

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: 34HID/8CCTS/277V/EX39/DIM/SD

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24010037e

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

Review by:

Wei Fei

Approved by:



April Zou

Engineer: Wei Fei
Feb. 04, 2024

Manager: April Zou
Feb. 04, 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	34HID/8CCTS/277V/ EX39/DIM/SD 3000K Setting	34HID/8CCTS/277V/ EX39/DIM/SD 4000K Setting	34HID/8CCTS/277V/ EX39/DIM/SD 5000K Setting
Luminous Efficacy (Lumens /Watt)	142.3	156.5	151.5
Total Luminous Flux (Lumens)	4951.9	5316.7	5269.6
Power (Watts)	34.79	33.98	34.78
Power Factor	0.9955	0.9954	0.9955
CCT (K)	2990	3800	4856
CRI	83.3	85.8	84.5
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	: Jan. 31, 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	: 34HID/8CCTS/277V/EX39/DIM/SD
Electrical Ratings	: 120-277V, 50/60Hz, 34W
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)	0.292	0.136
Power Factor	0.9955	0.9063
Test Power (W)	34.79	34.17
THD A%	3.90	16.34
Luminous Efficacy (lm/W)	142.3	146.2
Total Luminous Flux (lm)	4951.9	4994.2
Color Rendering Index (CRI)	83.3	
R9	10.2	
Correlated Color Temperature (CCT)(K)	2990	
Chromaticity Chroma x	0.4357	
Chromaticity Chroma y	0.4007	
Chromaticity Chroma u	0.2513	
Chromaticity Chroma v	0.3466	
Duv	-0.0012	
Chromaticity Chroma u'	0.2513	
Chromaticity Chroma v'	0.5199	

Special Color Rendering Indices	
R1	82.2
R2	92.3
R3	95.5
R4	81
R5	82.5
R6	90.8
R7	82.3
R8	59.6
R9	10.2
R10	82.3
R11	80.7
R12	73.2
R13	84.8
R14	98.3

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

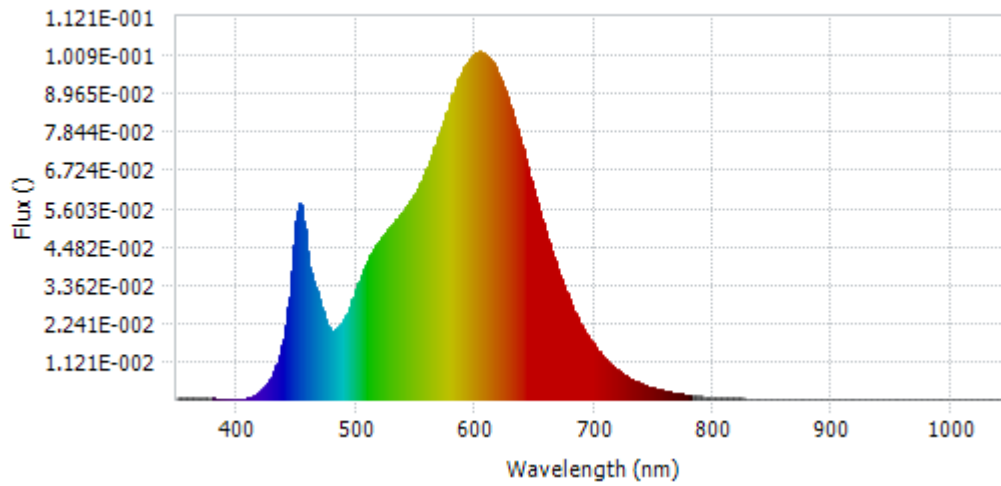
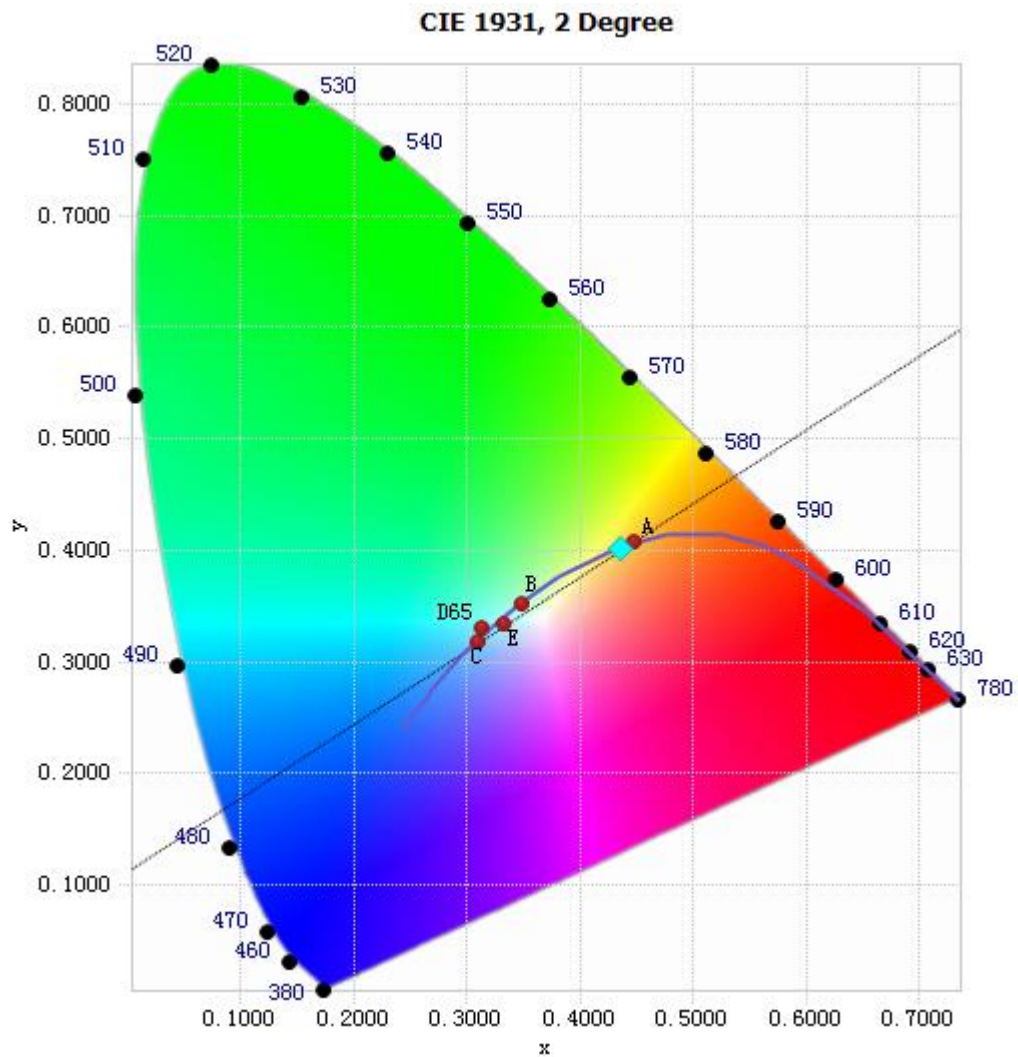


