

Report of Test LLI-16163-1-R03

This test report supercedes test report number LLI-16163-1-R02

Greenstar Products - Pole arm mounted roadway luminaire. Product ID: XAVH08434SNXXI

Grey painted cast aluminum housing with fins. Fixture extends ~ 25" x 10" x 4.5".

8 LEDs mounted in 2 x 4 array on white PCB with clear plastic sheet of individual lenses.

One Mean Well power supply. Model: HVG-100-48B

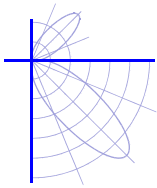
Operating at 480 Vac and 60 Hz with dimming disconnected.



Performance Summary

Total Light Output	10045 lm	Power Factor	0.95
Luminaire Power	106.9 W	THD(i)*	3.5 %
Luminous Efficacy	94.0 lm/W	0-90° Zonal Flux %	100.0 %
CCT	4080 K	80-90° Zonal Flux %	0.6 %
CIE(x,y) 1931	(0.376, 0.372)	BUG Rating*	B2-U0-G2
CRI	74	Street Classification*	Type III Medium

PREPARED FOR : Greenstar Products, Inc., 6900 Alamo Downs Pkwy, San Antonio, TX 78238



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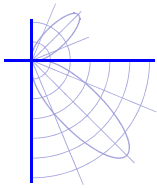
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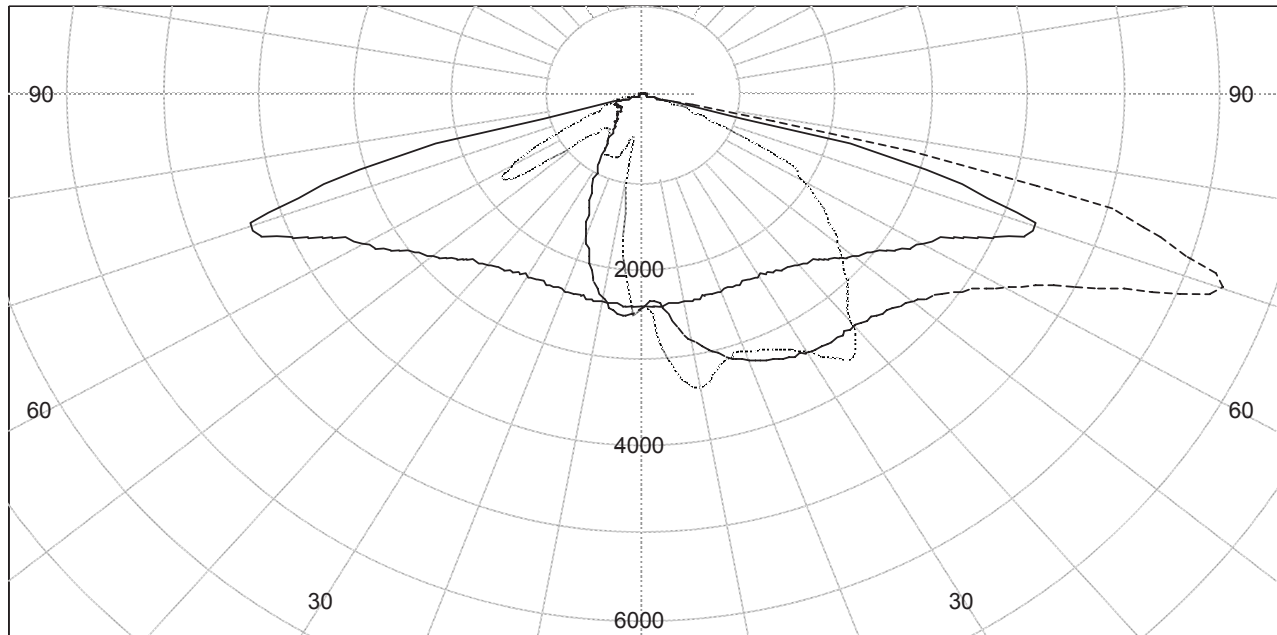
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Polar Light Distribution Curves



House side / L270

L90 / 270 - Solid, Plane of maximum - Dashed, L0 / 180 - Grey (cd)

Street side / L90

Percentage Outputs

	Upward	Downward	Total
Street Side	0.0 %	78.6 %	78.6 %
House Side	0.0 %	21.4 %	21.4 %
	0.0 %	100.0 %	100.0 %

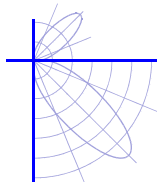
Report data based on absolute values as measured.

