

## 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 Tube

**Model: 17PLL/835/BYP/R**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ22070009e

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

Review by:



Engineer: April Zou  
Jul. 15, 2022

Approved by:



Manager: Jim Zhang  
Jul. 15, 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: 17PLL/835/BYP/R

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
136.9	2177.2	15.90	0.9782
CCT (K)	CRI	Stabilization Time (Light & Power)	
3469	82.0	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** : Jul. 08, 2022

**Date of Test** : Jul. 12, 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-79-2008 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>	: 17PLL/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 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)	0.136	0.063
Power Factor	0.9782	0.9095
Test Power (W)	15.90	15.76
THD A%	18.52	20.30
Luminous Efficacy (lm/W)	136.9	138.0
Total Luminous Flux (lm)	2177.2	2175.6
Color Rendering Index (CRI)	82.0	
R9	2	
Correlated Color Temperature (CCT)(K)	3469	
Chromaticity Chroma x	0.4078	
Chromaticity Chroma y	0.3938	
Chromaticity Chroma u	0.2360	
Chromaticity Chroma v	0.3419	
Duv	0.0008	
Chromaticity Chroma u'	0.2360	
Chromaticity Chroma v'	0.5129	

Special Color Rendering Indices	
R1	79.8
R2	89.1
R3	96.2
R4	80.7
R5	80.2
R6	85.9
R7	84
R8	59.8
R9	2
R10	75.1
R11	80
R12	66.2
R13	82
R14	98.2

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)	0.138
Power Factor	0.9789
Power (W)	16.18
Luminous Efficacy (lm/W)	133.6
Total Luminous Flux (lm)	2161.3
Beam Angle ( ° )	108.5 (0°-180°) / 143.4 (90°-270°)
Center Beam Candle Power (cd)	481
Maximum Beam Candle Power (cd)	482.5 (At: C=320.0, Gamma=2.5)
Spacing Criteria	1.20 (0°-180°) / 1.46 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	55.11%
Zonal Lumens in the 60 °-90 °Zone	24.26%
Zonal Lumens in the 90 °-120 °Zone	10.63%
Zonal Lumens in the 120 °-180 °Zone	9.99%

