



Photometric Test Report

Relevant Standards

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

Prepared For

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Catalog Number

91138, 91139, 91140

**91138 and 91140 were selected as the representative models.
All measurements are the same except CCT.**

Project Number

4788382593

Report Number

4788382593_1

Test Date

3/13/2018-3/22/2018

Issue Date

3/23/2018

Revision Date

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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1.0 Test Summary

DLC Technical Requirements v4.3- issued 2018-03-26

Requirement Category	Test Method	Requirements	Test value	Results (Fail/Pass)
Minimum Light Output (lm)	IES LM-79-2008	2700	2812.20	Pass
Minimum Bare Lamp Output (lm)	IES LM-79-2008	1600	1854.37	Pass
Spacing Criteria (0-180°)	IES LM-79-2008	1.0-2.0	1.30	Pass
Spacing Criteria (90-270°)	IES LM-79-2008	1.0-2.0	1.24	Pass
Zonal Lumen Requirement 1 (0°-60°)	IES LM-79-2008	75%	84.6%	Pass
Zonal Lumen Requirement 2	IES LM-79-2008	N/A	N/A	N/A
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	100	102.47	Pass
Minimum Bare Lamp Efficacy (lm/W)	IES LM-79-2008	110	134.31	Pass
Allowable CCTs* (K)	IES LM-79-2008 ANSI C78.377-2015	5029±283	5133	Pass
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥80	81.51	Pass
L70 Lumen maintenance (hours)	IES TM-21-2011	≥50000	≥50000	Pass
L90 Lumen maintenance (hours)	IES TM-21-2011	N/A	N/A	N/A
Power Factor	ANSI C82.77-10-2014	≥0.9	0.9249	Pass
Total Harmonic Distortion (A%)	ANSI C82.77-10-2014	≤25%	22.54%	Pass
In-Situ Temperature Measurement Test for LED (°C)	UL1598-2008	≤85	56.1	Pass
In-Situ Temperature Measurement Test for Driver (°C)	UL1598-2008	N/A	N/A	N/A
Minimum Luminaire Warranty (years)	N/A	5	5	Pass



2.0 Test List

Test Item	Test	Test Date	Model Number	Tests Conducted By
1	Integrating Sphere Test for the Lower CCT	3/13/2018	91138	Yakima Yuan
2	Integrating Sphere Test for the Higher CCT	3/13/2018	91140	Yakima Yuan
3	Goniophotometer Test	3/14/2018	91138	Yakima Yuan
4	THD and PF Test	3/13/2018	91138	Yakima Yuan
5	In-Situ Temperature Measurement Test	3/22/2018	91138	Yakima Yuan

Remark (if any)

