LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Lamp

Model: 25PAR38HO/930FL40/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18120013c

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

Review by: April Zou

Engineer: April Zou
Dec. 18, 2018

Approved by: Jim Zhang

Manager: Jim Zhang
Dec. 18, 2018

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: **25PAR38HO/930FL40/277V**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
100.9	2524.0	25.02	0.9958

CCT (K)	CRI	Stabilization Time (Light & Power)
3063	92.2	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. 12, 2018
Date of Test	: Dec. 13, 2018
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 Photos

Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: LED Lamp
Model	: 25PAR38HO/930FL40/277V
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0℃.

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 70 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.209	0.097
Power Factor	0.9958	0.9346
Test Power (W)	25.02	25.20
THD A%	5.32	18.80
Luminous Efficacy (lm/W)	100.9	101.5
Total Luminous Flux (lm)	2524.0	2557.0
Color Rendering Index (CRI)	92.2	
R9	58.9	
Correlated Color Temperature (CCT)(K)	3063	
Chromaticity Chroma x	0.4339	
Chromaticity Chroma y	0.4057	
Chromaticity Chroma u	0.2479	
Chromaticity Chroma v	0.3477	
Duv	0.0011	
Chromaticity Chroma u ’	0.2479	
Chromaticity Chroma v’	0.5216	

Special Color Rendering Indices	
R1	91.9
R2	94.7
R3	96.8
R4	92.9
R5	91.7
R6	93.6
R7	93.1
R8	82.6
R9	58.9
R10	87.4
R11	93.7
R12	82
R13	92.5
R14	97.7
Rf	91
Rg	100

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 25.0℃.

The photometric distance is 2.47m.

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)	0.211
Power Factor	0.9956
Test Power (W)	25.19
Luminous Efficacy (lm/W)	102.5
Total Luminous Flux (lm)	2580.7
Beam Angle (°)	36.1
Center Beam Candle Power (cd)	5123
Spacing Criteria	0.59 (0 °-180 °)/ 0.60 (90 °-270 °)
Zonal Lumens in the 0 °-60 °Zone	96.51%
Zonal Lumens in the 60 °-90 °Zone	3.36%
Zonal Lumens in the 90 °-120 °Zone	0.00%
Zonal Lumens in the 120 °-180 °Zone	0.13%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

