

SKM0138

Name: Sample Approval

Ver: V1.0

date: 2023.09.07

Sample Approval Sheet

Project Name: SKM0138

Sample Name: Main + Div + WIFI/BT antenna

Sample SPEC: FPC material, gold plated, 3M300 adhesive backing

Customer PN.:

Transfer Date: 2023.09.07

Supplier Confirm	Project	Engineer	Quality
	Xiao Qiang	Huang Zhenming	Gu Shuang
date	2023.09.07	2023.09.07	2023.09.07

Customer confirm	PM	Electron	MD	PD	QE
date					

conclusion	☐ MP	☐ Limits use () K
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☐ ROHS

Supplier name:Shenzhen Haotiancheng Wireless Technology Co., Ltd

Supplier address:Shenzhen Baoan District Liuxian 1st Road Lane 2 Baicai

Science and Technology Park L Building 5E

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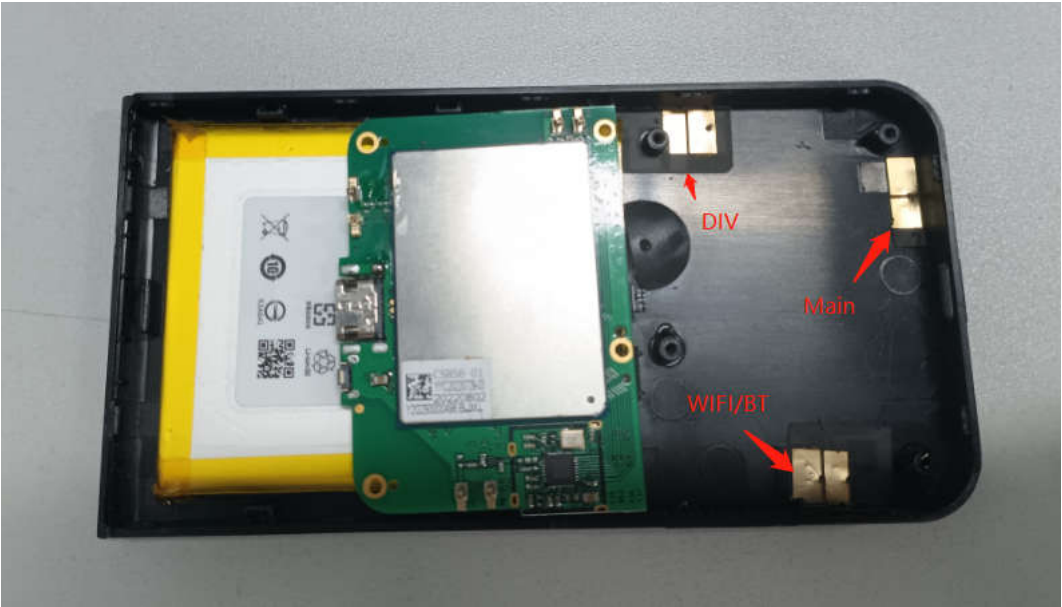
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1. Datasheet overview

The specification describes the condition of the built-in antenna of Shangzan SKM0138, and its frequency band LTE/GSM/WCDMA/WIFI/BT is manufactured by Shenzhen Haotiancheng Wireless Technology Co., Ltd.

2. Appearance

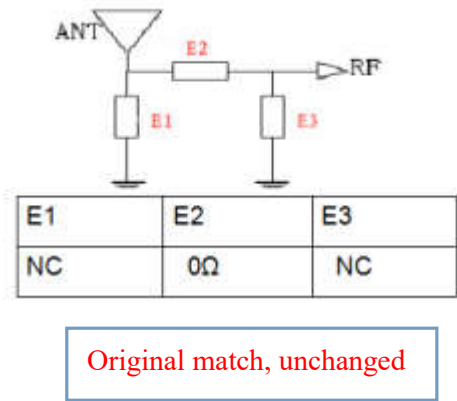


3. Electrical properties

3.1. Antenna band

	2G&3&4G	WIFI/BT
Transmit band(MHz)	700~2690	2400~2500
Receive band(MHz)	700~2690	2400~2500

