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: 12.5A21DIM/9CCTS

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist, Hangzhou, Zhejiang Province, China 311100

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Report No.: HZ24120023e

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

Review by: Wei Fei

Engineer: Wei Fei

Dec. 26, 2024

Approved by: April Zou

Manager: April Zou

Dec. 26, 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	12.5A21DIM /9CCTS 2700K Setting	12.5A21DIM /9CCTS 3000K Setting	12.5A21DIM /9CCTS 3500K Setting	12.5A21DIM /9CCTS 4000K Setting	12.5A21DIM /9CCTS 5000K Setting
Luminous Efficacy (Lumens /Watt)	146.2	149.9	150.6	150.8	145.9
Total Luminous Flux (Lumens)	1760.1	1806.6	1818.8	1821.4	1777.5
Power (Watts)	12.04	12.05	12.08	12.08	12.18
Power Factor	0.9288	0.9290	0.9294	0.9294	0.9303
CCT (K)	2741	3139	3396	3776	4936
CRI	93.6	96.8	97.0	96.9	95.8
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins	50 mins	50 mins
Note	2700K	3000K	3500K	4000K	5000K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Dec. 12, 2024

Date of Test : Dec. 16, 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

TABLE OF CONTENT

SAMPLE PHOTO

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Lamp
Model	: 12.5A21DIM/9CCTS
Electrical Ratings	: 120V, 60Hz,12.5W
Product Description	: Color- Tunable 2700K/3000K/3500K /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 (2700K 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
Voltage frequency (Hz)	60
Test Current (A)	0.108
Power Factor	0.9288
Test Power (W)	12.04
THD A%	18.78
Luminous Efficacy (lm/W)	146.2
Total Luminous Flux (lm)	1760.1
Color Rendering Index (CRI)	93.6
R9	59.4
Correlated Color Temperature (CCT)(K)	2741
Chromaticity Chroma x	0.4560
Chromaticity Chroma y	0.4091
Chromaticity Chroma u	0.2607
Chromaticity Chroma v	0.3508
Duv	-0.0002
Chromaticity Chroma u ’	0.2607
Chromaticity Chroma v’	0.5262

Special Color Rendering Indices	
R1	95.2
R2	97.7
R3	98.2
R4	94.4
R5	94.5
R6	96.6
R7	90.8
R8	81.8
R9	59.4
R10	92.1
R11	95.7
R12	83.6
R13	95.7
R14	97.5

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

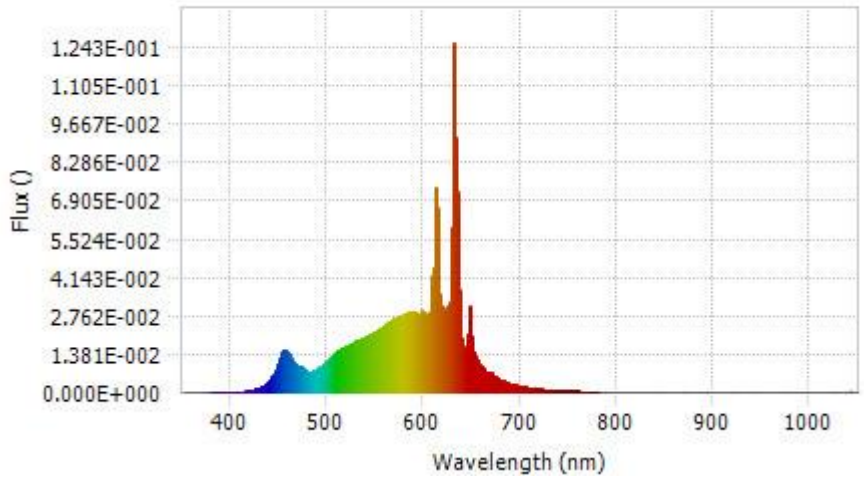
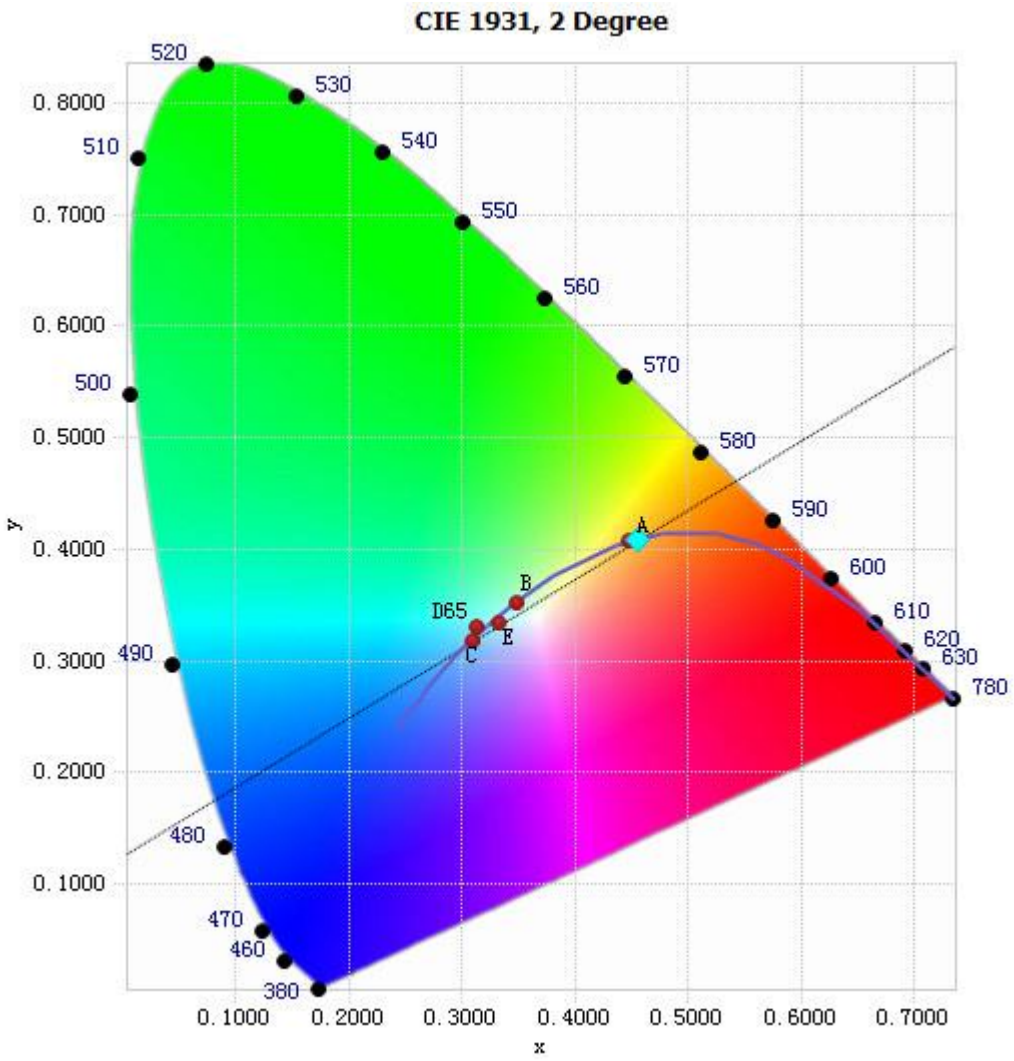


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	8.30E-05	485	7.65E-03	590	2.87E-02	695	2.59E-03
385	1.40E-04	490	8.67E-03	595	2.79E-02	700	2.20E-03
390	9.92E-05	495	9.83E-03	600	2.83E-02	705	1.87E-03
395	1.47E-04	500	1.15E-02	605	2.84E-02	710	1.56E-03
400	9.02E-05	505	1.31E-02	610	3.64E-02	715	1.34E-03
405	1.54E-04	510	1.45E-02	615	4.68E-02	720	1.15E-03
410	1.60E-04	515	1.58E-02	620	3.05E-02	725	9.73E-04
415	3.39E-04	520	1.66E-02	625	3.07E-02	730	8.44E-04
420	5.80E-04	525	1.75E-02	630	1.11E-01	735	7.00E-04
425	1.05E-03	530	1.83E-02	635	9.17E-02	740	5.96E-04
430	1.76E-03	535	1.90E-02	640	1.75E-02	745	5.28E-04
435	2.75E-03	540	1.99E-02	645	1.56E-02	750	4.60E-04
440	4.47E-03	545	2.08E-02	650	1.55E-02	755	3.90E-04
445	7.21E-03	550	2.17E-02	655	1.13E-02	760	3.26E-04
450	1.22E-02	555	2.30E-02	660	9.06E-03	765	2.90E-04
455	1.55E-02	560	2.44E-02	665	7.06E-03	770	2.47E-04
460	1.33E-02	565	2.54E-02	670	6.95E-03	775	1.94E-04
465	1.05E-02	570	2.65E-02	675	5.19E-03	780	1.80E-04
470	9.40E-03	575	2.75E-02	680	4.30E-03		
475	8.19E-03	580	2.81E-02	685	3.63E-03		
480	7.24E-03	585	2.89E-02	690	3.05E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4560, 0.4091)

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

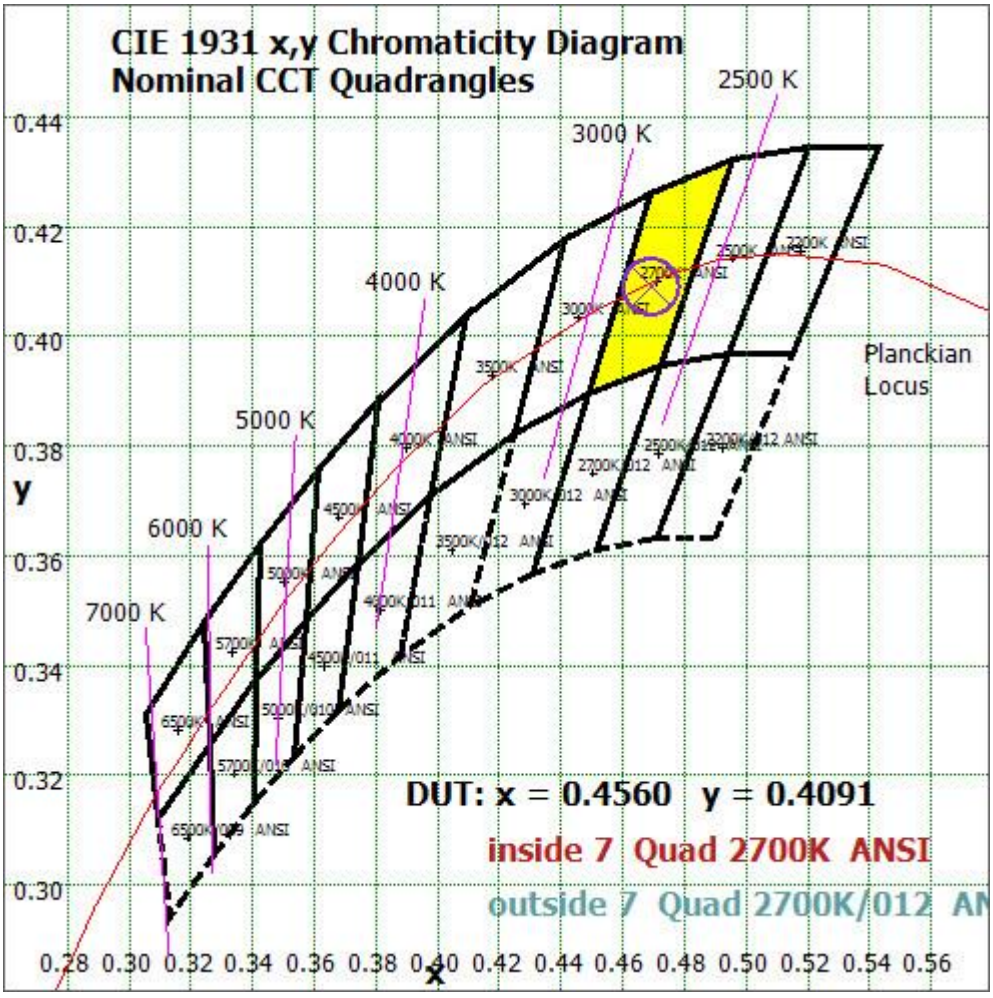


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/12/16 **Model:** 12.5A21DIM/9CCTS

