



## LM-79-08 Test Report

for

**ABBlighting, Inc.**

3 Adams St Belvidere, NJ 07823.

**70W PKG**

**Model: ABBPKG70501**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ15050020a

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

Reviewed by:

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May 25, 2015



*Jim Zhang*

Manager: Jim Zhang  
May 25, 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: **ABBPKG70501**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
95.0	6287.1	66.16	0.9895
CCT (K)	CRI	Stabilization Time (Light & Power)	
5112	78.5	60	

Table 1: Executive Data Summary

### Test specifications:

**Date of Receipt** : May 18, 2015

**Date of Test** : May 21, 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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## Photos

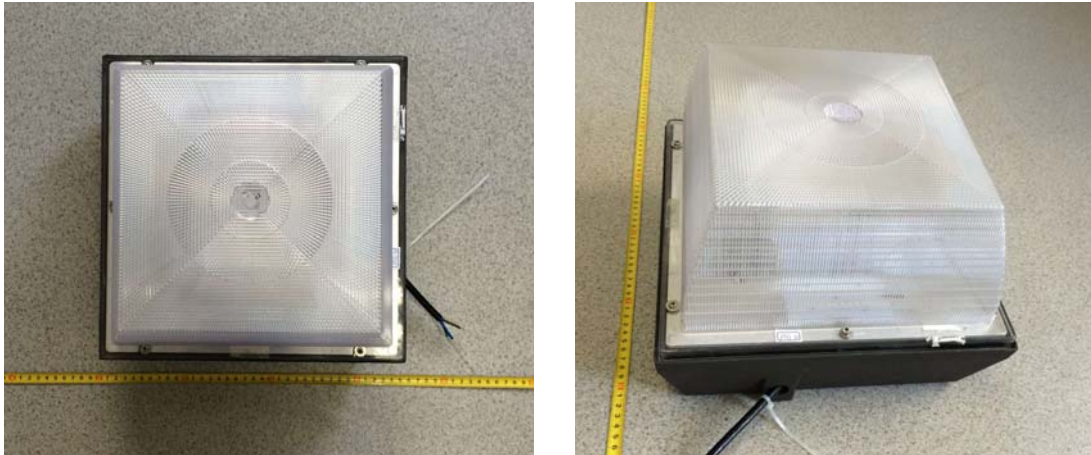


Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: 70W PKG
<b>Model</b>	: ABBPKG70501
<b>Electrical Ratings</b>	: 100~277VAC, 50/60Hz, 70W
<b>Product Description</b>	: 5000K, Parking Garage Luminaires, Plastic light Cover Manufacturer of light source: Philips Lumileds Model of light source: LUXEON 3030 2D Quantity of light source: 80pcs
<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 24.3°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 95 minutes.

The photometric distance of Goniophotometer is 2.475 m.

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

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	77
Voltage frequency (Hz)	60	60	60	R2	85
Test Current (A)	0.557	0.668	0.251	R3	87
Power Factor	0.9895	0.9910	0.9383	R4	77
Test Power (W)	66.16	66.23	65.32	R5	77
THD A%	9.73	9.93	16.14	R6	77
Luminous Efficacy (lm/W)	95.0	93.5	94.3	R7	85
Total Luminous Flux (lm)	6287.1	6192.5	6159.7	R8	64
Color Rendering Index (CRI)	78.5			R9	-1
R9	-1			R10	60
Correlated Color Temperature (CCT) (K)	5112			R11	72
Chromaticity (Chroma x, Chroma y)	(0.3420, 0.3490)			R12	50
Chromaticity (Chroma u, Chroma v)	(0.2104, 0.3219)			R13	79
Chromaticity (Chroma u', Chroma v')	(0.2104, 0.4829)			R14	92
Duv	0.0001				
Average Beam Angle (°)	168.9				
Center Beam Candle Power (cd)	751				
Spacing Criteria	1.75 (0°-180°)/ 1.85 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	49.38%				
Zonal Lumens in the 60°-90°Zone	42.29%				
Zonal Lumens in the 90°-120°Zone	5.79%				
Zonal Lumens in the 120°-180°Zone	2.54%				

