

## 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: 9.5PLV/8CCTS/DIR

### Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23050029b

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

Review by:

*Wei Fei*

Approved by



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Engineer: Wei Fei

Jul. 26, 2023

Jul. 26, 2023

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## TEST SUMMARY

Tested Model	9.5PLV/8CCTS/DIR 3000K Setting	9.5PLV/8CCTS/DIR 3500K Setting	9.5PLV/8CCTS/DIR 4000K Setting
Luminous Efficacy (Lumens /Watt)	91.3	95.1	94.7
Total Luminous Flux (Lumens)	1160.4	1183.5	1209.5
Power (Watts)	12.71	12.45	12.77
Power Factor	0.9913	0.9911	0.9913
CCT (K)	3031	3440	4005
CRI	82.7	84.0	83.4
Stabilization Time(Light & Power)	50	50	50
Note	3000K	3500K	4000K

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: May 24, 2023
<b>Date of Test</b>	: May 25, 2023 & Jul. 26, 2023
<b>Test item</b>	: Total Luminous Flux, 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

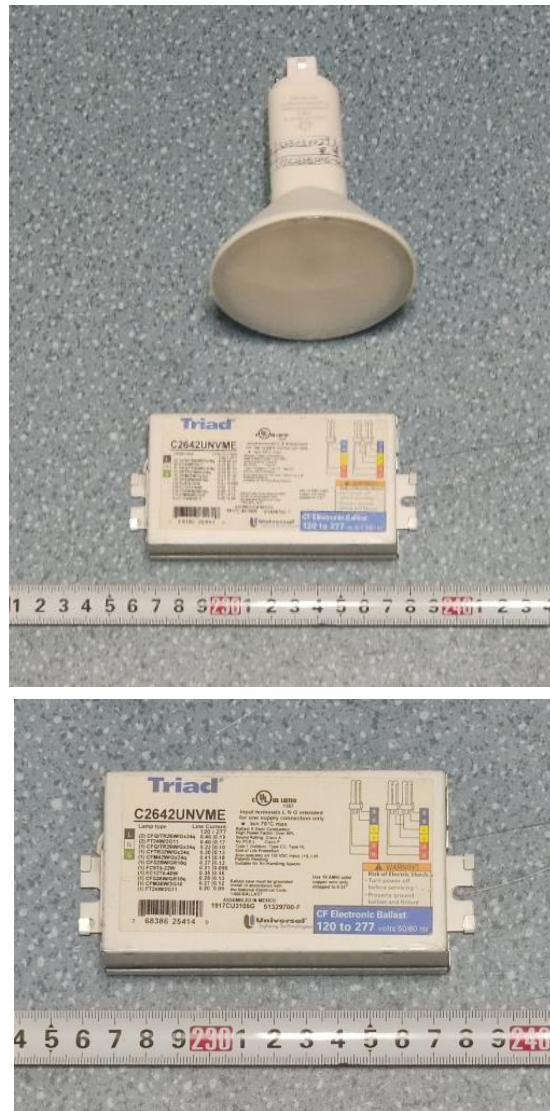


Figure 1- Overview of the sample

### Equipment Under Test(EUT)

<b>Name</b>	: LED Lamp
<b>Model</b>	: 9.5PLV/8CCTS/DIR
<b>Electrical Ratings</b>	: 120-277 Vac, 50/60Hz
<b>Product Description</b>	: Color-Tunable 3000K/3500K/4000K LED Lamp supplied by a high frequency fluorescent lamp ballast: C2642UNVME
<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 (3000K Setting)

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)	0.107	0.050
Power Factor	0.9913	0.9436
Test Power (W)	12.71	13.16
THD A%	10.33	5.18
Luminous Efficacy (lm/W)	91.3	88.2
Total Luminous Flux (lm)	1160.4	1160.5
Color Rendering Index (CRI)	82.7	
R9	6.8	
Correlated Color Temperature (CCT)(K)	3031	
Chromaticity Chroma x	0.4325	
Chromaticity Chroma y	0.3989	
Chromaticity Chroma u	0.2500	
Chromaticity Chroma v	0.3458	
Duv	-0.0015	
Chromaticity Chroma u'	0.2500	
Chromaticity Chroma v'	0.5187	

Special Color Rendering Indices	
R1	81.2
R2	90.9
R3	96.1
R4	81.2
R5	81.8
R6	89.3
R7	82.4
R8	58.9
R9	6.8
R10	79.8
R11	81.2
R12	74.8
R13	83.5
R14	98.5

