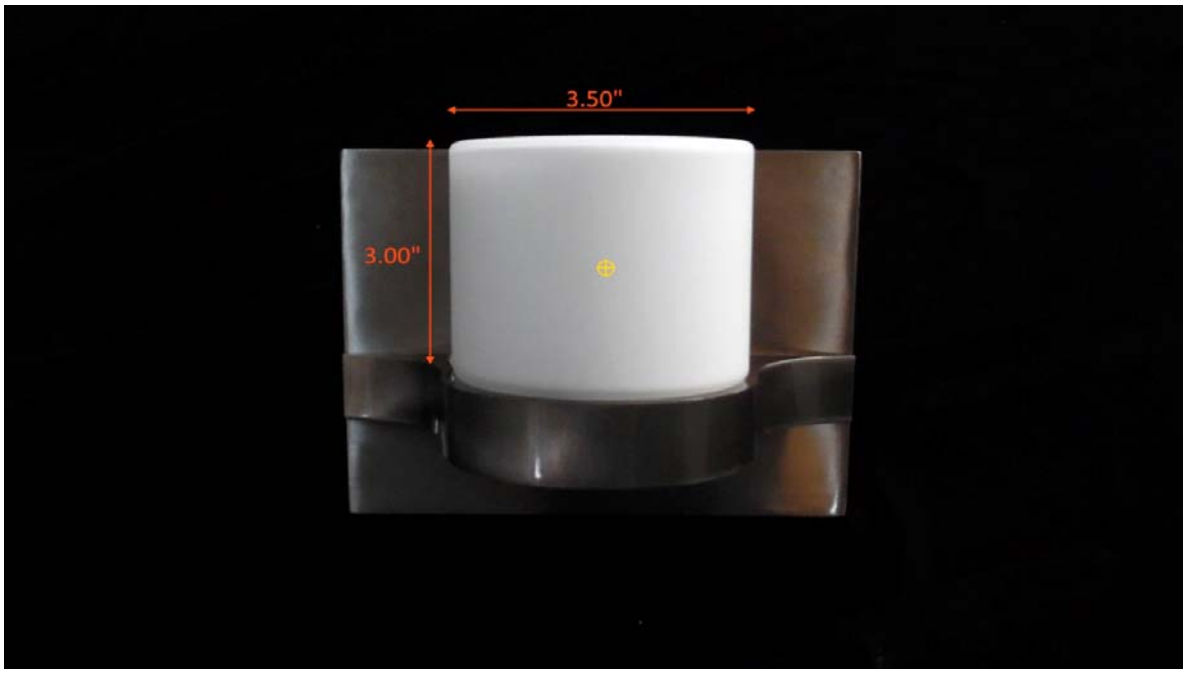
LightLab INTERNATIONAL ALLENTOWN LLC

NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA000824-037A

Catalog Number: 3-538 Olio
Wall mounted, formed steel housing with translucent white glass enclosure
24 white LEDs, One Harvard Engineering LEDENG-165-930 LED board
One LTF DA12W350C1834D010-0014 dimming LED driver.
120.0Vac, 60.00Hz, 0.0881A, 10.14W, 0.959PF, 12.2%THD(i)



