



Report of Test

LLIA001129-001A

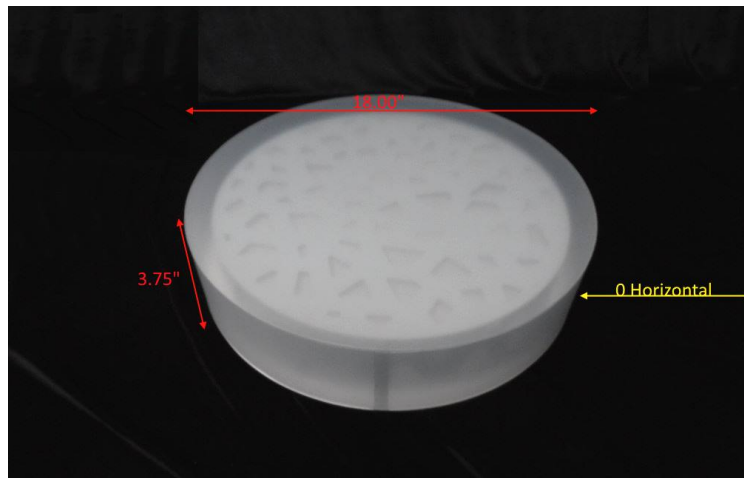
Indoor Distribution Photometry Test Report

Catalog Number: ESM51801

Surface ceiling mounted, white enamel aluminum housing, formed white enamel steel LED plate, perforated "lumenate" inner diffuser, translucent "trans lumenate" outer and lower diffuser.

120 white LEDs on one Keystone Technologies KTLM-1440-C3-830-120B LED board

One Keystone Technologies KTLD-36-UV-1000-VDIM-AF6 /K LED driver



Prepared For:
Lumetta, Inc
33 Minnesota Avenue
Warwick, RI 02888, USA

Performance Summary			
Input Voltage	120.0 V	Luminous Flux	1040.8 Lumens
Input Current	0.2704 A	Total Efficacy	32.3 Lm/W
Input Power	32.22 W	Downward Flux	841.8 Lumens
Frequency	60.00 Hz	Downward Flux	80.9 % of Total
Power Factor	0.993		
Current THD	8.7 %		

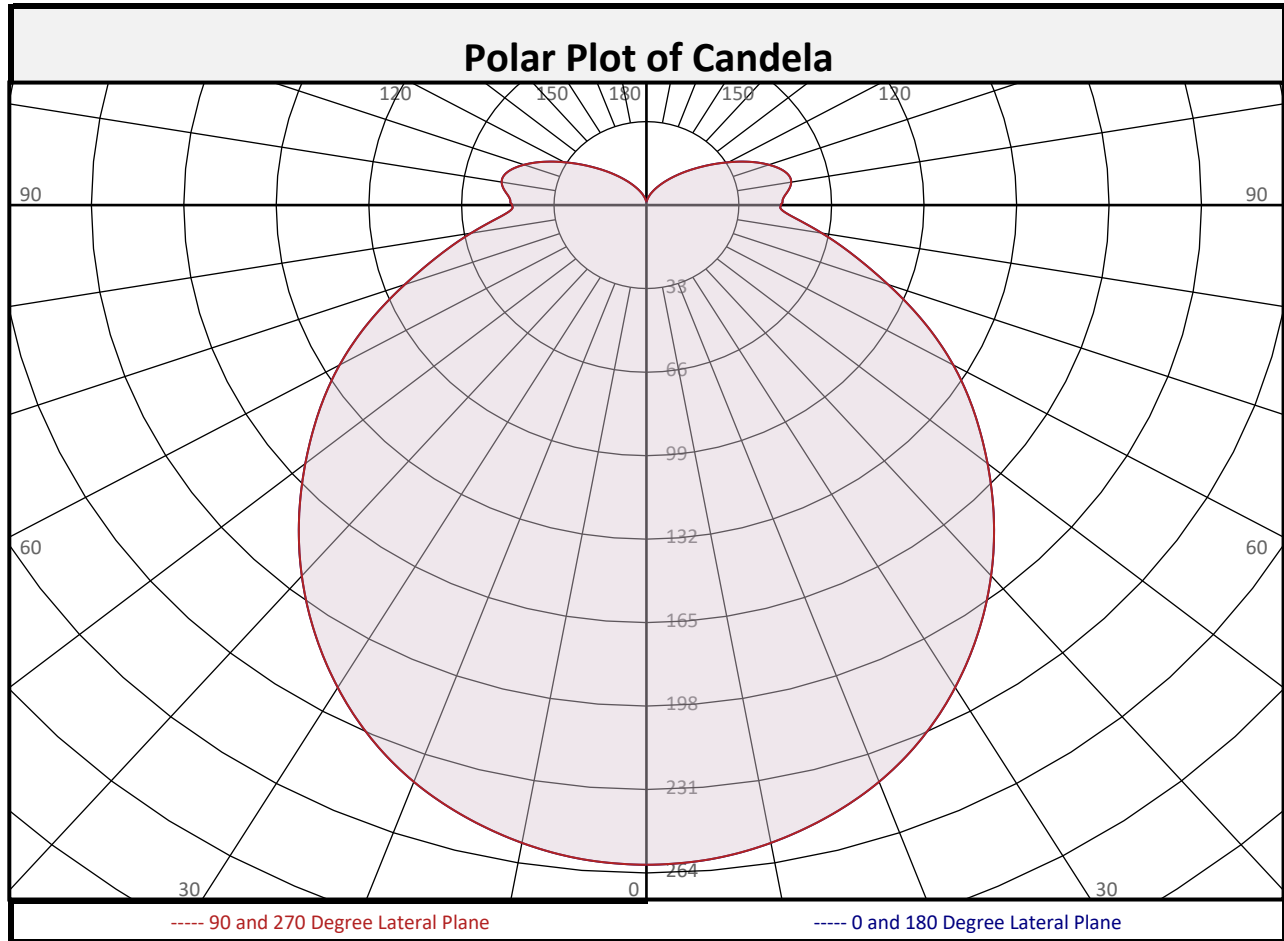
This test report was issued by LightLab International Allentown, LLC without alterations or erasures.

