

## Report of Test

**LLIA002687-001A**

### Indoor Distribution Photometry Test Report

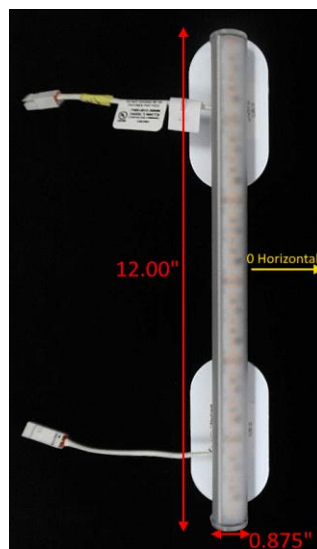
Catalog Number: FWD-I012-3000K 3W

Surface mounted, extruded aluminum housing, lightly frosted plastic lens.

One system with 1392 LEDs was tested to create a fully loaded condition.

Optical measurements were performed only on a 12" luminaire containing 48 white LEDs

One ERP VZM100W-24 LED power supply



Prepared For:

Light Engine Technologies

200 Wilson Street

Unit A1

Port Jefferson Station, NY 11776, USA

#### Performance Summary

Input System Voltage	120.0 Vac	12" Section Luminous Flux	291.6 Lumens
Input System Current	0.5613 A	12" Section Efficacy**†	126.9 lm/W
Input System Power	66.62 W	Downward Flux	26.3 Lumens
12" Section System Power**†	2.297 W	Downward Flux	9.0 % of Total
System Frequency	60.00 Hz		
System Power Factor	0.989		
System Current THD	11.5 %		

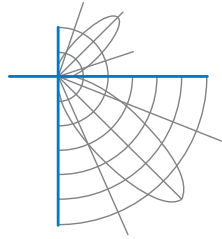
\*\*12" Section System Power and Efficacy is calculated using the fraction (48/1392) of measured full-system input power

This test report was issued by LightLab International Allentown, LLC without alterations or erasures.

