LCTECH

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IESNA SUSTAINING MEMBER

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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

For products:

LED Ceiling Light

Models No.:

544372##(##=01-10)

(Where ## denotes CCT and could be 01-10 identifies 2700K)

Test Date:	Jan. 16, 2017 to Jan. 17, 2017
Test Item:	Total luminous flux, Luminous Efficacy, Electrical values, Luminous Intensity Distribution, Chromaticity coordinates, CCT and CRI, Spectral Power Distribution.
Test Lab.:	**LCTECH (Zhongshan) Testing Service Co., Ltd** 2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China Tel:+86-760-22833366 Fax:+86-760-22833399 E-mail:Service@lccert.com http://www.lccert.com
Template No.:	LC-RT-PL/LM79-08/01
Test Note:	

Complied by:	**Reviewed by:**
Fish Tan	**Richard Li**
Project Engineer	**Technical Manager**
Jan. 18, 2017	**Jan. 18, 2017**

Table of Contents

1. General

1.1 Product Information

Brand Name	Commercial Electric
Product Type	LED Ceiling Light
Model Number	544372##(##=01-10)
Rated Inputs	120-277V,50/ 60Hz
Rated Power	22W
Rated Light output	1500lm
Declared CCT	2700K
Power Supply	LED Driver
LED Package, Array or Module	Model: SPMWHx229xxxxxxxxx, manufactured by SAMSUNG ELECTRINICS CO., LTD.
Receipt Samples	1 unit
Date of Receipt Samples	Dec. 28, 2016
Note	-

1.2 Standards or methods

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

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011	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	2016-02-04	2017-02-03
AC Power supply	LC-I-987	APW-110N	2016-02-04	2017-02-03
Power analyzer	LC-I-928	WT210	2016-01-24	2017-01-24
Power analyzer	LC-I-954	WT210	2016-02-04	2017-02-03
Multimeter	LC-I-972	Fluke 17B	2016-08-10	2017-08-09
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-PL-I-002	24V100W	2016-10-08	2017-10-07
Luminous Flux Standard Lamp	LC-PL-I-001	110V/200W	2016-09-24	2017-09-23
Goniophotometer(with mirror)	LC-I-902	GMS2000	2016-05-07	2017-05-07
Wireless temperature transmitter	LC-I-978	DWRF-B	2016-02-03	2017-02-02
Wireless temperature transmitter	LC-I-979	DWRF-B	2016-02-03	2017-02-02

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 °C ± 1°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 type C goniophotometer system and a sphere (2 meter)-spectroradiometer 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 color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were 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.

3. Test Result Summary

3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	120.00 V~60Hz	120.00 V~60Hz
Input Current(A)	0.186	0.186
Total Power(W)	21.91	21.93
Power Factor	0.983	0.983
I-THD	-	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	1516.60	1519.83
Luminaire Efficacy(Lm/W)	69.22	69.30
Correlated Color Temperature (CCT)(K)	2740	-
Color Rendering Index (CRI)	83.3	-
R9	12	-
Chromaticity Coordinate (x,y)	x = 0.4552 y = 0.4072	-
Chromaticity Coordinate (u,v)	u = 0.2610 v = 0.3503	-
Chromaticity Coordinate (u',v')	u' = 0.2610 v' = 0.5254	-
Duv	-0.0009	-
Zone Lumens between 0-60 °	-	55.2%

