Quality Assured

NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

MAXLITE INC.

12 YORK AVE. WEST CALDWELL, NJ. 07006

Light Bar

Model: 6LB27

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ15070023h

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

Reviewed by: April Zou

Engineer: April Zou

Jul. 30, 2015

Approved by: Jim Zhang

LEADING TESTING LABORATORIES 1

Manager: Jim Zhang

Jul. 30, 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: **6LB27**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
50.9	146.1	2.87	0.9323

CCT (K)	CRI	Stabilization Time (Light & Power)
2661	97.7	60

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt : Jul. 27, 2015

Date of Test : Jul. 30, 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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Sample Photo

Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: Light Bar
Model	: 6LB27
Electrical Ratings	: 120Vac, 60Hz, 3W
Product Description	: 2700K, Frosted plastic cover, Dimmable Manufacturer of light source: SSC Model of light source: STW9Q14C Quantity of LED light source: 9pcs

TEST RESULTS

Test ambient temperature was 25.1℃.

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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.026
Power Factor	0.9323
Test Power (W)	2.87
Luminous Efficacy (lm/W)	50.9
THD A%	23.26
Total Luminous Flux (lm)	146.1
Color Rendering Index (CRI)	97.7
R9	89.9
Correlated Color Temperature (CCT) (K)	2661
Chromaticity Chroma x	0.4599
Chromaticity Chroma y	0.4059
Chromaticity Chroma u	0.2647
Chromaticity Chroma v	0.3504
Duv	0.0018
Chromaticity Chroma u ’	0.2647
Chromaticity Chroma v’	0.5255

Special Color Rendering Indices	
R1	99.1
R2	99.3
R3	96.8
R4	97.4
R5	99.3
R6	97.2
R7	96.9
R8	95.5
R9	89.9
R10	98.3
R11	95.1
R12	91.7
R13	98.9
R14	97.1

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u’,v’) diagram, u’ = u = 4x/(-2x+12y+3), v’ = 3v/2 = 9y/(-2x+12y+3).

Goniophotometer Method

Test ambient temperature was 25.4℃.

The photometric distance is 2.475 m.

Luminous data was taken at 0.5°vertical intervals and 10°horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.027
Power Factor	0.9094
Test Power (W)	2.96
Luminous Efficacy (lm/W)	50.1
Total Luminous Flux (lm)	148.3
Beam Angle (°)	106.7
Center Beam Candle Power (cd)	53.9
Maximum Beam Candle Power (cd)	54.16 (At: C=20.0, Gamma=2.5)
Spacing Criteria	1.21 (0°-180°)/ 1.23 (90°-270°)
Zonal Lumens in the 0°-60°Zone	77.75%
Zonal Lumens in the 60°-90°Zone	20.31%
Zonal Lumens in the 90°-120°Zone	1.48%
Zonal Lumens in the 120°-180°Zone	0.45%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

