

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: 10FA19DIM/927

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ21120007w

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

Review by:



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Dec. 15, 2021

Approved by:



Manager: Jim Zhang

Dec. 15, 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: 10FA19DIM/927

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
141.3	1268.9	8.98	0.9784
CCT (K)	CRI	Stabilization Time (Light & Power)	
2735	92.0	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. 09, 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	: 10FA19DIM/927
Electrical Ratings	: 120V, 60Hz, 10W
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 °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
Voltage frequency (Hz)	60
Test Current (A)	0.076
Power Factor	0.9784
Test Power (W)	8.98
THD A%	16.37
Luminous Efficacy (lm/W)	141.3
Total Luminous Flux (lm)	1268.9
Color Rendering Index (CRI)	92
R9	53
Correlated Color Temperature (CCT)(K)	2735
Chromaticity Chroma x	0.4560
Chromaticity Chroma y	0.4084
Chromaticity Chroma u	0.2610
Chromaticity Chroma v	0.3506
Duv	-0.0005
Chromaticity Chroma u'	0.2610
Chromaticity Chroma v'	0.5259

Special Color Rendering Indices	
R1	92.4
R2	97.3
R3	98
R4	91.5
R5	92.4
R6	96.9
R7	89.5
R8	77.8
R9	53
R10	93
R11	92.9
R12	84.6
R13	93.9
R14	99.8

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 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)	0.077
Power Factor	0.9775
Power (W)	9.04
Luminous Efficacy (lm/W)	142.6
Total Luminous Flux (lm)	1289.1
Beam Angle (°)	309.9 (0°-180°) /307.9(90°-270°)
Center Beam Candle Power (cd)	59.0
Maximum Beam Candle Power (cd)	142.3 (At: C=180.0, Gamma=82.0)
Spacing Criteria	2.65 (0°-180°) / 2.41 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	24.65%
Zonal Lumens in the 60 °-90 °Zone	31.22%
Zonal Lumens in the 90 °-120 °Zone	28.80%
Zonal Lumens in the 120 °-180 °Zone	15.33%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

