



## LM-79-08 Test Report

for

**MaxLite Inc.**

1148 Ocean Circle Anaheim Ca. 92806

**Architectural Flood and Spot Luminaires**

**Model: FLS15U50B (5000K)**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

No.1805, DongLiu road, BinJiang District, Hangzhou, China

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ15070047a

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

Reviewed by:

Engineer: April Zou  
Jul. 24, 2015

Approve By:

Manager: Jim Zhang  
Jul. 24, 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: **FLS15U50B (5000K)**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
95.6	1261.8	13.20	0.9909
CCT (K)	CRI	Stabilization Time (Light & Power)	
5146	82.5	60	

Table 1: Executive Data Summary

### Test specifications:

**Date of Receipt** : Jun. 29, 2015

**Date of Test** : Jun. 29, 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

## TABLE OF CONTENT

LM-79-08 Test Report.....	1
Test Summary.....	2
Sample Photo.....	4
TEST RESULTS .....	5
Spectral Power Distribution .....	6
Zonal Lumen Tabulation.....	7
Illuminance Plots.....	8
Luminous Intensity Distribution Plots.....	10
Luminous Intensity Data .....	11
EQUIPMENT LIST .....	12
TEST METHODS .....	12
Seasoning of SSL Product.....	12
Goniophotometer Method .....	12
Photometric and Electrical Measurements.....	12
Color Characteristics Measurements.....	13
Color Spatial Uniformity .....	13

## Sample Photo



Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: Architectural Flood and Spot Luminaires
<b>Model</b>	: FLS15U50B (5000K)
<b>Electrical Ratings</b>	: 100~277VAC, 50/60Hz, 15W
<b>Product Description</b>	: 5000K, Architectural Flood and Spot Luminaires Manufacturer of light source: NICHIA Model of light source: NFCWL060B Model of LED driver: DRM-012360032
<b>Manufacturer</b>	: GREEN INOVA LIGHTING TECHNOLOGY (SHENZHEN) LTD
<b>Address</b>	: FL9-11, Bldg2, NO.2, Chongqing Road, Qiaotou Community, Fuyong Street, Baoan District, Shenzhen, China 518103

## TEST RESULTS

Test ambient temperature was 25.7°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.

The photometric distance is 30m.

Luminous data was taken at 0.5°vertical intervals and 22.5°horizontal intervals.

Parameter	Result		
Test Voltage (V)	120.0	100.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	0.111	0.136	0.055
Power Factor	0.9909	0.9816	0.8923
Test Power (W)	13.20	13.36	13.68
THD A%	4.79	13.78	5.98
Luminous Efficacy (lm/W)	95.6	93.7	94.7
Total Luminous Flux (lm)	1261.8	1251.8	1295.4
Color Rendering Index (CRI)	82.5		
R9	7		
Correlated Color Temperature (CCT) (K)	5146		
Chromaticity (Chroma x, Chroma y)	(0.3414, 0.3524)		
Chromaticity (Chroma u, Chroma v)	(0.2086, 0.3230)		
Chromaticity (Chroma u', Chroma v')	(0.2086, 0.4845)		
Duv	0.0019		
Beam Angle (°)	87.6 (0°-180°)/ 106.9 (90°-270°)		
Average Beam Angle (°)	97.2		
Center Beam Candle Power (cd)	636		
Spacing Criteria	1.19 (0°-180°)/ 1.19 (90°-270°)		
Zonal Lumens in the 0°-60°Zone	97.74%		
Zonal Lumens in the 60°-90°Zone	2.14%		
Zonal Lumens in the 90°-120°Zone	0.01%		
Zonal Lumens in the 120°-180°Zone	0.11%		

Special Color Rendering Indices	
R1	81
R2	86
R3	91
R4	84
R5	82
R6	82
R7	86
R8	68
R9	7
R10	68
R11	84
R12	66
R13	82
R14	95

