TECHNICAL STATEMENT
IN SUPPORT OF A REQUEST FOR
SPECIAL TEMPORARY AUTHORIZATION
WTIU 192 kW(H) 57.7 kW(V) 165 M HAAT CH. 14
BLOOMINGTON, INDIANA

INTRODUCTION

The Trustees of Indiana University (the "Applicant"), licensee of digital television station WTIU Channel 14, Facility ID No. 66536, request special temporary authorization (STA) to operate WTIU on Channel 14 with parameters at variance from those specified on the current station license using a different antenna.[1] WTIU was reassigned to Channel 33 as part of the TV-repack and because operation on the new channel involves replacing the station's main antenna in Phase 6, the use of an interim antenna to continue operations on Channel 14 during the designated construction period is needed.[2] Therefore, this application requests prior FCC authority to temporarily transmit on Channel 14 at reduced power using an interim antenna to be side mounted below the main. The technical operating parameters for the proposed interim antenna are described in detail below.

INTERIM ANTENNA AND OPERATING PARAMETERS

As stated above, the proposed interim antenna will enable WTIU to continue operations on Channel 14 during its assigned construction phase for transitioning to Channel 33. The antenna to be employed is an elliptically polarized directional ERI Model i230ECW-16-14/33 with 1.0 degree electrical beam tilt. This interim antenna will be designed to operate such that the horizontally polarized effective radiated power (ERP) will be 192 kW and the vertically polarized ERP will be 57.7 kW. A composite of the horizontal and vertical azimuth patterns are shown in Figure 1.

The height of the antenna radiation center will be 137.2 meters above ground level (AGL) or 382.9 meters above mean sea level (AMSL). Because the proposed STA facility will operate with technical parameters that are less than the associated licensed facility, no

[1] FCC File No. BLEDT-20030925AVS authorizes a directional antenna system with a maximum ERP of 224 kW at a radiation center height above mean sea level (AMSL) of 437 meters. The licensed site coordinates are 39-08-31.0 N, 86-29-42.9 W (Antenna Structure Registration Number 1234684).

[2] WTIU is scheduled to transition to Channel 33 in Phase 6, which begins on September 7, 2019 and ends October 18, 2019.

extension of the normally protected contour will result in any direction as the contour map depicts in Figure 2.

The TVStudy summary report provided in Figure 3 indicates that no interference check failures were found.[3] More specifically, the study found no cases of temporary pairwise (station-to-station) interference caused to other stations in excess of two percent.[4] This analysis was performed using the standard analysis settings and excluding downstream linked stations WLKY (Facility ID 53939) and WTTK (Facility ID 56526).

ENVIRONMENTAL IMPACT

The criteria outlined in 47 CFR § 1.1307(a) for certain types of facilities that may significantly affect the environment do not apply because this request to operate WTIU at reduced power using a temporary antenna system does not result in a facility that will exceed the rules in 47 CFR § 1.1307(b) concerning human exposure to radio-frequency (RF) energy. A showing of compliance with the RF exposure guidelines is provided below.

Using the methodology for predicting power density levels for television broadcast antennas outlined in FCC OET Bulletin No. 65, Edition 97-01, (OET-65), the proposed STA facility is calculated to produce a maximum power density of 11.49 μW/cm² at points 2 meters above ground (approximate human head height). As Figure 4 indicates, the above worst-case exposure level is predicted at a horizontal distance of 186.09 meters from the tower base. This determination was made using the following operating parameters along with the antenna relative field values listed in Figure 5:

Frequency:	470 - 476 MHz (UHF Channel 14)
Effective radiated power:	192 kW (H); 57.7 kW (V)
Antenna type:	ERI i230ECW-16-14/33
Antenna polarization:	Elliptical
Antenna height:	137.2 meters AGL
Location coordinates:	39-08-31.0 N, 86-29-42.9 (NAD83)
Site elevation:	245.7 meters AMSL
Overall tower height:	196.9 meters AGL (ASRN 1234684)

The maximum permissible exposure (MPE) guidelines applicable to Channel 14, as determined in accordance with 47 CFR § 1.1310 for uncontrolled and controlled situations, are

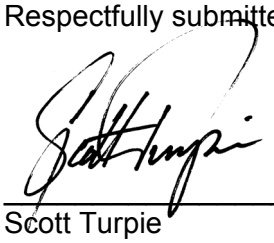
[3] *TVStudy* Program, Version 2.2.5.