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

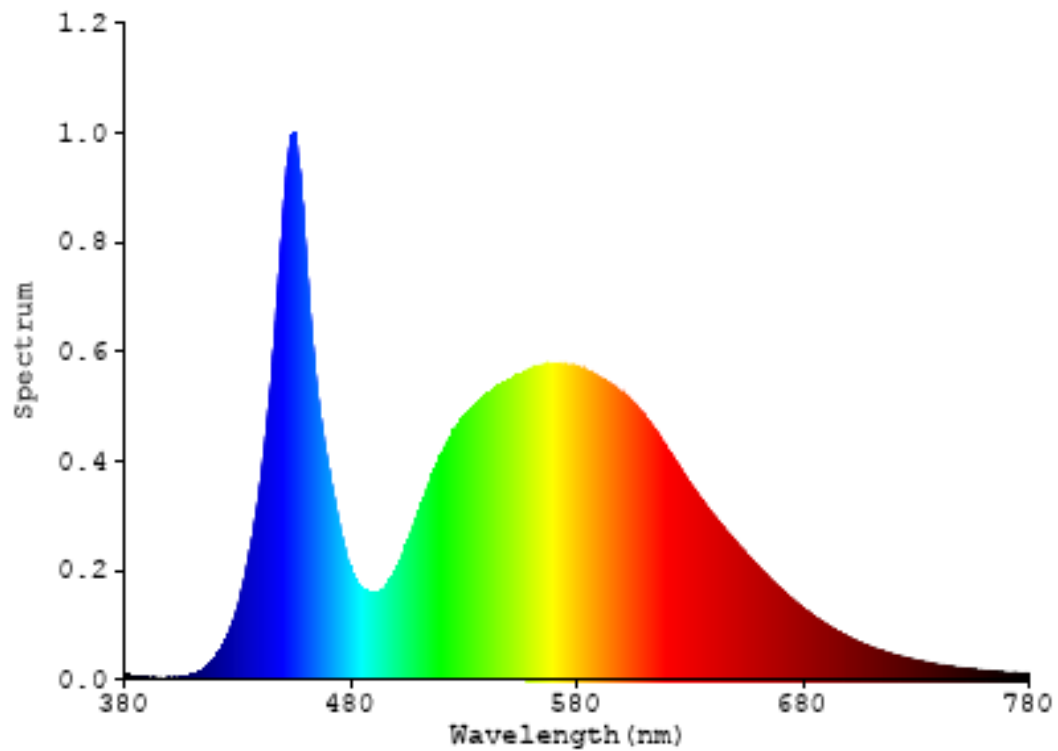


Chart 1: Spectral Power Distribution

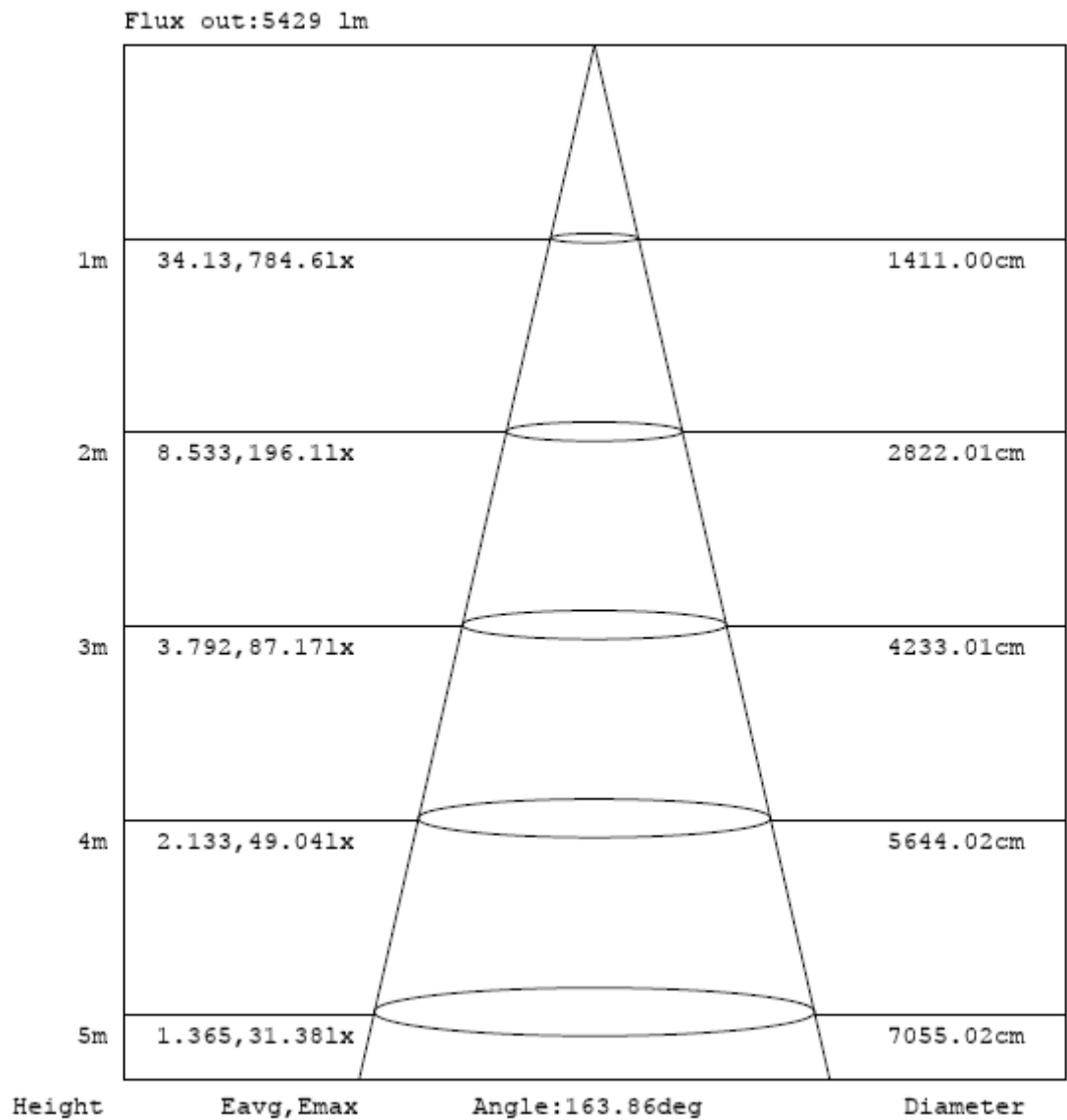
## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	74.096	1.18%
10- 20	232.014	3.69%
20- 30	406.725	6.47%
30- 40	589.843	9.38%
40- 50	753.523	11.99%
50- 60	1048.433	16.68%
60- 70	1091.523	17.36%
70- 80	1061.306	16.88%
80- 90	505.765	8.04%
90-100	151.703	2.41%
100-110	107.986	1.72%
110-120	104.339	1.66%
120-130	91.558	1.46%
130-140	49.039	0.78%
140-150	16.35	0.26%
150-160	2.511	0.04%
160-170	0.306	0.00%
170-180	0.105	0.00%
Total	6287.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3104.634	49.38%
60- 90	2658.594	42.29%
0-90	5763.228	91.67%
90- 180	523.897	8.33%
0- 180	6287.1	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



