



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

for

### **ABOVE ALL LIGHTING INC**

1501 Industrial Way N. Toms River, NJ 08755.

### **V-Line Wall Pack**

### **Model: WL52501**

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

**NVLAP CODE: 200960-0**

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Report No.: HZ17030090n

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

Reviewed by:

Engineer: April Zou

Apr. 13, 2017

Approved by:

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: **WL52501**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
126.6	6547.9	51.74	126.6
CCT (K)	CRI	BUG	Stabilization Time (Light & Power)
4766	66.9	B1-U1-G1	60

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Mar. 24, 2017
<b>Date of Test</b>	: Apr. 11, 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 Wall Pack
<b>Model</b>	: WL52501
<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)	0.433	0.195
Power Factor	0.9954	0.9526
Test Power (W)	51.74	51.55
THD A%	5.86	8.49
Luminous Efficacy (lm/W)	126.6	126.3
Total Luminous Flux (lm)	6547.9	6510.7
Color Rendering Index (CRI)	66.9	
R9	-40	
Correlated Color Temperature (CCT) (K)	4766	
Chromaticity (Chroma x, Chroma y)	(0.3531, 0.3659)	
Chromaticity (Chroma u, Chroma v)	(0.2113, 0.3284)	
Chromaticity (Chroma u', Chroma v')	(0.2113, 0.4926)	
Duv	0.0039	
Average Beam Angle (°)	90.3	
Center Beam Candle Power (cd)	2005	
Spacing Criteria	0.57 (0°-180°)/ 1.39 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	80.23%	
Zonal Lumens in the 60°-90°Zone	19.70%	
Zonal Lumens in the 90°-120°Zone	0.02%	
Zonal Lumens in the 120°-180°Zone	0.05%	

Special Color Rendering Indices	
R1	65
R2	71
R3	75
R4	69
R5	65
R6	60
R7	77
R8	53
R9	-40
R10	31
R11	65
R12	35
R13	64
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

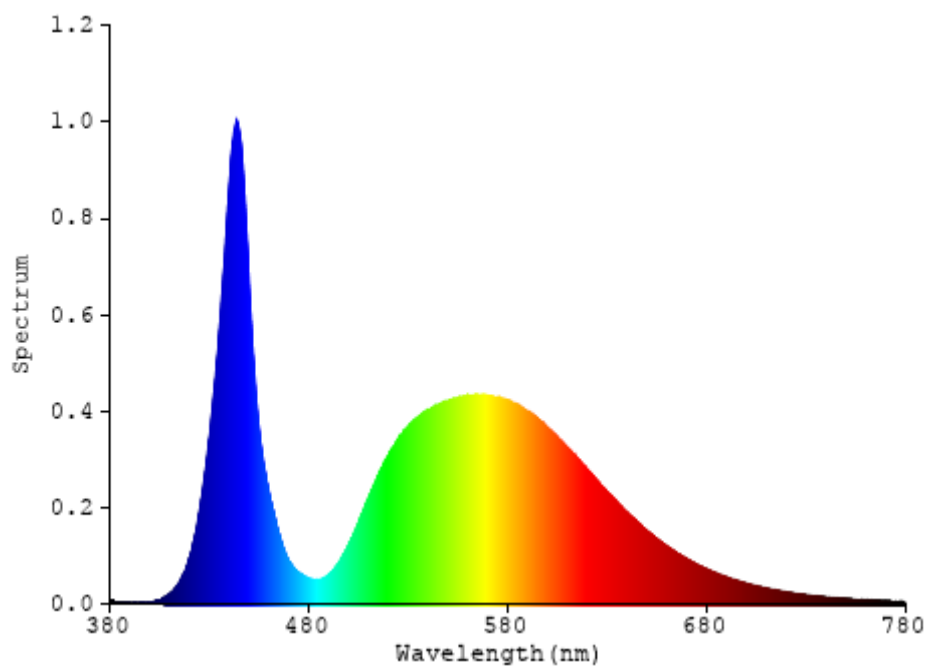


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	173.246	2.65%
10- 20	492.731	7.53%
20- 30	811.844	12.40%
30- 40	1106.298	16.90%
40- 50	1342.279	20.50%
50- 60	1326.708	20.26%
60- 70	1006.039	15.36%
70- 80	270.48	4.13%
80- 90	13.305	0.20%
90-100	0.265	0.00%
100-110	0.493	0.01%
110-120	0.627	0.01%
120-130	0.733	0.01%
130-140	0.847	0.01%
140-150	0.818	0.01%
150-160	0.625	0.01%
160-170	0.392	0.01%
170-180	0.136	0.00%
Total	6547.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	5253.106	80.23%
60- 90	1289.824	19.70%
0-90	6542.93	99.92%
90- 180	4.936	0.08%
0- 180	6547.9	100%

