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/E26/DIM/SD

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24010037d

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

Review by: Wei Fei — Engineer: Wei Fei — Feb. 04, 2024

Approved by: April Zou — 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/ E26/DIM/SD 3000K Setting	34HID/8CCTS/277V/ E26/DIM/SD 4000K Setting	34HID/8CCTS/277V/ E26/DIM/SD 5000K Setting
Luminous Efficacy (Lumens /Watt)	142.3	156.2	151.6
Total Luminous Flux (Lumens)	5000.4	5362.3	5313.4
Power (Watts)	35.15	34.32	35.04
Power Factor	0.9870	0.9881	0.9872
CCT (K)	2998	3806	4878
CRI	83.3	85.9	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. 30, 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/E26/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 ℃.

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)	0.297	0.137
Power Factor	0.9870	0.9034
Test Power (W)	35.15	34.36
THD A%	3.96	16.64
Luminous Efficacy (lm/W)	142.3	146.0
Total Luminous Flux (lm)	5000.4	5018.2
Color Rendering Index (CRI)	83.3	
R9	10.3	
Correlated Color Temperature (CCT)(K)	2998	
Chromaticity Chroma x	0.4352	
Chromaticity Chroma y	0.4006	
Chromaticity Chroma u	0.2510	
Chromaticity Chroma v	0.3465	
Duv	-0.0012	
Chromaticity Chroma u ’	0.2510	
Chromaticity Chroma v’	0.5197	

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	59.7
R9	10.3
R10	82.3
R11	80.7
R12	73.1
R13	84.8
R14	98.4

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

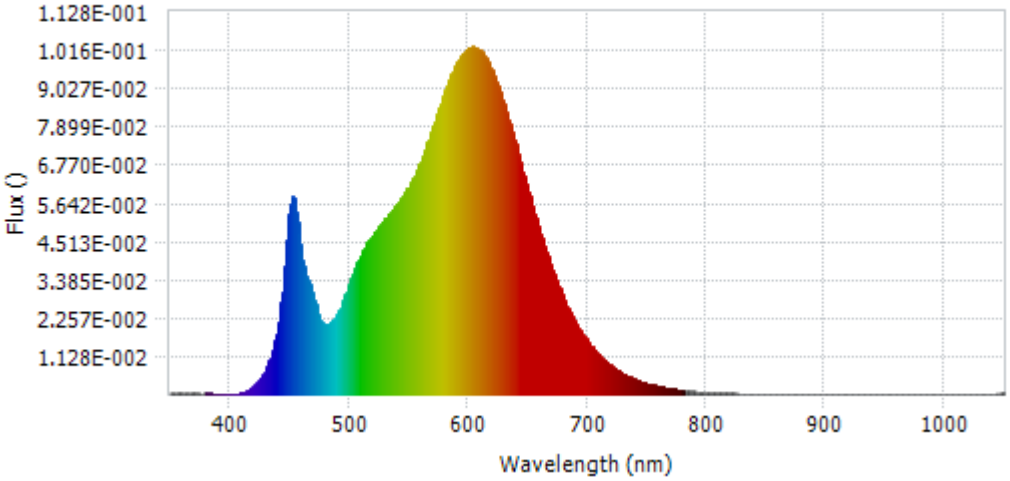
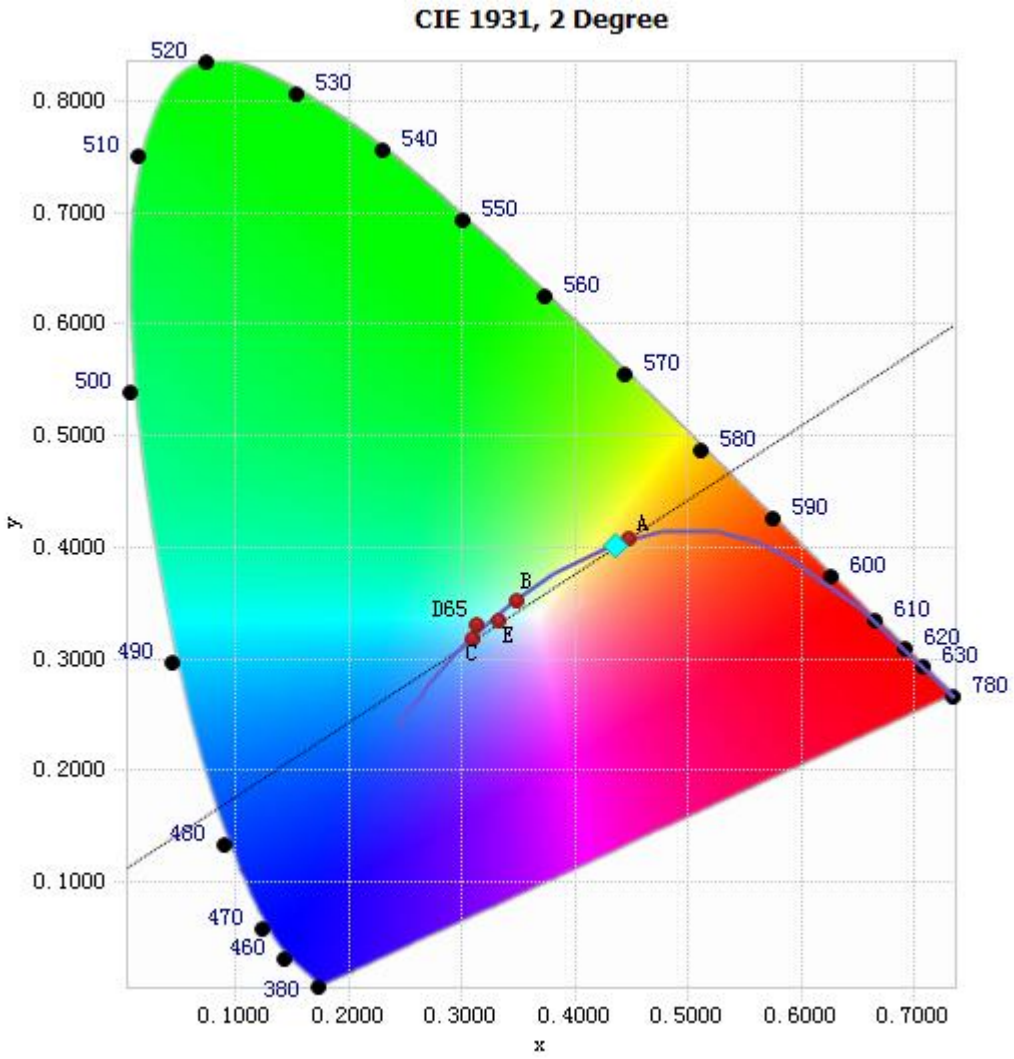


