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: 9PLO/8CCTS/HYB/PF

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23070004j

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

Review by: Wei Fei

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Jul. 24, 2023

Approved by: April Zou

Manager: April Zou

Jul. 24, 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	9PLO/8CCTS/HYB/PF 3000K Setting	9PLO/8CCTS/HYB/PF 3500K Setting	9PLO/8CCTS/HYB/PF 4000K Setting
Luminous Efficacy (Lumens /Watt)	108.5	118.7	116.1
Total Luminous Flux (Lumens)	1262.3	1349.1	1355.3
Power (Watts)/2	11.63	11.37	11.67
Power Factor	0.9952	0.9951	0.9953
CCT (K)	3051	3498	4016
CRI	82.9	84.0	83.6
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Jul. 06, 2023

Date of Test : Jul. 13, 2023

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

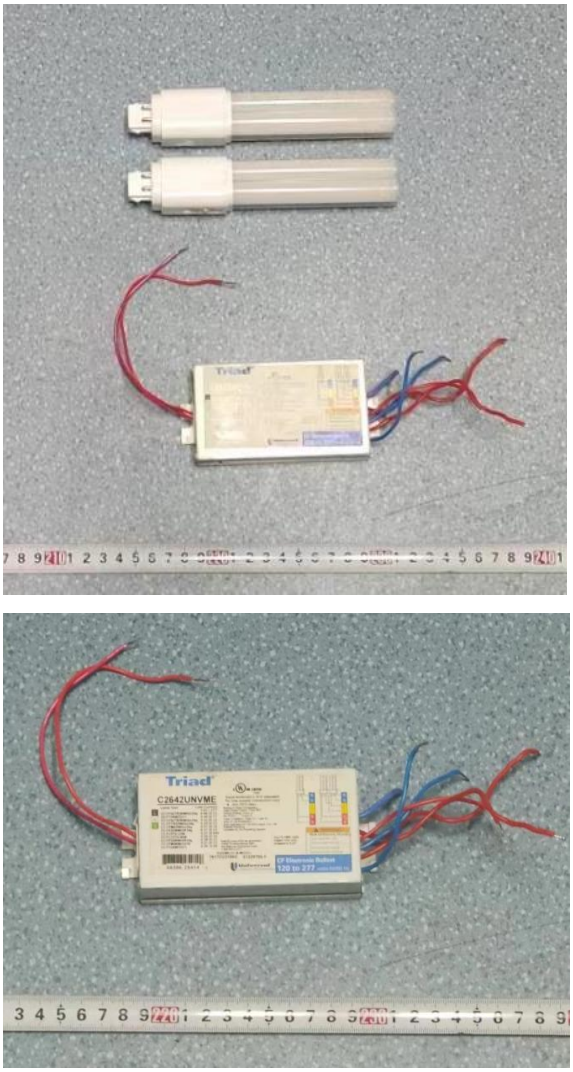


Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Lamp
Model	: 9PLO/8CCTS/HYB/PF
Electrical Ratings	: 120-277V, 50/60Hz, 9W
Product Description	: Color- Tunable 3000K/3500K/4000K LED Lamps supplied by a high frequency fluorescent lamp ballast: C2642UNVME
Manufacturer	: GREEN CREATIVE LTD
Address	: 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 ℃.

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)	0.195	0.086
Power Factor	0.9952	0.9780
Test Power (W)/2	11.63	11.70
THD A%	8.19	8.22
Luminous Efficacy (lm/W)	108.5	107.8
Total Luminous Flux (lm)	1262.3	1261.2
Color Rendering Index (CRI)	82.9	
R9	8.9	
Correlated Color Temperature (CCT)(K)	3051	
Chromaticity Chroma x	0.4307	
Chromaticity Chroma y	0.3975	
Chromaticity Chroma u	0.2494	
Chromaticity Chroma v	0.3452	
Duv	-0.0018	
Chromaticity Chroma u ’	0.2494	
Chromaticity Chroma v’	0.5178	

Special Color Rendering Indices	
R1	82.5
R2	94.4
R3	92.2
R4	79.4
R5	83.2
R6	93
R7	80.3
R8	58.1
R9	8.9
R10	87.2
R11	79
R12	74.9
R13	85.9
R14	96.4

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

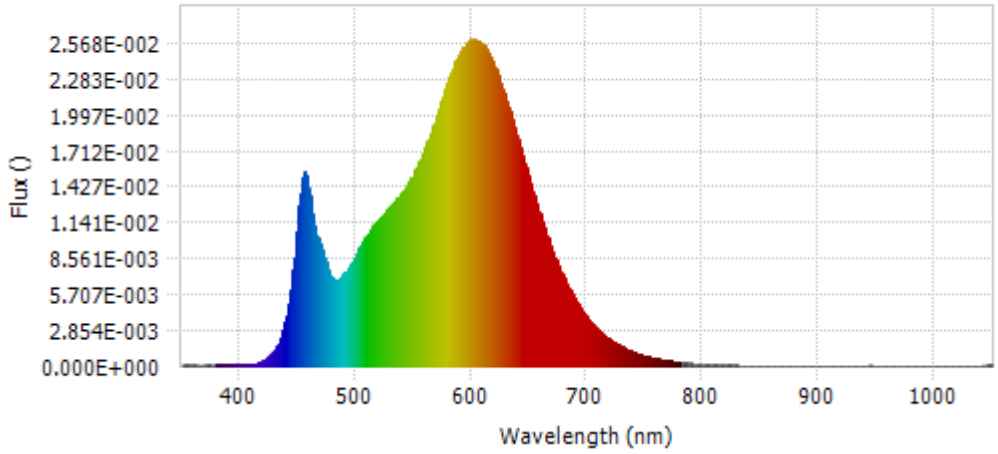
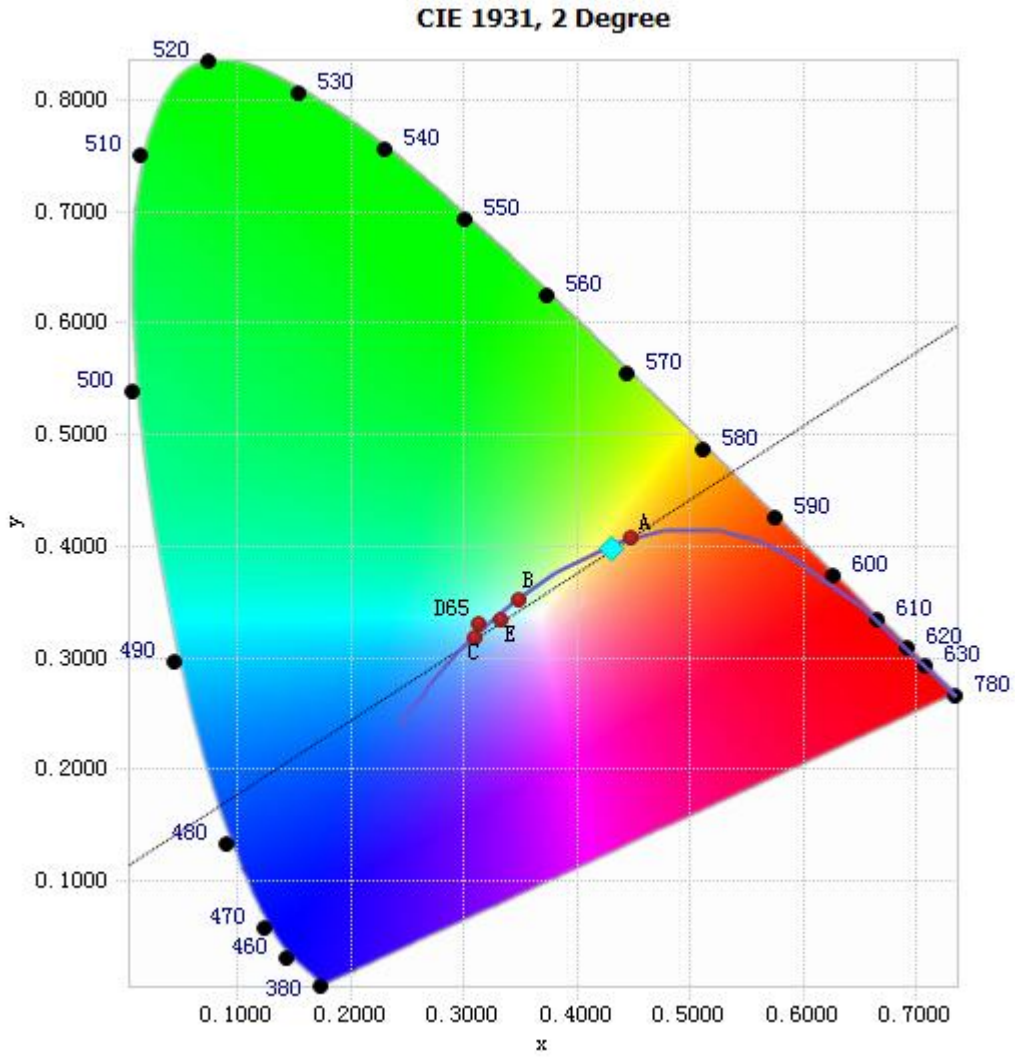


