LightLab INTERNATIONAL ALLENTOWN LLC

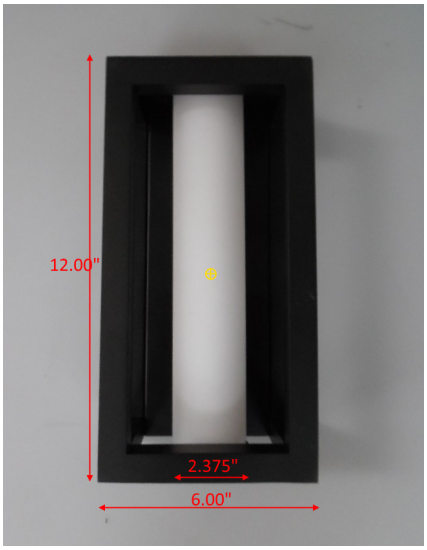
NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001166-020A

Indoor Distribution Photometry Test Report

Catalog Number: Aperto 3-722-15
Wall mounted, formed and extruded aluminum
housing, white coated glass enclosure.
44 white LEDs, one 120V-18W-288X32 LED board
One onboard LED driver



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

Performance Summary					
Input Voltage	120.0	V	Luminous Flux	465.7	Lumens
Input Current	0.1016	A	Total Efficacy	38.7	Lm/W
Input Power	12.04	W	Downward Flux	238.4	Lumens
Frequency	60.00	Hz	Downward Flux	51.2	% of Total
Power Factor	0.987				
Current THD	16.0	%			

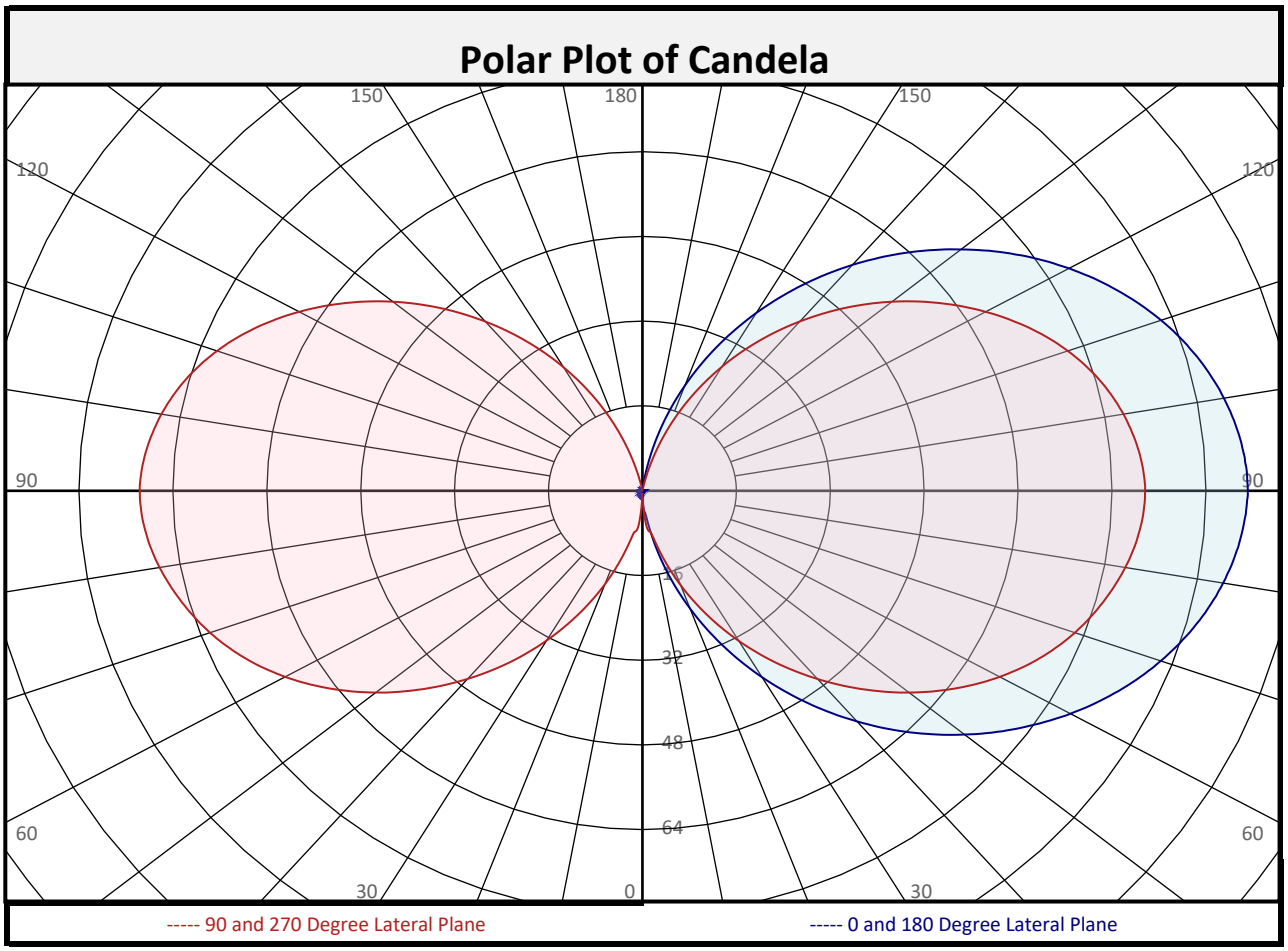
This test report was issued by LightLab International Allentown, LLC without alterations or erasures.

