LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Downlight

Model: GIMB2/927/FL/DIM120

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.: HZ19020002m

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. 21, 2019

Approved by:

Manager: Jim Zhang
Feb. 21, 2019

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: **GIMB2/927/FL/DIM120**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
73.0	580.0	7.95	0.9592

CCT (K)	CRI	Stabilization Time (Light & Power)
2727	97.9	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	: Feb. 01, 2019
Date of Test	: Feb. 12, 2019
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

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Sample Photo

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Downlight
Model	: GIMB2/927/FL/DIM120
Electrical Ratings	: 120V, 60Hz, 8W
Product Description	: 2700K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0℃.

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 70minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.069
Power Factor	0.9592
Test Power (W)	7.95
THD A%	19.65
Luminous Efficacy (lm/W)	73.0
Total Luminous Flux (lm)	580.0
Color Rendering Index (CRI)	97.9
R9	85.2
Correlated Color Temperature (CCT)(K)	2727
Chromaticity Chroma x	0.4579
Chromaticity Chroma y	0.4108
Chromaticity Chroma u	0.2612
Chromaticity Chroma v	0.3514
Duv	0
Chromaticity Chroma u ’	0.2612
Chromaticity Chroma v’	0.5271

Special Color Rendering Indices	
R1	99.3
R2	99.4
R3	97.5
R4	99.4
R5	99
R6	98.2
R7	96.9
R8	93.6
R9	85.2
R10	97.2
R11	97.5
R12	90.6
R13	99.6
R14	97.5
Rf	96
Rg	100

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 24.8℃.

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)	0.070
Power Factor	0.9509
Test Power (W)	8.04
Luminous Efficacy (lm/W)	73.5
Total Luminous Flux (lm)	590.6
Beam Angle (°)	36.8
Center Beam Candle Power (cd)	1206
Spacing Criteria	0.58 (0 °-180 °)/ 0.58 (90 °-270 °)
Zonal Lumens in the 0 °-60 °Zone	97.17%
Zonal Lumens in the 60 °-90 °Zone	2.71%
Zonal Lumens in the 90 °-120 °Zone	0.00%
Zonal Lumens in the 120 °-180 °Zone	0.12%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

