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**Test report of
IES LM-79-08**

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

For products:
LED corn cob style lamp

Models No.:
CL-EZ2-27W-50K

Test Date: Nov. 7, 2015 to Nov. 12, 2015

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1. General

1.1 Product Information

Product Type	LED corn cob style lamp
Model Number	CL-EZ2-27W-50K
Rated Inputs	100-300V, 50/60Hz
Rated Power	27W
Rated Light output	3000lm
Declared CCT	5000K
Power Supply	Not provided
LED Package, Array or Module	Not provided
Receipt Samples	1 unit
Date of Receipt Samples	Nov. 5, 2015
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	2015-02-05	2016-02-04
AC Power supply	LC-I-987	APW-110N	2015-02-05	2016-02-04
Power analyzer	LC-I-928	WT210	2015-02-09	2016-02-08
Power analyzer	LC-I-954	WT210	2015-03-04	2016-03-03
Multimeter	LC-I-972	Fluke 17B	2015-08-17	2016-08-16
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-I-917	24V100W	2015-10-09	2016-10-08
Luminous Flux Standard Lamp	LC-I-946	110V/200W	2015-10-09	2016-10-08
Goniophotometer(with mirror)	LC-I-902	GMS2000	2012-05-10	2016-05-09
Wireless temperature transmitter	LC-I-978	DWRF-B	2015-02-11	2016-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2015-02-11	2016-02-10

2. Test conducted and method

2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$; 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 ± 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 sphere-spectroradiometer system and 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.

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the total luminous flux was 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	120.00V~60Hz	120.04V~60Hz
Input Current(A)	0.221	0.223
Total Power(W)	26.27	26.56
Power Factor	0.992	0.992
THD	9.6 %	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	2993.2	3022.77
Luminaire Efficacy(lm/W)	112.02	113.81
Correlated Color Temperature (CCT)(K)	5110	-
Color Rendering Index (CRI)	84.2	-
R9	15	-
Chromaticity Coordinate (x,y)	0.3422, 0.3509	-
Chromaticity Coordinate (u,v)	0.2097, 0.3226	-
Chromaticity Coordinate (u',v')	0.2097, 0.4839	-
Duv	0.0008	-
Spacing Criteria(0-180°)	-	2.78
Spacing Criteria(90-270°)	-	2.74
Zone Lumens between 0-60 °	-	25.10%

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
83	89	93	84	84	85	87	69
R9	R10	R11	R12	R13	R14	R15	-
15	74	83	65	84	96	78	-

