

## **LM-79-08 Test Report**

for

### **GREEN CREATIVE LTD**

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

### **5.5"ROUND DOWNLIGHT**

**Model: 10SMPS5.5DIM/940**

### **Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ17060033b

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

Review by:



Engineer: April Zou  
Jun. 22, 2017

Approved by:



Manager: Jim Zhang  
Jun. 22, 2017

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: 10SMPS5.5DIM/940

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
64.0	615.5	9.62	0.9134
CCT (K)	CRI	Stabilization Time (Light & Power)	
4005	94.6	60	

Table 1: Executive Data Summary

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

### Test specifications:

**Date of Receipt** : Jun. 19, 2017

**Date of Test** : Jun. 20, 2017

**Test item** : Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters

**Reference Standard** : IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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## Sample Photos



Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: 5.5"ROUND DOWNLIGHT
<b>Model</b>	: 10SMPS5.5DIM/940
<b>Electrical Ratings</b>	: 120V, 60Hz, 10W
<b>Product Description</b>	: LED Adapter (E26 & GU24 optional) base, 4000K, CRI90
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

## TEST RESULTS

Test ambient temperature was 25.4°C.

Base orientation was light down. 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 70 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.088
Power Factor	0.9134
Test Power (W)	9.62
THD A%	34.57
Luminous Efficacy (lm/W)	64.0
Total Luminous Flux (lm)	615.5
Color Rendering Index (CRI)	94.6
R9	78
Correlated Color Temperature (CCT)(K)	4005
Chromaticity Chroma x	0.3811
Chromaticity Chroma y	0.3802
Chromaticity Chroma u	0.2242
Chromaticity Chroma v	0.3354
Duv	0.0006
Chromaticity Chroma u'	0.2242
Chromaticity Chroma v'	0.5032

Special Color Rendering Indices	
R1	96.9
R2	95.2
R3	90.9
R4	96.4
R5	94.5
R6	92
R7	97.6
R8	92.9
R9	78
R10	85.8
R11	94.4
R12	67.2
R13	96.7
R14	94
Rf	90
Rg	100

Table 2: Test data per Sphere-Spectroradiometer Method

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

## Goniophotometer Method

Test ambient temperature was 24.6°C.

The photometric distance is 2.47m.

Luminous data was taken at 0.5°vertical intervals and 10°horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.088
Power Factor	0.9135
Test Power (W)	9.69
Luminous Efficacy (lm/W)	64.3
Total Luminous Flux (lm)	623.2
Beam Angle (°)	87.6
Center Beam Candle Power (cd)	297
Spacing Criteria	1.20 (0°-180°)/ 1.22 (90°-270°)
Zonal Lumens in the 0°-60°Zone	86.38%
Zonal Lumens in the 60°-90°Zone	13.48%
Zonal Lumens in the 90°-120°Zone	0.03%
Zonal Lumens in the 120°-180°Zone	0.11%

