

## 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: 12T8/3F/830/BYP/RC**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,  
Hangzhou, Zhejiang Province, China 311100

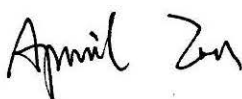
Tel: +86571 86376106

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

Report No.: HZ22060037j

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

Review by:



Engineer: April Zou

Jun. 30, 2022

Approved by:



Manager: Jim Zhang

Jun. 30, 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: 12T8/3F/830/BYP/RC

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
125.6	1556.1	12.39	0.9880
CCT (K)	CRI	Stabilization Time (Light & Power)	
2989	81.7	50	

Table 1: Executive Data Summary

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

### Test specifications:

**Date of Receipt** : Jun. 13, 2022

**Date of Test** : Jun. 17, 2022

**Test item** : Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters

**Reference Standard** : IESNA LM-79-2019 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>	: 12T8/3F/830/BYP/RC
<b>Electrical Ratings</b>	: 120-277V, 60Hz
<b>Product Description</b>	: 3000K

## 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)	0.105	0.050
Power Factor	0.9880	0.9281
Test Power (W)	12.39	12.72
THD A%	13.98	18.57
Luminous Efficacy (lm/W)	125.6	125.8
Total Luminous Flux (lm)	1556.1	1600.3
Color Rendering Index (CRI)	81.7	
R9	2	
Correlated Color Temperature (CCT)(K)	2989	
Chromaticity Chroma x	0.4381	
Chromaticity Chroma y	0.4053	
Chromaticity Chroma u	0.2508	
Chromaticity Chroma v	0.3480	
Duv	0.0003	
Chromaticity Chroma u'	0.2508	
Chromaticity Chroma v'	0.5221	

Special Color Rendering Indices	
R1	79.6
R2	89
R3	96.8
R4	80.7
R5	80
R6	87
R7	82.6
R8	57.5
R9	2
R10	75.7
R11	80.7
R12	71.8
R13	81.6
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 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)	0.106
Power Factor	0.9817
Power (W)	12.47
Luminous Efficacy (lm/W)	123.4
Total Luminous Flux (lm)	1538.3
Beam Angle (°)	113.4 (0°-180°) / 256.3 (90°-270°)
Center Beam Candle Power (cd)	226
Maximum Beam Candle Power (cd)	226.7 (At: C=60.0, Gamma=8.0)
Spacing Criteria	1.23 (0°-180°) / 1.49 (90°-270°)
Zonal Lumens in the 0°-60°Zone	38.95%
Zonal Lumens in the 60°-90°Zone	26.18%
Zonal Lumens in the 90°-120°Zone	19.01%
Zonal Lumens in the 120°-180°Zone	15.86%