Test date: 10/17/2019
Report date: 10/18/2019

Signed: Michael L. Grather

Report of Test

LLIA001166-020A



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	0.5	0.1%	90-100	54.9	11.8%	0-20	3.3	0.7%
10-20	2.8	0.6%	100-110	50.7	10.9%	0-30	11.4	2.4%
20-30	8.1	1.7%	110-120	43.2	9.3%	0-40	27.4	5.9%
30-40	16.0	3.4%	120-130	33.7	7.2%	0-60	88.2	18.9%
40-50	25.4	5.5%	130-140	23.4	5.0%	0-80	183.4	39.4%
50-60	35.3	7.6%	140-150	13.8	3.0%	10-90	237.9	51.1%
60-70	44.3	9.5%	150-160	6.2	1.3%	20-50	49.6	10.7%
70-80	51.0	11.0%	160-170	1.3	0.3%	40-90	211.0	45.3%
80-90	54.9	11.8%	170-180	0.0	0.0%	60-90	150.2	32.3%
0-90	238.4	51.2%	90-180	227.3	48.8%	0-180	465.7	100.0%

Report of Test

LLIA001166-020A

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	0	0	0	0	0	0	0	0	0
	2.5	3	3	3	3	3	2	2	1	1
	5	4	5	6	7	6	5	3	2	1
	7.5	5	6	8	9	8	6	4	2	1
	10	8	8	8	9	8	6	5	2	1
	12.5	11	12	10	10	10	7	5	2	1
	15	15	15	12	12	12	9	5	2	1
	17.5	20	20	14	14	16	11	5	2	1
	20	24	24	16	16	19	13	4	2	1
	22.5	28	28	18	19	22	15	4	2	1
	25	32	32	20	21	26	17	4	2	1
	27.5	36	36	22	23	29	19	4	2	1
	30	41	41	24	25	33	21	4	2	1
	32.5	45	45	26	28	36	23	4	2	1
	35	49	49	29	30	40	25	4	2	1
	37.5	53	53	30	32	43	27	4	2	1
	40	57	57	32	34	46	29	3	2	1
	42.5	61	61	34	36	50	31	3	2	1
	45	65	64	36	38	53	33	3	1	1
	47.5	68	68	38	40	56	35	3	1	1
	50	72	72	39	42	59	37	3	1	1
	52.5	75	75	41	44	62	39	3	1	1
	55	78	78	42	46	65	40	2	1	1
	57.5	81	81	44	47	68	42	2	1	0
	60	84	84	45	49	70	43	2	1	0
	62.5	87	87	46	50	73	45	2	1	0
	65	89	89	48	52	75	46	2	1	0
	67.5	92	92	49	53	77	47	2	1	0
	70	94	94	50	54	78	48	2	1	0
	72.5	96	96	51	55	80	49	1	1	0
	75	98	98	51	55	81	50	1	1	0
	77.5	99	99	52	56	82	51	1	1	0
	80	100	100	53	57	84	51	1	0	0
	82.5	101	101	53	57	84	52	1	0	0
	85	102	102	54	58	85	52	1	0	0
	87.5	103	103	54	58	85	52	1	0	0
	90	103	103	54	58	86	52	1	0	0