Test date: 06/17/2025

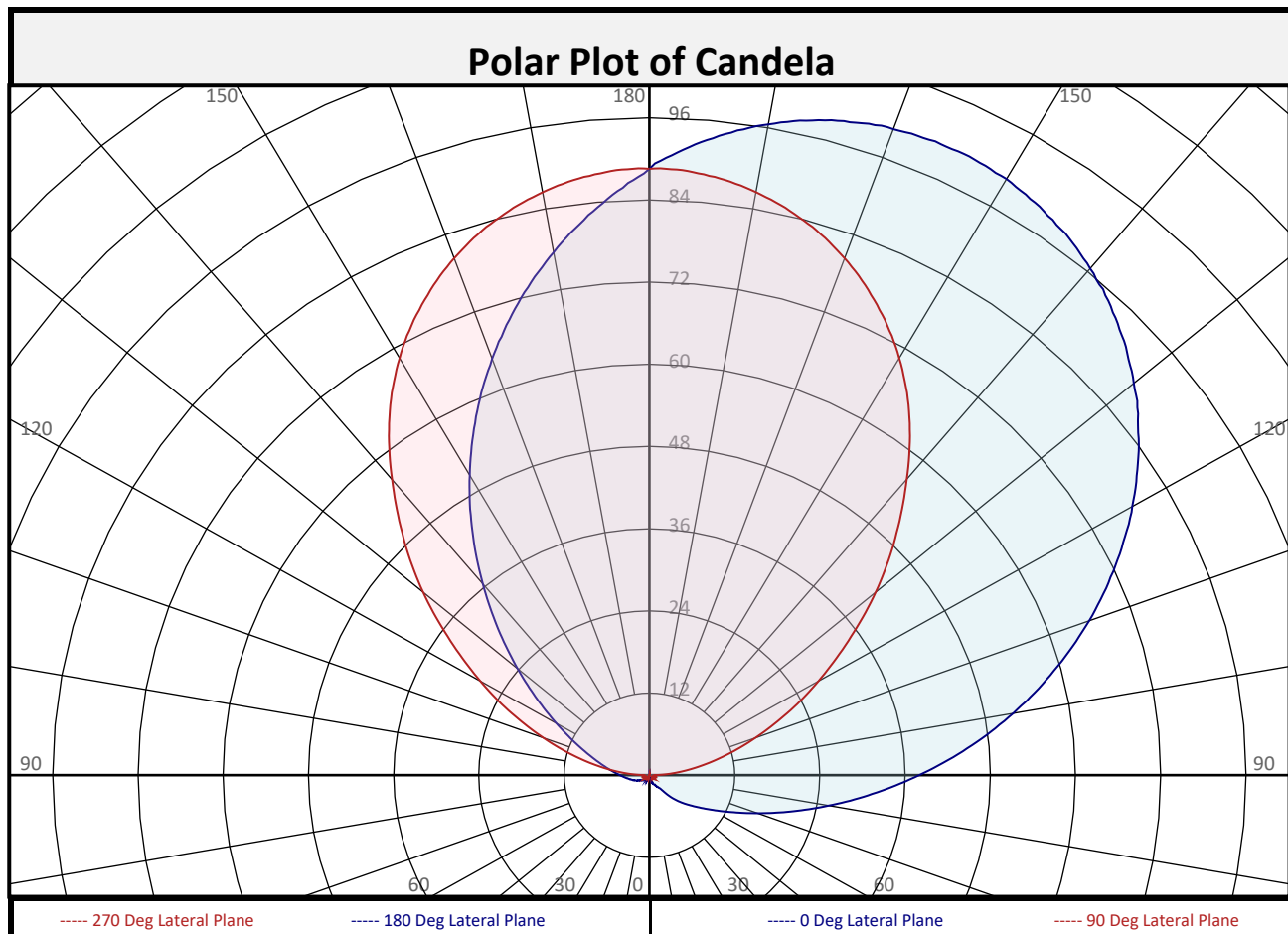
Report date: 06/19/2025

Signed: \_\_\_\_\_

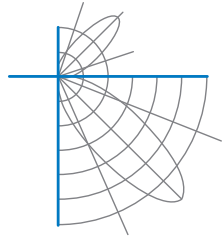


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### LLIA002687-001A



Zonal Flux Summary										
Zone (Deg Vert)	Flux (Lumens)	Percent of Total		Zone (Deg Vert)	Flux (Lumens)	Percent of Total		Zone (Deg Vert)	Flux (Lumens)	Percent of Total
0-10	0.0	0.0%		90-100	16.7	5.7%		0-20	0.1	0.0%
10-20	0.1	0.0%		100-110	24.2	8.3%		0-30	0.5	0.2%
20-30	0.4	0.1%		110-120	32.1	11.0%		0-40	1.2	0.4%
30-40	0.7	0.2%		120-130	39.0	13.4%		0-60	4.8	1.7%
40-50	1.3	0.4%		130-140	43.1	14.8%		0-80	15.5	5.3%
50-60	2.4	0.8%		140-150	42.3	14.5%		10-90	26.3	9.0%
60-70	4.0	1.4%		150-160	35.7	12.2%		20-50	2.3	0.8%
70-80	6.7	2.3%		160-170	23.8	8.2%		40-90	25.1	8.6%
80-90	10.8	3.7%		170-180	8.4	2.9%		60-90	21.5	7.4%
0-90	26.3	9.0%		90-180	265.3	91.0%		0-180	291.6	100.0%



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Luminous Intensity (Candela) Table

Lateral (C-Plane) Angles										
	0	22.5	45	67.5	90	112.5	135	157.5	180	
Vertical (Gamma) Angles - Data was acquired in 0.5° increments, 2.5° increments shown.	0	0	0	0	0	0	0	0	0	0
	2.5	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0
	7.5	0	0	0	0	0	0	0	0	0
	10	0	0	0	0	0	0	0	0	0
	12.5	1	1	0	0	0	0	0	0	0
	15	1	1	1	0	0	0	0	0	0
	17.5	1	1	1	0	0	0	0	0	0
	20	1	1	1	1	0	0	0	0	0
	22.5	1	1	1	1	0	0	0	0	0
	25	1	1	1	1	0	0	1	0	0
	27.5	2	2	1	1	0	1	1	1	1
	30	2	2	1	1	1	1	1	1	1
	32.5	2	2	1	1	1	1	1	1	1
	35	2	2	2	1	1	1	1	1	1
	37.5	2	2	2	1	1	1	1	1	1
	40	3	2	2	1	1	1	1	1	1
	42.5	4	3	2	1	1	1	1	1	1
	45	5	4	2	1	1	1	1	1	1
	47.5	6	5	2	1	1	1	1	1	1
	50	6	6	3	1	1	1	1	1	1
	52.5	7	6	4	1	1	1	1	1	1
	55	8	7	4	1	1	1	1	1	1
	57.5	9	8	5	1	1	1	1	1	1
	60	10	9	6	1	1	1	1	1	2
	62.5	11	10	6	2	1	1	1	2	2
	65	13	11	7	2	1	1	1	2	2
	67.5	14	13	8	2	1	1	1	2	2
	70	16	14	9	3	1	1	1	2	2
	72.5	18	16	10	3	1	1	1	2	2
	75	21	18	11	4	1	1	2	2	3
	77.5	23	20	13	4	1	1	2	3	3
	80	26	23	14	5	1	1	2	3	3
	82.5	29	25	16	6	1	1	2	3	3
	85	31	28	18	7	1	1	3	3	4
	87.5	35	31	20	8	1	2	3	4	4
	90	38	34	22	10	1	2	3	4	4

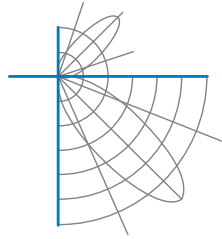
16 lateral half-planes of data were acquired, 22.5 degree increments shown.

