

# Report of Test LLI-19091-3

Optolum - Linear luminaire. Product ID: OLM-010VH-H-012435--014800

Extruded aluminum housing with clear plastic flat lens.

48 LEDs mounted in single row with individual prismatic clear plastic focusing lenses.

Two Harvard Technology LED drivers. Model: CLS50-1400A-UNI-B-I/F

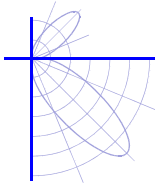
Operating at 277v AC an 60 Hz,



### Performance Summary

Total Light Output	4894 lm	Min Power Factor	0.86 @ 277 V
Luminaire Power	70.6 W	Max THD(i)*	13.0 % @ 277 V
Luminous Efficacy	69.3 lm/W		
CCT	3390 K		
CIE(x,y) 1931	(0.407, 0.381)		
CRI	95		

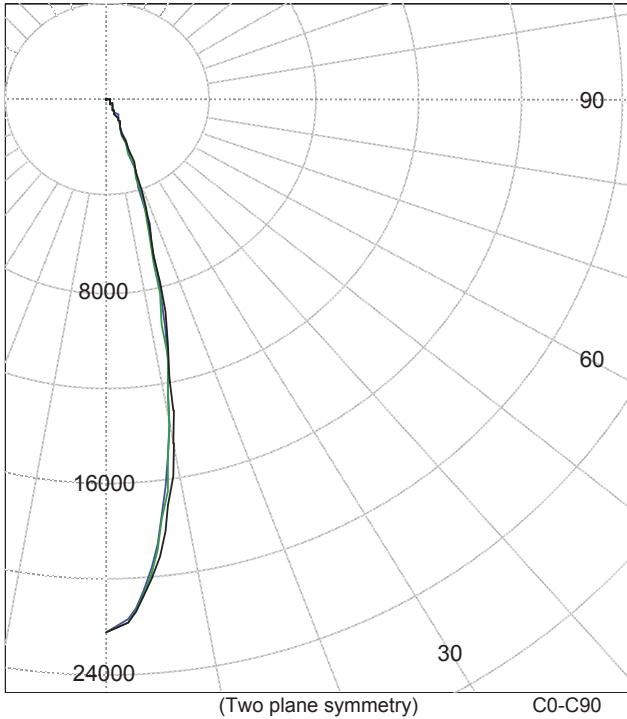
PREPARED FOR : Optolum, Tempe, AZ 85281



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Legend: C0-Black, C45-Green, C90-Blue (cd)



**INTENSITY SUMMARY (cd)**

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	22259	22259	22259	22259	22259	
5.0	20037	19975	19831	19714	19674	1702
10.0	14576	14335	13789	13609	13743	
15.0	7906	7698	7105	7057	7440	2032
20.0	3255	3221	2857	2857	3181	
25.0	1249	1225	1080	1077	1220	595
30.0	561	546	493	483	529	
35.0	335	326	306	298	308	205
40.0	246	239	230	224	226	
45.0	196	190	185	181	180	145
50.0	159	154	151	147	146	
55.0	127	123	122	117	116	108
60.0	99	96	95	91	90	
65.0	74	71	71	68	67	70
70.0	51	49	49	47	46	
75.0	30	29	29	28	27	31
80.0	13	13	13	13	12	
85.0	4	4	4	4	3	5
90.0	0	0	0	0	0	

**ZONAL FLUX AND PERCENTAGES**

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	4330	N / A	88.5
0-40	4535	N / A	92.7
0-60	4788	N / A	97.8
0-90	4894	N / A	100.0
40-90	359	N / A	7.3
60-90	106	N / A	2.2
90-180	0	N / A	0.0
0-180	4894	N / A	100.0

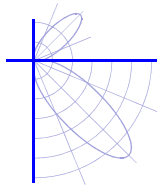
Total Light Output = 4,894 lm

Signed:

*Ryder Tunney*  
Ryder Tunney  
Authorized Signatory

Date of test 5-Apr-2019  
Date of report 8-Apr-2019

*RT*



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Extruded aluminum housing with clear plastic flat lens.

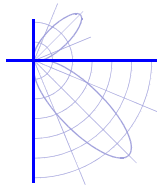
48 LEDs mounted in single row with individual prismatic clear plastic focusing lenses.

