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/930

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ21120007e

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/930**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
108.4	904.1	8.34	0.8340

CCT (K)	CRI	Stabilization Time (Light & Power)
3044	95.7	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

TABLE OF CONTENT

SAMPLE PHOTO

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Lamp
Model	: 9BR30DIM/930
Electrical Ratings	: 120V, 60Hz, 9W
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 26.0 ℃.

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	0.8340
Test Power (W)	8.34
THD A%	55.91
Luminous Efficacy (lm/W)	108.4
Total Luminous Flux (lm)	904.1
Color Rendering Index (CRI)	95.7
R9	70.8
Correlated Color Temperature (CCT)(K)	3044
Chromaticity Chroma x	0.4312
Chromaticity Chroma y	0.3978
Chromaticity Chroma u	0.2496
Chromaticity Chroma v	0.3454
Duv	-0.0017
Chromaticity Chroma u ’	0.2496
Chromaticity Chroma v’	0.5180

Special Color Rendering Indices	
R1	98.5
R2	98.5
R3	96.4
R4	97.3
R5	97.7
R6	96.1
R7	93.5
R8	87.8
R9	70.8
R10	94
R11	96.5
R12	84.1
R13	98.6
R14	96.5

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 ℃.

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	0.8233
Power (W)	8.36
Luminous Efficacy (lm/W)	111.0
Total Luminous Flux (lm)	928.3
Beam Angle (°)	108.1 (0^o-180^o) / 108.1 (90^o-270^o)
Center Beam Candle Power (cd)	301
Maximum Beam Candle Power (cd)	301.4 (At: C=190.0, Gamma=1.5)
Spacing Criteria	1.24 (0^o-180^o) /1.22(90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	70.10%
Zonal Lumens in the 60 °-90 °Zone	24.44%
Zonal Lumens in the 90 °-120 °Zone	4.77%
Zonal Lumens in the 120 °-180 °Zone	0.70%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

