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## Photometric Test Report

Relevant Standards  
IES LM-79-2008, ANSI C82.77-2002, UL 1598-2008  
CIE 13.3-1995, CIE 15-2004, ANSI C78.377-2015  
IES TM-30-2015

Prepared For  
**Renova Lighting Systems Inc**  
36 Bellair Ave  
Warwick, RI 02886  
United States

Catalog Number  
**RVN22-N-L030-UNV-DM-C35-AF**  
Order Number  
11902607  
Test Number  
11902607.01

Test Date

2017-08-08 - 2017-08-10

Prepared By

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Approved By

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The results contained in this report pertain only to the tested sample.  
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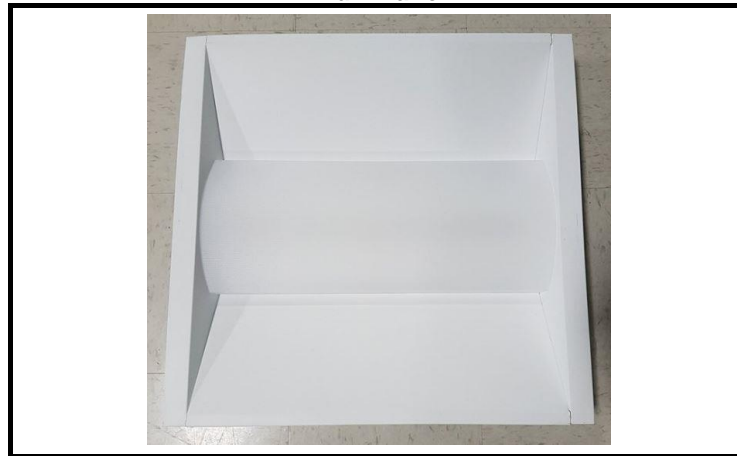
Laboratory results may not be representative of field performance  
Ballast factors have not been applied

Testing was performed in a 2-meter integrating sphere using the  $4\pi$  geometry method.  
Absorption correction was employed for Sphere measurement



**Luminaire Description:** White formed steel housing, frosted plastic linear prismatic lens enclosure  
**Lamp:** 112 white LED  
**Mounting:** Recessed  
**Ballast/Driver:** One Osram Oti 20/120-277/700 DIM L AUX

**Luminaire**



**Luminaire Characteristics**

Luminous Length: 21.25 in.  
Luminous Width: 22.50 in.

**Summary of Results**

**Integrating Sphere**

Luminous Flux: 3075 Lumens  
Efficacy: 139.2 lm/w  
CCT: 3508 K  
CRI (Ra): 82.3

**Distribution**

Total Luminaire Output: 2939 Lumens  
Luminaire Efficacy: 132.9 lm/w  
Maximum Candela: 1108 Candela

**Electrical Data at 277 VAC**

Test Temperature: 24.9 °C  
Voltage: 277.0 VAC  
Current: 0.08420 A  
Power: 22.81 W  
Power Factor: 0.977  
Frequency: 60 Hz  
Current THD: 6.66 %

**In-Situ**

LED Temperature: 48.5 °C  
Driver Temperature: 45.0 °C  
Measured LED Current: 0.05915 A

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



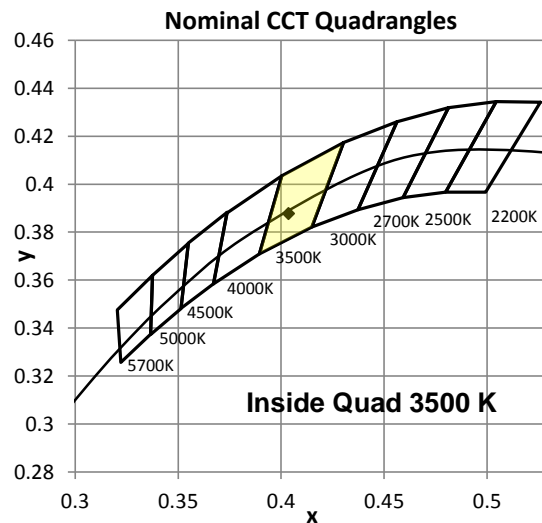
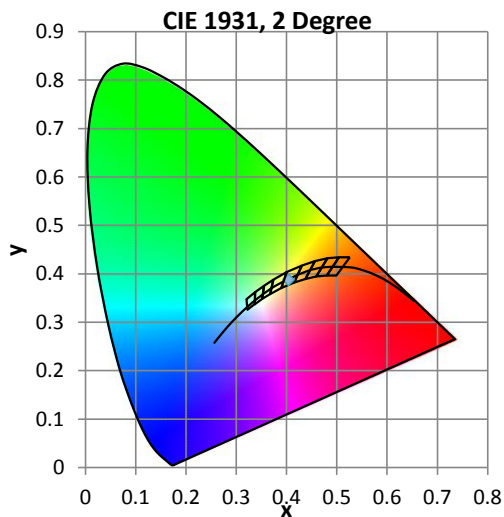
## Color Quality - Integrating Sphere

