

TECHNICAL EXHIBIT
MEDIA POWER GROUP, INC.
APPLICATION FOR NEW FM TRANSLATOR
FOR AM STATION WSKN
FACILITY ID 203065
CHANNEL 287D 250 WATTS DA

OCTOBER 11, 2018

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Technical Narrative

The technical exhibit, of which this narrative is part, has been prepared on behalf of Media Power Group, Inc., licensee of a AM radio station WSKN, 1320 KHz in San Juan, PR, Facility ID 10062. Media Power Group, Inc. is requesting a new FM translator to serve as a fill-in translator for AM radio station WSKN, a Class B facility.

Proposed Transmitter Location

The proposed transmitting facility would operate on channel 287D using a Scala CA5-FM/CP/RM circularly polarized antenna array, side-mounted on an existing tower. The proposed site location, is described by the following NAD27 geographic coordinates:

18° 24' 56.6" North

66° 17' 42.1" West

It is proposed to side mount the antenna radiation center (RC) at a height of 78 meters (256 feet) above ground on an existing tower at a site with an elevation of 91 mts. AMSL. Thus, the antenna RC will be mounted at a height of 169 meters AMSL.. The permissible ERP of 250 Watts allowed under these conditions is requested. The proposed tower currently is being used by Crown Castle.

Tower Registration

The FAA is not being notified of the proposed construction, as it is proposed to side-mount the FM antenna on an existing 81.4 meter registered tower, ASRN 1253198.

Environmental Considerations

The proposal is excluded from environmental processing, as an existing supporting structure is to be employed and the proposal complies with the FCC Rules concerning human exposure to radio frequency (RF) energy. The calculation of RF energy at 2-m above ground was made under the procedures of OET Bulletin No. 65.* The formula employed is as follows:

$$S = \frac{(33.4)F^2P}{R^2}$$

where, S = power density in $\mu\text{W}/\text{cm}^2$, F = relative field factor at the angle to the calculation point, P = the total effective radiated power relative to a dipole in watts, and R = distance from the antenna radiation center to the calculation point in meters.

Based on the vertical radiation pattern of the proposed antenna, a relative field factor of 0.952 or less for any depression angle equal or greater than 10 degrees below horizon (see Figure 3), a total effective radiated power of 500 watts (circular polarization) and an antenna radiation center height above ground of 78 m, the calculated power density will not exceed $2.6 \mu\text{W}/\text{cm}^2$. Therefore, the calculated RF exposure at 2 m above ground will not exceed 1.3 % of the limit of $200 \mu\text{W}/\text{cm}^2$ for the general population and uncontrolled environments.

The antenna system will be restricted from access and appropriate warning signs posted. In the event that personnel are required to climb the structure, the transmissions of the proposed FM translator will be reduced or terminated, as necessary to prevent RF exposure above the FCC recommended limits.

FCC Monitoring Stations

FCC rules pertaining to FCC monitoring stations, Section 73.1030(c), requires that the proposed facility does not produce a field strength greater than 10 mV/m at the FCC stations. The closest FCC monitoring station to the proposed operation is located at Santa Isabel, PR, at a distance of 46 kilometers. The proposed operation will produce field strengths much lower than 10 mV/m at the FCC station in Santa Isabel, PR.

* Federal Communications Commission OET Bulletin No. 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (Edition 97-01, August 1997).

Quiet Zone Notification

As required by FCC rules pertaining to radio Quiet Zones, Section 73.1030(a), the National Astronomy and Ionosphere Center (NAIC) in Arecibo, Puerto Rico has been notified of this application. A copy of the notification letter to the Arecibo Observatory of the proposed facility is included herein as Appendix 1.

AM Stations within 3.2 kilometers

There is only one AM directional station within 3.2 km of the above specified coordinates, WUNO 630 kHz, at a distance of 3.02 km. Since an existing tower for which no structural changes are contemplated is proposed, no adverse effect should be caused to this AM station, thus the proposal is believed to be compliant with Section 47 CFR 73.1692.

Fill-In Compliance and Allocation Considerations

Figure 1 is a Fill-In Compliance map. As shown in Figure 1, the proposed translator 60 dBu contour will be contained within the 25 mile radius of WSKN. Figure 2 summarizes the allocation study for the proposed facility. As indicated in Figure 2a, there is no co-channel or first-adjacent full-service station, translator, or LPFM facility to be concerned, as far as causing interference to by the proposed facility. Figure 2b shows the predicted contour overlap with station WVJZ; while no interference to WVJZ is predicted, some interference to the proposed translator is predicted; however, as shown at the bottom of Figure 2b, the intervening path between WVJZ and the proposed facility is obstructed by mountainous terrain, so no actual significant interference to the proposed facility from WVJZ is expected.

The proposed FM station will operate on Channel 287D, third adjacent channel to WKAQ-FM, channel 284B and second adjacent to WCAD (FM), channel 289B. Thus, the protection requirements of the undesired signal from the proposal is 40 dB higher than the desired signals of these stations.

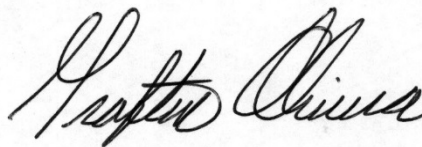
The proposed transmitter site is located 24.6 kilometers from station WKAQ-FM, which operates with an ERP of 50 kW and HAAT of 372 meters. The predicted WKAQ-FM F(50,50) field strength at the proposed site is 85.6 dBu. Using the U/D ratio of 40 dB, the proposed F(50,10) interfering signal is 125.6 dBu, thus this contour defines the maximum extent of predicted interference.

The proposed transmitter site is located 24.3 kilometers from station WCAD, which operates with an ERP of 50 kW and HAAT of 335 meters; the predicted WCAD F(50,50) field strength at the proposed site is 85 dBu. The proposed transmitter site is located 24.3 kilometers from a CP of station WCAD, which would operate with an ERP of 50 kW and HAAT of 332 meters; the predicted WCAD CP F(50,50) field strength at the proposed site is 84.8 dBu. Using the U/D ratio of 40 dB, the proposed F(50,10) interfering signal is 124.8 dBu, thus this contour defines the maximum extent of predicted interference. Since the CP of WCAD is the weaker signal of the mentioned adjacent channels at the proposed FX site, this facility is the determining factor when calculating protection.

Since an ERP of 250 watts is proposed, the interfering signal contour is calculated by means of a free-space calculation. Based on free-space calculations, the minimum height above ground level that the 124.8 dBu contour would reach is 168 feet at a horizontal distance of 134 feet from the transmitting antenna. This is graphically depicted in Figure 4. The proposed antenna tower is located in a rural area with no high rise building near the proposed tower; therefore, no harmful interference is predicted to WCAD (or WKAQ-FM) as a result of the proposed facility. Figure 3 is a tabulation and Figure 4 a graphic representation of the distances and heights of the predicted 124.8 dBu contour under these assumptions.

The predicted contours were calculated in accordance with Section 73.313 of the FCC Rules, using the V-Soft FMCommander@2016 software in conjunction with the 30 second Global terrain database; contour calculation were made using an evenly spaced set of radials. The antenna height elevations of the facilities was used in conjunction with the propagation prediction curves of Section 73.333 to determine distances to contours.