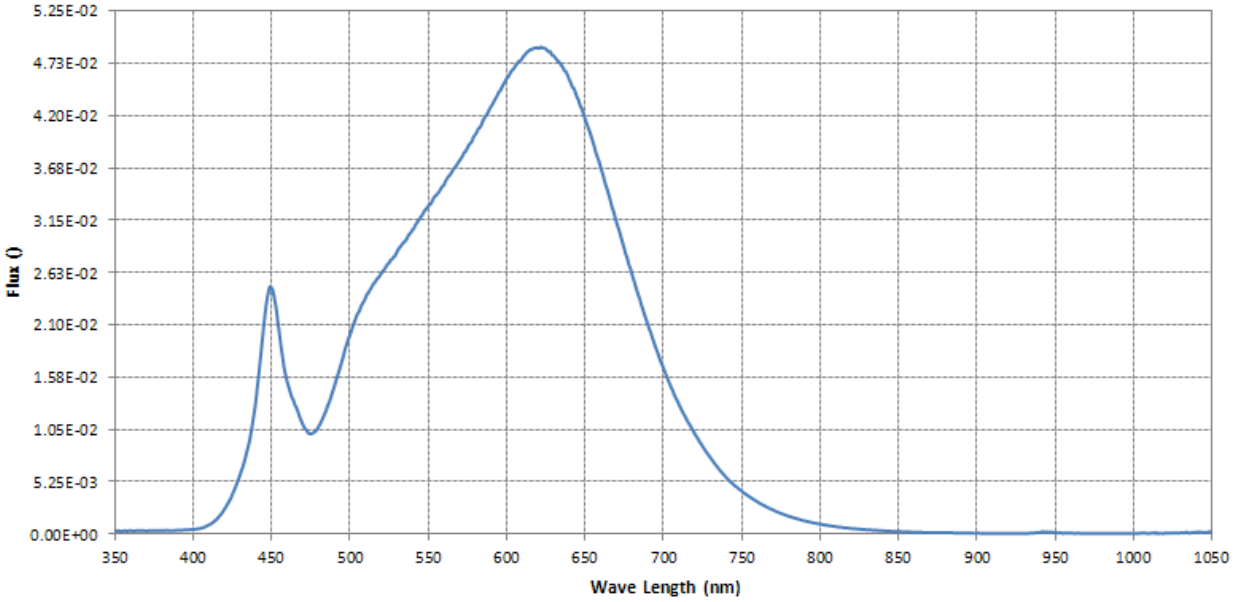
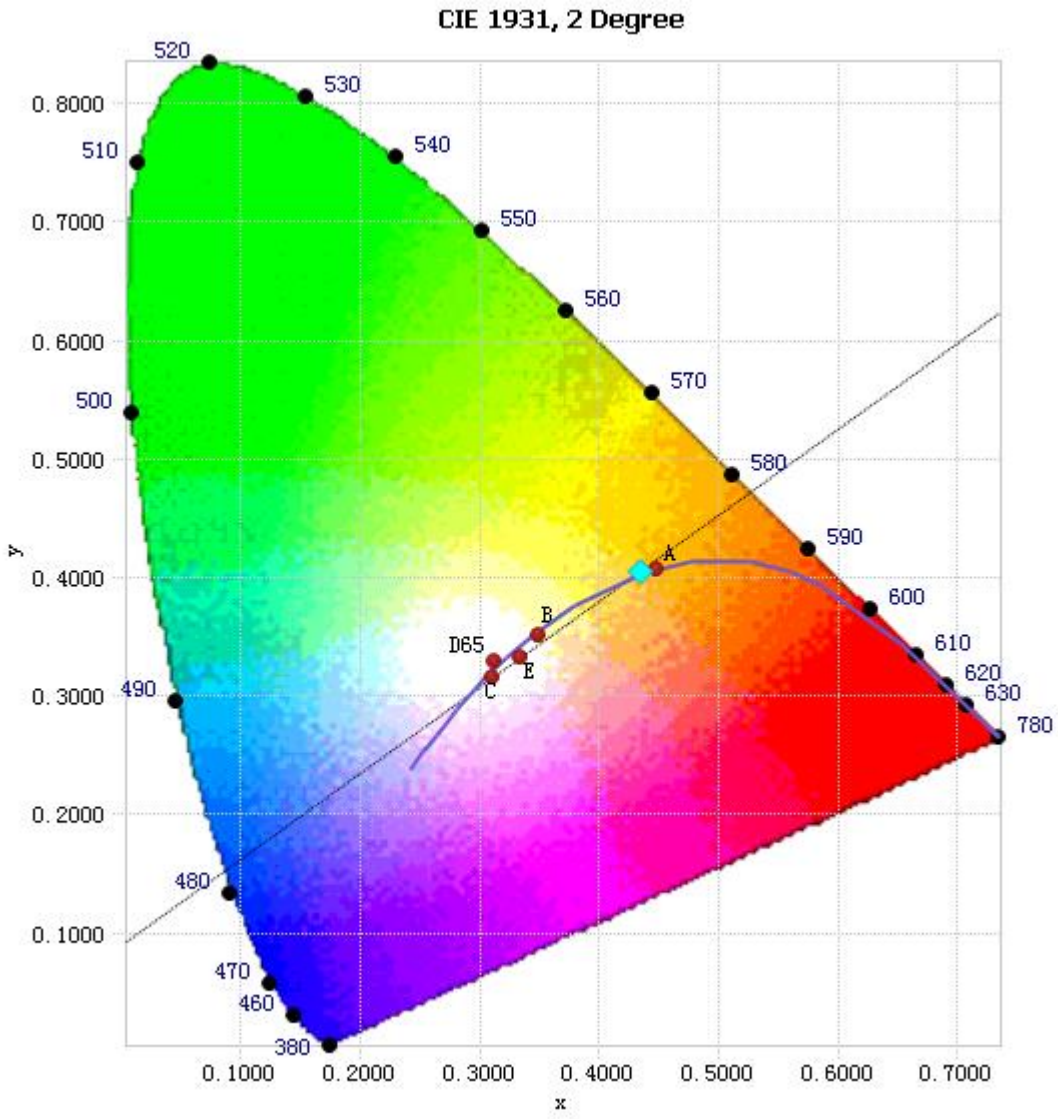


