LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

LED Track Light

Model: ORB/L/927/FL/DIM120V/xx/yy

Where xx mean different type of Adaptor, could be J, H, L, CM, GES, TEK.

Where yy mean different color of product, could be WH, SV, BL.

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist, Hangzhou, Zhejiang Province, China 311100

Tel: +86571 86376106

www.ledtestlab.com

Report No.: HZ20120037x

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

Review by: April Zou

Engineer: April Zou

Feb. 03, 2021

Approved by: Jim Zhang

Manager: Jim Zhang

Feb. 03, 2021

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: **ORB/L/927/FL/DIM120V/H/BL**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
87.0	3355.8	38.56	0.9814

CCT (K)	CRI	Stabilization Time (Light & Power)
2723	91.9	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 : Dec. 23, 2020

Date of Test : Jan. 07, 2021

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

TABLE OF CONTENT

SAMPLE PHOTO

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Track Light
Model	: ORB/L/927/FL/DIM120V/H/BL
Electrical Ratings	: 120V, 60Hz, 40W
Product Description	: 2700K
Manufacturer	: GREEN CREATIVE LTD
Address	: Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

TEST RESULTS

Test ambient temperature was 26.0 ℃.

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)	0.328
Power Factor	0.9814
Test Power (W)	38.56
THD A%	13.51
Luminous Efficacy (lm/W)	87.0
Total Luminous Flux (lm)	3355.8
Color Rendering Index (CRI)	91.9
R9	56.6
Correlated Color Temperature (CCT)(K)	2723
Chromaticity Chroma x	0.4574
Chromaticity Chroma y	0.4093
Chromaticity Chroma u	0.2615
Chromaticity Chroma v	0.3510
Duv	-0.0003
Chromaticity Chroma u ’	0.2615
Chromaticity Chroma v’	0.5265

Special Color Rendering Indices	
R1	92.1
R2	95.1
R3	96.8
R4	92.6
R5	91.7
R6	94.5
R7	91.6
R8	80.6
R9	56.6
R10	88
R11	93.7
R12	83.4
R13	92.8
R14	97.4

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 25.1 ℃.

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)	0.329
Power Factor	0.9827
Power (W)	38.83
Luminous Efficacy (lm/W)	89.9
Total Luminous Flux (lm)	3491.0
Beam Angle (°)	35.3 (0^o-180^o) / 35.2 (90^o-270^o)
Center Beam Candle Power (cd)	9305
Maximum Beam Candle Power (cd)	9319 (At: C=270.0, Gamma=1.0)
Spacing Criteria	0.57 (0^o-180^o) / 0.54 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	98.81%
Zonal Lumens in the 60 °-90 °Zone	1.12%
Zonal Lumens in the 90 °-120 °Zone	0.00%
Zonal Lumens in the 120 °-180 °Zone	0.07%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

