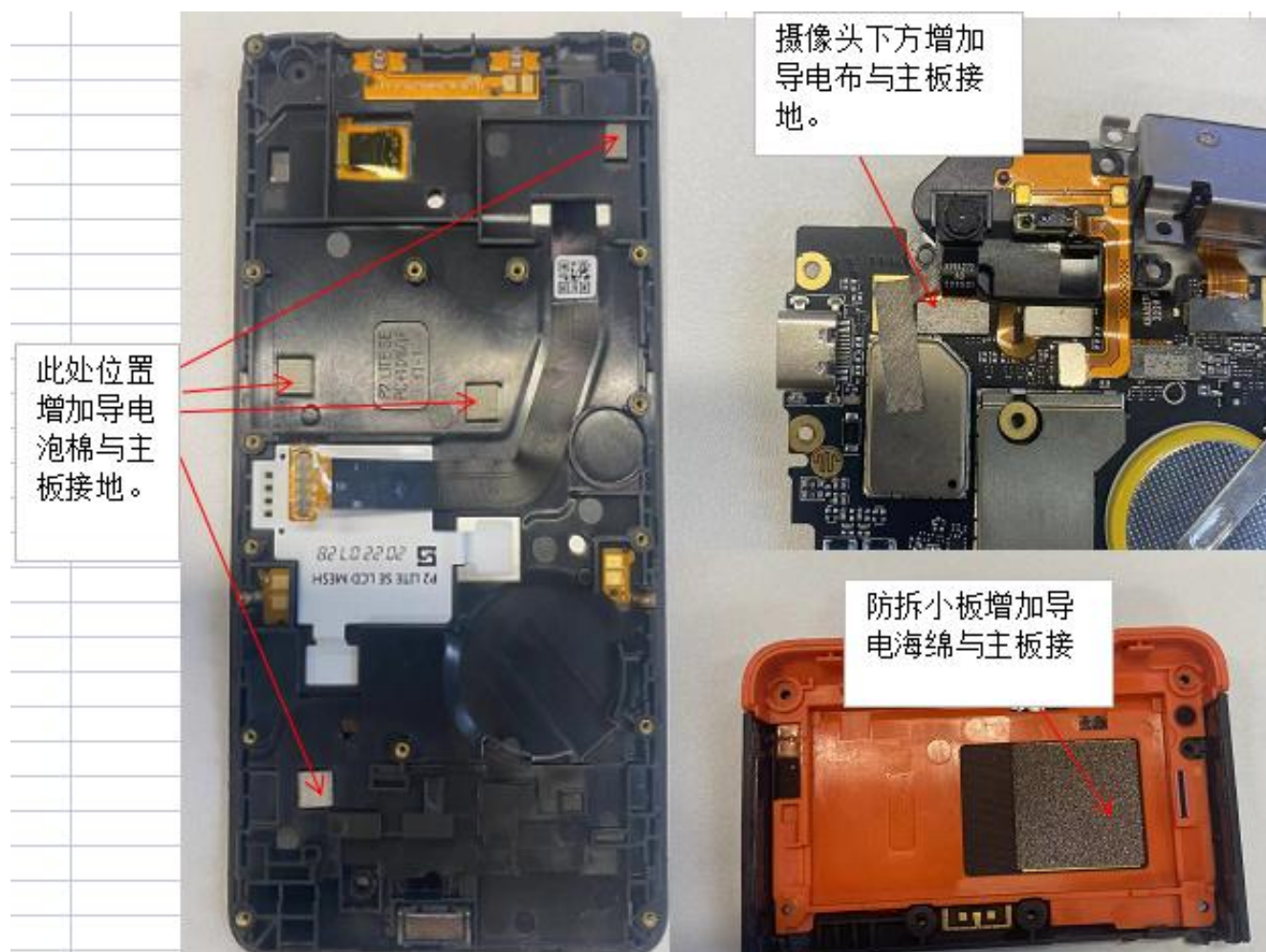
EU		
制式	Band	Gain(dBi)
GSM	GSM850	-1.6
	GSM900	-0.1
	GSM1800	-0.1
WCDMA	WCDMA-B1	-2
	WCDMA-B5	-1.6
	WCDMA-B8	-0.1
FDD LTE	LTE-B110M	-2
	LTE-B310M	-0.1
	LTE-B510M	-1.6
	LTE-B710M	0.5
	LTE-B810M	-0.1
	LTE-B1910M	-1.6
	LTE-B2010M	-0.8
TDD LTE	LTE-B3820M	0.5
	LTE-B4020M	-0.3
	LTE-B4120M	0.5

