

## 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 Tube

**Model: 9.5T5HE/2F/835/BYP/R**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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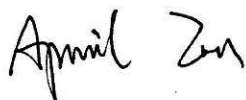
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[www.ledtestlab.com](http://www.ledtestlab.com)

Report No.: HZ22070025o

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

Review by:



Engineer: April Zou  
Aug. 17, 2022

Approved by:



Manager: Jim Zhang  
Aug. 17, 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: **9.5T5HE/2F/835/BYP/R**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
133.6	1225.5	9.17	0.9779
CCT (K)	CRI	Stabilization Time (Light & Power)	
3477	82.1	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>	: Jul. 20, 2022
<b>Date of Test</b>	: Aug. 15, 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

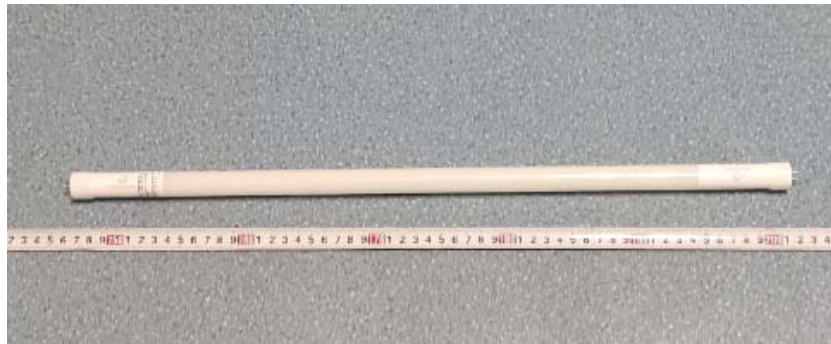


Figure 1- Overview of the sample

### Equipment Under Test(EUT)

<b>Name</b>	: LED Tube
<b>Model</b>	: 9.5T5HE/2F/835/BYP/R
<b>Electrical Ratings</b>	: 120-277V, 50/60Hz
<b>Product Description</b>	: 3500K
<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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.078	0.037
Power Factor	0.9779	0.8967
Test Power (W)	9.17	9.25
THD A%	16.11	18.98
Luminous Efficacy (lm/W)	133.6	132.1
Total Luminous Flux (lm)	1225.5	1222.0
Color Rendering Index (CRI)	82.1	
R9	1.9	
Correlated Color Temperature (CCT)(K)	3477	
Chromaticity Chroma x	0.4073	
Chromaticity Chroma y	0.3936	
Chromaticity Chroma u	0.2358	
Chromaticity Chroma v	0.3418	
Duv	0.0008	
Chromaticity Chroma u'	0.2358	
Chromaticity Chroma v'	0.5128	

Special Color Rendering Indices	
R1	79.9
R2	89.4
R3	96.3
R4	80.6
R5	80.4
R6	86.4
R7	83.9
R8	59.7
R9	1.9
R10	75.8
R11	79.9
R12	67.2
R13	82.2
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 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)	0.079
Power Factor	0.9777
Power (W)	9.23
Luminous Efficacy (lm/W)	133.5
Total Luminous Flux (lm)	1232.6
Beam Angle (°)	110.4 (0°-180°) / 227.9 (90°-270°)
Center Beam Candle Power (cd)	200
Maximum Beam Candle Power (cd)	200.0 (At: C=240.0, Gamma=3.0)
Spacing Criteria	1.27 (0°-180°) / 1.47 (90°-270°)
Zonal Lumens in the 0°-60°Zone	42.30%
Zonal Lumens in the 60°-90°Zone	27.40%
Zonal Lumens in the 90°-120°Zone	17.59%
Zonal Lumens in the 120°-180°Zone	12.72%

