

SPECIFICATION

START USA, INC.
5600 Tennyson Parkway, Suite 390, Plano, TX 75024, USA

Antenna Report

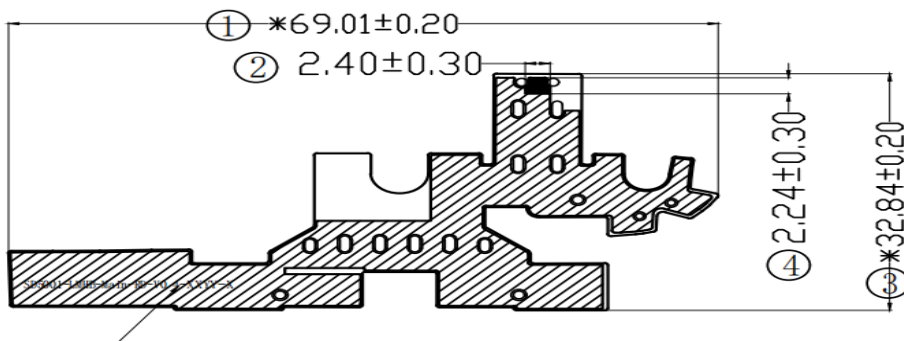
For FCC ID: 2AUOUH1

Factory	Etheta Communication Technology (shenzhen) co.,Ltd
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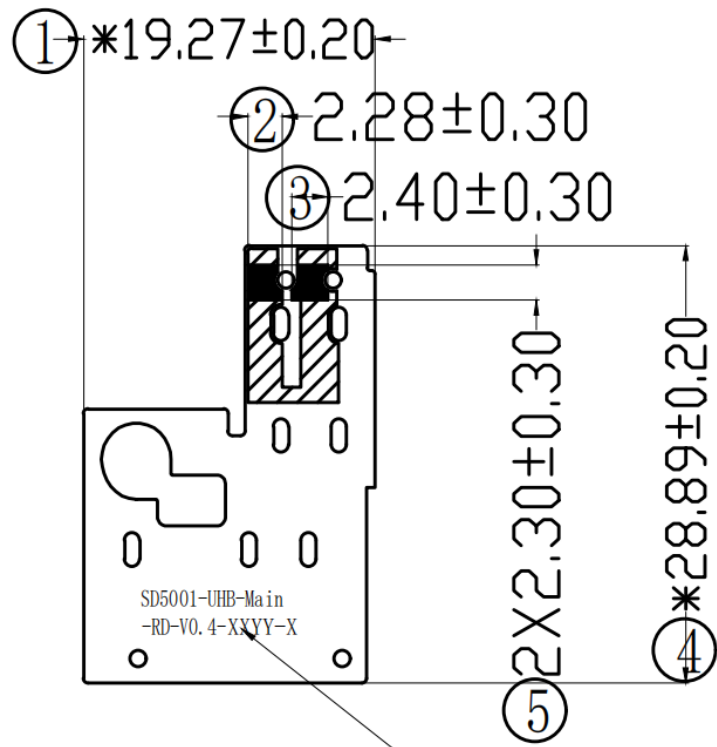
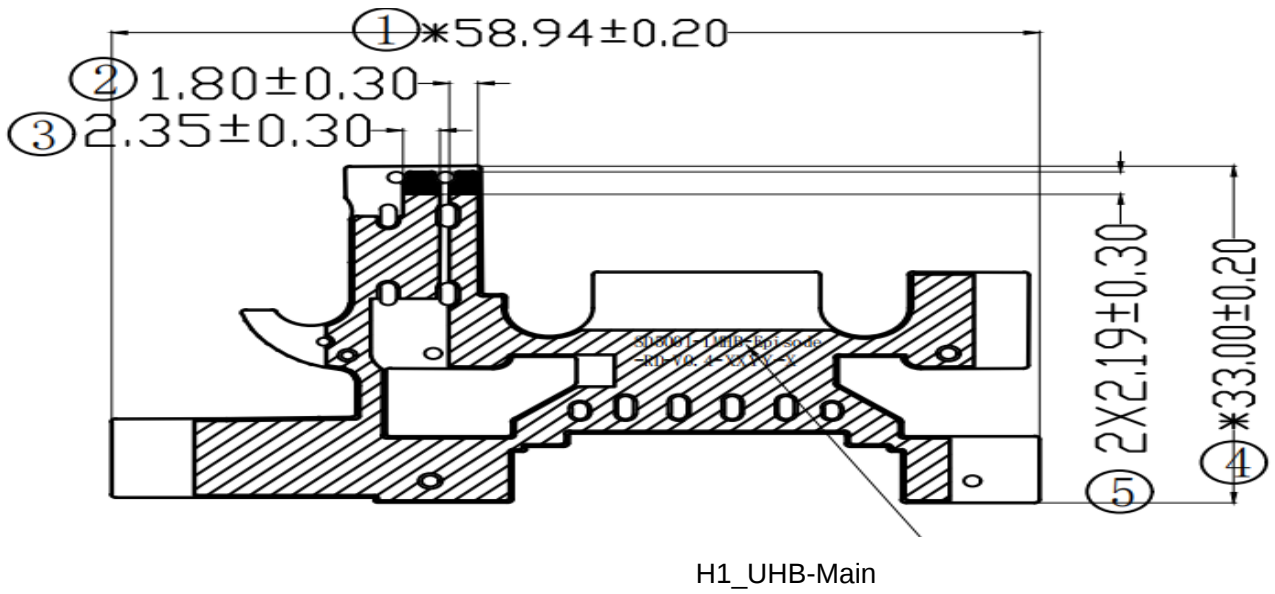
1 General description