Report of Test

LLIA001166-020A

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	103	103	54	58	86	52	1	0	0
	92.5	103	103	54	58	85	52	1	0	0
	95	102	102	54	58	85	52	1	0	0
	97.5	102	101	54	57	84	52	1	0	0
	100	101	100	53	56	83	51	1	0	0
	102.5	99	99	52	56	82	50	1	0	0
	105	98	98	51	55	81	50	1	0	0
	107.5	96	96	50	54	79	49	1	0	0
	110	94	94	49	52	77	47	1	0	0
	112.5	92	91	48	51	75	46	1	0	0
	115	89	89	47	49	73	45	1	0	0
	117.5	87	86	45	48	70	43	1	0	0
	120	84	83	44	46	68	42	1	0	0
	122.5	81	80	42	44	65	40	1	0	0
	125	78	77	41	42	62	38	1	0	0
	127.5	74	74	39	40	59	36	1	0	0
	130	71	70	37	38	56	34	1	0	0
	132.5	67	66	35	36	52	32	1	0	0
	135	63	63	33	33	49	30	1	0	0
	137.5	60	59	31	31	45	28	1	0	0
	140	56	55	29	29	42	26	1	0	0
	142.5	51	50	27	26	38	24	1	0	0
	145	47	46	24	24	34	21	1	0	0
	147.5	43	42	22	21	31	19	1	0	0
	150	39	38	20	19	27	17	1	0	0
	152.5	34	33	17	16	23	14	1	0	0
	155	30	29	15	14	19	12	1	0	0
	157.5	25	24	13	11	16	10	0	0	0
	160	21	20	10	8	12	7	0	0	0
	162.5	17	15	8	6	8	5	0	0	0
	165	12	11	5	3	5	3	0	0	0
	167.5	8	7	3	1	2	1	0	0	0
	170	4	3	1	0	0	0	0	0	0
	172.5	1	1	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

LightLab INTERNATIONAL ALLENTOWN LLC

NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001166-020A

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	107	107	107	107		99	99	99	99		84	84	84		70	70	70		57	57	57	51
1	92	85	79	73		84	78	72	67		65	60	56		52	49	46		41	39	36	31
2	81	71	62	55		74	65	57	51		53	47	42		43	38	34		33	29	26	21
3	73	60	51	43		66	55	46	40		45	38	33		36	30	26		27	23	20	15
4	66	52	42	35		59	48	39	32		39	32	26		31	25	21		23	19	15	11
5	60	46	36	29		54	42	33	26		34	27	21		27	21	17		20	16	12	9
6	55	40	31	24		49	37	28	22		30	23	18		24	18	14		18	14	10	7
7	50	36	27	20		45	33	25	19		27	20	15		21	16	12		16	12	8	6
8	46	32	24	18		42	30	22	16		24	18	13		19	14	10		15	10	7	5
9	43	29	21	15		39	27	19	14		22	16	11		18	12	9		13	9	6	4
10	40	27	19	13		36	24	17	12		20	14	10		16	11	8		12	8	5	3

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	0.0	53.87	88.79
8.0	0.0	71.82	118.38
10.0	0.0	89.78	147.98
12.0	0.0	107.74	177.58
14.0	0.0	125.69	207.17
16.0	0.0	143.65	236.77

Average Luminance (cd/m^2)

	0 deg Plane	45 deg Plane	90 deg Plane
0	112	112	112
45	4292	1783	3524
55	4734	1886	3939
65	5111	1974	4268
75	5435	2058	4524
85	5723	2142	4759

