



UL Verification Services Inc.
7036 Snowdrift Road
Allentown, PA 18106
610-774-1300



Photometric Test Report

Relevant Standards
IES LM-79-2008
ANSI C82.77-2002
UL1598-2008

Prepared For
Renova Lighting Systems Inc

Rick Edwards
20 Middlesex Road
Mansfield, MA 02048

Catalog Number
L-KVN24-WN-L28-UNV-30DM-W24-104-C40-AF

Order Number
10703472
Test Number
948068

Test Date

2015-03-10 - 2015-03-11

Prepared By

Kyle Spaziani, Project Handler

Approved By

Jeff Smith Jr., Project Handler

The results contained in this report pertain only to the tested sample.
This report shall not be reproduced, except in full, without written approval of Underwriters Laboratories.
This report must not be used by the client to claim product certification, approval, or endorsement by
NVLAP, NIST, or any agency of the Federal Government.



Table of Contents

Summary of Results	Page 3
Integrating Sphere Results	Page 4
Distribution Results	Page 5
Conditions / Summary of Results / Polar Plot / Zonal / Luminance	Page 5
Candela Tabulation	Page 6
Coefficients of Utilization	Page 7
ISOFootcandle Plot	Page 8

DLC Results Summary

Technical Requirements v2.1

Retrofit Kits for 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces		
Requirement Category	Requirement	Test Results
Minimum Light Output	≥2700 Lumens	2801 Lumens
Minimum Lamp Output	N/A	N/A
Spacing Criteria (0-180°)	0.9-2.1	1.22
Spacing Criteria (90-270°)	0.9-2.1	1.22
Zonal Lumen Requirement (0-60°)	≥72%	79.6%
Zonal Lumen Requirement 2	N/A	N/A
Minimum Luminaire Efficacy	≥82.45 lm/w	116 lm/w
Minimum Lamp Efficacy	N/A	N/A
Allowable CCTs*	≤5000K	3989 K
Minimum CRI	≥78	85.7
L70 Lumen maintenance	50000 Hours	TM-21 must be completed
Minimum Luminaire Warranty	5 Years	N/A
Power Factor 120 / 277	≥0.87	0.929 at 277 V
Total Harmonic Distortion (A-%)	≤25%	13.1% at 277 V

*Defined by ANSI C78.377-2011†

†ANSI C78.377-2011 also referred to for Duv and (x,y) chromaticity coordinates tolerances for indoor categories

Laboratory results may not be representative of field performance
Ballast factors have not been applied

Testing was performed in a 3-meter integrating sphere using the 4π geometry method.

Absorption correction was employed for Sphere measurement



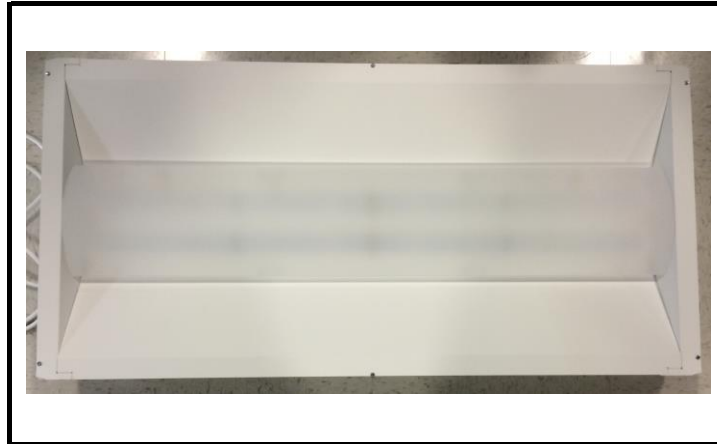
Luminaire Description: Formed white enamel steel housing, white enamel steel reflector, frosted plastic lens

Lamp: 104 white LEDs

Mounting: Recessed

Ballast/Driver: One Osram Optotronic OT30W/PRG1050C/UNV/DIM/L (555mA)

Luminaire



Luminaire Characteristics

Luminous Length: 44.75 in.
Luminous Width: 21.50 in.

