Photometric Test Report

Relevant Standards

UL1598-2008
ANSI C82.77-10-2014
IES LM-79-2008

Prepared For

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Test Laboratory:
UL-CCIC Company Limited
Test Laboratory Address:

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Catalog Number
KT-CBLED34-14A-8XX-VDIM-P

Project Number
4788965897
Report Number
4788965897_1

Test Date
03/12/2019 - 03/16/2019
Issue Date
04/19/2019
Revision Date
N/A

Prepared By	**Approved By**
Xu, Jonathan	Yang, Duff

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**	≥1500	-10%	4261.8
Spacing Criteria (0-180°)	**IES LM-79-2008**	1.0-2.0	±0.1	1.32
Spacing Criteria (90-270°)	**IES LM-79-2008**	1.0-2.0	±0.1	1.22
Zonal Lumen Requirement 1(0°-60°)	**IES LM-79-2008**	≥75%	-3%	76.90%
Minimum Luminaire Efficacy (lm/W)-Luminaires	**IES LM-79-2008**	≥125	-3%	123.98
Allowable CCT (3500K)	**IES LM-79-2008/ANSI C78.377-2015**	3465±245	N/A	3370.0
Allowable CCT (5000K)	**IES LM-79-2008/ANSI C78.377-2015**	5029±283	N/A	4955.0
Minimum CRI	**IES LM-79-2008/CIE 13.3-1995**	≥80	-2	81.74
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	0.9414
Total Harmonic Distortion (A%)	**ANSI C82.77-10-2014**	≤20%	5%	6.33%
In-Situ Temperature Measurement Test for LED 1 (°C)	**UL1598-2008**	≤105	N/A	39.7
In-Situ Temperature Measurement Test for Driver 1 (°C)	**UL1598-2008**	≤90	N/A	48.7
Minimum Luminaire Warranty (Years)	**N/A**	≥5	N/A	≥5

Test List

Sample Received Date: 03/13/2019

Test Item	Test Date	Model Number	Tests Conducted By
Integrating Sphere Test	03/12/2019	KT-CBLED34-14A-835-VDIM-P	Yang, Gavin X
Integrating Sphere Test	03/12/2019	KT-CBLED34-14A-850-VDIM-P	Yang, Gavin X
Goniophotometer Test	03/14/2019	KT-CBLED34-14A-835-VDIM-P	Yang, Gavin X
THD and PF Test	03/12/2019	KT-CBLED34-14A-835-VDIM-P	Yang, Gavin X
In-Situ Temperature Measurement Test	03/16/2019	KT-CBLED34-14A-835-VDIM-P	Yang, Gavin X

Remark (if any)

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

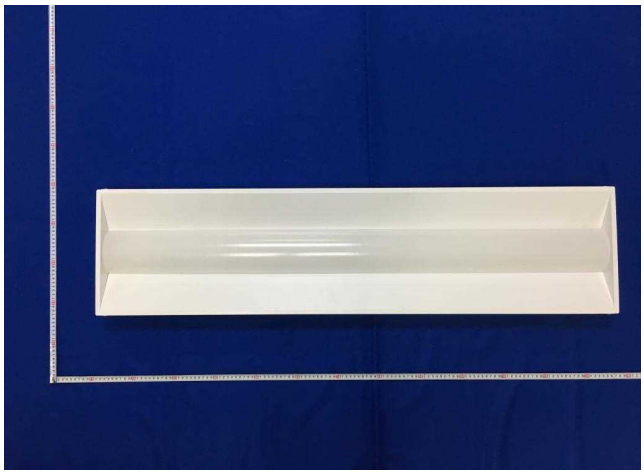
Product Description

Luminaire Description: 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces1
Model Number: KT-CBLED34-14A-835-VDIM-P
Rated Voltage: 120-277V
Frequency: 50/60Hz
LED Package: STW8A2PD-XX
Family Model and Variation: KT-CBLED34-14A-850-VDIM-P

