

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: 34HID/840/277V/EX39/SD

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Hangzhou, Zhejiang Province, China 311100

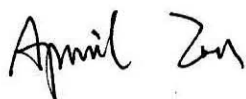
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Report No.: HZ21120007ad

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

Review by:



Engineer: April Zou

Dec. 16, 2021

Approved by:



Manager: Jim Zhang

Dec. 16, 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: 34HID/840/277V/EX39/SD

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
152.7	5013.2	32.82	0.9923
CCT (K)	CRI	Stabilization Time (Light & Power)	
3828	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	: Dec. 03, 2021
Date of Test	: Dec. 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

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SAMPLE PHOTO



Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Lamp
Model	: 34HID/840/277V/EX39/SD
Electrical Ratings	: 120-277V, 50/60Hz, 34W
Product Description	: 4000K
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)	0.276	0.120
Power Factor	0.9923	0.9706
Test Power (W)	32.82	32.37
THD A%	10.68	11.02
Luminous Efficacy (lm/W)	152.7	154.7
Total Luminous Flux (lm)	5013.2	5007.6
Color Rendering Index (CRI)	82.2	
R9	3	
Correlated Color Temperature (CCT)(K)	3828	
Chromaticity Chroma x	0.3899	
Chromaticity Chroma y	0.3870	
Chromaticity Chroma u	0.2272	
Chromaticity Chroma v	0.3383	
Duv	0.0021	
Chromaticity Chroma u'	0.2272	
Chromaticity Chroma v'	0.5074	

Special Color Rendering Indices	
R1	80
R2	88.5
R3	95.5
R4	81.3
R5	80.3
R6	84.7
R7	85.5
R8	62.1
R9	3
R10	73.4
R11	80.5
R12	63.7
R13	81.9
R14	97.7

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)	0.278
Power Factor	0.9925
Power (W)	33.13
Luminous Efficacy (lm/W)	152.1
Total Luminous Flux (lm)	5039.9
Beam Angle (°)	223.8 (0°-180°) / 219.2 (90°-270°)
Center Beam Candle Power (cd)	619
Maximum Beam Candle Power (cd)	639.9 (At: C=270.0, Gamma=28.5)
Spacing Criteria	1.51 (0°-180°) / 1.57 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	37.17%
Zonal Lumens in the 60 °-90 °Zone	30.76%
Zonal Lumens in the 90 °-120 °Zone	21.66%
Zonal Lumens in the 120 °-180 °Zone	10.41%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