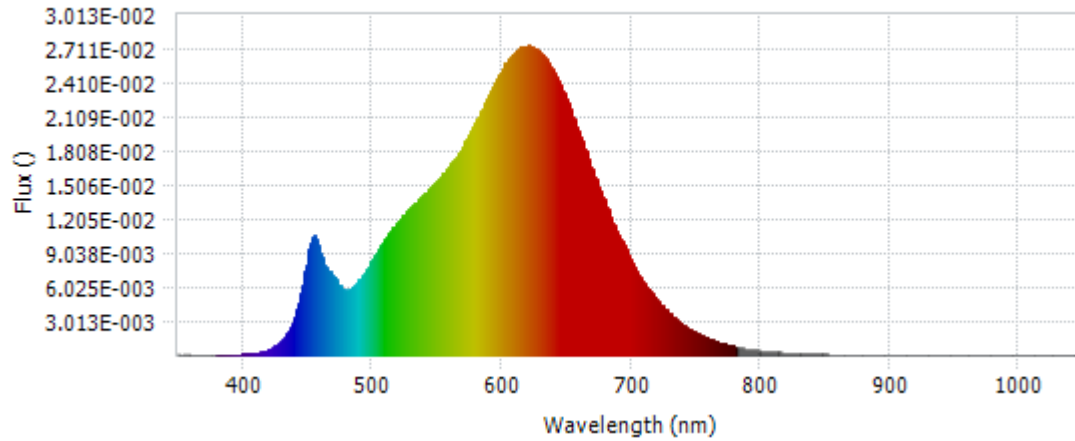
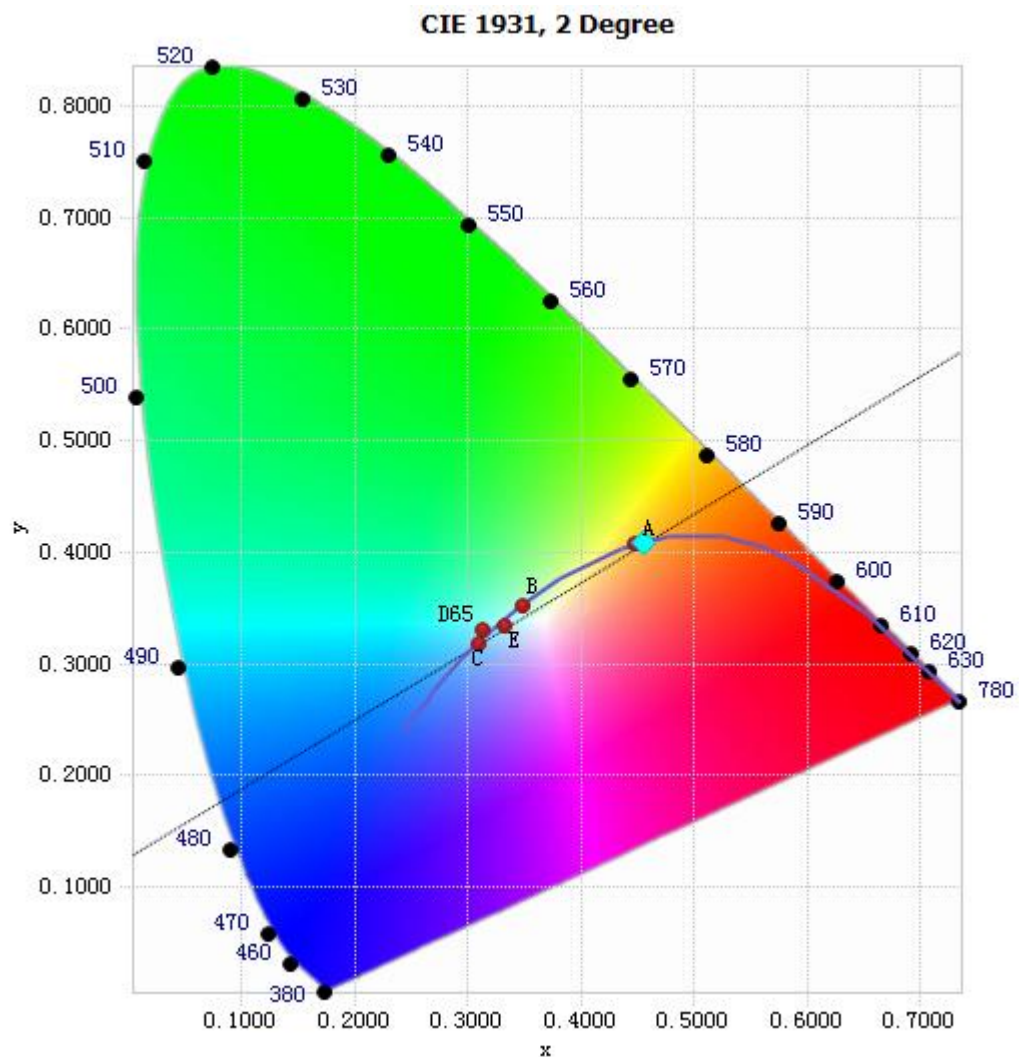


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	8.12E-05	485	6.06E-03	590	2.30E-02	695	9.68E-03
385	7.15E-05	490	6.68E-03	595	2.42E-02	700	8.36E-03
390	6.32E-05	495	7.47E-03	600	2.51E-02	705	7.34E-03
395	6.82E-05	500	8.43E-03	605	2.61E-02	710	6.41E-03
400	9.40E-05	505	9.44E-03	610	2.67E-02	715	5.62E-03
405	1.24E-04	510	1.03E-02	615	2.72E-02	720	4.93E-03
410	2.01E-04	515	1.11E-02	620	2.73E-02	725	4.24E-03
415	3.08E-04	520	1.18E-02	625	2.72E-02	730	3.67E-03
420	4.95E-04	525	1.25E-02	630	2.68E-02	735	3.15E-03
425	8.01E-04	530	1.31E-02	635	2.61E-02	740	2.69E-03
430	1.32E-03	535	1.36E-02	640	2.52E-02	745	2.31E-03
435	2.12E-03	540	1.42E-02	645	2.40E-02	750	1.99E-03
440	3.40E-03	545	1.48E-02	650	2.26E-02	755	1.71E-03
445	5.52E-03	550	1.54E-02	655	2.11E-02	760	1.47E-03
450	8.71E-03	555	1.61E-02	660	1.96E-02	765	1.26E-03
455	1.06E-02	560	1.68E-02	665	1.80E-02	770	1.09E-03
460	9.10E-03	565	1.76E-02	670	1.64E-02	775	9.24E-04
465	7.64E-03	570	1.85E-02	675	1.49E-02	780	7.88E-04
470	6.99E-03	575	1.95E-02	680	1.34E-02		
475	6.12E-03	580	2.06E-02	685	1.20E-02		
480	5.75E-03	585	2.19E-02	690	1.07E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4560, 0.4084)