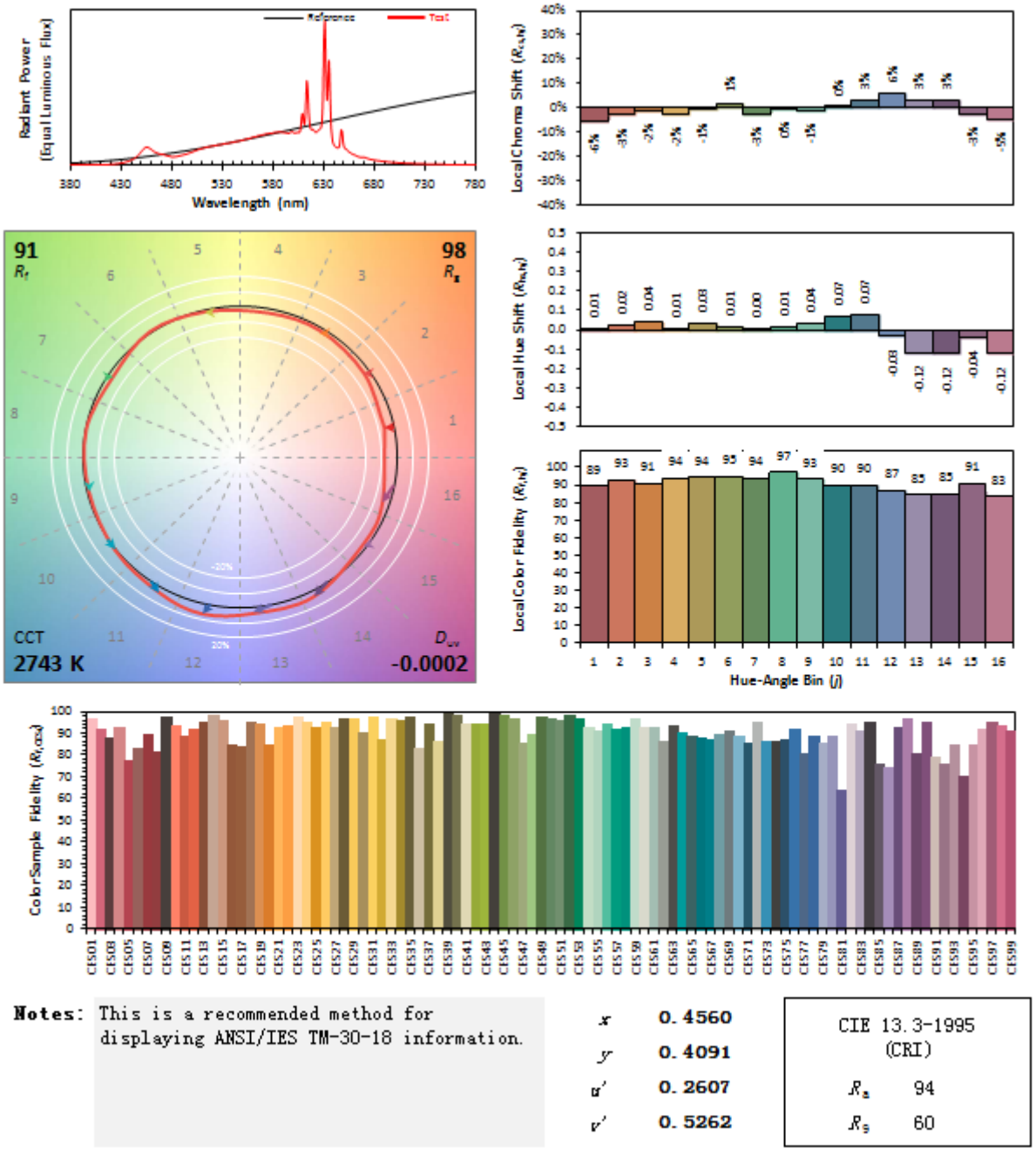


Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

Goniophotometer Method

Test ambient temperature was 25.1 ℃.

The photometric distance is 2.47 m.

Luminous data was taken at 0.5 °vertical intervals and 10 °horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.108
Power Factor	0.9311
Power (W)	12.10
Luminous Efficacy (lm/W)	146.4
Total Luminous Flux (lm)	1771.9
Beam Angle (°)	225.2 (0^o-180^o) / 223.0 (90^o-270^o)
Center Beam Candle Power (cd)	216
Maximum Beam Candle Power (cd)	220.6 (At: C=247.5, Gamma=25.5)
Spacing Criteria	1.52 (0^o-180^o) / 1.55 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	36.91%
Zonal Lumens in the 60 °-90 °Zone	30.70%
Zonal Lumens in the 90 °-120 °Zone	21.87%
Zonal Lumens in the 120 °-180 °Zone	10.52%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	20.586	1.16%
10- 20	61.085	3.45%
20- 30	99.476	5.61%
30- 40	133.564	7.54%
40- 50	160.652	9.07%
50- 60	178.694	10.09%
60- 70	186.563	10.53%
70- 80	184.221	10.40%
80- 90	173.102	9.77%
90-100	154.43	8.72%
100-110	129.915	7.33%
110-120	103.083	5.82%
120-130	76.471	4.32%
130-140	52.492	2.96%
140-150	32.501	1.83%
150-160	17.359	0.98%
160-170	6.81	0.38%
170-180	0.845	0.05%
Total	1771.8	100%

γ(°)	Lumens	% Total
0-130	1661.842	93.79%
130-180	110.007	6.21%
0-180	1771.8	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