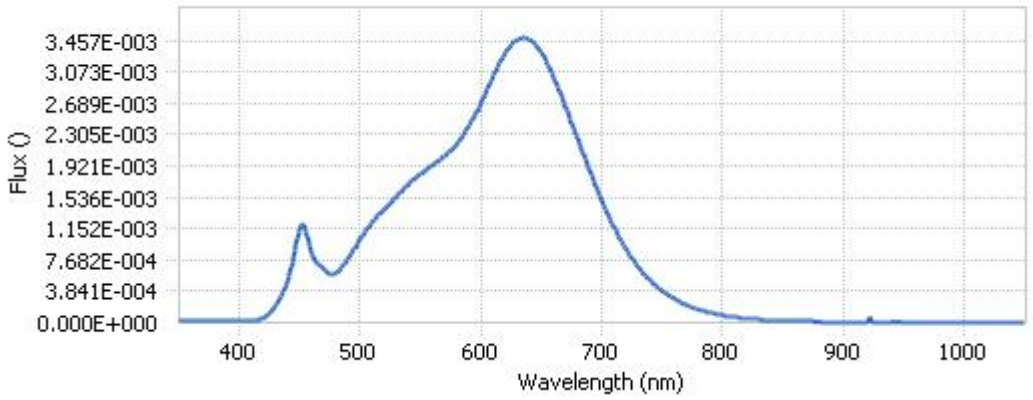
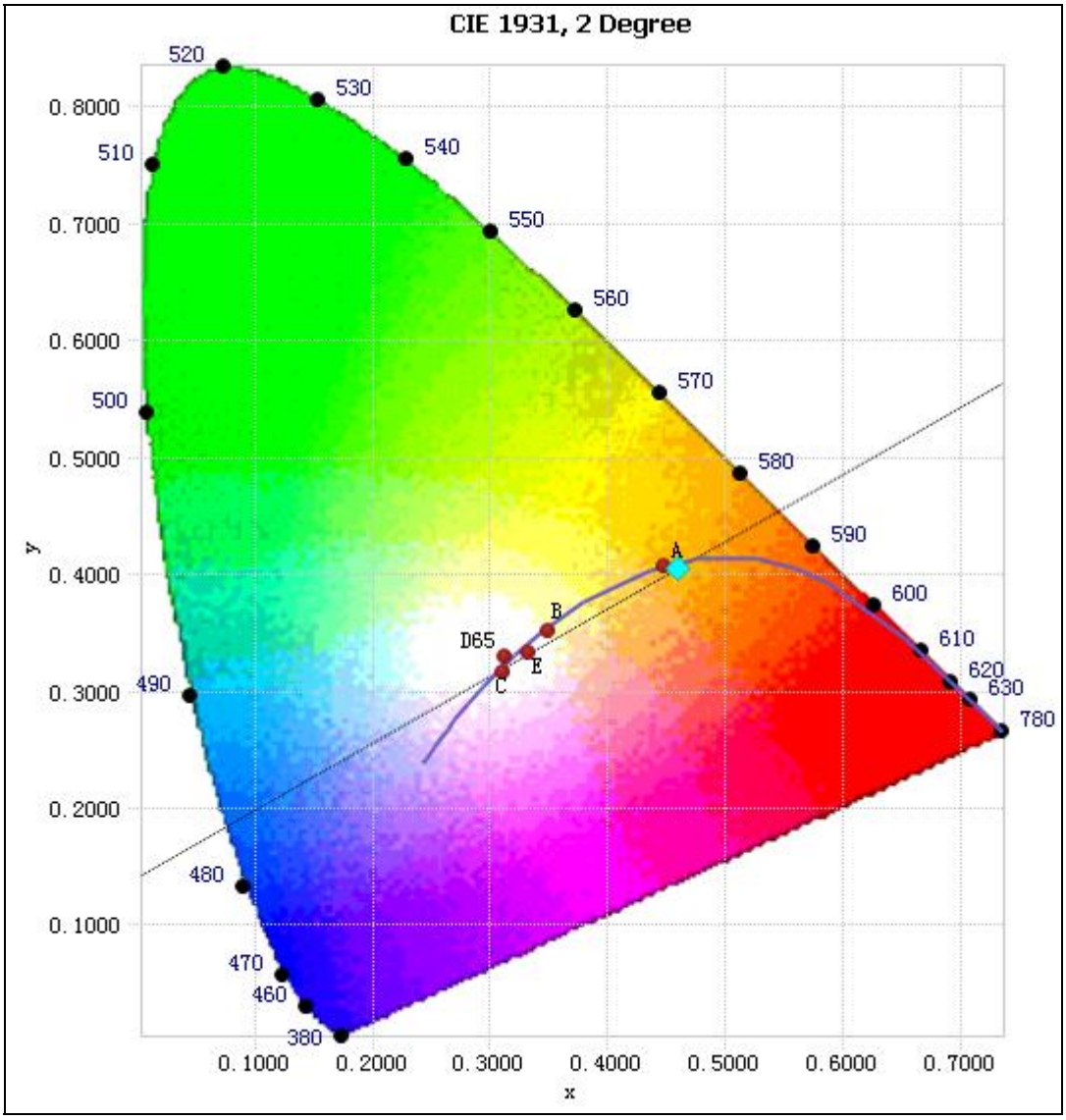


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.28E-05	485	6.87E-04	590	2.41E-03	695	1.68E-03
385	1.88E-05	490	7.82E-04	595	2.54E-03	700	1.50E-03
390	1.61E-05	495	8.98E-04	600	2.69E-03	705	1.33E-03
395	1.53E-05	500	1.02E-03	605	2.86E-03	710	1.18E-03
400	1.65E-05	505	1.13E-03	610	3.02E-03	715	1.04E-03
405	1.57E-05	510	1.23E-03	615	3.16E-03	720	9.16E-04
410	1.85E-05	515	1.32E-03	620	3.30E-03	725	7.98E-04
415	2.94E-05	520	1.39E-03	625	3.40E-03	730	6.94E-04
420	5.72E-05	525	1.47E-03	630	3.46E-03	735	6.01E-04
425	1.18E-04	530	1.55E-03	635	3.49E-03	740	5.20E-04
430	2.08E-04	535	1.62E-03	640	3.47E-03	745	4.49E-04
435	3.34E-04	540	1.70E-03	645	3.41E-03	750	3.86E-04
440	5.11E-04	545	1.76E-03	650	3.32E-03	755	3.38E-04
445	8.17E-04	550	1.82E-03	655	3.18E-03	760	2.91E-04
450	1.15E-03	555	1.88E-03	660	3.02E-03	765	2.52E-04
455	1.11E-03	560	1.93E-03	665	2.84E-03	770	2.18E-04
460	8.26E-04	565	1.98E-03	670	2.64E-03	775	1.88E-04
465	7.19E-04	570	2.04E-03	675	2.45E-03	780	1.62E-04
470	6.56E-04	575	2.11E-03	680	2.25E-03		
475	5.90E-04	580	2.19E-03	685	2.06E-03		
480	6.02E-04	585	2.29E-03	690	1.87E-03		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4599, 0.4059)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

