LCTECH

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

For products:

LED Ceiling Light

Models No.:

544513##(##=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:	

Complied by:	**Reviewed by:**
Fish Tan	**Richard Li**
Project Engineer	**Technical Manager**
Apr. 28, 2017	**Apr. 28, 2017**

Table of Contents

1. General

1.1 Product Information

Brand Name	Hampton Bay
Product Type	LED Ceiling Light
Model Number	544513##(##=11-30)
Rated Inputs	120VAC, 60Hz
Rated Power	22W
Rated Light output	1450lm
Declared CCT	3000K
Power Supply	LED Driver
LED Package, Array or Module	Model: SPMWHx229xxxxxxxxx, manufactured by SAMSUNG ELECTRONICS CO., LTD
Receipt Samples	1 unit
Sample Code of lab.	1704201137 + 13 Lens
Date of Receipt Samples	Apr. 20, 2017
Note	This product is a color tunable luminaire, all the tests were tested at 3000K setting.

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 °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	120.02 V~60Hz
Input Current(A)	0.205	0.206
Total Power(W)	21.95	21.95
Power Factor	0.893	0.890
I-THD	-	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	1631.30	1634.22
Luminaire Efficacy(Lm/W)	74.32	74.45
Correlated Color Temperature (CCT)(K)	3065	-
Color Rendering Index (CRI)	84.6	-
R9	15	-
Chromaticity Coordinate (x,y)	x = 0.4311 y = 0.3996	-
Chromaticity Coordinate (u,v)	u = 0.2487 v = 0.3458	-
Chromaticity Coordinate (u',v')	u' = 0.2487 v' = 0.5187	-
Duv	-0.0010	-
Zone Lumens between 0-60 °	-	49.99 %

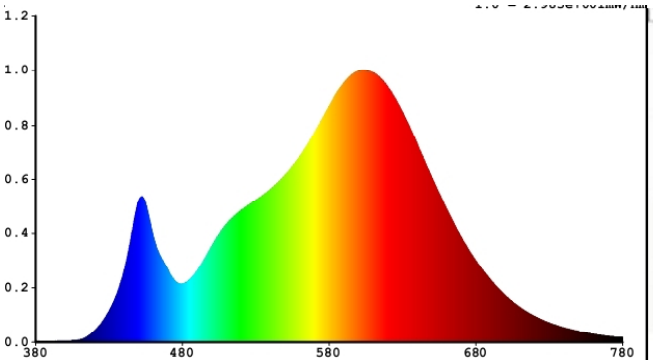
3.3 Color Rendering Details

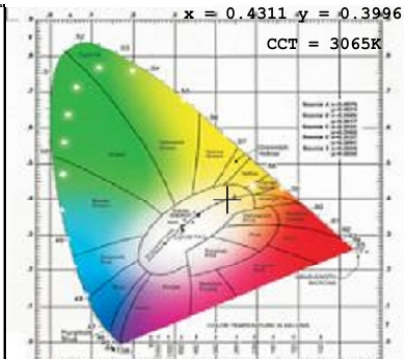
R1	R2	R3	R4	R5	R6	R7	R8
83	92	96	83	84	91	84	62
R9	R10	R11	R12	R13	R14	R15	-
15	83	83	76	86	99	76	-

Note: N.A.