Products Scaled Value

Model Number	CCT	Luminous Flux	Power	Luminous Efficacy
KT-CBLED34-14A-835-VDIM-P	3500	4375	35	125
KT-CBLED34-14A-840-VDIM-P	4000	4445	35	127
KT-CBLED34-14A-850-VDIM-P	5000	4480	35	128

Photos of Products Characteristics



TESTING
NVLAP LAB CODE 600106-0

Integrating Sphere Test

Model No.	KT-CBLED34-14A-835-VDIM-P	Sample ID.	2125719
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

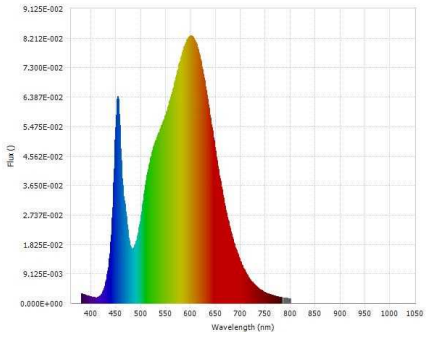
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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.

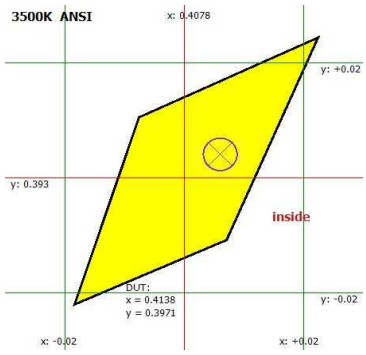
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.5	120.04	60	0.2926	34.33	0.9774	N/A	Horizontal

Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3370.0	81.87	0.001	4294.76	125.10	N/A





Luminous Flux (lm)	4294.76	Chrom x	0.4138
Chrom y	0.3971	Chrom u	0.2386
Chrom v	0.3434	Duv	0.001
Chrom u’	0.2386	Chrom v’	0.5152
CCT (K)	3370.0	Luminous Efficacy (lm/W)	125.10
Ra	81.87	R1	80.1
R2	88.9	R3	95.5
R4	80.0	R5	79.5
R6	84.9	R7	84.8
R8	61.2	R9	6.2
R10	73.4	R11	78.2
R12	61.1	R13	82.1
R14	97.5	R15	73.5
Rf	81.6	Rg	95.4

TESTING
NVLAP LAB CODE 600106-0

Integrating Sphere Test

Model No.	KT-CBLED34-14A-850-VDIM-P		Sample ID.	2125722
Operate time (Min.)	90	Stabilization time (Min.)		45

Test Method

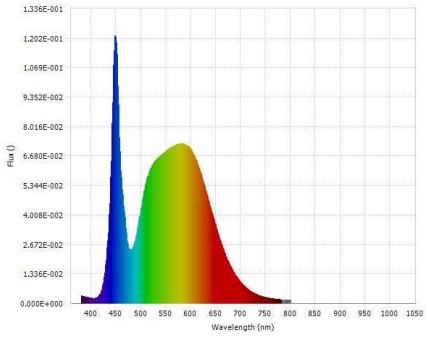
1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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.

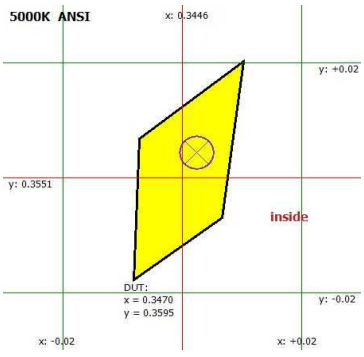
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.4	120.04	60	0.2958	34.674	0.9766	N/A	Horizontal

Test Results

CCT (K)	CRI (Ra)	Duv	Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
4955.0	81.74	0.0032	4520.18	130.36	N/A





