LightLab INTERNATIONAL ALLENTOWN LLC

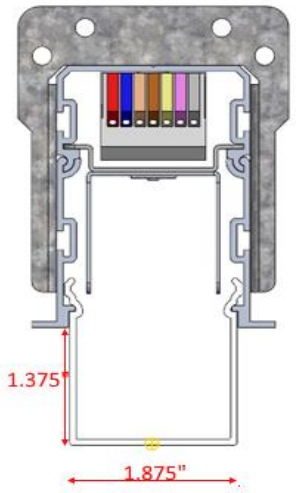
NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001159-005A

Indoor Distribution Photometry Test Report

Catalog Number: MLR2-MO-K35-80-4-XX-AL2-UNV
Recessed ceiling mounted, extruded aluminum housing with steel endcaps,
formed white enamel aluminum reflector, translucent white plastic enclosure.
92 white LEDs, One PAL-Lighting FlexRad board.
One Osram Optotronic OTi 20/120-277/700 DIM-1 L G2 LED driver labeled as 480mA



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

Performance Summary					
Input Voltage	120.0	V	Luminous Flux	1876.7	Lumens
Input Current	0.1555	A	Total Efficacy	101.4	Lm/W
Input Power	18.50	W	Downward Flux	1518.8	Lumens
Frequency	60.00	Hz	Downward Flux	80.9	% of Total
Power Factor	0.992				
Current THD	5.9	%			

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

Test date: 09/06/2019
Report date: 09/06/2019

Signed: Michael L. Grather

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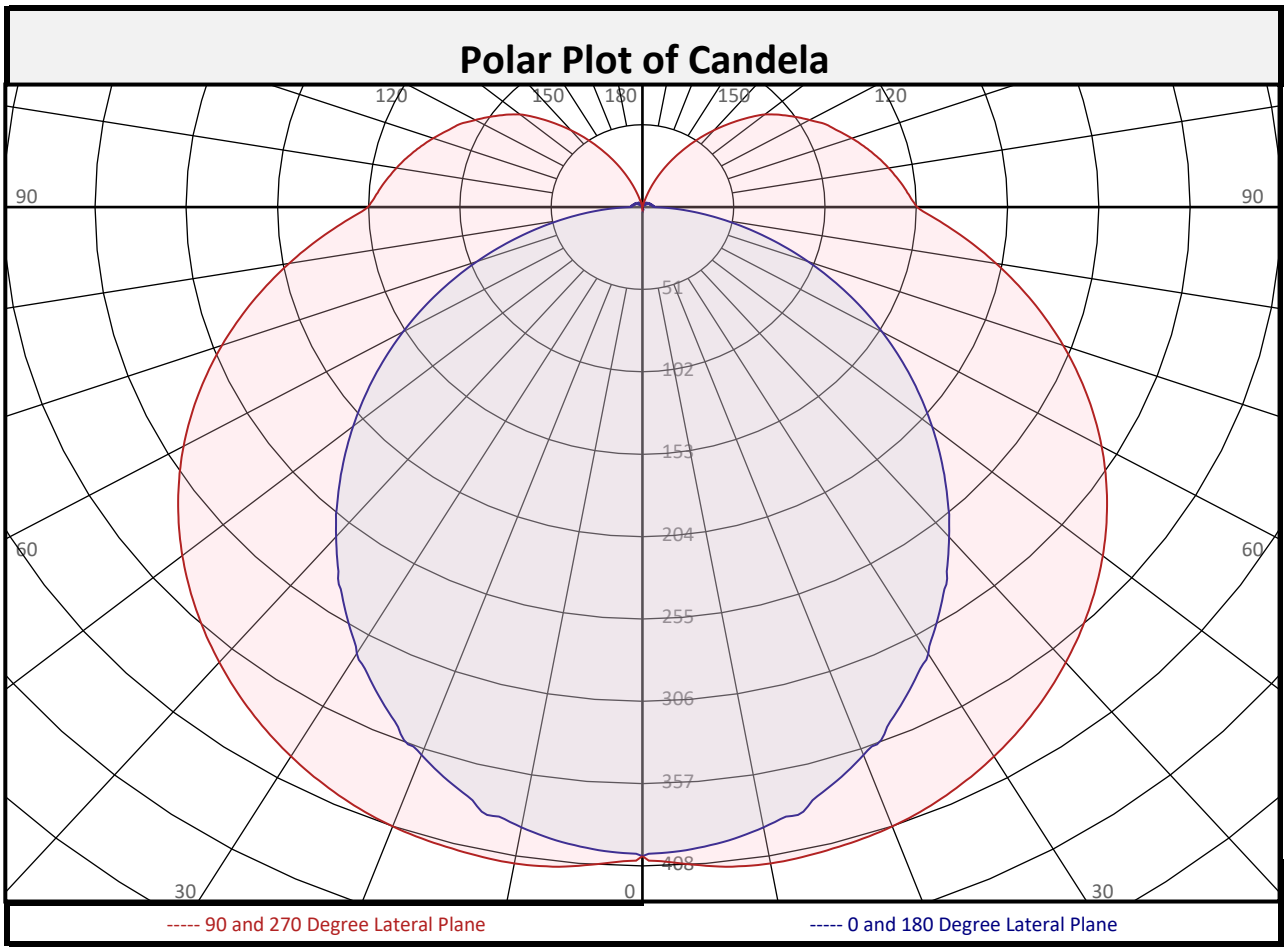
LLIA001159-005A



