LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

LED Lamp

Model: 10PAR30SNDIM/840FL40/N

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ19070039f

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

Review by: April Zou

Engineer: April Zou
Aug. 01, 2019

Approved by: Jim Zhang

Manager: Jim Zhang
Aug. 01, 2019

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: **10PAR30SNDIM/840FL40/N**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
111.3	1078.2	9.69	0.7306

CCT (K)	CRI	Stabilization Time (Light & Power)
3878	81.7	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. 25, 2019

Date of Test : Jul. 31, 2019

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

ANSI/IES TM-30-18 IES Method for Evaluating Light Source Color Rendition

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SAMPLE PHOTO

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Lamp
Model	: 10PAR30SNDIM/840FL40/N
Electrical Ratings	: 120V, 60Hz, 10W
Product Description	: 4000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 26.0 ℃.

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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.111
Power Factor	0.7306
Test Power (W)	9.69
THD A%	67.77
Luminous Efficacy (lm/W)	111.3
Total Luminous Flux (lm)	1078.2
Color Rendering Index (CRI)	81.7
R9	2.4
Correlated Color Temperature (CCT)(K)	3878
Chromaticity Chroma x	0.3876
Chromaticity Chroma y	0.3859
Chromaticity Chroma u	0.2261
Chromaticity Chroma v	0.3377
Duv	0.0022
Chromaticity Chroma u ’	0.2261
Chromaticity Chroma v’	0.5066

Special Color Rendering Indices	
R1	79.5
R2	89.3
R3	95.7
R4	78.6
R5	79.2
R6	85
R7	84.9
R8	61.3
R9	2.4
R10	74.3
R11	76.5
R12	59.9
R13	82
R14	97.9

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 24.9 ℃.

The photometric distance is 2.47 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)	0.109
Power Factor	0.7369
Power (W)	9.65
Luminous Efficacy (lm/W)	113.4
Total Luminous Flux (lm)	1094.4
Beam Angle (°)	38.1 (0^o-180^o) / 38.6 (90^o-270^o)
Center Beam Candle Power (cd)	1750
Maximum Beam Candle Power (cd)	1750 (At: C=90.0, Gamma=0.5)
Spacing Criteria	0.64 (0^o-180^o) / 0.62 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	95.19%
Zonal Lumens in the 60 °-90 °Zone	4.61%
Zonal Lumens in the 90 °-120 °Zone	0.08%
Zonal Lumens in the 120 °-180 °Zone	0.12%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

