

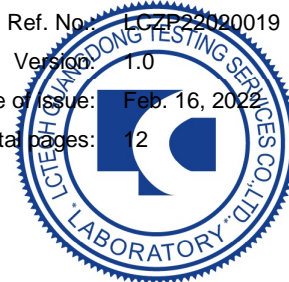


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Test report of

## IES LM-79-08

**Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products**

Rendered to:

**ETI Solid State Lighting (Zhuhai) Ltd**

No.1, Zhongzhu Road South, Science & Technology Innovation Coast, High Tech District, Zhuhai

City, Guangdong Prov., China

**NVC VIETNAM TECHNOLOGY AND LIGHTING COMPANY LIMITED**

Lot CN23-1, Yen Phong Industrial park, Dong Phong commune, Yen Phong district, Bac Ninh

province VIETNAM

For products:

**LED Ceiling Light**

Models No.:

**564211###(##=41-50, #=0-9)**

(The product is 4000K luminaire, ## can be 41-50, # can be 0-9 and represent different client and sales districts.)

**Test Date:** Jan. 19, 2021 to Jan. 20, 2021

**Test Lab.:** **LCTECH Guangdong Testing Services Co., Ltd.**

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**Template No.:** LC-RT-PL-001 Rev.1.4

**Test Note:** *This report was based on LCZP21010060 except adding the ETI brand.*

**Complied by:**

**Fish Tan**

**Feb. 16, 2022**

*Fish Tan*

**Reviewed by:**

**Lin Qiu**

**Feb. 16, 2022**

*Lin Qiu*

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## 1. General

### 1.1 Product Information

Brand Name	Commercial Electric, Hampton Bay, ETI
Product Type	LED Ceiling Light
Model Number	564211###(##=41-50, #=0-9)
Rated Inputs	120VAC, 60Hz
Rated Power	7W
Rated Light output	650lm
Declared CCT	4000K
Power Supply	ETI-AD00700050135SNA
LED Package, Array or Module	SPMWH1229AQ5SGT*SM, Samsung Electronics Co., LTD.
Receipt Samples	1 unit
Sample Code of lab.	210116106001
Date of Receipt Samples	Jan. 16, 2021
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 or 2015 or 2017	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-987	APW-120N	2020-12-23	2021-12-22
AC Power supply	LC-I-989	APW-120N	2020-12-23	2021-12-22
Power analyzer	LC-I-928	WT210	2020-12-25	2021-12-24
Power analyzer	LC-I-954	WT210	2020-12-25	2021-12-24
Multimeter	LC-I-972	FLUKE	2020-07-20	2021-07-19
Photometric colorimetric electric system* (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp**	LC-PL-I-011	D204C	2020-07-14	2021-07-13
Luminous Flux Standard Lamp***	LC-PL-I-003	24V/100W	2020-07-14	2021-07-13
Goniophotometer(with mirror)	LC-I-902	GMS-2000	2020-04-23	2021-04-22
Wireless temperature transmitter	LC-I-PL-009	DWLR-DLR	2020-12-24	2021-12-23
Wireless temperature transmitter	LC-I-PL-008	DWLR-DLR	2020-12-24	2021-12-23

Note:

\* Bandwidth of spectroradiometer is 1 nm.

\*\* halogen lamp, 100W, omni-directional type, and its traceability to NIM.

\*\*\* halogen lamp, 100W, omni-directional type, and its traceability to NIM.

## 2. Test conducted and method

The lamp/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.

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.