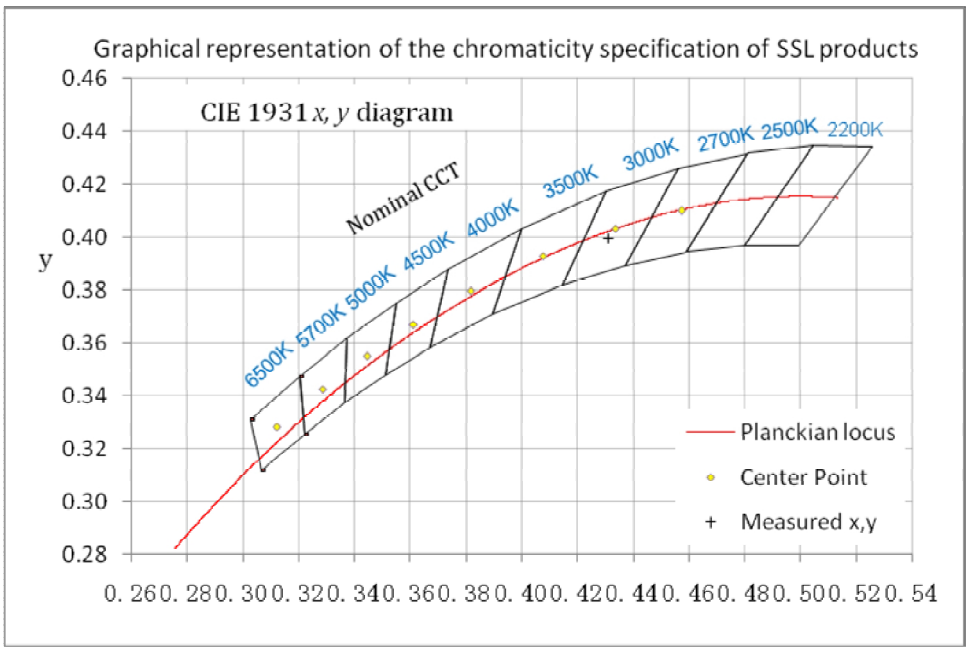
4. Test Data

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)	1.36	Luminous Length	0.38 m (Diameter)
Spacing Criteria (90-270)	1.36	Luminous Width	0.38 m (Diameter)
Spacing Criteria (Diagonal)	1.50	Luminous Height	0.07 m
Test Distance	29.65 m		

4.4 Zonal Lumen Summary

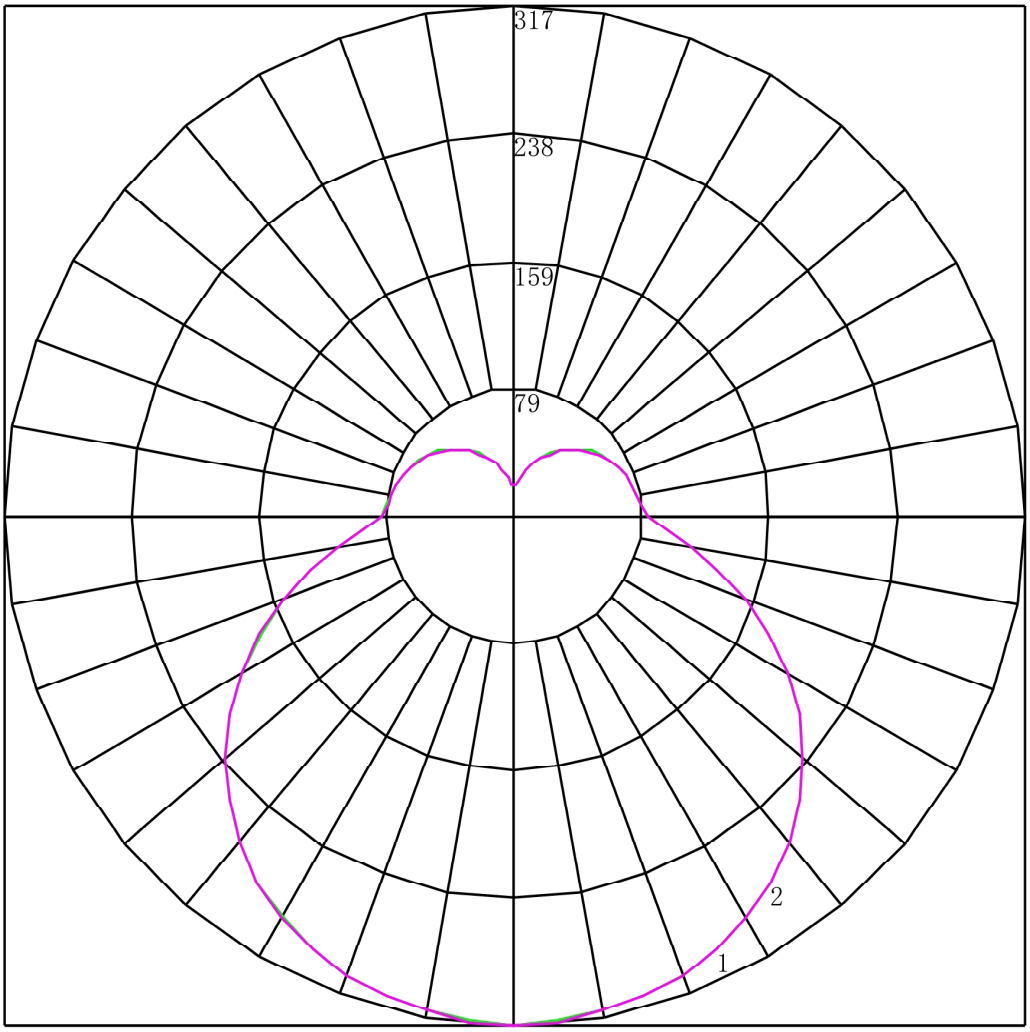
Zone	Lumens	%Lamp	%Fixt
0-20	117.57	7.20	7.20
0-30	254.94	15.60	15.60
0-40	429.29	26.30	26.30
0-60	816.86	50.00	50.00
0-80	1129.11	69.10	69.10
0-90	1233.18	75.50	75.50
10-90	1203.1	73.60	73.60
20-40	311.72	19.10	19.10
20-50	505.69	30.90	30.90
40-70	560.95	34.30	34.30
60-80	312.25	19.10	19.10
70-80	138.87	8.50	8.50
80-90	104.07	6.40	6.40
90-110	167.31	10.20	10.20
90-120	237.99	14.60	14.60
90-130	296.54	18.10	18.10
90-150	372.29	22.80	22.80
90-180	401.04	24.50	24.50
110-180	233.74	14.30	14.30
0-180	1634.22	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	30.08
10-20	87.49
20-30	137.37
30-40	174.35
40-50	193.96
50-60	193.61
60-70	173.38
70-80	138.87
80-90	104.07
90-100	87.20
100-110	80.11
110-120	70.68
120-130	58.56
130-140	44.82
140-150	30.92
150-160	18.35
160-170	8.40
170-180	2.01