Table 3: Test data per Goniophotometer Method

## Spectral Power Distribution - Sphere Spectroradiometer Method

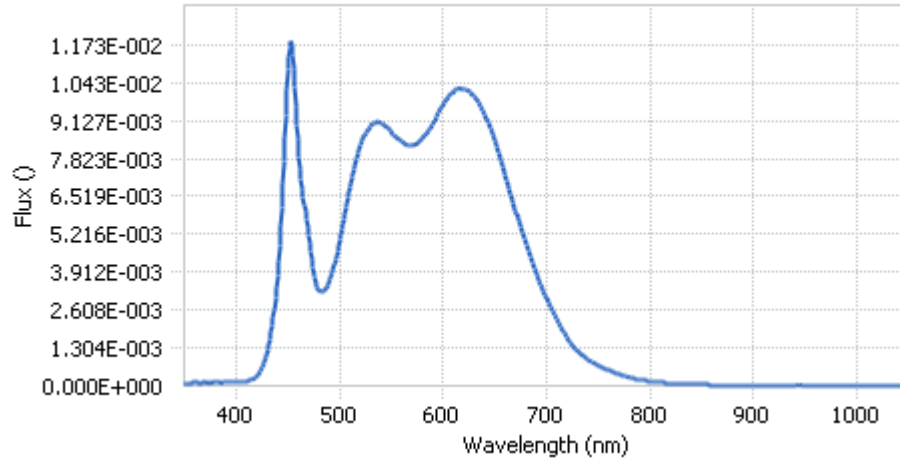


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.15E-04	485	3.27E-03	590	9.04E-03	695	3.43E-03
385	9.03E-05	490	3.56E-03	595	9.35E-03	700	3.00E-03
390	1.12E-04	495	4.17E-03	600	9.66E-03	705	2.62E-03
395	1.15E-04	500	5.01E-03	605	9.96E-03	710	2.26E-03
400	1.21E-04	505	5.93E-03	610	1.01E-02	715	1.94E-03
405	1.35E-04	510	6.80E-03	615	1.02E-02	720	1.65E-03
410	1.59E-04	515	7.60E-03	620	1.02E-02	725	1.39E-03
415	2.14E-04	520	8.25E-03	625	1.01E-02	730	1.19E-03
420	3.32E-04	525	8.67E-03	630	9.97E-03	735	1.02E-03
425	5.94E-04	530	8.95E-03	635	9.74E-03	740	8.91E-04
430	1.11E-03	535	9.05E-03	640	9.39E-03	745	7.87E-04
435	2.07E-03	540	9.04E-03	645	8.92E-03	750	6.90E-04
440	3.79E-03	545	8.91E-03	650	8.42E-03	755	6.05E-04
445	6.93E-03	550	8.73E-03	655	7.85E-03	760	5.28E-04
450	1.09E-02	555	8.53E-03	660	7.25E-03	765	4.59E-04
455	1.14E-02	560	8.40E-03	665	6.65E-03	770	3.91E-04
460	8.45E-03	565	8.30E-03	670	6.02E-03	775	3.30E-04
465	6.51E-03	570	8.27E-03	675	5.45E-03	780	2.86E-04
470	5.16E-03	575	8.35E-03	680	4.91E-03		
475	3.82E-03	580	8.49E-03	685	4.39E-03		
480	3.27E-03	585	8.75E-03	690	3.89E-03		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

