LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Tube

Model: 11.5T5HO/2F/830/BYP

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.: HZ19020002v

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. 22, 2019

Approved by: Zhang

Manager: Jim Zhang
Feb. 22, 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: **11.5T5HO/2F/830/BYP**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
128.9	1431.0	11.10	0.9773

CCT (K)	CRI	Stabilization Time (Light & Power)
2922	82.2	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	: Feb. 01, 2019
Date of Test	: Feb. 12, 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

TABLE OF CONTENT

LM-79-08 Test Report 1
Test Summary 2
Sample Photo 4
TEST RESULTS 5
Spectral Power Distribution - Sphere Spectroradiometer Method 7
Chromaticity Diagram - Sphere Spectroradiometer Method 8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method 9
Color Vector – Sphere Spectroradiometer Method 10
Zonal Lumen Tabulation- Goniophotometer Method 11
Luminous Intensity Distribution Plots- Goniophotometer Method 13
Luminous Intensity Data- Goniophotometer Method 14
EQUIPMENT LIST 16
TEST METHODS 16
Seasoning of SSL Product 16
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements 16
Goniophotometer Method 17
Photometric and Electrical Measurements 17
Color Characteristics Measurements 17
Color Spatial Uniformity 17

Sample Photo

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: 11.5T5HO/2F/830/BYP
Electrical Ratings	: 120-277V, 50/60Hz, 11.5W
Product Description	: 3000K
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 Horizontal. 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 70minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.095	0.044
Power Factor	0.9773	0.9455
Test Power (W)	11.10	11.53
THD A%	19.69	20.23
Luminous Efficacy (lm/W)	128.9	124.1
Total Luminous Flux (lm)	1431.0	1431.0
Color Rendering Index (CRI)	82.2	
R9	6.3	
Correlated Color Temperature (CCT)(K)	2922	
Chromaticity Chroma x	0.4409	
Chromaticity Chroma y	0.4028	
Chromaticity Chroma u	0.2537	
Chromaticity Chroma v	0.3477	
Duv	0.0013	
Chromaticity Chroma u ’	0.2537	
Chromaticity Chroma v’	0.5215	

Special Color Rendering Indices	
R1	81.1
R2	92.6
R3	94
R4	79.1
R5	81.5
R6	91.3
R7	80.8
R8	57.1
R9	6.3
R10	83.2
R11	78.3
R12	73.8
R13	84.1
R14	97.5
Rf	85
Rg	94

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 2.47m.

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)	0.095
Power Factor	0.9773
Test Power (W)	11.13
Luminous Efficacy (lm/W)	127.2
Total Luminous Flux (lm)	1416.0
Beam Angle (°)	116.9
Center Beam Candle Power (cd)	397
Spacing Criteria	1.21 (0°-180°)/ 1.31 (90°-270°)
Zonal Lumens in the 0°-60° Zone	63.59%
Zonal Lumens in the 60°-90° Zone	25.87%
Zonal Lumens in the 90°-120° Zone	8.11%
Zonal Lumens in the 120°-180° Zone	2.43%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

