



Photometric Test Report

Relevant Standards

UL1598-2008

ANSI C82.77-10-2014

IES LM-79-2008

Prepared For

P.Q.L., Inc.

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Test Laboratory:

UL-CCIC Company Limited

Test Laboratory Address:

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Catalog Number

55076

Project Number

4789044943

Report Number

4789044943_7

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06/19/2019 - 06/26/2019

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Revision Date

N/A

Prepared By

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Approved By

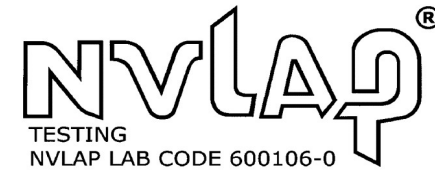
Duff Yang

Yang, Duff

The results contained in this report pertain only to the tested sample.

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Test Summary

DLC Technical Requirements v4.4- issued 2018-10-18

Requirement Category	Test Method	Requirements	Tolerance	Test Result
Minimum Light Output (lm)-Luminaires	IES LM-79-2008	≥2000	-10%	3849.2
Spacing Criteria (0-180°)	IES LM-79-2008	1.0-2.0	±0.1	1.22
Spacing Criteria (90-270°)	IES LM-79-2008	1.0-2.0	±0.1	1.30
Zonal Lumen Requirement 1(0°-60°)	IES LM-79-2008	≥75%	-3%	74.50%
Minimum Luminaire Efficacy (lm/W)-Luminaires	IES LM-79-2008	≥125	-3%	127.73
Allowable CCT (3500K)	IES LM-79-2008/ANSI C78.377-2015	3465±245	N/A	3431.0
Allowable CCT (5000K)	IES LM-79-2008/ANSI C78.377-2015	5029±283	N/A	5139.0
Minimum CRI	IES LM-79-2008/CIE 13.3-1995	≥80	-2	81.98
L70 Lumen maintenance (Hours)	N/A	≥50000	N/A	≥50000
L90 Lumen maintenance (Hours)	N/A	≥36000	N/A	≥36000
Power Factor	ANSI C82.77-10-2014	≥0.9	-0.03	0.9521
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤20%	5%	5.98%
In-Situ Temperature Measurement Test for LED 1 (°C)	UL1598-2008	≤105	N/A	56.1
In-Situ Temperature Measurement Test for Driver 1 (°C)	UL1598-2008	≤90	N/A	52.2
Minimum Luminaire Warranty (Years)	N/A	≥5	N/A	≥5



Test List

Sample Received Date: 06/18/2019

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	06/25/2019	5507X-30-35K	Xiong, Blaire
Integrating Sphere Test	06/25/2019	55076	Xiong, Blaire
Goniophotometer Test	06/19/2019	5507X-30-35K	Xiong, Blaire
THD and PF Test	06/26/2019	5507X-30-35K	Xiong, Blaire
In-Situ Temperature Measurement Test	06/26/2019	5507X-30-35K	Xiong, Blaire

Remark (if any)

1. UL test equipment information is recorded on Meter Use in UL's Aurora database.



Product Description

Lamp/Luminaire Description: 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model Number: 5507X-30-35K

Electrical Parameter: 120-277V, 50/60Hz

LED Package: STW8A2PD-XX

Family Model and Variation: 55076

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
5507X-30-35K	3500	3780	30	126
55075	4000	3810	30	127
55076	5000	3840	30	128

Photos of Products Characteristics





Integrating Sphere Test

Model No.	5507X-30-35K		Sample ID.	2359061
Operate time (Min.)	90	Stabilization time (Min.)	45	

Test Method

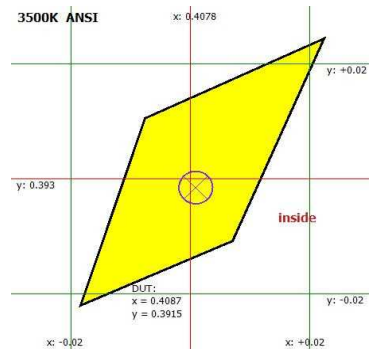
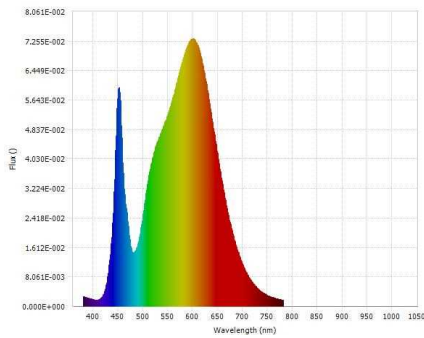
1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
 2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by Labsphere, Inc., Optical Calibration Laboratory.
 3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Integrating Sphere Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.0	120.03	60	0.2533	30.134	0.9914	N/A	Horizontal

Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3431.0	81.98	-0.0004	3881.46	128.81	N/A



Luminous Flux (lm)	3881.46	Chrom x	0.4087
Chrom y	0.3915	Chrom u	0.2376
Chrom v	0.3414	Duv	-0.0004
Chrom u'	0.2376	Chrom v'	0.5121
CCT (K)	3431.0	Luminous Efficacy (lm/W)	128.81
Ra	81.98	R1	80.4
R2	88.6	R3	94.7
R4	80.7	R5	80.0
R6	84.5	R7	84.8
R8	62.1	R9	7.5
R10	72.8	R11	79.1
R12	62.5	R13	82.2
R14	97.0	R15	74.2
Rf	81.3	Rg	96.6



Integrating Sphere Test

Model No.	55076	Sample ID.	2359063
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

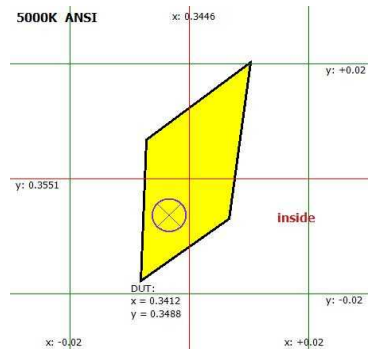
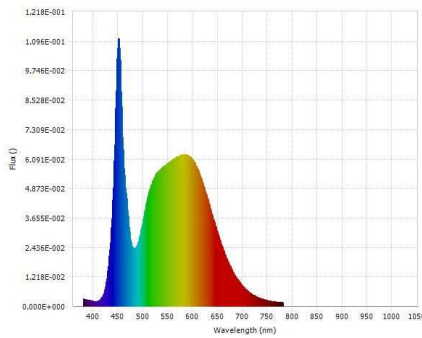
1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
 2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The reference standard lamp is rated current 2.679A omni-directional Incandescent lamp and was calibrated by Labsphere, Inc., Optical Calibration Laboratory.
 3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Integrating Sphere Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.0	120.06	60	0.2536	30.184	0.9915	N/A	Horizontal

Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
5139.0	83.42	0.0002	3965.7	131.38	N/A



Luminous Flux (lm)	3965.7	Chrom x	0.3412
Chrom y	0.3488	Chrom u	0.2099
Chrom v	0.3218	Duv	0.0002
Chrom u'	0.2099	Chrom v'	0.4827
CCT (K)	5139.0	Luminous Efficacy (lm/W)	131.38
Ra	83.42	R1	82.5
R2	87.9	R3	90.7
R4	83.9	R5	82.9
R6	82.5	R7	87.2
R8	69.8	R9	13.7
R10	70.3	R11	83.1
R12	61.1	R13	83.9
R14	94.9	R15	78.3
Rf	81.3	Rg	96.5



Goniophotometer Test

Model No.	5507X-30-35K	Sample ID.	2359061
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using a type C goniophotometer and software.
3.The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is rated current 3.8466A, 3.8601A, 3.8618A omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.
4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonallumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.4	120.02	60	0.2523	30.135	0.9952	5.56%	Horizontal

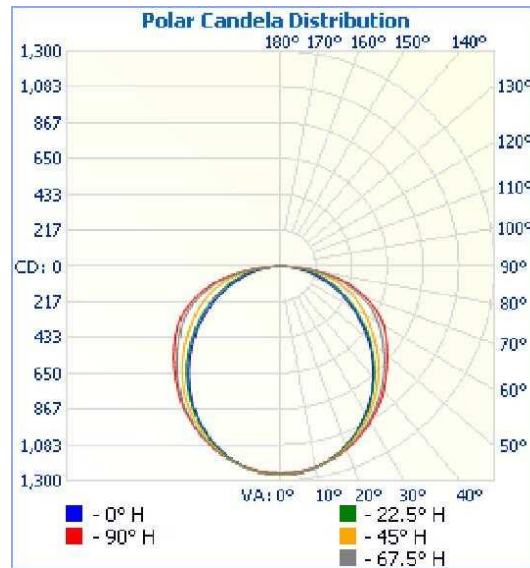
Test Results

Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)	Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
	0°-60°	N/A	Horizontal Spread	Vertical Spread			
3849.2	74.50%	N/A	131.0	106.3	127.73	1.22	1.30

