



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-KVN14-WN-L30-UNV-30DM-W25-104-C40-AF

Order Number
10846565
Test Number
1110177

Test Date

2015-06-18 - 2015-06-24

Prepared By

Eric Gaudreau, Engineering Project Handler

Approved By

Kyle Spaziani, 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
In-Situ Results	Page 8

DLC Results Summary

Technical Requirements v2.1

1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces		
Requirement Category	Requirement	Test Results
Minimum Light Output	≥1350 Lumens	2986 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%	82.4%
Zonal Lumen Requirement 2	N/A	N/A
Minimum Luminaire Efficacy	≥82.45 lm/w	123 lm/w
Minimum Lamp Efficacy	N/A	N/A
Allowable CCTs*	≤5000K	4218 K
Minimum CRI	≥78	85.2
L70 Lumen maintenance	50000 Hours	TM-21 must be completed
Minimum Luminaire Warranty	5 Years	N/A
Power Factor 120 / 277	≥0.87	0.934 at 277 V
Total Harmonic Distortion (A-%)	≤25%	12.2% 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 2-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 (571 mA)

Luminaire



Luminaire Characteristics

Luminous Length: 44.75 in.
Luminous Width: 9.250 in.

Summary of Results

Integrating Sphere

Luminous Flux: 3139 Lumens
Efficacy: 129.9 lm/w
CCT: 4218 K
CRI (Ra): 85.2

Distribution

Total Luminaire Output: 2986 Lumens
Luminaire Efficacy: 123.4 lm/w
Maximum Candela: 1169 Candela

Electrical Data at 277 VAC

Test Temperature: 25.2 °C
Voltage: 277.0 VAC
Current: 0.09990 A
Power: 25.85 W
Power Factor: 0.934
Frequency: 60 Hz
Current THD: 12.2 %

In-Situ

LED Temperature: 37.6 °C
Driver Temperature: 44.5 °C
Maximum LED Current: 0.06990 A

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



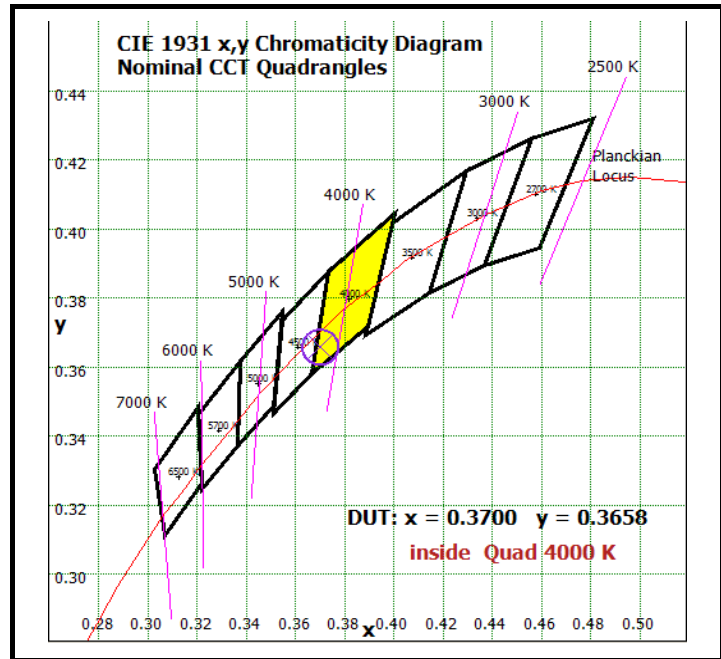
Color Quality - Integrating Sphere

Integrating Sphere Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
24.6 °C	120.0 VAC	0.2022 A	24.17 W	0.996	60 Hz	5.29 %

