

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: 17A21/9CCTS/277V/DIM

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24010037a

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. 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	17A21/9CCTS/277V/DIM 3000K Setting	17A21/9CCTS/277V/DIM 4000K Setting	17A21/9CCTS/277V/DIM 5000K Setting
Luminous Efficacy (Lumens /Watt)	124.8	134.9	131.1
Total Luminous Flux (Lumens)	2099.9	2229.6	2210.9
Power (Watts)	16.83	16.53	16.87
Power Factor	0.9951	0.9951	0.9951
CCT (K)	2968	4042	4997
CRI	93.7	95.4	93.1
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	: 17A21/9CCTS/277V/DIM
Electrical Ratings	: 120-277V, 50/60Hz, 17W
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)	0.141	0.061
Power Factor	0.9951	0.9190
Test Power (W)	16.83	15.46
THD A%	7.01	16.90
Luminous Efficacy (lm/W)	124.8	130.1
Total Luminous Flux (lm)	2099.9	2011.1
Color Rendering Index (CRI)	93.7	
R9	58.1	
Correlated Color Temperature (CCT)(K)	2968	
Chromaticity Chroma x	0.4381	
Chromaticity Chroma y	0.4028	
Chromaticity Chroma u	0.2519	
Chromaticity Chroma v	0.3474	
Duv	-0.0007	
Chromaticity Chroma u'	0.2519	
Chromaticity Chroma v'	0.5210	

Special Color Rendering Indices	
R1	97.2
R2	98.8
R3	95.1
R4	97.1
R5	98
R6	93.5
R7	89.3
R8	80.1
R9	58.1
R10	97.5
R11	97.7
R12	87.3
R13	99.1
R14	98

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

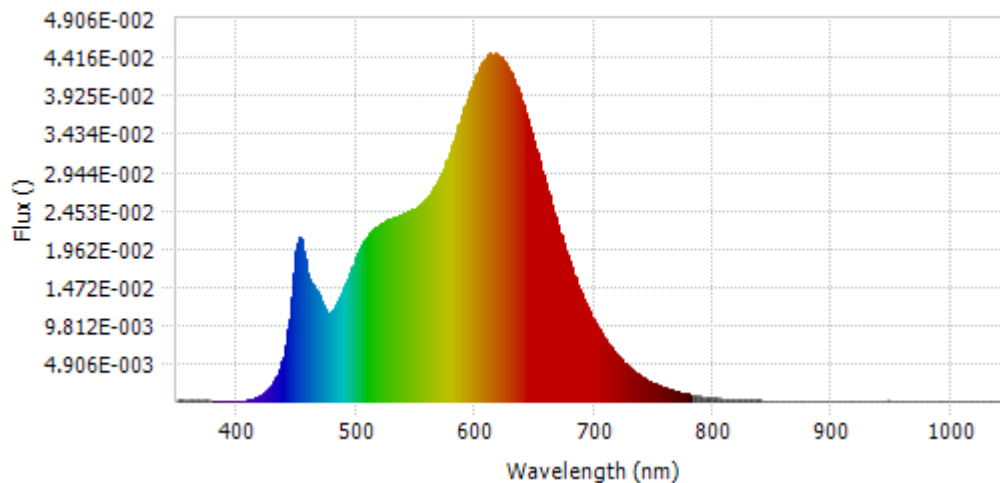
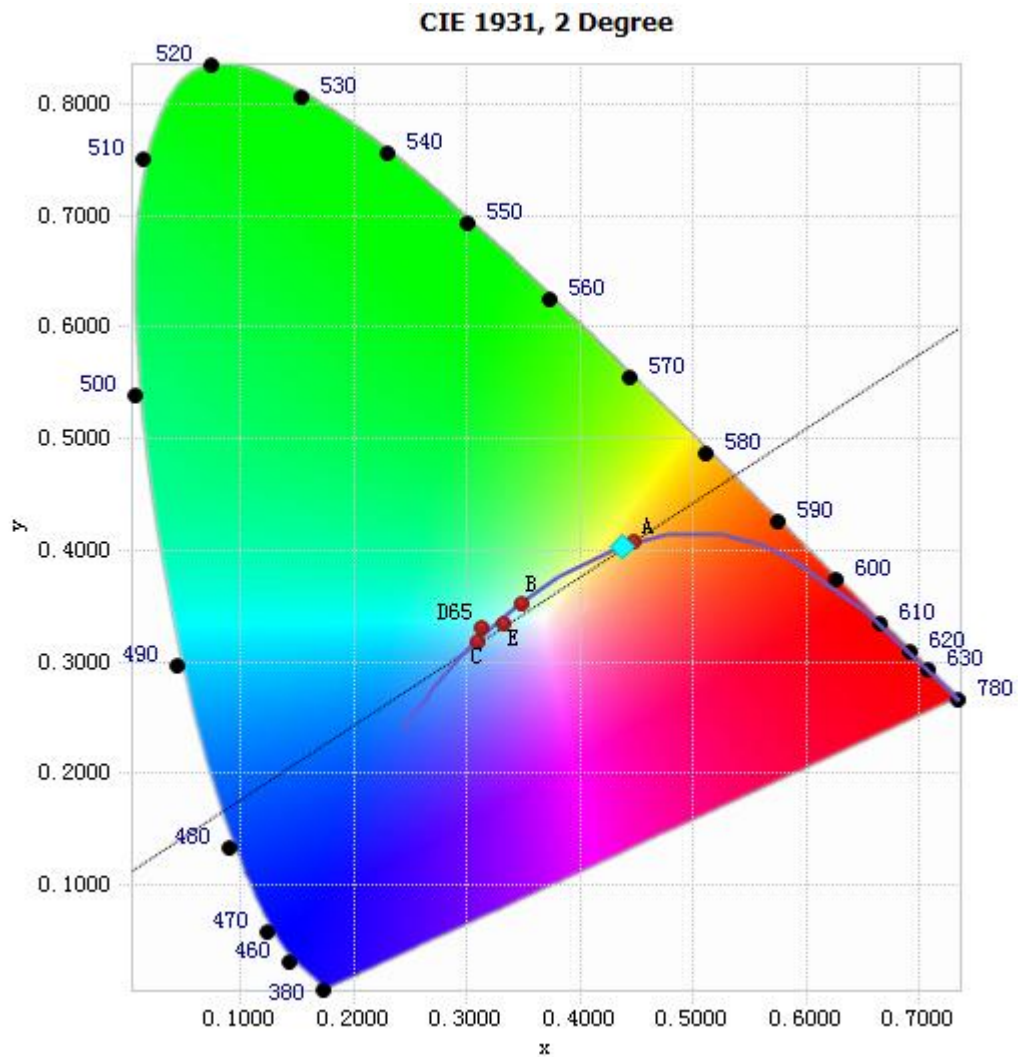


