

shanghai Shangyuan Communication Technology Co., LTD

Skyline Acknowledgment

Customer name: Xiangcheng		Project name: R2351	
Working frequency band: G4/W1/2/4/5/8 FDD: 1/2/3/4/5/7/8//12/17/20/25/26/28/38/40/41 GPS/WIFI2. 4G/5G			
Motherboard version:			
Shangyuan material specifications			
specifications and models	Shangyuan material number	Customer part number	
Change your resume			
Date of preparation/change	Change content	Change of person	edition
Shangyuan co-signature bar			
research and development	structure:	examine and verify:	Quality Engineer:
	radio frequency:	examine and verify:	
		ratify:	
Customer signature bar			
electronic engineer	project manager	construction engineer	Quality engineer

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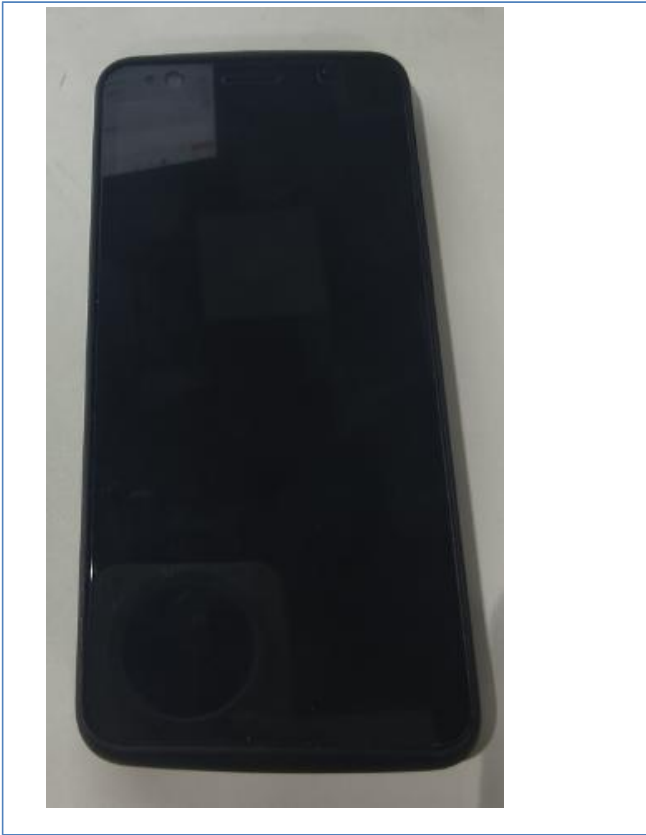
Chongqing R&D Center address: No.19 Xiantao Data Valley East Road, Yubei District, Chongqing C08-1 building-1 floor

catalogue

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1.item information

Machine information



Antenna information

	Antenna version
main antenna	
diversity	
triangle	

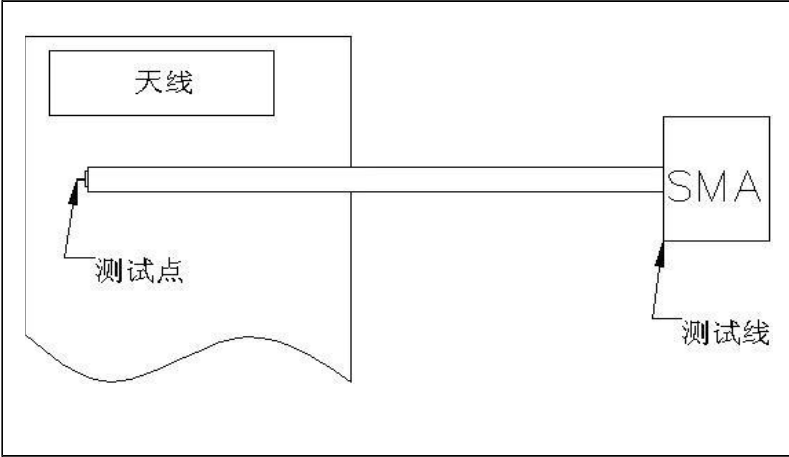
Note: The customers final antenna performance prototype will be retained in our company for at least one year, so as to analyze and solve the abnormal situation in the mass production of antenna,

ensure antenna quality of shipment.

2. Test tools

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

Making method: The prototype fixture is made by connecting one end of a 50 ohm coaxial cable to the test point at the back end of the matching circuit of the prototype motherboard (the front end of the RF test hole), and the other end to the SMA connector. The schematic diagram is as follows:



3.building-out circuit

	Logical matching		
	Main antenna main road		
	item	mate	
	L0531	NC	
	C0533	0 Ω	
	L0532	12nH	
	R0531	0 Ω	
	C0534	NC	
	C0535	NC	
	R0532	0 Ω	
	C0532	0 Ω	
	Main antenna switch		
		c0531	NC
C0530		0 Ω	
L0501		NC	
RF1	C0522	0 Ω	GSM900 WCDMA8/1 FDD:1/8
RF2	C0524	2. 2NH	GSM850, FDD:5, 20/7/38/41
RF3	C0523	27NH	TDD:40
RF4	C0525	NC	GSM:1800/1900 FDD:3

Distributed antenna matching

Main road

item	mate
C0402	15NH
C0400	3PF

Distributed antenna switch

	C0443	NC	tunner logic
	C0442	0 Ω	
	L0502	NC	
RF1	C0537	0 Ω	GSM900, 1900, W:1/8 FDD:1/8TDD:40
RF2	C0538	3. 3NH	GSM:850, 1800 FDD:3. 5, 20, 7TDD:38/41
RF3	C0539	12NH	NC
RF4	C0540	NC	NC