Table 3: Test data per Goniophotometer Method

### Spectral Power Distribution - Sphere Spectroradiometer Method

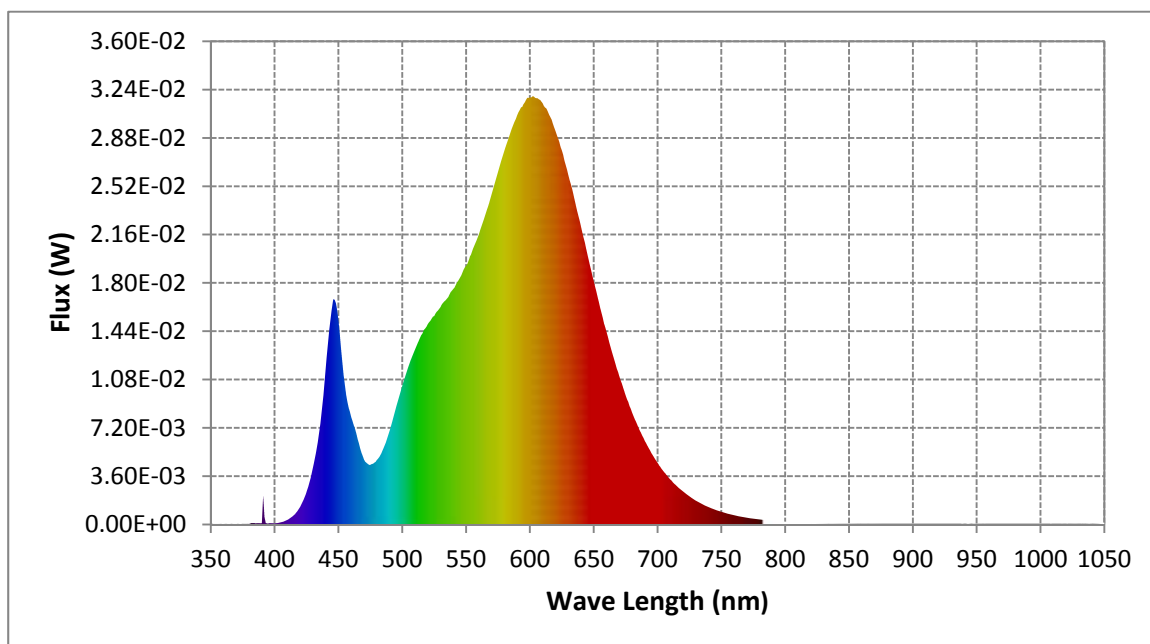
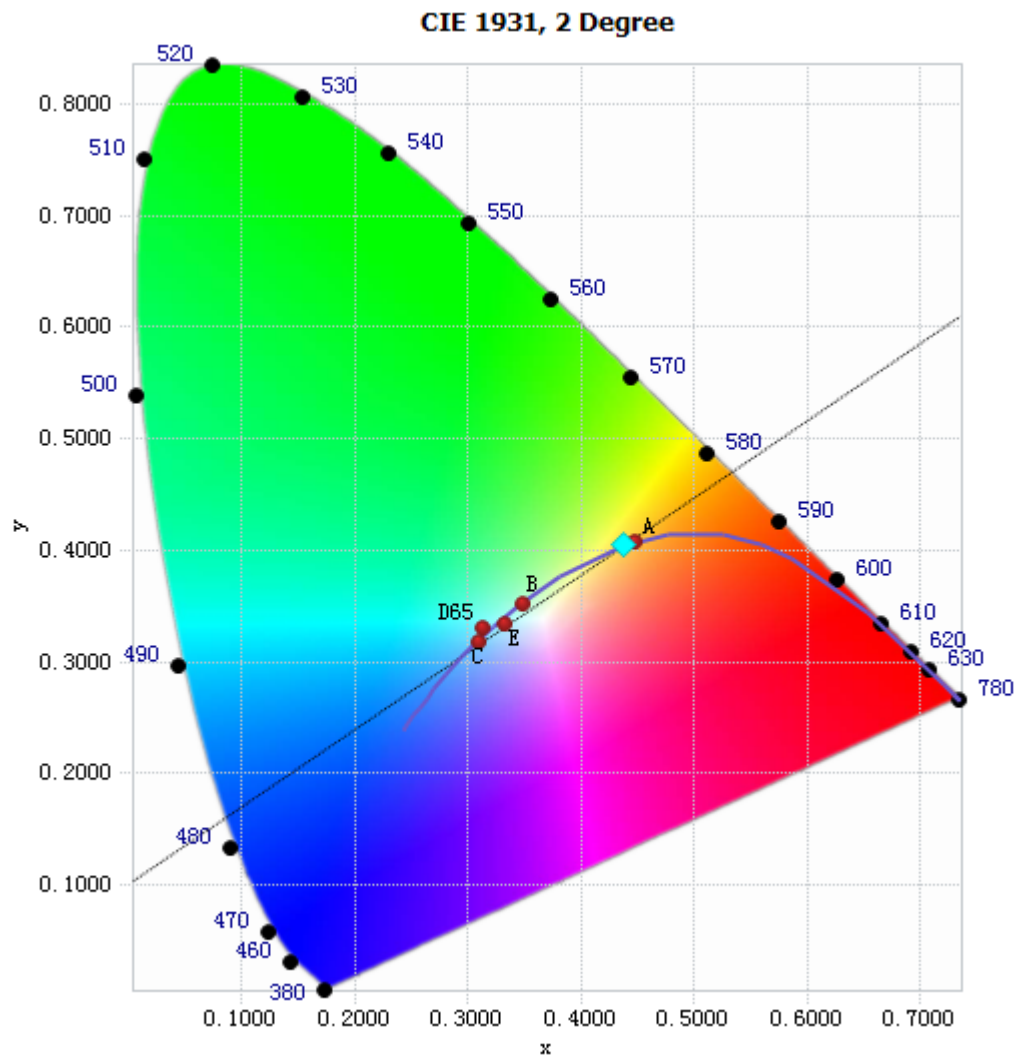


