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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,  
ZhuhaiCity, Guangdong Province, P.R. China 519085

For products:

LED Ceiling Light

Models No.:

544505##(##=11-30)

(Where ## denotes CCT and could be 11-30 which refers 3000K, 4000K and 5000K.)

**Test Date:** Apr. 25, 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:**

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**Complied by:**

**Fish Tan**

**Project Engineer**

**Apr. 28, 2017**

**Reviewed by:**

**Richard Li**

**Technical Manager**

**Apr. 28, 2017**

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## 1. General

### 1.1 Product Information

Brand Name	Hampton Bay
Product Type	LED Ceiling Light
Model Number	544505##(##=11-30)
Rated Inputs	120VAC, 60Hz
Rated Power	14W
Rated Light output	910lm
Declared CCT	3000K
Power Supply	LED Driver
LED Package, Array or Module	Model: SPMWHx229xxxxxxxx, manufactured by SAMSUNG ELECTRONICS CO., LTD
Receipt Samples	1 unit
Sample Code of lab.	17042011316 + 05 Lens
Date of Receipt Samples	Apr. 20, 2017
Note	This product is a color tunable luminaire, all the tests were tested at 3000K setting.



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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 C78.377-2011	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	2017-02-04	2018-02-03
AC Power supply	LC-I-987	APW-110N	2017-02-04	2018-02-03
Power analyzer	LC-I-928	WT210	2017-01-19	2018-01-19
Power analyzer	LC-I-954	WT210	2017-02-04	2018-02-03
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	2017-02-10	2018-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2017-02-10	2018-02-10

## 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ; 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  $\pm 0.2$  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.



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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	119.98 V~60Hz
Input Current(A)	0.127	0.127
Total Power(W)	13.63	13.59
Power Factor	0.895	0.893
I-THD	-	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	1011.73	1013.20
Luminaire Efficacy(Lm/W)	74.23	74.55
Correlated Color Temperature (CCT)(K)	3080	-
Color Rendering Index (CRI)	86.2	-
R9	23	-
Chromaticity Coordinate (x,y)	x = 0.4289 y = 0.3968	-
Chromaticity Coordinate (u,v)	u = 0.2485 v = 0.3449	-
Chromaticity Coordinate (u',v')	u' = 0.2485 v' = 0.5173	-
Duv	-0.0018	-
Zone Lumens between 0-60 °	-	46.10 %

#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
86	95	95	85	86	94	84	65
R9	R10	R11	R12	R13	R14	R15	-
23	88	85	81	88	98	79	-

Note: N.A.

