LCTECH

IESNA SUSTAINING MEMBER

Ref. No.: LCDP16010387
Version: 1.0
Date of issue: Apr. 27, 2016
Total pages: 14

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

For products:
SSL Downlight Retrofits

Models No.:
90922

Test Date: Feb. 19, 2016 to Feb. 25, 2016
Test Lab.: LCTECH (Zhongshan) Testing Service Co.,Ltd
2/F.,Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China
Test Note:

Complied by:	**Reviewed by:**
Fish Tan	**Richard Li**
Project Engineer	**Technical Manager**
Apr. 27, 2016	**Apr. 27, 2016**

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1. General

1.1 Product Information

Brand Name	Superior Life®
Trade Mark	Superior Life®
Product Type	SSL Downlight Retrofits
Model Number	90922
Rated Inputs	120VAC, 60Hz
Rated Power	15 W
Rated Light output	1000 lm
Declared CCT	2700 K
Power Supply	LED driver, not provided
LED Package, Array or Module	HL-AT-2835FVW-S1-08-PCT-HR3
Receipt Samples	1 unit
Date of Receipt Samples	Apr. 5, 2016
Note	All the tests are tested in a Can. Auxiliary test can mode: HALO® H7ICAT

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	2016-02-04	2017-02-03
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	2012-05-07	2016-05-07
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

All the tests are tested in a Can which model HALO® H7ICAT

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 both 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	120.00 V~60Hz	120.02 V~60Hz
Input Current(A)	0.127	0.127
Total Power(W)	14.99	14.97
Power Factor	0.982	0.983
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	1001.40	1009.59
Luminaire Efficacy(Lm/W)	66.80	67.44
Correlated Color Temperature (CCT)(K)	2720	-
Color Rendering Index (CRI)	92.8	-
R9	61	-
Chromaticity Coordinate (x,y)	x = 0.4537 y = 0.4021	-
Chromaticity Coordinate (u,v)	u = 0.2624 v = 0.3487	-
Chromaticity Coordinate (u',v')	u' = 0.2624 v' = 0.5231	-
Duv	-0.0027	-
Spacing Criteria(0-180°)	-	1.22
Spacing Criteria(90-270°)	-	1.22
Zone Lumens between 0-60 °	-	91.7 %

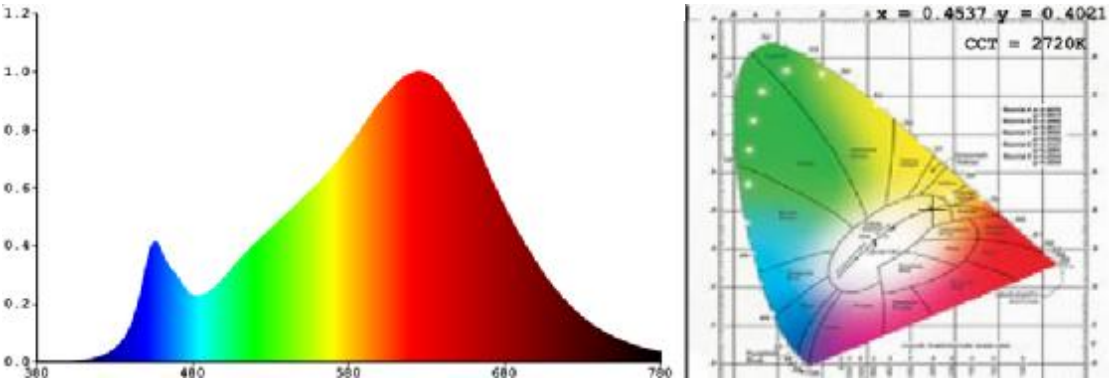
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
94	98	98	91	94	97	90	81
R9	R10	R11	R12	R13	R14	R15	-
61	95	92	85	95	100	90	-

