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Test report of

## IES LM-79-08

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

Rendered to:

Light Efficient Design, LLC

188 S. Northwest Highway , Cary, IL 60013, USA

For products:

LED Lamps

Models No.:

LED-8088M/E30-G4

**Test Date:** May. 2, 2018 to May. 7, 2018

**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](mailto:Service@lccert.com)

<http://www.lccert.com>

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**Test Note:**

**Complied by:**

Fish Tan

Project Engineer

Jun. 6, 2018

*Fish Tan*

**Reviewed by:**

Richard Li

Technical Manager

Jun. 6, 2018

*Richard Li*

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## 1. General

### 1.1 Product Information

Brand Name	-
Product Type	LED Lamp
Model Number	LED-8088M/E30-G4
Rated Inputs	120-277VAC, 50/60Hz
Rated Power	50W
Rated Light output	6900lm
Declared CCT	3000K
Power Supply	Integrated in lamp
LED Package, Array or Module	Not provided
Receipt Samples	1 unit
Sample Code of lab.	180423101001
Date of Receipt Samples	Apr. 23, 2018
Note	-

## 1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377-2015	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	2018-01-10	2019-01-09
AC Power supply	LC-I-987	APW-110N	2018-01-10	2019-01-09
Power analyzer	LC-I-928	WT210	2018-01-05	2019-01-05
Power analyzer	LC-I-954	WT210	2018-01-10	2019-01-09
Multimeter	LC-I-972	Fluke 17B	2017-08-08	2018-08-07
Photometric colorimetric electric system <sup>1</sup> (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp <sup>2</sup>	LC-PL-I-011	D204C	2017-09-07	2018-09-06
Luminous Flux Standard Lamp <sup>3</sup>	LC-PL-I-003	24V100W	2017-09-22	2018-09-21
Goniophotometer(with mirror)	LC-I-902	GMS2000	2018-05-07	2019-05-06
Wireless temperature transmitter	LC-I-978	DWRF-B	2018-02-11	2019-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2018-02-11	2019-02-10

Note:

1, Bandwidth of spectroradiometer is 1 nm.

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

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

## 2. Test conducted and method

The lamp 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  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ; 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  $\pm 0.2$  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	120.00 V~60Hz	120.08 V~60Hz
Input Current(A)	0.417	0.418
Total Power(W)	49.25	49.40
Power Factor	0.985	0.985
I-THD	16.05%	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	- <sup>4</sup>	6915.23
Luminaire Efficacy(Lm/W)	-	139.98
Correlated Color Temperature (CCT)(K)	3108	-
Color Rendering Index (CRI)	84.0	-
R9	14	-
Chromaticity Coordinate (x,y)	x = 0.4271 y = 0.3962	-
Chromaticity Coordinate (u,v)	u = 0.2476 v = 0.3445	-
Chromaticity Coordinate (u',v')	u' = 0.2476 v' = 0.5168	-
Duv	-0.0018	-
Zone Lumens between 0-60 °	-	78.95%

#### 3.3 Color Rendering Details

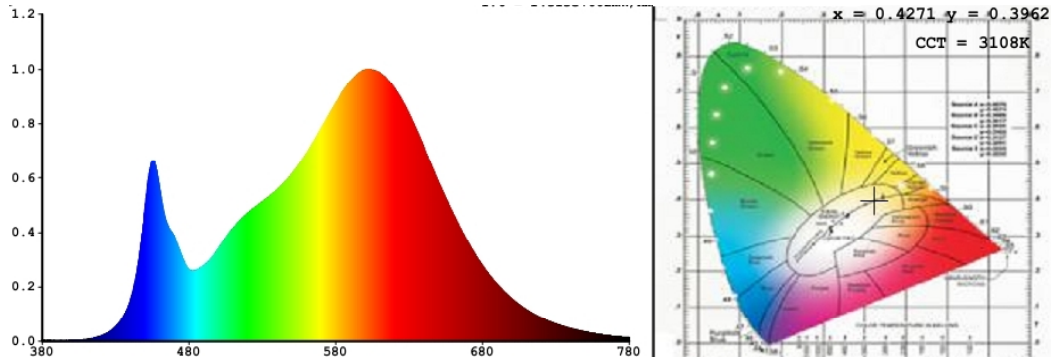
R1	R2	R3	R4	R5	R6	R7	R8
84	94	94	81	84	93	82	61
R9	R10	R11	R12	R13	R14	R15	-
14	86	80	73	87	97	77	-

