



LM-79-08 Test Report

for

ABBlighting, Inc.

1501 Industrial Way N. Toms River, NJ 08755

15W Floodlight

Model: ABBFL15LED50-N

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ15060008a

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

Reviewed by:

April Zou

Engineer: April Zou
Jun. 05, 2015



Jim Zhang

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: ABBFL15LED50-N

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
81.5	1152.7	14.14	0.9765
CCT (K)	CRI	Stabilization Time (Light & Power)	
5098	73.9	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

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Sample Photo



Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: 15W Floodlight
Model	: ABBFL15LED50-N
Electrical Ratings	: 100~277VAC, 50/60Hz, 15W
Product Description	: 5000K, Architectural Flood and Spot Luminaires Manufacturer of light source: Samsung Model of light source: LH351B Series Quantity of LED light source: 6pcs
Manufacturer	: ABB Lighting (Shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.8°C.

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			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	70
Voltage frequency (Hz)	60	60	60	R2	81
Test Current (A)	0.121	0.146	0.057	R3	88
Power Factor	0.9765	0.9763	0.8741	R4	72
Test Power (W)	14.14	14.29	13.73	R5	71
THD A%	11.85	9.65	19.03	R6	73
Luminous Efficacy (lm/W)	81.5	80.1	82.6	R7	82
Total Luminous Flux (lm)	1152.7	1145.3	1134.5	R8	55
Color Rendering Index (CRI)	73.9			R9	-32
R9	-32			R10	54
Correlated Color Temperature (CCT) (K)	5098			R11	67
Chromaticity (Chroma x, Chroma y)	(0.3429, 0.3565)			R12	50
Chromaticity (Chroma u, Chroma v)	(0.2081, 0.3245)			R13	72
Chromaticity (Chroma u', Chroma v')	(0.2081, 0.4867)			R14	93
Duv	0.0033				
Average Beam Angle (°)	70.4				
Center Beam Candle Power (cd)	1026				
Spacing Criteria	0.96 (0°-180°)/ 0.96 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	99.60%				
Zonal Lumens in the 60°-90°Zone	0.34%				
Zonal Lumens in the 90°-120°Zone	0.00%				
Zonal Lumens in the 120°-180°Zone	0.06%				