Signed:

Ryder Tunney
Authorized Signatory

Date of test
Date of report

24-Jun-2016
13-Oct-2016



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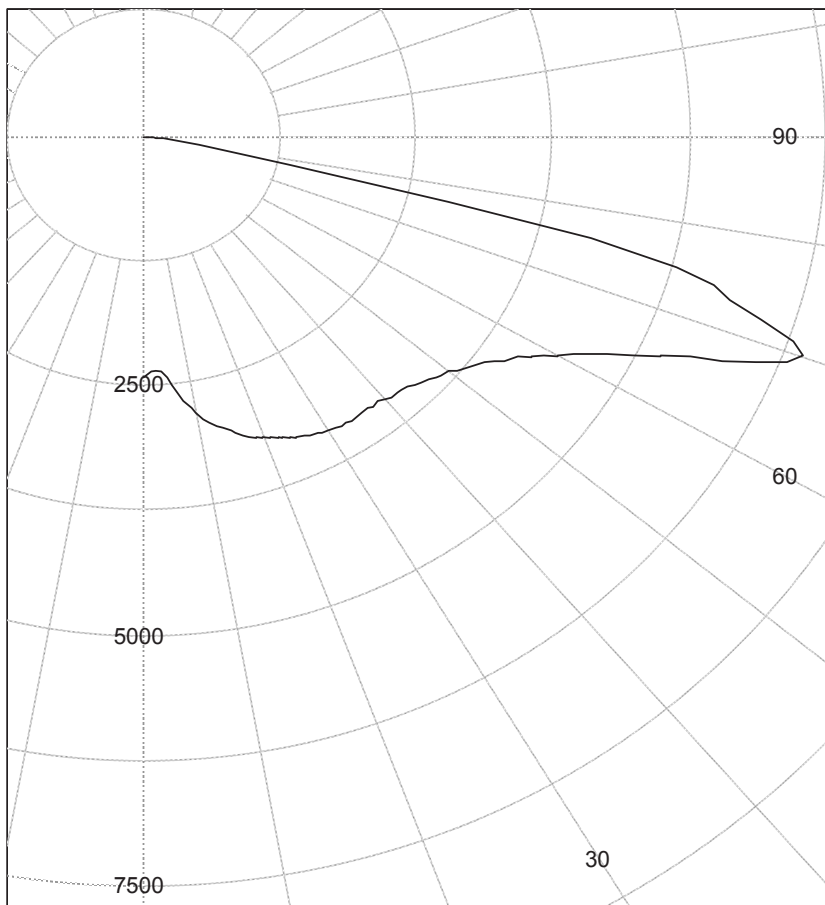
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Operating at 480 Vac and 60 Hz with dimming disconnected.

Intensity
in principal plane

Vertical Angle (°)	Intensity (cd)
0.0	2416.7
10.0	2826.0
20.0	3223.8
30.0	3404.8
35.0	3428.5
40.0	3443.6
45.0	3517.9
47.5	3580.0
50.0	3666.3
52.5	3784.3
55.0	3931.9
57.5	4137.6
60.0	4387.2
62.5	4699.6
65.0	5221.0
67.5	5895.0
70.0	6430.1
72.5	5758.3
75.0	5059.9
77.5	2063.3
80.0	191.7
82.5	74.7
85.0	21.2
87.5	8.7
90.0	0.0
92.5	0.0
95.0	0.0
97.5	0.0
100.0	0.0
102.5	0.0
105.0	0.0
120.0	0.0
135.0	0.0
150.0	0.0
165.0	0.0
180.0	0.0

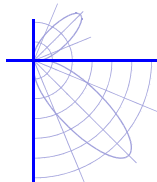
Principal Vertical Plane



Plane of maximum intensity (cd)

	Maximum Intensity
House Side	4359 cd @ (270.0°, 69.5°)
Street Side	6430 cd @ (290.0°, 70.0°)

Coordinates expressed in the C Type coordinate system
Data for the two symmetric halves of the luminaire has been averaged.



