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Test report of

IES LM-79-08

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Rendered to:

ELEC-TECH INTERNATIONAL CO LTD

No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District,
Zhuhai City, Guangdong Province, P.R. China 519085

For products:

SSL downlight retrofit kit

Models No.:

538041##(##=11-30)

(where "##" denotes color temperature, the CCT were tunable, 11~30 identifies tunable CCT 2700K to 5000K and Nightlight CCT is 2000K)

Test Date: Mar. 29, 2018

Test Item: Total luminous flux, Luminous Efficacy, Electrical values, Luminous Intensity Distribution, Chromaticity coordinates, CCT and CRI, Spectral Power Distribution.

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Template No.: LC-RT-PL-001 Rev.1.0

Test Note: *This product was a color tunable luminaire, this test was tested at 2700K.*

Complied by:

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Apr. 3, 2018

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Apr. 3, 2018

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1. General

1.1 Product Information

Brand Name	Commercial Electric
Product Type	SSL downlight retrofit kit
Model Number	538041##(##=11-30)
Rated Inputs	120VAC, 60Hz
Rated Power	11W
Rated Light output	670lm
Declared CCT	2700K
Power Supply	LED Driver
LED Package, Array or Module	SPMWHX229AXXXXXXXXX, SAMSUNG ELECTRONICS CO., LTD
Receipt Samples	1 unit
Sample Code of lab.	180328105008
Date of Receipt Samples	Mar. 28, 2018
Note	-



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1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377-2015	Specifications for the Chromaticity of Solid State Lighting Products
ANSI C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004	Colorimetry
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-923	CHP-500	2018-01-10	2019-01-09
AC Power supply	LC-I-987	APW-110N	2018-01-10	2019-01-09
Power analyzer	LC-I-928	WT210	2018-01-05	2019-01-05
Power analyzer	LC-I-954	WT210	2018-01-10	2019-01-09
Multimeter	LC-I-972	Fluke 17B	2017-08-08	2018-08-07
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-PL-I-011	D204C	2017-09-07	2018-09-06
Luminous Flux Standard Lamp	LC-PL-I-003	24V100W	2017-09-22	2018-09-21
Goniophotometer(with mirror)	LC-I-902	GMS2000	2017-05-07	2018-05-06
Wireless temperature transmitter	LC-I-978	DWRF-B	2018-02-10	2019-02-09
Wireless temperature transmitter	LC-I-979	DWRF-B	2018-02-10	2019-02-09

2. Test conducted and method

The luminaire was operated at least 2 hours to reach stabilization and temperature equilibrium before test.

2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$; the air flow around the sample(s) being tested did not affect the performance.

2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within ± 0.2 percent under load.

2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for AC voltage and current were less than 0.2 percent, and the calibration uncertainty of the AC power meter was less than 0.5 percent (95 % confidence interval, $k=2$).

2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by both sphere-spectroradiometer system and type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the total luminous flux was calculated from these by software automatically.

2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.



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3. Test Result Summary

3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	120.00 V~60Hz	119.94 V~60Hz
Input Current(A)	0.098	0.098
Total Power(W)	10.27	10.26
Power Factor	0.877	0.974
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	765.02	769.41
Luminaire Efficacy(Lm/W)	74.49	74.99
Correlated Color Temperature (CCT)(K)	2789	-
Color Rendering Index (CRI)	93.6	-
R9	62	-
Chromaticity Coordinate (x,y)	x = 0.4526 y = 0.4086	-
Chromaticity Coordinate (u,v)	u = 0.2587 v = 0.3503	-
Chromaticity Coordinate (u',v')	u' = 0.2587 v' = 0.5255	-
Duv	-0.0001	-
Zone Lumens between 0-60 °	-	86.56%

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
95	99	98	93	95	97	91	82
R9	R10	R11	R12	R13	R14	R15	-
62	96	95	85	96	100	90	-

Note: N.A.