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

## Spectral Power Distribution - Sphere Spectroradiometer Method

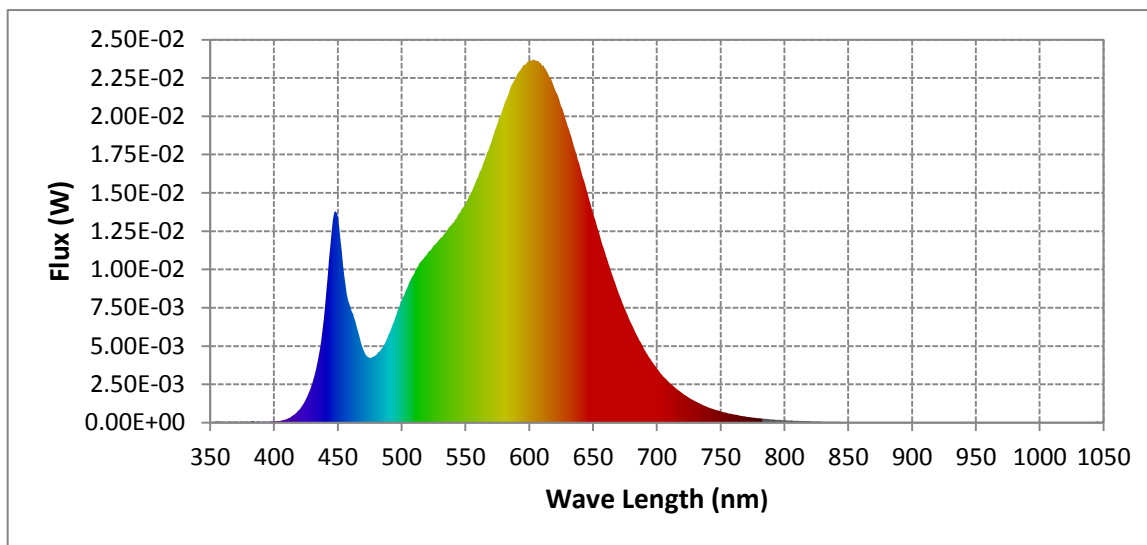


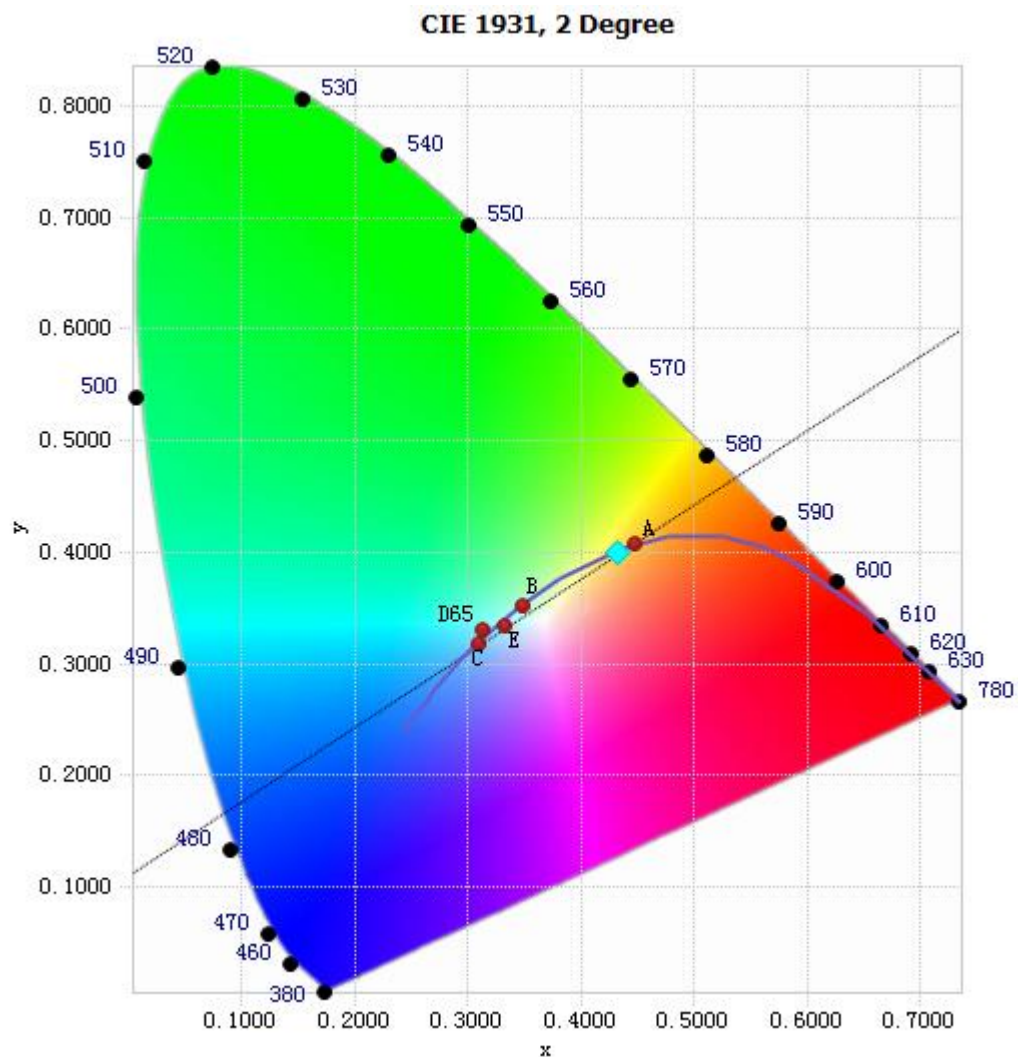
Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.26E-05	485	4.90E-03	590	2.27E-02	695	4.15E-03
385	6.24E-05	490	5.78E-03	595	2.33E-02	700	3.55E-03
390	5.50E-05	495	6.87E-03	600	2.36E-02	705	3.01E-03
395	6.18E-05	500	8.00E-03	605	2.36E-02	710	2.61E-03
400	7.38E-05	505	8.95E-03	610	2.33E-02	715	2.23E-03
405	1.26E-04	510	9.78E-03	615	2.28E-02	720	1.92E-03
410	2.37E-04	515	1.05E-02	620	2.18E-02	725	1.63E-03
415	4.84E-04	520	1.10E-02	625	2.06E-02	730	1.40E-03
420	8.54E-04	525	1.16E-02	630	1.94E-02	735	1.19E-03
425	1.54E-03	530	1.20E-02	635	1.80E-02	740	1.01E-03
430	2.59E-03	535	1.25E-02	640	1.66E-02	745	8.55E-04
435	4.38E-03	540	1.30E-02	645	1.52E-02	750	7.33E-04
440	7.69E-03	545	1.36E-02	650	1.37E-02	755	6.33E-04
445	1.24E-02	550	1.42E-02	655	1.23E-02	760	5.32E-04
450	1.34E-02	555	1.51E-02	660	1.09E-02	765	4.62E-04
455	9.53E-03	560	1.61E-02	665	9.64E-03	770	3.98E-04
460	7.53E-03	565	1.71E-02	670	8.44E-03	775	3.40E-04
465	6.21E-03	570	1.82E-02	675	7.39E-03	780	2.92E-04
470	4.79E-03	575	1.95E-02	680	6.43E-03		
475	4.22E-03	580	2.07E-02	685	5.57E-03		
480	4.41E-03	585	2.18E-02	690	4.81E-03		

Table 3: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method



## Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4325, 0.3989)

