LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

LED Lamp

Model: 7.5MR16DIM/930FL35/R

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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

Tel: +86571 86376106

www.ledtestlab.com

Report No.: HZ20060049h

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

Review by: April Zou

Engineer: April Zou

Oct. 15, 2020

Approved by: Jim Zhang

Manager: Jim Zhang

Oct. 15, 2020

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: **7.5MR16DIM/930FL35/R**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
91.4	585.0	6.40	0.9125

CCT (K)	CRI	Stabilization Time (Light & Power)
3052	96.4	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 : Jun. 25, 2020

Date of Test : Jun. 25, 2020

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
ANSI/IES TM-30-18 IES Method for Evaluating Light Source Color Rendition

TABLE OF CONTENT

SAMPLE PHOTO

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Lamp
Model	: 7.5MR16DIM/930FL35/R
Electrical Ratings	: 12Vac, 50/60Hz, 7.5W
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

TEST RESULTS

Test ambient temperature was 25.2 ℃.

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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	12.0
Voltage frequency (Hz)	60
Test Current (A)	0.583
Power Factor	0.9125
Test Power (W)	6.40
THD A%	24.61
Luminous Efficacy (lm/W)	91.4
Total Luminous Flux (lm)	585.0
Color Rendering Index (CRI)	96.4
R9	81.7
Correlated Color Temperature (CCT)(K)	3052
Chromaticity Chroma x	0.4331
Chromaticity Chroma y	0.4027
Chromaticity Chroma u	0.2487
Chromaticity Chroma v	0.3468
Duv	0.0002
Chromaticity Chroma u ’	0.2487
Chromaticity Chroma v’	0.5203

Special Color Rendering Indices	
R1	97.5
R2	98.3
R3	96.7
R4	97
R5	96.4
R6	96.9
R7	96.4
R8	92.2
R9	81.7
R10	94
R11	97.3
R12	81.9
R13	97.9
R14	97.2

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 24.9 ℃.

The photometric distance is 2.47 m.

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

Parameter	**Result**
Test Voltage (V)	12.0
Voltage frequency (Hz)	60
Test Current (A)	0.602
Power Factor	0.9158
Power (W)	6.61
Luminous Efficacy (lm/W)	90.5
Total Luminous Flux (lm)	598.2
Beam Angle (°)	32.5 (0^o-180^o) / 32.0 (90^o-270^o)
Center Beam Candle Power (cd)	1784
Maximum Beam Candle Power (cd)	1787 (At: C=140.0, Gamma=1.0)
Spacing Criteria	0.51 (0^o-180^o) / 0.55 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	97.58%
Zonal Lumens in the 60 °-90 °Zone	1.77%
Zonal Lumens in the 90 °-120 °Zone	0.38%
Zonal Lumens in the 120 °-180 °Zone	0.27%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

