

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: 24HID/8CCTS/277V/EX39/DIM/SD

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24010037c

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

Review by:

Wei Fei



April Zou

Engineer: Wei Fei
Feb. 27, 2024

Manager: April Zou
Feb. 27, 2024

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	24HID/8CCTS/277V/ EX39/DIM/SD 3000K Setting	24HID/8CCTS/277V/ EX39/DIM/SD 4000K Setting	24HID/8CCTS/277V/ EX39/DIM/SD 5000K Setting
Luminous Efficacy (Lumens /Watt)	138.2	147.8	141.2
Total Luminous Flux (Lumens)	3519.5	3754.7	3649.2
Power (Watts)	25.47	25.41	25.85
Power Factor	0.9965	0.9966	0.9966
CCT (K)	3056	4192	4915
CRI	82.0	84.8	83.8
Stabilization Time(Light & Power)	50	50	50
Note	3000K	4000K	5000K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Jan. 25, 2024
Date of Test	: Feb. 26, 2024
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	: 24HID/8CCTS/277V/EX39/DIM/SD
Electrical Ratings	: 120-277V, 50/60Hz, 24W
Product Description	: Color- Tunable 3000K/4000K/5000K
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
Voltage frequency (Hz)	60	60
Test Current (A)	0.213	0.091
Power Factor	0.9965	0.9254
Test Power (W)	25.47	23.37
THD A%	4.13	18.96
Luminous Efficacy (lm/W)	138.2	142.4
Total Luminous Flux (lm)	3519.5	3328.4
Color Rendering Index (CRI)	82.0	
R9	6.1	
Correlated Color Temperature (CCT)(K)	3056	
Chromaticity Chroma x	0.4302	
Chromaticity Chroma y	0.3971	
Chromaticity Chroma u	0.2492	
Chromaticity Chroma v	0.3451	
Duv	-0.0019	
Chromaticity Chroma u'	0.2492	
Chromaticity Chroma v'	0.5176	

Special Color Rendering Indices	
R1	80.4
R2	89.7
R3	96.1
R4	80.3
R5	80.5
R6	87
R7	82.7
R8	59.1
R9	6.1
R10	76.3
R11	79.6
R12	69.7
R13	82.5
R14	98.2

Table 2: Test data per Sphere-Spectroradiometer Method

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

Spectral Power Distribution - Sphere Spectroradiometer Method

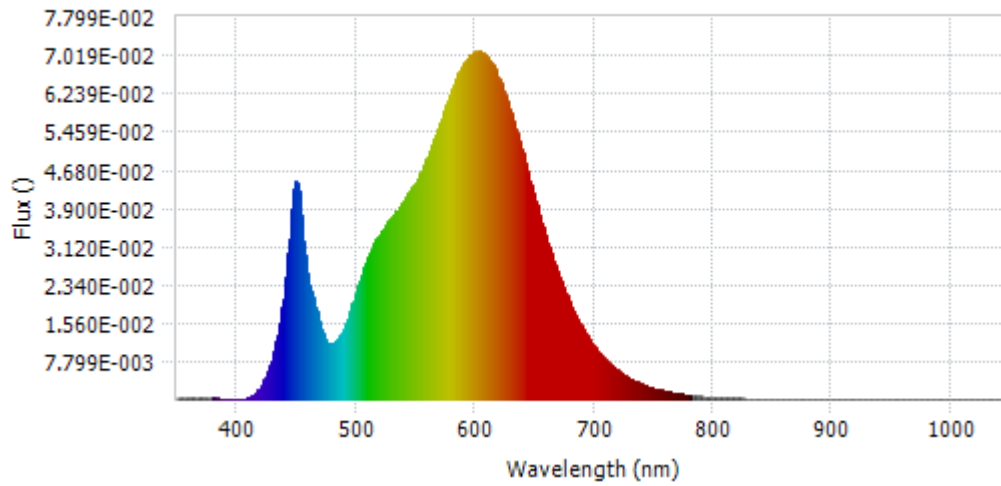
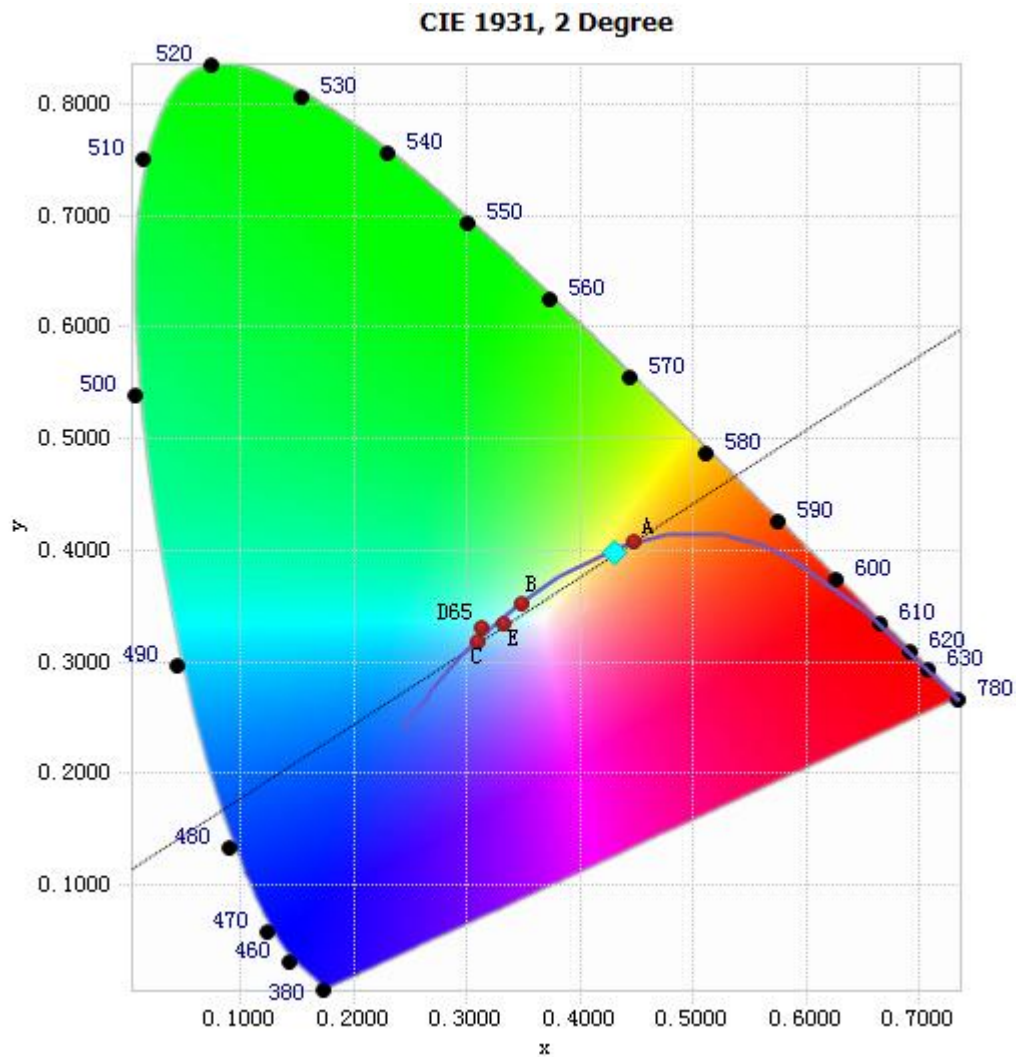


