NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Commercial Downlight

Model: 14CDLA4/827/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16020003a/R1

This report is replaced the old report No. HZ16020003a dated Mar. 15, 2016

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

Reviewed by: April Zou

Engineer: April Zou

Mar. 31, 2016

Approved by: Jim Zhang

Manager: Jim Zhang

Mar. 31, 2016

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: **14CDLA4/827/277V**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
82.1	1099.6	13.40	0.9894

CCT (K)	CRI	Stabilization Time (Light & Power)
2685	81.8	60

Table 1 Executive Data Summary

Test specifications:	
Date of Receipt	: Mar. 07, 2016
Date of Test	: Mar. 14, 2016
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters, Color Uniformity
Reference Standard	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

TABLE OF CONTENT

Sample Photo

Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: LED commercial downlight
Model	: 14CDLA4/827/277V
Electrical Ratings	: 120-277VAC, 60Hz, 14W
Product Description	: 2700K, Non-dimmable, CRI80 Manufacturer of LED light source: Lextar Electronics Corp Model of LED light source: PC35H11
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 24.2℃.

Sample 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 95 minutes.

The photometric distance of Goniophotometer is 2.475m.

Luminous data was taken at 0.5°vertical intervals and 10.0°horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.113	0.0505
Power Factor	0.9894	0.9124
Test Power (W)	13.40	12.77
Off-State Power (W)	0	0
THD A%	10.46	20.43
Luminous Efficacy (lm/W)	82.1	79.5
Total Luminous Flux (lm)	1099.6	1015.0
Color Rendering Index (CRI)	81.8	
R9	4	
Correlated Color Temperature (CCT) (K)	2685	
Chromaticity (Chroma x, Chroma y)	(0.4621, 0.4127)	
Chromaticity (Chroma u, Chroma v)	(0.2630, 0.3523)	
Chromaticity (Chroma u', Chroma v')	(0.2630, 0.5285)	
Duv	0.0006	
Average Beam Angle (°)	96.4	
Center Beam Candle Power (cd)	484	
Spacing Criteria	1.20 (0°-180°)/ 1.19 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	86.77%	
Zonal Lumens in the 60°-90°Zone	13.13%	
Zonal Lumens in the 90°-120°Zone	0.02%	
Zonal Lumens in the 120°-180°Zone	0.08%	

Special Color Rendering Indices	
R1	81
R2	93
R3	93
R4	79
R5	81
R6	93
R7	80
R8	55
R9	4
R10	85
R11	78
R12	77
R13	84
R14	97

Table 2: Test data per Goniophotometer Method

Note: According to CIE 1976 (u',v') diagram, u' = u = 4x/(-2x+12y+3), v' = 3v/2 = 9y/(-2x+12y+3).