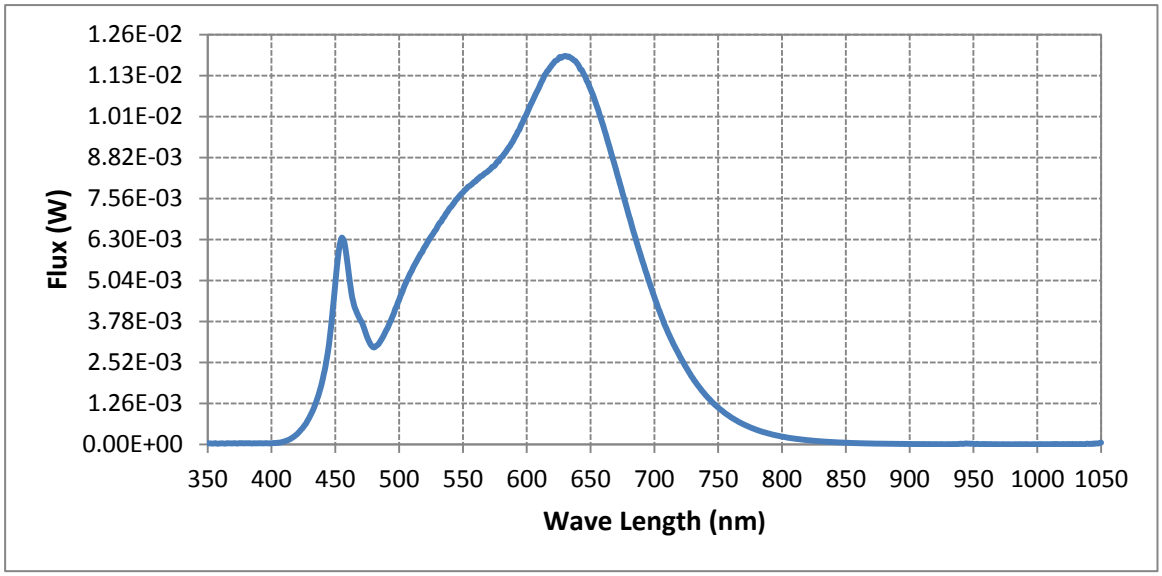
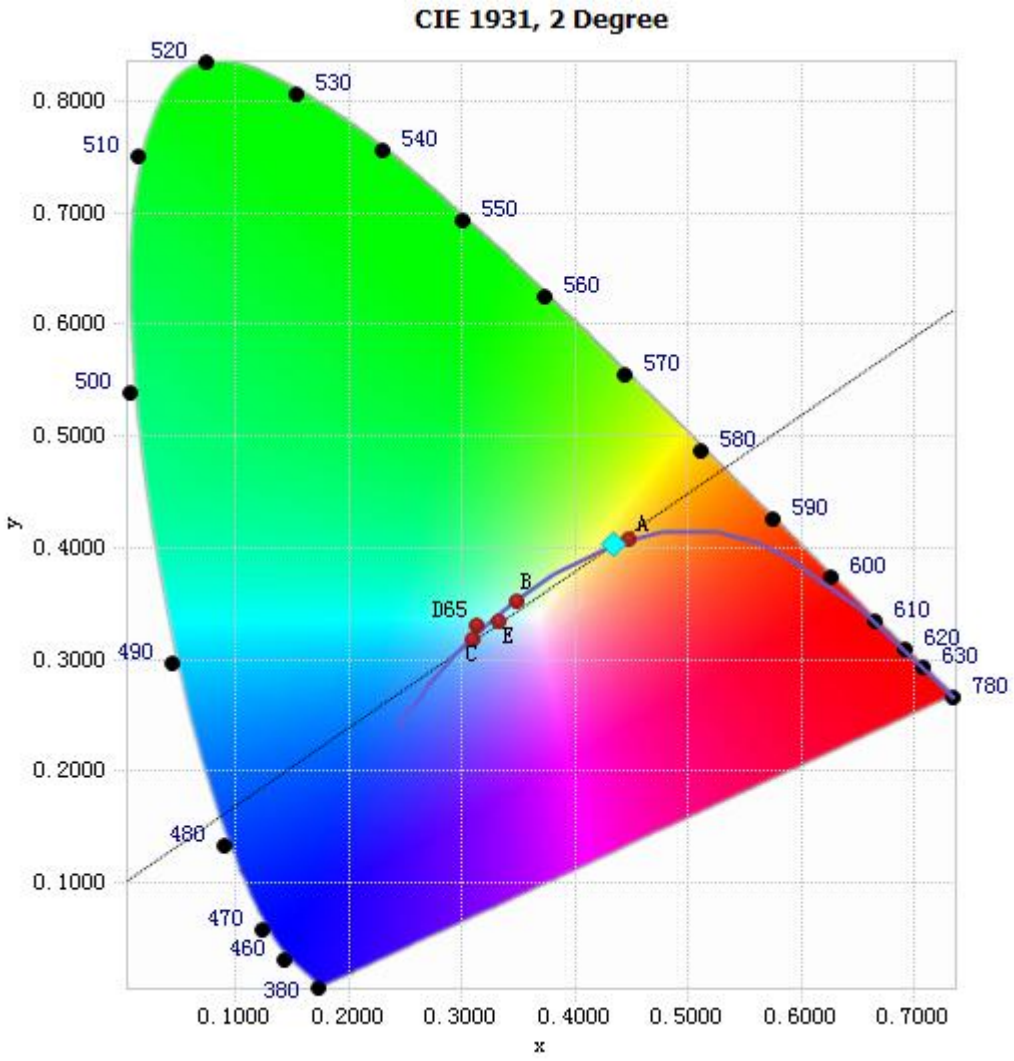