Two Harvard Technology LED drivers. Model: CLS50-1400A-UNI-B-I/F

Operating at 277v AC an 60 Hz,

**Intensity data (cd)**

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	22259	22259	22259	22259	22259
2.5	21651	21655	21631	21572	21526
5.0	20037	19975	19831	19714	19674
7.5	17652	17477	17103	16927	16942
10.0	14576	14335	13789	13609	13743
12.5	11146	10893	10280	10165	10451
15.0	7906	7698	7105	7057	7440
17.5	5205	5093	4595	4588	4986
20.0	3255	3221	2857	2857	3181
22.5	2002	1989	1749	1743	1969
25.0	1249	1225	1080	1077	1220
27.5	812	789	701	693	781
30.0	561	546	493	483	529
32.5	417	407	376	366	389
35.0	335	326	306	298	308
37.5	283	275	261	255	259
40.0	246	239	230	224	226
42.5	219	212	205	201	201
45.0	196	190	185	181	180
47.5	177	171	167	163	162
50.0	159	154	151	147	146
52.5	142	138	136	132	130
55.0	127	123	122	117	116
57.5	113	109	108	104	103
60.0	99	96	95	91	90
62.5	86	83	82	79	78
65.0	74	71	71	68	67
67.5	62	60	59	57	56
70.0	51	49	49	47	46
72.5	40	39	39	37	36
75.0	30	29	29	28	27
77.5	21	20	20	20	19
80.0	13	13	13	13	12
82.5	8	7	8	8	7
85.0	4	4	4	4	3
87.5	2	2	2	1	1
90.0	0	0	0	0	0



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Operating at 277v AC an 60 Hz,

**LM-79 Performance Data**

<b>Spectral</b>	CIE 1931 (x, y) <sup>(1)</sup>	(0.407, 0.381)
	CIE 1976 (u', v') <sup>(1)</sup>	(0.241, 0.507)
	Correlated Color Temperature (CCT) <sup>(1)</sup>	3390 K
	Spatial Δ (u', v') Uniformity <sup>(2)</sup>	1.90E-03
	Color Rendering Index (Ra) <sup>(1)</sup>	95.0
	Special CRI 9 (R <sub>9</sub> ) <sup>(1),(3)</sup>	76.8
	Distance from Planckian Locus (Duv) <sup>(1),(3)</sup>	-4.67E-03
	Scotopic/Photopic Ratio <sup>(1),(3)</sup>	1.62

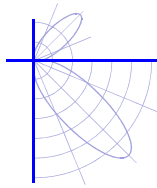
<b>Electrical</b>	Voltage	277.0 V	(Setpoint 1)
	Frequency	60.0 Hz	
	Current	0.296 A	
	Power	70.6 W	
	Power Factor	0.86	
	Current THD	13 %	
	Voltage	120.0 V	(Setpoint 2)
	Frequency	60.0 Hz	
	Current	0.616 A	
	Power	72.0 W	
	Power Factor	0.97	
	Current THD	2.2 %	

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer  
Photometric and spectral values were measured at Setpoint 1

(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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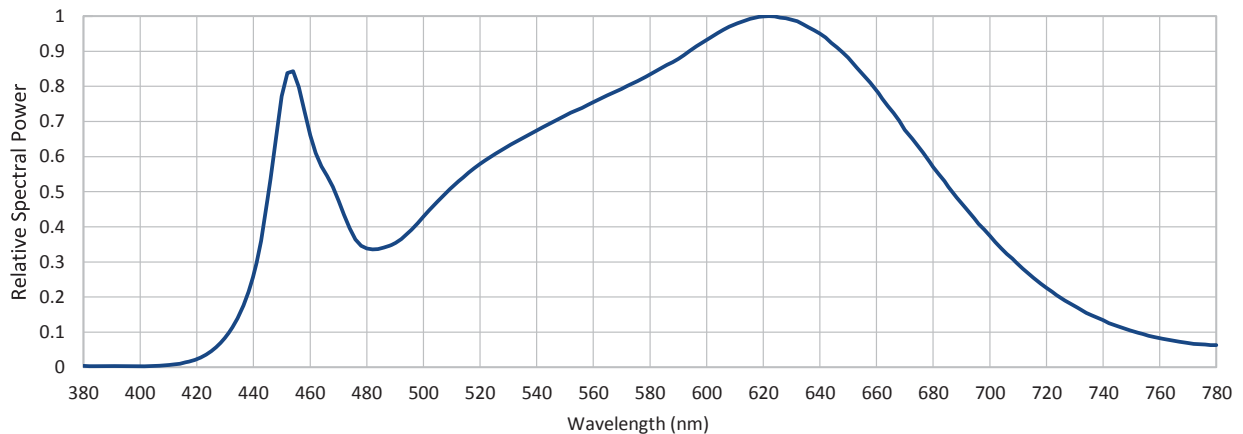
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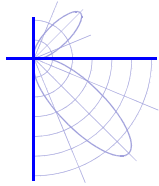
**LM-79 Performance Data**