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

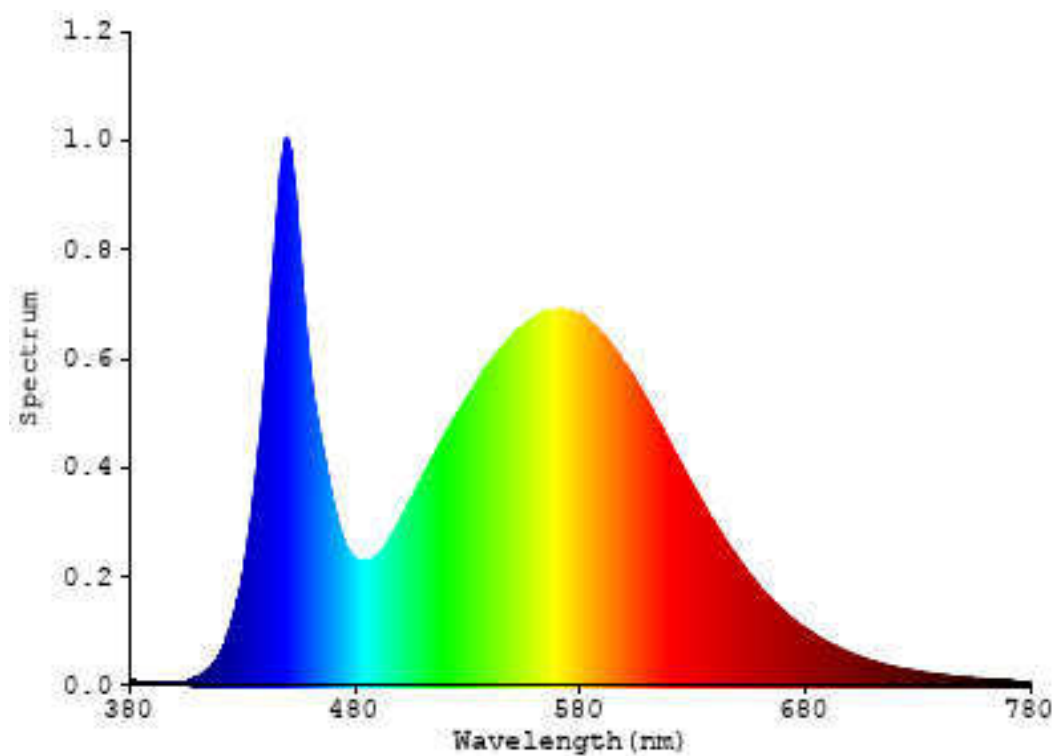


Chart 1: Spectral Power Distribution

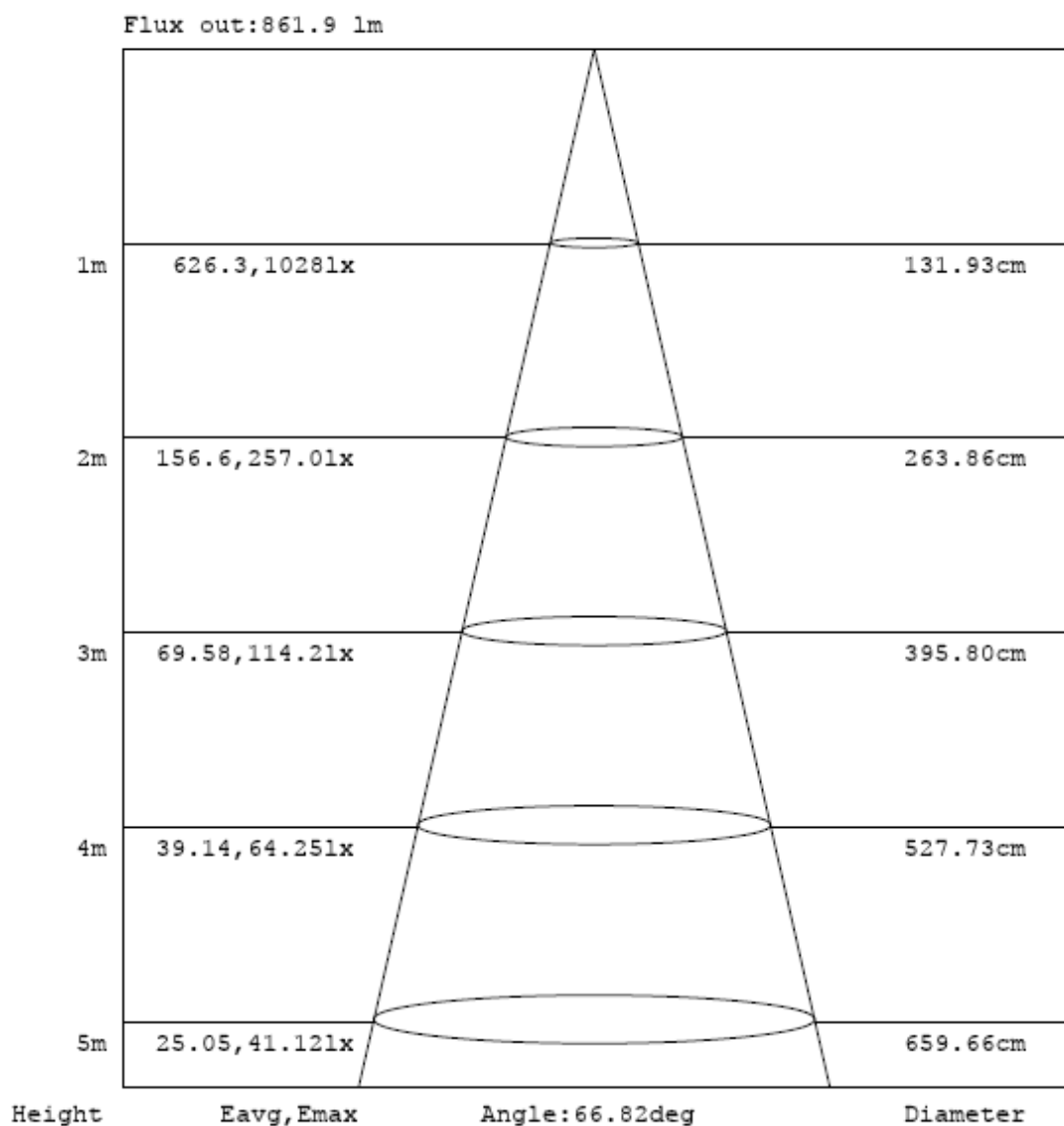
Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	96.316	8.36%
10- 20	266.61	23.13%
20- 30	367.512	31.88%
30- 40	319.948	27.76%
40- 50	89.125	7.73%
50- 60	8.612	0.75%
60- 70	2.775	0.24%
70- 80	0.956	0.08%
80- 90	0.144	0.01%
90-100	0.014	0.00%
100-110	0.016	0.00%
110-120	0.028	0.00%
120-130	0.065	0.01%
130-140	0.115	0.01%
140-150	0.152	0.01%
150-160	0.155	0.01%
160-170	0.115	0.01%
170-180	0.044	0.00%
Total	1152.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1148.123	99.60%
60- 90	3.875	0.34%
0-90	1151.998	99.94%
90- 180	0.704	0.06%
0- 180	1152.7	100%

