



# Report of Test

## LLIA000833-003A

Catalog Number: MQS2-I/D-HO/HO-K35-80-2X2-XXX-AL/AL-XXXX-UNV

Pendant mounted, extruded aluminum housing, formed white enamel aluminum reflectors, translucent white plastic enclosures. 352 white LEDs, 4 PAL-Lighting LED upper boards with 44 LEDs each and 4 PAL-Lighting LED lower boards with 44 LEDs each  
Two Osram Optotronic OT50W/PRG1400C/UNV/DIM/L LED drivers  
120.0Vac, 60.00Hz, 0.8229A, 98.03W, 0.993PF, 9.2%THD(i)



### Performance Summary

Total Light Output	9664 lm
Luminaire Power	98.0 W
Luminous Efficacy	98.6 lm/W

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



**Test Report No. LLIA000833-003A**

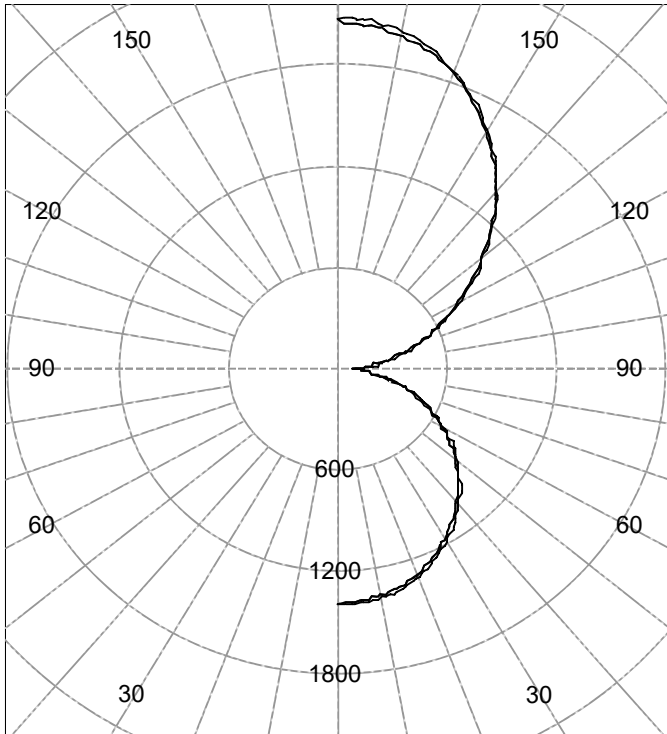
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Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



(Two plane symmetry) C0-C90

**INTENSITY SUMMARY (cd)**

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	1387	1387	1387	1387	1387	
5.0	1372	1385	1389	1385	1372	132
10.0	1356	1370	1375	1371	1356	
15.0	1328	1341	1347	1342	1330	378
20.0	1282	1298	1305	1299	1284	
25.0	1227	1244	1249	1244	1226	572
30.0	1162	1182	1184	1177	1159	
35.0	1090	1107	1110	1105	1087	690
40.0	1013	1028	1030	1024	1011	
45.0	931	945	943	939	927	724
50.0	839	852	852	849	837	
55.0	746	757	758	755	744	674
60.0	650	659	659	657	648	
65.0	550	557	556	555	548	548
70.0	449	453	450	450	445	
75.0	352	350	345	345	343	361
80.0	226	236	240	232	219	
85.0	149	159	163	156	142	172
90.0	83	91	92	88	78	

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

Gamma	C0	C45	C90
45.0	9539	9505	9501
55.0	9256	9185	9235
65.0	9003	8780	8963
75.0	8833	8188	8624
85.0	8591	8261	8222

**ZONAL FLUX AND PERCENTAGES**

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	1081	N / A	11.2
0-40	1771	N / A	18.3
0-60	3169	N / A	32.8
0-90	4250	N / A	44.0
40-90	2479	N / A	25.6
60-90	1081	N / A	11.2
90-180	5413	N / A	56.0
0-180	9664	N / A	100.0

