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Test report of

IES LM-79-08

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

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

For products:

LED Lamp

Models No.:

LED-8082E27

Test Date: Jul. 14, 2016

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

<http://www.lccert.com>

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Test Note:

Complied by:

Fish Tan
Project Engineer
Jul. 18, 2016

Fish Tan

Reviewed by:

Richard Li
Technical Manager
Jul. 18, 2016

Richard Li

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1. General

1.1 Product Information

Brand Name	
Trade Mark	-
Product Type	LED Lamp
Model Number	LED-8082E27
Rated Inputs	120-277V, 60Hz
Rated Power	45 W
Rated Light output	N/A
Declared CCT	2700K
Power Supply	N/A
LED Package, Array or Module	SPMWH122BFD5WAV0S2(2700K) ,manufactured by SAMSUNG ELECTRONICS CO.,LTD
Receipt Samples	1 unit
Date of Receipt Samples	Jul. 6, 2016
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	2016-02-04	2017-02-03
AC Power supply	LC-I-987	APW-110N	2016-02-04	2017-02-03
Power analyzer	LC-I-928	WT210	2016-01-24	2017-01-24
Power analyzer	LC-I-954	WT210	2016-02-04	2017-02-03
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	2015-10-17	2016-10-16
Goniophotometer(with mirror)	LC-I-902	GMS2000	2016-05-07	2017-05-07
Wireless temperature transmitter	LC-I-978	DWRF-B	2016-02-03	2017-02-02
Wireless temperature transmitter	LC-I-979	DWRF-B	2016-02-03	2017-02-02

2. Test conducted and method

The 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 (50 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 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.

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	277.08V~60Hz
Input Current(A)	0.168	0.165
Total Power(W)	42.19	42.21
Power Factor	0.904	0.925
I-THD(%)	12.90	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	3985.35
Luminaire Efficacy(Lm/W)	-	94.42
Correlated Color Temperature (CCT)(K)	2614	-
Color Rendering Index (CRI)	82.2	-
R9	15	-
Chromaticity Coordinate (x,y)	x=0.4645 y=0.4077	-
Chromaticity Coordinate (u,v)	u=0.2668 v=0.3512	-
Chromaticity Coordinate (u',v')	u'=0.2668 v'=0.5269	-
Duv	-0.00142	-
Spacing Criteria(0-180°)	-	1.24
Spacing Criteria(90-270°)	-	1.24
Zone Lumens between 0-60 °	-	67.84%

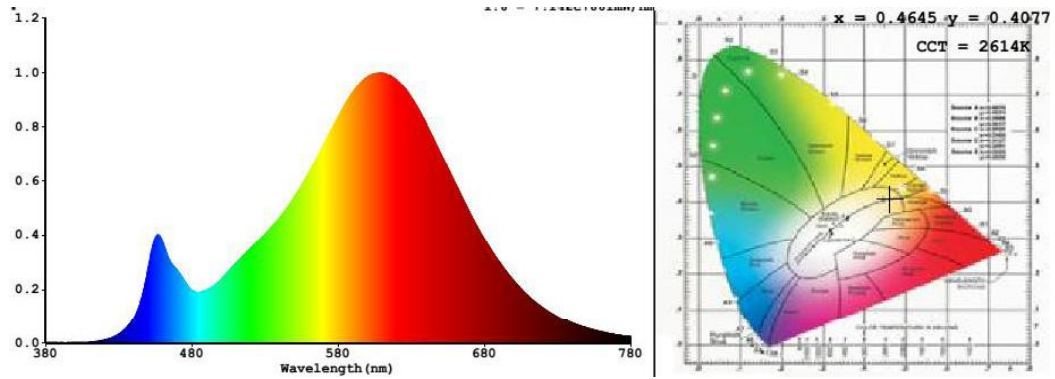
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
81	93	94	77	81	92	81	59
R9	R10	R11	R12	R13	R14	R15	-
15	84	75	75	84	98	75	-