For the above stated reasons, it is believed that the proposed facility is in compliance with FCC Rules and Regulations and will serve the public interest.



Grafton Olivera, P.E.
Consulting Engineer
5119 60th Drive E
Bradenton, Florida 34203

(941) 329-6001

October 11, 2018

FIGURE 1



AM FILL-IN COMPLIANCE MAP – NEW FM TRANSLATOR FOR WSKN (AM)
CH 287 (105.3 MHZ) - 0.250 KW DA
DORADO, PUERTO RICO

Figure 2a

Allocation Study – Proposed NEW FX Facility for WSKN

<div> <div>N. Lat. 18 24 56.6 W. Lng. 66 17 42.1</div> <div>169 m COR 0.25 kW DA CH 287.105.3 D</div> <div>Contours are detailed</div> <div>Dorado PR X 96.6 m HAAT</div> <div>WSKN FX 1777781 1777781 10-11-18</div> </div>									
Call	Type	Ch	Location		Azi	Dist	In	Out	
1777781	APP-D	287D	Dorado	PR	0.0	0.00	---		
WKAQ-FM	LIC	284B	San Juan	PR	127.6	24.57	5.8	-68.6*	
WCAD	LIC	289B	San Juan	PR	127.7	24.33	5.8	-66.2*	
WCAD	CP	289B	San Juan	PR	127.7	24.33	5.8	-65.6*	
WVJZ	LIC	287B	Charlotte Amali	VI	92.4	139.76	-37.6*	0.1	
WIOC	LIC	286B	Ponce	PR	216.8	58.96	5.8	6.7	
WIOC	CP-N	286B	Ponce	PR	217.0	60.03	5.8	7.4	
W286DH	CP	286D	Caguas	PR	120.6	36.43	14.0	13.7	

End of Screen List, Cardinal Radials = 12

Allocation Study FX for WSKN Channel 287D											
Media Power Group, Inc.											
REFERENCE		CH#	287D	-	105.3 MHz,	Pwr=	0.25 kW DA,	HAAT=	96.6 M,	COR=	169 M
18 24 56.6 N.		Average Protected F(50-50)= 12.65 km									
66 17 42.1 W.		Standard Directional									
		DISPLAY DATES									
		DATA 10-10-18									
		SEARCH 10-11-18									
CH	CALL	TYPE	ANT	AZI	DIST	LAT	PWR(kw)	INT(km)	PRO(km)	*IN*	*OUT*
CITY		STATE		<--	FILE #	LNG	HAAT(M)	COR(M)	LICENSEE	(Overlap	in km)
287D	1777781	APP DC_		0.0	0.00	18 24 56.6	0.250		---	Reference---	
Dorado		PR		0.0	BNPFT20180131A	66 17 42.1		169		Media Power Group, Inc.	
284B	WKAQ-FM	LIC _CN		127.6	24.57	18 16 51.0	50.000	10.2	92.3	5.8	-68.6*
San Juan		PR		307.6	BLH19961118KC	66 06 38.0	372	592	Wlil/wsur	License Partners	
289B	WCAD	LIC _CN		127.7	24.33	18 16 54.0	50.000	9.9	89.6	5.8	-66.2*
San Juan		PR		307.8	BMLED20170829AAW	66 06 46.0	335	553	Educational Media Foundati		
289B	WCAD	CP _CN		127.7	24.33	18 16 54.0	50.000	9.8	89.0	5.8	-65.6*
San Juan		PR		307.8	BPED20180809AAX	66 06 46.0	323	545	Educational Media Foundati		
287B	WVJZ	LIC _C_		92.4	139.76	18 21 33.0	30.200	165.1	87.6	-37.6*	0.1
Charlotte Amalie		VI		272.8	BMLH20000320AAV	64 58 18.0	483	504	Gark, LLC		
286B	WIOC	LIC _CN		216.8	58.96	17 59 27.0	47.000	44.3	35.7	5.8	6.7
Ponce		PR		36.7	BLH19990225KF	66 37 45.0	-61	35	International Broadcasting		
286B	WIOC	CP NCX		217.0	60.03	17 59 03.0	50.000	45.3	36.1	5.8	7.4
Ponce		PR		36.9	BPH20160815AAP	66 38 12.0	-20	48	International Broadcasting		
286D	W286DH	CP _C_		120.6	36.43	18 14 55.2	0.250	15.1	7.1	14.0	13.7
Caguas		PR		300.7	BNPFT20171201AKV	65 59 52.8		165	Ochoa Broadcasting Corp.		

Terrain database is GLOBE 30 Sec , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
In & Out distances between contours are shown at closest points. Reference zone= East Zone, Co to 3rd adjacent.
All separation margins (if shown) include rounding.

Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
"*"affixed to 'IN' or 'OUT' values = site inside restricted contour.