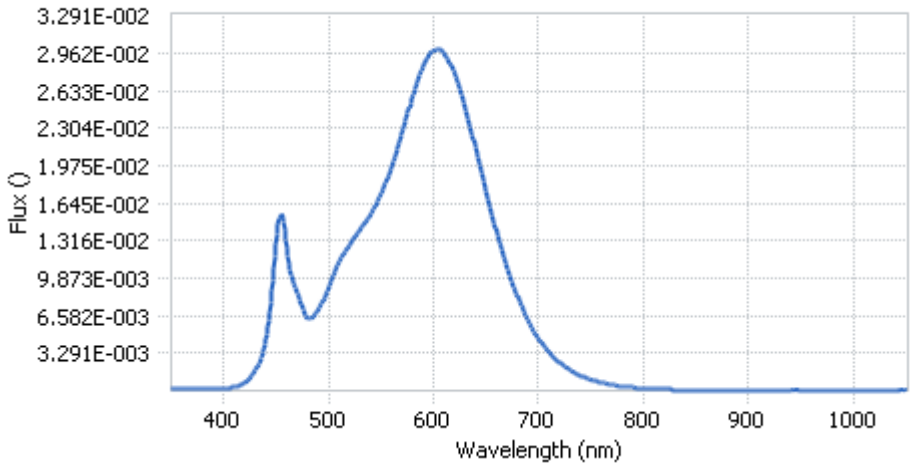
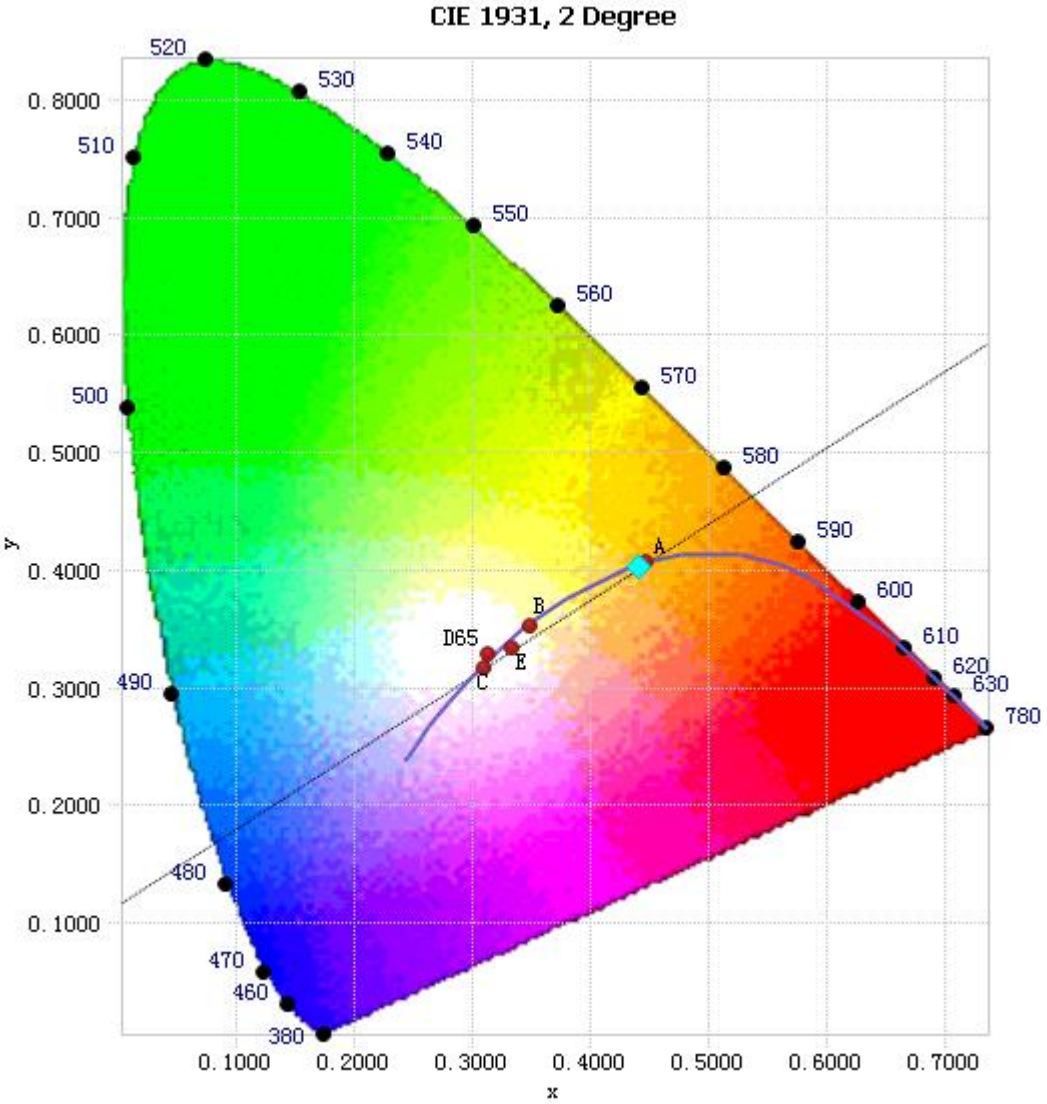