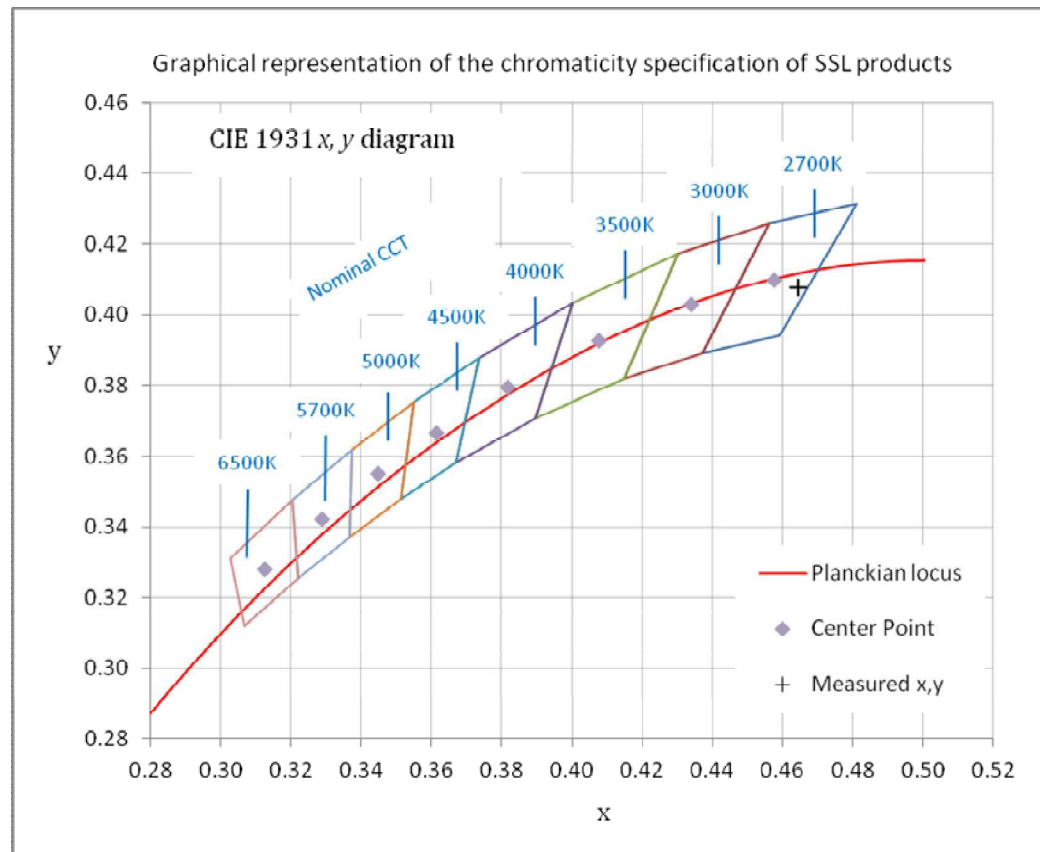
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Direct lighting	Basic Luminous Shape	Circular w/ Sides
Spacing Criteria (0-180°)	1.24	Luminous Diameter	125 mm
Spacing Criteria (90-270°)	1.24	Luminous Height	33 mm
Spacing Criteria (Diagonal)	1.36		
Test Distance	29.54 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	446.44	11.20	11.20
0-30	943.89	23.70	23.70
0-40	1537.65	38.60	38.60
0-60	2703.75	67.80	67.80
0-80	3487.89	87.50	87.50
0-90	3707.69	93.00	93.00
10-90	3591.84	90.10	90.10
20-40	1091.21	27.40	27.40
20-50	1701.9	42.70	42.70
40-70	1618.31	40.60	40.60
60-80	784.14	19.70	19.70
70-80	331.93	8.30	8.30
80-90	219.80	5.50	5.50
90-110	202.15	5.10	5.10
90-120	236.87	5.90	5.90
90-130	254.14	6.40	6.40
90-150	270.79	6.80	6.80
90-180	277.66	7.00	7.00
110-180	75.51	1.90	1.90
0-180	3985.35	100.00	100.00

