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INDEPENDENT TEST LABORATORY REPORT No. 31901

Description:

OPTOLUM INC - LED DOWN LIGHT, CAT# DL LO 19
WITH WHITE INTERIOR AND CLEAR PLASTIC FOCUSING LENSES WITH FROSTED EDGE
THREE LEDS. LUMINAIRE OUTPUT = 264 LMS.
ONE HIGH PERFECTION LP1013-24 DRIVER OPERATING AT 120 VAC AND 4.88 WATTS

The sample(s) was(were) tested in accordance with the following applied standards/regulations:

IES LM-41-98: Approved Method for Photometric Testing of Indoor Fluorescent Luminaire (withdrawn)
IES LM-79-08: Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

Prepared for:

OPTOLUM
TEMPE, AZ

Approved by:

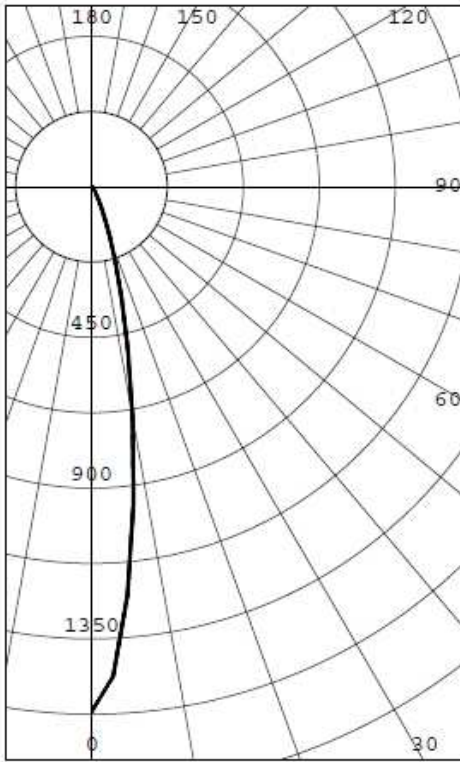
RYDER TUNNEY
STAFF ENGINEER
JUL 11, 2013

This report shall not be reproduced except in full without the written approval of the laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.

LIGHTING SCIENCES, INC.
7826 E. EVANS RD.
SCOTTSDALE, AZ, USA 85260

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INTENSITY (CANDLEPOWER) SUMMARY

ANGLE	MEAN CP	LUMENS
0	1567	
5	1223	100
10	701	
15	344	97
20	156	
25	71	35
30	34	
35	20	13
40	14	
45	10	8
50	8	
55	7	6
60	5	
65	4	4
70	2	
75	1	1
80	0	
85	0	0
90	0	

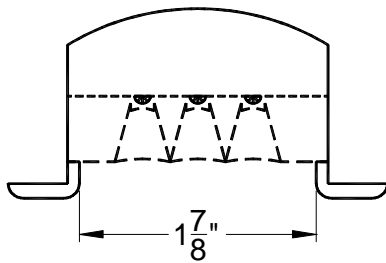
ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	232	87.71
0-40	245	92.63
0-60	259	97.99
0-90	264	100.00
40-90	19	7.37
60-90	5	2.01
90-180	0	0.00
0-180	264	100.00

EFFICACY (LUMENS PER WATT): 54.1

*** THIS IS AN ABSOLUTE TEST ***

LUMINOUS DIAMETER: 1.875 INS



LUMINANCE SUMMARY CD./SQ.M.

S/MH: 0.3
SC: 0.3

ANGLE	MEAN CD/SQ M
45	8347
55	6563
65	5341
75	2857
85	404

TESTED IN ACCORDANCE WITH IES PROCEDURES.

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INTENSITY(CANDLEPOWER) DATA
IN 2.5 DEGREE STEPS

ANGLE	INTENSITY (CANDLEPOWER)	LUMENS
0.0	1567	
2.5	1463	
5.0	1223	100
7.5	949	
10.0	701	
12.5	498	
15.0	344	97
17.5	233	
20.0	156	
22.5	104	
25.0	71	35
27.5	48	
30.0	34	
32.5	25	
35.0	20	13
37.5	16	
40.0	14	
42.5	12	
45.0	10	8
47.5	9	
50.0	8	
52.5	7	
55.0	7	6
57.5	6	
60.0	5	
62.5	5	
65.0	4	4
67.5	3	
70.0	2	
72.5	2	
75.0	1	1
77.5	1	
80.0	0	
82.5	0	
85.0	0	0
87.5	0	
90.0	0	

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AVERAGE LUMINANCE DATA

CD./SQ.M (FOOTLAMBERTS)

ANGLE	LUMINANCE
0	879586 (256720)
30	21864 (6381)
40	10337 (3017)
45	8347 (2436)
50	7122 (2078)
55	6563 (1915)
60	5796 (1691)
65	5341 (1559)
70	3857 (1125)
75	2857 (834)
80	1030 (300)
85	404 (117)