Note:

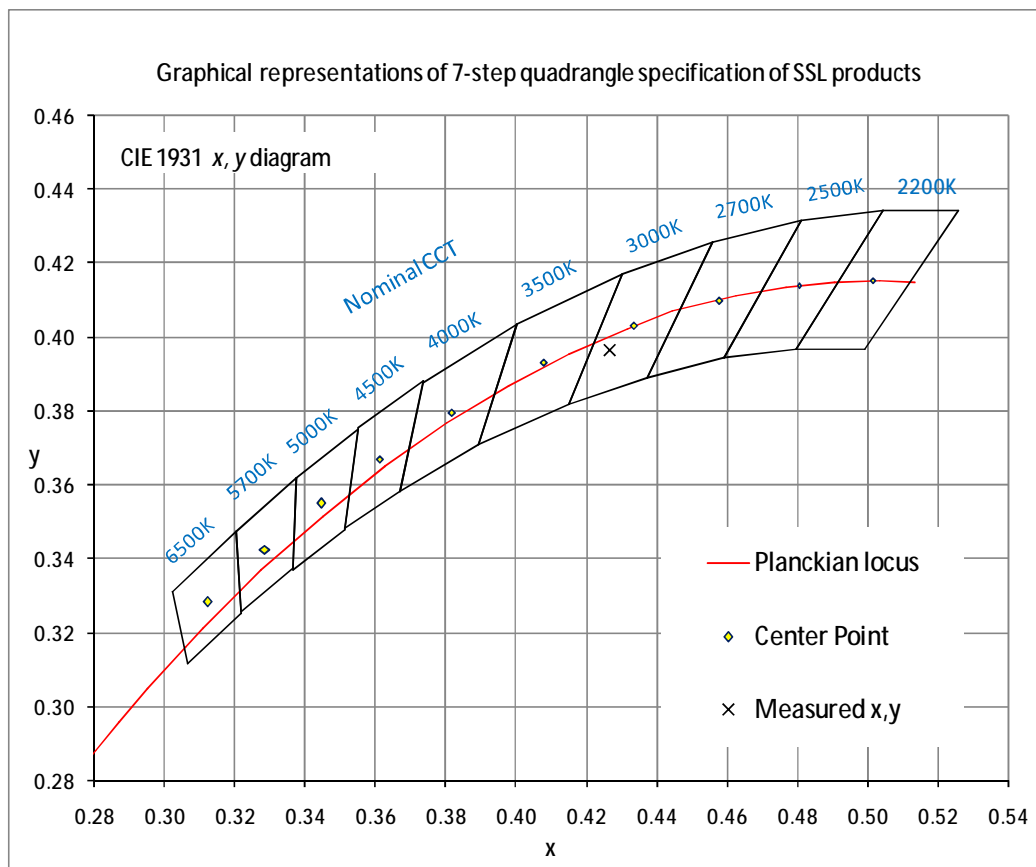
4, Self-absorption is 1.

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram



#### 4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180)	1.30	Luminous Length	0.11 m
Spacing Criteria (90-270)	1.30	Luminous Width	0.07 m
Spacing Criteria (Diagonal)	1.40	Luminous Height	0.00 m
Test Distance	29.79 m		

#### 4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	867.27	12.50	12.50
0-30	1855.00	26.80	26.80
0-40	3058.03	44.20	44.20
0-60	5459.32	78.90	78.90
0-80	6771.6	97.90	97.90
0-90	6888.86	99.60	99.60
10-90	6665.52	96.40	96.40
20-40	2190.76	31.70	31.70
20-50	3449.67	49.90	49.90
40-70	3256.91	47.10	47.10
60-80	1312.28	19.00	19.00
70-80	456.66	6.60	6.60
80-90	117.25	1.70	1.70
90-110	12.74	0.20	0.20
90-120	15.00	0.20	0.20
90-130	17.18	0.20	0.20
90-150	21.07	0.30	0.30
90-180	26.38	0.40	0.40
110-180	13.64	0.20	0.20
0-180	6915.24	100.00	100.00