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

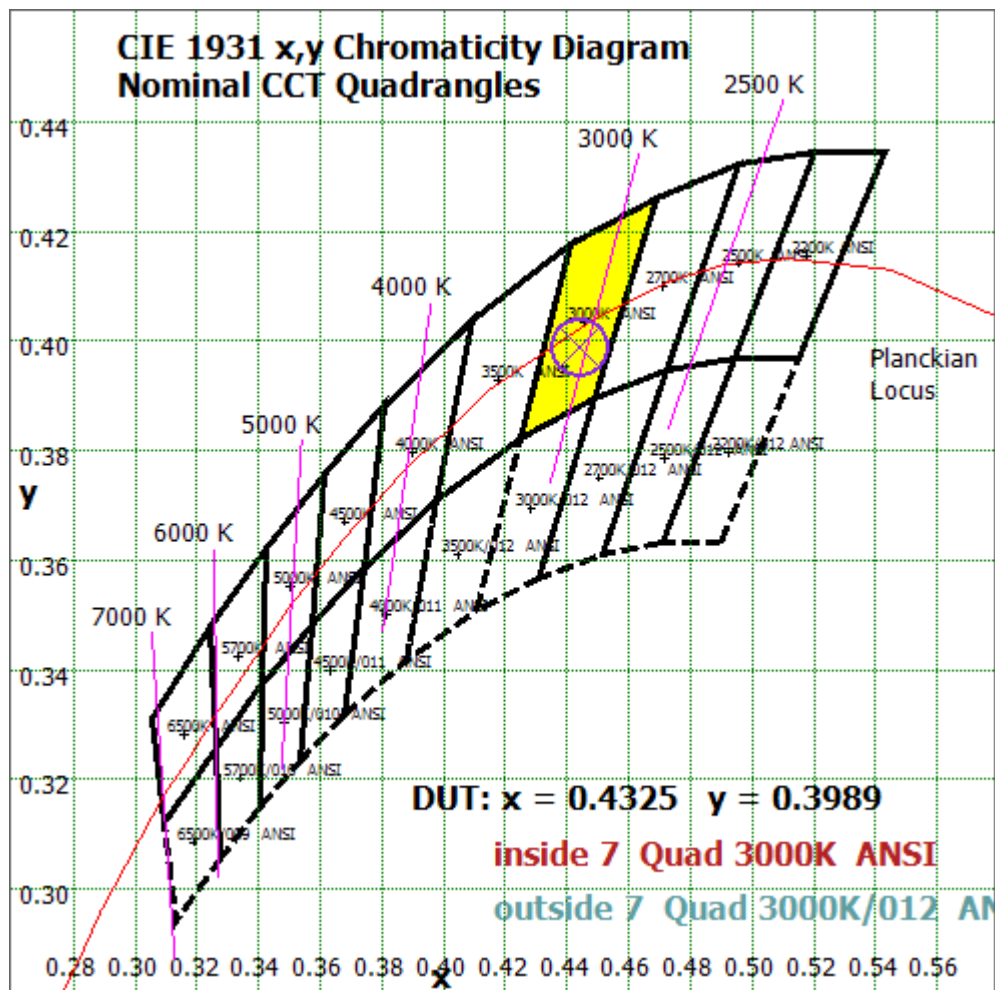


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

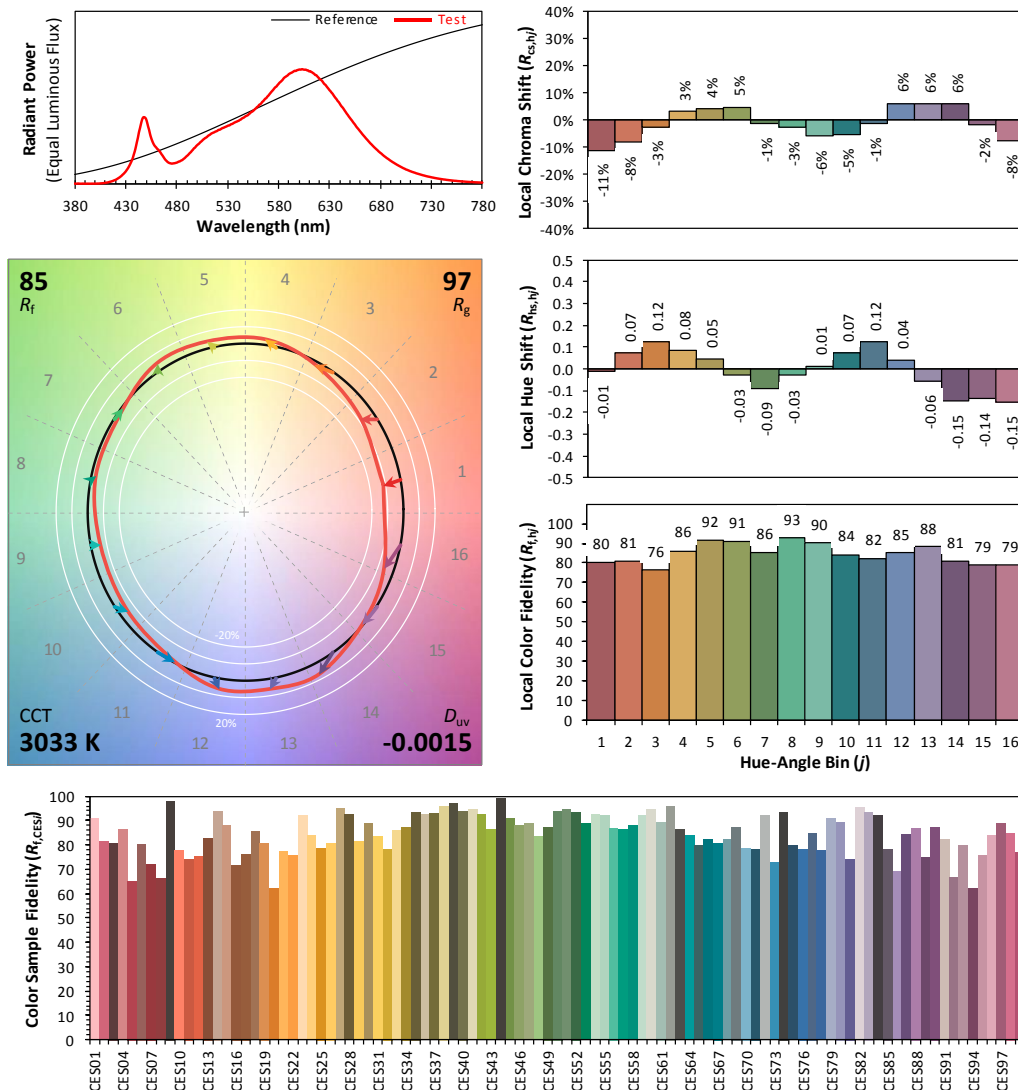
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/05/25

Model: 9.5PLV/8CCTS/DIR



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

$x$  0.4325  
 $y$  0.3989  
 $u'$  0.2500  
 $v'$  0.5187

CIE 13.3-1995  
 (CRI)  
 $R_a$  83  
 $R_9$  7

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.

### Goniophotometer Method

Test ambient temperature was 25.0 °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)	0.107
Power Factor	0.9928
Power (W)	12.77
Luminous Efficacy (lm/W)	91.7
Total Luminous Flux (lm)	1171.0
Beam Angle (°)	102.9 (0°-180°) / 102.8 (90°-270°)
Center Beam Candle Power (cd)	440
Maximum Beam Candle Power (cd)	440.4 (At: C=230.0, Gamma=0.5)
Spacing Criteria	1.23 (0°-180°) / 1.23 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	78.84%
Zonal Lumens in the 60 °-90 °Zone	19.87%
Zonal Lumens in the 90 °-120 °Zone	1.23%
Zonal Lumens in the 120 °-180 °Zone	0.06%

Table 4: Test data per Goniophotometer Method

### Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	41.591	3.55%
10- 20	118.308	10.10%
20- 30	176.636	15.08%
30- 40	207.428	17.71%
40- 50	205.699	17.57%
50- 60	173.507	14.82%
60- 70	124.127	10.60%
70- 80	73.654	6.29%
80- 90	34.909	2.98%
90-100	11.759	1.00%
100-110	2.341	0.20%
110-120	0.319	0.03%
120-130	0.132	0.01%
130-140	0.162	0.01%
140-150	0.168	0.01%
150-160	0.142	0.01%
160-170	0.094	0.01%
170-180	0.033	0.00%
Total	1171.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	923.169	78.84%
60- 90	232.69	19.87%
0-90	1155.86	98.71%
90- 180	15.15	1.29%
0- 180	1171.0	100%

