Quality Assured

NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

ABBlighting,Inc.

1501 Industrial Way N. Toms River, NJ 08755

45W Floodlight

Model: ABBFL45LED50-N

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

No.1805, DongLiu road, BinJiang District, Hangzhou, China

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www.ledtestlab.com

Report No.: HZ15060008c

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

Reviewed by:

Engineer: April Zou

Jun. 05, 2015

Approved by:

Manager: Jim Zhang

Jun. 05, 2015

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: **ABBFL45LED50-N**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
84.3	3634.1	43.13	0.9904

CCT (K)	CRI	Stabilization Time (Light & Power)
5080	74.0	60

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Jun. 02, 2015
Date of Test	: Jun. 03, 2015
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

TABLE OF CONTENT

Sample Photo

Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: 45W Floodlight
Model	: ABBFL45LED50-N
Electrical Ratings	: 100~277VAC, 50/60Hz, 45W
Product Description	: 5000K, Architectural Flood and Spot Luminaires Manufacturer of light source: Samsung Model of light source: LH351B Series Quantity of LED light source: 18 pcs
Manufacturer	: ABB Lighting (Shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.7℃.

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 85 minutes.

The photometric distance is 2.475m.

Luminous data was taken at 0.5°vertical intervals and 10°horizontal intervals.

Parameter	Result		
Test Voltage (V)	120.0	100.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	0.363	0.445	0.163
Power Factor	0.9904	0.9848	0.9487
Test Power (W)	43.13	43.81	42.73
THD A%	9.44	10.41	11.77
Luminous Efficacy (lm/W)	84.3	82.8	85.0
Total Luminous Flux (lm)	3634.1	3629.1	3632.5
Color Rendering Index (CRI)	74.0		
R9	-31		
Correlated Color Temperature (CCT) (K)	5080		
Chromaticity (Chroma x, Chroma y)	(0.3434, 0.3563)		
Chromaticity (Chroma u, Chroma v)	(0.2085, 0.3245)		
Chromaticity (Chroma u', Chroma v')	(0.2085, 0.4867)		
Duv	0.0030		
Average Beam Angle (°)	74.5		
Center Beam Candle Power (cd)	2935		
Spacing Criteria	1.02 (0°-180°)/ 1.05 (90°-270°)		
Zonal Lumens in the 0°-60°Zone	99.59%		
Zonal Lumens in the 60°-90°Zone	0.35%		
Zonal Lumens in the 90°-120°Zone	0.00%		
Zonal Lumens in the 120°-180°Zone	0.06%		

Special Color Rendering Indices	
R1	70
R2	81
R3	87
R4	72
R5	72
R6	73
R7	82
R8	55
R9	-31
R10	53
R11	68
R12	50
R13	72
R14	93