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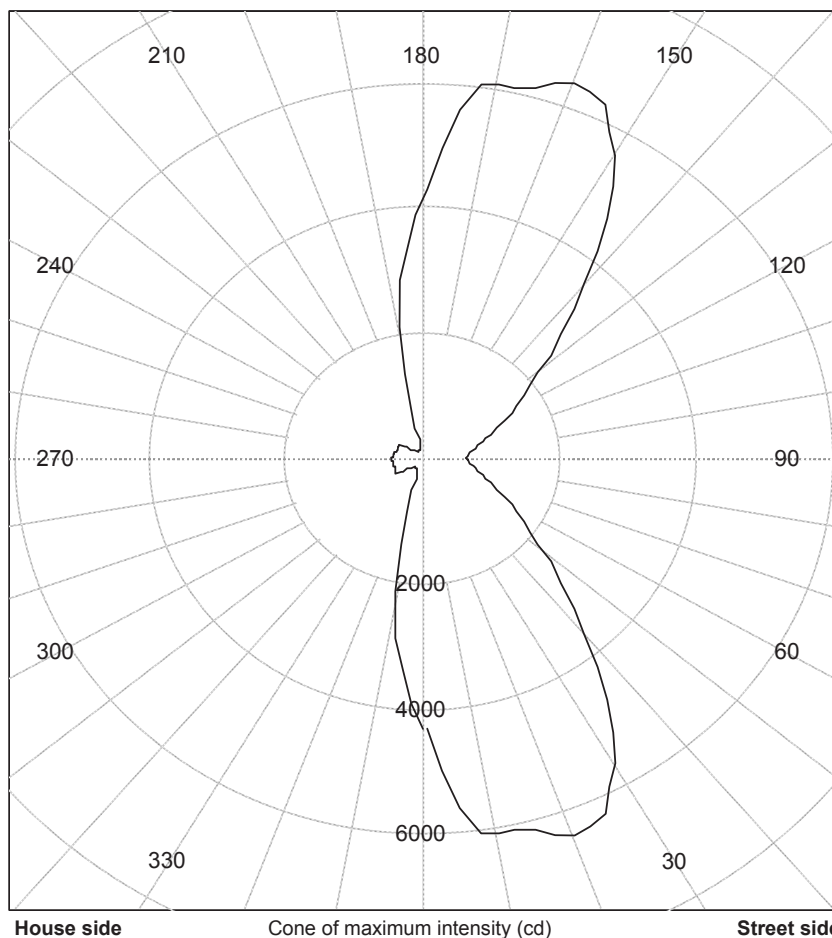
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Intensity
in principal cone

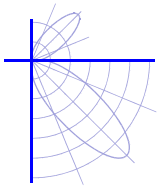
Lateral Plane (°)	Intensity (cd)
0	580.0
15	790.6
30	1440.3
40	2140.4
45	2824.7
50	3672.9
55	4701.8
60	5608.3
65	6245.9
70	6430.1
75	6154.2
80	6087.4
85	5609.0
90	4328.9
95	3395.4
100	2175.9
105	869.3
110	308.2
115	215.3
120	161.3
125	166.0
130	179.1
135	181.8
140	220.8
150	438.0
165	431.5
180	459.7

Principal Conical Surface



	Maximum Intensity
House Side	4359 cd @ (270.0°, 69.5°)
Street Side	6430 cd @ (290.0°, 70.0°)

Coordinates expressed in the C Type coordinate system
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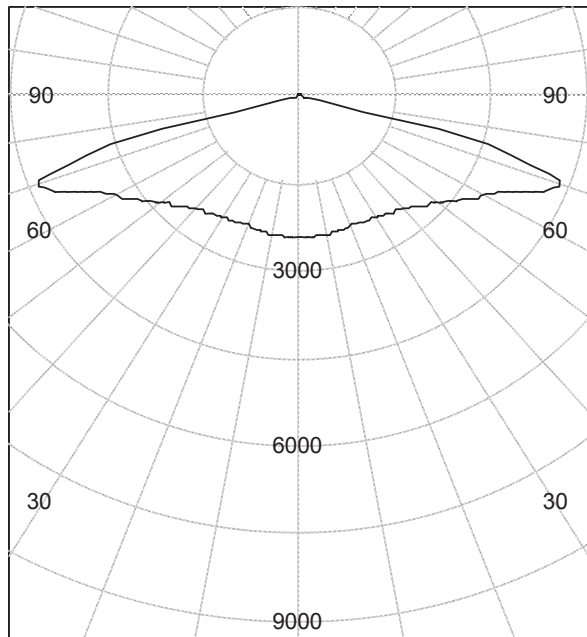
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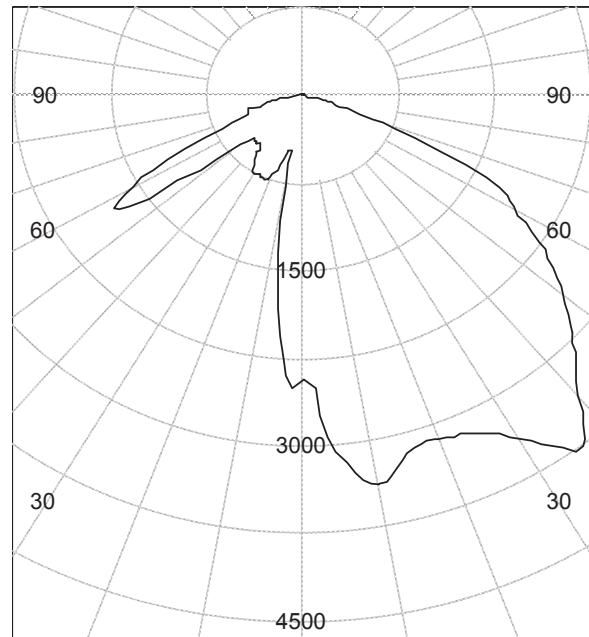
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Polar curve through L90 / L270

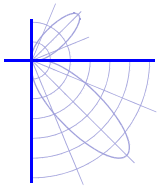


(L90) (cd) (L270)

