



TFU-31JTH/VP-R 04 (SP)

Proposal Number: C-70321
Date: 25-Feb-17
Customer: WPSD
Location: Paducah, KY

Electrical Specifications

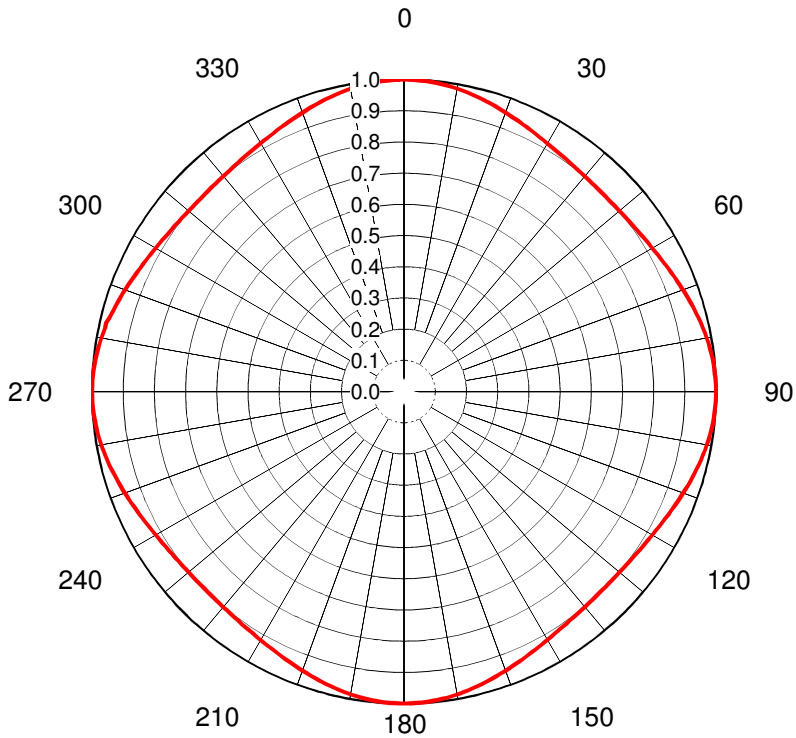
Polarization	Elliptical		
Azimuth Pattern	Omni		
Antenna Input	6-1/8"	75 Ohm	EIA/DCA
VSWR	Channel	1.08 : 1	
Bandwidth	6 MHz		
Rated Input Power	40 kW	(16.02 dBk)	Maximum Average Power

Mechanical Specifications

Mounting	Top Mounted		
Environmental Protection	Full Radome		
Height	67.8 ft (20.7m)	less Lightning Protector	71.8 ft (21.9m) with Lightning Protector
Weight	14100 lb (6.4t)		
Effective Projected Area	78.5 ft ² (7.3m ²)	TIA-222-G	Basic Wind Speed 90 m/h (144.8 km/h)

Channel Specifications

Call	CH	Freq	Hpol ERP	Vpol ERP	TPO	RMS Main Lobe Hpol Gain	RMS Main Lobe Vpol Gain	RMS at Horizontal Hpol Gain	RMS at Horizontal Vpol Gain
WPSD	19	503 MHz	679.0 kW (28.32 dBk)	204.0 kW (23.10 dBk)	40.6 kW (16.08 dBk)	23.84 (13.77dB)	7.16 (8.55dB)	13.66 (11.35dB)	4.10 (6.13dB)



AZIMUTH PATTERN Horizontal Polarization

Proposal No. **C-70321**
 Date **25-Feb-17**
 Call Letters **WPSD 19**
 Frequency **503 MHz**
 Antenna Type **TFU-31JTH/VP-R 04 (SP)**