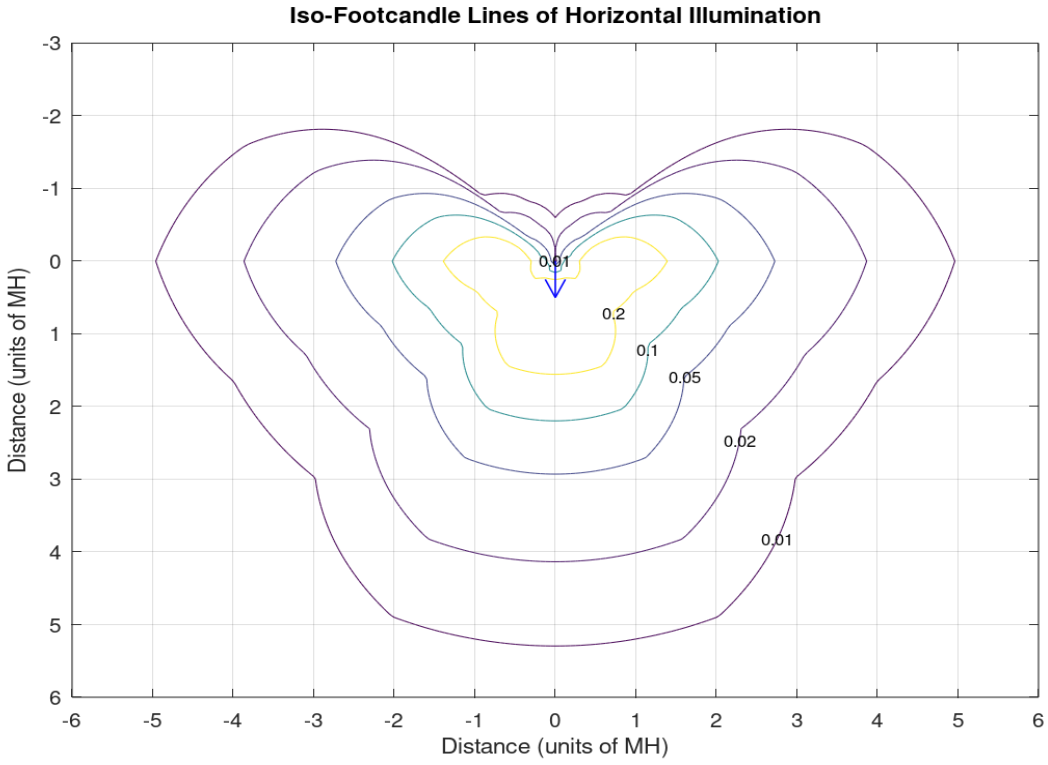
Spacing Criterion

0 degree plane:	15.8
90 degree plane:	14.8
180 degree plane:	2.2
270 degree plane:	14.8

Report of Test

LLIA001166-020A

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.

Report of Test

LLIA001166-020A

Test Distance	9.5 m
Ambient 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-79-19 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

LLIA001166-020B

Integrating Sphere Report
Catalog Number: Aperto 3-722-15
Wall mounted, formed and extruded aluminum housing, white coated glass enclosure.
44 white LEDs, one 120V-18W-288X32 LED board
One onboard LED driver