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

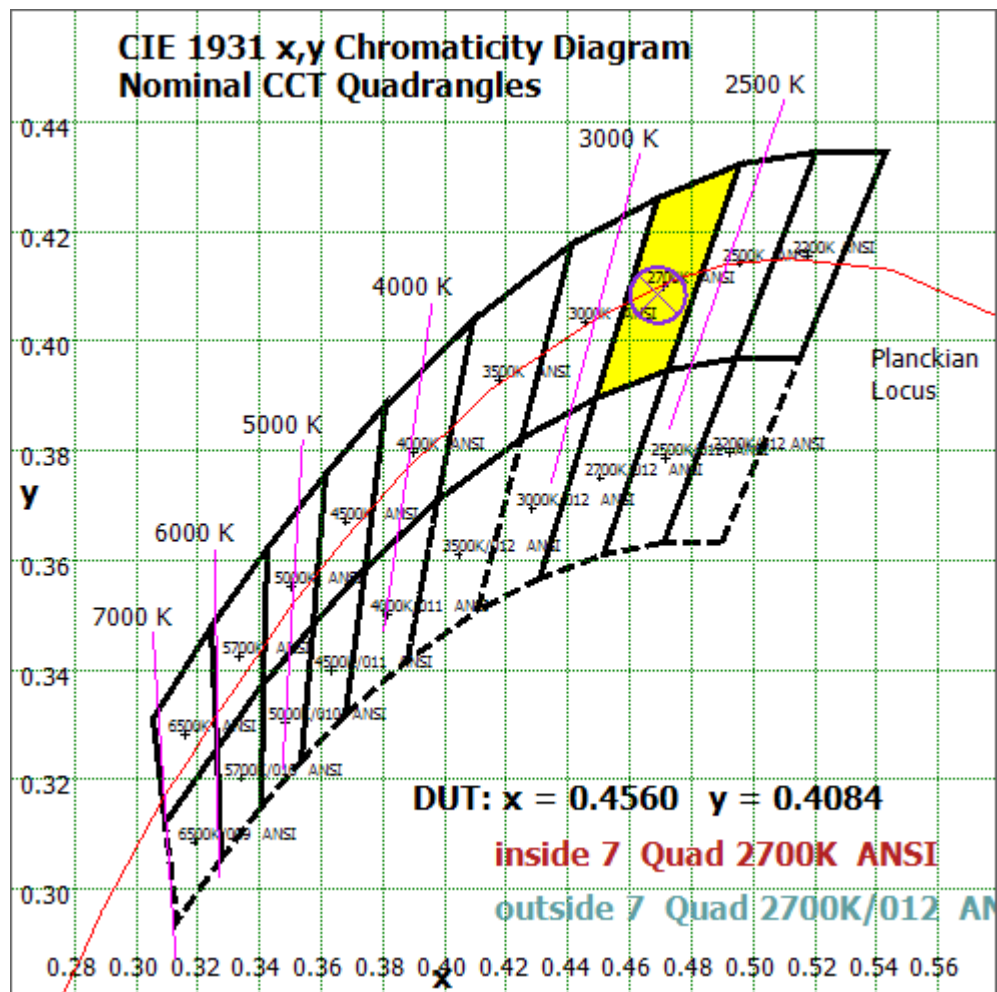


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

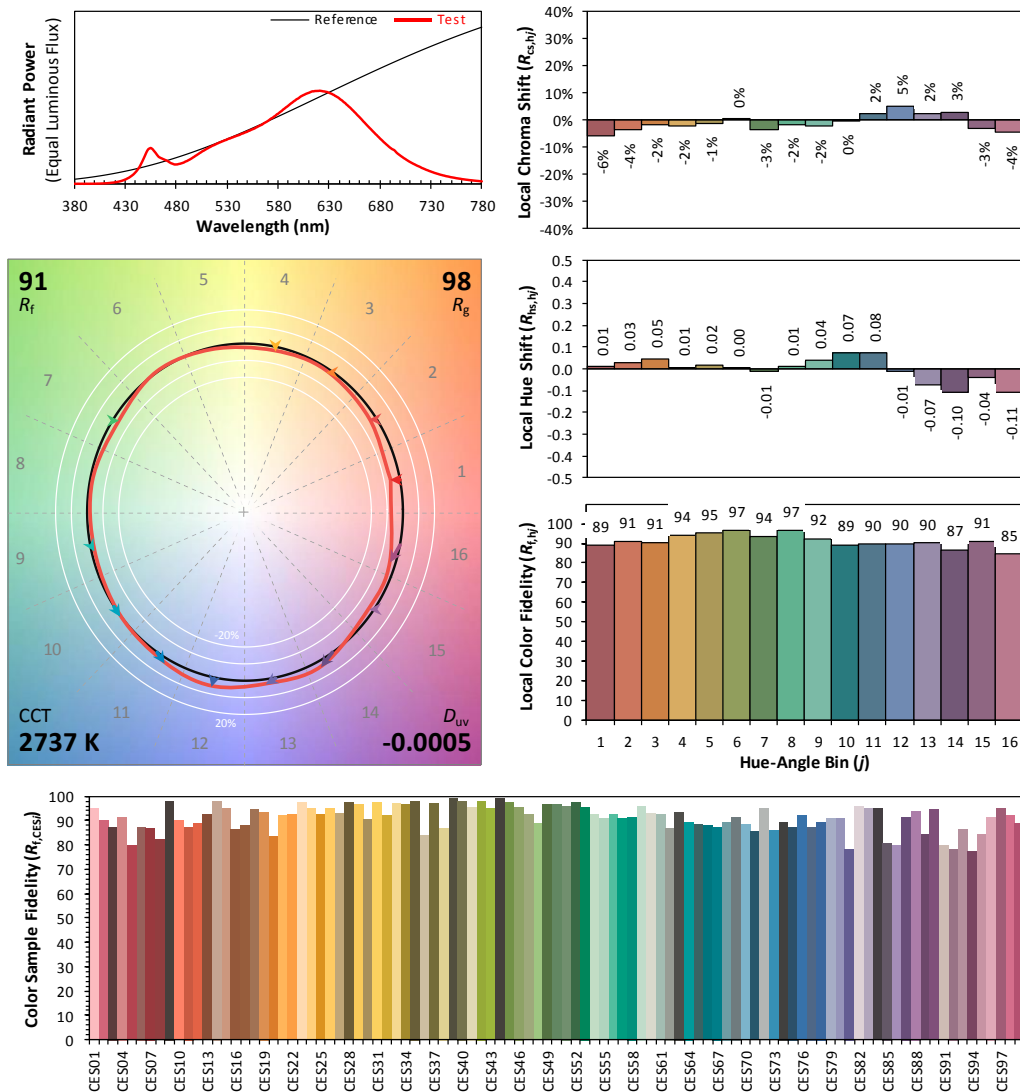
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2021/12/09

Model: 10FA19DIM/927



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

x 0.4560
 y 0.4084
 u' 0.2610
 v' 0.5259

CIE 13.3-1995
(CRI)
 R_a 92
 R_g 53

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	5.876	0.46%
10- 20	19.715	1.53%
20- 30	38.481	2.99%
30- 40	61.572	4.78%
40- 50	85.191	6.61%
50- 60	106.925	8.29%
60- 70	124.579	9.66%
70- 80	136.552	10.59%
80- 90	141.353	10.96%
90-100	137.739	10.68%
100-110	125.948	9.77%
110-120	107.603	8.35%
120-130	85.068	6.60%
130-140	59.694	4.63%
140-150	34.921	2.71%
150-160	14.605	1.13%
160-170	3.225	0.25%
170-180	0.093	0.01%
Total	1289.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	1176.6	91.27%
130-180	112.538	8.73%
0-180	1289.1	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

