

# SPECIFICATION

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

## Antenna Report

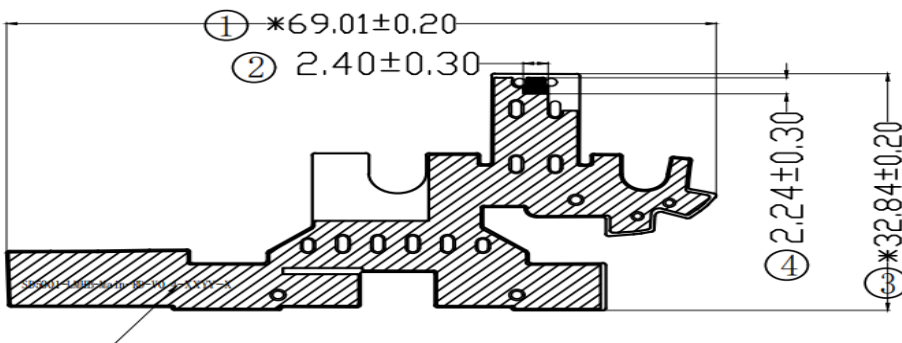
For FCC ID: 2AUOUH1

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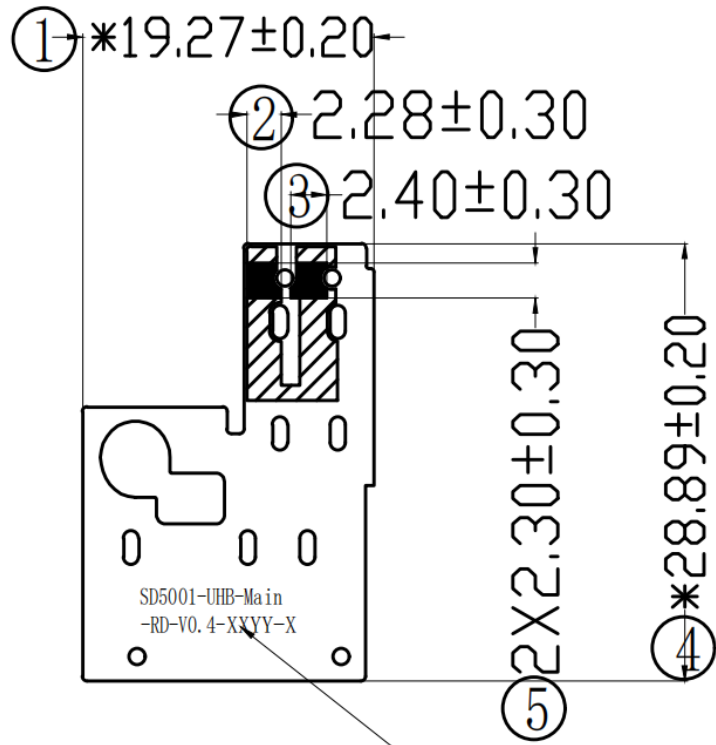
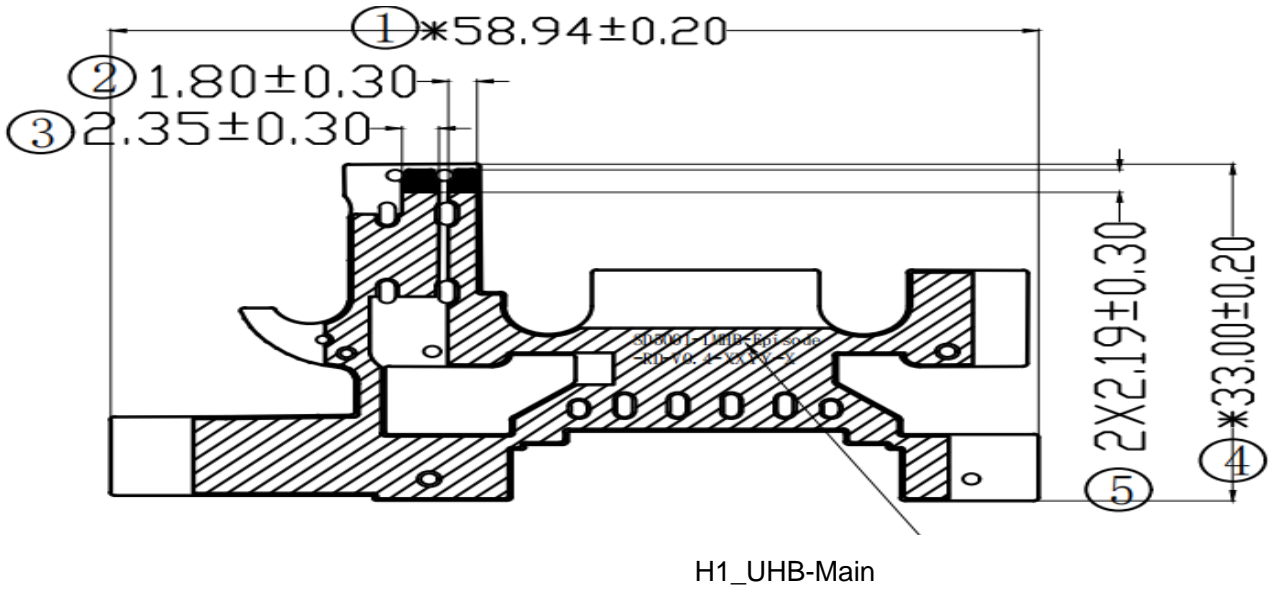
# 1 General description