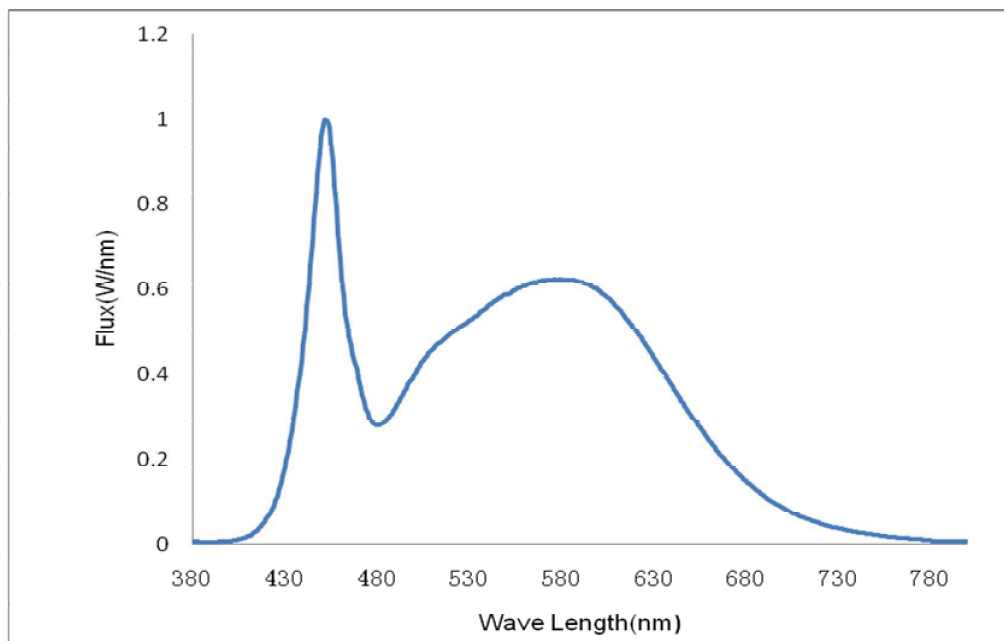
3.4 Additional test at 277V

Criteria Item	Result (Sphere)	Result (Goniophotometer)
Input Voltage & Frequency	277.00V~60Hz	-
Input Current(A)	0.112	-
Total Power(W)	28.13	-
Power Factor	0.908	-
THD	17.8 %	-
Off-state Power(W)	-	-

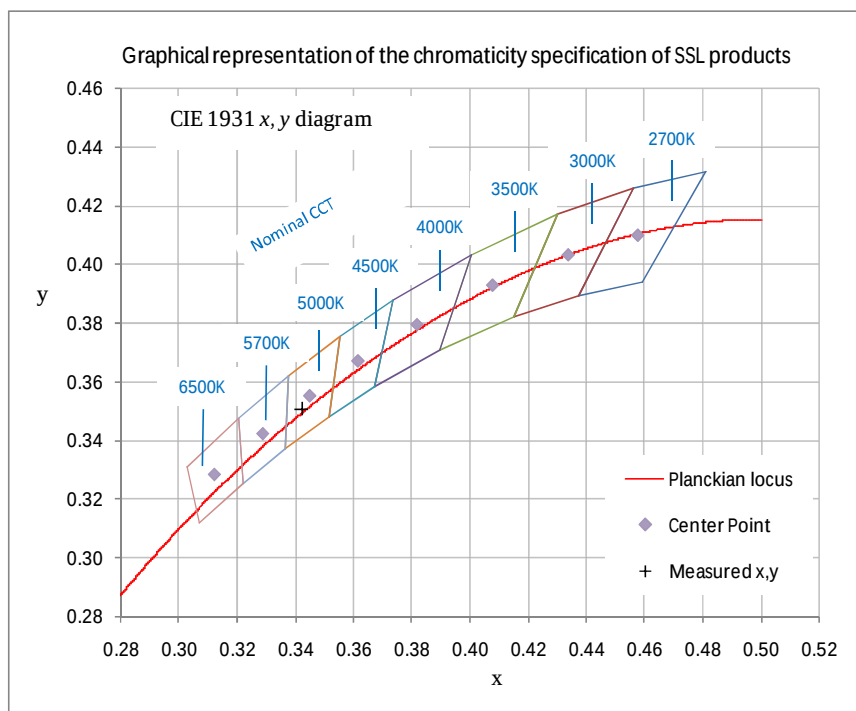
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	General Diffuse	Basic Luminous Shape	Circular w/ Sides
Spacing Criteria (0-180)	2.78	Luminous Length	0.09 m (Diameter)
Spacing Criteria (90-270)	2.74	Luminous Width	0.09 m (Diameter)
Spacing Criteria (Diagonal)	NA	Luminous Height	0.08 m
Test Distance	29.86 m		

