



TFU-22DSC/VP-R C170

Proposal Number: C-70098-1
Date: 27-Feb-17
Customer: Raycom
Location: Toledo, OH

Electrical Specifications

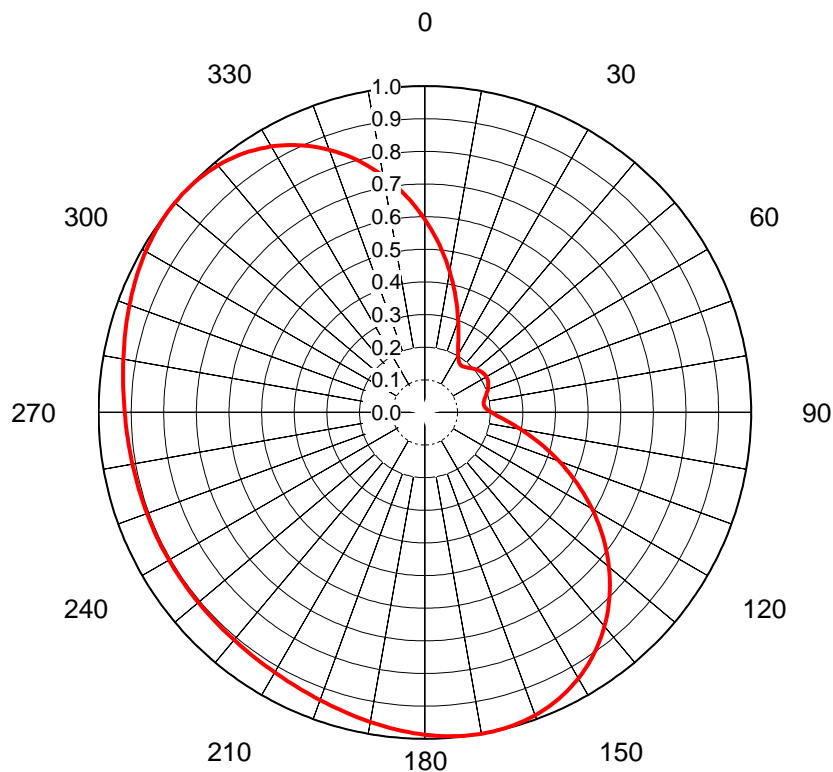
Polarization	Elliptical		
Azimuth Pattern	Directional		
Antenna Input	6-1/8"	75 Ohm	EIA/DCA
VSWR	Channel	1.08 : 1	
Bandwidth	6 MHz		
Rated Input Power	30 kW	(14.77 dBk)	Maximum Average Power

Mechanical Specifications

Mounting	Side Mounted		
Environmental Protection	Full Radome		
Height	45.3 ft (13.8m)		
Weight	950 lb (0.4t)		
Effective Projected Area	35.6 ft ² (3.3m ²)	TIA-222-G	Basic Wind Speed 90 m/h (144.8 km/h)

Channel Specifications

Call	CH	Freq	Hpol ERP	Vpol ERP	TPO	Peak Main Lobe Hpol Gain	Peak Main Lobe Vpol Gain	Peak at Horizontal Hpol Gain	Peak at Horizontal Vpol Gain
WUPW	26	545 MHz	65.0 kW (18.13 dBk)	27.9 kW (14.45 dBk)	4.6 kW (6.60 dBk)	23.01 (13.62dB)	9.86 (9.94dB)	15.85 (12.00dB)	6.79 (8.32dB)



AZIMUTH PATTERN Horizontal Polarization

Proposal No. **C-70098-1**
 Date **27-Feb-17**
 Call Letters **WUPW 26**
 Frequency **545 MHz**
 Antenna Type **TFU-22DSC/VP-R C170**