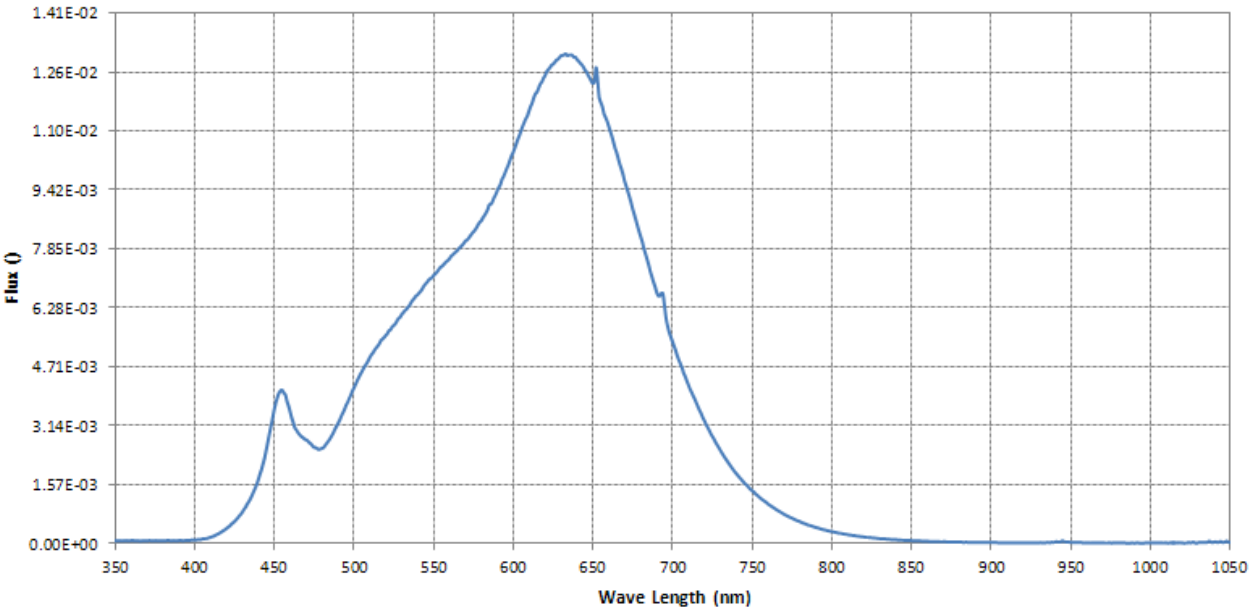