Test date: 06/25/2019
Report date: 06/25/2019

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	24.7	2.4%		90-100	54.6	5.2%		0-20	95.3	9.2%
10-20	70.6	6.8%		100-110	53.5	5.1%		0-30	202.4	19.4%
20-30	107.1	10.3%		110-120	40.2	3.9%		0-40	331.5	31.8%
30-40	129.1	12.4%		120-130	25.1	2.4%		0-60	594.5	57.1%
40-50	135.3	13.0%		130-140	14.1	1.4%		0-80	783.6	75.3%
50-60	127.7	12.3%		140-150	7.1	0.7%		10-90	817.1	78.5%
60-70	108.0	10.4%		150-160	3.2	0.3%		20-50	371.5	35.7%
70-80	81.2	7.8%		160-170	1.1	0.1%		40-90	510.3	49.0%
80-90	58.2	5.6%		170-180	0.2	0.0%		60-90	247.3	23.8%
0-90	841.8	80.9%		90-180	199.0	19.1%		0-180	1041	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	261	261	261	261	261	261	261	261	261
	2.5	260	260	260	260	260	260	260	260	260
	5	260	260	260	260	260	260	260	260	260
	7.5	258	258	258	258	258	258	258	258	258
	10	256	256	256	256	256	256	256	256	256
	12.5	253	253	253	253	253	253	253	253	253
	15	250	250	250	250	250	250	250	250	250
	17.5	247	247	247	247	247	247	247	247	247
	20	243	243	243	243	243	243	243	243	243
	22.5	238	238	238	238	238	238	238	238	238
	25	233	233	233	233	233	233	233	233	233
	27.5	227	227	227	227	227	227	227	227	227
	30	220	220	220	220	220	220	220	220	220
	32.5	213	213	213	213	213	213	213	213	213
	35	206	206	206	206	206	206	206	206	206
	37.5	199	199	199	199	199	199	199	199	199
	40	191	191	191	191	191	191	191	191	191
	42.5	183	183	183	183	183	183	183	183	183
	45	175	175	175	175	175	175	175	175	175
	47.5	167	167	167	167	167	167	167	167	167
50	159	159	159	159	159	159	159	159	159	
52.5	151	151	151	151	151	151	151	151	151	
55	143	143	143	143	143	143	143	143	143	
57.5	135	135	135	135	135	135	135	135	135	
60	126	126	126	126	126	126	126	126	126	
62.5	118	118	118	118	118	118	118	118	118	
65	109	109	109	109	109	109	109	109	109	
67.5	100	100	100	100	100	100	100	100	100	
70	92	92	92	92	92	92	92	92	92	
72.5	84	84	84	84	84	84	84	84	84	
75	76	76	76	76	76	76	76	76	76	
77.5	70	70	70	70	70	70	70	70	70	
80	63	63	63	63	63	63	63	63	63	
82.5	57	57	57	57	57	57	57	57	57	
85	52	52	52	52	52	52	52	52	52	
87.5	49	49	49	49	49	49	49	49	49	
90	48	48	48	48	48	48	48	48	48	