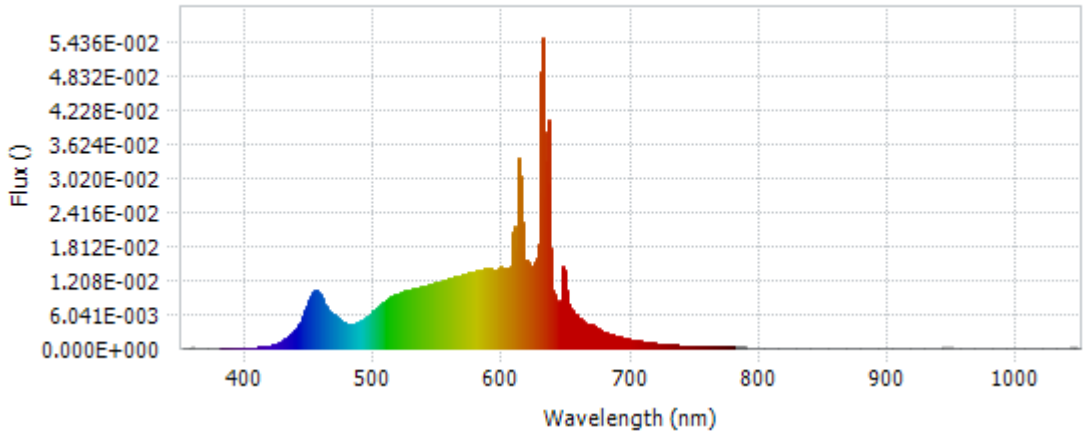
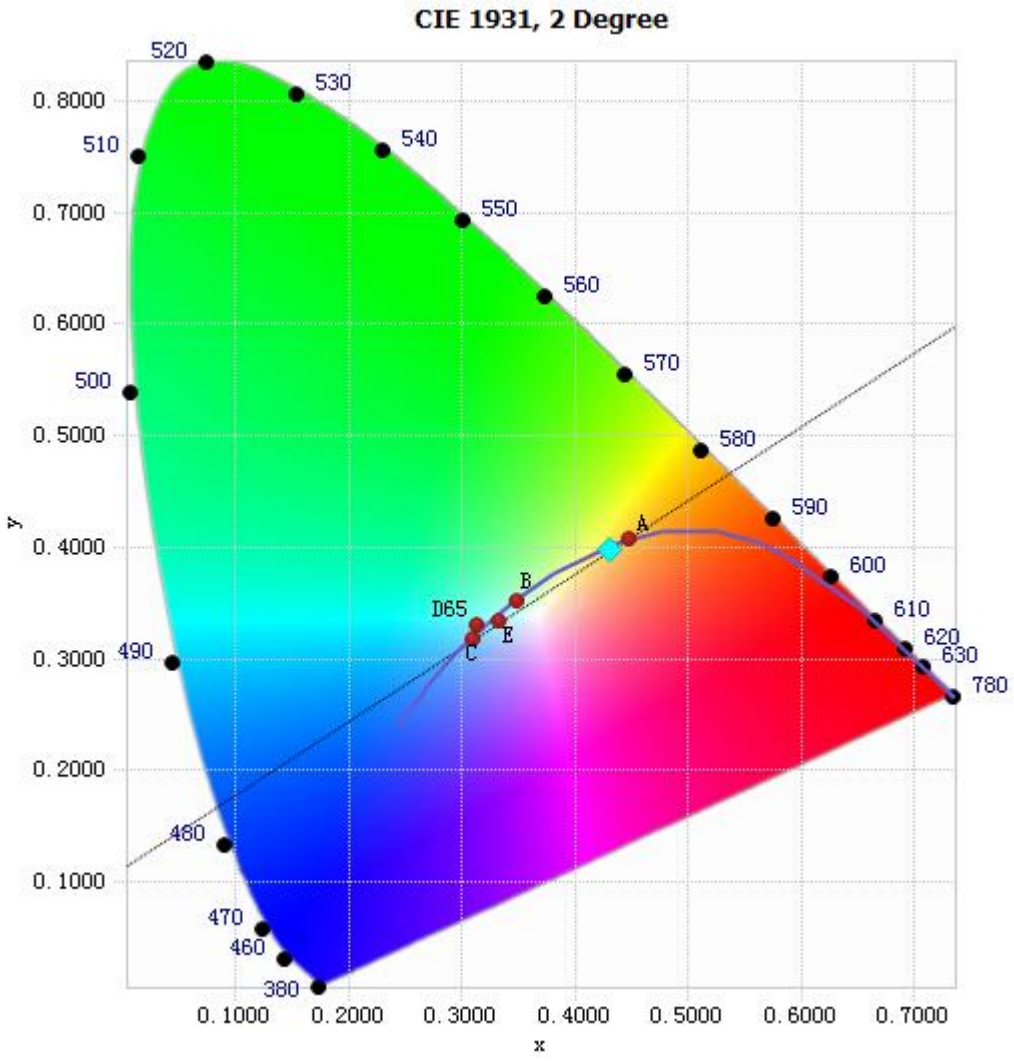


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.49E-05	485	4.31E-03	590	1.40E-02	695	1.72E-03
385	4.72E-05	490	4.88E-03	595	1.38E-02	700	1.45E-03
390	7.74E-05	495	5.69E-03	600	1.41E-02	705	1.24E-03
395	6.90E-05	500	6.67E-03	605	1.42E-02	710	1.06E-03
400	5.42E-05	505	7.74E-03	610	1.77E-02	715	9.06E-04
405	6.47E-05	510	8.53E-03	615	2.24E-02	720	7.75E-04
410	1.31E-04	515	9.25E-03	620	1.51E-02	725	6.64E-04
415	2.63E-04	520	9.78E-03	625	1.52E-02	730	5.63E-04
420	5.20E-04	525	1.01E-02	630	4.91E-02	735	4.84E-04
425	9.25E-04	530	1.05E-02	635	4.04E-02	740	4.16E-04
430	1.54E-03	535	1.07E-02	640	9.34E-03	745	3.49E-04
435	2.52E-03	540	1.10E-02	645	8.40E-03	750	2.99E-04
440	3.94E-03	545	1.14E-02	650	8.27E-03	755	2.58E-04
445	6.07E-03	550	1.16E-02	655	6.31E-03	760	2.15E-04
450	9.01E-03	555	1.20E-02	660	5.23E-03	765	1.90E-04
455	1.02E-02	560	1.23E-02	665	4.23E-03	770	1.59E-04
460	8.28E-03	565	1.28E-02	670	4.09E-03	775	1.45E-04
465	6.42E-03	570	1.31E-02	675	3.23E-03	780	1.22E-04
470	5.48E-03	575	1.34E-02	680	2.74E-03		
475	4.63E-03	580	1.37E-02	685	2.33E-03		
480	4.16E-03	585	1.40E-02	690	2.01E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4312, 0.3978)