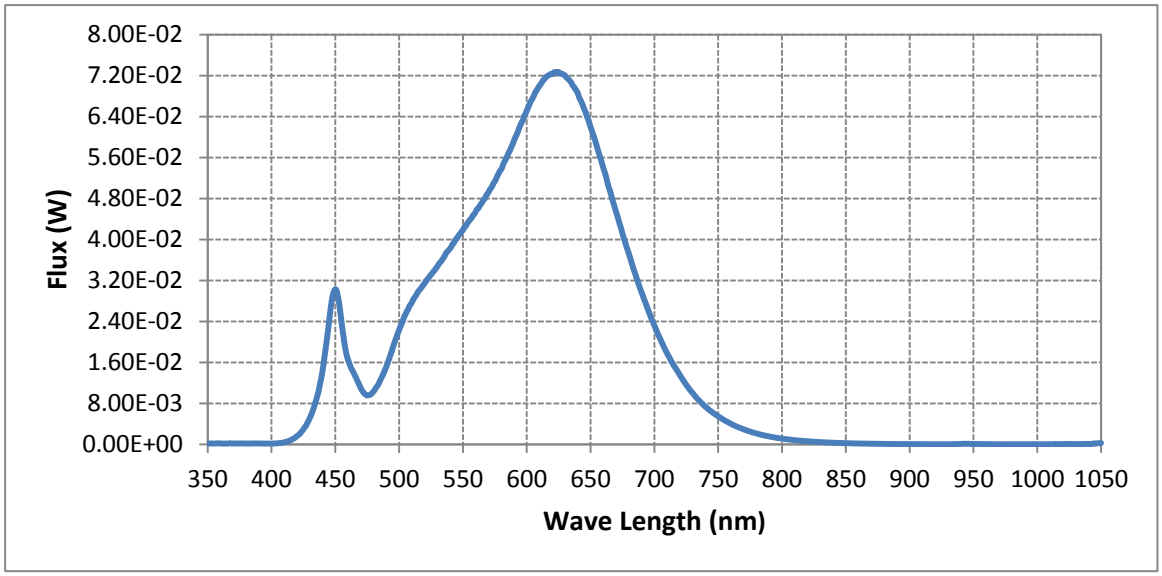
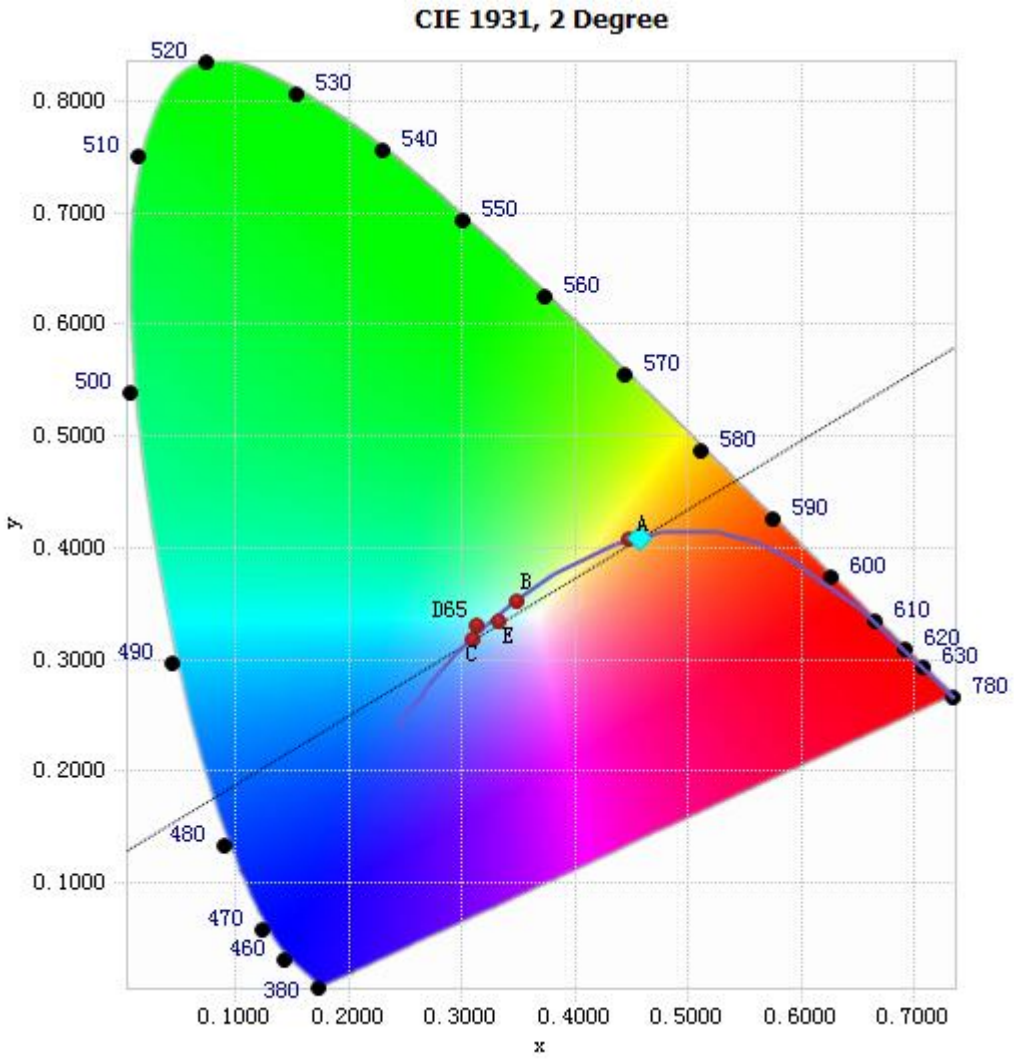


