FCC Form 302-FM
Radio Station KHSB-FM,
Channel 284A, Kingsland, Texas,
FCC Facility ID No. 181260
Application for a License to Cover
Construction Permit BPH-20190322ABH
June 2022

EXHIBIT 5

ANTENNA PROOF OF PERFORMANCE

The Proof of Performance generated by the manufacturer of Station KHSB-FM's new main antenna follows. Please note that the values of transmission-line length, transmission-line loss, and transmitter output power specified in the following Antenna Proof of Performance depart slightly from those specified in Exhibit 4 to this Application. The values specified in Exhibit 4 to this Application control.

Propagation Systems, Inc.
Quality Broadcast Antenna Systems

Directional FM Antenna
KHSB
Munbilla Broadcasting Properties, Ltd.
Kingsland, TX

A standard model PSIFMR antenna with parasitic elements was used in conjunction with a model of the customer's 24" face frequency matched Bell Industries Tower to create the necessary directional radiation pattern. The final antenna consists of three radiating elements full wavelength spaced with one horizontal and two vertical parasitic elements per bay. The antenna array is end fed. Each radiating element receives equal power and phase.

Pattern testing was performed using a 1/3-scale model element and tower. The azimuth plane measurements were taken on a ground reflection test range. This type of test range utilizes the reflected signal and direct signal from the source antenna to form an interference pattern on the antenna under test. The antenna and tower under test were mounted to a turntable that allowed the structure to be rotated 360° in the azimuth plane. The source antenna was located approximately 75 ft. from the antenna under test. The source height above ground was adjusted to peak the first lobe of the interference pattern at the antenna under test.

The test antenna was mounted in the center of rotation of the turntable. The antenna and mounting structure were rotated clockwise while data was recorded in a counter clockwise direction. All feed cables to the antenna were secured and grounded during pattern measurements. A Hewlett Packard 8753E-network analyzer operating at 314.1 MHz was used as both the source and receiver. The level of the received signal was compared with a standard dipole to establish the directivity of the final pattern. The final pattern measured does not exceed the envelope pattern and is 95% of the envelope RMS.

The antenna is to be mounted 223.8 meters (734.4 ft.) above ground level on the northwest tower leg and positioned 315°. At this elevation the antenna will be within the allowed +2/-4 meters tolerance from the approved 222-meter center of radiation. No other antenna can be installed within 10 ft of any radiating element. The antenna orientation is to be confirmed by a licensed surveyor. It is recommended that a broadcast engineer be present to supervise the installation of the antenna and that he or she certifies the antenna has been installed according to the enclosed instructions.

PO Box 113 • 719 Pensacola Rd • Ebensburg • PA• 15931 • Phone (814) 472-5540 • Fax (814) 472-5676
www.psibroadcast.com

An input power level of .449 kW will be required at the antenna input in order to reach the licensed 1.05 kW ERP. A transmitter output of .646 kW is required with the supplied 750 ft. of 1-5/8" foam coaxial cable.