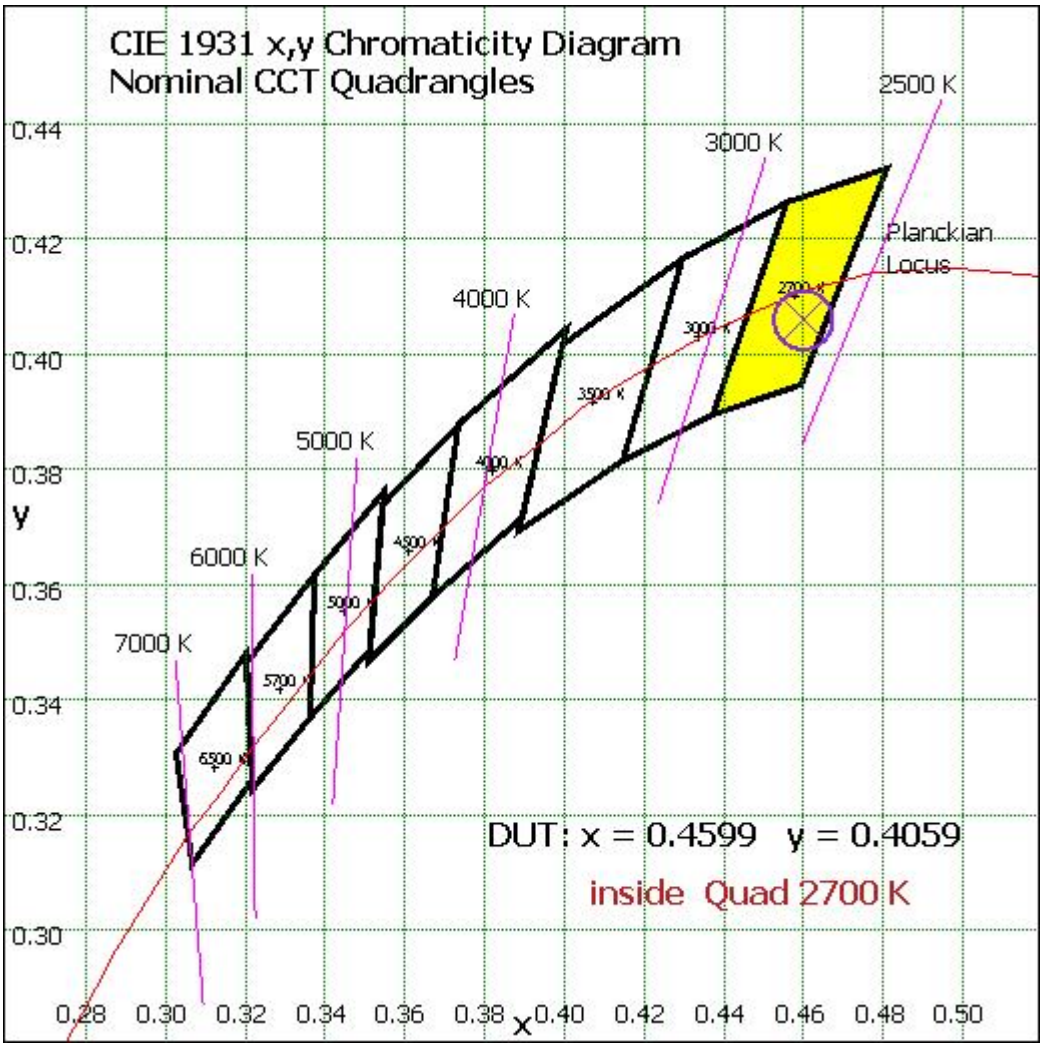


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	5.08	3.43%
10- 20	14.418	9.72%
20- 30	21.512	14.51%
30- 40	25.446	17.16%
40- 50	25.871	17.45%
50- 60	22.978	15.49%
60- 70	17.277	11.65%
70- 80	9.851	6.64%
80- 90	2.998	2.02%
90-100	0.904	0.61%
100-110	0.733	0.49%
110-120	0.556	0.37%
120-130	0.341	0.23%
130-140	0.18	0.12%
140-150	0.092	0.06%
150-160	0.039	0.03%
160-170	0.015	0.01%
170-180	0.005	0.00%
Total	148.3	100%

γ(°)	Lumens	% Total
0- 60	115.305	77.75%
60- 90	30.126	20.31%
0-90	145.431	98.07%
90- 180	2.865	1.93%
0- 180	148.3	100%