Polar curve through L0 / L180



House side (L180) (cd) Street side (L0)



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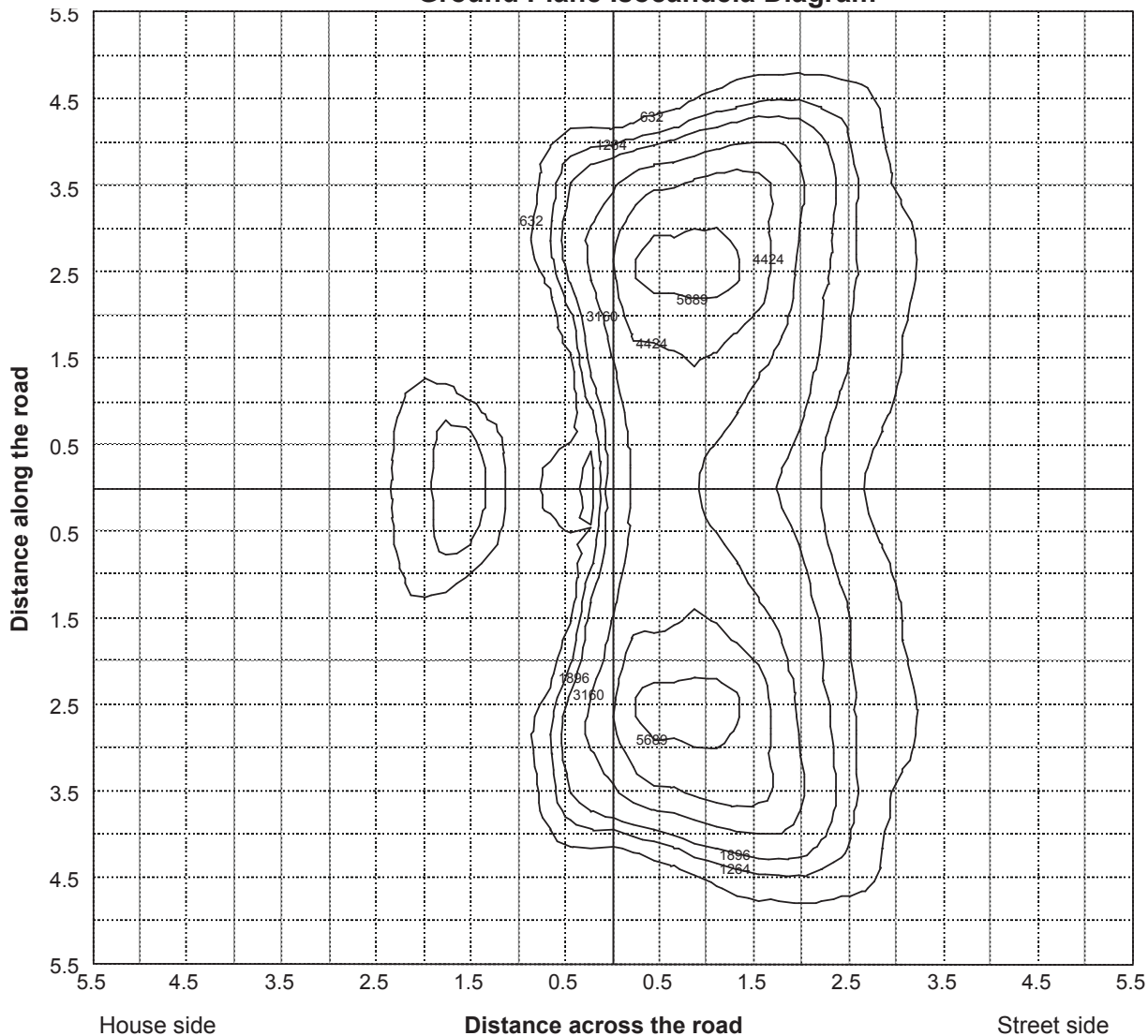
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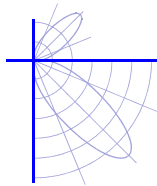
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Ground Plane Isocandela Diagram



The isocandela contour units are expressed as cd

Upstream and downstream sides have been averaged.



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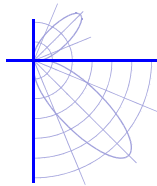
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House side intensity data (cd)