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.11E-04	485	2.15E-02	590	9.78E-02	695	1.85E-02
385	3.13E-04	490	2.38E-02	595	1.00E-01	700	1.59E-02
390	3.18E-04	495	2.77E-02	600	1.02E-01	705	1.36E-02
395	3.18E-04	500	3.24E-02	605	1.02E-01	710	1.17E-02
400	2.74E-04	505	3.71E-02	610	1.01E-01	715	1.00E-02
405	3.11E-04	510	4.10E-02	615	9.92E-02	720	8.57E-03
410	4.80E-04	515	4.47E-02	620	9.55E-02	725	7.34E-03
415	1.24E-03	520	4.69E-02	625	9.10E-02	730	6.24E-03
420	2.53E-03	525	4.94E-02	630	8.57E-02	735	5.31E-03
425	4.54E-03	530	5.18E-02	635	7.99E-02	740	4.54E-03
430	7.43E-03	535	5.35E-02	640	7.37E-02	745	3.88E-03
435	1.19E-02	540	5.59E-02	645	6.72E-02	750	3.31E-03
440	1.96E-02	545	5.85E-02	650	6.06E-02	755	2.83E-03
445	3.36E-02	550	6.12E-02	655	5.46E-02	760	2.42E-03
450	5.30E-02	555	6.47E-02	660	4.85E-02	765	2.08E-03
455	5.64E-02	560	6.87E-02	665	4.29E-02	770	1.77E-03
460	4.21E-02	565	7.33E-02	670	3.75E-02	775	1.52E-03
465	3.42E-02	570	7.83E-02	675	3.29E-02	780	1.29E-03
470	2.91E-02	575	8.35E-02	680	2.86E-02		
475	2.28E-02	580	8.87E-02	685	2.49E-02		
480	2.05E-02	585	9.40E-02	690	2.16E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4352, 0.4006)

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

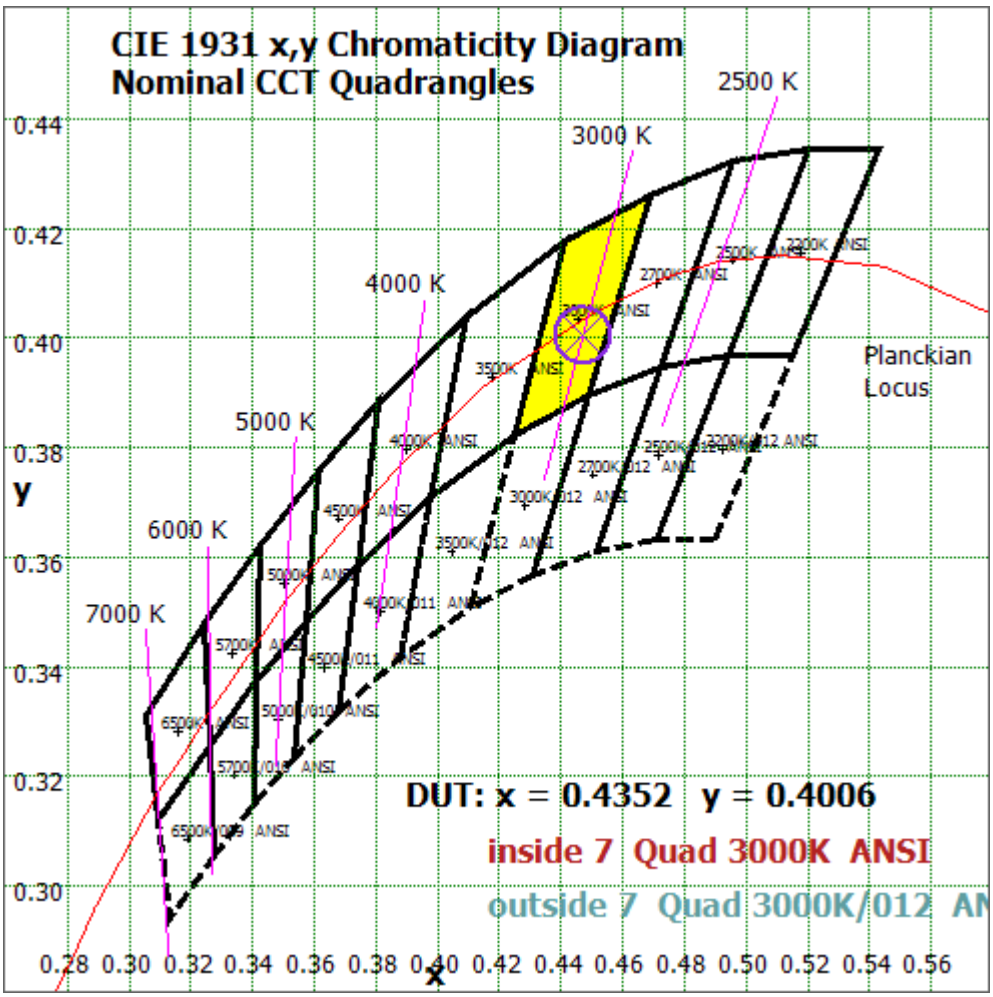


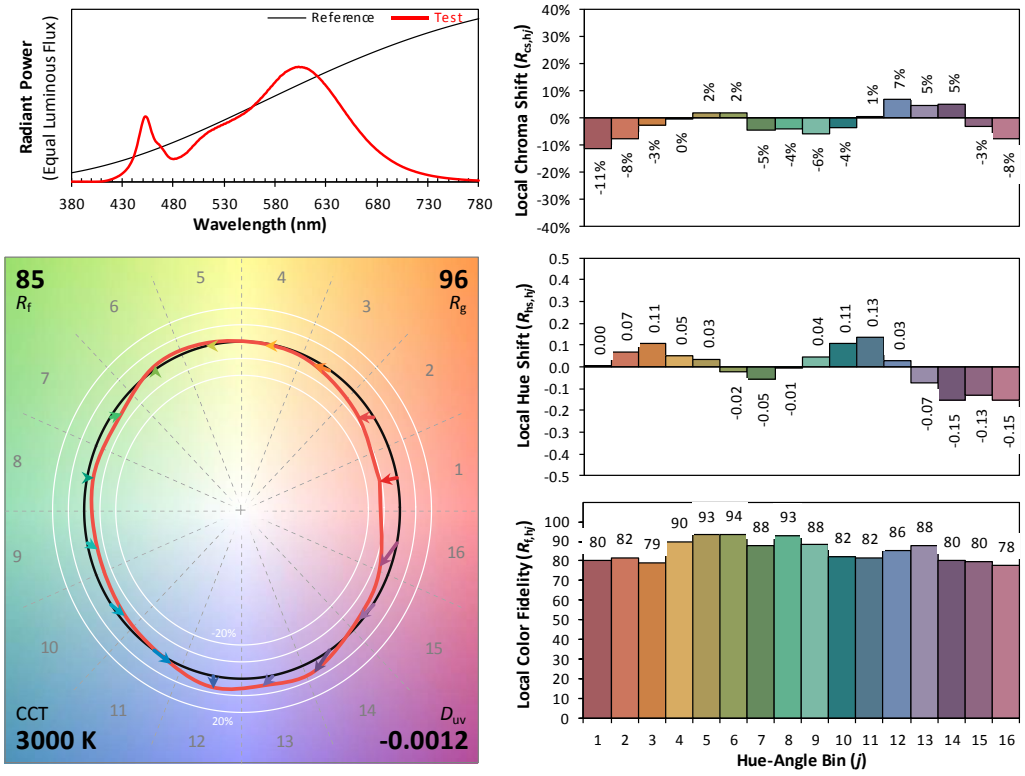
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/01/30 **Model:** 34HID/8CCTS/277V/E26/DIM/SD



