

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.: HZ23070004k

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)	129.6	143.6	138.9
Total Luminous Flux (Lumens)	1122.2	1210.5	1205.6
Power (Watts)	8.66	8.43	8.68
Power Factor	0.9755	0.9741	0.9758
CCT (K)	3052	3490	4018
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. 14, 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

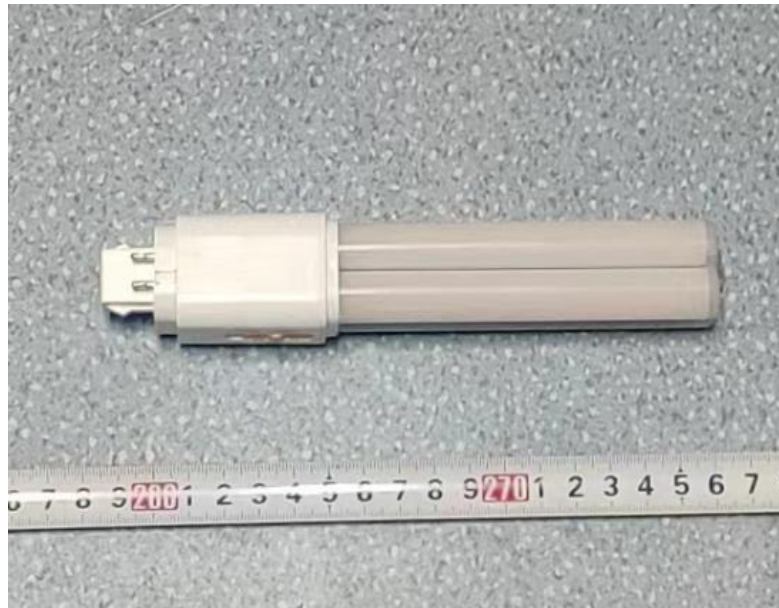


Figure 1- Overview of the sample

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
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 °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)	0.074	0.036
Power Factor	0.9755	0.8890
Test Power (W)	8.66	8.80
THD A%	10.27	17.65
Luminous Efficacy (lm/W)	129.6	130.5
Total Luminous Flux (lm)	1122.2	1148.1
Color Rendering Index (CRI)	82.9	
R9	8.8	
Correlated Color Temperature (CCT)(K)	3052	
Chromaticity Chroma x	0.4307	
Chromaticity Chroma y	0.3977	
Chromaticity Chroma u	0.2493	
Chromaticity Chroma v	0.3453	
Duv	-0.0017	
Chromaticity Chroma u'	0.2493	
Chromaticity Chroma v'	0.5179	

Special Color Rendering Indices	
R1	82.5
R2	94.2
R3	92.5
R4	79.6
R5	83.1
R6	92.9
R7	80.5
R8	58.2
R9	8.8
R10	86.8
R11	79.2
R12	74.8
R13	85.8
R14	96.6

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

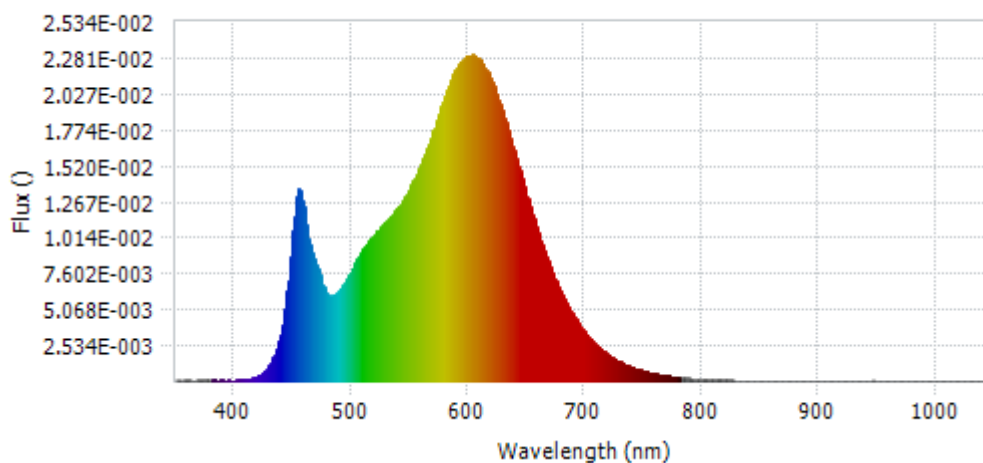


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.27E-05	485	6.07E-03	590	2.21E-02	695	3.98E-03
385	6.84E-05	490	6.48E-03	595	2.27E-02	700	3.40E-03
390	7.83E-05	495	7.07E-03	600	2.30E-02	705	2.91E-03
395	6.32E-05	500	7.87E-03	605	2.29E-02	710	2.51E-03
400	7.09E-05	505	8.63E-03	610	2.26E-02	715	2.14E-03
405	7.47E-05	510	9.30E-03	615	2.20E-02	720	1.85E-03
410	1.18E-04	515	9.91E-03	620	2.11E-02	725	1.58E-03
415	2.16E-04	520	1.03E-02	625	2.00E-02	730	1.35E-03
420	3.68E-04	525	1.08E-02	630	1.87E-02	735	1.15E-03
425	6.89E-04	530	1.13E-02	635	1.74E-02	740	9.77E-04
430	1.19E-03	535	1.17E-02	640	1.60E-02	745	8.30E-04
435	2.09E-03	540	1.23E-02	645	1.46E-02	750	7.13E-04
440	3.62E-03	545	1.29E-02	650	1.31E-02	755	6.08E-04
445	6.34E-03	550	1.36E-02	655	1.18E-02	760	5.22E-04
450	1.07E-02	555	1.44E-02	660	1.04E-02	765	4.46E-04
455	1.36E-02	560	1.54E-02	665	9.20E-03	770	3.80E-04
460	1.17E-02	565	1.65E-02	670	8.06E-03	775	3.31E-04
465	9.34E-03	570	1.77E-02	675	7.05E-03	780	2.78E-04
470	8.18E-03	575	1.89E-02	680	6.14E-03		
475	6.85E-03	580	2.01E-02	685	5.33E-03		
480	6.04E-03	585	2.13E-02	690	4.62E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method

