

● BMW-N1 天线调试报告

目录

- ❑ 项目需求分析
- ❑ 整体方案设计
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- LTE天线: GSM: B2/B3/B5/B8; 3G/UMTS/WCDMA: B1/B2/B4/B5/B8 4G / LTE: 1 (2100 MHz)+2 (1900 MHz)+3 (1800 MHz)+4 (AWS)+5 (850 MHz)+7 (2600 MHz)+8 (900 MHz)+11 (1500 MHz)+12 (700 MHz)+13 (700c MHz)+17 (700b MHz)+18 (800 MHz)+19 (800 MHz)+20 (800 MHz DD)+21 (1500 MHz)+25 (1900 MHz)+26 (800 MHz)+28 (700 APT MHz)+29 (700 de MHz)+30 (2300 MHz)+38 (TD 2600)+39 (TD 1900)+40 (TD 2300)+41 (TD 2500)+66 (AWS-3)+71 (600 MHz)
- 蓝牙: BT1/BT2/BT3 (5.0, •i480e*2+i1571-s*1, supplier is BARROT. •Wi-Fi Spectral Bands: 2.4 GHz, 5 GHz •Channel Utilization: 20/40/80 MHz •MIMO Configuration: 1x1 (1-stream))
- WIFI: (Standards: 802.11ax-ready, 802.11ac Wave 2, 802.11a/b/g/n)
- GPS: (Beidou, Galileo, GLONASS, NAVSTAR GPS (Accuracy $\leq 1\text{m}$) • Full A-GPS capability(E911/SUPL/EPO/HotStill)

整体方案设计



- 天线采用支架+LDS形式

无源数据 主天线 效率&增益

Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)		Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
610	11%	-9.55	-3.74		790	46%	-3.36	1.98
620	14%	-8.55	-2.87		800	50%	-3.00	2.13
630	17%	-7.59	-1.85		810	47%	-3.29	1.80
640	21%	-6.75	-0.94		820	47%	-3.31	1.99
650	24%	-6.25	-0.04		830	47%	-3.30	1.93
660	25%	-5.98	0.49		840	48%	-3.22	1.99
670	28%	-5.53	0.67		850	47%	-3.27	1.77
680	31%	-5.06	0.53		860	46%	-3.36	1.91
690	33%	-4.80	0.41		870	44%	-3.55	1.80
700	35%	-4.62	0.58		880	39%	-4.06	2.11
710	29%	-5.35	-0.25		890	39%	-4.04	2.60
720	33%	-4.88	0.23		900	39%	-4.06	2.75
730	36%	-4.44	0.78		910	39%	-4.12	2.72
740	38%	-4.17	0.92		920	38%	-4.22	2.37
750	40%	-3.96	0.94		930	38%	-4.23	1.88
760	36%	-4.38	0.92		940	38%	-4.24	1.70
770	40%	-4.01	1.19		950	36%	-4.41	1.33
780	43%	-3.64	1.74		960	34%	-4.67	1.03

无源数据 主天线 效率&增益

Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)	Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)	Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
1420	34%	-4.65	-0.36	1950	44%	-3.53	2.90	2500	37%	-4.32	2.19
1440	31%	-5.16	-1.39	1970	44%	-3.61	2.44	2510	37%	-4.28	2.02
1460	30%	-5.29	-1.58	1990	41%	-3.83	2.03	2530	37%	-4.33	2.01
1480	27%	-5.66	-1.56	2010	42%	-3.81	2.01	2550	37%	-4.31	1.69
1500	27%	-5.76	-1.60	2030	40%	-3.95	1.84	2570	38%	-4.26	1.16
1520	24%	-6.18	-1.72	2050	43%	-3.66	1.45	2590	38%	-4.20	0.84
1710	28%	-5.47	1.69	2070	42%	-3.73	1.57	2610	37%	-4.32	0.47
1730	32%	-4.93	2.39	2090	44%	-3.53	1.93	2630	38%	-4.25	0.11
1750	36%	-4.44	2.73	2110	46%	-3.34	2.50	2650	38%	-4.16	0.52
1770	41%	-3.88	3.01	2130	44%	-3.55	3.00	2670	37%	-4.36	0.51
1790	46%	-3.33	3.53	2150	42%	-3.75	2.39	2690	37%	-4.29	0.26
1810	51%	-2.94	3.81	2170	39%	-4.13	2.05				
1830	51%	-2.94	3.50	2300	38%	-4.16	2.11				
1850	51%	-2.94	3.47	2320	37%	-4.32	2.14				
1870	51%	-2.95	3.78	2340	37%	-4.35	2.66				
1890	48%	-3.16	3.89	2360	37%	-4.32	2.95				
1910	46%	-3.39	3.58	2380	38%	-4.26	2.92				
1930	45%	-3.50	3.19	2400	38%	-4.19	2.81				

无源数据 分集天线 效率&增益

Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)		Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
610	2%	-16.42	-12.63		790	8%	-10.71	-8.35
620	3%	-15.16	-11.39		800	11%	-9.48	-9.09
630	4%	-14.27	-10.32		810	14%	-8.48	-9.19
640	4%	-13.87	-9.56		820	16%	-7.89	-9.03
650	4%	-13.89	-8.96		830	17%	-7.69	-5.09
660	4%	-14.54	-8.89		840	15%	-8.33	-3.98
670	2%	-16.68	-9.48		850	18%	-7.56	-3.48
680	3%	-15.63	-10.13		860	19%	-7.10	-3.11
690	4%	-14.47	-11.09		870	21%	-6.71	-2.20
700	5%	-13.40	-11.63		880	21%	-6.73	-0.95
710	6%	-12.38	-11.99		890	21%	-6.82	-0.28
720	7%	-11.71	-12.29		900	19%	-7.17	0.04
730	7%	-11.31	-5.88		910	18%	-7.54	-0.40
740	7%	-11.31	-5.58		920	16%	-7.99	-0.98
750	7%	-11.68	-5.71		930	14%	-8.41	-1.74
760	6%	-12.34	-6.20		940	13%	-8.82	-2.27
770	5%	-12.89	-6.65		950	11%	-9.55	-2.69
780	4%	-13.59	-7.26		960	10%	-10.18	-3.48