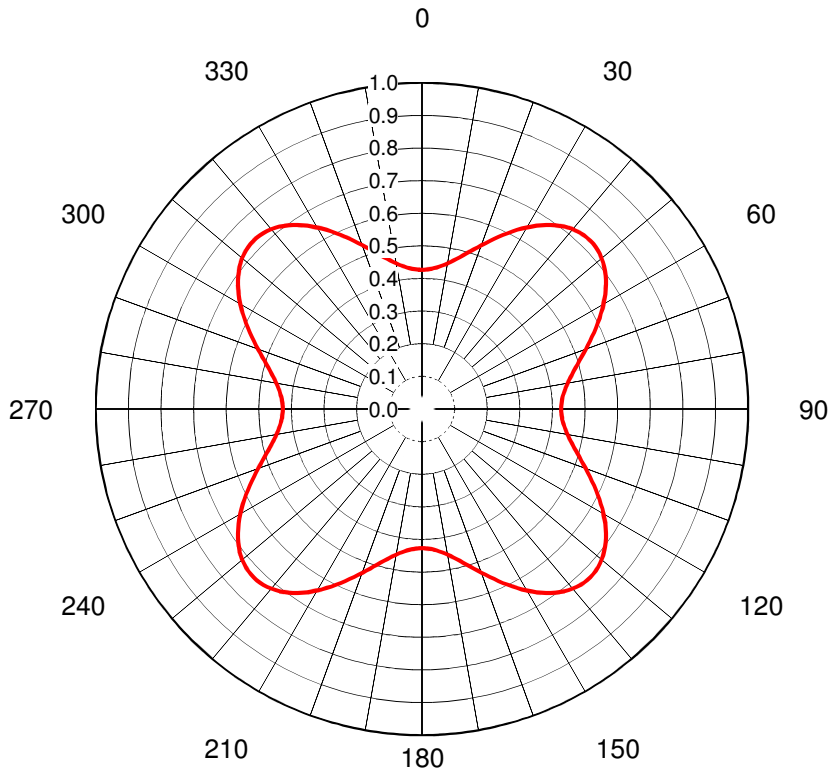
Gain **1.12 (0.47dB)**
 Calculated
 Circularity **+/- 1.0 dB**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	1.000	36	0.906	72	0.959	108	0.959	144	0.906	180	1.000	216	0.906	252	0.959	288	0.959	324	0.906
1	1.000	37	0.905	73	0.963	109	0.955	145	0.908	181	1.000	217	0.905	253	0.963	289	0.955	325	0.908
2	0.999	38	0.903	74	0.966	110	0.952	146	0.910	182	0.999	218	0.903	254	0.966	290	0.952	326	0.910
3	0.998	39	0.902	75	0.970	111	0.948	147	0.912	183	0.998	219	0.902	255	0.970	291	0.948	327	0.912
4	0.998	40	0.901	76	0.973	112	0.945	148	0.914	184	0.998	220	0.901	256	0.973	292	0.945	328	0.914
5	0.996	41	0.901	77	0.977	113	0.941	149	0.917	185	0.996	221	0.900	257	0.976	293	0.941	329	0.917
6	0.995	42	0.900	78	0.980	114	0.938	150	0.919	186	0.995	222	0.900	258	0.980	294	0.938	330	0.919
7	0.993	43	0.899	79	0.983	115	0.934	151	0.922	187	0.993	223	0.899	259	0.983	295	0.934	331	0.922
8	0.991	44	0.899	80	0.986	116	0.931	152	0.925	188	0.991	224	0.899	260	0.986	296	0.931	332	0.925
9	0.988	45	0.899	81	0.988	117	0.928	153	0.928	189	0.988	225	0.899	261	0.988	297	0.928	333	0.928
10	0.986	46	0.899	82	0.991	118	0.925	154	0.931	190	0.986	226	0.899	262	0.991	298	0.925	334	0.931
11	0.983	47	0.899	83	0.993	119	0.922	155	0.934	191	0.983	227	0.899	263	0.993	299	0.922	335	0.934
12	0.980	48	0.900	84	0.995	120	0.919	156	0.938	192	0.980	228	0.900	264	0.995	300	0.919	336	0.938
13	0.977	49	0.901	85	0.996	121	0.917	157	0.941	193	0.977	229	0.900	265	0.996	301	0.917	337	0.941
14	0.973	50	0.901	86	0.998	122	0.914	158	0.945	194	0.973	230	0.901	266	0.998	302	0.914	338	0.945
15	0.970	51	0.902	87	0.998	123	0.912	159	0.948	195	0.970	231	0.902	267	0.998	303	0.912	339	0.948
16	0.966	52	0.903	88	0.999	124	0.910	160	0.952	196	0.966	232	0.903	268	0.999	304	0.910	340	0.952