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

x	0.4352
y	0.4006
u'	0.2510
v'	0.5197

CIE 13.3-1995 (CRI)	
R_a	83
R_9	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 ℃.
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)	0.295
Power Factor	0.9959
Power (W)	35.20
Luminous Efficacy (lm/W)	143.1
Total Luminous Flux (lm)	5035.6
Beam Angle (°)	213.4 (0^o-180^o) / 215.1 (90^o-270^o)
Center Beam Candle Power (cd)	649
Maximum Beam Candle Power (cd)	650.3 (At: C=315.0, Gamma=4.0)
Spacing Criteria	1.48 (0^o-180^o) / 1.50 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	38.49%
Zonal Lumens in the 60 °-90 °Zone	31.08%
Zonal Lumens in the 90 °-120 °Zone	21.16%
Zonal Lumens in the 120 °-180 °Zone	9.27%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	61.92	1.23%
10- 20	183.328	3.64%
20- 30	297.395	5.91%
30- 40	397.1	7.89%
40- 50	474.538	9.42%
50- 60	523.789	10.40%
60- 70	542.329	10.77%
70- 80	530.669	10.54%
80- 90	491.81	9.77%
90-100	431.262	8.56%
100-110	356.939	7.09%
110-120	277.523	5.51%
120-130	200.824	3.99%
130-140	133.146	2.64%
140-150	78.739	1.56%
150-160	38.714	0.77%
160-170	13.676	0.27%
170-180	1.871	0.04%
Total	5035.6	100%

γ(°)	Lumens	% Total
0-130	4769.43	94.71%
130-180	266.146	5.29%
0-180	5035.6	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