**North America (issuing laboratory)**

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**LLIA002687-001A**

Luminous Intensity (Candela) Table

Lateral (C-Plane) Angles										
	0	22.5	45	67.5	90	112.5	135	157.5	180	
Vertical (Gamma) Angles - Data was acquired in 0.5° increments shown.	90	38	34	22	10	1	2	3	4	4
	92.5	41	37	25	11	2	2	4	4	5
	95	45	40	27	13	4	3	4	5	5
	97.5	48	44	30	15	5	4	5	6	6
	100	52	47	33	17	7	5	6	6	6
	102.5	56	50	36	20	9	6	7	7	7
	105	59	54	39	22	11	8	8	8	7
	107.5	62	57	42	25	13	9	9	9	8
	110	66	60	46	28	16	11	11	10	9
	112.5	69	64	49	31	19	13	12	11	10
	115	72	67	52	34	21	16	14	13	12
	117.5	76	70	55	37	24	18	16	14	13
	120	79	73	59	41	27	21	18	16	15
	122.5	81	76	62	45	31	24	20	18	17
	125	84	79	66	48	34	27	23	20	19
	127.5	87	82	69	52	38	30	26	23	22
	130	89	84	72	55	42	33	29	26	24
	132.5	91	87	75	59	45	37	32	28	27
	135	93	89	78	62	49	40	35	31	30
	137.5	95	91	81	66	53	44	38	35	33
	140	97	93	83	69	56	47	42	38	36
	142.5	98	94	85	72	60	51	45	41	40
	145	99	95	87	75	64	55	49	45	43
	147.5	100	97	89	78	67	58	52	48	47
	150	101	97	90	80	70	62	56	52	51
	152.5	101	98	91	83	73	65	59	56	54
	155	101	98	92	84	76	68	63	59	58
	157.5	101	98	93	86	78	71	66	63	61
	160	100	98	94	87	80	74	69	66	65
	162.5	100	98	94	88	82	76	72	69	68
	165	99	97	94	89	84	79	75	72	71
	167.5	98	97	94	90	85	81	78	75	75
	170	97	95	93	90	86	83	80	78	78
	172.5	95	94	92	90	87	85	83	81	80
	175	93	92	91	90	88	86	85	84	83
	177.5	91	91	90	89	89	87	87	86	86
	180	89	89	89	89	89	89	89	89	89

16 lateral half-planes of data were acquired, 22.5 degree increments shown.

**North America (issuing laboratory)**

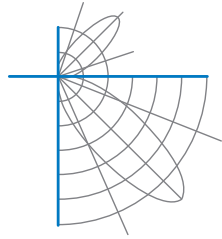
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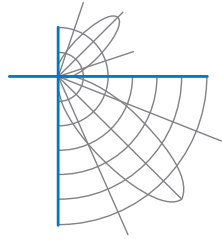
### LLIA002687-001A

#### Coefficients of Utilization/Room Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80					70					50				30				10			0
RW	70	50	30	10		70	50	30	10		50	30	10		50	30	10		50	30	10	0
RCR																						
0	97	97	97	97		85	85	85	85		61	61	61		39	39	39		18	18	18	9
1	87	82	78	74		75	71	67	64		50	48	46		31	30	28		14	13	12	4
2	79	71	65	59		68	61	56	52		43	40	37		27	25	23		11	10	9	2
3	71	62	55	49		61	53	47	42		38	34	30		23	21	19		10	8	7	2
4	65	54	47	41		56	47	40	35		33	29	25		20	18	16		8	7	6	1
5	59	48	40	34		51	42	35	30		29	25	21		18	15	13		7	6	5	1
6	54	43	35	29		47	37	30	26		26	22	18		16	13	11		7	5	4	1
7	50	38	31	25		43	33	27	22		23	19	16		14	12	10		6	5	4	0
8	46	34	27	22		40	30	24	19		21	17	14		13	10	8		5	4	3	0
9	43	31	24	19		37	27	21	17		19	15	12		12	9	7		5	4	3	0
10	40	28	21	17		34	25	19	15		18	13	11		11	8	6		5	3	2	0

For absolute test reports, RUs are expressed as a percentage of total lumen output. For relative test reports, CUs are expressed as a percentage of total lamp output. Calculations were based on published IES procedures, and are based on the zonal cavity method. Basic assumptions: 1) Room surfaces are lambertian reflectors. 2) Incident flux on each surface is uniformly distributed. 3) The room is spectrally neutral. When luminaires are not evenly distributed throughout the room, or do not exhibit lateral symmetry, CU values may differ from actual performance.



## Report of Test

### LLIA002687-001A

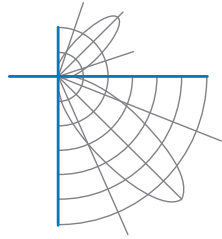
#### UGR Table - Corrected

##### Reflectances

Ceiling Cavity	70	70	50	50	30	70	70	50	50	30
Walls	50	30	50	30	30	50	30	50	30	30
Floor Cavity	20	20	20	20	20	20	20	20	20	20