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.93E-05	485	5.61E-03	590	3.05E-02	695	5.33E-03
385	7.10E-05	490	6.99E-03	595	3.13E-02	700	4.59E-03
390	9.01E-05	495	8.69E-03	600	3.18E-02	705	3.91E-03
395	5.90E-05	500	1.03E-02	605	3.18E-02	710	3.34E-03
400	7.28E-05	505	1.18E-02	610	3.14E-02	715	2.86E-03
405	1.58E-04	510	1.30E-02	615	3.05E-02	720	2.45E-03
410	3.41E-04	515	1.41E-02	620	2.93E-02	725	2.08E-03
415	6.92E-04	520	1.49E-02	625	2.79E-02	730	1.76E-03
420	1.31E-03	525	1.55E-02	630	2.60E-02	735	1.50E-03
425	2.42E-03	530	1.62E-02	635	2.42E-02	740	1.28E-03
430	4.22E-03	535	1.68E-02	640	2.22E-02	745	1.08E-03
435	6.94E-03	540	1.76E-02	645	2.01E-02	750	9.38E-04
440	1.15E-02	545	1.84E-02	650	1.81E-02	755	8.00E-04
445	1.63E-02	550	1.93E-02	655	1.61E-02	760	6.75E-04
450	1.52E-02	555	2.05E-02	660	1.43E-02	765	5.80E-04
455	1.04E-02	560	2.16E-02	665	1.26E-02	770	4.99E-04
460	7.99E-03	565	2.31E-02	670	1.10E-02	775	4.21E-04
465	6.36E-03	570	2.46E-02	675	9.60E-03	780	3.62E-04
470	4.83E-03	575	2.62E-02	680	8.33E-03		
475	4.44E-03	580	2.79E-02	685	7.21E-03		
480	4.79E-03	585	2.93E-02	690	6.22E-03		

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

# Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4381, 0.4053)