Table 3: Test data per Goniophotometer Method

## Spectral Power Distribution - Sphere Spectroradiometer Method

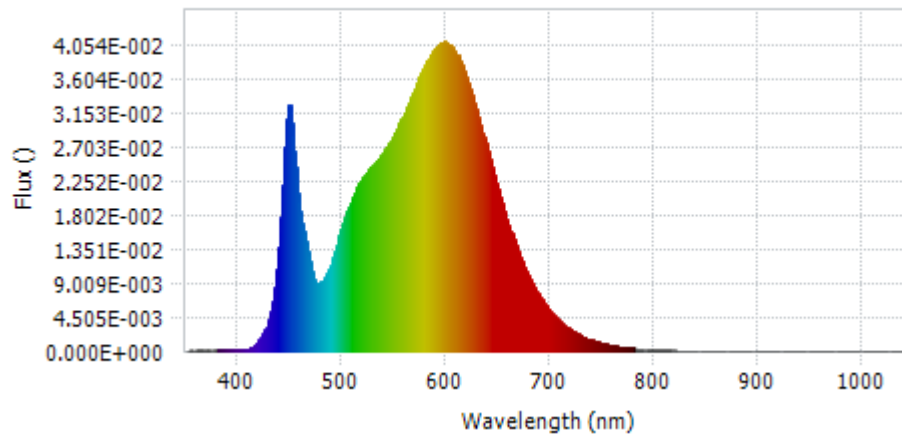
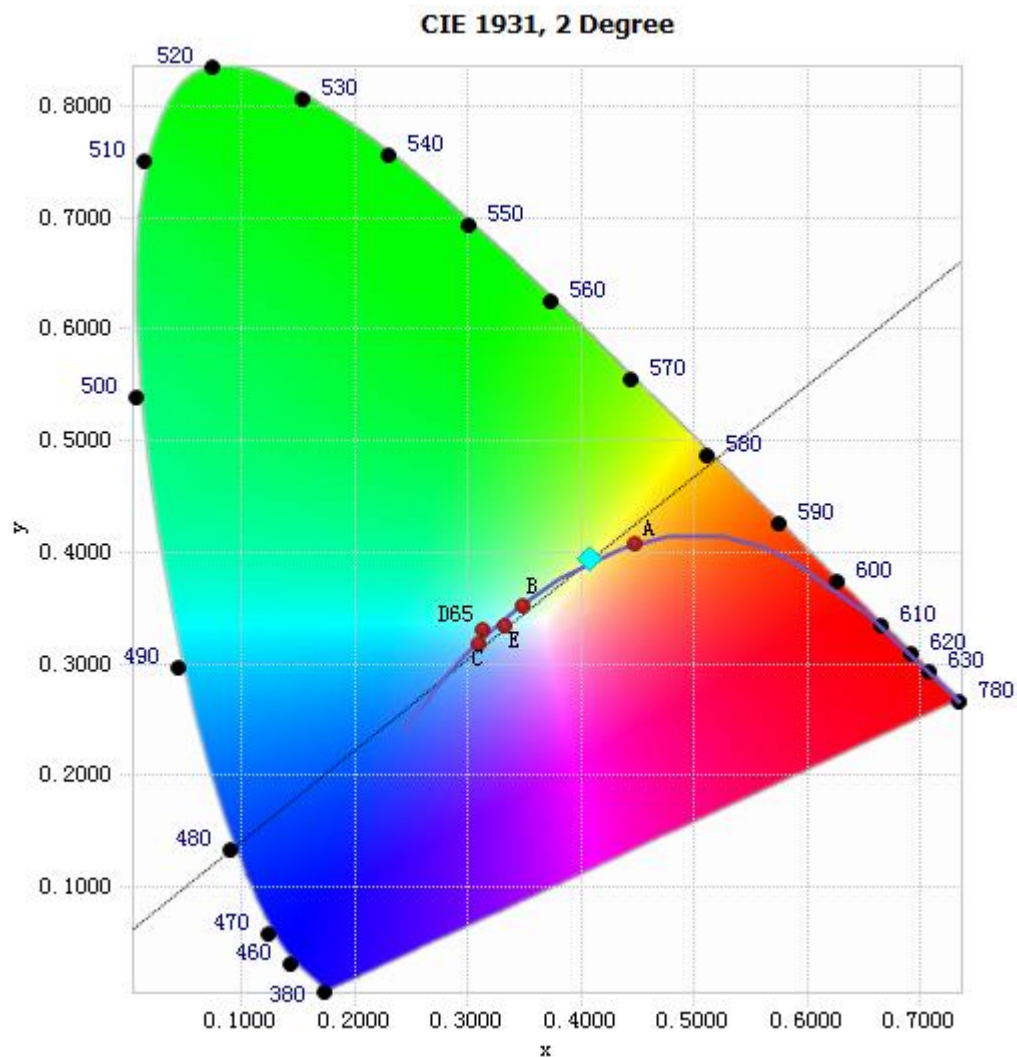


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.77E-04	485	1.02E-02	590	4.02E-02	695	6.20E-03
385	1.80E-04	490	1.19E-02	595	4.08E-02	700	5.31E-03
390	1.55E-04	495	1.42E-02	600	4.08E-02	705	4.53E-03
395	1.64E-04	500	1.66E-02	605	4.03E-02	710	3.86E-03
400	1.39E-04	505	1.86E-02	610	3.93E-02	715	3.29E-03
405	2.16E-04	510	2.05E-02	615	3.79E-02	720	2.82E-03
410	3.69E-04	515	2.19E-02	620	3.61E-02	725	2.38E-03
415	7.45E-04	520	2.30E-02	625	3.39E-02	730	2.03E-03
420	1.45E-03	525	2.39E-02	630	3.15E-02	735	1.72E-03
425	2.58E-03	530	2.47E-02	635	2.89E-02	740	1.47E-03
430	4.72E-03	535	2.55E-02	640	2.64E-02	745	1.26E-03
435	8.52E-03	540	2.64E-02	645	2.38E-02	750	1.06E-03
440	1.56E-02	545	2.75E-02	650	2.13E-02	755	9.11E-04
445	2.69E-02	550	2.88E-02	655	1.89E-02	760	7.74E-04
450	3.27E-02	555	3.01E-02	660	1.68E-02	765	6.50E-04
455	2.43E-02	560	3.15E-02	665	1.48E-02	770	5.63E-04
460	1.77E-02	565	3.31E-02	670	1.29E-02	775	4.88E-04
465	1.47E-02	570	3.48E-02	675	1.13E-02	780	4.16E-04
470	1.11E-02	575	3.64E-02	680	9.70E-03		
475	9.12E-03	580	3.79E-02	685	8.40E-03		
480	9.25E-03	585	3.92E-02	690	7.24E-03		

