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Photometric Test Report

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

Prepared For
Renova Lighting Systems Inc

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Mansfield, MA 02048

Catalog Number
L-KVN24-WN-L37-UNV-30DM-W33-104-C40-AF

Order Number
10703472
Test Number
948067

Test Date

2015-03-10 - 2015-03-12

Prepared By

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Approved By

Jeff Smith Jr., Project Handler

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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	3745 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%	79.7%
Zonal Lumen Requirement 2	N/A	N/A
Minimum Luminaire Efficacy	≥82.45 lm/w	112 lm/w
Minimum Lamp Efficacy	N/A	N/A
Allowable CCTs*	≤5000K	4001 K
Minimum CRI	≥78	85.6
L70 Lumen maintenance	50000 Hours	TM-21 must be completed
Minimum Luminaire Warranty	5 Years	N/A
Power Factor 120 / 277	≥0.87	0.951 at 277 V
Total Harmonic Distortion (A-%)	≤25%	13.5% 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 (751mA)

Luminaire



Luminaire Characteristics

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

Summary of Results

Integrating Sphere

Total Output: 3820 Lumens
Efficacy: 114.2 lm/w
CCT: 4001 K
CRI (Ra): 85.6

Distribution

Total Luminaire Output: 3745 Lumens
Luminaire Efficacy: 112 lm/w
Maximum Candela: 1451 Candela

Electrical Data at 277 VAC

Test Temperature: 25.1 °C
Voltage: 277.0 VAC
Current: 0.1313 A
Power: 34.59 W
Power Factor: 0.951
Frequency: 60 Hz
Current THD: 13.5 %

In-Situ

LED Temperature: 41.5 °C
Driver Temperature: 43.6 °C
Maximum LED Current: 0.09400 A

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



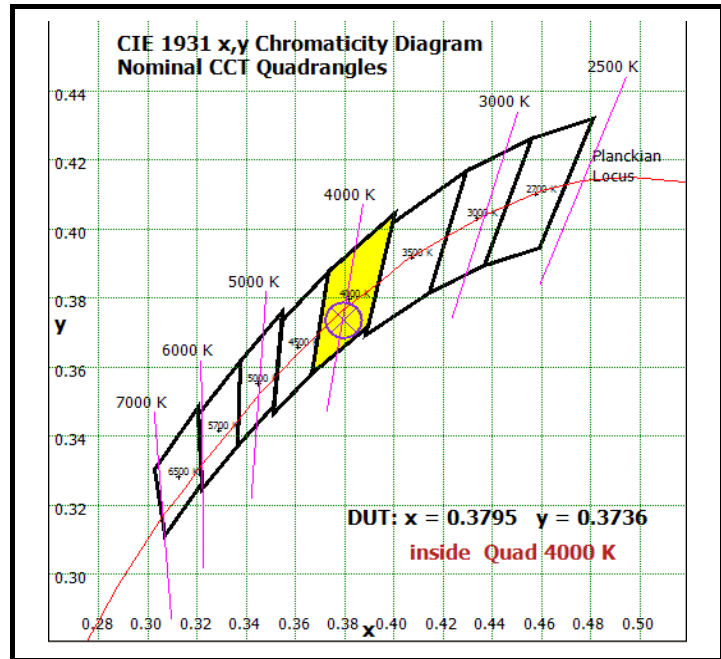
Color Quality - Integrating Sphere

Integrating Sphere Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
24.9 °C	120.0 VAC	0.2796 A	33.45 W	0.997	60 Hz	6.08 %

