



## **LM-79-08 Test Report**

for

### **ABOVE ALL LIGHTING INC**

1501 Industrial Way N. Toms River, NJ 08755.

### **V-Line Flood Light**

**Model: FL26501**

### **Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ17030090b

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

Reviewed by:

*April Zou*

Engineer: April Zou

Apr. 13, 2017

Approved by:  *Jim Zhang*

Manager: Jim Zhang

Apr. 13, 2017

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: **FL26501**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
122.9	3061.3	24.91	0.9938
CCT (K)	CRI	BUG	Stabilization Time (Light & Power)
4831	67.2	B1-U1-G0	60

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Mar. 24, 2017
<b>Date of Test</b>	: Apr. 09, 2017
<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>	: V-Line Flood Light
<b>Model</b>	: FL26501
<b>Electrical Ratings</b>	: 120~277Vac, 50/60Hz
<b>Product Description</b>	: 5000K Manufacturer of light source: Samsung Model of light source: LH351B
<b>Manufacturer</b>	: ABOVE ALL LIGHTING (SHANGHAI) Co., Ltd.
<b>Address</b>	: Room 1012, North Minch Fortune 108 Plaza, # 1839 Qixin road, Shanghai

## TEST RESULTS

Test ambient temperature was 24.6°C.

Base orientation was Base up. 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 of Goniophotometer is 2.47 m.

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)	0.209	0.099
Power Factor	0.9938	0.9238
Test Power (W)	24.91	25.32
THD A%	6.15	9.75
Luminous Efficacy (lm/W)	122.9	119.8
Total Luminous Flux (lm)	3061.3	3035.0
Color Rendering Index (CRI)	67.2	
R9	-38	
Correlated Color Temperature (CCT) (K)	4831	
Chromaticity (Chroma x, Chroma y)	(0.3507, 0.3617)	
Chromaticity (Chroma u, Chroma v)	(0.2113, 0.3269)	
Chromaticity (Chroma u', Chroma v')	(0.2113, 0.4903)	
Duv	0.0028	
Average Beam Angle (°)	83.7	
Center Beam Candle Power (cd)	1452	
Spacing Criteria	0.71 (0°-180°)/ 1.30 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	93.98%	
Zonal Lumens in the 60°-90°Zone	5.95%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.06%	

Special Color Rendering Indices	
R1	65
R2	71
R3	75
R4	69
R5	66
R6	60
R7	77
R8	54
R9	-38
R10	31
R11	66
R12	35
R13	65
R14	86

