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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-8029E57, LED-8029E57C

Test Date: Oct. 30, 2015 to Nov. 3, 2015

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

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Test Note: *Model LED-8029E57 and LED-8029E57C are the same except for model number.*

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Nov. 9, 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-8029E57,LED-8029E57C
Rated Inputs	120-277VAC 50-60Hz
Rated Power	24 W
Rated Light output	2500 lm
Declared CCT	5700 K
Power Supply	Integral LED driver
LED Package, Array or Module	Not provided
Receipt Samples	1 unit
Date of Receipt Samples	Oct. 29, 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$; 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 ± 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	277.00V~60Hz	276.96V~60Hz
Input Current(A)	0.094	0.094
Total Power(W)	24.77	24.87
Power Factor	0.956	0.951
I-THD	15.27%	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	2549.60	2541.00
Luminaire Efficacy(lm/W)	102.93	102.17
Correlated Color Temperature (CCT)(K)	5518	-
Color Rendering Index (CRI)	85.8	-
R9	26	-
Chromaticity Coordinate (x,y)	x = 0.3320 y = 0.3380	-
Chromaticity Coordinate (u,v)	u = 0.2078 v = 0.4759	-
Chromaticity Coordinate (u',v')	u' = 0.2078 v' = 0.4759	-
Duv	-0.00141	-
Beam Angle	-	C15 plan: 294.85°
Filed Angle	-	C15 plan: N/A°

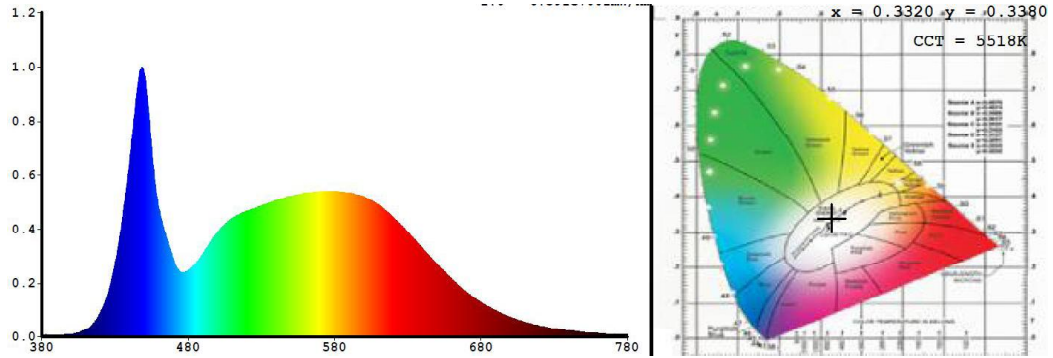
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
86	89	90	87	87	85	88	75
R9	R10	R11	R12	R13	R14	R15	-
26	73	88	71	86	95	82	-

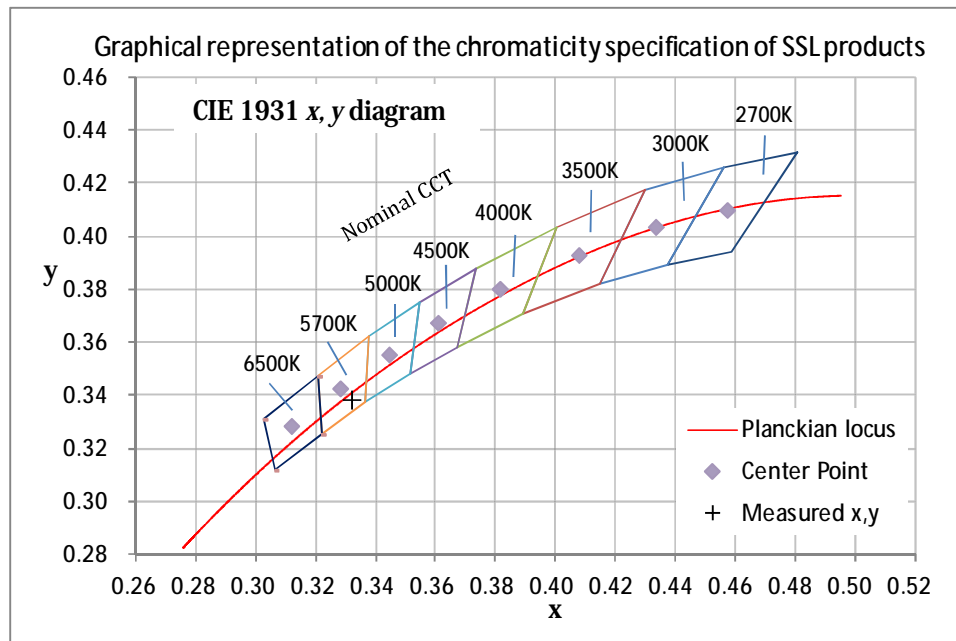
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram





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4.3 Goniometry Test Data

CIE Type	General Diffuse	Basic Luminous Shape	Circular w/Sides
Spacing Criteria (0-180)	N/A	Luminous Length	0.06(Diameter)
Spacing Criteria (90-270)	N/A	Luminous Width	0.06(Diameter)
Spacing Criteria (Diagonal)	N/A	Luminous Height	0.08m
Test Distance	30.04 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	69.32	2.70	2.70
0-30	167.22	6.60	6.60
0-40	311.30	12.30	12.30
0-60	725.51	28.60	28.60
0-80	1253.25	49.30	49.30
0-90	1517.22	59.70	59.70
10-90	1501.28	59.10	59.10
20-40	241.99	9.50	9.50
20-50	429.87	16.90	16.90
40-70	674.04	26.50	26.50
60-80	527.74	20.80	20.80
70-80	267.91	10.50	10.50
80-90	263.97	10.40	10.40
90-110	492.07	19.40	19.40
90-120	693.36	27.30	27.30
90-130	840.94	33.10	33.10
90-150	994.73	39.10	39.10
90-180	1023.78	40.30	40.30
110-180	531.72	20.90	20.90
0-180	2541.00	100.00	100.00

Total Luminaire Efficiency = 100.00%

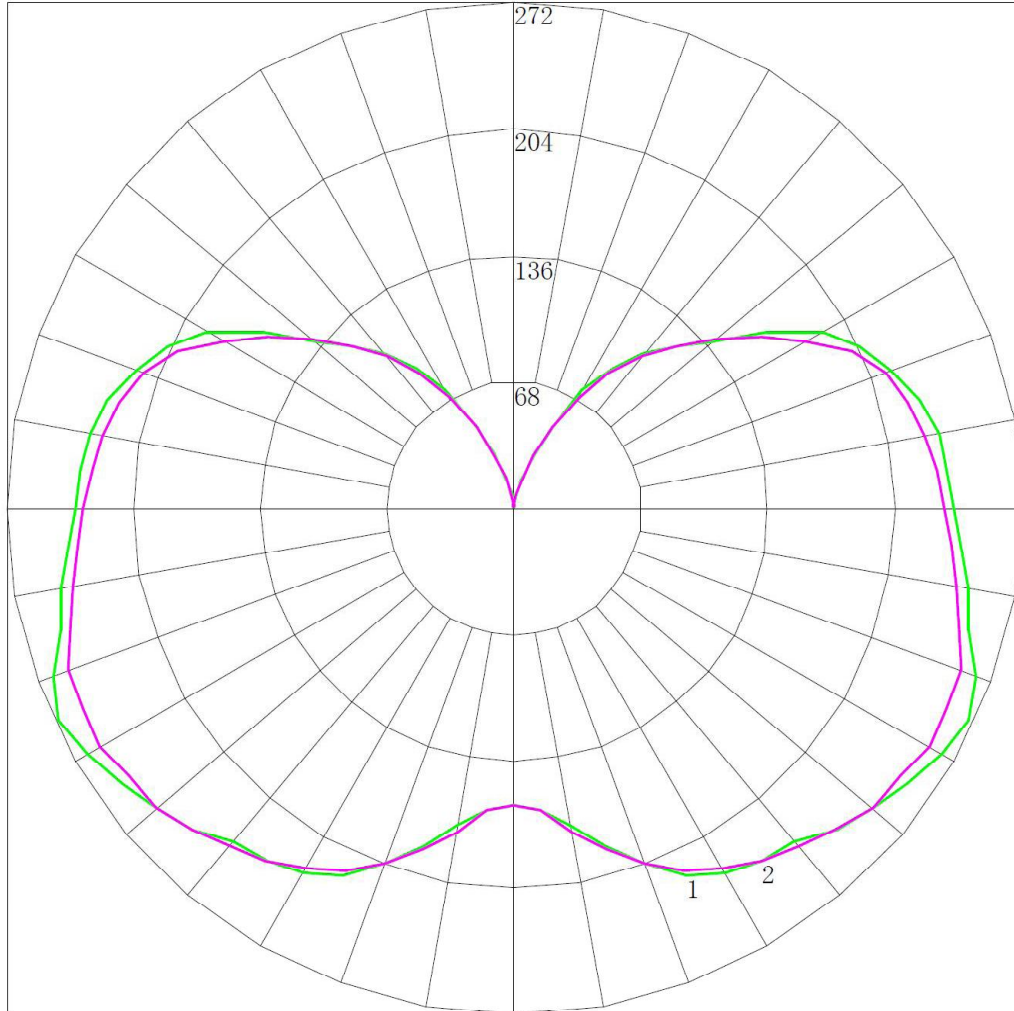
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	15.94
10-20	53.37
20-30	97.90
30-40	144.09
40-50	187.88
50-60	226.33
60-70	259.83
70-80	267.91
80-90	263.97
90-100	255.33
100-110	236.74
110-120	201.30
120-130	147.58
130-140	96.61
140-150	57.18
150-160	23.67
160-170	5.08
170-180	0.30