Table 5: Zonal Lumen

## Illuminance Plots- Goniophotometer Method

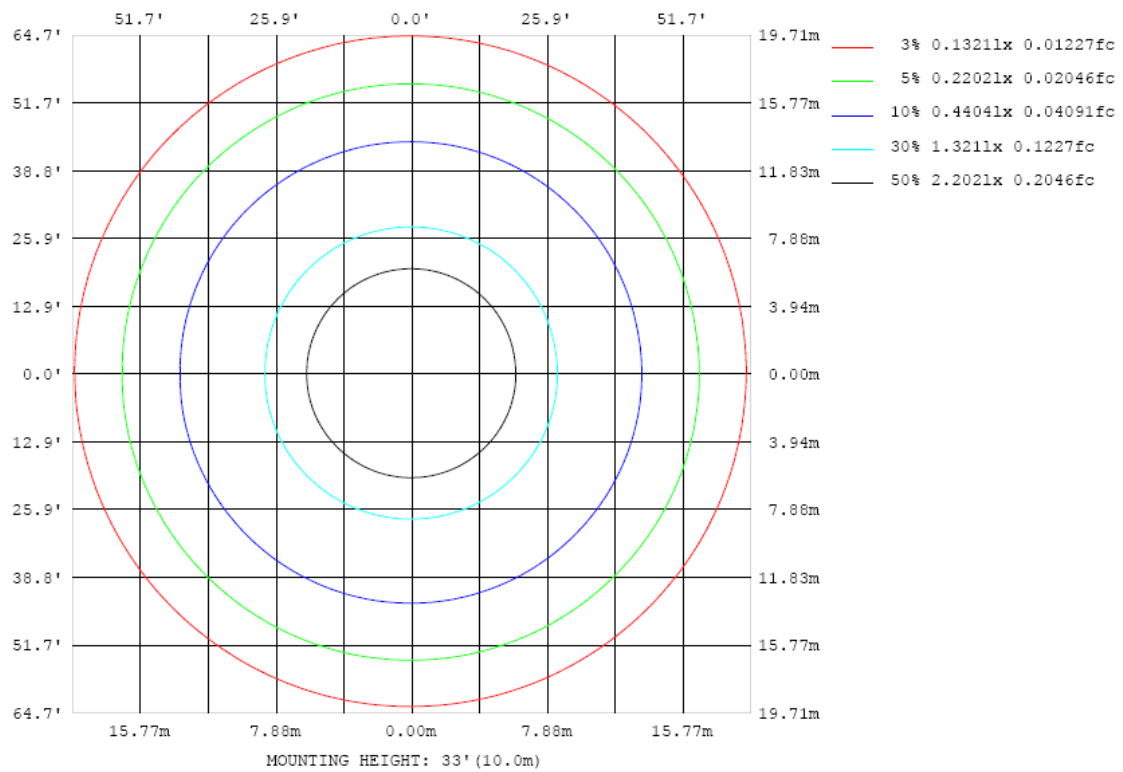


Chart 5: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

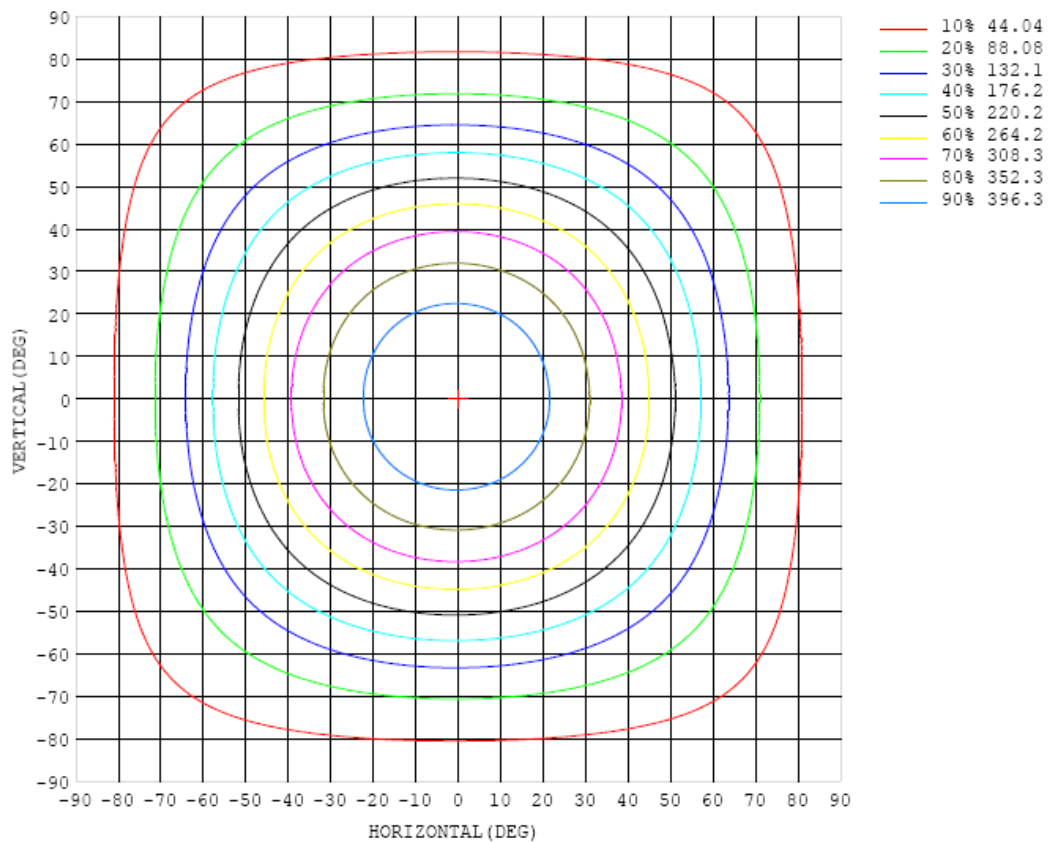


Chart 6: Isocandela Plot

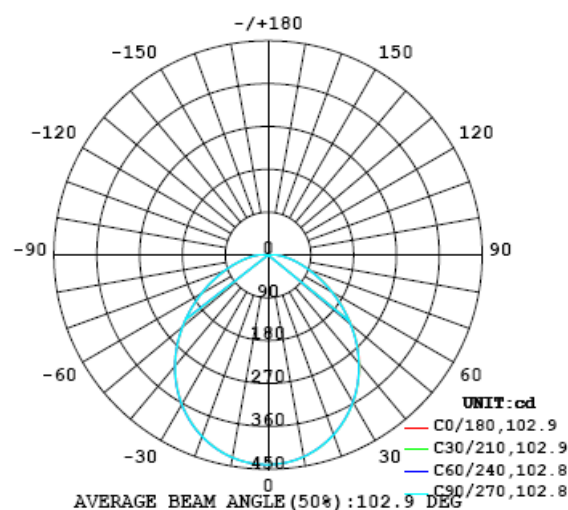


Chart 7: Polar Candela Distribution

## Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440
5	438	438	437	438	438	437	438	438	438	438	438	438	438	438	438	438	438	438	438
10	430	430	430	430	430	430	430	430	430	430	431	431	431	431	431	431	431	431	432
15	418	419	418	418	418	418	418	418	418	418	419	419	419	419	420	420	420	420	420
20	402	402	402	402	402	401	402	401	402	402	402	403	403	404	404	405	405	405	405
25	382	382	382	381	381	381	381	381	381	381	382	382	383	383	384	385	385	385	385
30	357	358	357	357	356	356	356	357	357	357	358	358	359	359	360	361	362	362	362
35	330	330	329	329	328	328	328	328	329	329	330	330	331	332	333	333	334	334	334
40	298	298	298	297	297	297	297	297	297	297	298	299	300	301	301	303	303	304	303
45	264	264	264	263	263	262	262	262	263	263	264	265	266	267	268	269	270	270	270
50	228	228	227	227	226	226	226	226	226	227	227	228	229	230	231	232	233	234	233
55	192	192	191	190	190	189	189	189	190	190	191	191	192	193	194	195	196	197	196
60	156	156	155	155	154	154	154	154	154	154	155	155	156	157	158	159	160	160	160
65	124	123	122	122	121	121	121	121	121	121	121	122	122	123	124	125	125	126	127
70	93.7	93.3	92.8	92.4	91.9	91.5	91.4	91.3	91.4	91.4	91.7	92.1	92.4	92.9	93.4	94.1	94.6	95.4	96.0
75	68.1	67.8	67.4	67.4	66.6	66.1	66.0	66.5	66.0	66.2	66.0	66.4	66.8	67.2	67.5	68.0	68.5	69.0	69.6
80	47.7	47.4	47.0	46.7	46.4	46.2	46.0	46.0	46.0	46.0	46.1	46.2	46.5	46.8	47.0	47.4	47.8	48.2	48.0
85	31.1	30.9	30.6	30.4	30.1	30.0	29.8	29.8	29.8	29.8	29.8	30.0	30.1	30.3	30.5	30.8	31.1	31.4	31.3
90	18.9	18.6	18.4	18.2	18.0	17.9	17.8	17.7	17.7	17.7	17.8	17.9	18.0	18.1	18.2	18.4	18.6	18.9	18.8
95	10.3	10.1	9.95	9.78	9.62	9.53	9.45	9.41	9.38	9.38	9.39	9.42	9.46	9.55	9.65	9.77	9.91	10.1	9.94
100	4.88	4.78	4.68	4.56	4.45	4.37	4.30	4.25	4.22	4.21	4.20	4.20	4.22	4.26	4.31	4.37	4.45	4.55	4.53
105	2.01	1.97	1.92	1.86	1.79	1.73	1.67	1.64	1.60	1.59	1.59	1.58	1.58	1.60	1.62	1.65	1.68	1.74	1.75
110	0.77	0.75	0.73	0.71	0.68	0.66	0.64	0.62	0.61	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.60	0.62	0.64
115	0.27	0.27	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.21	0.21	0.21	0.21	0.20	0.19	0.19	0.20	0.20
120	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12
125	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.14
130	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.17
135	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.20
140	0.25	0.25	0.25	0.25	0.24	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
145	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27
150	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.29
155	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.29	0.29	0.28	0.31
160	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32
165	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.32	0.32
170	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
175	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.36
180	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37

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	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440		
5	438	438	439	439	439	439	439	438	438	438	438	438	438	438	438	438	438		
10	432	432	432	432	432	432	432	432	432	432	432	431	431	431	431	431	430		
15	421	421	421	421	421	421	421	421	421	421	420	420	420	419	419	419	418		
20	405	405	406	406	406	406	406	406	405	405	405	404	404	403	403	402	402		
25	386	386	386	387	387	387	386	386	386	385	385	384	384	383	383	382	381		
30	362	363	363	363	363	363	363	363	362	362	361	360	360	359	359	358	357		
35	335	335	336	336	336	336	336	335	335	334	334	333	332	331	331	330	329		
40	304	305	305	305	305	305	305	305	304	303	303	302	301	300	300	299	298		
45	270	271	271	272	272	272	271	271	270	270	269	268	267	267	266	265	264		
50	234	235	235	236	236	236	235	235	234	234	233	232	231	230	229	229	228		
55	197	198	198	199	199	199	198	198	197	197	196	195	195	194	193	192	191		
60	161	162	162	162	162	162	162	162	161	161	160	160	159	158	157	157	156		
65	128	128	129	129	129	129	129	129	128	128	128	127	126	126	125	124	124		
70	96.6	97.3	97.6	98.2	98.3	98.3	98.3	98.2	98.0	97.7	97.3	96.9	96.3	95.7	95.1	94.5	93.9		
75	70.2	70.8	71.2	71.6	71.8	71.8	71.9	71.9	71.8	71.6	71.3	70.8	70.4	69.9	69.3	68.8	68.3		
80	48.5	49.0	49.4	49.8	50.0	50.1	50.1	50.2	50.1	49.9	49.7	49.4	49.0	48.6	48.2	47.7	47.3		
85	31.7	32.1	32.3	32.7	32.9	33.0	33.1	33.2	33.1	33.0	32.9	32.6	32.3	32.0	31.6	31.2	30.8		
90	19.0	19.4	19.6	19.9	20.0	20.2	20.3	20.3	20.4	20.3	20.1	20.0	19.8	19.5	19.2	18.9	18.6		
95	10.1	10.3	10.5	10.7	10.8	11.0	11.0	11.1	11.2	11.2	11.1	11.0	10.9	10.7	10.5	10.3	10.1		
100	4.64	4.78	4.92	5.07	5.18	5.27	5.35	5.42	5.45	5.47	5.43	5.37	5.29	5.18	5.06	4.95	4.84		
105	1.82	1.91	1.99	2.08	2.16	2.23	2.28	2.31	2.33	2.33	2.31	2.27	2.21	2.15	2.10	2.04	1.99		
110	0.68	0.73	0.77	0.83	0.87	0.90	0.93	0.94	0.95	0.94	0.93	0.90	0.87	0.84	0.81	0.78	0.77		
115	0.21	0.24	0.26	0.28	0.30	0.32	0.34	0.34	0.35	0.35	0.34	0.34	0.33	0.31	0.29	0.28	0.27		
120	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.11	0.11	0.11	0.12	0.12		
125	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	0.13		
130	0.16	0.16	0.16	0.16	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16		
135	0.20	0.20	0.20	0.20	0.20	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.20		
140	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.24		
145	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27		
150	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30		
155	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.31		
160	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.35	0.34	0.34	0.34	0.34	0.35	0.32		
165	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.32		
170	0.36	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.36	0.35	0.34		
175	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.36	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.36		
180	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37		