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.63E-04	485	1.24E-02	590	6.84E-02	695	1.26E-02
385	2.31E-04	490	1.45E-02	595	7.01E-02	700	1.08E-02
390	2.17E-04	495	1.79E-02	600	7.09E-02	705	9.26E-03
395	1.87E-04	500	2.18E-02	605	7.08E-02	710	7.93E-03
400	1.62E-04	505	2.55E-02	610	6.98E-02	715	6.82E-03
405	1.83E-04	510	2.88E-02	615	6.81E-02	720	5.85E-03
410	3.83E-04	515	3.17E-02	620	6.55E-02	725	5.03E-03
415	1.15E-03	520	3.36E-02	625	6.21E-02	730	4.29E-03
420	2.63E-03	525	3.56E-02	630	5.85E-02	735	3.64E-03
425	5.02E-03	530	3.73E-02	635	5.43E-02	740	3.11E-03
430	8.75E-03	535	3.86E-02	640	5.02E-02	745	2.65E-03
435	1.44E-02	540	4.04E-02	645	4.56E-02	750	2.29E-03
440	2.27E-02	545	4.23E-02	650	4.11E-02	755	1.95E-03
445	3.56E-02	550	4.42E-02	655	3.70E-02	760	1.66E-03
450	4.46E-02	555	4.66E-02	660	3.29E-02	765	1.42E-03
455	3.48E-02	560	4.93E-02	665	2.91E-02	770	1.22E-03
460	2.43E-02	565	5.25E-02	670	2.54E-02	775	1.05E-03
465	1.99E-02	570	5.58E-02	675	2.22E-02	780	8.89E-04
470	1.50E-02	575	5.92E-02	680	1.94E-02		
475	1.17E-02	580	6.27E-02	685	1.69E-02		
480	1.14E-02	585	6.60E-02	690	1.46E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4302, 0.3971)

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

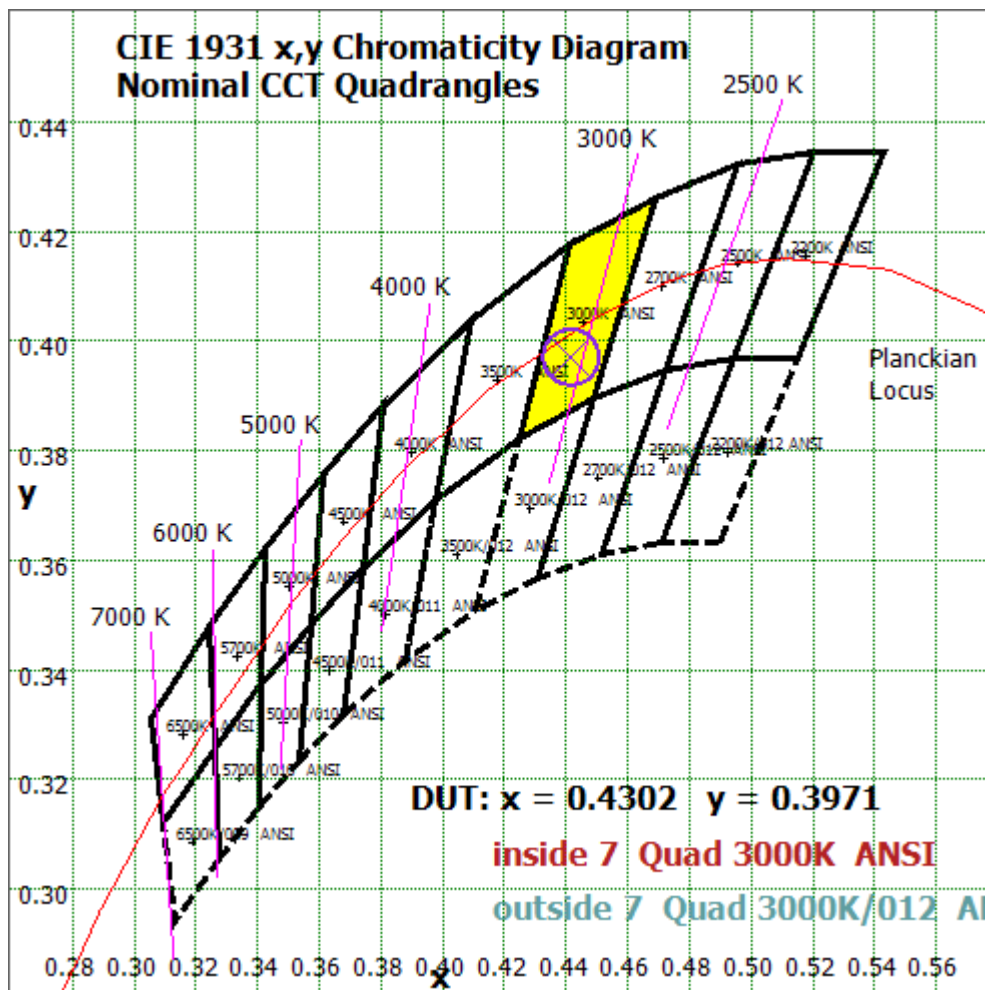


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

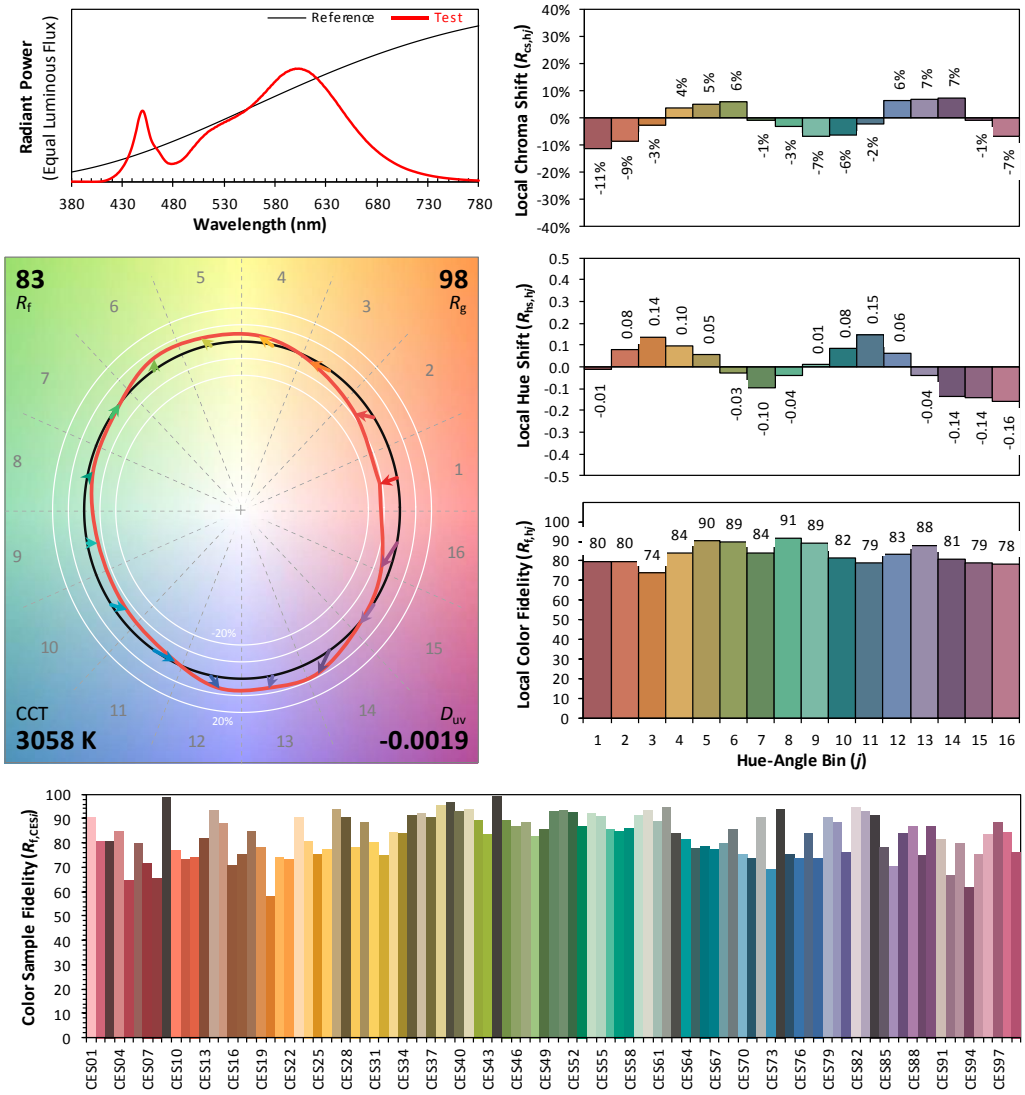
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/02/26

