



## LM-79-08 Test Report

for

**ABB Lighting, Inc.**

3 Adams St Belvidere, NJ 07823.

**DS WALLPACK**

**Model: ABWP20LED50DS**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ15110008b

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

Reviewed by:

Engineer: April Zou  
Nov. 13, 2015

Approved



Manager: Jim Zhang  
Nov. 13, 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: **ABWP20LED50DS**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
98.3	2020.9	20.55	0.9906
CCT (K)	CRI	Stabilization Time (Light & Power)	
5040	76.2	60	

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Nov. 09, 2015
<b>Date of Test</b>	: Nov. 09, 2015
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<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>	: DS WALLPACK
<b>Model</b>	: ABWP20LED50DS
<b>Electrical Ratings</b>	: 100~277Vac, 50/60Hz, 20W
<b>Product Description</b>	: 5000K, Outdoor Wall-Mounted Area Luminaires Manufacturer of light source: Philips Lumileds Model of light source: LUXEON 3030 2D Quantity of LED light source: 20pcs
<b>Manufacturer</b>	: ABB Lighting (shanghai) Co., Ltd.
<b>Address</b>	: Room 1012, North Minch Fortune 108 Plaza, # 1839 Qixin road, Shanghai

## TEST RESULTS

Test ambient temperature was 25.3°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.

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	74
Voltage frequency (Hz)	60	60	60	R2	82
Test Current (A)	0.173	0.209	0.088	R3	85
Power Factor	0.9906	0.9938	0.8716	R4	75
Test Power (W)	20.55	20.74	21.13	R5	74
THD A%	11.52	10.34	15.26	R6	74
Luminous Efficacy (lm/W)	98.3	97.3	95.6	R7	84
Total Luminous Flux (lm)	2020.9	2017.2	2019.3	R8	61
Color Rendering Index (CRI)	76.2			R9	-12
R9	-12			R10	55
Correlated Color Temperature (CCT) (K)	5040			R11	70
Chromaticity (Chroma x, Chroma y)	(0.3441, 0.3520)			R12	47
Chromaticity (Chroma u, Chroma v)	(0.2106, 0.3231)			R13	76
Chromaticity (Chroma u', Chroma v')	(0.2106, 0.4847)			R14	91
Duv	0.0006				
Average Beam Angle (°)	111.9				
Center Beam Candle Power (cd)	728				
Spacing Criteria	1.27 (0°-180°)/ 1.32 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	83.74%				
Zonal Lumens in the 60°-90°Zone	16.18%				
Zonal Lumens in the 90°-120°Zone	0.02%				
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