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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	48	48	48	48	48	48	48	48	48
	92.5	49	49	49	49	49	49	49	49	49
	95	50	50	50	50	50	50	50	50	50
	97.5	52	52	52	52	52	52	52	52	52
	100	52	52	52	52	52	52	52	52	52
	102.5	52	52	52	52	52	52	52	52	52
	105	51	51	51	51	51	51	51	51	51
	107.5	49	49	49	49	49	49	49	49	49
	110	47	47	47	47	47	47	47	47	47
	112.5	44	44	44	44	44	44	44	44	44
	115	40	40	40	40	40	40	40	40	40
	117.5	37	37	37	37	37	37	37	37	37
	120	34	34	34	34	34	34	34	34	34
	122.5	31	31	31	31	31	31	31	31	31
	125	28	28	28	28	28	28	28	28	28
	127.5	25	25	25	25	25	25	25	25	25
	130	22	22	22	22	22	22	22	22	22
	132.5	20	20	20	20	20	20	20	20	20
	135	18	18	18	18	18	18	18	18	18
	137.5	16	16	16	16	16	16	16	16	16
140	14	14	14	14	14	14	14	14	14	
142.5	13	13	13	13	13	13	13	13	13	
145	11	11	11	11	11	11	11	11	11	
147.5	10	10	10	10	10	10	10	10	10	
150	9	9	9	9	9	9	9	9	9	
152.5	8	8	8	8	8	8	8	8	8	
155	7	7	7	7	7	7	7	7	7	
157.5	6	6	6	6	6	6	6	6	6	
160	5	5	5	5	5	5	5	5	5	
162.5	4	4	4	4	4	4	4	4	4	
165	4	4	4	4	4	4	4	4	4	
167.5	3	3	3	3	3	3	3	3	3	
170	3	3	3	3	3	3	3	3	3	
172.5	2	2	2	2	2	2	2	2	2	
175	2	2	2	2	2	2	2	2	2	
177.5	1	1	1	1	1	1	1	1	1	
180	1	1	1	1	1	1	1	1	1	



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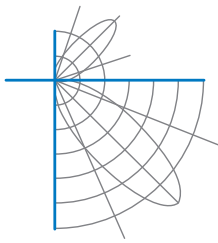
Coefficients of Utilization/Room Utilization - Zonal Cavity Method																						
Effective Floor Cavity Reflectance 0.20																						
RC	80					70					50				30				10			0
RW	70	50	30	10		70	50	30	10		50	30	10		50	30	10		50	30	10	0
RCR																						
0	114	114	114	114		110	110	110	110		100	100	100		92	92	92		84	84	84	81
1	102	97	92	88		98	93	88	84		85	81	78		78	75	72		71	69	67	64
2	93	84	76	70		88	80	73	68		73	68	63		67	63	59		62	58	55	52
3	84	73	64	58		80	70	62	56		64	58	52		59	54	49		54	50	46	43
4	77	64	55	48		73	62	53	47		57	50	44		52	46	42		48	43	39	36
5	70	57	48	41		67	55	47	40		51	44	38		47	41	36		43	38	34	31
6	65	51	42	36		62	49	41	35		46	38	33		42	36	31		39	34	30	27
7	60	46	38	31		57	45	37	31		41	34	29		38	32	28		35	30	26	24
8	56	42	34	28		53	41	33	27		38	31	26		35	29	25		33	27	23	21
9	52	39	30	25		50	37	30	24		35	28	23		32	26	22		30	25	21	19
10	49	36	28	22		47	34	27	22		32	26	21		30	24	20		28	23	19	17

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	7.2	7.53	7.53	
8.0	4.1	10.04	10.04	
10.0	2.6	12.55	12.55	
12.0	1.8	15.06	15.06	
14.0	1.3	17.57	17.57	
16.0	1.0	20.08	20.08	