无源数据 分集天线 效率&增益

Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)	Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)	Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
1420	4%	-14.34	-9.80	1950	13%	-8.85	-3.12	2500	26%	-5.87	2.22
1440	3%	-14.99	-10.00	1970	14%	-8.54	-2.77	2510	25%	-5.97	2.32
1460	3%	-15.04	-9.47	1990	14%	-8.43	-2.43	2530	29%	-5.37	2.73
1480	3%	-15.23	-10.17	2010	16%	-8.04	-1.98	2550	31%	-5.04	2.79
1500	3%	-15.40	-10.17	2030	15%	-8.27	-2.12	2570	35%	-4.53	3.32
1520	3%	-15.08	-9.91	2050	16%	-8.04	-1.78	2590	37%	-4.37	3.99
1710	4%	-13.61	-6.80	2070	16%	-7.84	-1.21	2610	37%	-4.37	3.98
1730	5%	-12.88	-5.93	2090	17%	-7.75	-0.96	2630	37%	-4.35	3.77
1750	6%	-12.59	-5.54	2110	18%	-7.41	-0.25	2650	36%	-4.41	3.91
1770	6%	-11.92	-5.21	2130	16%	-7.92	-1.47	2670	34%	-4.62	3.91
1790	7%	-11.27	-4.73	2150	17%	-7.65	-0.81	2690	33%	-4.86	3.81
1810	9%	-10.69	-4.03	2170	17%	-7.65	-0.28				
1830	9%	-10.26	-3.71	2300	21%	-6.87	-0.04				
1850	10%	-9.82	-3.60	2320	20%	-6.98	-0.48				
1870	11%	-9.78	-3.33	2340	23%	-6.34	0.12				
1890	9%	-10.35	-2.81	2360	25%	-6.04	0.23				
1910	12%	-9.32	-3.04	2380	28%	-5.56	0.46				
1930	12%	-9.05	-3.20	2400	28%	-5.59	1.57				

无源数据 GPS 效率&增益

Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)		Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
1150	22%	-6.65	-1.93		1550	34%	-4.71	0.79
1155	23%	-6.47	-1.83		1555	34%	-4.73	0.84
1160	23%	-6.46	-1.94		1560	33%	-4.77	0.67
1165	24%	-6.17	-1.70		1565	34%	-4.66	0.84
1170	25%	-6.04	-1.42		1570	35%	-4.61	0.67
1175	26%	-5.82	-1.23		1575	36%	-4.49	0.90
1180	26%	-5.93	-1.14		1580	36%	-4.41	0.69
1185	27%	-5.70	-0.86		1585	37%	-4.29	0.91
1190	26%	-5.77	-0.79		1590	39%	-4.12	0.76
					1595	38%	-4.23	0.74
					1600	38%	-4.16	0.62

无源数据 BT1 效率&增益

Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
2400	44%	-3.60	2.66
2410	43%	-3.68	2.63
2420	44%	-3.53	2.69
2430	43%	-3.65	2.72
2440	44%	-3.55	2.74
2450	44%	-3.56	2.56
2460	45%	-3.44	2.75
2470	44%	-3.55	2.78
2480	41%	-3.89	2.42
2490	39%	-4.13	2.20
2500	36%	-4.47	1.86

无源数据 BT2 效率&增益

Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
2400	35%	-4.62	-0.02
2410	37%	-4.37	0.01
2420	37%	-4.26	0.29
2430	40%	-3.99	0.85
2440	39%	-4.11	0.87
2450	40%	-3.97	0.96
2460	39%	-4.04	0.94
2470	39%	-4.05	0.94
2480	42%	-3.81	1.15
2490	41%	-3.91	1.03
2500	43%	-3.72	1.55

无源数据 BT3 效率&增益

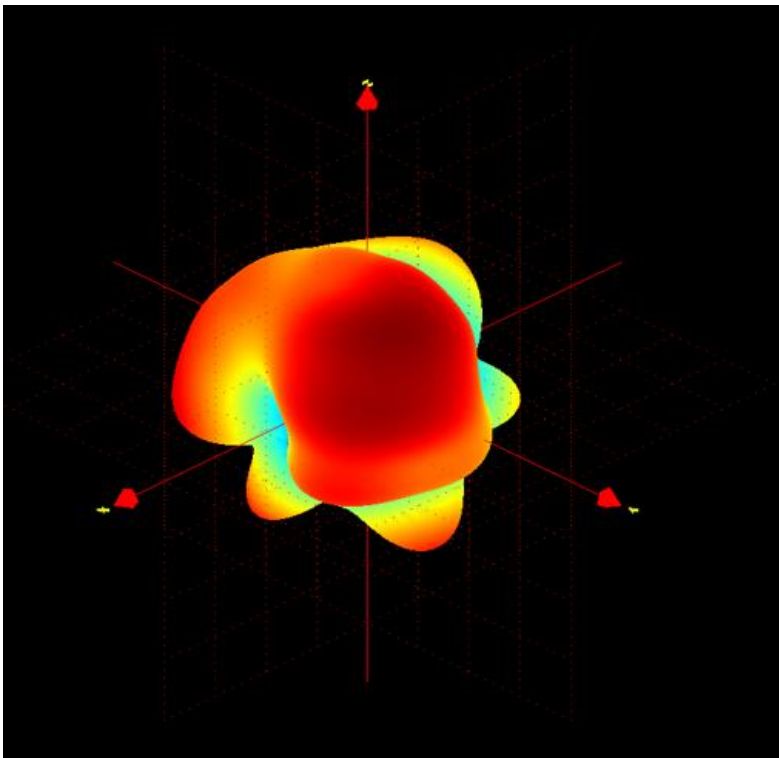
Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
2400	37%	-4.26	0.33
2410	38%	-4.26	0.28
2420	37%	-4.28	0.15
2430	38%	-4.19	0.03
2440	37%	-4.36	-0.17
2450	37%	-4.37	0.02
2460	35%	-4.52	0.03
2470	34%	-4.73	-0.39
2480	35%	-4.58	-0.23
2490	33%	-4.85	-0.63
2500	34%	-4.68	-0.33