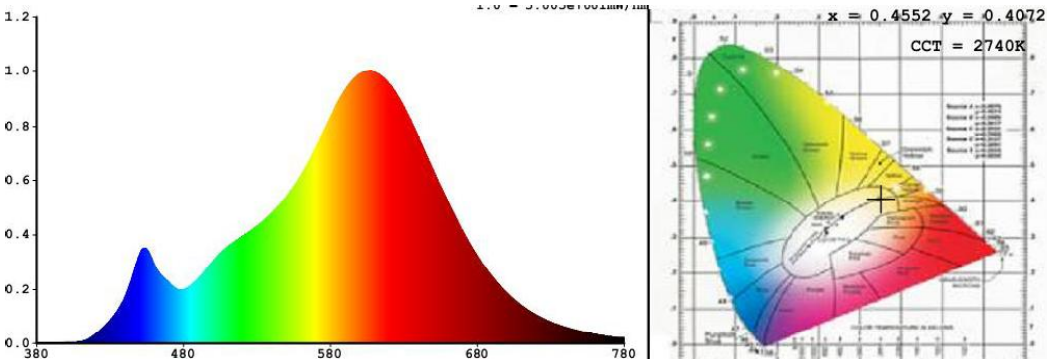
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
82	93	94	81	83	93	81	59
R9	R10	R11	R12	R13	R14	R15	-
12	86	81	82	85	97	74	-

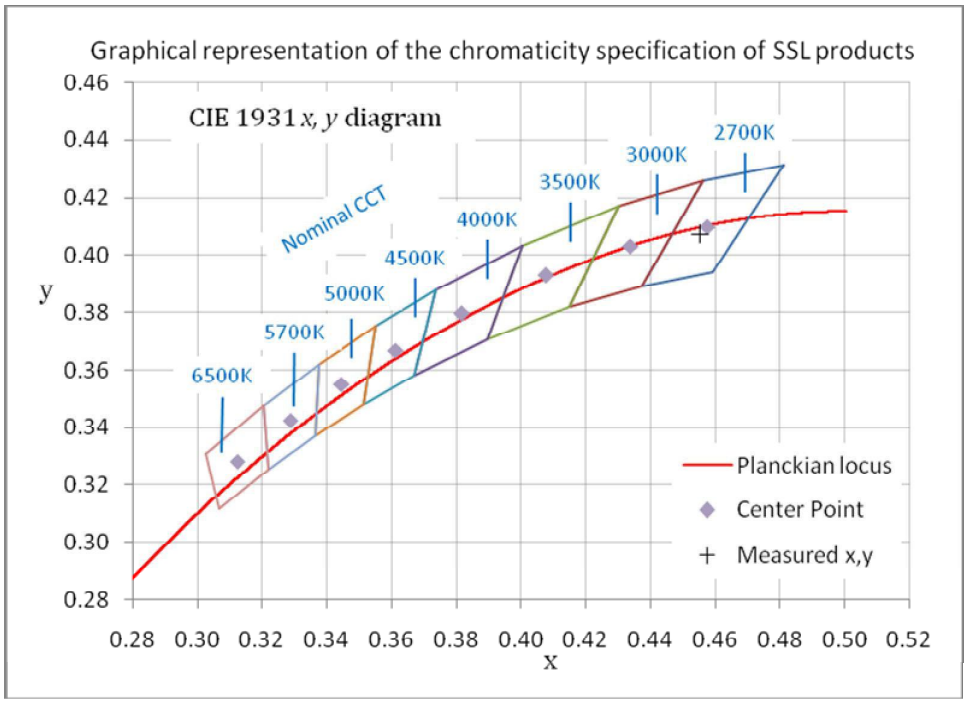
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Semi-Direct	Basic Luminous Shape	Circular w/ Sides
Spacing Criteria (0-180)	1.30	Luminous Length	0.39 m (Diameter)
Spacing Criteria (90-270)	1.30	Luminous Width	0.39 m (Diameter)
Spacing Criteria (Diagonal)	1.44	Luminous Height	0.05 m
Test Distance	29.65 m		

