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 Track Light

Model: ORB/S/927/FL/DIM120V/xx/yy

Where xx mean different type of Adaptor, could be J, H, L, CM, GES, TEK.

Where yy mean different color of product, could be WH, SV, BL.

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.: HZ20120037r

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

Review by: April Zou

Engineer: April Zou

Feb. 03, 2021

Approved by: Jim Zhang

Manager: Jim Zhang

Feb. 03, 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: **ORB/S/927/FL/DIM120V/H/BL**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
93.6	902.3	9.64	0.9668

CCT (K)	CRI	Stabilization Time (Light & Power)
2723	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	: Dec. 23, 2020
Date of Test	: Jan. 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 Track Light
Model	: ORB/S/927/FL/DIM120V/H/BL
Electrical Ratings	: 120V, 60Hz, 10W
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 ℃.

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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.083
Power Factor	0.9668
Test Power (W)	9.64
THD A%	15.06
Luminous Efficacy (lm/W)	93.6
Total Luminous Flux (lm)	902.3
Color Rendering Index (CRI)	94.6
R9	70
Correlated Color Temperature (CCT)(K)	2723
Chromaticity Chroma x	0.4593
Chromaticity Chroma y	0.4127
Chromaticity Chroma u	0.2612
Chromaticity Chroma v	0.3520
Duv	0.0009
Chromaticity Chroma u ’	0.2612
Chromaticity Chroma v’	0.5281

Special Color Rendering Indices	
R1	95
R2	96.9
R3	97.4
R4	95.5
R5	94.5
R6	96.5
R7	94.4
R8	86.7
R9	70
R10	91.8
R11	96.7
R12	83.2
R13	95.5
R14	97.6

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)	0.084
Power Factor	0.9684
Power (W)	9.72
Luminous Efficacy (lm/W)	97.0
Total Luminous Flux (lm)	942.5
Beam Angle (°)	34.8 (0^o-180^o) / 34.7 (90^o-270^o)
Center Beam Candle Power (cd)	2464
Maximum Beam Candle Power (cd)	2467 (At: C=50.0, Gamma=2.0)
Spacing Criteria	0.55 (0^o-180^o) / 0.53 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	98.99%
Zonal Lumens in the 60 °-90 °Zone	0.95%
Zonal Lumens in the 90 °-120 °Zone	0.00%
Zonal Lumens in the 120 °-180 °Zone	0.06%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

