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INDEPENDENT TEST LABORATORY REPORT No. 31905

Description:

OPTOLUM INC - LED DOWN LIGHT, CAT# DL HO 25
 WITH WHITE INTERIOR AND FROSTED PLASTIC FOCUSING LENSES
 FOUR LEDS. LUMINAIRE OUTPUT = 340 LMS.
 ONE HIGH PERFECTION LP1013-24 DRIVER OPERATING AT 120 VAC AND 5.85 WATTS

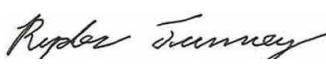
The sample(s) was(were) tested in accordance with the following applied standards/regulations:

IES LM-41-98: Approved Method for Photometric Testing of Indoor Fluorescent Luminaire (withdrawn)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:

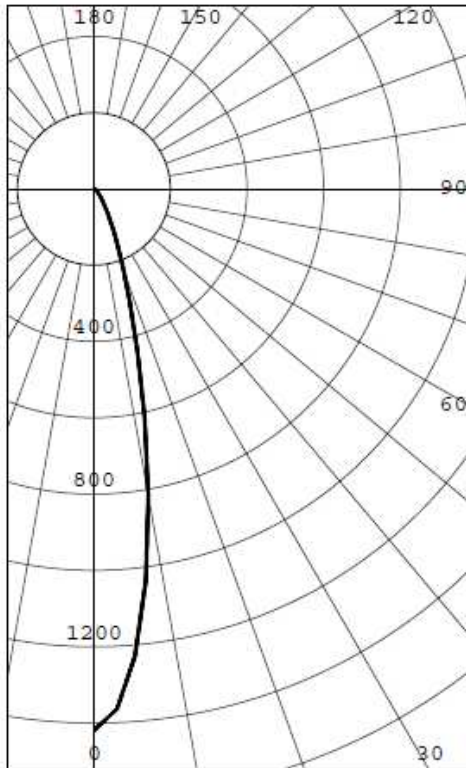
RYDER TUNNEY

 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	1419	
5	1228	104
10	818	
15	436	122
20	223	
25	122	58
30	69	
35	41	26
40	25	
45	17	14
50	12	
55	9	8
60	7	
65	5	5
70	3	
75	1	1
80	0	
85	0	0
90	0	

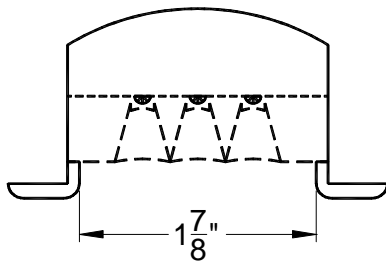
ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	285	83.83
0-40	311	91.62
0-60	333	98.14
0-90	340	100.00
40-90	28	8.38
60-90	6	1.86
90-180	0	0.00
0-180	340	100.00

EFFICACY (LUMENS PER WATT): 58.1

*** THIS IS AN ABSOLUTE TEST ***

LUMINOUS DIAMETER: 1.875 INS



LUMINANCE SUMMARY CD./SQ.M.

S/MH: 0.4
 SC: 0.4

ANGLE	MEAN CD/SQ M
45	13806
55	9283
65	6675
75	2585
85	121

TESTED IN ACCORDANCE WITH IES PROCEDURES.

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INTENSITY(CANDLEPOWER) DATA
IN 2.5 DEGREE STEPS

ANGLE	INTENSITY (CANDLEPOWER)	LUMENS
0.0	1419	
2.5	1365	
5.0	1228	104
7.5	1036	
10.0	818	
12.5	609	
15.0	436	122
17.5	310	
20.0	223	
22.5	164	
25.0	122	58
27.5	91	
30.0	69	
32.5	53	
35.0	41	26
37.5	32	
40.0	25	
42.5	21	
45.0	17	14
47.5	15	
50.0	12	
52.5	11	
55.0	9	8
57.5	8	
60.0	7	
62.5	6	
65.0	5	5
67.5	4	
70.0	3	
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	796323 (232418)
30	44644 (13030)
40	18677 (5451)
45	13806 (4029)
50	10905 (3182)
55	9283 (2709)
60	7992 (2332)
65	6675 (1948)
70	4554 (1329)
75	2585 (754)
80	444 (129)
85	121 (35)

