



## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

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

### PLH LAMP

**Model: 6PLH/830/BYP/GU24/R**

**6PLH/830/BYP/R**

**6PLH/830/BYP/E26/R**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ17030074a

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

Review by:

Engineer: April Zou

Mar. 24, 2017

Approved by:



Manager: Jim Zhang

Mar. 24, 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: 6PLH/830/BYP/GU24/R, 6PLH/830/BYP/R, 6PLH/830/BYP/E26/R

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
116.3	684.0	5.88	0.9758
CCT (K)	CRI	Stabilization Time (Light & Power)	
2950	82.4	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** : Mar. 22, 2017

**Date of Test** : Mar. 23, 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

## TABLE OF CONTENT

LM-79-08 Test Report.....	1
Test Summary.....	2
Sample Photos.....	4
TEST RESULTS .....	5
Goniophotometer Method .....	6
Spectral Power Distribution - Sphere Spectroradiometer Method .....	7
Chromaticity Diagram - Sphere Spectroradiometer Method.....	8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method .....	9
Zonal Lumen Tabulation- Goniophotometer Method .....	10
Luminous Intensity Distribution Plots- Goniophotometer Method.....	12
Luminous Intensity Data- Goniophotometer Method.....	13
EQUIPMENT LIST .....	15
TEST METHODS .....	15
Seasoning of SSL Product.....	15
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	15
Goniophotometer Method .....	16
Photometric and Electrical Measurements.....	16
Color Characteristics Measurements.....	16
Color Spatial Uniformity .....	16

## Sample Photos



Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: PLH LAMP
<b>Model</b>	: 6PLH/830/BYP/GU24/R, 6PLH/830/BYP/R , 6PLH/830/BYP/E26/R
<b>Electrical Ratings</b>	: 120-277Vac, 60Hz, 6W
<b>Product Description</b>	: GU24 base, 3000K, CRI80
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

## TEST RESULTS

Test ambient temperature was 24.7°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 70 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.050	0.024
Power Factor	0.9758	0.8895
Test Power (W)	5.88	5.91
THD A%	19.99	25.52
Luminous Efficacy (lm/W)	116.3	116.1
Total Luminous Flux (lm)	684.0	686.0
Color Rendering Index (CRI)	82.4	
R9	7.5	
Correlated Color Temperature (CCT)(K)	2950	
Chromaticity Chroma x	0.4355	
Chromaticity Chroma y	0.3953	
Chromaticity Chroma u	0.2535	
Chromaticity Chroma v	0.3451	
Duv	0.0036	
Chromaticity Chroma u'	0.2535	
Chromaticity Chroma v'	0.5177	

Special Color Rendering Indices	
R1	81.9
R2	93.4
R3	93.1
R4	79.3
R5	82.5
R6	91.9
R7	80.1
R8	57.3
R9	7.5
R10	85
R11	78.9
R12	75.9
R13	85
R14	97
Rf	82
Rg	96

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)	0.050
Power Factor	0.9751
Test Power (W)	5.90
Luminous Efficacy (lm/W)	119.2
Total Luminous Flux (lm)	703.2
Beam Angle (°)	112.2
Center Beam Candle Power (cd)	213
Spacing Criteria	1.15 (0°-180°)/ 1.22 (90°-270°)
Zonal Lumens in the 0°-60°Zone	66.76%
Zonal Lumens in the 60°-90°Zone	24.93%
Zonal Lumens in the 90°-120°Zone	7.06%
Zonal Lumens in the 120°-180°Zone	1.25%