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.39E-04	485	1.24E-02	590	4.29E-02	695	1.88E-02
385	3.51E-04	490	1.48E-02	595	4.43E-02	700	1.67E-02
390	4.02E-04	495	1.73E-02	600	4.57E-02	705	1.48E-02
395	4.18E-04	500	1.99E-02	605	4.68E-02	710	1.30E-02
400	4.74E-04	505	2.21E-02	610	4.78E-02	715	1.15E-02
405	5.86E-04	510	2.37E-02	615	4.86E-02	720	1.01E-02
410	9.12E-04	515	2.51E-02	620	4.88E-02	725	8.83E-03
415	1.46E-03	520	2.61E-02	625	4.87E-02	730	7.68E-03
420	2.46E-03	525	2.72E-02	630	4.80E-02	735	6.63E-03
425	3.93E-03	530	2.83E-02	635	4.70E-02	740	5.71E-03
430	5.94E-03	535	2.94E-02	640	4.56E-02	745	4.95E-03
435	8.67E-03	540	3.05E-02	645	4.39E-02	750	4.34E-03
440	1.32E-02	545	3.18E-02	650	4.17E-02	755	3.75E-03
445	2.06E-02	550	3.29E-02	655	3.94E-02	760	3.25E-03
450	2.47E-02	555	3.40E-02	660	3.69E-02	765	2.81E-03
455	2.03E-02	560	3.50E-02	665	3.42E-02	770	2.44E-03
460	1.53E-02	565	3.63E-02	670	3.14E-02	775	2.09E-03
465	1.30E-02	570	3.75E-02	675	2.87E-02	780	1.80E-03
470	1.10E-02	575	3.87E-02	680	2.61E-02		
475	1.01E-02	580	4.01E-02	685	2.36E-02		
480	1.07E-02	585	4.15E-02	690	2.11E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4339, 0.4057)