17	0.963	53	0.905	89	1.000	125	0.908	161	0.955	197	0.963	233	0.905	269	1.000	305	0.908	341	0.955
18	0.959	54	0.906	90	1.000	126	0.906	162	0.959	198	0.959	234	0.906	270	1.000	306	0.906	342	0.959
19	0.955	55	0.908	91	1.000	127	0.905	163	0.963	199	0.955	235	0.908	271	1.000	307	0.905	343	0.963
20	0.952	56	0.910	92	0.999	128	0.903	164	0.966	200	0.952	236	0.910	272	0.999	308	0.903	344	0.966
21	0.948	57	0.912	93	0.998	129	0.902	165	0.970	201	0.948	237	0.912	273	0.998	309	0.902	345	0.970
22	0.945	58	0.914	94	0.998	130	0.901	166	0.973	202	0.945	238	0.914	274	0.998	310	0.901	346	0.973
23	0.941	59	0.917	95	0.996	131	0.900	167	0.977	203	0.941	239	0.917	275	0.996	311	0.900	347	0.977
24	0.938	60	0.919	96	0.995	132	0.900	168	0.980	204	0.938	240	0.919	276	0.995	312	0.900	348	0.980
25	0.934	61	0.922	97	0.993	133	0.899	169	0.983	205	0.934	241	0.922	277	0.993	313	0.899	349	0.983
26	0.931	62	0.925	98	0.991	134	0.899	170	0.986	206	0.931	242	0.925	278	0.991	314	0.899	350	0.986
27	0.928	63	0.928	99	0.988	135	0.899	171	0.988	207	0.928	243	0.928	279	0.988	315	0.899	351	0.988
28	0.925	64	0.931	100	0.986	136	0.899	172	0.991	208	0.925	244	0.931	280	0.986	316	0.899	352	0.991
29	0.922	65	0.934	101	0.983	137	0.899	173	0.993	209	0.922	245	0.934	281	0.983	317	0.899	353	0.993
30	0.919	66	0.938	102	0.980	138	0.900	174	0.995	210	0.919	246	0.938	282	0.980	318	0.900	354	0.995
31	0.917	67	0.941	103	0.976	139	0.900	175	0.996	211	0.917	247	0.941	283	0.980	319	0.900	355	0.996
32	0.914	68	0.945	104	0.973	140	0.901	176	0.998	212	0.914	248	0.945	284	0.973	320	0.901	356	0.998
33	0.912	69	0.948	105	0.970	141	0.902	177	0.998	213	0.912	249	0.948	285	0.970	321	0.902	357	0.998
34	0.910	70	0.952	106	0.966	142	0.903	178	0.999	214	0.910	250	0.952	286	0.966	322	0.903	358	0.999
35	0.908	71	0.955	107	0.963	143	0.905	179	1.000	215	0.908	251	0.955	287	0.963	323	0.905	359	1.000