Total Light Output = 9,664 lm

Signed:

Authorized Signatory

Date of test

7-Sep-2017

Date of report

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**Intensity data (cd)**

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	1387	1387	1387	1387	1387
2.5	1375	1388	1392	1388	1375
5.0	1372	1385	1389	1385	1372
7.5	1366	1380	1383	1380	1366
10.0	1356	1370	1375	1371	1356
12.5	1343	1360	1363	1361	1344
15.0	1328	1341	1347	1342	1330
17.5	1308	1321	1327	1322	1309
20.0	1282	1298	1305	1299	1284
22.5	1255	1273	1278	1273	1255
25.0	1227	1244	1249	1244	1226
27.5	1196	1214	1218	1212	1195
30.0	1162	1182	1184	1177	1159
32.5	1127	1145	1148	1141	1125
35.0	1090	1107	1110	1105	1087
37.5	1053	1069	1071	1064	1050
40.0	1013	1028	1030	1024	1011
42.5	973	986	987	982	969
45.0	931	945	943	939	927
47.5	885	898	898	895	883
50.0	839	852	852	849	837
52.5	793	804	806	803	791
55.0	746	757	758	755	744
57.5	698	708	709	706	696
60.0	650	659	659	657	648
62.5	600	608	608	606	598
65.0	550	557	556	555	548
67.5	499	505	503	502	496
70.0	449	453	450	450	445
72.5	400	401	398	397	393
75.0	352	350	345	345	343
77.5	272	282	293	278	265
80.0	226	236	240	232	219
82.5	185	195	199	191	178
85.0	149	159	163	156	142
87.5	120	129	131	126	114
90.0	83	91	92	88	78



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**Intensity data (cd)**

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
90.0	83	91	92	88	78
92.5	140	151	152	147	135
95.0	175	188	192	186	172
97.5	214	229	234	227	213
100.0	259	273	279	272	258
102.5	307	322	331	321	306
105.0	377	384	385	383	375
107.5	431	438	441	439	431
110.0	489	496	498	496	489
112.5	549	555	559	556	550
115.0	612	619	623	619	613
117.5	675	687	687	686	677
120.0	742	755	754	754	743
122.5	812	825	823	825	812
125.0	884	895	893	894	885
127.5	953	968	966	967	953
130.0	1028	1043	1043	1040	1028
132.5	1107	1118	1117	1115	1106
135.0	1185	1191	1194	1192	1186
137.5	1268	1267	1269	1270	1271
140.0	1342	1341	1343	1346	1347
142.5	1410	1417	1417	1422	1415
145.0	1481	1494	1492	1497	1483
147.5	1552	1564	1562	1567	1551
150.0	1620	1630	1629	1632	1615
152.5	1685	1694	1694	1697	1676
155.0	1743	1754	1756	1756	1737
157.5	1799	1810	1813	1809	1799
160.0	1855	1863	1865	1860	1855
162.5	1901	1911	1913	1910	1901
165.0	1935	1955	1959	1955	1935
167.5	1963	1987	1994	1987	1963
170.0	1989	2011	2017	2011	1988
172.5	2011	2031	2036	2031	2010
175.0	2026	2046	2051	2046	2026
177.5	2035	2055	2060	2055	2035
180.0	2054	2054	2054	2054	2054



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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	106	106	106	106	97	97	97	97	80	80	80	65	65	65	51	51	51	44
1	96	91	87	83	87	84	80	77	69	67	64	56	54	53	44	43	41	36
2	87	79	73	68	79	73	67	62	60	56	53	49	46	43	38	36	34	29
3	79	69	62	56	72	64	57	52	53	48	44	43	39	36	33	31	29	24
4	72	61	53	47	66	56	49	44	47	41	37	38	34	31	30	27	25	21
5	66	54	46	40	60	50	43	37	42	36	32	34	30	26	27	24	21	18
6	61	49	40	34	55	45	37	32	37	32	28	31	26	23	24	21	19	16
7	56	44	36	30	51	40	33	28	34	28	24	28	23	20	22	19	16	14
8	52	40	32	26	47	37	30	25	31	25	21	25	21	18	20	17	15	12
9	48	36	29	23	44	33	27	22	28	23	19	23	19	16	19	15	13	11
10	45	33	26	21	41	31	24	20	26	21	17	21	17	14	17	14	12	10