4.4 Zonal Lumen Summary

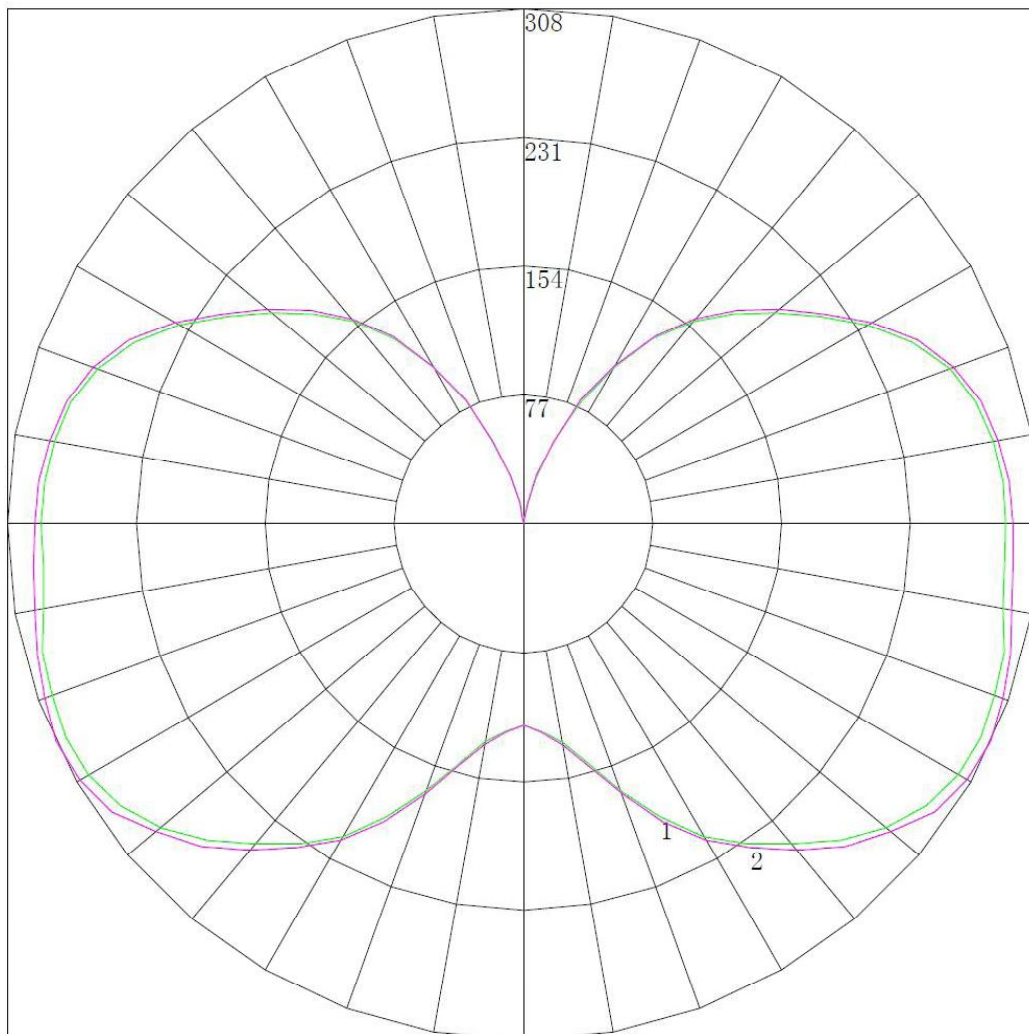
Zone	Lumens	%Lamp	%Fixt
0-30	143.98	4.8	4.8
0-40	289.5	9.6	9.6
0-60	759.79	25.1	25.1
0-90	1695.2	56.1	56.1
90-120	866.03	28.7	28.7
90-130	1060.57	35.1	35.1
90-150	1280.35	42.4	42.4
90-180	1327.57	43.9	43.9
0-180	3022.78	100	100

Zone	Lumens
0-10	12.09
10-20	42.71
20-30	89.18
30-40	145.52
40-50	206.72
50-60	263.57
60-70	300.29
70-80	315.88
80-90	319.24
90-100	315.97
100-110	296.1
110-120	253.97
120-130	194.54
130-140	136.37
140-150	83.41
150-160	37.38
160-170	9.26
170-180	.58



