

## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

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

**6" new construction Downlight**

**Model: 12NCDRL6DIM/927/EXT**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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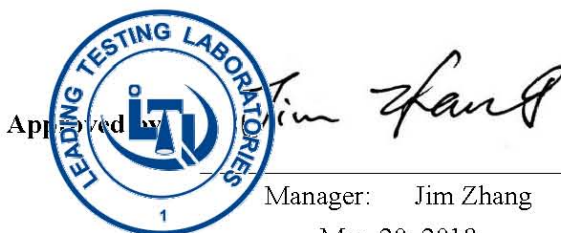
Report No.: HZ18030026d

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/927/EXT

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
78.8	969.4	12.31	0.9820
CCT (K)	CRI	Stabilization Time (Light & Power)	
2802	92.8	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/927/EXT
<b>Electrical Ratings</b>	: 120V, 60Hz
<b>Product Description</b>	: 2700K
<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)	0.105
Power Factor	0.9820
Test Power (W)	12.31
THD A%	12.09
Luminous Efficacy (lm/W)	78.8
Total Luminous Flux (lm)	969.4
Color Rendering Index (CRI)	92.8
R9	62
Correlated Color Temperature (CCT) (K)	2802
Chromaticity (Chroma x, Chroma y)	(0.4483, 0.4023)
Chromaticity (Chroma u, Chroma v)	(0.2588, 0.3483)
Chromaticity (Chroma u', Chroma v')	(0.2588, 0.5224)
Duv	0.0021
Average Beam Angle (°)	113.2
Center Beam Candle Power (cd)	334
Spacing Criteria	1.25 (0°-180°)/ 1.26 (90°-270°)
Zonal Lumens in the 0°-60°Zone	77.67%
Zonal Lumens in the 60°-90°Zone	22.20%
Zonal Lumens in the 90°-120°Zone	0.03%
Zonal Lumens in the 120°-180°Zone	0.10%

Special Rendering Indices	Color
R1	95
R2	99
R3	95
R4	93
R5	95
R6	95
R7	89
R8	81
R9	62
R10	99
R11	94
R12	84
R13	97
R14	98
Rf	89
Rg	97