Reference station has protected zone issue: Arecibo AM tower

Figure 2b

Contour Overlaps with WVJZ and Line-of Sight Projection

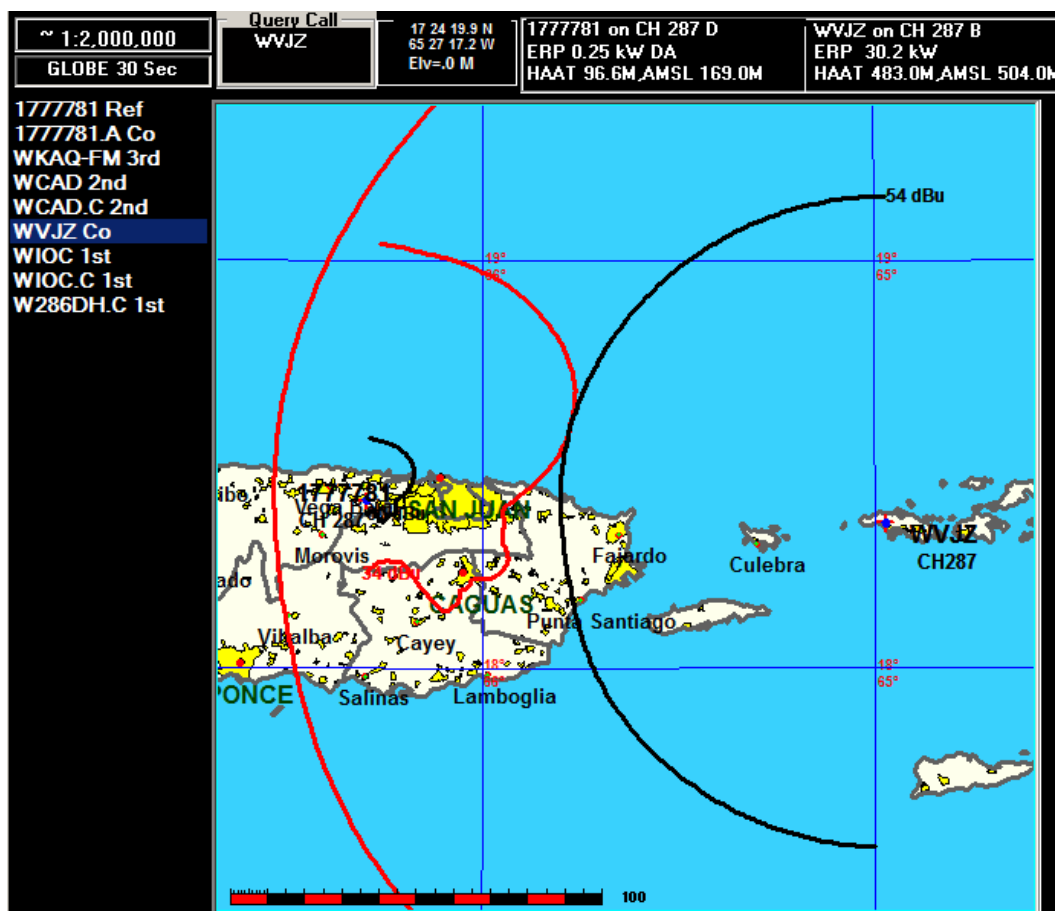
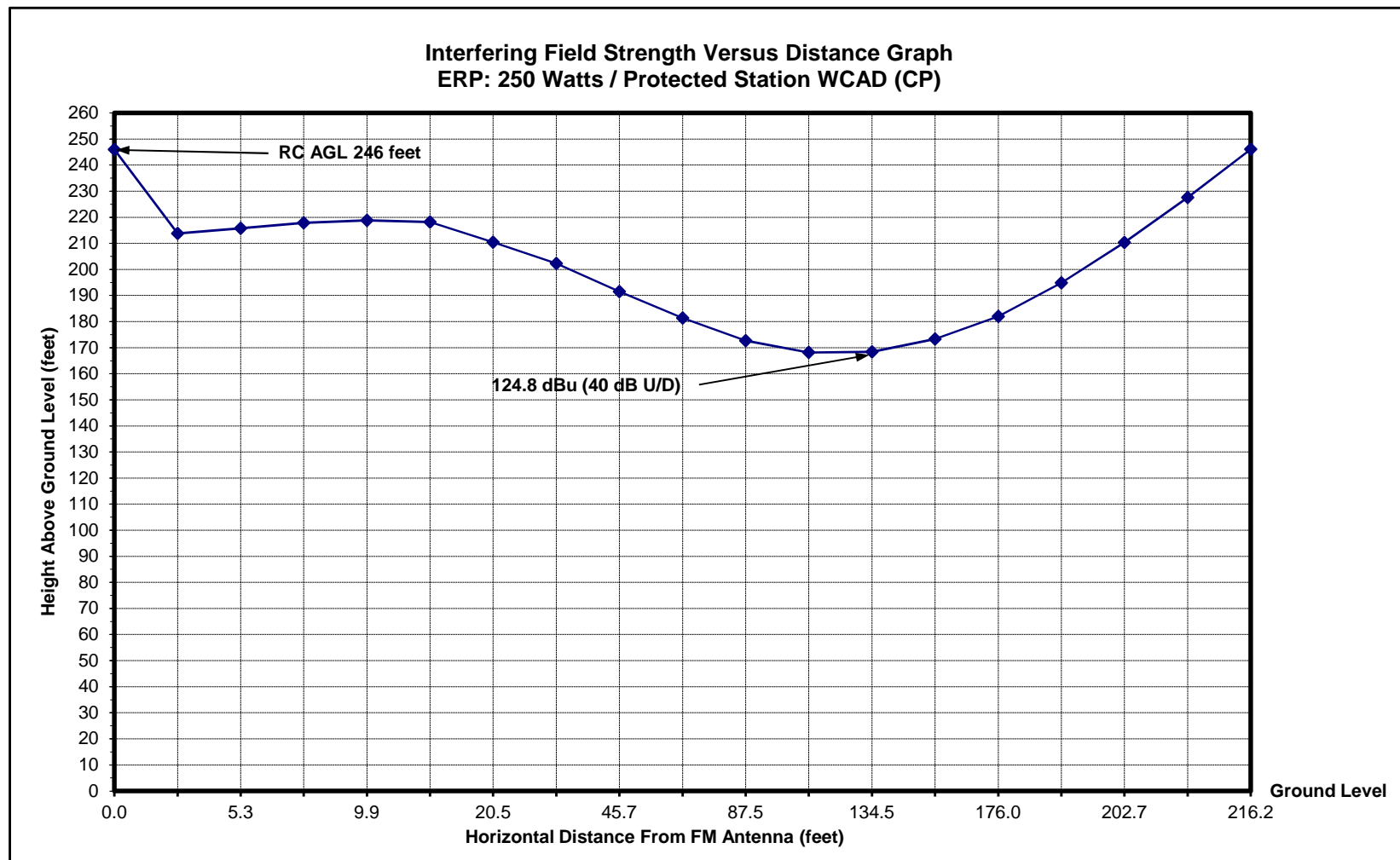


Figure 3

Desired (dBu)	84.8	WCAD CP				
	40					
Undesired (dBu)	124.8					
NEW FX WSKN	CHANNEL:	287			RCAGL-M	RCAGL-FT
ASR 1253198					75	246
Interfering Field Strength Vs. Distance Graph						
Antenna: SCALA CA5-FM/CP/RM 3 ANT AT 0, 75, 285 DEG						
RCAGL	246	feet	IX TO:	ERP:	0.25	dBk
Interfering Contour	124.8	dBu	WCAD CP		-6.020599913	
Signal from Station	84.8	dBu				
Depression Angle	VRF	ERP (dBk)	Distance to Contour (m)**	Distance to Contour (feet)**	Horiz. Dist. (feet)	Height AGL (feet)
90	0.157	-22.1	10.3	34	0	246
85	0.150	-22.5	9.9	32	3	214
80	0.142	-23.0	9.4	31	5	216
75	0.135	-23.4	8.9	29	8	218
70	0.134	-23.5	8.8	29	10	219
65	0.142	-23.0	9.4	31	13	218
60	0.190	-20.4	12.5	41	21	210
55	0.247	-18.2	16.3	53	31	202
50	0.329	-15.7	21.7	71	46	192
45	0.423	-13.5	27.9	91	65	181
40	0.528	-11.6	34.8	114	87	173
35	0.628	-10.1	41.4	136	111	168
30	0.718	-8.9	47.3	155	134	168
25	0.796	-8.0	52.5	172	156	173
20	0.866	-7.3	57.1	187	176	182
15	0.915	-6.8	60.3	198	191	195
10	0.952	-6.4	62.7	206	203	210
5	0.982	-6.2	64.7	212	212	228
0	1.000	-6.0	65.9	216	216	246

Figure 4



Appendix 1

Grafton Olivera, P.E.

Consulting Engineer

October 11, 2018

Via email (prcz@naic.edu)

Angel M. Vázquez, Spectrum Manager
National Astronomy and Ionosphere Center
Arecibo Observatory
HC3 Box 53995
Arecibo, PR 00612

Gentlemen:

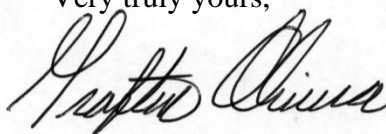
On behalf of our client, Power Media Group, Inc., licensee of AM station WSKN in San Juan, PR, Facility ID 10062, in accordance with Section 73.1030 of FCC Rules, we hereby notify of a proposed new FM translator station for AM station WSKN. The particulars of the proposal are as follows:

Proposed Facility:

Geographical coordinates of antenna location (NAD27): 18-24-56.6 / 66-17-42.1
Antenna RC height: 78 m AGL; 169 m AMSL
Maximum Antenna Gain (horizontal plane): 2.9 dBd @ 213°
Operating channel: 287D (105.3 MHz)
Type of emission: F3E
Effective isotropic radiated power: 0.41 kW – Circular Polarization

Please review this proposal and let me know your findings; feel free to communicate via email (<mailto:Grafton.Olivera@me.com>), telephone (941-323-0381) or regular mail.

