



Photometric Test Report

Relevant Standards

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

Prepared For

P.Q.L., Inc.

2285 Ward Avenue

Simi Valley, CA 93065

Test Laboratory & Address:

UL-CCIC Company Limited location

2, Chengwan Road, Suzhou Industrial Park, Suzhou 21522 China

Catalog Number

55252, 55253

Project Number

4787945842

Report Number

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Test Date

4/21/2017-4/25/2017

Issue Date

4/28/2017

Prepared By

Jonathan Xu

Jonathan Xu

Approved By

Duff Yang

Duff Yang

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

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1.0 Test Summary

DLC Technical Requirements v4.1

Requirement Category	Test Method	Requirements	Test value	Results (Fail/Pass)
Minimum Light Output (lm)	IES LM-79-2008	375lm/ft	1749.14	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%	68.80%	Pass
Zonal Lumen Requirement 2	IES LM-79-2008	N/A	N/A	N/A
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	105lm/W	110.74	Pass
Minimum Lamp Efficacy (lm/ft)	IES LM-79-2008	N/A	N/A	N/A
Allowable CCTs* (K)	IES LM-79-2008	≤5000	4987	N/A
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥80	84.53	N/A
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	N/A	N/A	N/A
Power Factor	ANSI C82.77-2002	≥0.9	0.9501	N/A
Total Harmonic Distortion (A%)	ANSI C82.77-2002	≤20%	10.80%	N/A
In-Situ Temperature Measurement Test for LED (°C)	UL1598-2008/ UL1993-2012	≤105	71.5	Pass
In-Situ Temperature Measurement Test for Driver (°C)	UL1598-2008/ UL1993-2012	N/A	N/A	N/A
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	4/21/2017	55252	Elvis Wu
2	Integrating Sphere Test for the Higher CCT	4/24/2017	55253	Elvis Wu
3	Goniophotometer Test	4/22/2017	55252	Elvis u
4	THD and PF Test	4/21/2017	55252	Elvis Wu
5	In-Situ Temperature Measurement Test	4/25/2017	55252	Elvis Wu

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: 55252

Rated Voltage: 120-277V

Frequency: 50/60Hz

LED Package: STWxA2PD-xx

Family Model and Variation: 55253

Photos of Luminaire Characteristics





4.0 LM-79 Measurement and Test Results

Model No.	55252	Sample ID.	916461-001
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method

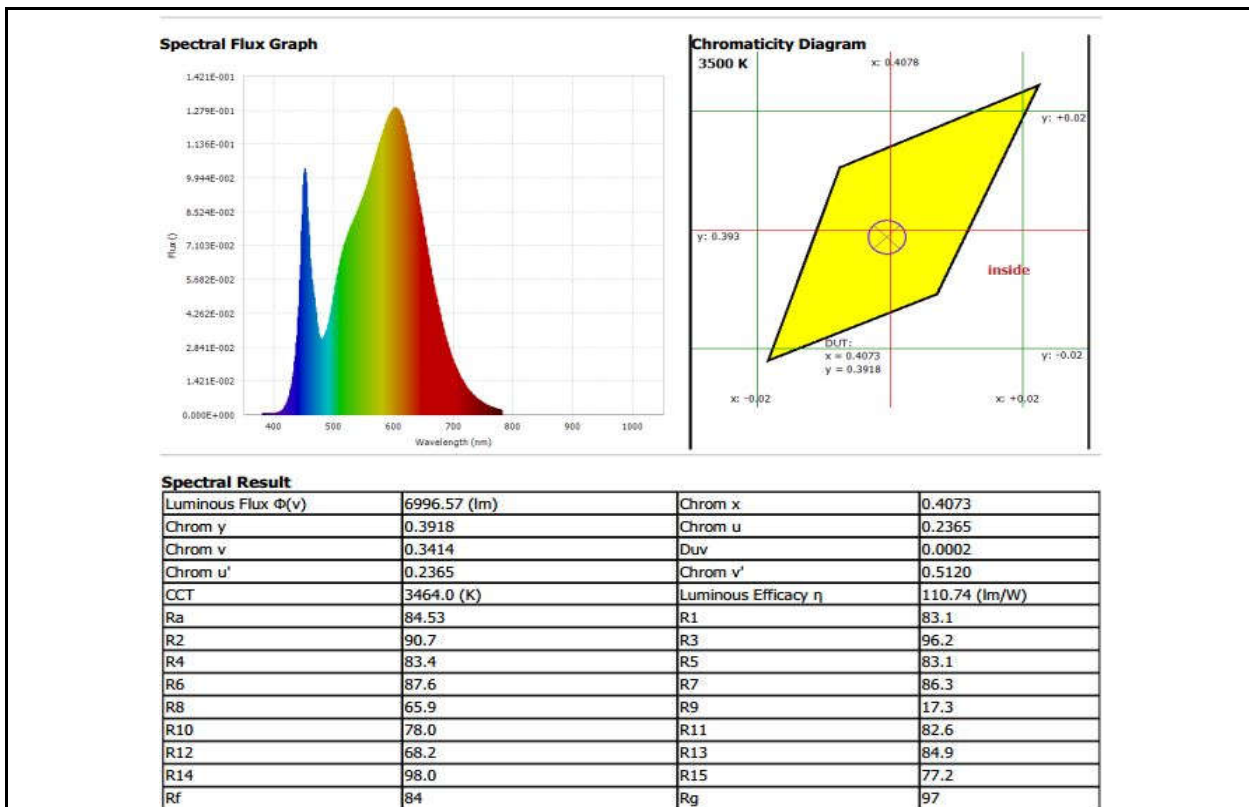
- 1.The sample was tested according to the IES LM-79-2008.
- 2.Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$.The reference standard lamp 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
25.1	120.03	60	0.529	63.18	0.9950	6.50%