[4] See Transition Scheduling Plan Adoption Public Notice (DA 17-107, rel. Jan. 27, 2017). *"A station cannot cause more than two percent new interference to another station during the transition."*

313 μW/cm² and 1,567 μW/cm² respectively. Because the worst-case exposure level is not more than 5% of those guidelines, no further showing of compliance is necessary. Therefore, this application complies with the RF exposure limits and is categorically excluded from environmental processing by 47 CFR § 1.1306.

Preventative steps to limit exposure to persons authorized to access the transmitter site will be consistent with the appropriate recommendations in OET-65. Such steps shall include reducing power or shutting down the facility. In addition, WTIU will coordinate all maintenance and other related work to be performed at elevations above ground level with other site users. The Applicant will also ensure that suitable signs are posted to establish awareness of the potential for exposure.

Respectfully submitted,



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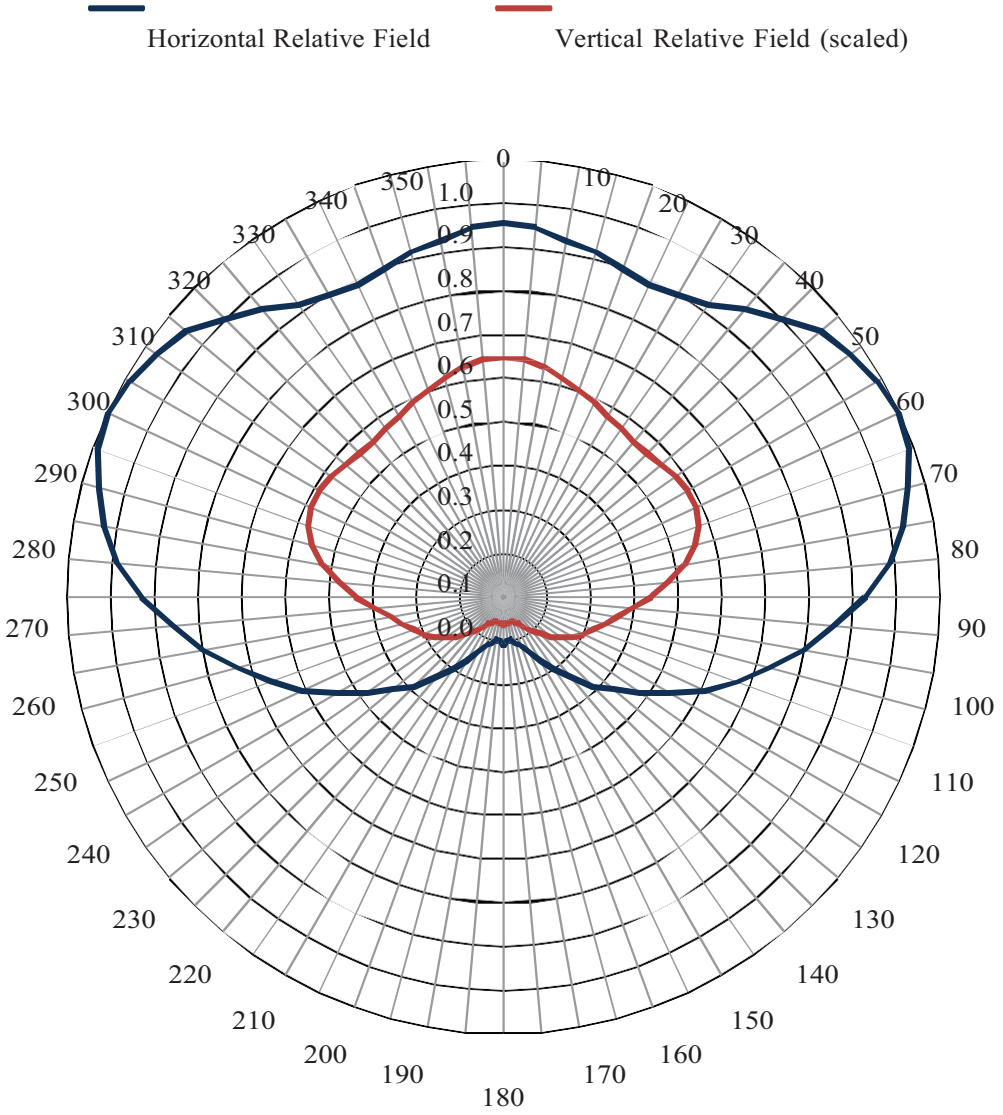
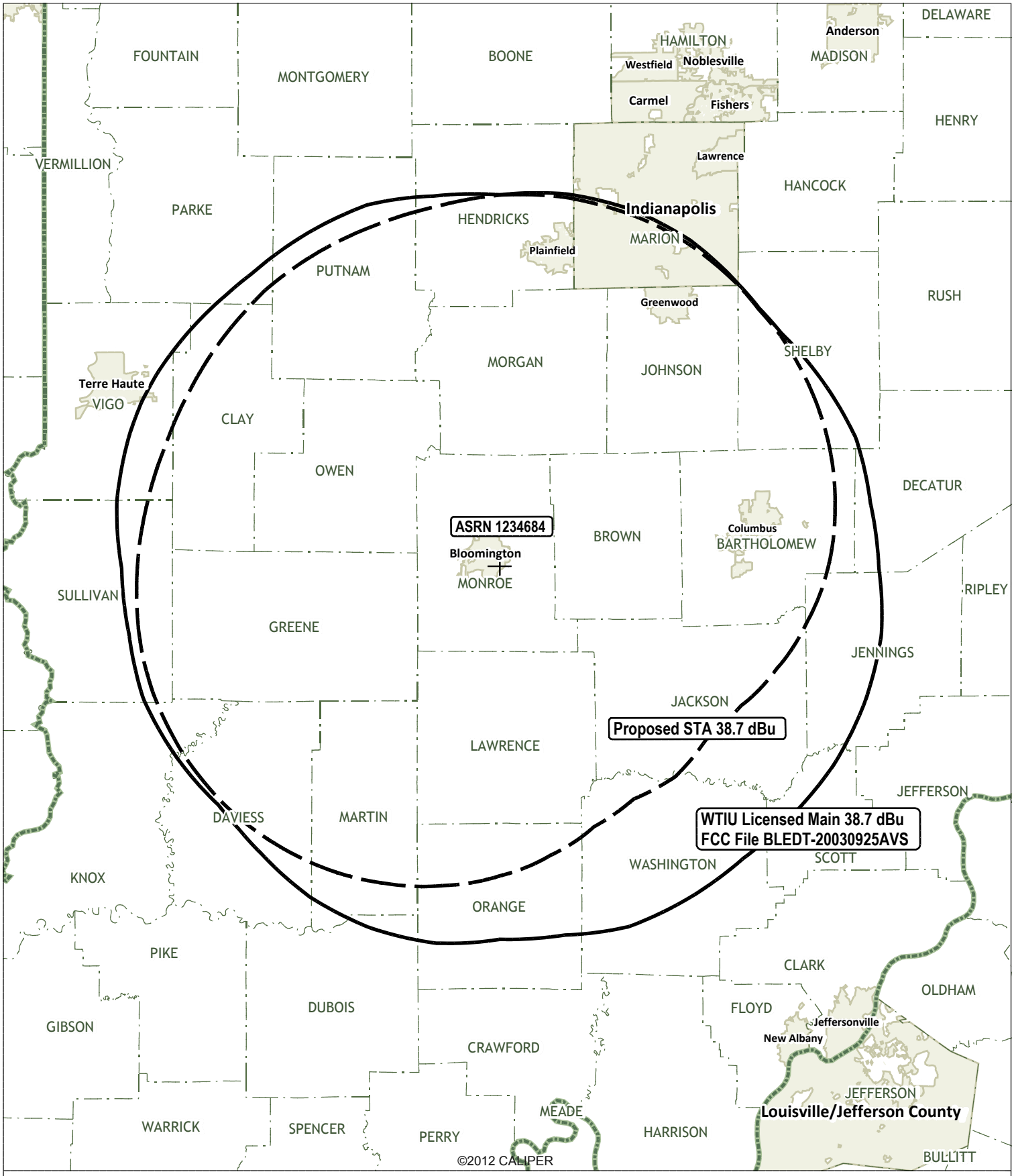
September 5, 2019