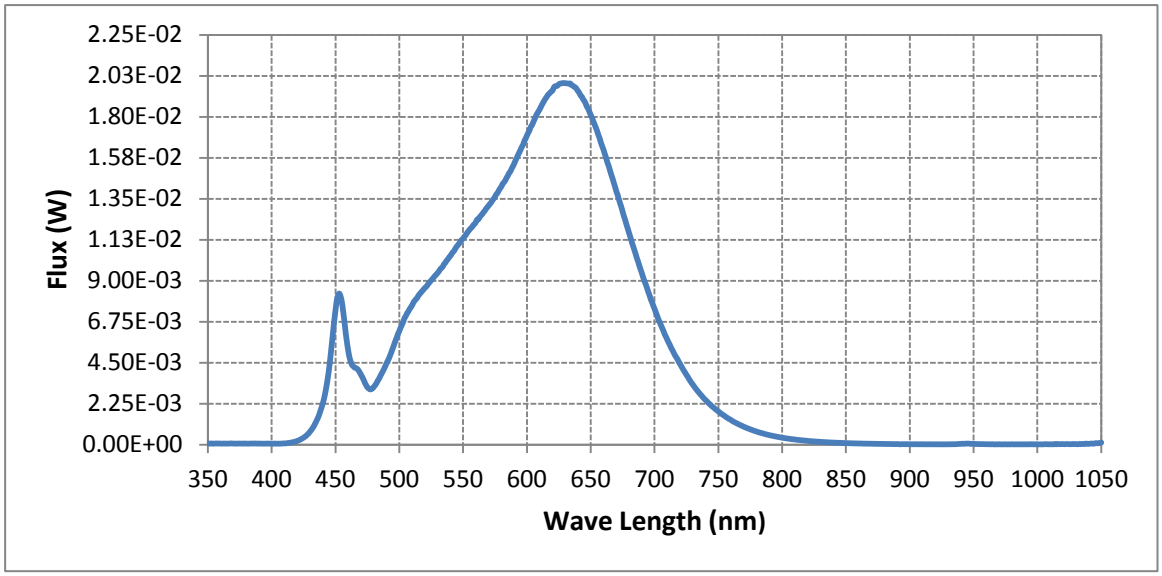
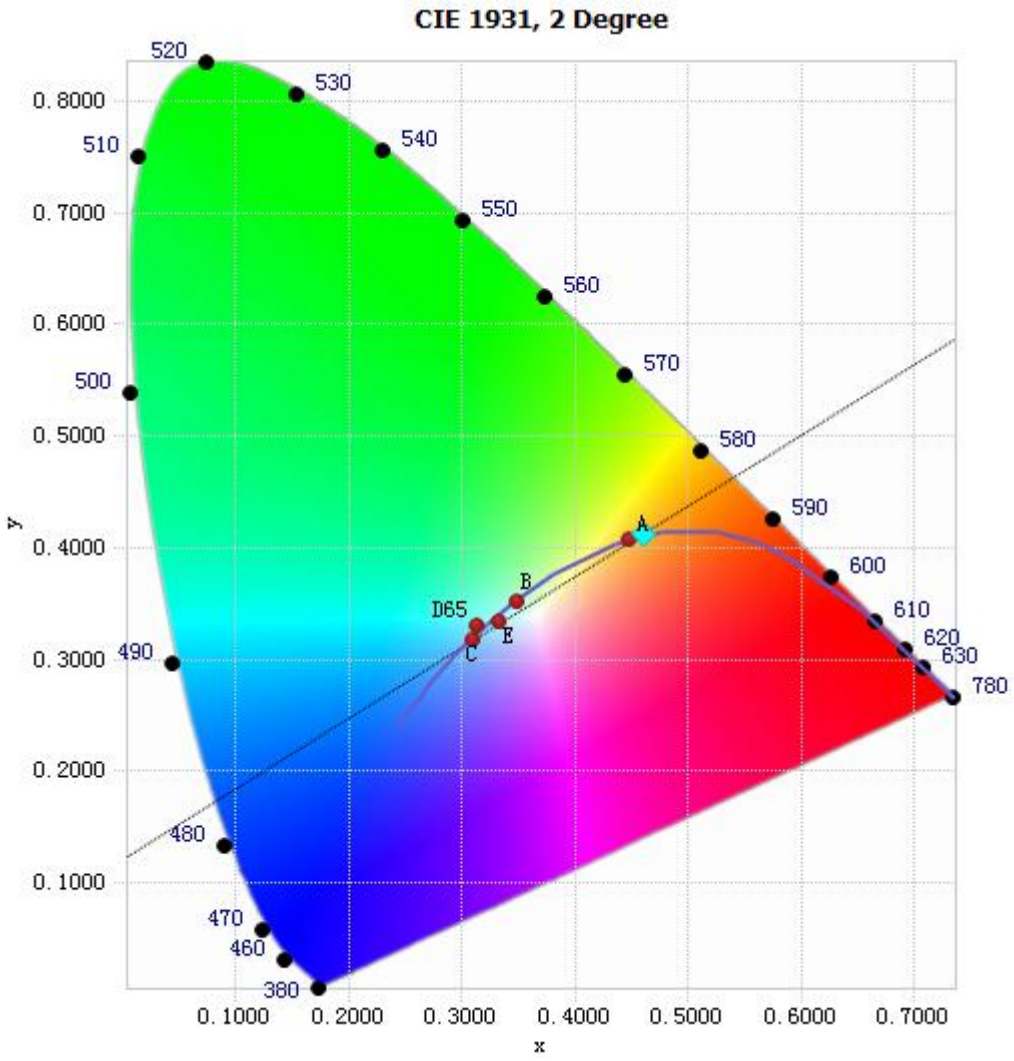


