



## LM-79-08 Test Report

for

### ABOVE ALL LIGHTING INC

1501 Industrial Way N. Toms River, NJ 08755.

### V-Line Flood Light

**Model: FL52301**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ17030090e

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: **FL52301**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
114.1	5926.8	51.96	0.9927
CCT (K)	CRI	BUG	Stabilization Time (Light & Power)
2973	73.1	B2-U1-G0	60

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Mar. 24, 2017
<b>Date of Test</b>	: Apr. 01, 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>	: FL52301
<b>Electrical Ratings</b>	: 120~277Vac, 50/60Hz
<b>Product Description</b>	: 3000K 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)	0.436	0.197
Power Factor	0.9927	0.9501
Test Power (W)	51.96	51.77
THD A%	7.53	8.17
Luminous Efficacy (lm/W)	114.1	114.2
Total Luminous Flux (lm)	5926.8	5908.6
Color Rendering Index (CRI)	73.1	
R9	-25	
Correlated Color Temperature (CCT) (K)	2973	
Chromaticity (Chroma x, Chroma y)	(0.4402, 0.4075)	
Chromaticity (Chroma u, Chroma v)	(0.2512, 0.3488)	
Chromaticity (Chroma u', Chroma v')	(0.2512, 0.5232)	
Duv	0.0009	
Average Beam Angle (°)	85.1	
Center Beam Candle Power (cd)	2900	
Spacing Criteria	0.75 (0°-180°)/ 1.34 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	94.08%	
Zonal Lumens in the 60°-90°Zone	5.84%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.06%	

Special Color Rendering Indices	
R1	69
R2	83
R3	95
R4	68
R5	68
R6	76
R7	79
R8	46
R9	-25
R10	62
R11	62
R12	52
R13	72
R14	97

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

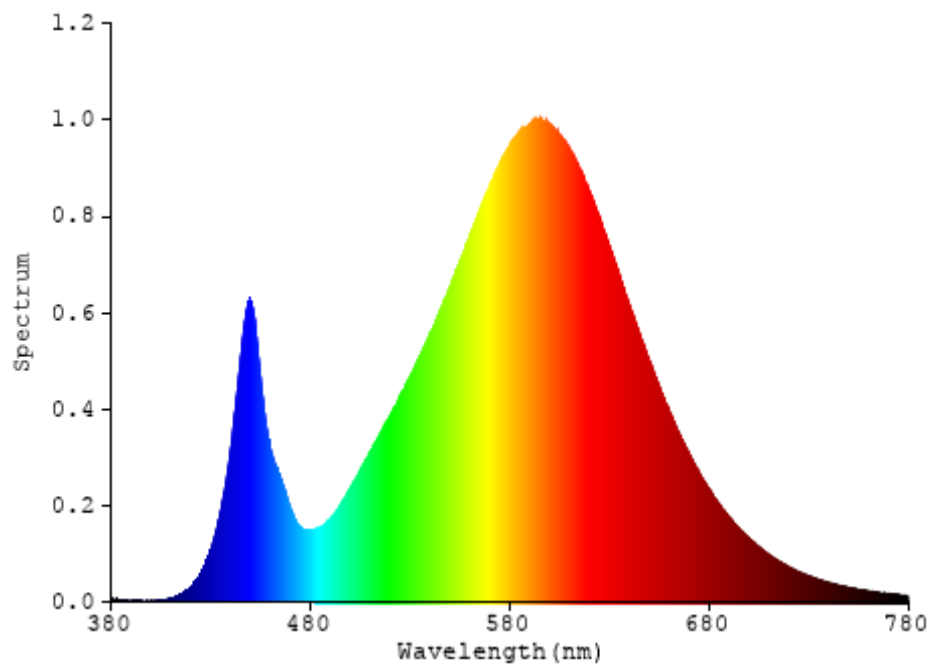


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	273.412	4.61%
10- 20	782.717	13.21%
20- 30	1181.894	19.94%
30- 40	1322.541	22.31%
40- 50	1215.784	20.51%
50- 60	799.89	13.50%
60- 70	298.157	5.03%
70- 80	46.898	0.79%
80- 90	1.237	0.02%
90-100	0.104	0.00%
100-110	0.226	0.00%
110-120	0.365	0.01%
120-130	0.549	0.01%
130-140	0.782	0.01%
140-150	0.876	0.01%
150-160	0.741	0.01%
160-170	0.489	0.01%
170-180	0.174	0.00%
Total	5926.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	5576.238	94.08%
60- 90	346.292	5.84%
0-90	5922.53	99.93%
90- 180	4.306	0.07%
0- 180	5926.8	100%