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	38.5	2.1%	90-100	99.4	5.3%	0-20	150.6	8.0%
10-20	112.2	6.0%	100-110	87.0	4.6%	0-30	324.0	17.3%
20-30	173.3	9.2%	110-120	70.4	3.8%	0-40	539.3	28.7%
30-40	215.4	11.5%	120-130	51.4	2.7%	0-60	1009	53.8%
40-50	235.6	12.6%	130-140	31.4	1.7%	0-80	1392	74.2%
50-60	233.7	12.5%	140-150	14.9	0.8%	10-90	1480	78.9%
60-70	211.1	11.2%	150-160	3.3	0.2%	20-50	624.3	33.3%
70-80	172.5	9.2%	160-170	0.0	0.0%	40-90	979.5	52.2%
80-90	126.6	6.7%	170-180	0.0	0.0%	60-90	510.2	27.2%
0-90	1519	80.9%	90-180	357.8	19.1%	0-180	1877	100.0%

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Luminous Intensity (Candela) Table

	Lateral (C-Plane) Angles									
Vertical (Gamma) Angles		0	22.5	45	67.5	90	112.5	135	157.5	180
	0	402	402	402	402	402	402	402	402	402
	2.5	400	400	402	404	406	404	402	400	400
	5	398	399	403	407	409	407	403	399	398
	7.5	394	397	403	409	412	409	403	397	394
	10	390	395	403	410	413	410	403	395	390
	12.5	386	391	401	409	412	409	401	391	386
	15	378	389	398	407	411	407	398	389	378
	17.5	370	381	396	405	410	405	396	381	370
	20	361	374	390	402	408	402	390	374	361
	22.5	353	367	384	399	405	399	384	367	353
	25	341	358	378	395	402	395	378	358	341
	27.5	330	349	372	390	398	390	372	349	330
	30	319	338	364	385	393	385	364	338	319
	32.5	306	328	357	379	387	379	357	328	306
	35	293	317	348	373	381	373	348	317	293
	37.5	280	306	340	365	375	365	340	306	280
	40	266	295	331	358	368	358	331	295	266
	42.5	253	283	321	350	361	350	321	283	253
	45	239	272	311	342	353	342	311	272	239
	47.5	225	259	301	333	344	333	301	259	225
	50	211	247	290	324	336	324	290	247	211
	52.5	197	235	279	314	327	314	279	235	197
	55	183	222	268	304	317	304	268	222	183
	57.5	169	209	257	294	307	294	257	209	169
	60	155	197	245	283	296	283	245	197	155
	62.5	140	184	234	272	285	272	234	184	140
	65	126	170	222	260	274	260	222	170	126
	67.5	112	157	209	248	262	248	209	157	112
	70	98	144	197	237	250	237	197	144	98
	72.5	85	132	185	224	238	224	185	132	85
	75	71	119	173	212	226	212	173	119	71
	77.5	59	107	161	200	213	200	161	107	59
	80	47	95	149	187	201	187	149	95	47
	82.5	35	84	137	175	188	175	137	84	35
	85	25	73	126	163	176	163	126	73	25
	87.5	15	63	115	152	164	152	115	63	15
	90	7	54	106	142	154	142	106	54	7

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Luminous Intensity (Candela) Table