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.22E-05	485	3.75E-03	590	1.54E-02	695	8.39E-03
385	6.01E-05	490	4.47E-03	595	1.62E-02	700	7.45E-03
390	5.97E-05	495	5.32E-03	600	1.70E-02	705	6.56E-03
395	5.35E-05	500	6.24E-03	605	1.77E-02	710	5.75E-03
400	5.10E-05	505	7.05E-03	610	1.84E-02	715	5.04E-03
405	5.52E-05	510	7.65E-03	615	1.90E-02	720	4.42E-03
410	6.68E-05	515	8.19E-03	620	1.94E-02	725	3.83E-03
415	1.14E-04	520	8.61E-03	625	1.98E-02	730	3.30E-03
420	2.08E-04	525	9.02E-03	630	1.98E-02	735	2.83E-03
425	3.83E-04	530	9.43E-03	635	1.97E-02	740	2.45E-03
430	7.15E-04	535	9.91E-03	640	1.94E-02	745	2.11E-03
435	1.29E-03	540	1.04E-02	645	1.89E-02	750	1.82E-03
440	2.26E-03	545	1.09E-02	650	1.81E-02	755	1.57E-03
445	4.18E-03	550	1.13E-02	655	1.72E-02	760	1.34E-03
450	7.39E-03	555	1.18E-02	660	1.62E-02	765	1.15E-03
455	7.82E-03	560	1.22E-02	665	1.51E-02	770	9.79E-04
460	5.14E-03	565	1.27E-02	670	1.39E-02	775	8.41E-04
465	4.23E-03	570	1.31E-02	675	1.28E-02	780	7.17E-04
470	3.83E-03	575	1.36E-02	680	1.16E-02		
475	3.15E-03	580	1.42E-02	685	1.05E-02		
480	3.17E-03	585	1.48E-02	690	9.42E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4593, 0.4127)