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.92E-04	485	6.45E-03	590	2.84E-02	695	5.33E-03
385	1.89E-04	490	7.09E-03	595	2.93E-02	700	4.59E-03
390	1.91E-04	495	7.96E-03	600	2.98E-02	705	3.94E-03
395	2.05E-04	500	9.11E-03	605	2.99E-02	710	3.39E-03
400	2.23E-04	505	1.02E-02	610	2.96E-02	715	2.89E-03
405	2.64E-04	510	1.13E-02	615	2.88E-02	720	2.49E-03
410	3.41E-04	515	1.22E-02	620	2.78E-02	725	2.13E-03
415	4.95E-04	520	1.29E-02	625	2.64E-02	730	1.82E-03
420	7.39E-04	525	1.35E-02	630	2.48E-02	735	1.55E-03
425	1.16E-03	530	1.42E-02	635	2.31E-02	740	1.32E-03
430	1.77E-03	535	1.48E-02	640	2.13E-02	745	1.14E-03
435	2.81E-03	540	1.55E-02	645	1.93E-02	750	9.85E-04
440	4.55E-03	545	1.63E-02	650	1.75E-02	755	8.39E-04
445	7.80E-03	550	1.73E-02	655	1.57E-02	760	7.17E-04
450	1.28E-02	555	1.84E-02	660	1.40E-02	765	6.12E-04
455	1.55E-02	560	1.97E-02	665	1.23E-02	770	5.32E-04
460	1.26E-02	565	2.11E-02	670	1.08E-02	775	4.54E-04
465	9.97E-03	570	2.27E-02	675	9.49E-03	780	3.90E-04
470	8.73E-03	575	2.42E-02	680	8.28E-03		
475	7.22E-03	580	2.59E-02	685	7.18E-03		
480	6.33E-03	585	2.73E-02	690	6.20E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4409, 0.4028)

