

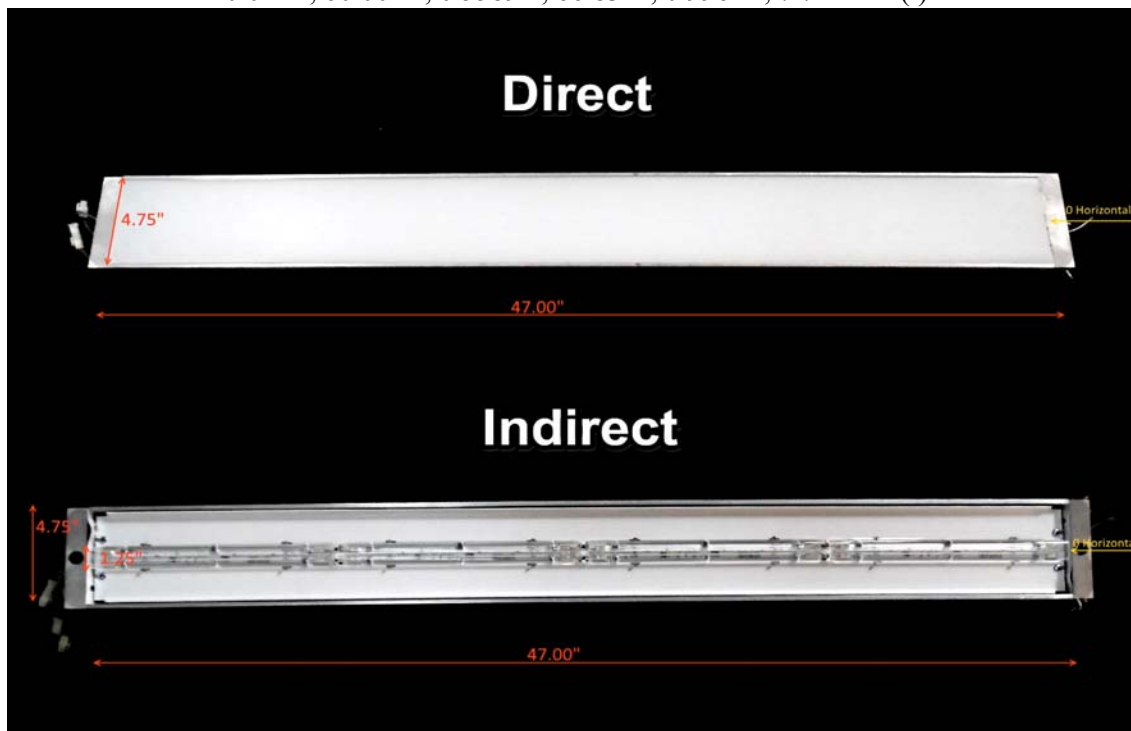
# Report of Test

## LLIA000844-011A-R04\*

\*This test report supersedes test report LLIA000844-001A-R03

Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

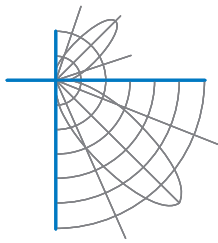
Pendant mounted, extruded aluminum housing with aluminum end caps, formed white enamel aluminum LED tray/reflectors, frosted plastic lower enclosure. 288 white LEDs, four upper Osram PrevaLED Line boards with 36 LEDs each, clear linear plastic lens above, four lower Osram PrevaLED Line boards with 36 LEDs each. Two Osram Optotronic OTi 50/120-277/1A4 DIM L LED drivers 120.0Vac, 60.00Hz, 0.5589A, 66.83W, 0.996PF, 7.7%THD(i)



### Performance Summary

Total Light Output	8264 lm
Luminaire Power	66.8 W
Luminous Efficacy	123.7 lm/W

**PREPARED FOR : Precision Architectural Lighting, 4830 Timber Creek Drive, Houston, TX 77017**

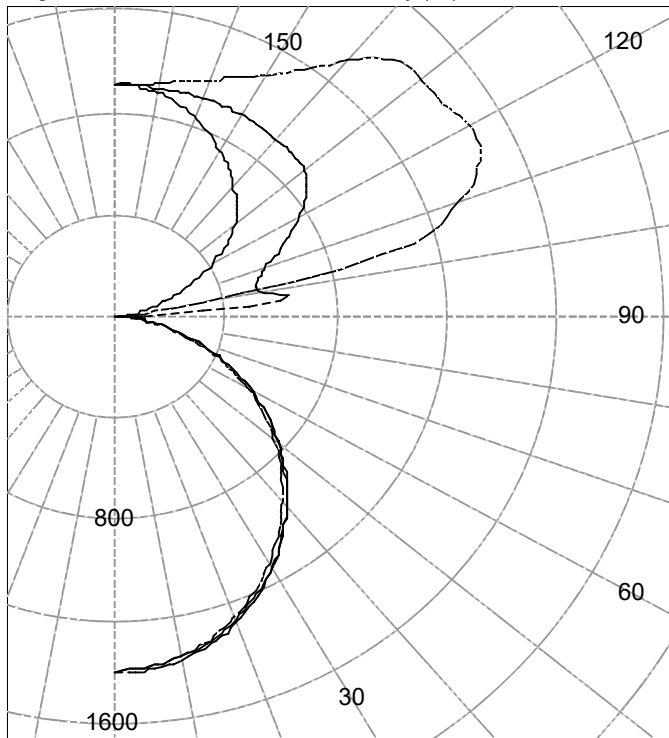


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Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