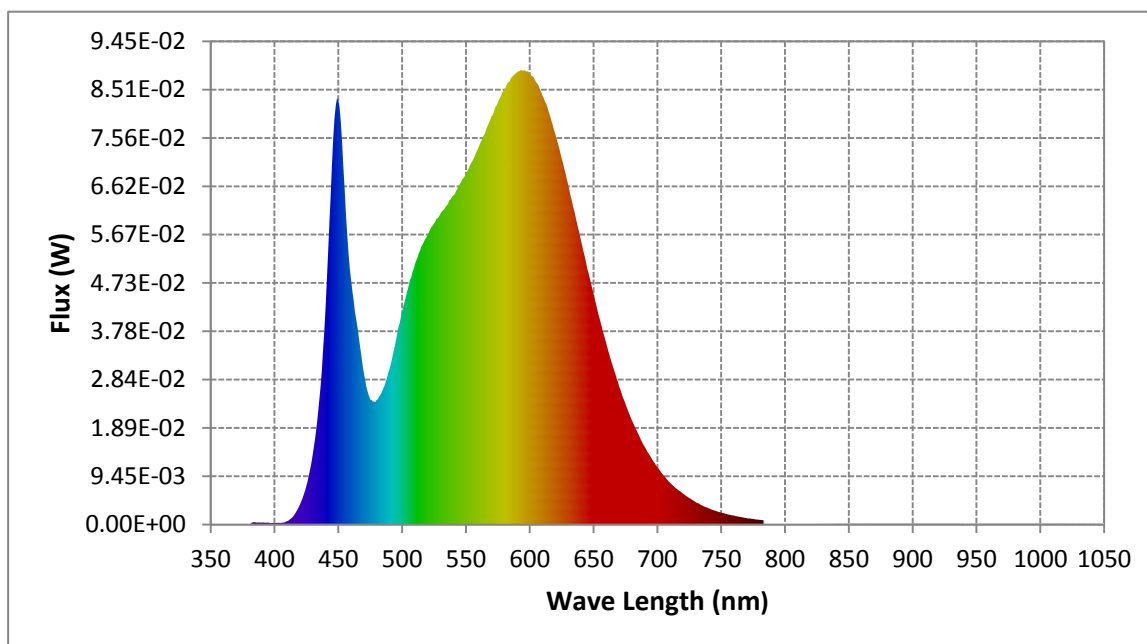
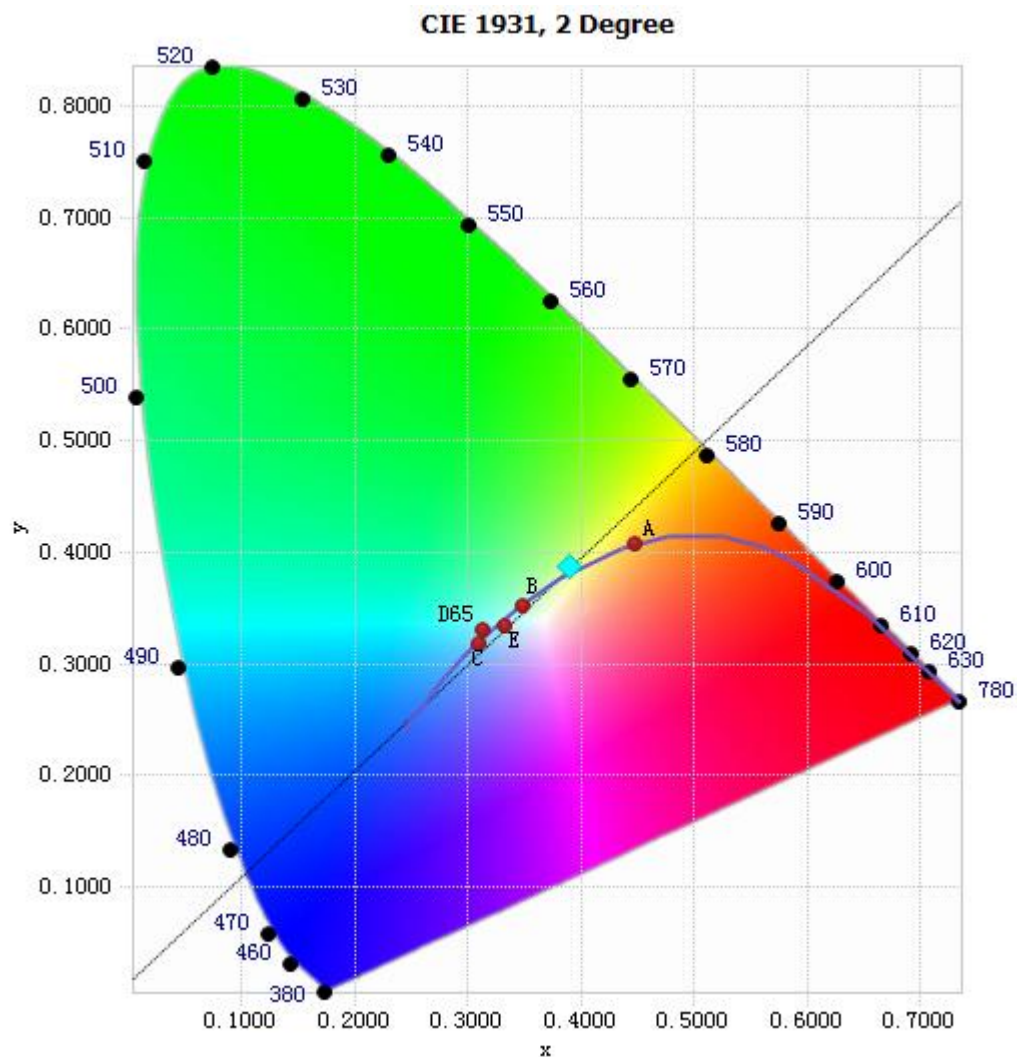