4.4 Zonal Lumen Summary

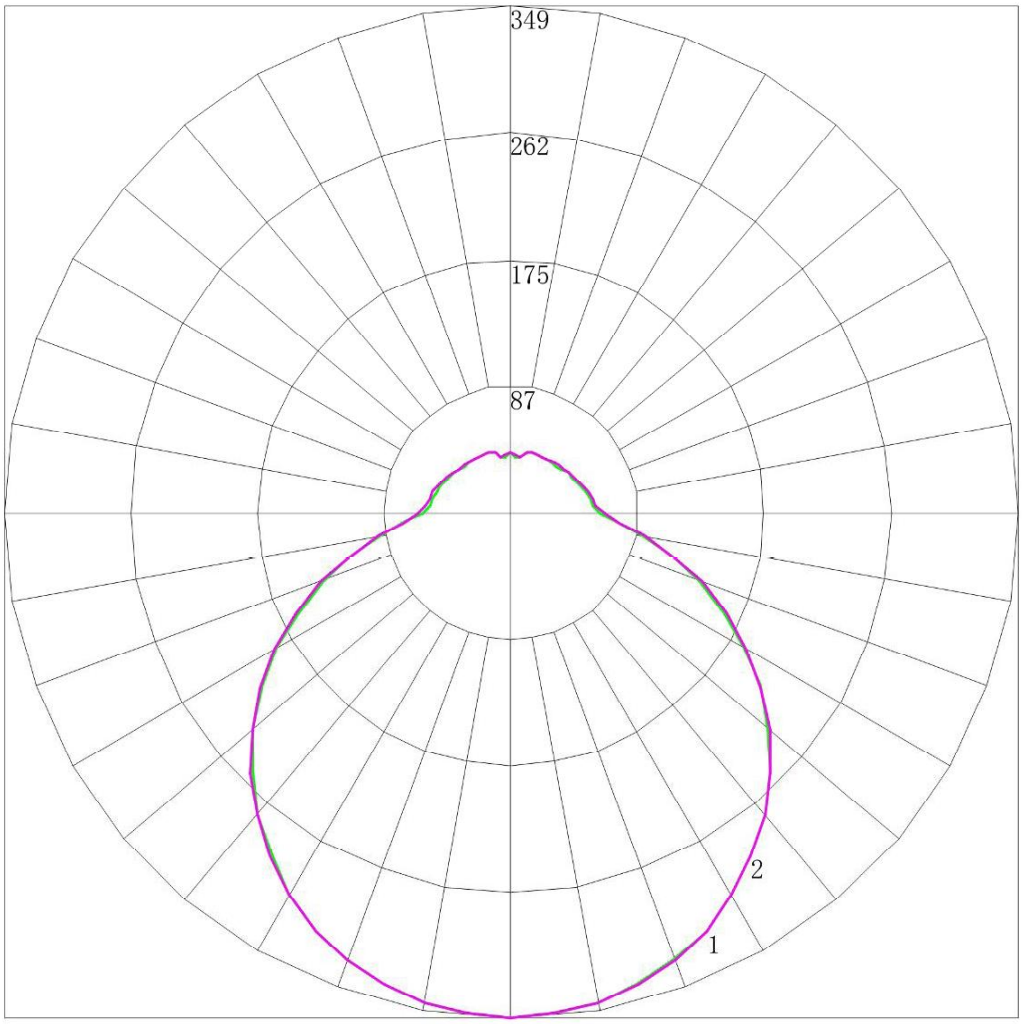
Zone	Lumens	%Lamp	%Fixt
0-20	128.45	8.50	8.50
0-30	275.10	18.10	18.10
0-40	456.19	30.00	30.00
0-60	839.49	55.20	55.20
0-80	1122.72	73.90	73.90
0-90	1205.54	79.30	79.30
10-90	1172.45	77.10	77.10
20-40	327.74	21.60	21.60
20-50	522.99	34.40	34.40
40-70	544.86	35.90	35.80
60-80	283.23	18.60	18.60
70-80	121.66	8.00	8.00
80-90	82.82	5.40	5.40
90-110	121.29	8.00	8.00
90-120	171.88	11.30	11.30
90-130	215.04	14.10	14.10
90-150	278.13	18.30	18.30
90-180	314.30	20.70	20.70
110-180	193.01	12.70	12.70
0-180	1519.83	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	33.08
10-20	95.37
20-30	146.65
30-40	181.09
40-50	195.25
50-60	188.05
60-70	161.57
70-80	121.66
80-90	82.82
90-100	63.91
100-110	57.38
110-120	50.58
120-130	43.16
130-140	35.36
140-150	27.74
150-160	20.43
160-170	12.01
170-180	3.72

