

Report of Test

LLIA001168-006A

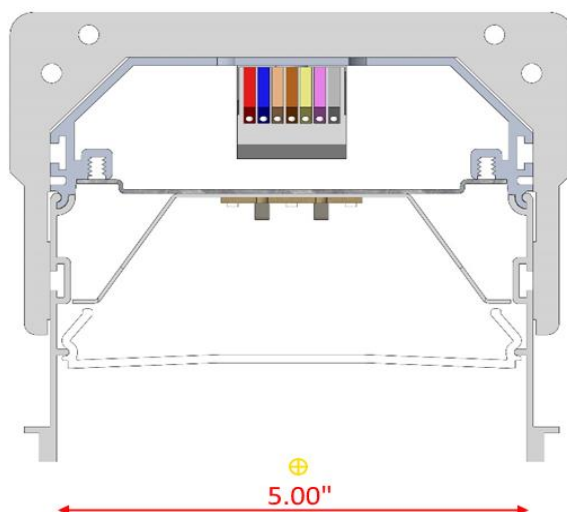
Indoor Distribution Photometry Test Report

Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

Recessed ceiling mounted, extruded aluminum housing, formed white enamel aluminum reflector, translucent white plastic enclosure.

144 white LEDs, four Osram PrevaLED BARs with 36 LEDs each.

One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 760mA.



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

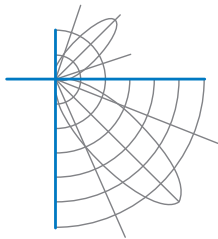
Performance Summary			
Input Voltage	120.0 V	Luminous Flux	3476.8 Lumens
Input Current	0.2479 A	Total Efficacy	118.1 Lm/W
Input Power	29.43 W	Downward Flux	3476.7 Lumens
Frequency	60.00 Hz	Downward Flux	100.0 % of Total
Power Factor	0.989		
Current THD	6.6 %		