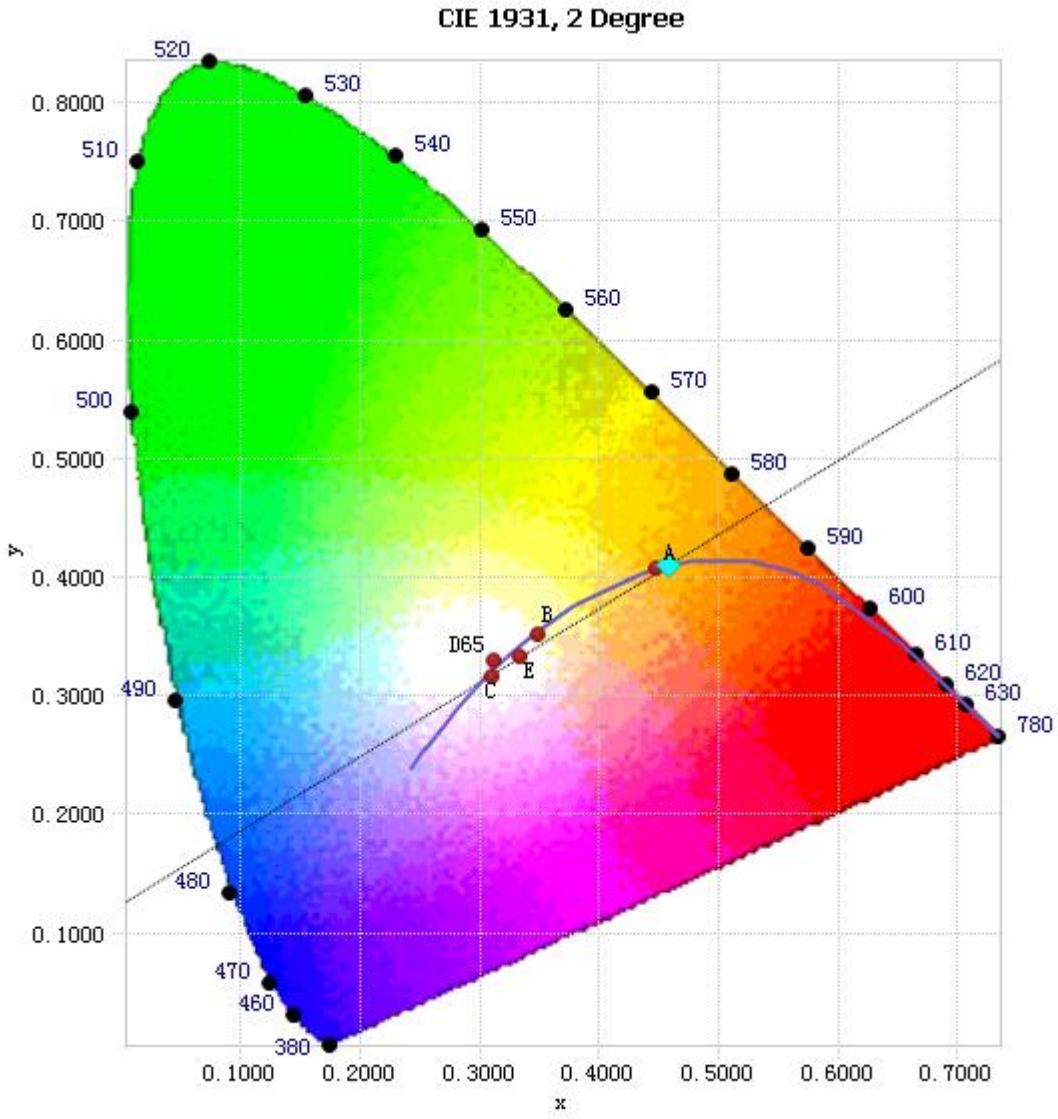


