

**Antenna Model: TFU-16WB-R C160**

Reference Number: **20200319WTG**  
 Date: **19-Mar-20**  
 Customer: **TEGNA**  
 Location: **Waterbury, CONNECTICUT**

## Electrical Specifications

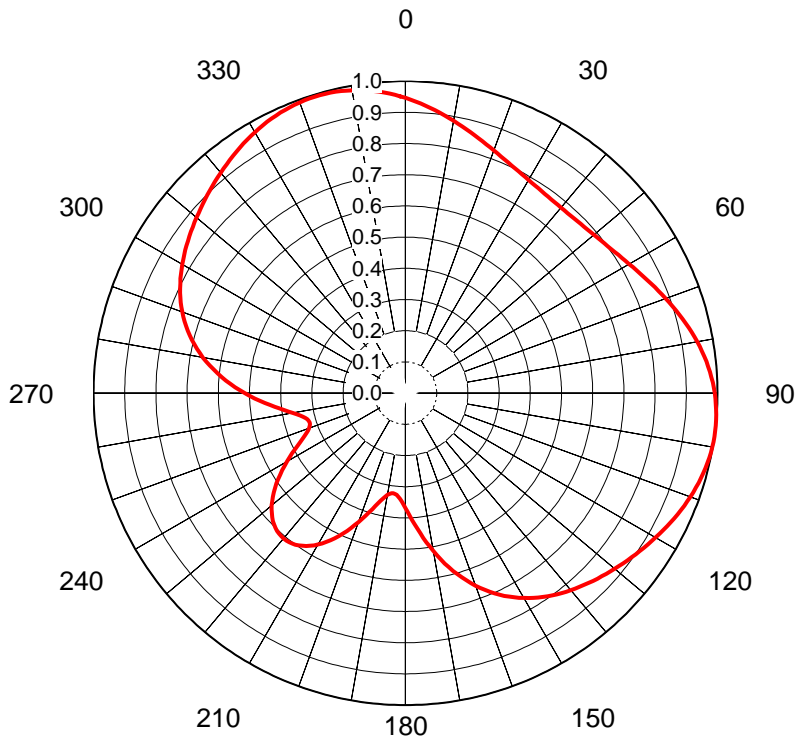
Polarization: **Horizontal**  
 Azimuth Pattern: **C160**  
 Antenna Input: **6-1/8 in 50 Ohm EIA/DCA**  
 VSWR: **Channel 1.15:1 Band 1.15:1**  
 Bandwidth: **470-698 MHz**  
 Rated Input Power: **40 kW (16.02 dBk) Maximun Combined Average Power**

## Mechanical Specifications

Mounting: **Side Mounted**  
 Environmental Protection: **Full Radome**  
 Height: **28.9 ft ( 8.8m)**  
 Weight: **1260 lb (572 kg) mounts excluded**  
 Effective Projected Area: **61.1 ft² (5.7m²)**

## Channel Specifications

Call	Ch	Freq	Hpol ERP	TPO	Peak Gain Main Lobe Hpol	Peak Gain at Horizontal Hpol
WCCT	33	587	75.0 kW (18.75 dBk)	4.56 kW (6.59 dBk)	24.17 (13.83dB)	22.51 (13.52dB)
WTIC	34	593	100.0 kW (20.00 dBk)	6.10 kW (7.85 dBk)	24.14 (13.83dB)	22.43 (13.51dB)



