

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 Lamp

Model: 24HID/835/277V/EX39/SD

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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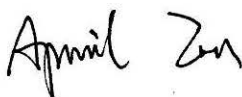
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Report No.: HZ21120007al

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

Review by:



Engineer: April Zou

Dec. 24, 2021

Approved by:



Manager: Jim Zhang

Dec. 24, 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: **24HID/835/277V/EX39/SD**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
141.2	3294.1	23.33	0.9876
CCT (K)	CRI	Stabilization Time (Light & Power)	
3441	82.7	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	: Dec. 03, 2021
Date of Test	: Dec. 23, 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

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SAMPLE PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 24HID/835/277V/EX39/SD
Electrical Ratings	: 120-277V, 50/60Hz, 24W
Product Description	: 3500K
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°C.

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 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.197	0.091
Power Factor	0.9876	0.9177
Test Power (W)	23.33	23.24
THD A%	7.54	16.48
Luminous Efficacy (lm/W)	141.2	139.9
Total Luminous Flux (lm)	3294.1	3251.4
Color Rendering Index (CRI)	82.7	
R9	5.9	
Correlated Color Temperature (CCT)(K)	3441	
Chromaticity Chroma x	0.4085	
Chromaticity Chroma y	0.3924	
Chromaticity Chroma u	0.2371	
Chromaticity Chroma v	0.3416	
Duv	0	
Chromaticity Chroma u'	0.2371	
Chromaticity Chroma v'	0.5125	

Special Color Rendering Indices	
R1	81
R2	90.7
R3	96.2
R4	80.7
R5	81.3
R6	87.7
R7	83.7
R8	60.6
R9	5.9
R10	78.3
R11	79.8
R12	67.3
R13	83.4
R14	98.5

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°C.

The photometric distance is 30 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)	0.196
Power Factor	0.9880
Power (W)	23.26
Luminous Efficacy (lm/W)	143.9
Total Luminous Flux (lm)	3346.4
Beam Angle (°)	224.7(0°-180°) / 225.6 (90°-270°)
Center Beam Candle Power (cd)	402
Maximum Beam Candle Power (cd)	414.7 (At: C=30.0, Gamma=33.5)
Spacing Criteria	1.48 (0°-180°) / 1.50 (90°-270°)
Zonal Lumens in the 0°-60°Zone	36.79%
Zonal Lumens in the 60°-90°Zone	30.93%
Zonal Lumens in the 90°-120°Zone	21.89%
Zonal Lumens in the 120°-180°Zone	10.39%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

