Dielectric

Proposal #: **EM-070918-1** Antenna Type: **TUM-C5SP-14/60H-2-T-R** Channel: **43 DTV**

Call Letters: **KCSM-DT** Location: **San Francisco, CA**

Electrical Specifications			**Value** Ratio	dBd	**Remarks**
RMS Gain at Main Lobe over Halfwave Dipole		Hpol	21.7	13.36	
		Vpol	4.3	6.33	
RMS Gain at Horizontal over Halfwave Dipole		Hpol	9.4	9.73	
		Vpol	1.9	2.79	
Peak Directional Gain over Halfwave Dipole		Hpol	43.4	16.37	
		Vpol	8.2	9.14	
Peak Directional Gain at Horizontal over Halfwave Dipole		Hpol	18.8	12.74	
		Vpol	3.5	5.44	
Circularity	Directional		dB		
Axial Ratio			dB		
Beam Tilt			0.75 deg		
Antenna Input:	T/L	2 x	6-1/8 in	50.0 ohm	Type: EIA/DCA
Maximum Antenna Input VSWR			Channel	1.10 : 1	Notes: 5 psi dry air or Nitrogen required.
Patterns	Azimuth		TUM-C5SP-6470	TUM-C5SP-6470	
	Elevation		14U270075	14U270075-90	

Mechanical Specifications	**Metric**	**English**	
Radome Full Cylindrical			

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

NOTE:

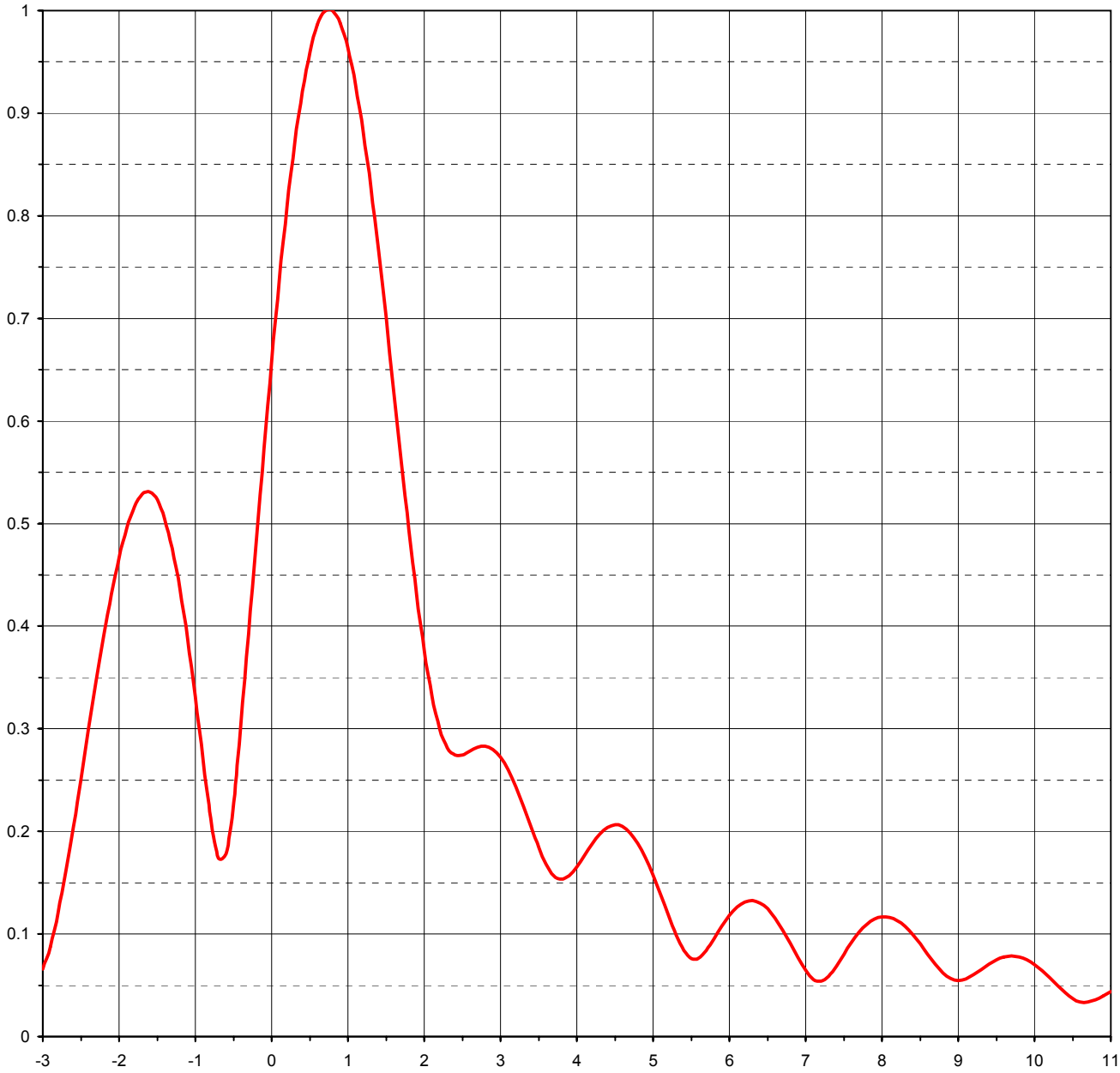
Prepared By : EHM Approved By : AJS

Original Date : 18-Sep-07

Proposal Number	**EM-070918-1**		
Date	**18-Sep-07**		
Call Letters	**KCSM-DT**	Channel	**43**
Location	**San Francisco, CA**		
Customer			
Antenna Type	**TUM-C5SP-14/60H-2-T-R**		

ELEVATION PATTERN

RMS Gain at Main Lobe	**26.00 (14.15 dB)**	Beam Tilt	**0.75 deg**
