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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, DIV OF TADD LLC
188 S. Northwest Highway Cary, IL 60013.

For products:

LED Lamp

Models No.:

LED-8045M27, LED-8045M27C

Test Date: Oct. 15, 2015 to Oct. 15, 2015

Test Lab.: LCTECH (Zhongshan) Testing Service Co., Ltd

2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan,
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Test Note: *Model LED-8045M27 and LED-8045M27C are the same except for model number.*

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Nov. 6, 2015

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1. General

1.1 Product Information

Brand Name	Light Efficient Design
Trade Mark	-
Luminaire Type	LED Lamps
Model Number	LED-8045M27, LED-8045M27C
Rated Inputs	120-277VAC 50-60Hz
Rated Power	50 W
Rated Light output	4500 lm
Declared CCT	2700 K
Power Supply	Integral LED driver
LED Package, Array or Module	Not provided
Receipt Samples	1 unit
Date of Receipt Samples	Oct. 13, 2015

Photo



Picture 1



Picture 2

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	277.10V~60Hz	277.00V~60Hz
Input Current(A)	0.203	0.204
Total Power(W)	52.89	53.01
Power Factor	0.940	0.939
I-THD	10.13%	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	4508.70	4527.01
Luminaire Efficacy(Lm/W)	85.25	85.40
Correlated Color Temperature (CCT)(K)	2806	-
Color Rendering Index (CRI)	82.4	-
R9	7	-
Chromaticity Coordinate (x,y)	x = 0.4502 y = 0.4063	-
Chromaticity Coordinate (u,v)	u = 0.2582 v = 0.3495	-
Chromaticity Coordinate (u',v')	u' = 0.2582 v' = 0.5242	-
Duv	-0.000729	-
Beam Angle	-	C0 plan: 55.37°
Filed Angle	-	C0 plan: 95.2°

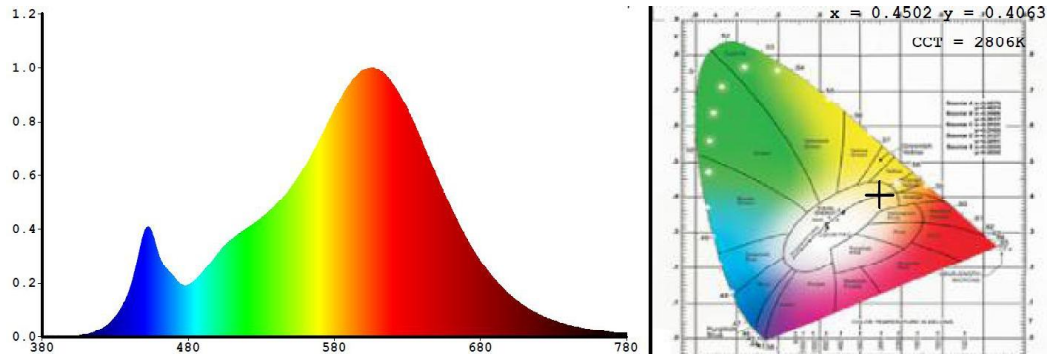
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
81	93	94	80	82	92	81	57
R9	R10	R11	R12	R13	R14	R15	-
7	84	79	78	84	97	73	-

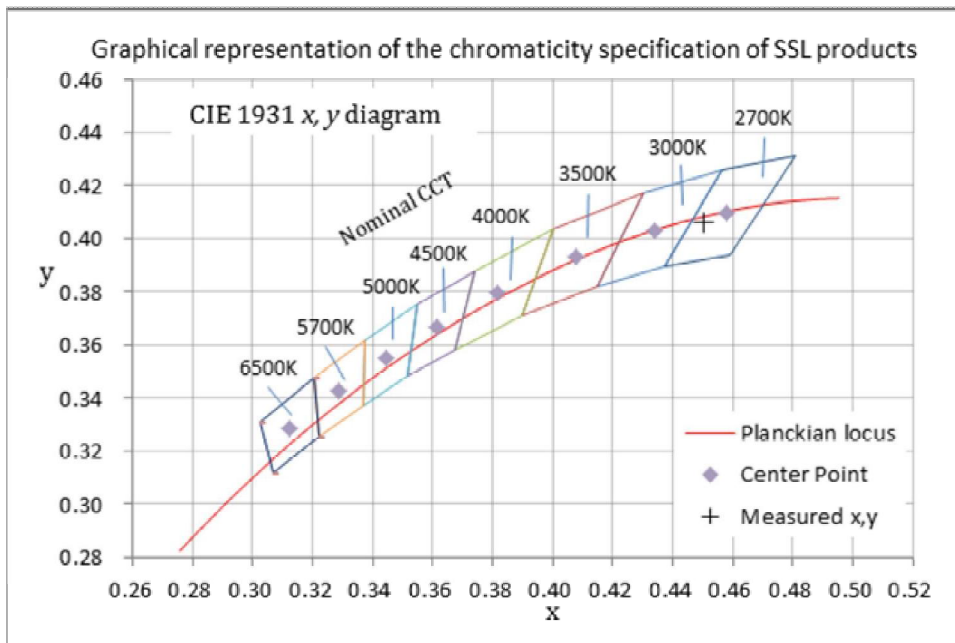
Note: N.A.