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

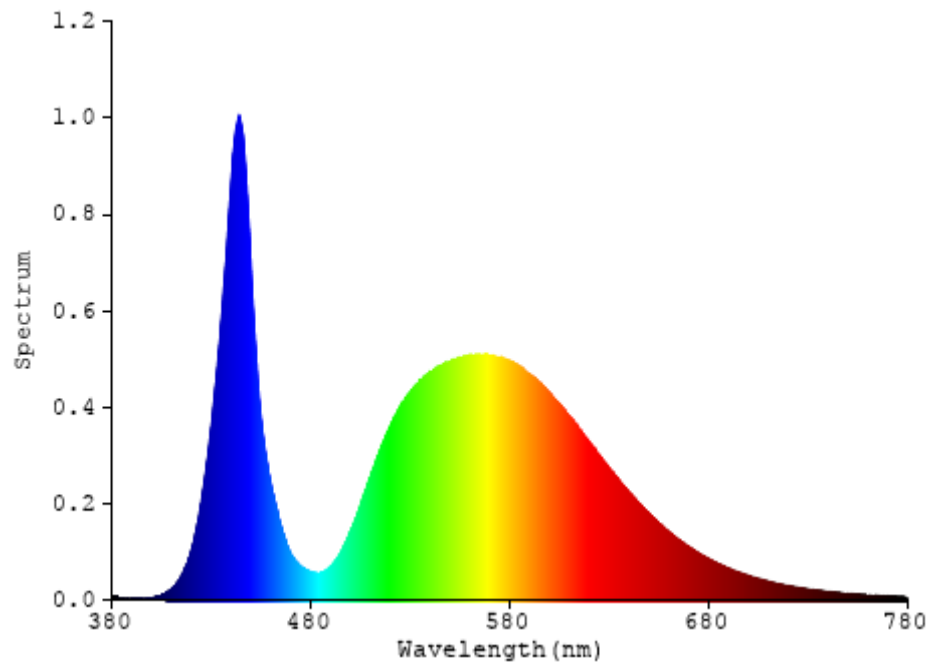


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	138.132	4.51%
10- 20	393.842	12.87%
20- 30	589.985	19.27%
30- 40	663.659	21.68%
40- 50	648.954	21.20%
50- 60	442.485	14.45%
60- 70	159.178	5.20%
70- 80	22.334	0.73%
80- 90	0.517	0.02%
90-100	0.04	0.00%
100-110	0.111	0.00%
110-120	0.188	0.01%
120-130	0.276	0.01%
130-140	0.392	0.01%
140-150	0.444	0.01%
150-160	0.379	0.01%
160-170	0.252	0.01%
170-180	0.089	0.00%
Total	3061.3	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2877.057	93.98%
60- 90	182.029	5.95%
0-90	3059.086	99.93%
90- 180	2.171	0.07%
0- 180	3061.3	100%

