Lighting Sciences, Inc.
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INDEPENDENT TEST LABORATORY REPORT No. 31907

Description:

OPTOLUM INC - LED DOWN LIGHT,CAT# DL LO 33
WITH WHITE INTERIOR AND FROSTED PLASTIC FOCUSING LENSES
THREE LEDS. LUMINAIRE OUTPUT = 245 LMS.
ONE HIGH PERFECTION LP1013-24 DRIVER OPERATING AT 120 VAC AND 4.87 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IES LM-41-98: Approved Method for Photometric Testing of Indoor Fluorescent Luminaire (withdrawn)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

Ryder Tunney

STAFF ENGINEER

JUL 11, 2013

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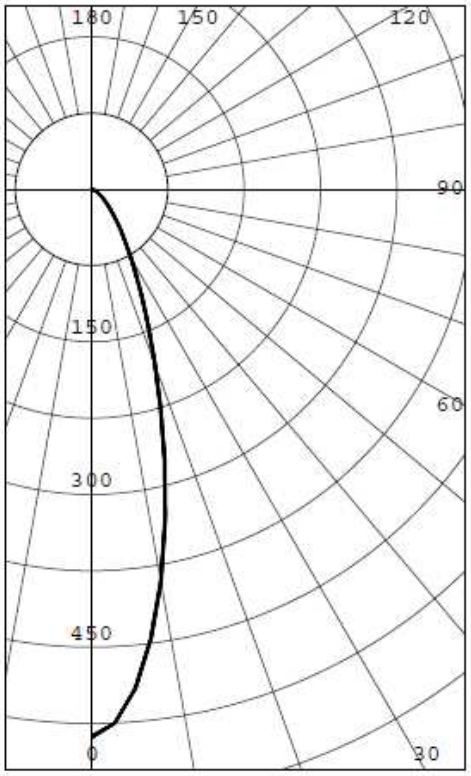

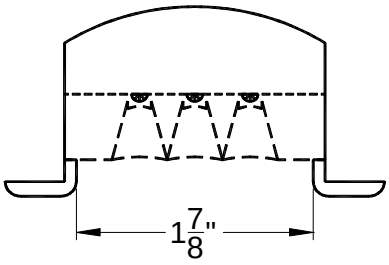

INTENSITY(CANDLEPOWER) SUMMARY

ANGLE	MEAN CP	LUMENS
0	538	
5	493	44
10	391	
15	277	76
20	181	
25	117	54
30	77	
35	51	32
40	34	
45	24	19
50	16	
55	12	11
60	8	
65	6	6
70	4	
75	2	2
80	1	
85	0	0
90	0	

ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	174	71.29
0-40	207	84.56
0-60	236	96.46
0-90	245	100.00
40-90	38	15.44
60-90	9	3.54
90-180	0	0.00
0-180	245	100.00

EFFICACY (LUMENS PER WATT): 50.3

*** THIS IS AN ABSOLUTE TEST ***

LUMINOUS DIAMETER: 1.875 INS

LUMINANCE SUMMARY CD./SQ.M.

S/MH: 0.5
SC: 0.5

ANGLE	MEAN CD/SQ M
45	18866
55	11334
65	7775
75	4871
85	1939

TESTED IN ACCORDANCE WITH IES PROCEDURES.

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INTENSITY(CANDLEPOWER) DATA
IN 2.5 DEGREE STEPS

ANGLE	INTENSITY (CANDLEPOWER)	LUMENS
0.0	538	
2.5	525	
5.0	493	44
7.5	446	
10.0	391	
12.5	334	
15.0	277	76
17.5	225	
20.0	181	
22.5	145	
25.0	117	54
27.5	95	
30.0	77	
32.5	62	
35.0	51	32
37.5	42	
40.0	34	
42.5	28	
45.0	24	19
47.5	20	
50.0	16	
52.5	14	
55.0	12	11
57.5	10	
60.0	8	
62.5	7	
65.0	6	6
67.5	5	
70.0	4	
72.5	3	
75.0	2	2
77.5	2	
80.0	1	
82.5	1	
85.0	0	0
87.5	0	
90.0	0	

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AVERAGE LUMINANCE DATA

CD./SQ.M (FOOTLAMBERTS)

ANGLE	LUMINANCE	
0	302099	(88172)
30	49740	(14517)
40	25217	(7360)
45	18866	(5506)
50	14366	(4192)
55	11334	(3308)
60	9213	(2689)
65	7775	(2269)
70	6431	(1877)
75	4871	(1421)
80	3111	(908)
85	1939	(566)