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

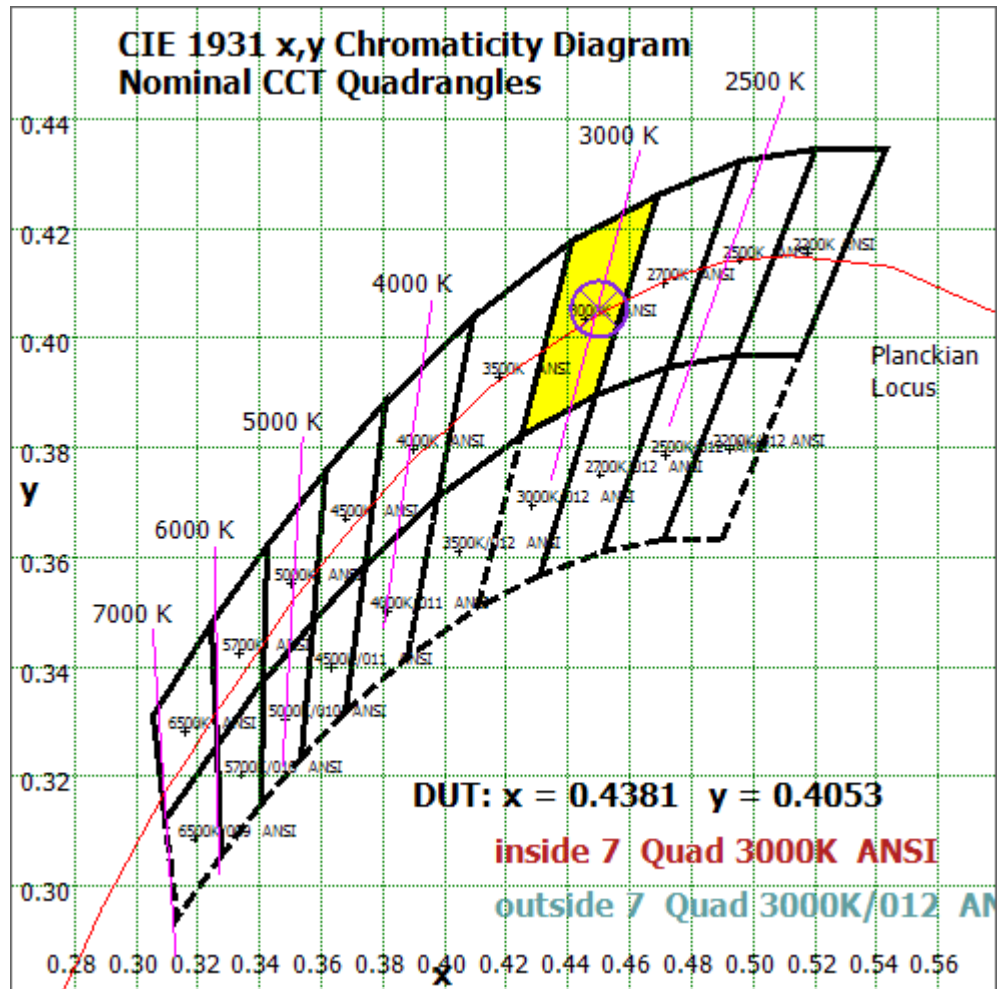


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

## Color Rendition Report – Sphere Spectroradiometer Method

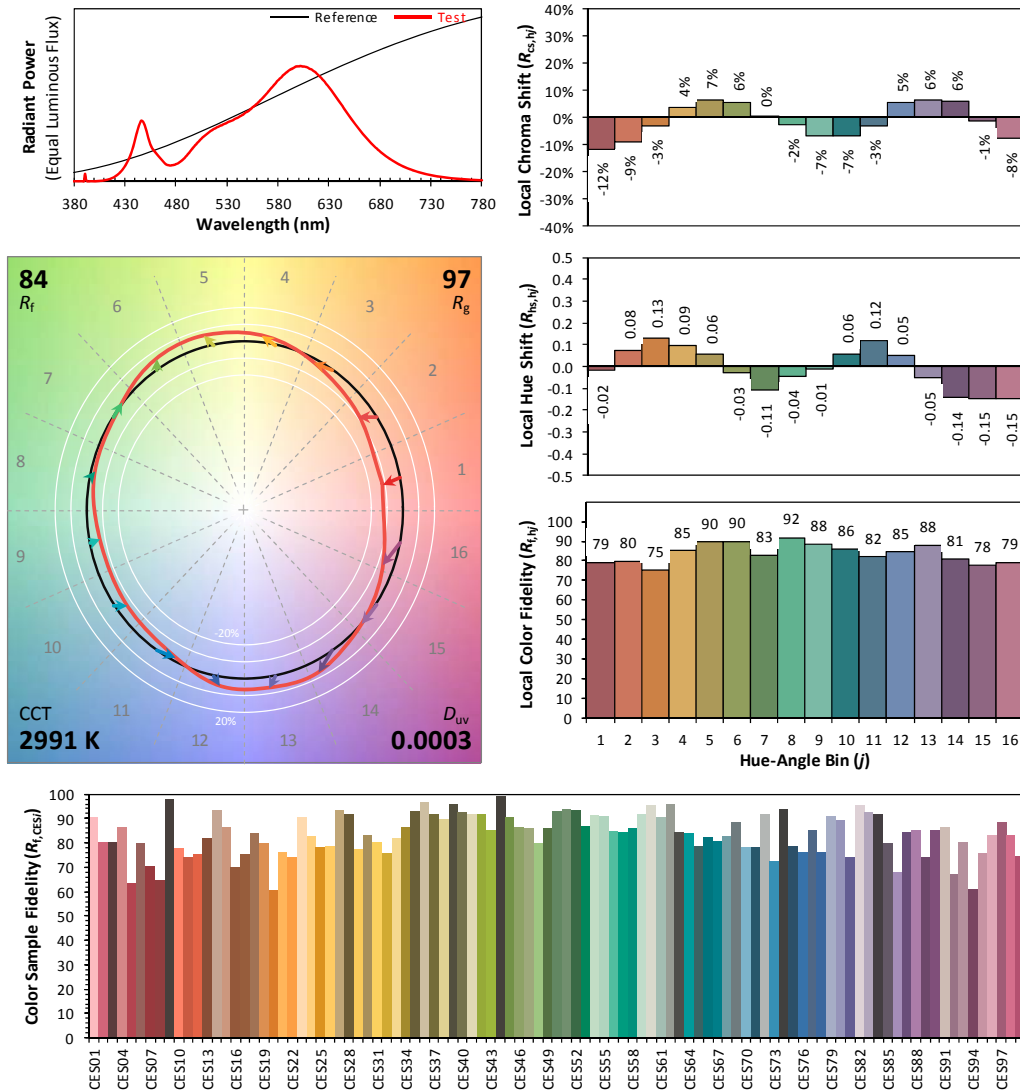
### ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2022/06/17