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.52E-04	485	2.11E-02	590	9.67E-02	695	1.84E-02
385	3.17E-04	490	2.35E-02	595	9.94E-02	700	1.58E-02
390	3.19E-04	495	2.72E-02	600	1.01E-01	705	1.35E-02
395	3.06E-04	500	3.21E-02	605	1.01E-01	710	1.16E-02
400	2.42E-04	505	3.66E-02	610	1.01E-01	715	9.92E-03
405	2.61E-04	510	4.06E-02	615	9.85E-02	720	8.49E-03
410	5.03E-04	515	4.42E-02	620	9.47E-02	725	7.26E-03
415	1.22E-03	520	4.64E-02	625	9.03E-02	730	6.19E-03
420	2.58E-03	525	4.89E-02	630	8.51E-02	735	5.26E-03
425	4.51E-03	530	5.11E-02	635	7.93E-02	740	4.52E-03
430	7.40E-03	535	5.29E-02	640	7.33E-02	745	3.85E-03
435	1.19E-02	540	5.52E-02	645	6.67E-02	750	3.29E-03
440	1.95E-02	545	5.79E-02	650	6.02E-02	755	2.79E-03
445	3.36E-02	550	6.05E-02	655	5.41E-02	760	2.40E-03
450	5.24E-02	555	6.40E-02	660	4.81E-02	765	2.05E-03
455	5.52E-02	560	6.81E-02	665	4.25E-02	770	1.76E-03
460	4.13E-02	565	7.26E-02	670	3.73E-02	775	1.49E-03
465	3.36E-02	570	7.76E-02	675	3.26E-02	780	1.28E-03
470	2.85E-02	575	8.27E-02	680	2.84E-02		
475	2.24E-02	580	8.78E-02	685	2.47E-02		
480	2.01E-02	585	9.31E-02	690	2.14E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4357, 0.4007)

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

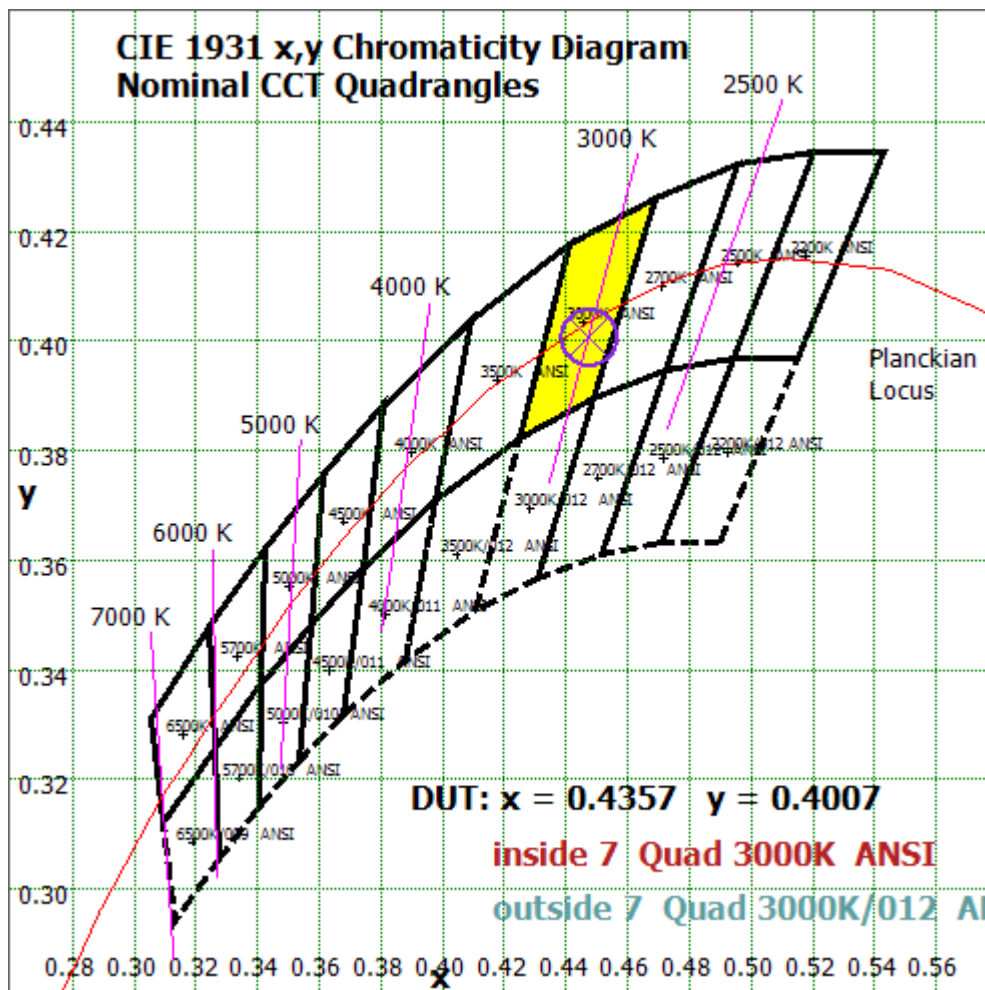


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

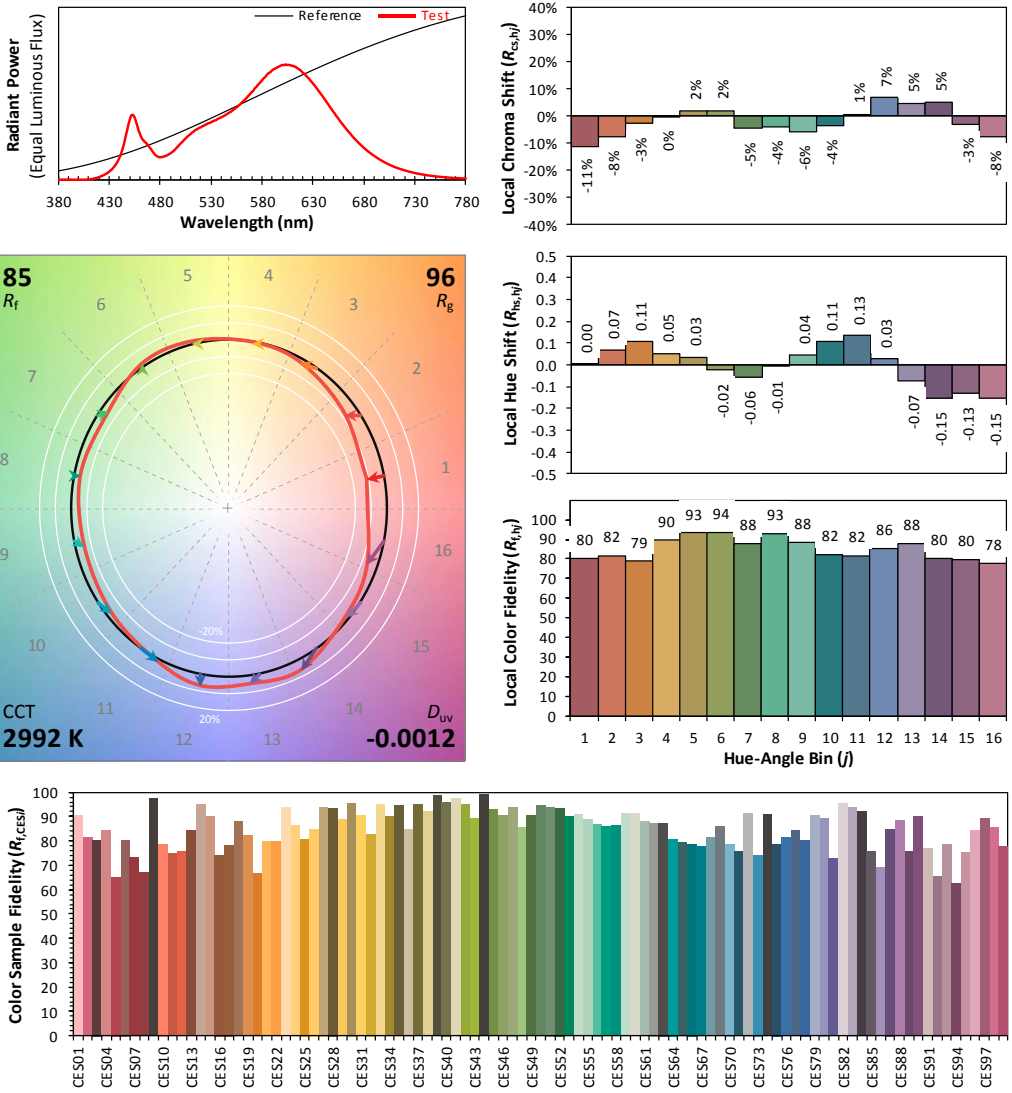
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/01/31