Table 5: Zonal Lumen Data

Illuminance Plots- Goniophotometer Method

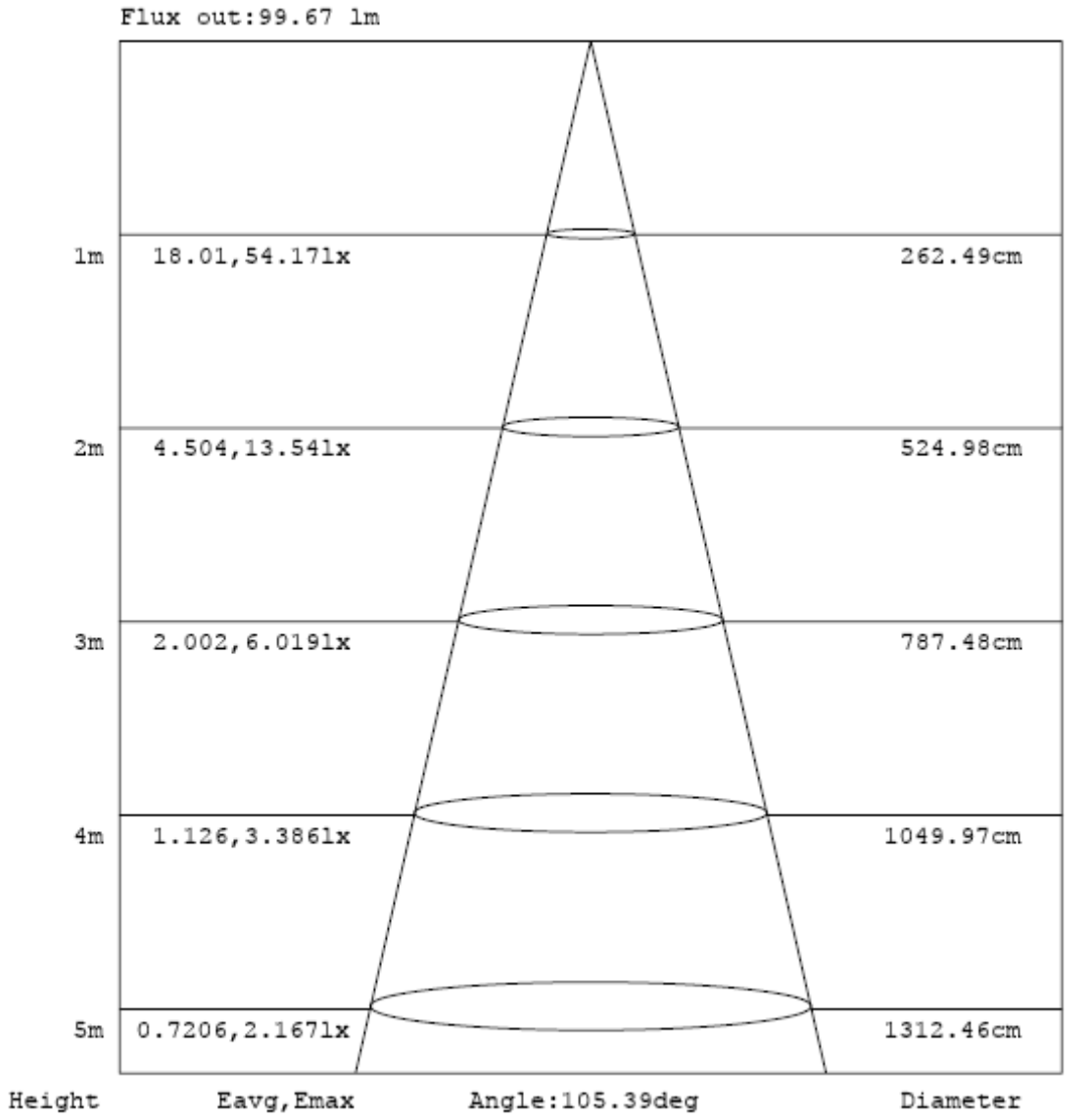


Chart 4: Beam Angle

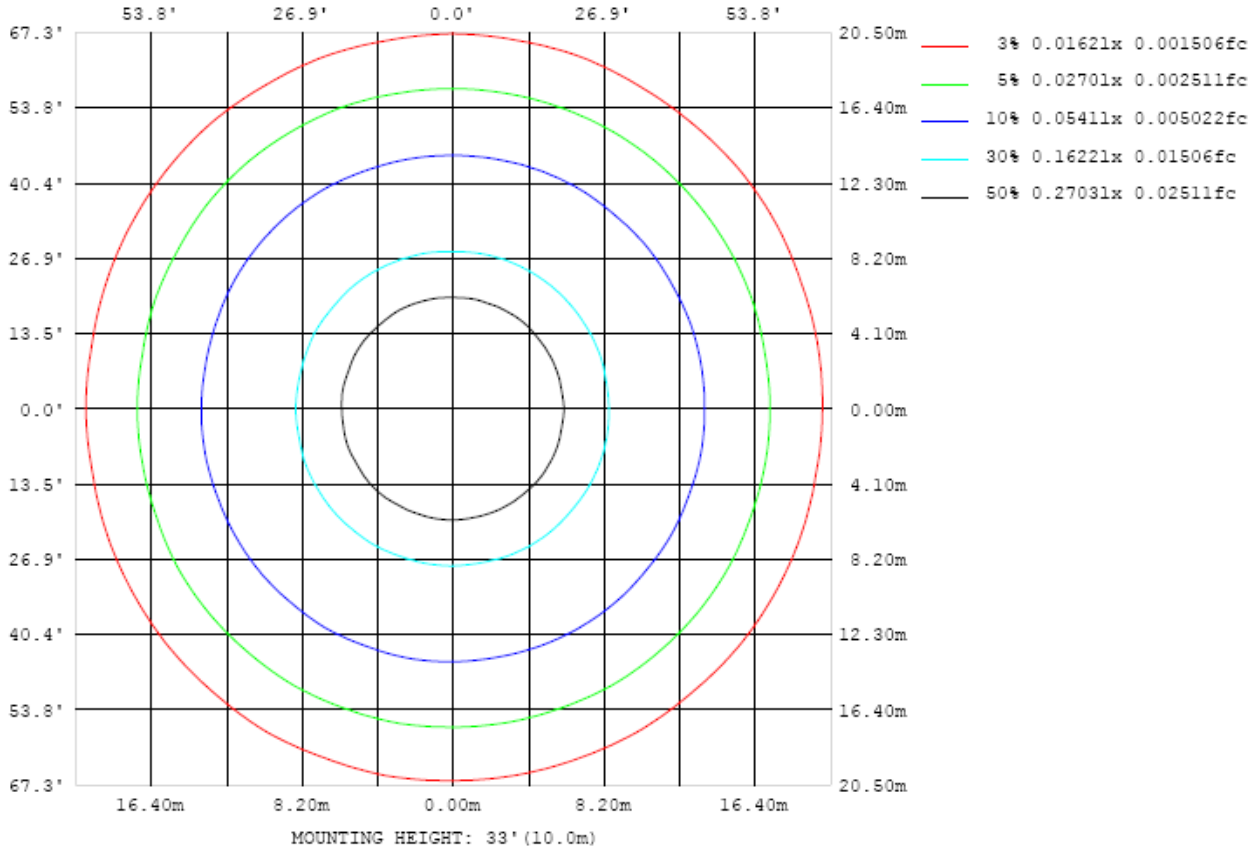


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

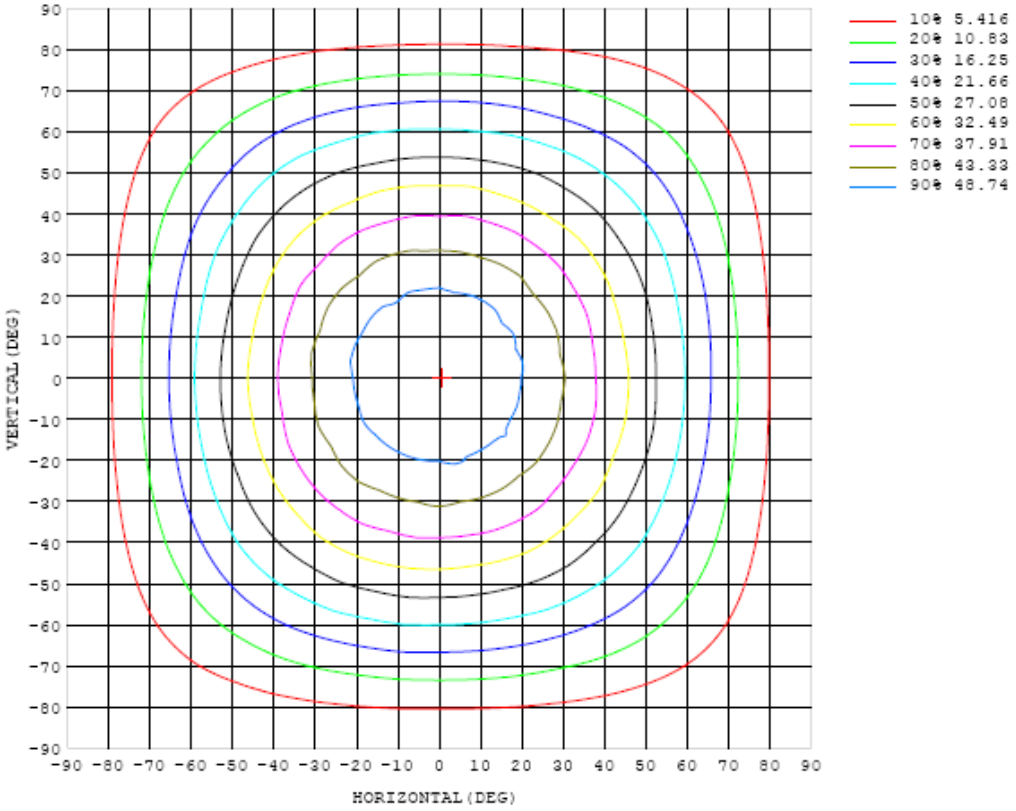


Chart 6: Isocandela Plot

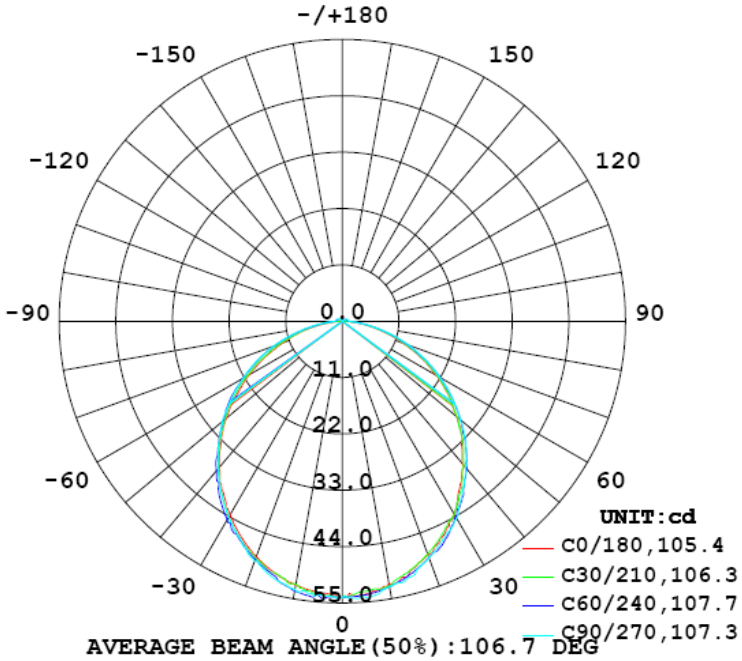


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

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	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9
5	53.4	53.3	54.1	52.9	53.6	53.5	53.6	53.0	52.9	54.2	52.9	53.5	53.0	53.5	53.6	53.1	54.0	53.9	53.1
10	52.0	51.9	53.2	52.5	52.7	52.5	52.6	52.6	52.5	52.6	52.0	52.6	52.7	52.7	52.7	52.7	53.1	53.1	52.3
15	50.5	50.4	51.5	50.4	51.2	51.0	51.1	50.8	50.9	51.6	50.6	51.2	50.7	51.2	51.8	51.2	51.1	51.4	50.8
20	48.4	48.3	49.0	48.4	48.8	48.5	49.1	48.7	49.1	49.1	48.6	49.2	48.8	49.3	49.4	49.3	49.2	49.3	48.9
25	46.2	46.2	46.7	45.9	46.6	46.1	47.1	46.8	46.7	46.7	46.2	46.8	46.4	47.2	47.3	46.4	46.7	47.3	46.5
30	43.5	43.0	43.9	43.5	43.7	43.3	44.1	43.9	43.5	44.4	43.5	43.9	43.6	44.5	44.5	43.5	44.2	44.0	43.6
35	39.7	39.9	40.6	40.2	40.6	40.3	41.1	40.3	40.7	40.7	40.7	40.8	41.0	41.3	41.2	40.6	40.7	41.1	40.5
40	36.3	36.5	37.1	36.7	36.7	36.9	37.6	37.3	36.9	37.3	37.0	37.4	37.4	37.8	37.8	37.4	37.6	37.2	37.3
45	32.9	32.9	33.0	33.0	33.2	33.0	33.8	33.6	33.3	33.9	33.6	33.9	33.7	34.0	33.7	33.3	33.6	33.5	33.3
50	28.9	29.1	29.2	29.1	29.2	29.5	30.0	29.7	29.5	29.8	29.6	30.2	30.0	29.9	29.8	29.6	29.5	29.7	29.5
55	25.2	25.1	25.3	25.2	25.3	25.5	26.0	25.8	25.6	26.0	25.9	25.9	26.0	25.9	26.0	25.5	25.4	25.5	25.2
60	21.1	21.0	21.2	21.3	21.5	21.5	21.9	21.5	21.6	21.8	21.8	21.9	21.8	21.8	21.8	21.4	21.0	21.0	20.9
65	16.9	16.7	17.1	17.2	17.4	17.4	17.7	17.5	17.6	17.8	17.7	17.8	17.6	17.7	17.5	16.8	16.9	16.6	16.6
