

## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

**6" new construction Downlight**

**Model: 12NCDRL6DIM/930/EXT**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, Yuhang Dist,  
Hangzhou, Zhejiang Province, China 311100

Tel: +86 571 86376106

[www.ledtestlab.com](http://www.ledtestlab.com)

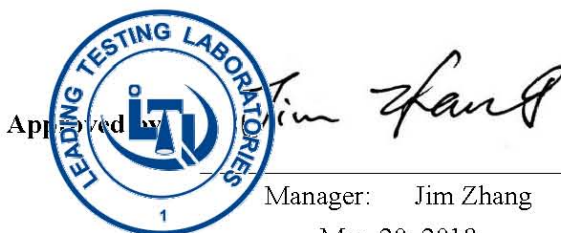
Report No.: HZ18030026e

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Review by:



Engineer: April Zou  
Mar. 20, 2018



Approved by

Manager: Jim Zhang  
Mar. 20, 2018

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## Test Summary

Sample Tested: 12NCDRL6DIM/930/EXT

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
79.8	982.0	12.31	0.9826
CCT (K)	CRI	Stabilization Time (Light & Power)	
3036	92.5	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

### Test specifications:

<b>Date of Receipt</b>	: Mar. 15, 2018
<b>Date of Test</b>	: Mar. 16, 2018
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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## Sample Photos



Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: 6" new construction Downlight
<b>Model</b>	: 12NCDRL6DIM/930/EXT
<b>Electrical Ratings</b>	: 120V, 60Hz
<b>Product Description</b>	: 3000K
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

## TEST RESULTS

Test ambient temperature was 25.0°C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 95 minutes.

The photometric distance of Goniophotometer is 2.47 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.104
Power Factor	0.9826
Test Power (W)	12.31
THD A%	12.03
Luminous Efficacy (lm/W)	79.8
Total Luminous Flux (lm)	982.0
Color Rendering Index (CRI)	92.5
R9	64
Correlated Color Temperature (CCT) (K)	3036
Chromaticity (Chroma x, Chroma y)	(0.4311, 0.3963)
Chromaticity (Chroma u, Chroma v)	(0.2502, 0.3449)
Chromaticity (Chroma u', Chroma v')	(0.2502, 0.5174)
Duv	0.0023
Average Beam Angle (°)	113.1
Center Beam Candle Power (cd)	339
Spacing Criteria	1.25 (0°-180°)/ 1.26 (90°-270°)
Zonal Lumens in the 0°-60°Zone	77.75%
Zonal Lumens in the 60°-90°Zone	22.12%
Zonal Lumens in the 90°-120°Zone	0.03%
Zonal Lumens in the 120°-180°Zone	0.11%

Special Rendering Indices	Color
R1	96
R2	98
R3	94
R4	92
R5	95
R6	94
R7	89
R8	82
R9	64
R10	98
R11	93
R12	80
R13	98
R14	98
Rf	88
Rg	96

Table 2: Test data per Goniophotometer Method

Note: According to CIE 1976 (u',v') diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