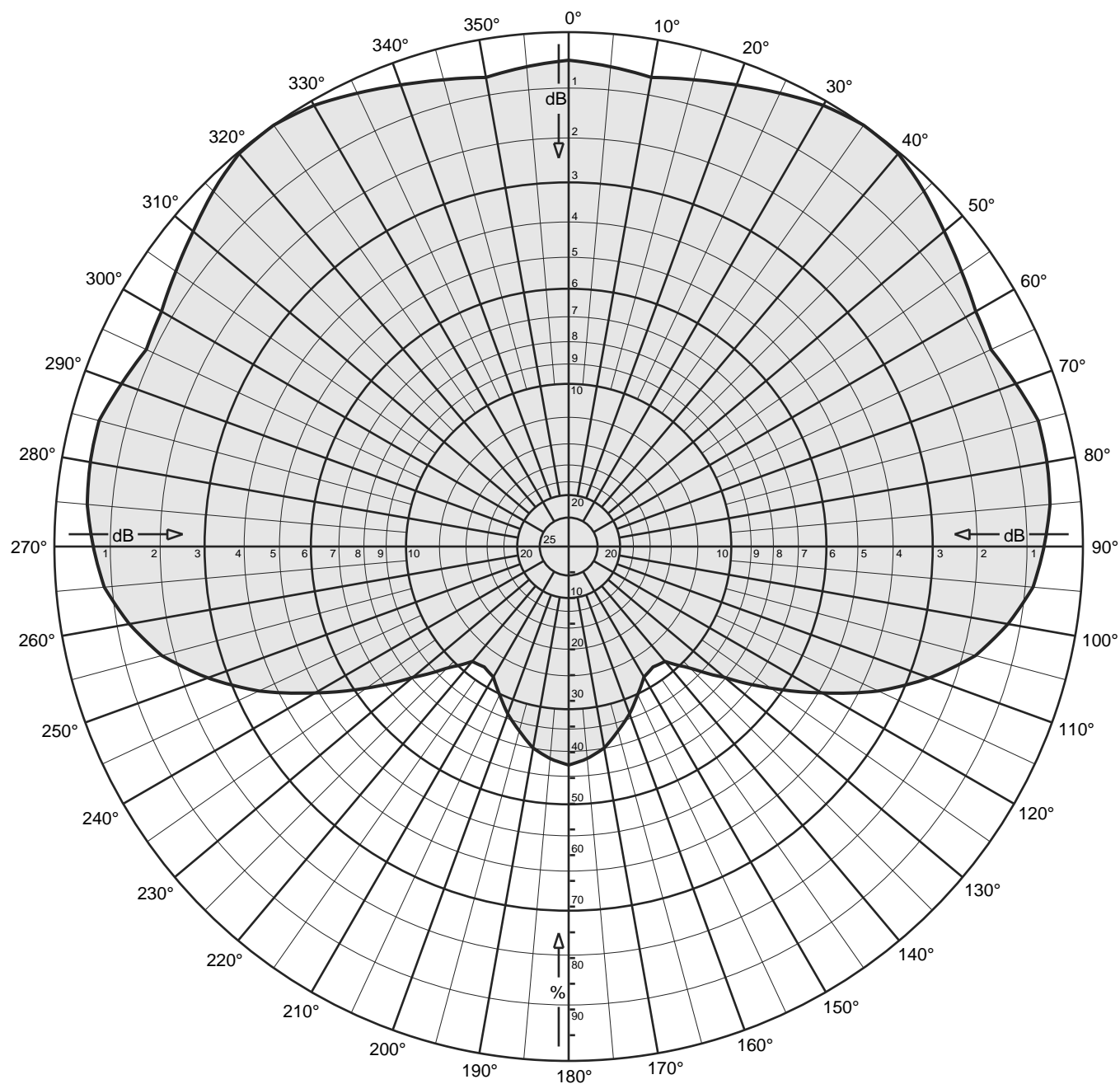
Very truly yours,



Grafton Olivera, P.E.
5119 60th Drive E
Bradenton, FL 34203

Tel. 941-323-0381
Email: Grafton.Olivera@me.com

APPENDIX 2 - ANTENNA DATA



Three CA5-FM/CP/RM yagis
 Oriented 1 each at 0, 75, 285 degrees
 Maximum array gain: 2.9 dBd
 Circular polarization
 Horizontal plane pattern



Three CA5-FM/CP/RM yagis

Horizontal plane pattern

Oriented 1 each at 0, 75, 285 degrees

Maximum array gain: 2.9 dBd

Circular polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	0.945	-0.49	2.41	1.74	45	0.977	-0.20	2.70	1.86
1	0.944	-0.50	2.40	1.74	46	0.972	-0.24	2.66	1.84
2	0.942	-0.52	2.38	1.73	47	0.968	-0.29	2.61	1.83
3	0.940	-0.54	2.36	1.72	48	0.963	-0.33	2.57	1.81
4	0.938	-0.55	2.35	1.72	49	0.958	-0.37	2.53	1.79
5	0.936	-0.57	2.33	1.71	50	0.953	-0.42	2.48	1.77
6	0.934	-0.59	2.31	1.70	51	0.949	-0.45	2.45	1.76
7	0.932	-0.61	2.29	1.69	52	0.945	-0.49	2.41	1.74
8	0.930	-0.63	2.27	1.69	53	0.941	-0.53	2.37	1.73
9	0.928	-0.65	2.25	1.68	54	0.937	-0.57	2.33	1.71
10	0.926	-0.67	2.23	1.67	55	0.933	-0.61	2.29	1.70
11	0.929	-0.64	2.26	1.68	56	0.929	-0.64	2.26	1.68
12	0.931	-0.62	2.28	1.69	57	0.925	-0.68	2.22	1.67
13	0.934	-0.59	2.31	1.70	58	0.921	-0.71	2.19	1.66
14	0.937	-0.57	2.33	1.71	59	0.918	-0.74	2.16	1.64
15	0.939	-0.54	2.36	1.72	60	0.914	-0.78	2.12	1.63
16	0.943	-0.51	2.39	1.73	61	0.913	-0.79	2.11	1.62
17	0.946	-0.49	2.41	1.74	62	0.911	-0.81	2.09	1.62
18	0.949	-0.46	2.44	1.75	63	0.909	-0.83	2.07	1.61
19	0.952	-0.43	2.47	1.77	64	0.908	-0.84	2.06	1.61
20	0.955	-0.40	2.50	1.78	65	0.906	-0.86	2.04	1.60
21	0.958	-0.37	2.53	1.79	66	0.910	-0.82	2.08	1.61
22	0.962	-0.34	2.56	1.80	67	0.914	-0.78	2.12	1.63
23	0.965	-0.31	2.59	1.82	68	0.918	-0.75	2.15	1.64
24	0.969	-0.27	2.63	1.83	69	0.921	-0.71	2.19	1.66
25	0.972	-0.24	2.66	1.84	70	0.925	-0.67	2.23	1.67
26	0.976	-0.21	2.69	1.86	71	0.929	-0.64	2.26	1.68
27	0.980	-0.18	2.72	1.87	72	0.933	-0.60	2.30	1.70
28	0.983	-0.15	2.75	1.88	73	0.937	-0.56	2.34	1.71
29	0.987	-0.12	2.78	1.90	74	0.941	-0.52	2.38	1.73
30	0.990	-0.08	2.82	1.91	75	0.945	-0.49	2.41	1.74
31	0.992	-0.07	2.83	1.92	76	0.945	-0.49	2.41	1.74
32	0.994	-0.05	2.85	1.93	77	0.945	-0.49	2.41	1.74
33	0.996	-0.03	2.87	1.93	78	0.945	-0.49	2.41	1.74
34	0.998	-0.02	2.88	1.94	79	0.945	-0.49	2.41	1.74
35	1.000	0.00	2.90	1.95	80	0.945	-0.49	2.41	1.74
36	0.999	-0.01	2.89	1.95	81	0.944	-0.50	2.40	1.74
37	0.999	-0.01	2.89	1.95	82	0.943	-0.51	2.39	1.73
38	0.998	-0.02	2.88	1.94	83	0.942	-0.52	2.38	1.73
39	0.998	-0.02	2.88	1.94	84	0.941	-0.53	2.37	1.73
40	0.997	-0.03	2.87	1.94	85	0.940	-0.54	2.36	1.72
41	0.993	-0.06	2.84	1.92	86	0.937	-0.57	2.33	1.71
42	0.989	-0.10	2.80	1.91	87	0.934	-0.60	2.30	1.70
43	0.985	-0.13	2.77	1.89	88	0.931	-0.62	2.28	1.69
44	0.981	-0.17	2.73	1.88	89	0.928	-0.65	2.25	1.68