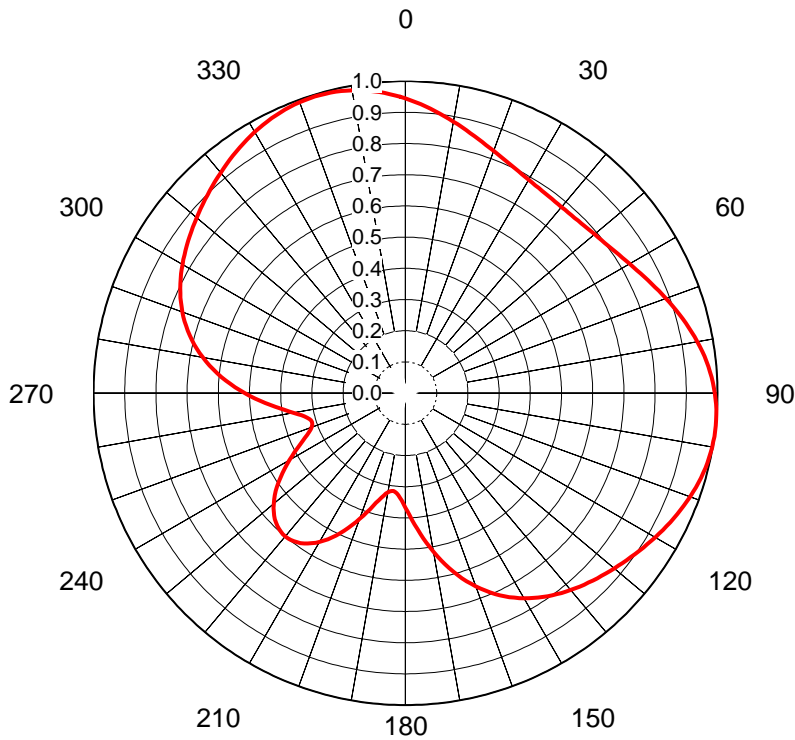
## AZIMUTH PATTERN Horizontal Polarization

Proposal No. **20200319WTG**  
 Date **19-Mar-20**  
 Call Letters **WCCT**  
 Channel **33**  
 Frequency **587 MHz**  
 Antenna Type **TFU-16WB-R C160**  
 Gain **1.68 (2.25dB)**  
 Calculated

