深圳市千目通讯科技有限公司

Shenzhen Qianmu Communication Technology Co.,Ltd.

Antenna Acknowledgement

Applicable model	H18		
Customer	Shenzhen Mirasol Innovation Intelligent Technology Co., Ltd.		
Specification description			
	Product content	**Specification**	**Customer material code**
Specification description	Antenna	LDS	
Change of resume			
Serial number	**Date**	**Version**	**Brief description of the changes**
1	2024-05-09	V1.0	New project
2			
3			

Supplier sample confirmation			
Research and development	**Structure**	**Audit**	**Judgement**
			PASS FAIL

Customer sample confirmation					
Electron	**Structure**	**Project**	**Procurement**	**Quality**	**Audit**
Reasons for rejection or other precautions:					

1. Test report on electrical performance of main antenna

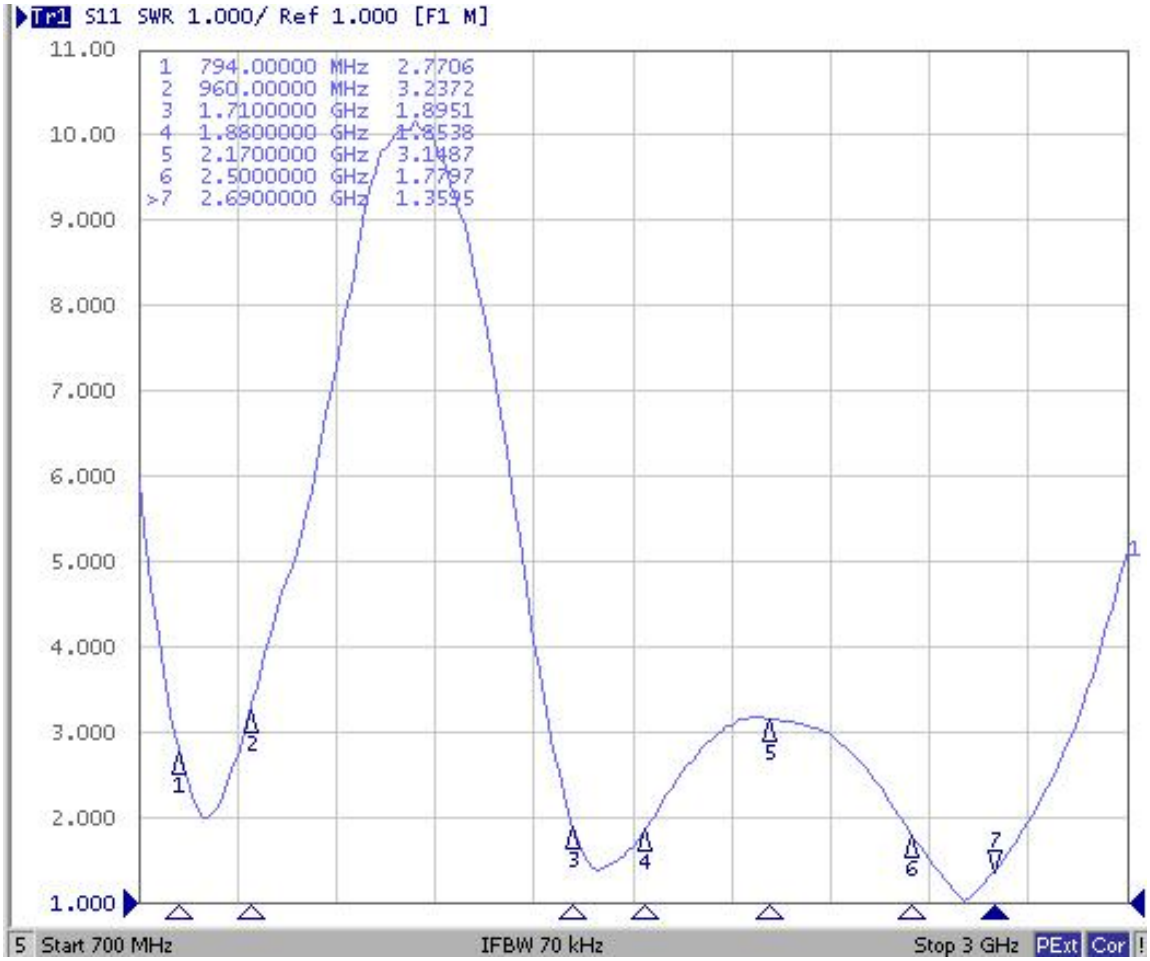
1.1 Test items and equipment

	Test item	Equipment
Passive test	① VS WR parameter ② Return loss parameter	Network analyzer: HP8753D 3D anechoic chamber antenna test system (ETS test system, network analyzer, integrated tester)
Active test	① Transmitting power ② Receiving level ③ Receiving sensitivity	Comprehensive tester: Agilent E5515C 3D darkroom antenna test system (ETS test system, comprehensive tester)

