3301 E. Deseret Drive, St. George, UT 84790
www.wilsonelectronics.com • info@wilsonelectronics.com
phone 1-800-204-4104 • fax 1-435-656-2432

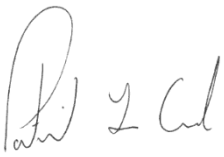
October 15, 2013

Subject: Antenna Measurements and Testing Data

To Whom It May Concern:

The gains for each antenna were tested using a log periodic antenna calibrated by RTCE labs as the standard. Attached are the Wilson Electronics antenna measurements, the RTCE Antenna Testing Summary, and calibration information.

Sincerely,



Patrick L. Cook

Senior Research and Development Engineer

Wilson Electronics Antenna Average Gain (dBi)
---cable loss not included
Last updated by Erin Elder 10/15/13

Recommended Band for Use
Marginal Band
Not Recommended Band

Outside Mobile Antennas

Antenna #		698-716	776-787	824-849	1710-1755	1850-1995	Initials	Date Measured
MAGNET MOUNT ANTENNAS								
311103 311125 311128 314202	Gains	-4.8	0.1	2.0	-7.0	2.5	CKA	9/17/2013
311703	Gains	-15.0	-4.2	0.7	-2.0	1.2	CKA	9/17/2013
MINI MAGNET MOUNT ANTENNAS								
301113 301126	Gains	-0.3	-2.2	-1.9	1.2	1.9	CKA	9/17/2013
TRUCKER ANTENNAS								
311101	Gains	-4.5	0.4	1.7	-3.6	6.1	CKA	9/17/2013
311701	Gains	-14.1	-0.7	2.2	-0.2	2.7	CKA	9/17/2013
311119	Gains	-1.4	0.4	1.2	-2.3	3.6	CKA	9/17/2013
311133	Gains	-3.3	0.2	1.2	-4.8	4.2	CKA	9/17/2013
MARINE ANTENNAS								
311130	Gains	-1.0	-1.6	0.7	-1.7	3.6	CKA	9/17/2013
GLASS MOUNT ANTENNAS								
311102	Gains	-3.7	-2.5	-0.9	2.2	3.4	CKA	9/17/2013
MINI GLASS MOUNT ANTENNAS								
311114	Gains	-7.5	-6.1	-5.4	2.6	1.4	CKA	9/17/2013
NMO ANTENNAS								
311104	Gains	-4.1	-0.9	2.5	-3.5	1.8	CKA	9/17/2013
311112	Gains	-3.2	-0.5	2.5	-2.6	-0.7	CKA	9/17/2013
314203	Gains	-1.6	0.5	1.8	-5.7	0.8	CKA	9/17/2013
301105	Gains	4.1	4.1	1.4		-7.0	CKA	6/22/2010

Wilson Electronics Antenna Average Gain (dBi)
---cable loss not included
Last updated by Erin Elder 10/15/13

Recommended Band for Use
Marginal Band
Not Recommended Band

Inside Mobile Antennas

Antenna #		728-746	746-756	869-894	1930-1995	2110-2155	Initials	Date Measured
LOW PROFILE ANTENNAS								
311127	Gains	-1.9	-2.3	2.2	-3.1	-0.5	DD	9/25/2013
311106	Gains	-5.6	-5.6	0.5	0.9	0.1	DD	9/25/2013
ULTRA SLIM ANTENNAS								
301143 301149	Gains	-5.7	-5.7	-6.8	3.9	5.0	CKA	9/27/2010
301143 301149	Gains	-7.0	-7.0	-8.0	-16.0	-15.0	CKA	9/27/2010
CRADLE PLUS ANTENNAS								
301146 301148	Gains	-5.0	-5.0	0.7	2.6	1.5	CKA	11/9/2012
301146 301148	Gains	-7.0	-7.0	-8.0	-16.0	-15.0	CKA	11/9/2012

Wilson Electronics Antenna Average Gain (dBi)
---cable loss not included
Last updated by Erin Elder 10/15/13

Recommended Band for Use
Marginal Band
Not Recommended Band

Outside Fixed Antennas

Antenna #		698-716	776-787	824-849	1710-1755	1850-1995	Initials	Date Measured
EXTERIOR PANEL ANTENNA								
311141	Gains	-2.9	-0.6	1.2	-0.4	5.5	CKA	9/17/2013
OMNI DIRECTIONAL ANTENNAS								
311202	Gains	-1.5	-0.2	0.6	-2.5	5.1	CKA	9/17/2013
YAGI ANTENNAS								
301111	Gains	10.0	10.0	10.8	-6.8	-14.9	CKA	9/17/2013
311124	Gains	2.0	7.2	9.6	-6.7	-12.0	CKA	9/17/2013
311129	Gains	-18.7	-18.7	-23.4	9.1	10.9	CKA	9/17/2013
301142	Gains	-3.6	-3.6	3.7		-10.2	CKA	6/22/2010
YAGI (LOG PERIODIC, WIDE BAND DIRECTIONAL) ANTENNAS								
314411 314475	Gains	7.3	7.2	7.8	7.9	9.1	CKA	9/17/2013
PANEL ANTENNAS								
311135 311155 314451 314471 314452 314472 314453 314473 314447	Gains	3.8	3.6	4.4	8.2	10.0	CKA	9/17/2013

Wilson Electronics Antenna Average Gain (dBi)
---cable loss not included
Last updated by Erin Elder 10/15/13