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.92E-04	485	2.64E-02	590	8.85E-02	695	1.31E-02
385	4.16E-04	490	3.03E-02	595	8.88E-02	700	1.12E-02
390	3.60E-04	495	3.58E-02	600	8.81E-02	705	9.54E-03
395	3.56E-04	500	4.17E-02	605	8.65E-02	710	8.17E-03
400	2.79E-04	505	4.66E-02	610	8.38E-02	715	7.00E-03
405	3.11E-04	510	5.09E-02	615	8.06E-02	720	6.04E-03
410	6.33E-04	515	5.43E-02	620	7.63E-02	725	5.15E-03
415	1.72E-03	520	5.67E-02	625	7.15E-02	730	4.38E-03
420	3.95E-03	525	5.89E-02	630	6.65E-02	735	3.71E-03
425	7.60E-03	530	6.08E-02	635	6.12E-02	740	3.18E-03
430	1.39E-02	535	6.24E-02	640	5.57E-02	745	2.70E-03
435	2.43E-02	540	6.43E-02	645	5.01E-02	750	2.29E-03
440	4.22E-02	545	6.65E-02	650	4.51E-02	755	1.98E-03
445	7.01E-02	550	6.86E-02	655	4.00E-02	760	1.73E-03
450	8.30E-02	555	7.10E-02	660	3.54E-02	765	1.45E-03
455	6.54E-02	560	7.38E-02	665	3.10E-02	770	1.25E-03
460	4.78E-02	565	7.65E-02	670	2.71E-02	775	1.07E-03
465	3.86E-02	570	7.98E-02	675	2.36E-02	780	9.03E-04
470	2.95E-02	575	8.25E-02	680	2.04E-02		
475	2.44E-02	580	8.51E-02	685	1.77E-02		
480	2.43E-02	585	8.72E-02	690	1.52E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3899, 0.3870)