Vertical	L-Plane								
	L180	L195	L210	L220	L225	L230	L235	L240	L245
0.0	2417	2417	2417	2417	2417	2417	2417	2417	2417
10.0	794	893	1198	1468	1620	1773	1929	2089	2246
20.0	740	726	665	584	542	509	574	883	1310
30.0	773	791	784	756	722	674	601	528	524
35.0	628	660	689	683	673	637	593	525	459
40.0	537	537	510	507	512	490	466	443	404
45.0	540	529	454	382	359	356	358	360	355
47.5	540	522	437	353	317	310	322	334	336
50.0	753	633	416	328	291	278	288	304	315
52.5	1117	918	432	303	272	260	260	271	291
55.0	1636	1405	548	284	256	247	242	250	270
57.5	1737	1640	725	282	246	237	230	234	256
60.0	1530	1531	865	294	243	235	225	224	246
62.5	1260	1320	969	298	238	222	216	210	230
65.0	843	950	951	294	231	207	198	193	217
67.5	566	590	689	261	219	198	184	177	216
70.0	460	432	438	221	182	179	166	161	215
72.5	438	380	315	194	149	143	148	149	185
75.0	421	365	266	168	129	116	114	122	159
77.5	329	322	230	148	104	92	89	95	111
80.0	265	256	192	132	83	74	72	70	70
82.5	205	176	126	104	58	52	77	48	50
85.0	15	18	26	26	20	22	28	25	26
87.5	7	7	6	7	6	6	9	7	7
90.0	0	0	0	0	0	0	0	0	0
92.5	0	0	0	0	0	0	0	0	0
95.0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0
100.0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0
105.0	0	0	0	0	0	0	0	0	0
120.0	0	0	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0



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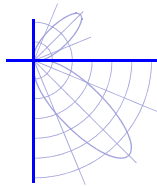
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Vertical	House side			Intensity data (cd)					Street side	
	L250	L255	L260	L-Plane					L285	L290
	L265	L270	L275	L280	L285	L290				
0.0	2417	2417	2417	2417	2417	2417	2417	2417	2417	2417
10.0	2368	2473	2508	2464	2399	2373	2461	2644	2826	2826
20.0	1702	2063	2337	2430	2372	2513	2825	3052	3224	3224
30.0	942	1571	2092	2363	2391	2728	3088	3307	3405	3405
35.0	632	1324	1983	2339	2441	2850	3219	3411	3429	3429
40.0	450	1094	1914	2336	2518	2991	3367	3510	3444	3444
45.0	385	919	1863	2373	2661	3199	3574	3645	3518	3518
47.5	362	851	1854	2407	2751	3321	3690	3721	3580	3580
50.0	337	798	1853	2446	2853	3458	3819	3814	3666	3666
52.5	315	760	1856	2489	2967	3604	3956	3915	3784	3784
55.0	298	735	1869	2549	3096	3768	4108	4029	3932	3932
57.5	291	720	1893	2632	3257	3973	4306	4190	4138	4138
60.0	287	706	1852	2616	3373	4228	4558	4406	4387	4387
62.5	272	690	1835	2654	3557	4609	4938	4724	4700	4700
65.0	270	707	1923	2897	3849	5094	5449	5226	5221	5221
67.5	290	771	2059	3215	4209	5598	5980	5826	5895	5895
70.0	308	869	2176	3395	4329	5609	6087	6154	6430	6430
72.5	283	636	1723	2758	3613	4847	5344	5462	5758	5758
75.0	205	232	955	1780	2238	3093	3608	4413	5060	5060
77.5	138	132	153	178	188	262	569	1254	2063	2063
80.0	83	85	85	93	100	135	165	205	192	192
82.5	45	49	51	55	55	82	91	95	75	75
85.0	23	22	25	27	28	40	39	32	21	21
87.5	7	8	10	10	12	12	9	9	9	9
90.0	0	0	0	0	0	0	0	0	0	0
92.5	0	0	0	0	0	0	0	0	0	0
95.0	0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0	0
100.0	0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0	0
105.0	0	0	0	0	0	0	0	0	0	0
120.0	0	0	0	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0	0



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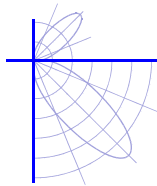
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Operating at 480 Vac and 60 Hz with dimming disconnected.

Street side intensity data (cd)