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

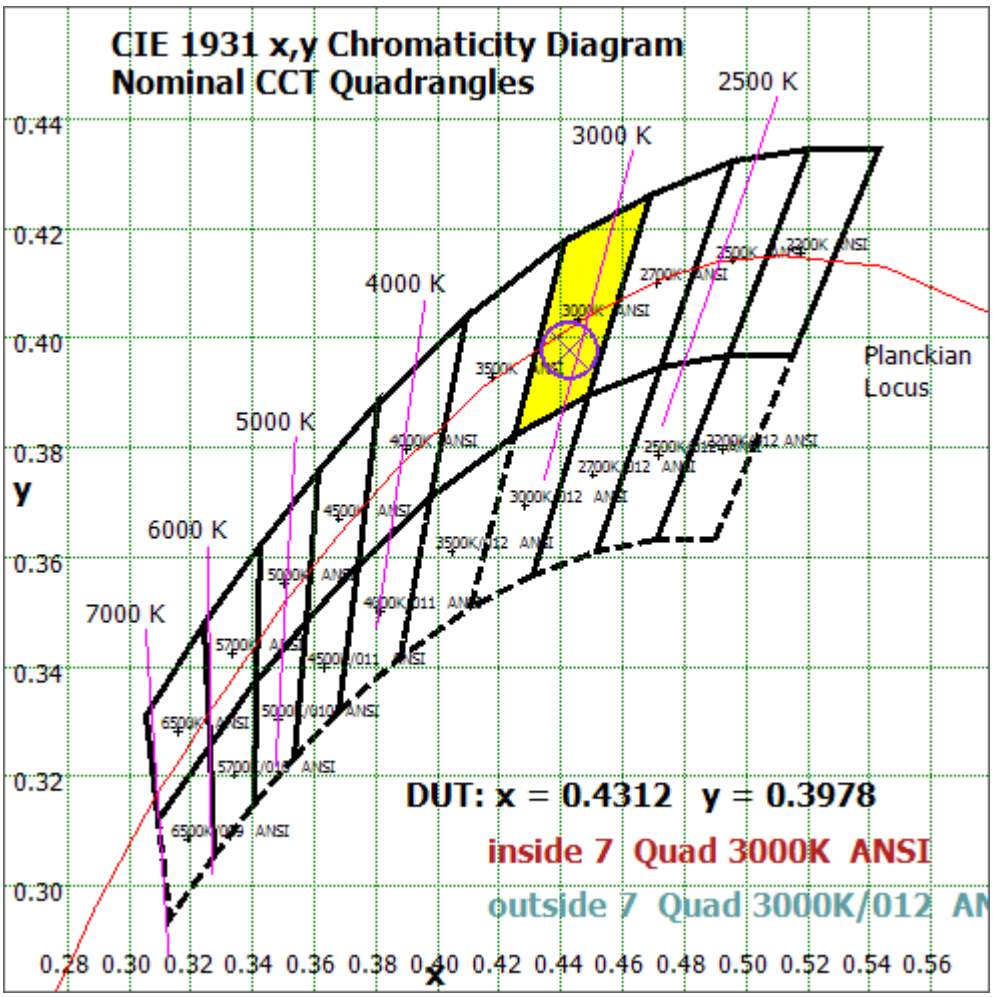


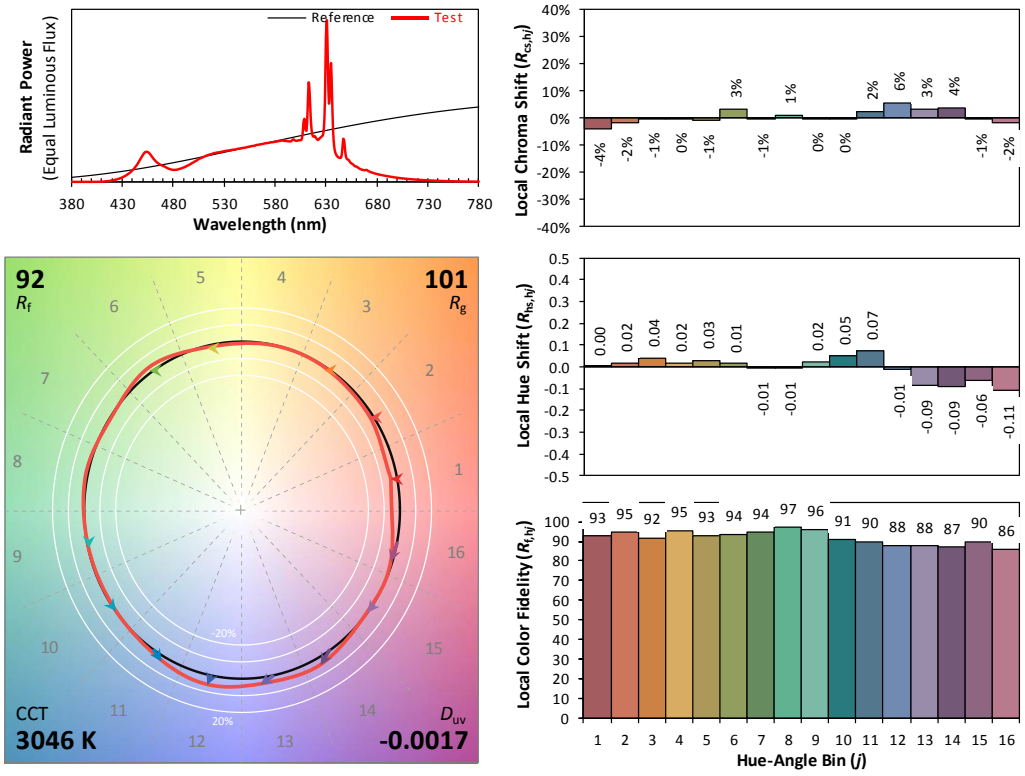
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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/930



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

x	0.4312
y	0.3978
u'	0.2496
v'	0.5180

CIE 13.3-1995 (CRI)

R_a	96
R_9	71

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	28.453	3.07%
10- 20	80.948	8.72%
20- 30	121.098	13.05%
30- 40	143.289	15.44%
40- 50	145.688	15.69%
50- 60	131.225	14.14%
60- 70	105.291	11.34%
70- 80	74.906	8.07%
80- 90	46.65	5.03%
90-100	24.995	2.69%
100-110	12.5	1.35%
110-120	6.775	0.73%
120-130	3.639	0.39%
130-140	1.766	0.19%
140-150	0.721	0.08%
150-160	0.23	0.02%
160-170	0.085	0.01%
170-180	0.029	0.00%
Total	928.3	100%

γ(°)	Lumens	% Total
0- 60	650.701	70.10%
60- 90	226.847	24.44%
0-90	877.548	94.53%
90- 180	50.74	5.47%
0- 180	928.3	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