(Two plane symmetry) C0-C90

**INTENSITY SUMMARY (cd)**

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	1399	1399	1399	1399	1399	
5.0	1383	1389	1397	1394	1384	132
10.0	1360	1365	1373	1370	1358	
15.0	1322	1326	1334	1329	1316	374
20.0	1271	1274	1282	1276	1260	
25.0	1208	1210	1217	1210	1193	557
30.0	1136	1136	1142	1135	1117	
35.0	1054	1054	1058	1051	1033	658
40.0	966	965	967	960	942	
45.0	872	870	870	863	847	668
50.0	771	770	769	762	748	
55.0	665	667	665	657	645	591
60.0	557	560	558	550	540	
65.0	449	452	448	440	433	440
70.0	339	342	337	331	326	
75.0	230	233	230	227	224	243
80.0	130	131	132	133	132	
85.0	50	52	54	55	55	62
90.0	2	3	4	4	3	

**AVERAGE LUMINANCE (cd / m<sup>2</sup>)**

Gamma	C0	C45	C90
45.0	8534	8515	8291
55.0	8030	8025	7782
65.0	7346	7342	7091
75.0	6162	6144	5989
85.0	3953	4289	4398

**ZONAL FLUX AND PERCENTAGES**

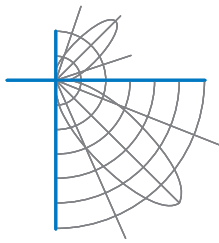
Zone	Flux (lm)	% Lamp	% Luminaire
0-30	1063	N / A	12.9
0-40	1721	N / A	20.8
0-60	2979	N / A	36.1
0-90	3725	N / A	45.1
40-90	2004	N / A	24.3
60-90	746	N / A	9.0
90-180	4538	N / A	54.9
0-180	8264	N / A	100.0

Total Light Output = 8,264 lm

Signed:

Authorized Signatory

Date of test 28-Aug-2017  
Date of report 23-Mar-2022



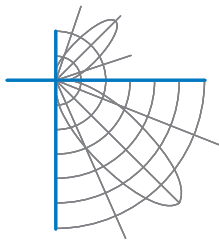
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Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

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**Intensity data (cd)**

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	1399	1399	1399	1399	1399
2.5	1389	1395	1403	1401	1391
5.0	1383	1389	1397	1394	1384
7.5	1373	1379	1387	1384	1373
10.0	1360	1365	1373	1370	1358
12.5	1343	1347	1355	1351	1338
15.0	1322	1326	1334	1329	1316
17.5	1298	1302	1309	1304	1290
20.0	1271	1274	1282	1276	1260
22.5	1241	1244	1251	1244	1228
25.0	1208	1210	1217	1210	1193
27.5	1173	1175	1180	1174	1156
30.0	1136	1136	1142	1135	1117
32.5	1096	1096	1101	1094	1076
35.0	1054	1054	1058	1051	1033
37.5	1011	1010	1013	1006	988
40.0	966	965	967	960	942
42.5	920	918	919	912	895
45.0	872	870	870	863	847
47.5	822	821	820	813	798
50.0	771	770	769	762	748
52.5	719	719	717	710	697
55.0	665	667	665	657	645
57.5	612	614	612	604	593
60.0	557	560	558	550	540
62.5	503	506	503	495	486
65.0	449	452	448	440	433
67.5	394	397	393	385	380
70.0	339	342	337	331	326
72.5	284	287	283	278	274
75.0	230	233	230	227	224
77.5	178	180	179	178	177
80.0	130	131	132	133	132
82.5	86	88	90	92	91
85.0	50	52	54	55	55
87.5	21	22	23	24	23
90.0	2	3	4	4	3



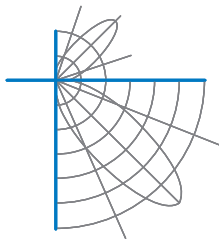
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**Intensity data (cd)**

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
90.0	2	3	4	4	3
92.5	10	23	33	14	12
95.0	26	65	485	75	45
97.5	49	106	621	226	117
100.0	76	134	551	646	316
102.5	106	161	518	1086	740
105.0	139	192	537	1217	1114
107.5	175	228	556	1273	1247
110.0	213	268	587	1317	1336
112.5	254	310	630	1334	1414
115.0	300	354	673	1334	1459
117.5	349	400	717	1323	1486
120.0	397	447	764	1309	1490
122.5	446	492	810	1297	1474
125.0	491	536	848	1295	1458
127.5	530	579	876	1301	1451
130.0	564	620	893	1304	1452
132.5	593	658	901	1294	1448
135.0	619	692	904	1266	1426
137.5	643	720	906	1222	1380
140.0	667	743	908	1172	1317
142.5	689	761	911	1125	1249
145.0	712	776	913	1086	1187
147.5	734	789	914	1055	1136
150.0	755	801	914	1030	1094
152.5	777	814	915	1010	1061
155.0	797	826	916	993	1034
157.5	817	839	917	978	1011
160.0	836	851	917	966	991
162.5	853	863	916	956	975
165.0	868	874	913	945	961
167.5	882	884	911	934	946
170.0	893	893	910	924	931
172.5	902	900	911	916	919
175.0	909	906	913	914	913
177.5	912	909	916	913	910
180.0	913	913	913	913	913