Luminous Flux (lm)	4520.18	Chrom x	0.3470
Chrom y	0.3595	Chrom u	0.2096
Chrom v	0.3258	Duv	0.0032
Chrom u’	0.2096	Chrom v’	0.4888
CCT (K)	4955.0	Luminous Efficacy (lm/W)	130.36
Ra	81.74	R1	79.8
R2	85.6	R3	90.2
R4	82.2	R5	80.1
R6	80.2	R7	87.8
R8	68.1	R9	6.9
R10	66.0	R11	81.0
R12	56.2	R13	81.0
R14	94.7	R15	74.4
Rf	81.0	Rg	96.6

Goniophotometer Test

Model No.	KT-CBLED34-14A-835-VDIM-P		Sample ID.	2125719
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

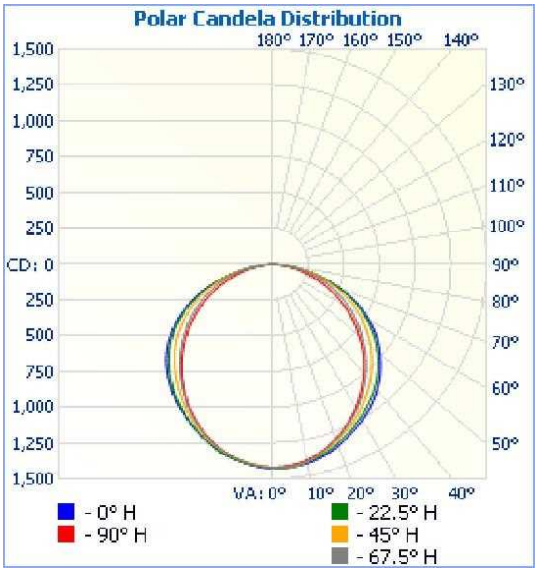
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD	Orientation
24.8	120.04	60	0.2884	34.374	0.9929	N/A	Horizontal

Test Results

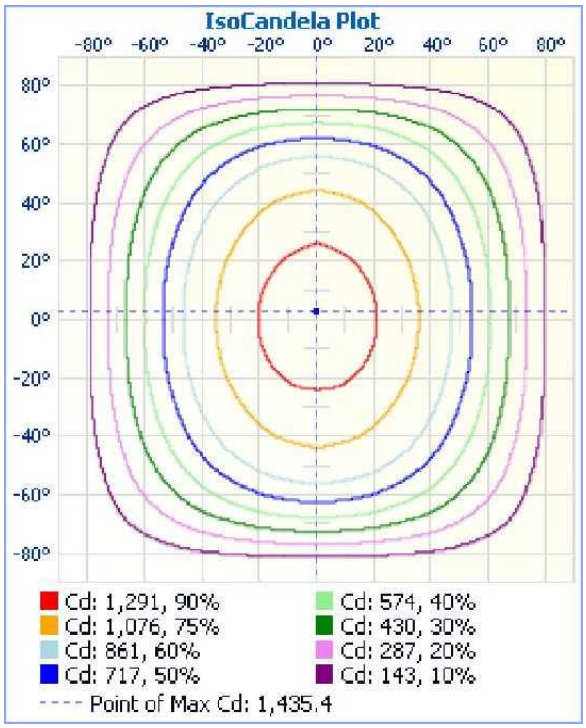
Luminous Flux (lm)	Zonal Lumen Requirement 1	Zonal Lumen Requirement 2	Beam Angle (50%)		Luminous Efficacy (lm/W)	Spacing Criteria (0-180°)	Spacing Criteria (90°-270°)
	0°-60°	N/A	Horizontal Spread	Vertical Spread			
4261.8	76.90%	N/A	107.7	124.7	123.98	1.32	1.22

Goniophotometer Test (Cont'd)