Summary of Results

Integrating Sphere

Total Output: 2864 Lumens
Efficacy: 118.8 lm/w
CCT: 3989 K
CRI (Ra): 85.7

Distribution

Total Luminaire Output: 2801 Lumens
Luminaire Efficacy: 116.1 lm/w
Maximum Candela: 1083 Candela

Electrical Data at 277 VAC

Test Temperature: 25.3 °C
Voltage: 277.0 VAC
Current: 0.1002 A
Power: 25.79 W
Power Factor: 0.929
Frequency: 60 Hz
Current THD: 13.1 %

In-Situ

LED Temperature: 36.5 °C
Driver Temperature: 40.3 °C
Maximum LED Current: 0.06860 A

Temperature is offset to an ambient temperature of 25°C as described in UL1598-2008.



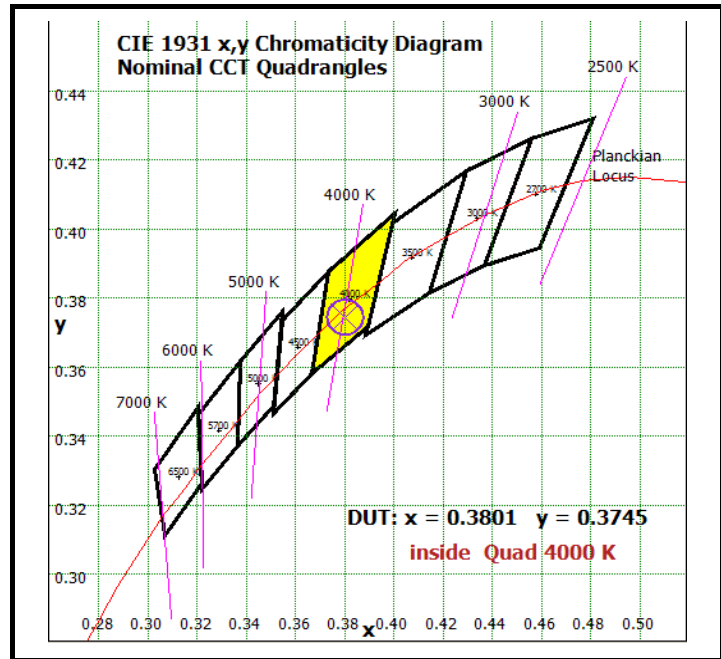
Color Quality - Integrating Sphere

Integrating Sphere Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.4 °C	119.9 VAC	0.2019 A	24.11 W	0.996	60 Hz	5.65 %

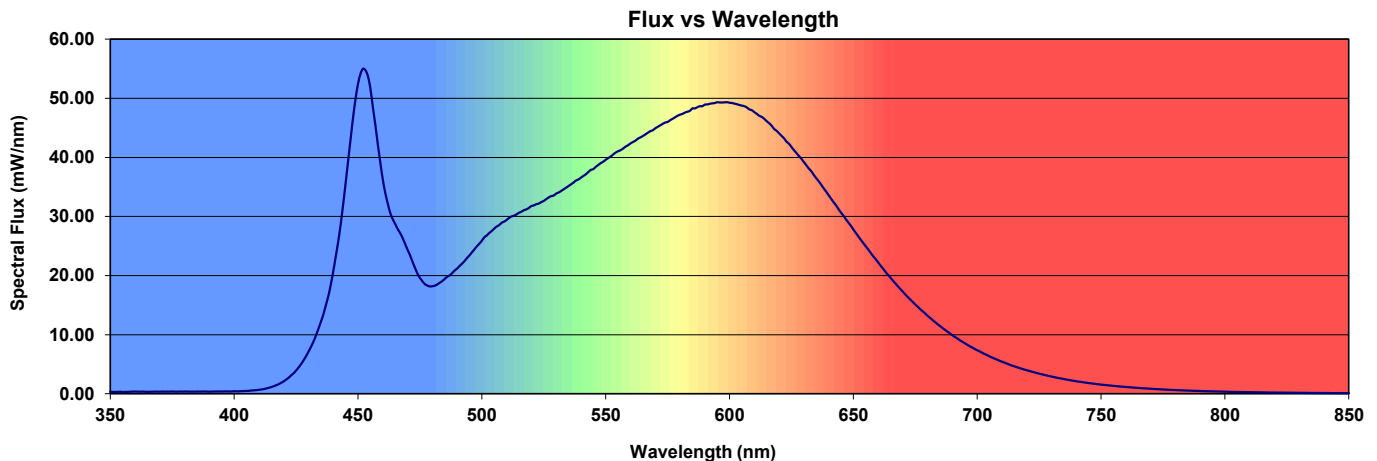
Summary of Results

Luminous Flux:	2864 Lumens
Efficacy:	118.8 lm/w
CCT:	3989 K
CRI (Ra):	85.7
CRI (R9):	21.6
Chromaticity (x):	0.3801
Chromaticity (y):	0.3745
Chromaticity (u):	0.2258
Chromaticity (v):	0.3337
Chromaticity (u')	0.2258
Chromaticity (v')	0.5005
Duv:	-0.0010



