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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##(##=01-10)

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

**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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**Jan. 10, 2017**

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**Jan. 10, 2017**

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## 1. General

### 1.1 Product Information

Brand Name	Commercial Electric
Product Type	LED Ceiling Light
Model Number	544362##(##=01-10)
Rated Inputs	120-277V,50/ 60Hz
Rated Power	14W
Rated Light output	980lm
Declared CCT	2700K
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	120.05 V~60Hz
Input Current(A)	0.119	0.119
Total Power(W)	13.96	13.93
Power Factor	0.980	0.979
I-THD	-	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	975.60	983.53
Luminaire Efficacy(Lm/W)	69.89	70.61
Correlated Color Temperature (CCT)(K)	2727	-
Color Rendering Index (CRI)	83.3	-
R9	12	-
Chromaticity Coordinate (x,y)	x = 0.4561 y = 0.4073	-
Chromaticity Coordinate (u,v)	u = 0.2615 v = 0.3503	-
Chromaticity Coordinate (u',v')	u' = 0.2615 v' = 0.5255	-
Duv	-0.00089	-
Zone Lumens between 0-60 °	-	52.0%

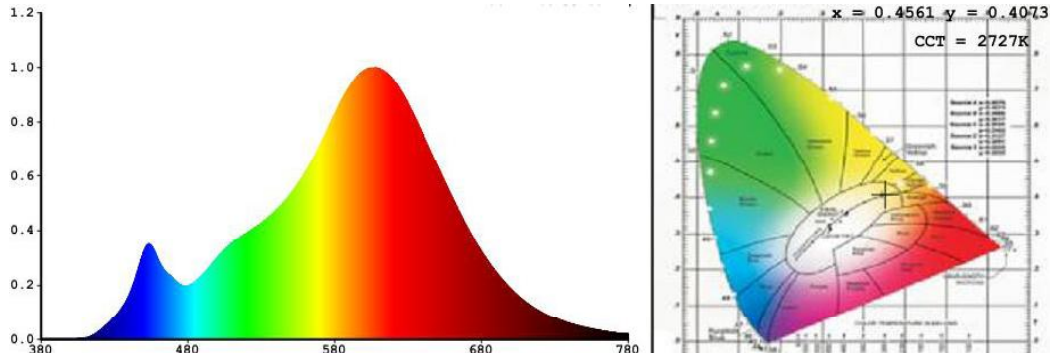
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
82	94	93	81	83	93	81	59
R9	R10	R11	R12	R13	R14	R15	-
12	86	81	82	85	97	75	-

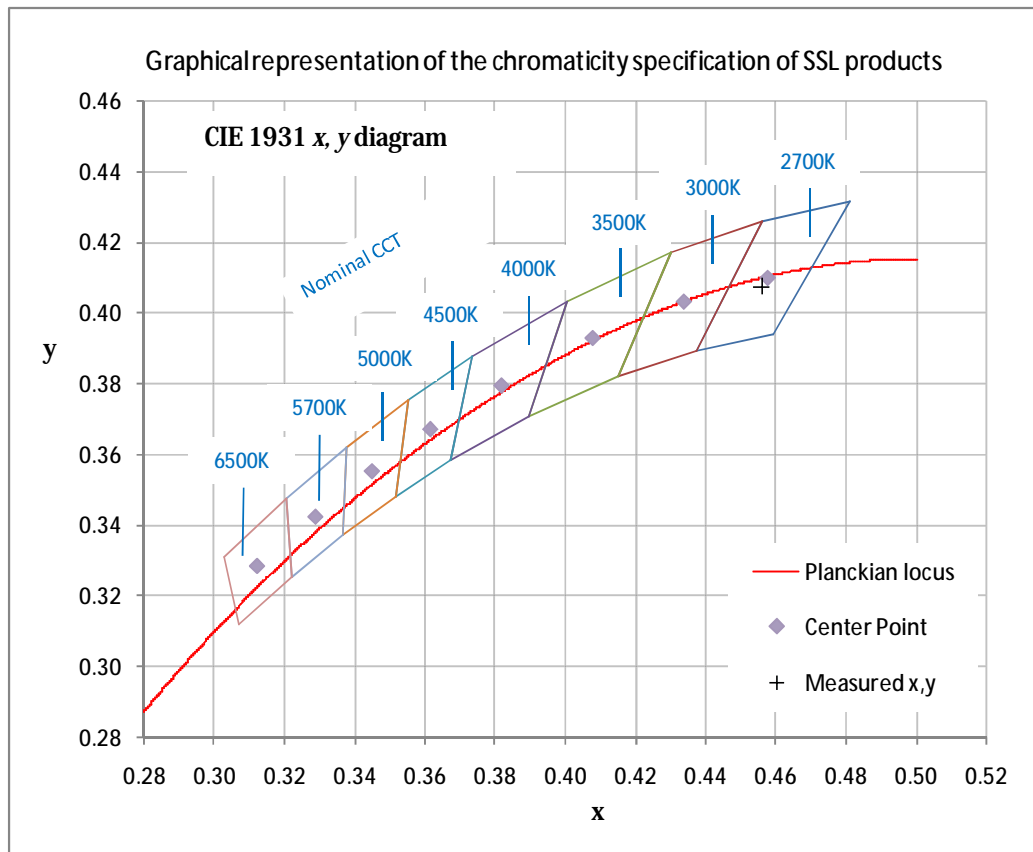
Note: N.A.