1.2 GSM Passive Test Report

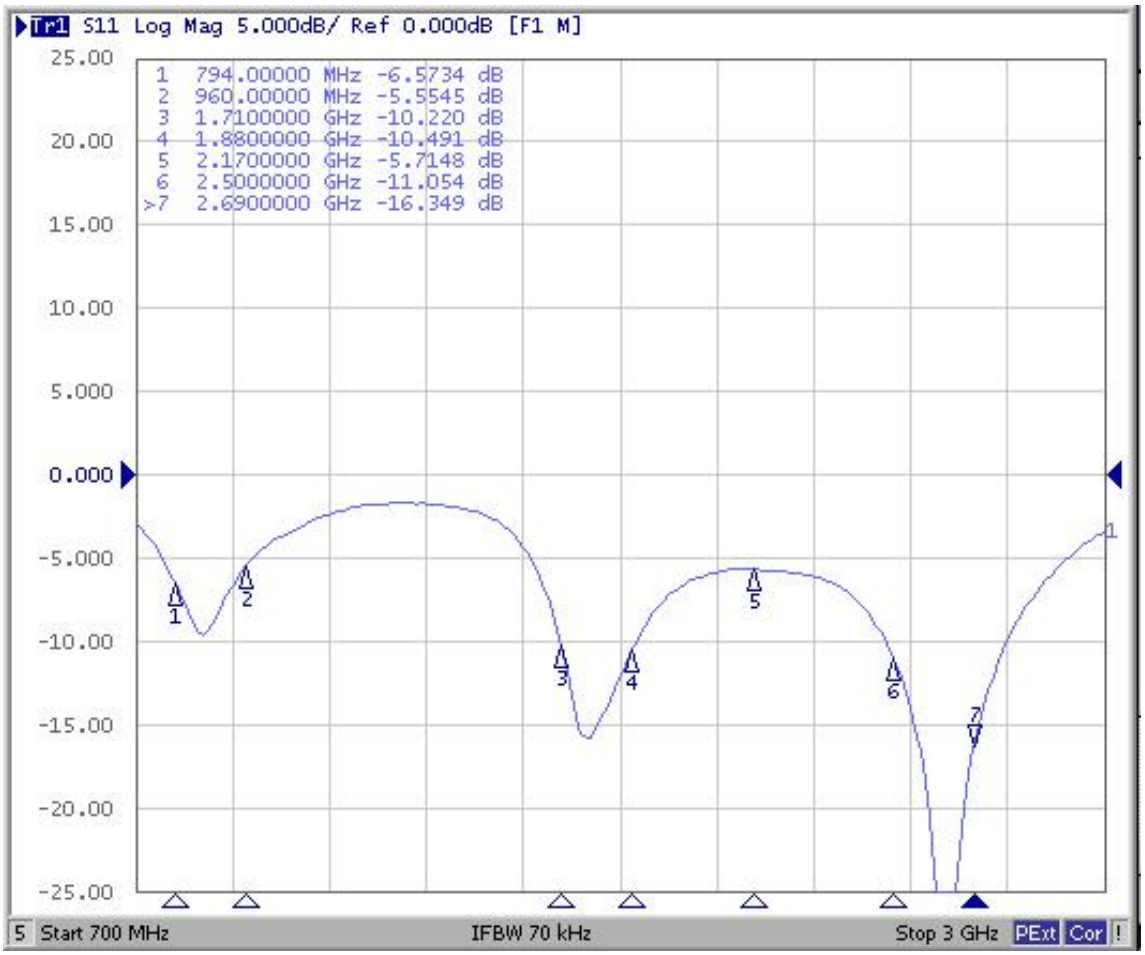
VS WR parameter values

Frequency (MHZ)	794	960	1710	1880	2170	2500	2690
RL	2.7	1.71	1.8	1.8	3.1	1.7	1.3



Return loss parameter value

Frequency (MHZ)	794	960	1710	1880	2170	2500	2690
RL	-6.5	-5.5	-10.2	-10.4	-5.7	-11	-16.3



2. Matching circuit-GSM antenna

The original matching circuit of the prototype is not changed.