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

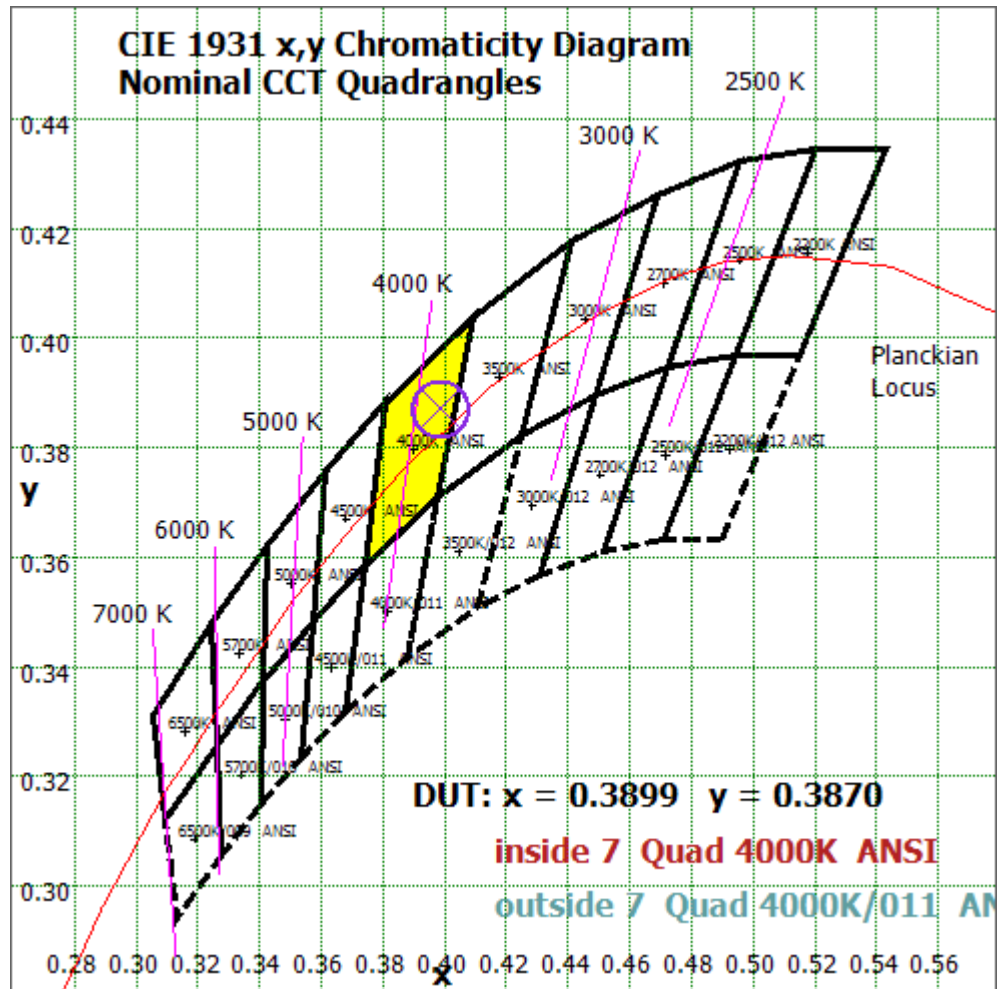


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

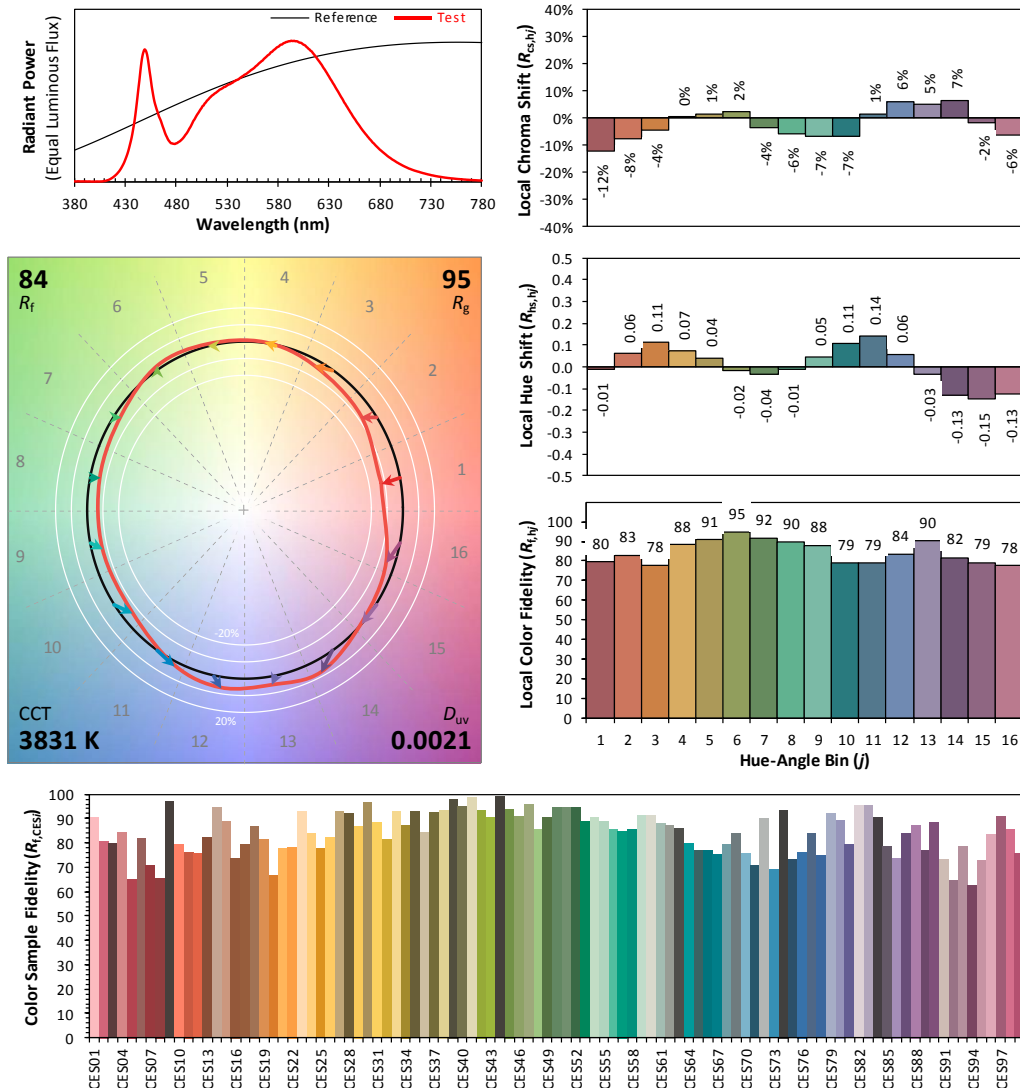
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2021/12/07