Three CA5-FM/CP/RM yagis

Horizontal plane pattern

Oriented 1 each at 0, 75, 285 degrees

Maximum array gain: 2.9 dBd

Circular polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
90	0.925	-0.68	2.22	1.67	135	0.334	-9.53	-6.63	0.22
91	0.921	-0.72	2.18	1.65	136	0.325	-9.75	-6.85	0.21
92	0.917	-0.75	2.15	1.64	137	0.317	-9.98	-7.08	0.20
93	0.914	-0.78	2.12	1.63	138	0.308	-10.22	-7.32	0.19
94	0.910	-0.82	2.08	1.61	139	0.300	-10.46	-7.56	0.18
95	0.906	-0.85	2.05	1.60	140	0.292	-10.71	-7.81	0.17
96	0.899	-0.93	1.97	1.57	141	0.290	-10.74	-7.84	0.16
97	0.891	-1.00	1.90	1.55	142	0.289	-10.77	-7.87	0.16
98	0.883	-1.08	1.82	1.52	143	0.288	-10.81	-7.91	0.16
99	0.875	-1.16	1.74	1.49	144	0.287	-10.84	-7.94	0.16
100	0.867	-1.23	1.67	1.47	145	0.286	-10.88	-7.98	0.16
101	0.858	-1.33	1.57	1.43	146	0.287	-10.83	-7.93	0.16
102	0.848	-1.43	1.47	1.40	147	0.289	-10.79	-7.89	0.16
103	0.838	-1.53	1.37	1.37	148	0.290	-10.75	-7.85	0.16
104	0.829	-1.63	1.27	1.34	149	0.291	-10.71	-7.81	0.17
105	0.819	-1.73	1.17	1.31	150	0.293	-10.67	-7.77	0.17
106	0.805	-1.89	1.01	1.26	151	0.298	-10.52	-7.62	0.17
107	0.790	-2.05	0.85	1.22	152	0.303	-10.38	-7.48	0.18
108	0.776	-2.21	0.69	1.17	153	0.308	-10.24	-7.34	0.18
109	0.761	-2.37	0.53	1.13	154	0.313	-10.10	-7.20	0.19
110	0.747	-2.53	0.37	1.09	155	0.318	-9.96	-7.06	0.20
111	0.730	-2.73	0.17	1.04	156	0.323	-9.81	-6.91	0.20
112	0.714	-2.93	-0.03	0.99	157	0.329	-9.66	-6.76	0.21
113	0.697	-3.13	-0.23	0.95	158	0.335	-9.51	-6.61	0.22
114	0.681	-3.34	-0.44	0.90	159	0.340	-9.36	-6.46	0.23
115	0.665	-3.55	-0.65	0.86	160	0.346	-9.21	-6.31	0.23
116	0.645	-3.80	-0.90	0.81	161	0.351	-9.09	-6.19	0.24
117	0.626	-4.06	-1.16	0.76	162	0.356	-8.97	-6.07	0.25
118	0.607	-4.33	-1.43	0.72	163	0.361	-8.85	-5.95	0.25
119	0.588	-4.61	-1.71	0.67	164	0.366	-8.73	-5.83	0.26
120	0.569	-4.90	-2.00	0.63	165	0.371	-8.61	-5.71	0.27
121	0.551	-5.18	-2.28	0.59	166	0.376	-8.49	-5.59	0.28
122	0.533	-5.46	-2.56	0.55	167	0.382	-8.37	-5.47	0.28
123	0.515	-5.76	-2.86	0.52	168	0.387	-8.24	-5.34	0.29
124	0.498	-6.06	-3.16	0.48	169	0.392	-8.13	-5.23	0.30
125	0.480	-6.38	-3.48	0.45	170	0.398	-8.01	-5.11	0.31
126	0.463	-6.69	-3.79	0.42	171	0.401	-7.94	-5.04	0.31
127	0.446	-7.01	-4.11	0.39	172	0.404	-7.87	-4.97	0.32
128	0.429	-7.34	-4.44	0.36	173	0.407	-7.80	-4.90	0.32
129	0.413	-7.69	-4.79	0.33	174	0.411	-7.73	-4.83	0.33
130	0.396	-8.05	-5.15	0.31	175	0.414	-7.66	-4.76	0.33
131	0.383	-8.33	-5.43	0.29	176	0.416	-7.62	-4.72	0.34
132	0.371	-8.61	-5.71	0.27	177	0.418	-7.57	-4.67	0.34
133	0.359	-8.91	-6.01	0.25	178	0.420	-7.53	-4.63	0.34
134	0.346	-9.21	-6.31	0.23	179	0.423	-7.48	-4.58	0.35