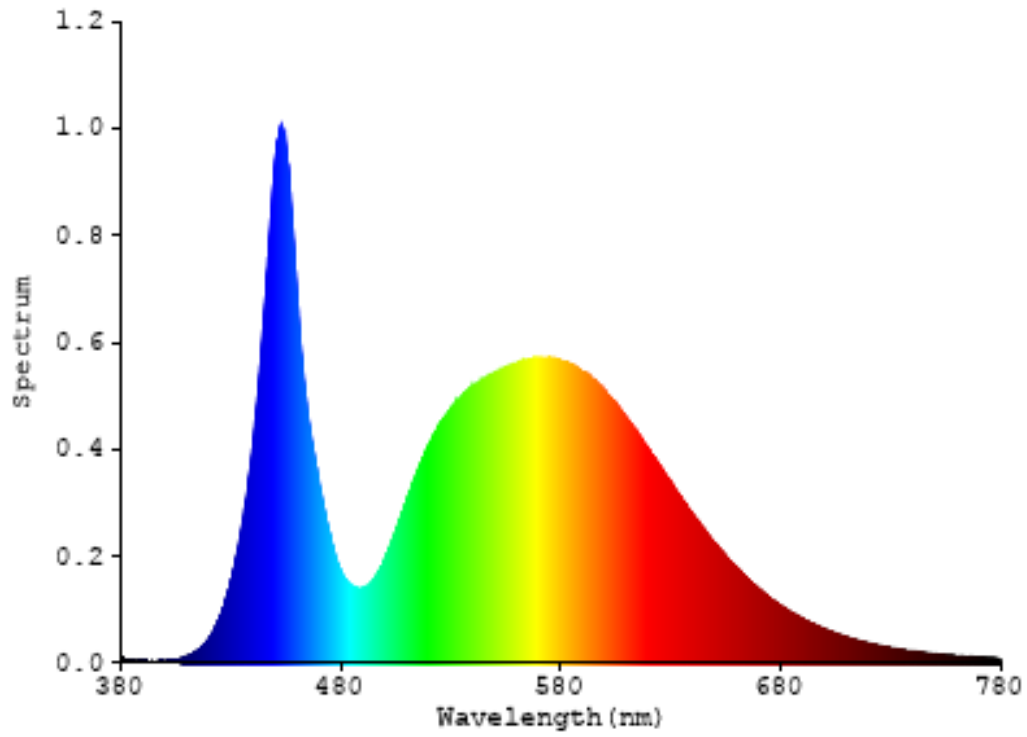


Chart 1: Spectral Power Distribution

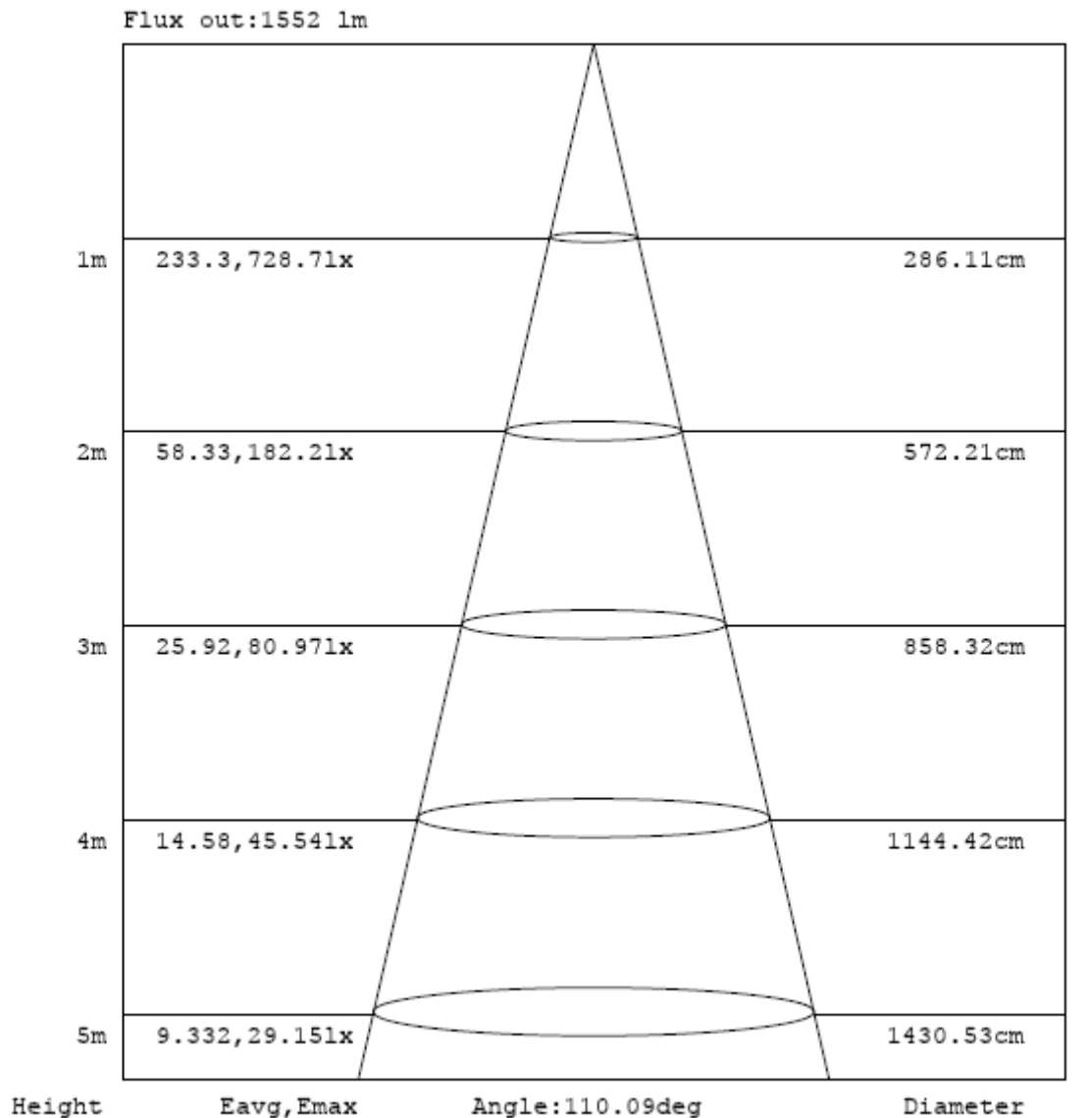
## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	68.909	3.41%
10- 20	199.44	9.87%
20- 30	307.965	15.24%
30- 40	379.835	18.80%
40- 50	397.475	19.67%
50- 60	338.598	16.76%
60- 70	220.444	10.91%
70- 80	93.488	4.63%
80- 90	13.09	0.65%
90-100	0.121	0.01%
100-110	0.175	0.01%
110-120	0.194	0.01%
120-130	0.214	0.01%
130-140	0.246	0.01%
140-150	0.249	0.01%
150-160	0.213	0.01%
160-170	0.143	0.01%
170-180	0.052	0.00%
Total	2020.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1692.222	83.74%
60- 90	327.022	16.18%
0-90	2019.244	99.92%
90- 180	1.607	0.08%
0- 180	2020.9	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