	Lateral (C-Plane) Angles									
Vertical (Gamma) Angles		0	22.5	45	67.5	90	112.5	135	157.5	180
	90	7	54	106	142	154	142	106	54	7
	92.5	6	53	103	138	150	138	103	53	6
	95	6	52	101	135	146	135	101	52	6
	97.5	6	51	99	132	143	132	99	51	6
	100	6	49	97	129	140	129	97	49	6
	102.5	5	48	94	126	136	126	94	48	5
	105	5	46	92	122	132	122	92	46	5
	107.5	5	45	89	119	128	119	89	45	5
	110	5	42	86	115	125	115	86	42	5
	112.5	5	38	83	111	121	111	83	38	5
	115	4	35	80	107	117	107	80	35	4
	117.5	4	32	77	104	113	104	77	32	4
	120	4	29	74	100	108	100	74	29	4
	122.5	4	26	70	95	103	95	70	26	4
	125	4	23	64	91	99	91	64	23	4
	127.5	3	20	59	86	94	86	59	20	3
	130	3	17	54	80	89	80	54	17	3
	132.5	3	14	48	74	83	74	48	14	3
	135	2	11	43	67	76	67	43	11	2
	137.5	2	9	38	61	69	61	38	9	2
	140	2	6	33	54	62	54	33	6	2
	142.5	2	4	29	48	55	48	29	4	2
	145	2	2	24	42	49	42	24	2	2
	147.5	1	1	19	36	42	36	19	1	1
	150	1	1	15	30	35	30	15	1	1
	152.5	1	1	11	24	29	24	11	1	1
	155	1	1	7	18	23	18	7	1	1
	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	115	115	115	115		110	110	110	110		101	101	101		92	92	92		85	85	85	81
1	102	96	91	86		97	92	87	83		84	80	77		77	74	71		70	68	65	62
2	91	82	74	68		87	78	71	66		72	66	61		66	61	57		60	56	53	49
3	83	71	62	55		78	68	60	53		62	56	50		57	51	47		52	48	44	41
4	75	63	53	46		71	60	51	45		55	48	42		50	44	39		46	41	37	34
5	69	55	46	39		65	53	44	38		49	41	36		45	39	34		41	36	32	29
6	64	50	40	34		60	48	39	33		44	37	31		40	34	29		37	32	28	25
7	59	45	36	29		56	43	35	29		40	32	27		37	30	26		34	28	24	22
8	55	41	32	26		52	39	31	25		36	29	24		34	27	23		31	26	22	19
9	51	37	29	23		48	36	28	23		33	26	22		31	25	20		29	23	19	17
10	48	34	26	21		45	33	25	20		31	24	19		29	23	18		26	21	18	16

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	11.2	7.10	8.71
8.0	6.3	9.46	11.61
10.0	4.0	11.83	14.51
12.0	2.8	14.20	17.42
14.0	2.1	16.56	20.32
16.0	1.6	18.93	23.22

Average Luminance (cd/m^2)

	0 deg Plane	45 deg Plane	90 deg Plane
0	7088	7088	7088
45	5915	6766	7332
55	5561	6821	7577
65	5179	7030	7996
75	4729	7599	8801
85	4611	9503	10830

Spacing Criterion

0 degree plane:	1.2
90 degree plane:	1.5
180 degree plane:	1.2
270 degree plane:	1.5

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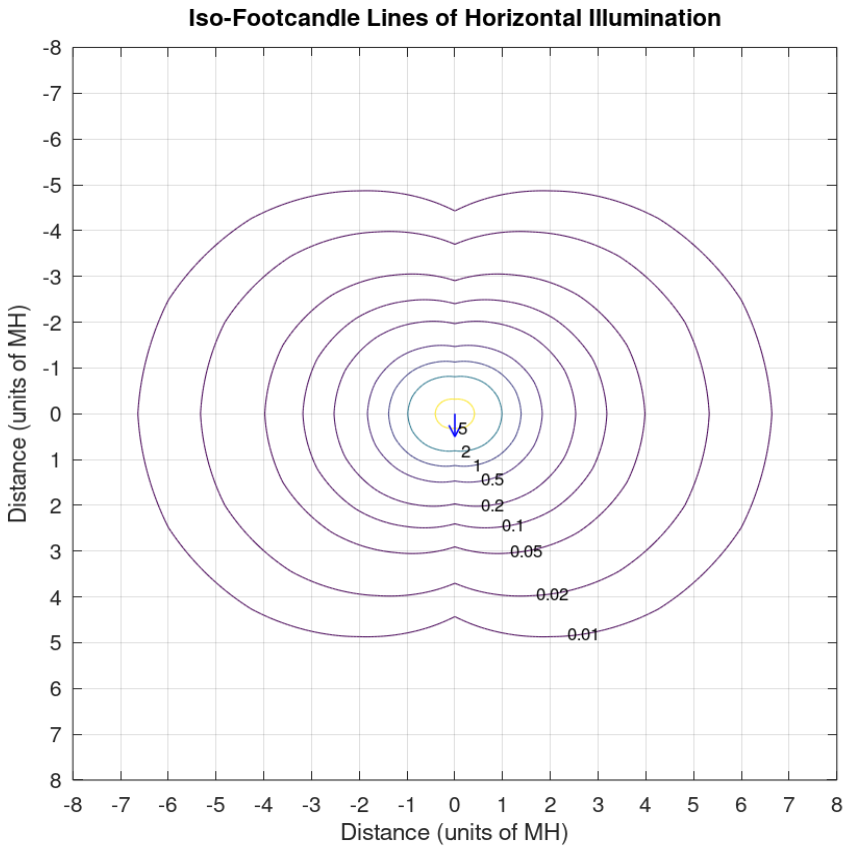
Iso-Illuminance Plot