Table 3: Zonal Lumen Data

Illuminance Plots



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

Chart 2: Beam Angle

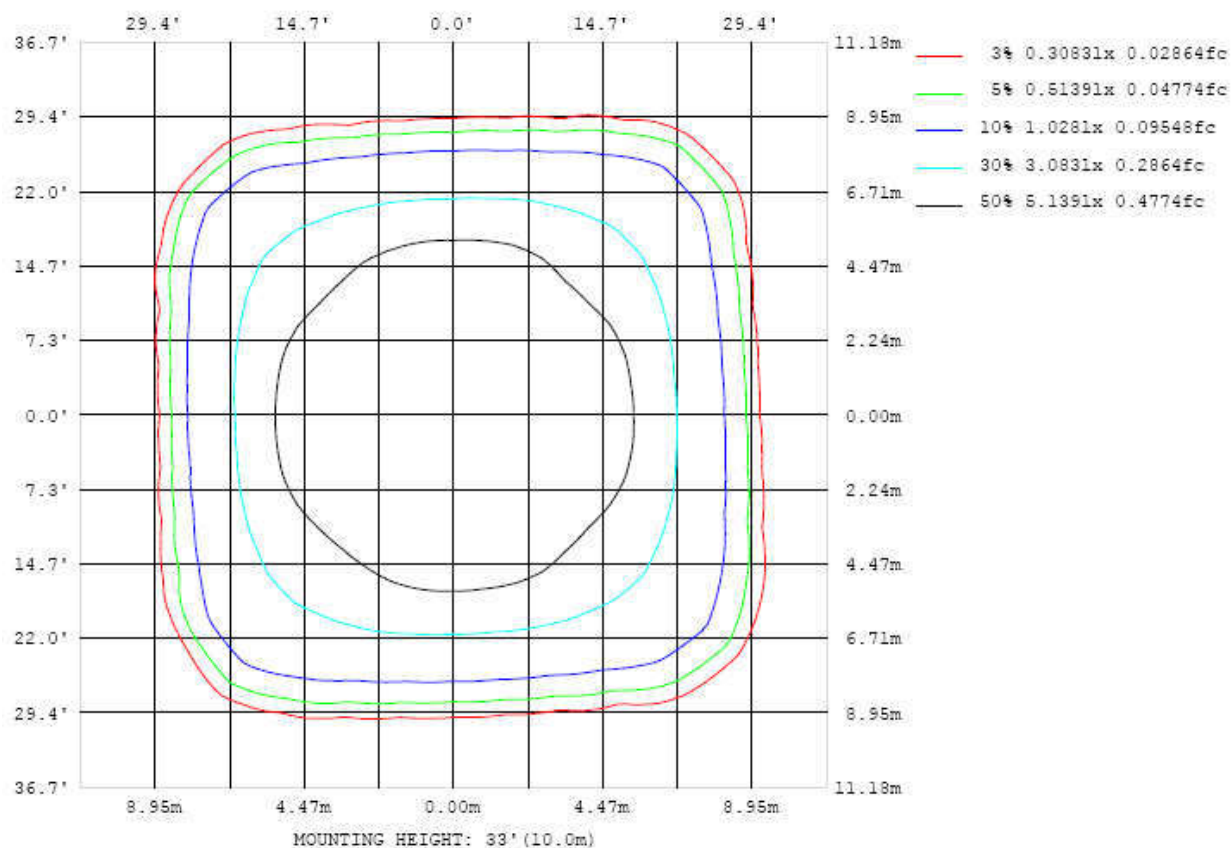


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

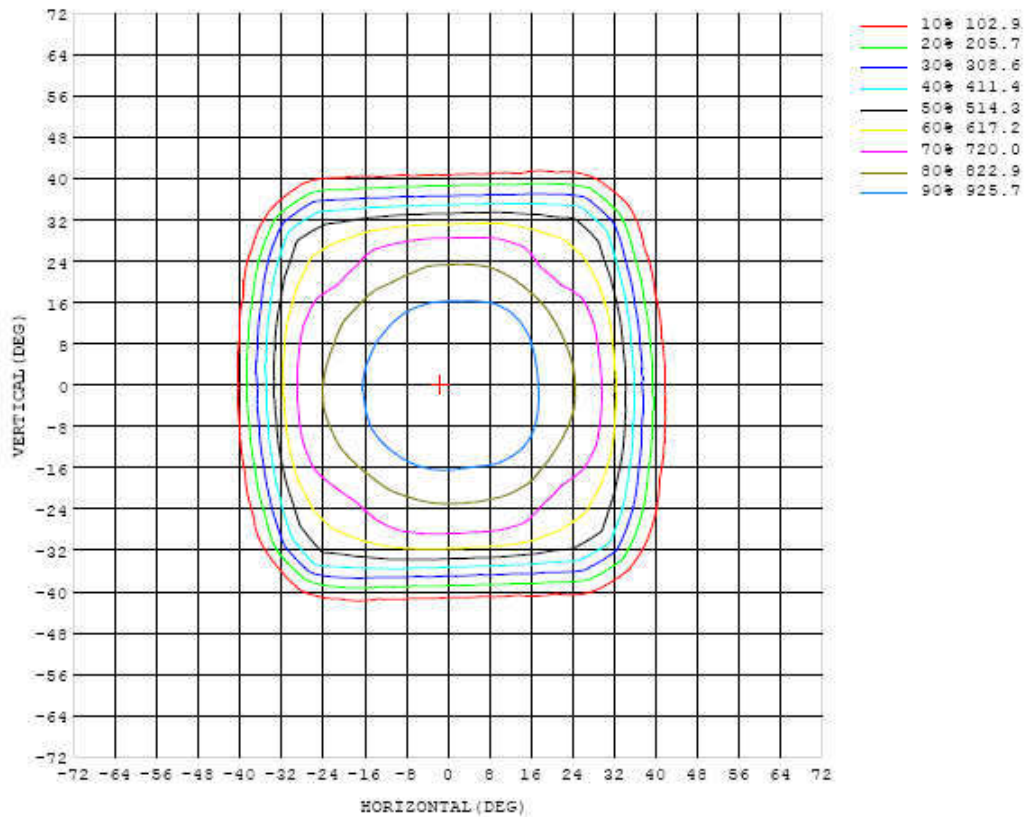


Chart 4: Isocandela Plot

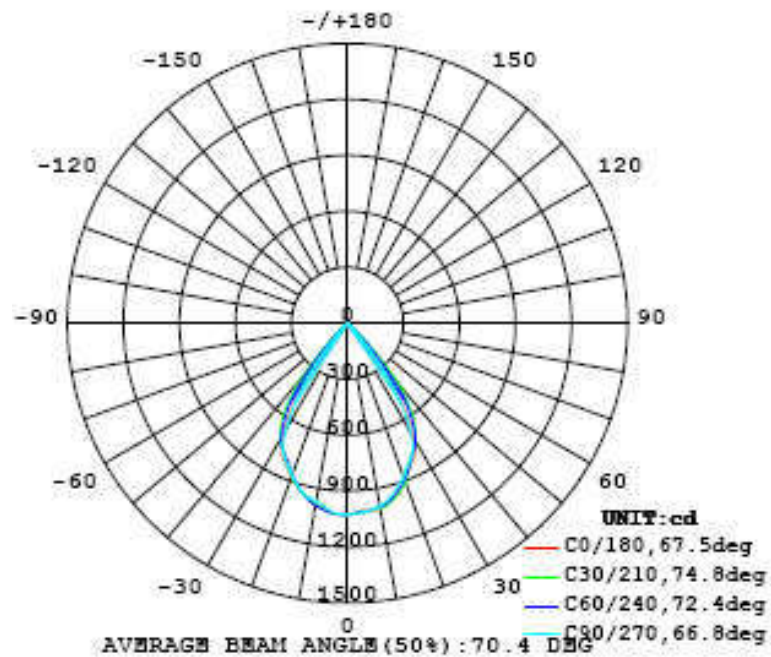


Chart 5: Polar Candela Distribution

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	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026
5	1010	1010	1010	1012	1012	1013	1014	1016	1017	1019	1022	1024	1024	1024	1022	1021	1020	1019	1019
10	1008	1011	1010	1010	1009	1007	1000	995	993	996	1000	1002	999	995	991	990	988	986	984
15	960	965	968	973	975	970	958	946	943	946	948	949	949	948	947	946	943	942	941
20	883	887	895	902	905	900	890	881	879	877	876	873	875	876	878	881	878	879	879
25	817	819	814	804	802	810	806	803	800	801	799	789	790	782	786	804	813	815	812
30	703	717	736	729	697	704	726	711	685	680	694	711	706	682	702	725	717	694	684
35	459	493	562	608	626	615	577	507	442	429	464	537	589	618	614	573	497	428	409
40	175	203	281	413	517	473	326	214	160	148	173	248	381	505	458	325	206	142	124
45	40.7	45.7	72.1	163	271	217	86.9	50.8	41.6	40.3	43.4	61.1	122	234	189	89.0	46.2	48.6	47.4