## 1.1 Antenna appearing diagram

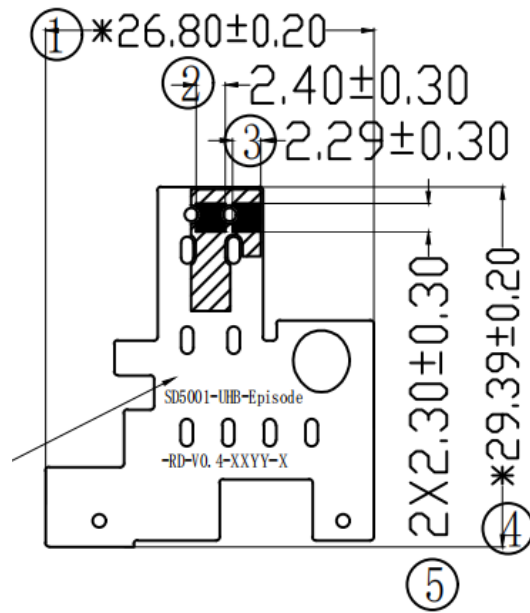
H1\_LMHB-Main



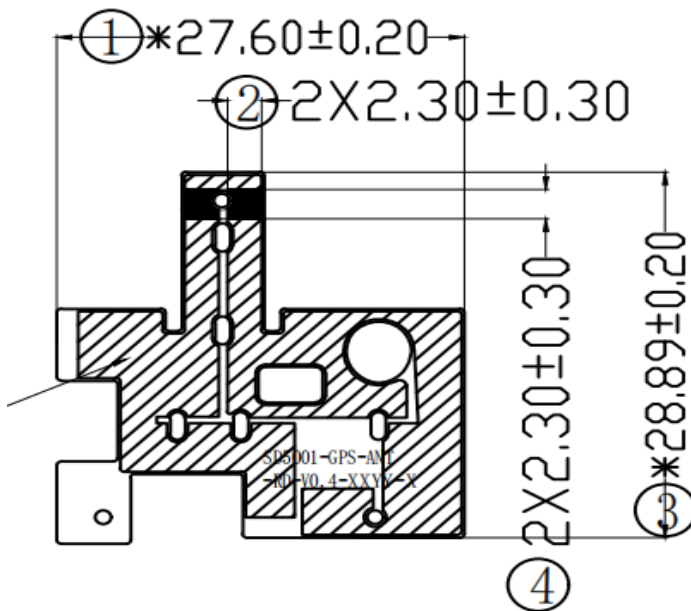
H1\_LMHB-Episode



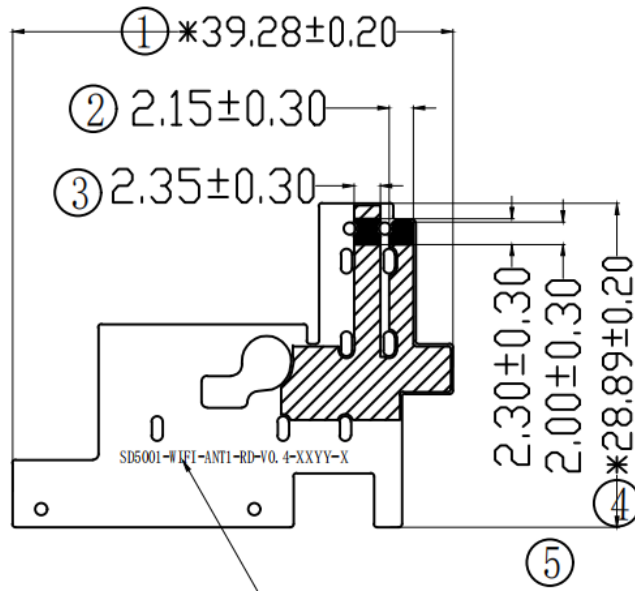
H1\_UHB-Episode



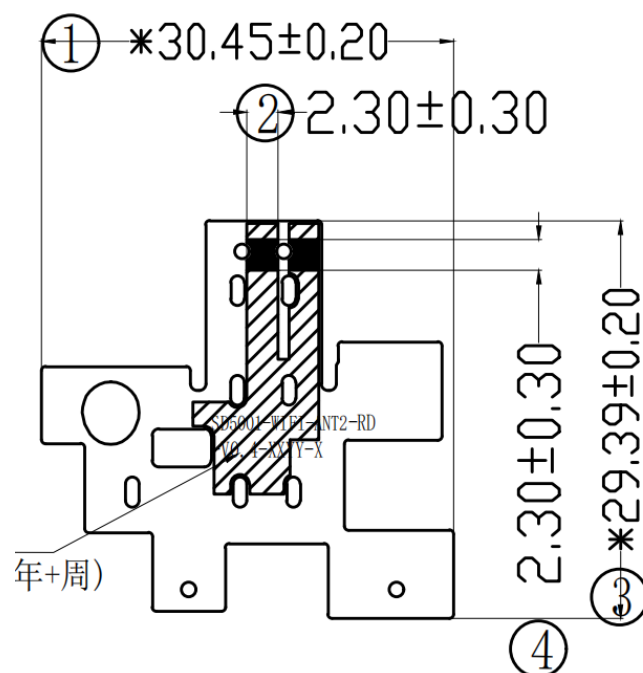
H1\_GPS-ANT



H1\_WIFI-ANT1

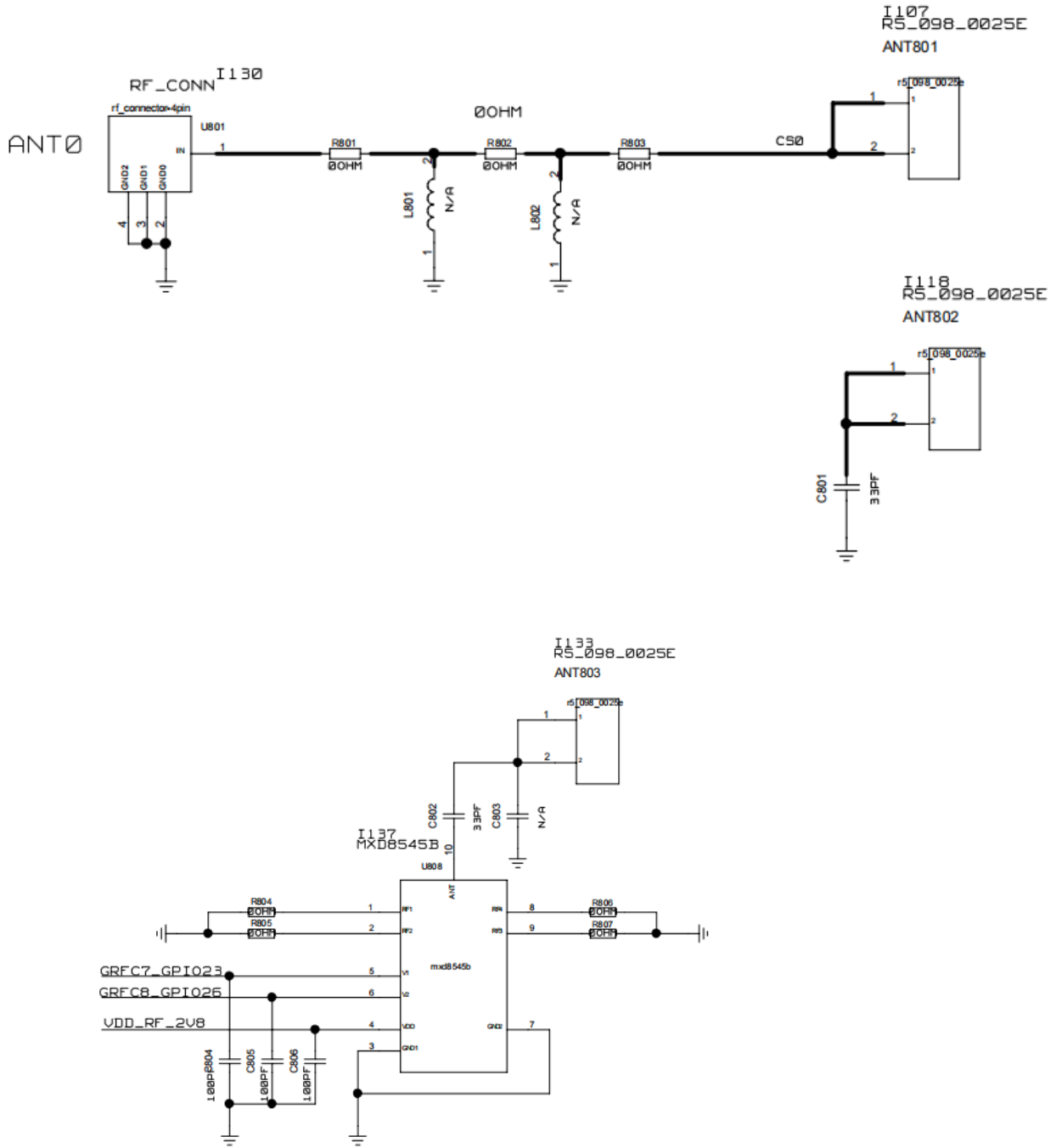


H1\_WIFI-ANT2