RMS Gain at Horizontal	**11.30 (10.53 dB)**	Frequency	**647.00 MHz**
Calculated / Measured	**Calculated**	Drawing #	**14U270075**



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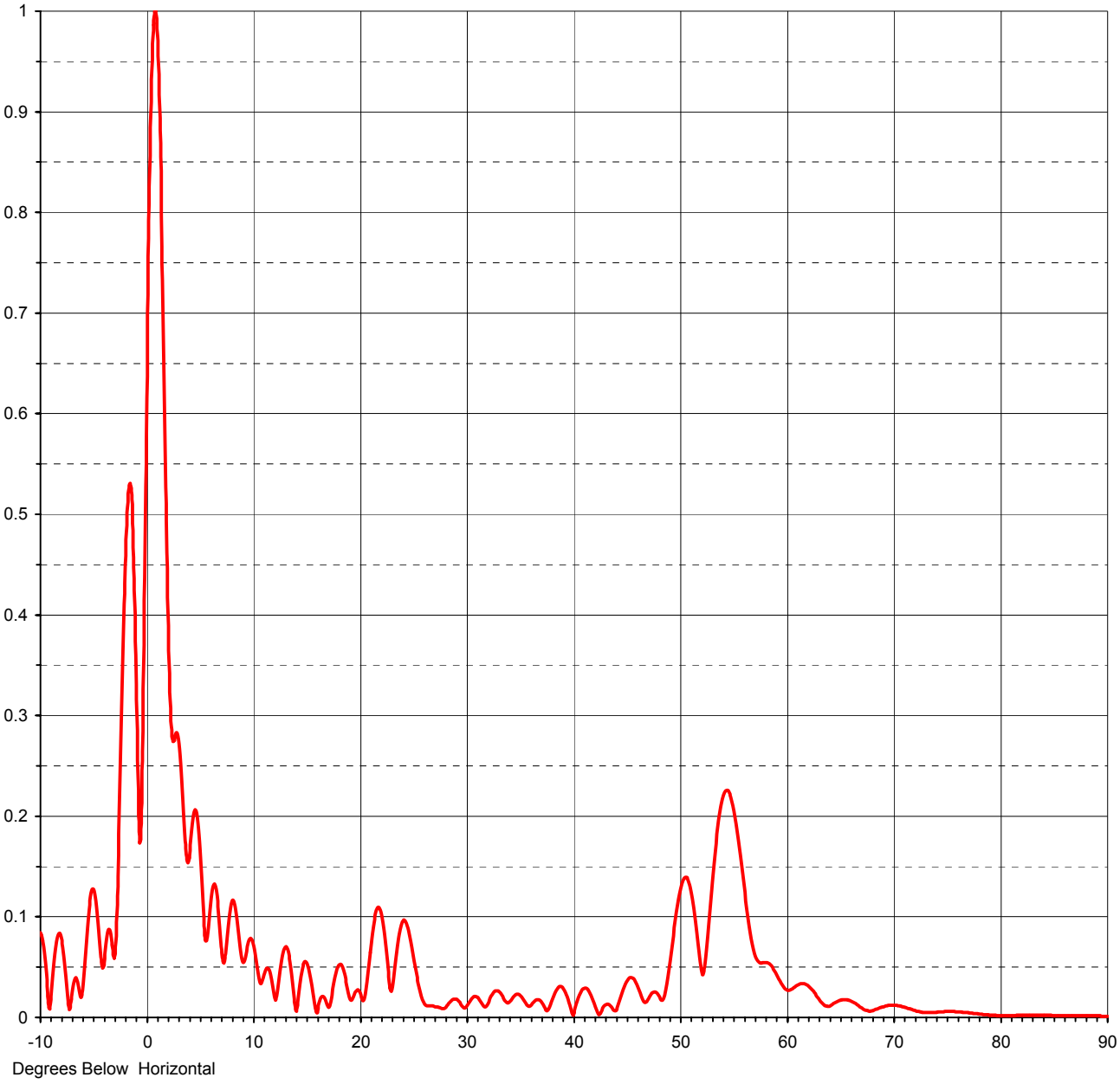
Date	**18-Sep-07**		
Call Letters	**KCSM-DT**	Channel	**43**
Location	**San Francisco, CA**		
Customer			
Antenna Type	**TUM-C5SP-14/60H-2-T-R**		