1.1 Antenna appearing diagram

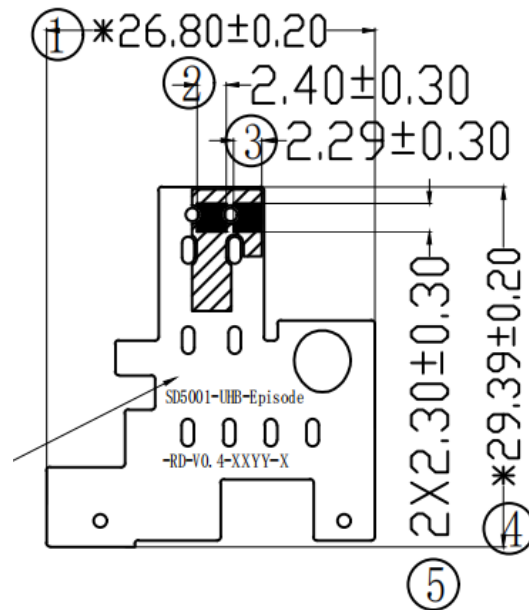
H1_LMHB-Main



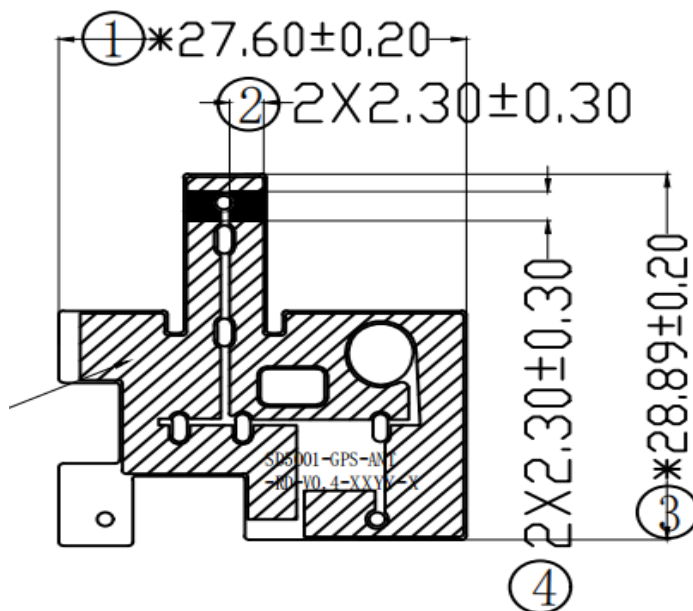
H1_LMHB-Episode



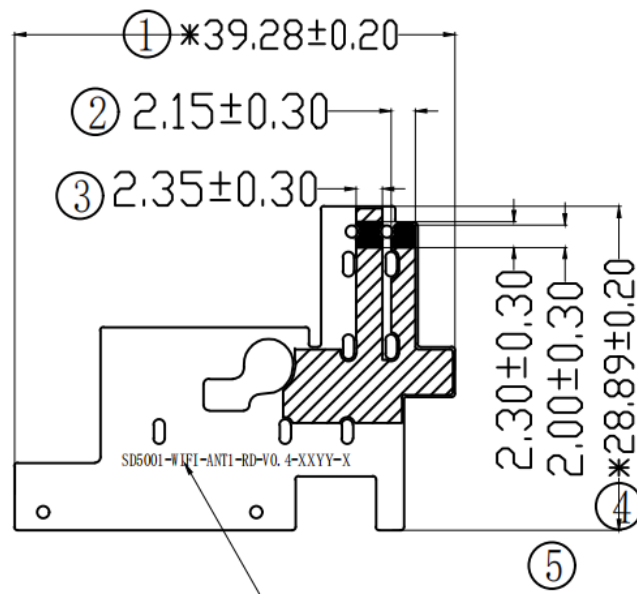
H1_UHB-Episode



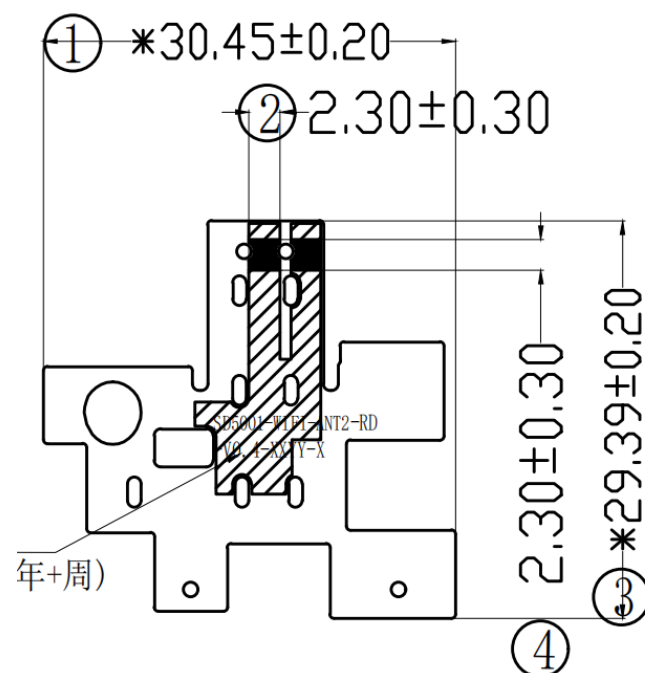
H1_GPS-ANT



H1_WIFI-ANT1

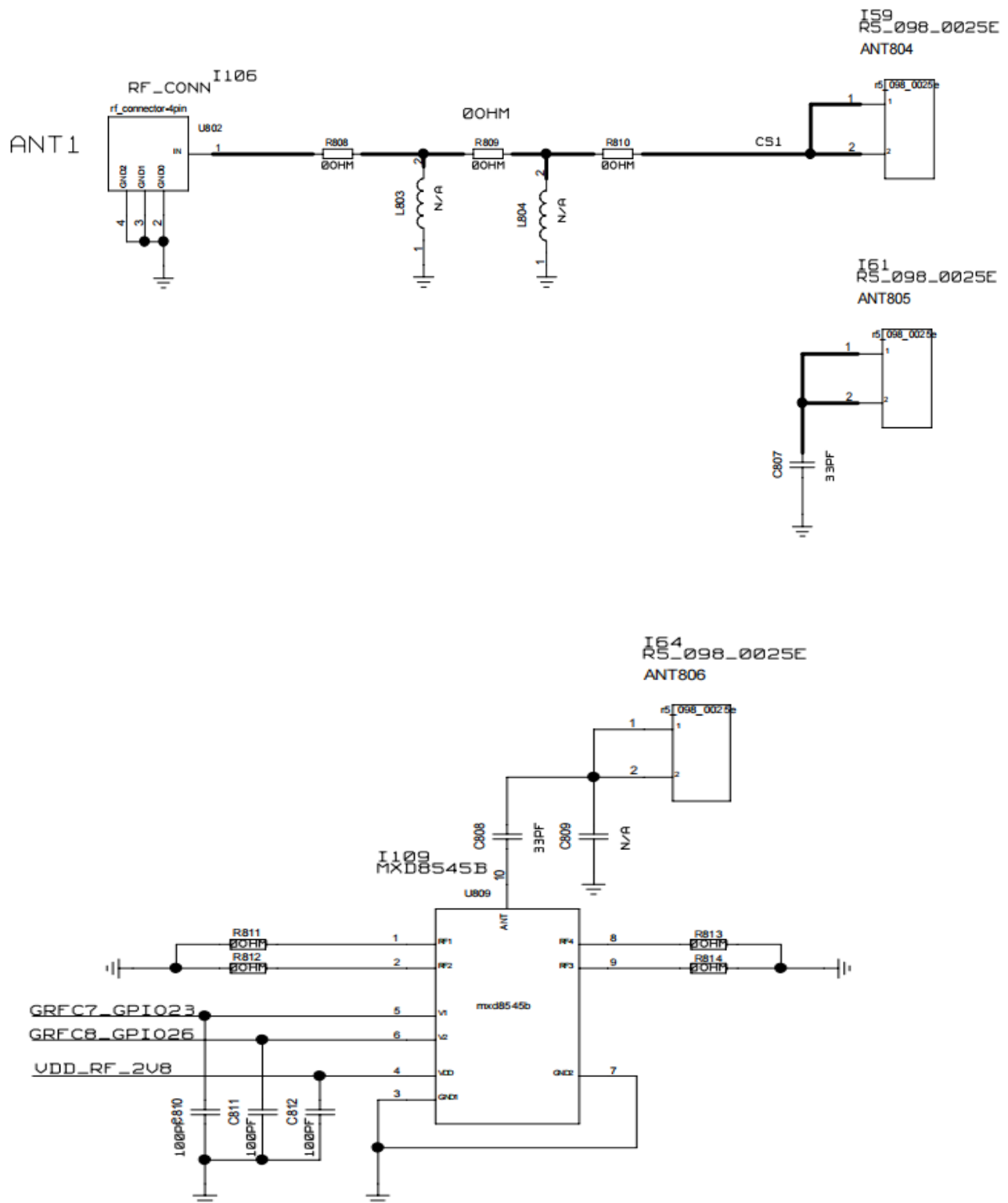


H1_WIFI-ANT2



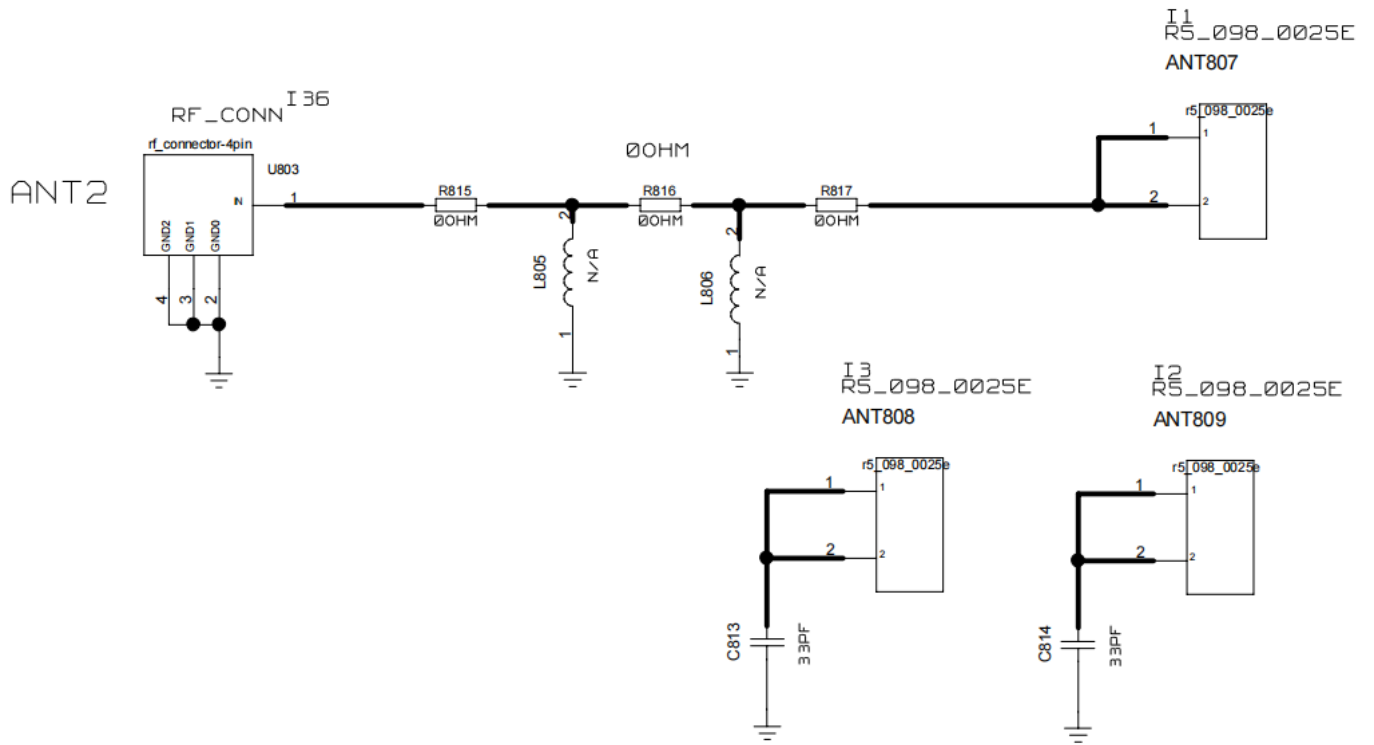
H1_LMHB-Main	
Element	Value
R801	2.7NH
L801	0.3PF
R802	0 Ω
L802	68NH
R803	33PF
L2	100NH