Room Size		UGR Viewed Crosswise					UGR Viewed Endwise				
X=2H	Y=2H	5.4	6.0	6.6	7.2	9.0	0.0	0.0	0.0	0.0	0.0
	3H	11.7	12.2	12.9	13.4	15.2	0.0	0.0	0.0	0.0	0.0
	4H	15.0	15.6	16.3	16.8	18.5	0.0	0.0	0.0	0.0	0.0
	6H	18.5	19.0	19.8	20.3	22.0	0.0	0.0	0.0	0.0	0.4
	8H	20.4	20.9	21.6	22.1	23.9	0.0	0.0	0.0	0.0	1.0
	12H	22.3	22.8	23.6	24.0	25.8	0.0	0.0	0.0	0.0	1.7
4H	2H	5.8	6.3	7.0	7.5	9.3	0.0	0.0	0.0	0.0	1.4
	3H	12.3	12.8	13.6	14.0	15.8	0.4	0.9	1.7	2.1	3.9
	4H	15.9	16.3	17.1	17.5	19.3	1.4	1.8	2.7	3.1	4.9
	6H	19.6	20.0	20.8	21.2	23.0	2.5	2.9	3.7	4.1	5.9
	8H	21.5	21.9	22.8	23.1	24.9	3.0	3.4	4.3	4.6	6.4
	12H	23.6	23.9	24.8	25.1	26.9	3.5	3.8	4.8	5.1	6.9
8H	4H	16.1	16.4	17.4	17.7	19.5	6.6	6.9	7.8	8.2	10.0
	6H	20.0	20.3	21.3	21.6	23.4	7.8	8.1	9.1	9.4	11.2
	8H	22.2	22.4	23.4	23.7	25.5	8.4	8.6	9.6	9.9	11.7
	12H	24.4	24.6	25.7	25.9	27.7	8.8	9.0	10.1	10.3	12.1
12H	4H	16.1	16.4	17.3	17.6	19.4	8.3	8.6	9.6	9.9	11.7
	6H	20.1	20.3	21.3	21.6	23.4	9.9	10.2	11.2	11.4	13.2
	8H	22.2	22.5	23.5	23.7	25.6	10.6	10.9	11.9	12.1	13.9

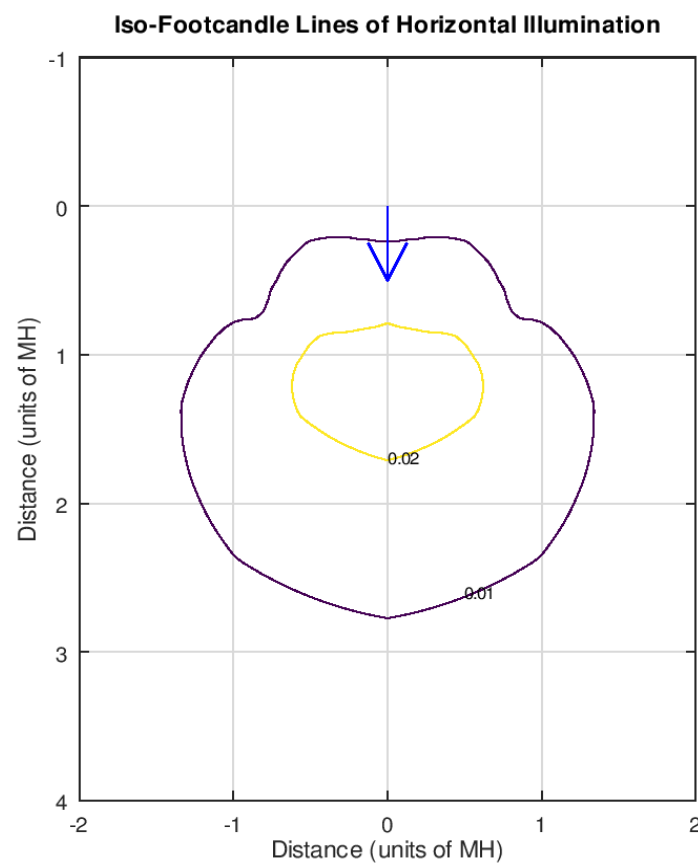
Maximum UGR = 27.7



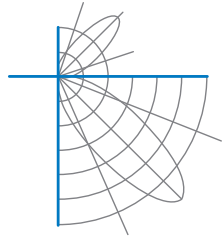
## Report of Test

### LLIA002687-001A

#### Iso-Illuminance Plot

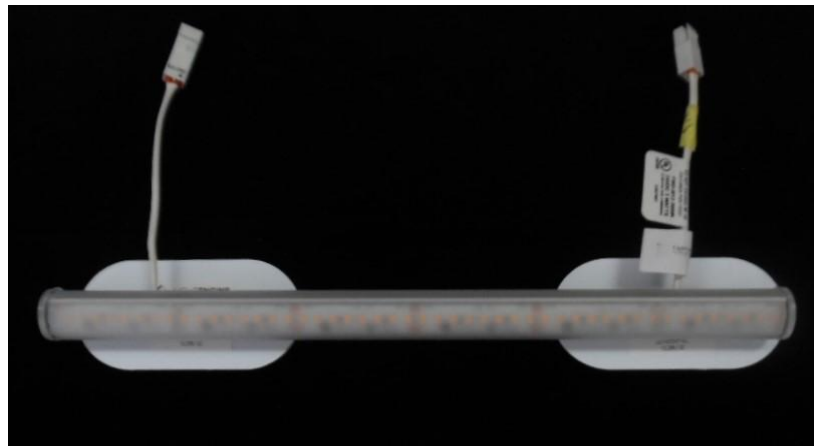


The isofootcandle values shown in the plot above are based on a mounting height of  $h = 8.0$  feet. Grid values show multiples of mounting height. The isoilluminance contour lines are expressed in units of footcandles. The values expressed are based on the direct light from a single unit without the contribution of room reflections.