3、Test report

	GSM900				DCS1800		
Channel	1	62	124		512	698	885
TRP	17.53	17.48	17.32		21.16	21.37	21.53
TIS			-91.29				-101.48
	GSM850				PCS1900		
Channel	128	190	251		512	661	810
TRP	15.38	15.47	15.62		22.03	22.16	22.47
TIS			-90.47				-101.69

	W850				W900		
Channel	4357	4408	4458		2937	3013	3088
TRP	5.25	5.37	5.41		10.15	9.48	9.13
TIS			-91.14				-91.06
	W1900				W2100		
Channel	9662	9800	9938		10562	10700	10838
TRP	15.12	15.19	15.35		15.27	15.29	15.34
TIS			-101.12				-100.26

	B1				B2		
Channel	18050	18300	18550		18650	18900	19150
TRP	15.36	15.06	15.16		15.43	15.32	15.71
TIS			-89				-88.34
	B3				B4		
Channel	19300	19575	19850		20000	20175	20350
TRP	15.18	15.35	15.59		15.68	15.22	15.75
TIS			-87.07				-88.31

	B5				B7		
Channel	20450	20550	20600		20800	21100	21400
TRP	5.32	5.41	5.53		16.19	15.48	15.44
TIS			-78.26				-86.76
	B8				B12		
Channel	21500	21625	21750		23060	23095	23130
TRP	10.57	9.91	9.31		0.25	0.37	0.45
TIS			-80.21				-70.27

	B17				B20		
Channel	23780	23790	23800		24200	24300	24400
TRP	0.33	0.47	0.52		6.63	6.52	6.24
TIS			-70.63				-78.39

	B34							
Channel	36250	36275	36300					
TRP	15.63	15.27	15.17					
TIS			-86.63					

	B38				B39			
Channel	37850	38000	38150		38350	38450	38550	
TRP	15.88	15.39	15.52		15.04	15.43	15.98	
TIS			-89.01				-86.42	
	B40				B41			
Channel	38750	39150	39550		40340	40740	41140	
TRP	15.95	15.69	15.92		15.81	15.71	15.86	
TIS			-87.18				-89.22	

	B28AB				
Channel	27260	27433	27435	27510	27610
TRP	0.41	0.62	0.67	0.75	0.86
TIS			-70.14		-70.48

Conductive back cover

	B1				B2			
Channel	18050	18300	18550		18650	18900	19150	
TRP	13.09	12.67	12.53		13.41	13.07	13.36	
TIS			-86.41				-87.58	
	B3				B5			
Channel	19300	19575	19850		20000	20175	20350	
TRP	14.28	14.59	14.08		5.12	5.36	5.49	
TIS			-87.58				-78.01	

Conductive back cover

	B38				B39			
Channel	37850	38000	38150		38350	38450	38550	
TRP	11.98	11.49	10.7		13.2	13.52	12.96	
TIS			-85.93				-84.15	
	B40				B41			
Channel	38750	39150	39550		40340	40740	41140	
TRP	14.6	13.79	12.67		13.15	11.69	11.26	
TIS			-85.85				-86.63	

4、Antenna gain

Frequency band	Gain	Frequency band	Gain
B1	0.75	B17	-4.39
B2	1.36	B20	-2.58
B3	1.41	B28	-4.12
B4	1.10	B34	0.64
B5	-2.45	B38	1.02
B7	1.08	B39	0.73
B8	-1.83	B40	1.03
B12	-4.47	B41	0.56

