



Photometric Test Report

Relevant Standards

- IES LM-79-2008
- ANSI C82.77-2002
- UL1598-2008/ UL1993-2012

Prepared For **MaxLite Inc**

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Catalog Number
LS-4846U-XX[Blank or MS]

Project Number
4788259862

Report Number
4788259862_7

Test Date
10/22/2017-10/31/2017

Issue Date
12/1/2017

Prepared By

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Approved By

Duff Yang

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1.0 Test Summary

DLC Technical Requirements v4.2

Requirement Category	Test Method	Requirements	Test value	Results (Fail/Pass)
Minimum Light Output (lm)	IES LM-79-2008	375lm/ft	1496.46	Pass
Minimum Lamp Output (lm)	IES LM-79-2008	N/A	N/A	N/A
Spacing Criteria (0-180°)	IES LM-79-2008	N/A	N/A	N/A
Spacing Criteria (90-270°)	IES LM-79-2008	N/A	N/A	N/A
Zonal Lumen Requirement (0°-60°)	IES LM-79-2008	40%	61.40%	Pass
Zonal Lumen Requirement 2	IES LM-79-2008	N/A	N/A	N/A
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	126.1lm/W	129.68	Pass
Minimum Lamp Efficacy (lm/ft)	IES LM-79-2008	N/A	N/A	Pass
Allowable CCTs* (K)	IES LM-79-2008	≤5000	5048	Pass
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥80	82.78	Pass
L70 Lumen maintenance (hours)	IES LM-80-2015 IES TM-21-2011	≥50000	≥50000	Pass
L90 Lumen maintenance (hours)	IES LM-80-2015 IES TM-21-2011	≥36000	≥36000	Pass
Power Factor	ANSI C82.77-2002	≥0.9	0.9436	Pass
Total Harmonic Distortion (A%)	ANSI C82.77-2002	≤20%	12.57%	Pass
In-Situ Temperature Measurement Test for LED (°C)	UL1598-2008/ UL1993-2012	≤105	62.7	Pass
In-Situ Temperature Measurement Test for Driver (°C)	UL1598-2008/ UL1993-2012	85	72	Pass
Minimum Luminaire Warranty (years)	N/A	5	5	Pass

*Defined by ANSI C78.377-2011‡

‡ANSI C78.377-2015 also referred to for Duv and (x,y) chromaticity coordinates tolerances for indoor categories.



2.0 Test List

Test Item	Test	Test Date	Model Number	Tests Conducted By
1	Integrating Sphere Test for the Lower CCT	10/23/2017	LS-4846U-35[Blank or MS]	Gavin Yang
2	Integrating Sphere Test for the Higher CCT	10/23/2017	LS-4846U-50[Blank or MS]	Gavin Yang
3	Goniophotometer Test	10/22/2017	LS-4846U-35[Blank or MS]	Gavin Yang
4	THD and PF Test	10/22/2017	LS-4846U-35[Blank or MS]	Gavin Yang
5	In-Situ Temperature Measurement Test	10/31/2017	LS-4846U-35[Blank or MS]	Gavin Yang

Remark (if any)

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



3.0 Production Description

Luminaire Description: Direct Linear Ambient Luminaires

Model Number: LS-4846U-35[Blank or MS]