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

## Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4078, 0.3938)

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

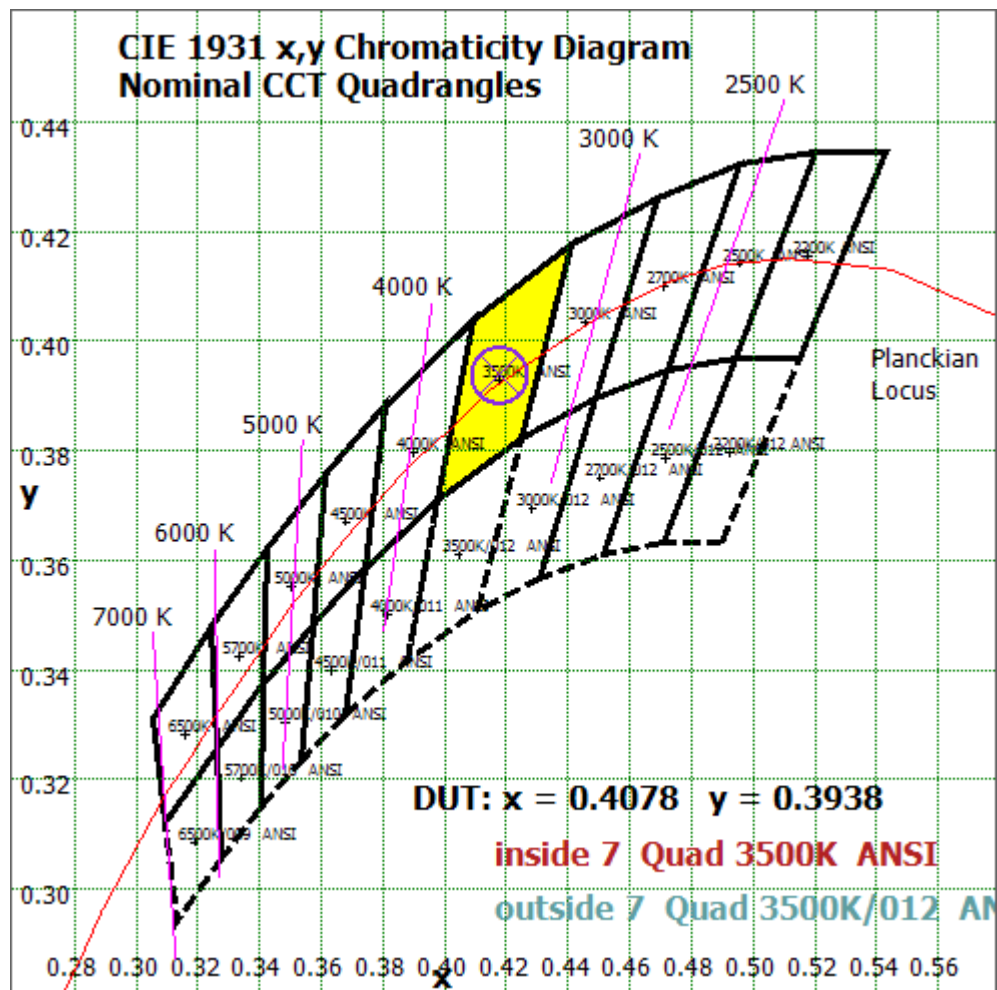


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

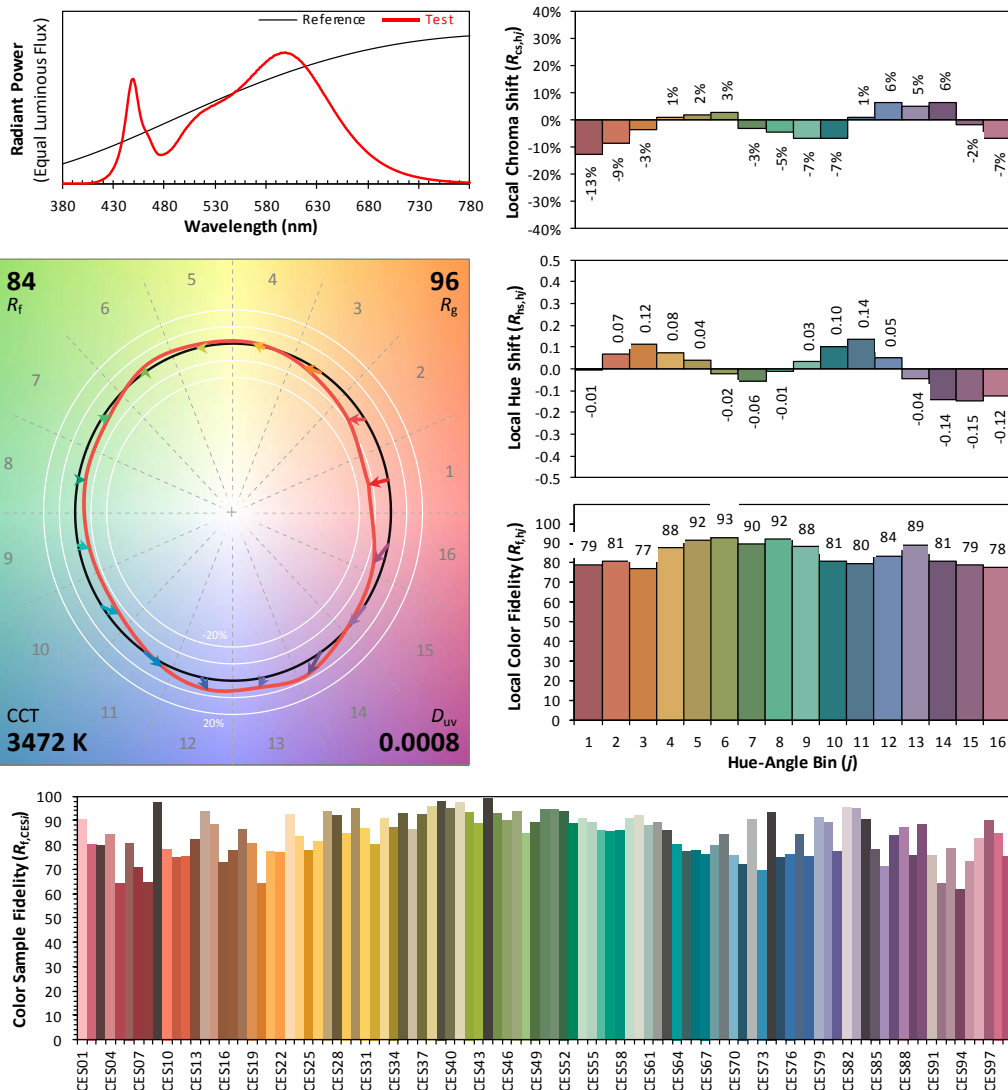
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2022/07/12

Model: 17PLL/835/BYP/R



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

$x$  0.4078  
 $y$  0.3938  
 $u'$  0.2360  
 $v'$  0.5129

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	45.657	2.11%
10- 20	132.218	6.12%
20- 30	205.228	9.50%
30- 40	257.461	11.91%
40- 50	280.217	12.97%
50- 60	270.411	12.51%
60- 70	232.426	10.75%
70- 80	175.922	8.14%
80- 90	115.907	5.36%
90-100	84.131	3.89%
100-110	75.324	3.49%
110-120	70.383	3.26%
120-130	64.974	3.01%
130-140	56.34	2.61%
140-150	44.226	2.05%
150-160	29.881	1.38%
160-170	16.539	0.77%
170-180	4.049	0.19%
Total	2161.3	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1191.19	55.11%
60- 90	524.255	24.26%
0-90	1715.45	79.37%
90- 180	445.847	20.63%
0- 180	2161.3	100%