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**

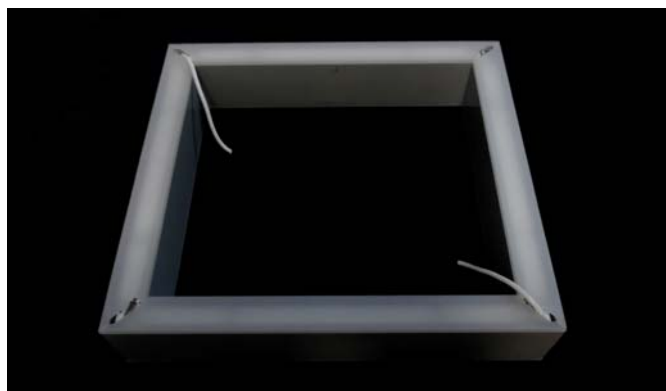
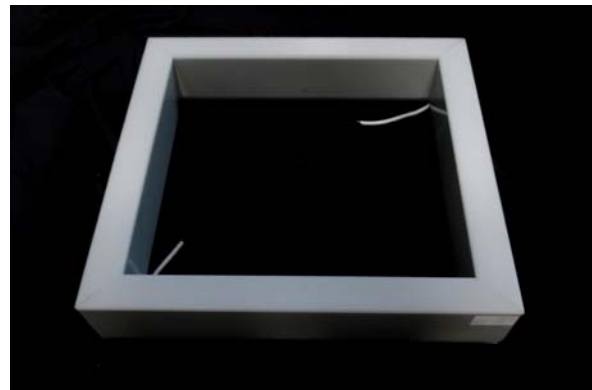
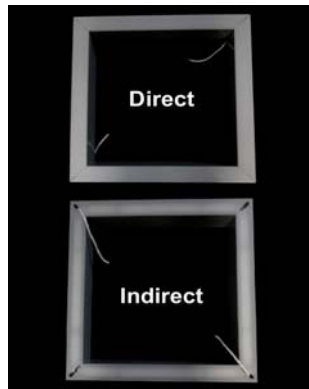
Height(ft)	Illuminance at Nadir (fc)	Beam Width (across 50% Nadir Illum)	
		0-180	90-270
6.0	38.5	7.48	7.48
8.0	21.7	9.97	9.97
10.0	13.9	12.47	12.46
12.0	9.6	14.96	14.95
14.0	7.1	17.46	17.44
16.0	5.4	19.95	19.93

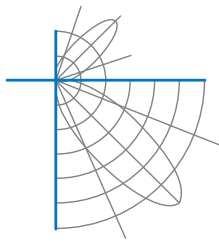


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**Test Distance** 9.5 m  
**Test Temperature** 25.0 °C

**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.



## Report of Test

**LLIA000833-003B**

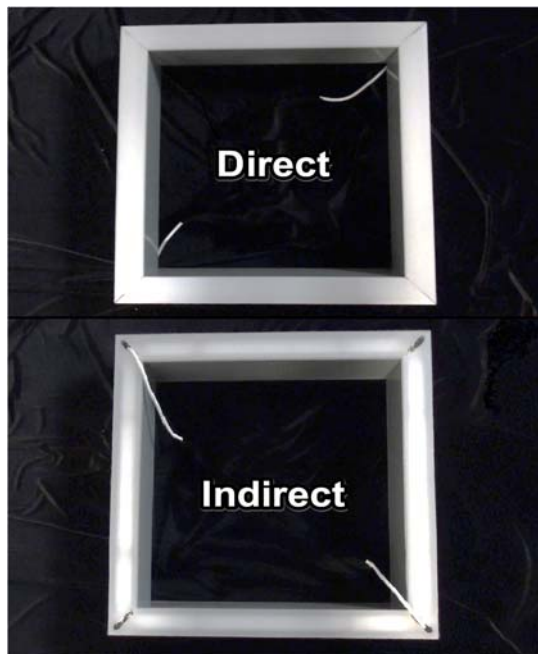
Integrating Sphere Report

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Two Osram Optotronic OT50W/PRG1400C/UNV/DIM/L LED drivers