## Chromaticity Diagram - Sphere Spectroradiometer Method

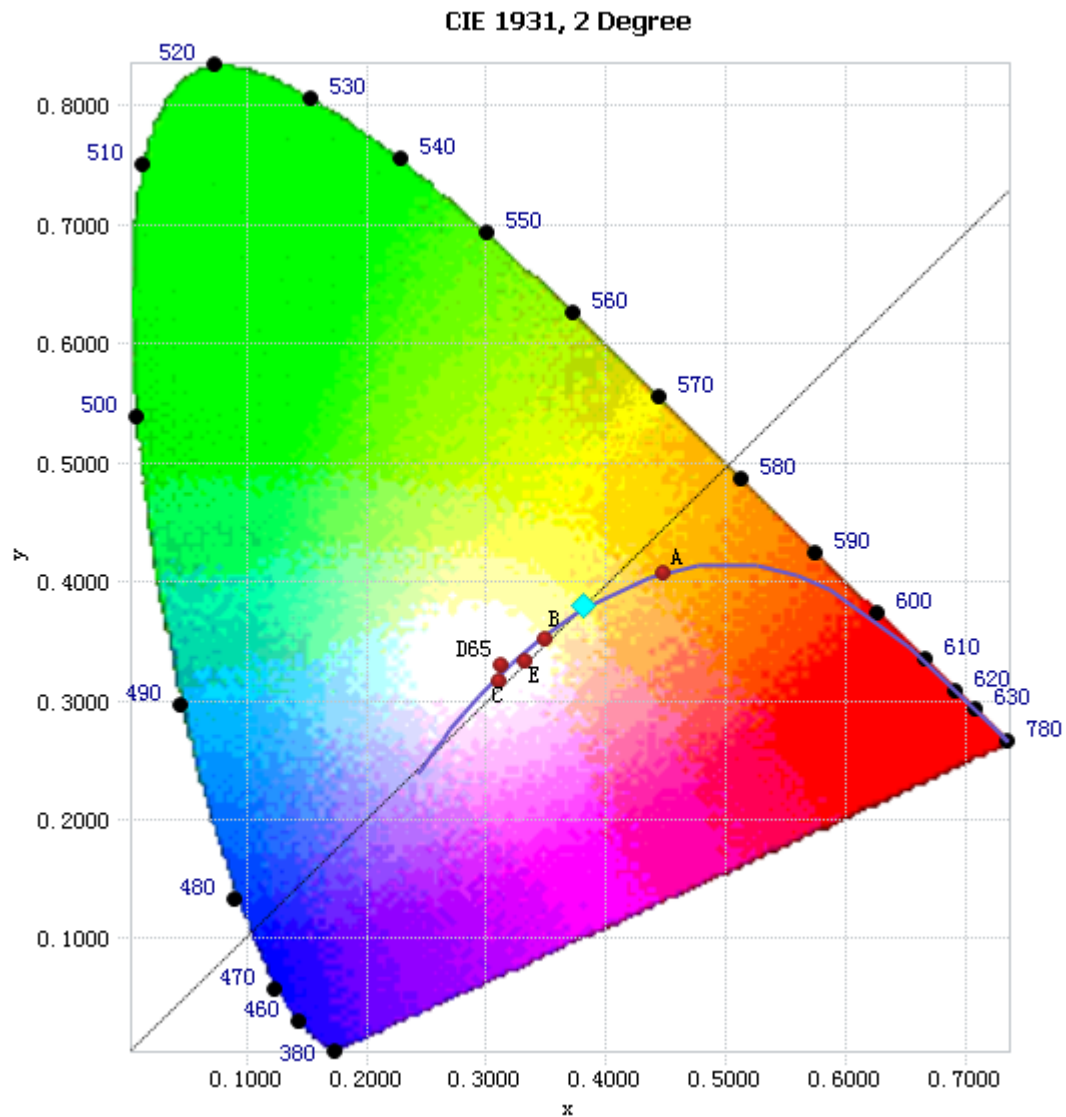


Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.