Rated Voltage: 120-277V

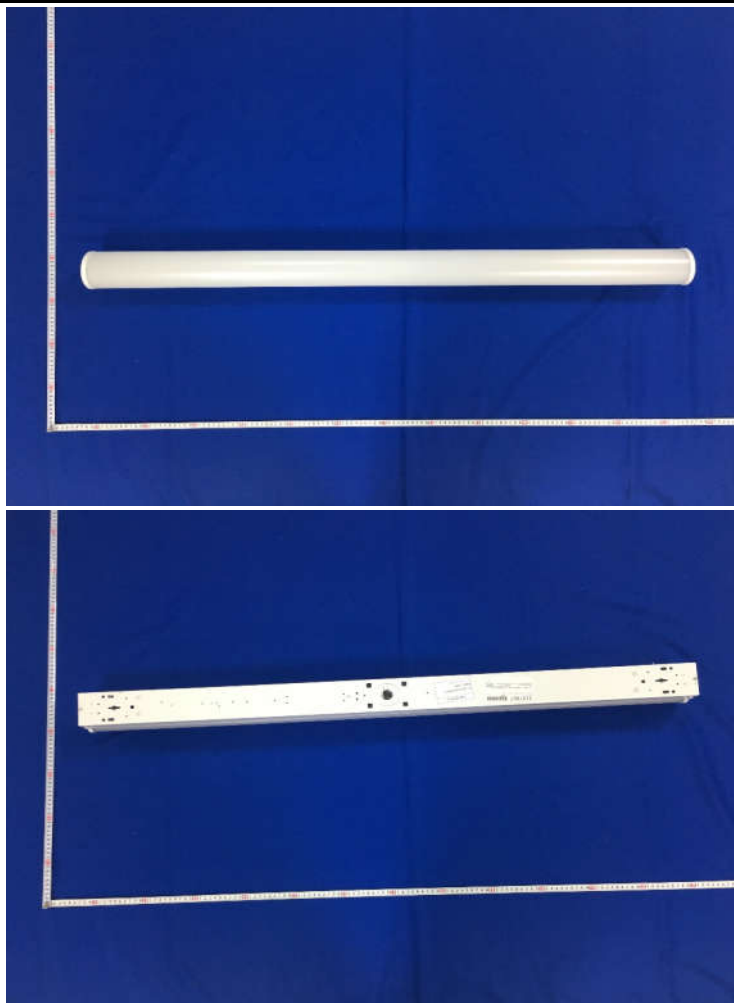
Frequency: 50/60Hz

LED Package: STWxA2PD-xx

Family Model and Variation: LS-4846U-50[Blank or MS]

Photos of Luminaire Characteristics

Model Number	CCT	Light Output (lm)	Power (W)	Luminous efficacy (lm/W)
LS-4846U-35[Blank or MS]	3500K	5888	46	128
LS-4846U-40[Blank or MS]	4000K	6026	46	131
LS-4846U-50[Blank or MS]	5000K	6118	46	133





4.0 LM-79 Measurement and Test Results

Model No.	LS-4846U-35[Blank or MS]	Sample ID.	1209821-004
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1.The sample was tested according to the IES LM-79-2008.
 2.Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° C.The reference standard lamp is rated current 2.6A omni-directional Incandescent lamp and was calibrated by china seprei 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.

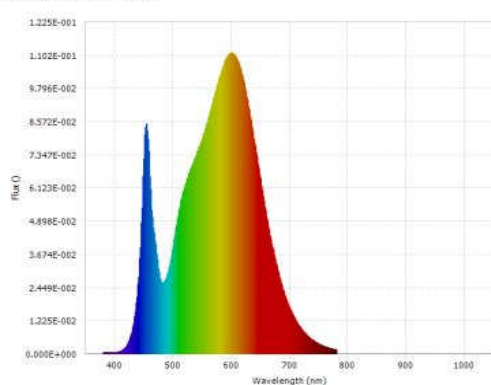
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD
25.2	120.01	60	0.3897	46.159	0.9891	11.09%

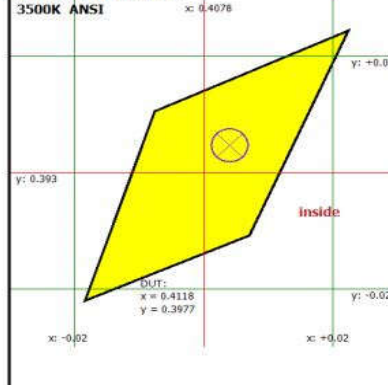
Test Results

CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3415	82.78	0.0016	5985.84	129.68	1496.46