无源数据 WIFI 效率&增益

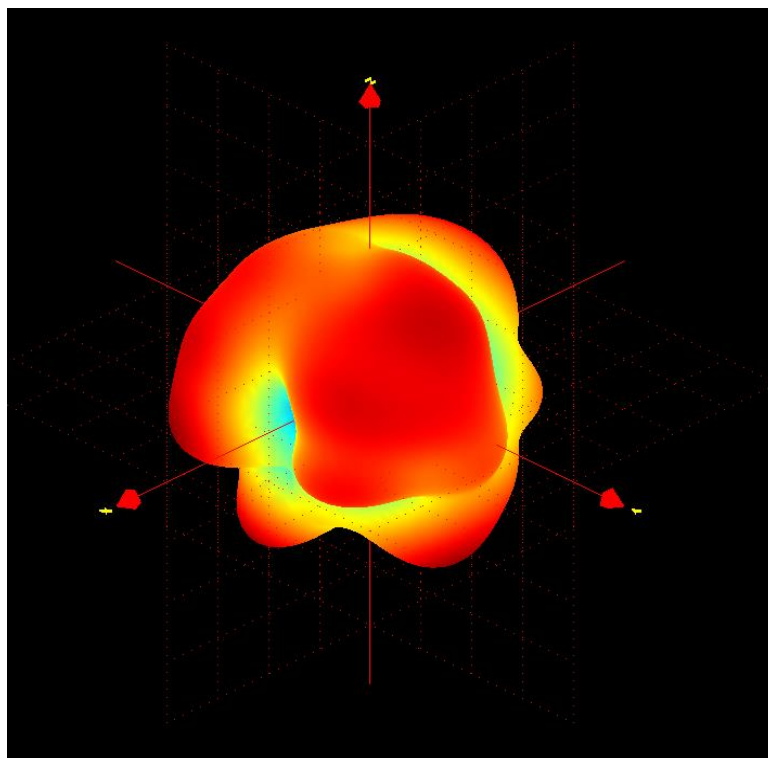
Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)	Frequency (MHz)	Efficiency (%)	Efficiency (dB)	Gain (dB)
2400	40%	-3.95	1.47	5150	42%	-3.79	3.52
2410	41%	-3.88	1.73	5200	41%	-3.89	2.81
2420	43%	-3.70	1.99	5250	41%	-3.88	2.61
2430	46%	-3.40	2.72	5300	43%	-3.63	3.10
2440	46%	-3.37	2.86	5350	45%	-3.51	3.22
2450	46%	-3.41	2.89	5400	41%	-3.83	3.23
2460	44%	-3.61	2.31	5450	45%	-3.51	3.60
2470	43%	-3.69	2.66	5500	43%	-3.70	3.77
2480	43%	-3.70	2.41	5550	41%	-3.90	3.56
2490	43%	-3.65	2.32	5600	38%	-4.20	3.20
2500	45%	-3.45	2.65	5650	37%	-4.32	3.29
				5700	37%	-4.34	3.63
				5750	36%	-4.46	3.25
				5800	31%	-5.07	2.50
				5850	30%	-5.22	2.08