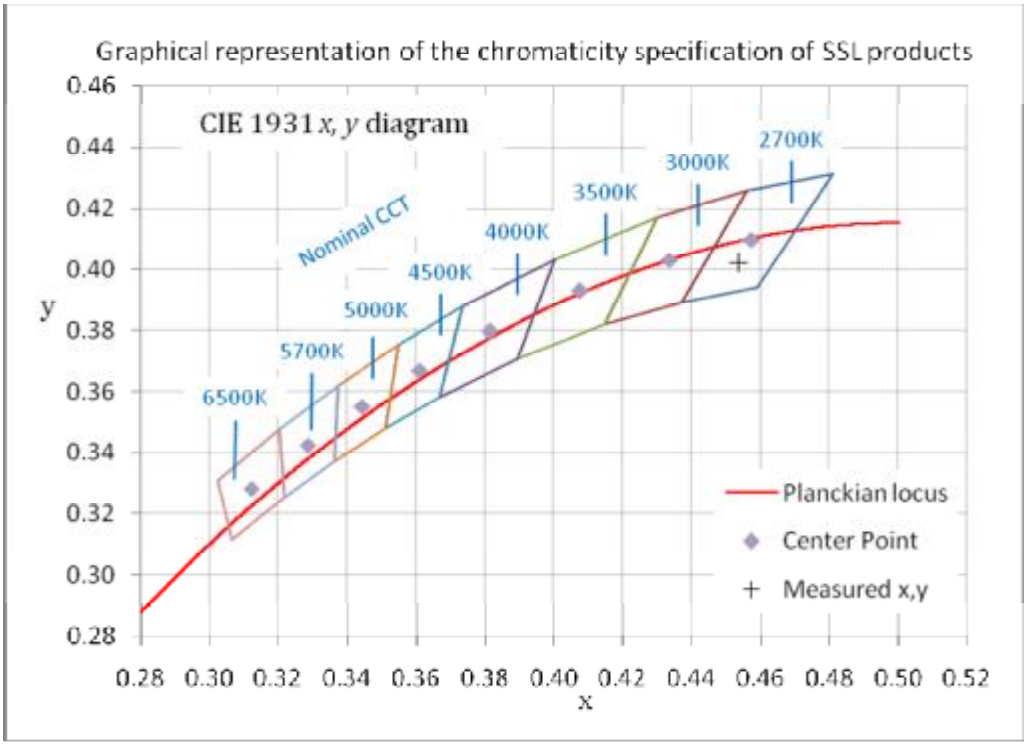
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram



4.3 Goniometry Test Data

CIE Type	Direct	Basic Luminous Shape	Circular
Spacing Criteria (0-180)	1.22	Luminous Length	0.14 m (Diameter)
Spacing Criteria (90-270)	1.22	Luminous Width	0.14 m (Diameter)
Spacing Criteria (Diagonal)	1.28	Luminous Height	0.00 m
Test Distance	29.68 m		