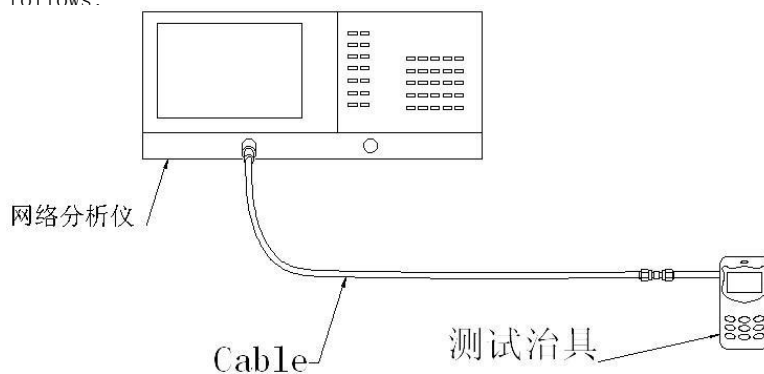
4. S11 Test

1. S11 Test method description

Test equipment: Network Analyzer (E5071C)

Test method: A 50 ohm CABLE cable is exported from the instrument test port, and the SMA connector of the sample machine fixture is connected after calibration with a calibration piece, and the echo loss and standing wave ratio corresponding to the relevant frequency points are recorded.

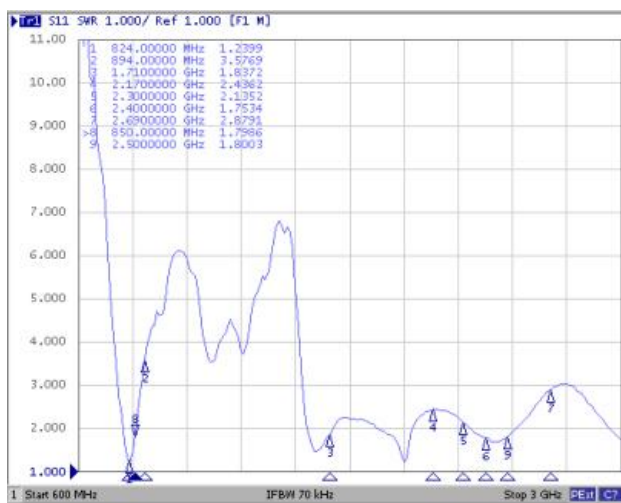
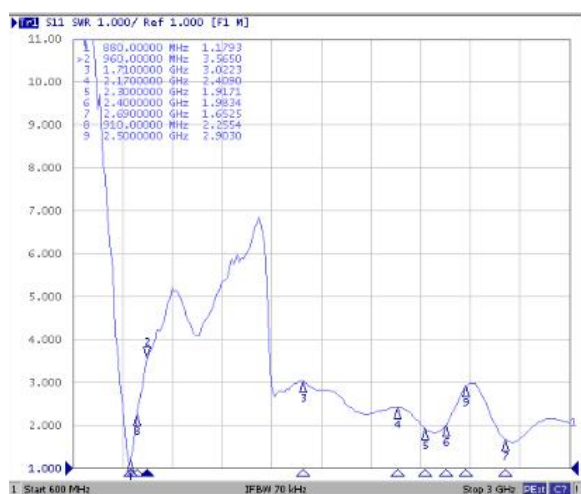
The test diagram is as follows:



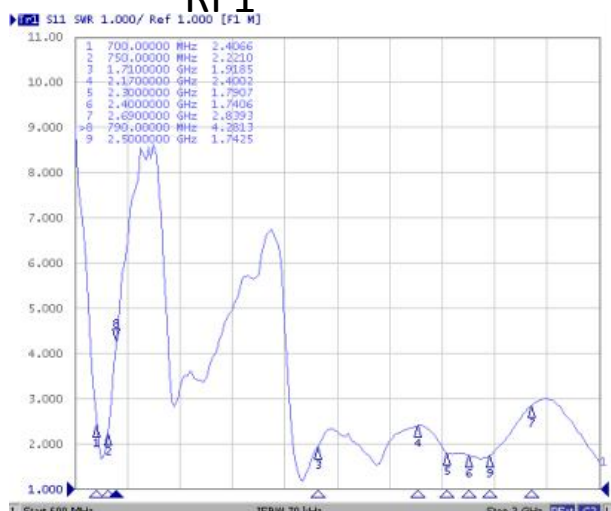
Schematic diagram of the test

4.2 S11 parameters

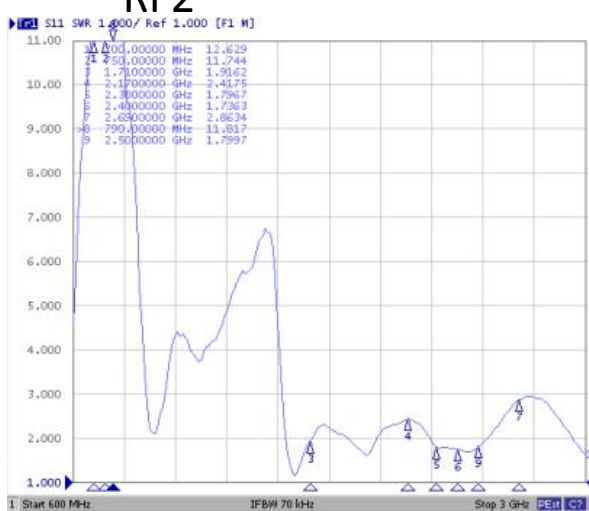
Main antenna



RF1



RF2



RF3

RF4

Diversity antenna



RF1



RF2



RF3

Diversity antenna 2



GPS/WIFI



5 Dark room test data

Test system: shielded dark room

Test environment: temperature 22°C± 3°C, humidity 50%±15%

Test equipment: Use network analyzer Agilent E5062C when testing passive data

When testing active data, use the comprehensive tester Agilent 8960 /CMW500/E4438c

