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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.:

544362##(##=41-50)

(Where ## denotes CCT and could be 41-50 identifies 4000K)

**Test Date:** Jan. 4, 2017 to Jan. 5, 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**

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**Template No.:** LC-RT-PL/LM79-08/01

**Test Note:**

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**Complied by:**

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**Jan. 9, 2017**

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**Reviewed by:**

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**Jan. 9, 2017**

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## 1. General

### 1.1 Product Information

Brand Name	Commercial Electric
Product Type	LED Ceiling Light
Model Number	544362##(##=41-50)
Rated Inputs	120-277V,50/ 60Hz
Rated Power	14W
Rated Light output	1000lm
Declared CCT	4000K
Power Supply	LED Driver
LED Package, Array or Module	Model: SPMWHx229xxxxxxxx, manufactured by SAMSUNG ELECTRONICS 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ; 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.

### 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)	0.119	0.118
Total Power(W)	13.95	13.92
Power Factor	0.981	0.980
I-THD	-	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	1141.80	1150.01
Luminaire Efficacy(Lm/W)	81.85	82.62
Correlated Color Temperature (CCT)(K)	4021	-
Color Rendering Index (CRI)	84.7	-
R9	14	-
Chromaticity Coordinate (x,y)	x = 0.3802 y = 0.3790	-
Chromaticity Coordinate (u,v)	u = 0.2241 v = 0.3350	-
Chromaticity Coordinate (u',v')	u' = 0.2241 v' = 0.5025	-
Duv	0.0011	-
Zone Lumens between 0-60 °	-	52.0%

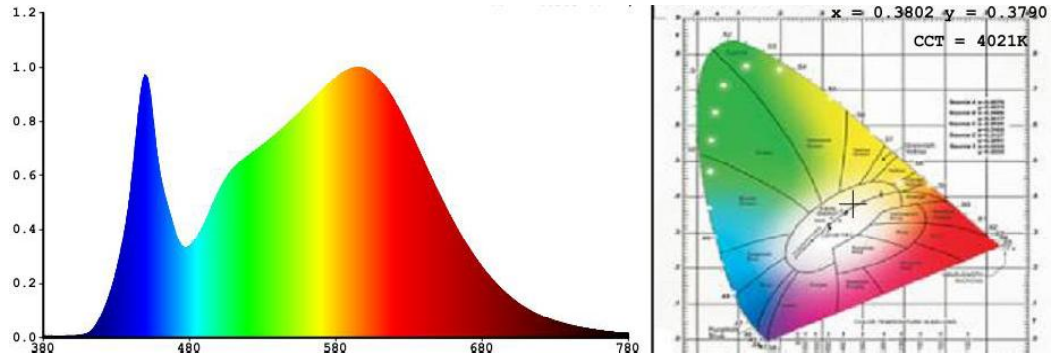
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
83	90	96	84	83	87	87	67
R9	R10	R11	R12	R13	R14	R15	-
14	77	83	69	85	98	77	-