## Spectral Power Distribution

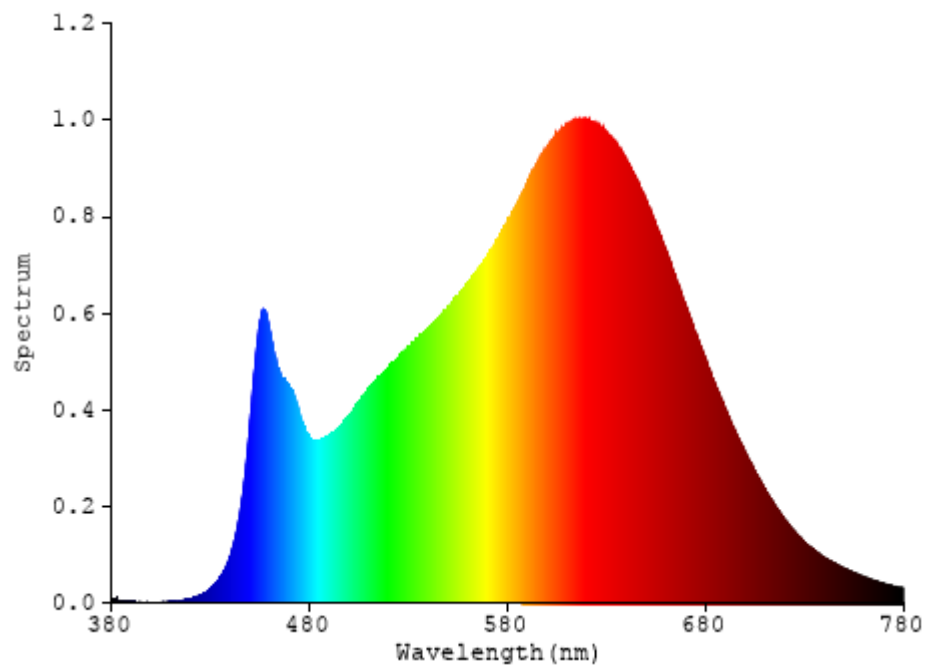


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	32.068	3.27%
10- 20	91.804	9.35%
20- 30	139.054	14.16%
30- 40	167.663	17.07%
40- 50	174.218	17.74%
50- 60	158.657	16.16%
60- 70	123.758	12.60%
70- 80	73.995	7.54%
80- 90	19.422	1.98%
90-100	0.05	0.01%
100-110	0.095	0.01%
110-120	0.148	0.02%
120-130	0.194	0.02%
130-140	0.236	0.02%
140-150	0.245	0.02%
150-160	0.204	0.02%
160-170	0.134	0.01%
170-180	0.045	0.00%
Total	982.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	763.464	77.75%
60- 90	217.175	22.12%
0-90	980.639	99.86%
90- 180	1.351	0.14%
0- 180	982.0	100%