Pattern Number **WB-C160-33 Hpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.946	36	0.778	72	0.900	108	0.979	144	0.801	180	0.368	216	0.600	252	0.322	288	0.744	324	0.940
1	0.941	37	0.777	73	0.907	109	0.976	145	0.795	181	0.357	217	0.604	253	0.321	289	0.753	325	0.945
2	0.935	38	0.777	74	0.913	110	0.972	146	0.788	182	0.348	218	0.606	254	0.322	290	0.761	326	0.949
3	0.930	39	0.776	75	0.919	111	0.968	147	0.781	183	0.339	219	0.608	255	0.326	291	0.769	327	0.953
4	0.924	40	0.776	76	0.926	112	0.964	148	0.774	184	0.333	220	0.608	256	0.331	292	0.777	328	0.958
5	0.918	41	0.776	77	0.932	113	0.959	149	0.766	185	0.328	221	0.608	257	0.337	293	0.784	329	0.962
6	0.911	42	0.777	78	0.938	114	0.955	150	0.758	186	0.325	222	0.606	258	0.346	294	0.791	330	0.966
7	0.905	43	0.777	79	0.944	115	0.950	151	0.750	187	0.323	223	0.604	259	0.356	295	0.797	331	0.969
8	0.899	44	0.778	80	0.949	116	0.945	152	0.741	188	0.324	224	0.600	260	0.367	296	0.803	332	0.973
9	0.893	45	0.779	81	0.955	117	0.941	153	0.732	189	0.327	225	0.596	261	0.379	297	0.809	333	0.976
10	0.886	46	0.781	82	0.960	118	0.936	154	0.723	190	0.331	226	0.590	262	0.393	298	0.815	334	0.979
11	0.880	47	0.782	83	0.965	119	0.931	155	0.713	191	0.337	227	0.584	263	0.407	299	0.821	335	0.982
12	0.874	48	0.784	84	0.970	120	0.926	156	0.703	192	0.345	228	0.577	264	0.421	300	0.826	336	0.984
13	0.868	49	0.786	85	0.974	121	0.921	157	0.692	193	0.354	229	0.569	265	0.436	301	0.831	337	0.987
14	0.861	50	0.789	86	0.978	122	0.916	158	0.681	194	0.364	230	0.560	266	0.452	302	0.836	338	0.989
15	0.855	51	0.792	87	0.982	123	0.911	159	0.669	195	0.375	231	0.550	267	0.468	303	0.841	339	0.990
16	0.850	52	0.795	88	0.985	124	0.906	160	0.657	196	0.387	232	0.540	268	0.484	304	0.846	340	0.992
17	0.844	53	0.798	89	0.988	125	0.901	161	0.644	197	0.399	233	0.529	269	0.499	305	0.851	341	0.993
18	0.838	54	0.801	90	0.991	126	0.896	162	0.631	198	0.412	234	0.517	270	0.515	306	0.856	342	0.993
19	0.833	55	0.805	91	0.994	127	0.891	163	0.618	199	0.426	235	0.505	271	0.531	307	0.861	343	0.994
20	0.828	56	0.809	92	0.996	128	0.886	164	0.604	200	0.439	236	0.492	272	0.547	308	0.865	344	0.994
21	0.823	57	0.813	93	0.997	129	0.881	165	0.590	201	0.453	237	0.479	273	0.562	309	0.870	345	0.993
22	0.818	58	0.818	94	0.998	130	0.876	166	0.575	202	0.466	238	0.466	274	0.577	310	0.875	346	0.992
23	0.814	59	0.823	95	0.999	131	0.871	167	0.560	203	0.480	239	0.452	275	0.592	311	0.879	347	0.991
24	0.809	60	0.828	96	1.000	132	0.866	168	0.545	204	0.493	240	0.438	276	0.606	312	0.884	348	0.990
25	0.805	61	0.833	97	1.000	133	0.861	169	0.530	205	0.505	241	0.425	277	0.620	313	0.889	349	0.988
26	0.802	62	0.838	98	1.000	134	0.856	170	0.514	206	0.518	242	0.411	278	0.634	314	0.893	350	0.986
27	0.798	63	0.844	99	0.999	135	0.851	171	0.499	207	0.529	243	0.398	279	0.647	315	0.898	351	0.983
28	0.795	64	0.850	100	0.998	136	0.846	172	0.483	208	0.540	244	0.385	280	0.659	316	0.903	352	0.980
29	0.792	65	0.856	101	0.997	137	0.841	173	0.468	209	0.551	245	0.373	281	0.672	317	0.907	353	0.977
30	0.789	66	0.862	102	0.995	138	0.835	174	0.452	210	0.560	246	0.362	282	0.683	318	0.912	354	0.974
31	0.787	67	0.868	103	0.993	139	0.830	175	0.437	211	0.569	247	0.352	283	0.695	319	0.917	355	0.970
32	0.784	68	0.874	104	0.991	140	0.825	176	0.422	212	0.577	248	0.343	284	0.705	320	0.922	356	0.966
33	0.782	69	0.881	105	0.989	141	0.819	177	0.407	213	0.584	249	0.335	285	0.716	321	0.926	357	0.961
34	0.781	70	0.887	106	0.986	142	0.813	178	0.394	214	0.590	250	0.329	286	0.726	322	0.931	358	0.957
35	0.779	71	0.894	107	0.983	143	0.807	179	0.381	215	0.596	251	0.324	287	0.735	323	0.936	359	0.952

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## AZIMUTH PATTERN Horizontal Polarization

Proposal No. **20200319WTG**  
 Date **19-Mar-20**  
 Call Letters **WTIC**  
 Channel **34**  
 Frequency **593 MHz**  
 Antenna Type **TFU-16WB-R C160**  
 Gain **1.69 (2.27dB)**  
 Calculated