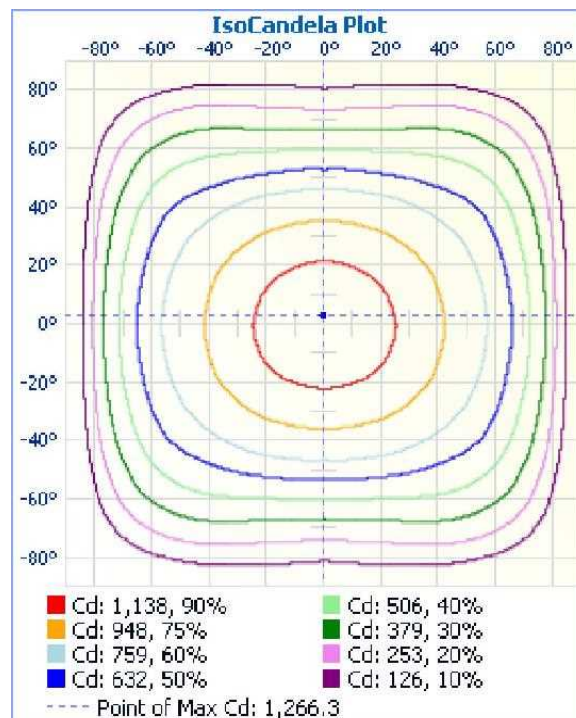


Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot





Goniophotometer Test (Cont'd)
Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	974.7	25.30%
0-40	1596.8	41.50%
0-60	2863.1	74.40%
60-90	977.0	25.40%
70-100	461.7	12.00%
90-120	3.7	0.10%
0-90	3840.1	99.80%
90-180	9.1	0.20%
0-180	3849.2	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	30.1	0.80%	90-95	1.2	0.00%
5-10	89.1	2.30%	95-100	0.8	0.00%
10-15	144.9	3.80%	100-105	0.6	0.00%
15-20	195.6	5.10%	105-110	0.5	0.00%
20-25	239.5	6.20%	110-115	0.4	0.00%
25-30	275.4	7.20%	115-120	0.4	0.00%
30-35	302.4	7.90%	120-125	0.4	0.00%
35-40	319.7	8.30%	125-130	0.5	0.00%
40-45	327.3	8.50%	130-135	0.5	0.00%
45-50	325.5	8.50%	135-140	0.6	0.00%
50-55	315.2	8.20%	140-145	0.6	0.00%
55-60	298.2	7.70%	145-150	0.6	0.00%
60-65	274.6	7.10%	150-155	0.5	0.00%
65-70	242.6	6.30%	155-160	0.5	0.00%
70-75	201.5	5.20%	160-165	0.4	0.00%
75-80	152.1	4.00%	165-170	0.3	0.00%
80-85	87.6	2.30%	170-175	0.2	0.00%
85-90	18.5	0.50%	175-180	0.1	0.00%



Goniophotometer Test (Cont'd)
Intensity Data(cd)