Vertical	L-Plane								
	L295	L300	L305	L310	L315	L320	L330	L345	L0
0.0	2417	2417	2417	2417	2417	2417	2417	2417	2417
10.0	2946	3043	3123	3198	3256	3291	3360	3386	3391
20.0	3330	3384	3364	3309	3238	3186	3140	3116	3116
30.0	3347	3244	3186	3178	3174	3187	3264	3333	3387
35.0	3316	3248	3250	3264	3267	3281	3369	3592	3703
40.0	3338	3333	3361	3401	3433	3467	3501	3503	3360
45.0	3462	3498	3569	3654	3697	3666	3455	3135	2994
47.5	3556	3625	3741	3827	3828	3737	3427	2982	2813
50.0	3679	3784	3914	3967	3907	3752	3354	2835	2653
52.5	3834	3959	4064	4062	3922	3720	3248	2691	2478
55.0	4032	4162	4219	4124	3903	3651	3135	2523	2298
57.5	4259	4358	4343	4140	3826	3536	2992	2349	2095
60.0	4475	4512	4394	4079	3708	3379	2837	2153	1894
62.5	4731	4689	4430	4006	3595	3213	2676	1985	1776
65.0	5132	4920	4509	3984	3512	3109	2431	1653	1387
67.5	5712	5275	4655	3998	3357	2817	1944	1137	841
70.0	6246	5608	4702	3673	2825	2140	1440	791	580
72.5	5494	4883	3809	2678	1858	1447	922	511	315
75.0	4922	3769	2530	1677	1112	887	553	349	234
77.5	2722	2038	1200	644	609	499	309	250	164
80.0	290	411	376	251	219	204	181	148	102
82.5	63	72	79	68	88	136	152	101	71
85.0	28	30	32	32	45	77	68	51	38
87.5	8	8	7	6	6	6	8	12	9
90.0	0	0	0	0	0	0	0	0	0
92.5	0	0	0	0	0	0	0	0	0
95.0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0
100.0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0
105.0	0	0	0	0	0	0	0	0	0
120.0	0	0	0	0	0	0	0	0	0
135.0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0
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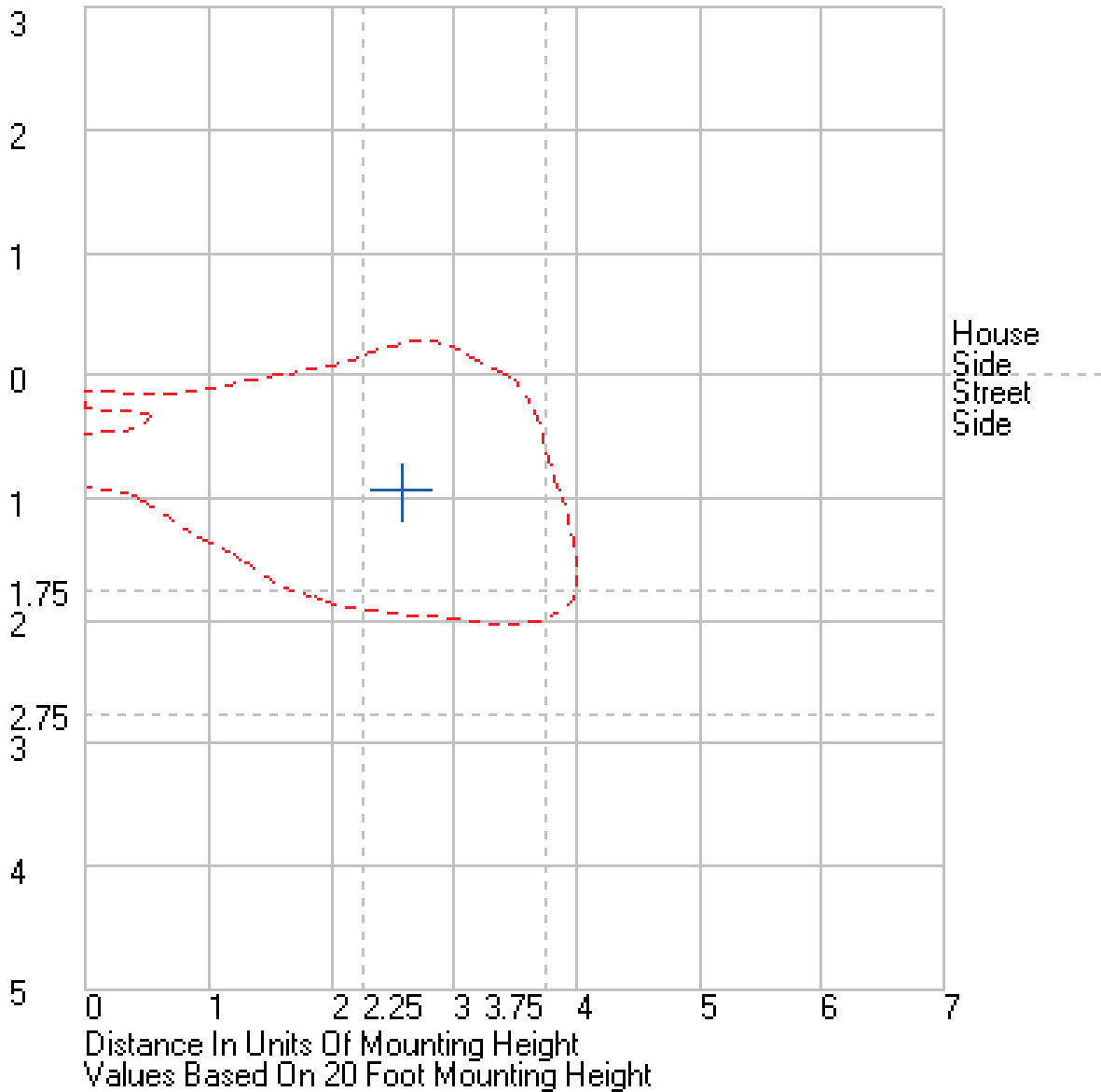
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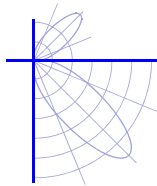
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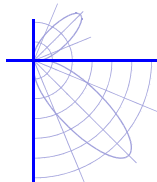
LM-79 Performance Data