Model: 34HID/840/277V/EX39/SD



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

x 0.3899
 y 0.3870
 u' 0.2272
 v' 0.5074

CIE 13.3-1995
(CRI)
 R_a 82
 R_9 3

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	59.098	1.17%
10- 20	175.188	3.48%
20- 30	284.776	5.65%
30- 40	382.167	7.58%
40- 50	460.185	9.13%
50- 60	512.012	10.16%
60- 70	533.895	10.59%
70- 80	525.759	10.43%
80- 90	490.785	9.74%
90-100	434.915	8.63%
100-110	365.676	7.26%
110-120	290.794	5.77%
120-130	216.688	4.30%
130-140	148.812	2.95%
140-150	91.472	1.81%
150-160	47.183	0.94%
160-170	17.573	0.35%
170-180	2.891	0.06%
Total	5039.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1873.43	37.17%
60- 90	1550.44	30.76%
0-90	3423.87	67.94%
90- 180	1616	32.06%
0- 180	5039.9	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

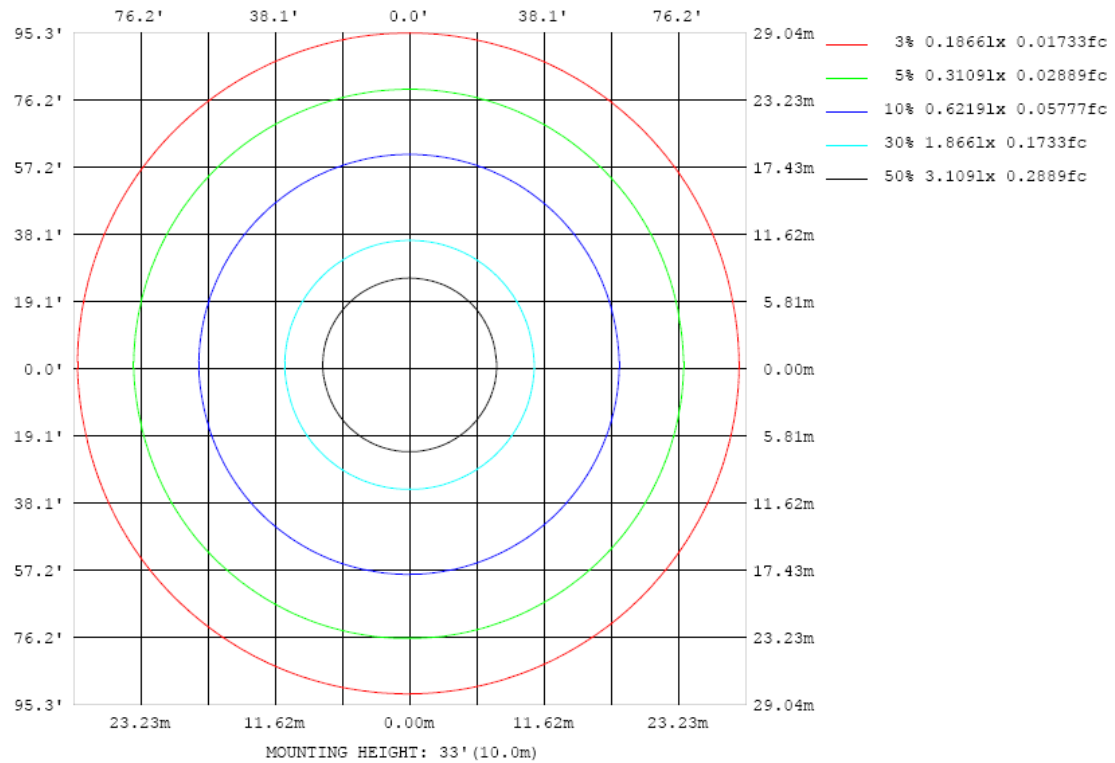


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

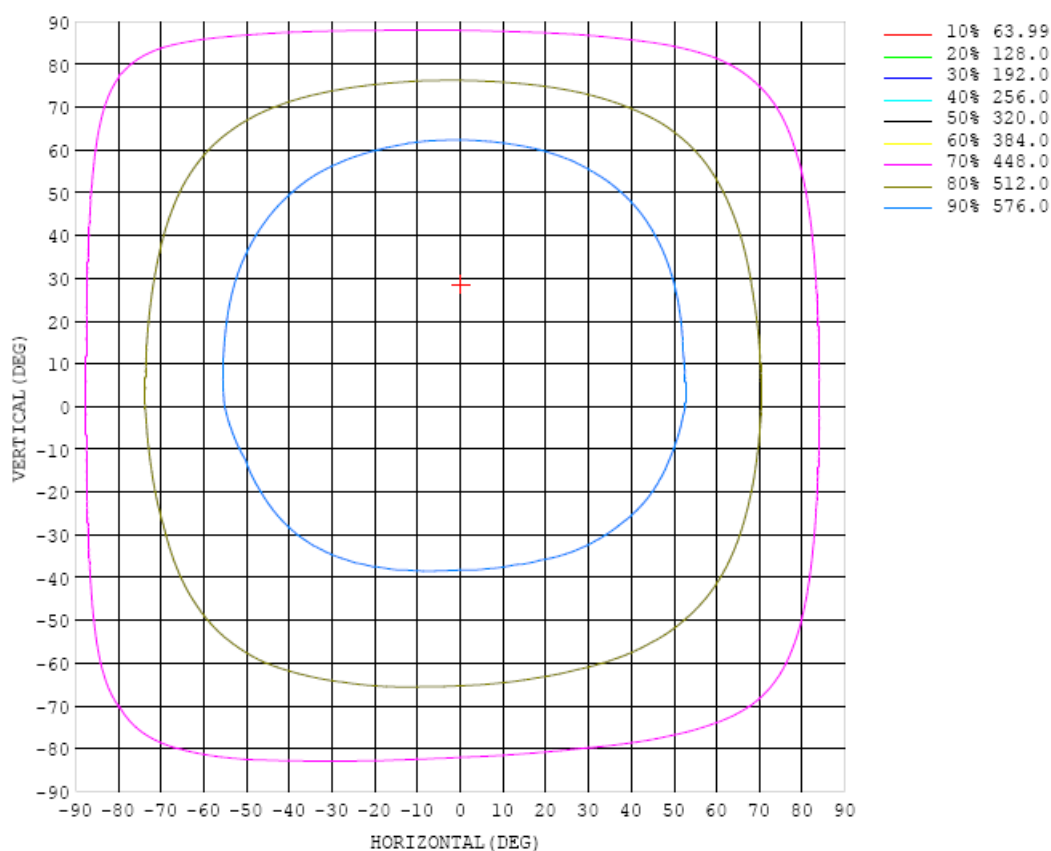


Chart 6: Isocandela Plot

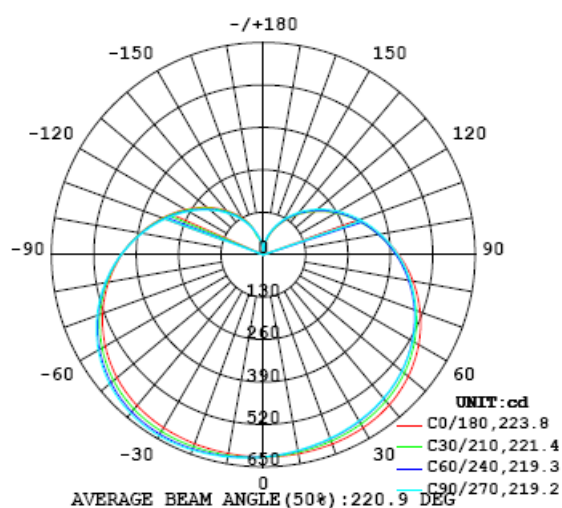


Chart 7: Polar Candela Distribution

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	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
5	619	619	618	617	616	615	615	615	614	614	614	614	615	615	616	616	617	618	619
10	619	617	616	614	612	611	610	610	609	609	609	610	610	611	612	613	615	617	618
15	618	616	614	611	609	607	605	605	604	604	604	604	605	607	608	610	612	615	617