Table 3: Zonal Lumen Data

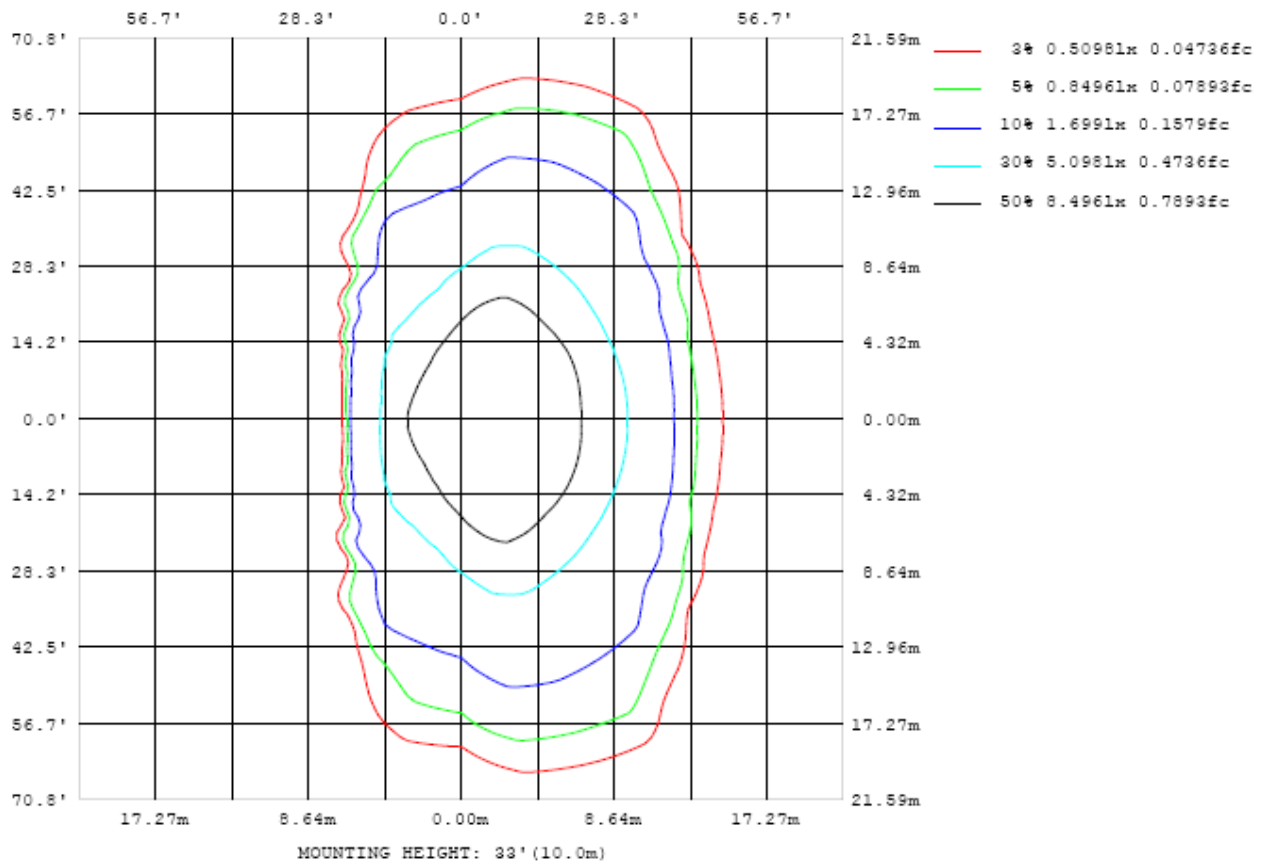


Chart 2: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots

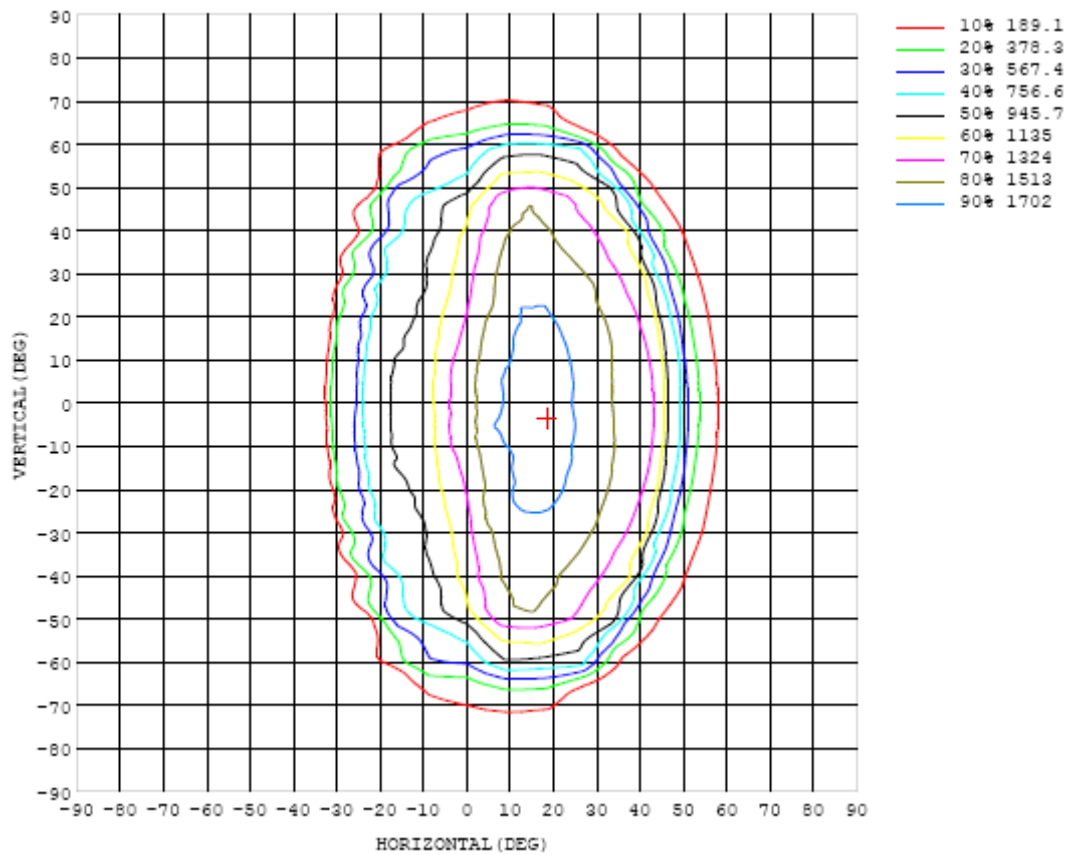


Chart 3: Isocandela Plot

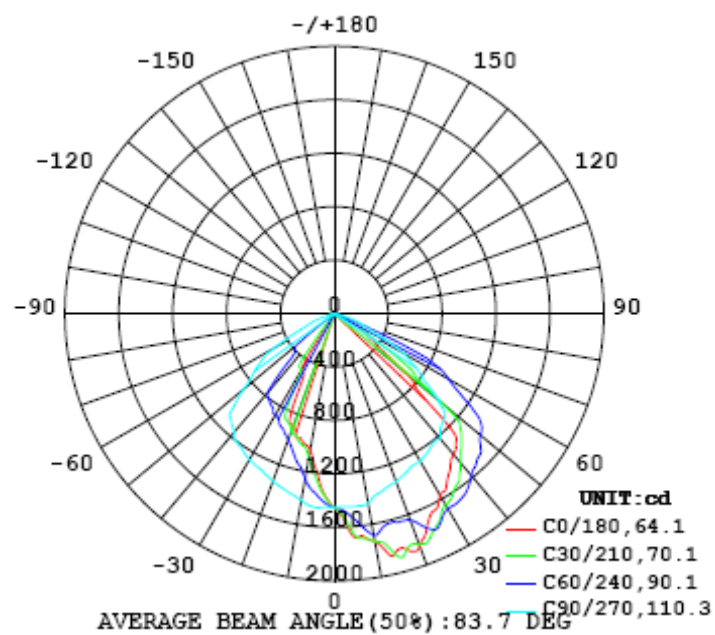


Chart 4: Polar Candela Distribution

## 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	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452
5	1679	1675	1667	1653	1622	1578	1530	1496	1463	1450	1439	1411	1384	1355	1326	1299	1278	1274	1265
10	1731	1728	1730	1729	1705	1689	1684	1577	1471	1437	1394	1338	1269	1194	1131	1078	1052	1043	1038
15	1827	1839	1862	1888	1784	1671	1620	1621	1457	1375	1299	1209	1107	1035	1004	997	987	968	965
20	1847	1871	1886	1838	1792	1829	1644	1583	1492	1339	1235	1114	1014	981	955	946	909	901	898
25	1675	1712	1734	1773	1800	1741	1781	1573	1516	1295	1161	1008	943	928	886	881	786	659	616
30	1568	1607	1654	1649	1694	1718	1686	1632	1493	1274	1077	940	891	857	742	499	496	492	488
35	1475	1504	1547	1573	1599	1618	1669	1682	1471	1235	1028	908	842	685	475	387	73.7	53.4	49.2
40	1376	1388	1412	1457	1517	1555	1582	1618	1480	1223	972	851	788	463	166	43.1	42.0	39.7	36.3
45	1238	1288	1302	1334	1379	1460	1515	1593	1454	1141	909	793	449	190	44.0	48.8	33.8	32.4	34.6