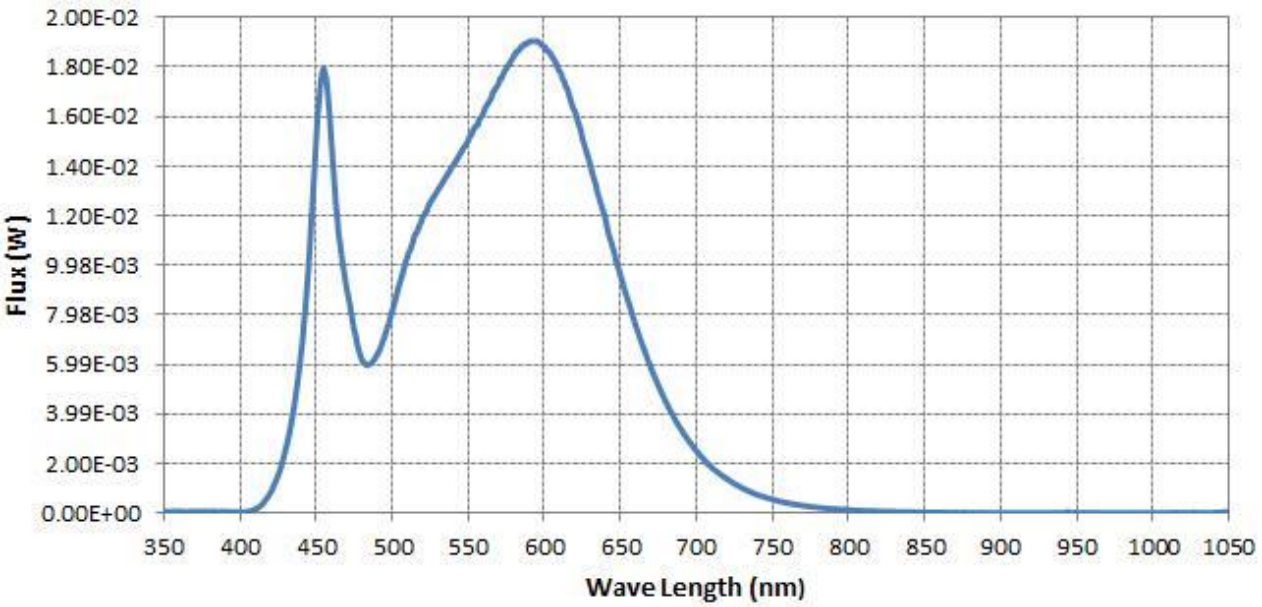
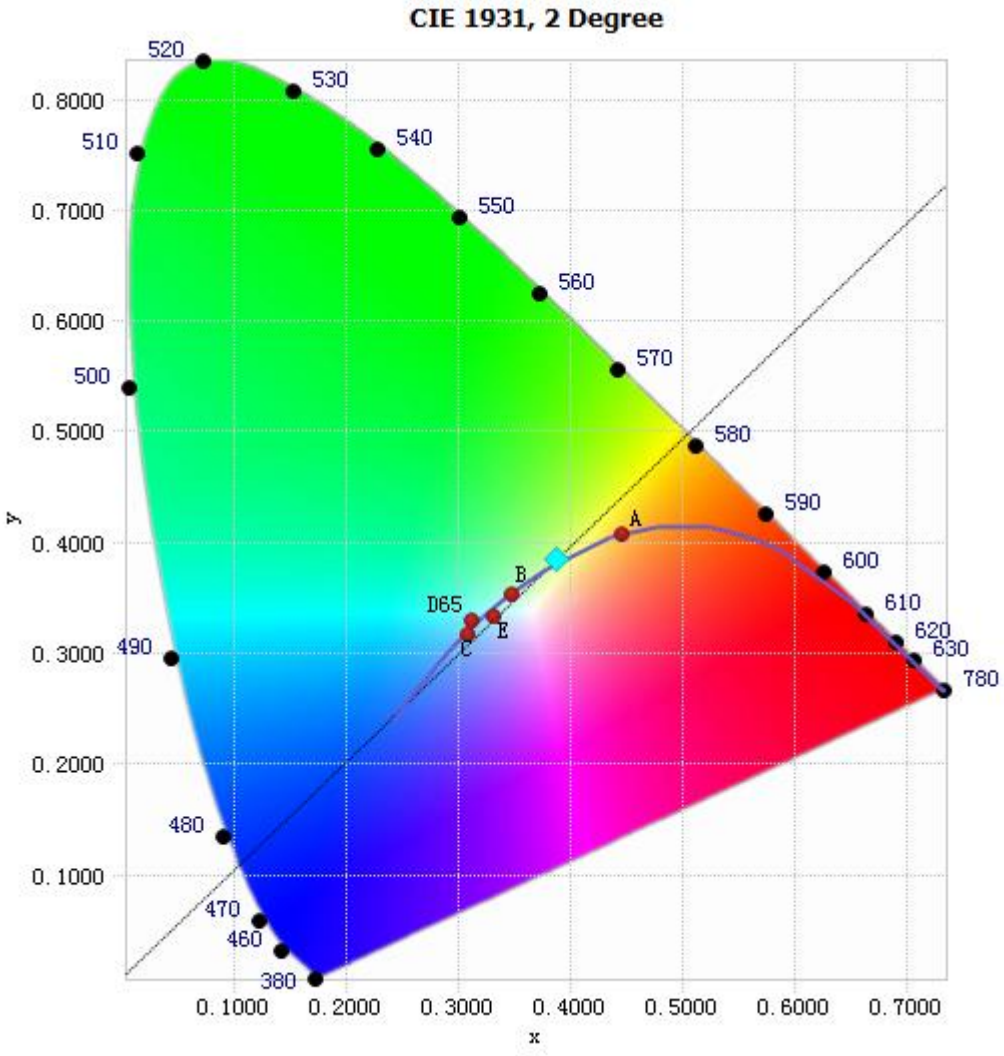