Spectral Power Distribution

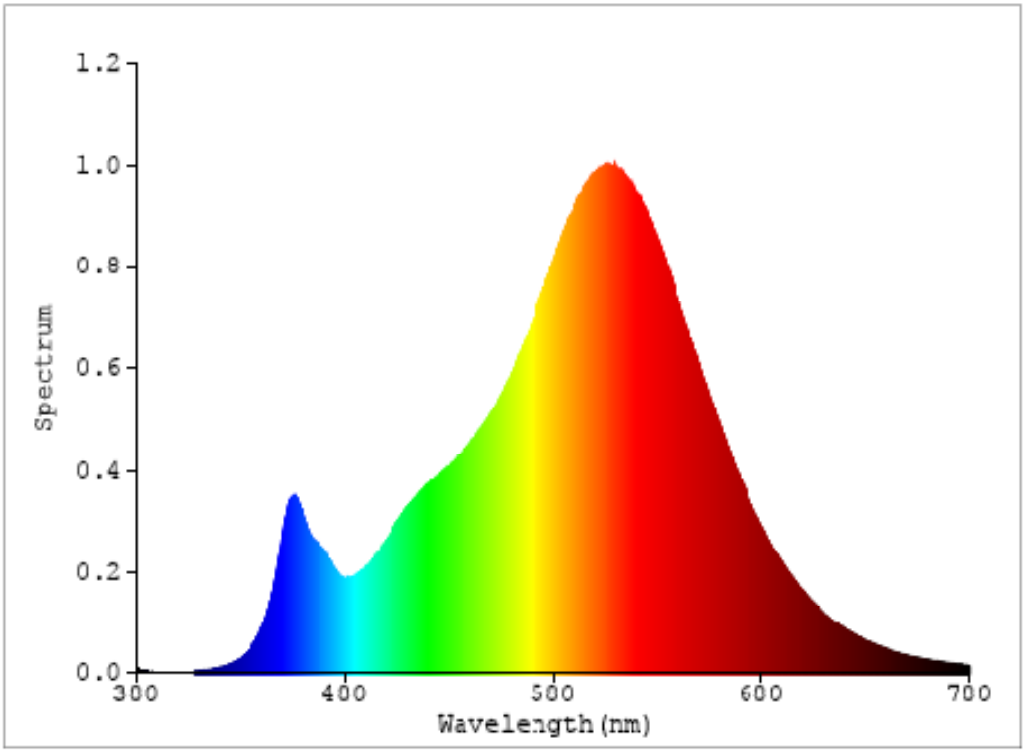


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	45.667	4.15%
10- 20	128.949	11.73%
20- 30	189.664	17.25%
30- 40	218.875	19.90%
40- 50	208.095	18.92%
50- 60	162.909	14.82%
60- 70	99.342	9.03%
70- 80	37.089	3.37%
80- 90	7.963	0.72%
90-100	0.051	0.00%
100-110	0.082	0.01%
110-120	0.108	0.01%
120-130	0.134	0.01%
130-140	0.17	0.02%
140-150	0.19	0.02%
150-160	0.172	0.02%
160-170	0.117	0.01%
170-180	0.043	0.00%
Total	1099.6	100%

γ(°)	Lumens	% Total
0- 60	954.159	86.77%
60- 90	144.394	13.13%
0-90	1098.553	99.90%
90- 180	1.067	0.10%
0- 180	1099.6	100%