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



3.0 Production Description

Luminaire Description: Four-Foot Linear Replacement Lamps

Model Number: 91138

Rated Voltage: 120-277V

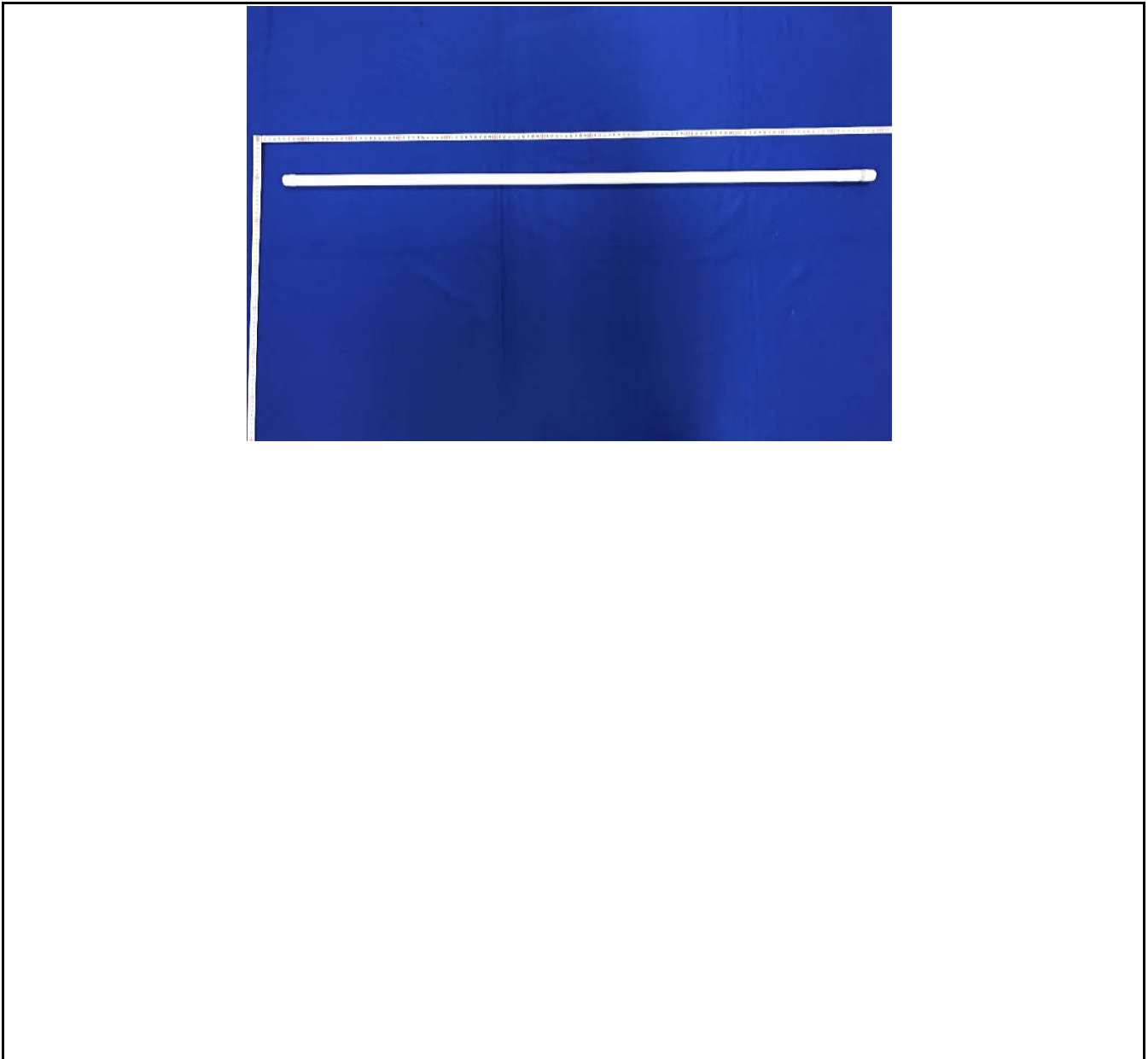
Frequency: 50/60Hz

LED Package: SL-35B2835FTA-11CAGJ3C-APH001

Family Model and Variation: 91139, 91140

Remark:

Photos of Luminaire Characteristics





4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test for the lower CCT

Model No.	91138	Sample ID.	1459934-001
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