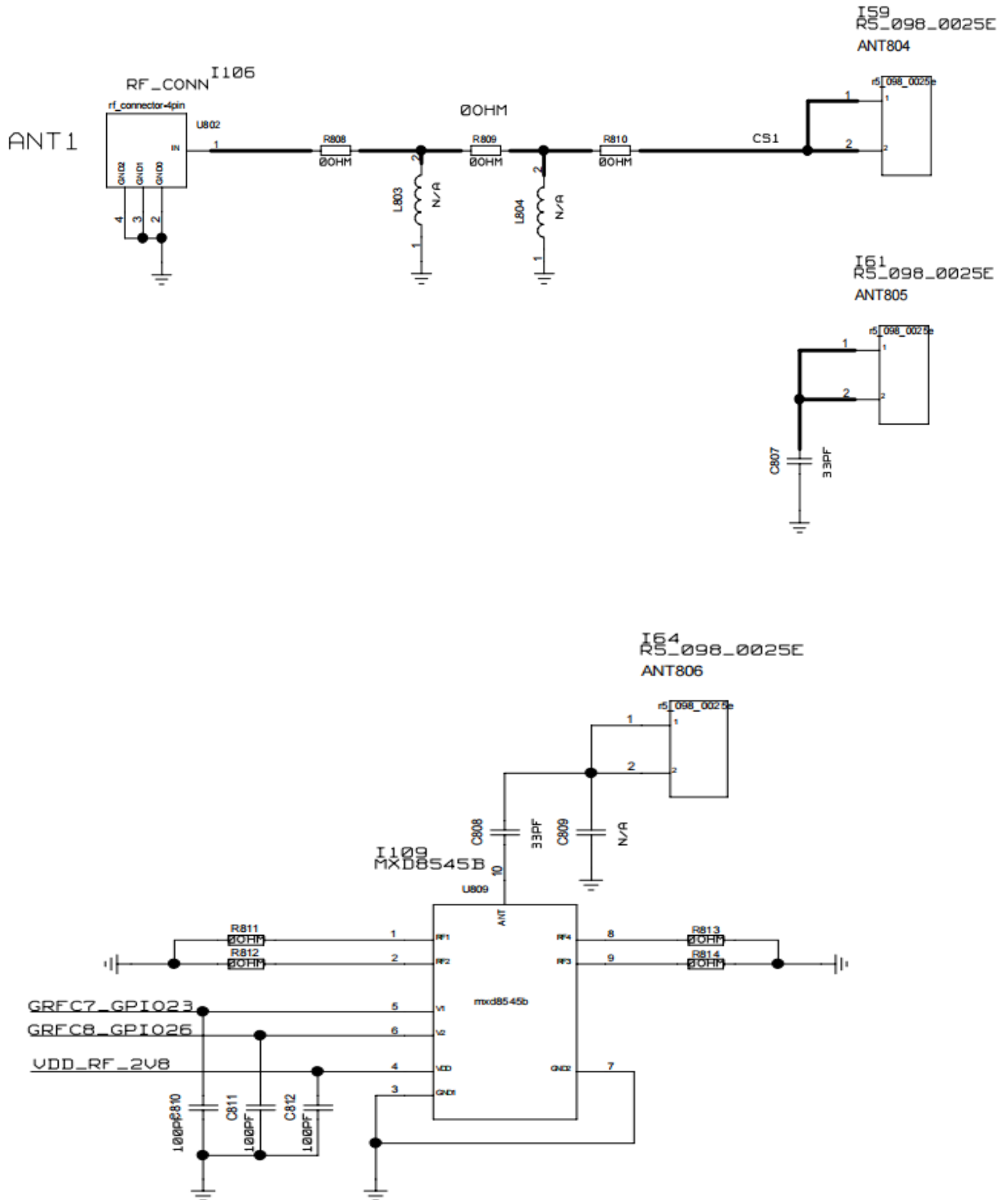
# 1.2 Antenna Matching circuits

H1\_LMHB-Main Antenna



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

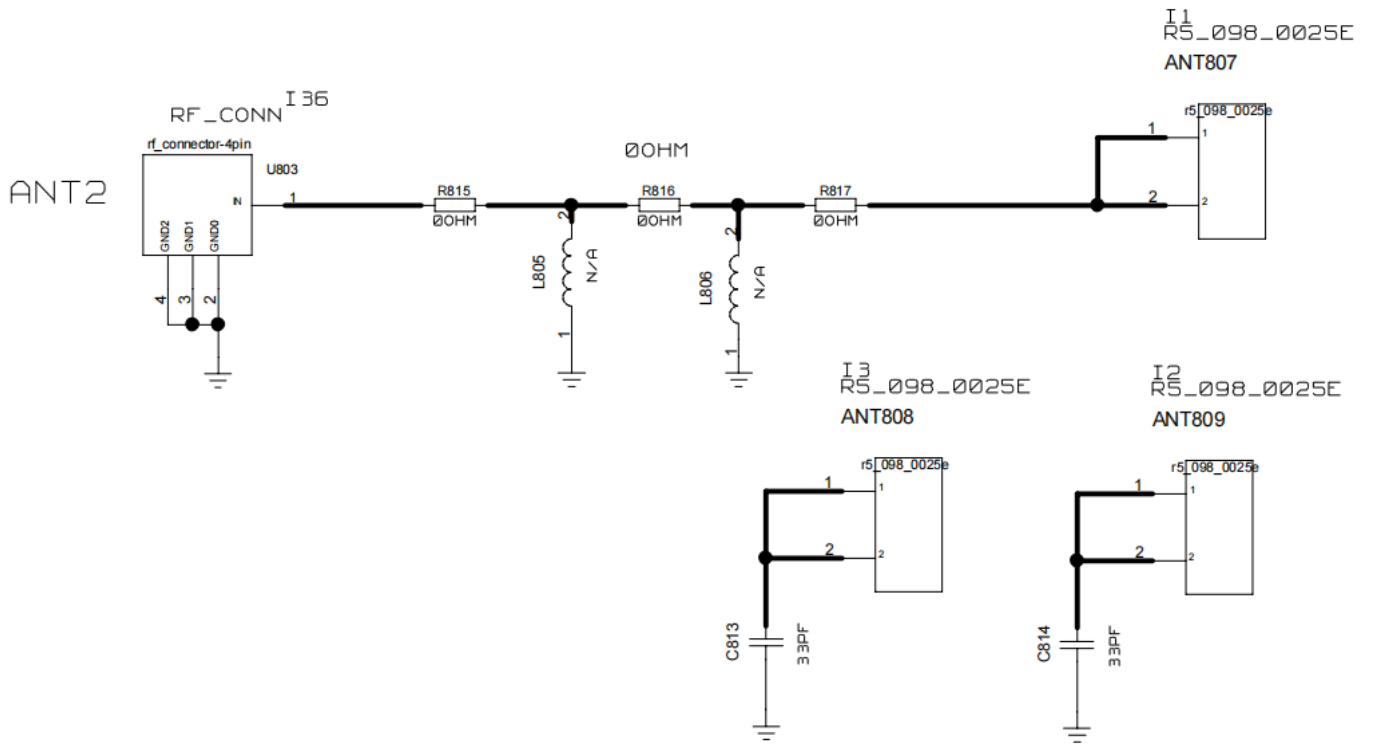
H1\_LMHB-Episode Antenna





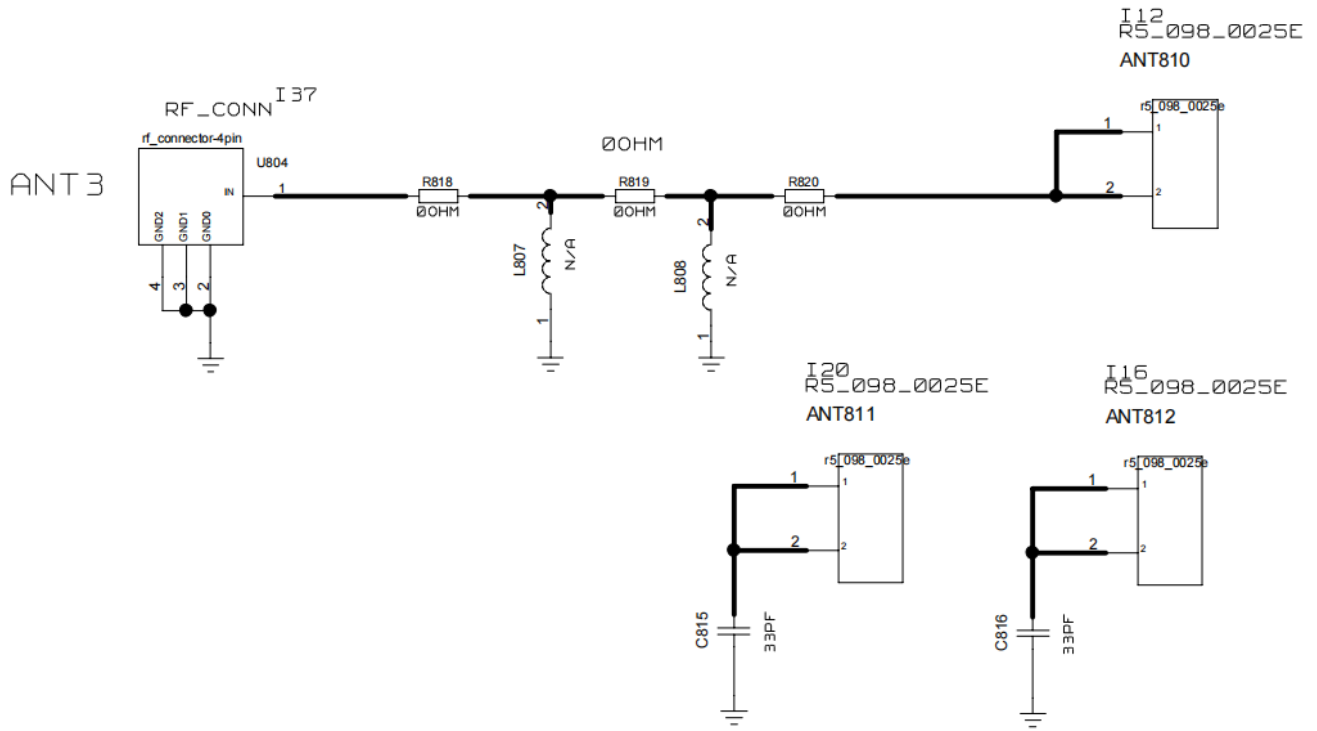
H1_LMHB-Episode	
Element	Value
R808	0Ω
L803	NC
R809	3.9PF
L804	12NH
R810	0Ω
L11	100NH