Recommended Band for Use
Marginal Band
Not Recommended Band

Inside Fixed Antennas

Antenna #		728-746	746-756	869-894	1930-1995	2110-2155	Initials	Date Measured
DESKTOP MOUNT ANTENNAS								
301213	Gains	2.4	2.4	3.1	3.5	-2.7	CKA	9/19/2013
DOME ANTENNAS								
301121 301151	Gains	-2.5	-2.5	1.5	3.0	1.5	CKA	8/18/2010
301123	Gains	-11.7	-11.7	-20.7	-8.3	-8.3	CKA	8/18/2010
PANEL ANTENNAS								
311135 311155 314451 314471 314452 314472 314453 314473 314447	Gains	4.2	4.2	6.1	9.8	6.7	CKA	9/19/2013

RTCE Antenna Testing Summary

www.RTCE.com

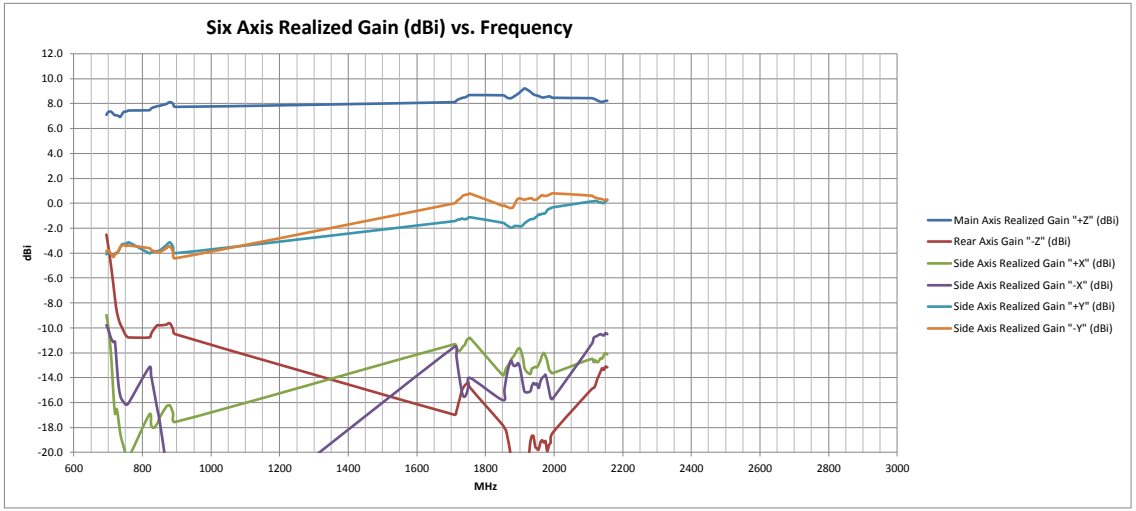
Test Date	Friday, July 19, 2013
Tested By:	Glenn Robb (919) 200-0292 g@RTCE.com
Sample Description	

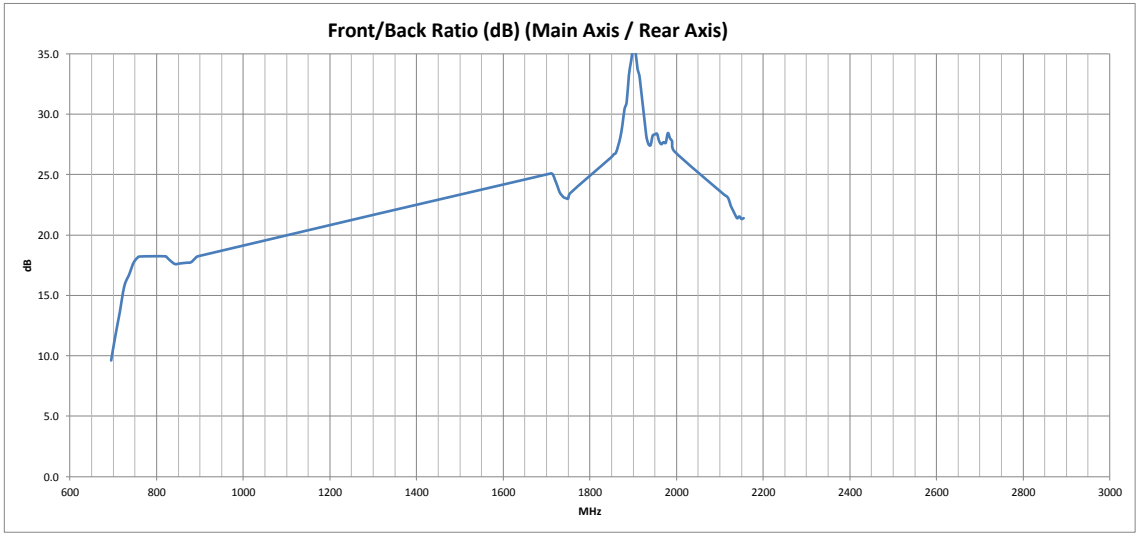
Axis	**Antenna Under Test Orientation Notes** (See Coordinate Diagram Tab And Separate Setup Photos)
+Z Axis is Theta= 0 & Phi=any	Axis of intended use
-Z Axis is Theta= 180 & Phi=any	Axis of feed line

Other Coordinate Notes, 3-Axis Cuts in Spherical Coordinates …
XZ Cut (Turntable) is Theta=0-360 & Phi=0, or Theta=0-180 & Phi=0 then Theta=180-0 & Phi=180
YZ Cut is Theta=0-360 & Phi=90, or Theta=0-180 & Phi=90 then Theta=180-0 & Phi=270
XY Cut is Theta=90 & Phi=0-360