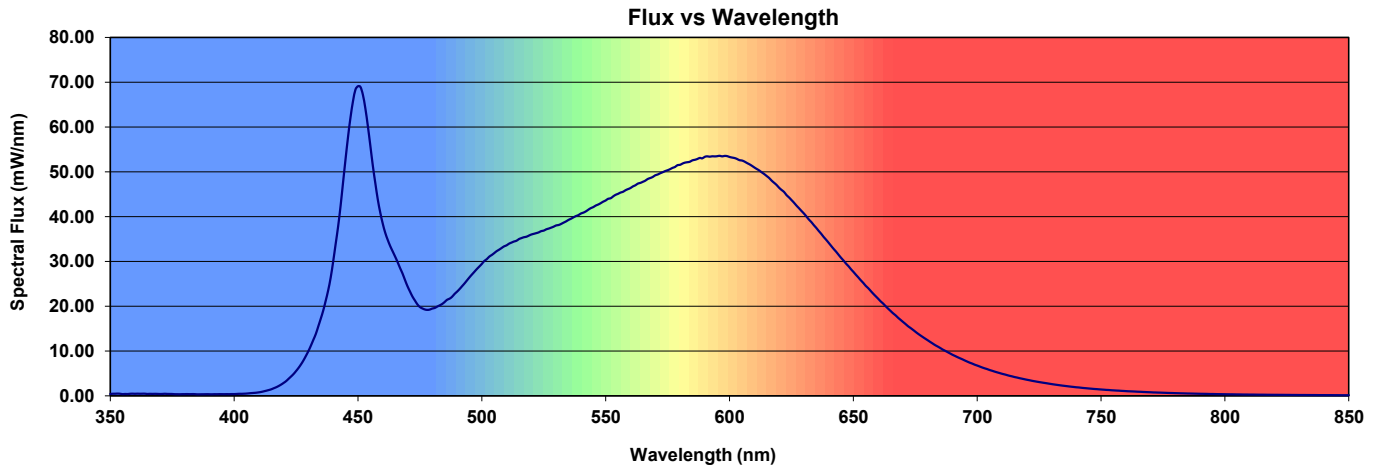
Summary of Results

Total Output:	3139 Lumens
Efficacy:	129.9 lm/w
CCT:	4218 K
CRI (Ra):	85.2
CRI (R9):	17.3
Chromaticity (x):	0.3700
Chromaticity (y):	0.3658
Chromaticity (u):	0.2226
Chromaticity (v):	0.3301
Chromaticity (u')	0.2226
Chromaticity (v')	0.4951
Duv:	-0.0023



Color Rendering Index Detail

Ra (CRI)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
85.2	84.1	91.6	95.6	84.0	84.5	87.5	86.5	67.8	17.3	79.7	83.4	67.1	86.2	98.0





Distribution - Goniophotometer

Distribution Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.2 °C	120.0 VAC	0.2025 A	24.20 W	0.995	60 Hz	5.17 %

Summary of Results

Spacing Criteria

0-180: 1.22
90-270: 1.22

Total Lumen Output:

2986 Lumens

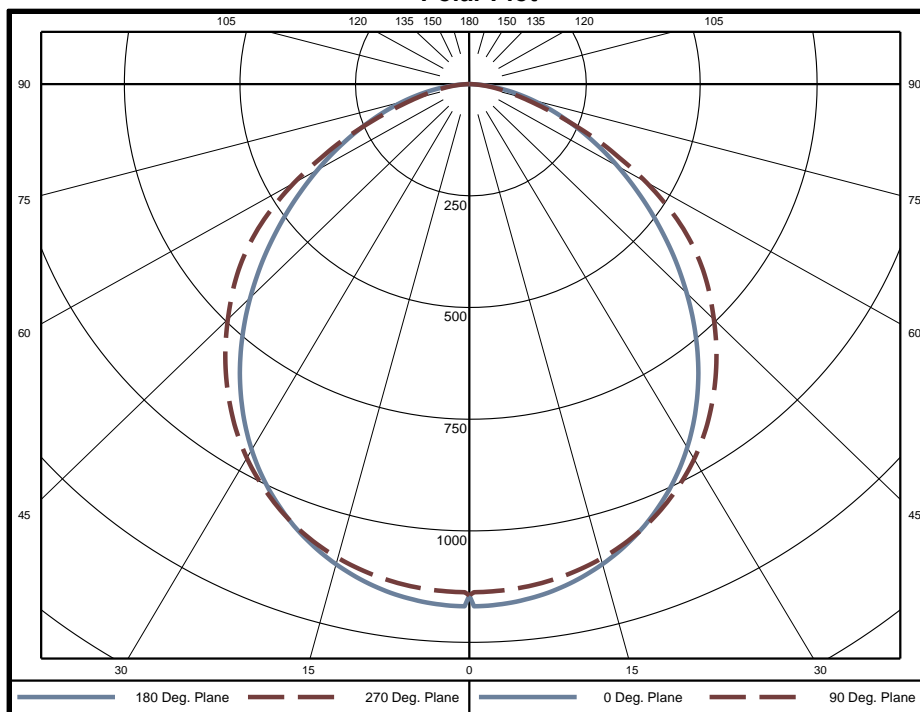
Luminaire Efficacy:

123.4 lm/w

Maximum Candela:

1169 Candela

Polar Plot



Zonal Lumen Summary

Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire
0-5	27.3	0.9%	60-65	184.4	6.2%	120-125	0	0.0%
5-10	81.0	2.7%	65-70	141.4	4.7%	125-130	0	0.0%
10-15	131.9	4.4%	70-75	99.0	3.3%	130-135	0	0.0%
15-20	178.1	6.0%	75-80	61.7	2.1%	135-140	0	0.0%
20-25	217.8	7.3%	80-85	31.2	1.0%	140-145	0	0.0%
25-30	249.1	8.3%	85-90	7.3	0.2%	145-150	0	0.0%
30-35	270.6	9.1%	90-95	0	0.0%	150-155	0	0.0%
35-40	281.2	9.4%	95-100	0	0.0%	155-160	0	0.0%
40-45	280.9	9.4%	100-105	0	0.0%	160-165	0	0.0%
45-50	270.4	9.1%	105-110	0	0.0%	165-170	0	0.0%
50-55	250.8	8.4%	110-115	0	0.0%	170-175	0	0.0%
55-60	222.0	7.4%	115-120	0	0.0%	175-180	0	0.0%

Zone	Lumens	% of Luminaire
0-40	1437	48.1%
0-60	2461	82.4%
0-90	2986	100.0%
90-180	0	0.0%



Candela Tabulation
Horizontal Angle (Degrees)

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	1145	1145	1145	1145	1145	1145	1145	1145	1145	1145	1145	1145	1145	1145	1145	1145
5	1163	1144	1133	1134	1134	1134	1133	1144	1163	1144	1133	1134	1134	1134	1133	1144
10	1144	1127	1118	1121	1121	1121	1118	1127	1144	1127	1118	1121	1121	1121	1118	1127
15	1113	1098	1093	1099	1100	1099	1093	1098	1113	1098	1093	1099	1100	1099	1093	1098
20	1069	1058	1057	1065	1068	1065	1057	1058	1069	1058	1057	1065	1068	1065	1057	1058
25	1012	1005	1011	1021	1024	1021	1011	1005	1012	1005	1011	1021	1024	1021	1011	1005
30	943	940	953	966	970	966	953	940	943	940	953	966	970	966	953	940
35	861	865	885	900	905	900	885	865	861	865	885	900	905	900	885	865
40	768	779	808	825	830	825	808	779	768	779	808	825	830	825	808	779
45	668	686	723	742	748	742	723	686	668	686	723	742	748	742	723	686
50	567	590	634	658	663	658	634	590	567	590	634	658	663	658	634	590
55	467	495	542	566	564	566	542	495	467	495	542	566	564	566	542	495
60	375	403	454	458	443	458	454	403	375	403	454	458	443	458	454	403
65	290	317	357	336	318	336	357	317	290	317	357	336	318	336	357	317
70	213	238	258	223	201	223	258	238	213	238	258	223	201	223	258	238
75	146	168	167	132	118	132	167	168	146	168	167	132	118	132	167	168
80	85	100	89	71	66	71	89	100	85	100	89	71	66	71	89	100
85	34	40	33	28	27	28	33	40	34	40	33	28	27	28	33	40
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	4286	4286	4286
45	3538	3831	3958
55	3049	3536	3683
65	2566	3166	2820
75	2108	2414	1712
85	1475	1417	1146