50	14.5	18.0	20.1	34.1	47.3	40.0	23.4	19.7	19.1	20.2	19.2	20.7	24.6	35.9	30.5	27.9	24.6	22.1	21.8
55	7.41	7.03	7.17	7.45	6.99	7.52	9.62	9.02	7.73	8.62	7.57	10.5	7.83	6.34	6.63	10.1	7.92	7.37	7.16
60	4.69	4.15	3.79	3.87	3.97	4.10	4.25	4.39	4.83	5.44	4.59	4.12	4.07	3.90	3.86	3.74	3.73	4.26	4.75
65	3.30	2.85	2.54	2.63	2.56	2.60	2.82	2.96	3.45	3.87	3.29	2.85	2.88	2.59	2.50	2.47	2.41	2.60	2.96
70	1.89	1.72	1.51	1.56	1.60	1.65	1.71	1.79	2.10	2.37	2.04	1.68	1.63	1.53	1.44	1.38	1.31	1.45	1.64
75	1.02	0.90	0.80	0.83	0.85	0.87	1.01	1.05	1.32	1.37	1.21	1.04	0.88	0.73	0.68	0.72	0.59	0.64	0.68
80	0.27	0.28	0.30	0.33	0.35	0.37	0.41	0.47	0.63	0.60	0.49	0.39	0.35	0.30	0.27	0.26	0.25	0.23	0.23
85	0.12	0.13	0.14	0.14	0.16	0.17	0.17	0.18	0.17	0.17	0.17	0.15	0.13	0.11	0.10	0.08	0.07	0.05	0.05
90	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
95	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
100	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
105	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
110	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01
115	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02