Table 3: Zonal Lumen Data

Illuminance Plots

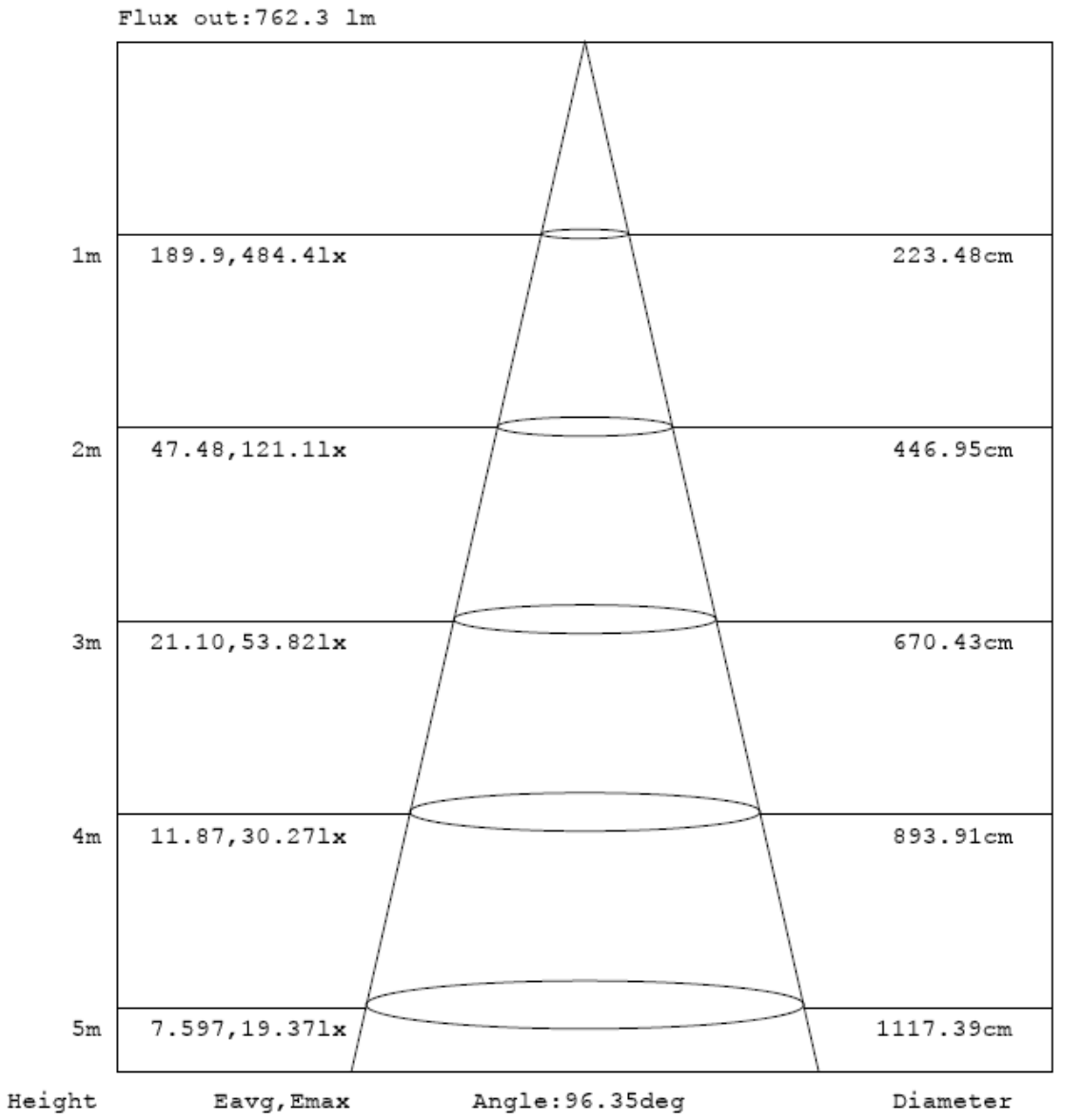


Chart 2: Beam angle

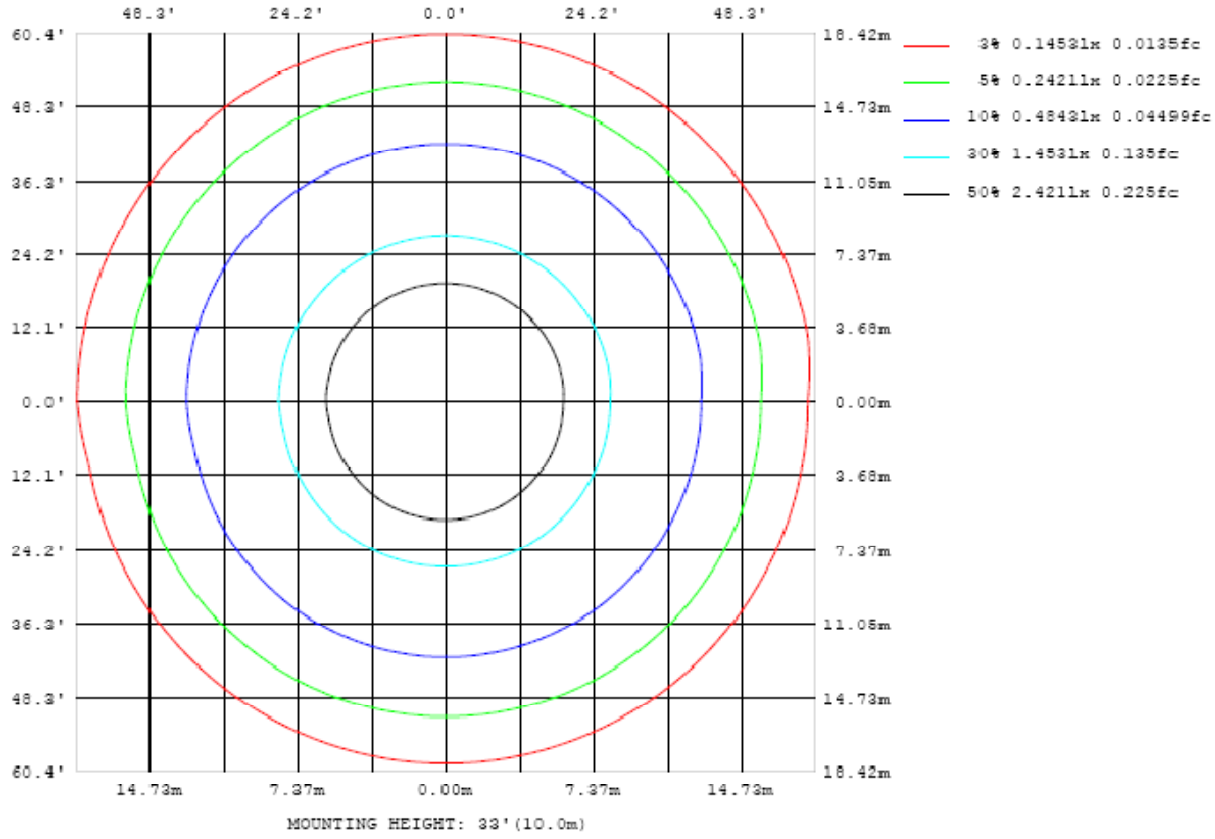


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

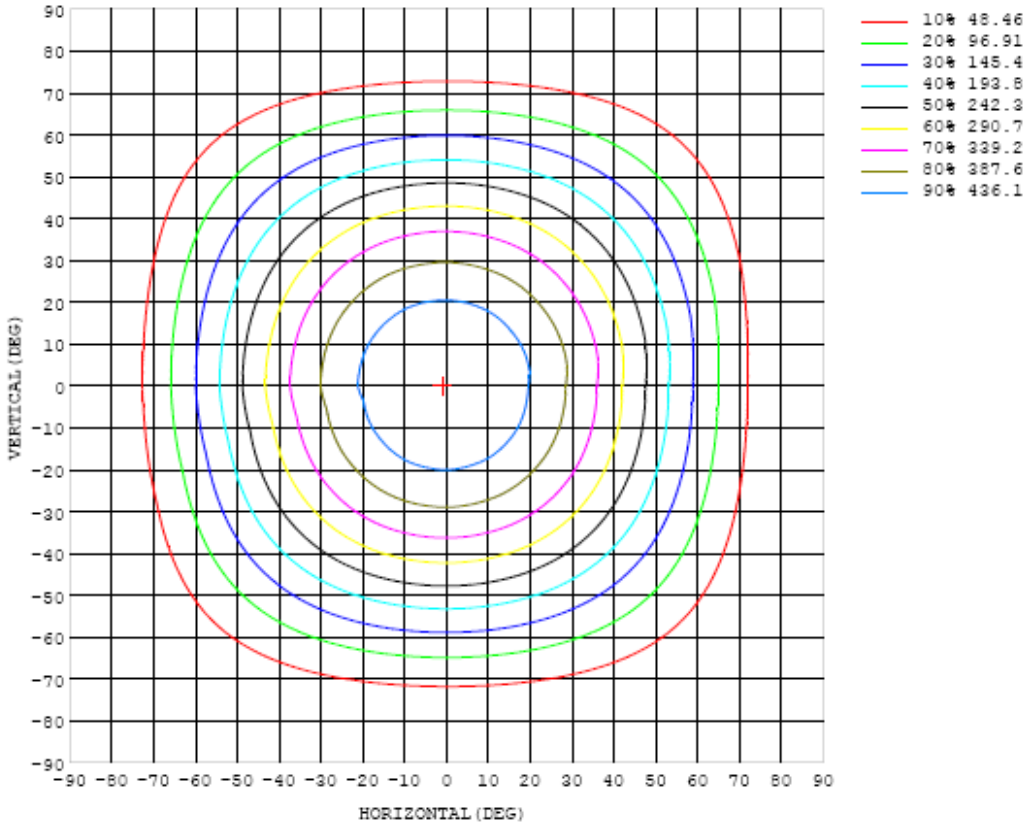


Chart 4: Isocandla Plot

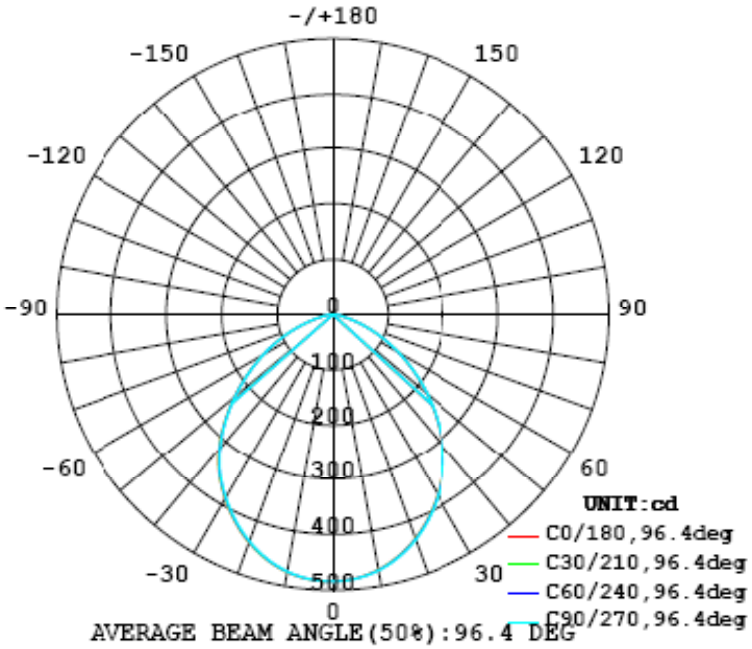


Chart 5: Polar Candela Distribution

Luminous Intensity Data

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	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
5	480	480	480	481	481	481	481	481	481	481	481	481	481	481	481	482	481	481	482
10	470	470	470	471	471	471	471	472	472	472	472	473	473	472	473	473	473	473	475
15	454	455	455	455	455	456	456	456	457	457	457	458	457	457	458	458	458	458	461
20	433	433	434	434	434	435	435	435	436	436	436	437	437	437	437	437	437	438	441
25	407	408	408	408	409	409	409	410	410	411	411	411	411	412	412	412	412	412	417
30	378	378	379	379	379	380	380	380	381	381	381	382	382	383	383	383	383	383	388
35	346	346	346	346	347	347	347	348	348	349	349	349	349	350	350	350	350	351	357
40	307	307	308	308	308	309	309	309	309	310	310	310	311	311	311	311	312	312	319