Model: 24HID/8CCTS/277V/EX39/DIM/SD



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

x 0.4302
 y 0.3971
 u' 0.2492
 v' 0.5176

CIE 13.3-1995 (CRI)	
R_a	82
R_g	6

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 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)	0.214
Power Factor	0.9938
Power (W)	25.50
Luminous Efficacy (lm/W)	139.0
Total Luminous Flux (lm)	3543.7
Beam Angle (°)	221.9 (0°-180°) / 221.9 (90°-270°)
Center Beam Candle Power (cd)	441
Maximum Beam Candle Power (cd)	444.0 (At: C=0.0, Gamma=18.0)
Spacing Criteria	1.48 (0°-180°) / 1.50 (90°-270°)
Zonal Lumens in the 0°-60° Zone	37.39%
Zonal Lumens in the 60°-90° Zone	30.90%
Zonal Lumens in the 90°-120° Zone	21.78%
Zonal Lumens in the 120°-180° Zone	9.93%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	42.081	1.19%
10- 20	124.692	3.52%
20- 30	202.386	5.71%
30- 40	270.763	7.64%
40- 50	324.73	9.16%
50- 60	360.449	10.17%
60- 70	375.968	10.61%
70- 80	371.225	10.48%
80- 90	347.727	9.81%
90-100	308.645	8.71%
100-110	258.889	7.31%
110-120	204.295	5.76%
120-130	150.195	4.24%
130-140	100.956	2.85%
140-150	59.768	1.69%
150-160	29.438	0.83%
160-170	10.247	0.29%
170-180	1.27	0.04%
Total	3543.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	3342.05	94.31%
130-180	201.679	5.69%
0-180	3543.7	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