120	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04
125	0.06	0.06	0.07	0.07	0.07	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	0.06
130	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.13	0.12	0.10
135	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.17	0.17	0.17	0.17	0.16	0.16	0.15	0.15	0.16	0.17	0.16	0.15
140	0.19	0.19	0.19	0.19	0.19	0.20	0.21	0.21	0.21	0.22	0.21	0.20	0.20	0.19	0.19	0.19	0.20	0.20	0.20
145	0.24	0.23	0.22	0.23	0.23	0.24	0.25	0.26	0.26	0.26	0.25	0.25	0.24	0.23	0.23	0.23	0.24	0.25	0.25
150	0.29	0.27	0.27	0.27	0.28	0.28	0.29	0.30	0.30	0.30	0.29	0.28	0.28	0.28	0.28	0.28	0.29	0.30	0.29
155	0.36	0.32	0.32	0.31	0.32	0.32	0.32	0.32	0.33	0.32	0.32	0.32	0.32	0.32	0.33	0.34	0.34	0.34	0.34
160	0.41	0.38	0.36	0.35	0.35	0.35	0.36	0.36	0.36	0.35	0.35	0.36	0.36	0.38	0.38	0.37	0.38	0.39	0.39
165	0.45	0.43	0.38	0.38	0.38	0.38	0.38	0.37	0.36	0.37	0.36	0.36	0.38	0.40	0.40	0.40	0.42	0.42	0.43
170	0.46	0.47	0.45	0.39	0.39	0.39	0.40	0.40	0.41	0.42	0.41	0.43	0.45	0.46	0.44	0.45	0.45	0.45	0.46
175	0.47	0.48	0.49	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.46	0.47	0.47	0.47	0.47	0.46	0.47	0.47
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	0.48	0.48

