

## LM-79-19 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: 9.5A19DIM/850/R**

**9.5A19DIM/850/R/4PK**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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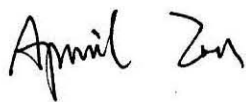
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Report No.: HZ22050020d

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

Review by:



Engineer: April Zou  
May 24, 2022

Approved by:



Manager: Jim Zhang  
May 24, 2022

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: 9.5A19DIM/850/R

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
99.3	927.3	9.34	0.8302
CCT (K)	CRI	Stabilization Time (Light & Power)	
4782	86.4	50	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

### Test specifications:

<b>Date of Receipt</b>	: May 16, 2022
<b>Date of Test</b>	: May 23, 2022
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: IESNA LM-79-2019 Approved Method: 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)

<b>Name</b>	: LED Lamp
<b>Model</b>	: 9.5A19DIM/850/R 9.5A19DIM/850/R/4PK
<b>Electrical Ratings</b>	: 120V, 60Hz, 9.5W
<b>Product Description</b>	: 5000K
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 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 base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.094
Power Factor	0.8302
Test Power (W)	9.34
THD A%	65.69
Luminous Efficacy (lm/W)	99.3
Total Luminous Flux (lm)	927.3
Color Rendering Index (CRI)	86.4
R9	26
Correlated Color Temperature (CCT)(K)	4782
Chromaticity Chroma x	0.3514
Chromaticity Chroma y	0.3565
Chromaticity Chroma u	0.2138
Chromaticity Chroma v	0.3253
Duv	0
Chromaticity Chroma u'	0.2138
Chromaticity Chroma v'	0.4880

Special Color Rendering Indices	
R1	86.2
R2	95
R3	95.4
R4	81.9
R5	85.1
R6	90.3
R7	86.4
R8	70.7
R9	26
R10	86.2
R11	81.4
R12	63.9
R13	89.4
R14	98.3

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 24.8 °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)	0.095
Power Factor	0.8317
Power (W)	9.49
Luminous Efficacy (lm/W)	99.3
Total Luminous Flux (lm)	942.0
Beam Angle (°)	216.5 (0°-180°) / 216.6 (90°-270°)
Center Beam Candle Power (cd)	119
Maximum Beam Candle Power (cd)	119.8 (At: C=315.0, Gamma=16.5)
Spacing Criteria	1.49 (0°-180°) / 1.51 (90°-270°)
Zonal Lumens in the 0°-60° Zone	37.75%
Zonal Lumens in the 60°-90° Zone	30.41%
Zonal Lumens in the 90°-120° Zone	21.12%
Zonal Lumens in the 120°-180° Zone	10.72%