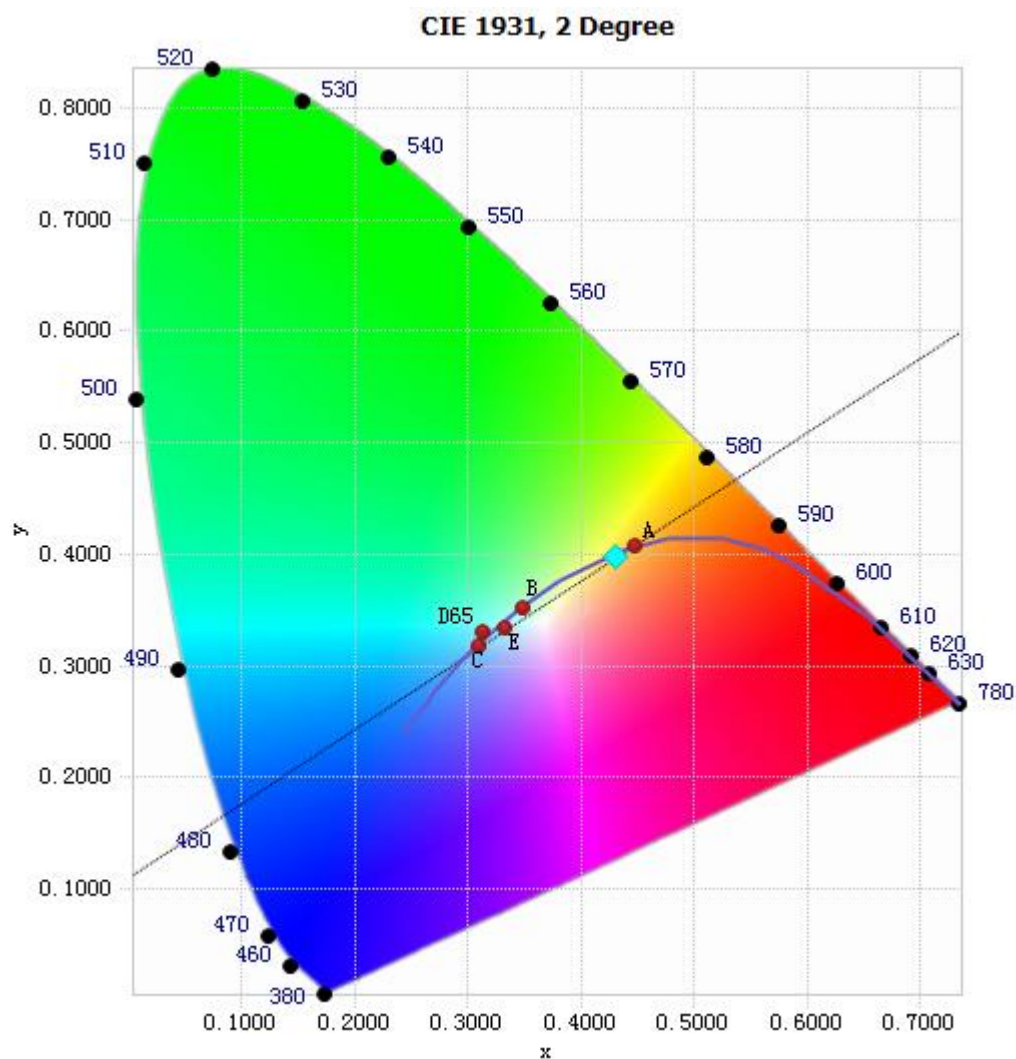


Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

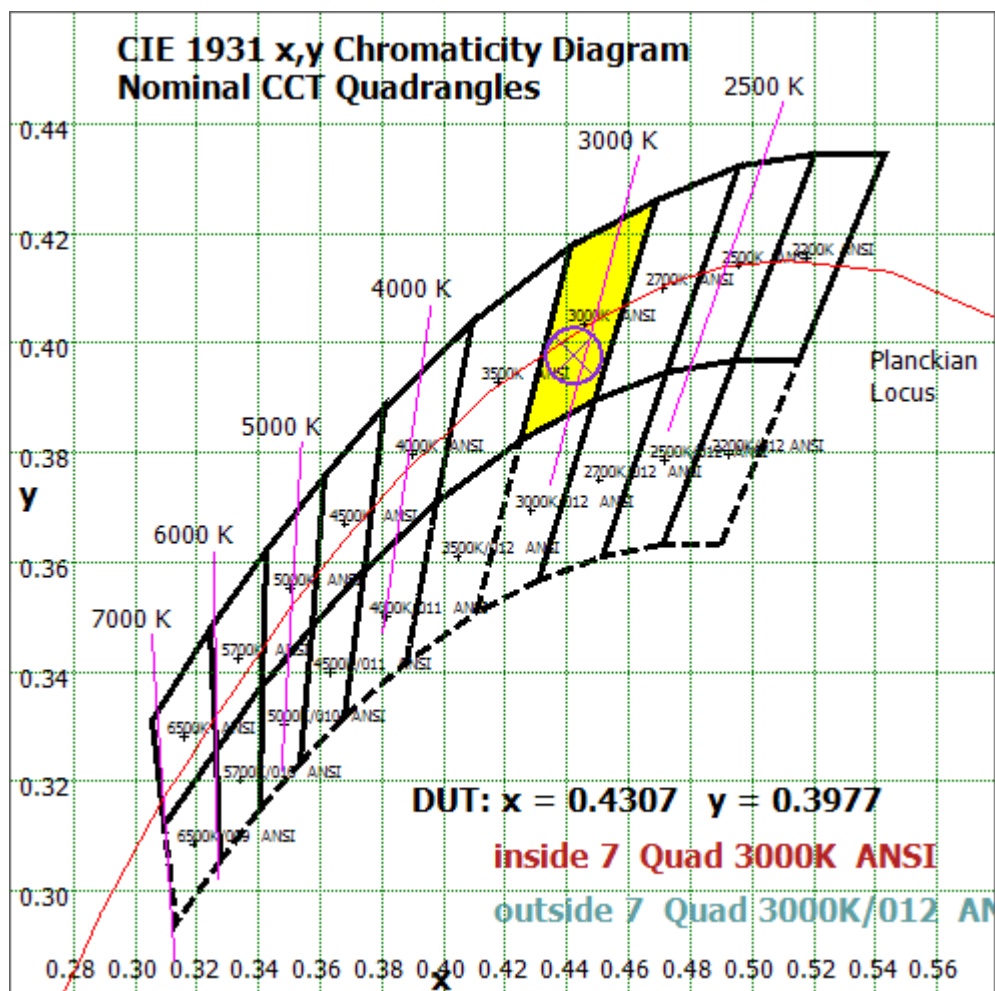


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

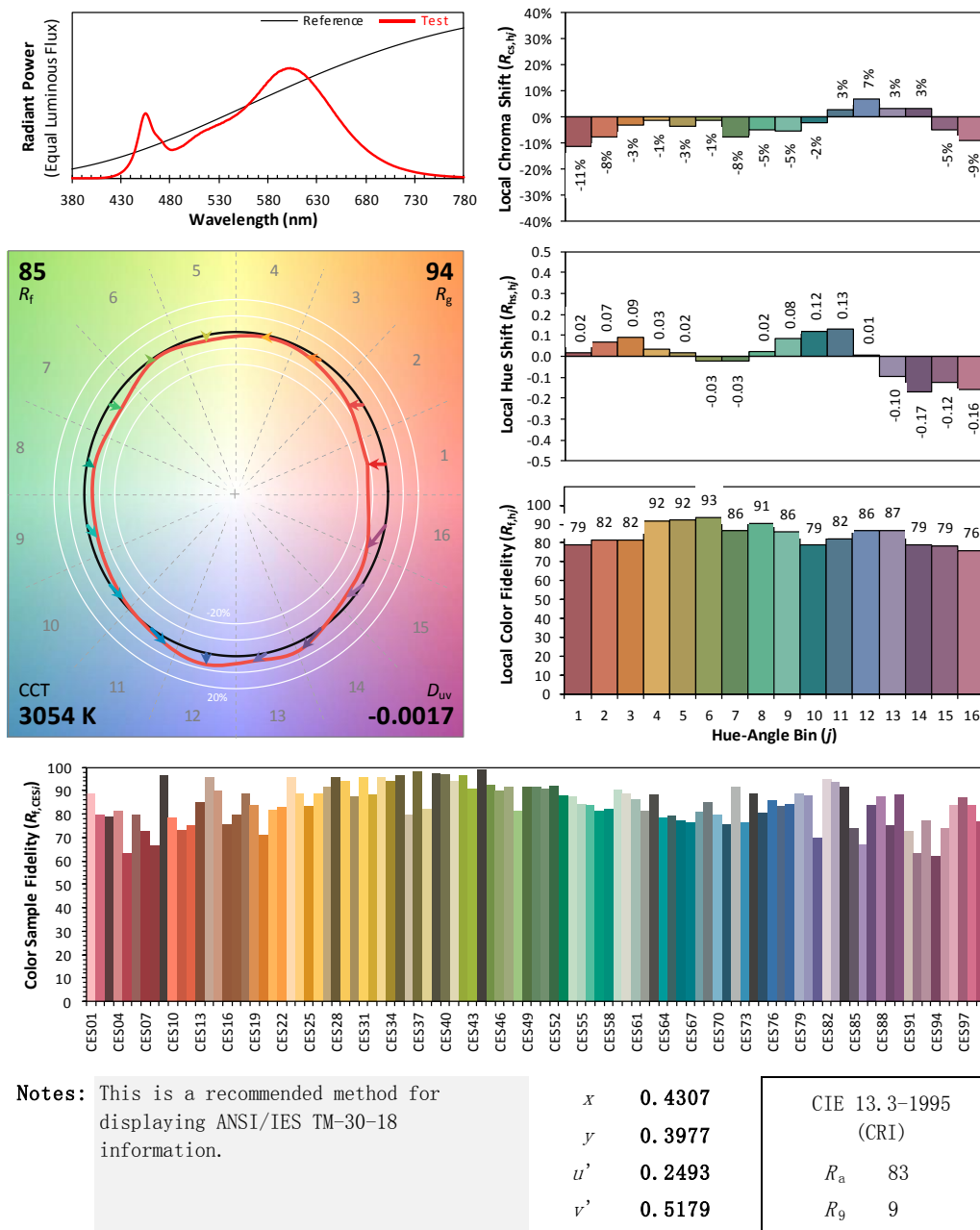
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/07/14