Color Rendering Index Detail

Ra (CRI)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
85.7	84.6	92.7	96.3	83.6	84.7	89.0	86.6	68.4	21.6	82.0	82.6	67.7	86.9	98.5





Distribution - Goniophotometer

Distribution Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.1 °C	120.0 VAC	0.2018 A	24.13 W	0.996	60 Hz	5.45 %

Summary of Results

Spacing Criteria

0-180: 1.22
90-270: 1.22

Total Lumen Output:

2801 Lumens

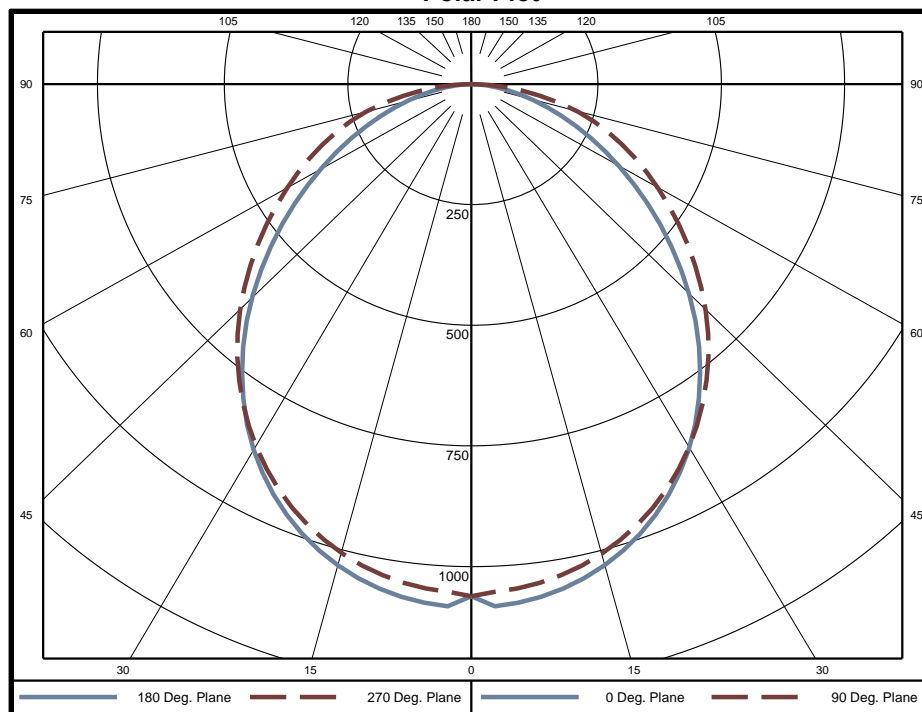
Luminaire Efficacy:

116.1 lm/w

Maximum Candela:

1083 Candela

Polar Plot



Zonal Lumen Summary

Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire
0-5	26.9	1.0%	60-65	172.4	6.2%	120-125	0.0	0.0%
5-10	74.9	2.7%	65-70	143.1	5.1%	125-130	0.0	0.0%
10-15	121.6	4.3%	70-75	112.8	4.0%	130-135	0.0	0.0%
15-20	163.7	5.8%	75-80	80.8	2.9%	135-140	0.0	0.0%
20-25	199.2	7.1%	80-85	47.2	1.7%	140-145	0.0	0.0%
25-30	226.7	8.1%	85-90	15.2	0.5%	145-150	0.0	0.0%
30-35	245.0	8.7%	90-95	0.0	0.0%	150-155	0.0	0.0%
35-40	253.6	9.1%	95-100	0.0	0.0%	155-160	0.0	0.0%
40-45	252.4	9.0%	100-105	0.0	0.0%	160-165	0.0	0.0%
45-50	241.9	8.6%	105-110	0.0	0.0%	165-170	0.0	0.0%
50-55	223.7	8.0%	110-115	0.0	0.0%	170-175	0.0	0.0%
55-60	199.8	7.1%	115-120	0.0	0.0%	175-180	0.0	0.0%