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**Coefficients Of Utilization - Zonal Cavity Method**

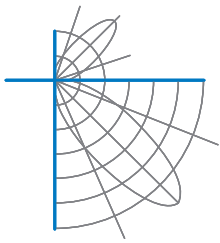
Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	106	106	106	106	97	97	97	97	81	81	81	65	65	65	52	52	52	45
1	97	92	88	85	88	85	81	78	71	68	66	58	56	54	46	45	44	38
2	88	81	74	69	80	74	69	64	62	58	55	50	48	45	40	38	37	32
3	80	71	63	58	73	65	59	54	54	50	46	45	41	38	35	33	31	27
4	73	63	55	49	67	58	51	45	48	43	39	40	36	33	32	29	27	23
5	67	56	48	42	61	51	44	39	43	38	34	36	32	28	28	26	23	20
6	62	50	42	36	57	46	39	34	39	33	29	32	28	25	26	23	20	17
7	57	45	37	32	52	42	35	30	35	30	26	29	25	22	24	20	18	15
8	53	41	33	28	49	38	31	26	32	27	23	27	22	19	22	18	16	14
9	49	37	30	25	45	34	28	23	29	24	20	24	20	17	20	17	15	12
10	46	34	27	22	42	32	25	21	27	22	18	23	19	16	18	15	13	11

For absolute test reports, CUs are expressed as a percentage of total lumen 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.

**Circle of Light Plot**

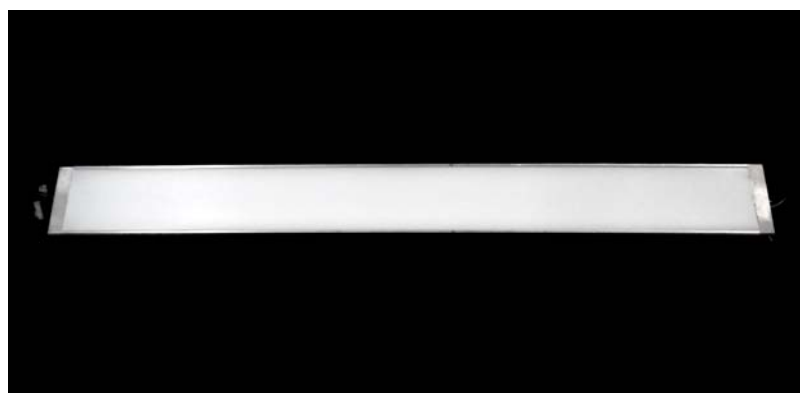
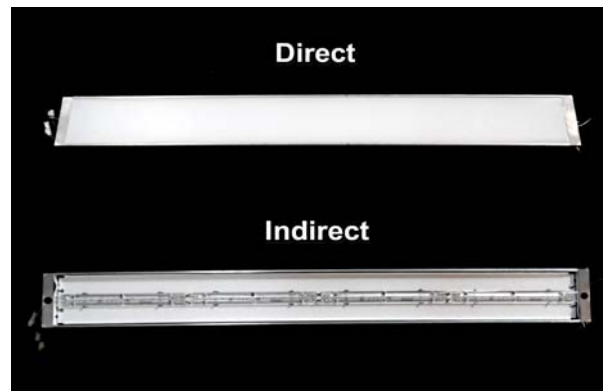
Height(ft)	Illuminance at Nadir (fc)	Beam Width (across 50% Nadir Illum)	
		0-180	90-270
6.0	38.9	7.26	7.15
8.0	21.9	9.68	9.54
10.0	14.0	12.10	11.92
12.0	9.7	14.52	14.31
14.0	7.1	16.94	16.69
16.0	5.5	19.36	19.07

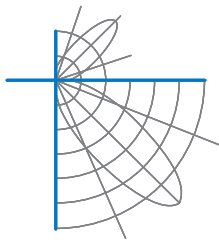


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**Test Distance** 9.5 m  
**Test Temperature** 24.8 °C

**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 C78.377:2015, 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.

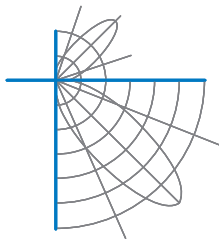
Photometric intensity values are reported using the CIE Gamma coordinate system as defined in CIE publication number 121.

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.

