

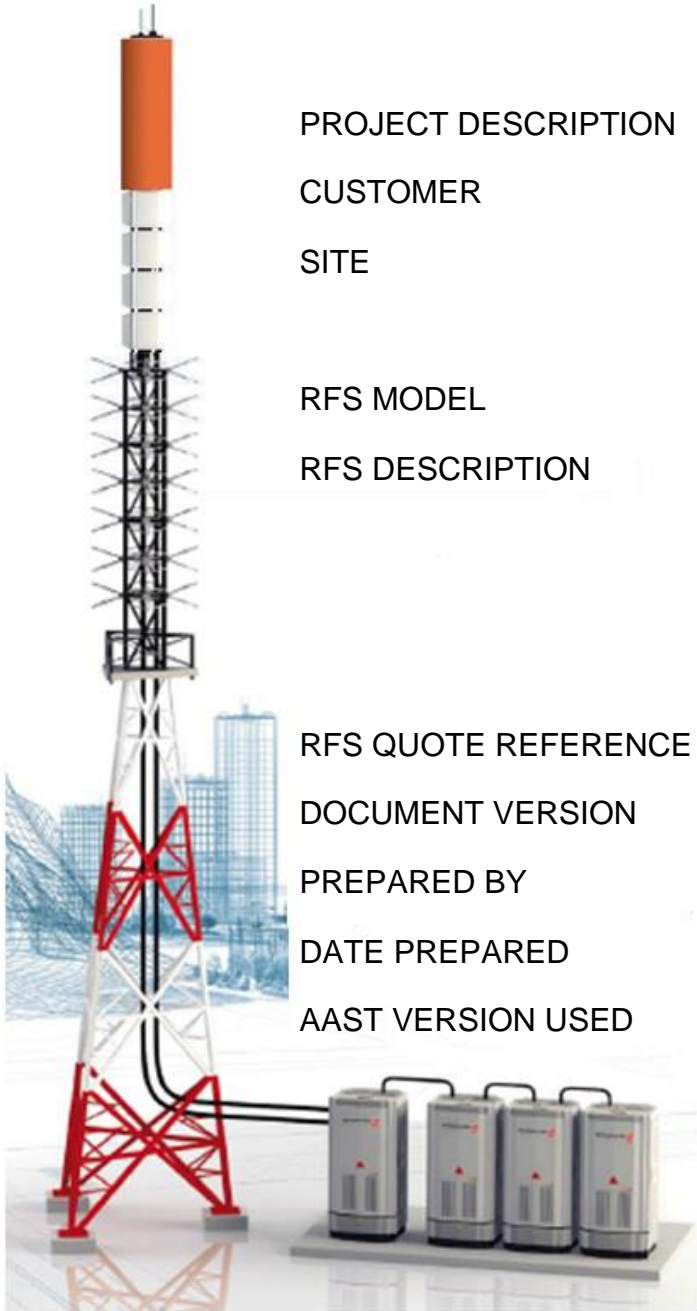
The new wave in broadcast solutions

Antennas



RADIO FREQUENCY SYSTEMS

TECHNICAL PROPOSAL



PROJECT DESCRIPTION	KTXH Consolidation
CUSTOMER	Station KTXH/KRIV
SITE	Houston, Texas
RFS MODEL	SBB-EP50-24C160A
RFS DESCRIPTION	SBB-Epol Broadband Slot Antenna
RFS QUOTE REFERENCE	513085
DOCUMENT VERSION	1.1
PREPARED BY	Jose L Kroiss Neto
DATE PREPARED	July 5, 2021
AAST VERSION USED	2.0.2.0

TV & RADIO | IN-BUILDING | WIRELESS | IN-TUNNEL | HF & DEFENSE | MICROWAVE | MOBILE RADIO



A new wave in TV and Radio Solutions

Because no two networks are the same, Radio Frequency Systems is primed and ready to provide the widest possible range of options for you.

RFS broadcast antennas are recognized throughout the broadcast industry for their quality and broadband performance. As the only supplier who can offer end-to-end passive broadcast solutions, RFS provides RF systems from the output of the transmitter, to the antennas. This provides a single point of accountability with a fully integrated solution and a complete system warranty.

We offer a vast portfolio of premium performance antenna solutions for television, radio and HF.

Broadband panel arrays

With all polarization options available, RFS broadband panel arrays support Bands I, II (87.5-108MHz), III (174-240MHz), IV and V (470-860MHz). Each array can be tailored for specific coverage and power-handling capability.

Top mount antennas

We offer a range of lightweight and low-profile antennas (including super turnstile slot, dipole, and collinear antennas) that support single or multi-channel services

Side mount antennas

Providing a range of polarization and power options, RFS' side mount antennas are an ideal alternative for television and radio applications where the tower cannot support a top mounted antenna.

New technologies

Whichever broadcast band is in use for fixed or mobile television or radio broadcast, we're fully conversant with all global broadcasting standards and emerging digital technologies, including: Television (analogue and digital) – DVB-T, DVB-T2, ATSC, ISDB-T, DMB-T/H, PAL, NTSC, etc. Radio (analogue and digital) – FM, DAB, DAB+, HD Radio, CDR, etc

HELIFLEX® – the original and still the best

Our world-renowned HELIFLEX® air-dielectric coaxial transmission line is installed easily and quickly, providing maximum strength and reliability.

HELIFLEX® is available in a wide range of sizes (3/8-inch to 9-inch diameter) and ensures a completely sealed feeder system, without the need for joining flanges or suspension hanger systems.

HELIFLEX®'s electrical performance is unsurpassed, delivering consistently low VSWR across the entire broadcast band, and low attenuation performance. It is also one of the few flexible feeder cables that can support the high-power requirements of multiple broadcast services.

> Why RFS

Product	Best-in-class technical performance	Future proof	Bespoke/standard designs	Cyclone rated	Low wind load	Rugged construction
VHF TV Band I	✓		✓		✓	✓
VHF FM Radio Band II	✓	✓	✓	✓	✓	✓
VHF TV Band III	✓	✓	✓	✓	✓	✓
UHF Band IV/V	✓	✓	✓	✓	✓	✓



ANTENNA PROPOSAL - MODEL SBB-EP50-24C160A

ANTENNA SYSTEM DATA

Panel orientation	A
Direction	0°
Number of slots	24
Power ratio	100.0%
Vertical spacing between bays (centre to centre)	Refer to the drawing if available
Azimuth radiation pattern	Wide Cardioid (Refer HRP)

ANTENNA MOUNTING DATA

Antenna mounting	Side Mount
Antenna system assembly	Supplied as kit of parts to be assembled on site
Power divider network	Supplied assembled and tested in the factory

POWER DIVIDER NETWORK DATA

VSWR Tuner	Included
Cable Test Section	Not Included
Power Dividers	1 X 3 WAY POWER DIVIDER (PD81E3E49 3 UP) 3 X 2 WAY POWER DIVIDER (PD49E2E31)
Branch feeder cables	HCA400-50J (32.81 ft /each.)

FACTORY TEST DATA

Factory Tests	VSWR, Phasing, Pressurization, HRP and VRP (Both calc. from phasing). ISO 9001 Quality testing
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ANTENNA SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Antenna Model	SBB-EP50-24C160A
Frequency Range	470 - 700 MHz
Operating Channels	CH US 19 (503.00 MHz) CH US 26 (545.00 MHz)
Polarization	Elliptical (Vertical Component Ratio 50% at design frequency 545 MHz)
Number of Slots	24
Azimuth Pattern	Wide Cardioid-C160A
Impedance	75 Ohm
VSWR	Across channels: <1.1:1 (Return Loss > 26.4 dB)
Input Power Rating	1 x 105.0 kW into full antenna system
Input Connector Size	1 x 8-3/16" EIA
Input Connector Location	Antenna Center (approx.)
Antenna Gain	Refer System Summary
Beam Tilt	1.00 degrees
Null Fill	Refer Elevation Pattern
Note: Beam tilt and Null fill can be modified, if required	

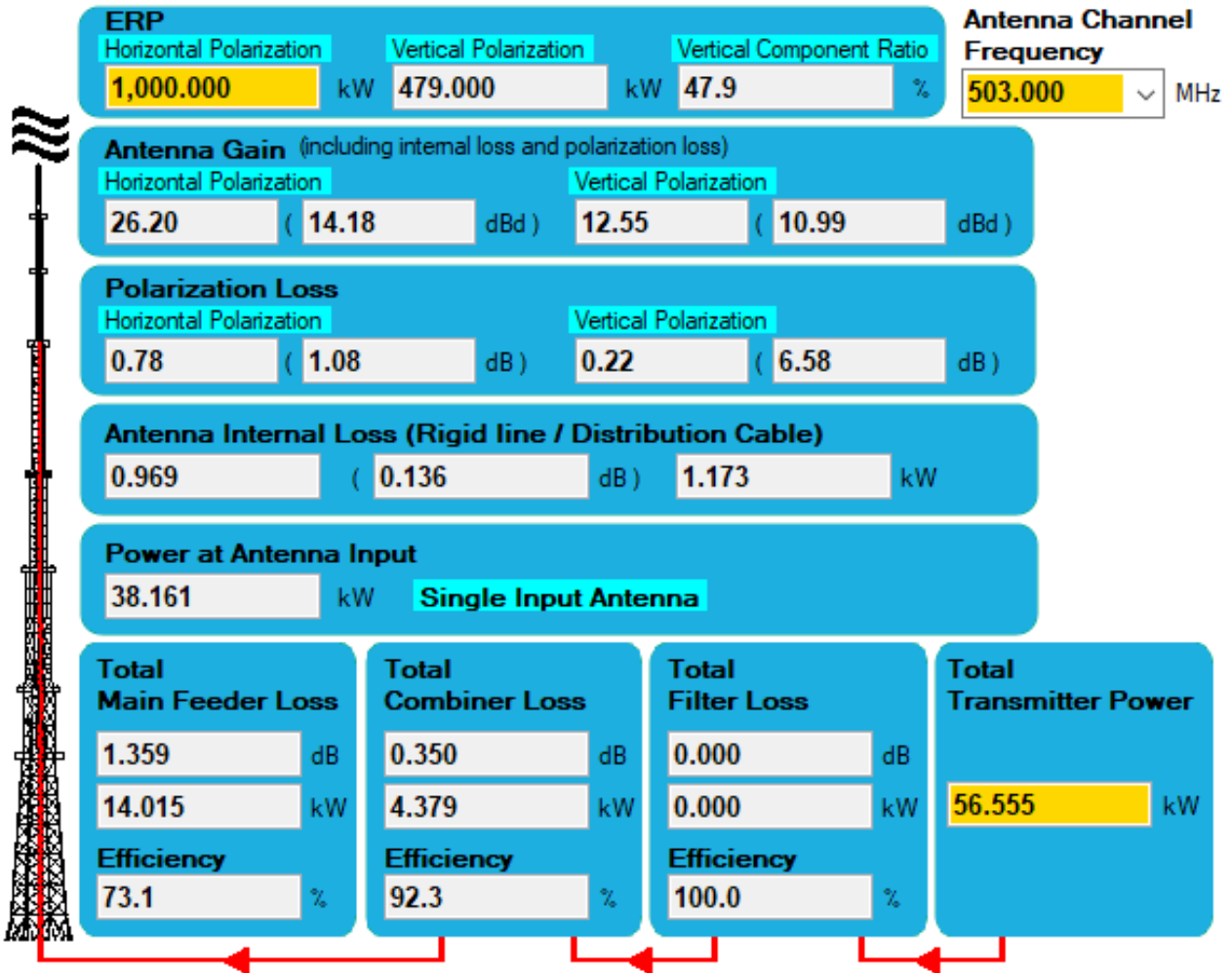
MECHANICAL SPECIFICATIONS

Antenna Mounting	Side Mount
Operating Temperature	-40°F to 104°F
Height (aperture) (H)	42.98 ft
Diameter (D)	1.25 ft
Center of Radiation (COR) above base	21.49 ft
Weight	2,315 lbs
Effective Projected Area (EPA=CaAa)	67 ft ² (antenna, mounts, power dividers and cables)

Note: Calculated weight and effective projected area (EPA) is based on preliminary antenna design and assumed site conditions. More accurate weight and EPA for the specific antenna design will be provided at the time of quotation. Site specific operating temperature (lowest monthly mean) will be considered for the antenna structural steel materials qualification in accordance with TIA-222-G standard.