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

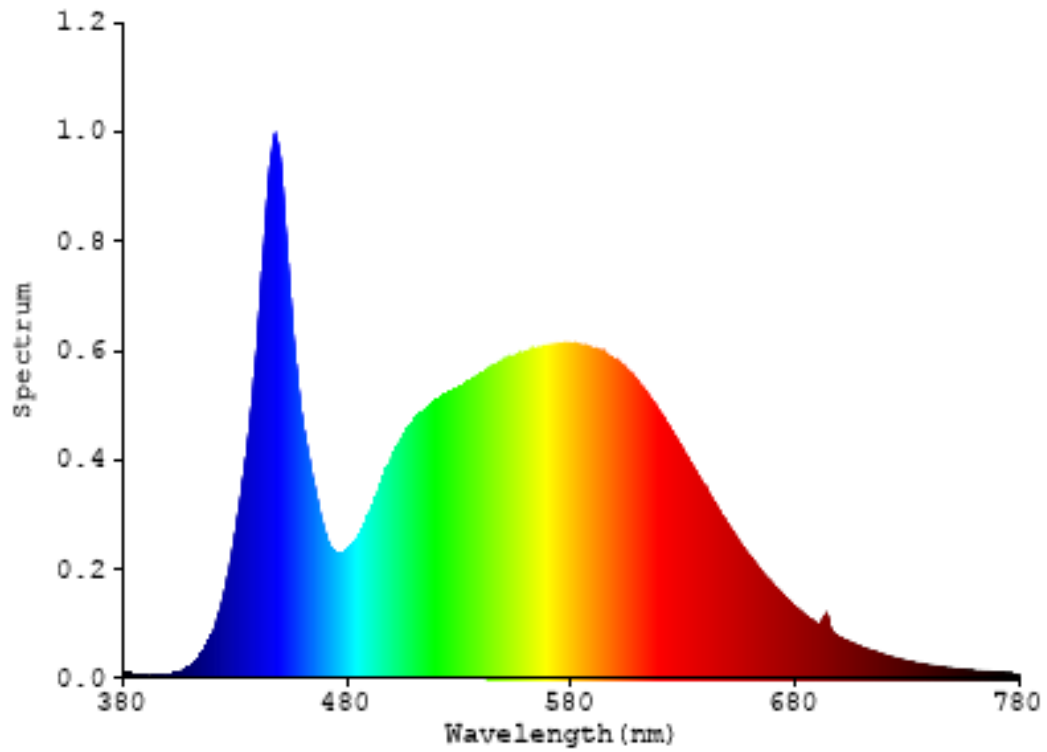


Chart 1: Spectral Power Distribution

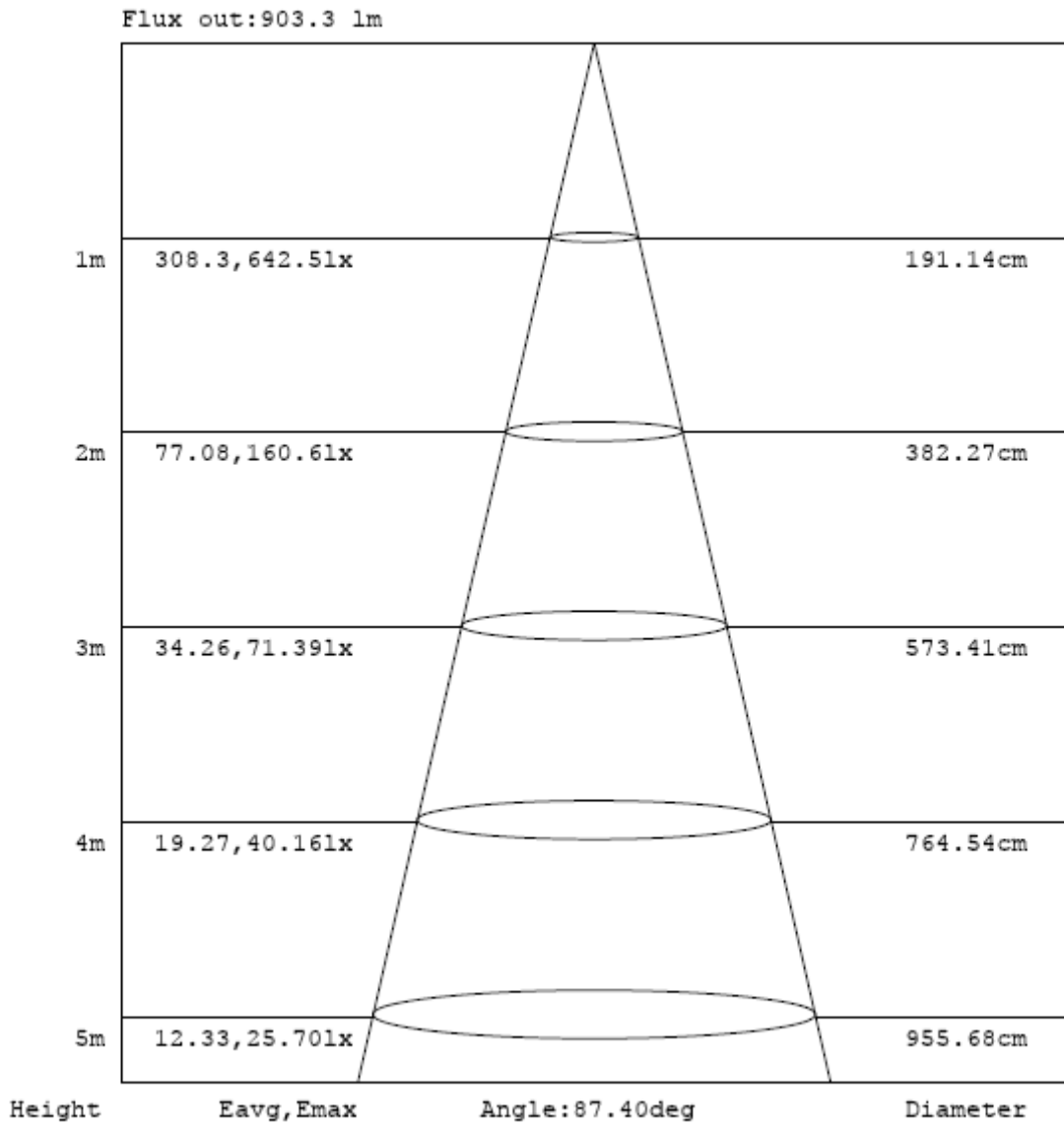
### Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	59.721	4.73%
10- 20	170.148	13.48%
20- 30	254.887	20.20%
30- 40	297.216	23.55%
40- 50	284.602	22.56%
50- 60	166.703	13.21%
60- 70	25.485	2.02%
70- 80	1.498	0.12%
80- 90	0	0.00%
90-100	0	0.00%
100-110	0	0.00%
110-120	0.072	0.01%
120-130	0.195	0.02%
130-140	0.327	0.03%
140-150	0.342	0.03%
150-160	0.276	0.02%
160-170	0.219	0.02%
170-180	0.108	0.01%
Total	1261.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1233.277	97.74%
60- 90	26.983	2.14%
0-90	1260.26	99.88%
90- 180	1.539	0.12%
0- 180	1261.8	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