Attachments:
Figure 1 – Composite Azimuth Patterns
Figure 2 – Contour Map
Figure 3 – Summary of TV Study Results
Figure 4 – RF Exposure Analysis
Figure 5 – Tabulation Data for Elevation Pattern

Composite Azimuth Patterns

Type:	i230W C-H-14	Polarization:	Elliptical
Directivity (H-Pol):	2.07 numeric (3.16 dB)	Frequency:	14 (ATSC)
Directivity (V-Pol):	2.33 numeric (3.67 dB)		WTIU
Location:			
Percent Horizontal:	78.93%	NOTE: Pattern shape and directivity may	
Percent Vertical:	21.07%	vary with channel and mounting	
Power Ratio:	26.69%		
ERP V/H Ratio:	30.00%		





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Scale 1:1,000,000

10 0 10 20 30 40
Kilometers

FIGURE 2
MAP SHOWING NO EXTENSION OF
WTIU'S NORMALLY PROTECTED CONTOUR
LICENSE 224 KW-DA 221 M HAAT CH. 14
STA 192 KW-DA 165 M HAAT CH. 14
BLOOMINGTON, INDIANA

September 2019

FIGURE 3

Study created: 2019.09.04 19:57:37

Study build station data: LMS TV 2019-09-04

```
    Proposal: WTIU D14 DT APP BLOOMINGTON, IN
 File number: WTIU Interim Antenna Ch-14
 Facility ID: 66536
Station data: User record
   Record ID: 268
     Country: U.S.
        Zone: I
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Build options:
Protect pre-transition records not on baseline channel

Search options:
All post-transition APP, CP, and baseline records excluded

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	WKSO-TV	D14	DT	LIC	SOMERSET, KY	BMLEDT20120608AAL	263.6 km
No	WOBC-CD	D14	DC	LIC	BATTLE CREEK, MI	BLDTA20120403ADU	367.2
No	KNLC	D14	DT	APP	ST. LOUIS, MO	BLANK0000035663	361.9
No	KNLC	D14	DT	LIC	ST. LOUIS, MO	BLCDT20061228AAC	361.9
Yes	WCMH-TV	D14	DT	LIC	COLUMBUS, OH	BLCDT20050823AAD	311.1
No	WDSI-TV	D14	DT	LIC	CHATTANOOGA, TN	BLANK0000059350	454.6
No	WLFG	D14	DD	LIC	GRUNDY, VA	BLANK0000071597	464.4
No	WYYW-CD	D15	DC	LIC	EVANSVILLE, IN	BLDTA20130109AGB	145.0

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

```
    Channel: D14
   Latitude:  39  8 31.00 N (NAD83)
  Longitude:  86 29 42.90 W
Height AMSL: 382.9 m
       HAAT: 164.9 m
   Peak ERP: 192 kW
    Antenna: ERI i23OECW-16-14 320.0 deg
Elev Pattrn: Generic
  Elec Tilt: 1.00
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38.7 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	142 kW	171.0 m	72.9 km
45.0	149	151.2	71.6
90.0	20.9	186.1	64.5
135.0	2.12	188.6	53.5
180.0	11.1	177.5	60.8
225.0	112	162.7	71.1
270.0	173	137.3	71.2
315.0	137	145.2	70.6

Distance to Canadian border: 418.7 km

Distance to Mexican border: 1710.3 km

Conditions at FCC monitoring station: Allegan MI
Bearing: 6.5 degrees Distance: 387.6 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 280.0 degrees Distance: 1603.9 km

No land mobile station failures found

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%

Proposal causes 0.24% interference to BLCDT20050823AAD LIC scenario 1

---- Below is IX received by proposal WTIU Interim Antenna C ----

Proposal receives 0.11% interference from scenario 1
No IX check failures found.