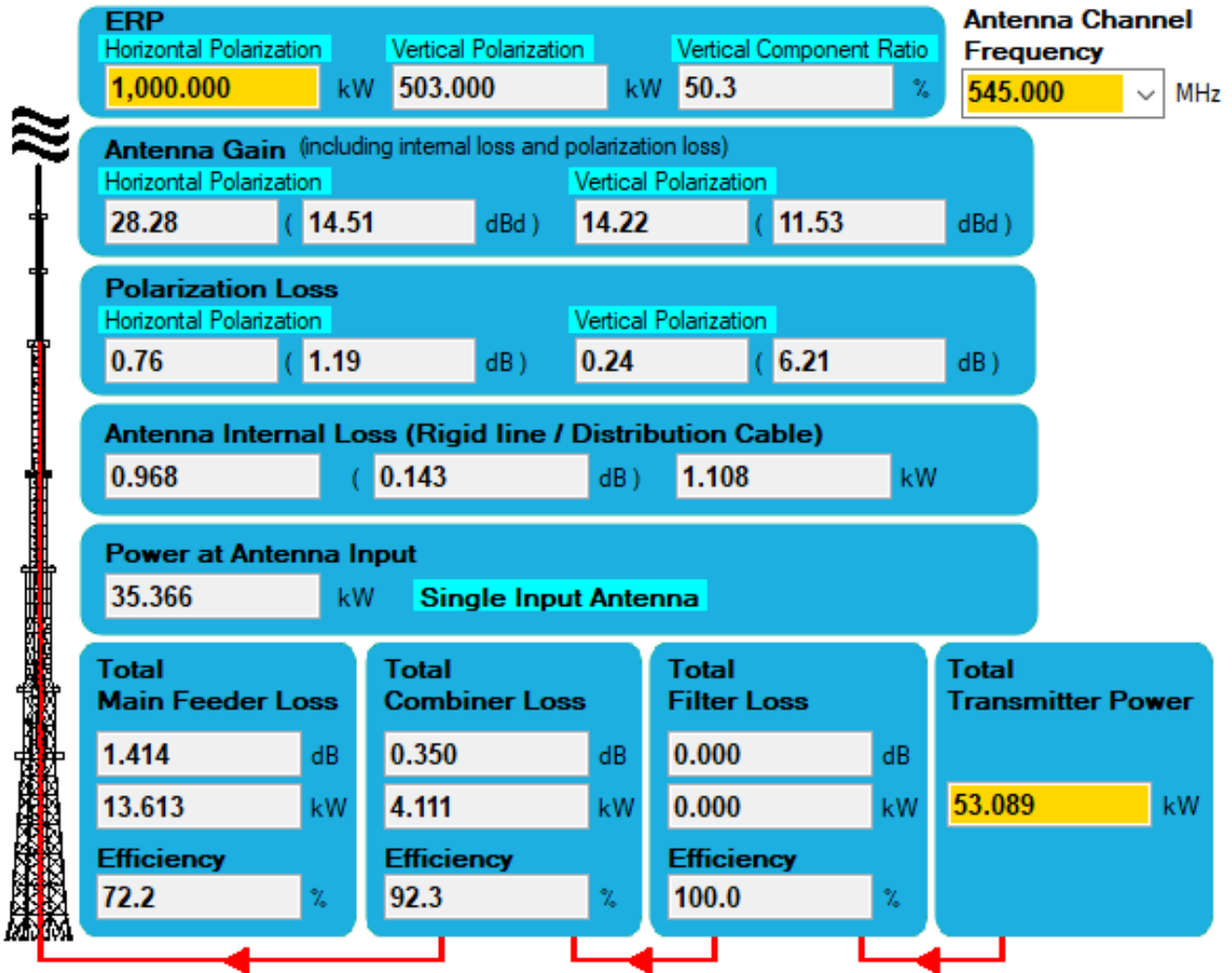
SYSTEM SUMMARY

ANTENNA MODEL: SBB-EP50-24C160A



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Antenna

Channel	US 19	US 26
Frequency (MHz)	503.00 MHz	545.00 MHz
ERP	Hpol: 1,000.00 kW (30.00 dBk) Vpol: 479.00 kW (26.80 dBk)	Hpol: 1,000.00 kW (30.00 dBk) Vpol: 503.00 kW (27.02 dBk)
Peak Directivity	Hpol: 34.7 (15.40 dBd) Vpol: 58.9 (17.70 dBd)	Hpol: 38.4 (15.84 dBd) Vpol: 61.4 (17.88 dBd)
Polarization Loss	Hpol: 0.78 (1.08 dB) Vpol: 0.22 (6.58 dB)	Hpol: 0.76 (1.19 dB) Vpol: 0.24 (6.21 dB)
Antenna Internal Loss	0.97 (0.14 dB)	0.97 (0.14 dB)
Antenna Gain	Hpol: 26.2 (14.18 dBd) Vpol: 12.6 (10.99 dBd)	Hpol: 28.3 (14.51 dBd) Vpol: 14.2 (11.53 dBd)
Power at Antenna Input	38.16 kW (15.82 dBk)	35.37 kW (15.49 dBk)

Transmission Line

Type	8 3/16" 75 Ohm Rigid Line	8 3/16" 75 Ohm Rigid Line
Impedance	75 ohm	75 ohm
Length	1,850.00 ft	1,850.00 ft
Attenuation	1.36 dB	1.41 dB
Efficiency	73.1 %	72.2 %

Transmitter

Filter Loss	1.00 (0.00 dB)	1.00 (0.00 dB)
Combiner Loss	0.92 (0.35 dB)	0.92 (0.35 dB)
Power Required	56.56 kW (17.52 dBk)	53.09 kW (17.25 dBk)



ANTENNA POWER AND VOLTAGE RATINGS

Component Description	Length (ft)	No of Outputs	Loss (dB)	Operating Power (kW)	Max. Rated Power (kW)	Safety Factor Power	Operating Volts (kV)	Max Rated Voltage (kV)	Safety Factor Voltage
NGS-EP50-C170 8-bay (2x 3-1/8" EIA input)				11.95	17.50	1.5	4.18	9.60	2.30
HCA400 Branch feeder cables	32.8		0.09	12.20	23.10	1.9	4.23	9.70	2.30
PD49E2E31 Secondary Power Divder		2.0 way		24.39	40.00	1.6	5.98	12.75	2.13
4-7/8" Rigid Phasing Section	0.8			24.39	40.31	1.7	5.98	14.70	2.46
PD81E3E49 3 UP Input Power Divider		3.0 way		73.18	120.00	1.6	10.35	23.00	2.22
LC81E Line Tuner				73.18	120.00	1.6	10.35	18.72	1.81
Main Feeder Cable - 8 3/16" 75 Ohm Rigid Line	1,850		1.41	101.16	114.93	1.1	12.17	23.40	1.92
Combiner Output Power				101.16			12.17		

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Frequency Information	
Design Frequency	545.00 MHz
Frequency Span	138 MHz

Envelope Approach	
Total Digital Peak to Average Power Ratio (PAPR):	12.1 dB

Summary Power and Voltage Data:	
Total Average Power at Combiner O/P	101.16 kW
Total Peak Voltage at Combiner O/P	12.78 kV
RMS Voltage (Beta Distribution Av. Voltage)	2.25 kV
Beta Distribution Peak Voltage	12.17 kV

Maximum Antenna Ratings	
Maximum Average Power	107.17 kW
Maximum Peak Voltage	13.37 kV

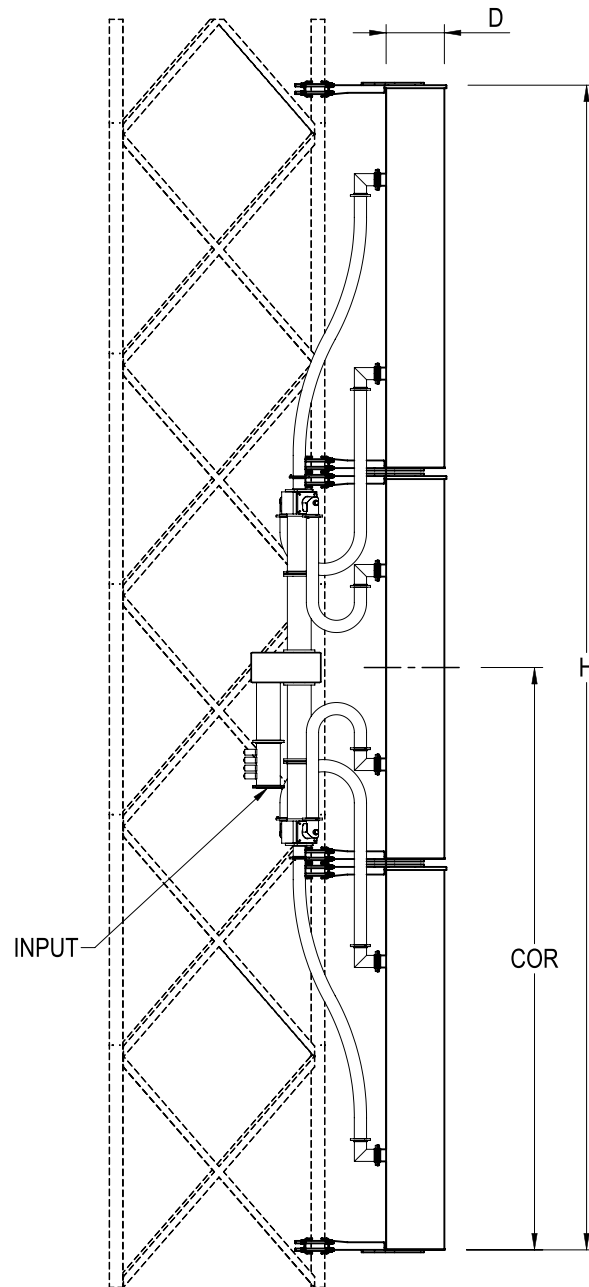
Notes:

1. Tx powers are peak sync for analogue transmitters
2. Tx powers are average power for digital transmitters
3. Voltages are peak, instantaneous in phase voltages.
4. Voltage safety factors are calculated for limited bandwidth (beta distribution) and provide the most accurate representation of maximum peak voltages
5. Total Peak Voltage at Combiner O/P is calculated using Total Average Power at Combiner O/P and the capped PAPR of 16dB for more than 4 digital channels in the system.
6. Power safety factor of 1.0 and voltage safety factor of 1.40 are the minimum allowable for continuous operation at 40 degrees centigrade.
7. Peak to Average Power Ratios for Digital Tx are shown below:

DVB-T	10 dB
DVB-T2	10 dB
ISDB-T 6MHz	10 dB
ISDB-T 8MHz	10 dB
ATSC 1.0	08 dB
ATSC 3.0	10 dB
DAB	10 dB
IBOC	08 dB



ANTENNA DRAWING



(Illustrative purpose) Actual antenna may have a different number of bays

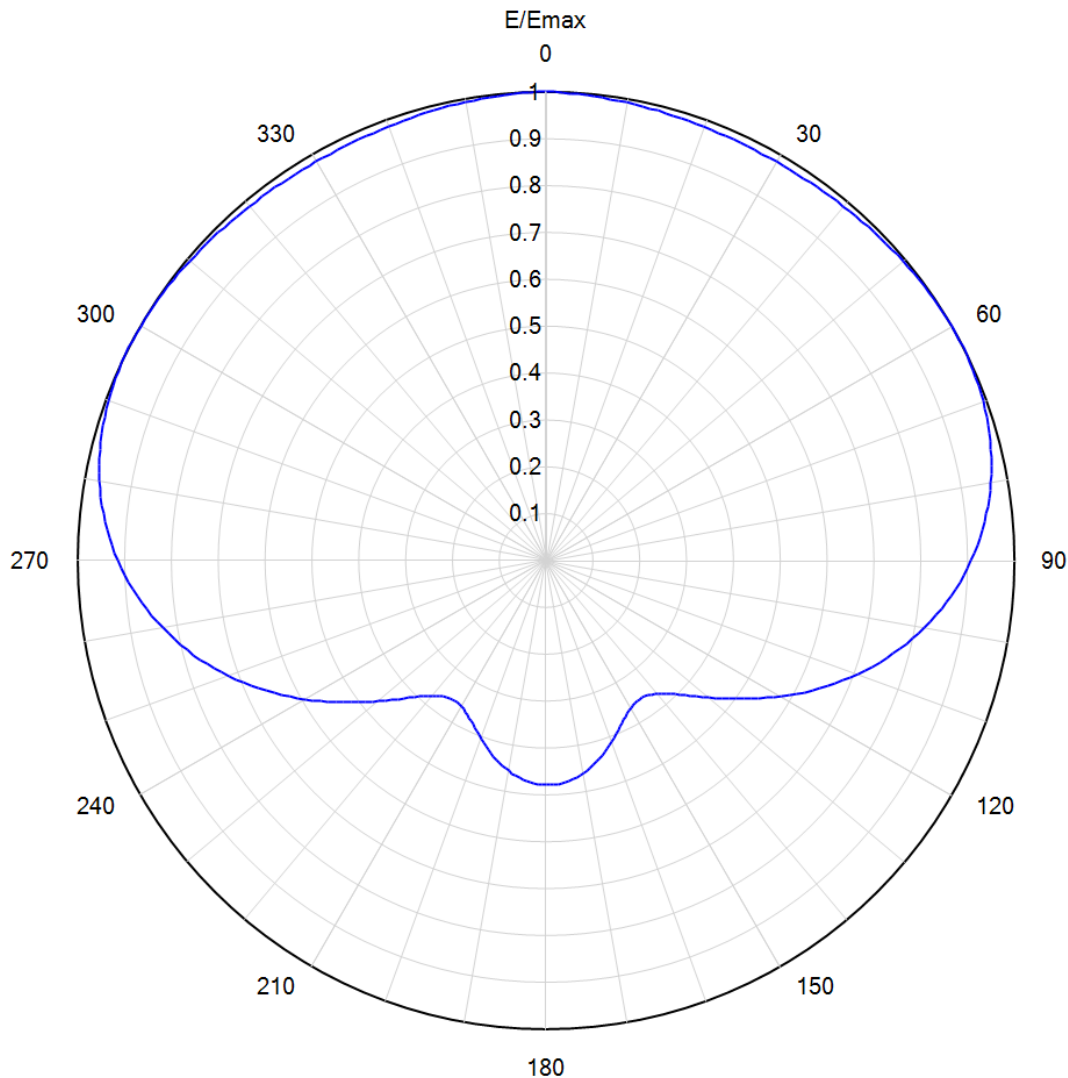
TV & RADIO | IN-BUILDING | WIRELESS | IN-TUNNEL | HF & DEFENSE | MICROWAVE | MOBILE RADIO



ANTENNA RADIATION PATTERNS KTXH - Ch 19 (503 MHz)



Azimuth Pattern



Model: SBB-EP50-24C160A

Location: Houston, Texas

Customer: Station KTXH/KRIV

Date: July 5, 2021

Rotation Angle: 0 degrees

Note: Pattern Tolerance +/-5% of Emax

Polarization: Horizontal

Frequency: 503.00 MHz

Directivity: 1.5 (1.89 dB)

Elevation Angle: 1.00 degrees

Horizontal Unit Pattern:

File = SBB-EP-C160A_HP_503.pat



Model: **SBB-EP50-24C160A**
 Location: **Houston, Texas**
 Customer: **Station KTXH/KRIV**
 Date: **July 5, 2021**