Table 5: Zonal Lumen

## Illuminance Plots- Goniophotometer Method

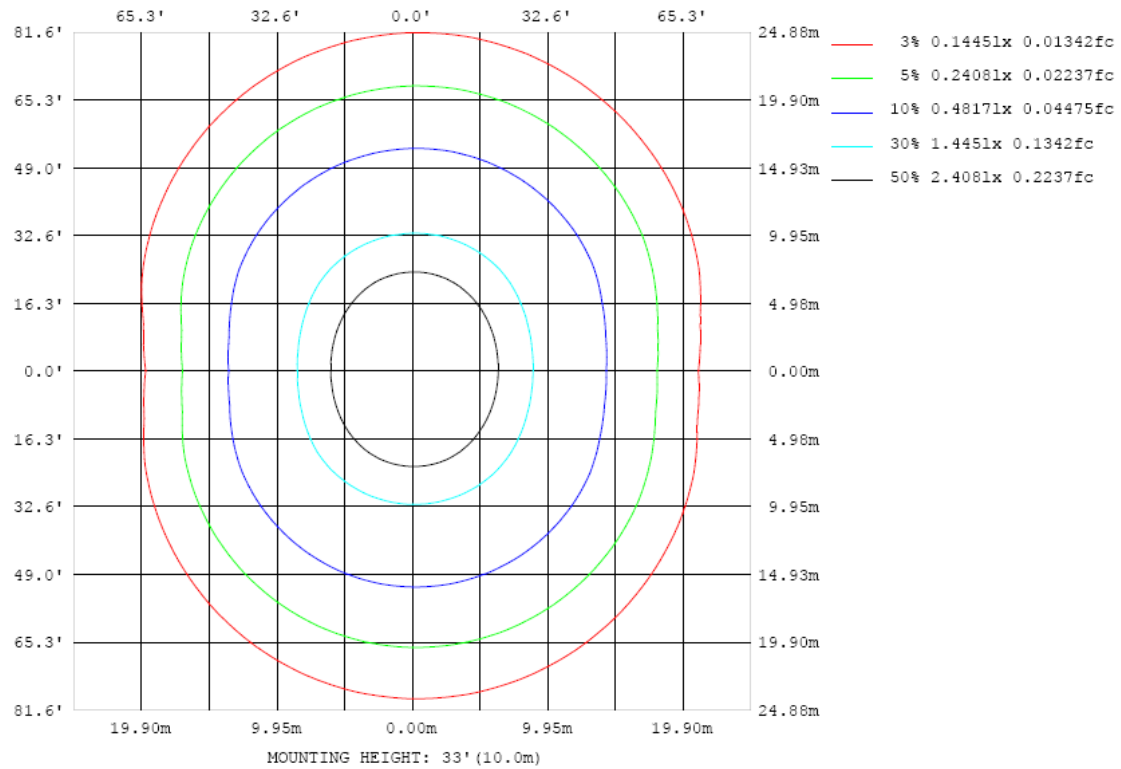


Chart 5: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

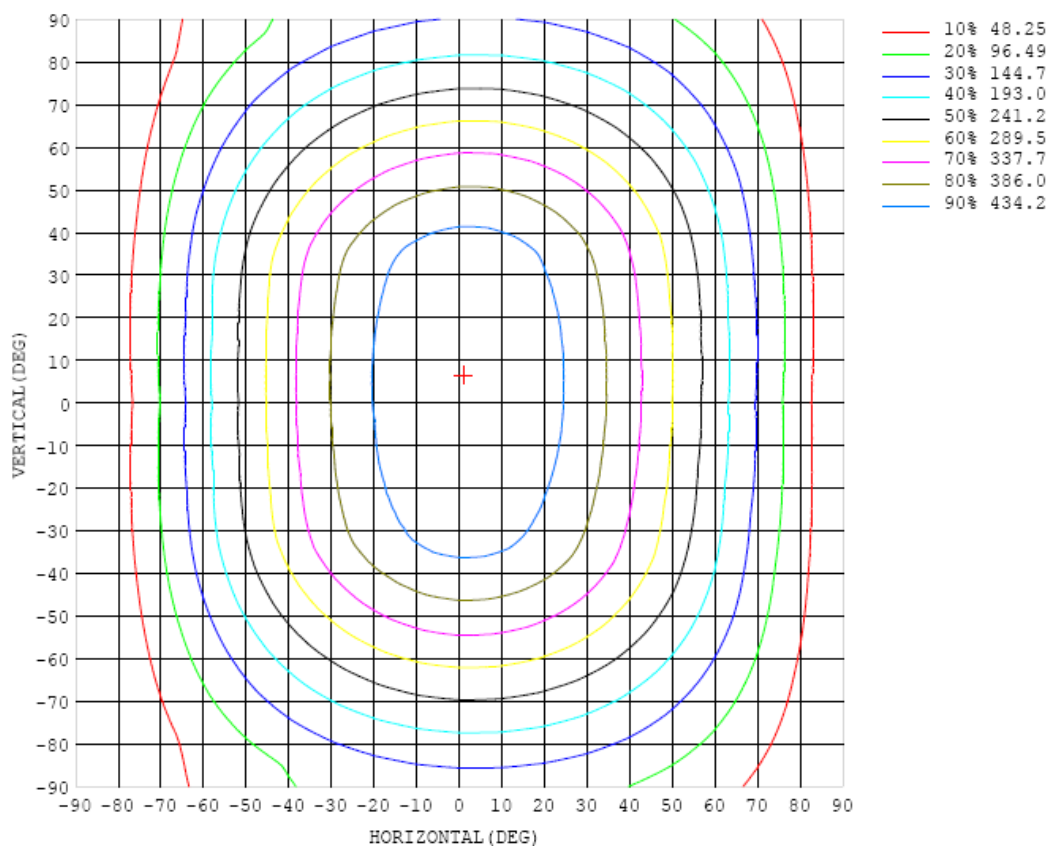


Chart 6: Isocandela Plot

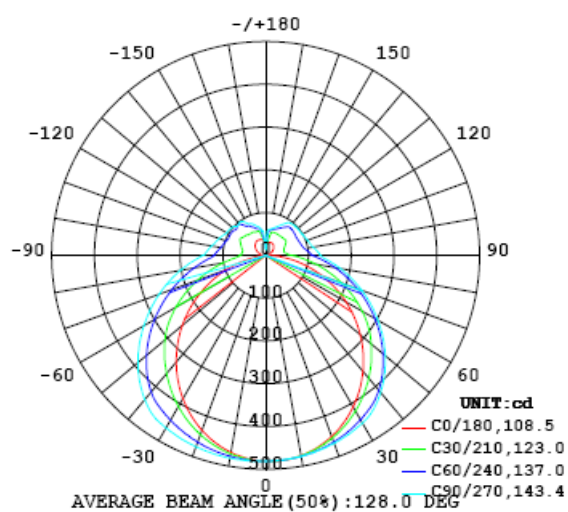


Chart 7: Polar Candela Distribution

## 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	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481
5	481	481	481	481	480	481	480	480	480	479	479	478	478	478	478	477	477	477	477
10	475	475	475	476	476	477	477	478	477	477	476	475	473	472	471	469	468	467	467
15	465	465	465	467	469	471	472	473	474	472	472	470	466	464	461	457	455	454	453
20	451	451	452	454	458	462	464	467	468	468	466	462	458	453	448	442	438	435	436
25	432	432	435	439	444	450	455	459	461	461	458	454	447	440	432	424	418	414	413
30	409	410	413	420	428	436	443	449	452	452	450	443	435	425	414	403	394	388	387
35	383	384	389	398	409	421	430	437	439	439	436	430	421	408	394	380	368	360	357
40	354	356	363	375	389	403	412	416	419	418	414	408	400	389	373	355	339	329	325
45	322	325	334	349	366	379	386	391	394	393	390	382	373	362	348	328	309	295	291
50	289	292	304	322	339	350	358	363	366	364	361	354	343	331	317	300	277	260	254