Model: 9PLO/8CCTS/HYB/PF



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 °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)	0.074
Power Factor	0.9767
Power (W)	8.63
Luminous Efficacy (lm/W)	130.9
Total Luminous Flux (lm)	1129.8
Beam Angle (°)	335.8 (0°-180°) / 337.1 (90°-270°)
Center Beam Candle Power (cd)	10.4
Maximum Beam Candle Power (cd)	126.7 (At: C=300.0, Gamma=87.0)
Spacing Criteria	4.74 (0°-180°) / 4.84 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	19.76%
Zonal Lumens in the 60 °-90 °Zone	32.52%
Zonal Lumens in the 90 °-120 °Zone	31.17%
Zonal Lumens in the 120 °-180 °Zone	16.55%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	1.397	0.12%
10- 20	7.924	0.70%
20- 30	21.376	1.89%
30- 40	40.773	3.61%
40- 50	63.902	5.66%
50- 60	87.894	7.78%
60- 70	109.444	9.69%
70- 80	125.245	11.09%
80- 90	132.749	11.75%
90-100	130.847	11.58%
100-110	119.794	10.60%
110-120	101.511	8.98%
120-130	78.946	6.99%
130-140	55.226	4.89%
140-150	33.089	2.93%
150-160	15.519	1.37%
160-170	4.028	0.36%
170-180	0.13	0.01%
Total	1129.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	223.266	19.76%
60- 90	367.438	32.52%
0-90	590.704	52.28%
90- 180	539.09	47.72%
0- 180	1129.8	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