Table 3: Zonal Lumen Data

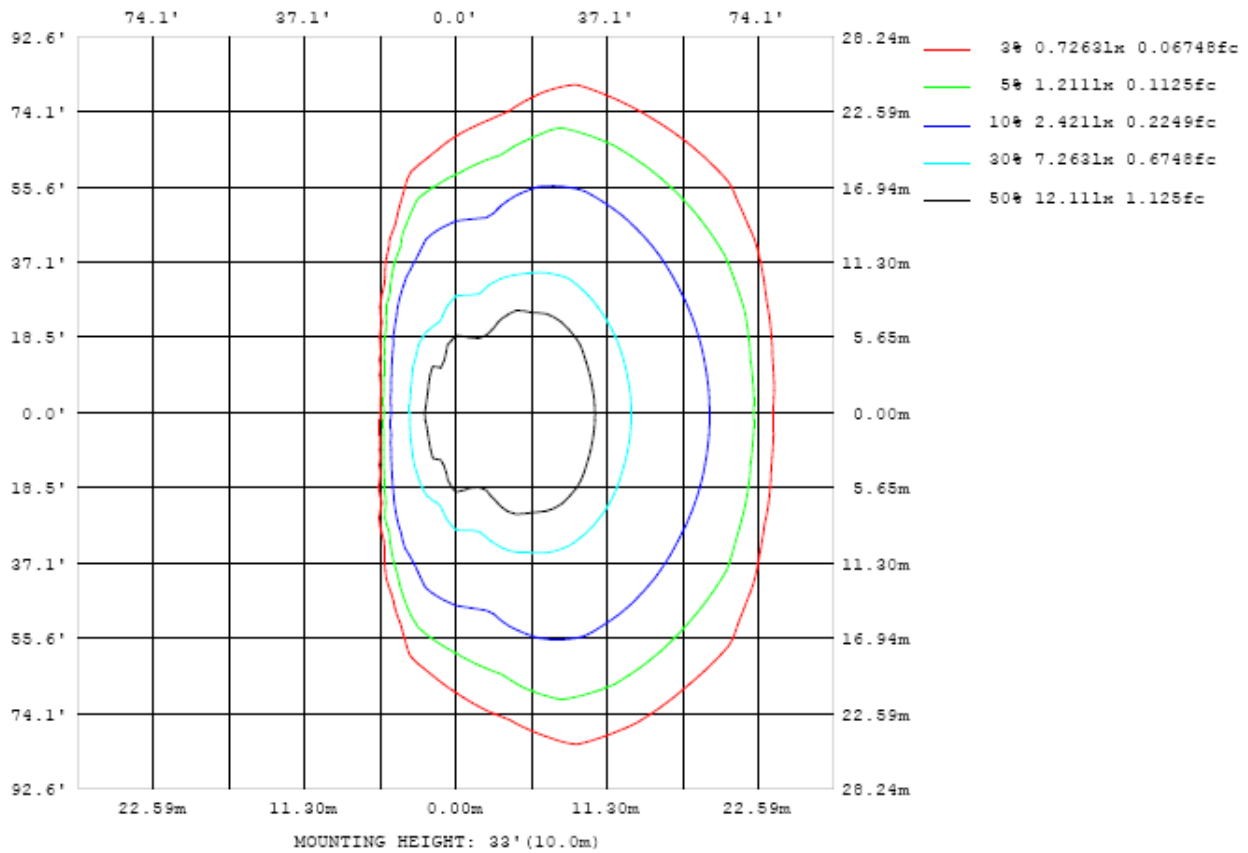


Chart 2: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots

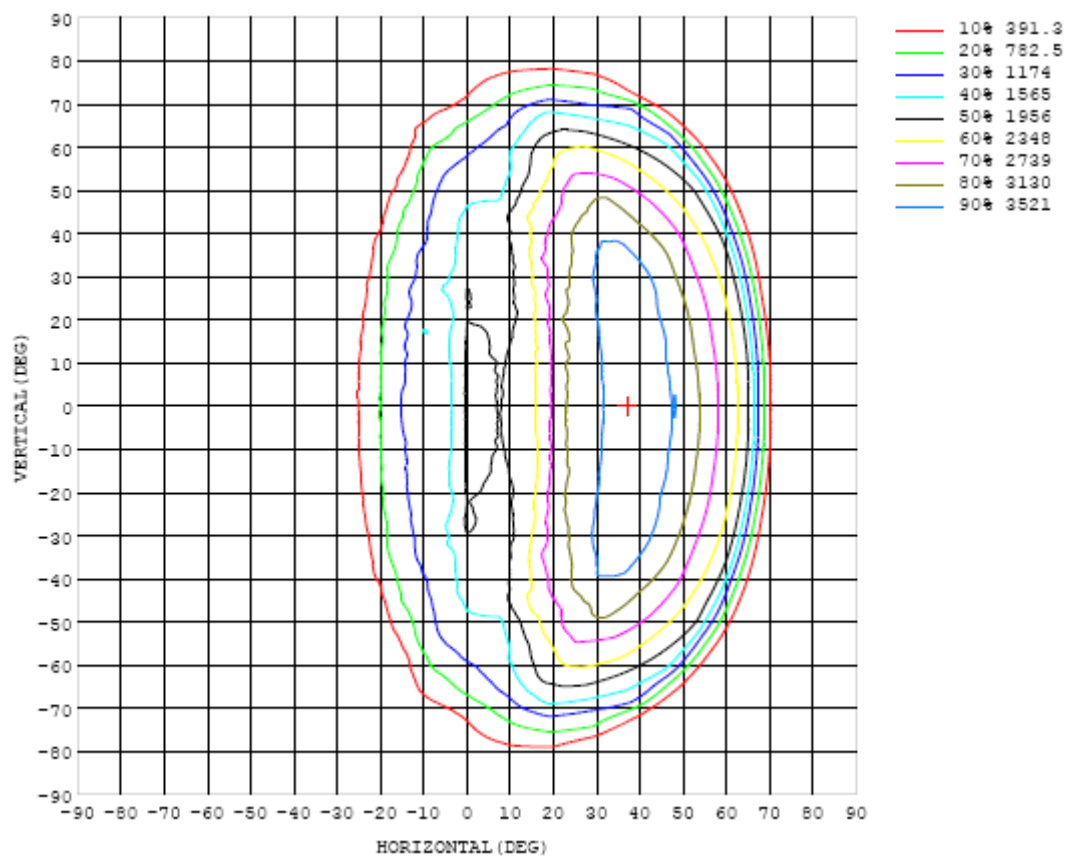


Chart 3: Isocandela Plot

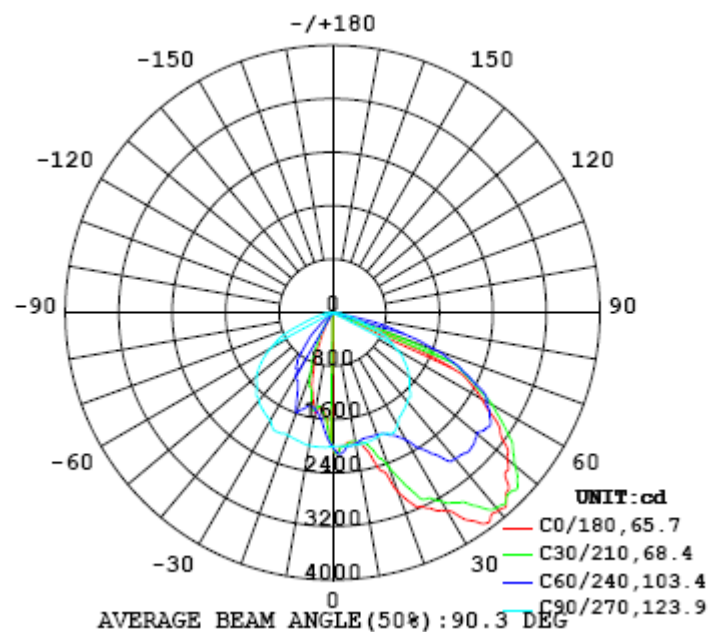


Chart 4: Polar Candela Distribution

## Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
5	1995	2001	2004	2011	2013	2014	2069	2111	2096	2001	1915	1811	1678	1588	1553	1522	1497	1487	1481
10	1974	1973	1968	1962	1955	1959	1988	2012	2081	2010	1803	1580	1479	1423	1428	1474	1505	1514	1518
15	2223	2201	2119	2050	1994	1964	1941	1959	2030	2004	1698	1501	1449	1464	1377	1246	1216	1204	1190
20	2843	2809	2670	2458	2239	2028	1946	1909	1954	1979	1573	1464	1517	1264	1103	991	869	819	792
25	3205	3170	3149	3049	2727	2327	2021	1892	1895	1997	1532	1432	1271	1025	850	663	492	413	397
30	3432	3411	3359	3256	3132	2737	2209	1896	1854	1947	1512	1349	1077	830	524	305	170	102	84.5
35	3846	3804	3692	3472	3329	3034	2577	2015	1772	1823	1307	1214	928	517	202	61.4	33.5	31.9	30.5