 Gain **1.7 (2.3dB)**
Calculated

 Directional
 Drawing # **H7-C170-CH26**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.592	36	0.183	72	0.200	108	0.408	144	0.895	180	0.988	216	0.913	252	0.907	288	0.958	324	0.974
1	0.577	37	0.182	73	0.198	109	0.423	145	0.903	181	0.986	217	0.912	253	0.907	289	0.961	325	0.969
2	0.561	38	0.182	74	0.195	110	0.438	146	0.912	182	0.983	218	0.911	254	0.907	290	0.963	326	0.964
3	0.546	39	0.183	75	0.193	111	0.454	147	0.919	183	0.981	219	0.911	255	0.908	291	0.966	327	0.959
4	0.530	40	0.183	76	0.191	112	0.469	148	0.927	184	0.979	220	0.910	256	0.908	292	0.969	328	0.953
5	0.515	41	0.185	77	0.189	113	0.484	149	0.934	185	0.976	221	0.909	257	0.908	293	0.971	329	0.947
6	0.500	42	0.186	78	0.186	114	0.500	150	0.941	186	0.974	222	0.909	258	0.909	294	0.974	330	0.941
7	0.484	43	0.189	79	0.185	115	0.515	151	0.947	187	0.971	223	0.908	259	0.909	295	0.976	331	0.934
8	0.469	44	0.191	80	0.183	116	0.530	152	0.953	188	0.969	224	0.908	260	0.910	296	0.979	332	0.927
9	0.454	45	0.193	81	0.183	117	0.546	153	0.959	189	0.966	225	0.908	261	0.911	297	0.981	333	0.919
10	0.438	46	0.195	82	0.182	118	0.561	154	0.964	190	0.963	226	0.907	262	0.911	298	0.983	334	0.912
11	0.423	47	0.198	83	0.182	119	0.577	155	0.969	191	0.961	227	0.907	263	0.912	299	0.986	335	0.903
12	0.408	48	0.200	84	0.183	120	0.592	156	0.974	192	0.958	228	0.907	264	0.913	300	0.988	336	0.895
13	0.394	49	0.203	85	0.185	121	0.607	157	0.977	193	0.955	229	0.906	265	0.914	301	0.990	337	0.886
14	0.379	50	0.205	86	0.187	122	0.622	158	0.981	194	0.953	230	0.906	266	0.915	302	0.992	338	0.876
15	0.365	51	0.207	87	0.190	123	0.637	159	0.984	195	0.950	231	0.906	267	0.916	303	0.993	339	0.866
16	0.351	52	0.209	88	0.193	124	0.652	160	0.988	196	0.948	232	0.906	268	0.917	304	0.995	340	0.856
17	0.337	53	0.211	89	0.199	125	0.666	161	0.990	197	0.945	233	0.906	269	0.919	305	0.996	341	0.846
18	0.324	54	0.213	90	0.204	126	0.681	162	0.993	198	0.943	234	0.906	270	0.920	306	0.997	342	0.835
19	0.311	55	0.214	91	0.210	127	0.695	163	0.994	199	0.941	235	0.906	271	0.921	307	0.998	343	0.824
20	0.298	56	0.216	92	0.217	128	0.709	164	0.996	200	0.938	236	0.906	272	0.923	308	0.999	344	0.812
21	0.286	57	0.216	93	0.225	129	0.723	165	0.997	201	0.936	237	0.905	273	0.925	309	1.000	345	0.800
22	0.274	58	0.217	94	0.233	130	0.737	166	0.999	202	0.934	238	0.905	274	0.926	310	1.000	346	0.788
23	0.264	59	0.218	95	0.243	131	0.750	167	0.999	203	0.932	239	0.905	275	0.928	311	1.000	347	0.776
24	0.253	60	0.218	96	0.253	132	0.763	168	1.000	204	0.930	240	0.905	276	0.930	312	1.000	348	0.763
25	0.243	61	0.218	97	0.264	133	0.776	169	1.000	205	0.928	241	0.905	277	0.932	313	0.999	349	0.750
26	0.233	62	0.217	98	0.274	134	0.788	170	1.000	206	0.926	242	0.905	278	0.934	314	0.999	350	0.737
27	0.225	63	0.216	99	0.286	135	0.800	171	1.000	207	0.925	243	0.905	279	0.936	315	0.997	351	0.723
28	0.217	64	0.216	100	0.298	136	0.812	172	0.999	208	0.923	244	0.906	280	0.938	316	0.996	352	0.709
29	0.210	65	0.214	101	0.311	137	0.824	173	0.998	209	0.921	245	0.906	281	0.941	317	0.994	353	0.695
30	0.204	66	0.213	102	0.324	138	0.835	174	0.997	210	0.920	246	0.906	282	0.943	318	0.993	354	0.681
31	0.199	67	0.211	103	0.337	139	0.846	175	0.996	211	0.919	247	0.906	283	0.945	319	0.990	355	0.666
32	0.193	68	0.209	104	0.351	140	0.856	176	0.995	212	0.917	248	0.906	284	0.948	320	0.988	356	0.652
33	0.190	69	0.207	105	0.365	141	0.866	177	0.993	213	0.916	249	0.906	285	0.950	321	0.984	357	0.637
34	0.187	70	0.205	106	0.379	142	0.876	178	0.992	214	0.915	250	0.906	286	0.953	322	0.981	358	0.622
35	0.185	71	0.203	107	0.394	143	0.886	179	0.990	215	0.914	251	0.906	287	0.955	323	0.977	359	0.607