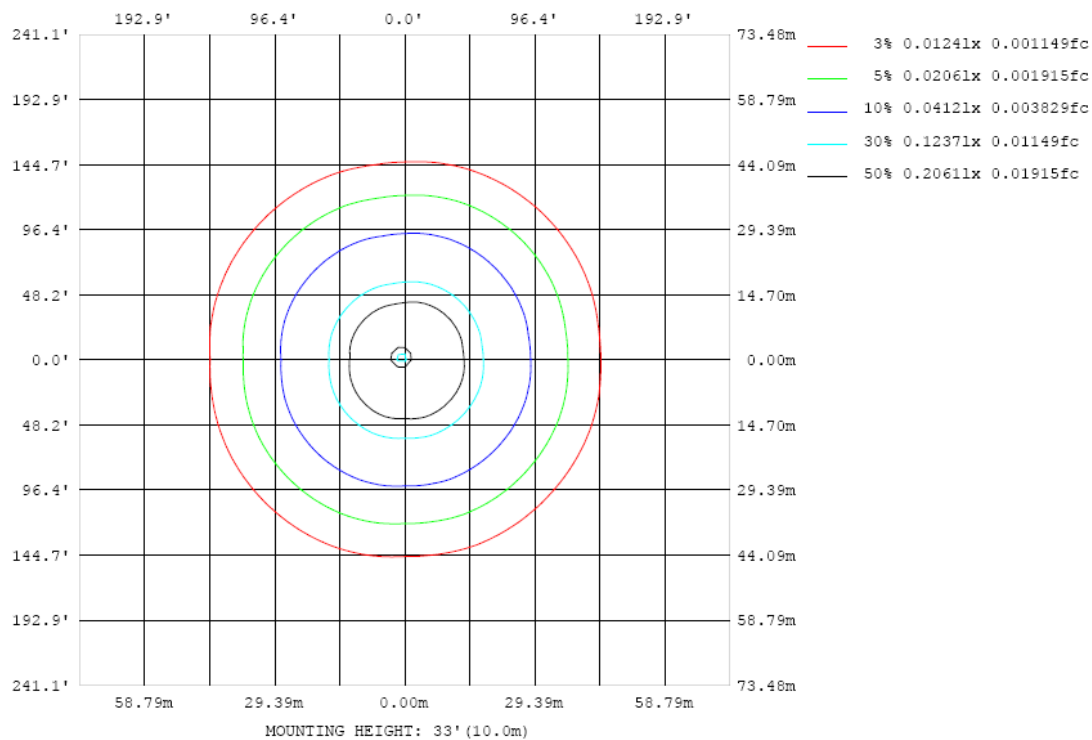


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

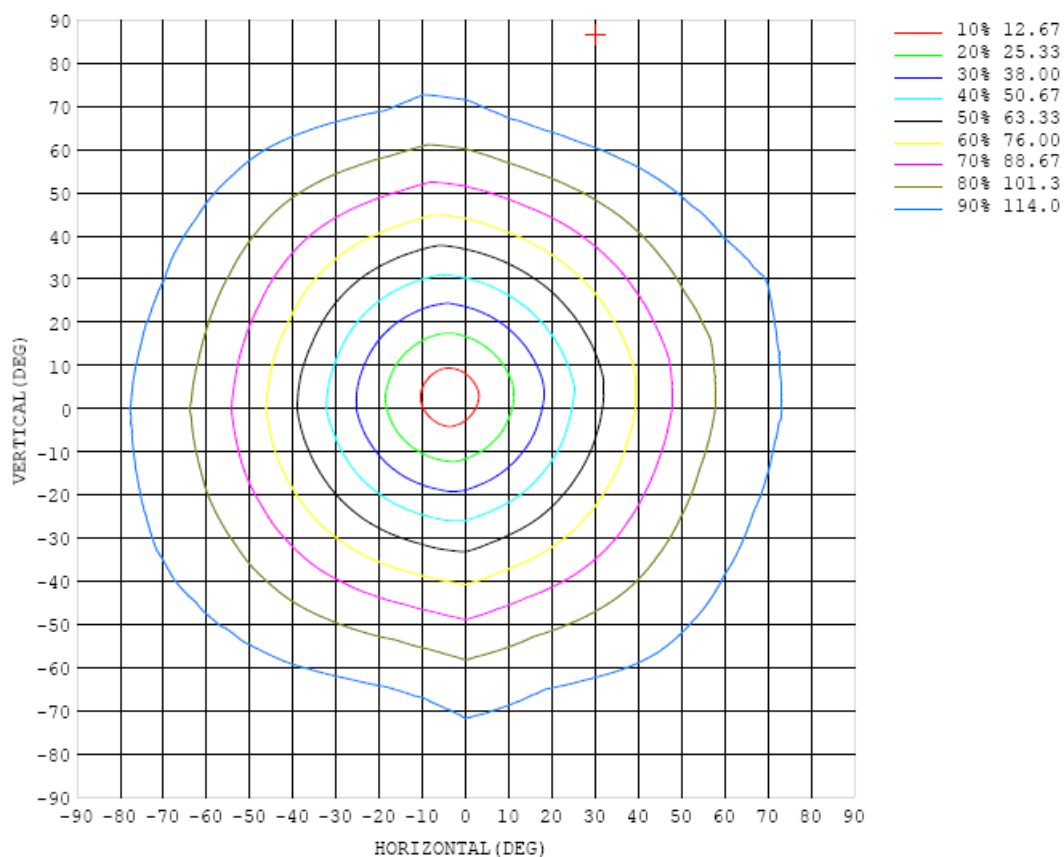


Chart 6: Isocandela Plot

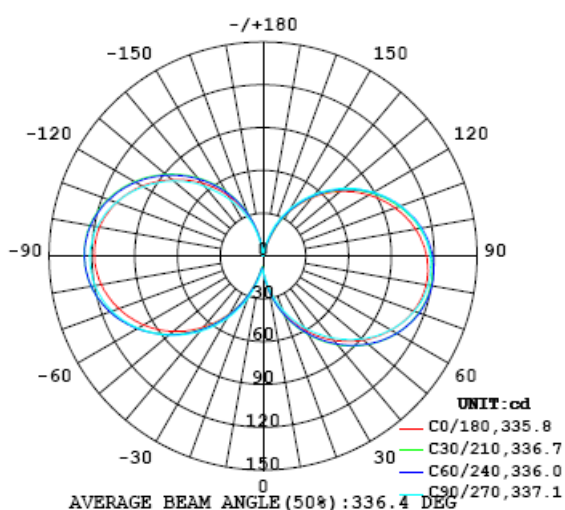


Chart 7: Polar Candela Distribution

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	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
5	16.1	16.5	16.8	17.0	17.0	16.9	16.7	16.3	15.8	15.2	14.6	13.8	13.1	12.3	11.6	10.8	10.2	9.49	8.90
10	24.0	24.7	25.2	25.4	25.4	25.0	24.3	23.6	22.5	21.5	20.4	19.5	18.5	17.4	16.1	15.0	14.0	12.9	
15	33.0	33.9	34.4	34.8	35.0	34.8	34.2	33.4	32.5	31.1	29.7	29.0	28.0	26.9	25.6	24.1	22.6	21.2	19.9
20	42.2	43.3	44.0	44.5	44.7	44.4	43.8	43.0	41.8	40.0	38.8	38.5	37.5	36.3	34.9	33.3	31.6	29.9	28.3
25	51.4	52.6	53.5	54.1	54.4	54.0	53.3	52.5	51.1	49.0	48.3	48.1	47.3	46.1	44.6	42.8	41.1	39.2	37.3
30	60.4	61.9	62.8	63.6	63.7	63.3	62.7	61.8	60.2	57.8	57.8	57.8	57.1	55.9	54.4	52.7	50.8	48.7	46.5
35	69.0	70.6	71.9	72.6	72.7	72.4	71.7	71.0	69.2	66.5	67.1	67.3	66.6	65.5	64.1	62.2	60.2	58.1	55.9
40	77.0	79.1	80.4	81.2	81.2	80.9	80.4	79.6	77.6	74.8	76.0	76.5	75.9	74.9	73.4	71.6	69.5	67.2	65.1
45	84.6	87.1	88.5	89.2	89.1	88.9	88.5	87.7	85.7	82.7	84.4	85.1	84.9	83.7	82.3	80.6	78.5	75.9	73.9
50	91.6	94.4	95.7	96.5	96.4	96.3	95.9	95.4	93.1	90.5	92.4	93.4	93.0	92.1	90.7	89.1	86.8	84.1	82.2
55	98.1	101	102	103	103	103	103	102	99.8	97.4	99.8	101	101	99.6	98.4	96.9	94.7	91.8	89.9
60	104	107	108	108	108	108	108	108	106	104	106	108	107	107	105	104	102	98.8	96.6
65	109	111	113	113	113	113	113	113	111	109	112	113	113	112	111	110	108	105	103
70	112	115	116	116	116	116	117	117	115	113	116	118	118	117	116	115	113	110	108
75	115	117	118	118	118	119	119	119	117	116	119	121	121	121	120	119	117	114	112
80	116	118	120	119	119	120	120	120	118	118	121	123	123	123	123	122	120	117	115
85	116	118	119	119	119	119	120	121	119	118	122	124	124	124	124	123	122	119	117
90	115	117	118	118	118	118	119	119	117	117	121	123	124	124	124	123	122	119	118
95	112	115	116	116	115	116	116	117	115	116	119	122	122	123	122	122	121	119	118
100	109	111	112	112	111	112	113	113	112	112	116	118	119	120	120	120	119	117	116
105	104	106	107	107	107	107	108	109	107	108	112	114	115	116	116	116	115	113	113
110	98.6	101	102	102	101	102	102	103	101	102	106	109	110	111	111	112	111	109	110
115	92.4	94.1	95.2	95.2	95.0	95.5	96.1	96.4	95.2	96.4	99.9	102	104	105	106	106	105	103	104
120	85.6	86.9	88.1	88.1	88.0	88.3	89.0	89.2	87.9	89.4	92.7	95.3	96.9	98.0	98.7	99.1	98.7	96.6	98.0
125	78.3	79.2	80.3	80.5	80.4	80.7	81.1	81.2	80.3	81.9	85.0	87.7	89.3	90.5	91.3	91.7	91.4	89.5	91.0
130	70.5	70.9	71.9	72.2	72.2	72.5	72.8	72.9	72.1	73.8	76.8	79.3	81.2	82.3	83.2	83.7	83.4	82.0	83.2
135	62.0	62.4	63.3	63.5	63.7	64.0	64.2	64.2	63.7	65.4	68.3	70.6	72.4	73.7	74.5	75.1	75.0	73.8	75.1
140	53.3	53.5	54.2	54.6	54.8	55.0	55.2	55.2	55.0	56.7	59.2	61.5	63.3	64.6	65.5	66.0	66.2	65.7	66.8
145	44.3	44.4	45.0	45.2	45.3	45.6	45.8	45.9	46.0	47.7	49.9	52.1	53.9	55.3	56.2	56.8	56.9	56.8	58.0
150	35.2	35.2	35.5	35.6	35.7	36.0	36.4	36.6	36.9	38.6	40.6	42.5	44.2	45.5	46.6	47.1	47.6	47.6	48.9
155	25.6	22.3	22.7	25.2	26.1	26.0	26.6	27.3	27.8	29.3	31.0	32.8	34.4	35.7	36.7	37.5	38.0	38.2	39.4
160	13.0	6.87	7.28	13.7	15.7	15.1	15.5	16.5	17.6	20.1	21.8	23.3	24.7	26.0	27.0	27.8	28.5	29.0	29.9
165	3.84	2.18	2.53	4.50	4.68	4.39	3.71	4.48	6.57	9.31	11.5	13.0	14.4	15.8	17.3	18.3	19.2	19.9	20.6
170	0.05	0.09	0.09	0.09	0.09	0.09	0.09	0.07	0.13	0.49	1.28	2.15	2.94	4.19	5.45	6.76	7.73	8.61	9.39
175	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.06	0.08	0.03	0.10	0.26
180	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Table 6: Luminous Intensity Data