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

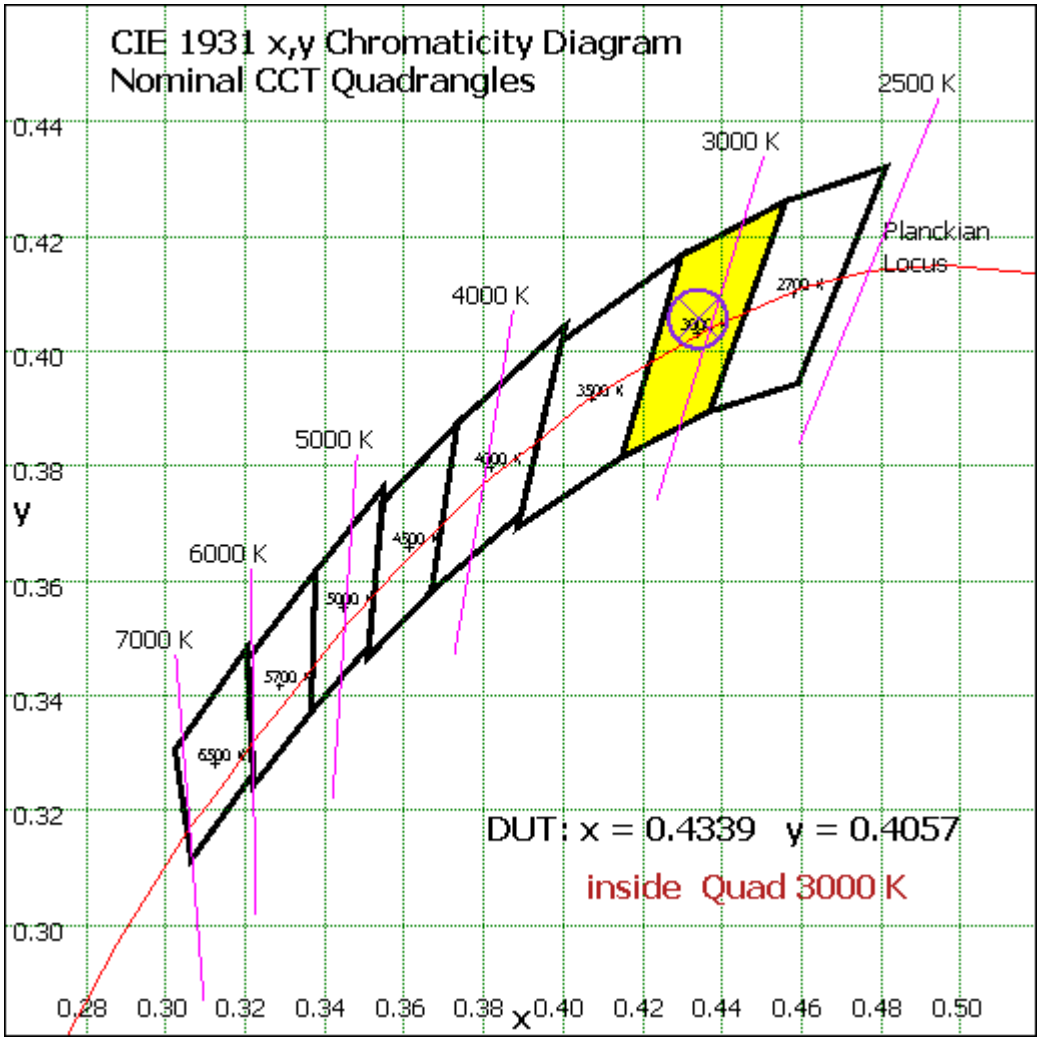


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	438.109	16.98%
10- 20	865.846	33.55%
20- 30	650.203	25.19%
30- 40	316.654	12.27%
40- 50	138.48	5.37%
50- 60	81.378	3.15%
60- 70	52.904	2.05%
70- 80	27.322	1.06%
80- 90	6.399	0.25%
90-100	0.012	0.00%
100-110	0.028	0.00%
110-120	0.06	0.00%
120-130	0.162	0.01%
130-140	0.451	0.02%
140-150	0.806	0.03%
150-160	0.938	0.04%
160-170	0.724	0.03%
170-180	0.243	0.01%
Total	2580.7	100%

γ(°)	Lumens	% Total
0- 60	2490.67	96.51%
60- 90	86.625	3.36%
0-90	2577.295	99.87%
90- 180	3.424	0.13%
0- 180	2580.7	100%