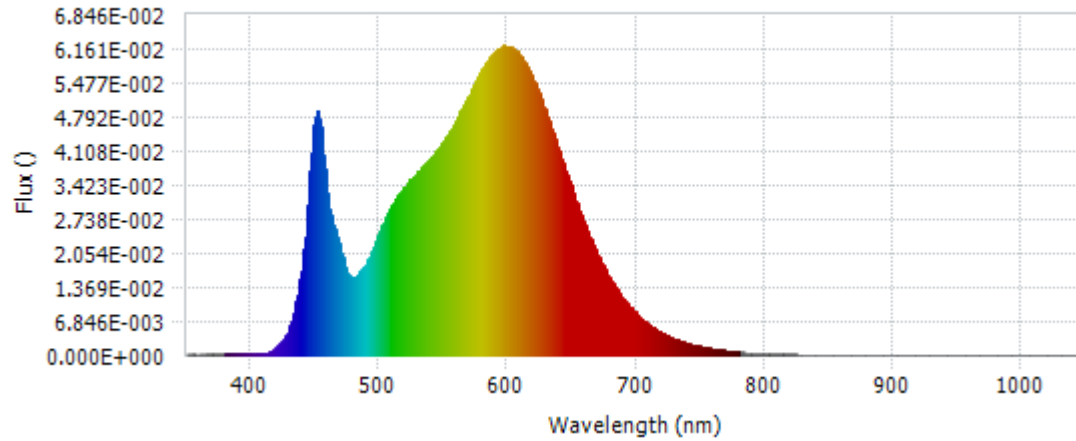
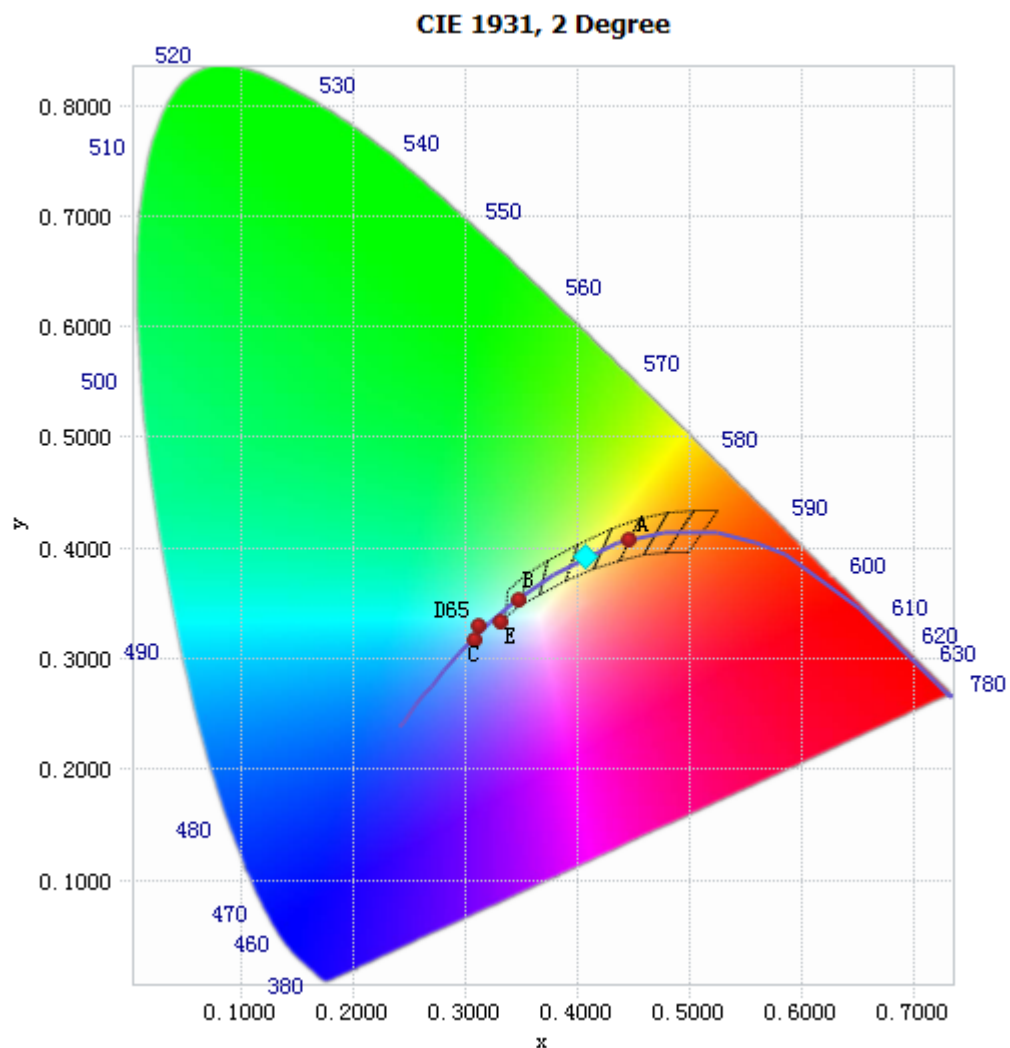