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

2. Photometric 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.

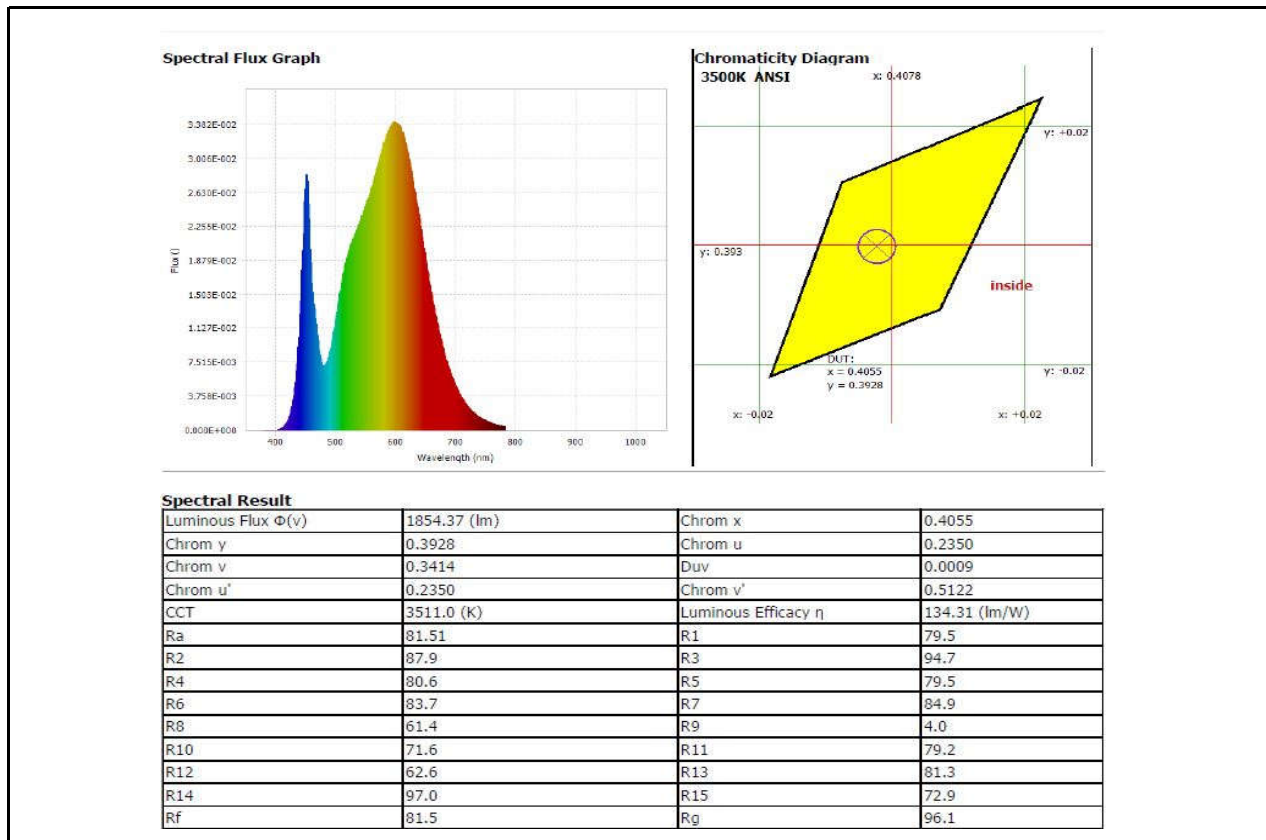
3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions were using 4π geometry. The self-absorption 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
25.2	119.98	60	0.118	13.807	0.9749	21.80%

Test Results

CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
3511	81.51	0.0009	1854.37	134.31	N/A





4.0 LM-79 Measurement and Test Results

4.2 Integrating Sphere Test for the higher CCT

Model No.	91140	Sample ID.	1459934-002
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