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	6.73E-05	485	5.99E-03	590	1.90E-02	695	2.90E-03
385	6.24E-05	490	6.37E-03	595	1.90E-02	700	2.50E-03
390	6.02E-05	495	7.09E-03	600	1.88E-02	705	2.15E-03
395	4.27E-05	500	8.13E-03	605	1.84E-02	710	1.84E-03
400	4.29E-05	505	9.25E-03	610	1.78E-02	715	1.60E-03
405	5.66E-05	510	1.03E-02	615	1.71E-02	720	1.38E-03
410	1.54E-04	515	1.12E-02	620	1.62E-02	725	1.18E-03
415	3.79E-04	520	1.19E-02	625	1.51E-02	730	1.02E-03
420	8.26E-04	525	1.25E-02	630	1.41E-02	735	8.69E-04
425	1.51E-03	530	1.30E-02	635	1.29E-02	740	7.42E-04
430	2.55E-03	535	1.35E-02	640	1.19E-02	745	6.42E-04
435	4.07E-03	540	1.40E-02	645	1.07E-02	750	5.56E-04
440	6.33E-03	545	1.45E-02	650	9.58E-03	755	4.74E-04
445	9.84E-03	550	1.50E-02	655	8.56E-03	760	4.10E-04
450	1.49E-02	555	1.56E-02	660	7.57E-03	765	3.56E-04
455	1.79E-02	560	1.61E-02	665	6.69E-03	770	3.07E-04
460	1.51E-02	565	1.67E-02	670	5.87E-03	775	2.60E-04
465	1.12E-02	570	1.73E-02	675	5.13E-03	780	2.25E-04
470	9.11E-03	575	1.79E-02	680	4.47E-03		
475	7.41E-03	580	1.84E-02	685	3.88E-03		
480	6.21E-03	585	1.88E-02	690	3.36E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3876, 0.3859)

