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 Tube

Model: 10.5T8/3F/8CCTS/EXT/SD/A4

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23060027f

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

Review by: Wei Fei

Engineer: Wei Fei

Jul. 07, 2023

Approved by: April Zou

Manager: April Zou

Jul. 07, 2023

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	10.5T8/3F/8CCTS/EXT/SD/A4 3000K Setting	10.5T8/3F/8CCTS/EXT/SD/A4 3500K Setting	10.5T8/3F/8CCTS/EXT/SD/A4 4000K Setting
Luminous Efficacy (Lumens /Watt)	137.2	141.3	144.5
Total Luminous Flux (Lumens)	1656.0	1686.8	1713.3
Power (Watts)/4	12.07	11.94	11.86
Power Factor	0.9943	0.9942	0.9942
CCT (K)	3046	3464	3916
CRI	82.5	84.4	85.4
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Tested Model	10.5T8/3F/8CCTS/EXT/SD/A4 5000K Setting	10.5T8/3F/8CCTS/EXT/SD/A4 6500K Setting
Luminous Efficacy (Lumens /Watt)	144.9	141.8
Total Luminous Flux (Lumens)	1722.3	1706.9
Power (Watts)/4	11.89	12.04
Power Factor	0.9942	0.9942
CCT (K)	5085	6513
CRI	85.9	84.3
Stabilization Time (Light & Power)	50 mins	50 mins
Note	5000K	6500K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Jun. 27, 2023

Date of Test : Jun. 29, 2023

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 Tube
Model	: 10.5T8/3F/8CCTS/EXT/SD/A4
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: Color- Tunable 3000K/3500K/4000K/5000K/6500K LED Tube supplied by a LED driver: 15T8T5HEDRIVER/SD/4CH
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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.405	0.186
Power Factor	0.9943	0.9281
Test Power (W)/4	12.07	11.95
THD A%	5.95	7.19
Luminous Efficacy (lm/W)	137.2	138.5
Total Luminous Flux (lm)	1656.0	1655.3
Color Rendering Index (CRI)	82.5	
R9	7.1	
Correlated Color Temperature (CCT)(K)	3046	
Chromaticity Chroma x	0.4326	
Chromaticity Chroma y	0.4010	
Chromaticity Chroma u	0.2491	
Chromaticity Chroma v	0.3464	
Duv	-0.0006	
Chromaticity Chroma u ’	0.2491	
Chromaticity Chroma v’	0.5195	

Special Color Rendering Indices	
R1	82.1
R2	94.4
R3	91.8
R4	78.6
R5	82.6
R6	93.2
R7	80
R8	57.2
R9	7.1
R10	87.3
R11	78.1
R12	73.1
R13	85.6
R14	96.1

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

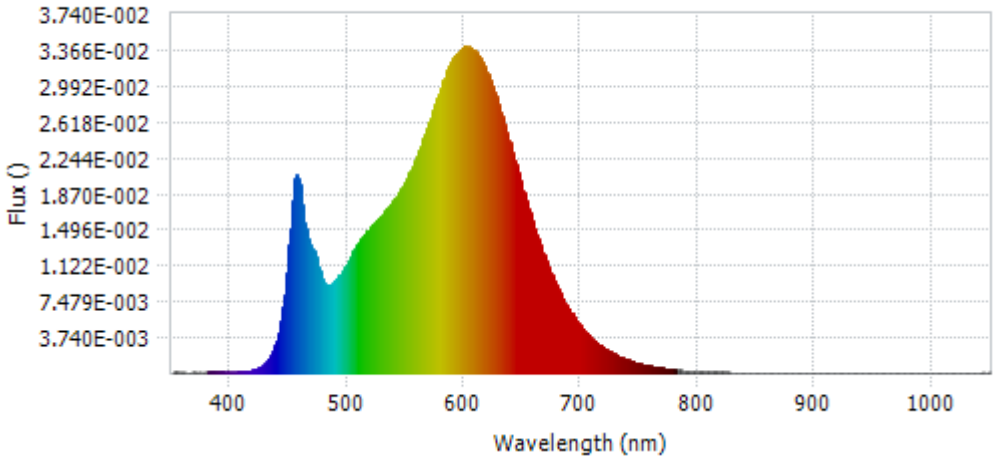
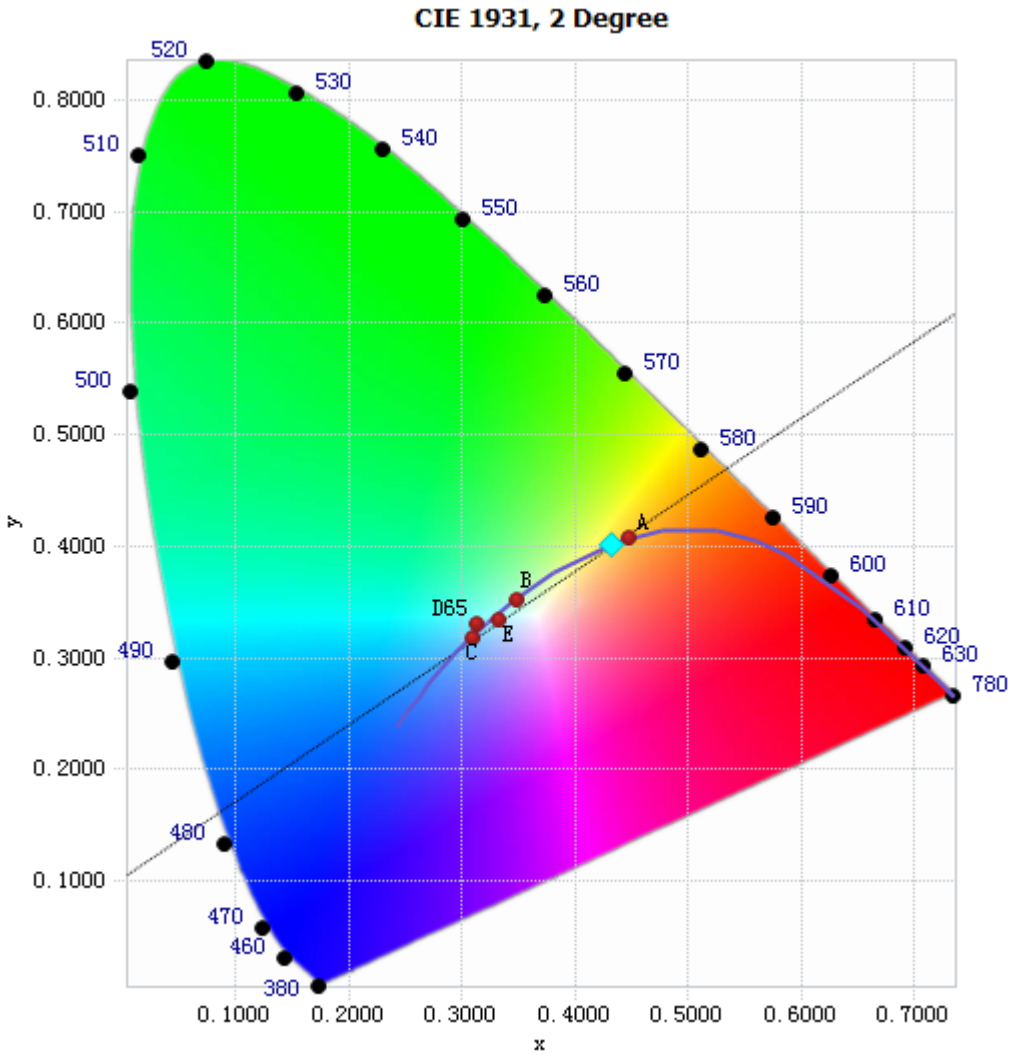