70	12.6	12.7	12.9	12.9	13.2	13.4	13.5	13.5	13.7	13.6	13.7	13.6	13.4	13.5	13.1	12.6	12.7	12.4	12.4
75	8.69	8.70	8.85	8.87	9.22	9.38	9.55	9.56	9.59	9.69	9.59	9.68	9.38	9.22	9.04	8.72	8.63	8.57	8.59
80	5.23	5.21	5.34	5.36	5.49	5.61	5.73	5.79	5.77	5.79	5.80	5.76	5.58	5.46	5.23	5.11	4.98	4.84	4.81
85	1.97	2.05	2.28	2.43	2.52	2.56	2.67	2.68	2.70	2.70	2.67	2.64	2.50	2.36	2.21	2.01	1.81	1.64	1.62
90	0.37	0.46	0.64	0.79	0.96	1.09	1.19	1.25	1.28	1.27	1.27	1.24	1.16	1.05	0.90	0.74	0.56	0.34	0.26
95	0.03	0.12	0.35	0.57	0.79	0.96	1.10	1.18	1.22	1.23	1.21	1.19	1.08	0.96	0.78	0.58	0.34	0.11	0.04
100	0.03	0.12	0.27	0.48	0.69	0.86	1.02	1.12	1.18	1.21	1.18	1.12	1.01	0.88	0.69	0.48	0.27	0.11	0.04
105	0.03	0.09	0.24	0.42	0.62	0.78	0.95	1.04	1.11	1.14	1.11	1.05	0.93	0.81	0.63	0.42	0.25	0.08	0.04
110	0.03	0.07	0.19	0.29	0.55	0.72	0.87	0.97	1.03	1.07	1.02	0.98	0.86	0.74	0.56	0.34	0.18	0.05	0.04
115	0.03	0.05	0.15	0.27	0.39	0.65	0.80	0.89	0.96	0.98	0.95	0.89	0.79	0.66	0.43	0.24	0.12	0.03	0.03
120	0.04	0.04	0.12	0.22	0.36	0.46	0.69	0.81	0.86	0.90	0.86	0.81	0.68	0.48	0.32	0.18	0.09	0.03	0.03
125	0.03	0.04	0.10	0.19	0.29	0.39	0.51	0.57	0.64	0.69	0.64	0.57	0.48	0.37	0.26	0.14	0.06	0.03	0.03
130	0.03	0.04	0.08	0.15	0.23	0.31	0.39	0.45	0.49	0.52	0.49	0.45	0.38	0.29	0.18	0.11	0.05	0.03	0.04
135	0.03	0.03	0.05	0.11	0.18	0.24	0.30	0.35	0.38	0.40	0.38	0.35	0.30	0.22	0.16	0.09	0.04	0.04	0.04
140	0.03	0.03	0.04	0.08	0.13	0.19	0.24	0.27	0.30	0.31	0.30	0.27	0.23	0.18	0.12	0.06	0.04	0.04	0.04
145	0.03	0.03	0.03	0.06	0.10	0.14	0.18	0.21	0.23	0.24	0.23	0.21	0.17	0.13	0.08	0.05	0.04	0.04	0.05
150	0.04	0.04	0.04	0.04	0.07	0.10	0.13	0.15	0.16	0.17	0.16	0.15	0.12	0.09	0.06	0.05	0.04	0.04	0.05
155	0.04	0.04	0.04	0.04	0.05	0.07	0.08	0.10	0.11	0.11	0.11	0.09	0.08	0.06	0.05	0.04	0.04	0.05	0.05