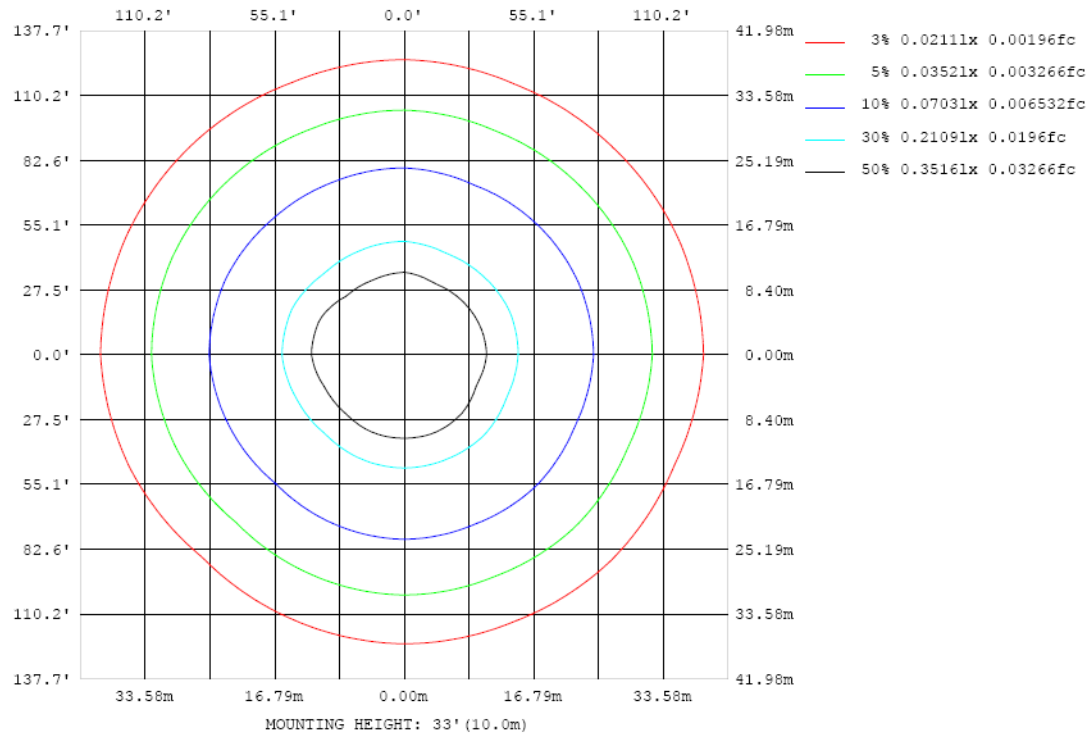


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

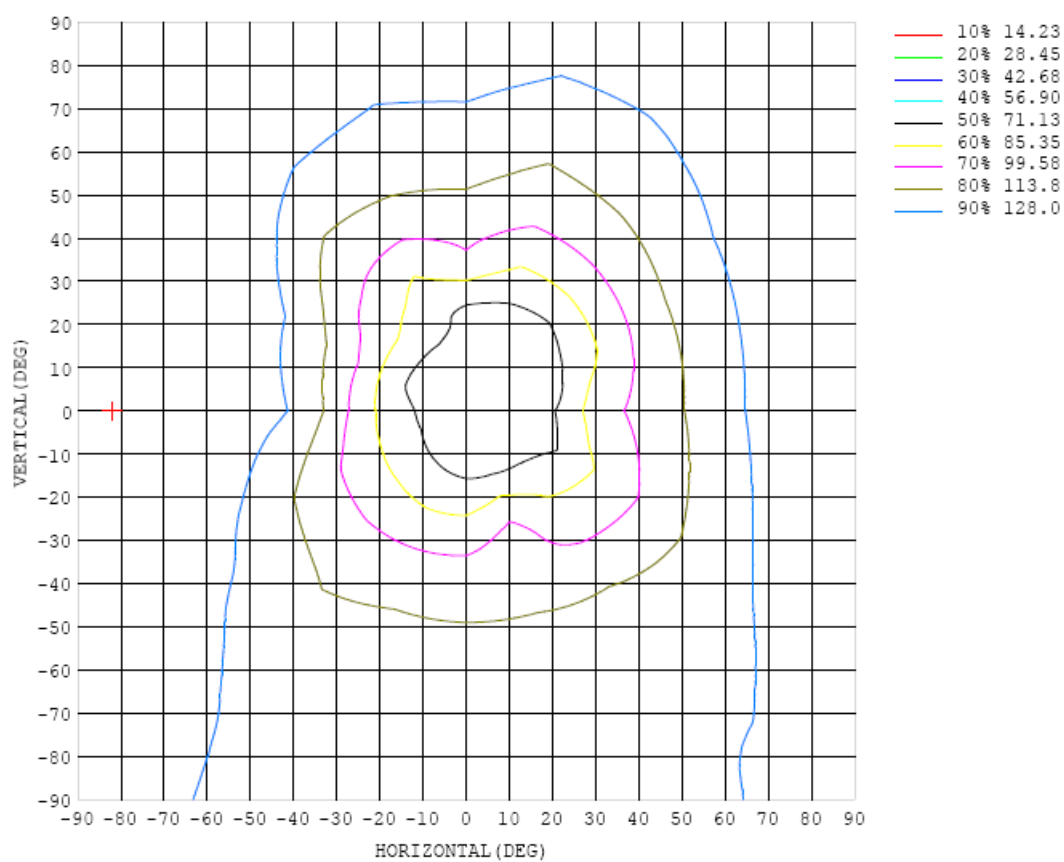


Chart 6: Isocandela Plot

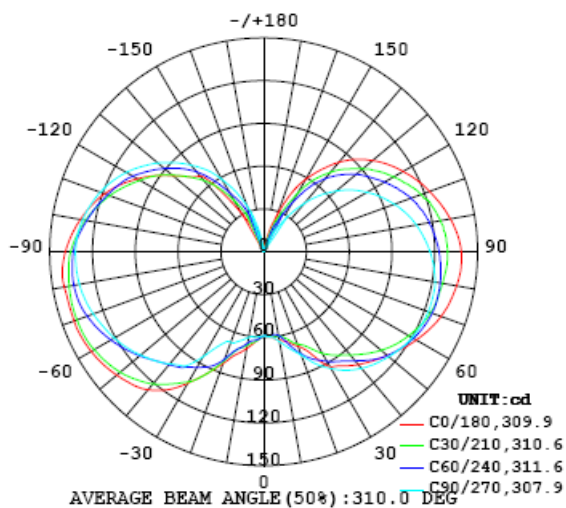


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0			
5	59.4	59.0	58.6	59.2	60.0	60.9	61.8	62.6	63.1	63.0	62.2	61.2	60.2	59.3	59.3	59.4			
10	62.9	59.9	59.6	62.2	64.0	65.7	67.2	68.9	68.8	66.4	65.1	63.7	61.0	59.9	61.9	62.6			
15	65.4	63.4	66.8	69.5	70.2	71.9	74.4	77.5	74.4	70.8	70.5	69.3	64.7	61.9	64.1	63.9			
20	70.5	68.8	76.0	82.3	77.3	78.6	81.7	83.6	83.3	81.3	79.8	74.9	67.6	65.0	65.7	64.1			
25	79.1	73.8	83.1	94.7	86.7	86.5	88.8	90.4	94.2	94.2	88.7	77.9	72.1	69.0	67.7	72.2			
30	93.3	82.2	88.7	103	94.6	94.3	95.1	97.3	106	105	93.6	82.7	84.9	75.8	75.1	80.3			
35	97.7	88.6	93.7	106	101	101	101	103	118	113	99.0	87.9	97.9	84.6	85.3	88.3			
40	103	94.5	99.9	108	107	107	106	109	126	121	103	96.6	103	92.4	93.3	96.9			
45	108	101	107	111	111	112	110	115	131	127	108	105	108	99.6	102	105			
50	113	107	113	114	114	115	113	120	135	131	114	112	113	106	108	112			
55	118	113	118	117	118	117	115	124	138	135	119	117	117	111	113	119			