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.25E-05	485	2.79E-03	590	9.39E-03	695	6.35E-03
385	7.03E-05	490	3.20E-03	595	9.88E-03	700	5.38E-03
390	7.78E-05	495	3.67E-03	600	1.04E-02	705	4.79E-03
395	8.65E-05	500	4.13E-03	605	1.10E-02	710	4.22E-03
400	9.06E-05	505	4.57E-03	610	1.15E-02	715	3.75E-03
405	1.21E-04	510	4.96E-03	615	1.20E-02	720	3.28E-03
410	1.64E-04	515	5.26E-03	620	1.25E-02	725	2.86E-03
415	2.60E-04	520	5.54E-03	625	1.28E-02	730	2.49E-03
420	3.97E-04	525	5.80E-03	630	1.30E-02	735	2.16E-03
425	5.84E-04	530	6.09E-03	635	1.30E-02	740	1.87E-03
430	8.35E-04	535	6.34E-03	640	1.29E-02	745	1.62E-03
435	1.19E-03	540	6.62E-03	645	1.26E-02	750	1.41E-03
440	1.70E-03	545	6.91E-03	650	1.22E-02	755	1.22E-03
445	2.49E-03	550	7.14E-03	655	1.17E-02	760	1.05E-03
450	3.56E-03	555	7.37E-03	660	1.11E-02	765	9.11E-04
455	4.09E-03	560	7.58E-03	665	1.04E-02	770	7.83E-04
460	3.51E-03	565	7.80E-03	670	9.65E-03	775	6.76E-04
465	2.95E-03	570	8.05E-03	675	8.91E-03	780	5.84E-04
470	2.76E-03	575	8.30E-03	680	8.18E-03		
475	2.56E-03	580	8.59E-03	685	7.43E-03		
480	2.53E-03	585	9.02E-03	690	6.71E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4579, 0.4108)