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.36E-04	485	9.27E-03	590	3.27E-02	695	5.65E-03
385	1.22E-04	490	9.81E-03	595	3.35E-02	700	4.85E-03
390	1.07E-04	495	1.05E-02	600	3.40E-02	705	4.13E-03
395	1.02E-04	500	1.16E-02	605	3.38E-02	710	3.54E-03
400	1.05E-04	505	1.27E-02	610	3.33E-02	715	3.02E-03
405	1.07E-04	510	1.36E-02	615	3.25E-02	720	2.58E-03
410	1.56E-04	515	1.45E-02	620	3.11E-02	725	2.22E-03
415	2.22E-04	520	1.52E-02	625	2.95E-02	730	1.88E-03
420	3.81E-04	525	1.59E-02	630	2.76E-02	735	1.59E-03
425	6.48E-04	530	1.66E-02	635	2.56E-02	740	1.36E-03
430	1.14E-03	535	1.73E-02	640	2.35E-02	745	1.16E-03
435	2.05E-03	540	1.81E-02	645	2.13E-02	750	9.85E-04
440	3.74E-03	545	1.90E-02	650	1.91E-02	755	8.49E-04
445	6.99E-03	550	2.00E-02	655	1.71E-02	760	7.30E-04
450	1.34E-02	555	2.13E-02	660	1.51E-02	765	6.24E-04
455	2.02E-02	560	2.27E-02	665	1.33E-02	770	5.38E-04
460	1.86E-02	565	2.44E-02	670	1.16E-02	775	4.49E-04
465	1.43E-02	570	2.61E-02	675	1.02E-02	780	3.90E-04
470	1.30E-02	575	2.79E-02	680	8.82E-03		
475	1.12E-02	580	2.98E-02	685	7.63E-03		
480	9.34E-03	585	3.16E-02	690	6.59E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4326, 0.4010)