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

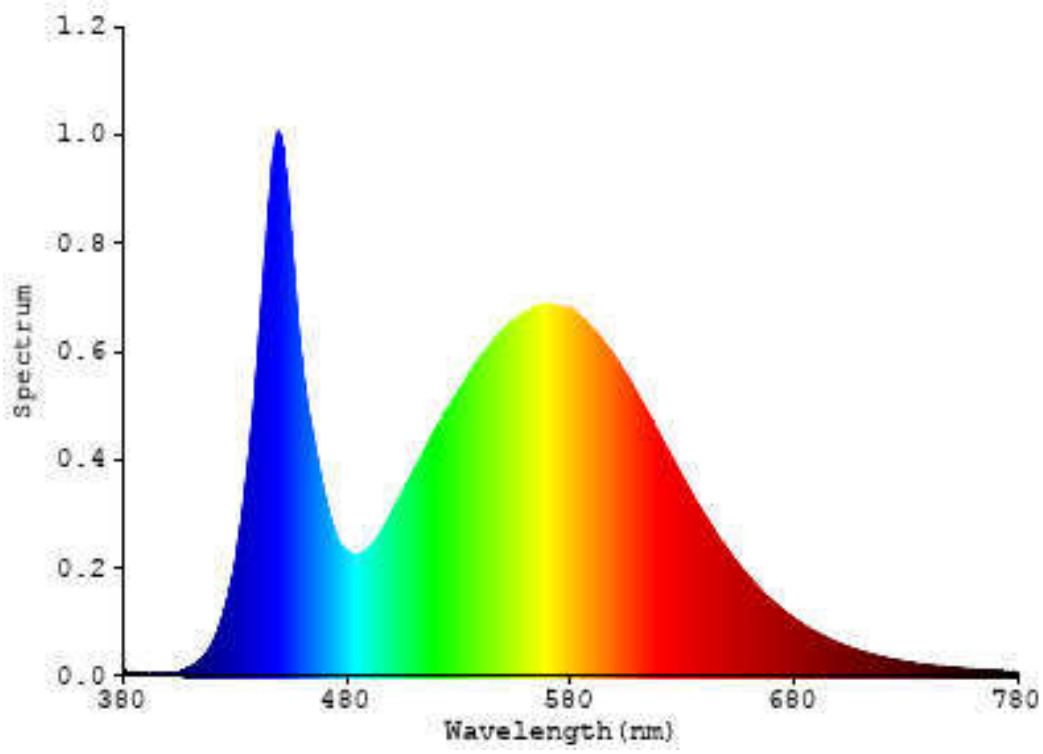


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	275.909	7.59%
10- 20	754.781	20.77%
20- 30	1061.945	29.22%
30- 40	1063.655	29.27%
40- 50	426.662	11.74%
50- 60	36.369	1.00%
60- 70	9.444	0.26%
70- 80	2.97	0.08%
80- 90	0.249	0.01%
90-100	0.032	0.00%
100-110	0.037	0.00%
110-120	0.08	0.00%
120-130	0.199	0.01%
130-140	0.356	0.01%
140-150	0.461	0.01%
150-160	0.464	0.01%
160-170	0.34	0.01%
170-180	0.127	0.00%
Total	3634.1	100%

γ(°)	Lumens	% Total
0- 60	3619.321	99.59%
60- 90	12.663	0.35%
0-90	3631.984	99.94%
90- 180	2.096	0.06%
0- 180	3634.1	100%