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.05E-05	485	6.92E-03	590	2.49E-02	695	4.48E-03
385	7.69E-05	490	7.35E-03	595	2.55E-02	700	3.85E-03
390	7.87E-05	495	7.98E-03	600	2.59E-02	705	3.29E-03
395	8.41E-05	500	8.82E-03	605	2.58E-02	710	2.82E-03
400	8.17E-05	505	9.67E-03	610	2.54E-02	715	2.43E-03
405	9.83E-05	510	1.04E-02	615	2.48E-02	720	2.09E-03
410	1.34E-04	515	1.11E-02	620	2.37E-02	725	1.80E-03
415	2.35E-04	520	1.16E-02	625	2.25E-02	730	1.52E-03
420	4.28E-04	525	1.22E-02	630	2.11E-02	735	1.30E-03
425	7.45E-04	530	1.27E-02	635	1.96E-02	740	1.11E-03
430	1.31E-03	535	1.31E-02	640	1.81E-02	745	9.52E-04
435	2.26E-03	540	1.38E-02	645	1.64E-02	750	8.08E-04
440	3.91E-03	545	1.45E-02	650	1.48E-02	755	6.93E-04
445	6.84E-03	550	1.52E-02	655	1.33E-02	760	5.94E-04
450	1.18E-02	555	1.62E-02	660	1.18E-02	765	5.06E-04
455	1.54E-02	560	1.73E-02	665	1.04E-02	770	4.37E-04
460	1.35E-02	565	1.85E-02	670	9.09E-03	775	3.72E-04
465	1.07E-02	570	1.99E-02	675	7.97E-03	780	3.21E-04
470	9.44E-03	575	2.13E-02	680	6.96E-03		
475	7.98E-03	580	2.27E-02	685	6.02E-03		
480	6.95E-03	585	2.40E-02	690	5.21E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4307, 0.3975)

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

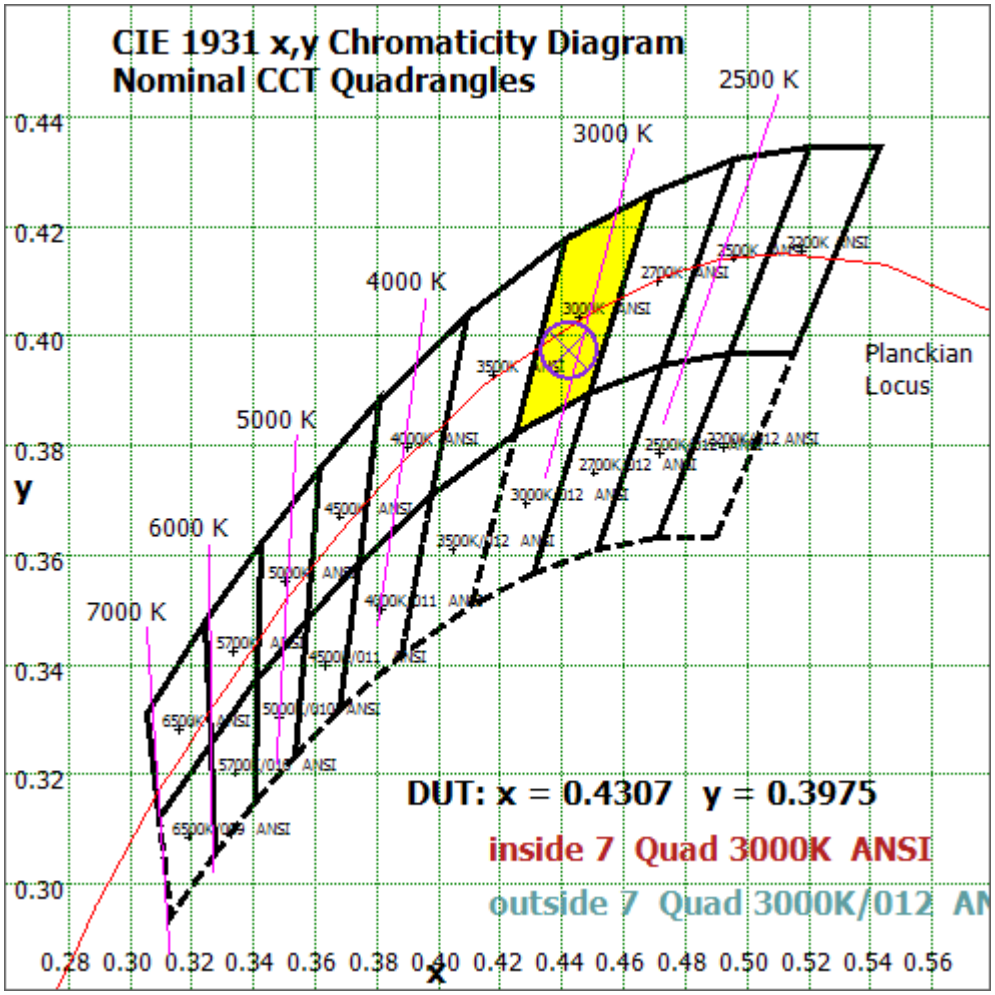


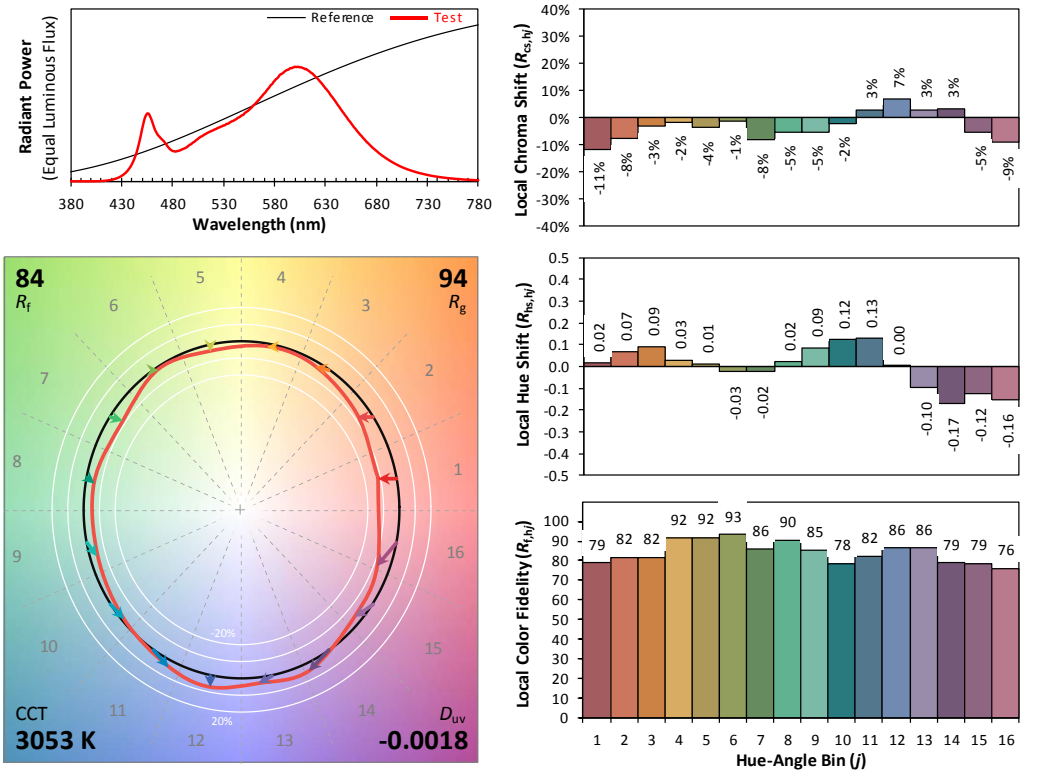
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** GREEN CREATIVE LTD

Date: 2023/07/13 **Model:** 9PLO/8CCTS/HYB/PF



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

x	0.4307
y	0.3975
u'	0.2494
v'	0.5178

CIE 13.3-1995 (CRI)

R_a	83
R_9	9

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 25.1 ℃.