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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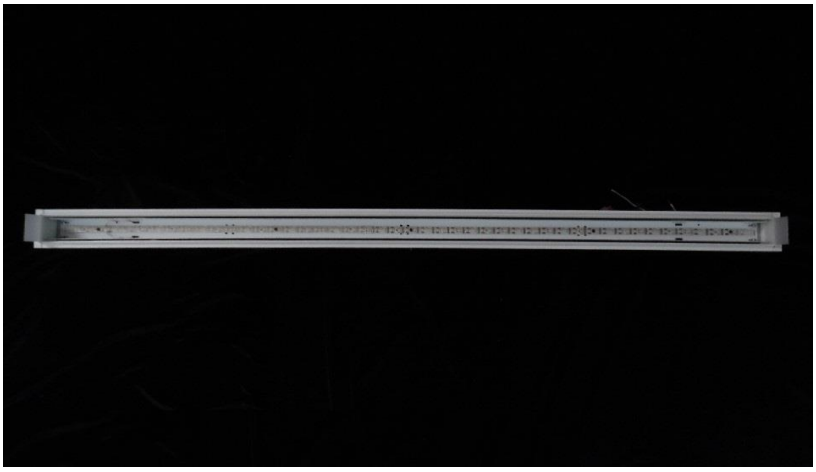
Additional Pictures of Test Subject



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Test Distance	9.5 m
Ambient Temperature	24.9 °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 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.

LightLab INTERNATIONAL ALLENTOWN LLC

NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001159-005B

Integrating Sphere Report
Catalog Number: MLR2-MO-K35-80-4-XX-AL2-UNV
Recessed ceiling mounted, extruded aluminum housing with steel endcaps,
formed white enamel aluminum reflector, translucent white plastic enclosure.
92 white LEDs, One PAL-Lighting FlexRad board.
One Osram Optotronic OTi 20/120-277/700 DIM-1 L G2 LED driver labeled as 480mA

Performance Summary

Voltage	120.0	Vac
Current	0.1560	A
Power	18.57	W
Frequency	60.00	Hz
Power Factor	0.992	
Current THD	5.9	%
Total Luminous Flux	1886.6	lm
Efficacy	101.6	lm/W
Chromaticity (x,y)	(0.4043, 0.3868)	
(u',v')	(0.2367, 0.5095)	
Duv	-0.0015	
CCT	3490	K
CRI (Ra)	84	
R9	16	
TM-30: Rf	83	
TM-30: Rg	94	

