



ENGINEERING STATEMENT

In support of a request for

Minor Modification of a Licensed Facility for DTV Application

KSCE (DT) Ch 21

El Paso, Texas

Facility ID: 10202

PURPOSE

MARSAND, INC. has been retained by Ch 38 Christian Television, the “applicant”, to prepare this engineering statement in support of a request for a minor modification of a Licensed Facility for DTV Application. The applicant proposes to remove the existing antenna and transmission line and install a new broadband antenna, transmission line and transmitter in order to continue to provide interim service on the licensed Ch 39 and establish post-incentive auction service on its reassigned new channel, Ch 21.

The proposed DTV facility will operate on the DTV channel for this station as established in the post-incentive auction channel reassignment public notice. It will operate post-incentive auction facilities that do not expand the noise-limited service contour in any direction beyond that established by the post-incentive auction channel reassignment public notice and that match or reduce by no more than five percent with respect to predicted population from those defined in the post-incentive auction channel reassignment public notice. The antenna structure to be used by this facility has been registered by the Commission and will not require reregistration.

DISCUSSION

The applicant currently is licensed and operating on Ch 39 (DTV) at 150 kW ERP (BLEDT-20101008AAQ). The station has been reassigned Ch 21 at 102 kW ERP. The existing antenna is a PSI PSIUSMD24AP-38/39, a dual channel antenna for Ch 38 and Ch 39. In order to minimize tower modifications and maintain the optimal location on the tower, it is proposed

to exchange the existing PSI antenna with an RFS RD-24C170-500626-SL wideband antenna that will accommodate the existing Ch 39 and the reassigned Ch 21. The existing transmission line utilizes 20 ft. sections which will not accommodate Ch 21. It is proposed to replace the existing line with 4" air dielectric flexible coaxial line which will accommodate both Ch 39 and Ch 21. The wideband antenna will allow interim service on Ch 39 on its licensed power of 150 kW ERP until the transition phase deadline: March 13, 2020, phase 8.

The proposed antenna pattern does not exactly replicate the antenna used to establish the baseline service area. It is proposed to operate at 75 kW ERP in order for the proposed service area to remain within the FCC baseline +1% and still maintain a service area population of more than 95% of baseline. The study results of this proposal utilizing the FCC TVStudy v2.2.2 software are included as **Exhibit 1**.

FCC OET Bulletin No. 65 "Evaluating Compliance With FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 97-01, and has been found to comply with the limits set forth in Section 1.1310 of the Rules as shown in **Exhibit 2**. The total exposure as defined by the ANSI standard computations for occupational/controlled area is 0.15 % of the maximum. The total exposure as defined by the ANSI standard computations for general population/uncontrolled area is 0.73 % of the maximum.

Proposed coverage contour shown in **Exhibit 3**.

Proposed RFS antenna technical information is shown in **Exhibit 4**.

CONCLUSION

It is respectfully requested that the Commission grant this request for minor modification for these facilities as specified herein. As the proposed facility is within 4.8 kilometers of the Mexican border, Mexican coordination is requested.



MARSAND, INC.

Matthew A. Sanderford, Jr., P.E.

DECLARATION

Matthew A. Sanderford, Jr., P.E., declares and states that he is a graduate Electrical Engineer with a Bachelor of Science Degree in Electrical Engineering from the University of Texas at El Paso, a Licensed Professional Engineer in the State of Texas, and his qualifications are known to the Federal Communications Commission, and that he is President of MARSAND, INC., a Registered Professional Engineering firm in the State of Texas, and that firm has been retained by Ch 38 Christian Television, to perform the engineering support as contained in this report.

All facts contained herein are true of his own knowledge except where stated to be on information or belief provided by others, and as to those facts, he believes them to be true.

I declare under penalty of perjury that the foregoing is true and correct.



Matthew A. Sanderford, Jr., P.E.
President - MARSAND, INC.

Executed this 30th of June, 2017
State of Texas

EXHIBIT 1

tvstudy v2.2.2
Database: localhost, Study: KSCE_POST_AUCTION, Model: Longley-Rice
Start: 2017.06.25 20:41:37

Study created: 2017.06.25 20:41:27

Study build station data: LMS TV 2017-05-01 (5)

Proposal: KSCE D21 DT BL EL PASO, TX
File number: KSCE_POST_AUCTION
Facility ID: 10202
Station data: User record
Record ID: 31
Country: U.S.

Stations potentially affected:

Call	Chan	Svc	Status	City, State	File Number	Distance
KTFN	D20	DT	BL	EL PASO, TX	DTVBL68753	0.0 km
KWBA-TV	D21	DT	BL	SIERRA VISTA, AZ	DTVBL35095	408.0
KYNM-CD	D21	DC	LIC	ALBUQUERQUE, NM	BLANK0000001606	379.0
KRWB-TV	D21	DT	LIC	ROSWELL, NM	BLCDT20090619ABH	253.8

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D21
Latitude: 31 48 19.00 N (NAD83)
Longitude: 106 29 1.00 W
Height AMSL: 1799.0 m
HAAT: 557.0 m
Peak ERP: 75.0 kW
Antenna: RD-24C170-500626-SL 0.0 deg

39.5 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	69.6 kW	231.5 m	72.9 km
45.0	60.8	598.3	98.8
90.0	65.8	601.3	99.6
135.0	70.3	675.6	103.1
180.0	14.3	628.1	87.8
225.0	4.36	530.2	74.6
270.0	6.84	610.1	81.2
315.0	60.9	566.7	97.1

Database HAAT does not agree with computed HAAT

Database HAAT: 557 m Computed HAAT: 555 m

Proposal service area is within baseline plus 1.0%
Proposal service area population is more than 95.0% of baseline

Distance to Canadian border: 1911.2 km

**Proposal is within coordination distance of Mexican border

Distance to Mexican border: 4.8 km

Conditions at FCC monitoring station: Douglas AZ
Bearing: 264.4 degrees Distance: 301.9 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 6.5 degrees Distance: 930.5 km

No land mobile station failures found

Matthew A. Sanderford, Jr., P.E.

Study cell size: 2.00 km
Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%
Maximum new IX to LPTV: 2.00%

Interference to DTVBL68753 BL, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance		
	KTFN	D20	DT	BL	EL PASO, TX	DTVBL68753			
Undesireds:	KSCE	D21	DT	BL	EL PASO, TX	DTVBL10202	0.0 km		
	KSCE	D21	DT	BL	EL PASO, TX	KSCE_POST_AUCTION	0.0		
Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
16663.4	1,015,088	15442.5	1,010,526	15418.3	1,010,526	15422.3	1,010,526	-0.03	0.00
7123.9	1,343,132	6722.7	1,339,604	6694.9	1,339,604	6706.8	1,339,604	-0.18	0.00 (in Mexico)
Undesired		Total IX		Unique IX, before		Unique IX, after			
KSCE D21 DT BL		24.2	0	24.2	0				
KSCE D21 DT BL		20.2	0			20.2	0		
KSCE D21 DT BL		27.8	0	27.8	0			(in Mexico)	
KSCE D21 DT BL		15.9	0			15.9	0	(in Mexico)	

Interference to DTVBL35095 BL, scenario 1
Proposal causes no interference.

Interference to BLANK0000001606 LIC, scenario 1
Proposal causes no interference.

Interference to BLCDT20090619ABH LIC, scenario 1
Proposal causes no interference.

Interference to proposal, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KSCE	D21	DT	BL	EL PASO, TX	KSCE_POST_AUCTION	
Undesireds:	KTFN	D20	DT	BL	EL PASO, TX	DTVBL68753	0.0 km
	KYNM-CD	D21	DC	LIC	ALBUQUERQUE, NM	BLANK0000001606	379.0
	KRWB-TV	D21	DT	LIC	ROSWELL, NM	BLCDT20090619ABH	253.8
Service area		Terrain-limited		IX-free		Percent IX	
17581.7	1,015,008	15998.2	1,010,509	15488.1	1,010,498	3.19	0.00
7841.0	1,343,149	7447.6	1,340,672	7439.7	1,340,672	0.11	0.00 (in Mexico)
Undesired		Total IX		Unique IX		Prct Unique IX	
KRWB-TV D21 DT LIC		510.1	11	510.1	11	3.19	0.00
KRWB-TV D21 DT LIC		7.9	0	7.9	0	0.11	0.00 (in Mexico)

EXHIBIT 2

ENVIRONMENTAL STATEMENT

The proposed facility complies in full with the requirements of 47 C.F.R. Section 1.1306 and will have no significant environmental impact. Population is very scattered and sparse near the immediate location of the proposed site. The site is located in a State Park. KSCE is currently licensed for 150 kW ERP. The antenna only will be exchanged, radiating from the same height on the tower, but radiating at 75 kW ERP. This lower ERP represents even less exposure to RFR than is currently present and within the exposure guidelines. The proposed site does not involve any other conditions specified in Section 1.1307(a)(1)-(6) of the Rules.