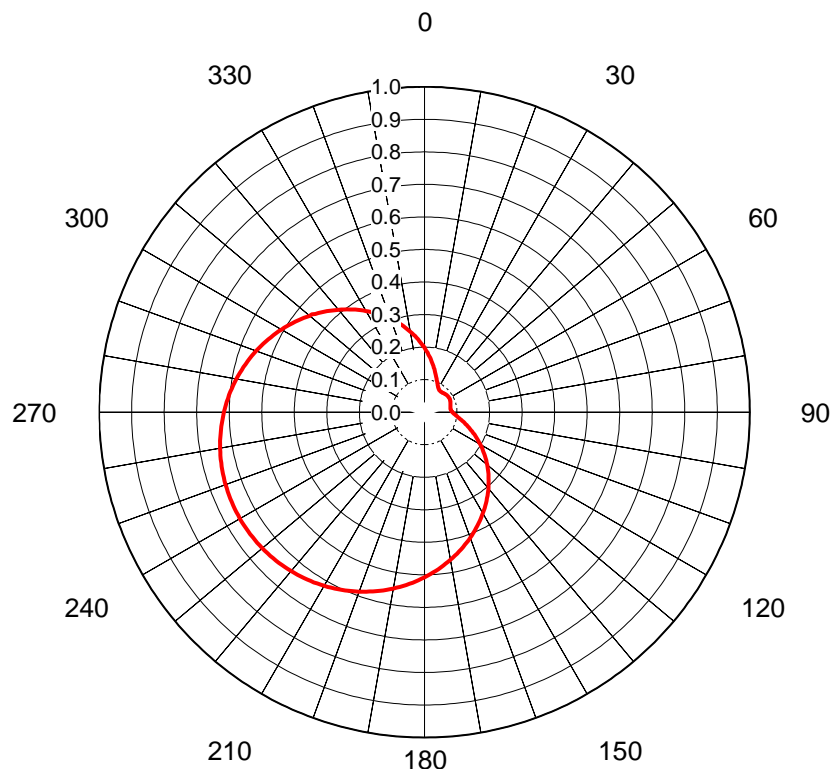
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AZIMUTH PATTERN Vertical Polarization

Proposal No. **C-70098-1**
Date **27-Feb-17**
Call Letters **WUPW 26**
Frequency **545 MHz**
Antenna Type **TFU-22DSC/VP-R C170**