Performance Summary

Total Light Output	302	lm
Luminaire Power	10.1	W
Luminous Efficacy	29.9	lm/W

PREPARED FOR : Oxygen Lighting, 201 Railhead Road, Fort Worth, TX 76106, USA

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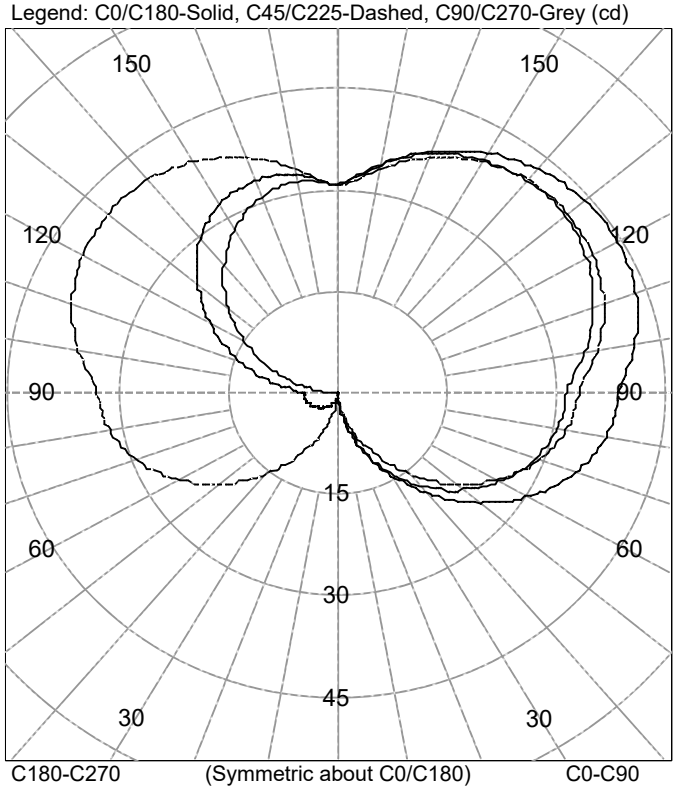
Legend: C0/C180-Solid, C45/C225-Dashed, C90/C270-Grey (cd)



AVERAGE LUMINANCE (cd/m²)

Gamma	C0	C45	C90
45.0	2200	2444	1998
55.0	2659	3069	2550
65.0	3128	3718	3124
75.0	3637	4418	3741
85.0	4251	5219	4440

INTENSITY SUMMARY (cd)

	C-Plane					Flux
Gamma	C0	C22.5	C45	C67.5	C90	(lm)
0.0	0.0	0.0	0.0	0.0	0.0	
5.0	0.9	0.9	0.7	0.5	0.3	0
10.0	3.4	3.4	3.2	2.7	2.1	
15.0	5.8	5.8	5.6	4.9	3.9	1
20.0	8.3	8.3	8.1	7.4	6.0	
25.0	10.8	10.8	10.8	10.0	8.2	3
30.0	13.2	13.4	13.6	12.7	10.7	
35.0	15.7	16.1	16.5	15.5	13.2	6
40.0	18.0	18.7	19.5	18.6	15.8	
45.0	20.2	21.3	22.5	21.5	18.4	11
50.0	22.3	23.9	25.3	24.3	20.9	
55.0	24.2	26.3	28.0	26.9	23.2	15
60.0	25.9	28.5	30.4	29.2	25.4	
65.0	27.4	30.4	32.6	31.2	27.4	19
70.0	28.7	32.2	34.5	32.8	29.1	
75.0	29.6	33.6	36.0	34.2	30.5	23
80.0	30.4	34.7	37.2	35.2	31.6	
85.0	31.0	35.4	38.0	35.9	32.3	25
90.0	31.2	35.8	38.5	36.3	32.9	

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	4	N / A	1.4
0-40	11	N / A	3.5
0-60	36	N / A	12.0
0-90	103	N / A	34.1
40-90	92	N / A	30.6
60-90	67	N / A	22.1
90-180	199	N / A	65.9
0-180	302	N / A	100.0

Total Light Output = 302 lm

Signed: Michael L. Grather

Authorized Signatory

Date of test 11-Sep-2017

Date of report 14-Sep-2017

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Intensity data (cd)