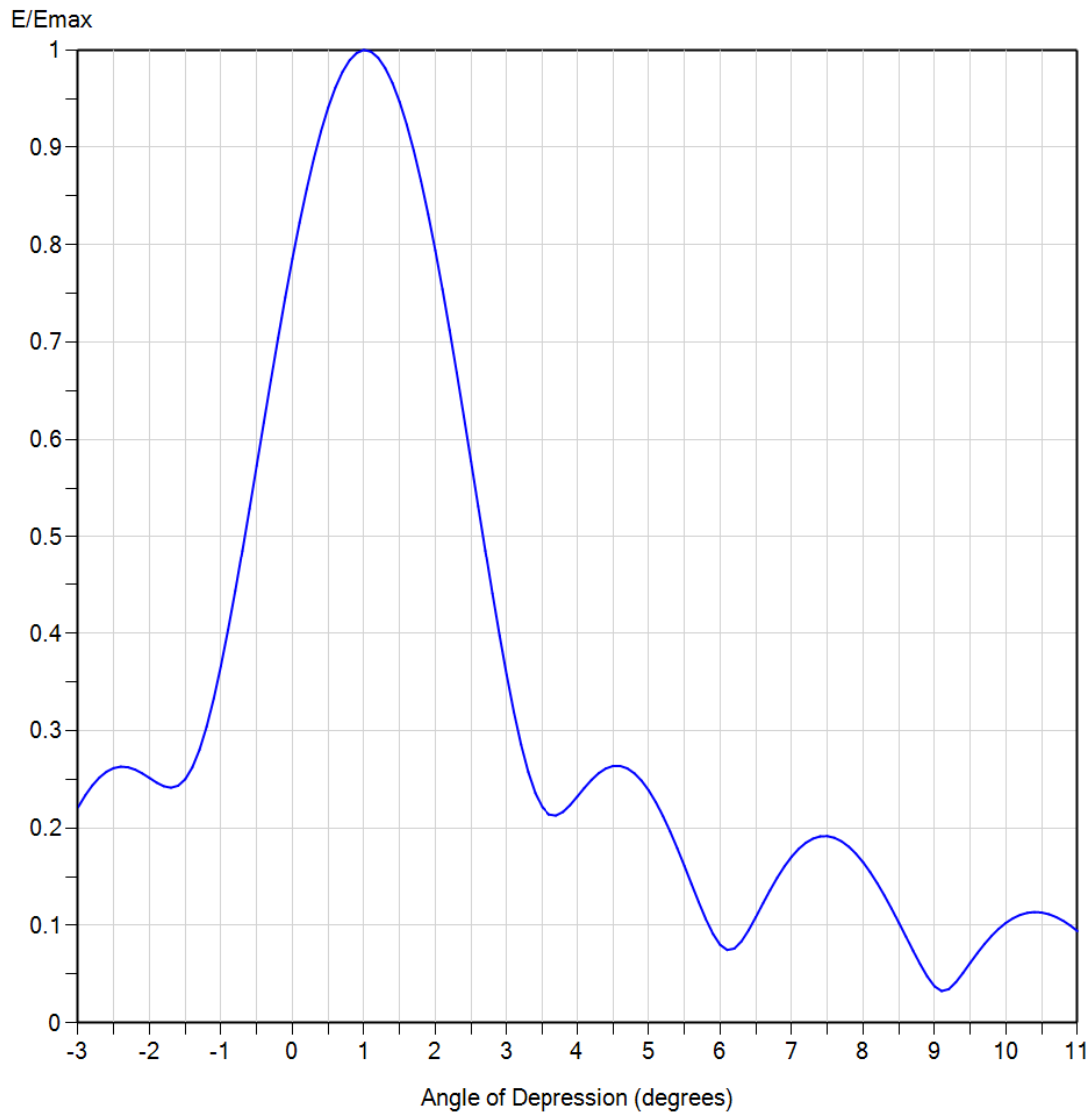
Polarization: **Horizontal**
 Frequency (MHz): **503.00**
 Directivity: **1.5 (1.89 dB)**
 Elevation Angle: **1.00 degrees**
 Rotation Angle: **0 degrees**

**TABULATED AZIMUTH PATTERN**

Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field
0	1.000	45	0.990	90	0.908	135	0.406	180	0.479	225	0.414	270	0.915	315	0.990
1	1.000	46	0.991	91	0.900	136	0.397	181	0.479	226	0.424	271	0.921	316	0.989
2	0.999	47	0.992	92	0.893	137	0.390	182	0.478	227	0.434	272	0.928	317	0.988
3	0.998	48	0.993	93	0.885	138	0.383	183	0.477	228	0.444	273	0.934	318	0.987
4	0.997	49	0.994	94	0.877	139	0.377	184	0.475	229	0.455	274	0.940	319	0.987
5	0.996	50	0.995	95	0.868	140	0.372	185	0.473	230	0.467	275	0.945	320	0.986
6	0.996	51	0.995	96	0.859	141	0.367	186	0.470	231	0.478	276	0.950	321	0.985
7	0.995	52	0.996	97	0.850	142	0.363	187	0.467	232	0.490	277	0.955	322	0.985
8	0.994	53	0.997	98	0.841	143	0.361	188	0.464	233	0.503	278	0.960	323	0.984
9	0.993	54	0.998	99	0.831	144	0.359	189	0.461	234	0.515	279	0.964	324	0.984
10	0.992	55	0.998	100	0.821	145	0.358	190	0.457	235	0.528	280	0.968	325	0.984
11	0.991	56	0.999	101	0.811	146	0.357	191	0.452	236	0.541	281	0.972	326	0.983
12	0.991	57	0.999	102	0.801	147	0.358	192	0.448	237	0.554	282	0.976	327	0.983
13	0.990	58	1.000	103	0.790	148	0.359	193	0.443	238	0.567	283	0.979	328	0.983
14	0.989	59	1.000	104	0.779	149	0.361	194	0.438	239	0.580	284	0.982	329	0.983
15	0.988	60	1.000	105	0.768	150	0.363	195	0.433	240	0.593	285	0.985	330	0.983
16	0.987	61	1.000	106	0.756	151	0.366	196	0.427	241	0.606	286	0.987	331	0.983
17	0.987	62	1.000	107	0.745	152	0.370	197	0.422	242	0.619	287	0.989	332	0.983
18	0.986	63	1.000	108	0.733	153	0.374	198	0.416	243	0.632	288	0.991	333	0.983
19	0.985	64	0.999	109	0.721	154	0.378	199	0.410	244	0.645	289	0.993	334	0.983
20	0.984	65	0.999	110	0.709	155	0.383	200	0.405	245	0.658	290	0.995	335	0.983
21	0.984	66	0.998	111	0.696	156	0.388	201	0.399	246	0.671	291	0.996	336	0.983
22	0.984	67	0.997	112	0.684	157	0.394	202	0.394	247	0.684	292	0.997	337	0.984
23	0.983	68	0.996	113	0.671	158	0.399	203	0.388	248	0.696	293	0.998	338	0.984
24	0.983	69	0.995	114	0.658	159	0.405	204	0.383	249	0.709	294	0.999	339	0.984
25	0.983	70	0.993	115	0.645	160	0.410	205	0.378	250	0.721	295	0.999	340	0.985
26	0.983	71	0.991	116	0.632	161	0.416	206	0.374	251	0.733	296	1.000	341	0.986
27	0.983	72	0.989	117	0.619	162	0.422	207	0.370	252	0.745	297	1.000	342	0.987
28	0.983	73	0.987	118	0.606	163	0.427	208	0.366	253	0.756	298	1.000	343	0.987
29	0.983	74	0.985	119	0.593	164	0.433	209	0.363	254	0.768	299	1.000	344	0.988
30	0.983	75	0.982	120	0.580	165	0.438	210	0.361	255	0.779	300	1.000	345	0.989
31	0.983	76	0.979	121	0.567	166	0.443	211	0.359	256	0.790	301	1.000	346	0.990
32	0.983	77	0.976	122	0.554	167	0.448	212	0.358	257	0.801	302	0.999	347	0.991
33	0.983	78	0.972	123	0.541	168	0.452	213	0.357	258	0.811	303	0.999	348	0.991
34	0.984	79	0.968	124	0.528	169	0.457	214	0.358	259	0.821	304	0.998	349	0.992
35	0.984	80	0.964	125	0.515	170	0.461	215	0.359	260	0.831	305	0.998	350	0.993
36	0.984	81	0.960	126	0.503	171	0.464	216	0.361	261	0.841	306	0.997	351	0.994
37	0.985	82	0.955	127	0.490	172	0.467	217	0.363	262	0.850	307	0.996	352	0.995
38	0.985	83	0.950	128	0.478	173	0.470	218	0.367	263	0.859	308	0.995	353	0.996
39	0.986	84	0.945	129	0.467	174	0.473	219	0.372	264	0.868	309	0.995	354	0.996
40	0.987	85	0.940	130	0.455	175	0.475	220	0.377	265	0.877	310	0.994	355	0.997
41	0.987	86	0.934	131	0.444	176	0.477	221	0.383	266	0.885	311	0.993	356	0.998
42	0.988	87	0.928	132	0.434	177	0.478	222	0.390	267	0.893	312	0.992	357	0.999
43	0.989	88	0.921	133	0.424	178	0.479	223	0.397	268	0.900	313	0.991	358	1.000
44	0.990	89	0.915	134	0.414	179	0.479	224	0.406	269	0.908	314	0.990	359	1.000



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 503.00 MHz

Polarization: Horizontal

Directivity (Main Lobe): 22.4 (13.51 dBd)

Location: Houston, Texas

Directivity (At Horizon): 13.8 (11.41 dBd)

Customer: Station KTXH/KRIV

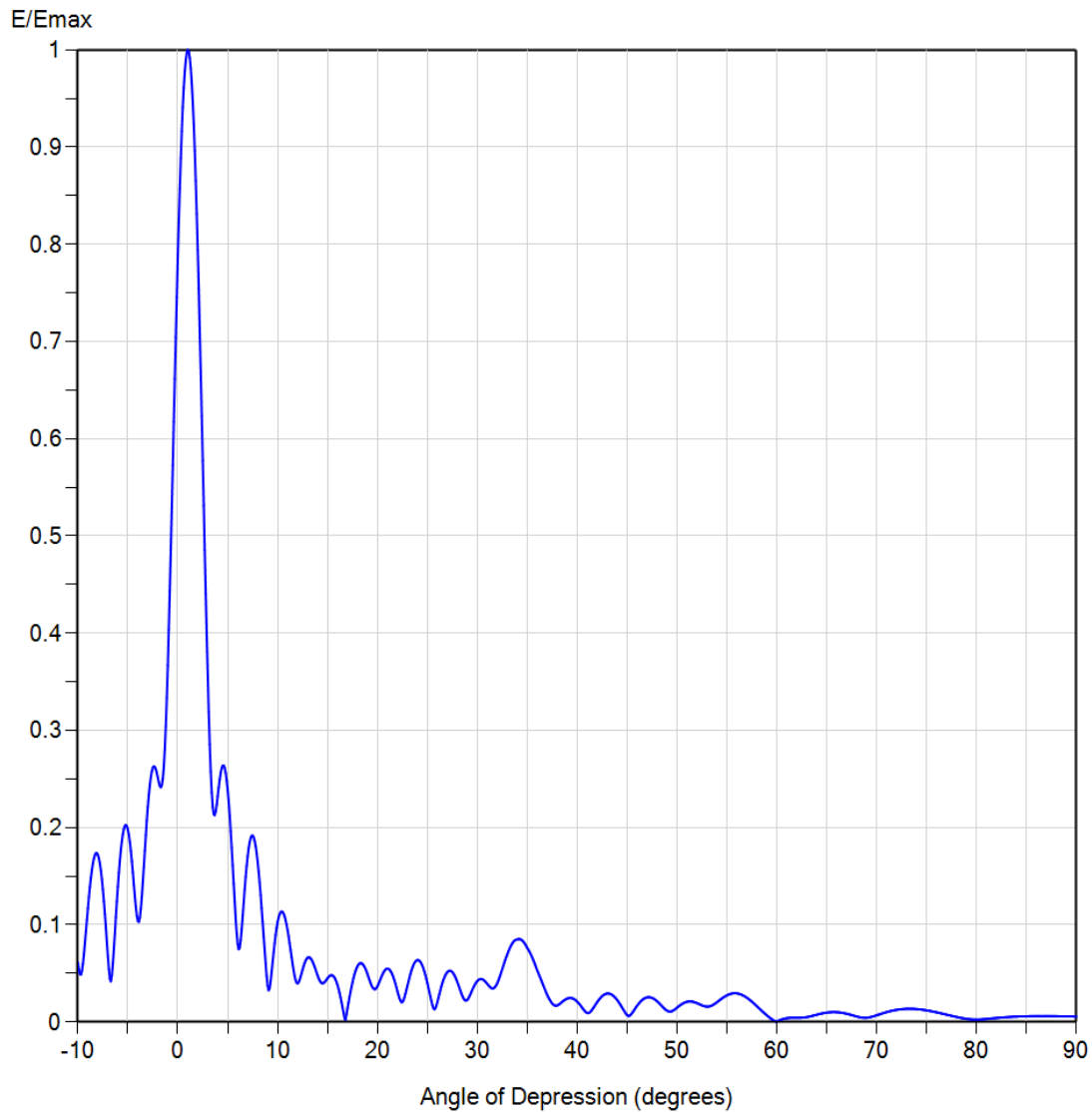
Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 337 degrees



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 503.00 MHz

Polarization: Horizontal

Directivity (Main Lobe): 22.4 (13.51 dBd)

Location: Houston, Texas

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Customer: Station KTXH/KRIV

Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 337 degrees



Model: **SBB-EP50-24C160A**
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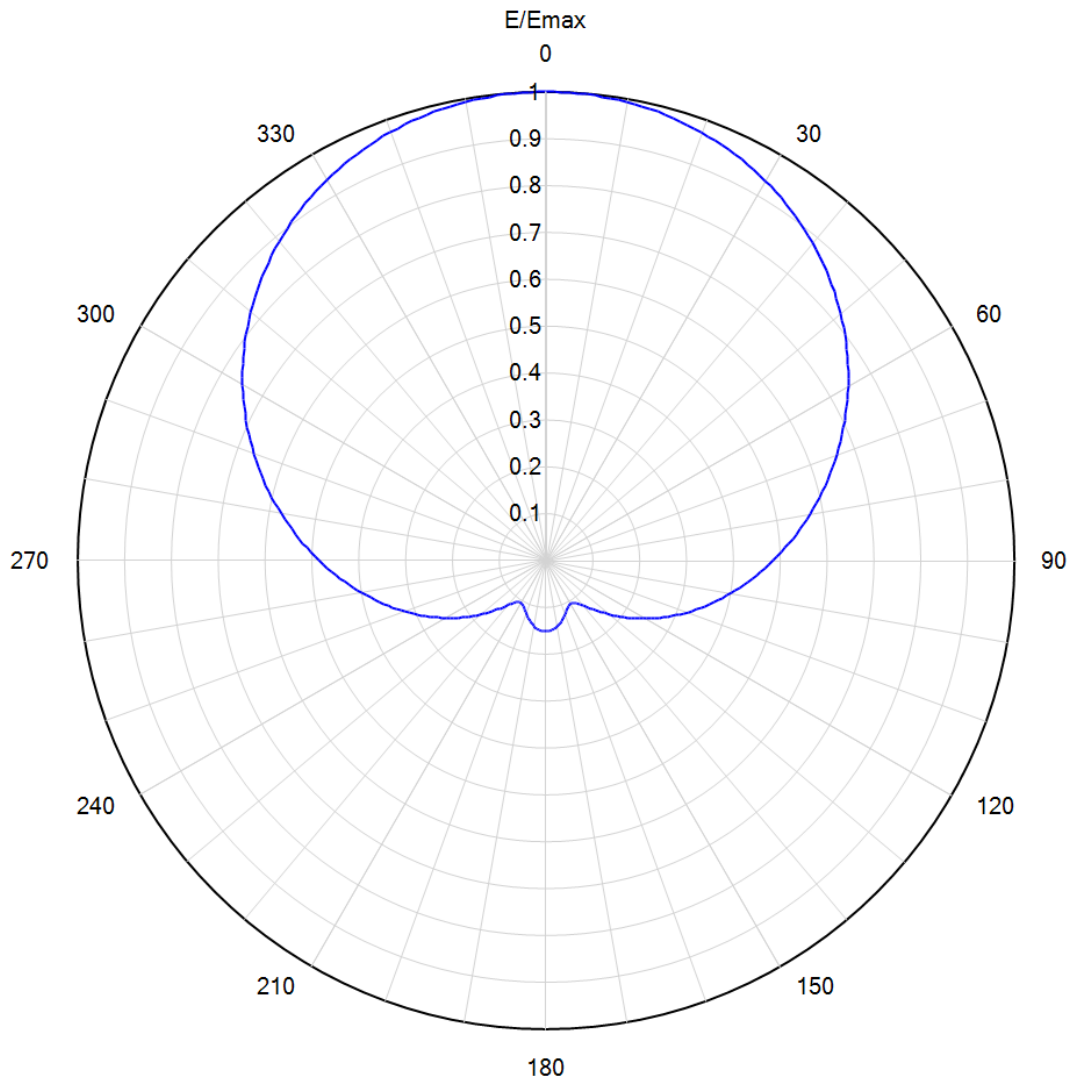
Polarization: **Horizontal**
 Frequency (MHz): **503.00**
 Directivity (Main Lobe): **22.4 (13.51 dB)**
 Directivity (At Horizon): **13.8 (11.41 dB)**
 Beam Tilt: **1.00 degrees**