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

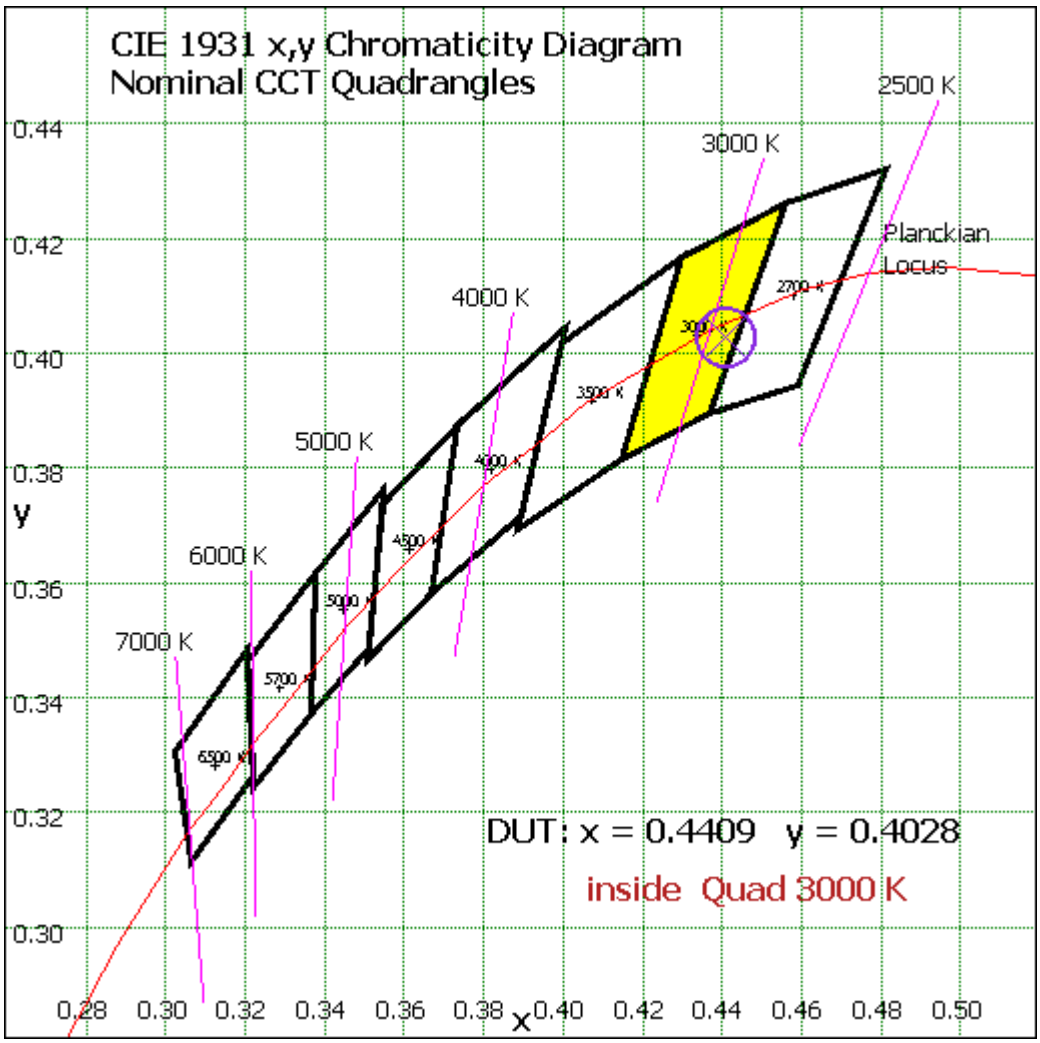


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Vector – Sphere Spectroradiometer Method

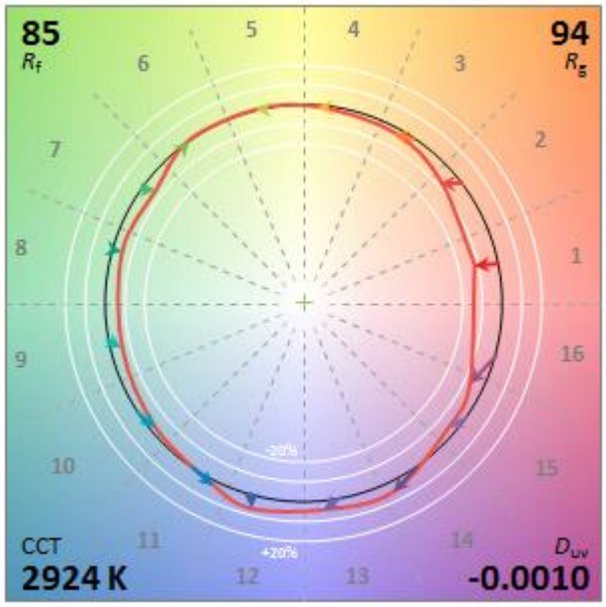


Chart 4: Color Vector Diagram of TM-30-18

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	37.581	2.65%
10- 20	107.497	7.59%
20- 30	162.557	11.48%
30- 40	196.06	13.85%
40- 50	205.182	14.49%
50- 60	191.623	13.53%
60- 70	161.04	11.37%
70- 80	121.666	8.59%
80- 90	83.602	5.90%
90-100	55.678	3.93%
100-110	36.365	2.57%
110-120	22.794	1.61%
120-130	14.335	1.01%
130-140	9.108	0.64%
140-150	5.638	0.40%
150-160	3.284	0.23%
160-170	1.634	0.12%
170-180	0.388	0.03%
Total	1416.0	100%

γ(°)	Lumens	% Total
0- 60	900.5	63.59%
60- 90	366.308	25.87%
0-90	1266.808	89.46%
90- 180	149.224	10.54%
0- 180	1416.0	100%