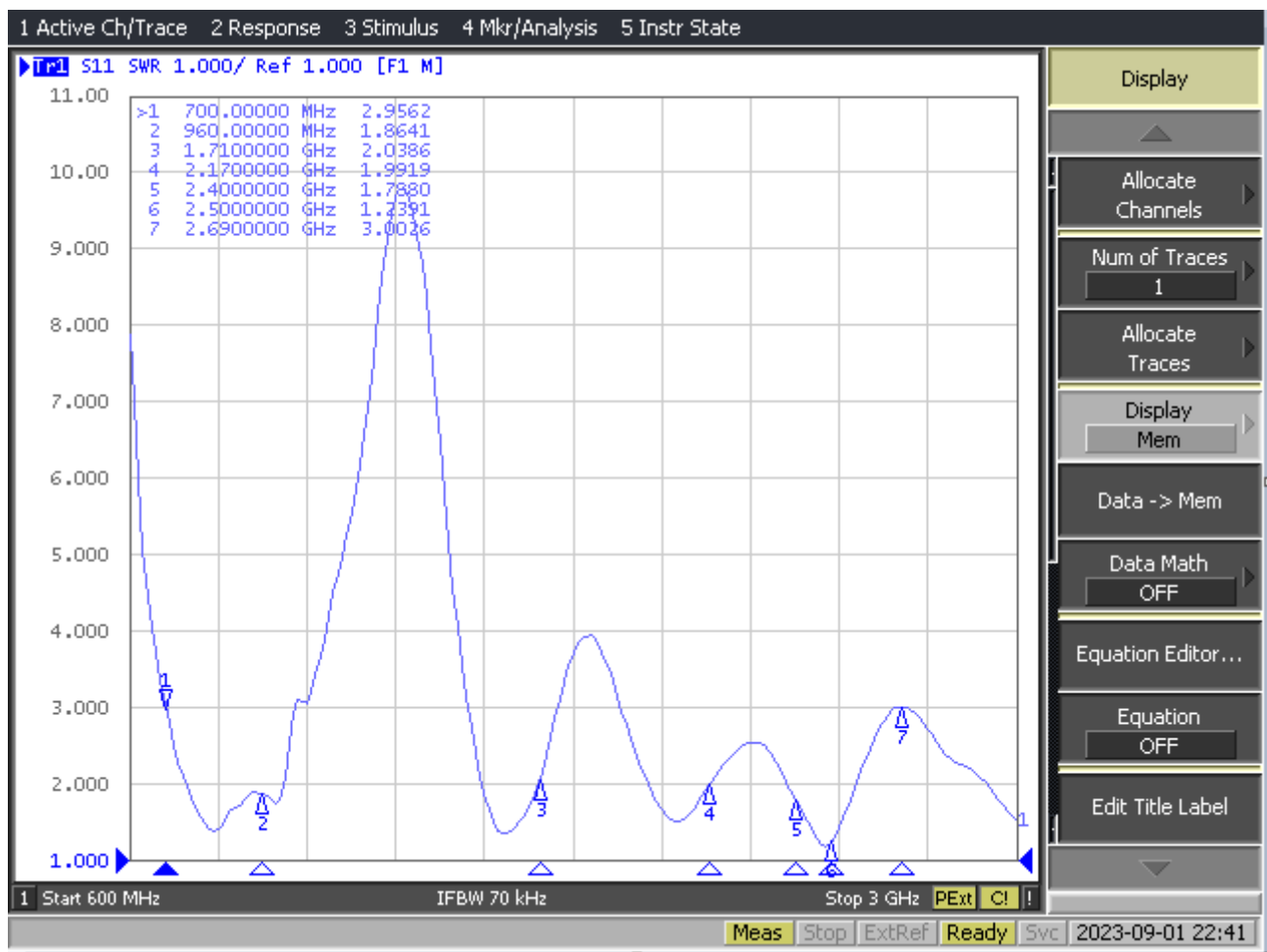
3.2. Matching circuit



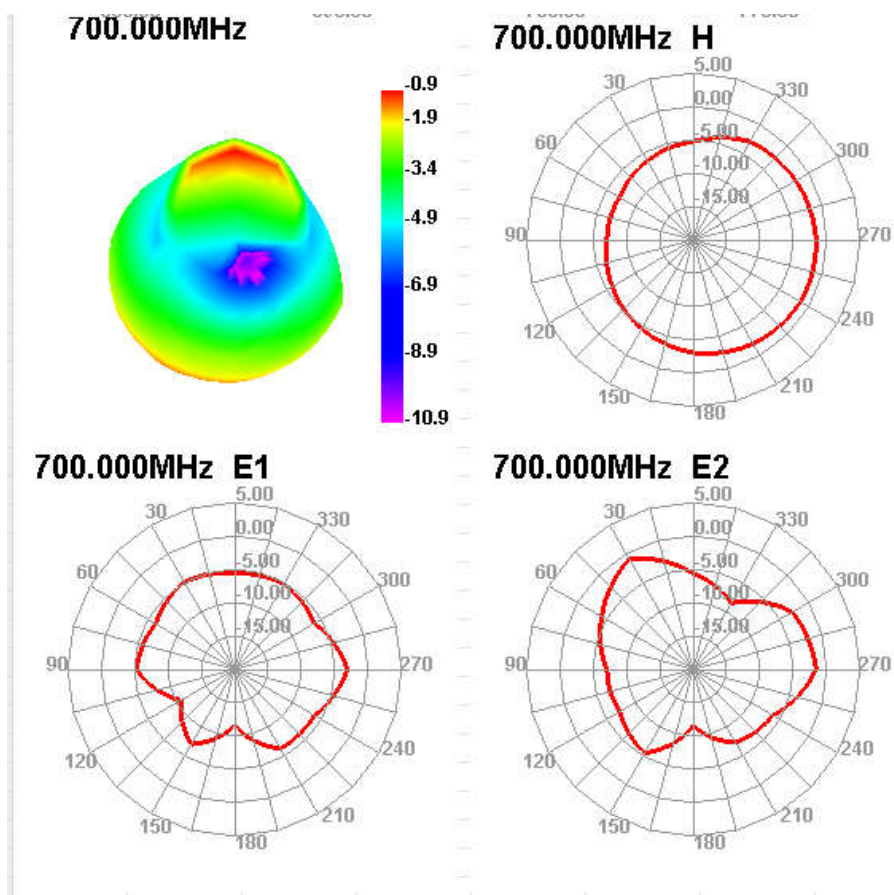
3.3. Impedance requirements50 ohm

3.4. Antenna passive standing wave plot vs. apple plot and gain efficiency

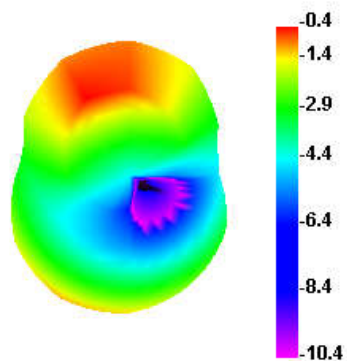
Main antenna passive standing wave vs. Apple graph and gain efficiency



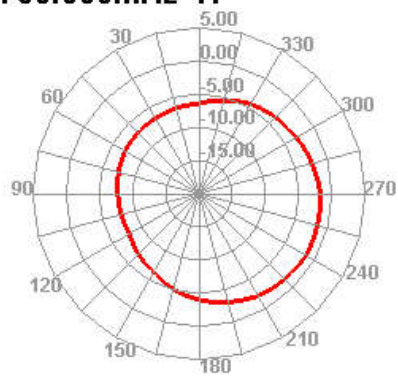
Freq (MHz)	Effi (%)	Gain (dBi)
700	31.35	-0.86
710	35.43	0.29
720	36.97	1.17
730	34.96	0.82
740	32.04	0.75
750	34.11	-0.4
760	33.64	-0.76
770	28.48	-1.39
780	26.56	-1.79
790	28.87	-1.78
800	39.92	-0.33



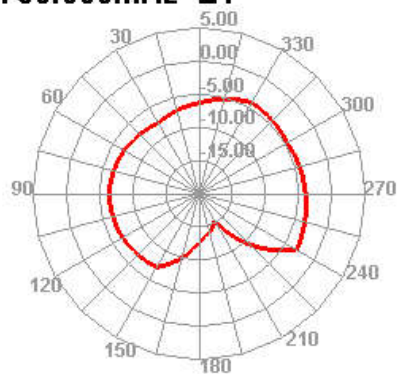
750.000MHz



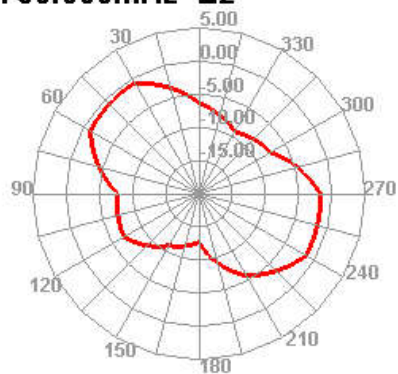
750.000MHz H



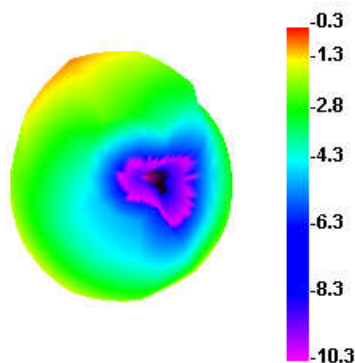
750.000MHz E1



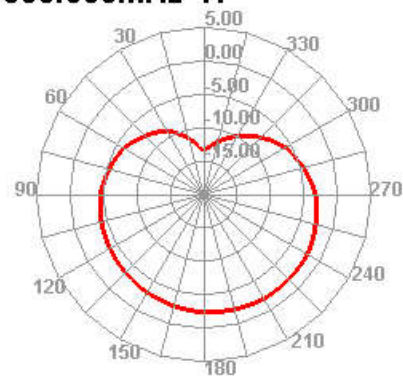
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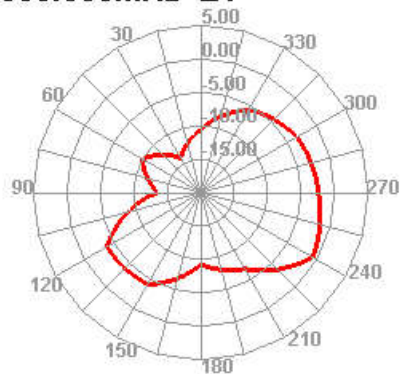
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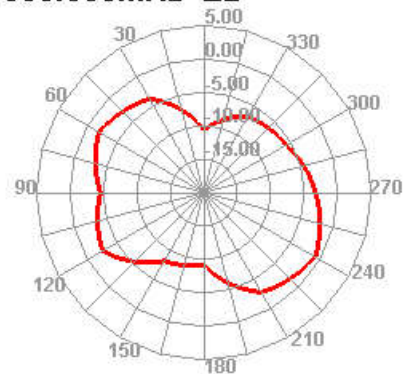
800.000MHz H



800.000MHz E1

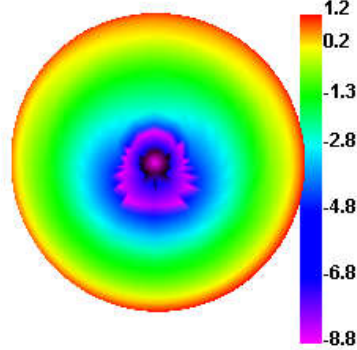


800.000MHz E2

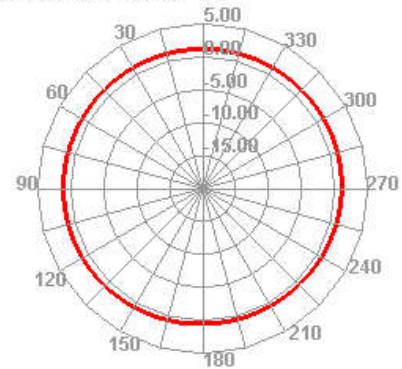


Freq (MHz)	Effi (%)	Gain (dBi)
810	47.81	1.25
820	47.35	1.17
830	45.69	0.74
840	49.66	0.59
850	43.86	0.57
860	43.79	0.63
870	49.68	0.58
880	48.67	0.7
890	48.76	0.71
900	46.57	0.46
910	44.33	0.23
920	44.18	0.29
930	46.29	0.71
940	49.79	1.24
950	47.88	1.25
960	40.33	0.73