50	670	749	787	1059	1237	1315	1417	1519	1428	1000	838	729	396	26.7	32.1	30.5	35.4	38.9	39.8
55	319	335	370	555	744	1139	1259	1241	1163	770	662	438	36.3	18.2	36.1	39.7	43.8	37.6	34.4
60	62.8	72.3	152	241	310	659	980	977	937	592	556	313	13.2	21.8	31.1	45.0	42.3	41.7	40.2
65	38.9	40.8	40.4	44.0	137	199	611	572	495	302	291	31.9	15.3	24.1	40.6	46.7	46.3	45.0	43.9
70	26.8	28.4	28.2	32.2	23.8	46.1	75.6	254	253	188	146	6.48	14.8	33.8	45.8	30.5	26.7	25.0	20.8
75	3.71	4.51	6.66	8.52	14.5	10.2	11.8	46.1	53.8	40.8	27.3	4.99	16.2	21.4	24.9	5.33	4.27	3.56	3.23
80	0.20	0.21	0.27	1.90	2.61	2.73	3.58	4.67	4.46	3.71	1.86	1.50	5.54	4.38	0.51	0.28	0.28	0.27	0.27
85	0.09	0.09	0.10	0.10	0.12	0.14	0.74	0.87	1.41	1.22	0.82	0.37	0.18	0.15	0.15	0.16	0.18	0.18	0.18
90	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.05	0.05	0.05
95	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.01
100	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.08	0.07	0.06	0.04	0.03	0.02	0.04
105	0.01	0.01	0.01	0.01	0.02	0.03	0.05	0.07	0.08	0.10	0.11	0.11	0.12	0.11	0.10	0.08	0.05	0.05	0.09
110	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.10	0.12	0.14	0.16	0.16	0.16	0.15	0.14	0.13	0.10	0.08	0.16
115	0.01	0.01	0.02	0.03	0.05	0.08	0.11	0.14	0.16	0.19	0.20	0.20	0.21	0.20	0.19	0.17	0.14	0.14	0.24