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AZIMUTH PATTERN Vertical Polarization

Proposal No. **C-70321**
 Date **25-Feb-17**
 Call Letters **WPSD 19**
 Frequency **503 MHz**
 Antenna Type **TFU-31JTH/VP-R 04 (SP)**
 Gain **1.59 (2dB)**
 Circularity **Calculated
+/- 3.0 dB**



Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.427	36	0.696	72	0.514	108	0.514	144	0.696	180	0.427	216	0.696	252	0.514	288	0.514	324	0.696
1	0.427	37	0.703	73	0.505	109	0.524	145	0.689	181	0.427	217	0.703	253	0.505	289	0.524	325	0.689
2	0.428	38	0.709	74	0.496	110	0.534	146	0.680	182	0.428	218	0.709	254	0.496	290	0.534	326	0.680
3	0.429	39	0.715	75	0.487	111	0.545	147	0.672	183	0.429	219	0.715	255	0.487	291	0.545	327	0.672
4	0.431	40	0.719	76	0.480	112	0.556	148	0.663	184	0.431	220	0.719	256	0.480	292	0.556	328	0.663
5	0.433	41	0.723	77	0.472	113	0.567	149	0.653	185	0.433	221	0.723	257	0.472	293	0.567	329	0.653
6	0.436	42	0.726	78	0.465	114	0.578	150	0.643	186	0.436	222	0.726	258	0.465	294	0.578	330	0.643
7	0.440	43	0.728	79	0.459	115	0.589	151	0.632	187	0.440	223	0.728	259	0.459	295	0.589	331	0.632
8	0.444	44	0.729	80	0.453	116	0.600	152	0.622	188	0.444	224	0.729	260	0.453	296	0.600	332	0.622
9	0.448	45	0.730	81	0.448	117	0.611	153	0.611	189	0.448	225	0.730	261	0.448	297	0.611	333	0.611
10	0.453	46	0.729	82	0.444	118	0.622	154	0.600	190	0.453	226	0.729	262	0.444	298	0.622	334	0.600
11	0.459	47	0.728	83	0.440	119	0.632	155	0.589	191	0.459	227	0.728	263	0.440	299	0.632	335	0.589
12	0.465	48	0.726	84	0.436	120	0.643	156	0.578	192	0.465	228	0.726	264	0.436	300	0.643	336	0.578
13	0.472	49	0.723	85	0.433	121	0.653	157	0.567	193	0.472	229	0.723	265	0.433	301	0.653	337	0.567
14	0.480	50	0.719	86	0.431	122	0.663	158	0.556	194	0.480	230	0.719	266	0.431	302	0.663	338	0.556
15	0.487	51	0.715	87	0.429	123	0.672	159	0.545	195	0.487	231	0.715	267	0.429	303	0.672	339	0.545
16	0.496	52	0.709	88	0.428	124	0.680	160	0.534	196	0.496	232	0.709	268	0.428	304	0.680	340	0.534
17	0.505	53	0.703	89	0.427	125	0.689	161	0.524	197	0.505	233	0.703	269	0.427	305	0.689	341	0.524
18	0.514	54	0.696	90	0.427	126	0.696	162	0.514	198	0.514	234	0.696	270	0.427	306	0.696	342	0.514
19	0.524	55	0.689	91	0.427	127	0.703	163	0.505	199	0.524	235	0.689	271	0.427	307	0.703	343	0.505
20	0.534	56	0.680	92	0.428	128	0.709	164	0.496	200	0.534	236	0.680	272	0.428	308	0.709	344	0.496
21	0.545	57	0.672	93	0.429	129	0.715	165	0.487	201	0.545	237	0.672	273	0.429	309	0.715	345	0.487
22	0.556	58	0.663	94	0.431	130	0.719	166	0.480	202	0.556	238	0.663	274	0.431	310	0.719	346	0.480
23	0.567	59	0.653	95	0.433	131	0.723	167	0.472	203	0.567	239	0.653	275	0.433	311	0.723	347	0.472
24	0.578	60	0.643	96	0.436	132	0.726	168	0.465	204	0.578	240	0.643	276	0.436	312	0.726	348	0.465
25	0.589	61	0.632	97	0.440	133	0.728	169	0.459	205	0.589	241	0.632	277	0.440	313	0.728	349	0.459
26	0.600	62	0.622	98	0.444	134	0.729	170	0.453	206	0.600	242	0.622	278	0.444	314	0.729	350	0.453
27	0.611	63	0.611	99	0.448	135	0.730	171	0.448	207	0.611	243	0.611	279	0.448	315	0.730	351	0.448
28	0.622	64	0.600	100	0.453	136	0.729	172	0.444	208	0.622	244	0.600	280	0.453	316	0.729	352	0.444
29	0.632	65	0.589	101	0.459	137	0.728	173	0.440	209	0.632	245	0.589	281	0.459	317	0.728	353	0.440
30	0.643	66	0.578	102	0.465	138	0.726	174	0.436	210	0.643	246	0.578	282	0.465	318	0.726	354	0.436
31	0.653	67	0.567	103	0.472	139	0.723	175	0.433	211	0.653	247	0.567	283	0.472	319	0.723	355	0.433
32	0.663	68	0.556	104	0.480	140	0.719	176	0.431	212	0.663	248	0.556	284	0.480	320	0.719	356	0.431
33	0.672	69	0.545	105	0.487	141	0.715	177	0.429	213	0.672	249	0.545	285	0.487	321	0.715	357	0.429
34	0.680	70	0.534	106	0.496	142	0.709	178	0.428	214	0.680	250	0.534	286	0.496	322	0.709	358	0.428
35	0.689	71	0.524	107	0.505	143	0.703	179	0.427	215	0.689	251	0.524	287	0.505	323	0.703	359	0.427