Gain **2.49 (3.97dB)**
Calculated

Directional
Drawing # **V7-C170-CH26**



Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.198	36	0.081	72	0.084	108	0.140	144	0.327	180	0.508	216	0.630	252	0.649	288	0.558
1	0.193	37	0.081	73	0.084	109	0.144	145	0.332	181	0.512	217	0.632	253	0.647	289	0.554
2	0.188	38	0.081	74	0.083	110	0.149	146	0.338	182	0.517	218	0.634	254	0.646	290	0.550
3	0.183	39	0.081	75	0.083	111	0.153	147	0.343	183	0.521	219	0.636	255	0.645	291	0.546
4	0.178	40	0.081	76	0.082	112	0.158	148	0.348	184	0.525	220	0.638	256	0.644	292	0.542
5	0.173	41	0.081	77	0.082	113	0.163	149	0.354	185	0.530	221	0.639	257	0.642	293	0.538
6	0.168	42	0.081	78	0.081	114	0.168	150	0.359	186	0.534	222	0.641	258	0.641	294	0.534
7	0.163	43	0.082	79	0.081	115	0.173	151	0.364	187	0.538	223	0.642	259	0.639	295	0.530
8	0.158	44	0.082	80	0.081	116	0.178	152	0.370	188	0.542	224	0.644	260	0.638	296	0.525
9	0.153	45	0.083	81	0.081	117	0.183	153	0.375	189	0.546	225	0.645	261	0.636	297	0.521
10	0.149	46	0.083	82	0.081	118	0.188	154	0.380	190	0.550	226	0.646	262	0.634	298	0.517
11	0.144	47	0.084	83	0.081	119	0.193	155	0.385	191	0.554	227	0.647	263	0.632	299	0.512
12	0.140	48	0.084	84	0.081	120	0.198	156	0.390	192	0.558	228	0.649	264	0.630	300	0.508
13	0.136	49	0.085	85	0.081	121	0.203	157	0.396	193	0.562	229	0.649	265	0.628	301	0.503
14	0.131	50	0.085	86	0.082	122	0.209	158	0.401	194	0.566	230	0.650	266	0.626	302	0.499
15	0.127	51	0.086	87	0.082	123	0.214	159	0.406	195	0.569	231	0.651	267	0.624	303	0.494
16	0.123	52	0.086	88	0.083	124	0.219	160	0.411	196	0.573	232	0.652	268	0.621	304	0.489
17	0.120	53	0.086	89	0.084	125	0.224	161	0.416	197	0.577	233	0.653	269	0.619	305	0.485
18	0.116	54	0.087	90	0.086	126	0.230	162	0.421	198	0.580	234	0.653	270	0.616	306	0.480
19	0.112	55	0.087	91	0.087	127	0.235	163	0.426	199	0.584	235	0.654	271	0.614	307	0.475
20	0.109	56	0.087	92	0.089	128	0.241	164	0.431	200	0.587	236	0.654	272	0.611	308	0.470
21	0.106	57	0.087	93	0.091	129	0.246	165	0.436	201	0.590	237	0.654	273	0.608	309	0.466
22	0.103	58	0.088	94	0.093	130	0.251	166	0.441	202	0.593	238	0.654	274	0.606	310	0.461
23	0.100	59	0.088	95	0.095	131	0.257	167	0.446	203	0.597	239	0.655	275	0.603	311	0.458
24	0.097	60	0.088	96	0.097	132	0.262	168	0.451	204	0.600	240	0.655	276	0.600	312	0.451
25	0.095	61	0.088	97	0.100	133	0.268	169	0.456	205	0.603	241	0.655	277	0.597	313	0.446
26	0.093	62	0.088	98	0.103	134	0.273	170	0.461	206	0.606	242	0.654	278	0.593	314	0.441
27	0.091	63	0.087	99	0.106	135	0.278	171	0.466	207	0.608	243	0.654	279	0.590	315	0.436
28	0.089	64	0.087	100	0.109	136	0.284	172	0.470	208	0.611	244	0.654	280	0.587	316	0.431
29	0.087	65	0.087	101	0.112	137	0.289	173	0.475	209	0.614	245	0.654	281	0.584	317	0.426
30	0.086	66	0.087	102	0.116	138	0.295	174	0.480	210	0.616	246	0.653	282	0.580	318	0.421
31	0.084	67	0.086	103	0.120	139	0.300	175	0.485	211	0.619	247	0.653	283	0.577	319	0.416
32	0.083	68	0.086	104	0.123	140	0.306	176	0.489	212	0.621	248	0.652	284	0.573	320	0.411
33	0.082	69	0.086	105	0.127	141	0.311	177	0.494	213	0.624	249	0.651	285	0.569	321	0.406
34	0.082	70	0.085	106	0.131	142	0.316	178	0.499	214	0.626	250	0.650	286	0.566	322	0.401
35	0.081	71	0.085	107	0.136	143	0.322	179	0.503	215	0.628	251	0.649	287	0.562	323	0.396