5.1 Passive test data

5.1.1 Passive efficiency of the main antenna

frequency (MHz)	gain (dBi)	productive ness (dBi)	productive ness (%)	frequency (MHz)	gain (dBi)	productive ness (dBi)	productive ness (%)	frequency (MHz)	gain (dBi)	productive ness (dBi)	productive ness (%)
700	0.92	-6.41	22.84	1820	2.16	-4.62	34.49	2340	1.83	-5.13	30.71
710	0.52	-5.71	26.85	1830	2.49	-4.56	35.02	2350	1.77	-5.39	28.88
720	0.54	-6.02	25.02	1840	2.28	-5.27	29.71	2360	1.65	-5.65	27.24
730	0.4	-6.32	23.33	1850	2.32	-5	31.63	2370	1.58	-5.71	26.85
740	0.2	-7.08	19.58	1860	2.3	-5.28	29.62	2380	1.8	-5.57	27.76
750	0.61	-7.24	18.9	1870	2.11	-4.91	32.26	2390	1.96	-5.25	29.82
760	1.38	-6.87	20.58	1880	2.12	-4.63	34.42	2400	1.89	-5.31	29.46
770	1.3	-6.92	20.34	1890	1.76	-4.94	32.06	2500	1.88	-5.66	27.14
780	-2.66	-8.43	14.35	1900	1.72	-4.9	32.38	2510	1.73	-5.94	25.46
790	-2.97	-7.9	16.2	1910	1.45	-5.48	28.31	2520	1.66	-6.13	24.37
frequency (MHz)	gain (dBi)	productive ness (dBi)	productive ness (%)	1920	1.46	-5.47	28.36	2530	1.99	-5.74	26.69
820	-0.92	-6.28	23.55	1930	2.05	-5.32	29.4	2540	2.02	-5.66	27.14
830	-1.68	-6.14	24.31	1940	2.54	-4.49	35.53	2550	2.3	-5.08	31.06
840	-0.46	-4.87	32.57	1950	2.67	-3.96	40.17	2560	2.16	-5.15	30.52
850	-0.64	-5.65	27.2	1960	1.97	-4.16	38.36	2570	1.99	-5.26	29.81
860	-1.15	-6.24	23.78	1970	1.97	-4.03	39.57	2580	1.64	-5.52	28.08
870	-0.56	-6.99	20.02	1980	2.06	-4.14	38.55	2590	1.35	-5.83	26.13
880	-0.55	-6.51	22.33	1990	1.63	-4.58	34.87	2600	1.1	-6.11	24.5
890	-1.75	-7.82	16.51	2000	1.03	-5.21	30.12	2610	0.78	-6.32	23.33
frequency (MHz)	gain (dBi)	productive ness (dBi)	productive ness (%)	2010	0.09	-5.75	26.62	2620	0.75	-6.24	23.74
880	0.26	-4.39	36.37	2020	-0.43	-5.67	27.11	2630	0.71	-6.32	23.36
890	0.83	-4.05	39.36	2030	-2.26	-6.66	21.57	2640	0.77	-6.25	23.73
900	0.18	-4.38	36.5	2040	-2.29	-6.79	20.93	2650	1.19	-5.83	26.09
910	-0.71	-5.73	26.72	2050	-3.09	-7.32	18.56	2660	1.11	-6	25.15
920	-1.28	-6.82	20.82	2060	-2.27	-6.48	22.47	2670	0.84	-6.43	22.76
930	-0.9	-7.32	18.54	2070	-1.4	-5.71	26.85	2680	1.93	-6.88	20.52
940	-0.68	-7.2	19.04	2080	-1.38	-5.72	26.81	2690	1.47	-7.58	17.46
950	0.54	-5.95	25.42	2090	-0.73	-5.61	27.48				
960	0.94	-5.31	29.45	2100	-0.29	-5.88	25.8				
1710	3.04	-4.03	39.57	2110	-0.12	-5.86	25.96				
1720	2.81	-4.34	36.8	2120	-0.14	-6.3	23.47				
1730	2.96	-4.05	39.37	2130	0.08	-6.04	24.91				
1740	2.77	-4.52	35.31	2140	0.58	-5.4	28.82				
1750	2.79	-4.49	35.59	2150	0.25	-5.8	26.27				
1760	2.87	-4.27	37.44	2160	0.51	-5.24	29.92				
1770	2.53	-4.83	32.87	2170	0.56	-5.46	28.43				
1780	2.67	-3.94	40.4	2300	1.26	-5.87	25.9				
1790	2.91	-3.74	42.23	2310	1.47	-5.6	27.52				
1800	2.51	-3.72	42.43	2320	1.65	-5.3	29.48				
1810	2.38	-3.96	40.19	2330	1.7	-5.11	30.81				

