



Antenna Model: **TUM-LP-C3-2/6M-1**

Proposal Number: **C-71938-2**  
Date: **8-Nov-23**  
Customer: **SBG**  
Location: **Sapphire Valley, NC**

### Electrical Specifications

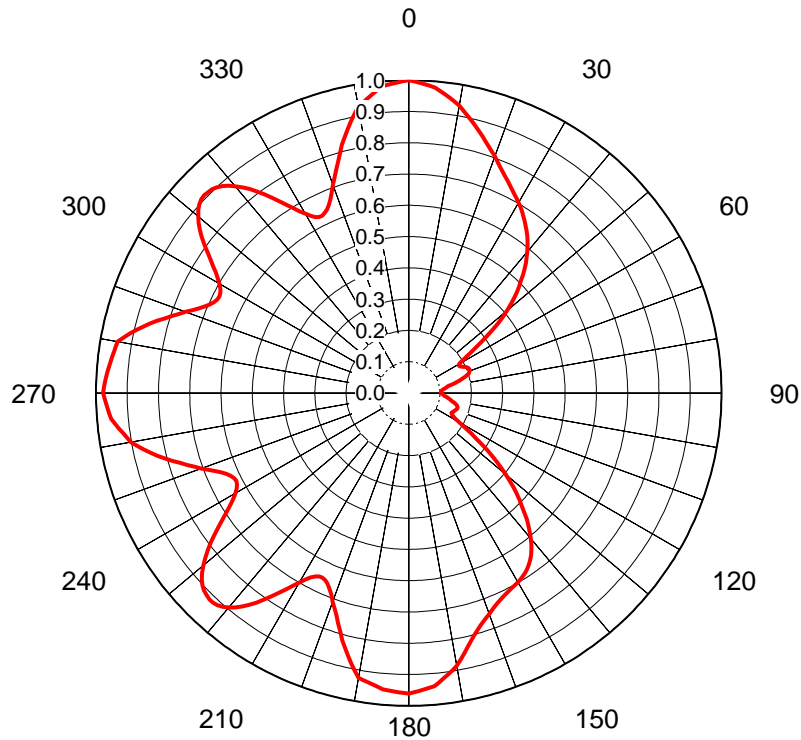
Polarization: **Elliptical**  
Azimuth Pattern: **Directional**  
Antenna Input: **1-5/8"** **50 Ohm** **EIA/DCA**  
VSWR: **Channel** **1.15 : 1**  
Bandwidth:  
Rated Input Power: **5 kW** **(6.99 dBk)** **Maximum Average Power**

### Mechanical Specifications

Mounting: **Side Mounted**  
Environmental Protection: **Panel Cover**  
Height: **6.8 ft (2.1m)**  
Weight: **250 lb (0.1t)** **Excludes Mounts**  
Effective Projected Area: **30.4 ft² (2.8m²)** **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
W34EP	21	515 MHz	15.0 kW (11.76 dBk)	9.75 kW (9.89 dBk)	4.05 kW (6.08 dBk)	5.35 (7.29dB)	3.48 (5.42dB)	5.35 (7.29dB)	3.48 (5.42dB)



