

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: 9BR30DIM/927

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ21120007d

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

Review by:



Engineer: April Zou

Dec. 15, 2021

Approved by:



Manager: Jim Zhang

Dec. 15, 2021

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: **9BR30DIM/927**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
108.1	905.7	8.38	0.8287
CCT (K)	CRI	Stabilization Time (Light & Power)	
2713	92.5	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	: Dec. 03, 2021
Date of Test	: Dec. 08, 2021
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

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SAMPLE PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 9BR30DIM/927
Electrical Ratings	: 120V, 60Hz, 9W
Product Description	: 2700K
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 26.0 °C.

Base orientation was horizontal. 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)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.084
Power Factor	0.8287
Test Power (W)	8.38
THD A%	55.53
Luminous Efficacy (lm/W)	108.1
Total Luminous Flux (lm)	905.7
Color Rendering Index (CRI)	92.5
R9	51.9
Correlated Color Temperature (CCT)(K)	2713
Chromaticity Chroma x	0.4570
Chromaticity Chroma y	0.4074
Chromaticity Chroma u	0.2621
Chromaticity Chroma v	0.3505
Duv	-0.001
Chromaticity Chroma u'	0.2621
Chromaticity Chroma v'	0.5257

Special Color Rendering Indices	
R1	93.8
R2	97.1
R3	98.3
R4	93.3
R5	93.5
R6	96.5
R7	89.3
R8	78.1
R9	51.9
R10	91.3
R11	94.8
R12	85
R13	94.6
R14	97.9

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 25.1 °C.

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)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.085
Power Factor	0.8259
Power (W)	8.42
Luminous Efficacy (lm/W)	110.4
Total Luminous Flux (lm)	929.5
Beam Angle (°)	110.3 (0°-180°) / 108.6 (90°-270°)
Center Beam Candle Power (cd)	296
Maximum Beam Candle Power (cd)	295.8 (At: C=10.0, Gamma=0.5)
Spacing Criteria	1.22 (0°-180°) / 1.24 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	69.75%
Zonal Lumens in the 60 °-90 °Zone	24.69%
Zonal Lumens in the 90 °-120 °Zone	4.84%
Zonal Lumens in the 120 °-180 °Zone	0.72%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