Table 5: Zonal Lumen

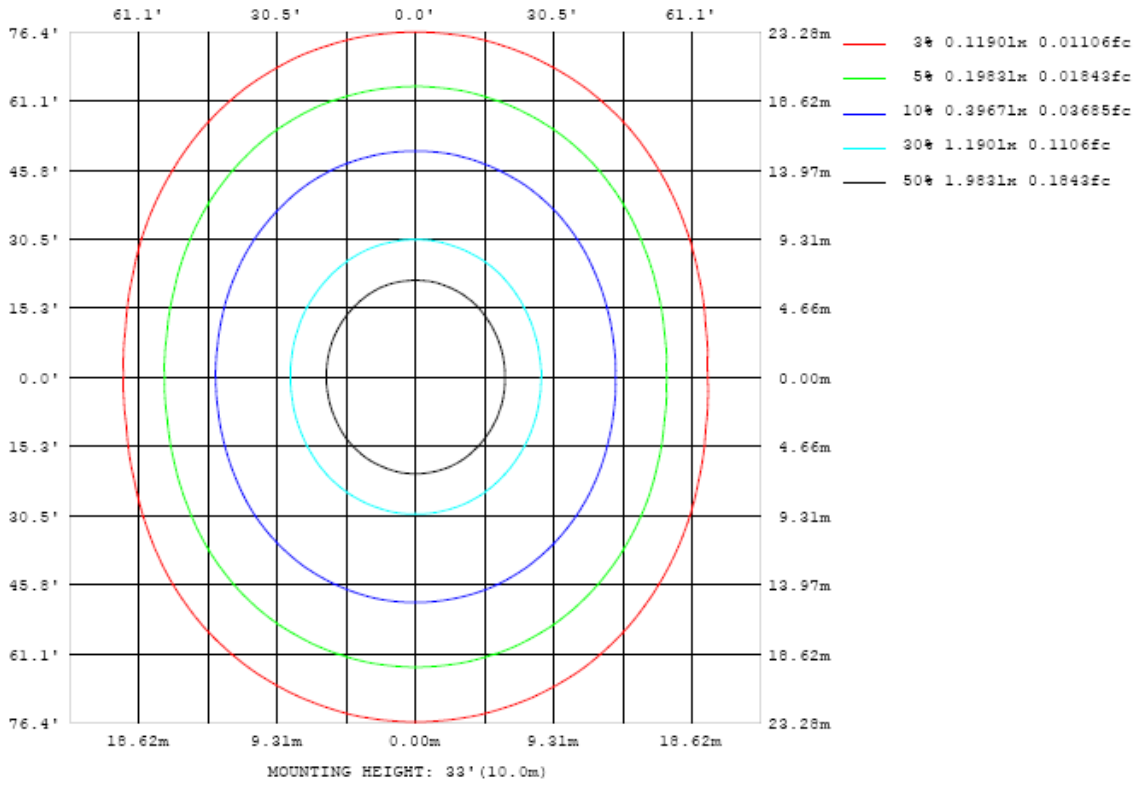


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

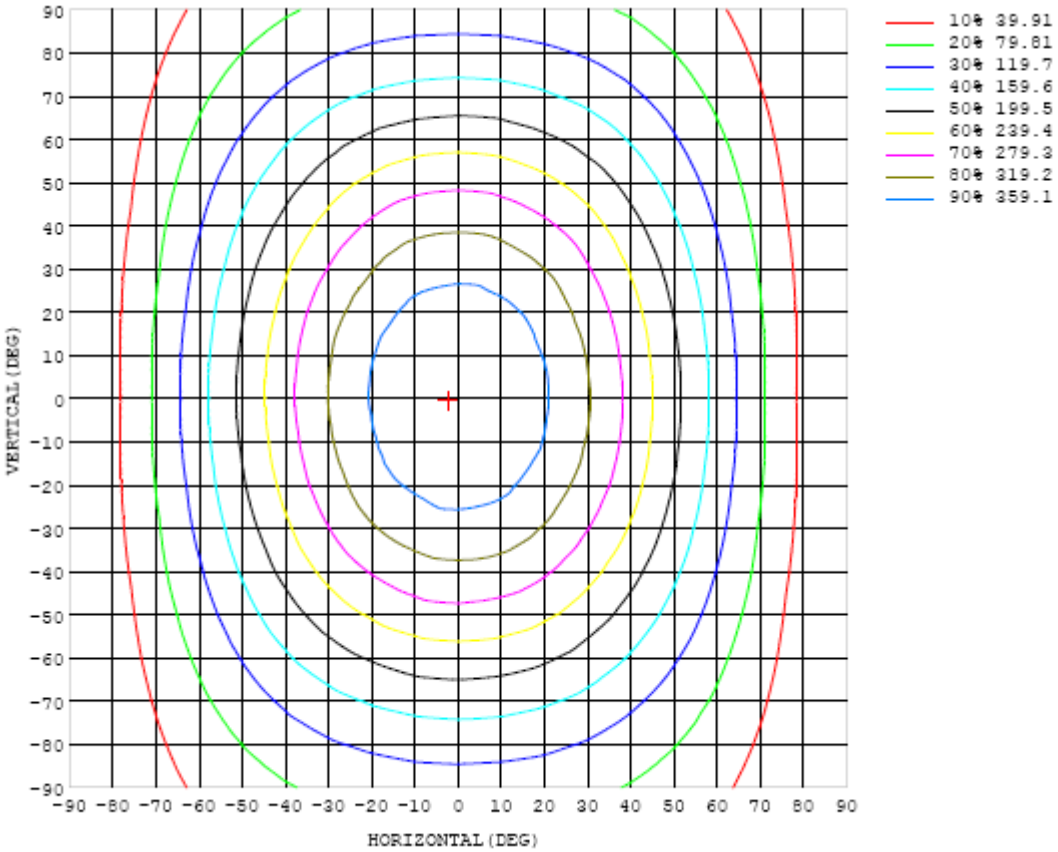


Chart 6: Isocandela Plot

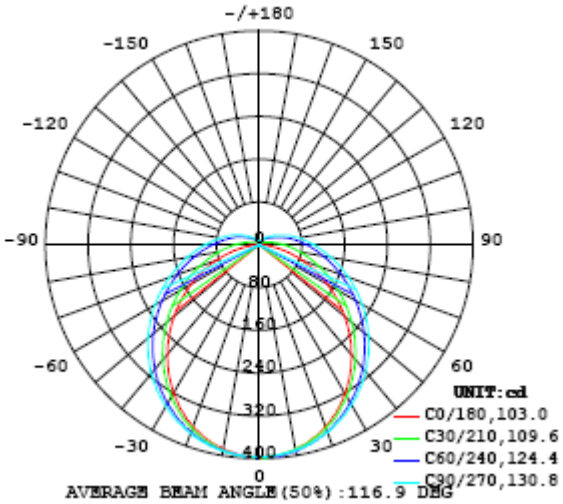


Chart 7: Polar Candela Distribution

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	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397
5	395	396	394	394	395	396	396	397	395	394	396	395	395	396	396	397	394	394	395
10	389	389	388	389	388	390	392	391	390	391	391	389	390	390	391	389	388	387	387
15	377	378	378	379	379	382	383	384	383	383	385	382	382	382	381	377	377	376	378
20	362	363	364	365	366	369	372	373	373	373	374	372	371	370	367	364	363	361	361
25	344	344	346	348	349	354	358	360	360	361	361	358	356	354	350	346	343	341	343
30	321	323	325	328	331	336	341	343	345	346	346	342	339	336	331	325	322	320	320
35	296	297	301	305	309	316	322	326	328	329	328	324	320	316	310	302	297	294	295
40	269	270	274	279	286	293	301	306	309	310	308	304	299	293	286	277	271	267	267
45	239	241	246	253	262	271	279	285	289	290	288	283	277	270	260	250	243	238	238
50	209	211	217	226	236	246	256	263	266	268	267	261	254	245	235	223	215	209	208