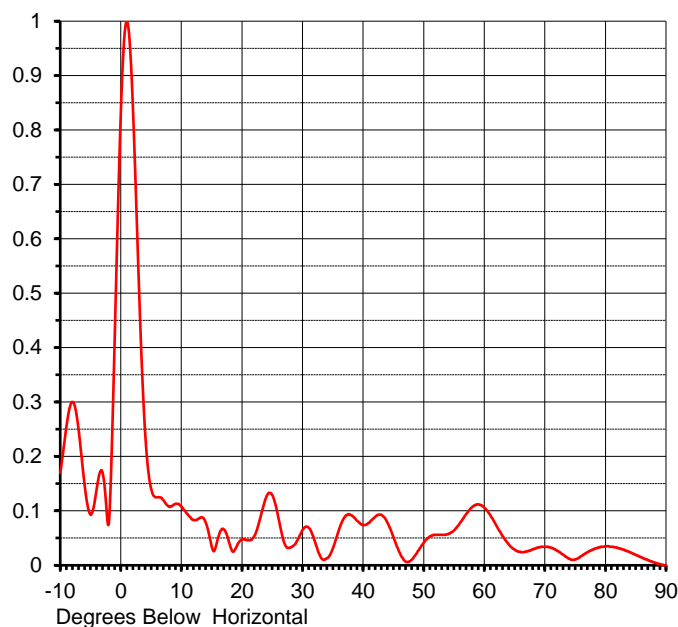
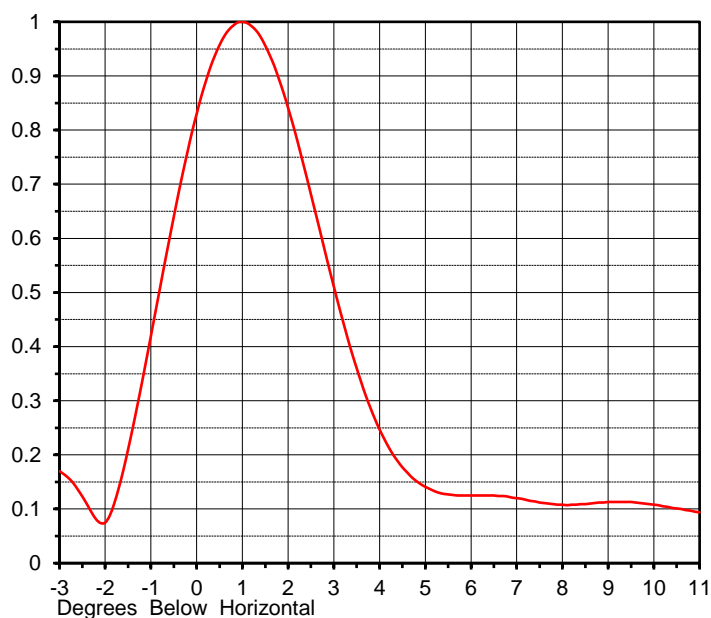
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ELEVATION PATTERN

Proposal No. **C-70098-1**
 Date **27-Feb-17**
 Call Letters **WUPW 26**
 Frequency **545 MHz**
 Antenna Type **TFU-22DSC/VP-R C170**

RMS Directivity at Main Lobe **17.50 (12.43 dB)**
 RMS Directivity at Horizontal **12.10 (10.83 dB)**
Calculated

Beam Tilt **1.00 deg**
 Drawing Number **22Q175100**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.170	10.0	0.108	30.0	0.065	50.0	0.041	70.0	0.034
-9.0	0.253	11.0	0.094	31.0	0.069	51.0	0.053	71.0	0.032
-8.0	0.300	12.0	0.083	32.0	0.045	52.0	0.056	72.0	0.027
-7.0	0.252	13.0	0.087	33.0	0.015	53.0	0.056	73.0	0.020
-6.0	0.150	14.0	0.079	34.0	0.013	54.0	0.057	74.0	0.012
-5.0	0.093	15.0	0.035	35.0	0.031	55.0	0.064	75.0	0.011
-4.0	0.139	16.0	0.048	36.0	0.065	56.0	0.078	76.0	0.017
-3.0	0.170	17.0	0.066	37.0	0.089	57.0	0.094	77.0	0.024
-2.0	0.075	18.0	0.038	38.0	0.092	58.0	0.107	78.0	0.029
-1.0	0.420	19.0	0.032	39.0	0.082	59.0	0.112	79.0	0.033
0.0	0.830	20.0	0.047	40.0	0.074	60.0	0.106	80.0	0.035
1.0	1.000	21.0	0.046	41.0	0.078	61.0	0.092	81.0	0.034
2.0	0.841	22.0	0.053	42.0	0.089	62.0	0.073	82.0	0.032
3.0	0.511	23.0	0.086	43.0	0.093	63.0	0.054	83.0	0.029
4.0	0.247	24.0	0.125	44.0	0.079	64.0	0.039	84.0	0.024
5.0	0.141	25.0	0.129	45.0	0.052	65.0	0.029	85.0	0.019
6.0	0.125	26.0	0.088	46.0	0.024	66.0	0.024	86.0	0.014
7.0	0.120	27.0	0.041	47.0	0.007	67.0	0.025	87.0	0.010
8.0	0.108	28.0	0.033	48.0	0.010	68.0	0.029	88.0	0.005
9.0	0.113	29.0	0.043	49.0	0.025	69.0	0.033	89.0	0.002
								90.0	0.000