The KSCE facility has been studied in accordance with the procedures set forth in the FCC OET Bulletin No. 65 "Evaluating Compliance With FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 97-01, and has been found to comply with the limits set forth in Section 1.1310 of the Rules. This determination has been based upon calculations with the total radiated power from all TV & FM co-located broadcast emitters. The total exposure as defined by the ANSI standard computations for occupational/controlled area is **1.25 %** of the maximum. The total exposure as defined by the ANSI standard computations for general population/uncontrolled area is **6.21 %** of the maximum. The proposed facility is in compliance with the Commission's guidelines.

Multiple Use FM/TV Tower					
Location:	KSCE CH 21- El Paso, TX				
		6/24/2017			
Channel Frequency Type	Service	ERP (W)	Ant Center of Radiation AG (m)	% of ANSI/FCC Limit (6min)	% of ANSI/FCC Limit (30 min)
51DTV	TV UHF#1	250,000	58.00	0.20	0.94
16DTV	TV UHF#2	250,000	111.00	0.42	2.10
21DTV	TV UHF#4	75,000	91.00	0.15	0.73
17DTV	TV UHF#5	263,000	111.00	0.44	2.19
26LPDTV	TV UHF#6	15,000	73.00	0.05	0.25
Total			%	1.25	6.21
IN COMPLIANCE					

Channel 38 Christian Television (Applicant) agrees to maintain full compliance with the safety precautions to workers on the tower (controlled) and the general public (uncontrolled) by reducing or removing radiated power during the time of construction or maintenance on or near the antenna. The Applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from Radiofrequency Electromagnetic exposure in excess of FCC guidelines.

The Applicant is believed to be in full compliance with the Environmental Impact and Commission Rules.

EXHIBIT 3

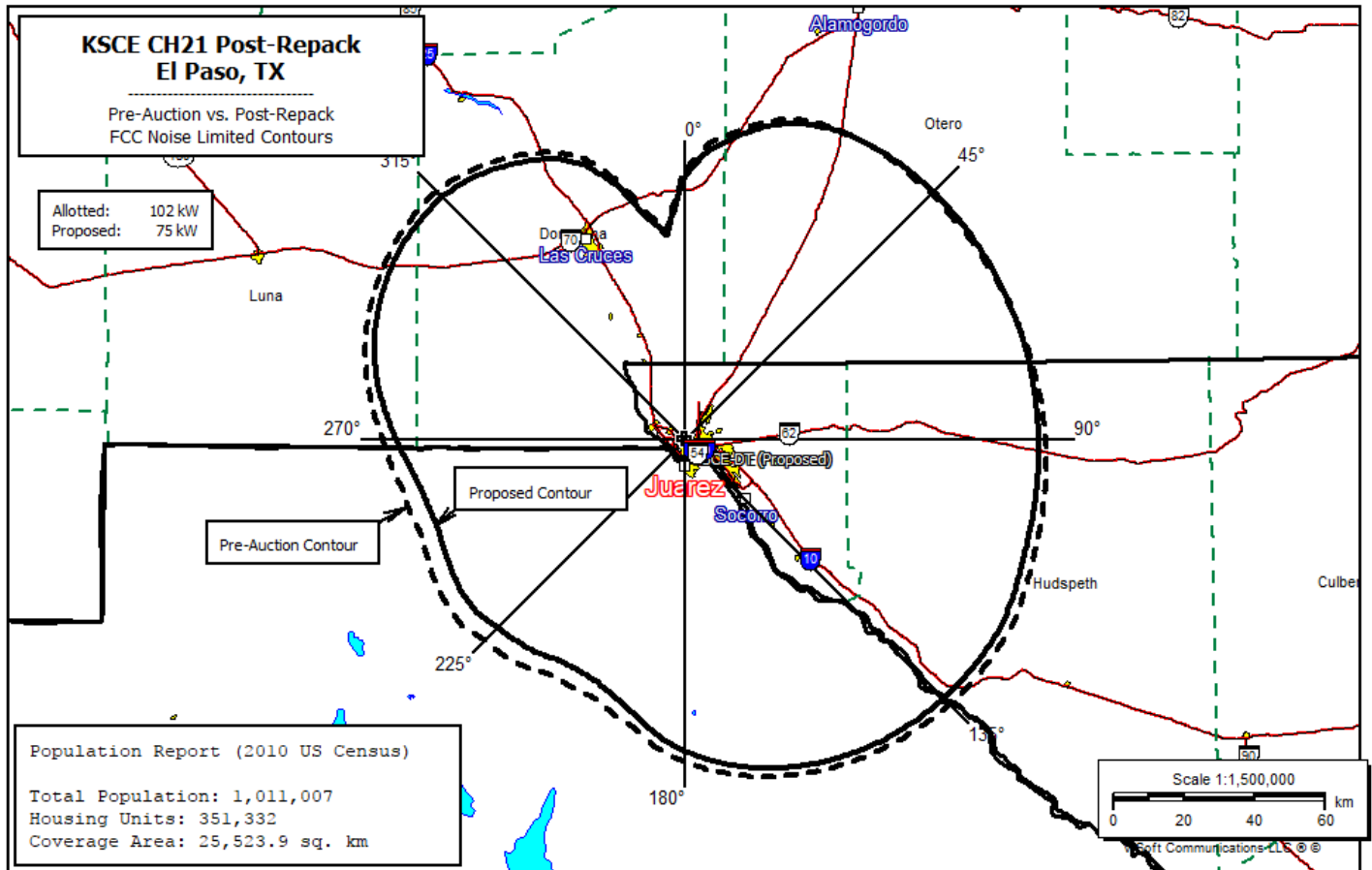
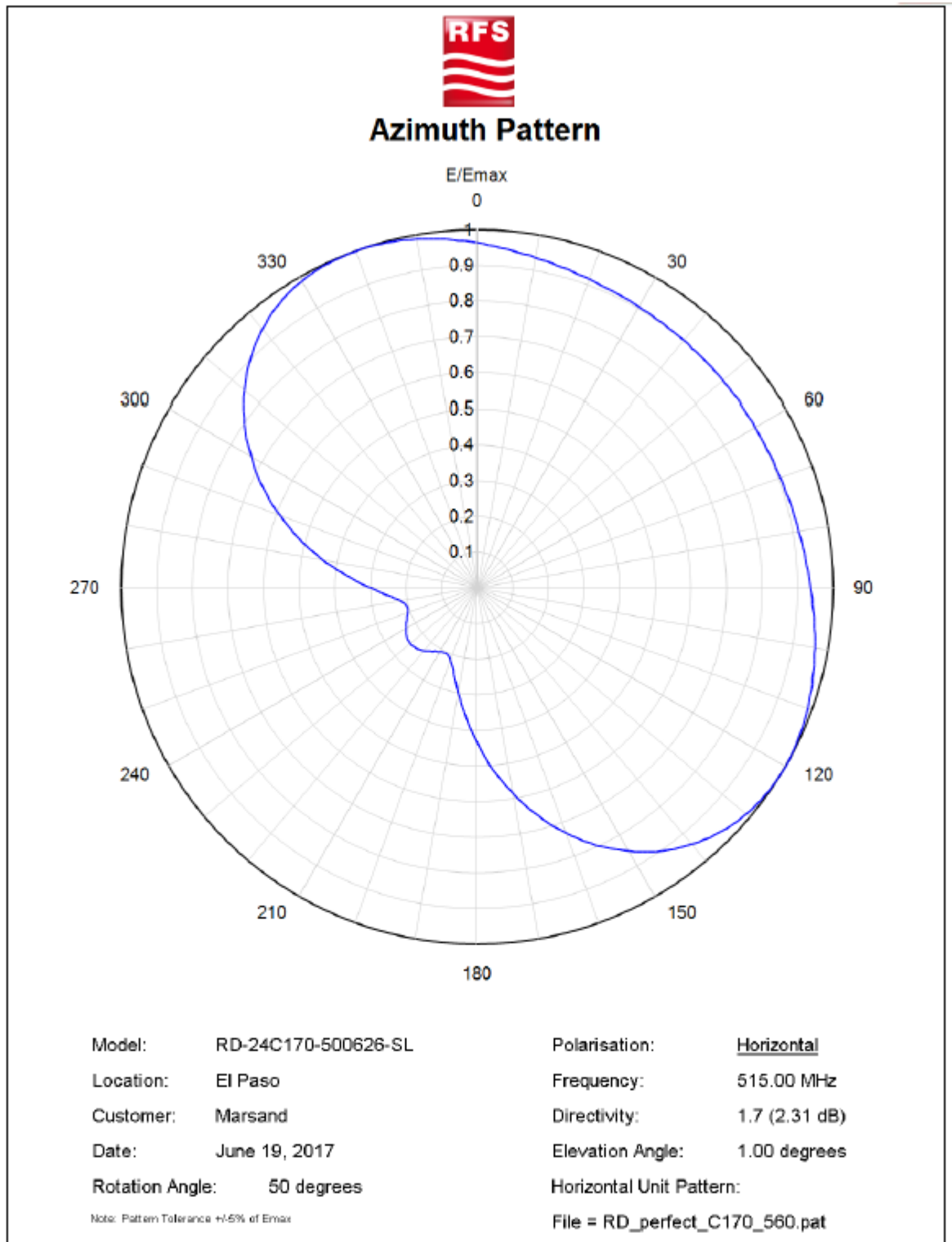