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.94E-05	485	3.16E-03	590	9.39E-03	695	5.11E-03
385	3.18E-05	490	3.52E-03	595	9.76E-03	700	4.53E-03
390	3.63E-05	495	3.95E-03	600	1.02E-02	705	3.99E-03
395	3.70E-05	500	4.45E-03	605	1.06E-02	710	3.51E-03
400	3.67E-05	505	4.94E-03	610	1.10E-02	715	3.08E-03
405	5.48E-05	510	5.35E-03	615	1.14E-02	720	2.71E-03
410	9.28E-05	515	5.73E-03	620	1.17E-02	725	2.36E-03
415	1.75E-04	520	6.07E-03	625	1.19E-02	730	2.05E-03
420	3.17E-04	525	6.39E-03	630	1.19E-02	735	1.77E-03
425	5.38E-04	530	6.70E-03	635	1.19E-02	740	1.52E-03
430	8.54E-04	535	6.98E-03	640	1.17E-02	745	1.31E-03
435	1.31E-03	540	7.28E-03	645	1.14E-02	750	1.14E-03
440	1.99E-03	545	7.53E-03	650	1.09E-02	755	9.75E-04
445	3.07E-03	550	7.75E-03	655	1.04E-02	760	8.35E-04
450	4.95E-03	555	7.94E-03	660	9.79E-03	765	7.21E-04
455	6.36E-03	560	8.09E-03	665	9.12E-03	770	6.17E-04
460	5.42E-03	565	8.26E-03	670	8.44E-03	775	5.27E-04
465	4.24E-03	570	8.42E-03	675	7.73E-03	780	4.51E-04
470	3.80E-03	575	8.58E-03	680	7.04E-03		
475	3.30E-03	580	8.82E-03	685	6.37E-03		
480	2.98E-03	585	9.08E-03	690	5.72E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4331, 0.4027)