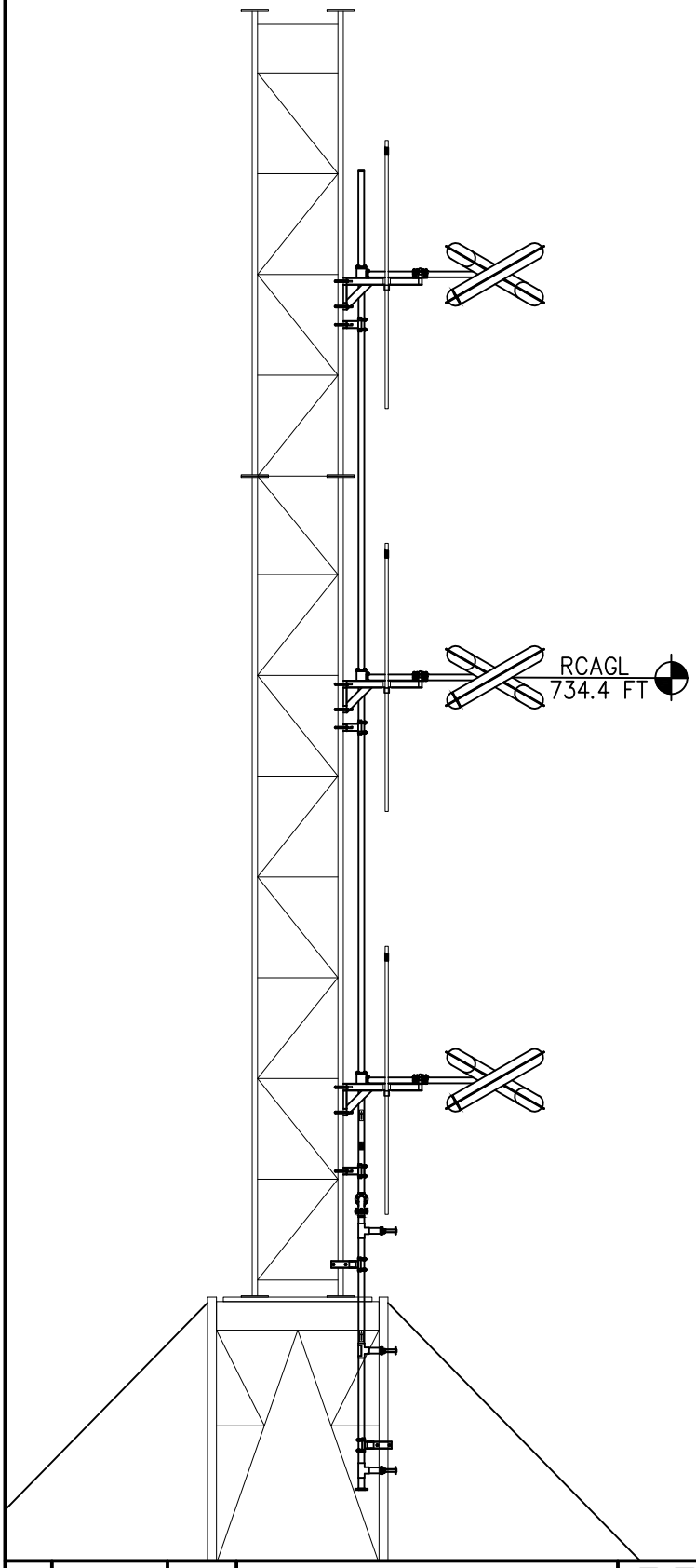
Antenna Specifications

Antenna Model	PSIFMR-3E-R-DA
Type	3-bay directional FM antenna
Bay Spacing	Full wavelength spaced elements with radomes
Frequency	104.7 MHz
Polarization	Circular
Envelope RMS	.817
Composite RMS	.776
Gain (h-pol)	2.34 (3.69 dB)
Gain (v-pol)	2.34 (3.69 dB)
Input	1-5/8" EIA end fed
Transmission line	750 ft. 1-5/8" Foam coaxial cable
Transmission line loss	1.58 dB
ERP	1.05 kW
Antenna Input power	.449 kW
Transmitter output power	.646 kW
Power rating	9 kW
Length	30.8 ft.
Weight	318.5 lbs.
Wind Area	22.8 sq. ft.

Statement of Certification

This is to certify the antenna has been designed, fabricated and tested under my supervision and it meets the required envelope pattern limitations set forth in the stations construction permit.

Douglas A. Ross
President
Propagation Systems Inc.



SPECIFICATIONS	
SPACING:	λ
BAY SPACING ('S'):	112.7 IN (286.3 cm)
APERTURE ('A'):	18.8 FT (5.7 M)
LENGTH ('L'):	30.8 FT (9.4 M)
RCAGL:	734.4 FT (223.8 M)
WEIGHT:	318.5 LB (144.4 Kg)
WIND AREA:	22.8 FT^2 (2.1 M^2)
POWER RATING:	9 kW
GAIN:	2.34 (3.69 dB)
POLARIZATION:	CIRCULAR

NOTE: 1. WEIGHT AND WIND AREA ARE ESTIMATED. WIND AREA IN ACCORDANCE WITH TIA/EIA-222-F Σ(CaAc)
2. TIE WRAP COAX. CABLE AT ±16" O.C.

REV.	MADE BY / CHECKED BY	DATE	CHANGE

This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of , directly or indirectly, and will not be used in whole or in part or assist in making or finish any information for the making of drawings, prints or other reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon the written permissions of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the forgoing agreement.

SIZE: A

PROPAGATION SYSTEMS, INC.