	C-Plane				
Gamma	**C0**	**C22.5**	**C45**	**C67.5**	**C90**
0.0	0.0	0.0	0.0	0.0	0.0
2.5	0.0	0.0	0.0	0.0	0.0
5.0	0.9	0.9	0.7	0.5	0.3
7.5	2.3	2.2	2.0	1.7	1.2
10.0	3.4	3.4	3.2	2.7	2.1
12.5	4.6	4.5	4.3	3.8	2.9
15.0	5.8	5.8	5.6	4.9	3.9
17.5	7.1	7.0	6.8	6.2	4.9
20.0	8.3	8.3	8.1	7.4	6.0
22.5	9.5	9.5	9.4	8.7	7.1
25.0	10.8	10.8	10.8	10.0	8.2
27.5	12.0	12.1	12.2	11.3	9.4
30.0	13.2	13.4	13.6	12.7	10.7
32.5	14.5	14.7	15.0	14.1	11.9
35.0	15.7	16.1	16.5	15.5	13.2
37.5	16.8	17.4	18.0	17.1	14.5
40.0	18.0	18.7	19.5	18.6	15.8
42.5	19.1	20.0	21.0	20.1	17.1
45.0	20.2	21.3	22.5	21.5	18.4
47.5	21.3	22.6	23.9	22.9	19.6
50.0	22.3	23.9	25.3	24.3	20.9
52.5	23.3	25.1	26.7	25.6	22.1
55.0	24.2	26.3	28.0	26.9	23.2
57.5	25.1	27.4	29.2	28.1	24.4
60.0	25.9	28.5	30.4	29.2	25.4
62.5	26.7	29.5	31.5	30.2	26.4
65.0	27.4	30.4	32.6	31.2	27.4
67.5	28.1	31.3	33.6	32.1	28.3
70.0	28.7	32.2	34.5	32.8	29.1
72.5	29.2	32.9	35.3	33.6	29.8
75.0	29.6	33.6	36.0	34.2	30.5
77.5	30.1	34.2	36.6	34.7	31.1
80.0	30.4	34.7	37.2	35.2	31.6
82.5	30.7	35.1	37.6	35.5	32.0
85.0	31.0	35.4	38.0	35.9	32.3
87.5	31.1	35.7	38.2	36.1	32.6
90.0	31.2	35.8	38.5	36.3	32.9

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Intensity data (cd)

	C-Plane				
Gamma	**C0**	**C22.5**	**C45**	**C67.5**	**C90**
90.0	31.2	35.8	38.5	36.3	32.9
92.5	31.6	36.3	38.9	36.8	33.4
95.0	32.5	37.1	39.7	37.6	34.2
97.5	33.4	38.0	40.5	38.5	35.2
100.0	34.3	38.7	41.3	39.3	36.0
102.5	35.1	39.4	41.9	40.0	36.7
105.0	35.8	40.0	42.4	40.6	37.4
107.5	36.5	40.6	42.9	41.2	38.0
110.0	37.2	41.0	43.3	41.7	38.6
112.5	37.8	41.4	43.6	42.2	39.1
115.0	38.4	41.8	43.9	42.6	39.5
117.5	38.9	42.1	44.1	42.9	39.9
120.0	39.3	42.3	44.2	43.2	40.3
122.5	39.8	42.5	44.3	43.4	40.6
125.0	40.0	42.6	44.3	43.5	40.8
127.5	40.3	42.6	44.2	43.6	41.0
130.0	40.5	42.6	44.1	43.6	41.1
132.5	40.6	42.5	43.9	43.5	41.1
135.0	40.7	42.3	43.6	43.3	41.1
137.5	40.7	42.1	43.3	43.1	40.9
140.0	40.6	41.8	42.9	42.7	40.8
142.5	40.5	41.5	42.5	42.4	40.5
145.0	40.2	41.1	42.0	41.9	40.2
147.5	40.0	40.7	41.5	41.4	39.8
150.0	39.6	40.2	40.8	40.8	39.4
152.5	39.2	39.6	40.2	40.1	38.8
155.0	38.7	39.1	39.5	39.4	38.3
157.5	38.2	38.4	38.7	38.6	37.6
160.0	37.5	37.7	37.9	37.7	36.9
162.5	36.9	36.9	37.0	36.8	36.2
165.0	36.1	36.1	36.1	35.9	35.3
167.5	35.2	35.2	35.2	34.9	34.4
170.0	34.3	34.3	34.2	33.9	33.5
172.5	33.3	33.3	33.1	32.8	32.6
175.0	32.3	32.2	32.1	31.8	31.6
177.5	31.3	31.2	31.1	31.0	30.9
180.0	30.6	30.6	30.6	30.6	30.6

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Intensity data (cd)