Table 3: Test data per Goniophotometer Method

## Spectral Power Distribution - Sphere Spectroradiometer Method

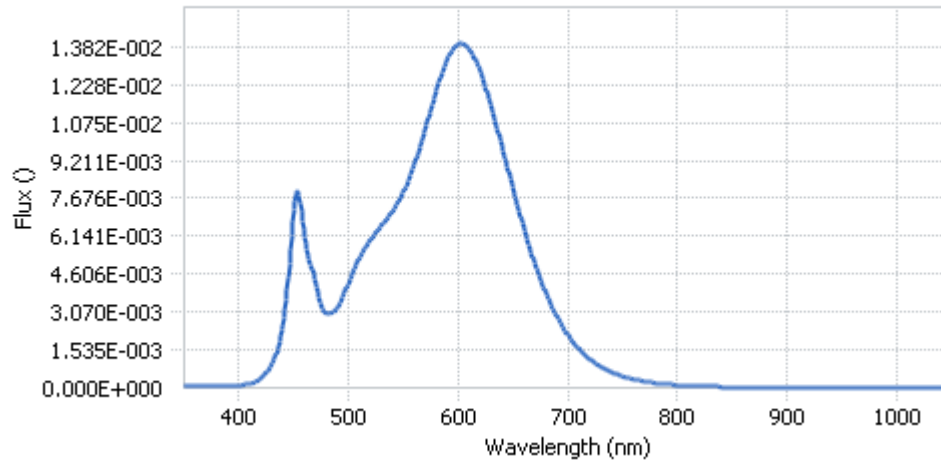
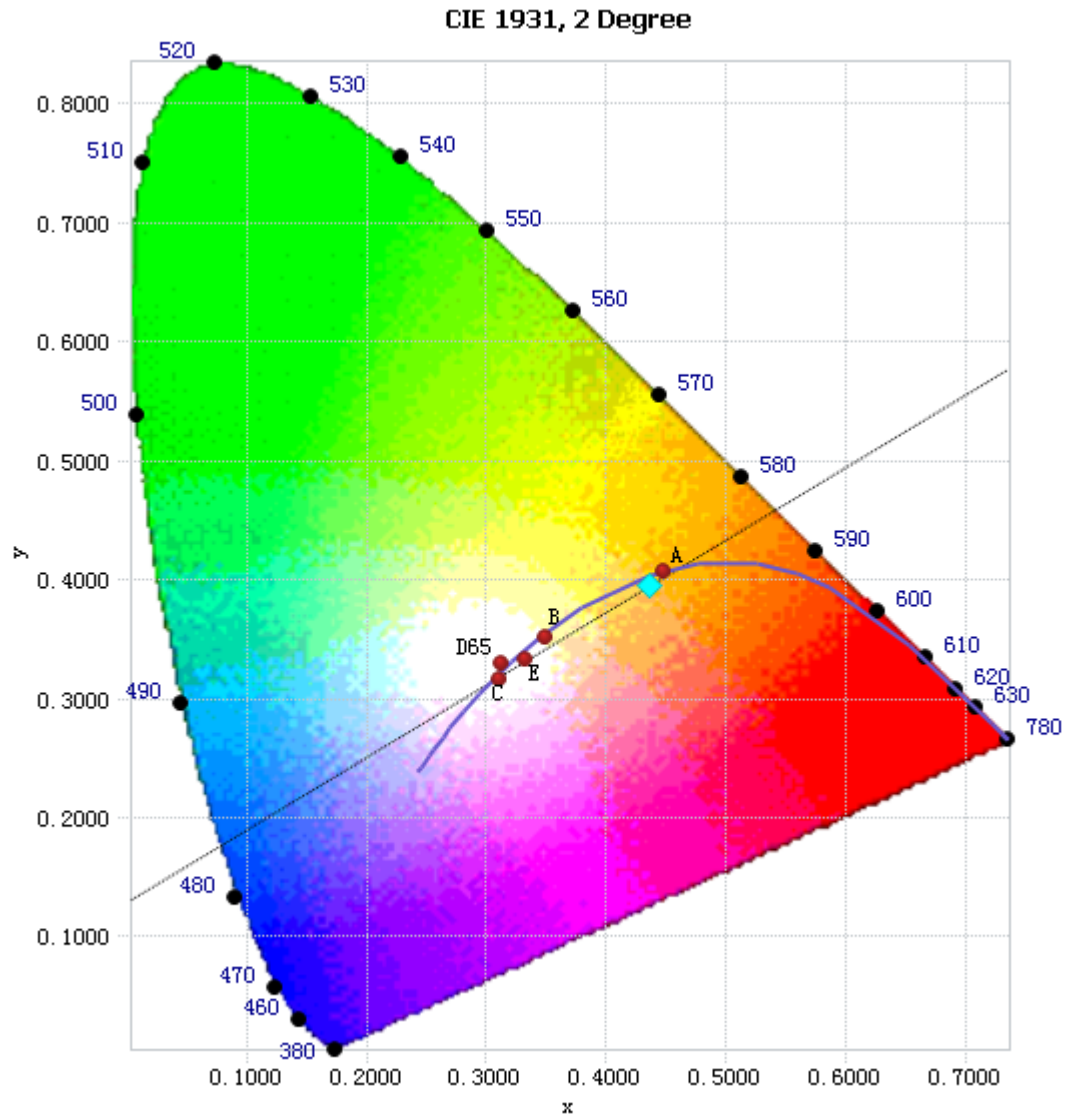