Table--2		UNIT: cd																	
γ (DEG)	C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	
0		10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	
5		8.36	7.80	7.35	7.61	7.96	8.40	8.95	9.56	10.2	10.9	11.6	12.3	13.0	13.6	14.3	15.0	15.6	
10		11.9	11.5	11.3	11.3	11.6	12.0	12.8	13.8	15.0	16.2	17.5	18.6	19.7	20.6	21.4	22.1	23.1	
15		18.9	18.5	18.4	18.5	18.7	19.1	19.8	20.9	22.5	24.1	25.6	27.0	28.3	29.3	30.2	30.7	31.6	
20		27.5	27.5	27.3	27.5	27.7	28.1	28.6	29.4	31.3	33.1	34.9	36.6	37.8	38.9	39.6	40.0	40.8	
25		37.0	37.2	37.2	37.3	37.5	37.9	38.1	38.5	40.8	42.8	44.7	46.3	47.7	48.7	49.4	49.6	49.5	
30		46.6	47.2	47.2	47.4	47.6	47.9	47.9	47.9	50.4	52.6	54.6	56.3	57.5	58.4	59.0	58.8	58.7	
35		56.2	57.0	57.2	57.3	57.6	57.8	57.7	57.4	59.8	62.1	64.3	66.1	67.3	68.0	68.4	68.1	67.6	
40		65.6	66.8	67.1	67.3	67.4	67.5	67.3	66.7	69.1	71.8	73.9	75.5	76.8	77.4	77.4	77.0	76.1	
45		74.8	76.1	76.5	76.7	76.8	77.0	76.6	75.4	77.7	80.6	82.9	84.6	85.6	86.2	86.2	85.3	84.0	
50		83.4	85.0	85.5	85.6	85.8	85.9	85.6	84.2	86.3	89.2	91.6	93.1	94.2	94.4	94.3	93.3	91.2	
55		91.6	93.3	93.9	94.0	94.2	94.2	93.7	91.9	94.2	97.3	99.6	101	102	102	102	100	97.6	
60		99.2	101	102	102	102	102	101	99.2	101	104	107	108	109	109	108	107	103	
65		106	108	108	109	109	109	108	106	108	111	113	114	115	114	114	112	109	
70		111	114	114	114	114	114	114	111	113	116	118	119	119	119	118	116	112	
75		116	118	119	119	119	119	118	116	117	120	122	123	123	122	121	119	115	
80		119	121	122	122	123	122	122	119	120	123	125	125	125	125	123	121	117	
85		121	124	124	125	125	125	124	121	121	124	126	127	126	125	124	121	117	
90		122	125	126	125	126	125	125	121	121	125	126	127	126	124	123	121	116	
95		122	124	125	125	125	125	124	121	121	124	125	125	124	123	121	118	114	
100		120	122	123	123	123	123	122	119	118	121	122	122	121	120	118	115	111	
105		117	119	120	120	120	120	119	115	115	117	118	118	117	115	113	110	106	
110		112	115	116	116	116	115	114	111	110	112	113	112	111	110	108	105	101	
115		107	109	110	110	110	110	109	105	104	106	107	106	105	103	101	98.2	94.8	
120		101	103	104	104	104	103	102	99.1	97.5	99.1	99.7	99.0	97.7	96.0	93.9	91.2	87.8	
125		93.9	96.0	97.0	97.0	96.7	96.0	94.9	91.8	89.7	91.3	91.8	91.1	89.8	88.0	85.9	83.3	80.2	
130		86.3	88.1	89.0	89.0	88.9	88.1	86.7	84.1	81.9	83.1	83.3	82.6	81.4	79.6	77.5	75.0	72.2	
135		77.8	79.5	80.6	80.6	80.3	79.4	78.1	75.6	73.4	73.4	72.9	73.2	72.3	70.7	68.7	66.1	63.8	
140		69.2	70.7	71.5	71.6	71.2	70.4	69.1	66.9	63.7	63.3	59.9	59.7	63.5	61.5	59.5	57.1	55.1	
145		60.1	61.3	62.2	62.3	61.8	61.1	59.8	57.8	53.9	52.2	42.3	45.9	54.3	51.9	49.9	47.9	46.1	
150		50.7	51.7	52.5	52.6	52.1	51.4	50.2	47.7	44.9	41.1	28.5	36.0	44.6	42.1	40.4	38.6	36.9	
155		41.1	41.7	42.3	42.3	42.0	41.4	40.0	38.1	35.6	31.2	21.9	31.0	34.3	32.5	30.9	29.3	27.8	
160		31.2	31.7	31.9	32.0	31.8	31.1	29.8	28.5	26.5	25.5	18.9	19.6	24.6	23.1	21.6	20.0	18.0	
165		21.4	22.1	19.6	21.7	21.3	20.7	19.8	18.3	16.8	15.3	14.8	12.7	13.1	12.1	10.5	7.94	5.88	
170		9.99	10.4	11.2	9.51	9.73	9.20	8.40	7.53	5.65	3.51	3.62	3.25	2.48	1.72	0.31	0.14	0.10	
175		0.22	0.04	0.15	0.36	0.14	0.05	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.09	0.09	
180		0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	

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 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)	0.072	0.035
Power Factor	0.9741	0.8841
Test Power (W)	8.43	8.59
THD A%	10.55	18.02
Luminous Efficacy (lm/W)	143.6	143.9
Total Luminous Flux (lm)	1210.5	1236.4
Color Rendering Index (CRI)	84	
R9	13.7	
Correlated Color Temperature (CCT)(K)	3490	
Chromaticity Chroma x	0.4034	
Chromaticity Chroma y	0.3847	
Chromaticity Chroma u	0.2369	
Chromaticity Chroma v	0.3390	
Duv	-0.0022	
Chromaticity Chroma u'	0.2369	
Chromaticity Chroma v'	0.5084	

Special Color Rendering Indices	
R1	84.3
R2	95.8
R3	91.9
R4	79.9
R5	84.5
R6	92.9
R7	81.2
R8	61.4
R9	13.7
R10	89.6
R11	79.5
R12	70.7
R13	87.9
R14	96.3

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

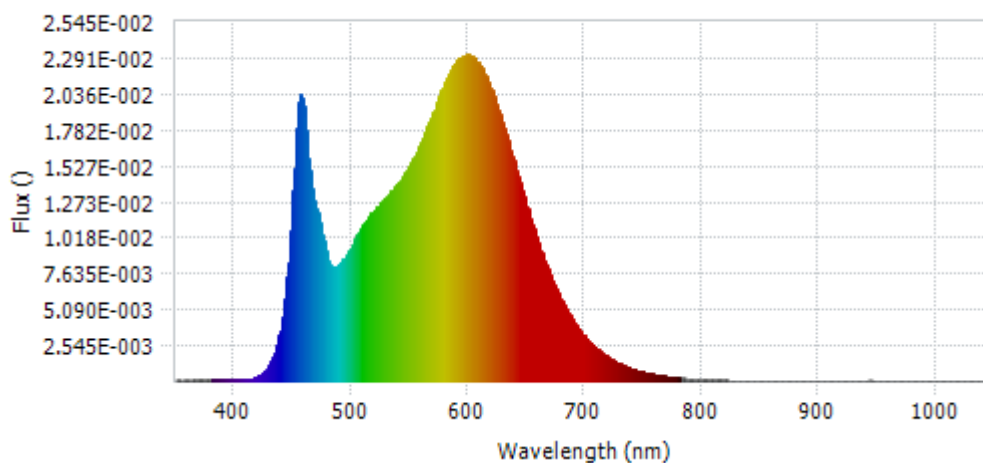
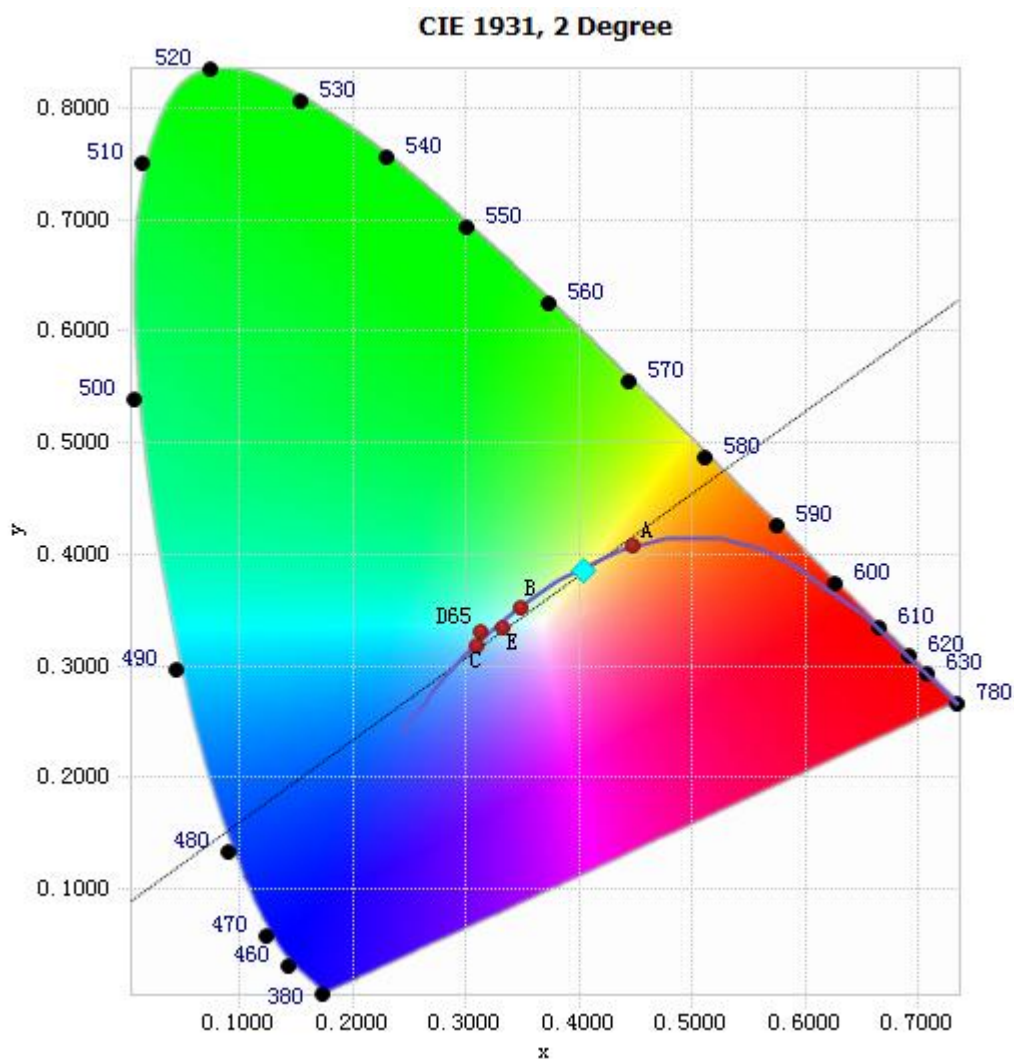