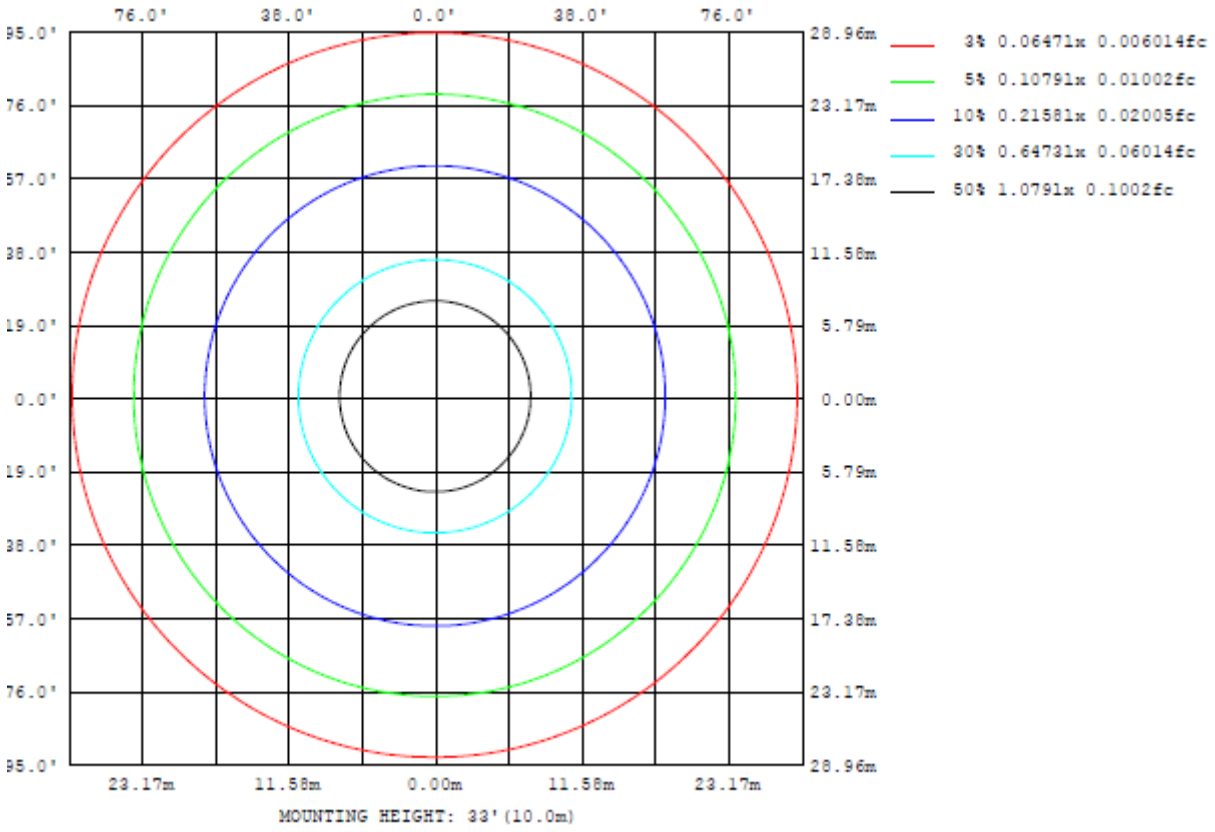


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

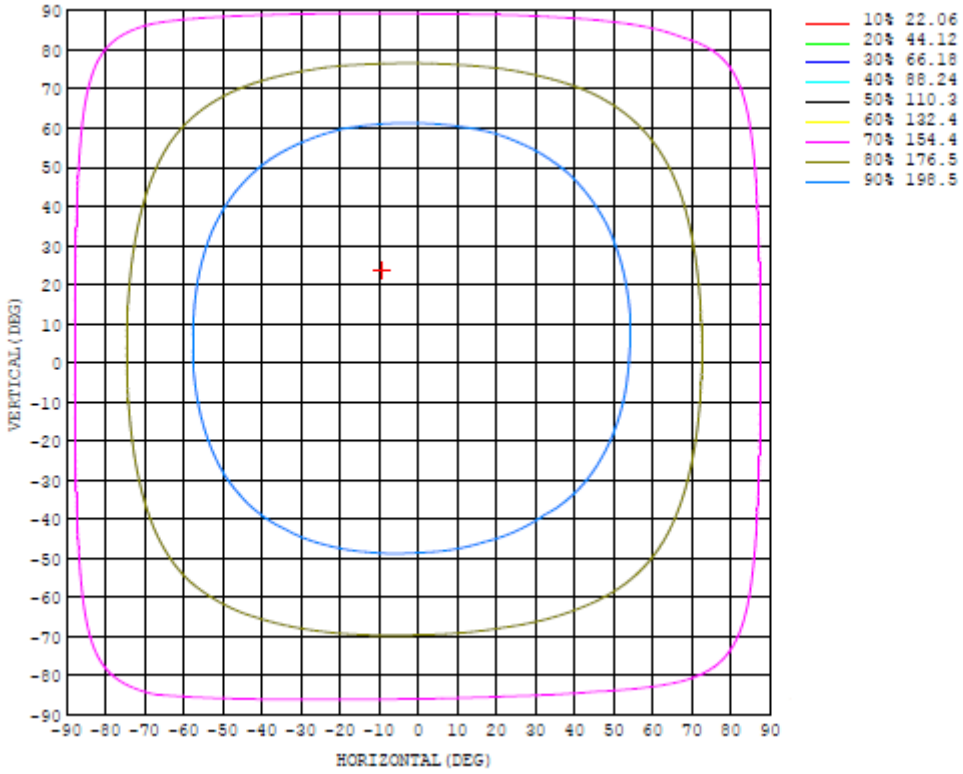


Chart 6: Isocandela Plot

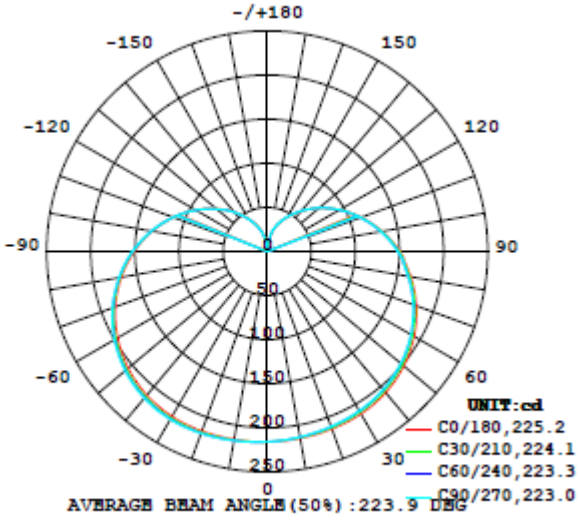


Chart 7: Polar Candela Distribution

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	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216			
5	216	215	215	215	215	215	215	216	216	216	217	217	217	216	216	216			
10	215	214	214	214	213	214	215	215	216	217	218	218	217	217	217	216			
15	215	213	213	212	212	213	214	215	216	218	219	219	219	218	217	216			
20	214	213	211	211	211	212	213	215	217	218	219	220	220	219	217	216			
25	213	212	210	210	210	211	213	215	217	218	220	221	220	219	217	215			
30	212	210	209	208	208	210	211	214	216	218	219	220	220	219	217	215			
35	211	209	207	206	207	208	210	212	215	217	218	219	219	218	216	213			
40	209	206	204	204	204	206	207	210	213	215	216	217	217	216	214	211			
45	206	203	201	201	201	203	204	207	210	212	214	215	214	213	211	208			
50	202	200	198	197	197	199	201	203	206	208	210	211	210	209	207	204			
55	198	195	193	193	193	194	196	199	201	204	205	206	206	205	203	200			
60	192	190	188	188	188	189	191	194	196	198	200	201	200	199	197	195			
65	186	184	183	182	182	184	185	188	190	192	193	194	194	193	191	189			
70	180	178	176	176	176	177	179	181	183	185	186	187	187	186	184	182			
75	173	171	169	169	169	170	172	174	176	178	179	179	179	178	177	175			
80	165	164	162	162	162	163	165	166	168	170	170	171	171	170	169	167			
85	157	156	155	155	155	156	157	158	159	161	162	162	162	162	160	159			
90	150	149	148	148	148	149	150	151	151	152	153	153	153	153	151	150			
95	141	141	140	139	140	140	141	142	142	143	143	144	143	143	142	141			
100	132	132	131	131	131	131	132	133	132	133	133	134	133	133	132	131			
105	123	122	122	121	122	122	123	124	123	123	124	124	123	123	123	122			
110	113	113	112	112	113	113	113	114	113	114	114	114	114	114	113	112			
115	104	104	103	103	104	104	104	105	104	104	104	104	104	104	103	103			
120	94.7	94.6	94.3	94.5	94.6	95.0	95.0	95.3	94.2	94.0	93.8	93.9	93.8	93.9	93.7	93.4			
125	85.5	85.5	85.4	85.6	85.7	85.9	86.0	86.0	84.8	84.4	84.2	84.2	84.1	84.4	84.2	84.2			
130	76.6	76.7	76.8	76.8	76.9	77.3	77.1	77.0	75.7	75.1	74.8	74.8	74.8	75.0	75.0	75.2			
135	67.9	68.2	68.3	68.4	68.6	68.6	68.5	68.2	67.5	67.0	66.6	66.6	66.6	66.9	67.1	67.2			
140	59.7	60.0	60.1	60.4	60.3	60.4	60.2	59.8	59.0	58.3	58.0	57.9	58.0	58.3	58.6	59.0			
145	51.8	52.2	52.5	52.6	52.7	52.7	52.3	51.9	51.0	50.2	49.8	49.7	49.9	50.2	50.6	51.1			
150	44.6	45.0	45.2	45.4	45.4	45.3	45.0	44.4	43.6	42.7	42.3	42.2	42.4	42.8	43.2	43.7			
155	37.8	38.3	38.5	38.7	38.6	38.5	38.0	37.5	36.6	35.6	35.3	35.2	35.4	35.8	36.3	36.9			
160	31.1	31.7	32.0	32.0	32.0	31.8	31.5	30.8	29.7	28.8	28.5	28.4	28.5	29.0	29.7	30.4			
165	23.7	24.7	25.1	24.6	25.2	25.3	24.7	24.1	23.0	21.7	21.4	21.3	21.7	21.7	23.1	23.7			
170	16.9	9.67	12.4	15.3	17.8	17.9	17.6	16.6	15.2	13.9	13.1	13.0	13.5	14.4	15.4	16.5			
175	9.97	11.7	11.1	8.88	8.31	9.02	8.26	5.70	2.99	0.51	0.30	0.29	0.30	1.79	4.63	7.93			
180	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29			

Table 6: Luminous Intensity Data

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
Voltage frequency (Hz)	60
Test Current (A)	0.108
Power Factor	0.9290
Test Power (W)	12.05
THD A%	18.81
Luminous Efficacy (lm/W)	149.9
Total Luminous Flux (lm)	1806.6
Color Rendering Index (CRI)	96.8
R9	80.7
Correlated Color Temperature (CCT)(K)	3139
Chromaticity Chroma x	0.4249
Chromaticity Chroma y	0.3954
Chromaticity Chroma u	0.2465
Chromaticity Chroma v	0.3441
Duv	-0.0017
Chromaticity Chroma u ’	0.2465
Chromaticity Chroma v’	0.5161

Special Color Rendering Indices	
R1	98.8
R2	99.3
R3	97
R4	99.2
R5	98.7
R6	95
R7	94.7
R8	91.9
R9	80.7
R10	97.2
R11	96.7
R12	82.2
R13	99.2
R14	96.7

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

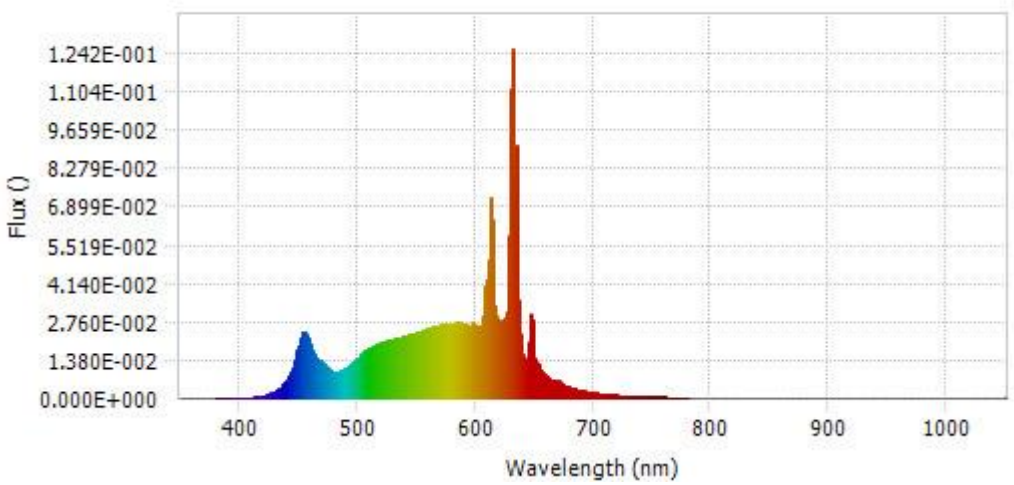
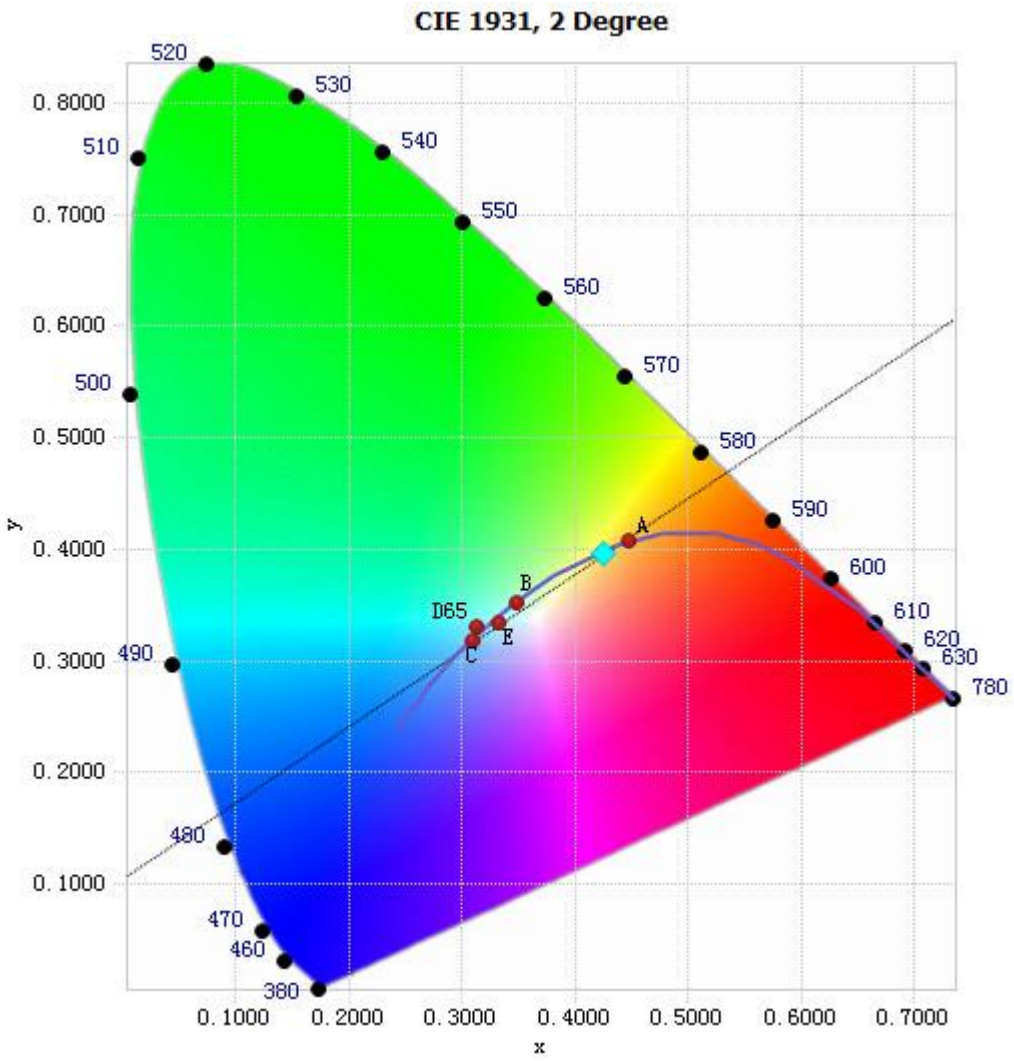