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.39E-05	485	3.04E-03	590	1.33E-02	695	2.49E-03
385	8.19E-05	490	3.26E-03	595	1.37E-02	700	2.16E-03
390	8.94E-05	495	3.76E-03	600	1.39E-02	705	1.85E-03
395	1.03E-04	500	4.25E-03	605	1.39E-02	710	1.59E-03
400	1.07E-04	505	4.79E-03	610	1.37E-02	715	1.37E-03
405	1.32E-04	510	5.26E-03	615	1.34E-02	720	1.17E-03
410	1.66E-04	515	5.68E-03	620	1.29E-02	725	1.00E-03
415	2.47E-04	520	6.02E-03	625	1.22E-02	730	8.62E-04
420	3.82E-04	525	6.30E-03	630	1.14E-02	735	7.38E-04
425	6.16E-04	530	6.57E-03	635	1.06E-02	740	6.32E-04
430	9.59E-04	535	6.84E-03	640	9.82E-03	745	5.40E-04
435	1.55E-03	540	7.16E-03	645	8.93E-03	750	4.66E-04
440	2.54E-03	545	7.54E-03	650	8.10E-03	755	4.01E-04
445	4.50E-03	550	7.92E-03	655	7.28E-03	760	3.45E-04
450	7.23E-03	555	8.44E-03	660	6.47E-03	765	2.96E-04
455	7.78E-03	560	9.04E-03	665	5.72E-03	770	2.54E-04
460	6.09E-03	565	9.71E-03	670	5.04E-03	775	2.20E-04
465	5.05E-03	570	1.05E-02	675	4.43E-03	780	1.87E-04
470	4.23E-03	575	1.13E-02	680	3.86E-03		
475	3.38E-03	580	1.20E-02	685	3.35E-03		
480	3.01E-03	585	1.28E-02	690	2.90E-03		

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

## Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4355, 0.3953)