### 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	120.01 V~60Hz	120.06 V~60Hz
Input Current(A)	0.065	0.065
Total Power(W)	6.63	6.62
Power Factor	0.849	0.848
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	732.21
Luminaire Efficacy(lm/W)	-	110.61
Correlated Color Temperature (CCT)(K)	3908	-
Color Rendering Index (CRI)	86.2	-
R9	23	-
Chromaticity Coordinate (x,y)	x = 0.3848 y = 0.3799	-
Chromaticity Coordinate (u,v)	u = 0.2267 v = 0.3357	-
Chromaticity Coordinate (u',v')	u' = 0.2267 v' = 0.5036	-
Duv	0.0002	-
Zone Lumens between 0-60 °	-	62.76 %
Beam Angle(50%Imax)	-	C0/180= 127.8° C90/270= 115.4°

#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
85	93	97	84	85	90	87	69
R9	R10	R11	R12	R13	R14	R15	-
23	82	84	66	88	99	80	-

Note: N/A

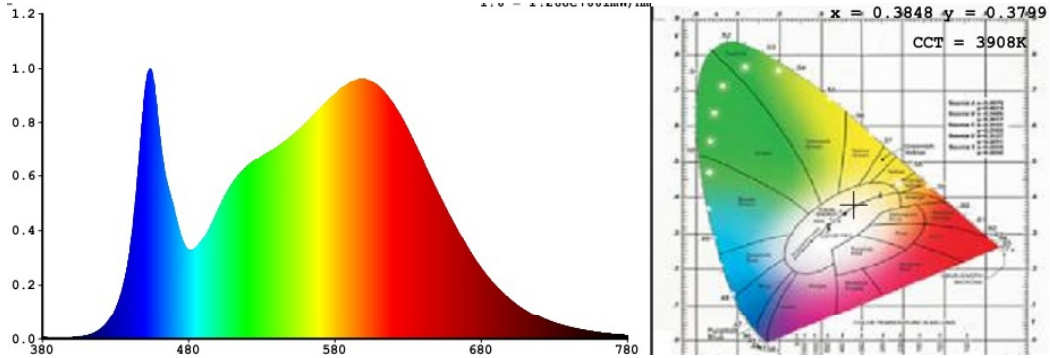


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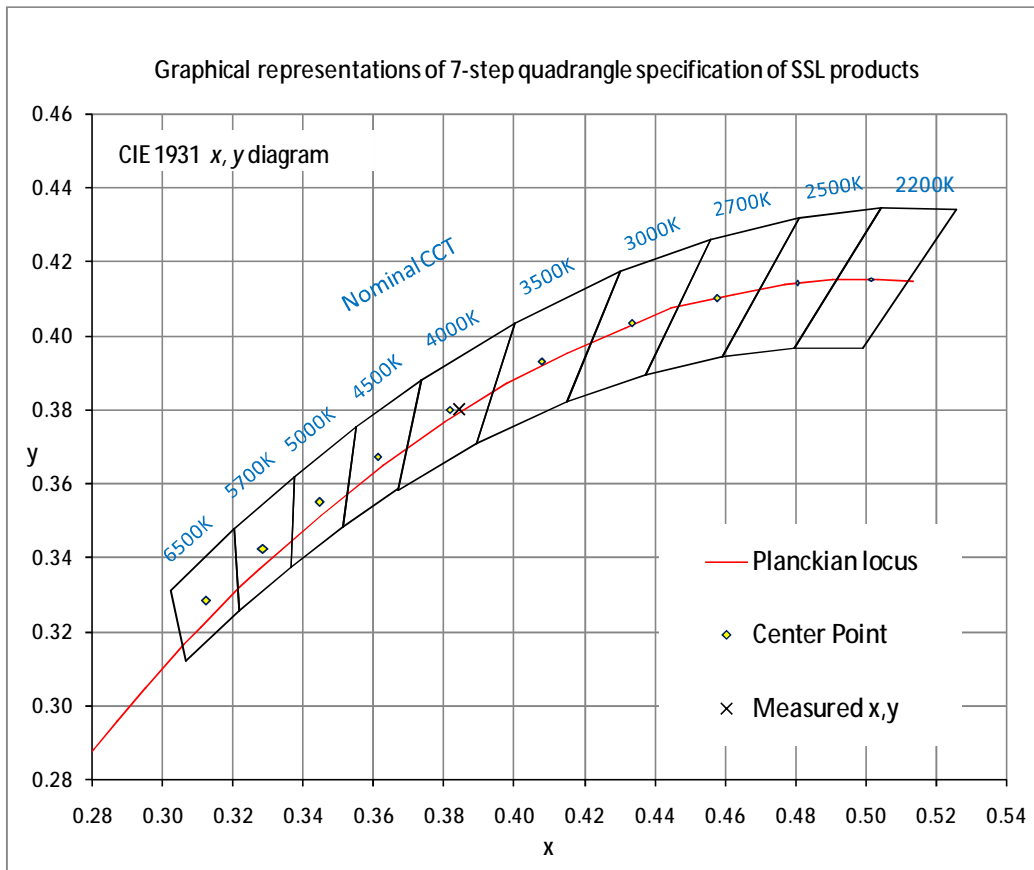