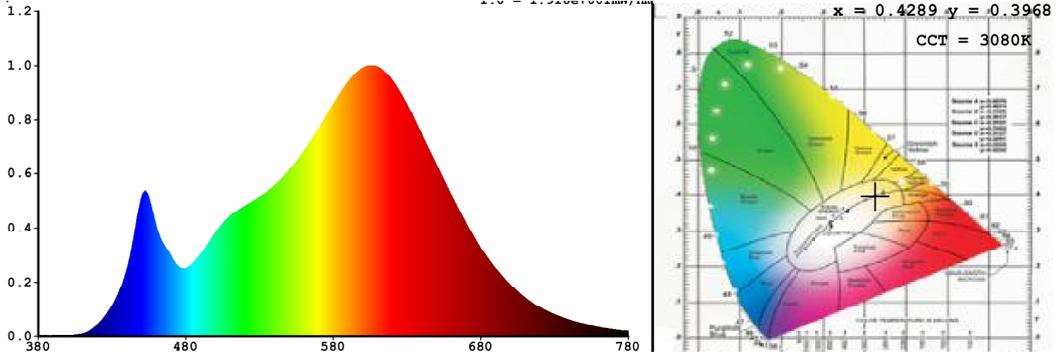


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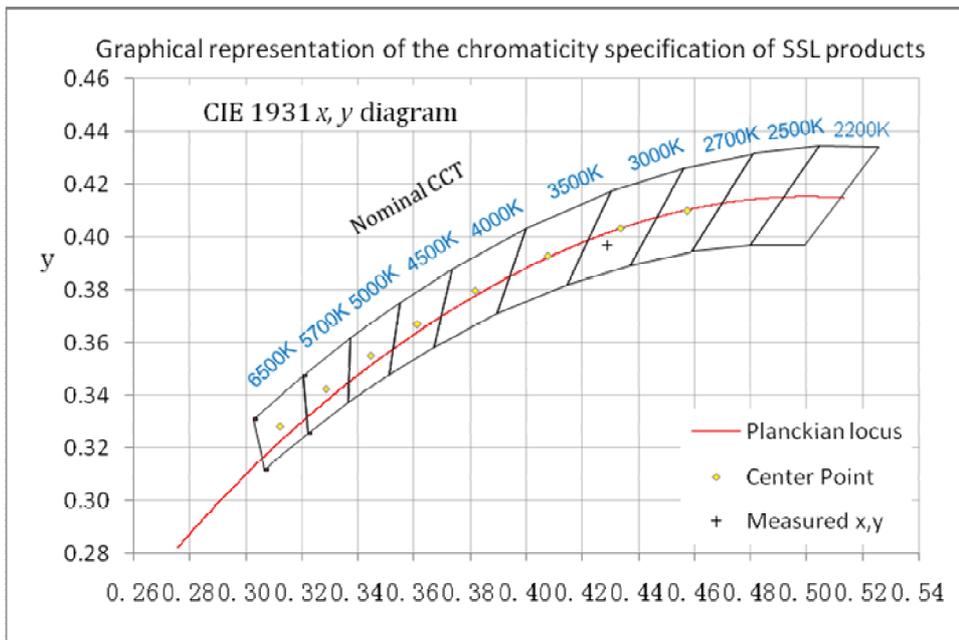


### 4. Test Data

#### 4.1 Spectral Distribution



#### 4.2 ANSI Chromaticity Quadrangles Diagram





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**4.3 Goniometry Test Data**

CIE Type	Semi-Direct	Basic Luminous Shape	Circular w/Sides
Spacing Criteria (0-180)	1.40	Luminous Length	0.29 m (Diameter)
Spacing Criteria (90-270)	1.40	Luminous Width	0.29 m (Diameter)
Spacing Criteria (Diagonal)	1.56	Luminous Height	0.07 m
Test Distance	29.65 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	64.76	6.40	6.40
0-30	140.93	13.90	13.90
0-40	239.06	23.60	23.60
0-60	467.10	46.10	46.10
0-80	675.37	66.70	66.70
0-90	756.57	74.70	74.70
10-90	740.04	73.00	73.00
20-40	174.30	17.20	17.20
20-50	286.23	28.30	28.30
40-70	338.71	33.40	33.40
60-80	208.27	20.60	20.60
70-80	97.60	9.60	9.60
80-90	81.20	8.00	8.00
90-110	121.27	12.00	12.00
90-120	164.84	16.30	16.30
90-130	198.54	19.60	19.60
90-150	240.00	23.70	23.70
90-180	256.63	25.30	25.30
110-180	135.36	13.40	13.40
0-180	1013.2	100.00	100.00