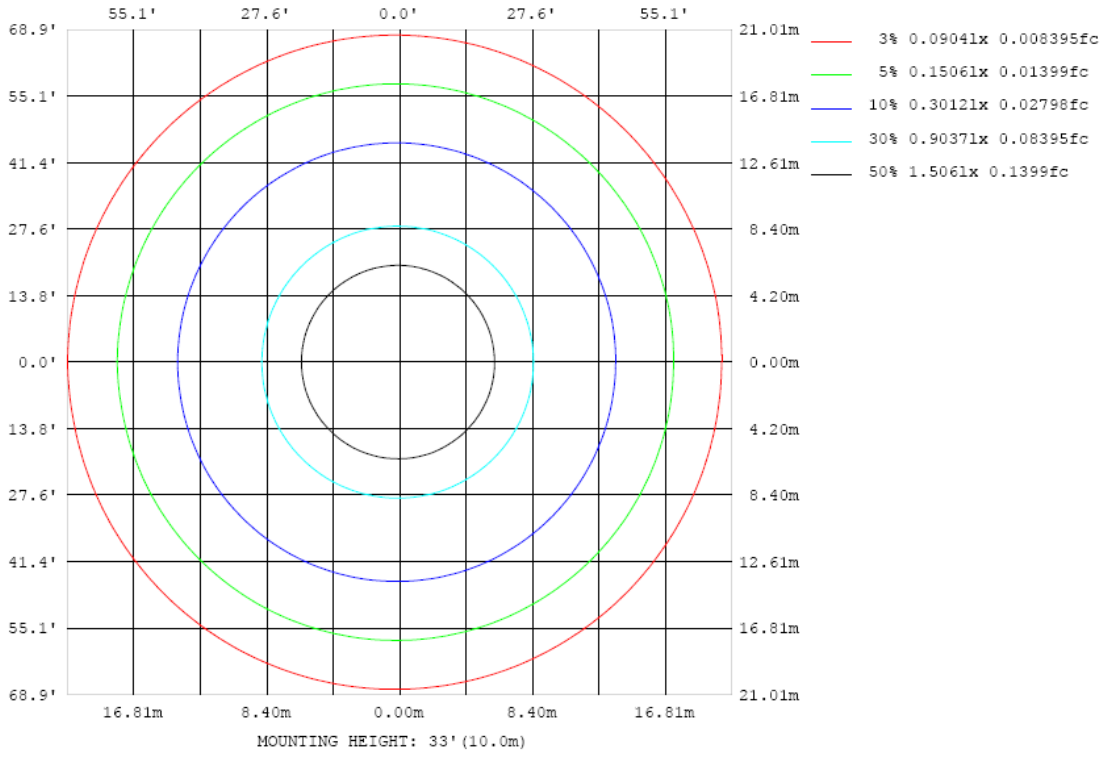


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

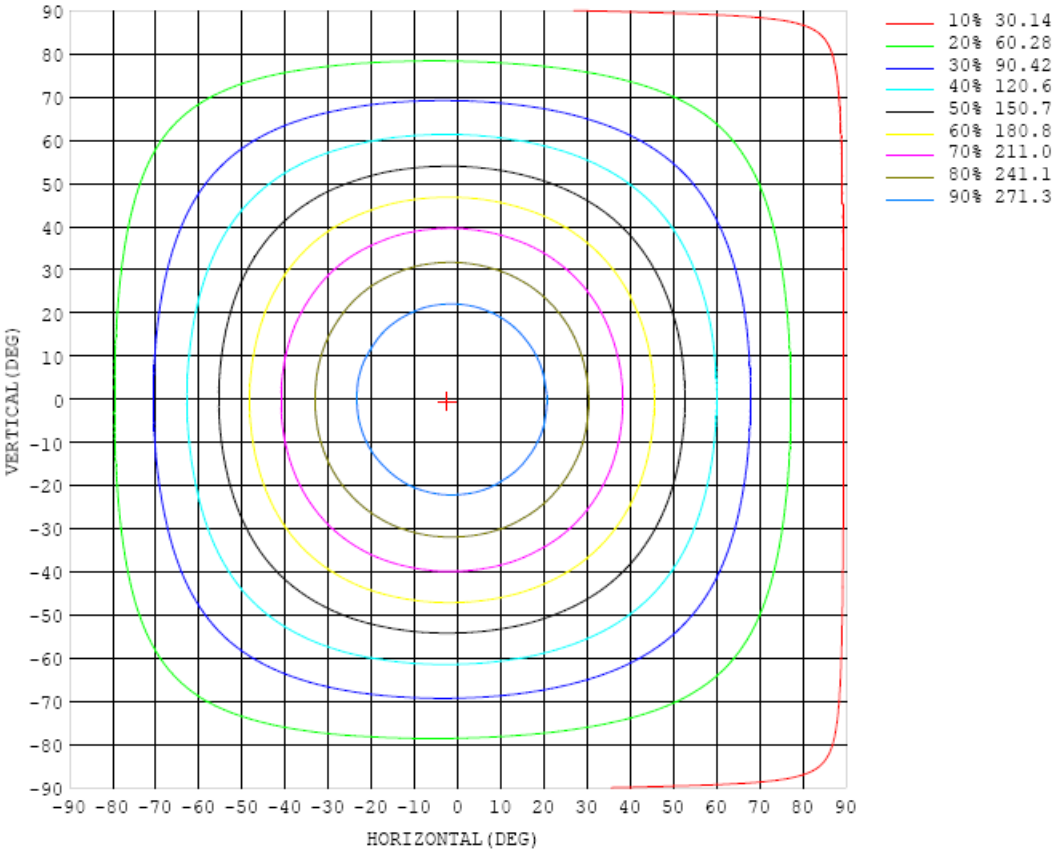


Chart 6: Isocandela Plot

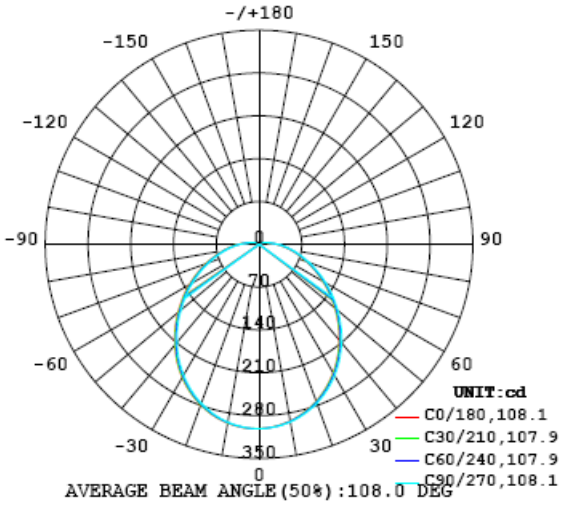


Chart 7: Polar Candela Distribution

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	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301
5	299	299	299	299	299	299	299	299	300	299	300	300	300	300	300	300	301	301	301
10	293	293	293	293	293	294	294	294	295	295	296	295	296	296	296	296	296	297	296
15	284	285	285	285	285	286	286	287	287	287	287	288	288	288	289	289	289	290	289
20	273	273	274	274	274	275	275	276	276	277	277	278	278	278	279	279	280	280	280
25	259	259	260	260	260	261	261	262	263	263	264	265	265	266	266	267	267	267	267
30	242	243	243	243	244	245	245	246	247	248	249	249	250	250	251	251	252	252	252
35	224	224	225	225	226	226	227	229	229	230	231	231	232	233	233	234	234	234	234
40	204	204	205	205	206	207	207	209	209	210	211	212	213	214	214	215	215	215	215
45	183	183	184	184	185	186	187	188	189	190	191	192	193	193	194	194	195	195	195
50	162	162	163	163	164	165	165	166	168	169	170	170	172	172	173	173	174	174	173
55	141	141	141	142	142	143	144	145	146	147	148	149	150	151	152	152	152	152	152