4.4 Zonal Lumen Summary

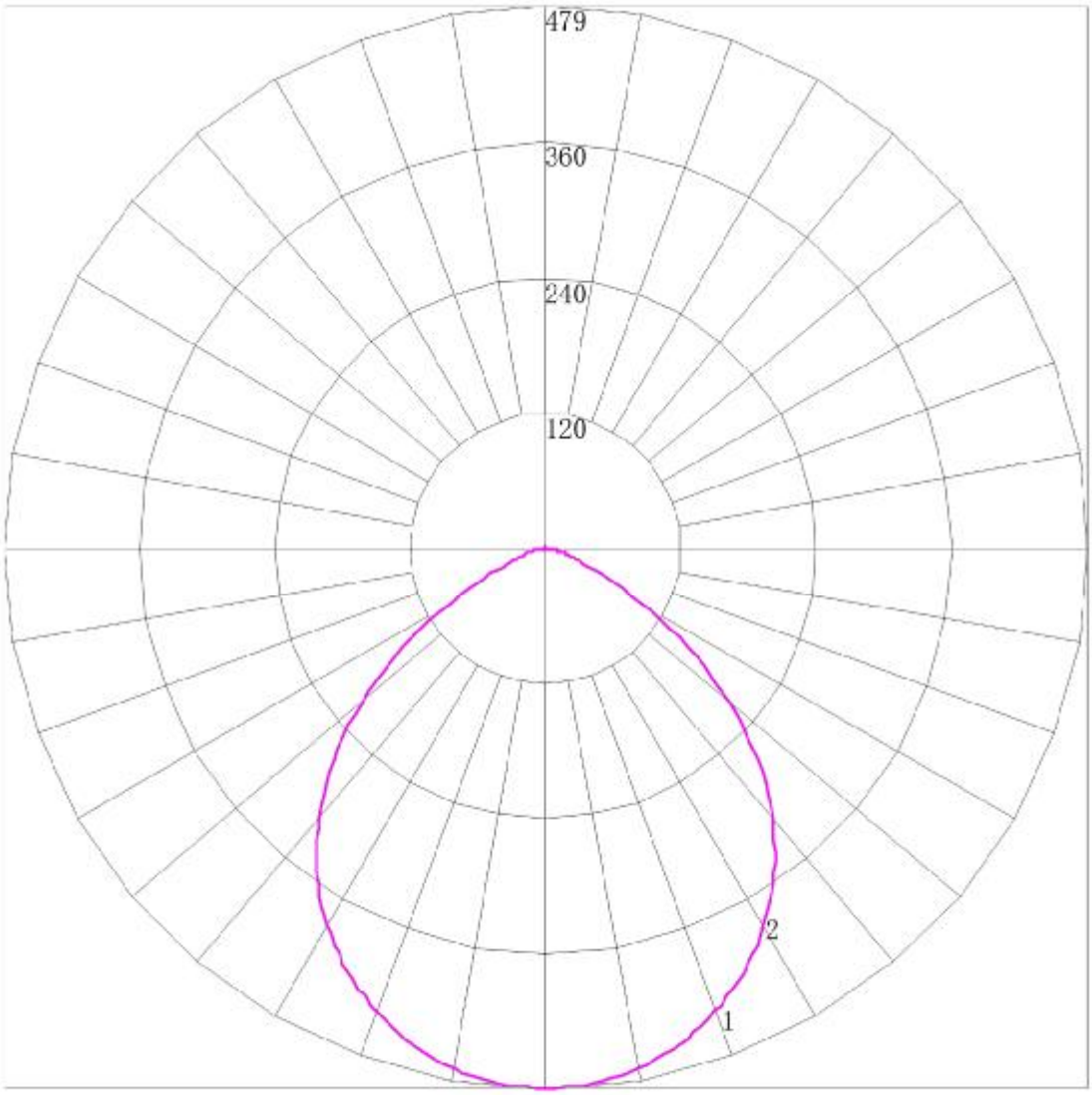
Zone	Lumens	%Lamp	%Fixt
0-20	173.63	17.20	17.20
0-30	364.54	36.10	36.10
0-40	584.51	57.90	57.90
0-60	926.28	91.70	91.70
0-80	1003.21	99.40	99.40
0-90	1008.79	99.90	99.90
10-90	963.58	95.40	95.40
20-40	410.88	40.70	40.70
20-50	614.94	60.90	60.90
40-70	397.97	39.40	39.40
60-80	76.93	7.60	7.60
70-80	20.73	2.10	2.10
80-90	5.59	0.60	0.60
90-110	0.01	0.00	0.00
90-120	0.01	0.00	0.00
90-130	0.01	0.00	0.00
90-150	0.11	0.00	0.00
90-180	0.80	0.10	0.10
110-180	0.78	0.10	0.10
0-180	1009.59	100.00	100.00

Total Luminaire Efficiency = 100.00%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	45.21
10-20	128.41
20-30	190.91
30-40	219.97
40-50	204.06
50-60	137.72
60-70	56.20
70-80	20.73
80-90	5.59
90-100	0.01
100-110	0.00
110-120	0.00
120-130	0.00
130-140	0.00
140-150	0.09
150-160	0.35
160-170	0.25
170-180	0.09

4.5 Polar Curves



Maximum Candela = 479.358 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (90 - 270)
2 - Vertical Plane Through Horizontal Angles (0 - 180)