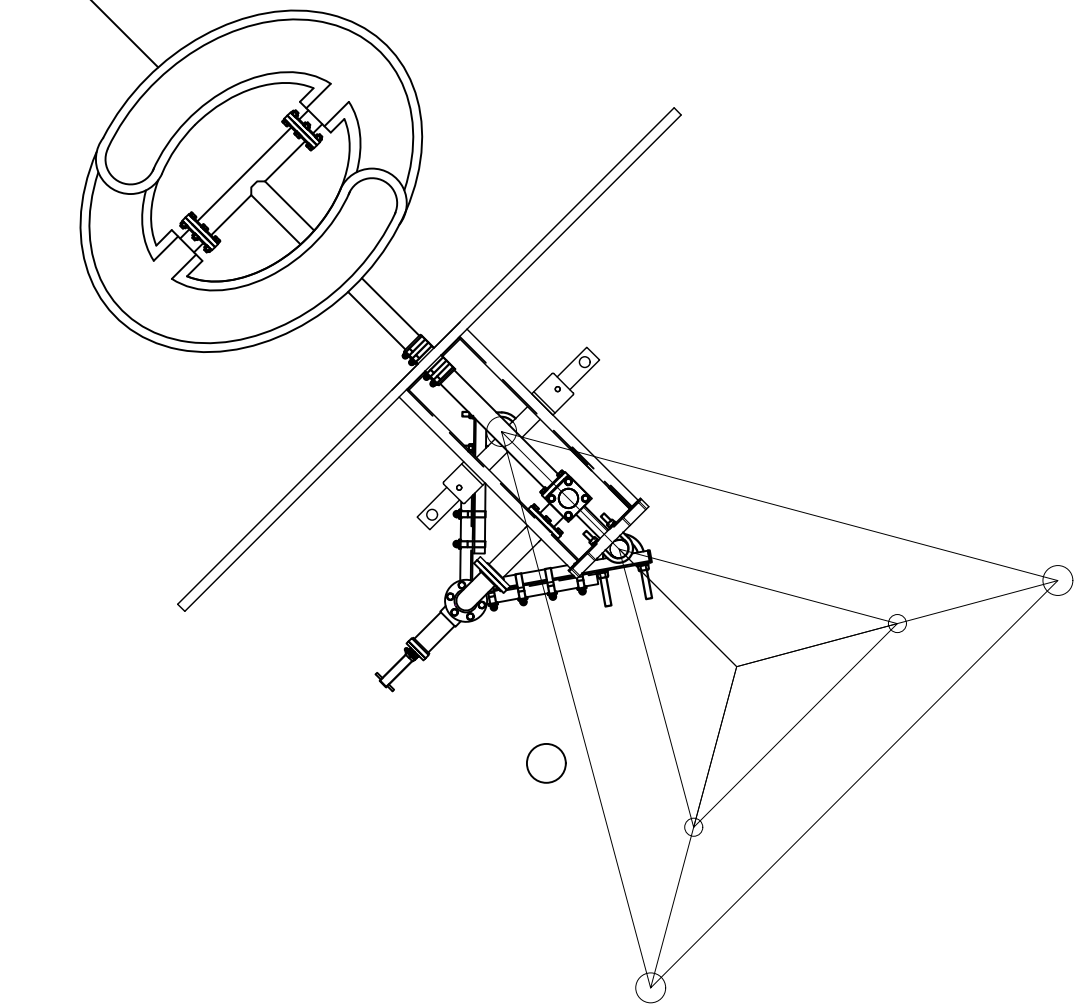
Ebensburg, Pennsylvania USA 814-472-5540

ANTENNA ELEVATION AND SPECIFICATIONS

MODEL:	DRAWN BY:	DATE:
PSIFMR-3E-R-DA	H.POTTS	7/14/21
CHANNEL/ FREQUENCY: 104.7 MHz	APPROVED BY:	DATE:
SCALE:	DRAWING NO.: 2309-001	REV.

North

315°



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SIZE: A

PROPAGATION SYSTEMS, INC.

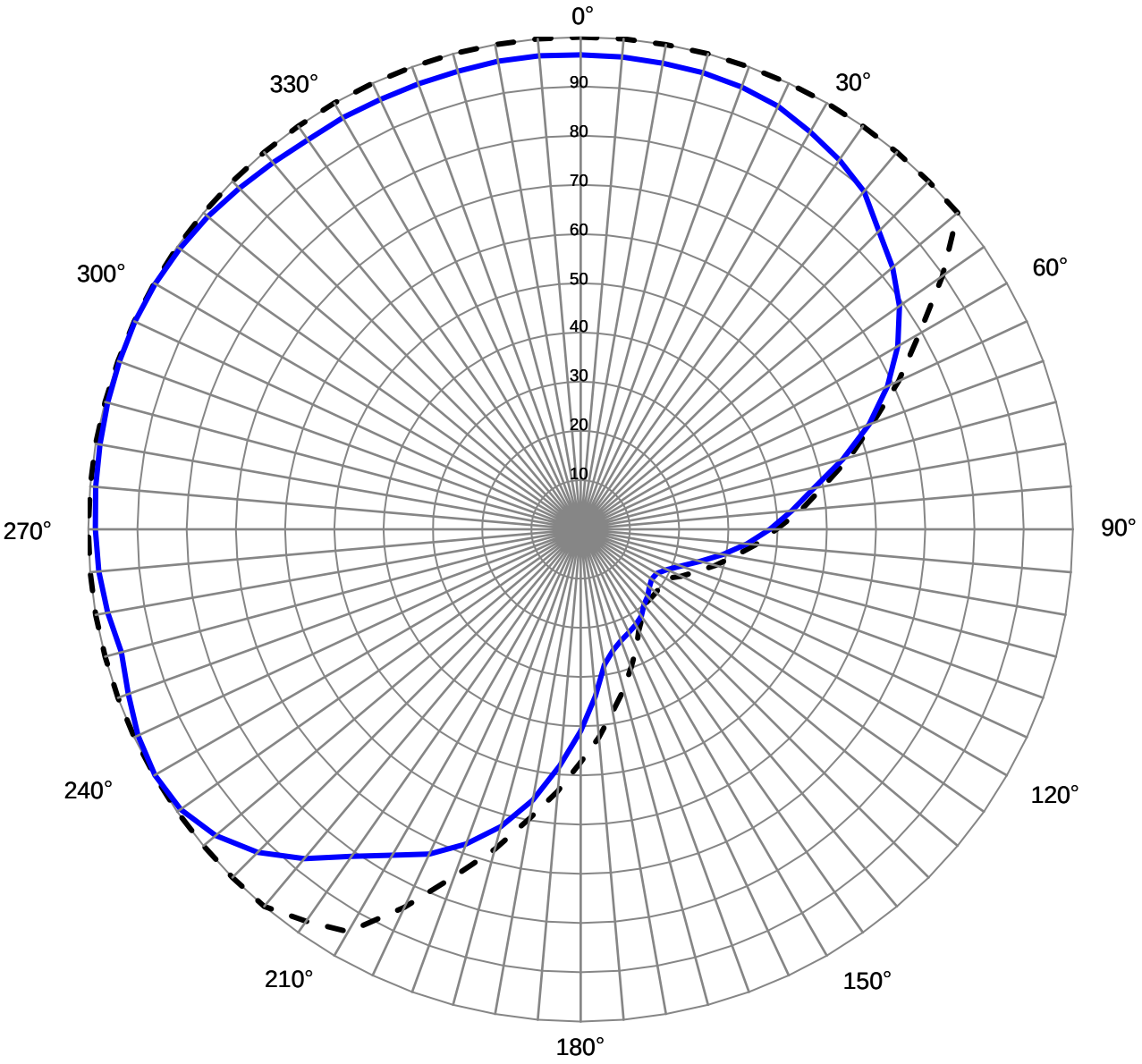
Ebensburg, Pennsylvania USA 814-472-5540

