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**INDEPENDENT TEST LABORATORY REPORT No. 31908**

**Description:**

OPTOLUM INC - LED DOWN LIGHT, CAT# DL HO 33  
 WITH WHITE INTERIOR AND FROSTED PLASTIC FOCUSING LENSES  
 FOUR LEDS. LUMINAIRE OUTPUT = 317 LMS.  
 ONE HIGH PERFECTION LP1013-24 DRIVER OPERATING AT 120 VAC AND 5.70 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IES LM-41-98: Approved Method for Photometric Testing of Indoor Fluorescent Luminaire (withdrawn)  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:**

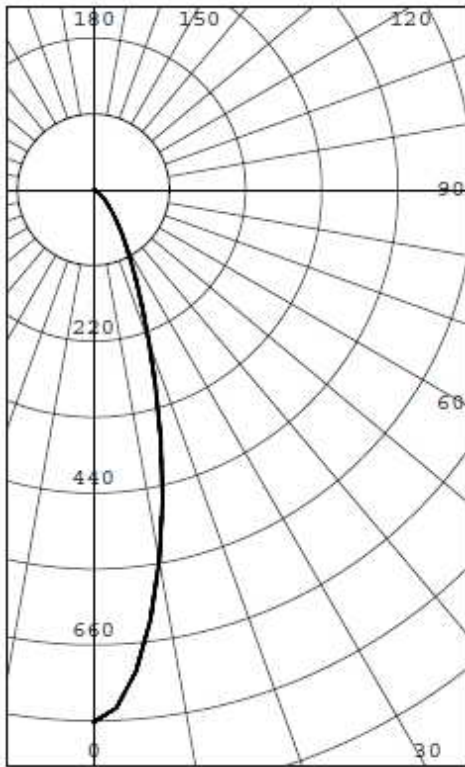
RYDER TUNNEY  
  
 STAFF ENGINEER  
 JUL 11, 2013

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INTENSITY (CANDLEPOWER) SUMMARY

ANGLE	MEAN CP	LUMENS
0	772	
5	701	62
10	547	
15	375	102
20	234	
25	146	68
30	94	
35	62	40
40	41	
45	28	22
50	19	
55	13	12
60	10	
65	7	7
70	4	
75	2	3
80	1	
85	0	0
90	0	

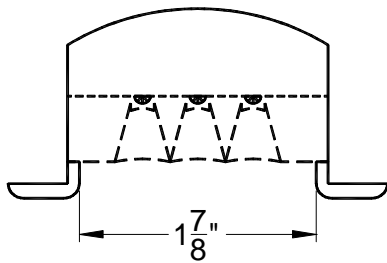
ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	233	73.55
0-40	273	86.05
0-60	307	96.93
0-90	317	100.00
40-90	44	13.95
60-90	10	3.07
90-180	0	0.00
0-180	317	100.00

EFFICACY (LUMENS PER WATT): 55.6

\*\*\* 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	22408
55	13262
65	8916
75	5238
85	2101

TESTED IN ACCORDANCE WITH IES PROCEDURES.

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INTENSITY(CANDLEPOWER) DATA  
IN 2.5 DEGREE STEPS

ANGLE	INTENSITY (CANDLEPOWER)	LUMENS
0.0	772	
2.5	752	
5.0	701	62
7.5	629	
10.0	547	
12.5	460	
15.0	375	102
17.5	298	
20.0	234	
22.5	184	
25.0	146	68
27.5	117	
30.0	94	
32.5	77	
35.0	62	40
37.5	51	
40.0	41	
42.5	34	
45.0	28	22
47.5	23	
50.0	19	
52.5	16	
55.0	13	12
57.5	11	
60.0	10	
62.5	8	
65.0	7	7
67.5	5	
70.0	4	
72.5	3	
75.0	2	3
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	433281 ( 126459)
30	61238 ( 17873)
40	30333 ( 8853)
45	22408 ( 6540)
50	16996 ( 4960)
55	13262 ( 3870)
60	10700 ( 3123)
65	8916 ( 2602)
70	7088 ( 2068)
75	5238 ( 1529)
80	3434 ( 1002)
85	2101 ( 613)