Notes And Observations

Frequency (MHz)	Main Axis Realized Gain "+Z" (dBi)	Rear Axis Gain "-Z" (dBi)	Front/Back Ratio (dB)	Side Axis Realized Gain "+X" (dBi)	Side Axis Realized Gain "-X" (dBi)	Side Axis Realized Gain "+Y" (dBi)	Side Axis Realized Gain "-Y" (dBi)
695	7.1	-2.5	9.6	-9.0	-9.8	-4.1	-3.9
700	7.3	-3.4	10.7	-9.8	-10.1	-3.9	-3.8
705	7.4	-4.3	11.7	-11.1	-10.6	-4.0	-3.9
710	7.3	-5.3	12.7	-12.7	-10.9	-4.1	-4.1
715	7.2	-6.4	13.6	-15.1	-11.1	-4.2	-4.3
720	7.1	-7.7	14.7	-16.9	-11.1	-4.0	-4.1
725	7.1	-8.7	15.7	-16.5	-12.9	-4.0	-4.0
730	7.0	-9.2	16.2	-17.3	-14.5	-3.9	-3.8
735	6.9	-9.7	16.6	-18.4	-15.4	-3.5	-3.6
740	7.1	-9.9	17.1	-19.0	-15.8	-3.3	-3.4
745	7.3	-10.3	17.6	-19.5	-16.0	-3.3	-3.4
750	7.4	-10.5	17.9	-20.0	-16.1	-3.3	-3.4
755	7.4	-10.7	18.1	-20.4	-16.2	-3.2	-3.4
760	7.5	-10.8	18.2	-20.4	-16.0	-3.1	-3.4
820	7.5	-10.8	18.2	-17.0	-13.2	-4.0	-3.6
825	7.6	-10.5	18.1	-17.8	-13.8	-4.0	-3.7
830	7.7	-10.3	17.9	-18.0	-14.5	-3.9	-3.8
835	7.7	-10.1	17.8	-18.0	-15.3	-3.9	-3.9
840	7.8	-9.9	17.6	-17.8	-16.0	-3.9	-3.9
845	7.8	-9.8	17.6	-17.6	-16.8	-3.8	-3.9
850	7.8	-9.8	17.6	-17.2	-17.4	-3.8	-3.9
870	8.0	-9.7	17.7	-16.3	-21.2	-3.4	-3.6
875	8.1	-9.6	17.7	-16.2	-22.6	-3.2	-3.5
880	8.1	-9.6	17.8	-16.2	-24.1	-3.1	-3.5
885	8.1	-9.9	17.9	-16.5	-25.6	-3.3	-3.6
890	8.0	-10.2	18.1	-16.9	-27.4	-3.6	-4.0
895	7.7	-10.5	18.2	-17.6	-29.0	-4.0	-4.4
1710	8.1	-17.0	25.1	-11.3	-11.5	-1.4	0.0
1715	8.2	-16.7	25.0	-11.6	-12.2	-1.4	0.1
1720	8.3	-16.2	24.5	-11.9	-13.3	-1.3	0.3
1725	8.4	-15.7	24.1	-11.8	-14.2	-1.3	0.4
1730	8.4	-15.1	23.6	-11.7	-15.0	-1.2	0.5
1735	8.5	-14.8	23.3	-11.5	-15.5	-1.3	0.6
1740	8.5	-14.6	23.1	-11.4	-15.5	-1.3	0.7
1745	8.6	-14.5	23.1	-11.0	-15.3	-1.3	0.7
1750	8.7	-14.4	23.0	-10.9	-14.7	-1.2	0.7
1755	8.7	-14.8	23.5	-10.8	-14.0	-1.1	0.8
1850	8.7	-17.8	26.5	-13.8	-15.8	-1.6	-0.2
1855	8.6	-18.0	26.7	-13.7	-15.0	-1.6	-0.2
1860	8.5	-18.3	26.8	-13.3	-14.1	-1.7	-0.3
1865	8.5	-18.9	27.4	-13.1	-13.4	-1.8	-0.3
1870	8.4	-19.6	28.0	-12.8	-12.9	-1.9	-0.4
1875	8.4	-20.6	29.1	-12.5	-12.6	-2.0	-0.4
1880	8.5	-21.9	30.4	-12.4	-13.0	-1.9	-0.3
1885	8.6	-22.4	31.0	-12.2	-13.1	-1.8	-0.1
1890	8.7	-24.5	33.2	-11.9	-13.0	-1.8	0.2
1895	8.8	-25.6	34.4	-11.7	-12.8	-1.8	0.4
1900	8.9	-26.5	35.4	-11.7	-13.1	-1.9	0.4
1905	9.0	-26.2	35.2	-12.0	-13.9	-1.8	0.4
1910	9.1	-24.6	33.8	-12.6	-14.7	-1.7	0.3
1915	9.2	-23.8	33.0	-13.3	-15.1	-1.6	0.3
1930	9.0	-19.3	28.3	-13.7	-15.1	-1.3	0.4
1935	8.9	-18.7	27.5	-13.3	-14.7	-1.3	0.4
1940	8.7	-18.7	27.4	-13.2	-14.4	-1.3	0.3
1945	8.7	-19.5	28.2	-13.1	-14.6	-1.2	0.3
1950	8.7	-19.7	28.3	-13.2	-14.5	-1.1	0.3
1955	8.6	-19.8	28.4	-13.0	-14.8	-0.9	0.4
1960	8.6	-19.2	27.8	-12.6	-14.3	-0.9	0.6
1965	8.5	-19.0	27.5	-12.2	-14.0	-0.8	0.7
1970	8.5	-19.2	27.7	-12.0	-13.9	-0.8	0.6
1975	8.5	-19.1	27.6	-12.3	-13.8	-0.8	0.6
1980	8.5	-19.9	28.4	-12.7	-14.3	-0.6	0.6
1985	8.6	-19.4	28.0	-13.3	-15.0	-0.5	0.7
1990	8.6	-19.2	27.7	-13.5	-15.6	-0.4	0.7
1995	8.5	-18.5	26.9	-13.6	-15.7	-0.3	0.8
2110	8.4	-14.9	23.3	-12.5	-11.3	0.2	0.6
2115	8.4	-14.8	23.2	-12.8	-10.8	0.1	0.5
2120	8.4	-14.6	23.0	-12.6	-10.7	0.2	0.5
2125	8.3	-14.2	22.4	-12.8	-10.7	0.2	0.4
2130	8.2	-13.9	22.1	-12.7	-10.6	0.1	0.4
2135	8.2	-13.6	21.7	-12.5	-10.5	0.1	0.4
2140	8.2	-13.2	21.4	-12.5	-10.6	0.0	0.3
2145	8.2	-13.4	21.5	-12.2	-10.6	0.0	0.3
2150	8.2	-13.1	21.3	-12.0	-10.4	0.2	0.3
2155	8.2	-13.2	21.4	-12.1	-10.5	0.3	0.3