4.6 Candela Tabulation

	0	15	30	45	60	75	90
0	479.358	479.358	479.358	479.358	479.358	479.358	479.358
1	478.668	478.668	478.668	478.668	478.668	478.668	478.668
2	478.482	478.482	478.482	478.482	478.482	478.482	478.482
3	478.039	478.039	478.039	478.039	478.039	478.039	478.039
4	477.599	477.599	477.599	477.599	477.599	477.599	477.599
5	476.460	476.460	476.460	476.460	476.460	476.460	476.460
6	475.069	475.069	475.069	475.069	475.069	475.069	475.069
7	473.674	473.674	473.674	473.674	473.674	473.674	473.674
8	472.131	472.131	472.131	472.131	472.131	472.131	472.131
9	470.448	470.448	470.448	470.448	470.448	470.448	470.448
10	468.169	468.169	468.169	468.169	468.169	468.169	468.169
11	466.335	466.335	466.335	466.335	466.335	466.335	466.335
12	463.730	463.730	463.730	463.730	463.730	463.730	463.730
13	461.304	461.304	461.304	461.304	461.304	461.304	461.304
14	458.479	458.479	458.479	458.479	458.479	458.479	458.479
15	455.543	455.543	455.543	455.543	455.543	455.543	455.543
16	452.351	452.351	452.351	452.351	452.351	452.351	452.351
17	449.012	449.012	449.012	449.012	449.012	449.012	449.012
18	445.448	445.448	445.448	445.448	445.448	445.448	445.448
19	441.341	441.341	441.341	441.341	441.341	441.341	441.341
20	437.851	437.851	437.851	437.851	437.851	437.851	437.851
21	433.523	433.523	433.523	433.523	433.523	433.523	433.523
22	428.862	428.862	428.862	428.862	428.862	428.862	428.862
23	424.856	424.856	424.856	424.856	424.856	424.856	424.856
24	419.572	419.572	419.572	419.572	419.572	419.572	419.572
25	415.092	415.092	415.092	415.092	415.092	415.092	415.092
26	409.808	409.808	409.808	409.808	409.808	409.808	409.808
27	404.377	404.377	404.377	404.377	404.377	404.377	404.377
28	398.722	398.722	398.722	398.722	398.722	398.722	398.722
29	392.927	392.927	392.927	392.927	392.927	392.927	392.927
30	387.050	387.050	387.050	387.050	387.050	387.050	387.050
31	380.406	380.406	380.406	380.406	380.406	380.406	380.406
32	374.135	374.135	374.135	374.135	374.135	374.135	374.135
33	367.411	367.411	367.411	367.411	367.411	367.411	367.411
34	359.964	359.964	359.964	359.964	359.964	359.964	359.964
35	352.952	352.952	352.952	352.952	352.952	352.952	352.952
36	345.427	345.427	345.427	345.427	345.427	345.427	345.427
37	337.393	337.393	337.393	337.393	337.393	337.393	337.393
38	329.020	329.020	329.020	329.020	329.020	329.020	329.020
39	320.689	320.689	320.689	320.689	320.689	320.689	320.689
40	312.212	312.212	312.212	312.212	312.212	312.212	312.212
41	303.694	303.694	303.694	303.694	303.694	303.694	303.694
42	294.264	294.264	294.264	294.264	294.264	294.264	294.264
43	285.455	285.455	285.455	285.455	285.455	285.455	285.455
44	275.949	275.949	275.949	275.949	275.949	275.949	275.949
45	266.113	266.113	266.113	266.113	266.113	266.113	266.113
46	255.762	255.762	255.762	255.762	255.762	255.762	255.762
47	245.818	245.818	245.818	245.818	245.818	245.818	245.818
48	235.246	235.246	235.246	235.246	235.246	235.246	235.246
49	224.381	224.381	224.381	224.381	224.381	224.381	224.381
50	212.676	212.676	212.676	212.676	212.676	212.676	212.676
51	201.659	201.659	201.659	201.659	201.659	201.659	201.659
52	190.210	190.210	190.210	190.210	190.210	190.210	190.210
53	177.948	177.948	177.948	177.948	177.948	177.948	177.948
54	166.019	166.019	166.019	166.019	166.019	166.019	166.019

CANDELA TABULATION - (Cont.)