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

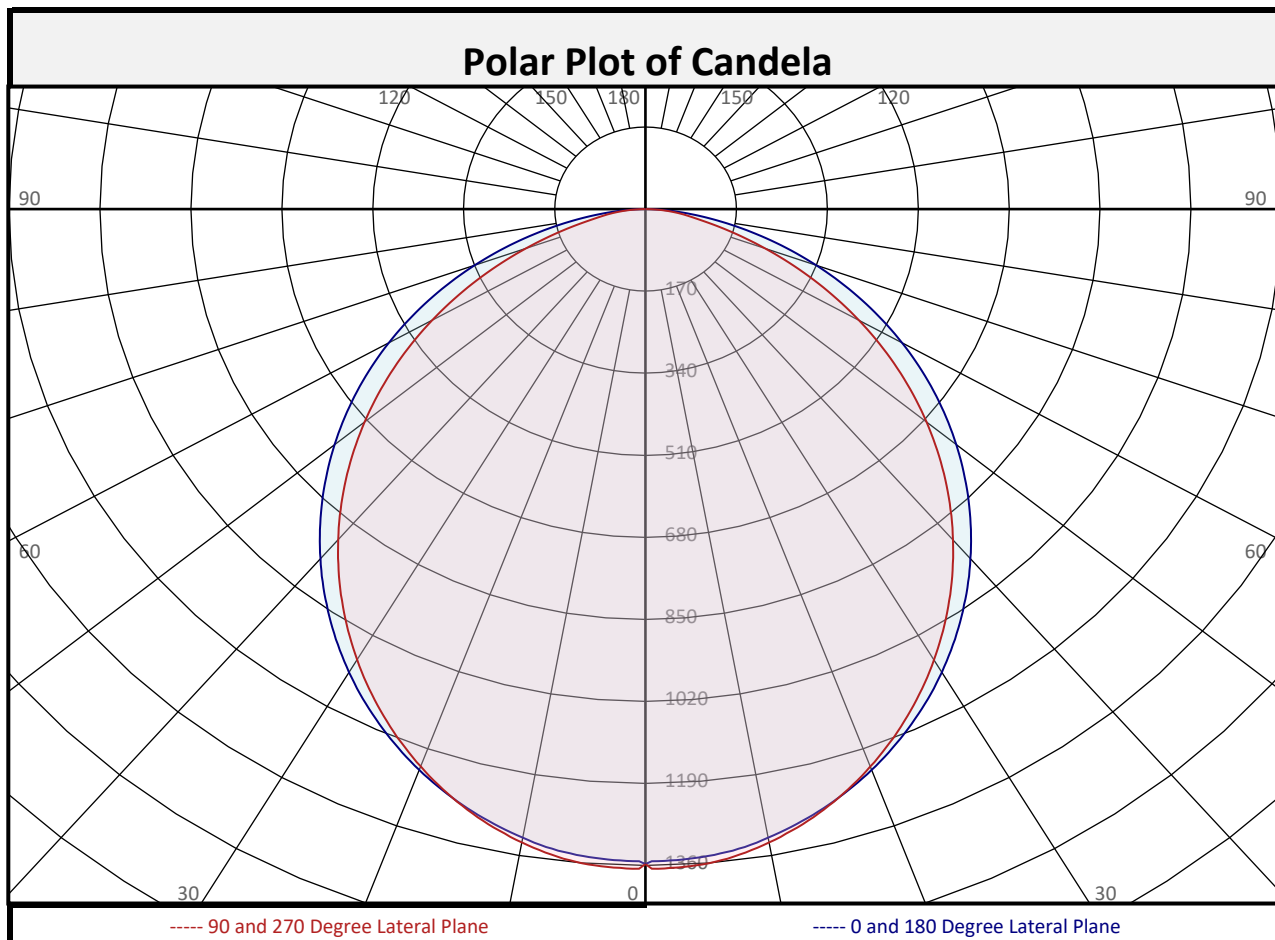
Test date: 11/01/2019

Report date: 11/04/2019

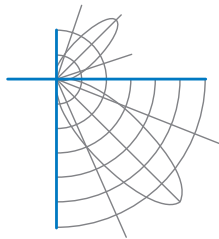
Signed: _____



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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	128.3	3.7%		90-100	0.0	0.0%		0-20	491.0	14.1%
10-20	362.7	10.4%		100-110	0.0	0.0%		0-30	1028	29.6%
20-30	537.3	15.5%		110-120	0.0	0.0%		0-40	1658	47.7%
30-40	629.9	18.1%		120-130	0.0	0.0%		0-60	2839	81.7%
40-50	632.4	18.2%		130-140	0.0	0.0%		0-80	3428	98.6%
50-60	548.1	15.8%		140-150	0.0	0.0%		10-90	3348	96.3%
60-70	391.0	11.2%		150-160	0.0	0.0%		20-50	1800	51.8%
70-80	197.8	5.7%		160-170	0.0	0.0%		40-90	1818	52.3%
80-90	49.1	1.4%		170-180	0.0	0.0%		60-90	637.9	18.3%
0-90	3477	100.0%		90-180	0.0	0.0%		0-180	3477	100.0%

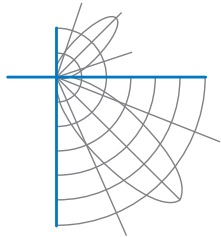


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Luminous Intensity (Candela) Table

		Lateral (C-Plane) Angles								
		0	22.5	45	67.5	90	112.5	135	157.5	180
Vertical (Gamma) Angles	0	1357	1357	1357	1357	1357	1357	1357	1357	1357
	2.5	1350	1351	1354	1360	1366	1360	1354	1351	1350
	5	1345	1347	1350	1355	1361	1355	1350	1347	1345
	7.5	1337	1339	1342	1345	1349	1345	1342	1339	1337
	10	1322	1326	1328	1330	1333	1330	1328	1326	1322
	12.5	1305	1308	1309	1311	1313	1311	1309	1308	1305
	15	1285	1288	1285	1288	1288	1288	1285	1288	1285
	17.5	1262	1264	1259	1262	1261	1262	1259	1264	1262
	20	1237	1237	1230	1231	1229	1231	1230	1237	1237
	22.5	1208	1208	1198	1197	1196	1197	1198	1208	1208
	25	1177	1175	1164	1161	1159	1161	1164	1175	1177
	27.5	1144	1140	1127	1122	1120	1122	1127	1140	1144
	30	1109	1103	1088	1081	1079	1081	1088	1103	1109
	32.5	1070	1064	1047	1038	1036	1038	1047	1064	1070
	35	1030	1022	1004	993	990	993	1004	1022	1030
	37.5	989	979	959	947	943	947	959	979	989
	40	945	935	913	899	895	899	913	935	945
	42.5	901	889	865	850	844	850	865	889	901
	45	855	841	817	800	793	800	817	841	855
	47.5	807	793	767	748	740	748	767	793	807
	50	759	743	716	695	686	695	716	743	759
	52.5	709	692	664	640	631	640	664	692	709
	55	658	641	611	586	575	586	611	641	658
	57.5	607	589	558	530	518	530	558	589	607
	60	554	536	504	474	461	474	504	536	554
	62.5	500	483	449	417	404	417	449	483	500
	65	447	430	394	360	347	360	394	430	447
67.5	393	377	339	304	291	304	339	377	393	
70	339	324	284	250	238	250	284	324	339	
72.5	286	271	230	198	188	198	230	271	286	
75	234	220	179	151	144	151	179	220	234	
77.5	184	170	131	111	106	111	131	170	184	
80	137	123	91	82	81	82	91	123	137	
82.5	95	79	61	61	60	61	61	79	95	
85	57	43	40	39	39	39	40	43	57	
87.5	24	19	18	18	18	18	18	19	24	
90	1	1	2	2	3	2	2	1	1	

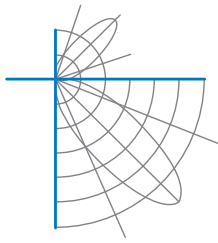


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Luminous Intensity (Candela) Table