Pattern Number **WB-C160-34 Hpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.945	36	0.780	72	0.901	108	0.978	144	0.801	180	0.367	216	0.591	252	0.314	288	0.745	324	0.941
1	0.939	37	0.779	73	0.907	109	0.975	145	0.795	181	0.355	217	0.595	253	0.314	289	0.753	325	0.945
2	0.933	38	0.779	74	0.914	110	0.971	146	0.788	182	0.345	218	0.597	254	0.315	290	0.761	326	0.950
3	0.927	39	0.779	75	0.920	111	0.967	147	0.782	183	0.336	219	0.599	255	0.319	291	0.769	327	0.954
4	0.921	40	0.779	76	0.926	112	0.962	148	0.774	184	0.328	220	0.599	256	0.325	292	0.776	328	0.958
5	0.915	41	0.779	77	0.932	113	0.958	149	0.767	185	0.322	221	0.599	257	0.332	293	0.783	329	0.962
6	0.909	42	0.779	78	0.938	114	0.953	150	0.759	186	0.319	222	0.597	258	0.341	294	0.790	330	0.966
7	0.903	43	0.780	79	0.944	115	0.949	151	0.751	187	0.317	223	0.595	259	0.352	295	0.797	331	0.970
8	0.896	44	0.781	80	0.950	116	0.944	152	0.743	188	0.317	224	0.592	260	0.364	296	0.803	332	0.974
9	0.890	45	0.782	81	0.955	117	0.939	153	0.734	189	0.318	225	0.587	261	0.376	297	0.809	333	0.977
10	0.884	46	0.783	82	0.960	118	0.934	154	0.725	190	0.322	226	0.582	262	0.390	298	0.815	334	0.980
11	0.877	47	0.785	83	0.965	119	0.929	155	0.715	191	0.328	227	0.576	263	0.405	299	0.820	335	0.983
12	0.871	48	0.787	84	0.970	120	0.924	156	0.705	192	0.335	228	0.568	264	0.420	300	0.825	336	0.985
13	0.865	49	0.789	85	0.974	121	0.919	157	0.694	193	0.344	229	0.560	265	0.435	301	0.831	337	0.987
14	0.859	50	0.791	86	0.979	122	0.914	158	0.683	194	0.354	230	0.551	266	0.451	302	0.836	338	0.989
15	0.853	51	0.794	87	0.982	123	0.909	159	0.671	195	0.365	231	0.542	267	0.467	303	0.841	339	0.991
16	0.847	52	0.797	88	0.986	124	0.904	160	0.659	196	0.376	232	0.531	268	0.483	304	0.846	340	0.992
17	0.842	53	0.800	89	0.989	125	0.899	161	0.647	197	0.389	233	0.520	269	0.499	305	0.850	341	0.993
18	0.836	54	0.804	90	0.991	126	0.894	162	0.634	198	0.402	234	0.509	270	0.515	306	0.855	342	0.994
19	0.831	55	0.807	91	0.994	127	0.889	163	0.621	199	0.415	235	0.496	271	0.531	307	0.860	343	0.994
20	0.826	56	0.811	92	0.996	128	0.884	164	0.607	200	0.429	236	0.483	272	0.547	308	0.865	344	0.994
21	0.821	57	0.815	93	0.997	129	0.879	165	0.593	201	0.442	237	0.470	273	0.562	309	0.869	345	0.994
22	0.817	58	0.820	94	0.999	130	0.874	166	0.578	202	0.456	238	0.457	274	0.577	310	0.874	346	0.993
23	0.813	59	0.824	95	0.999	131	0.869	167	0.563	203	0.469	239	0.443	275	0.592	311	0.879	347	0.991
24	0.809	60	0.829	96	1.000	132	0.864	168	0.548	204	0.483	240	0.429	276	0.607	312	0.883	348	0.990
25	0.805	61	0.834	97	1.000	133	0.859	169	0.532	205	0.495	241	0.416	277	0.621	313	0.888	349	0.988
26	0.801	62	0.840	98	1.000	134	0.854	170	0.517	206	0.508	242	0.402	278	0.634	314	0.893	350	0.986
27	0.798	63	0.845	99	0.999	135	0.849	171	0.501	207	0.519	243	0.389	279	0.647	315	0.898	351	0.983
28	0.795	64	0.851	100	0.998	136	0.844	172	0.485	208	0.530	244	0.376	280	0.660	316	0.902	352	0.980
29	0.792	65	0.857	101	0.997	137	0.839	173	0.469	209	0.541	245	0.364	281	0.672	317	0.907	353	0.976
30	0.790	66	0.863	102	0.995	138	0.834	174	0.453	210	0.551	246	0.353	282	0.684	318	0.912	354	0.973
31	0.788	67	0.869	103	0.993	139	0.829	175	0.438	211	0.559	247	0.343	283	0.695	319	0.917	355	0.969
32	0.786	68	0.875	104	0.991	140	0.824	176	0.422	212	0.568	248	0.334	284	0.706	320	0.922	356	0.964
33	0.784	69	0.882	105	0.988	141	0.818	177	0.408	213	0.575	249	0.326	285	0.716	321	0.927	357	0.960
34	0.782	70	0.888	106	0.985	142	0.813	178	0.393	214	0.581	250	0.320	286	0.726	322	0.931	358	0.955
35	0.781	71	0.894	107	0.982	143	0.807	179	0.380	215	0.587	251	0.316	287	0.736	323	0.936	359	0.950