5.1.2 Diversity antenna efficiency

frequency (MHz)	gain (dBi)	productiveness (dBi)	productiveness (%)
750	-2.65	-8.37	14.55
760	-3.03	-8.79	13.2
770	-3.68	-9.48	11.28
780	-2.44	-7.73	16.86
790	-2.89	-7.81	16.57
frequency (MHz)	gain (dBi)	productiveness (dBi)	productiveness (%)
850	1.14	-6.84	20.7
860	1.54	-6.44	22.68
870	1.93	-5.95	25.39
880	2.07	-5.74	26.64
890	1.91	-5.83	26.1
frequency (MHz)	gain (dBi)	productiveness (dBi)	productiveness (%)
920	-1.71	-7.25	18.86
930	-1.19	-6.75	21.11
940	-0.97	-6.45	22.66
950	-0.87	-6.26	23.66
960	-1	-6.35	23.18
1880	-1.89	-6.72	21.29
1890	-1.49	-6.37	23.06
1900	-0.08	-5.42	28.73
1910	0.28	-5.13	30.68
1920	-0.08	-5.29	29.59
1930	0.09	-5.12	30.75
1940	1.74	-4.89	32.41
1950	0.7	-5.9	25.7
1960	0.88	-5.86	25.93
1970	1.05	-5.77	26.47
1980	1.42	-5.55	27.83
1990	1.97	-5.59	27.62
2000	2.06	-5.61	27.45
2010	1.78	-5.82	26.18
2020	0.35	-7.01	19.88
2030	-0.73	-7.7	16.98
2040	-1.43	-8.09	15.54
2050	-2.18	-8.49	14.17
2060	-1.01	-7.44	18.04
2070	-1.23	-7.55	17.58
2080	-0.09	-6.83	20.73
2090	-0.14	-6.83	20.73
2100	-0.79	-7.33	18.51
2110	-1.96	-8.1	15.5
2120	-2.9	-8.79	13.2
2130	-2.95	-8.72	13.41
2140	-3.54	-9.07	12.39
2150	-3.1	-8.77	13.27
2160	-2.67	-8.52	14.07
2170	-2.65	-8.55	13.97

Diversity 2 efficiency

frequency (MHz)	gain (dBi)	productiveness (dBi)	productiveness (%)
2400	0.9	-5.11	30.83
2410	1.27	-4.84	32.8
2420	1.23	-5.04	31.34
2430	1.27	-5.23	29.96
2440	1.39	-5.35	29.15
2450	1.51	-5.49	28.25
2460	2.01	-5.21	30.11
2470	2.17	-5.27	29.7
2480	2.67	-4.99	31.72
2490	2.68	-5.17	30.44
2500	2.74	-5.28	29.64
2510	2.85	-5.27	29.72
2520	3.01	-5.24	29.95
2530	3.09	-5.31	29.46
2540	2.83	-5.51	28.11
2550	2.89	-5.49	28.28
2560	2.91	-5.54	27.93
2570	2.86	-5.61	27.49
2580	2.95	-5.55	27.86
2590	2.65	-5.8	26.28
2600	2.59	-5.86	25.94
2610	2.21	-6.03	24.93
2620	2.57	-5.63	27.36
2630	2.03	-6.02	25.03
2640	1.74	-6.4	22.93
2650	2.46	-5.04	31.34
2660	2.72	-5.02	31.49
2670	2.48	-5.2	30.18
2680	3.01	-5.36	29.12
2690	2.51	-5.75	26.62
2700	2.21	-5.83	26.12

Three-way antenna efficiency

frequency (MHz)	gain (dBi)	productivene ss (dBi)	productivene ss (%)
1520	0.53	-4.86	32.69
1530	0.59	-4.85	32.72
1540	0.54	-4.62	34.52
1550	1.09	-3.81	41.6
1560	0.91	-4.35	36.74
1570	1.16	-4.34	36.78
1580	0.59	-5.08	31.04
1590	0.3	-4.85	32.72
1600	-0.23	-4.44	35.96
1610	-0.79	-4.75	33.48

frequency (MHz)	gain (dBi)	productiveness (dBi)	productiveness (%)	frequency (MHz)	gain (dBi)	productiveness (dBi)	productiveness (%)
2400	3.43	-5	31.6	5200	2.8	-3.23	47.55
2410	3.4	-4.89	32.43	5220	3.22	-2.91	51.16
2420	3.22	-4.97	31.83	5240	3.23	-3.05	49.58
2430	3.2	-4.85	32.71	5260	2.87	-3.44	45.25
2440	3.11	-4.85	32.7	5280	2.71	-3.39	45.76
2450	3.05	-5.06	31.22	5300	2.32	-3.84	41.26
2460	3.15	-4.98	31.73	5320	2.78	-3.43	45.35
2470	3.31	-5.07	31.11	5340	2.57	-3.7	42.66
2480	3.59	-4.77	33.38	5360	1.99	-4.3	37.16
2490	3.66	-4.85	32.7	5380	2.26	-3.88	40.92
2500	3.61	-4.92	32.22	5400	2.07	-4.11	38.81
				5420	1.63	-4.18	38.21
				5440	1.23	-4.52	35.3
				5460	1.16	-4.79	33.19
				5480	1.35	-4.93	32.13
				5500	1.48	-4.73	33.67
				5520	1.59	-4.68	34.08
				5540	1.41	-4.74	33.57
				5560	1.44	-4.9	32.36
				5580	1.73	-4.81	33.04
				5600	1.88	-4.8	33.12
				5620	1.23	-5.41	28.78
				5640	0.51	-5.76	26.55
				5660	0.66	-5.86	25.95
				5680	0.42	-6.26	23.67
				5700	1.16	-5.87	25.9
				5720	0.99	-6.03	24.95
				5740	0.96	-6.07	24.72
				5760	1.31	-5.9	25.68
				5780	1.31	-5.95	25.39
				5800	1.35	-6.04	24.86
				5820	1.26	-6.05	24.84
				5840	3.06	-5.26	29.79
				5860	3.5	-4.98	31.75

