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IESNA SUSTAINING MEMBER

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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-8090M30-G4,LED-8090-NW-E40-G4

Test Date:	Nov. 14, 2018 to Nov. 16, 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 http://www.lccert.com
Template No.:	LC-RT-PL-001 Rev.1.1
Test Note:	*LED-8090M30-G4 and LED-8090-NW-E40-G4 are the same except the model number.*

Complied by:		**Reviewed by:**	
Ray He	Ray He	**Richard Li**	
Project Engineer		**Technical Manager**	
Nov. 16, 2018		**Nov. 16, 2018**	

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1. General

1.1 Product Information

Brand Name	Light Efficient Design
Product Type	LED Lamp
Model Number	LED-8090M30-G4,LED-8090-NW-E40-G4
Rated Inputs	120-277VAC, 50/60Hz
Rated Power	110W
Rated Light output	15000 lm
Declared CCT	3000K
Power Supply	Integrated in lamp
LED Package, Array or Module	Model: SPMWHT541MXXXXXXXX, manufactured by SAMSUNG ELECTRONICS CO.,LTD.
Receipt Samples	1 unit
Sample Code of lab.	1811140102008
Date of Receipt Samples	Nov. 14, 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-987	APW-120N	2018-01-10	2019-01-09
AC Power supply	LC-I-989	APW-120N	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	2018-08-01	2019-07-31
Photometric colorimetric electric system* (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp**	LC-PL-I-011	D204C	2018-08-09	2019-08-08
Luminous Flux Standard Lamp***	LC-PL-I-003	24V100W	2018-08-09	2019-08-08
Goniophotometer(with mirror)	LC-I-902	GMS2000	2018-05-06	2019-05-05
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:

* Bandwidth of spectroradiometer is 1 nm.

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

*** 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°C ± 1°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 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	120.00 V~60Hz
Input Current(A)	0.931	0.931
Total Power(W)	111.52	111.50
Power Factor	0.999	0.999
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-[4]	15746.15
Luminaire Efficacy(Lm/W)	-	141.22
Correlated Color Temperature (CCT)(K)	3112	-
Color Rendering Index (CRI)	84.0	-
R9	12	-
Chromaticity Coordinate (x,y)	x = 0.4263 y = 0.3951	-
Chromaticity Coordinate (u,v)	u = 0.2476 v = 0.3441	-
Chromaticity Coordinate (u',v')	u' = 0.2476 v' = 0.5162	-
Duv	-0.0021	-
Zone Lumens between 0-60 °	-	78.90%

3.3 Color Rendering Details

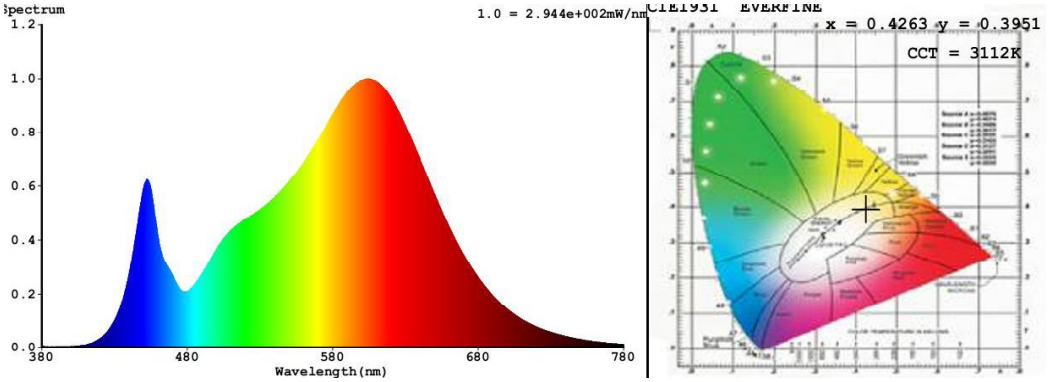
R1	R2	R3	R4	R5	R6	R7	R8
83	93	96	82	84	91	83	61
R9	R10	R11	R12	R13	R14	R15	-
12	83	82	76	86	98	76	-

Note:

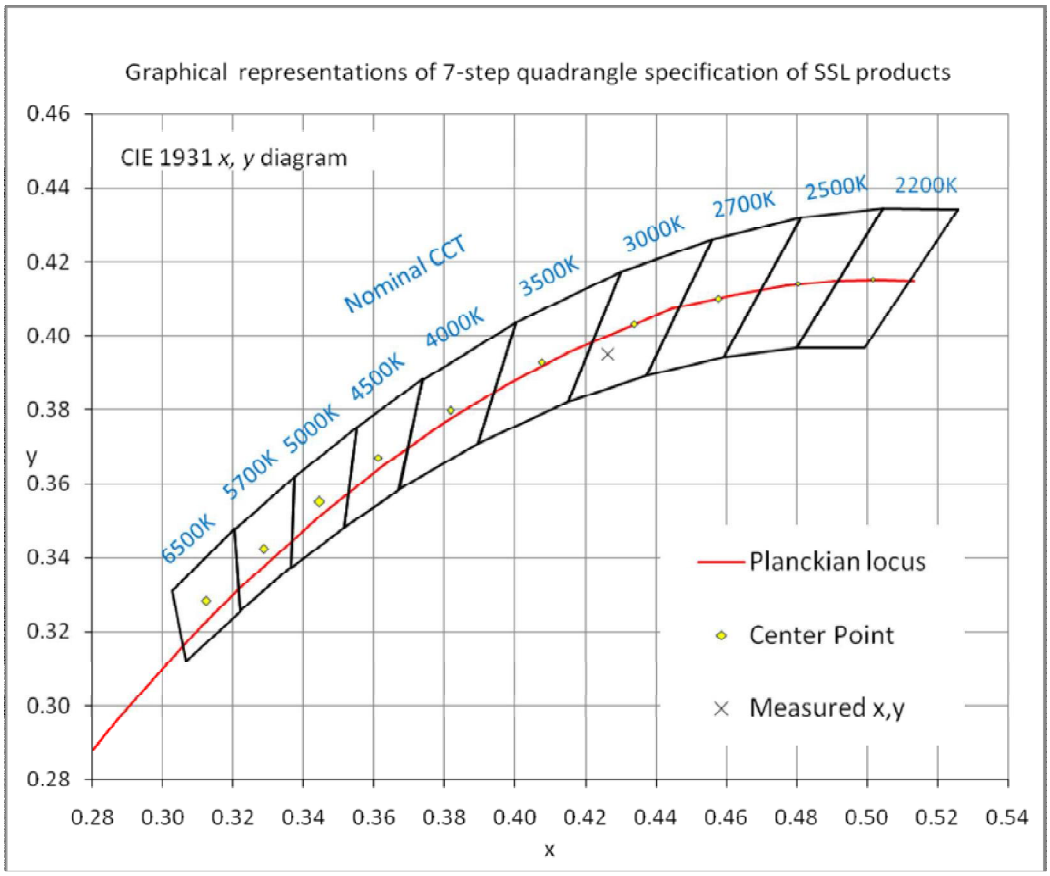
4, Self-absorption is 1.

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)	1.24	Luminous Length	0.14 m
Spacing Criteria (90-270)	1.30	Luminous Width	0.09 m
Spacing Criteria (Diagonal)	1.38	Luminous Height	0.00 m
Test Distance	30.00 m		