### Integrating Sphere Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
24.8 °C	119.9 VAC	0.1844 A	22.09 W	0.998	60 Hz	3.90 %

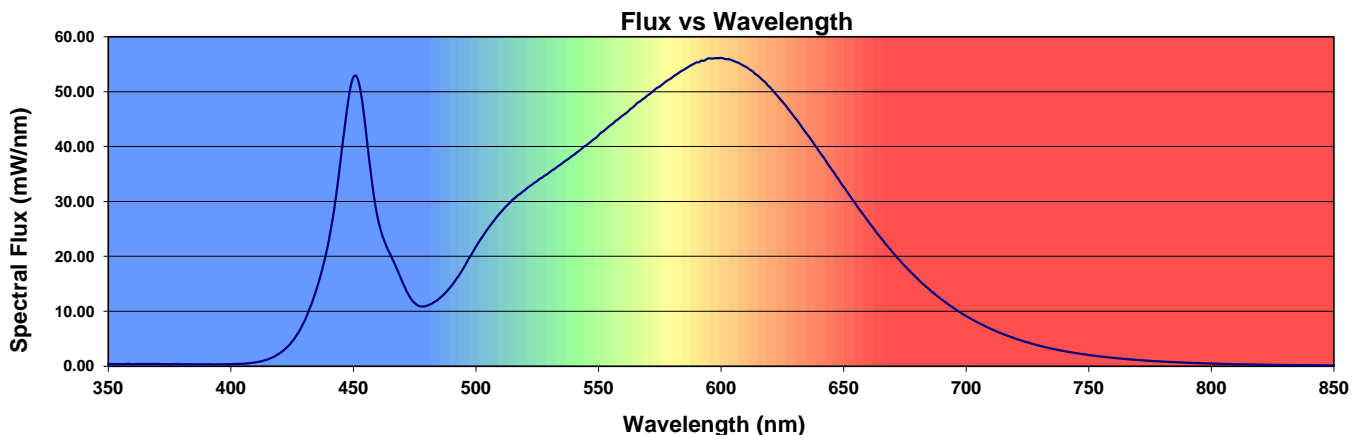
### Summary of Results

<b>Total Output:</b>	3075 Lumens	<b>Chromaticity (x):</b>	0.4037
<b>Efficacy:</b>	139.2 lm/w	<b>Chromaticity (y):</b>	0.3878
<b>CCT:</b>	3508 K	<b>Chromaticity (u'):</b>	0.2359
<b>CRI (Ra):</b>	82.3	<b>Chromaticity (v'):</b>	0.5098
<b>CRI (R9):</b>	11.4	<b>TM-30 Rf:</b>	81.3
<b>Peak Wavelength:</b>	599.3 nm	<b>TM-30 Rg:</b>	97.1
<b>Dominant Wavelength:</b>	581.3 nm	<b>Duv:</b>	-0.0011
<b>S/P Ratio:</b>	1.506		



### Color Rendering Index Detail

Ra (CRI)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
82.3	80.7	88.4	94.2	81.2	80.5	84.0	85.4	64.0	11.4	72.6	79.7	62.9	82.4	96.7