20	617	614	611	608	605	602	600	599	599	598	599	599	601	603	605	607	610	613	616
25	615	611	607	604	600	597	595	594	593	593	594	594	596	598	601	604	607	611	615
30	612	607	603	599	595	592	589	588	587	587	588	589	591	594	597	600	604	608	612
35	608	602	597	593	589	585	583	582	581	581	582	583	586	589	592	596	600	604	608
40	601	595	590	585	581	578	575	574	573	574	575	576	579	583	586	590	594	599	603
45	592	586	581	576	572	568	566	565	564	565	566	568	571	575	578	582	586	591	596
50	581	575	569	565	560	557	555	554	554	555	557	558	562	566	569	573	577	581	586
55	566	561	555	551	547	544	542	542	542	543	545	547	550	554	557	561	565	569	574
60	550	545	540	536	532	529	527	528	528	529	531	533	537	540	544	547	552	556	560
65	532	527	522	518	515	513	511	512	512	514	515	518	521	525	529	532	536	540	543
70	512	507	502	499	496	494	493	494	494	496	498	501	504	508	511	514	518	521	525
75	490	486	481	478	476	474	474	475	475	477	480	482	485	489	492	495	499	501	505
80	466	463	459	456	454	453	453	454	455	457	460	462	465	469	472	475	478	480	483
85	441	438	435	433	431	431	430	432	433	436	438	441	444	447	450	452	455	457	459
90	416	413	410	409	407	407	407	409	411	413	415	418	421	424	427	429	431	433	434
95	390	387	385	384	383	383	383	385	387	389	392	395	397	400	403	404	407	408	409
100	363	361	359	358	358	358	359	361	363	365	368	370	373	376	378	379	381	382	383