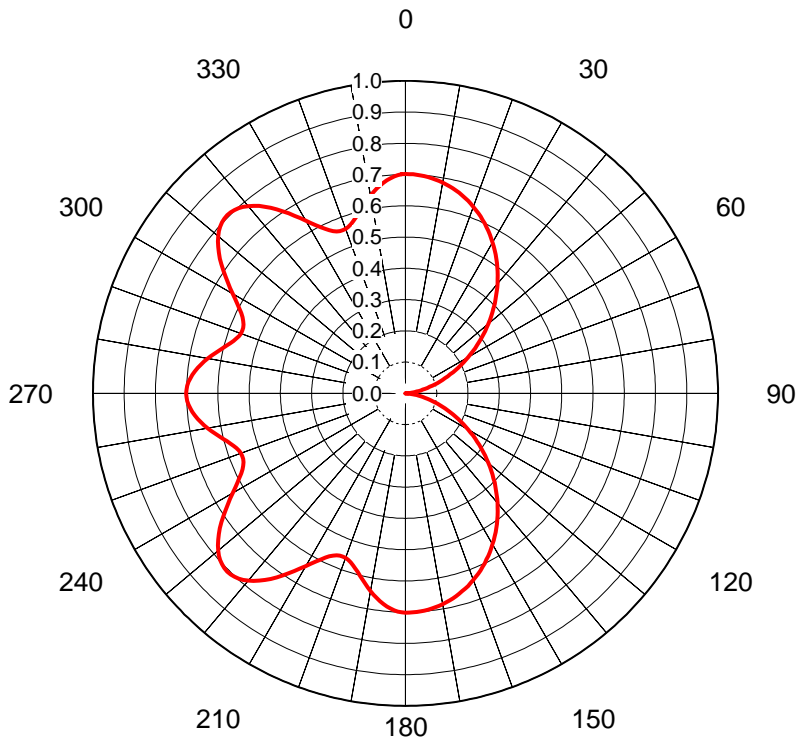
## AZIMUTH PATTERN Horizontal Polarization

In Free Space

Proposal No. **C-71938-2**  
Date **8-Nov-23**  
Call Letters **W34EP**  
Channel **21**  
Frequency **515 MHz**  
Antenna Type **TUM-LP-C3-2/6M-1**  
Gain **1.97 (2.95dB)**  
Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	1.000	36	0.641	72	0.201	108	0.163	144	0.660	180	0.961	216	0.828	252	0.744	288	0.796
1	0.997	37	0.630	73	0.195	109	0.161	145	0.669	181	0.959	217	0.849	253	0.765	289	0.777
2	0.993	38	0.617	74	0.187	110	0.159	146	0.677	182	0.957	218	0.867	254	0.786	290	0.760
3	0.989	39	0.604	75	0.178	111	0.158	147	0.684	183	0.955	219	0.882	255	0.808	291	0.740
4	0.984	40	0.589	76	0.169	112	0.156	148	0.690	184	0.953	220	0.894	256	0.828	292	0.723
5	0.979	41	0.575	77	0.159	113	0.154	149	0.694	185	0.951	221	0.906	257	0.848	293	0.708
6	0.970	42	0.560	78	0.149	114	0.152	150	0.698	186	0.945	222	0.913	258	0.867	294	0.696
7	0.961	43	0.543	79	0.139	115	0.151	151	0.702	187	0.940	223	0.917	259	0.885	295	0.687
8	0.952	44	0.526	80	0.128	116	0.152	152	0.705	188	0.935	224	0.917	260	0.902	296	0.681
9	0.942	45	0.507	81	0.124	117	0.156	153	0.709	189	0.930	225	0.914	261	0.912	297	0.679
10	0.933	46	0.491	82	0.120	118	0.163	154	0.713	190	0.925	226	0.910	262	0.923	298	0.682
11	0.919	47	0.473	83	0.115	119	0.172	155	0.717	191	0.905	227	0.901	263	0.933	299	0.688
12	0.906	48	0.454	84	0.111	120	0.183	156	0.722	192	0.884	228	0.890	264	0.944	300	0.699
13	0.893	49	0.433	85	0.107	121	0.200	157	0.729	193	0.862	229	0.875	265	0.954	301	0.712
14	0.880	50	0.410	86	0.106	122	0.219	158	0.736	194	0.841	230	0.857	266	0.959	302	0.728
15	0.867	51	0.387	87	0.105	123	0.240	159	0.744	195	0.819	231	0.837	267	0.964	303	0.746