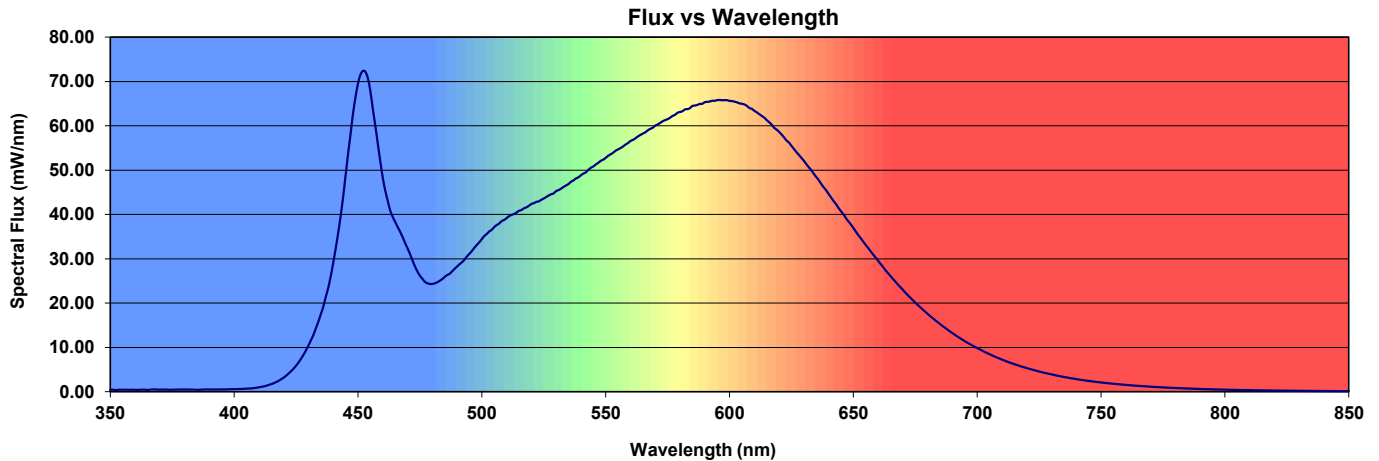
Summary of Results

Luminous Flux:	3820 Lumens
Efficacy:	114.2 lm/w
CCT:	4001 K
CRI (Ra):	85.6
CRI (R9):	21.2
Chromaticity (x):	0.3795
Chromaticity (y):	0.3736
Chromaticity (u):	0.2257
Chromaticity (v):	0.3333
Chromaticity (u')	0.2257
Chromaticity (v')	0.5000
Duv:	-0.0020



Color Rendering Index Detail

Ra (CRI)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
85.6	84.5	92.5	96.2	83.5	84.6	88.8	86.6	68.3	21.2	81.7	82.5	68.0	86.8	98.4





Distribution - Goniophotometer

Distribution Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
24.4 °C	120.0 VAC	0.2794 A	33.45 W	0.997	60 Hz	5.99 %

Summary of Results

Spacing Criteria

0-180: 1.22
90-270: 1.22

Total Lumen Output:

3745 Lumens

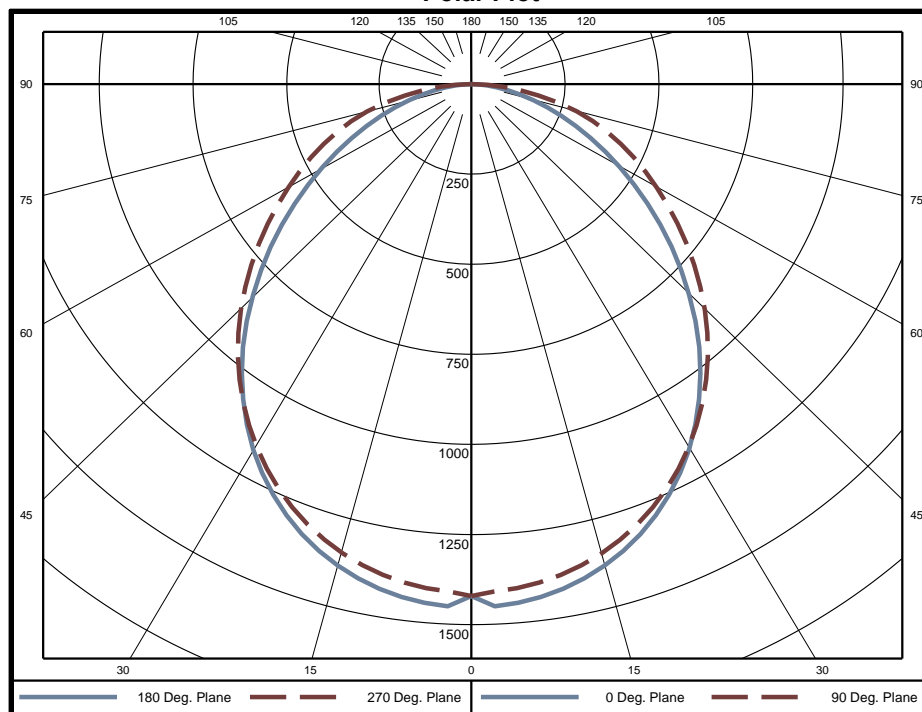
Luminaire Efficacy:

112.0 lm/w

Maximum Candela:

1451 Candela

Polar Plot



Zonal Lumen Summary

Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire
0-5	36.0	1.0%	60-65	230.1	6.1%	120-125	0.0	0.0%
5-10	100.3	2.7%	65-70	190.9	5.1%	125-130	0.0	0.0%
10-15	162.9	4.3%	70-75	150.3	4.0%	130-135	0.0	0.0%
15-20	219.1	5.9%	75-80	107.3	2.9%	135-140	0.0	0.0%
20-25	266.8	7.1%	80-85	62.5	1.7%	140-145	0.0	0.0%
25-30	303.7	8.1%	85-90	20.1	0.5%	145-150	0.0	0.0%
30-35	328.2	8.8%	90-95	0.0	0.0%	150-155	0.0	0.0%
35-40	339.6	9.1%	95-100	0.0	0.0%	155-160	0.0	0.0%
40-45	337.8	9.0%	100-105	0.0	0.0%	160-165	0.0	0.0%
45-50	323.5	8.6%	105-110	0.0	0.0%	165-170	0.0	0.0%
50-55	299.1	8.0%	110-115	0.0	0.0%	170-175	0.0	0.0%
55-60	266.8	7.1%	115-120	0.0	0.0%	175-180	0.0	0.0%

Zone	Lumens	% of Luminaire
0-40	1756.5	46.9%
0-60	2983.7	79.7%
0-90	3745.0	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	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421
5	1445	1420	1404	1405	1404	1405	1404	1420	1445	1420	1404	1405	1404	1405	1404	1420
10	1422	1398	1383	1384	1383	1384	1383	1398	1422	1398	1383	1384	1383	1384	1383	1398
15	1383	1361	1348	1349	1349	1349	1348	1361	1383	1361	1348	1349	1349	1349	1348	1361
20	1329	1308	1298	1300	1301	1300	1298	1308	1329	1308	1298	1300	1301	1300	1298	1308
25	1257	1240	1235	1239	1239	1239	1235	1240	1257	1240	1235	1239	1239	1239	1235	1240
30	1171	1157	1157	1163	1165	1163	1157	1157	1171	1157	1157	1163	1165	1163	1157	1157
35	1067	1060	1067	1078	1080	1078	1067	1060	1067	1060	1067	1078	1080	1078	1067	1060
40	953	952	968	983	987	983	968	952	953	952	968	983	987	983	968	952
45	828	835	861	881	886	881	861	835	828	835	861	881	886	881	861	835
50	703	715	750	775	780	775	750	715	703	715	750	775	780	775	750	715
55	578	597	639	668	675	668	639	597	578	597	639	668	675	668	639	597
60	461	483	532	565	574	565	532	483	461	483	532	565	574	565	532	483
65	354	379	432	469	481	469	432	379	354	379	432	469	481	469	432	379
70	258	285	342	377	388	377	342	285	258	285	342	377	388	377	342	285
75	173	205	255	285	294	285	255	205	173	205	255	285	294	285	255	205
80	101	133	169	182	183	182	169	133	101	133	169	182	183	182	169	133
85	43	64	83	87	87	87	83	64	43	64	83	87	87	87	83	64
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	2289	2289	2289
45	1886	1961	2018
55	1623	1795	1897
65	1348	1648	1832
75	1076	1589	1827
85	798	1528	1612