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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	1.161	.131	.111	.09	1.141	.121	.091	.07	1.121	.101	.071	.06	1.051	.041	.02	1.021	.000	.99	0.980	.970	.96	0.95			
	2	1.111	.071	.031	.00	1.091	.051	.020	.99	1.071	.031	.000	.98	1.000	.980	.95	0.970	.950	.93	0.950	.930	.92	0.90			
	3	1.071	.010	.960	.92	1.050	.990	.950	.92	1.030	.980	.940	.91	0.960	.930	.90	0.930	.910	.88	0.910	.890	.87	0.86			
	4	1.030	.960	.910	.87	1.010	.950	.900	.87	0.990	.940	.900	.86	0.920	.880	.85	0.900	.870	.84	0.880	.850	.83	0.82			
	5	0.990	.910	.860	.82	0.970	.900	.850	.81	0.950	.890	.840	.81	0.870	.830	.80	0.860	.820	.80	0.840	.820	.79	0.78			
	6	0.950	.870	.820	.78	0.940	.860	.810	.78	0.920	.850	.810	.77	0.840	.800	.77	0.830	.790	.76	0.810	.780	.76	0.75			
	7	0.910	.830	.770	.74	0.900	.820	.770	.74	0.890	.820	.770	.73	0.800	.760	.73	0.790	.750	.73	0.780	.750	.72	0.71			
	8	0.880	.790	.740	.71	0.870	.790	.740	.70	0.860	.780	.730	.70	0.770	.730	.70	0.760	.720	.69	0.750	.720	.69	0.68			
	9	0.840	.760	.710	.67	0.830	.750	.710	.67	0.820	.750	.700	.67	0.740	.700	.67	0.730	.690	.66	0.720	.690	.66	0.65			
	10	0.810	.730	.680	.64	0.800	.720	.680	.64	0.800	.720	.680	.64	0.710	.670	.64	0.710	.670	.64	0.700	.660	.64	0.63			

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 5.7

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:	0.049	AMPS
INPUT POWER:	5.7	WATTS
POWER FACTOR:	96.9	PERCENT
TOTAL HARMONIC DISTORTION:	21.63	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:	81.1	PERCENT
TOTAL HARMONIC DISTORTION:	26.64	PERCENT