### 4. Test Data

#### 4.1 Spectral Distribution



#### 4.2 ANSI Chromaticity Quadrangles Diagram





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**4.3 Goniometry Test Data**

CIE Type	Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.14	Luminous Length	0.06 m
Spacing Criteria (90-270)	1.30	Luminous Width	0.08 m
Spacing Criteria (Diagonal)	1.40	Luminous Height	0.03 m
Test Distance	30.13 m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	72.88	10.00	10.00
0-30	154.37	21.10	21.10
0-40	252.96	34.50	34.50
0-60	459.55	62.80	62.80
0-80	617.61	84.30	84.30
0-90	664.89	90.80	90.80
10-90	646.03	88.20	88.20
20-40	180.08	24.60	24.60
20-50	285.15	38.90	38.90
40-70	295.50	40.40	40.40
60-80	158.06	21.60	21.60
70-80	69.15	9.40	9.40
80-90	47.28	6.50	6.50
90-110	54.11	7.40	7.40
90-120	64.09	8.80	8.80
90-130	66.44	9.10	9.10
90-150	67.12	9.20	9.20
90-180	67.31	9.20	9.20
110-180	13.20	1.80	1.80
0-180	732.21	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

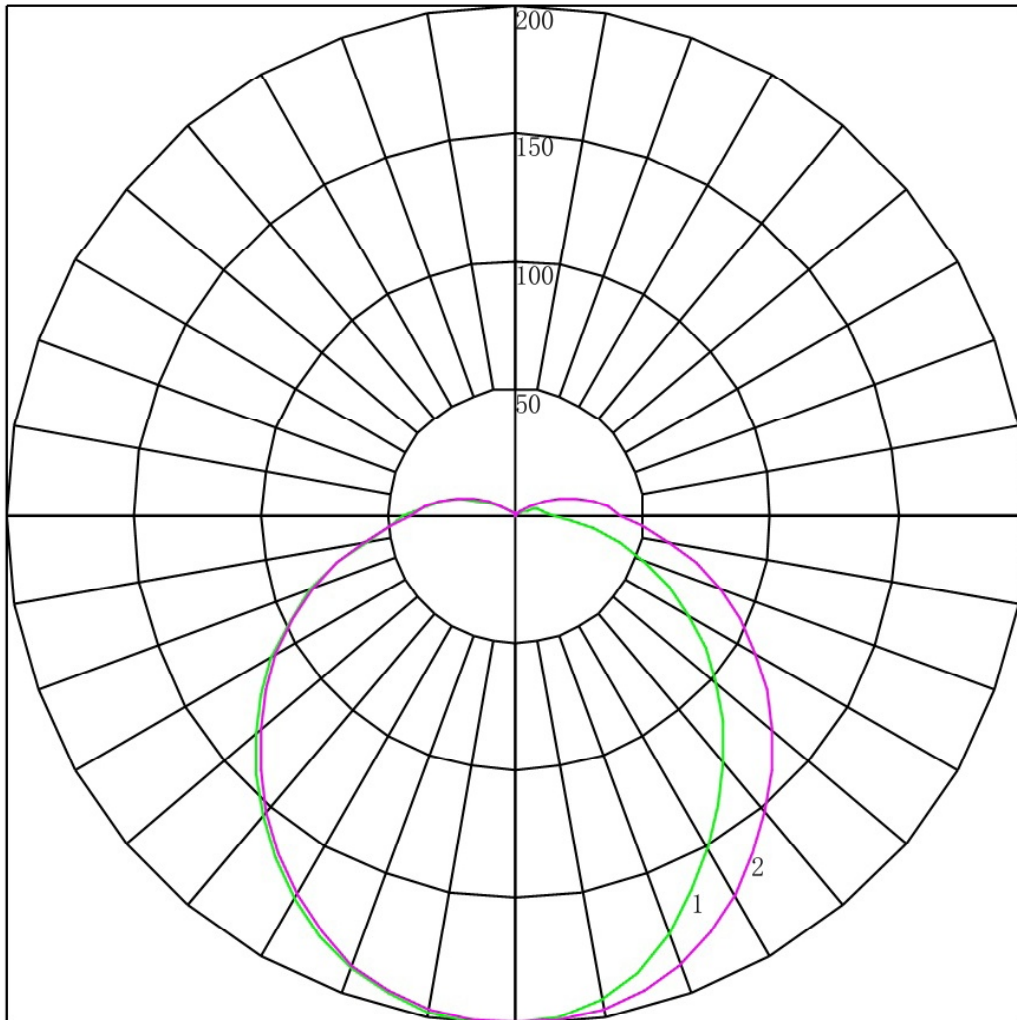
Zone	Lumens
0-10	18.86
10-20	54.02
20-30	81.49
30-40	98.59
40-50	105.08
50-60	101.52
60-70	88.90
70-80	69.15
80-90	47.28
90-100	32.75
100-110	21.36
110-120	9.98
120-130	2.35
130-140	0.48
140-150	0.20
150-160	0.09
160-170	0.08
170-180	0.03