EXHIBIT 4



Model: RD-24C170-500626-SL
Location: El Paso
Customer: Marsand
Date: June 19, 2017

Polarization: Horizontal
Frequency (MHz): 515.00
Directivity: 1.7 (2.31 dB)
Elevation Angle: 1.00 degrees
Rotation Angle: 50 degrees



TABULATED AZIMUTH PATTERN

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
0	0.963	45	0.900	90	0.937	135	0.968	180	0.437	225	0.241	270	0.302	315	0.901
1	0.960	46	0.900	91	0.939	136	0.963	181	0.422	226	0.242	271	0.314	316	0.910
2	0.957	47	0.899	92	0.941	137	0.958	182	0.407	227	0.243	272	0.326	317	0.918
3	0.954	48	0.899	93	0.944	138	0.952	183	0.393	228	0.244	273	0.339	318	0.926
4	0.952	49	0.899	94	0.947	139	0.946	184	0.379	229	0.244	274	0.352	319	0.933
5	0.949	50	0.899	95	0.949	140	0.940	185	0.365	230	0.245	275	0.365	320	0.940
6	0.947	51	0.899	96	0.952	141	0.933	186	0.352	231	0.244	276	0.379	321	0.946
7	0.944	52	0.899	97	0.954	142	0.926	187	0.339	232	0.244	277	0.393	322	0.952
8	0.941	53	0.899	98	0.957	143	0.918	188	0.326	233	0.243	278	0.407	323	0.958
9	0.939	54	0.900	99	0.960	144	0.910	189	0.314	234	0.242	279	0.422	324	0.963
10	0.937	55	0.900	100	0.963	145	0.901	190	0.302	235	0.241	280	0.437	325	0.968
11	0.934	56	0.900	101	0.965	146	0.893	191	0.290	236	0.240	281	0.452	326	0.973
12	0.932	57	0.900	102	0.968	147	0.884	192	0.280	237	0.238	282	0.467	327	0.977
13	0.930	58	0.900	103	0.971	148	0.874	193	0.269	238	0.236	283	0.482	328	0.981
14	0.928	59	0.900	104	0.973	149	0.864	194	0.260	239	0.234	284	0.497	329	0.984
15	0.926	60	0.901	105	0.976	150	0.854	195	0.251	240	0.232	285	0.512	330	0.987
16	0.924	61	0.901	106	0.979	151	0.843	196	0.243	241	0.229	286	0.527	331	0.990
17	0.922	62	0.901	107	0.981	152	0.832	197	0.235	242	0.227	287	0.543	332	0.992
18	0.920	63	0.901	108	0.983	153	0.821	198	0.229	243	0.224	288	0.558	333	0.994
19	0.918	64	0.902	109	0.986	154	0.809	199	0.223	244	0.222	289	0.573	334	0.996
20	0.917	65	0.902	110	0.988	155	0.797	200	0.218	245	0.219	290	0.589	335	0.997
21	0.915	66	0.903	111	0.990	156	0.785	201	0.214	246	0.216	291	0.604	336	0.999
22	0.914	67	0.903	112	0.992	157	0.773	202	0.210	247	0.214	292	0.619	337	0.999
23	0.912	68	0.904	113	0.993	158	0.760	203	0.208	248	0.211	293	0.634	338	1.000
24	0.911	69	0.905	114	0.995	159	0.747	204	0.206	249	0.209	294	0.648	339	1.000
25	0.910	70	0.905	115	0.996	160	0.733	205	0.204	250	0.207	295	0.663	340	1.000
26	0.909	71	0.906	116	0.997	161	0.720	206	0.204	251	0.206	296	0.677	341	1.000
27	0.908	72	0.907	117	0.998	162	0.708	207	0.204	252	0.205	297	0.692	342	0.999
28	0.907	73	0.908	118	0.999	163	0.692	208	0.205	253	0.204	298	0.706	343	0.998
29	0.906	74	0.909	119	1.000	164	0.677	209	0.206	254	0.204	299	0.720	344	0.997
30	0.905	75	0.910	120	1.000	165	0.663	210	0.207	255	0.204	300	0.733	345	0.996
31	0.905	76	0.911	121	1.000	166	0.648	211	0.209	256	0.206	301	0.747	346	0.995
32	0.904	77	0.912	122	1.000	167	0.634	212	0.211	257	0.208	302	0.760	347	0.993
33	0.903	78	0.914	123	0.999	168	0.619	213	0.214	258	0.210	303	0.773	348	0.992
34	0.903	79	0.915	124	0.999	169	0.604	214	0.216	259	0.214	304	0.785	349	0.990
35	0.902	80	0.917	125	0.997	170	0.589	215	0.219	260	0.218	305	0.797	350	0.988
36	0.902	81	0.918	126	0.996	171	0.573	216	0.222	261	0.223	306	0.809	351	0.986
37	0.901	82	0.920	127	0.994	172	0.558	217	0.224	262	0.229	307	0.821	352	0.983
38	0.901	83	0.922	128	0.992	173	0.543	218	0.227	263	0.235	308	0.832	353	0.981
39	0.901	84	0.924	129	0.990	174	0.527	219	0.229	264	0.243	309	0.843	354	0.979
40	0.901	85	0.926	130	0.987	175	0.512	220	0.232	265	0.251	310	0.854	355	0.976
41	0.900	86	0.928	131	0.984	176	0.497	221	0.234	266	0.260	311	0.864	356	0.973
42	0.900	87	0.930	132	0.981	177	0.482	222	0.236	267	0.269	312	0.874	357	0.971
43	0.900	88	0.932	133	0.977	178	0.467	223	0.238	268	0.280	313	0.884	358	0.968
44	0.900	89	0.934	134	0.973	179	0.452	224	0.240	269	0.290	314	0.893	359	0.965

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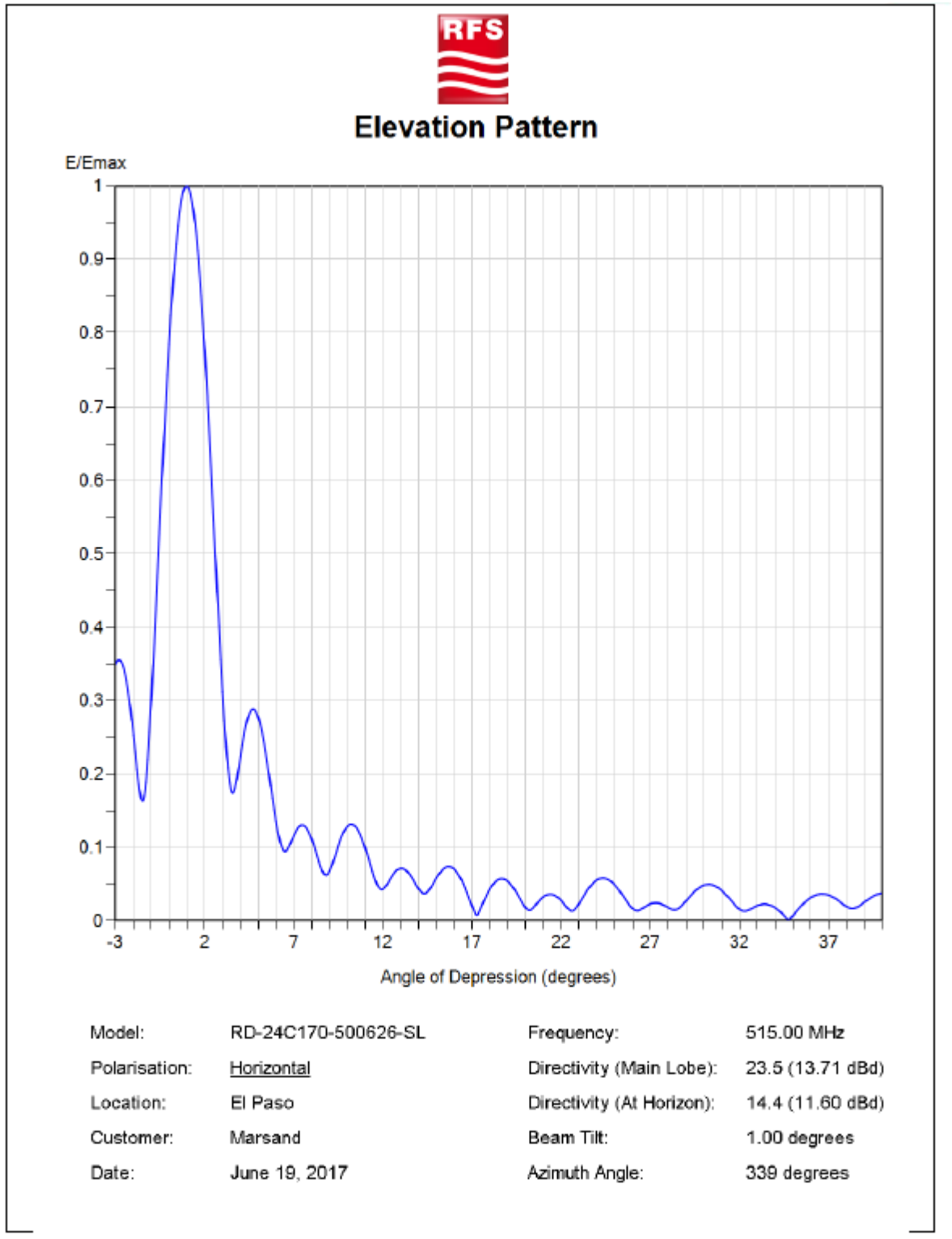
Model: RD-24C170-500626-SL
Location: El Paso
Customer: Marsand
Date: June 19, 2017