**TABULATED ELEVATION PATTERN**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.061	2.4	0.623	10.6	0.111	30.5	0.044	51.0	0.021	71.5	0.011
-9.5	0.060	2.6	0.531	10.8	0.105	31.0	0.039	51.5	0.021	72.0	0.012
-9.0	0.117	2.8	0.441	11.0	0.094	31.5	0.034	52.0	0.019	72.5	0.013
-8.5	0.163	3.0	0.357	11.5	0.060	32.0	0.040	52.5	0.017	73.0	0.013
-8.0	0.172	3.2	0.286	12.0	0.040	32.5	0.054	53.0	0.016	73.5	0.013
-7.5	0.136	3.4	0.236	12.5	0.054	33.0	0.069	53.5	0.017	74.0	0.013
-7.0	0.068	3.6	0.214	13.0	0.066	33.5	0.081	54.0	0.020	74.5	0.013
-6.5	0.060	3.8	0.216	13.5	0.062	34.0	0.085	54.5	0.024	75.0	0.012
-6.0	0.139	4.0	0.232	14.0	0.048	34.5	0.084	55.0	0.027	75.5	0.011
-5.5	0.193	4.2	0.249	14.5	0.040	35.0	0.076	55.5	0.029	76.0	0.010
-5.0	0.198	4.4	0.261	15.0	0.045	35.5	0.066	56.0	0.029	76.5	0.009
-4.5	0.154	4.6	0.264	15.5	0.048	36.0	0.053	56.5	0.028	77.0	0.007
-4.0	0.104	4.8	0.256	16.0	0.038	36.5	0.040	57.0	0.025	77.5	0.006
-3.5	0.144	5.0	0.239	16.5	0.015	37.0	0.028	57.5	0.021	78.0	0.005
-3.0	0.221	5.2	0.212	17.0	0.014	37.5	0.019	58.0	0.016	78.5	0.004
-2.8	0.244	5.4	0.179	17.5	0.041	38.0	0.017	58.5	0.011	79.0	0.003
-2.6	0.258	5.6	0.142	18.0	0.057	38.5	0.021	59.0	0.007	79.5	0.003
-2.4	0.263	5.8	0.106	18.5	0.060	39.0	0.024	59.5	0.003	80.0	0.002
-2.2	0.260	6.0	0.080	19.0	0.049	39.5	0.024	60.0	0.000	80.5	0.003
-2.0	0.251	6.2	0.076	19.5	0.036	40.0	0.021	60.5	0.003	81.0	0.003
-1.8	0.243	6.4	0.095	20.0	0.037	40.5	0.015	61.0	0.004	81.5	0.004
-1.6	0.243	6.6	0.123	20.5	0.049	41.0	0.009	61.5	0.004	82.0	0.004
-1.4	0.262	6.8	0.149	21.0	0.055	41.5	0.013	62.0	0.004	82.5	0.004
-1.2	0.304	7.0	0.170	21.5	0.049	42.0	0.020	62.5	0.004	83.0	0.005
-1.0	0.367	7.2	0.185	22.0	0.032	42.5	0.026	63.0	0.005	83.5	0.005
-0.8	0.443	7.4	0.191	22.5	0.021	43.0	0.029	63.5	0.006	84.0	0.005
-0.6	0.529	7.6	0.190	23.0	0.037	43.5	0.028	64.0	0.007	84.5	0.006
-0.4	0.617	7.8	0.181	23.5	0.056	44.0	0.023	64.5	0.009	85.0	0.006
-0.2	0.704	8.0	0.165	24.0	0.064	44.5	0.015	65.0	0.010	85.5	0.006
0.0	0.785	8.2	0.143	24.5	0.058	45.0	0.007	65.5	0.010	86.0	0.006
0.2	0.857	8.4	0.117	25.0	0.040	45.5	0.009	66.0	0.010	86.5	0.006
0.4	0.916	8.6	0.089	25.5	0.017	46.0	0.017	66.5	0.009	87.0	0.006
0.6	0.961	8.8	0.060	26.0	0.020	46.5	0.022	67.0	0.008	87.5	0.006
0.8	0.989	9.0	0.037	26.5	0.040	47.0	0.025	67.5	0.007	88.0	0.006
1.0	1.000	9.2	0.035	27.0	0.051	47.5	0.025	68.0	0.006	88.5	0.006
1.2	0.992	9.4	0.051	27.5	0.051	48.0	0.021	68.5	0.004	89.0	0.006
1.4	0.966	9.6	0.072	28.0	0.041	48.5	0.016	69.0	0.004	89.5	0.006
1.6	0.923	9.8	0.089	28.5	0.027	49.0	0.012	69.5	0.005	90.0	0.005
1.8	0.865	10.0	0.103	29.0	0.023	49.5	0.011	70.0	0.007		
2.0	0.794	10.2	0.111	29.5	0.033	50.0	0.015	70.5	0.009		
2.2	0.712	10.4	0.114	30.0	0.042	50.5	0.018	71.0	0.010		



Azimuth Pattern



Model: SBB-EP50-24C160A

Location: Houston, Texas

Customer: Station KTXH/KRIV

Date: July 5, 2021

Rotation Angle: 0 degrees

Note: Pattern Tolerance +/-5% of Emax

Polarization: Vertical

Frequency: 503.00 MHz

Directivity: 2.7 (4.25 dB)

Elevation Angle: 1.00 degrees

Horizontal Unit Pattern:

File = SBB-EP-C160A_VP_500.pat



Model: **SBB-EP50-24C160A**
 Location: **Houston, Texas**
 Customer: **Station KTXH/KRIV**
 Date: **July 5, 2021**

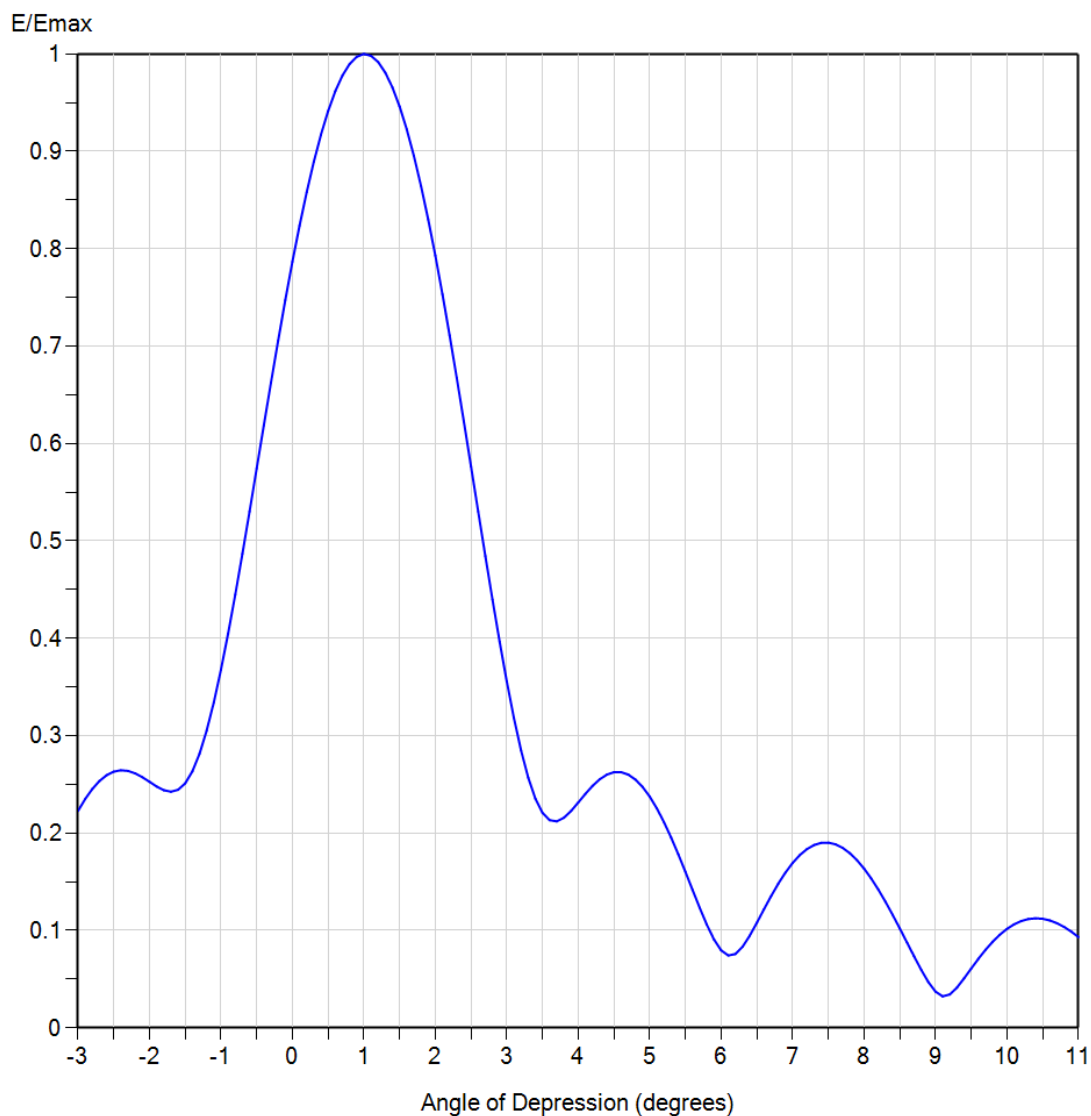
Polarization: **Vertical**
 Frequency (MHz): **503.00**
 Directivity: **2.7 (4.25 dB)**
 Elevation Angle: **1.00 degrees**
 Rotation Angle: **0 degrees**

**TABULATED AZIMUTH PATTERN**

Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field
0	1.000	45	0.855	90	0.485	135	0.150	180	0.151	225	0.148	270	0.485	315	0.857
1	1.000	46	0.848	91	0.476	136	0.145	181	0.151	226	0.153	271	0.494	316	0.863
2	1.000	47	0.841	92	0.468	137	0.140	182	0.151	227	0.159	272	0.502	317	0.869
3	0.999	48	0.835	93	0.459	138	0.135	183	0.151	228	0.165	273	0.511	318	0.875
4	0.999	49	0.828	94	0.451	139	0.131	184	0.150	229	0.171	274	0.520	319	0.881
5	0.998	50	0.821	95	0.442	140	0.126	185	0.150	230	0.178	275	0.529	320	0.887
6	0.998	51	0.814	96	0.434	141	0.122	186	0.149	231	0.184	276	0.538	321	0.893
7	0.997	52	0.806	97	0.426	142	0.119	187	0.148	232	0.191	277	0.547	322	0.898
8	0.996	53	0.799	98	0.417	143	0.116	188	0.146	233	0.197	278	0.556	323	0.904
9	0.994	54	0.792	99	0.409	144	0.113	189	0.145	234	0.204	279	0.565	324	0.909
10	0.993	55	0.784	100	0.401	145	0.111	190	0.143	235	0.211	280	0.574	325	0.914
11	0.992	56	0.776	101	0.393	146	0.109	191	0.142	236	0.218	281	0.583	326	0.919
12	0.990	57	0.769	102	0.385	147	0.107	192	0.140	237	0.225	282	0.592	327	0.924
13	0.988	58	0.761	103	0.377	148	0.106	193	0.138	238	0.232	283	0.601	328	0.928
14	0.986	59	0.753	104	0.369	149	0.106	194	0.136	239	0.239	284	0.610	329	0.933
15	0.984	60	0.745	105	0.361	150	0.106	195	0.134	240	0.246	285	0.619	330	0.937
16	0.982	61	0.737	106	0.353	151	0.106	196	0.131	241	0.253	286	0.628	331	0.941
17	0.980	62	0.729	107	0.346	152	0.107	197	0.129	242	0.260	287	0.637	332	0.945
18	0.977	63	0.720	108	0.338	153	0.108	198	0.127	243	0.267	288	0.646	333	0.949
19	0.975	64	0.712	109	0.330	154	0.109	199	0.124	244	0.275	289	0.655	334	0.953
20	0.972	65	0.704	110	0.323	155	0.110	200	0.122	245	0.282	290	0.663	335	0.957
21	0.969	66	0.695	111	0.315	156	0.112	201	0.120	246	0.290	291	0.672	336	0.960
22	0.966	67	0.687	112	0.307	157	0.114	202	0.117	247	0.297	292	0.681	337	0.963
23	0.963	68	0.678	113	0.300	158	0.116	203	0.115	248	0.305	293	0.689	338	0.967
24	0.959	69	0.669	114	0.292	159	0.118	204	0.113	249	0.312	294	0.698	339	0.970
25	0.956	70	0.661	115	0.285	160	0.120	205	0.111	250	0.320	295	0.706	340	0.972
26	0.952	71	0.652	116	0.278	161	0.123	206	0.109	251	0.327	296	0.715	341	0.975
27	0.948	72	0.643	117	0.270	162	0.125	207	0.108	252	0.335	297	0.723	342	0.978
28	0.944	73	0.634	118	0.263	163	0.127	208	0.107	253	0.343	298	0.732	343	0.980
29	0.940	74	0.626	119	0.256	164	0.130	209	0.106	254	0.351	299	0.740	344	0.982
30	0.936	75	0.617	120	0.248	165	0.132	210	0.105	255	0.359	300	0.748	345	0.985
31	0.932	76	0.608	121	0.241	166	0.134	211	0.105	256	0.367	301	0.756	346	0.987
32	0.927	77	0.599	122	0.234	167	0.136	212	0.105	257	0.375	302	0.764	347	0.988
33	0.922	78	0.590	123	0.227	168	0.138	213	0.106	258	0.383	303	0.772	348	0.990
34	0.917	79	0.581	124	0.220	169	0.140	214	0.107	259	0.391	304	0.779	349	0.992
35	0.912	80	0.572	125	0.213	170	0.142	215	0.109	260	0.399	305	0.787	350	0.993
36	0.907	81	0.564	126	0.206	171	0.144	216	0.111	261	0.407	306	0.794	351	0.994
37	0.902	82	0.555	127	0.200	172	0.145	217	0.114	262	0.416	307	0.802	352	0.996
38	0.896	83	0.546	128	0.193	173	0.147	218	0.117	263	0.424	308	0.809	353	0.997
39	0.891	84	0.537	129	0.187	174	0.148	219	0.120	264	0.433	309	0.816	354	0.998
40	0.885	85	0.528	130	0.180	175	0.149	220	0.124	265	0.441	310	0.823	355	0.998
41	0.879	86	0.519	131	0.174	176	0.150	221	0.128	266	0.450	311	0.830	356	0.999
42	0.873	87	0.511	132	0.168	177	0.150	222	0.133	267	0.458	312	0.837	357	0.999
43	0.867	88	0.502	133	0.162	178	0.151	223	0.137	268	0.467	313	0.844	358	1.000
44	0.861	89	0.493	134	0.156	179	0.151	224	0.142	269	0.476	314	0.850	359	1.000



