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INDEPENDENT TEST LABORATORY REPORT No. 31903

Description:

OPTOLUM INC - LED DOWN LIGHT, CAT# DL HO 19
WITH WHITE INTERIOR AND CLEAR PLASTIC FOCUSING LENSES WITH FROSTED EDGE
FOUR LEDS. LUMINAIRE OUTPUT = 341 LMS.
ONE HIGH PERFECTION LP1013-24 DRIVER OPERATING AT 120 VAC AND 5.62 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IES LM-41-98: Approved Method for Photometric Testing of Indoor Fluorescent Luminaire (withdrawn)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:

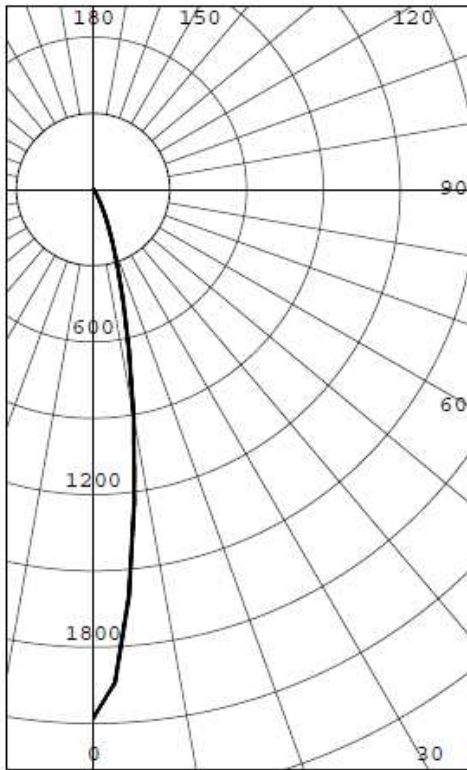
RYDER TUNNEY
STAFF ENGINEER
JUL 11, 2013

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	2078	
5	1606	131
10	909	
15	455	129
20	220	
25	104	50
30	47	
35	23	15
40	13	
45	9	7
50	7	
55	5	5
60	4	
65	3	3
70	2	
75	1	1
80	0	
85	0	0
90	0	

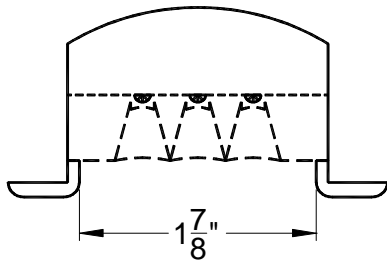
ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	310	90.75
0-40	325	95.28
0-60	337	98.90
0-90	341	100.00
40-90	16	4.72
60-90	4	1.10
90-180	0	0.00
0-180	341	100.00

EFFICACY (LUMENS PER WATT): 60.7

*** 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	7495
55	5348
65	4208
75	1197
85	0

TESTED IN ACCORDANCE WITH IES PROCEDURES.

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INTENSITY(CANDLEPOWER) DATA
IN 2.5 DEGREE STEPS

ANGLE	INTENSITY (CANDLEPOWER)	LUMENS
0.0	2078	
2.5	1941	
5.0	1606	131
7.5	1234	
10.0	909	
12.5	646	
15.0	455	129
17.5	317	
20.0	220	
22.5	152	
25.0	104	50
27.5	70	
30.0	47	
32.5	32	
35.0	23	15
37.5	17	
40.0	13	
42.5	11	
45.0	9	7
47.5	8	
50.0	7	
52.5	6	
55.0	5	5
57.5	5	
60.0	4	
62.5	4	
65.0	3	3
67.5	3	
70.0	2	
72.5	1	
75.0	1	1
77.5	0	
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	1166395 (340429)
30	30493 (8900)
40	9796 (2859)
45	7495 (2187)
50	6074 (1773)
55	5348 (1560)
60	4750 (1386)
65	4208 (1228)
70	2831 (826)
75	1197 (349)
80	20 (5)
85	0 (0)