	C-Plane				
Gamma	**C90**	**C112.5**	**C135**	**C157.5**	**C180**
0.0	0.0	0.0	0.0	0.0	0.0
2.5	0.0	0.0	0.0	0.0	0.0
5.0	0.3	0.1	0.0	0.0	0.0
7.5	1.2	0.7	0.3	0.1	0.0
10.0	2.1	1.2	0.5	0.1	0.1
12.5	2.9	1.8	0.7	0.1	0.1
15.0	3.9	2.5	1.0	0.1	0.1
17.5	4.9	3.2	1.3	0.2	0.0
20.0	6.0	3.9	1.7	0.2	0.1
22.5	7.1	4.7	2.0	0.3	0.1
25.0	8.2	5.5	2.2	0.2	0.1
27.5	9.4	6.3	2.3	0.2	0.1
30.0	10.7	7.1	2.4	0.2	0.1
32.5	11.9	7.9	2.4	0.2	0.2
35.0	13.2	8.7	2.5	0.2	0.1
37.5	14.5	9.5	2.6	0.2	0.2
40.0	15.8	10.2	2.7	0.2	0.2
42.5	17.1	11.0	2.9	0.1	0.1
45.0	18.4	11.7	3.0	0.1	0.2
47.5	19.6	12.4	3.2	0.1	0.1
50.0	20.9	13.1	3.3	0.1	0.1
52.5	22.1	13.8	3.4	0.1	0.1
55.0	23.2	14.4	3.6	0.1	0.1
57.5	24.4	15.1	3.7	0.1	0.1
60.0	25.4	15.6	3.8	0.1	0.1
62.5	26.4	16.1	3.9	0.1	0.1
65.0	27.4	16.7	4.1	0.0	0.1
67.5	28.3	17.1	4.2	0.0	0.0
70.0	29.1	17.5	4.3	0.1	0.1
72.5	29.8	17.9	4.4	0.0	0.0
75.0	30.5	18.2	4.5	0.1	0.0
77.5	31.1	18.5	4.5	0.0	0.0
80.0	31.6	18.8	4.6	0.0	0.0
82.5	32.0	19.0	4.7	0.0	0.0
85.0	32.3	19.2	4.7	0.0	0.0
87.5	32.6	19.3	4.7	0.0	0.0
90.0	32.9	19.5	4.8	0.1	0.0

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Intensity data (cd)

	C-Plane				
Gamma	**C90**	**C112.5**	**C135**	**C157.5**	**C180**
90.0	32.9	19.5	4.8	0.1	0.0
92.5	33.4	20.1	5.5	0.8	0.7
95.0	34.2	21.1	6.7	2.0	1.9
97.5	35.2	22.2	8.0	3.2	3.1
100.0	36.0	23.2	9.3	4.5	4.3
102.5	36.7	24.2	10.6	5.8	5.5
105.0	37.4	25.2	12.0	7.1	6.8
107.5	38.0	26.2	13.3	8.5	8.1
110.0	38.6	27.2	14.6	9.8	9.3
112.5	39.1	28.0	16.0	11.2	10.6
115.0	39.5	29.0	17.3	12.6	12.0
117.5	39.9	29.8	18.6	14.0	13.3
120.0	40.3	30.6	20.0	15.3	14.5
122.5	40.6	31.4	21.3	16.7	15.8
125.0	40.8	32.2	22.5	18.0	17.1
127.5	41.0	32.9	23.8	19.3	18.3
130.0	41.1	33.5	25.0	20.6	19.6
132.5	41.1	34.1	26.2	21.9	20.8
135.0	41.1	34.7	27.3	23.1	22.0
137.5	40.9	35.1	28.3	24.3	23.1
140.0	40.8	35.6	29.3	25.4	24.2
142.5	40.5	35.9	30.2	26.4	25.2
145.0	40.2	36.1	30.9	27.4	26.2
147.5	39.8	36.3	31.6	28.3	27.1
150.0	39.4	36.3	32.1	29.1	28.0
152.5	38.8	36.2	32.5	29.8	28.8
155.0	38.3	36.1	32.9	30.4	29.5
157.5	37.6	35.9	33.1	30.9	30.1
160.0	36.9	35.6	33.2	31.4	30.7
162.5	36.2	35.1	33.2	31.7	31.1
165.0	35.3	34.6	33.1	31.9	31.4
167.5	34.4	34.1	32.9	32.0	31.6
170.0	33.5	33.4	32.6	31.9	31.6
172.5	32.6	32.6	32.1	31.7	31.6
175.0	31.6	31.7	31.6	31.4	31.3
177.5	30.9	30.9	30.9	30.9	30.9
180.0	30.6	30.6	30.6	30.6	30.6