160	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.04	0.05	0.05	0.05
165	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
170	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
175	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
180	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Table 6: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9		
5	53.6	53.6	53.6	53.9	53.0	53.7	53.7	53.0	53.5	52.9	54.0	53.4	53.5	53.9	52.9	53.5	54.0		
10	52.8	52.8	52.2	53.0	52.3	53.4	52.3	52.1	53.2	52.1	53.0	52.7	52.6	53.1	52.6	52.4	52.7		
15	51.4	52.0	50.8	51.6	51.2	51.4	50.9	50.8	51.9	50.7	51.7	51.3	51.1	51.4	51.1	50.8	51.0		
20	49.4	49.9	49.3	49.6	48.9	49.5	49.6	49.5	49.8	48.7	49.5	49.2	49.4	49.1	49.0	48.7	49.3		
25	46.8	47.0	46.9	47.3	46.6	47.1	46.7	46.6	46.9	46.9	47.3	46.9	47.1	46.6	45.9	46.5	46.9		
30	43.7	44.2	44.2	43.9	43.8	44.8	43.9	43.8	44.2	44.1	44.0	44.0	44.1	43.7	43.3	43.8	43.3		
35	40.4	40.9	40.9	40.8	40.7	41.7	41.1	41.1	41.0	40.9	41.3	40.4	41.0	40.9	40.2	40.4	40.3		
40	36.9	37.5	37.4	37.3	37.6	38.1	37.4	37.6	37.6	37.6	37.6	37.3	37.5	37.3	36.7	37.0	36.6		
45	33.4	33.7	33.8	33.8	34.0	34.1	34.0	33.9	34.2	33.8	33.8	33.3	33.7	33.7	33.1	32.9	32.9		
50	29.2	29.7	29.9	30.1	30.1	30.3	30.1	30.2	30.5	30.0	30.0	29.8	29.9	29.9	29.1	29.5	29.1		
55	25.0	25.6	25.8	26.2	26.2	26.6	26.1	26.0	26.2	25.9	26.3	25.9	25.7	25.9	25.5	25.5	25.5		
60	20.8	21.5	21.3	21.9	22.1	22.5	22.3	22.0	22.2	21.9	22.0	21.9	22.0	21.9	21.5	21.5	21.2		
65	16.5	17.1	17.2	17.7	17.9	18.2	18.1	18.0	18.3	18.1	18.1	17.7	17.7	17.9	17.5	17.2	17.2		
70	12.4	12.8	13.0	13.3	13.7	14.0	13.9	13.9	14.2	14.0	14.0	13.8	13.7	13.6	13.4	13.2	12.9		
75	8.59	8.84	8.87	9.21	9.51	9.95	9.88	9.90	9.99	9.95	10.00	9.84	9.72	9.56	9.22	8.98	8.93		
80	4.96	5.29	5.32	5.49	5.72	6.02	6.11	6.15	6.27	6.22	6.18	6.11	6.03	5.88	5.58	5.50	5.38		