		Lateral (C-Plane) Angles								
		0	22.5	45	67.5	90	112.5	135	157.5	180
Vertical (Gamma) Angles	90	1	1	2	2	3	2	2	1	1
	92.5	0	0	0	0	0	0	0	0	0
	95	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
	102.5	0	0	0	0	0	0	0	0	0
	105	0	0	0	0	0	0	0	0	0
	107.5	0	0	0	0	0	0	0	0	0
	110	0	0	0	0	0	0	0	0	0
	112.5	0	0	0	0	0	0	0	0	0
	115	0	0	0	0	0	0	0	0	0
	117.5	0	0	0	0	0	0	0	0	0
	120	0	0	0	0	0	0	0	0	0
	122.5	0	0	0	0	0	0	0	0	0
	125	0	0	0	0	0	0	0	0	0
	127.5	0	0	0	0	0	0	0	0	0
	130	0	0	0	0	0	0	0	0	0
	132.5	0	0	0	0	0	0	0	0	0
	135	0	0	0	0	0	0	0	0	0
	137.5	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	
142.5	0	0	0	0	0	0	0	0	0	
145	0	0	0	0	0	0	0	0	0	
147.5	0	0	0	0	0	0	0	0	0	
150	0	0	0	0	0	0	0	0	0	
152.5	0	0	0	0	0	0	0	0	0	
155	0	0	0	0	0	0	0	0	0	
157.5	0	0	0	0	0	0	0	0	0	
160	0	0	0	0	0	0	0	0	0	
162.5	0	0	0	0	0	0	0	0	0	
165	0	0	0	0	0	0	0	0	0	
167.5	0	0	0	0	0	0	0	0	0	
170	0	0	0	0	0	0	0	0	0	
172.5	0	0	0	0	0	0	0	0	0	
175	0	0	0	0	0	0	0	0	0	
177.5	0	0	0	0	0	0	0	0	0	
180	0	0	0	0	0	0	0	0	0	



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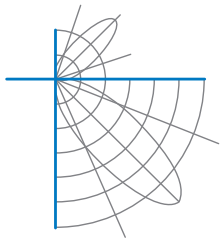
Coefficients of Utilization/Room Utilization - Zonal Cavity Method																						
Effective Floor Cavity Reflectance 0.20																						
RC	80					70					50				30				10			0
RW	70	50	30	10		70	50	30	10		50	30	10		50	30	10		50	30	10	0
RCR																						
0	119	119	119	119		116	116	116	116		111	111	111		106	106	106		102	102	102	100
1	109	105	101	97		107	102	99	95		98	95	92		94	92	90		91	89	87	85
2	100	92	85	80		97	90	84	79		86	81	77		83	79	75		80	77	73	71
3	91	81	73	67		89	79	72	66		76	70	65		74	68	64		71	67	63	61
4	84	72	63	57		81	71	63	56		68	61	56		66	60	55		64	58	54	52
5	77	64	56	49		75	63	55	49		61	54	48		59	53	48		57	52	47	45
6	71	58	49	43		69	57	49	43		55	48	42		54	47	42		52	46	42	40
7	66	53	44	38		64	52	44	38		50	43	38		49	42	37		48	42	37	35
8	62	48	40	34		60	48	40	34		46	39	34		45	38	34		44	38	33	31
9	58	44	36	31		56	44	36	31		43	35	30		42	35	30		41	35	30	28
10	54	41	33	28		53	40	33	28		39	33	28		39	32	28		38	32	27	26

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.

Circle of Light Plot				
Height(ft)	Illuminance at Nadir (fc)	Ground-level distance to half-of-nadir illuminance (ft)		
		0-180 deg	90-270 deg	
6.0	37.7	7.30	7.12	
8.0	21.2	9.73	9.50	
10.0	13.6	12.17	11.87	
12.0	9.4	14.60	14.24	
14.0	6.9	17.04	16.62	
16.0	5.3	19.47	18.99	

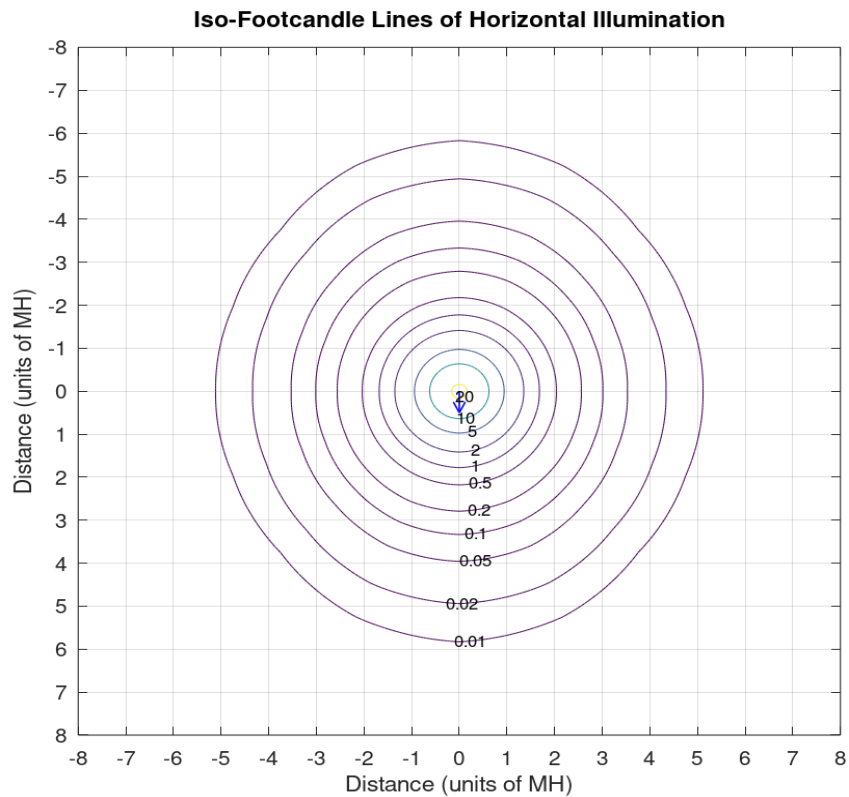
Average Luminance (cd/m ²)			
	0 deg Plane	45 deg Plane	90 deg Plane
0	8952	8952	8952
45	7971	7617	7396
55	7566	7029	6608
65	6976	6145	5418
75	5962	4553	3659
85	4296	3005	2943