3D图 BT-L

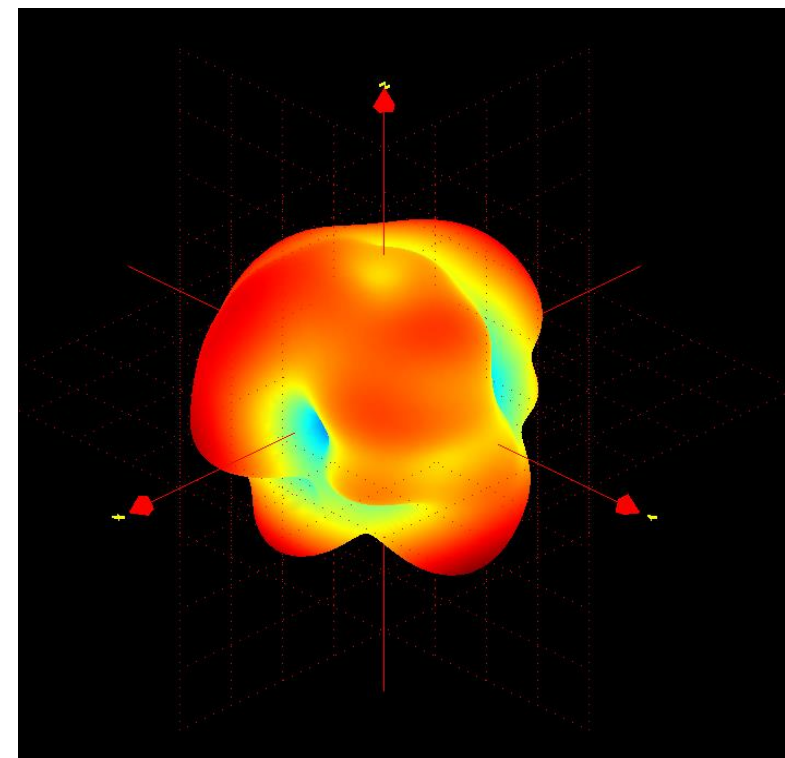
2400MHz



2450MHz

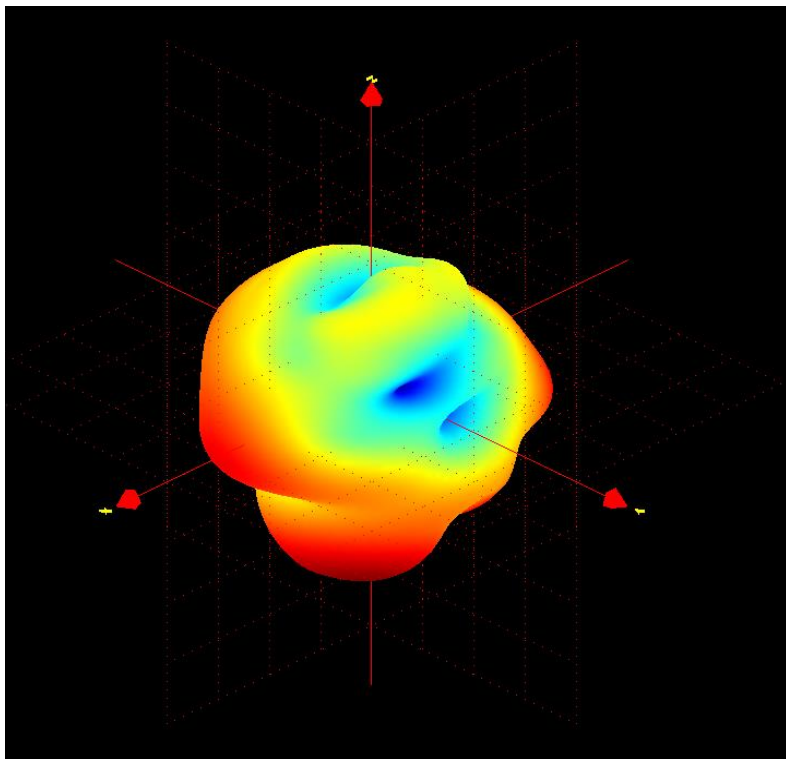


2500MHz

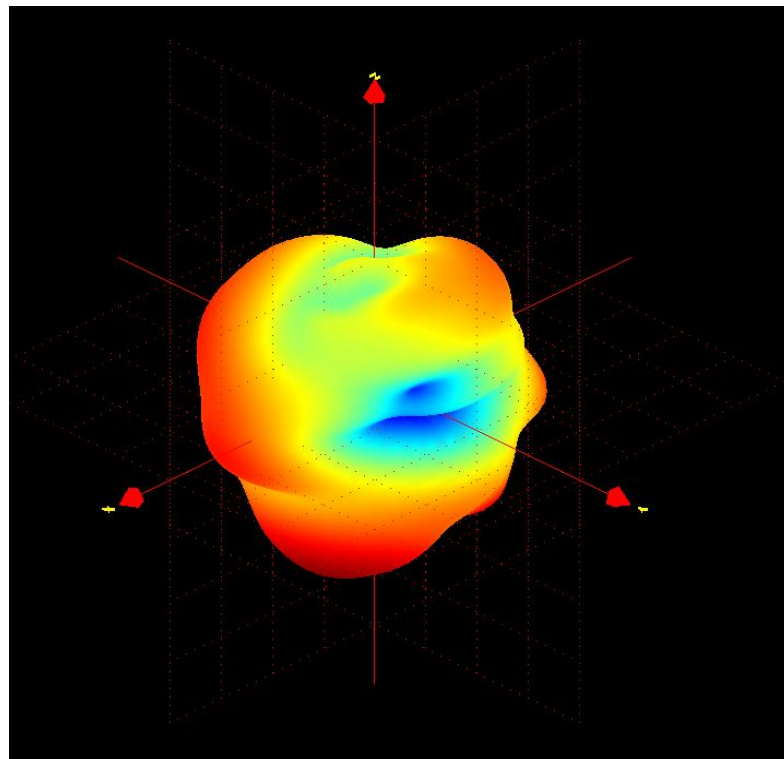


3D图 BT-R