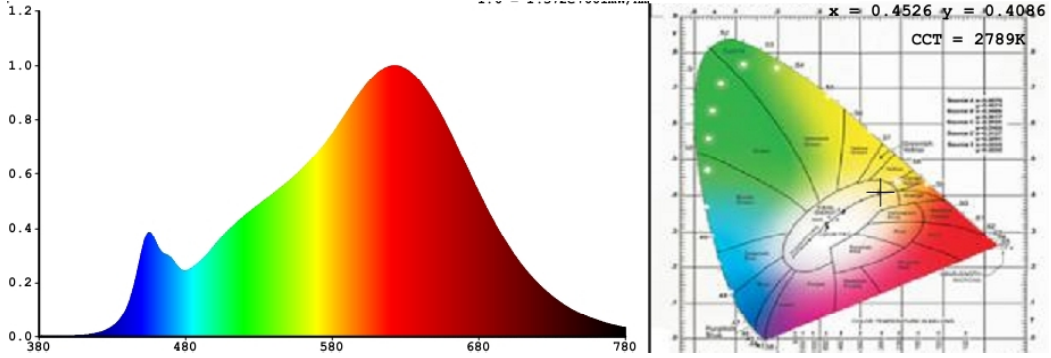


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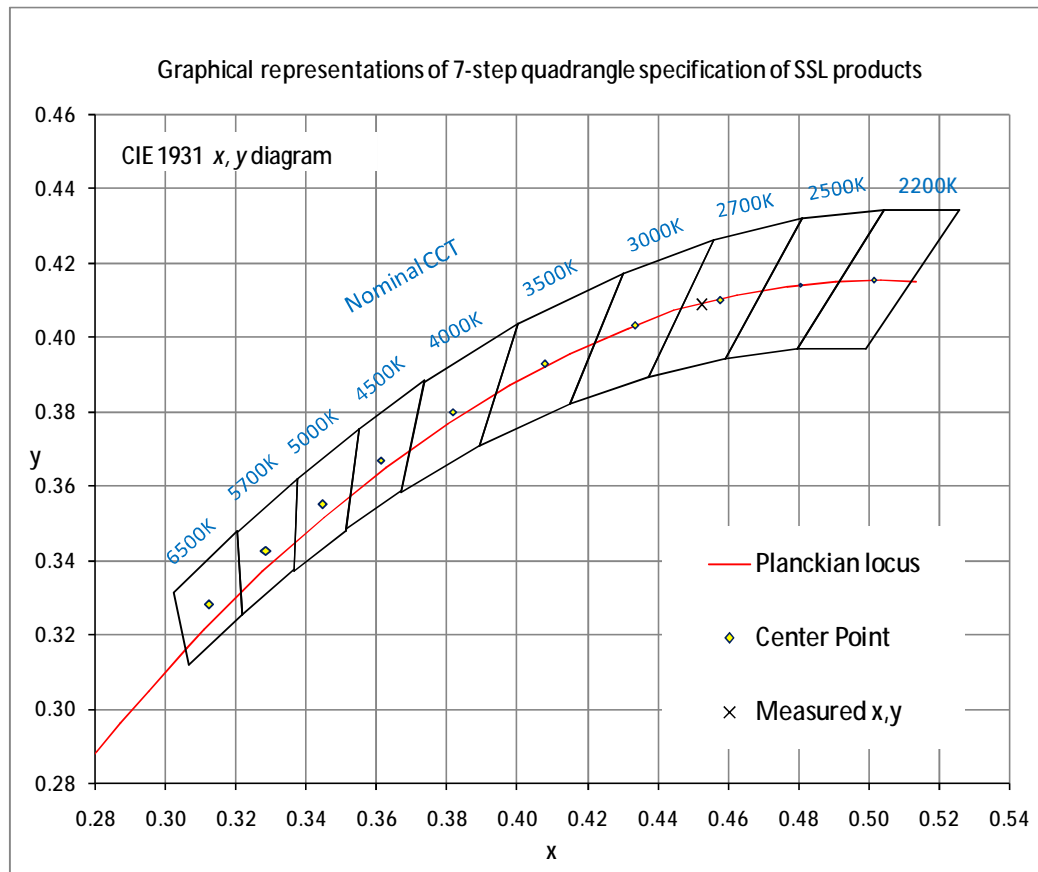