**LIGHT OUTPUT**

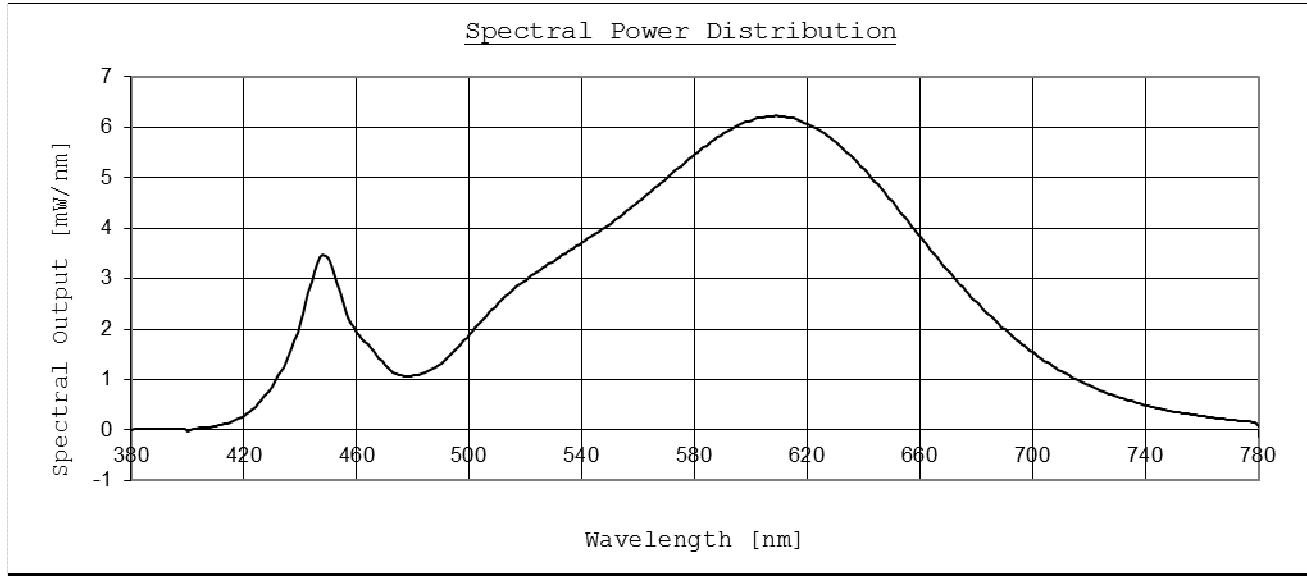
LUMENS:	317	lm
EFFICACY:	55.6	lm/W

**SPECTRAL MEASUREMENTS**

X:	0.4362	
Y:	0.4002	
u/u':	0.2518	
v:	0.3465	
v':	0.5198	
Duv:	0.0016	
CRI (R <sub>a</sub> ):	84.7	
CRI (R <sub>g</sub> ):	26.9	
CCT:	2978	K
RADIANT FLUX:	1028	mW

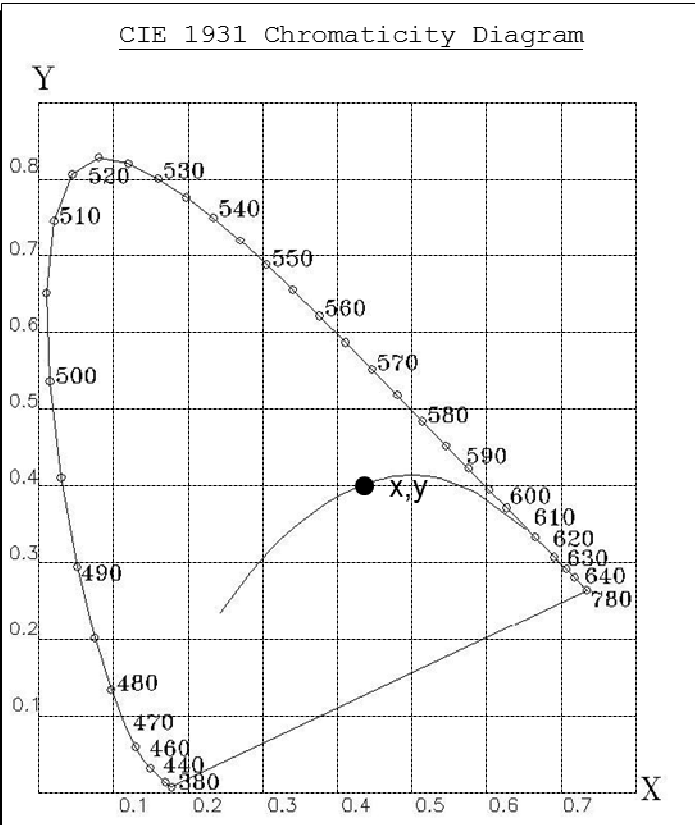
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Tabulated Spectral Power Distribution

Wavelength [nm]	[mW/nm]	Wavelength [nm]	[mW/nm]
380	0.01035	590	5.86825
390	0.02534	600	6.13740
400	-0.02482	610	6.22107
410	0.07829	620	6.06157
420	0.28390	630	5.70941
430	0.87362	640	5.17144
440	2.11801	650	4.52841
450	3.39055	660	3.82739
460	1.93674	670	3.15076
470	1.29381	680	2.52939
480	1.08127	690	1.99118
490	1.32403	700	1.53709
500	1.90027	710	1.17088
510	2.49633	720	0.88353
520	2.97688	730	0.66019
530	3.35651	740	0.49198
540	3.71819	750	0.36704
550	4.08755	760	0.27361
560	4.52672	770	0.20290
570	4.99446	780	0.07610
580	5.46752		



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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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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.