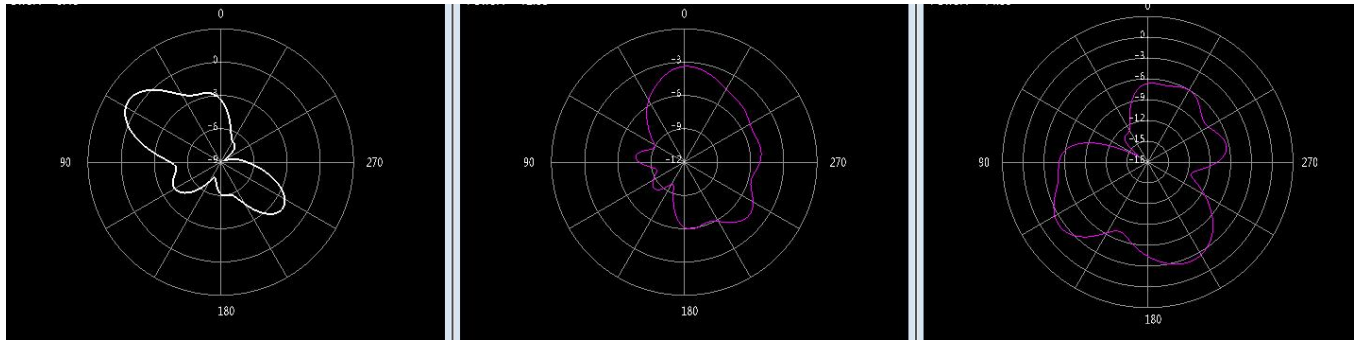
5.2 Active test data

5.2.1 Active test data (free space, screen off)

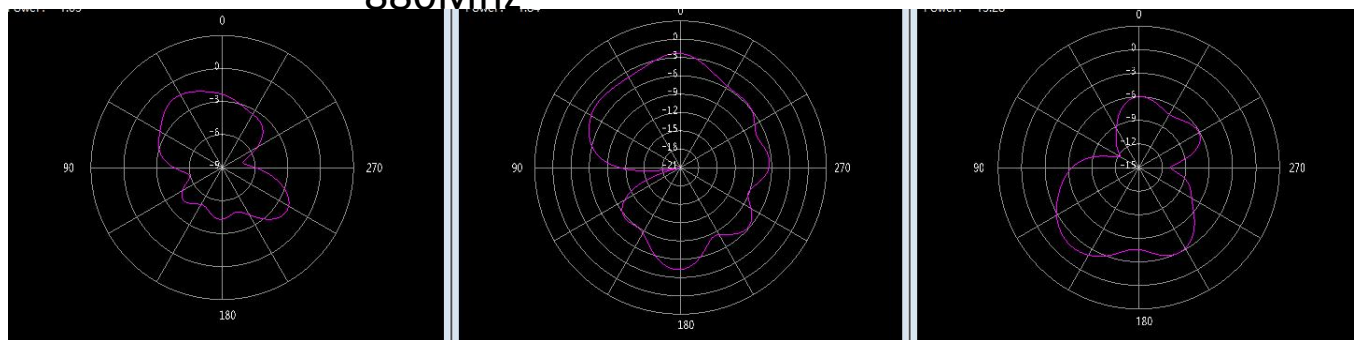
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WCDMA_B1	18. 83		FDD_B17	13. 13		
	19. 77			13. 49		
	19. 39	-104. 22		13. 6	-89. 44	
WCDMA_B2	19. 47		FDD_B25	18. 38		
	18. 37			17. 62		
	16. 76	-107. 19		17. 04	-94. 64	
WCDMA_B4	18. 13		FDD_B26	16. 67		
	18. 2			17. 16		
	17. 98	-105. 87		17. 55	-94. 12	
WCDMA_B5	18. 46		FDD_B28	13. 34		
	18. 92			13. 88		
	18. 93	-105. 46		14. 29	-91. 5	
WCDMA_B8	18. 98		FDD_B66	17. 12		
	17. 72			17. 03		
	17. 08	-103. 15		17. 55	-95. 03	
FDD_B1	19. 06		TDD_B38	17. 06		
	19. 56			17. 76		
	19. 38	94. 29		18. 24	-94. 51	
FDD_B2	17. 84		TDD_B41	17. 16		
	18. 07			17. 91		
	17. 29	-95. 41		17. 96	-94. 57	
FDD_B3	18. 1		Band	Channel	Total	TIS
	18. 12		WIFIB	1	15. 1	
	17. 8	-94. 46		7	14. 67	
FDD_B4	18. 2			13	13. 59	-75. 17
	18. 15		Band	Channel	Total	TIS
	18. 51	-94. 52	WIFIA	36	14. 26	
FDD_B5	18. 67			149	12. 79	
	19. 32			165	13. 46	-74. 51
		19. 6	-94. 37			
FDD_B7	18. 12		Band	Channel	TIS	
	17. 85		GPS	1575.42	-145.81	
	17. 49	-96. 05				
FDD_B12	13. 46					
	13. 61					
	14. 26	-89. 03				