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

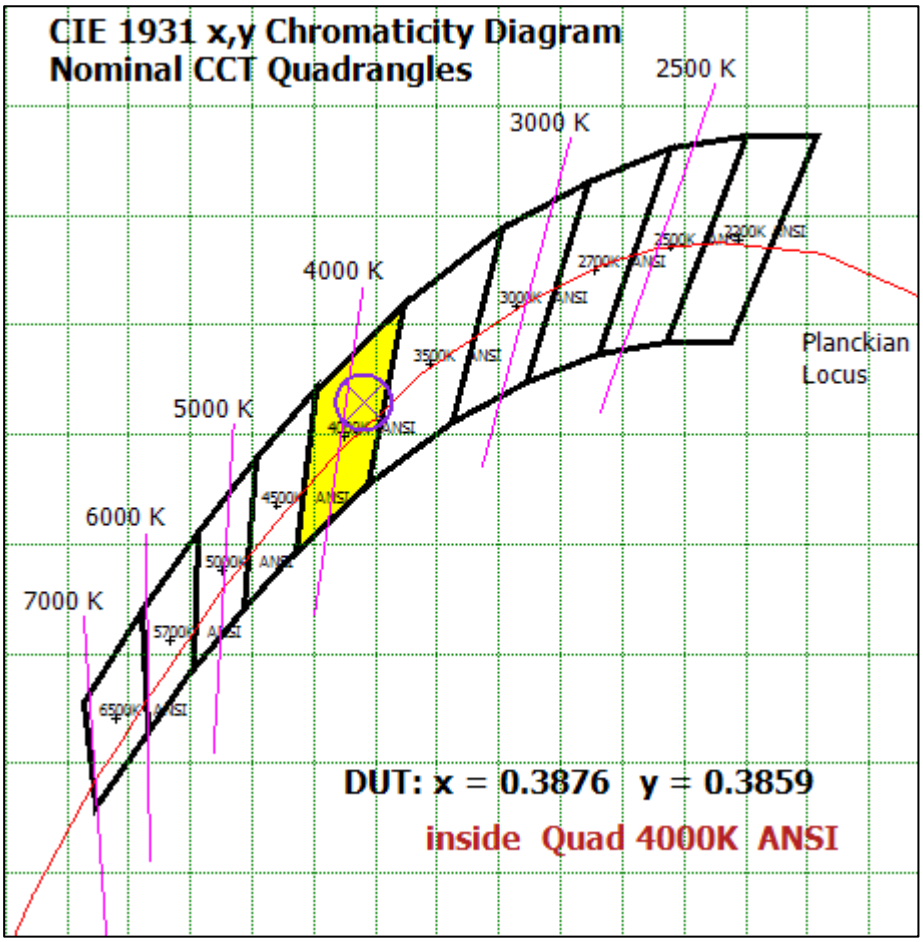


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

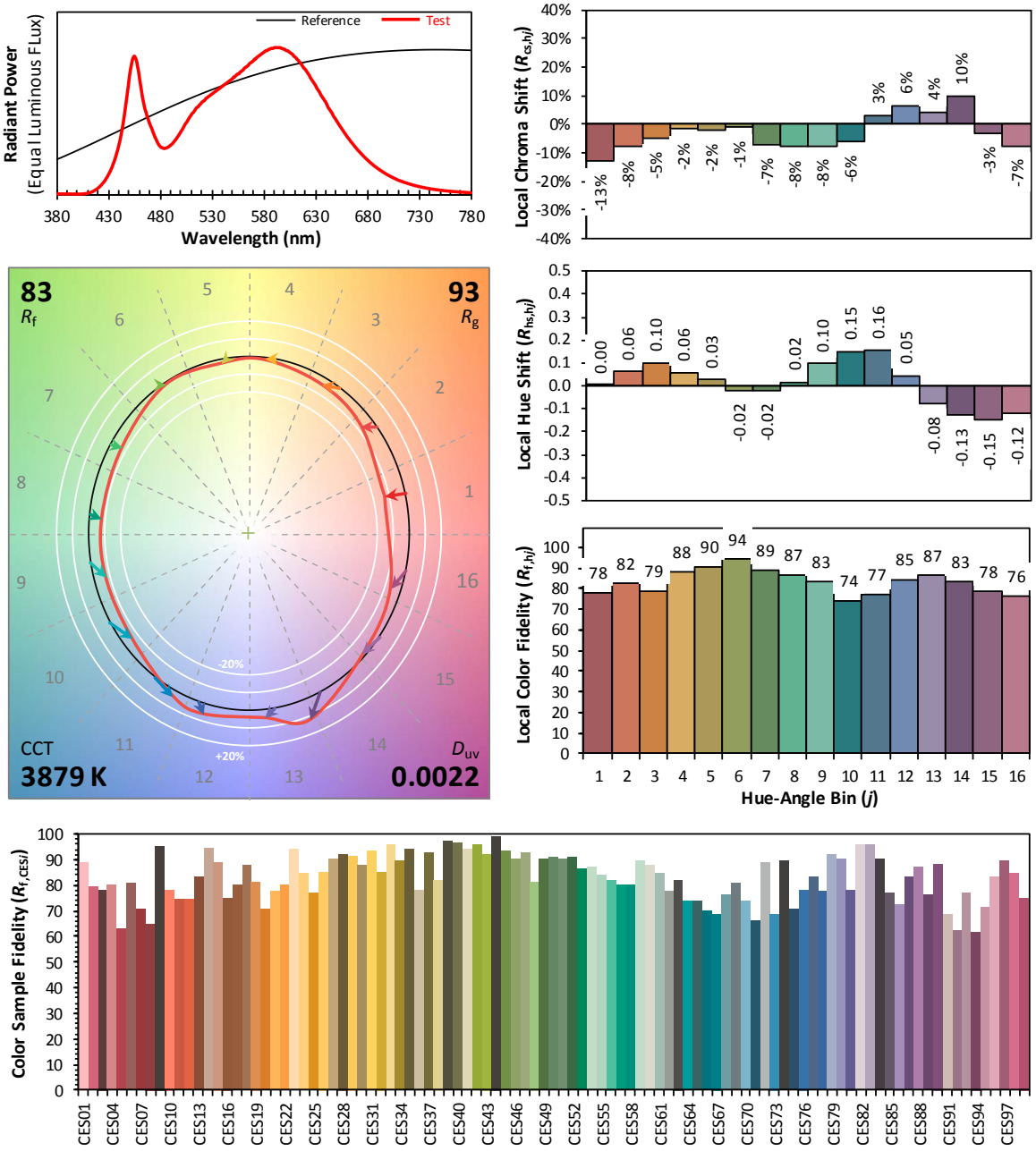


Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	156.175	14.27%
10- 20	317.619	29.02%
20- 30	258.973	23.66%
30- 40	165.59	15.13%
40- 50	92.749	8.47%
50- 60	50.696	4.63%
60- 70	29.141	2.66%
70- 80	15.445	1.41%
80- 90	5.822	0.53%
90-100	0.817	0.07%
100-110	0.021	0.00%
110-120	0.037	0.00%
120-130	0.084	0.01%
130-140	0.196	0.02%
140-150	0.322	0.03%
150-160	0.361	0.03%
160-170	0.273	0.02%
170-180	0.092	0.01%
Total	1094.4	100%