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.24E-05	485	9.75E-03	590	2.67E-02	695	2.35E-03
385	8.88E-05	490	1.09E-02	595	2.59E-02	700	1.98E-03
390	1.72E-04	495	1.24E-02	600	2.60E-02	705	1.69E-03
395	1.23E-04	500	1.43E-02	605	2.61E-02	710	1.42E-03
400	1.37E-04	505	1.62E-02	610	3.39E-02	715	1.22E-03
405	1.06E-04	510	1.76E-02	615	4.43E-02	720	1.03E-03
410	2.12E-04	515	1.90E-02	620	2.84E-02	725	8.85E-04
415	3.85E-04	520	1.98E-02	625	2.89E-02	730	7.56E-04
420	7.47E-04	525	2.06E-02	630	1.11E-01	735	6.41E-04
425	1.33E-03	530	2.12E-02	635	9.13E-02	740	5.51E-04
430	2.38E-03	535	2.16E-02	640	1.60E-02	745	4.78E-04
435	3.89E-03	540	2.22E-02	645	1.44E-02	750	3.95E-04
440	6.40E-03	545	2.29E-02	650	1.43E-02	755	3.53E-04
445	1.07E-02	550	2.36E-02	655	1.04E-02	760	3.18E-04
450	1.87E-02	555	2.43E-02	660	8.22E-03	765	2.65E-04
455	2.37E-02	560	2.50E-02	665	6.39E-03	770	2.24E-04
460	1.93E-02	565	2.57E-02	670	6.36E-03	775	1.85E-04
465	1.47E-02	570	2.63E-02	675	4.66E-03	780	1.63E-04
470	1.29E-02	575	2.67E-02	680	3.84E-03		
475	1.09E-02	580	2.69E-02	685	3.26E-03		
480	9.42E-03	585	2.73E-02	690	2.77E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4249, 0.3954)

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

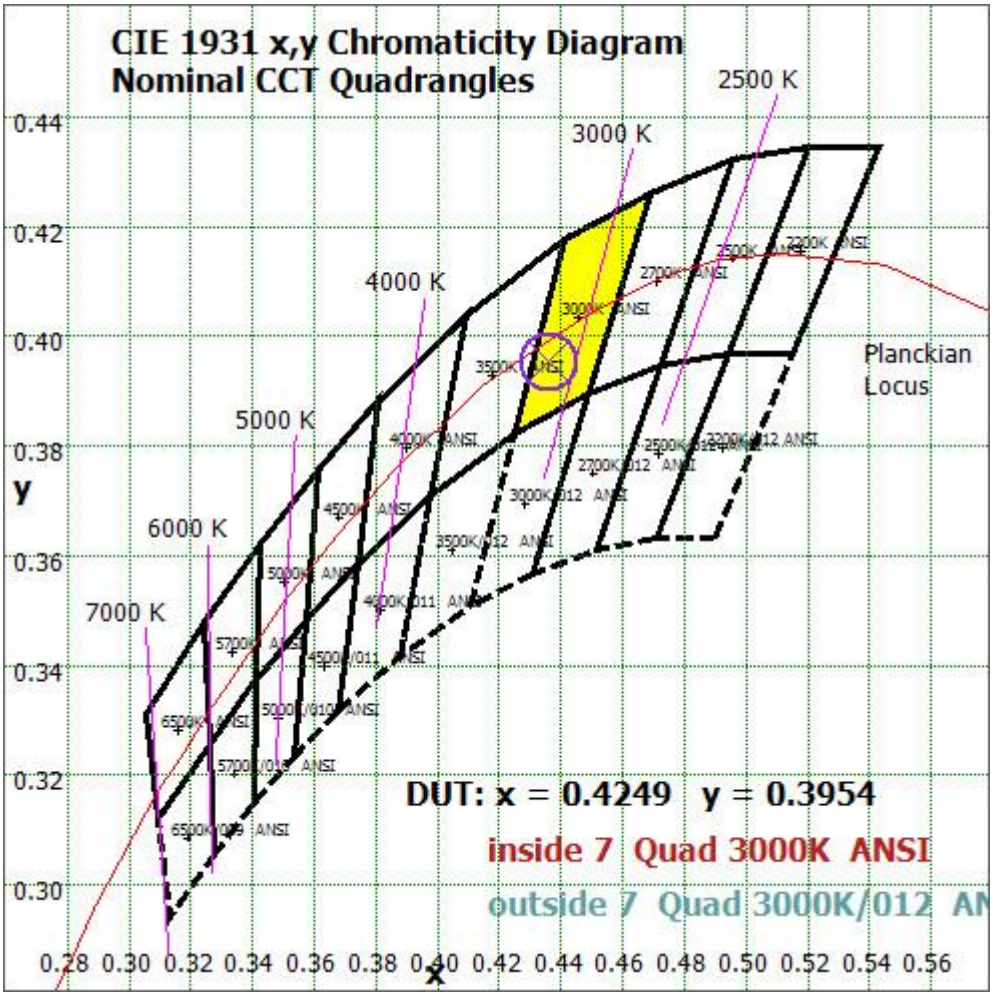


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/12/16 **Model:** 12.5A21DIM/9CCTS

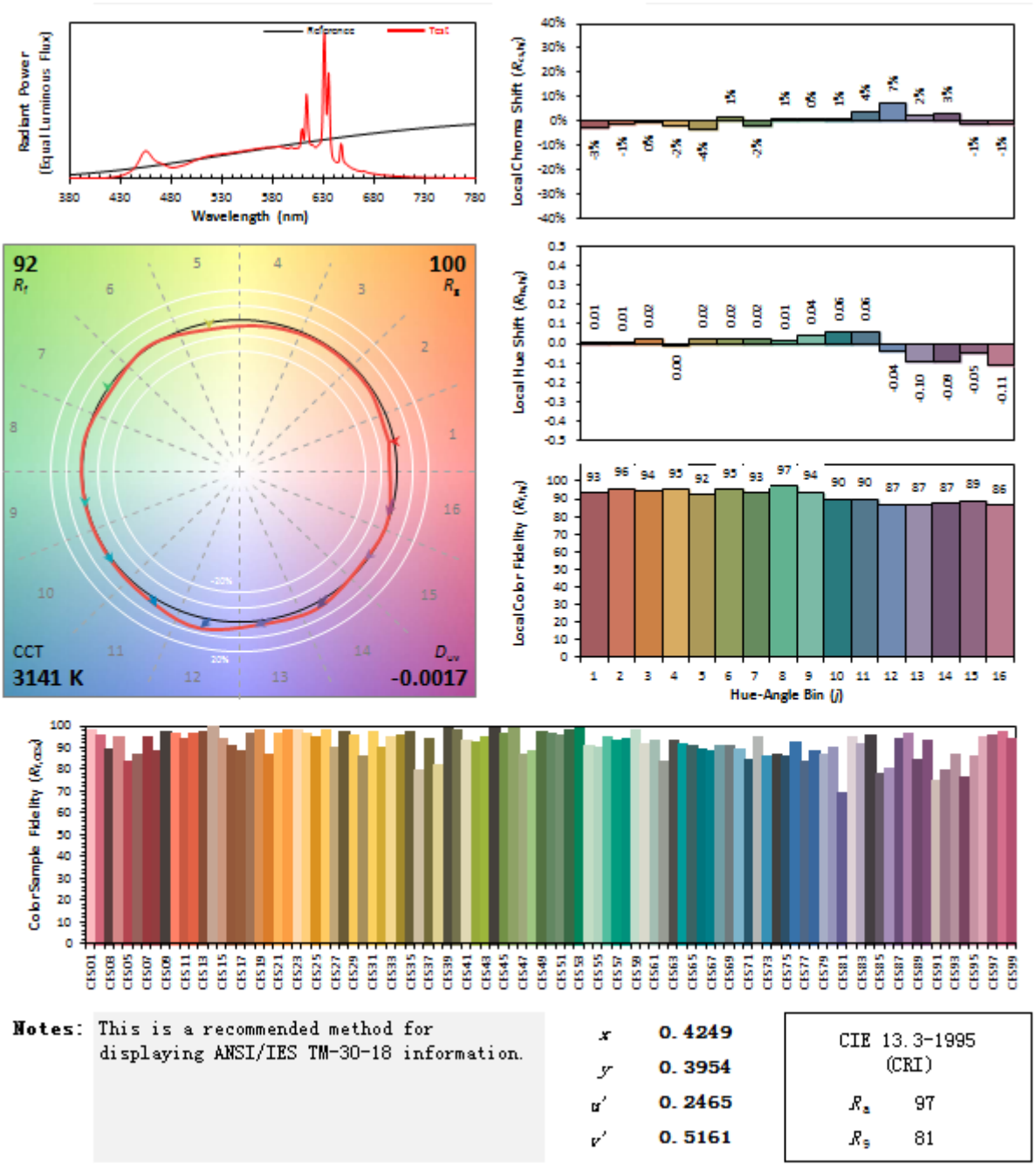


Chart 11: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 7 due to rounding.