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.74E-04	485	1.24E-02	590	5.93E-02	695	2.63E-02
385	1.90E-04	490	1.52E-02	595	6.23E-02	700	2.32E-02
390	2.07E-04	495	1.89E-02	600	6.52E-02	705	2.04E-02
395	1.68E-04	500	2.24E-02	605	6.78E-02	710	1.78E-02
400	1.80E-04	505	2.54E-02	610	7.00E-02	715	1.55E-02
405	2.34E-04	510	2.77E-02	615	7.17E-02	720	1.35E-02
410	4.25E-04	515	2.99E-02	620	7.23E-02	725	1.17E-02
415	8.53E-04	520	3.15E-02	625	7.27E-02	730	1.00E-02
420	1.64E-03	525	3.31E-02	630	7.21E-02	735	8.60E-03
425	2.97E-03	530	3.48E-02	635	7.06E-02	740	7.36E-03
430	5.15E-03	535	3.65E-02	640	6.86E-02	745	6.35E-03
435	8.67E-03	540	3.83E-02	645	6.55E-02	750	5.52E-03
440	1.44E-02	545	4.01E-02	650	6.20E-02	755	4.72E-03
445	2.38E-02	550	4.18E-02	655	5.81E-02	760	4.04E-03
450	3.03E-02	555	4.37E-02	660	5.40E-02	765	3.45E-03
455	2.37E-02	560	4.55E-02	665	4.97E-02	770	2.94E-03
460	1.65E-02	565	4.72E-02	670	4.54E-02	775	2.52E-03
465	1.36E-02	570	4.92E-02	675	4.12E-02	780	2.15E-03
470	1.10E-02	575	5.14E-02	680	3.72E-02		
475	9.57E-03	580	5.37E-02	685	3.33E-02		
480	1.04E-02	585	5.65E-02	690	2.97E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4574, 0.4093)