γ(°)	Lumens	% Total
0- 60	1041.802	95.19%
60- 90	50.408	4.61%
0-90	1092.21	99.80%
90- 180	2.203	0.20%
0- 180	1094.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

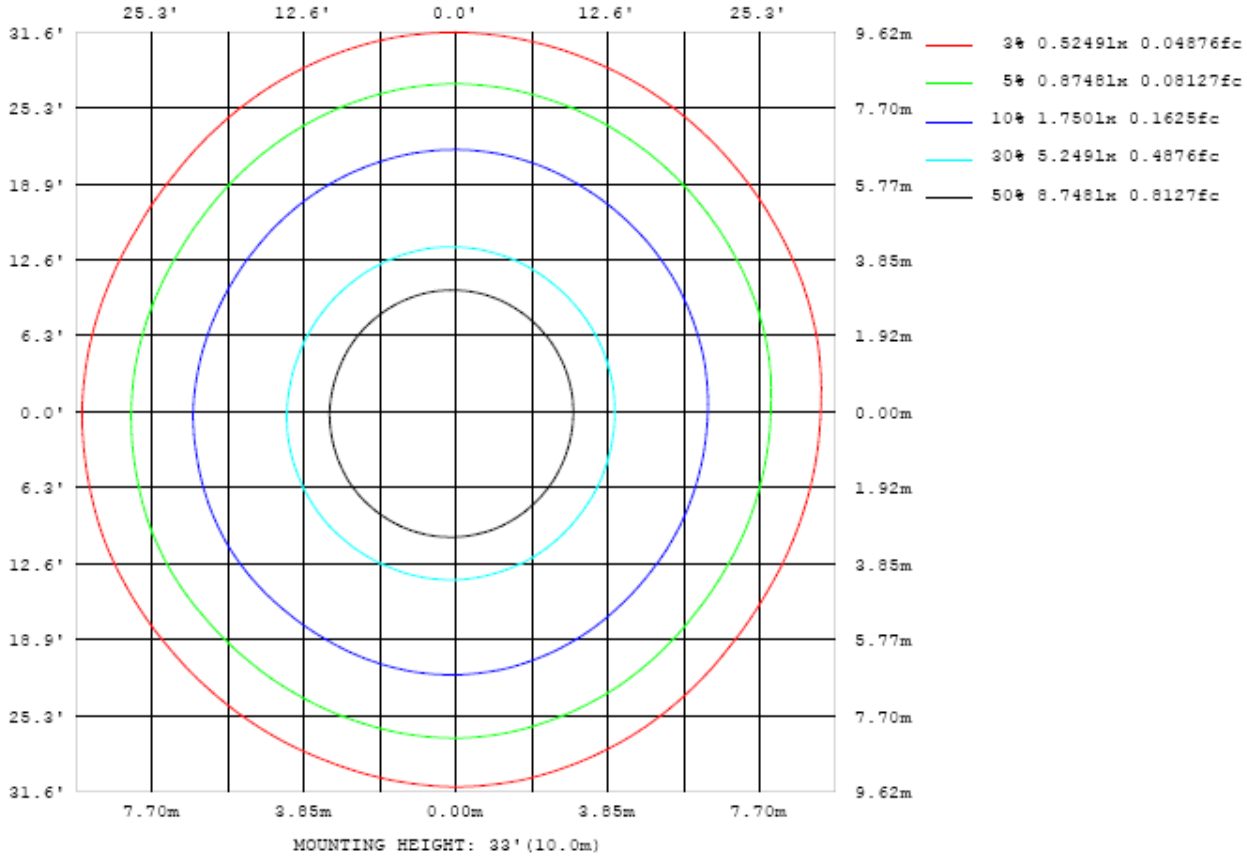


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

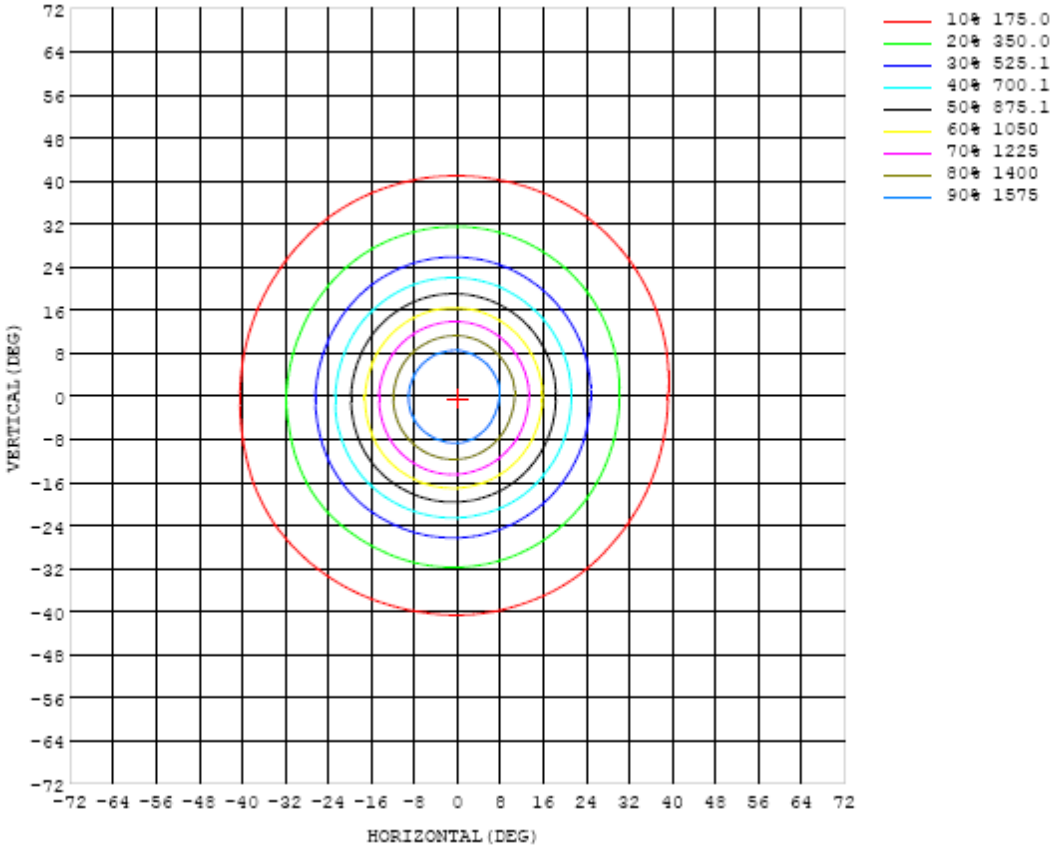


Chart 6: Isocandela Plot

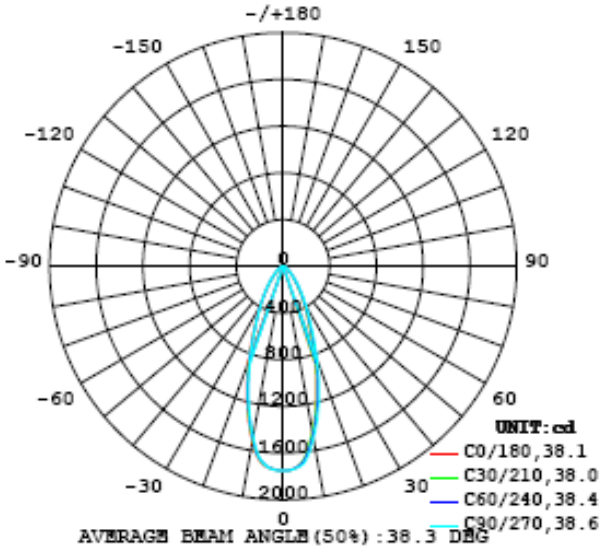


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
5	1701	1699	1700	1700	1702	1705	1705	1708	1713	1718	1718	1720	1720	1720	1720	1721	1719	1720	1719
10	1440	1435	1435	1441	1448	1457	1469	1482	1494	1500	1500	1506	1511	1517	1520	1519	1521	1523	1522
15	1105	1106	1110	1118	1128	1138	1152	1165	1177	1192	1202	1208	1212	1215	1217	1214	1208	1202	1199
20	769	769	774	783	792	804	819	832	842	850	860	866	871	875	879	878	873	867	864
25	515	514	517	521	528	537	547	559	569	577	582	590	588	591	593	593	592	587	586
30	353	352	352	355	359	365	375	385	394	398	400	401	400	402	405	407	405	402	402
35	243	239	239	239	241	247	255	264	270	274	276	274	271	271	275	279	277	274	273
40	165	162	160	158	159	165	171	176	182	185	184	182	181	181	182	185	186	184	182
45	112	109	107	105	106	110	115	118	121	122	120	118	117	117	117	118	120	120	121
50	77.5	75.4	73.7	72.3	73.1	75.6	78.2	80.6	81.9	81.2	79.6	78.2	76.6	75.8	75.4	75.2	76.5	78.0	79.9
55	54.2	53.1	52.0	51.4	52.0	53.2	54.8	56.2	56.9	56.6	55.6	54.8	53.9	53.1	52.7	52.5	52.9	53.7	55.0
60	38.9	38.3	37.6	37.4	37.7	38.5	39.5	40.5	40.8	40.6	40.0	39.5	38.9	38.5	38.4	38.3	38.2	38.6	39.1
65	28.4	28.0	27.7	27.6	28.0	28.5	29.0	29.7	30.0	29.8	29.6	29.4	29.2	29.1	29.0	29.0	28.9	28.9	29.2
70	20.5	20.3	20.1	20.2	20.4	20.7	21.1	21.5	21.7	21.7	21.6	21.6	21.5	21.5	21.5	21.5	21.4	21.4	21.6