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 503.00 MHz

Polarization: Vertical

Directivity (Main Lobe): 22.1 (13.44 dBd)

Location: Houston, Texas

Directivity (At Horizon): 13.7 (11.36 dBd)

Customer: Station KTXH/KRIV

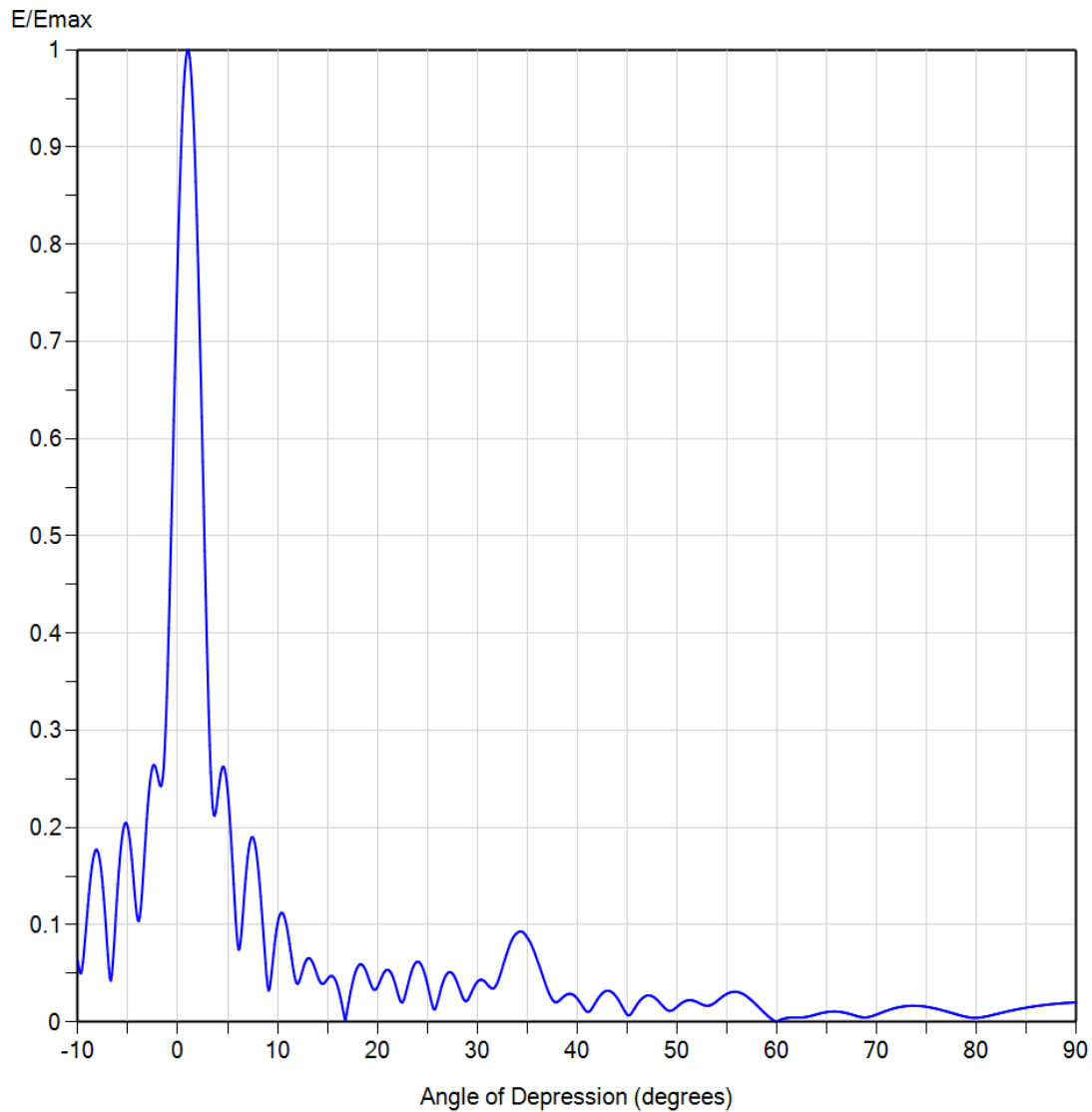
Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 3 degrees



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 503.00 MHz

Polarization: Vertical

Directivity (Main Lobe): 22.1 (13.44 dBd)

Location: Houston, Texas

Directivity (At Horizon): 13.7 (11.36 dBd)

Customer: Station KTXH/KRIV

Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 3 degrees



Model: **SBB-EP50-24C160A**
 Location: **Houston, Texas**
 Customer: **Station KTXH/KRIV**
 Date: **July 5, 2021**

Polarization: **Vertical**
 Frequency (MHz): **503.00**
 Directivity (Main Lobe): **22.1 (13.44 dB)**
 Directivity (At Horizon): **13.7 (11.36 dB)**
 Beam Tilt: **1.00 degrees**

**TABULATED ELEVATION PATTERN**

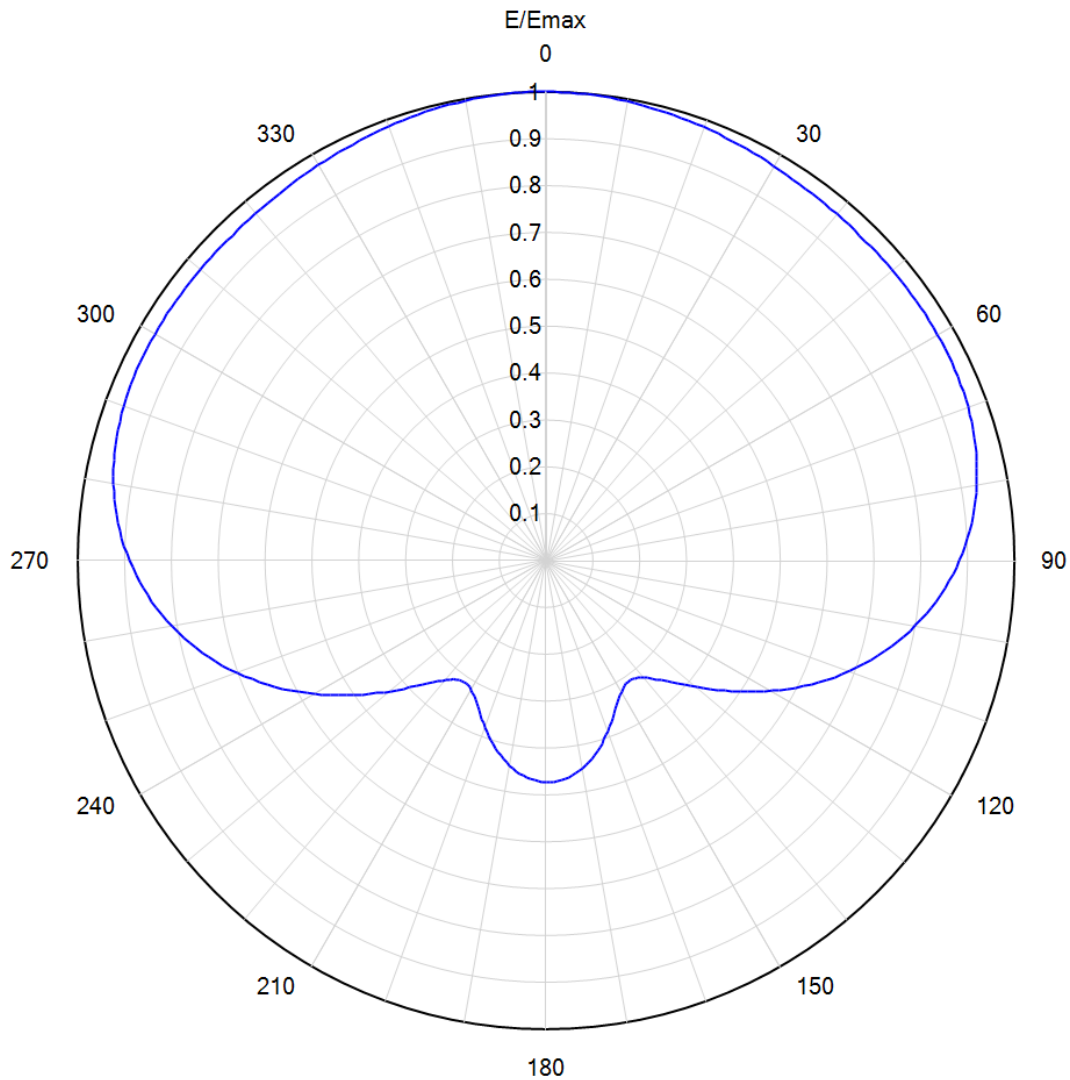
Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.063	2.4	0.622	10.6	0.110	30.5	0.043	51.0	0.022	71.5	0.013
-9.5	0.061	2.6	0.530	10.8	0.104	31.0	0.039	51.5	0.022	72.0	0.015
-9.0	0.120	2.8	0.440	11.0	0.093	31.5	0.034	52.0	0.021	72.5	0.016
-8.5	0.166	3.0	0.356	11.5	0.059	32.0	0.040	52.5	0.018	73.0	0.016
-8.0	0.175	3.2	0.285	12.0	0.039	32.5	0.055	53.0	0.017	73.5	0.017
-7.5	0.139	3.4	0.235	12.5	0.053	33.0	0.072	53.5	0.018	74.0	0.017
-7.0	0.069	3.6	0.213	13.0	0.065	33.5	0.085	54.0	0.021	74.5	0.016
-6.5	0.061	3.8	0.216	13.5	0.061	34.0	0.092	54.5	0.026	75.0	0.016
-6.0	0.141	4.0	0.231	14.0	0.047	34.5	0.093	55.0	0.029	75.5	0.015
-5.5	0.196	4.2	0.248	14.5	0.039	35.0	0.087	55.5	0.031	76.0	0.014
-5.0	0.200	4.4	0.260	15.0	0.044	35.5	0.077	56.0	0.031	76.5	0.012
-4.5	0.155	4.6	0.262	15.5	0.047	36.0	0.064	56.5	0.029	77.0	0.011
-4.0	0.105	4.8	0.255	16.0	0.037	36.5	0.049	57.0	0.026	77.5	0.009
-3.5	0.145	5.0	0.237	16.5	0.015	37.0	0.034	57.5	0.022	78.0	0.008
-3.0	0.223	5.2	0.211	17.0	0.014	37.5	0.023	58.0	0.017	78.5	0.006
-2.8	0.245	5.4	0.178	17.5	0.040	38.0	0.021	58.5	0.012	79.0	0.005
-2.6	0.259	5.6	0.142	18.0	0.056	38.5	0.025	59.0	0.007	79.5	0.004
-2.4	0.264	5.8	0.106	18.5	0.058	39.0	0.028	59.5	0.003	80.0	0.004
-2.2	0.261	6.0	0.080	19.0	0.048	39.5	0.028	60.0	0.000	80.5	0.005
-2.0	0.253	6.2	0.076	19.5	0.035	40.0	0.024	60.5	0.003	81.0	0.006
-1.8	0.244	6.4	0.095	20.0	0.036	40.5	0.017	61.0	0.004	81.5	0.007
-1.6	0.244	6.6	0.122	20.5	0.048	41.0	0.010	61.5	0.005	82.0	0.008
-1.4	0.263	6.8	0.148	21.0	0.054	41.5	0.014	62.0	0.005	82.5	0.009
-1.2	0.305	7.0	0.169	21.5	0.047	42.0	0.023	62.5	0.005	83.0	0.011
-1.0	0.368	7.2	0.183	22.0	0.031	42.5	0.029	63.0	0.005	83.5	0.012
-0.8	0.445	7.4	0.190	22.5	0.020	43.0	0.032	63.5	0.006	84.0	0.013
-0.6	0.530	7.6	0.188	23.0	0.036	43.5	0.030	64.0	0.008	84.5	0.014
-0.4	0.619	7.8	0.179	23.5	0.054	44.0	0.025	64.5	0.009	85.0	0.015
-0.2	0.706	8.0	0.163	24.0	0.062	44.5	0.016	65.0	0.010	85.5	0.016
0.0	0.787	8.2	0.142	24.5	0.056	45.0	0.008	65.5	0.011	86.0	0.016
0.2	0.858	8.4	0.116	25.0	0.039	45.5	0.010	66.0	0.011	86.5	0.017
0.4	0.917	8.6	0.088	25.5	0.017	46.0	0.018	66.5	0.010	87.0	0.018
0.6	0.962	8.8	0.060	26.0	0.020	46.5	0.024	67.0	0.009	87.5	0.018
0.8	0.990	9.0	0.037	26.5	0.039	47.0	0.027	67.5	0.008	88.0	0.019
1.0	1.000	9.2	0.034	27.0	0.050	47.5	0.026	68.0	0.006	88.5	0.019
1.2	0.992	9.4	0.051	27.5	0.050	48.0	0.023	68.5	0.005	89.0	0.019
1.4	0.966	9.6	0.071	28.0	0.040	48.5	0.017	69.0	0.005	89.5	0.020
1.6	0.923	9.8	0.088	28.5	0.026	49.0	0.012	69.5	0.006	90.0	0.020
1.8	0.864	10.0	0.102	29.0	0.022	49.5	0.012	70.0	0.008		
2.0	0.793	10.2	0.110	29.5	0.032	50.0	0.016	70.5	0.010		
2.2	0.711	10.4	0.112	30.0	0.041	50.5	0.020	71.0	0.012		