40	3865	3858	3880	3814	3562	3175	2852	2134	1736	1747	1284	1098	675	203	52.7	36.9	42.5	47.2	48.9
45	3732	3729	3778	3782	3711	3335	2903	2328	1770	1631	1239	900	356	47.1	54.2	58.9	61.9	62.2	63.5
50	3417	3441	3446	3564	3594	3384	2820	2317	1537	1496	1165	636	73.7	55.3	67.8	69.0	66.3	65.3	65.0
55	3060	3060	3123	3224	3173	3232	2888	2208	1451	1337	1075	362	42.9	81.3	72.2	67.6	62.3	61.4	59.3
60	2575	2597	2615	2758	2819	2760	2662	2132	1448	1113	786	65.3	85.0	80.4	67.0	61.3	58.2	53.1	53.6
65	1988	2076	2171	2195	2217	2289	2239	2001	1290	895	526	77.2	81.2	66.9	60.4	50.5	46.0	42.9	37.0
70	460	469	679	1035	1610	1656	1660	1575	1005	537	228	121	73.1	49.8	46.1	36.3	30.2	26.5	25.4
75	6.21	5.84	7.13	42.9	229	655	898	920	679	314	22.4	61.4	48.6	31.3	20.5	18.4	13.4	11.1	10.0
80	0.26	0.26	0.36	0.70	1.44	3.12	97.2	352	284	138	6.54	25.6	20.4	13.3	7.82	7.78	7.34	7.09	7.17
85	0.13	0.12	0.12	0.11	0.08	0.08	0.09	1.17	4.76	1.96	3.26	4.10	5.90	4.87	5.60	6.08	5.62	5.14	5.33