**Revision History**

- R01 - 12/14/2017 - Changed catalog number
- R02 - 01/03/2019 - Added -80 to catalog number for 80 CRI chips
- R03 - 01/23/2019 - Added K40/K40 to note the 4000 CCT
- R04 - 03/23/2022 - Revised to keep in series with 011B



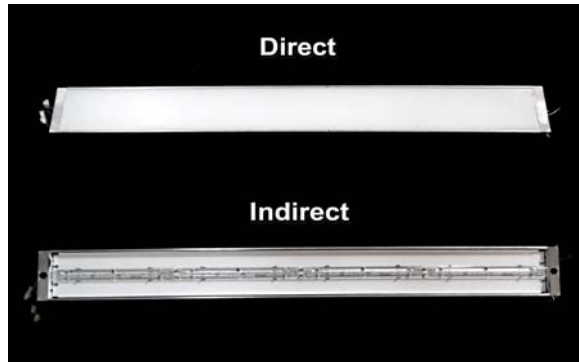
## Report of Test

LLIA000844-011B-R04\*

Integrating Sphere Report

Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

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### Performance Summary

Voltage	120.0 Vac
Current	0.5585 A
Power	66.78 W
Frequency	59.97 Hz
Power Factor	0.996
Current THD	7.7 %

Total Luminous Flux	8440.2 lm
Efficacy	126.4 lm/W
Chromaticity (x,y)	(0.3820, 0.3803)
(u',v')	(0.2247, 0.5034)
Duv	0.0012
CCT	3985 K
CRI (Ra)	82
R9	10

Prepared For:

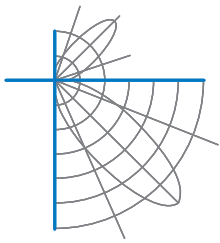
Precision Architectural Lighting  
4830 Timber Creek Drive  
Houston, TX 77017, USA