105	336	335	333	333	333	333	334	336	338	341	343	345	348	350	352	354	355	356	356
110	310	309	308	307	308	308	309	312	313	316	318	321	323	325	327	328	329	330	330
115	284	283	282	282	282	283	285	287	289	291	293	295	297	300	301	302	303	303	303
120	258	257	257	257	258	259	260	262	264	266	268	271	272	274	276	277	277	277	277
125	232	232	232	232	233	234	236	238	240	242	244	246	247	249	250	251	252	251	251
130	208	208	207	208	209	210	212	213	215	217	219	221	223	224	225	226	226	226	226
135	183	183	184	184	185	186	188	190	191	193	195	197	199	200	201	201	202	201	201
140	160	160	160	161	162	163	165	166	168	170	172	173	175	176	177	177	177	177	177
145	137	137	138	138	139	141	142	144	145	147	148	150	152	153	153	153	153	153	153
150	115	115	116	116	118	119	120	122	123	125	126	127	129	130	130	130	130	130	130
155	94.4	94.7	95.2	95.9	97.0	98.2	99.3	101	102	103	104	106	107	108	109	108	108	108	106
160	75.0	75.4	76.0	76.9	77.8	78.7	80.0	81.2	82.4	83.3	84.4	85.4	86.6	87.6	88.0	87.6	87.2	86.8	75.8
165	56.8	49.8	57.6	55.0	58.6	59.7	63.0	64.0	64.7	65.3	66.3	67.1	67.8	67.4	67.9	68.5	67.8	66.2	55.1
170	38.2	31.0	32.2	33.1	34.7	41.4	43.9	46.6	48.1	49.1	50.1	50.8	51.1	50.3	50.2	51.3	51.3	47.2	40.7
175	23.9	22.6	17.2	14.3	19.4	23.8	24.8	26.0	29.0	30.8	32.6	34.2	34.1	33.4	32.7	32.6	31.9	30.6	22.9
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	2.60	0.00	0.00	0.82	0.83