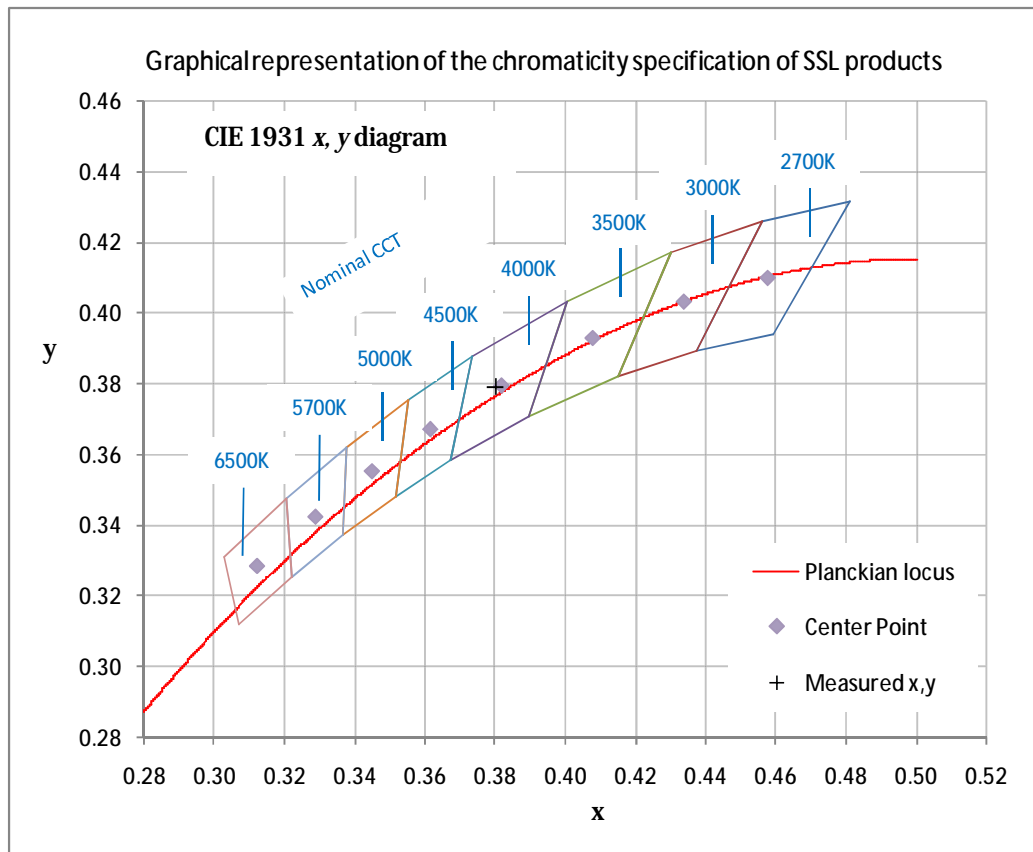
Note: N.A.

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram





**4.3 Goniometry Test Data**

CIE Type	Direct	Basic Luminous Shape	Circular w/ Sides
Spacing Criteria (0-180)	1.32	Luminous Length	0.29 m (Diameter)
Spacing Criteria (90-270)	1.32	Luminous Width	0.29 m (Diameter)
Spacing Criteria (Diagonal)	1.46	Luminous Height	0.05 m
Test Distance	29.65 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	90.45	7.90	7.90
0-30	193.96	16.90	16.90
0-40	322.27	28.00	28.00
0-60	597.44	52.00	52.00
0-80	809.70	70.40	70.40
0-90	878.55	76.40	76.40
10-90	855.28	74.40	74.40
20-40	231.82	20.20	20.20
20-50	371.14	32.30	32.30
40-70	394.14	34.30	34.30
60-80	212.26	18.50	18.50
70-80	93.29	8.10	8.10
80-90	68.86	6.00	6.00
90-110	102.95	9.00	9.00
90-120	146.02	12.70	12.70
90-130	183.34	15.90	15.90
90-150	239.26	20.80	20.80
90-180	271.45	23.60	23.60
110-180	168.50	14.70	14.70
0-180	1150.01	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