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)	0.195
Power Factor	0.9953
Power (W)/2	11.67
Luminous Efficacy (lm/W)	109.6
Total Luminous Flux (lm)	1279.2
Beam Angle (°)	335.0 (0^o-180^o) / 334.6 (90^o-270^o)
Center Beam Candle Power (cd)	11.8
Maximum Beam Candle Power (cd)	144.3 (At: C=190.0, Gamma=90.0)
Spacing Criteria	4.87 (0^o-180^o) / 4.90 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	19.78%
Zonal Lumens in the 60 °-90 °Zone	32.54%
Zonal Lumens in the 90 °-120 °Zone	31.19%
Zonal Lumens in the 120 °-180 °Zone	16.50%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	1.592	0.12%
10- 20	9.002	0.70%
20- 30	24.247	1.90%
30- 40	46.209	3.61%
40- 50	72.378	5.66%
50- 60	99.546	7.78%
60- 70	123.969	9.69%
70- 80	141.885	11.09%
80- 90	150.386	11.76%
90-100	148.216	11.59%
100-110	135.711	10.61%
110-120	115.009	8.99%
120-130	89.449	6.99%
130-140	62.664	4.90%
140-150	37.335	2.92%
150-160	17.214	1.35%
160-170	4.196	0.33%
170-180	0.192	0.02%
Total	1279.2	100%

γ(°)	Lumens	% Total
0- 60	252.974	19.78%
60- 90	416.24	32.54%
0-90	669.214	52.32%
90- 180	609.986	47.68%
0- 180	1279.2	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