Spectral Flux Graph



Chromaticity Diagram 3500K ANSI



Spectral Result

Luminous Flux $\Phi(v)$	5985.84 (lm)	Chrom x	0.4118
Chrom y	0.3977	Chrom u	0.2371
Chrom v	0.3434	Duv	0.0016
Chrom u'	0.2371	Chrom v'	0.5151
CCT	3415.0 (K)	Luminous Efficacy η	129.68 (lm/W)
Ra	82.78	R1	80.9
R2	89.8	R3	96.3
R4	80.7	R5	80.6
R6	86.3	R7	85.2
R8	62.5	R9	9.3
R10	75.7	R11	79.3
R12	63.1	R13	83.0
R14	98.1	R15	74.3
Rf	82.5	Rg	95.0



4.0 LM-79 Measurement and Test Results

4.2 Integrating Sphere Test for the higher CCT

Model No.	LS-4846U-50[Blank or MS]	Sample ID.	1209821-006
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1. The sample was tested according to the IES LM-79-2008.

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 2.6A omnidirectional Incandescent lamp and was calibrated by china seprei laboratory.

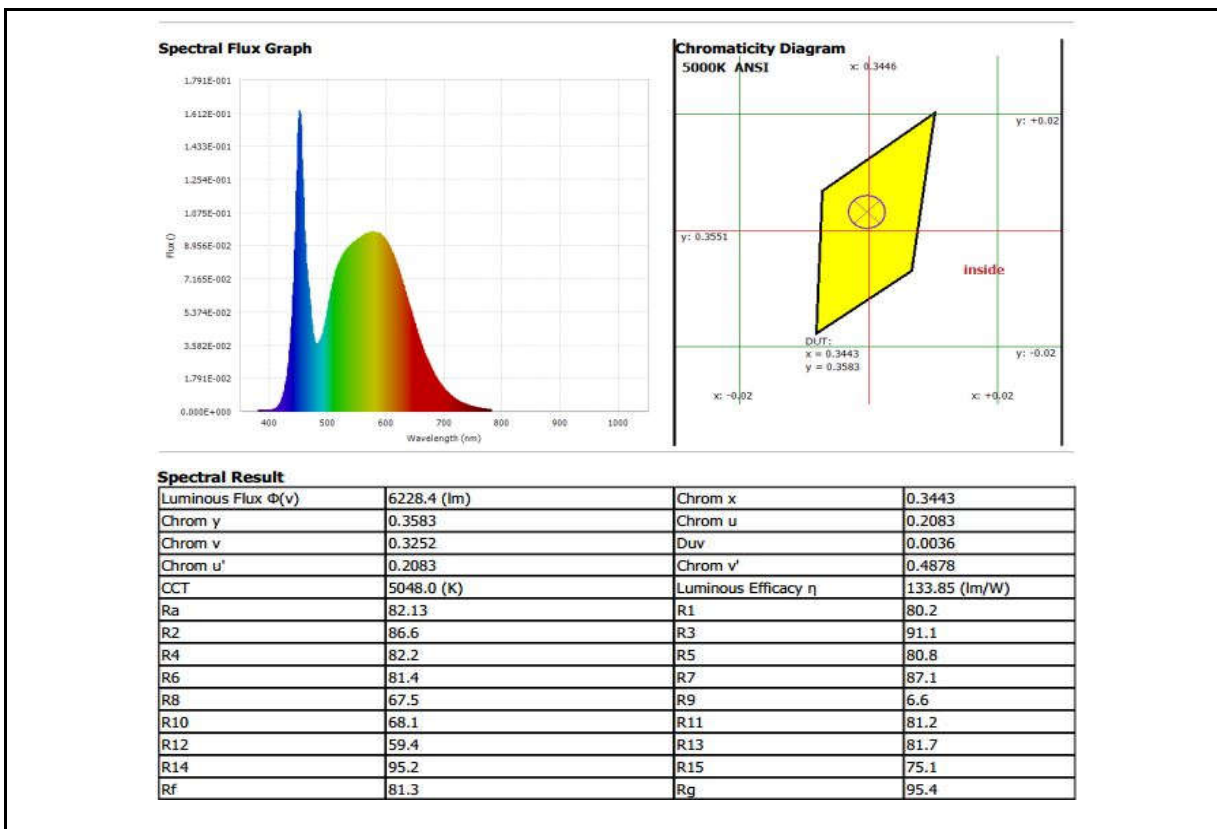
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption 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
25.2	119.99	60	0.3927	46.533	0.9879	11.35%