Polar Candela Distribution



IsoCandela Plot



Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1101.0	25.80%
0-40	1810.6	42.50%
0-60	3274.8	76.80%
60-90	973.4	22.80%
70-100	408.4	9.60%
90-120	4.6	0.10%
0-90	4248.3	99.70%
90-180	13.6	0.30%
0-180	4261.8	100.00%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-5	34.0	0.80%	90-95	1.0	0.00%
5-10	100.6	2.40%	95-100	0.8	0.00%
10-15	163.5	3.80%	100-105	0.8	0.00%
15-20	220.8	5.20%	105-110	0.7	0.00%
20-25	270.5	6.30%	110-115	0.7	0.00%
25-30	311.7	7.30%	115-120	0.7	0.00%
30-35	343.7	8.10%	120-125	0.8	0.00%
35-40	365.9	8.60%	125-130	0.8	0.00%
40-45	377.6	8.90%	130-135	0.9	0.00%
45-50	377.9	8.90%	135-140	1.0	0.00%
50-55	366.3	8.60%	140-145	1.0	0.00%
55-60	342.5	8.00%	145-150	0.9	0.00%
60-65	306.9	7.20%	150-155	0.9	0.00%
65-70	260.0	6.10%	155-160	0.8	0.00%
70-75	201.9	4.70%	160-165	0.7	0.00%
75-80	133.7	3.10%	165-170	0.6	0.00%
80-85	61.7	1.40%	170-175	0.4	0.00%
85-90	9.3	0.20%	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	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425
1	1435	1430	1423	1423	1420	1420	1419	1426	1432	1426	1419	1420	1420	1423	1423	1430	1435
2	1435	1430	1424	1423	1419	1418	1416	1423	1429	1423	1416	1418	1419	1423	1424	1430	1435
3	1433	1430	1425	1423	1418	1416	1413	1419	1424	1419	1413	1416	1418	1423	1425	1430	1433
4	1431	1428	1424	1422	1416	1413	1410	1416	1420	1416	1410	1413	1416	1422	1424	1428	1431
5	1428	1426	1423	1420	1413	1410	1406	1412	1415	1412	1406	1410	1413	1420	1423	1426	1428
6	1424	1422	1420	1418	1410	1406	1402	1408	1411	1408	1402	1406	1410	1418	1420	1422	1424
7	1421	1418	1417	1415	1406	1402	1399	1405	1405	1405	1399	1402	1406	1415	1417	1418	1421
8	1418	1414	1412	1410	1401	1397	1395	1400	1401	1400	1395	1397	1401	1410	1412	1414	1418
9	1415	1409	1407	1405	1396	1392	1391	1397	1397	1397	1391	1392	1396	1405	1407	1409	1415
10	1412	1403	1401	1398	1390	1386	1386	1393	1392	1393	1386	1386	1390	1398	1401	1403	1412
11	1408	1398	1394	1391	1383	1380	1381	1389	1388	1389	1381	1380	1383	1391	1394	1398	1408
12	1404	1393	1387	1384	1376	1373	1376	1385	1383	1385	1376	1373	1376	1384	1387	1393	1404
13	1398	1387	1379	1375	1368	1366	1369	1380	1379	1380	1369	1366	1368	1375	1379	1387	1398
14	1393	1381	1371	1366	1360	1359	1362	1374	1373	1374	1362	1359	1360	1366	1371	1381	1393
15	1386	1375	1363	1357	1351	1351	1355	1368	1367	1368	1355	1351	1351	1357	1363	1375	1386