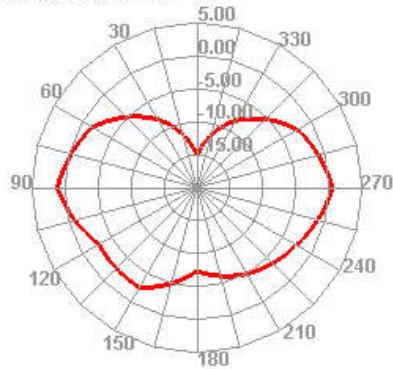
820.000MHz



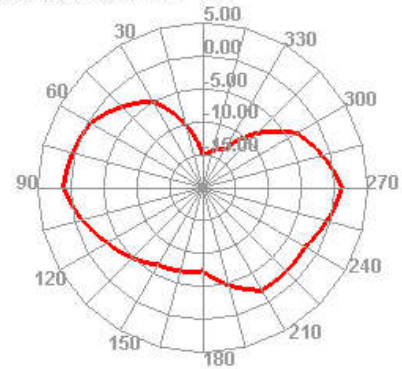
820.000MHz H



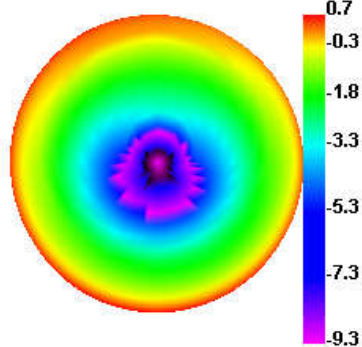
820.000MHz E1



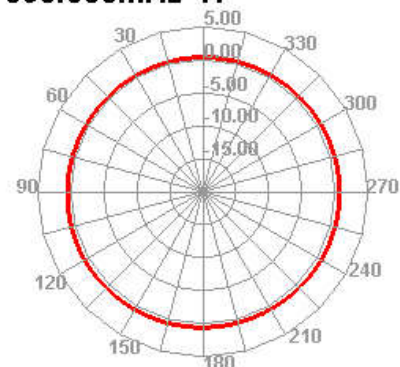
820.000MHz E2



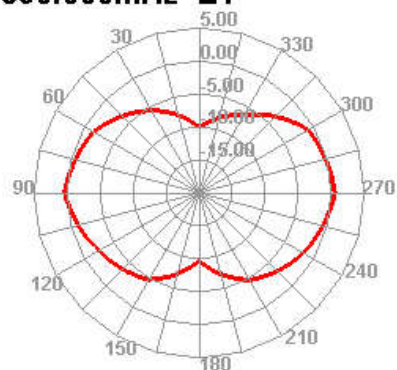
890.000MHz



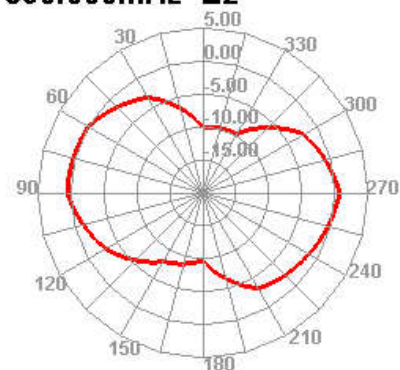
890.000MHz H



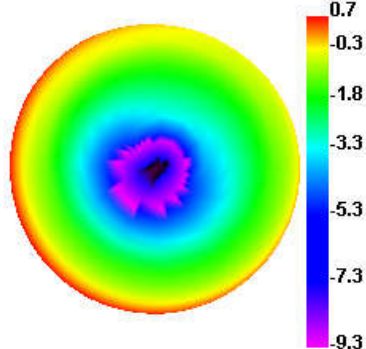
890.000MHz E1



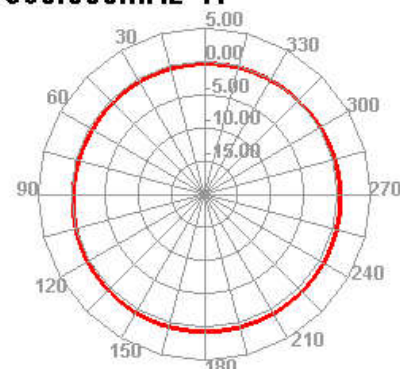
890.000MHz E2



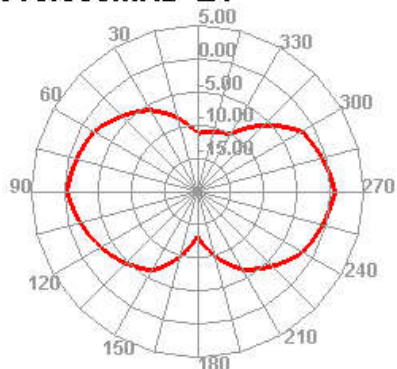
960.000MHz



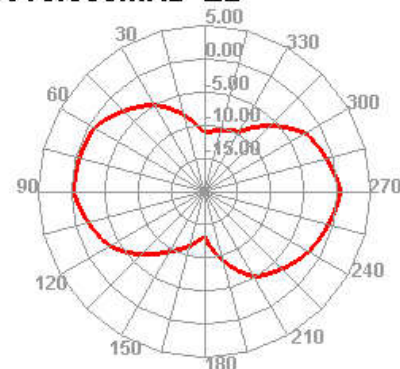
960.000MHz H



960.000MHz E1

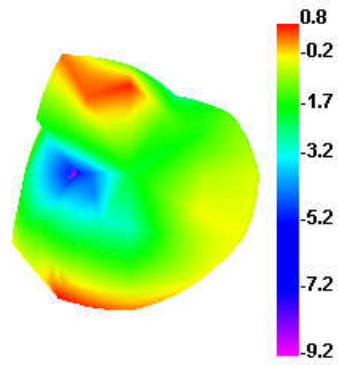


960.000MHz E2

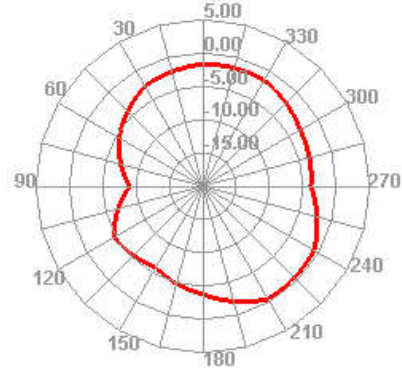


Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)
1710	49.66	0.83	2110	44.15	1.5
1720	47.9	0.68	2120	43.16	1.39
1730	48.53	0.78	2130	41.95	1.16
1740	49.64	0.58	2140	41.49	1.17
1750	52.23	0.56	2150	40.79	1.01
1760	54.09	0.67	2160	39.99	0.98
1770	53.8	0.79	2170	40.74	1.25
1860	49.57	0.73			
1870	47.03	0.39			
1880	45.51	0.2			
1890	43.54	0			
1900	42.01	-0.09			
1910	40.96	-0.01			
1920	42.05	0.3			
1930	43.59	0.66			
1940	45	0.88			
1950	47.94	1.21			
1960	48.03	1.25			
1970	48.19	1.23			
1980	47.96	1.22			
1990	48.24	1.25			
2000	50.32	1.44			
2010	50.25	1.37			
2020	49.71	1.43			
2030	50.31	1.5			
2040	47.78	1.3			
2050	46.06	1.2			
2060	44.53	1.23			
2070	43.12	1.28			
2080	44.71	1.58			
2090	45.49	1.73			
2100	46.64	1.75			