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

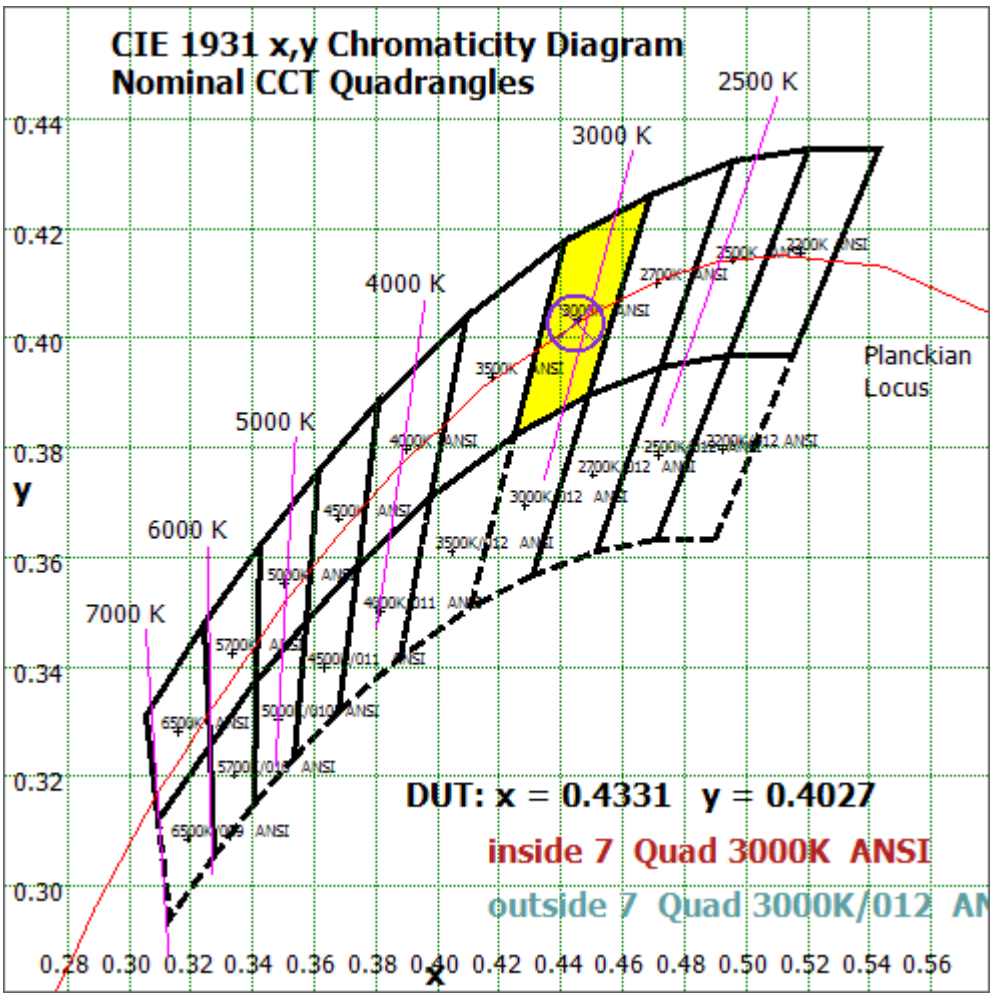


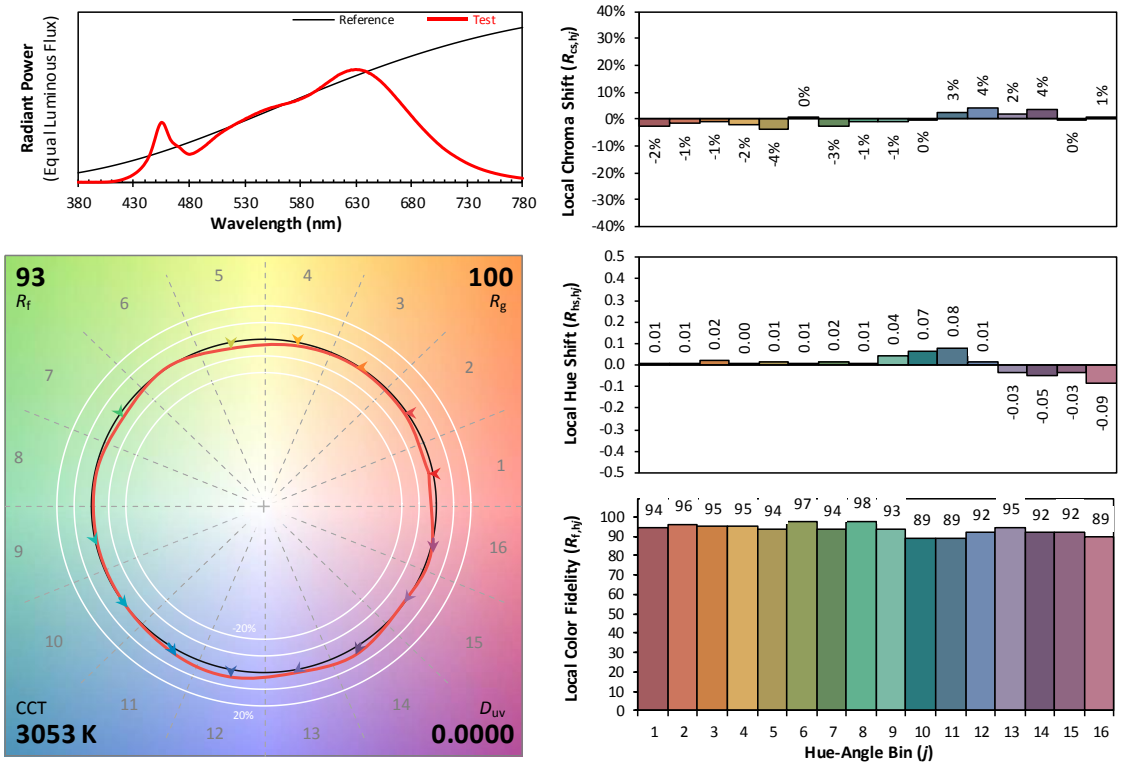
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** GREEN CREATIVE LTD

Date: 2020/06/25 **Model:** 7.5MR16DIM/930FL35/R



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4331
y	0.4027
u'	0.2487
v'	0.5203

CIE 13.3-1995 (CRI)

R_a	96
R_9	82

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	148.112	24.76%
10- 20	263.597	44.07%
20- 30	120.655	20.17%
30- 40	32.288	5.40%
40- 50	11.576	1.94%
50- 60	7.477	1.25%
60- 70	5.638	0.94%
70- 80	3.407	0.57%
80- 90	1.564	0.26%
90-100	0.627	0.10%
100-110	0.68	0.11%
110-120	0.939	0.16%
120-130	1.147	0.19%
130-140	0.094	0.02%
140-150	0.108	0.02%
150-160	0.12	0.02%
160-170	0.099	0.02%
170-180	0.034	0.01%
Total	598.2	100%

γ(°)	Lumens	% Total
0- 60	583.705	97.58%
60- 90	10.609	1.77%
0-90	594.314	99.36%
90- 180	3.848	0.64%
0- 180	598.2	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