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.49E-04	485	1.30E-02	590	3.72E-02	695	1.19E-02
385	1.28E-04	490	1.46E-02	595	3.95E-02	700	1.03E-02
390	1.40E-04	495	1.65E-02	600	4.16E-02	705	8.94E-03
395	1.17E-04	500	1.84E-02	605	4.30E-02	710	7.75E-03
400	1.26E-04	505	2.00E-02	610	4.41E-02	715	6.72E-03
405	1.25E-04	510	2.12E-02	615	4.46E-02	720	5.80E-03
410	1.99E-04	515	2.22E-02	620	4.42E-02	725	5.01E-03
415	4.21E-04	520	2.26E-02	625	4.34E-02	730	4.31E-03
420	8.19E-04	525	2.31E-02	630	4.21E-02	735	3.68E-03
425	1.39E-03	530	2.35E-02	635	4.02E-02	740	3.16E-03
430	2.27E-03	535	2.37E-02	640	3.82E-02	745	2.71E-03
435	3.76E-03	540	2.40E-02	645	3.56E-02	750	2.32E-03
440	6.47E-03	545	2.44E-02	650	3.29E-02	755	1.99E-03
445	1.18E-02	550	2.47E-02	655	3.02E-02	760	1.71E-03
450	1.92E-02	555	2.54E-02	660	2.75E-02	765	1.46E-03
455	2.02E-02	560	2.61E-02	665	2.48E-02	770	1.25E-03
460	1.61E-02	565	2.72E-02	670	2.22E-02	775	1.06E-03
465	1.47E-02	570	2.86E-02	675	1.97E-02	780	9.07E-04
470	1.32E-02	575	3.03E-02	680	1.75E-02		
475	1.15E-02	580	3.24E-02	685	1.55E-02		
480	1.16E-02	585	3.49E-02	690	1.36E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4381, 0.4028)

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

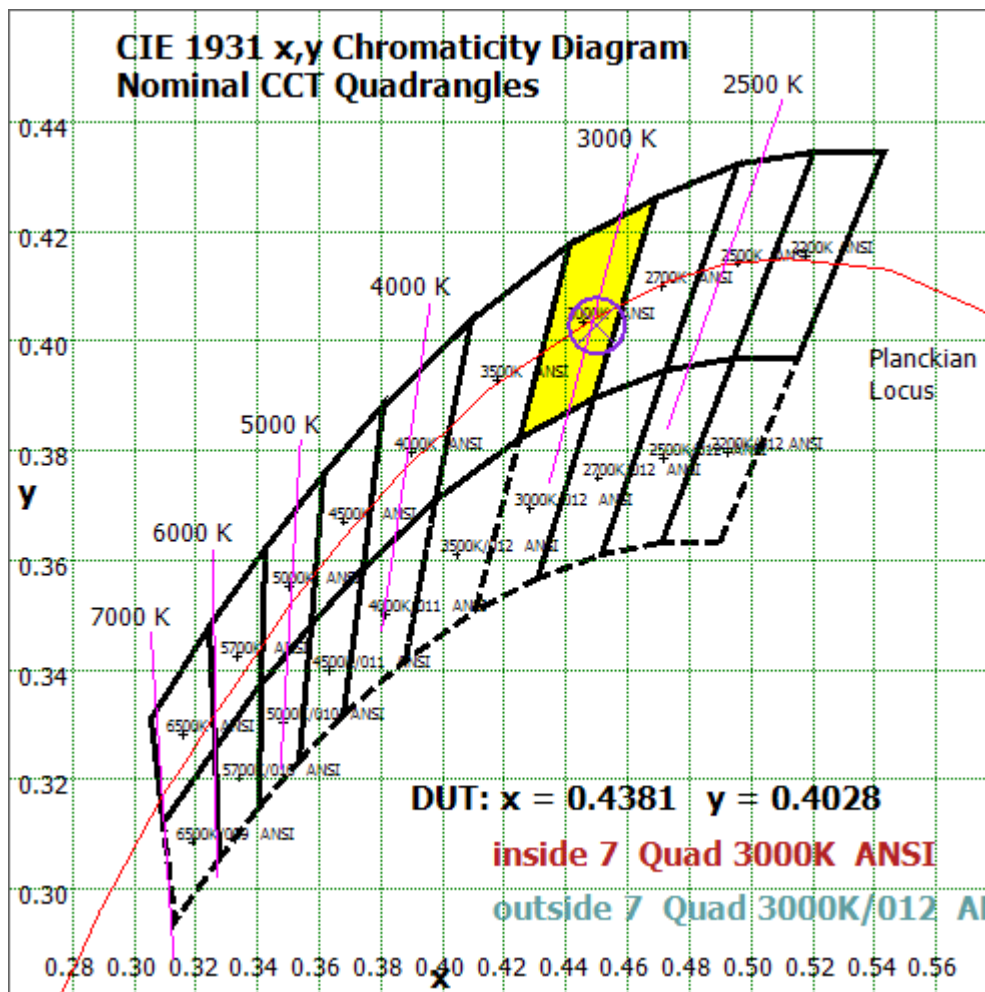


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

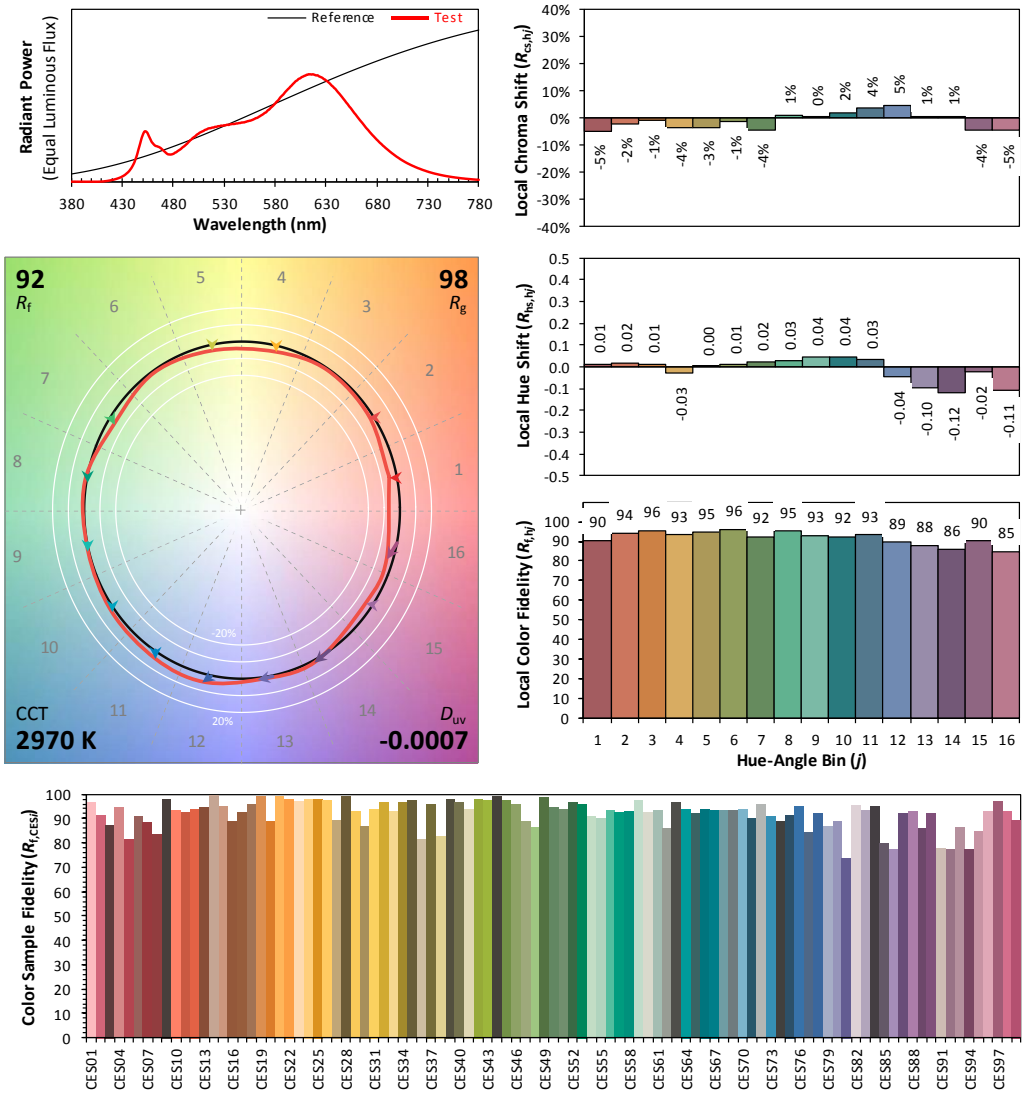
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/01/30