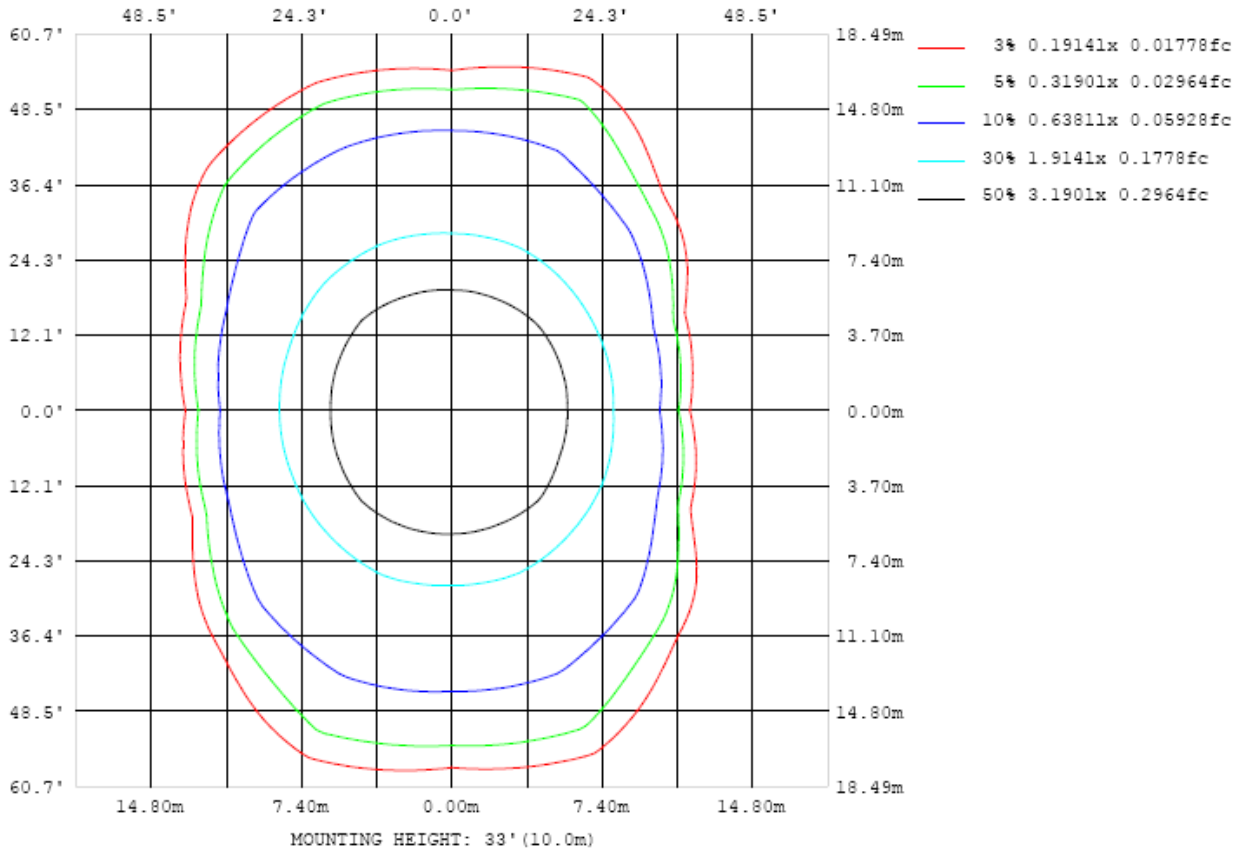


Chart 3: Illuminance Plot (Footcandles)