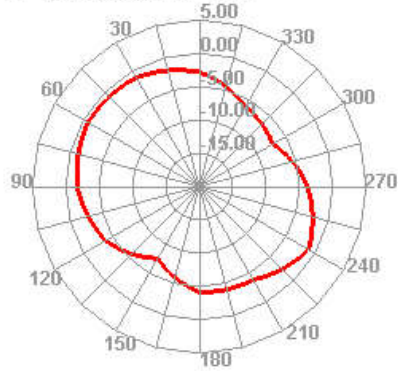
1710.000MHz



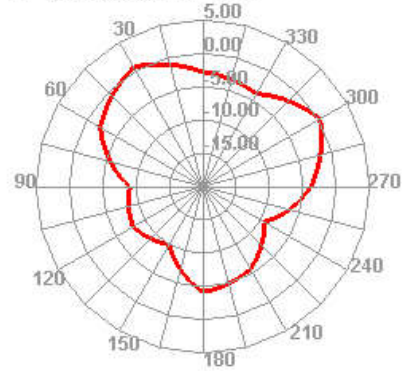
1710.000MHz H



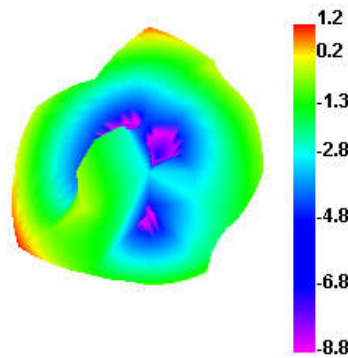
1710.000MHz E1



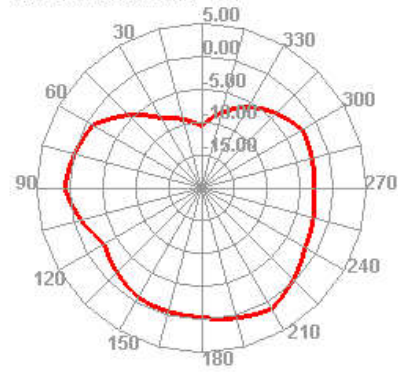
1710.000MHz E2



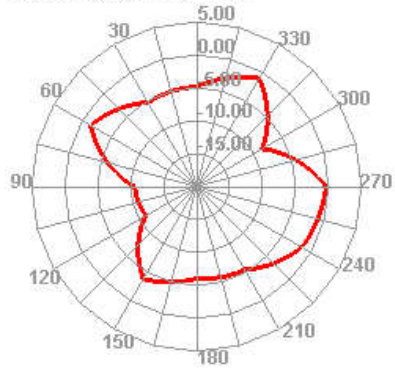
1970.000MHz



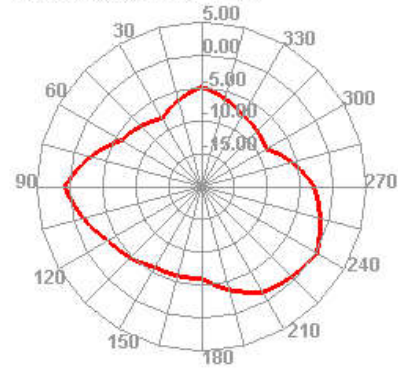
1970.000MHz H



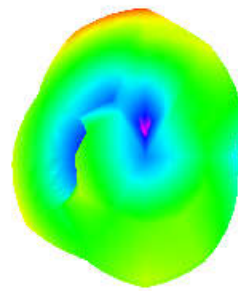
1970.000MHz E1



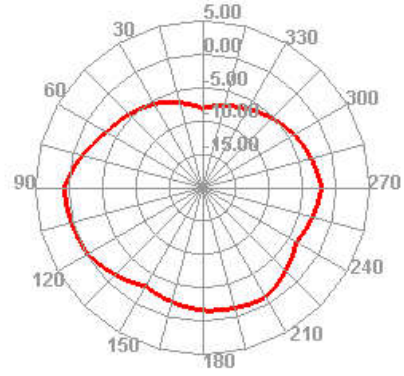
1970.000MHz E2



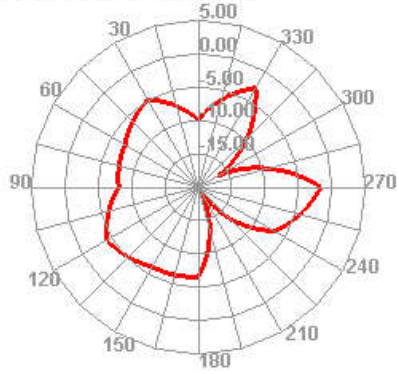
2170.000MHz



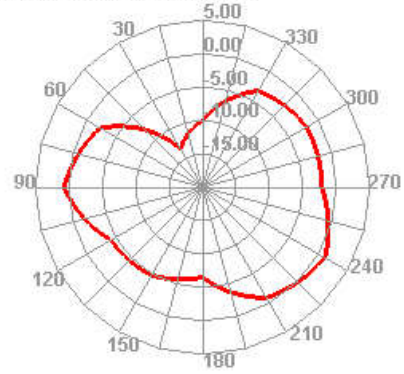
2170.000MHz H



2170.000MHz E1

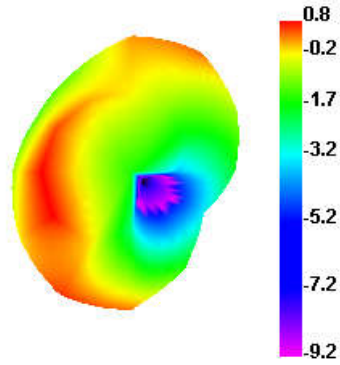


2170.000MHz E2

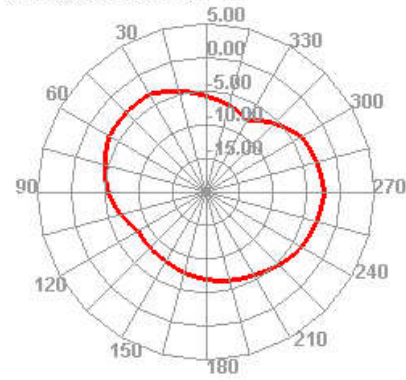


Freq (MHz)	Effi (%)	Gain (dBi)
2300	46.8	0.78
2310	48.12	0.75
2320	45.82	0.49
2330	46.93	0.62
2340	47.98	0.68
2350	44.6	0.26
2360	45.39	0.19
2370	43.32	-0.18
2380	46.42	0.23
2390	50.39	0.45
2400	52.13	0.45
2410	52.66	0.76
2420	53.11	0.66
2430	58.08	1.22
2440	66.89	2
2450	67.15	2.22
2460	69.73	2.37
2470	70.18	2.41
2480	71.23	2.42
2490	73.9	2.49
2500	73.69	2.29
2510	72.74	2.08
2520	71.14	2.09
2530	71.13	2.29
2540	69.26	2.39
2550	71.45	2.67
2560	73.45	2.87
2570	76.86	3.19
2580	77.77	3.25
2590	77.04	3.2
2600	81.33	3.4
2610	84.34	3.67
2620	80.07	3.5
2630	79.46	3.47
2640	81.73	3.6
2650	81.34	3.52
2660	81.1	3.48
2670	80.71	3.36
2680	81.09	3.35
2690	77.51	2.95
2700	76.45	2.61

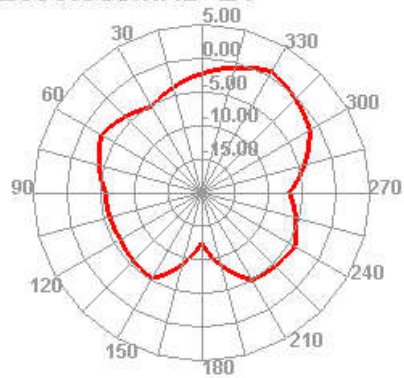
2300.000MHz



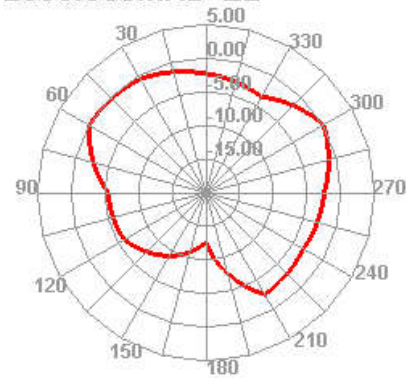
2300.000MHz H



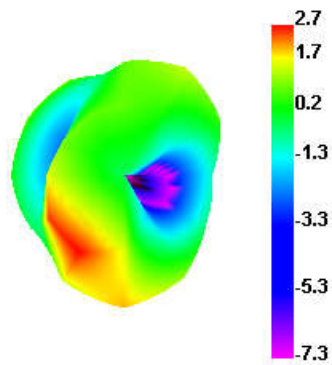
2300.000MHz E1



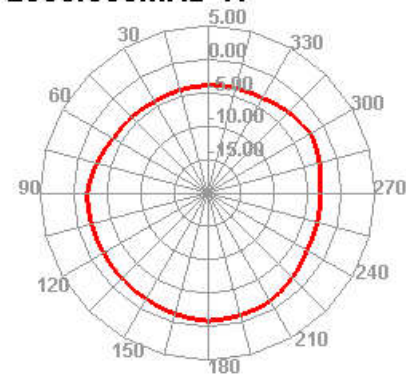
2300.000MHz E2



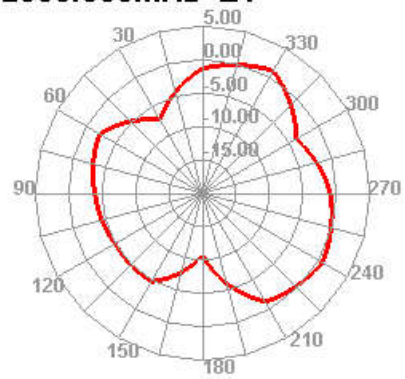
2550.000MHz



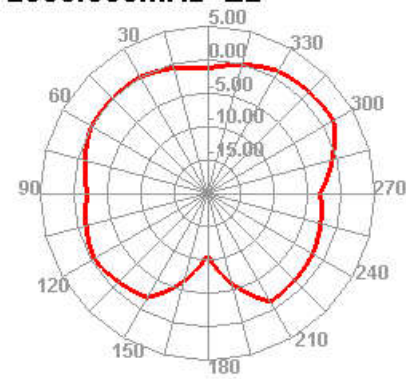
2550.000MHz H



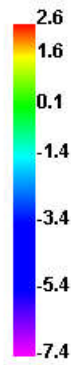
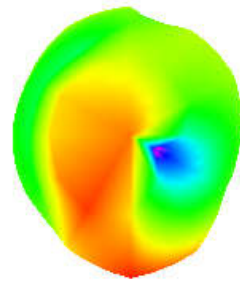
2550.000MHz E1