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

Test date: 09/04/2019
Report date: 09/06/2019

Test Report Number: LLIA001159-005B

Catalog Number: MLR2-MO-K35-80-4-XX-AL2-UNV

Recessed ceiling mounted, extruded aluminum housing with steel endcaps,
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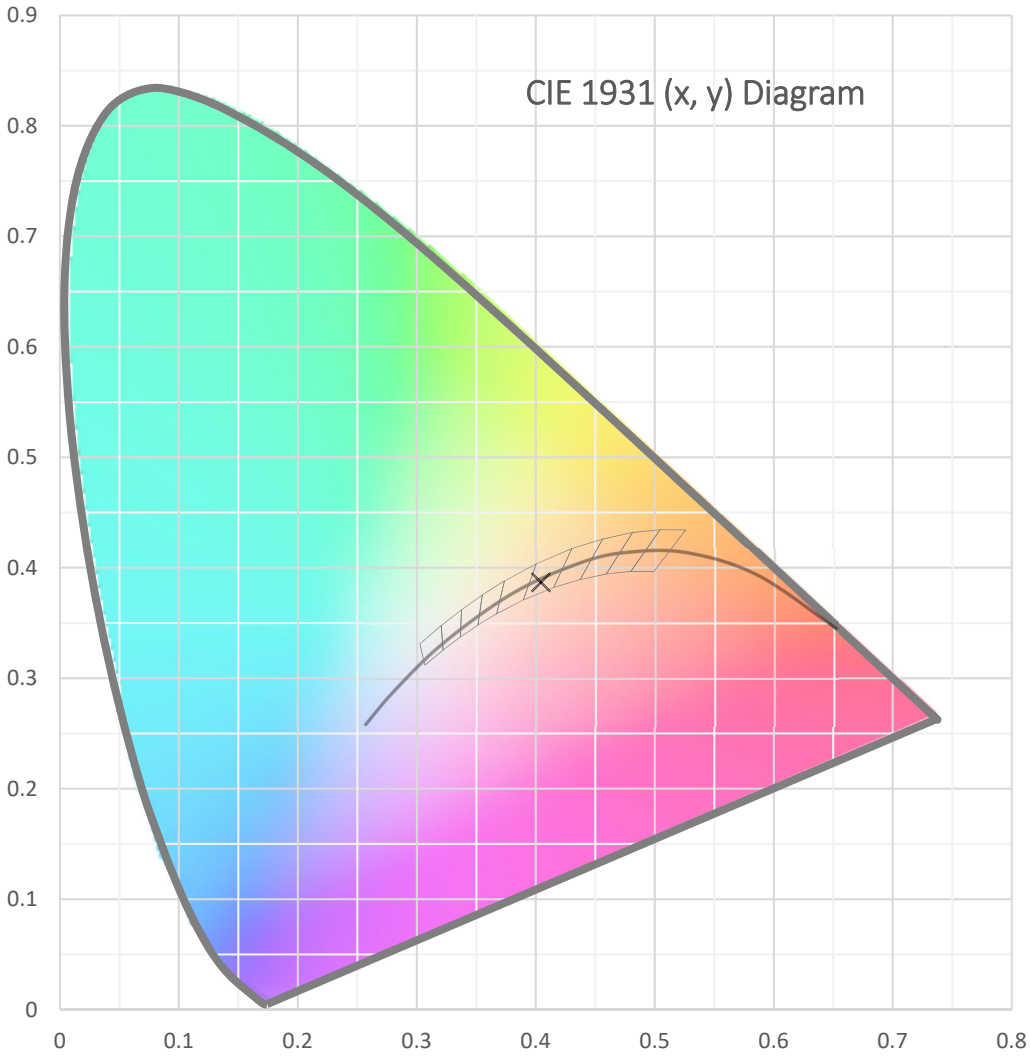