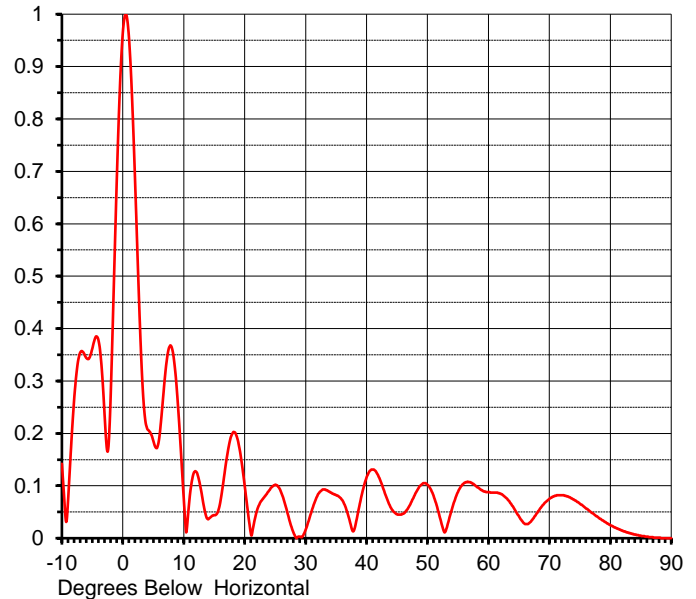
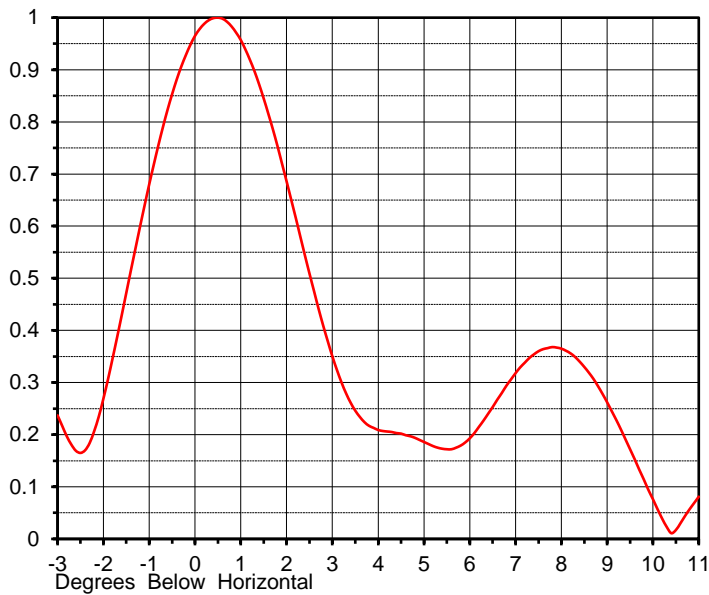
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## ELEVATION PATTERN

Proposal No. **20200319WTG**  
 Date **19-Mar-20**  
 Call Letters **WCCT**  
 Channel **33**  
 Frequency **587 MHz**  
 Antenna Type **TFU-16WB-R C160**

RMS Directivity at Main Lobe **14.4 ( 11.58 dB )**  
 RMS Directivity at Horizontal **13.4 ( 11.27 dB )**  
**Calculated**