55	154.275	154.275	154.275	154.275	154.275	154.275	154.275
56	142.341	142.341	142.341	142.341	142.341	142.341	142.341
57	131.256	131.256	131.256	131.256	131.256	131.256	131.256
58	119.656	119.656	119.656	119.656	119.656	119.656	119.656
59	108.273	108.273	108.273	108.273	108.273	108.273	108.273
60	97.593	97.593	97.593	97.593	97.593	97.593	97.593
61	87.238	87.238	87.238	87.238	87.238	87.238	87.238
62	77.400	77.400	77.400	77.400	77.400	77.400	77.400
63	68.957	68.957	68.957	68.957	68.957	68.957	68.957
64	60.990	60.990	60.990	60.990	60.990	60.990	60.990
65	53.282	53.282	53.282	53.282	53.282	53.282	53.282
66	47.226	47.226	47.226	47.226	47.226	47.226	47.226
67	41.684	41.684	41.684	41.684	41.684	41.684	41.684
68	36.952	36.952	36.952	36.952	36.952	36.952	36.952
69	33.283	33.283	33.283	33.283	33.283	33.283	33.283
70	29.835	29.835	29.835	29.835	29.835	29.835	29.835
71	27.305	27.305	27.305	27.305	27.305	27.305	27.305
72	24.994	24.994	24.994	24.994	24.994	24.994	24.994
73	22.681	22.681	22.681	22.681	22.681	22.681	22.681
74	20.589	20.589	20.589	20.589	20.589	20.589	20.589
75	18.791	18.791	18.791	18.791	18.791	18.791	18.791
76	17.249	17.249	17.249	17.249	17.249	17.249	17.249
77	15.966	15.966	15.966	15.966	15.966	15.966	15.966
78	14.755	14.755	14.755	14.755	14.755	14.755	14.755
79	13.361	13.361	13.361	13.361	13.361	13.361	13.361
80	12.039	12.039	12.039	12.039	12.039	12.039	12.039
81	10.570	10.570	10.570	10.570	10.570	10.570	10.570
82	9.065	9.065	9.065	9.065	9.065	9.065	9.065
83	7.634	7.634	7.634	7.634	7.634	7.634	7.634
84	6.166	6.166	6.166	6.166	6.166	6.166	6.166
85	4.698	4.698	4.698	4.698	4.698	4.698	4.698
86	3.265	3.265	3.265	3.265	3.265	3.265	3.265
87	2.017	2.017	2.017	2.017	2.017	2.017	2.017
88	1.391	1.391	1.391	1.391	1.391	1.391	1.391
89	0.438	0.438	0.438	0.438	0.438	0.438	0.438
90	0.219	0.219	0.219	0.219	0.219	0.219	0.219
91	0.000	0.000	0.000	0.000	0.000	0.000	0.000
92	0.000	0.000	0.000	0.000	0.000	0.000	0.000
93	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94	0.000	0.000	0.000	0.000	0.000	0.000	0.000
95	0.000	0.000	0.000	0.000	0.000	0.000	0.000
96	0.000	0.000	0.000	0.000	0.000	0.000	0.000
97	0.000	0.000	0.000	0.000	0.000	0.000	0.000
98	0.000	0.000	0.000	0.000	0.000	0.000	0.000
99	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000
101	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.000	0.000	0.000	0.000
103	0.000	0.000	0.000	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000	0.000	0.000	0.000
107	0.000	0.000	0.000	0.000	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000	0.000	0.000	0.000
109	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	0.000	0.000	0.000	0.000	0.000	0.000	0.000
111	0.000	0.000	0.000	0.000	0.000	0.000	0.000