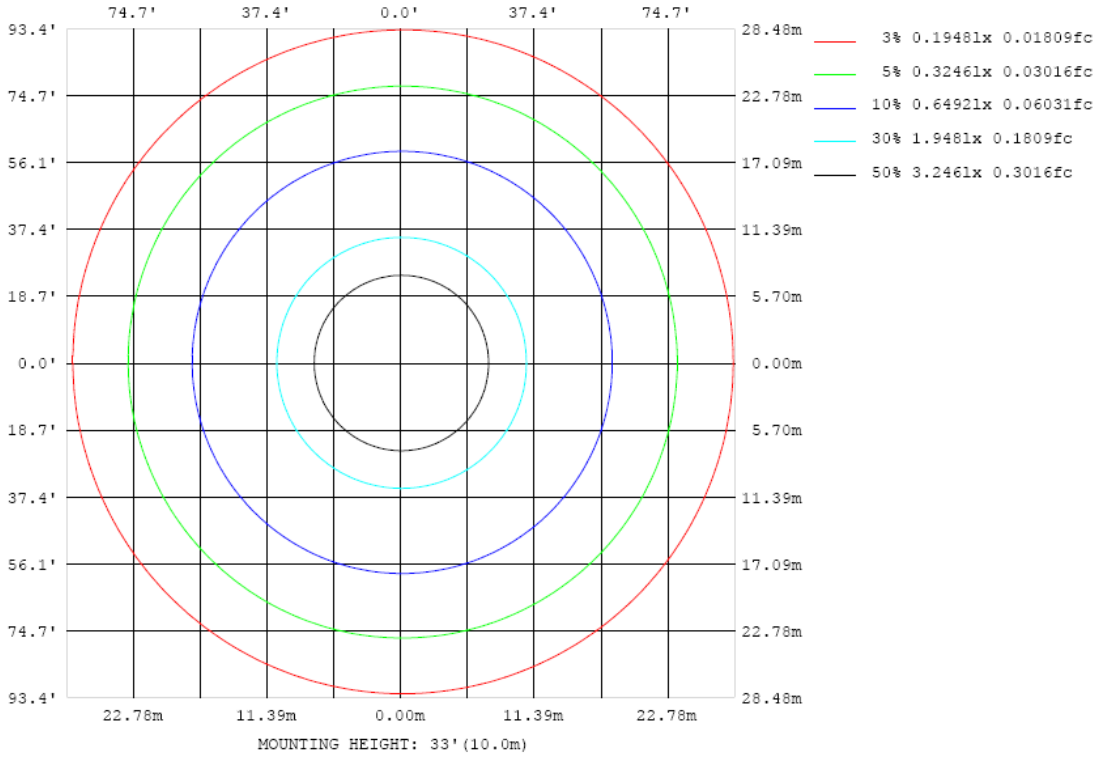


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

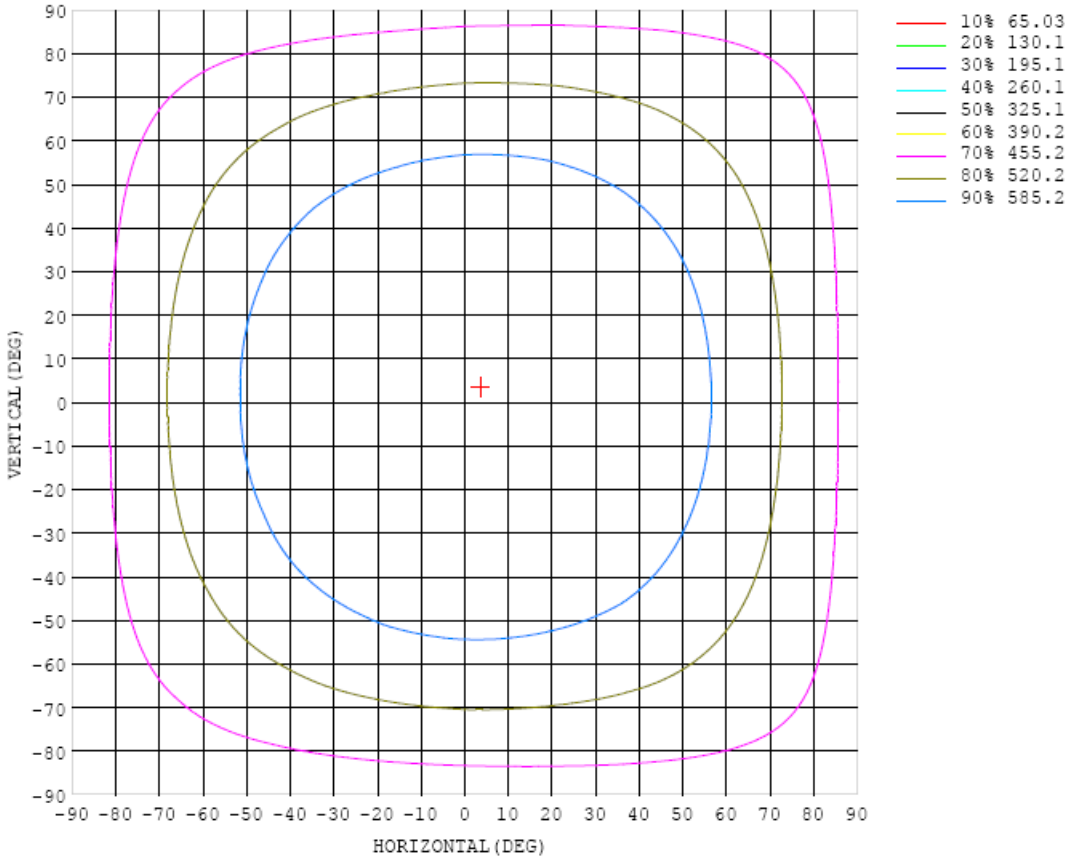


Chart 6: Isocandela Plot

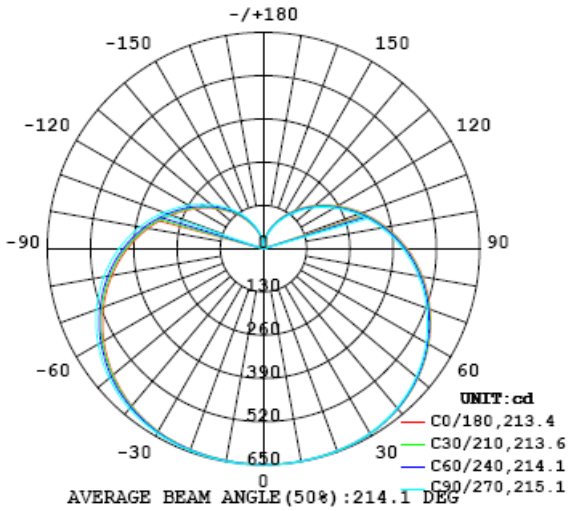


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (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	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649			
5	649	649	649	648	650	650	649	648	648	648	648	648	649	650	650	649			
10	649	649	649	648	649	649	648	648	647	648	647	647	648	649	648	649			
15	647	648	648	647	648	647	647	645	645	645	646	646	648	649	649	648			
20	646	647	647	646	647	646	644	644	642	643	644	644	645	646	647	647			
25	644	645	645	644	645	643	642	639	639	640	641	642	644	645	645	645			
30	641	642	642	641	641	639	636	635	634	635	637	638	640	642	642	641			
35	635	636	635	635	633	631	629	626	626	628	630	632	635	637	637	636			
40	629	628	628	627	625	623	618	617	617	619	621	624	628	629	630	629			
45	617	617	616	616	613	610	607	605	604	607	611	614	617	620	620	620			
50	606	605	603	601	599	596	592	589	591	593	598	601	606	608	608	606			
55	590	589	587	585	583	580	575	573	573	577	582	586	591	594	593	593			
60	573	572	569	567	565	561	557	554	555	559	565	569	574	577	577	575			
65	553	551	550	547	544	540	535	533	534	539	544	550	555	558	557	557			
70	533	530	528	525	522	518	513	511	512	517	523	529	535	537	537	535			
75	510	507	504	501	499	494	490	487	488	493	499	506	512	515	515	513			
80	485	482	480	476	473	469	465	462	463	469	475	481	488	491	490	488			
85	459	456	453	450	447	442	437	435	437	443	449	455	462	465	465	462			
90	432	429	426	422	419	415	411	408	410	415	422	428	434	438	437	435			
95	403	400	397	393	391	386	381	380	382	387	394	400	407	409	409	407			
100	374	371	368	365	361	357	353	351	353	358	365	372	377	381	380	378			
105	345	341	338	335	332	328	324	322	325	330	336	343	348	351	350	348			
110	315	312	309	305	303	299	295	294	296	301	307	314	319	322	321	319			
115	286	283	279	276	273	270	267	265	268	272	279	285	290	293	292	289			
120	257	254	251	247	245	241	239	238	240	245	251	256	261	264	263	261			
125	229	226	222	219	217	214	211	211	213	218	223	229	233	236	235	233			
130	202	199	196	193	190	188	186	185	187	192	197	202	206	208	208	205			
135	176	173	170	167	165	162	161	160	163	167	172	177	180	182	182	179			
140	151	149	145	143	140	138	137	137	141	144	149	152	156	157	157	155			
145	128	125	122	119	117	115	114	115	119	122	126	130	133	135	134	132			
150	106	104	101	97.5	95.6	94.0	92.8	93.8	97.4	101	104	108	111	113	112	110			
155	85.1	83.1	80.5	77.5	75.8	74.1	73.0	74.1	77.8	80.3	83.9	87.2	89.7	91.4	91.0	89.0			
160	66.4	64.9	62.8	60.2	58.3	56.5	55.3	56.6	59.3	61.5	64.5	67.5	69.9	71.7	71.2	69.7			
165	49.6	48.1	46.3	43.4	41.9	40.3	37.7	40.2	42.7	44.0	46.8	49.4	51.3	53.2	53.2	52.0			
170	34.2	33.0	31.5	28.4	19.7	20.9	23.4	24.4	27.6	27.6	29.7	33.7	32.4	36.8	37.1	35.4			
175	18.9	18.9	18.0	15.8	11.0	7.51	10.3	10.0	13.0	13.9	14.5	15.6	15.3	18.0	18.9	18.4			
180	0.00	0.00	0.00	0.00	0.00	0.70	0.81	0.20	0.84	0.85	0.85	0.85	0.85	0.85	0.85	0.85			

Table 6: Luminous Intensity Data

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)	0.290	0.135
Power Factor	0.9881	0.8991
Test Power (W)	34.32	33.56
THD A%	3.78	17.04
Luminous Efficacy (lm/W)	156.2	160.8
Total Luminous Flux (lm)	5362.3	5398.0
Color Rendering Index (CRI)	85.9	
R9	21.9	
Correlated Color Temperature (CCT)(K)	3806	
Chromaticity Chroma x	0.3873	
Chromaticity Chroma y	0.3757	
Chromaticity Chroma u	0.2301	
Chromaticity Chroma v	0.3348	
Duv	-0.0024	
Chromaticity Chroma u ’	0.2301	
Chromaticity Chroma v’	0.5021	

Special Color Rendering Indices	
R1	85.4
R2	93.2
R3	96.1
R4	83.9
R5	85.2
R6	89.6
R7	85.8
R8	67.7
R9	21.9
R10	83
R11	83.5
R12	66.8
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