Utilization of Lumens - Zonal Cavity Method

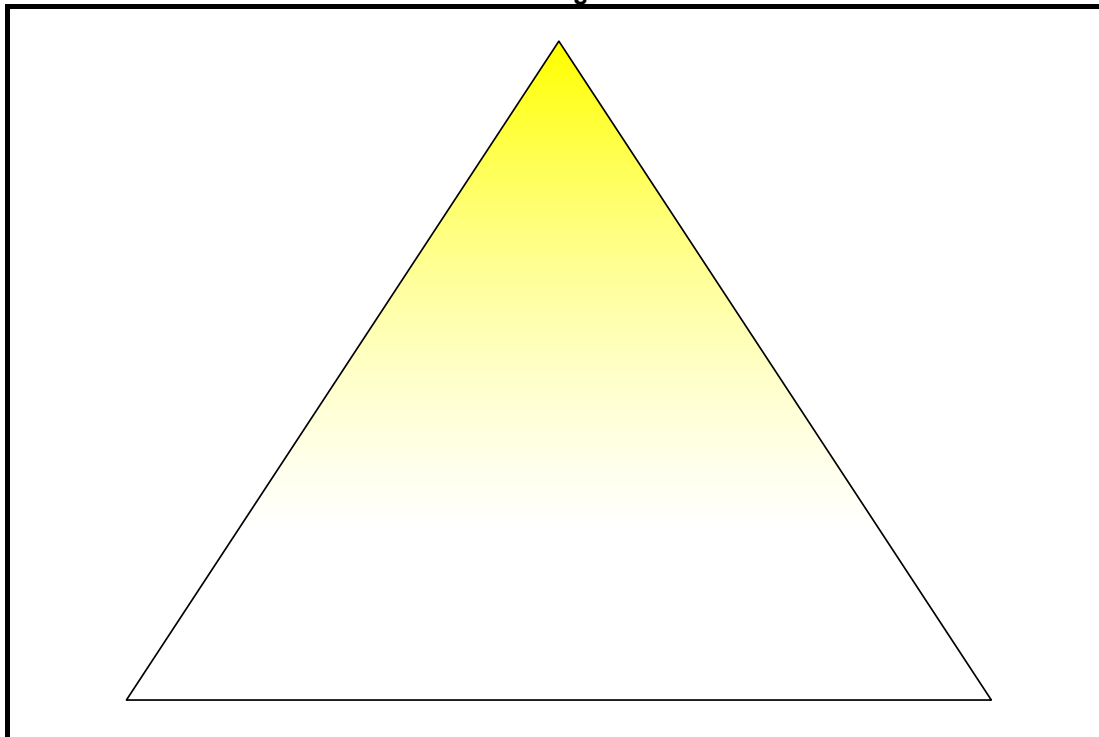
Effective Floor Cavity Reflectance 20%

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	3555	3555	3555	3555	3472	3472	3472	3472	3318	3318	3318	3177	3177	3177	3047	3047	3047	2986
1	3267	3132	3011	2902	3186	3064	2955	2855	2938	2848	2765	2822	2749	2681	2715	2656	2601	2540
2	2983	2747	2552	2388	2905	2691	2512	2360	2586	2435	2305	2489	2363	2253	2399	2296	2203	2140
3	2727	2424	2189	2001	2654	2377	2159	1983	2289	2102	1948	2207	2048	1915	2131	1997	1882	1818
4	2502	2155	1900	1706	2435	2115	1878	1694	2041	1834	1671	1972	1793	1648	1908	1754	1626	1563
5	2305	1930	1669	1475	2243	1897	1651	1467	1834	1617	1451	1776	1585	1436	1721	1554	1420	1358
6	2131	1741	1480	1292	2074	1713	1466	1287	1660	1439	1275	1610	1414	1264	1563	1389	1253	1193
7	1977	1581	1324	1145	1926	1557	1313	1140	1511	1292	1132	1469	1271	1124	1429	1251	1116	1057
8	1842	1445	1195	1023	1796	1424	1186	1020	1385	1168	1014	1348	1151	1008	1313	1135	1002	945
9	1722	1327	1086	922	1680	1309	1078	920	1276	1064	915	1244	1050	910	1213	1036	906	852
10	1615	1226	993	838	1577	1210	986	836	1181	974	832	1153	963	828	1127	951	825	773

Cone of Light Tabulation

Mounting Height	Footcandles at Nadir	Diameter (Feet)
4.00	71.5	4.95
6.00	31.8	7.42
8.00	17.9	9.90
10.0	11.4	12.4
12.0	7.95	14.8
14.0	5.84	17.3
16.0	4.47	19.8

Cone of Light Plot





In-Situ Test

In-Situ Test Conditions

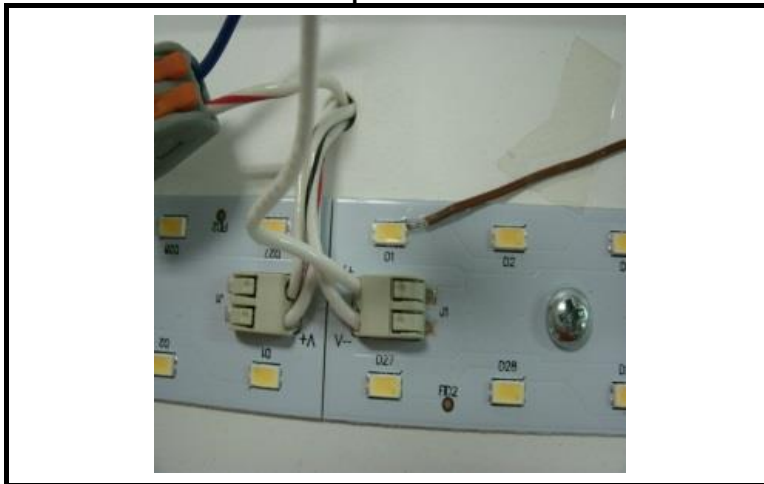
Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
22.5 °C	120.0 VAC	N/A	N/A	N/A	60 Hz	N/A

Summary of Results

LED Temperature: 37.6 °C
Driver Temperature: 44.5 °C
Maximum LED Current: 0.06990 A

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

LED Temperature Location



Driver Temperature Location