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.59E-04	485	1.69E-02	590	6.09E-02	695	9.80E-03
385	2.72E-04	490	1.88E-02	595	6.19E-02	700	8.44E-03
390	2.24E-04	495	2.17E-02	600	6.21E-02	705	7.20E-03
395	2.39E-04	500	2.50E-02	605	6.15E-02	710	6.18E-03
400	2.00E-04	505	2.78E-02	610	6.00E-02	715	5.28E-03
405	2.24E-04	510	3.02E-02	615	5.81E-02	720	4.55E-03
410	4.02E-04	515	3.24E-02	620	5.53E-02	725	3.86E-03
415	7.86E-04	520	3.40E-02	625	5.22E-02	730	3.30E-03
420	1.69E-03	525	3.54E-02	630	4.86E-02	735	2.81E-03
425	3.21E-03	530	3.69E-02	635	4.48E-02	740	2.42E-03
430	5.93E-03	535	3.81E-02	640	4.11E-02	745	2.07E-03
435	1.07E-02	540	3.97E-02	645	3.72E-02	750	1.77E-03
440	1.90E-02	545	4.13E-02	650	3.33E-02	755	1.51E-03
445	3.37E-02	550	4.31E-02	655	2.97E-02	760	1.30E-03
450	4.81E-02	555	4.51E-02	660	2.63E-02	765	1.12E-03
455	4.33E-02	560	4.73E-02	665	2.32E-02	770	9.51E-04
460	3.10E-02	565	4.99E-02	670	2.02E-02	775	8.39E-04
465	2.54E-02	570	5.26E-02	675	1.77E-02	780	7.07E-04
470	2.04E-02	575	5.51E-02	680	1.53E-02		
475	1.65E-02	580	5.75E-02	685	1.33E-02		
480	1.57E-02	585	5.95E-02	690	1.14E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4085, 0.3924)