6. 2D direction diagram

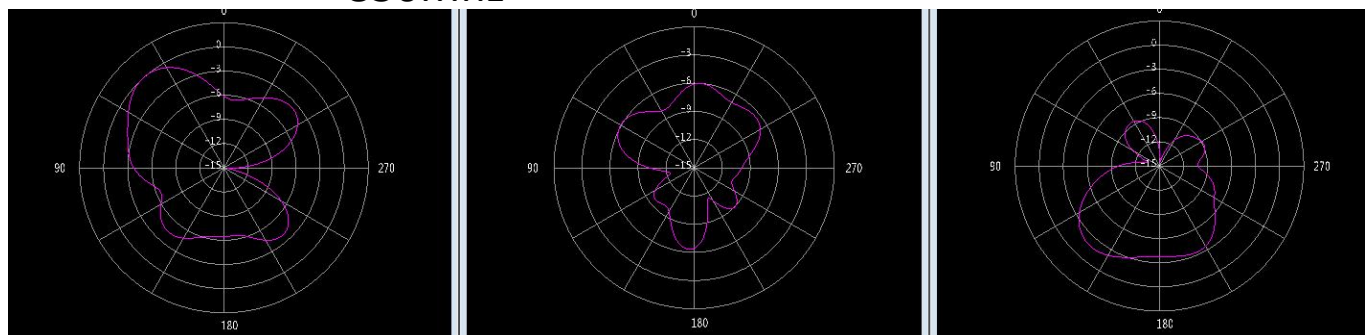
Main antenna



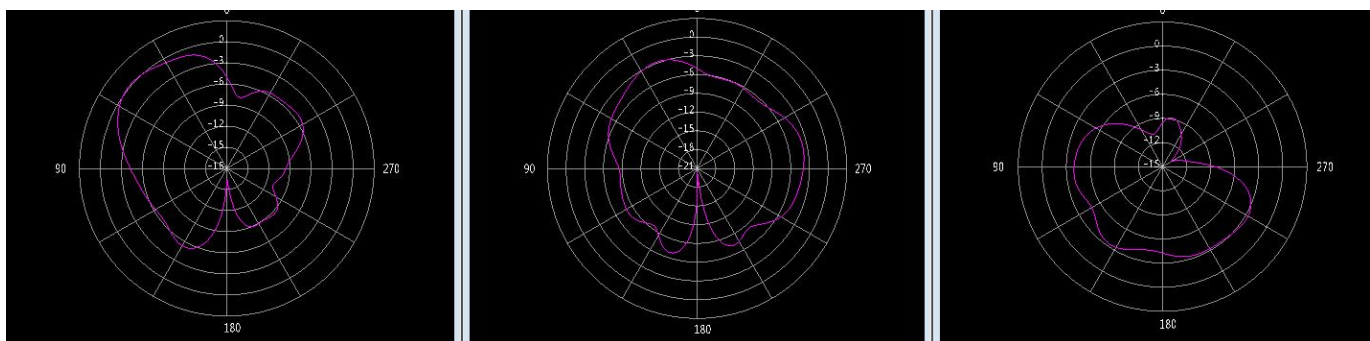
880Mhz



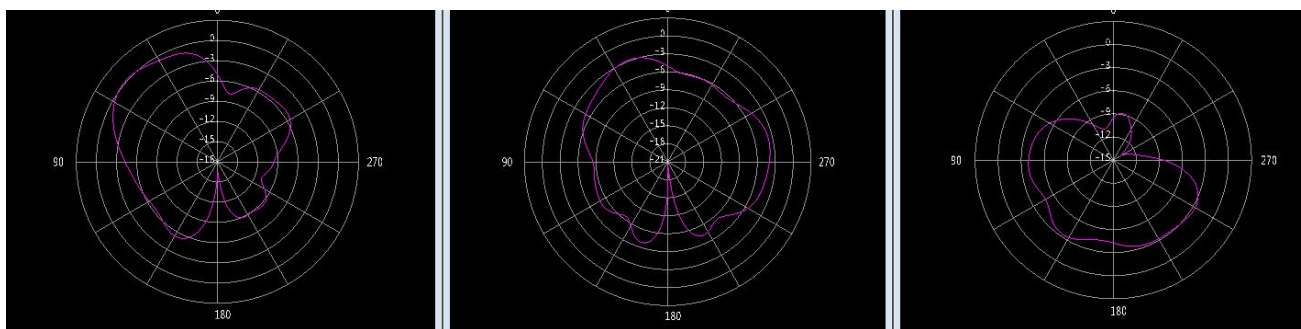
850Mhz



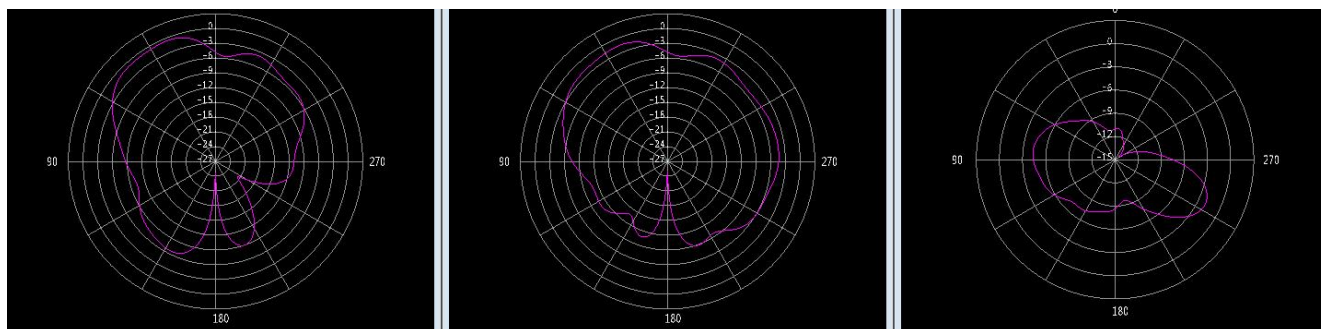
700Mhz



1880Mhz

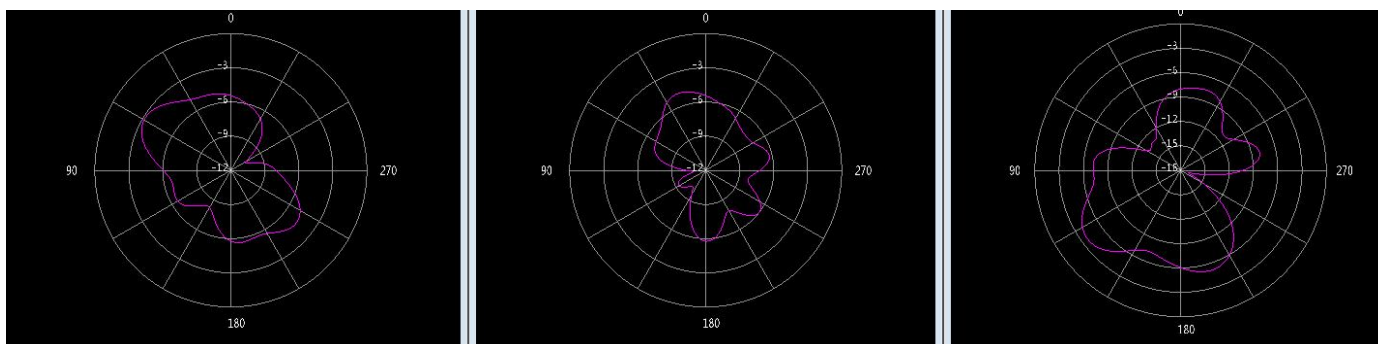


2170Mhz