Model: 34HID/8CCTS/277V/EX39/DIM/SD



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

x 0.4357
 y 0.4007
 u' 0.2513
 v' 0.5199

CIE 13.3-1995 (CRI)	
R_a	83
R_g	10

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)	0.293
Power Factor	0.9959
Power (W)	34.94
Luminous Efficacy (lm/W)	143.1
Total Luminous Flux (lm)	4998.8
Beam Angle (°)	217.0 (0°-180°) / 217.2 (90°-270°)
Center Beam Candle Power (cd)	634
Maximum Beam Candle Power (cd)	638.1 (At: C=337.5, Gamma=22.5)
Spacing Criteria	1.48 (0°-180°) / 1.51 (90°-270°)
Zonal Lumens in the 0°-60° Zone	38.08%
Zonal Lumens in the 60°-90° Zone	31.09%
Zonal Lumens in the 90°-120° Zone	21.39%
Zonal Lumens in the 120°-180° Zone	9.44%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	60.463	1.21%
10- 20	179.138	3.58%
20- 30	291.083	5.82%
30- 40	389.545	7.79%
40- 50	466.655	9.34%
50- 60	516.614	10.33%
60- 70	536.689	10.74%
70- 80	527.021	10.54%
80- 90	490.196	9.81%
90-100	431.515	8.63%
100-110	358.402	7.17%
110-120	279.558	5.59%
120-130	202.832	4.06%
130-140	134.762	2.70%
140-150	79.746	1.60%
150-160	39.109	0.78%
160-170	13.675	0.27%
170-180	1.79	0.04%
Total	4998.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	4729.71	94.62%
130-180	269.082	5.38%
0-180	4998.8	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