Table 3: Test data per Goniophotometer Method

## Spectral Power Distribution - Sphere Spectroradiometer Method

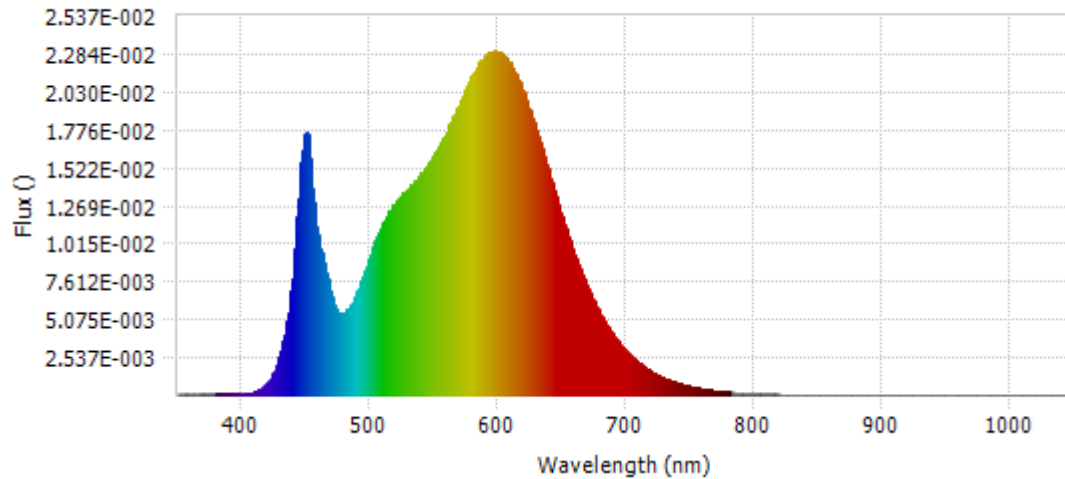
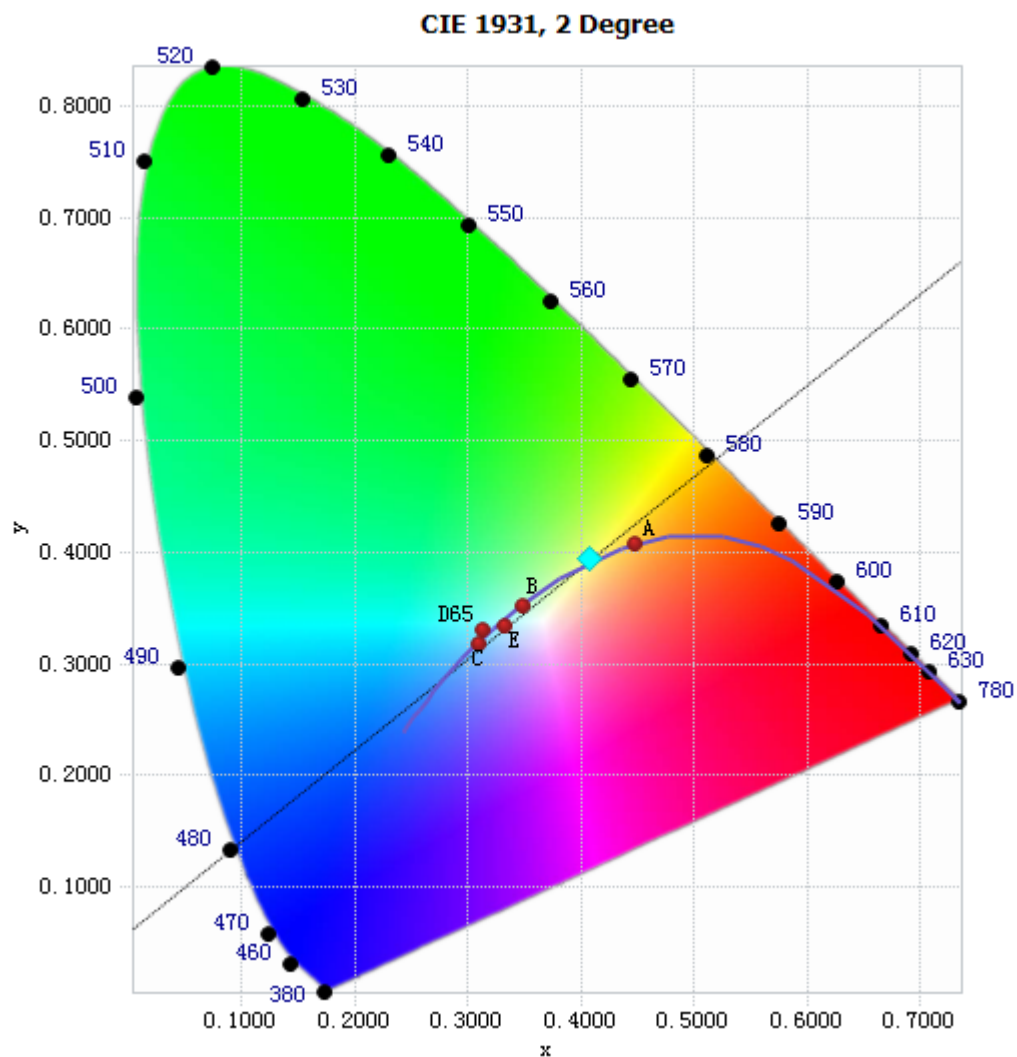