Table 7: Luminous Intensity Data

## TEST RESULTS (3500K Setting)

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

## Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.105	0.049
Power Factor	0.9911	0.9415
Test Power (W)	12.45	12.90
THD A%	10.41	4.95
Luminous Efficacy (lm/W)	95.1	91.8
Total Luminous Flux (lm)	1183.5	1183.8
Color Rendering Index (CRI)	84.0	
R9	12.4	
Correlated Color Temperature (CCT)(K)	3440	
Chromaticity Chroma x	0.4066	
Chromaticity Chroma y	0.3873	
Chromaticity Chroma u	0.2380	
Chromaticity Chroma v	0.3400	
Duv	-0.0018	
Chromaticity Chroma u'	0.2380	
Chromaticity Chroma v'	0.5100	

Special Color Rendering Indices	
R1	82.7
R2	90.8
R3	96.2
R4	83.1
R5	83.2
R6	88.2
R7	84.6
R8	63.4
R9	12.4
R10	78.9
R11	83.1
R12	71.7
R13	84.7
R14	98.3

Table 8: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 ( $u', v'$ ) diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

### Spectral Power Distribution - Sphere Spectroradiometer Method

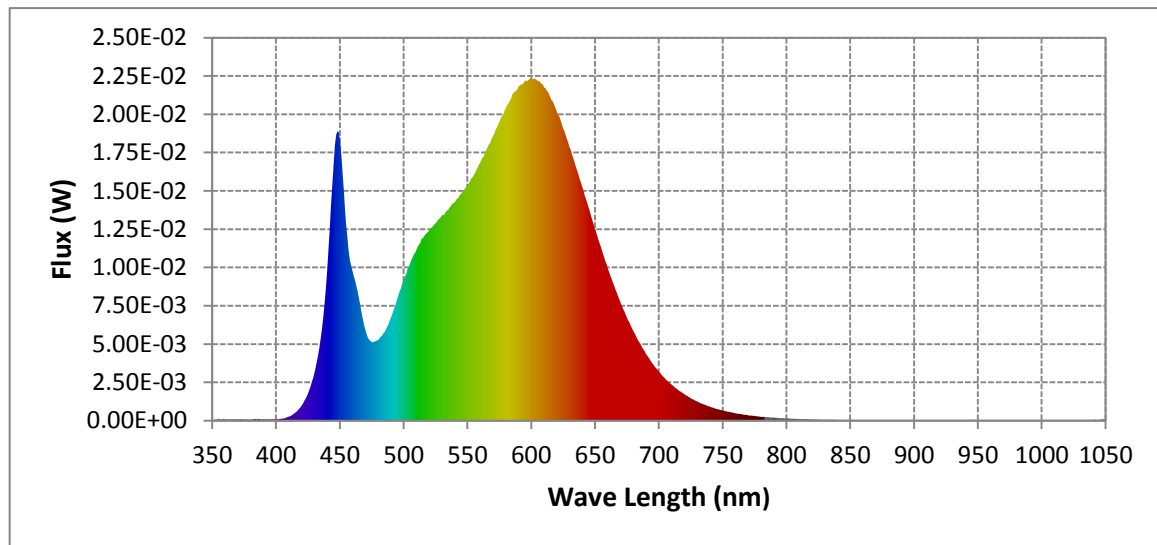
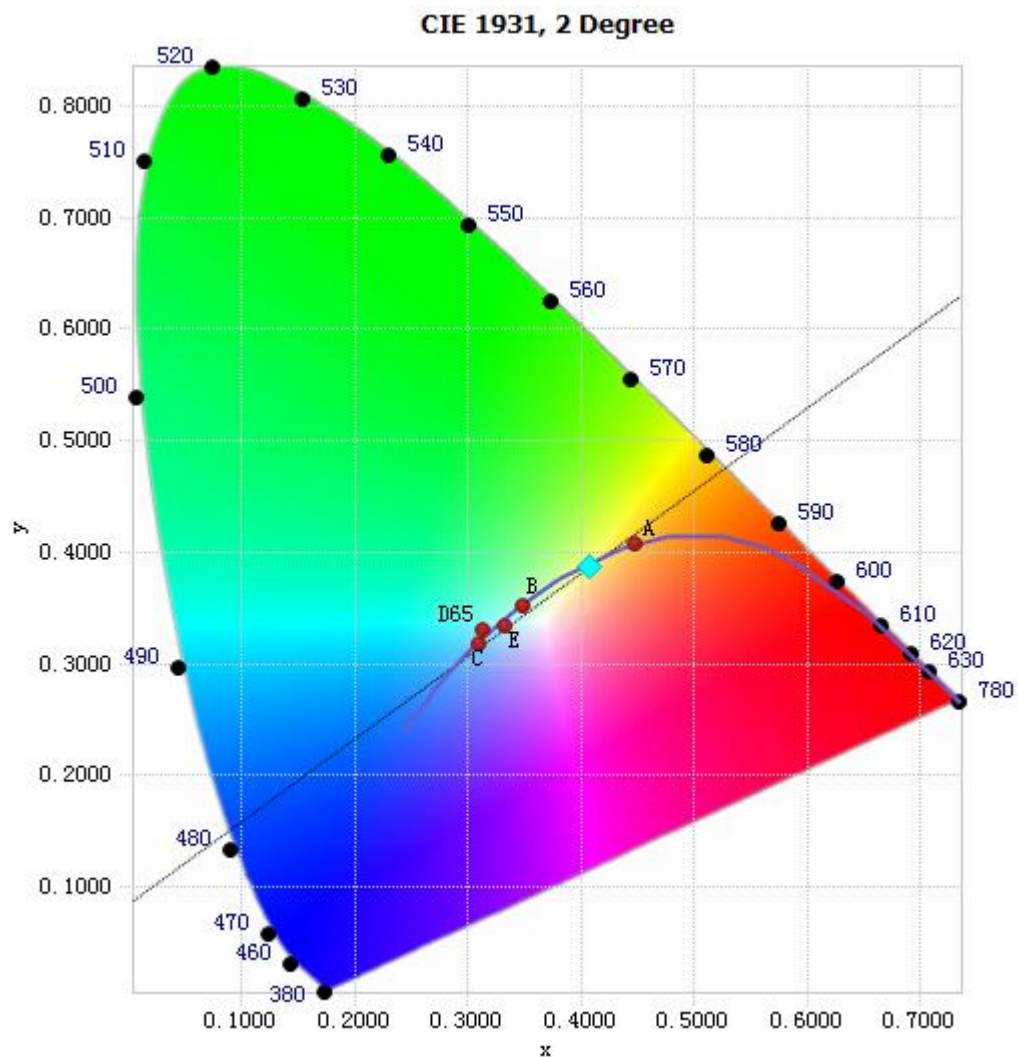