4.5 Polar Curves

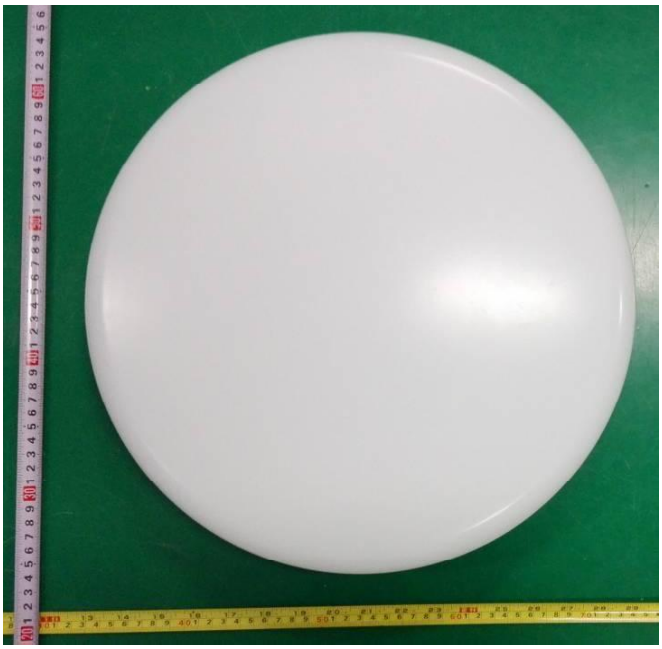


Maximum Candela = 349.15 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

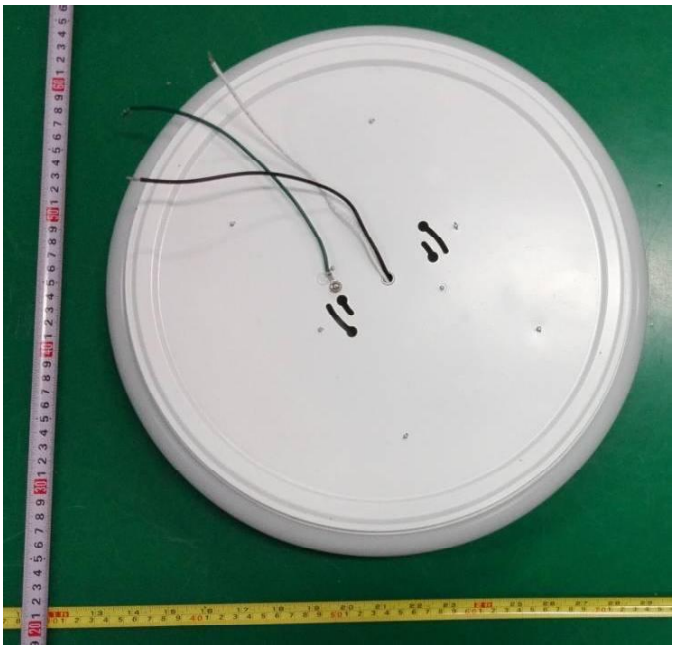
4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	349.150	349.150	349.150	349.150	349.150	349.150	349.150
5	347.831	348.051	347.832	348.052	348.270	347.612	347.844
10	343.873	343.873	343.877	344.309	344.088	343.660	343.926
15	337.717	337.277	337.284	337.704	338.143	337.511	337.831
20	328.922	328.922	328.493	329.339	329.118	328.948	329.124
25	317.929	317.269	317.288	318.331	318.331	318.187	318.241
30	304.737	304.517	304.322	305.122	305.122	304.792	304.745
35	288.467	288.687	288.721	289.714	289.714	289.422	289.072
40	271.757	271.537	271.581	272.323	272.542	272.294	272.093
45	252.408	252.408	252.685	253.171	253.388	252.970	253.373
50	231.741	231.741	232.249	232.256	232.917	232.548	232.477
55	209.314	209.534	209.836	210.460	210.899	210.587	210.709
60	186.008	186.668	186.544	186.903	187.565	187.749	187.636
65	162.263	162.263	162.592	163.127	163.568	164.255	163.691
70	138.077	137.857	137.763	138.692	139.793	139.660	139.747
75	113.452	113.892	114.033	114.476	115.358	115.946	115.803
80	91.465	91.025	91.622	92.464	92.904	93.549	93.165
85	72.556	72.996	73.607	73.973	75.294	75.763	75.315
90	61.563	61.563	61.964	62.966	63.846	64.344	63.996
95	56.286	56.726	57.130	57.681	58.561	59.072	58.772
100	54.967	54.967	55.372	55.477	56.137	56.874	57.031
105	53.208	53.208	53.834	54.377	54.816	55.117	55.289
110	51.449	51.669	52.076	52.836	53.055	53.361	53.548
115	50.130	50.130	50.538	51.074	51.074	51.604	51.807
120	48.371	48.811	48.999	49.533	49.973	49.847	50.065
125	47.491	47.711	47.901	48.213	48.212	48.311	48.759
130	46.172	46.612	46.802	47.112	46.891	46.773	47.018
135	44.853	45.293	45.484	45.570	45.789	45.674	45.712
140	44.413	44.193	44.824	44.689	44.909	45.016	44.841
145	43.534	43.754	43.945	44.249	44.249	44.138	43.970
150	43.534	43.754	43.726	43.809	44.028	43.917	43.970
155	43.974	43.974	44.165	44.249	44.249	44.356	43.970
160	44.413	44.633	44.385	44.468	44.468	44.356	44.841
165	42.654	42.435	42.626	42.707	42.705	42.598	42.664
170	39.136	38.697	38.891	38.965	38.744	38.647	38.746
175	38.257	38.257	38.674	38.527	38.746	38.649	39.181
180	40.965	40.965	40.965	40.965	40.965	40.965	40.965