ANTENNA ORIENTATION DETAILS

MODEL:	DRAWN BY:	DATE:
PSIFMR-3E-R-DA	H.POTTS	7/14/21
CHANNEL/ FREQUENCY: 104.7 MHz	APPROVED BY:	DATE:
SCALE:	DRAWING NO.: 2309-002	REV.

Propagation Systems, Inc.

Relative Field
Azimuth Plane Pattern



Pattern Type:	**Measured Composite**	Tower:	**Bell Tower 24" Face**
Antenna Model:	**PSIFMR-3E-R-DA**	Orientation:	**315°**
Polarization:	**Circular**	Frequency:	**104.7 MHz**
RMS (envelope)	**0.817**	Station:	**KHSB-FM**
RMS (composite)	**0.776**	Date:	**10/4/2021**

Maximum Envelope Tabulation

Antenna Model: PSIFMR-3E-R-DA

Munbilla Broadcasting Properties, Ltd.

Station: KHSB-FM

Frequency: 104.7 MHz

Location: Kingsland, TX

Maximum ERP: 1.05 kW

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	1.000	1.050	0.21
10	1.000	1.050	0.21
20	1.000	1.050	0.21
30	1.000	1.050	0.21
40	1.000	1.050	0.21
50	1.000	1.050	0.21
60	0.794	0.662	-1.79
70	0.631	0.418	-3.79
80	0.501	0.264	-5.79
90	0.398	0.166	-7.79
100	0.316	0.105	-9.79
110	0.251	0.066	-11.79
120	0.200	0.042	-13.77
130	0.200	0.042	-13.77
140	0.200	0.042	-13.77
150	0.237	0.059	-12.29
160	0.299	0.094	-10.27
170	0.376	0.148	-8.28
180	0.473	0.235	-6.29
190	0.596	0.373	-4.28
200	0.750	0.591	-2.29
210	0.944	0.936	-0.29
220	1.000	1.050	0.21
230	1.000	1.050	0.21
240	1.000	1.050	0.21
250	1.000	1.050	0.21
260	1.000	1.050	0.21
270	1.000	1.050	0.21
280	1.000	1.050	0.21
290	1.000	1.050	0.21
300	1.000	1.050	0.21
310	1.000	1.050	0.21
320	1.000	1.050	0.21
330	1.000	1.050	0.21
340	1.000	1.050	0.21
350	1.000	1.050	0.21