60	120	120	121	121	122	123	123	124	125	126	127	128	129	130	130	131	131	131	132
65	101	101	101	102	102	103	104	105	106	106	107	108	109	110	110	111	111	111	112
70	82.9	82.8	83.2	83.4	84.0	84.7	85.4	86.3	87.0	87.8	88.6	89.4	90.1	90.7	91.2	91.8	91.9	92.0	92.6
75	66.5	66.2	67.5	67.1	67.3	68.0	68.6	69.3	69.9	70.7	71.3	72.0	72.7	73.3	73.7	74.2	74.3	74.4	75.0
80	52.3	52.5	52.7	53.0	53.3	53.8	54.3	54.9	55.5	56.0	56.6	57.2	57.8	58.3	58.7	59.1	59.2	59.3	59.2
85	39.6	39.7	39.9	40.1	40.4	40.8	41.3	41.7	42.2	42.6	43.1	43.6	44.1	44.5	44.9	45.2	45.4	45.5	45.3
90	29.1	29.1	29.3	29.4	29.7	30.0	30.3	30.7	31.1	31.4	31.8	32.2	32.6	32.9	33.2	33.5	33.6	33.7	33.7
95	20.8	20.9	21.0	21.1	21.2	21.4	21.7	21.9	22.2	22.5	22.7	23.1	23.4	23.6	23.9	24.1	24.2	24.3	24.3
100	14.8	14.8	14.9	14.9	15.0	15.2	15.3	15.5	15.7	15.9	16.1	16.3	16.5	16.7	16.9	17.1	17.2	17.3	17.3
105	10.8	10.8	10.8	10.9	10.9	11.0	11.1	11.2	11.3	11.4	11.6	11.7	11.8	12.0	12.1	12.2	12.3	12.3	12.3
110	8.27	8.27	8.30	8.30	8.32	8.35	8.39	8.45	8.51	8.59	8.67	8.74	8.80	8.88	8.95	9.02	9.08	9.12	9.12
115	6.45	6.44	6.45	6.46	6.46	6.48	6.51	6.55	6.59	6.65	6.71	6.74	6.79	6.84	6.90	6.96	6.99	7.02	7.04