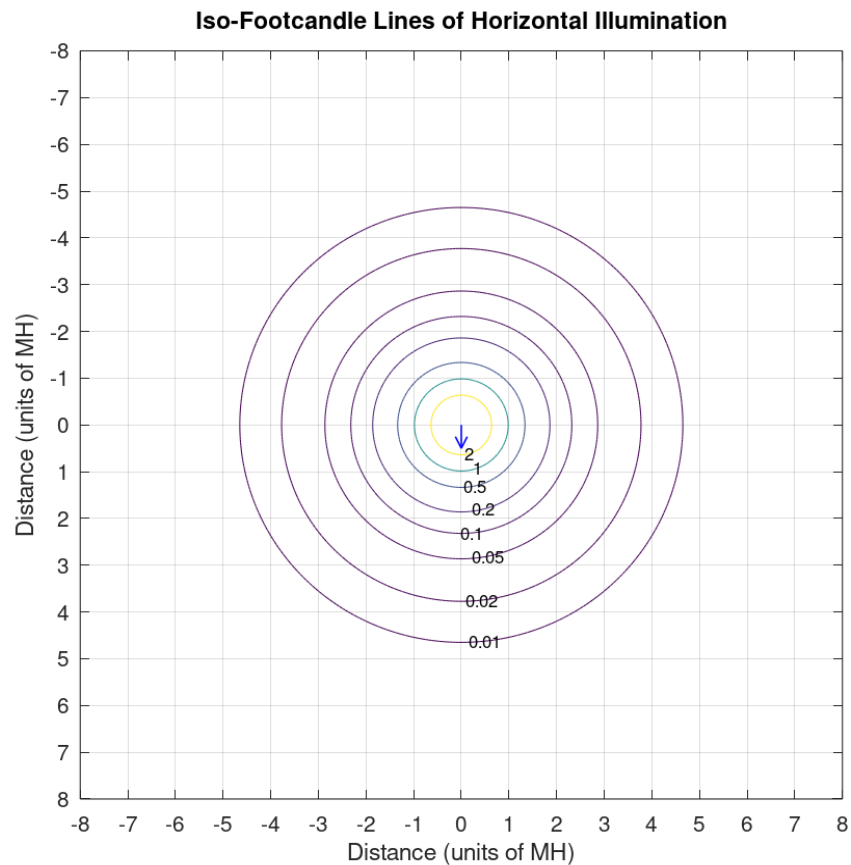
Average Luminance (cd/m ²)			
	0 deg Plane	45 deg Plane	90 deg Plane
0	1588	1588	1588
45	1193	1193	1193
55	1099	1099	1099
65	1002	1002	1002
75	904	904	904
85	905	905	905

Spacing Criterion	
Spacing Criterion:	1.3

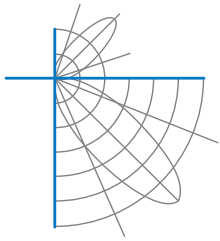


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Iso-Illuminance Plot



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.



Report of Test
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Additional Pictures of Test Subject





Report of Test

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Test Distance 9.5 m
Ambient Temperature 25.9 °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.



Report of Test

LLIA001129-001B

Integrating Sphere Report

Catalog Number: ESM51801

Surface ceiling mounted, white enamel aluminum housing, formed white enamel steel LED plate, perforated "lumenate" inner diffuser, translucent "trans lumenate" outer and lower diffuser.

120 white LEDs on one Keystone Technologies KTLM-1440-C3-830-120B LED board

One Keystone Technologies KTLD-36-UV-1000-VDIM-AF6 /K LED driver



Performance Summary

Voltage	120.0 Vac
Current	0.2707 A
Power	32.25 W
Frequency	59.99 Hz
Power Factor	0.993
Current THD	8.7 %

Total Luminous Flux	1034.1 lm
Efficacy	32.1 lm/W
Chromaticity (x,y)	(0.4285, 0.3980)
(u',v')	(0.2477, 0.5177)
Duv	-0.0012
CCT	3098 K
CRI (Ra)	86
R9	22
TM-30: Rf	86
TM-30: Rg	96

Prepared For:

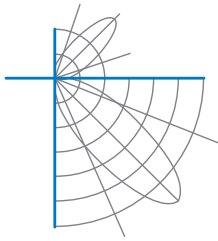
Lumetta, Inc

33 Minnesota Avenue

Warwick, RI 02888, USA

Test date: 06/24/2019

Report date: 06/25/2019



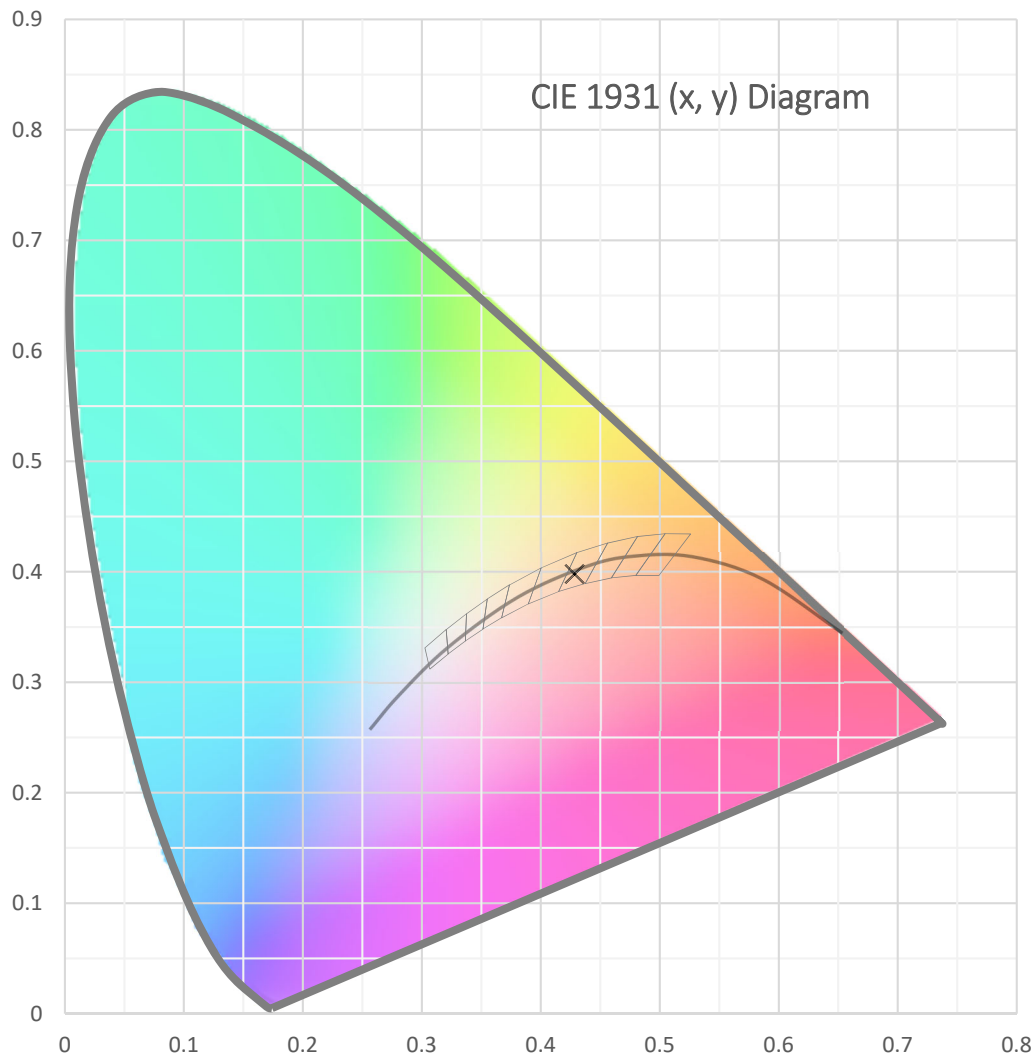
Test Report Number: LLIA001129-001B

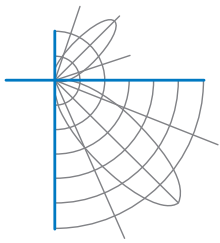
Catalog Number: ESM51801

Surface ceiling mounted, white enamel aluminum housing, formed white enamel steel LED plate, perforated "lumenate" inner diffuser, translucent "trans lumenate" outer and lower diffuser.