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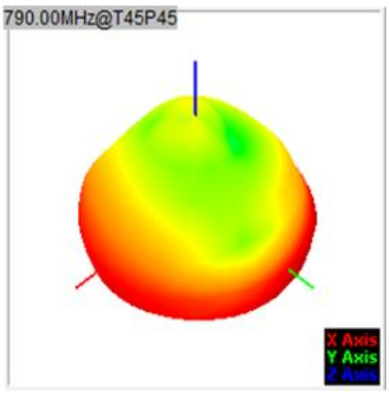
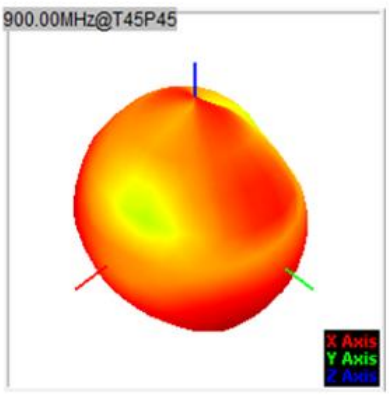
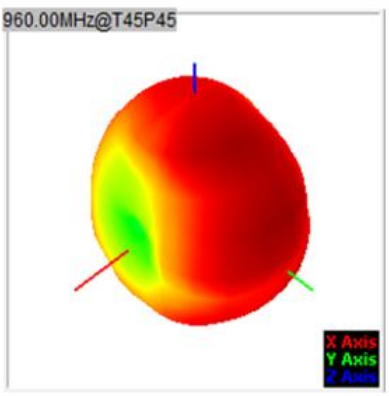
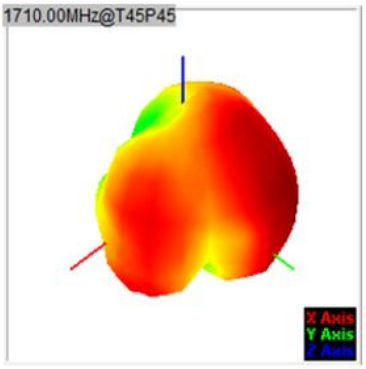
Frequency ID	1	2	3	4	5	6	7	8
Frequency (MHz)	790.0	807.0	824.0	880.0	900.0	920.0	940.0	960.0
Point Values								
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. Rad. Pwr. (dBm)	-12.00	-11.48	-10.91	-7.49	-6.62	-7.02	-8.78	-11.53
Peak EIRP (dBm)	-7.51	-7.29	-6.97	-3.96	-2.45	-1.83	-3.64	-7.42
Directivity (dBi)	4.49	4.19	3.95	3.53	4.17	5.18	5.13	4.11
Efficiency (dB)	-12.00	-11.48	-10.91	-7.49	-6.62	-7.02	-8.78	-11.53
Efficiency (%)	6.30	7.10	8.10	17.80	21.80	19.90	13.20	7.00
Gain (dBi)	-7.51	-7.29	-6.97	-3.96	-2.45	-1.83	-3.64	-7.42
NHPRP ±Pi/4 (dBm)	-12.72	-12.26	-11.76	-8.48	-7.65	-8.11	-10.11	-12.97
NHPRP ±Pi/6 (dBm)	-13.91	-13.49	-13.00	-9.72	-8.87	-9.36	-11.53	-14.47
NHPRP ±Pi/8 (dBm)	-14.91	-14.52	-14.07	-10.63	-9.80	-10.32	-12.70	-15.75
Upper Hem. PRP (dBm)	-16.81	-16.20	-15.58	-11.38	-10.17	-10.45	-11.95	-14.32
Lower Hem. PRP (dBm)	-13.74	-13.27	-12.72	-9.77	-9.15	-9.64	-11.63	-14.77
Upper Hem. PRP (%)	2.09	2.40	2.77	7.28	9.61	9.02	6.38	3.70
Lower Hem. PRP (%)	4.22	4.71	5.34	10.55	12.16	10.87	6.86	3.33