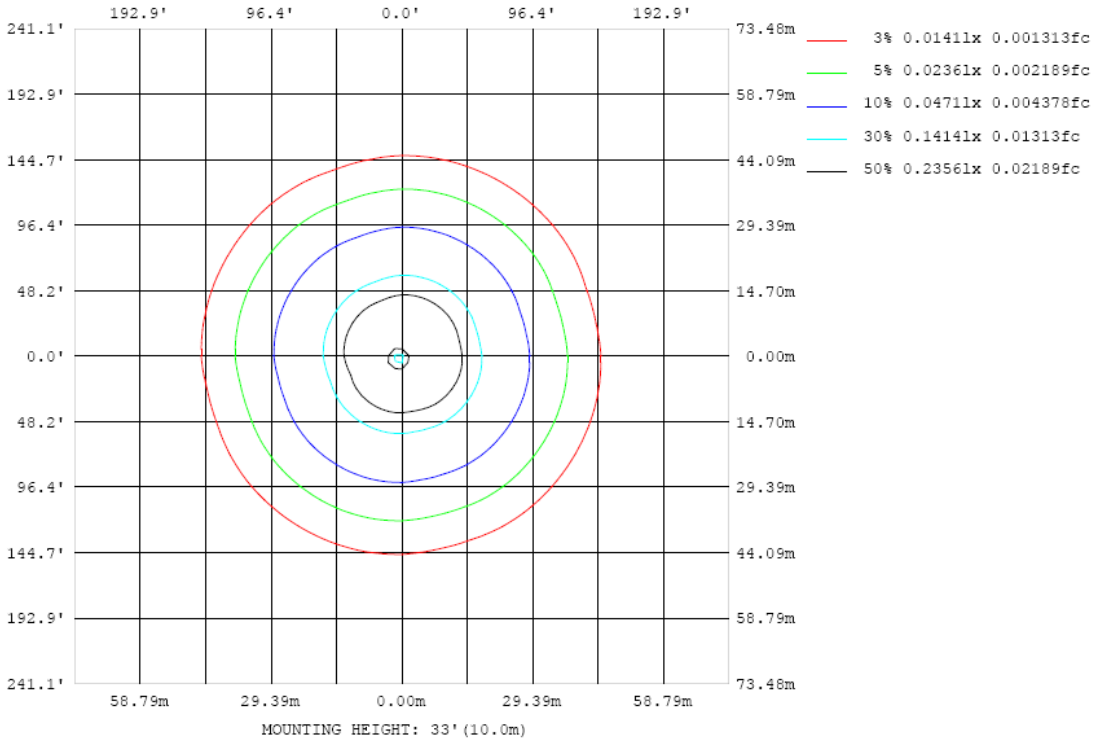


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

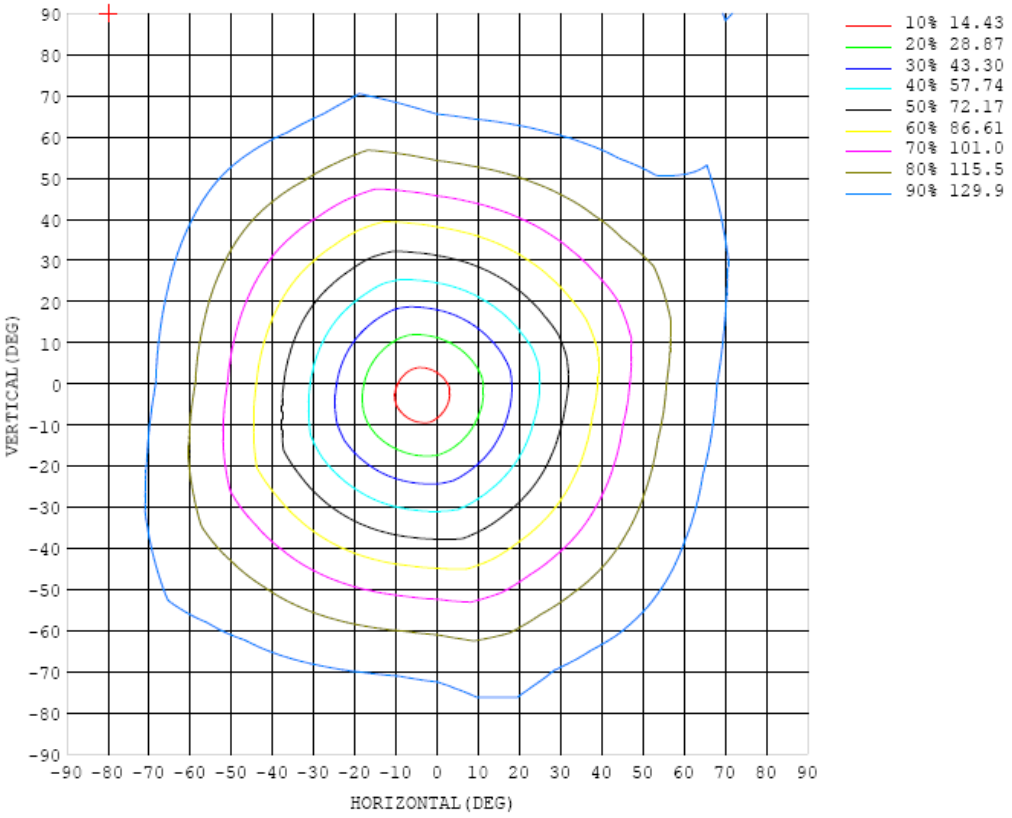


Chart 6: Isocandela Plot

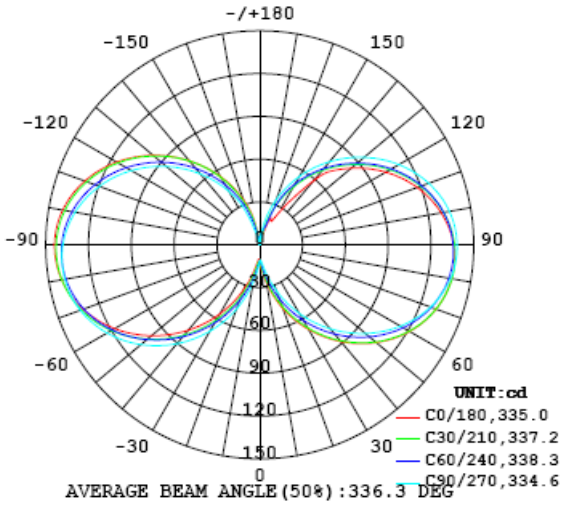


Chart 7: Polar Candela Distribution

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	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
5	17.8	17.3	16.9	16.3	15.6	14.9	14.1	13.2	12.4	11.6	10.8	10.1	9.56	9.13	8.54	8.80	9.29	9.79	10.4
10	26.6	26.1	25.4	24.5	23.4	22.2	20.9	19.4	17.9	16.5	15.1	14.3	13.7	13.2	12.9	12.8	13.1	14.0	15.0
15	36.7	36.3	35.5	34.6	33.3	31.7	29.9	28.1	26.2	24.3	23.3	22.5	21.8	21.1	20.6	20.6	20.9	22.0	23.3
20	47.3	46.9	46.5	45.4	43.8	42.0	40.1	37.9	35.7	34.2	33.4	32.6	31.9	31.1	30.5	30.2	30.6	32.0	33.6
25	58.0	57.8	57.6	56.2	54.6	52.6	50.6	48.2	45.7	44.8	44.3	43.5	42.8	42.1	41.4	40.7	41.0	42.7	44.5
30	68.4	68.8	68.4	67.1	65.3	63.3	61.2	58.6	55.8	55.5	55.3	54.6	53.9	53.3	52.5	51.5	51.6	53.8	55.8
35	78.6	79.5	79.0	77.6	75.8	73.8	71.6	68.7	66.0	66.3	66.2	65.7	65.1	64.5	63.6	62.6	61.8	64.8	67.1
40	88.5	89.8	88.9	87.7	85.9	83.9	81.6	78.6	76.0	76.8	77.0	76.5	76.0	75.4	74.6	73.5	71.7	75.6	78.1
45	97.8	99.2	98.4	97.1	95.4	93.6	91.2	88.0	85.6	87.0	87.3	87.0	86.5	86.0	85.2	84.1	81.7	85.7	88.8
50	107	108	107	106	104	103	100	97.0	94.9	96.7	97.2	97.0	96.6	96.0	95.4	94.1	91.5	95.2	99.1
55	114	116	115	114	112	111	109	105	103	106	106	106	106	106	105	104	101	104	109
60	121	123	122	121	120	118	116	113	111	114	115	115	114	114	114	112	110	112	117
65	127	128	128	127	126	125	123	119	118	121	122	122	122	122	122	120	118	120	125
70	132	133	132	131	131	130	128	124	124	127	128	129	129	128	128	127	124	126	132
75	135	136	136	135	134	134	132	129	129	132	133	134	134	134	134	132	130	131	137
80	136	138	137	137	136	136	135	131	132	136	137	137	138	138	138	136	133	135	141
85	137	138	138	137	137	137	136	133	134	138	139	140	140	140	140	139	136	137	143
90	136	137	137	137	137	137	136	133	134	138	140	140	141	141	141	140	137	138	144
95	133	134	134	134	135	135	134	131	133	137	139	140	140	140	141	140	136	137	143
100	129	130	131	131	131	132	131	129	131	135	137	138	138	138	139	138	134	135	140
105	124	125	126	126	127	127	126	125	127	131	133	134	135	135	135	134	131	131	136
110	117	119	120	120	121	121	121	119	122	126	128	129	130	130	130	129	126	126	131
115	110	112	113	113	114	115	114	113	116	120	122	123	124	124	124	123	120	120	124
120	102	104	105	105	106	107	107	106	109	113	115	116	117	117	117	116	112	112	116
125	93.1	94.7	95.9	96.8	97.9	98.5	98.1	97.7	101	104	106	108	109	109	109	108	105	104	107
130	83.6	85.3	86.5	87.6	88.7	89.4	89.1	89.1	92.0	95.5	97.5	98.9	99.6	99.9	99.8	98.7	95.9	94.8	97.6
135	73.8	75.5	76.8	78.0	79.1	79.8	79.7	79.9	82.8	86.0	88.1	89.4	90.1	90.3	90.1	89.0	86.8	85.4	87.5
140	58.7	62.3	66.3	68.0	69.1	69.8	69.8	70.4	73.2	76.0	78.0	79.4	80.1	80.3	80.0	79.0	77.1	75.7	76.9
145	38.6	47.1	55.9	57.6	58.6	59.4	59.7	60.7	63.2	65.8	67.6	69.0	69.7	69.8	69.5	68.5	66.9	65.7	66.1
150	24.5	33.6	45.2	46.6	48.0	48.9	49.1	50.3	52.9	55.2	56.9	58.2	58.9	59.0	58.6	57.8	56.4	55.4	55.3
155	18.7	25.6	33.5	35.7	36.9	38.1	38.0	39.7	42.6	44.4	45.9	47.0	47.5	47.5	47.3	46.9	45.7	44.8	44.4
160	16.7	18.1	21.5	24.9	24.2	20.6	21.8	27.6	32.3	33.6	35.0	35.4	35.1	34.6	34.7	34.7	34.2	33.9	33.6
165	5.14	7.09	8.87	12.8	14.3	13.0	12.5	18.1	22.3	23.0	24.2	24.6	23.9	21.5	20.5	21.8	22.5	22.7	22.6
170	0.11	0.14	0.46	1.86	3.79	5.66	7.65	9.86	11.2	12.0	13.1	13.6	13.2	12.4	11.3	10.7	10.6	10.2	6.60
175	0.10	0.10	0.10	0.10	0.11	0.15	0.31	0.47	0.56	0.68	1.04	1.47	2.00	2.54	2.85	2.45	1.79	1.03	0.33
180	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10