16	0.854	52	0.362	88	0.104	124	0.261	160	0.753	196	0.794	232	0.815	268	0.968	304	0.765
17	0.841	53	0.336	89	0.103	125	0.283	161	0.760	197	0.771	233	0.791	269	0.973	305	0.785
18	0.828	54	0.309	90	0.102	126	0.308	162	0.769	198	0.748	234	0.766	270	0.977	306	0.807
19	0.816	55	0.282	91	0.105	127	0.333	163	0.780	199	0.728	235	0.740	271	0.974	307	0.828
20	0.805	56	0.257	92	0.108	128	0.358	164	0.791	200	0.711	236	0.716	272	0.972	308	0.847
21	0.792	57	0.234	93	0.111	129	0.381	165	0.804	201	0.691	237	0.693	273	0.969	309	0.864
22	0.780	58	0.214	94	0.114	130	0.403	166	0.819	202	0.675	238	0.672	274	0.966	310	0.878
23	0.769	59	0.198	95	0.116	131	0.427	167	0.835	203	0.663	239	0.654	275	0.962	311	0.891
24	0.758	60	0.187	96	0.122	132	0.450	168	0.851	204	0.655	240	0.640	276	0.958	312	0.901
25	0.748	61	0.183	97	0.127	133	0.472	169	0.868	205	0.652	241	0.628	277	0.955	313	0.907
26	0.738	62	0.183	98	0.131	134	0.492	170	0.886	206	0.652	242	0.621	278	0.951	314	0.909
27	0.729	63	0.186	99	0.134	135	0.511	171	0.897	207	0.658	243	0.619	279	0.948	315	0.908
28	0.720	64	0.191	100	0.137	136	0.533	172	0.908	208	0.668	244	0.621	280	0.945	316	0.905
29	0.711	65	0.197	101	0.143	137	0.553	173	0.919	209	0.682	245	0.627	281	0.929	317	0.899
30	0.703	66	0.202	102	0.149	138	0.573	174	0.930	210	0.700	246	0.637	282	0.912	318	0.890
31	0.693	67	0.206	103	0.154	139	0.590	175	0.941	211	0.719	247	0.650	283	0.894	319	0.878
32	0.684	68	0.208	104	0.157	140	0.607	176	0.945	212	0.739	248	0.666	284	0.876	320	0.862
33	0.673	69	0.209	105	0.160	141	0.623	177	0.949	213	0.761	249	0.685	285	0.858	321	0.846
34	0.663	70	0.207	106	0.162	142	0.637	178	0.953	214	0.784	250	0.705	286	0.837	322	0.827
35	0.652	71	0.205	107	0.163	143	0.650	179	0.957	215	0.806	251	0.724	287	0.816	323	0.807