Model: 17A21/9CCTS/277V/DIM



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

x 0.4381
 y 0.4028
 u' 0.2519
 v' 0.5210

CIE 13.3-1995 (CRI)	
R_a	94
R_g	58

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)	0.141
Power Factor	0.9954
Power (W)	16.88
Luminous Efficacy (lm/W)	124.8
Total Luminous Flux (lm)	2106.8
Beam Angle (°)	227.6 (0°-180°) / 229.8 (90°-270°)
Center Beam Candle Power (cd)	252
Maximum Beam Candle Power (cd)	257.4 (At: C=90.0, Gamma=29.0)
Spacing Criteria	1.51 (0°-180°) / 1.49 (90°-270°)
Zonal Lumens in the 0°-60° Zone	36.38%
Zonal Lumens in the 60°-90° Zone	30.80%
Zonal Lumens in the 90°-120° Zone	22.27%
Zonal Lumens in the 120°-180° Zone	10.55%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	24.089	1.14%
10- 20	71.424	3.39%
20- 30	116.186	5.51%
30- 40	156.098	7.41%
40- 50	188.283	8.94%
50- 60	210.395	9.99%
60- 70	221.101	10.49%
70- 80	220.015	10.44%
80- 90	207.764	9.86%
90-100	185.983	8.83%
100-110	157.759	7.49%
110-120	125.482	5.96%
120-130	93.021	4.42%
130-140	63.323	3.01%
140-150	38.527	1.83%
150-160	19.603	0.93%
160-170	6.938	0.33%
170-180	0.793	0.04%
Total	2106.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0-130	1977.6	93.87%
130-180	129.184	6.13%
0-180	2106.8	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