Zone	Lumens	% of Luminaire
0-40	1311.7	46.8%
0-60	2229.6	79.6%
0-90	2801.1	100.0%
90-180	0.0	0.0%



Candela Tabulation
Horizontal Angle (Degrees)

	0	22.5	45	67.5	90	113	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	1061	1061	1061	1061	1061	1061	1061	1061	1061	1061	1061	1061	1061	1061	1061	1061
5	1079	1061	1049	1050	1049	1050	1049	1061	1079	1061	1049	1050	1049	1050	1049	1061
10	1062	1044	1034	1034	1034	1034	1034	1044	1062	1044	1034	1034	1034	1034	1034	1044
15	1032	1016	1007	1008	1008	1008	1007	1016	1032	1016	1007	1008	1008	1008	1007	1016
20	991	977	970	971	972	971	970	977	991	977	970	971	972	971	970	977
25	938	926	922	925	926	925	922	926	938	926	922	925	926	925	922	926
30	873	863	863	869	871	869	863	863	873	863	863	869	871	869	863	863
35	796	791	797	805	808	805	797	791	796	791	797	805	808	805	797	791
40	711	710	723	735	739	735	723	710	711	710	723	735	739	735	723	710
45	619	623	643	659	664	659	643	623	619	623	643	659	664	659	643	623
50	524	534	560	580	585	580	560	534	524	534	560	580	585	580	560	534
55	432	446	478	501	507	501	478	446	432	446	478	501	507	501	478	446
60	344	361	398	424	432	424	398	361	344	361	398	424	432	424	398	361
65	265	283	324	352	361	352	324	283	265	283	324	352	361	352	324	283
70	193	213	256	283	292	283	256	213	193	213	256	283	292	283	256	213
75	130	154	192	214	222	214	192	154	130	154	192	214	222	214	192	154
80	76	100	127	138	140	138	127	100	76	100	127	138	140	138	127	100
85	32	48	62	66	67	66	62	48	32	48	62	66	67	66	62	48
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Average Luminance (cd/m²)
Horizontal Angle (Degrees)

	0	45	90
0	1710	1710	1710
45	1411	1465	1513
55	1213	1342	1425
65	1010	1235	1377
75	807	1194	1379
85	598	1150	1239