### Nominal CCT Quadrangles – Sphere Spectroradiometer Method

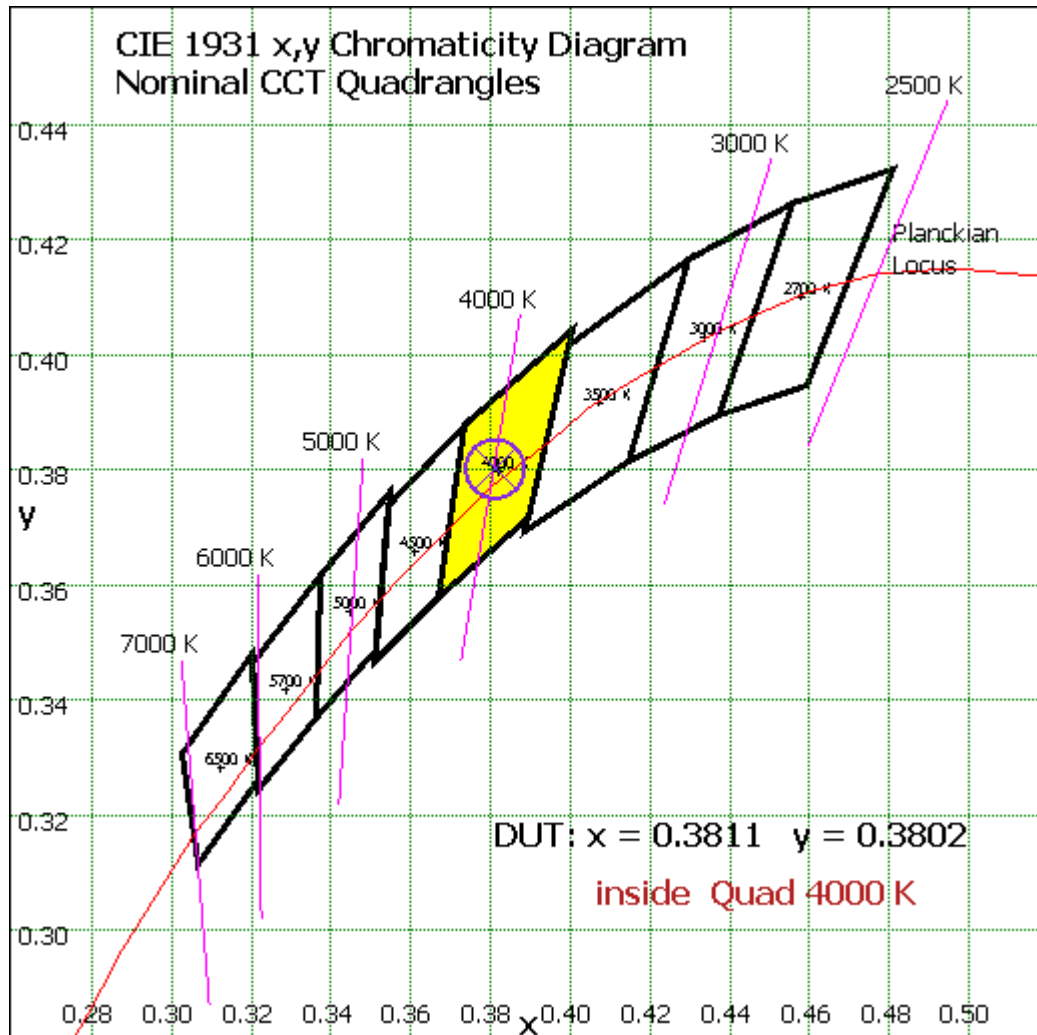


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

### Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	28.05	4.50%
10- 20	79.712	12.79%
20- 30	118.777	19.06%
30- 40	135.533	21.75%
40- 50	107.491	17.25%
50- 60	68.723	11.03%
60- 70	46.441	7.45%
70- 80	28.652	4.60%
80- 90	8.926	1.43%
90-100	0.025	0.00%
100-110	0.06	0.01%
110-120	0.106	0.02%
120-130	0.134	0.02%
130-140	0.158	0.03%
140-150	0.16	0.03%
150-160	0.13	0.02%
160-170	0.083	0.01%
170-180	0.028	0.00%
Total	623.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	538.286	86.38%
60- 90	84.019	13.48%
0-90	622.305	99.86%
90- 180	0.884	0.14%
0- 180	623.2	100%