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4.5 Polar Curves

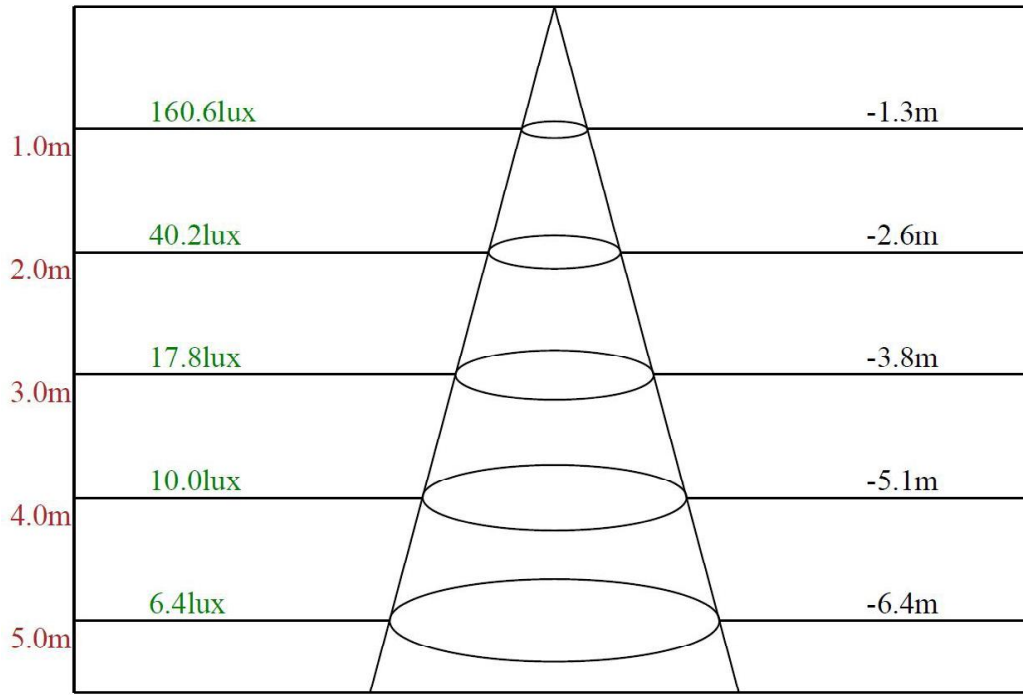


Maximum Candela = 272.45 Located At Horizontal Angle = 75, Vertical Angle = 60
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