Test Results

CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3464	84.53	0.0002	6996.57	110.74	1749.14





4.0 LM-79 Measurement and Test Results

4.2 Integrating Sphere Test for the higher CCT

Model No.	55253	Sample ID.	916461-002
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 omni-directional Incandescent lamp and was calibrated by china seprei laboratory.

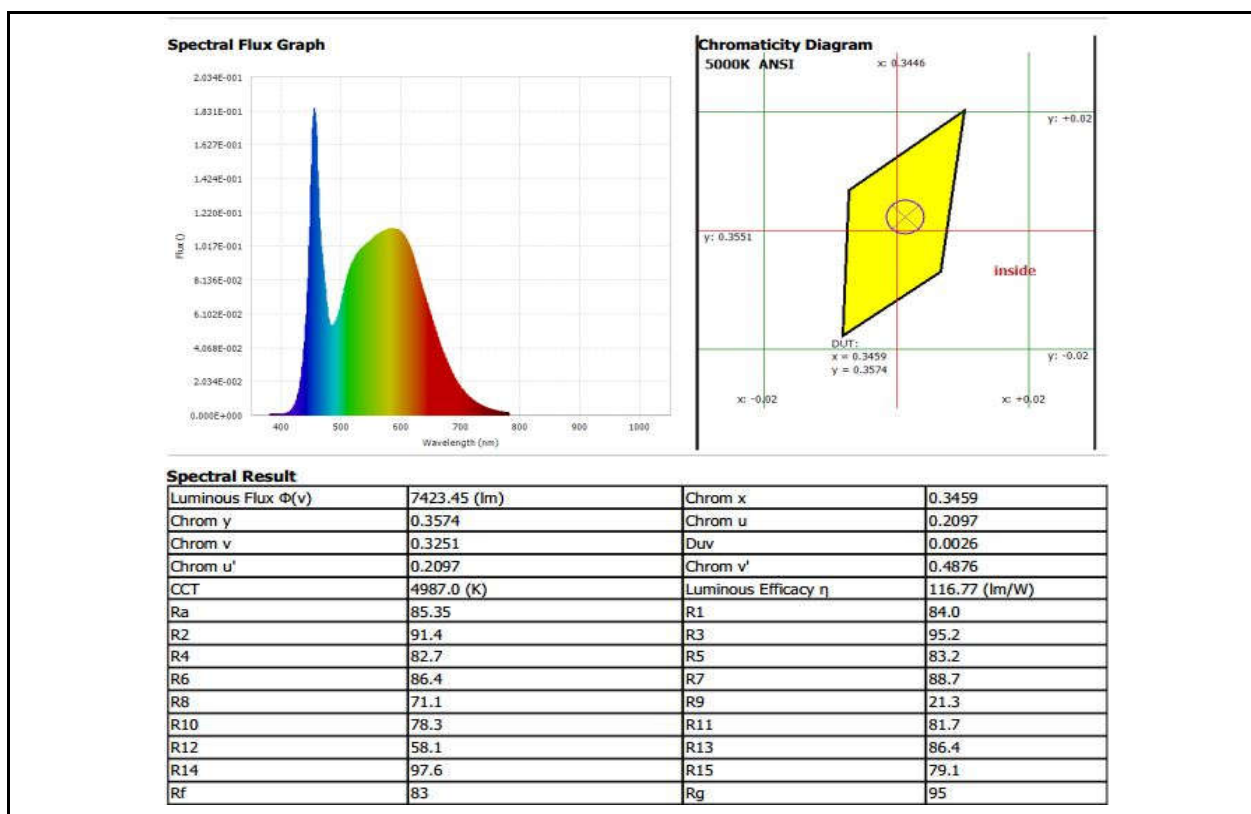
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using 4π geometry. The self-absorption 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
25.1	120.03	60	0.5344	63.571	0.9911	10.60%