Three CA5-FM/CP/RM yagis

Horizontal plane pattern

Oriented 1 each at 0, 75, 285 degrees

Maximum array gain: 2.9 dBd

Circular polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
180	0.425	-7.44	-4.54	0.35	225	0.334	-9.53	-6.63	0.22
181	0.423	-7.48	-4.58	0.35	226	0.346	-9.21	-6.31	0.23
182	0.420	-7.53	-4.63	0.34	227	0.359	-8.91	-6.01	0.25
183	0.418	-7.57	-4.67	0.34	228	0.371	-8.61	-5.71	0.27
184	0.416	-7.62	-4.72	0.34	229	0.383	-8.33	-5.43	0.29
185	0.414	-7.66	-4.76	0.33	230	0.396	-8.05	-5.15	0.31
186	0.411	-7.73	-4.83	0.33	231	0.413	-7.69	-4.79	0.33
187	0.407	-7.80	-4.90	0.32	232	0.429	-7.34	-4.44	0.36
188	0.404	-7.87	-4.97	0.32	233	0.446	-7.01	-4.11	0.39
189	0.401	-7.94	-5.04	0.31	234	0.463	-6.69	-3.79	0.42
190	0.398	-8.01	-5.11	0.31	235	0.480	-6.38	-3.48	0.45
191	0.392	-8.13	-5.23	0.30	236	0.498	-6.06	-3.16	0.48
192	0.387	-8.24	-5.34	0.29	237	0.515	-5.76	-2.86	0.52
193	0.382	-8.37	-5.47	0.28	238	0.533	-5.46	-2.56	0.55
194	0.376	-8.49	-5.59	0.28	239	0.551	-5.18	-2.28	0.59
195	0.371	-8.61	-5.71	0.27	240	0.569	-4.90	-2.00	0.63
196	0.366	-8.73	-5.83	0.26	241	0.588	-4.61	-1.71	0.67
197	0.361	-8.85	-5.95	0.25	242	0.607	-4.33	-1.43	0.72
198	0.356	-8.97	-6.07	0.25	243	0.626	-4.06	-1.16	0.76
199	0.351	-9.09	-6.19	0.24	244	0.645	-3.80	-0.90	0.81
200	0.346	-9.21	-6.31	0.23	245	0.665	-3.55	-0.65	0.86
201	0.340	-9.36	-6.46	0.23	246	0.681	-3.34	-0.44	0.90
202	0.335	-9.51	-6.61	0.22	247	0.697	-3.13	-0.23	0.95
203	0.329	-9.66	-6.76	0.21	248	0.714	-2.93	-0.03	0.99
204	0.323	-9.81	-6.91	0.20	249	0.730	-2.73	0.17	1.04
205	0.318	-9.96	-7.06	0.20	250	0.747	-2.53	0.37	1.09
206	0.313	-10.10	-7.20	0.19	251	0.761	-2.37	0.53	1.13
207	0.308	-10.24	-7.34	0.18	252	0.776	-2.21	0.69	1.17
208	0.303	-10.38	-7.48	0.18	253	0.790	-2.05	0.85	1.22
209	0.298	-10.52	-7.62	0.17	254	0.805	-1.89	1.01	1.26
210	0.293	-10.67	-7.77	0.17	255	0.819	-1.73	1.17	1.31
211	0.291	-10.71	-7.81	0.17	256	0.829	-1.63	1.27	1.34
212	0.290	-10.75	-7.85	0.16	257	0.838	-1.53	1.37	1.37
213	0.289	-10.79	-7.89	0.16	258	0.848	-1.43	1.47	1.40
214	0.287	-10.83	-7.93	0.16	259	0.858	-1.33	1.57	1.43
215	0.286	-10.88	-7.98	0.16	260	0.867	-1.23	1.67	1.47
216	0.287	-10.84	-7.94	0.16	261	0.875	-1.16	1.74	1.49
217	0.288	-10.81	-7.91	0.16	262	0.883	-1.08	1.82	1.52
218	0.289	-10.77	-7.87	0.16	263	0.891	-1.00	1.90	1.55
219	0.290	-10.74	-7.84	0.16	264	0.899	-0.93	1.97	1.57
220	0.292	-10.71	-7.81	0.17	265	0.906	-0.85	2.05	1.60
221	0.300	-10.46	-7.56	0.18	266	0.910	-0.82	2.08	1.61
222	0.308	-10.22	-7.32	0.19	267	0.914	-0.78	2.12	1.63
223	0.317	-9.98	-7.08	0.20	268	0.917	-0.75	2.15	1.64
224	0.325	-9.75	-6.85	0.21	269	0.921	-0.72	2.18	1.65