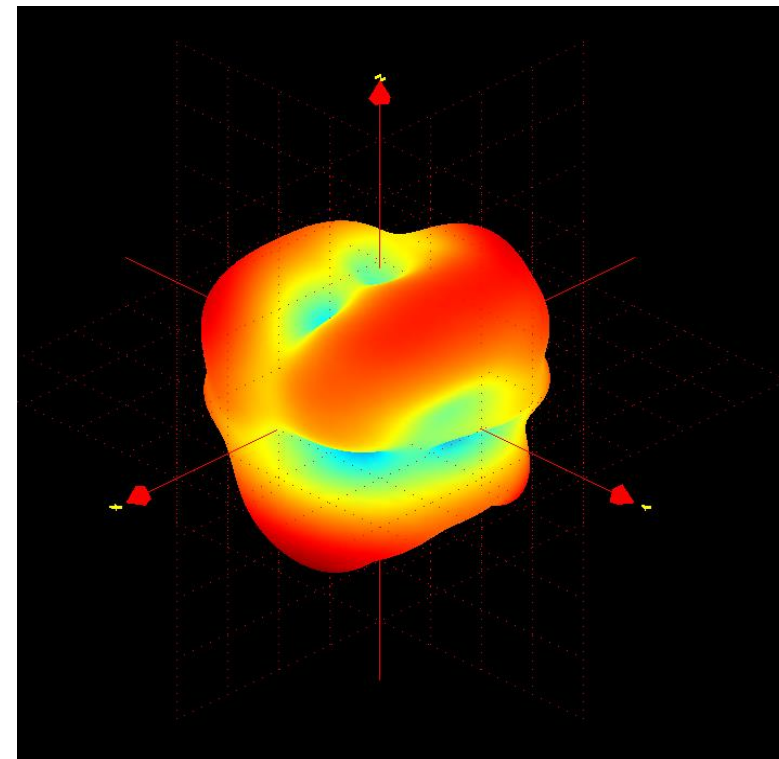
2400MHz



2450MHz

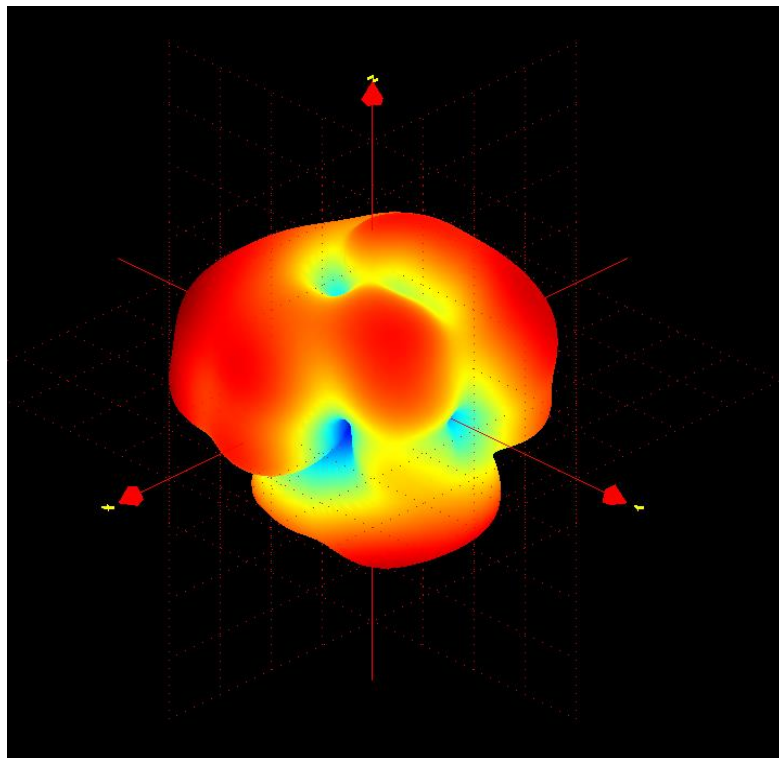


2500MHz

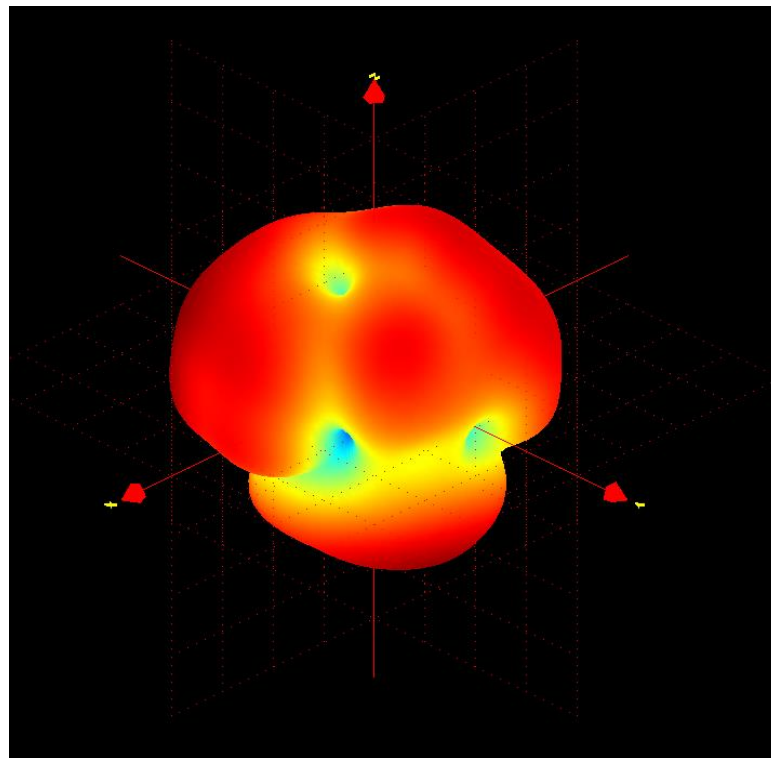


3D图 BT-157