Table 5: Zonal Lumen Data

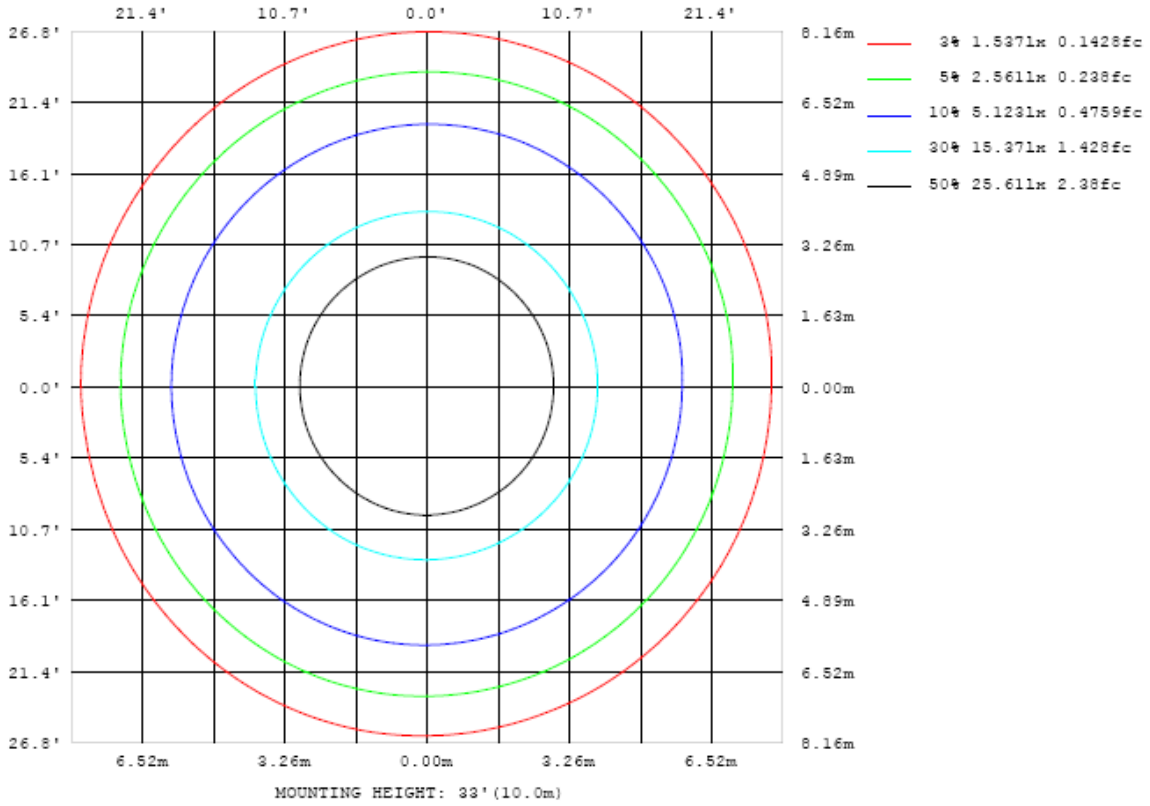


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

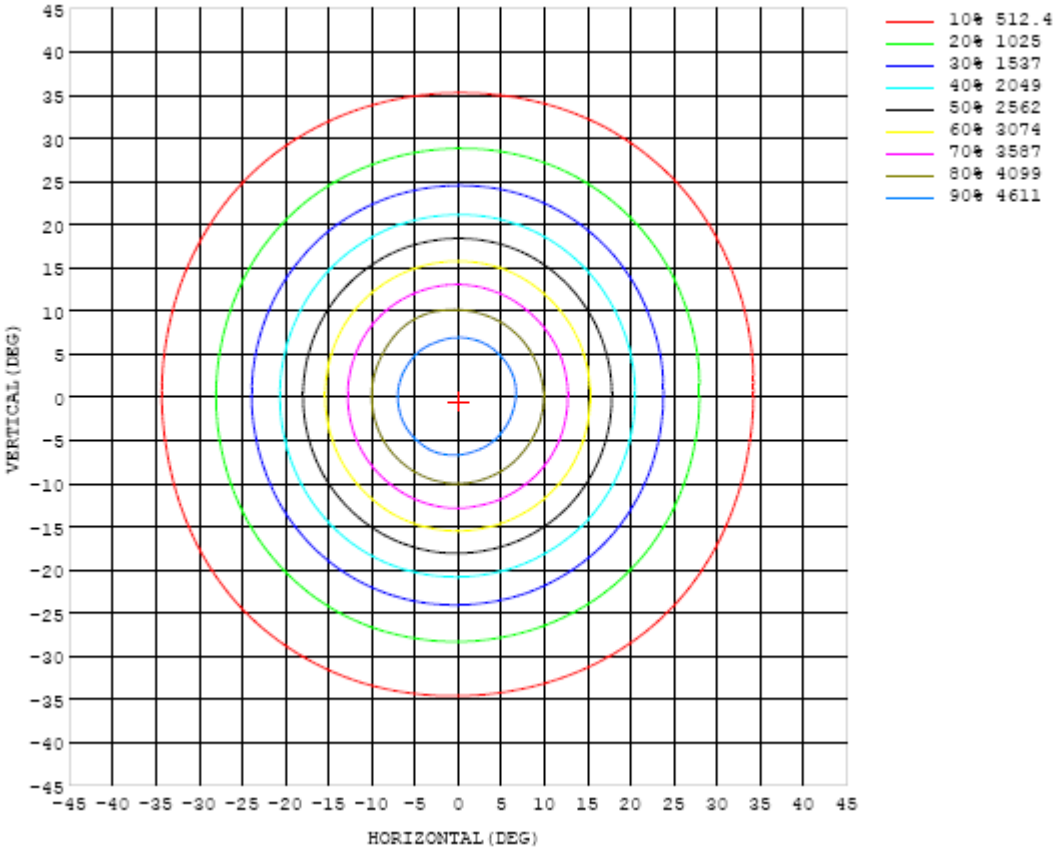


Chart 5: Isocandela Plot

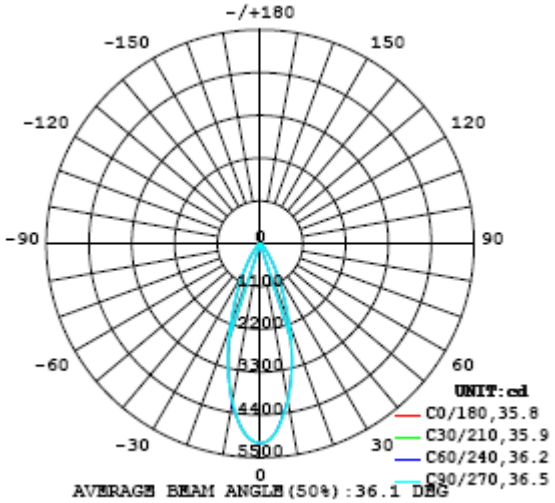


Chart 6: Polar Candela Distribution

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	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123
5	4837	4826	4821	4826	4823	4827	4828	4829	4828	4831	4840	4846	4850	4860	4872	4877	4875	4875	4872
10	4080	4079	4075	4068	4067	4076	4081	4086	4096	4099	4101	4101	4098	4096	4096	4100	4100	4101	4107
15	3131	3129	3136	3141	3143	3147	3150	3157	3162	3172	3175	3171	3166	3157	3154	3152	3153	3156	3163
20	2135	2131	2131	2137	2146	2152	2162	2175	2186	2196	2204	2200	2198	2192	2182	2175	2170	2167	2173
25	1369	1361	1361	1362	1367	1375	1382	1394	1400	1410	1417	1418	1410	1405	1398	1392	1385	1385	1389
30	825	819	816	819	825	829	835	845	851	859	863	863	858	852	844	841	836	833	837
35	467	462	462	463	466	470	475	481	485	490	494	494	491	486	481	476	472	472	476
40	261	259	260	260	262	265	268	271	274	278	280	281	279	276	273	271	269	269	272
45	164	164	164	165	166	167	169	171	172	173	173	173	172	171	170	169	169	169	172
50	116	115	116	116	117	117	118	118	119	120	120	120	119	119	118	118	118	118	120
55	87.0	86.6	86.9	87.1	87.3	87.6	87.9	88.3	88.6	89.0	89.3	89.3	89.2	88.8	88.6	88.6	89.0	89.4	90.6
60	68.7	68.4	68.4	68.7	68.4	68.6	68.7	69.0	69.2	69.5	69.5	69.4	69.3	69.2	69.5	68.7	69.1	69.4	69.5
65	52.6	52.4	52.3	52.2	52.0	52.2	52.4	52.7	52.9	53.3	53.4	53.6	53.5	53.5	53.4	53.4	53.5	53.4	53.8
70	38.3	38.2	38.1	37.9	37.9	37.9	38.0	38.1	38.3	38.4	38.5	38.6	38.8	38.8	38.9	39.0	39.1	39.1	39.4
75	25.3	25.2	25.1	25.0	25.0	25.0	25.1	25.2	25.3	25.4	25.5	25.5	25.7	25.8	25.8	25.9	26.0	26.1	26.3