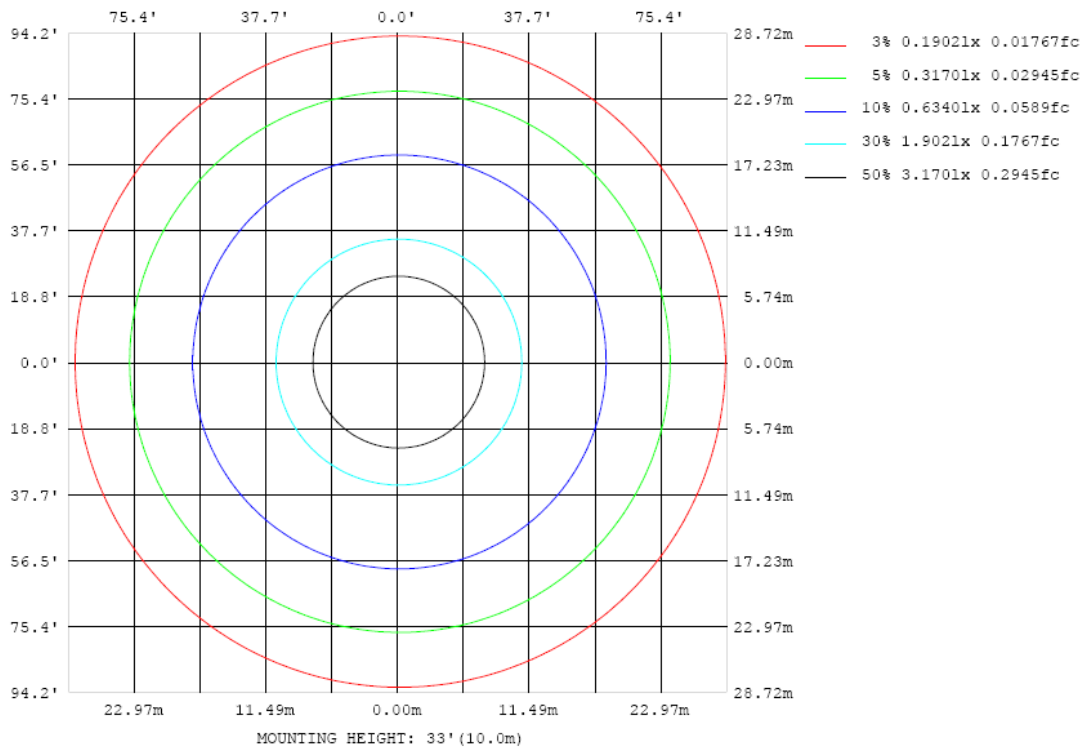


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

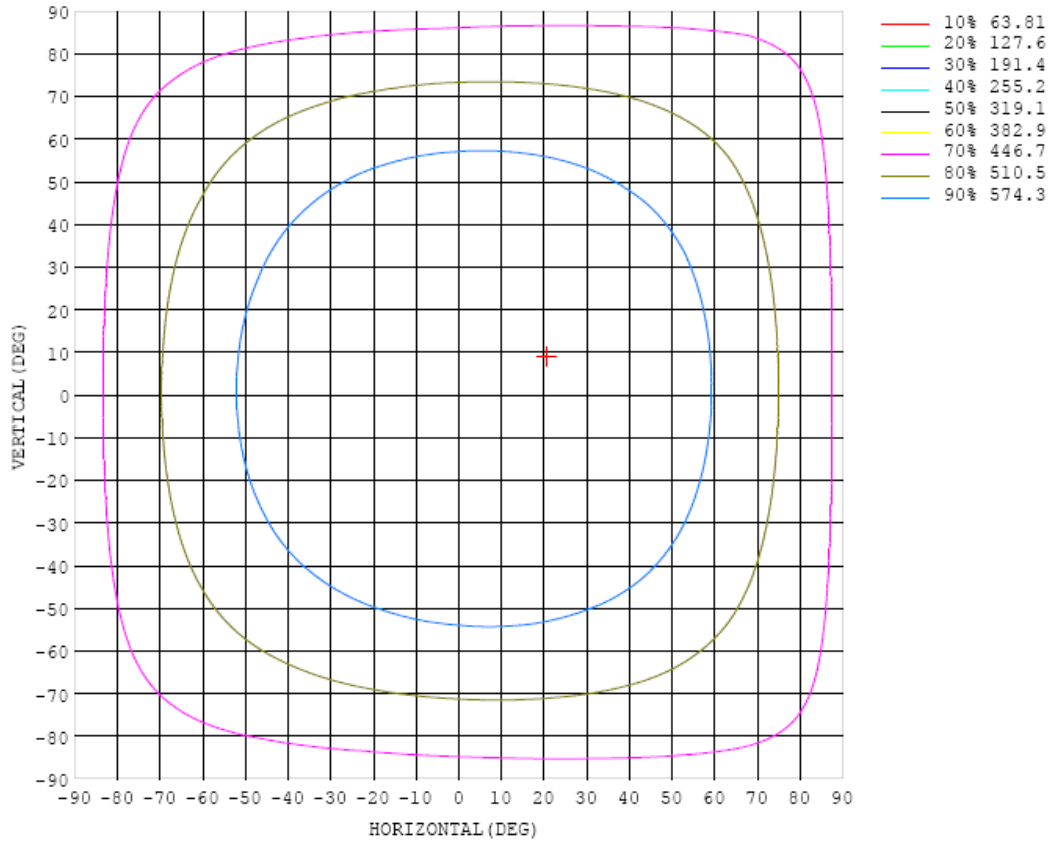


Chart 6: Isocandela Plot

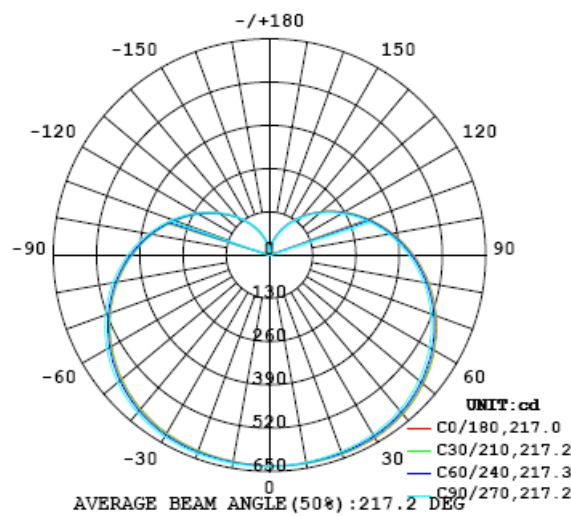


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5			
0	634	634	634	634	634	634	634	634	634	634	634	634	634	634	634	634			
5	635	635	633	634	634	632	632	632	632	633	633	634	635	635	635	636			
10	636	635	634	633	632	630	630	630	630	631	632	633	635	635	636	637			
15	636	635	632	631	630	628	627	628	628	629	631	633	635	636	637	637			
20	637	635	633	630	628	625	625	625	626	627	629	632	634	636	637	638			
25	636	634	631	628	625	624	621	621	623	624	628	631	633	635	636	638			
30	634	632	628	625	622	619	617	618	618	620	624	627	630	633	634	635			
35	630	627	623	620	616	613	611	611	612	613	618	622	625	629	630	632			
40	623	621	616	612	608	605	603	603	603	605	610	615	618	621	624	625			
45	614	611	607	603	598	595	593	592	593	595	600	604	608	612	613	616			
50	603	599	595	590	586	582	580	580	580	582	587	592	596	599	602	604			
55	588	585	580	576	571	567	565	565	565	567	572	577	581	585	588	590			
60	572	569	564	560	554	551	548	548	548	550	555	560	565	568	571	573			
65	553	550	546	541	537	532	529	530	530	532	536	541	546	549	553	555			
70	533	530	525	521	516	512	509	509	509	511	516	521	525	529	532	535			
75	511	507	504	499	494	490	487	487	488	489	493	498	503	506	509	512			
80	486	484	479	475	471	467	464	463	464	466	470	475	479	482	485	488			
85	460	458	454	450	446	442	440	439	439	441	445	449	453	457	459	462			
90	433	431	427	424	420	415	413	413	414	415	418	423	427	430	433	435			
95	405	403	399	396	392	389	387	386	387	388	391	395	399	402	404	407			
100	376	374	371	367	364	361	359	359	359	360	363	367	370	373	375	377			
105	346	345	342	339	336	333	331	331	331	332	335	338	341	344	346	348			
110	317	315	313	310	307	304	303	303	303	304	306	309	312	314	316	318			
115	287	286	284	282	279	277	275	275	275	276	278	281	283	285	287	289			
120	258	257	255	253	251	249	248	247	248	248	250	253	255	256	258	260			
125	230	229	228	226	224	222	221	221	221	221	223	225	227	228	230	231			
130	203	202	201	199	197	196	195	195	195	195	196	198	200	201	202	204			
135	176	176	174	173	172	171	170	170	170	170	171	173	174	175	176	177			
140	151	151	150	149	148	147	146	146	148	147	148	149	150	151	152	153			
145	128	127	127	126	125	124	123	123	125	125	125	125	126	127	129	130			
150	105	105	104	104	103	102	102	102	103	103	103	103	103	104	106	107			
155	83.9	83.7	83.4	82.9	83.1	82.4	81.8	81.6	83.1	82.9	82.2	82.2	82.2	82.6	84.2	85.6			
160	64.6	64.3	64.3	64.2	64.7	64.3	63.6	63.5	64.5	64.2	63.3	63.0	62.7	62.7	64.1	65.4			
165	46.4	46.3	46.5	45.0	47.5	47.3	45.7	46.2	47.4	46.9	46.2	45.8	44.9	44.9	45.8	46.9			
170	29.9	30.0	30.5	26.6	27.2	28.4	28.6	29.5	31.9	31.2	26.5	28.6	26.0	29.1	30.2	28.7			
175	15.2	16.0	15.9	14.2	11.4	11.9	13.6	15.2	16.8	16.2	15.6	14.8	13.0	10.6	12.0	13.6			
180	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.00	0.83	0.83	0.83	0.83	0.83	0.84	0.84	0.84			

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)	0.285	0.134
Power Factor	0.9954	0.9018
Test Power (W)	33.98	33.37
THD A%	3.85	16.82
Luminous Efficacy (lm/W)	156.5	160.9
Total Luminous Flux (lm)	5316.7	5370.2
Color Rendering Index (CRI)	85.8	
R9	21.7	
Correlated Color Temperature (CCT)(K)	3800	
Chromaticity Chroma x	0.3877	
Chromaticity Chroma y	0.3761	
Chromaticity Chroma u	0.2301	
Chromaticity Chroma v	0.3349	
Duv	-0.0023	
Chromaticity Chroma u'	0.2301	
Chromaticity Chroma v'	0.5024	

Special Color Rendering Indices	
R1	85.3
R2	93.2
R3	96.1
R4	83.9
R5	85.1
R6	89.6
R7	85.8
R8	67.6
R9	21.7
R10	83
R11	83.5
R12	66.7
R13	87.7
R14	98.6