Total Luminaire Efficiency = 100.00%

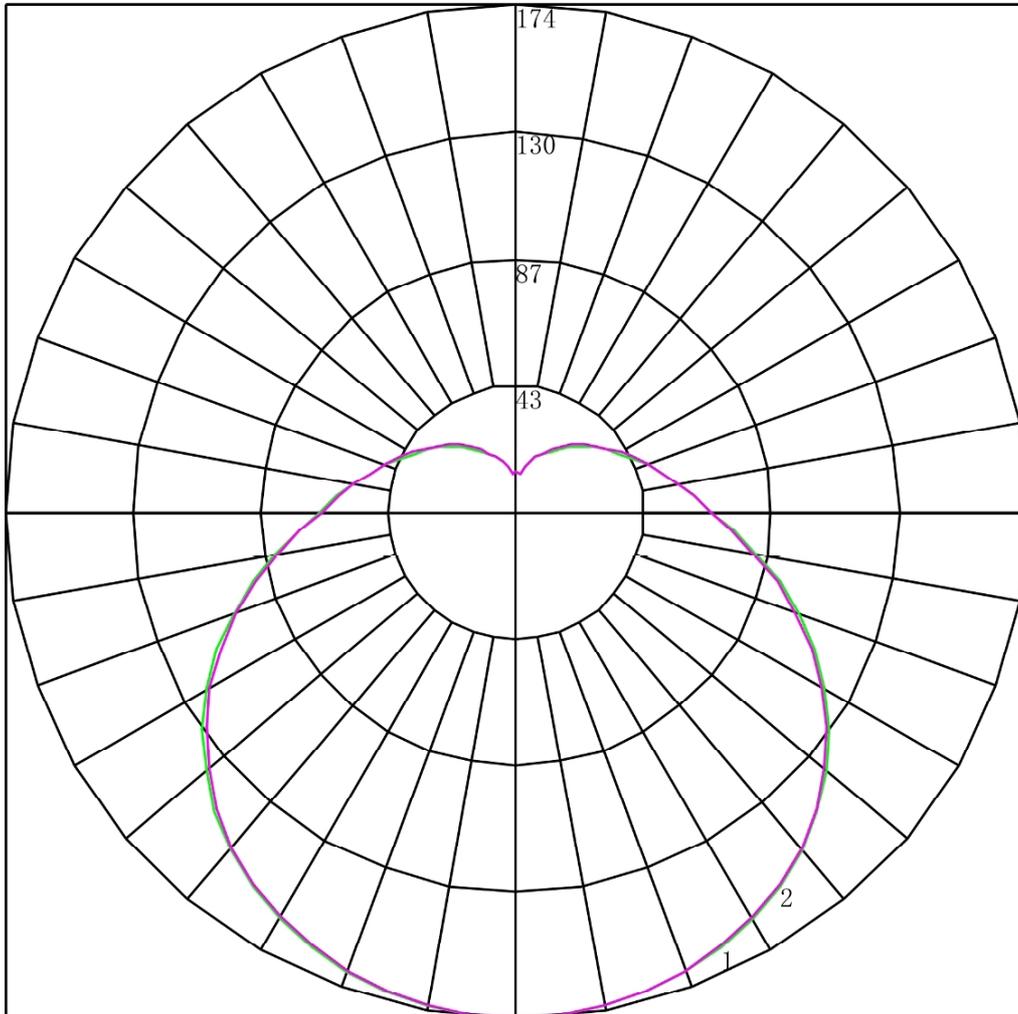
**ZONAL LUMEN SUMMARY**

Zone	Lumens
0-10	16.53
10-20	48.23
20-30	76.17
30-40	98.13
40-50	111.93
50-60	116.11
60-70	110.67
70-80	97.60
80-90	81.20
90-100	66.67
100-110	54.60
110-120	43.57
120-130	33.70
130-140	24.72
140-150	16.73
150-160	10.16
160-170	5.13
170-180	1.34



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4.5 Polar Curves



Maximum Candela = 173.949 Located At Horizontal Angle = 0, Vertical Angle = 0  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



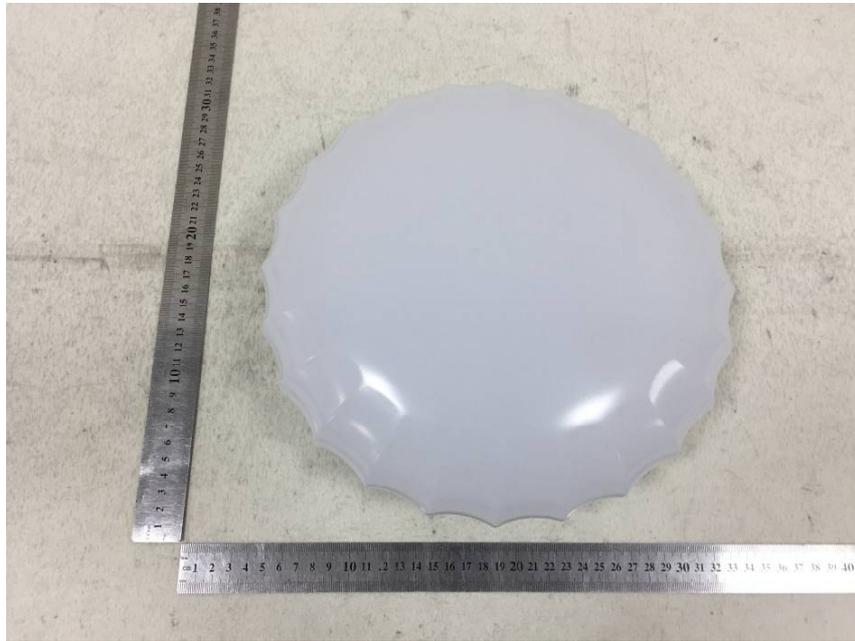
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4.6 Candela Tabulation