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

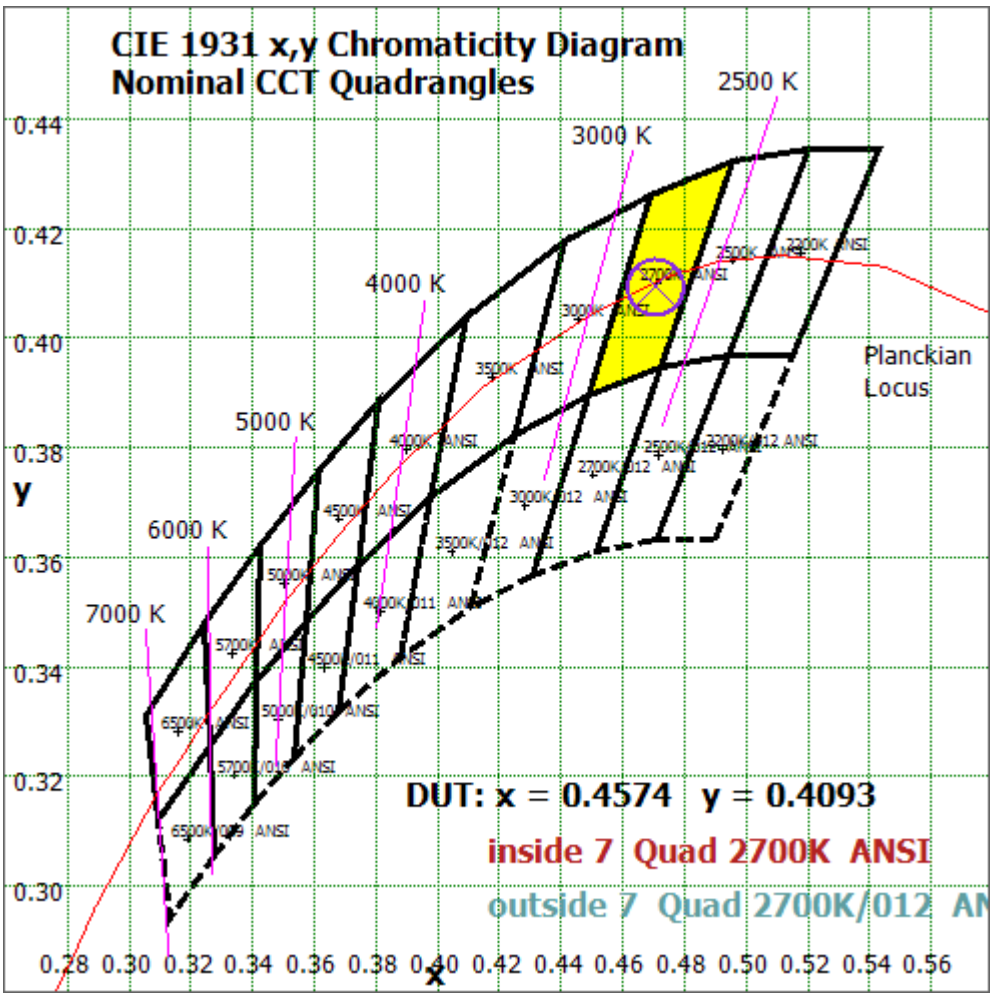


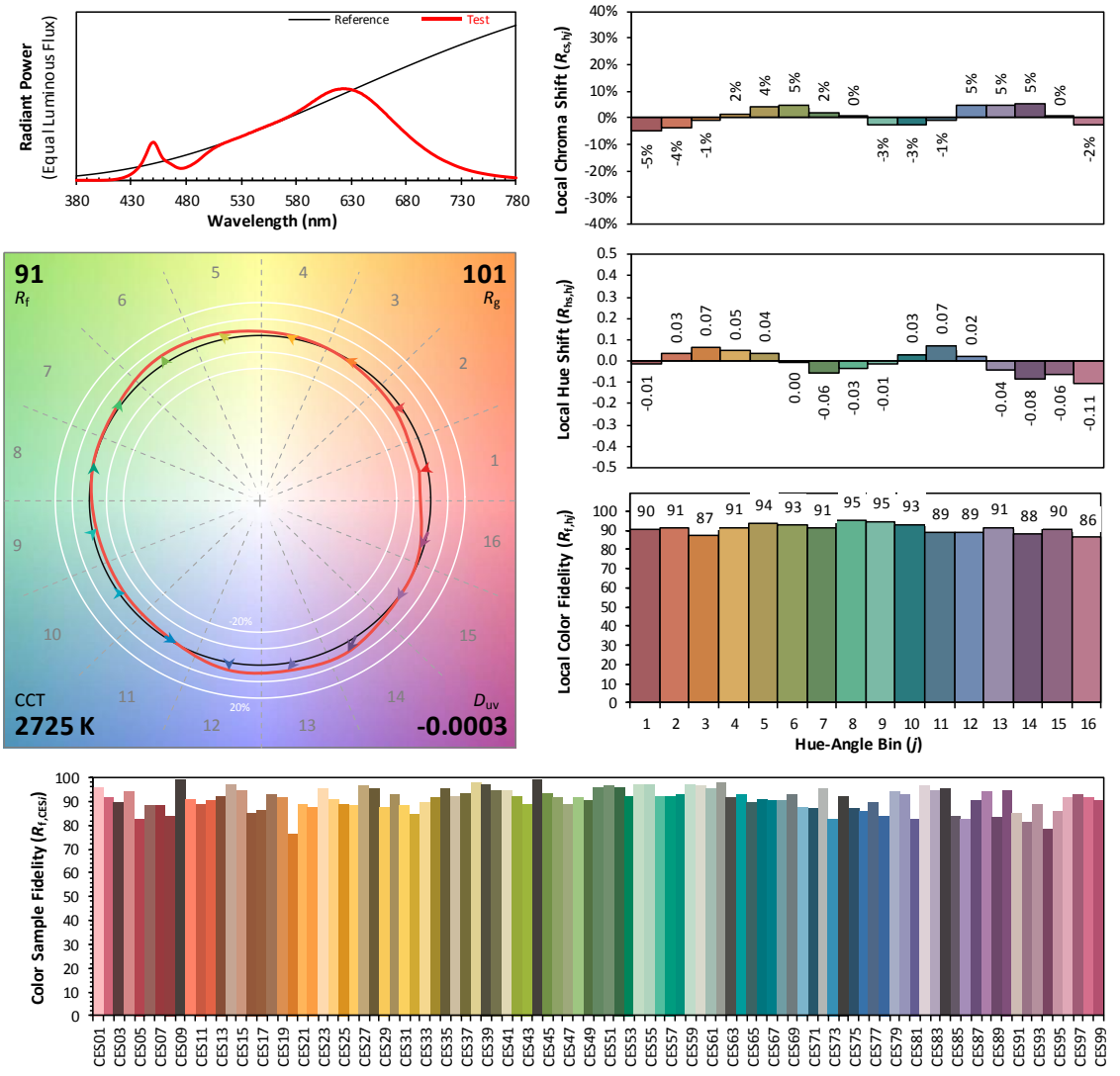
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** GREEN CREATIVE LTD