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

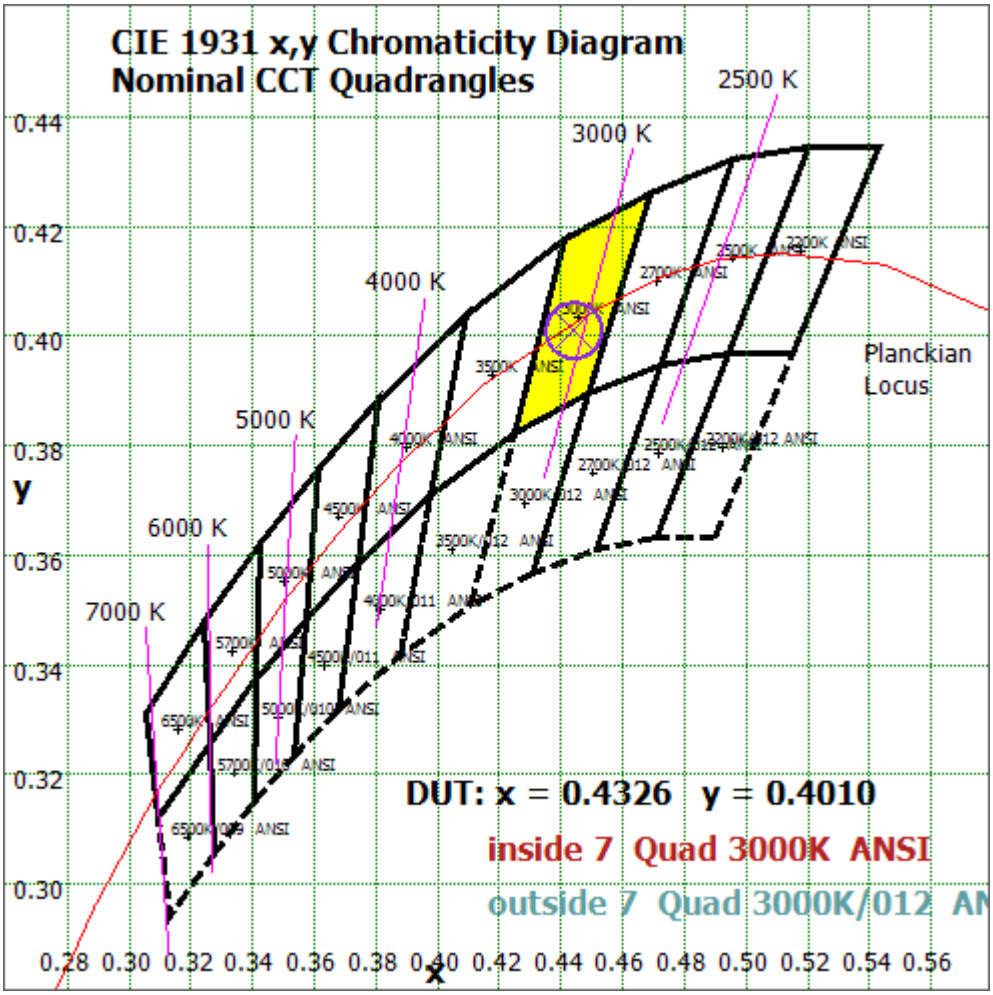


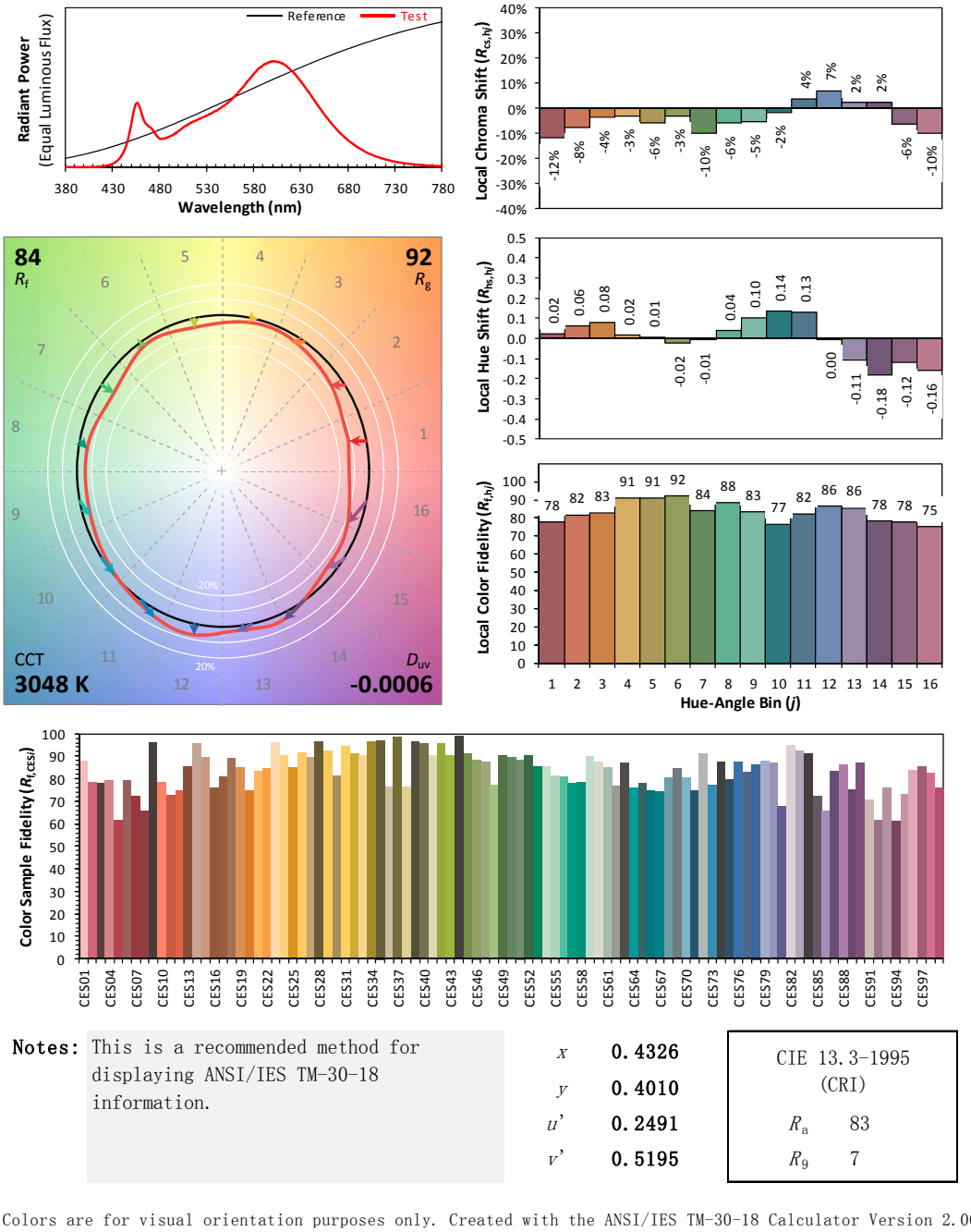
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/29 **Model:** 10.5T8/3F/8CCTS/EXT/SD/A4



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

x	0.4326
y	0.4010
u'	0.2491
v'	0.5195

CIE 13.3-1995 (CRI)

R_a	83
R_9	7

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 25.1°C.