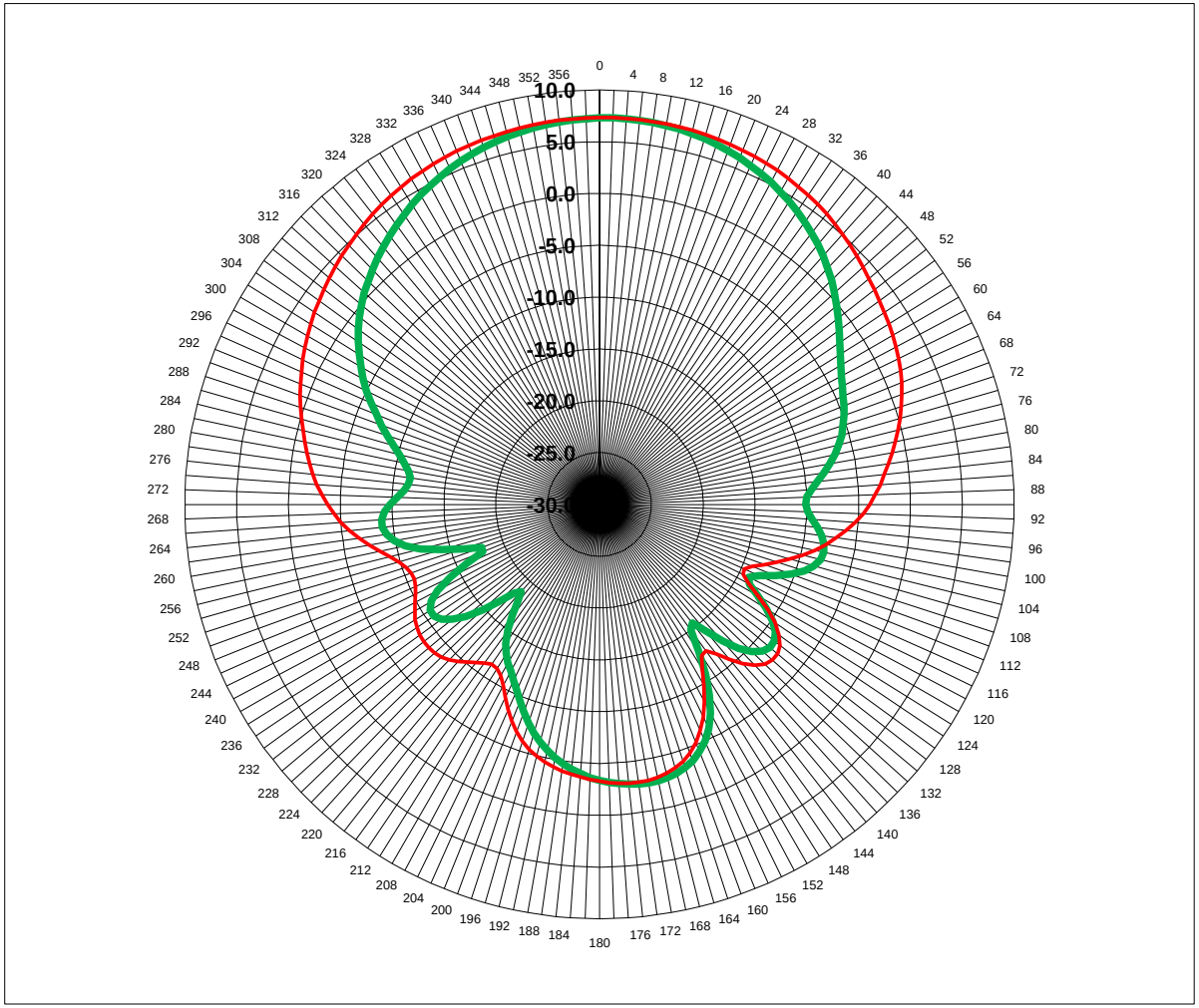


Angle (Degrees)	XZ-Plane Gain (dBi)	YZ-Plane Gain (dBi)
0	7.3	7.3
2	7.3	7.4
4	7.3	7.4
6	7.3	7.3
8	7.2	7.3
10	7.1	7.3
12	7.0	7.3
14	6.9	7.2
16	6.7	7.1
18	6.5	7.1
20	6.3	7.0
22	6.1	6.9
24	5.8	6.8
26	5.5	6.6
28	5.2	6.5
30	4.9	6.4
32	4.5	6.2
34	4.1	6.0
36	3.7	5.8
38	3.2	5.6
40	2.8	5.3
42	2.2	5.1
44	1.7	4.8
46	1.1	4.5
48	0.5	4.2
50	-0.2	3.9
52	-0.8	3.7
54	-1.4	3.4
56	-2.1	3.2
58	-2.6	2.9
60	-3.1	2.7
62	-3.6	2.4
64	-4.0	2.1
66	-4.3	1.8
68	-4.6	1.4
70	-4.9	1.1
72	-5.3	0.6
74	-5.7	0.2
76	-6.2	-0.3
78	-6.8	-0.8
80	-7.4	-1.4
82	-8.2	-1.9
84	-8.9	-2.4
86	-9.5	-2.8
88	-10.0	-3.4
90	-10.1	-3.9
92	-9.9	-4.5
94	-9.4	-5.2
96	-8.9	-6.0
98	-8.3	-6.9
100	-8.0	-7.8
102	-7.9	-8.8
104	-8.0	-9.8
106	-8.5	-10.9
108	-9.2	-12.0
110	-10.3	-13.0
112	-11.7	-14.1
114	-13.1	-14.7
116	-14.0	-14.6

