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Test report of

IES LM-79-08

Approved Method: Electrical and Photometric

Measurements of Solid-State Lighting Products

Rendered to:

P.Q.L. INC.

2285 Ward Avenue , Simi Valley, CA 93065, USA

For products:

LED Down light

Models:

90913

Test date: August 14, 2014 to August 16, 2014

Test laboratory: LCTECH (Zhongshan) Testing Service Co.,Ltd
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Xiaolan, Zhongshan, Guangdong, China

Laboratory note: N/A

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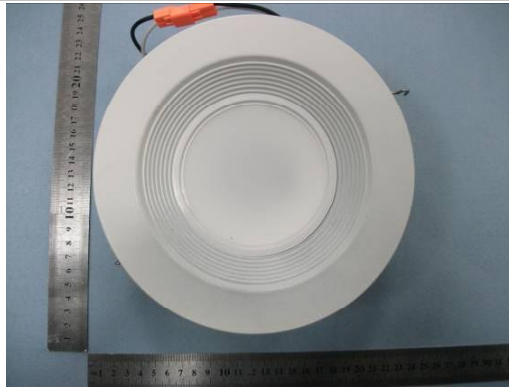
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1 General

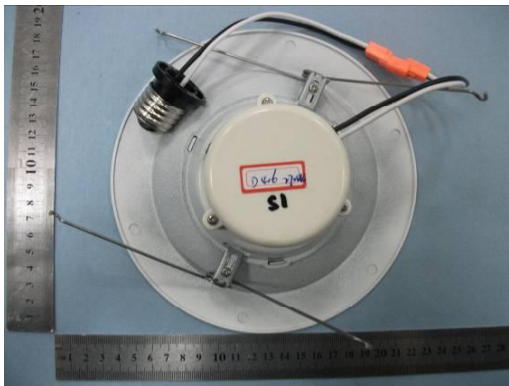
1.1 Product Information

Brand Name	Superior Life
Trade Mark	
Luminaire Type	LED Down light
Model Number	90910
Rated Inputs	120VAC,60Hz
Rated Power	14.8 W
Rated Initial Lamp Lumens	1000 lm
Declared CCT	2700 K
Power Supply	Integral LED driver
LED Package, Array or Module	NF2L757AR, Manufacturer by Nichia Corporation
Date of Receipt Samples	Aug 12, 2014
Quantity of Receipt Samples	1 unit

Photo



Picture 1



Picture 2



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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

ID	Instrument	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-923	CHP-500	2014-03-04	2015-03-03
AC Power supply	LC-I-953	APW-110N	2014-03-04	2015-03-03
Power analyzer	LC-I-928	WT210	2014-03-21	2015-03-20
Power analyzer	LC-I-954	WT210	2014-03-04	2015-03-03
Multimeter	LC-I-972	Fluke 17B	2014-08-15	2015-08-14
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-I-917	24V100W	2013-10-22	2014-10-21
Goniophotometer(with mirror)	LC-I-902	GMS2000	2014-05-14	2015-05-13
Wireless temperature transmitter	LC-I-958	DWRP-B(0)	2014-08-19	2015-08-18
Wireless temperature transmitter	LC-I-959	DWRP-B(0)	2014-08-19	2015-08-18



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 both sphere-spectroradiometer system and goniophotometer.

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the total luminous flux was calculated from these by software automatically.

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 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

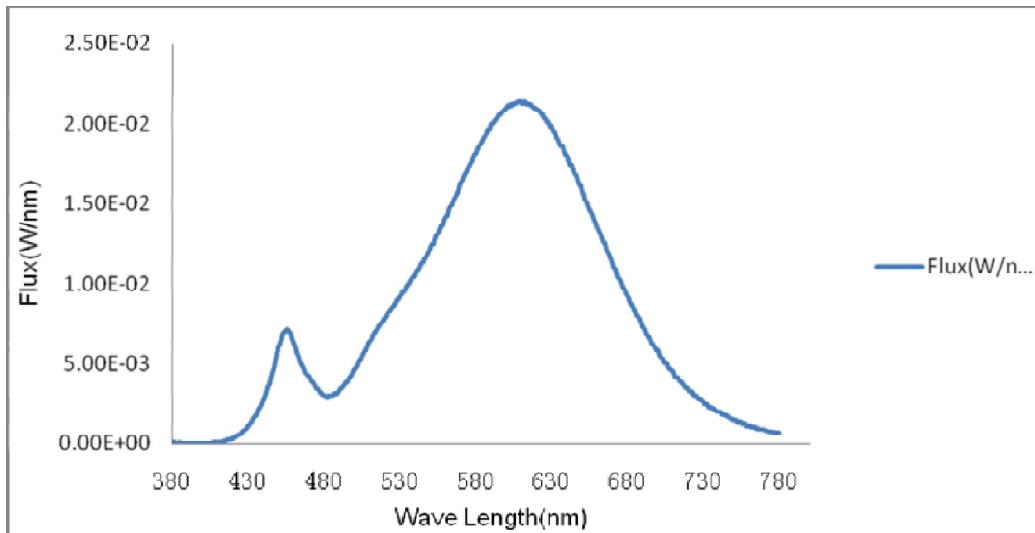
Criteria Item	Result (Sphere)	Result (Goniophotometer)
Input Voltage	120.08 V~60Hz	120.01 V~60Hz
Input Current	0.121 A	0.120 A
Total Power	14.26 W	14.21 W
Power Factor	0.986	0.985
I-THD	-	-
Off-state Power	0.0 W	-