55	178	181	188	198	210	221	232	240	243	245	243	238	231	220	209	196	185	178	177
60	147	150	159	171	184	196	208	216	220	222	220	214	207	196	183	168	157	148	147
65	116	121	131	145	159	173	185	193	198	200	198	192	183	172	158	142	128	118	116
70	85.8	91.1	104	120	136	150	163	171	176	178	176	170	161	149	134	117	102	89.5	85.7
75	57.4	64.3	79.8	97.4	114	129	142	150	154	156	155	149	140	128	113	95.1	77.8	62.6	56.8
80	31.7	40.4	58.7	77.2	94.6	109	122	130	135	137	135	129	121	109	93.2	75.4	56.7	39.1	31.0
85	11.6	21.7	41.3	60.7	77.5	92.3	104	112	117	118	117	111	103	91.6	76.7	58.9	39.7	20.3	10.8
90	1.67	10.4	28.1	46.8	63.4	77.3	88.8	96.8	101	102	101	95.5	87.8	77.0	62.8	45.3	26.8	9.40	1.06
95	0.05	4.88	18.2	35.7	51.5	64.8	75.2	82.6	86.6	87.9	86.7	81.7	74.5	63.9	50.7	34.3	17.5	4.12	0.17
100	0.32	3.10	11.9	25.6	40.3	53.2	63.4	70.0	74.1	75.5	74.0	69.5	62.9	53.0	39.8	24.9	11.5	2.89	0.29
105	0.60	2.46	8.65	19.0	30.6	41.9	51.7	58.5	62.5	63.7	62.5	58.3	51.3	41.5	30.0	18.7	8.56	2.26	0.64
110	0.85	2.14	6.74	14.8	23.9	32.8	40.5	46.5	50.3	51.8	50.6	46.2	40.5	32.9	23.9	14.8	7.19	2.40	1.04
115	1.29	2.43	5.89	11.9	19.5	26.8	33.2	38.0	40.7	41.8	40.8	37.8	33.2	26.9	19.6	12.3	6.40	2.60	1.43
120	1.67	2.70	5.52	10.0	16.1	22.2	27.5	31.5	33.9	34.6	33.8	31.5	27.6	22.5	16.5	10.6	5.91	2.81	1.83