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

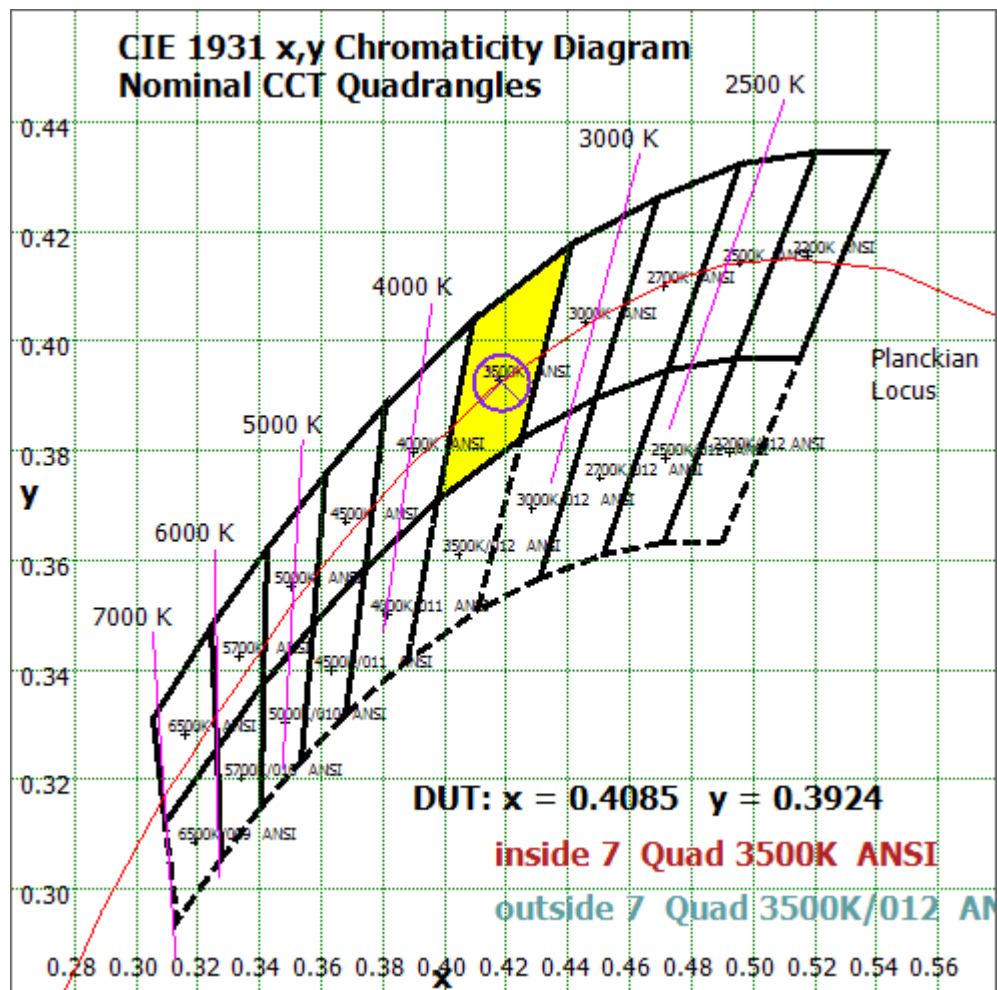


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

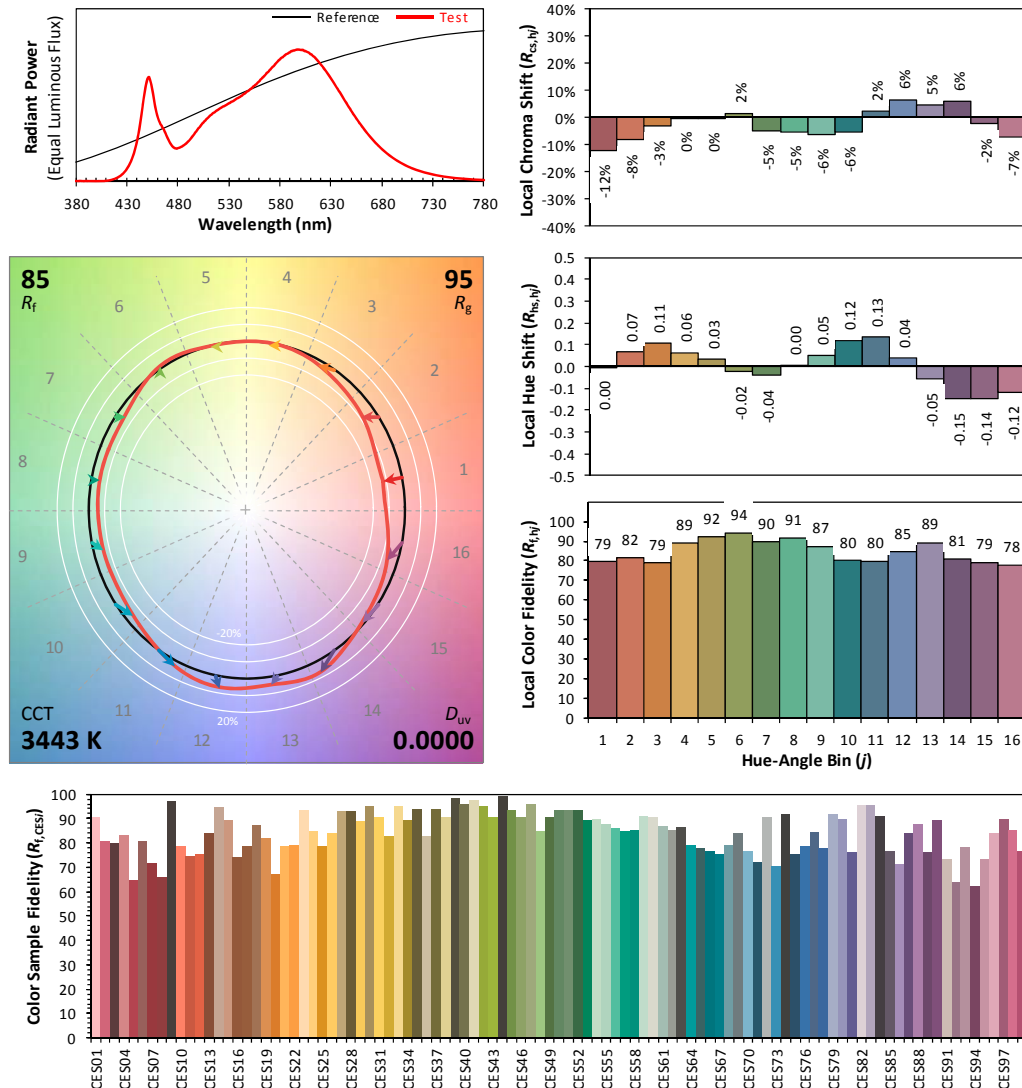
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2021/12/23

Model: 24HID/835/277V/EX39/SD



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

x 0.4085
 y 0.3924
 u' 0.2371
 v' 0.5125

CIE 13.3-1995
(CRI)
 R_a 83
 R_9 6

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

$\gamma(^{\circ})$	Lumens	% Total
0- 10	38.365	1.15%
10- 20	113.933	3.40%
20- 30	185.833	5.55%
30- 40	250.613	7.49%
40- 50	303.26	9.06%
50- 60	339.025	10.13%
60- 70	355.103	10.61%
70- 80	351.061	10.49%
80- 90	328.787	9.83%
90-100	292.026	8.73%
100-110	245.649	7.34%
110-120	194.99	5.83%
120-130	144.857	4.33%
130-140	99.128	2.96%
140-150	60.343	1.80%
150-160	30.822	0.92%
160-170	10.846	0.32%
170-180	1.725	0.05%
Total	3346.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1231.03	36.79%
60- 90	1034.95	30.93%
0-90	2265.98	67.71%
90- 180	1080.39	32.29%
0- 180	3346.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