Model: 12T8/3F/830/BYP/RC



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

$x$  0.4381  
 $y$  0.4053  
 $u'$  0.2508  
 $v'$  0.5221

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	21.458	1.39%
10- 20	62.519	4.06%
20- 30	98.159	6.38%
30- 40	125.497	8.16%
40- 50	142.623	9.27%
50- 60	148.945	9.68%
60- 70	145.549	9.46%
70- 80	135.17	8.79%
80- 90	121.938	7.93%
90-100	109.56	7.12%
100-110	97.438	6.33%
110-120	85.397	5.55%
120-130	73.452	4.77%
130-140	61.624	4.01%
140-150	48.958	3.18%
150-160	35.183	2.29%
160-170	19.552	1.27%
170-180	5.24	0.34%
Total	1538.3	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	599.201	38.95%
60- 90	402.657	26.18%
0-90	1001.86	65.13%
90- 180	536.404	34.87%
0- 180	1538.3	100%

Table 5: Zonal Lumen

## Illuminance Plots- Goniophotometer Method

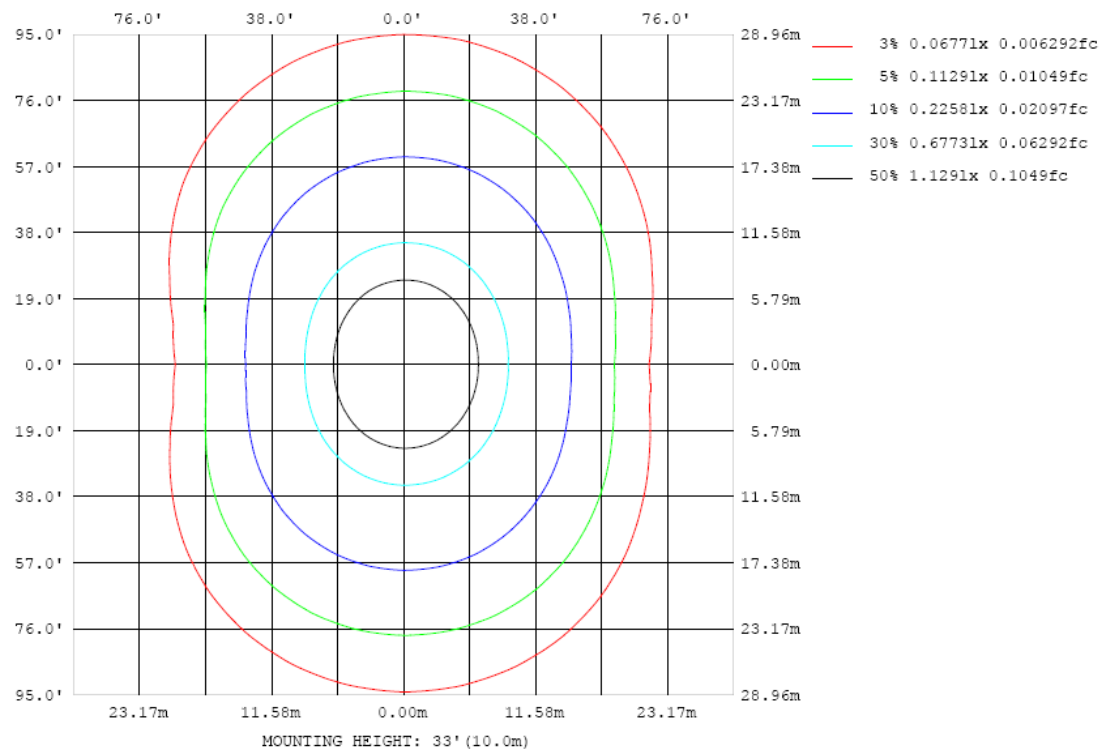


Chart 5: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

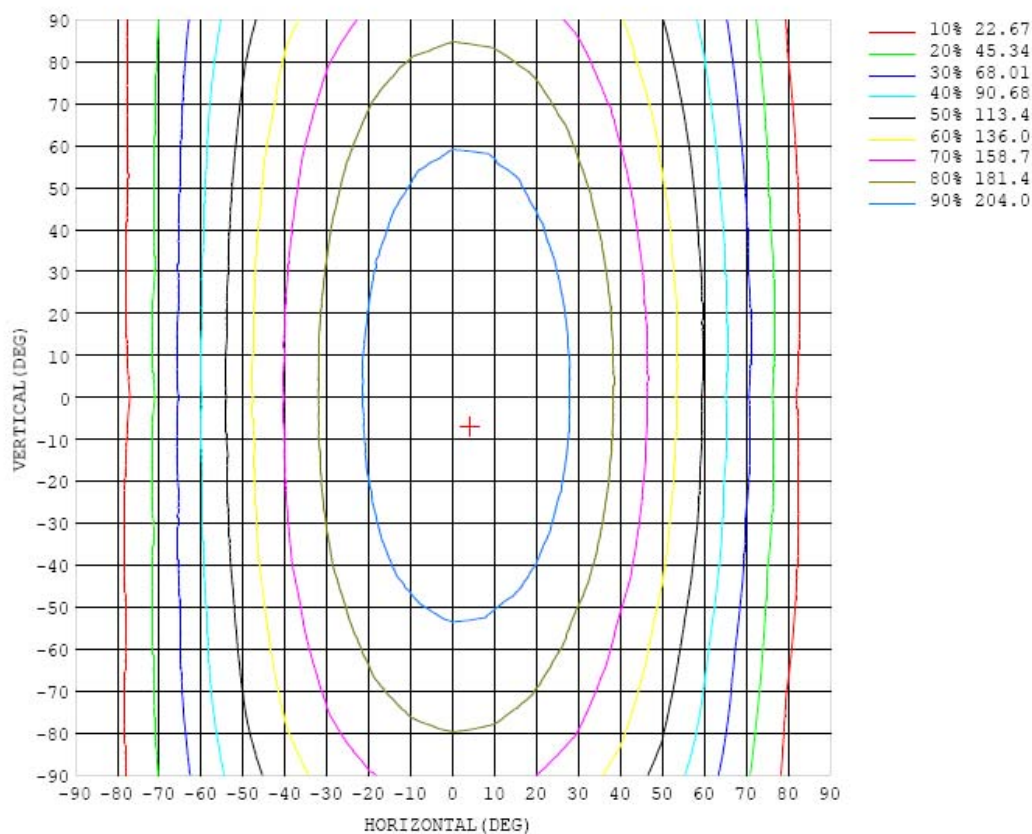


Chart 6: Isocandela Plot

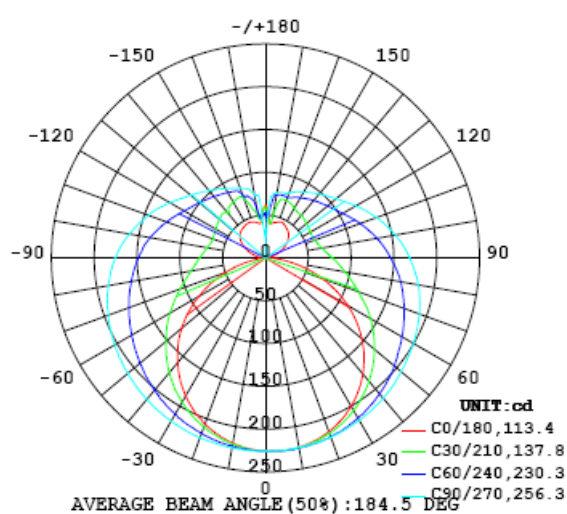


Chart 7: Polar Candela Distribution

## 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	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226
5	226	226	226	226	226	227	226	226	226	226	225	225	225	224	224	224	224	224	224
10	225	225	225	225	225	225	226	226	226	225	224	224	223	222	222	221	220	220	220
15	221	221	222	222	223	224	225	225	224	224	223	222	221	219	218	216	215	215	214
20	216	216	217	218	220	221	222	223	223	223	221	220	218	215	213	210	209	207	207