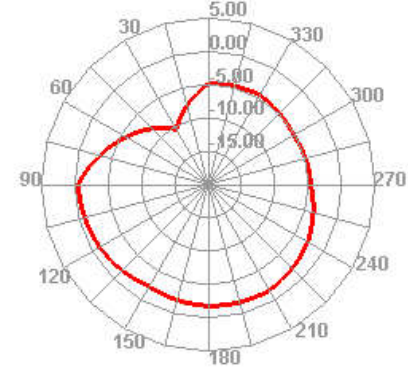
2550.000MHz E2



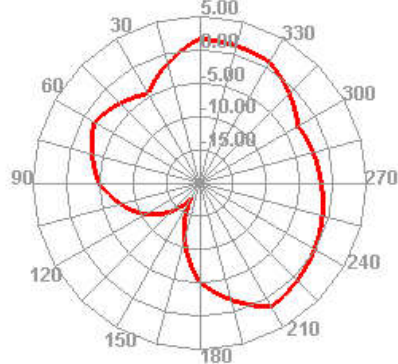
2700.000MHz



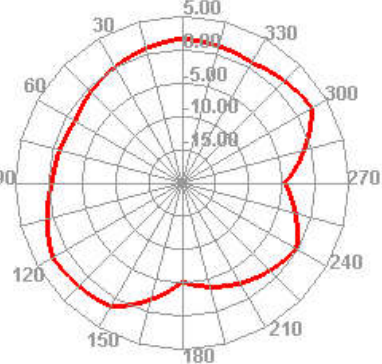
2700.000MHz H



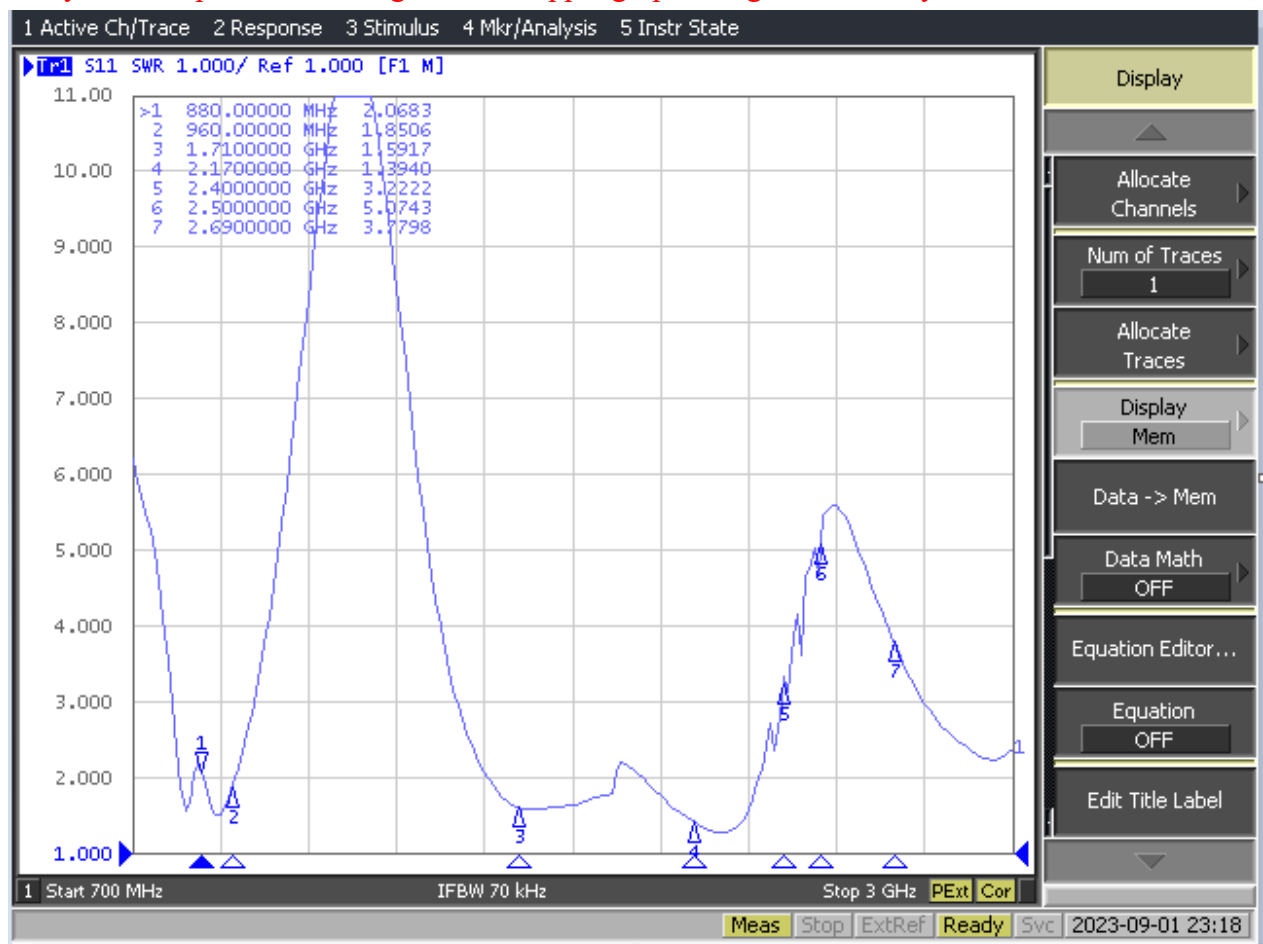
2700.000MHz E1



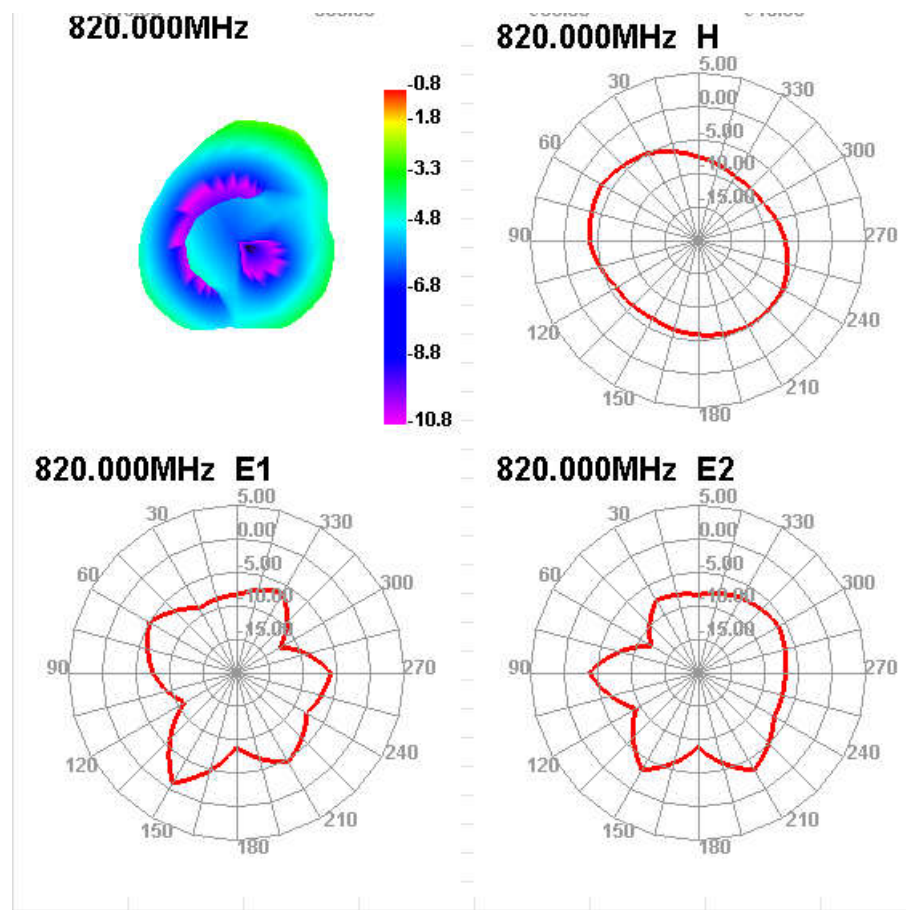
2700.000MHz E2



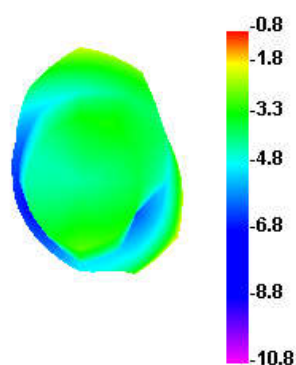
Diversity antenna passive standing wave vs. apple graph and gain efficiency



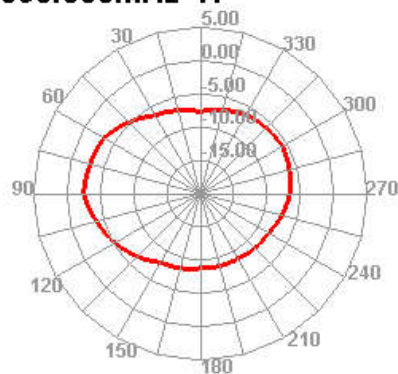
Freq (MHz)	Effi (%)	Gain (dBi)
820	32.89	-0.83
830	36.46	0.12
840	37.52	0.22
850	37.44	0.02
860	41.01	0.48
870	38.54	-0.39
880	41.42	-0.13
890	38.4	-0.78
900	36.19	0.19
910	35.62	0.57
920	37.71	0.65
930	36.88	0.64
940	30.71	-0.66
950	32.19	-0.84
960	34.5	-0.89