Utilization of Lumens - Zonal Cavity Method

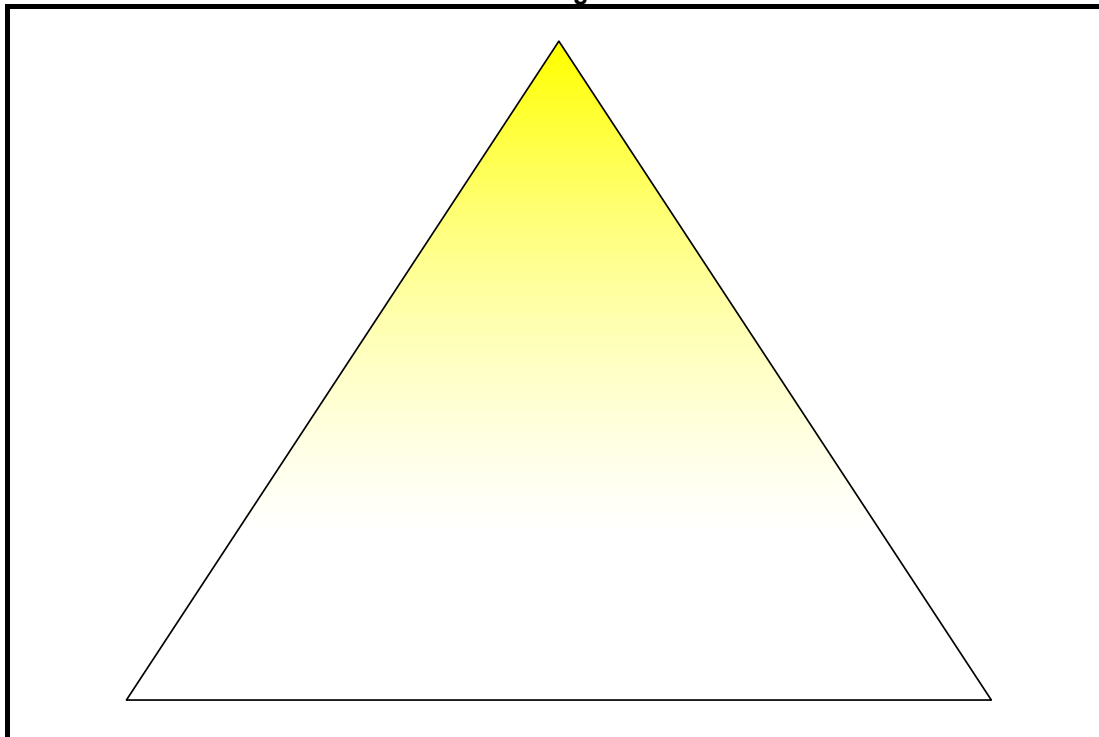
Effective Floor Cavity Reflectance 20%

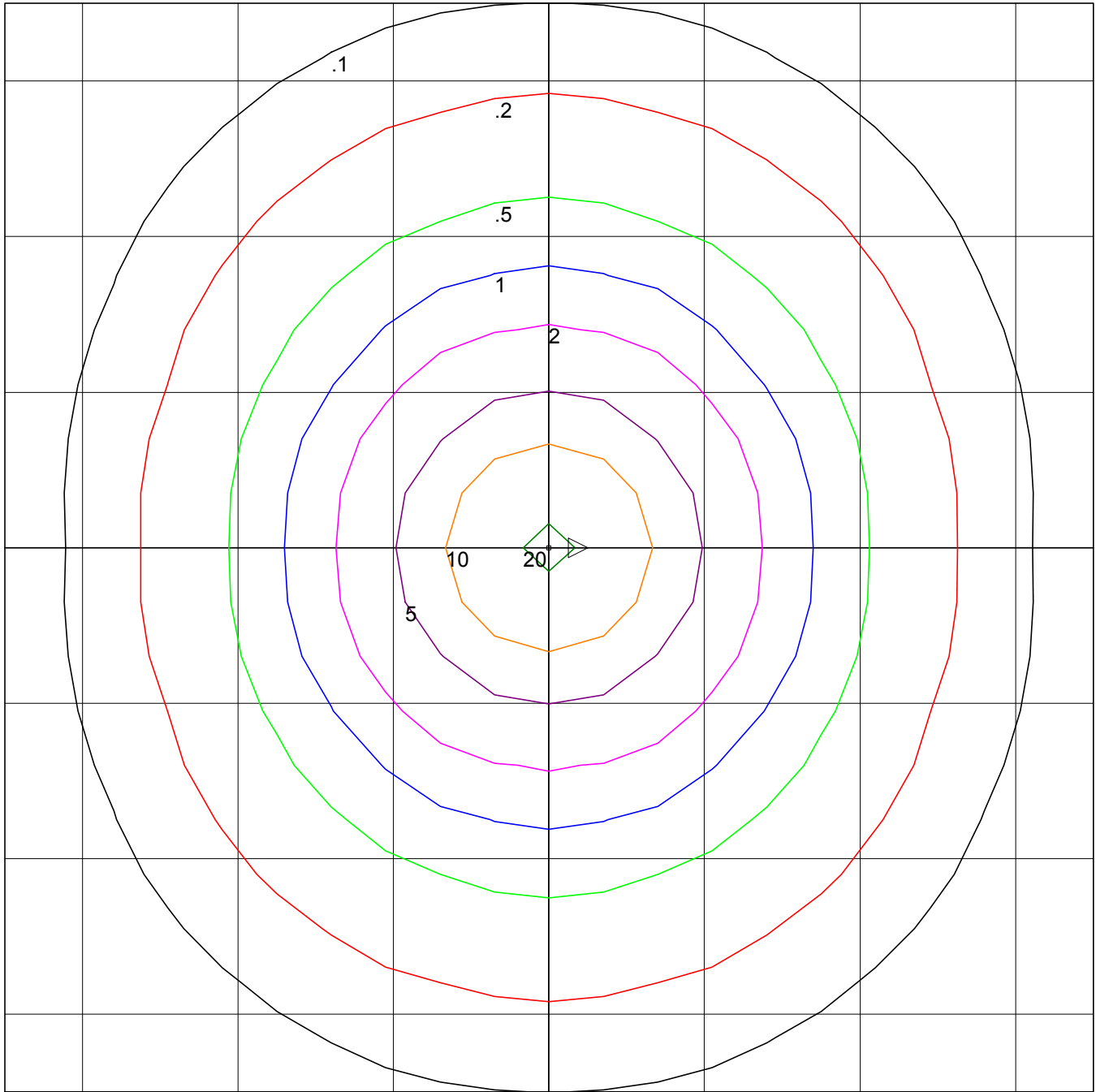
Ceiling Cavity Reflectance	80				70				50			30			10			0
Wall Reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **																	
0	4462	4462	4462	4462	4359	4359	4359	4359	4165	4165	4165	3988	3988	3988	3825	3825	3825	3748
1	4077	3899	3738	3594	3975	3813	3667	3535	3654	3533	3423	3507	3409	3318	3372	3293	3219	3141
2	3714	3406	3152	2938	3615	3336	3102	2903	3202	3005	2835	3080	2915	2771	2966	2830	2709	2628
3	3391	2999	2696	2454	3298	2940	2659	2432	2828	2587	2389	2725	2519	2347	2629	2455	2306	2225
4	3110	2664	2338	2089	3024	2615	2310	2074	2521	2255	2045	2433	2203	2017	2352	2154	1990	1909
5	2865	2387	2053	1806	2786	2345	2031	1796	2265	1988	1776	2191	1948	1757	2122	1909	1738	1658
6	2649	2153	1821	1582	2577	2118	1804	1575	2050	1770	1561	1987	1738	1547	1928	1707	1534	1457
7	2459	1956	1630	1402	2394	1926	1617	1397	1868	1589	1386	1814	1563	1376	1763	1538	1366	1292
8	2291	1788	1472	1254	2233	1762	1460	1250	1713	1438	1243	1666	1417	1235	1622	1396	1227	1156
9	2143	1644	1338	1131	2090	1621	1329	1128	1578	1310	1122	1538	1293	1117	1500	1275	1111	1043
10	2010	1518	1224	1028	1962	1499	1216	1026	1462	1201	1021	1427	1186	1016	1393	1172	1012	947