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120.0Vac, 60.00Hz, 0.0881A, 10.14W, 0.959PF, 12.2%THD(i)

Coefficients Of 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
0	103	103	103	103	93	93	93	93	75	75	75	57	57	57	42	42	42	34
1	90	84	79	74	80	75	71	66	59	55	52	44	41	39	30	28	27	20
2	80	71	63	57	71	63	57	51	49	44	40	36	33	29	24	22	19	14
3	72	61	52	45	64	54	47	41	42	36	32	31	27	23	20	17	15	10
4	65	53	44	37	58	47	39	33	37	31	26	26	22	19	17	14	12	7
5	60	47	38	31	53	42	34	28	32	26	21	23	19	15	15	12	9	6
6	55	41	32	26	48	37	29	23	28	22	18	21	16	13	13	10	8	4
7	50	37	28	22	44	33	25	20	25	20	15	18	14	11	12	9	6	3
8	46	33	25	19	41	30	22	17	23	17	13	17	12	9	11	8	6	3
9	43	30	22	17	38	27	20	15	21	15	12	15	11	8	10	7	5	2
10	40	27	20	15	35	24	18	13	19	14	10	14	10	7	9	6	4	2

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.

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Test Distance	9.5 m
Test Temperature	25.4 °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.

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USA east coast LightLab Int'l Allentown LLC, 905 Harrison Street, Suite 135, Allentown, PA 18103, Ph: +1 484-273-0705, www.lightlabint.com (issuing laboratory)

Australasia & S.E. Asia LightLab International, 50 Redcliffe Gardens Drive, Clontarf, Queensland, 4019, Australia, Ph : +61 7 3283 7862, Fx : +61 7 3283 8751, www.lightlabint.com

LightLab INTERNATIONAL ALLENTOWN LLC

NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA000824-037B

Integrating Sphere Report
Catalog Number: 3-538 Olio
Wall mounted, formed steel housing with translucent white glass enclosure.
24 white LEDs, one Harvard Engineering LEDENG-165-930 LED board
One LTF DA12W350C1834D010-0014 dimming LED driver.

Performance Summary

Voltage	120.0	Vac
Current	0.0882	A
Power	10.17	W
Frequency	60.00	Hz
Power Factor	0.960	
Current THD	12.2	%
Total Luminous Flux	299.3	lm
Efficacy	29.4	lm/W
Chromaticity (x,y)	(0.4380, 0.4041)	
(u',v')	(0.2513, 0.5215)	
Duv	-0.0001	
CCT	2982	K
CRI (Ra)	92	
R9	59	