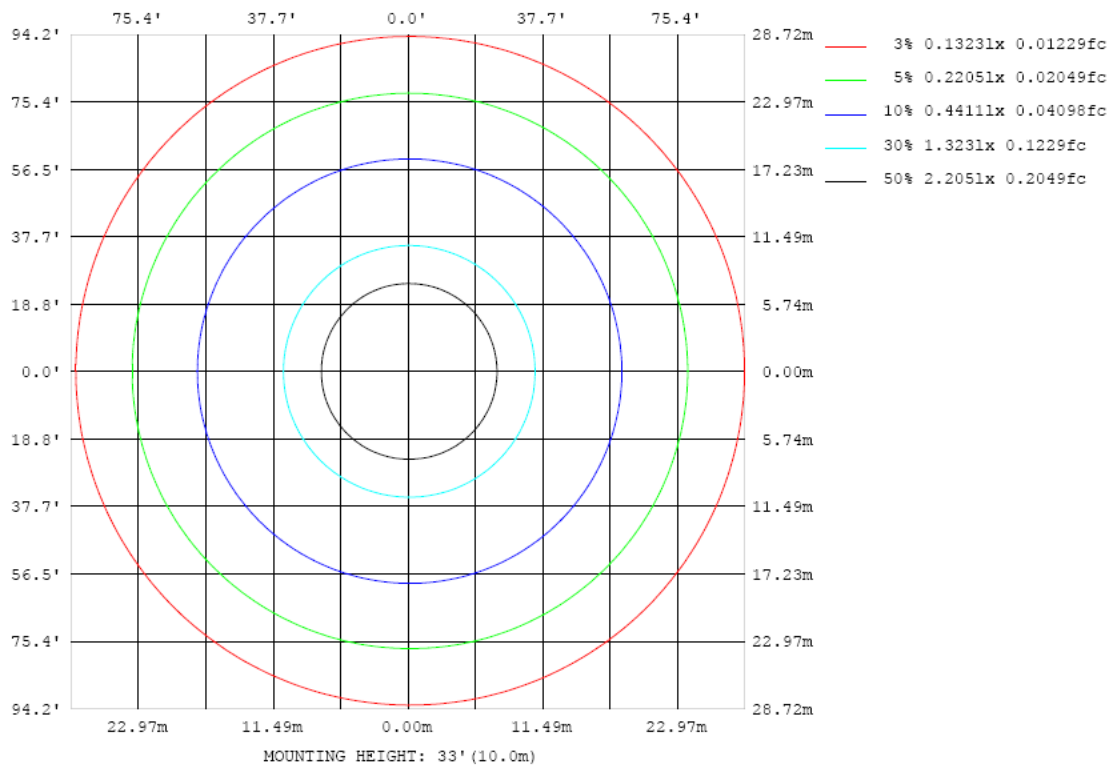


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

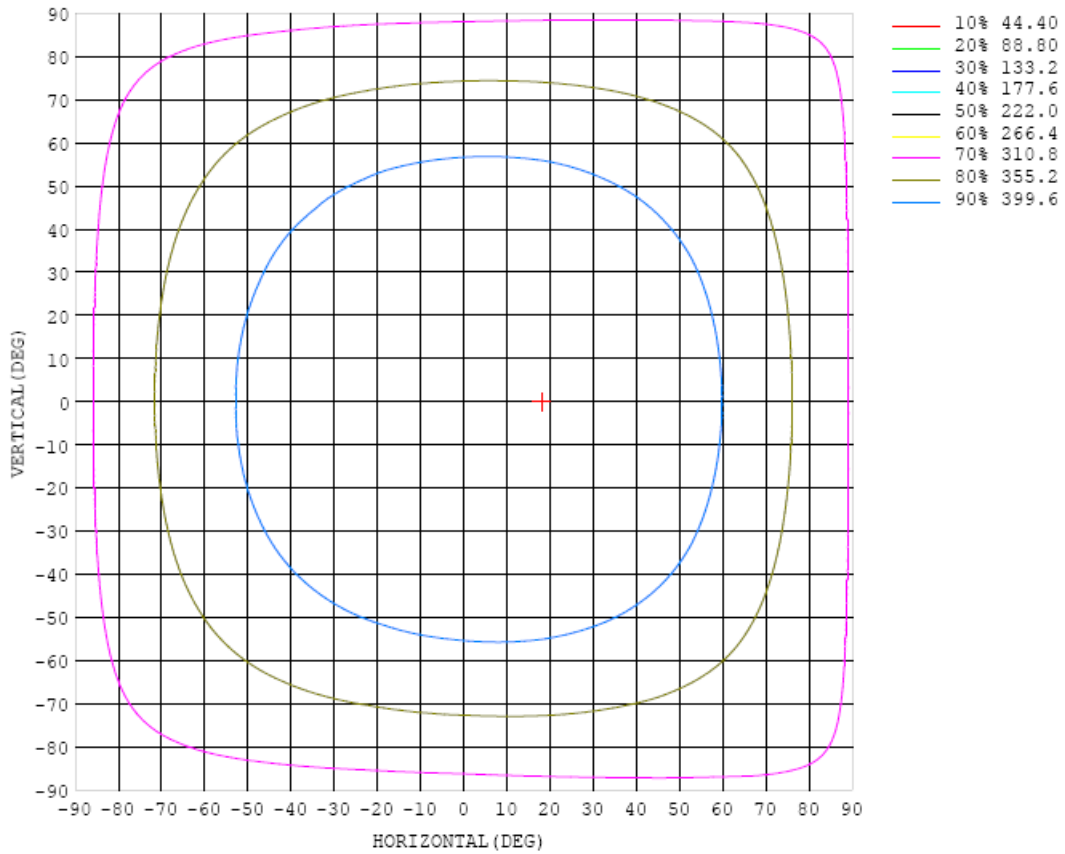


Chart 6: Isocandela Plot

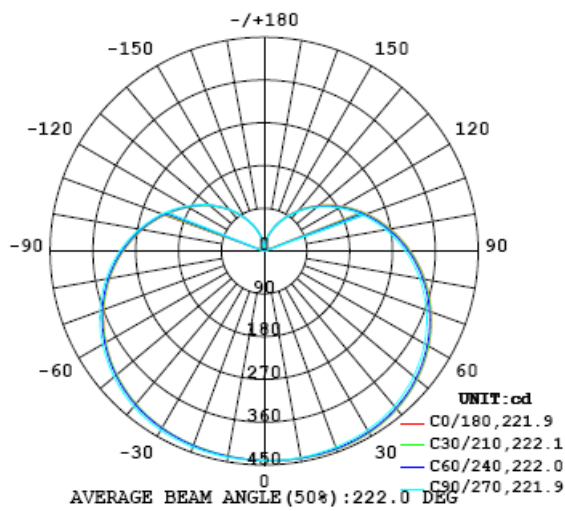


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441			
5	442	442	442	442	441	441	441	440	440	440	439	441	441	441	442	442			
10	443	443	442	442	441	440	439	438	438	438	439	440	441	441	442	443			
15	444	443	443	442	440	439	438	437	437	437	437	439	440	441	442	443			
20	444	443	442	441	439	438	436	435	435	435	435	438	439	441	442	443			
25	443	443	441	440	437	436	434	433	432	433	435	438	439	441	442	442			
30	441	441	439	438	435	432	431	430	429	429	430	433	435	437	439	441			
35	438	438	436	434	431	429	427	426	425	425	427	430	432	434	435	437			
40	434	433	431	429	425	423	422	420	420	420	422	424	427	429	431	433			
45	427	427	425	422	418	416	415	414	413	413	415	418	420	422	425	426			
50	420	419	417	414	410	408	406	405	405	405	407	410	412	415	417	419			
55	410	409	407	404	400	398	396	395	395	396	398	400	403	405	407	409			
60	399	398	396	393	389	387	385	384	385	385	387	390	392	395	397	398			
65	387	386	384	381	376	374	373	372	372	373	375	378	380	382	384	386			
70	374	372	370	366	363	361	360	359	360	360	362	365	367	369	371	373			
75	359	357	355	352	348	346	345	345	345	346	348	351	353	355	357	358			
80	343	341	339	336	332	330	329	329	330	331	333	336	338	340	341	342			
85	326	324	322	318	315	313	313	313	314	315	317	319	321	323	324	325			
90	307	306	303	301	297	296	295	295	297	298	300	302	304	306	307	308			
95	288	287	285	282	278	277	277	277	279	280	282	284	286	287	288	289			
100	269	267	265	262	259	258	258	259	261	262	263	265	267	268	269	269			
105	249	248	245	243	240	239	239	240	242	243	245	247	248	249	249	250			
110	229	228	225	223	220	219	220	221	223	224	226	227	228	229	229	230			
115	209	208	205	203	201	200	201	202	204	205	207	208	209	209	209	210			
120	189	187	185	183	182	181	182	183	185	186	187	189	189	190	190	190			
125	169	167	166	164	162	162	163	164	167	168	169	169	170	170	170	170			
130	149	148	146	145	144	144	144	146	149	150	151	152	152	152	152	151			
135	130	129	127	126	126	126	126	128	131	131	132	133	133	133	132	132			
140	111	110	109	109	108	108	109	110	113	114	114	115	115	114	114	113			
145	93.4	92.6	91.8	91.3	91.3	91.6	92.2	93.5	95.9	96.4	96.8	97.0	96.9	96.7	96.1	95.3			
150	76.3	75.9	75.3	75.1	75.3	75.6	76.2	77.3	79.5	79.9	80.1	80.1	79.8	79.5	78.9	78.2			
155	61.3	60.9	60.7	60.7	61.1	61.5	62.0	62.9	63.9	64.2	64.3	64.1	63.9	63.5	63.0	62.2			
160	46.8	46.5	46.4	46.3	47.4	47.5	47.9	48.8	49.7	49.9	49.8	49.6	49.2	48.9	48.4	47.7			
165	33.9	33.7	33.3	31.0	34.7	33.0	34.8	36.1	36.9	36.6	36.2	36.3	34.5	35.8	35.2	34.3			
170	21.7	22.0	21.5	18.5	13.2	18.4	22.7	23.6	25.3	24.3	20.7	20.9	21.1	19.9	22.8	19.8			
175	6.45	6.21	7.52	7.03	6.73	8.45	10.6	12.7	13.8	13.3	12.2	11.9	11.1	8.43	5.99	6.34			
180	0.58	0.58	0.57	0.51	0.45	0.47	0.51	0.04	0.60	0.58	0.58	0.58	0.58	0.58	0.58	0.58			

Table 6: Luminous Intensity Data

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
Voltage frequency (Hz)	60	60
Test Current (A)	0.213	0.091
Power Factor	0.9966	0.9248
Test Power (W)	25.41	23.35
THD A%	4.12	18.76
Luminous Efficacy (lm/W)	147.8	152.1
Total Luminous Flux (lm)	3754.7	3551.8
Color Rendering Index (CRI)	84.8	
R9	18.3	
Correlated Color Temperature (CCT)(K)	4192	
Chromaticity Chroma x	0.3713	
Chromaticity Chroma y	0.3675	
Chromaticity Chroma u	0.2228	
Chromaticity Chroma v	0.3307	
Duv	-0.0016	
Chromaticity Chroma u'	0.2228	
Chromaticity Chroma v'	0.4961	

Special Color Rendering Indices	
R1	83.8
R2	90.7
R3	94.6
R4	83.7
R5	83.6
R6	86.1
R7	87.1
R8	68.5
R9	18.3
R10	77
R11	82.9
R12	62.6
R13	85.7
R14	97.2