Cone of Light Tabulation

Mounting Height	Footcandles at Nadir	Diameter (Feet)
4.00	88.8	4.86
6.00	39.5	7.30
8.00	22.2	9.73
10.0	14.2	12.2
12.0	9.87	14.6
14.0	7.25	17.0
16.0	5.55	19.5

Cone of Light Plot





Horizontal Footcandles
Scale: 1 Inch = 8 Ft.
Mounting Height = 8.00 Ft.
Maximum Calculated Value = 22.20 Fc.



In-Situ Test

In-Situ Test Conditions

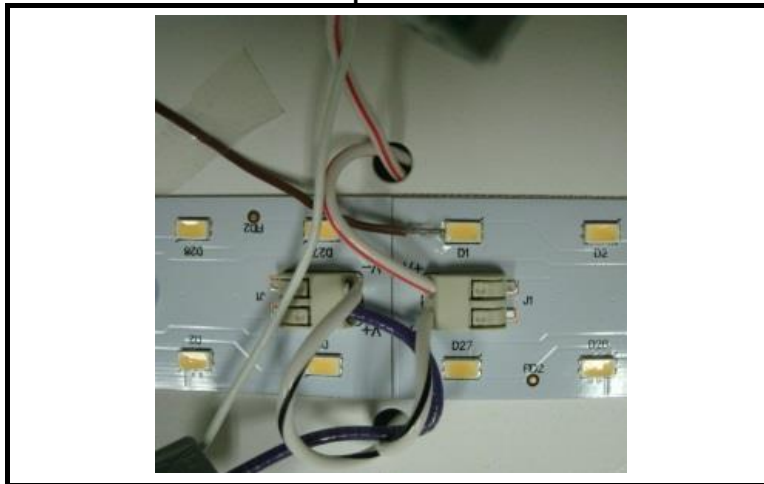
Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.3 °C	120.0 VAC	N / A	N / A	N / A	60 Hz	N / A

Summary of Results

LED Temperature: 41.5 °C
Driver Temperature: 43.6 °C
Maximum LED Current: 0.09400 A

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

LED Temperature Location



Driver Temperature Location