ELEVATION PATTERN

RMS Gain at Main Lobe	**26.00 (14.15 dB)**	Beam Tilt	**0.75 deg**
RMS Gain at Horizontal	**11.30 (10.53 dB)**	Frequency	**647.00 MHz**
Calculated / Measured	**Calculated**	Drawing #	**14U270075-90**



Dielectric

Proposal Number	**EM-070918-1**
Date	**18-Sep-07**
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Location	**San Francisco, CA**
Customer	
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TABULATION OF ELEVATION PATTERN

Elevation Pattern Drawing #: **14U270075-90**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.084	2.4	0.274	10.6	0.037	30.5	0.019	51.0	0.129	71.5	0.008
-9.5	0.050	2.6	0.278	10.8	0.034	31.0	0.021	51.5	0.094	72.0	0.007
-9.0	0.021	2.8	0.283	11.0	0.040	31.5	0.013	52.0	0.048	72.5	0.005
-8.5	0.075	3.0	0.272	11.5	0.048	32.0	0.013	52.5	0.065	73.0	0.005
-8.0	0.077	3.2	0.243	12.0	0.021	32.5	0.024	53.0	0.127	73.5	0.005
-7.5	0.028	3.4	0.204	12.5	0.041	33.0	0.026	53.5	0.183	74.0	0.005
-7.0	0.028	3.6	0.168	13.0	0.070	33.5	0.019	54.0	0.217	74.5	0.006
-6.5	0.035	3.8	0.153	13.5	0.055	34.0	0.015	54.5	0.226	75.0	0.006
-6.0	0.032	4.0	0.166	14.0	0.008	34.5	0.021	55.0	0.210	75.5	0.006
-5.5	0.101	4.2	0.188	14.5	0.041	35.0	0.023	55.5	0.176	76.0	0.005
-5.0	0.127	4.4	0.204	15.0	0.055	35.5	0.015	56.0	0.133	76.5	0.005
-4.5	0.079	4.6	0.205	15.5	0.033	36.0	0.012	56.5	0.092	77.0	0.004
-4.0	0.058	4.8	0.188	16.0	0.005	36.5	0.017	57.0	0.064	77.5	0.004
-3.5	0.087	5.0	0.157	16.5	0.021	37.0	0.016	57.5	0.054	78.0	0.003
-3.0	0.066	5.2	0.118	17.0	0.011	37.5	0.007	58.0	0.055	78.5	0.003
-2.8	0.121	5.4	0.084	17.5	0.028	38.0	0.016	58.5	0.052	79.0	0.002
-2.6	0.205	5.6	0.076	18.0	0.051	38.5	0.028	59.0	0.044	79.5	0.002
-2.4	0.299	5.8	0.095	18.5	0.047	39.0	0.030	59.5	0.034	80.0	0.002
-2.2	0.391	6.0	0.118	19.0	0.022	39.5	0.019	60.0	0.027	80.5	0.002
-2.0	0.467	6.2	0.131	19.5	0.023	40.0	0.002	60.5	0.028	81.0	0.002
-1.8	0.516	6.4	0.130	20.0	0.025	40.5	0.019	61.0	0.032	81.5	0.002
-1.6	0.531	6.6	0.115	20.5	0.021	41.0	0.029	61.5	0.034	82.0	0.002
-1.4	0.505	6.8	0.091	21.0	0.065	41.5	0.026	62.0	0.032	82.5	0.002
-1.2	0.436	7.0	0.064	21.5	0.103	42.0	0.014	62.5	0.026	83.0	0.002
-1.0	0.331	7.2	0.054	22.0	0.105	42.5	0.003	63.0	0.019	83.5	0.002
-0.8	0.213	7.4	0.069	22.5	0.067	43.0	0.012	63.5	0.013	84.0	0.002
-0.6	0.178	7.6	0.092	23.0	0.026	43.5	0.012	64.0	0.011	84.5	0.002
-0.4	0.305	7.8	0.109	23.5	0.067	44.0	0.007	64.5	0.015	85.0	0.002
-0.2	0.483	8.0	0.117	24.0	0.095	44.5	0.021	65.0	0.017	85.5	0.002
0.0	0.658	8.2	0.113	24.5	0.090	45.0	0.035	65.5	0.018	86.0	0.002
0.2	0.809	8.4	0.100	25.0	0.063	45.5	0.040	66.0	0.016	86.5	0.002
0.4	0.921	8.6	0.080	25.5	0.034	46.0	0.032	66.5	0.013	87.0	0.002
0.6	0.986	8.8	0.062	26.0	0.015	46.5	0.018	67.0	0.009	87.5	0.002
0.8	1.000	9.0	0.054	26.5	0.012	47.0	0.017	67.5	0.007	88.0	0.002
1.0	0.964	9.2	0.060	27.0	0.011	47.5	0.025	68.0	0.007	88.5	0.001
1.2	0.881	9.4	0.071	27.5	0.010	48.0	0.022	68.5	0.009	89.0	0.001
1.4	0.766	9.6	0.078	28.0	0.010	48.5	0.019	69.0	0.011	89.5	0.001
1.6	0.631	9.8	0.079	28.5	0.015	49.0	0.048	69.5	0.012	90.0	0.001
1.8	0.494	10.0	0.075	29.0	0.018	49.5	0.089	70.0	0.012		
2.0	0.377	10.2	0.064	29.5	0.013	50.0	0.123	70.5	0.011		
2.2	0.300	10.4	0.050	30.0	0.010	50.5	0.139	71.0	0.010		

Dielectric

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Location	**San Francisco, CA**
Customer	
Antenna Type	**TUM-C5SP-14/60H-2-T-R**