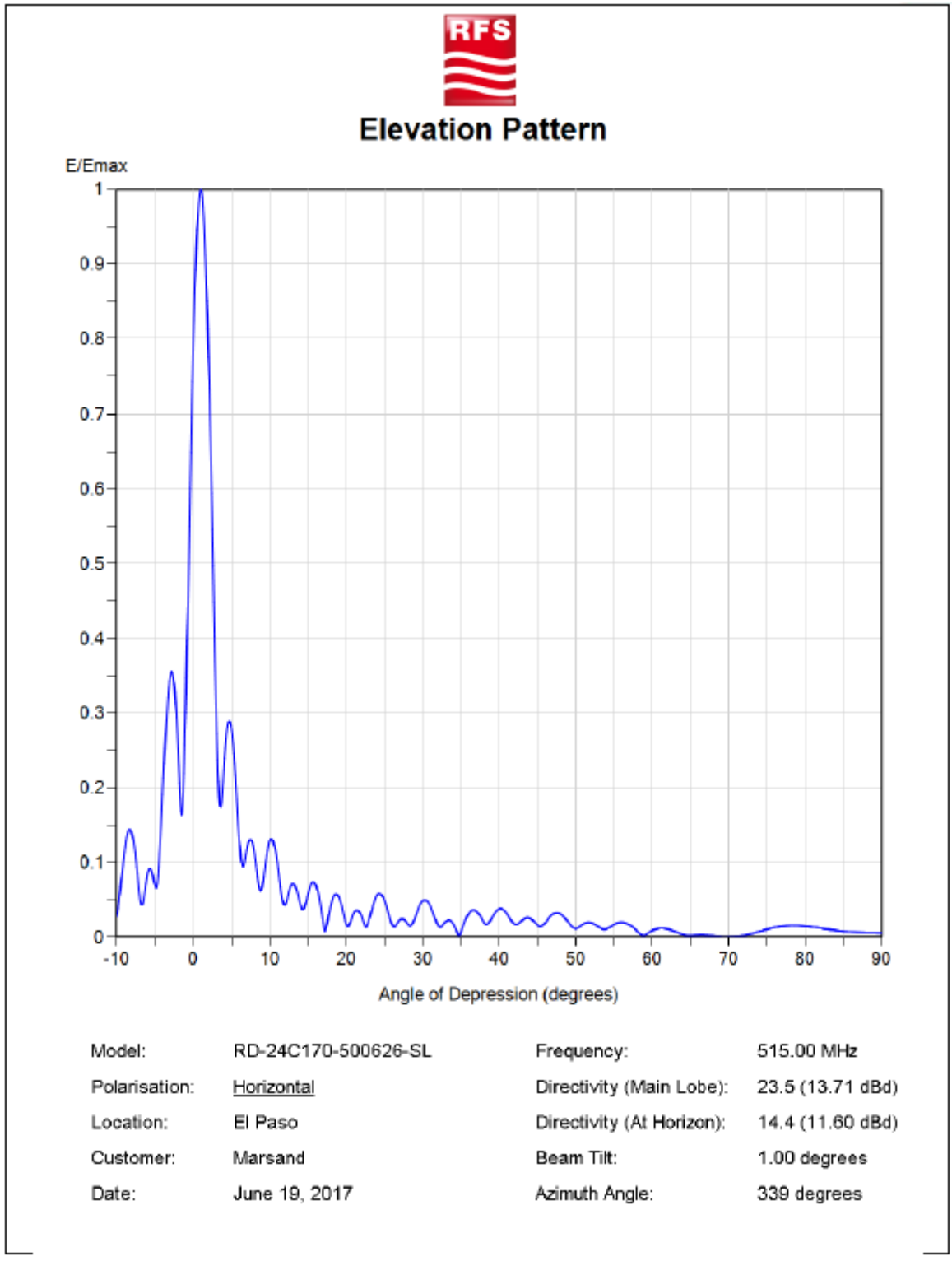
Polarization: Horizontal
Frequency (MHz): 515.00
Directivity: 1.7 (2.31 dB)
Elevation Angle: 1.00 degrees
Rotation Angle: 50 degrees



TABULATED AZIMUTH ERP

Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field
0	94.5	45	82.5	90	89.5	135	95.6	180	19.4	225	5.9	270	9.3	315	82.9
1	94.0	46	82.5	91	89.9	136	94.6	181	18.1	226	6.0	271	10.0	316	84.4
2	93.5	47	82.5	92	90.4	137	93.6	182	16.9	227	6.0	272	10.8	317	85.9
3	92.9	48	82.5	93	90.9	138	92.5	183	15.8	228	6.1	273	11.7	318	87.4
4	92.4	49	82.5	94	91.4	139	91.3	184	14.6	229	6.1	274	12.6	319	88.7
5	91.9	50	82.5	95	91.9	140	90.1	185	13.6	230	6.1	275	13.6	320	90.1
6	91.4	51	82.5	96	92.4	141	88.7	186	12.6	231	6.1	276	14.6	321	91.3
7	90.9	52	82.5	97	92.9	142	87.4	187	11.7	232	6.1	277	15.8	322	92.5
8	90.4	53	82.5	98	93.5	143	85.9	188	10.8	233	6.0	278	16.9	323	93.6
9	89.9	54	82.5	99	94.0	144	84.4	189	10.0	234	6.0	279	18.1	324	94.6
10	89.5	55	82.5	100	94.5	145	82.9	190	9.3	235	5.9	280	19.4	325	95.6
11	89.0	56	82.6	101	95.0	146	81.3	191	8.6	236	5.9	281	20.8	326	96.5
12	88.6	57	82.6	102	95.6	147	79.6	192	8.0	237	5.8	282	22.2	327	97.3
13	88.2	58	82.6	103	96.1	148	77.9	193	7.4	238	5.7	283	23.7	328	98.1
14	87.7	59	82.7	104	96.6	149	76.2	194	6.9	239	5.6	284	25.2	329	98.8
15	87.4	60	82.7	105	97.1	150	74.4	195	6.4	240	5.5	285	26.7	330	99.4
16	87.0	61	82.8	106	97.7	151	72.5	196	6.0	241	5.4	286	28.4	331	99.9
17	86.7	62	82.8	107	98.1	152	70.6	197	5.6	242	5.2	287	30.0	332	100.4
18	86.3	63	82.9	108	98.6	153	68.7	198	5.3	243	5.1	288	31.8	333	100.8
19	86.0	64	83.0	109	99.1	154	66.8	199	5.1	244	5.0	289	33.5	334	101.2
20	85.7	65	83.0	110	99.5	155	64.9	200	4.8	245	4.9	290	35.3	335	101.5
21	85.4	66	83.1	111	99.9	156	62.9	201	4.7	246	4.8	291	37.2	336	101.7
22	85.2	67	83.2	112	100.3	157	60.9	202	4.5	247	4.7	292	39.0	337	101.9
23	84.9	68	83.3	113	100.6	158	58.9	203	4.4	248	4.6	293	40.9	338	102.0
24	84.7	69	83.5	114	100.9	159	56.9	204	4.3	249	4.5	294	42.9	339	102.0
25	84.5	70	83.6	115	101.2	160	54.8	205	4.3	250	4.4	295	44.8	340	102.0
26	84.3	71	83.7	116	101.5	161	52.8	206	4.2	251	4.3	296	46.8	341	101.9
27	84.1	72	83.9	117	101.7	162	50.8	207	4.2	252	4.3	297	48.8	342	101.8
28	83.9	73	84.1	118	101.8	163	48.8	208	4.3	253	4.2	298	50.8	343	101.7
29	83.7	74	84.3	119	101.9	164	46.8	209	4.3	254	4.2	299	52.8	344	101.5
30	83.6	75	84.5	120	102.0	165	44.8	210	4.4	255	4.3	300	54.8	345	101.2
31	83.5	76	84.7	121	102.0	166	42.9	211	4.5	256	4.3	301	56.9	346	100.9
32	83.3	77	84.9	122	102.0	167	40.9	212	4.6	257	4.4	302	58.9	347	100.6
33	83.2	78	85.2	123	101.9	168	39.0	213	4.7	258	4.5	303	60.9	348	100.3
34	83.1	79	85.4	124	101.7	169	37.2	214	4.8	259	4.7	304	62.9	349	99.9
35	83.0	80	85.7	125	101.5	170	35.3	215	4.9	260	4.8	305	64.9	350	99.5
36	83.0	81	86.0	126	101.2	171	33.5	216	5.0	261	5.1	306	66.8	351	99.1
37	82.9	82	86.3	127	100.8	172	31.8	217	5.1	262	5.3	307	68.7	352	98.6
38	82.8	83	86.7	128	100.4	173	30.0	218	5.2	263	5.6	308	70.6	353	98.1
39	82.8	84	87.0	129	99.9	174	28.4	219	5.4	264	6.0	309	72.5	354	97.7
40	82.7	85	87.4	130	99.4	175	26.7	220	5.5	265	6.4	310	74.4	355	97.1
41	82.7	86	87.7	131	98.8	176	25.2	221	5.6	266	6.9	311	76.2	356	96.6
42	82.6	87	88.2	132	98.1	177	23.7	222	5.7	267	7.4	312	77.9	357	96.1
43	82.6	88	88.6	133	97.3	178	22.2	223	5.8	268	8.0	313	79.6	358	95.6
44	82.6	89	89.0	134	96.5	179	20.8	224	5.9	269	8.6	314	81.3	359	95.0