H1\_UHB-Main Antenna



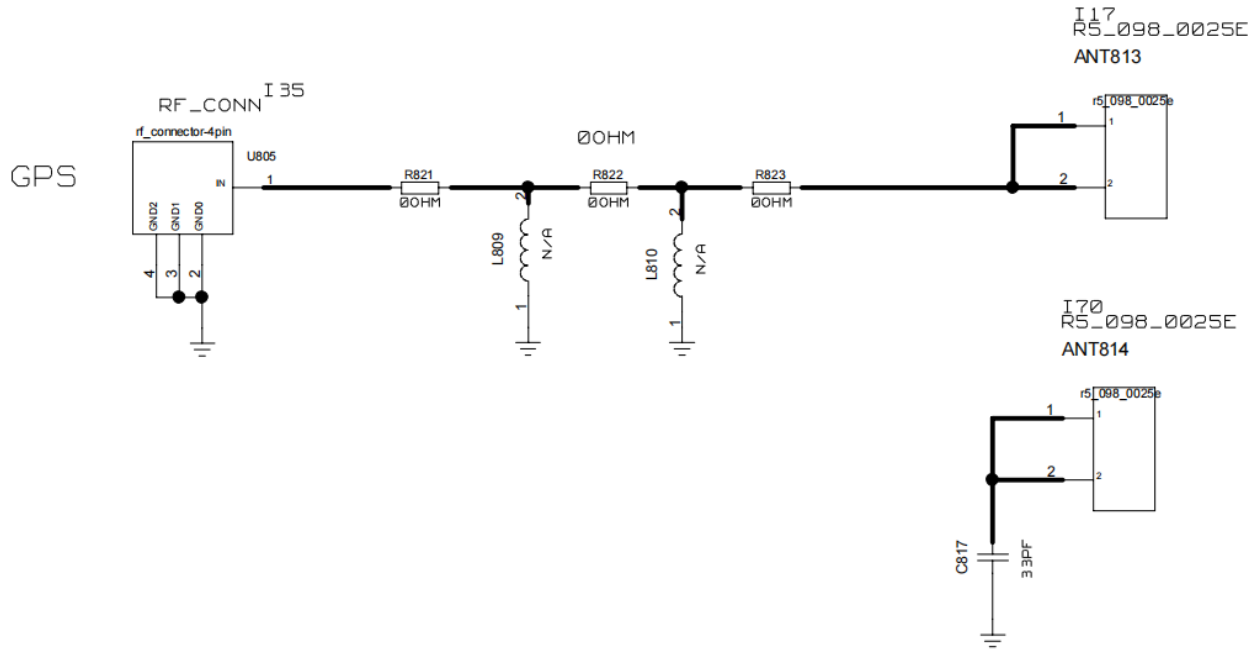
H1_UHB-Min	
Element	Value
R815	0Ω
L805	NC
R816	0Ω
L806	68NH
R817	33PF
C814	0Ω

H1\_UHB-Episode Antenna



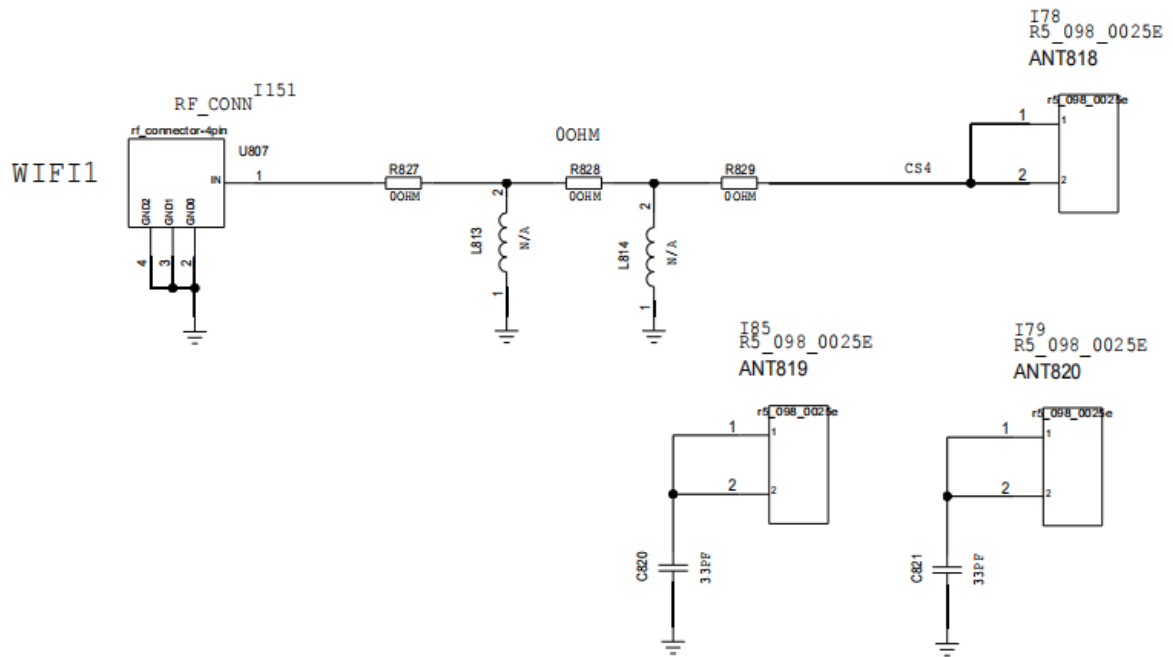
H1_UHB-Episode	
Element	Value
R818	0Ω
L807	NC
R819	0Ω
L808	NC
R820	0Ω
C815	0Ω

H1\_GPS-ANT Antenna



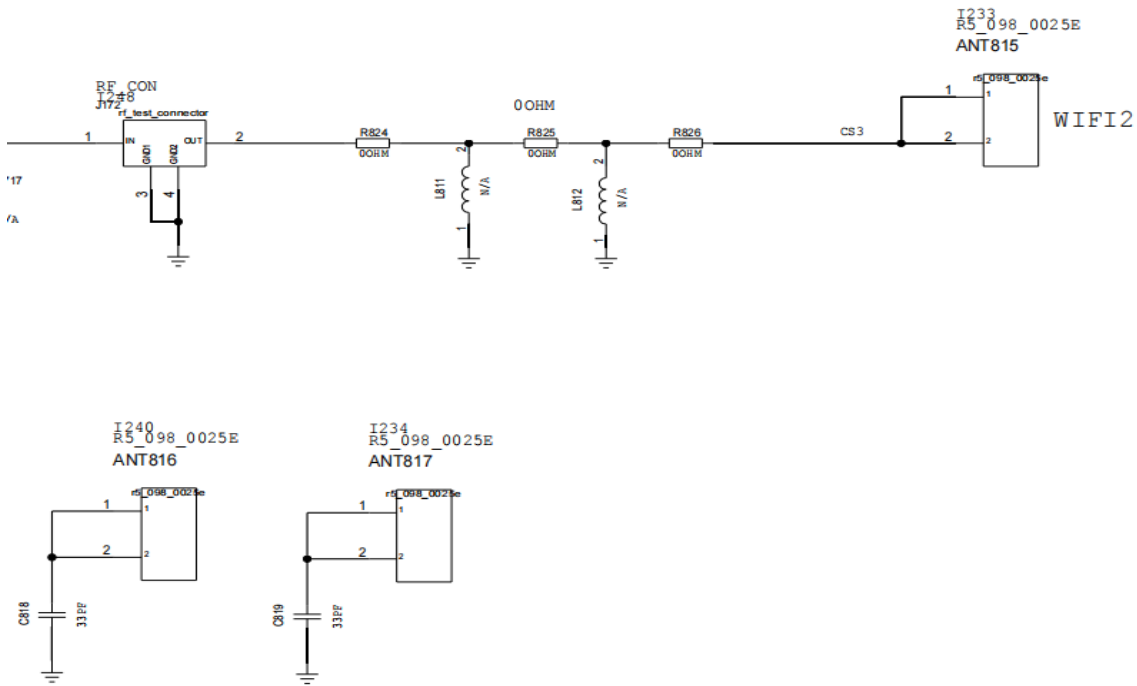
H1_GPS-ANT	
Element	Value
R821	0Ω
L809	NC
R822	0Ω
L810	NC
R823	0Ω
C817	0Ω