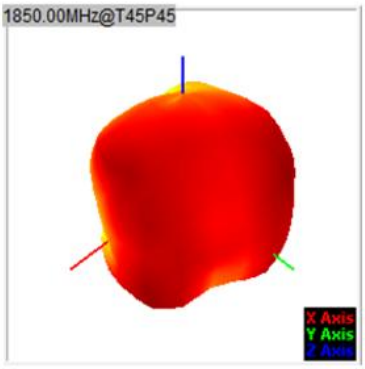


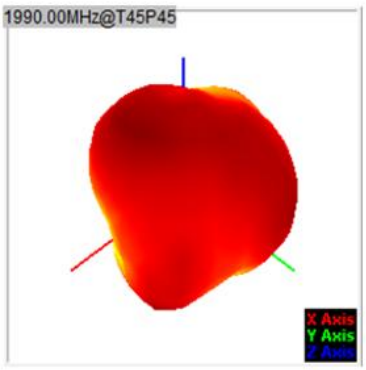




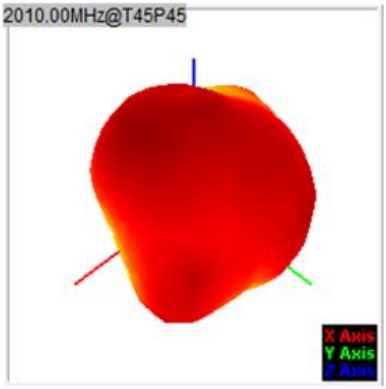
FEITUKEJI															
Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Frequency (MHz)	1710.0	1730.0	1750.0	1770.0	1790.0	1810.0	1830.0	1850.0	1870.0	1890.0	1910.0	1930.0	1950.0	1970.0	1990.0
Point Values															
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. Rad. Pwr. (dBm)	-4.49	-4.36	-4.28	-4.18	-4.32	-4.34	-4.28	-4.35	-4.48	-4.52	-4.42	-4.46	-4.34	-4.41	-4.54
Peak EIRP (dBm)	1.96	1.68	1.41	1.46	0.80	0.73	0.90	0.68	0.72	1.17	1.36	1.32	1.25	1.10	0.91
Directivity (dBi)	6.44	6.04	5.69	5.64	5.12	5.07	5.18	5.03	5.21	5.69	5.78	5.78	5.59	5.51	5.45
Efficiency (dB)	-4.49	-4.36	-4.28	-4.18	-4.32	-4.34	-4.28	-4.35	-4.48	-4.52	-4.42	-4.46	-4.34	-4.41	-4.54
Efficiency (%)	35.60	36.60	37.30	38.20	37.00	36.80	37.30	36.70	35.60	35.30	36.10	35.80	36.80	36.20	35.20
Gain (dBi)	1.96	1.68	1.41	1.46	0.80	0.73	0.90	0.68	0.72	1.17	1.36	1.32	1.25	1.10	0.91
NHPRP ±Pi/4 (dBm)	-5.71	-5.64	-5.51	-5.40	-5.61	-5.69	-5.61	-5.68	-5.83	-5.91	-5.85	-5.92	-5.86	-6.02	-6.27
NHPRP ±Pi/6 (dBm)	-7.26	-7.22	-7.10	-6.99	-7.23	-7.35	-7.26	-7.32	-7.50	-7.62	-7.55	-7.60	-7.52	-7.70	-7.97
NHPRP ±Pi/8 (dBm)	-8.51	-8.51	-8.41	-8.30	-8.53	-8.65	-8.55	-8.61	-8.82	-9.00	-8.94	-8.97	-8.88	-9.04	-9.31
Upper Hem. PRP (dBm)	-6.56	-6.46	-6.41	-6.31	-6.50	-6.56	-6.47	-6.51	-6.65	-6.74	-6.64	-6.62	-6.40	-6.28	-6.18
Lower Hem. PRP (dBm)	-8.69	-8.53	-8.40	-8.31	-8.35	-8.32	-8.30	-8.42	-8.53	-8.50	-8.39	-8.52	-8.58	-8.97	-9.56
Upper Hem. PRP (%)	22.09	22.59	22.88	23.40	22.38	22.10	22.52	22.33	21.61	21.17	21.66	21.78	22.93	23.53	24.12
Lower Hem. PRP (%)	13.51	14.02	14.46	14.77	14.64	14.72	14.77	14.38	14.02	14.13	14.48	14.07	13.88	12.67	11.07