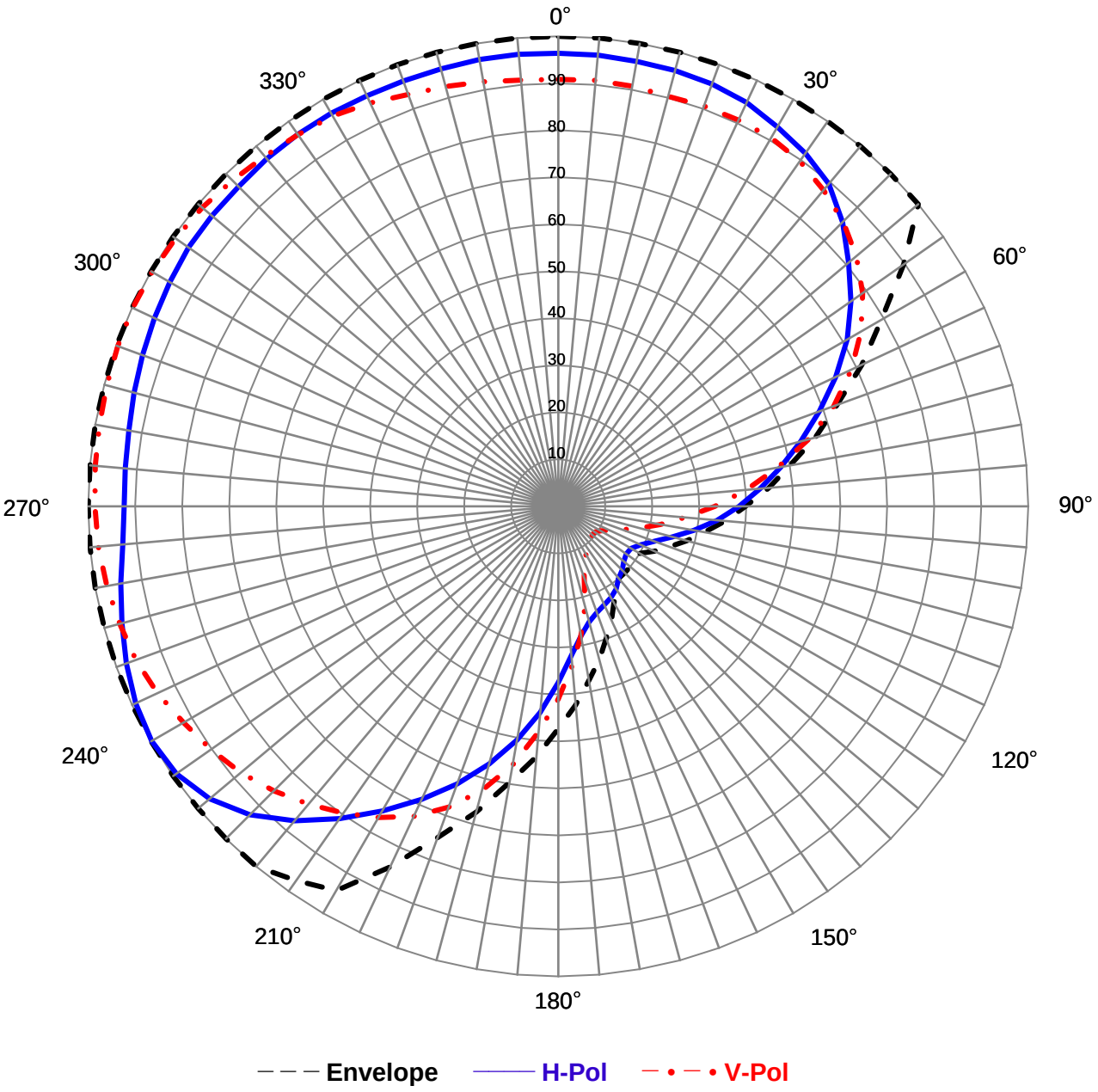
Composite Pattern Tabulation

Antenna Model: PSIFMR-3E-R-DA
Munbilla Broadcasting Properties, Ltd.
Station: KHSB-FM
Frequency: 104.7 MHz
Location: Kingsland, TX
Maximum ERP: 1.05 kW

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.964	0.976	-0.11
10	0.961	0.970	-0.13
20	0.956	0.960	-0.18
30	0.932	0.913	-0.40
40	0.896	0.843	-0.74
50	0.828	0.719	-1.43
60	0.744	0.581	-2.36
70	0.624	0.409	-3.89
80	0.480	0.242	-6.16
90	0.385	0.155	-8.09
100	0.293	0.090	-10.44
110	0.218	0.050	-13.03
120	0.179	0.034	-14.74
130	0.182	0.035	-14.57
140	0.200	0.042	-13.77
150	0.224	0.053	-12.78
160	0.240	0.061	-12.17
170	0.279	0.082	-10.86
180	0.410	0.176	-7.54
190	0.558	0.327	-4.85
200	0.681	0.486	-3.13
210	0.764	0.613	-2.12
220	0.873	0.801	-0.96
230	0.968	0.984	-0.07
240	1.000	1.050	0.21
250	0.978	1.004	0.02
260	0.975	0.999	0.00
270	0.986	1.020	0.09
280	0.991	1.032	0.14
290	0.997	1.044	0.19
300	0.998	1.045	0.19
310	0.989	1.026	0.11
320	0.972	0.993	-0.03
330	0.966	0.979	-0.09
340	0.963	0.974	-0.11
350	0.965	0.979	-0.09

Propagation Systems, Inc.