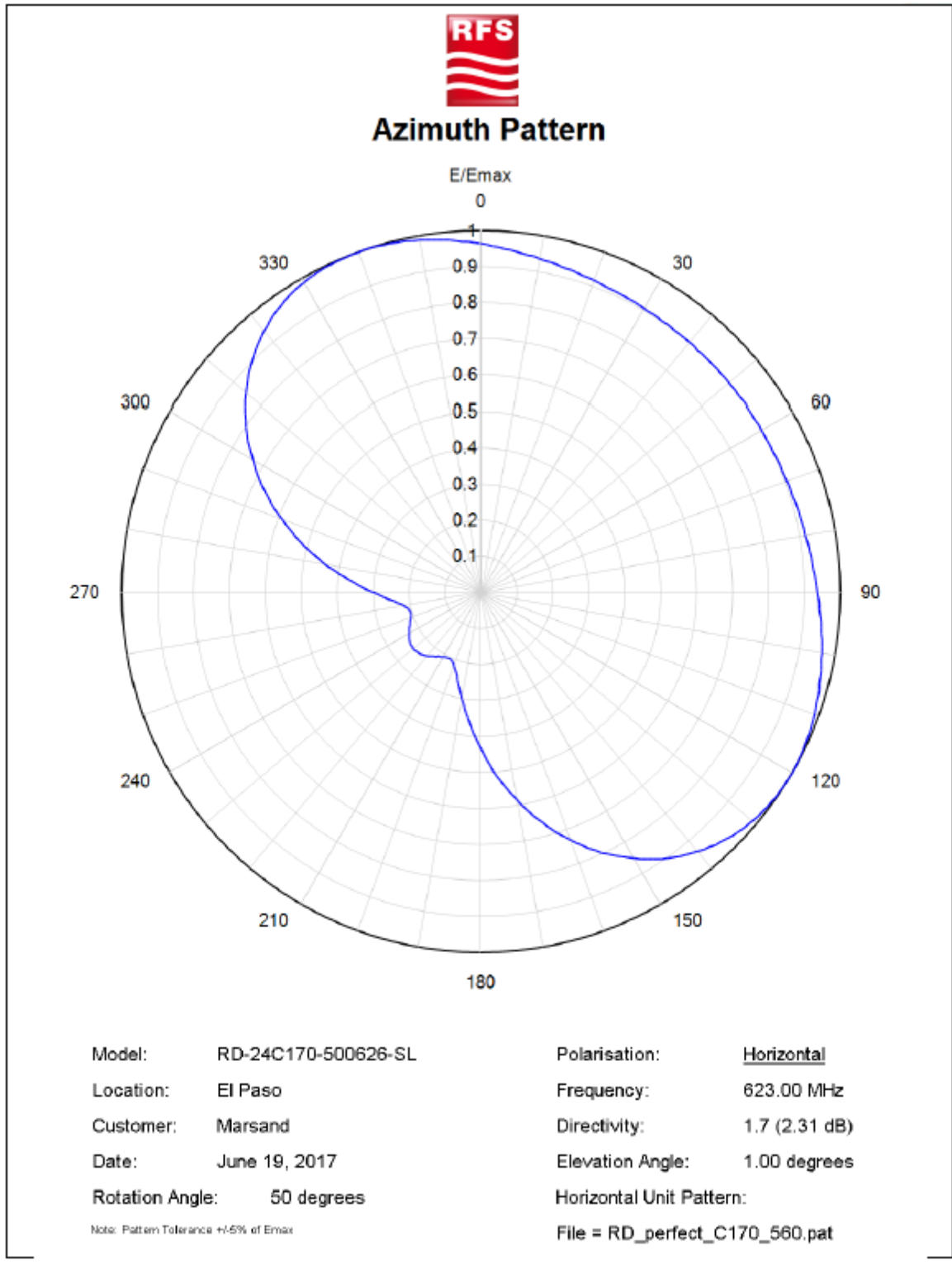
Model: RD-24C170-500626-SL
Location: El Paso
Customer: Marsand
Date: June 19, 2017

Polarization: Horizontal
Frequency (MHz): 515.00
Directivity (Main Lobe): 23.5 (13.71 dB)
Directivity (At Horizon): 14.4 (11.60 dB)
Beam Tilt: 1.00 degrees



TABULATED ELEVATION PATTERN

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.027	2.4	0.594	10.8	0.123	30.5	0.048	51.0	0.017	71.5	0.001
-9.5	0.067	2.6	0.498	10.8	0.112	31.0	0.041	51.5	0.019	72.0	0.002
-9.0	0.114	2.8	0.402	11.0	0.099	31.5	0.028	52.0	0.019	72.5	0.003
-8.5	0.141	3.0	0.312	11.5	0.080	32.0	0.015	52.5	0.017	73.0	0.005
-8.0	0.138	3.2	0.237	12.0	0.043	32.5	0.014	53.0	0.013	73.5	0.006
-7.5	0.104	3.4	0.187	12.5	0.080	33.0	0.020	53.5	0.010	74.0	0.007
-7.0	0.056	3.6	0.174	13.0	0.071	33.5	0.022	54.0	0.011	74.5	0.009
-6.5	0.051	3.8	0.193	13.5	0.063	34.0	0.017	54.5	0.013	75.0	0.010
-6.0	0.083	4.0	0.224	14.0	0.043	34.5	0.007	55.0	0.017	75.5	0.012
-5.5	0.090	4.2	0.253	14.5	0.039	35.0	0.007	55.5	0.019	76.0	0.013
-5.0	0.069	4.4	0.275	15.0	0.058	35.5	0.021	56.0	0.020	76.5	0.014
-4.5	0.095	4.6	0.287	15.5	0.072	36.0	0.031	56.5	0.019	77.0	0.014
-4.0	0.191	4.8	0.287	16.0	0.070	36.5	0.036	57.0	0.016	77.5	0.015
-3.5	0.290	5.0	0.277	16.5	0.050	37.0	0.035	57.5	0.012	78.0	0.015
-3.0	0.350	5.2	0.258	17.0	0.019	37.5	0.028	58.0	0.008	78.5	0.015
-2.8	0.355	5.4	0.232	17.5	0.018	38.0	0.019	58.5	0.004	79.0	0.015
-2.6	0.348	5.6	0.200	18.0	0.043	38.5	0.017	59.0	0.002	79.5	0.015
-2.4	0.328	5.8	0.167	18.5	0.056	39.0	0.025	59.5	0.006	80.0	0.014
-2.2	0.295	6.0	0.135	19.0	0.053	39.5	0.033	60.0	0.009	80.5	0.014
-2.0	0.253	6.2	0.110	19.5	0.037	40.0	0.037	60.5	0.011	81.0	0.013
-1.8	0.206	6.4	0.096	20.0	0.017	40.5	0.037	61.0	0.012	81.5	0.012
-1.6	0.169	6.6	0.096	20.5	0.019	41.0	0.031	61.5	0.011	82.0	0.012
-1.4	0.170	6.8	0.105	21.0	0.032	41.5	0.023	62.0	0.011	82.5	0.011
-1.2	0.219	7.0	0.116	21.5	0.036	42.0	0.017	62.5	0.009	83.0	0.010
-1.0	0.301	7.2	0.125	22.0	0.027	42.5	0.018	63.0	0.007	83.5	0.009
-0.8	0.398	7.4	0.130	22.5	0.014	43.0	0.022	63.5	0.005	84.0	0.009
-0.6	0.499	7.6	0.129	23.0	0.023	43.5	0.025	64.0	0.003	84.5	0.008
-0.4	0.600	7.8	0.122	23.5	0.043	44.0	0.025	64.5	0.002	85.0	0.008
-0.2	0.697	8.0	0.111	24.0	0.055	44.5	0.021	65.0	0.002	85.5	0.007
0.0	0.784	8.2	0.096	24.5	0.057	45.0	0.016	65.5	0.002	86.0	0.007
0.2	0.860	8.4	0.081	25.0	0.048	45.5	0.014	66.0	0.003	86.5	0.007
0.4	0.921	8.6	0.067	25.5	0.032	46.0	0.019	66.5	0.003	87.0	0.006
0.6	0.966	8.8	0.062	26.0	0.016	46.5	0.025	67.0	0.003	87.5	0.006
0.8	0.992	9.0	0.067	26.5	0.016	47.0	0.030	67.5	0.002	88.0	0.006
1.0	1.000	9.2	0.080	27.0	0.023	47.5	0.032	68.0	0.002	88.5	0.006
1.2	0.989	9.4	0.095	27.5	0.023	48.0	0.031	68.5	0.001	89.0	0.006
1.4	0.959	9.6	0.110	28.0	0.018	48.5	0.026	69.0	0.000	89.5	0.006
1.6	0.912	9.8	0.121	28.5	0.015	49.0	0.020	69.5	0.000	90.0	0.000
1.8	0.850	10.0	0.128	29.0	0.027	49.5	0.014	70.0	0.000		
2.0	0.774	10.2	0.131	29.5	0.040	50.0	0.011	70.5	0.000		
2.2	0.688	10.4	0.129	30.0	0.048	50.5	0.014	71.0	0.001		