Table 3: Test data per Goniophotometer Method

### Spectral Power Distribution - Sphere Spectroradiometer Method

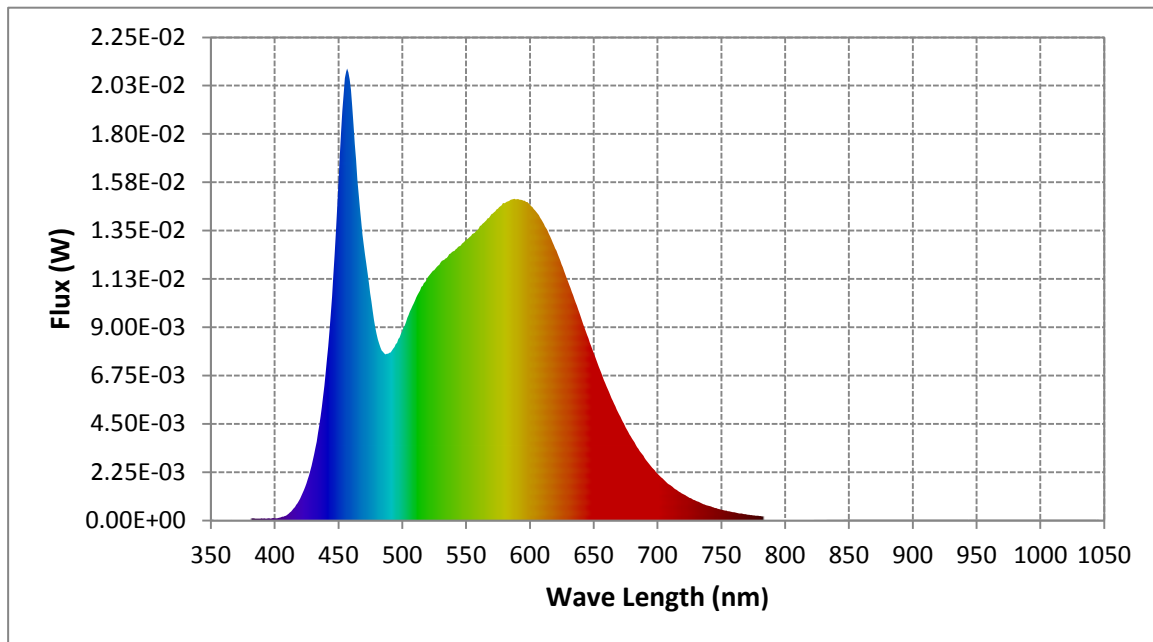
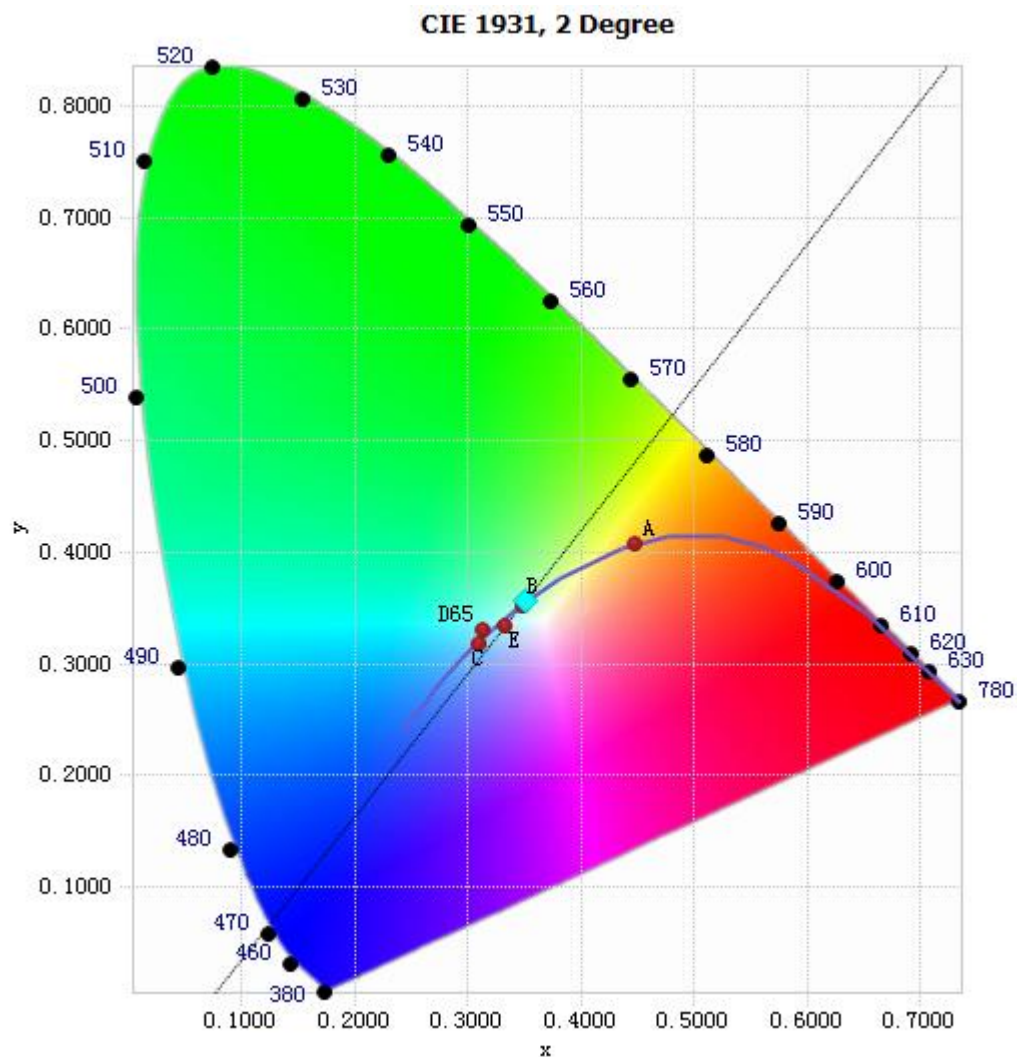