60	124	118	121	119	120	119	117	128	140	137	124	121	121	114	119	124			
65	128	122	124	120	122	120	118	129	141	139	128	124	124	118	123	128			
70	132	125	126	121	123	121	119	131	142	139	132	127	127	123	126	131			
75	135	126	126	122	123	121	119	132	141	139	134	129	130	126	129	133			
80	137	127	126	122	122	120	119	133	142	139	135	130	131	129	131	135			
85	139	129	125	121	120	118	118	133	142	137	135	130	132	130	132	136			
90	139	129	123	119	117	115	115	131	139	135	134	130	132	130	132	137			
95	136	128	121	116	113	112	112	128	135	132	130	130	131	130	132	138			
100	133	126	118	112	109	107	108	124	131	127	126	127	129	129	129	137			
105	129	122	114	108	104	102	104	119	125	121	122	124	126	126	126	136			
110	124	117	110	103	97.6	95.6	100	112	119	115	117	119	122	122	121	133			
115	119	112	104	96.2	91.0	88.8	97.8	104	111	108	112	113	117	117	116	128			
120	113	105	97.8	89.3	83.6	81.9	96.6	95.2	102	100	106	107	111	111	110	122			
125	107	98.4	91.2	82.2	75.6	74.2	92.8	85.7	93.1	93.0	98.7	99.8	104	105	104	114			
130	99.6	90.7	84.7	74.3	66.3	64.8	78.7	75.8	83.3	83.8	90.9	92.5	96.9	98.1	97.3	106			