Candela Table - Type C

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260
1	1266	1264	1263	1255	1252	1253	1262	1263	1265	1263	1262	1253	1252	1255	1263	1264	1266
2	1265	1263	1262	1256	1250	1255	1260	1263	1264	1263	1260	1255	1250	1256	1262	1263	1265
3	1263	1260	1260	1252	1254	1256	1259	1261	1261	1261	1259	1256	1254	1252	1260	1260	1263
4	1264	1259	1259	1254	1250	1254	1260	1259	1263	1259	1260	1254	1250	1254	1259	1259	1264
5	1258	1258	1255	1252	1248	1253	1255	1256	1259	1256	1255	1253	1248	1252	1255	1258	1258
6	1255	1255	1252	1248	1248	1248	1255	1253	1255	1253	1255	1248	1248	1248	1252	1255	1255
7	1250	1251	1249	1247	1243	1248	1252	1251	1248	1251	1252	1248	1243	1247	1249	1251	1250
8	1248	1244	1247	1242	1240	1245	1246	1247	1247	1247	1246	1245	1240	1242	1247	1244	1248
9	1244	1242	1240	1238	1239	1240	1243	1240	1241	1240	1243	1240	1239	1238	1240	1242	1244
10	1238	1237	1237	1236	1232	1238	1239	1237	1238	1237	1239	1238	1232	1236	1237	1237	1238
11	1231	1231	1233	1229	1231	1232	1232	1232	1230	1232	1232	1232	1231	1229	1233	1231	1231
12	1227	1224	1226	1225	1226	1227	1228	1223	1223	1223	1228	1227	1226	1225	1226	1224	1227
13	1220	1217	1220	1220	1220	1223	1221	1218	1217	1218	1221	1223	1220	1220	1220	1217	1220
14	1210	1212	1214	1214	1216	1218	1216	1212	1209	1212	1216	1218	1216	1214	1214	1212	1210
15	1204	1201	1208	1209	1209	1212	1211	1204	1202	1204	1211	1212	1209	1209	1208	1201	1204
16	1194	1194	1199	1204	1206	1205	1202	1194	1193	1194	1202	1205	1206	1204	1199	1194	1194
17	1188	1186	1191	1196	1198	1200	1195	1188	1182	1188	1195	1200	1198	1196	1191	1186	1188
18	1178	1178	1184	1190	1194	1193	1185	1178	1173	1178	1185	1193	1194	1190	1184	1178	1178
19	1166	1166	1174	1181	1184	1184	1180	1167	1165	1167	1180	1184	1184	1181	1174	1166	1166
20	1156	1157	1167	1172	1180	1178	1171	1158	1153	1158	1171	1178	1180	1172	1167	1157	1156
25	1100	1101	1113	1130	1138	1133	1121	1104	1094	1104	1121	1133	1138	1130	1113	1101	1100
30	1031	1038	1054	1076	1089	1081	1064	1038	1029	1038	1064	1081	1089	1076	1054	1038	1031
35	956	964	990	1018	1036	1026	997	967	955	967	997	1026	1036	1018	990	964	956
40	877	885	918	957	974	961	925	887	872	887	925	961	974	957	918	885	877
45	785	799	841	888	911	892	848	803	783	803	848	892	911	888	841	799	785
50	693	710	758	818	850	823	765	715	694	715	765	823	850	818	758	710	693
55	600	618	675	750	786	754	681	620	593	620	681	754	786	750	675	618	600
60	503	526	598	684	724	686	601	530	499	530	601	686	724	684	598	526	503
65	411	434	520	607	643	611	523	436	406	436	523	611	643	607	520	434	411
70	317	347	440	512	545	515	442	349	312	349	442	515	545	512	440	347	317
75	227	264	346	409	439	410	346	264	226	264	346	410	439	409	346	264	227
80	142	178	237	279	292	277	236	177	140	177	236	277	292	279	237	178	142
85	61	83	103	106	102	101	99	81	59	81	99	101	102	106	103	83	61
90	2	3	3	3	3	4	3	3	2	3	3	4	3	3	3	3	2
95	1	1	2	2	2	2	2	2	1	2	2	2	2	2	2	1	1
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
105	0	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	0
110	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
115	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
120	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
125	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
130	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
135	1	2	1	2	2	1	2	1	1	1	2	1	2	2	1	2	1
140	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
145	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
150	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
155	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
160	2	3	2	2	2	2	2	2	3	2	2	2	2	2	2	3	2
165	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
170	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
175	4	3	4	3	3	3	3	3	3	3	3	3	3	3	4	3	4
180	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4



THD and PF Test

Model No.	5507X-30-35K		Sample ID.	2359061
Operate time (Min.)	90	Stabilization time (Min.)	45	

Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
 2. The ambient temperature condition was maintained at 25° C ± 1° C. The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.4	120.02	60	0.2523	30.135	0.9952	5.56%	Horizontal
25.4	276.96	60	0.1124	29.639	0.9521	5.98%	Horizontal



In-Situ Temperature Measurement Test

Model No.	5507X-30-35K	Sample ID.	2359061
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Test Method

- In-Situ Temperature Measurement Test is conducted according to the UL 1598-2008, Section 14.
- The testing was conducted in a room with ambient temperature of 25°C ± 5°C. The apparatus construction followed those described in UL1598-2008 for normal temperature testing. Thermocouples were placed on the LED package in the locations indicated by LM-80 report. Thermocouples were placed on the LED driver case in the locations specified by the manufacture if necessary. The temperature was recorded after the lamp was operated by 7.5 hours.