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4.5 Polar Curves



Maximum Candela = 308.3 Located At Horizontal Angle = 90, Vertical Angle = 65

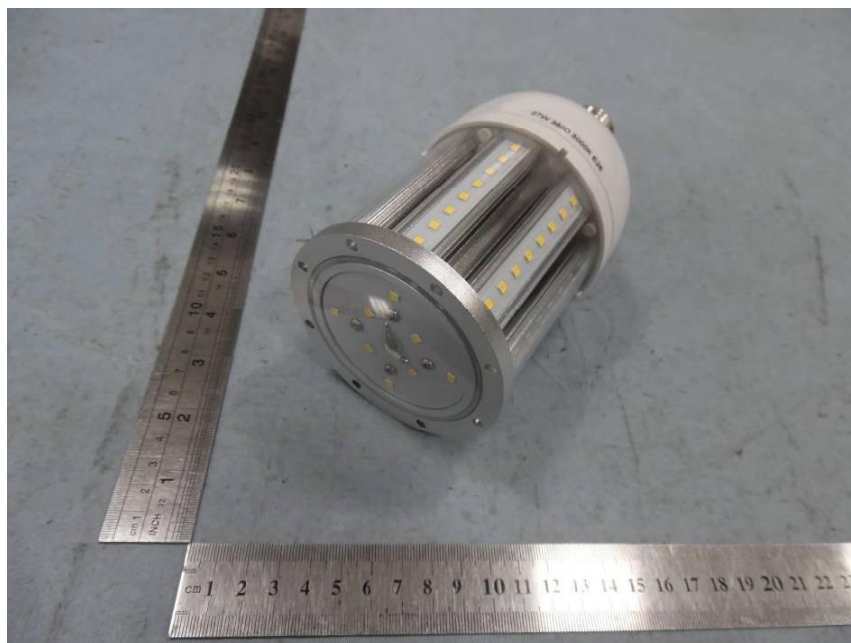
1 - Vertical Plane Through Horizontal Angles (0 - 180)

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

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>
0	120.16	120.16	120.16	120.16	120.16	120.16	120.16
5	124.41	123.35	124.22	123.55	123.83	123.97	125.56
10	132.95	131.47	132.57	132.09	132.50	132.34	133.92
15	148.50	146.61	148.17	147.92	147.59	147.97	150.09
20	170.09	167.98	168.03	168.25	168.56	167.87	171.25
25	193.52	191.68	193.39	191.33	191.28	191.62	196.59
30	215.78	211.71	212.92	213.47	211.89	211.70	218.30
35	233.62	230.15	232.00	231.38	229.17	230.01	236.69
40	250.16	248.71	248.85	247.66	246.38	247.83	254.81
45	267.99	267.90	267.47	264.62	265.37	266.00	272.38
50	282.70	284.53	285.23	281.36	281.64	284.59	286.69
55	293.79	295.31	296.93	293.86	292.90	293.99	300.17
60	300.27	300.36	303.23	299.38	298.67	300.74	306.26
65	301.88	303.38	306.36	300.20	300.90	304.45	308.30
70	299.69	301.56	306.70	298.85	300.92	303.75	304.63
75	297.58	299.51	303.26	293.12	296.75	299.90	300.99
80	291.10	295.52	299.49	290.61	293.56	296.24	296.22
85	288.20	292.33	296.84	286.67	291.53	294.05	293.77
90	288.33	291.77	296.84	286.36	290.35	292.95	292.23
95	287.44	290.56	295.50	284.63	289.15	291.44	291.23
100	284.85	287.05	291.66	281.91	285.38	288.06	287.82
105	280.02	280.80	285.52	276.95	278.98	281.51	282.69
110	270.81	270.96	274.83	268.09	268.92	270.61	273.61
115	256.77	256.47	259.72	254.59	255.64	255.85	259.76
120	237.73	238.46	241.55	235.23	237.07	238.47	240.55
125	215.82	215.85	218.22	214.06	215.11	215.59	218.80
130	195.75	194.35	198.11	194.23	194.38	195.47	199.22
135	177.02	173.89	178.20	175.34	174.31	175.01	180.10
140	157.62	153.21	156.03	155.63	154.29	153.12	159.62
145	134.87	131.15	133.56	133.16	131.99	131.24	136.92
150	108.27	106.29	108.50	107.23	106.87	106.56	108.53
155	80.29	79.13	79.21	78.78	78.92	77.61	81.61
160	52.75	52.41	53.01	52.37	52.09	51.77	52.41
165	28.34	29.82	29.57	29.49	30.27	29.95	30.15
170	12.38	12.48	11.42	11.97	12.93	12.62	12.22
175	2.15	2.64	2.88	2.94	2.75	2.71	2.27
180	1.11	1.11	1.11	1.11	1.11	1.11	1.11

Appendix 1 Product Photo



Picture 1



Picture 2

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