Table 5: Zonal Lumen Data

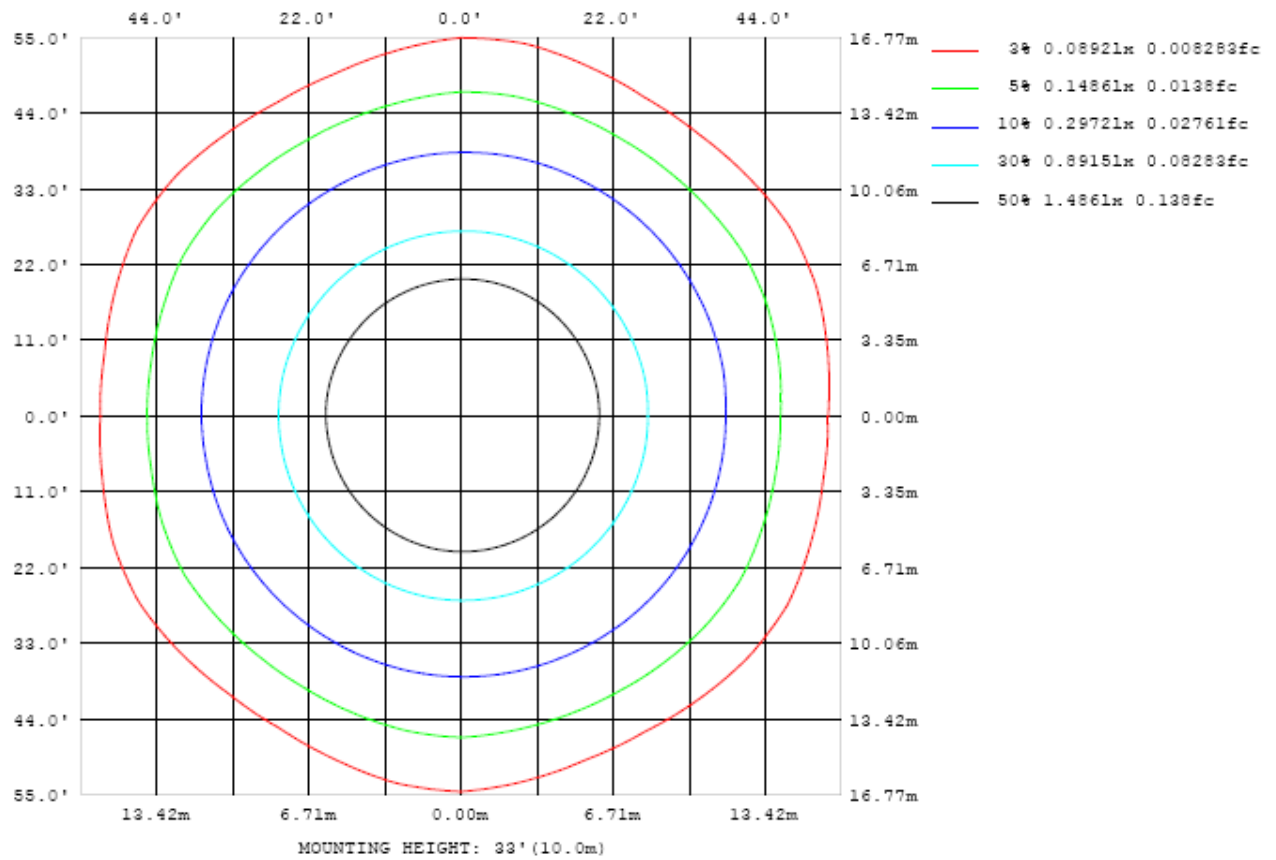


Chart 4: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

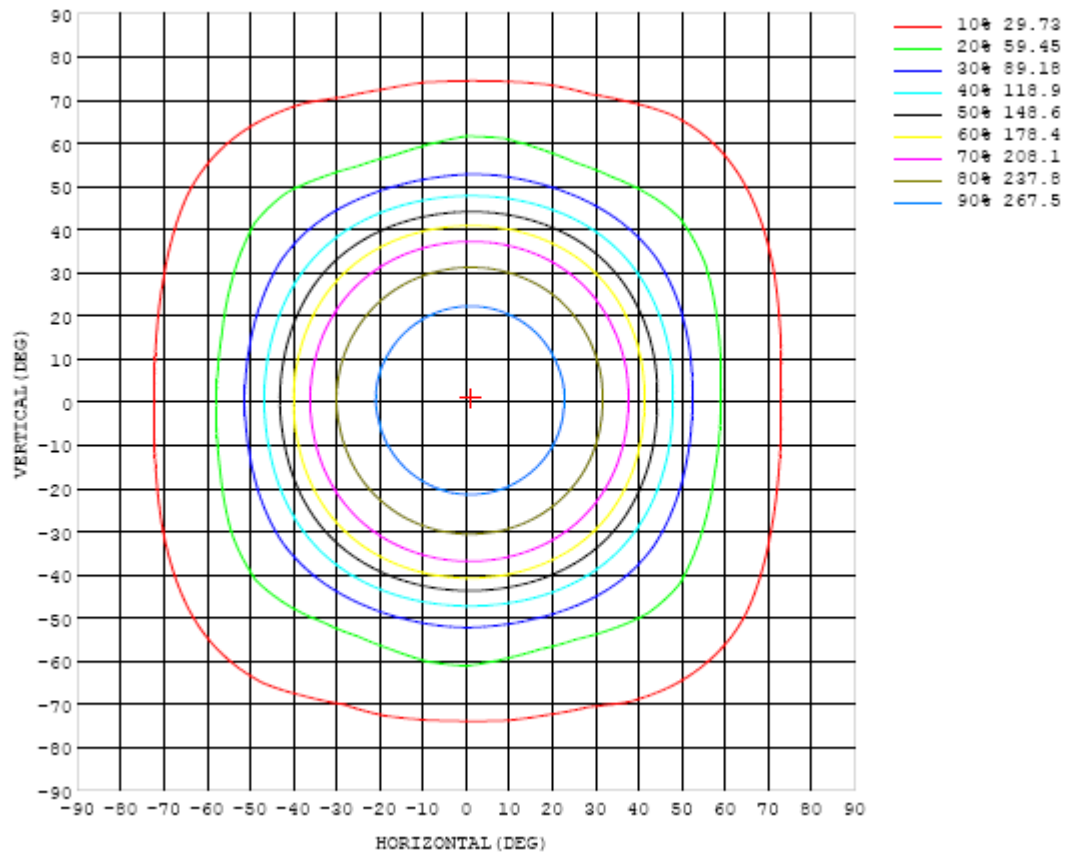


Chart 5: Isocandela Plot

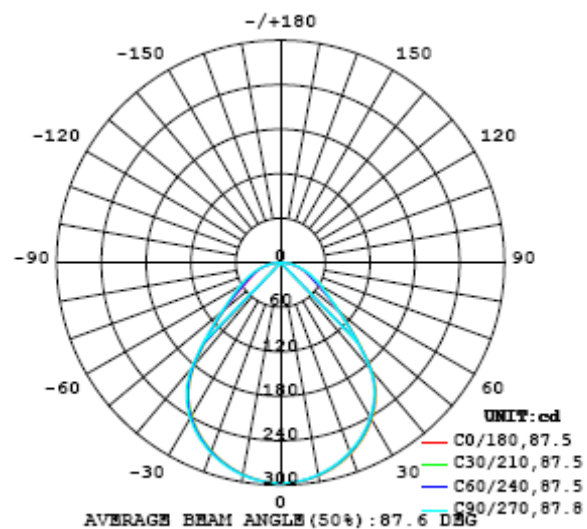


Chart 6: Polar Candela Distribution

## Luminous Intensity Data- Goniophotometer Method

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	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
5	296	296	296	296	296	296	296	295	295	295	295	295	295	295	295	295	295	295	295
10	292	292	292	291	291	291	291	290	290	290	290	289	289	289	289	289	289	289	289
15	284	284	284	284	283	283	283	282	282	282	282	281	281	281	281	281	281	281	281
20	274	274	274	273	273	272	272	272	271	271	271	270	270	269	269	269	269	269	270
25	261	261	260	260	259	259	258	258	258	257	257	256	255	255	255	255	255	255	256
30	244	244	243	243	242	241	241	241	240	240	239	239	238	237	237	237	237	237	238
35	222	222	221	221	220	220	219	219	219	218	217	216	215	215	214	214	214	214	215
40	190	190	189	189	188	188	187	187	186	186	184	183	181	180	179	179	178	178	179
45	142	142	142	141	140	139	139	138	137	136	135	134	133	133	132	132	132	132	133
50	104	104	104	103	103	102	102	101	101	100	99.8	98.7	97.7	97.2	97.3	97.6	97.1	96.4	97.3