Date: 2021/01/07 **Model:** ORB/L/927/FL/DIM120V/H/BL



Notes:	This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4574
y	0.4093
u'	0.2615
v'	0.5265

CIE 13.3-1995 (CRI)

R_a	92
R_9	57

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

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	849.511	24.33%
10- 20	1613.001	46.20%
20- 30	752.861	21.57%
30- 40	128.74	3.69%
40- 50	61.526	1.76%
50- 60	43.946	1.26%
60- 70	30.005	0.86%
70- 80	8.868	0.25%
80- 90	0.078	0.00%
90-100	0	0.00%
100-110	0.001	0.00%
110-120	0.008	0.00%
120-130	0.051	0.00%
130-140	0.269	0.01%
140-150	0.575	0.02%
150-160	0.745	0.02%
160-170	0.637	0.02%
170-180	0.226	0.01%
Total	3491.0	100%

γ(°)	Lumens	% Total
0- 60	3449.585	98.81%
60- 90	38.951	1.12%
0-90	3488.536	99.93%
90- 180	2.512	0.07%
0- 180	3491.0	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

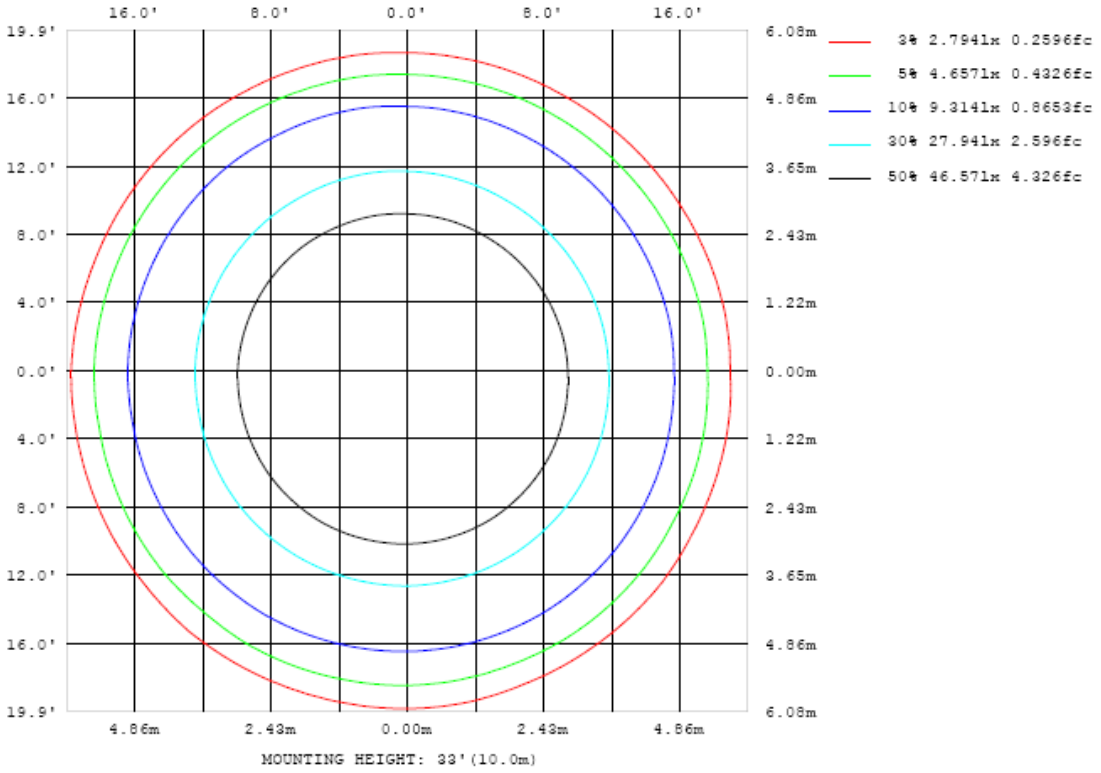


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

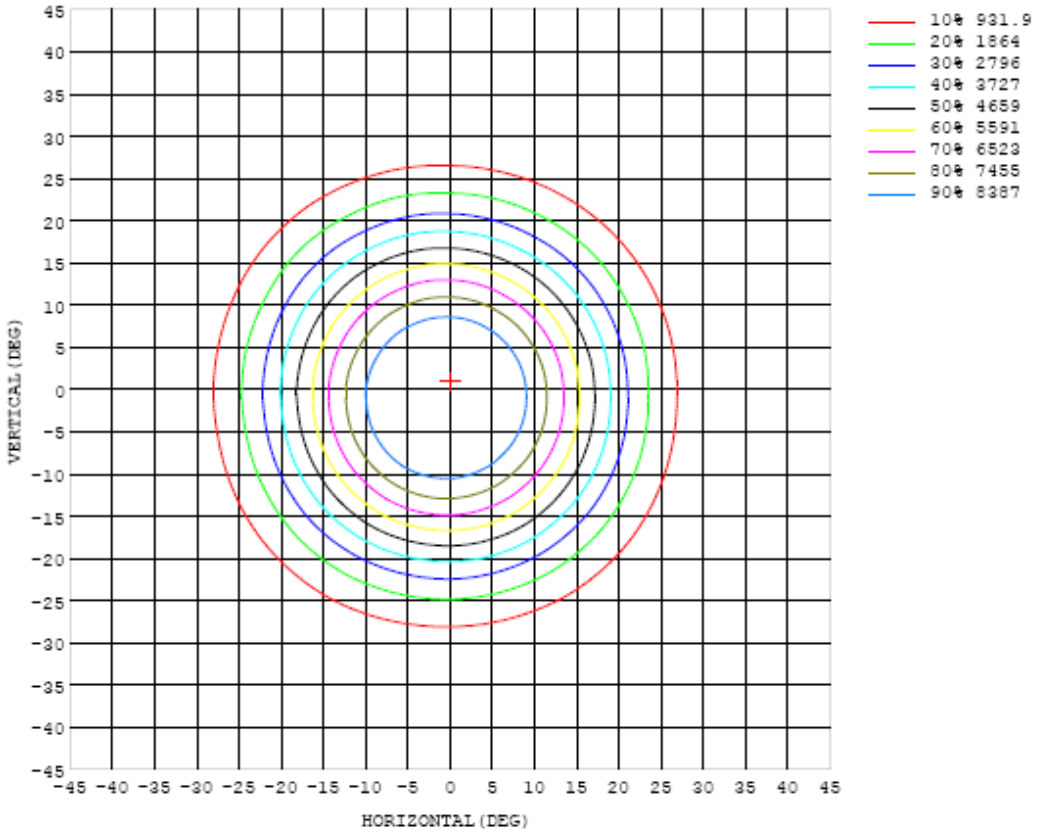


Chart 6: Isocandela Plot

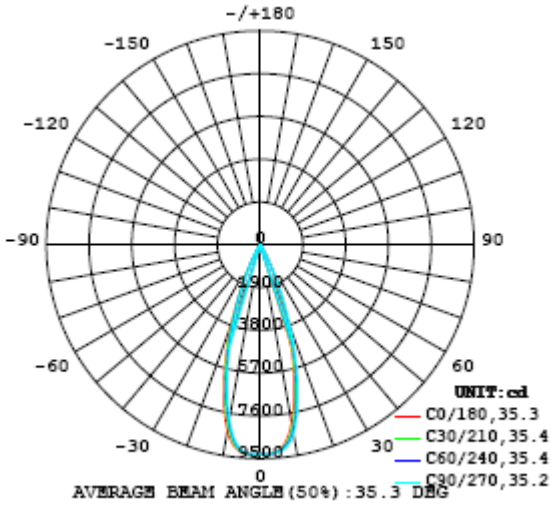


Chart 7: Polar Candela Distribution

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	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305
5	9183	9198	9201	9208	9214	9223	9227	9233	9240	9248	9252	9256	9252	9257	9265	9267	9268	9263	9259
10	8029	8093	8162	8228	8294	8337	8417	8462	8508	8546	8566	8582	8591	8576	8545	8513	8467	8416	8383