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	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619		
5	620	621	622	622	623	623	624	624	624	624	624	624	623	623	622	621	621		
10	620	622	624	625	626	627	628	629	629	629	629	628	627	626	624	623	621		
15	620	622	625	627	629	630	632	633	633	633	633	632	630	628	626	624	621		
20	619	622	626	629	631	633	635	636	637	637	636	635	633	630	627	624	621		
25	618	622	626	629	632	635	637	638	639	639	638	637	634	631	628	624	620		
30	616	621	625	629	632	635	638	639	640	640	639	637	634	631	626	622	617		
35	613	617	622	626	630	633	636	638	639	638	638	635	632	628	623	619	613		
40	608	613	617	621	625	629	632	633	634	634	633	631	628	623	618	613	607		
45	600	605	610	614	618	621	624	626	627	627	625	623	620	615	610	604	598		
50	591	595	600	604	608	611	614	615	616	616	615	612	609	604	598	593	587		
55	578	583	587	590	594	597	600	601	602	602	600	598	595	590	585	579	573		
60	564	567	572	575	578	580	583	584	585	585	583	581	578	573	568	563	556		
65	547	550	554	556	559	561	564	565	565	565	563	561	558	554	549	544	538		
70	527	530	534	536	538	540	542	543	543	542	541	539	536	532	527	522	517		
75	507	509	511	513	515	516	518	518	519	518	516	514	512	508	504	500	495		
80	484	486	488	489	490	491	492	492	492	491	490	488	486	483	479	475	471		
85	460	461	462	463	464	464	465	465	465	464	463	461	459	456	453	449	446		
90	435	435	436	436	436	437	437	437	437	436	434	433	431	428	426	423	419		
95	409	409	409	409	409	408	408	408	407	406	405	404	402	400	398	395	393		
100	382	382	382	381	380	380	380	379	378	377	376	375	373	372	370	368	366		
105	356	355	354	353	352	351	351	350	350	348	347	346	345	343	342	340	338		
110	329	328	327	325	325	323	323	322	321	320	319	318	317	316	314	313	312		
115	302	301	300	298	297	296	295	294	293	292	291	290	289	288	287	286	285		
120	276	275	273	272	270	269	268	266	266	265	264	263	262	261	261	260	259		
125	250	249	247	245	244	242	241	240	239	238	237	236	236	235	234	234	233		
130	225	223	222	220	218	216	215	214	213	212	211	210	210	209	209	209	209		
135	200	198	197	195	193	191	190	189	188	187	186	185	185	184	184	185	184		
140	175	174	172	171	169	167	166	165	164	163	162	161	161	160	161	161	161		
145	152	151	149	148	146	145	143	142	141	140	139	139	139	138	139	139	139		
150	129	128	127	125	123	122	120	119	119	118	117	116	116	116	116	117	116		
155	107	106	105	99.9	100	100	98.8	97.8	97.3	96.2	95.5	95.0	94.7	95.1	95.5	95.7	95.4		
160	74.4	76.8	67.6	76.5	77.3	78.2	78.8	77.6	77.2	76.5	75.8	75.3	75.1	75.6	76.0	75.9	76.0		
165	52.7	50.0	50.6	51.7	57.8	58.6	59.0	58.8	58.7	58.4	58.0	57.7	57.7	57.9	58.1	58.0	58.2		
170	40.2	38.2	38.3	38.3	38.8	40.3	40.9	40.9	41.0	41.6	41.9	41.6	41.6	41.9	41.8	41.5	41.0		
175	23.0	23.3	23.3	25.1	25.3	25.6	25.0	24.5	24.6	23.5	23.9	22.8	22.1	23.5	24.1	23.8	21.7		
180	0.83	0.83	0.83	0.83	0.83	0.83	0.82	0.83	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.83	0.83		

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

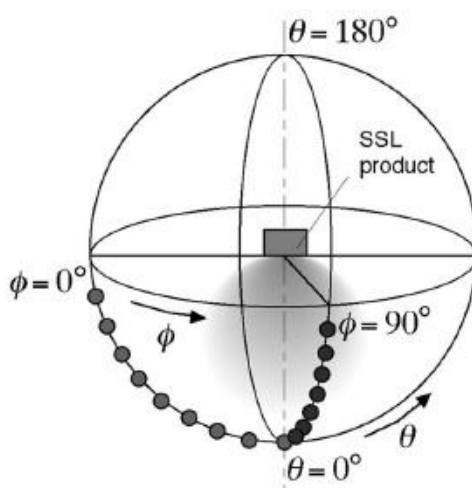
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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