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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	.141	.12	1.151	.131	.121	.10	1.131	.121	.101	.08	1.071	.061	.05	1.041	.031	.02	1.001	.000	.99	0.97			
	2	1.141	.111	.081	.05	1.121	.091	.061	.04	1.101	.071	.051	.03	1.041	.021	.00	1.011	.000	.98	0.990	.980	.96	0.95			
	3	1.111	.061	.031	.00	1.091	.051	.020	.99	1.071	.041	.010	.99	1.010	.990	.97	0.990	.970	.96	0.970	.960	.94	0.93			
	4	1.081	.030	.990	.96	1.061	.020	.980	.96	1.051	.010	.980	.95	0.990	.960	.94	0.970	.950	.93	0.950	.940	.92	0.91			
	5	1.051	.000	.950	.93	1.040	.990	.950	.92	1.020	.980	.940	.92	0.960	.930	.91	0.950	.920	.90	0.930	.920	.90	0.89			
	6	1.030	.970	.930	.91	1.020	.960	.930	.90	1.000	.960	.920	.90	0.940	.910	.89	0.930	.910	.89	0.920	.900	.88	0.87			
	7	1.000	.940	.900	.88	0.990	.940	.900	.88	0.980	.930	.900	.87	0.920	.890	.87	0.910	.880	.86	0.900	.880	.86	0.85			
	8	0.980	.920	.880	.86	0.970	.910	.880	.86	0.960	.900	.880	.85	0.900	.870	.85	0.890	.860	.85	0.880	.860	.84	0.83			
	9	0.960	.900	.860	.83	0.950	.890	.860	.83	0.940	.890	.860	.83	0.880	.850	.83	0.880	.850	.83	0.870	.840	.83	0.82			
	10	0.940	.880	.840	.82	0.930	.870	.840	.82	0.920	.870	.840	.81	0.860	.830	.81	0.860	.830	.81	0.850	.830	.81	0.80			

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 5.6

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:	0.048	AMPS
INPUT POWER:	5.6	WATTS
POWER FACTOR:	96.5	PERCENT
TOTAL HARMONIC DISTORTION:	22.00	PERCENT
OFF STATE POWER:	0.00	WATTS
INPUT VOLTAGE:	277.0	VOLTS AC
INPUT CURRENT:	0.032	AMPS
INPUT POWER:	7.1	WATTS
POWER FACTOR:	79.6	PERCENT
TOTAL HARMONIC DISTORTION:	29.78	PERCENT

LIGHT OUTPUT

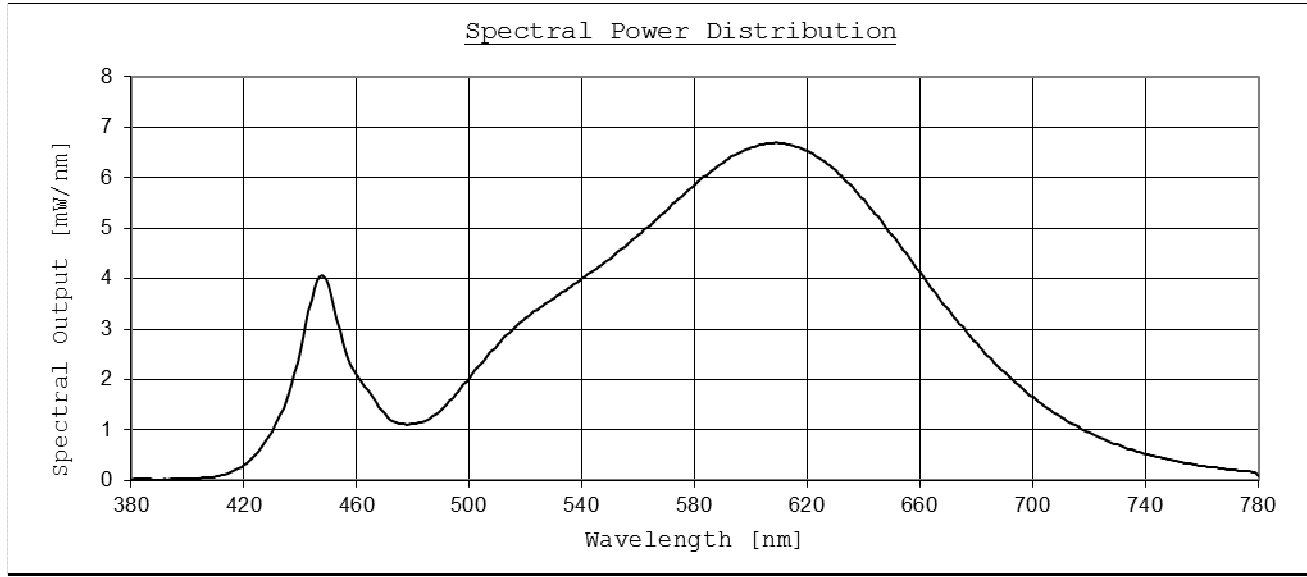
LUMENS:	341	lm
EFFICACY:	60.7	lm/W

SPECTRAL MEASUREMENTS

X:	0.4339	
Y:	0.3971	
u/u':	0.2516	
v:	0.3454	
v':	0.5182	
Duv:	0.0025	
CRI (R _a):	84.8	
CRI (R _g):	27.7	
CCT:	2992	K
RADIANT FLUX:	1110	mW