15	5744	5827	5928	6027	6114	6192	6289	6348	6409	6458	6483	6502	6505	6479	6457	6404	6352	6291	6242
20	3250	3330	3424	3515	3597	3666	3759	3817	3869	3909	3910	3928	3934	3934	3919	3884	3846	3790	3778
25	1389	1434	1490	1538	1601	1641	1701	1736	1772	1804	1826	1839	1857	1850	1840	1820	1794	1766	1772
30	420	456	472	488	524	539	552	562	587	604	609	619	628	603	627	619	606	592	576
35	170	171	173	177	178	180	183	185	189	190	187	186	186	186	187	186	185	184	192
40	109	111	111	112	112	113	115	116	117	117	115	113	111	110	112	111	112	112	115
45	76.7	77.4	76.9	76.4	75.5	76.8	78.9	81.3	82.3	82.9	82.7	81.5	80.6	79.1	80.6	82.0	83.4	83.8	85.3
50	60.1	60.3	59.6	57.8	56.4	57.2	59.3	60.7	60.4	60.4	60.9	60.0	59.0	58.3	60.1	62.2	64.1	64.7	64.9
55	49.6	49.6	49.0	47.9	47.2	47.5	48.1	49.2	49.3	49.4	49.5	49.3	48.2	47.7	48.5	49.6	50.8	51.5	51.8
60	39.9	40.4	40.2	39.3	38.7	39.1	40.2	41.2	41.4	41.6	41.9	41.6	40.8	40.2	40.9	41.7	42.1	42.5	42.5
65	30.3	30.8	30.9	30.3	29.7	30.5	31.5	31.7	32.0	32.2	32.3	32.5	31.5	30.8	31.9	32.3	32.6	32.7	32.9
70	17.1	17.9	18.6	19.1	19.0	20.4	21.4	21.8	21.7	22.1	22.6	22.5	21.8	21.0	21.9	21.9	21.8	20.8	20.9
75	6.32	6.78	7.40	7.92	8.42	8.73	9.40	9.69	9.62	9.93	10.3	10.2	10.0	10.1	9.87	9.80	9.76	9.07	9.05
80	0.22	0.25	0.27	0.34	0.44	0.61	0.91	1.28	1.69	1.92	2.17	2.24	2.26	1.97	2.14	2.03	1.96	1.65	1.53
85	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02