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.75E-05	485	7.86E-03	590	1.50E-02	695	2.53E-03
385	8.36E-05	490	7.81E-03	595	1.49E-02	700	2.19E-03
390	1.02E-04	495	8.22E-03	600	1.47E-02	705	1.90E-03
395	1.06E-04	500	8.81E-03	605	1.44E-02	710	1.65E-03
400	1.01E-04	505	9.57E-03	610	1.39E-02	715	1.43E-03
405	1.52E-04	510	1.02E-02	615	1.34E-02	720	1.23E-03
410	2.68E-04	515	1.09E-02	620	1.27E-02	725	1.06E-03
415	5.64E-04	520	1.13E-02	625	1.19E-02	730	9.18E-04
420	1.02E-03	525	1.17E-02	630	1.11E-02	735	7.90E-04
425	1.72E-03	530	1.20E-02	635	1.03E-02	740	6.85E-04
430	2.82E-03	535	1.22E-02	640	9.48E-03	745	5.84E-04
435	4.43E-03	540	1.25E-02	645	8.62E-03	750	5.01E-04
440	6.89E-03	545	1.28E-02	650	7.81E-03	755	4.36E-04
445	1.04E-02	550	1.30E-02	655	7.01E-03	760	3.79E-04
450	1.57E-02	555	1.33E-02	660	6.26E-03	765	3.25E-04
455	2.06E-02	560	1.36E-02	665	5.57E-03	770	2.78E-04
460	2.01E-02	565	1.39E-02	670	4.93E-03	775	2.39E-04
465	1.59E-02	570	1.43E-02	675	4.34E-03	780	2.10E-04
470	1.28E-02	575	1.45E-02	680	3.82E-03		
475	1.06E-02	580	1.48E-02	685	3.34E-03		
480	8.69E-03	585	1.49E-02	690	2.92E-03		

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

## Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3514, 0.3565)