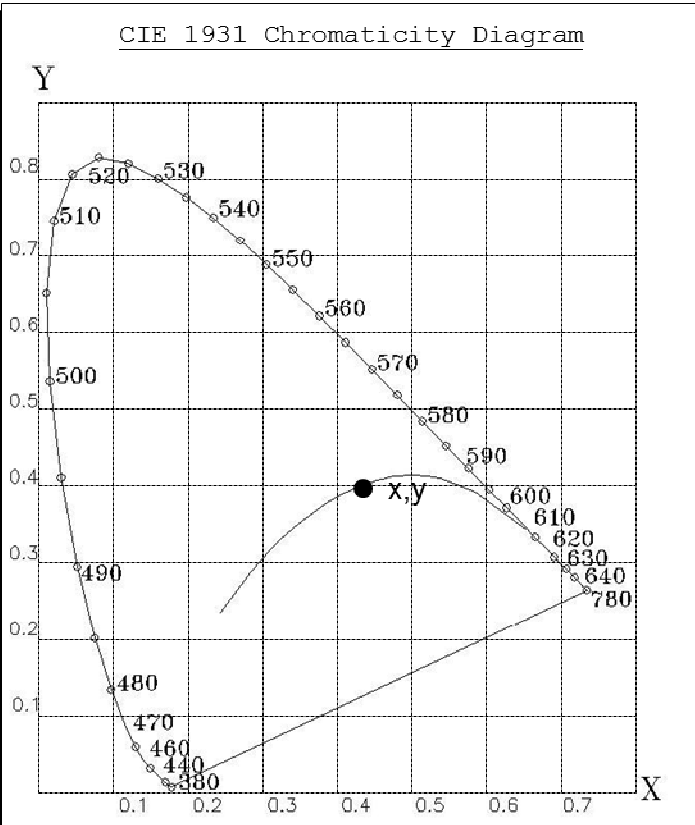
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Tabulated Spectral Power Distribution

Wavelength [nm]	[mW/nm]	Wavelength [nm]	[mW/nm]
380	0.01362	590	6.30305
390	0.02157	600	6.59940
400	0.03286	610	6.68478
410	0.08185	620	6.51683
420	0.30962	630	6.13647
430	0.98462	640	5.55740
440	2.57785	650	4.86169
450	3.85927	660	4.11196
460	2.08162	670	3.38217
470	1.32009	680	2.71478
480	1.12041	690	2.13813
490	1.40517	700	1.64878
500	2.04257	710	1.25590
510	2.69361	720	0.94771
520	3.21911	730	0.70815
530	3.61919	740	0.52834
540	4.00554	750	0.39161
550	4.39750	760	0.29327
560	4.86770	770	0.21746
570	5.36906	780	0.08048
580	5.87605		

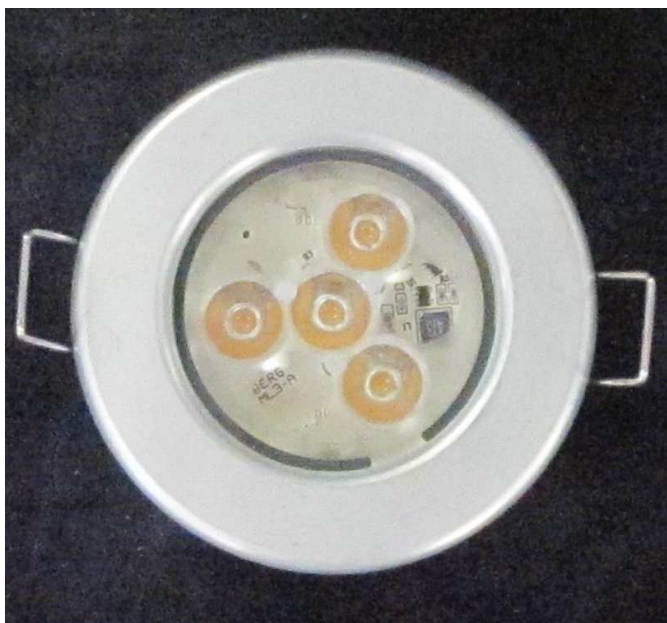


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LUMINOUS OPENING



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.