Spacing Criterion	
0 degree plane:	1.2
90 degree plane:	1.2
180 degree plane:	1.2
270 degree plane:	1.2

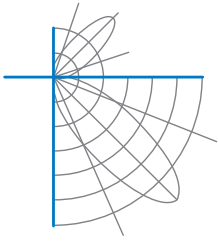


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Iso-Illuminance Plot



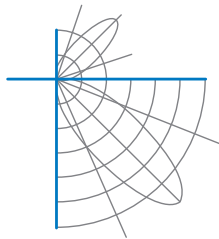
The isofootcandle values shown in the plot above are based on a mounting height of $h = 8.0$ feet. Grid values show multiples of mounting height. The isoilluminance contour lines are expressed in units of footcandles. The values expressed are based on the direct light from a single unit without the contribution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



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Additional Pictures of Test Subject





Report of Test

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Test Distance 9.5 m
Ambient Temperature 24.6 °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-79-19 and ANSI C82.77-10:2014. Format of reports and angular increments based on IES LM-41-14 and LM-46-04.

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

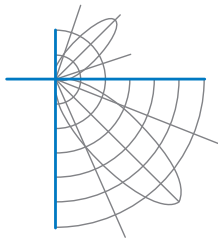
Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

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

LLIA001168-006B

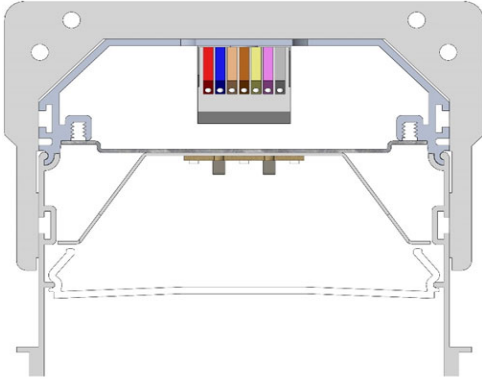
Integrating Sphere Report

Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

Recessed ceiling mounted, extruded aluminum housing, formed white enamel aluminum reflector, translucent white plastic enclosure.

144 white LEDs, four Osram PrevaLED BARs with 36 LEDs each.

One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 760mA.



Performance Summary

Voltage	120.0 Vac
Current	0.2485 A
Power	29.43 W
Frequency	59.97 Hz
Power Factor	0.987
Current THD	6.5 %

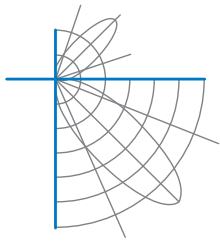
Total Luminous Flux	3522.4 lm
Efficacy	119.7 lm/W
Chromaticity (x,y)	(0.4075, 0.3928)
(u',v')	(0.2363, 0.5125)
Duv	0.0004
CCT	3469 K
CRI (Ra)	82
R9	6
TM-30: Rf	81
TM-30: Rg	98

Prepared For:

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

Test date: 11/01/2019

Report date: 11/04/2019



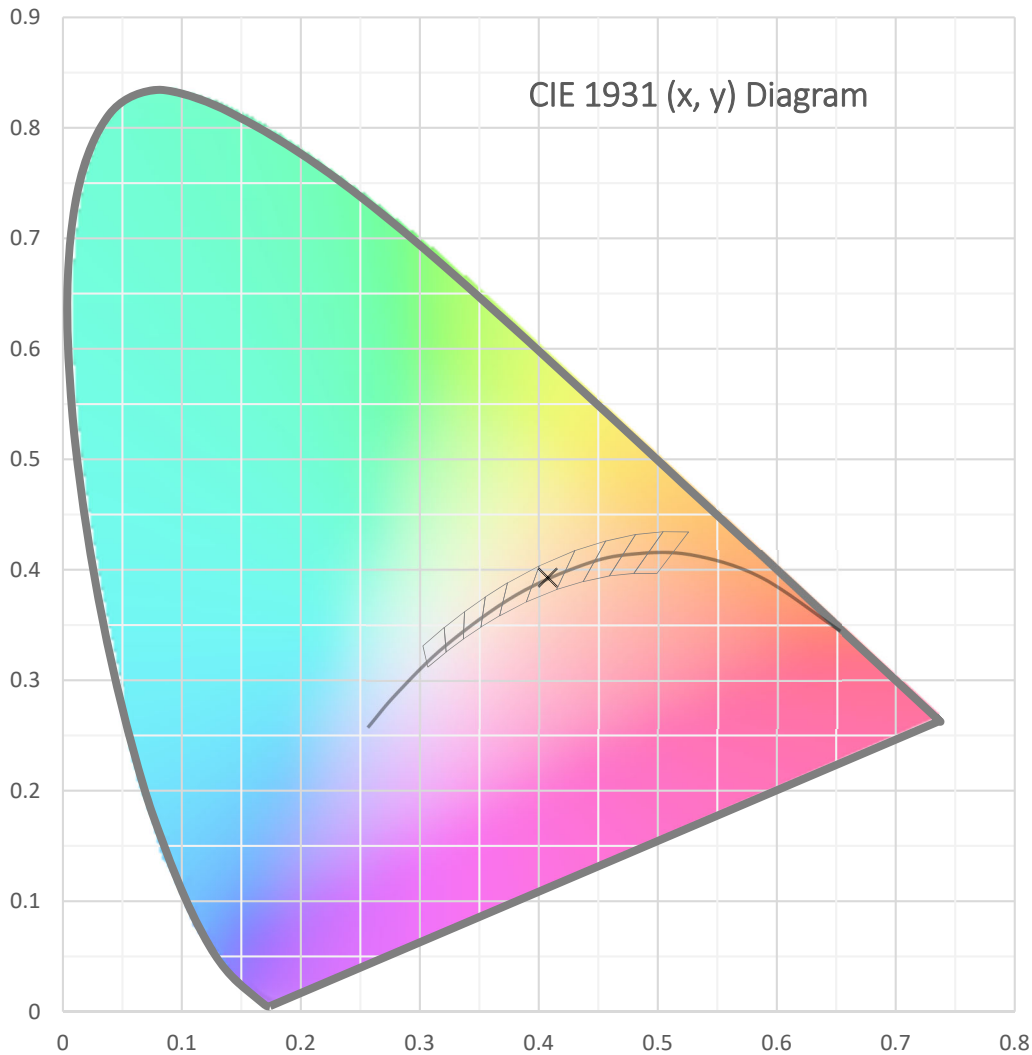
Test Report Number: LLIA001168-006B

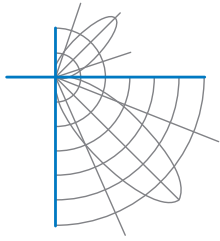
Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

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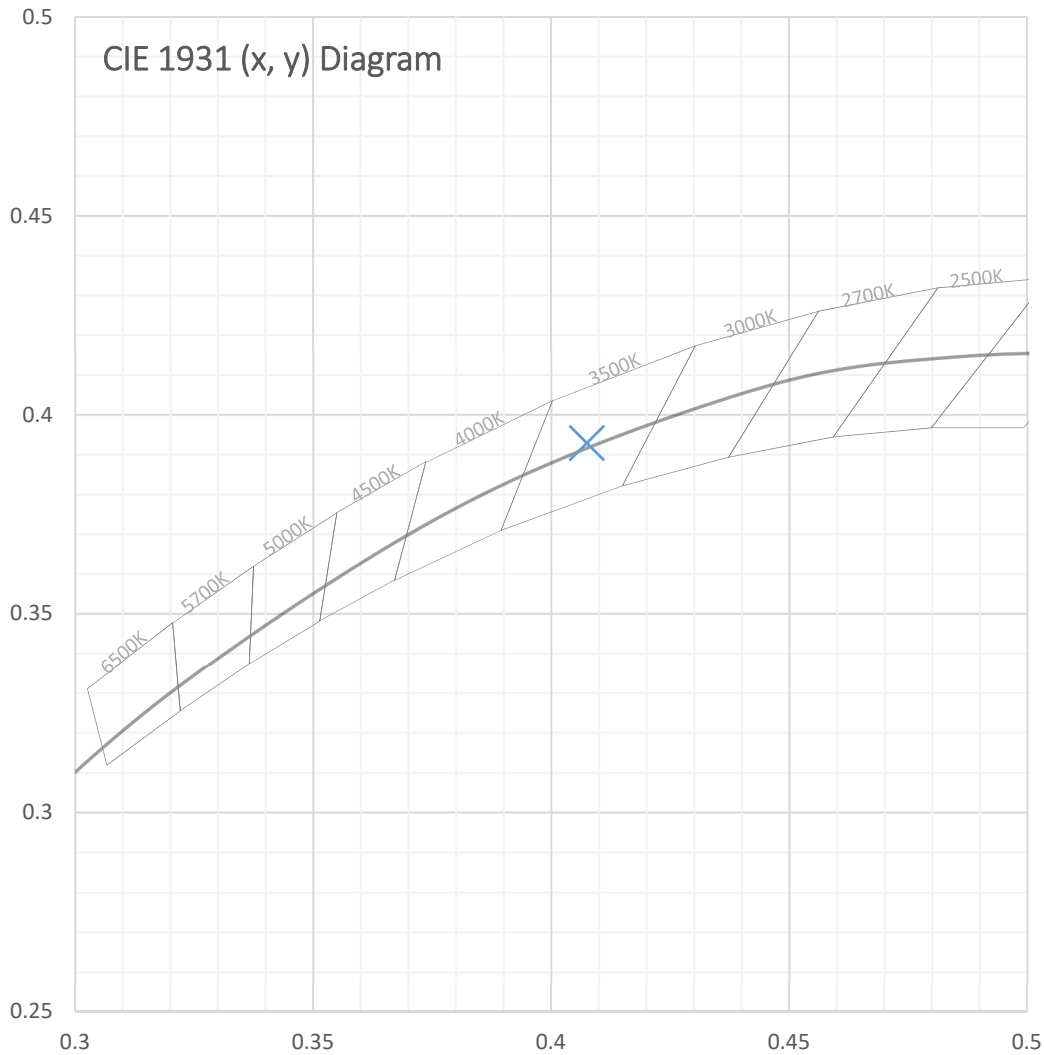
Test Report Number: LLIA001168-006B

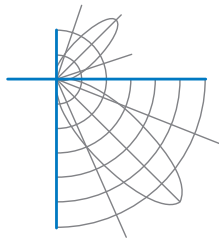
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One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 760mA.