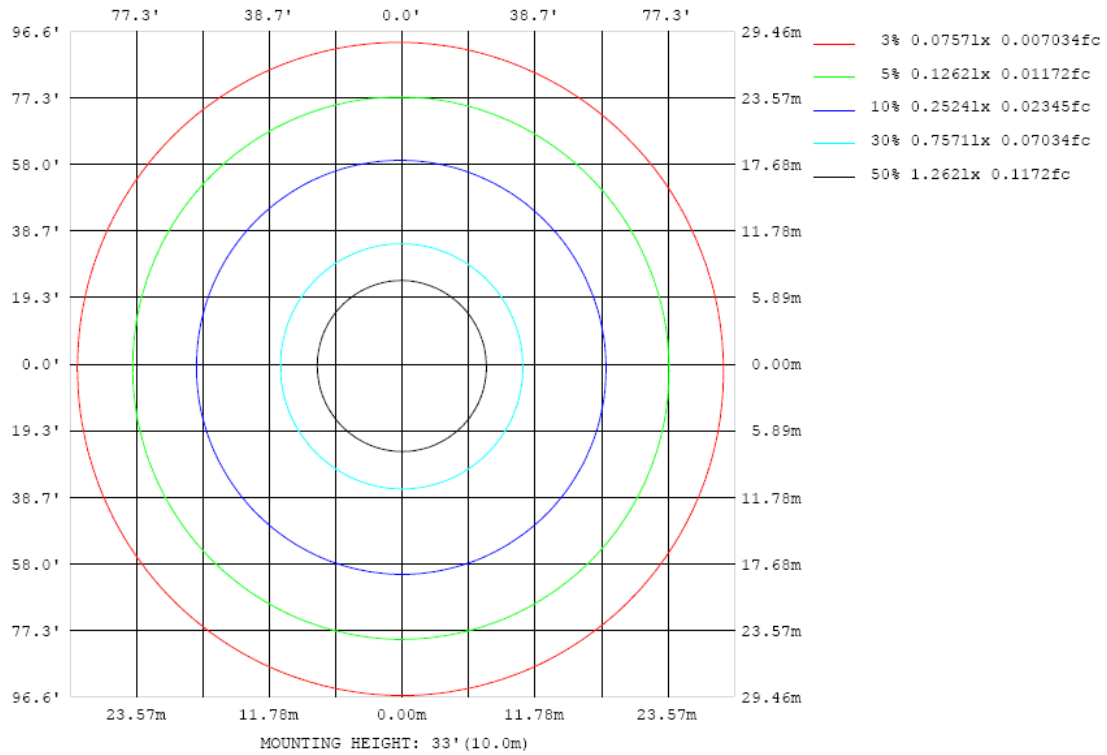


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

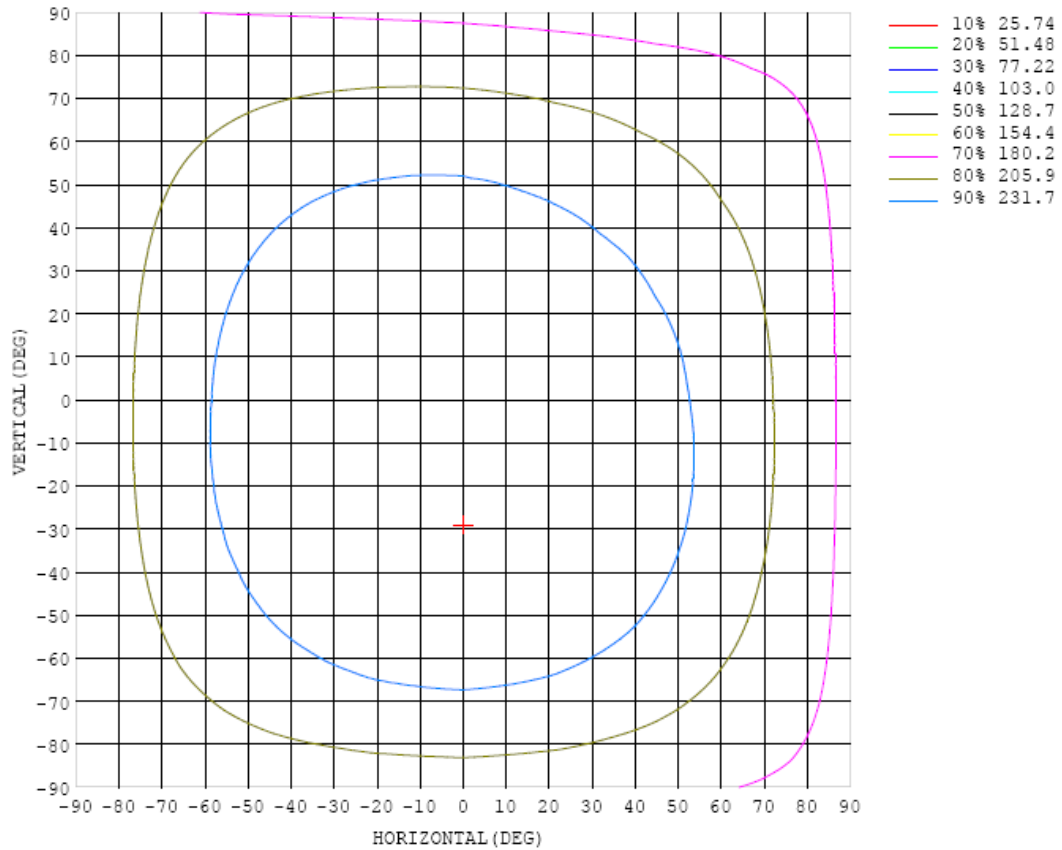


Chart 6: Isocandela Plot

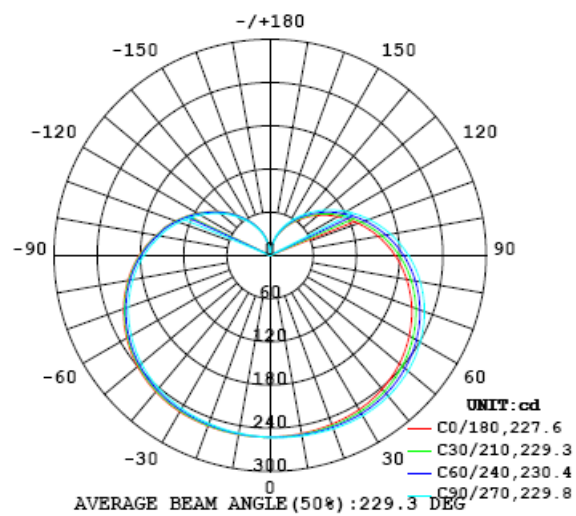


Chart 7: Polar Candela Distribution

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	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252			
5	252	252	253	253	254	253	253	253	252	252	252	252	252	252	252	251			
10	251	252	253	254	254	254	254	253	253	252	252	251	250	250	250	251			
15	251	252	254	255	255	255	255	254	252	252	251	250	250	249	249	250			
20	250	252	254	255	257	256	255	254	252	251	250	249	248	248	248	248			
25	249	251	254	256	257	256	255	254	251	251	249	248	247	246	246	247			
30	247	251	254	256	257	257	255	253	251	249	248	247	246	245	244	245			
35	245	249	253	255	256	256	254	252	249	248	246	245	243	242	242	243			
40	242	246	251	254	255	254	253	250	247	245	244	242	241	239	239	240			
45	239	244	248	251	253	252	250	247	244	242	241	239	237	236	235	236			
50	234	239	244	248	250	249	247	243	240	238	237	235	234	231	230	231			
55	229	235	240	244	246	245	242	239	236	234	232	230	228	226	225	226			
60	223	229	235	239	241	240	237	233	230	228	227	225	223	220	219	220			
65	217	223	228	233	235	234	231	228	224	222	220	219	216	214	212	213			
70	209	215	221	226	228	227	224	220	217	215	213	212	210	207	205	206			
75	201	207	213	218	220	219	216	213	209	207	206	204	202	199	197	198			
80	193	199	205	209	211	211	208	204	200	199	198	196	194	191	189	189			
85	183	189	196	200	202	201	199	195	191	190	189	187	185	182	180	180			
90	174	179	185	190	192	191	189	185	182	181	179	178	175	172	170	170			
95	163	169	175	179	181	180	178	175	171	170	169	168	166	162	160	160			
100	153	158	163	168	170	169	167	164	161	160	159	157	155	153	151	151			
105	142	146	152	156	158	158	155	152	151	150	149	148	146	143	140	140			
110	130	135	140	144	146	145	144	141	140	139	138	137	134	132	129	129			
115	119	124	128	132	134	134	132	129	128	128	127	125	123	120	118	118			
120	108	112	117	120	122	121	120	118	117	116	115	114	112	109	108	107			
125	97.2	101	105	108	110	110	108	106	105	105	104	103	101	98.7	96.8	96.5			
130	86.5	89.6	93.2	96.3	98.0	97.7	96.5	94.8	94.4	93.8	93.2	92.1	90.4	88.1	86.4	86.0			
135	76.0	78.7	81.9	84.6	86.1	86.1	85.0	83.7	83.6	83.2	82.6	81.5	80.0	77.8	76.1	75.8			
140	66.6	68.4	70.8	73.2	74.7	74.7	73.9	72.8	73.0	72.6	72.1	71.2	69.8	67.8	66.2	65.7			
145	56.7	58.6	61.0	63.0	64.4	64.5	63.9	63.2	62.7	62.6	62.2	61.3	60.0	58.1	56.6	56.1			
150	47.2	48.7	50.6	52.4	53.6	53.8	53.5	53.0	52.9	52.9	52.7	51.8	50.6	48.9	47.5	47.0			
155	38.2	39.3	40.9	42.4	43.4	43.8	43.7	43.5	43.5	43.7	43.4	42.7	41.6	40.1	38.8	38.2			
160	29.7	30.4	31.7	32.1	33.9	34.2	34.1	34.2	34.5	34.8	34.7	34.2	33.2	31.9	30.6	29.9			
165	21.8	22.2	22.7	22.1	19.2	20.6	24.8	25.7	26.2	26.2	25.4	26.1	23.8	24.2	23.1	21.6			
170	12.6	13.1	13.1	12.7	6.20	13.3	14.3	17.2	18.2	17.8	15.0	14.8	15.8	13.8	12.2	11.5			
175	2.54	2.52	2.52	4.69	3.63	2.18	6.17	8.36	9.53	9.39	7.98	8.13	8.50	7.54	5.68	2.89			
180	0.33	0.32	0.32	0.32	0.32	0.31	0.31	0.01	0.33	0.33	0.33	0.32	0.32	0.33	0.33	0.33			

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)	0.139	0.060
Power Factor	0.9951	0.9172
Test Power (W)	16.53	15.23
THD A%	6.99	16.34
Luminous Efficacy (lm/W)	134.9	140.0
Total Luminous Flux (lm)	2229.6	2132.9
Color Rendering Index (CRI)	95.4	
R9	72.7	
Correlated Color Temperature (CCT)(K)	4042	
Chromaticity Chroma x	0.3776	
Chromaticity Chroma y	0.3722	
Chromaticity Chroma u	0.2251	
Chromaticity Chroma v	0.3327	
Duv	-0.0013	
Chromaticity Chroma u'	0.2251	
Chromaticity Chroma v'	0.4991	

Special Color Rendering Indices	
R1	97.4
R2	99.4
R3	98.4
R4	95.9
R5	96.2
R6	95.5
R7	93
R8	87.7
R9	72.7
R10	99.1
R11	98.2
R12	76.3
R13	99.3
R14	99.7