Test Results

CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
4987	85.35	0.0026	7423.45	116.77	N/A





5.0 LM-79 Measurement and Test Results

Model No.	55252	Sample ID.	916461-001
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
25.1	120.01	60	0.52988	63.186	0.9937	Horizontal

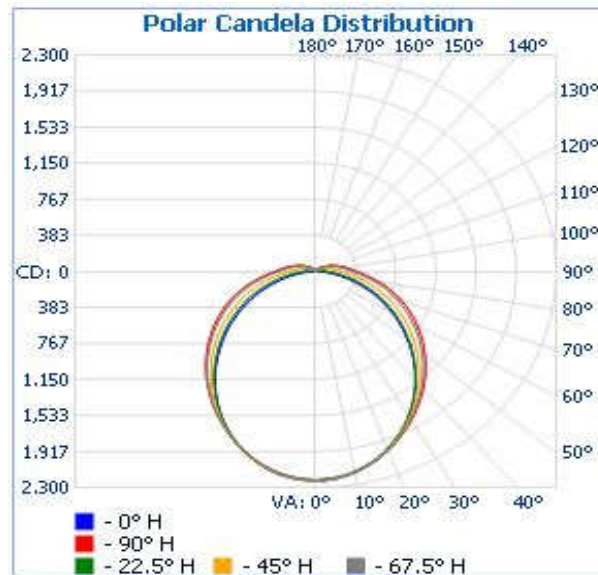
Test Result

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	
7001.1	68.8%	158.6	157.9	119.4	102.8	110.80
SC	SC					
0~180°	90°~270°					
N/A	N/A					

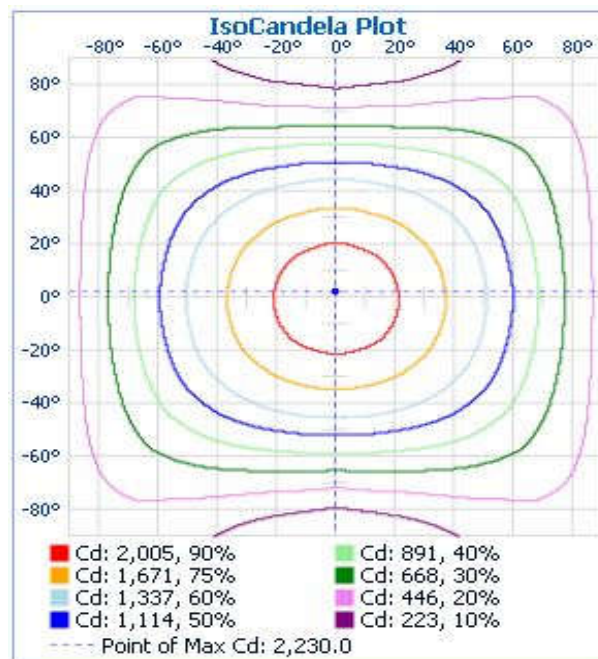


5.2 Goniophotometer Test (Cont'd)

Light Distribution Curve



IsoCandela Plot





5.2 Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	1,688.3	24.1%
0-40	2,738.0	39.1%
0-60	4,816.9	68.8%
60-90	1,729.7	24.7%
70-100	1,114.0	15.9%
90-120	396.1	5.7%
0-90	6,546.5	93.5%
90-180	454.2	6.5%
0-180	7,000.7	100%