## 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)	1.32	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	77.37	7.90	7.90
0-30	165.88	16.90	16.90
0-40	275.63	28.00	28.00
0-60	510.99	52.00	52.00
0-80	692.51	70.40	70.40
0-90	751.36	76.40	76.40
10-90	731.45	74.40	74.40
20-40	198.26	20.20	20.20
20-50	317.43	32.30	32.30
40-70	337.14	34.30	34.30
60-80	181.51	18.50	18.50
70-80	79.74	8.10	8.10
80-90	58.86	6.00	6.00
90-110	88.04	9.00	9.00
90-120	124.89	12.70	12.70
90-130	156.78	15.90	15.90
90-150	204.60	20.80	20.80
90-180	232.17	23.60	23.60
110-180	144.13	14.70	14.70
0-180	983.53	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

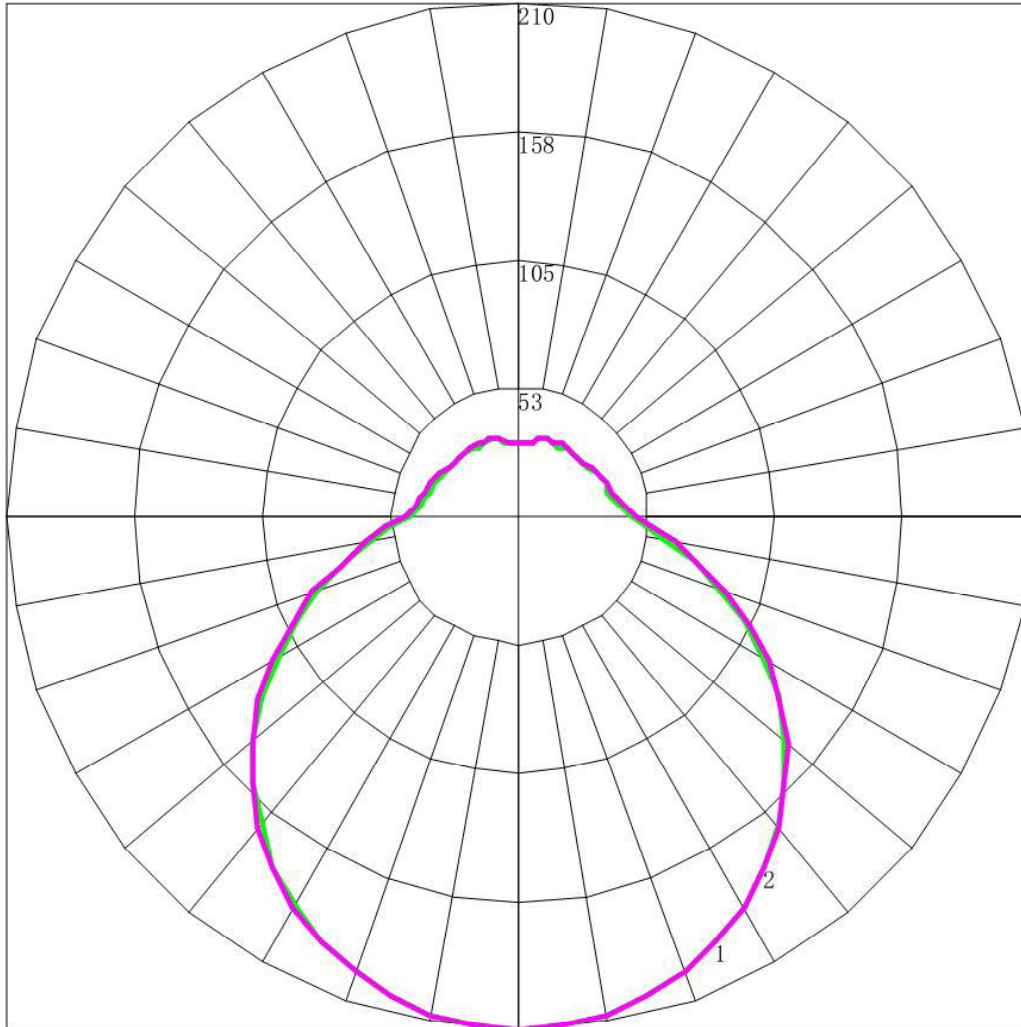
Zone	Lumens
0-10	19.91
10-20	57.46
20-30	88.51
30-40	109.75
40-50	119.18
50-60	116.19
60-70	101.77
70-80	79.74
80-90	58.86
90-100	46.72
100-110	41.31
110-120	36.86
120-130	31.89
130-140	26.61
140-150	21.21
150-160	15.42
160-170	9.27
170-180	2.88