The photometric distance is 30 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)	0.407
Power Factor	0.9919
Power (W)/4	12.10
Luminous Efficacy (lm/W)	137.5
Total Luminous Flux (lm)	1664.0
Beam Angle (°)	114.0 (0^o-180^o) / 248.4 (90^o-270^o)
Center Beam Candle Power (cd)	261
Maximum Beam Candle Power (cd)	262.0 (At: C=340.0, Gamma=4.5)
Spacing Criteria	1.23 (0^o-180^o) / 1.47 (90^o-270^o)
Zonal Lumens in the 0°-60°Zone	41.13%
Zonal Lumens in the 60°-90°Zone	27.03%
Zonal Lumens in the 90°-120°Zone	18.89%
Zonal Lumens in the 120°-180°Zone	12.95%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	24.763	1.49%
10- 20	71.914	4.32%
20- 30	112.579	6.77%
30- 40	143.46	8.62%
40- 50	162.49	9.77%
50- 60	169.133	10.16%
60- 70	164.379	9.88%
70- 80	151.155	9.08%
80- 90	134.318	8.07%
90-100	118.952	7.15%
100-110	104.99	6.31%
110-120	90.355	5.43%
120-130	74.625	4.48%
130-140	59.426	3.57%
140-150	43.125	2.59%
150-160	26.477	1.59%
160-170	10.288	0.62%
170-180	1.554	0.09%
Total	1664.0	100%

γ(°)	Lumens	% Total
0- 60	684.339	41.13%
60- 90	449.852	27.03%
0-90	1134.19	68.16%
90- 180	529.792	31.84%
0- 180	1664.0	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