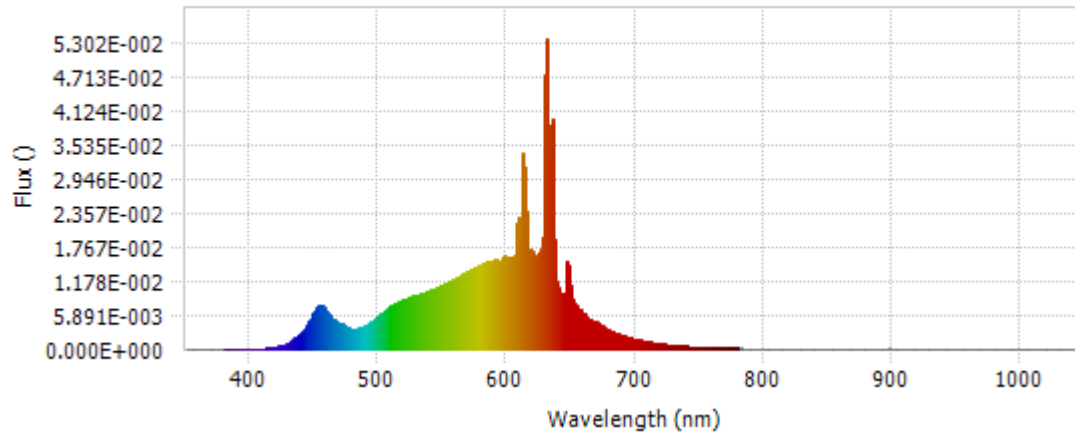
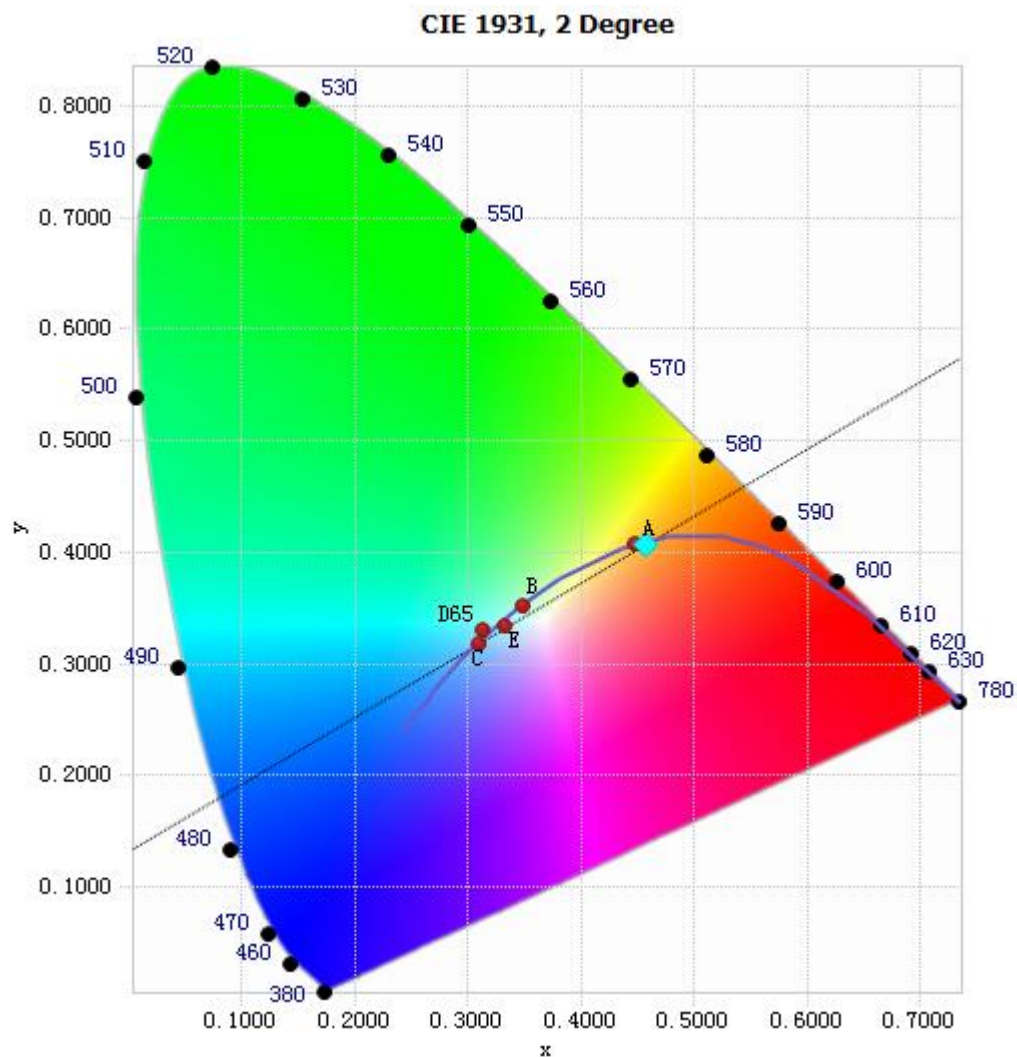


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.78E-05	485	3.66E-03	590	1.54E-02	695	2.05E-03
385	6.73E-05	490	4.17E-03	595	1.54E-02	700	1.74E-03
390	4.60E-05	495	4.87E-03	600	1.58E-02	705	1.50E-03
395	4.64E-05	500	5.74E-03	605	1.60E-02	710	1.27E-03
400	4.76E-05	505	6.67E-03	610	1.94E-02	715	1.08E-03
405	4.97E-05	510	7.43E-03	615	2.39E-02	720	9.33E-04
410	9.68E-05	515	8.08E-03	620	1.68E-02	725	7.91E-04
415	2.15E-04	520	8.57E-03	625	1.67E-02	730	6.83E-04
420	4.25E-04	525	9.01E-03	630	4.75E-02	735	5.84E-04
425	7.10E-04	530	9.40E-03	635	3.98E-02	740	4.89E-04
430	1.16E-03	535	9.77E-03	640	1.07E-02	745	4.23E-04
435	1.88E-03	540	1.02E-02	645	9.62E-03	750	3.58E-04
440	2.91E-03	545	1.06E-02	650	9.31E-03	755	3.13E-04
445	4.44E-03	550	1.11E-02	655	7.32E-03	760	2.64E-04
450	6.61E-03	555	1.16E-02	660	6.10E-03	765	2.25E-04
455	7.54E-03	560	1.22E-02	665	5.04E-03	770	2.00E-04
460	6.39E-03	565	1.29E-02	670	4.73E-03	775	1.72E-04
465	5.12E-03	570	1.35E-02	675	3.83E-03	780	1.47E-04
470	4.41E-03	575	1.40E-02	680	3.24E-03		
475	3.79E-03	580	1.46E-02	685	2.79E-03		
480	3.47E-03	585	1.51E-02	690	2.36E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4570, 0.4074)