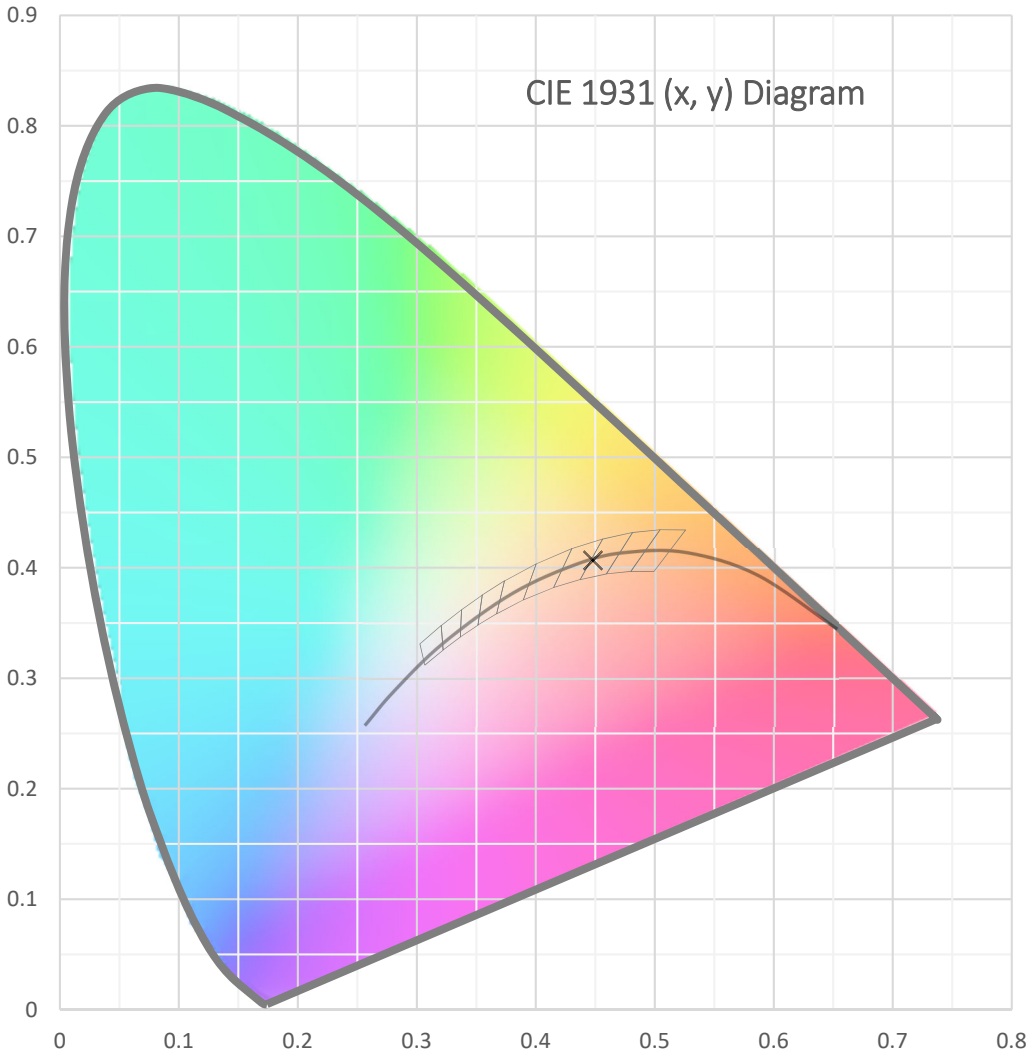
Performance Summary

Voltage	120.1	Vac
Current	0.1020	A
Power	12.05	W
Frequency	59.99	Hz
Power Factor	0.985	
Current THD	16.0	%
Total Luminous Flux	476.6	lm
Efficacy	39.6	lm/W
Chromaticity (x,y)	(0.4480, 0.4066)	
(u',v')	(0.2566, 0.5240)	
Duv	-0.0004	
CCT	2842	K
CRI (Ra)	92	
R9	58	
TM-30: Rf	91	
TM-30: Rg	100	

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

Test date: 10/15/2019
Report date: 10/18/2019

Test Report Number: LLIA001166-020B
Catalog Number: Aperto 3-722-15
Wall mounted, formed and extruded aluminum
housing, white coated glass enclosure.
44 white LEDs, one 120V-18W-288X32 LED board
One onboard LED driver