Total Luminaire Efficiency = 100.00%

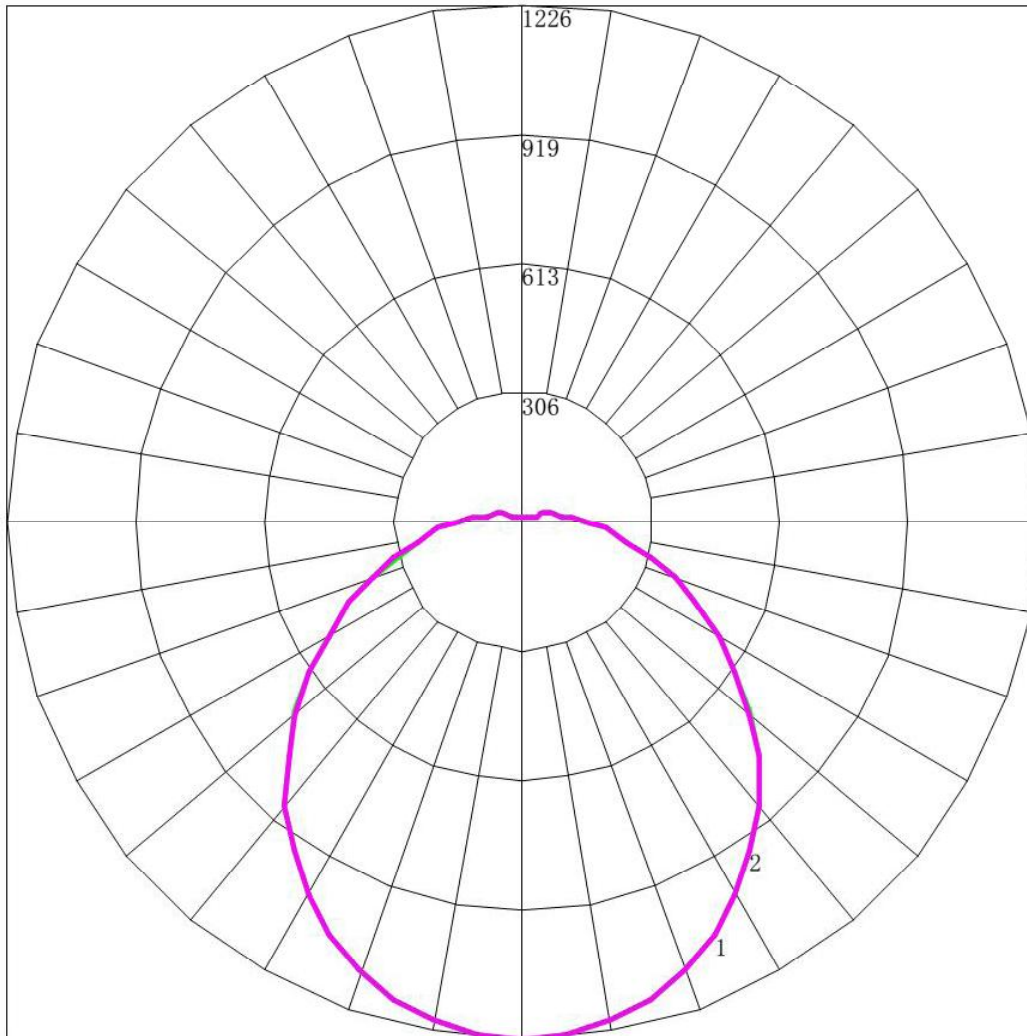
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	115.85
10-20	330.59
20-30	497.45
30-40	593.76
40-50	610.69
50-60	555.41
60-70	452.21
70-80	331.93
80-90	219.80
90-100	131.34
100-110	70.81
110-120	34.72
120-130	17.27
130-140	10.19
140-150	6.46
150-160	3.85
160-170	2.23
170-180	0.79



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4.5 Polar Curves



Maximum Candela = 1225.743 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	1225.743	1225.743	1225.743	1225.743	1225.743	1225.743	1225.743
5	1221.417	1219.262	1219.156	1219.959	1219.228	1219.816	1219.875
10	1201.974	1201.935	1201.183	1201.626	1201.156	1201.043	1201.836
15	1173.268	1171.144	1171.345	1171.594	1170.287	1172.006	1172.801
20	1132.853	1131.690	1131.126	1131.654	1130.701	1132.371	1133.290
25	1080.772	1078.488	1078.234	1079.580	1078.952	1080.025	1081.522
30	1019.734	1018.172	1018.929	1019.059	1018.612	1018.982	1019.583
35	947.379	947.948	947.869	949.938	949.161	950.613	950.298
40	873.539	872.204	873.493	872.612	872.014	872.891	873.450
45	791.922	790.284	790.022	792.230	790.683	792.557	792.169
50	705.193	705.091	705.024	706.130	707.019	706.507	708.323
55	620.867	619.680	618.979	620.204	619.803	620.108	621.434
60	535.580	534.465	535.660	535.348	535.508	535.586	536.806
65	453.526	454.203	454.763	454.966	455.178	455.248	456.785
70	380.647	378.524	379.798	380.041	380.321	381.235	381.371
75	311.133	311.291	312.249	312.579	312.680	312.387	313.129
80	251.711	251.586	251.417	252.145	252.101	252.411	252.147
85	199.412	199.409	199.594	199.591	199.871	199.479	200.726
90	155.326	154.587	154.510	155.155	154.835	154.895	155.695
95	118.974	118.472	118.413	118.401	118.497	118.989	119.401
100	88.957	89.186	88.706	88.850	88.939	89.187	89.670
105	65.713	65.313	65.455	65.344	65.308	65.402	65.895
110	47.493	47.376	47.178	47.317	47.325	47.351	47.595
115	33.818	33.868	33.785	33.720	33.613	33.813	34.077
120	24.337	24.462	24.407	24.553	24.632	24.482	24.689
125	18.613	18.527	18.496	18.595	18.572	18.618	18.734
130	15.118	15.014	14.962	15.059	15.041	15.086	15.257
135	12.977	12.919	12.847	12.942	12.905	12.972	13.040
140	11.535	11.544	11.494	11.545	11.553	11.576	11.519
145	10.268	10.213	10.186	10.258	10.180	10.246	10.171
150	9.088	8.969	8.964	8.970	8.981	8.982	8.911
155	8.214	8.161	8.157	8.141	8.153	8.175	8.085
160	7.952	7.900	7.917	7.923	7.826	7.892	7.824
165	7.865	7.812	7.787	7.813	7.826	7.761	7.737
170	8.127	8.009	8.027	8.032	7.978	7.957	7.954
175	8.564	8.489	8.485	8.512	8.458	8.459	8.476
180	8.579	8.579	8.579	8.579	8.579	8.579	8.579

Appendix 1 Product Photo



Picture 1



Picture 2

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