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.02E-04	485	6.06E-03	590	2.27E-02	695	3.47E-03
385	8.93E-05	490	6.92E-03	595	2.30E-02	700	2.97E-03
390	8.70E-05	495	8.14E-03	600	2.30E-02	705	2.55E-03
395	8.81E-05	500	9.40E-03	605	2.27E-02	710	2.16E-03
400	6.26E-05	505	1.06E-02	610	2.22E-02	715	1.86E-03
405	1.11E-04	510	1.15E-02	615	2.13E-02	720	1.58E-03
410	2.40E-04	515	1.24E-02	620	2.02E-02	725	1.35E-03
415	4.65E-04	520	1.29E-02	625	1.91E-02	730	1.14E-03
420	8.58E-04	525	1.34E-02	630	1.77E-02	735	9.69E-04
425	1.64E-03	530	1.39E-02	635	1.63E-02	740	8.23E-04
430	2.90E-03	535	1.43E-02	640	1.48E-02	745	7.04E-04
435	5.02E-03	540	1.49E-02	645	1.33E-02	750	5.94E-04
440	8.61E-03	545	1.55E-02	650	1.20E-02	755	5.03E-04
445	1.45E-02	550	1.61E-02	655	1.07E-02	760	4.37E-04
450	1.76E-02	555	1.69E-02	660	9.39E-03	765	3.73E-04
455	1.38E-02	560	1.76E-02	665	8.25E-03	770	3.17E-04
460	1.02E-02	565	1.86E-02	670	7.18E-03	775	2.70E-04
465	8.47E-03	570	1.96E-02	675	6.28E-03	780	2.33E-04
470	6.63E-03	575	2.05E-02	680	5.44E-03		
475	5.51E-03	580	2.15E-02	685	4.69E-03		
480	5.54E-03	585	2.23E-02	690	4.06E-03		

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

# Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4073, 0.3936)