TABULATION OF AZIMUTH PATTERN

Azimuth Pattern Drawing #: **TUM-C5SP-6470**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
0	0.590	45	0.920	90	0.964	135	0.920	180	0.590	225	0.499	270	0.203	315	0.499
1	0.590	46	0.936	91	0.962	136	0.903	181	0.594	226	0.488	271	0.203	316	0.511
2	0.594	47	0.950	92	0.957	137	0.885	182	0.602	227	0.479	272	0.202	317	0.525
3	0.602	48	0.963	93	0.948	138	0.867	183	0.613	228	0.471	273	0.201	318	0.540
4	0.615	49	0.975	94	0.937	139	0.849	184	0.626	229	0.465	274	0.199	319	0.555
5	0.631	50	0.984	95	0.922	140	0.832	185	0.641	230	0.459	275	0.197	320	0.572
6	0.650	51	0.991	96	0.905	141	0.815	186	0.658	231	0.455	276	0.195	321	0.589
7	0.671	52	0.997	97	0.887	142	0.800	187	0.675	232	0.451	277	0.193	322	0.606
8	0.694	53	0.999	98	0.867	143	0.787	188	0.692	233	0.448	278	0.192	323	0.623
9	0.718	54	1.000	99	0.847	144	0.776	189	0.709	234	0.445	279	0.193	324	0.641
10	0.741	55	0.998	100	0.827	145	0.768	190	0.725	235	0.442	280	0.194	325	0.658
11	0.764	56	0.994	101	0.808	146	0.763	191	0.740	236	0.439	281	0.198	326	0.674
12	0.786	57	0.988	102	0.791	147	0.762	192	0.753	237	0.435	282	0.203	327	0.690
13	0.806	58	0.979	103	0.777	148	0.763	193	0.765	238	0.431	283	0.210	328	0.706
14	0.824	59	0.968	104	0.766	149	0.767	194	0.776	239	0.425	284	0.219	329	0.720
15	0.839	60	0.956	105	0.758	150	0.774	195	0.785	240	0.419	285	0.229	330	0.734
16	0.851	61	0.941	106	0.755	151	0.783	196	0.792	241	0.411	286	0.241	331	0.746
17	0.860	62	0.925	107	0.755	152	0.794	197	0.797	242	0.403	287	0.254	332	0.757
18	0.866	63	0.907	108	0.760	153	0.806	198	0.801	243	0.393	288	0.268	333	0.768
19	0.869	64	0.888	109	0.768	154	0.818	199	0.803	244	0.382	289	0.283	334	0.777
20	0.868	65	0.869	110	0.780	155	0.830	200	0.804	245	0.370	290	0.298	335	0.785
21	0.865	66	0.849	111	0.795	156	0.841	201	0.803	246	0.357	291	0.313	336	0.791
22	0.859	67	0.830	112	0.812	157	0.851	202	0.800	247	0.343	292	0.328	337	0.797
23	0.851	68	0.812	113	0.830	158	0.859	203	0.797	248	0.328	293	0.343	338	0.800
24	0.841	69	0.795	114	0.849	159	0.865	204	0.791	249	0.313	294	0.357	339	0.803
25	0.830	70	0.780	115	0.869	160	0.868	205	0.785	250	0.298	295	0.370	340	0.804
26	0.818	71	0.768	116	0.888	161	0.869	206	0.777	251	0.283	296	0.382	341	0.803
27	0.806	72	0.760	117	0.907	162	0.866	207	0.768	252	0.268	297	0.393	342	0.801
28	0.794	73	0.755	118	0.925	163	0.860	208	0.757	253	0.254	298	0.403	343	0.797
29	0.783	74	0.755	119	0.941	164	0.851	209	0.746	254	0.241	299	0.411	344	0.792
30	0.774	75	0.758	120	0.956	165	0.839	210	0.734	255	0.229	300	0.419	345	0.785
31	0.767	76	0.766	121	0.968	166	0.824	211	0.720	256	0.219	301	0.425	346	0.776
32	0.763	77	0.777	122	0.979	167	0.806	212	0.706	257	0.210	302	0.431	347	0.765
33	0.762	78	0.791	123	0.988	168	0.786	213	0.690	258	0.203	303	0.435	348	0.753
34	0.763	79	0.808	124	0.994	169	0.764	214	0.674	259	0.198	304	0.439	349	0.740
35	0.768	80	0.827	125	0.998	170	0.741	215	0.658	260	0.194	305	0.442	350	0.725
36	0.776	81	0.847	126	1.000	171	0.718	216	0.641	261	0.193	306	0.445	351	0.709
37	0.787	82	0.867	127	0.999	172	0.694	217	0.623	262	0.192	307	0.448	352	0.692
38	0.800	83	0.887	128	0.997	173	0.671	218	0.606	263	0.193	308	0.451	353	0.675
39	0.815	84	0.905	129	0.991	174	0.650	219	0.589	264	0.195	309	0.455	354	0.658
40	0.832	85	0.922	130	0.984	175	0.631	220	0.572	265	0.197	310	0.459	355	0.641
41	0.849	86	0.937	131	0.975	176	0.615	221	0.555	266	0.199	311	0.465	356	0.626
42	0.867	87	0.948	132	0.963	177	0.602	222	0.540	267	0.201	312	0.471	357	0.613
43	0.885	88	0.957	133	0.950	178	0.594	223	0.525	268	0.202	313	0.479	358	0.602
44	0.903	89	0.962	134	0.936	179	0.590	224	0.511	269	0.203	314	0.488	359	0.594