4.5 Polar Curves

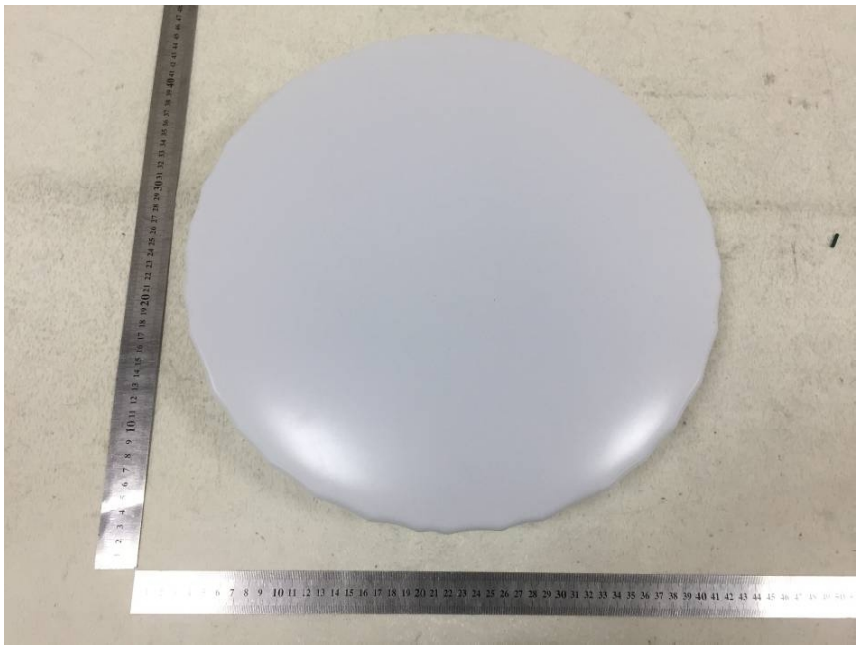


Maximum Candela = 317.37 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

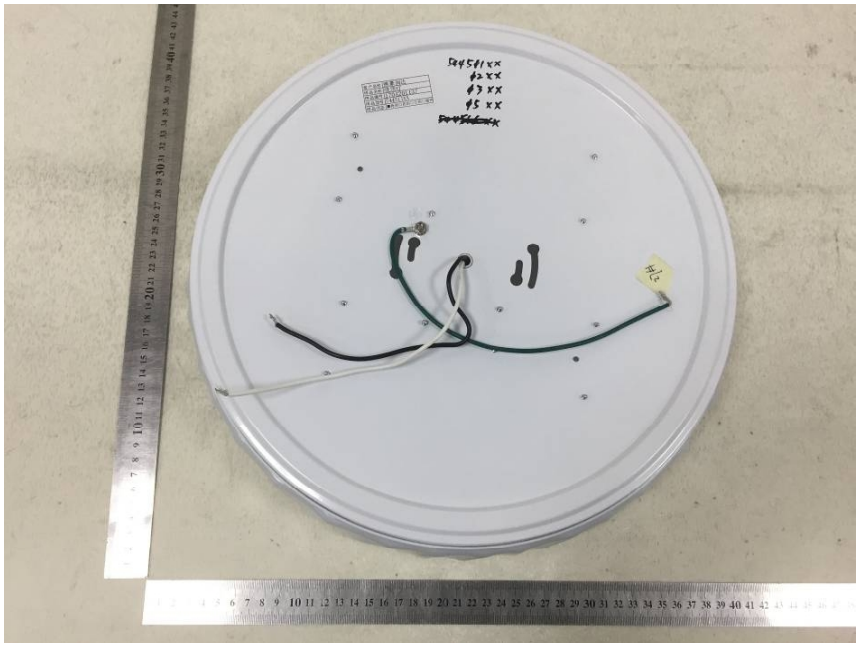
4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	317.370	317.370	317.370	317.370	317.370	317.370	317.370
5	316.006	315.919	316.050	316.117	316.140	316.009	316.493
10	313.016	312.843	313.126	313.085	313.042	313.001	313.553
15	309.277	309.217	309.410	309.151	309.286	309.291	309.779
20	304.659	304.163	304.353	304.229	304.278	304.285	304.689
25	297.798	297.328	297.471	297.482	297.600	297.765	298.371
30	288.870	288.802	289.094	288.890	288.814	288.961	289.814
35	278.710	278.210	278.298	278.276	278.358	278.511	278.801
40	265.999	265.750	265.721	265.728	265.837	265.865	266.120
45	251.178	251.026	251.539	251.356	251.317	251.485	251.552
50	234.377	234.369	234.696	234.611	234.908	234.778	234.835
55	216.388	216.437	216.732	216.657	216.588	216.534	216.933
60	196.069	196.571	196.504	196.659	196.533	196.380	196.661
65	174.518	175.145	175.110	175.035	175.380	174.689	174.942
70	153.011	152.950	153.210	153.257	152.908	152.735	153.091
75	130.889	130.820	131.025	131.392	131.008	130.693	130.712
80	110.701	110.581	110.642	110.691	110.777	110.649	110.222
85	93.768	93.770	94.041	93.726	93.819	93.547	93.856
90	83.389	83.419	83.531	83.639	83.538	83.097	83.238
95	79.386	79.398	79.596	79.684	79.409	79.123	79.026
100	77.363	77.376	77.639	77.728	77.432	77.126	77.139
105	75.780	75.794	76.033	76.146	75.828	75.545	75.516
110	73.669	73.750	74.011	73.970	73.741	73.437	73.629
115	71.250	71.267	71.482	71.377	71.303	70.956	71.084
120	68.611	68.498	68.580	68.630	68.425	68.124	68.188
125	65.488	65.399	65.523	65.487	65.328	64.963	65.029
130	62.058	61.817	62.005	61.949	61.814	61.340	61.474