3.2 Photometric data

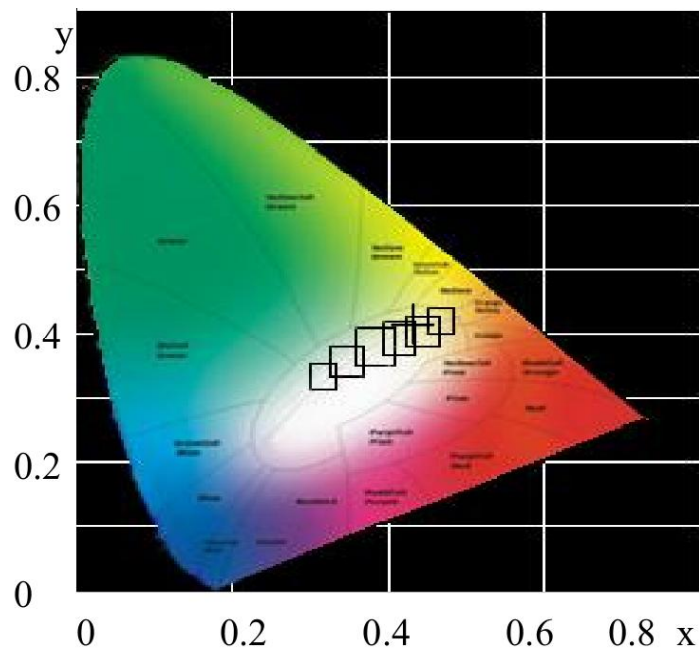
Criteria Item	Result (Sphere)	Result (Goniophotometer)
Total Lumens	1093.22 lm	1100.30 lm
Luminaire Efficacy	76.66 lm/W	77.43 lm/W
Correlated Color Temperature (CCT)	2611 K	-
Color Rendering Index (CRI)	81.7	-
R9	15	-
Chromaticity Coordinate (x,y)	x= 0.4692 y= 0.4154	-
Chromaticity Coordinate (u,v)	u= 0.2664 v= 0.3537	-
Chromaticity Coordinate (u',v')	u'= 0.2664 v'= 0.5306	-
Duv	+0.00105	-