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

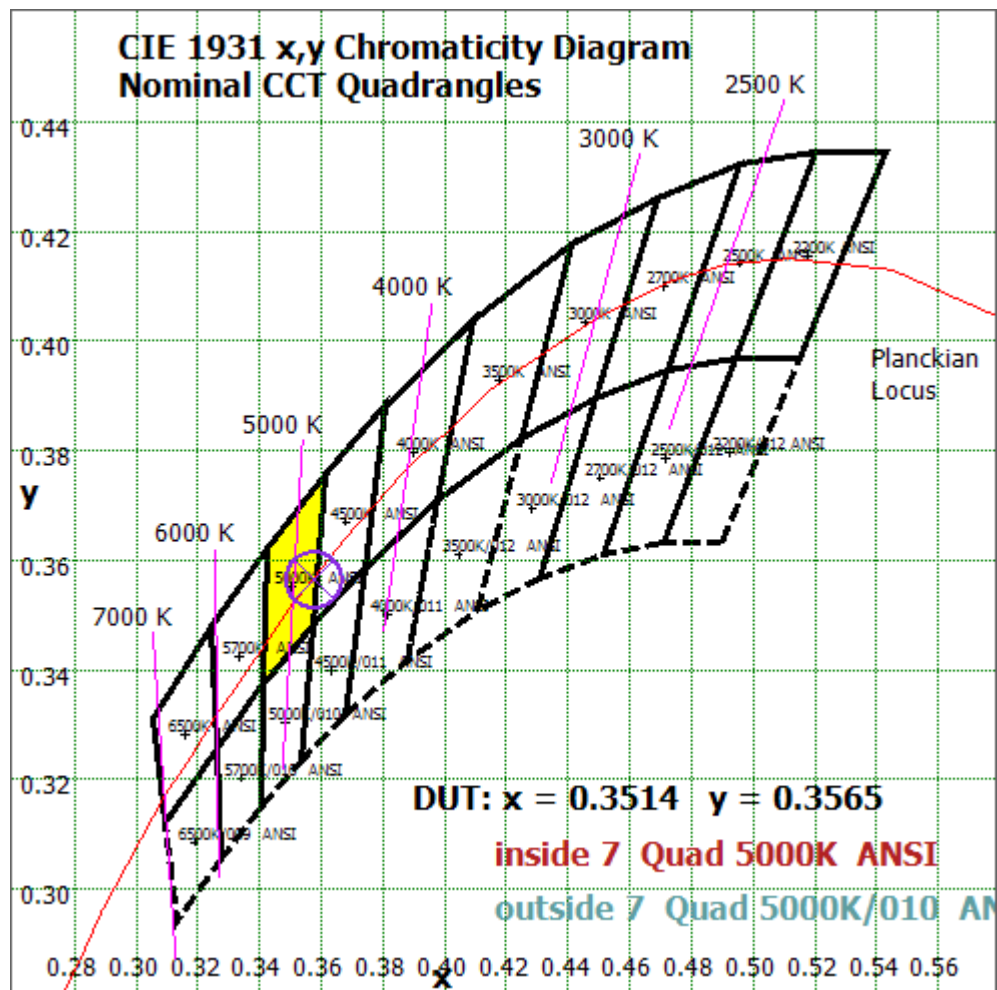


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

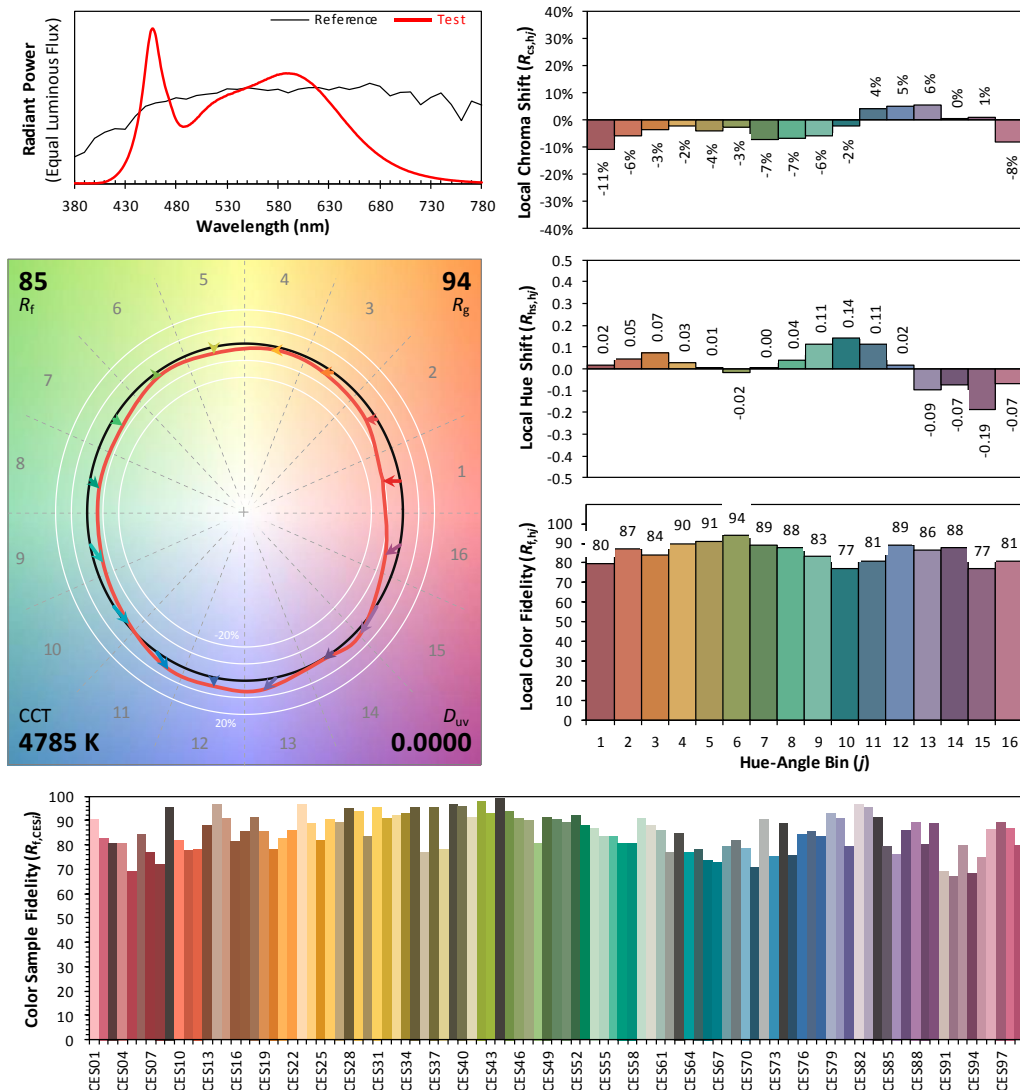
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2022/05/23