Table 3: Zonal Lumen Data

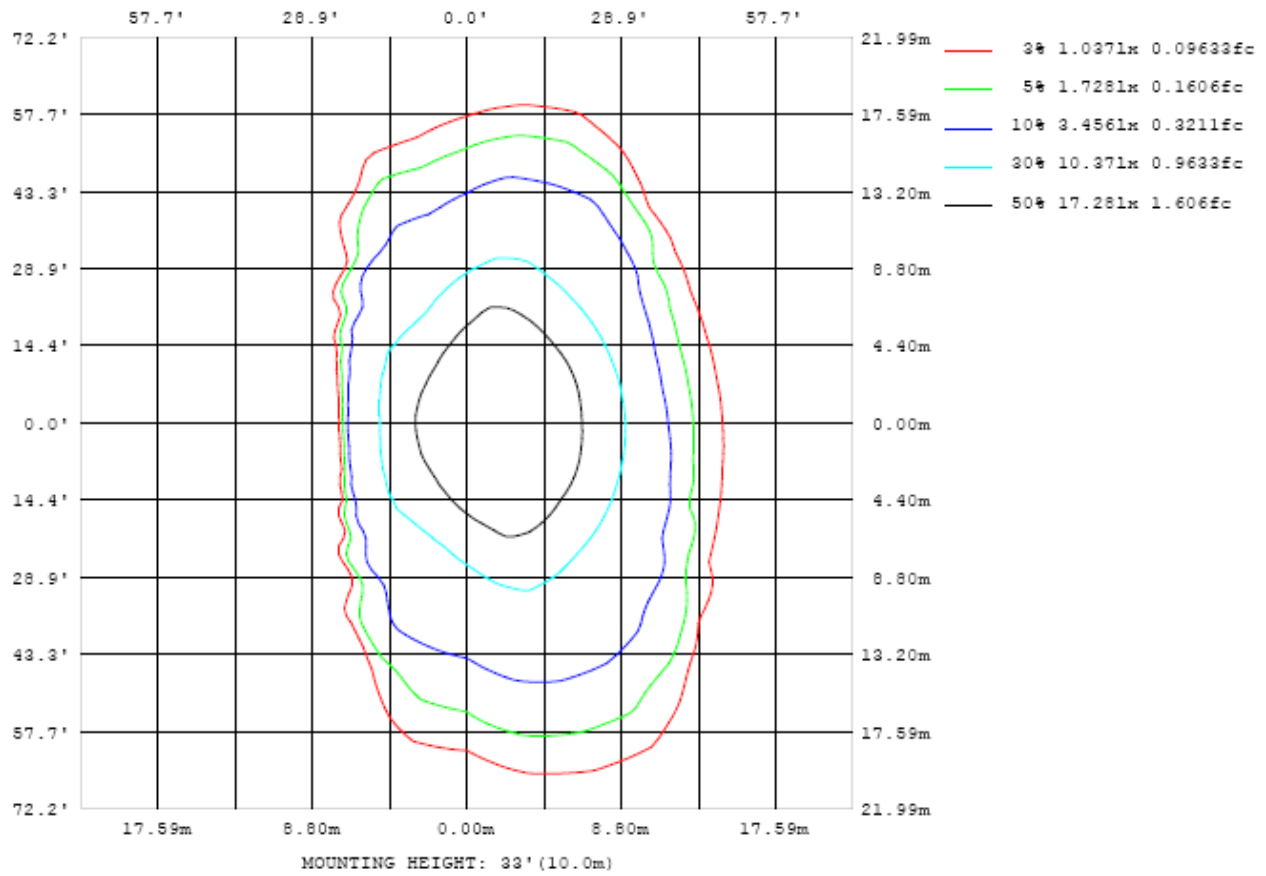


Chart 2: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

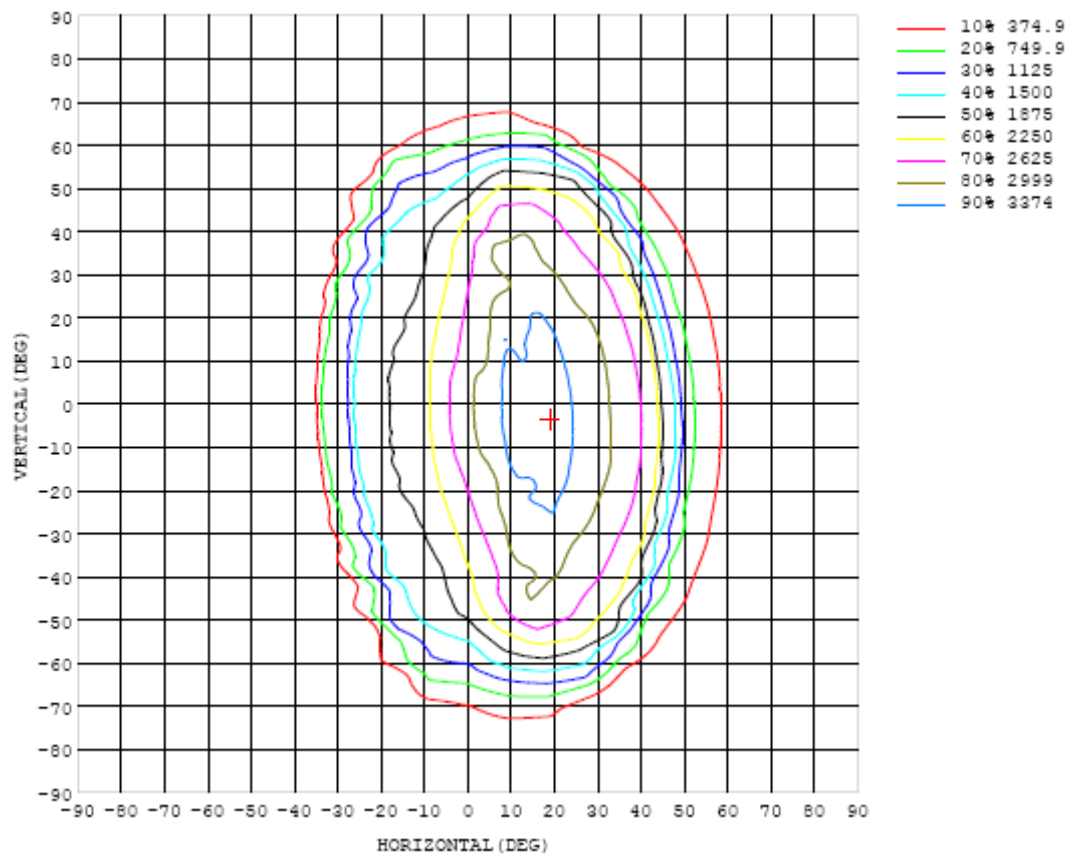


Chart 3: Isocandela Plot

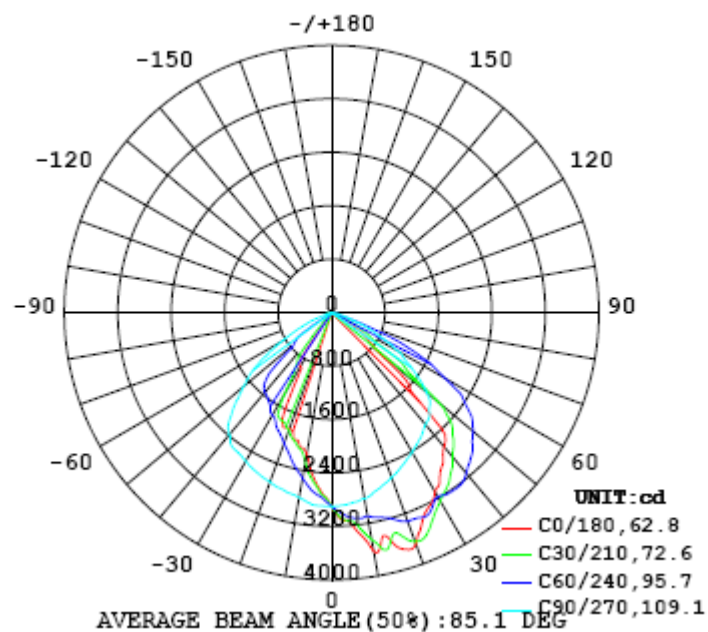


Chart 4: Polar Candela Distribution

## 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	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900
5	3144	3137	3128	3130	3123	3107	3074	3007	2948	2873	2806	2766	2736	2681	2644	2620	2601	2587	2580
10	3621	3594	3529	3445	3329	3196	3092	3063	2962	2828	2721	2623	2527	2438	2347	2241	2179	2153	2148
15	3575	3529	3452	3483	3607	3437	3179	3007	2901	2732	2585	2439	2276	2130	2084	2058	1997	1973	1974
20	3681	3731	3724	3644	3443	3432	3323	2988	2858	2627	2423	2236	2075	1999	1947	1888	1855	1851	1847
25	3307	3343	3423	3510	3551	3376	3357	3074	2796	2518	2275	2044	1949	1874	1813	1832	1808	1775	1751
30	3096	3156	3214	3254	3339	3409	3182	3083	2717	2409	2113	1888	1816	1754	1712	1299	938	944	938
35	2854	2900	3017	3074	3090	3206	3225	3126	2642	2306	1957	1758	1698	1548	904	917	739	414	365
40	2617	2653	2756	2822	2909	2977	3135	2960	2593	2186	1823	1665	1526	876	752	55.4	72.9	66.7	66.1
45	1730	2185	2476	2561	2666	2791	2979	3028	2612	2067	1725	1529	1076	731	62.9	71.5	53.8	60.2	60.7