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

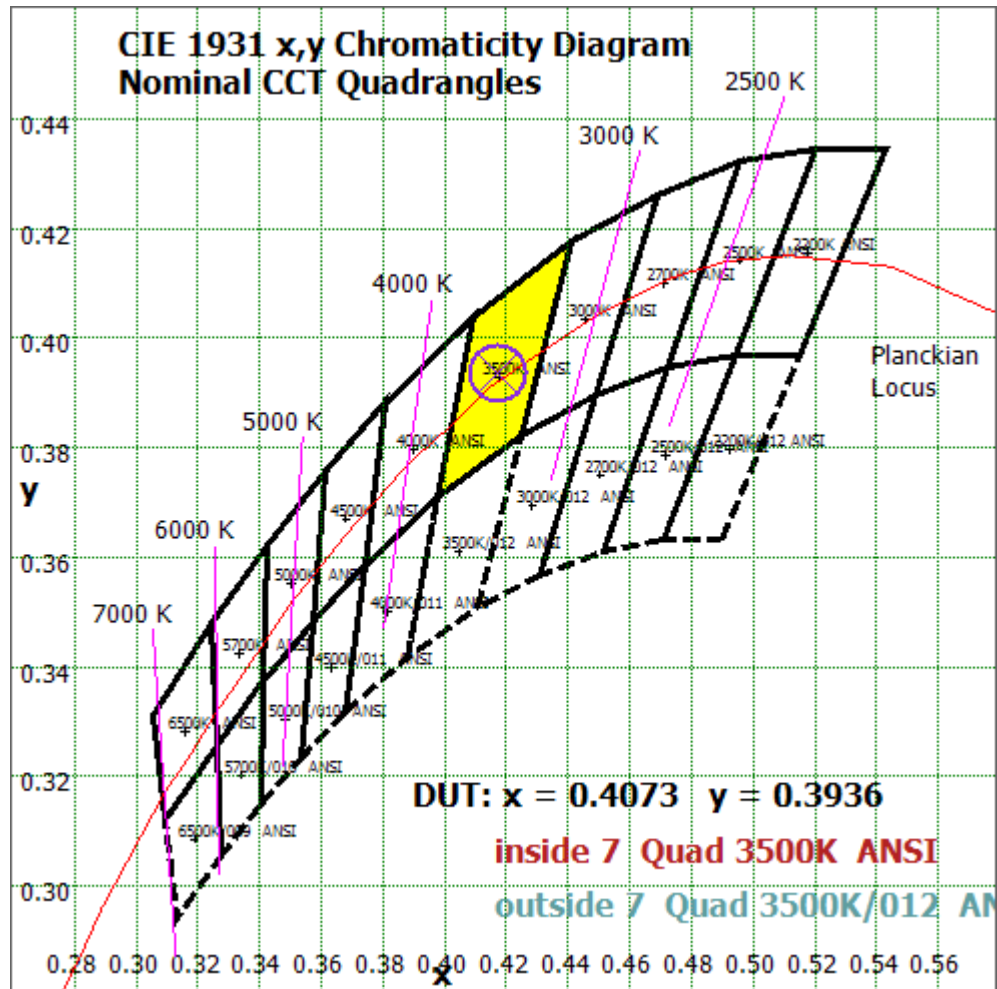


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

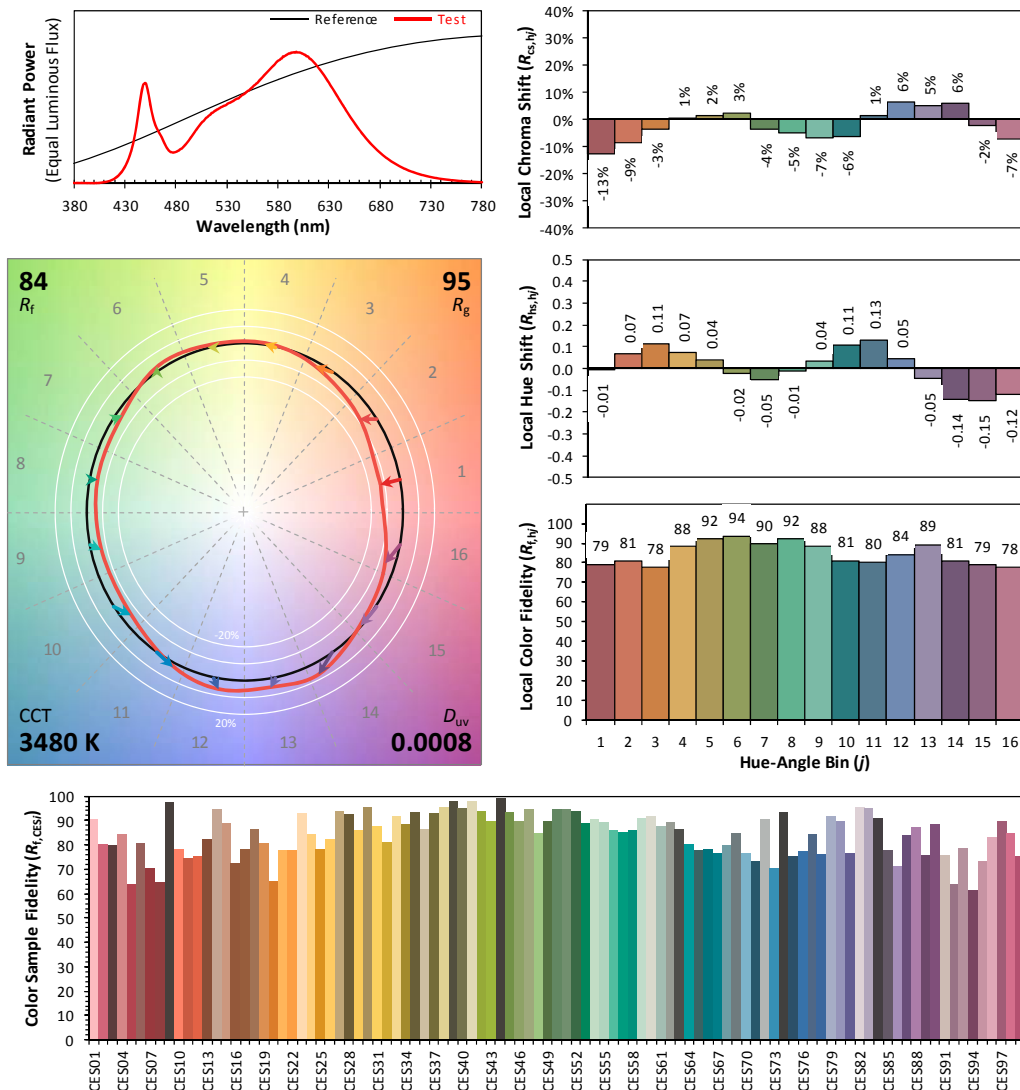
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2022/08/15