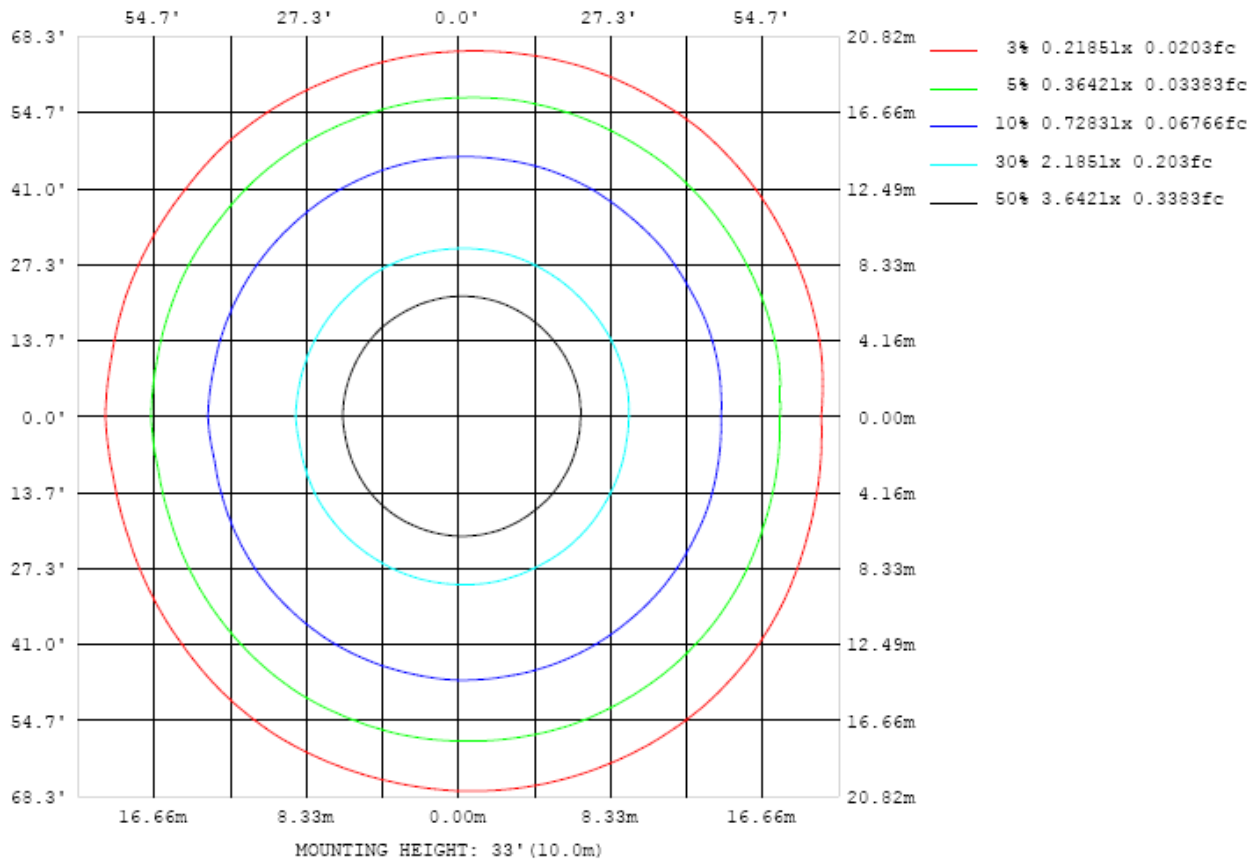


Chart 3: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

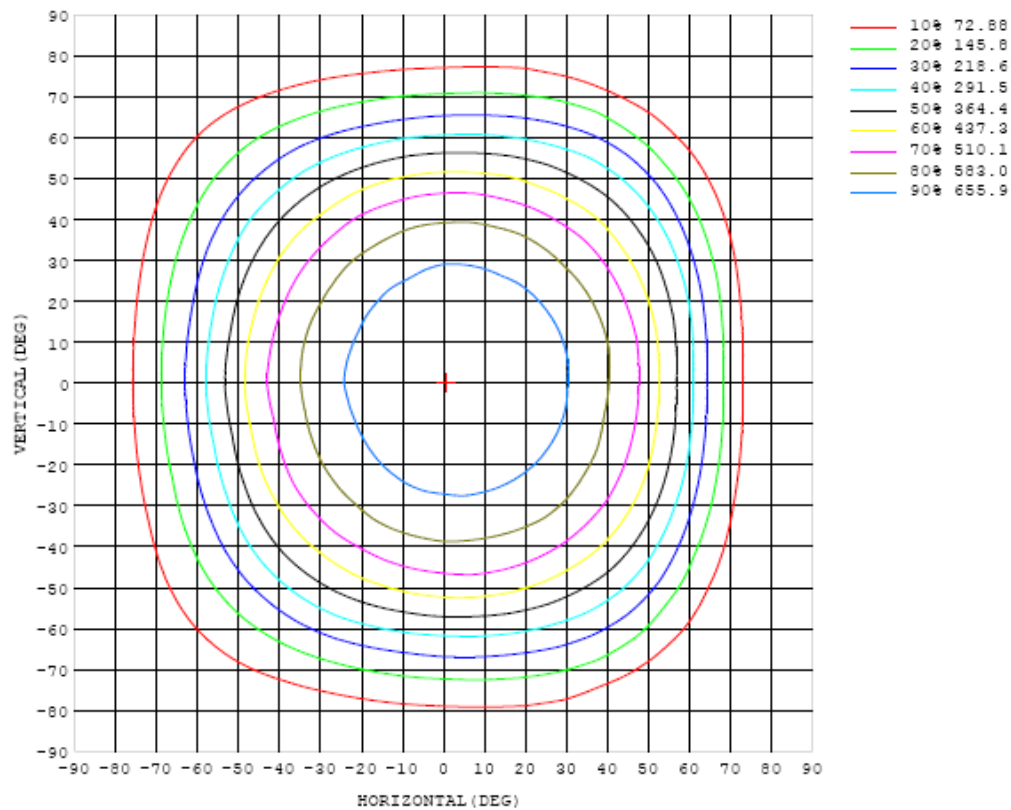


Chart 4: Isocandela Plot

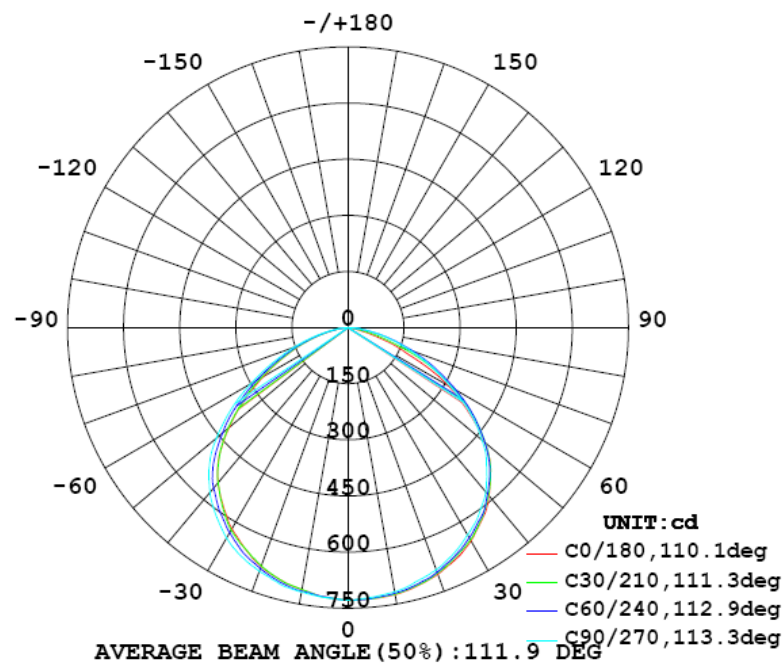


Chart 5: Polar Candela Distribution

## Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728
5	727	727	728	727	727	726	726	725	724	723	723	723	724	724	723	723	722	722	722
10	725	723	723	723	723	722	720	721	720	717	715	715	714	712	711	711	710	710	711
15	715	713	713	713	711	711	710	709	706	703	702	701	701	700	697	694	694	697	698
20	701	699	699	698	699	697	696	693	691	689	687	685	681	677	675	674	674	676	679
25	682	681	679	678	678	678	674	672	671	667	667	663	658	654	651	649	647	648	652
30	657	658	657	655	653	651	649	646	645	640	636	631	632	628	625	621	618	617	621
35	625	623	624	623	621	618	620	618	614	610	607	603	597	592	587	583	580	578	582
40	586	581	586	584	586	585	581	576	575	573	566	562	556	548	545	542	536	532	541
45	539	537	538	540	538	538	536	537	534	524	519	512	503	498	491	486	481	479	488
50	478	478	481	479	478	478	478	477	476	468	461	452	444	433	428	420	414	409	415
55	394	400	407	408	410	408	409	407	401	400	390	383	376	367	358	347	335	326	339