80	13.8	13.7	13.7	13.6	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.5	14.6	14.6	14.7	14.9
85	4.67	4.69	4.70	4.63	4.68	4.76	4.85	4.93	5.00	5.06	5.12	5.15	5.21	5.34	5.37	5.40	5.50	5.48	5.63
90	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.05	0.07	0.07	0.06	0.09	0.10	0.15
95	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	0.01
100	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
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	0.02	0.03
110	0.03	0.03	0.04	0.03	0.03	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.04
115	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
120	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.10
125	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.19
130	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.37
135	0.41	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.41	0.69
140	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.65	0.64	1.11
145	0.91	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.89	1.57
150	1.20	1.20	1.20	1.20	1.21	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.18	2.02
155	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.54	1.54	1.54	1.55	1.55	1.55	1.55	1.55	1.50	2.39
160	1.85	1.85	1.85	1.85	1.85	1.85	1.86	1.85	1.86	1.86	1.86	1.87	1.87	1.87	1.88	1.88	1.88	1.82	2.65
165	2.10	2.10	2.10	2.10	2.09	2.10	2.09	2.09	2.10	2.10	2.10	2.11	2.11	2.12	2.12	2.13	2.13	2.07	2.77
170	2.21	2.21	2.21	2.21	2.21	2.22	2.22	2.22	2.22	2.23	2.23	2.24	2.24	2.24	2.25	2.25	2.26	2.21	2.65
175	2.28	2.28	2.27	2.26	2.26	2.26	2.26	2.26	2.26	2.27	2.27	2.28	2.29	2.29	2.30	2.31	2.32	2.32	2.33
180	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53