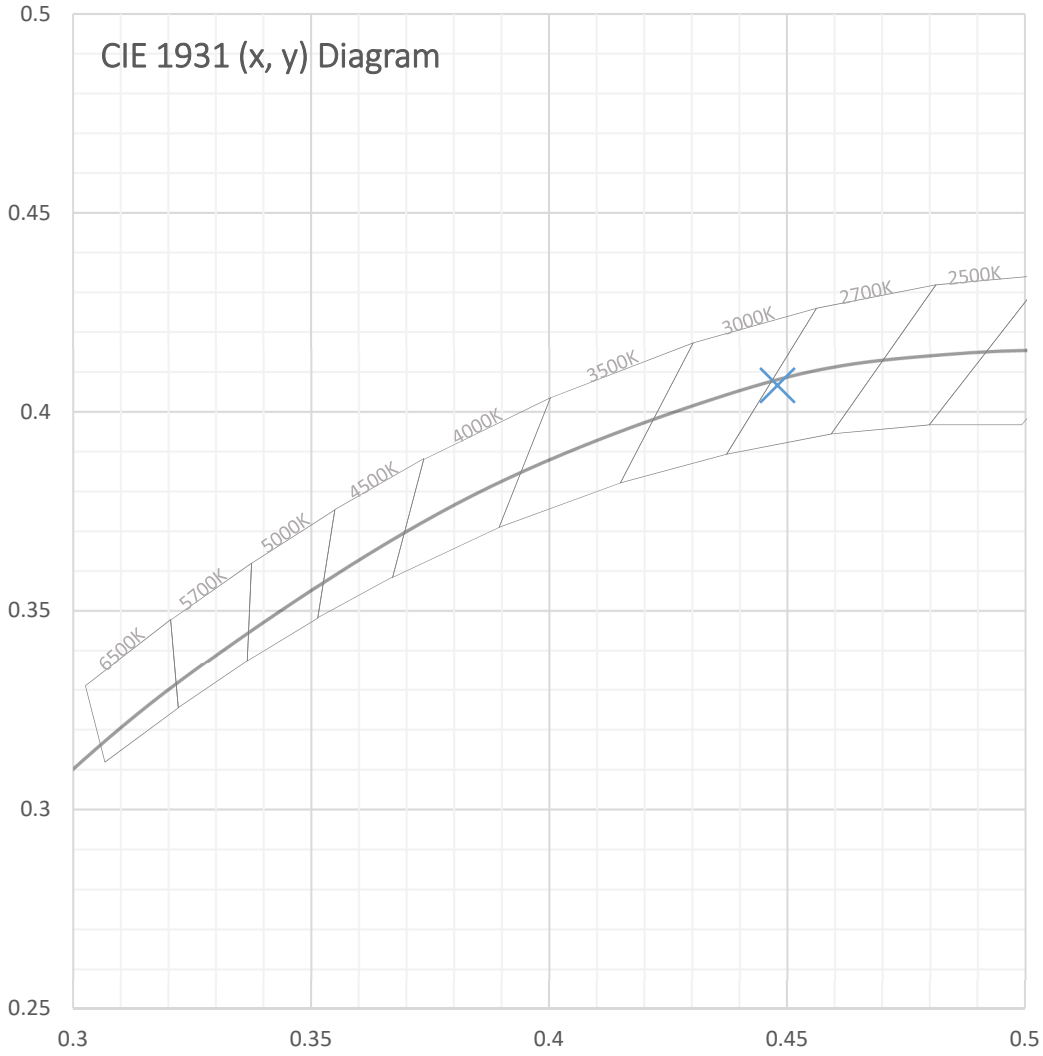
Test Report Number: LLIA001166-020B

Catalog Number: Aperto 3-722-15

Wall mounted, formed and extruded aluminum housing, white coated glass enclosure.

44 white LEDs, one 120V-18W-288X32 LED board

One onboard LED driver



Test Report Number: LLIA001166-020B

Catalog Number: Aperto 3-722-15

Wall mounted, formed and extruded aluminum housing, white coated glass enclosure.

44 white LEDs, one 120V-18W-288X32 LED board

One onboard LED driver

Spectral Data	Total Radiant Flux	1.680	W
	Total Luminous Flux	476.6	Lm
	Chromaticity CIE 1931 (x, y)	(0.4480, 0.4066)	
	Chromaticity CIE 1976 (u', v')	(0.2566, 0.5240)	
	Correlated Color Temperature (CCT)	2842	K
	Color Rendering Index (Ra)	92	
	R1	92	
	R2	96	
	R3	98	
	R4	93	
	R5	92	
	R6	95	
	R7	92	
	R8	81	
	R9	58	
	R10	89	
	R11	94	
	R12	84	
	R13	93	
	R14	98	
	TM-30: Rf	91	
	TM-30: Rg	100	
	Distance from Planckian Locus (Duv)	-0.0004	
	Scotopic/Photopic Ratio *	1.335	
Electrical Data			
	Voltage	120.1	Vac
	Current	0.1020	A
	Power	12.05	W
	Frequency	59.99	Hz
	Power Factor	0.985	
	Current THD	16.0	%