## Distribution - Goniophotometer

### Distribution Test Conditions

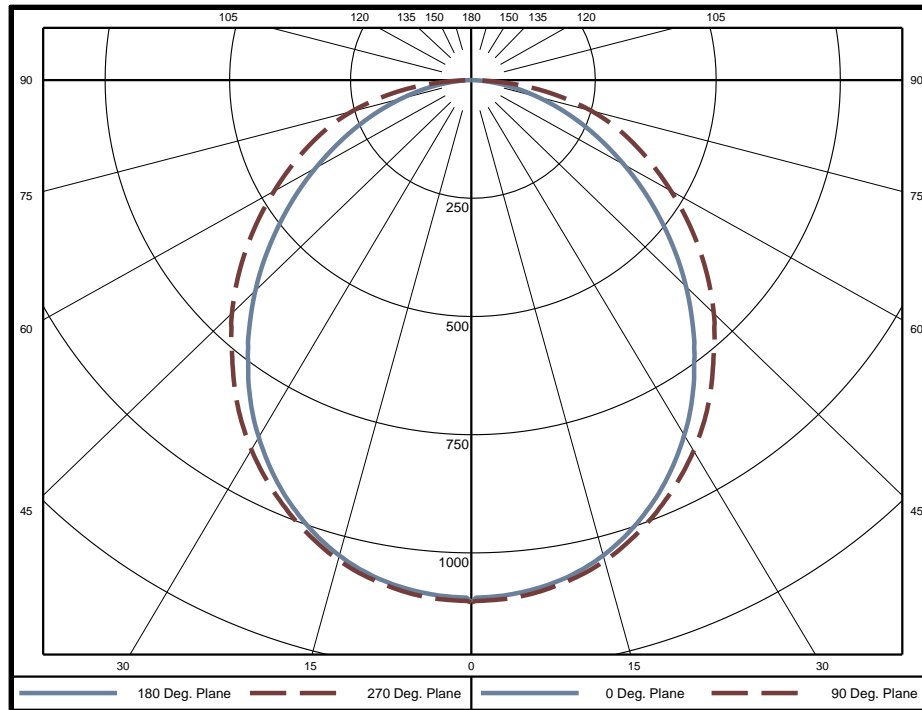
Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.4 °C	120.0 VAC	0.1844 A	22.11 W	0.998	60 Hz	3.88 %

### Summary of Results

**Spacing Criteria**  
 0-180: 1.18  
 90-270: 1.18

**Total Lumen Output:** 2939 Lumens  
**Luminaire Efficacy:** 132.9 lm/w  
**Maximum Candela:** 1108 Candela

### Polar Plot



### Zonal Lumen Summary

Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire
0-5	26.3	0.9%	60-65	185.5	6.3%	120-125	0	0.0%
5-10	78.0	2.7%	65-70	155.9	5.3%	125-130	0	0.0%
10-15	126.7	4.3%	70-75	124.4	4.2%	130-135	0	0.0%
15-20	170.0	5.8%	75-80	90.1	3.1%	135-140	0	0.0%
20-25	206.1	7.0%	80-85	52.9	1.8%	140-145	0	0.0%
25-30	234.0	8.0%	85-90	14.3	0.5%	145-150	0	0.0%
30-35	252.7	8.6%	90-95	0	0.0%	150-155	0	0.0%
35-40	260.9	8.9%	95-100	0	0.0%	155-160	0	0.0%
40-45	260.8	8.9%	100-105	0	0.0%	160-165	0	0.0%
45-50	252.3	8.6%	105-110	0	0.0%	165-170	0	0.0%
50-55	235.7	8.0%	110-115	0	0.0%	170-175	0	0.0%
55-60	212.7	7.2%	115-120	0	0.0%	175-180	0	0.0%

Zone	Lumens	% of Luminaire
0-40	1355	46.1%
0-60	2316	78.8%
0-90	2939	100.0%
90-180	0	0.0%