ANTENNA RADIATION PATTERNS KRIV - Ch 26 (545 MHz)



Azimuth Pattern



Model: SBB-EP50-24C160A

Location: Houston, Texas

Customer: Station KTXH/KRIV

Date: July 5, 2021

Rotation Angle: 0 degrees

Note: Pattern Tolerance +/-5% of Emax

Polarization: Horizontal

Frequency: 545.00 MHz

Directivity: 1.6 (2.10 dB)

Elevation Angle: 1.00 degrees

Horizontal Unit Pattern:

File = SBB-EP-C160A_HP_545.pat



Model: **SBB-EP50-24C160A**
 Location: **Houston, Texas**
 Customer: **Station KTXH/KRIV**
 Date: **July 5, 2021**

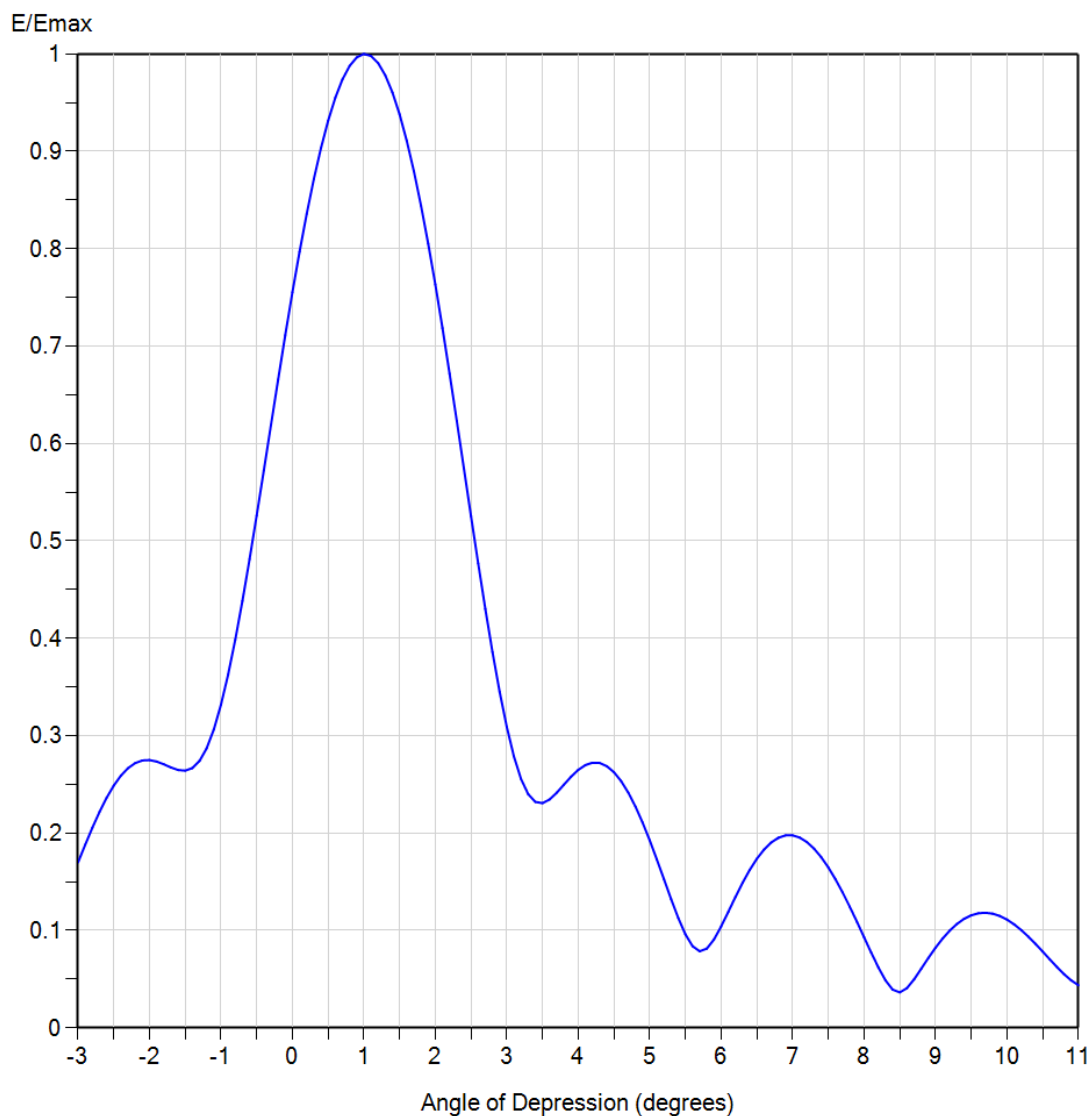
Polarization: **Horizontal**
 Frequency (MHz): **545.00**
 Directivity: **1.6 (2.10 dB)**
 Elevation Angle: **1.00 degrees**
 Rotation Angle: **0 degrees**

**TABULATED AZIMUTH PATTERN**

Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field
0	1.000	45	0.964	90	0.883	135	0.365	180	0.473	225	0.375	270	0.889	315	0.964
1	1.000	46	0.964	91	0.876	136	0.356	181	0.472	226	0.386	271	0.896	316	0.964
2	1.000	47	0.964	92	0.869	137	0.347	182	0.471	227	0.397	272	0.901	317	0.965
3	1.000	48	0.964	93	0.862	138	0.340	183	0.470	228	0.409	273	0.907	318	0.965
4	0.999	49	0.964	94	0.854	139	0.333	184	0.468	229	0.421	274	0.912	319	0.965
5	0.999	50	0.964	95	0.846	140	0.327	185	0.465	230	0.434	275	0.917	320	0.966
6	0.998	51	0.964	96	0.838	141	0.322	186	0.462	231	0.447	276	0.922	321	0.966
7	0.998	52	0.965	97	0.829	142	0.318	187	0.459	232	0.460	277	0.926	322	0.967
8	0.997	53	0.965	98	0.820	143	0.315	188	0.454	233	0.473	278	0.930	323	0.967
9	0.996	54	0.965	99	0.811	144	0.313	189	0.450	234	0.487	279	0.934	324	0.968
10	0.995	55	0.965	100	0.801	145	0.312	190	0.445	235	0.501	280	0.938	325	0.969
11	0.994	56	0.965	101	0.791	146	0.313	191	0.440	236	0.515	281	0.941	326	0.970
12	0.993	57	0.965	102	0.781	147	0.314	192	0.434	237	0.528	282	0.944	327	0.970
13	0.992	58	0.965	103	0.771	148	0.316	193	0.428	238	0.542	283	0.947	328	0.971
14	0.991	59	0.965	104	0.760	149	0.319	194	0.422	239	0.556	284	0.949	329	0.972
15	0.990	60	0.965	105	0.749	150	0.323	195	0.415	240	0.570	285	0.952	330	0.973
16	0.989	61	0.965	106	0.737	151	0.327	196	0.408	241	0.584	286	0.954	331	0.975
17	0.988	62	0.965	107	0.726	152	0.333	197	0.401	242	0.598	287	0.956	332	0.976
18	0.987	63	0.965	108	0.714	153	0.338	198	0.394	243	0.611	288	0.957	333	0.977
19	0.985	64	0.964	109	0.702	154	0.344	199	0.387	244	0.625	289	0.959	334	0.978
20	0.984	65	0.964	110	0.690	155	0.351	200	0.380	245	0.638	290	0.960	335	0.979
21	0.983	66	0.963	111	0.677	156	0.358	201	0.372	246	0.651	291	0.961	336	0.980
22	0.982	67	0.962	112	0.664	157	0.365	202	0.365	247	0.664	292	0.962	337	0.982
23	0.980	68	0.961	113	0.651	158	0.372	203	0.358	248	0.677	293	0.963	338	0.983
24	0.979	69	0.960	114	0.638	159	0.380	204	0.351	249	0.690	294	0.964	339	0.984
25	0.978	70	0.959	115	0.625	160	0.387	205	0.344	250	0.702	295	0.964	340	0.985
26	0.977	71	0.957	116	0.611	161	0.394	206	0.338	251	0.714	296	0.965	341	0.987
27	0.976	72	0.956	117	0.598	162	0.401	207	0.333	252	0.726	297	0.965	342	0.988
28	0.975	73	0.954	118	0.584	163	0.408	208	0.327	253	0.737	298	0.965	343	0.989
29	0.973	74	0.952	119	0.570	164	0.415	209	0.323	254	0.749	299	0.965	344	0.990
30	0.972	75	0.949	120	0.556	165	0.422	210	0.319	255	0.760	300	0.965	345	0.991
31	0.971	76	0.947	121	0.542	166	0.428	211	0.316	256	0.771	301	0.965	346	0.992
32	0.970	77	0.944	122	0.528	167	0.434	212	0.314	257	0.781	302	0.965	347	0.993
33	0.970	78	0.941	123	0.515	168	0.440	213	0.313	258	0.791	303	0.965	348	0.994
34	0.969	79	0.938	124	0.501	169	0.445	214	0.312	259	0.801	304	0.965	349	0.995
35	0.968	80	0.934	125	0.487	170	0.450	215	0.313	260	0.811	305	0.965	350	0.996
36	0.967	81	0.930	126	0.473	171	0.454	216	0.315	261	0.820	306	0.965	351	0.997
37	0.967	82	0.926	127	0.460	172	0.459	217	0.318	262	0.829	307	0.965	352	0.998
38	0.966	83	0.922	128	0.447	173	0.462	218	0.322	263	0.838	308	0.964	353	0.998
39	0.966	84	0.917	129	0.434	174	0.465	219	0.327	264	0.846	309	0.964	354	0.999
40	0.965	85	0.912	130	0.421	175	0.468	220	0.333	265	0.854	310	0.964	355	0.999
41	0.965	86	0.907	131	0.409	176	0.470	221	0.340	266	0.862	311	0.964	356	1.000
42	0.965	87	0.901	132	0.397	177	0.471	222	0.347	267	0.869	312	0.964	357	1.000
43	0.964	88	0.896	133	0.386	178	0.472	223	0.356	268	0.876	313	0.964	358	1.000
44	0.964	89	0.889	134	0.375	179	0.473	224	0.365	269	0.883	314	0.964	359	1.000



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 545.00 MHz

Polarization: Horizontal

Directivity (Main Lobe): 23.6 (13.73 dBd)

Location: Houston, Texas

Directivity (At Horizon): 13.5 (11.30 dBd)

Customer: Station KTXH/KRIV

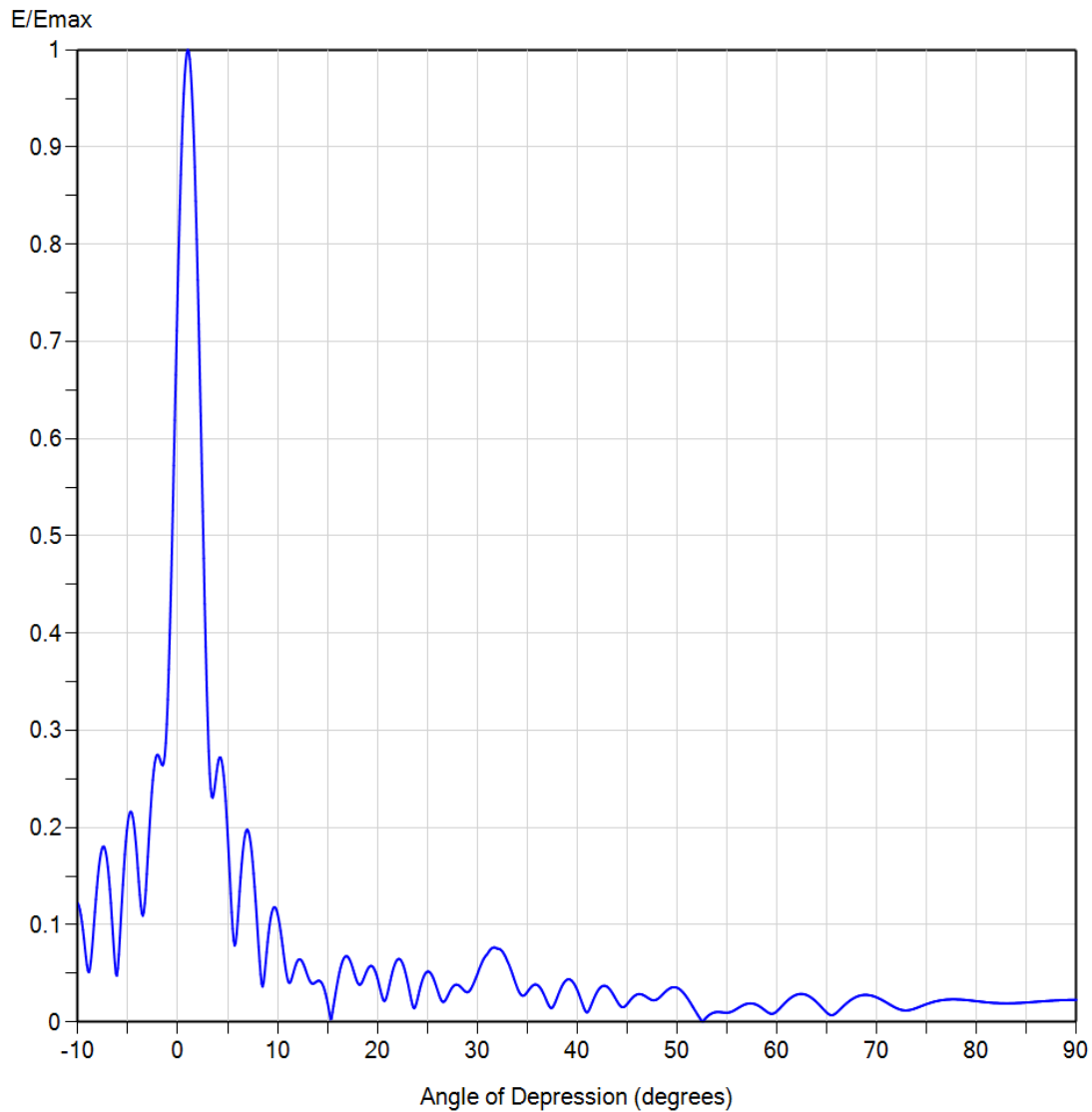
Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 27 degrees