Test Report Number: LLIA001166-020B

Catalog Number: Aperto 3-722-15

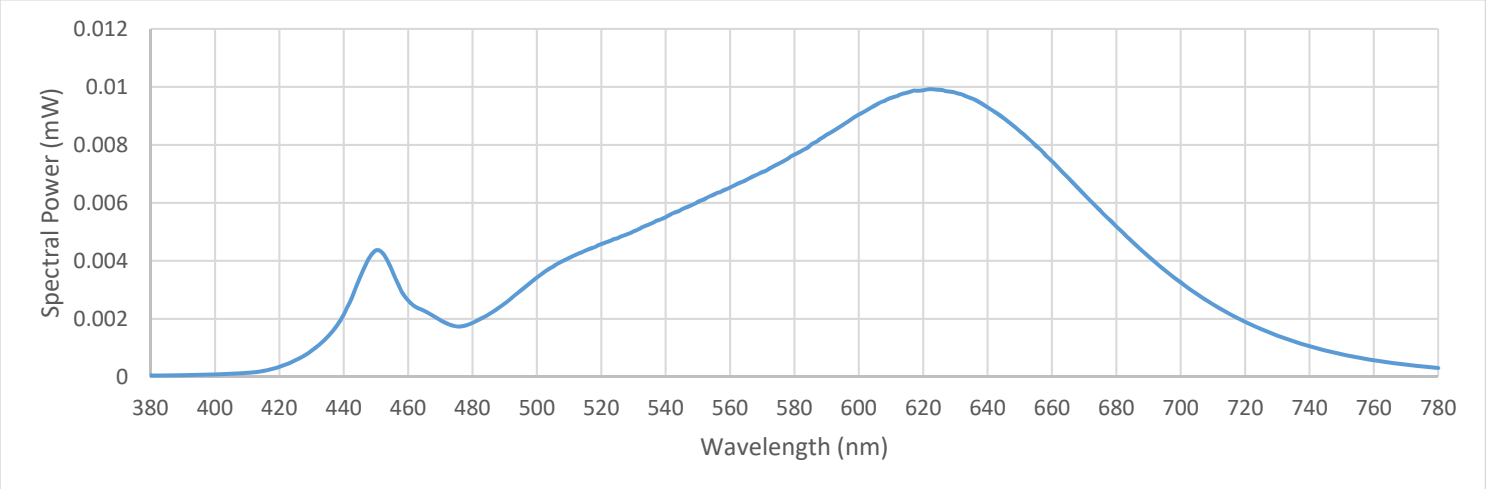
Wall mounted, formed and extruded aluminum housing, white coated glass enclosure.

44 white LEDs, one 120V-18W-288X32 LED board

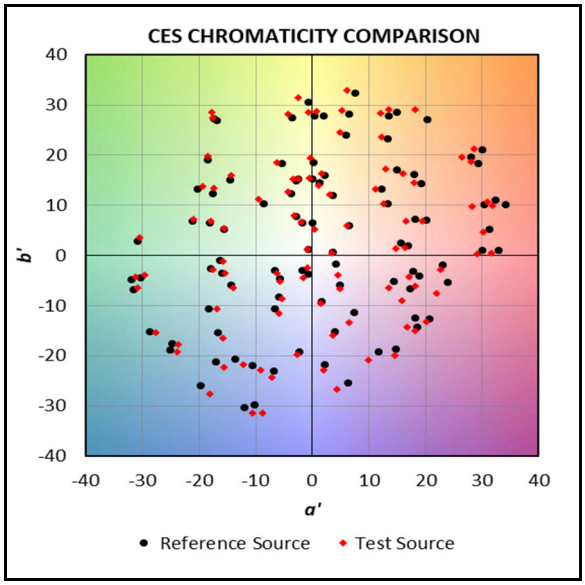
One onboard LED driver

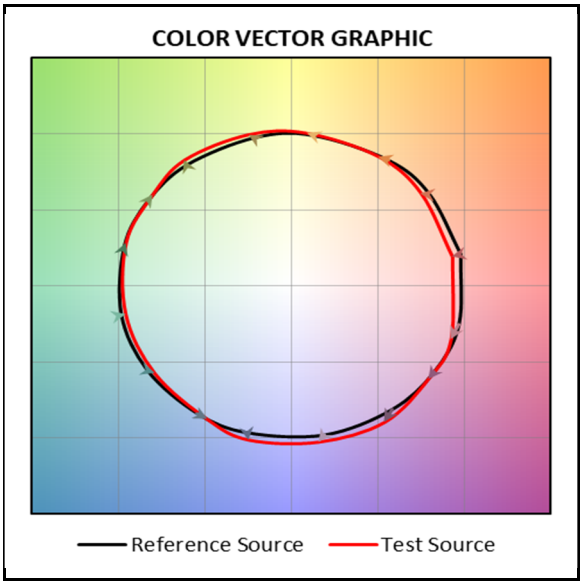
Summary Spectral Power Distribution (wavelength - nm, spectral power - mW)