Beam Tilt **0.55 deg**  
 Pattern Number **16W144055-33**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.142	10.0	0.076	30.0	0.016	50.0	0.102	70.0	0.075
-9.0	0.069	11.0	0.081	31.0	0.052	51.0	0.081	71.0	0.081
-8.0	0.263	12.0	0.127	32.0	0.083	52.0	0.041	72.0	0.082
-7.0	0.354	13.0	0.081	33.0	0.093	53.0	0.014	73.0	0.080
-6.0	0.344	14.0	0.036	34.0	0.088	54.0	0.055	74.0	0.074
-5.0	0.362	15.0	0.044	35.0	0.082	55.0	0.088	75.0	0.066
-4.0	0.378	16.0	0.069	36.0	0.073	56.0	0.105	76.0	0.057
-3.0	0.237	17.0	0.149	37.0	0.043	57.0	0.107	77.0	0.048
-2.0	0.269	18.0	0.200	38.0	0.017	58.0	0.099	78.0	0.040
-1.0	0.680	19.0	0.180	39.0	0.071	59.0	0.091	79.0	0.032
0.0	0.965	20.0	0.100	40.0	0.116	60.0	0.088	80.0	0.025
1.0	0.957	21.0	0.010	41.0	0.131	61.0	0.087	81.0	0.019
2.0	0.686	22.0	0.052	42.0	0.117	62.0	0.085	82.0	0.014
3.0	0.350	23.0	0.075	43.0	0.086	63.0	0.076	83.0	0.010
4.0	0.209	24.0	0.091	44.0	0.058	64.0	0.061	84.0	0.007
5.0	0.186	25.0	0.102	45.0	0.046	65.0	0.042	85.0	0.005
6.0	0.193	26.0	0.087	46.0	0.047	66.0	0.027	86.0	0.003
7.0	0.318	27.0	0.049	47.0	0.061	67.0	0.032	87.0	0.002
8.0	0.365	28.0	0.011	48.0	0.085	68.0	0.048	88.0	0.001
9.0	0.262	29.0	0.003	49.0	0.102	69.0	0.064	89.0	0.000
								90.0	0.000

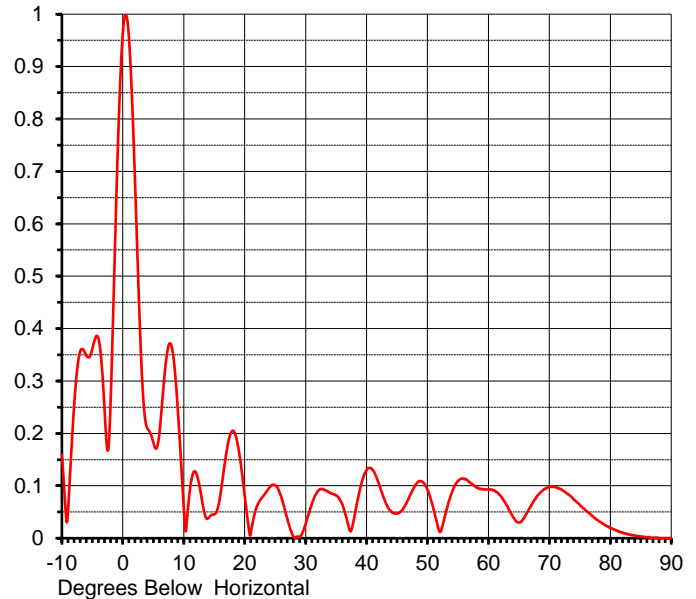
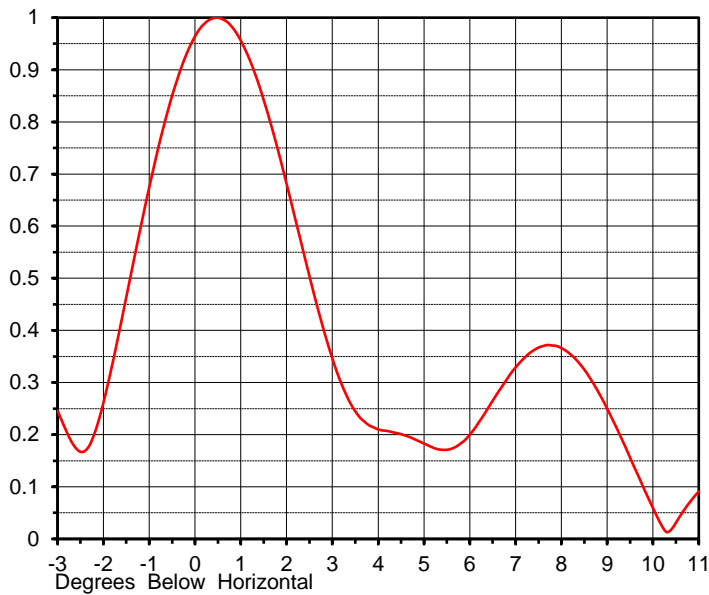
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## ELEVATION PATTERN