Table 3: Zonal Lumen Data

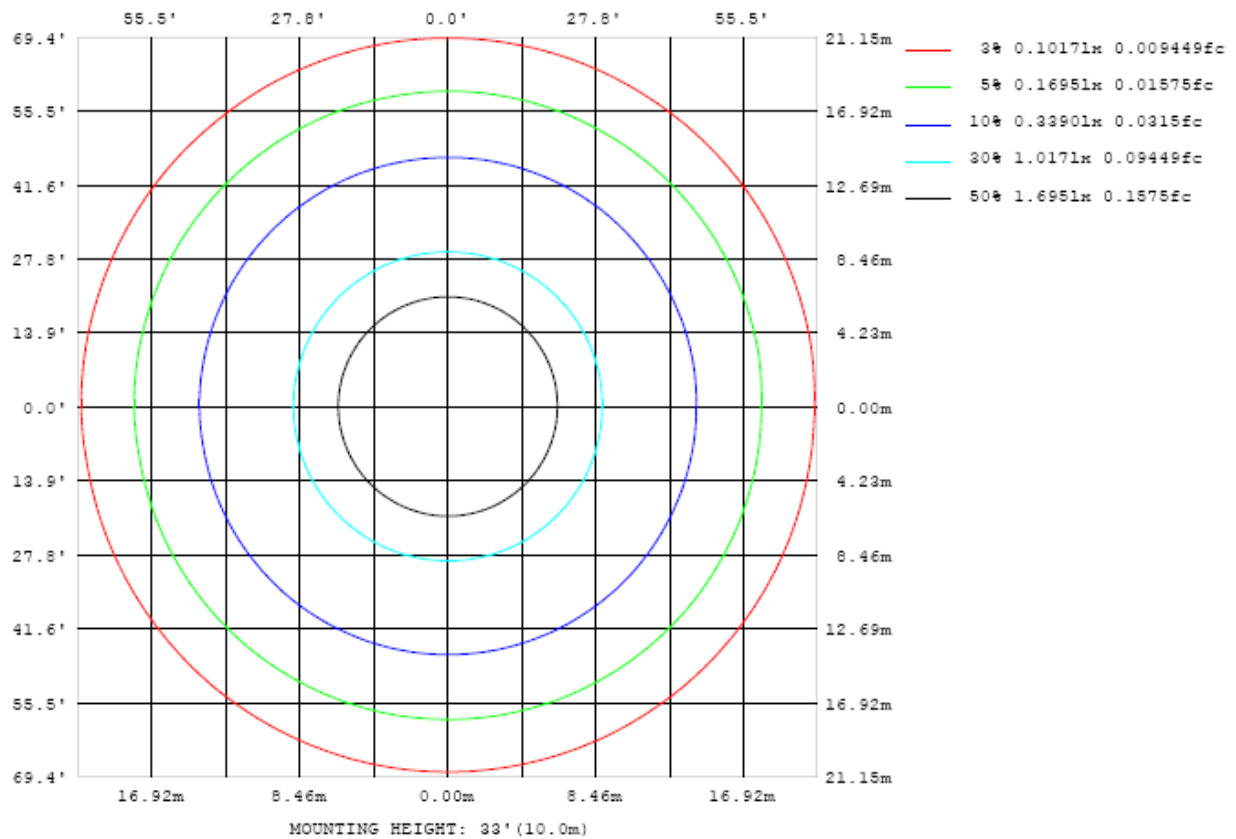


Chart 2: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots

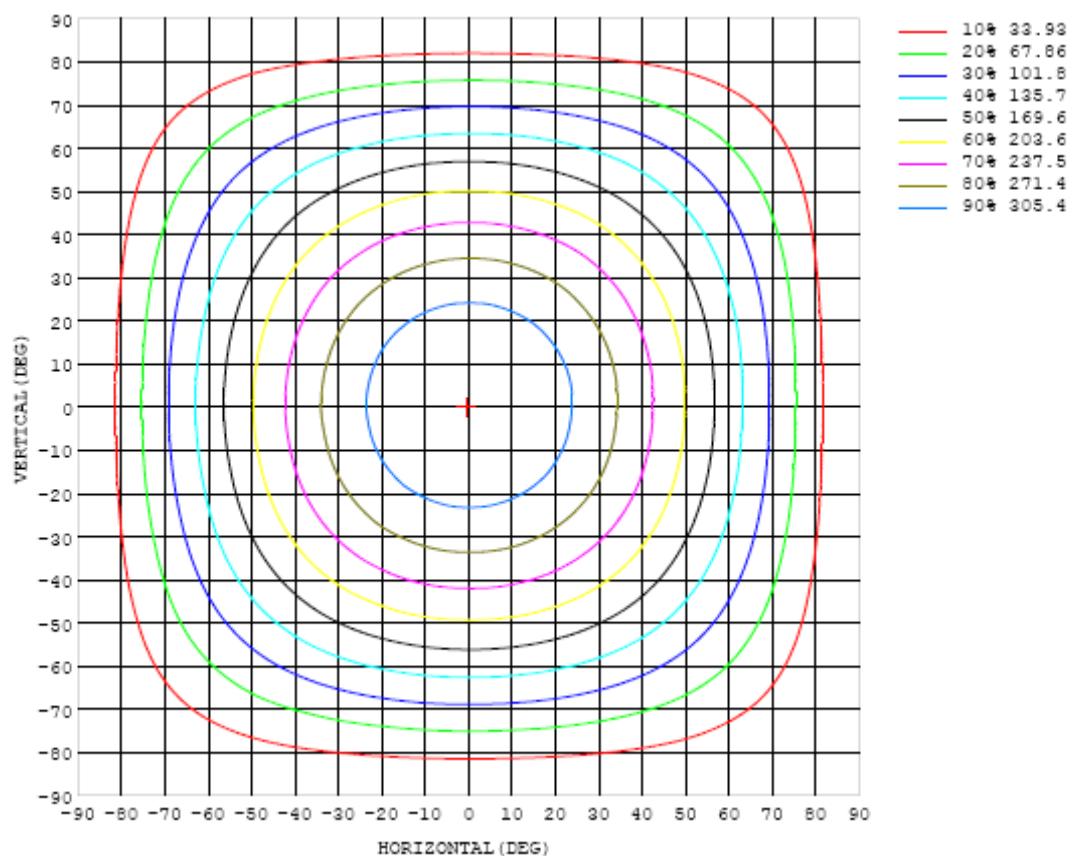


Chart 3: Isocandela Plot

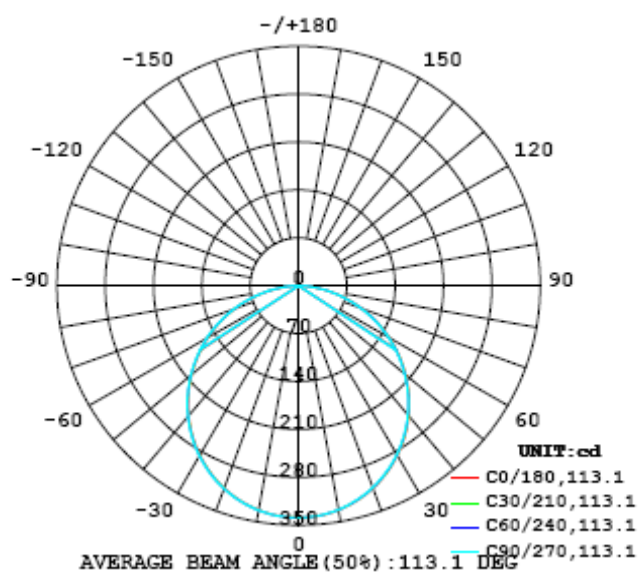


Chart 4: Polar Candela Distribution

## Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339
5	338	338	337	337	337	337	337	337	337	337	337	337	337	337	337	337	338	337	337
10	333	333	333	333	333	332	333	332	332	332	332	332	332	332	333	332	333	332	333
15	326	325	325	325	325	325	325	325	325	324	324	325	324	325	324	325	325	325	325
20	315	315	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	314	315
25	302	302	301	301	301	301	301	301	300	300	300	300	300	301	300	301	301	301	302
30	286	286	286	286	286	285	285	285	285	284	284	284	284	285	285	285	285	285	286
35	268	268	268	268	267	267	267	267	267	266	266	266	266	266	266	267	267	267	268
40	248	248	248	247	247	247	247	246	246	246	246	246	246	246	246	246	246	247	248
45	226	226	226	225	225	225	225	224	224	224	224	224	224	224	224	224	224	225	226
50	203	202	202	202	201	201	201	201	200	200	200	200	200	200	200	200	201	201	202
55	178	177	177	177	177	176	176	176	176	175	175	175	175	176	175	176	176	176	177
60	152	152	151	151	151	150	150	150	150	150	150	149	149	150	149	150	150	150	152
65	125	125	125	124	124	124	123	123	123	123	123	123	123	123	123	123	123	123	125
70	97.7	97.6	97.2	96.8	96.5	96.3	96.1	96.0	95.7	95.3	95.4	95.4	95.3	95.5	95.3	95.5	95.7	95.8	97.5
75	70.1	69.8	69.3	69.3	69.1	68.9	68.6	68.3	68.0	68.3	67.9	67.2	67.5	67.1	68.0	67.9	68.2	68.2	70.0
80	42.5	42.3	42.3	42.3	42.5	42.2	42.0	41.9	41.6	41.5	41.2	41.2	41.2	41.3	41.3	41.0	40.6	40.6	41.9
85	15.9	15.7	15.5	15.8	16.4	16.3	16.1	16.0	15.8	15.6	15.6	15.5	15.4	15.4	15.2	15.0	14.3	14.2	15.7
90	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
95	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
100	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
105	0.08	0.07	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.08	0.09	0.10	0.09	0.08	0.08	0.09
110	0.10	0.10	0.10	0.10	0.11	0.11	0.10	0.10	0.10	0.10	0.09	0.10	0.11	0.12	0.12	0.13	0.12	0.12	0.13
115	0.13	0.13	0.13	0.13	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.16	0.16	0.15	0.16	0.16	0.17
120	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.16	0.16	0.15	0.16	0.16	0.18	0.20	0.20	0.19	0.18	0.20	0.21
125	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.19	0.19	0.18	0.20	0.21	0.23	0.23	0.23	0.22	0.21	0.23