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

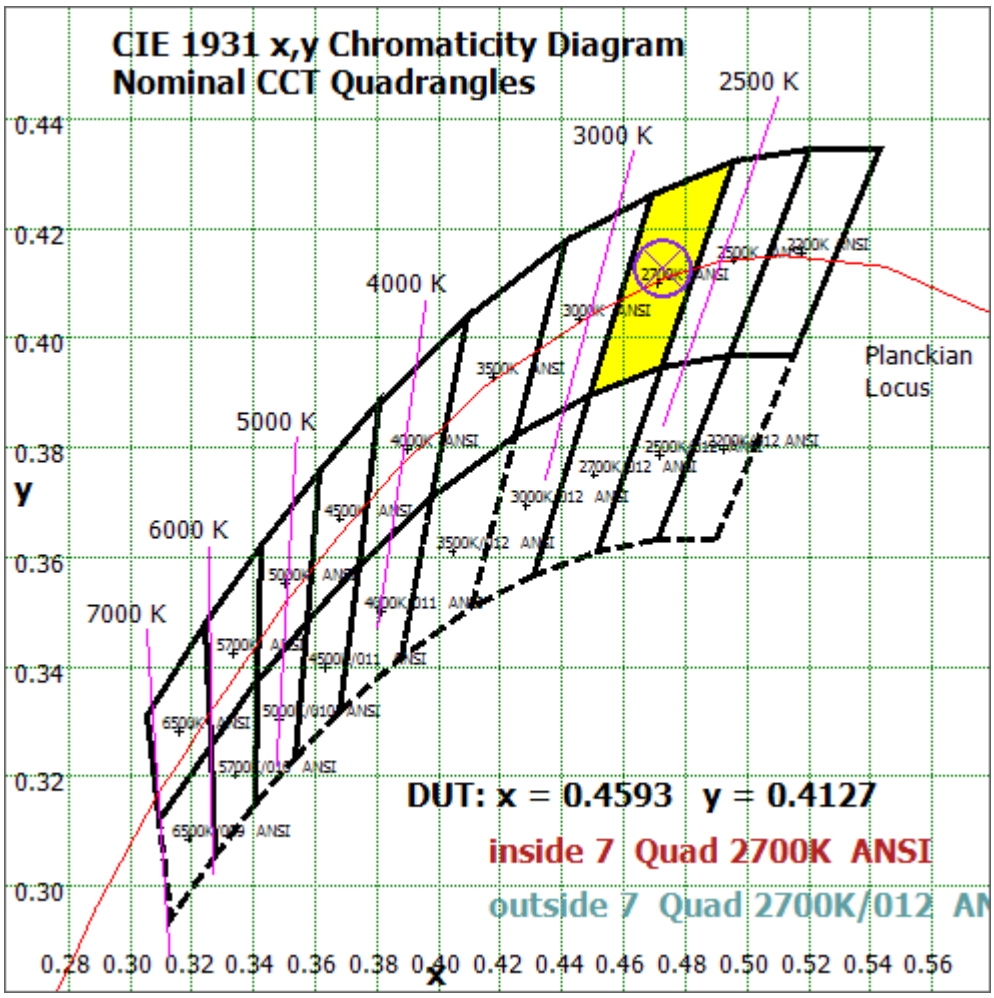


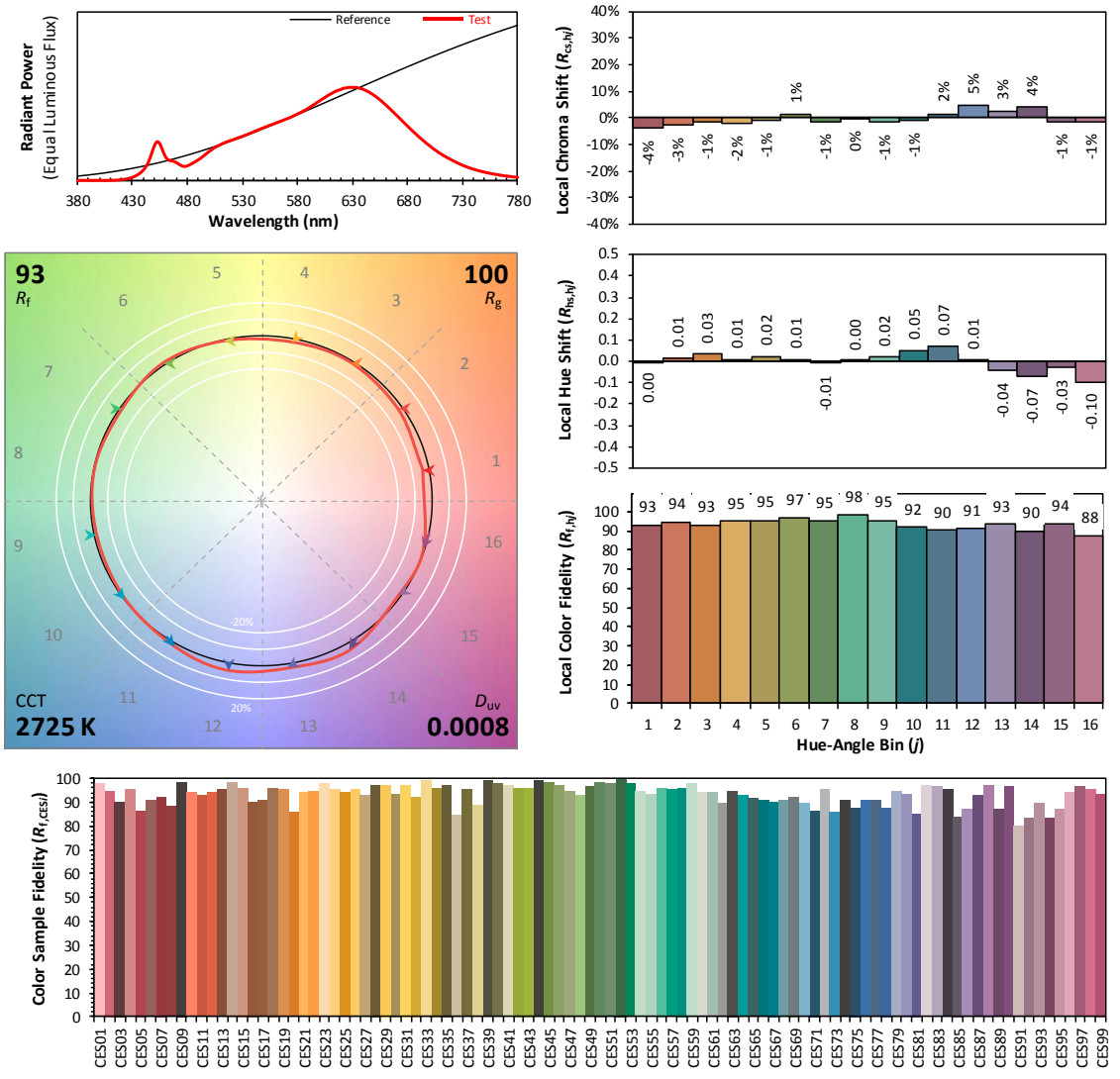
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2021/01/08 **Model:** ORB/S/927/FL/DIM120V/H/BL