Total Luminaire Efficiency = 100.00%

#### ZONAL LUMEN SUMMARY

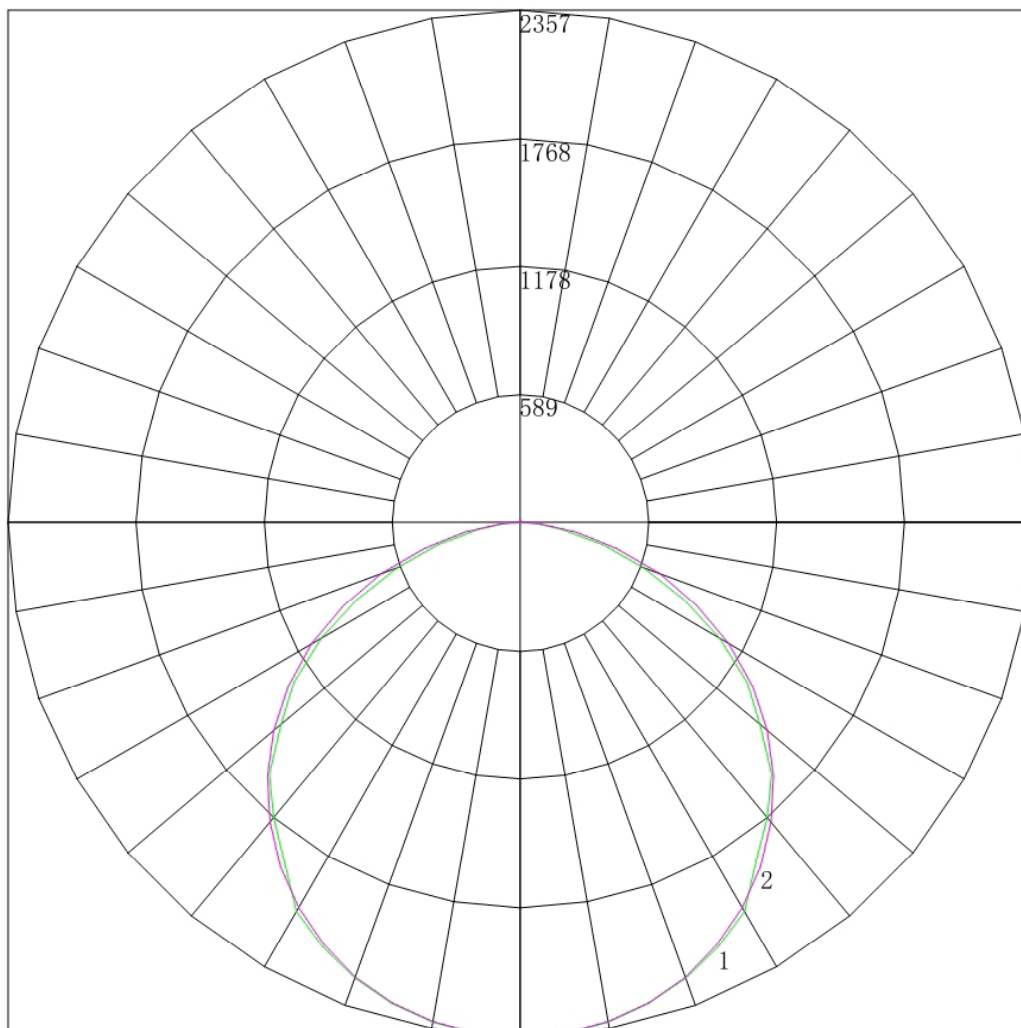
Zone	Lumens
0-10	223.34
10-20	643.93
20-30	987.73
30-40	1203.03
40-50	1258.91
50-60	1142.38
60-70	855.62
70-80	456.66
80-90	117.25
90-100	9.92
100-110	2.82
110-120	2.27
120-130	2.18
130-140	1.88
140-150	2.01
150-160	2.35
160-170	2.10
170-180	0.86