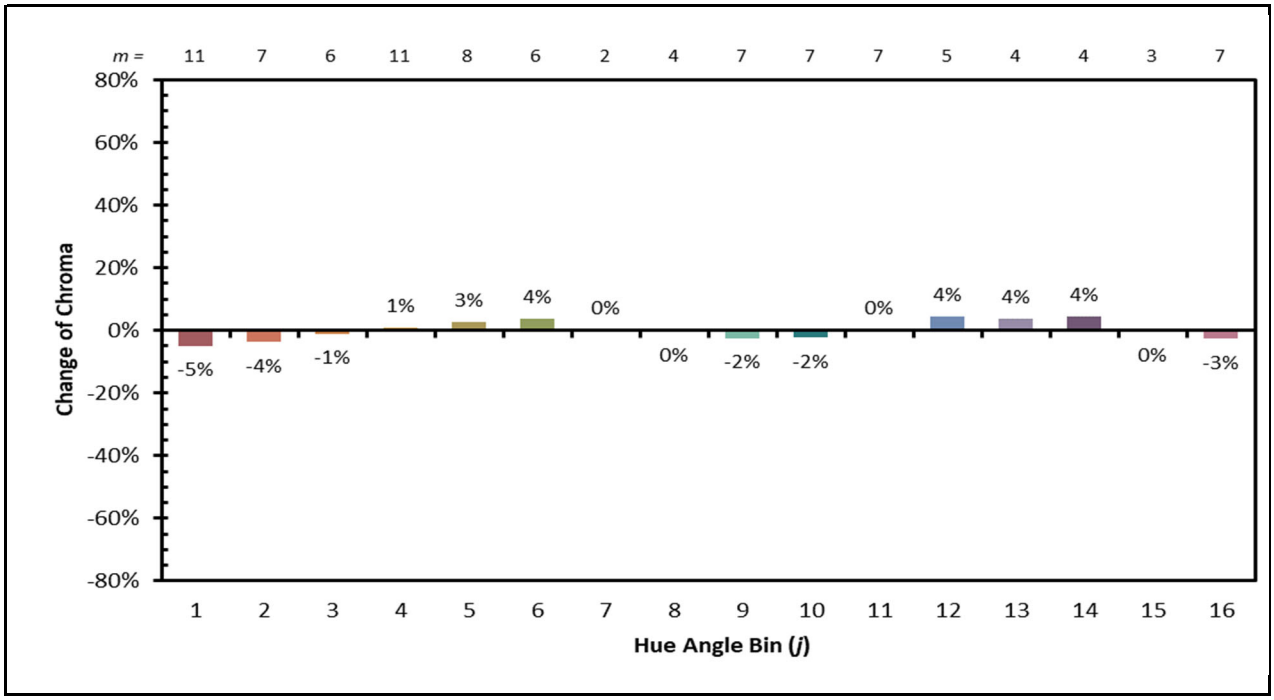
380	0.000042	480	0.001855	580	0.007660	680	0.005180
385	0.000045	485	0.002152	585	0.007992	685	0.004658
390	0.000054	490	0.002531	590	0.008349	690	0.004149
395	0.000066	495	0.002982	595	0.008686	695	0.003677
400	0.000082	500	0.003423	600	0.009047	700	0.003261
405	0.000102	505	0.003799	605	0.009354	705	0.002861
410	0.000133	510	0.004105	610	0.009618	710	0.002498
415	0.000201	515	0.004350	615	0.009802	715	0.002179
420	0.000341	520	0.004579	620	0.009887	720	0.001897
425	0.000569	525	0.004780	625	0.009899	725	0.001644
430	0.000902	530	0.005015	630	0.009802	730	0.001426
435	0.001378	535	0.005262	635	0.009606	735	0.001224
440	0.002143	540	0.005506	640	0.009300	740	0.001051
445	0.003417	545	0.005776	645	0.008918	745	0.000905
450	0.004360	550	0.006035	650	0.008467	750	0.000775
455	0.003662	555	0.006283	655	0.007969	755	0.000663
460	0.002636	560	0.006528	660	0.007441	760	0.000572
465	0.002264	565	0.006791	665	0.006872	765	0.000489
470	0.001958	570	0.007063	670	0.006287	770	0.000417
475	0.001732	575	0.007346	675	0.005737	775	0.000356
						780	0.000304



IES TM-30 Details







Test Report Number: LLIA001166-020B

Catalog Number: Aperto 3-722-15
Wall mounted, formed and extruded aluminum
housing, white coated glass enclosure.
44 white LEDs, one 120V-18W-288X32 LED board
One onboard 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:	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.

USA west coast LightLab International, LLC, 24825 N. 16th Avenue, Suite 125, Phoenix, AZ, 85085, Ph : +1 623-434-1499, Fx : +1 623-434-1492, www.lightlabint.com

USA east coast LightLab Int'l Allentown LLC, 905 Harrison Street, Suite 135, Allentown, PA 18103, Ph: +1 484-273-0705, www.lightlaballentown.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