50	870	1223	1492	2114	2406	2561	2763	2931	2457	1851	1621	1406	686	33.2	64.7	63.7	70.0	72.7	72.9
55	601	644	719	1183	1790	2268	2477	2505	2069	1480	1346	894	24.1	45.3	77.1	77.1	76.5	69.0	69.6
60	134	254	445	568	809	1804	1946	1913	1660	1137	1071	571	15.5	49.2	67.6	80.6	77.4	74.9	73.9
65	109	99.5	77.8	177	379	701	1320	1273	1046	729	693	18.6	32.5	56.3	79.2	86.7	84.0	87.3	89.0
70	52.5	55.1	64.6	73.4	59.3	171	451	641	576	356	220	12.8	35.8	68.4	88.9	75.3	51.2	49.6	50.2
75	7.88	10.9	20.4	34.9	33.3	19.8	64.4	264	221	166	50.0	13.2	39.5	67.8	52.2	38.0	15.0	8.11	7.98
80	0.40	0.58	3.67	5.59	8.83	7.02	7.66	7.62	7.69	6.97	3.80	11.7	28.1	18.4	7.64	3.28	0.22	0.23	0.21
85	0.09	0.11	0.14	0.21	0.31	2.05	2.77	3.21	4.28	3.48	2.05	1.40	1.08	0.24	0.18	0.15	0.13	0.12	0.11
90	0.03	0.05	0.06	0.07	0.06	0.06	0.07	0.15	0.74	0.64	0.18	0.08	0.07	0.07	0.06	0.06	0.05	0.03	0.03
95	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.08	0.08	0.08	0.06	0.04	0.04	0.03	0.03	0.05
100	0.03	0.03	0.03	0.03	0.04	0.05	0.07	0.08	0.10	0.11	0.12	0.13	0.13	0.12	0.09	0.07	0.06	0.05	0.10
105	0.03	0.03	0.03	0.04	0.06	0.08	0.10	0.13	0.15	0.17	0.18	0.20	0.20	0.18	0.16	0.12	0.10	0.09	0.18
110	0.03	0.03	0.04	0.06	0.08	0.12	0.15	0.19	0.22	0.25	0.26	0.27	0.28	0.26	0.24	0.21	0.17	0.15	0.29
115	0.04	0.04	0.06	0.09	0.11	0.17	0.22	0.27	0.30	0.34	0.35	0.34	0.35	0.34	0.32	0.29	0.25	0.24	0.44