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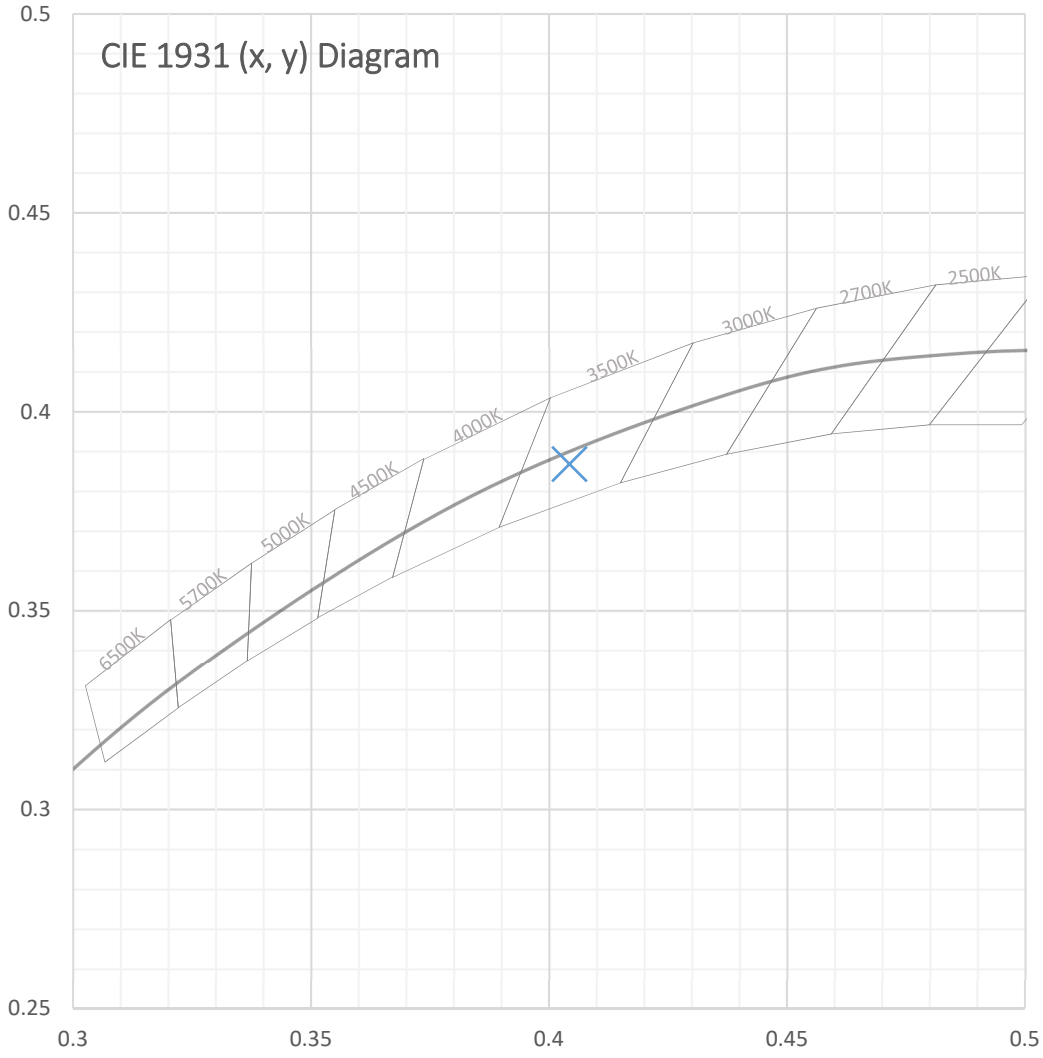

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Spectral Data	Total Radiant Flux	5.858	W
	Total Luminous Flux	1886.6	Lm
	Chromaticity CIE 1931 (x, y)	(0.4043, 0.3868)	
	Chromaticity CIE 1976 (u', v')	(0.2367, 0.5095)	
	Correlated Color Temperature (CCT)	3490	K
	Color Rendering Index (Ra)	84	
	R1	83	
	R2	93	
	R3	96	
	R4	81	
	R5	83	
	R6	90	
	R7	84	
	R8	64	
	R9	16	
	R10	82	
	R11	80	
	R12	67	
	R13	86	
	R14	99	
	TM-30: Rf	83	
	TM-30: Rg	94	
	Distance from Planckian Locus (Duv)	-0.0015	
	Scotopic/Photopic Ratio *	1.565	
Electrical Data			
	Voltage	120.0	Vac
	Current	0.1560	A
	Power	18.57	W
	Frequency	60.00	Hz
	Power Factor	0.992	
	Current THD	5.9	%