Relative Field
Azimuth Plane Pattern



Pattern Type:	**Measured Field**	Tower:	**Bell Tower 24" Face**
Antenna Model:	**PSIFMR-3E-R-DA**	Orientation:	**315°**
Polarization:	**Circular**	Configuration:	**104.7 MHz**
Gain (H-pol):	**2.34 (3.69 dB)**	Station:	**KHSB-FM**
Gain (V-pol):	**2.34 (3.69 dB)**	Date:	**10/4/2021**

Measured Relative Field Tabulation

Antenna Model: PSIFMR-3E-R-DA

Munbilla Broadcasting Properties, Ltd.

Station: KHSB-FM

Frequency: 104.7 MHz

Location: Kingsland, TX

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.964	2.174	3.37
10	0.961	2.163	3.35
20	0.956	2.139	3.30
30	0.932	2.035	3.08
40	0.896	1.878	2.74
50	0.807	1.523	1.83
60	0.710	1.180	0.72
70	0.592	0.819	-0.87
80	0.480	0.540	-2.68
90	0.385	0.346	-4.61
100	0.293	0.201	-6.96
110	0.218	0.111	-9.55
120	0.179	0.075	-11.26
130	0.182	0.078	-11.09
140	0.200	0.094	-10.29
150	0.224	0.118	-9.30
160	0.240	0.135	-8.69
170	0.279	0.183	-7.38
180	0.374	0.328	-4.84
190	0.505	0.596	-2.25
200	0.629	0.925	-0.34
210	0.748	1.309	1.17
220	0.873	1.785	2.52
230	0.968	2.192	3.41
240	1.000	2.340	3.69
250	0.978	2.238	3.50
260	0.945	2.090	3.20
270	0.923	1.995	3.00
280	0.928	2.015	3.04
290	0.941	2.072	3.16
300	0.954	2.131	3.29
310	0.962	2.163	3.35
320	0.965	2.178	3.38
330	0.966	2.183	3.39
340	0.963	2.170	3.37
350	0.965	2.181	3.39

Maximum Value

Field	1.00
Gain	2.34 (3.69 dB)
Azimuth Bearing	240 degrees

Minimum Field

Field	0.176
Gain	.073 (-11.40 dB)
Azimuth Bearing	125 degrees

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.908	1.931	2.86
10	0.908	1.929	2.85
20	0.906	1.922	2.84
30	0.906	1.919	2.83
40	0.878	1.804	2.56
50	0.828	1.603	2.05
60	0.744	1.295	1.12
70	0.624	0.911	-0.41
80	0.474	0.526	-2.79
90	0.333	0.260	-5.85
100	0.221	0.114	-9.43
110	0.145	0.049	-13.10
120	0.104	0.025	-15.95
130	0.094	0.021	-16.81
140	0.099	0.023	-16.42
150	0.118	0.033	-14.84
160	0.161	0.061	-12.17
170	0.279	0.183	-7.39
180	0.410	0.392	-4.06
190	0.558	0.730	-1.37
200	0.681	1.084	0.35
210	0.764	1.367	1.36
220	0.827	1.601	2.04
230	0.882	1.819	2.60
240	0.921	1.983	2.97
250	0.956	2.140	3.30
260	0.975	2.226	3.48
270	0.986	2.273	3.57
280	0.991	2.300	3.62
290	0.997	2.326	3.67
300	0.998	2.329	3.67
310	0.989	2.287	3.59
320	0.972	2.212	3.45
330	0.959	2.151	3.33
340	0.933	2.036	3.09
350	0.917	1.969	2.94

Maximum Value

Field	1.00
Gain	2.34 (3.69 dB)
Azimuth Bearing	295 degrees

Minimum Field

Field	0.094
Gain	.021 (-16.81 dB)
Azimuth Bearing	130 degrees

ERP Tabulation

Antenna Model: PSIFMR-3E-R-DA

Munbilla Broadcasting Properties, Ltd.

Station: KHSB-FM

Frequency: 104.7 MHz

Location: Kingsland, TX

Maximum ERP: 1.05 kW

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.964	0.98	-0.11
10	0.961	0.97	-0.13
20	0.956	0.96	-0.18
30	0.932	0.91	-0.40
40	0.896	0.84	-0.74
50	0.807	0.68	-1.65
60	0.710	0.53	-2.76
70	0.592	0.37	-4.35
80	0.480	0.24	-6.16
90	0.385	0.16	-8.09
100	0.293	0.09	-10.44
110	0.218	0.05	-13.03
120	0.179	0.03	-14.74
130	0.182	0.03	-14.57
140	0.200	0.04	-13.77
150	0.224	0.05	-12.78
160	0.240	0.06	-12.17
170	0.279	0.08	-10.86
180	0.374	0.15	-8.32
190	0.505	0.27	-5.73
200	0.629	0.42	-3.82
210	0.748	0.59	-2.31
220	0.873	0.80	-0.96
230	0.968	0.98	-0.07
240	1.000	1.05	0.21
250	0.978	1.00	0.02
260	0.945	0.94	-0.28
270	0.923	0.90	-0.48
280	0.928	0.90	-0.44
290	0.941	0.93	-0.32
300	0.954	0.96	-0.19
310	0.962	0.97	-0.13
320	0.965	0.98	-0.10
330	0.966	0.98	-0.09
340	0.963	0.97	-0.11
350	0.965	0.98	-0.09