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

x	0.4593
y	0.4127
u'	0.2612
v'	0.5281

CIE 13.3-1995 (CRI)

R_a	95
R_9	70

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	220.345	23.38%
10- 20	412.131	43.73%
20- 30	190.796	20.24%
30- 40	63.079	6.69%
40- 50	31.278	3.32%
50- 60	15.313	1.62%
60- 70	7.06	0.75%
70- 80	1.878	0.20%
80- 90	0.003	0.00%
90-100	0	0.00%
100-110	0	0.00%
110-120	0	0.00%
120-130	0.004	0.00%
130-140	0.058	0.01%
140-150	0.141	0.01%
150-160	0.189	0.02%
160-170	0.162	0.02%
170-180	0.058	0.01%
Total	942.5	100%

γ(°)	Lumens	% Total
0- 60	932.942	98.99%
60- 90	8.941	0.95%
0-90	941.883	99.94%
90- 180	0.612	0.06%
0- 180	942.5	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

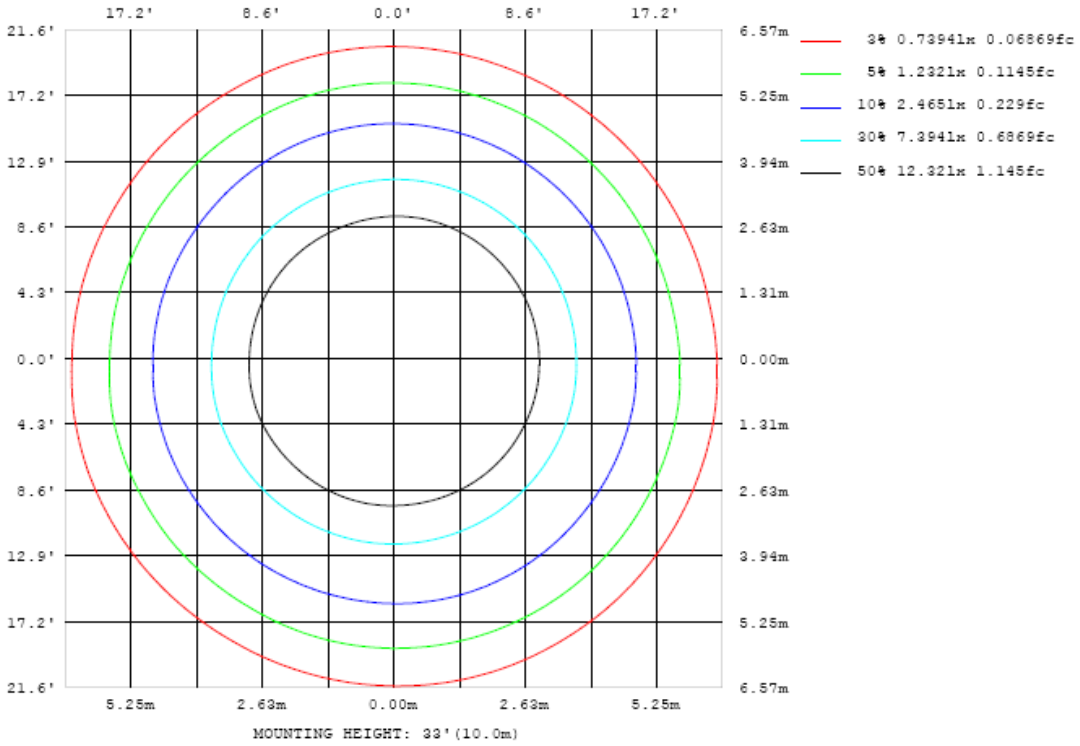


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

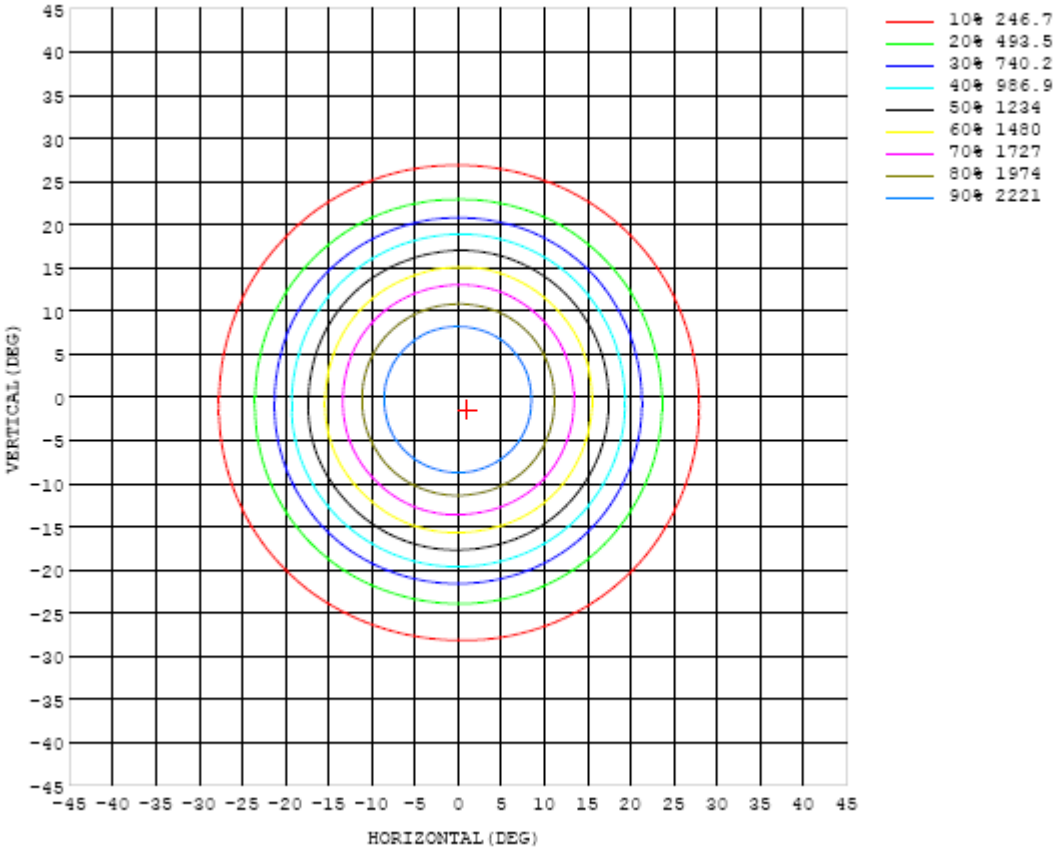


Chart 6: Isocandela Plot

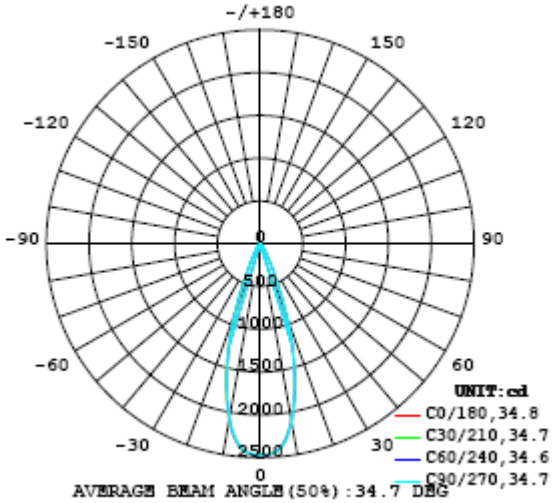


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464
5	2414	2414	2418	2421	2423	2421	2421	2424	2423	2425	2425	2426	2427	2429	2430	2426	2423	2422	2419
10	2084	2093	2102	2105	2111	2111	2112	2110	2109	2110	2108	2107	2109	2111	2111	2105	2100	2093	2091
15	1539	1548	1553	1560	1567	1567	1565	1562	1558	1562	1568	1568	1565	1559	1558	1560	1556	1549	1534
20	898	913	919	922	929	932	935	937	939	940	942	940	939	938	936	933	930	918	895
25	388	398	400	400	401	406	408	409	410	408	405	403	404	403	401	401	396	391	382
30	183	189	189	190	191	192	192	192	192	192	191	189	186	187	188	187	187	185	178
35	97.4	100.0	101	102	103	104	103	104	103	102	101	101	101	101	101	101	101	100	96.4