55	75.0	75.1	76.7	79.1	77.9	75.8	73.8	73.8	75.4	77.8	76.1	73.1	70.9	71.0	72.8	75.3	73.9	71.0	70.3
60	55.8	56.3	59.4	62.6	61.6	58.3	55.4	55.9	59.1	62.5	60.8	56.7	53.5	54.1	57.2	60.2	59.0	55.2	52.7
65	43.3	44.1	47.3	49.6	49.1	46.6	43.3	44.4	47.8	49.8	49.0	45.9	42.2	43.1	46.1	47.8	47.2	44.7	41.7
70	34.6	35.5	37.3	37.9	37.9	37.1	34.7	35.8	37.7	38.2	37.9	36.7	33.9	34.6	36.2	36.4	36.2	35.4	33.5
75	26.3	26.6	27.4	27.3	27.6	27.6	26.3	26.7	27.7	27.4	27.4	27.0	25.4	25.7	26.6	26.2	26.1	26.0	25.2
80	17.7	17.7	18.0	18.0	18.2	18.2	17.5	17.6	18.1	18.0	17.9	17.6	16.7	16.7	17.1	16.8	16.7	16.7	16.6
85	8.51	8.51	8.55	8.50	8.53	8.48	8.19	8.22	8.40	8.33	8.15	7.84	7.36	7.19	7.25	7.04	6.93	6.95	7.06
90	0.09	0.08	0.07	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01
95	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03
100	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.05	0.04
105	0.09	0.08	0.09	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.05
110	0.10	0.10	0.10	0.09	0.10	0.10	0.10	0.08	0.07	0.06	0.06	0.06	0.06	0.07	0.06	0.05	0.06	0.06	0.06
115	0.12	0.12	0.12	0.11	0.11	0.13	0.13	0.12	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.07	0.07	0.06	0.07
120	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.14	0.12	0.12	0.11	0.11	0.10	0.10	0.45	0.09	0.08	0.08	0.08