**Candela Tabulation**  
Horizontal Angle (Degrees)

Vertical Angle (Degrees)	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	1104	1104	1104	1104	1104	1104	1104	1104	1104	1104	1104	1104	1104	1104	1104	1104
5	1089	1102	1103	1099	1097	1099	1103	1102	1089	1102	1103	1099	1097	1099	1103	1102
10	1072	1085	1086	1082	1080	1082	1086	1085	1072	1085	1086	1082	1080	1082	1086	1085
15	1041	1054	1057	1054	1053	1054	1057	1054	1041	1054	1057	1054	1053	1054	1057	1054
20	996	1009	1013	1012	1012	1012	1013	1009	996	1009	1013	1012	1012	1012	1013	1009
25	939	952	958	962	963	962	958	952	939	952	958	962	963	962	958	952
30	871	886	897	904	907	904	897	886	871	886	897	904	907	904	897	886
35	794	809	824	837	842	837	824	809	794	809	824	837	842	837	824	809
40	710	725	747	762	769	762	747	725	710	725	747	762	769	762	747	725
45	624	641	668	691	700	691	668	641	624	641	668	691	700	691	668	641
50	536	555	586	614	625	614	586	555	536	555	586	614	625	614	586	555
55	449	468	502	536	548	536	502	468	449	468	502	536	548	536	502	468
60	365	384	421	458	472	458	421	384	365	384	421	458	472	458	421	384
65	286	305	345	384	399	384	345	305	286	305	345	384	399	384	345	305
70	213	233	273	314	330	314	273	233	213	233	273	314	330	314	273	233
75	145	165	206	242	256	242	206	165	145	165	206	242	256	242	206	165
80	85	105	138	162	170	162	138	105	85	105	138	162	170	162	138	105
85	33	45	66	77	79	77	66	45	33	45	66	77	79	77	66	45
90	0	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2
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/m<sup>2</sup>)**  
Horizontal Angle (Degrees)

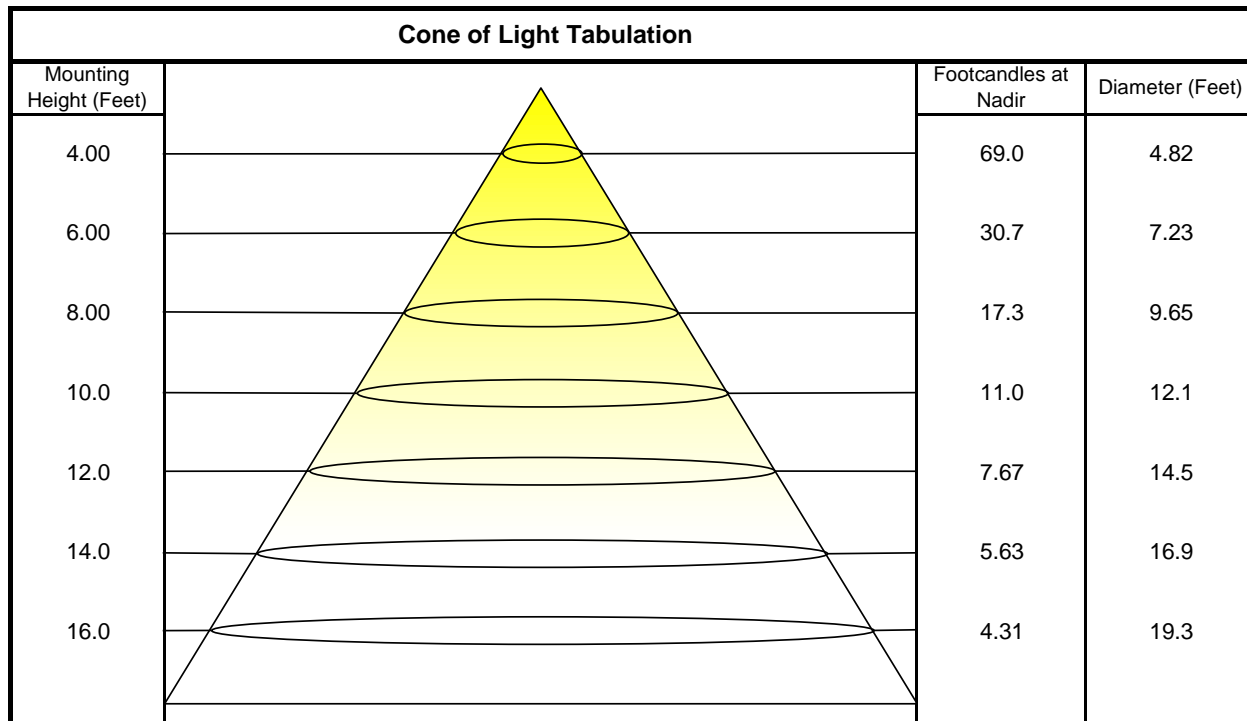
Vertical Angle (Degrees)	Horizontal Angle (Degrees)		
	0	45	90
0	3580	3580	3580
45	2861	3062	3211
55	2539	2840	3098
65	2194	2645	3060
75	1817	2583	3200
85	1222	2438	2945