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	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8		
5	11.0	11.8	12.6	13.5	14.4	15.3	16.2	17.0	17.7	18.2	18.7	19.0	19.1	19.2	19.0	18.8	18.3		
10	16.1	17.4	18.6	19.8	21.0	22.4	24.0	25.4	26.6	27.5	28.2	28.7	28.9	28.8	28.5	27.9	27.2		
15	24.7	26.2	27.7	29.0	30.3	31.6	33.5	35.4	36.9	38.1	38.9	39.5	39.7	39.5	38.9	38.0	37.2		
20	35.1	36.7	38.2	39.6	40.8	41.8	43.8	46.1	47.8	49.1	50.1	50.7	50.9	50.5	49.8	48.5	47.3		
25	46.2	47.8	49.3	50.8	51.9	52.4	54.2	56.8	58.9	60.3	61.3	61.8	61.9	61.5	60.6	58.7	57.8		
30	57.6	59.1	60.6	62.0	62.9	63.2	64.5	67.5	69.8	71.3	72.3	72.8	72.8	72.2	71.1	69.0	68.1		
35	68.9	70.4	71.7	73.0	73.8	73.8	74.7	77.8	80.3	81.8	82.8	83.3	83.3	82.6	81.3	78.9	77.9		
40	80.0	81.4	82.6	83.8	84.5	84.0	84.5	87.8	90.4	91.9	92.8	93.3	93.1	92.5	90.9	88.4	87.1		
45	90.7	92.0	93.1	94.1	94.6	93.9	93.9	97.2	99.9	101	102	103	102	102	100.0	97.1	95.8		
50	101	102	103	104	104	103	103	106	109	110	111	111	111	110	108	105	104		
55	110	111	112	113	113	112	111	114	117	118	118	119	118	118	116	112	111		
60	119	120	120	121	121	119	118	121	124	125	125	125	125	124	122	118	118		
65	126	127	127	128	127	126	124	127	129	130	130	130	130	129	128	123	123		
70	133	133	133	133	133	131	129	131	134	135	135	134	134	133	132	127	128		
75	138	138	138	138	137	135	132	134	137	138	137	137	137	136	134	130	131		
80	142	142	141	140	140	138	134	136	139	139	139	138	138	137	135	131	132		
85	144	144	143	142	141	139	135	137	139	139	139	138	138	137	135	131	132		
90	144	144	143	142	141	139	135	136	138	138	137	137	136	136	134	130	131		
95	143	143	142	140	139	137	133	133	135	135	135	134	133	133	131	127	128		
100	141	140	139	137	136	134	129	130	131	131	130	130	129	128	126	123	124		
105	137	136	135	133	131	129	125	124	126	126	125	124	124	123	121	118	119		
110	132	131	129	127	126	123	119	118	120	120	119	118	117	116	114	111	113		
115	125	124	123	121	119	116	112	111	112	112	111	111	110	109	107	104	106		
120	118	116	115	113	111	108	104	103	104	104	103	102	101	100	98.3	96.1	97.6		
125	109	108	106	104	102	99.5	95.6	94.1	95.0	94.9	94.1	93.3	92.4	91.3	89.4	87.3	89.1		
130	99.7	98.5	96.9	94.9	92.8	90.1	86.5	84.8	85.4	85.3	84.5	83.8	82.9	81.7	80.0	78.1	80.2		
135	89.6	88.5	87.0	85.0	82.9	80.2	76.9	75.0	75.4	75.2	74.5	73.7	72.8	71.7	70.1	68.4	70.9		
140	79.0	78.0	76.7	74.7	72.5	70.0	66.9	64.9	64.9	64.6	64.0	63.3	62.4	61.2	60.0	58.6	60.8		
145	67.8	67.2	65.9	64.0	61.8	59.4	56.6	54.5	54.1	53.7	53.1	52.4	51.6	50.5	44.6	41.7	43.1		
150	56.2	56.0	54.5	52.8	50.7	48.6	46.2	43.9	43.3	42.7	42.0	41.3	40.3	39.2	32.6	24.7	25.6		
155	44.5	44.4	42.9	41.3	39.4	37.6	35.5	33.5	32.4	31.6	30.3	28.8	27.5	26.6	21.5	13.0	14.9		
160	32.9	32.3	31.2	29.5	27.7	26.0	23.8	21.2	14.3	16.8	14.9	13.6	12.6	11.2	10.1	10.9	14.1		
165	21.8	19.9	20.0	16.7	14.6	12.7	9.27	5.80	2.91	3.77	2.10	1.23	1.38	1.07	0.20	0.82	2.36		
170	3.75	3.42	4.48	3.16	1.06	0.56	0.51	0.09	0.08	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11		
175	0.16	0.09	0.11	0.10	0.10	0.10	0.09	0.09	0.08	0.08	0.09	0.10	0.10	0.10	0.10	0.10	0.10		
180	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		

Table 7: Luminous Intensity Data

TEST RESULTS (3500K Setting)

Test ambient temperature was 26.0 ℃.

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)	0.191	0.085
Power Factor	0.9951	0.9771
Test Power (W)/2	11.37	11.45
THD A%	8.28	8.18
Luminous Efficacy (lm/W)	118.7	117.8
Total Luminous Flux (lm)	1349.1	1349.3
Color Rendering Index (CRI)	84	
R9	14.1	
Correlated Color Temperature (CCT)(K)	3498	
Chromaticity Chroma x	0.4029	
Chromaticity Chroma y	0.3842	
Chromaticity Chroma u	0.2368	
Chromaticity Chroma v	0.3388	
Duv	-0.0024	
Chromaticity Chroma u ’	0.2368	
Chromaticity Chroma v’	0.5081	

Special Color Rendering Indices	
R1	84.5
R2	96.2
R3	91.4
R4	79.5
R5	84.6
R6	93.1
R7	80.9
R8	61.4
R9	14.1
R10	90.4
R11	79.1
R12	70.9
R13	88.2
R14	96

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

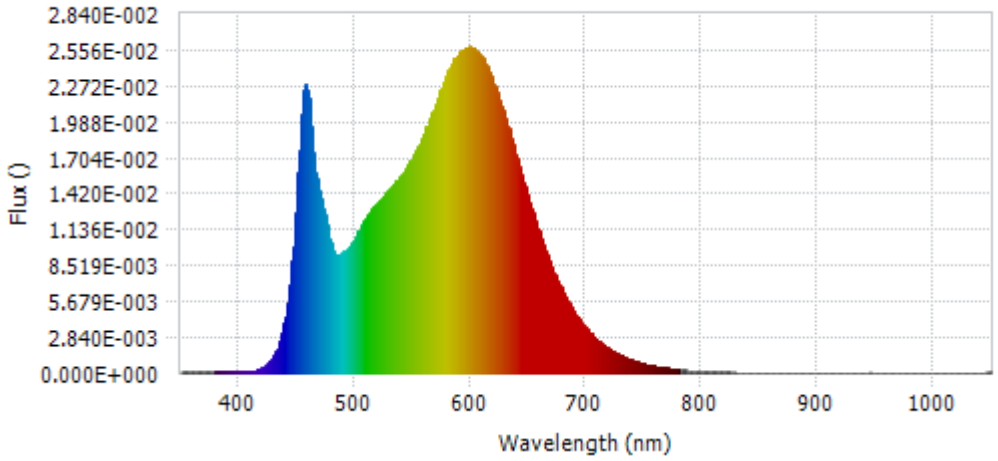
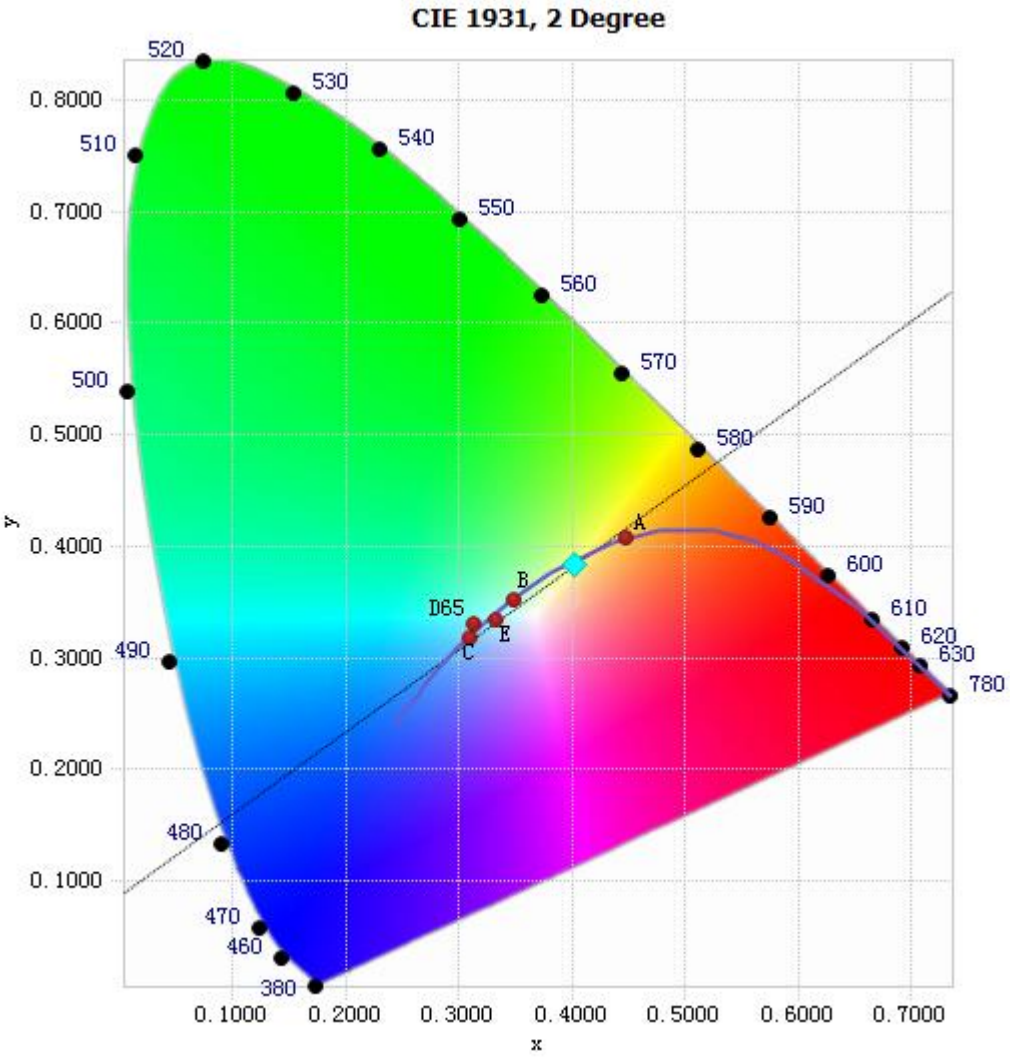