120 white LEDs on one Keystone Technologies KTLM-1440-C3-830-120B LED board

One Keystone Technologies KTLD-36-UV-1000-VDIM-AF6 /K LED driver

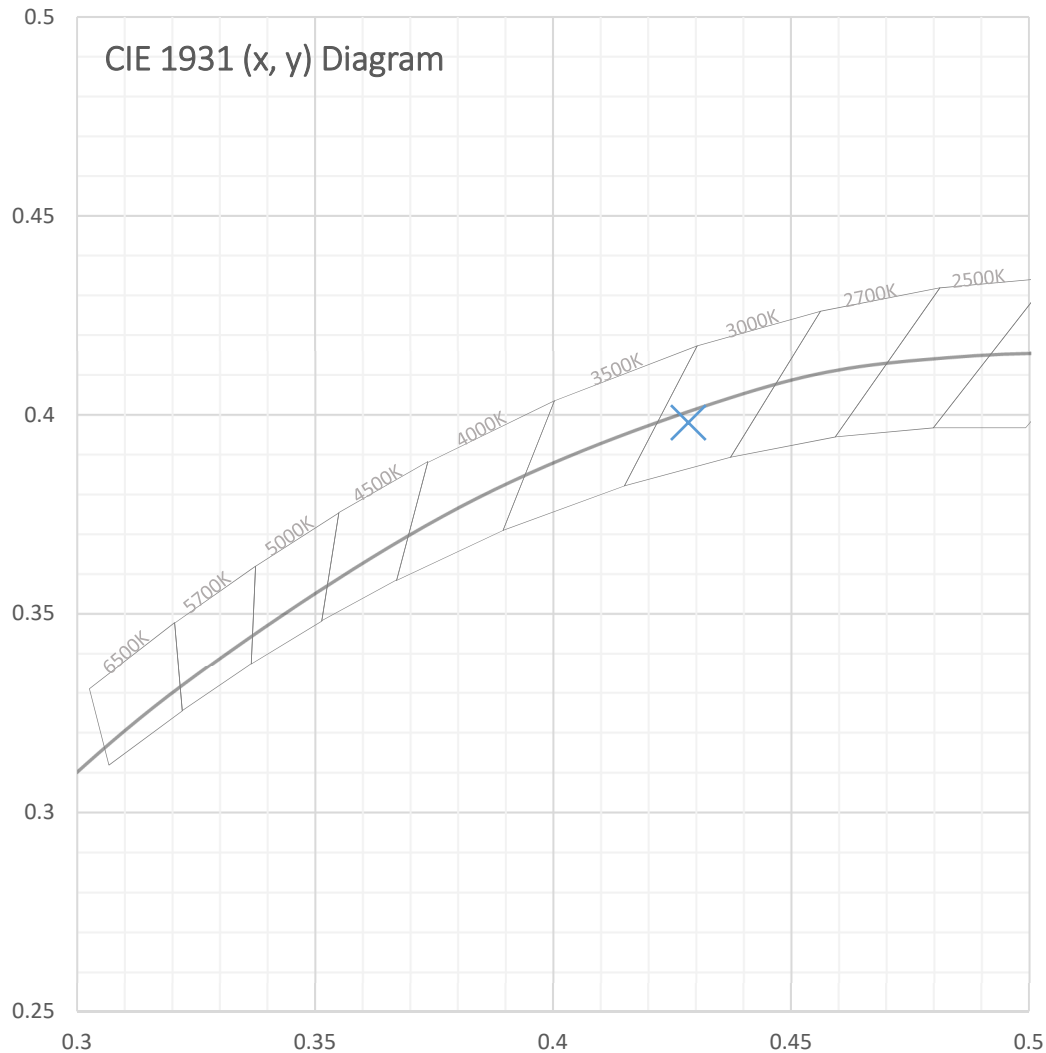




Test Report Number: LLIA001129-001B

Catalog Number: ESM51801

Surface ceiling mounted, white enamel aluminum housing, formed white enamel steel LED plate, perforated "luminate" inner diffuser, translucent "trans luminate" outer and lower diffuser.
120 white LEDs on one Keystone Technologies KTLM-1440-C3-830-120B LED board
One Keystone Technologies KTLD-36-UV-1000-VDIM-AF6 /K LED driver





Test Report Number: LLIA001129-001B

Catalog Number: ESM51801

Surface ceiling mounted, white enamel aluminum housing, formed white enamel steel LED plate, perforated "lumenate" inner diffuser, translucent "trans lumenate" outer and lower diffuser.
120 white LEDs on one Keystone Technologies KTLM-1440-C3-830-120B LED board
One Keystone Technologies KTLD-36-UV-1000-VDIM-AF6 /K LED driver

Spectral Data

Total Radiant Flux	3.426 W
Total Luminous Flux	1034.1 Lm
Chromaticity CIE 1931 (x, y)	(0.4285, 0.3980)
Chromaticity CIE 1976 (u', v')	(0.2477, 0.5177)
Correlated Color Temperature (CCT)	3098 K
Color Rendering Index (Ra)	86
R1	85
R2	94
R3	95
R4	84
R5	86
R6	93
R7	84
R8	65
R9	22
R10	87
R11	84
R12	79
R13	88
R14	98
TM-30: Rf	86
TM-30: Rg	96
Distance from Planckian Locus (Duv)	-0.0012
Scotopic/Photopic Ratio *	1.436

Electrical Data

Voltage	120.0 Vac
Current	0.2707 A
Power	32.25 W
Frequency	59.99 Hz
Power Factor	0.993
Current THD	8.7 %