Lumens Per Zone

Lumens Per Zone

Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	53.0	0.8%	90-95	111.0	1.6%
5-10	156.6	2.2%	95-100	89.6	1.3%
10-15	253.6	3.6%	100-105	71.0	1%
15-20	340.3	4.9%	105-110	54.5	0.8%
20-25	413.5	5.9%	110-115	40.6	0.6%
25-30	471.4	6.7%	115-120	29.4	0.4%
30-35	512.7	7.3%	120-125	20.5	0.3%
35-40	537.1	7.7%	125-130	13.8	0.2%
40-45	545.1	7.8%	130-135	8.8	0.1%
45-50	537.4	7.7%	135-140	5.2	0.1%
50-55	515.4	7.4%	140-145	2.9	0%
55-60	480.9	6.9%	145-150	1.8	0%
60-65	435.2	6.2%	150-155	1.4	0%
65-70	381.1	5.4%	155-160	1.2	0%
70-75	320.6	4.6%	160-165	1.0	0%
75-80	256.5	3.7%	165-170	0.8	0%
80-85	194.0	2.8%	170-175	0.5	0%
85-90	142.3	2.0%	175-180	0.2	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	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222
1	2229	2214	2226	2220	2215	2221	2227	2216	2227	2216	2227	2221	2215	2220	2226	2214	2229
2	2230	2211	2223	2218	2215	2219	2224	2214	2228	2214	2224	2219	2215	2218	2223	2211	2230
3	2225	2209	2219	2214	2213	2216	2226	2213	2223	2213	2226	2216	2213	2214	2219	2209	2225
4	2222	2205	2217	2210	2208	2213	2221	2208	2223	2208	2221	2213	2208	2210	2217	2205	2222
5	2216	2201	2210	2204	2204	2208	2214	2205	2217	2205	2214	2208	2204	2204	2210	2201	2216
6	2208	2195	2206	2200	2197	2202	2210	2200	2214	2200	2210	2202	2197	2200	2206	2195	2208
7	2201	2187	2197	2193	2191	2196	2203	2194	2205	2194	2203	2196	2191	2193	2197	2187	2201
8	2193	2178	2189	2185	2184	2189	2195	2186	2199	2186	2195	2189	2184	2185	2189	2178	2193
9	2185	2170	2180	2176	2176	2181	2187	2178	2191	2178	2187	2181	2176	2176	2180	2170	2185
10	2173	2160	2170	2164	2165	2171	2178	2168	2180	2168	2178	2171	2165	2164	2170	2160	2173
11	2163	2148	2160	2155	2155	2160	2168	2158	2170	2158	2168	2160	2155	2155	2160	2148	2163
12	2150	2136	2149	2144	2144	2150	2155	2147	2159	2147	2155	2150	2144	2144	2149	2136	2150
13	2137	2122	2134	2130	2132	2137	2144	2134	2147	2134	2144	2137	2132	2130	2134	2122	2137
14	2123	2109	2121	2116	2118	2124	2131	2123	2131	2123	2131	2124	2118	2116	2121	2109	2123
15	2108	2094	2106	2103	2104	2112	2117	2107	2117	2107	2117	2112	2104	2103	2106	2094	2108
16	2093	2079	2090	2087	2089	2096	2102	2092	2104	2092	2102	2096	2089	2087	2090	2079	2093
17	2077	2062	2074	2073	2073	2079	2087	2077	2084	2077	2087	2079	2073	2073	2074	2062	2077
18	2059	2043	2058	2057	2057	2064	2070	2058	2067	2058	2070	2064	2057	2057	2058	2043	2059
19	2040	2025	2038	2037	2041	2048	2051	2040	2050	2040	2051	2048	2041	2037	2038	2025	2040
20	2021	2006	2018	2020	2025	2030	2034	2023	2028	2023	2034	2030	2025	2020	2018	2006	2021
25	1910	1898	1915	1923	1931	1934	1932	1917	1924	1917	1932	1934	1931	1923	1915	1898	1910
30	1782	1773	1796	1814	1828	1828	1817	1795	1795	1795	1817	1828	1828	1814	1796	1773	1782
35	1637	1634	1666	1699	1719	1713	1689	1659	1650	1659	1689	1713	1719	1699	1666	1634	1637
40	1483	1485	1531	1578	1603	1594	1554	1513	1499	1513	1554	1594	1603	1578	1531	1485	1483
45	1320	1330	1390	1452	1484	1466	1413	1358	1335	1358	1413	1466	1484	1452	1390	1330	1320
50	1154	1173	1247	1323	1362	1336	1268	1201	1169	1201	1268	1336	1362	1323	1247	1173	1154
55	986	1012	1102	1193	1237	1208	1125	1040	1002	1040	1125	1208	1237	1193	1102	1012	986
60	818	855	959	1063	1110	1074	979	882	832	882	979	1074	1110	1063	959	855	818
65	652	698	815	932	983	943	837	724	662	724	837	943	983	932	815	698	652
70	490	546	679	802	854	813	697	572	500	572	697	813	854	802	679	546	490
75	333	404	546	676	726	684	564	426	342	426	564	684	726	676	546	404	333
80	191	275	421	548	600	558	436	293	198	293	436	558	600	548	421	275	191
85	77	168	312	435	478	441	323	181	81	181	323	441	478	435	312	168	77
90	22	104	236	346	386	351	244	111	25	111	244	351	386	346	236	104	22
95	20	74	190	286	322	290	196	80	23	80	196	290	322	286	190	74	20
100	18	54	152	236	268	239	157	58	19	58	157	239	268	236	152	54	18
105	15	38	120	193	221	195	122	39	16	39	122	195	221	193	120	38	15
110	14	26	92	154	179	152	87	25	14	25	87	152	179	154	92	26	14
115	11	17	69	122	142	120	60	16	12	16	60	120	142	122	69	17	11
120	10	10	51	94	108	88	41	11	10	11	41	88	108	94	51	10	10
125	8	8	34	70	84	61	27	8	8	8	27	61	84	70	34	8	8
130	7	7	22	50	61	40	17	7	7	7	17	40	61	50	22	7	7
135	6	7	12	32	42	25	10	6	6	6	10	25	42	32	12	7	6
140	5	6	6	18	25	15	6	6	6	6	6	15	25	18	6	6	5
145	5	5	6	9	13	8	5	5	5	5	5	8	13	9	6	5	5
150	6	6	5	6	6	5	5	6	6	6	5	5	6	6	5	6	6
155	6	6	6	5	5	5	6	6	5	6	6	5	5	5	6	6	6
160	6	6	6	6	5	5	6	6	7	6	6	5	5	6	6	6	6
165	7	7	7	5	6	5	6	6	7	6	6	5	6	5	7	7	7
170	7	7	7	7	6	6	7	7	7	7	7	6	6	7	7	7	7
175	8	8	7	7	7	8	7	7	7	7	7	8	7	7	7	8	8
180	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8