90	0.05	0.04	0.04	0.04	0.04	0.05	0.06	0.08	0.10	0.12	0.14	0.15	0.17	0.17	0.16	0.20	0.31	0.48	1.05
95	0.03	0.03	0.04	0.04	0.04	0.05	0.07	0.11	0.15	0.18	0.21	0.25	0.28	0.31	0.44	0.28	0.24	0.23	0.38
100	0.03	0.03	0.04	0.04	0.05	0.07	0.10	0.15	0.26	0.34	0.47	0.61	0.71	0.72	0.65	0.54	0.46	0.41	0.70
105	0.03	0.04	0.04	0.04	0.06	0.09	0.14	0.22	0.39	0.45	0.58	0.69	0.71	0.71	0.68	0.63	0.57	0.54	1.01
110	0.04	0.04	0.04	0.05	0.08	0.12	0.18	0.51	0.48	0.54	0.67	0.75	0.77	0.79	0.78	0.77	0.73	0.71	1.19
115	0.04	0.04	0.05	0.07	0.10	0.15	0.24	0.54	0.52	0.61	0.77	0.87	0.90	0.94	0.93	0.93	0.91	0.89	1.37
120	0.05	0.05	0.06	0.10	0.13	0.20	0.36	0.49	0.56	0.66	0.82	0.93	0.99	1.07	1.09	1.12	1.11	1.10	1.58
125	0.06	0.07	0.09	0.14	0.18	0.27	0.40	0.48	0.62	0.75	0.93	1.07	1.13	1.23	1.27	1.34	1.35	1.34	1.76
130	0.09	0.11	0.15	0.20	0.22	0.32	0.46	0.56	0.67	0.83	1.04	1.24	1.35	1.41	1.49	1.60	1.61	1.65	2.00