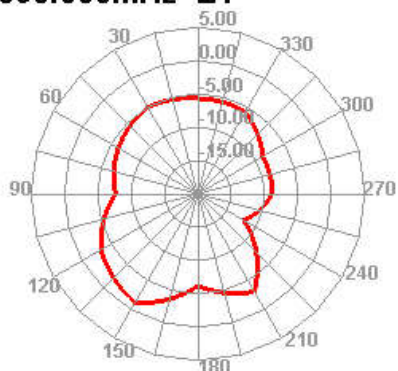
890.000MHz



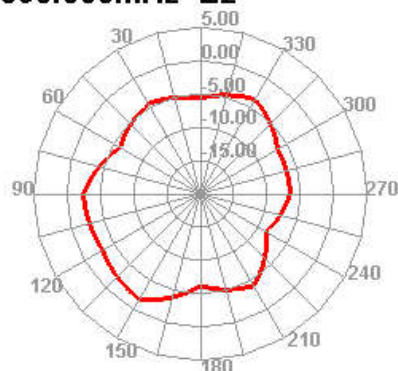
890.000MHz H



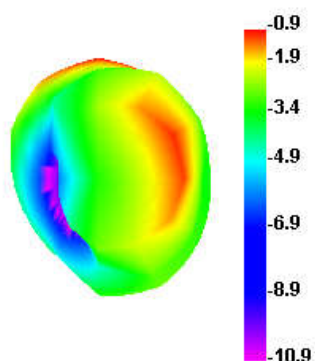
890.000MHz E1



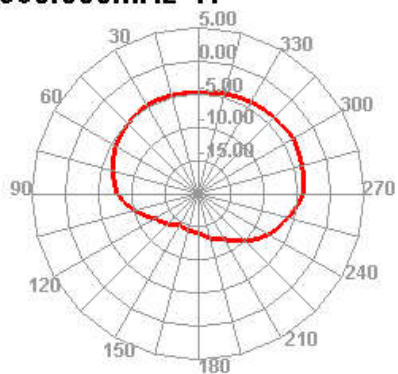
890.000MHz E2



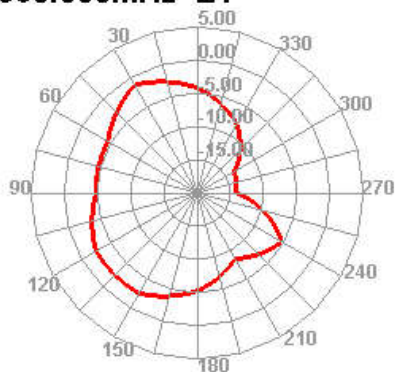
960.000MHz



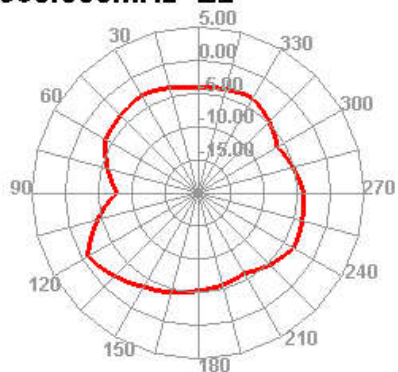
960.000MHz H



960.000MHz E1

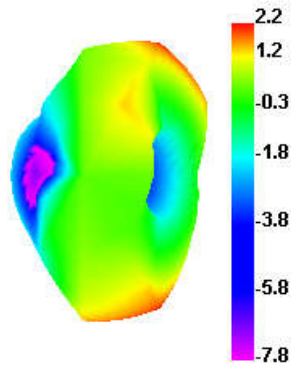


960.000MHz E2

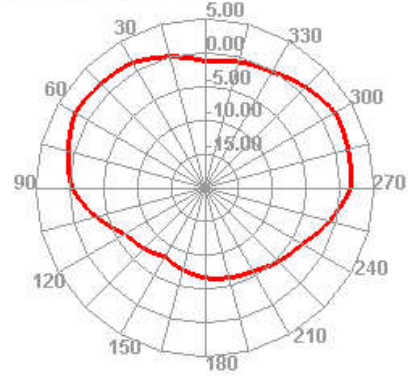


Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)
1700	67.35	2.24	2120	62.95	2.12
1710	68.66	2.17	2130	60.36	1.98
1720	67.01	2.07	2140	59.78	1.97
1730	66.94	2.02	2150	59.55	1.92
1740	67.24	2.25	2160	57.31	1.72
1750	72.45	2.72	2170	58.04	1.79
1760	77.22	3.03			
1850	78.51	3.17			
1860	79.49	3.32			
1870	75.41	3.08			
1880	72.78	3.04			
1890	67.58	2.72			
1900	63.39	2.5			
1910	59.88	2.26			
1920	58.45	2.29			
1930	56.5	2.29			
1940	53.58	2.02			
1950	57.53	1.61			
1960	64.2	1.73			
1970	67.23	1.94			
1980	67.19	1.96			
1990	66.97	2.05			
2000	67.85	2.26			
2010	67.2	2.37			
2020	67.42	2.46			
2030	68.03	2.5			
2040	66.91	2.41			
2050	65.94	2.3			
2060	63.42	2.11			
2070	61.73	1.95			
2080	63.27	2.07			
2090	65.36	2.28			
2100	68.66	2.51			
2110	64.34	2.24			