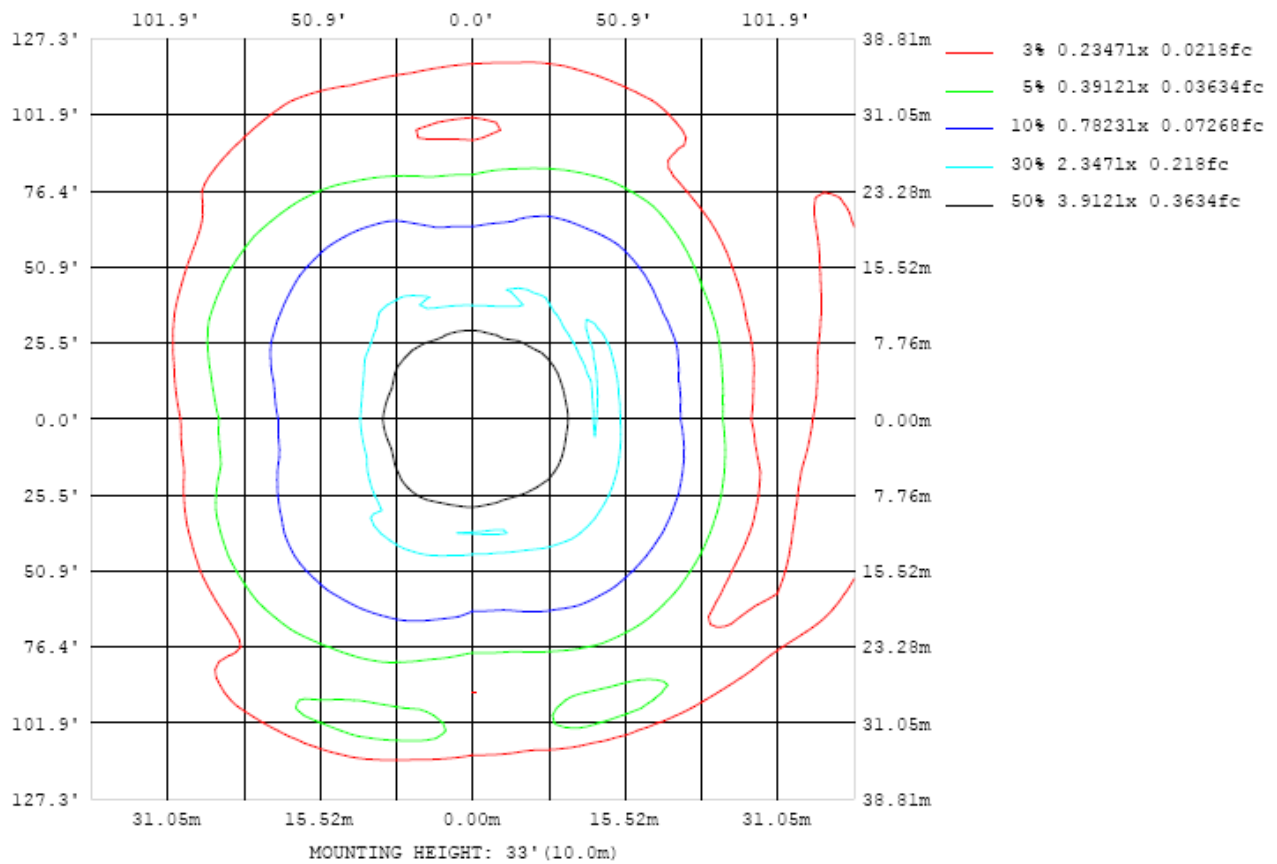


Chart 3: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

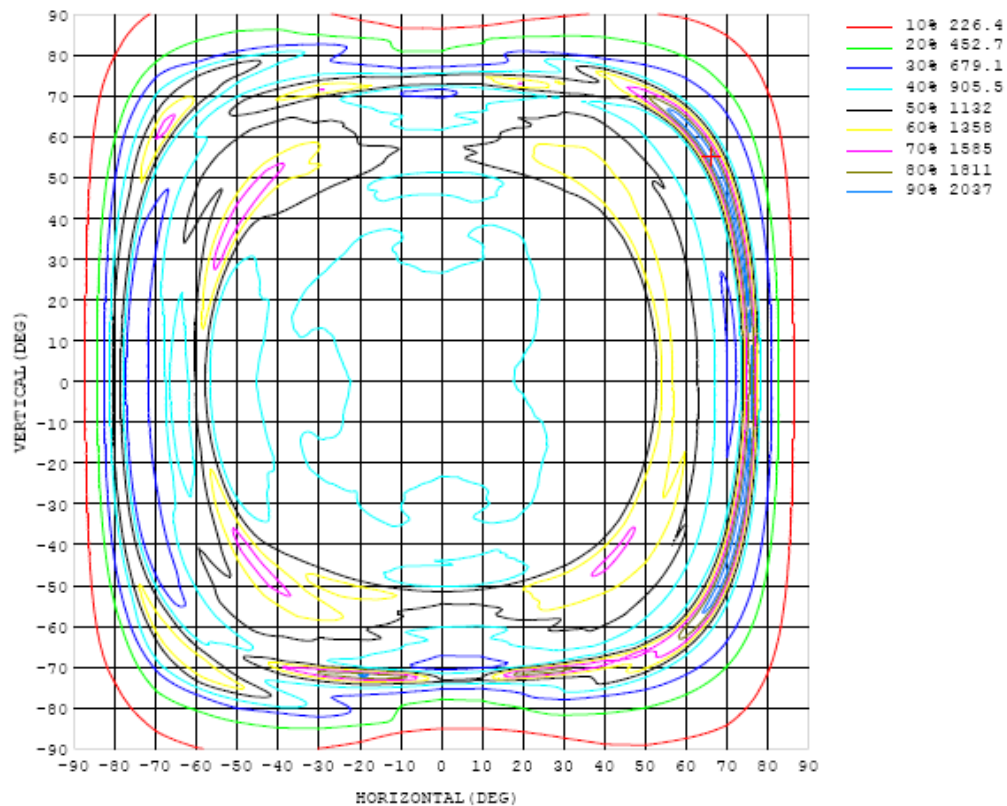


Chart 4: Isocandela Plot

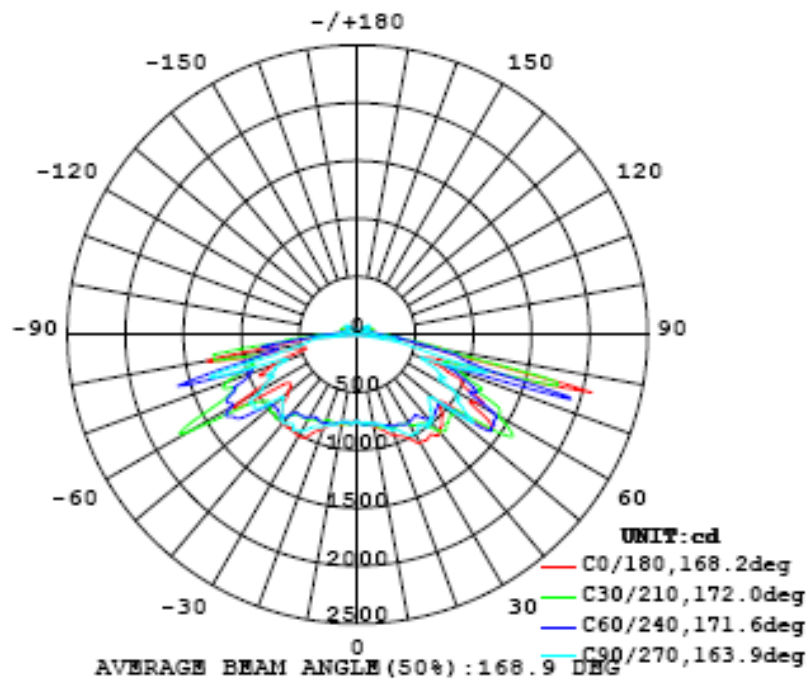


Chart 5: Polar Candela Distribution

## 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	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751
5	770	779	787	788	787	783	773	768	764	761	761	769	776	779	778	780	773	762	759
10	806	815	800	786	788	784	781	792	790	787	793	780	770	778	777	780	800	801	791
15	856	852	841	829	833	814	810	817	816	812	813	796	795	801	796	797	799	816	801
20	923	895	879	859	834	837	841	856	876	879	863	842	811	794	786	818	837	869	864
25	979	929	904	861	842	828	854	879	922	940	899	852	814	798	796	837	890	933	950
30	1079	1023	963	900	885	878	884	914	965	984	956	898	855	843	860	880	941	991	1015
35	1078	1024	963	943	935	892	856	876	944	969	935	867	882	913	898	861	894	970	995
40	1100	1066	1079	1087	1045	991	950	935	951	972	982	952	1013	1011	1003	955	942	999	1012
45	1027	1022	1065	1084	1087	1017	953	887	901	912	922	934	1018	1053	1034	957	900	891	906
50	928	952	1003	1072	1026	1000	926	858	841	862	883	925	1005	1044	1025	934	813	783	784