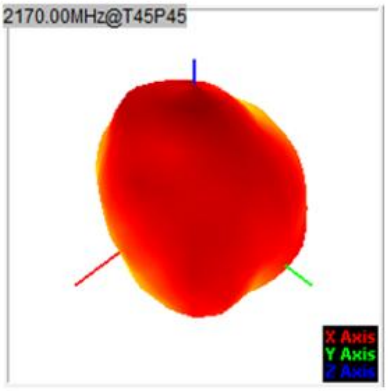


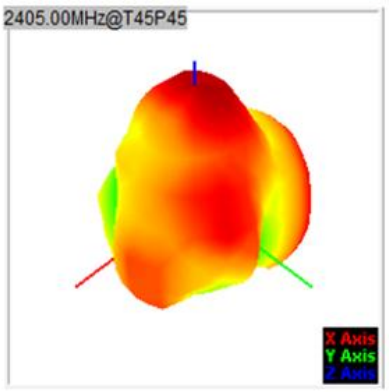




FEITUKEJI																	
Frequency ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Frequency (MHz)	2010.0	2030.0	2050.0	2070.0	2090.0	2110.0	2130.0	2150.0	2170.0	2300.0	2315.0	2330.0	2345.0	2360.0	2375.0	2390.0	2405.0
Point Values																	
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. Rad. Pwr. (dBm)	-4.57	-4.63	-4.53	-4.62	-4.53	-4.81	-4.87	-4.80	-4.84	-4.92	-4.85	-4.80	-4.89	-5.02	-5.08	-5.13	-5.05
Peak EIRP (dBm)	0.60	0.53	0.64	0.07	0.26	-0.25	-0.18	0.39	0.75	0.77	0.94	1.32	1.49	1.42	1.17	1.03	1.30
Directivity (dBi)	5.17	5.16	5.16	4.68	4.79	4.56	4.69	5.19	5.59	5.69	5.79	6.12	6.38	6.44	6.25	6.16	6.35
Efficiency (dB)	-4.57	-4.63	-4.53	-4.62	-4.53	-4.81	-4.87	-4.80	-4.84	-4.92	-4.85	-4.80	-4.89	-5.02	-5.08	-5.13	-5.05
Efficiency (%)	34.90	34.50	35.30	34.50	35.20	33.00	32.60	33.10	32.80	32.20	32.80	33.10	32.40	31.50	31.10	30.70	31.30
Gain (dBi)	0.60	0.53	0.64	0.07	0.26	-0.25	-0.18	0.39	0.75	0.77	0.94	1.32	1.49	1.42	1.17	1.03	1.30
NHPRP ±Pi/4 (dBm)	-6.34	-6.35	-6.22	-6.30	-6.20	-6.53	-6.69	-6.72	-6.72	-6.61	-6.56	-6.53	-6.61	-6.73	-6.77	-6.79	-6.71
NHPRP ±Pi/6 (dBm)	-8.05	-8.05	-7.89	-7.92	-7.81	-8.19	-8.38	-8.43	-8.40	-8.08	-8.00	-7.95	-8.03	-8.16	-8.21	-8.21	-8.10
NHPRP ±Pi/8 (dBm)	-9.36	-9.36	-9.21	-9.20	-9.07	-9.48	-9.67	-9.73	-9.68	-9.24	-9.14	-9.08	-9.16	-9.30	-9.35	-9.33	-9.19
Upper Hem. PRP (dBm)	-6.10	-6.18	-6.15	-6.26	-6.18	-6.46	-6.53	-6.41	-6.41	-6.44	-6.43	-6.49	-6.72	-6.93	-7.07	-7.19	-7.12
Lower Hem. PRP (dBm)	-9.83	-9.84	-9.59	-9.64	-9.54	-9.80	-9.85	-9.89	-10.00	-10.19	-10.00	-9.71	-9.52	-9.49	-9.42	-9.35	-9.26
Upper Hem. PRP (%)	24.54	24.08	24.29	23.67	24.11	22.57	22.25	22.84	22.83	22.68	22.75	22.42	21.28	20.26	19.62	19.09	19.41
Lower Hem. PRP (%)	10.39	10.39	10.98	10.87	11.12	10.46	10.35	10.26	10.00	9.57	10.00	10.69	11.16	11.24	11.43	11.61	11.87