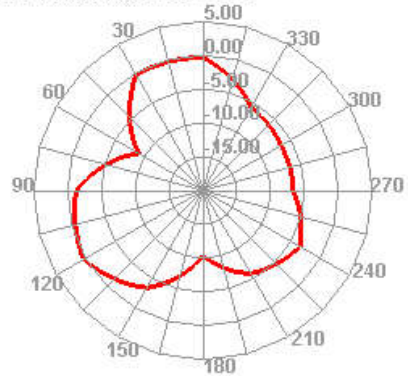
1700.000MHz



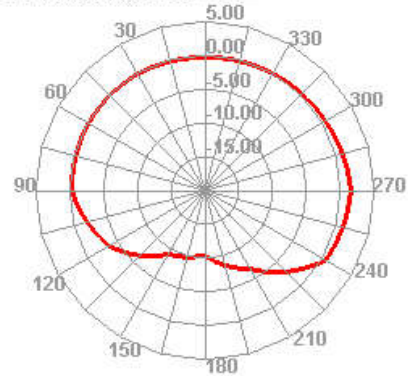
1700.000MHz H



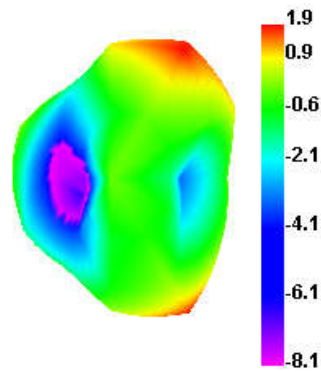
1700.000MHz E1



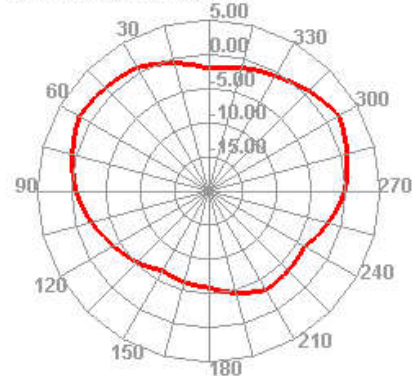
1700.000MHz E2



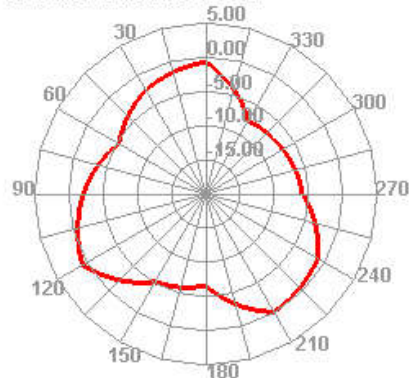
1970.000MHz



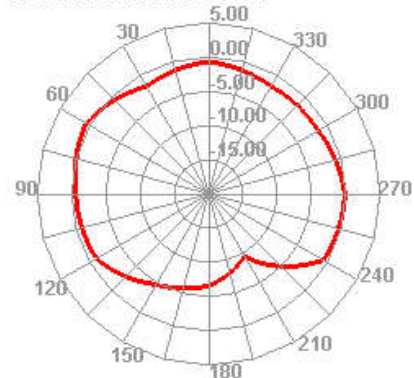
1970.000MHz H



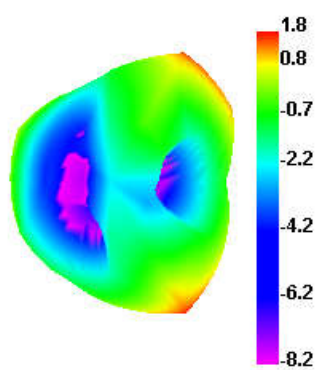
1970.000MHz E1



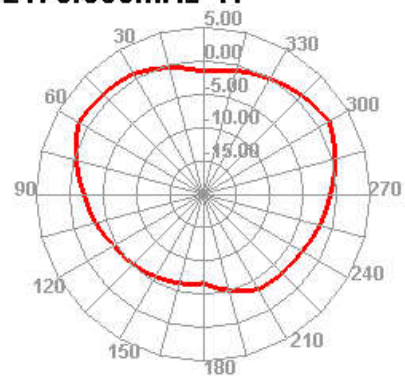
1970.000MHz E2



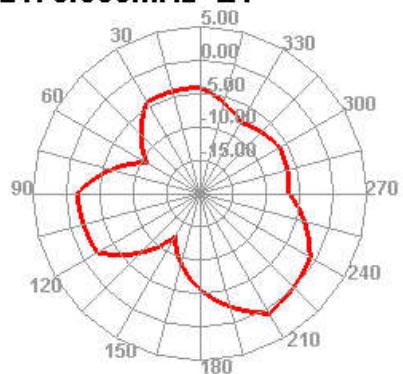
2170.000MHz



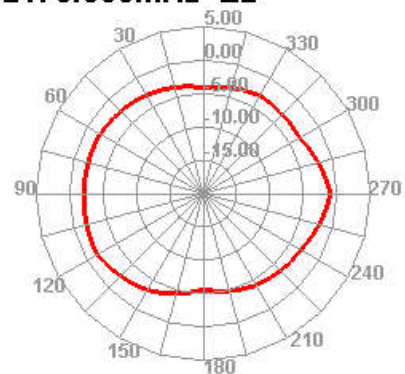
2170.000MHz H



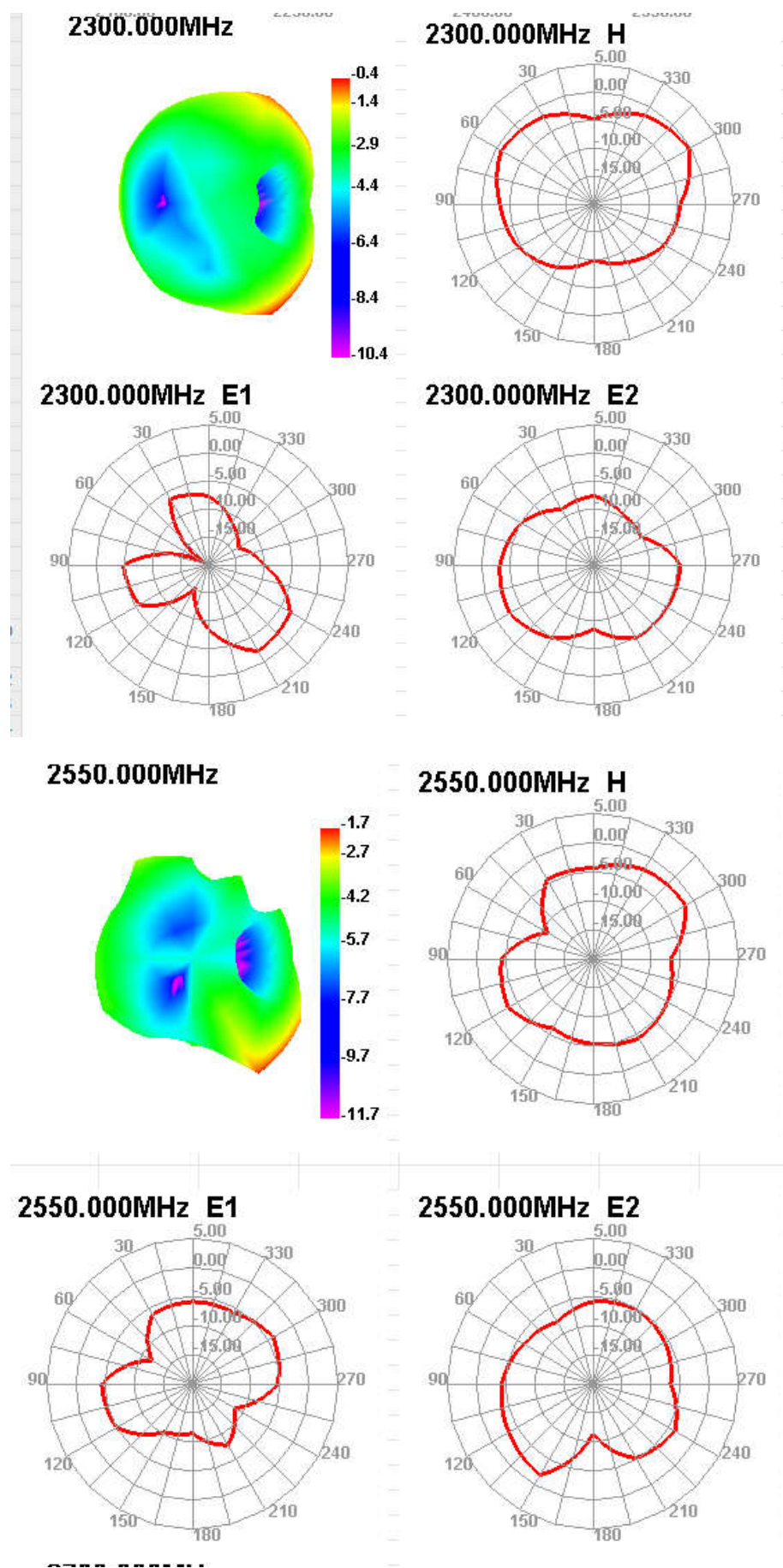
2170.000MHz E1



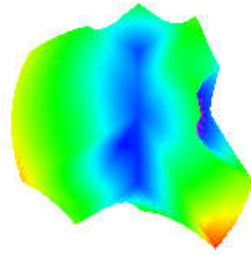
2170.000MHz E2



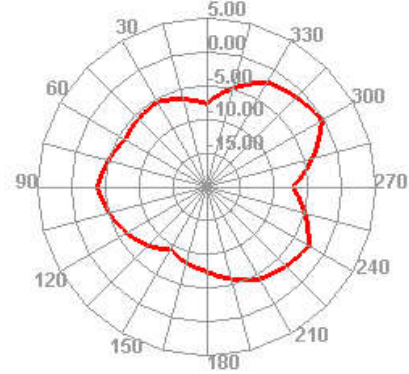
Freq (MHz)	Effi (%)	Gain (dBi)
2300	42.59	-0.38
2310	39.12	-1.02
2320	44.37	-0.75
2330	41.4	-0.52
2340	38.27	-0.47
2350	36.97	-1.55
2360	34.16	-1.48
2370	32.63	-1.83
2380	40.47	-0.35
2390	39.01	-1.37
2400	40.11	-0.99
2410	38.88	-1.32
2420	39.11	-1.37
2430	40.58	-0.87
2440	41.36	-0.47
2450	41.03	-0.3
2460	44.01	-0.62
2470	45.91	-0.09
2480	46.2	-0.87
2490	38.83	-1.2
2500	40.61	-0.69
2510	42.83	-0.28
2520	43.26	-0.39
2530	45.64	-0.14
2540	38.2	-1.85
2550	39.26	-1.69
2560	41.24	-1.47
2570	41.62	-1.43
2580	43.06	-1.19
2590	45.25	-0.96
2600	43.79	-1.18
2610	46.06	-0.85
2620	45.07	-0.91
2630	43.33	-1.08
2640	44.01	-0.81
2650	43.25	-0.84
2660	46.41	-0.3
2670	45.07	-0.24
2680	44.63	-0.29
2690	44.32	-0.25
2700	43.74	-0.38



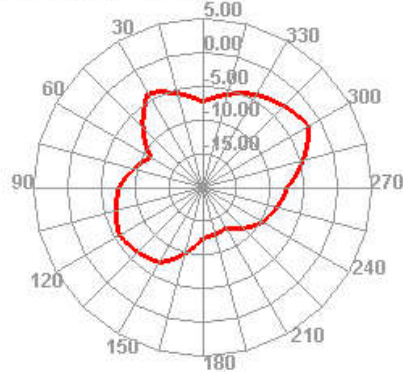
2700.000MHz



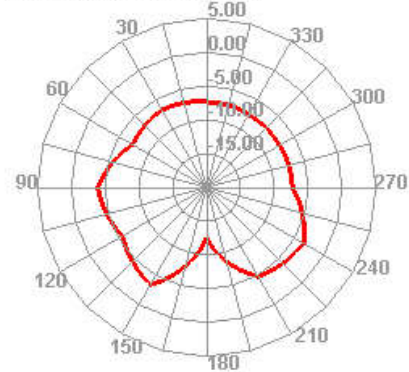
2700.000MHz H



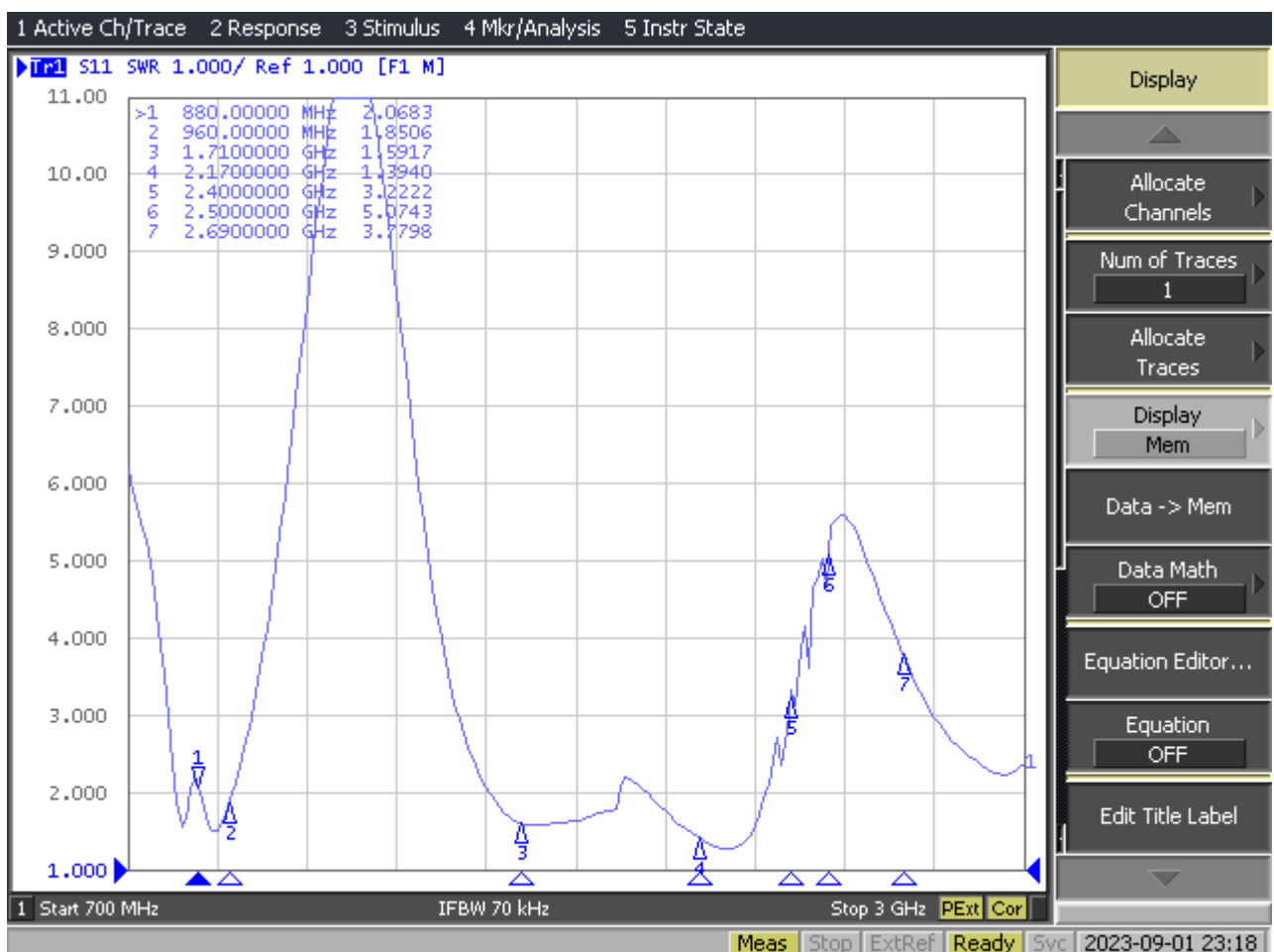
2700.000MHz E1



2700.000MHz E2

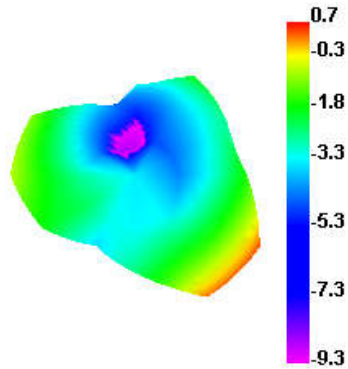


Wifi/BT passive standing wave with Apple graph and gain efficiency

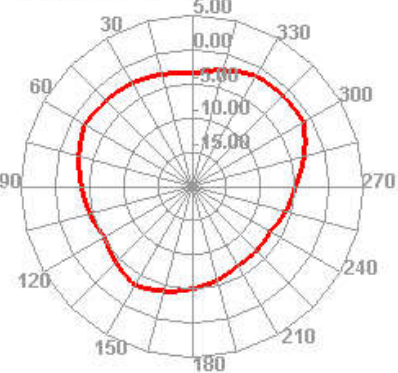


Freq (MHz)	Effi (%)	Gain (dBi)
2400	52.87	0.67
2410	54.95	1.48
2420	55.58	1.27
2430	57.36	1.43
2440	60.03	1.86
2450	64.77	2.97
2460	66.89	3.02
2470	67.01	3.31
2480	69.62	3.67
2490	73.68	4.13
2500	75.35	4.36

