



## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

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

### LED commercial downlight

**Model: 45CDLA9.5/827/277V**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ16020003b/R1

This report is replaced the old report No. HZ16020003b dated Mar. 16, 2016

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

Reviewed by:

Engineer: April Zou  
Mar. 31, 2016

Approved by:



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: 45CDLA9.5/827/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
87.6	3895.8	44.47	0.9927
CCT (K)	CRI	Stabilization Time (Light & Power)	
2718	82.0	60	

Table 1 Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Mar. 07, 2016
<b>Date of Test</b>	: Mar. 14, 2016
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters, Color Uniformity
<b>Reference Standard</b>	: 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)

<b>Name</b>	: LED commercial downlight
<b>Model</b>	: 45CDLA9.5/827/277V
<b>Electrical Ratings</b>	: 120-277VAC, 60Hz, 45W
<b>Product Description</b>	: 2700K, Non-dimmable, CRI80 Manufacturer of LED light source: Lextar Electronics Corp Model of LED light source: PC35H11
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

## TEST RESULTS

Test ambient temperature was 24.1°C.

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)	0.373	0.171
Power Factor	0.9927	0.9233
Test Power (W)	44.47	43.64
Off-State Power (W)	0	0
THD A%	10.06	17.73
Luminous Efficacy (lm/W)	87.6	86.3
Total Luminous Flux (lm)	3895.8	3765.0
Color Rendering Index (CRI)	82.0	
R9	6	
Correlated Color Temperature (CCT) (K)	2718	
Chromaticity (Chroma x, Chroma y)	(0.4583 , 0.4101)	
Chromaticity (Chroma u, Chroma v)	(0.2617, 0.3513)	
Chromaticity (Chroma u', Chroma v')	(0.2617, 0.5269)	
Duv	0.0001	
Average Beam Angle (°)	102.2	
Center Beam Candle Power (cd)	1583	
Spacing Criteria	1.21 (0°-180°)/ 1.20 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	83.54%	
Zonal Lumens in the 60°-90°Zone	16.36%	
Zonal Lumens in the 90°-120°Zone	0.03%	
Zonal Lumens in the 120°-180°Zone	0.07%	

Special Rendering Indices	Color
R1	81
R2	93
R3	92
R4	79
R5	82
R6	93
R7	80
R8	55
R9	6
R10	86
R11	78
R12	77
R13	84
R14	96