Appendix 1 Product Photo



Picture 1



Picture 2

Attachment 2
U.S. Department of Energy
Lighting Facts^{CM} Uniform LM-79 Reporting Template

Laboratory Information

Name of test lab	LCTECH (Zhongshan) Testing Service Co.,Ltd
Date of test report	Jan. 18, 2017
Test report number	LCZP16120486
Laboratory contact name	Richard Li

Product Information

Manufacturer	Elec-Tech International Co., Ltd	
Brand name	Commercial Electric	
Model number	544372##(##=01-10)	
SKU(if available)	N/A	
Type of luminaire (for integral lamps, list base type and lamp type)	LED Ceiling Light	
Luminaire aperture	-	in.
Luminaire height	1.97	in.
Luminaire length	15.35	in.
Luminaire width	15.35	in.
Number of units(modular products)	N/A	

Electrical Measurements	Integrating sphere output	Goniophotometer Output	
Input wattage	21.91	21.93	W
Input current	0.186	0.186	A
Input voltage(AC)	120.00	120.06	V
Power factor	0.983	0.983	
Off-state power	0.0	0.0	W

Photometric Characteristics			
Total initial lumen output	1516.60	1519.83	lm
Initial luminaire efficacy	69.22	69.30	lm/W
Correlated color temperature / CCT	2740	K	
Color rendering index/CRI	83.3		
R9value	12		
Duv	-0.0009		

Luminous Intensity Distribution		Goniophotometer Output	
Center beam candle power(if applicable)	--	349.150	cd
Beam angle(if applicable)		124.8	°
Zonallumensinthe0°-60°zone		55.2	%
Zonal lumens in the60°-90° zone		24.1	%
Zonallumensinthe90°-120°zone		11.3	%
Zonallumensinthe120°-180°zone		9.4	%

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