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COEFFICIENTS OF UTILIZATION

ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

CC	90				80				70				50			30			10			0
WALL	70	50	30	10	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																						
0	1.22	1.22	1.22	1.22	1.19	1.19	1.19	1.19	1.16	1.16	1.16	1.16	1.11	1.11	1.11	1.06	1.06	1.06	1.02	1.02	1.02	1.00
1	1.16	1.13	1.11	1.09	1.14	1.11	1.09	1.07	1.12	1.09	1.07	1.05	1.05	1.04	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.94
2	1.11	1.07	1.03	0.99	1.09	1.05	1.01	0.98	1.07	1.03	1.00	0.97	1.00	0.97	0.95	0.97	0.95	0.93	0.94	0.93	0.91	0.90
3	1.06	1.00	0.96	0.92	1.04	0.99	0.95	0.91	1.03	0.98	0.94	0.91	0.95	0.92	0.89	0.93	0.90	0.88	0.91	0.88	0.86	0.85
4	1.02	0.95	0.90	0.86	1.00	0.94	0.89	0.86	0.99	0.93	0.89	0.85	0.91	0.87	0.84	0.89	0.86	0.83	0.87	0.84	0.82	0.81
5	0.98	0.90	0.84	0.81	0.96	0.89	0.84	0.80	0.95	0.88	0.83	0.80	0.86	0.82	0.79	0.85	0.81	0.79	0.83	0.80	0.78	0.77
6	0.94	0.86	0.80	0.77	0.93	0.85	0.80	0.76	0.91	0.84	0.79	0.76	0.83	0.79	0.75	0.81	0.78	0.75	0.80	0.77	0.74	0.73
7	0.90	0.81	0.76	0.73	0.89	0.81	0.76	0.72	0.88	0.80	0.75	0.72	0.79	0.74	0.71	0.78	0.74	0.71	0.77	0.73	0.71	0.69
8	0.87	0.78	0.72	0.69	0.86	0.77	0.72	0.69	0.84	0.76	0.72	0.68	0.75	0.71	0.68	0.75	0.71	0.68	0.74	0.70	0.67	0.66
9	0.83	0.74	0.69	0.65	0.82	0.74	0.69	0.65	0.81	0.73	0.69	0.65	0.72	0.68	0.65	0.72	0.67	0.65	0.71	0.67	0.64	0.63
10	0.80	0.71	0.66	0.62	0.79	0.71	0.66	0.62	0.78	0.70	0.66	0.62	0.69	0.65	0.62	0.69	0.65	0.62	0.68	0.64	0.62	0.61

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:	96.6	PERCENT
TOTAL HARMONIC DISTORTION:	22.34	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:	76.29	PERCENT
TOTAL HARMONIC DISTORTION:	26.88	PERCENT

LIGHT OUTPUT

LUMENS:	245	lm
EFFICACY:	50.3	lm/W

SPECTRAL MEASUREMENTS

X:	0.4330	
y:	0.3969	
u/u':	0.2511	
v:	0.3453	
v':	0.5179	
Duv:	0.0024	
CRI(R_a):	85.1	
CRI(R_9):	28.5	
CCT:	3007	K
RADIANT FLUX:	798	mW