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.19E-04	485	9.29E-03	590	2.53E-02	695	4.11E-03
385	9.51E-05	490	9.50E-03	595	2.56E-02	700	3.53E-03
390	9.72E-05	495	9.97E-03	600	2.58E-02	705	3.01E-03
395	1.12E-04	500	1.06E-02	605	2.54E-02	710	2.58E-03
400	1.02E-04	505	1.15E-02	610	2.49E-02	715	2.21E-03
405	1.09E-04	510	1.23E-02	615	2.41E-02	720	1.90E-03
410	1.58E-04	515	1.30E-02	620	2.29E-02	725	1.64E-03
415	2.38E-04	520	1.34E-02	625	2.16E-02	730	1.39E-03
420	4.30E-04	525	1.40E-02	630	2.01E-02	735	1.18E-03
425	7.83E-04	530	1.46E-02	635	1.86E-02	740	1.01E-03
430	1.37E-03	535	1.50E-02	640	1.70E-02	745	8.64E-04
435	2.46E-03	540	1.56E-02	645	1.54E-02	750	7.36E-04
440	4.44E-03	545	1.63E-02	650	1.38E-02	755	6.29E-04
445	7.82E-03	550	1.70E-02	655	1.24E-02	760	5.39E-04
450	1.43E-02	555	1.79E-02	660	1.09E-02	765	4.61E-04
455	2.18E-02	560	1.89E-02	665	9.63E-03	770	3.97E-04
460	2.17E-02	565	2.01E-02	670	8.39E-03	775	3.41E-04
465	1.66E-02	570	2.13E-02	675	7.36E-03	780	2.99E-04
470	1.42E-02	575	2.25E-02	680	6.39E-03		
475	1.21E-02	580	2.36E-02	685	5.54E-03		
480	1.00E-02	585	2.47E-02	690	4.78E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4029, 0.3842)

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

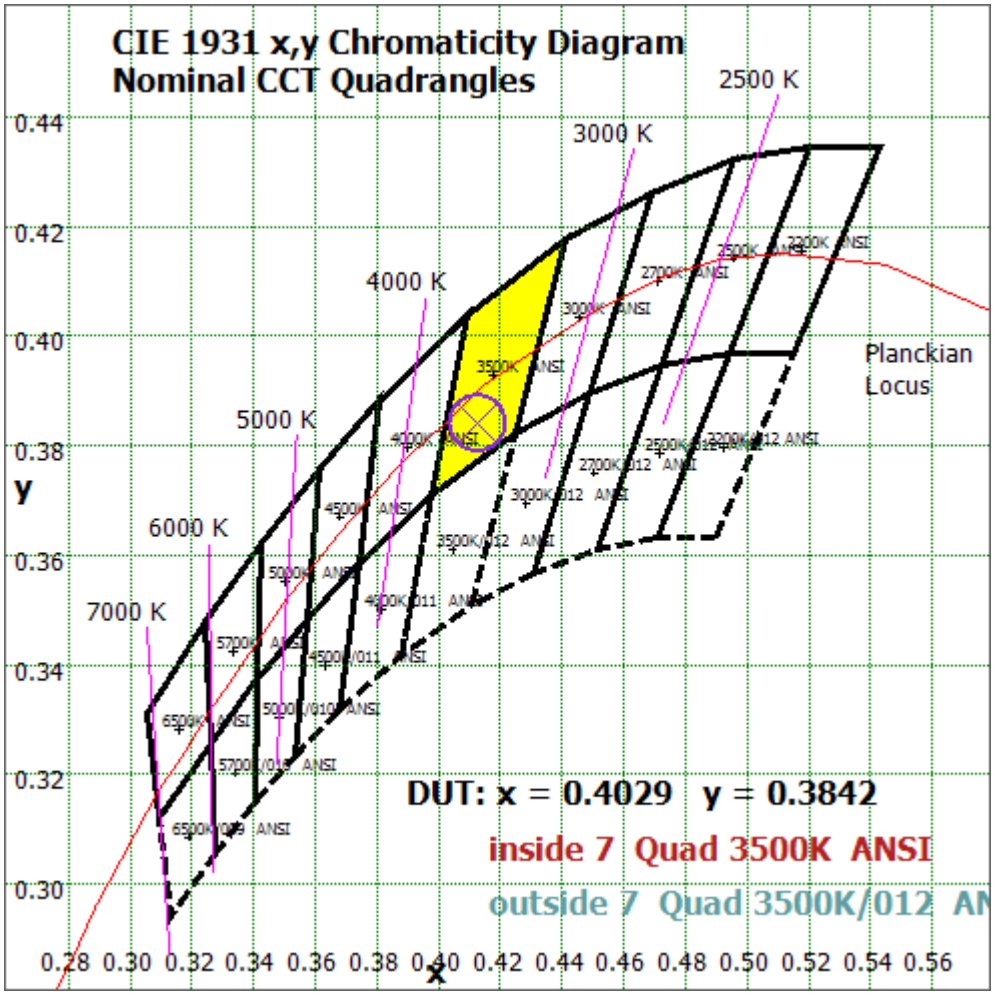


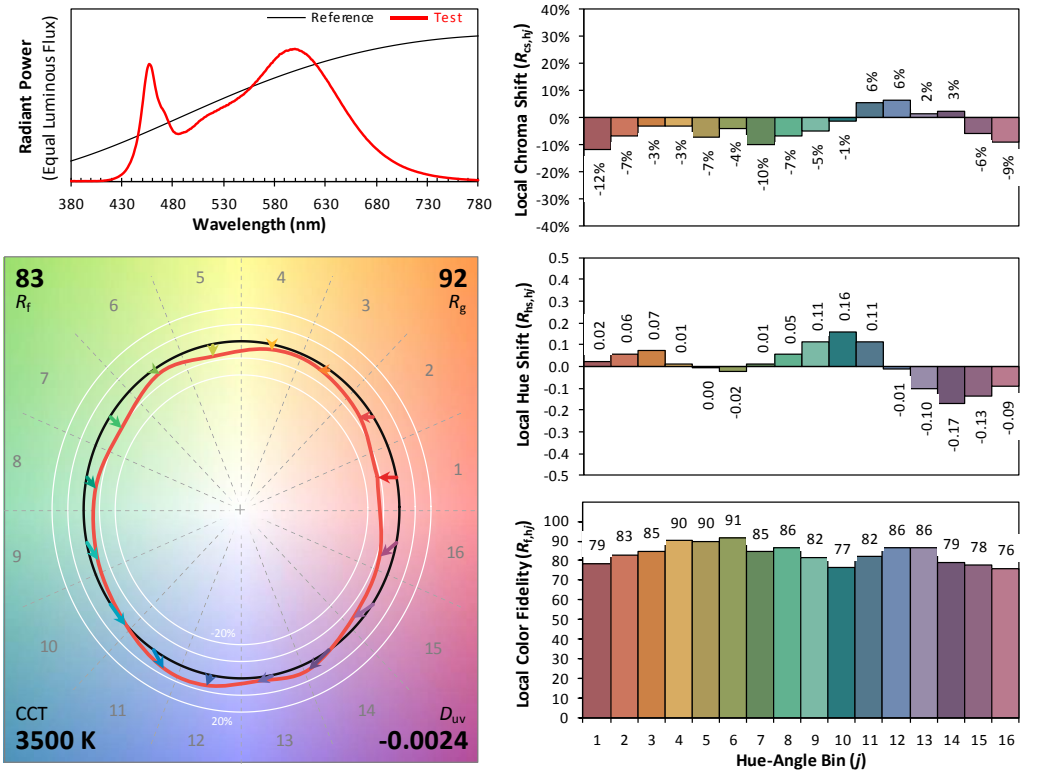
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