Model: 9.5A19DIM/850/R



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

$x$  0.3514  
 $y$  0.3565  
 $u'$  0.2138  
 $v'$  0.4880

CIE 13.3-1995  
(CRI)  
 $R_a$  86  
 $R_g$  26

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	11.352	1.21%
10- 20	33.619	3.57%
20- 30	54.492	5.78%
30- 40	72.822	7.73%
40- 50	87.147	9.25%
50- 60	96.203	10.21%
60- 70	99.438	10.56%
70- 80	97.068	10.30%
80- 90	89.93	9.55%
90-100	79.287	8.42%
100-110	66.56	7.07%
110-120	53.097	5.64%
120-130	40.043	4.25%
130-140	28.289	3.00%
140-150	18.378	1.95%
150-160	10.301	1.09%
160-170	3.749	0.40%
170-180	0.187	0.02%
Total	942.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	881.058	93.53%
130-180	60.904	6.47%
0-180	942.0	100%

Table 5: Zonal Lumen

## Illuminance Plots- Goniophotometer Method

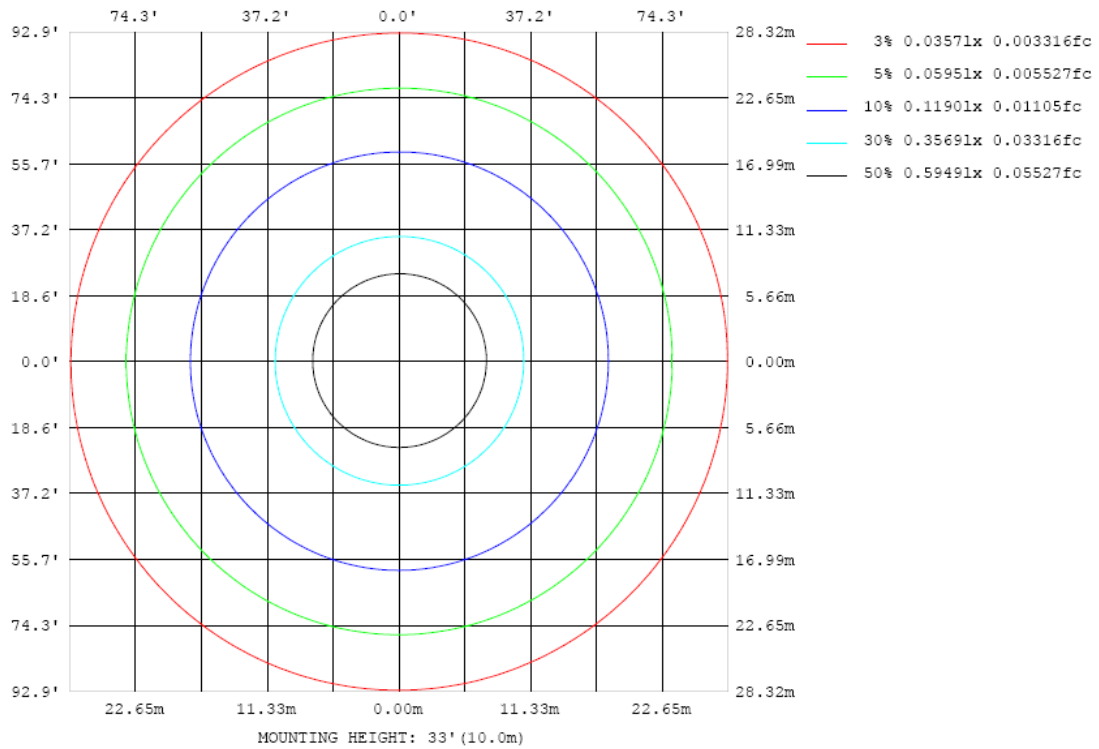


Chart 5: Illuminance Plot (Footcandles)