4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram





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4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Circular
Spacing Criteria (0-180)	1.24	Luminous Length	0.12 m (Diameter)
Spacing Criteria (90-270)	1.24	Luminous Width	0.12 m (Diameter)
Spacing Criteria (Diagonal)	1.34	Luminous Height	0.00 m
Test Distance	29.79 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	115.36	15.00	15.00
0-30	243.40	31.60	31.60
0-40	395.01	51.30	51.30
0-60	666.04	86.60	86.60
0-80	763.43	99.20	99.20
0-90	768.26	99.90	99.90
10-90	738.29	96.00	96.00
20-40	279.65	36.30	36.30
20-50	429.63	55.80	55.80
40-70	343.72	44.70	44.70
60-80	97.39	12.70	12.70
70-80	24.69	3.20	3.20
80-90	4.83	0.60	0.60
90-110	0.09	0.00	0.00
90-120	0.16	0.00	0.00
90-130	0.28	0.00	0.00
90-150	0.61	0.10	0.10
90-180	1.15	0.10	0.10
110-180	1.07	0.10	0.10
0-180	769.41	100.00	100.00

Total Luminaire Efficiency = 100.00%

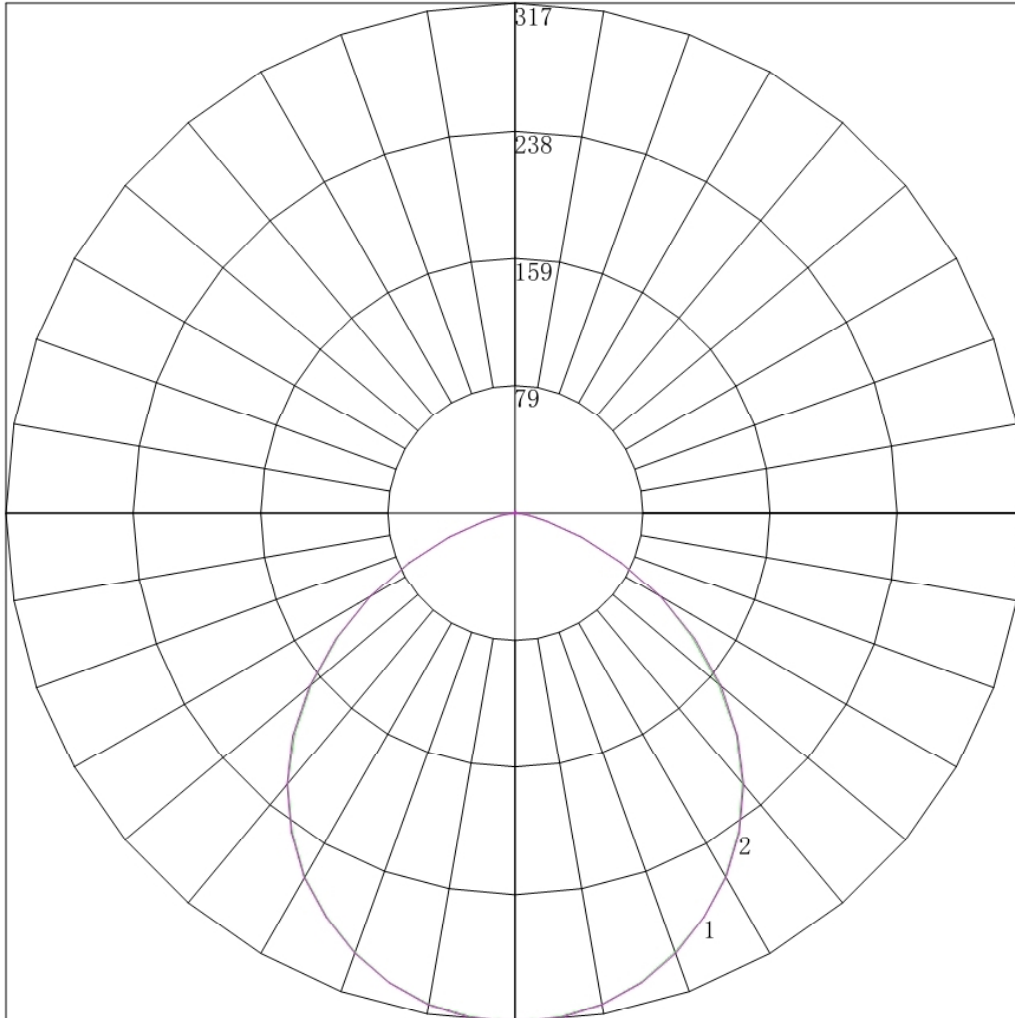
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	29.97
10-20	85.39
20-30	128.04
30-40	151.61
40-50	149.98
50-60	121.04
60-70	72.70
70-80	24.69
80-90	4.83
90-100	0.03
100-110	0.06
110-120	0.08
120-130	0.12
130-140	0.14
140-150	0.18
150-160	0.23
160-170	0.22
170-180	0.09