6.0 THD and PF Test

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
25.1	276.94	60	0.2345	61.704	0.9501	10.80%



7.0 In-Situ Temperature Measurement Test

Test Method

1. In-Situ Temperature Measurement Test is conducted according to the UL1598-2008, Section 14 or UL1993-2012, Section 8.5.
2. 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
26.2	120.03	60	0.529	63.18	0.995	Horizontal

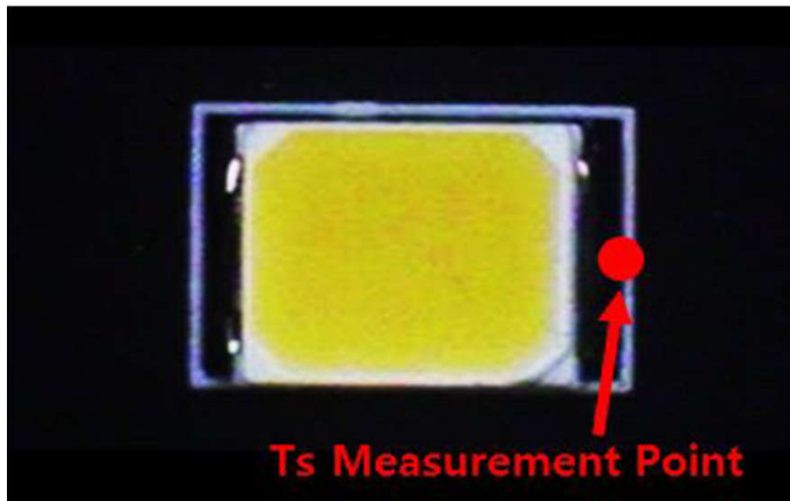
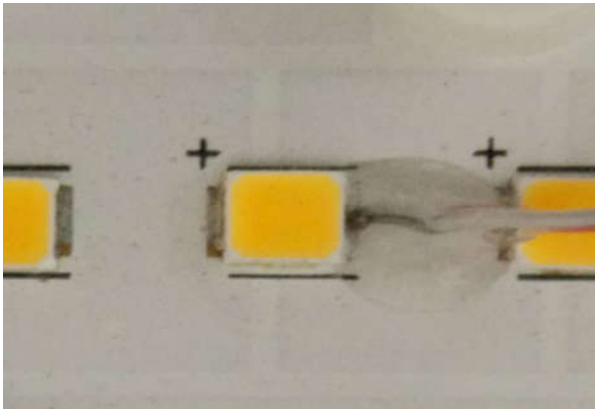
Test Results(LED)

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	140	72.7	71.5	STWxA2PD-xx	300	85
Ambient temperature	N/A	26.2	25.0			



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

Test Photos for Tc Point of LED Packages





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