FIGURE 4

Call sign:	WTIU	Ground reflection factor:	2.56
Channel:	14	Isotropic factor:	1.64
HERP (kW):	192.0	Exposure ht. AGL (m):	2.0
VERP (kW):	57.7		
Antenna Manufacturer:	ERI	Bottom Frequency (MHz):	470
Antenna Model:	i230ECW-16-14/33	General MPE Limit (μW/cm²):	313
Antenna RCAGL (m):	137.2 m	Occupational MPE Limit (μW/cm²):	1567

Depression Angle	Distance (meters)	Slope (meters)	Relative Field	Power Density (μW/cm²)	General MPE Limit	Occupational MPE Limit
90	0.00	135.20	0.050	1.14	0.36%	0.07%
88	4.72	135.28	0.050	1.14	0.36%	0.07%
86	9.45	135.53	0.050	1.14	0.36%	0.07%
84	14.21	135.94	0.050	1.13	0.36%	0.07%
82	19.00	136.53	0.050	1.12	0.36%	0.07%
80	23.84	137.29	0.050	1.11	0.35%	0.07%
78	28.74	138.22	0.050	1.09	0.35%	0.07%
76	33.71	139.34	0.040	0.69	0.22%	0.04%
74	38.77	140.65	0.040	0.67	0.22%	0.04%
72	43.93	142.16	0.030	0.37	0.12%	0.02%
70	49.21	143.88	0.030	0.36	0.12%	0.02%
68	54.62	145.82	0.020	0.16	0.05%	0.01%
66	60.19	147.99	0.020	0.15	0.05%	0.01%
64	65.94	150.42	0.010	0.04	0.01%	0.00%
62	71.89	153.12	0.010	0.04	0.01%	0.00%
60	78.06	156.12	0.050	0.86	0.27%	0.05%
58	84.48	159.42	0.100	3.28	1.05%	0.21%
56	91.19	163.08	0.150	7.06	2.25%	0.45%
54	98.23	167.12	0.190	10.78	3.44%	0.69%
52	105.63	171.57	0.200	11.34	3.62%	0.72%
50	113.45	176.49	0.180	8.68	2.77%	0.55%
48	121.73	181.93	0.130	4.26	1.36%	0.27%
46	130.56	187.95	0.060	0.85	0.27%	0.05%
44	140.00	194.63	0.000	0.00	0.00%	0.00%
42	150.15	202.05	0.040	0.33	0.10%	0.02%
40	161.13	210.33	0.110	2.28	0.73%	0.15%
38	173.05	219.60	0.200	6.92	2.21%	0.44%
36	186.09	230.02	0.270	11.49	3.67%	0.73%
34	200.44	241.78	0.250	8.92	2.85%	0.57%
32	216.37	255.13	0.140	2.51	0.80%	0.16%
30	234.17	270.40	0.000	0.00	0.00%	0.00%
28	254.27	287.98	0.100	1.01	0.32%	0.06%
26	277.20	308.41	0.070	0.43	0.14%	0.03%
24	303.66	332.40	0.080	0.48	0.15%	0.03%
22	334.63	360.91	0.170	1.85	0.59%	0.12%
20	371.46	395.30	0.150	1.20	0.38%	0.08%
18	416.10	437.52	0.010	0.00	0.00%	0.00%
16	471.50	490.50	0.100	0.35	0.11%	0.02%
14	542.26	558.86	0.100	0.27	0.09%	0.02%
12	636.07	650.28	0.220	0.95	0.30%	0.06%
10	766.76	778.59	0.390	2.09	0.67%	0.13%

Maximum ground-level exposure = 11.49 μW/cm² at 186.09 meters.

Tabulated Data for Elevation Pattern

Type: i230W C-16-14

-5 to 10 degrees in 0.25 degree increments.
10 to 90 degrees in 0.50 degree increments.

