LCTECH

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-8090M40C-G4

Test Date:	Sep. 20, 2018 to Nov. 12, 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:	/

Complied by:		**Reviewed by:**	
Ray He	Ray He	**Richard Li**	
Project Engineer		**Technical Manager**	
Nov. 13, 2018		**Nov. 13, 2018**	

Table of Contents

1. General

1.1 Product Information

Brand Name	Light Efficient Design
Product Type	LED Lamp
Model Number	LED-8090M40C-G4
Rated Inputs	220-347VAC, 50/60Hz
Rated Power	110W
Rated Light output	15000 lm
Declared CCT	4000K
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.	180920101004
Date of Receipt Samples	Sep. 20, 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	347.00 V~60Hz	347.00 V~60Hz
Input Current(A)	0.337	0.337
Total Power(W)	108.30	108.30
Power Factor	0.927	0.925
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-[4]	15159.03
Luminaire Efficacy(Lm/W)	-	139.97
Correlated Color Temperature (CCT)(K)	4125	-
Color Rendering Index (CRI)	84.3	-
R9	14	-
Chromaticity Coordinate (x,y)	x = 0.3750 y = 0.3730	-
Chromaticity Coordinate (u,v)	u = 0.2230 v = 0.4991	-
Chromaticity Coordinate (u',v')	u' = 0.2230 v' = 0.4991	-
Duv	-0.0001	-
Zone Lumens between 0-60 º	-	79.56%

3.3 Color Rendering Details

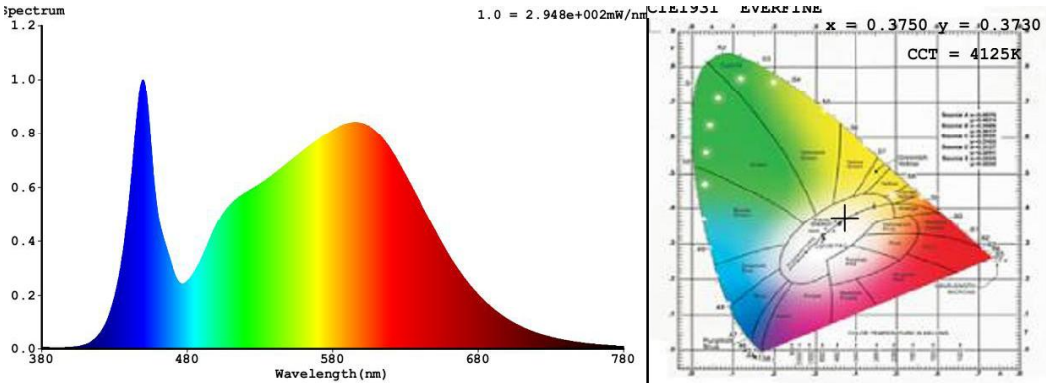
R1	R2	R3	R4	R5	R6	R7	R8
83	89	94	84	83	86	87	67
R9	R10	R11	R12	R13	R14	R15	-
14	75	84	67	84	97	77	-

Note:

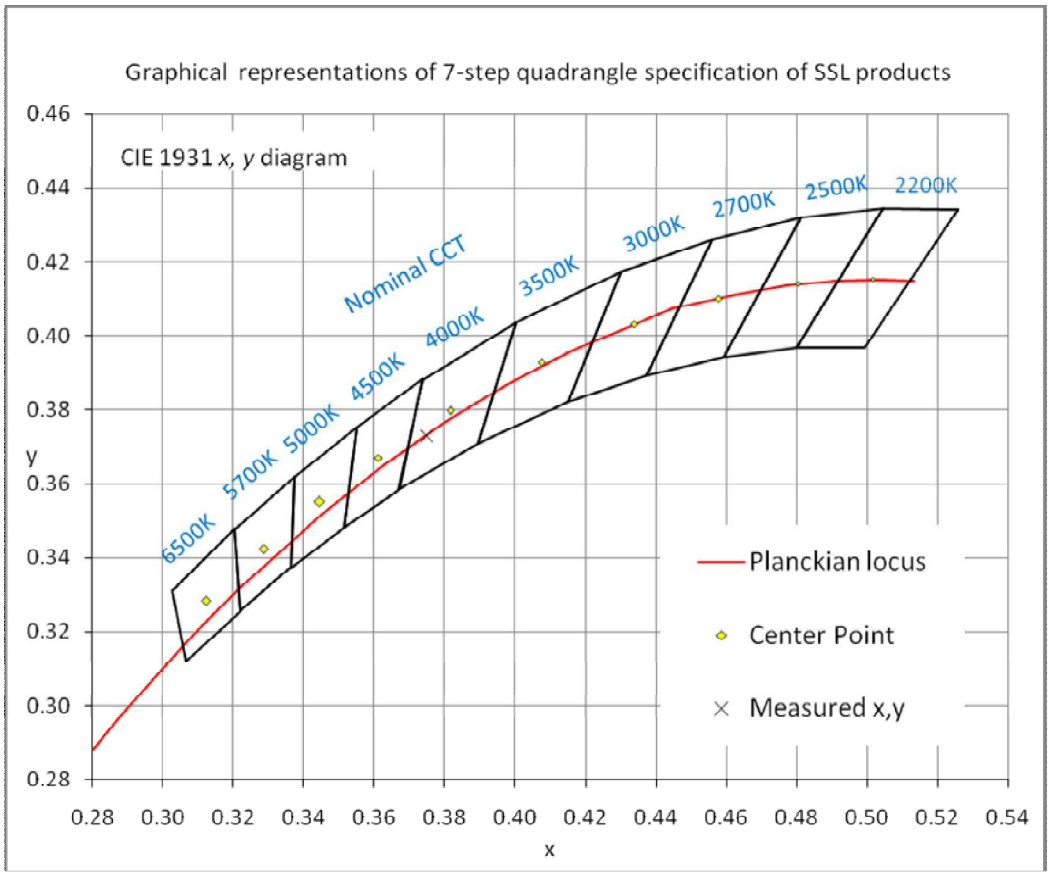
4, Self-absorption is 1.

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)	1.26	Luminous Length	0.14 m
Spacing Criteria (90-270)	1.30	Luminous Width	0.09 m
Spacing Criteria (Diagonal)	1.40	Luminous Height	0.00 m
Test Distance	30.00 m		

4.4 Zonal Lumen Summary

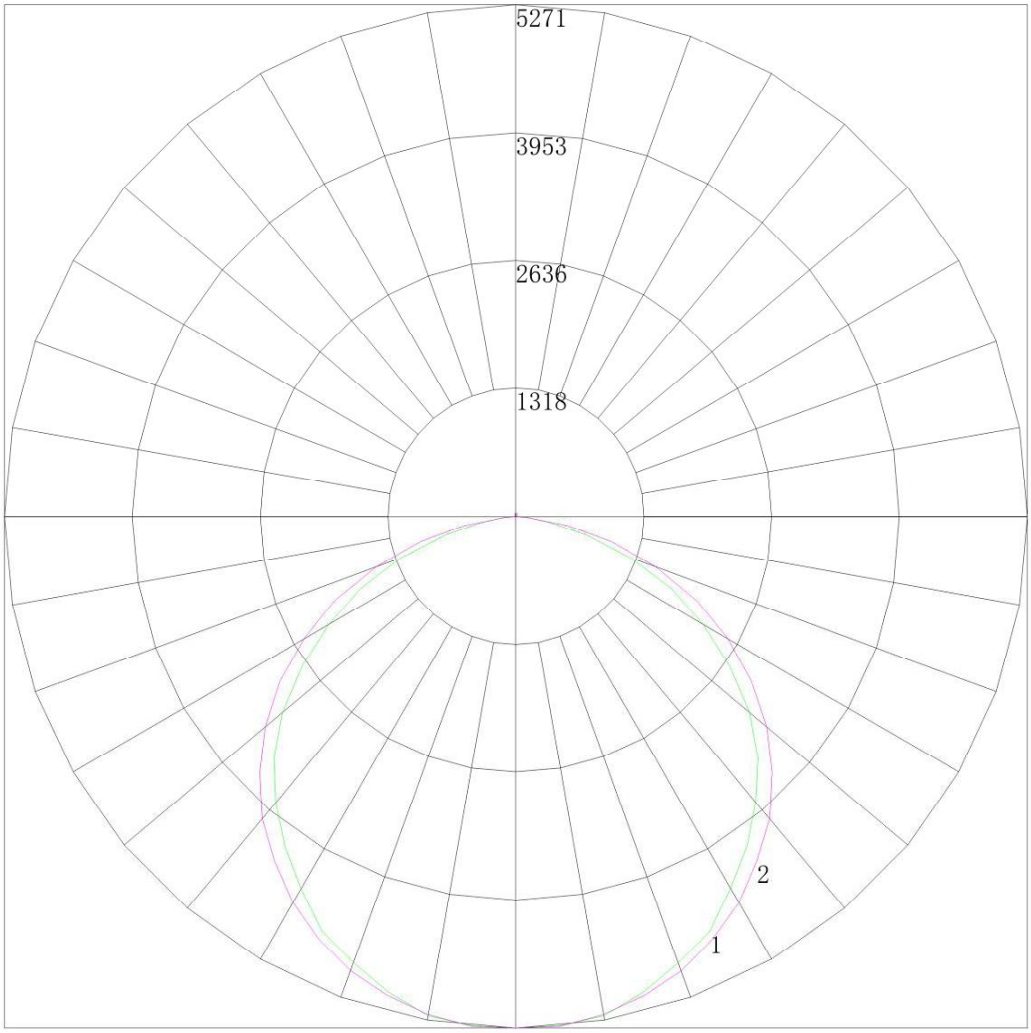
Zone	Lumens	%Lamp	%Fixt
0-20	1940.13	12.80	12.80
0-30	4129.98	27.20	27.20
0-40	6782.92	44.70	44.70
0-60	12060.08	79.60	79.60
0-80	14867.51	98.10	98.10
0-90	15076.01	99.50	99.50
10-90	14575.83	96.20	96.20
20-40	4842.8	31.90	31.90
20-50	7615.9	50.20	50.20
40-70	7130.72	47.00	47.00
60-80	2807.43	18.50	18.50
70-80	953.87	6.30	6.30
80-90	208.50	1.40	1.40
90-110	28.81	0.20	0.20
90-120	36.32	0.20	0.20
90-130	43.61	0.30	0.30
90-150	61.22	0.40	0.40
90-180	83.02	0.50	0.50
110-180	54.21	0.40	0.40
0-180	15159.03	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	500.18
10-20	1439.95
20-30	2189.86
30-40	2652.94
40-50	2773.1
50-60	2504.06
60-70	1853.56
70-80	953.87
80-90	208.50
90-100	19.31
100-110	9.50
110-120	7.51
120-130	7.29
130-140	7.74
140-150	9.87
150-160	10.47
160-170	8.18
170-180	3.15