TEST RESULTS (3500K Setting)

Test ambient temperature was 26.0 ℃.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.108
Power Factor	0.9294
Test Power (W)	12.08
THD A%	18.71
Luminous Efficacy (lm/W)	150.6
Total Luminous Flux (lm)	1818.8
Color Rendering Index (CRI)	97
R9	90.2
Correlated Color Temperature (CCT)(K)	3396
Chromaticity Chroma x	0.4092
Chromaticity Chroma y	0.3887
Chromaticity Chroma u	0.2391
Chromaticity Chroma v	0.3407
Duv	-0.0017
Chromaticity Chroma u ’	0.2391
Chromaticity Chroma v’	0.5110

Special Color Rendering Indices	
R1	97
R2	99
R3	95.8
R4	98
R5	98.1
R6	95
R7	96.8
R8	96.4
R9	90.2
R10	98
R11	94.9
R12	80.7
R13	97.6
R14	96

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

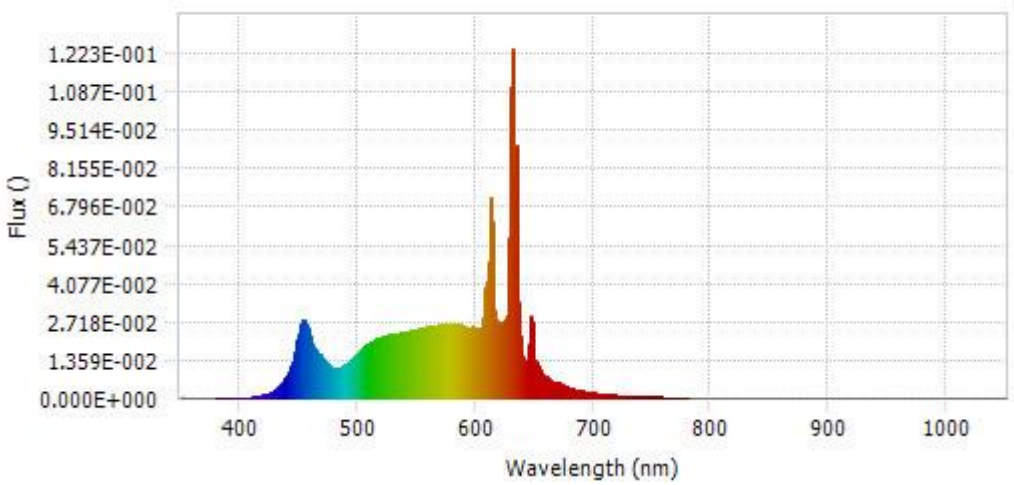
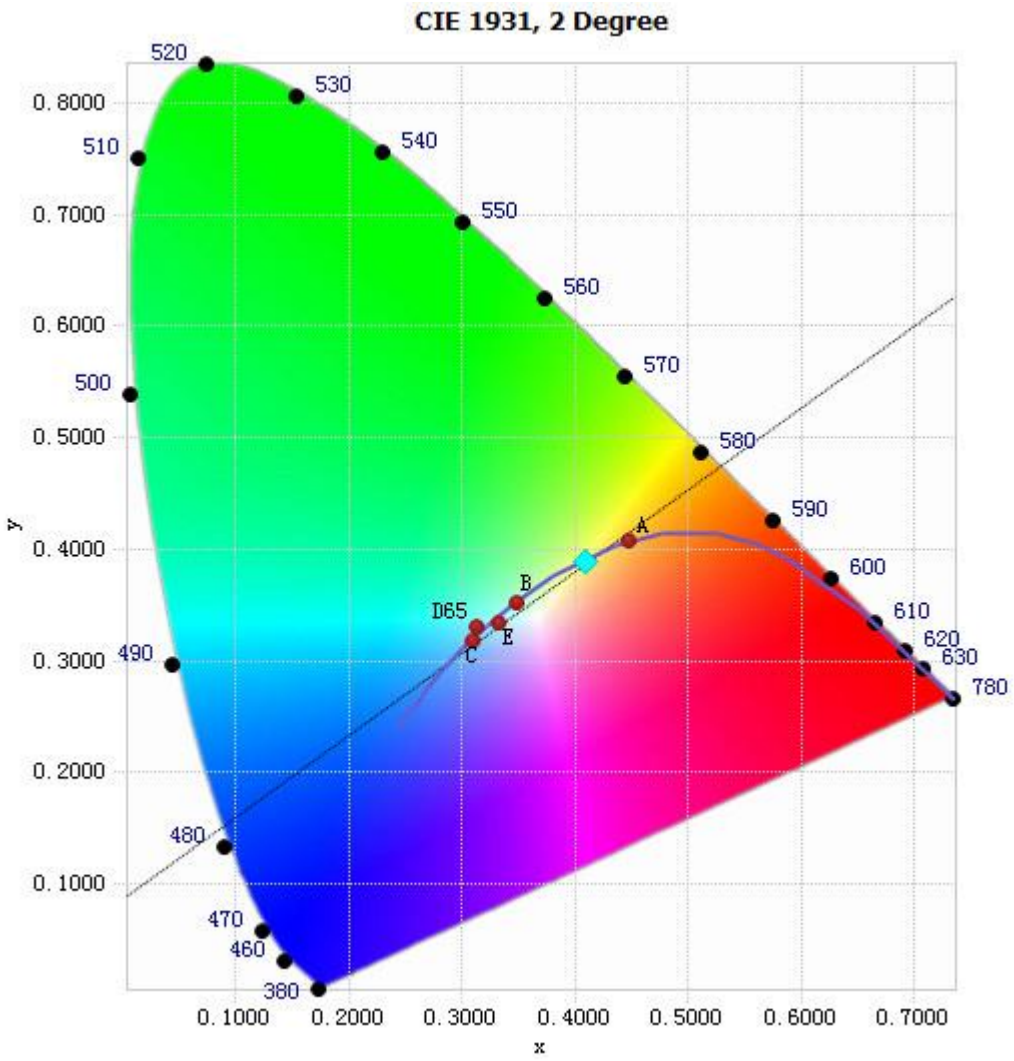


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.28E-04	485	1.08E-02	590	2.54E-02	695	2.18E-03
385	1.01E-04	490	1.19E-02	595	2.45E-02	700	1.85E-03
390	1.67E-04	495	1.35E-02	600	2.46E-02	705	1.59E-03
395	9.20E-05	500	1.57E-02	605	2.46E-02	710	1.34E-03
400	1.31E-04	505	1.76E-02	610	3.24E-02	715	1.15E-03
405	1.59E-04	510	1.93E-02	615	4.27E-02	720	9.96E-04
410	2.43E-04	515	2.06E-02	620	2.69E-02	725	8.38E-04
415	5.02E-04	520	2.14E-02	625	2.77E-02	730	6.93E-04
420	1.01E-03	525	2.20E-02	630	1.10E-01	735	6.19E-04
425	1.67E-03	530	2.26E-02	635	8.98E-02	740	5.23E-04
430	2.77E-03	535	2.30E-02	640	1.50E-02	745	4.53E-04
435	4.57E-03	540	2.34E-02	645	1.35E-02	750	3.81E-04
440	7.66E-03	545	2.39E-02	650	1.36E-02	755	3.39E-04
445	1.31E-02	550	2.43E-02	655	9.70E-03	760	2.79E-04
450	2.28E-02	555	2.47E-02	660	7.73E-03	765	2.60E-04
455	2.76E-02	560	2.53E-02	665	5.89E-03	770	2.26E-04
460	2.18E-02	565	2.57E-02	670	5.93E-03	775	1.80E-04
465	1.67E-02	570	2.59E-02	675	4.37E-03	780	1.70E-04
470	1.44E-02	575	2.61E-02	680	3.57E-03		
475	1.20E-02	580	2.60E-02	685	3.05E-03		
480	1.03E-02	585	2.63E-02	690	2.56E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4092, 0.3887)

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

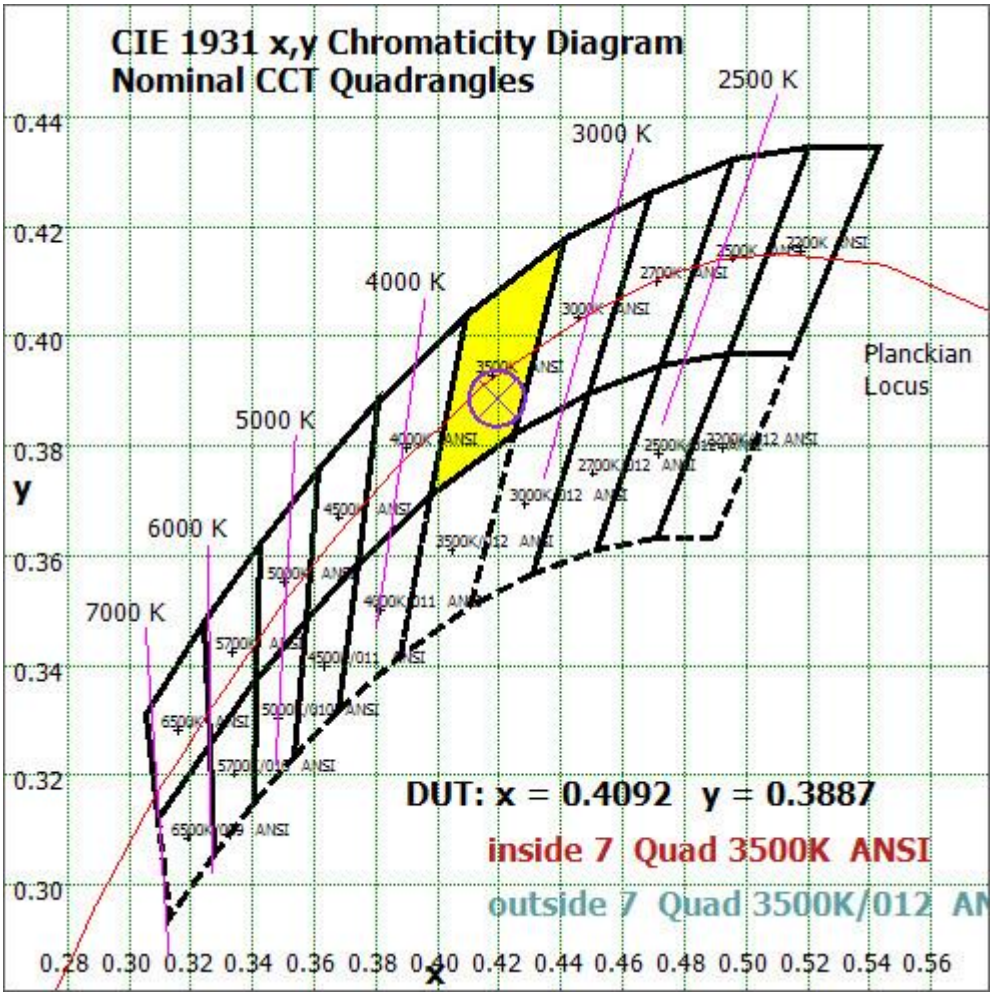


Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/12/16 **Model:** 12.5A21DIM/9CCTS