120	0.05	0.06	0.08	0.12	0.16	0.23	0.28	0.35	0.40	0.44	0.45	0.45	0.46	0.45	0.42	0.40	0.38	0.37	0.64
125	0.10	0.12	0.15	0.19	0.23	0.32	0.39	0.40	0.52	0.58	0.58	0.58	0.59	0.58	0.57	0.56	0.55	0.55	0.87
130	0.18	0.21	0.25	0.28	0.30	0.41	0.50	0.56	0.64	0.74	0.74	0.73	0.74	0.75	0.72	0.75	0.75	0.75	1.16
135	0.30	0.33	0.38	0.41	0.43	0.52	0.64	0.76	0.80	0.93	0.95	0.98	0.95	0.95	0.98	1.00	1.01	1.02	1.47
140	0.42	0.46	0.50	0.53	0.57	0.65	0.74	0.87	0.94	1.05	1.08	1.12	1.14	1.19	1.21	1.19	1.23	1.24	1.76
145	0.55	0.60	0.62	0.64	0.70	0.81	0.93	1.01	1.16	1.22	1.29	1.36	1.40	1.42	1.41	1.39	1.42	1.40	1.97
150	0.71	0.75	0.78	0.80	0.82	0.87	0.99	1.12	1.23	1.33	1.39	1.44	1.45	1.49	1.53	1.53	1.57	1.52	2.08
155	0.90	0.95	0.99	1.00	0.94	0.95	1.02	1.14	1.20	1.24	1.33	1.40	1.45	1.52	1.59	1.66	1.69	1.63	2.10
160	1.15	1.18	1.19	1.19	1.12	1.07	1.11	1.18	1.23	1.19	1.35	1.43	1.49	1.56	1.65	1.73	1.75	1.72	2.05
165	1.34	1.36	1.35	1.36	1.29	1.22	1.22	1.23	1.25	1.25	1.41	1.50	1.55	1.62	1.70	1.74	1.77	1.77	1.89
170	1.55	1.58	1.58	1.53	1.43	1.41	1.40	1.42	1.48	1.47	1.57	1.66	1.73	1.77	1.81	1.84	1.86	1.89	1.84
175	1.81	1.77	1.75	1.65	1.56	1.54	1.54	1.56	1.54	1.50	1.61	1.70	1.75	1.79	1.83	1.89	1.96	2.00	2.05
180	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70