Antenna Gain in dB Isotropic

Green "XZ-Plane" (Phi=0) "E-Plane"	0.5 dBi Average Gain In Cut
Red "YZ-Plane" (Phi=90) "H-Plane"	2.1 dBi Average Gain In Cut
Average Gain In Both Cuts	1.4 dBi Average Gain In Both Cuts

Test Frequency: (See Tab Label)

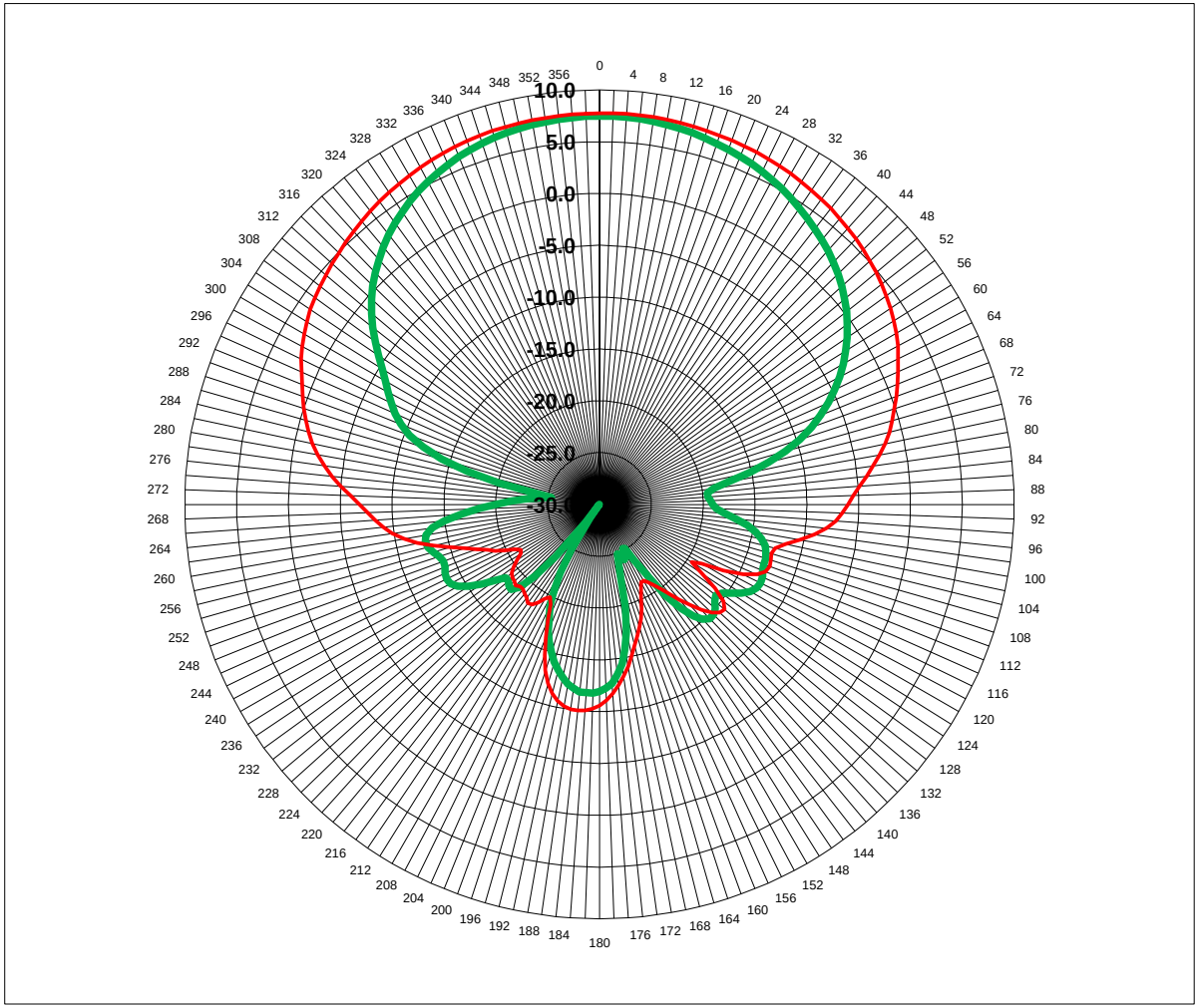


Angle (Degrees)	XZ-Plane Gain (dBi)	YZ-Plane Gain (dBi)
0	7.5	7.8
2	7.5	7.8
4	7.5	7.8
6	7.4	7.8
8	7.3	7.8
10	7.2	7.7
12	7.1	7.7
14	7.0	7.6
16	6.8	7.5
18	6.6	7.5
20	6.4	7.4
22	6.2	7.3
24	6.0	7.2
26	5.7	7.1
28	5.5	7.0
30	5.2	6.9
32	4.8	6.7
34	4.5	6.6
36	4.1	6.4
38	3.8	6.2
40	3.4	6.1
42	2.9	5.8
44	2.5	5.6
46	2.0	5.4
48	1.5	5.1
50	0.9	4.8
52	0.2	4.5
54	-0.4	4.2
56	-1.2	3.9
58	-2.0	3.5
60	-2.8	3.1
62	-3.7	2.6
64	-4.8	2.1
66	-5.8	1.5
68	-7.0	1.0
70	-8.2	0.5
72	-9.7	-0.1
74	-11.3	-0.6
76	-13.2	-1.2
78	-15.2	-1.8
80	-17.3	-2.6
82	-18.9	-3.3
84	-19.6	-4.1
86	-19.5	-4.8
88	-19.3	-5.5
90	-19.1	-6.0
92	-18.7	-6.6
94	-18.0	-7.1
96	-16.8	-8.0
98	-15.6	-9.1
100	-14.7	-10.3
102	-14.0	-11.6
104	-13.5	-12.5
106	-13.3	-12.8
108	-13.1	-12.6
110	-13.1	-12.5
112	-13.1	-12.7
114	-12.8	-13.4
116	-12.7	-14.6