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4.5 Polar Curves



Maximum Candela = 210.091 Located At Horizontal Angle = 0, Vertical Angle = 0

# 1 - Vertical Plane Through Horizontal Angles (0 - 180)

# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



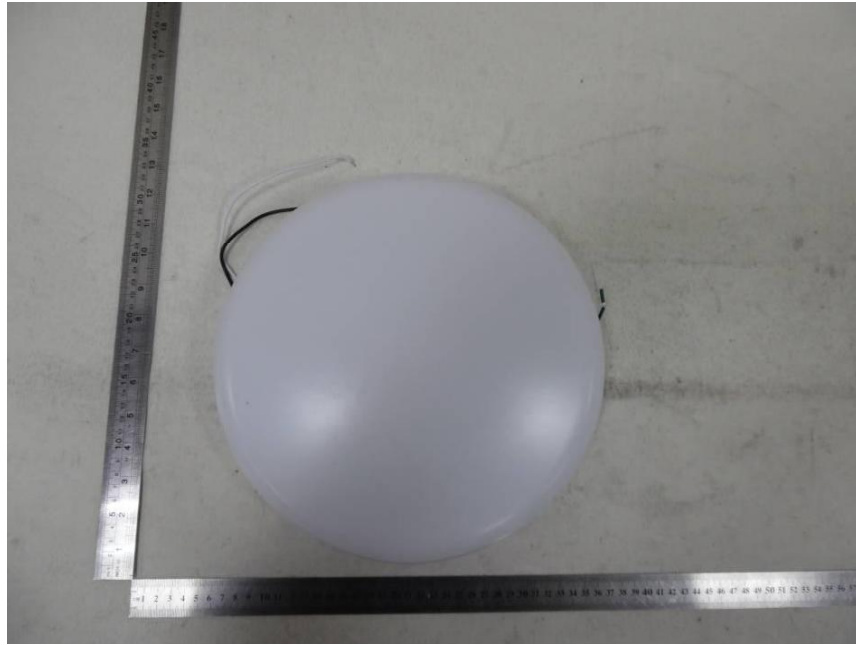
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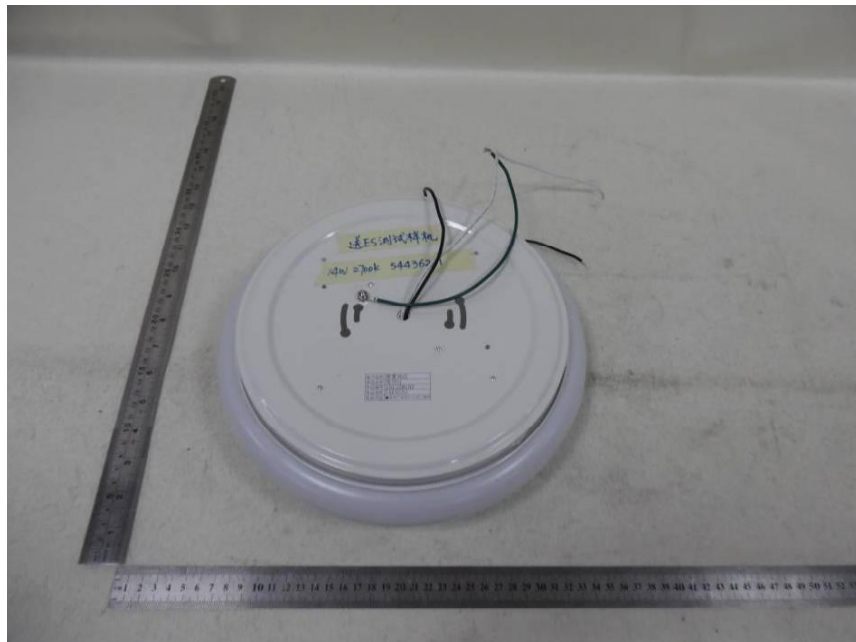
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
<b>0</b>	210.091	210.091	210.091	210.091	210.091	210.091	210.091
<b>5</b>	209.344	209.431	209.234	209.388	209.278	209.497	209.258
<b>10</b>	207.058	207.101	206.993	207.036	207.147	207.234	207.286
<b>15</b>	203.146	203.319	203.302	203.432	203.455	203.586	203.561
<b>20</b>	198.048	198.241	198.160	198.399	198.468	198.509	198.434
<b>25</b>	191.323	191.557	191.701	191.829	192.030	192.158	192.079
<b>30</b>	183.720	183.885	183.923	184.225	184.428	184.643	184.542
<b>35</b>	174.797	174.805	174.849	175.259	175.464	175.720	175.514
<b>40</b>	164.732	164.823	165.049	165.479	165.599	165.875	165.873
<b>45</b>	153.656	153.787	153.998	154.294	154.679	155.085	154.829
<b>50</b>	141.613	141.805	142.089	142.493	142.792	143.350	143.303
<b>55</b>	128.911	129.251	129.456	129.790	130.356	130.669	130.638
<b>60</b>	115.638	115.796	116.075	116.451	116.998	117.484	117.360
<b>65</b>	101.617	101.990	102.211	102.584	103.178	103.683	103.687
<b>70</b>	87.728	87.875	88.128	88.717	89.138	89.552	89.839
<b>75</b>	74.147	74.244	74.549	74.983	75.626	75.927	76.253
<b>80</b>	61.972	62.043	62.333	62.896	63.454	63.774	64.202
<b>85</b>	52.303	52.413	52.710	53.293	53.676	54.083	54.429
<b>90</b>	45.490	45.642	45.921	46.370	46.799	47.160	47.505
<b>95</b>	41.535	41.684	41.856	42.305	42.713	43.029	43.385
<b>100</b>	39.381	39.486	39.747	40.173	40.559	40.919	41.150