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

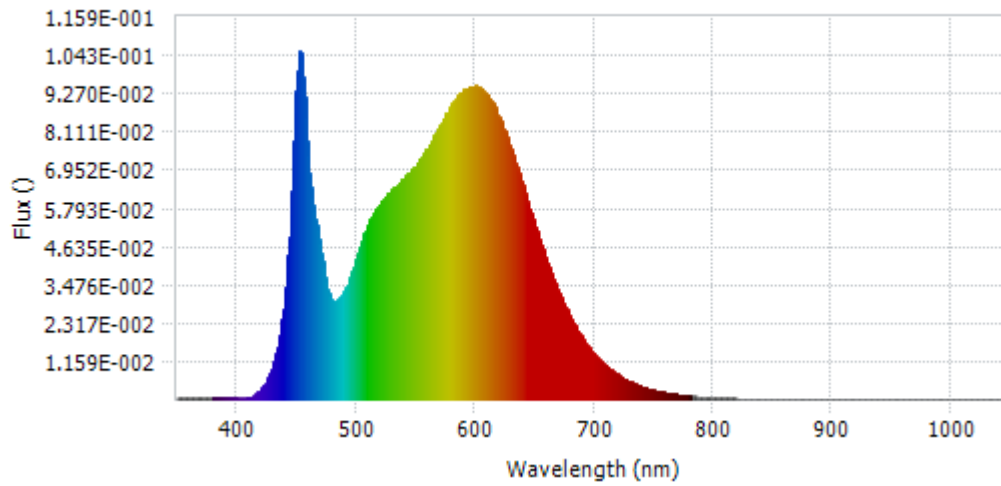
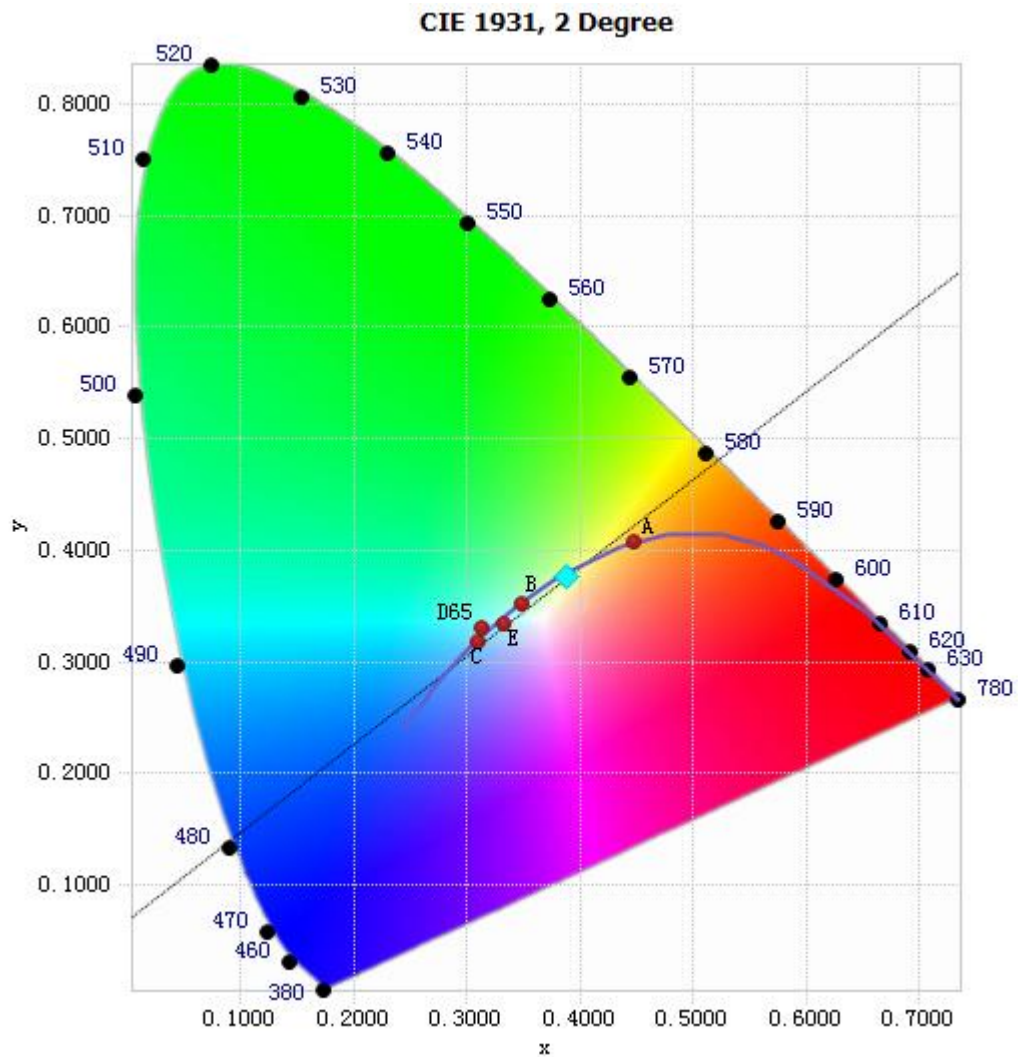


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	4.90E-04	485	3.02E-02	590	9.37E-02	695	1.61E-02
385	4.97E-04	490	3.26E-02	595	9.46E-02	700	1.38E-02
390	4.16E-04	495	3.68E-02	600	9.51E-02	705	1.18E-02
395	3.92E-04	500	4.26E-02	605	9.40E-02	710	1.01E-02
400	3.72E-04	505	4.80E-02	610	9.22E-02	715	8.66E-03
405	3.56E-04	510	5.26E-02	615	8.96E-02	720	7.43E-03
410	5.77E-04	515	5.67E-02	620	8.55E-02	725	6.37E-03
415	1.45E-03	520	5.89E-02	625	8.12E-02	730	5.42E-03
420	3.05E-03	525	6.15E-02	630	7.61E-02	735	4.62E-03
425	5.77E-03	530	6.35E-02	635	7.05E-02	740	3.94E-03
430	1.02E-02	535	6.49E-02	640	6.50E-02	745	3.35E-03
435	1.76E-02	540	6.68E-02	645	5.90E-02	750	2.88E-03
440	3.06E-02	545	6.89E-02	650	5.31E-02	755	2.46E-03
445	5.55E-02	550	7.07E-02	655	4.76E-02	760	2.11E-03
450	9.33E-02	555	7.33E-02	660	4.23E-02	765	1.79E-03
455	1.02E-01	560	7.62E-02	665	3.74E-02	770	1.55E-03
460	7.36E-02	565	7.93E-02	670	3.27E-02	775	1.32E-03
465	5.64E-02	570	8.26E-02	675	2.86E-02	780	1.14E-03
470	4.66E-02	575	8.57E-02	680	2.49E-02		
475	3.50E-02	580	8.89E-02	685	2.16E-02		
480	2.97E-02	585	9.19E-02	690	1.87E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3877, 0.3761)