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

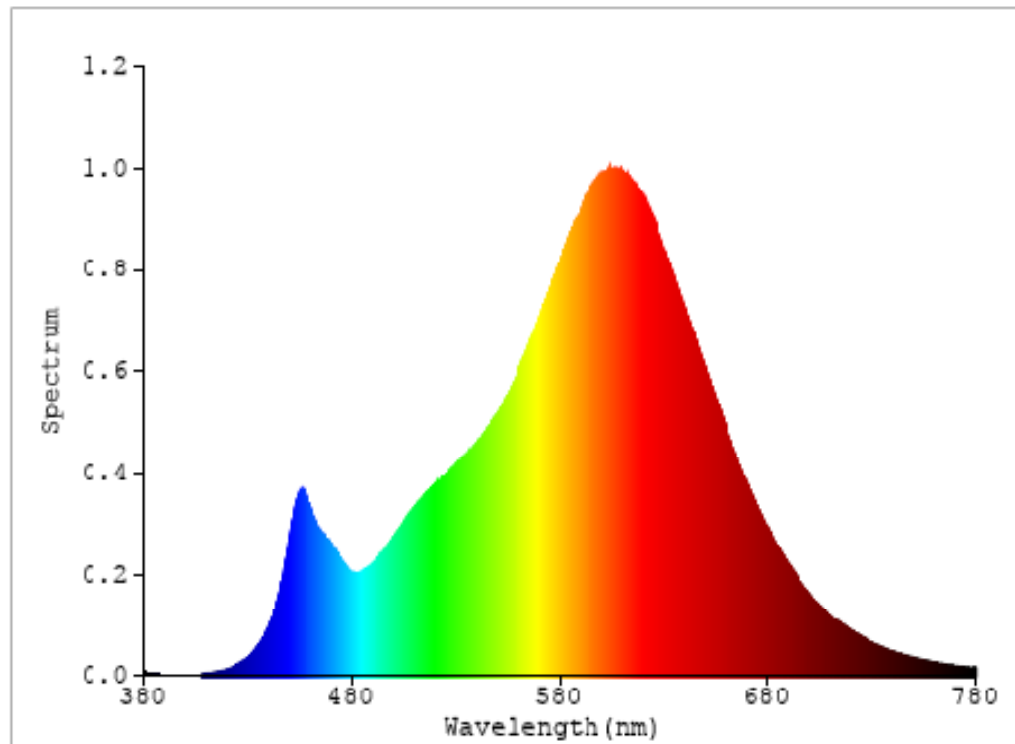


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	149.192	3.83%
10- 20	421.449	10.82%
20- 30	622.168	15.97%
30- 40	722.827	18.55%
40- 50	719.72	18.47%
50- 60	619.136	15.89%
60- 70	425.228	10.92%
70- 80	187.753	4.82%
80- 90	24.384	0.63%
90-100	0.239	0.01%
100-110	0.353	0.01%
110-120	0.438	0.01%
120-130	0.513	0.01%
130-140	0.613	0.02%
140-150	0.659	0.02%
150-160	0.585	0.02%
160-170	0.398	0.01%
170-180	0.146	0.00%
Total	3895.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3254.492	83.54%
60- 90	637.365	16.36%
0-90	3891.857	99.90%
90- 180	3.944	0.10%
0- 180	3895.8	100%