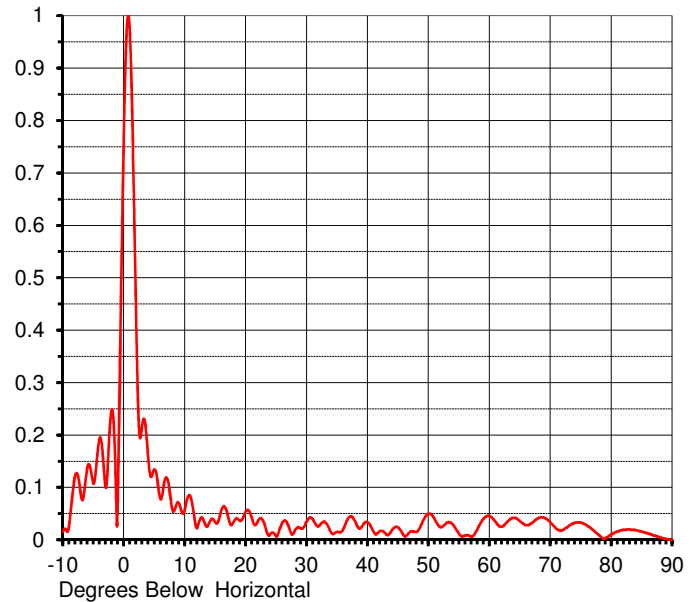
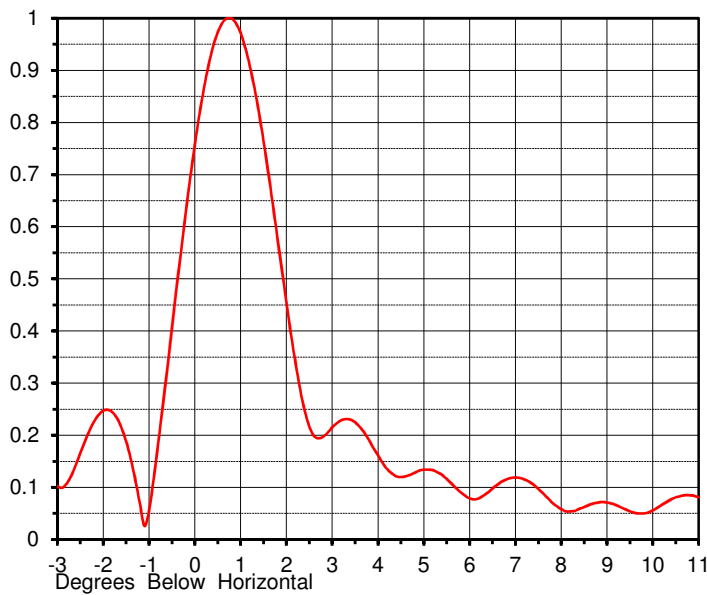
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ELEVATION PATTERN

Proposal No. **C-70321**
 Date **25-Feb-17**
 Call Letters **WPSD 19**
 Frequency **503 MHz**
 Antenna Type **TFU-31JTH/VP-R 04 (SP)**

RMS Directivity at Main Lobe **31.00 (14.91 dB)**
 RMS Directivity at Horizontal **17.80 (12.50 dB)**
Calculated