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	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	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	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	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
120	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	0.01
125	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	0.05	0.03
130	0.16	0.16	0.16	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.12
135	0.37	0.36	0.36	0.35	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.33
140	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.50	0.50	0.50	0.50	0.51	0.51	0.60
145	0.90	0.88	0.88	0.86	0.85	0.84	0.82	0.81	0.80	0.79	0.78	0.77	0.77	0.77	0.77	0.77	0.78	0.78	0.94
150	1.24	1.22	1.21	1.20	1.19	1.17	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.09	1.09	1.10	1.10	1.11	1.31
155	1.63	1.62	1.61	1.59	1.58	1.56	1.55	1.53	1.52	1.51	1.50	1.49	1.48	1.48	1.48	1.48	1.49	1.50	1.65
160	1.99	1.98	1.97	1.95	1.94	1.93	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.85	1.85	1.85	1.86	1.86	2.01
165	2.29	2.28	2.27	2.26	2.26	2.25	2.24	2.23	2.22	2.21	2.20	2.20	2.19	2.19	2.18	2.18	2.19	2.19	2.38
170	2.39	2.39	2.39	2.39	2.39	2.38	2.37	2.37	2.37	2.36	2.36	2.35	2.34	2.34	2.33	2.33	2.33	2.33	2.62
175	2.32	2.33	2.34	2.35	2.34	2.33	2.32	2.32	2.31	2.30	2.30	2.29	2.28	2.28	2.28	2.28	2.27	2.26	2.38
180	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20