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4.5 Polar Curves



Maximum Candela = 199.706 Located At Horizontal Angle = 180, Vertical Angle = 5

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

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



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**4.6 Candela Tabulation**

	<b>0</b>	<b>15</b>	<b>30</b>	<b>45</b>	<b>60</b>	<b>75</b>	<b>90</b>	<b>105</b>	<b>120</b>	<b>135</b>
<b>0</b>	199.069	199.069	199.069	199.069	199.069	199.069	199.069	199.069	199.069	199.069
<b>5</b>	197.158	196.933	197.027	197.751	197.934	198.388	198.934	198.705	198.978	199.387
<b>10</b>	192.882	193.070	193.396	194.523	195.526	196.663	197.089	196.708	197.433	197.887
<b>15</b>	185.513	185.843	186.905	189.477	191.075	192.716	193.309	192.941	193.618	194.477
<b>20</b>	174.595	175.617	178.281	181.703	184.807	187.133	187.550	187.220	188.031	188.658
<b>25</b>	162.403	163.936	167.887	172.883	176.814	179.690	180.125	179.958	180.900	181.975
<b>30</b>	150.303	151.983	156.585	162.836	167.321	170.975	171.711	171.335	174.818	173.747
<b>35</b>	138.202	140.166	145.329	151.744	157.147	161.351	162.081	161.941	163.551	164.655
<b>40</b>	126.465	128.440	133.709	140.378	145.837	150.730	151.912	152.047	154.059	154.563
<b>45</b>	114.820	116.577	121.772	128.649	134.618	139.880	141.247	141.565	143.659	146.929
<b>50</b>	102.355	104.579	109.427	116.375	123.080	128.532	130.358	130.900	133.304	133.970
<b>55</b>	90.436	92.216	97.444	104.418	111.361	117.410	119.648	120.371	122.404	123.378
<b>60</b>	78.427	79.945	85.098	92.598	99.461	105.879	108.309	109.025	110.958	111.877
<b>65</b>	66.235	67.674	73.025	80.733	87.878	94.578	96.925	97.224	99.103	99.602
<b>70</b>	53.680	55.629	60.952	68.368	76.069	82.685	84.865	85.241	86.976	87.282
<b>75</b>	41.943	43.767	49.197	56.684	64.442	71.021	72.806	72.713	74.441	74.417
<b>80</b>	30.752	32.359	37.668	45.455	52.724	59.040	60.747	60.505	61.860	61.916
<b>85</b>	21.563	23.133	28.182	35.500	42.232	47.828	49.632	49.612	50.779	50.642