125	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.14	0.14	0.14	0.13	0.13	0.12	0.14	0.12	0.11	0.10	0.10	0.11
130	0.19	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.16	0.15	0.15	0.15	0.13	0.15	0.13	0.13	0.12	0.12	0.14
135	0.22	0.21	0.21	0.20	0.20	0.20	0.20	0.18	0.17	0.17	0.18	0.17	0.16	0.17	0.16	0.15	0.14	0.14	0.17
140	0.25	0.24	0.23	0.22	0.22	0.22	0.21	0.21	0.19	0.19	0.20	0.19	0.18	0.19	0.18	0.17	0.17	0.17	0.21
145	0.26	0.25	0.24	0.23	0.22	0.22	0.22	0.22	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.19	0.19	0.25
150	0.26	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.23	0.22	0.23	0.22	0.21	0.21	0.21	0.21	0.28
155	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.23	0.24	0.25	0.25	0.24	0.23	0.23	0.22	0.23	0.22	0.22	0.30
160	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.25	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.31
165	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.27	0.27	0.27	0.27	0.27	0.25	0.25	0.25	0.25	0.25	0.26	0.31
170	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.26	0.26	0.27	0.27	0.27	0.27	0.30
175	0.30	0.30	0.30	0.30	0.30	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.28	0.27	0.27	0.27
180	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27