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
Spacing Criteria (0-180)	0.80	Luminous Length	0.09 m(Diameter)
Spacing Criteria (90-270)	0.80	Luminous Width	0.09 m(Diameter)
Spacing Criteria (Diagonal)	0.92	Luminous Height	0 m
Test Distance	30.04 m		

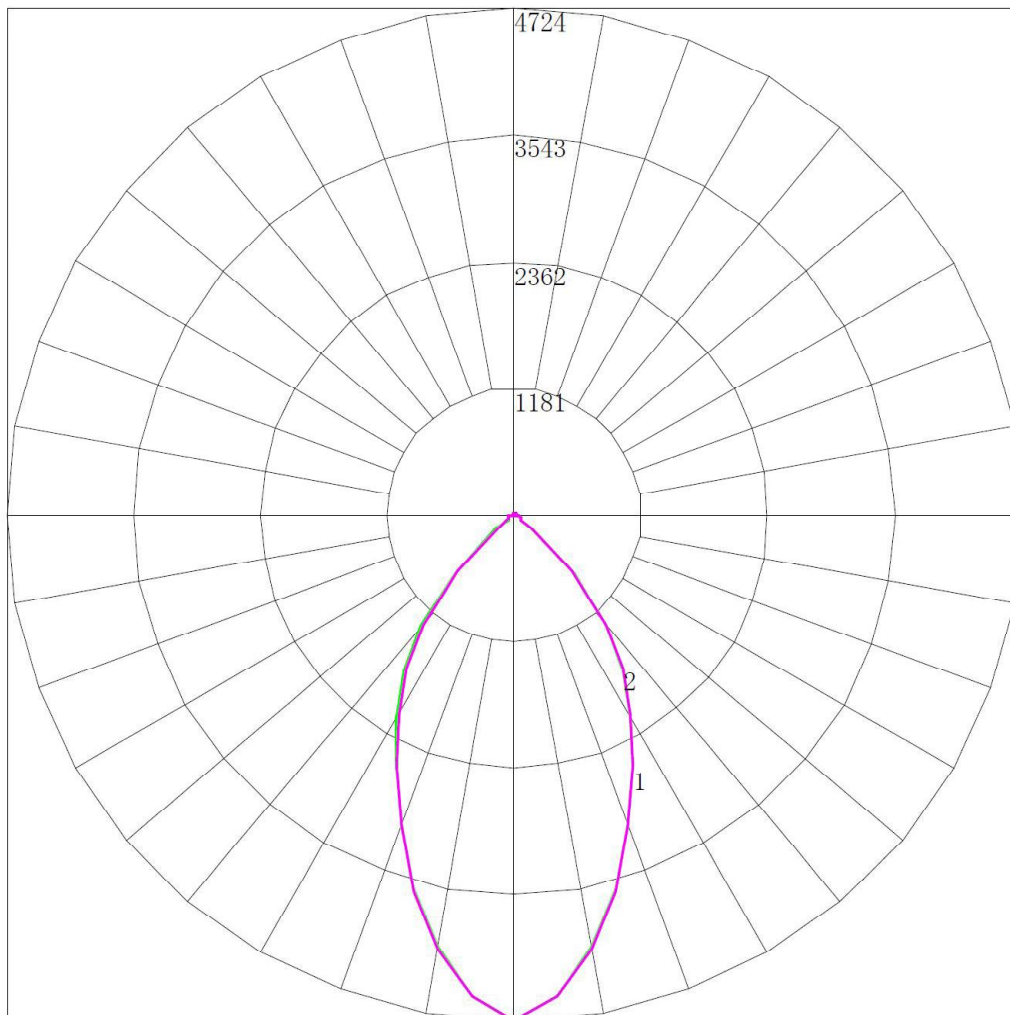
4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-30	2632.93	58.2	58.2
0-40	3729.67	82.4	82.4
0-60	4416.58	97.6	97.6
0-90	4512.32	99.7	99.7
90-120	.65	0	0
90-130	1.17	0	0
90-150	4.25	.1	.1
90-180	14.69	.3	.3
0-180	4527.01	100	100