Model: 9.5T5HE/2F/835/BYP/R



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

$x$  0.4073  
 $y$  0.3936  
 $u'$  0.2358  
 $v'$  0.5128

CIE 13.3-1995  
(CRI)  
 $R_a$  82  
 $R_9$  2

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	18.946	1.54%
10- 20	55.06	4.47%
20- 30	86.103	6.99%
30- 40	109.479	8.88%
40- 50	123.628	10.03%
50- 60	128.104	10.39%
60- 70	123.935	10.06%
70- 80	113.518	9.21%
80- 90	100.229	8.13%
90-100	86.241	7.00%
100-110	71.734	5.82%
110-120	58.846	4.77%
120-130	48.678	3.95%
130-140	39.775	3.23%
140-150	30.847	2.50%
150-160	21.838	1.77%
160-170	12.317	1.00%
170-180	3.275	0.27%
Total	1232.6	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	521.32	42.30%
60- 90	337.682	27.40%
0-90	859.002	69.69%
90- 180	373.551	30.31%
0- 180	1232.6	100%

Table 5: Zonal Lumen

## Illuminance Plots- Goniophotometer Method

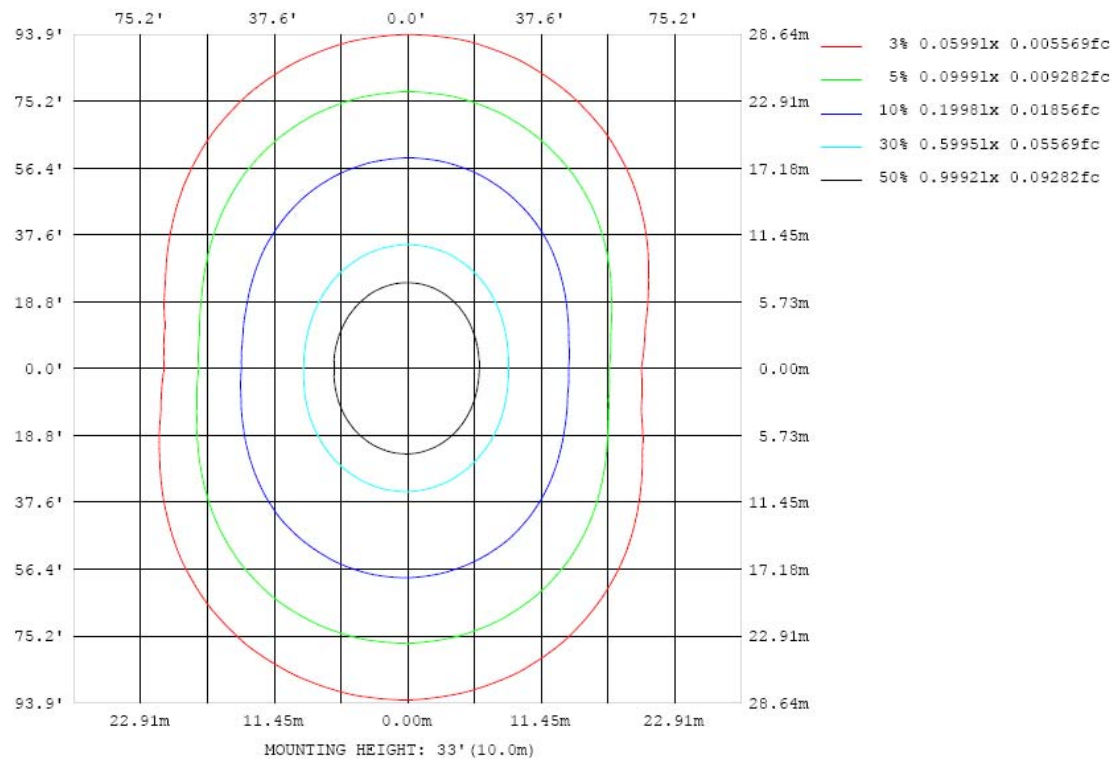


Chart 5: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

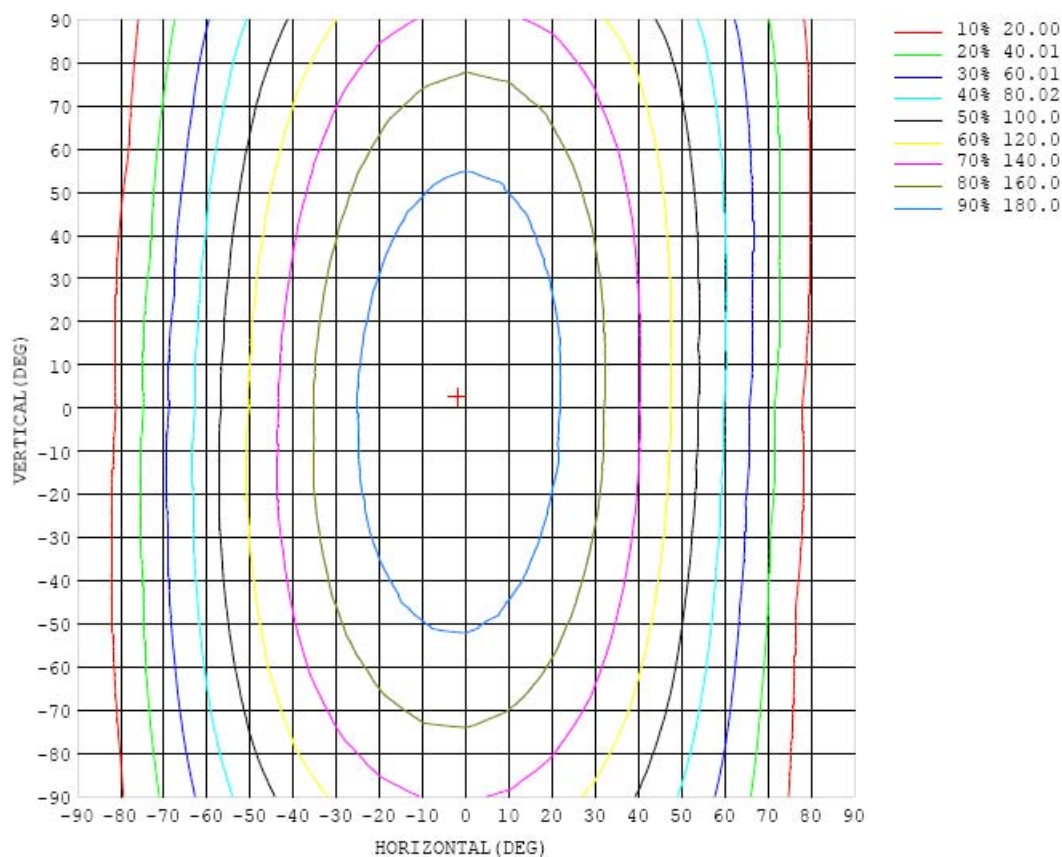


Chart 6: Isocandela Plot

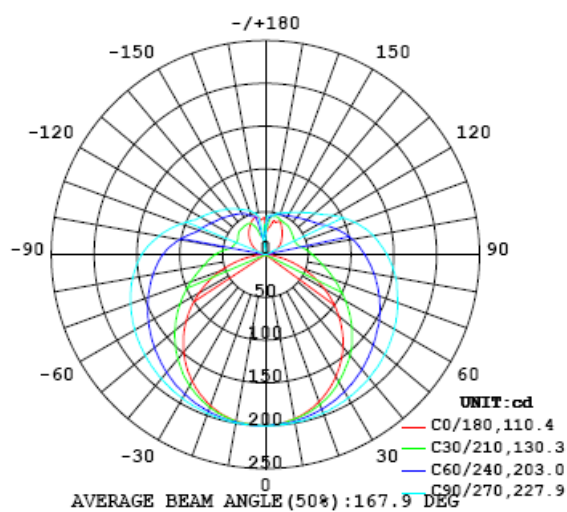


Chart 7: Polar Candela Distribution

## 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	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
5	198	198	198	198	198	199	199	199	199	199	199	199	200	199	200	200	200	199	199
10	195	195	195	195	196	197	197	198	198	199	199	199	198	199	198	197	198	198	197
15	190	190	190	191	193	194	195	196	197	198	198	198	197	196	195	195	194	193	194