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



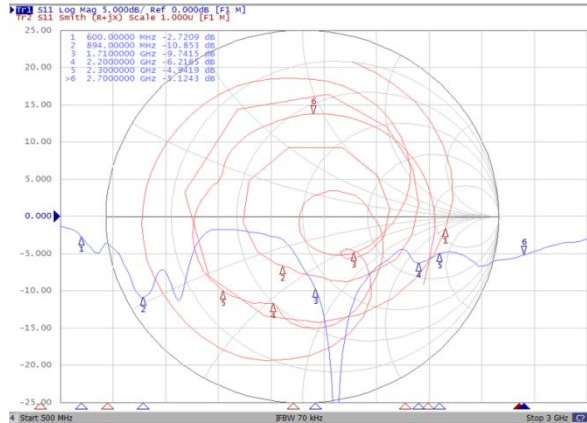
H1_WIFI-ANT2	
Element	Value
R824	0Ω
L811	NC
R825	0Ω
L812	68NH
L12	100NH
R826	0Ω
C819	33PF

## 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

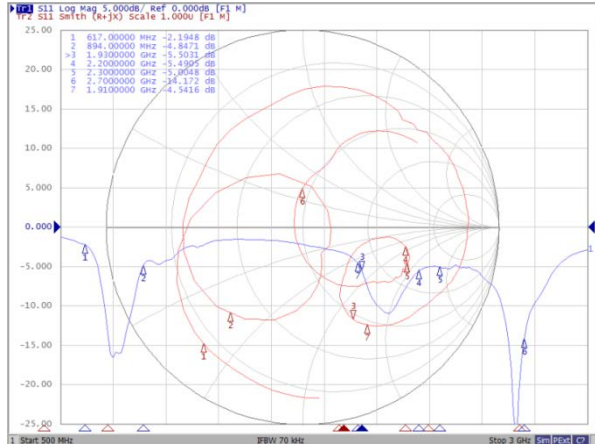
2300	29%	-5.42	-1.89
2310	30%	-5.16	-1.66
2320	33%	-4.85	-1.47
2330	34%	-4.67	-1.6
2340	35%	-4.57	-1.78
2350	37%	-4.32	-1.55
2360	38%	-4.22	-1.41
2370	39%	-4.15	-1.39
2380	42%	-3.73	-1.05
2390	44%	-3.52	-0.97
2400	44%	-3.54	-1.18
2410	46%	-3.41	-1.22
2420	45%	-3.44	-1.4
2430	44%	-3.6	-1.65
2440	46%	-3.41	-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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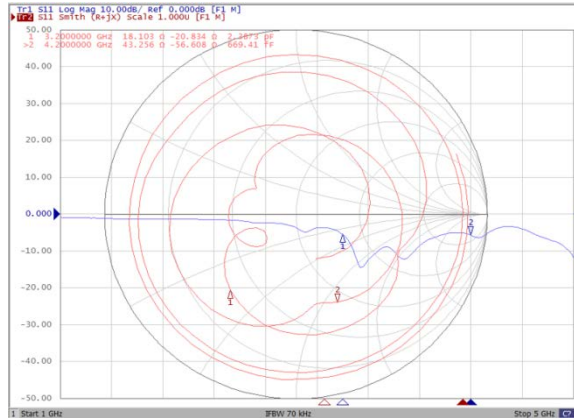
2320	26%	-5.88	-2.43
2330	24%	-6.15	-2.36
2340	24%	-6.21	-2.04
2350	25%	-6.1	-1.52
2360	25%	-6.04	-1.17
2370	26%	-5.85	-0.8
2380	29%	-5.4	-0.2
2390	31%	-5.06	0.27
2400	33%	-4.8	0.54
2410	36%	-4.49	0.8
2420	37%	-4.32	0.92
2430	37%	-4.3	0.86
2440	39%	-4.06	1.03
2450	41%	-3.82	1.22
2460	44%	-3.57	1.41
2470	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

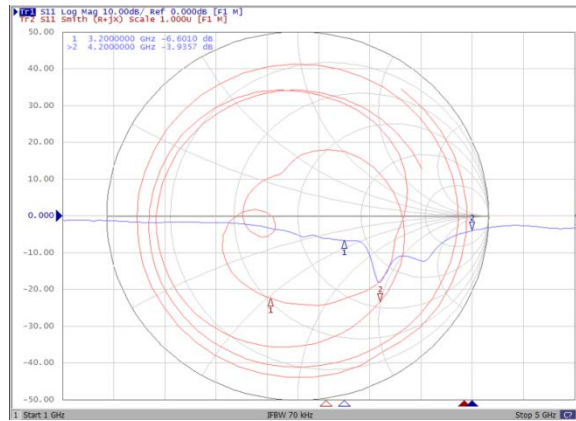


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3680	37%	-4.32	-1.05
3700	35%	-4.6	-1.53
3720	35%	-4.6	0.28
3740	35%	-4.62	-0.01
3760	36%	-4.43	-0.05
3780	38%	-4.24	0.02
3800	40%	-3.96	0.26
3820	41%	-3.9	0.32
3840	40%	-3.95	0.29
3860	40%	-3.99	0.19
3880	40%	-4.03	0.07
3900	41%	-3.83	0.18
3920	44%	-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

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H1\_UHB-Episode

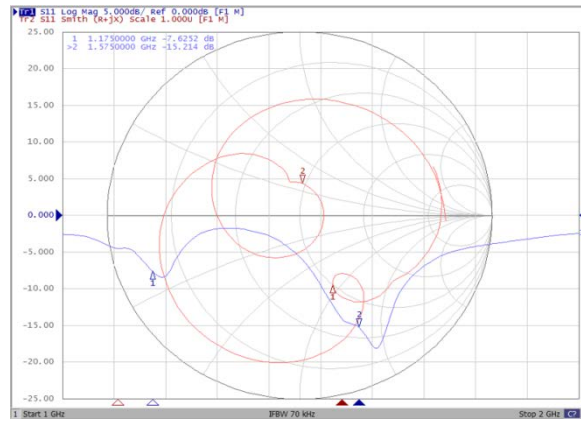


Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
3300	35%	-4.54	0.41
3320	35%	-4.5	0.67
3340	35%	-4.51	0.79
3360	35%	-4.59	0.81
3380	34%	-4.66	0.63
3400	34%	-4.68	0.48
3420	33%	-4.84	0.05
3440	32%	-4.99	-0.45
3460	30%	-5.22	-1.2
3480	29%	-5.34	-0.72
3500	28%	-5.51	-0.28
3520	27%	-5.66	0.18
3540	28%	-5.52	-1.36
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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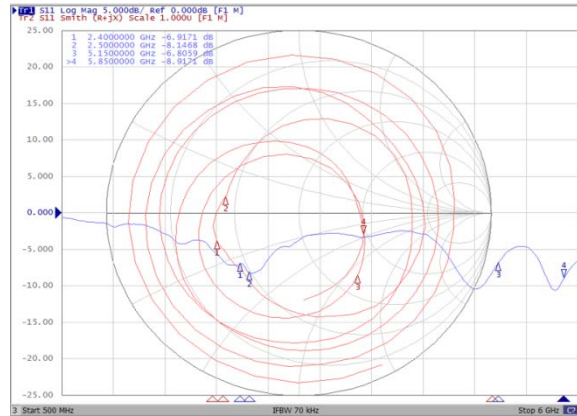
3680	36%	-4.44	-1.33
3700	36%	-4.49	-1.49
3720	35%	-4.52	0.4
3740	34%	-4.7	-0.05
3760	35%	-4.51	0.18
3780	38%	-4.16	0.75
3800	39%	-4.09	-0.95
3820	36%	-4.38	-1.33
3840	34%	-4.63	-1.63
3860	33%	-4.81	-1.94
3880	31%	-5.02	-1.95
3900	34%	-4.74	-1.32
3920	36%	-4.45	-0.7
3940	38%	-4.18	-0.23
3960	39%	-4.06	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



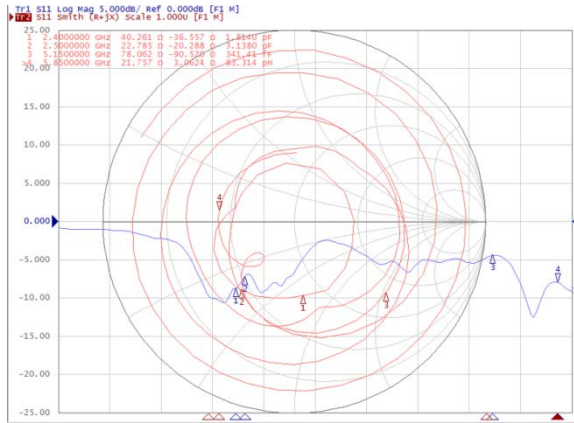
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	39%	-4.1	-0.46
2410	39%	-4.05	-0.19
2420	39%	-4.1	0
2430	38%	-4.21	-0.08
2440	39%	-4.05	0.1
2450	40%	-3.93	0.19
2460	36%	-4.38	-0.73
2470	38%	-4.18	-0.87
2480	34%	-4.72	1.24
2490	39%	-4.1	-0.46
2500	39%	-4.05	-0.19
5150	52%	-2.85	1.64
5200	59%	-2.32	2.37
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