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	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900		
5	2581	2596	2610	2645	2690	2721	2764	2822	2891	2954	3013	3055	3076	3079	3092	3113	3128		
10	2159	2197	2270	2363	2441	2515	2600	2695	2810	2922	2958	3056	3209	3349	3466	3560	3618		
15	1979	2017	2037	2068	2160	2298	2429	2578	2753	2855	3020	3272	3439	3426	3376	3451	3537		
20	1840	1846	1867	1936	1989	2079	2267	2464	2698	2822	3174	3249	3340	3475	3598	3640	3660		
25	1778	1794	1779	1782	1845	1922	2087	2348	2642	2867	3169	3286	3425	3419	3353	3312	3298		
30	922	1046	1416	1706	1692	1769	1922	2224	2571	2922	3003	3264	3223	3141	3149	3130	3093		
35	518	781	891	1056	1632	1636	1783	2102	2512	3018	3131	3072	3003	2947	2916	2894	2860		
40	66.4	77.6	233	878	1004	1556	1685	1953	2383	2822	3071	2890	2796	2728	2649	2609	2607		
45	55.8	64.5	52.6	133	831	1363	1548	1718	2110	2698	2848	2650	2540	2439	2384	1907	1707		
50	72.7	70.5	65.1	39.8	84.4	742	1289	1371	1731	2330	2464	2376	2246	1585	1277	956	861		
55	73.7	80.6	66.9	40.9	46.6	420	1038	1038	1346	1820	1906	1970	1401	781	638	594	578		
60	75.3	80.3	69.1	56.3	29.8	38.9	471	658	864	1137	1270	970	526	425	323	188	157		
65	89.7	89.5	87.8	69.7	37.1	25.3	153	322	465	549	558	228	171	64.2	82.6	106	112		
70	50.2	50.8	60.0	76.8	47.6	14.8	9.72	126	161	225	78.0	44.3	38.1	38.7	50.4	54.3	52.2		
75	7.92	12.0	26.5	31.8	27.5	18.9	3.22	5.04	7.06	6.64	8.48	7.61	12.6	13.7	8.39	8.01	7.64		
80	0.20	0.19	0.20	0.37	3.39	1.10	1.74	2.51	3.40	3.34	2.77	2.71	2.31	0.46	0.36	0.36	0.37		
85	0.10	0.09	0.08	0.08	0.08	0.10	0.16	0.37	0.55	0.22	0.09	0.07	0.07	0.07	0.08	0.08	0.08		
90	0.03	0.03	0.05	0.07	0.10	0.14	0.16	0.15	0.12	0.09	0.06	0.04	0.04	0.04	0.04	0.04	0.04		
95	0.06	0.07	0.10	0.16	0.23	0.28	0.30	0.27	0.22	0.16	0.10	0.06	0.04	0.04	0.04	0.04	0.04		