55	1419	1426	1518	1464	1459	1452	1407	1250	1133	1113	1208	1376	1458	1382	1177	965	815	749	726
60	1186	1304	1391	1393	1497	1437	1352	1123	939	928	1060	1231	1360	1510	1629	1679	1460	1194	1176
65	991	1085	1125	1140	1229	1197	1114	933	797	777	902	1115	1219	1331	1249	1140	994	831	805
70	663	756	834	890	929	919	830	707	594	583	698	845	958	1078	1165	1137	1030	824	785
75	1614	1809	1623	1565	1626	1307	1100	917	744	746	925	1191	1364	1531	1145	757	653	495	458
80	733	791	796	760	729	685	647	483	378	358	449	603	774	1025	1383	1592	1539	1317	1313
85	280	306	335	356	378	381	366	292	239	235	298	422	526	550	548	499	485	355	368
90	161	178	201	212	220	218	203	177	148	144	168	204	227	243	238	225	200	162	162
95	93.5	95.1	96.3	120	144	157	157	142	121	120	135	155	164	163	146	122	99.6	93.1	96.2
100	62.5	66.3	90.2	95.4	96.7	107	114	110	103	104	111	117	119	106	92.5	92.5	80.7	51.6	54.6
105	137	114	126	139	105	93.3	83.4	79.6	82.6	84.4	84.4	82.9	86.1	91.3	103	148	116	108	129
110	130	105	111	139	126	101	74.0	56.2	57.4	57.5	60.5	60.2	84.8	104	130	150	114	109	127
115	125	100	101	129	131	121	89.4	72.6	63.5	60.4	67.4	72.3	99.8	126	135	131	95.8	101	118
120	117	91.4	90.2	115	116	116	110	113	108	107	109	111	110	123	124	120	87.2	97.8	113