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COEFFICIENTS OF UTILIZATION

ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

CC WALL	90				80				70				50				30				10				0	
	70	50	30	10	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0	
RCR	0	1.221	.221	.221	.22	1.191	.191	.191	.19	1.161	.161	.161	.16	1.111	.111	.111	.11	1.061	.061	.061	.06	1.021	.021	.021	.02	1.00
	1	1.181	.151	.131	.11	1.151	.131	.111	.10	1.131	.111	.091	.08	1.071	.061	.05	1.031	.021	.021	.02	1.000	.990	.99	0.97		
	2	1.131	.101	.071	.04	1.121	.081	.061	.03	1.101	.061	.041	.02	1.031	.011	.00	1.010	.990	.98	0.980	.970	.96	0.94			
	3	1.101	.051	.020	.99	1.081	.041	.010	.98	1.071	.031	.000	.97	1.010	.980	.96	0.980	.960	.94	0.960	.950	.93	0.92			
	4	1.071	.020	.980	.95	1.061	.010	.970	.94	1.041	.000	.970	.94	0.980	.950	.93	0.960	.930	.92	0.940	.920	.91	0.89			
	5	1.040	.980	.940	.91	1.030	.970	.930	.91	1.010	.960	.930	.90	0.950	.920	.90	0.930	.910	.89	0.920	.900	.88	0.87			
	6	1.020	.960	.910	.89	1.000	.950	.910	.88	0.990	.940	.900	.88	0.930	.900	.87	0.920	.890	.87	0.900	.880	.86	0.85			
	7	0.990	.920	.880	.86	0.980	.920	.880	.86	0.970	.910	.880	.85	0.900	.870	.85	0.890	.860	.84	0.880	.860	.84	0.83			
	8	0.970	.900	.860	.84	0.960	.900	.860	.83	0.950	.890	.860	.83	0.880	.850	.83	0.870	.840	.82	0.870	.840	.82	0.81			
	9	0.940	.880	.840	.81	0.930	.880	.840	.81	0.930	.870	.840	.81	0.860	.830	.81	0.860	.830	.81	0.850	.820	.80	0.80			
	10	0.920	.860	.820	.79	0.920	.850	.820	.79	0.910	.850	.820	.79	0.840	.810	.79	0.840	.810	.79	0.830	.810	.79	0.78			

THE ABOVE COEFFICIENTS HAVE BEEN CALCULATED BASED ON LUMINAIRE LUMENS
 BECAUSE IN AN ABSOLUTE TEST THE BARE LAMP LUMENS ARE UNKNOWN.
 LIGHTING DESIGN CALCULATIONS MADE USING THESE COEFFICIENTS SHOULD
 THEREFORE USE THE LUMINAIRE LUMENS IN THE CALCULATION FORMULA

LUMINAIRE INPUT WATTS 4.9

LABORATORY RESULTS MAY NOT BE REPRESENTATIVE OF FIELD PERFORMANCE.
 BALLAST AND FIELD FACTORS HAVE NOT BEEN APPLIED.

TEST DISTANCE EXCEEDS FIVE TIMES THE GREATEST
 LUMINOUS OPENING OF LUMINAIRE.

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ELECTRICAL MEASUREMENTS

INPUT VOLTAGE:	120.0	VOLTS AC
INPUT CURRENT:	0.042	AMPS
INPUT POWER:	4.9	WATTS
POWER FACTOR:	96.8	PERCENT
TOTAL HARMONIC DISTORTION:	22.36	PERCENT
OFF STATE POWER:	0.00	WATTS

INPUT VOLTAGE:	277.0	VOLTS AC
INPUT CURRENT:	0.030	AMPS
INPUT POWER:	6.4	WATTS
POWER FACTOR:	77.7	PERCENT
TOTAL HARMONIC DISTORTION:	29.37	PERCENT

LIGHT OUTPUT

LUMENS:	264	lm
EFFICACY:	54.1	lm/W

SPECTRAL MEASUREMENTS

X:	0.4341	
Y:	0.3982	
u/u' :	0.2513	
v:	0.3457	
v' :	0.5186	
Duv:	0.0021	
CRI (R _a):	84.5	
CRI (R _g):	27.0	
CCT:	2997	K
RADIANT FLUX:	858	mW