\*This test report supersedes test report LLIA000844-011B-R03

Test date: 08/22/2017

Report date: 03/23/2022

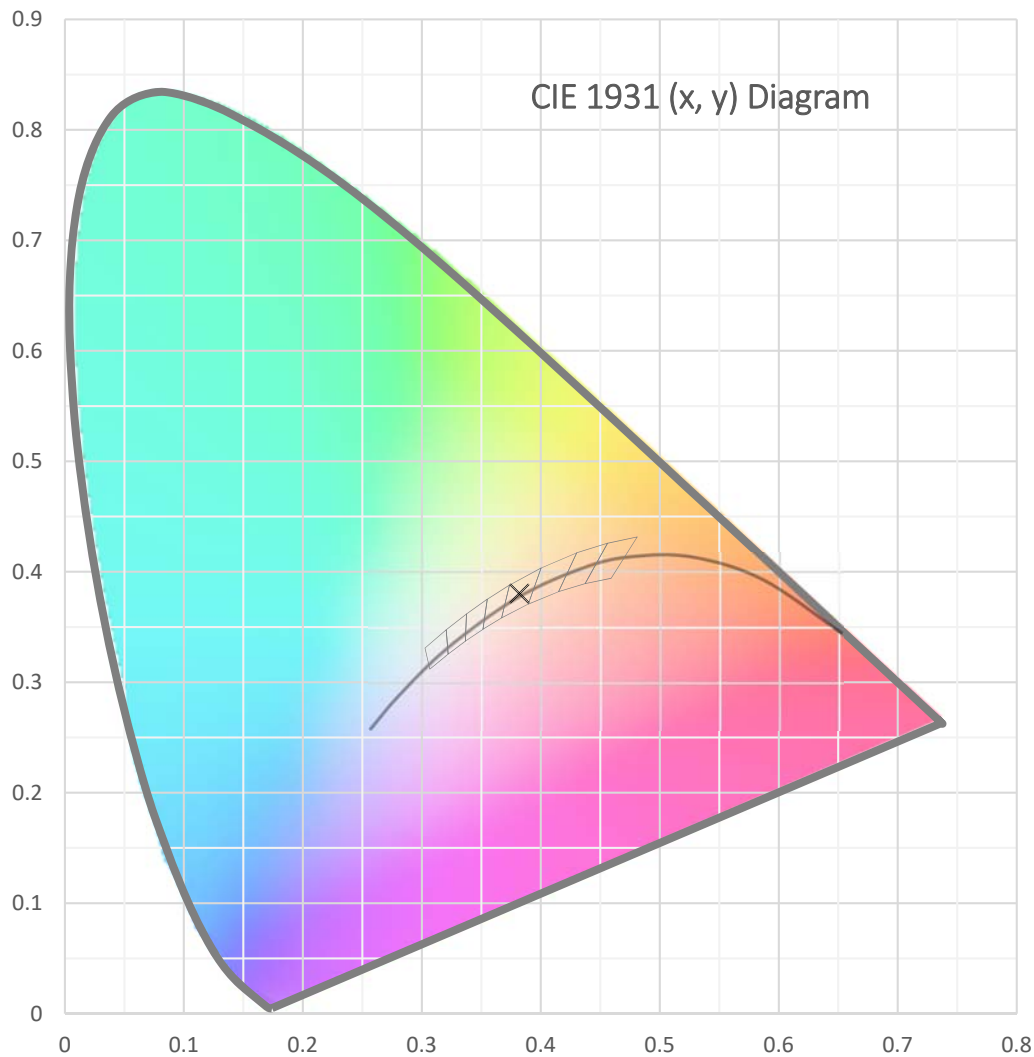


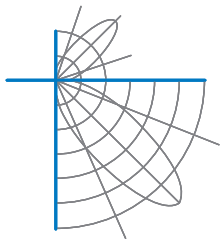


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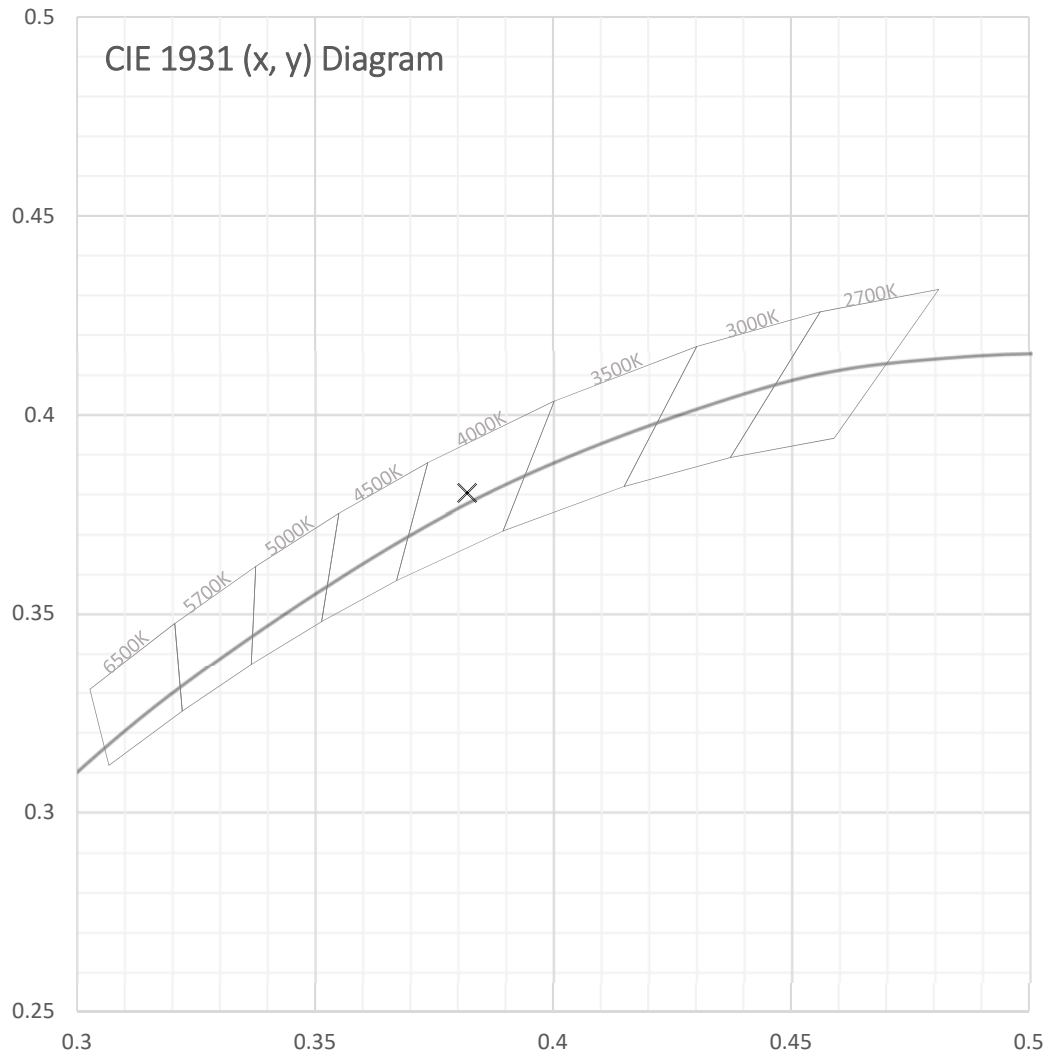


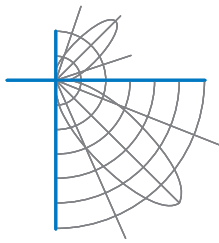


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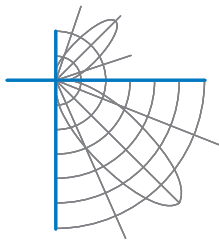
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**Spectral Data**

Total Radiant Flux	25.92 W
Total Luminous Flux	8440.2 Lm
Chromaticity CIE 1931 (x, y)	(0.3820, 0.3803)
Chromaticity CIE 1976 (u', v')	(0.2247, 0.5034)
Correlated Color Temperature (CCT)	3985 K
Color Rendering Index (Ra)	82
R1	80
R2	88
R3	93
R4	81
R5	79
R6	82
R7	87
R8	66
R9	10
R10	70
R11	78
R12	55
R13	82
R14	96
Distance from Planckian Locus (Duv)	0.0012
Scotopic/Photopic Ratio *	1.651

**Electrical Data**

Voltage	120.0 Vac
Current	0.5585 A
Power	66.78 W
Frequency	59.97 Hz
Power Factor	0.996
Current THD	7.7 %