Table 3: Zonal Lumen Data

Illuminance Plots

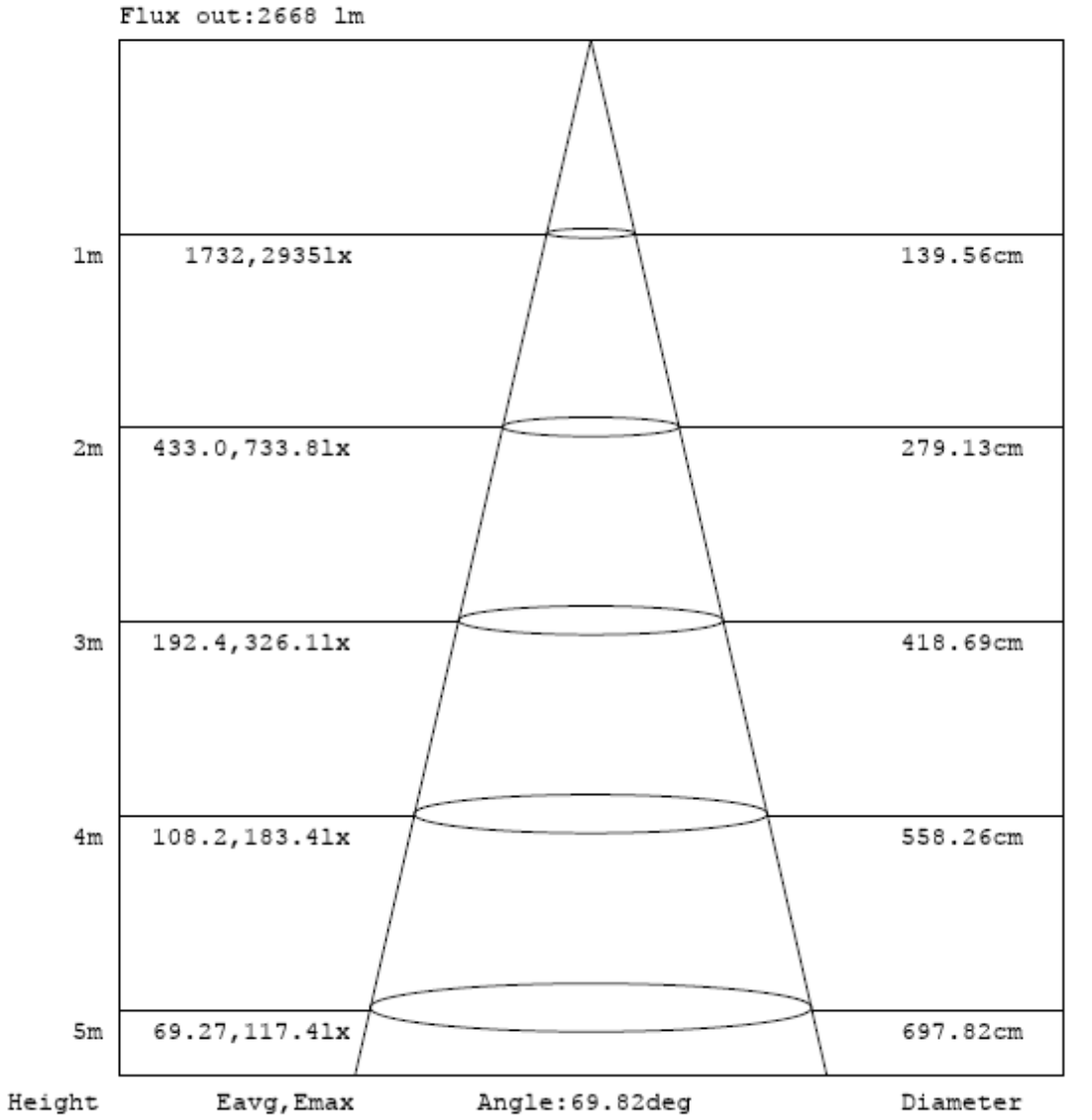


Chart 2: Beam Angle

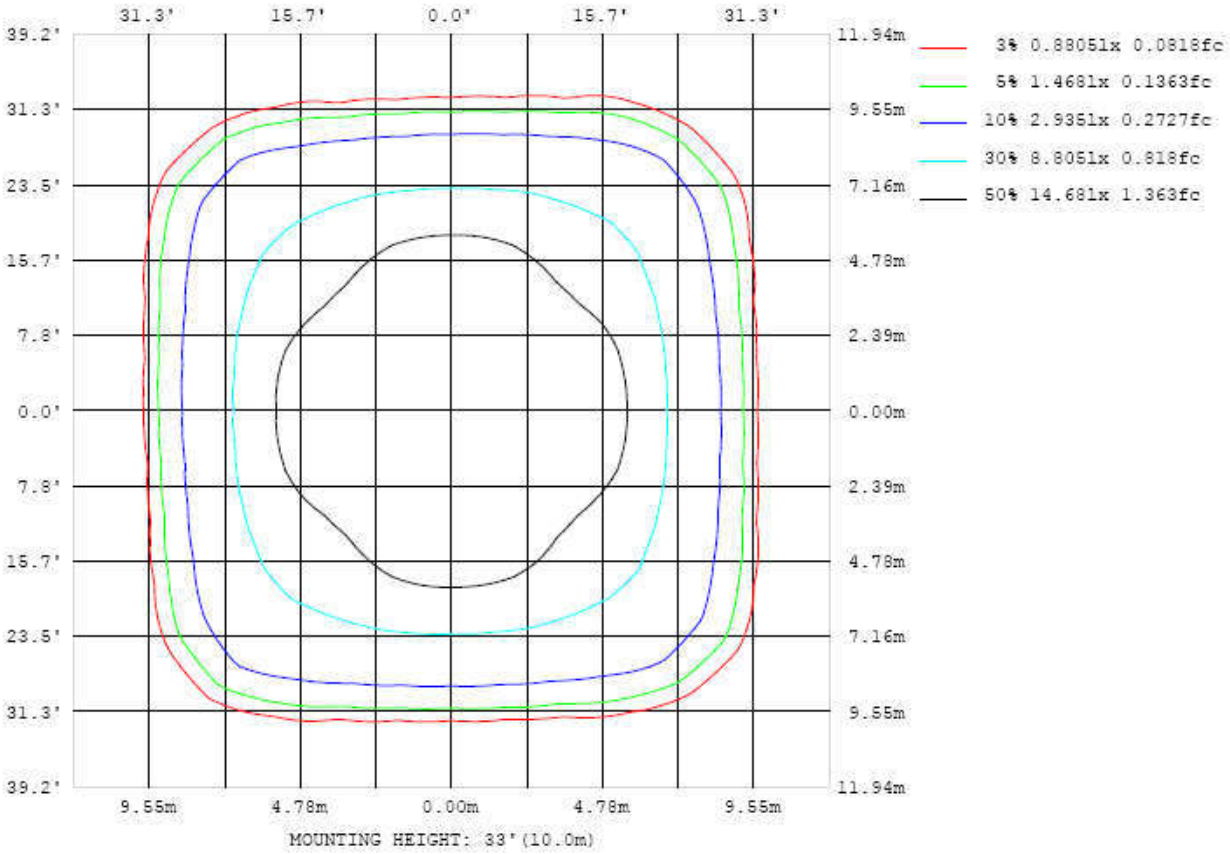


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

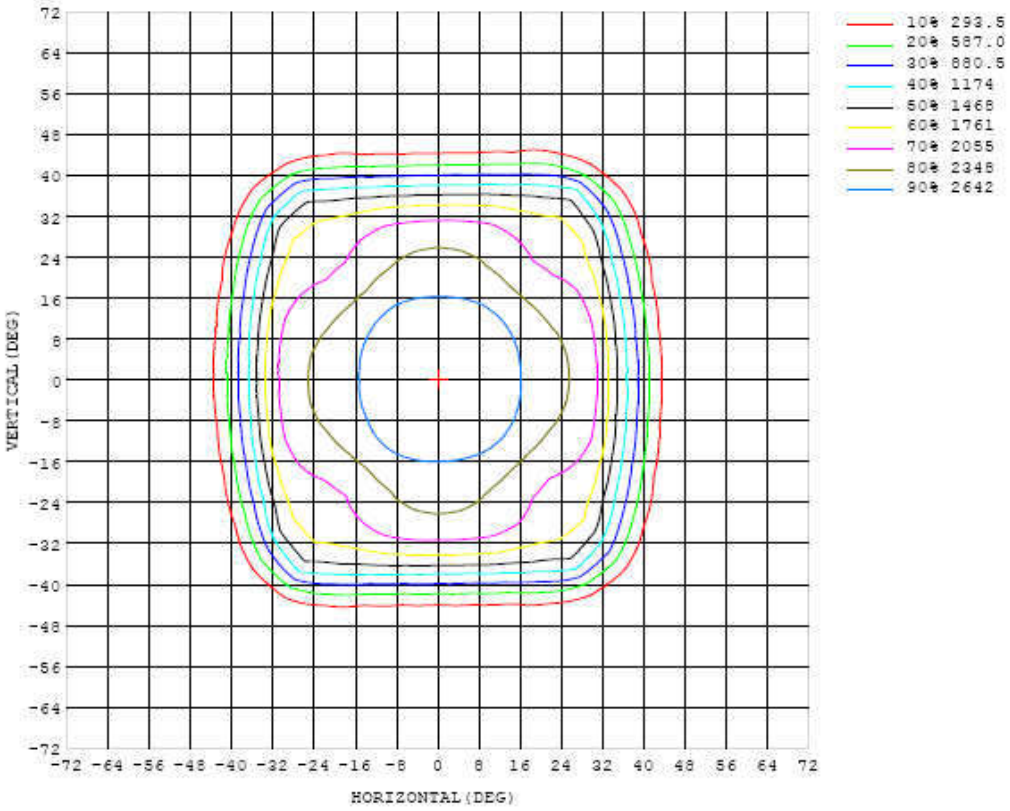


Chart 4: Isocandela Plot

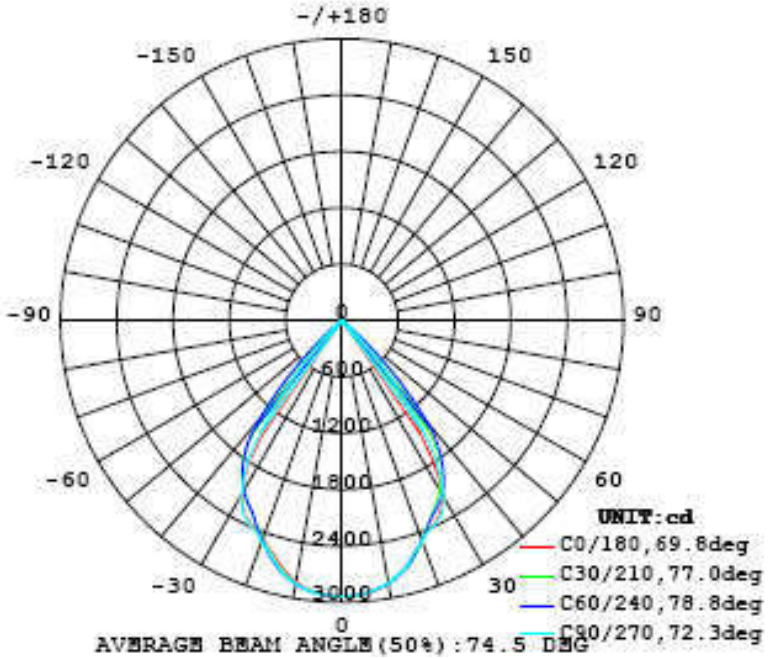


Chart 5: Polar Candela Distribution

Luminous Intensity Data

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	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935
5	2913	2915	2915	2915	2914	2913	2913	2913	2913	2913	2913	2913	2913	2913	2914	2914	2914	2913	2913
10	2842	2846	2844	2845	2844	2842	2840	2840	2839	2839	2839	2840	2837	2832	2833	2834	2832	2828	2824
15	2691	2696	2699	2703	2710	2710	2704	2694	2688	2688	2691	2696	2700	2702	2695	2675	2668	2660	2654
20	2497	2498	2492	2489	2494	2484	2486	2494	2497	2498	2499	2491	2479	2468	2464	2473	2476	2476	2477
25	2362	2353	2329	2270	2208	2228	2288	2345	2369	2377	2369	2338	2256	2201	2212	2280	2332	2352	2353