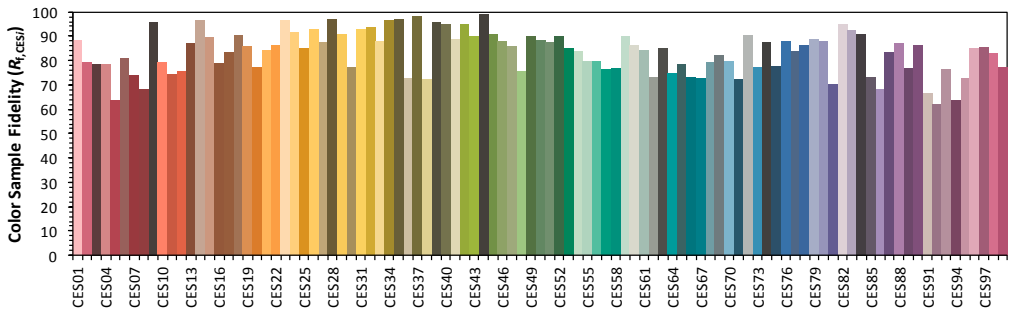
Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** GREEN CREATIVE LTD

Date: 2023/07/13 **Model:** 9PLO/8CCTS/HYB/PF





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

x	0.4029
y	0.3842
u'	0.2368
v'	0.5081

CIE 13.3-1995 (CRI)

R_a	84
R_9	14

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 ℃.

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)	0.195	0.087
Power Factor	0.9953	0.9781
Test Power (W)/2	11.67	11.73
THD A%	8.13	8.04
Luminous Efficacy (lm/W)	116.1	115.4
Total Luminous Flux (lm)	1355.3	1353.8
Color Rendering Index (CRI)	83.6	
R9	11	
Correlated Color Temperature (CCT)(K)	4016	
Chromaticity Chroma x	0.3792	
Chromaticity Chroma y	0.3747	
Chromaticity Chroma u	0.2251	
Chromaticity Chroma v	0.3337	
Duv	-0.0006	
Chromaticity Chroma u ’	0.2251	
Chromaticity Chroma v’	0.5005	

Special Color Rendering Indices	
R1	83.5
R2	95.2
R3	92.6
R4	78.4
R5	83.1
R6	91.4
R7	81.9
R8	62.3
R9	11
R10	87.6
R11	77.7
R12	65.4
R13	87.4
R14	96.5

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

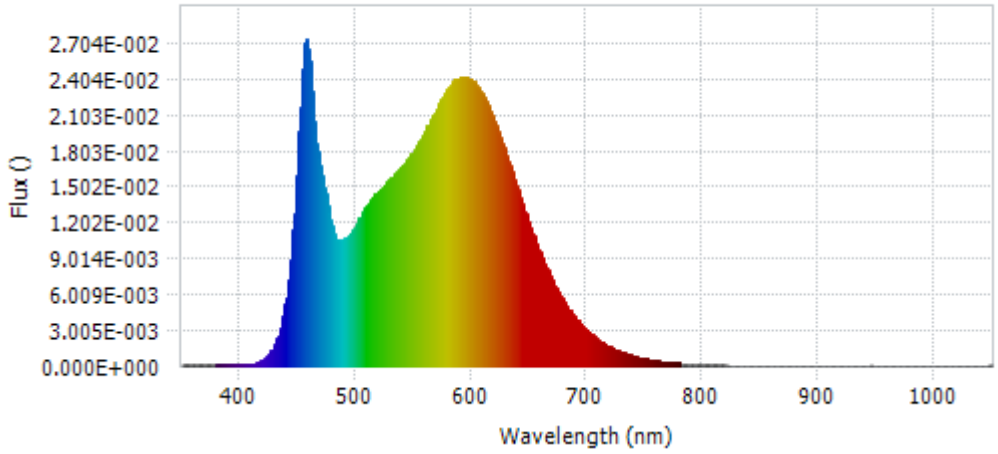
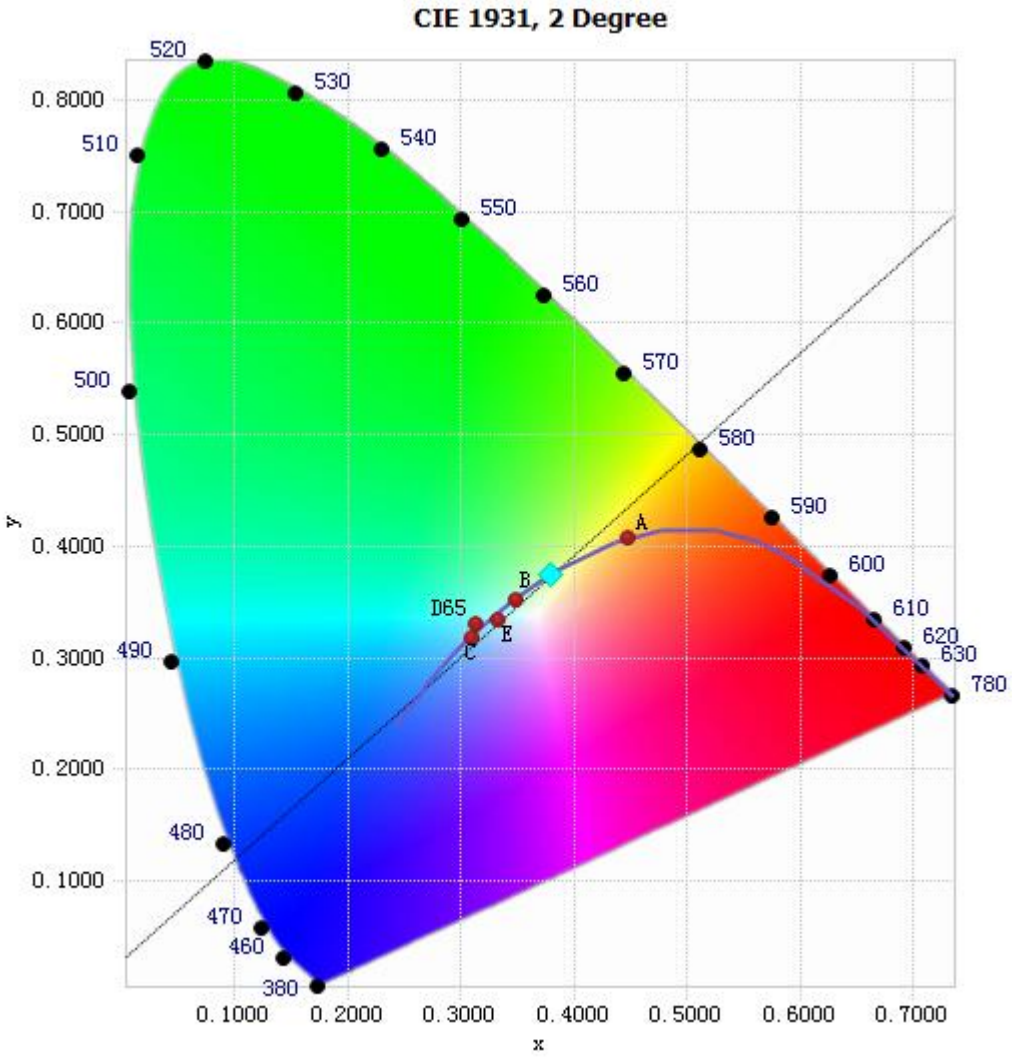


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.25E-04	485	1.05E-02	590	2.42E-02	695	3.45E-03
385	1.14E-04	490	1.06E-02	595	2.42E-02	700	2.95E-03
390	1.35E-04	495	1.11E-02	600	2.41E-02	705	2.51E-03
395	1.23E-04	500	1.18E-02	605	2.34E-02	710	2.16E-03
400	1.18E-04	505	1.27E-02	610	2.26E-02	715	1.85E-03
405	1.32E-04	510	1.34E-02	615	2.17E-02	720	1.60E-03
410	1.84E-04	515	1.42E-02	620	2.04E-02	725	1.36E-03
415	3.00E-04	520	1.46E-02	625	1.91E-02	730	1.16E-03
420	5.59E-04	525	1.51E-02	630	1.76E-02	735	9.83E-04
425	9.99E-04	530	1.57E-02	635	1.62E-02	740	8.46E-04
430	1.84E-03	535	1.61E-02	640	1.48E-02	745	7.22E-04
435	3.23E-03	540	1.67E-02	645	1.33E-02	750	6.15E-04
440	5.76E-03	545	1.74E-02	650	1.19E-02	755	5.33E-04
445	1.00E-02	550	1.80E-02	655	1.06E-02	760	4.58E-04
450	1.77E-02	555	1.88E-02	660	9.34E-03	765	3.87E-04
455	2.62E-02	560	1.97E-02	665	8.18E-03	770	3.38E-04
460	2.55E-02	565	2.06E-02	670	7.15E-03	775	2.90E-04
465	1.93E-02	570	2.15E-02	675	6.20E-03	780	2.50E-04
470	1.64E-02	575	2.24E-02	680	5.36E-03		
475	1.39E-02	580	2.32E-02	685	4.66E-03		
480	1.14E-02	585	2.40E-02	690	4.00E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3792, 0.3747)