H1_LMHB-Episode Antenna



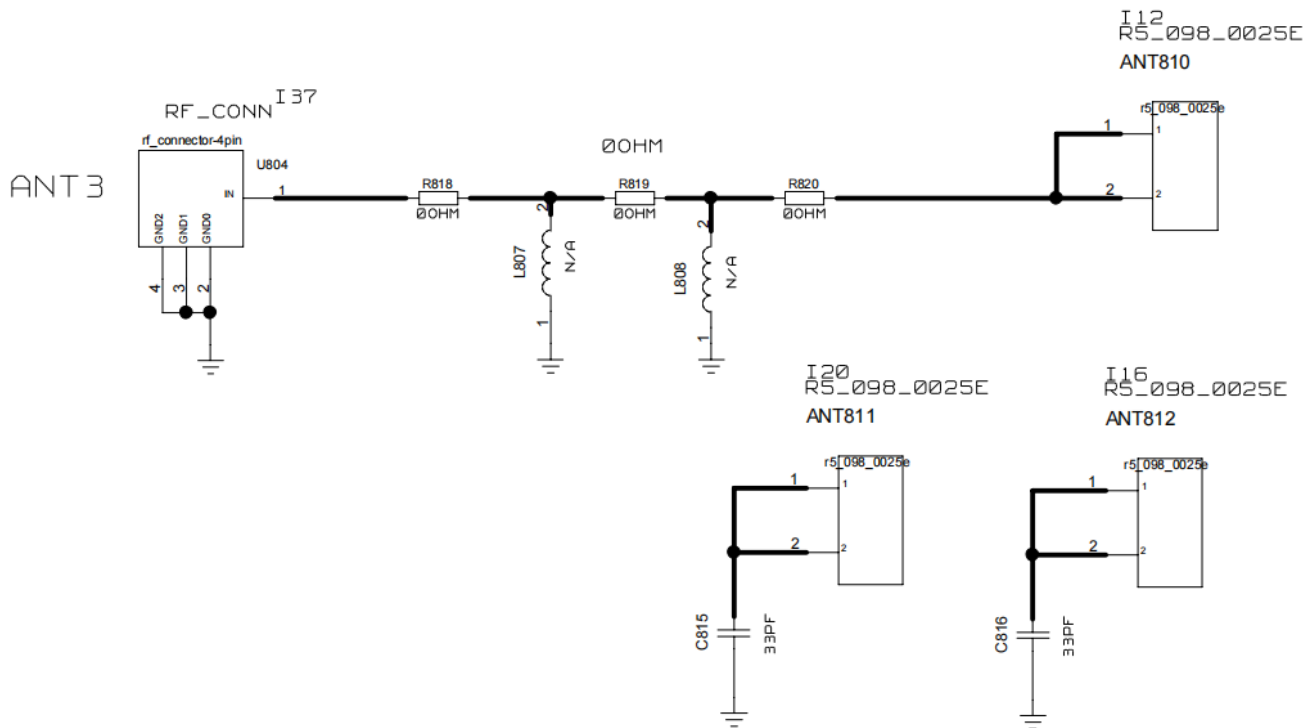
H1_LMHB-Episode	
Element	Value
R808	0 Ω
L803	NC
R809	3.9PF
L804	12NH
R810	0 Ω
L11	100NH

H1_UHB-Main Antenna



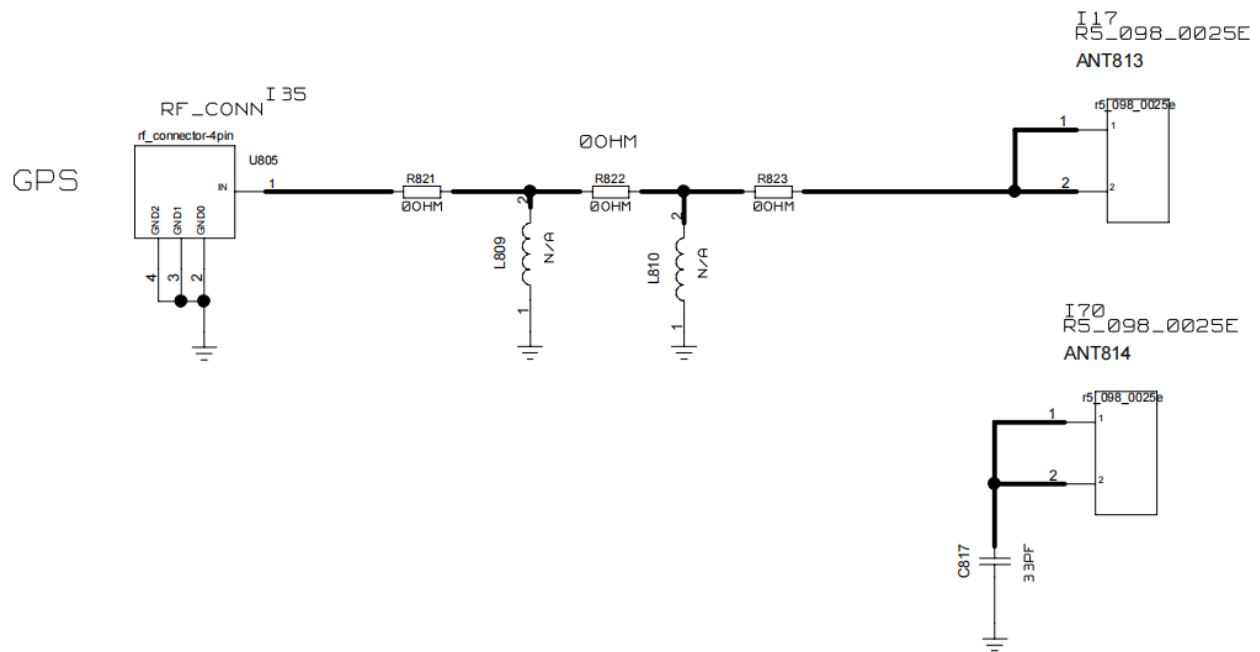
H1_UHB-Min	
Element	Value
R815	0Ω
L805	NC
R816	0Ω
L806	68NH
R817	33PF
C814	0Ω