Total Luminaire Efficiency = 100%

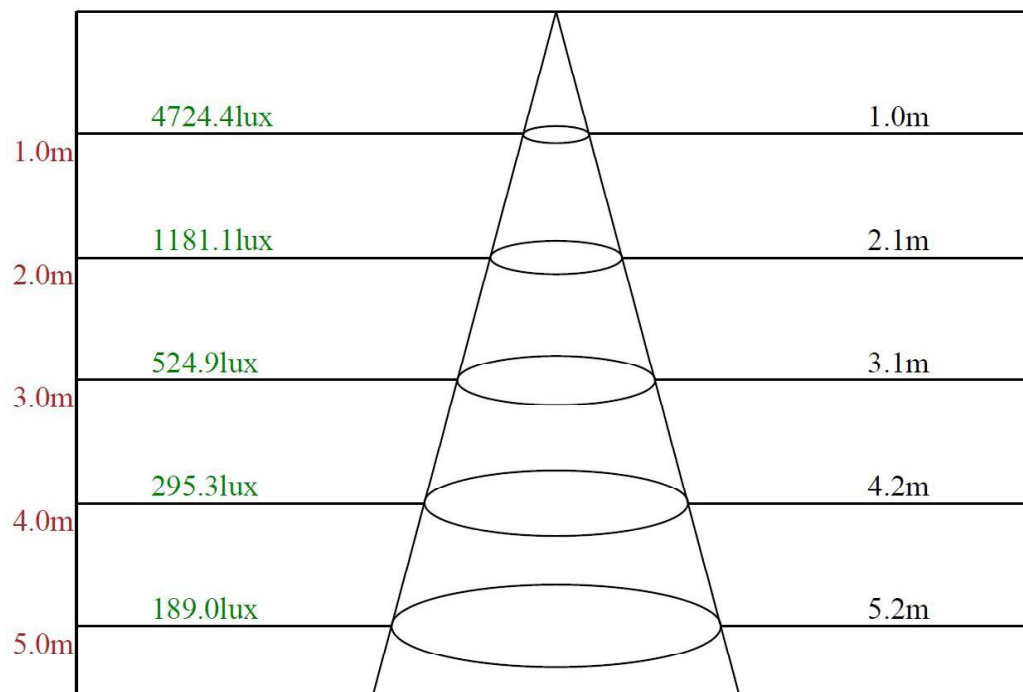
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	419.27
10-20	1014.15
20-30	1199.51
30-40	1096.74
40-50	588.41
50-60	98.49
60-70	57.15
70-80	30.89
80-90	7.71
90-100	.23
100-110	.19
110-120	.22
120-130	.52
130-140	.92
140-150	2.16
150-160	3.91
160-170	4.66
170-180	1.87



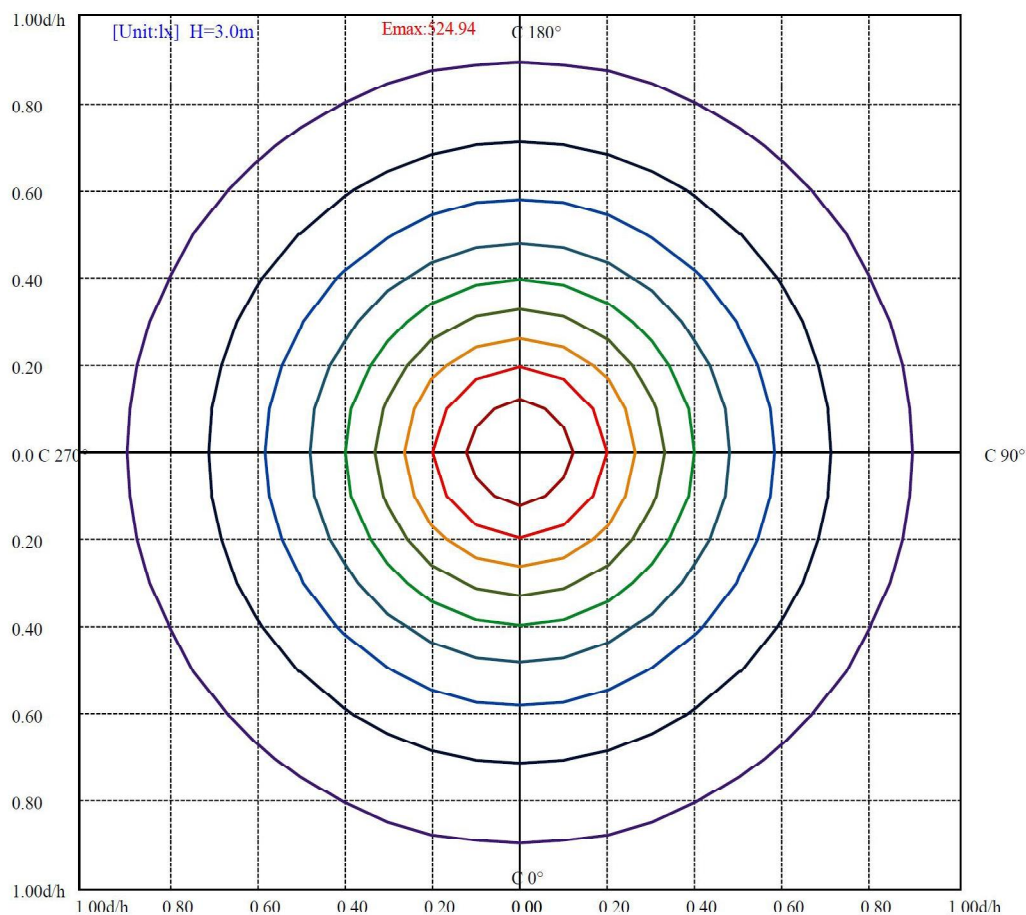
Maximum Candela = 4724.45 Located At Horizontal Angle = 0, Vertical Angle = 0
 # 1 - Vertical Plane Through Horizontal Angles (0 - 180)
 # 2 - Vertical Plane Through Horizontal Angles (90 - 270)