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4.5 Polar Curves



Maximum Candela = 317.205 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



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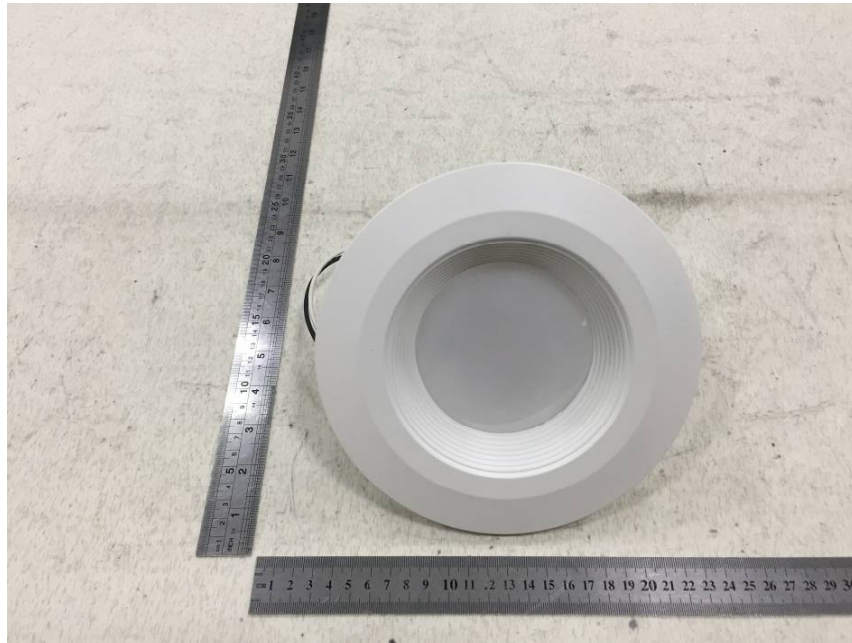
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	317.205	317.205	317.205	317.205	317.205	317.205	317.205
5	315.518	315.540	315.540	315.563	315.652	315.588	316.277
10	310.767	310.655	310.635	310.704	310.751	310.669	311.450
15	302.730	302.639	302.579	302.696	302.833	302.648	303.303
20	291.585	291.515	291.814	291.803	291.832	291.635	292.234
25	277.909	277.660	277.965	277.915	277.881	277.964	278.331
30	261.925	261.584	261.474	261.764	261.757	261.612	262.745
35	242.388	242.578	242.565	242.729	242.839	242.801	243.396
40	220.321	220.440	220.836	220.766	220.948	220.555	221.080
45	194.568	194.440	194.802	195.186	195.575	195.339	195.972
50	165.440	165.419	165.727	166.323	166.432	166.425	167.194
55	134.803	135.510	135.564	135.596	135.736	136.002	136.419
60	104.033	103.581	104.470	104.360	103.843	104.295	104.406
65	72.996	73.162	73.153	73.344	73.147	72.831	73.101
70	44.091	43.786	43.812	44.015	43.737	43.583	44.058
75	20.247	20.250	19.975	20.078	20.094	19.875	20.280
80	9.724	9.770	9.832	9.717	9.781	9.682	9.697
85	3.863	3.930	3.973	4.016	3.992	4.033	4.074
90	0.044	0.000	0.022	0.022	0.022	0.089	0.000
95	0.044	0.044	0.022	0.022	0.022	0.044	0.000
100	0.044	0.044	0.000	0.000	0.044	0.022	0.000
105	0.089	0.044	0.044	0.022	0.133	0.067	0.044
110	0.133	0.044	0.044	0.067	0.067	0.067	0.044
115	0.044	0.133	0.044	0.089	0.089	0.067	0.089
120	0.044	0.111	0.089	0.067	0.111	0.133	0.044
125	0.089	0.133	0.155	0.133	0.155	0.133	0.089
130	0.222	0.133	0.200	0.155	0.200	0.177	0.177
135	0.178	0.155	0.178	0.177	0.177	0.155	0.177
140	0.222	0.200	0.178	0.200	0.200	0.221	0.177
145	0.266	0.289	0.311	0.333	0.311	0.310	0.265
150	0.355	0.377	0.377	0.377	0.355	0.421	0.354
155	0.488	0.466	0.510	0.532	0.532	0.465	0.531
160	0.710	0.644	0.644	0.643	0.665	0.643	0.620
165	0.844	0.799	0.799	0.776	0.843	0.820	0.752
170	0.844	0.888	0.910	0.887	0.932	0.931	0.841
175	0.977	1.021	0.977	0.998	0.998	0.975	0.974
180	1.027	1.027	1.027	1.027	1.027	1.027	1.027