55	253	257	273	294	308	319	327	333	335	334	330	322	312	299	284	267	245	224	216
60	217	222	240	260	274	286	295	301	304	303	299	290	279	265	249	231	212	187	177
65	179	186	208	225	240	252	262	268	272	271	266	258	245	231	214	195	175	150	138
70	141	150	172	189	205	218	228	236	240	239	234	225	213	197	178	158	137	114	98.1
75	103	114	136	153	170	185	196	204	208	208	203	194	181	165	145	123	100	78.5	60.0
80	66.3	80.6	99.9	119	137	153	165	173	178	177	173	163	150	133	114	91.3	67.4	44.3	26.4
85	33.4	47.7	67.1	88.0	107	123	135	144	149	149	144	135	122	106	86.3	64.2	41.9	19.1	4.41
90	8.35	19.9	41.0	62.3	80.1	96.2	109	120	126	129	127	120	109	94.1	76.1	55.8	33.7	13.5	2.38
95	0.84	9.63	29.2	50.1	69.2	86.6	101	112	118	121	119	112	102	87.7	70.4	52.0	32.8	16.4	5.54
100	3.41	10.3	25.9	44.2	62.1	78.1	92.1	103	110	112	111	106	96.3	83.9	68.9	52.4	36.1	23.2	9.33
105	6.15	16.6	27.9	44.1	60.7	75.3	88.1	97.9	105	108	107	102	93.6	82.2	68.7	54.4	41.6	27.1	13.5
110	9.55	19.9	32.9	45.5	60.4	73.8	85.6	94.9	101	104	103	99.3	91.7	81.6	69.8	58.6	47.1	30.3	17.8
115	13.3	23.4	38.7	49.2	61.3	73.3	84.1	92.7	98.6	101	101	97.2	90.5	81.8	72.5	63.0	51.1	33.4	21.9
120	17.0	27.1	41.7	53.9	64.2	74.0	83.4	91.1	96.5	99.0	98.9	95.6	90.3	83.5	75.6	66.9	51.7	36.6	25.5