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.86E-05	485	8.13E-03	590	2.27E-02	695	3.66E-03
385	1.00E-04	490	8.40E-03	595	2.30E-02	700	3.13E-03
390	9.16E-05	495	8.84E-03	600	2.31E-02	705	2.69E-03
395	1.11E-04	500	9.56E-03	605	2.28E-02	710	2.30E-03
400	8.90E-05	505	1.03E-02	610	2.24E-02	715	1.95E-03
405	9.81E-05	510	1.10E-02	615	2.16E-02	720	1.68E-03
410	1.23E-04	515	1.17E-02	620	2.06E-02	725	1.44E-03
415	2.15E-04	520	1.21E-02	625	1.94E-02	730	1.23E-03
420	3.71E-04	525	1.26E-02	630	1.81E-02	735	1.05E-03
425	6.99E-04	530	1.31E-02	635	1.67E-02	740	8.90E-04
430	1.25E-03	535	1.35E-02	640	1.53E-02	745	7.60E-04
435	2.25E-03	540	1.40E-02	645	1.38E-02	750	6.50E-04
440	4.10E-03	545	1.47E-02	650	1.24E-02	755	5.57E-04
445	7.37E-03	550	1.53E-02	655	1.11E-02	760	4.72E-04
450	1.35E-02	555	1.61E-02	660	9.81E-03	765	4.07E-04
455	1.98E-02	560	1.70E-02	665	8.60E-03	770	3.46E-04
460	1.87E-02	565	1.80E-02	670	7.52E-03	775	2.96E-04
465	1.42E-02	570	1.90E-02	675	6.57E-03	780	2.58E-04
470	1.23E-02	575	2.02E-02	680	5.70E-03		
475	1.03E-02	580	2.12E-02	685	4.93E-03		
480	8.56E-03	585	2.21E-02	690	4.26E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4034, 0.3847)

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

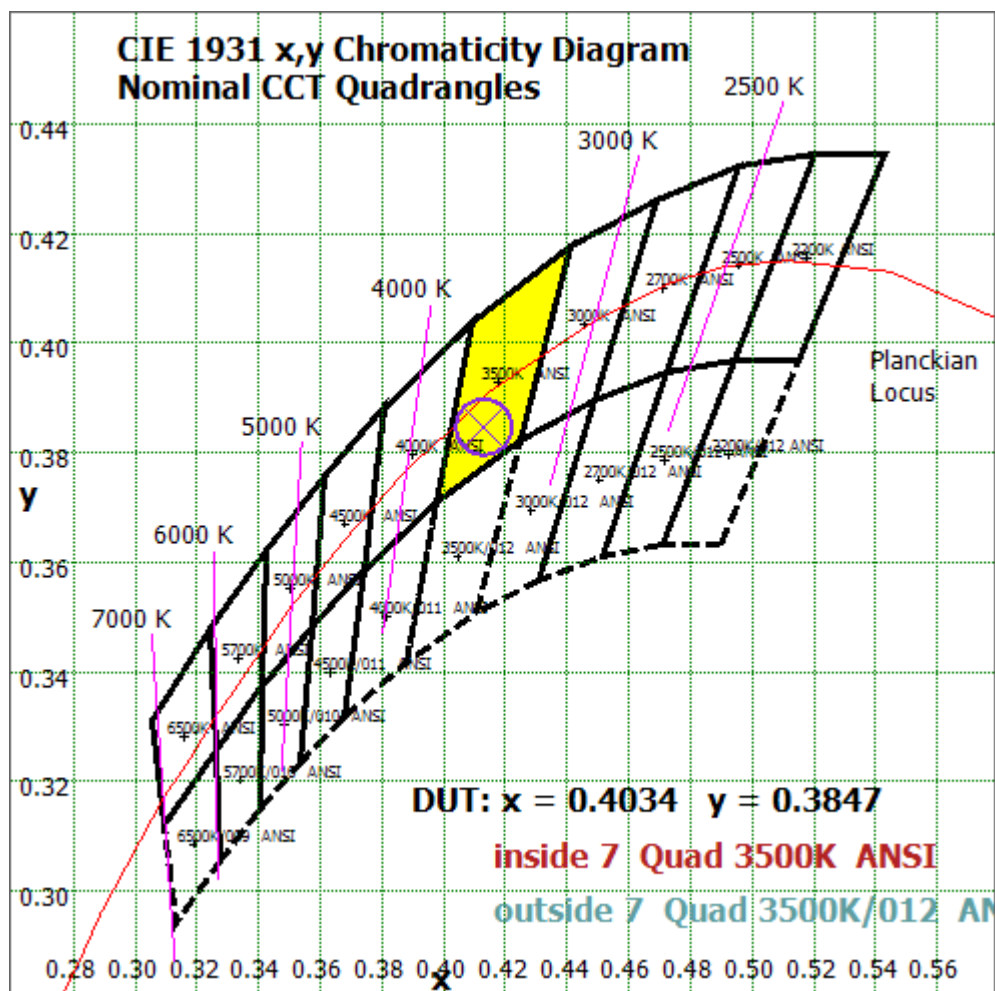


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

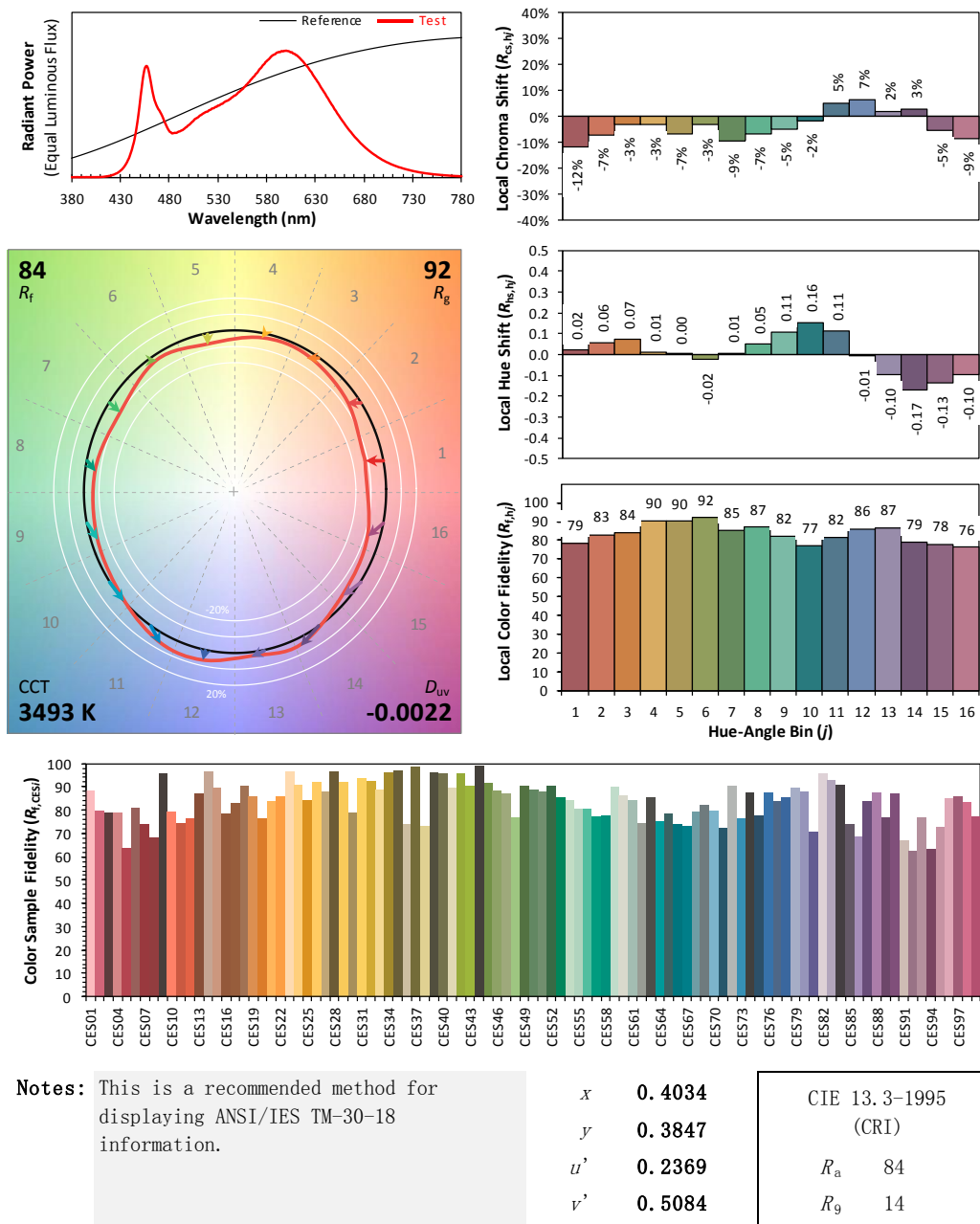
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/07/14