125	98.8	77.7	73.0	98.7	103	99.3	112	127	128	129	127	125	106	101	108	99.2	69.2	81.0	95.1
130	46.2	64.9	49.9	68.9	68.3	89.4	109	122	127	130	128	125	107	82.2	69.0	62.0	43.2	53.5	34.9
135	38.7	38.1	20.7	21.9	45.1	68.6	87.2	96.8	101	104	103	101	86.3	63.2	35.7	15.3	22.3	30.8	32.2
140	10.3	6.55	2.96	1.58	27.4	49.1	65.4	73.0	80.5	83.4	80.3	75.0	62.4	42.4	17.4	1.51	4.65	7.32	9.54
145	1.44	1.42	1.44	1.44	6.81	26.7	40.9	49.5	54.1	56.0	54.5	49.2	37.9	21.5	1.40	1.40	1.38	1.37	1.52
150	1.32	1.36	1.27	1.36	1.31	4.96	18.1	26.5	31.2	32.5	31.1	24.6	15.1	2.69	1.26	1.29	1.18	1.28	1.36
155	1.24	1.29	1.18	1.25	1.18	1.12	1.06	3.93	6.65	8.11	7.04	2.71	1.09	1.18	1.22	1.19	1.09	1.20	1.24
160	1.21	1.24	1.23	1.11	1.13	1.06	1.01	0.93	0.92	0.94	1.02	1.02	1.07	1.14	1.16	1.08	1.16	1.16	1.21
165	1.21	1.23	1.24	1.19	1.07	0.99	0.92	0.88	0.86	0.88	0.93	0.97	1.06	1.10	1.10	1.21	1.18	1.16	1.19
170	1.23	1.23	1.22	1.17	1.11	1.01	0.91	0.84	0.87	0.87	0.85	0.91	1.06	1.19	1.21	1.21	1.20	1.19	1.24
175	1.22	1.22	1.21	1.18	1.17	1.11	1.01	0.94	0.98	0.97	0.97	0.98	1.10	1.17	1.21	1.24	1.23	1.20	1.24
180	1.16	1.19	1.21	1.21	1.21	1.18	1.11	1.05	1.06	1.07	1.04	1.05	1.13	1.21	1.22	1.20	1.14	1.12	1.15