45	265	265	265	265	265	266	266	266	267	267	267	267	268	268	268	268	268	268	277
50	221	221	221	221	221	221	222	222	222	223	222	223	223	223	224	224	224	224	232
55	177	177	177	178	178	178	178	178	178	178	178	179	179	179	179	180	179	180	188
60	135	135	135	135	135	136	136	136	136	136	136	136	136	136	137	137	137	137	145
65	96.0	95.9	96.0	95.9	95.9	95.9	95.8	95.8	95.8	95.9	95.8	95.9	96.1	96.1	96.2	96.3	96.3	96.5	104
70	60.7	61.0	60.9	60.5	60.4	60.3	60.2	60.2	60.1	60.1	59.9	60.1	60.0	60.0	60.2	60.5	60.2	60.3	66.8
75	31.3	31.1	31.1	30.9	30.8	30.7	30.6	30.5	30.4	30.3	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.4	35.2
80	15.3	15.3	15.2	15.2	15.2	15.2	15.2	15.2	15.1	15.1	15.1	15.0	15.0	15.0	15.1	15.1	15.1	15.1	16.2
85	6.62	6.57	6.48	6.43	6.35	6.30	6.22	6.16	6.06	6.02	5.94	5.91	5.88	5.87	5.84	5.84	5.85	5.85	7.72
90	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	0.02	0.06
95	0.02	0.02	0.03	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	0.03	0.02	0.06
100	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	0.04	0.09
105	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.11
110	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.12
115	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.13
120	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13
125	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
130	0.18	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.19	0.17
135	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
140	0.26	0.26	0.26	0.25	0.26	0.26	0.25	0.25	0.26	0.25	0.25	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.27
145	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.32
150	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	0.36
155	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.40
160	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.43
165	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.45
170	0.39	0.39	0.39	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.39	0.40	0.40	0.40	0.40	0.47
175	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.40
180	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.49	0.48