Table 3: Zonal Lumen Data

## Illuminance Plots

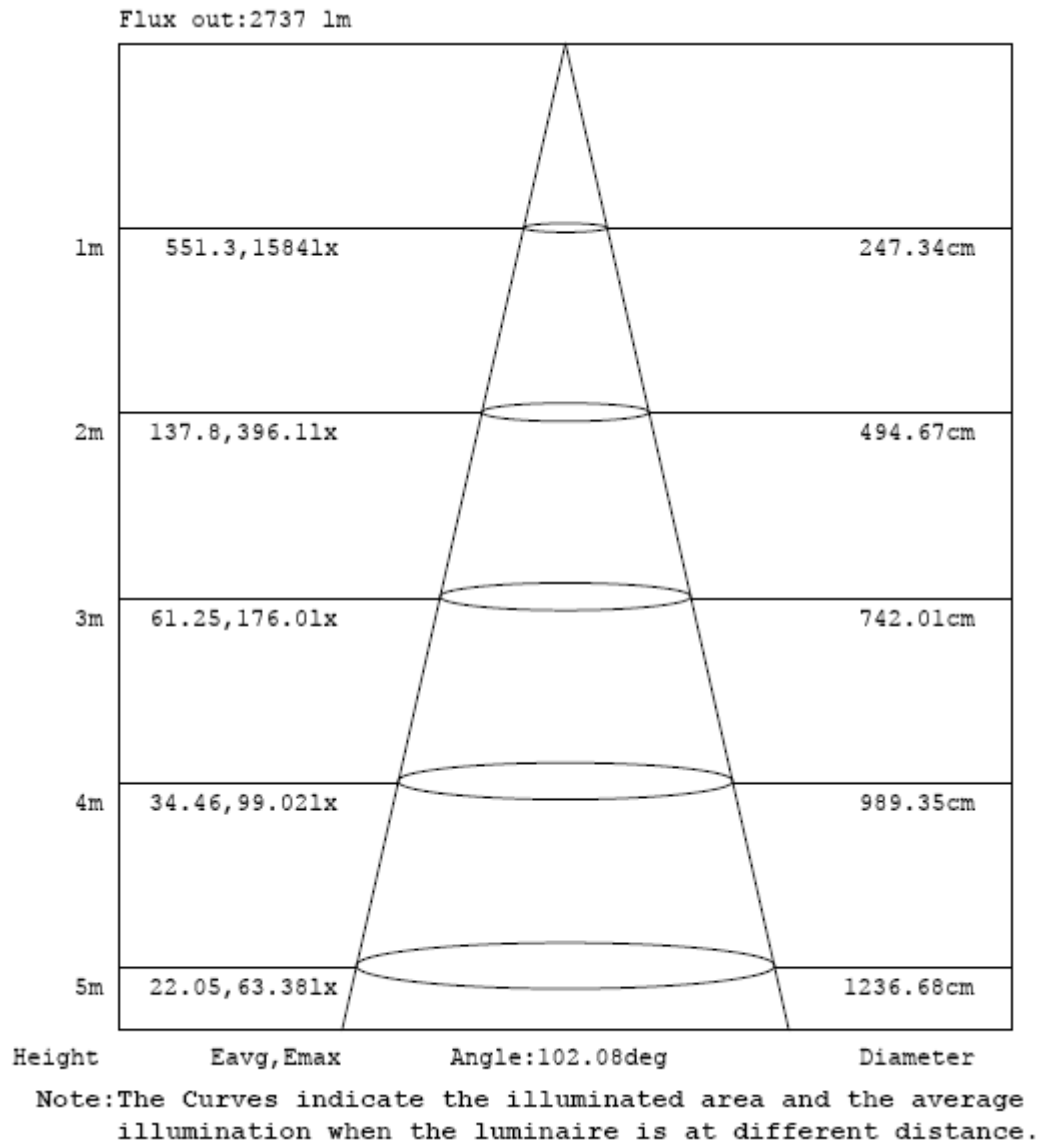


Chart 2: Beam angle



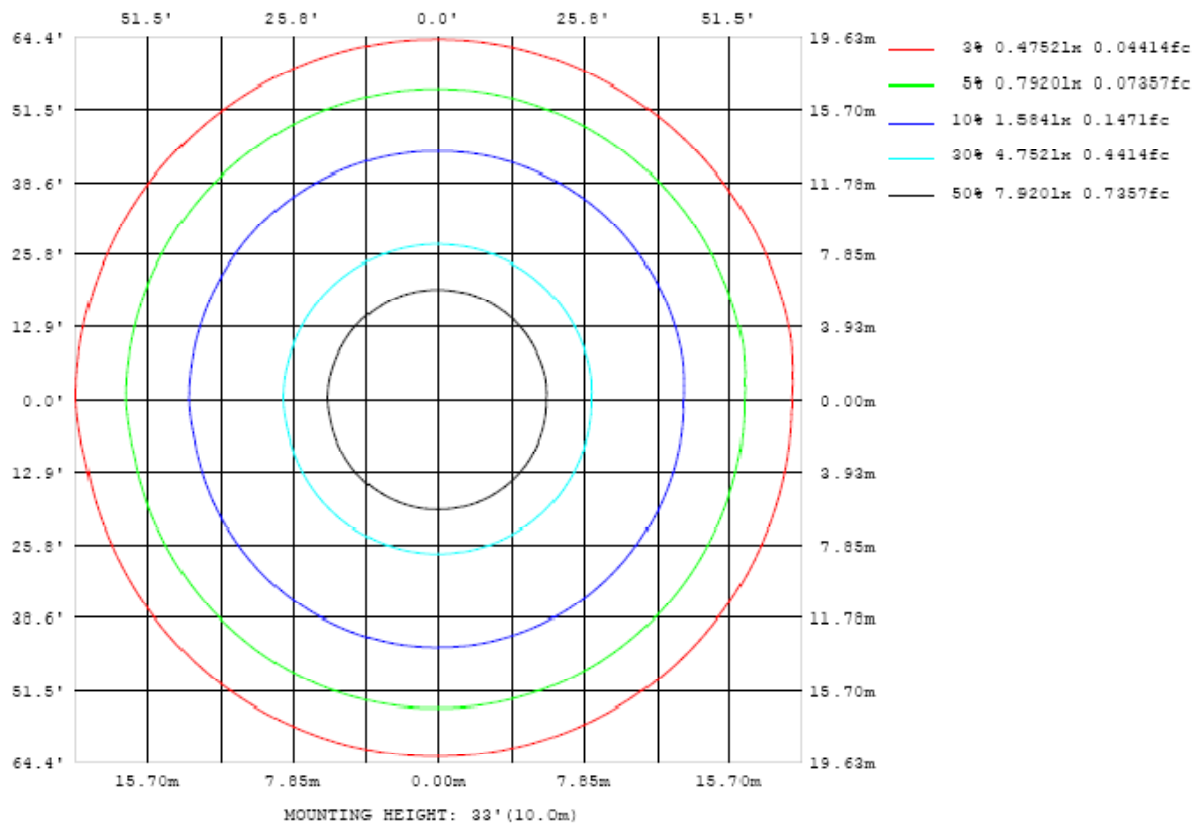


Chart 3: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

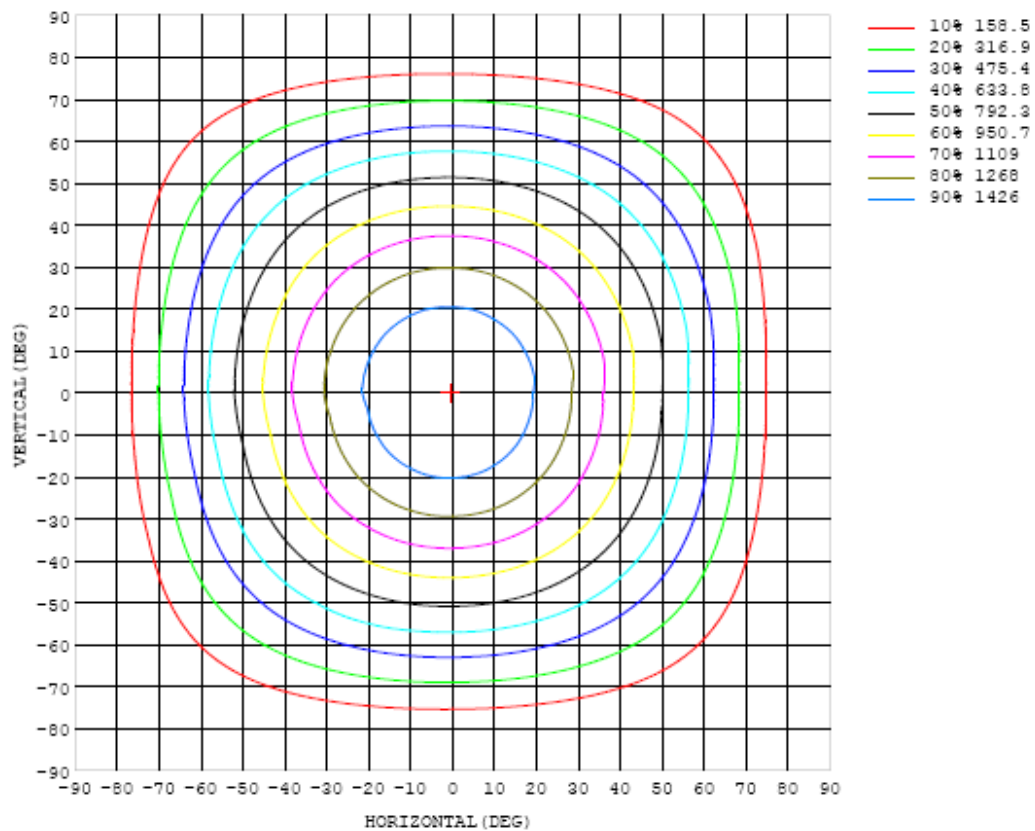


Chart 4: Isocandla Plot

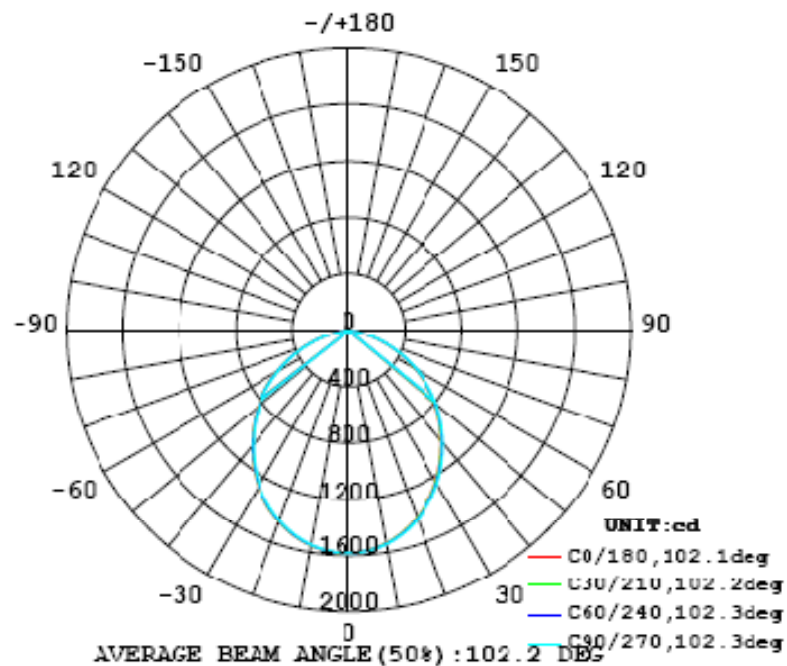


Chart 5: Polar Candela Distribution

## Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583
5	1568	1568	1563	1569	1569	1570	1571	1571	1572	1572	1573	1574	1574	1574	1574	1575	1574	1574	1578
10	1534	1534	1533	1536	1537	1538	1540	1541	1542	1543	1544	1545	1546	1546	1547	1547	1547	1547	1553
15	1482	1482	1483	1484	1486	1488	1490	1491	1493	1495	1496	1497	1499	1500	1500	1501	1501	1501	1509
20	1413	1413	1415	1416	1419	1421	1424	1425	1428	1430	1432	1433	1435	1435	1437	1437	1437	1437	1448
25	1329	1330	1332	1334	1336	1340	1342	1344	1347	1350	1351	1353	1355	1356	1357	1357	1357	1357	1372
30	1234	1235	1235	1239	1242	1245	1248	1251	1253	1256	1258	1260	1262	1263	1264	1264	1264	1264	1281
35	1130	1131	1132	1135	1138	1141	1144	1147	1150	1152	1155	1157	1158	1159	1161	1161	1161	1160	1180
40	1019	1021	1022	1025	1028	1031	1034	1037	1040	1043	1044	1047	1048	1049	1051	1051	1051	1050	1071