### Performance Summary

Voltage	120.1 Vac
Current	0.8199 A
Power	97.90 W
Frequency	60.00 Hz
Power Factor	0.994
Current THD	9.3 %

Total Luminous Flux	9918.4 lm
Efficacy	101.3 lm/W
Chromaticity (x,y)	(0.4088, 0.3944)
(u',v')	(0.2365, 0.5133)
Duv	0.0009
CCT	3454 K
CRI (Ra)	82
R9	11

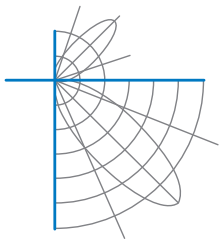
Prepared For:

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

Test date: 09/06/2017

Report date: 09/07/2017

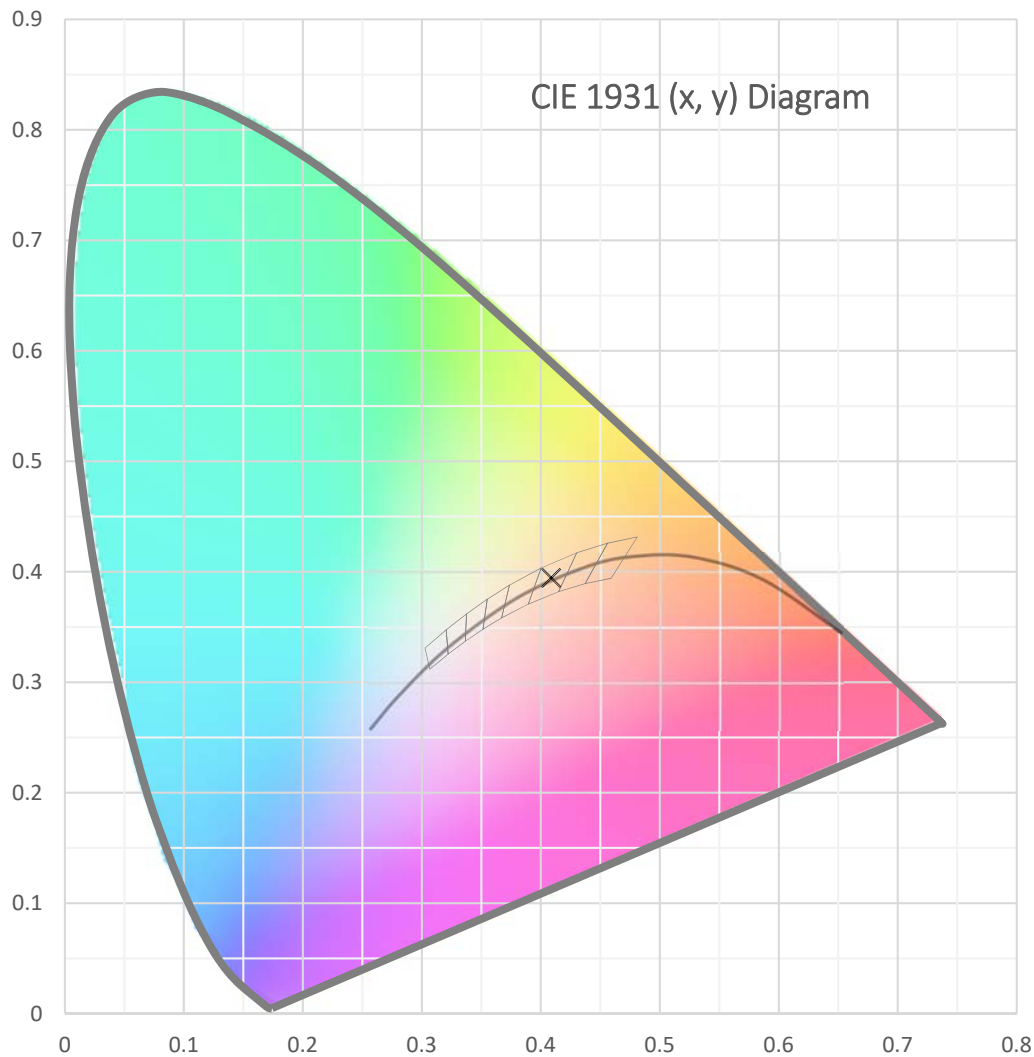


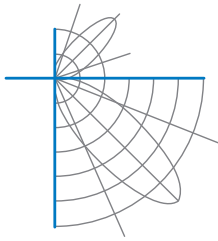


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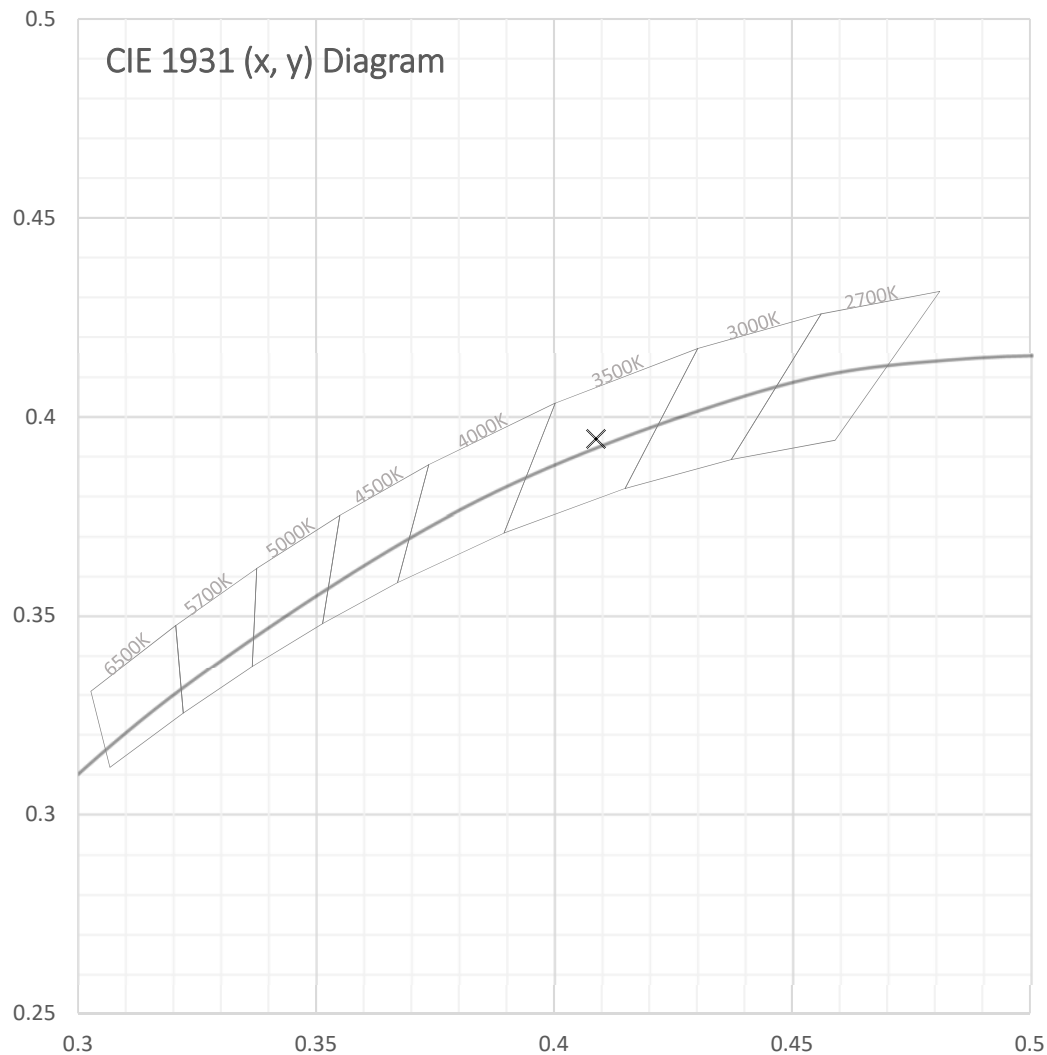