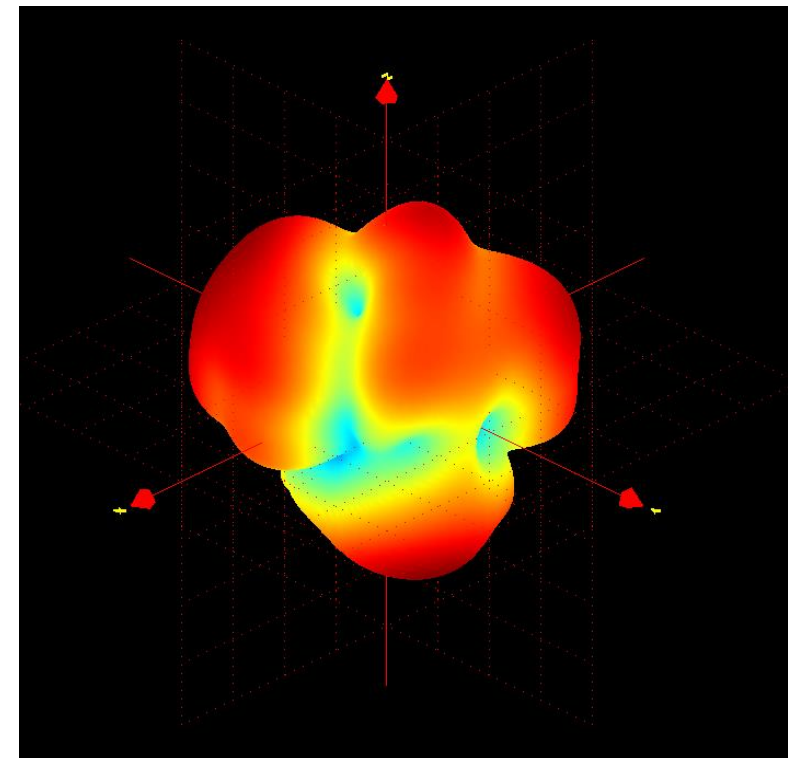
2400MHz



2450MHz



2500MHz

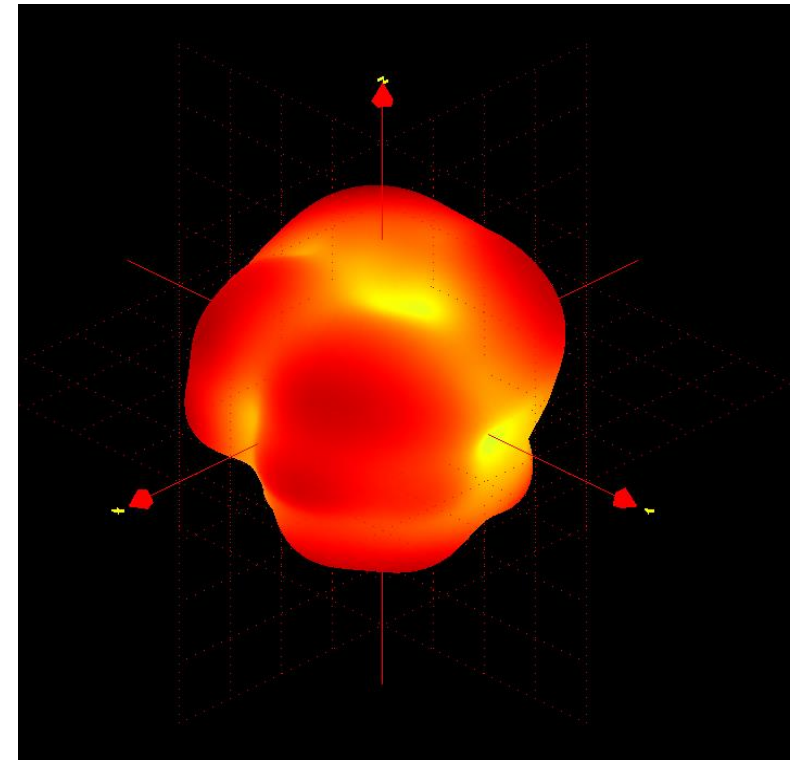
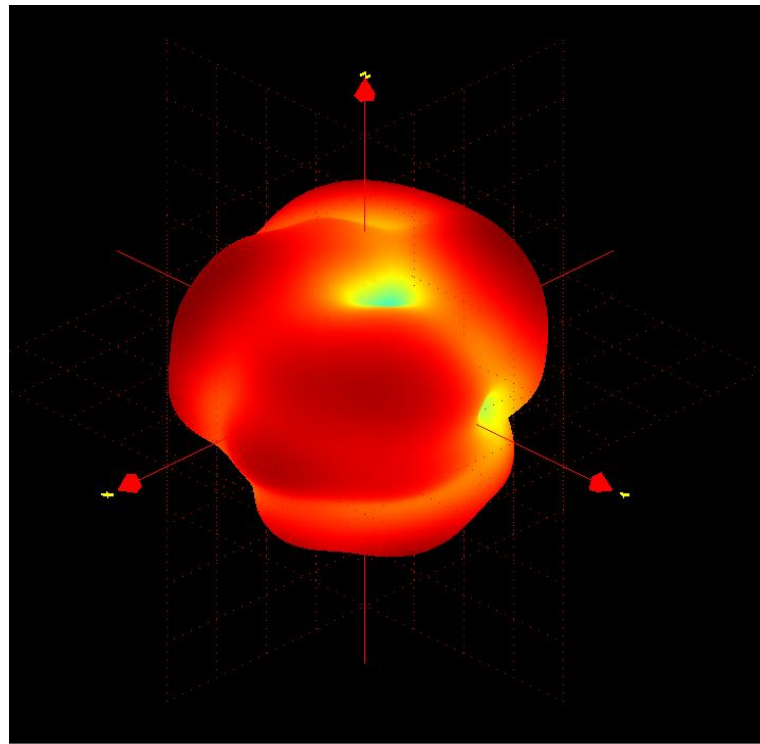
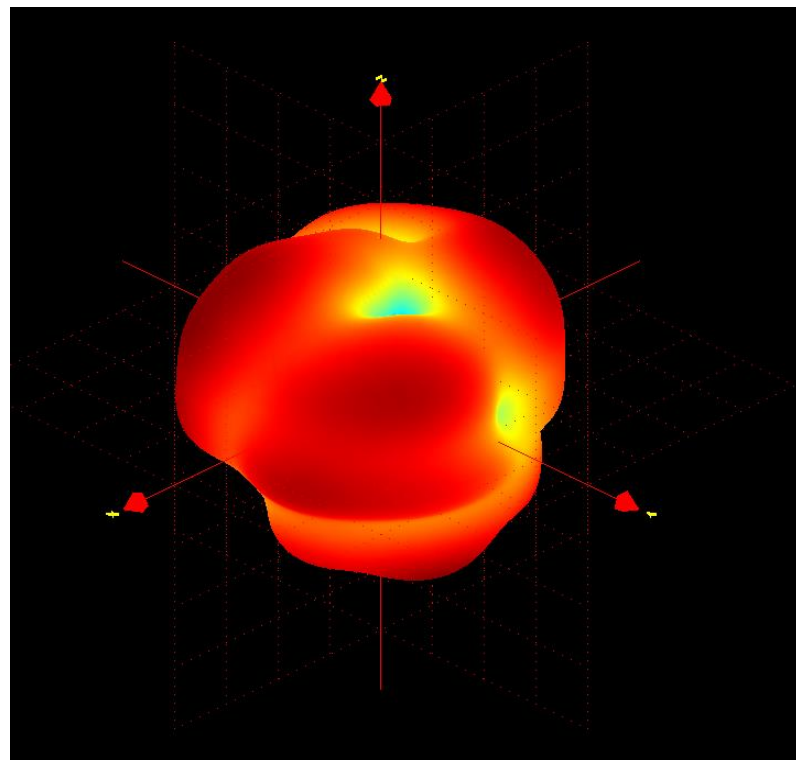