Model: RD-24C170-500626-SL
Location: El Paso
Customer: Marsand
Date: June 19, 2017

Polarization: Horizontal
Frequency (MHz): 623.00
Directivity: 1.7 (2.31 dB)
Elevation Angle: 1.00 degrees
Rotation Angle: 50 degrees



TABULATED AZIMUTH PATTERN

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
0	0.963	45	0.900	90	0.937	135	0.968	180	0.437	225	0.241	270	0.302	315	0.901
1	0.960	46	0.900	91	0.939	136	0.963	181	0.422	226	0.242	271	0.314	316	0.910
2	0.957	47	0.899	92	0.941	137	0.958	182	0.407	227	0.243	272	0.326	317	0.918
3	0.954	48	0.899	93	0.944	138	0.952	183	0.393	228	0.244	273	0.339	318	0.926
4	0.952	49	0.899	94	0.947	139	0.946	184	0.379	229	0.244	274	0.352	319	0.933
5	0.949	50	0.899	95	0.949	140	0.940	185	0.365	230	0.245	275	0.365	320	0.940
6	0.947	51	0.899	96	0.952	141	0.933	186	0.352	231	0.244	276	0.379	321	0.946
7	0.944	52	0.899	97	0.954	142	0.926	187	0.339	232	0.244	277	0.393	322	0.952
8	0.941	53	0.899	98	0.957	143	0.918	188	0.326	233	0.243	278	0.407	323	0.958
9	0.939	54	0.900	99	0.960	144	0.910	189	0.314	234	0.242	279	0.422	324	0.963
10	0.937	55	0.900	100	0.963	145	0.901	190	0.302	235	0.241	280	0.437	325	0.968
11	0.934	56	0.900	101	0.965	146	0.893	191	0.290	236	0.240	281	0.452	326	0.973
12	0.932	57	0.900	102	0.968	147	0.884	192	0.280	237	0.238	282	0.467	327	0.977
13	0.930	58	0.900	103	0.971	148	0.874	193	0.269	238	0.236	283	0.482	328	0.981
14	0.928	59	0.900	104	0.973	149	0.864	194	0.260	239	0.234	284	0.497	329	0.984
15	0.926	60	0.901	105	0.976	150	0.854	195	0.251	240	0.232	285	0.512	330	0.987
16	0.924	61	0.901	106	0.979	151	0.843	196	0.243	241	0.229	286	0.527	331	0.990
17	0.922	62	0.901	107	0.981	152	0.832	197	0.235	242	0.227	287	0.543	332	0.992
18	0.920	63	0.901	108	0.983	153	0.821	198	0.229	243	0.224	288	0.558	333	0.994
19	0.918	64	0.902	109	0.986	154	0.809	199	0.223	244	0.222	289	0.573	334	0.996
20	0.917	65	0.902	110	0.988	155	0.797	200	0.218	245	0.219	290	0.589	335	0.997
21	0.915	66	0.903	111	0.990	156	0.785	201	0.214	246	0.216	291	0.604	336	0.999
22	0.914	67	0.903	112	0.992	157	0.773	202	0.210	247	0.214	292	0.619	337	0.999
23	0.912	68	0.904	113	0.993	158	0.760	203	0.208	248	0.211	293	0.634	338	1.000
24	0.911	69	0.905	114	0.995	159	0.747	204	0.206	249	0.209	294	0.648	339	1.000
25	0.910	70	0.905	115	0.996	160	0.733	205	0.204	250	0.207	295	0.663	340	1.000
26	0.909	71	0.906	116	0.997	161	0.720	206	0.204	251	0.206	296	0.677	341	1.000
27	0.908	72	0.907	117	0.998	162	0.706	207	0.204	252	0.205	297	0.692	342	0.999
28	0.907	73	0.908	118	0.999	163	0.692	208	0.205	253	0.204	298	0.706	343	0.998
29	0.906	74	0.909	119	1.000	164	0.677	209	0.206	254	0.204	299	0.720	344	0.997
30	0.905	75	0.910	120	1.000	165	0.663	210	0.207	255	0.204	300	0.733	345	0.996
31	0.905	76	0.911	121	1.000	166	0.648	211	0.209	256	0.206	301	0.747	346	0.995
32	0.904	77	0.912	122	1.000	167	0.634	212	0.211	257	0.208	302	0.760	347	0.993
33	0.903	78	0.914	123	0.999	168	0.619	213	0.214	258	0.210	303	0.773	348	0.992
34	0.903	79	0.915	124	0.999	169	0.604	214	0.216	259	0.214	304	0.785	349	0.990
35	0.902	80	0.917	125	0.997	170	0.589	215	0.219	260	0.218	305	0.797	350	0.988
36	0.902	81	0.918	126	0.996	171	0.573	216	0.222	261	0.223	306	0.809	351	0.986
37	0.901	82	0.920	127	0.994	172	0.558	217	0.224	262	0.229	307	0.821	352	0.983
38	0.901	83	0.922	128	0.992	173	0.543	218	0.227	263	0.235	308	0.832	353	0.981
39	0.901	84	0.924	129	0.990	174	0.527	219	0.229	264	0.243	309	0.843	354	0.979
40	0.901	85	0.926	130	0.987	175	0.512	220	0.232	265	0.251	310	0.854	355	0.976
41	0.900	86	0.928	131	0.984	176	0.497	221	0.234	266	0.260	311	0.864	356	0.973
42	0.900	87	0.930	132	0.981	177	0.482	222	0.236	267	0.269	312	0.874	357	0.971
43	0.900	88	0.932	133	0.977	178	0.467	223	0.238	268	0.280	313	0.884	358	0.968
44	0.900	89	0.934	134	0.973	179	0.452	224	0.240	269	0.290	314	0.893	359	0.965