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

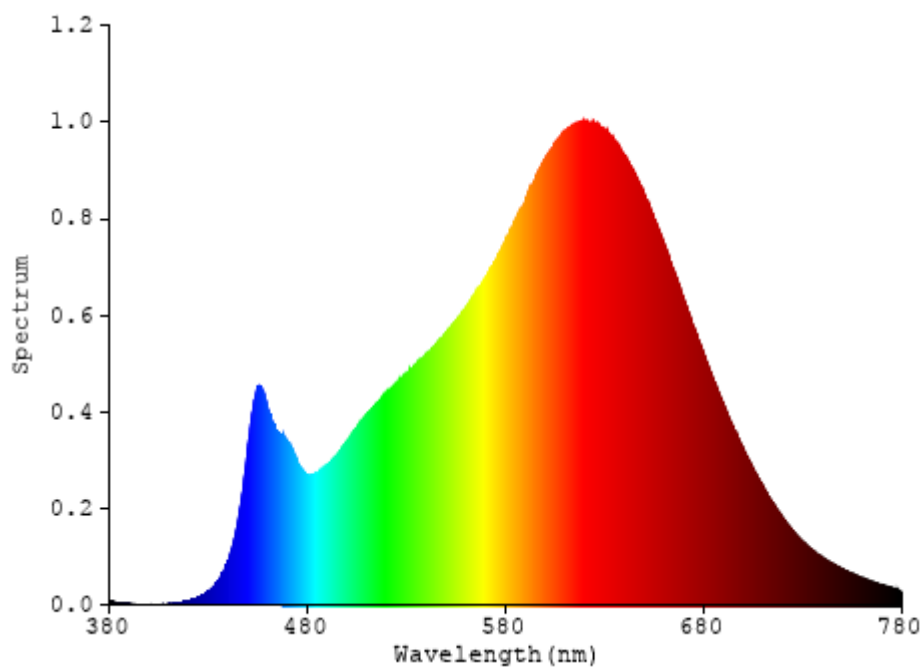


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	31.604	3.26%
10- 20	90.484	9.33%
20- 30	137.076	14.14%
30- 40	165.314	17.05%
40- 50	171.839	17.73%
50- 60	156.623	16.16%
60- 70	122.33	12.62%
70- 80	73.433	7.58%
80- 90	19.456	2.01%
90-100	0.047	0.00%
100-110	0.086	0.01%
110-120	0.131	0.01%
120-130	0.171	0.02%
130-140	0.208	0.02%
140-150	0.216	0.02%
150-160	0.181	0.02%
160-170	0.121	0.01%
170-180	0.041	0.00%
Total	969.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	752.94	77.67%
60- 90	215.219	22.20%
0-90	968.159	99.88%
90- 180	1.202	0.12%
0- 180	969.4	100%