Test Results

CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
5048	82.13	0.0036	6228.4	133.85	1557.10





5.0 LM-79 Measurement and Test Results

Model No.	LS-4846U-35[Blank or MS]	Sample ID.	1209821-004
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1.The sample was tested according to the IES LM-79-2008.
2.Photometric paramters 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 3.865A omni-directional Incandescent lamp and was calibrated by china seprei laboratory.
4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5° 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	Orientation
25.2	120.00	60	0.38921	46.194	0.9891	Horizontal

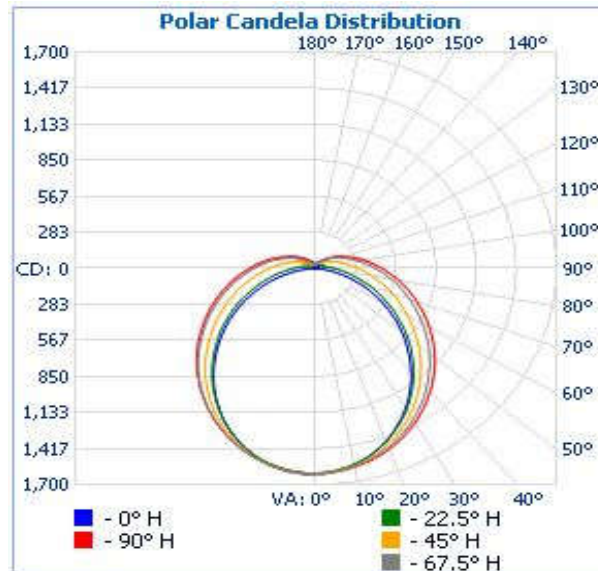
Test Result

Flux (lm)	Zonal Lumen Requirement (0°-60°)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
5937.5	61.4%	157.5	156.6	133.6	102.7	128.53
SC	SC					
0~180°	90°~270°					
N/A	N/A					