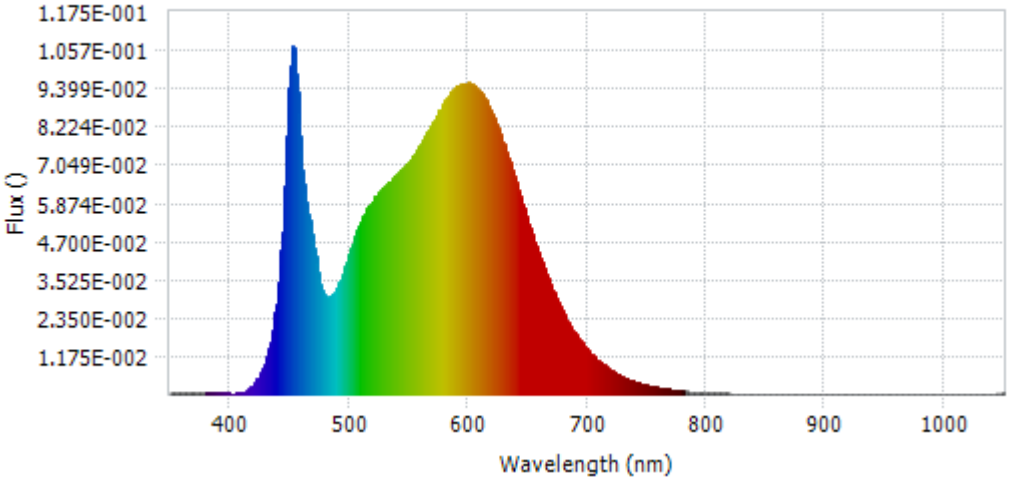
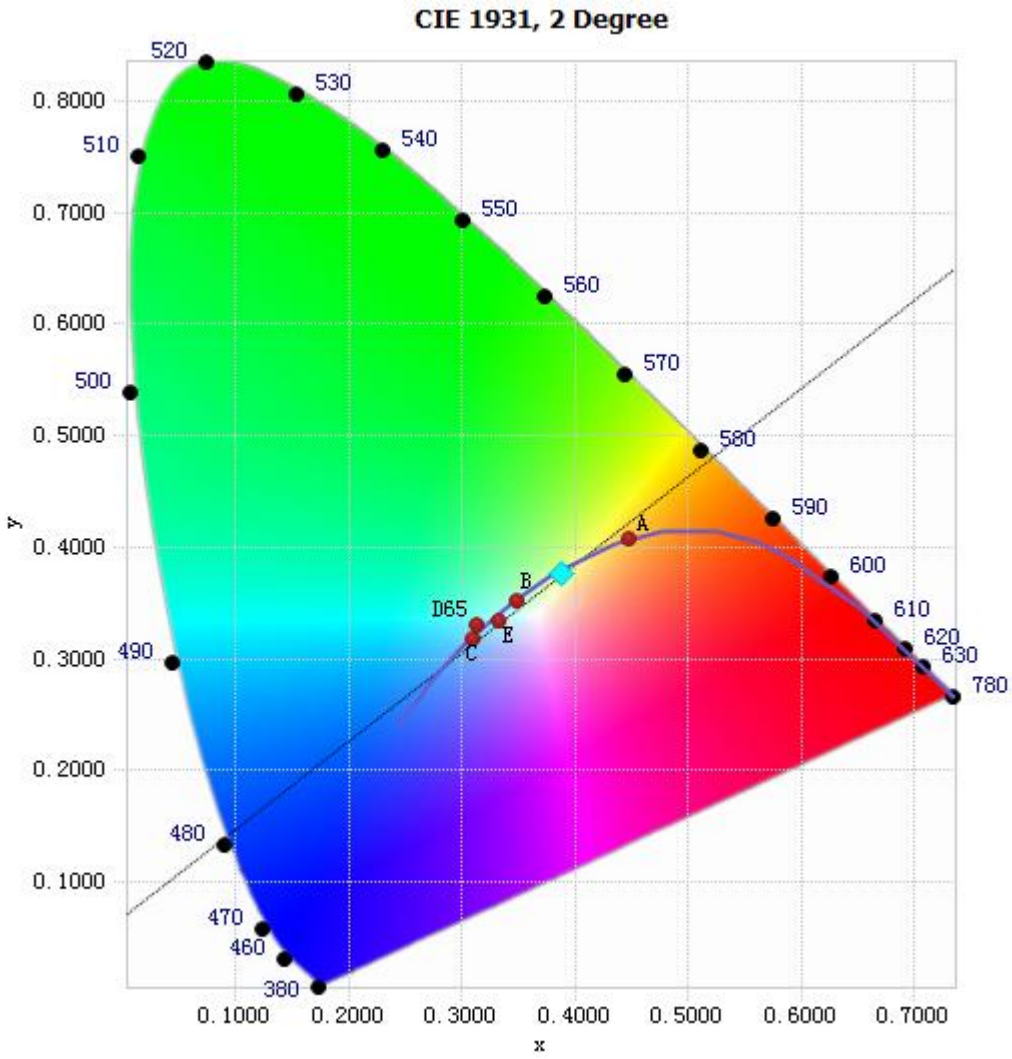


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	4.70E-04	485	3.05E-02	590	9.46E-02	695	1.62E-02
385	4.66E-04	490	3.28E-02	595	9.54E-02	700	1.39E-02
390	4.27E-04	495	3.71E-02	600	9.59E-02	705	1.19E-02
395	4.16E-04	500	4.29E-02	605	9.47E-02	710	1.02E-02
400	3.47E-04	505	4.85E-02	610	9.29E-02	715	8.73E-03
405	3.80E-04	510	5.30E-02	615	9.03E-02	720	7.49E-03
410	5.62E-04	515	5.72E-02	620	8.62E-02	725	6.39E-03
415	1.45E-03	520	5.94E-02	625	8.18E-02	730	5.49E-03
420	3.15E-03	525	6.19E-02	630	7.67E-02	735	4.65E-03
425	5.96E-03	530	6.41E-02	635	7.12E-02	740	3.97E-03
430	1.05E-02	535	6.55E-02	640	6.55E-02	745	3.40E-03
435	1.80E-02	540	6.75E-02	645	5.96E-02	750	2.91E-03
440	3.13E-02	545	6.95E-02	650	5.36E-02	755	2.48E-03
445	5.64E-02	550	7.15E-02	655	4.81E-02	760	2.13E-03
450	9.45E-02	555	7.40E-02	660	4.27E-02	765	1.83E-03
455	1.04E-01	560	7.68E-02	665	3.77E-02	770	1.55E-03
460	7.44E-02	565	8.00E-02	670	3.30E-02	775	1.33E-03
465	5.69E-02	570	8.33E-02	675	2.88E-02	780	1.14E-03
470	4.71E-02	575	8.64E-02	680	2.50E-02		
475	3.53E-02	580	8.96E-02	685	2.18E-02		
480	3.01E-02	585	9.28E-02	690	1.88E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3873, 0.3757)