In-Situ Temperature Measurement Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
25.5	120.02	60	0.2523	30.135	0.9952	5.56%	Horizontal

Test Results (LEDs)

Thermocouple Location	Declared Light Source Current (mA)	Temperature for Light Source (°C)		LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp (°C)
		Test Result	Test Result (Correct to 25 °C)			
Ambient TEMP	N/A	25.5	25.0			
TMP of Location 1	105	56.6	56.1	STW8A2PD-XX	200	105

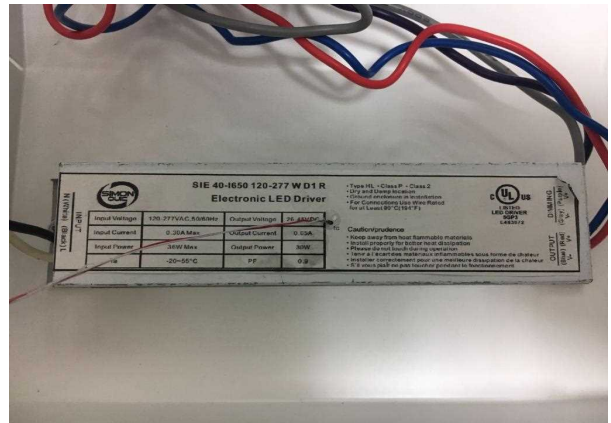
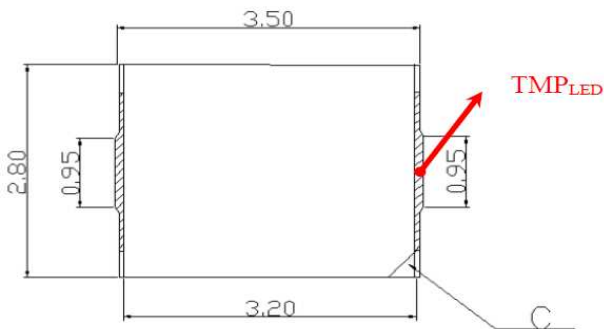
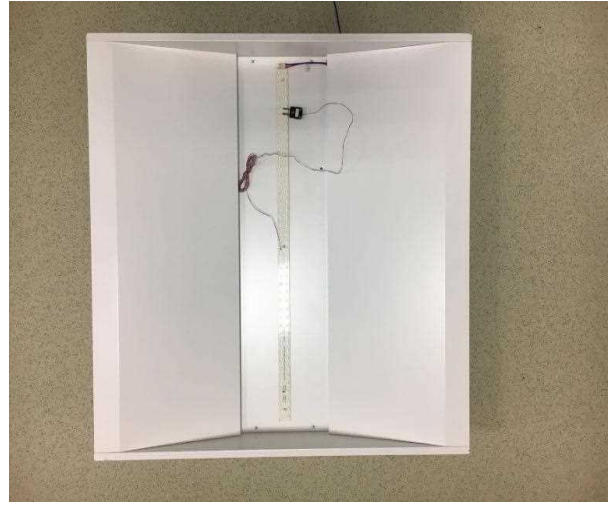
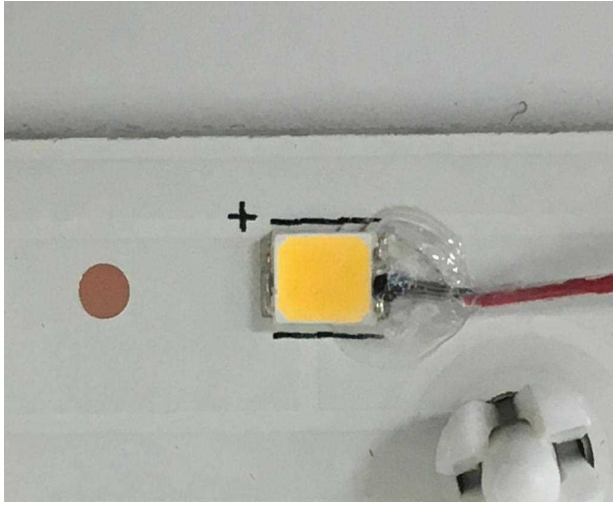
Test Results (Drivers)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	25.5	25.0		
TMP of Location 1	52.7	52.2	SIE40-I650 120-277 W D1 R	90



In-Situ Temperature Measurement Test (Cont'd)

Test Photos for Ts Point of Light Sources & Tc Point of Drivers





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