135	57.880	57.950	58.201	58.126	57.794	57.454	57.613
140	53.569	53.598	53.892	53.796	53.598	53.283	53.532
145	49.127	49.159	49.318	49.247	49.183	48.914	49.144
150	44.465	44.413	44.503	44.457	44.284	44.150	44.230
155	39.495	39.512	39.446	39.556	39.430	39.210	39.403
160	34.525	34.568	34.477	34.414	34.487	34.314	34.445
165	29.248	29.293	29.244	29.052	29.237	29.353	29.222
170	23.970	23.865	23.813	23.844	23.658	23.776	23.694
175	19.572	19.646	19.503	19.580	19.550	19.517	19.306
180	18.549	18.549	18.549	18.549	18.549	18.549	18.549

Appendix 1 Product Photo



Picture 1



Picture 2

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	LCZP17040297
Laboratory contact name	Richard Li

Product Information

Applicant	ELEC-TECH INTERNATIONAL CO LTD	
Brand name	Hampton Bay	
Model number	544513##(##=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	2.76	in.
Luminaire length	14.96	in.
Luminaire width	14.96	in.
Number of units(modular products)	N/A	

Electrical Measurements	**Integrating sphere output**	**Goniophotometer Output**	
Input wattage	21.95	21.95	W
Input current	0.205	0.206	A
Input voltage(AC)	120.00	120.02	V
Power factor	0.893	0.890	
Off-state power	0.0	0.0	W
Photometric Characteristics			
Total initial lumen output	1631.30	1634.22	lm
Initial luminaire efficacy	74.32	74.45	lm/W
Correlated color temperature / CCT	3065	K	
Color rendering index/CRI	84.6		
R9value	15		
Duv	-0.0010		

Luminous Intensity Distribution		**Goniophotometer Output**	
Center beam candle power(if applicable)	--	317.370	cd
Beam angle(if applicable)		137.4	°
Zonallumensinthe0°-60°zone		49.98	%
Zonal lumens in the60°-90° zone		31.32	%
Zonallumensinthe90°-120°zone		17.53	%
Zonallumensinthe120°-180°zone		9.98	%

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