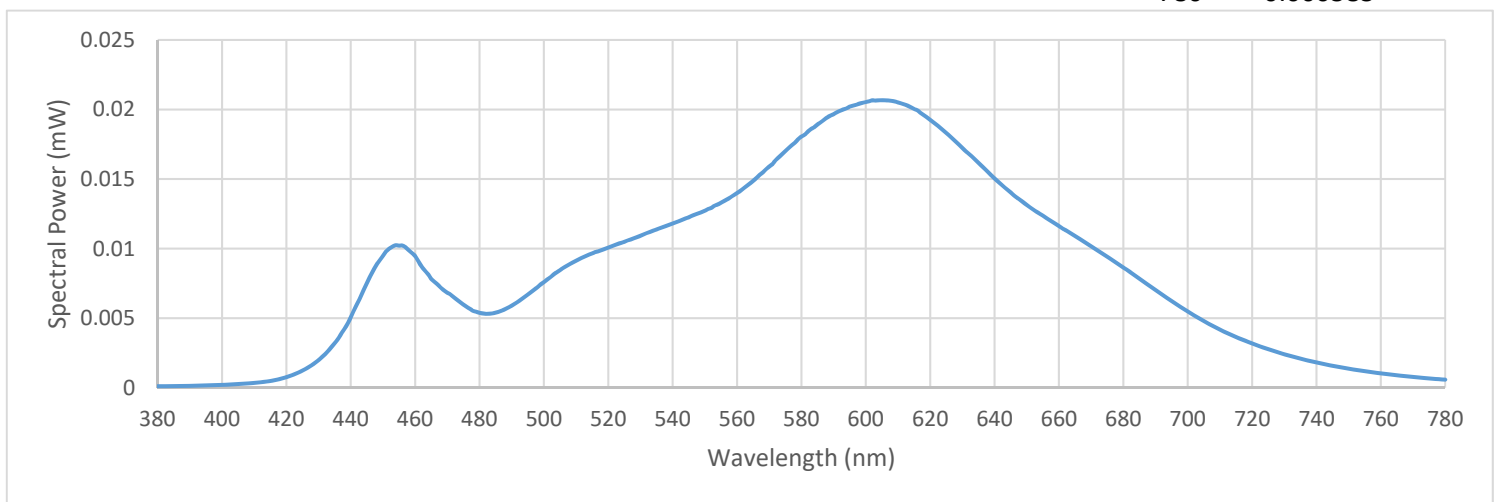
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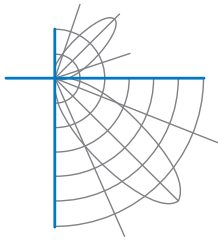
Catalog Number: ESM51801