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

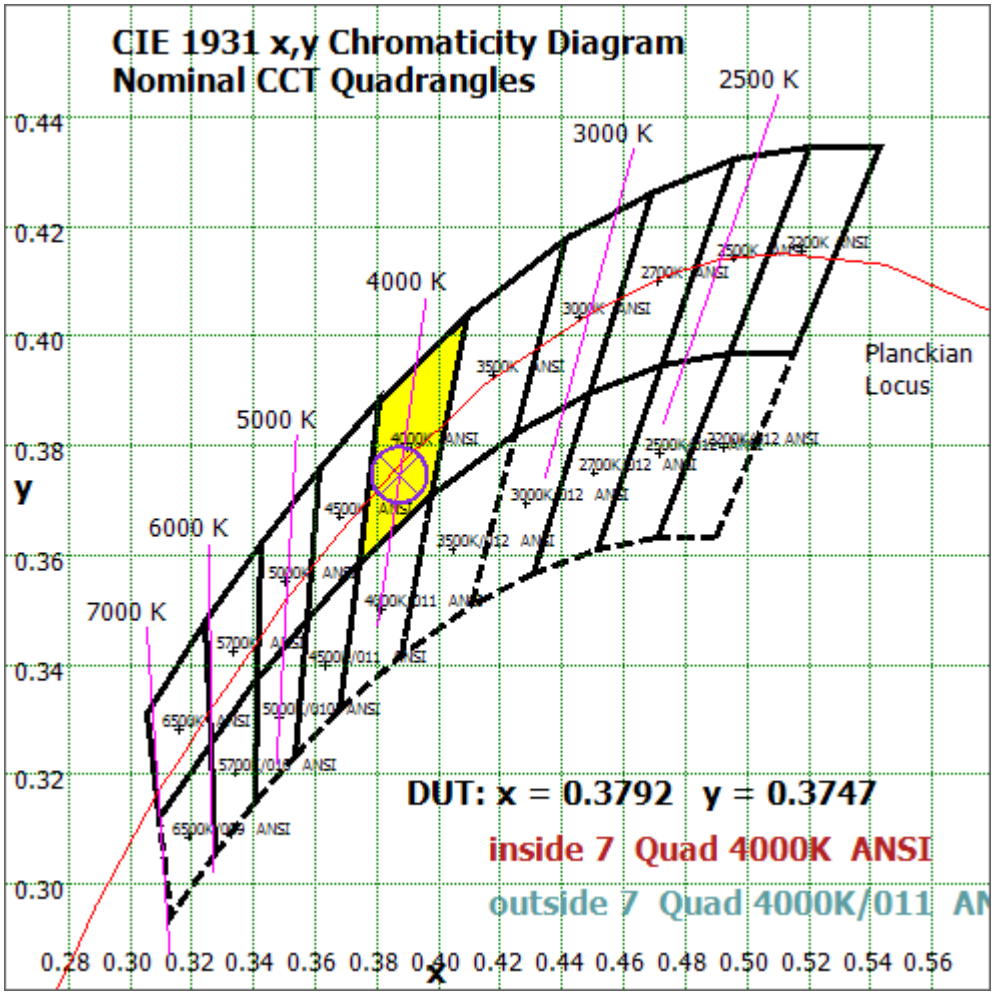


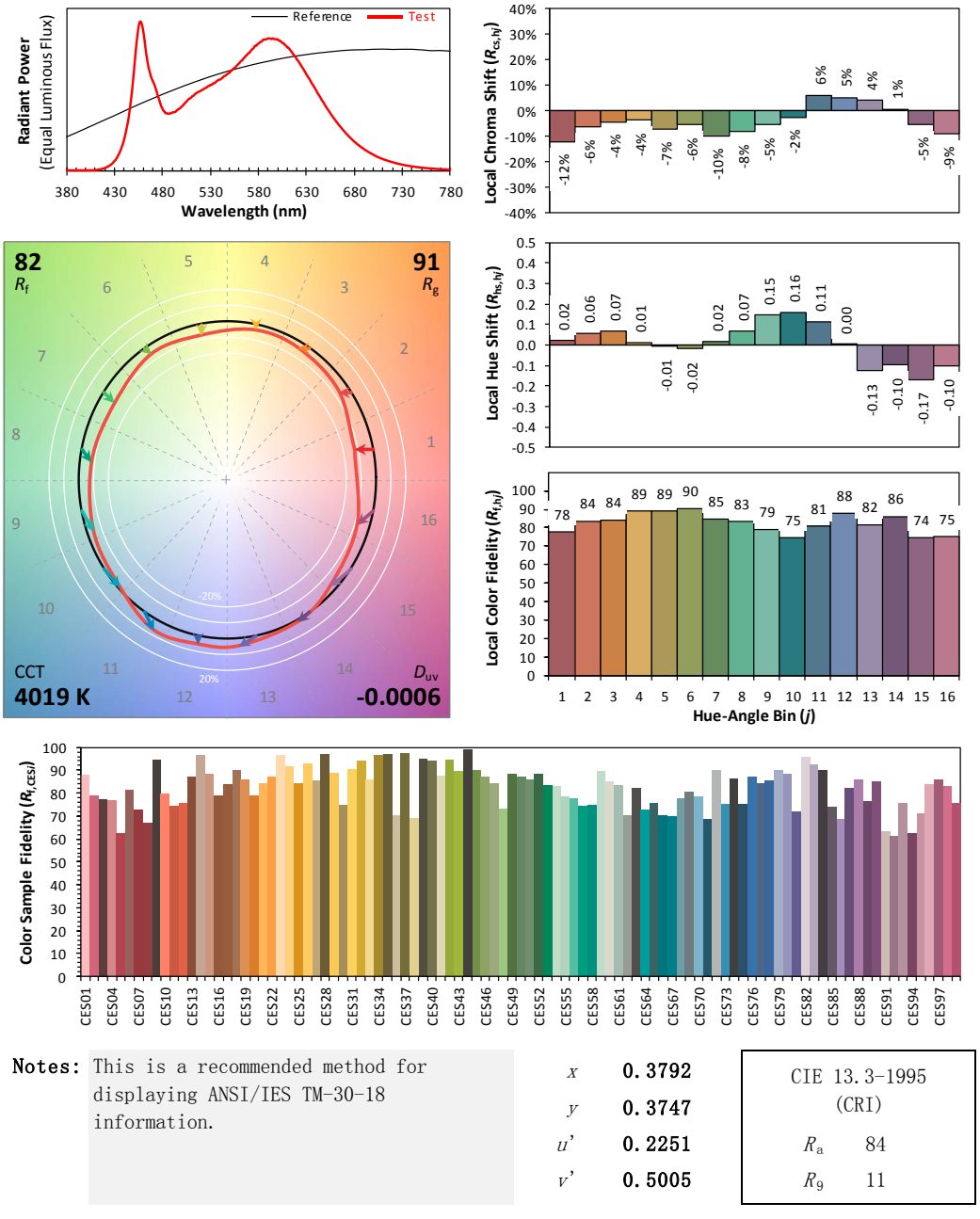
Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

Source: LED **Manufacturer:** GREEN CREATIVE LTD

Date: 2023/07/13 **Model:** 9PLO/8CCTS/HYB/PF



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

x	0.3792
y	0.3747
u'	0.2251
v'	0.5005

CIE 13.3-1995 (CRI)

R_a	84
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
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 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 4π. 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.

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 expended 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 ***