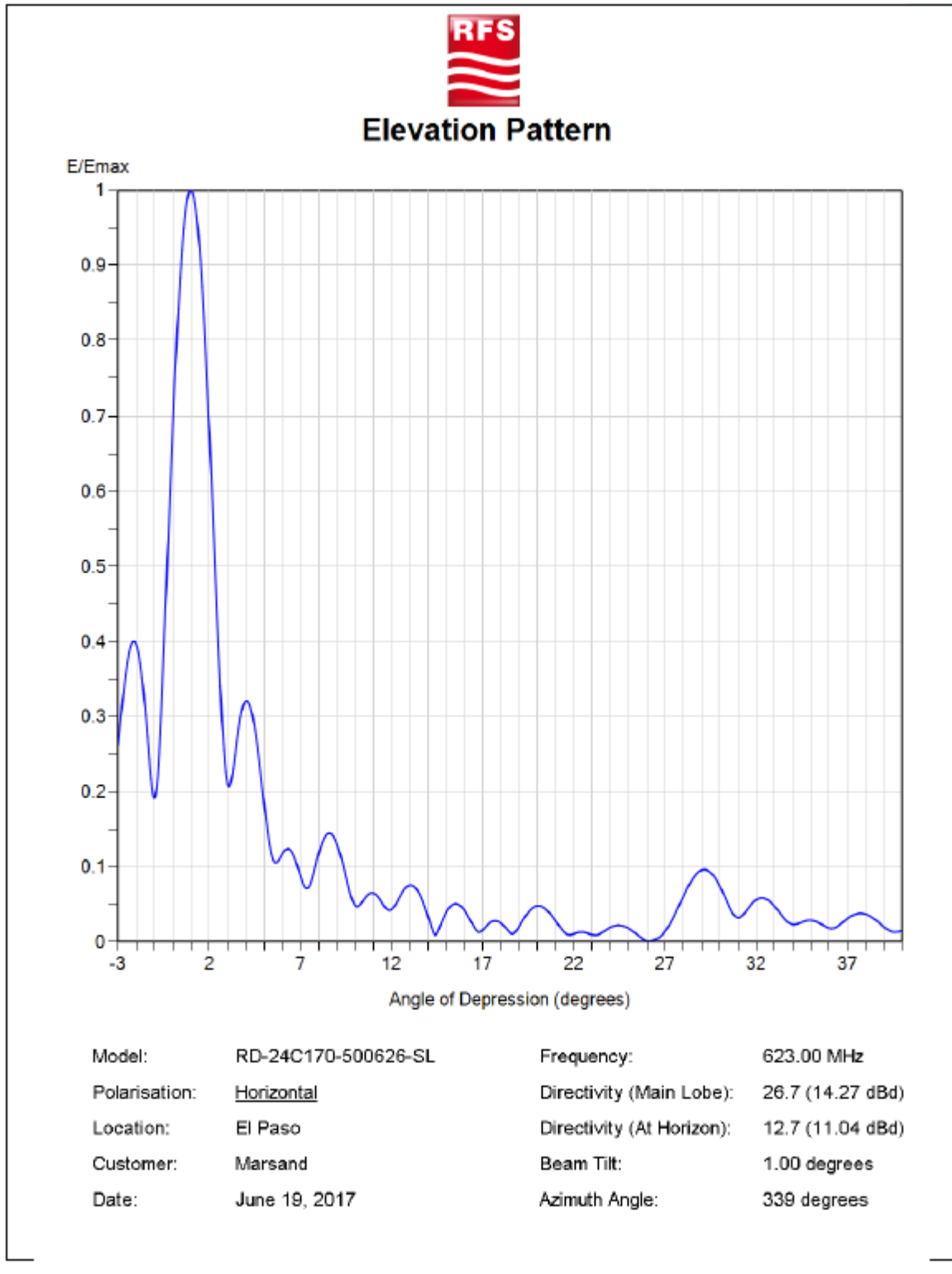
Model: RD-24C170-500626-SL
Location: El Paso
Customer: Marsand
Date: June 19, 2017

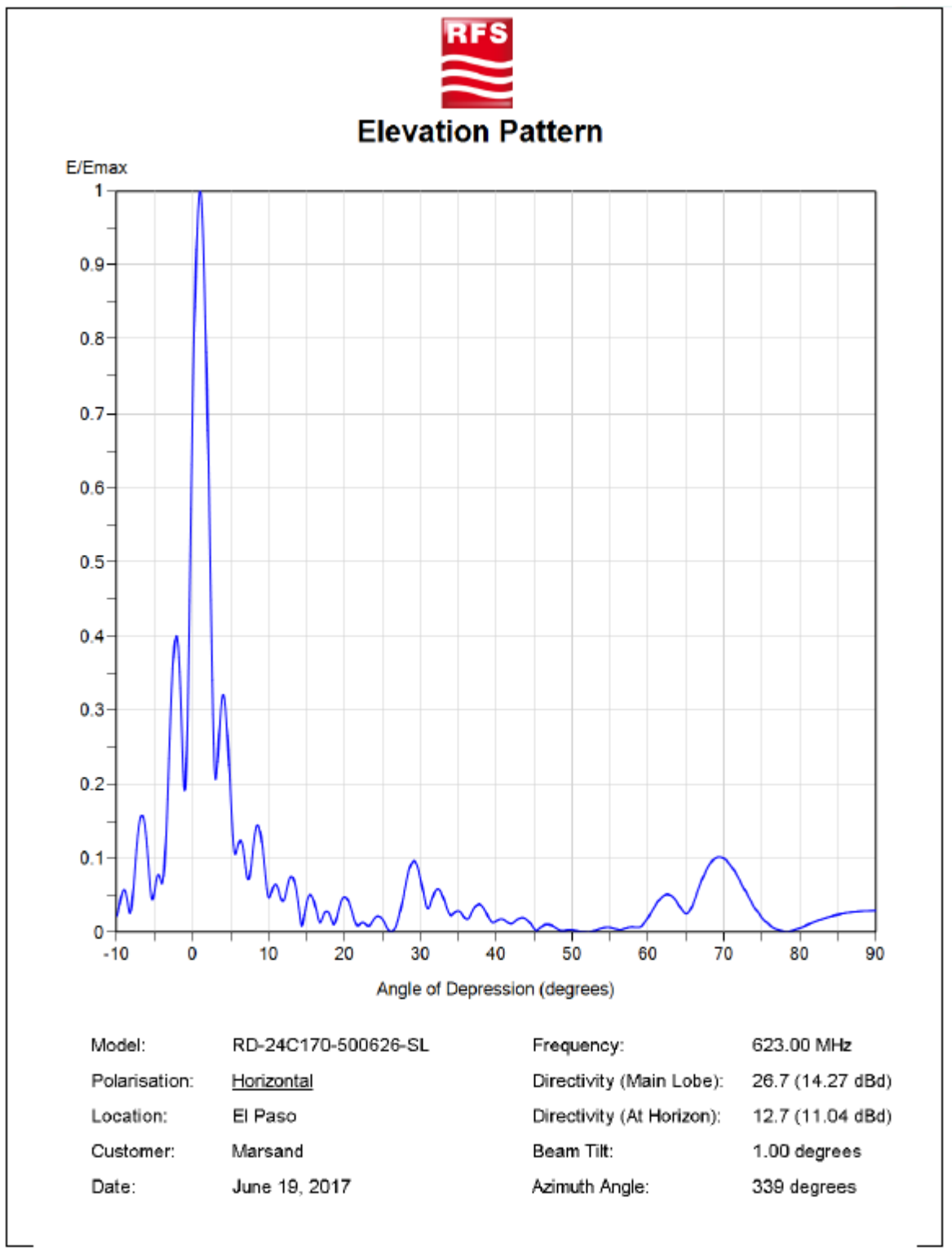
Polarization: Horizontal
Frequency (MHz): 623.00
Directivity: 1.7 (2.31 dB)
Elevation Angle: 1.00 degrees
Rotation Angle: 50 degrees