### Luminous Intensity Distribution Plots

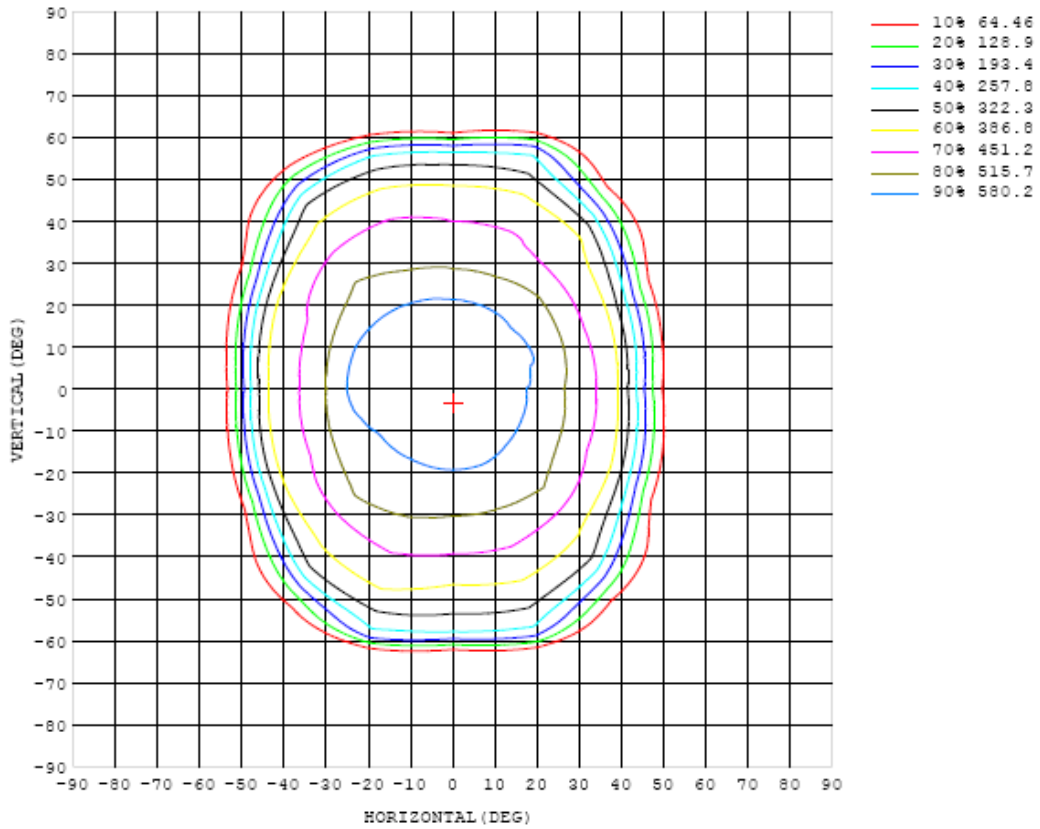


Chart 4: Isocandela Plot

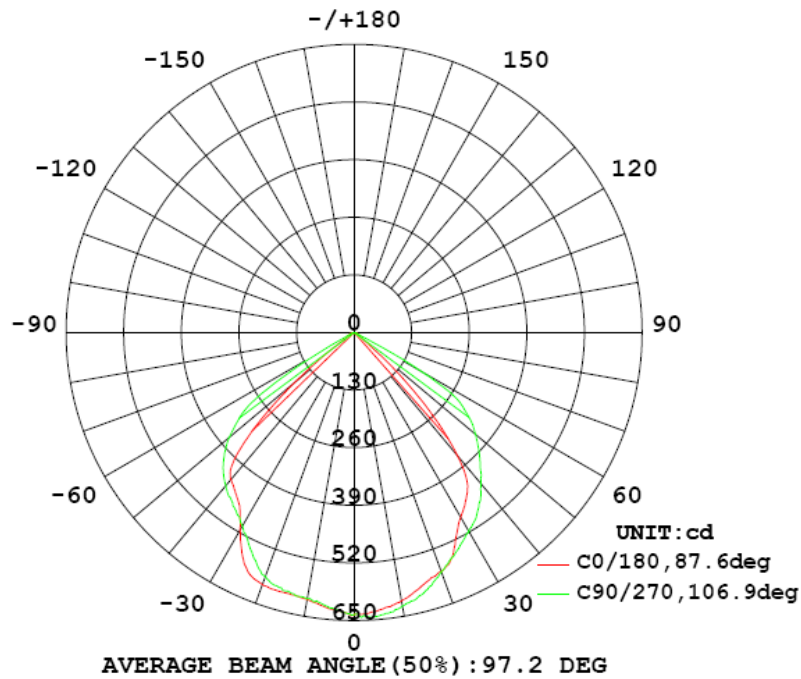


Chart 5: Polar Candela Distribution

**Luminous Intensity Data**

Table--1 UNIT: cd

C (DEG) y (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338			
0	636	636	636	636	636	636	636	636	636	636	636	636	636	636	636	636			
5	629	633	638	643	642	642	635	631	626	626	625	624	624	623	624	625			
10	615	618	623	627	627	627	627	621	612	613	616	612	610	605	607	608			
15	591	595	601	605	608	606	604	604	608	610	612	608	604	600	594	591			
20	575	569	570	575	575	577	580	585	605	605	603	594	586	582	580	582			
25	535	545	544	541	546	551	556	567	582	580	571	556	547	547	555	559			
30	481	488	523	518	518	527	542	528	515	526	536	517	504	504	512	491			
35	444	449	485	487	488	497	505	468	459	469	508	491	477	471	455	442			
40	363	406	425	450	445	460	448	433	433	442	471	469	451	449	422	393			
45	207	289	383	410	401	426	404	383	351	399	424	434	418	418	394	265			
50	57.2	130	326	370	358	386	357	233	174	258	376	386	368	370	292	106			
55	19.7	22.6	198	313	305	325	246	67.9	32.7	90.1	287	313	296	301	137	24.9			
60	15.6	14.4	57.2	224	173	242	91.0	20.7	19.3	22.5	129	163	102	185	22.0	14.0			
65	10.3	9.71	9.31	13.8	10.4	16.8	14.6	13.4	13.4	11.3	12.2	12.5	10.5	14.2	7.85	9.90			
70	4.11	4.70	3.91	3.32	3.22	3.53	5.37	5.87	5.05	5.33	4.27	3.42	3.44	3.53	3.59	4.43			
75	1.34	1.65	1.25	0.80	0.65	0.72	1.43	1.41	1.17	1.28	1.29	0.73	0.83	0.96	1.19	1.44			
80	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.04	0.00	0.00			