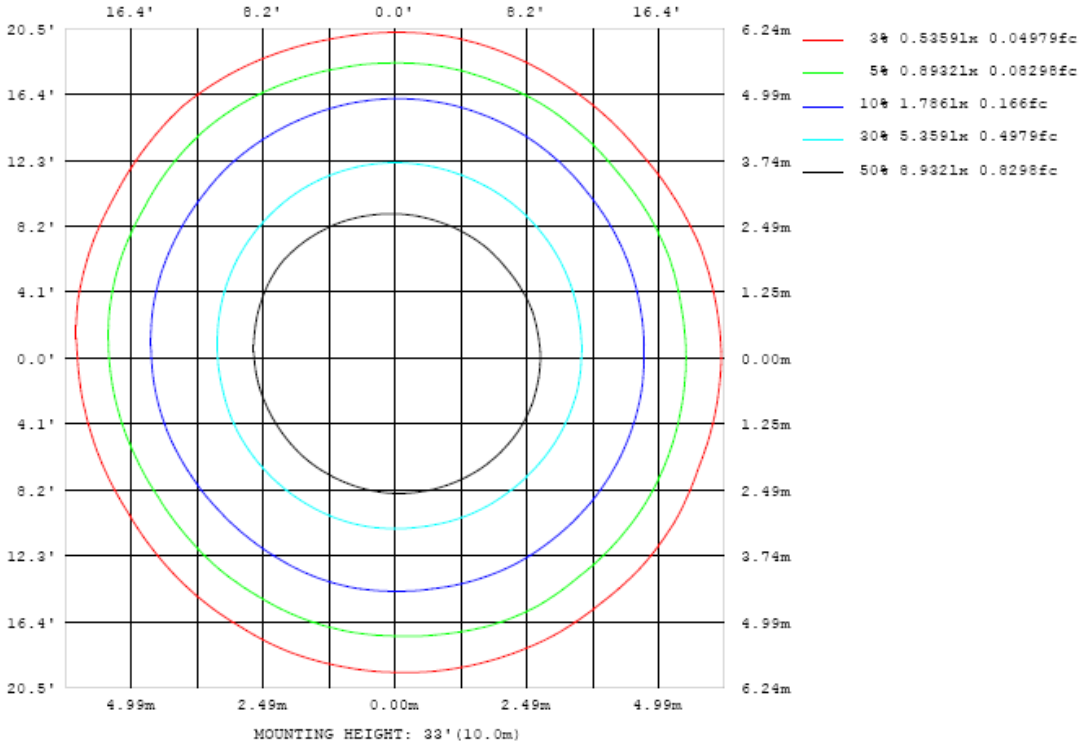


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

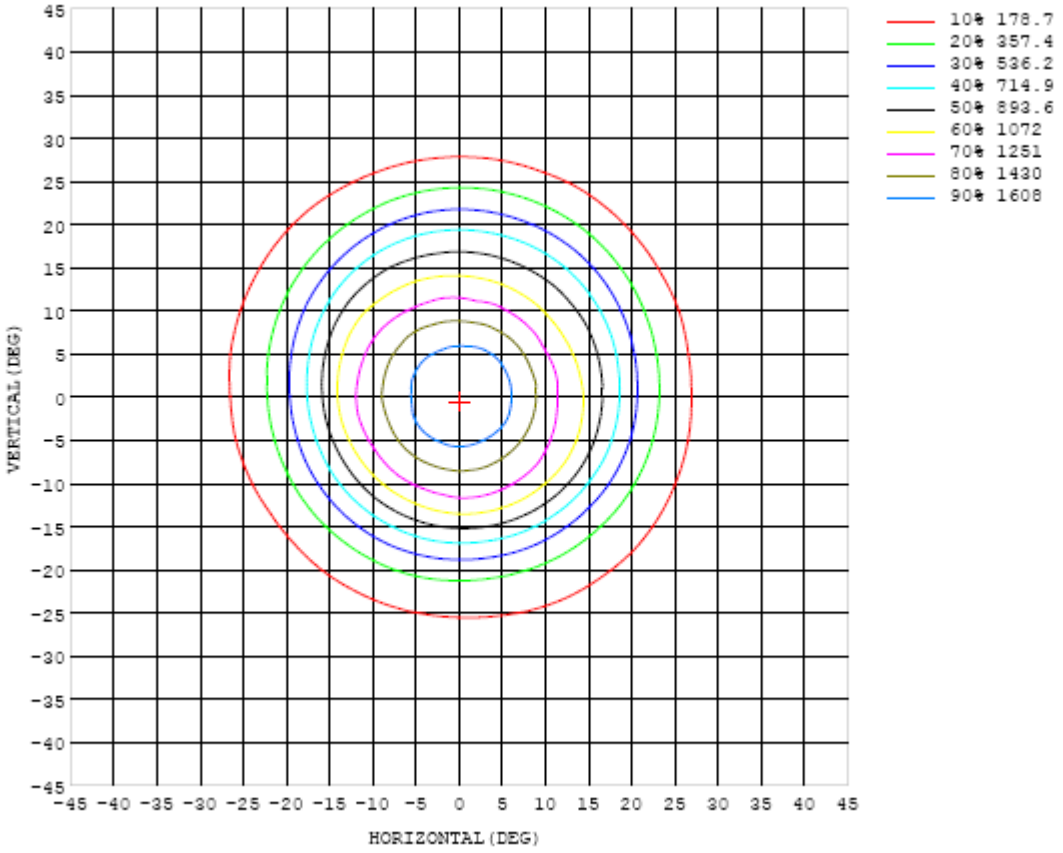


Chart 6: Isocandela Plot

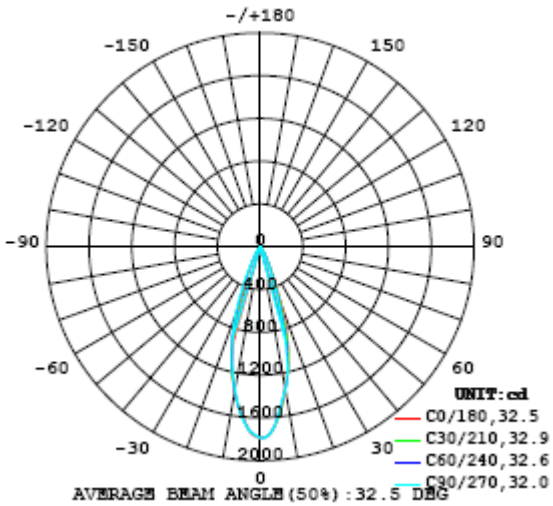


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784
5	1664	1666	1665	1666	1660	1658	1655	1659	1657	1659	1654	1648	1649	1653	1656	1655	1649	1642	1639
10	1347	1348	1351	1349	1351	1350	1351	1363	1366	1362	1349	1345	1348	1353	1355	1356	1359	1366	1374
15	1031	1027	1023	1014	994	977	957	936	925	914	907	902	904	910	914	922	939	963	984
20	591	578	553	529	502	482	465	454	445	440	441	442	442	446	453	462	475	491	505
25	253	249	241	233	226	218	213	205	197	193	191	189	187	189	189	196	210	221	229
30	112	111	107	108	106	103	104	101	97.5	95.7	93.3	91.5	88.2	88.1	87.1	86.7	90.0	95.1	100
35	52.0	51.3	48.9	49.9	48.3	46.3	45.8	45.1	44.3	43.2	42.2	42.0	41.0	41.3	41.0	40.9	42.4	43.7	43.9
40	24.9	24.8	24.0	23.4	22.9	22.7	22.6	22.1	21.8	21.6	20.7	20.7	20.7	20.9	21.0	21.1	21.7	22.1	22.4
45	14.3	14.3	14.1	13.8	13.6	13.4	13.2	13.0	13.0	13.1	13.1	13.2	13.2	13.4	13.4	13.5	13.7	14.0	14.0
50	10.2	10.3	10.3	10.4	10.4	10.2	9.97	9.91	9.89	9.91	10.0	10.1	10.2	10.3	10.3	10.4	10.5	10.6	10.6