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## AZIMUTH PATTERN Vertical Polarization

In Free Space

Proposal No. **C-71938-2**  
Date **8-Nov-23**  
Call Letters **W34EP**  
Channel **21**  
Frequency **515 MHz**  
Antenna Type **TUM-LP-C3-2/6M-1**  
Gain **2.01 (3.04dB)**  
Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.702	36	0.500	72	0.107	108	0.107	144	0.500	180	0.702	216	0.734	252	0.568	288	0.568	324	0.734
1	0.702	37	0.490	73	0.098	109	0.117	145	0.510	181	0.701	217	0.748	253	0.575	289	0.563	325	0.719
2	0.701	38	0.479	74	0.089	110	0.126	146	0.520	182	0.698	218	0.761	254	0.583	290	0.560	326	0.703
3	0.700	39	0.469	75	0.081	111	0.136	147	0.530	183	0.695	219	0.772	255	0.592	291	0.559	327	0.687
4	0.699	40	0.458	76	0.072	112	0.146	148	0.539	184	0.690	220	0.782	256	0.601	292	0.560	328	0.670
5	0.698	41	0.447	77	0.065	113	0.156	149	0.548	185	0.684	221	0.791	257	0.611	293	0.563	329	0.654
6	0.696	42	0.436	78	0.057	114	0.166	150	0.558	186	0.678	222	0.797	258	0.622	294	0.568	330	0.638
7	0.694	43	0.425	79	0.050	115	0.177	151	0.566	187	0.670	223	0.802	259	0.632	295	0.576	331	0.623
8	0.691	44	0.414	80	0.043	116	0.188	152	0.575	188	0.661	224	0.805	260	0.642	296	0.585	332	0.609
9	0.688	45	0.403	81	0.036	117	0.198	153	0.584	189	0.652	225	0.806	261	0.652	297	0.596	333	0.596
10	0.685	46	0.392	82	0.030	118	0.209	154	0.592	190	0.642	226	0.805	262	0.661	298	0.609	334	0.585
11	0.681	47	0.380	83	0.024	119	0.220	155	0.600	191	0.632	227	0.802	263	0.670	299	0.623	335	0.576
12	0.677	48	0.369	84	0.019	120	0.232	156	0.607	192	0.622	228	0.797	264	0.678	300	0.638	336	0.568
13	0.673	49	0.358	85	0.014	121	0.243	157	0.615	193	0.611	229	0.791	265	0.684	301	0.654	337	0.563
14	0.669	50	0.346	86	0.010	122	0.254	158	0.622	194	0.601	230	0.782	266	0.690	302	0.670	338	0.560
15	0.664	51	0.335	87	0.006	123	0.265	159	0.629	195	0.592	231	0.772	267	0.695	303	0.687	339	0.559
16	0.659	52	0.323	88	0.003	124	0.277	160	0.635	196	0.583	232	0.761	268	0.698	304	0.703	340	0.560
17	0.653	53	0.311	89	0.001	125	0.288	161	0.642	197	0.575	233	0.748	269	0.701	305	0.719	341	0.563
18	0.648	54	0.300	90	0.000	126	0.300	162	0.648	198	0.568	234	0.734	270	0.702	306	0.734	342	0.568
19	0.642	55	0.288	91	0.001	127	0.311	163	0.653	199	0.563	235	0.719	271	0.701	307	0.748	343	0.575
20	0.635	56	0.277	92	0.003	128	0.323	164	0.659	200	0.560	236	0.703	272	0.698	308	0.761	344	0.583
21	0.629	57	0.265	93	0.006	129	0.335	165	0.664	201	0.559	237	0.687	273	0.695	309	0.772	345	0.592
22	0.622	58	0.254	94	0.010	130	0.346	166	0.669	202	0.560	238	0.670	274	0.690	310	0.782	346	0.601
23	0.615	59	0.243	95	0.014	131	0.358	167	0.673	203	0.563	239	0.654	275	0.684	311	0.791	347	0.611
24	0.607	60	0.232	96	0.019	132	0.369	168	0.677	204	0.568	240	0.638	276	0.678	312	0.797	348	0.622
25	0.600	61	0.220	97	0.024	133	0.380	169	0.681	205	0.576	241	0.623	277	0.670	313	0.802	349	0.632
26	0.592	62	0.209	98	0.030	134	0.392	170	0.685	206	0.585	242	0.609	278	0.661	314	0.805	350	0.642
27	0.584	63	0.198	99	0.036	135	0.403	171	0.688	207	0.596	243	0.596	279	0.652	315	0.806	351	0.652
28	0.575	64	0.188	100	0.043	136	0.414	172	0.691	208	0.609	244	0.585	280	0.642	316	0.805	352	0.661
29	0.566	65	0.177	101	0.050	137	0.425	173	0.694	209	0.623	245	0.576	281	0.632	317	0.802	353	0.670
30	0.558	66	0.166	102	0.057	138	0.436	174	0.696	210	0.638	246	0.568	282	0.622	318	0.797	354	0.678
31	0.548	67	0.156	103	0.065	139	0.447	175	0.698	211	0.654	247	0.563	283	0.611	319	0.791	355	0.684
32	0.539	68	0.146	104	0.072	140	0.458	176	0.699	212	0.670	248	0.560	284	0.601	320	0.782	356	0.690
33	0.530	69	0.136	105	0.081	141	0.469	177	0.700	213	0.687	249	0.559	285	0.592	321	0.772	357	0.695
34	0.520	70	0.126	106	0.089	142	0.479	178	0.701	214	0.703	250	0.560	286	0.583	322	0.761	358	0.698
35	0.510	71	0.117	107	0.098	143	0.490	179	0.702	215	0.719	251	0.563	287	0.575	323	0.748	359	0.701