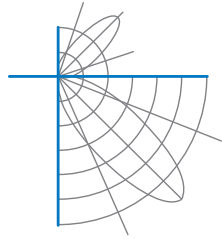


## Report of Test LLIA002687-001A

### Additional Pictures of Test Subject







## Report of Test

### LLIA002687-001A

Test Distance                      9.5 m  
Ambient Temperature            25.2 °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 IES LM-79-24. Format of reports and angular increments based on IES LM-41-20 and LM-46-20.

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

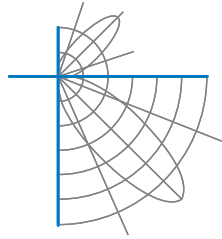
Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

This report is free of erasures and corrections.

Photometric intensity values are reported using the CIE C-Gamma coordinate system as defined in CIE publication number 121.

This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with ‡ are not covered.

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.



## Report of Test

**LLIA002687-001B**

Integrating Sphere Report

Catalog Number: FWD-I012-3000K 3W

Surface mounted, extruded aluminum housing, lightly frosted plastic lens.

One system with 1392 LEDs was tested to create a fully loaded condition.

Optical measurements were performed only on a 12" luminaire containing 48 white LEDs

One ERP VZM100W-24 LED power supply



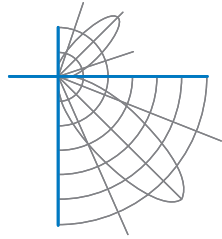
### Performance Summary

System Voltage	120.0 Vac
System Current	0.5566 A
System Power	66.06 W
12" Section System Power**‡	2.278 W
System Frequency	59.99 Hz
System Power Factor	0.989
System Current THD	11.5 %
12" Section Luminous Flux	294.6 lm
12" Section System Efficacy**‡	129.3 lm/W
Chromaticity (x,y)	(0.4322, 0.4016)
(u',v')	(0.2486, 0.5197)
Duv	-0.0003
CCT	3061 K
CRI (Ra)	98
R9	96
TM-30: Rf	93
TM-30: Rg	99
TM-30: Rcs,h1	-1

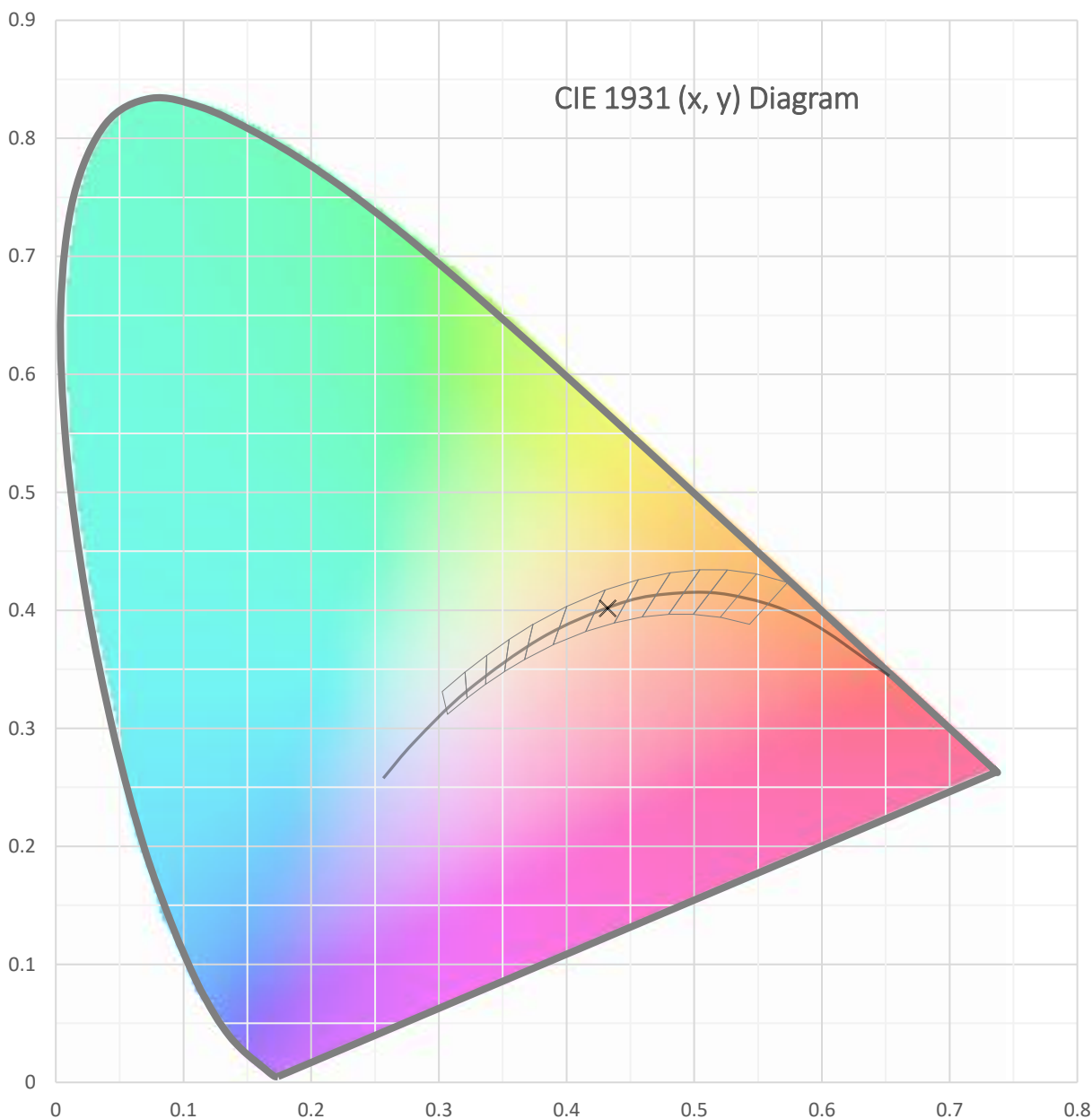
Prepared For:  
Light Engine Technologies  
200 Wilson Street  
Unit A1  
Port Jefferson Station, NY 11776, USA