40	59.5	60.4	61.5	62.4	62.9	63.1	62.7	62.5	62.2	62.4	62.2	62.4	62.5	62.3	62.2	62.4	62.7	61.7	60.1
45	39.3	40.8	41.4	41.8	42.3	42.2	41.9	41.2	40.3	40.6	41.4	41.3	41.0	41.0	41.2	41.4	40.9	40.0	39.7
50	26.6	27.8	28.2	28.5	28.7	28.7	28.6	27.5	27.1	27.4	28.5	28.7	28.8	28.9	29.0	28.8	27.8	27.1	27.2
55	16.3	16.7	16.9	16.9	17.0	16.9	16.8	16.5	16.2	16.4	16.8	17.1	17.1	17.2	17.3	17.1	16.8	16.5	16.3
60	10.5	10.6	10.6	10.5	10.6	10.6	10.5	10.5	10.4	10.5	10.6	10.7	10.7	10.8	10.9	10.9	10.9	10.7	10.7
65	7.16	7.26	7.19	7.09	7.10	7.15	7.19	7.18	6.88	7.18	7.35	7.35	7.31	7.36	7.41	7.45	7.43	7.07	7.19
70	3.94	3.95	3.87	3.78	3.80	3.86	3.92	3.96	3.93	3.98	4.03	4.01	3.98	3.99	4.04	4.06	4.07	4.01	3.91
75	1.74	1.72	1.72	1.75	1.78	1.74	1.75	1.76	1.77	1.79	1.82	1.84	1.90	1.91	1.87	1.85	1.85	1.82	1.74
80	0.09	0.09	0.09	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.11	0.11	0.10	0.10	0.09	0.08	0.07	0.04
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03
135	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08
140	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.14
145	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.25	0.25	0.23
150	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.35	0.32
155	0.43	0.42	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.44	0.42
160	0.52	0.51	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.51	0.51	0.51	0.51	0.52	0.51
165	0.60	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.60	0.60	0.60
170	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.65	0.65	0.65	0.65
175	0.59	0.59	0.59	0.60	0.60	0.60	0.61	0.61	0.62	0.61	0.61	0.60	0.60	0.59	0.59	0.59	0.58	0.58	0.60
180	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