### 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	3499	3499	3499	3499	3418	3418	3418	3418	3266	3266	3266	3127	3127	3127	2999	2999	2999	2939
1	3192	3050	2923	2808	3112	2983	2867	2762	2858	2762	2674	2743	2665	2592	2637	2574	2515	2453
2	2904	2660	2459	2289	2827	2605	2419	2262	2500	2344	2209	2404	2273	2158	2314	2206	2110	2046
3	2650	2339	2099	1908	2577	2293	2070	1890	2205	2014	1856	2124	1961	1824	2048	1910	1792	1728
4	2429	2076	1818	1621	2361	2037	1796	1610	1963	1753	1587	1894	1713	1565	1831	1674	1544	1480
5	2236	1859	1595	1400	2174	1826	1578	1392	1763	1544	1377	1705	1513	1362	1651	1482	1347	1284
6	2067	1676	1414	1226	2011	1648	1400	1220	1595	1374	1209	1546	1349	1198	1499	1324	1188	1127
7	1919	1522	1265	1085	1868	1498	1255	1081	1453	1233	1073	1411	1213	1065	1371	1193	1057	999
8	1788	1391	1142	971	1742	1371	1133	968	1332	1116	962	1295	1099	956	1261	1083	950	894
9	1672	1279	1038	875	1630	1261	1031	873	1227	1016	868	1196	1002	864	1166	989	859	806
10	1569	1181	950	795	1531	1166	944	794	1137	932	790	1109	920	786	1083	909	783	731

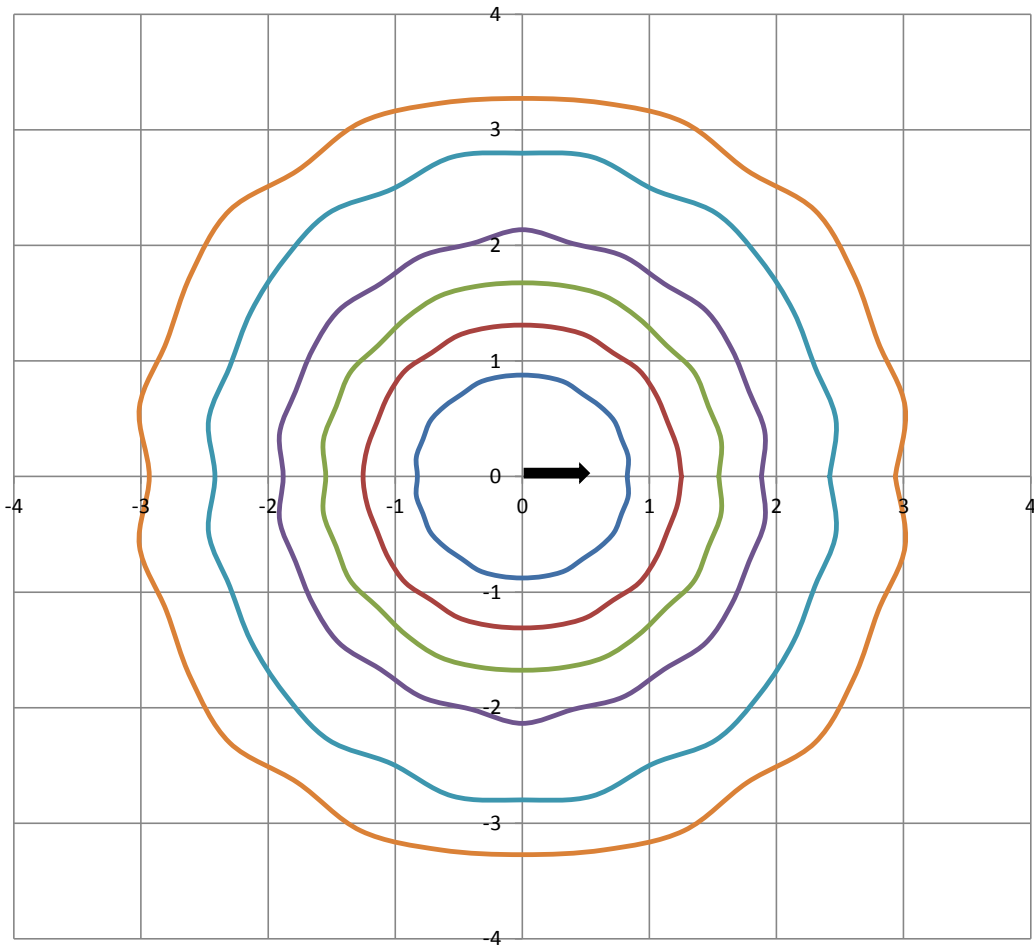
Beam and Field Information	
CIE Type:	Direct
Center Beam Intensity:	1104 Candela
Central Cone Intensity:	1103 Candela
Beam Flux:	1968.9 Lumens
Beam Angle (0-180):	98.2 Degrees
Beam Angle (90-270):	109.5 Degrees
Field Angle (0-180):	155.7 Degrees
Field Angle (90-270):	166.7 Degrees