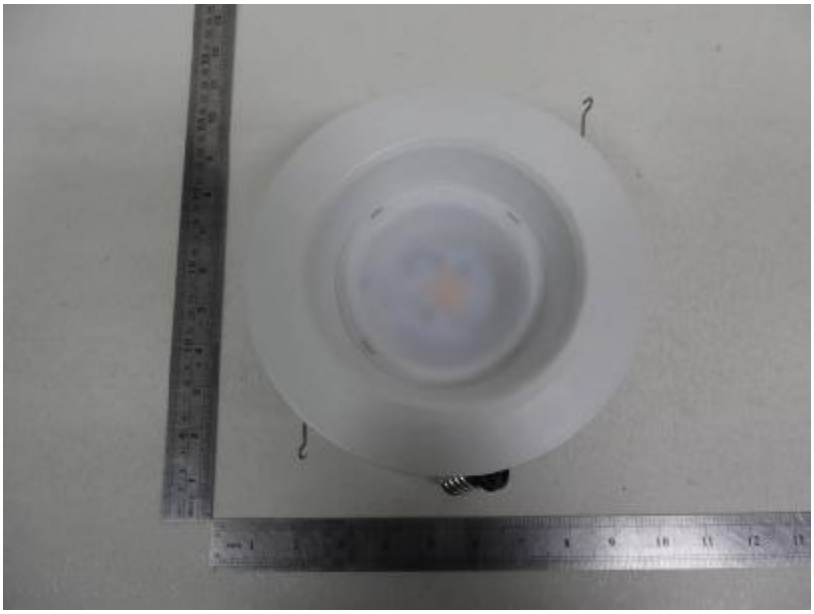
CANDELA TABULATION - (Cont.)

112	0.000	0.000	0.000	0.000	0.000	0.000	0.000
113	0.000	0.000	0.000	0.000	0.000	0.000	0.000
114	0.000	0.000	0.000	0.000	0.000	0.000	0.000
115	0.000	0.000	0.000	0.000	0.000	0.000	0.000
116	0.000	0.000	0.000	0.000	0.000	0.000	0.000
117	0.000	0.000	0.000	0.000	0.000	0.000	0.000
118	0.000	0.000	0.000	0.000	0.000	0.000	0.000
119	0.000	0.000	0.000	0.000	0.000	0.000	0.000
120	0.000	0.000	0.000	0.000	0.000	0.000	0.000
121	0.000	0.000	0.000	0.000	0.000	0.000	0.000
122	0.000	0.000	0.000	0.000	0.000	0.000	0.000
123	0.000	0.000	0.000	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000	0.000	0.000	0.000
125	0.000	0.000	0.000	0.000	0.000	0.000	0.000
126	0.000	0.000	0.000	0.000	0.000	0.000	0.000
127	0.000	0.000	0.000	0.000	0.000	0.000	0.000
128	0.000	0.000	0.000	0.000	0.000	0.000	0.000
129	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000	0.000	0.000
131	0.000	0.000	0.000	0.000	0.000	0.000	0.000
132	0.000	0.000	0.000	0.000	0.000	0.000	0.000
133	0.000	0.000	0.000	0.000	0.000	0.000	0.000
134	0.000	0.000	0.000	0.000	0.000	0.000	0.000
135	0.000	0.000	0.000	0.000	0.000	0.000	0.000
136	0.000	0.000	0.000	0.000	0.000	0.000	0.000
137	0.000	0.000	0.000	0.000	0.000	0.000	0.000
138	0.000	0.000	0.000	0.000	0.000	0.000	0.000
139	0.000	0.000	0.000	0.000	0.000	0.000	0.000
140	0.000	0.000	0.000	0.000	0.000	0.000	0.000
141	0.000	0.000	0.000	0.000	0.000	0.000	0.000
142	0.000	0.000	0.000	0.000	0.000	0.000	0.000
143	0.183	0.183	0.183	0.183	0.183	0.183	0.183
144	0.037	0.037	0.037	0.037	0.037	0.037	0.037
145	0.147	0.147	0.147	0.147	0.147	0.147	0.147
146	0.220	0.220	0.220	0.220	0.220	0.220	0.220
147	0.110	0.110	0.110	0.110	0.110	0.110	0.110
148	0.293	0.293	0.293	0.293	0.293	0.293	0.293
149	0.330	0.330	0.330	0.330	0.330	0.330	0.330
150	0.551	0.551	0.551	0.551	0.551	0.551	0.551
151	0.513	0.513	0.513	0.513	0.513	0.513	0.513
152	0.587	0.587	0.587	0.587	0.587	0.587	0.587
153	0.770	0.770	0.770	0.770	0.770	0.770	0.770
154	0.770	0.770	0.770	0.770	0.770	0.770	0.770
155	0.881	0.881	0.881	0.881	0.881	0.881	0.881
156	0.881	0.881	0.881	0.881	0.881	0.881	0.881
157	0.881	0.881	0.881	0.881	0.881	0.881	0.881
158	0.881	0.881	0.881	0.881	0.881	0.881	0.881
159	0.881	0.881	0.881	0.881	0.881	0.881	0.881
160	0.881	0.881	0.881	0.881	0.881	0.881	0.881
161	0.881	0.881	0.881	0.881	0.881	0.881	0.881
162	0.881	0.881	0.881	0.881	0.881	0.881	0.881
163	0.881	0.881	0.881	0.881	0.881	0.881	0.881
164	0.881	0.881	0.881	0.881	0.881	0.881	0.881
165	0.881	0.881	0.881	0.881	0.881	0.881	0.881
166	0.881	0.881	0.881	0.881	0.881	0.881	0.881
167	0.881	0.881	0.881	0.881	0.881	0.881	0.881
168	0.881	0.881	0.881	0.881	0.881	0.881	0.881