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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	.06	1.021	.021	.02	1.00			
1	1.171	.141	.121	.10	1.151	.121	.111	.09	1.121	.111	.091	.07	1.061	.051	.04	1.031	.021	.01	0.990	.980	.98	0.96				
2	1.131	.091	.061	.03	1.111	.071	.041	.01	1.091	.051	.031	.00	1.021	.000	.98	1.000	.980	.96	0.970	.960	.94	0.93				
3	1.091	.041	.000	.97	1.071	.030	.990	.96	1.061	.010	.980	.96	0.990	.960	.94	0.970	.950	.93	0.950	.930	.91	0.90				
4	1.061	.000	.950	.93	1.040	.990	.950	.92	1.030	.980	.940	.91	0.960	.930	.90	0.940	.910	.89	0.920	.900	.88	0.87				
5	1.030	.960	.910	.88	1.010	.950	.910	.88	0.990	.940	.900	.87	0.930	.890	.87	0.910	.880	.86	0.900	.870	.85	0.84				
6	1.000	.930	.880	.85	0.980	.920	.880	.85	0.970	.910	.870	.85	0.900	.870	.84	0.890	.860	.84	0.880	.850	.83	0.82				
7	0.960	.890	.850	.82	0.950	.890	.850	.82	0.940	.880	.840	.81	0.870	.840	.81	0.860	.830	.81	0.850	.820	.80	0.79				
8	0.940	.870	.820	.80	0.930	.860	.820	.79	0.920	.850	.820	.79	0.850	.810	.79	0.840	.810	.78	0.830	.800	.78	0.77				
9	0.910	.840	.800	.77	0.900	.840	.800	.77	0.890	.830	.790	.77	0.820	.790	.76	0.820	.780	.76	0.810	.780	.76	0.75				
10	0.890	.820	.770	.74	0.880	.810	.770	.74	0.870	.810	.770	.74	0.800	.770	.74	0.800	.760	.74	0.790	.760	.74	0.73				

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 5.8

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:	0.050	AMPS
INPUT POWER:	5.9	WATTS
POWER FACTOR:	97.5	PERCENT
TOTAL HARMONIC DISTORTION:	21.46	PERCENT
OFF STATE POWER:	0.00	WATTS

INPUT VOLTAGE:	277.0	VOLTS AC
INPUT CURRENT:	0.032	AMPS
INPUT POWER:	7.2	WATTS
POWER FACTOR:	81.8	PERCENT
TOTAL HARMONIC DISTORTION:	26.31	PERCENT