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#### 4.5 Polar Curves



Maximum Candela = 2356.873 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

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	2356.873	2356.873	2356.873	2356.873	2356.873	2356.873	2356.873
5	2350.642	2348.431	2347.543	2349.552	2347.348	2346.253	2351.125
10	2326.166	2322.886	2323.326	2324.477	2320.102	2319.487	2323.686
15	2284.333	2281.125	2282.664	2280.979	2277.571	2275.905	2281.197
20	2226.479	2221.592	2223.343	2220.614	2217.764	2214.627	2220.999
25	2151.714	2141.401	2144.691	2142.942	2138.467	2136.540	2138.224
30	2061.373	2056.988	2053.376	2049.949	2037.911	2042.301	2040.840
35	1893.598	1895.939	1933.172	1937.430	1931.796	1926.603	1926.193
40	1767.209	1762.879	1757.212	1803.603	1802.432	1793.645	1791.621
45	1634.591	1627.375	1618.358	1617.636	1653.797	1645.433	1646.870
50	1438.778	1445.002	1466.608	1456.745	1480.560	1481.510	1482.200
55	1271.447	1263.736	1259.538	1285.868	1281.002	1303.427	1302.915
60	1056.053	1058.705	1071.134	1072.367	1086.305	1107.870	1107.250
65	829.534	844.343	853.196	867.534	880.280	898.370	896.091
70	603.904	606.211	621.015	638.526	661.900	679.588	681.838
75	394.296	403.178	410.378	426.596	447.938	463.026	459.165
80	192.698	193.035	215.780	233.965	249.684	262.384	263.487
85	73.430	74.191	80.691	91.262	96.166	104.876	98.778
90	23.587	23.101	22.672	21.768	21.723	24.124	18.606
95	2.225	6.442	9.337	7.106	4.875	2.655	1.328
100	1.335	2.666	4.446	4.663	3.546	2.213	1.328
105	1.780	2.221	3.111	3.108	2.880	2.434	1.771
110	2.225	2.221	2.444	2.442	2.437	2.434	1.771
115	2.225	1.999	2.223	2.442	2.437	2.212	2.214
120	2.225	1.999	2.222	2.442	2.437	2.434	2.214
125	2.225	2.221	2.444	2.442	2.437	2.655	2.656
130	2.670	2.666	2.666	2.663	2.437	2.434	2.213
135	2.225	2.221	2.222	2.442	2.215	2.212	2.213
140	2.670	2.666	2.666	2.663	2.658	2.655	2.655
145	3.115	3.110	3.111	3.107	3.101	3.097	3.098
150	4.005	3.998	3.999	3.995	3.987	3.982	3.984
155	5.340	5.109	5.110	5.104	5.094	5.088	5.312
160	6.230	6.220	6.221	6.214	6.423	6.194	6.197
165	7.565	7.553	7.554	7.546	7.531	7.743	7.525
170	8.901	8.441	8.665	8.656	8.639	8.628	8.410
175	9.346	9.108	9.110	9.321	9.082	9.070	8.853
180	9.761	9.761	9.761	9.761	9.761	9.761	9.761

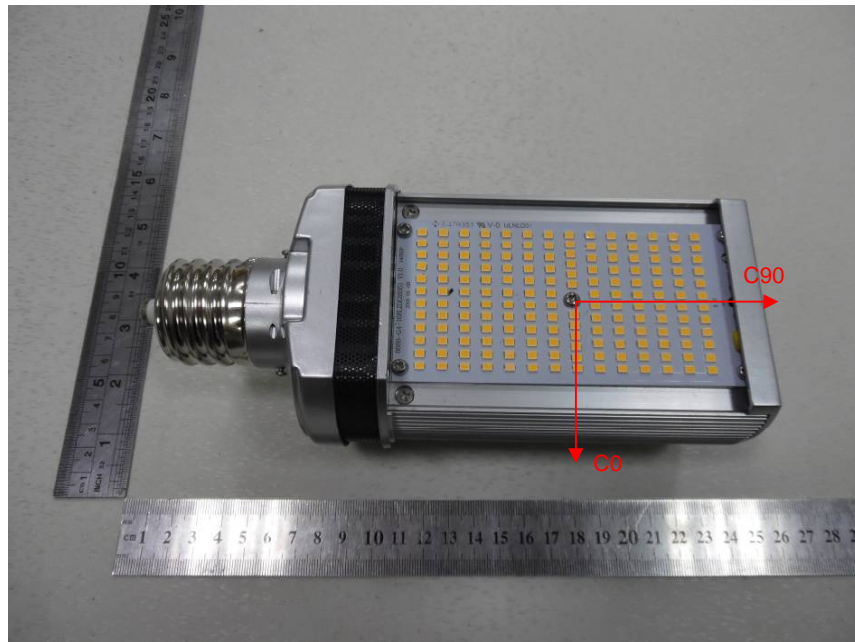


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## Appendix A Product Photo

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Picture 1



Picture 2

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