Spectral	CIE 1931 (x, y) ⁽¹⁾	(0.376, 0.372)
	CIE 1976 (u', v') ⁽¹⁾	(0.225, 0.499)
	Correlated Color Temperature (CCT) ⁽¹⁾	4080 K
	Color Spatial Uniformity ⁽²⁾	0.0194
	Color Rendering Index (Ra) ⁽¹⁾	74
	Special CRI 9 (R ₉) ^{(1),(3)}	-17
	Distance from Planckian Locus (Duv) ^{(1),(3)}	-0.0012
	Scotopic/Photopic Ratio ^{(1),(3)}	1.56

Electrical	Voltage	480 V
	Frequency	60 Hz
	Current	0.235 A
	Power	107 W
	Power Factor	0.949
	Current THD	3.51 %

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer

- (1) Value is computed from the weighted average of the spatial measurements
- (2) Value is the maximum deviation of the spatial u' and v' measurements from the weighted average
- (3) Quantity is in addition to the scope of IESNA LM-79-08



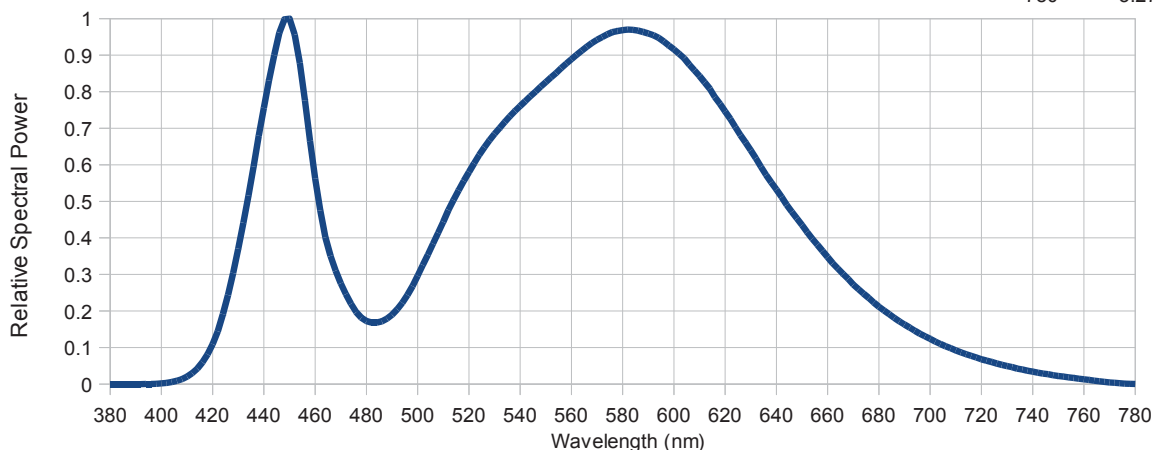
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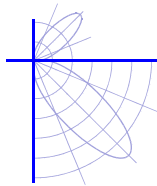
LM-79 Performance Data

Summary Relative Spectral Irradiance Distribution (wavelength – nm, irradiance – relative to peak = 1)

380	0.00E+00	480	1.72E-01	580	9.68E-01	680	2.11E-01
385	0.00E+00	485	1.70E-01	585	9.68E-01	685	1.86E-01
390	0.00E+00	490	1.90E-01	590	9.60E-01	690	1.63E-01
395	5.91E-05	495	2.33E-01	595	9.43E-01	695	1.42E-01
400	1.70E-03	500	2.97E-01	600	9.16E-01	700	1.24E-01
405	7.16E-03	505	3.69E-01	605	8.83E-01	705	1.07E-01
410	2.04E-02	510	4.44E-01	610	8.43E-01	710	9.21E-02
415	5.08E-02	515	5.17E-01	615	7.97E-01	715	7.95E-02
420	1.09E-01	520	5.80E-01	620	7.46E-01	720	6.78E-02
425	2.17E-01	525	6.37E-01	625	6.92E-01	725	5.83E-02
430	3.71E-01	530	6.85E-01	630	6.40E-01	730	4.92E-02
435	5.55E-01	535	7.25E-01	635	5.84E-01	735	4.11E-02
440	7.56E-01	540	7.61E-01	640	5.32E-01	740	3.40E-02
445	9.31E-01	545	7.94E-01	645	4.81E-01	745	2.77E-02
450	1.00E+00	550	8.27E-01	650	4.35E-01	750	2.21E-02
455	8.28E-01	555	8.58E-01	655	3.89E-01	755	1.74E-02
460	5.62E-01	560	8.89E-01	660	3.48E-01	760	1.28E-02
465	3.76E-01	565	9.17E-01	665	3.09E-01	765	8.33E-03
470	2.76E-01	570	9.42E-01	670	2.72E-01	770	4.26E-03
475	2.08E-01	575	9.60E-01	675	2.42E-01	775	1.71E-03
						780	3.27E-04



* The spectral power distribution combines the weighted spectral power distributions of all spatial measurements.