30	2130	2150	2165	2087	2010	2032	2138	2195	2177	2166	2180	2173	2096	2018	2024	2114	2164	2141	2130
35	1422	1501	1706	1837	1893	1894	1866	1811	1709	1669	1723	1809	1864	1901	1889	1829	1729	1543	1485
40	716	778	963	1242	1657	1672	1412	1096	905	858	925	1142	1476	1703	1644	1208	902	743	713
45	170	198	318	621	995	1092	674	366	226	200	238	405	739	1176	934	542	280	175	182
50	58.6	57.5	72.5	135	298	277	120	62.3	52.9	55.9	53.6	69.8	142	331	267	96.0	59.9	49.4	50.3
55	25.9	21.3	29.0	36.7	30.2	31.2	31.0	26.2	21.9	26.3	20.9	28.2	31.4	29.8	28.9	31.2	22.8	19.6	24.6
60	17.6	12.8	13.9	14.7	14.3	14.2	14.3	12.8	13.3	17.4	12.4	13.5	13.7	13.8	13.5	14.0	12.6	12.5	17.3
65	11.3	8.81	9.70	9.92	9.14	9.33	9.74	9.07	9.32	11.1	8.85	9.64	9.54	8.89	8.96	9.45	8.52	8.52	10.7
70	6.52	5.10	6.00	5.91	5.39	5.78	6.23	5.57	5.14	6.30	4.94	5.95	6.07	5.28	5.14	5.70	5.23	4.87	6.25
75	2.98	2.32	2.93	3.10	2.59	2.57	2.97	2.42	2.27	2.69	2.22	2.63	2.82	2.43	2.46	2.81	2.26	2.14	2.75