H1_UHB-Episode Antenna



H1_UHB-Episode	
Element	Value
R818	0Ω
L807	NC
R819	0Ω
L808	NC
R820	0Ω
C815	0Ω

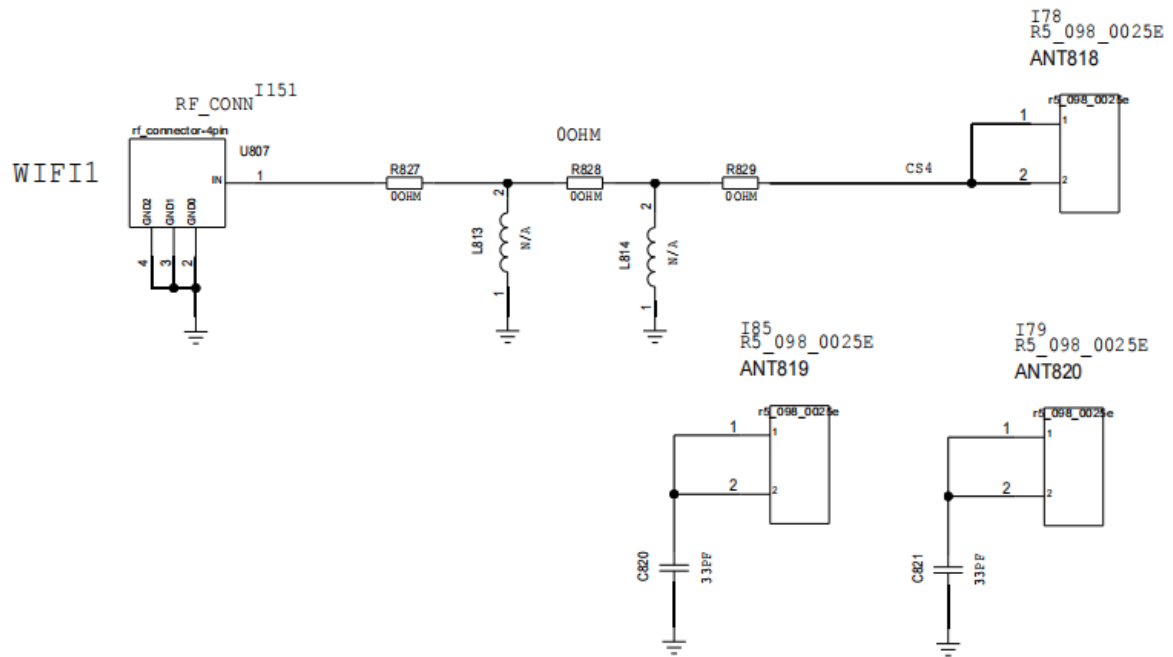
H1_GPS-ANT Antenna



H1_GPS-ANT

Element	Value
R821	0Ω
L809	NC
R822	0Ω
L810	NC
R823	0Ω
C817	0Ω

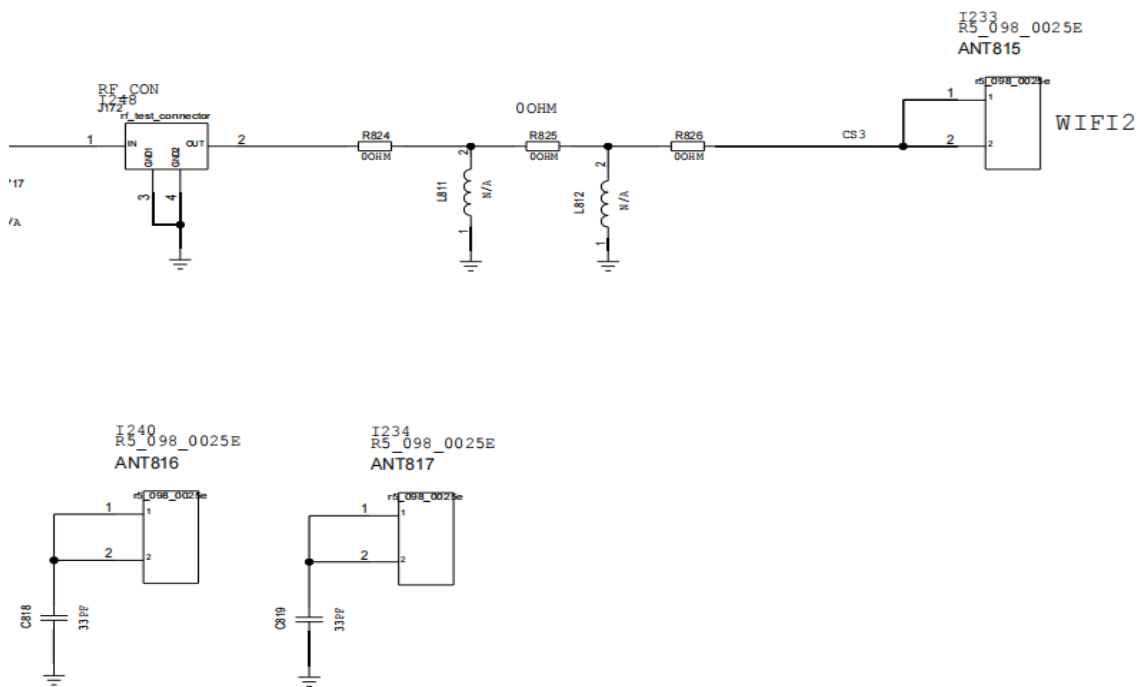
H1_WIFI-ANT1 Antenna



H1_WIFI-ANT1

Element	Value
R827	0Ω
L813	NC
R828	0Ω
L814	68NH
R829	33PF
L9	100NH
C820	33PF

H1_WIFI-ANT2 Antenna



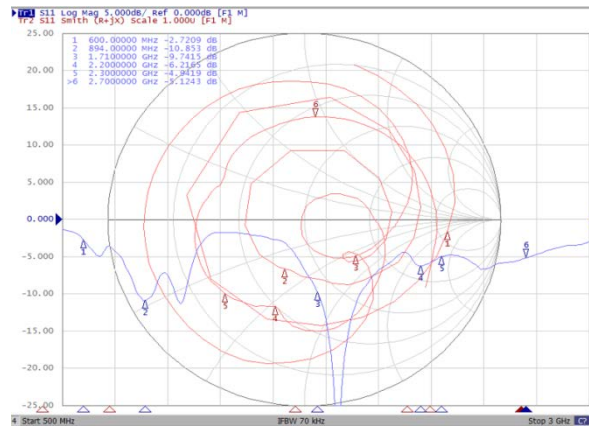
H1_WIFI-ANT2	
Element	Value
R824	0Ω
L811	NC
R825	0Ω
L812	68NH
L12	100NH
R826	0Ω
C819	33PF

2 Electrical performance

2.1 S11

H1_LMHB-Main Antenna

B5/B12/B13/B14/B71



Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
600	24%	-6.28	-3.59
610	24%	-6.14	-3.73
620	26%	-5.87	-3.59
630	28%	-5.53	-3.19
640	29%	-5.32	-3.29
650	31%	-5.1	-3
660	32%	-4.91	-2.38
670	32%	-4.89	-2.74
680	37%	-4.36	-2.35
690	42%	-3.72	-1.26
700	44%	-3.53	1.88
710	43%	-3.62	1.83
720	45%	-3.47	1.86

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730	45%	-3.45	1.68
740	46%	-3.4	1.46
750	46%	-3.34	1.52
760	47%	-3.29	1.72
770	45%	-3.51	1.69
780	43%	-3.66	1.6
790	43%	-3.66	1.65
800	42%	-3.75	1.57
810	43%	-3.68	1.62
820	44%	-3.54	1.7
830	45%	-3.51	1.6
840	46%	-3.41	1.71
850	47%	-3.3	1.76
860	46%	-3.37	1.64
870	46%	-3.4	1.51
880	46%	-3.33	1.46
890	46%	-3.36	1.14
900	45%	-3.5	0.59

1710	34%	-4.7	-0.75
1720	34%	-4.74	-0.66
1730	35%	-4.53	-0.43
1740	36%	-4.43	-0.37
1750	38%	-4.2	-0.24
1760	39%	-4.12	-0.31
1770	40%	-3.98	-0.41
1780	40%	-3.93	-0.57
1790	41%	-3.83	-0.48
1800	42%	-3.81	-0.6
1810	41%	-3.83	-0.64
1820	42%	-3.76	-0.11
1830	43%	-3.65	0.4
1840	42%	-3.75	0.57

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1850	43%	-3.62	0.97
1860	42%	-3.81	0.93
1870	41%	-3.86	0.89
1880	40%	-3.99	0.9
1890	39%	-4.1	0.89
1900	39%	-4.06	1.06
1910	39%	-4.05	1.14
1920	41%	-3.86	1.52
1930	41%	-3.89	1.57
1940	42%	-3.8	1.7
1950	40%	-3.98	1.44
1960	39%	-4.06	1.26
1970	41%	-3.92	1.2
1980	41%	-3.91	1.04
1990	41%	-3.84	1.07
2000	43%	-3.7	1.22
2010	44%	-3.54	0.2
2020	43%	-3.62	0.24
2030	45%	-3.47	0.56
2040	45%	-3.44	0.68
2050	46%	-3.35	0.66
2060	46%	-3.34	0.79
2070	47%	-3.24	0.87
2080	47%	-3.25	0.81
2090	48%	-3.18	0.8
2100	47%	-3.23	0.51
2110	46%	-3.35	0.18
2120	46%	-3.38	0.5
2130	46%	-3.36	0.9
2140	44%	-3.52	1.1
2150	46%	-3.39	1.54
2160	44%	-3.58	1.57
2170	44%	-3.61	1.54

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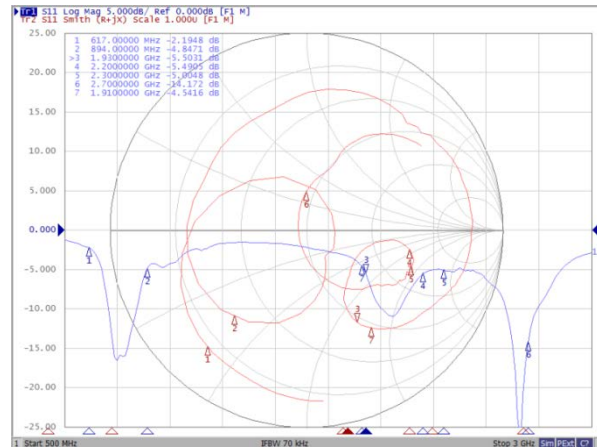
2180	42%	-3.76	1.48
2190	41%	-3.87	1.4
2200	41%	-3.83	1.45
2210	41%	-3.82	1.45
2220	43%	-3.64	1.82

2300	29%	-5.42	-1.89
2310	30%	-5.16	-1.66
2320	33%	-4.85	-1.47
2330	34%	-4.67	-1.6
2340	35%	-4.57	-1.78
2350	37%	-4.32	-1.55
2360	38%	-4.22	-1.41
2370	39%	-4.15	-1.39
2380	42%	-3.73	-1.05
2390	44%	-3.52	-0.97
2400	44%	-3.54	-1.18
2410	46%	-3.41	-1.22
2420	45%	-3.44	-1.4
2430	44%	-3.6	-1.65
2440	46%	-3.41	-1.44
2450	49%	-3.11	-1.14
2460	40%	-3.98	-1.1
2470	42%	-3.81	-1.21
2480	44%	-3.58	-0.87
2490	45%	-3.45	-0.51
2500	46%	-3.41	-0.32
2510	47%	-3.32	-0.18
2520	47%	-3.31	-0.19
2530	46%	-3.41	-0.38
2540	46%	-3.35	-0.44
2550	47%	-3.3	-0.59
2560	47%	-3.29	-0.61
2570	46%	-3.35	-0.47

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2580	46%	-3.37	-0.15
2590	46%	-3.38	0.02
2600	44%	-3.56	0.06
2610	43%	-3.64	0.04
2620	42%	-3.74	-0.04
2630	42%	-3.79	-0.08
2640	33%	-4.82	-0.99
2650	33%	-4.79	-0.75
2660	36%	-4.48	-0.79
2670	35%	-4.5	-0.72
2680	37%	-4.33	-0.73
2690	36%	-4.44	-0.76