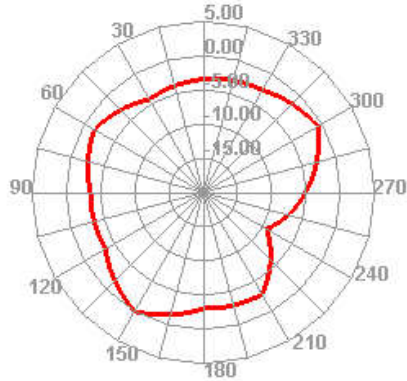
2400.000MHz



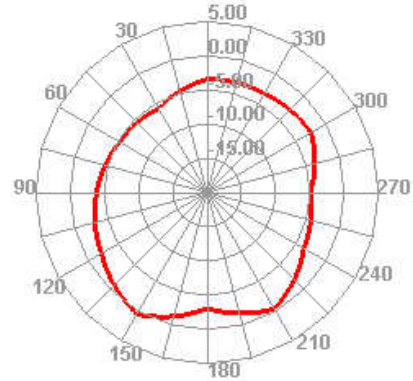
2400.000MHz H



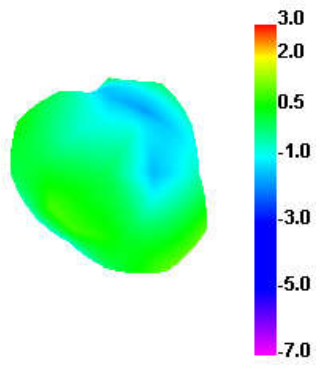
2400.000MHz E1



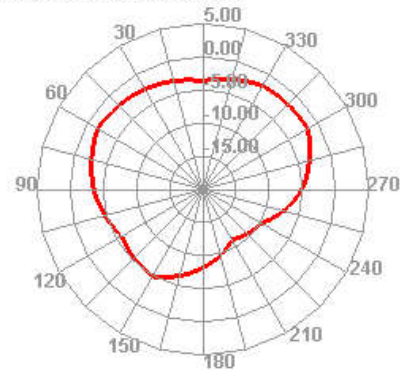
2400.000MHz E2



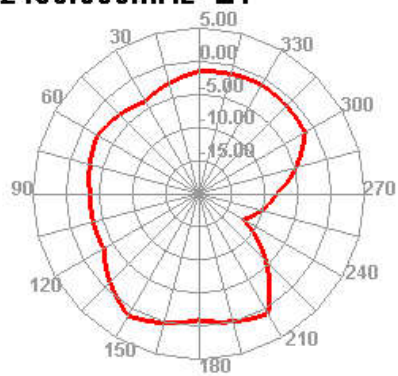
2450.000MHz



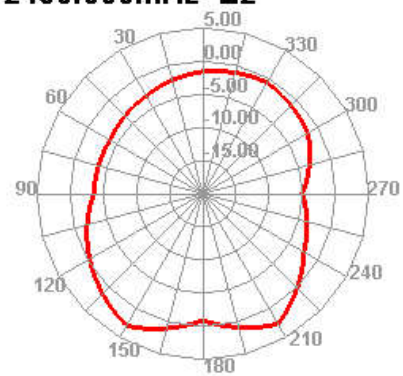
2450.000MHz H



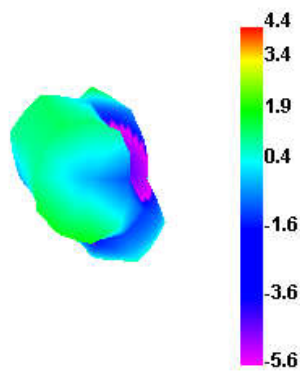
2450.000MHz E1



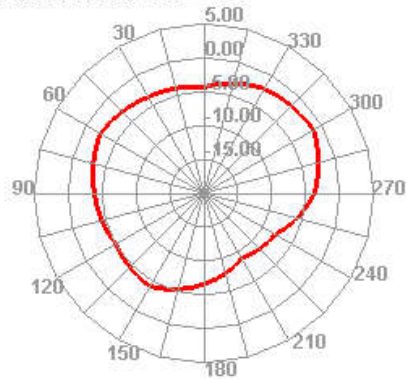
2450.000MHz E2



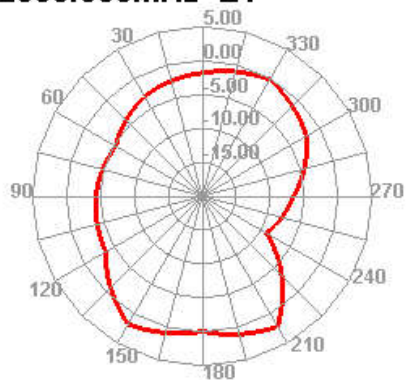
2500.000MHz



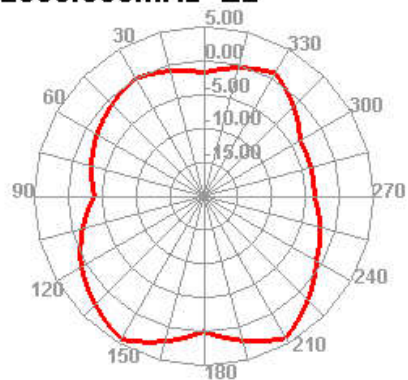
2500.000MHz H



2500.000MHz E1



2500.000MHz E2



3.5. Main antenna test data

Band	TRP/TIS	L	M	H	Band	TRP/TIS	L	M	H
WCDMA850	TRP	16.56	16.77	17.01	LTE-B7	TRP	18.14	18.38	18.48
	TIS			-103.68		TIS			-90.72
WCDMA900	TRP	17.42	17.27	16.43	LTE-B8	TRP	17.16	17.25	16.87
	TIS			-103.57		TIS			-90.14
WCDMA1700	TRP	18.13	18.24	18.54	LTE-B9	TRP	18.18	18.29	18.55
	TIS			-104.32		TIS			-90.38
WCDMA1900	TRP	18.63	18.48	18.55	LTE-B12	TRP	17.27	17.48	17.59
	TIS			-104.24		TIS			-90.27
WCDMA2100	TRP	18.15	18.38	18.65	LTE-B13	TRP	17.11	17.34	17.54
	TIS			-104.50		TIS			-90.27
LTE-B1	TRP	18.17	18.29	18.41	LTE-B17	TRP	17.16	17.54	17.68
	TIS			-92.18		TIS			-89.27
LTE-B2	TRP	18.45	18.74	19.06	LTE-B18	TRP	16.74	16.63	17.52
	TIS			-92.38		TIS			-90.34
LTE-B3	TRP	18.14	18.26	18.58	LTE-B19	TRP	16.49	16.86	17.18
	TIS			-92.75		TIS			-90.51
LTE-B4	TRP	18.45	18.22	18.59	LTE-B20	TRP	16.38	16.68	17.25
	TIS			-92.48		TIS			-89.34
LTE-B5	TRP	16.22	16.58	17.46	LTE-B25	TRP	18.27	18.44	18.56
	TIS			-90.38		TIS			-90.59

Band	TRP/TIS	L	M	H	Band	TRP/TIS	L	M	H
LTE-B26	TRP	16.24	16.75	17.13	LTE-B39	TRP	18.37	18.68	18.75
	TIS			-90.14		TIS			-89.17
LTE-B28	TRP	17.63	17.68	17.58	LTE-B40	TRP	18.26	18.38	18.52
	TIS			-90.47		TIS			-89.44
LTE-B34	TRP	18.39	18.45	18.58	LTE-B41	TRP	18.68	18.42	18.58
	TIS			-91.55		TIS			-89.63
LTE-B38	TRP	18.16	18.57	18.65	LTE-B66	TRP	18.14	18.30	18.57
	TIS			-90.21		TIS			-90.29

3.6. WIFI antenna test data

Band	TRP/TIS	L	M	H
11b (11M)	TRP	13.58	13.48	13.22
	TIS	-81.17	-81.28	-81.54
11g (54M)	TRP	12.18	12.37	12.59
	TIS	-67.33	-67.24	-67.85
11n (MCS7)	TRP	12.18	12.39	12.48
	TIS	-65.44	-65.17	-65.24

3.7. Environmental treatment

No environmental treatment

4. Appearance structure

4.1Antenna material

Antenna material: FPC antenna, black ink, one and a half pairs of material, gold plating in exposed copper area. Base material + double-sided adhesive + release paper

4.2 Structural drawings