120	5.01	4.99	5.00	4.99	5.00	5.01	5.03	5.07	5.10	5.15	5.17	5.19	5.23	5.26	5.30	5.35	5.38	5.41	5.45
125	3.84	3.83	3.83	3.82	3.82	3.83	3.85	3.87	3.90	3.93	3.94	3.96	3.99	4.01	4.04	4.08	4.11	4.14	4.17
130	2.91	2.90	2.89	2.87	2.87	2.88	2.89	2.91	2.93	2.96	2.97	2.98	2.99	3.01	3.03	3.06	3.09	3.11	3.14
135	2.16	2.15	2.14	2.12	2.12	2.12	2.12	2.14	2.17	2.19	2.20	2.20	2.21	2.21	2.23	2.25	2.27	2.29	2.33
140	1.57	1.56	1.54	1.52	1.51	1.51	1.51	1.53	1.55	1.57	1.57	1.57	1.58	1.58	1.59	1.60	1.62	1.63	1.67
145	1.10	1.09	1.07	1.05	1.03	1.03	1.03	1.05	1.06	1.07	1.08	1.08	1.08	1.08	1.08	1.09	1.10	1.11	1.14
150	0.74	0.73	0.71	0.69	0.67	0.66	0.67	0.67	0.68	0.69	0.70	0.70	0.70	0.70	0.70	0.71	0.71	0.71	0.74
155	0.48	0.48	0.46	0.45	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.44	0.45	0.45	0.44	0.44	0.43	0.44
160	0.33	0.32	0.31	0.31	0.30	0.30	0.30	0.29	0.28	0.27	0.28	0.29	0.30	0.31	0.31	0.30	0.30	0.28	0.29
165	0.28	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.28
170	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.29
175	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.30	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30
180	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33