55	8.38	8.54	8.66	8.80	8.80	8.54	8.24	8.09	8.15	8.22	8.30	8.27	8.29	8.40	8.28	8.27	8.32	8.28	8.33
60	7.03	7.10	7.20	7.20	7.20	6.97	6.80	6.73	6.74	6.78	6.86	6.88	6.90	6.83	6.73	6.70	6.76	6.84	6.92
65	5.88	5.85	5.86	5.89	5.71	5.63	5.61	5.40	5.35	5.41	5.37	5.42	5.59	5.42	5.33	5.39	5.42	5.54	5.75
70	4.67	4.41	4.41	4.57	4.19	4.18	4.36	3.99	3.96	4.17	3.98	3.98	4.25	3.98	3.92	4.20	4.03	4.07	4.56
75	3.51	3.24	3.17	3.10	3.00	2.94	2.86	2.80	2.77	2.75	2.75	2.78	2.75	2.75	2.76	2.79	2.84	2.93	3.05
80	2.21	2.14	2.10	1.99	1.95	1.90	1.83	1.84	1.80	1.77	1.79	1.74	1.73	1.82	1.77	1.79	1.91	1.95	2.01
85	1.50	1.42	1.33	1.33	1.24	1.17	1.25	1.18	1.12	1.20	1.11	1.00	1.14	1.12	1.05	1.20	1.25	1.21	1.37
90	0.98	0.82	0.72	0.77	0.66	0.62	0.74	0.67	0.63	0.71	0.63	0.62	0.70	0.65	0.60	0.72	0.70	0.69	0.89
95	0.52	0.53	0.43	0.45	0.42	0.40	0.44	0.41	0.43	0.45	0.43	0.43	0.48	0.44	0.42	0.45	0.49	0.44	0.48
100	0.44	0.45	0.46	0.49	0.49	0.49	0.54	0.53	0.52	0.57	0.54	0.52	0.57	0.54	0.46	0.51	0.50	0.45	0.50
105	0.49	2.23	0.58	0.69	0.79	0.47	0.76	0.55	0.44	0.55	0.46	0.45	0.53	0.47	0.44	0.57	0.45	0.47	0.98
110	0.49	0.47	0.42	0.43	0.48	0.45	0.40	0.43	0.46	0.38	0.42	0.46	0.38	0.38	0.43	0.35	0.36	0.46	0.39