125	2.11	2.81	4.37	8.89	13.5	18.6	23.0	26.3	28.3	29.0	28.3	26.1	22.9	18.8	14.0	9.30	5.43	2.84	2.21
130	2.41	3.22	5.05	8.03	11.7	15.6	19.3	22.1	23.8	24.3	23.8	22.0	19.3	15.8	12.0	7.94	4.80	3.02	2.53
135	2.73	3.54	5.02	6.88	10.2	13.3	16.3	18.5	19.8	20.4	19.9	18.4	16.3	13.6	10.5	7.18	4.70	3.24	2.79
140	2.99	3.75	4.91	6.27	8.68	11.5	13.8	15.6	16.7	17.0	16.7	15.5	13.8	11.7	8.95	6.40	4.84	3.53	3.24
145	3.29	3.95	4.79	6.09	6.74	9.49	11.7	13.1	13.9	14.2	13.9	13.0	11.8	9.93	7.94	6.07	4.94	3.77	3.66
150	3.44	4.06	4.78	5.64	6.89	7.54	9.32	10.6	11.5	11.8	11.6	11.0	10.1	8.84	7.44	6.23	5.27	3.82	3.97
155	3.63	4.08	4.93	5.46	6.12	7.25	8.02	8.38	9.09	9.53	9.70	9.30	8.65	7.80	6.82	5.96	5.36	3.72	4.31
160	3.94	3.90	4.91	5.36	5.75	6.24	6.93	7.54	7.78	7.91	8.01	7.86	7.54	6.89	6.17	5.63	5.11	3.60	4.21
165	4.08	3.53	4.27	5.20	5.52	5.71	6.06	6.32	6.41	6.57	6.65	6.62	6.34	6.13	5.75	5.42	4.53	3.47	4.12
170	3.81	3.16	3.05	3.37	3.62	4.31	5.41	5.75	5.77	5.85	5.98	5.24	4.65	4.28	3.99	3.70	3.44	3.46	3.67
175	2.94	2.97	3.00	3.01	3.01	3.01	3.02	3.00	2.71	1.65	2.67	3.14	3.24	3.24	3.23	3.22	3.22	3.22	3.22
180	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87