TABULATED AZIMUTH ERP

Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field
0	139.0	45	121.4	90	131.6	135	140.6	180	28.6	225	8.7	270	13.6	315	121.9
1	138.2	46	121.4	91	132.2	136	139.1	181	26.7	226	8.8	271	14.7	316	124.2
2	137.4	47	121.3	92	132.9	137	137.6	182	24.9	227	8.9	272	15.9	317	126.4
3	136.6	48	121.3	93	133.6	138	136.0	183	23.2	228	8.9	273	17.2	318	128.5
4	135.9	49	121.3	94	134.4	139	134.3	184	21.5	229	9.0	274	18.5	319	130.5
5	135.1	50	121.3	95	135.1	140	132.4	185	20.0	230	9.0	275	20.0	320	132.4
6	134.4	51	121.3	96	135.9	141	130.5	186	18.5	231	9.0	276	21.5	321	134.3
7	133.6	52	121.3	97	136.6	142	128.5	187	17.2	232	8.9	277	23.2	322	136.0
8	132.9	53	121.3	98	137.4	143	126.4	188	15.9	233	8.9	278	24.9	323	137.6
9	132.2	54	121.4	99	138.2	144	124.2	189	14.7	234	8.8	279	26.7	324	139.1
10	131.6	55	121.4	100	139.0	145	121.9	190	13.6	235	8.7	280	28.6	325	140.6
11	130.9	56	121.4	101	139.8	146	119.5	191	12.6	236	8.6	281	30.6	326	141.9
12	130.2	57	121.4	102	140.6	147	117.1	192	11.7	237	8.5	282	32.6	327	143.1
13	129.7	58	121.5	103	141.3	148	114.6	193	10.9	238	8.4	283	34.8	328	144.2
14	129.0	59	121.6	104	142.1	149	112.0	194	10.1	239	8.2	284	37.0	329	145.2
15	128.5	60	121.6	105	142.9	150	109.3	195	9.4	240	8.1	285	39.3	330	146.2
16	128.0	61	121.7	106	143.6	151	106.6	196	8.8	241	7.9	286	41.7	331	147.0
17	127.4	62	121.8	107	144.3	152	103.9	197	8.3	242	7.7	287	44.2	332	147.7
18	126.9	63	121.9	108	145.0	153	101.1	198	7.8	243	7.5	288	46.7	333	148.3
19	126.5	64	122.0	109	145.7	154	98.2	199	7.4	244	7.4	289	49.3	334	148.8
20	126.1	65	122.1	110	146.3	155	95.4	200	7.1	245	7.2	290	51.9	335	149.2
21	125.6	66	122.3	111	146.9	156	92.5	201	6.8	246	7.0	291	54.6	336	149.6
22	125.2	67	122.4	112	147.5	157	89.5	202	6.6	247	6.9	292	57.4	337	149.8
23	124.9	68	122.6	113	148.0	158	86.6	203	6.5	248	6.7	293	60.2	338	149.9
24	124.5	69	122.7	114	148.4	159	83.6	204	6.3	249	6.6	294	63.0	339	150.0
25	124.2	70	122.9	115	148.9	160	80.6	205	6.3	250	6.4	295	65.9	340	150.0
26	123.9	71	123.2	116	149.2	161	77.7	206	6.2	251	6.4	296	68.8	341	149.9
27	123.6	72	123.4	117	149.5	162	74.7	207	6.2	252	6.3	297	71.8	342	149.7
28	123.4	73	123.6	118	149.7	163	71.8	208	6.3	253	6.2	298	74.7	343	149.5
29	123.2	74	123.9	119	149.9	164	68.8	209	6.4	254	6.2	299	77.7	344	149.2
30	122.9	75	124.2	120	150.0	165	65.9	210	6.4	255	6.3	300	80.7	345	148.9
31	122.7	76	124.5	121	150.0	166	63.0	211	6.6	256	6.3	301	83.6	346	148.4
32	122.6	77	124.9	122	149.9	167	60.2	212	6.7	257	6.5	302	86.6	347	148.0
33	122.4	78	125.2	123	149.8	168	57.4	213	6.9	258	6.6	303	89.5	348	147.5
34	122.3	79	125.6	124	149.6	169	54.6	214	7.0	259	6.8	304	92.5	349	146.9
35	122.1	80	126.1	125	149.2	170	51.9	215	7.2	260	7.1	305	95.4	350	146.3
36	122.0	81	126.5	126	148.8	171	49.3	216	7.4	261	7.4	306	98.2	351	145.7
37	121.9	82	126.9	127	148.3	172	46.7	217	7.5	262	7.8	307	101.1	352	145.0
38	121.8	83	127.4	128	147.7	173	44.2	218	7.7	263	8.3	308	103.9	353	144.3
39	121.7	84	128.0	129	147.0	174	41.7	219	7.9	264	8.8	309	106.6	354	143.6
40	121.6	85	128.5	130	146.2	175	39.3	220	8.1	265	9.4	310	109.3	355	142.9
41	121.6	86	129.0	131	145.2	176	37.0	221	8.2	266	10.1	311	112.0	356	142.1
42	121.5	87	129.7	132	144.2	177	34.8	222	8.4	267	10.9	312	114.6	357	141.3
43	121.4	88	130.2	133	143.1	178	32.6	223	8.5	268	11.7	313	117.1	358	140.6
44	121.4	89	130.9	134	141.9	179	30.6	224	8.6	269	12.6	314	119.5	359	139.8





Model: RD-24C170-500626-SL
Location: El Paso
Customer: Marsand
Date: June 19, 2017

Polarization: Horizontal
Frequency (MHz): 623.00
Directivity (Main Lobe): 26.7 (14.27 dB)
Directivity (At Horizon): 12.7 (11.04 dB)
Beam Tilt: 1.00 degrees



TABULATED ELEVATION PATTERN

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.022	2.4	0.449	10.6	0.060	30.5	0.048	51.0	0.001	71.5	0.080
-9.5	0.044	2.6	0.341	10.8	0.064	31.0	0.032	51.5	0.000	72.0	0.071
-9.0	0.057	2.8	0.255	11.0	0.065	31.5	0.043	52.0	0.000	72.5	0.062
-8.5	0.038	3.0	0.210	11.5	0.051	32.0	0.056	52.5	0.001	73.0	0.052
-8.0	0.037	3.2	0.215	12.0	0.043	32.5	0.057	53.0	0.002	73.5	0.043
-7.5	0.098	3.4	0.248	12.5	0.062	33.0	0.047	53.5	0.004	74.0	0.034
-7.0	0.147	3.6	0.284	13.0	0.075	33.5	0.032	54.0	0.006	74.5	0.026
-6.5	0.154	3.8	0.310	13.5	0.064	34.0	0.023	54.5	0.007	75.0	0.020
-6.0	0.115	4.0	0.321	14.0	0.033	34.5	0.026	55.0	0.007	75.5	0.014
-5.5	0.055	4.2	0.316	14.5	0.011	35.0	0.028	55.5	0.005	76.0	0.010
-5.0	0.057	4.4	0.296	15.0	0.039	35.5	0.024	56.0	0.004	76.5	0.006
-4.5	0.078	4.6	0.265	15.5	0.051	36.0	0.018	56.5	0.004	77.0	0.004
-4.0	0.066	4.8	0.226	16.0	0.041	36.5	0.021	57.0	0.005	77.5	0.002
-3.5	0.130	5.0	0.185	16.5	0.020	37.0	0.031	57.5	0.007	78.0	0.001
-3.0	0.262	5.2	0.146	17.0	0.016	37.5	0.037	58.0	0.007	78.5	0.001
-2.8	0.313	5.4	0.118	17.5	0.027	38.0	0.037	58.5	0.007	79.0	0.002
-2.6	0.355	5.6	0.106	18.0	0.025	38.5	0.030	59.0	0.008	79.5	0.004
-2.4	0.385	5.8	0.108	18.5	0.012	39.0	0.020	59.5	0.012	80.0	0.006
-2.2	0.399	6.0	0.117	19.0	0.021	39.5	0.013	60.0	0.020	80.5	0.008
-2.0	0.395	6.2	0.123	19.5	0.039	40.0	0.015	60.5	0.028	81.0	0.010
-1.8	0.371	6.4	0.123	20.0	0.048	40.5	0.018	61.0	0.037	81.5	0.012
-1.6	0.329	6.6	0.116	20.5	0.042	41.0	0.017	61.5	0.044	82.0	0.014
-1.4	0.273	6.8	0.103	21.0	0.027	41.5	0.013	62.0	0.049	82.5	0.016
-1.2	0.217	7.0	0.087	21.5	0.012	42.0	0.011	62.5	0.051	83.0	0.018
-1.0	0.192	7.2	0.074	22.0	0.011	42.5	0.015	63.0	0.050	83.5	0.020
-0.8	0.235	7.4	0.072	22.5	0.013	43.0	0.018	63.5	0.045	84.0	0.021
-0.6	0.330	7.6	0.082	23.0	0.009	43.5	0.020	64.0	0.038	84.5	0.022
-0.4	0.448	7.8	0.099	23.5	0.011	44.0	0.017	64.5	0.029	85.0	0.024
-0.2	0.571	8.0	0.118	24.0	0.019	44.5	0.012	65.0	0.025	85.5	0.025
0.0	0.690	8.2	0.133	24.5	0.022	45.0	0.005	65.5	0.029	86.0	0.026
0.2	0.796	8.4	0.142	25.0	0.017	45.5	0.003	66.0	0.040	86.5	0.026
0.4	0.884	8.6	0.145	25.5	0.009	46.0	0.008	66.5	0.054	87.0	0.027
0.6	0.949	8.8	0.140	26.0	0.001	46.5	0.010	67.0	0.068	87.5	0.028
0.8	0.989	9.0	0.130	26.5	0.003	47.0	0.010	67.5	0.080	88.0	0.028
1.0	1.000	9.2	0.114	27.0	0.014	47.5	0.008	68.0	0.090	88.5	0.028
1.2	0.983	9.4	0.095	27.5	0.035	48.0	0.005	68.5	0.097	89.0	0.029
1.4	0.940	9.6	0.076	28.0	0.060	48.5	0.002	69.0	0.101	89.5	0.029
1.6	0.871	9.8	0.058	28.5	0.083	49.0	0.002	69.5	0.101	90.0	0.000
1.8	0.782	10.0	0.048	29.0	0.095	49.5	0.003	70.0	0.099		
2.0	0.678	10.2	0.048	29.5	0.092	50.0	0.003	70.5	0.095		
2.2	0.564	10.4	0.054	30.0	0.074	50.5	0.002	71.0	0.088		