80	0.58	0.56	0.66	0.76	0.74	0.77	0.76	0.76	0.72	0.70	0.71	0.76	0.78	0.76	0.71	0.68	0.55	0.50	0.50
85	0.08	0.08	0.10	0.11	0.14	0.17	0.18	0.19	0.21	0.20	0.21	0.21	0.20	0.18	0.15	0.12	0.09	0.08	0.10
90	0.03	0.03	0.02	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
95	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	0.04
100	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	0.04
105	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.04
110	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.04
115	0.06	0.06	0.06	0.07	0.08	0.08	0.08	0.08	0.07	0.06	0.07	0.08	0.08	0.08	0.08	0.08	0.07	0.06	0.06
120	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.12	0.11
125	0.23	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.25	0.25	0.25	0.24	0.23	0.22	0.22	0.22	0.22	0.22	0.18
130	0.35	0.34	0.34	0.33	0.34	0.34	0.35	0.36	0.37	0.38	0.37	0.35	0.34	0.33	0.32	0.33	0.33	0.34	0.28
135	0.48	0.48	0.46	0.46	0.46	0.48	0.50	0.52	0.49	0.52	0.50	0.49	0.46	0.44	0.43	0.44	0.46	0.47	0.42
140	0.61	0.60	0.59	0.58	0.59	0.61	0.63	0.66	0.64	0.66	0.64	0.61	0.58	0.56	0.55	0.55	0.56	0.59	0.55
145	0.74	0.72	0.72	0.69	0.71	0.74	0.76	0.78	0.80	0.78	0.76	0.74	0.71	0.68	0.67	0.66	0.70	0.69	0.70
150	0.86	0.86	0.87	0.86	0.85	0.85	0.89	0.90	0.89	0.89	0.87	0.85	0.82	0.82	0.81	0.82	0.84	0.83	0.87
155	0.99	1.00	0.99	1.02	0.97	0.97	0.98	0.99	0.97	0.96	0.95	0.94	0.94	0.95	0.98	1.00	0.97	0.96	1.01
160	1.11	1.10	1.09	1.11	1.09	1.05	1.04	1.04	1.03	0.98	1.02	1.03	1.04	1.08	1.13	1.12	1.09	1.07	1.17
165	1.15	1.16	1.18	1.19	1.19	1.14	1.11	1.10	1.08	1.06	1.11	1.15	1.15	1.19	1.20	1.18	1.16	1.12	1.21
170	1.20	1.21	1.24	1.26	1.25	1.18	1.16	1.15	1.18	1.16	1.15	1.20	1.20	1.23	1.24	1.22	1.20	1.18	1.29
175	1.38	1.39	1.40	1.42	1.39	1.35	1.34	1.32	1.29	1.27	1.32	1.35	1.35	1.36	1.38	1.38	1.37	1.36	1.38
180	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36