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.09E-05	485	5.79E-03	590	2.18E-02	695	3.74E-03
385	9.14E-05	490	6.72E-03	595	2.22E-02	700	3.21E-03
390	8.69E-05	495	7.96E-03	600	2.23E-02	705	2.73E-03
395	7.87E-05	500	9.20E-03	605	2.22E-02	710	2.35E-03
400	7.64E-05	505	1.02E-02	610	2.17E-02	715	2.01E-03
405	1.38E-04	510	1.12E-02	615	2.11E-02	720	1.72E-03
410	2.62E-04	515	1.19E-02	620	2.02E-02	725	1.47E-03
415	5.29E-04	520	1.24E-02	625	1.91E-02	730	1.25E-03
420	9.78E-04	525	1.29E-02	630	1.78E-02	735	1.07E-03
425	1.77E-03	530	1.34E-02	635	1.66E-02	740	9.08E-04
430	3.12E-03	535	1.37E-02	640	1.53E-02	745	7.79E-04
435	5.41E-03	540	1.43E-02	645	1.39E-02	750	6.59E-04
440	9.83E-03	545	1.48E-02	650	1.25E-02	755	5.73E-04
445	1.67E-02	550	1.53E-02	655	1.12E-02	760	4.81E-04
450	1.84E-02	555	1.60E-02	660	9.93E-03	765	4.16E-04
455	1.26E-02	560	1.68E-02	665	8.78E-03	770	3.53E-04
460	9.79E-03	565	1.77E-02	670	7.67E-03	775	3.04E-04
465	8.02E-03	570	1.86E-02	675	6.68E-03	780	2.59E-04
470	5.94E-03	575	1.95E-02	680	5.83E-03		
475	5.14E-03	580	2.04E-02	685	5.05E-03		
480	5.27E-03	585	2.13E-02	690	4.35E-03		

Table 9: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

### Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4066, 0.3873)

Chart 9: 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

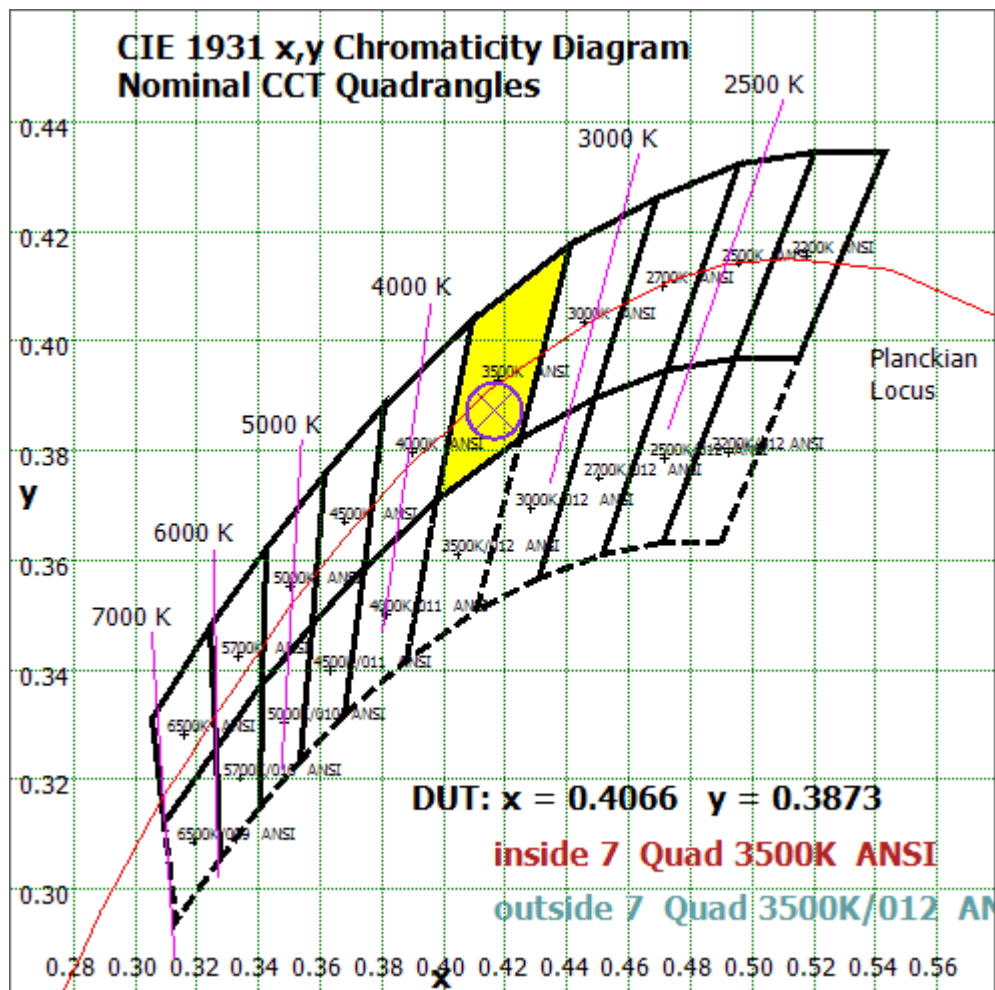


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

## Color Rendition Report – Sphere Spectroradiometer Method

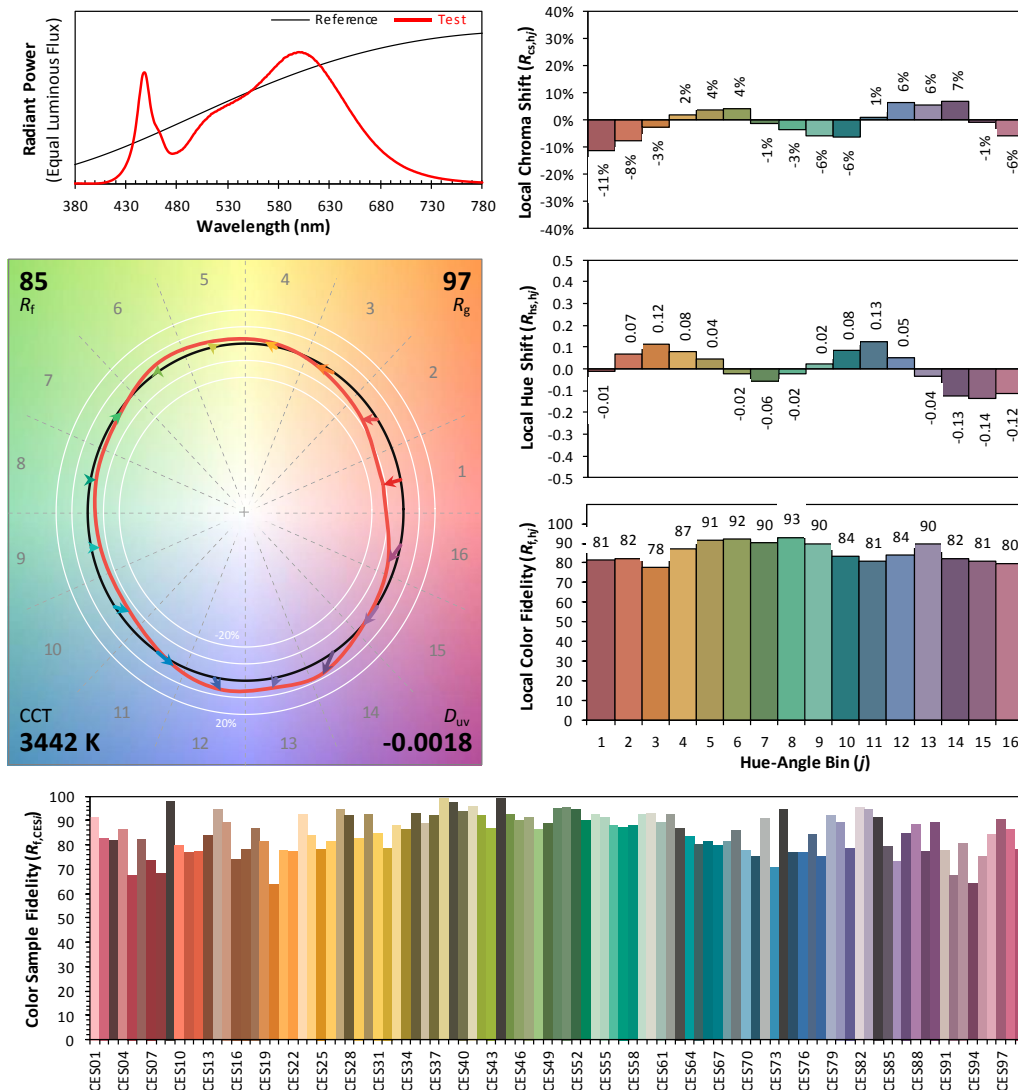
### ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/05/25

Model: 9.5PLV/8CCTS/DIR



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

$x$  0.4066  
 $y$  0.3873  
 $u'$  0.2380  
 $v'$  0.5100

CIE 13.3-1995  
 (CRI)  
 $R_a$  84  
 $R_9$  13

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 11: 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 8 due to rounding.