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

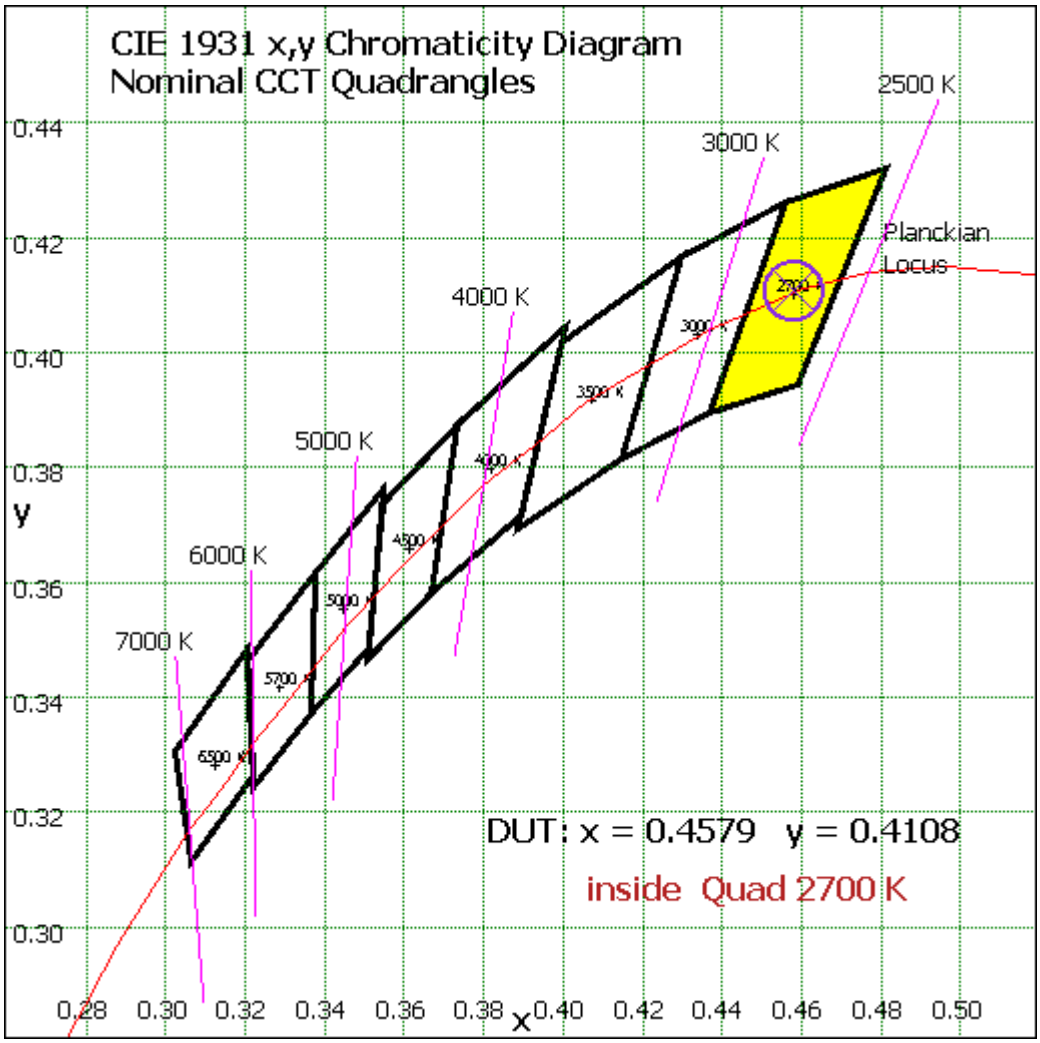


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Vector – Sphere Spectroradiometer Method

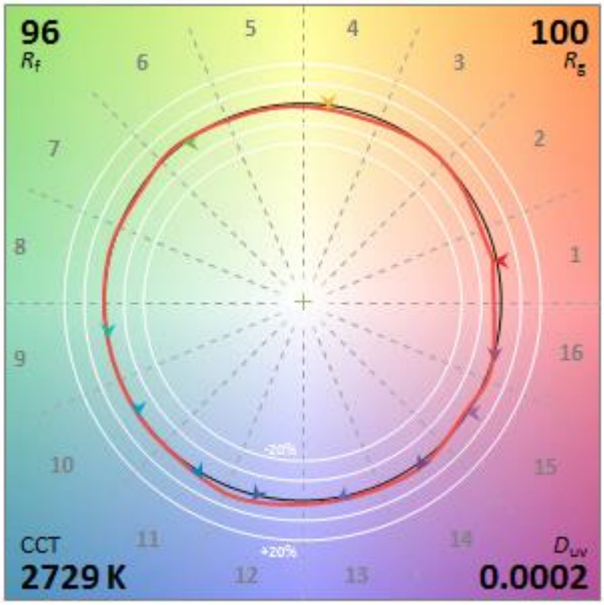


Chart 4: Color Vector Diagram of TM-30-18

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	104.439	17.68%
10- 20	208.144	35.24%
20- 30	159.06	26.93%
30- 40	69.004	11.68%
40- 50	21.441	3.63%
50- 60	11.756	1.99%
60- 70	9.108	1.54%
70- 80	5.151	0.87%
80- 90	1.726	0.29%
90-100	0.002	0.00%
100-110	0	0.00%
110-120	0	0.00%
120-130	0.013	0.00%
130-140	0.088	0.01%
140-150	0.183	0.03%
150-160	0.222	0.04%
160-170	0.172	0.03%
170-180	0.059	0.01%
Total	590.6	100%