Antenna Gain in dB Isotropic

Green "XZ-Plane" (Phi=0) "E-Plane"	0.4 dBi Average Gain In Cut
Red "YZ-Plane" (Phi=90) "H-Plane"	2.3 dBi Average Gain In Cut
Average Gain In Both Cuts	1.5 dBi Average Gain In Both Cuts

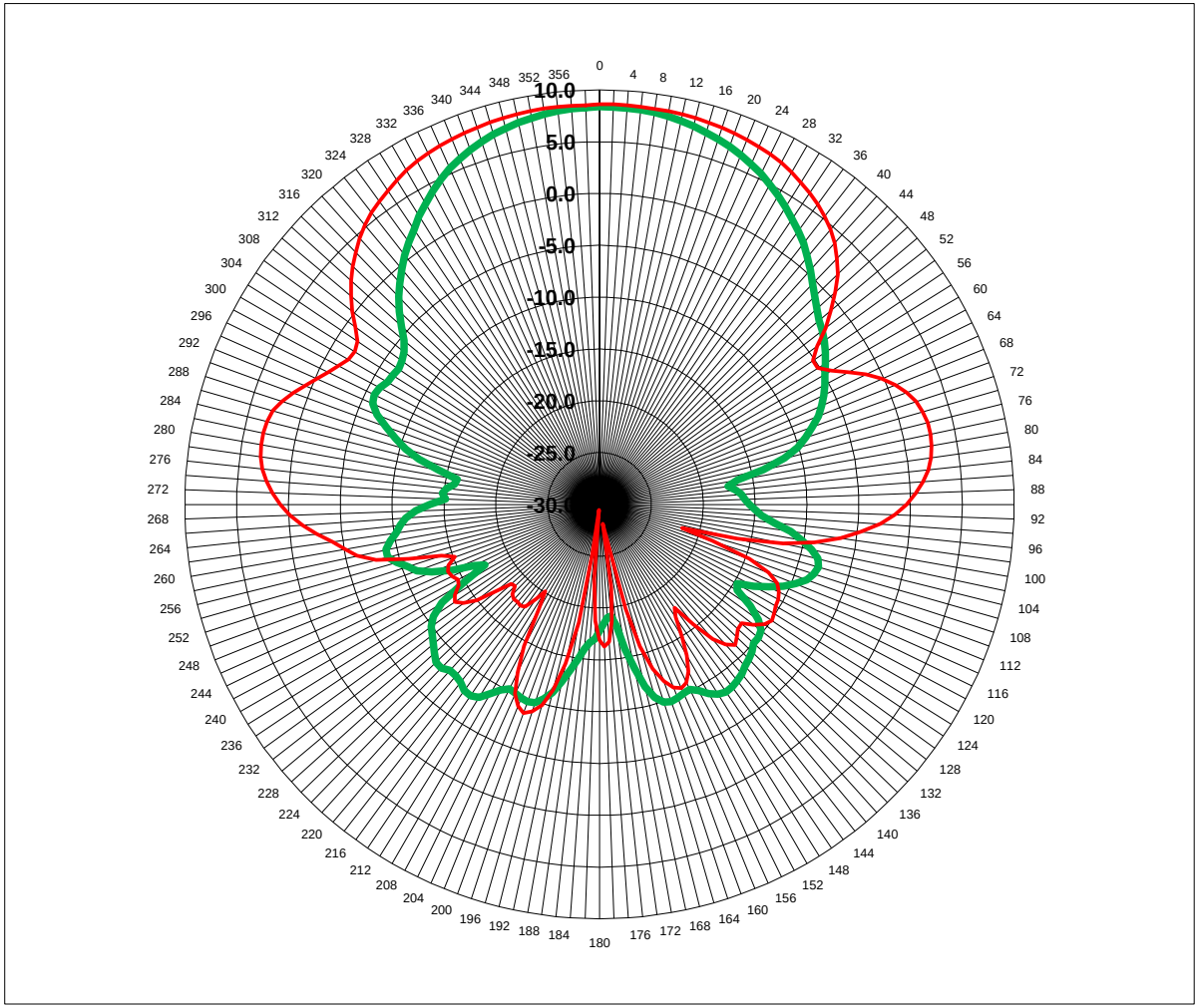
Test Frequency: (See Tab Label)