Utilization of Lumens - Zonal Cavity Method

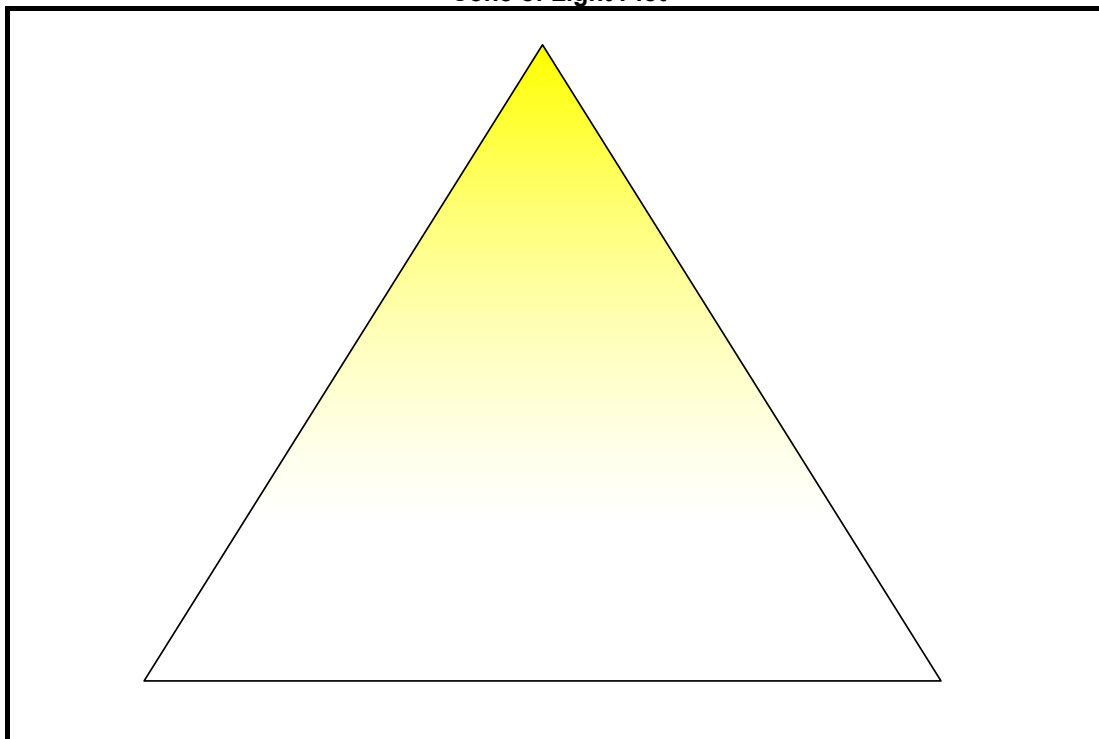
Effective Floor Cavity Reflectance 20%

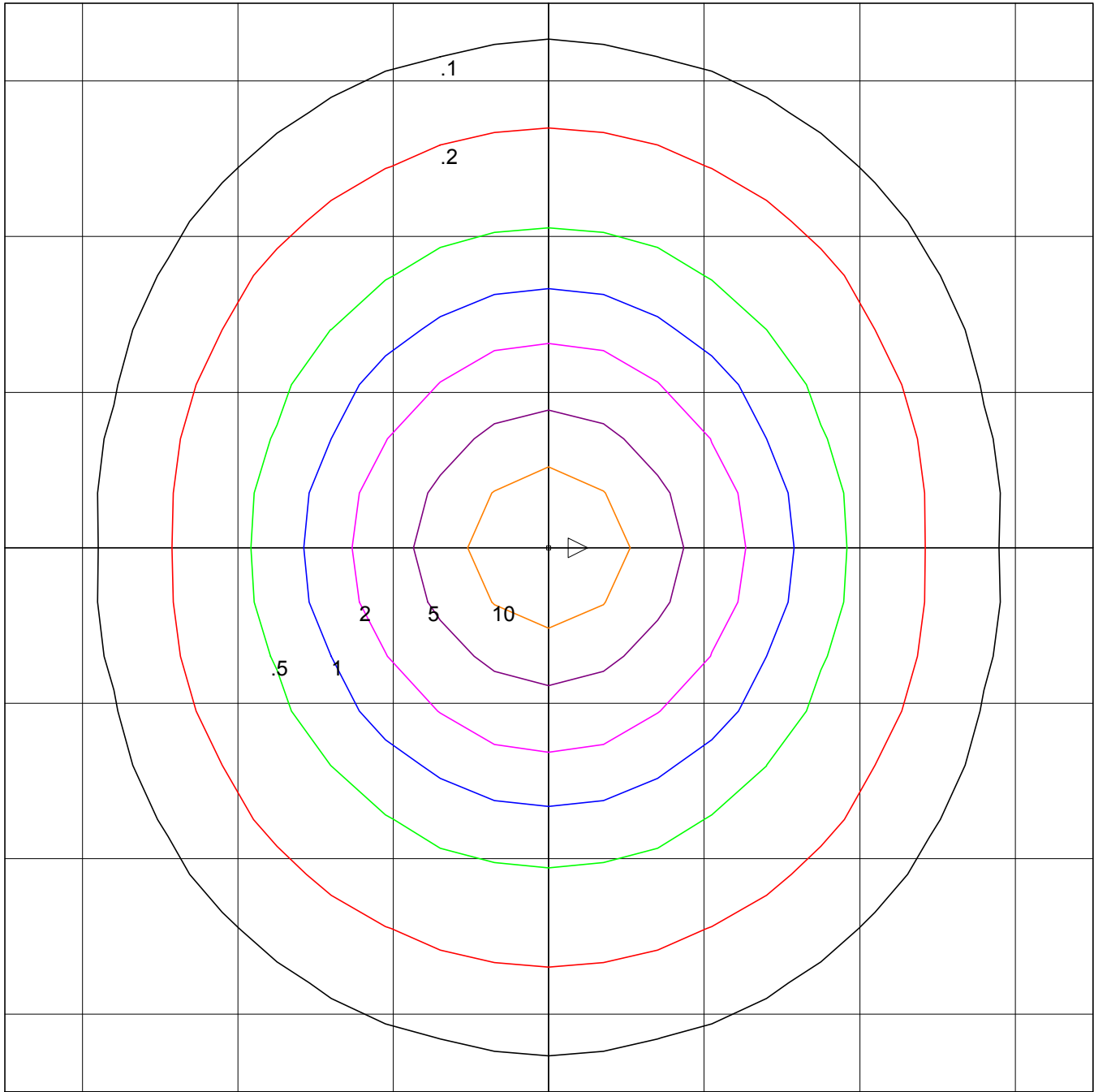
Ceiling Cavity Reflectance	80				70				50			30			10			0
Wall Reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **																	
0	3338	3338	3338	3338	3260	3260	3260	3260	3115	3115	3115	2983	2983	2983	2861	2861	2861	2804
1	3049	2915	2795	2687	2973	2852	2742	2643	2732	2642	2559	2623	2549	2481	2521	2462	2407	2348
2	2777	2547	2357	2196	2703	2494	2319	2170	2394	2247	2119	2302	2179	2071	2217	2116	2025	1964
3	2536	2242	2015	1834	2466	2198	1987	1817	2114	1934	1785	2037	1883	1754	1965	1835	1724	1663
4	2325	1992	1747	1561	2261	1955	1726	1550	1884	1686	1528	1819	1647	1507	1758	1610	1487	1426
5	2142	1784	1534	1349	2083	1753	1518	1342	1693	1486	1327	1638	1456	1313	1586	1427	1298	1239
6	1980	1610	1361	1182	1927	1583	1348	1177	1533	1323	1166	1485	1299	1156	1441	1275	1146	1088
7	1838	1462	1218	1048	1790	1439	1208	1044	1396	1188	1036	1356	1168	1028	1318	1149	1021	965
8	1713	1337	1100	937	1669	1317	1091	934	1280	1075	928	1245	1059	922	1212	1043	917	864
9	1602	1228	1000	845	1562	1212	993	843	1180	979	839	1149	966	834	1121	953	830	779
10	1503	1135	915	768	1467	1120	909	766	1093	897	763	1066	886	759	1041	876	756	707