Table 6: 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	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297		
5	295	295	295	295	295	296	296	296	296	296	296	296	296	296	296	296	296		
10	290	290	290	290	290	291	291	291	291	291	292	292	292	292	292	292	292		
15	281	282	282	282	282	283	283	283	284	284	284	284	284	285	285	285	285		
20	270	271	271	271	271	272	272	273	273	274	274	274	274	274	274	275	275		
25	256	256	256	257	257	258	258	259	260	260	260	261	261	261	261	261	262		
30	238	239	239	239	240	240	241	242	243	243	244	244	244	244	244	244	245		
35	215	215	216	216	217	218	219	220	221	222	222	222	223	223	223	223	223		
40	179	179	180	180	181	182	184	185	187	188	189	189	190	191	191	191	192		
45	133	134	134	135	136	137	138	140	141	142	142	143	143	144	144	145	144		
50	97.7	98.7	99.7	100.0	100	100	102	103	104	105	105	105	106	106	106	107	106		
55	70.9	73.6	76.9	76.3	74.1	72.8	73.9	76.6	80.2	80.1	77.8	76.2	76.7	78.4	80.9	80.3	77.9		
60	53.7	57.4	61.1	60.4	57.2	54.8	55.8	59.8	63.9	63.6	60.0	57.0	57.4	60.4	63.6	62.9	59.1		
65	42.8	46.2	48.5	48.2	46.2	43.6	44.6	48.4	51.1	50.9	48.4	45.1	45.6	48.4	50.5	49.9	47.0		
70	34.4	36.3	37.0	37.2	36.8	35.0	36.0	38.4	39.4	39.4	38.6	36.2	36.8	38.5	38.9	38.4	37.3		
75	25.7	26.6	26.7	27.0	27.3	26.4	27.0	28.5	28.7	28.8	28.8	27.5	27.8	28.7	28.3	28.0	27.8		
80	16.7	17.2	17.2	17.5	17.7	17.3	17.8	18.6	18.8	19.0	19.0	18.4	18.6	19.0	18.7	18.5	18.4		
85	7.10	7.23	7.23	7.38	7.53	7.53	7.81	8.25	8.53	8.66	8.73	8.56	8.66	8.87	8.82	8.77	8.83		
90	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.04	0.06	0.09	0.11	0.13	0.17		
95	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
100	0.06	0.05	0.04	0.04	0.06	0.05	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03		
105	0.06	0.06	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.07	0.08	0.09		
110	0.07	0.08	0.07	0.08	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.10	0.09	0.09	0.09		
115	0.07	0.08	0.08	0.09	0.11	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.11	0.11	0.11		
120	0.10	0.10	0.10	0.10	0.12	0.14	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.14	0.14	0.14		
125	0.12	0.12	0.12	0.13	0.14	0.15	0.17	0.18	0.18	0.18	0.18	0.18	0.19	0.18	0.18	0.17	0.17		
130	0.15	0.15	0.15	0.16	0.17	0.18	0.20	0.20	0.21	0.21	0.21	0.22	0.23	0.23	0.22	0.22	0.21		
135	0.19	0.19	0.19	0.20	0.21	0.22	0.23	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.27	0.27	0.26		
140	0.23	0.23	0.23	0.23	0.25	0.26	0.27	0.27	0.27	0.28	0.30	0.31	0.31	0.32	0.32	0.32	0.31		
145	0.26	0.26	0.26	0.27	0.28	0.29	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.33	0.33	0.33	0.32		
150	0.29	0.29	0.29	0.29	0.30	0.31	0.32	0.32	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.33		
155	0.31	0.31	0.31	0.31	0.31	0.32	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.33		
160	0.31	0.31	0.31	0.32	0.32	0.32	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33		
165	0.31	0.31	0.31	0.31	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32		
170	0.30	0.31	0.31	0.31	0.31	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32		
175	0.28	0.28	0.29	0.29	0.28	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31		
180	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27		

Table 7: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 26, 2016	Jul. 25, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 26, 2016	Jul. 25, 2017
AC Power Supply	DPS1060	HZTE001-06	Dec. 25, 2016	Dec. 24, 2017
DC Power Supply	WY12010	HZTE004-03	Dec. 25, 2016	Dec. 24, 2017
Temperature Meter	TES1310	HZTE017-01	Aug. 08, 2016	Aug. 07, 2017
Standard source	D908	HZTE012-01	Jul. 28, 2016	Jul. 27, 2017
Integrate Sphere system	2M	HZTE015-01	Jul. 26, 2016	Jul. 25, 2017
Digital Power Meter	WT210	HZTE008-01	Jul. 26, 2016	Jul. 25, 2017
AC Power Supply	PCR 500L	HZTE001-07	Dec. 25, 2016	Dec. 24, 2017
DC Power Supply	IT6154	HZTE004-04	Jul. 27, 2016	Jul. 26, 2017
Temperature and humidity recorder	JR900	HZTE018-01	Dec. 25, 2016	Dec. 24, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 28, 2016	Jul. 27, 2017

Table 8: 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.

### Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is  $4\pi$ . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. 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 FA19 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 Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 2.1% with a coverage factor  $k=2$ .



## **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 FA19 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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