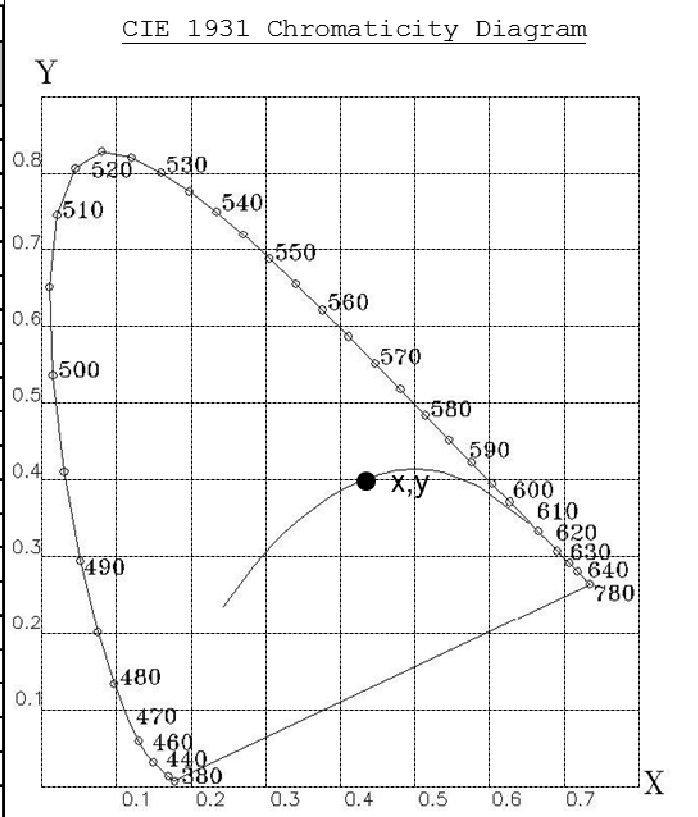
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Tabulated Spectral Power Distribution

Wavelength [nm]	[mW/nm]	Wavelength [nm]	[mW/nm]
380	0.01017	590	4.86634
390	0.01765	600	5.09084
400	0.03058	610	5.15815
410	0.08395	620	5.02680
420	0.32698	630	4.73140
430	0.99149	640	4.28260
440	2.29229	650	3.75182
450	2.60024	660	3.17138
460	1.45006	670	2.60596
470	0.94875	680	2.09138
480	0.83548	690	1.64644
490	1.08706	700	1.26755
500	1.59321	710	0.96503
510	2.10613	720	0.73011
520	2.51187	730	0.54341
530	2.81860	740	0.40477
540	3.11627	750	0.30091
550	3.41860	760	0.22496
560	3.77579	770	0.16624
570	4.15653	780	0.06184
580	4.54145		

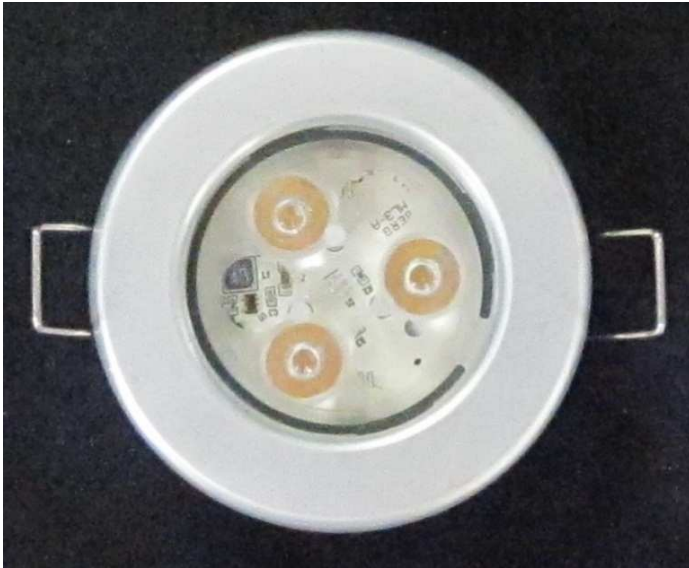


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LUMINOUS OPENING



SIDE VIEW



All testing was conducted in accordance with LM-79-08,

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products as published by the Illuminating Engineering Society of North America (IESNA).

The condition of the item tested was new. Stabilization time before testing meets the stabilization requirements of LM-79-08.

The test results (luminous distribution and flux) were obtained by using a Lighting Sciences series 6000 Type C Moving Mirror Goniophotometer

- The photometric reference standard used is a set of three incandescent luminous intensity standard lamps calibrated and traceable to the U.S. National Institute of Standards and Technology.

The test results (colorimetric and luminous flux) were obtained by using a Labsphere Model LMS-760 Integrating Sphere. 4π geometry was used. Correction factors were applied for self-absorption.

- The colorimetric & photometric reference standard used is an incandescent spectral flux standard lamp calibrated and traceable to the U.S. National Institute of Standards and Technology.

Power measurements were obtained with a Yokogawa WT210 power analyzer.

Ambient temperature during testing was $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, measured using an Omega model DP460.

Calibration certificates are on file at the laboratories of Lighting Sciences Inc.

The results in this report apply to the test sample(s) mentioned in this report at the time of the testing period only and are not to be used to indicate applicability to other similar products.