135	0.16	0.18	0.23	0.29	0.31	0.39	0.51	0.64	0.75	0.95	1.14	1.31	1.44	1.59	1.74	1.82	1.87	1.93	2.20
140	0.23	0.25	0.32	0.38	0.38	0.48	0.58	0.68	0.85	1.03	1.22	1.43	1.57	1.76	1.87	1.93	1.99	2.03	2.31
145	0.30	0.35	0.43	0.46	0.45	0.52	0.62	0.73	0.94	1.10	1.27	1.49	1.64	1.77	1.88	1.95	2.03	1.99	2.37
150	0.41	0.47	0.54	0.59	0.58	0.59	0.64	0.79	0.90	1.08	1.21	1.37	1.51	1.66	1.77	1.85	1.88	1.83	2.29
155	0.54	0.61	0.66	0.75	0.69	0.64	0.70	0.83	0.93	1.02	1.15	1.31	1.44	1.58	1.69	1.74	1.70	1.65	2.11
160	0.69	0.75	0.81	0.89	0.87	0.76	0.77	0.91	0.99	0.95	1.16	1.34	1.45	1.55	1.63	1.63	1.58	1.53	1.95
165	0.84	0.88	0.97	1.03	1.05	0.92	0.91	1.02	1.04	1.05	1.23	1.42	1.50	1.56	1.58	1.56	1.51	1.45	1.65
170	0.98	1.02	1.12	1.18	1.20	1.05	0.97	1.05	1.18	1.18	1.18	1.43	1.54	1.57	1.57	1.54	1.50	1.42	1.46
175	1.12	1.21	1.27	1.34	1.40	1.32	1.22	1.28	1.32	1.29	1.38	1.49	1.61	1.64	1.67	1.66	1.62	1.56	1.44
180	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.28	1.28	1.28	1.28	1.29	1.29	1.30	1.30	1.30	1.30	1.30	1.31