60	309	314	319	327	333	334	333	330	324	319	315	307	302	291	279	269	259	256	263
65	199	211	226	241	252	257	258	254	250	246	237	232	226	216	204	196	189	186	193
70	120	125	132	145	170	181	185	185	182	176	170	162	155	147	139	133	129	125	134
75	49.5	54.3	61.6	75.1	88.5	110	120	123	121	115	111	103	95.8	89.4	85.2	80.4	76.6	73.8	80.9
80	6.34	8.84	14.4	22.7	33.6	47.1	62.5	69.1	67.2	63.9	60.7	55.5	50.5	46.0	42.7	39.3	36.4	33.9	38.4
85	0.19	0.22	0.27	0.35	2.48	6.74	15.1	25.7	26.4	24.2	21.8	19.1	16.4	13.9	11.7	9.48	6.98	4.24	7.29
90	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	1.45	0.20	0.21	0.23	0.29	0.32	0.18	0.11	0.06	0.05	0.23
95	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.14
100	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.09	0.10	0.10	0.09	0.08	0.07	0.07	0.07	0.18
105	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.11	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.09	0.22
110	0.12	0.12	0.11	0.12	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.23
115	0.15	0.15	0.15	0.15	0.14	0.15	0.15	0.16	0.16	0.17	0.18	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.22
120	0.20	0.20	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.21	0.21	0.21	0.20	0.20	0.21	0.21	0.21	0.21	0.23