Three CA5-FM/CP/RM yagis

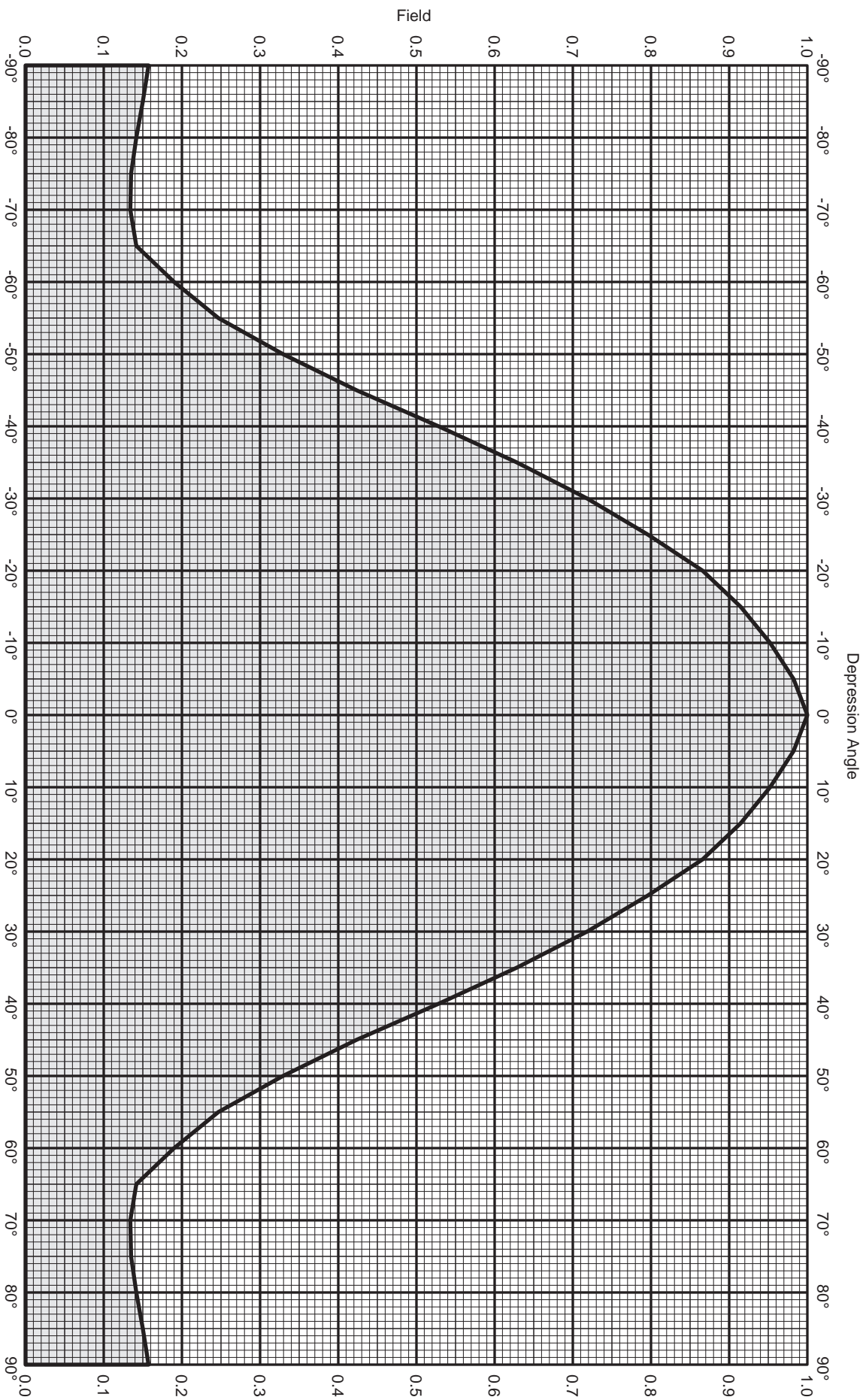
Horizontal plane pattern

Oriented 1 each at 0, 75, 285 degrees

Maximum array gain: 2.9 dBd

Circular polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
270	0.925	-0.68	2.22	1.67	315	0.977	-0.20	2.70	1.86
271	0.928	-0.65	2.25	1.68	316	0.981	-0.17	2.73	1.88
272	0.931	-0.62	2.28	1.69	317	0.985	-0.13	2.77	1.89
273	0.934	-0.60	2.30	1.70	318	0.989	-0.10	2.80	1.91
274	0.937	-0.57	2.33	1.71	319	0.993	-0.06	2.84	1.92
275	0.940	-0.54	2.36	1.72	320	0.997	-0.03	2.87	1.94
276	0.941	-0.53	2.37	1.73	321	0.998	-0.02	2.88	1.94
277	0.942	-0.52	2.38	1.73	322	0.998	-0.02	2.88	1.94
278	0.943	-0.51	2.39	1.73	323	0.999	-0.01	2.89	1.95
279	0.944	-0.50	2.40	1.74	324	0.999	-0.01	2.89	1.95
280	0.945	-0.49	2.41	1.74	325	1.000	0.00	2.90	1.95
281	0.945	-0.49	2.41	1.74	326	0.998	-0.02	2.88	1.94
282	0.945	-0.49	2.41	1.74	327	0.996	-0.03	2.87	1.93
283	0.945	-0.49	2.41	1.74	328	0.994	-0.05	2.85	1.93
284	0.945	-0.49	2.41	1.74	329	0.992	-0.07	2.83	1.92
285	0.945	-0.49	2.41	1.74	330	0.990	-0.08	2.82	1.91
286	0.941	-0.52	2.38	1.73	331	0.987	-0.12	2.78	1.90
287	0.937	-0.56	2.34	1.71	332	0.983	-0.15	2.75	1.88
288	0.933	-0.60	2.30	1.70	333	0.980	-0.18	2.72	1.87
289	0.929	-0.64	2.26	1.68	334	0.976	-0.21	2.69	1.86
290	0.925	-0.67	2.23	1.67	335	0.972	-0.24	2.66	1.84
291	0.921	-0.71	2.19	1.66	336	0.969	-0.27	2.63	1.83
292	0.918	-0.75	2.15	1.64	337	0.965	-0.31	2.59	1.82
293	0.914	-0.78	2.12	1.63	338	0.962	-0.34	2.56	1.80
294	0.910	-0.82	2.08	1.61	339	0.958	-0.37	2.53	1.79
295	0.906	-0.86	2.04	1.60	340	0.955	-0.40	2.50	1.78
296	0.908	-0.84	2.06	1.61	341	0.952	-0.43	2.47	1.77
297	0.909	-0.83	2.07	1.61	342	0.949	-0.46	2.44	1.75
298	0.911	-0.81	2.09	1.62	343	0.946	-0.49	2.41	1.74
299	0.913	-0.79	2.11	1.62	344	0.943	-0.51	2.39	1.73
300	0.914	-0.78	2.12	1.63	345	0.939	-0.54	2.36	1.72
301	0.918	-0.74	2.16	1.64	346	0.937	-0.57	2.33	1.71
302	0.921	-0.71	2.19	1.66	347	0.934	-0.59	2.31	1.70
303	0.925	-0.68	2.22	1.67	348	0.931	-0.62	2.28	1.69
304	0.929	-0.64	2.26	1.68	349	0.929	-0.64	2.26	1.68
305	0.933	-0.61	2.29	1.70	350	0.926	-0.67	2.23	1.67
306	0.937	-0.57	2.33	1.71	351	0.928	-0.65	2.25	1.68
307	0.941	-0.53	2.37	1.73	352	0.930	-0.63	2.27	1.69
308	0.945	-0.49	2.41	1.74	353	0.932	-0.61	2.29	1.69
309	0.949	-0.45	2.45	1.76	354	0.934	-0.59	2.31	1.70
310	0.953	-0.42	2.48	1.77	355	0.936	-0.57	2.33	1.71
311	0.958	-0.37	2.53	1.79	356	0.938	-0.55	2.35	1.72
312	0.963	-0.33	2.57	1.81	357	0.940	-0.54	2.36	1.72
313	0.968	-0.29	2.61	1.83	358	0.942	-0.52	2.38	1.73
314	0.972	-0.24	2.66	1.84	359	0.944	-0.50	2.40	1.74