Table 7: 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

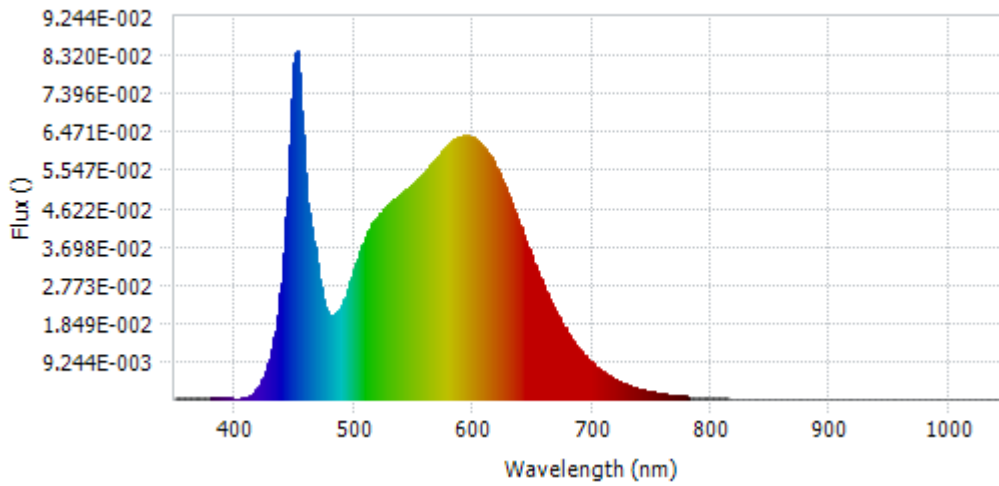
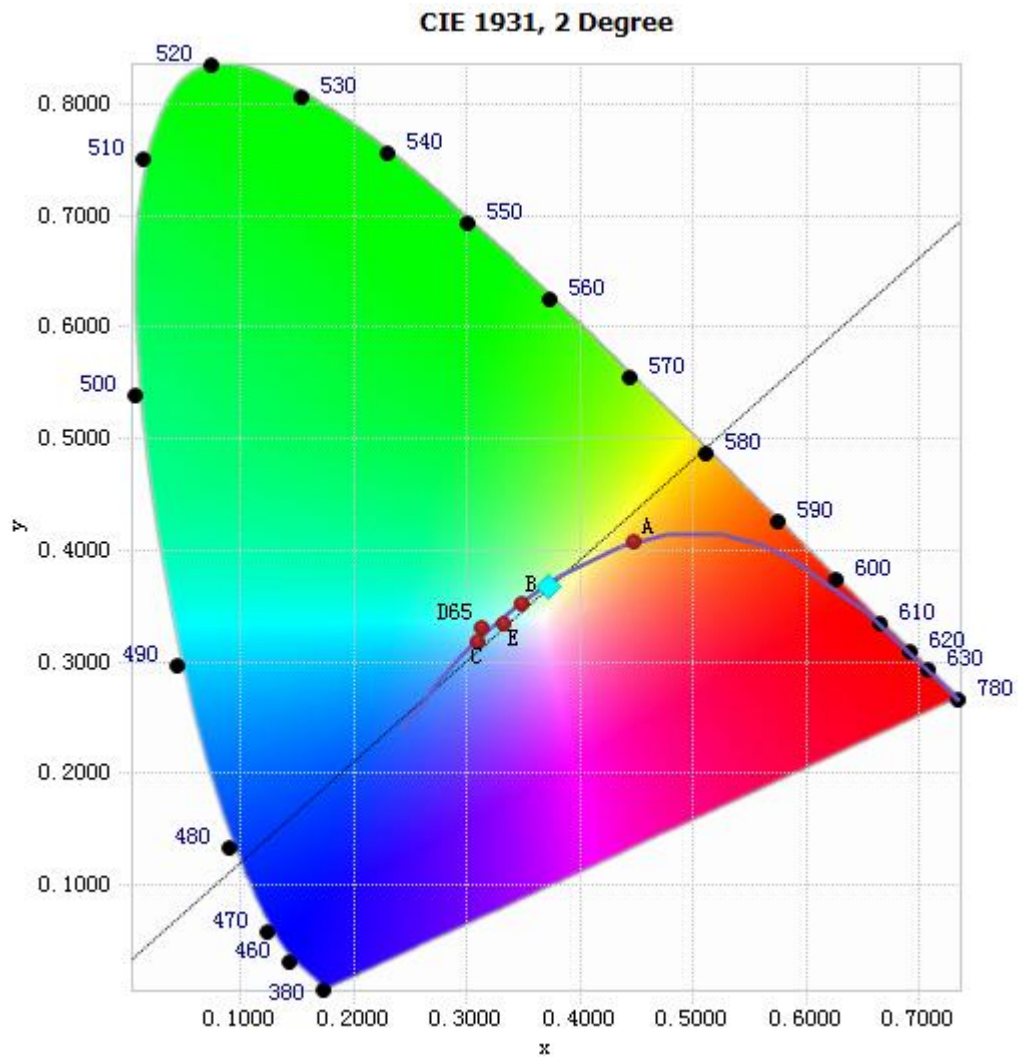


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.70E-04	485	2.09E-02	590	6.36E-02	695	1.03E-02
385	3.25E-04	490	2.29E-02	595	6.38E-02	700	8.77E-03
390	3.35E-04	495	2.67E-02	600	6.33E-02	705	7.53E-03
395	2.72E-04	500	3.14E-02	605	6.22E-02	710	6.44E-03
400	2.48E-04	505	3.56E-02	610	6.06E-02	715	5.52E-03
405	2.63E-04	510	3.94E-02	615	5.84E-02	720	4.77E-03
410	4.88E-04	515	4.24E-02	620	5.55E-02	725	4.07E-03
415	1.40E-03	520	4.41E-02	625	5.24E-02	730	3.47E-03
420	3.18E-03	525	4.60E-02	630	4.90E-02	735	2.96E-03
425	6.11E-03	530	4.75E-02	635	4.53E-02	740	2.53E-03
430	1.09E-02	535	4.84E-02	640	4.16E-02	745	2.16E-03
435	1.86E-02	540	4.97E-02	645	3.77E-02	750	1.84E-03
440	3.14E-02	545	5.10E-02	650	3.39E-02	755	1.58E-03
445	5.51E-02	550	5.21E-02	655	3.03E-02	760	1.36E-03
450	8.15E-02	555	5.36E-02	660	2.69E-02	765	1.17E-03
455	7.44E-02	560	5.51E-02	665	2.38E-02	770	9.97E-04
460	5.08E-02	565	5.68E-02	670	2.07E-02	775	8.63E-04
465	3.99E-02	570	5.86E-02	675	1.82E-02	780	7.38E-04
470	3.10E-02	575	6.01E-02	680	1.58E-02		
475	2.29E-02	580	6.17E-02	685	1.37E-02		
480	2.04E-02	585	6.31E-02	690	1.19E-02		

Table 8: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3713, 0.3675)