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

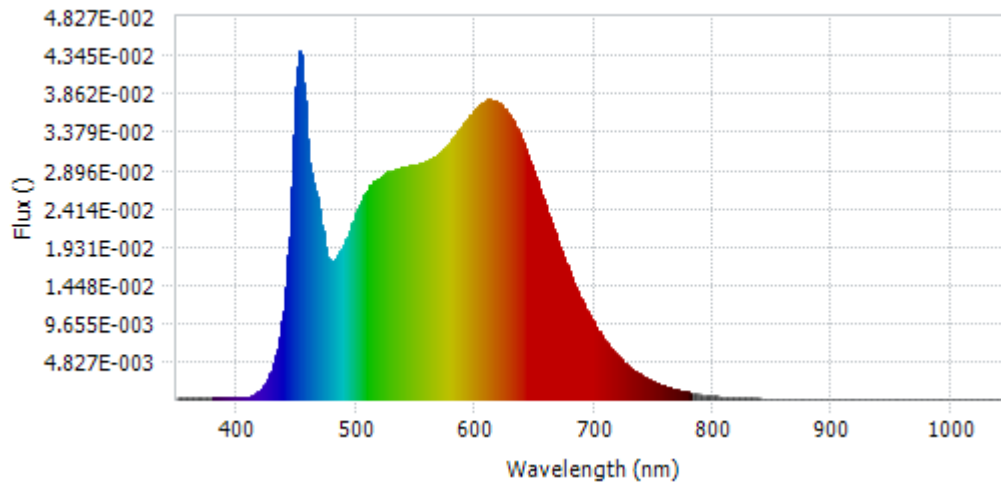
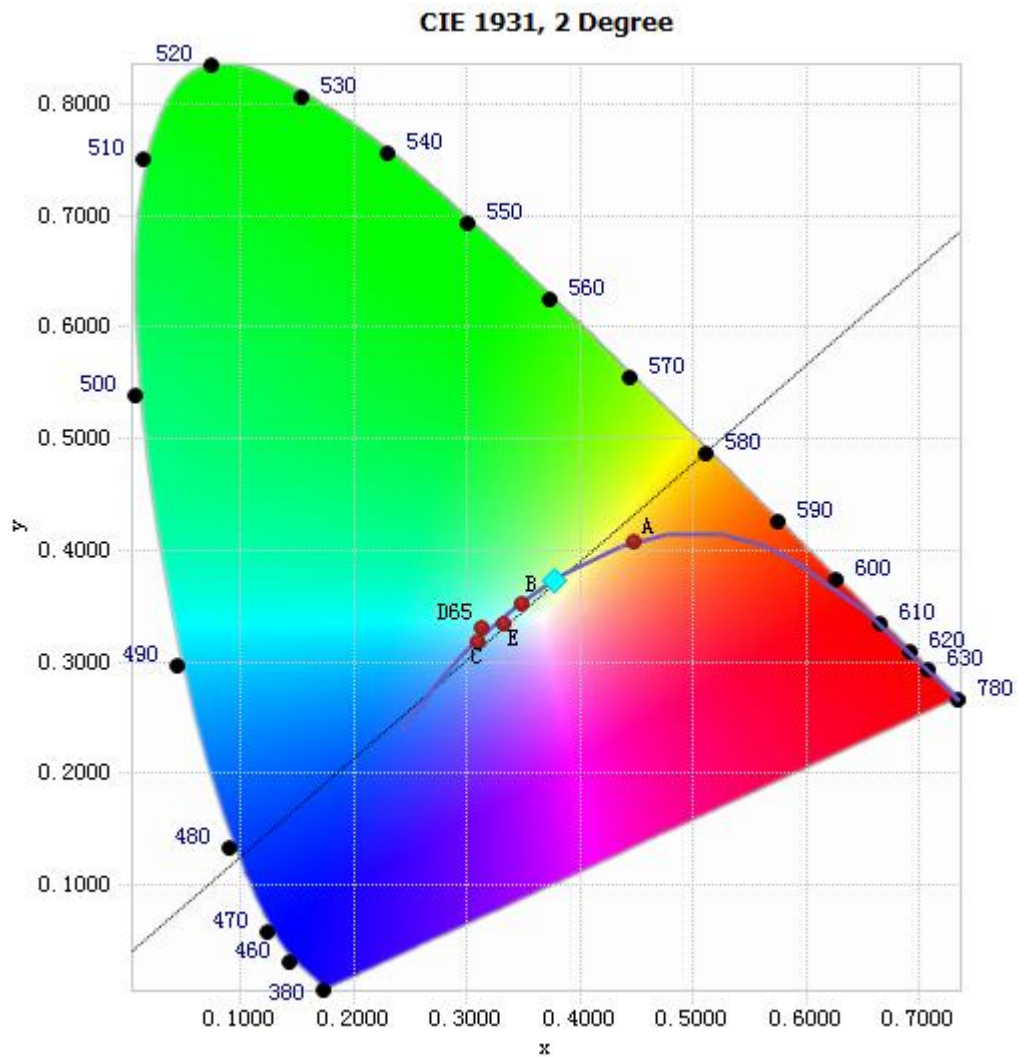


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.21E-04	485	1.83E-02	590	3.48E-02	695	1.09E-02
385	1.91E-04	490	1.95E-02	595	3.57E-02	700	9.50E-03
390	1.87E-04	495	2.13E-02	600	3.67E-02	705	8.27E-03
395	1.99E-04	500	2.34E-02	605	3.72E-02	710	7.21E-03
400	1.73E-04	505	2.51E-02	610	3.77E-02	715	6.27E-03
405	1.63E-04	510	2.64E-02	615	3.78E-02	720	5.44E-03
410	2.64E-04	515	2.75E-02	620	3.73E-02	725	4.70E-03
415	5.89E-04	520	2.78E-02	625	3.66E-02	730	4.07E-03
420	1.23E-03	525	2.84E-02	630	3.55E-02	735	3.48E-03
425	2.27E-03	530	2.89E-02	635	3.41E-02	740	3.00E-03
430	4.04E-03	535	2.90E-02	640	3.25E-02	745	2.57E-03
435	7.07E-03	540	2.92E-02	645	3.05E-02	750	2.22E-03
440	1.25E-02	545	2.95E-02	650	2.83E-02	755	1.90E-03
445	2.35E-02	550	2.95E-02	655	2.62E-02	760	1.63E-03
450	3.96E-02	555	2.98E-02	660	2.40E-02	765	1.39E-03
455	4.22E-02	560	3.01E-02	665	2.19E-02	770	1.19E-03
460	3.14E-02	565	3.05E-02	670	1.97E-02	775	1.02E-03
465	2.67E-02	570	3.11E-02	675	1.76E-02	780	8.73E-04
470	2.31E-02	575	3.17E-02	680	1.57E-02		
475	1.85E-02	580	3.26E-02	685	1.40E-02		
480	1.74E-02	585	3.37E-02	690	1.24E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3776, 0.3722)