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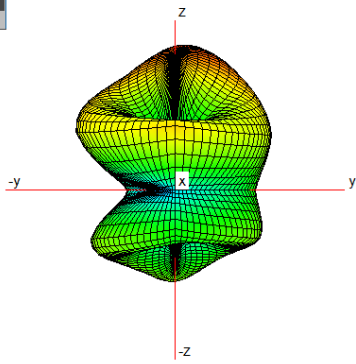
5500	46%	-3.38	1.38
5550	46%	-3.38	1.56
5600	43%	-3.68	1.66
5650	44%	-3.55	2.66
5700	47%	-3.27	2.92
5750	43%	-3.65	2.25
5800	44%	-3.53	1.23
5850	45%	-3.51	-0.2



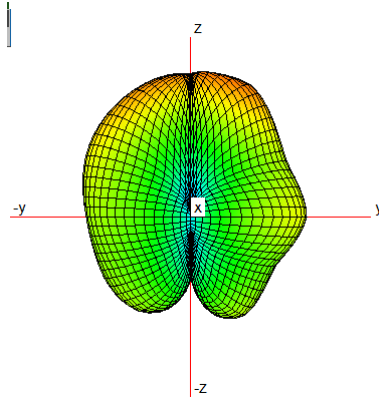
2.3 3D Pattern

LTE B2 1880MHz

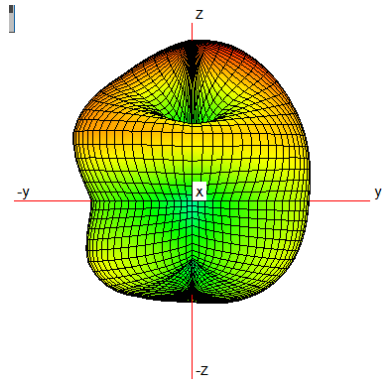
Theta



Phi

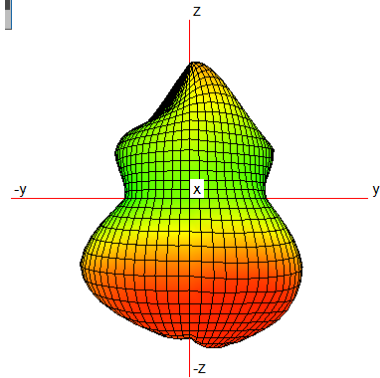


Total

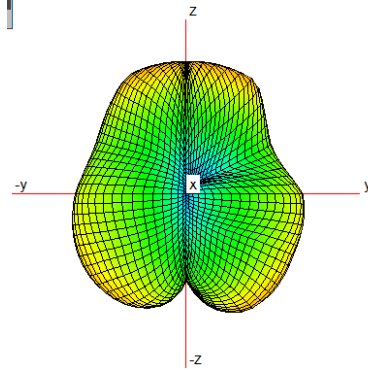


LTE B4 1750MHz

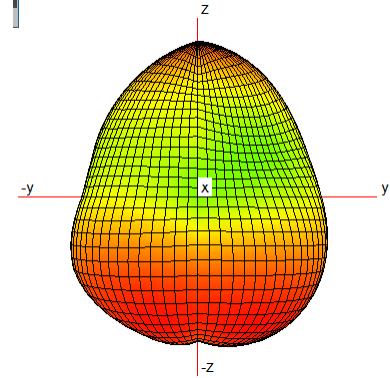