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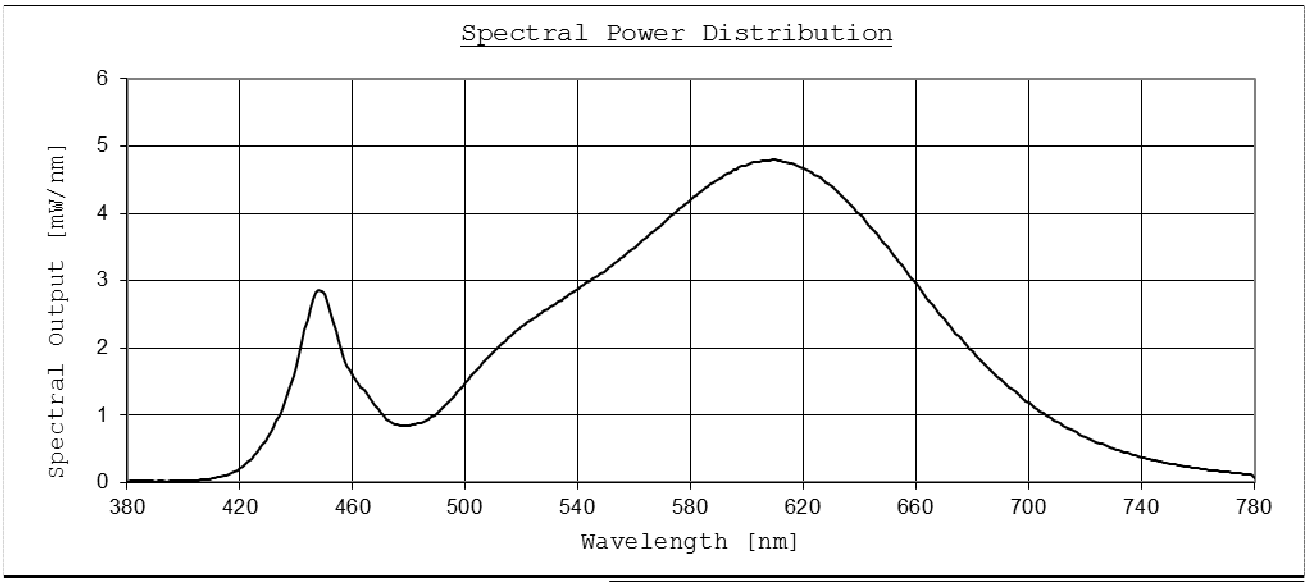
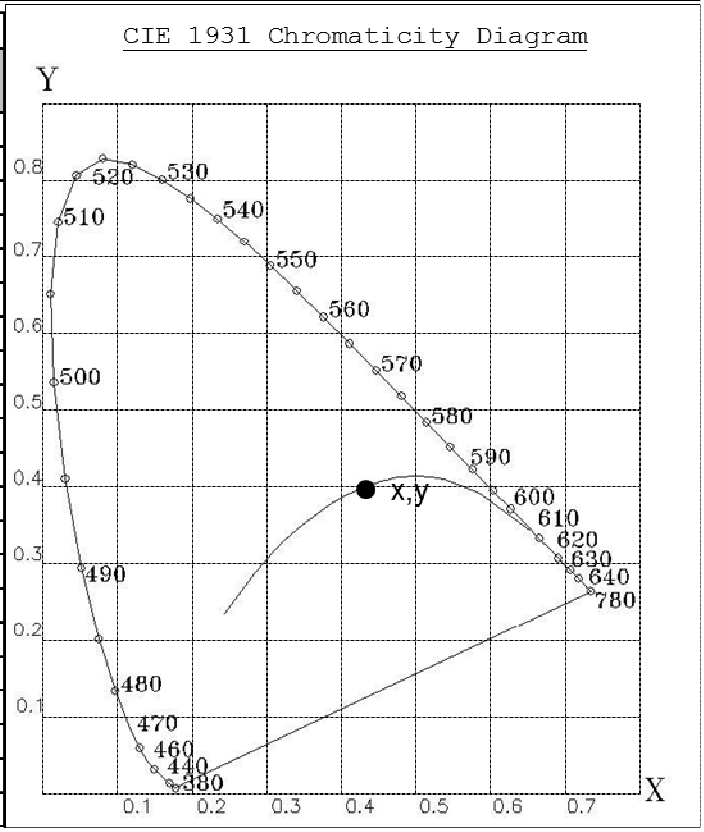


Tabulated Spectral Power Distribution				
Wavelength [nm]	[mW/nm]		Wavelength [nm]	[mW/nm]
380	0.01014		590	4.51651
390	0.01709		600	4.72682
400	0.02171		610	4.79031
410	0.05784		620	4.67058
420	0.21483		630	4.39634
430	0.68427		640	3.98116
440	1.73790		650	3.48583
450	2.79686		660	2.94806
460	1.57778		670	2.42612
470	1.03710		680	1.94566
480	0.85324		690	1.53145
490	1.03537		700	1.18099
500	1.48344		710	0.89901
510	1.94696		720	0.67958
520	2.31891		730	0.50691
530	2.60578		740	0.37762
540	2.88103		750	0.28040
550	3.16195		760	0.21031
560	3.49541		770	0.15609
570	3.85029		780	0.05792
580	4.21264			



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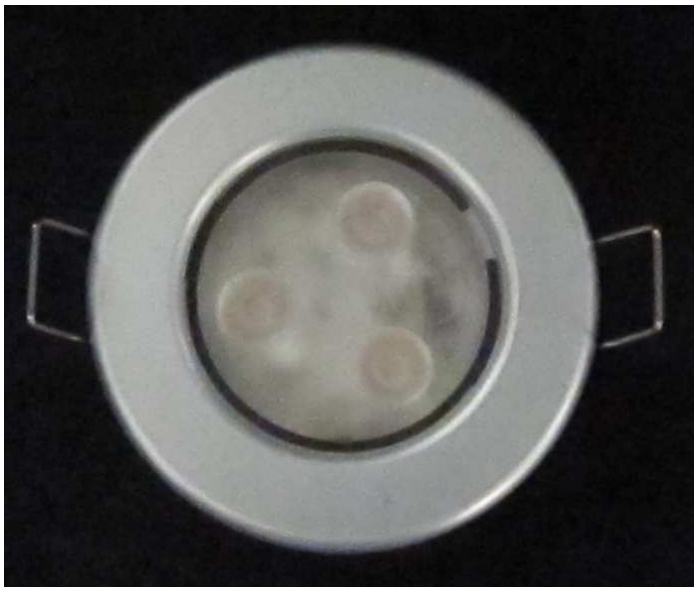
LUMINOUS OPENING



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° C ± 1° 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.