Angle	Field	dB	Angle	Field	dB	Angle	Field	dB	Angle	Field	dB	Angle	Field	dB
-10.00	0.120	-18.42	2.25	0.930	-0.63	19.00	0.090	-20.92	43.50	0.010	-40.00	68.00	0.020	-33.98
-9.75	0.130	-17.72	2.50	0.900	-0.92	19.50	0.120	-18.42	44.00	0.000	---	68.50	0.030	-30.46
-9.50	0.140	-17.08	2.75	0.860	-1.31	20.00	0.150	-16.48	44.50	0.010	-40.00	69.00	0.030	-30.46
-9.25	0.150	-16.48	3.00	0.820	-1.72	20.50	0.170	-15.39	45.00	0.020	-33.98	69.50	0.030	-30.46
-9.00	0.160	-15.92	3.25	0.770	-2.27	21.00	0.180	-14.89	45.50	0.040	-27.96	70.00	0.030	-30.46
-8.75	0.170	-15.39	3.50	0.720	-2.85	21.50	0.180	-14.89	46.00	0.060	-24.44	70.50	0.030	-30.46
-8.50	0.180	-14.89	3.75	0.660	-3.61	22.00	0.170	-15.39	46.50	0.080	-21.94	71.00	0.030	-30.46
-8.25	0.190	-14.42	4.00	0.610	-4.29	22.50	0.160	-15.92	47.00	0.100	-20.00	71.50	0.030	-30.46
-8.00	0.200	-13.98	4.25	0.540	-5.35	23.00	0.140	-17.08	47.50	0.110	-19.17	72.00	0.030	-30.46
-7.75	0.200	-13.98	4.50	0.470	-6.56	23.50	0.110	-19.17	48.00	0.130	-17.72	72.50	0.030	-30.46
-7.50	0.210	-13.56	4.75	0.415	-7.64	24.00	0.080	-21.94	48.50	0.150	-16.48	73.00	0.040	-27.96
-7.25	0.200	-13.98	5.00	0.340	-9.37	24.50	0.050	-26.02	49.00	0.160	-15.92	73.50	0.040	-27.96
-7.00	0.200	-13.98	5.25	0.275	-11.21	25.00	0.030	-30.46	49.50	0.170	-15.39	74.00	0.040	-27.96
-6.75	0.190	-14.42	5.50	0.210	-13.56	25.50	0.050	-26.02	50.00	0.180	-14.89	74.50	0.040	-27.96
-6.50	0.180	-14.89	5.75	0.145	-16.77	26.00	0.070	-23.10	50.50	0.190	-14.42	75.00	0.040	-27.96
-6.25	0.165	-15.65	6.00	0.080	-21.94	26.50	0.090	-20.92	51.00	0.200	-13.98	75.50	0.040	-27.96
-6.00	0.140	-17.08	6.25	0.020	-33.98	27.00	0.100	-20.00	51.50	0.200	-13.98	76.00	0.040	-27.96
-5.75	0.115	-18.79	6.50	0.040	-27.96	27.50	0.100	-20.00	52.00	0.200	-13.98	76.50	0.040	-27.96
-5.50	0.090	-20.92	6.75	0.090	-20.92	28.00	0.100	-20.00	52.50	0.200	-13.98	77.00	0.040	-27.96
-5.25	0.055	-25.19	7.00	0.140	-17.08	28.50	0.080	-21.94	53.00	0.200	-13.98	77.50	0.050	-26.02
-5.00	0.020	-33.98	7.25	0.190	-14.42	29.00	0.060	-24.44	53.50	0.190	-14.42	78.00	0.050	-26.02
-4.75	0.020	-33.98	7.50	0.240	-12.40	29.50	0.040	-27.96	54.00	0.190	-14.42	78.50	0.050	-26.02
-4.50	0.060	-24.44	7.75	0.270	-11.37	30.00	0.000	---	54.50	0.180	-14.89	79.00	0.050	-26.02
-4.25	0.110	-19.17	8.00	0.310	-10.17	30.50	0.030	-30.46	55.00	0.170	-15.39	79.50	0.050	-26.02