130	0.22	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.23	0.24	0.24	0.26	0.26	0.27	0.26	0.25	0.27
135	0.26	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.30	0.30	0.30	0.31	0.30	0.33
140	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.30	0.31	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.35	0.34	0.40
145	0.32	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.35	0.35	0.35	0.35	0.36	0.37	0.37	0.37	0.37	0.44
150	0.34	0.34	0.35	0.35	0.35	0.35	0.35	0.36	0.36	0.37	0.37	0.37	0.37	0.38	0.38	0.39	0.39	0.38	0.47
155	0.37	0.37	0.37	0.37	0.38	0.38	0.38	0.39	0.39	0.39	0.39	0.40	0.40	0.40	0.41	0.41	0.41	0.41	0.49
160	0.39	0.39	0.39	0.39	0.40	0.40	0.40	0.41	0.42	0.41	0.40	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.50
165	0.41	0.41	0.41	0.41	0.42	0.42	0.43	0.44	0.44	0.44	0.42	0.43	0.43	0.43	0.44	0.44	0.45	0.45	0.50
170	0.43	0.43	0.43	0.43	0.44	0.45	0.46	0.47	0.47	0.47	0.46	0.45	0.45	0.45	0.46	0.46	0.46	0.47	0.51
175	0.43	0.43	0.43	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.45	0.46	0.48	0.47	0.45	0.45	0.46	0.47	0.48
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339		
5	337	337	338	338	338	338	338	338	338	338	338	338	338	338	338	338	338		
10	333	333	333	333	333	333	333	333	333	334	334	333	334	334	333	334	333		
15	325	325	325	326	326	326	326	326	326	326	326	326	326	326	326	326	326		
20	315	315	315	315	315	316	316	316	316	316	316	316	316	316	316	316	316		
25	302	302	302	302	302	303	303	303	303	303	303	303	303	303	303	303	303		
30	286	286	286	287	287	287	287	287	287	288	288	288	288	288	288	287	287		
35	268	268	269	269	269	269	269	270	269	270	270	270	270	270	270	270	270		
40	248	248	248	249	249	249	249	250	250	250	250	250	250	250	250	250	249		
45	226	226	226	227	227	227	227	228	228	228	228	228	228	228	228	228	227		
50	202	203	203	203	203	204	204	204	204	204	204	204	205	204	204	204	204		
55	177	178	178	178	179	179	179	179	179	180	180	180	180	179	179	180	179		
60	152	152	152	153	153	153	154	154	154	155	155	154	155	154	154	154	154		
65	125	125	126	126	126	127	127	128	127	128	128	128	128	128	128	128	127		
70	97.7	97.9	98.6	98.7	98.8	99.3	99.6	99.7	100	100	100	100	101	100	100	99.9	100.0		
75	70.0	70.3	70.5	70.8	71.0	71.4	71.6	72.1	72.1	72.2	72.2	72.5	72.7	72.5	72.4	72.2	72.0		
80	42.1	42.5	43.2	43.6	43.9	44.1	44.4	44.5	44.6	44.8	45.0	45.0	45.1	45.0	44.7	44.2	43.9		
85	16.1	16.4	16.8	17.6	18.0	18.1	18.3	18.4	18.6	18.7	18.8	18.8	18.9	18.8	18.1	17.7	17.4		
90	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05		
95	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