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

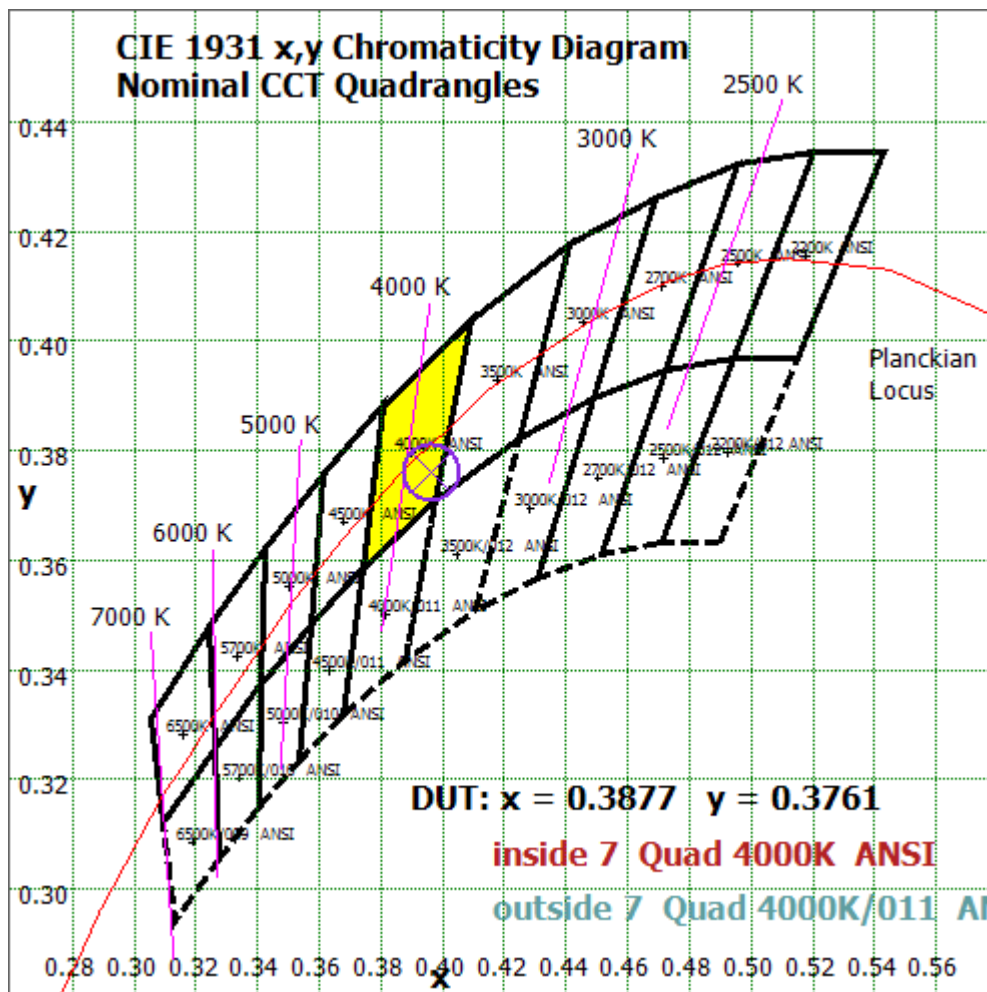


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

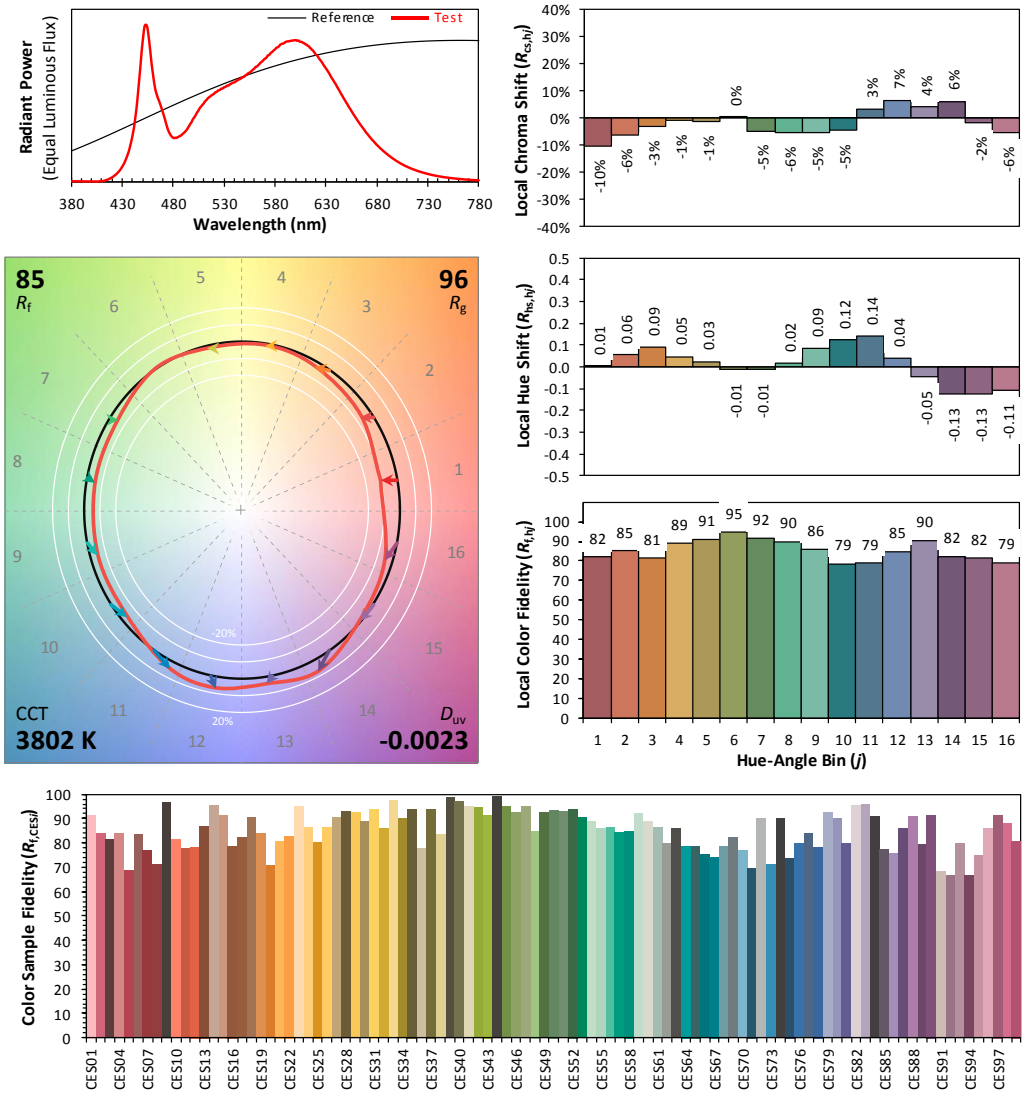
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/01/31

Model: 34HID/8CCTS/277V/EX39/DIM/SD



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

x 0.3877
 y 0.3761
 u' 0.2301
 v' 0.5024

CIE 13.3-1995 (CRI)	
R_a	86
R_g	22

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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.292	0.136
Power Factor	0.9955	0.9061
Test Power (W)	34.78	34.15
THD A%	3.89	16.34
Luminous Efficacy (lm/W)	151.5	155.4
Total Luminous Flux (lm)	5269.6	5305.8
Color Rendering Index (CRI)	84.5	
R9	16.6	
Correlated Color Temperature (CCT)(K)	4856	
Chromaticity Chroma x	0.3494	
Chromaticity Chroma y	0.3572	
Chromaticity Chroma u	0.2121	
Chromaticity Chroma v	0.3253	
Duv	0.0011	
Chromaticity Chroma u'	0.2121	
Chromaticity Chroma v'	0.4880	