CA5-FM/CP/RM

FM

KATHREIN

USA

Maximum gain: 6.0 dBd

Circular polarization

Vertical radiation pattern

KATHREIN

USA

CA5-FM/CP/RM

Vertical radiation pattern

FM

Maximum gain: 6.0 dBd

Circular polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
-90	0.157	-16.06	-10.06	0.10	-45	0.423	-7.47	-1.47	0.71
-89	0.156	-16.14	-10.14	0.10	-44	0.444	-7.05	-1.05	0.79
-88	0.154	-16.23	-10.23	0.09	-43	0.465	-6.64	-0.64	0.86
-87	0.153	-16.31	-10.31	0.09	-42	0.486	-6.26	-0.26	0.94
-86	0.151	-16.39	-10.39	0.09	-41	0.507	-5.89	0.11	1.02
-85	0.150	-16.48	-10.48	0.09	-40	0.528	-5.54	0.46	1.11
-84	0.148	-16.58	-10.58	0.09	-39	0.548	-5.22	0.78	1.20
-83	0.147	-16.67	-10.67	0.09	-38	0.568	-4.91	1.09	1.29
-82	0.145	-16.77	-10.77	0.08	-37	0.588	-4.61	1.39	1.38
-81	0.143	-16.87	-10.87	0.08	-36	0.608	-4.32	1.68	1.47
-80	0.142	-16.97	-10.97	0.08	-35	0.628	-4.04	1.96	1.57
-79	0.140	-17.06	-11.06	0.08	-34	0.646	-3.79	2.21	1.66
-78	0.139	-17.14	-11.14	0.08	-33	0.664	-3.55	2.45	1.76
-77	0.138	-17.22	-11.22	0.08	-32	0.682	-3.32	2.68	1.85
-76	0.136	-17.31	-11.31	0.07	-31	0.700	-3.09	2.91	1.95
-75	0.135	-17.39	-11.39	0.07	-30	0.718	-2.87	3.13	2.05
-74	0.135	-17.41	-11.41	0.07	-29	0.734	-2.69	3.31	2.14
-73	0.135	-17.42	-11.42	0.07	-28	0.749	-2.51	3.49	2.24
-72	0.134	-17.43	-11.43	0.07	-27	0.765	-2.33	3.67	2.33
-71	0.134	-17.44	-11.44	0.07	-26	0.780	-2.15	3.85	2.42
-70	0.134	-17.46	-11.46	0.07	-25	0.796	-1.98	4.02	2.52
-69	0.136	-17.36	-11.36	0.07	-24	0.810	-1.83	4.17	2.61
-68	0.137	-17.26	-11.26	0.07	-23	0.824	-1.68	4.32	2.70
-67	0.139	-17.16	-11.16	0.08	-22	0.838	-1.54	4.46	2.80
-66	0.140	-17.07	-11.07	0.08	-21	0.852	-1.39	4.61	2.89
-65	0.142	-16.97	-10.97	0.08	-20	0.866	-1.25	4.75	2.99
-64	0.151	-16.40	-10.40	0.09	-19	0.876	-1.15	4.85	3.05
-63	0.161	-15.86	-9.86	0.10	-18	0.885	-1.06	4.94	3.12
-62	0.171	-15.36	-9.36	0.12	-17	0.895	-0.96	5.04	3.19
-61	0.180	-14.88	-8.88	0.13	-16	0.905	-0.87	5.13	3.26
-60	0.190	-14.42	-8.42	0.14	-15	0.915	-0.77	5.23	3.33
-59	0.201	-13.92	-7.92	0.16	-14	0.922	-0.70	5.30	3.39
-58	0.213	-13.45	-7.45	0.18	-13	0.930	-0.63	5.37	3.44
-57	0.224	-13.00	-7.00	0.20	-12	0.937	-0.56	5.44	3.50
-56	0.235	-12.57	-6.57	0.22	-11	0.945	-0.49	5.51	3.55
-55	0.247	-12.16	-6.16	0.24	-10	0.952	-0.42	5.58	3.61
-54	0.263	-11.59	-5.59	0.28	-9	0.958	-0.37	5.63	3.66
-53	0.280	-11.07	-5.07	0.31	-8	0.964	-0.32	5.68	3.70
-52	0.296	-10.57	-4.57	0.35	-7	0.970	-0.26	5.74	3.75
-51	0.313	-10.09	-4.09	0.39	-6	0.976	-0.21	5.79	3.79
-50	0.329	-9.65	-3.65	0.43	-5	0.982	-0.15	5.85	3.84
-49	0.348	-9.17	-3.17	0.48	-4	0.986	-0.12	5.88	3.87
-48	0.367	-8.71	-2.71	0.54	-3	0.989	-0.09	5.91	3.90
-47	0.386	-8.27	-2.27	0.59	-2	0.993	-0.06	5.94	3.93
-46	0.405	-7.86	-1.86	0.65	-1	0.996	-0.03	5.97	3.95
					0	1.000	0.00	6.00	3.98

KATHREIN

USA

CA5-FM/CP/RM

Vertical radiation pattern

FM

Maximum gain: 6.0 dBd

Circular polarization

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	6.00	3.98	45	0.423	-7.47	-1.47	0.71
1	0.996	-0.03	5.97	3.95	46	0.405	-7.86	-1.86	0.65
2	0.993	-0.06	5.94	3.93	47	0.386	-8.27	-2.27	0.59
3	0.989	-0.09	5.91	3.90	48	0.367	-8.71	-2.71	0.54
4	0.986	-0.12	5.88	3.87	49	0.348	-9.17	-3.17	0.48
5	0.982	-0.15	5.85	3.84	50	0.329	-9.65	-3.65	0.43
6	0.976	-0.21	5.79	3.79	51	0.313	-10.09	-4.09	0.39
7	0.970	-0.26	5.74	3.75	52	0.296	-10.57	-4.57	0.35
8	0.964	-0.32	5.68	3.70	53	0.280	-11.07	-5.07	0.31
9	0.958	-0.37	5.63	3.66	54	0.263	-11.59	-5.59	0.28
10	0.952	-0.42	5.58	3.61	55	0.247	-12.16	-6.16	0.24
11	0.945	-0.49	5.51	3.55	56	0.235	-12.57	-6.57	0.22
12	0.937	-0.56	5.44	3.50	57	0.224	-13.00	-7.00	0.20
13	0.930	-0.63	5.37	3.44	58	0.213	-13.45	-7.45	0.18
14	0.922	-0.70	5.30	3.39	59	0.201	-13.92	-7.92	0.16
15	0.915	-0.77	5.23	3.33	60	0.190	-14.42	-8.42	0.14
16	0.905	-0.87	5.13	3.26	61	0.180	-14.88	-8.88	0.13
17	0.895	-0.96	5.04	3.19	62	0.171	-15.36	-9.36	0.12
18	0.885	-1.06	4.94	3.12	63	0.161	-15.86	-9.86	0.10
19	0.876	-1.15	4.85	3.05	64	0.151	-16.40	-10.40	0.09
20	0.866	-1.25	4.75	2.99	65	0.142	-16.97	-10.97	0.08
21	0.852	-1.39	4.61	2.89	66	0.140	-17.07	-11.07	0.08
22	0.838	-1.54	4.46	2.80	67	0.139	-17.16	-11.16	0.08
23	0.824	-1.68	4.32	2.70	68	0.137	-17.26	-11.26	0.07
24	0.810	-1.83	4.17	2.61	69	0.136	-17.36	-11.36	0.07
25	0.796	-1.98	4.02	2.52	70	0.134	-17.46	-11.46	0.07
26	0.780	-2.15	3.85	2.42	71	0.134	-17.44	-11.44	0.07
27	0.765	-2.33	3.67	2.33	72	0.134	-17.43	-11.43	0.07
28	0.749	-2.51	3.49	2.24	73	0.135	-17.42	-11.42	0.07
29	0.734	-2.69	3.31	2.14	74	0.135	-17.41	-11.41	0.07
30	0.718	-2.87	3.13	2.05	75	0.135	-17.39	-11.39	0.07
31	0.700	-3.09	2.91	1.95	76	0.136	-17.31	-11.31	0.07
32	0.682	-3.32	2.68	1.85	77	0.138	-17.22	-11.22	0.08
33	0.664	-3.55	2.45	1.76	78	0.139	-17.14	-11.14	0.08
34	0.646	-3.79	2.21	1.66	79	0.140	-17.06	-11.06	0.08
35	0.628	-4.04	1.96	1.57	80	0.142	-16.97	-10.97	0.08
36	0.608	-4.32	1.68	1.47	81	0.143	-16.87	-10.87	0.08
37	0.588	-4.61	1.39	1.38	82	0.145	-16.77	-10.77	0.08
38	0.568	-4.91	1.09	1.29	83	0.147	-16.67	-10.67	0.09
39	0.548	-5.22	0.78	1.20	84	0.148	-16.58	-10.58	0.09
40	0.528	-5.54	0.46	1.11	85	0.150	-16.48	-10.48	0.09
41	0.507	-5.89	0.11	1.02	86	0.151	-16.39	-10.39	0.09
42	0.486	-6.26	-0.26	0.94	87	0.153	-16.31	-10.31	0.09
43	0.465	-6.64	-0.64	0.86	88	0.154	-16.23	-10.23	0.09
44	0.444	-7.05	-1.05	0.79	89	0.156	-16.14	-10.14	0.10
					90	0.157	-16.06	-10.06	0.10