25	209	209	210	213	215	217	220	221	221	221	219	218	214	211	207	203	200	198	197
30	200	201	203	206	209	213	216	218	219	219	217	215	210	205	200	195	190	188	186
35	189	190	193	197	203	208	212	215	217	217	215	211	205	199	192	185	179	175	174
40	177	178	182	188	195	202	207	212	214	214	211	207	201	192	184	175	167	162	159
45	163	164	170	178	187	195	202	208	210	211	208	203	195	185	175	163	154	147	144
50	147	149	156	166	178	188	196	202	206	207	204	198	189	178	165	152	139	130	128
55	130	133	141	154	168	180	190	198	202	203	200	194	183	171	156	140	125	113	109
60	111	115	126	142	157	172	184	193	198	199	196	189	178	163	146	128	109	95.1	90.0
65	91.0	96.2	110	129	147	164	178	188	194	195	192	185	172	156	137	115	94.6	76.8	70.8
70	70.6	77.1	94.9	115	138	157	173	184	190	191	188	180	167	150	129	105	80.0	59.1	49.3
75	50.5	58.7	78.8	104	129	150	166	178	185	186	183	175	161	144	122	95.6	67.5	43.0	29.8
80	30.3	41.3	65.6	94.5	121	143	160	172	179	181	178	170	156	138	115	87.7	58.3	29.1	13.0
85	13.0	26.6	55.8	86.0	114	136	153	166	173	175	172	164	150	132	109	81.2	50.9	20.4	2.39
90	2.35	17.4	48.1	78.2	105	128	146	159	166	168	165	157	144	126	103	75.8	46.2	16.8	1.24
95	1.33	13.8	42.4	71.9	99.1	122	140	152	159	162	159	151	138	120	97.4	71.2	43.1	16.8	4.21
100	4.45	14.4	39.2	66.8	92.8	115	132	145	152	154	151	144	131	114	92.2	67.3	41.9	19.8	8.87
105	9.20	17.8	38.3	63.0	87.3	108	125	137	144	146	144	136	124	108	87.5	64.8	43.1	23.7	14.2