## TEST RESULTS (4000K Setting)

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)	0.107	0.050
Power Factor	0.9913	0.9475
Test Power (W)	12.77	13.16
THD A%	10.25	5.13
Luminous Efficacy (lm/W)	94.7	91.8
Total Luminous Flux (lm)	1209.5	1208.7
Color Rendering Index (CRI)	83.4	
R9	11	
Correlated Color Temperature (CCT)(K)	4005	
Chromaticity Chroma x	0.3800	
Chromaticity Chroma y	0.3763	
Chromaticity Chroma u	0.2250	
Chromaticity Chroma v	0.3342	
Duv	-0.0001	
Chromaticity Chroma u'	0.2250	
Chromaticity Chroma v'	0.5013	

Special Color Rendering Indices	
R1	81.8
R2	88.7
R3	94.2
R4	83.4
R5	82.3
R6	84.8
R7	86.3
R8	65.9
R9	11
R10	73.6
R11	83
R12	66.7
R13	83.3
R14	96.9

Table 10: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 ( $u', v'$ ) diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .



### Spectral Power Distribution - Sphere Spectroradiometer Method

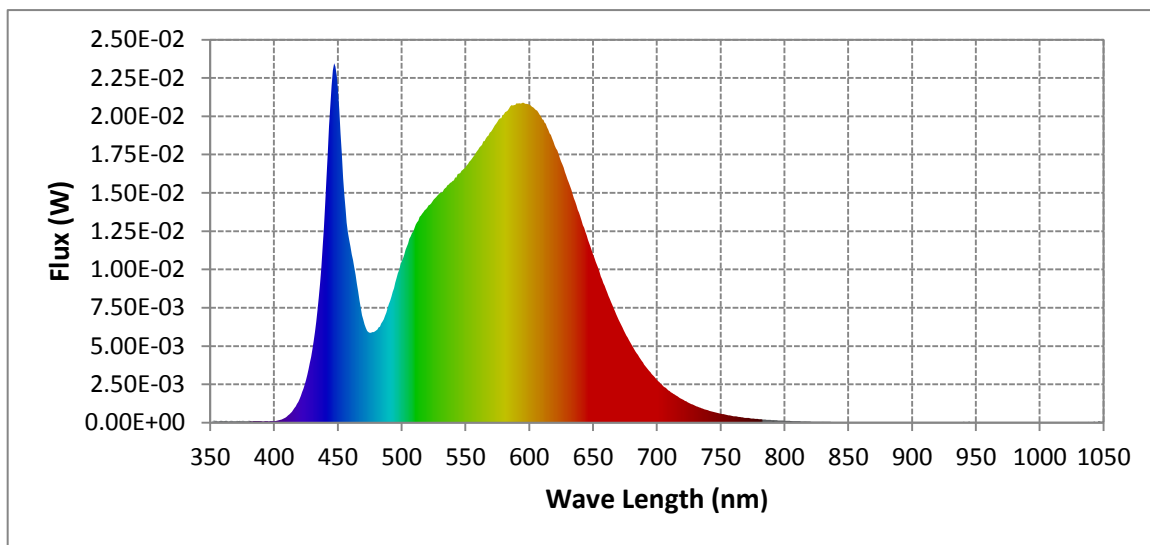
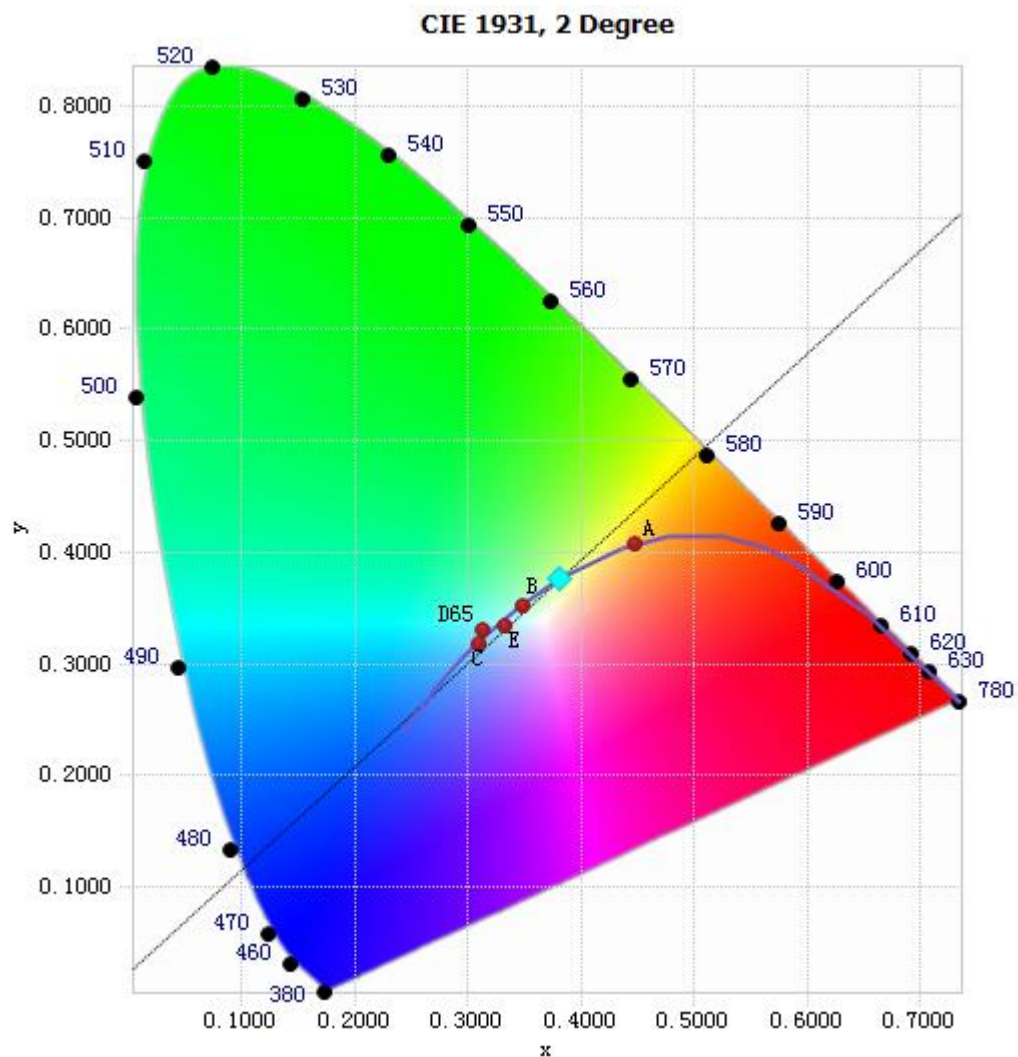


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.21E-04	485	6.59E-03	590	2.09E-02	695	3.29E-03
385	1.01E-04	490	7.74E-03	595	2.09E-02	700	2.80E-03
390	1.05E-04	495	9.16E-03	600	2.08E-02	705	2.39E-03
395	1.02E-04	500	1.05E-02	605	2.04E-02	710	2.06E-03
400	1.01E-04	505	1.17E-02	610	1.98E-02	715	1.77E-03
405	1.88E-04	510	1.27E-02	615	1.91E-02	720	1.52E-03
410	3.95E-04	515	1.35E-02	620	1.81E-02	725	1.30E-03
415	8.35E-04	520	1.40E-02	625	1.71E-02	730	1.10E-03
420	1.53E-03	525	1.46E-02	630	1.59E-02	735	9.38E-04
425	2.77E-03	530	1.50E-02	635	1.46E-02	740	8.05E-04
430	4.79E-03	535	1.54E-02	640	1.35E-02	745	6.95E-04
435	8.18E-03	540	1.58E-02	645	1.22E-02	750	5.89E-04
440	1.43E-02	545	1.62E-02	650	1.10E-02	755	5.02E-04
445	2.20E-02	550	1.67E-02	655	9.83E-03	760	4.24E-04
450	2.17E-02	555	1.72E-02	660	8.71E-03	765	3.70E-04
455	1.48E-02	560	1.78E-02	665	7.69E-03	770	3.16E-04
460	1.15E-02	565	1.84E-02	670	6.71E-03	775	2.76E-04
465	9.06E-03	570	1.90E-02	675	5.84E-03	780	2.35E-04
470	6.72E-03	575	1.96E-02	680	5.09E-03		
475	5.87E-03	580	2.01E-02	685	4.42E-03		
480	6.01E-03	585	2.06E-02	690	3.81E-03		