Maximum Value (H-pol)

Field 1.00

ERP 1.05 kW (.212 dB)

Azimuth Bearing 240 degrees

Minimum Field (H-pol)

Field 0.176

ERP .033 kW (-14.88 dBk)

Azimuth Bearing 125 degrees

Vertical Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.908	0.87	-0.62
10	0.908	0.87	-0.63
20	0.906	0.86	-0.64
30	0.906	0.86	-0.65
40	0.878	0.81	-0.92
50	0.828	0.72	-1.43
60	0.744	0.58	-2.36
70	0.624	0.41	-3.89
80	0.474	0.24	-6.27
90	0.333	0.12	-9.33
100	0.221	0.05	-12.91
110	0.145	0.02	-16.58
120	0.104	0.01	-19.43
130	0.094	0.01	-20.29
140	0.099	0.01	-19.90
150	0.118	0.01	-18.32
160	0.161	0.03	-15.66
170	0.279	0.08	-10.87
180	0.410	0.18	-7.54
190	0.558	0.33	-4.85
200	0.681	0.49	-3.13
210	0.764	0.61	-2.12
220	0.827	0.72	-1.44
230	0.882	0.82	-0.88
240	0.921	0.89	-0.51
250	0.956	0.96	-0.18
260	0.975	1.00	0.00
270	0.986	1.02	0.09
280	0.991	1.03	0.14
290	0.997	1.04	0.19
300	0.998	1.05	0.19
310	0.989	1.03	0.11
320	0.972	0.99	-0.03
330	0.959	0.97	-0.15
340	0.933	0.91	-0.39
350	0.917	0.88	-0.54

Maximum Value (V-pol)

Field 1.00

ERP 1.05 kW (.212 dB)

Azimuth Bearing 295 degrees

Minimum Field (V-pol)