110	14.9	22.3	39.6	61.1	82.5	102	118	129	136	138	135	129	117	102	83.7	63.8	45.5	28.0	19.9
115	20.2	27.0	42.0	60.3	78.7	96.2	110	121	128	130	128	121	111	96.9	80.9	64.0	48.3	33.0	25.6
120	25.5	32.5	44.9	60.6	76.1	91.3	104	114	120	122	120	114	105	93.0	79.4	64.9	50.7	38.9	30.8
125	30.6	38.1	48.0	61.6	74.8	87.8	98.8	107	112	114	113	108	100	90.1	78.4	65.9	52.9	44.5	35.5
130	34.6	43.5	51.2	62.7	74.0	85.1	94.5	102	106	108	106	103	96.0	87.5	77.7	66.6	56.3	50.3	38.9
135	38.2	48.1	53.5	64.1	73.3	82.8	90.9	96.9	101	102	101	97.8	92.5	85.7	77.4	67.6	59.8	55.2	41.7
140	40.9	51.3	57.8	65.4	72.8	80.7	87.6	92.7	96.0	97.4	96.5	93.9	89.6	84.1	77.5	70.2	64.3	58.4	43.1
145	42.6	54.1	61.9	65.2	72.8	78.7	84.3	88.9	91.8	93.0	92.4	90.4	86.9	82.8	77.3	70.6	66.6	61.8	44.2
150	44.6	56.5	65.0	67.6	70.8	77.2	81.1	85.0	87.9	89.1	88.8	87.5	84.8	81.6	76.3	72.3	69.2	64.5	45.5
155	46.0	55.9	67.0	70.2	71.3	74.2	78.2	81.4	84.0	85.5	85.5	84.6	82.5	79.1	76.4	72.7	70.8	66.0	45.8
160	44.8	47.9	66.3	71.6	73.3	74.1	75.4	77.2	78.9	80.2	80.4	80.3	79.6	78.8	73.2	72.1	67.2	59.3	44.8
165	42.9	41.3	51.9	71.2	72.6	74.5	76.0	77.1	77.9	78.7	79.0	79.2	77.7	71.5	66.9	60.6	56.5	48.8	43.4
170	41.0	38.9	39.2	47.8	66.0	73.4	74.7	75.6	76.3	77.2	77.2	76.2	65.4	56.3	52.3	49.0	46.7	43.2	41.0
175	48.1	47.0	45.2	44.2	49.1	47.9	55.1	61.1	68.8	71.6	58.0	43.2	41.2	48.3	47.6	51.0	48.4	49.6	49.8
180	61.0	60.7	59.8	58.3	54.8	48.8	45.5	39.0	38.9	1.39	29.9	43.1	40.4	51.0	53.0	57.8	59.8	60.7	60.8