<b>90</b>	15.285	16.679	21.329	27.862	33.920	38.977	41.353	41.898	42.831	42.596
<b>95</b>	12.374	13.589	17.879	23.635	28.970	33.440	35.863	36.314	36.972	36.868
<b>100</b>	10.372	11.543	15.384	20.363	24.929	28.632	30.418	30.093	30.748	30.821
<b>105</b>	8.552	9.498	12.706	16.727	20.253	23.280	24.209	23.645	24.206	23.911
<b>110</b>	6.551	7.317	9.938	13.182	15.804	17.972	18.179	17.061	17.166	17.046
<b>115</b>	4.458	5.226	7.125	9.455	11.354	12.664	12.329	10.842	10.716	10.591
<b>120</b>	2.820	3.272	4.493	6.091	7.313	7.719	6.705	5.487	5.312	5.090
<b>125</b>	1.820	1.818	2.405	3.273	3.816	3.498	2.340	1.631	1.543	1.181
<b>130</b>	1.092	1.136	1.135	1.500	1.590	1.136	0.720	0.772	0.682	0.454
<b>135</b>	0.728	0.727	0.681	0.818	0.909	0.726	0.765	0.817	0.591	0.409
<b>140</b>	0.455	0.454	0.363	0.409	0.681	0.726	0.720	0.817	0.500	0.227
<b>145</b>	0.182	0.318	0.182	0.227	0.454	0.817	0.720	0.590	0.318	0.045
<b>150</b>	0.182	0.182	0.227	0.182	0.227	0.500	0.315	0.181	0.227	0.091
<b>155</b>	0.182	0.227	0.272	0.227	0.182	0.136	0.090	0.091	0.091	0.091
<b>160</b>	0.273	0.273	0.318	0.273	0.273	0.273	0.180	0.182	0.182	0.182
<b>165</b>	0.273	0.318	0.363	0.273	0.363	0.318	0.315	0.272	0.318	0.227
<b>170</b>	0.273	0.318	0.363	0.318	0.409	0.363	0.315	0.318	0.273	0.318
<b>175</b>	0.364	0.318	0.272	0.227	0.318	0.318	0.315	0.227	0.227	0.182
<b>180</b>	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147	0.147

**Vert. Angles Horizontal Angles**

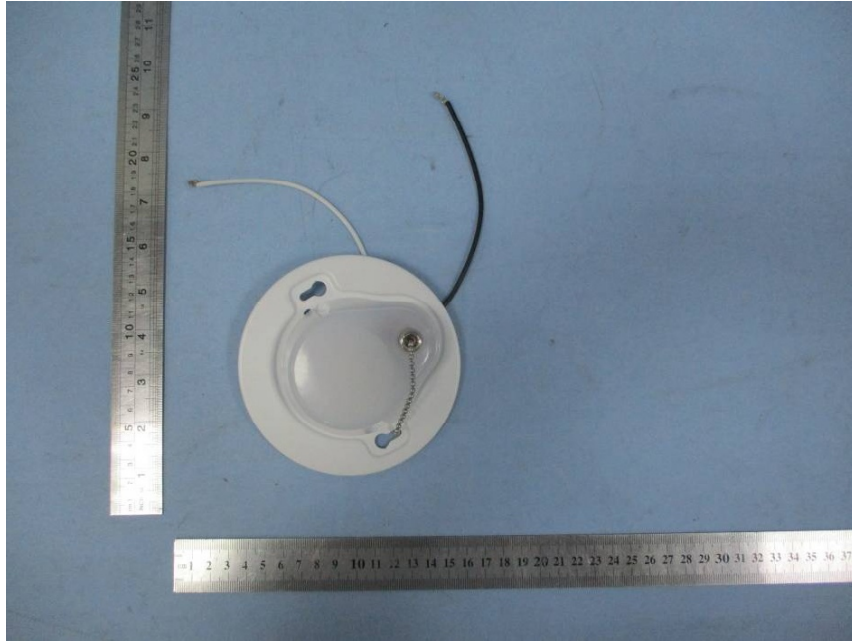
	<b>150</b>	<b>165</b>	<b>180</b>
<b>0</b>	199.069	199.069	199.069
<b>5</b>	199.024	199.342	199.706
<b>10</b>	197.616	197.978	197.977
<b>15</b>	193.895	194.388	194.247
<b>20</b>	188.584	189.070	188.788
<b>25</b>	181.821	182.025	182.419
<b>30</b>	173.425	173.754	174.140
<b>35</b>	164.257	164.345	164.769
<b>40</b>	154.635	154.801	154.670
<b>45</b>	144.377	144.348	144.571
<b>50</b>	133.802	133.803	133.471
<b>55</b>	122.772	122.577	122.644
<b>60</b>	113.834	110.897	111.180
<b>65</b>	98.808	98.444	98.170
<b>70</b>	86.371	85.809	85.705
<b>75</b>	73.527	75.720	72.786
<b>80</b>	61.000	60.221	60.139