Model: 9PLO/8CCTS/HYB/PF



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)	0.074	0.036
Power Factor	0.9758	0.8887
Test Power (W)	8.68	8.82
THD A%	10.26	17.65
Luminous Efficacy (lm/W)	138.9	139.8
Total Luminous Flux (lm)	1205.6	1233.1
Color Rendering Index (CRI)	83.6	
R9	10.5	
Correlated Color Temperature (CCT)(K)	4018	
Chromaticity Chroma x	0.3792	
Chromaticity Chroma y	0.3748	
Chromaticity Chroma u	0.2250	
Chromaticity Chroma v	0.3337	
Duv	-0.0005	
Chromaticity Chroma u'	0.2250	
Chromaticity Chroma v'	0.5006	

Special Color Rendering Indices	
R1	83.4
R2	94.9
R3	92.9
R4	78.6
R5	83
R6	91.1
R7	82.1
R8	62.3
R9	10.5
R10	87
R11	77.9
R12	65.3
R13	87.1
R14	96.7

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

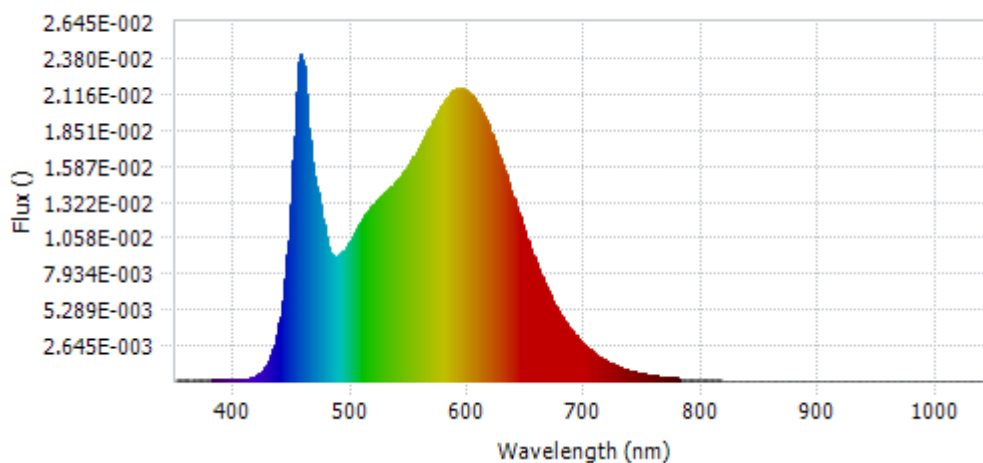
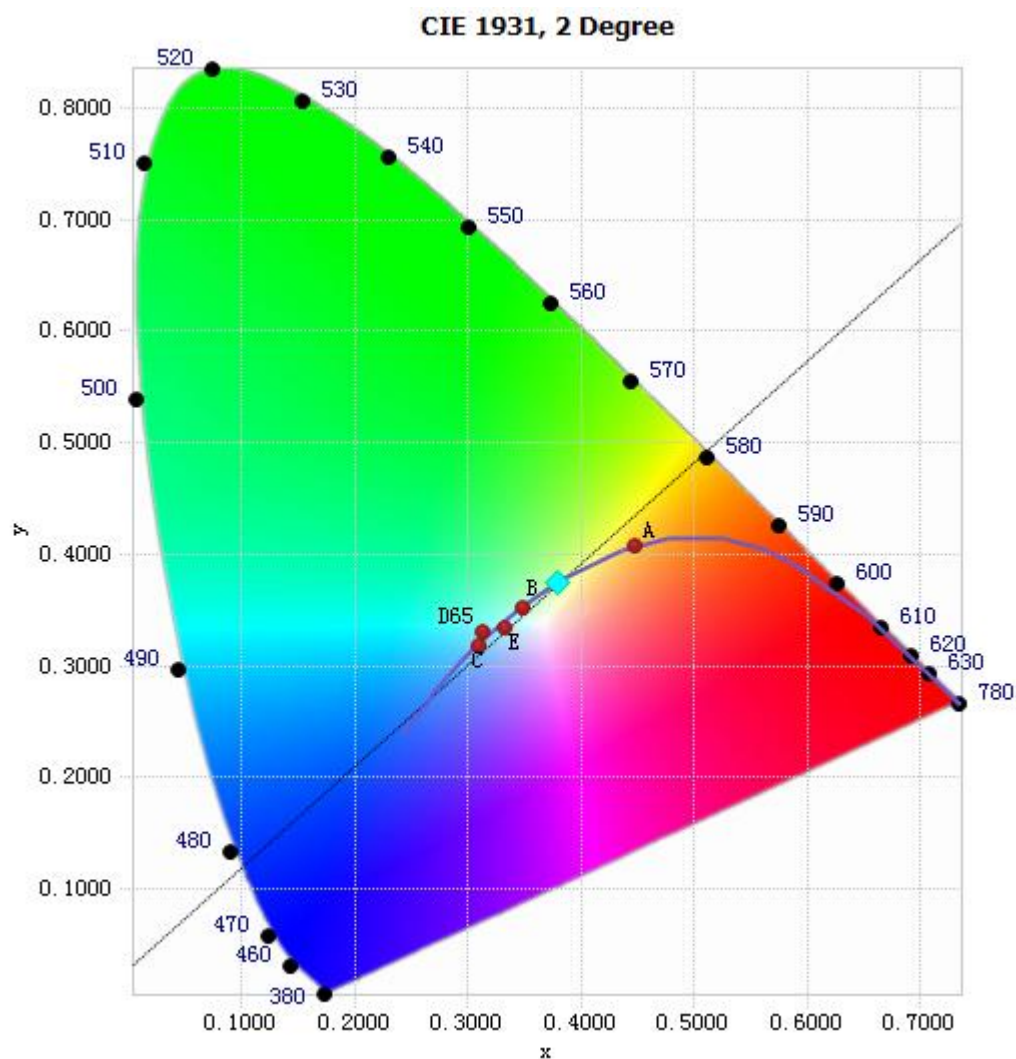