4.4 Zonal Lumen Summary

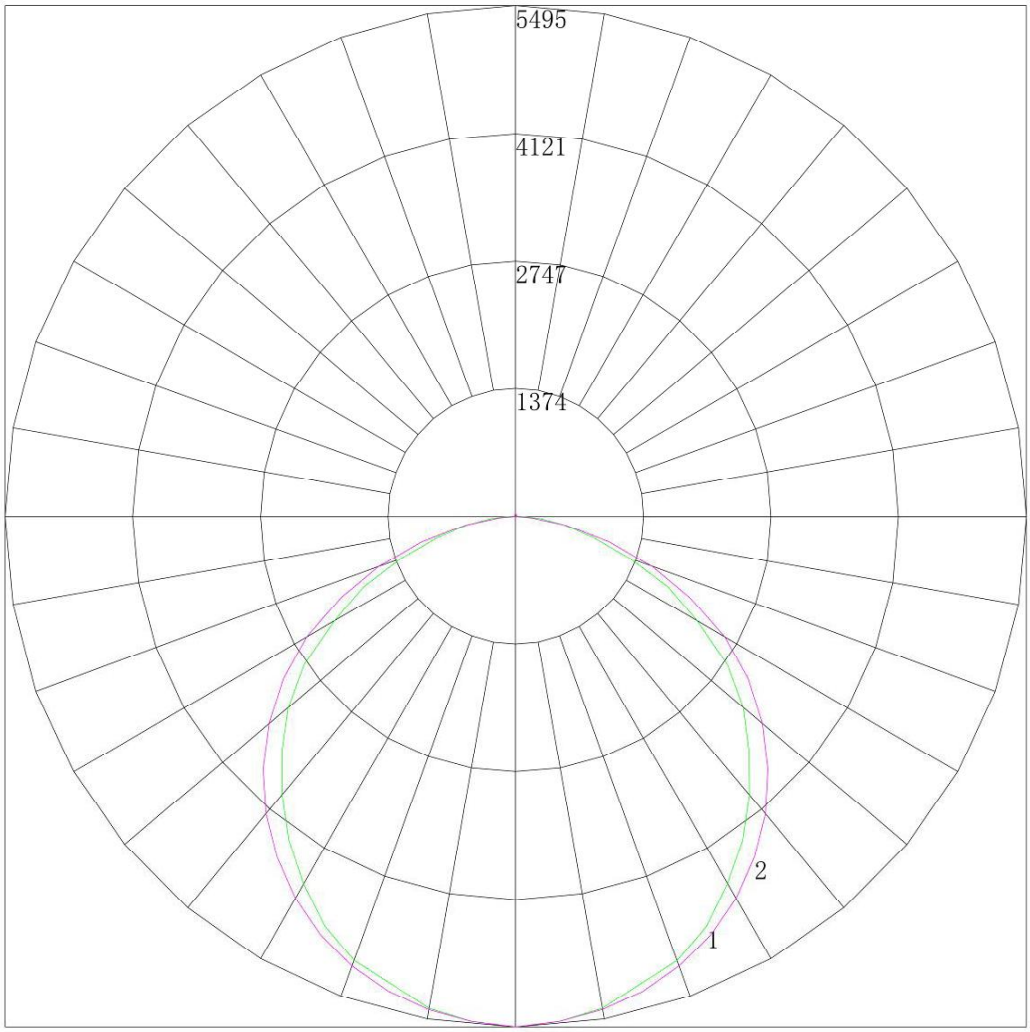
Zone	Lumens	%Lamp	%Fixt
0-20	2008.55	12.80	12.80
0-30	4274.81	27.10	27.10
0-40	7009.78	44.50	44.50
0-60	12424.33	78.90	78.90
0-80	15375.82	97.60	97.60
0-90	15656.95	99.40	99.40
10-90	15136.77	96.10	96.10
20-40	5001.23	31.80	31.80
20-50	7843.73	49.80	49.80
40-70	7334.11	46.60	46.60
60-80	2951.48	18.70	18.70
70-80	1031.92	6.60	6.60
80-90	281.14	1.80	1.80
90-110	41.87	0.30	0.30
90-120	50.26	0.30	0.30
90-130	57.29	0.40	0.40
90-150	71.54	0.50	0.50
90-180	89.19	0.60	0.60
110-180	47.33	0.30	0.30
0-180	15746.15	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	520.19
10-20	1488.37
20-30	2266.26
30-40	2734.97
40-50	2842.5
50-60	2572.05
60-70	1919.56
70-80	1031.92
80-90	281.14
90-100	30.65
100-110	11.22
110-120	8.40
120-130	7.03
130-140	6.29
140-150	7.97
150-160	8.40
160-170	6.68
170-180	2.57