Angle (Degrees)	XZ-Plane Gain (dBi)	YZ-Plane Gain (dBi)
0	8.4	8.6
2	8.4	8.6
4	8.3	8.6
6	8.3	8.6
8	8.2	8.6
10	8.1	8.5
12	7.9	8.5
14	7.6	8.4
16	7.4	8.3
18	7.1	8.2
20	6.8	8.1
22	6.4	8.0
24	6.0	7.8
26	5.5	7.6
28	5.0	7.4
30	4.4	7.0
32	3.8	6.7
34	3.2	6.2
36	2.6	5.8
38	2.0	5.3
40	1.2	4.7
42	0.4	3.9
44	-0.4	3.0
46	-1.1	1.9
48	-1.8	0.6
50	-2.3	-0.8
52	-2.8	-2.3
54	-3.2	-4.0
56	-3.7	-5.2
58	-4.3	-5.2
60	-4.9	-4.1
62	-5.4	-2.8
64	-6.0	-1.4
66	-6.5	-0.2
68	-7.2	0.8
70	-8.2	1.5
72	-9.1	2.1
74	-10.1	2.4
76	-11.6	2.6
78	-13.9	2.6
80	-16.5	2.5
82	-17.5	2.3
84	-16.8	1.9
86	-16.3	1.3
88	-16.0	0.5
90	-15.5	-0.4
92	-15.0	-1.5
94	-14.3	-2.9
96	-13.1	-4.6
98	-11.4	-6.5
100	-10.2	-8.9
102	-9.1	-11.9
104	-8.3	-16.3
106	-8.0	-21.7
108	-8.3	-18.6
110	-8.7	-14.6
112	-9.6	-12.4
114	-10.6	-11.2

Antenna Gain in dB Isotropic

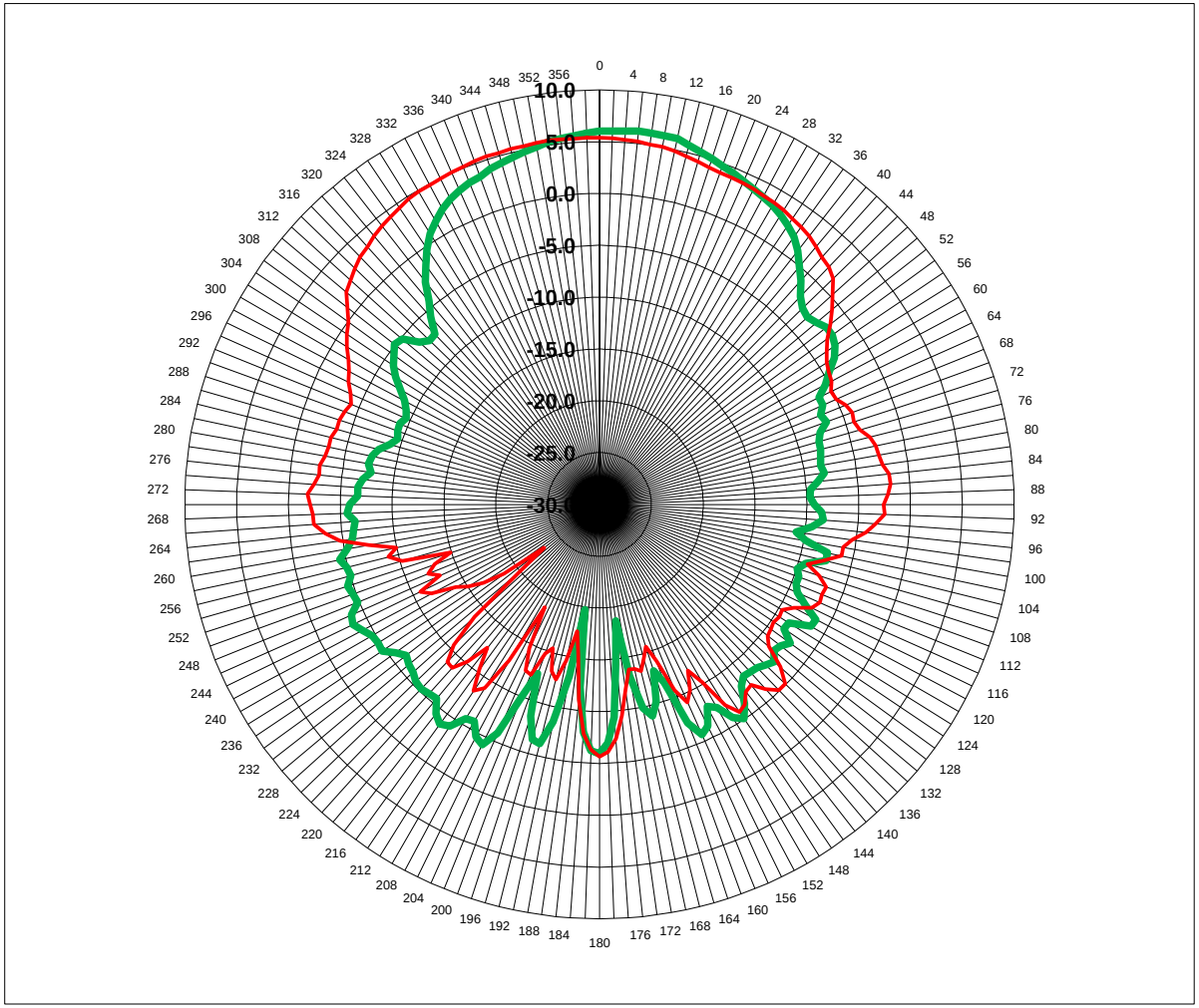
Green "XZ-Plane" (Phi=0) "E-Plane"	0.5 dBi Average Gain In Cut
Red "YZ-Plane" (Phi=90) "H-Plane"	2.6 dBi Average Gain In Cut
Average Gain In Both Cuts	1.7 dBi Average Gain In Both Cuts
Test Frequency: (See Tab Label)	