75	13.6	13.6	13.6	13.6	13.8	14.0	14.3	14.6	14.9	15.1	15.1	15.1	15.2	15.2	15.2	15.2	15.1	15.0	15.1
80	8.25	8.21	8.30	8.40	8.48	8.54	8.75	9.00	9.20	9.44	9.54	9.54	9.67	9.71	9.61	9.62	9.65	9.49	9.47
85	4.70	4.70	4.76	4.83	4.89	4.96	5.07	5.24	5.39	5.56	5.66	5.67	5.77	5.80	5.72	5.75	5.81	5.67	5.73
90	1.73	1.75	1.78	1.81	1.84	1.88	1.93	2.01	2.10	2.17	2.24	2.28	2.33	2.37	2.40	2.41	2.41	2.38	2.44
95	0.46	0.47	0.48	0.50	0.52	0.54	0.56	0.60	0.63	0.65	0.67	0.69	0.71	0.72	0.73	0.74	0.73	0.73	0.74
100	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09
105	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.02
110	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
115	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
120	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	0.06
125	0.08	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.09
130	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.16
135	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	0.28
140	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.43
145	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.36	0.60
150	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.47	0.46	0.77
155	0.61	0.62	0.62	0.61	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.58	0.91
160	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.69	1.01
165	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.80	0.80	0.80	0.80	0.78	1.06
170	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.83	1.02
175	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.89	0.89	0.88	0.88	0.89	0.89	0.89	0.88	0.92
180	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96