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

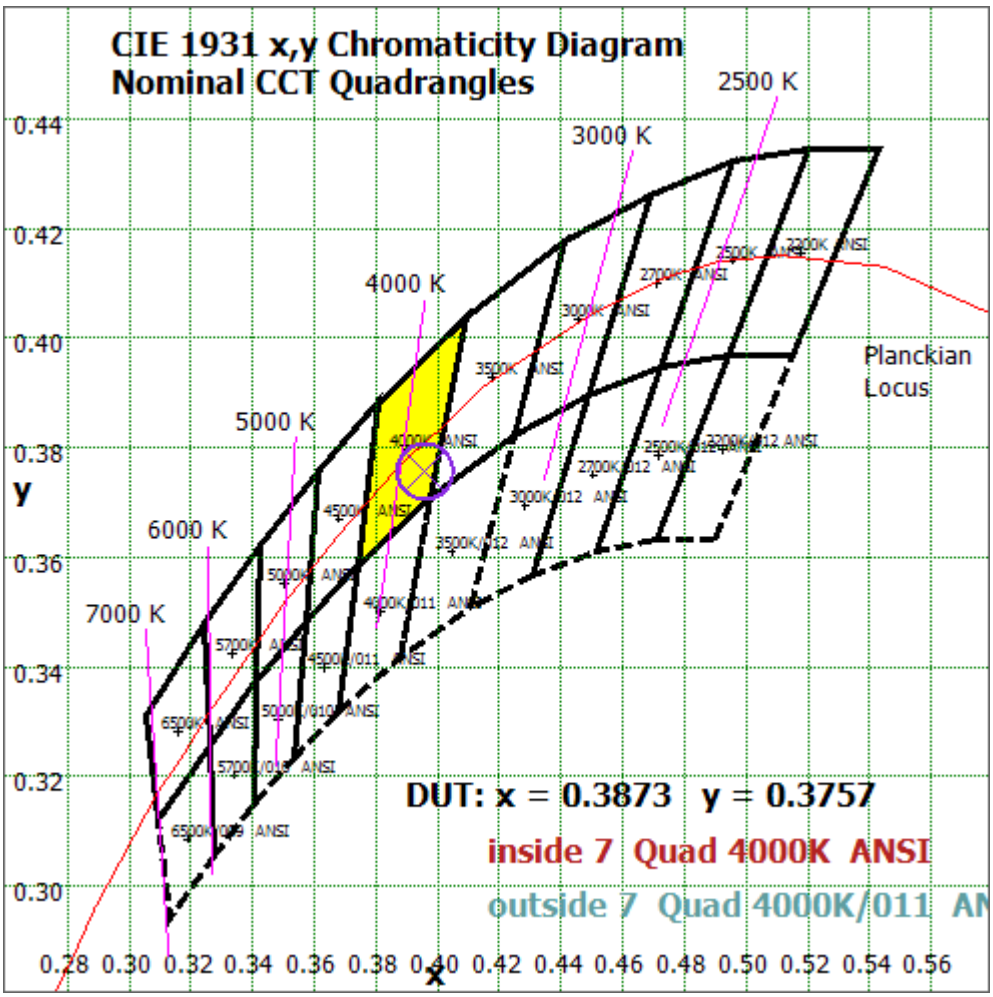


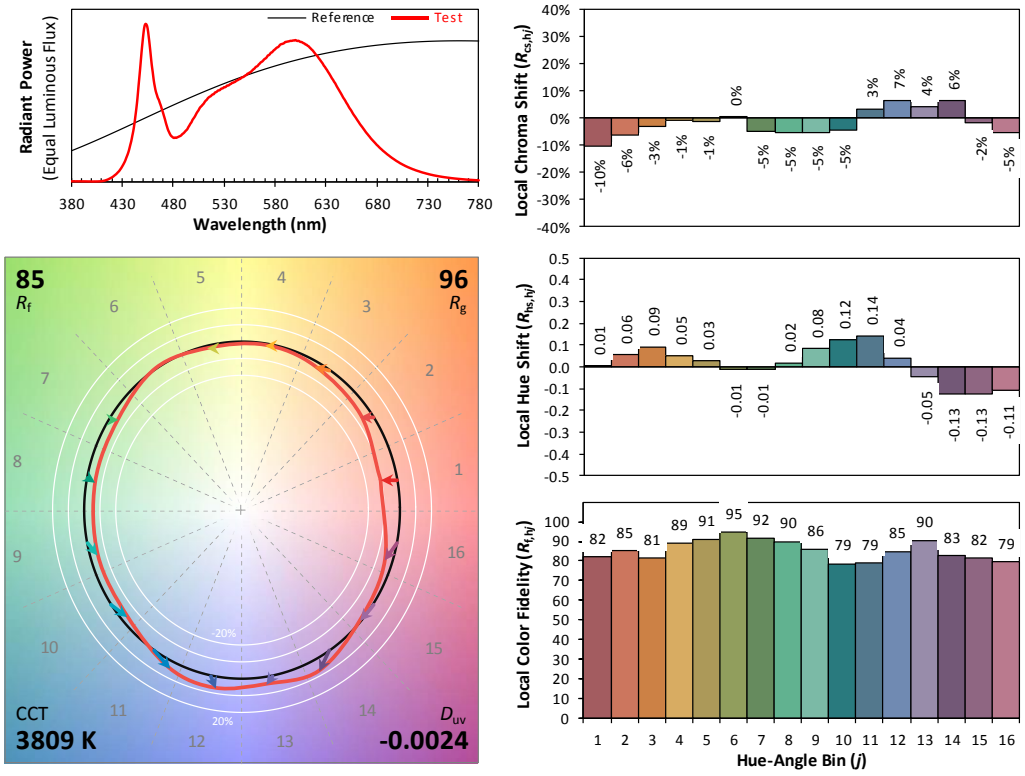
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/01/30 **Model:** 34HID/8CCTS/277V/E26/DIM/SD



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

x	0.3873
y	0.3757
u'	0.2301
v'	0.5021

CIE 13.3-1995 (CRI)

R_a	86
R_9	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 was26.0 ℃.

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)	0.296	0.137
Power Factor	0.9872	0.9031
Test Power (W)	35.04	34.25
THD A%	3.87	16.64
Luminous Efficacy (lm/W)	151.6	155.5
Total Luminous Flux (lm)	5313.4	5324.5
Color Rendering Index (CRI)	84.5	
R9	16.8	
Correlated Color Temperature (CCT)(K)	4878	
Chromaticity Chroma x	0.3487	
Chromaticity Chroma y	0.3564	
Chromaticity Chroma u	0.2120	
Chromaticity Chroma v	0.3250	
Duv	0.0009	
Chromaticity Chroma u ’	0.2120	
Chromaticity Chroma v’	0.4875	

Special Color Rendering Indices	
R1	83.1
R2	90.3
R3	94.2
R4	82.8
R5	82.7
R6	85.1
R7	88.1
R8	69.6
R9	16.8
R10	75.9
R11	81.7
R12	57.9
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