115	0.38	0.43	0.44	0.38	0.49	0.79	0.36	0.98	1.61	0.53	1.31	2.35	0.47	1.41	2.37	0.20	0.66	1.55	0.20
120	1.91	3.83	4.11	1.48	3.39	4.01	1.44	2.57	2.20	0.92	2.10	0.98	1.39	3.21	0.41	1.80	3.97	0.48	2.78
125	1.26	1.34	0.96	0.58	0.32	0.22	0.25	0.17	0.17	0.17	0.15	0.16	0.19	0.19	0.14	0.17	0.17	0.17	0.39
130	0.13	0.12	0.13	0.13	0.12	0.12	0.11	0.11	0.12	0.11	0.11	0.12	0.10	0.11	0.11	0.10	0.11	0.11	0.10
135	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.12	0.12	0.11	0.11	0.11	0.11	0.12	0.11
140	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.14	0.14
145	0.18	0.18	0.17	0.18	0.18	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
150	0.22	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21
155	0.26	0.27	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.26	0.25
160	0.30	0.32	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.32	0.30
165	0.34	0.36	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.38	0.38	0.36	0.36
170	0.38	0.38	0.39	0.40	0.39	0.39	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36
175	0.36	0.36	0.35	0.34	0.33	0.34	0.36	0.37	0.37	0.37	0.36	0.35	0.24	0.31	0.32	0.31	0.31	0.31	0.32
180	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31