100	0.11	0.14	0.21	0.31	0.41	0.47	0.48	0.43	0.35	0.26	0.17	0.10	0.05	0.04	0.04	0.04	0.04		
105	0.21	0.27	0.38	0.50	0.60	0.66	0.66	0.61	0.50	0.37	0.26	0.16	0.08	0.05	0.05	0.05	0.05		
110	0.34	0.42	0.53	0.65	0.76	0.80	0.79	0.74	0.62	0.47	0.34	0.23	0.13	0.07	0.05	0.05	0.05		
115	0.51	0.59	0.69	0.81	0.89	0.90	0.88	0.84	0.71	0.56	0.42	0.30	0.20	0.12	0.07	0.06	0.05		
120	0.71	0.78	0.87	0.96	1.01	1.02	0.98	0.94	0.82	0.68	0.54	0.40	0.30	0.21	0.14	0.11	0.09		
125	0.97	1.03	1.10	1.15	1.21	1.21	1.17	1.12	1.01	0.85	0.70	0.54	0.44	0.34	0.27	0.21	0.18		
130	1.29	1.33	1.40	1.44	1.46	1.46	1.43	1.38	1.26	1.08	0.93	0.73	0.63	0.52	0.44	0.37	0.32		
135	1.63	1.67	1.73	1.80	1.80	1.76	1.70	1.63	1.50	1.34	1.13	1.00	0.87	0.77	0.67	0.59	0.51		
140	1.95	1.97	2.02	2.07	2.07	2.01	1.93	1.85	1.71	1.54	1.38	1.22	1.10	0.98	0.88	0.80	0.67		
145	2.23	2.24	2.25	2.25	2.23	2.18	2.10	1.98	1.91	1.65	1.61	1.46	1.33	1.18	1.10	1.03	0.86		
150	2.40	2.38	2.37	2.35	2.29	2.22	2.13	1.99	1.87	1.84	1.74	1.58	1.51	1.41	1.37	1.29	1.07		
155	2.46	2.42	2.41	2.36	2.26	2.16	2.06	2.00	1.86	1.85	1.74	1.72	1.62	1.62	1.59	1.48	1.22		
160	2.46	2.42	2.37	2.34	2.28	2.19	2.09	2.02	1.88	1.82	1.78	1.80	1.77	1.79	1.80	1.78	1.45		
165	2.26	2.27	2.30	2.27	2.25	2.20	2.12	2.02	1.96	1.89	1.85	1.85	1.85	1.89	1.93	1.94	1.49		
170	2.05	2.10	2.18	2.20	2.17	2.13	2.08	1.99	1.94	1.87	1.98	1.90	1.95	2.06	2.09	1.99	1.50		
175	2.05	2.01	1.99	2.05	2.06	2.05	2.00	1.93	1.83	1.87	1.93	1.97	2.09	2.14	2.08	1.81	1.84		
180	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70		

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.

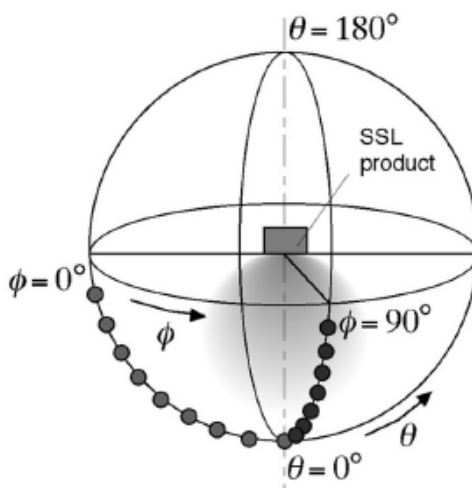
## Color Characteristics Measurements

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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