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

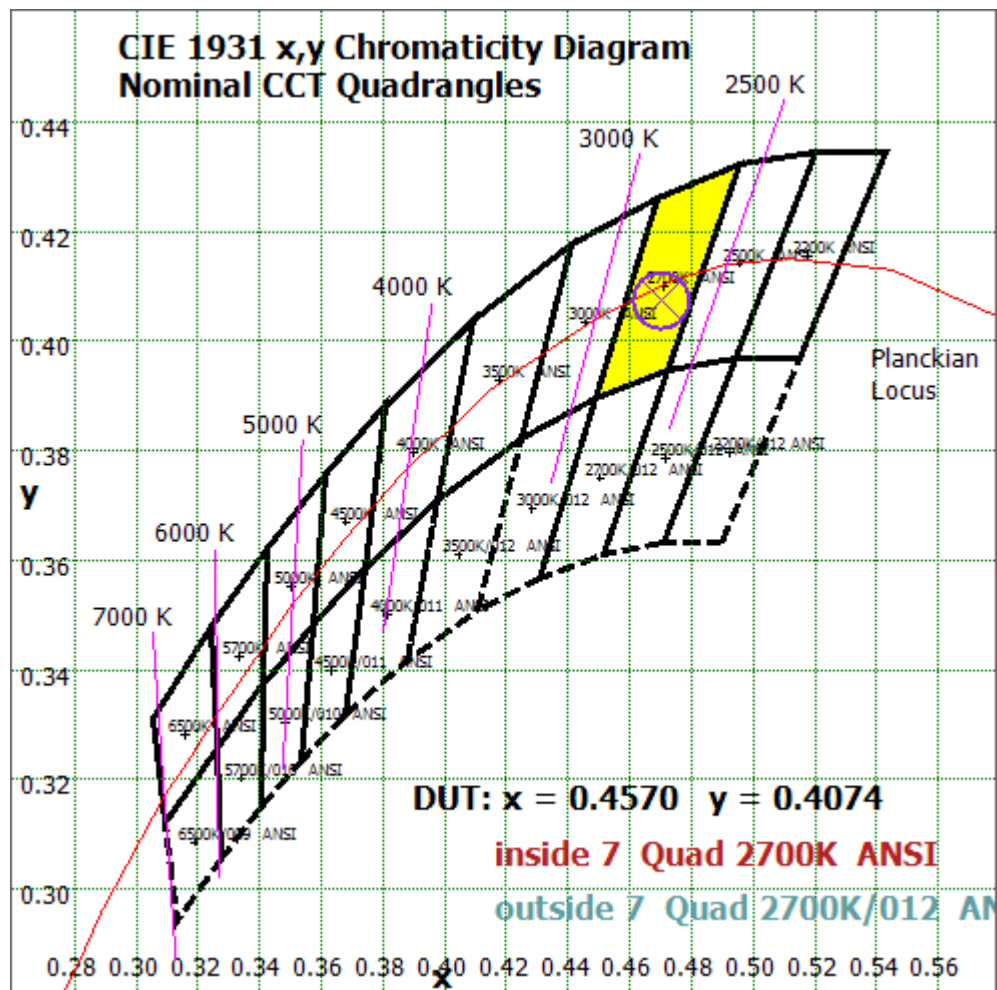


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

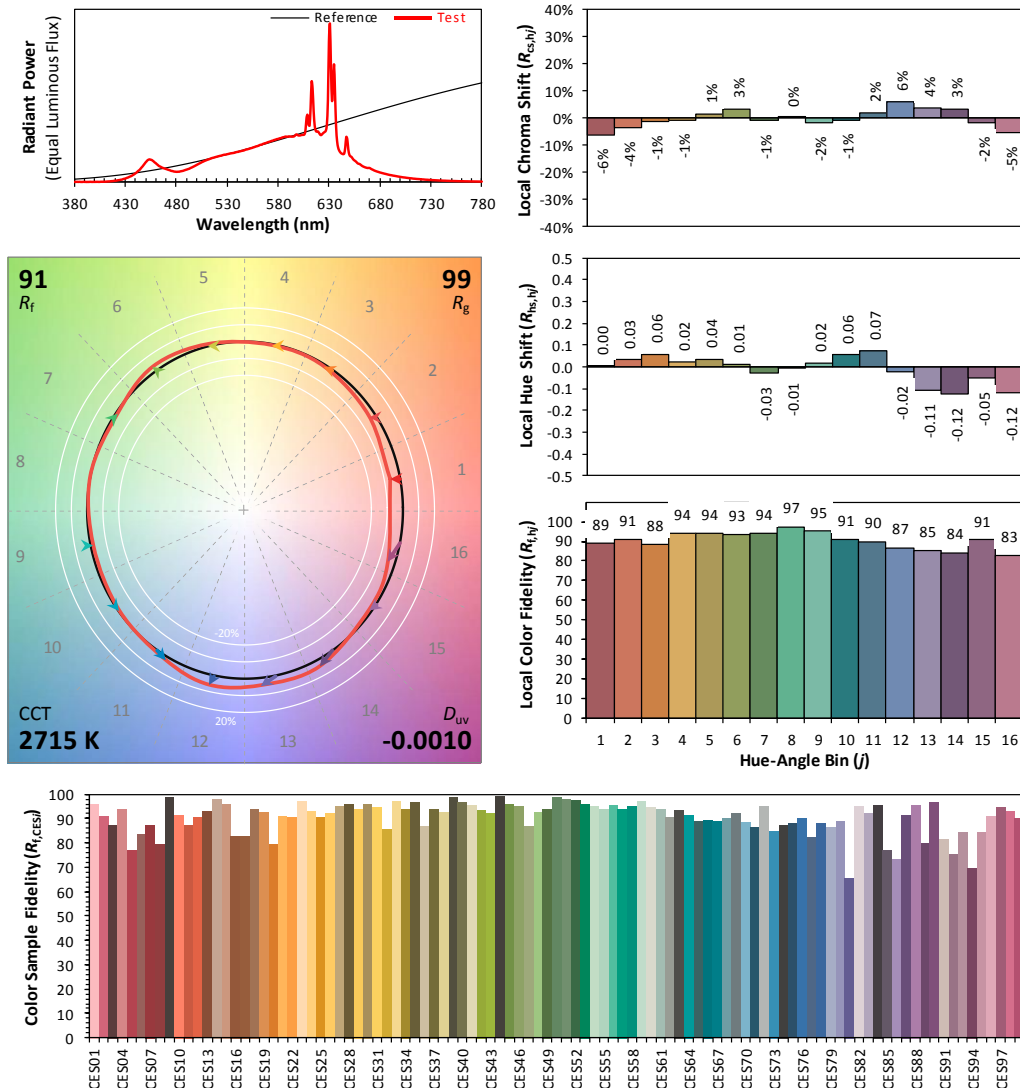
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2021/12/08

Model: 9BR30DIM/927



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

x 0.4570
 y 0.4074
 u' 0.2621
 v' 0.5257

CIE 13.3-1995
(CRI)
 R_a 93
 R_g 52

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

$\gamma(^{\circ})$	Lumens	% Total
0- 10	27.942	3.01%
10- 20	79.773	8.58%
20- 30	119.93	12.90%
30- 40	142.654	15.35%
40- 50	145.897	15.70%
50- 60	132.143	14.22%
60- 70	106.504	11.46%
70- 80	75.836	8.16%
80- 90	47.155	5.07%
90-100	25.35	2.73%
100-110	12.735	1.37%
110-120	6.9	0.74%
120-130	3.724	0.40%
130-140	1.803	0.19%
140-150	0.747	0.08%
150-160	0.268	0.03%
160-170	0.106	0.01%
170-180	0.034	0.00%
Total	929.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	648.339	69.75%
60- 90	229.495	24.69%
0-90	877.834	94.44%
90- 180	51.667	5.56%
0- 180	929.5	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