Prepared For:
Oxygen Lighting
201 Railhead Road
Fort Worth, TX 76106, USA

Test date: 09/11/2017
Report date: 09/14/2017

Test Report Number: LLIA000824-037B

Catalog Number: 3-538 Olio

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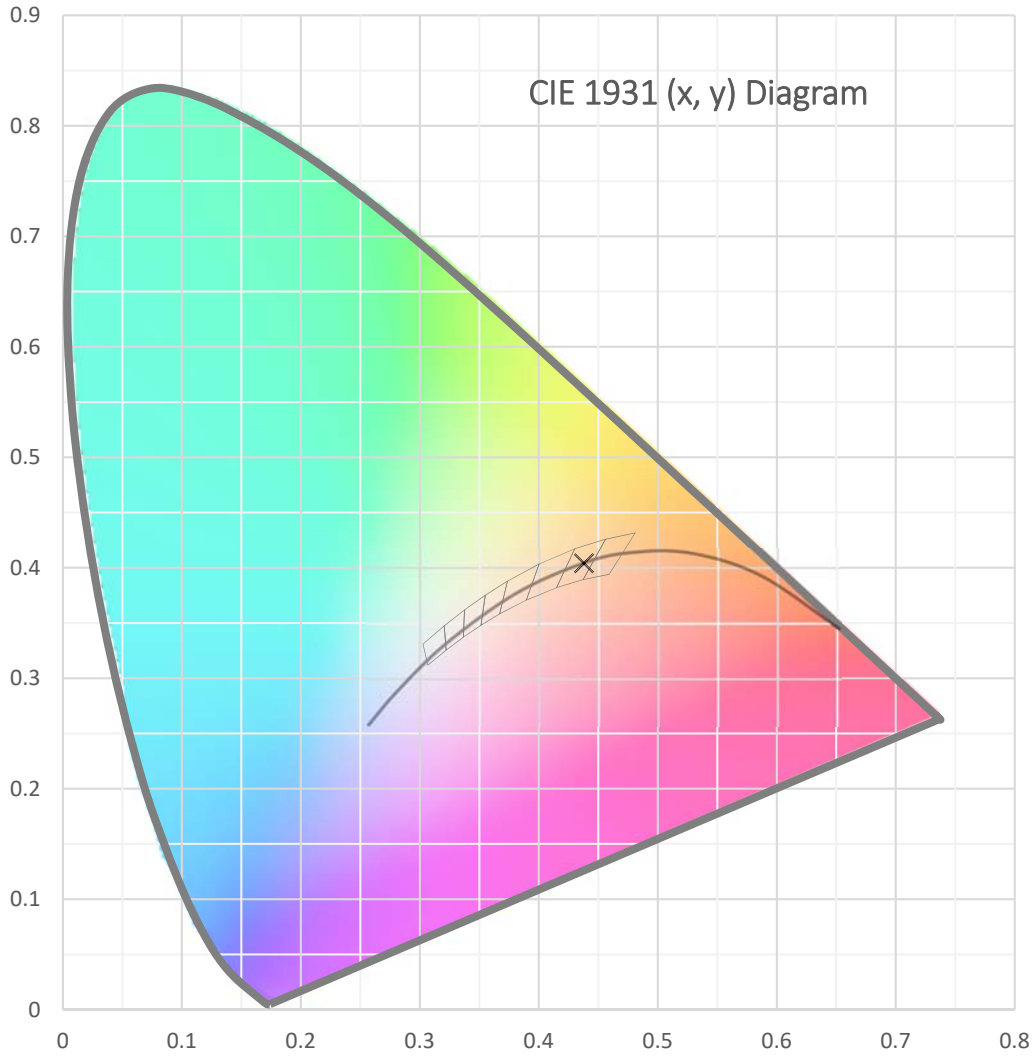