H1_LMHB-Episode Antenna



Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
600	20%	-6.93	-4.73
610	24%	-6.27	-4.05
620	28%	-5.59	-3.48
630	32%	-5.01	-2.54
640	32%	-4.89	-2.39
650	34%	-4.71	-2.14
720	36%	-4.48	-1.2
730	37%	-4.34	-1.13
740	37%	-4.37	-1.4
750	38%	-4.2	-0.88
760	38%	-4.2	-0.79
770	37%	-4.34	-0.97
860	42%	-3.82	-0.58
870	42%	-3.81	-0.5
880	42%	-3.78	-0.33
890	40%	-3.99	-0.49

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900	41%	-3.93	-0.28
1930	38%	-4.26	-0.79
1940	33%	-4.75	-1.48
1950	31%	-5.12	-2
1960	28%	-5.46	-2.35
1970	27%	-5.67	-2.65
1980	28%	-5.47	-2.33
1990	30%	-5.26	-2.23
2000	30%	-5.19	-2.22
2010	31%	-5.04	-1.95
2020	27%	-5.76	-0.93
2030	27%	-5.62	-0.62
2040	29%	-5.38	-0.27
2050	32%	-4.91	0.29
2060	35%	-4.56	0.71
2070	37%	-4.3	0.95
2080	40%	-4	1.16
2090	38%	-4.23	2.5
2100	35%	-4.58	2.23
2110	33%	-4.82	1.98
2120	31%	-5.06	1.73
2130	29%	-5.34	1.41
2140	29%	-5.45	1.27
2150	28%	-5.58	1.02
2160	32%	-4.95	-1.27
2170	33%	-4.88	-1.1
2180	33%	-4.76	-0.8
2190	36%	-4.46	-0.31
2200	37%	-4.29	0.08
2300	30%	-5.29	-2.01
2310	27%	-5.63	-2.38

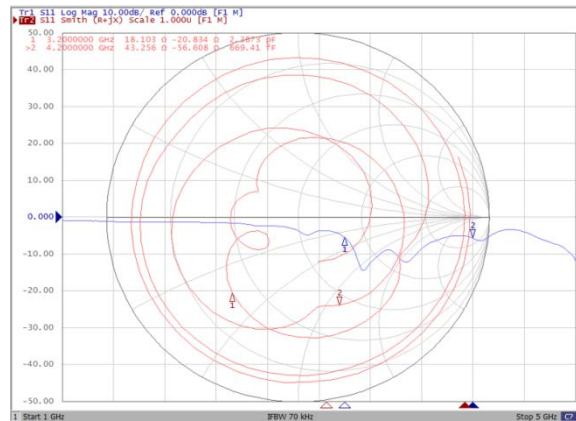
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2320	26%	-5.88	-2.43
2330	24%	-6.15	-2.36
2340	24%	-6.21	-2.04
2350	25%	-6.1	-1.52
2360	25%	-6.04	-1.17
2370	26%	-5.85	-0.8
2380	29%	-5.4	-0.2
2390	31%	-5.06	0.27
2400	33%	-4.8	0.54
2410	36%	-4.49	0.8
2420	37%	-4.32	0.92
2430	37%	-4.3	0.86
2440	39%	-4.06	1.03
2450	41%	-3.82	1.22
2460	44%	-3.57	1.41
2470	46%	-3.39	1.59
2480	49%	-3.14	1.83
2490	48%	-3.17	2
2500	49%	-3.11	2.12
2510	49%	-3.06	2.36
2520	48%	-3.2	2.32
2530	47%	-3.28	2.37
2540	45%	-3.44	2.28
2550	43%	-3.67	2.14
2560	40%	-3.94	1.96
2570	39%	-4.11	1.85
2580	37%	-4.3	1.69
2590	35%	-4.56	1.48
2600	35%	-4.61	1.43
2610	34%	-4.7	1.29
2620	33%	-4.88	1.12
2630	31%	-5.12	0.8
2640	30%	-5.29	0.54

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2650	28%	-5.56	0.21
2660	26%	-5.91	-0.24
2670	24%	-6.21	-0.75
2680	22%	-6.51	-1.2
2690	21%	-6.75	-1.67

H1_UHB-Main Antenna

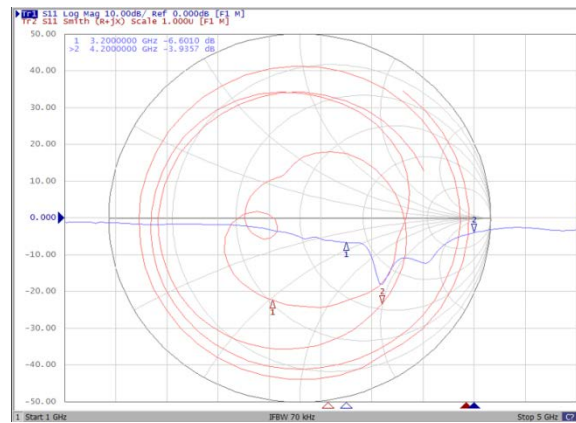


Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
3300	34%	-4.69	-0.97
3320	37%	-4.29	-0.95
3340	39%	-4.06	-0.85
3360	40%	-3.95	-0.69
3380	42%	-3.82	-0.05
3400	42%	-3.78	0.39
3420	40%	-3.95	0.51
3440	39%	-4.11	0.41
3460	36%	-4.39	0.56
3480	35%	-4.53	0.9
3500	34%	-4.65	0.98
3520	33%	-4.8	1.01
3540	35%	-4.6	-0.76
3560	36%	-4.41	-0.42
3580	37%	-4.28	-0.68
3600	38%	-4.2	-0.56
3620	37%	-4.37	-0.67
3640	36%	-4.47	-0.88
3660	38%	-4.23	-0.83

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3680	37%	-4.32	-1.05
3700	35%	-4.6	-1.53
3720	35%	-4.6	0.28
3740	35%	-4.62	-0.01
3760	36%	-4.43	-0.05
3780	38%	-4.24	0.02
3800	40%	-3.96	0.26
3820	41%	-3.9	0.32
3840	40%	-3.95	0.29
3860	40%	-3.99	0.19
3880	40%	-4.03	0.07
3900	41%	-3.83	0.18
3920	44%	-3.61	0.31
3940	46%	-3.35	0.46
3960	49%	-3.14	0.55
3980	49%	-3.07	0.37
4000	32%	-4.95	0.47
4020	33%	-4.86	0.53
4040	33%	-4.83	0.46
4060	33%	-4.83	0.32
4080	34%	-4.64	0.41
4100	36%	-4.43	0.49
4120	38%	-4.23	0.66
4140	39%	-4.1	0.75
4160	39%	-4.05	0.77
4180	39%	-4.08	0.72
4200	41%	-3.88	0.87

H1_UHB-Episode

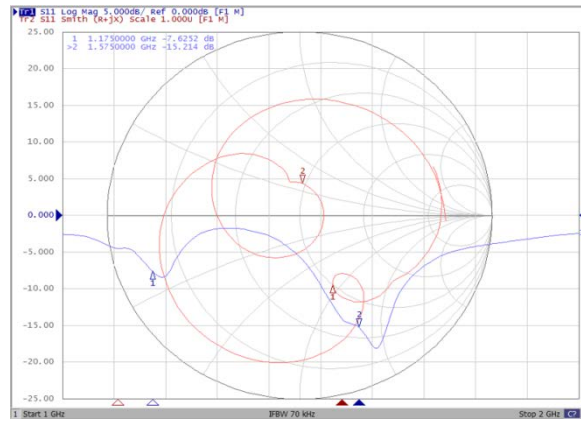


Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
3300	35%	-4.54	0.41
3320	35%	-4.5	0.67
3340	35%	-4.51	0.79
3360	35%	-4.59	0.81
3380	34%	-4.66	0.63
3400	34%	-4.68	0.48
3420	33%	-4.84	0.05
3440	32%	-4.99	-0.45
3460	30%	-5.22	-1.2
3480	29%	-5.34	-0.72
3500	28%	-5.51	-0.28
3520	27%	-5.66	0.18
3540	28%	-5.52	-1.36
3560	29%	-5.38	-0.93
3580	30%	-5.21	-0.66
3600	31%	-5.07	-0.51
3620	31%	-5.07	-0.85
3640	32%	-4.88	-1.06
3660	35%	-4.51	-1.19