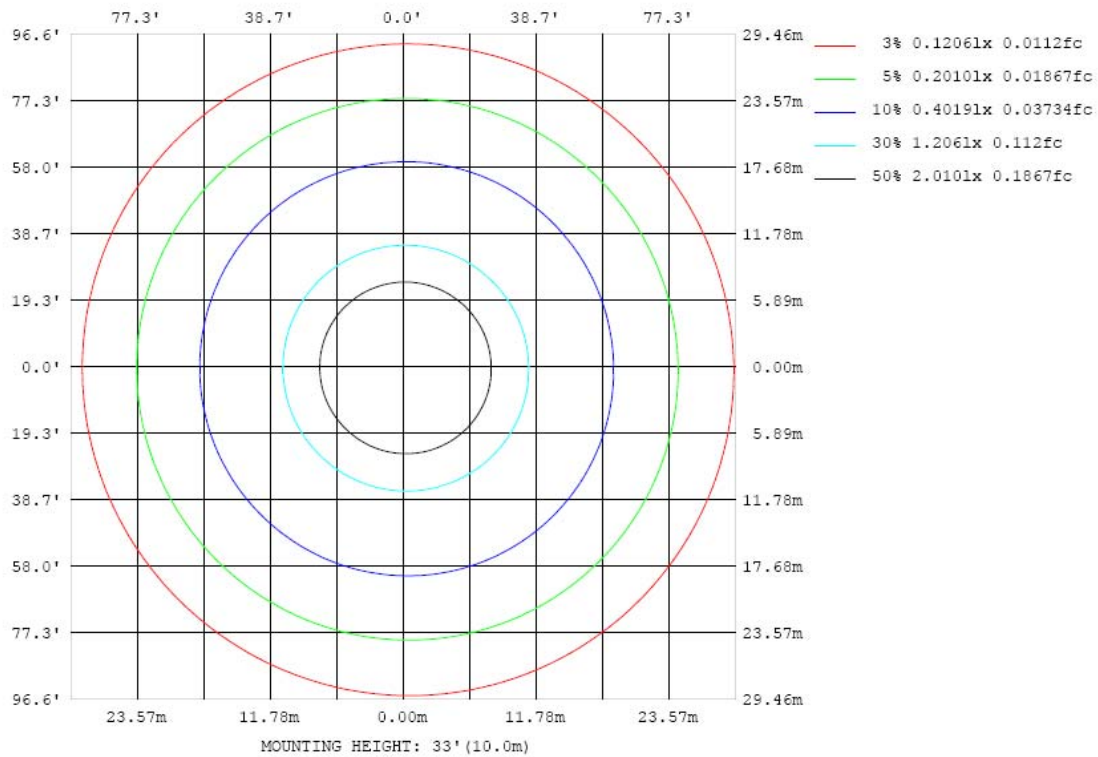


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

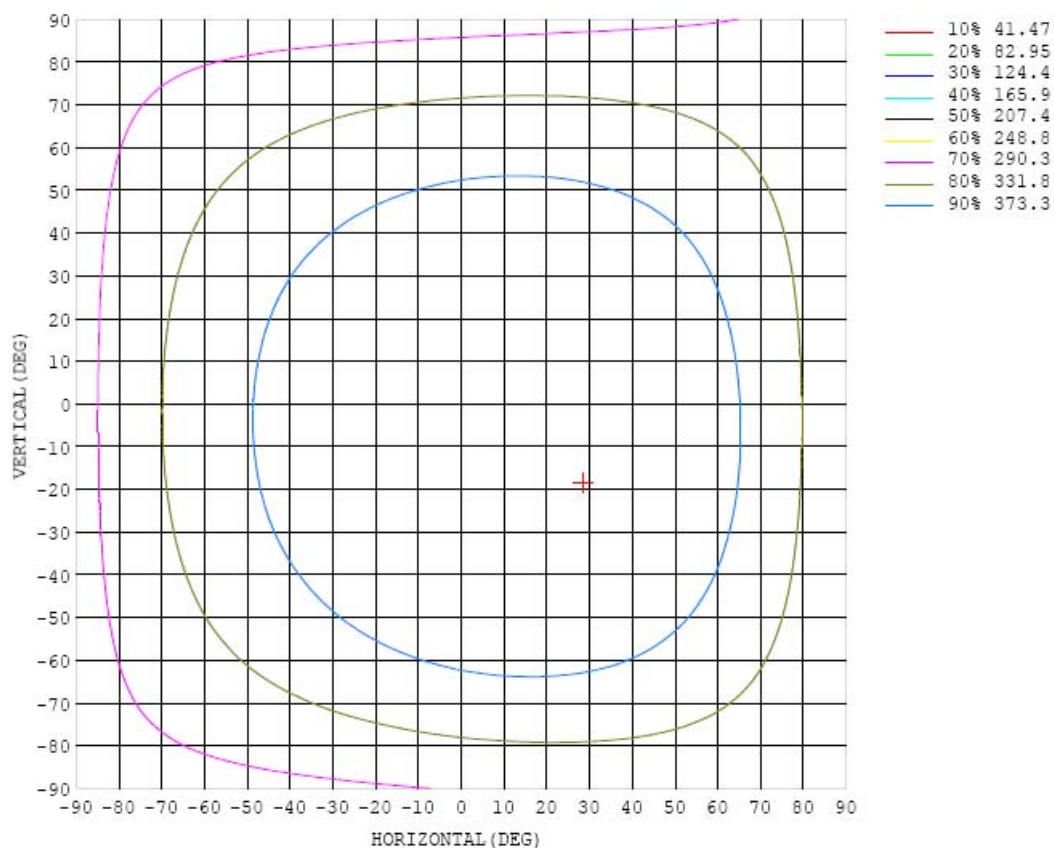


Chart 6: Isocandela Plot

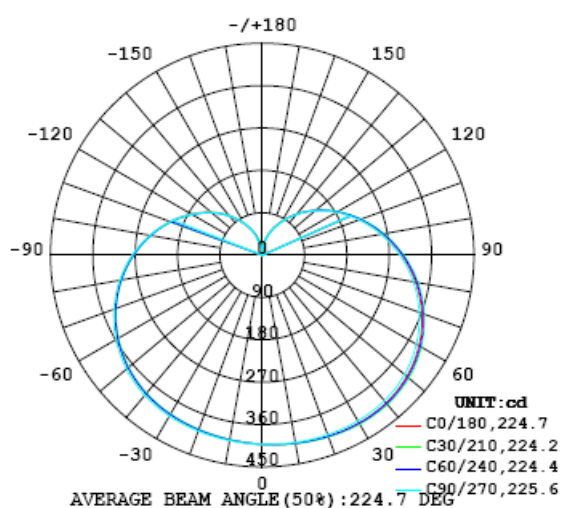


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402
5	404	404	404	404	404	404	404	403	403	403	403	402	402	401	401	401	400	400	400
10	406	406	406	406	406	406	406	405	405	404	403	402	401	401	400	400	399	399	398
15	408	408	409	409	409	408	408	407	406	405	404	403	401	400	399	398	398	397	396
20	409	410	411	411	411	410	409	408	407	406	404	403	401	399	398	397	396	395	394
25	411	412	413	413	413	412	411	410	408	406	404	402	400	398	397	395	394	394	393
30	412	413	414	414	414	413	412	411	409	406	404	402	399	397	395	394	392	391	390
35	411	413	414	415	414	414	412	411	408	405	403	400	397	395	393	391	390	388	387
40	410	412	413	414	414	413	411	409	406	404	400	397	394	391	389	387	386	384	383
45	406	409	410	411	411	410	408	406	403	400	396	393	390	386	384	382	380	379	378
50	401	404	405	406	406	405	403	401	398	394	391	387	384	380	378	376	374	372	371
55	394	396	398	399	399	398	396	394	391	387	383	380	376	372	370	368	366	364	363
60	385	387	389	390	390	389	387	385	382	378	374	370	367	363	360	358	356	355	354
65	374	376	378	379	379	378	376	374	371	367	364	360	356	353	350	348	346	344	343
70	361	363	365	366	366	365	364	361	358	355	351	347	344	341	338	336	334	333	332
75	346	349	351	352	352	351	349	347	344	341	337	334	330	327	325	323	321	320	319
80	331	333	335	336	336	335	334	331	329	326	323	319	316	313	310	308	307	306	305
85	314	316	318	318	319	318	316	315	312	310	306	303	300	298	295	293	292	291	290