Angle (Degrees)	XZ-Plane Gain (dBi)	YZ-Plane Gain (dBi)
0	6.0	5.4
2	6.1	5.3
4	6.1	5.3
6	6.3	5.2
8	6.2	5.1
10	6.1	5.1
12	6.1	4.9
14	5.7	4.7
16	5.4	4.4
18	5.1	4.2
20	4.8	4.1
22	4.5	4.0
24	4.2	4.0
26	3.9	3.9
28	3.6	3.7
30	3.4	3.7
32	3.0	3.5
34	2.5	3.3
36	1.9	3.1
38	1.1	2.8
40	0.0	2.5
42	-0.9	2.1
44	-2.1	1.8
46	-2.7	1.3
48	-3.0	0.2
50	-2.7	-0.7
52	-2.2	-1.7
54	-2.3	-2.9
56	-2.6	-3.6
58	-3.3	-4.1
60	-4.4	-4.5
62	-5.3	-4.7
64	-6.4	-5.2
66	-6.4	-5.0
68	-7.0	-4.4
70	-6.7	-4.0
72	-7.6	-4.2
74	-8.0	-3.9
76	-8.0	-3.1
78	-8.2	-2.8
80	-8.4	-2.6
82	-8.1	-2.4
84	-8.8	-1.9
86	-9.6	-1.9
88	-9.7	-2.2
90	-9.3	-2.6
92	-8.6	-2.5
94	-8.4	-3.3
96	-9.4	-4.1
98	-10.8	-5.4
100	-9.8	-6.1
102	-7.5	-6.1
104	-7.5	-7.7
106	-9.3	-9.1
108	-10.0	-7.7
110	-9.5	-6.7
112	-9.6	-6.9
114	-9.1	-6.7

Antenna Gain in dB Isotropic

Green "XZ-Plane" (Phi=0) "E-Plane"	-1.1 dBi Average Gain In Cut
Red "YZ-Plane" (Phi=90) "H-Plane"	-0.2 dBi Average Gain In Cut
Average Gain In Both Cuts	-0.6 dBi Average Gain In Both Cuts
Test Frequency: (See Tab Label)	



From IEEE Std 149 (1979) "IEEE Standard Test Procedures for Antennas"

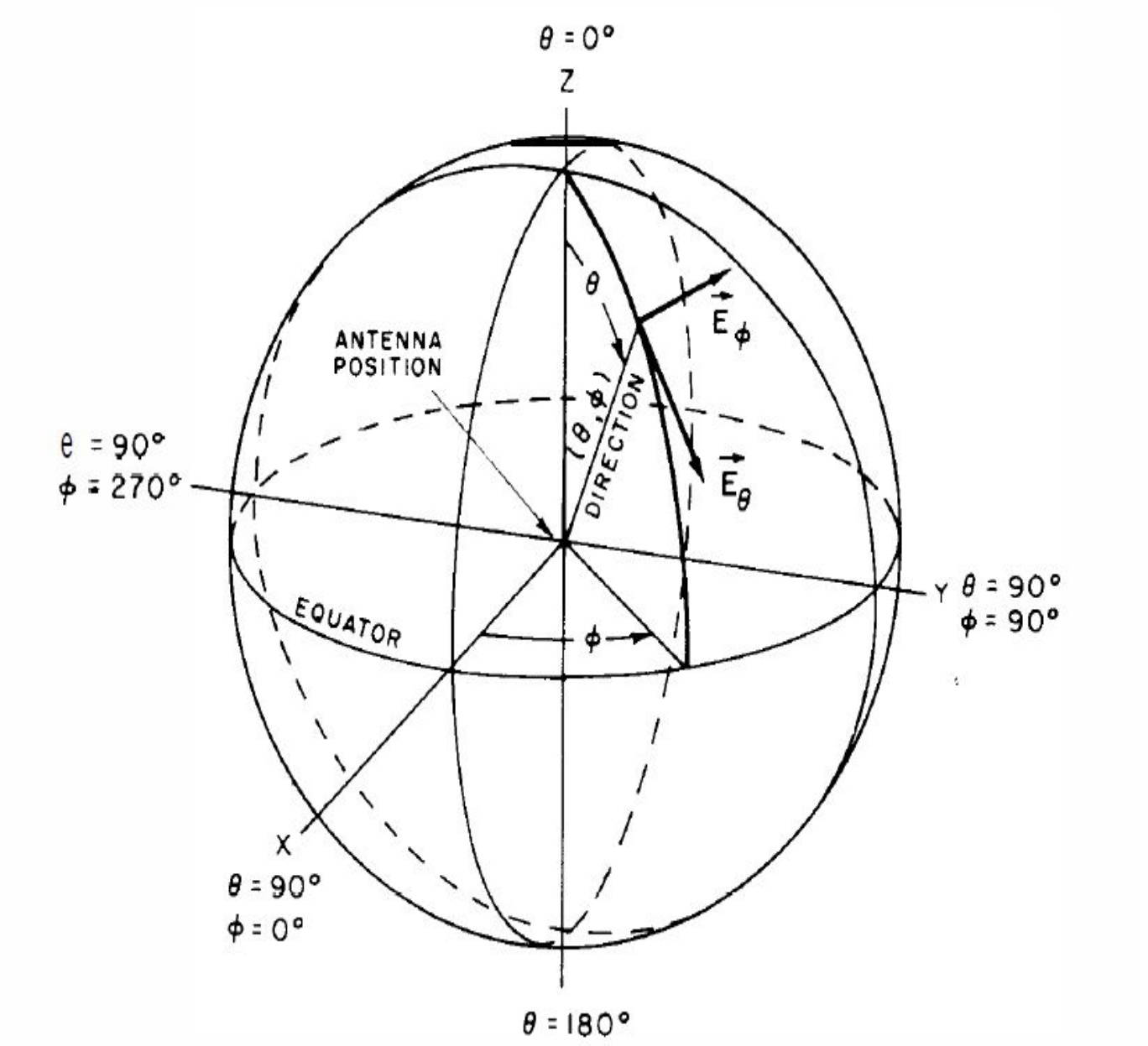


Fig 2
Standard Spherical Coordinate System Used in Antenna Measurements