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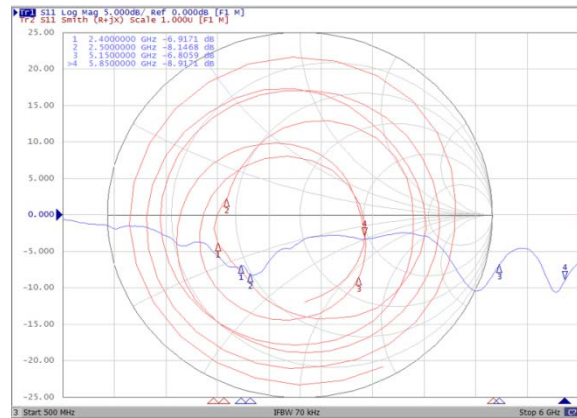
3680	36%	-4.44	-1.33
3700	36%	-4.49	-1.49
3720	35%	-4.52	0.4
3740	34%	-4.7	-0.05
3760	35%	-4.51	0.18
3780	38%	-4.16	0.75
3800	39%	-4.09	-0.95
3820	36%	-4.38	-1.33
3840	34%	-4.63	-1.63
3860	33%	-4.81	-1.94
3880	31%	-5.02	-1.95
3900	34%	-4.74	-1.32
3920	36%	-4.45	-0.7
3940	38%	-4.18	-0.23
3960	39%	-4.06	0.04
3980	38%	-4.21	0.01
4000	37%	-4.28	-0.03
4020	39%	-4.11	-0.03
4040	38%	-4.17	-0.28
4060	38%	-4.23	-0.37
4080	37%	-4.28	-0.22
4100	36%	-4.4	-0.03
4120	38%	-4.24	0.4
4140	39%	-4.05	0.88
4160	39%	-4.06	0.8
4180	40%	-4	0.93
4200	40%	-3.94	1.1

H1_GPS-ANT Antenna



Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
1175	26%	-5.82	-1.17
1575	57%	-2.42	0.25

H1_WIFI-ANT1

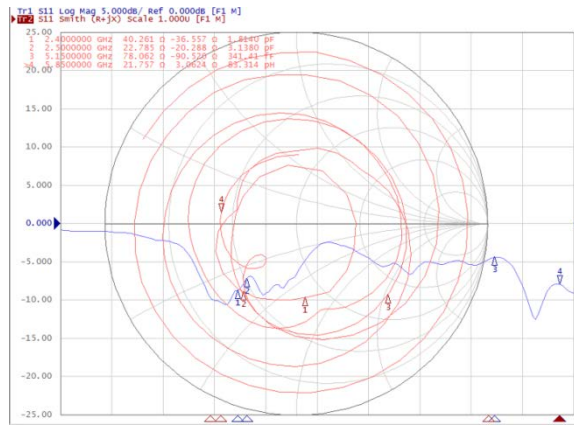


Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	39%	-4.1	-0.46
2410	39%	-4.05	-0.19
2420	39%	-4.1	0
2430	38%	-4.21	-0.08
2440	39%	-4.05	0.1
2450	40%	-3.93	0.19
2460	36%	-4.38	-0.73
2470	38%	-4.18	-0.87
2480	34%	-4.72	1.24
2490	39%	-4.1	-0.46
2500	39%	-4.05	-0.19
5150	52%	-2.85	1.64
5200	59%	-2.32	2.37
5250	60%	-2.24	2.45
5300	60%	-2.21	3
5350	57%	-2.44	3.31
5400	58%	-2.37	4.03
5450	51%	-2.9	3.52
5500	46%	-3.33	3.37

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5550	44%	-3.52	2.93
5600	41%	-3.89	2.12
5650	42%	-3.73	1.66
5700	49%	-3.12	1.8
5750	49%	-3.12	1.79
5800	53%	-2.73	1.99
5850	61%	-2.13	2.71

H1_WIFI-ANT2



Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	44%	-3.61	1.14
2410	45%	-3.5	1.31
2420	44%	-3.58	1.32
2430	42%	-3.74	1.35
2440	43%	-3.65	1.42
2450	43%	-3.63	1.54
2460	43%	-3.63	1.31
2470	44%	-3.6	1.26
2480	44%	-3.59	1.16
2490	42%	-3.72	1.01
2500	42%	-3.77	1
5150	48%	-3.22	2.36
5200	49%	-3.08	3.38
5250	49%	-3.12	4.12
5300	48%	-3.15	4.51
5350	48%	-3.19	4.06
5400	52%	-2.86	3.91
5450	48%	-3.16	2.36

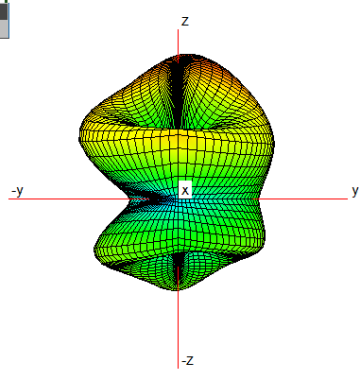
Confidential Information

5500	46%	-3.38	1.38
5550	46%	-3.38	1.56
5600	43%	-3.68	1.66
5650	44%	-3.55	2.66
5700	47%	-3.27	2.92
5750	43%	-3.65	2.25
5800	44%	-3.53	1.23
5850	45%	-3.51	-0.2