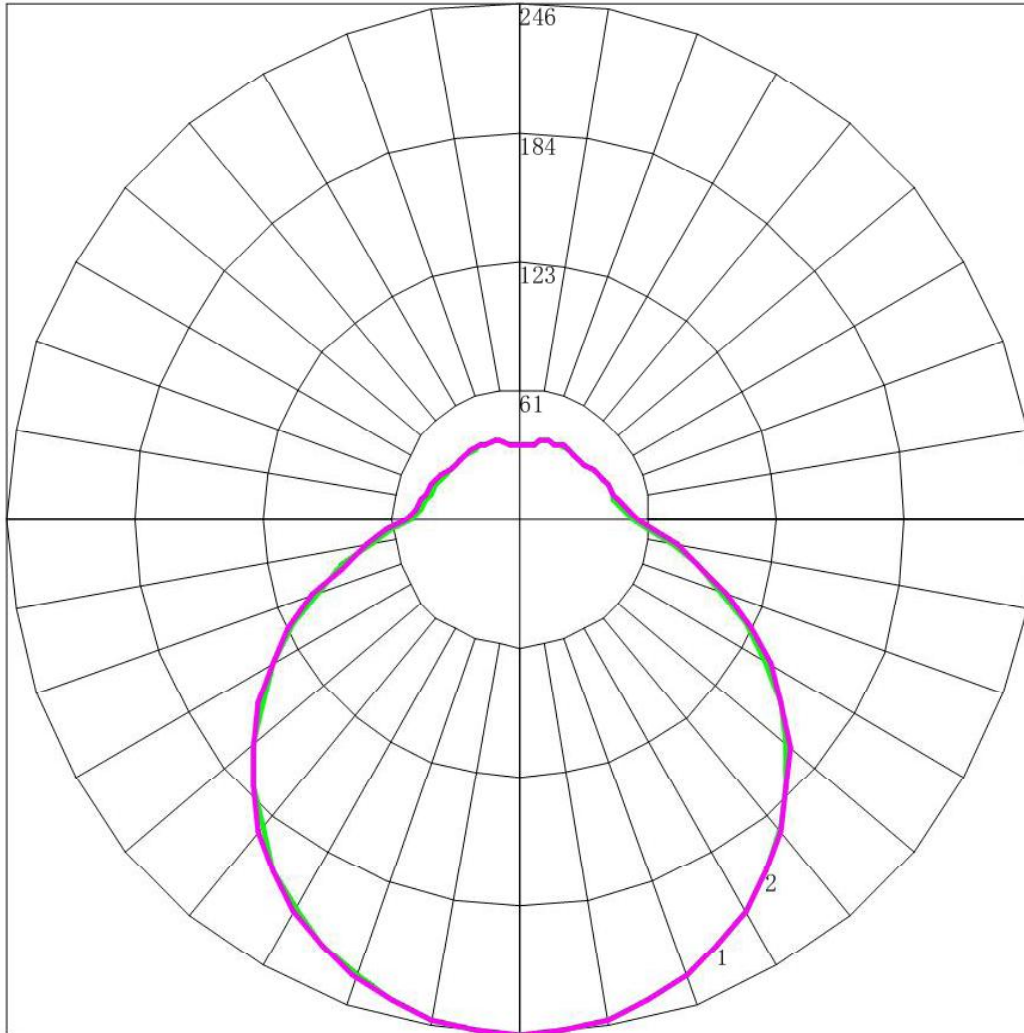
Zone	Lumens
0-10	23.28
10-20	67.17
20-30	103.51
30-40	128.31
40-50	139.33
50-60	135.84
60-70	118.97
70-80	93.29
80-90	68.86
90-100	54.66
100-110	48.29
110-120	43.07
120-130	37.32
130-140	31.13
140-150	24.79
150-160	18.00
160-170	10.83
170-180	3.36





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4.5 Polar Curves



Maximum Candela = 245.632 Located At Horizontal Angle = 0, Vertical Angle = 0  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