# Luminous Intensity Distribution Plots- Goniophotometer Method

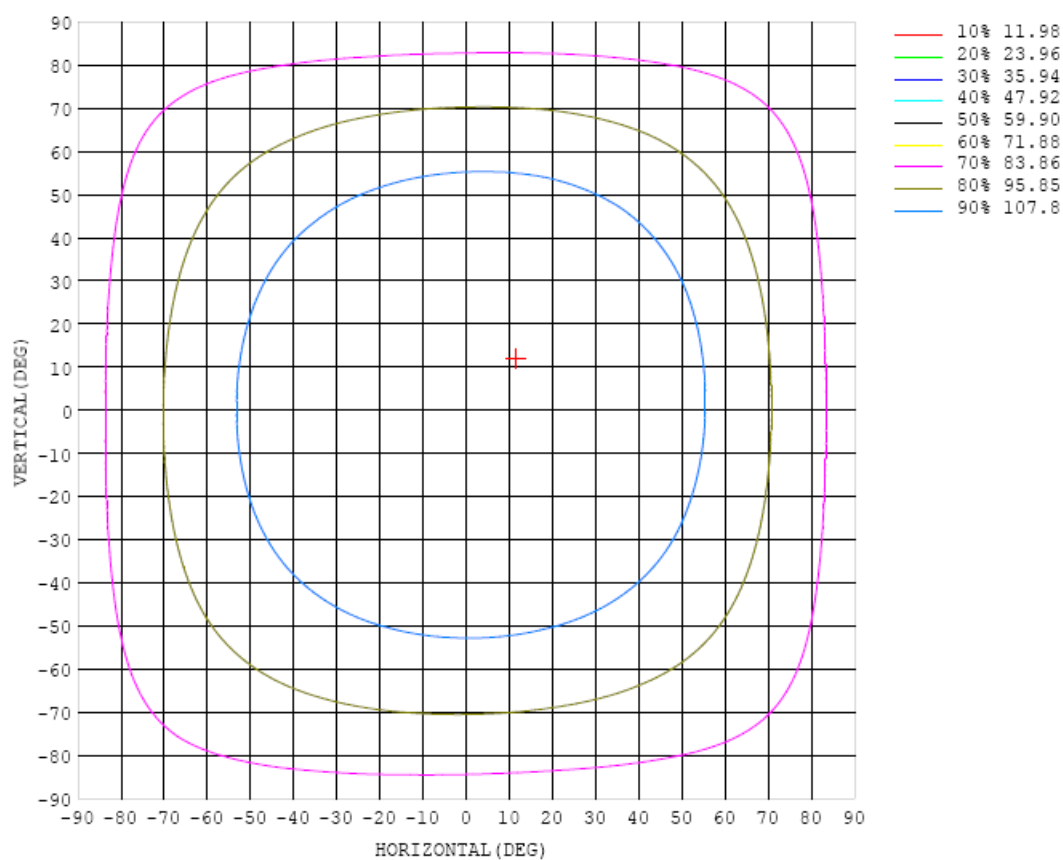


Chart 6: Isocandela Plot

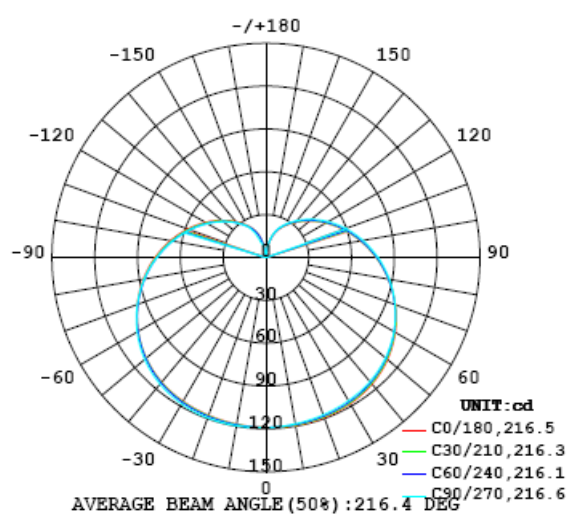


Chart 7: Polar Candela Distribution

## Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

$\gamma$ (DEG) \ C (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	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119			
5	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119			
10	119	119	119	118	118	118	118	118	118	119	119	119	120	120	120	120			
15	119	119	118	118	118	118	118	118	118	118	119	119	120	120	120	120			
20	119	119	118	118	117	117	117	117	118	118	118	119	119	120	120	120			
25	119	118	117	117	116	116	116	117	117	117	118	118	119	119	119	119			
30	118	117	117	116	116	115	116	116	116	117	117	118	118	119	119	119			
35	117	116	116	115	115	114	115	115	115	116	116	117	117	118	118	118			
40	116	115	114	114	113	113	113	113	114	114	115	115	116	116	116	116			
45	114	113	112	112	111	111	111	112	112	112	112	113	114	114	114	114			
50	111	110	110	109	109	109	109	109	110	110	110	110	111	112	112	112			
55	108	108	107	107	107	107	107	107	107	107	107	107	108	108	109	109			
60	105	104	104	104	104	104	104	104	104	104	104	104	104	105	105	105			
65	101	100	100	99.9	100	100	100	100	100.0	99.8	99.7	100.0	100	101	101	101			
70	96.5	96.3	96.0	96.0	96.3	96.4	96.4	96.3	96.0	95.7	95.5	95.7	96.1	96.5	96.7	96.6			
75	92.0	91.9	91.7	91.9	92.2	92.4	92.4	92.2	91.8	91.3	91.0	91.1	91.4	91.8	92.0	92.0			
80	87.2	87.2	87.2	87.4	87.8	88.2	88.1	87.9	87.3	86.7	86.3	86.3	86.6	87.0	87.1	87.2			
85	82.3	82.4	82.5	82.8	83.3	83.7	83.7	83.3	82.7	82.0	81.4	81.4	81.6	81.9	82.1	82.2			
90	77.3	77.5	77.7	78.1	78.7	79.1	79.0	78.6	77.9	77.1	76.5	76.4	76.5	76.8	76.9	77.1			
95	72.2	72.5	72.9	73.3	73.9	74.4	74.3	73.8	73.0	72.2	71.5	71.4	71.5	71.7	71.8	72.0			