125	20.5	30.8	42.7	58.2	67.7	76.1	84.1	90.7	95.2	97.6	97.6	95.4	91.3	85.4	78.4	69.0	52.5	39.8	29.1
130	23.7	34.3	44.3	58.5	70.8	78.4	85.5	91.1	95.2	97.4	97.5	95.7	92.0	87.0	80.3	67.2	53.5	42.1	32.3
135	26.6	37.4	46.1	57.4	71.0	80.0	86.2	91.3	94.9	96.9	97.1	95.5	92.4	87.7	78.0	65.7	54.5	45.2	34.9
140	29.1	39.3	48.1	56.9	67.7	78.2	86.3	90.9	94.2	96.0	96.2	94.8	91.7	84.1	74.1	64.4	55.4	46.3	37.1
145	31.1	42.0	49.8	56.8	64.9	73.1	81.1	87.6	91.9	93.8	93.5	90.5	85.3	78.4	70.6	63.2	56.2	48.3	38.9
150	32.4	44.8	51.2	57.0	62.9	68.8	74.9	79.9	83.4	85.2	84.8	82.4	78.5	73.4	67.7	62.5	57.0	50.0	39.9
155	32.6	45.8	51.8	57.1	61.5	65.5	69.6	73.3	75.9	77.1	77.0	75.4	72.7	69.2	65.4	61.6	56.9	52.6	39.8
160	32.5	47.6	53.4	57.1	60.3	63.5	65.5	67.9	69.8	70.7	70.6	69.7	68.0	65.9	63.9	59.7	57.1	51.9	39.4
165	31.2	39.2	49.8	56.7	59.2	61.3	62.9	63.9	65.1	65.7	65.8	65.3	64.5	63.1	60.7	59.0	57.1	49.5	38.6
170	29.6	30.4	33.0	38.7	52.9	59.1	59.8	61.0	62.0	62.6	62.8	62.5	60.4	56.2	51.5	47.6	42.8	38.8	36.1
175	28.2	28.1	28.0	28.0	28.0	31.3	40.8	49.2	56.0	58.7	47.9	37.1	34.7	34.0	33.7	33.7	34.0	34.2	34.6
180	39.8	39.5	38.0	35.2	30.4	22.1	18.0	21.7	0.00	14.5	8.83	4.18	11.8	24.8	29.9	35.8	39.2	47.4	39.9