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 545.00 MHz

Polarization: Horizontal

Directivity (Main Lobe): 23.6 (13.73 dBd)

Location: Houston, Texas

Directivity (At Horizon): 13.5 (11.30 dBd)

Customer: Station KTXH/KRIV

Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 27 degrees



Model: **SBB-EP50-24C160A**
 Location: **Houston, Texas**
 Customer: **Station KTXH/KRIV**
 Date: **July 5, 2021**

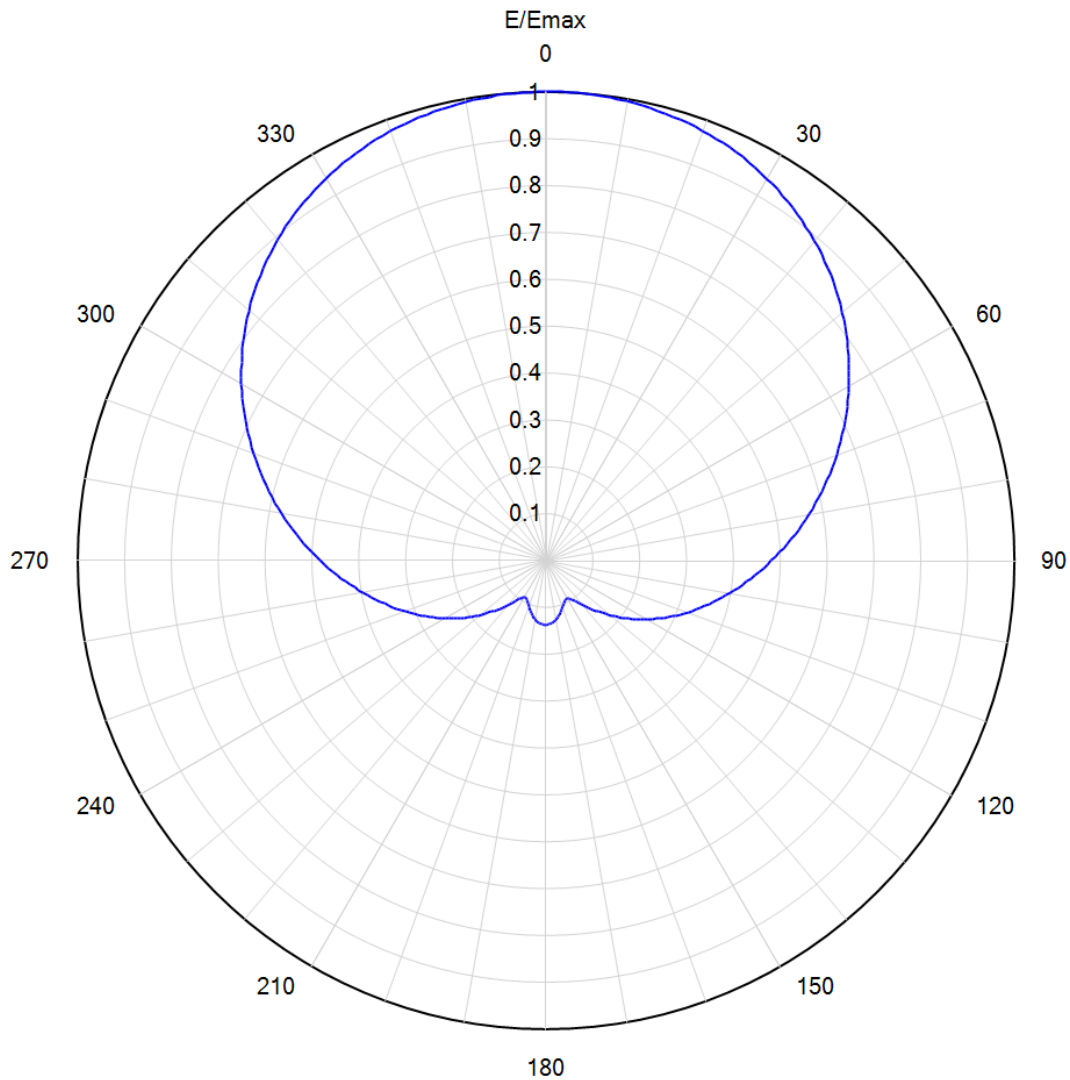
Polarization: **Horizontal**
 Frequency (MHz): **545.00**
 Directivity (Main Lobe): **23.6 (13.73 dB)**
 Directivity (At Horizon): **13.5 (11.30 dB)**
 Beam Tilt: **1.00 degrees**

**TABULATED ELEVATION PATTERN**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.122	2.4	0.574	10.6	0.070	30.5	0.062	51.0	0.025	71.5	0.017
-9.5	0.095	2.6	0.477	10.8	0.055	31.0	0.070	51.5	0.017	72.0	0.014
-9.0	0.053	2.8	0.386	11.0	0.044	31.5	0.076	52.0	0.008	72.5	0.012
-8.5	0.086	3.0	0.309	11.5	0.048	32.0	0.075	52.5	0.001	73.0	0.012
-8.0	0.149	3.2	0.255	12.0	0.063	32.5	0.073	53.0	0.005	73.5	0.013
-7.5	0.180	3.4	0.232	12.5	0.061	33.0	0.063	53.5	0.009	74.0	0.014
-7.0	0.159	3.6	0.234	13.0	0.048	33.5	0.050	54.0	0.010	74.5	0.016
-6.5	0.091	3.8	0.250	13.5	0.039	34.0	0.035	54.5	0.010	75.0	0.018
-6.0	0.055	4.0	0.265	14.0	0.042	34.5	0.027	55.0	0.009	75.5	0.020
-5.5	0.141	4.2	0.272	14.5	0.039	35.0	0.031	55.5	0.011	76.0	0.021
-5.0	0.205	4.4	0.269	15.0	0.020	35.5	0.037	56.0	0.014	76.5	0.022
-4.5	0.211	4.6	0.253	15.5	0.010	36.0	0.038	56.5	0.017	77.0	0.023
-4.0	0.158	4.8	0.227	16.0	0.041	36.5	0.032	57.0	0.019	77.5	0.023
-3.5	0.109	5.0	0.193	16.5	0.062	37.0	0.020	57.5	0.019	78.0	0.023
-3.0	0.170	5.2	0.152	17.0	0.067	37.5	0.015	58.0	0.017	78.5	0.023
-2.8	0.205	5.4	0.113	17.5	0.056	38.0	0.025	58.5	0.014	79.0	0.022
-2.6	0.236	5.6	0.084	18.0	0.041	38.5	0.037	59.0	0.010	79.5	0.022
-2.4	0.259	5.8	0.081	18.5	0.042	39.0	0.044	59.5	0.008	80.0	0.021
-2.2	0.272	6.0	0.104	19.0	0.054	39.5	0.042	60.0	0.011	80.5	0.021
-2.0	0.275	6.2	0.134	19.5	0.057	40.0	0.033	60.5	0.016	81.0	0.020
-1.8	0.271	6.4	0.162	20.0	0.045	40.5	0.019	61.0	0.021	81.5	0.020
-1.6	0.265	6.6	0.183	20.5	0.025	41.0	0.010	61.5	0.026	82.0	0.019
-1.4	0.267	6.8	0.195	21.0	0.029	41.5	0.020	62.0	0.028	82.5	0.019
-1.2	0.287	7.0	0.198	21.5	0.051	42.0	0.031	62.5	0.029	83.0	0.019
-1.0	0.332	7.2	0.191	22.0	0.064	42.5	0.037	63.0	0.028	83.5	0.019
-0.8	0.398	7.4	0.175	22.5	0.061	43.0	0.036	63.5	0.025	84.0	0.019
-0.6	0.481	7.6	0.152	23.0	0.042	43.5	0.030	64.0	0.020	84.5	0.020
-0.4	0.572	7.8	0.124	23.5	0.018	44.0	0.021	64.5	0.015	85.0	0.020
-0.2	0.666	8.0	0.093	24.0	0.023	44.5	0.015	65.0	0.010	85.5	0.020
0.0	0.755	8.2	0.062	24.5	0.043	45.0	0.018	65.5	0.007	86.0	0.021
0.2	0.836	8.4	0.039	25.0	0.052	45.5	0.024	66.0	0.010	86.5	0.021
0.4	0.903	8.6	0.041	25.5	0.047	46.0	0.028	66.5	0.015	87.0	0.021
0.6	0.955	8.8	0.061	26.0	0.033	46.5	0.028	67.0	0.019	87.5	0.022
0.8	0.988	9.0	0.082	26.5	0.021	47.0	0.025	67.5	0.023	88.0	0.022
1.0	1.000	9.2	0.100	27.0	0.026	47.5	0.023	68.0	0.026	88.5	0.022
1.2	0.991	9.4	0.112	27.5	0.036	48.0	0.023	68.5	0.027	89.0	0.023
1.4	0.960	9.6	0.118	28.0	0.038	48.5	0.028	69.0	0.028	89.5	0.023
1.6	0.911	9.8	0.117	28.5	0.034	49.0	0.033	69.5	0.027	90.0	0.023
1.8	0.844	10.0	0.111	29.0	0.030	49.5	0.035	70.0	0.025		
2.0	0.763	10.2	0.100	29.5	0.037	50.0	0.035	70.5	0.023		
2.2	0.672	10.4	0.086	30.0	0.049	50.5	0.031	71.0	0.020		



Azimuth Pattern



Model: SBB-EP50-24C160A

Location: Houston, Texas

Customer: Station KTXH/KRIV

Date: July 5, 2021

Rotation Angle: 0 degrees

Note: Pattern Tolerance +/-5% of Emax

Polarization: Vertical

Frequency: 545.00 MHz

Directivity: 2.7 (4.24 dB)

Elevation Angle: 1.00 degrees

Horizontal Unit Pattern:

File = SBB-EP-C160A_VP_542.pat



Model: **SBB-EP50-24C160A**
 Location: **Houston, Texas**
 Customer: **Station KTXH/KRIV**
 Date: **July 5, 2021**

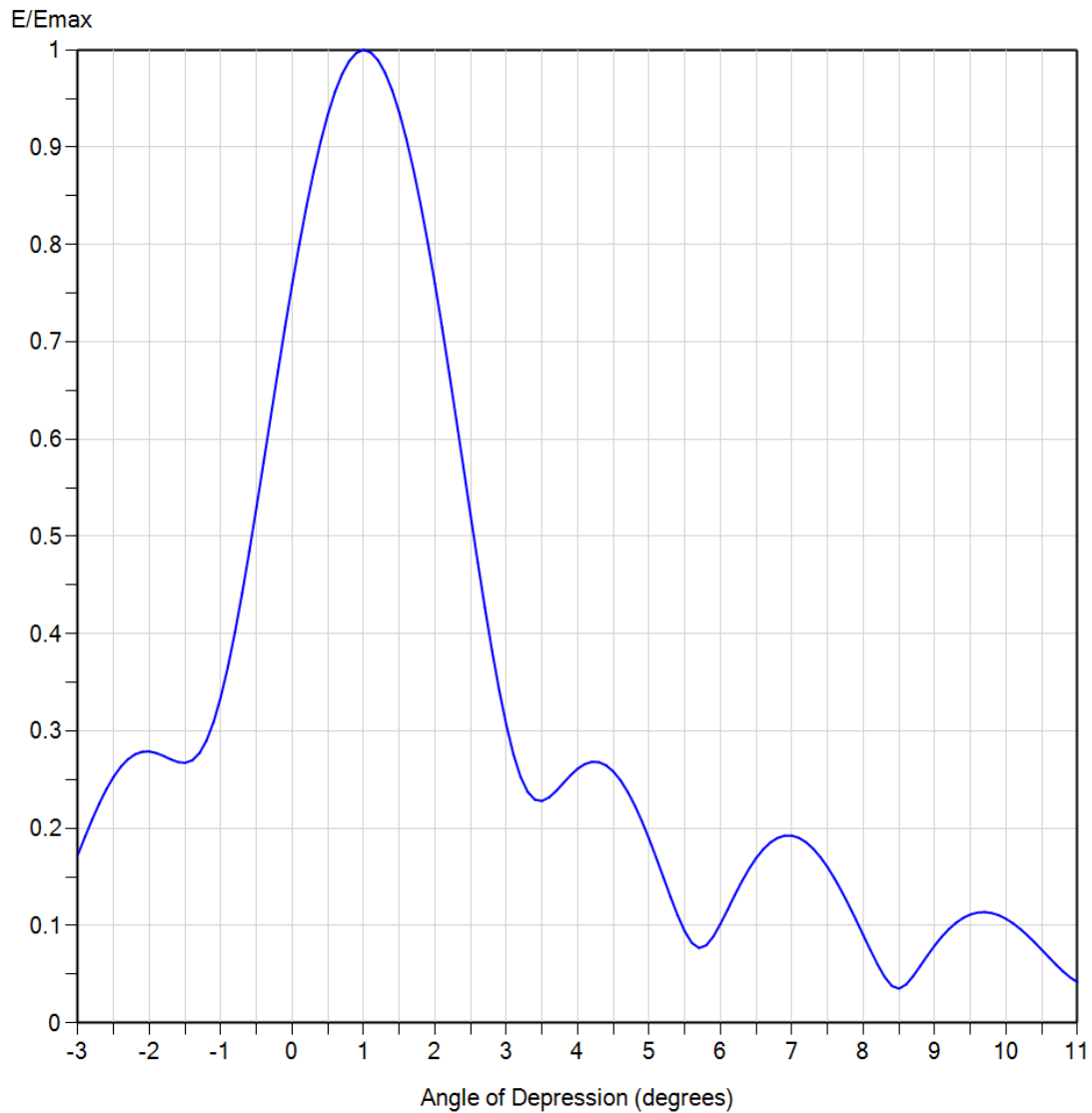
Polarization: **Vertical**
 Frequency (MHz): **545.00**
 Directivity: **2.7 (4.24 dB)**
 Elevation Angle: **1.00 degrees**
 Rotation Angle: **0 degrees**