# ISOFootcandle Plot

Mounting Height - 8 Feet



Grid Lines in Units of Mounting Height







## In-Situ Test

### In-Situ Test Conditions

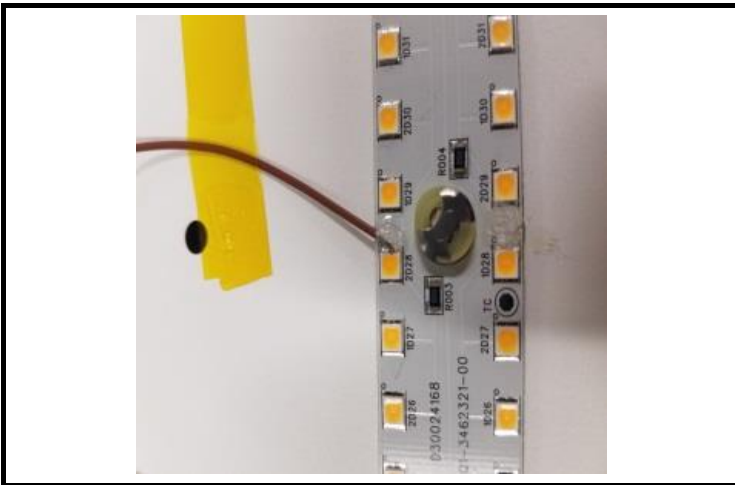
Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
22.5 °C	120.1 VAC	N/A	N/A	N/A	60 Hz	N/A

### Summary of Results

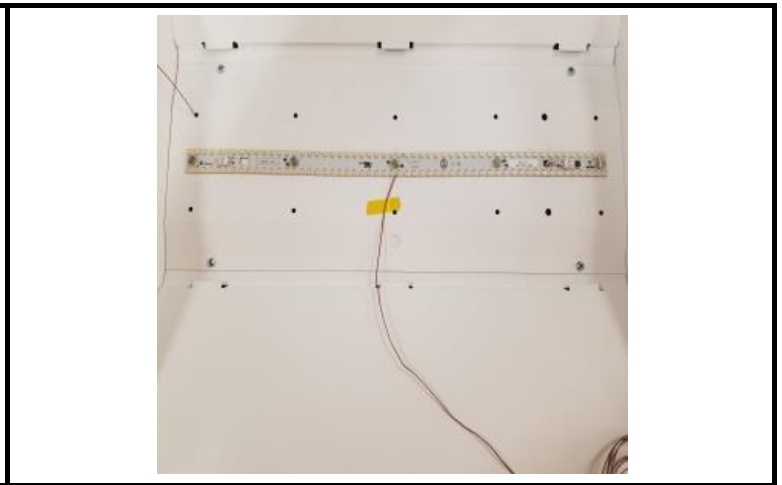
LED Temperature: 48.5 °C  
Driver Temperature: 45.0 °C  
Measured LED Current: 0.05915 A

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

### LED Temperature Location



### Thermocouple Reference



### Driver Temperature Location