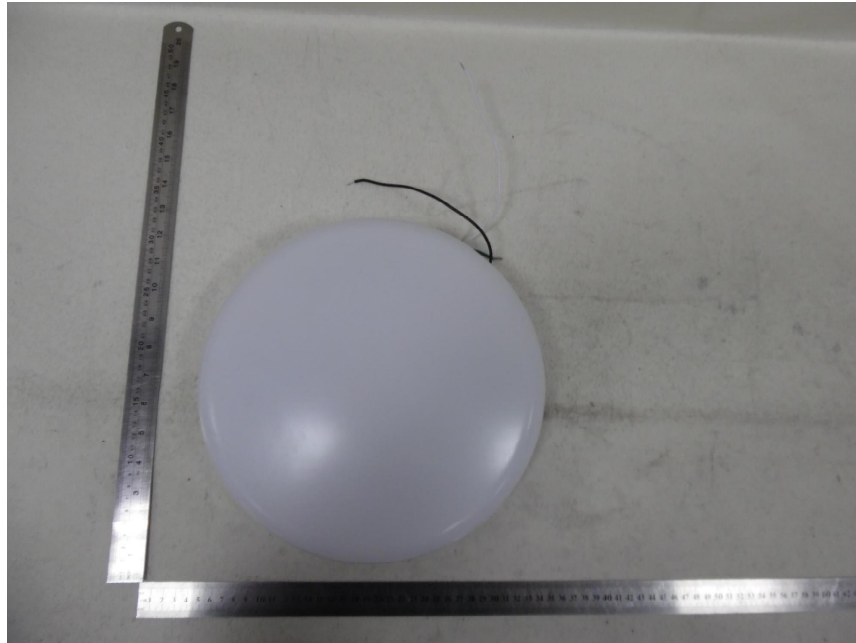
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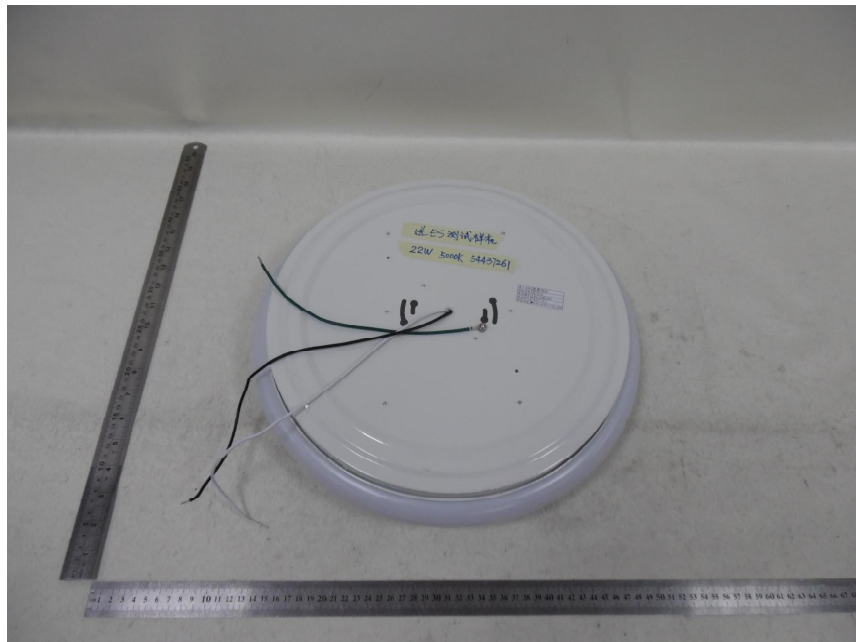
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	245.632	245.632	245.632	245.632	245.632	245.632	245.632
<b>5</b>	245.192	244.754	244.534	244.534	244.534	244.973	244.755
<b>10</b>	242.551	241.897	241.898	242.117	242.117	242.337	242.562
<b>15</b>	237.708	237.504	237.723	237.723	237.723	237.943	238.175
<b>20</b>	231.986	231.571	231.791	231.791	232.011	232.011	232.473
<b>25</b>	224.062	223.882	224.321	224.321	224.541	224.760	225.016
<b>30</b>	214.818	214.874	215.093	215.313	215.753	215.753	215.805
<b>35</b>	204.693	204.329	204.547	204.986	205.207	205.207	205.278
<b>40</b>	192.808	192.684	192.683	193.342	193.342	194.002	194.312
<b>45</b>	180.042	179.500	180.160	180.379	180.819	181.258	181.154
<b>50</b>	165.956	165.659	166.099	166.538	166.978	167.636	167.556
<b>55</b>	150.989	151.159	151.379	151.598	152.257	152.696	153.081
<b>60</b>	135.582	135.120	135.780	136.219	136.658	137.317	137.291
<b>65</b>	118.854	119.301	119.522	119.741	120.400	121.278	121.500
<b>70</b>	102.567	102.604	103.043	103.922	104.141	104.580	105.271
<b>75</b>	87.160	86.785	87.444	87.664	88.323	88.541	89.480
<b>80</b>	72.633	72.504	72.944	73.603	74.263	74.700	75.444
<b>85</b>	61.188	61.299	61.520	62.398	62.838	63.275	63.601
<b>90</b>	53.264	53.390	53.609	54.270	54.709	55.145	55.706
<b>95</b>	48.862	48.776	48.996	49.435	49.655	50.532	50.881
<b>100</b>	46.221	46.359	46.359	47.019	47.458	47.676	48.249
<b>105</b>	44.900	44.601	45.260	45.481	45.920	46.358	46.495
<b>110</b>	44.020	43.722	44.162	44.382	44.602	45.039	45.179
<b>115</b>	42.699	42.843	43.063	43.504	43.723	43.721	43.863
<b>120</b>	41.819	42.185	42.185	42.185	42.624	42.843	42.986
<b>125</b>	41.379	41.305	41.306	41.745	41.745	41.964	41.670
<b>130</b>	40.498	40.426	40.427	40.866	41.086	40.865	40.792
<b>135</b>	40.058	39.987	40.207	39.988	40.207	40.206	40.354
<b>140</b>	39.618	39.547	39.547	39.547	39.767	40.206	40.354
<b>145</b>	39.618	39.108	39.547	39.328	39.328	39.547	39.915
<b>150</b>	39.178	38.888	39.108	39.327	39.108	39.327	39.477
<b>155</b>	38.297	38.668	38.448	38.668	39.108	39.108	39.038
<b>160</b>	38.738	38.668	38.668	38.668	38.889	38.888	39.038
<b>165</b>	38.738	38.888	38.448	38.668	39.107	38.889	39.038
<b>170</b>	36.096	35.812	36.031	36.032	35.812	35.813	35.968
<b>175</b>	34.776	34.494	34.714	34.494	34.494	34.274	34.652
<b>180</b>	36.032	36.032	36.032	36.032	36.032	36.032	36.032