Test Report Number: LLIA000824-037B

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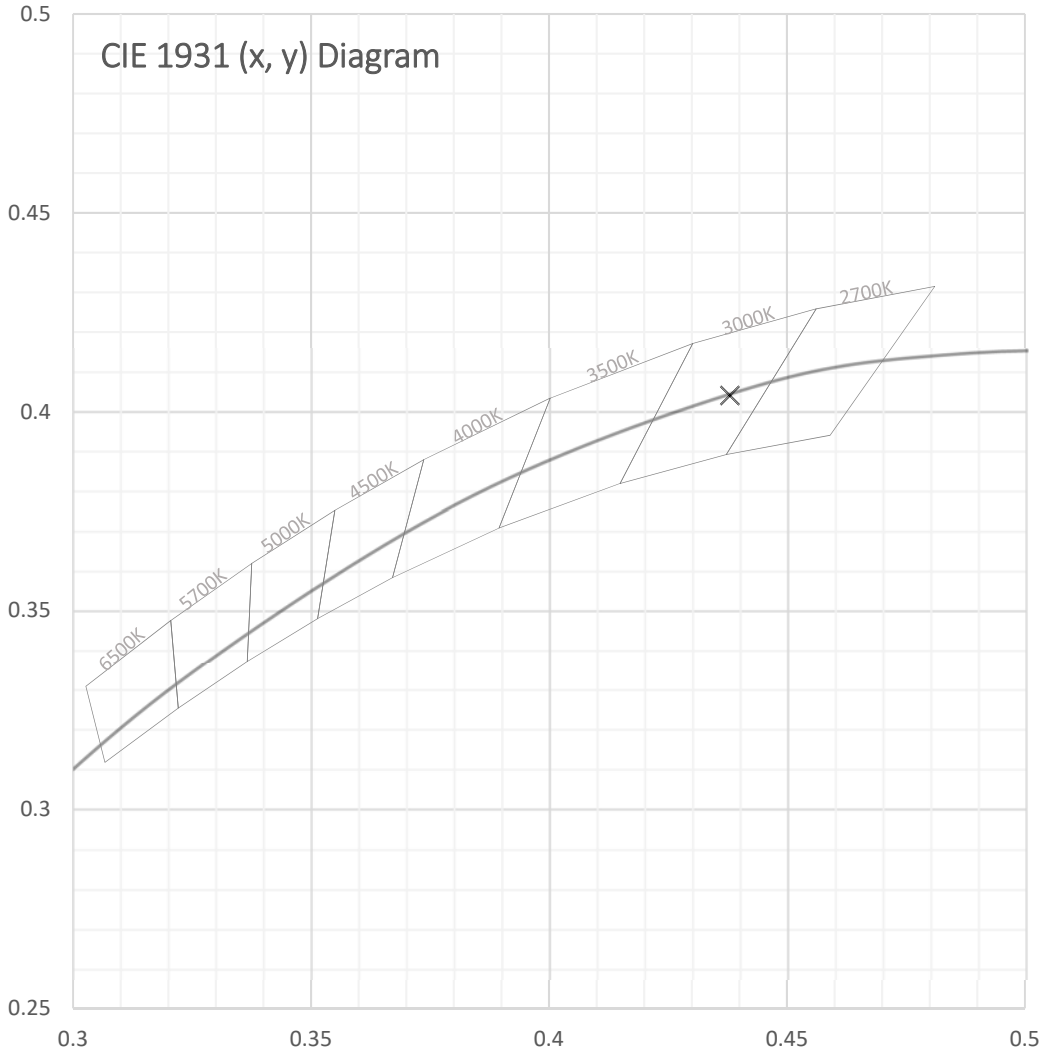

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One LTF DA12W350C1834D010-0014 dimming LED driver.

Spectral Data	Total Radiant Flux	1.057	W
	Total Luminous Flux	299.3	Lm
	Chromaticity CIE 1931 (x, y)	(0.4380, 0.4041)	
	Chromaticity CIE 1976 (u', v')	(0.2513, 0.5215)	
	Correlated Color Temperature (CCT)	2982	K
	Color Rendering Index (Ra)	92	
	R1	92	
	R2	95	
	R3	97	
	R4	92	
	R5	92	
	R6	94	
	R7	93	
	R8	82	
	R9	59	
	R10	88	
	R11	92	
	R12	81	
	R13	93	
	R14	97	
	Distance from Planckian Locus (Duv)	-0.0001	
	Scotopic/Photopic Ratio *	1.390	
Electrical Data			
	Voltage	120.0	Vac
	Current	0.0882	A
	Power	10.17	W
	Frequency	60.00	Hz
	Power Factor	0.960	
	Current THD	12.2	%