Cone of Light Tabulation

Mounting Height	Footcandles at Nadir	Diameter (Feet)
4.00	66.3	4.86
6.00	29.5	7.29
8.00	16.6	9.72
10.0	10.6	12.2
12.0	7.37	14.6
14.0	5.42	17.0
16.0	4.15	19.4

Cone of Light Plot





Horizontal Footcandles
Scale: 1 Inch = 8 Ft.
Mounting Height = 8.00 Ft.
Maximum Calculated Value = 16.58 Fc.



In-Situ Test

In-Situ Test Conditions

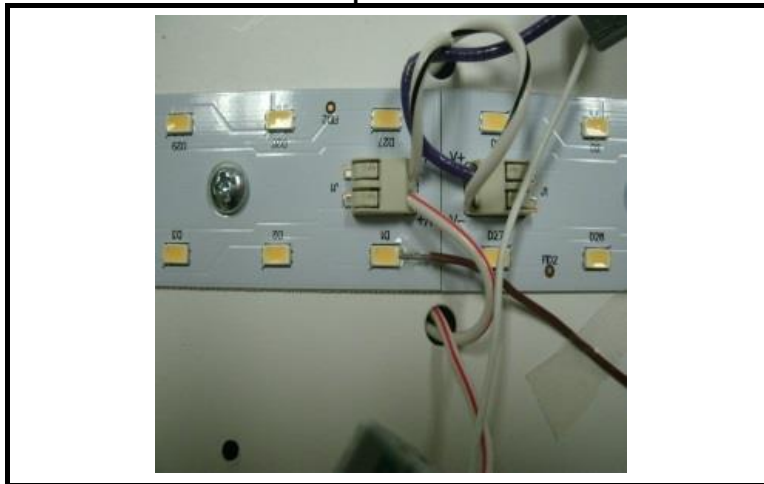
Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.1 °C	120.0 VAC	N / A	N / A	N / A	60 Hz	N / A

Summary of Results

LED Temperature: 36.5 °C
Driver Temperature: 40.3 °C
Maximum LED Current: 0.06860 A

Temperatures are offset to an ambient temperature of 25°C as described in UL1598-2008

LED Temperature Location



Driver Temperature Location