Table 4: 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	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484		
5	482	482	482	482	482	482	482	482	482	481	481	481	481	481	481	481	481		
10	475	475	475	474	474	474	474	473	473	473	473	473	473	472	472	472	472		
15	461	461	460	460	460	460	459	459	459	458	458	458	458	458	457	457	457		
20	441	441	441	440	440	440	439	439	439	438	438	438	437	437	437	437	437		
25	417	417	416	416	415	415	415	414	414	413	413	413	412	412	412	412	412		
30	388	388	388	387	387	386	386	385	385	384	384	384	383	383	383	383	383		
35	356	356	356	356	355	354	354	354	353	353	352	352	352	352	351	351	351		
40	319	319	318	318	317	317	316	316	316	315	315	315	314	314	314	314	314		
45	276	276	276	275	275	274	274	274	273	273	273	273	272	272	272	272	272		
50	232	232	231	231	231	230	230	230	229	229	229	228	228	228	228	228	228		
55	188	187	187	187	187	186	186	186	186	185	185	185	185	185	185	185	185		
60	145	145	145	145	145	145	145	144	144	144	144	144	144	144	143	143	144		
65	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104		
70	66.8	66.9	66.9	67.0	67.0	67.0	67.1	67.0	67.1	67.1	67.1	67.0	67.0	67.0	67.0	67.0	67.1		
75	35.2	35.3	35.5	35.5	35.6	35.7	35.8	35.8	36.0	36.0	36.1	36.1	36.1	36.2	36.2	36.1	36.0		
80	16.2	16.2	16.3	16.3	16.3	16.3	16.4	16.4	16.5	16.5	16.5	16.5	16.5	16.6	16.5	16.5	16.5		
85	7.80	7.83	7.90	7.94	8.02	8.10	8.17	8.25	8.33	8.40	8.45	8.49	8.51	8.53	8.50	8.51	8.47		
90	0.07	0.08	0.09	0.09	0.11	0.12	0.14	0.15	0.18	0.20	0.19	0.18	0.22	0.24	0.24	0.23	0.22		
95	0.06	0.07	0.07	0.06	0.07	0.07	0.06	0.07	0.07	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.07		
100	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		
105	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11		
110	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12		
115	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13		
120	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.13	0.13	0.14	0.13	0.13		
125	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15		
130	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.17	0.18	0.18	0.18	0.18		
135	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22		
140	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27		
145	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		
150	0.36	0.36	0.36	0.36	0.37	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.36	0.37	0.37	0.37	0.37		
155	0.40	0.40	0.40	0.40	0.41	0.41	0.40	0.41	0.41	0.41	0.41	0.40	0.40	0.41	0.41	0.41	0.41		
160	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.44	0.44	0.43		
165	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45		
170	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47		
175	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48		
180	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48		

Table 5: Luminous Intensity Data

Color Spatial Uniformity- Goniophotometer Method

Color uniformity was measured at two horizontal angles, 0°and 90°, the vertical intervals was 1°.

	C Angle = 0°		C Angle = 90°	
γ Angle (°)	Chromaticity Coordinate u'	Chromaticity Coordinate v'	Chromaticity Coordinate u'	Chromaticity Coordinate v'
0	0.2642	0.5290	0.2642	0.5290
1	0.2642	0.5289	0.2640	0.5289
2	0.2642	0.5289	0.2640	0.5289
3	0.2641	0.5289	0.2640	0.5289
4	0.2641	0.5289	0.2640	0.5289
5	0.2641	0.5289	0.2640	0.5289
6	0.2641	0.5289	0.2640	0.5289
7	0.2642	0.5289	0.2640	0.5289
8	0.2641	0.5289	0.2640	0.5289
9	0.2641	0.5289	0.2640	0.5289
10	0.2641	0.5289	0.2640	0.5289
11	0.2641	0.5289	0.2640	0.5289
12	0.2641	0.5289	0.2640	0.5289
13	0.2642	0.5289	0.2640	0.5289
14	0.2642	0.5289	0.2639	0.5289
15	0.2641	0.5289	0.2639	0.5289
16	0.2641	0.5289	0.2639	0.5289
17	0.2641	0.5289	0.2639	0.5288
18	0.2641	0.5289	0.2639	0.5289
19	0.2641	0.5289	0.2638	0.5288
20	0.2641	0.5289	0.2639	0.5288
21	0.2639	0.5288	0.2639	0.5288
22	0.2639	0.5288	0.2638	0.5288
23	0.2639	0.5288	0.2638	0.5288
24	0.2639	0.5288	0.2638	0.5288
25	0.2639	0.5288	0.2637	0.5288
26	0.2638	0.5288	0.2637	0.5288
27	0.2638	0.5288	0.2636	0.5287
28	0.2638	0.5288	0.2636	0.5288
29	0.2638	0.5288	0.2636	0.5287
30	0.2638	0.5287	0.2636	0.5287
31	0.2637	0.5287	0.2635	0.5287
32	0.2637	0.5287	0.2634	0.5287
33	0.2637	0.5287	0.2634	0.5286
34	0.2635	0.5286	0.2634	0.5286
35	0.2634	0.5286	0.2633	0.5286