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	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464	2464		
5	2415	2413	2413	2411	2408	2406	2406	2406	2408	2406	2406	2406	2408	2409	2411	2413	2414		
10	2093	2086	2079	2073	2067	2062	2059	2057	2056	2055	2061	2066	2073	2077	2080	2079	2083		
15	1522	1514	1508	1504	1496	1484	1479	1483	1489	1498	1499	1501	1506	1515	1523	1532	1537		
20	883	872	860	852	844	838	838	838	842	848	848	853	860	865	871	880	887		
25	374	365	355	347	343	341	340	339	338	337	339	342	346	353	359	367	376		
30	175	170	166	162	159	157	157	155	154	154	154	156	158	162	166	171	174		
35	94.6	93.2	91.7	90.2	88.6	86.7	86.3	85.2	85.0	84.9	85.2	85.8	87.1	88.7	90.5	92.4	93.8		
40	59.1	58.8	58.0	57.1	56.0	54.9	54.6	54.0	54.1	54.3	54.4	54.5	55.0	55.9	56.8	57.8	58.3		
45	39.9	39.8	39.5	39.1	38.5	37.6	36.5	35.7	36.1	37.0	36.9	37.0	37.3	37.9	38.3	38.3	38.1		
50	27.8	27.8	27.4	27.0	26.7	26.1	25.1	24.6	24.8	25.7	25.9	26.2	26.4	26.7	26.7	25.9	25.7		
55	16.5	16.5	16.2	16.0	15.8	15.5	15.2	15.1	15.3	15.6	15.9	16.0	16.2	16.3	16.2	16.0	15.8		
60	10.7	10.6	10.5	10.4	10.3	10.2	10.2	10.1	10.3	10.4	10.5	10.5	10.6	10.7	10.6	10.6	10.4		
65	7.29	7.14	6.95	6.90	6.92	6.95	6.93	6.62	6.93	7.09	7.05	7.03	7.11	7.17	7.21	7.23	6.87		
70	3.88	3.78	3.66	3.61	3.70	3.78	3.85	3.82	3.80	3.82	3.77	3.72	3.75	3.84	3.89	3.95	3.92		
75	1.70	1.65	1.64	1.65	1.63	1.65	1.67	1.67	1.68	1.69	1.68	1.69	1.70	1.70	1.69	1.71	1.71		
80	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.05	0.06	0.07	0.08	0.08	0.08	0.07	0.08		
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
130	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
135	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08		
140	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	0.14	0.14		
145	0.21	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.21		
150	0.30	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.31		
155	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.40	0.40	0.39	0.41		
160	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.51		
165	0.58	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.60		
170	0.62	0.61	0.63	0.61	0.61	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.60	0.66		
175	0.63	0.65	0.65	0.67	0.69	0.69	0.65	0.62	0.60	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.58		
180	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50		

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, 2020	Aug. 04, 2021
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2020	Aug. 04, 2021
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2020	Aug. 04, 2021
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2020	Aug. 04, 2021
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2020	Aug. 04, 2021
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2020	Aug. 04, 2021
Standard source	D908	HZTE012-01	Aug. 05, 2020	Aug. 04, 2021
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2020	Aug. 04, 2021
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2020	Aug. 04, 2021
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2020	Aug. 04, 2021
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2020	Aug. 04, 2021
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2020	Aug. 04, 2021
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2020	Aug. 04, 2021
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2020	Aug. 04, 2021

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

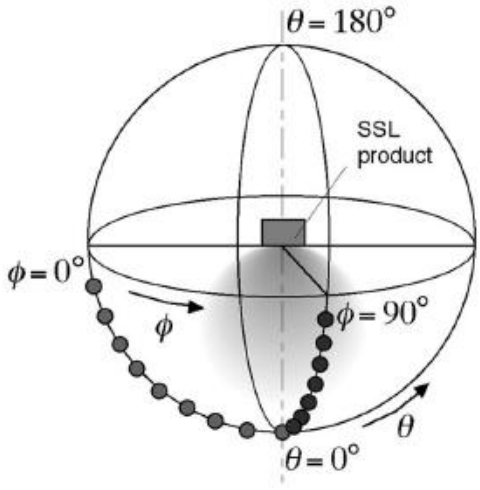
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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