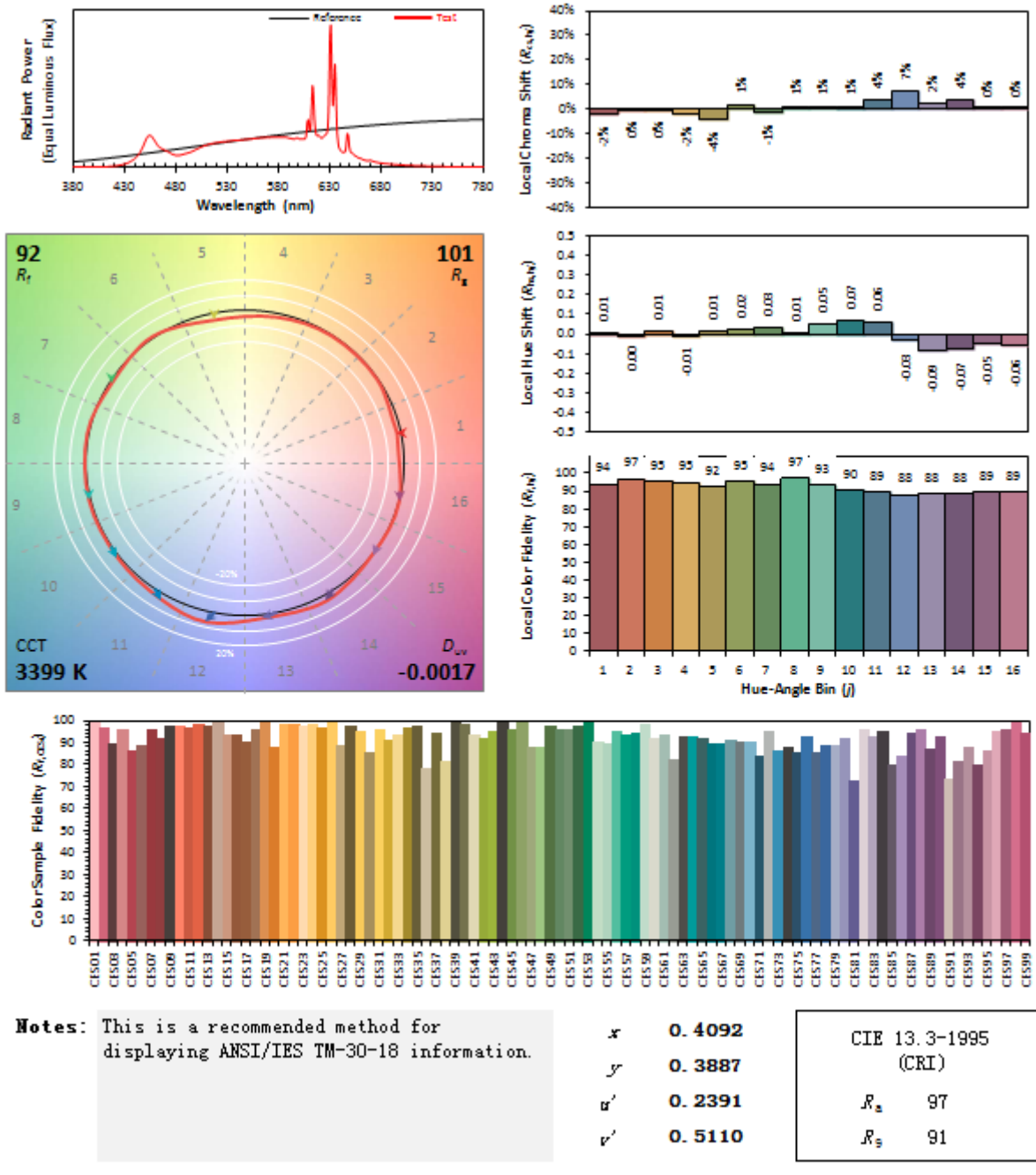


Chart 15: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 9 due to rounding.

TEST RESULTS (4000K Setting)

Test ambient temperature was 26.0 ℃.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 50 minutes, and the total operating time including stabilization was 55 minutes.

Sphere-Spectroradiometer Method

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.108
Power Factor	0.9294
Test Power (W)	12.08
THD A%	18.76
Luminous Efficacy (lm/W)	150.8
Total Luminous Flux (lm)	1821.4
Color Rendering Index (CRI)	96.9
R9	96.9
Correlated Color Temperature (CCT)(K)	3776
Chromaticity Chroma x	0.3900
Chromaticity Chroma y	0.3807
Chromaticity Chroma u	0.2298
Chromaticity Chroma v	0.3365
Duv	-0.0008
Chromaticity Chroma u ’	0.2298
Chromaticity Chroma v’	0.5048

Special Color Rendering Indices	
R1	95.6
R2	99.3
R3	94
R4	96.4
R5	97.4
R6	95.7
R7	99
R8	97.7
R9	96.9
R10	97.7
R11	93.2
R12	78.1
R13	96.6
R14	95.1

Table 11: 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

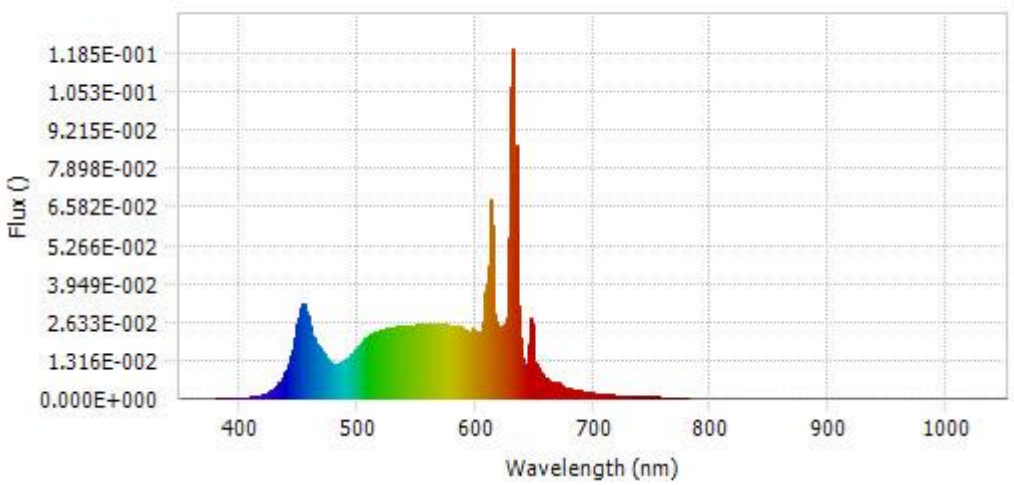
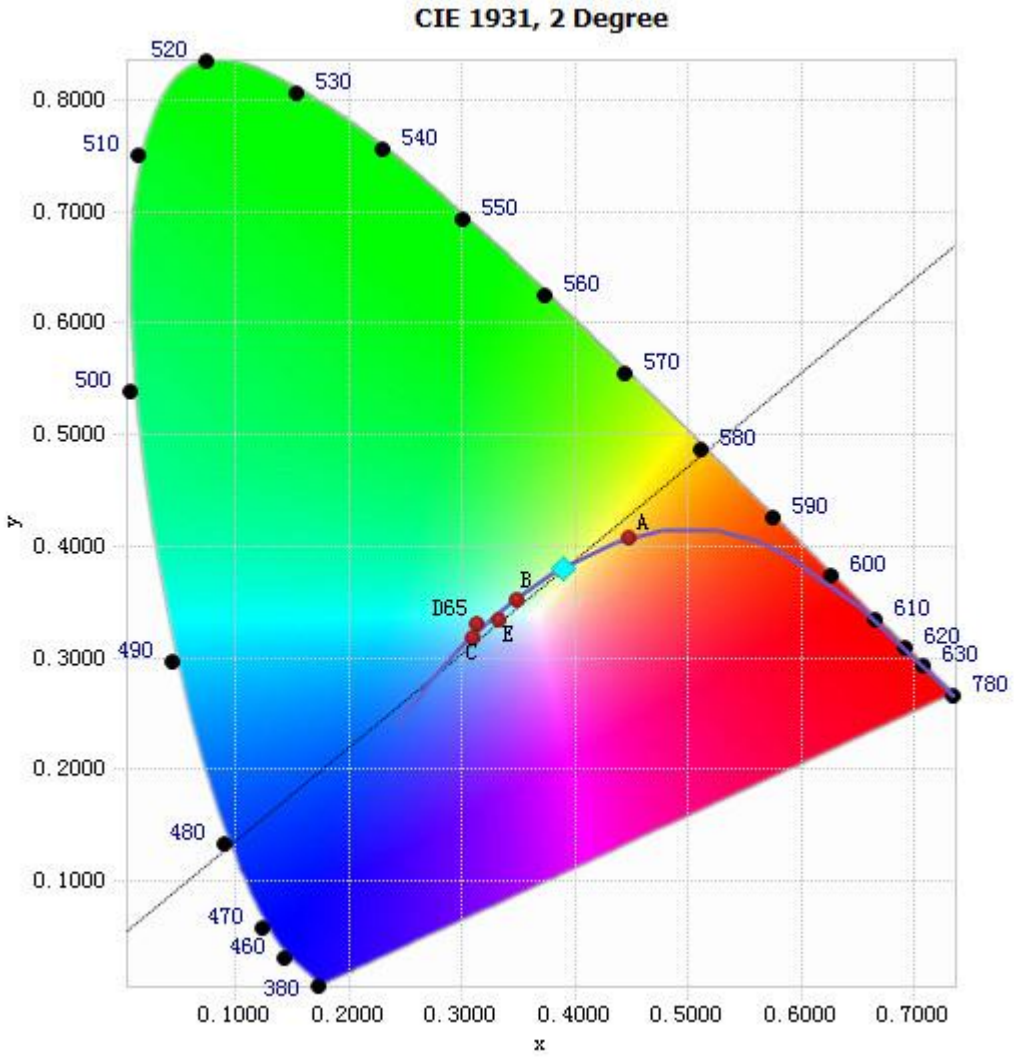


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.68E-04	485	1.19E-02	590	2.37E-02	695	1.96E-03
385	1.94E-04	490	1.31E-02	595	2.27E-02	700	1.67E-03
390	1.49E-04	495	1.49E-02	600	2.27E-02	705	1.41E-03
395	7.71E-05	500	1.73E-02	605	2.26E-02	710	1.22E-03
400	1.93E-04	505	1.95E-02	610	3.01E-02	715	1.03E-03
405	1.66E-04	510	2.11E-02	615	4.01E-02	720	8.82E-04
410	3.52E-04	515	2.25E-02	620	2.50E-02	725	7.63E-04
415	6.12E-04	520	2.33E-02	625	2.57E-02	730	6.48E-04
420	1.13E-03	525	2.39E-02	630	1.07E-01	735	5.56E-04
425	2.03E-03	530	2.44E-02	635	8.68E-02	740	4.87E-04
430	3.45E-03	535	2.45E-02	640	1.38E-02	745	4.22E-04
435	5.70E-03	540	2.48E-02	645	1.24E-02	750	3.45E-04
440	9.59E-03	545	2.50E-02	650	1.25E-02	755	3.15E-04
445	1.65E-02	550	2.51E-02	655	8.85E-03	760	2.75E-04
450	2.76E-02	555	2.53E-02	660	7.01E-03	765	2.23E-04
455	3.21E-02	560	2.55E-02	665	5.33E-03	770	2.11E-04
460	2.45E-02	565	2.55E-02	670	5.47E-03	775	1.72E-04
465	1.89E-02	570	2.54E-02	675	3.92E-03	780	1.52E-04
470	1.61E-02	575	2.52E-02	680	3.23E-03		
475	1.30E-02	580	2.48E-02	685	2.72E-03		
480	1.14E-02	585	2.47E-02	690	2.33E-03		

Table 12: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3900, 0.3807)