4 Test Data

4.1 Spectral Distribution

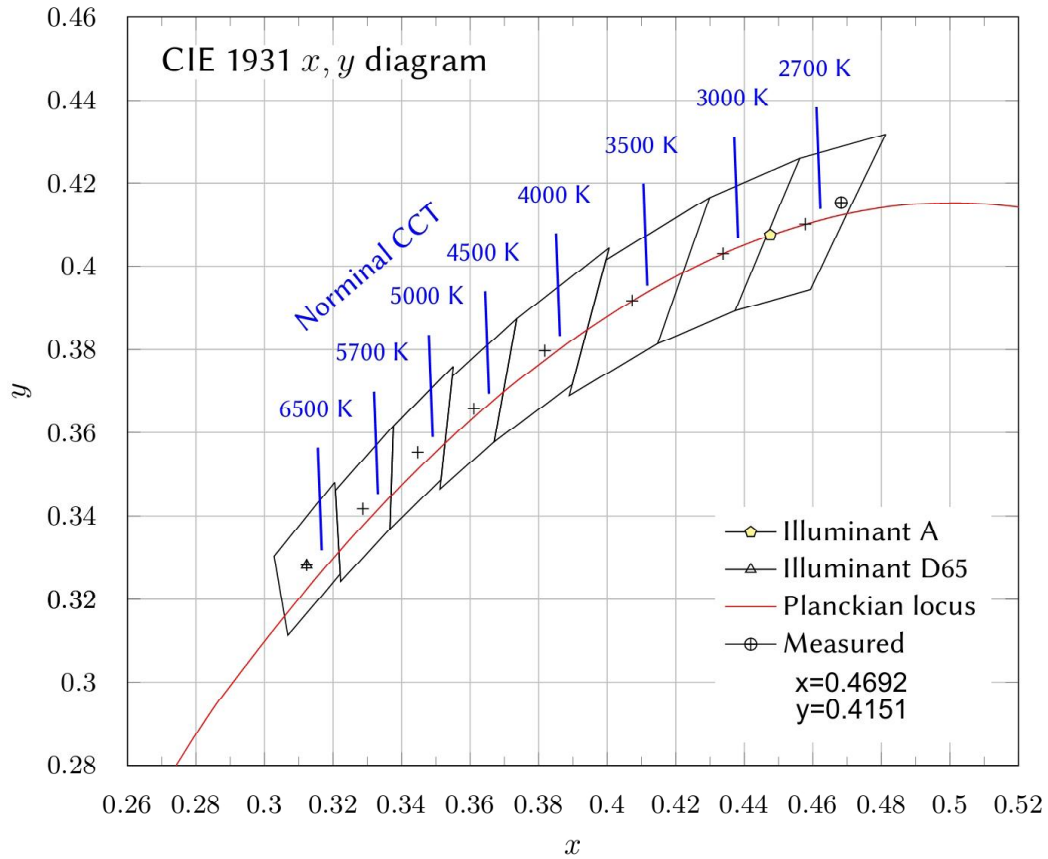


4.2 Chromaticity Diagram (CIE 1931)





4.3 ANSI Chromaticity Quadrangles Diagram



4.4 Color Rendering Details

R1	R2	R3	R4	R5
79	90	97	78	78
R6	R7	R8	R9	R10
86	84	61	15	76
R11	R12	R13	R14	R15
75	67	82	99	74



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4.5 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Circular
Spacing Criteria (0-180)	1.14	Luminous Length	0.09 m(Diameter)
Spacing Criteria (90-270)	1.16	Luminous Width	0.09 m(Diameter)
Spacing Criteria (Diagonal)	1.24	Luminous Height	0.00 m
Test Distance	18.54 m		

4.6 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-30	382.41	34.8	34.8
0-40	602.57	54.8	54.8
0-60	974.14	88.5	88.5
0-90	1095.94	99.6	99.6
90-120	1.39	.1	.1
90-130	1.91	.2	.2
90-150	2.92	.3	.3
90-180	4.36	.4	.4
0-180	1100.31	100	100

Total Luminaire Efficiency = 100%

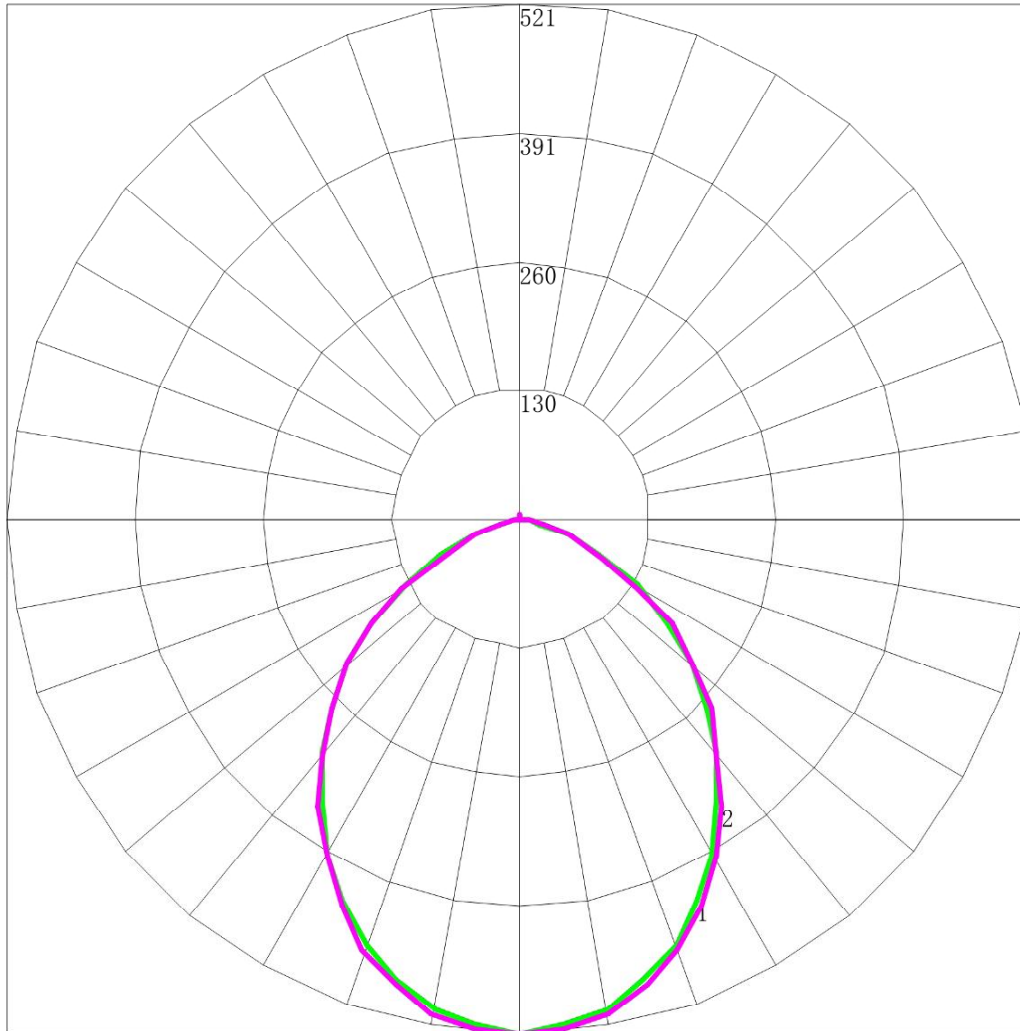
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	48.89
10-20	136.6
20-30	196.92
30-40	220.16
40-50	207.77
50-60	163.8
60-70	90.4
70-80	27.09
80-90	4.31
90-100	.44
100-110	.46
110-120	.49
120-130	.52
130-140	.48
140-150	.54
150-160	.63
160-170	.58
170-180	.23