### 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

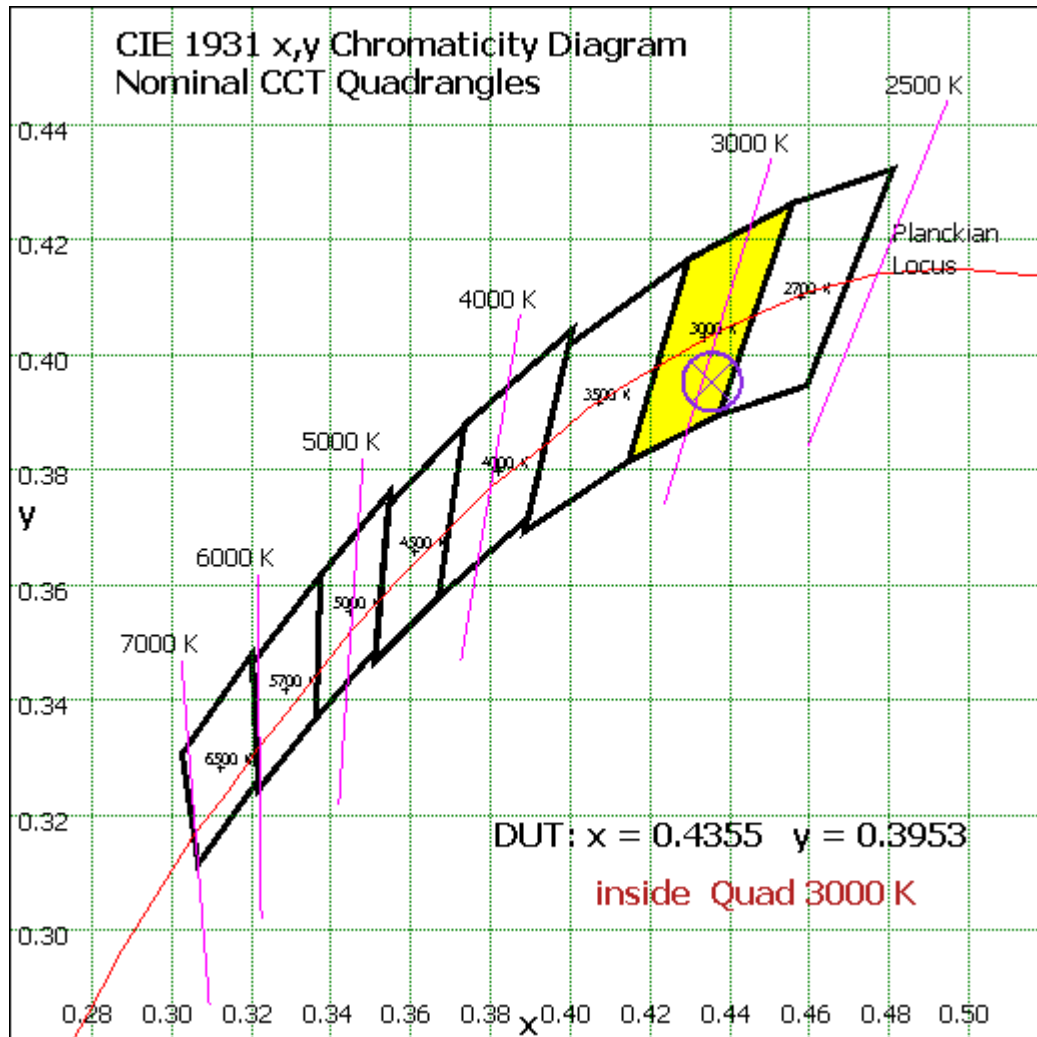


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

### Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	20.117	2.86%
10- 20	57.236	8.14%
20- 30	85.75	12.20%
30- 40	102.274	14.55%
40- 50	106.057	15.08%
50- 60	97.992	13.94%
60- 70	80.673	11.47%
70- 80	57.999	8.25%
80- 90	36.637	5.21%
90-100	23.453	3.34%
100-110	16.014	2.28%
110-120	10.176	1.45%
120-130	5.179	0.74%
130-140	2.167	0.31%
140-150	0.907	0.13%
150-160	0.364	0.05%
160-170	0.132	0.02%
170-180	0.028	0.00%
Total	703.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	469.426	66.76%
60- 90	175.309	24.93%
0-90	644.735	91.69%
90- 180	58.42	8.31%
0- 180	703.2	100%