Spectral Data	Total Radiant Flux	10.53 W
	Total Luminous Flux	3522.4 Lm
	Chromaticity CIE 1931 (x, y)	(0.4075, 0.3928)
	Chromaticity CIE 1976 (u', v')	(0.2363, 0.5125)
	Correlated Color Temperature (CCT)	3469 K
	Color Rendering Index (Ra)	82
	R1	81
	R2	87
	R3	93
	R4	83
	R5	81
	R6	84
	R7	85
	R8	63
	R9	6
	R10	70
	R11	84
	R12	61
	R13	82
	R14	96
	TM-30: Rf	81
	TM-30: Rg	98
	Distance from Planckian Locus (Duv)	0.0004
	Scotopic/Photopic Ratio *	1.470

Electrical Data

Voltage	120.0 Vac
Current	0.2485 A
Power	29.43 W
Frequency	59.97 Hz
Power Factor	0.987
Current THD	6.5 %



Test Report Number: LLIA001168-006B

Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

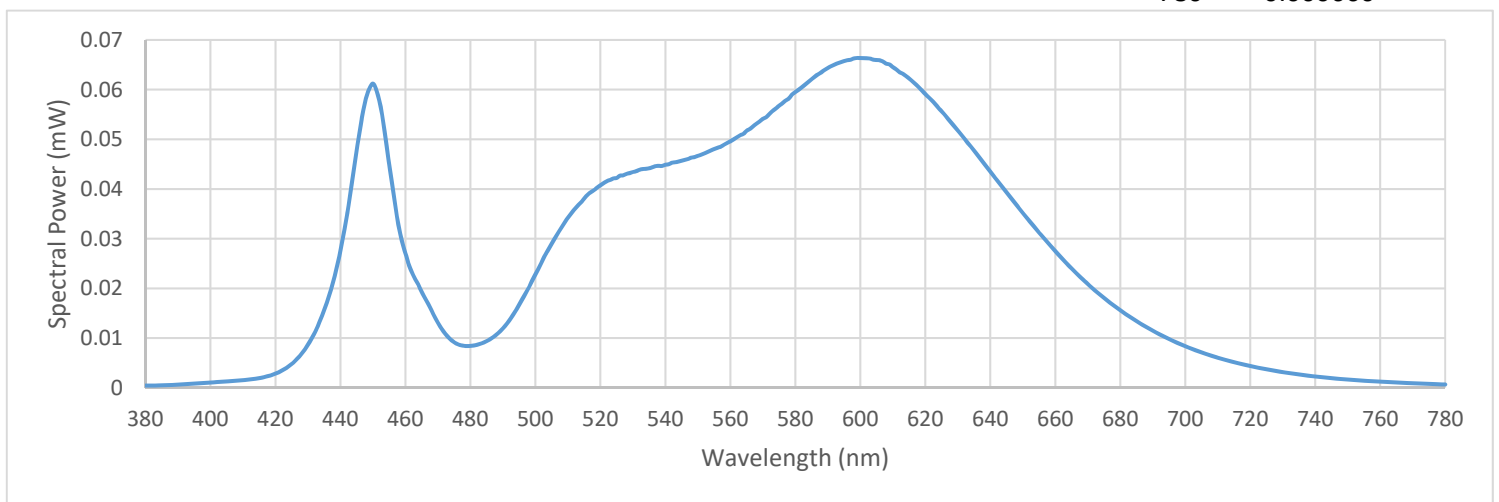
Recessed ceiling mounted, extruded aluminum housing, formed white enamel aluminum reflector, translucent white plastic enclosure.