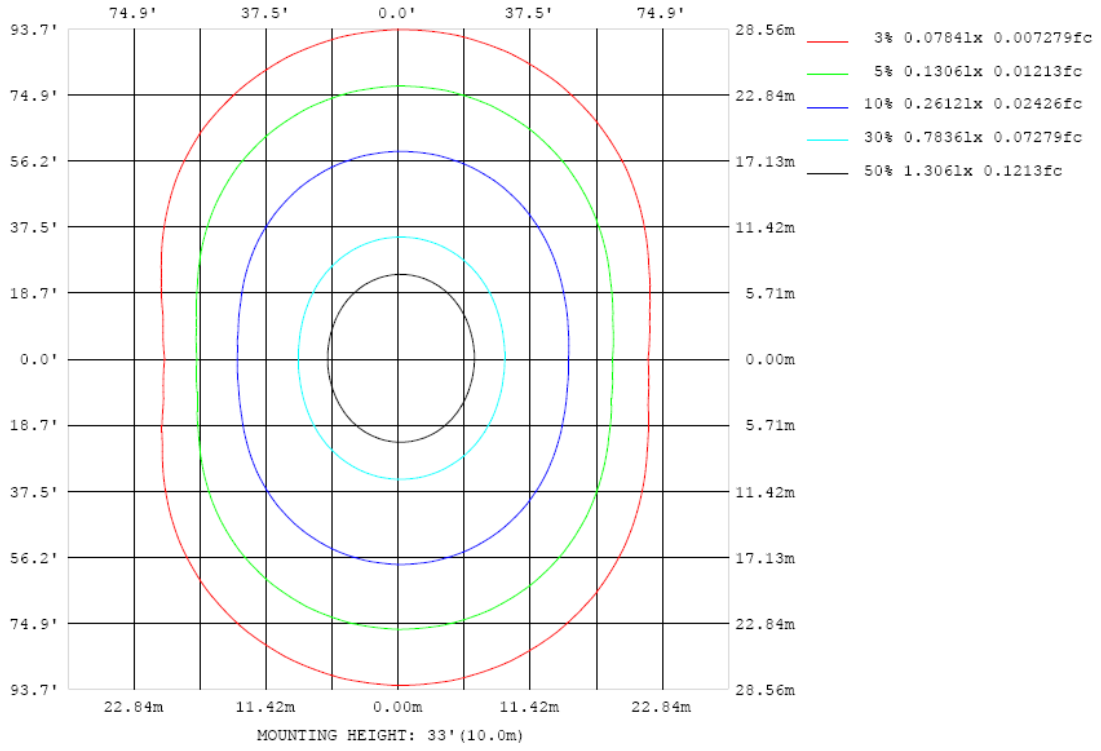


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

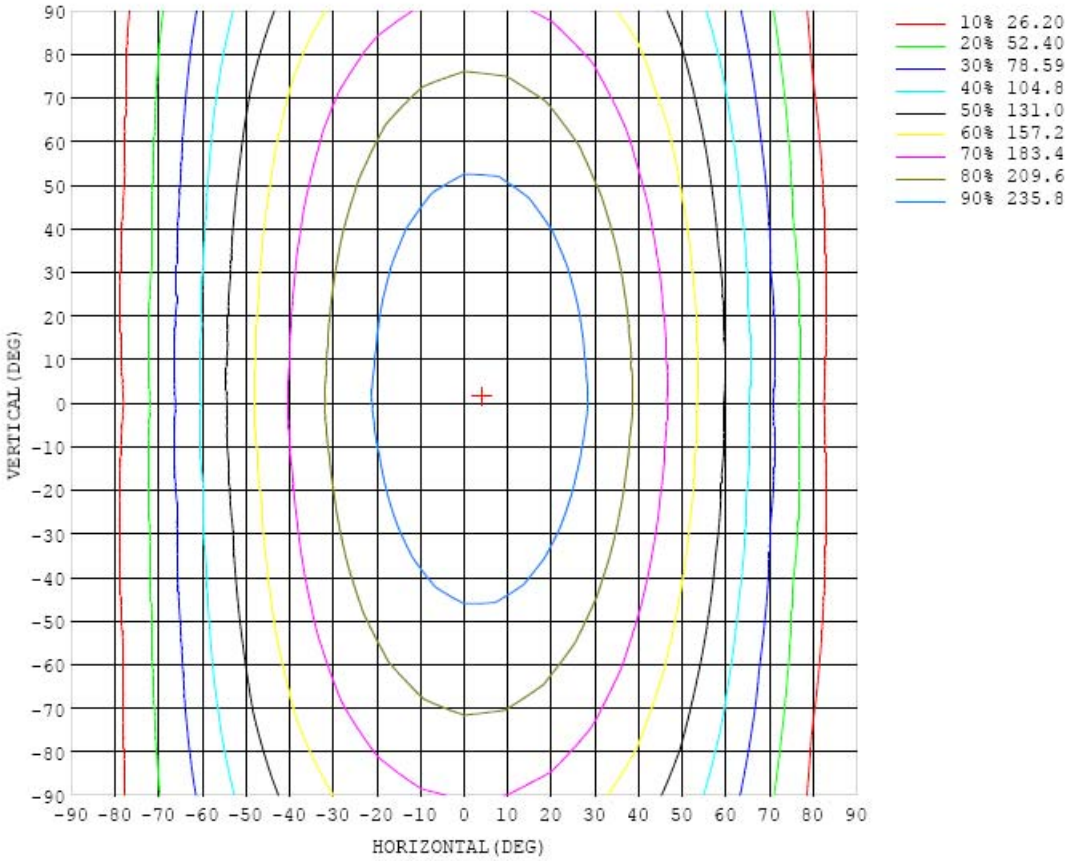


Chart 6: Isocandela Plot

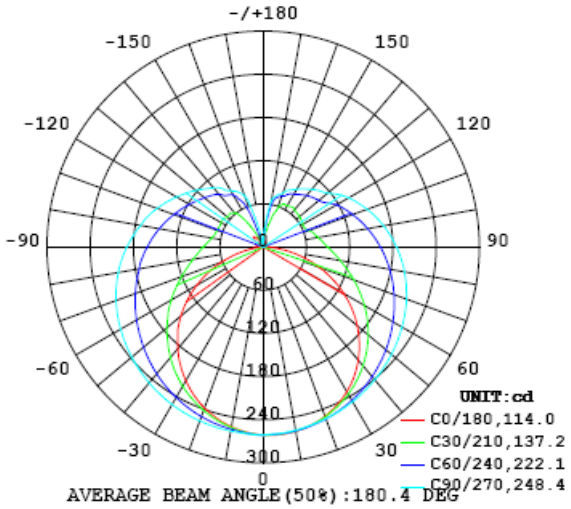


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C(DEG) / γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261
5	262	261	261	261	261	261	261	261	260	260	260	259	259	259	258	258	258	258	258
10	260	260	260	260	260	260	260	259	259	258	258	257	256	255	255	254	253	253	254
15	256	256	256	256	257	257	257	257	257	256	255	254	252	251	249	248	247	247	247
20	250	250	250	251	252	253	254	255	255	254	253	251	248	245	243	240	239	238	238
25	242	242	243	244	246	249	250	252	252	251	250	247	243	239	235	231	229	227	227
30	232	232	233	236	240	243	246	248	249	248	246	242	238	232	227	221	217	215	215
35	220	220	222	226	231	237	241	244	245	245	242	238	232	225	217	210	204	201	200
40	205	206	209	215	222	229	235	239	241	241	238	233	226	217	207	198	190	186	185
45	189	190	195	203	212	221	229	234	237	237	234	228	219	209	197	185	175	169	168
50	170	172	179	190	202	213	222	229	232	232	229	222	212	200	186	172	159	151	149
55	151	153	163	176	191	204	215	223	227	227	224	216	205	192	175	158	142	132	128
60	129	133	145	162	179	195	208	217	222	222	219	211	199	183	165	144	125	111	107
65	107	112	128	148	168	186	201	211	216	217	213	205	192	175	154	131	108	90.7	84.0
70	83.0	90.2	110	134	157	177	193	204	210	211	208	199	185	167	144	119	92.2	70.3	61.1
75	60.0	69.5	92.8	121	147	169	186	198	204	206	201	192	178	159	135	108	78.0	51.9	39.0
80	36.8	49.5	77.7	109	137	160	178	191	198	199	195	186	171	151	127	97.9	66.2	35.2	19.2
85	16.7	32.6	65.6	98.3	128	152	170	183	191	192	188	179	164	144	119	90.1	57.5	23.9	5.20
90	3.90	21.4	56.1	89.5	119	144	163	176	183	185	181	172	157	137	113	83.5	51.6	19.3	1.37
95	1.56	16.7	50.1	83.0	112	136	155	168	176	177	174	165	150	131	107	78.6	48.2	19.2	2.81
100	2.36	13.2	45.5	77.3	105	129	147	160	168	170	166	157	144	125	102	74.8	46.9	21.0	6.17
105	5.96	13.3	41.0	72.8	99.3	122	140	152	160	162	158	150	137	119	97.1	72.8	46.1	24.7	10.1
110	8.91	15.6	39.3	67.5	94.3	115	132	144	151	153	151	143	130	113	93.1	70.6	47.6	29.0	11.5
115	7.86	17.4	41.8	63.6	88.1	109	125	136	143	145	142	135	124	108	89.3	69.2	50.1	34.3	11.0
120	2.07	17.5	45.1	63.7	82.1	101	117	128	135	137	134	128	117	103	85.9	69.0	52.6	39.0	10.2
125	0.46	21.9	48.0	64.8	80.2	93.4	107	118	125	127	125	119	110	97.5	83.6	69.6	55.4	44.4	11.2
130	1.32	27.4	50.6	65.7	79.4	90.9	101	108	114	117	116	111	104	93.7	81.9	70.1	56.5	47.7	15.1
135	2.35	29.4	52.7	66.5	78.3	88.6	97.3	104	108	111	110	106	99.2	90.4	80.7	70.7	59.2	48.3	19.1
140	4.56	21.2	53.8	68.0	76.9	85.6	93.5	99.5	103	105	104	100	94.7	87.7	80.0	69.9	59.9	45.1	18.1
145	4.42	14.9	53.6	68.3	76.4	82.7	89.1	94.1	97.3	98.6	97.9	95.2	90.8	84.6	78.4	70.2	62.1	45.2	14.4
150	5.83	16.5	51.0	66.2	73.6	80.3	85.0	88.9	91.8	92.9	92.3	90.0	86.5	82.0	75.6	68.9	61.0	44.7	15.0
155	7.91	13.7	37.6	66.2	71.0	75.5	80.9	84.6	86.6	87.3	87.2	85.4	81.6	77.0	73.1	67.4	58.9	33.5	12.2
160	7.91	12.4	27.1	54.9	69.6	73.0	75.7	77.3	78.7	79.6	78.9	77.7	76.7	73.9	69.5	64.7	51.3	25.5	10.4
165	7.54	11.9	17.2	36.1	56.5	67.8	70.9	72.4	73.5	74.1	73.9	73.1	71.8	69.6	63.9	51.9	35.1	17.0	8.94
170	7.35	12.0	17.3	21.4	32.9	43.5	52.4	59.2	62.7	64.1	63.8	61.7	57.6	51.6	42.0	27.6	17.7	11.2	8.25
175	7.61	9.29	13.7	17.1	18.5	19.4	20.4	21.5	23.0	24.1	24.0	23.2	22.3	21.2	17.8	13.7	11.3	9.16	7.80
180	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35