120	0.02	0.02	0.03	0.05	0.07	0.11	0.13	0.19	0.22	0.25	0.27	0.26	0.27	0.26	0.24	0.24	0.21	0.21	0.34
125	0.03	0.04	0.06	0.08	0.11	0.15	0.20	0.22	0.28	0.32	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.30	0.46
130	0.07	0.08	0.10	0.12	0.14	0.20	0.26	0.28	0.34	0.40	0.43	0.43	0.44	0.42	0.41	0.43	0.41	0.42	0.62
135	0.12	0.13	0.16	0.18	0.20	0.26	0.32	0.38	0.44	0.51	0.54	0.54	0.54	0.55	0.56	0.56	0.55	0.56	0.80
140	0.18	0.19	0.22	0.24	0.27	0.33	0.37	0.45	0.47	0.56	0.60	0.63	0.65	0.69	0.67	0.67	0.68	0.67	0.96
145	0.24	0.26	0.29	0.30	0.32	0.38	0.45	0.50	0.56	0.64	0.69	0.74	0.75	0.76	0.76	0.76	0.77	0.76	1.10
150	0.32	0.35	0.38	0.37	0.39	0.42	0.47	0.53	0.58	0.66	0.70	0.74	0.76	0.80	0.82	0.82	0.83	0.83	1.19
155	0.41	0.45	0.48	0.51	0.46	0.46	0.51	0.56	0.58	0.63	0.68	0.73	0.76	0.80	0.84	0.88	0.88	0.88	1.23
160	0.53	0.57	0.58	0.61	0.57	0.54	0.55	0.57	0.60	0.63	0.70	0.75	0.78	0.83	0.87	0.89	0.90	0.91	1.23
165	0.63	0.67	0.69	0.69	0.68	0.64	0.63	0.64	0.66	0.68	0.75	0.81	0.82	0.86	0.89	0.91	0.93	0.92	1.13
170	0.73	0.76	0.78	0.79	0.76	0.68	0.69	0.70	0.75	0.75	0.78	0.86	0.88	0.90	0.92	0.93	0.95	0.94	1.04
175	0.86	0.90	0.90	0.90	0.89	0.83	0.84	0.83	0.82	0.81	0.89	0.94	0.97	0.99	1.01	1.04	1.04	1.03	1.00
180	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87