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	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301
5	301	300	300	300	300	300	300	300	300	299	299	299	299	299	299	299	299
10	297	297	296	296	296	296	296	295	295	295	294	294	294	293	293	293	293
15	290	289	289	289	289	288	288	288	287	287	286	286	285	285	285	284	284
20	280	280	279	279	278	278	278	277	276	276	275	275	274	273	273	273	273
25	267	267	266	266	265	265	264	264	263	262	261	261	260	259	259	259	259
30	252	252	251	251	250	249	249	248	247	246	245	244	243	243	242	242	242
35	234	234	233	233	232	231	231	230	229	228	227	226	225	224	224	224	224
40	215	215	214	213	212	212	211	210	209	208	207	206	205	204	204	204	204
45	194	194	193	192	192	191	190	189	188	187	186	185	184	183	183	183	183
50	173	173	172	171	170	169	169	168	167	166	165	164	163	162	162	161	162
55	152	152	151	150	150	149	148	147	147	145	145	144	143	142	142	142	142
60	132	131	130	130	129	128	128	127	126	125	124	123	122	122	121	121	121
65	111	111	110	109	109	108	107	107	106	105	104	103	103	102	102	101	102
70	92.3	91.9	91.2	90.5	90.0	89.3	88.7	88.0	87.3	86.5	85.9	85.1	84.4	83.9	83.6	83.4	83.4
75	74.8	74.4	73.8	73.3	72.8	72.1	71.6	71.0	70.3	69.7	69.1	68.4	67.9	67.4	67.1	66.8	66.9
80	59.0	58.8	58.3	57.9	57.4	56.8	56.4	55.8	55.3	54.7	54.1	53.6	53.1	52.7	52.4	52.2	52.2
85	45.3	45.2	44.7	44.4	44.0	43.5	43.1	42.6	42.2	41.7	41.2	40.7	40.3	39.9	39.7	39.5	39.5
90	33.7	33.5	33.3	32.9	32.6	32.2	31.9	31.5	31.2	30.8	30.4	30.0	29.7	29.4	29.2	29.0	29.0
95	24.3	24.2	24.0	23.8	23.5	23.3	23.0	22.7	22.4	22.1	21.9	21.6	21.3	21.1	20.9	20.8	20.8
100	17.3	17.2	17.1	16.9	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.1	15.0	14.9	14.8
105	12.3	12.3	12.2	12.1	12.0	11.9	11.8	11.7	11.5	11.4	11.3	11.2	11.0	10.9	10.8	10.8	10.7
110	9.12	9.13	9.08	9.04	8.99	8.92	8.86	8.81	8.74	8.66	8.58	8.51	8.43	8.36	8.31	8.27	8.24
115	7.05	7.05	7.03	7.01	6.98	6.94	6.91	6.88	6.83	6.78	6.72	6.67	6.60	6.55	6.51	6.47	6.45
120	5.46	5.46	5.44	5.42	5.41	5.38	5.37	5.35	5.31	5.27	5.22	5.18	5.13	5.09	5.06	5.02	5.01
125	4.18	4.18	4.16	4.15	4.14	4.13	4.13	4.11	4.09	4.06	4.02	3.98	3.94	3.91	3.88	3.86	3.85
130	3.15	3.15	3.14	3.13	3.13	3.13	3.13	3.13	3.11	3.09	3.06	3.03	2.99	2.97	2.94	2.93	2.92
135	2.34	2.34	2.32	2.31	2.31	2.32	2.33	2.33	2.32	2.32	2.29	2.26	2.23	2.21	2.20	2.19	2.19
140	1.68	1.67	1.66	1.65	1.66	1.67	1.69	1.69	1.69	1.69	1.67	1.65	1.62	1.61	1.60	1.60	1.59
145	1.15	1.15	1.13	1.13	1.13	1.15	1.17	1.18	1.18	1.18	1.18	1.16	1.14	1.13	1.13	1.13	1.13
150	0.74	0.74	0.73	0.73	0.73	0.75	0.77	0.78	0.79	0.80	0.80	0.79	0.78	0.77	0.77	0.78	0.77
155	0.45	0.44	0.45	0.45	0.46	0.46	0.48	0.49	0.51	0.52	0.52	0.53	0.53	0.53	0.52	0.52	0.51
160	0.30	0.30	0.31	0.32	0.32	0.33	0.33	0.33	0.35	0.36	0.37	0.39	0.40	0.40	0.40	0.39	0.36
165	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.34	0.34	0.34	0.31
170	0.33	0.32	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.33	0.29
175	0.31	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32	0.31
180	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33

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.

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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

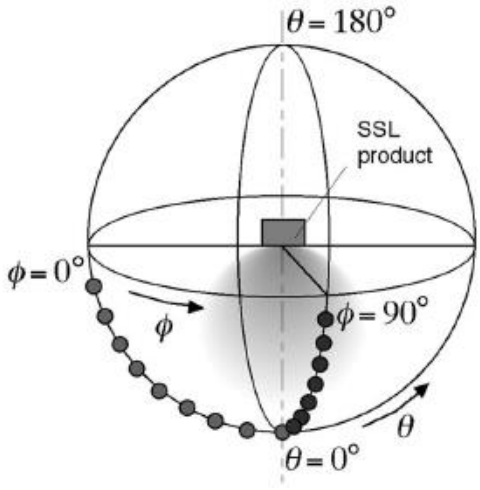
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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 ***