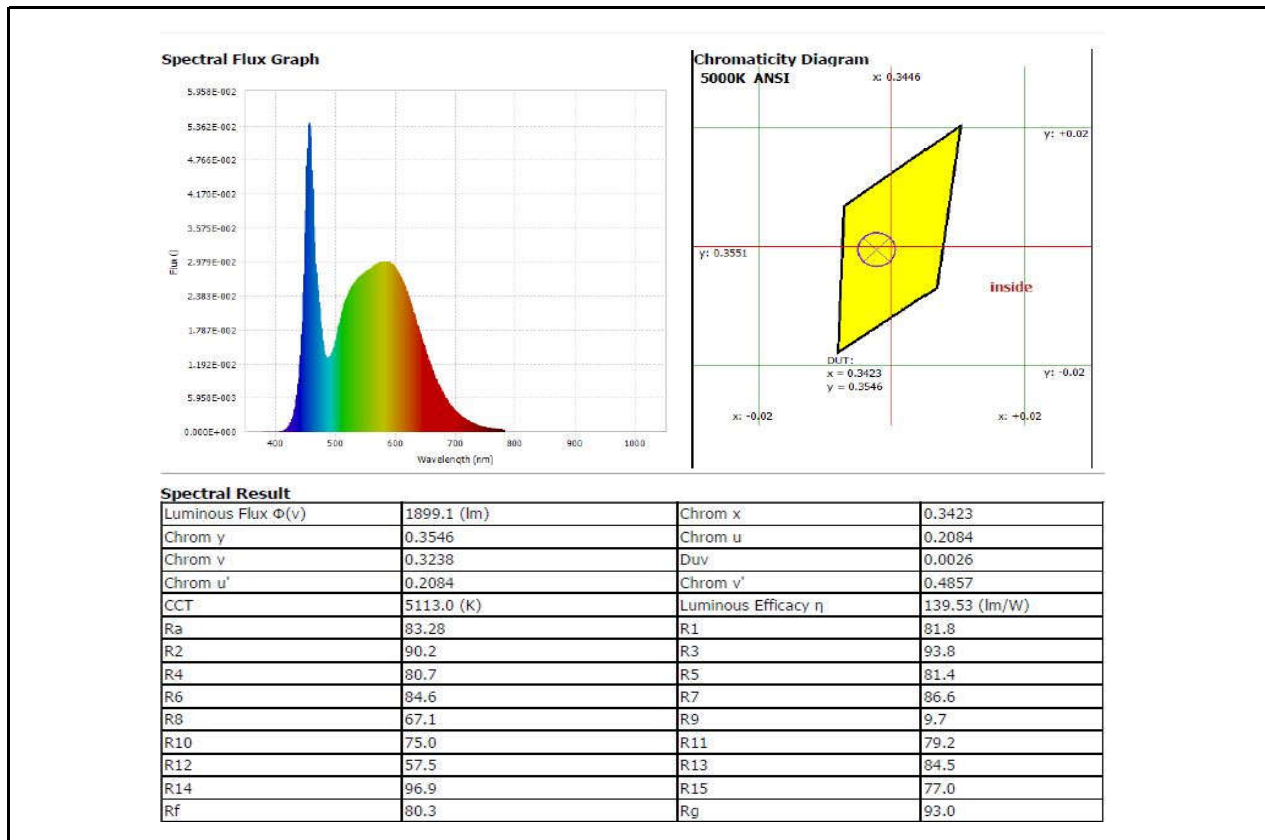
1. The sample was tested according to the IES LM-79-2008.
2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The reference standard lamp is rated current 2.6A 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 were 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	120.08	60	0.1163	13.611	0.9749	21.80%

Test Results

CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/ft)
5133	83.28	0.0026	1899.1	139.53	N/A





5.0 LM-79 Measurement and Test Results

Model No.	91138	Sample ID.	1459934-001, 1473115
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 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 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
25.1	120.03	60	0.23405	27.444	0.9769	20.93%	Horizontal

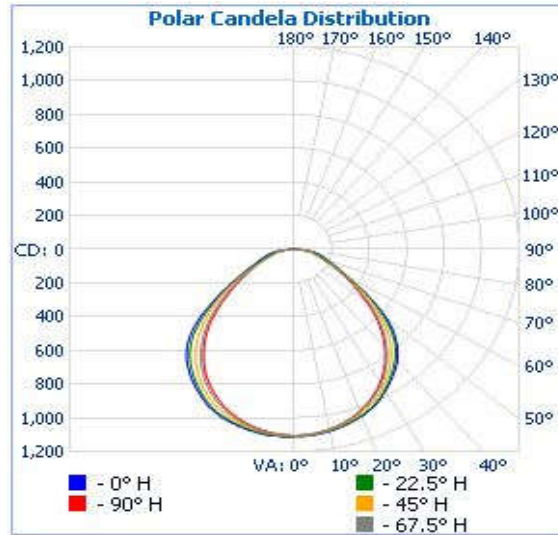
Test Result

Flux (lm)	Zonal Lumen Requirement 1 (0°-60°)	Zonal Lumen Requirement 2	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)
			Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
2812.2	84.6%	N/A	155.4	160.6	97.3	106.7	102.47
SC	SC						
0~180°	90°~270°						
1.30	1.24						