3D图 WIFI

2400MHz

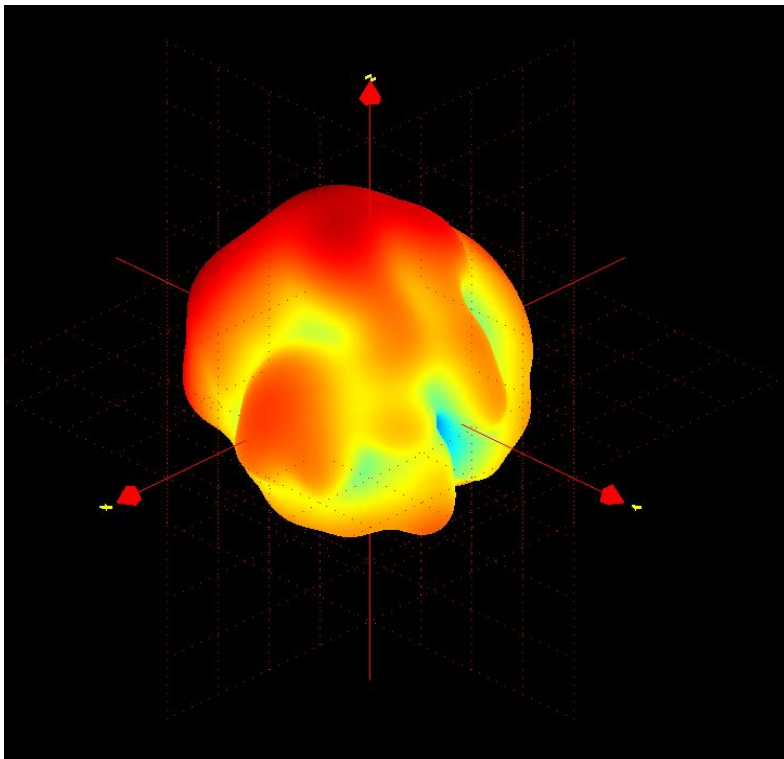
2450MHz

2500MHz

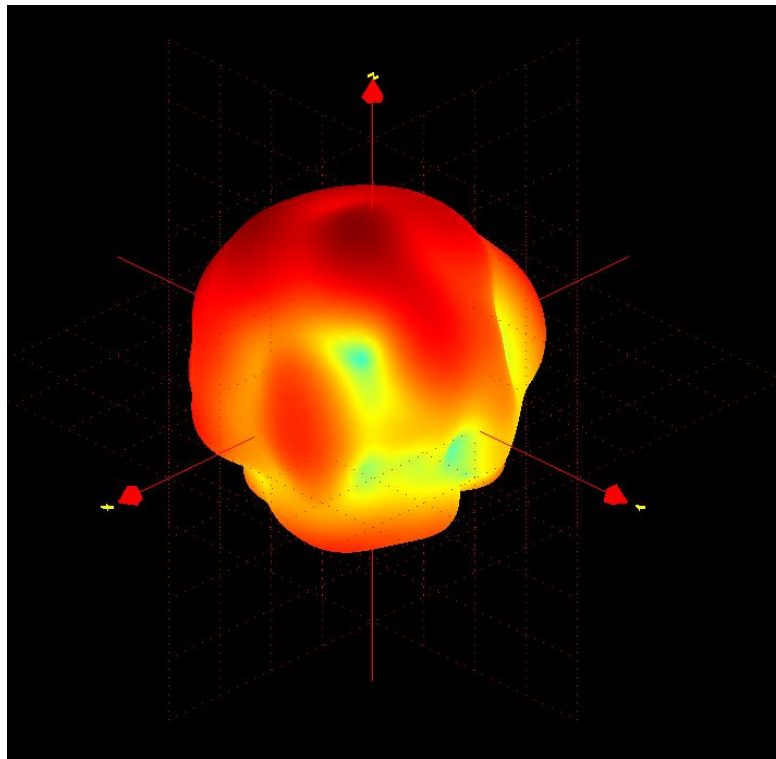


3D图 WIFI

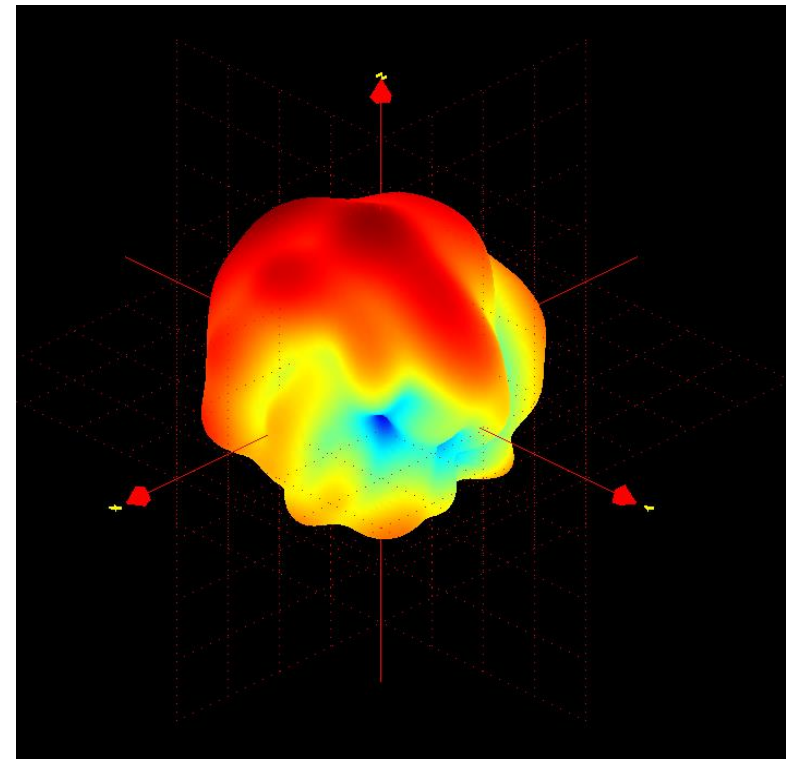
5150MHz



5450MHz

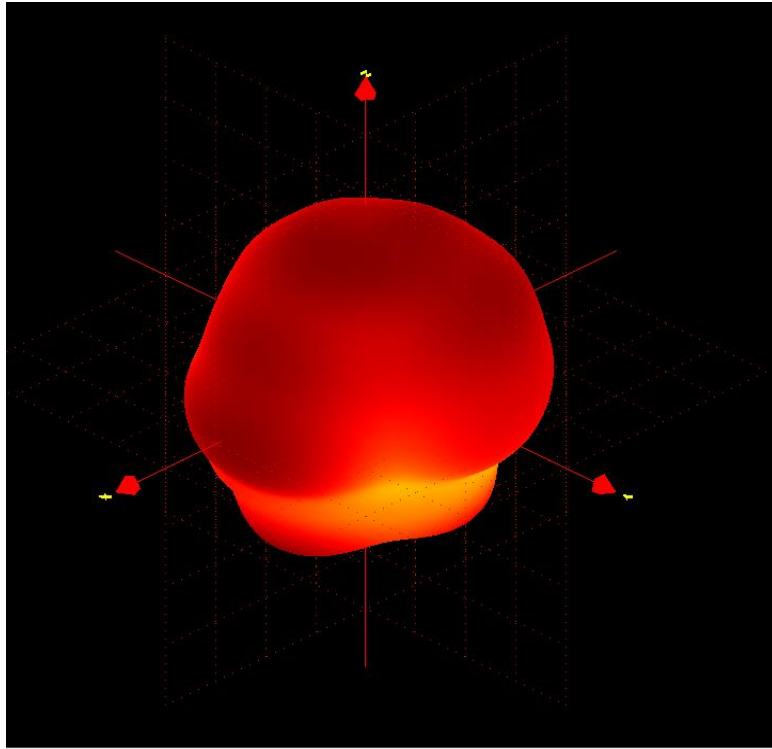


5850MHz

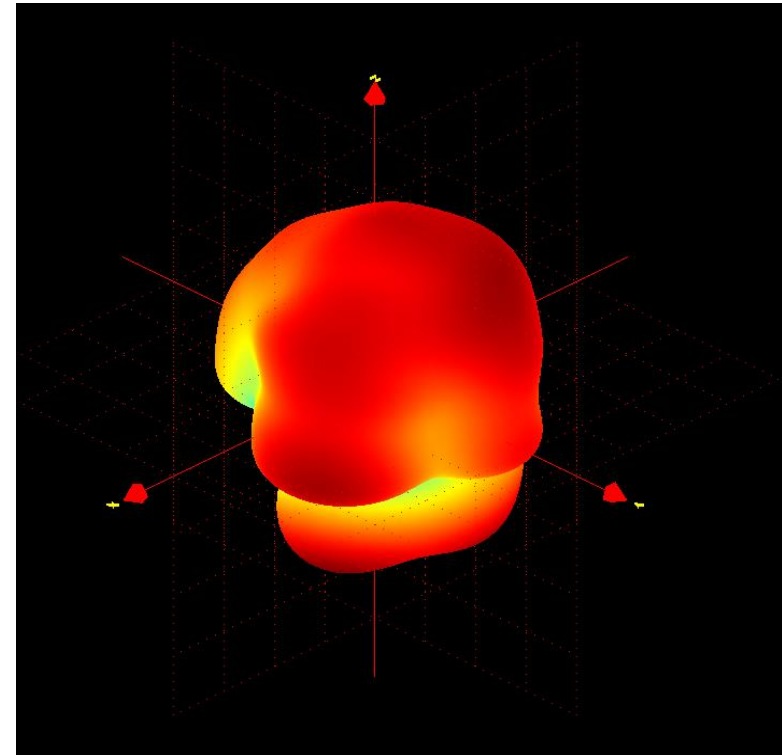


3D图 GPS

1176MHz



1575MHz



有源测试数据 主天线

2G	Channel	TRP	TIS		Channel	TRP	TIS
GSM850	128	25.77		GSM1800	512	23.02	
	190	25.48			699	24.45	
	251	25.27	-102.41		885	25.39	-103.50
GSM900	975	25.47		GSM1900	512	24.25	
	38	26.17			661	24.22	
	124	26.48	-101.98		810	24.69	-105.16
3G	Channel	TRP	TIS		Channel	TRP	TIS
W1	9612	19.55		W5	4132	19.51	
	9750	19.33			4183	18.09	
	9888	19.80	-103.88		4233	19.74	-103.73
W2	9262	19.71		W8	2712	19.23	
	9400	18.02			2788	19.70	
	9538	18.75	-106.01		2863	19.45	-102.38
W4							