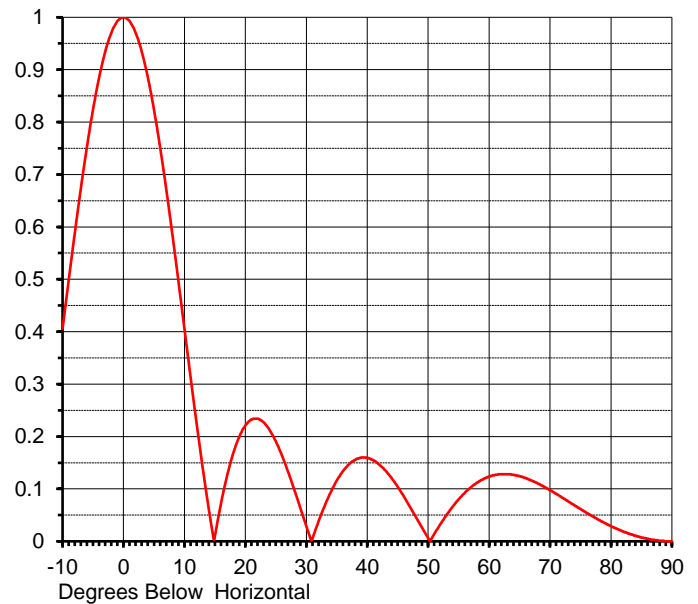
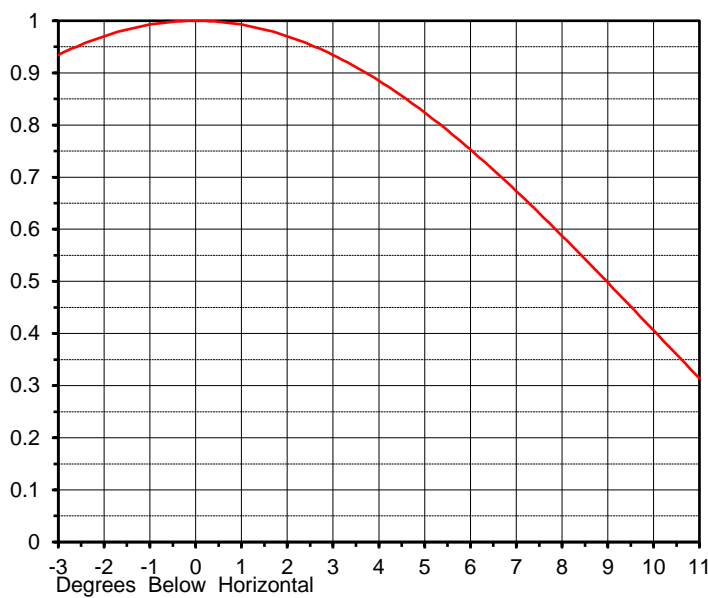
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## ELEVATION PATTERN

Proposal No. **C-71938-2**  
 Date **8-Nov-23**  
 Call Letters **W34EP**  
 Channel **21**  
 Frequency **515 MHz**  
 Antenna Type **TUM-LP-C3-2/6M-1**

RMS Directivity at Main Lobe **4.4 ( 6.47 dB )**  
 RMS Directivity at Horizontal **4.4 ( 6.43 dB )**  
**Calculated**

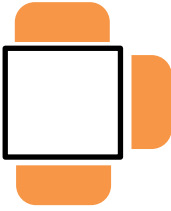
Beam Tilt **0.00 deg**  
 Pattern Number **02U045000**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.406	10.0	0.406	30.0	0.029	50.0	0.006	70.0	0.098
-9.0	0.498	11.0	0.314	31.0	0.005	51.0	0.014	71.0	0.091
-8.0	0.587	12.0	0.225	32.0	0.038	52.0	0.033	72.0	0.083
-7.0	0.673	13.0	0.140	33.0	0.067	53.0	0.050	73.0	0.076
-6.0	0.753	14.0	0.061	34.0	0.093	54.0	0.066	74.0	0.069
-5.0	0.824	15.0	0.010	35.0	0.116	55.0	0.080	75.0	0.062
-4.0	0.885	16.0	0.072	36.0	0.134	56.0	0.092	76.0	0.054
-3.0	0.934	17.0	0.125	37.0	0.147	57.0	0.103	77.0	0.048
-2.0	0.970	18.0	0.168	38.0	0.155	58.0	0.112	78.0	0.041
-1.0	0.993	19.0	0.199	39.0	0.160	59.0	0.118	79.0	0.035
0.0	1.000	20.0	0.221	40.0	0.159	60.0	0.123	80.0	0.029
1.0	0.993	21.0	0.232	41.0	0.155	61.0	0.127	81.0	0.024
2.0	0.970	22.0	0.234	42.0	0.146	62.0	0.128	82.0	0.019
3.0	0.934	23.0	0.227	43.0	0.135	63.0	0.128	83.0	0.014
4.0	0.885	24.0	0.212	44.0	0.121	64.0	0.127	84.0	0.011
5.0	0.824	25.0	0.191	45.0	0.104	65.0	0.124	85.0	0.007
6.0	0.753	26.0	0.164	46.0	0.086	66.0	0.121	86.0	0.005
7.0	0.673	27.0	0.133	47.0	0.066	67.0	0.116	87.0	0.003
8.0	0.587	28.0	0.099	48.0	0.046	68.0	0.110	88.0	0.001
9.0	0.498	29.0	0.064	49.0	0.026	69.0	0.104	89.0	0.000
								90.0	0.000