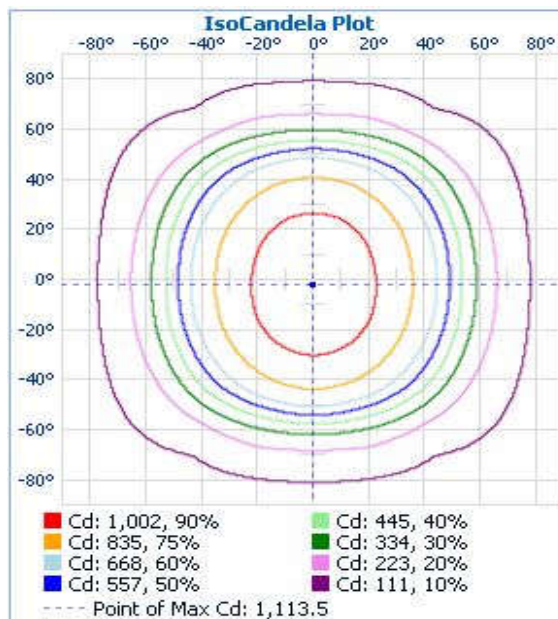


5.0 Goniophotometer Test (Cont'd)

Light Distribution Curve



IsoCandela Plot





5.0 Goniophotometer Test (Cont'd)
Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	870.1	30.9%
0-40	1,424.6	50.7%
0-60	2,379.7	84.6%
60-90	432.0	15.4%
70-100	195.2	6.9%
90-120	0.1	0%
0-90	2,811.7	100%
90-180	0.1	0%
0-180	2,811.8	100%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	26.4	0.9%	90-95	0.1	0%
5-10	78.5	2.8%	95-100	0	0%
10-15	128.3	4.6%	100-105	0	0%
15-20	174.2	6.2%	105-110	0	0%
20-25	214.8	7.6%	110-115	0	0%
25-30	247.8	8.8%	115-120	0	0%
30-35	270.9	9.6%	120-125	0	0%
35-40	283.6	10.1%	125-130	0	0%
40-45	283.4	10.1%	130-135	0	0%
45-50	265.0	9.4%	135-140	0	0%
50-55	227.3	8.1%	140-145	0	0%
55-60	179.4	6.4%	145-150	0	0%
60-65	135.1	4.8%	150-155	0	0%
65-70	101.8	3.6%	155-160	0	0%
70-75	78.6	2.8%	160-165	0	0%
75-80	61.2	2.2%	165-170	0	0%
80-85	41.3	1.5%	170-175	0	0%
85-90	13.9	0.5%	175-180	0	0%