Dielectric

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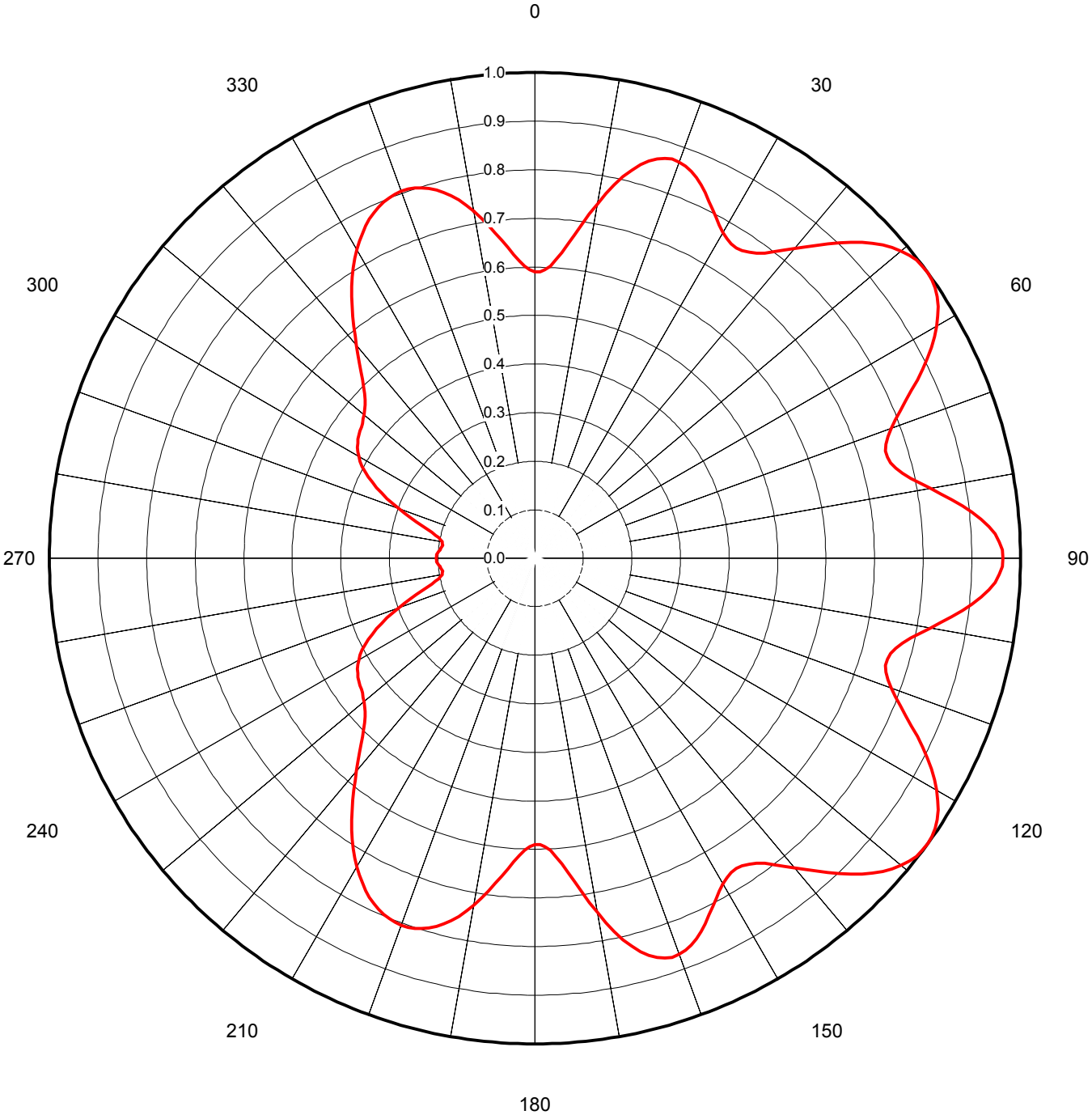
Location	**San Francisco, CA**		
Customer			
Antenna Type	**TUM-C5SP-14/60H-2-T-R**		

AZIMUTH PATTERN

Gain	**2.00**	**(3.01 dB)**	
Calculated / Measured	**Calculated**		
Frequency	**647.00 MHz**		
Drawing #	**TUM-C5SP-6470**		



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AZIMUTH PATTERN/VERTICAL POLARIZATION

Gain	**2.00**	**(3.01 dB)**	
Calculated / Measured	**Calculated**		
Frequency	**647.00 MHz**		
Drawing #	**TUM-C5SP-6470**