45	906	907	909	912	914	917	920	923	925	928	930	932	934	935	936	936	936	936	957
50	791	792	794	796	799	801	805	807	810	812	814	816	818	819	820	820	820	820	841
55	664	663	665	671	673	676	679	682	684	687	689	692	693	694	695	695	695	695	720
60	535	536	538	540	542	545	548	550	553	556	558	560	561	562	563	563	564	564	588
65	404	405	406	408	410	412	415	417	419	422	424	426	428	429	430	430	431	430	455
70	275	275	277	278	280	281	284	286	288	290	292	294	296	297	299	300	300	300	324
75	153	154	155	156	157	159	161	163	165	167	169	171	172	174	175	175	176	176	198
80	55.8	56.4	56.9	57.6	57.7	58.8	60.8	62.2	63.6	64.8	65.1	66.8	68.2	69.2	69.9	70.6	70.7	70.9	88.3
85	12.7	12.8	13.0	13.1	13.3	13.5	13.7	14.0	14.2	14.6	14.9	15.1	15.3	15.5	15.7	15.7	15.8	15.8	20.5
90	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	1.02	0.10	0.12	0.12	0.12	0.12	0.13	0.12	1.66
95	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	0.11	0.11	0.11	0.11	0.11	0.29
100	0.17	0.16	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.37
105	0.22	0.22	0.22	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	0.21	0.44
110	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.48
115	0.38	0.38	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.37	0.36	0.36	0.36	0.36	0.36	0.50
120	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.51
125	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.55
130	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.64
135	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.77	0.79
140	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.94
145	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	1.09
150	1.11	1.11	1.11	1.11	1.10	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.09	1.09	1.09	1.09	1.24
155	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.37
160	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.24	1.24	1.24	1.23	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.46
165	1.30	1.30	1.30	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.51
170	1.35	1.34	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.59
175	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.54	1.55	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.54	1.54	1.62
180	1.61	1.62	1.62	1.62	1.61	1.61	1.62	1.62	1.61	1.61	1.63	1.63	1.63	1.63	1.63	1.63	1.62	1.62	1.61