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4.7 Polar Curves



Maximum Candela = 520.71 Located At Horizontal Angle = 0, Vertical Angle = 0

1 - Vertical Plane Through Horizontal Angles (0 - 180)

2 - Vertical Plane Through Horizontal Angles (90 - 270)



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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	520.71	520.71	520.71	520.71	520.71	520.71	520.71
5	514.69	514.98	515.22	515.67	515.74	516.52	520.08
10	503.69	503.66	503.81	503.83	504.38	504.50	509.10
15	484.27	484.47	485.00	484.40	484.94	485.73	489.66
20	458.97	458.68	459.54	459.36	459.78	460.63	463.81
25	427.31	427.15	427.38	427.47	427.94	429.10	432.29
30	391.22	390.90	390.86	391.77	391.95	392.64	395.69
35	350.45	351.39	351.76	351.65	352.64	353.09	355.26
40	309.34	309.39	309.67	310.43	310.67	311.40	313.64
45	268.02	268.10	268.06	269.09	269.06	269.85	271.29
50	227.33	227.59	227.95	228.19	228.05	229.12	230.16
55	183.59	183.72	183.54	184.31	184.69	184.82	185.86
60	135.36	135.77	135.92	136.58	136.51	136.25	137.56
65	89.41	89.77	89.89	89.83	89.92	89.90	90.69
70	49.94	50.06	49.96	50.14	50.04	49.70	50.30
75	22.41	22.66	22.65	22.51	22.67	22.64	22.88
80	7.54	7.67	7.64	7.61	7.67	7.68	7.96
85	3.92	3.92	3.89	3.89	3.86	3.81	3.80
90	0.38	0.40	0.41	0.43	0.42	0.43	0.45
95	0.40	0.40	0.41	0.38	0.38	0.39	0.40
100	0.40	0.43	0.40	0.40	0.41	0.41	0.40
105	0.43	0.46	0.44	0.44	0.43	0.44	0.40
110	0.45	0.46	0.46	0.49	0.46	0.47	0.50
115	0.46	0.52	0.47	0.48	0.48	0.50	0.48
120	0.53	0.52	0.52	0.52	0.52	0.52	0.53
125	0.55	0.59	0.57	0.58	0.58	0.58	0.60
130	0.60	0.62	0.63	0.61	0.65	0.62	0.64
135	0.60	0.58	0.60	0.59	0.59	0.60	0.58
140	0.65	0.67	0.68	0.70	0.70	0.67	0.67
145	0.81	0.84	0.83	0.87	0.83	0.82	0.81
150	1.08	1.09	1.11	1.09	1.09	1.10	1.08
155	1.36	1.34	1.36	1.36	1.33	1.37	1.39
160	1.75	1.71	1.74	1.73	1.73	1.76	1.75
165	2.06	2.04	2.08	2.09	2.07	2.09	2.11
170	2.34	2.31	2.31	2.35	2.35	2.33	2.30
175	2.41	2.43	2.45	2.44	2.47	2.43	2.42
180	2.55	2.55	2.55	2.55	2.55	2.55	2.55

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