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	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751		
5	762	772	781	781	781	776	763	758	761	767	776	786	789	787	788	777	770		
10	799	799	781	773	769	771	774	767	770	779	777	778	780	777	803	819	809		
15	812	790	788	789	797	806	811	810	808	819	824	814	813	814	833	852	857		
20	859	812	789	794	799	812	829	852	845	846	835	838	851	864	871	885	917		
25	907	850	819	783	779	808	838	873	876	858	862	843	850	866	890	923	970		
30	963	914	853	804	791	823	896	949	967	933	885	852	851	881	954	1017	1060		
35	938	882	858	862	871	856	910	947	960	935	895	871	901	938	962	999	1040		
40	958	910	918	935	932	907	928	980	997	958	907	909	975	1029	1056	1071	1075		
45	890	912	998	1035	1038	961	917	928	925	897	924	1003	1054	1065	1073	1051	1024		
50	780	860	996	1032	1027	956	876	851	843	855	906	987	1064	1032	1011	983	942		
55	742	848	1012	1174	1266	1267	1155	1068	1088	1151	1245	1267	1206	1187	1265	1447	1428		
60	1370	1666	1671	1491	1375	1262	1076	965	953	1024	1212	1443	1521	1529	1334	1247	1149		
65	915	1101	1209	1291	1281	1174	1041	892	865	975	1072	1206	1316	1272	1166	1106	1021		
70	935	1110	1197	1191	1137	993	834	685	651	751	910	1073	1136	1031	914	833	718		
75	573	735	963	1274	1290	1368	1204	1072	1136	1382	1344	1355	1267	944	910	1269	1670		
80	1207	1722	1253	1014	784	697	614	488	474	568	763	1011	1014	902	801	759	734		
85	455	636	629	548	525	492	406	327	328	370	436	467	493	487	430	373	313		
90	188	233	256	267	260	237	202	164	158	173	203	219	232	231	218	198	169		
95	108	120	138	161	170	170	155	134	131	143	162	168	168	155	133	111	100		
100	59.2	77.3	84.6	94.6	110	121	120	111	110	115	122	118	108	93.8	77.1	68.1	51.6		
105	116	130	134	100	88.7	87.0	87.3	85.5	85.9	86.1	87.4	85.8	92.1	105	146	124	114		
110	111	126	146	127	104	83.3	64.9	62.6	61.5	63.2	70.5	87.9	111	134	144	110	108		
115	98.2	110	139	140	130	96.3	76.3	69.7	69.4	75.7	80.8	112	135	136	130	98.7	104		
120	91.9	105	132	131	127	114	115	112	113	117	115	122	128	127	117	84.7	97.2		
125	76.3	90.2	116	117	103	114	126	128	131	130	123	108	110	111	98.9	69.0	84.5		
130	52.2	53.8	80.0	79.9	93.9	109	119	122	126	123	116	104	84.2	82.2	75.3	52.7	58.9		
135	28.4	19.4	36.0	54.9	79.2	93.5	101	104	107	103	99.0	86.0	65.3	41.2	25.1	28.4	42.0		
140	6.26	3.18	14.1	39.0	58.6	72.2	80.9	84.1	85.6	82.6	76.9	64.6	47.6	20.3	1.54	5.30	8.43		
145	1.25	1.50	1.52	20.4	37.9	50.2	57.6	62.1	63.0	59.6	53.3	42.3	26.4	4.66	1.38	1.36	1.41		
150	1.34	1.34	1.37	1.49	17.7	29.7	36.0	39.6	40.1	37.5	32.3	21.1	6.03	1.26	1.28	1.10	1.28		
155	1.25	1.09	1.23	1.26	1.24	6.49	14.1	18.4	18.7	15.6	8.93	1.16	1.16	1.18	1.20	1.06	1.20		
160	1.23	1.23	1.06	1.20	1.18	1.12	1.07	1.04	0.97	0.93	0.97	1.06	1.10	1.14	1.08	1.18	1.19		
165	1.21	1.24	1.25	1.08	1.08	1.10	0.99	0.92	0.87	0.88	0.88	0.96	1.02	1.03	1.09	1.20	1.19		
170	1.24	1.27	1.27	1.27	1.25	1.08	0.95	0.88	0.87	0.88	0.84	0.88	0.98	1.07	1.18	1.20	1.21		
175	1.24	1.27	1.26	1.24	1.17	1.12	1.01	0.93	0.93	0.95	0.94	0.93	1.02	1.11	1.14	1.15	1.16		
180	1.15	1.19	1.21	1.21	1.19	1.17	1.10	1.05	1.04	1.08	1.03	1.05	1.13	1.20	1.21	1.19	1.15		

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 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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