Table 4: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583	1583		
5	1577	1577	1576	1576	1576	1576	1574	1574	1573	1572	1572	1572	1571	1571	1571	1570	1570		
10	1553	1552	1551	1550	1550	1548	1547	1546	1545	1543	1542	1541	1540	1540	1540	1539	1539		
15	1509	1508	1507	1506	1504	1503	1501	1499	1497	1495	1495	1493	1491	1491	1490	1490	1490		
20	1447	1446	1445	1443	1442	1441	1438	1436	1434	1432	1430	1428	1426	1426	1424	1424	1425		
25	1372	1370	1369	1367	1366	1364	1361	1359	1357	1354	1352	1350	1347	1347	1345	1344	1344		
30	1281	1279	1278	1276	1275	1273	1270	1267	1265	1262	1259	1257	1254	1254	1252	1251	1251		
35	1179	1177	1176	1174	1173	1171	1168	1165	1162	1160	1157	1155	1152	1151	1149	1148	1148		
40	1070	1068	1067	1065	1064	1062	1059	1057	1054	1051	1049	1046	1043	1042	1040	1039	1039		
45	957	955	954	952	951	948	946	944	941	938	936	933	931	929	927	926	926		
50	841	839	838	836	835	833	831	828	826	823	821	819	816	815	813	812	812		
55	719	717	716	715	713	711	709	706	704	701	699	697	694	693	691	689	689		
60	587	586	584	583	581	579	577	575	572	570	567	565	563	561	560	558	558		
65	454	453	451	450	448	446	444	442	440	438	435	433	431	429	428	427	427		
70	323	322	320	319	317	315	312	310	308	306	304	302	301	299	298	298	298		
75	197	196	195	193	192	189	187	185	183	181	180	179	177	176	175	175	175		
80	87.9	87.1	85.5	84.1	82.7	80.9	79.1	77.5	75.6	74.3	73.0	71.8	70.8	70.2	69.6	69.4	69.6		
85	20.3	19.9	19.4	20.1	19.4	18.8	18.2	17.7	17.2	17.5	17.1	16.8	16.5	16.4	16.2	16.2	16.2		
90	1.57	1.43	1.29	1.11	0.95	0.80	0.62	0.53	0.44	0.38	0.33	0.29	0.27	0.26	0.25	0.25	0.25		
95	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31		
100	0.37	0.37	0.37	0.37	0.38	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39		
105	0.44	0.44	0.45	0.45	0.45	0.45	0.46	0.46	0.46	0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.47		
110	0.48	0.48	0.49	0.49	0.49	0.49	0.49	0.50	0.50	0.50	0.50	0.50	0.51	0.51	0.51	0.51	0.51		
115	0.50	0.50	0.50	0.50	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52		
120	0.51	0.51	0.52	0.52	0.52	0.52	0.53	0.53	0.53	0.53	0.53	0.53	0.54	0.54	0.54	0.54	0.54		
125	0.55	0.55	0.56	0.56	0.56	0.56	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57		
130	0.64	0.65	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.67	0.67	0.67	0.67	0.67	0.67	0.67		
135	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.82	0.82		
140	0.94	0.94	0.95	0.95	0.95	0.95	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.97	0.97	0.97		
145	1.09	1.10	1.10	1.10	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.12	1.12	1.12	1.12		
150	1.24	1.24	1.25	1.25	1.25	1.25	1.25	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26		
155	1.37	1.37	1.37	1.37	1.37	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38		
160	1.46	1.46	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.48	1.47	1.47	1.47	1.47	1.47	1.48	1.47		
165	1.52	1.52	1.52	1.52	1.52	1.52	1.51	1.52	1.52	1.52	1.53	1.52	1.52	1.52	1.52	1.52	1.52		
170	1.59	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.59	1.59	1.59	1.59	1.59	1.58	1.58	1.58	1.58		
175	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.63	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.61		
180	1.62	1.62	1.62	1.62	1.62	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61		