Table 5: Zonal Lumen Data

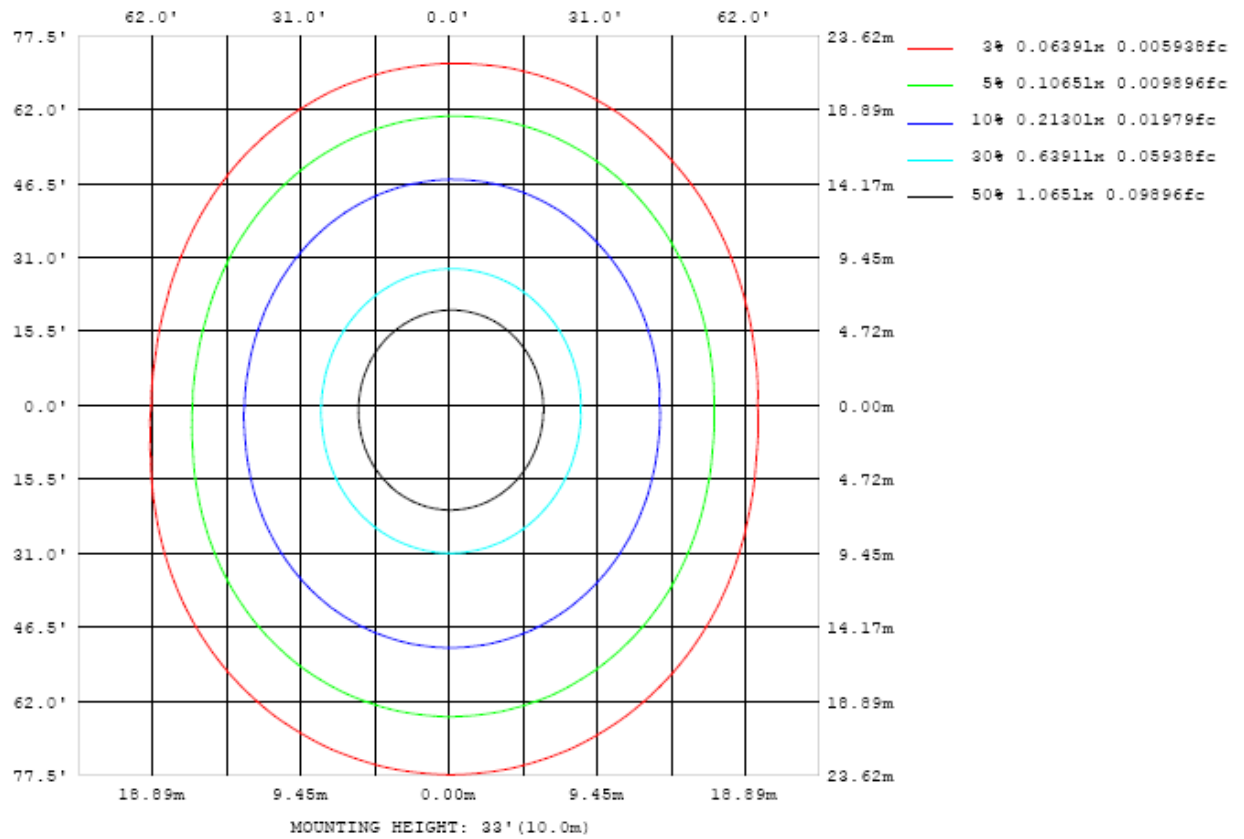


Chart 4: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

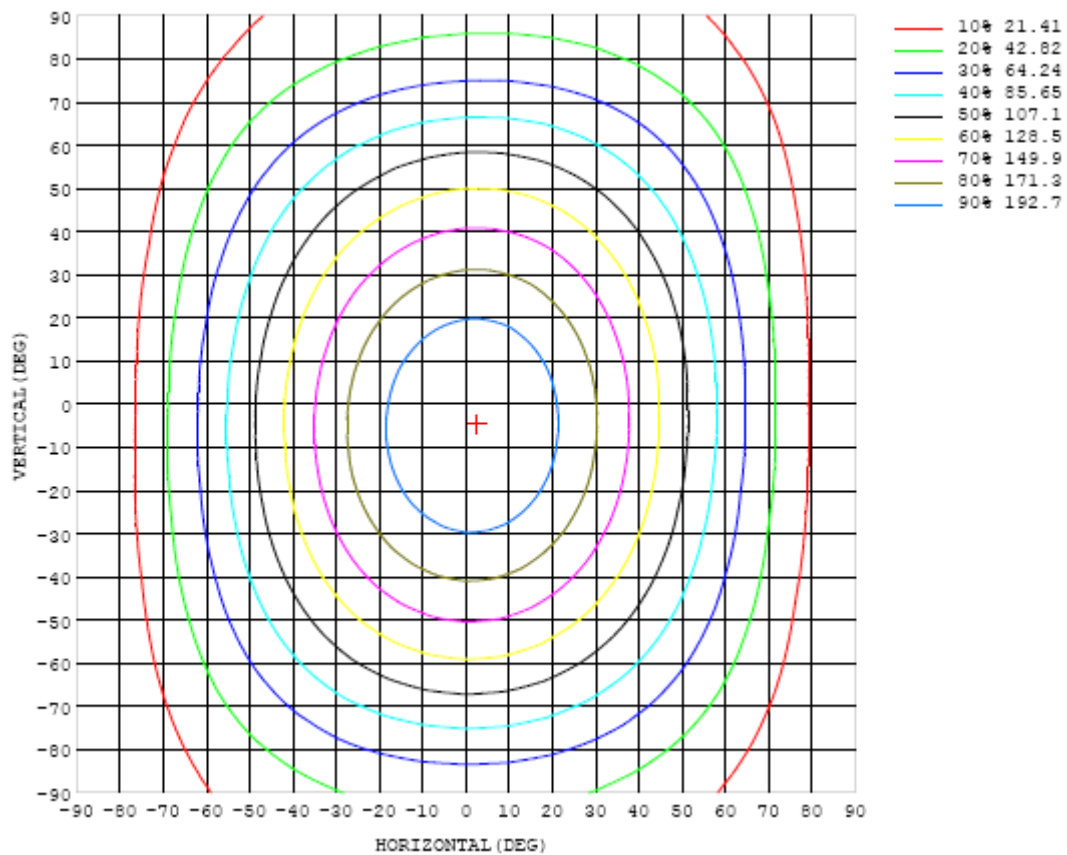


Chart 5: Isocandela Plot

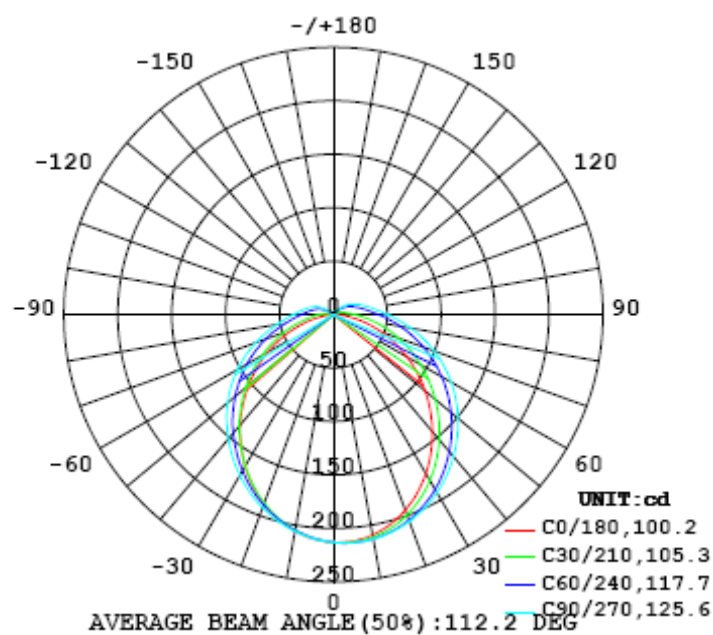


Chart 6: Polar Candela Distribution

## 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	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213
5	213	213	213	213	214	214	214	214	214	214	214	214	213	213	212	212	211	211	211
10	209	210	211	211	212	213	213	213	213	213	213	212	211	210	209	208	207	206	206
15	203	204	205	207	208	209	210	210	211	210	210	209	208	206	204	202	201	199	198
20	195	196	197	199	201	203	204	206	206	206	205	204	202	199	197	194	192	190	189
25	184	185	187	190	193	195	197	199	200	200	199	197	194	191	188	185	181	179	177
30	172	173	176	179	182	186	189	191	192	192	191	188	186	181	177	173	169	166	164
35	158	160	163	166	171	175	178	181	183	183	182	179	175	170	165	160	156	152	150
40	143	145	148	153	158	163	167	171	173	173	172	169	164	159	153	147	141	137	135
45	127	129	133	138	144	150	155	159	162	162	161	157	152	146	139	132	126	121	119
50	111	113	118	123	130	136	142	147	150	151	149	145	140	133	125	118	111	105	103
55	94.8	97.1	102	108	115	123	129	135	138	139	137	133	127	120	111	103	95.6	89.7	86.3
60	78.6	81.0	86.2	93.4	101	109	116	122	125	126	124	120	114	106	97.4	88.7	80.6	74.0	70.4
65	62.4	65.1	70.9	78.6	86.8	95.0	102	108	112	113	111	107	101	92.8	83.8	74.7	65.9	58.9	54.7
70	47.4	50.0	56.5	64.4	72.9	81.4	88.9	94.9	98.5	99.6	98.0	93.8	87.6	79.6	70.5	61.2	52.2	44.3	39.5
75	32.6	35.3	42.4	51.1	59.9	68.2	75.6	81.5	85.0	86.1	84.4	80.6	74.7	66.8	58.2	48.6	39.1	30.7	25.1
80	19.3	22.2	29.7	38.6	47.5	55.9	62.9	68.5	71.9	72.8	71.4	67.9	62.5	55.1	46.5	37.2	27.5	18.6	12.7
85	8.78	11.5	19.0	28.0	36.6	44.7	51.6	57.0	60.4	60.8	59.7	56.5	51.3	44.4	36.4	27.5	18.4	9.70	3.77