16	1381	1367	1354	1348	1341	1342	1348	1361	1361	1361	1348	1342	1341	1348	1354	1367	1381
17	1374	1360	1346	1337	1331	1334	1339	1353	1353	1353	1339	1334	1331	1337	1346	1360	1374
18	1367	1352	1336	1327	1321	1324	1330	1344	1344	1344	1330	1324	1321	1327	1336	1352	1367
19	1360	1343	1327	1316	1310	1314	1322	1334	1334	1334	1322	1314	1310	1316	1327	1343	1360
20	1352	1335	1317	1305	1299	1303	1312	1324	1324	1324	1312	1303	1299	1305	1317	1335	1352
25	1304	1288	1265	1246	1236	1243	1257	1276	1278	1276	1257	1243	1236	1246	1265	1288	1304
30	1259	1236	1205	1177	1163	1172	1193	1222	1228	1222	1193	1172	1163	1177	1205	1236	1259
35	1205	1180	1137	1100	1082	1093	1125	1164	1175	1164	1125	1093	1082	1100	1137	1180	1205
40	1143	1118	1064	1015	994	1009	1051	1100	1117	1100	1051	1009	994	1015	1064	1118	1143
45	1069	1044	985	925	899	920	973	1028	1051	1028	973	920	899	925	985	1044	1069
50	985	960	898	828	798	825	891	948	973	948	891	825	798	828	898	960	985
55	892	866	804	728	690	726	797	855	878	855	797	726	690	728	804	866	892
60	782	759	702	626	578	622	694	747	768	747	694	622	578	626	702	759	782
65	656	641	592	523	464	516	582	626	641	626	582	516	464	523	592	641	656
70	512	505	474	415	350	409	463	490	500	490	463	409	350	415	474	505	512
75	354	354	343	302	238	297	334	341	340	341	334	297	238	302	343	354	354
80	186	190	200	187	134	183	192	179	171	179	192	183	134	187	200	190	186
85	35	40	56	72	50	68	50	33	23	33	50	68	50	72	56	40	35
90	2	2	2	3	4	3	2	2	2	2	2	3	4	3	2	2	2
95	2	2	2	2	1	2	2	2	2	2	2	2	1	2	2	2	2
100	2	2	2	2	1	2	2	2	2	2	2	2	1	2	2	2	2
105	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2
110	2	1	2	1	1	1	1	2	2	2	1	1	1	1	2	1	2
115	1	2	2	1	1	1	2	2	2	2	2	1	1	1	2	2	1
120	2	2	1	2	1	1	1	2	1	2	1	1	1	2	1	2	2
125	2	2	2	1	2	2	2	2	2	2	2	2	2	1	2	2	2
130	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
135	2	2	3	2	2	2	2	2	3	2	2	2	2	2	3	2	2
140	2	3	3	2	3	3	3	3	3	3	3	3	3	2	3	3	2
145	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
150	3	3	3	3	4	3	3	3	3	3	3	3	4	3	3	3	3
155	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
160	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
165	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4
170	5	6	6	5	5	5	6	6	5	6	6	5	5	5	6	6	5
175	5	5	6	6	5	5	6	6	6	6	6	5	5	6	6	5	5
180	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