135	91.7	82.1	76.4	65.0	56.2	54.0	59.6	63.3	74.4	74.4	82.8	84.4	88.5	90.3	90.1	96.2			
140	82.0	72.8	67.0	53.6	44.4	40.8	43.6	51.6	69.5	65.3	73.3	75.8	79.4	82.0	81.6	86.3			
145	70.4	62.0	54.8	40.6	32.0	28.9	32.1	41.1	50.9	54.4	61.1	66.0	70.2	72.3	73.2	74.6			
150	58.6	46.9	39.1	23.3	20.0	20.5	22.8	26.5	31.2	41.4	47.8	55.3	58.5	61.6	64.2	59.5			
155	44.4	31.0	23.8	5.84	9.46	9.56	14.8	18.2	21.1	29.7	37.2	43.5	46.5	54.7	53.3	46.3			
160	27.7	19.4	9.36	1.28	0.45	0.74	3.36	10.2	15.0	19.1	25.8	30.2	34.0	45.5	40.5	35.7			
165	14.4	4.88	0.54	0.18	0.14	0.16	0.31	0.74	4.49	9.21	14.0	18.1	21.0	24.3	25.6	21.1			
170	2.13	0.29	0.17	0.11	0.11	0.10	0.11	0.21	0.41	0.96	2.23	5.06	8.18	9.28	9.19	6.51			
175	0.21	0.15	0.10	0.10	0.10	0.11	0.11	0.11	0.16	0.22	0.28	0.36	0.43	0.46	0.38	0.28			
180	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13			

Table 6: 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 7: 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

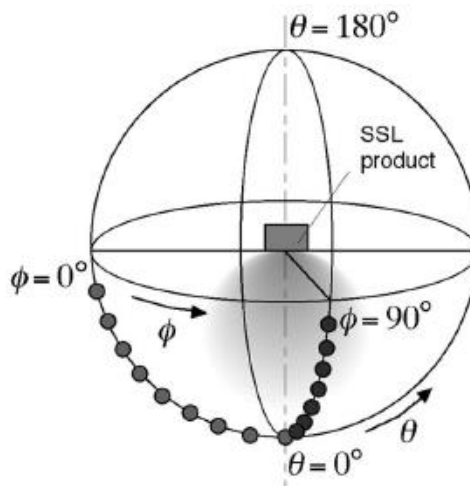
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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