**Relative spectral power distribution**

(Relative to peak = 1, weighted average of spatial measurements)

$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power
380	0.004	460	0.661	540	0.675	620	0.999	700	0.374
385	0.003	465	0.558	545	0.695	625	0.998	705	0.331
390	0.003	470	0.475	550	0.716	630	0.990	710	0.293
395	0.003	475	0.380	555	0.736	635	0.972	715	0.258
400	0.003	480	0.338	560	0.755	640	0.950	720	0.226
405	0.004	485	0.339	565	0.774	645	0.918	725	0.198
410	0.006	490	0.354	570	0.793	650	0.882	730	0.174
415	0.012	495	0.385	575	0.813	655	0.836	735	0.151
420	0.023	500	0.429	580	0.834	660	0.788	740	0.134
425	0.046	505	0.472	585	0.856	665	0.734	745	0.118
430	0.085	510	0.512	590	0.878	670	0.676	750	0.104
435	0.151	515	0.547	595	0.906	675	0.627	755	0.093
440	0.262	520	0.579	600	0.933	680	0.571	760	0.083
445	0.480	525	0.606	605	0.957	685	0.519	765	0.075
450	0.772	530	0.630	610	0.977	690	0.467	770	0.069
455	0.820	535	0.653	615	0.991	695	0.419	775	0.065
								780	0.063





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Operating at 277v AC an 60 Hz,

**LM-79 Performance Data**

**Spatial measurements**

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0.0° plane	Horiz. ° plane
0.0	(0.242, 0.508)	(0.241, 0.508)
2.0	(0.242, 0.508)	(0.241, 0.508)
4.0	(0.242, 0.508)	(0.241, 0.508)
6.0	(0.242, 0.508)	(0.241, 0.508)
8.0	(0.242, 0.508)	(0.241, 0.507)
10.0	(0.241, 0.508)	(0.240, 0.507)
12.0	(0.241, 0.508)	(0.240, 0.507)
14.0	(0.241, 0.507)	(0.240, 0.507)
16.0	(0.241, 0.507)	(0.240, 0.506)
18.0	(0.241, 0.507)	(0.240, 0.506)

**Spatial measurements**

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0.0° plane	Horiz. ° plane
18.0	(0.241, 0.507)	(0.240, 0.506)
20.0	(0.241, 0.507)	(0.239, 0.506)
22.0	I <= 10% peak	(0.239, 0.506)
24.0	I <= 10% peak	I <= 10% peak
26.0	I <= 10% peak	I <= 10% peak
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

**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 & total operation time 1.0 / 1.75 hours

**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 %
Horiz., Vert. Angles	± 0.25°		

PhotoResearch PR-670 spectroradiometer (grating with 380 - 780 nm range, 2 nm / pixel, 5 nm bandwidth, incandescent/halogen calibration source). Measured at a distance from the sample deemed >5 times the maximum observed luminous opening dimension.

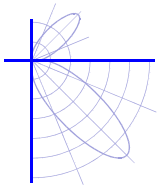
CIE (x, y) coordinates	± 0.003	CCT	± 100 K
CIE (u', v') coordinates	± 0.002	CRI (Ra)	± 2
Spatial Δ (u', v') uniformity	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Rel. Spectral Irradiance *	± 2 %	R9 *	± 2
Duv *	± 5E-04		

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.