Test Report Number: LLIA000824-037B

Catalog Number: 3-538 Olio

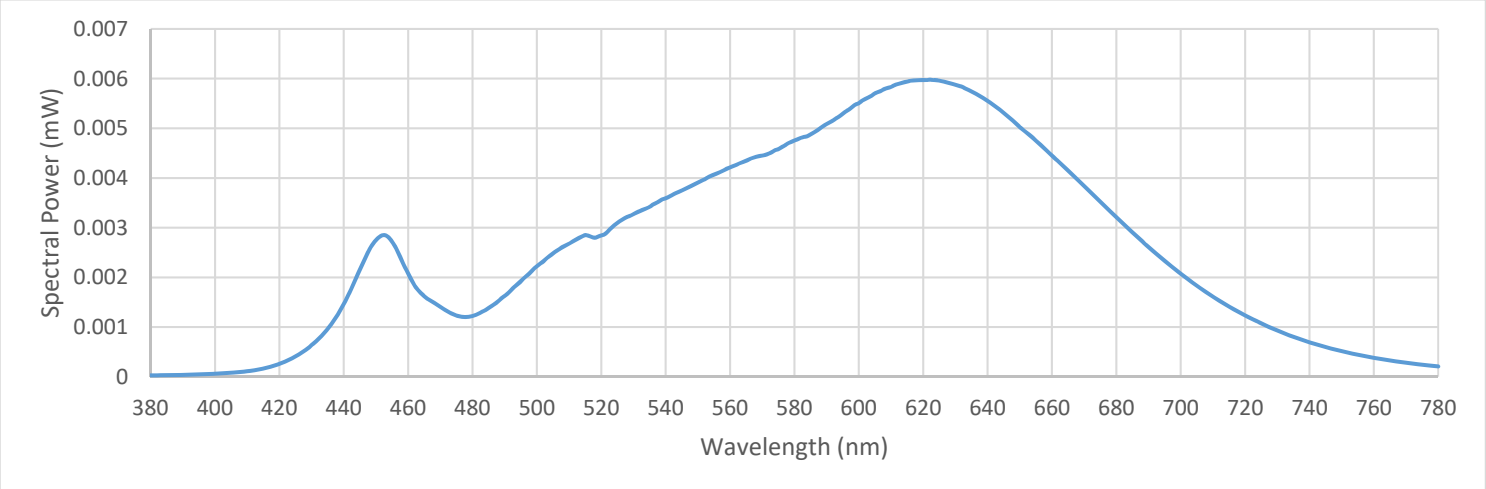
Wall mounted, formed steel housing with translucent white glass enclosure.

24 white LEDs, one Harvard Engineering LEDENG-165-930 LED board

One LTF DA12W350C1834D010-0014 dimming LED driver.

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

380	0.000029	480	0.001224	580	0.004755	680	0.003211
385	0.000031	485	0.001384	585	0.004879	685	0.002909
390	0.000038	490	0.001628	590	0.005087	690	0.002613
395	0.000048	495	0.001920	595	0.005292	695	0.002330
400	0.000061	500	0.002225	600	0.005506	700	0.002076
405	0.000080	505	0.002479	605	0.005703	705	0.001834
410	0.000112	510	0.002676	610	0.005831	710	0.001611
415	0.000165	515	0.002851	615	0.005937	715	0.001414
420	0.000261	520	0.002844	620	0.005972	720	0.001235
425	0.000409	525	0.003094	625	0.005957	725	0.001074
430	0.000638	530	0.003270	630	0.005876	730	0.000935
435	0.000967	535	0.003417	635	0.005744	735	0.000804
440	0.001466	540	0.003592	640	0.005551	740	0.000691
445	0.002159	545	0.003750	645	0.005311	745	0.000597
450	0.002750	550	0.003906	650	0.005024	750	0.000513
455	0.002722	555	0.004068	655	0.004751	755	0.000442
460	0.002084	560	0.004212	660	0.004457	760	0.000384
465	0.001622	565	0.004345	665	0.004151	765	0.000329
470	0.001405	570	0.004452	670	0.003834	770	0.000283
475	0.001230	575	0.004580	675	0.003525	775	0.000243
						780	0.000209



Test Report Number: LLIA000824-037B

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Wall mounted, formed steel housing with translucent white glass enclosure.

24 white LEDs, one Harvard Engineering LEDENG-165-930 LED board

One LTF DA12W350C1834D010-0014 dimming LED driver.

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:	24.9 °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.

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