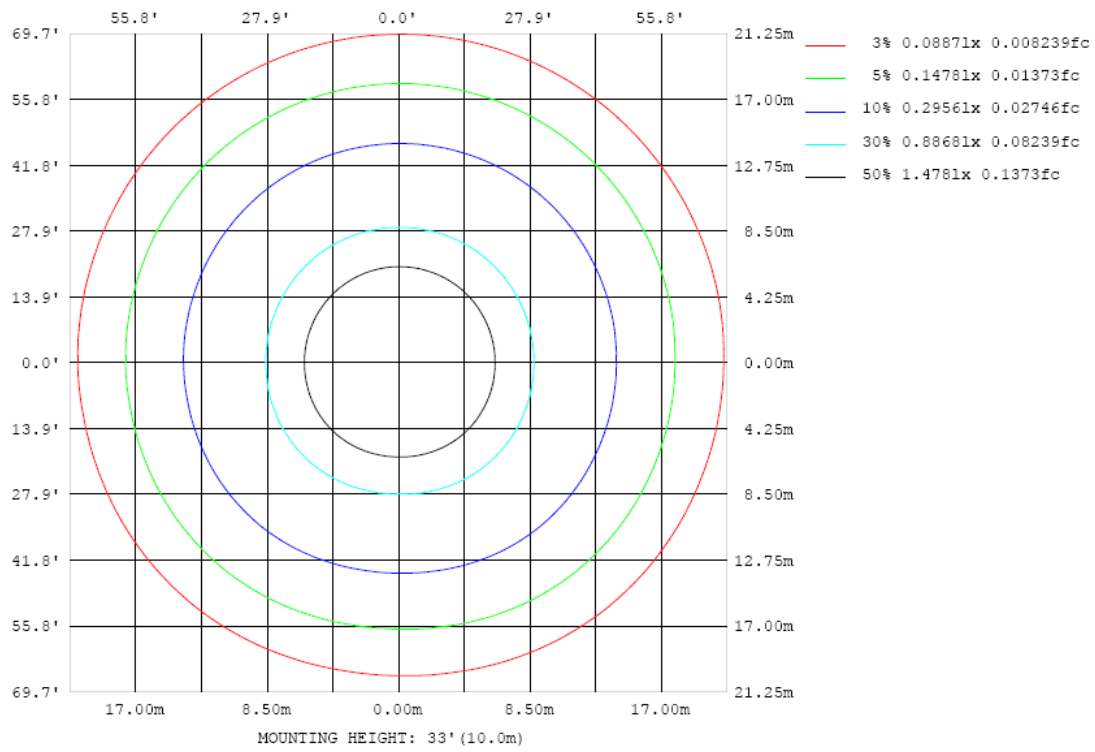


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

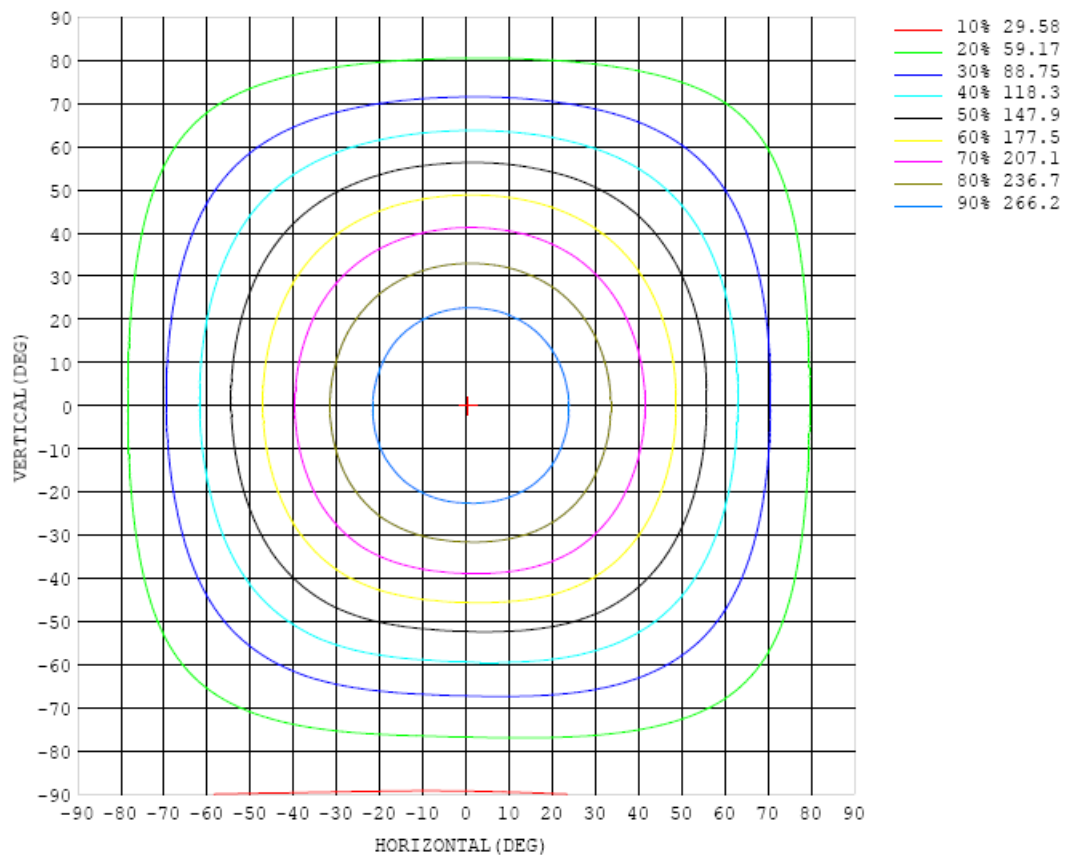


Chart 6: Isocandela Plot

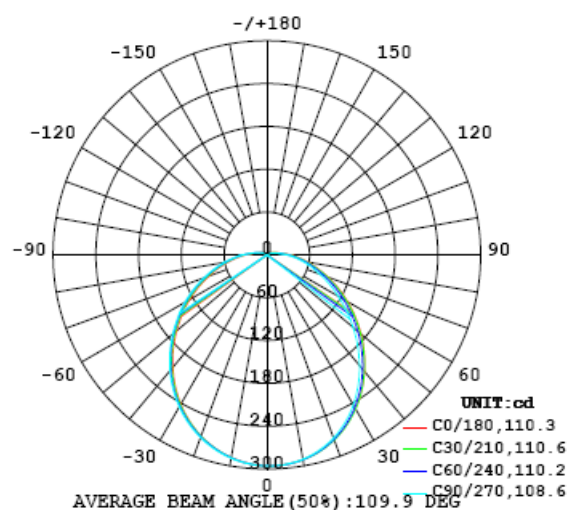


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296
5	295	295	295	295	295	295	295	295	295	295	295	294	294	294	294	294	294	294	293
10	291	291	291	291	292	291	291	291	291	291	290	290	290	290	289	289	289	289	288
15	285	285	285	285	285	285	285	284	284	283	283	283	283	282	282	282	281	281	281
20	275	276	276	276	276	276	275	274	273	273	273	273	272	272	272	272	271	271	270
25	263	263	263	264	264	263	262	261	260	259	259	259	259	259	259	259	258	257	257
30	249	249	249	249	249	248	247	245	244	243	242	243	243	244	244	243	243	242	242
35	232	232	232	232	231	230	229	227	225	223	223	224	225	226	226	226	225	225	225
40	213	213	213	213	212	211	209	206	204	202	202	203	205	207	207	207	206	206	206
45	193	193	192	192	192	190	188	185	182	180	180	182	184	186	186	186	186	186	186
50	172	172	171	171	171	169	167	163	160	158	158	160	162	164	165	165	165	165	166
55	151	151	150	150	149	148	145	142	138	136	136	138	141	143	144	144	144	145	146
60	130	130	129	129	128	126	124	121	118	116	116	117	120	122	123	123	124	124	126