90	1.86	4.72	11.7	19.9	28.1	35.5	42.0	46.8	49.7	50.5	49.5	46.8	42.0	35.7	28.6	20.6	12.4	5.00	0.17
95	0.54	1.91	7.53	14.9	22.2	29.0	34.7	39.2	41.6	42.4	41.5	39.1	35.1	29.6	23.1	16.1	9.00	2.96	0.20
100	0.44	1.38	5.29	11.5	18.0	24.1	29.3	33.2	35.5	36.2	35.5	33.4	29.9	25.0	19.2	12.9	6.81	1.95	0.26
105	0.30	1.04	3.95	9.11	14.8	20.3	25.0	28.6	30.6	31.4	30.7	28.8	25.6	21.3	16.0	10.5	5.17	1.83	0.23
110	0.18	0.61	2.78	7.10	12.2	17.1	21.3	24.5	26.4	27.0	26.5	24.8	21.9	18.0	13.4	8.43	3.71	1.35	0.22
115	0.05	0.30	1.78	4.91	9.87	14.2	18.0	20.9	22.6	23.3	22.8	21.2	18.6	15.1	11.0	6.30	2.82	1.04	0.26
120	0.07	0.24	1.10	3.00	7.21	11.6	15.0	17.6	19.2	19.7	19.4	18.0	15.6	12.5	8.54	3.77	2.23	0.89	0.32
125	0.08	0.22	0.81	1.97	4.17	8.43	12.1	14.5	16.0	16.5	16.2	14.9	12.7	9.29	5.03	3.23	1.78	0.79	0.43
130	0.10	0.21	0.63	1.43	2.72	4.84	7.93	10.4	12.0	13.0	12.7	11.2	9.01	5.88	3.84	2.51	1.44	0.75	0.51
135	0.12	0.21	0.51	1.09	2.15	3.32	4.65	6.34	7.89	8.65	8.44	7.21	5.55	4.27	3.11	1.95	1.18	0.70	0.55
140	0.15	0.22	0.42	0.83	1.69	2.68	3.63	4.48	5.18	5.46	5.33	4.87	4.23	3.33	2.39	1.55	0.99	0.64	0.49
145	0.17	0.23	0.38	0.65	1.26	2.01	2.65	3.24	3.66	3.86	3.87	3.64	3.11	2.47	1.85	1.26	0.86	0.58	0.43
150	0.19	0.25	0.34	0.48	0.88	1.50	1.93	2.30	2.57	2.69	2.67	2.53	2.28	1.86	1.44	1.02	0.70	0.44	0.30
155	0.26	0.30	0.40	0.56	0.82	1.12	1.40	1.63	1.80	1.87	1.84	1.72	1.53	1.26	0.98	0.70	0.46	0.31	0.28
160	0.31	0.37	0.45	0.53	0.68	0.84	1.00	1.14	1.23	1.28	1.26	1.18	1.07	0.90	0.72	0.56	0.42	0.31	0.28
165	0.26	0.28	0.35	0.45	0.54	0.63	0.71	0.78	0.83	0.84	0.83	0.79	0.73	0.64	0.54	0.45	0.38	0.31	0.29
170	0.27	0.28	0.33	0.37	0.41	0.46	0.50	0.54	0.56	0.56	0.55	0.53	0.50	0.47	0.42	0.38	0.34	0.31	0.30
175	0.20	0.20	0.21	0.27	0.32	0.33	0.35	0.35	0.35	0.37	0.37	0.37	0.36	0.36	0.35	0.33	0.30	0.28	0.28
180	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213		