Chart 17: 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

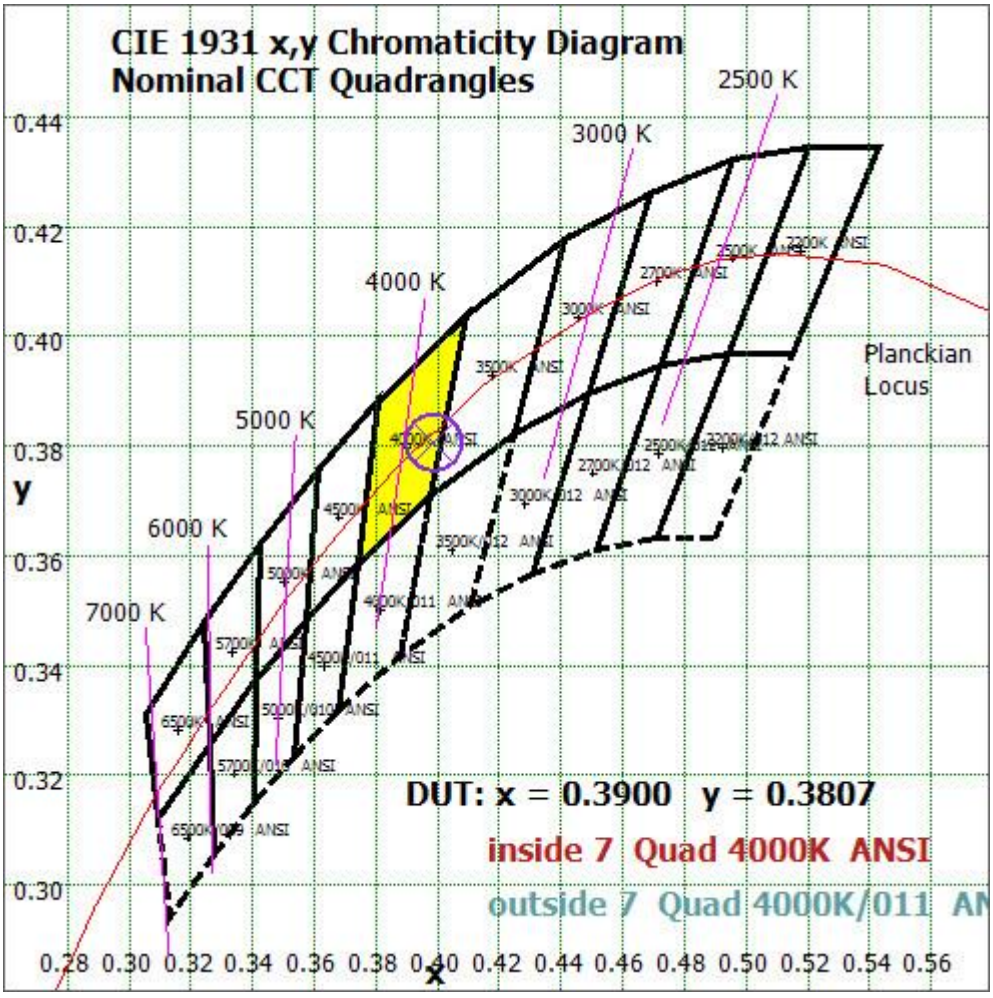


Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/12/16 **Model:** 12.5A21DIM/9CCTS

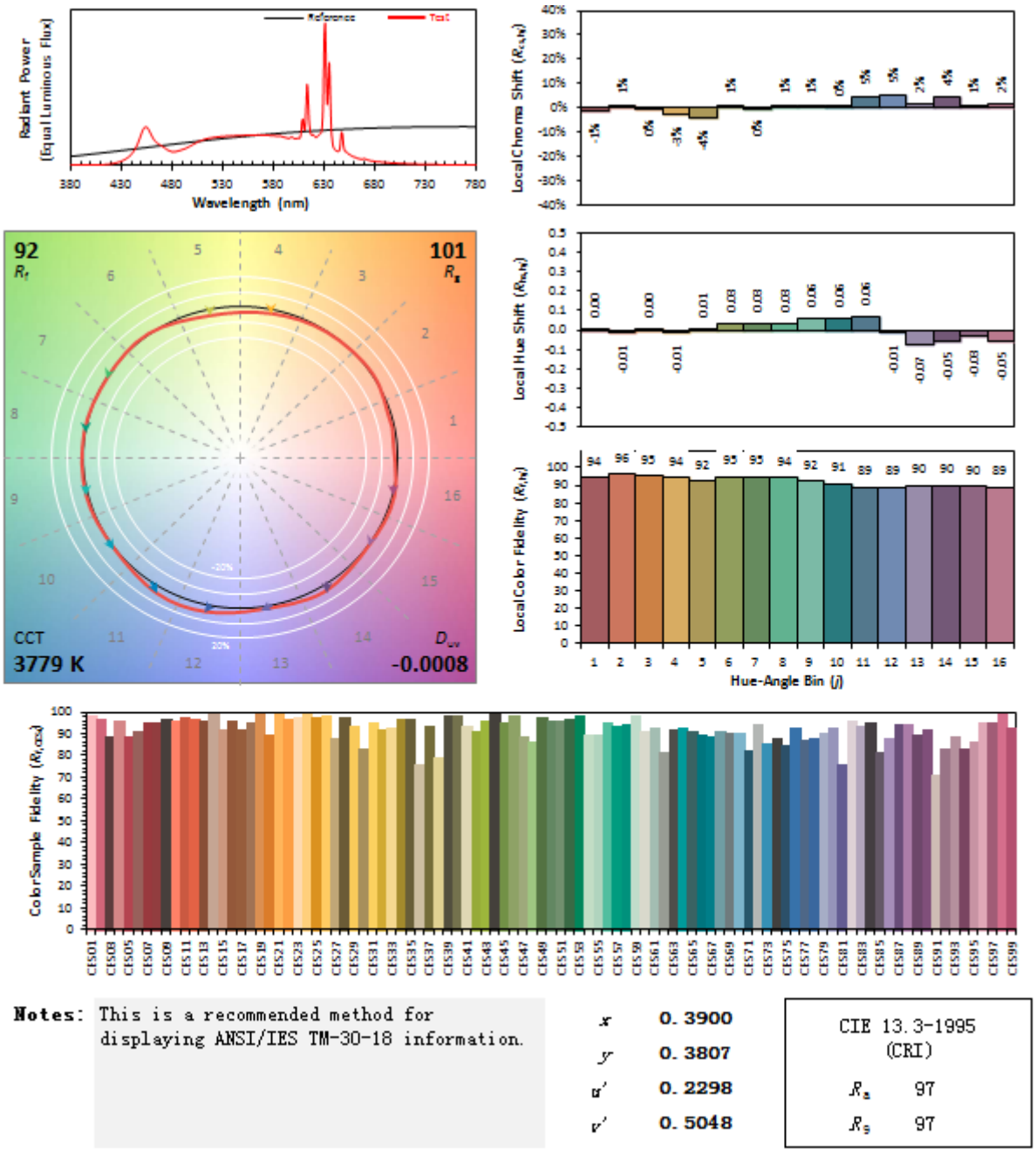


Chart 19: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 11 due to rounding.

TEST RESULTS (5000K 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
Voltage frequency (Hz)	60
Test Current (A)	0.109
Power Factor	0.9303
Test Power (W)	12.18
THD A%	18.65
Luminous Efficacy (lm/W)	145.9
Total Luminous Flux (lm)	1777.5
Color Rendering Index (CRI)	95.8
R9	89.3
Correlated Color Temperature (CCT)(K)	4936
Chromaticity Chroma x	0.3479
Chromaticity Chroma y	0.3637
Chromaticity Chroma u	0.2087
Chromaticity Chroma v	0.3272
Duv	0.0049
Chromaticity Chroma u ’	0.2087
Chromaticity Chroma v’	0.4909

Special Color Rendering Indices	
R1	97.4
R2	97.2
R3	90.3
R4	97.1
R5	98.4
R6	95.4
R7	96.7
R8	93.8
R9	89.3
R10	90.9
R11	93.4
R12	69
R13	97.1
R14	93.5

Table 13: 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

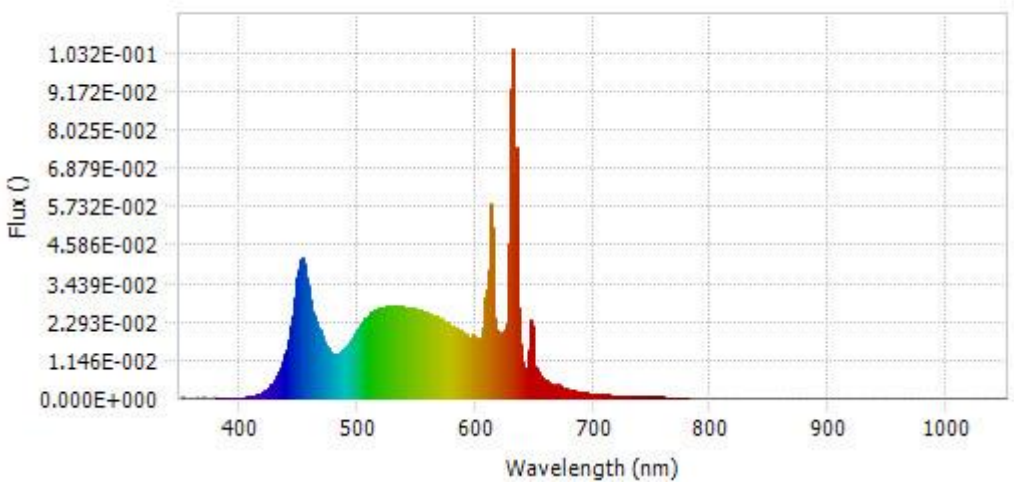
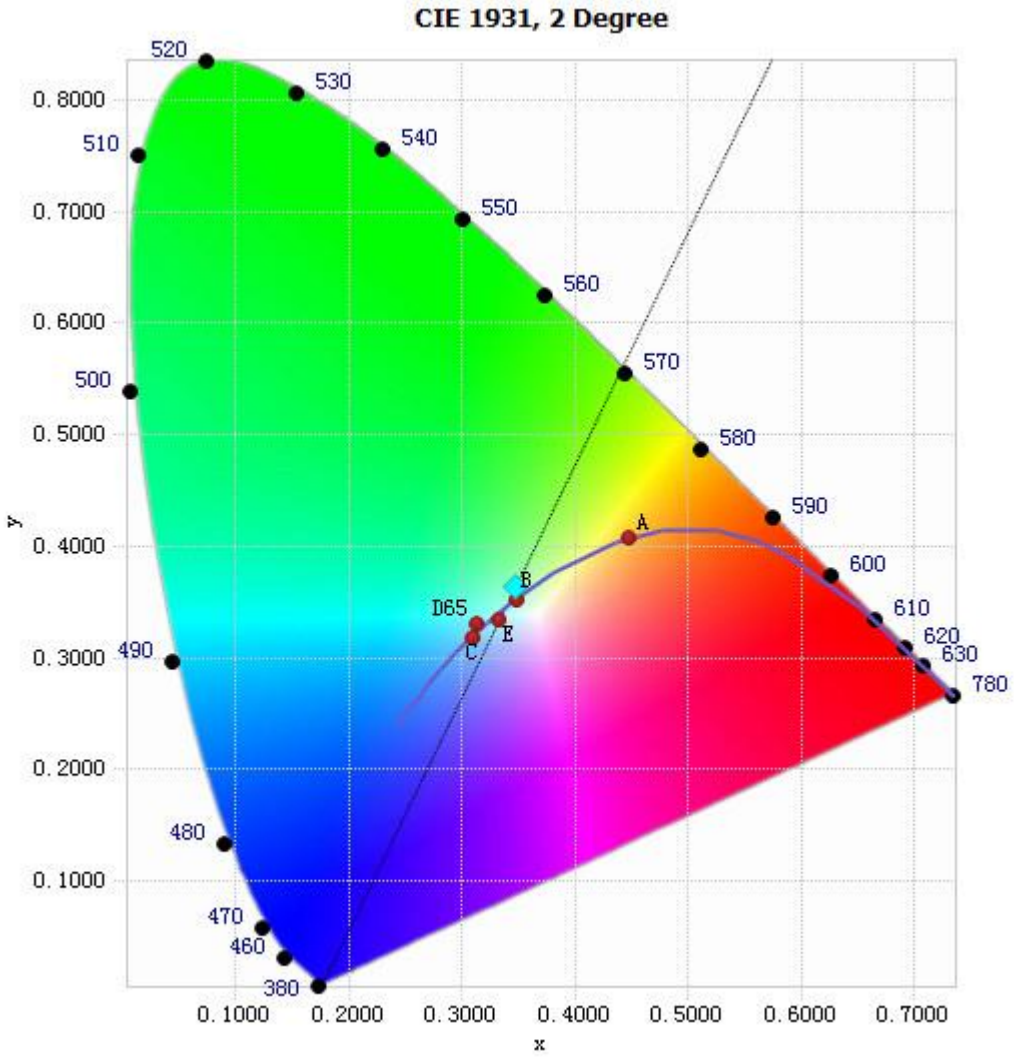