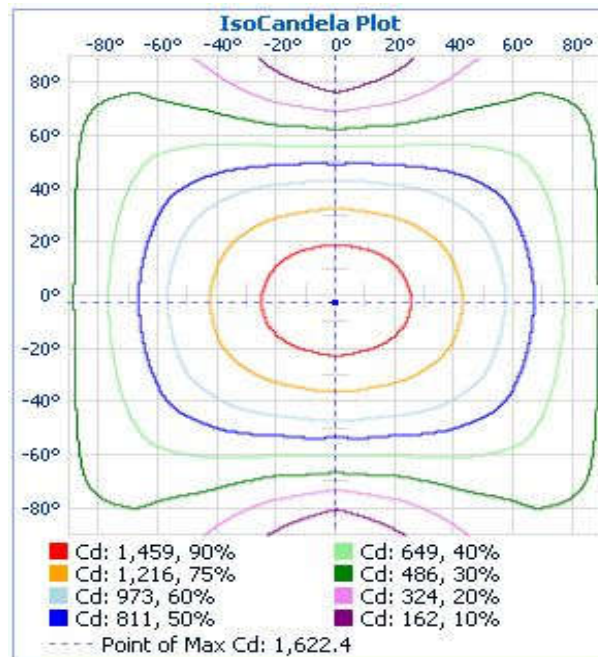


5.2 Goniophotometer Test (Cont'd)

Light Distribution Curve



IsoCandela Plot





5.2 Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,245.0	21%
0-40	2,036.3	34.3%
0-60	3,646.0	61.4%
60-90	1,555.7	26.2%
70-100	1,150.4	19.4%
90-120	556.6	9.4%
0-90	5,201.7	87.6%
90-180	735.6	12.4%
0-180	5,937.3	100%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	38.5	0.6%	90-95	141.7	2.4%
5-10	114.1	1.9%	95-100	118.9	2%
10-15	185.4	3.1%	100-105	98.8	1.7%
15-20	250.1	4.2%	105-110	80.7	1.4%
20-25	305.8	5.2%	110-115	64.7	1.1%
25-30	351.1	5.9%	115-120	51.8	0.9%
30-35	384.9	6.5%	120-125	41.0	0.7%
35-40	406.4	6.8%	125-130	32.4	0.5%
40-45	415.9	7.0%	130-135	25.3	0.4%
45-50	413.9	7.0%	135-140	20.0	0.3%
50-55	401.0	6.8%	140-145	15.9	0.3%
55-60	379.0	6.4%	145-150	12.8	0.2%
60-65	350.1	5.9%	150-155	10.3	0.2%
65-70	315.8	5.3%	155-160	8.0	0.1%
70-75	278.4	4.7%	160-165	5.8	0.1%
75-80	239.7	4.0%	165-170	4.1	0.1%
80-85	202.5	3.4%	170-175	2.5	0%
85-90	169.2	2.8%	175-180	0.9	0%



5.2 Goniophotometer Test (Cont'd)

Intensity Data(cd)

	0	22.5	45	67.5	90	113	135	158	180	203	225	247.5	270	293	315	338	360
0	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614	1614
1	1619	1608	1618	1613	1611	1614	1618	1610	1622	1610	1618	1614	1611	1613	1618	1608	1619
2	1618	1606	1615	1610	1611	1613	1617	1609	1622	1609	1617	1613	1611	1610	1615	1606	1618
3	1613	1604	1612	1610	1610	1613	1617	1611	1620	1611	1617	1613	1610	1610	1612	1604	1613
4	1610	1599	1608	1606	1607	1611	1615	1607	1617	1607	1615	1611	1607	1606	1608	1599	1610
5	1605	1596	1605	1605	1605	1610	1615	1606	1616	1606	1615	1610	1605	1605	1605	1596	1605
6	1598	1590	1600	1600	1602	1607	1612	1602	1612	1602	1612	1607	1602	1600	1600	1590	1598
7	1591	1585	1596	1597	1598	1606	1607	1599	1610	1599	1607	1606	1598	1597	1596	1585	1591
8	1584	1579	1591	1590	1596	1600	1604	1595	1604	1595	1604	1600	1596	1590	1591	1579	1584
9	1576	1573	1585	1586	1590	1596	1600	1589	1599	1589	1600	1596	1590	1586	1585	1573	1576
10	1569	1563	1576	1582	1586	1592	1594	1584	1593	1584	1594	1592	1586	1582	1576	1563	1569
11	1561	1555	1568	1574	1581	1587	1588	1575	1589	1575	1588	1587	1581	1574	1568	1555	1561
12	1551	1546	1561	1569	1575	1580	1581	1571	1581	1571	1581	1580	1575	1569	1561	1546	1551
13	1539	1537	1551	1563	1568	1575	1574	1560	1571	1560	1574	1575	1568	1563	1551	1537	1539
14	1530	1526	1543	1553	1562	1567	1565	1555	1564	1555	1565	1567	1562	1553	1543	1526	1530
15	1518	1516	1534	1546	1557	1561	1558	1543	1551	1543	1558	1561	1557	1546	1534	1516	1518