20	183	183	184	186	188	190	192	194	196	197	197	196	195	194	192	190	189	188	188
25	174	175	176	180	182	186	189	192	194	195	195	194	192	191	187	185	182	180	180
30	164	165	167	171	176	180	185	189	192	193	193	192	190	186	182	178	175	172	171
35	153	155	158	162	168	174	180	185	189	191	191	189	185	181	176	170	165	162	160
40	141	143	147	154	160	168	175	181	186	188	188	185	181	176	168	162	156	151	149
45	127	129	135	143	153	161	170	177	182	185	185	181	176	169	161	153	145	139	135
50	112	114	121	132	143	155	164	173	179	182	181	178	171	163	153	143	133	125	121
55	95.9	98.5	107	120	134	148	158	168	175	178	178	173	166	157	145	132	120	111	105
60	79.2	82.1	93.0	108	125	140	154	163	170	174	173	168	160	151	136	121	107	95.6	89.2
65	62.3	65.7	79.0	96.6	115	133	148	158	165	169	168	163	155	143	128	111	93.9	80.1	72.5
70	45.1	49.5	65.4	86.1	107	125	142	154	161	164	163	158	149	136	119	100	80.9	64.5	56.0
75	28.6	34.3	53.3	76.2	98.5	118	135	148	156	159	158	153	143	129	111	90.2	68.9	49.6	39.0
80	14.2	21.5	43.1	67.6	91.0	112	129	142	151	154	153	147	136	122	103	81.4	58.2	36.2	23.2
85	4.30	12.5	35.5	60.5	84.1	105	122	136	145	148	147	141	130	115	96.0	73.6	49.3	25.6	10.1
90	1.43	8.63	30.3	54.6	78.1	98.7	116	129	138	142	141	134	123	108	89.2	66.8	42.6	18.5	2.43
95	2.54	7.06	26.4	50.0	72.8	93.0	110	123	131	135	134	127	116	102	82.8	60.7	37.3	14.7	1.77
100	4.80	8.16	23.0	44.9	67.0	86.6	103	116	124	128	127	121	110	95.4	76.9	55.5	32.9	12.3	3.09
105	7.80	11.3	23.0	40.3	60.9	79.8	95.8	108	116	120	119	113	102	88.2	70.2	49.8	28.9	12.5	5.17