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

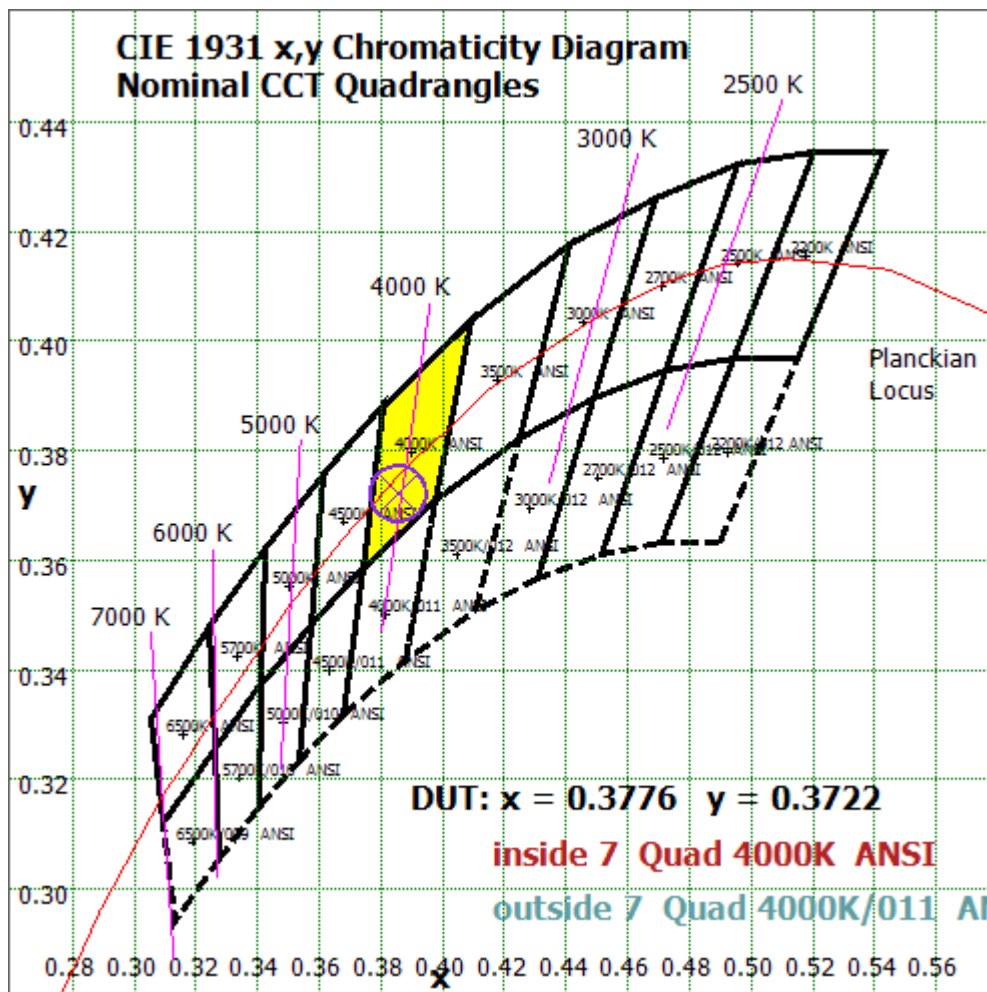


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

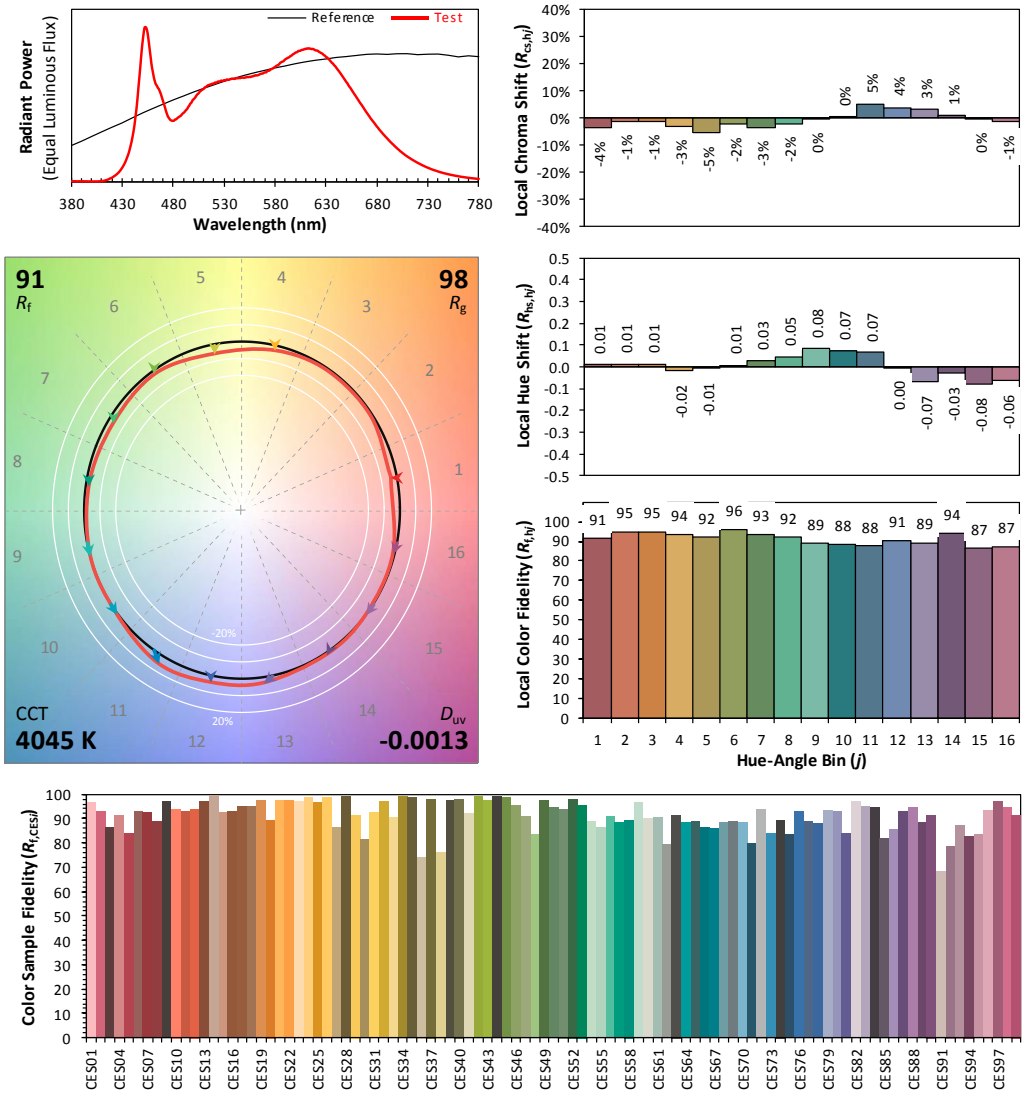
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/01/30

Model: 17A21/9CCTS/277V/DIM



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.3776	CIE 13.3-1995 (CRI) R_a 96 R_g 73
	y	0.3722	
	u'	0.2251	
	v'	0.4991	

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)	0.141	0.061
Power Factor	0.9951	0.9194
Test Power (W)	16.87	15.45
THD A%	7.17	16.48
Luminous Efficacy (lm/W)	131.1	136.4
Total Luminous Flux (lm)	2210.9	2106.9
Color Rendering Index (CRI)	93.1	
R9	65.8	
Correlated Color Temperature (CCT)(K)	4997	
Chromaticity Chroma x	0.3456	
Chromaticity Chroma y	0.3571	
Chromaticity Chroma u	0.2096	
Chromaticity Chroma v	0.3249	
Duv	0.0026	
Chromaticity Chroma u'	0.2096	
Chromaticity Chroma v'	0.4874	