90	296	298	300	300	300	300	299	297	295	292	290	287	284	282	279	278	276	275	275
95	278	279	281	281	282	281	280	278	277	275	272	270	267	265	263	262	260	259	259
100	258	260	262	262	262	262	261	259	258	256	254	252	250	248	246	245	244	243	242
105	239	241	242	243	243	242	242	240	239	237	236	234	232	231	229	228	227	226	226
110	220	222	223	223	223	223	222	221	220	219	217	216	215	213	212	211	210	209	209
115	202	203	204	204	204	204	203	202	201	200	199	198	197	196	194	194	193	192	192
120	183	184	185	185	185	185	184	184	183	182	181	180	179	178	177	176	176	175	175
125	165	166	166	166	166	166	166	165	165	164	163	163	162	161	160	159	159	158	158
130	147	148	148	148	148	148	148	147	147	147	146	145	145	144	143	142	142	142	142
135	130	130	131	131	131	131	131	130	130	129	129	128	128	127	127	126	126	126	126
140	113	114	114	114	114	114	114	114	113	113	112	112	112	111	110	110	110	110	110
145	97.3	97.7	98.0	98.1	98.1	98.0	97.7	97.5	97.2	96.9	96.6	96.2	95.8	95.3	94.8	94.3	94.0	94.1	94.2
150	82.0	82.3	82.4	82.5	82.5	82.4	82.3	82.1	81.9	81.6	81.3	80.9	80.5	80.0	79.6	79.1	78.8	78.9	78.9
155	67.5	67.8	67.9	67.9	67.8	67.7	67.4	67.3	67.2	67.2	66.9	66.6	66.3	65.9	65.5	65.1	64.7	64.6	64.4
160	54.4	54.7	54.8	54.9	54.8	54.7	54.6	54.4	54.3	54.1	53.8	53.5	53.1	52.7	52.3	51.9	51.5	51.2	50.8
165	41.2	41.8	42.1	42.2	42.1	42.0	41.9	41.8	41.6	41.5	41.2	40.9	40.5	40.2	39.8	39.3	38.8	38.5	38.1
170	29.6	30.0	30.3	30.5	30.6	30.7	30.6	30.5	30.4	30.2	29.6	29.0	28.9	28.9	28.1	26.7	25.6	25.6	25.7
175	17.1	18.3	19.1	19.6	19.8	19.9	19.9	19.9	19.8	19.6	19.3	18.8	18.3	17.8	17.4	16.9	15.5	12.9	10.3
180	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	0.05	0.30	0.53