Table 3: Zonal Lumen Data

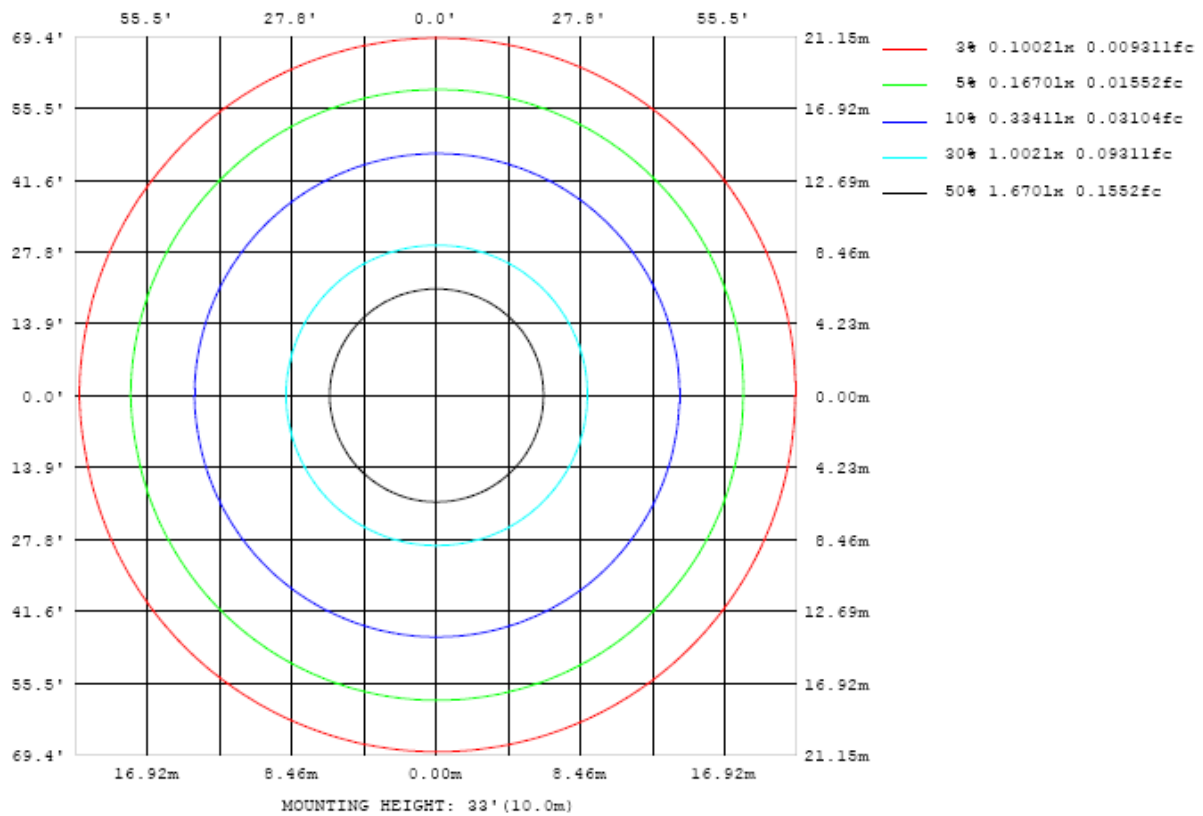


Chart 2: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots

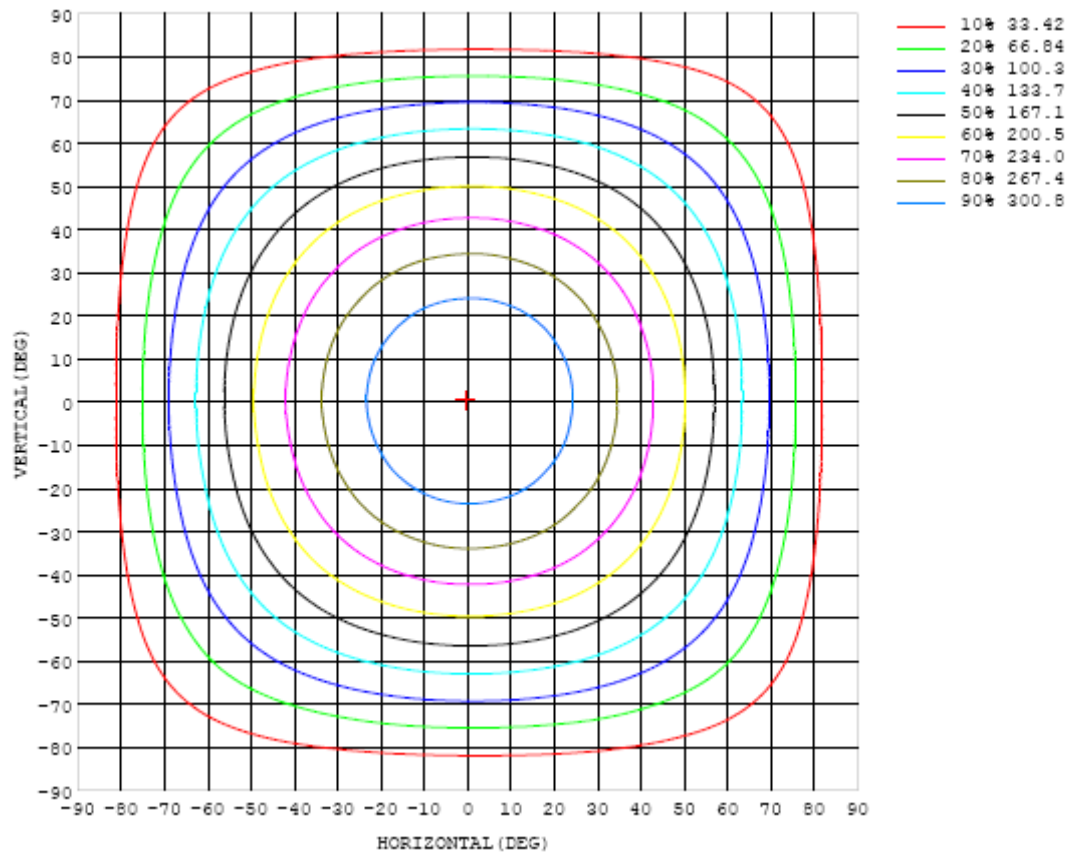


Chart 3: Isocandela Plot

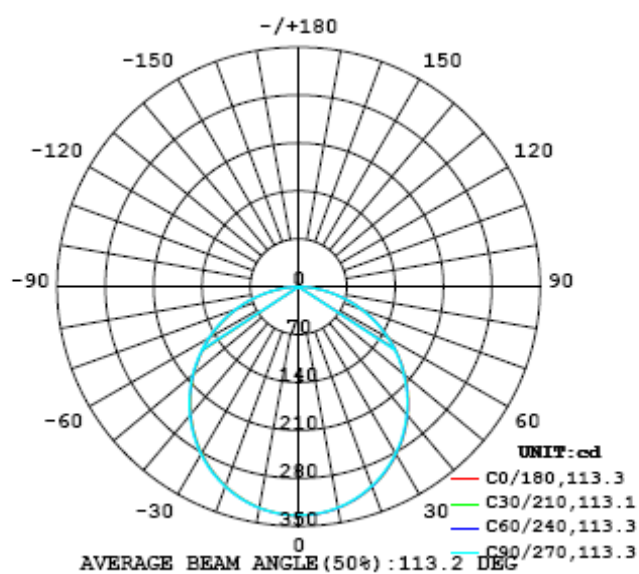


Chart 4: Polar Candela Distribution

## Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334
5	333	333	333	333	333	333	333	332	332	332	332	332	332	332	332	332	332	332	332
10	329	328	329	328	328	328	328	328	327	327	327	327	327	327	327	327	327	327	327
15	322	321	321	321	321	321	321	321	320	320	320	320	320	320	320	319	319	319	320
20	311	311	311	311	310	310	311	310	310	310	310	309	309	309	309	309	309	309	310
25	298	298	298	298	298	298	298	297	297	296	296	296	296	296	296	296	296	296	296
30	283	283	283	283	282	282	282	282	281	281	281	281	280	280	280	280	280	280	281
35	266	265	265	265	265	265	264	264	264	263	263	263	263	262	262	262	262	262	263
40	246	246	246	245	245	245	244	244	244	243	243	243	243	243	242	242	242	242	243
45	224	224	224	224	223	223	223	223	222	222	222	221	221	221	221	220	220	220	221
50	201	201	201	200	200	200	200	199	199	199	198	198	198	198	197	197	197	197	198
55	177	176	176	176	176	176	175	175	175	174	174	174	173	173	173	172	172	172	174
60	151	151	151	151	150	150	150	150	149	149	149	148	148	148	147	147	147	147	148
65	125	125	125	124	124	124	124	123	123	123	123	122	122	121	121	121	121	121	122
70	97.9	97.8	97.8	97.7	97.4	97.4	97.2	96.9	96.6	96.2	96.0	95.5	95.1	94.8	94.4	94.1	93.9	93.7	95.2
75	70.5	70.5	70.4	70.6	70.1	70.3	70.3	69.9	69.5	69.3	68.9	68.5	67.7	67.3	67.3	67.5	66.6	67.3	68.1
80	43.1	43.0	43.2	43.1	43.3	44.0	44.0	43.7	43.5	43.0	42.8	42.5	42.1	41.6	41.4	41.1	40.7	40.2	40.8
85	16.8	16.8	17.1	17.1	17.3	18.2	18.5	18.3	18.1	17.8	17.5	17.1	16.8	16.4	16.1	15.7	15.1	14.0	14.9
90	0.04	0.04	0.04	0.04	0.04	0.04	0.04	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	0.04
100	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06
105	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.09
110	0.09	0.10	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.09	0.10	0.10	0.11
115	0.12	0.13	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.13	0.13
120	0.15	0.15	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.16
125	0.18	0.18	0.20	0.19	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.19
130	0.21	0.22	0.22	0.22	0.22	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.23
135	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.28
140	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.33
145	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.37
150	0.31	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.40
155	0.34	0.34	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.42
160	0.37	0.37	0.37	0.38	0.38	0.38	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.35	0.36	0.36	0.36	0.43
165	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	0.38	0.44
170	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.42	0.41	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.41	0.45
175	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.41	0.42	0.42	0.41	0.41	0.41	0.40	0.41	0.41	0.41	0.41
180	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37