110	10.9	15.2	24.3	38.4	55.2	72.6	87.7	99.5	107	111	110	104	93.9	80.3	63.5	44.8	27.5	14.4	7.84
115	14.3	18.9	26.3	37.9	51.7	65.8	79.7	90.6	97.9	101	99.9	94.5	85.3	72.6	57.4	41.8	27.3	17.8	11.2
120	17.8	22.5	28.7	38.2	49.7	61.3	72.0	81.8	88.6	91.4	90.3	85.3	76.6	65.6	53.2	40.2	28.0	21.1	14.8
125	21.3	26.2	31.2	38.9	48.5	58.1	67.1	74.5	79.8	81.8	80.8	76.7	69.9	61.0	50.6	39.5	29.7	24.7	18.7
130	24.3	29.5	33.7	39.9	47.7	55.6	63.2	69.1	73.5	75.0	74.2	70.6	64.7	57.5	48.7	39.4	31.9	28.1	22.5
135	27.0	31.9	35.9	41.2	47.2	53.5	59.6	64.6	68.1	69.3	68.5	65.7	60.8	54.7	47.5	40.0	34.4	31.5	26.6
140	30.4	34.6	37.7	42.4	47.0	52.0	56.8	60.7	63.6	64.4	63.8	61.3	57.4	52.6	46.7	41.0	36.9	34.7	30.3
145	33.9	37.6	38.9	42.5	47.0	50.7	54.4	57.5	59.5	60.4	59.7	57.7	54.6	50.8	46.6	42.4	39.3	37.4	33.9
150	37.6	39.6	39.6	43.4	47.2	49.7	52.4	54.6	56.2	56.9	56.2	54.8	52.4	49.7	46.6	43.5	40.5	39.1	37.0
155	41.6	42.0	42.7	43.3	46.7	49.0	50.9	52.5	53.7	54.0	53.4	52.4	50.8	48.9	46.5	42.9	41.9	41.4	40.7
160	40.9	42.6	44.2	45.6	47.1	48.5	49.6	50.7	51.4	51.6	51.5	50.7	49.7	47.9	45.1	43.5	43.4	43.0	43.6
165	40.7	43.7	45.1	46.5	47.5	48.2	48.8	49.0	49.0	49.3	48.9	48.1	46.9	44.6	44.5	44.8	44.7	44.8	45.2
170	34.7	39.2	45.1	45.5	45.5	46.4	46.9	46.7	46.6	46.6	46.4	46.1	46.0	45.6	45.2	45.1	45.0	45.5	43.5
175	29.2	32.4	34.3	36.8	40.8	43.1	43.1	43.8	45.2	46.1	46.1	45.9	45.9	45.9	45.8	45.7	45.6	45.4	41.7
180	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9