γ(°)	Lumens	% Total
0- 60	573.844	97.17%
60- 90	15.985	2.71%
0-90	589.829	99.87%
90- 180	0.739	0.13%
0- 180	590.6	100%

Table 5: Zonal Lumen

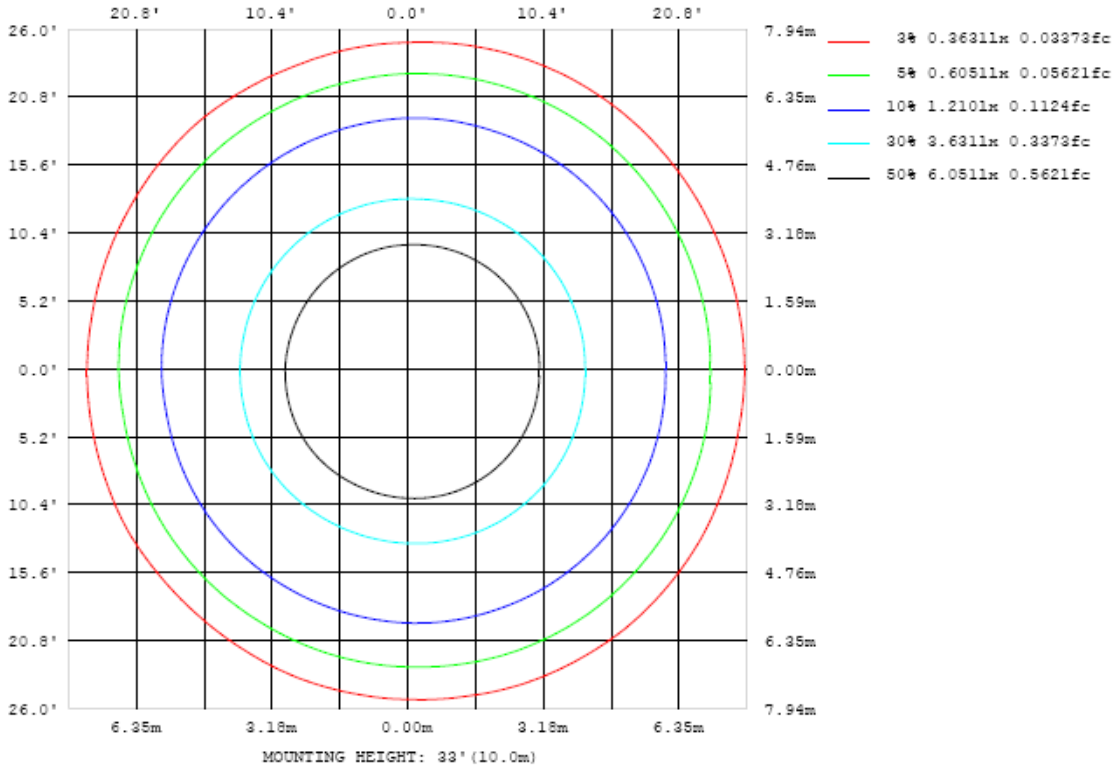


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

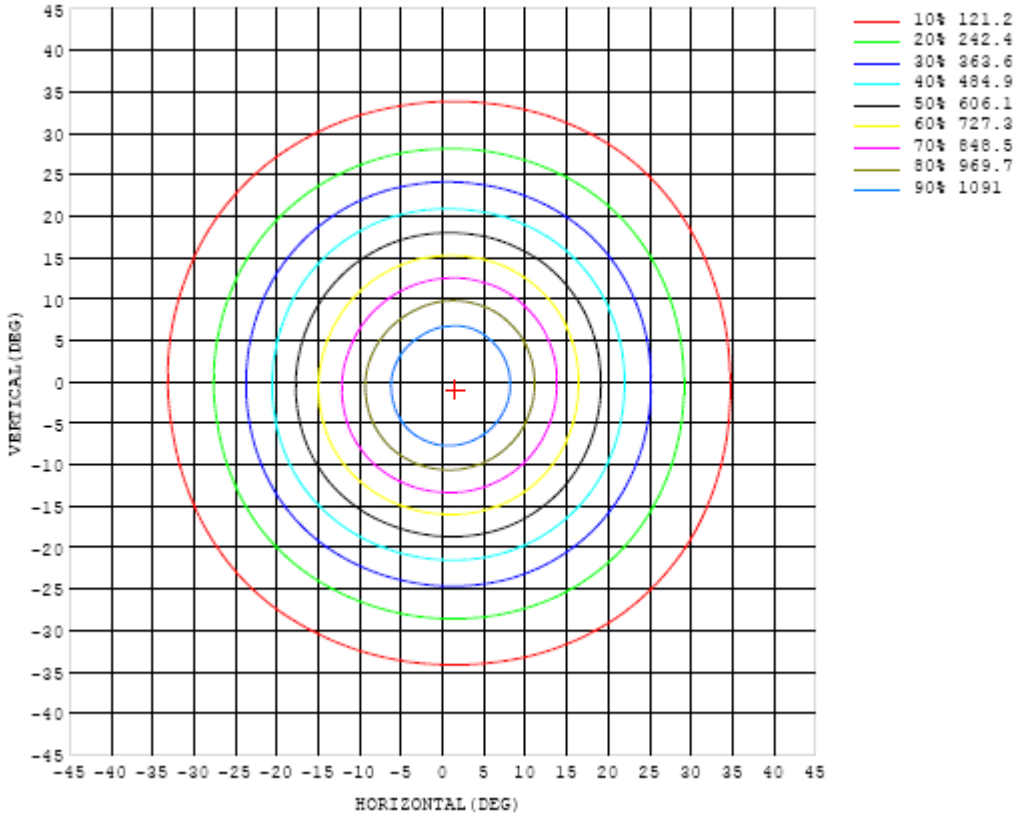


Chart 6: Isocandela Plot

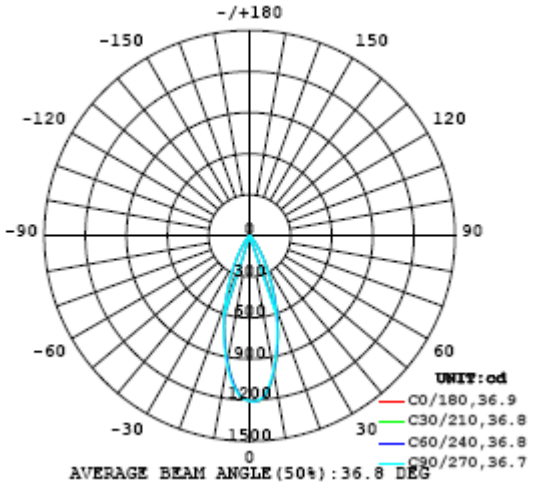


Chart 7: Polar Candela Distribution

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	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206
5	1183	1185	1186	1186	1185	1182	1181	1178	1175	1172	1167	1162	1157	1152	1146	1142	1136	1133	1130
10	1017	1020	1020	1019	1017	1013	1011	1006	1002	996	992	985	978	973	965	959	952	945	940
15	792	795	796	798	797	795	793	788	781	773	767	761	757	754	750	745	737	731	726
20	567	569	572	574	575	574	570	565	557	548	541	535	532	529	526	523	517	512	509
25	369	371	374	375	375	373	370	365	358	352	345	340	337	335	333	329	325	322	321
30	219	222	224	224	224	222	220	215	212	207	202	198	195	193	191	188	185	183	185
35	116	119	120	121	120	119	117	114	111	107	105	102	99.0	97.6	95.9	94.9	93.2	92.1	93.6
40	56.6	56.9	57.9	59.6	60.1	59.5	57.4	55.4	53.1	51.1	49.7	48.4	46.9	45.6	45.5	45.4	44.7	44.5	44.0
45	26.2	26.8	27.0	27.7	28.5	28.7	27.8	26.8	25.8	25.5	24.7	24.6	24.8	24.3	24.6	24.2	23.8	23.1	22.2
50	18.1	18.3	18.3	18.7	19.1	19.0	18.7	18.2	17.8	17.4	17.1	17.2	17.3	17.0	17.2	17.0	16.8	16.0	15.5
55	13.0	13.2	13.6	13.9	14.3	14.3	14.4	13.8	13.5	12.9	12.6	12.4	12.4	12.2	12.3	12.3	12.3	11.8	11.4