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	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452		
5	1274	1280	1297	1323	1347	1375	1410	1441	1456	1475	1498	1534	1580	1626	1656	1669	1675		
10	1040	1062	1091	1130	1185	1255	1324	1381	1420	1467	1558	1660	1671	1690	1717	1732	1727		
15	966	985	997	1005	1037	1122	1200	1297	1373	1473	1594	1608	1664	1766	1862	1853	1823		
20	901	901	938	937	967	1001	1108	1221	1334	1487	1561	1644	1767	1752	1812	1856	1847		
25	657	777	868	869	903	937	999	1142	1289	1472	1559	1702	1714	1756	1726	1719	1700		
30	491	494	493	719	838	876	931	1072	1262	1469	1610	1646	1674	1654	1648	1650	1605		
35	51.2	70.4	375	470	664	826	902	1011	1217	1448	1629	1633	1585	1583	1577	1533	1487		
40	39.2	47.6	54.1	180	462	766	838	951	1160	1441	1591	1559	1521	1490	1431	1384	1366		
45	28.7	28.8	40.8	44.1	131	423	774	910	1098	1418	1534	1491	1421	1336	1293	1285	1276		
50	40.3	36.2	29.9	36.4	24.4	370	691	747	882	1288	1424	1362	1268	1206	963	774	738		
55	38.7	45.1	41.4	30.2	15.9	19.8	372	611	707	1062	1150	1155	1098	707	420	353	330		
60	39.9	41.2	43.4	32.2	20.6	10.8	286	459	521	772	895	909	579	275	218	95.6	40.3		
65	47.0	48.3	49.4	40.5	22.9	12.0	7.89	208	249	377	437	325	154	62.4	32.9	40.0	40.2		
70	24.3	25.9	28.8	44.6	31.4	12.0	5.32	111	145	209	196	41.7	22.8	21.7	25.0	28.7	26.2		
75	3.24	3.33	3.90	17.3	16.5	17.3	3.10	3.11	14.2	19.9	16.2	3.42	7.04	8.33	6.99	3.66	3.32		
80	0.26	0.25	0.25	0.29	1.79	1.66	1.21	1.46	2.66	2.40	1.80	1.86	1.79	2.03	0.31	0.23	0.21		
85	0.18	0.16	0.15	0.13	0.12	0.14	0.26	0.54	0.75	0.76	0.33	0.13	0.10	0.09	0.09	0.09	0.09		
90	0.05	0.03	0.03	0.02	0.03	0.04	0.05	0.05	0.04	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.02		
95	0.02	0.02	0.03	0.05	0.09	0.11	0.12	0.12	0.09	0.07	0.04	0.02	0.01	0.01	0.01	0.01	0.01		
100	0.04	0.05	0.08	0.13	0.17	0.21	0.22	0.20	0.16	0.12	0.08	0.04	0.02	0.01	0.01	0.01	0.01		
105	0.10	0.12	0.17	0.23	0.28	0.32	0.32	0.30	0.25	0.18	0.12	0.07	0.03	0.02	0.02	0.02	0.02		
110	0.17	0.20	0.26	0.31	0.37	0.41	0.41	0.38	0.32	0.25	0.17	0.11	0.06	0.03	0.02	0.02	0.02		
115	0.26	0.29	0.34	0.40	0.44	0.46	0.45	0.43	0.37	0.29	0.21	0.15	0.09	0.05	0.03	0.02	0.02		
120	0.36	0.39	0.43	0.48	0.51	0.52	0.50	0.47	0.42	0.34	0.27	0.19	0.14	0.09	0.05	0.04	0.03		
125	0.48	0.50	0.53	0.57	0.59	0.59	0.57	0.54	0.48	0.41	0.34	0.25	0.19	0.15	0.11	0.08	0.07		
130	0.63	0.64	0.67	0.69	0.71	0.71	0.68	0.66	0.60	0.51	0.44	0.35	0.28	0.23	0.19	0.15	0.14		
135	0.81	0.81	0.85	0.87	0.87	0.85	0.82	0.80	0.74	0.64	0.55	0.45	0.39	0.35	0.30	0.25	0.22		
140	0.98	0.98	1.00	1.03	1.02	0.99	0.95	0.91	0.83	0.75	0.65	0.59	0.52	0.46	0.40	0.35	0.31		
145	1.12	1.12	1.13	1.14	1.14	1.11	1.06	0.99	0.93	0.84	0.79	0.72	0.65	0.57	0.52	0.47	0.43		
150	1.20	1.22	1.20	1.20	1.17	1.14	1.10	1.04	0.95	0.91	0.87	0.80	0.75	0.67	0.66	0.61	0.56		
155	1.24	1.25	1.26	1.21	1.16	1.12	1.07	1.03	0.97	0.94	0.89	0.86	0.81	0.79	0.79	0.73	0.68		
160	1.25	1.24	1.24	1.22	1.16	1.11	1.07	1.03	0.95	0.93	0.93	0.91	0.89	0.90	0.90	0.89	0.84		
165	1.15	1.18	1.18	1.17	1.15	1.11	1.07	1.02	0.98	0.92	0.92	0.93	0.91	0.95	0.95	0.97	0.95		
170	1.06	1.11	1.13	1.12	1.11	1.08	1.05	1.00	0.96	0.95	0.95	0.95	0.92	0.98	1.03	1.05	1.03		
175	1.00	1.05	1.06	1.07	1.04	1.03	1.00	0.96	0.93	0.91	0.98	0.98	0.96	1.02	1.07	1.08	1.09		
180	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87		

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard Source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 2017

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 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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