Special Color Rendering Indices	
R1	83
R2	90.3
R3	94.3
R4	82.7
R5	82.6
R6	85.1
R7	88.1
R8	69.5
R9	16.6
R10	76
R11	81.7
R12	57.8
R13	85.3
R14	97.1

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

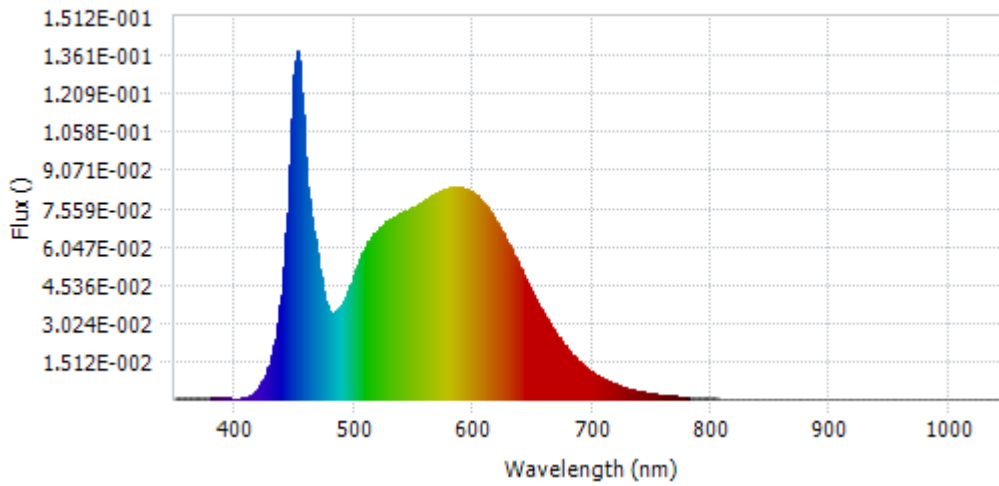
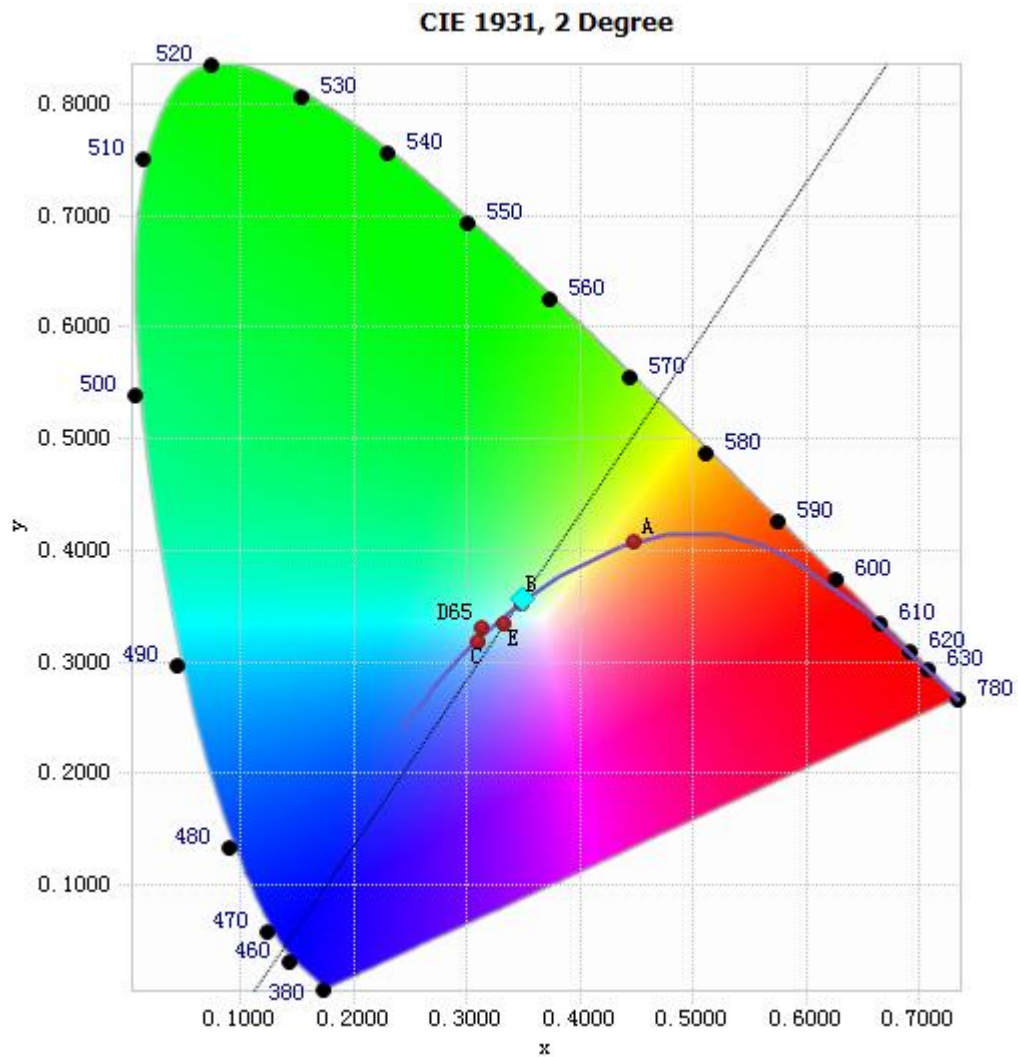


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.82E-04	485	3.49E-02	590	8.39E-02	695	1.25E-02
385	5.52E-04	490	3.75E-02	595	8.28E-02	700	1.08E-02
390	5.20E-04	495	4.26E-02	600	8.16E-02	705	9.22E-03
395	4.48E-04	500	4.91E-02	605	7.93E-02	710	7.91E-03
400	3.91E-04	505	5.52E-02	610	7.67E-02	715	6.79E-03
405	4.04E-04	510	6.01E-02	615	7.37E-02	720	5.80E-03
410	7.66E-04	515	6.45E-02	620	6.96E-02	725	4.99E-03
415	2.01E-03	520	6.68E-02	625	6.54E-02	730	4.28E-03
420	4.53E-03	525	6.92E-02	630	6.07E-02	735	3.64E-03
425	8.73E-03	530	7.10E-02	635	5.61E-02	740	3.12E-03
430	1.56E-02	535	7.20E-02	640	5.15E-02	745	2.68E-03
435	2.69E-02	540	7.34E-02	645	4.65E-02	750	2.29E-03
440	4.64E-02	545	7.48E-02	650	4.17E-02	755	1.96E-03
445	8.22E-02	550	7.57E-02	655	3.73E-02	760	1.68E-03
450	1.28E-01	555	7.74E-02	660	3.31E-02	765	1.44E-03
455	1.28E-01	560	7.88E-02	665	2.92E-02	770	1.24E-03
460	9.01E-02	565	8.03E-02	670	2.55E-02	775	1.06E-03
465	6.86E-02	570	8.17E-02	675	2.23E-02	780	9.14E-04
470	5.46E-02	575	8.26E-02	680	1.94E-02		
475	4.05E-02	580	8.35E-02	685	1.69E-02		
480	3.45E-02	585	8.42E-02	690	1.46E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3494, 0.3572)