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<b>Spectral Data</b>	Total Radiant Flux	30.40 W
	Total Luminous Flux	9918.4 Lm
	Chromaticity CIE 1931 (x, y)	(0.4088, 0.3944)
	Chromaticity CIE 1976 (u', v')	(0.2365, 0.5133)
	Correlated Color Temperature (CCT)	3454 K
	Color Rendering Index (Ra)	82
	R1	81
	R2	89
	R3	95
	R4	81
	R5	80
	R6	84
	R7	86
	R8	64
	R9	11
	R10	73
	R11	79
	R12	61
	R13	83
	R14	97
	Distance from Planckian Locus (Duv)	0.0009
	Scotopic/Photopic Ratio *	1.487

**Electrical Data**

Voltage	120.1 Vac
Current	0.8199 A
Power	97.90 W
Frequency	60.00 Hz
Power Factor	0.994
Current THD	9.3 %



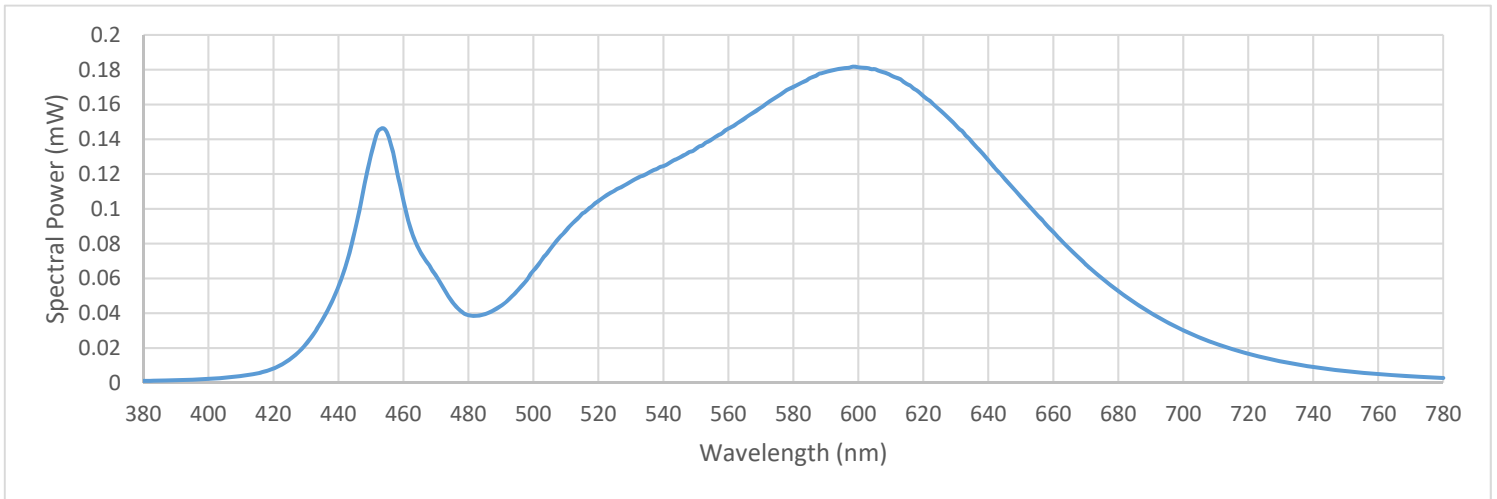
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Summary Spectral Power Distribution (wavelength - nm, spectral power - mW)