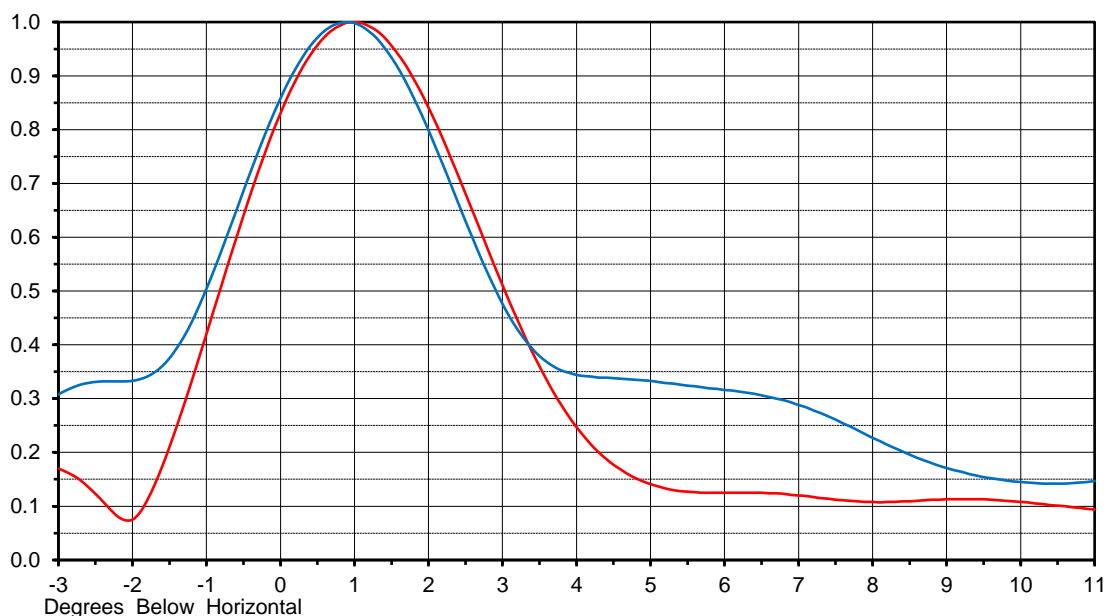
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FutureFill refers to the use of predetermined illuminations with broadband panels or limited bandwidth slotted coaxial antennas that can be modified in the field to provide the flexibility to customize the null structure at a future date.

FutureFill OVERLAY

Proposal No. **C-70098-1**
 Date **27-Feb-17**
 Call Letters **WUPW 26**
 Frequency **545 MHz**
 Antenna Type **TFU-22DSC/VP-R C170**

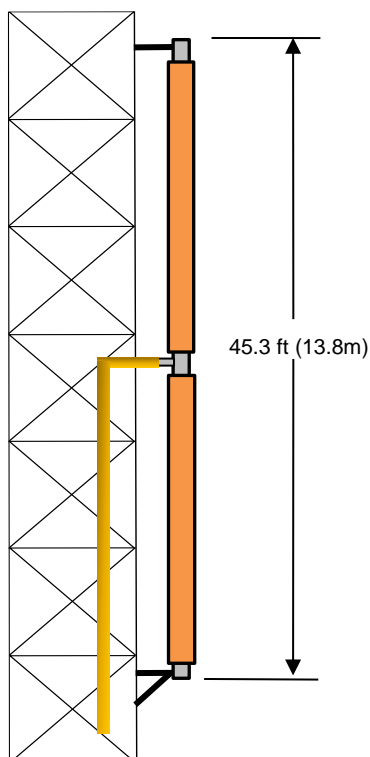
RMS Directivity 17.50 (12.4 dB) Beam Tilt 1.00 Drawing No. 22Q175100 Red
 RMS Directivity 11.72 (10.7 dB) Beam Tilt 0.90 Drawing No. 22Q17510-FF Blue
 Calculated