Beam Tilt **0.75 deg**
 Drawing Number **31J310075**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.015	10.0	0.056	30.0	0.034	50.0	0.050	70.0	0.034
-9.0	0.024	11.0	0.081	31.0	0.040	51.0	0.041	71.0	0.021
-8.0	0.120	12.0	0.022	32.0	0.026	52.0	0.024	72.0	0.018
-7.0	0.085	13.0	0.041	33.0	0.034	53.0	0.032	73.0	0.026
-6.0	0.135	14.0	0.031	34.0	0.015	54.0	0.029	74.0	0.032
-5.0	0.108	15.0	0.034	35.0	0.015	55.0	0.012	75.0	0.033
-4.0	0.192	16.0	0.055	36.0	0.019	56.0	0.008	76.0	0.028
-3.0	0.102	17.0	0.051	37.0	0.043	57.0	0.006	77.0	0.019
-2.0	0.247	18.0	0.033	38.0	0.035	58.0	0.019	78.0	0.009
-1.0	0.055	19.0	0.037	39.0	0.024	59.0	0.039	79.0	0.002
0.0	0.757	20.0	0.053	40.0	0.034	60.0	0.045	80.0	0.010
1.0	0.972	21.0	0.043	41.0	0.016	61.0	0.035	81.0	0.016
2.0	0.455	22.0	0.035	42.0	0.016	62.0	0.025	82.0	0.019
3.0	0.215	23.0	0.033	43.0	0.012	63.0	0.035	83.0	0.020
4.0	0.161	24.0	0.010	44.0	0.018	64.0	0.042	84.0	0.018
5.0	0.134	25.0	0.007	45.0	0.024	65.0	0.036	85.0	0.016
6.0	0.079	26.0	0.032	46.0	0.008	66.0	0.028	86.0	0.012
7.0	0.119	27.0	0.028	47.0	0.015	67.0	0.032	87.0	0.008
8.0	0.058	28.0	0.015	48.0	0.015	68.0	0.041	88.0	0.005
9.0	0.071	29.0	0.022	49.0	0.033	69.0	0.042	89.0	0.002
								90.0	0.000

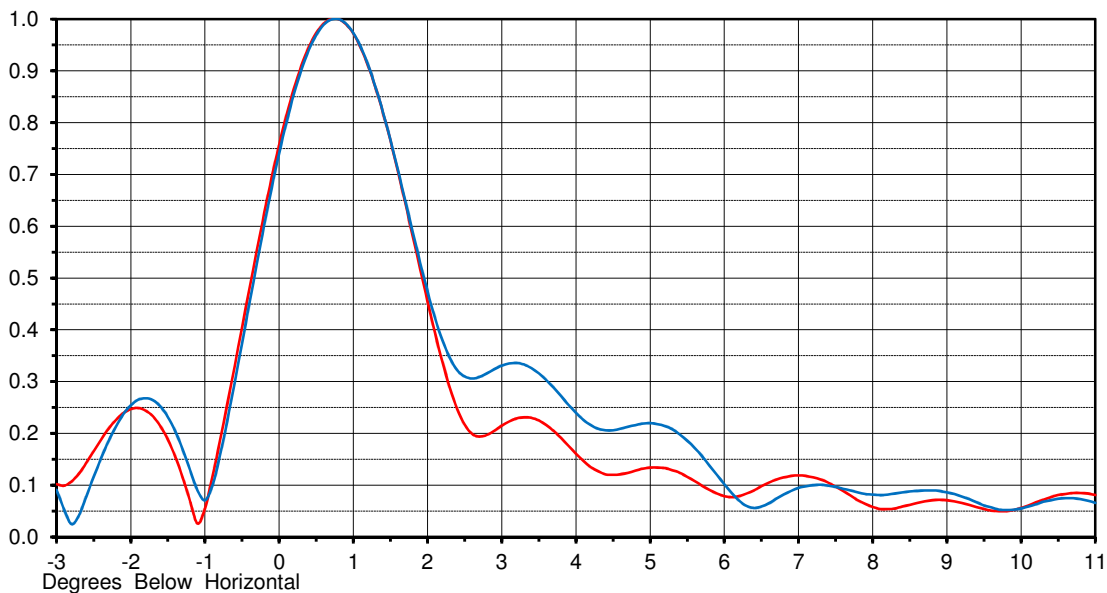
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FutureFill refers to the use of predetermined illuminations with broadband panels or limited bandwidth slotted coaxial antennas that can be modified in the field to provide the flexibility to customize the null structure at a future date.