Surface ceiling mounted, white enamel aluminum housing, formed white enamel steel LED plate, perforated "lumenate" inner diffuser, translucent "trans lumenate" outer and lower diffuser.
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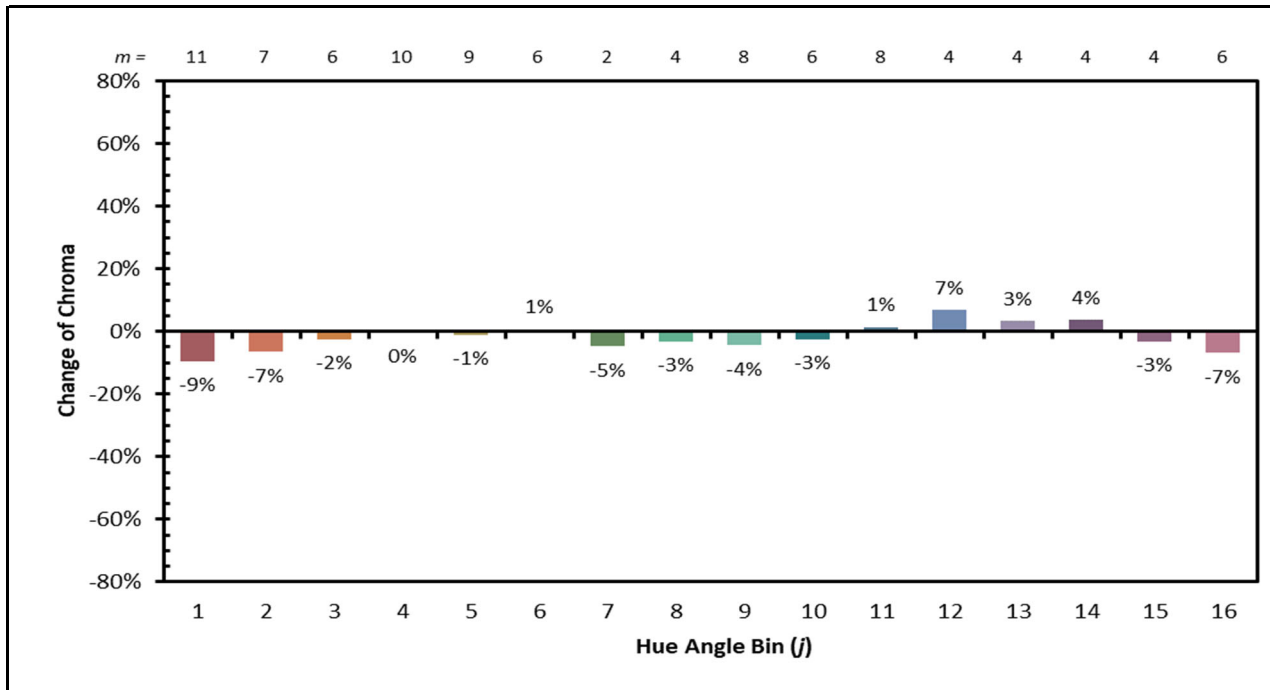
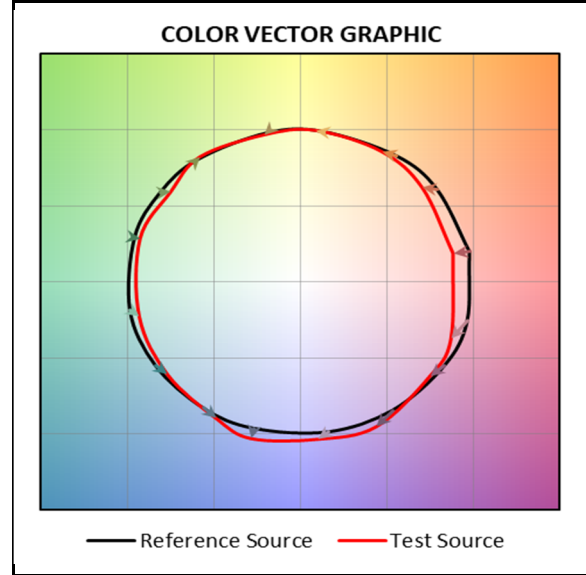
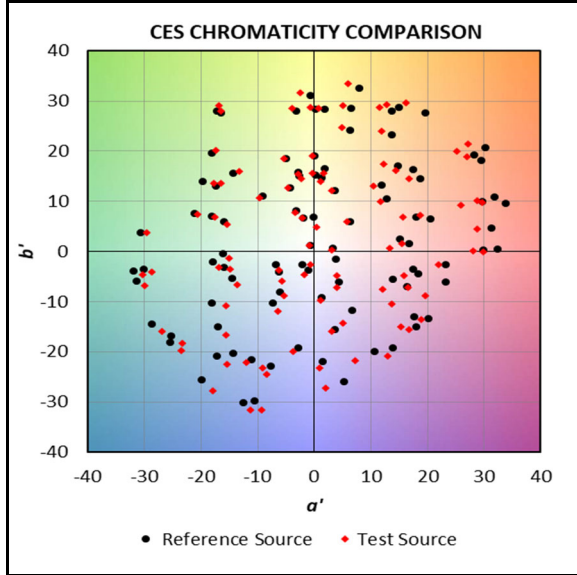
Summary Spectral Power Distribution (wavelength - nm, spectral power - mW)

380	0.000110	480	0.005387	580	0.018054	680	0.008644
385	0.000114	485	0.005406	585	0.018934	685	0.007852
390	0.000140	490	0.005904	590	0.019662	690	0.007027
395	0.000168	495	0.006693	595	0.020207	695	0.006212
400	0.000209	500	0.007597	600	0.020533	700	0.005481
405	0.000261	505	0.008455	605	0.020660	705	0.004795
410	0.000345	510	0.009124	610	0.020504	710	0.004177
415	0.000484	515	0.009651	615	0.020033	715	0.003661
420	0.000771	520	0.010095	620	0.019246	720	0.003192
425	0.001232	525	0.010491	625	0.018335	725	0.002766
430	0.001989	530	0.010928	630	0.017247	730	0.002410
435	0.003197	535	0.011379	635	0.016177	735	0.002093
440	0.005051	540	0.011810	640	0.015028	740	0.001817
445	0.007525	545	0.012252	645	0.014039	745	0.001583
450	0.009486	550	0.012735	650	0.013135	750	0.001371
455	0.010215	555	0.013300	655	0.012368	755	0.001191
460	0.009469	560	0.013991	660	0.011640	760	0.001039
465	0.007823	565	0.014866	665	0.010920	765	0.000897
470	0.006834	570	0.015896	670	0.010177	770	0.000775
475	0.005970	575	0.017021	675	0.009418	775	0.000674
						780	0.000585





IES TM-30 Details





Test Report Number: LLIA001129-001B

Catalog Number: ESM51801

Surface ceiling mounted, white enamel aluminum housing, formed white enamel steel LED plate, perforated "lumenate" inner diffuser, translucent "trans lumenate" outer and lower diffuser.
120 white LEDs on one Keystone Technologies KTLM-1440-C3-830-120B LED board
One Keystone Technologies KTLD-36-UV-1000-VDIM-AF6 /K LED driver

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: 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

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Quantities marked with * are not covered.