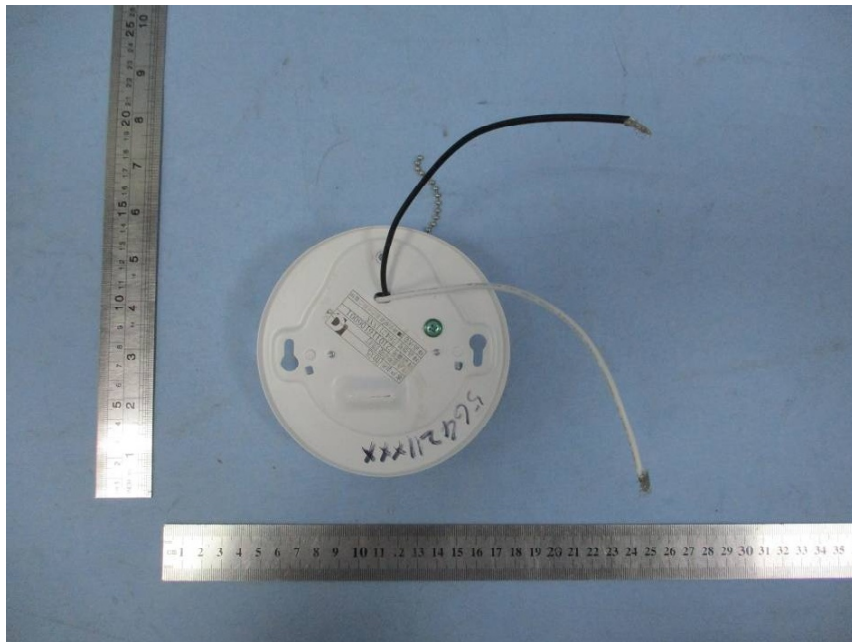
**CANDELA TABULATION - (Cont.)**

<b>85</b>	49.744	48.767	49.039
<b>90</b>	41.484	40.859	43.944
<b>95</b>	36.037	35.542	35.301
<b>100</b>	30.137	29.997	29.660
<b>105</b>	23.555	24.951	23.473
<b>110</b>	16.793	16.634	16.650
<b>115</b>	10.257	10.135	10.008
<b>120</b>	5.899	4.590	4.549
<b>125</b>	0.771	0.636	0.637
<b>130</b>	0.136	0.091	0.182
<b>135</b>	0.045	0.091	0.091
<b>140</b>	0.091	0.045	0.091
<b>145</b>	0.000	0.045	0.000
<b>150</b>	0.045	0.136	0.091
<b>155</b>	0.182	0.182	0.273
<b>160</b>	0.227	0.318	0.273
<b>165</b>	0.318	0.273	0.364
<b>170</b>	0.318	0.182	0.182
<b>175</b>	0.272	0.227	0.273
<b>180</b>	0.147	0.147	0.147

### Appendix A Product Photo



Picture 1



Picture 2

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