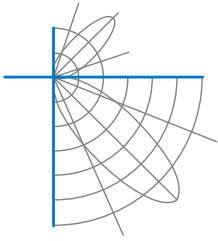
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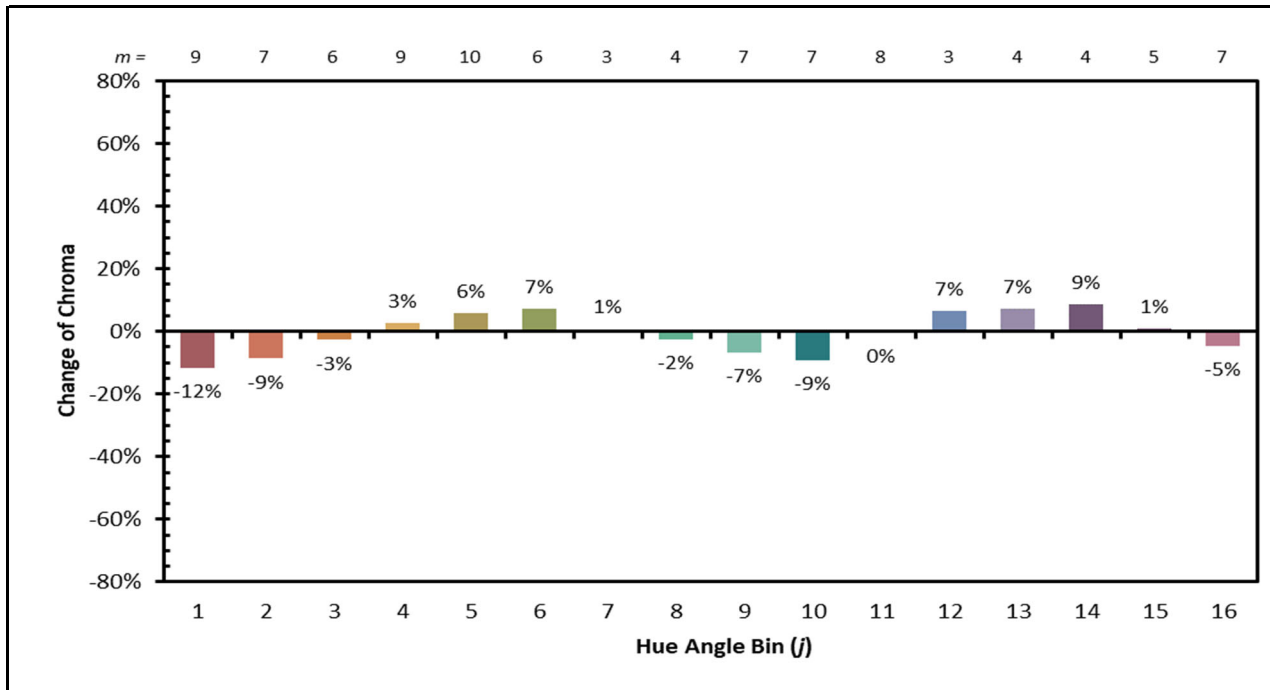
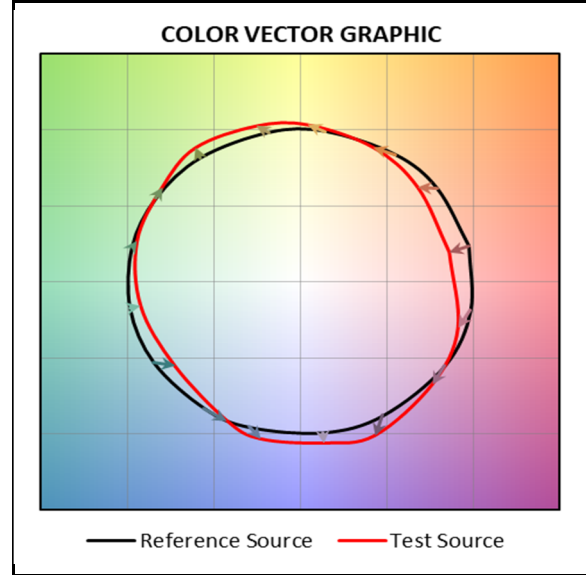
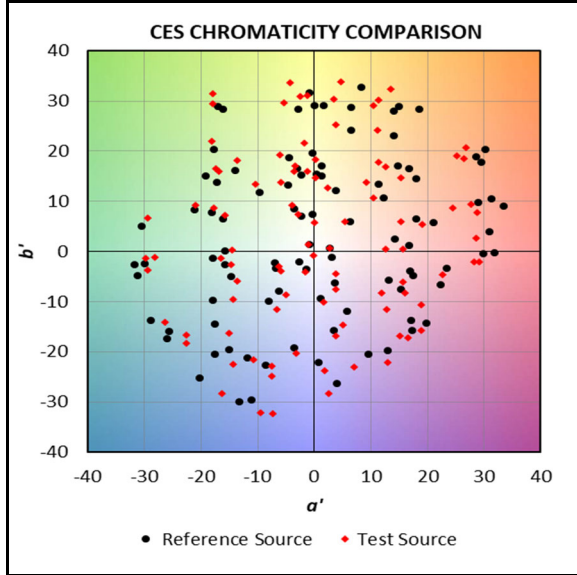
Summary Spectral Power Distribution (wavelength - nm, spectral power - mW)

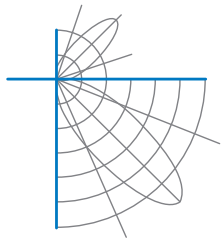
380	0.000434	480	0.008427	580	0.059504	680	0.015586
385	0.000490	485	0.009378	585	0.062101	685	0.013402
390	0.000639	490	0.011961	590	0.064399	690	0.011472
395	0.000829	495	0.016697	595	0.065778	695	0.009806
400	0.001052	500	0.022860	600	0.066355	700	0.008395
405	0.001275	505	0.028934	605	0.065957	705	0.007124
410	0.001529	510	0.034181	610	0.064520	710	0.006045
415	0.001944	515	0.038075	615	0.062263	715	0.005156
420	0.002851	520	0.040749	620	0.059080	720	0.004368
425	0.004769	525	0.042223	625	0.055673	725	0.003696
430	0.008729	530	0.043428	630	0.051758	730	0.003152
435	0.015628	535	0.044165	635	0.047780	735	0.002674
440	0.027401	540	0.044883	640	0.043486	740	0.002268
445	0.047706	545	0.045688	645	0.039316	745	0.001936
450	0.061204	550	0.046683	650	0.035153	750	0.001661
455	0.044897	555	0.048023	655	0.031190	755	0.001419
460	0.027085	560	0.049585	660	0.027560	760	0.001223
465	0.019284	565	0.051719	665	0.024033	765	0.001047
470	0.013119	570	0.054125	670	0.020886	770	0.000894
475	0.009132	575	0.056764	675	0.018083	775	0.000772
						780	0.000660





IES TM-30 Details





Test Report Number: LLIA001168-006B

Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

Recessed ceiling mounted, extruded aluminum housing, formed white enamel aluminum reflector, translucent white plastic enclosure.