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		200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200		
5		199	199	199	199	200	200	200	200	200	200	199	199	199	198	198	198	198		
10		197	197	198	198	198	198	199	200	200	199	198	198	197	196	196	195	195		
15		194	194	194	195	196	197	198	198	198	198	197	196	195	193	192	191	190		
20		188	189	190	191	193	195	196	197	198	197	195	193	191	189	187	185	183		
25		181	182	184	186	189	192	194	196	196	195	193	190	187	184	181	177	176		
30		172	174	177	181	184	188	191	193	194	193	190	187	183	178	173	169	166		
35		162	164	169	174	179	184	189	191	192	191	188	183	177	171	165	159	155		
40		150	154	159	166	173	179	185	188	189	188	184	179	172	164	155	148	143		
45		137	142	149	158	167	174	181	185	186	185	181	174	165	156	145	136	130		
50		123	129	138	149	160	169	176	181	183	182	177	169	159	148	135	124	115		
55		108	116	127	140	152	163	172	178	180	178	173	164	153	140	125	111	100		
60		92.0	102	115	130	145	158	167	174	176	174	169	159	146	131	114	98.2	85.1		
65		75.6	87.5	104	121	138	152	162	169	172	170	164	153	140	123	104	85.5	70.3		
70		59.8	73.7	92.8	112	130	146	157	165	168	166	159	148	134	115	94.7	73.6	55.2		
75		43.9	61.4	82.3	104	123	140	152	160	163	161	154	143	127	108	86.0	63.3	41.5		
80		29.3	49.9	73.0	96.3	116	133	146	154	157	156	148	137	121	101	78.4	54.2	29.9		
85		17.6	40.5	65.9	88.9	110	127	140	148	152	150	143	131	115	95.1	71.7	46.9	21.8		
90		10.6	33.6	58.9	81.8	103	120	133	141	145	142	136	124	108	88.1	65.6	40.7	16.0		
95		6.99	26.2	50.8	73.8	94.5	112	124	133	136	134	127	115	99.6	80.2	57.8	32.9	13.1		
100		7.10	22.3	42.1	65.0	85.0	102	115	123	126	124	118	106	90.6	71.1	49.1	30.7	13.3		
105		10.1	21.8	39.0	56.5	74.8	91.4	104	112	116	114	108	96.4	81.2	64.9	47.1	29.5	16.4		
110		13.6	22.5	37.7	55.2	70.6	82.8	93.5	101	105	103	97.6	87.6	74.8	59.7	44.4	31.7	19.3		
115		16.2	25.0	36.8	51.8	67.0	78.3	86.7	92.6	94.6	92.8	86.5	78.4	68.3	57.3	45.3	33.5	21.9		
120		17.8	27.7	37.3	49.6	62.7	73.5	81.2	86.0	87.7	86.3	81.8	74.8	66.9	56.6	45.8	35.2	24.5		
125		21.4	30.6	39.0	48.6	59.9	69.3	76.6	80.8	82.6	81.4	77.8	71.8	65.1	55.9	46.2	36.6	26.6		
130		24.2	32.8	40.6	48.5	57.6	66.3	72.4	76.1	78.0	77.1	73.9	69.0	62.9	54.8	46.5	37.5	27.1		
135		25.3	33.1	41.4	48.9	56.0	63.1	68.5	71.7	73.4	72.7	70.2	66.5	60.7	53.8	46.7	38.4	28.3		
140		25.2	31.7	41.2	49.0	54.8	60.3	64.8	67.8	69.7	68.8	67.0	63.3	58.6	52.9	46.1	39.2	29.7		
145		25.5	31.2	41.5	48.1	53.6	57.8	61.4	63.9	65.3	65.0	63.3	60.4	56.7	51.8	45.0	39.8	30.6		
150		27.0	30.3	41.6	45.7	51.8	55.6	58.3	60.4	61.4	61.2	59.9	57.7	55.1	50.4	45.2	40.9	29.8		
155		29.7	27.4	40.1	44.6	48.0	52.4	55.3	56.7	57.7	57.6	56.6	55.4	53.4	50.2	46.2	41.5	29.6		
160		36.0	26.3	34.5	43.0	46.1	47.5	49.6	52.5	54.6	54.8	54.0	53.2	51.8	49.2	46.1	36.7	31.2		
165		42.0	27.3	23.9	31.0	40.3	46.0	47.5	48.8	50.4	51.2	50.7	49.8	47.3	45.1	38.6	29.0	32.1		
170		34.8	26.6	23.0	21.3	19.1	19.3	22.5	34.1	45.4	29.1	27.0	28.1	28.0	28.5	27.4	27.8	29.7		
175		32.7	24.9	23.3	23.4	22.5	21.6	23.7	26.5	1.64	29.8	29.1	26.4	26.2	26.2	26.1	26.2	26.8		
180		24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9		

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, 2022	Aug. 04, 2023
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2022	Aug. 04, 2023
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2022	Aug. 04, 2023
Standard source	D908	HZTE012-01	Aug. 05, 2022	Aug. 04, 2023
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2022	Aug. 04, 2023
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2022	Aug. 04, 2023
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2022	Aug. 04, 2023
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2022	Aug. 04, 2023

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 \*\*\*

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