5.0 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	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108	1108
1	1110	1110	1108	1106	1103	1106	1108	1111	1112	1111	1108	1106	1103	1106	1108	1110	1110
2	1110	1110	1106	1105	1103	1105	1107	1112	1114	1112	1107	1105	1103	1105	1106	1110	1110
3	1109	1108	1105	1104	1102	1105	1106	1111	1112	1111	1106	1105	1102	1104	1105	1108	1109
4	1109	1106	1103	1101	1100	1104	1106	1110	1112	1110	1106	1104	1100	1101	1103	1106	1109
5	1107	1105	1101	1100	1099	1102	1106	1110	1111	1110	1106	1102	1099	1100	1101	1105	1107
6	1105	1102	1099	1098	1097	1100	1104	1108	1111	1108	1104	1100	1097	1098	1099	1102	1105
7	1104	1101	1096	1096	1094	1098	1101	1107	1113	1107	1101	1098	1094	1096	1096	1101	1104
8	1100	1098	1094	1093	1091	1096	1099	1106	1111	1106	1099	1096	1091	1093	1094	1098	1100
9	1098	1096	1092	1090	1087	1093	1097	1104	1108	1104	1097	1093	1087	1090	1092	1096	1098
10	1096	1092	1087	1085	1083	1089	1094	1102	1106	1102	1094	1089	1083	1085	1087	1092	1096
11	1092	1089	1084	1081	1080	1085	1091	1099	1102	1099	1091	1085	1080	1081	1084	1089	1092
12	1088	1084	1078	1076	1074	1079	1087	1096	1101	1096	1087	1079	1074	1076	1078	1084	1088
13	1083	1082	1075	1071	1069	1075	1083	1093	1099	1093	1083	1075	1069	1071	1075	1082	1083
14	1080	1077	1070	1065	1063	1071	1079	1092	1097	1092	1079	1071	1063	1065	1070	1077	1080
15	1076	1074	1065	1059	1057	1065	1075	1087	1092	1087	1075	1065	1057	1059	1065	1074	1076
16	1072	1070	1061	1054	1051	1060	1071	1084	1091	1084	1071	1060	1051	1054	1061	1070	1072
17	1068	1064	1053	1048	1045	1054	1065	1080	1085	1080	1065	1054	1045	1048	1053	1064	1068
18	1063	1059	1047	1040	1037	1045	1060	1076	1083	1076	1060	1045	1037	1040	1047	1059	1063
19	1057	1054	1042	1033	1029	1039	1055	1072	1080	1072	1055	1039	1029	1033	1042	1054	1057
20	1053	1049	1036	1025	1021	1032	1048	1066	1073	1066	1048	1032	1021	1025	1036	1049	1053
25	1022	1013	997	981	974	989	1013	1037	1046	1037	1013	989	974	981	997	1013	1022
30	970	964	944	924	914	934	963	989	1003	989	963	934	914	924	944	964	970
35	915	903	879	852	841	863	899	932	951	932	899	863	841	852	879	903	915
40	855	839	803	764	751	775	823	867	890	867	823	775	751	764	803	839	855
45	768	752	708	664	645	671	723	780	809	780	723	671	645	664	708	752	768
50	647	623	586	542	521	550	603	653	685	653	603	550	521	542	586	623	647
55	479	467	455	418	401	425	473	494	519	494	473	425	401	418	455	467	479
60	336	333	322	302	304	310	342	358	370	358	342	310	304	302	322	333	336
65	241	243	216	216	233	224	230	260	266	260	230	224	233	216	216	243	241
70	185	186	145	160	177	166	153	198	200	198	153	166	177	160	145	186	185
75	149	144	109	122	130	126	114	151	159	151	114	126	130	122	109	144	149
80	109	104	88	87	95	88	92	109	120	109	92	88	95	87	88	104	109
85	54	56	46	46	48	48	52	62	67	62	52	48	48	46	46	56	54
90	1	2	2	2	2	2	3	5	7	5	3	2	2	2	2	2	1
95	0	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	0
105	0	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	0
115	0	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	0
125	0	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	0
135	0	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	0
145	0	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	0
155	0	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	0
165	0	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	0
175	0	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	0



6.0 THD and PF Test

Model No.	91138	Sample ID.	1459934-001
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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
25.1	277	60	0.0551	14.129	0.9249	22.54%



7.0 In-Situ Temperature Measurement Test

Model No.	91138	Sample ID.	1459934-001, 1473115
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Test Method

1. In-Situ Temperature Measurement Test is conducted according to the UL1598-2008, 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. 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
23.8	120.03	60	0.23405	27.444	0.9769	Horizontal