4.5 Polar Curves

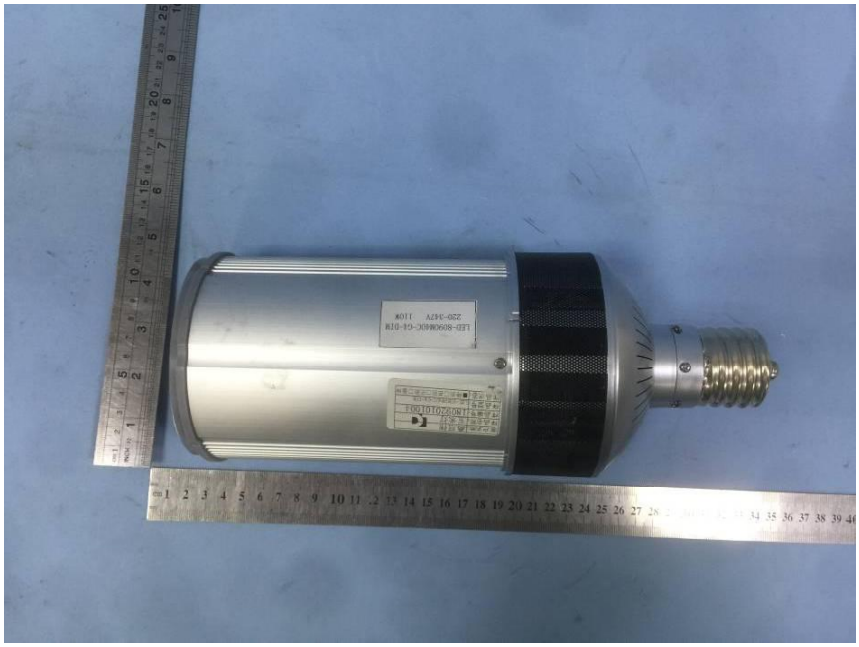


Maximum Candela = 5271.162 Located At Horizontal Angle = 90, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