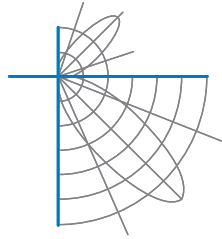
\*\*12" Section System Power and Efficacy is calculated using the fraction (48/1392) of measured full-system input power

Test date: 06/12/2025  
Report date: 06/18/2025

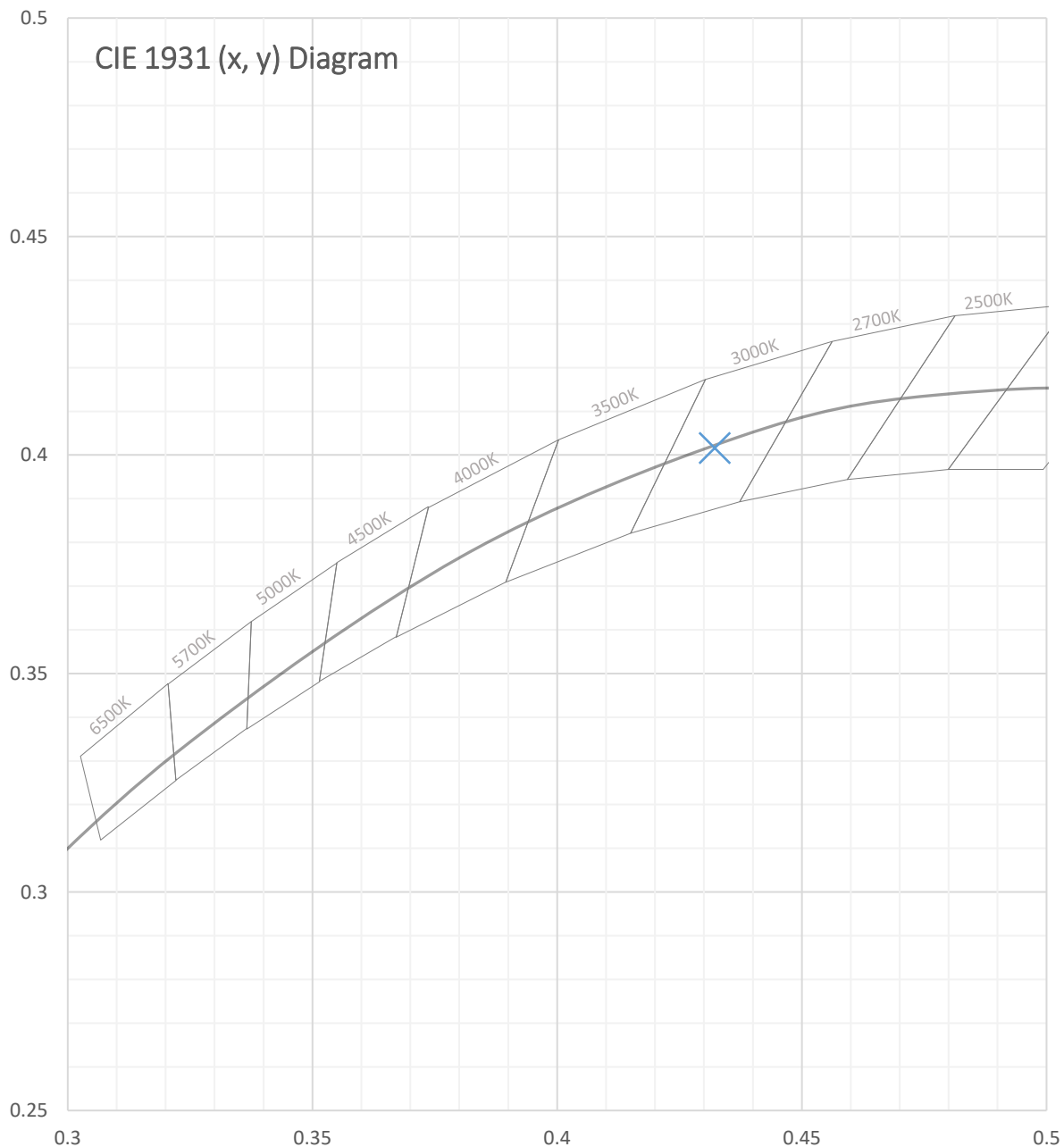


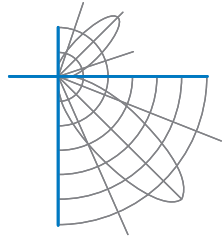
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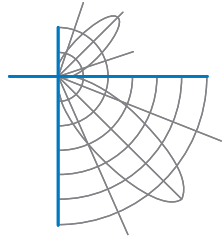