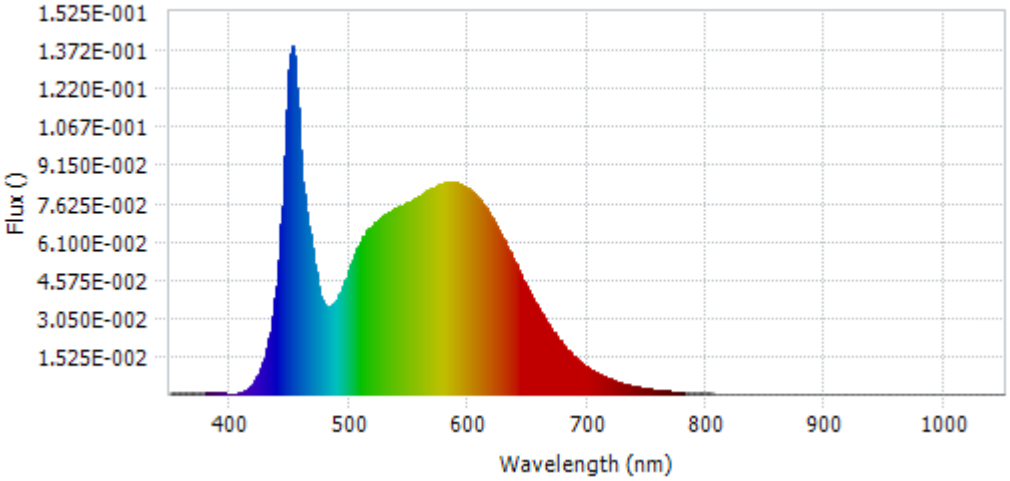
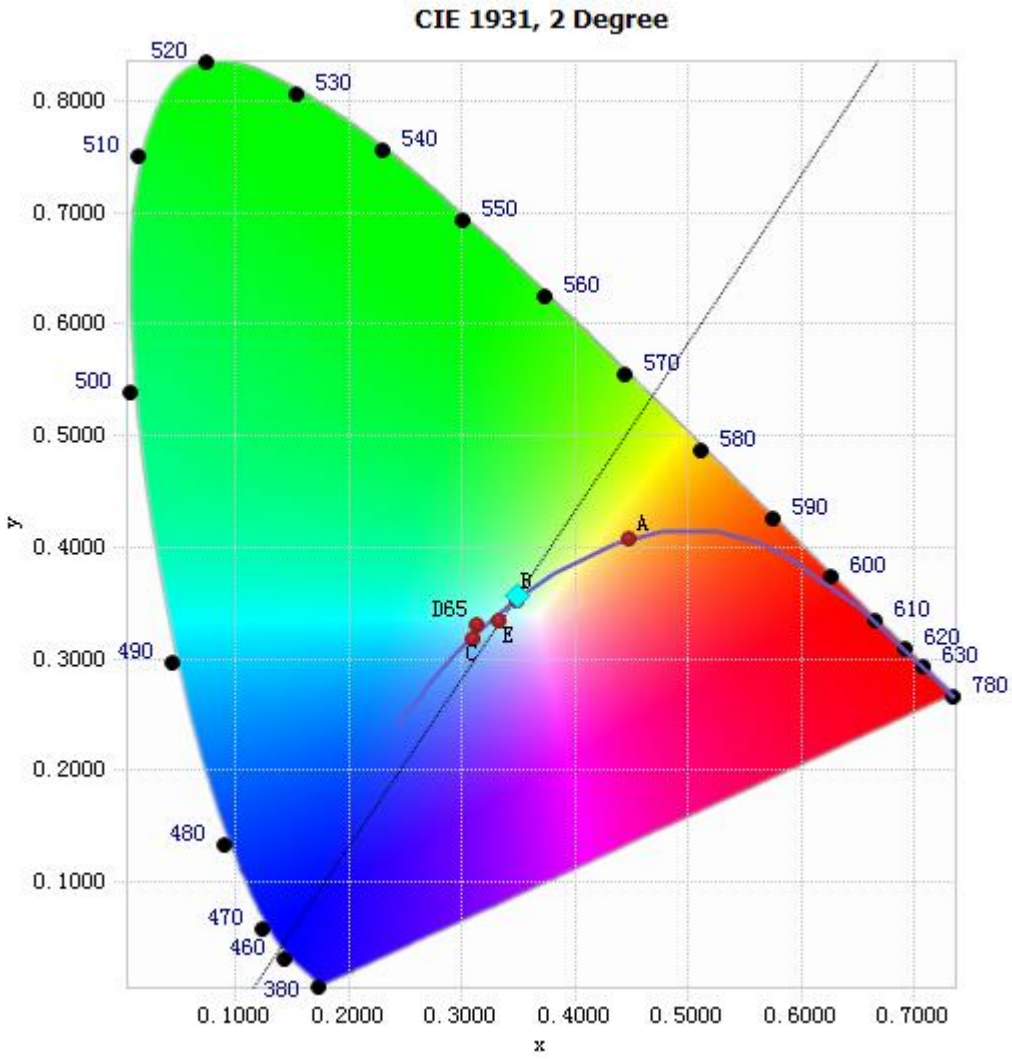


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.77E-04	485	3.53E-02	590	8.46E-02	695	1.26E-02
385	5.46E-04	490	3.79E-02	595	8.34E-02	700	1.09E-02
390	5.22E-04	495	4.30E-02	600	8.23E-02	705	9.27E-03
395	4.74E-04	500	4.96E-02	605	7.99E-02	710	7.99E-03
400	3.89E-04	505	5.57E-02	610	7.72E-02	715	6.84E-03
405	4.31E-04	510	6.06E-02	615	7.40E-02	720	5.87E-03
410	7.61E-04	515	6.51E-02	620	7.00E-02	725	5.04E-03
415	2.12E-03	520	6.73E-02	625	6.58E-02	730	4.32E-03
420	4.77E-03	525	6.97E-02	630	6.12E-02	735	3.67E-03
425	9.14E-03	530	7.17E-02	635	5.65E-02	740	3.14E-03
430	1.62E-02	535	7.26E-02	640	5.18E-02	745	2.69E-03
435	2.79E-02	540	7.42E-02	645	4.68E-02	750	2.31E-03
440	4.82E-02	545	7.54E-02	650	4.20E-02	755	1.98E-03
445	8.41E-02	550	7.65E-02	655	3.76E-02	760	1.71E-03
450	1.30E-01	555	7.80E-02	660	3.33E-02	765	1.45E-03
455	1.30E-01	560	7.94E-02	665	2.94E-02	770	1.25E-03
460	9.10E-02	565	8.10E-02	670	2.56E-02	775	1.07E-03
465	6.93E-02	570	8.23E-02	675	2.24E-02	780	9.23E-04
470	5.52E-02	575	8.33E-02	680	1.95E-02		
475	4.08E-02	580	8.42E-02	685	1.70E-02		
480	3.49E-02	585	8.49E-02	690	1.47E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3487, 0.3564)