100	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.06	0.07	0.07	0.07		
105	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.10	0.09	0.09	0.09	0.10	0.09		
110	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.13	0.12	0.12	0.12	0.12	0.12		
115	0.17	0.17	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.15	0.14	0.14	0.15	0.14		
120	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.20	0.19	0.18	0.17	0.17	0.17	0.17		
125	0.24	0.25	0.25	0.24	0.23	0.22	0.23	0.24	0.25	0.25	0.24	0.22	0.22	0.21	0.21	0.20	0.20		
130	0.27	0.27	0.27	0.27	0.27	0.27	0.29	0.30	0.30	0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.25		
135	0.33	0.37	0.33	0.33	0.33	0.34	0.35	0.35	0.35	0.35	0.34	0.34	0.33	0.32	0.31	0.30	0.30		
140	0.40	0.40	0.39	0.39	0.40	0.40	0.40	0.41	0.41	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36		
145	0.45	0.45	0.44	0.44	0.45	0.45	0.45	0.46	0.45	0.45	0.45	0.45	0.44	0.43	0.42	0.41	0.41		
150	0.48	0.48	0.48	0.48	0.48	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.47	0.45	0.45	0.44		
155	0.50	0.50	0.50	0.50	0.50	0.51	0.51	0.52	0.51	0.51	0.50	0.50	0.50	0.49	0.48	0.47	0.46		
160	0.51	0.51	0.51	0.51	0.51	0.52	0.52	0.53	0.52	0.52	0.52	0.51	0.51	0.51	0.50	0.48	0.47		
165	0.51	0.51	0.51	0.50	0.51	0.52	0.53	0.53	0.53	0.53	0.53	0.53	0.52	0.52	0.51	0.50	0.48		
170	0.52	0.51	0.51	0.51	0.50	0.51	0.52	0.53	0.54	0.54	0.53	0.52	0.52	0.52	0.52	0.51	0.48		
175	0.48	0.48	0.48	0.48	0.48	0.47	0.48	0.48	0.50	0.50	0.50	0.49	0.48	0.46	0.44	0.44	0.43		
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38		

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Standard Source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018

Table 6: Test Equipment List

## TEST METHODS

### Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

### Goniophotometer Method

#### Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 2.3% with a coverage factor  $k=2$ .

## Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

## Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ( $C=0^\circ/180^\circ$  and  $C=90^\circ/270^\circ$ ) and at  $10^\circ$  or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the  $u'$ ,  $v'$  chromaticity coordinates. The spatial non-uniformity of chromaticity,  $\Delta u'v'$ , is determined as the maximum deviation (distance on the CIE ( $u'$ ,  $v'$ ) diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



\*\*\* End of Report \*\*\*

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