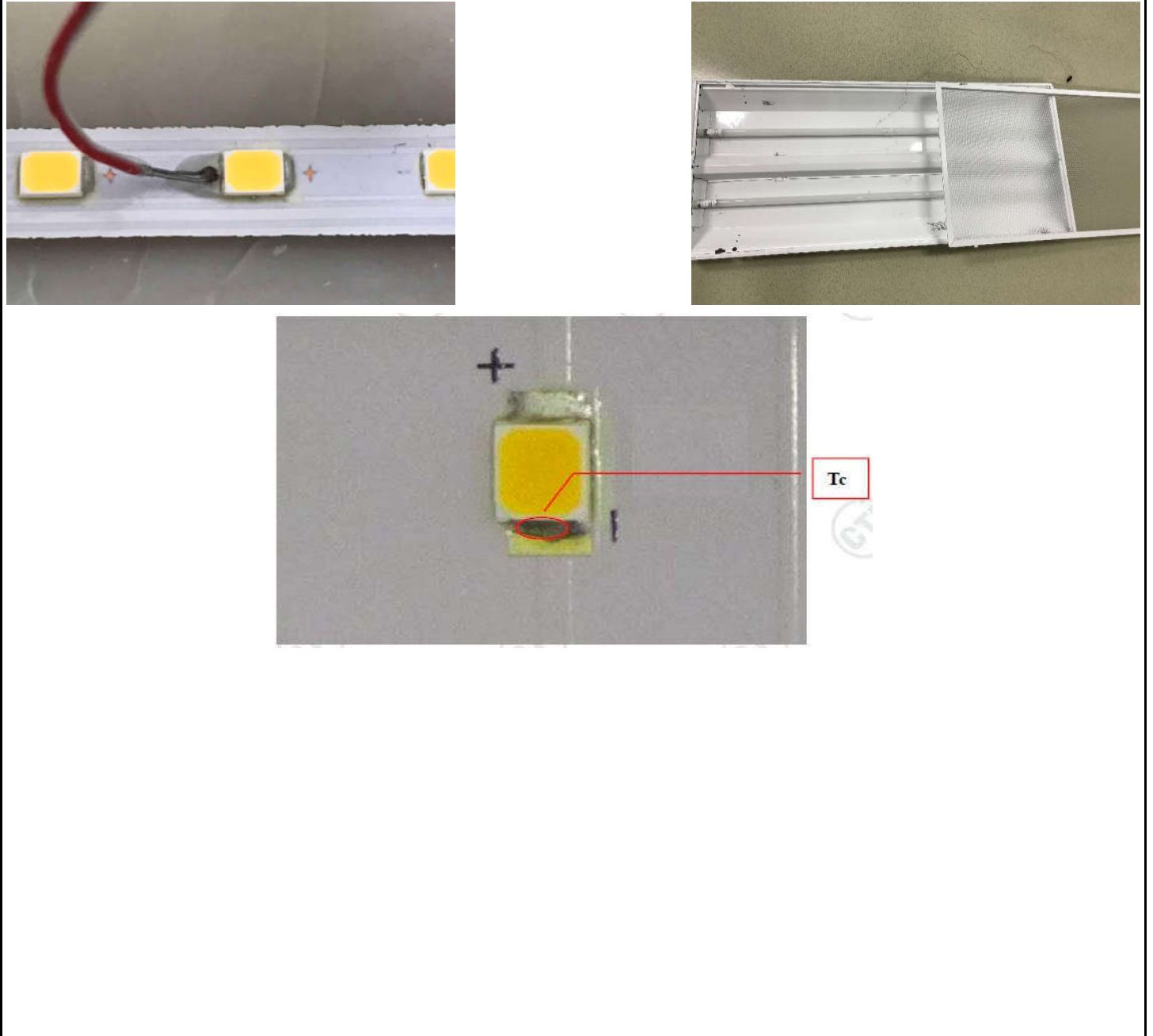
Test Results(LED)

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	Test Result (Correct to 25 °C)			
TMP of LEDs	60	54.9	56.1	SL-35B2835FTA-11CAGJ3C-APH001	60	85
Ambient Temperature	N/A	23.8	25.0			



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

Test Photos for Ts Point of LED Packages & Tc Point of Driver





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