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www.lightingsciences.com

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IES LM-41-98: Approved Method for Photometric Testing of Indoor Fluorescent Luminaire (withdrawn)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

STAFF ENGINEER

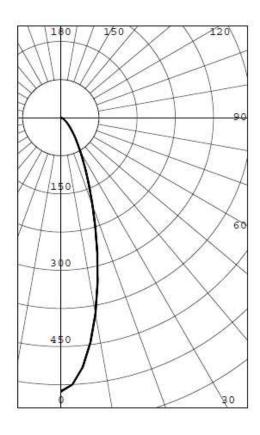
Rupler Tunney

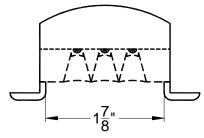
JUL 11, 2013

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.

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LUMINANCE SUMMARY CD./SQ.M.

MGLE	MEAN	CD/SQ	M
45	18	3866	
55	11	L334	
65	7	7775	
75	4	1871	
85	1	L939	

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

S/MH: 0.5 SC: 0.5

TESTED IN ACCORDANCE WITH IES PROCEDURES.

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## INTENSITY(CANDLEPOWER) DATA IN 2.5 DEGREE STEPS

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

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#### AVERAGE LUMINANCE DATA

CD	/SO.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	1.221	.221	.221	.22	1.191	.191	.191	.19	1.161	.161	.161	.16	1.111	.111	.11	1.061	.061	.06	1.021	.021	.02	1.00
1	1.161	.131	.111	.09	1.141	.111	.091	.07	1.121	.091	.071	.05	1.051	.041	.02	1.011	.000	.99	0.980	.970	.96	0.94
2	1.111	.071	.030	.99	1.091	.051	.010	.98	1.071	.031	.000	.97	1.000	.970	.95	0.970	.950	.93	0.940	.930	.91	0.90
3	1.061	.000	.960	.92	1.040	.990	.950	.91	1.030	.980	.940	.91	0.950	.920	.89	0.930	.900	.88	0.910	.880	.86	0.85
4	1.020	.950	.900	.86	1.000	.940	.890	.86	0.990	.930	.890	.85	0.910	.870	.84	0.890	.860	.83	0.870	.840	.82	0.81
5	0.980	.900	.840	.81	0.960	.890	.840	.80	0.950	.880	.830	.80	0.860	.820	.79	0.850	.810	.79	0.830	.800	.78	0.77
6	0.940	.860	.800	.77	0.930	.850	.800	.76	0.910	.840	.790	.76	0.830	.790	.75	0.810	.780	.75	0.800	.770	.74	0.73
7	0.900	.810	.760	.73	0.890	.810	.760	.72	0.880	.800	.750	.72	0.790	.740	.71	0.780	.740	.71	0.770	.730	.71	0.69
8	0.870	.780	.720	.69	0.860	.770	.720	.69	0.840	.760	.720	.68	0.750	.710	.68	0.750	.710	.68	0.740	.700	.67	0.66
9	0.830	.740	.690	.65	0.820	.740	.690	.65	0.810	.730	.690	.65	0.720	.680	.65	0.720	.670	.65	0.710	.670	.64	0.63
10	0.800	.710	.660	.62	0.790	.710	.660	.62	0.780	.700	.660	.62	0.690	.650	.62	0.690	.650	.62	0.680	.640	.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

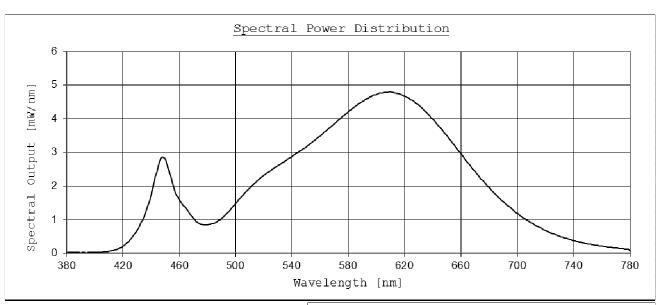
LUMENS: 245 lm
EFFICACY: 50.3 lm/W

#### SPECTRAL MEASUREMENTS

X: 0.4330 y: 0.3969 u/u': 0.2511 v: 0.3453 v': 0.5179 Duv: 0.0024 CRI(R<sub>a</sub>): 85.1 CRI(R<sub>9</sub>): 28.5 CCT: 3007 K RADIANT FLUX: 798 mW

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Tabulated	l Spectral	l F	ower Dist	ribution	CIE 1931 Chromaticity Diagram
Wavelength			Wavelength		Y
[nm]	[mW/nm]		[nm]	[mW/nm]	1
380	0.01014		590	4.51651	
390	0.01709		600	4.72682	0.8 580 530
400	0.02171		610	4.79031	9.510
410	0.05784		620	4.67058	0010
420	0.21483		630	4.39634	550
430	0.68427		640	3.98116	560
440	1.73790		650	3.48583	0.6
450	2.79686		660	2.94806	570
460	1.57778		670	2.42612	0.5
470	1.03710		680	1.94566	
480	0.85324		690	1.53145	0.4
490	1.03537		700	1.18099	0.4
500	1.48344		710	0.89901	0.3
510	1.94696		720	0.67958	490 630 780
520	2.31891		730	0.50691	
530	2.60578		740	0.37762	0.2
540	2.88103		750	0.28040	480
550	3.16195		760	0.21031	0.1 470
560	3.49541		770	0.15609	460
570	3.85029		780	0.05792	4490   X
580	4.21264				0.1 0.2 0.3 0.4 0.5 0.6 0.7

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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.  $4\pi$  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  $25^{\circ}$  C  $\pm$   $1^{\circ}$  C, measured using an Omega model DP460.

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

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