Table 6: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261	261		
5	259	259	259	259	260	260	260	260	261	261	261	261	262	262	262	262	262		
10	254	254	255	255	256	257	258	259	260	260	260	261	260	260	260	260	260		
15	247	248	249	251	252	254	256	258	259	259	260	259	259	258	257	257	257		
20	239	240	242	245	248	251	254	256	257	258	258	257	256	254	253	251	251		
25	228	230	233	238	242	247	250	253	255	256	256	254	252	249	246	244	243		
30	216	218	223	229	236	242	247	251	253	253	253	250	247	243	239	235	233		
35	202	206	212	220	228	236	242	247	250	250	249	246	241	235	229	224	221		
40	186	192	200	210	221	230	238	243	246	247	245	240	234	226	218	211	207		
45	170	177	187	200	212	224	233	239	242	243	240	234	226	216	206	197	191		
50	152	162	174	189	204	217	227	234	238	238	235	228	218	206	193	182	174		
55	133	145	161	179	195	210	222	230	233	233	229	221	209	195	179	166	156		
60	112	127	147	168	186	203	216	224	229	228	223	213	200	183	166	149	135		
65	91.1	110	134	157	178	196	210	219	223	222	217	206	191	172	152	130	114		
70	70.2	93.0	121	148	171	189	204	213	217	216	210	198	182	162	137	112	91.9		
75	50.4	77.9	109	138	163	182	197	207	211	210	203	190	173	151	124	94.7	70.1		
80	33.5	65.4	98.8	129	155	175	190	200	204	203	196	183	165	141	111	78.9	49.8		
85	22.0	55.9	90.3	121	148	168	183	193	197	195	188	175	156	131	100	65.7	32.9		
90	15.4	49.1	83.2	114	140	161	175	185	189	188	180	167	148	122	90.9	55.8	21.8		
95	11.6	43.2	77.2	108	133	154	169	177	181	179	172	159	139	114	83.4	49.2	17.4		
100	12.4	40.3	72.5	102	127	147	161	170	173	171	165	151	132	107	77.5	45.6	17.4		
105	14.5	40.2	69.5	97.0	120	139	153	162	166	164	156	143	124	101	73.0	44.2	19.9		
110	16.4	41.1	68.0	92.9	114	132	145	154	157	155	147	135	117	95.0	69.9	44.6	24.0		
115	16.4	42.5	67.3	89.5	109	125	137	145	148	146	139	127	111	90.4	68.0	46.6	27.6		
120	14.0	43.5	67.5	86.7	104	118	130	137	139	137	131	120	105	86.7	67.1	49.7	28.8		
125	4.06	42.0	68.3	84.5	99.5	112	122	128	131	129	123	113	99.5	83.8	67.0	53.6	27.0		
130	1.85	38.2	65.2	81.7	95.8	107	115	120	122	121	115	107	95.0	81.6	67.6	57.2	22.9		
135	0.39	32.5	65.7	78.4	91.2	102	109	113	115	113	108	101	91.0	79.4	68.9	58.8	18.9		
140	2.53	24.6	61.9	76.3	85.1	95.4	102	106	107	106	102	95.5	84.2	75.5	67.0	53.8	14.4		
145	4.05	15.6	48.6	75.0	81.9	87.7	92.6	97.4	99.4	97.6	92.9	86.5	81.1	74.5	64.3	40.7	9.27		
150	5.17	9.37	28.2	65.7	75.9	83.5	87.3	89.7	90.7	89.8	87.4	83.8	78.7	72.1	55.0	21.9	7.70		
155	5.65	6.48	11.4	29.0	60.9	69.8	79.9	83.6	84.7	84.3	82.5	79.6	75.0	63.8	34.5	12.5	8.29		
160	6.43	5.95	7.71	8.63	16.0	33.8	55.2	69.7	75.7	76.1	75.1	70.7	59.2	38.1	14.2	9.86	6.24		
165	4.61	4.89	5.75	5.58	8.39	9.01	8.24	21.1	37.1	41.5	40.2	33.0	23.3	12.6	9.78	6.81	5.94		
170	6.69	4.55	3.20	6.85	7.80	7.56	5.91	6.93	6.71	8.94	8.44	8.76	11.0	10.00	5.63	6.83	6.47		
175	7.62	7.86	7.81	6.74	5.84	5.21	3.68	1.81	1.48	3.39	3.84	4.28	5.47	7.13	7.26	6.50	7.03		
180	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35		