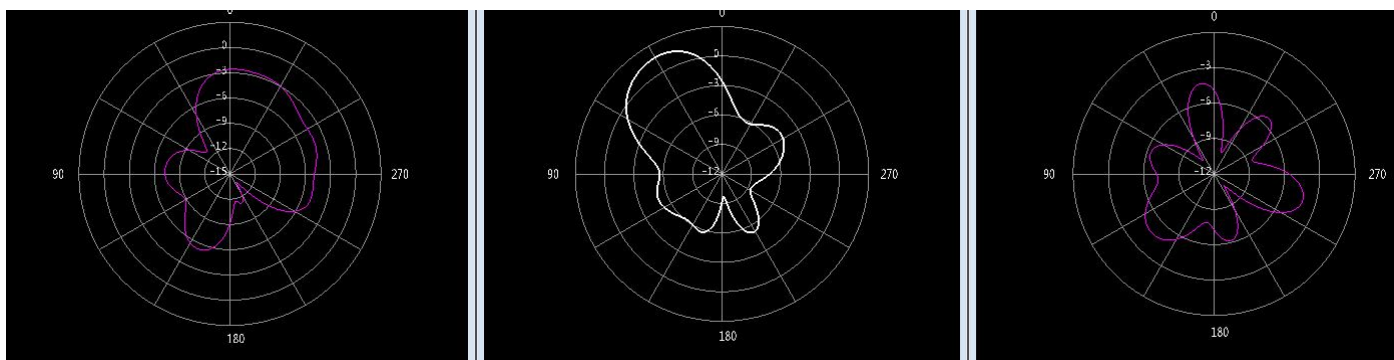


2550Mhz

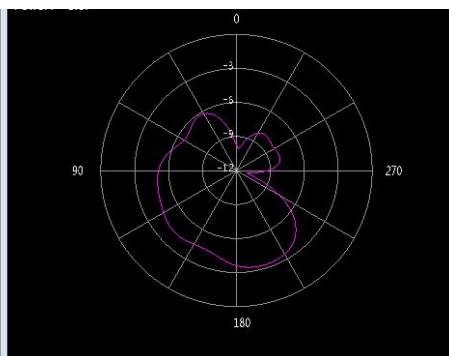
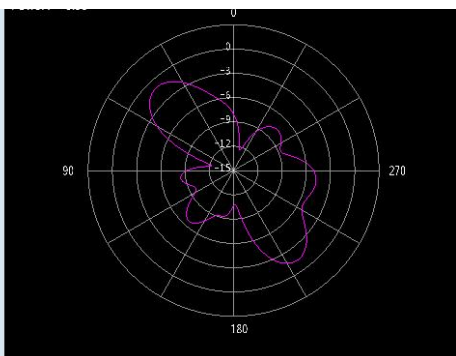
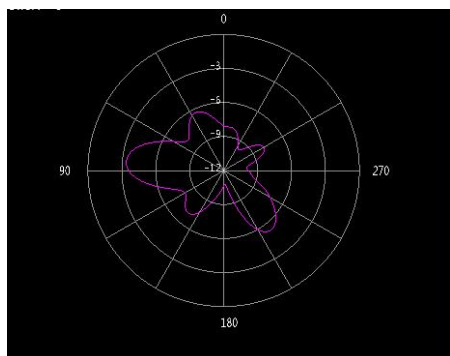
Diversity antenna



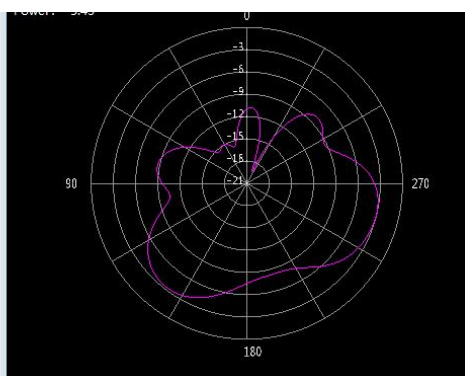
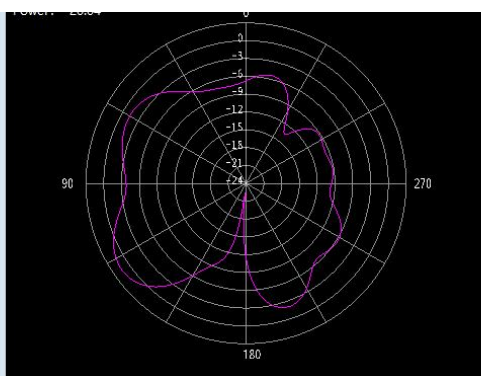
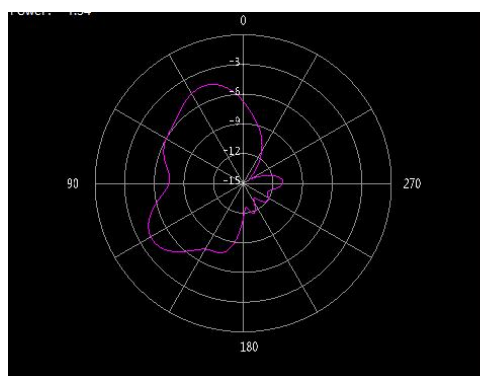
790Mhz