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	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
5	1715	1715	1713	1712	1712	1711	1710	1710	1713	1713	1713	1711	1709	1709	1708	1707	1705		
10	1516	1511	1508	1504	1498	1494	1490	1486	1482	1474	1468	1459	1454	1451	1448	1447	1446		
15	1191	1184	1181	1176	1169	1165	1158	1154	1148	1141	1134	1125	1117	1111	1107	1105	1106		
20	854	847	842	839	835	832	829	825	816	807	799	788	779	773	769	769	770		
25	578	571	567	564	563	563	564	563	559	554	546	537	530	525	521	520	519		
30	394	388	385	384	385	388	390	391	390	387	381	375	369	366	362	359	357		
35	268	263	259	259	262	266	269	272	273	271	266	260	257	255	253	250	248		
40	180	176	173	173	177	180	183	187	188	186	183	180	178	175	173	173	171		
45	119	115	113	114	117	122	125	128	128	126	125	123	121	119	117	116	115		
50	79.1	77.6	76.6	77.1	79.7	83.4	86.3	87.6	87.5	86.4	85.7	84.3	82.6	81.5	80.4	80.1	79.7		
55	55.0	54.6	54.0	54.2	55.8	58.0	60.1	60.9	60.8	60.1	59.6	58.6	57.4	56.7	56.0	55.7	55.4		
60	39.1	38.7	38.3	38.3	39.1	40.5	41.9	42.5	42.4	42.2	41.9	41.4	40.7	40.3	39.8	39.7	39.5		
65	28.9	28.5	28.1	28.1	28.4	29.1	30.0	30.4	30.4	30.3	30.2	29.8	29.4	29.2	29.0	28.9	28.8		
70	21.4	21.0	20.8	20.6	20.7	21.0	21.4	21.7	21.7	21.6	21.5	21.2	21.0	20.8	20.7	20.7	20.7		
75	15.0	14.7	14.5	14.4	14.3	14.3	14.5	14.6	14.5	14.4	14.2	14.0	13.8	13.7	13.7	13.7	13.7		
80	9.47	9.40	9.33	9.27	9.14	9.04	9.08	9.05	8.97	8.88	8.75	8.60	8.47	8.42	8.37	8.35	8.32		
85	5.73	5.69	5.63	5.56	5.44	5.34	5.34	5.31	5.25	5.19	5.10	4.99	4.89	4.86	4.82	4.81	4.80		
90	2.42	2.37	2.31	2.25	2.16	2.09	2.02	1.98	1.94	1.91	1.88	1.84	1.80	1.76	1.76	1.76	1.76		
95	0.73	0.71	0.69	0.66	0.62	0.58	0.55	0.53	0.52	0.52	0.51	0.50	0.49	0.48	0.47	0.47	0.47		
100	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03		
105	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
110	0.02	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
115	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		
120	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.06		
125	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11		
130	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19		
135	0.29	0.29	0.30	0.30	0.30	0.31	0.31	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32		
140	0.45	0.45	0.46	0.46	0.47	0.47	0.48	0.48	0.49	0.49	0.49	0.50	0.50	0.50	0.50	0.50	0.48		
145	0.63	0.63	0.64	0.64	0.65	0.65	0.66	0.66	0.67	0.67	0.68	0.68	0.68	0.68	0.68	0.68	0.66		
150	0.81	0.81	0.81	0.82	0.82	0.83	0.83	0.84	0.85	0.85	0.86	0.86	0.86	0.86	0.86	0.87	0.83		
155	0.97	0.96	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.01	0.97		
160	1.09	1.08	1.09	1.09	1.09	1.09	1.10	1.10	1.10	1.10	1.11	1.11	1.11	1.11	1.11	1.12	1.07		
165	1.16	1.15	1.15	1.15	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.18	1.10		
170	1.16	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.13	1.13	1.14	1.14	1.16	1.06		
175	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.93		
180	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 14, 2018	Aug. 13, 2019
Digital Power Meter	PF2010A	HZTE028-01	Sep. 12, 2018	Sep. 11, 2019
AC Power Supply	DPS1060	HZTE001-06	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	WY12010	HZTE004-03	Aug. 09, 2018	Aug. 08, 2019
Temperature recorder	JM624U	HZTE018-08	Aug. 09, 2018	Aug. 08, 2019
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 09, 2018	Aug. 08, 2019
Standard source	D908	HZTE012-01	Aug. 14, 2018	Aug. 13, 2019
Integrate Sphere system	3M	HZTE015-04	Aug. 16, 2018	Aug. 15, 2019
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2018	Aug. 01, 2019
AC Power Supply	PCR 500L	HZTE001-07	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	IT6154	HZTE004-04	Aug. 09, 2018	Aug. 08, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 09, 2018	Aug. 08, 2019
Temperature Meter	TES1310	HZTE017-01	Aug. 09, 2018	Aug. 08, 2019

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 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 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.

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The uncertainty of integrating sphere system reported in this document is expended uncertainty is 2.1% 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 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 2.3% with a coverage factor k=2.

Color Characteristics Measurements

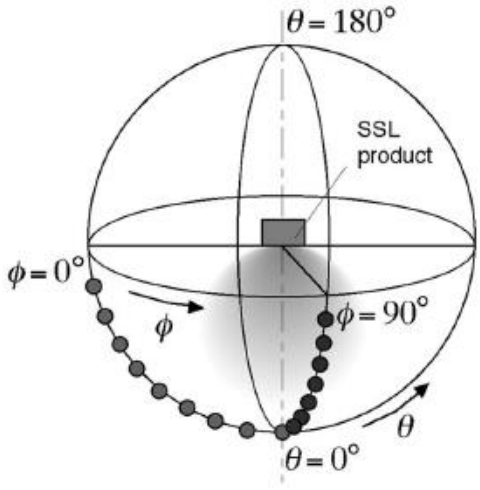
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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 ***