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	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226	226		
5	224	224	224	224	225	225	225	226	226	226	226	226	226	226	226	226	226		
10	220	220	221	222	222	224	224	225	225	225	226	225	226	225	225	225	225		
15	214	215	216	218	220	221	223	224	224	225	225	225	224	223	222	222	222		
20	207	208	211	213	216	218	221	222	223	224	224	223	222	220	218	218	217		
25	198	200	203	207	211	215	218	221	222	222	222	220	219	216	213	211	210		
30	187	190	195	200	206	211	215	218	220	220	220	217	214	211	207	203	201		
35	175	179	186	193	200	207	212	216	218	219	217	214	209	204	199	194	191		
40	162	167	175	184	193	202	208	213	216	216	214	210	204	197	190	184	179		
45	146	153	164	175	187	197	204	210	213	213	211	205	197	189	180	171	165		
50	131	140	152	166	180	191	201	207	210	210	207	200	191	180	169	158	150		
55	114	125	141	156	172	186	197	203	207	206	203	195	184	171	157	144	135		
60	95.5	110	129	147	165	180	192	200	203	203	198	189	177	162	145	130	117		
65	76.7	94.7	117	140	158	175	188	196	200	199	193	184	170	153	134	115	98.9		
70	58.3	80.2	106	131	152	169	183	192	195	194	189	178	163	144	122	99.2	79.9		
75	41.3	67.4	96.4	124	146	164	178	187	191	190	184	172	156	136	111	84.6	61.3		
80	27.4	57.1	88.4	117	141	159	173	182	186	185	178	166	149	128	101	71.4	44.0		
85	18.6	49.8	81.9	111	136	154	168	178	181	180	173	160	143	120	92.4	60.8	29.8		
90	15.4	45.6	77.1	106	130	148	163	172	176	173	167	154	137	114	85.3	53.1	20.8		
95	15.6	42.6	72.7	101	124	143	157	165	169	167	160	148	131	108	79.7	48.2	17.2		
100	19.0	41.5	69.1	95.5	118	137	150	158	162	160	153	142	124	102	74.5	44.6	17.0		
105	24.2	43.0	66.4	90.6	112	130	143	150	153	152	145	134	117	95.7	70.2	42.9	20.1		
110	30.3	45.8	65.5	86.7	107	123	135	143	145	144	138	127	111	90.3	66.9	43.6	25.4		
115	36.2	49.2	66.1	83.9	101	116	128	135	138	136	130	119	104	85.7	65.3	45.7	31.5		
120	42.1	53.0	67.2	82.5	96.9	110	120	127	129	127	122	112	98.4	82.5	65.1	48.8	37.1		
125	47.2	56.8	68.6	81.5	94.0	105	113	119	121	119	115	106	94.2	80.6	65.8	52.8	42.8		
130	51.8	59.6	70.4	81.0	91.4	101	108	112	114	113	108	101	90.9	79.3	67.1	56.9	47.0		
135	56.5	63.1	72.0	80.8	89.4	96.9	103	107	108	107	103	96.7	88.5	78.7	69.1	60.9	52.3		
140	61.0	66.5	73.7	80.9	87.6	93.7	98.6	101	103	101	98.4	93.2	86.4	78.7	71.2	64.5	56.6		
145	64.4	69.6	73.7	80.7	86.0	90.8	94.8	97.1	97.9	96.9	94.3	90.2	85.0	79.0	73.1	67.0	59.2		
150	66.7	72.4	75.5	81.4	84.7	88.4	91.2	93.0	93.6	92.6	90.8	87.7	83.9	79.4	74.7	69.2	60.8		
155	68.1	74.7	77.0	81.0	84.1	87.1	89.5	91.1	91.8	90.2	88.1	85.8	82.9	79.4	75.5	72.5	64.2		
160	67.5	74.1	77.0	81.0	84.1	87.1	89.5	91.1	91.8	90.2	88.1	85.8	82.9	79.4	75.5	72.5	64.2		
165	67.5	74.1	77.0	81.0	84.1	87.1	89.5	91.1	91.8	90.2	88.1	85.8	82.9	79.4	75.5	72.5	64.2		
170	67.5	74.1	77.0	81.0	84.1	87.1	89.5	91.1	91.8	90.2	88.1	85.8	82.9	79.4	75.5	72.5	64.2		
175	67.5	74.1	77.0	81.0	84.1	87.1	89.5	91.1	91.8	90.2	88.1	85.8	82.9	79.4	75.5	72.5	64.2		
180	67.5	74.1	77.0	81.0	84.1	87.1	89.5	91.1	91.8	90.2	88.1	85.8	82.9	79.4	75.5	72.5	64.2		

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 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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