Table 6: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784		
5	1644	1647	1651	1653	1651	1653	1654	1657	1656	1659	1662	1667	1668	1670	1670	1669	1667		
10	1367	1369	1372	1374	1380	1373	1364	1362	1348	1346	1354	1350	1360	1362	1353	1350	1359		
15	1006	1027	1043	1055	1042	1033	1030	1017	1011	1007	1003	1003	1005	1001	1007	1018	1022		
20	532	558	584	604	627	648	659	669	671	669	664	663	659	651	640	624	606		
25	241	250	255	264	277	286	297	308	313	312	309	301	292	280	274	267	259		
30	108	110	111	116	121	119	117	115	115	115	112	110	107	105	110	112	111		
35	47.0	48.8	49.2	51.3	53.1	52.1	53.3	52.8	51.5	50.1	48.7	48.5	48.1	46.4	48.2	50.1	51.3		
40	22.8	23.3	23.9	24.3	24.9	25.3	26.0	26.5	27.0	27.5	27.2	27.0	26.3	25.4	24.8	24.4	24.4		
45	14.1	14.2	14.4	14.7	15.1	15.3	15.5	15.5	15.7	16.0	16.1	15.8	15.4	15.0	14.4	14.2	14.1		
50	10.4	10.3	10.2	10.1	10.2	10.2	10.2	10.2	10.5	10.7	10.8	10.7	10.4	9.95	9.65	9.57	9.84		
55	8.36	8.42	8.46	8.37	8.32	8.30	8.24	8.21	8.16	8.17	8.07	8.04	7.97	7.73	7.75	7.89	8.08		
60	6.99	7.04	7.01	7.01	7.02	7.01	7.04	7.00	6.92	6.87	6.73	6.66	6.66	6.56	6.60	6.79	6.94		
65	5.79	5.80	5.95	5.93	5.98	6.03	6.02	5.99	5.96	5.94	5.88	5.85	5.75	5.62	5.58	5.65	5.75		
70	4.39	4.39	4.78	4.63	4.66	4.86	4.79	4.76	4.91	4.81	4.73	4.89	4.62	4.52	4.58	4.44	4.50		
75	3.11	3.21	3.46	3.45	3.49	3.88	3.66	3.61	3.91	3.65	3.57	3.96	3.52	3.44	3.70	3.37	3.38		
80	2.10	2.17	2.24	2.32	2.40	2.47	2.51	2.53	2.55	2.52	2.49	2.47	2.42	2.38	2.32	2.30	2.29		
85	1.43	1.37	1.49	1.60	1.57	1.64	1.74	1.74	1.73	1.75	1.67	1.60	1.63	1.58	1.55	1.60	1.58		
90	0.89	0.84	0.96	1.02	1.02	1.15	1.21	1.23	1.30	1.22	1.12	1.11	1.08	1.09	1.15	1.09	1.01		
95	0.54	0.48	0.55	0.57	0.53	0.59	0.62	0.61	0.65	0.63	0.62	0.62	0.62	0.60	0.61	0.61	0.51		
100	0.50	0.44	0.48	0.47	0.42	0.45	0.43	0.43	0.45	0.44	0.41	0.44	0.42	0.42	0.45	0.42	0.43		
105	1.27	0.43	0.78	1.46	0.44	0.54	0.53	0.49	0.53	0.55	0.61	0.51	0.96	0.59	0.49	1.86	0.68		
110	0.40	0.47	0.50	0.48	0.45	0.80	0.59	0.39	1.03	0.98	0.47	1.17	0.62	0.44	0.84	0.58	0.41		
115	0.77	0.87	0.31	0.39	0.39	0.34	0.34	0.37	0.37	0.38	0.46	0.40	0.38	0.44	0.41	0.43	0.44		
120	4.10	1.58	2.34	2.87	1.89	0.70	1.10	1.87	0.54	1.42	2.26	0.52	2.10	3.10	0.89	2.78	3.57		
125	0.75	0.26	2.06	3.12	0.41	3.07	3.50	0.86	3.34	3.63	1.19	3.73	4.18	2.40	2.32	3.17	2.32		
130	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.15	0.18	0.16	0.16	0.15	0.13	0.13		
135	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.13	0.11	0.11	0.13	0.12	0.12	0.12		
140	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.14	0.14	0.15	0.14	0.15	0.15		
145	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	0.18	0.18	0.18		
150	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.22	0.22		
155	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26		
160	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30		
165	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.34		
170	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		
175	0.33	0.33	0.34	0.35	0.35	0.36	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36		
180	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 02, 2019	Aug. 01, 2020
Digital Power Meter	PF2010A	HZTE028-01	Aug. 02, 2019	Aug. 01, 2020
AC Power Supply	DPS1060	HZTE001-06	Aug. 02, 2019	Aug. 01, 2020
DC Power Supply	WY12010	HZTE004-03	Aug. 02, 2019	Aug. 01, 2020
Temperature recorder	JM624U	HZTE018-08	Aug. 02, 2019	Aug. 01, 2020
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 02, 2019	Aug. 01, 2020
Standard source	D908	HZTE012-01	Aug. 02, 2019	Aug. 01, 2020
Integrate Sphere system	3M	HZTE015-04	Aug. 02, 2019	Aug. 01, 2020
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2019	Aug. 01, 2020
AC Power Supply	PCR 500L	HZTE001-07	Aug. 02, 2019	Aug. 01, 2020
DC Power Supply	IT6154	HZTE004-04	Aug. 02, 2019	Aug. 01, 2020
Standard source	SCL-1400	HZTE012-02	Aug. 02, 2019	Aug. 01, 2020
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 02, 2019	Aug. 01, 2020
Temperature Meter	TES1310	HZTE017-01	Aug. 02, 2019	Aug. 01, 2020

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 4π. 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 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 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.

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,
Hangzhou, Zhejiang Province, China 311100
Tel: +86 571 86376106 www.ledtestlab.com

The uncertainty of integrating sphere system reported in this document is expended 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 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 expended uncertainty is 2.3% with a coverage factor k=2.

Color Characteristics Measurements

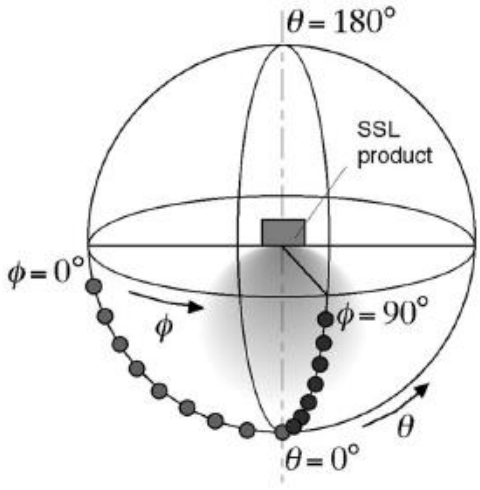
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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°/180° and C=90°/270°) and at 10° 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, Δu'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 ***