Special Color Rendering Indices	
R1	93.4
R2	96.7
R3	97.7
R4	91.5
R5	91.7
R6	93.2
R7	94
R8	86.6
R9	65.8
R10	90.9
R11	92.4
R12	67.3
R13	94.7
R14	98.9

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

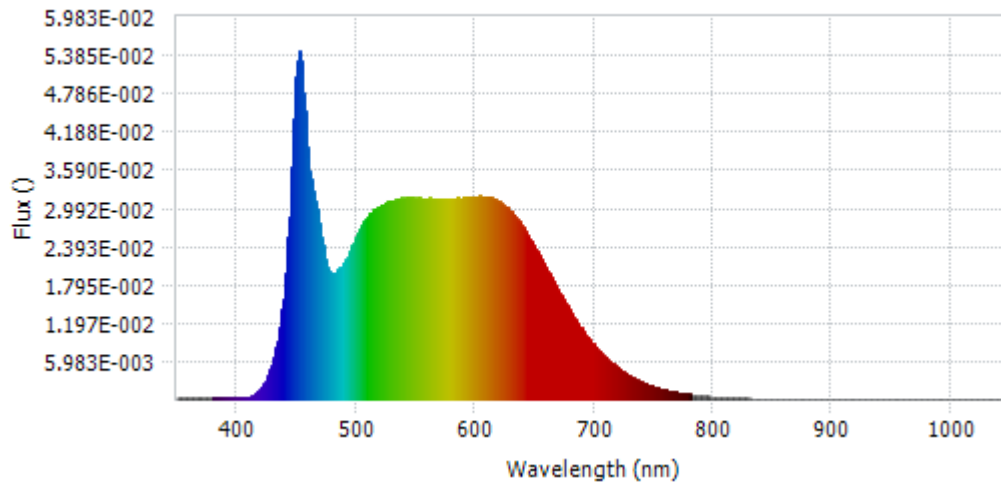
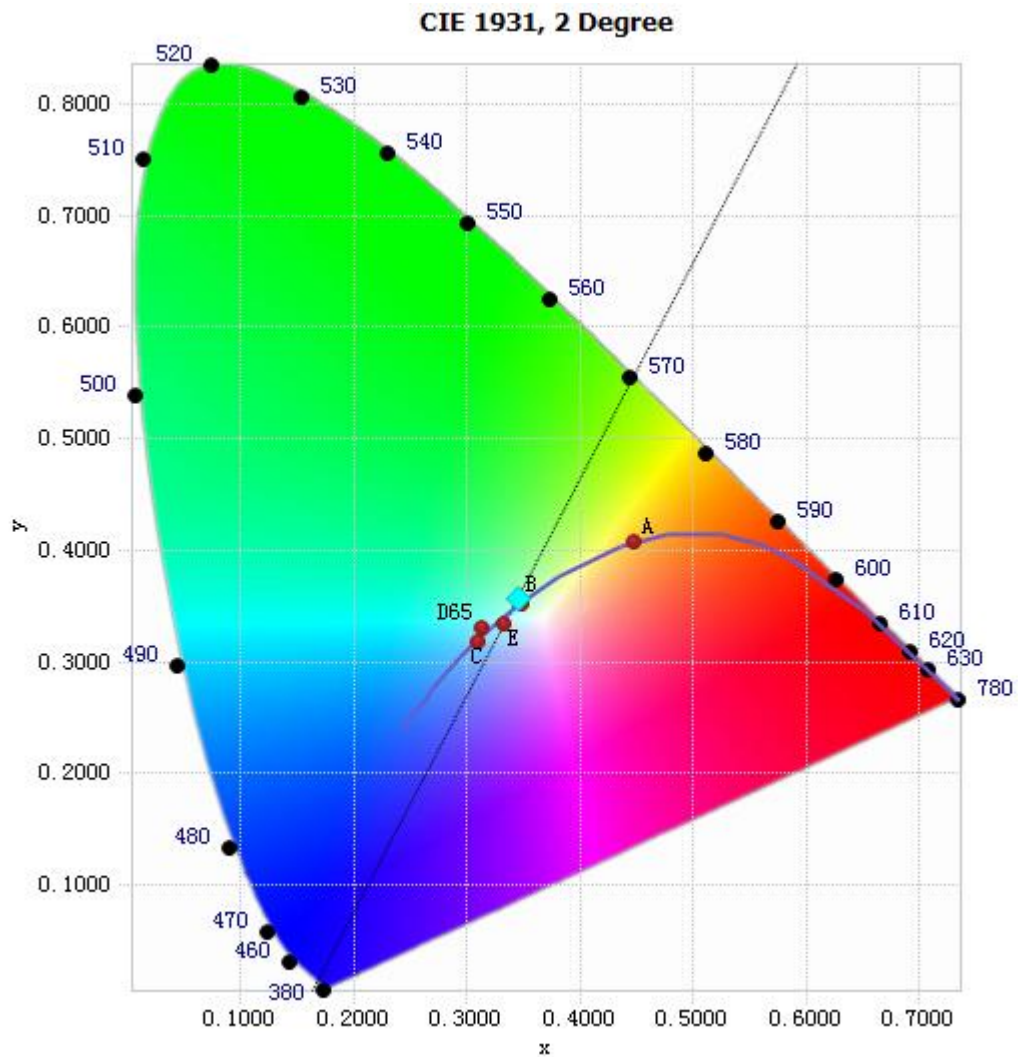


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.42E-04	485	2.03E-02	590	3.16E-02	695	9.63E-03
385	2.16E-04	490	2.15E-02	595	3.16E-02	700	8.46E-03
390	2.33E-04	495	2.33E-02	600	3.18E-02	705	7.40E-03
395	2.19E-04	500	2.55E-02	605	3.17E-02	710	6.46E-03
400	1.89E-04	505	2.72E-02	610	3.17E-02	715	5.65E-03
405	1.99E-04	510	2.85E-02	615	3.15E-02	720	4.92E-03
410	3.37E-04	515	2.97E-02	620	3.09E-02	725	4.27E-03
415	8.23E-04	520	3.01E-02	625	3.02E-02	730	3.69E-03
420	1.76E-03	525	3.07E-02	630	2.93E-02	735	3.18E-03
425	3.30E-03	530	3.12E-02	635	2.83E-02	740	2.74E-03
430	5.88E-03	535	3.12E-02	640	2.70E-02	745	2.36E-03
435	1.01E-02	540	3.14E-02	645	2.55E-02	750	2.02E-03
440	1.78E-02	545	3.15E-02	650	2.38E-02	755	1.74E-03
445	3.21E-02	550	3.14E-02	655	2.22E-02	760	1.49E-03
450	5.06E-02	555	3.14E-02	660	2.04E-02	765	1.28E-03
455	5.09E-02	560	3.14E-02	665	1.87E-02	770	1.10E-03
460	3.77E-02	565	3.14E-02	670	1.69E-02	775	9.42E-04
465	3.16E-02	570	3.14E-02	675	1.53E-02	780	8.07E-04
470	2.65E-02	575	3.13E-02	680	1.37E-02		
475	2.10E-02	580	3.13E-02	685	1.23E-02		
480	1.96E-02	585	3.15E-02	690	1.09E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3456, 0.3571)