有源测试数据 主天线

4G	Channel	TRP	TIS		Channel	TRP	TIS		Channel	TRP	TIS
B1	18050	18.85		B8	21500	17.97		B19	24050	18.37	
	18300	19.05			21625	18.51			24075	19.4	
	18550	19.11	-90.69		21750	17.43	-92.07		24100	18.34	-91.4
B2	18650	19.24		B11	22800	17.66		B20	24200	19.83	
	18900	19.91			22850	17.27			24300	19.71	
	19150	18.02	-94.22		22900	17.09	-88.45		24400	19.94	-90.25
B3	19250	17.02		B12	23035	17.65		B21	24500	16.61	
	19575	17.04			23095	17.58			24525	17.33	
	19900	18.29	-90.12		23155	17.52	-90.17		24550	16.81	-87.28
B4	20000	17.59		B13	23230	18.53		B25	26065	18.63	
	20175	17.3			23230	18.72			26365	18.67	
	20350	17.1	-91.84		23230	18.39	-88.83		26665	17.34	-92.83
B5	20450	18.03		B17	23780	17.78		B26	26715	17.33	
	20525	19.15			23790	18.18			26865	18.53	
	20600	18.37	-90.33		23800	17.56	-90.45		27015	18.91	-91.29
B7	20850	17.59		B18	23900	17.91		B28	27260	18.31	
	21100	17.29			23925	19.27			27435	18.28	
	21350	18.59	-92.29		23950	18.19	-91.58		27610	17.26	-90.5

有源测试数据 主天线

4G	Channel	TRP	TIS		Channel	TRP	TIS
B29				B66	132022	18.57	
					132322	19.29	
					132622	17.71	-91.82
B30	27710	19.94		B71	133172	17.11	
	27710	20.28			133297	17.23	
	27710	19.56	-93.71		133422	17.33	-90.23
B38	37850	17.89					
	38000	17.78					
	38150	17.61	-90.64				
B39	38350	19.45					
	38450	18.95					
	38550	20.64	-90.51				
B40	38750	21.76					
	39150	19.6					
	39550	19.38	-90.33				
B41	39750	19.89					
	40620	19.29					
	41490	19.91	-89.57				

有源测试数据 WIFI

B	11M	11M		G	54M	54M		N	mcs7	mcs7
Channel s	TRP	TIS		Channel s	TRP	TIS		Channel s	TRP	TIS
2.412 GHz	10.2	-81.34		2.412 GHz	12.35	-66.97		2.412 GHz	10.56	-62.58
2.442 GHz	11.77	-80.24		2.442 GHz	13.22	-67.77		2.442 GHz	11.83	-61.51
2.472 GHz	11.43	-81.1		2.472 GHz	13.12	-66.89		2.472 GHz	11.38	-62.02
A	54M	54M		N	MCS7	MCS7				
Channel s	TRP	TIS		Channel s	TRP	TIS				
5.18 GHz	11.38	-67.96		5.18 GHz	11.22	-64.23				
5.32 GHz	11.41	-67.85		5.32 GHz	11.39	-64.53				
5.825 GHz	11.34	-68.63		5.825 GHz	11.41	-66.01				

有源测试数据 BT

BT L				BT R				157		
	TRP	TIS			TRP	TIS			TRP	TIS
0	3.96	-84.18		0	3.48	-81.24		0	2.87	-79.47
39	4.15	-84.23		39	3.84	-82.34		39	3.34	-81.68
78	4.3	-84.63		78	4.41	-81.35		78	3.76	-80.67

天线匹配

主天线			分集天线			BT1	
	馈路			馈路		C0711	NA
	C1224	7.5NH		C1227	8.2NH	C0713	0Ω
	R1205	0Ω		R1206	0Ω	C0712	NA
	C1221	NA		C1228	NA	R0719	0Ω
	R1208	0Ω					
				R1215	0Ω		
	E1203脚						
	R1202	18NH		R1214	27NH	BT2	
RF4	L1201	0Ω	RF4	L1217	6.2NH	C0754	NA
RF1	L1202	8.2NH	RF1	L1218	0Ω	C0756	0Ω
RF3	L1203	22NH	RF3	L1219	27NH	C0755	NA
RF2	L1204	12NH	RF2	L1220	3.9NH	R0783	0Ω

天线匹配

BT3		GPS		WIFI	
C0718	NA	C11217	NA	C1360	NA
C0720	0Ω	R7345	0Ω	R1356	0Ω
C0719	NA	C11218	NA	C1365	NA
R0724	0Ω			R1357	0Ω
				R1301	0Ω

天线逻辑

一,主天线	
状态一	ALL ON (SW1 2 3 4 5 6 7 8 ON) GSM900 WCDMA B8 LTE:B8/B40/B30/B7/B38/B41
状态二	SW1 SW2 SW7 ON SW3 4 5 6 8 OFF GSM850 WCDMA B5 LTE:B20/B19/B5/B18/B26
状态三	SW2 SW7 ON SW1 3 4 5 6 8 OFF LTE:B13
状态四	SW3 ON SW1 2 4 5 6 7 8 OFF GSM 1900 WCDMA:B1/B2/B4 LTE:B29/B12/B28/B17/B11/B21/B3/B4/B2/B25/B39/B1
状态五	SW7 ON SW1 2 3 4 5 6 8 OFF GSM 1800 LTE:B71/B66

二：分集天线

状态一	ALL ON (SW1 2 3 4 5 6 7 8 ON)	GSM900 /1800 WCDMA B8 LTE:B8/B3/B40/B30/B7/B38/B41
状态二	SW1 2 3 ON SW4 5 6 7 8 OFF	GSM850 WCDMA B5 LTE: B26/B18/B19/B5
状态三	SW4 ON SW1 2 3 5 6 7 8 OFF	LTE:B20
状态四	SW3 ON SW1 2 4 5 6 7 8 OFF	LTE:B29/B12/B13/B28/B17/B11/B21
状态五	SW7 ON SW1 2 3 4 5 6 8 OFF	GSM1900 WCDMA:B1/B2/B4 LTE:B71/B4/B2/B25/B39/B1/B66

Thank You