Table 7: Luminous Intensity Data

TEST RESULTS (3500K 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)	0.401	0.184
Power Factor	0.9942	0.9267
Test Power (W)/4	11.94	11.83
THD A%	5.99	7.43
Luminous Efficacy (lm/W)	141.3	142.4
Total Luminous Flux (lm)	1686.8	1684.8
Color Rendering Index (CRI)	84.4	
R9	16.5	
Correlated Color Temperature (CCT)(K)	3464	
Chromaticity Chroma x	0.4039	
Chromaticity Chroma y	0.3831	
Chromaticity Chroma u	0.2380	
Chromaticity Chroma v	0.3385	
Duv	-0.0031	
Chromaticity Chroma u ’	0.2380	
Chromaticity Chroma v’	0.5078	

Special Color Rendering Indices	
R1	85.3
R2	96.7
R3	91.2
R4	80.2
R5	85.4
R6	93.3
R7	80.8
R8	62
R9	16.5
R10	91.7
R11	80.1
R12	71
R13	89.1
R14	95.9

Table 8: 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

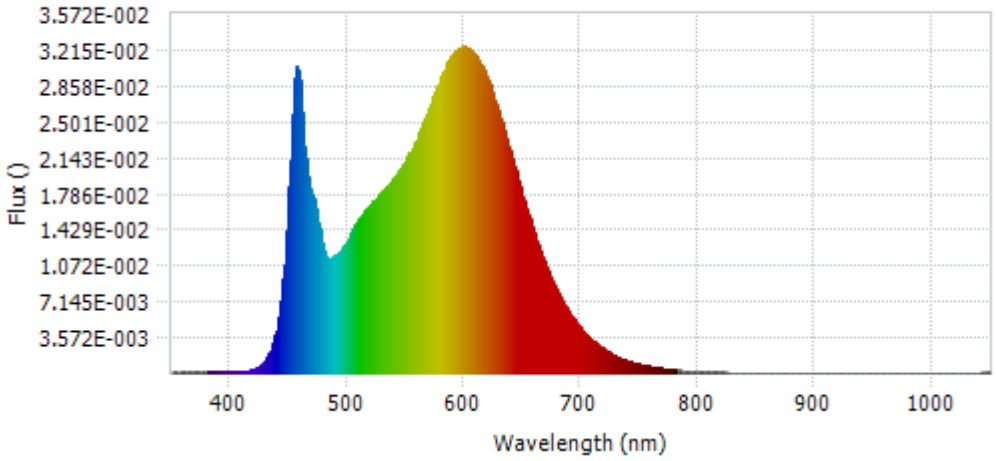
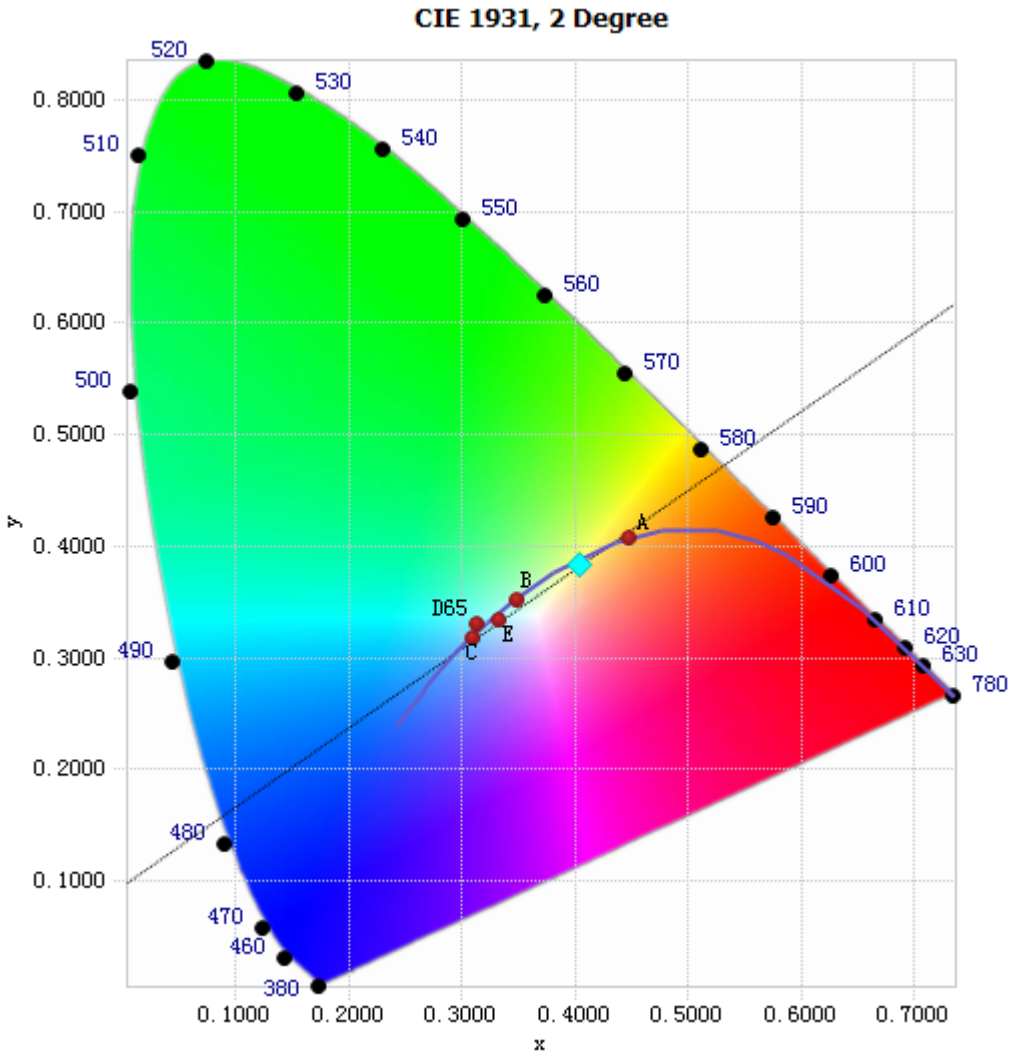