65	110	110	109	108	108	106	104	101	98.4	96.8	96.6	98.1	100.0	102	103	103	104	104	106
70	91.0	90.4	89.7	89.3	88.5	87.2	85.3	83.0	80.8	79.4	79.2	80.3	81.9	83.4	84.2	84.8	85.1	85.6	86.9
75	73.4	72.7	72.1	71.6	70.9	69.8	68.4	67.1	65.1	64.3	64.4	64.7	65.7	66.7	67.4	67.7	68.2	68.5	69.8
80	58.2	57.6	57.0	56.6	55.9	55.1	53.9	52.6	51.2	50.3	50.2	50.8	51.7	52.5	53.0	53.4	53.8	54.1	54.6
85	44.3	43.8	43.3	42.9	42.4	41.7	40.8	39.9	38.9	38.2	38.2	38.6	39.1	39.7	40.1	40.4	40.7	41.0	41.5
90	32.8	32.3	31.9	31.5	31.1	30.6	30.0	29.4	28.7	28.3	28.2	28.4	28.8	29.1	29.4	29.6	29.9	30.2	30.6
95	23.6	23.3	22.9	22.6	22.3	22.0	21.6	21.1	20.7	20.5	20.4	20.5	20.7	20.9	21.1	21.3	21.5	21.7	22.0
100	16.8	16.6	16.3	16.1	15.9	15.6	15.4	15.1	14.9	14.7	14.6	14.7	14.8	14.9	15.0	15.2	15.3	15.5	15.8
105	12.1	12.0	11.8	11.7	11.5	11.4	11.2	11.0	10.9	10.8	10.7	10.8	10.8	10.9	10.9	11.0	11.1	11.2	11.3
110	9.08	8.99	8.88	8.79	8.70	8.60	8.50	8.41	8.31	8.24	8.22	8.22	8.24	8.28	8.30	8.36	8.42	8.49	8.56
115	7.08	7.00	6.92	6.86	6.79	6.72	6.63	6.56	6.49	6.44	6.42	6.41	6.41	6.43	6.44	6.47	6.52	6.57	6.65
120	5.50	5.45	5.39	5.33	5.28	5.22	5.16	5.11	5.05	5.00	4.98	4.97	4.96	4.97	4.97	5.00	5.03	5.07	5.14