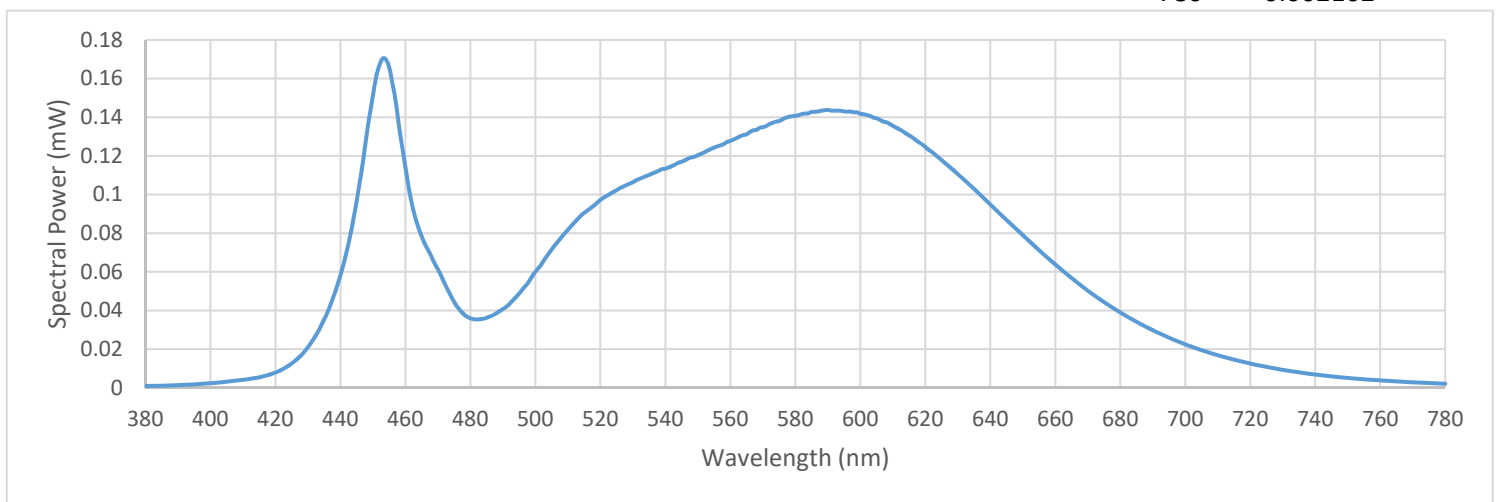
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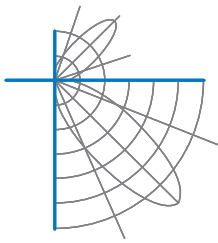
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Summary Spectral Power Distribution (wavelength - nm, spectral power - mW)

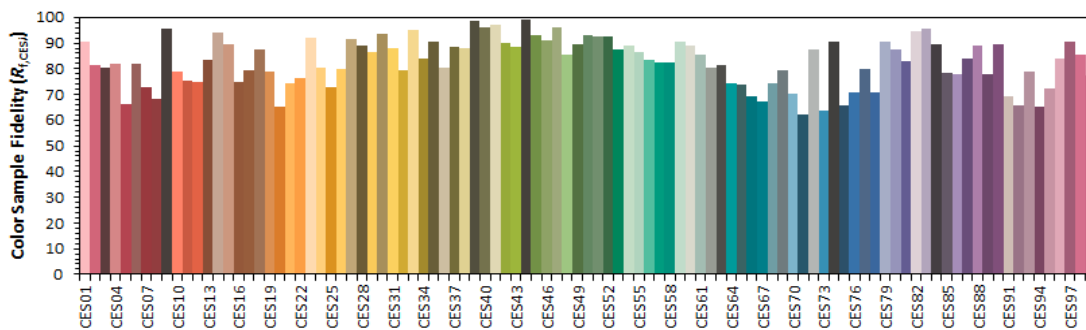
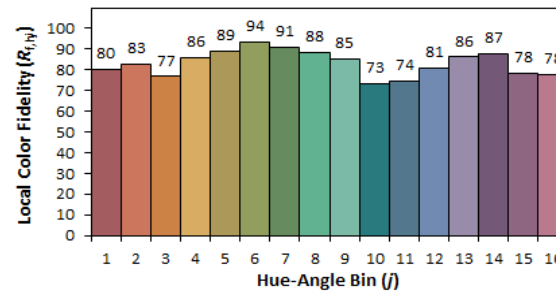
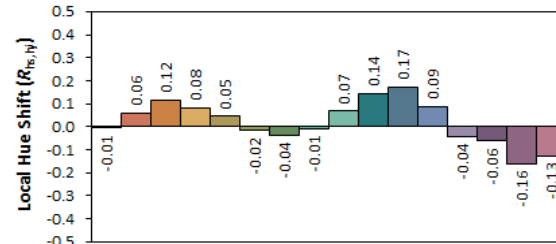
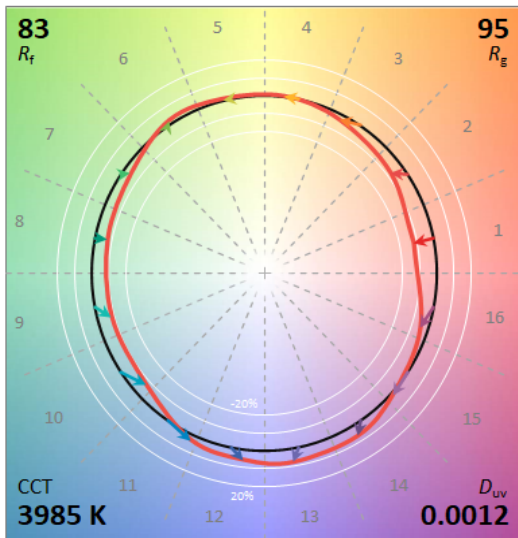
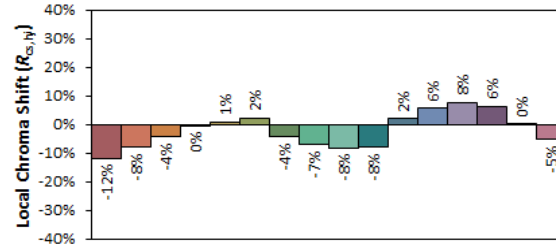
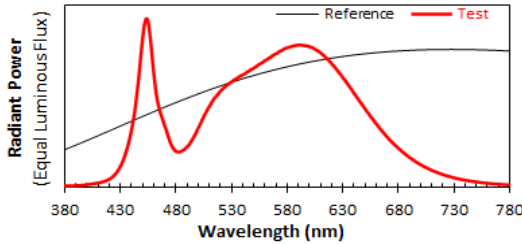
380	0.000936	480	0.035884	580	0.140782	680	0.038961
385	0.001043	485	0.036250	585	0.142729	685	0.034212
390	0.001339	490	0.040710	590	0.143768	690	0.029795
395	0.001771	495	0.048660	595	0.143017	695	0.025893
400	0.002368	500	0.059927	600	0.141744	700	0.022498
405	0.003123	505	0.071524	605	0.139427	705	0.019485
410	0.004108	510	0.081621	610	0.135540	710	0.016782
415	0.005397	515	0.090471	615	0.130543	715	0.014567
420	0.007876	520	0.097242	620	0.124564	720	0.012510
425	0.012564	525	0.102223	625	0.117918	725	0.010762
430	0.021131	530	0.106343	630	0.110421	730	0.009294
435	0.035419	535	0.110060	635	0.102941	735	0.007963
440	0.058210	540	0.113327	640	0.094848	740	0.006839
445	0.096832	545	0.116969	645	0.086786	745	0.005908
450	0.151369	550	0.120382	650	0.078872	750	0.005091
455	0.165920	555	0.124251	655	0.071084	755	0.004380
460	0.114108	560	0.127739	660	0.063868	760	0.003811
465	0.078121	565	0.131129	665	0.056710	765	0.003282
470	0.061215	570	0.134847	670	0.050249	770	0.002827
475	0.044268	575	0.138010	675	0.044385	775	0.002445
						780	0.002102