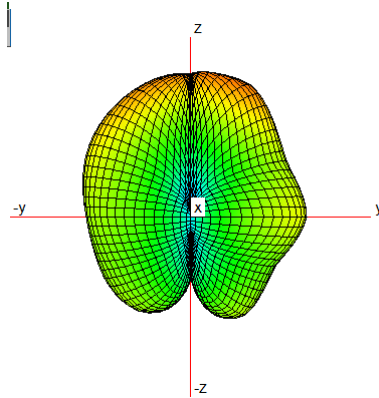
2.3 3D Pattern

LTE B2 1880MHz

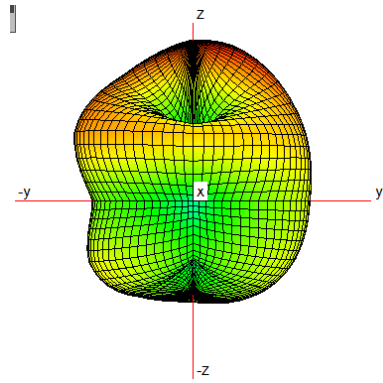
Theta



Phi

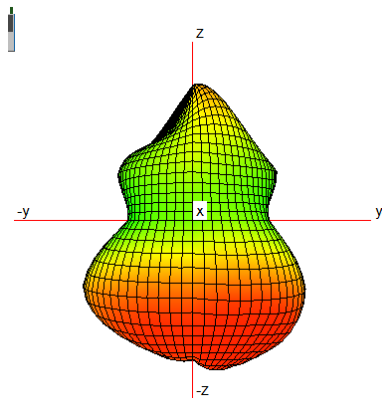


Total

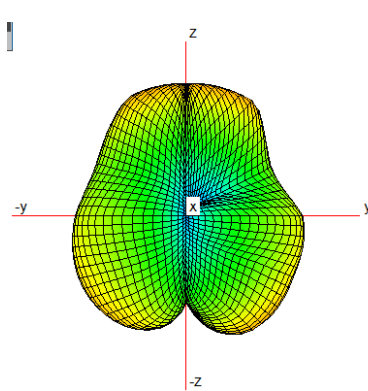


LTE B4 1750MHz

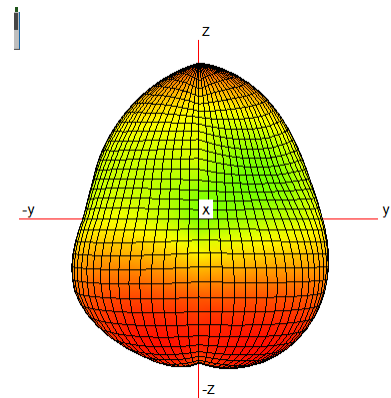
Theta



Phi

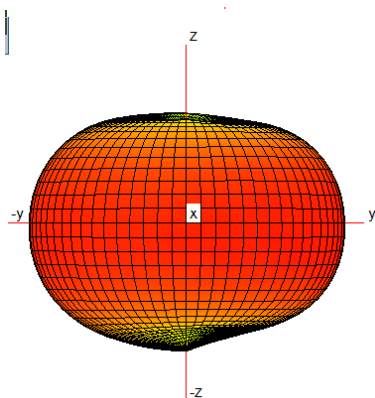


Total

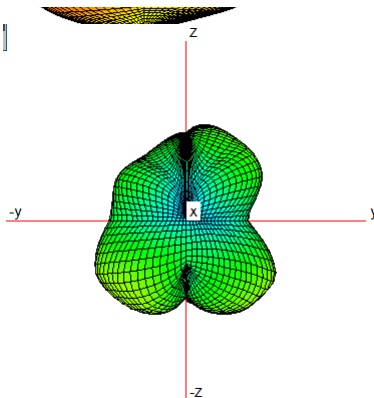


LTE B5 844MHz

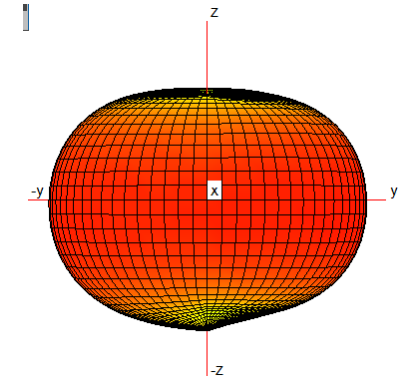
Theta



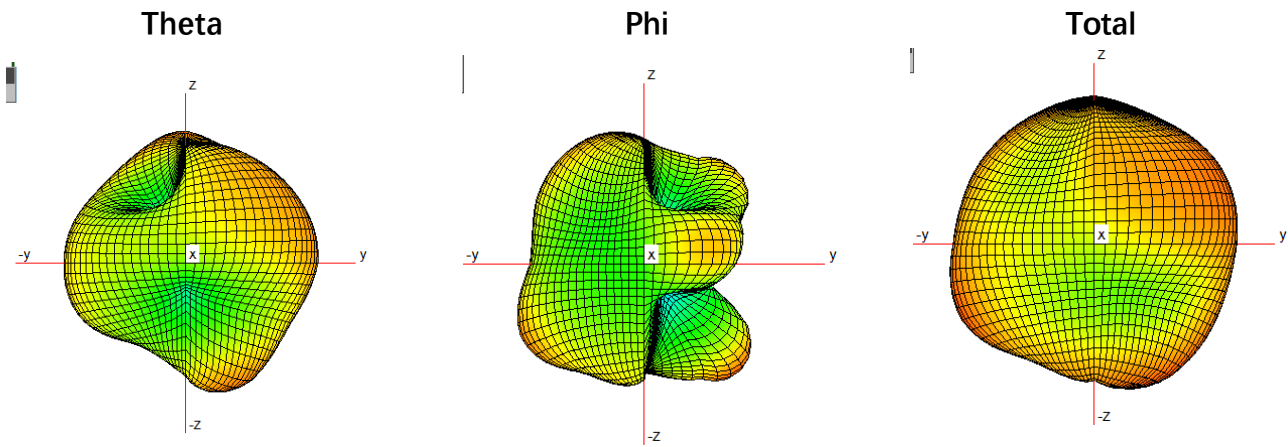
Phi



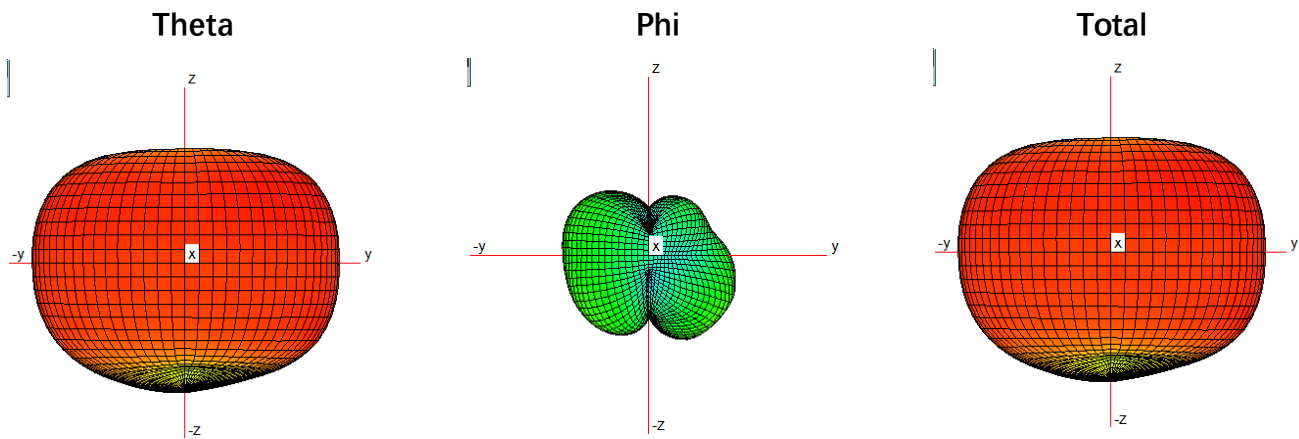
Total



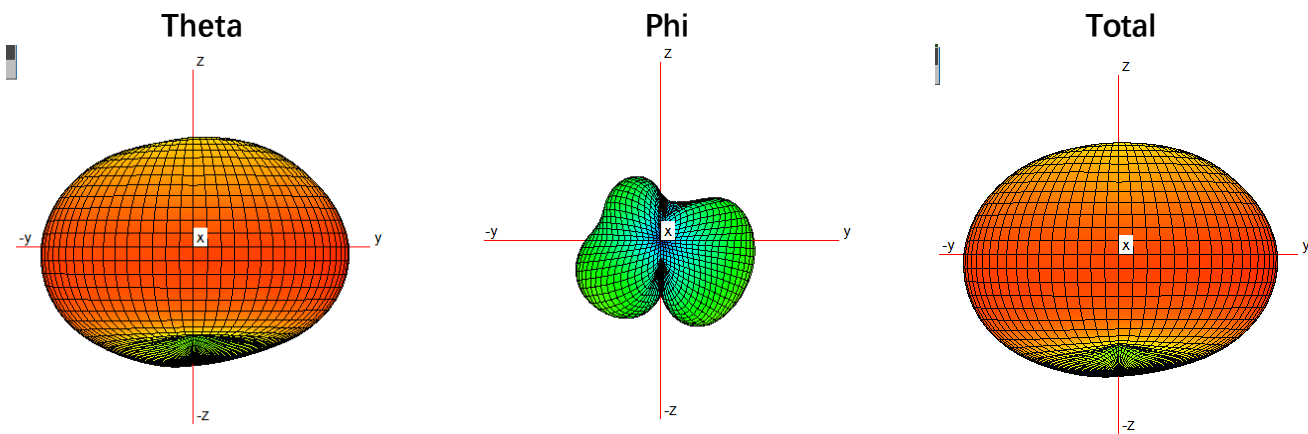
LTE 7 2535MHz



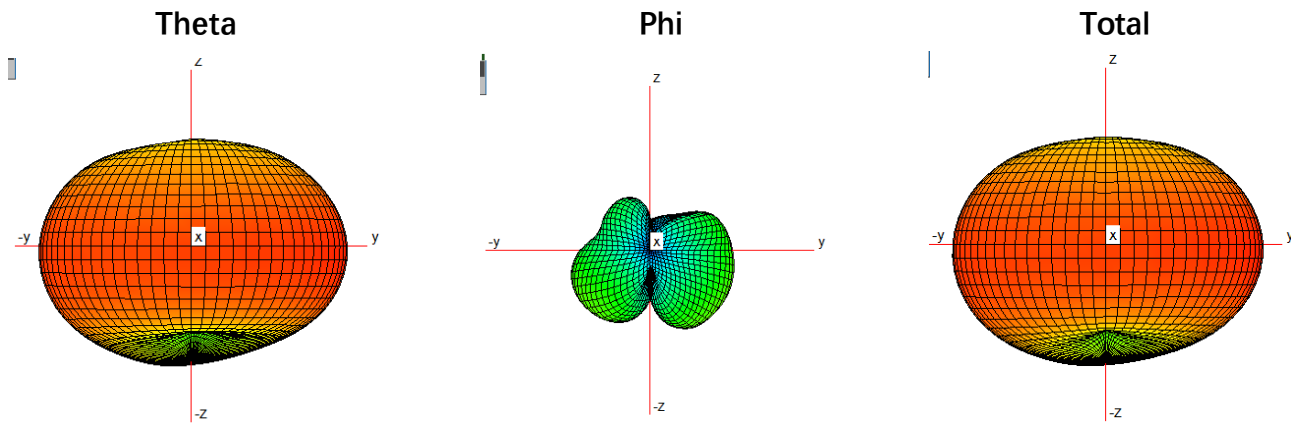
LTE 12 701.5MHz



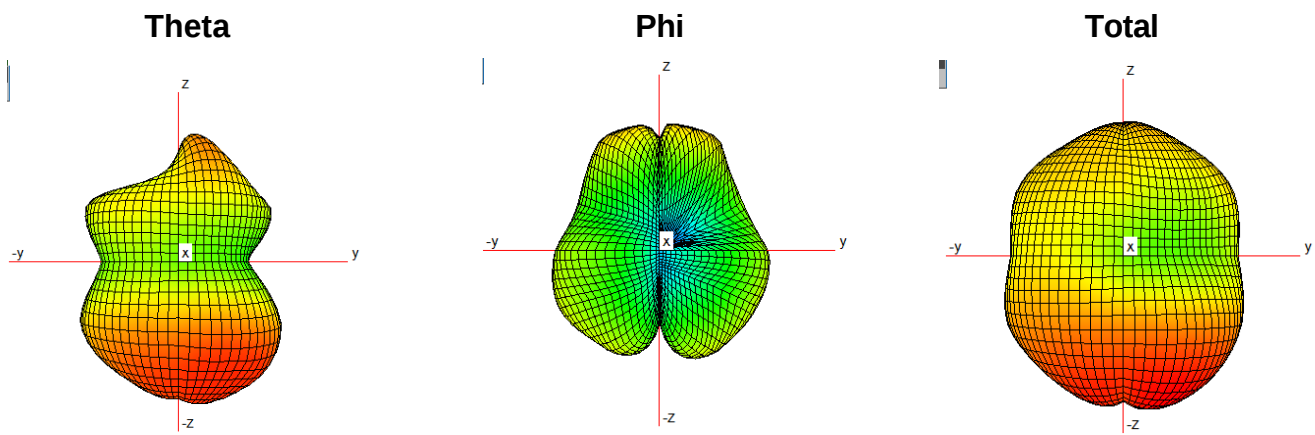
LTE 13 782MHz



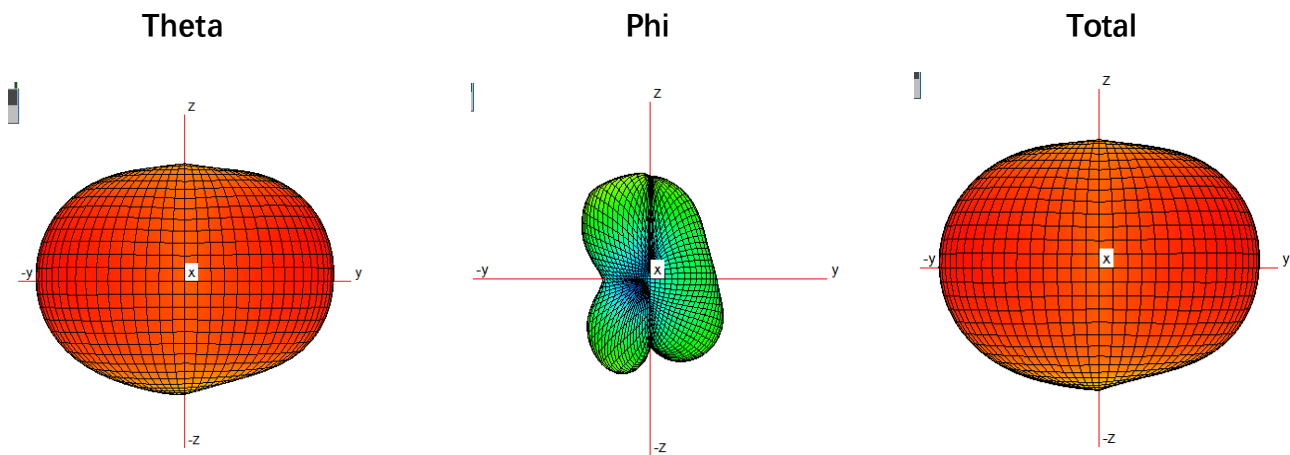