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

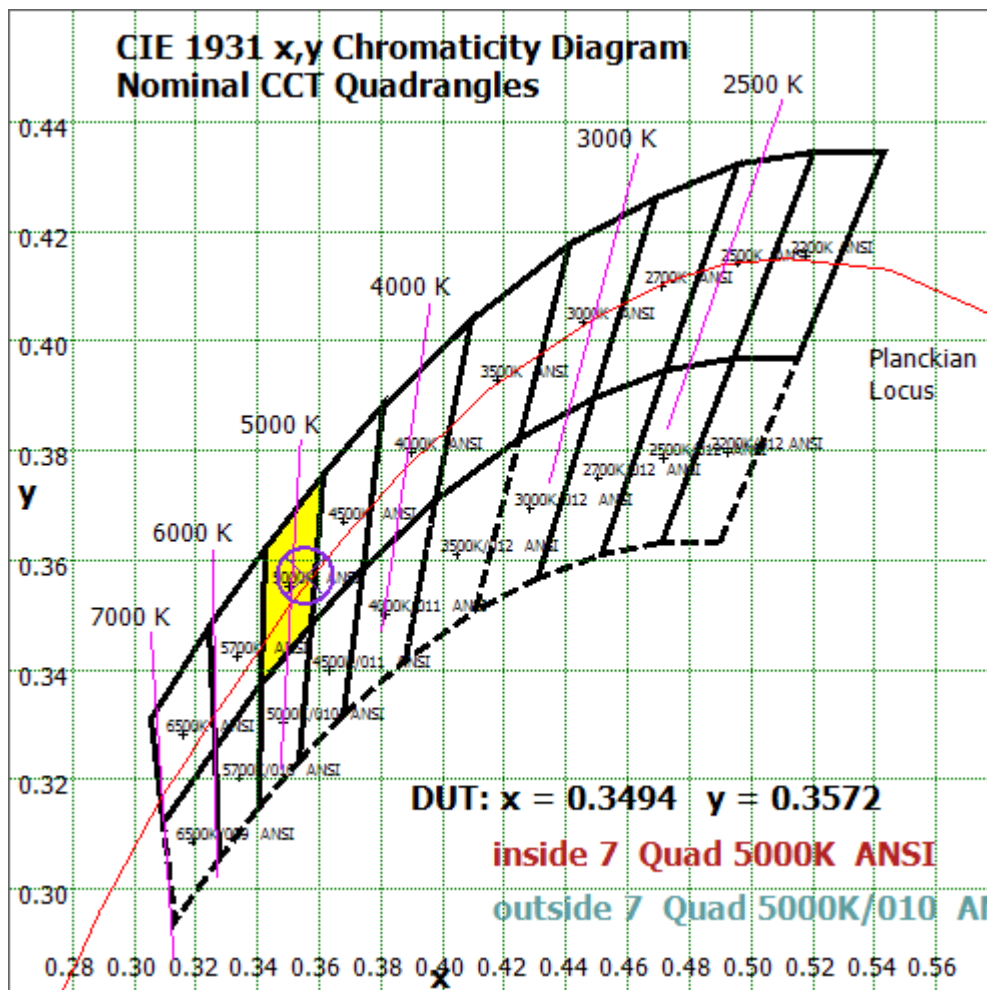


Chart 14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

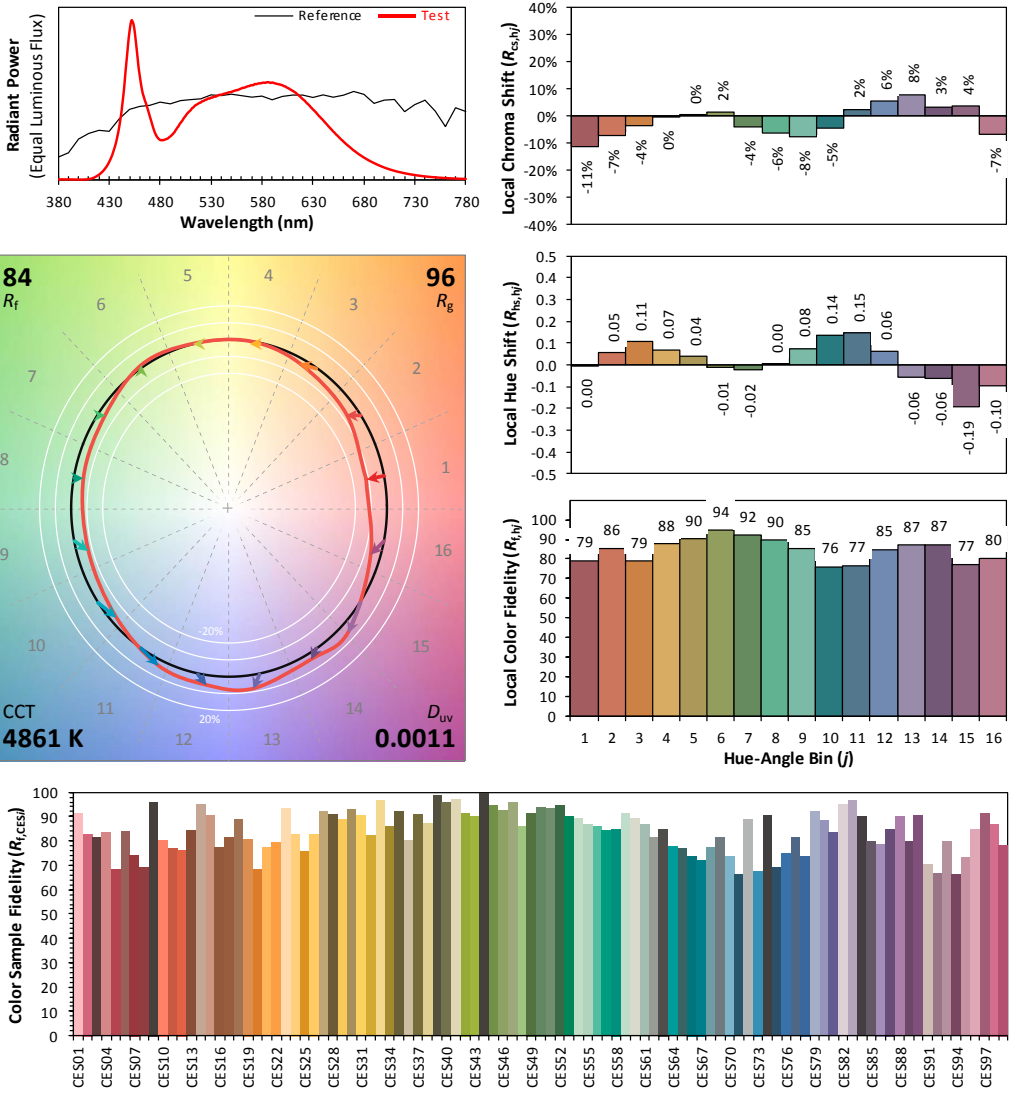
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/01/31

Model: 34HID/8CCTS/277V/EX39/DIM/SD



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

x 0.3494
 y 0.3572
 u' 0.2121
 v' 0.4880

CIE 13.3-1995 (CRI)	
R_a	84
R_g	17

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	Jun. 05, 2023	-
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	Jul. 24, 2023	-
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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