Chart20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.00E-04	485	1.37E-02	590	1.94E-02	695	1.46E-03
385	1.37E-04	490	1.52E-02	595	1.80E-02	700	1.24E-03
390	1.21E-04	495	1.74E-02	600	1.78E-02	705	1.03E-03
395	1.55E-04	500	2.03E-02	605	1.75E-02	710	9.11E-04
400	2.02E-04	505	2.30E-02	610	2.45E-02	715	7.80E-04
405	2.15E-04	510	2.48E-02	615	3.37E-02	720	6.76E-04
410	4.93E-04	515	2.63E-02	620	1.98E-02	725	6.01E-04
415	9.20E-04	520	2.68E-02	625	2.06E-02	730	5.12E-04
420	1.76E-03	525	2.73E-02	630	9.23E-02	735	4.36E-04
425	3.19E-03	530	2.76E-02	635	7.48E-02	740	3.70E-04
430	5.33E-03	535	2.75E-02	640	1.05E-02	745	3.34E-04
435	8.78E-03	540	2.72E-02	645	9.45E-03	750	2.90E-04
440	1.45E-02	545	2.70E-02	650	9.79E-03	755	2.46E-04
445	2.43E-02	550	2.64E-02	655	6.68E-03	760	2.13E-04
450	3.83E-02	555	2.60E-02	660	5.19E-03	765	1.80E-04
455	4.02E-02	560	2.54E-02	665	3.88E-03	770	1.71E-04
460	2.92E-02	565	2.46E-02	670	4.12E-03	775	1.40E-04
465	2.26E-02	570	2.37E-02	675	2.87E-03	780	1.29E-04
470	1.87E-02	575	2.26E-02	680	2.33E-03		
475	1.48E-02	580	2.16E-02	685	1.99E-03		
480	1.29E-02	585	2.08E-02	690	1.71E-03		

Table 14: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3479, 0.3637)

Chart 21: 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

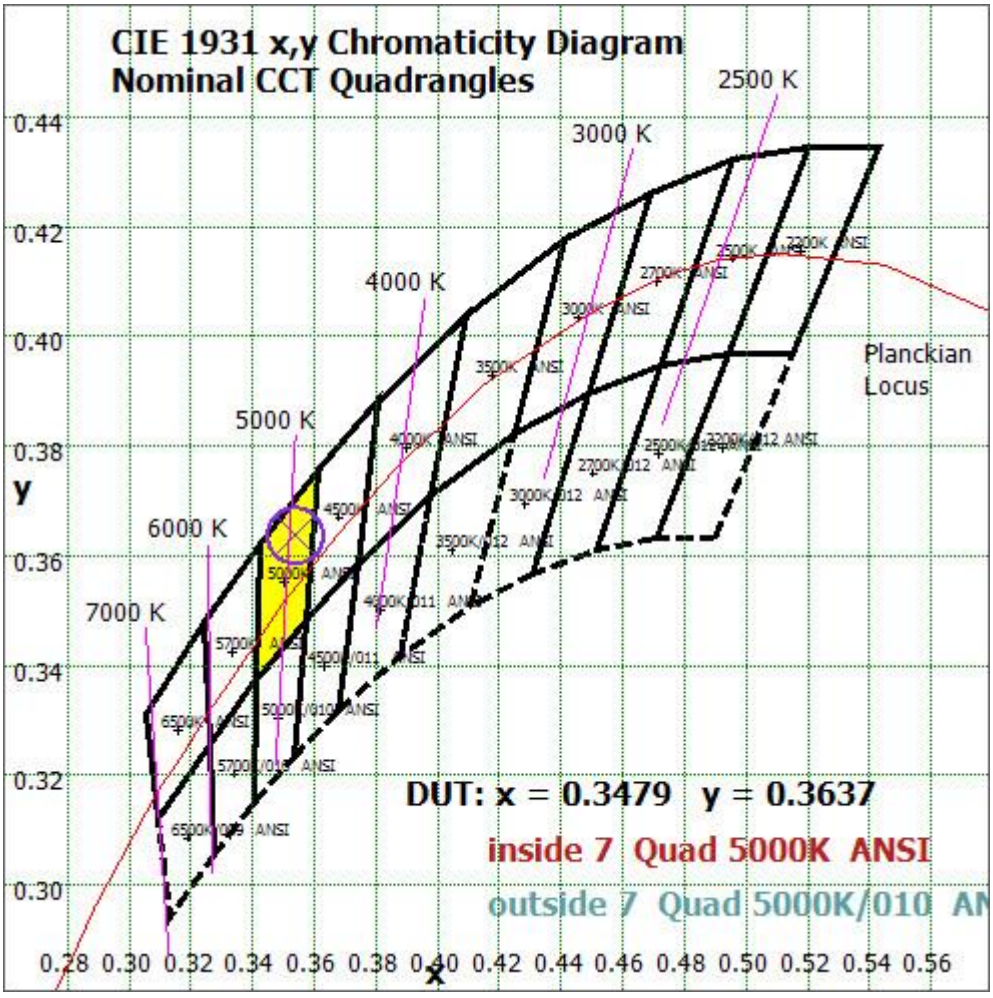


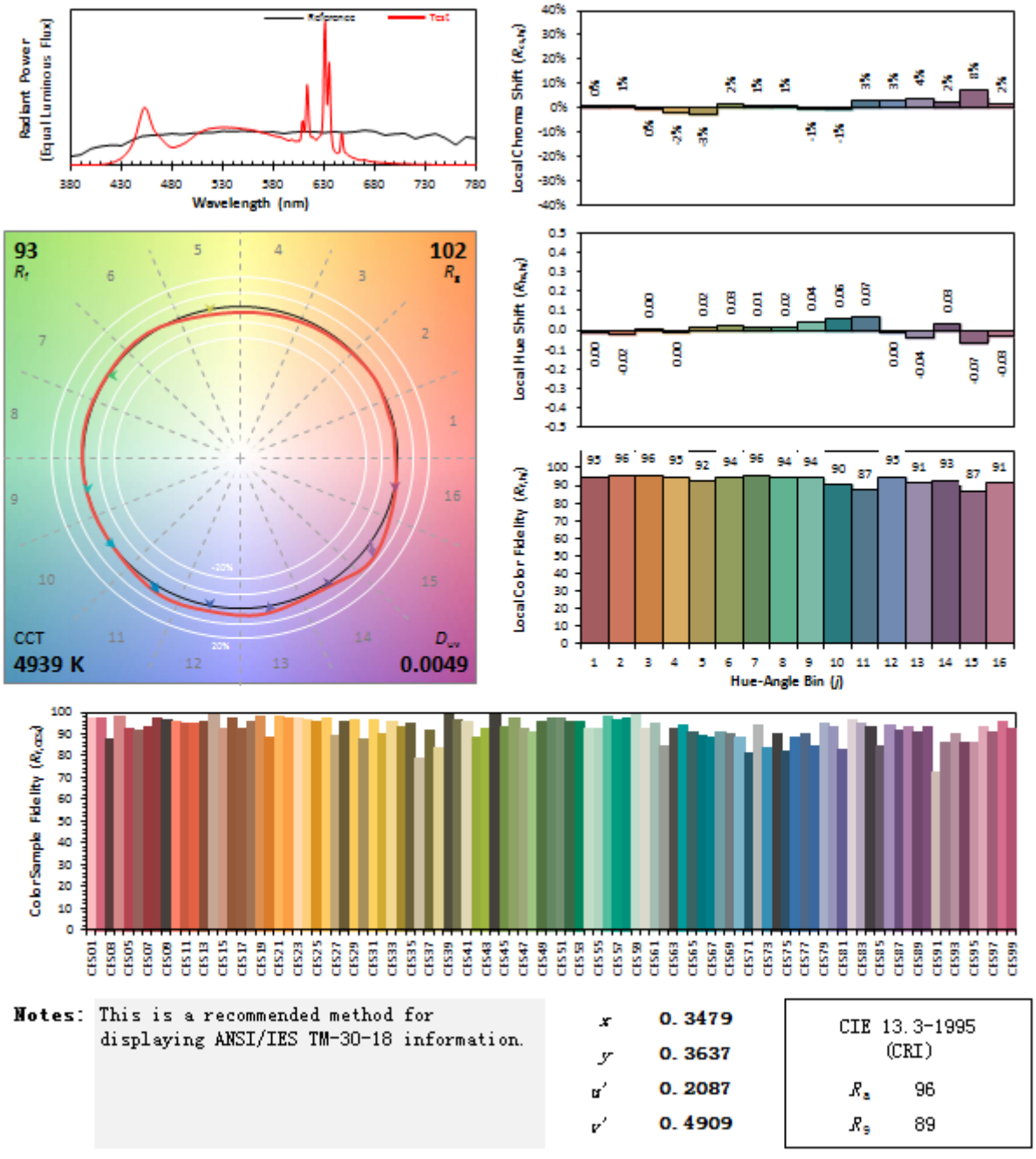
Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/12/16 **Model:** 12.5A21DIM/9CCTS



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

x	0.3479
y	0.3637
u'	0.2087
v'	0.4909

CIE 13.3-1995 (CRI)

R_a	96
R_9	89

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Chart 23: 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 13 due to rounding.

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jun. 18, 2024	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	DPS1060	HZTE001-06	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	WY12010	HZTE004-03	Aug. 08, 2024	Aug. 07, 2025
Temperature recorder	JM624U	HZTE018-08	Aug. 08, 2024	Aug. 07, 2025
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 08, 2024	Aug. 07, 2025
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Dec. 10, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	PCR 500L	HZTE001-07	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	IT6154	HZTE004-04	Aug. 08, 2024	Aug. 07, 2025
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 08, 2024	Aug. 07, 2025
Temperature Meter	TES1310	HZTE017-01	Aug. 08, 2024	Aug. 07, 2025

Table 15: 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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