Theta



Phi

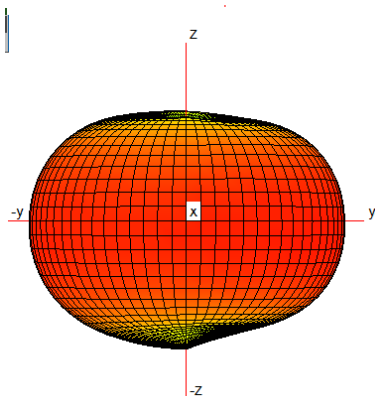


Total

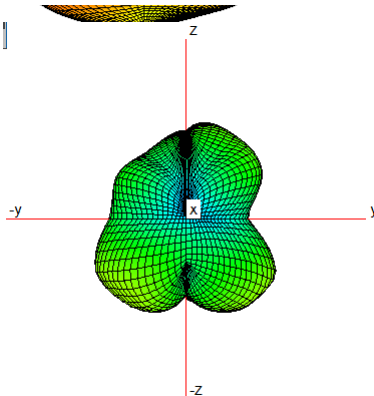


LTE B5 844MHz

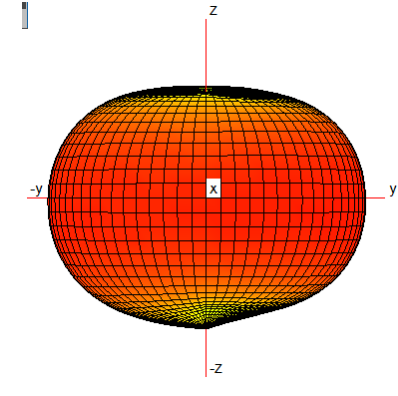
Theta



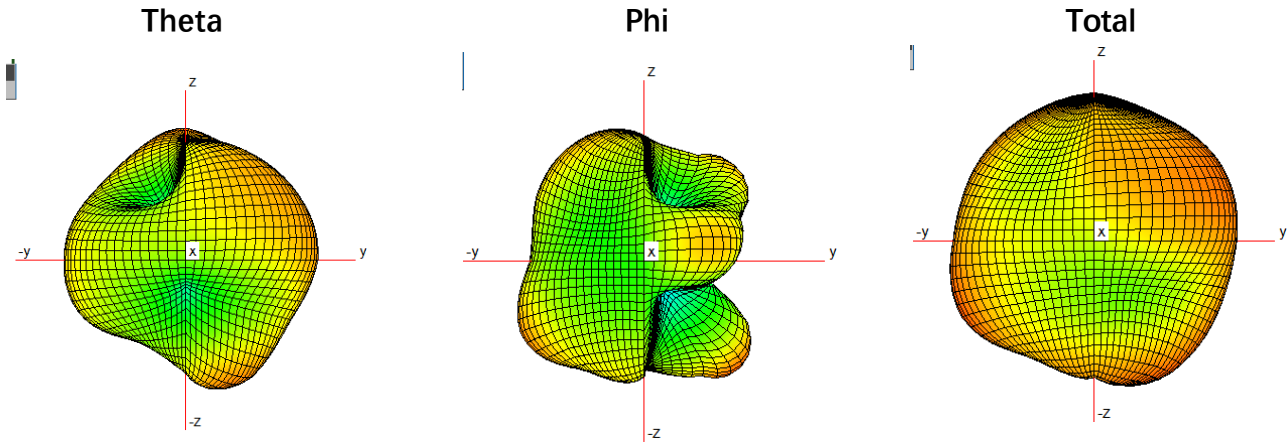
Phi



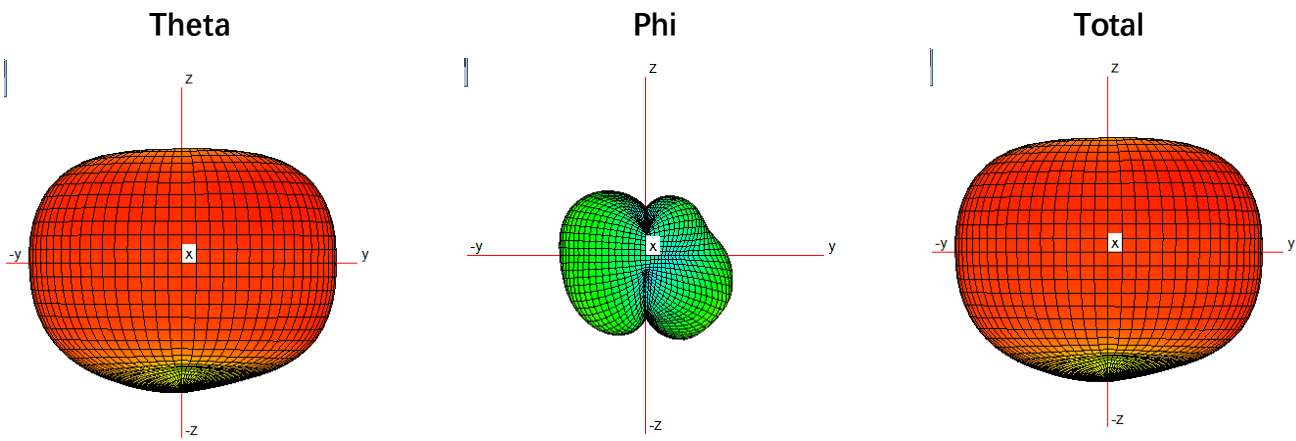
Total



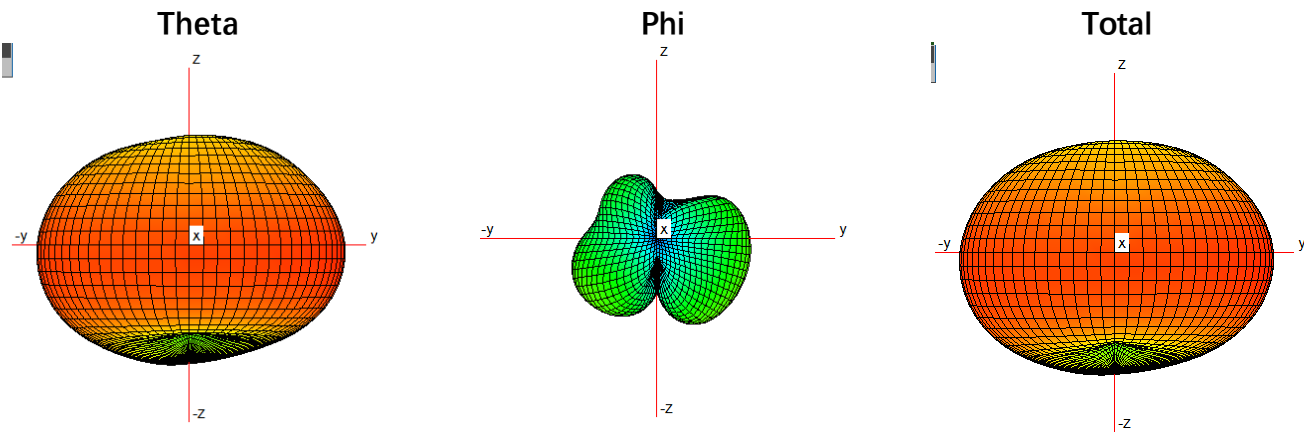
### LTE 7 2535MHz



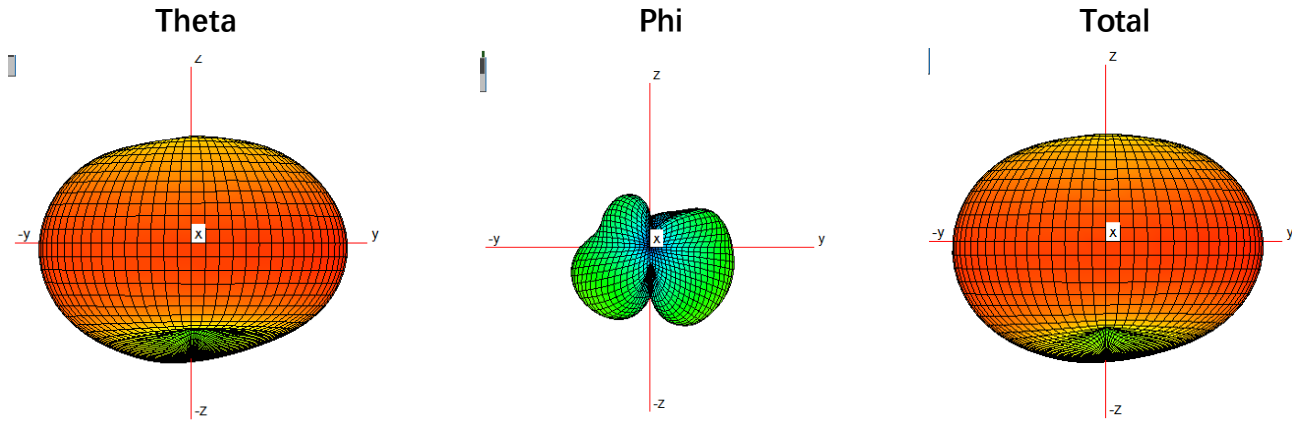
### LTE 12 701.5MHz



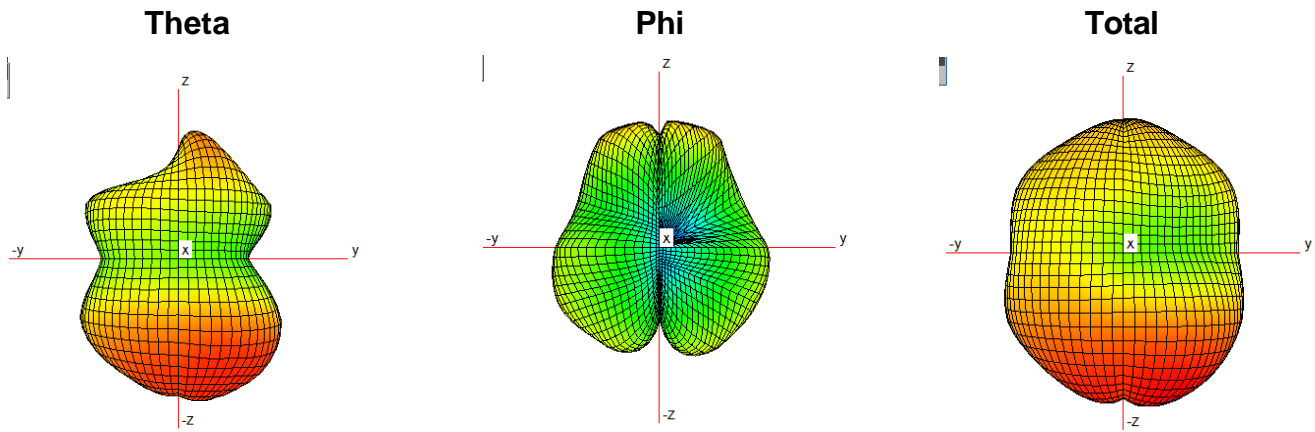
### LTE 13 782MHz



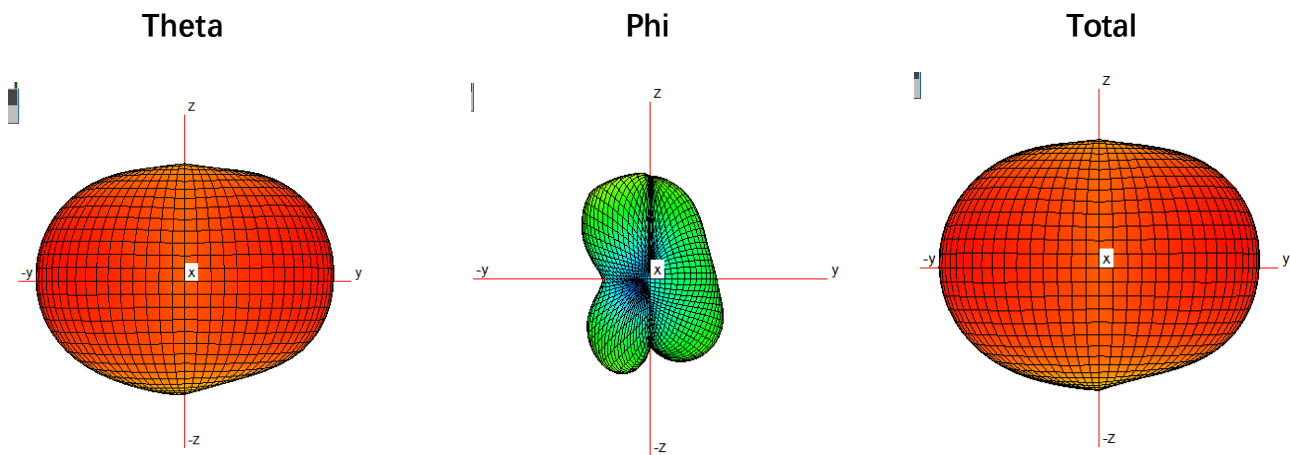