Test Report Number: LLIA002687-001B

Total Radiant Flux	1.110 W
Total Luminous Flux	294.6 Lm
Chromaticity CIE 1931 (x, y)	(0.4322, 0.4016)
Chromaticity CIE 1976 (u', v')	(0.2486, 0.5197)
Correlated Color Temperature (CCT)	3061 K
Color Rendering Index (Ra)	98
R1	98
R2	99
R3	98
R4	99
R5	98
R6	97
R7	97
R8	97
R9	96
R10	99
R11	98
R12	83
R13	98
R14	98
TM-30: Rf	93
TM-30: Rg	99
TM-30: Rcs,h1	-1
Distance from Planckian Locus (Duv)	-0.0003
Scotopic/Photopic Ratio $\frac{V_{sc}}{V_{ph}}$	1.511

**Electrical Data**

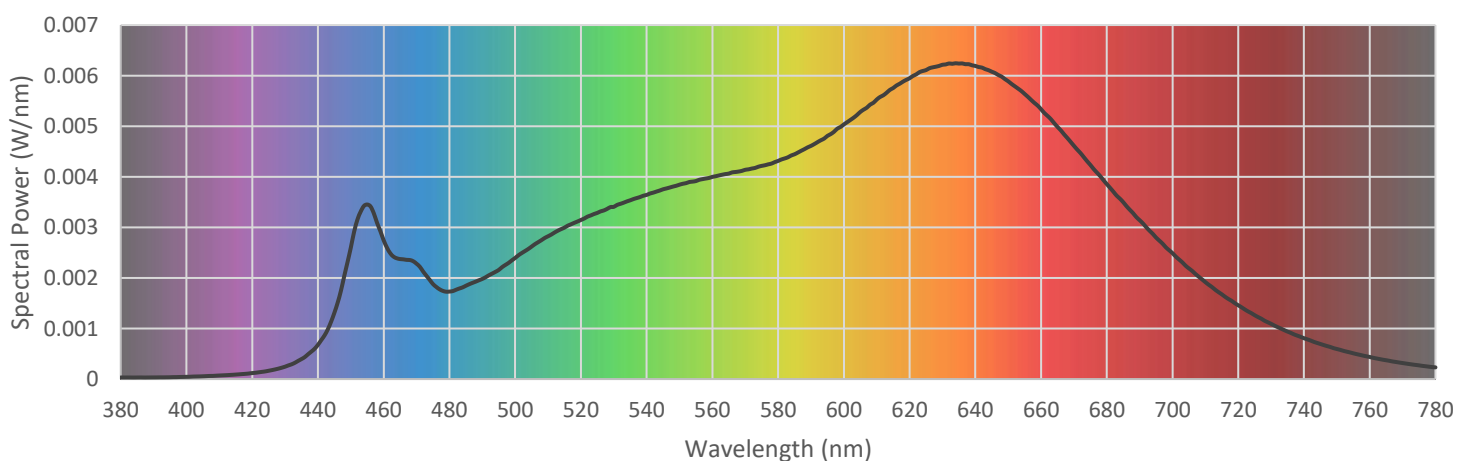
Voltage	120.0 Vac
Current	0.5566 A
Power	66.06 W
Frequency	59.99 Hz
Power Factor	0.989
Current THD	11.5 %

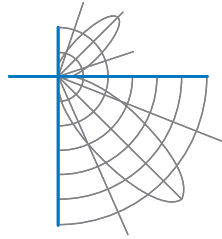


Test Report Number: LLIA002687-001B

Summary Spectral Power Distribution (wavelength - nm, spectral power - W/nm)

380	0.000032	480	0.001730	580	0.004313	680	0.003855
385	0.000031	485	0.001845	585	0.004445	685	0.003498
390	0.000032	490	0.001980	590	0.004611	690	0.003142
395	0.000036	495	0.002158	595	0.004808	695	0.002798
400	0.000044	500	0.002395	600	0.005034	700	0.002489
405	0.000055	505	0.002619	605	0.005282	705	0.002187
410	0.000070	510	0.002824	610	0.005527	710	0.001917
415	0.000089	515	0.002995	615	0.005754	715	0.001675
420	0.000119	520	0.003146	620	0.005948	720	0.001459
425	0.000164	525	0.003286	625	0.006110	725	0.001263
430	0.000245	530	0.003406	630	0.006215	730	0.001092
435	0.000396	535	0.003535	635	0.006238	735	0.000939
440	0.000678	540	0.003641	640	0.006192	740	0.000808
445	0.001312	545	0.003752	645	0.006078	745	0.000694
450	0.002599	550	0.003844	650	0.005889	750	0.000595
455	0.003451	555	0.003916	655	0.005638	755	0.000509
460	0.002742	560	0.003998	660	0.005335	760	0.000437
465	0.002373	565	0.004063	665	0.004986	765	0.000372
470	0.002281	570	0.004138	670	0.004613	770	0.000317
475	0.001878	575	0.004216	675	0.004235	775	0.000271
						780	0.000231