890Mhz

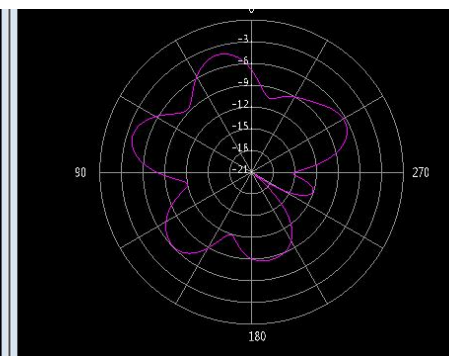
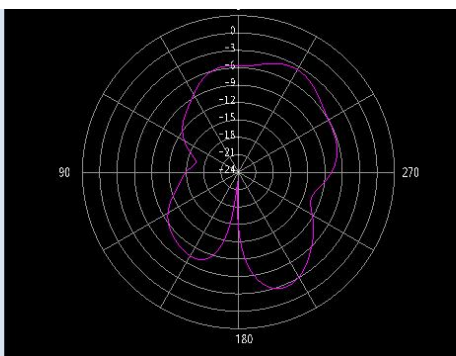
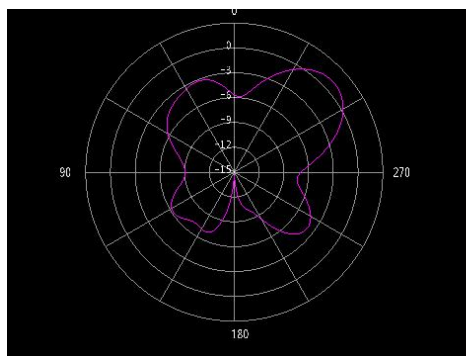


960Mhz



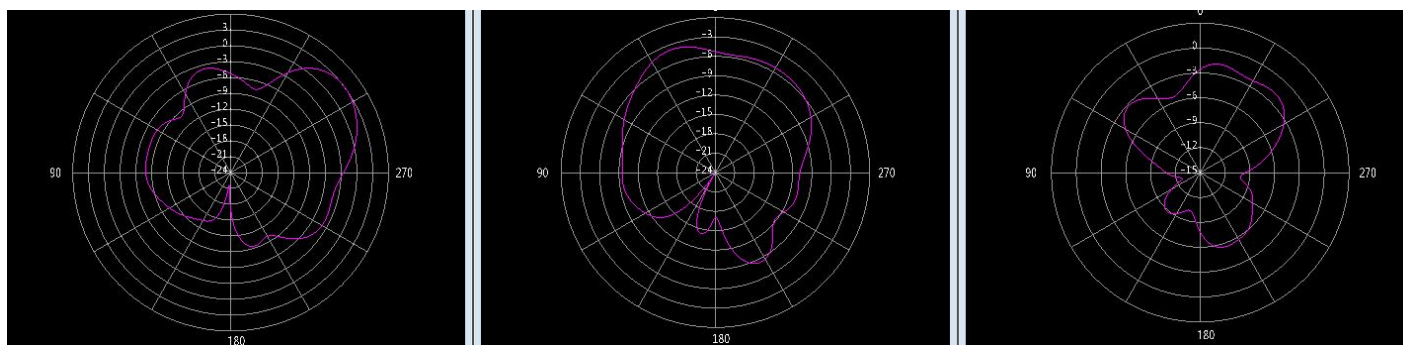
2170Mhz

Diversity antenna 2

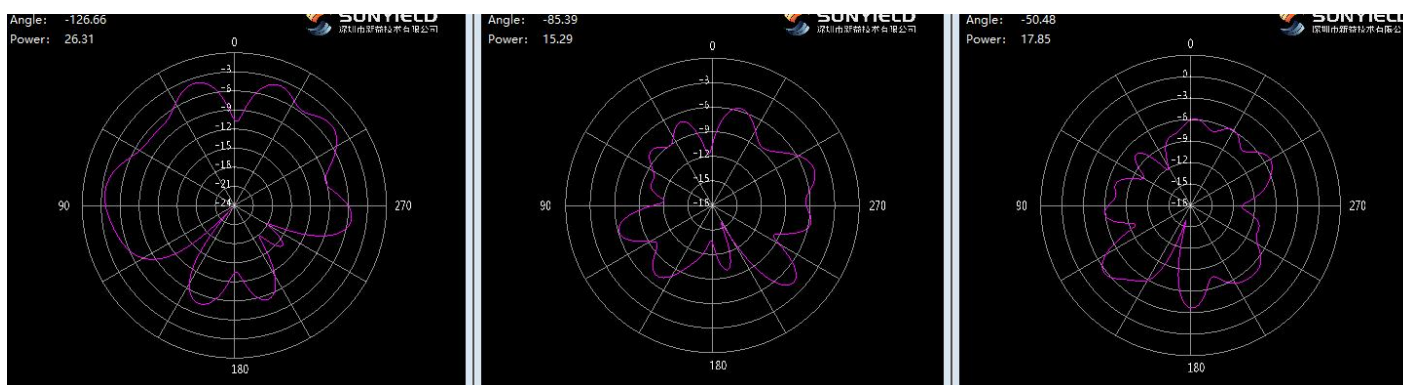


2450Mhz

Triangle Antenna



2450Mhz



5500Mhz