<b>105</b>	38.194	38.386	38.626	38.964	39.285	39.600	39.792
<b>110</b>	37.447	37.507	37.725	37.997	38.362	38.568	38.696
<b>115</b>	36.656	36.693	36.890	37.096	37.330	37.491	37.601
<b>120</b>	35.821	35.924	36.099	36.173	36.429	36.590	36.637
<b>125</b>	35.250	35.308	35.374	35.470	35.638	35.733	35.760
<b>130</b>	34.722	34.737	34.715	34.898	34.935	35.030	35.103
<b>135</b>	34.107	34.143	34.210	34.239	34.341	34.480	34.533
<b>140</b>	33.799	33.857	33.792	33.909	34.012	34.129	34.226
<b>145</b>	33.579	33.527	33.704	33.733	33.814	33.997	34.007
<b>150</b>	33.272	33.330	33.441	33.557	33.660	33.755	33.744
<b>155</b>	32.920	33.000	33.111	33.162	33.331	33.491	33.481
<b>160</b>	33.052	33.110	33.111	33.250	33.309	33.360	33.525
<b>165</b>	33.140	33.132	32.957	33.096	33.462	33.426	33.394
<b>170</b>	30.986	30.911	30.650	30.854	30.738	30.745	30.720
<b>175</b>	29.580	29.592	29.705	29.514	29.464	29.272	29.581
<b>180</b>	30.753	30.753	30.753	30.753	30.753	30.753	30.753

### 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. 10, 2017
Test report number	LCZP16120483
Laboratory contact name	Richard Li

**Product Information**

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

Electrical Measurements	Integrating sphere output	Goniophotometer Output	
Input wattage	13.96	13.93	W
Input current	0.119	0.119	A
Input voltage(AC)	120.00	120.05	V
Power factor	0.980	0.979	
Off-state power	0.0	0.0	W

Photometric Characteristics			
Total initial lumen output	975.60	983.53	lm
Initial luminaire efficacy	69.89	70.61	lm/W
Correlated color temperature / CCT	2727	K	
Color rendering index/CRI	83.3		
Rgvalue	12		
Duv	-0.00082		

Luminous Intensity Distribution		Goniophotometer Output	
Center beam candle power(if applicable)		210.091	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\*\*\*\*