Proposal No. **20200319WTG**  
 Date **19-Mar-20**  
 Call Letters **WTIC**  
 Channel **34**  
 Frequency **593 MHz**  
 Antenna Type **TFU-16WB-R C160**

RMS Directivity at Main Lobe **14.3 ( 11.56 dB )**  
 RMS Directivity at Horizontal **13.3 ( 11.24 dB )**  
**Calculated**

Beam Tilt **0.55 deg**  
 Pattern Number **16W143055-34**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.159	10.0	0.059	30.0	0.027	50.0	0.093	70.0	0.098
-9.0	0.051	11.0	0.091	31.0	0.065	51.0	0.055	71.0	0.097
-8.0	0.251	12.0	0.125	32.0	0.090	52.0	0.012	72.0	0.093
-7.0	0.356	13.0	0.072	33.0	0.093	53.0	0.048	73.0	0.084
-6.0	0.349	14.0	0.038	34.0	0.087	54.0	0.087	74.0	0.074
-5.0	0.361	15.0	0.046	35.0	0.082	55.0	0.109	75.0	0.064
-4.0	0.381	16.0	0.082	36.0	0.065	56.0	0.113	76.0	0.053
-3.0	0.246	17.0	0.163	37.0	0.025	57.0	0.106	77.0	0.043
-2.0	0.261	18.0	0.205	38.0	0.041	58.0	0.097	78.0	0.034
-1.0	0.674	19.0	0.170	39.0	0.097	59.0	0.094	79.0	0.026
0.0	0.964	20.0	0.081	40.0	0.130	60.0	0.093	80.0	0.020
1.0	0.956	21.0	0.010	41.0	0.130	61.0	0.091	81.0	0.015
2.0	0.681	22.0	0.061	42.0	0.105	62.0	0.081	82.0	0.011
3.0	0.346	23.0	0.080	43.0	0.072	63.0	0.063	83.0	0.007
4.0	0.210	24.0	0.096	44.0	0.051	64.0	0.041	84.0	0.005
5.0	0.183	25.0	0.101	45.0	0.047	65.0	0.030	85.0	0.003
6.0	0.200	26.0	0.079	46.0	0.056	66.0	0.042	86.0	0.002
7.0	0.329	27.0	0.037	47.0	0.078	67.0	0.062	87.0	0.001
8.0	0.366	28.0	0.003	48.0	0.101	68.0	0.080	88.0	0.000
9.0	0.250	29.0	0.002	49.0	0.109	69.0	0.092	89.0	0.000
								90.0	0.000

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## Summary

Proposal No.	20200319WTG
Date	19-Mar-20
Call Letters	WCCT
Channel	33
Frequency	587 MHz
Antenna Type	TFU-16WB-R C160

## Antenna

		Hpol
ERP:	75.0 kW	( 18.75 dBk )
Peak Gain	24.17	( 13.83 dBd )

Antenna Input Power	3.10 kW	( 4.92 dBk )
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## Transmission Line

Type:	Rigid	Attenuation:	( 1.42 dB )
Size:	6-1/8"	Efficiency:	72.1%
Impedance:	75 Ohm		
Length:	1200 ft	365.8 m	

## Combiner Losses

Attenuation	( 0.25 dB )
Efficiency	94.4%

## Combiner Input

4.56 kW	( 6.59 dBk )
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Transmitter filter losses not included

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## Summary

Proposal No.	20200319WTG
Date	19-Mar-20
Call Letters	WTIC
Channel	34
Frequency	593 MHz
Antenna Type	TFU-16WB-R C160

## Antenna

		Hpol
ERP:	100.0 kW	( 20.00 dBk )
Peak Gain	24.14	( 13.83 dBd )

Antenna Input Power	4.14 kW	( 6.17 dBk )
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## Transmission Line

Type:	Rigid	Attenuation:	( 1.43 dB )
Size:	6-1/8"	Efficiency:	72.0%
Impedance:	75 Ohm		
Length:	1200 ft	365.8 m	

## Combiner Losses

Attenuation	( 0.25 dB )
Efficiency	94.4%

## Combiner Input

6.10 kW	( 7.85 dBk )
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Transmitter filter losses not included

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