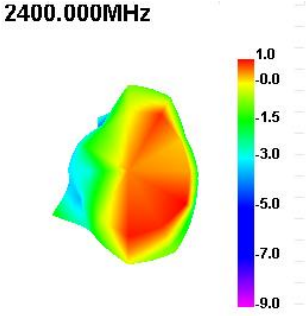


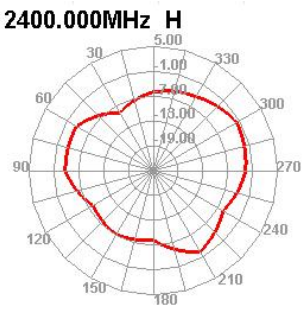


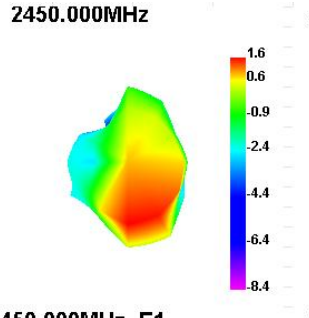
无源测试数据
Passive test data

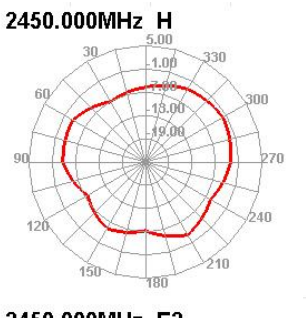
Passive Test For WIFI2.4								
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)
2400	38.11	-4.19	0.95	-1.2	25.64	12.474	0.95	-14.38
2410	39.81	-4	1.21	-0.94	26.779	13.03	1.21	-14.32
2420	39.45	-4.04	1.25	-0.9	26.62	12.835	1.25	-14.3
2430	38.3	-4.17	1.05	-1.1	25.801	12.497	1.05	-13.53
2440	42.62	-3.7	1.49	-0.66	28.426	14.192	1.49	-12.52
2450	44.03	-3.56	1.63	-0.52	29.258	14.773	1.63	-11.59
2460	40.88	-3.88	1.22	-0.93	27.082	13.802	1.22	-11.71
2470	41.79	-3.79	1.28	-0.87	27.528	14.266	1.28	-11.51
2480	44.02	-3.56	1.4	-0.75	28.802	15.214	1.4	-11.48
2490	44.81	-3.49	1.31	-0.84	29.015	15.798	1.31	-11.53
2500	39.97	-3.98	0.84	-1.31	25.717	14.252	0.84	-12.13