Calculator / report version 1.0.10 / 5.9 (14th Dec 2017)



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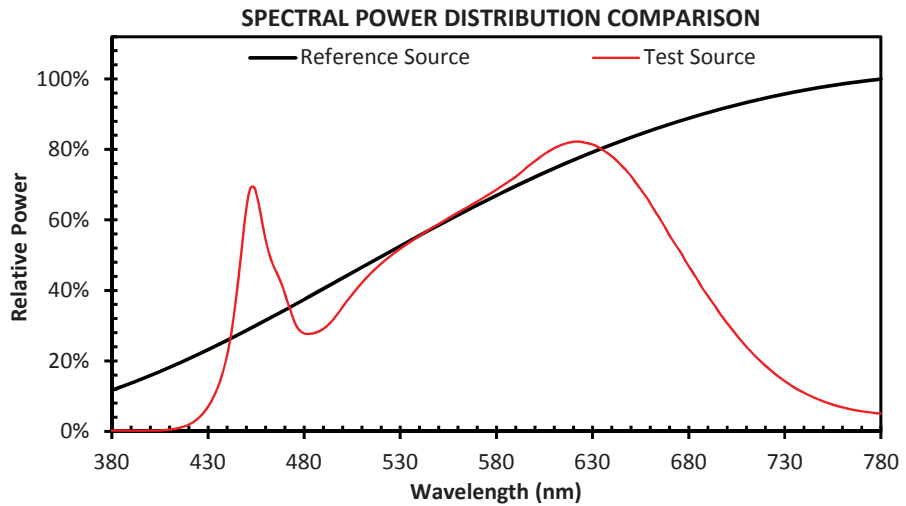
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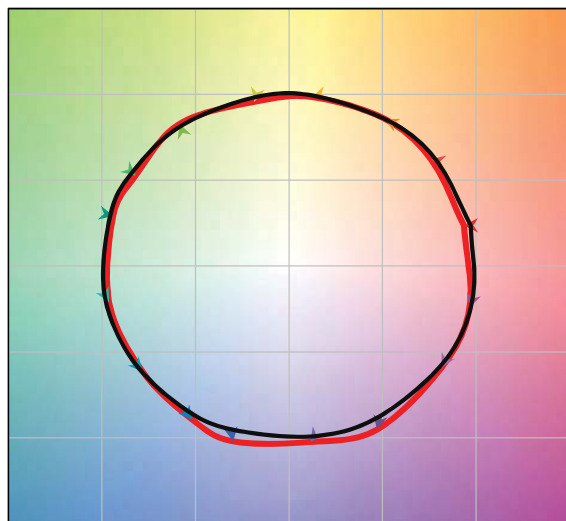
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Operating at 277v AC an 60 Hz,

$R_f$	90
$R_g$	100

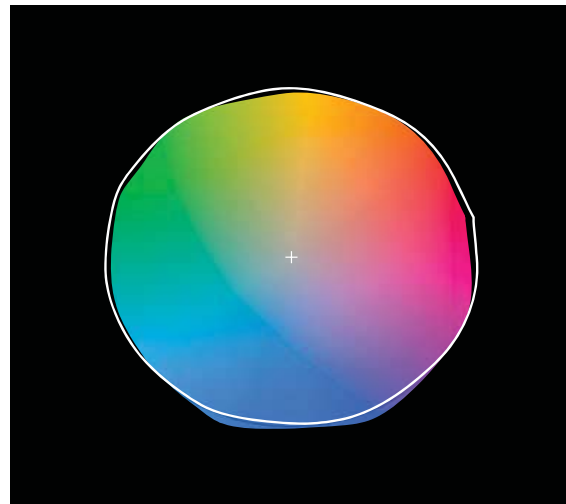


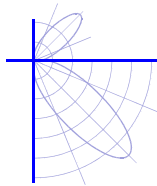
**COLOR VECTOR GRAPHIC**



— Test Source      — Series1

**COLOR DISTORTION GRAPHIC**





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**Test Distance**            8.0 m  
**Test 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 publications: IES LM-79-08 (Sec. 12), IES LM-16-93, IES LM-58-13, CIE 13.3:1995, CIE 15:2004, ANSI C78.377:2015, ANSI C82.77-10:2014.

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 Gamma coordinate system as defined in CIE publication number 121.

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