Test Report No. LLI-16163-1-R03

Greenstar Products - Pole arm mounted roadway luminaire. Product ID: XAVH08434SNXXI
 Grey painted cast aluminum housing with fins. Fixture extents ~ 25" x 10" x 4.5".
 8 LEDs mounted in 2 x 4 array on white PCB with clear plastic sheet of individual lenses.
 One Mean Well power supply. Model: HVG-100-48B
 Operating at 480 Vac and 60 Hz with dimming disconnected.

LM-79 Performance Data

Spatial measurements

Vertical angle (deg)	CIE 1976 (u',v') coordinates	
	Horizontal 0 plane	Horizontal 90 plane
0	(0.223, 0.482)	(0.222, 0.479)
10	(0.223, 0.482)	(0.223, 0.480)
20	(0.223, 0.483)	(0.223, 0.480)
30	(0.223, 0.485)	(0.224, 0.485)
40	(0.223, 0.489)	(0.224, 0.493)
50	(0.224, 0.495)	(0.225, 0.502)
60	(0.225, 0.503)	(0.225, 0.510)
70	(0.226, 0.514)	(0.225, 0.509)
80	I <= 10 %	I <= 10 %
-	-	-

Spatial measurements

Vertical angle (deg)	CIE 1976 (u',v') coordinates	
	Horizontal 0 plane	Horizontal 90 plane
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Test procedure

All measurements were performed in an environmentally controlled laboratory employing suitable baffling to minimize stray light. The sample was mounted in its normal operating orientation on a rotating mirror goniophotometer and operated from a stabilized supply. The photometric output was monitored and measurements were performed once stability was achieved.

The goniophotometer was used to measure the spatial distribution of both luminous intensity and, in conjunction with a spectroradiometer, spectral irradiance. The distribution locus comprises points in two or more planes (as indicated in the table above) at no more than 10° vertical intervals. The CIE (x,y) coordinates and other derived metrics (CIE (u', v'), CCT and CRI) are calculated from the weighted sum (weighted for intensity and represented solid angle) of the measured spectral irradiances.

Sample Orientation	Horizontal	Stabilization Time	3.25 hour
		Total Operation Time	8.00 hour

Equipment and uncertainties

LightLab International R80A C-gamma rotating mirror goniophotometer with a test distance of 8 m.

Luminous Intensity	± 4 %	Temperature	± 1 °C
Luminous Flux	± 4 %	Luminous Efficacy	± 4.5 %
Horizontal, Vertical Angles	± 0.25°		

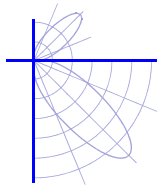
PhotoResearch PR-670 spectroradiometer (380 - 780 nm., 2 nm. per pixel) measuring at a distance from the sample deemed greater than five times the maximum observed luminous opening dimension.

CIE (x, y) coordinates	± 0.003	CCT	± 100 K
CIE (u', v') coordinates	± 0.002	CRI (Ra)	± 2
Δ (u', v') Color difference	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Relative Spectral Irradiance *	± 2 %	R9 *	± 2

Yokogawa WT210 power meter connected in circuit to the sample electrical supply

Voltage	± 0.5 %	Frequency *	± 0.1 Hz
Current	± 0.5 %	Power	± 0.5 %
Current THD *	± 3 %	Power Factor	± 0.02

This report contains data that are not covered by the NVLAP accreditation. Quantities marked with * are not covered.
 IESNA LM-79-08 Calculator v5 (17th Apr 2015)



Test Report No. LLI-16163-1-R03

Greenstar Products - Pole arm mounted roadway luminaire. Product ID: XAVH08434SNXXI
Grey painted cast aluminum housing with fins. Fixture extents ~ 25" x 10" x 4.5".
8 LEDs mounted in 2 x 4 array on white PCB with clear plastic sheet of individual lenses.
One Mean Well power supply. Model: HVG-100-48B
Operating at 480 Vac and 60 Hz with dimming disconnected.

Test Distance 8.0 m
Test Temperature 24.8 °C

Notes The laboratory has not participated in the selection of samples to be tested. All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

Tested in accordance with the applicable sections of publications: IES LM-79-08 (Sec. 12), IES LM-16-93, IES LM-58-13, CIE 13.3:1995, CIE 15:2004, ANSI C78.377:2011, ANSI C82.77:2002.

The luminous intensity values, and other derived quantities, contained in this report are based on the absolute data, as measured.

Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

This report is free of erasures and corrections.

Photometric intensity values are reported using the IESNA Type C coordinate system (L, V) as defined in IESNA publication LM-75.

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