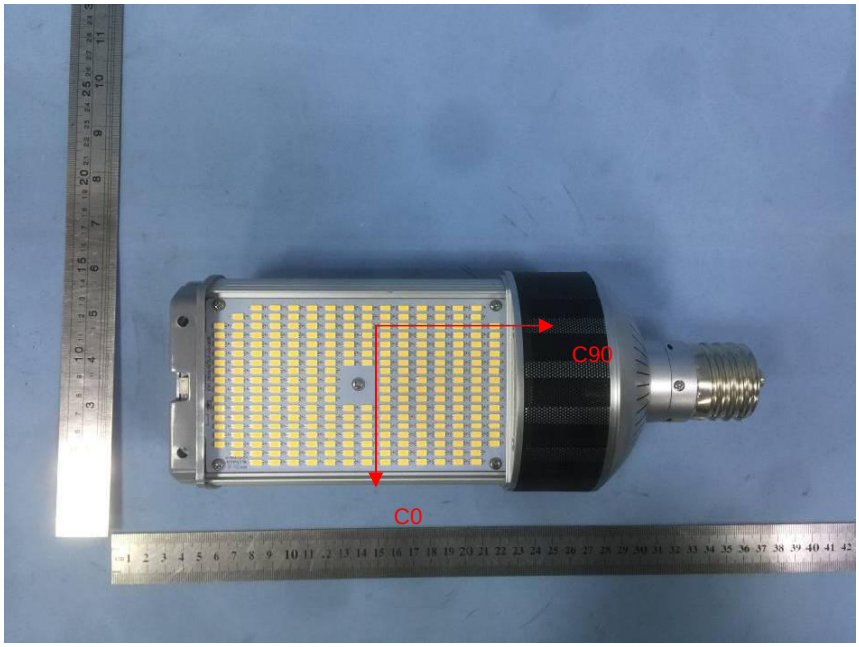
4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	5271.065	5271.065	5271.065	5271.065	5271.065	5271.065	5271.065
5	5265.646	5252.794	5254.607	5255.980	5252.441	5255.400	5271.162
10	5224.551	5215.121	5208.830	5206.231	5196.092	5197.953	5212.847
15	5077.330	5095.559	5114.334	5124.971	5109.447	5103.016	5111.922
20	4894.883	4892.080	4907.772	4955.463	4985.084	4968.607	4982.668
25	4718.759	4708.678	4719.690	4738.686	4797.666	4798.932	4802.743
30	4427.027	4430.753	4482.453	4523.262	4547.814	4593.392	4596.312
35	4152.906	4155.086	4161.106	4243.004	4279.121	4346.957	4332.938
40	3846.722	3862.050	3872.680	3885.763	3989.085	4058.367	4066.355
45	3528.344	3520.961	3522.461	3558.232	3637.322	3720.152	3735.180
50	3139.969	3144.231	3171.108	3183.881	3222.501	3341.800	3372.577
55	2689.273	2705.689	2763.828	2797.148	2833.947	2935.782	2964.665
60	2223.674	2221.129	2264.321	2356.612	2393.090	2490.292	2523.964
65	1770.269	1767.471	1810.602	1831.294	1919.641	2010.466	2064.846
70	1258.336	1277.699	1330.523	1392.306	1441.677	1485.811	1526.845
75	750.919	801.393	861.532	890.547	925.248	969.482	1018.244
80	346.919	380.063	431.243	458.254	471.435	529.269	550.620
85	113.126	129.394	141.654	142.510	147.355	156.094	142.758
90	38.973	43.154	42.730	31.603	25.974	19.157	9.941
95	11.245	16.964	20.497	18.233	13.963	9.674	5.573
100	7.045	10.377	13.281	12.448	10.572	8.461	5.976
105	7.993	8.798	10.035	10.174	8.979	7.923	6.380
110	7.316	7.738	8.840	8.599	8.036	7.496	6.470
115	6.909	7.128	7.735	7.699	7.632	7.295	6.649
120	7.451	7.264	7.397	7.811	7.902	7.788	7.230
125	7.993	8.099	8.231	8.329	8.463	8.484	8.213
130	8.174	8.279	8.366	8.397	8.508	8.416	8.345
135	9.664	9.678	9.720	9.725	9.652	9.605	9.558
140	12.509	12.543	12.493	12.403	12.346	12.366	12.344
145	15.941	16.039	15.944	15.780	15.781	15.755	15.711
150	19.283	19.243	19.123	19.112	19.103	19.144	19.034
155	22.986	22.897	22.844	22.826	22.762	22.869	22.713
160	26.509	26.461	26.340	26.270	26.218	26.302	26.254
165	29.444	29.371	29.316	29.196	29.092	29.085	29.122
170	31.657	31.627	31.549	31.402	31.336	31.239	31.321
175	33.825	33.793	33.736	33.653	33.514	33.460	33.612
180	35.100	35.100	35.100	35.100	35.100	35.100	35.100

Appendix A Product Photo



Picture 1



Picture 2

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