Tabulations for 22Q17510-FF

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.375	10.0	0.145	30.0	0.181	50.0	0.149	70.0	0.051
-9.0	0.402	11.0	0.147	31.0	0.199	51.0	0.163	71.0	0.055
-8.0	0.373	12.0	0.189	32.0	0.170	52.0	0.167	72.0	0.055
-7.0	0.252	13.0	0.258	33.0	0.125	53.0	0.164	73.0	0.052
-6.0	0.136	14.0	0.283	34.0	0.105	54.0	0.162	74.0	0.048
-5.0	0.118	15.0	0.231	35.0	0.115	55.0	0.161	75.0	0.044
-4.0	0.180	16.0	0.160	36.0	0.132	56.0	0.163	76.0	0.042
-3.0	0.308	17.0	0.143	37.0	0.136	57.0	0.163	77.0	0.041
-2.0	0.333	18.0	0.149	38.0	0.118	58.0	0.158	78.0	0.041
-1.0	0.504	19.0	0.150	39.0	0.086	59.0	0.145	79.0	0.041
0.0	0.858	20.0	0.144	40.0	0.051	60.0	0.124	80.0	0.040
1.0	0.998	21.0	0.136	41.0	0.015	61.0	0.096	81.0	0.038
2.0	0.799	22.0	0.108	42.0	0.025	62.0	0.069	82.0	0.034
3.0	0.476	23.0	0.047	43.0	0.058	63.0	0.048	83.0	0.030
4.0	0.344	24.0	0.080	44.0	0.078	64.0	0.037	84.0	0.025
5.0	0.333	25.0	0.133	45.0	0.088	65.0	0.033	85.0	0.020
6.0	0.316	26.0	0.137	46.0	0.097	66.0	0.031	86.0	0.015
7.0	0.288	27.0	0.116	47.0	0.104	67.0	0.031	87.0	0.010
8.0	0.227	28.0	0.102	48.0	0.113	68.0	0.036	88.0	0.006
9.0	0.171	29.0	0.130	49.0	0.130	69.0	0.044	89.0	0.002
								90.0	0.000

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MECHANICALS

Proposal No. **C-70098-1**
 Date **27-Feb-17**
 Call Letters **WUPW** **26**
 Frequency **545 MHz**
 Antenna Type **TFU-22DSC/VP-R C170**

Preliminary Specifications

Side Mounted

Mechanical Specification without ice TIA-222-G

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 40 m/h (64.4 km/h)

Mechanical Specifications

		without ice	with ice
Height	H2	45.3 ft (13.8m)	
Height of Center of Radiation	H3	22.7 ft (6.9m)	
Effective Projected Area	(EPA) _A	35.6 ft ² (3.3m ²)	112.2 ft ² (10.4m ²)
Weight	W	950 lb (0.4t)	5450 lb (2.5t)

*Does not include mounts

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

Prepared by: jls
 Rev. No.1 by: JBC

Date: 27-Feb-17
 Date: 11-Feb-19

ME: EE:

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Summary

Proposal No.	C-70098-1	
Date	27-Feb-17	
Call Letters	WUPW	26 DTV
Frequency	545 MHz	
Antenna Type	TFU-22DSC/VP-R C170	

Antenna

	Hpol		Vpol	
ERP:	65.0 kW	(18.13 dBk)	27.9 kW	(14.45 dBk)
Peak Gain*	23.01	(13.62 dB)	9.86	(9.94 dB)

Antenna Input Power	2.8 kW	(4.52 dBk)
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Transmission Line

Type	Rigid	Attenuation	(2.09 dB)
Size	Size 4-1/16"	Efficiency	61.9%
Impedance	50 Ohm		
Length	1325 ft	403.9 m	

Transmitter Output

4.6 kW	(6.60 dBk)
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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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