**TABULATED AZIMUTH PATTERN**

Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field	Angl	Field
0	1.000	45	0.860	90	0.481	135	0.152	180	0.138	225	0.149	270	0.482	315	0.862
1	1.000	46	0.853	91	0.473	136	0.146	181	0.138	226	0.155	271	0.491	316	0.868
2	1.000	47	0.846	92	0.464	137	0.140	182	0.137	227	0.161	272	0.500	317	0.875
3	1.000	48	0.839	93	0.456	138	0.135	183	0.137	228	0.167	273	0.509	318	0.881
4	0.999	49	0.832	94	0.447	139	0.129	184	0.136	229	0.174	274	0.518	319	0.886
5	0.999	50	0.825	95	0.439	140	0.124	185	0.136	230	0.180	275	0.527	320	0.892
6	0.998	51	0.818	96	0.431	141	0.120	186	0.135	231	0.187	276	0.536	321	0.898
7	0.997	52	0.810	97	0.423	142	0.115	187	0.133	232	0.193	277	0.545	322	0.903
8	0.997	53	0.803	98	0.415	143	0.111	188	0.132	233	0.200	278	0.555	323	0.908
9	0.996	54	0.795	99	0.407	144	0.107	189	0.130	234	0.207	279	0.564	324	0.914
10	0.995	55	0.787	100	0.399	145	0.104	190	0.129	235	0.214	280	0.573	325	0.919
11	0.993	56	0.779	101	0.391	146	0.101	191	0.127	236	0.220	281	0.582	326	0.923
12	0.992	57	0.771	102	0.383	147	0.099	192	0.125	237	0.227	282	0.591	327	0.928
13	0.990	58	0.763	103	0.375	148	0.096	193	0.123	238	0.234	283	0.600	328	0.932
14	0.989	59	0.755	104	0.368	149	0.095	194	0.121	239	0.241	284	0.610	329	0.937
15	0.987	60	0.747	105	0.360	150	0.094	195	0.118	240	0.248	285	0.619	330	0.941
16	0.985	61	0.739	106	0.352	151	0.093	196	0.116	241	0.255	286	0.628	331	0.945
17	0.983	62	0.730	107	0.345	152	0.093	197	0.113	242	0.262	287	0.637	332	0.949
18	0.981	63	0.722	108	0.338	153	0.093	198	0.111	243	0.269	288	0.646	333	0.952
19	0.978	64	0.713	109	0.330	154	0.094	199	0.108	244	0.276	289	0.655	334	0.956
20	0.976	65	0.704	110	0.323	155	0.095	200	0.106	245	0.283	290	0.664	335	0.959
21	0.973	66	0.696	111	0.315	156	0.096	201	0.103	246	0.290	291	0.673	336	0.963
22	0.970	67	0.687	112	0.308	157	0.098	202	0.101	247	0.297	292	0.682	337	0.966
23	0.967	68	0.678	113	0.301	158	0.100	203	0.099	248	0.304	293	0.691	338	0.969
24	0.964	69	0.669	114	0.294	159	0.102	204	0.097	249	0.312	294	0.700	339	0.971
25	0.961	70	0.660	115	0.287	160	0.104	205	0.095	250	0.319	295	0.708	340	0.974
26	0.957	71	0.651	116	0.279	161	0.106	206	0.093	251	0.327	296	0.717	341	0.977
27	0.954	72	0.642	117	0.272	162	0.109	207	0.092	252	0.334	297	0.725	342	0.979
28	0.950	73	0.633	118	0.265	163	0.111	208	0.092	253	0.342	298	0.734	343	0.981
29	0.946	74	0.624	119	0.258	164	0.114	209	0.091	254	0.349	299	0.742	344	0.983
30	0.942	75	0.615	120	0.251	165	0.116	210	0.092	255	0.357	300	0.751	345	0.985
31	0.937	76	0.606	121	0.244	166	0.118	211	0.092	256	0.365	301	0.759	346	0.987
32	0.933	77	0.597	122	0.237	167	0.121	212	0.094	257	0.373	302	0.767	347	0.989
33	0.928	78	0.588	123	0.230	168	0.123	213	0.095	258	0.381	303	0.775	348	0.990
34	0.923	79	0.579	124	0.224	169	0.125	214	0.098	259	0.389	304	0.783	349	0.992
35	0.918	80	0.570	125	0.217	170	0.127	215	0.100	260	0.397	305	0.791	350	0.993
36	0.913	81	0.561	126	0.210	171	0.129	216	0.104	261	0.405	306	0.798	351	0.994
37	0.908	82	0.552	127	0.203	172	0.130	217	0.107	262	0.413	307	0.806	352	0.996
38	0.902	83	0.543	128	0.196	173	0.132	218	0.112	263	0.422	308	0.814	353	0.997
39	0.897	84	0.534	129	0.190	174	0.133	219	0.116	264	0.430	309	0.821	354	0.997
40	0.891	85	0.525	130	0.183	175	0.134	220	0.121	265	0.439	310	0.828	355	0.998
41	0.885	86	0.516	131	0.177	176	0.135	221	0.126	266	0.447	311	0.835	356	0.999
42	0.879	87	0.507	132	0.170	177	0.136	222	0.131	267	0.456	312	0.842	357	0.999
43	0.873	88	0.499	133	0.164	178	0.137	223	0.137	268	0.465	313	0.849	358	1.000
44	0.866	89	0.490	134	0.158	179	0.137	224	0.143	269	0.473	314	0.855	359	1.000



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 545.00 MHz

Polarization: Vertical

Directivity (Main Lobe): 23.1 (13.64 dBd)

Location: Houston, Texas

Directivity (At Horizon): 13.3 (11.24 dBd)

Customer: Station KTXH/KRIV

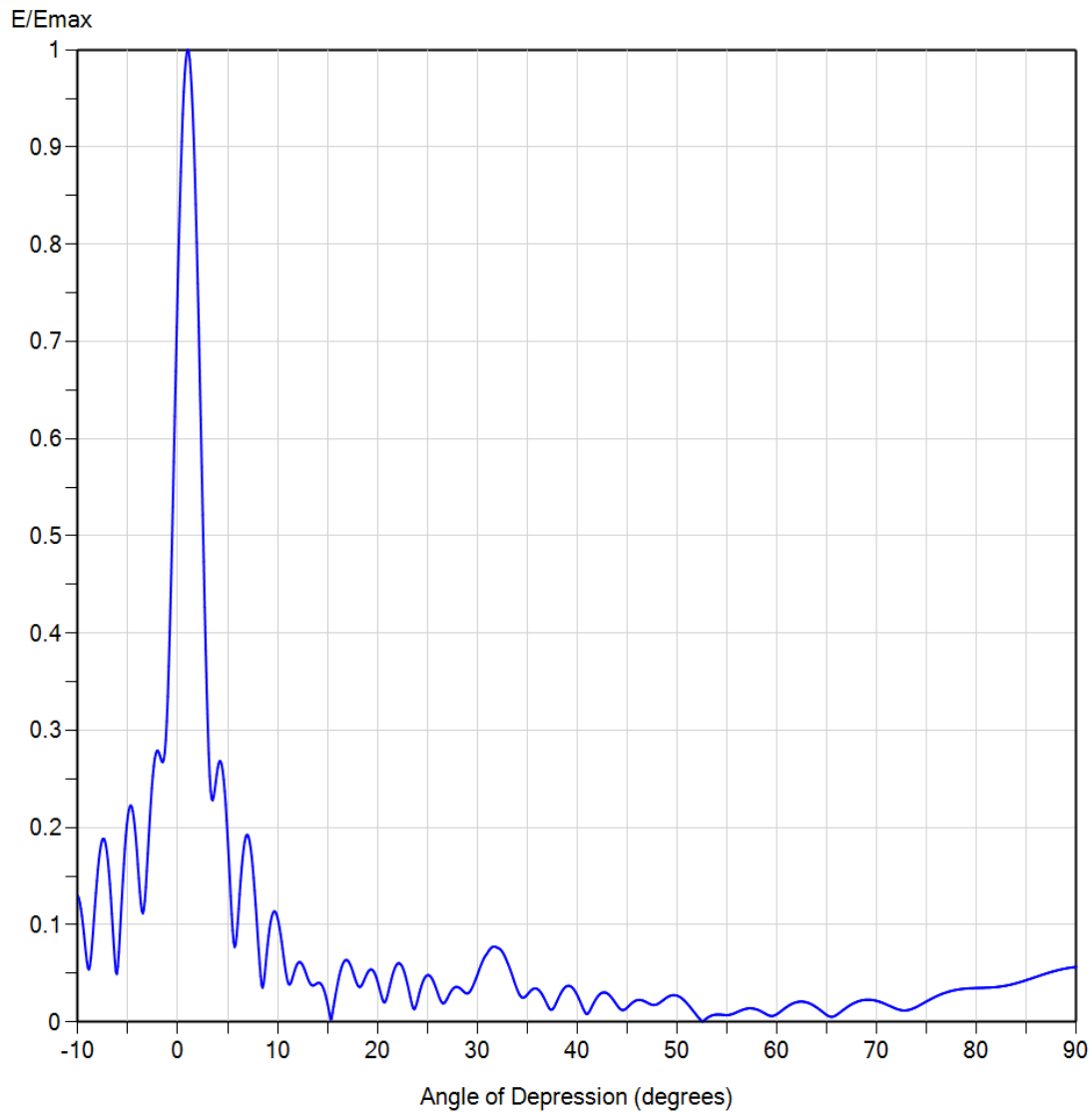
Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 3 degrees



Elevation Pattern



Model: SBB-EP50-24C160A

Frequency: 545.00 MHz

Polarization: Vertical

Directivity (Main Lobe): 23.1 (13.64 dBd)

Location: Houston, Texas

Directivity (At Horizon): 13.3 (11.24 dBd)

Customer: Station KTXH/KRIV

Beam Tilt: 1.00 degrees

Date: July 5, 2021

Azimuth Angle: 3 degrees



Model: **SBB-EP50-24C160A**
 Location: **Houston, Texas**
 Customer: **Station KTXH/KRIV**
 Date: **July 5, 2021**

Polarization: **Vertical**
 Frequency (MHz): **545.00**
 Directivity (Main Lobe): **23.1 (13.64 dB)**
 Directivity (At Horizon): **13.3 (11.24 dB)**
 Beam Tilt: **1.00 degrees**

**TABULATED ELEVATION PATTERN**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.130	2.4	0.571	10.6	0.067	30.5	0.062	51.0	0.019	71.5	0.016
-9.5	0.100	2.6	0.473	10.8	0.053	31.0	0.071	51.5	0.013	72.0	0.013
-9.0	0.056	2.8	0.383	11.0	0.042	31.5	0.077	52.0	0.006	72.5	0.012
-8.5	0.091	3.0	0.306	11.5	0.046	32.0	0.076	52.5	0.001	73.0	0.012
-8.0	0.157	3.2	0.253	12.0	0.060	32.5	0.072	53.0	0.004	73.5	0.013
-7.5	0.188	3.4	0.229	12.5	0.059	33.0	0.061	53.5	0.007	74.0	0.015
-7.0	0.166	3.6	0.232	13.0	0.045	33.5	0.048	54.0	0.008	74.5	0.018
-6.5	0.095	3.8	0.246	13.5	0.037	34.0	0.033	54.5	0.007	75.0	0.021
-6.0	0.057	4.0	0.261	14.0	0.040	34.5	0.025	55.0	0.007	75.5	0.024
-5.5	0.146	4.2	0.268	14.5	0.037	35.0	0.028	55.5	0.008	76.0	0.026
-5.0	0.212	4.4	0.265	15.0	0.019	35.5	0.033	56.0	0.010	76.5	0.029
-4.5	0.217	4.6	0.249	15.5	0.009	36.0	0.034	56.5	0.012	77.0	0.030
-4.0	0.162	4.8	0.223	16.0	0.039	36.5	0.028	57.0	0.014	77.5	0.032
-3.5	0.112	5.0	0.189	16.5	0.059	37.0	0.018	57.5	0.014	78.0	0.033
-3.0	0.173	5.2	0.150	17.0	0.063	37.5	0.013	58.0	0.013	78.5	0.034
-2.8	0.209	5.4	0.111	17.5	0.053	38.0	0.022	58.5	0.010	79.0	0.034
-2.6	0.240	5.6	0.082	18.0	0.038	38.5	0.032	59.0	0.008	79.5	0.035
-2.4	0.263	5.8	0.080	18.5	0.039	39.0	0.037	59.5	0.006	80.0	0.035
-2.2	0.276	6.0	0.102	19.0	0.051	39.5	0.035	60.0	0.008	80.5	0.035
-2.0	0.279	6.2	0.131	19.5	0.053	40.0	0.028	60.5	0.012	81.0	0.035
-1.8	0.274	6.4	0.158	20.0	0.042	40.5	0.016	61.0	0.015	81.5	0.035
-1.6	0.268	6.6	0.178	20.5	0.023	41.0	0.008	61.5	0.018	82.0	0.036
-1.4	0.270	6.8	0.190	21.0	0.027	41.5	0.016	62.0	0.020	82.5	0.037
-1.2	0.290	7.0	0.192	21.5	0.048	42.0	0.025	62.5	0.021	83.0	0.037
-1.0	0.335	7.2	0.186	22.0	0.060	42.5	0.030	63.0	0.020	83.5	0.039
-0.8	0.402	7.4	0.170	22.5	0.056	43.0	0.029	63.5	0.018	84.0	0.040
-0.6	0.485	7.6	0.148	23.0	0.039	43.5	0.024	64.0	0.015	84.5	0.041
-0.4	0.576	7.8	0.121	23.5	0.017	44.0	0.017	64.5	0.011	85.0	0.043
-0.2	0.669	8.0	0.090	24.0	0.022	44.5	0.012	65.0	0.007	85.5	0.045
0.0	0.759	8.2	0.060	24.5	0.040	45.0	0.015	65.5	0.005	86.0	0.046
0.2	0.839	8.4	0.038	25.0	0.048	45.5	0.019	66.0	0.007	86.5	0.048
0.4	0.906	8.6	0.039	25.5	0.044	46.0	0.022	66.5	0.011	87.0	0.050
0.6	0.957	8.8	0.059	26.0	0.031	46.5	0.022	67.0	0.015	87.5	0.051
0.8	0.989	9.0	0.079	26.5	0.020	47.0	0.020	67.5	0.018	88.0	0.053
1.0	1.000	9.2	0.096	27.0	0.024	47.5	0.018	68.0	0.021	88.5	0.054
1.2	0.990	9.4	0.108	27.5	0.033	48.0	0.018	68.5	0.022	89.0	0.055
1.4	0.959	9.6	0.113	28.0	0.036	48.5	0.021	69.0	0.023	89.5	0.056
1.6	0.908	9.8	0.113	28.5	0.033	49.0	0.025	69.5	0.023	90.0	0.057
1.8	0.841	10.0	0.107	29.0	0.029	49.5	0.027	70.0	0.022		
2.0	0.760	10.2	0.096	29.5	0.036	50.0	0.027	70.5	0.020		
2.2	0.668	10.4	0.083	30.0	0.048	50.5	0.024	71.0	0.018		



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