5.2 Active test data

Main antenna active test data (free space, bright screen)

频段	信道		测试数据		频段	信道		测试数据	
			Free Space					Free Space	
	uplink	downlink	TRP	TIS		uplink	downlink	TRP	TIS
GSM 850	128	128	27.13	-105.58	FDD LTE 3 (10MHz)	19250	1250	18.84	-94.97
	190	190	27.12	-104.56		19575	1575	18.79	-94.82
	251	251	27.11	-104.33		19900	1900	19.09	-94.62
GSM 900	975	975	26.85	-103.91	FDD LTE 4 (10MHz)	20000	2000	19.84	-93.09
	37	37	27.15	-103.51		20175	2175	20.32	-93.42
	124	124	27.16	-102.68		20350	2350	20.11	-93.28
GSM 1800	512	512	25.21	-107.54	FDD LTE 5 (10MHz)	20450	2450	17.65	-92.35
	698	698	25.63	-105.71		20525	2525	17.48	-91.82
	885	885	26.87	-105.58		20600	2600	17.36	-91.37
GSM 1900	512	512	26.87	-105.49	FDD LTE 7 (10MHz)	20800	2800	19.24	-94.33
	661	661	26.15	-105.2		21100	3100	19.32	-94.5
	810	810	25.99	-105.26		21400	3400	18.94	-94.25
WCDMA UMTS I	9612	10562	19.13	-105.82	FDD LTE 12 (10MHz)	23060	5060	17.03	-90.88
	9750	10700	18.46	-105.75		23095	5095	17.39	-90.67
	9888	10838	18.16	-105.52		23130	5130	17.47	-90.25
WCDMA UMTS II	9262	9662	19.27	-106.71	FDD LTE17 (10MHz)	23780	5780	17.03	-90.15
	9400	9800	19.25	-106.13		23790	5790	17.17	-90.22
	9538	9938	18.78	-106.22		23800	5800	17.21	-90.66
WCDMA UMTS V	4132	4357	17.58	-104.1	FDD LTE 28 (10MHz)	27260	9260	17.09	-90.09
	4182	4408	17.54	-104.99		27435	9435	17.12	-90.33
	4233	4458	17.69	-104.09		27610	9610	16.85	-90.81
WCDMA UMTS VIII	2712	2937	17.32	-104.41	TDD LTE38 (20MHz)	37850		19.31	-91.25
	2788	3012	17.41	-104.52		38000		19.07	-91.49
	2863	3088	17.93	-104.37		38150		19.77	-91.73
FDD LTE 1 (10MHz)	18050	50	19.09	-93.27	TDD LTE41 (20MHz)	39750		18.66	-91.69
	18300	300	18.74	-94.1		40620		19.07	-91.63
	18550	550	18.64	-93.19		41490		19.31	-91.62
FDD LTE 2 (10MHz)	18650	650	19.66	-96.77					
	18900	900	19.37	-95.25					
	19150	1150	18.97	-96.33					

6. Prototype grounding



7. Mass production antenna indicators

When the antenna is mass-produced, the standing wave ratio is used as the mass production test standard. According to the differences in the project itself, the following criteria are given:

frequency (MHz)	Mass production standards
Main antenna 700--960; 1710--2690	VSWR (Mass production performance) <VSWR(Acknowledge performance)+0.5

8 Drawings