60	11.3	11.4	11.8	12.2	12.7	12.9	13.0	12.1	11.7	11.2	10.9	10.8	10.7	10.5	10.6	10.6	10.7	10.3	9.89
65	9.24	9.46	10.1	10.8	11.6	12.4	12.3	11.2	10.3	9.59	9.45	9.37	9.12	8.89	8.82	8.89	9.02	8.63	8.27
70	6.72	6.80	7.30	7.87	8.69	9.01	8.96	8.04	7.46	6.96	6.78	6.72	6.62	6.68	6.51	6.51	6.44	6.44	6.37
75	4.76	4.83	5.05	5.32	5.84	6.01	6.08	5.43	5.17	4.91	4.85	4.82	4.75	4.64	4.49	4.41	4.44	4.43	4.46
80	3.08	3.09	3.19	3.34	3.63	3.72	3.79	3.41	3.28	3.18	3.13	3.13	3.13	2.95	2.76	2.72	2.73	2.72	2.72
85	1.36	1.44	1.71	1.90	2.11	2.21	2.25	2.08	1.91	1.92	1.92	1.88	1.91	1.75	1.52	1.48	1.47	1.45	1.42
90	0.00	0.01	0.03	0.08	0.15	0.19	0.21	0.17	0.17	0.16	0.15	0.13	0.14	0.16	0.10	0.07	0.03	0.01	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	0.01	0.01	0.02
130	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07
135	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.16
140	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.28
145	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.21	0.21	0.41
150	0.26	0.26	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.54
155	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.64
160	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.43	0.44	0.44	0.71
165	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.49	0.49	0.49	0.49	0.49	0.49	0.75
170	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.53	0.73
175	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.65
180	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61