125	4.25	4.21	4.16	4.12	4.07	4.02	3.97	3.92	3.87	3.83	3.80	3.79	3.78	3.78	3.78	3.80	3.82	3.86	3.92
130	3.24	3.20	3.17	3.13	3.09	3.04	3.00	2.96	2.91	2.87	2.85	2.83	2.81	2.81	2.81	2.82	2.83	2.86	2.92
135	2.42	2.39	2.36	2.33	2.29	2.25	2.22	2.19	2.14	2.10	2.07	2.05	2.04	2.03	2.02	2.03	2.04	2.06	2.12
140	1.77	1.75	1.72	1.70	1.67	1.63	1.60	1.57	1.54	1.50	1.46	1.44	1.43	1.42	1.41	1.41	1.42	1.43	1.48
145	1.27	1.25	1.23	1.21	1.19	1.16	1.13	1.10	1.07	1.04	1.00	0.98	0.96	0.95	0.94	0.94	0.94	0.94	1.00
150	0.90	0.89	0.87	0.85	0.83	0.81	0.78	0.76	0.73	0.70	0.67	0.64	0.62	0.61	0.60	0.60	0.60	0.60	0.65
155	0.65	0.64	0.62	0.61	0.59	0.57	0.54	0.52	0.50	0.48	0.45	0.42	0.40	0.39	0.39	0.38	0.38	0.38	0.42
160	0.50	0.49	0.48	0.46	0.45	0.43	0.41	0.38	0.35	0.34	0.33	0.31	0.30	0.29	0.28	0.28	0.28	0.29	0.32
165	0.41	0.40	0.40	0.39	0.38	0.36	0.34	0.32	0.30	0.29	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.31
170	0.39	0.38	0.37	0.37	0.36	0.35	0.34	0.32	0.32	0.32	0.31	0.29	0.29	0.29	0.28	0.28	0.28	0.29	0.30
175	0.39	0.39	0.39	0.38	0.38	0.37	0.35	0.33	0.32	0.32	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.31
180	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32