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	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481		
5	477	478	478	479	480	480	481	481	482	482	482	482	482	482	482	481	481		
10	468	470	471	473	475	477	479	480	481	482	482	481	480	480	478	477	476		
15	455	457	460	464	468	472	475	478	479	480	479	478	475	474	470	469	466		
20	437	440	446	452	459	464	470	474	476	476	475	472	469	465	459	455	453		
25	415	421	428	437	447	455	463	469	471	472	470	465	459	452	445	439	435		
30	390	397	408	420	433	445	455	462	466	466	462	456	448	438	427	418	412		
35	362	371	385	401	418	433	445	454	458	458	454	445	433	421	407	395	387		
40	331	343	360	381	401	416	428	435	440	440	438	431	418	402	385	370	359		
45	297	313	335	359	378	392	404	412	417	418	415	408	398	382	360	342	329		
50	262	281	308	331	349	364	376	385	390	391	388	381	371	357	335	313	297		
55	226	249	277	298	317	333	346	355	360	362	358	352	341	327	308	282	263		
60	188	216	242	264	283	300	314	323	329	330	327	319	308	294	276	251	228		
65	152	181	206	228	249	266	281	291	297	298	294	286	274	260	242	220	192		
70	115	144	169	193	214	233	248	259	265	266	261	253	240	225	206	185	157		
75	80.6	107	134	159	182	201	217	227	233	234	230	220	207	190	170	149	122		
80	45.8	72.9	101	128	151	170	186	197	202	203	198	188	174	156	136	113	88.5		
85	19.2	45.8	73.3	99.1	123	142	157	167	173	173	168	158	144	126	104	78.8	54.4		
90	12.6	35.7	60.4	83.6	104	121	134	142	147	146	141	131	117	97.9	75.7	50.9	25.7		
95	16.5	33.9	56.0	77.4	97.3	114	126	134	136	134	128	116	101	81.7	60.0	36.6	13.9		
100	23.3	36.9	55.1	74.4	92.1	107	118	126	128	126	120	108	93.2	75.0	54.4	32.8	13.1		
105	26.9	42.2	57.1	72.8	89.1	102	113	119	121	119	112	102	87.9	71.1	52.1	32.6	16.7		
110	30.6	48.8	60.8	74.1	86.0	99.1	108	114	116	114	108	97.4	84.4	68.2	51.6	35.5	20.6		
115	33.9	53.0	64.6	76.4	87.2	95.8	103	109	111	109	103	92.7	80.7	68.1	53.7	40.7	21.8		
120	36.1	53.0	69.2	77.8	88.5	96.3	102	105	106	104	98.8	91.0	81.8	69.2	53.7	41.8	26.1		
125	39.0	53.2	71.1	80.3	87.7	95.9	101	104	105	103	98.0	91.1	81.4	67.0	61.5	42.1	30.5		
130	41.6	54.5	67.7	83.8	88.8	92.7	98.9	102	102	100	96.3	88.5	77.2	73.6	62.1	45.1	34.0		
135	44.3	55.1	66.0	76.3	91.7	94.6	95.0	96.0	96.5	94.6	90.0	85.7	82.9	70.4	54.0	47.1	37.1		
140	47.1	56.0	62.8	73.9	84.1	95.9	98.3	98.1	97.1	95.3	93.2	89.3	77.8	63.0	57.9	47.6	39.7		
145	49.4	56.2	62.2	71.0	78.5	84.9	93.1	96.4	97.2	95.2	91.5	82.9	71.2	68.1	57.0	49.2	42.6		
150	50.4	55.9	62.6	67.8	73.7	80.2	81.9	83.8	86.3	85.8	83.0	78.9	73.7	64.6	58.2	50.8	44.5		
155	49.2	56.4	60.2	65.1	68.0	73.3	77.5	80.9	82.3	82.0	79.8	73.0	68.6	63.6	58.5	52.8	43.7		
160	43.5	55.6	59.4	63.4	66.0	67.7	71.8	75.0	76.0	75.5	73.9	70.1	66.8	63.2	58.9	55.0	46.9		
165	40.0	50.8	58.6	61.6	63.4	64.8	64.8	68.6	70.0	69.8	68.9	67.0	64.3	62.0	59.3	54.5	42.0		
170	36.1	37.1	41.3	45.4	51.5	58.0	63.4	61.7	58.4	64.7	65.0	64.2	62.5	60.8	52.7	37.0	30.7		
175	34.7	34.8	34.9	34.9	34.8	34.9	35.5	37.1	46.6	54.5	52.8	50.5	42.7	32.2	28.7	28.5	28.4		
180	40.0	39.5	38.0	35.1	30.4	24.1	18.4	13.6	14.3	5.99	14.3	13.7	18.4	23.8	29.8	34.7	37.7		

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 30min, 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.

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

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