Test Report Number: LLIA000844-011B-R04

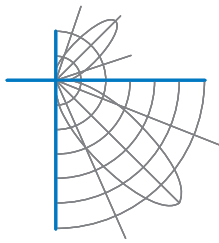
IES TM-30 Details



Notes:

x **0.3819**  
y **0.3803**  
u' **0.2247**  
v' **0.5033**

CIE 13.3-1995  
(CRI)  
Ra 82  
Rg 10



**Test Report Number: LLIA000844-011B-R04**

Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

Pendant mounted, extruded aluminum housing with aluminum end caps, formed white enamel aluminum LED tray/reflectors, frosted plastic lower enclosure. 288 white LEDs, four upper Osram PrevaLED Line boards with 36 LEDs each, clear linear plastic lens above, four lower Osram PrevaLED Line boards with 36 LEDs each. Two Osram Optotronic OTi 50/120-277/1A4 DIM L LED drivers

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:	25.2 °C
Test Procedure:	Tested in accordance with the applicable sections of: LM-79-08, LM-78-07, LM-58-13, ANSI_ANSLG C78.377-2015, ANSI C82-77-10:2014
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:	The measurements 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  This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with * are not covered.
Revision History:	R01 - 12/14/2017 - Changed catalog number R02 - 01/03/2019 - Added -80 to catalog number for 80 CRI chips R03 - 01/23/2019 - Added K40/K40 to note the 4000 CCT R04 - 03/23/2022 - Added TM-30 metrics page to report



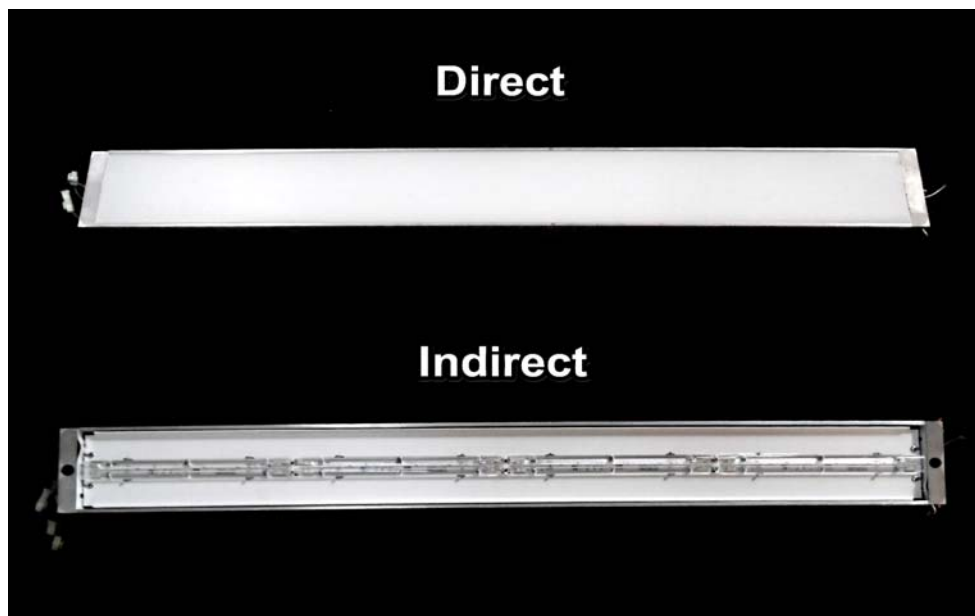
## Report of Test

LLIA000844-011C-R04\*

ISTM Report

Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

Pendant mounted, extruded aluminum housing with aluminum end caps, formed white enamel aluminum LED tray/reflectors, frosted plastic lower enclosure. 288 white LEDs, four upper Osram PrevaLED Line boards with 36 LEDs each, clear linear plastic lens above, four lower Osram PrevaLED Line boards with 36 LEDs each. Two Osram Optotronic OTi 50/120-277/1A4 DIM L LED drivers