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	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005		
5	1484	1495	1514	1548	1597	1684	1802	1917	2022	2074	2102	2087	2017	2008	2000	1994	1996		
10	1517	1498	1471	1425	1419	1478	1597	1798	2024	2080	2009	1980	1961	1953	1960	1965	1974		
15	1190	1183	1240	1378	1515	1442	1493	1689	1989	2041	1957	1936	1962	1994	2037	2114	2202		
20	814	873	967	1150	1254	1586	1421	1552	1956	1943	1902	1941	2008	2323	2481	2596	2817		
25	417	490	637	821	1045	1238	1434	1551	1975	1892	1885	1973	2341	2702	2988	3187	3169		
30	94.2	162	288	486	827	1103	1355	1512	1868	1848	1887	2192	2724	3176	3237	3354	3404		
35	31.8	32.3	56.5	193	485	920	1195	1284	1801	1765	1983	2540	3060	3293	3470	3722	3787		
40	49.3	43.2	39.3	45.7	192	633	1055	1279	1715	1792	2116	2814	3146	3544	3791	3830	3832		
45	63.9	61.1	63.9	56.1	41.5	328	899	1244	1604	1761	2348	2886	3359	3698	3832	3712	3683		
50	66.1	67.2	69.4	73.2	59.1	64.0	619	1150	1485	1514	2273	2809	3388	3536	3558	3439	3362		
55	60.6	64.6	66.4	70.1	85.2	49.9	346	1043	1304	1404	2149	2836	3186	3153	3191	3061	3037		
60	55.3	56.1	58.2	64.9	79.1	86.0	53.7	775	1079	1434	2143	2664	2735	2733	2719	2592	2583		
65	38.8	42.1	53.7	57.5	66.7	78.8	93.5	531	842	1204	1920	2165	2183	2174	2162	2143	2106		
70	24.5	28.5	32.1	43.5	43.3	72.3	116	193	474	945	1484	1525	1609	1594	1151	742	456		
75	10.5	11.4	15.0	18.0	26.1	42.8	57.9	21.7	280	600	818	846	754	343	45.0	6.94	5.95		
80	7.21	6.97	7.27	7.20	8.97	15.0	20.7	5.17	118	248	300	199	3.54	2.37	1.36	0.61	0.33		
85	5.45	5.22	5.34	5.38	4.56	4.24	4.04	3.47	2.08	17.6	2.29	0.57	0.11	0.12	0.12	0.13	0.14		
90	1.33	1.42	1.58	1.24	1.09	1.01	0.80	0.60	0.26	0.13	0.08	0.07	0.07	0.07	0.06	0.07	0.08		
95	0.39	0.43	0.48	0.53	0.57	0.56	0.48	0.37	0.25	0.16	0.09	0.06	0.05	0.05	0.04	0.04	0.04		
100	0.71	0.75	0.81	0.87	0.88	0.81	0.66	0.49	0.35	0.23	0.14	0.08	0.05	0.05	0.05	0.04	0.04		
105	1.02	1.04	1.07	1.10	1.07	0.96	0.80	0.63	0.47	0.33	0.21	0.12	0.07	0.06	0.06	0.05	0.05		
110	1.19	1.23	1.26	1.26	1.21	1.10	0.94	0.77	0.59	0.42	0.28	0.17	0.10	0.07	0.06	0.06	0.05		
115	1.36	1.36	1.37	1.36	1.28	1.16	1.02	0.84	0.67	0.49	0.34	0.22	0.15	0.09	0.07	0.07	0.06		
120	1.56	1.52	1.49	1.46	1.35	1.22	1.08	0.91	0.73	0.56	0.41	0.29	0.21	0.14	0.10	0.08	0.07		
125	1.74	1.70	1.63	1.56	1.42	1.29	1.17	1.01	0.83	0.64	0.51	0.37	0.28	0.20	0.15	0.12	0.09		
130	1.99	1.91	1.84	1.72	1.59	1.46	1.33	1.17	0.98	0.76	0.63	0.49	0.40	0.30	0.24	0.19	0.15		
135	2.22	2.14	2.08	1.98	1.82	1.66	1.51	1.38	1.14	0.95	0.77	0.64	0.54	0.48	0.39	0.31	0.26		
140	2.36	2.30	2.23	2.17	2.03	1.86	1.67	1.52	1.28	1.08	0.87	0.80	0.69	0.62	0.54	0.44	0.37		
145	2.42	2.39	2.32	2.23	2.14	1.99	1.82	1.61	1.45	1.17	1.06	0.95	0.87	0.78	0.71	0.61	0.52		
150	2.33	2.34	2.29	2.23	2.14	1.99	1.85	1.65	1.44	1.27	1.20	1.05	1.03	0.96	0.91	0.83	0.72		
155	2.17	2.22	2.25	2.19	2.08	1.95	1.80	1.64	1.50	1.41	1.23	1.14	1.09	1.10	1.14	1.02	0.90		
160	2.00	2.04	2.10	2.10	2.02	1.92	1.80	1.65	1.44	1.47	1.34	1.24	1.17	1.28	1.31	1.22	1.11		
165	1.69	1.76	1.84	1.90	1.92	1.87	1.78	1.60	1.48	1.39	1.39	1.31	1.29	1.36	1.41	1.38	1.29		
170	1.48	1.57	1.66	1.73	1.78	1.77	1.72	1.52	1.45	1.43	1.43	1.36	1.32	1.48	1.55	1.52	1.43		
175	1.44	1.50	1.56	1.64	1.62	1.64	1.60	1.48	1.41	1.43	1.50	1.45	1.42	1.58	1.63	1.58	1.53		
180	1.30	1.30	1.30	1.30	1.30	1.29	1.29	1.28	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.27	1.27		

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 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  $10^\circ$  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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