LTE 14 793MHz



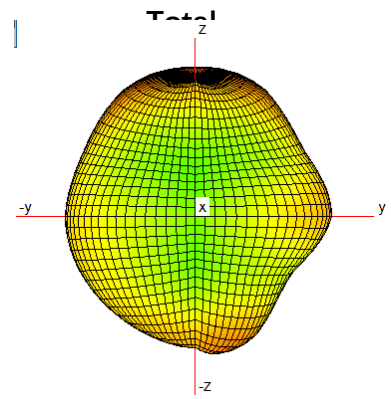
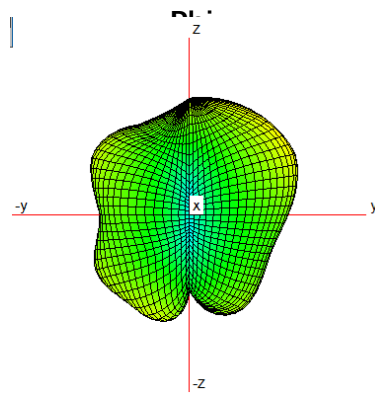
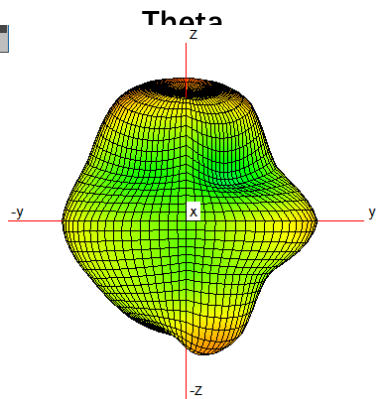
LTE 25 1855MHz



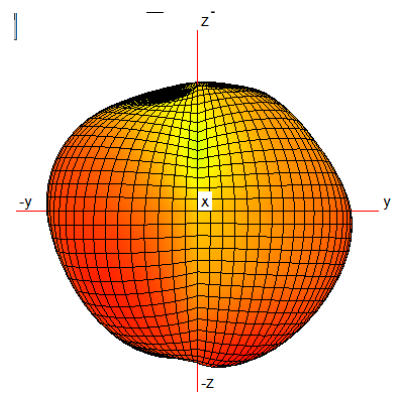
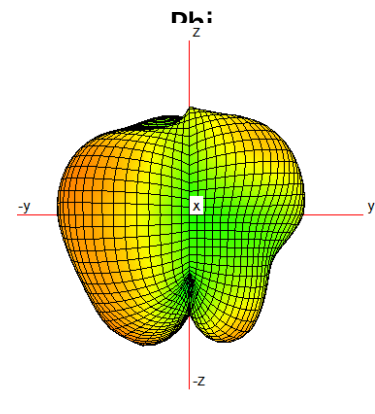
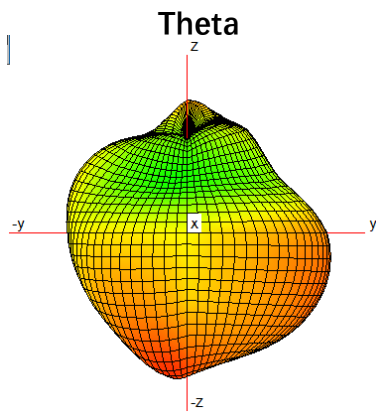
LTE 26 831.5MHz



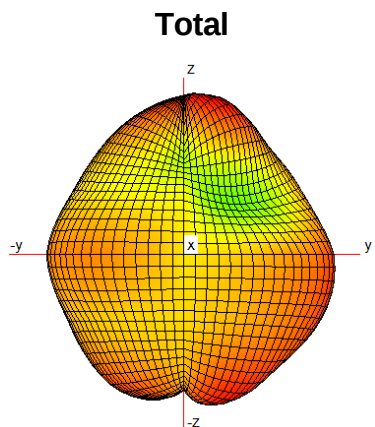
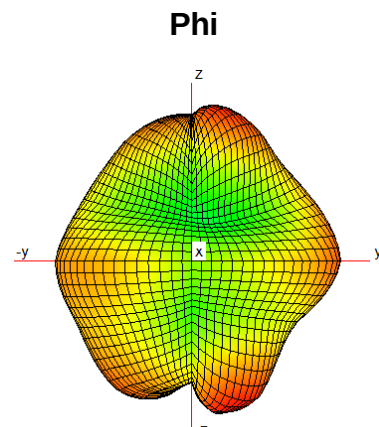
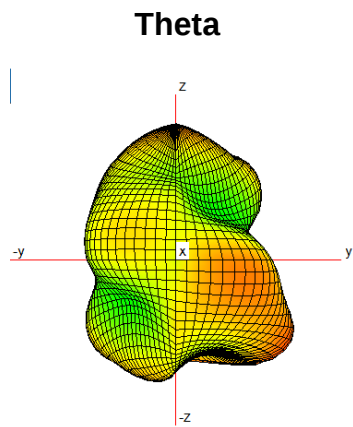
LTE 30 2310MHz



LTE 41 2506MHz

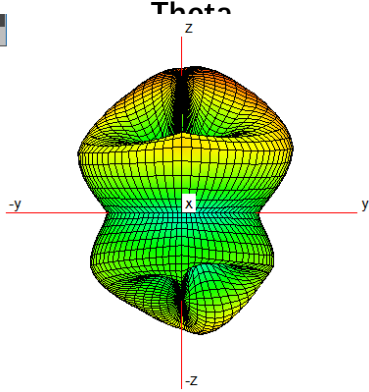


LTE 48 3625MHz

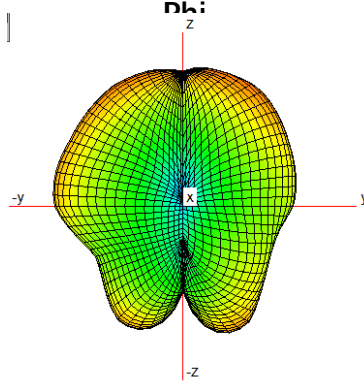


LTE 66 1745MHz

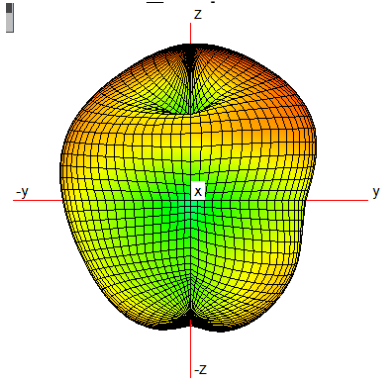
Theta



Phi

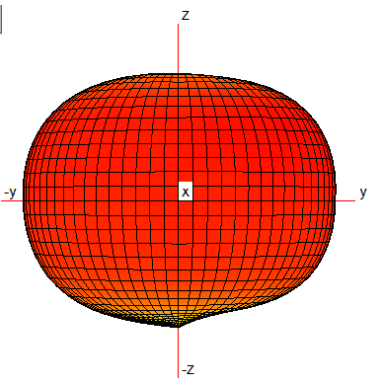


Total

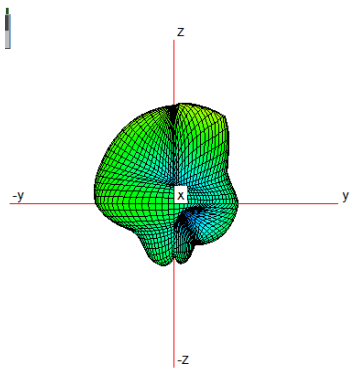


LTE 71 693MHz

Theta



Phi



Total