Prepared For:  
Precision Architectural Lighting  
4830 Timber Creek Drive  
Houston, TX 77017, USA

\*This test report supersedes test report LLIA000844-011C-R03

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

Test date: 08/23/2017

Report date: 03/23/2022



**Test Report Number: LLIA000844-011C-R04**

Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

Pendant mounted, extruded aluminum housing with aluminum end caps, formed white enamel aluminum LED tray/reflectors, frosted plastic lower enclosure. 288 white LEDs, four upper Osram PrevaLED Line boards with 36 LEDs each, clear linear plastic lens above, four lower Osram PrevaLED Line boards with 36 LEDs each. Two Osram Optotronic OTi 50/120-277/1A4 DIM L LED drivers

- Purpose of Test:** To determine the in-situ temperature of the specified LED Ts point and driver Tc point. In this test, in-situ temperature refers to standard laboratory conditions with the luminaire configured in accordance with appropriate sections of UL1598-2008
- Luminaire Mounting:** Pendant
- LED Test Point:** Thermocouples were attached to the LED case temperature point (Ts) as specified by report number SQETMP098101, issued 04/12/2016 by Nichia Corporation LED Testing Laboratory. The measured LED was selected according to guidance provided by DLC and ENERGY STAR for lumen maintenance projection.
- Driver Test Point:** Thermocouples were attached to the driver case in the location (Tc) designated by the manufacturer.
- Sample Selection:** LightLab International Allentown. LLC has not participated in the selection of sample(s) being tested. Testing is performed on the understanding that the significance of the report is limited to the extent to which the sample is representative of production units.
- Disclaimer:** 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.
- Procedure:** In-situ temperature measurements were performed with the luminaire mounted suspended from a simulated ceiling. The luminaire supply voltage and frequency was set according to the luminaire manufacturer's instructions. The luminaire was allowed to reach stabilization as defined in UL1598-2008 prior to reported measurements. Testing was performed in a draft-free, temperature-controlled environment with an ambient temperature of 25 +/- 5 °C.
- Test Equipment:** GW Instek APS-7100 AC Power Source  
Xitron 2801 Power Analyzer  
Fluke 52-ii Thermometer





**Test Report Number: LLIA000844-011C-R04**

Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

Pendant mounted, extruded aluminum housing with aluminum end caps, formed white enamel aluminum LED tray/reflectors, frosted plastic lower enclosure. 288 white LEDs, four upper Osram PrevaLED Line boards with 36 LEDs each, clear linear plastic lens above, four lower Osram PrevaLED Line boards with 36 LEDs each. Two Osram Optotronic OTi 50/120-277/1A4 DIM L LED drivers

Electrical Measurements

Voltage	120.0 Vac
Current	0.5605 A
Power	67.02 W
Frequency	60.0 Hz
Power Factor	0.996
Current THD	7.7 %
Driver #1 Output	0.841 Adc
Driver #2 Output	0.841 Adc

Temperature Measurements

LED #1 (Ts)	44.5°C	Driver #1 (Tc)	47.9°C
LED #2 (Ts)	46.0°C	Driver #2 (Tc)	45.0°C

\*The above temperatures have been normalized to 25°C ambient.

Measured Ambient Temperature (Ta) 24.0°C



Indirect LED Thermocouple Location



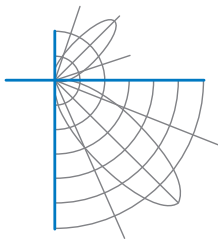
Indirect Driver Thermocouple Location



Indirect Selected LED Location



Direct LED Thermocouple Location



**Test Report Number: LLIA000844-011C-R04**

Catalog Number: MLS5-I/D-HO/HO-K40/K40-80-4-XX-WSOP/LOH-XXXX-120

Pendant mounted, extruded aluminum housing with aluminum end caps, formed white enamel aluminum LED tray/reflectors, frosted plastic lower enclosure. 288 white LEDs, four upper Osram PrevaLED Line boards with 36 LEDs each, clear linear plastic lens above, four lower Osram PrevaLED Line boards with 36 LEDs each. Two Osram Optotronic OTi 50/120-277/1A4 DIM L LED drivers



Direct Driver Thermocouple Location



Direct Selected LED Location

Revision History:

- R01 - 12/14/2017 - Changed catalog number
- R02 - 01/03/2019 - Added -80 to catalog number for 80 CRI chips
- R03 - 01/23/2019 - Added K40/K40 to note the 4000 CCT
- R04 - 03/23/2022 - Revised to keep in series with 011B