FutureFill OVERLAY

Proposal No. **C-70321**
 Date **25-Feb-17**
 Call Letters **WPSD 19**
 Frequency **503 MHz**
 Antenna Type **TFU-31JTH/VP-R 04 (SP)**

RMS Directivity 31.00 (14.9 dB) Beam Tilt 0.75 Drawing No. 31J310075 **Red**
 RMS Directivity 24.60 (13.9 dB) Beam Tilt 0.75 Drawing No. 31J310075-FF **Blue**
 Calculated



Tabulations for 30J310075-FF

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.014	10.0	0.055	30.0	0.038	50.0	0.070	70.0	0.046
-9.0	0.017	11.0	0.066	31.0	0.054	51.0	0.043	71.0	0.025
-8.0	0.122	12.0	0.055	32.0	0.046	52.0	0.006	72.0	0.005
-7.0	0.130	13.0	0.097	33.0	0.026	53.0	0.037	73.0	0.018
-6.0	0.173	14.0	0.101	34.0	0.030	54.0	0.038	74.0	0.030
-5.0	0.154	15.0	0.116	35.0	0.066	55.0	0.017	75.0	0.034
-4.0	0.278	16.0	0.057	36.0	0.067	56.0	0.008	76.0	0.031
-3.0	0.091	17.0	0.050	37.0	0.090	57.0	0.007	77.0	0.024
-2.0	0.254	18.0	0.132	38.0	0.102	58.0	0.016	78.0	0.014
-1.0	0.071	19.0	0.142	39.0	0.081	59.0	0.038	79.0	0.006
0.0	0.741	20.0	0.154	40.0	0.052	60.0	0.049	80.0	0.008
1.0	0.973	21.0	0.143	41.0	0.059	61.0	0.046	81.0	0.014
2.0	0.474	22.0	0.067	42.0	0.077	62.0	0.043	82.0	0.017
3.0	0.331	23.0	0.052	43.0	0.063	63.0	0.050	83.0	0.018
4.0	0.240	24.0	0.084	44.0	0.059	64.0	0.051	84.0	0.017
5.0	0.220	25.0	0.071	45.0	0.073	65.0	0.044	85.0	0.015
6.0	0.102	26.0	0.078	46.0	0.064	66.0	0.041	86.0	0.012
7.0	0.095	27.0	0.069	47.0	0.046	67.0	0.051	87.0	0.008
8.0	0.082	28.0	0.020	48.0	0.045	68.0	0.061	88.0	0.005
9.0	0.086	29.0	0.014	49.0	0.065	69.0	0.060	89.0	0.002
								90.0	0.000

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MECHANICALS

Proposal No. **C-70321**
 Date **25-Feb-17**
 Call Letters **WPSD** **19**
 Frequency **503 MHz**
 Antenna Type **TFU-31JTH/VP-R 04 (SP)**

Preliminary Specifications

Top Mounted

Mechanical Specification without ice TIA-222-G

Height AGL(z) 1700 ft (518.2 m)
 Basic Wind Speed 90 m/h (144.8 km/h)

Structure Class II
 Exposure Category C
 Topography Category 1

Mechanical Specifications with ice TIA-222-G

Design Ice 1 in $t_{iz} = 2.80$ in
 Wind Speed w/Ice 30 m/h (48.3 km/h)

Mechanical Specifications

		without ice	with ice
Height with Lightning Protector	H4	71.8 ft (21.9m)	
Height less Lightning Protector	H2	67.8 ft (20.7m)	
Height of Center of Radiation	H3	33.9 ft (10.3m)	
Effective Projected Area	(EPA) _S	78.5 ft ² (7.3m ²)	220.3 ft ² (20.5m ²)
Moment Arm	D1	35.4 ft (10.8m)	36.6 ft (11.2m)

		without ice	with ice
Weight	W	14100 lb (6.4t)	22000 lb (10t)

Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA-222-G

Prepared by: KLP
 Date: 25-Feb-17
 ME: EE:

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Summary

Proposal No.	C-70321	
Date	25-Feb-17	
Call Letters	WPSD	19
Frequency	503 MHz	
Antenna Type	TFU-31JTH/VP-R 04 (SP)	

Antenna

	Hpol	Vpol
ERP:	679.0 kW (28.32 dBk)	204.0 kW (23.10 dBk)
RMS Gain*	23.84 (13.77 dB)	7.16 (8.55 dB)

Antenna Input Power	28.5 kW (14.55 dBk)
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Transmission Line

Type	Rigid	Attenuation	(1.54 dB)
Size	7-3/16"	Efficiency	70.2%
Impedance	75 Ohm		
Length	1650 ft	502.9 m	

Transmitter Output

40.6 kW (16.08 dBk)

Transmitter filter losses not included

* Directivity and Gain are with respect to half wave dipole.

**Antenna Gain includes feed system losses

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