125	0.24	0.24	0.23	0.23	0.22	0.23	0.23	0.23	0.24	0.24	0.25	0.26	0.25	0.25	0.25	0.25	0.25	0.26	0.24
130	0.28	0.28	0.28	0.27	0.26	0.27	0.28	0.28	0.28	0.29	0.29	0.30	0.29	0.29	0.29	0.30	0.29	0.29	0.27
135	0.32	0.33	0.32	0.31	0.30	0.31	0.32	0.32	0.31	0.33	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32
140	0.35	0.36	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.35	0.36	0.35	0.35	0.36	0.36	0.35	0.36	0.36	0.37
145	0.38	0.39	0.39	0.38	0.38	0.38	0.38	0.37	0.38	0.38	0.39	0.39	0.39	0.39	0.38	0.38	0.39	0.40	0.41
150	0.41	0.42	0.43	0.42	0.41	0.40	0.40	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.42	0.42	0.45
155	0.44	0.45	0.45	0.45	0.42	0.41	0.41	0.41	0.41	0.41	0.42	0.43	0.43	0.43	0.43	0.45	0.44	0.44	0.48
160	0.47	0.48	0.47	0.47	0.45	0.42	0.41	0.41	0.42	0.40	0.43	0.44	0.45	0.46	0.47	0.47	0.46	0.46	0.52
165	0.49	0.50	0.50	0.49	0.48	0.45	0.44	0.44	0.43	0.42	0.45	0.47	0.48	0.49	0.49	0.49	0.49	0.48	0.52
170	0.50	0.51	0.51	0.51	0.49	0.47	0.46	0.46	0.47	0.46	0.46	0.48	0.50	0.50	0.50	0.50	0.50	0.49	0.52
175	0.58	0.57	0.57	0.57	0.55	0.53	0.53	0.52	0.51	0.50	0.52	0.53	0.54	0.54	0.55	0.55	0.56	0.56	0.56
180	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54