### LTE 14 793MHz



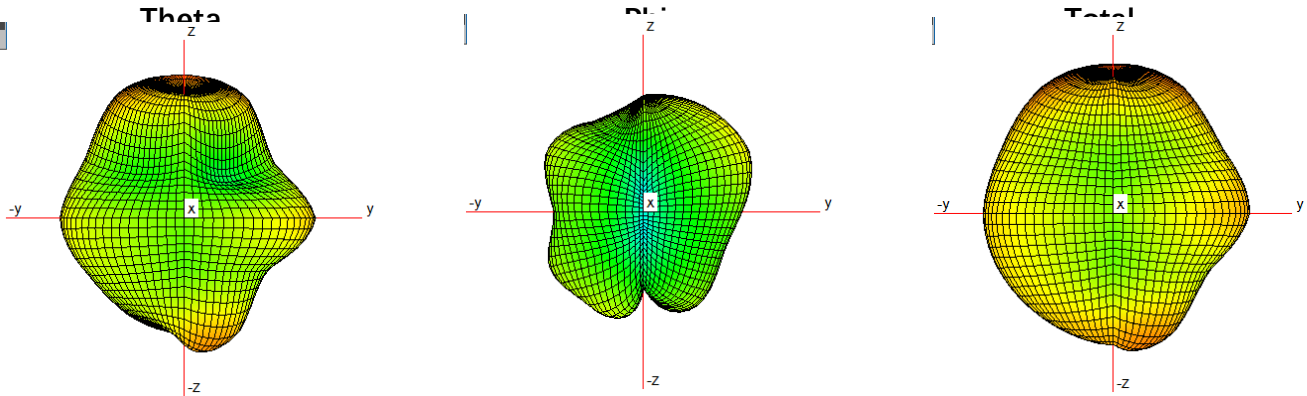
### LTE 25 1855MHz



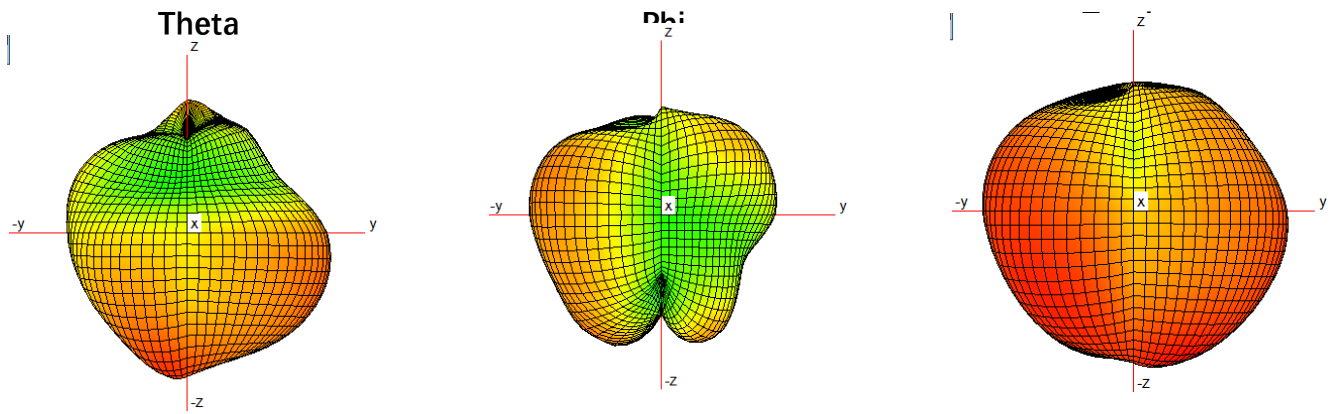
### LTE 26 831.5MHz



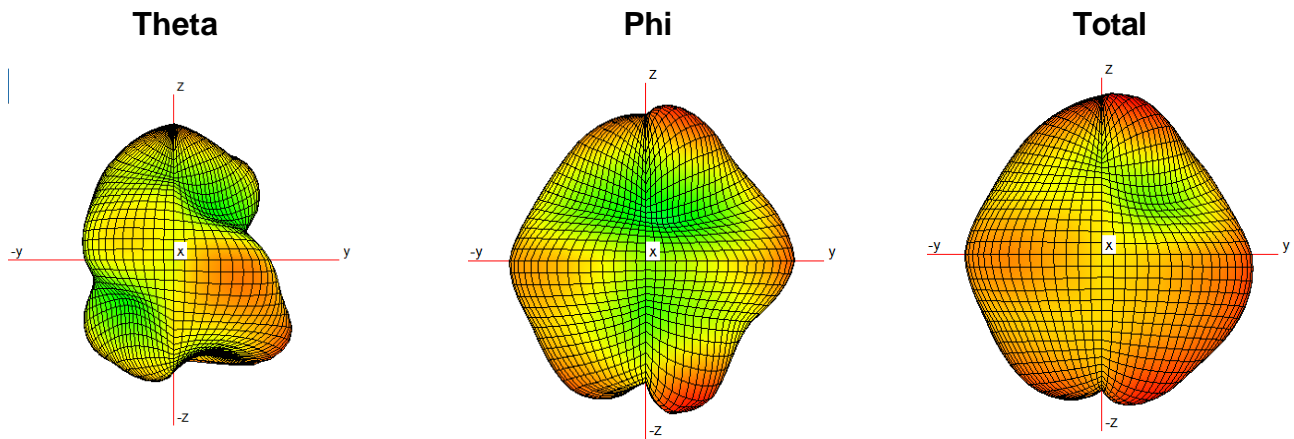
LTE 30 2310MHz



LTE 41 2506MHz

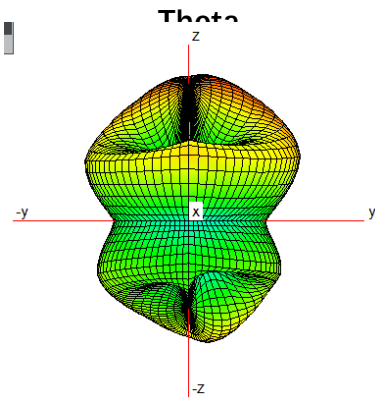


LTE 48 3625MHz

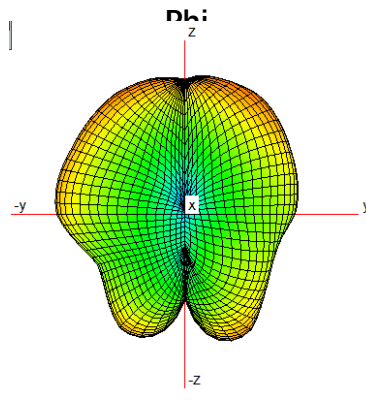


LTE 66 1745MHz

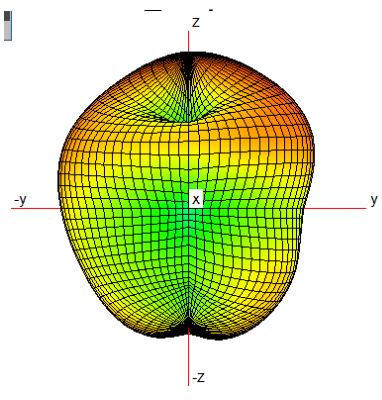
Theta



Phi

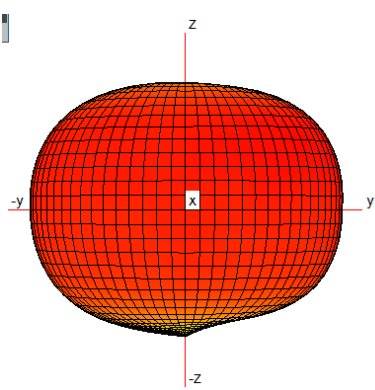


Total

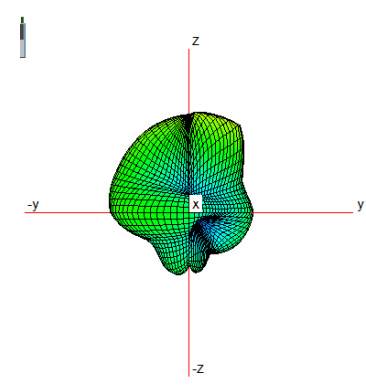


LTE 71 693MHz

Theta



Phi



Total