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	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334	334		
5	332	332	332	332	333	333	333	333	333	333	333	333	333	333	333	333	333		
10	327	328	328	328	328	328	328	328	328	329	328	329	329	329	329	329	329		
15	320	320	320	320	321	321	321	321	321	321	321	322	322	322	321	322	322		
20	310	310	310	310	310	311	311	311	311	311	311	312	312	312	311	312	311		
25	296	297	297	297	297	298	298	298	298	299	299	299	299	299	299	299	299		
30	281	281	281	281	282	282	282	283	283	283	283	284	284	284	284	284	284		
35	263	263	264	264	264	265	265	265	265	266	266	266	266	266	266	266	266		
40	243	243	244	244	244	245	245	245	246	246	246	246	247	247	247	247	247		
45	221	221	222	222	223	223	223	223	224	224	225	225	225	225	225	225	225		
50	198	198	199	199	199	200	200	200	201	201	201	202	202	202	202	202	202		
55	174	174	174	174	175	175	175	176	176	177	177	177	177	178	178	178	178		
60	149	149	149	150	150	150	150	151	152	152	152	152	153	153	153	153	153		
65	122	122	123	123	123	124	124	124	125	125	126	126	126	126	126	127	126		
70	95.5	95.4	95.8	95.8	96.1	96.4	96.8	97.3	97.5	98.0	98.5	98.9	99.1	99.1	99.5	99.6	99.5		
75	67.9	68.1	68.1	68.3	68.8	69.3	69.6	69.8	70.2	70.5	70.8	71.3	71.5	71.8	71.7	72.1	72.2		
80	40.9	40.8	41.0	41.2	42.0	42.0	42.3	42.6	43.0	43.4	43.6	44.1	44.4	44.5	44.9	44.7	44.3		
85	14.6	14.6	14.7	14.9	15.6	16.1	16.3	16.5	16.8	17.2	17.5	17.9	18.1	18.5	18.7	18.4	18.2		
90	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05		
95	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04		
100	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06		
105	0.09	0.09	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08		
110	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11		
115	0.13	0.13	0.13	0.13	0.14	0.14	0.15	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13		
120	0.16	0.15	0.15	0.16	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16		
125	0.19	0.19	0.19	0.19	0.20	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.19	0.20	0.20	0.19	0.19		
130	0.23	0.23	0.24	0.24	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.23		
135	0.28	0.29	0.29	0.29	0.30	0.31	0.31	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.28	0.29	0.29		
140	0.33	0.34	0.34	0.34	0.35	0.36	0.36	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.34		
145	0.38	0.38	0.39	0.39	0.40	0.41	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.38	0.38	0.38		
150	0.41	0.42	0.42	0.43	0.43	0.44	0.44	0.43	0.43	0.44	0.43	0.42	0.42	0.42	0.42	0.41	0.41		
155	0.43	0.44	0.44	0.44	0.45	0.46	0.46	0.45	0.45	0.46	0.45	0.45	0.44	0.44	0.44	0.44	0.43		
160	0.44	0.45	0.45	0.46	0.46	0.47	0.47	0.46	0.47	0.47	0.47	0.46	0.45	0.45	0.45	0.45	0.44		
165	0.45	0.46	0.46	0.46	0.46	0.47	0.47	0.47	0.47	0.48	0.48	0.48	0.47	0.46	0.46	0.46	0.46		
170	0.47	0.46	0.46	0.46	0.46	0.46	0.47	0.48	0.48	0.49	0.49	0.49	0.49	0.49	0.48	0.47	0.46		
175	0.41	0.41	0.41	0.40	0.41	0.43	0.44	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.44	0.44		
180	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37		

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.

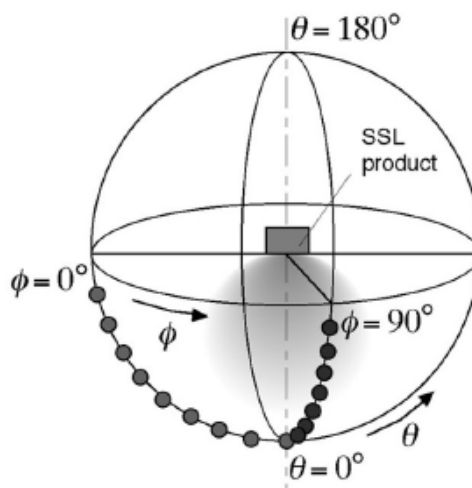
## Color Characteristics Measurements

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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