LIGHT OUTPUT

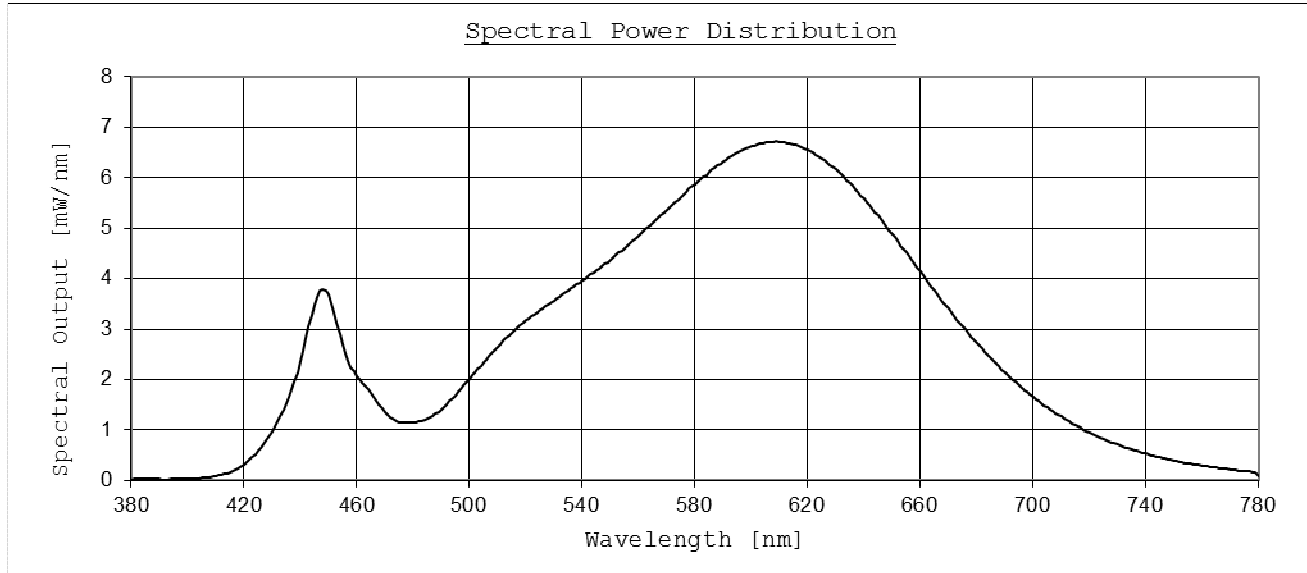
LUMENS:	340	lm
EFFICACY:	58.1	lm/W

SPECTRAL MEASUREMENTS

X:	0.4365	
Y:	0.3987	
u/u':	0.2526	
v:	0.3461	
v':	0.5192	
Duv:	0.0023	
CRI (R _a):	84.7	
CRI (R _g):	27.0	
CCT:	2961	K
RADIANT FLUX:	1107	mW

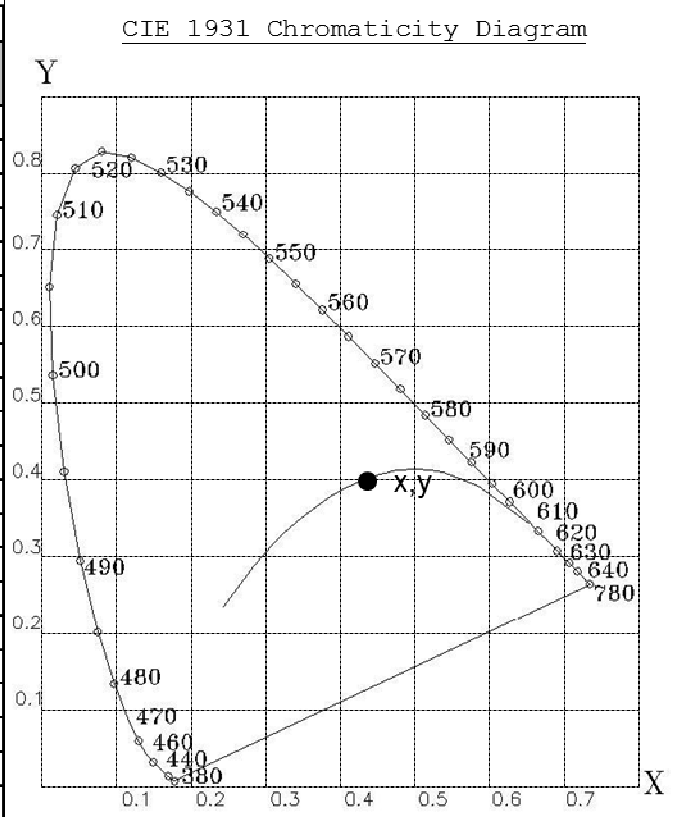
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Tabulated Spectral Power Distribution

Wavelength [nm]	[mW/nm]	Wavelength [nm]	[mW/nm]
380	0.01434	590	6.31726
390	0.02528	600	6.61582
400	0.03561	610	6.71226
410	0.08699	620	6.54515
420	0.31760	630	6.16267
430	0.97760	640	5.58378
440	2.36378	650	4.88899
450	3.67795	660	4.13335
460	2.07156	670	3.40433
470	1.36445	680	2.73150
480	1.15030	690	2.15227
490	1.40597	700	1.66163
500	2.01708	710	1.26618
510	2.65346	720	0.95803
520	3.16714	730	0.71435
530	3.57080	740	0.53313
540	3.96310	750	0.39698
550	4.36843	760	0.29517
560	4.84639	770	0.21941
570	5.35482	780	0.08160
580	5.87587		



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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.