	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	173.949	173.949	173.949	173.949	173.949	173.949	173.949
<b>5</b>	173.641	173.554	173.532	173.619	173.575	173.422	173.510
<b>10</b>	172.367	172.367	172.389	172.345	172.345	172.236	172.280
<b>15</b>	170.609	170.566	170.500	170.476	170.499	170.281	170.391
<b>20</b>	168.192	168.083	168.105	168.036	167.928	167.821	167.843
<b>25</b>	165.071	165.074	164.964	164.937	164.874	164.637	164.724
<b>30</b>	161.248	161.273	161.273	161.179	161.028	160.793	160.771
<b>35</b>	156.897	156.813	156.747	156.651	156.501	156.291	156.247
<b>40</b>	151.447	151.475	151.365	151.200	151.096	150.844	150.932
<b>45</b>	145.250	145.258	145.192	145.023	144.701	144.452	144.386
<b>50</b>	138.219	138.074	137.964	137.836	137.472	137.183	137.139
<b>55</b>	130.308	130.121	129.989	129.923	129.561	129.210	129.188
<b>60</b>	121.562	121.422	121.180	121.043	120.771	120.403	120.359
<b>65</b>	112.245	112.195	111.975	111.746	111.520	111.090	111.046
<b>70</b>	102.532	102.528	102.265	102.053	101.741	101.558	101.426
<b>75</b>	92.864	92.664	92.467	92.272	91.963	91.741	91.806
<b>80</b>	83.107	83.064	82.932	82.842	82.602	82.318	82.318
<b>85</b>	74.405	74.342	74.255	74.138	74.032	73.884	73.840
<b>90</b>	66.890	66.939	66.851	66.665	66.626	66.615	66.505
<b>95</b>	61.089	60.963	60.919	60.862	60.847	60.816	60.663
<b>100</b>	56.079	55.955	55.845	55.917	55.859	55.853	55.918
<b>105</b>	51.464	51.583	51.407	51.455	51.508	51.504	51.482
<b>110</b>	47.289	47.387	47.475	47.455	47.443	47.507	47.572
<b>115</b>	43.509	43.608	43.718	43.762	43.839	43.861	43.883
<b>120</b>	40.125	40.115	40.401	40.575	40.653	40.742	40.720
<b>125</b>	37.005	37.105	37.259	37.542	37.708	37.799	37.777
<b>130</b>	34.104	34.205	34.359	34.641	34.983	35.097	35.185
<b>135</b>	31.511	31.393	31.503	31.717	32.083	32.330	32.550
<b>140</b>	28.786	28.735	28.911	29.123	29.292	29.431	29.694
<b>145</b>	26.369	26.231	26.341	26.552	26.699	26.729	26.839
<b>150</b>	23.864	23.814	23.880	24.046	24.194	24.225	24.335
<b>155</b>	21.799	21.727	21.705	21.738	21.821	21.963	21.875
<b>160</b>	19.909	19.772	19.794	19.716	19.733	19.811	19.855
<b>165</b>	18.107	18.102	18.036	18.024	18.129	18.186	18.230
<b>170</b>	15.822	15.818	15.752	15.826	15.822	15.726	15.770
<b>175</b>	12.789	12.808	12.830	12.836	12.789	12.827	12.739
<b>180</b>	13.628	13.628	13.628	13.628	13.628	13.628	13.628

### Appendix 1 Product Photo



Picture 1



Picture 2



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## Appendix 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	Apr. 28, 2017
Test report number	LCZP17040293
Laboratory contact name	Richard Li

### Product Information

Applicant	ELEC-TECH INTERNATIONAL CO LTD	
Brand name	Hampton Bay	
Model number	544505##(##=11-30)	
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	2.26	in.
Luminaire length	11.42	in.
Luminaire width	11.42	in.
Number of units(modular products)	N/A	

Electrical Measurements	Integrating sphere output	Goniophotometer Output	
Input wattage	13.63	13.59	W
Input current	0.127	0.127	A
Input voltage(AC)	120.00	119.98	V
Power factor	0.895	0.893	
Off-state power	0.0	0.0	W

Photometric Characteristics			
Total initial lumen output	1011.73	1013.20	lm
Initial luminaire efficacy	74.23	74.55	lm/W
Correlated color temperature / CCT	3080	K	
Color rendering index/CRI	86.2		
Rgvalue	23		
Duv	-0.0018		

Luminous Intensity Distribution		Goniophotometer Output	
Center beam candle power(if applicable)	--	173.949	cd
Beam angle(if applicable)		155.1	°
Zonallumensinthe0°-60°zone		46.10	%
Zonal lumens in the60°-90° zone		34.29	%
Zonallumensinthe90°-120°zone		20.08	%
Zonallumensinthe120°-180°zone		9.06	%

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