380	0.001057	480	0.038858	580	0.170143	680	0.052714
385	0.001154	485	0.039422	585	0.175070	685	0.046214
390	0.001412	490	0.044217	590	0.178831	690	0.040182
395	0.001770	495	0.052778	595	0.180792	695	0.034756
400	0.002269	500	0.064495	600	0.181342	700	0.030234
405	0.002905	505	0.076444	605	0.180348	705	0.026137
410	0.003820	510	0.087408	610	0.176768	710	0.022452
415	0.005305	515	0.097163	615	0.171753	715	0.019411
420	0.008276	520	0.104476	620	0.164910	720	0.016666
425	0.013435	525	0.110499	625	0.157003	725	0.014330
430	0.022391	530	0.115659	630	0.148044	730	0.012340
435	0.036003	535	0.120284	635	0.138345	735	0.010553
440	0.055205	540	0.124553	640	0.127937	740	0.009055
445	0.087017	545	0.129505	645	0.117243	745	0.007790
450	0.130663	550	0.134542	650	0.106835	750	0.006700
455	0.143696	555	0.139984	655	0.096510	755	0.005760
460	0.104818	560	0.146083	660	0.086822	760	0.005011
465	0.075820	565	0.151890	665	0.076982	765	0.004298
470	0.061479	570	0.158174	670	0.068043	770	0.003696
475	0.046408	575	0.164364	675	0.060049	775	0.003194
						780	0.002750





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**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:** 25.0 °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.

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Quantities marked with \* are not covered.



## Report of Test

LLIA000833-003C

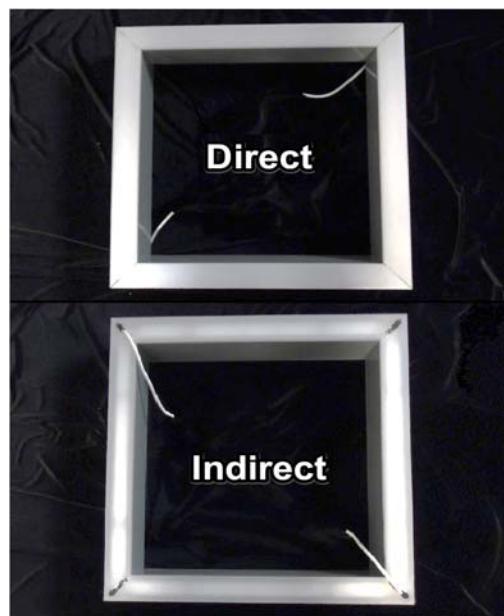
ISTM Report

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Prepared For:

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

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

Test date: 09/07/2017

Report date: 09/07/2017



**Test Report Number: LLIA000833-003C**

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- 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: LLIA000833-003C**

Catalog Number: MQS2-I/D-HO/HO-K35-80-2X2-XXX-AL/AL-XXXX-UNV

Pendant mounted, extruded aluminum housing, formed white enamel aluminum reflectors, translucent white plastic enclosures. 352 white LEDs, 4 PAL-Lighting LED upper boards with 44

LEDs each and 4 PAL-Lighting LED lower boards with 44 LEDs each

Two Osram Optotronic OT50W/PRG1400C/UNV/DIM/L LED drivers

Electrical Measurements

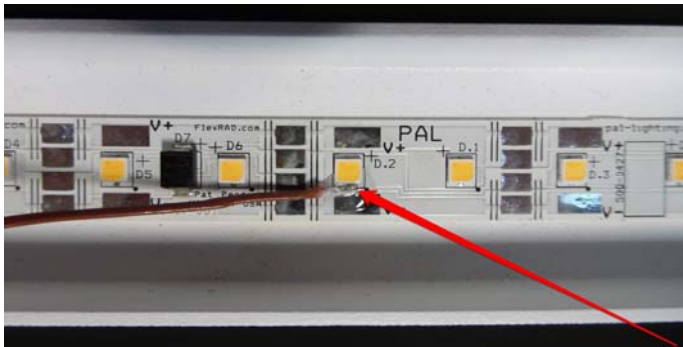
Voltage	120.0 Vac
Current	0.8212 A
Power	98.01 W
Frequency	60.0 Hz
Power Factor	0.995
Current THD	9.4 %
Driver #1 Output	1.253 Adc
Driver #2 Output	1.253 Adc