4.5 Polar Curves

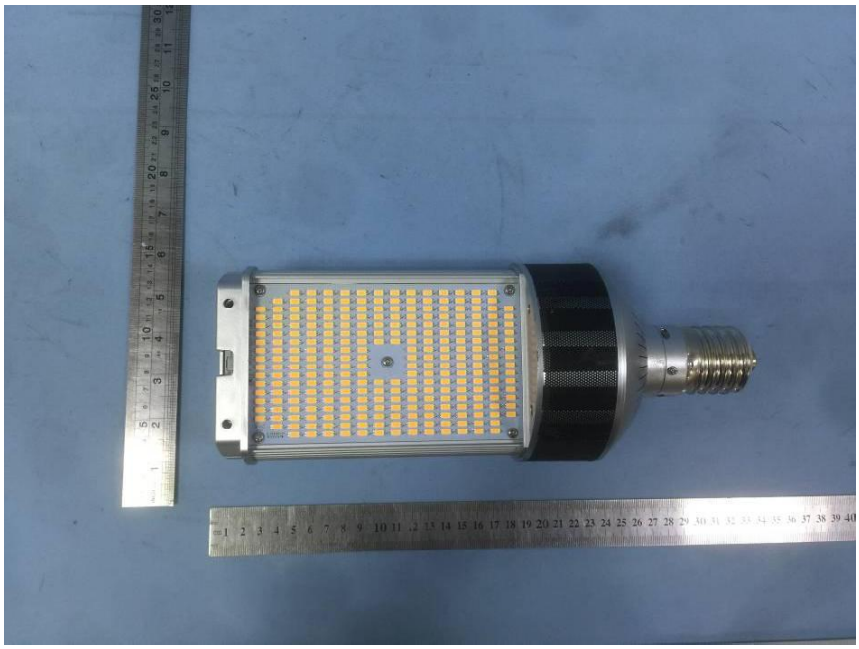


Maximum Candela = 5494.669 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

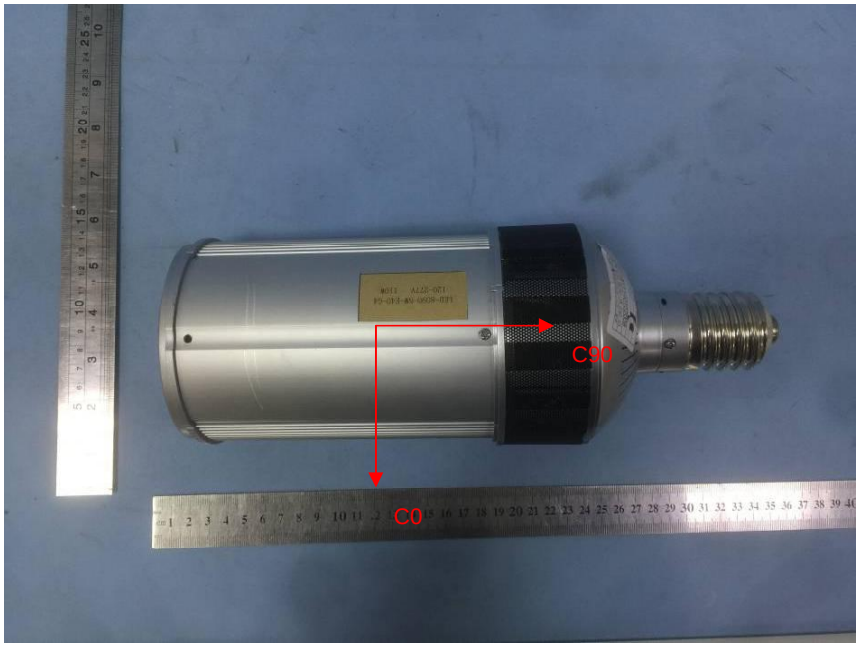
4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	5494.669	5494.669	5494.669	5494.669	5494.669	5494.669	5494.669
5	5454.880	5474.541	5471.656	5481.388	5472.456	5471.369	5455.799
10	5375.299	5395.388	5412.552	5418.334	5412.777	5409.303	5394.567
15	5201.669	5212.204	5224.400	5285.251	5308.000	5304.213	5293.098
20	5084.560	5092.342	5086.337	5089.582	5149.373	5166.631	5147.805
25	4861.191	4885.639	4916.011	4913.937	4916.935	4984.461	4966.752
30	4563.668	4577.611	4622.957	4695.510	4686.739	4762.408	4742.759
35	4255.294	4279.084	4293.358	4378.193	4430.066	4486.129	4479.430
40	3911.199	3929.677	3961.507	4023.962	4131.888	4160.329	4183.467
45	3553.991	3584.338	3608.218	3658.718	3748.896	3820.188	3841.002
50	3199.497	3205.071	3221.541	3263.936	3336.738	3435.011	3462.321
55	2782.151	2797.542	2810.501	2854.550	2913.366	3030.114	3052.315
60	2249.053	2277.654	2368.798	2423.243	2459.702	2572.784	2598.957
65	1806.025	1819.866	1863.029	1951.566	2000.718	2078.616	2067.084
70	1312.535	1361.144	1416.071	1445.135	1513.357	1529.777	1563.933
75	866.794	907.417	947.794	979.523	979.427	1005.495	1045.249
80	520.800	545.804	550.855	526.909	528.004	532.944	549.130
85	262.390	264.567	246.727	206.730	195.200	191.695	171.513
90	91.472	90.684	74.149	55.297	37.082	21.820	14.451
95	31.199	32.701	32.079	23.551	16.086	9.680	4.915
100	9.360	14.450	18.724	16.166	12.138	8.089	5.183
105	8.229	10.493	13.377	12.812	10.051	7.417	5.675
110	9.179	9.792	11.257	10.876	8.817	6.991	5.809
115	9.134	9.318	9.881	9.232	7.561	6.520	5.809
120	8.998	9.182	8.979	8.106	7.292	6.565	6.167
125	8.953	8.594	8.234	7.904	7.471	7.125	6.795
130	8.048	7.983	7.919	7.747	7.337	7.215	7.065
135	7.687	7.734	7.806	7.454	7.359	7.260	7.199
140	10.038	10.109	10.265	9.954	9.692	9.702	9.612
145	12.977	13.140	13.085	12.814	12.632	12.570	12.607
150	15.826	15.808	15.724	15.403	15.212	15.170	15.155
155	18.720	18.477	18.319	18.173	17.949	17.881	17.883
160	21.613	21.530	21.364	21.303	21.157	21.018	21.014
165	24.326	24.266	24.116	23.983	23.760	23.662	23.743
170	26.135	26.121	26.012	25.830	25.622	25.567	25.532
175	27.537	27.614	27.478	27.451	27.260	27.225	27.231
180	28.492	28.492	28.492	28.492	28.492	28.492	28.492

Appendix A Product Photo



Picture 1



Picture 2

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