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	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397	397
5	396	396	396	397	397	395	397	397	395	395	398	397	395	395	395	395	395
10	389	389	391	390	389	391	393	393	391	393	391	392	392	389	389	389	389
15	378	379	380	381	382	384	385	385	384	384	384	384	384	380	379	378	378
20	363	363	366	368	369	372	375	374	375	375	374	374	372	368	365	364	362
25	344	346	350	351	355	359	363	364	364	363	360	359	357	352	348	345	345
30	322	324	329	332	337	343	347	349	349	348	346	343	340	333	328	325	322
35	296	300	305	310	317	325	330	331	333	332	328	326	320	312	305	301	297
40	270	273	280	287	296	305	310	313	315	314	309	303	298	289	281	274	270
45	240	246	254	262	272	281	289	292	293	292	287	282	275	264	254	246	241
50	210	216	226	236	247	259	266	271	272	271	265	259	249	238	226	217	211
55	179	187	198	210	222	234	242	247	249	247	242	234	224	212	198	188	181
60	150	158	171	184	198	210	219	224	225	224	218	210	199	185	170	159	151
65	120	130	145	159	173	186	195	200	202	200	195	186	174	159	145	131	120
70	90.5	103	119	136	151	163	172	177	178	177	171	163	151	136	119	103	90.9
75	63.4	78.7	96.5	114	129	142	151	155	157	156	150	142	129	114	95.7	78.3	63.6
80	39.5	57.4	76.1	93.5	109	121	130	135	137	135	129	121	109	93.6	75.1	56.2	39.4
85	21.2	40.0	59.1	76.4	91.2	103	112	116	118	116	111	103	91.5	75.9	57.8	38.5	20.6
90	9.91	27.1	45.2	61.7	76.0	87.5	95.4	99.5	101	99.9	94.7	86.8	75.6	61.0	43.8	25.6	9.18
95	5.00	18.3	34.5	49.8	63.1	73.6	81.1	85.4	86.6	85.3	80.7	73.2	62.7	49.1	33.2	17.0	4.25
100	3.06	12.3	26.4	40.0	52.2	62.0	68.8	72.5	73.6	72.5	68.3	61.6	51.7	39.3	25.2	11.5	2.37
105	2.57	9.05	19.9	32.2	43.1	52.0	58.3	61.9	63.0	61.8	57.7	51.4	42.5	31.3	18.8	8.03	1.98
110	2.62	7.30	15.1	24.9	35.0	43.3	49.1	52.5	53.5	52.4	48.7	42.7	34.4	24.2	14.1	6.26	1.85
115	2.78	6.36	12.4	19.8	27.5	35.0	40.6	43.7	44.6	43.6	40.0	34.4	26.8	18.8	11.3	5.46	2.15
120	3.01	5.84	10.5	16.4	22.6	28.0	32.3	35.1	36.0	35.0	31.8	27.3	21.7	15.5	9.52	4.90	2.51
125	3.27	5.56	9.22	13.8	18.8	23.2	26.6	28.6	29.1	28.3	26.0	22.5	18.0	13.0	8.31	4.77	2.89
130	3.56	5.44	8.31	11.9	15.8	19.4	22.1	23.6	24.1	23.5	21.6	18.8	15.2	11.2	7.45	4.79	3.28
135	3.73	5.38	7.62	10.4	13.4	16.3	18.4	19.7	20.1	19.6	18.0	15.8	12.9	9.78	6.91	4.90	3.63
140	4.07	5.33	7.04	9.12	11.4	13.6	15.4	16.4	16.8	16.3	15.1	13.3	11.1	8.73	6.60	5.03	3.91
145	4.29	5.29	6.68	8.22	9.93	11.6	12.8	13.6	13.8	13.5	12.6	11.3	9.69	7.95	6.39	5.17	4.12
150	4.58	5.33	6.37	7.49	8.74	9.92	10.8	11.4	11.6	11.3	10.7	9.72	8.58	7.37	6.20	5.28	4.14
155	4.45	5.13	6.06	6.88	7.74	8.57	9.20	9.56	9.68	9.54	9.08	8.47	7.67	6.85	6.04	5.24	4.26
160	4.78	4.98	5.63	6.34	6.93	7.46	7.86	8.12	8.22	8.14	7.85	7.48	7.00	6.47	5.95	5.31	4.64
165	4.94	4.84	5.14	5.59	6.10	6.58	6.85	7.00	7.08	7.06	6.91	6.72	6.45	6.18	5.85	5.39	4.87
170	4.06	4.45	4.63	5.05	5.46	5.24	5.80	6.25	6.24	6.26	6.19	6.12	6.00	5.89	5.80	5.40	4.31
175	3.21	3.28	3.42	3.44	3.56	3.99	4.70	4.94	5.07	5.46	5.58	5.62	5.64	5.46	4.68	3.64	3.03
180	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87

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

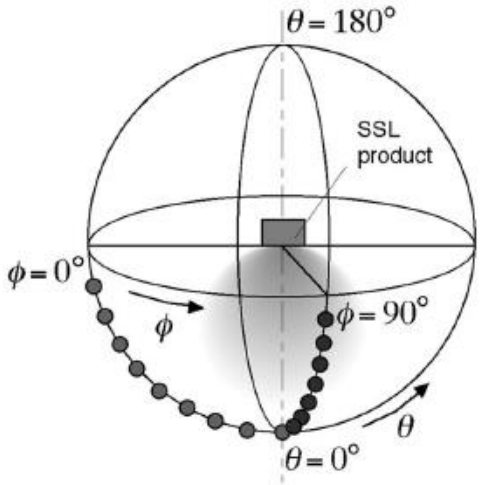
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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