144 white LEDs, four Osram PrevaLED BARs with 36 LEDs each.

One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 760mA.

Test Equipment Configuration: LightLab International Allentown 2m Integrating Sphere
Measurements acquired using a Labsphere CDS 2600 spectroradiometer
Testing was performed using 4 π geometry

Test Temperature: 25.1 °C

Test Procedure: Tested in accordance with the applicable sections of:
LM-79-19, LM-78-07, LM-58-13, ANSI_ANSLG C78.377-2017,
ANSI C82-77-10:2014, TM-30-15

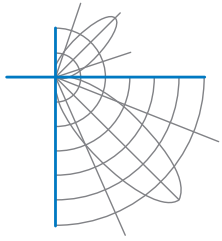
Significance: The laboratory has not participated in the selection of samples to be tested.
All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

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.



Report of Test

LLIA001168-006C

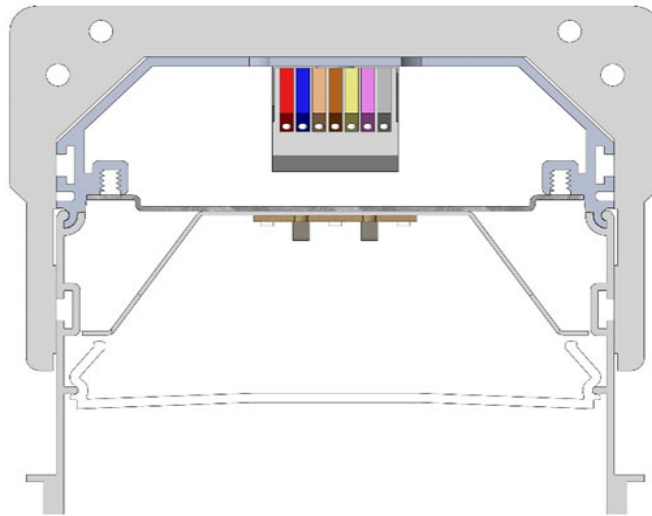
ISTM Report

Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

Recessed ceiling mounted, extruded aluminum housing, formed white enamel aluminum reflector, translucent white plastic enclosure.

144 white LEDs, four Osram PrevaLED BARs with 36 LEDs each.

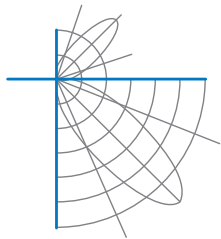
One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 760mA.



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: 11/04/2019
Report date: 11/04/2019



Test Report Number: LLIA001168-006C

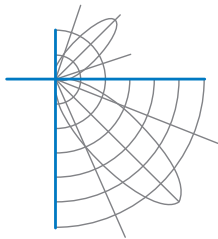
Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

Recessed ceiling mounted, extruded aluminum housing, formed white enamel aluminum reflector, translucent white plastic enclosure.

144 white LEDs, four Osram PrevaLED BARs with 36 LEDs each.

One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 760mA.

- 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:** Recessed/Ceiling (NON-IC)
- LED Test Point:** Thermocouples were attached to the LED case temperature point (Ts) as specified by report number SQETMR704203, issued 06/04/2018 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 inside of a normal temperature test box for type NON-IC luminaires. 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: LLIA001168-006C

Catalog Number: MLR5RG-HO-K35-80-4-XX-LOH-UNV

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Electrical Measurements

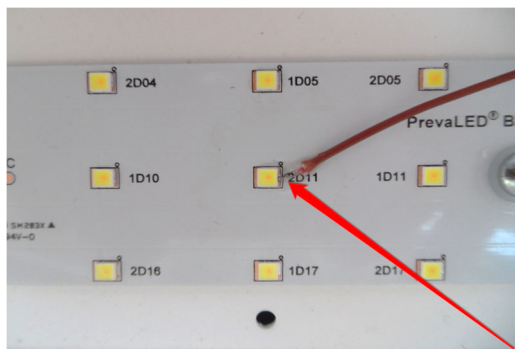
Voltage	120.0 Vac
Current	0.2481 A
Power	29.48 W
Frequency	60.0 Hz
Power Factor	0.990
Current THD	6.6 %
Driver #1 Output	0.758 Adc

Temperature Measurements

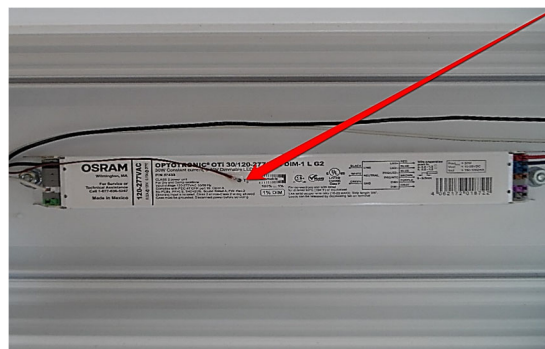
LED #1 (Ts)	41.7°C	Driver #1 (Tc)	42.6°C
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*The above temperatures have been normalized to 25°C ambient.

Measured Ambient Temperature (Ta) 23.6°C



LED Thermocouple Location



Driver Thermocouple Location



Selected LED Location