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	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728		
5	723	723	723	723	722	722	722	723	724	724	725	726	727	727	727	726	727		
10	711	711	711	712	713	715	717	717	718	720	721	721	721	721	722	724	725		
15	697	698	698	700	701	704	707	708	709	709	712	712	712	713	714	715	716		
20	677	677	677	679	682	685	687	690	693	695	696	698	699	701	702	701	704		
25	651	650	651	655	658	663	666	670	675	675	678	680	683	682	683	684	685		
30	621	621	625	629	630	633	636	644	650	652	652	653	656	657	658	660	660		
35	584	585	585	589	596	599	604	609	615	618	622	622	622	623	626	629	630		
40	539	542	541	547	551	559	566	571	575	580	581	585	584	583	587	589	593		
45	485	482	487	491	499	508	514	520	525	529	532	534	535	536	540	542	544		
50	413	416	419	424	427	438	447	454	460	467	468	467	469	474	474	477	481		
55	333	339	344	349	355	363	371	378	382	387	395	399	398	403	400	406	403		
60	260	264	269	271	279	284	288	296	301	309	314	319	324	325	325	324	321		
65	192	194	196	201	205	208	210	216	222	229	237	241	246	243	237	226	217		
70	132	131	133	137	139	142	145	150	154	160	165	168	166	150	137	134	130		
75	78.8	78.1	79.5	80.4	82.5	85.4	87.7	90.9	94.0	98.7	102	100	84.4	73.8	62.7	60.7	59.0		
80	36.8	36.0	36.3	36.6	37.6	39.2	40.6	42.9	45.0	48.4	49.3	38.3	27.3	19.6	15.0	12.1	11.0		
85	5.84	5.86	6.35	6.89	7.24	7.82	8.41	9.19	10.4	12.0	6.24	1.02	0.30	0.28	0.27	0.27	0.28		
90	0.16	0.11	0.11	0.12	0.13	0.14	0.14	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.11	0.11	0.11		
95	0.14	0.15	0.16	0.17	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.16	0.16	0.15	0.15	0.14	0.14		
100	0.19	0.20	0.21	0.22	0.23	0.24	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.19	0.18	0.18	0.17		
105	0.23	0.23	0.24	0.25	0.25	0.26	0.26	0.26	0.26	0.25	0.24	0.23	0.22	0.22	0.22	0.21	0.21		
110	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.26	0.25	0.24	0.24	0.23	0.22	0.22	0.21	0.21		
115	0.23	0.23	0.23	0.23	0.24	0.25	0.26	0.26	0.25	0.24	0.24	0.23	0.22	0.21	0.21	0.21	0.21		
120	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.21	0.21	0.22		
125	0.24	0.24	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.23	0.23	0.22	0.22	0.21	0.22	0.22	0.23		
130	0.27	0.27	0.28	0.27	0.27	0.28	0.28	0.29	0.28	0.27	0.27	0.25	0.25	0.24	0.25	0.25	0.26		
135	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.33	0.31	0.30	0.30	0.29	0.30	0.30	0.30	0.30		
140	0.38	0.38	0.38	0.38	0.39	0.38	0.38	0.38	0.38	0.36	0.35	0.35	0.34	0.35	0.34	0.34	0.34		
145	0.42	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.40	0.41	0.40	0.40	0.39	0.39	0.39	0.38		
150	0.46	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.45	0.45	0.45	0.44	0.45	0.45	0.46	0.44	0.43		
155	0.49	0.50	0.52	0.52	0.50	0.50	0.50	0.50	0.48	0.49	0.48	0.49	0.49	0.50	0.50	0.48	0.47		
160	0.54	0.54	0.54	0.55	0.55	0.53	0.53	0.52	0.50	0.51	0.50	0.51	0.52	0.54	0.54	0.53	0.51		
165	0.54	0.54	0.55	0.56	0.56	0.57	0.56	0.55	0.54	0.53	0.53	0.53	0.53	0.54	0.55	0.55	0.52		
170	0.56	0.56	0.57	0.58	0.59	0.59	0.58	0.57	0.56	0.56	0.56	0.55	0.54	0.56	0.57	0.57	0.53		
175	0.58	0.58	0.59	0.59	0.59	0.58	0.58	0.57	0.55	0.55	0.57	0.56	0.58	0.59	0.58	0.58	0.58		
180	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54		

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 17, 2015	Jul. 16, 2016
Digital Power Meter	PF2010A	HZTE028-01	Jul. 17, 2015	Jul. 16, 2016
AC Power Supply	PCR 500L	HZTE001-08	Jul. 17, 2015	Jul. 16, 2016
DC Power Supply	WY12010	HZTE004-03	Jul. 17, 2015	Jul. 16, 2016
Temperature Meter	TES1310	HZTE017-01	Jul. 17, 2015	Jul. 16, 2016
Standard source	D908	HZTE012-01	Jul. 23, 2015	Jul. 22, 2016
Standard source	SCL-1400	HZTE012-02	Oct. 21, 2015	Oct. 20, 2016

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 expanded 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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