16	1504	1505	1523	1538	1547	1553	1549	1535	1540	1535	1549	1553	1547	1538	1523	1505	1504
17	1493	1491	1514	1529	1540	1547	1542	1524	1531	1524	1542	1547	1540	1529	1514	1491	1493
18	1477	1478	1502	1518	1533	1539	1530	1511	1519	1511	1530	1539	1533	1518	1502	1478	1477
19	1462	1465	1491	1507	1523	1528	1518	1500	1506	1500	1518	1528	1523	1507	1491	1465	1462
20	1449	1451	1478	1500	1514	1520	1509	1488	1494	1488	1509	1520	1514	1500	1478	1451	1449
25	1364	1373	1410	1441	1462	1465	1446	1417	1420	1417	1446	1465	1462	1441	1410	1373	1364
30	1267	1284	1331	1372	1402	1402	1374	1333	1332	1333	1374	1402	1402	1372	1331	1284	1267
35	1161	1184	1242	1300	1336	1332	1290	1240	1231	1240	1290	1332	1336	1300	1242	1184	1161
40	1047	1076	1148	1219	1260	1254	1200	1139	1123	1139	1200	1254	1260	1219	1148	1076	1047
45	925	962	1050	1134	1182	1169	1104	1029	1007	1029	1104	1169	1182	1134	1050	962	925
50	800	847	949	1050	1099	1083	1003	917	888	917	1003	1083	1099	1050	949	847	800
55	679	728	848	958	1015	992	904	803	765	803	904	992	1015	958	848	728	679
60	553	617	752	873	926	901	806	688	639	688	806	901	926	873	752	617	553
65	426	508	660	786	843	816	713	579	515	579	713	816	843	786	660	508	426
70	306	406	572	705	760	730	622	470	393	470	622	730	760	705	572	406	306
75	192	315	494	626	682	650	538	374	274	374	538	650	682	626	494	315	192
80	96	238	423	554	606	573	460	288	165	288	460	573	606	554	423	238	96
85	25	176	358	484	534	503	388	215	75	215	388	503	534	484	358	176	25
90	5	130	302	422	468	437	327	158	15	158	327	437	468	422	302	130	5
95	6	97	253	366	409	378	274	117	6	117	274	378	409	366	253	97	6
100	7	76	213	315	354	326	228	88	7	88	228	326	354	315	213	76	7
105	8	63	179	270	306	271	188	65	8	65	188	271	306	270	179	63	8
110	10	53	150	230	259	232	142	45	9	45	142	232	259	230	150	53	10
115	12	46	128	196	216	194	104	35	11	35	104	194	216	196	128	46	12
120	14	41	109	167	185	150	80	29	12	29	80	150	185	167	109	41	14
125	17	39	92	142	156	112	64	27	14	27	64	112	156	142	92	39	17
130	20	38	78	118	130	85	50	26	17	26	50	85	130	118	78	38	20
135	23	37	67	93	107	66	41	28	20	28	41	66	107	93	67	37	23
140	26	37	59	78	87	49	38	30	23	30	38	49	87	78	59	37	26
145	29	37	54	67	72	39	36	31	27	31	36	39	72	67	54	37	29
150	32	38	49	57	59	33	36	33	30	33	36	33	59	57	49	38	32
155	34	38	46	50	52	29	34	34	32	34	34	29	52	50	46	38	34
160	37	39	43	46	29	27	34	36	35	36	34	27	29	46	43	39	37
165	39	38	42	42	22	26	34	36	38	36	34	22	22	42	42	38	39
170	40	38	41	40	22	28	34	37	40	37	34	22	22	40	41	38	40
175	42	40	39	38	22	29	35	40	41	40	35	22	22	38	39	40	42
180	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37