Table 5: Luminous Intensity Data

## Color Spatial Uniformity- Goniophotometer Method

Color uniformity was measured at two horizontal angles,  $0^\circ$  and  $90^\circ$ , the vertical intervals was  $1^\circ$ .

	C Angle = $0^\circ$		C Angle = $90^\circ$	
$\gamma$ Angle ( $^\circ$ )	Chromaticity Coordinate u'	Chromaticity Coordinate v'	Chromaticity Coordinate u'	Chromaticity Coordinate v'
0	0.2626	0.5275	0.2626	0.5275
1	0.2626	0.5274	0.2626	0.5274
2	0.2626	0.5274	0.2625	0.5274
3	0.2626	0.5274	0.2626	0.5274
4	0.2627	0.5274	0.2625	0.5274
5	0.2626	0.5274	0.2626	0.5274
6	0.2626	0.5274	0.2626	0.5274
7	0.2626	0.5274	0.2626	0.5274
8	0.2627	0.5274	0.2626	0.5274
9	0.2626	0.5274	0.2625	0.5274
10	0.2626	0.5274	0.2626	0.5274
11	0.2626	0.5274	0.2625	0.5274
12	0.2627	0.5274	0.2626	0.5274
13	0.2626	0.5274	0.2626	0.5274
14	0.2626	0.5274	0.2625	0.5274
15	0.2626	0.5274	0.2625	0.5274
16	0.2626	0.5274	0.2625	0.5274
17	0.2626	0.5274	0.2626	0.5274
18	0.2626	0.5274	0.2625	0.5274
19	0.2626	0.5274	0.2624	0.5273
20	0.2626	0.5274	0.2624	0.5273
21	0.2626	0.5274	0.2624	0.5273
22	0.2626	0.5274	0.2624	0.5273
23	0.2626	0.5274	0.2624	0.5273
24	0.2626	0.5273	0.2624	0.5273
25	0.2626	0.5273	0.2624	0.5273
26	0.2626	0.5273	0.2624	0.5273
27	0.2626	0.5273	0.2624	0.5272
28	0.2623	0.5272	0.2623	0.5272
29	0.2623	0.5272	0.2622	0.5272
30	0.2623	0.5272	0.2622	0.5272
31	0.2623	0.5272	0.2622	0.5272
32	0.2623	0.5272	0.2622	0.5272
33	0.2623	0.5272	0.2622	0.5272
34	0.2623	0.5272	0.2621	0.5272
35	0.2622	0.5272	0.262	0.5271

36	0.2622	0.5271	0.262	0.5271
37	0.2622	0.5271	0.262	0.5271
38	0.262	0.527	0.2619	0.5271
39	0.2619	0.527	0.2619	0.527
40	0.2619	0.527	0.2618	0.527
41	0.2619	0.527	0.2618	0.527
42	0.2619	0.527	0.2617	0.527
43	0.2618	0.5269	0.2617	0.5269
44	0.2618	0.5269	0.2617	0.5269
45	0.2618	0.5269	0.2615	0.5269
46	0.2616	0.5268	0.2615	0.5268
47	0.2615	0.5268	0.2615	0.5268
48	0.2615	0.5268	0.2615	0.5268
49	0.2615	0.5268	0.2613	0.5268
50	0.2615	0.5268	0.2613	0.5267
51	0.2615	0.5267	0.2613	0.5267
52	0.2614	0.5267	0.2613	0.5267
53	0.2612	0.5267	0.2612	0.5267
54	0.2612	0.5266	0.2612	0.5266
55	0.2611	0.5266	0.2612	0.5266
56	0.2611	0.5266	0.2611	0.5266
57	0.2611	0.5265	0.2608	0.5265
58	0.2609	0.5265	0.2608	0.5265
59	0.2608	0.5264	0.2607	0.5264
60	0.2608	0.5264	0.2607	0.5264
61	0.2608	0.5264	0.2607	0.5264
62	0.2606	0.5263	0.2607	0.5263
63	0.2605	0.5263	0.2603	0.5263
64	0.2605	0.5263	0.2604	0.5262
65	0.2603	0.5262	0.2604	0.5262
66	0.2604	0.5262	0.2604	0.5262
67	0.2603	0.5262	0.2603	0.5262
68	0.2602	0.5261	0.2601	0.5261
69	0.2602	0.5261	0.2601	0.5261
70	0.2600	0.5260	0.2601	0.5260
71	0.2600	0.5260	0.2598	0.5260
72	0.2599	0.5260	0.2599	0.5260
73	0.2600	0.5260	0.2598	0.5260
74	0.2599	0.5259	0.2599	0.5260