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	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305	9305		
5	9253	9242	9228	9221	9211	9197	9196	9188	9182	9175	9164	9162	9160	9165	9165	9168	9173		
10	8321	8245	8173	8117	8058	7985	7938	7901	7858	7843	7821	7810	7834	7861	7890	7939	7992		
15	6164	6072	5987	5896	5808	5719	5642	5590	5525	5491	5462	5445	5469	5503	5554	5611	5690		
20	3723	3647	3588	3507	3439	3348	3293	3233	3157	3119	3071	3048	3067	3089	3120	3168	3213		
25	1743	1686	1638	1597	1547	1469	1430	1391	1317	1294	1278	1269	1275	1294	1319	1347	1400		
30	547	517	496	472	450	424	406	392	376	370	366	362	371	380	390	406	423		
35	187	181	174	171	169	167	164	165	162	160	159	157	158	160	163	164	172		
40	112	110	108	107	107	108	106	105	104	104	102	101	99.6	100	102	104	108		
45	83.2	80.9	79.0	77.0	77.0	75.8	75.8	75.7	75.0	74.1	72.2	70.6	69.3	70.2	72.0	73.8	76.3		
50	63.5	61.0	58.4	57.1	57.5	58.3	59.2	59.1	58.9	58.7	56.8	54.4	53.5	54.6	56.6	58.5	59.9		
55	51.2	50.2	49.1	48.4	48.7	49.2	49.9	50.0	49.9	49.4	48.5	47.2	46.7	47.2	48.2	49.0	49.7		
60	42.0	41.2	39.9	38.9	39.5	40.1	40.2	40.2	40.1	40.0	39.2	38.0	37.3	38.0	38.9	39.6	40.0		
65	32.6	32.1	31.1	29.7	30.3	30.5	30.2	29.8	29.5	29.4	29.5	28.6	27.4	28.6	29.6	29.7	30.1		
70	20.9	20.3	19.4	17.7	17.8	17.5	17.1	16.4	15.8	15.8	15.7	15.4	15.0	15.8	16.3	16.7	17.0		
75	9.04	8.57	8.15	7.62	7.10	6.77	6.47	6.03	5.62	5.59	5.58	5.46	5.50	5.69	5.83	5.97	6.17		
80	1.13	0.70	0.48	0.33	0.25	0.18	0.15	0.13	0.11	0.10	0.09	0.08	0.08	0.09	0.12	0.17	0.22		
85	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	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	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	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	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	0.00		
110	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01		
115	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
120	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
125	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		
130	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15		
135	0.34	0.35	0.35	0.36	0.37	0.38	0.38	0.39	0.40	0.40	0.40	0.41	0.41	0.41	0.41	0.40	0.40		
140	0.61	0.62	0.64	0.65	0.66	0.67	0.68	0.69	0.70	0.70	0.71	0.71	0.72	0.72	0.71	0.71	0.70		
145	0.95	0.97	0.98	1.00	1.01	1.02	1.04	1.05	1.06	1.07	1.07	1.08	1.08	1.08	1.07	1.07	1.06		
150	1.31	1.33	1.35	1.36	1.38	1.39	1.41	1.42	1.43	1.44	1.44	1.45	1.45	1.45	1.45	1.44	1.43		
155	1.65	1.67	1.68	1.70	1.71	1.72	1.74	1.75	1.76	1.77	1.77	1.78	1.78	1.78	1.78	1.77	1.76		
160	2.00	2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.08	2.09	2.09	2.09	2.09	2.09	2.08	2.08		
165	2.35	2.35	2.36	2.37	2.37	2.37	2.38	2.39	2.39	2.39	2.39	2.40	2.40	2.40	2.40	2.39	2.39		
170	2.57	2.57	2.57	2.57	2.56	2.56	2.56	2.56	2.56	2.55	2.55	2.56	2.57	2.57	2.56	2.55	2.55		
175	2.34	2.33	2.33	2.32	2.32	2.31	2.29	2.27	2.26	2.25	2.25	2.27	2.28	2.27	2.27	2.26	2.25		
180	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 05, 2020	Aug. 04, 2021
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2020	Aug. 04, 2021
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2020	Aug. 04, 2021
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2020	Aug. 04, 2021
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2020	Aug. 04, 2021
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2020	Aug. 04, 2021
Standard source	D908	HZTE012-01	Aug. 05, 2020	Aug. 04, 2021
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2020	Aug. 04, 2021
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2020	Aug. 04, 2021
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2020	Aug. 04, 2021
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2020	Aug. 04, 2021
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2020	Aug. 04, 2021
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2020	Aug. 04, 2021
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2020	Aug. 04, 2021

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.

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,
Hangzhou, Zhejiang Province, China 311100
Tel: +86 571 86376106 www.ledtestlab.com

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

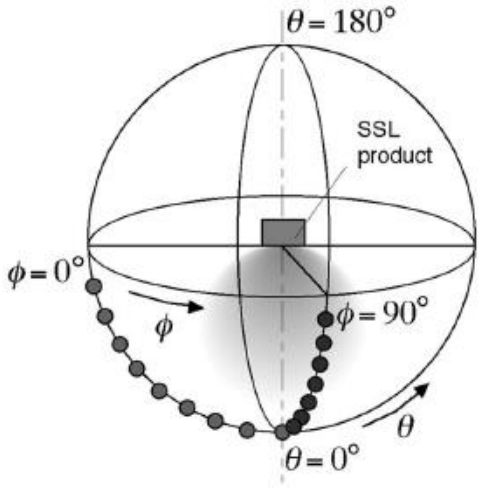
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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