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	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935	2935		
5	2913	2914	2915	2915	2917	2919	2919	2920	2920	2920	2919	2918	2916	2914	2913	2913	2913		
10	2827	2834	2843	2846	2846	2846	2843	2844	2847	2847	2846	2846	2848	2849	2850	2846	2842		
15	2661	2673	2683	2696	2704	2705	2701	2697	2694	2697	2702	2713	2719	2714	2706	2699	2693		
20	2476	2479	2471	2462	2468	2480	2499	2506	2510	2506	2504	2498	2498	2498	2495	2502	2496		
25	2350	2326	2266	2206	2209	2260	2333	2359	2369	2361	2343	2279	2229	2249	2300	2343	2358		
30	2154	2165	2097	2018	2019	2092	2156	2145	2140	2158	2172	2108	2035	2052	2141	2170	2146		
35	1565	1752	1848	1889	1877	1835	1774	1671	1635	1698	1814	1863	1906	1897	1837	1667	1495		
40	775	963	1279	1667	1655	1365	1076	909	869	942	1145	1449	1697	1599	1186	918	761		
45	205	329	615	988	1065	655	371	248	227	267	431	760	1120	906	545	287	200		
50	48.1	62.1	123	292	272	167	93.2	71.6	72.5	76.2	106	200	278	256	115	67.7	55.6		
55	19.1	25.1	28.7	22.6	24.8	41.9	30.1	22.3	27.0	22.4	34.3	40.4	25.4	26.4	35.8	26.2	21.5		
60	11.9	13.2	13.8	13.7	13.7	14.8	13.3	13.3	18.0	13.0	14.0	15.0	14.6	14.6	15.1	13.3	13.3		
65	8.24	9.31	9.40	8.87	9.02	9.53	9.31	9.33	11.3	9.03	9.80	9.86	9.29	9.57	10.2	9.18	9.29		
70	4.66	5.83	5.61	5.20	5.48	6.23	5.81	5.25	6.55	5.26	6.13	6.38	5.57	5.60	6.24	5.67	5.33		
75	2.08	2.64	2.79	2.53	2.57	3.10	2.65	2.52	3.21	2.45	2.94	3.21	2.63	2.69	3.28	2.54	2.51		
80	0.52	0.66	0.74	0.74	0.79	0.84	0.77	0.74	0.73	0.75	0.78	0.85	0.80	0.74	0.73	0.60	0.59		
85	0.10	0.13	0.16	0.19	0.22	0.24	0.25	0.26	0.25	0.25	0.23	0.21	0.18	0.14	0.11	0.10	0.09		
90	0.03	0.04	0.03	0.03	0.04	0.03	0.04	0.03	0.04	0.03	0.04	0.04	0.03	0.03	0.03	0.04	0.04		
95	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
100	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		
105	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.04		
110	0.04	0.05	0.06	0.07	0.07	0.06	0.05	0.05	0.04	0.05	0.05	0.06	0.07	0.07	0.06	0.05	0.04		
115	0.07	0.08	0.09	0.10	0.10	0.09	0.08	0.07	0.07	0.07	0.08	0.10	0.10	0.10	0.09	0.07	0.06		
120	0.11	0.13	0.14	0.15	0.15	0.15	0.14	0.13	0.12	0.13	0.14	0.15	0.15	0.15	0.14	0.12	0.11		
125	0.19	0.20	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.22	0.21	0.20	0.19	0.19		
130	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.34	0.34	0.34	0.34	0.33	0.32	0.31	0.30	0.29	0.28		
135	0.41	0.42	0.43	0.45	0.46	0.48	0.49	0.50	0.50	0.49	0.49	0.47	0.46	0.44	0.44	0.43	0.42		
140	0.56	0.56	0.57	0.59	0.62	0.64	0.66	0.66	0.66	0.65	0.64	0.61	0.58	0.58	0.55	0.55	0.54		
145	0.71	0.70	0.71	0.73	0.77	0.80	0.83	0.84	0.83	0.80	0.77	0.75	0.75	0.71	0.69	0.70	0.70		
150	0.87	0.88	0.87	0.89	0.92	0.95	0.97	0.98	0.94	0.96	0.95	0.91	0.90	0.87	0.88	0.88	0.88		
155	1.03	1.04	1.07	1.06	1.06	1.07	1.06	1.08	1.07	1.09	1.05	1.05	1.02	1.02	1.05	1.02	1.01		
160	1.20	1.20	1.22	1.22	1.21	1.19	1.18	1.20	1.17	1.20	1.17	1.17	1.15	1.18	1.17	1.16	1.16		
165	1.24	1.28	1.31	1.34	1.34	1.32	1.29	1.27	1.27	1.27	1.27	1.28	1.26	1.27	1.26	1.23	1.21		
170	1.33	1.35	1.38	1.41	1.43	1.41	1.39	1.34	1.34	1.34	1.35	1.33	1.30	1.34	1.35	1.32	1.26		
175	1.40	1.41	1.43	1.45	1.45	1.44	1.41	1.39	1.36	1.35	1.41	1.38	1.38	1.41	1.41	1.37	1.37		
180	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36		

Table 5: Luminous Intensity Data

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 6: 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

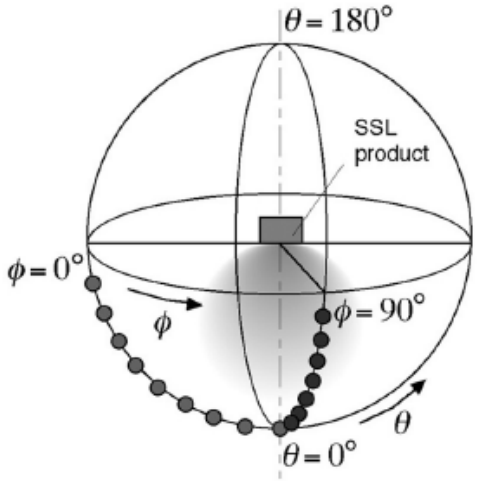
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured 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 P.R. 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 ***

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