-4.00	0.150	-16.48	8.25	0.335	-9.50	31.00	0.070	-23.10	55.50	0.160	-15.92	80.00	0.050	-26.02
-3.75	0.210	-13.56	8.50	0.360	-8.87	31.50	0.110	-19.17	56.00	0.150	-16.48	80.50	0.050	-26.02
-3.50	0.260	-11.70	8.75	0.375	-8.52	32.00	0.140	-17.08	56.50	0.130	-17.72	81.00	0.050	-26.02
-3.25	0.320	-9.90	9.00	0.390	-8.18	32.50	0.180	-14.89	57.00	0.120	-18.42	81.50	0.050	-26.02
-3.00	0.370	-8.64	9.25	0.400	-7.96	33.00	0.210	-13.56	57.50	0.110	-19.17	82.00	0.050	-26.02
-2.75	0.430	-7.33	9.50	0.400	-7.96	33.50	0.230	-12.77	58.00	0.100	-20.00	82.50	0.050	-26.02
-2.50	0.490	-6.20	9.75	0.395	-8.07	34.00	0.250	-12.04	58.50	0.080	-21.94	83.00	0.050	-26.02
-2.25	0.550	-5.19	10.00	0.390	-8.18	34.50	0.260	-11.70	59.00	0.070	-23.10	83.50	0.050	-26.02
-2.00	0.610	-4.29	10.50	0.360	-8.87	35.00	0.270	-11.37	59.50	0.060	-24.44	84.00	0.050	-26.02
-1.75	0.660	-3.61	11.00	0.310	-10.17	35.50	0.270	-11.37	60.00	0.050	-26.02	84.50	0.050	-26.02
-1.50	0.710	-2.97	11.50	0.270	-11.37	36.00	0.270	-11.37	60.50	0.040	-27.96	85.00	0.050	-26.02
-1.25	0.760	-2.38	12.00	0.220	-13.15	36.50	0.260	-11.70	61.00	0.030	-30.46	85.50	0.050	-26.02
-1.00	0.800	-1.94	12.50	0.160	-15.92	37.00	0.240	-12.40	61.50	0.020	-33.98	86.00	0.050	-26.02
-0.75	0.845	-1.46	13.00	0.100	-20.00	37.50	0.220	-13.15	62.00	0.010	-40.00	86.50	0.050	-26.02
-0.50	0.880	-1.11	13.50	0.100	-20.00	38.00	0.200	-13.98	62.50	0.010	-40.00	87.00	0.050	-26.02
-0.25	0.915	-0.77	14.00	0.100	-20.00	38.50	0.180	-14.89	63.00	0.000	---	87.50	0.050	-26.02
0.00	0.950	-0.45	14.50	0.110	-19.17	39.00	0.150	-16.48	63.50	0.010	-40.00	88.00	0.050	-26.02
0.25	0.965	-0.31	15.00	0.120	-18.42	39.50	0.130	-17.72	64.00	0.010	-40.00	88.50	0.050	-26.02
0.50	0.980	-0.18	15.50	0.120	-18.42	40.00	0.110	-19.17	64.50	0.010	-40.00	89.00	0.050	-26.02
0.75	0.995	-0.04	16.00	0.100	-20.00	40.50	0.090	-20.92	65.00	0.020	-33.98	89.50	0.050	-26.02
1.00	1.000	0.00	16.50	0.080	-21.94	41.00	0.070	-23.10	65.50	0.020	-33.98	90.00	0.050	-26.02
1.25	1.000	0.00	17.00	0.060	-24.44	41.50	0.060	-24.44	66.00	0.020	-33.98			
1.50	0.990	-0.09	17.50	0.020	-33.98	42.00	0.040	-27.96	66.50	0.020	-33.98			
1.75	0.975	-0.22	18.00	0.010	-40.00	42.50	0.030	-30.46	67.00	0.020	-33.98			
2.00	0.950	-0.45	18.50	0.050	-26.02	43.00	0.020	-33.98	67.50	0.020	-33.98			