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

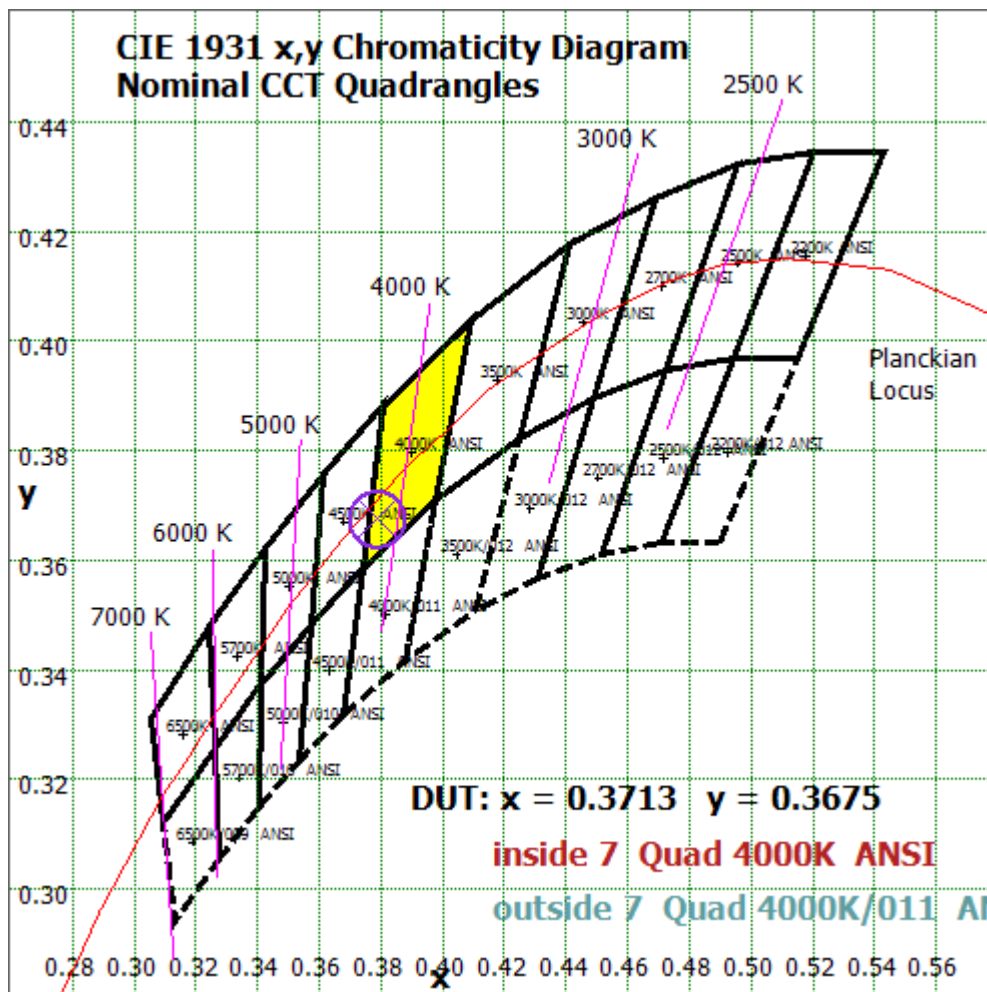


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

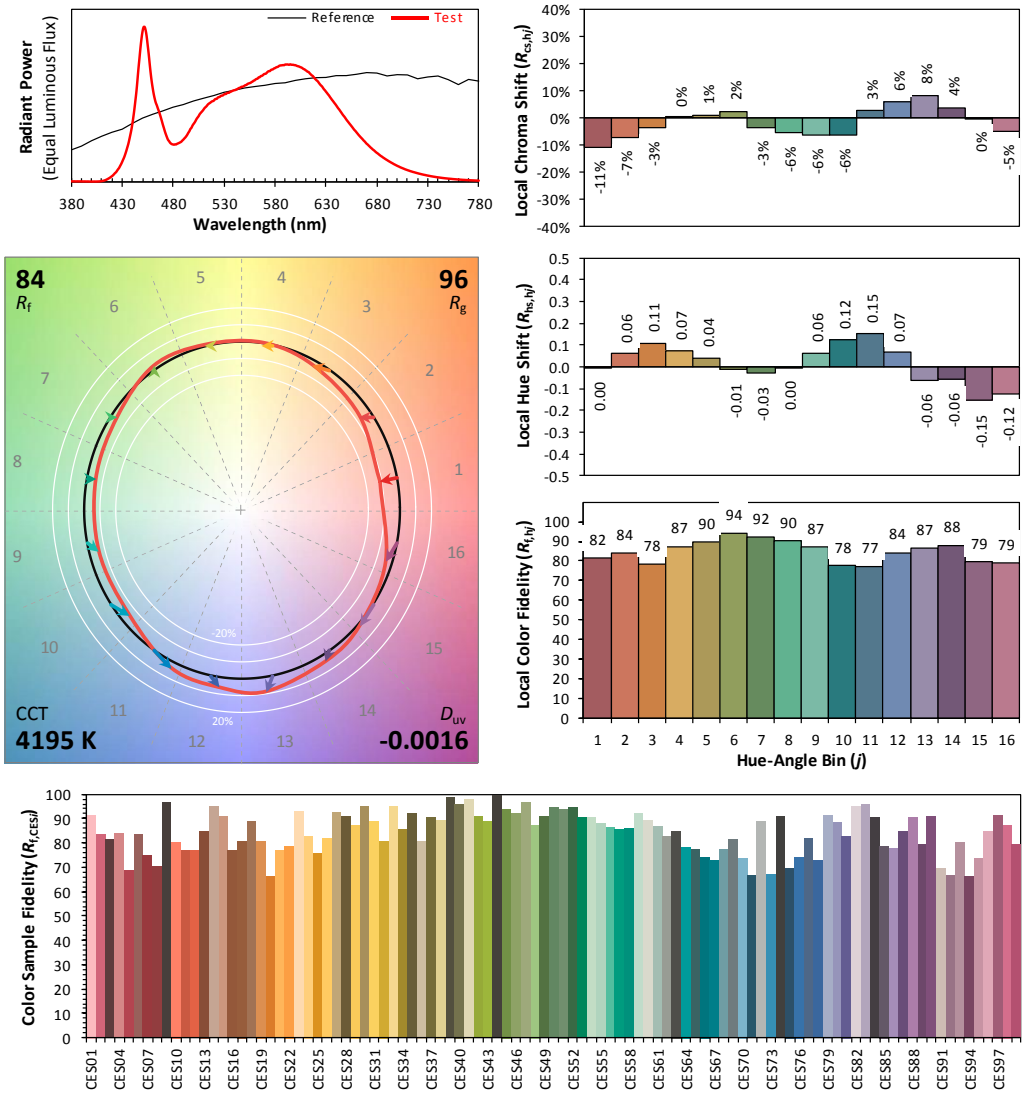
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/02/26

Model: 24HID/8CCTS/277V/EX39/DIM/SD



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

x 0.3713
 y 0.3675
 u' 0.2228
 v' 0.4961

CIE 13.3-1995 (CRI)	
R_a	85
R_g	18

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 7 due to rounding.

TEST RESULTS (5000K 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
Voltage frequency (Hz)	60	60
Test Current (A)	0.217	0.092
Power Factor	0.9966	0.9264
Test Power (W)	25.85	23.56
THD A%	4.21	18.84
Luminous Efficacy (lm/W)	141.2	146.1
Total Luminous Flux (lm)	3649.2	3441.6
Color Rendering Index (CRI)	83.8	
R9	14.1	
Correlated Color Temperature (CCT)(K)	4915	
Chromaticity Chroma x	0.3476	
Chromaticity Chroma y	0.3555	
Chromaticity Chroma u	0.2116	
Chromaticity Chroma v	0.3246	
Duv	0.0009	
Chromaticity Chroma u'	0.2116	
Chromaticity Chroma v'	0.4869	

Special Color Rendering Indices	
R1	82.2
R2	89.2
R3	93.2
R4	82.7
R5	82.1
R6	83.8
R7	88.1
R8	69.2
R9	14.1
R10	73.4
R11	81.5
R12	57.8
R13	84.2
R14	96.5