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	0	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	
5	5	293	293	293	293	293	293	293	293	294	294	294	294	294	294	294	295	295	
10	10	288	288	288	288	288	289	289	289	289	289	290	290	290	290	290	291	291	
15	15	281	281	281	281	281	281	282	282	282	282	283	283	283	284	284	284	284	
20	20	270	270	270	271	271	271	272	272	272	272	273	273	274	274	275	275	275	
25	25	257	257	258	258	259	259	259	260	260	260	261	262	262	262	263	263	263	
30	30	242	242	243	243	244	244	245	245	246	246	247	247	248	248	248	248	248	
35	35	225	225	226	227	227	228	229	229	230	230	231	231	232	232	232	232	232	
40	40	206	207	208	208	209	210	211	211	212	212	213	213	214	214	213	213	213	
45	45	186	187	188	189	190	191	192	192	192	193	194	194	194	194	194	193	193	
50	50	166	167	168	169	170	171	172	172	173	173	174	174	174	174	173	173	173	
55	55	147	147	148	149	150	151	152	152	153	153	153	154	154	153	153	152	152	
60	60	126	127	128	129	130	131	132	132	133	133	134	134	134	134	133	133	132	
65	65	106	107	108	110	111	111	112	113	113	114	114	114	114	113	113	112	112	
70	70	87.7	88.6	89.6	90.6	91.7	92.5	93.2	93.7	94.2	94.5	94.8	94.8	94.6	94.2	93.7	93.1	92.4	
75	75	70.5	71.3	72.3	73.2	74.1	74.9	75.6	76.1	76.5	76.8	77.0	76.9	76.7	76.3	75.9	75.3	74.6	
80	80	55.2	55.9	56.8	57.6	58.4	59.1	59.7	60.1	60.5	60.7	60.9	60.8	60.6	60.2	59.8	59.3	58.6	
85	85	42.0	42.6	43.3	44.0	44.6	45.2	45.7	46.1	46.4	46.6	46.7	46.6	46.5	46.1	45.8	45.3	44.8	
90	90	31.0	31.5	32.1	32.6	33.1	33.5	33.9	34.2	34.5	34.7	34.7	34.7	34.5	34.3	34.0	33.6	33.1	
95	95	22.4	22.7	23.1	23.5	23.8	24.2	24.5	24.7	24.9	25.0	25.1	25.0	24.9	24.7	24.5	24.2	23.9	
100	100	16.0	16.2	16.5	16.7	17.0	17.2	17.4	17.5	17.7	17.8	17.8	17.8	17.7	17.6	17.4	17.2	17.0	
105	105	11.5	11.6	11.8	12.0	12.1	12.3	12.4	12.5	12.6	12.6	12.7	12.7	12.6	12.5	12.4	12.3	12.2	
110	110	8.65	8.75	8.85	8.95	9.05	9.14	9.23	9.30	9.37	9.41	9.43	9.43	9.41	9.36	9.30	9.22	9.13	
115	115	6.72	6.79	6.87	6.94	7.01	7.08	7.14	7.21	7.27	7.30	7.32	7.32	7.31	7.27	7.23	7.18	7.11	
120	120	5.20	5.26	5.32	5.38	5.43	5.49	5.55	5.60	5.65	5.69	5.71	5.70	5.70	5.67	5.64	5.60	5.55	
125	125	3.97	4.02	4.07	4.12	4.17	4.22	4.27	4.32	4.36	4.38	4.41	4.41	4.41	4.39	4.36	4.33	4.29	
130	130	2.97	3.01	3.06	3.10	3.14	3.19	3.23	3.27	3.31	3.34	3.35	3.36	3.36	3.34	3.32	3.30	3.27	
135	135	2.16	2.21	2.25	2.29	2.32	2.36	2.40	2.43	2.47	2.49	2.51	2.52	2.52	2.51	2.50	2.47	2.45	
140	140	1.53	1.57	1.60	1.63	1.67	1.70	1.74	1.77	1.80	1.82	1.84	1.85	1.85	1.85	1.84	1.82	1.80	
145	145	1.04	1.08	1.11	1.13	1.16	1.20	1.23	1.26	1.28	1.31	1.32	1.34	1.34	1.34	1.33	1.32	1.31	
150	150	0.69	0.72	0.74	0.77	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.96	0.96	0.96	0.96	0.95	0.94	
155	155	0.45	0.47	0.50	0.53	0.55	0.57	0.60	0.62	0.64	0.66	0.68	0.69	0.69	0.69	0.69	0.69	0.68	
160	160	0.34	0.35	0.37	0.40	0.42	0.44	0.46	0.47	0.49	0.51	0.52	0.53	0.53	0.53	0.53	0.54	0.52	
165	165	0.35	0.35	0.35	0.36	0.38	0.40	0.41	0.42	0.42	0.43	0.43	0.44	0.45	0.45	0.45	0.46	0.44	
170	170	0.36	0.36	0.36	0.36	0.38	0.39	0.41	0.41	0.41	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.40	
175	175	0.34	0.37	0.36	0.36	0.37	0.37	0.37	0.37	0.38	0.39	0.41	0.41	0.41	0.42	0.42	0.41	0.40	
180	180	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2021	Aug. 04, 2022
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2021	Aug. 04, 2022
Standard source	D908	HZTE012-01	Aug. 05, 2021	Aug. 04, 2022
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2021	Aug. 04, 2022
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2021	Aug. 04, 2022
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2021	Aug. 04, 2022

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.

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 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° 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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