Test Report Number: LLIA001159-005B

Catalog Number: MLR2-MO-K35-80-4-XX-AL2-UNV

Recessed ceiling mounted, extruded aluminum housing with steel endcaps,
formed white enamel aluminum reflector, translucent white plastic enclosure.
92 white LEDs, One PAL-Lighting FlexRad board.
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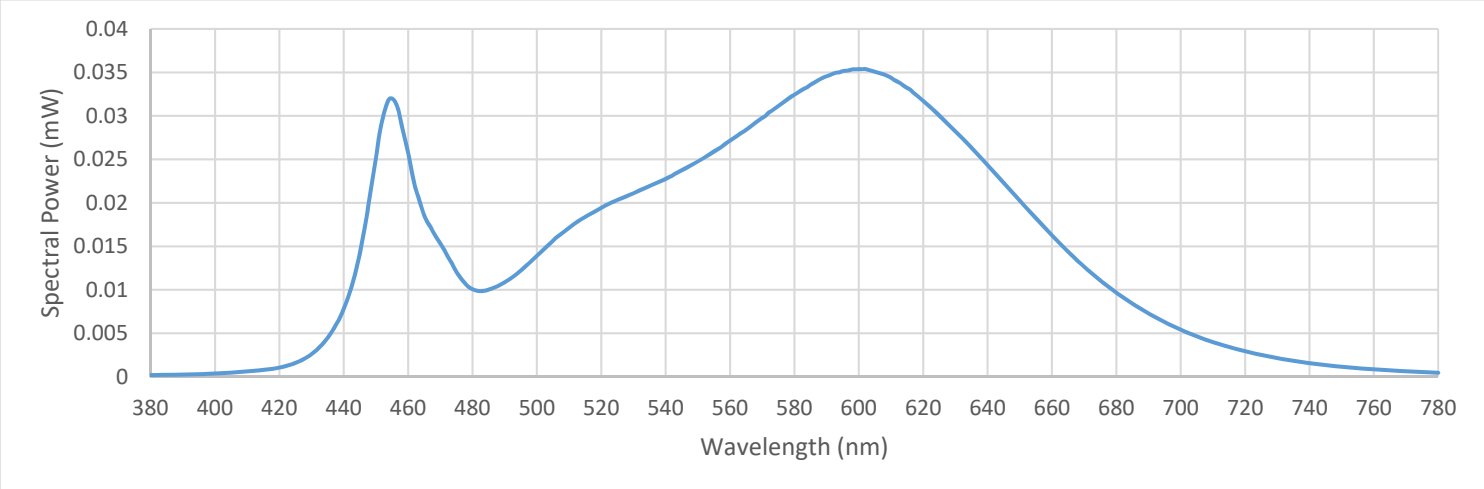
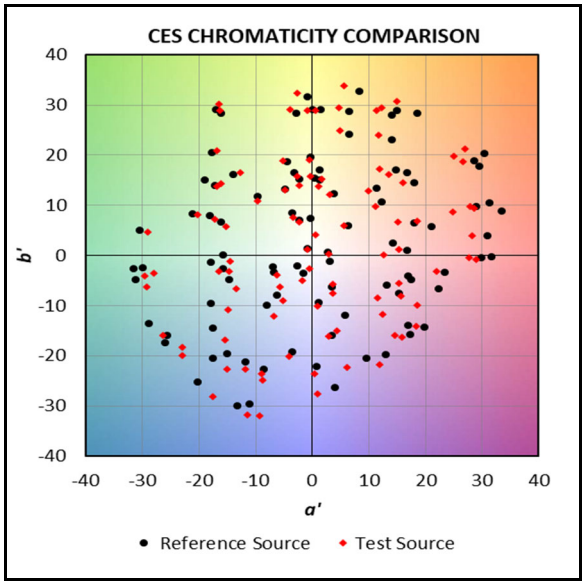
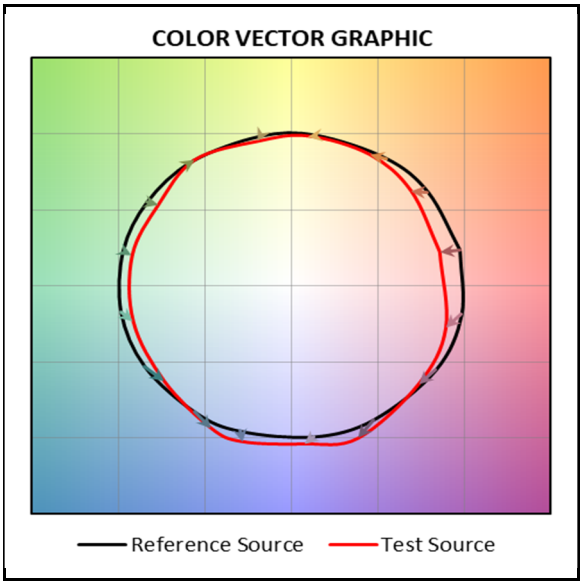
Summary Spectral Power Distribution (wavelength - nm, spectral power - mW)