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

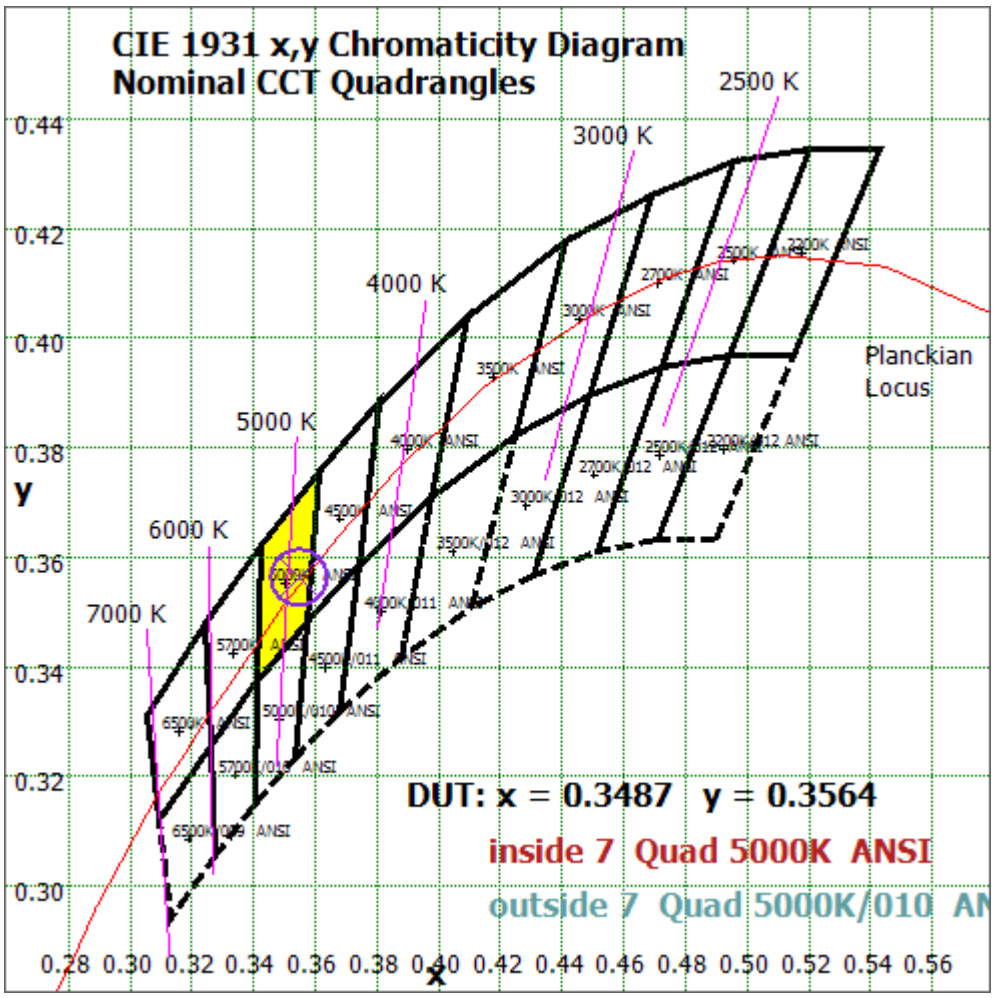


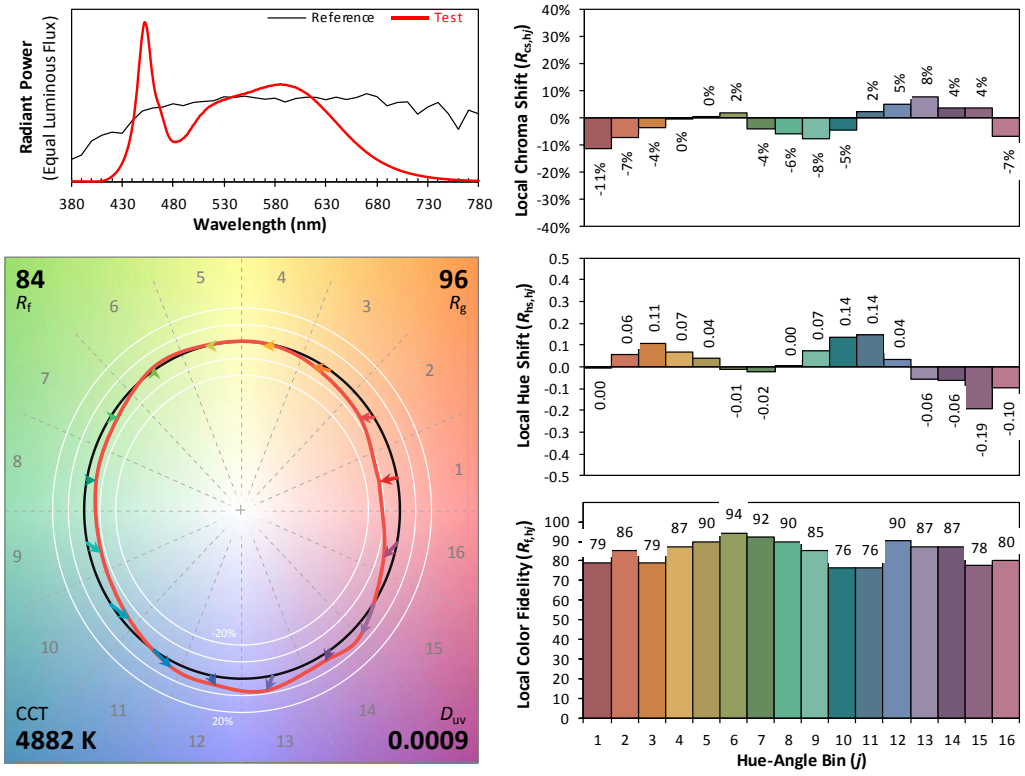
Chart 14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

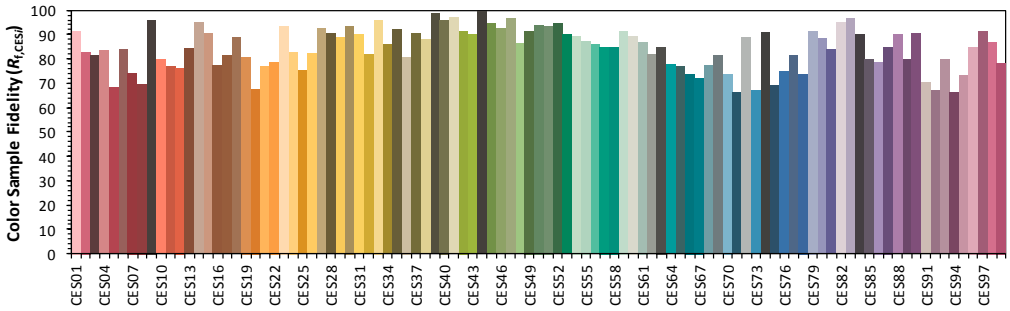
Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/01/30 **Model:** 34HID/8CCTS/277V/E26/DIM/SD





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

x	0.3487
y	0.3564
u'	0.2120
v'	0.4875

CIE 13.3-1995 (CRI)

R_a	85
R_9	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 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 ***

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