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4.6 Lux Distance curve

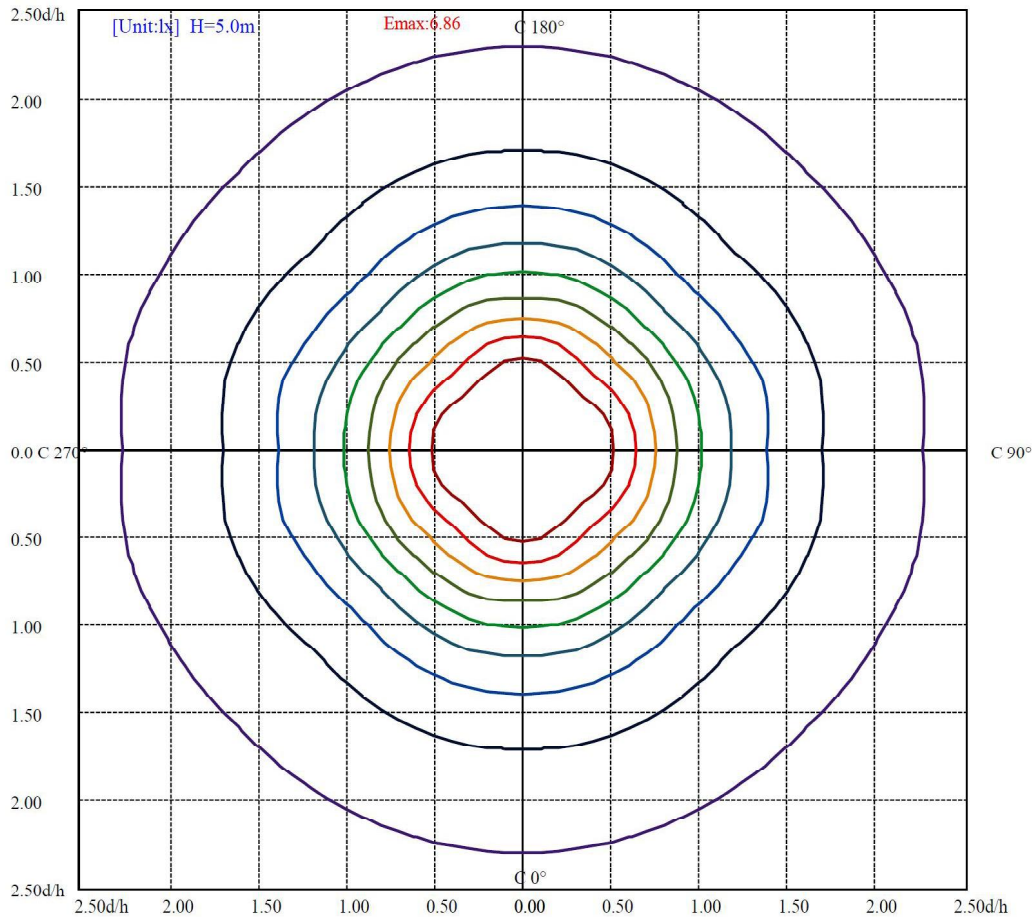


Beam angle of C15plane294.85



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4.7 ISO illuminance diagram



(10%Emax) 0.68572	—
(20%Emax) 1.37144	—
(30%Emax) 2.057156	—
(40%Emax) 2.742876	—
(50%Emax) 3.428596	—
(60%Emax) 4.11432	—
(70%Emax) 4.80004	—
(80%Emax) 5.48576	—
(90%Emax) 6.17148	—

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	160.613	160.613	160.613	160.613	160.613	160.613	160.613
5	163.448	163.676	163.291	163.583	163.409	163.810	162.784
10	173.487	172.954	172.440	172.877	174.691	175.503	176.493
15	189.017	188.080	185.836	184.880	186.406	188.065	190.428
20	203.737	202.367	197.381	195.958	199.950	203.908	204.136
25	217.826	213.758	207.274	205.512	211.078	216.015	214.814
30	226.874	225.172	216.479	212.152	217.884	224.530	223.998
35	231.376	233.726	226.630	223.207	228.612	231.803	232.594
40	234.122	239.174	235.499	235.425	240.380	238.500	237.435
45	245.555	247.974	239.980	235.868	242.071	246.698	244.402
50	251.272	253.307	244.680	231.723	244.372	254.625	251.641
55	258.294	256.724	246.888	232.921	246.147	267.155	252.682
60	265.407	265.543	255.938	244.756	261.006	272.450	257.568
65	270.043	267.185	262.171	254.914	262.584	271.556	255.939
70	263.651	262.613	257.553	254.995	256.425	267.455	254.944
75	252.938	253.928	249.276	252.036	252.712	260.364	247.117
80	247.536	246.094	243.674	248.621	246.210	254.680	241.190
85	241.099	239.095	238.997	244.851	240.292	248.704	235.218
90	235.967	234.436	233.421	241.047	236.010	244.289	231.553
95	233.491	232.390	231.763	237.652	232.094	240.971	227.663
100	231.376	228.877	227.832	232.873	228.285	236.559	224.631
105	226.019	223.496	222.058	226.368	221.890	230.136	219.202
110	215.936	214.290	214.718	216.751	213.511	220.937	211.782
115	204.952	203.553	203.240	204.743	202.060	208.044	200.110
120	190.547	187.824	187.268	187.791	184.698	187.956	180.700
125	165.294	163.966	164.433	164.834	162.070	165.948	162.060
130	138.780	140.847	140.943	140.658	140.606	145.304	141.656
135	122.800	124.485	124.341	122.455	122.382	126.415	123.559
140	108.125	109.404	108.296	108.368	107.295	109.536	106.683
145	92.235	91.670	91.210	91.145	90.713	91.702	89.129
150	73.194	71.689	71.671	71.234	68.472	71.504	69.267
155	50.552	49.963	48.985	49.703	49.709	50.421	48.410
160	31.330	30.796	30.832	30.253	29.406	30.147	30.087
165	15.800	16.140	14.393	15.666	15.465	15.680	16.514
170	6.032	5.692	5.588	6.317	6.517	6.220	7.103
175	1.531	1.553	1.391	1.369	1.491	1.649	2.353
180	0.722	0.722	0.722	0.722	0.722	0.722	0.722

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