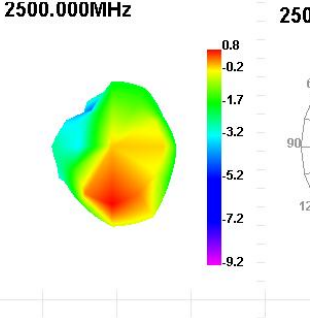
无源测试数据
Passive test data

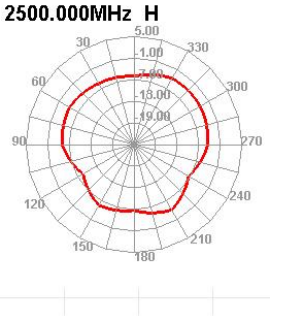


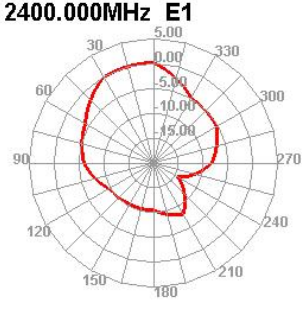


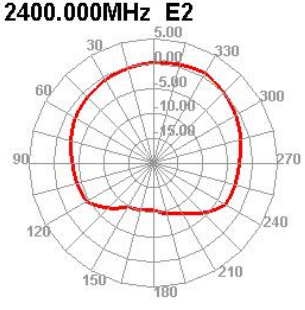


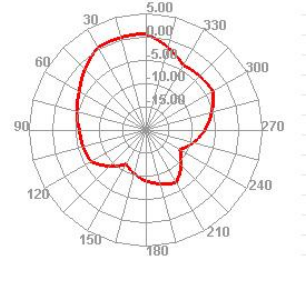


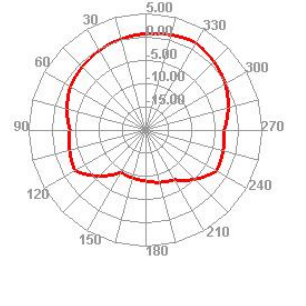


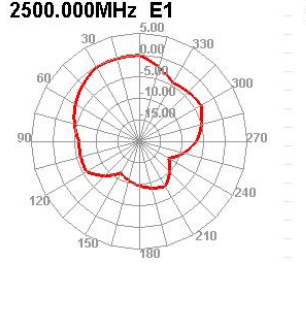


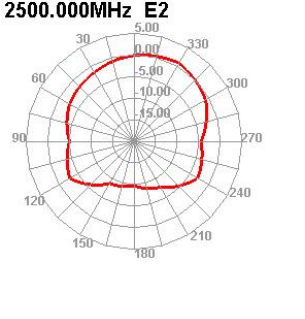




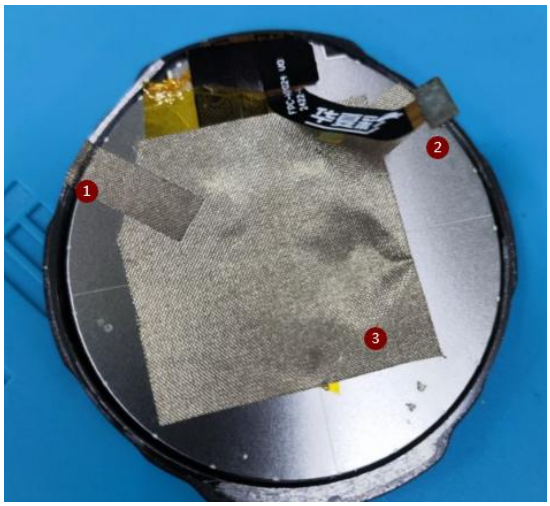




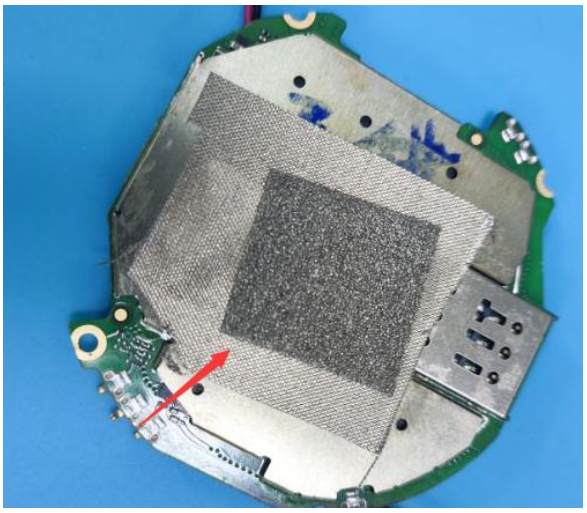




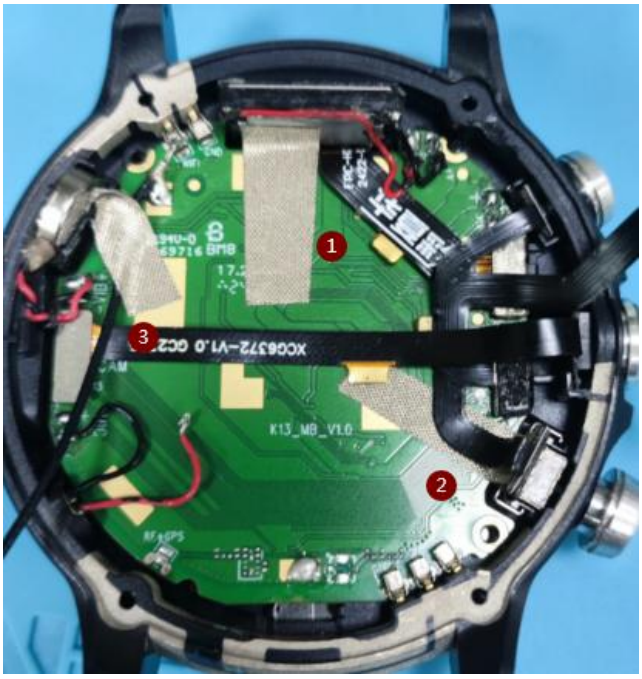
5、Environmental treatment



1.2 Grounding of two metal sections with conductive cloth and screen The unshielded flat cable attached to the missile at 3 places is grounded to the mainboard



Paste conductive cloth and conductive wool here to ground the mainboard



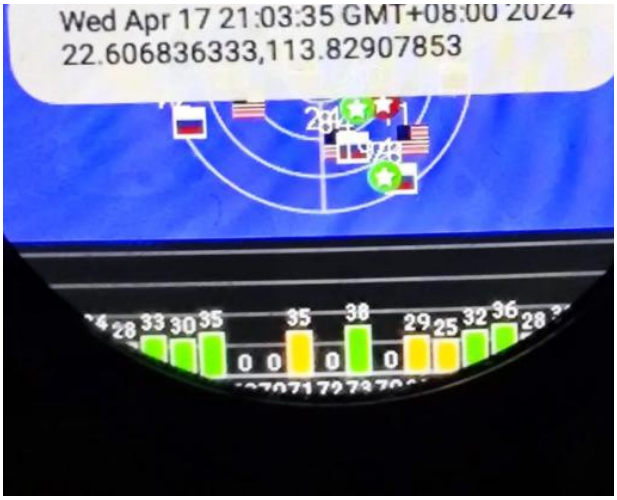
1. The conductive cloth is pasted here and the speaker is grounded with the mainboard.

2. The key with conductive cloth pasted here is grounded to the mainboard.

3. The motor and the mainboard are grounded with conductive cloth here.

6、GPS, WiFi test

WIFI Measured Map



GPS Measured Map

7. Structural drawings