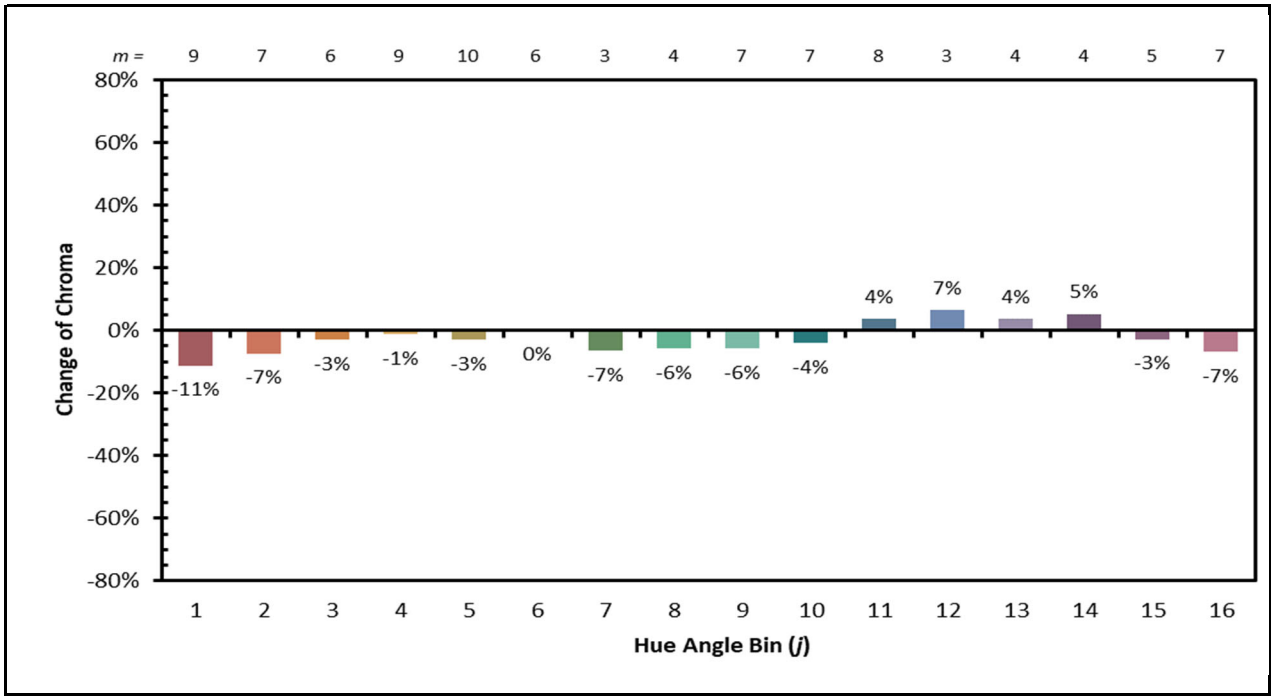
380	0.000206	480	0.010061	580	0.032423	680	0.009665
385	0.000206	485	0.010013	585	0.033592	685	0.008419
390	0.000244	490	0.010879	590	0.034565	690	0.007297
395	0.000297	495	0.012216	595	0.035151	695	0.006277
400	0.000381	500	0.013929	600	0.035378	700	0.005417
405	0.000493	505	0.015641	605	0.035063	705	0.004658
410	0.000610	510	0.017148	610	0.034388	710	0.003984
415	0.000776	515	0.018375	615	0.033214	715	0.003428
420	0.001057	520	0.019452	620	0.031729	720	0.002941
425	0.001583	525	0.020340	625	0.030062	725	0.002502
430	0.002600	530	0.021100	630	0.028229	730	0.002148
435	0.004492	535	0.021917	635	0.026345	735	0.001833
440	0.007798	540	0.022757	640	0.024337	740	0.001564
445	0.014245	545	0.023763	645	0.022328	745	0.001345
450	0.025165	550	0.024730	650	0.020262	750	0.001148
455	0.031994	555	0.025919	655	0.018250	755	0.000987
460	0.025756	560	0.027140	660	0.016293	760	0.000854
465	0.018508	565	0.028386	665	0.014387	765	0.000732
470	0.015309	570	0.029756	670	0.012648	770	0.000630
475	0.012032	575	0.031147	675	0.011089	775	0.000541
						780	0.000465



IES TM-30 Details







Test Report Number: LLIA001159-005B

Catalog Number: MLR2-MO-K35-80-4-XX-AL2-UNV
Recessed ceiling mounted, extruded aluminum housing with steel endcaps,
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92 white LEDs, One PAL-Lighting FlexRad board.
One Osram Optotronic OTi 20/120-277/700 DIM-1 L G2 LED driver labeled as 480mA

Test Equipment Configuration:	LightLab International Allentown 2m Integrating Sphere Measurements acquired using a Labsphere CDS 2600 spectroradiometer Testing was performed using 4π geometry
Test Temperature:	24.8 °C
Test Procedure:	Tested in accordance with the applicable sections of: LM-79-08, 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.

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