Table 6: Chromaticity per Measurement Angle

Weighted Average	
u'	v'
0.2619	0.5270

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

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

32	0.0004	0.0002	0.0003	0.0002
33	0.0004	0.0002	0.0003	0.0002
34	0.0004	0.0002	0.0002	0.0002
35	0.0003	0.0002	0.0001	0.0001
36	0.0003	0.0001	0.0001	0.0001
37	0.0003	0.0001	0.0001	0.0001
38	0.0001	0.0000	0.0000	0.0001
39	0.0000	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0001	0.0000
41	0.0000	0.0000	0.0001	0.0000
42	0.0000	0.0000	0.0002	0.0000
43	0.0001	0.0001	0.0002	0.0001
44	0.0001	0.0001	0.0002	0.0001
45	0.0001	0.0001	0.0004	0.0001
46	0.0003	0.0002	0.0004	0.0002
47	0.0004	0.0002	0.0004	0.0002
48	0.0004	0.0002	0.0004	0.0002
49	0.0004	0.0002	0.0006	0.0002
50	0.0004	0.0002	0.0006	0.0003
51	0.0004	0.0003	0.0006	0.0003
52	0.0005	0.0003	0.0006	0.0003
53	0.0007	0.0003	0.0007	0.0003
54	0.0007	0.0004	0.0007	0.0004
55	0.0008	0.0004	0.0007	0.0004
56	0.0008	0.0004	0.0008	0.0004
57	0.0008	0.0005	0.0011	0.0005
58	0.0010	0.0005	0.0011	0.0005
59	0.0011	0.0006	0.0012	0.0006
60	0.0011	0.0006	0.0012	0.0006
61	0.0011	0.0006	0.0012	0.0006
62	0.0013	0.0007	0.0012	0.0007
63	0.0014	0.0007	0.0016	0.0007
64	0.0014	0.0007	0.0015	0.0008
65	0.0016	0.0008	0.0015	0.0008

Table 7: Chromatic Spatial Uniformity

**Spatial non-uniformity of chromaticity  $\Delta u'v'$ : 0.0016**



## 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.

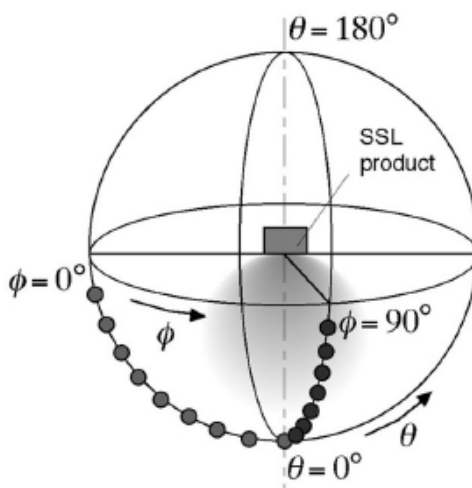
## Color Characteristics Measurements

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 ( $C=0^\circ/180^\circ$  and  $C=90^\circ/270^\circ$ ) and at  $10^\circ$  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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