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402	402		
5	400	400	400	400	400	400	400	401	401	401	402	402	402	403	403	403	404		
10	398	398	398	398	398	398	399	399	400	401	401	402	403	403	404	405	405		
15	396	396	396	396	396	397	397	398	399	400	401	402	403	404	405	406	407		
20	394	394	394	394	395	395	396	397	398	399	400	402	403	404	406	407	408		
25	392	392	392	392	393	393	394	395	397	398	399	401	403	405	406	408	409		
30	390	390	390	390	391	391	392	394	395	397	398	400	402	404	406	408	410		
35	387	387	387	387	388	388	390	391	393	394	396	398	400	403	405	408	410		
40	383	383	383	383	384	384	386	387	389	391	393	395	397	400	403	406	408		
45	377	377	377	378	378	379	380	382	384	385	388	390	393	396	399	402	404		
50	371	371	371	371	372	372	374	375	377	379	381	384	387	390	393	396	399		
55	363	363	363	363	363	364	365	367	369	371	373	376	379	382	385	389	391		
60	353	353	353	353	354	355	356	357	359	361	364	366	369	372	376	379	382		
65	343	342	342	343	343	344	345	346	348	350	353	355	358	361	365	368	371		
70	331	331	331	331	331	332	333	334	336	338	340	343	346	349	352	355	358		
75	318	318	318	318	318	319	320	321	322	324	327	329	332	335	338	341	344		
80	304	304	304	304	304	304	305	306	308	310	312	314	317	319	323	326	328		
85	290	289	289	289	289	290	290	291	293	294	296	298	301	303	306	309	311		
90	274	274	274	274	274	274	274	275	277	278	280	282	284	287	289	292	294		
95	258	258	258	257	257	258	258	259	260	261	263	265	267	269	271	274	276		
100	242	242	241	241	241	241	241	242	243	244	245	247	249	251	253	255	257		
105	225	225	224	224	224	224	224	225	226	227	228	229	231	233	235	236	238		
110	208	208	208	207	207	207	207	208	208	209	210	212	213	215	216	218	219		
115	191	191	191	190	190	190	190	190	191	192	193	194	195	196	198	199	201		
120	174	174	174	173	173	173	173	173	174	174	175	176	177	178	180	181	182		
125	158	157	157	156	156	156	156	156	157	157	158	159	160	161	162	163	164		
130	142	142	141	141	141	140	140	141	141	142	142	143	144	145	146	147	147		
135	126	125	125	125	124	124	124	124	124	125	126	126	127	128	129	130	130		
140	110	109	109	109	108	108	108	108	108	109	109	110	111	112	112	113	113		
145	94.0	93.7	93.5	93.2	92.9	92.6	92.4	92.5	92.7	93.1	93.7	94.3	94.9	95.7	96.6	97.2	97.4		
150	78.8	78.5	78.3	78.0	77.8	77.5	77.4	77.4	77.7	78.0	78.5	79.0	79.7	80.5	81.3	81.9	82.1		
155	64.3	64.1	63.9	63.7	63.4	63.2	63.0	62.9	62.9	63.4	64.0	64.6	65.2	65.9	66.6	67.2	67.5		
160	50.0	49.3	49.2	49.3	49.4	49.4	48.9	47.7	46.6	46.8	47.4	47.8	48.3	49.4	51.1	52.7	53.7		
165	37.7	37.2	37.2	36.8	34.2	29.6	25.1	22.0	19.5	17.0	15.5	15.9	18.3	23.7	31.3	37.6	40.6		
170	25.7	25.4	23.9	22.1	21.1	21.0	21.4	22.0	22.5	22.5	22.3	22.2	22.2	23.0	24.5	26.2	27.9		
175	9.37	8.91	8.13	7.34	7.07	7.38	8.02	8.86	9.72	10.2	10.7	11.6	12.7	13.6	14.2	15.0	16.0		
180	0.57	0.54	0.53	0.53	0.53	0.54	0.53	0.51	0.50	0.51	0.54	0.54	0.54	0.56	0.58	0.51	0.31		

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, 2021	Aug. 04, 2022
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2021	Aug. 04, 2022
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2021	Aug. 04, 2022
Standard source	D908	HZTE012-01	Aug. 05, 2021	Aug. 04, 2022
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2021	Aug. 04, 2022
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2021	Aug. 04, 2022
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2021	Aug. 04, 2022

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 expanded 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 expanded uncertainty is 2.3% with a coverage factor $k=2$.

Color Characteristics Measurements

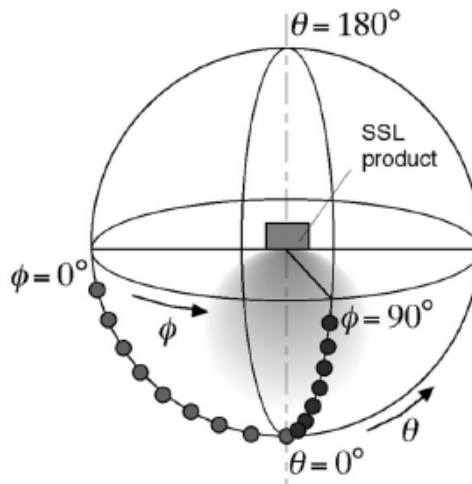
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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 ($C=0^\circ/180^\circ$ and $C=90^\circ/270^\circ$) 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, $\Delta u'v'$, 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 ***

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