Table 11: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

### Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3800, 0.3763)

Chart 13: 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

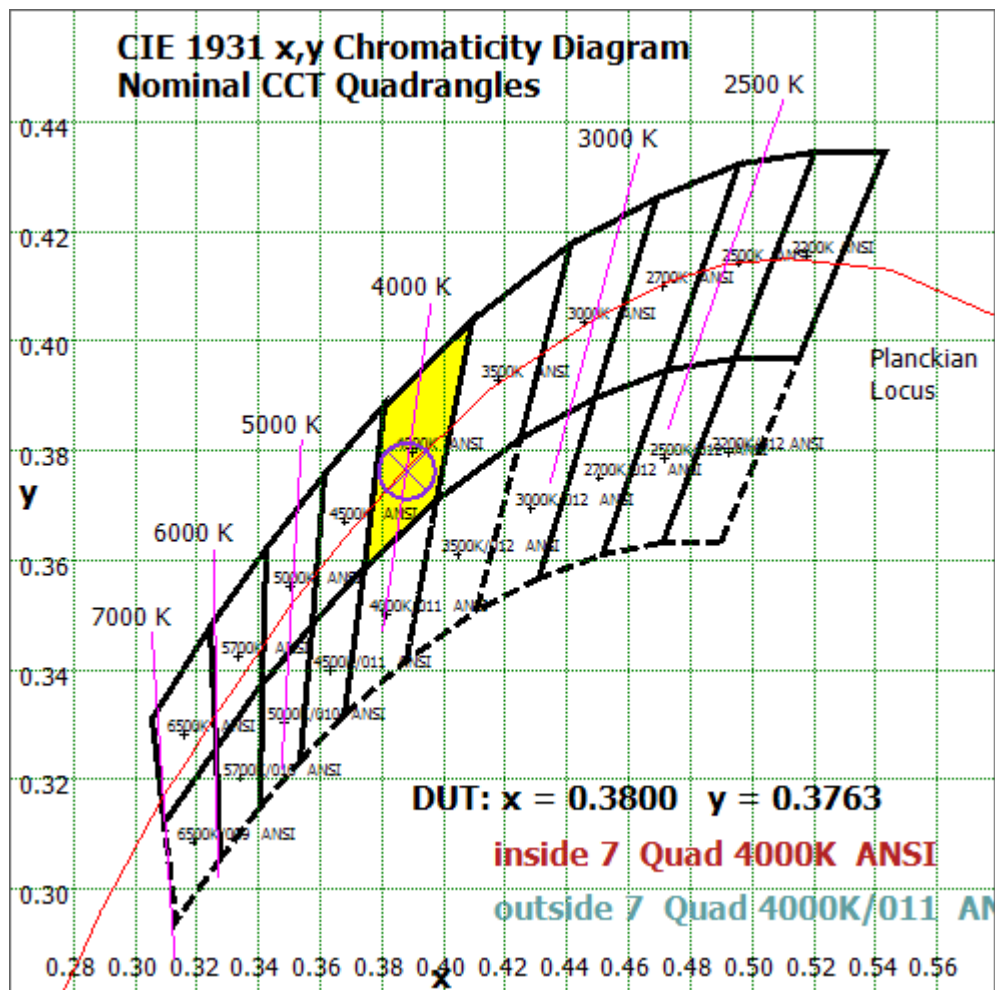


Chart 14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

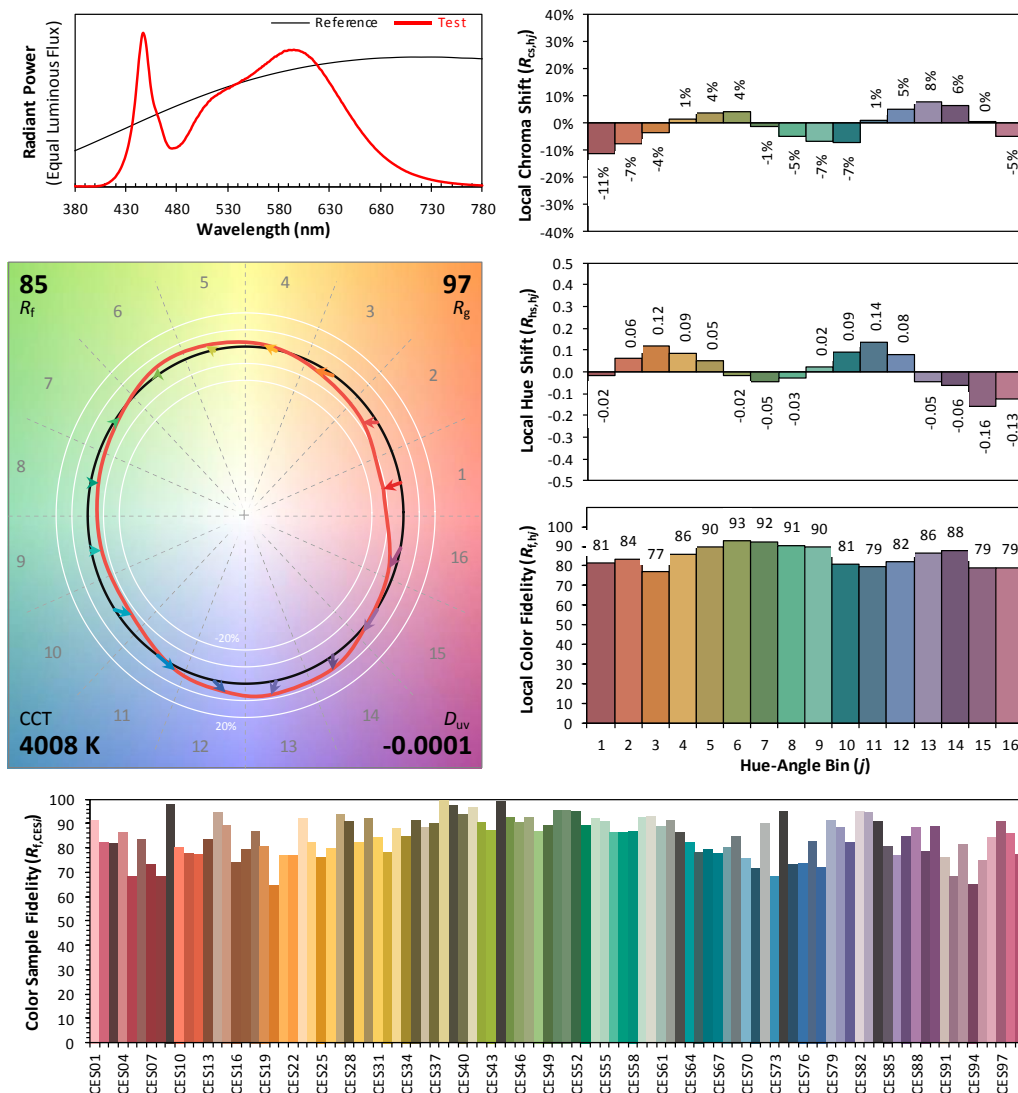
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/05/25

Model: 9.5PLV/8CCTS/DIR



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

$x$  0.3800  
 $y$  0.3763  
 $u'$  0.2250  
 $v'$  0.5013

CIE 13.3-1995  
 (CRI)  
 $R_a$  83  
 $R_9$  11

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 15: 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 10 due to rounding.

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
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
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2022	Aug. 04, 2023
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2022	Aug. 04, 2023
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2022	Aug. 04, 2023

Table 12: 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 expended uncertainty is 2.1% with a coverage factor  $k=2$ .

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

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