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

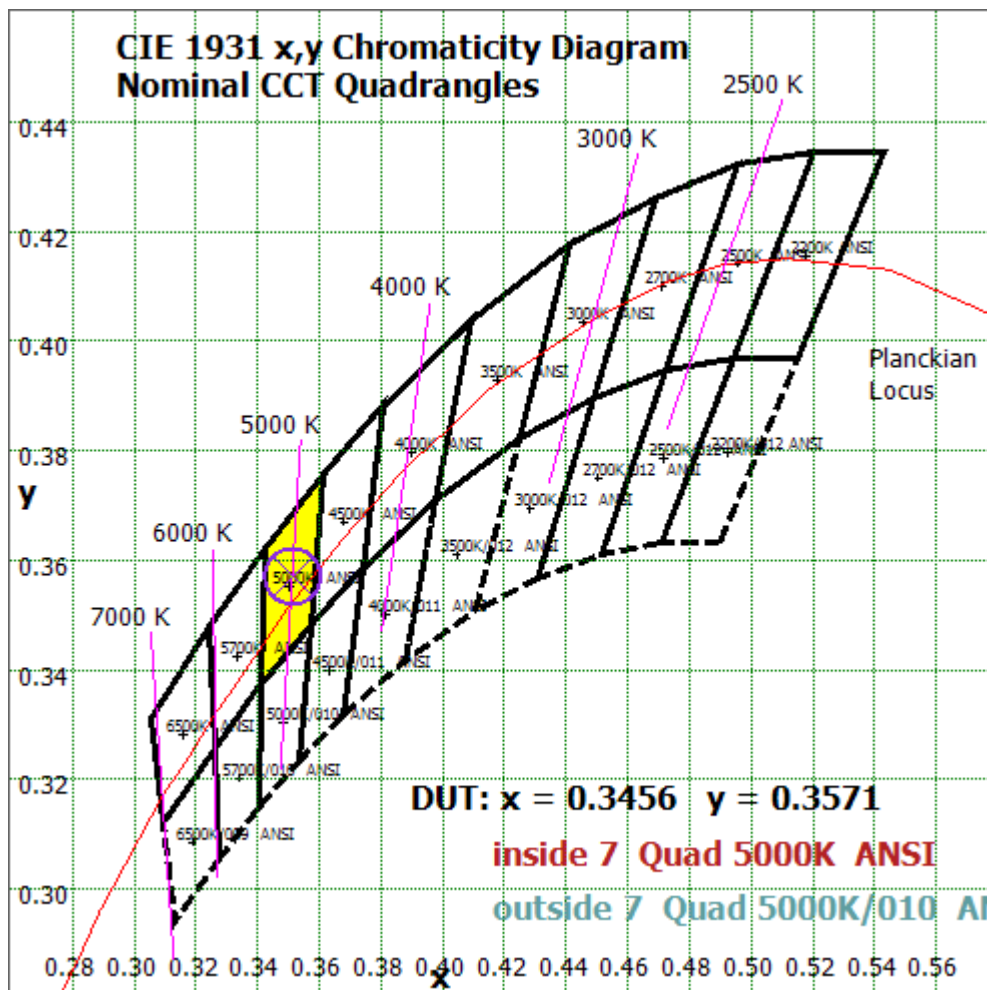


Chart 14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

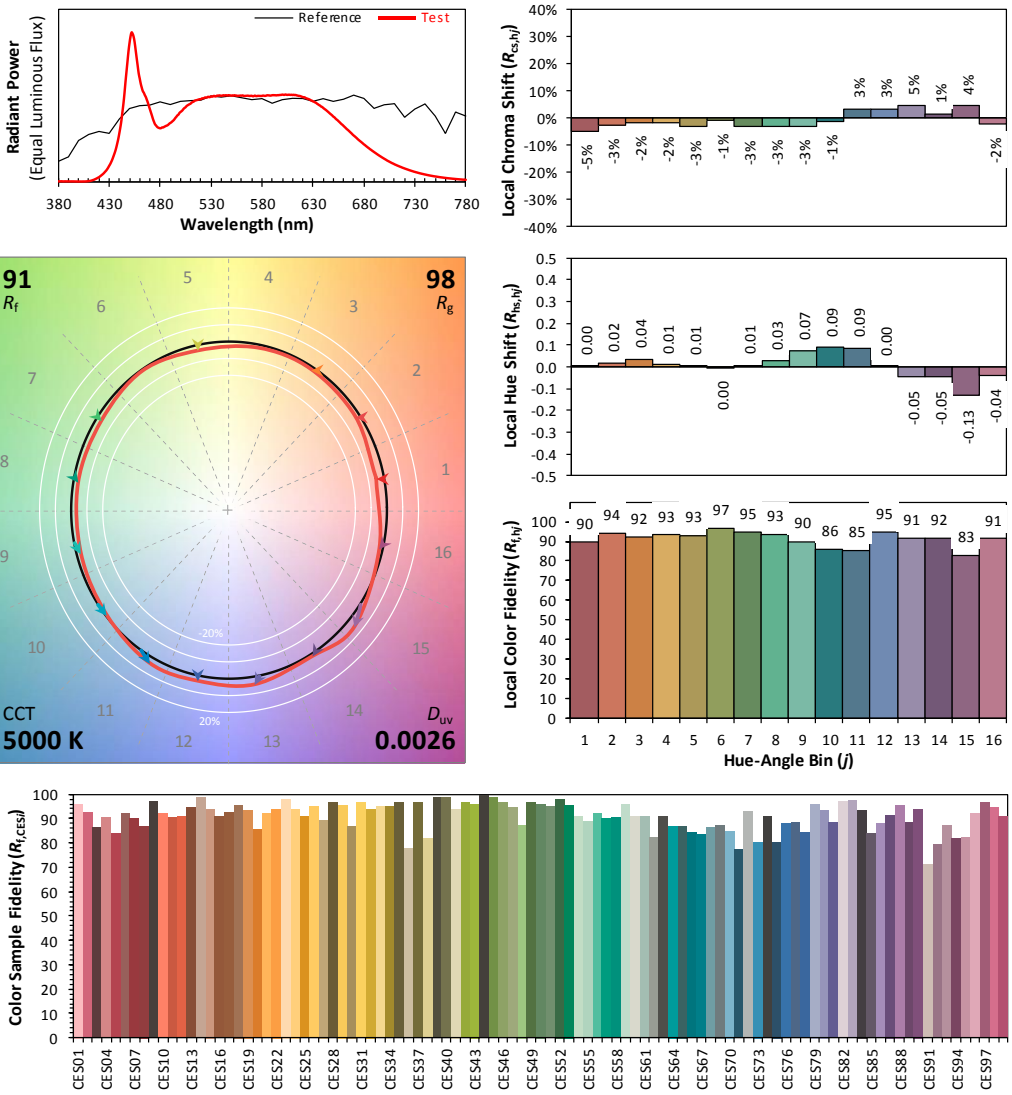
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2024/01/30

Model: 17A21/9CCTS/277V/DIM



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

x 0.3456
 y 0.3571
 u' 0.2096
 v' 0.4874

CIE 13.3-1995 (CRI)
R_a 93
R_g 65

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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