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	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206	1206		
5	1127	1124	1123	1122	1123	1125	1128	1135	1138	1144	1150	1156	1163	1168	1174	1178	1181		
10	936	933	929	928	929	933	938	948	957	967	976	985	994	1001	1008	1013	1016		
15	720	716	715	716	717	720	724	730	736	745	752	763	772	779	788	790	794		
20	506	504	506	508	509	511	515	517	520	524	533	540	550	556	561	564	566		
25	320	319	321	322	323	325	328	330	334	337	342	348	354	361	365	368	369		
30	186	186	185	186	186	188	190	193	197	200	202	206	211	215	217	219	220		
35	93.7	93.8	94.7	94.7	96.4	96.5	97.6	99.5	102	106	109	111	114	115	115	116	116		
40	43.2	43.7	44.0	45.2	45.0	45.1	45.0	45.6	47.4	48.9	51.5	53.7	54.5	54.9	55.5	55.8	56.2		
45	22.6	22.4	23.3	23.7	24.0	24.2	23.8	23.0	23.4	24.1	25.4	26.9	27.3	27.6	27.2	26.7	26.4		
50	15.5	15.6	15.7	16.2	16.5	16.6	16.1	16.2	16.1	16.3	17.0	18.0	18.3	18.7	18.4	18.4	18.3		
55	11.5	11.7	11.6	11.8	12.0	12.1	11.7	11.7	11.6	11.7	12.0	12.8	13.1	13.3	13.2	13.3	13.1		
60	9.77	9.94	10.0	10.8	11.1	11.1	10.5	10.2	9.92	9.82	9.98	10.5	10.7	11.0	11.1	11.3	11.2		
65	8.16	8.34	8.94	9.76	9.65	9.26	8.89	8.53	8.19	8.10	8.22	8.51	8.69	8.83	9.11	9.20	9.19		
70	6.34	6.59	7.05	7.59	7.41	7.17	6.77	6.51	6.36	6.23	6.28	6.35	6.42	6.41	6.68	6.76	6.77		
75	4.51	4.71	4.85	5.17	5.13	5.02	4.64	4.57	4.44	4.38	4.38	4.44	4.49	4.54	4.64	4.70	4.72		
80	2.75	2.86	2.90	3.04	3.14	3.11	2.83	2.78	2.71	2.67	2.68	2.73	2.72	2.71	2.83	2.94	3.03		
85	1.41	1.45	1.44	1.54	1.62	1.63	1.45	1.38	1.33	1.32	1.31	1.34	1.35	1.38	1.50	1.57	1.59		
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	0.01	0.01		
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	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
130	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06		
135	0.16	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.14		
140	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.25	0.25	0.25		
145	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.39	0.39	0.39	0.38	0.38	0.38	0.38		
150	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.52	0.52	0.51	0.51	0.51	0.50	0.50	0.50		
155	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.62	0.62	0.62	0.61	0.61	0.61	0.61		
160	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.70	0.69	0.69		
165	0.76	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.74	0.74	0.74	0.74	0.74		
170	0.74	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.74		
175	0.66	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.67		
180	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 14, 2018	Aug. 13, 2019
Digital Power Meter	PF2010A	HZTE028-01	Sep. 12, 2018	Sep. 11, 2019
AC Power Supply	DPS1060	HZTE001-06	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	WY12010	HZTE004-03	Aug. 09, 2018	Aug. 08, 2019
Temperature recorder	JM624U	HZTE018-08	Aug. 09, 2018	Aug. 08, 2019
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 09, 2018	Aug. 08, 2019
Standard source	D908	HZTE012-01	Aug. 14, 2018	Aug. 13, 2019
Integrate Sphere system	3M	HZTE015-04	Aug. 16, 2018	Aug. 15, 2019
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2018	Aug. 01, 2019
AC Power Supply	PCR 500L	HZTE001-07	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	IT6154	HZTE004-04	Aug. 09, 2018	Aug. 08, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 09, 2018	Aug. 08, 2019
Temperature Meter	TES1310	HZTE017-01	Aug. 09, 2018	Aug. 08, 2019

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

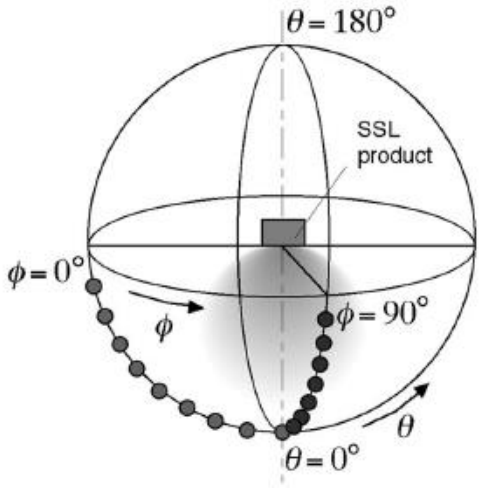
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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