85	1.75	2.03	2.26	2.51	2.67	2.88	2.98	3.04	3.10	3.07	3.08	3.01	2.96	2.82	2.67	2.51	2.22		
90	0.38	0.62	0.81	1.00	1.16	1.30	1.36	1.41	1.41	1.41	1.39	1.31	1.21	1.05	0.87	0.70	0.50		
95	0.15	0.41	0.67	0.88	1.06	1.22	1.31	1.35	1.39	1.36	1.31	1.21	1.07	0.88	0.63	0.39	0.13		
100	0.15	0.33	0.57	0.80	0.99	1.16	1.25	1.31	1.34	1.30	1.24	1.12	0.96	0.77	0.54	0.31	0.14		
105	0.12	0.32	0.51	0.73	0.92	1.08	1.19	1.25	1.28	1.24	1.17	1.04	0.90	0.70	0.48	0.29	0.12		
110	0.09	0.24	0.43	0.66	0.84	1.01	1.11	1.18	1.21	1.17	1.09	0.98	0.83	0.64	0.36	0.22	0.09		
115	0.06	0.17	0.32	0.54	0.77	0.93	1.03	1.09	1.11	1.09	1.01	0.89	0.75	0.48	0.31	0.18	0.08		
120	0.04	0.13	0.25	0.41	0.58	0.83	0.93	0.99	1.02	0.99	0.92	0.79	0.58	0.41	0.26	0.15	0.07		
125	0.03	0.10	0.19	0.33	0.45	0.58	0.68	0.77	0.81	0.76	0.69	0.58	0.46	0.34	0.22	0.13	0.05		
130	0.04	0.08	0.16	0.26	0.36	0.46	0.54	0.59	0.60	0.59	0.54	0.46	0.38	0.29	0.19	0.11	0.04		
135	0.04	0.06	0.13	0.21	0.29	0.38	0.43	0.46	0.48	0.47	0.42	0.36	0.31	0.23	0.15	0.07	0.03		
140	0.04	0.05	0.11	0.17	0.24	0.30	0.34	0.37	0.39	0.37	0.35	0.29	0.25	0.19	0.12	0.05	0.04		
145	0.04	0.05	0.08	0.14	0.19	0.24	0.27	0.29	0.30	0.29	0.28	0.24	0.20	0.15	0.08	0.04	0.04		
150	0.05	0.05	0.06	0.10	0.14	0.18	0.21	0.22	0.23	0.23	0.21	0.19	0.15	0.10	0.05	0.04	0.04		
155	0.05	0.05	0.06	0.07	0.10	0.13	0.15	0.17	0.17	0.17	0.16	0.14	0.10	0.07	0.05	0.04	0.04		
160	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.11	0.12	0.11	0.11	0.09	0.07	0.06	0.05	0.04	0.04		
165	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.06	0.05	0.04	0.04	0.05		
170	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
175	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
180	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		