Table 9: 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

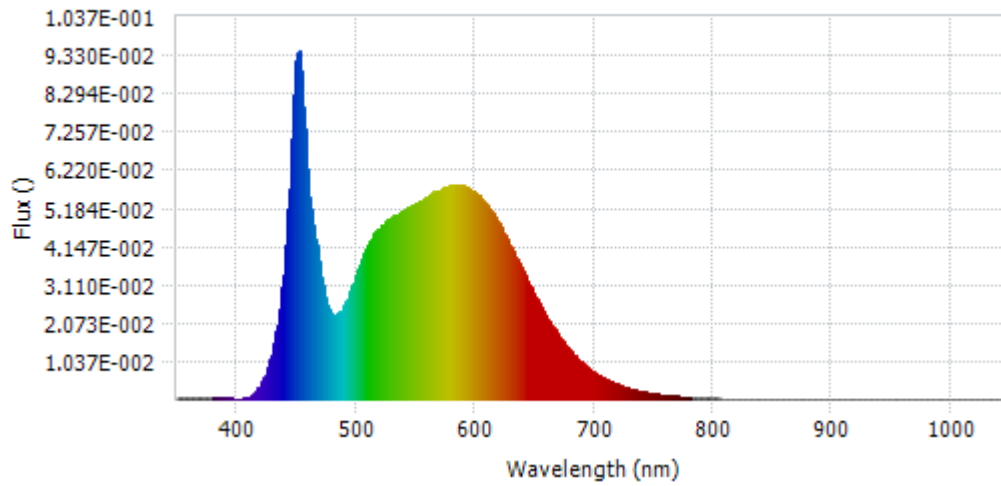
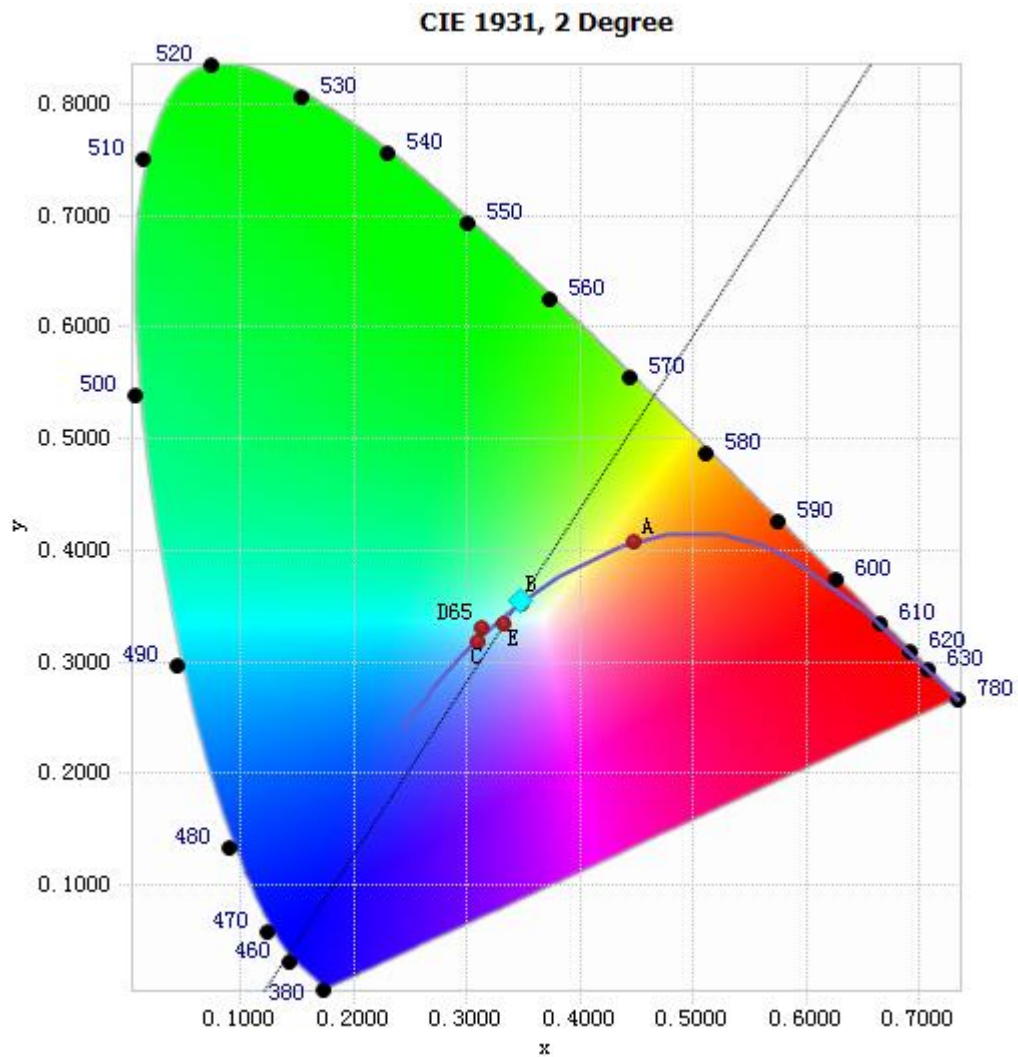


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.80E-04	485	2.33E-02	590	5.79E-02	695	8.56E-03
385	3.55E-04	490	2.53E-02	595	5.72E-02	700	7.35E-03
390	3.31E-04	495	2.91E-02	600	5.61E-02	705	6.32E-03
395	3.41E-04	500	3.38E-02	605	5.45E-02	710	5.40E-03
400	2.58E-04	505	3.82E-02	610	5.26E-02	715	4.65E-03
405	2.84E-04	510	4.18E-02	615	5.03E-02	720	4.00E-03
410	6.14E-04	515	4.48E-02	620	4.76E-02	725	3.43E-03
415	1.81E-03	520	4.64E-02	625	4.45E-02	730	2.95E-03
420	4.09E-03	525	4.81E-02	630	4.14E-02	735	2.51E-03
425	7.78E-03	530	4.95E-02	635	3.82E-02	740	2.14E-03
430	1.35E-02	535	5.02E-02	640	3.49E-02	745	1.83E-03
435	2.26E-02	540	5.13E-02	645	3.16E-02	750	1.58E-03
440	3.75E-02	545	5.22E-02	650	2.83E-02	755	1.35E-03
445	6.39E-02	550	5.30E-02	655	2.53E-02	760	1.15E-03
450	9.16E-02	555	5.39E-02	660	2.25E-02	765	1.00E-03
455	8.41E-02	560	5.48E-02	665	1.98E-02	770	8.59E-04
460	5.85E-02	565	5.58E-02	670	1.73E-02	775	7.37E-04
465	4.54E-02	570	5.67E-02	675	1.51E-02	780	6.36E-04
470	3.52E-02	575	5.73E-02	680	1.32E-02		
475	2.61E-02	580	5.79E-02	685	1.15E-02		
480	2.29E-02	585	5.83E-02	690	9.94E-03		

Table 10: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3476, 0.3555)