4.6 Lux Distance curve



Beam angle of C0plane55.37

4.7 ISO illuminance diagram



(10%Emax)	52.49378	
(20%Emax)	104.9876	
(30%Emax)	157.4811	
(40%Emax)	209.9756	
(50%Emax)	262.4689	
(60%Emax)	314.9633	
(70%Emax)	367.4567	
(80%Emax)	419.95	
(90%Emax)	472.4445	

4.8 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	4724.45	4724.45	4724.45	4724.45	4724.45	4724.45	4724.45
5	4509.82	4513.99	4512.12	4512.56	4499.15	4521.28	4509.33
10	4114.32	4121.23	4131.07	4127.84	4111.1	4123.56	4123.57
15	3623.88	3639.93	3637.2	3639.46	3620.21	3634.19	3636.6
20	3089.79	3093.97	3098.01	3092.11	3080.92	3084.31	3087.00
25	2601.15	2606.05	2595.58	2595.59	2581.69	2591.55	2588.24
30	2178.65	2193.68	2173.68	2174.99	2162.6	2164.48	2167.07
35	1773.11	1775.25	1763.99	1768.24	1754.45	1754.95	1756.17
40	1343.00	1348.00	1339.69	1339.31	1324.24	1321.49	1329.29
45	775.35	770.36	778.10	773.45	763.20	762.72	763.67
50	203.87	201.71	207.68	206.31	223.16	244.53	199.10
55	75.50	77.45	79.14	78.05	78.53	79.75	79.78
60	70.01	72.81	73.41	71.95	71.73	72.93	73.98
65	54.85	56.70	57.48	56.54	56.20	56.59	56.37
70	44.77	45.99	46.29	45.45	44.74	44.63	45.11
75	28.48	29.11	29.24	28.76	28.58	28.49	28.82
80	14.17	14.35	14.37	14.23	14.07	14.15	13.80
85	7.20	7.17	7.01	6.78	6.71	6.68	6.58
90	0.18	0.14	0.18	0.41	0.61	0.81	0.14
95	0.18	0.16	0.16	0.09	0.09	0.16	0.14
100	0.23	0.11	0.18	0.20	0.20	0.16	0.18
105	0.14	0.20	0.18	0.18	0.14	0.20	0.18
110	0.23	0.20	0.23	0.20	0.23	0.16	0.23
115	0.14	0.18	0.23	0.20	0.20	0.20	0.27
120	0.27	0.27	0.34	0.27	0.23	0.32	0.32
125	0.58	0.56	0.65	0.61	0.56	0.56	0.59
130	0.90	0.88	0.93	0.90	0.90	0.88	0.86
135	0.90	0.92	0.97	0.99	0.97	0.97	0.95
140	1.98	2.00	1.94	1.94	1.98	1.96	1.95
145	3.33	3.36	3.36	3.34	3.31	3.34	3.36
150	5.35	5.34	5.33	5.38	5.29	5.33	5.36
155	8.10	8.09	8.21	8.11	8.17	8.17	8.17
160	12.78	12.87	12.81	12.85	12.81	12.91	12.89
165	17.28	17.31	17.37	17.39	17.33	17.40	17.34
170	19.08	19.06	19.18	19.22	19.18	19.25	19.20
175	19.75	19.70	19.76	19.88	19.81	19.89	19.70
180	20.42	20.42	20.42	20.42	20.42	20.42	20.42

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