Temperature Measurements

LED #1 (Ts)	49.7°C	Driver #1 (Tc)	57.3°C
LED #2 (Ts)	49.3°C	Driver #2 (Tc)	55.0°C

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

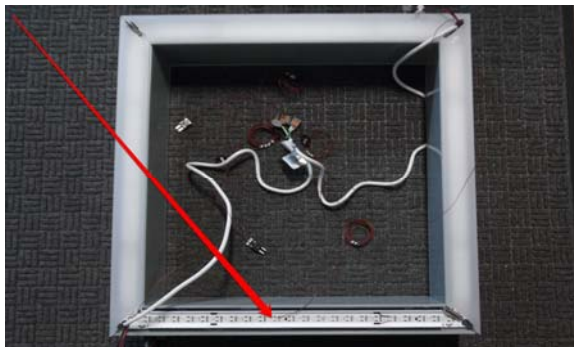
Measured Ambient Temperature (Ta) 24.6°C



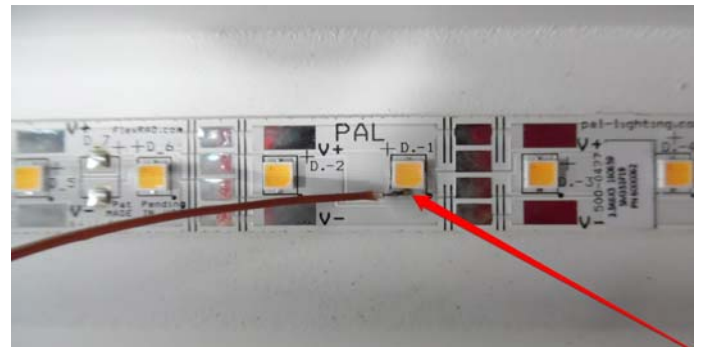
Indirect LED Thermocouple Location



Indirect Driver Thermocouple Location

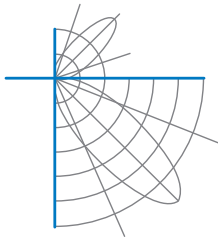


Indirect Selected LED Location



Direct LED Thermocouple Location





**Test Report Number: LLIA000833-003C**

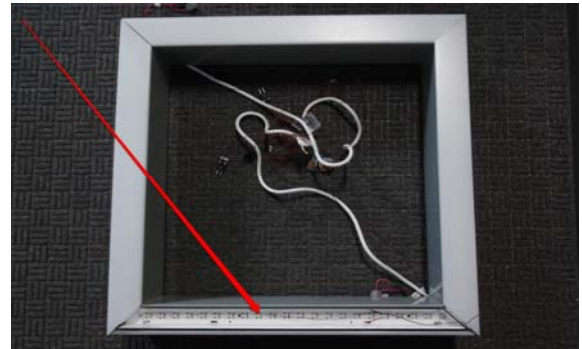
Catalog Number: MQS2-I/D-HO/HO-K35-80-2X2-XXX-AL/AL-XXXX-UNV

Pendant mounted, extruded aluminum housing, formed white enamel aluminum reflectors, translucent white plastic enclosures. 352 white LEDs, 4 PAL-Lighting LED upper boards with 44 LEDs each and 4 PAL-Lighting LED lower boards with 44 LEDs each

LEDs each and 4 PAL-Lighting LED lower boards with 44 LEDs each  
Two Osram Optotronic OT50W/PRG1400C/UNV/DIM/L LED drivers



Direct Driver Thermocouple Location



Direct Selected LED Location