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.32	0.35	0.34	0.08	0.00			
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.32	0.56	0.59	0.57	0.38	0.01			
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.38	0.76	0.80	0.79	0.46	0.20			
130	0.00	0.00	0.00	0.06	0.07	0.09	0.00	0.01	0.30	0.40	0.50	0.83	0.95	0.83	0.57	0.58			
135	0.00	0.04	0.11	0.18	0.17	0.15	0.00	0.01	0.68	0.68	0.68	0.83	0.99	0.83	0.72	0.80			
140	0.13	0.20	0.12	0.21	0.22	0.18	0.08	0.02	0.67	0.90	0.80	0.84	0.98	0.83	0.73	1.03			
145	0.30	0.32	0.20	0.28	0.35	0.21	0.15	0.17	0.64	0.94	0.80	0.84	0.97	0.83	0.75	1.16			
150	0.38	0.36	0.35	0.27	0.39	0.22	0.21	0.21	0.61	0.86	0.79	0.83	0.95	0.82	0.76	1.17			
155	0.38	0.39	0.36	0.26	0.29	0.21	0.25	0.25	0.69	0.82	0.96	0.92	0.96	0.88	0.76	1.21			
160	0.32	0.41	0.30	0.26	0.27	0.21	0.29	0.29	0.69	0.83	1.01	0.95	0.96	0.92	0.82	1.21			
165	0.56	0.56	0.39	0.61	0.55	0.53	0.41	0.56	0.86	0.88	1.06	1.06	1.06	1.18	1.11	1.26			
170	1.06	0.96	0.70	0.95	0.97	0.92	0.93	1.08	1.04	0.98	1.29	1.16	1.07	1.27	1.28	1.27			
175	1.22	1.08	0.90	1.08	1.26	1.15	1.16	1.25	1.14	0.97	1.23	1.18	1.08	1.29	1.28	1.23			
180	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25			

Table 4: 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 5: 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  $k=2$ .

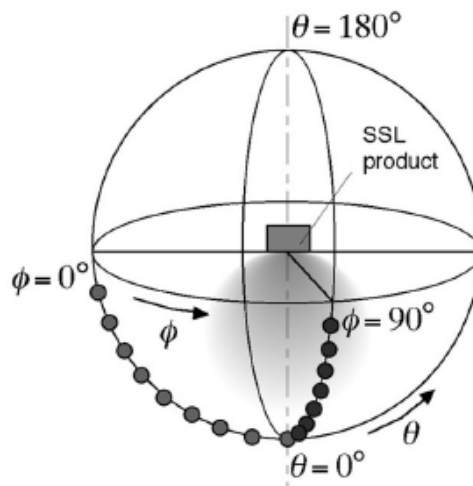
## Color Characteristics Measurements

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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