5	210	210	210	210	210	210	210	210	210	210	211	211	211	211	212	212	212		
10	205	205	205	205	205	205	205	205	206	206	206	207	207	207	208	208	209		
15	198	197	197	197	198	198	199	199	200	200	201	201	201	201	202	202	203		
20	188	187	188	188	189	189	190	191	192	193	193	193	193	193	193	193	194		
25	176	176	176	177	178	180	181	182	183	184	184	184	184	183	183	183	183		
30	163	163	163	165	167	169	171	172	174	174	174	174	173	172	171	171	171		
35	148	149	150	152	154	157	159	161	163	164	163	163	161	160	158	157	157		
40	134	134	136	139	142	145	148	150	152	152	152	151	149	147	145	143	143		
45	118	119	121	124	128	132	136	139	140	141	140	139	136	133	130	129	127		
50	102	103	106	110	115	119	123	126	128	129	128	126	122	119	115	113	112		
55	85.8	87.7	91.1	95.7	101	106	110	114	116	116	115	113	109	105	101	97.8	95.7		
60	70.1	72.2	76.5	81.5	87.2	92.8	97.3	101	103	103	102	99.6	95.5	90.9	86.2	82.5	79.7		
65	54.5	57.5	62.4	68.2	74.2	79.5	84.6	87.6	89.5	89.8	88.9	86.0	81.8	77.0	71.9	67.4	64.2		
70	39.5	43.4	49.0	55.3	61.5	66.9	71.6	74.8	76.7	77.0	75.8	73.3	68.7	63.7	58.4	53.0	49.1		
75	25.8	30.4	36.8	43.2	49.6	55.0	59.4	62.5	64.1	64.7	63.3	60.7	56.5	51.3	45.6	39.7	35.0		
80	13.8	19.5	26.5	33.2	39.2	44.6	49.0	51.9	53.3	53.5	52.4	49.7	45.5	40.1	34.2	28.0	22.5		
85	5.65	11.6	18.6	25.2	31.2	36.2	40.1	43.0	44.2	44.3	43.1	40.4	36.5	31.2	25.2	18.7	12.5		
90	1.93	7.17	13.5	19.7	25.3	30.1	33.8	36.2	37.4	37.6	36.3	33.8	29.8	24.8	18.8	12.3	6.29		
95	1.01	4.68	10.1	15.9	21.1	25.6	29.0	31.2	32.4	32.4	31.3	28.8	25.0	20.2	14.7	8.66	3.37		
100	0.78	3.11	7.69	12.8	17.7	21.8	25.0	27.1	28.2	28.1	27.0	24.7	21.2	16.7	11.5	6.36	2.36		
105	0.52	2.86	5.60	10.2	14.8	18.6	21.6	23.5	24.4	24.4	23.3	21.1	17.9	13.6	8.95	4.71	1.62		
110	0.24	1.75	4.17	7.57	11.9	15.6	18.4	20.3	21.1	21.0	20.0	17.9	14.8	10.7	6.32	2.89	0.83		
115	0.27	1.21	2.95	4.60	8.27	12.3	15.3	17.1	17.9	17.8	16.8	14.8	11.3	6.80	3.61	1.51	0.33		