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

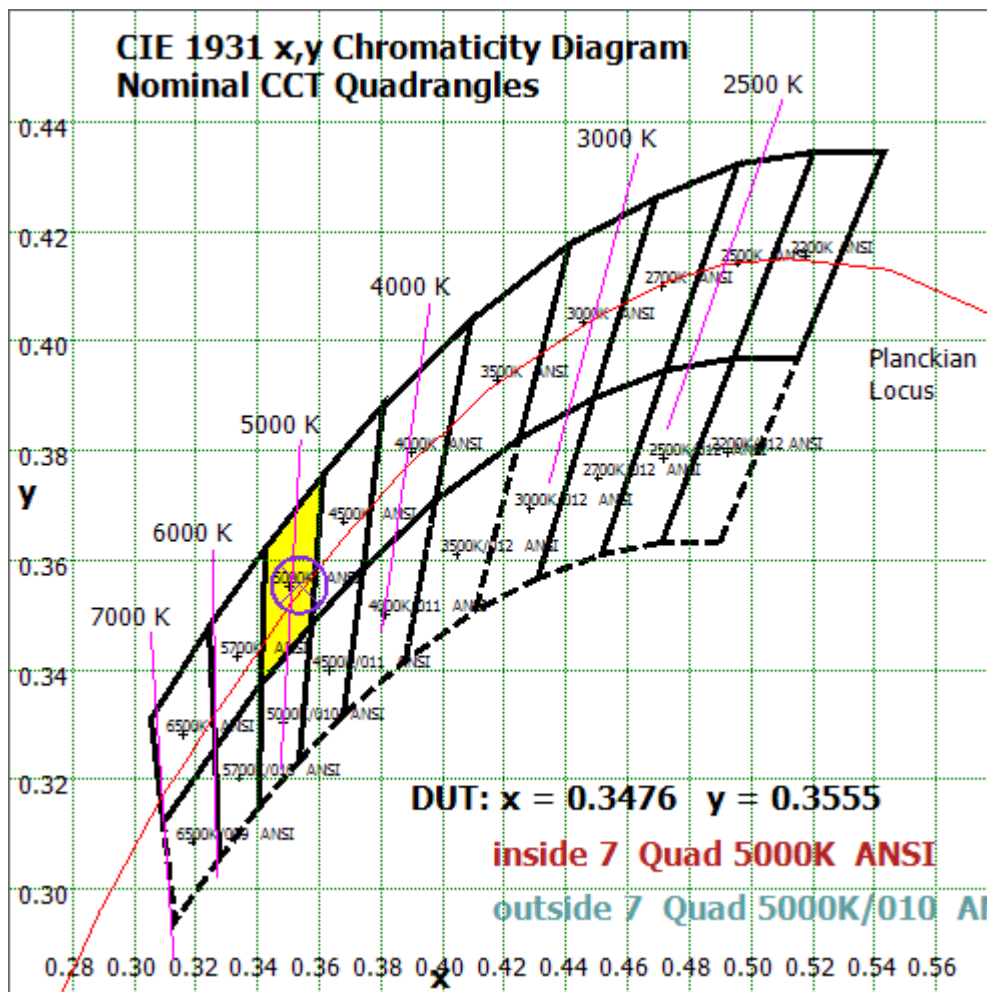


Chart 14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

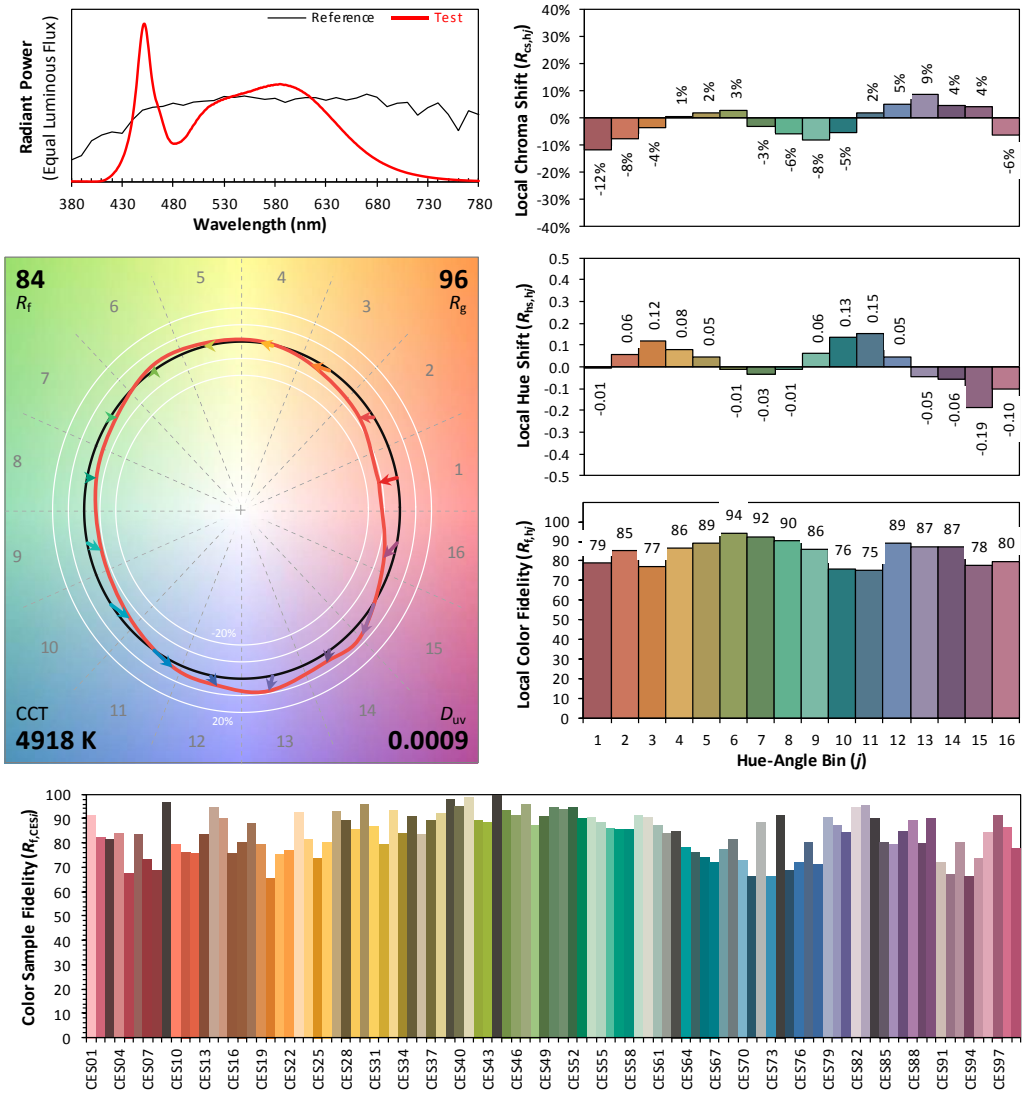
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/02/26

Model: 24HID/8CCTS/277V/EX39/DIM/SD



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

x 0.3476
 y 0.3555
 u' 0.2116
 v' 0.4869

CIE 13.3-1995 (CRI)	
R_a	84
R_g	14

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	Feb. 18, 2024	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	DPS1060	HZTE001-06	Aug. 01, 2023	Jul. 31, 2024
DC Power Supply	WY12010	HZTE004-03	Aug. 01, 2023	Jul. 31, 2024
Temperature recorder	JM624U	HZTE018-08	Aug. 04, 2023	Aug. 03, 2024
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 04, 2023	Aug. 03, 2024
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Feb. 18, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	PCR 500L	HZTE001-07	Aug. 01, 2023	Jul.31, 2024
DC Power Supply	IT6154	HZTE004-04	Aug. 01, 2023	Jul. 31, 2024
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 04, 2023	Aug. 03, 2024
Temperature Meter	TES1310	HZTE017-01	Aug. 04, 2023	Aug. 03, 2024

Table 11: 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 expanded uncertainty is 2.1% with a coverage factor $k=2$.

Goniophotometer Method

Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 20 min, taken 10 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 2.3% with a coverage factor $k=2$.

Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

*** End of Report ***

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