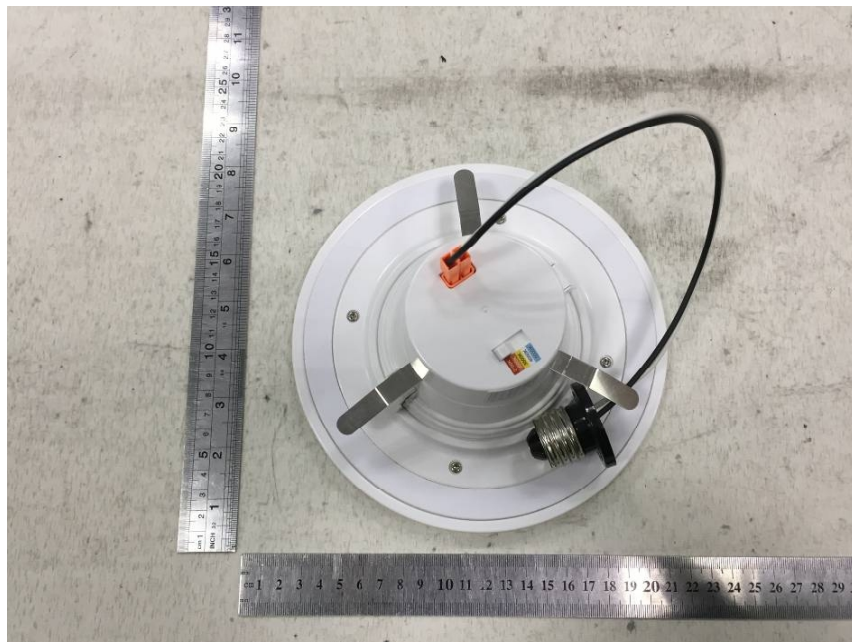


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Appendix A Product Photo



Picture 1



Picture 2

****End of test report****