Test Report Number: LLIA002687-001B

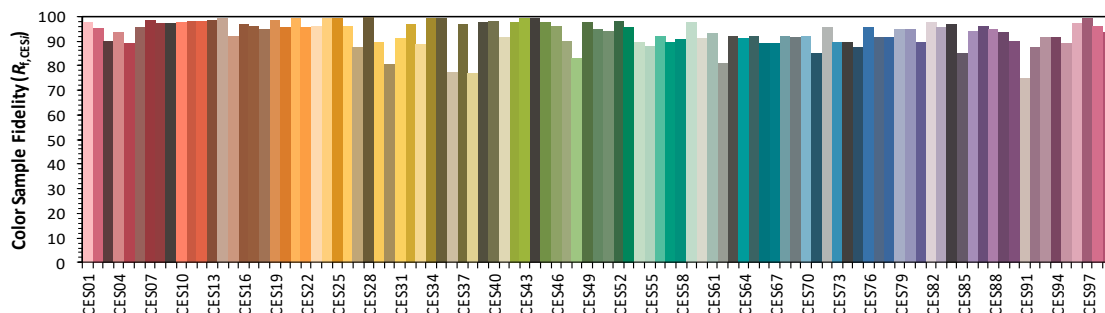
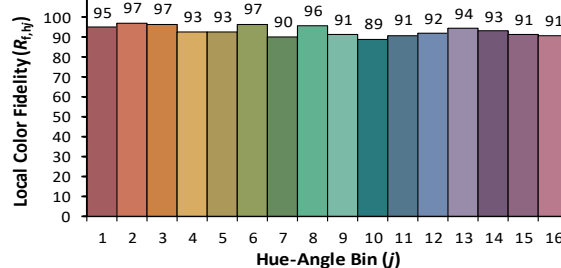
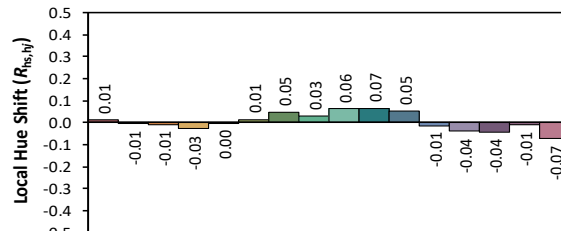
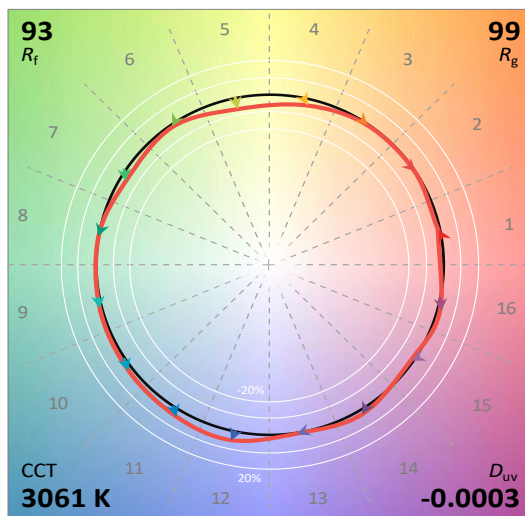
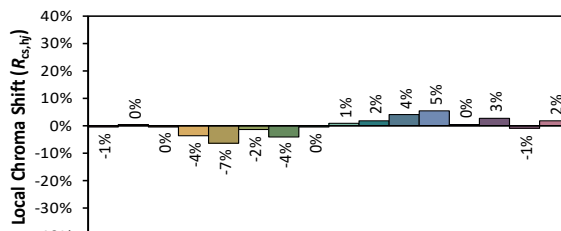
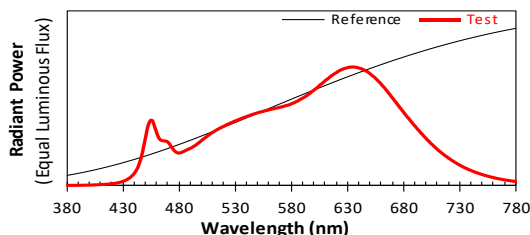
### IES TM-30 Details

Source: LLIA002687-001B

Manufacturer: Light Engine Technologies

Date: 6/18/2025

Model: FWD-I012-3000K 3W

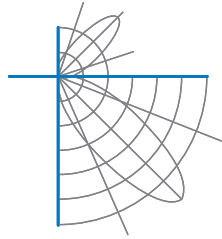


Notes:

x 0.4322  
y 0.4016  
u' 0.2486  
v' 0.5197

CIE 13.3-1995  
(CRI)

R<sub>a</sub> 98  
R<sub>g</sub> 96



## Test Report Number: LLIA002687-001B

Test Equipment Configuration:	LightLab International Allentown 2m Integrating Sphere Measurements acquired using a Labsphere CDS 2600 spectroradiometer Testing was performed using 4 $\pi$ geometry
Test Temperature:	24.4 °C
Test Procedure:	Tested in accordance with the applicable sections of: LM-79-24, LM-78-20, LM-58-20, ANSI_ANSLG C78.377-2024, TM-30-24
Significance:	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.
Notes:	<p>The measurements and other derived quantities contained in this report are based on the absolute data as measured.</p> <p>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.</p> <p>This report is free of erasures and corrections</p> <p>This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with ‡ are not covered.</p> <p>This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.</p>

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