120	0.31	0.94	2.05	3.59	4.71	7.47	11.0	13.3	14.2	14.0	12.8	10.1	6.12	3.50	2.05	0.90	0.23		
125	0.37	0.80	1.52	2.51	3.60	4.69	5.88	7.41	8.42	8.18	6.87	5.15	3.45	2.21	1.33	0.60	0.18		
130	0.53	0.72	1.18	1.83	2.55	3.23	4.07	4.69	4.88	4.72	4.18	3.31	2.24	1.45	0.90	0.43	0.17		
135	0.58	0.68	0.95	1.40	1.88	2.27	2.78	3.11	3.18	3.07	2.74	2.22	1.52	0.99	0.63	0.33	0.17		
140	0.57	0.60	0.80	1.10	1.41	1.61	1.85	2.04	2.15	2.08	1.88	1.56	1.09	0.72	0.47	0.28	0.19		
145	0.35	0.38	0.53	0.71	0.86	1.03	1.26	1.42	1.51	1.47	1.35	1.17	0.85	0.52	0.38	0.26	0.21		
150	0.25	0.27	0.35	0.47	0.61	0.74	0.89	0.99	1.08	1.10	1.01	0.86	0.71	0.47	0.35	0.27	0.24		
155	0.26	0.26	0.30	0.38	0.45	0.53	0.63	0.69	0.73	0.72	0.68	0.61	0.52	0.41	0.32	0.27	0.28		
160	0.28	0.26	0.27	0.31	0.35	0.39	0.44	0.48	0.50	0.51	0.49	0.46	0.42	0.38	0.32	0.26	0.28		
165	0.29	0.28	0.26	0.26	0.28	0.31	0.33	0.34	0.36	0.36	0.36	0.35	0.34	0.33	0.31	0.27	0.26		
170	0.29	0.28	0.28	0.28	0.27	0.28	0.26	0.26	0.26	0.29	0.29	0.29	0.30	0.30	0.28	0.25	0.27		
175	0.28	0.28	0.27	0.25	0.24	0.20	0.19	0.18	0.19	0.20	0.19	0.18	0.19	0.20	0.20	0.20	0.19		
180	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17		

Table 7: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Integrate Sphere system	2M	HZTE015-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	WT210	HZTE008-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-07	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	6154	HZTE004-04	Jul. 27, 2016	Jul. 26, 2017
Temperature and humidity recorder	JR900	HZTE018-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 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 1.06% 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 1.94% 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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