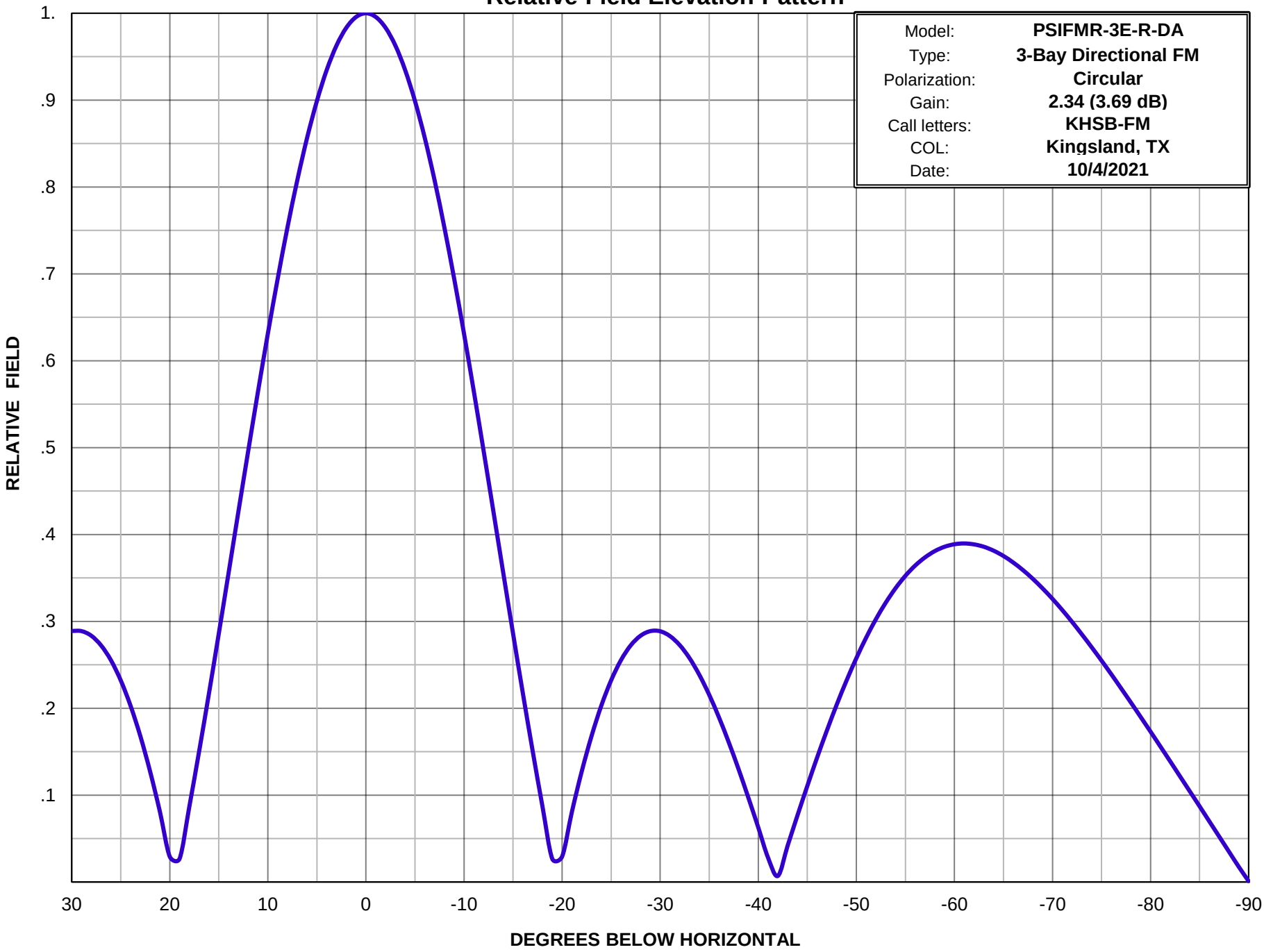
Field 0.094

ERP .01 kW (-20.29 dBk)

Azimuth Bearing 130 degrees

Propagation Systems, Inc.

Relative Field Elevation Pattern



Propagation Systems Inc.

Relative Field Tabulation Elevation Pattern

Antenna Model: PSIFMR-3E-R-DA

Gain: 2.34 (3.69 dB)

Station: KHSB

Angle	Field	dB	Angle	Field	dB	Angle	Field	dB
-90	0.001	-60.00	-50	0.258	-11.78	-10	0.631	-4.00
-89	0.017	-35.18	-49	0.232	-12.70	-9	0.694	-3.17
-88	0.035	-29.16	-48	0.204	-13.80	-8	0.753	-2.46
-87	0.052	-25.63	-47	0.174	-15.17	-7	0.808	-1.85
-86	0.070	-23.14	-46	0.143	-16.88	-6	0.857	-1.35
-85	0.087	-21.20	-45	0.110	-19.14	-5	0.899	-0.93
-84	0.104	-19.63	-44	0.077	-22.31	-4	0.935	-0.59
-83	0.122	-18.30	-43	0.042	-27.54	-3	0.963	-0.33
-82	0.139	-17.14	-42	0.007	-43.14	-2	0.983	-0.15
-81	0.156	-16.13	-41	0.028	-31.05	-1	0.996	-0.04
-80	0.173	-15.24	-40	0.063	-24.03	0	1.000	0.00
-79	0.190	-14.43	-39	0.097	-20.28	1	0.996	-0.04
-78	0.207	-13.70	-38	0.130	-17.74	2	0.983	-0.15
-77	0.223	-13.04	-37	0.161	-15.88	3	0.963	-0.33
-76	0.239	-12.43	-36	0.189	-14.45	4	0.935	-0.59
-75	0.255	-11.87	-35	0.215	-13.33	5	0.899	-0.93
-74	0.270	-11.37	-34	0.238	-12.46	6	0.857	-1.35
-73	0.285	-10.90	-33	0.258	-11.78	7	0.808	-1.85
-72	0.299	-10.48	-32	0.273	-11.29	8	0.753	-2.46
-71	0.313	-10.09	-31	0.283	-10.96	9	0.694	-3.17
-70	0.326	-9.74	-30	0.289	-10.79	10	0.631	-4.00
-69	0.338	-9.42	-29	0.289	-10.79	11	0.565	-4.96
-68	0.349	-9.14	-28	0.283	-10.95	12	0.496	-6.08
-67	0.359	-8.90	-27	0.272	-11.30	13	0.427	-7.40
-66	0.368	-8.69	-26	0.255	-11.86	14	0.356	-8.97
-65	0.375	-8.51	-25	0.232	-12.69	15	0.286	-10.87
-64	0.381	-8.37	-24	0.203	-13.85	16	0.217	-13.25
-63	0.386	-8.27	-23	0.168	-15.50	17	0.151	-16.43
-62	0.389	-8.21	-22	0.127	-17.92	18	0.087	-21.20
-61	0.390	-8.19	-21	0.081	-21.86	19	0.027	-31.43
-60	0.389	-8.21	-20	0.029	-30.68	20	0.029	-30.68
-59	0.386	-8.27	-19	0.027	-31.48	21	0.081	-21.87
-58	0.381	-8.38	-18	0.087	-21.21	22	0.127	-17.93
-57	0.374	-8.55	-17	0.151	-16.43	23	0.168	-15.50
-56	0.364	-8.77	-16	0.217	-13.26	24	0.203	-13.86
-55	0.352	-9.06	-15	0.286	-10.87	25	0.232	-12.69
-54	0.338	-9.42	-14	0.356	-8.97	26	0.255	-11.86
-53	0.322	-9.86	-13	0.426	-7.40	27	0.272	-11.30
-52	0.303	-10.38	-12	0.496	-6.09	28	0.283	-10.95
-51	0.281	-11.02	-11	0.565	-4.96	29	0.289	-10.79