### Appendix 1 Product Photo



Picture 1



Picture 2



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**Attachment 2**

**U.S. Department of Energy  
Lighting Facts<sup>CM</sup> Uniform LM-79 Reporting Template**

**Laboratory Information**

Name of test lab	LCTECH (Zhongshan) Testing Service Co.,Ltd
Date of test report	Jan. 9, 2017
Test report number	LCZP16120484
Laboratory contact name	Richard Li

**Product Information**

Manufacturer	Elec-Tech International Co., Ltd	
Brand name	Commercial Electric	
Model number	544362##(##=41-50)	
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	11.42	in.
Luminaire width	11.42	in.
Number of units(modular products)	N/A	

Electrical Measurements	Integrating sphere output	Goniophotometer Output	
Input wattage	13.95	13.92	W
Input current	0.119	0.118	A
Input voltage(AC)	120.00	120.00	V
Power factor	0.981	0.980	
Off-state power	0.0	0.0	W

**Photometric Characteristics**

Total initial lumen output	1141.80	1150.01	lm
Initial luminaire efficacy	81.85	82.62	lm/W
Correlated color temperature / CCT	4021	K	
Color rendering index/CRI	84.7		
Rgvalue	14		
Duv	0.00111		

Luminous Intensity Distribution		Goniophotometer Output	
Center beam candle power(if applicable)		245.632	cd
Beam angle(if applicable)		127.6	°
Zonallumensinthe0°-60°zone	--	52.0	%
Zonal lumens in the60°-90° zone		24.4	%
Zonallumensinthe90°-120°zone		12.7	%
Zonallumensinthe120°-180°zone		10.9	%

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