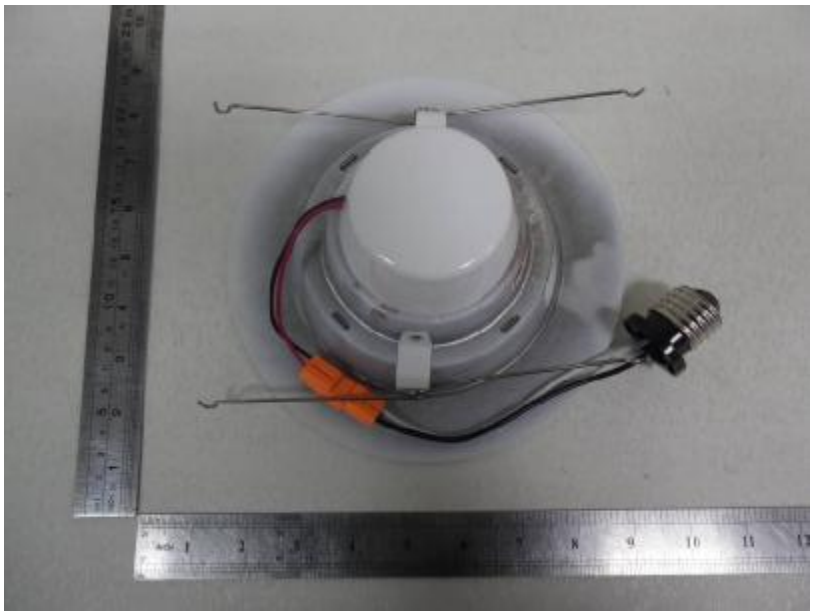
CANDELA TABULATION - (Cont.)

169	0.881	0.881	0.881	0.881	0.881	0.881	0.881
170	0.881	0.881	0.881	0.881	0.881	0.881	0.881
171	0.881	0.881	0.881	0.881	0.881	0.881	0.881
172	0.881	0.881	0.881	0.881	0.881	0.881	0.881
173	0.881	0.881	0.881	0.881	0.881	0.881	0.881
174	0.918	0.918	0.918	0.918	0.918	0.918	0.918
175	0.917	0.917	0.917	0.917	0.917	0.917	0.917
176	0.954	0.954	0.954	0.954	0.954	0.954	0.954
177	0.991	0.991	0.991	0.991	0.991	0.991	0.991
178	0.990	0.990	0.990	0.990	0.990	0.990	0.990
179	0.917	0.917	0.917	0.917	0.917	0.917	0.917
180	0.881	0.881	0.881	0.881	0.881	0.881	0.881

Appendix 1 Product Photo



Picture 1



Picture 2

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