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	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123	5123		
5	4870	4866	4861	4855	4847	4842	4843	4849	4860	4864	4870	4870	4865	4859	4855	4849	4843		
10	4111	4111	4115	4131	4155	4168	4160	4136	4122	4110	4100	4096	4088	4084	4079	4077	4079		
15	3168	3177	3190	3203	3210	3210	3219	3222	3225	3218	3213	3196	3176	3165	3156	3149	3137		
20	2180	2186	2195	2204	2218	2229	2244	2253	2260	2256	2248	2230	2208	2187	2173	2155	2146		
25	1392	1399	1405	1412	1432	1444	1458	1468	1474	1477	1474	1457	1441	1427	1411	1396	1384		
30	838	841	848	860	869	882	893	903	910	914	911	900	888	874	863	853	842		
35	478	482	486	492	500	508	517	523	529	529	528	524	514	505	497	488	479		
40	274	276	278	281	287	291	295	298	300	299	297	293	287	282	277	271	267		
45	173	174	175	177	179	180	181	182	183	183	182	179	177	175	172	170	168		
50	121	121	122	123	123	124	124	124	125	125	124	122	121	120	119	118	118		
55	90.8	90.8	91.1	91.5	91.8	91.9	91.9	92.0	92.1	92.1	91.6	90.8	90.0	89.6	89.3	88.9	88.3		
60	69.7	69.7	69.6	69.8	70.1	70.2	70.3	70.4	70.5	70.6	70.4	69.9	69.7	69.9	69.8	69.6	69.2		
65	53.8	53.7	53.6	53.5	53.6	53.8	53.8	53.7	53.8	53.7	53.7	53.4	53.1	53.0	53.1	52.9	52.8		
70	39.5	39.4	39.4	39.2	39.2	39.2	39.2	39.1	39.0	38.8	38.7	38.5	38.4	38.4	38.4	38.5	38.5		
75	26.3	26.3	26.3	26.2	26.1	26.1	26.0	26.0	25.9	25.9	25.7	25.5	25.4	25.4	25.5	25.5	25.5		
80	14.9	14.9	14.8	14.9	14.8	14.7	14.7	14.6	14.5	14.4	14.1	14.0	14.0	14.0	13.9	14.0	14.0		
85	5.65	5.65	5.61	5.57	5.55	5.49	5.42	5.34	5.27	5.20	5.10	5.01	4.94	4.92	4.87	4.84	4.82		
90	0.16	0.15	0.13	0.15	0.13	0.11	0.08	0.06	0.04	0.04	0.03	0.02	0.00	0.00	0.01	0.00	0.00		
95	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		
100	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		
105	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		
110	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		
115	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06		
120	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	0.11	0.10		
125	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20		
130	0.39	0.39	0.39	0.39	0.40	0.40	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.39		
135	0.73	0.72	0.73	0.73	0.74	0.74	0.75	0.75	0.76	0.76	0.76	0.75	0.75	0.75	0.74	0.74	0.72		
140	1.17	1.16	1.17	1.17	1.18	1.18	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.15		
145	1.68	1.67	1.67	1.67	1.68	1.68	1.68	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.71	1.64		
150	2.18	2.16	2.16	2.16	2.16	2.17	2.17	2.17	2.17	2.18	2.18	2.18	2.18	2.19	2.19	2.21	2.10		
155	2.61	2.58	2.57	2.57	2.57	2.57	2.57	2.57	2.58	2.58	2.58	2.59	2.59	2.60	2.60	2.64	2.49		
160	2.94	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.92	2.92	2.92	2.93	2.93	2.98	2.77		
165	3.14	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.12	3.12	3.12	3.13	3.13	3.18	2.90		
170	3.11	3.08	3.07	3.07	3.07	3.07	3.07	3.06	3.07	3.07	3.08	3.08	3.08	3.09	3.10	3.16	2.76		
175	2.70	2.72	2.72	2.72	2.72	2.72	2.71	2.71	2.71	2.71	2.72	2.72	2.73	2.74	2.74	2.75	2.28		
180	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53		

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.

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

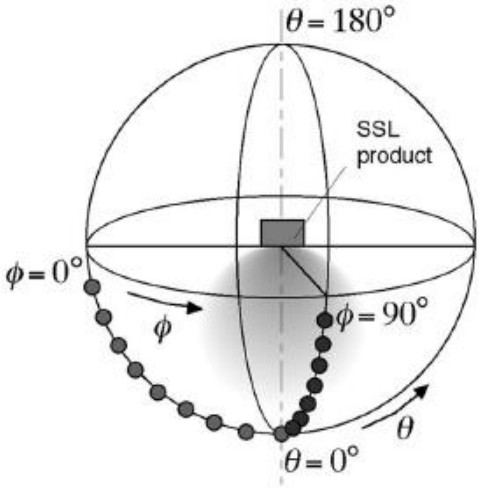
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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