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## MECHANICAL SPECIFICATIONS



Proposal No. **C-71938-2**  
 Date **8-Nov-23**  
 Call Letters **W34EP**  
 Channel **21**  
 Frequency **515 MHz**  
 Antenna Type **TUM-LP-C3-2/6M-1**

### Preliminary Specifications

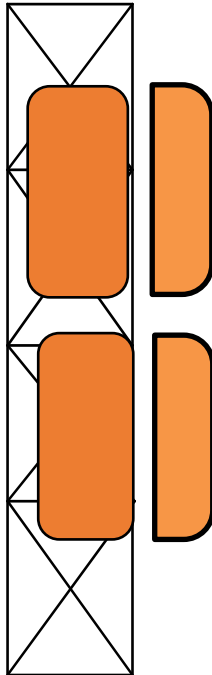
#### Side Mounted

##### With ice TIA-222-G

Height AGL(z) 195 ft (59.4 m)  
 Basic Wind Speed 90 m/h (144.8 km/h)

Structure Class III  
 Exposure Category C  
 Topography Category 1

Design Ice 0.5 in  $t_{iz} = 1.20$  in  
 Wind Speed w/Ice 40 m/h (64.4 km/h)



6.8 ft (2.1m)

#### Mechanical Specifications

		without ice	with ice	
Height	H2	6.8 ft (2.1m)		
Height of Center of Radiation	H3	3.4 ft (1m)		
Effective Projected Area	(EPA) <sub>A</sub>	30.4 ft² (2.8m²)	41.8 ft² (3.9m²)	Mounts Excluded
Weight	W	250 lb (0.1t)	500 lb (0.2t)	Mounts Excluded

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

Prepared by: CAB

Date: 19-Aug-22

ME:

EE:

Rev. No.2 by: CAB

Date: 8-Nov-23

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## Summary

Proposal No.	<b>C-71938-2</b>
Date	<b>8-Nov-23</b>
Call Letters	<b>W34EP</b>
Channel	<b>21</b>
Frequency	<b>515 MHz</b>
Antenna Type	<b>TUM-LP-C3-2/6M-1</b>

## Antenna

	Hpol		Vpol	
ERP:	<b>15.0 kW</b>	<b>( 11.76 dBk )</b>	<b>9.75 kW</b>	<b>( 9.89 dBk )</b>
Peak Gain*	5.35	( 7.29 dB )	3.48	( 5.42 dB )

<b>Antenna Input Power</b>	<b>2.80 kW</b>	<b>( 4.47 dBk )</b>
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## Transmission Line

Type:	<b>Rigid Digitline</b>	Attenuation:	<b>( 1.60 dB )</b>
Size:	<b>3-1/8"</b>	Efficiency:	<b>69.2%</b>
Impedance:	<b>50 Ohm</b>		
Length:	<b>680 ft</b>	<b>207.3 m</b>	

## Transmitter Output

<b>4.05 kW</b>	<b>( 6.08 dBk )</b>
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Transmitter filter losses not included

\* Directivity and Gain are with respect to half wave dipole. The gain includes feed system losses

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