100	67.3	67.6	68.0	68.5	69.1	69.6	69.5	69.0	68.1	67.3	66.6	66.4	66.5	66.7	66.8	67.0			
105	62.3	62.7	63.2	63.7	64.4	64.8	64.7	64.2	63.3	62.4	61.7	61.4	61.5	61.7	61.8	62.0			
110	57.6	57.9	58.4	59.0	59.7	60.1	60.0	59.4	58.5	57.6	56.9	56.6	56.7	56.9	56.9	57.2			
115	52.8	53.2	53.8	54.4	55.0	55.4	55.3	54.7	53.8	53.0	52.3	52.0	52.0	52.2	52.2	52.5			
120	48.4	48.8	49.3	49.8	50.4	50.8	50.7	50.1	49.3	48.4	47.8	47.5	47.5	47.6	47.7	48.0			
125	44.0	44.4	44.9	45.4	46.1	46.4	46.3	45.7	44.9	44.1	43.5	43.2	43.1	43.3	43.3	43.7			
130	39.9	40.3	40.8	41.3	41.8	42.1	42.0	41.5	40.7	39.9	39.3	39.1	39.0	39.1	39.2	39.5			
135	36.0	36.4	36.8	37.3	37.8	38.0	37.9	37.4	36.7	36.0	35.4	35.2	35.2	35.2	35.3	35.6			
140	32.2	32.6	33.0	33.5	33.9	34.1	34.0	33.5	32.9	32.3	31.8	31.5	31.5	31.6	31.7	31.9			
145	28.7	29.1	29.5	29.9	30.3	30.4	30.3	29.9	29.3	28.7	28.3	28.1	28.0	28.1	28.2	28.4			
150	25.5	25.8	26.2	26.6	26.9	27.0	26.9	26.4	25.9	25.4	25.0	24.7	24.5	24.8	24.9	25.1			
155	22.1	22.7	22.9	23.3	23.4	23.6	23.4	22.8	22.4	21.9	21.8	20.8	19.2	21.1	21.6	21.6			
160	18.4	19.2	19.2	19.6	19.4	19.7	19.4	18.8	18.5	17.9	17.9	13.2	12.5	16.5	17.4	17.2			
165	13.6	14.9	14.7	15.1	14.5	14.9	14.6	13.8	13.5	12.9	12.9	11.4	9.76	10.1	8.40	11.0			
170	8.03	8.72	8.62	8.79	8.11	6.92	6.04	5.28	5.00	4.94	4.70	4.75	6.01	6.42	4.21	4.31			
175	0.14	0.16	0.15	0.14	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14			
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 3 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  $4\pi$ . 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 20 min, taken 10 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 20 min, taken 10 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.

\*\*\* End of Report \*\*\*

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.