THD and PF Test

Model No.	KT-CBLED34-14A-835-VDIM-P		Sample ID.	2125719
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 25º C ± 1º 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
24.8	120.04	60	0.2884	34.374	0.9929	6.33%	Horizontal
24.8	277.03	60	0.1294	33.743	0.9414	4.52%	Horizontal

TESTING
NVLAP LAB CODE 600106-0

In-Situ Temperature Measurement Test

Model No.	KT-CBLED34-14A-835-VDIM-P	Sample ID.	2125719

Test Method

1. In-Situ Temperature Measurement Test is conducted according to the UL 1598-2008, Section 14.
2. 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
24.5	120.04	60	0.2884	34.374	0.9929	N/A	Horizontal

Test Results (LEDs)

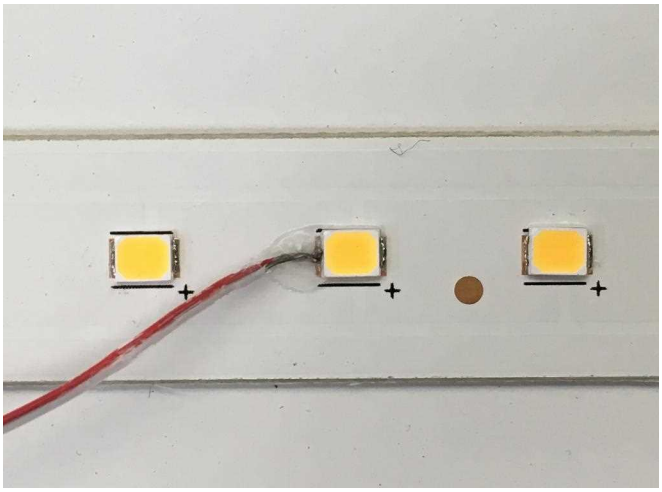
Thermocouple Location	Declared Light Source Current (mA)	Temperature for Light Source (°C)		LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp (°C)
		Test Result	Test Result (Correct to 25 °C)			
Ambient TEMP	N/A	24.5	25.0			
TMP of Location 1	105	39.2	39.7	STW8A2PD-XX	200	105

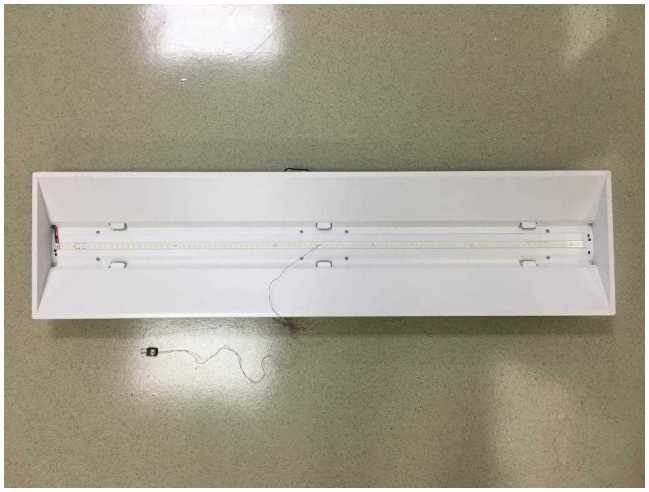
Test Results (Drivers)

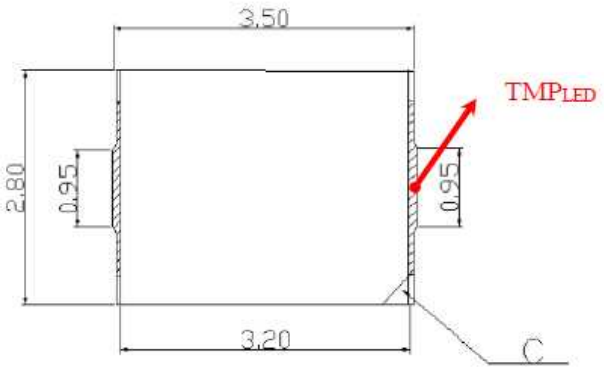
Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp (°C)
	Test Result	Test Result (Correct to 25 °C)		
Ambient TEMP	24.5	25.0		
TMP of Driver Location 1	48.2	48.7	KTLD-40-UV-750-VDIM-LA1	90

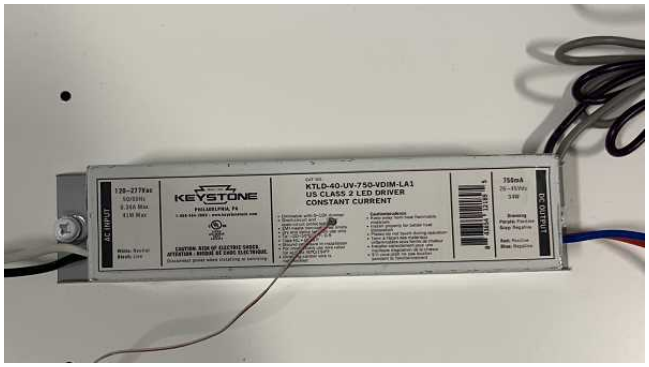
In-Situ Temperature Measurement Test (Cont'd)

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









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