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	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026	1026		
5	1019	1020	1022	1023	1023	1022	1019	1015	1011	1011	1011	1012	1012	1014	1013	1011	1010		
10	985	985	984	986	990	992	989	979	969	970	979	993	1003	1008	1008	1007	1007		
15	940	936	936	936	939	941	943	944	943	946	955	964	967	968	965	962	960		
20	873	868	873	876	869	865	867	869	869	875	884	891	900	900	890	884	883		
25	808	802	795	781	784	786	793	801	799	805	811	806	793	796	804	811	814		
30	696	718	721	696	703	711	690	669	659	679	714	724	696	700	731	725	705		
35	447	525	595	626	607	554	478	416	397	431	515	582	621	623	593	533	471		
40	159	237	367	491	447	304	196	143	131	159	228	356	499	484	344	236	185		
45	49.0	53.5	99.4	209	175	76.5	43.0	42.4	41.9	41.7	49.7	110	240	226	102	50.4	41.2		
50	22.1	25.3	26.0	25.1	26.5	23.2	21.8	20.9	21.0	20.4	22.1	27.3	32.4	35.0	22.4	19.6	15.4		
55	6.50	8.97	7.92	6.07	6.28	7.85	7.78	7.58	8.04	6.79	6.74	8.87	6.39	6.40	6.59	6.39	7.16		
60	4.13	3.68	3.75	3.83	3.84	3.85	4.15	5.17	5.47	4.66	4.13	3.93	3.62	3.53	3.59	3.66	4.26		
65	2.65	2.40	2.45	2.43	2.53	2.61	2.80	3.38	3.61	3.12	2.80	2.67	2.33	2.36	2.45	2.51	3.01		
70	1.45	1.39	1.35	1.37	1.47	1.54	1.76	2.12	2.20	1.82	1.61	1.51	1.47	1.45	1.41	1.49	1.76		
75	0.62	0.61	0.63	0.62	0.70	0.86	0.93	1.15	1.21	1.03	0.95	0.91	0.77	0.76	0.74	0.77	0.94		
80	0.23	0.24	0.24	0.26	0.29	0.33	0.36	0.45	0.46	0.43	0.37	0.35	0.32	0.30	0.29	0.27	0.27		
85	0.05	0.05	0.06	0.08	0.09	0.10	0.11	0.13	0.13	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13		
90	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01		
95	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.02	0.02		
100	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02		
105	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		
110	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02		
115	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03		
120	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.05	0.05	0.04	0.04		
125	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.06	0.06	0.06		
130	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09		
135	0.15	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13		
140	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.19		
145	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.26	0.26	0.25	0.25	0.23	0.23	0.23	0.23	0.24		
150	0.29	0.29	0.30	0.31	0.31	0.32	0.33	0.33	0.32	0.32	0.30	0.29	0.29	0.28	0.28	0.28	0.29		
155	0.34	0.34	0.34	0.35	0.36	0.37	0.38	0.38	0.37	0.35	0.36	0.35	0.34	0.34	0.34	0.35	0.36		
160	0.39	0.39	0.38	0.39	0.39	0.39	0.40	0.40	0.41	0.41	0.40	0.39	0.39	0.38	0.39	0.41	0.40		
165	0.43	0.43	0.43	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.42	0.43	0.42	0.42	0.44	0.45	0.44		
170	0.46	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.44	0.44	0.45	0.46	0.45	0.46	0.46	0.46		
175	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.45	0.46	0.46		
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

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.

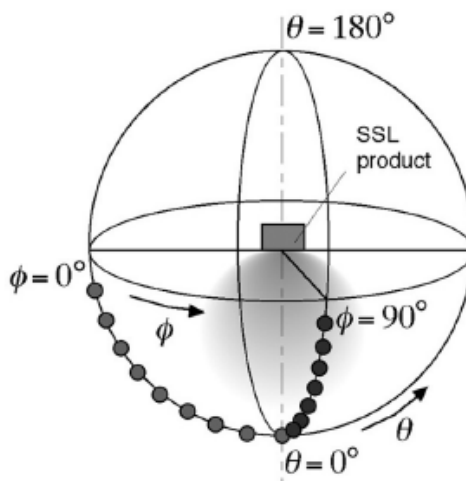
Color Characteristics Measurements

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 ($C=0^\circ/180^\circ$ and $C=90^\circ/270^\circ$) 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, $\Delta u'v'$, 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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