36	0.2634	0.5286	0.2633	0.5286
37	0.2634	0.5286	0.2631	0.5285
38	0.2633	0.5286	0.2631	0.5285
39	0.2633	0.5286	0.2631	0.5285
40	0.2632	0.5286	0.2630	0.5285
41	0.2632	0.5285	0.2628	0.5284
42	0.2630	0.5284	0.2628	0.5284
43	0.2629	0.5284	0.2628	0.5284
44	0.2629	0.5284	0.2627	0.5283
45	0.2628	0.5284	0.2625	0.5283
46	0.2628	0.5283	0.2625	0.5283
47	0.2627	0.5283	0.2625	0.5283
48	0.2625	0.5282	0.2623	0.5282
49	0.2625	0.5282	0.2622	0.5282
50	0.2624	0.5282	0.2622	0.5282
51	0.2623	0.5281	0.2620	0.5281
52	0.2621	0.5281	0.2620	0.5281
53	0.2621	0.5280	0.2620	0.5280
54	0.2620	0.5280	0.2619	0.5280
55	0.2620	0.5280	0.2619	0.5280
56	0.2618	0.5279	0.2619	0.5280
57	0.2618	0.5279	0.2615	0.5279
58	0.2617	0.5279	0.2615	0.5279
59	0.2617	0.5279	0.2615	0.5279
60	0.2615	0.5278	0.2615	0.5279
61	0.2615	0.5278	0.2615	0.5278
62	0.2615	0.5278	0.2612	0.5278
63	0.2614	0.5278	0.2612	0.5278
64	0.2614	0.5278	0.2611	0.5278
65	0.2613	0.5278	0.2612	0.5278
66	0.2613	0.5278	0.2612	0.5278
67	0.2612	0.5278	0.2610	0.5278
68	0.2613	0.5278	0.2611	0.5278
69	0.2612	0.5278	0.2611	0.5278
70	0.2613	0.5279	0.2613	0.5279
71	0.2614	0.5279	0.2611	0.5279
72	0.2616	0.5280	0.2613	0.5280
73	0.2617	0.5281	0.2616	0.5281

Table 6: Chromaticity per Measurement Angle

Weighted Average	
u'	v'
0.2631	0.5285

The chromaticity measurements need to be made only for the γ angles where the average luminous intensity is more than 10 % of the peak intensity.

γ Angle (°)	C Angle = 0°/180°		C Angle = 90°/270°	
	Δu'	Δv'	Δu'	Δv'
0	0.0011	0.0005	0.0011	0.0005
1	0.0011	0.0004	0.0009	0.0004
2	0.0011	0.0004	0.0009	0.0004
3	0.0010	0.0004	0.0009	0.0004
4	0.0010	0.0004	0.0009	0.0004
5	0.0010	0.0004	0.0009	0.0004
6	0.0010	0.0004	0.0009	0.0004
7	0.0011	0.0004	0.0009	0.0004
8	0.0010	0.0004	0.0009	0.0004
9	0.0010	0.0004	0.0009	0.0004
10	0.0010	0.0004	0.0009	0.0004
11	0.0010	0.0004	0.0009	0.0004
12	0.0010	0.0004	0.0009	0.0004
13	0.0011	0.0004	0.0009	0.0004
14	0.0011	0.0004	0.0008	0.0004
15	0.0010	0.0004	0.0008	0.0004
16	0.0010	0.0004	0.0008	0.0004
17	0.0010	0.0004	0.0008	0.0003
18	0.0010	0.0004	0.0008	0.0004
19	0.0010	0.0004	0.0007	0.0003
20	0.0010	0.0004	0.0008	0.0003
21	0.0008	0.0003	0.0008	0.0003
22	0.0008	0.0003	0.0007	0.0003
23	0.0008	0.0003	0.0007	0.0003
24	0.0008	0.0003	0.0007	0.0003
25	0.0008	0.0003	0.0006	0.0003
26	0.0007	0.0003	0.0006	0.0003
27	0.0007	0.0003	0.0005	0.0002
28	0.0007	0.0003	0.0005	0.0003
29	0.0007	0.0003	0.0005	0.0002
30	0.0007	0.0002	0.0005	0.0002
31	0.0006	0.0002	0.0004	0.0002