Table 7: 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
Integrate Sphere system	2M	HZTE015-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	WT210	HZTE008-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-07	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	6154	HZTE004-04	Sep. 18, 2014	Sep. 17, 2015
Temperature and humidity recorder	JR900	HZTE018-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2014	Sep. 17, 2015

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.

Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is 4π. Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.
Ambient temperature was measured at a position inside the sphere. 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 Luminairess) 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 Yokogawa Power Analyzer.
The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.
The uncertainty of integrating sphere system reported in this document is expended uncertainty is 1.06% with a coverage factor k=2.

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 Luminairess) 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

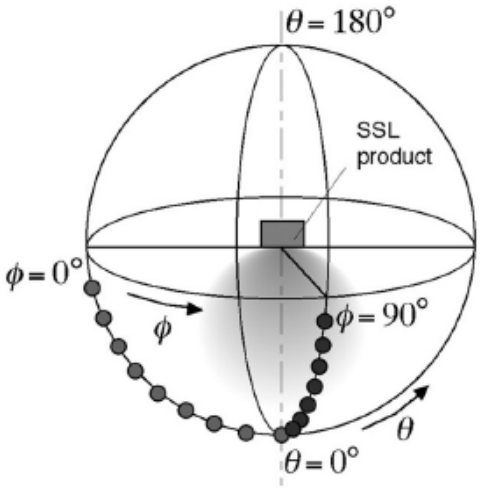
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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°/180° and C=90°/270°) and at 10° 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, Δu'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 ***