6.0 THD and PF Test

Model No.	LS-4846U-35[Blank or MS]	Sample ID.	1209821-004
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Test Method

1. The samples were tested according to the ANSI C82.77-2002.
2. The ambient temperature condition was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. 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
25.2	276.84	60	0.1742	45.501	0.9436	12.57%



7.0 In-Situ Temperature Measurement Test

Model No.	LS-4846U-35[Blank or MS]	Sample ID.	1209821-004
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Test Method

- In-Situ Temperature Measurement Test is conducted according to the UL1598-2008, Section 14 or UL1993-2012, Section 8.5.
- The testing was conducted in a room with ambient temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$. 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. The temperature was recorded after the lamp was operated by 3.5 hours in stability or by 7.5 hours.

In-Situ Temperature Measurement Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.5	120.01	60	0.3897	46.16	0.9891	Horizontal

Test Results(LED)

Thermocouple Location	Manufacturer Declared Current (mA)	Temperature for Lighting source (°C)		LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp. (°C)
		Test result column 1	Test result (Correct to 25 °C)			
TMP of LEDs	100	63.2	62.7	STWxA2PD-xx	300	85
Ambient temperature	N/A	25.5	25.0			

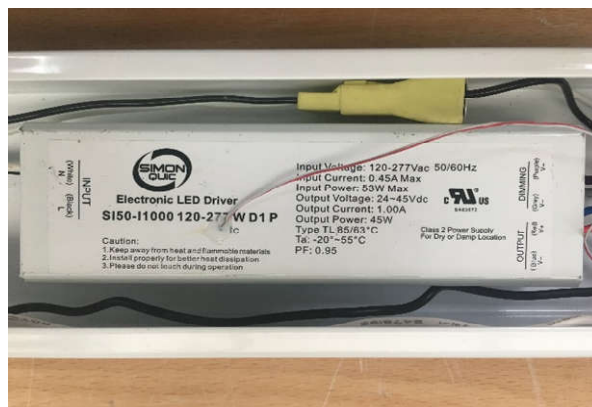
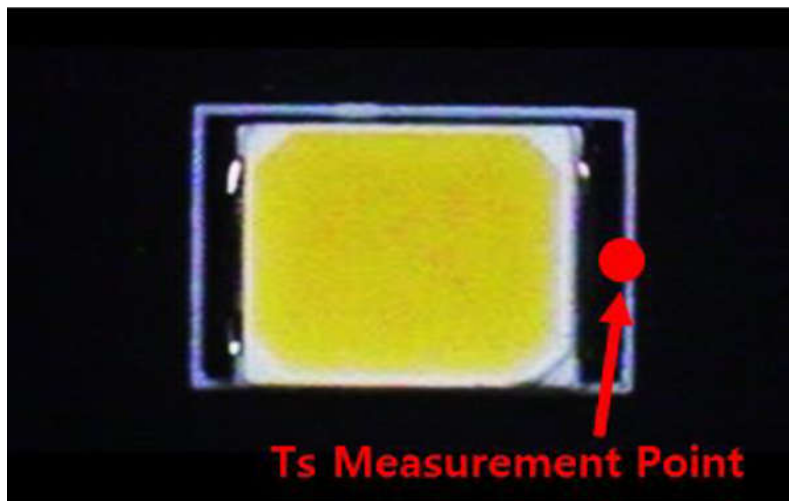
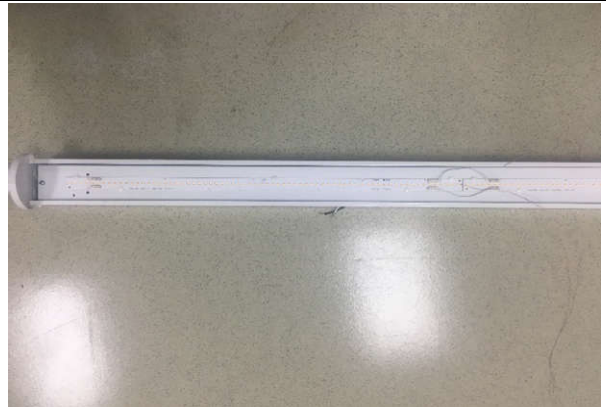
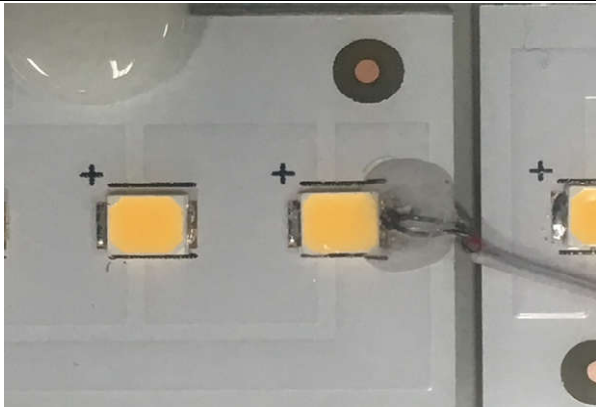
Test Results(Driver)

Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp. (°C)
	Test result column 1	Test result (Correct to 25 °C)		
TMP of Driver	72.5	72.0	SI50-I1000 120-277 W D1 P	85
Ambient temperature	25.5	25.0		



7.0 In-Situ Temperature Measurement Test (Cont'd)

Test Photos for Tc Point of LED Packages





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