32	0.0006	0.0002	0.0003	0.0002
33	0.0006	0.0002	0.0003	0.0001
34	0.0004	0.0001	0.0003	0.0001
35	0.0003	0.0001	0.0002	0.0001
36	0.0003	0.0001	0.0002	0.0001
37	0.0003	0.0001	0.0000	0.0000
38	0.0002	0.0001	0.0000	0.0000
39	0.0002	0.0001	0.0000	0.0000
40	0.0001	0.0001	0.0001	0.0000
41	0.0001	0.0000	0.0003	0.0001
42	0.0001	0.0001	0.0003	0.0001
43	0.0002	0.0001	0.0003	0.0001
44	0.0002	0.0001	0.0004	0.0002
45	0.0003	0.0001	0.0006	0.0002
46	0.0003	0.0002	0.0006	0.0002
47	0.0004	0.0002	0.0006	0.0002
48	0.0006	0.0003	0.0008	0.0003
49	0.0006	0.0003	0.0009	0.0003
50	0.0007	0.0003	0.0009	0.0003
51	0.0008	0.0004	0.0011	0.0004
52	0.0010	0.0004	0.0011	0.0004
53	0.0010	0.0005	0.0011	0.0005
54	0.0011	0.0005	0.0012	0.0005
55	0.0011	0.0005	0.0012	0.0005
56	0.0013	0.0006	0.0012	0.0005
57	0.0013	0.0006	0.0016	0.0006
58	0.0014	0.0006	0.0016	0.0006
59	0.0014	0.0006	0.0016	0.0006
60	0.0016	0.0007	0.0016	0.0006
61	0.0016	0.0007	0.0016	0.0007
62	0.0016	0.0007	0.0019	0.0007
63	0.0017	0.0007	0.0019	0.0007
64	0.0017	0.0007	0.0020	0.0007
65	0.0018	0.0007	0.0019	0.0007

Table 7: Chromatic Spatial Uniformity

Spatial non-uniformity of chromaticity Δu'v': 0.0020

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	PF2010A	HZTE028-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-08	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	WY12010	HZTE004-03	Sep. 18, 2014	Sep. 17, 2015
Temperature Meter	TES1310	HZTE017-01	Sep. 18, 2014	Sep. 17, 2015
Standard Source	D908	HZTE012-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2014	Sep. 17, 2015

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.

Goniophotometer Method

Photometric and Electrical Measurements

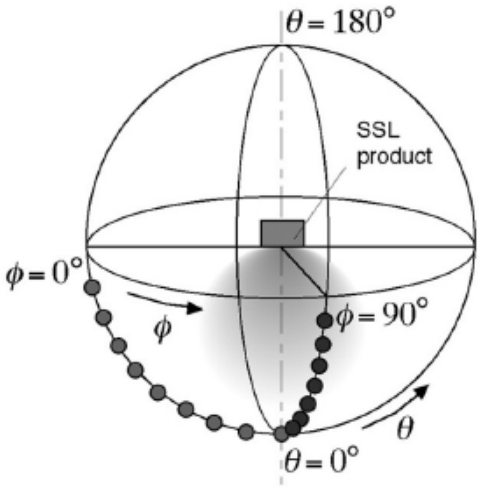
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured 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 China.
The uncertainty of goniophotometer system reported in this document is expended uncertainty is 1.94% 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 ***