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.14E-04	485	9.21E-03	590	2.15E-02	695	3.05E-03
385	8.91E-05	490	9.38E-03	595	2.15E-02	700	2.60E-03
390	1.07E-04	495	9.78E-03	600	2.13E-02	705	2.23E-03
395	1.12E-04	500	1.05E-02	605	2.08E-02	710	1.90E-03
400	1.07E-04	505	1.13E-02	610	2.01E-02	715	1.64E-03
405	1.14E-04	510	1.20E-02	615	1.92E-02	720	1.40E-03
410	1.59E-04	515	1.26E-02	620	1.82E-02	725	1.20E-03
415	2.78E-04	520	1.30E-02	625	1.70E-02	730	1.03E-03
420	4.74E-04	525	1.36E-02	630	1.57E-02	735	8.74E-04
425	9.24E-04	530	1.40E-02	635	1.44E-02	740	7.51E-04
430	1.67E-03	535	1.44E-02	640	1.31E-02	745	6.32E-04
435	2.99E-03	540	1.49E-02	645	1.18E-02	750	5.44E-04
440	5.34E-03	545	1.54E-02	650	1.05E-02	755	4.65E-04
445	9.27E-03	550	1.60E-02	655	9.35E-03	760	3.97E-04
450	1.63E-02	555	1.67E-02	660	8.27E-03	765	3.45E-04
455	2.35E-02	560	1.75E-02	665	7.24E-03	770	2.93E-04
460	2.21E-02	565	1.83E-02	670	6.32E-03	775	2.50E-04
465	1.68E-02	570	1.91E-02	675	5.50E-03	780	2.19E-04
470	1.43E-02	575	1.99E-02	680	4.77E-03		
475	1.20E-02	580	2.07E-02	685	4.12E-03		
480	9.87E-03	585	2.13E-02	690	3.54E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3792, 0.3748)

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

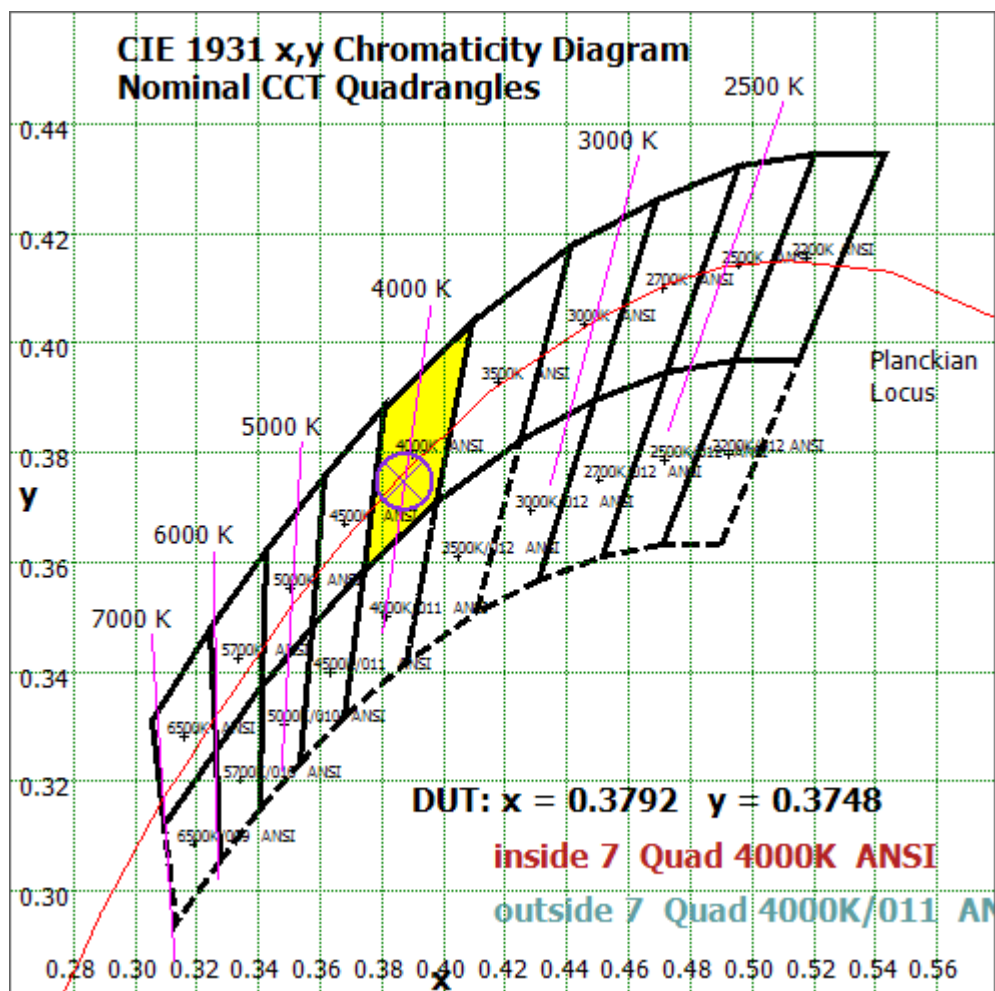


Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

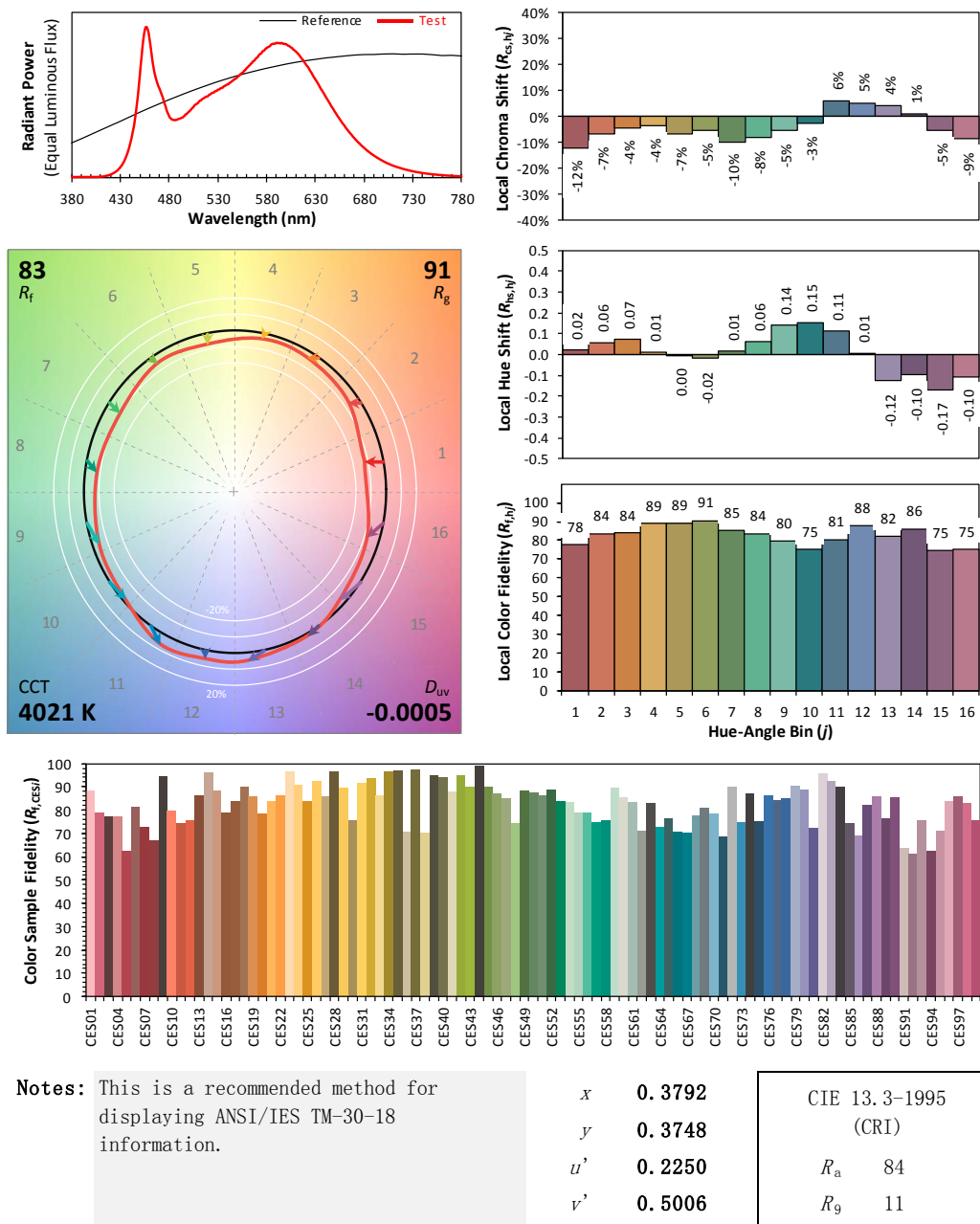
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/07/14

Model: 9PLO/8CCTS/HYB/PF



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

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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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