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.49E-04	485	1.14E-02	590	3.17E-02	695	5.16E-03
385	1.28E-04	490	1.17E-02	595	3.23E-02	700	4.40E-03
390	1.44E-04	495	1.23E-02	600	3.25E-02	705	3.78E-03
395	1.39E-04	500	1.33E-02	605	3.21E-02	710	3.20E-03
400	1.32E-04	505	1.44E-02	610	3.15E-02	715	2.74E-03
405	1.24E-04	510	1.54E-02	615	3.06E-02	720	2.35E-03
410	1.70E-04	515	1.62E-02	620	2.91E-02	725	2.01E-03
415	2.49E-04	520	1.67E-02	625	2.76E-02	730	1.69E-03
420	4.32E-04	525	1.74E-02	630	2.57E-02	735	1.44E-03
425	7.51E-04	530	1.81E-02	635	2.37E-02	740	1.24E-03
430	1.35E-03	535	1.87E-02	640	2.18E-02	745	1.05E-03
435	2.57E-03	540	1.94E-02	645	1.97E-02	750	8.95E-04
440	4.89E-03	545	2.03E-02	650	1.76E-02	755	7.68E-04
445	9.29E-03	550	2.11E-02	655	1.57E-02	760	6.51E-04
450	1.86E-02	555	2.22E-02	660	1.39E-02	765	5.66E-04
455	2.94E-02	560	2.34E-02	665	1.22E-02	770	4.81E-04
460	2.76E-02	565	2.49E-02	670	1.06E-02	775	4.08E-04
465	2.01E-02	570	2.64E-02	675	9.27E-03	780	3.51E-04
470	1.78E-02	575	2.79E-02	680	8.02E-03		
475	1.50E-02	580	2.95E-02	685	6.97E-03		
480	1.21E-02	585	3.09E-02	690	5.99E-03		

Table 9: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4039, 0.3831)

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

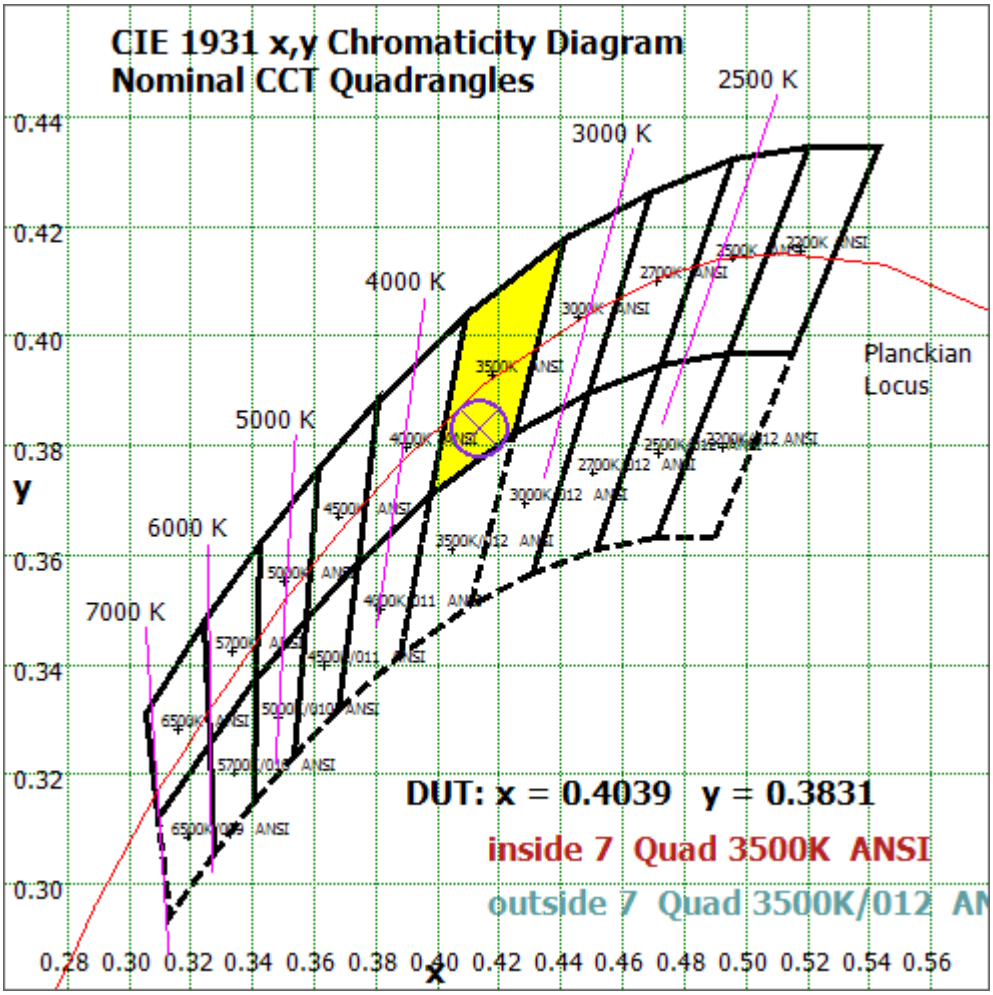


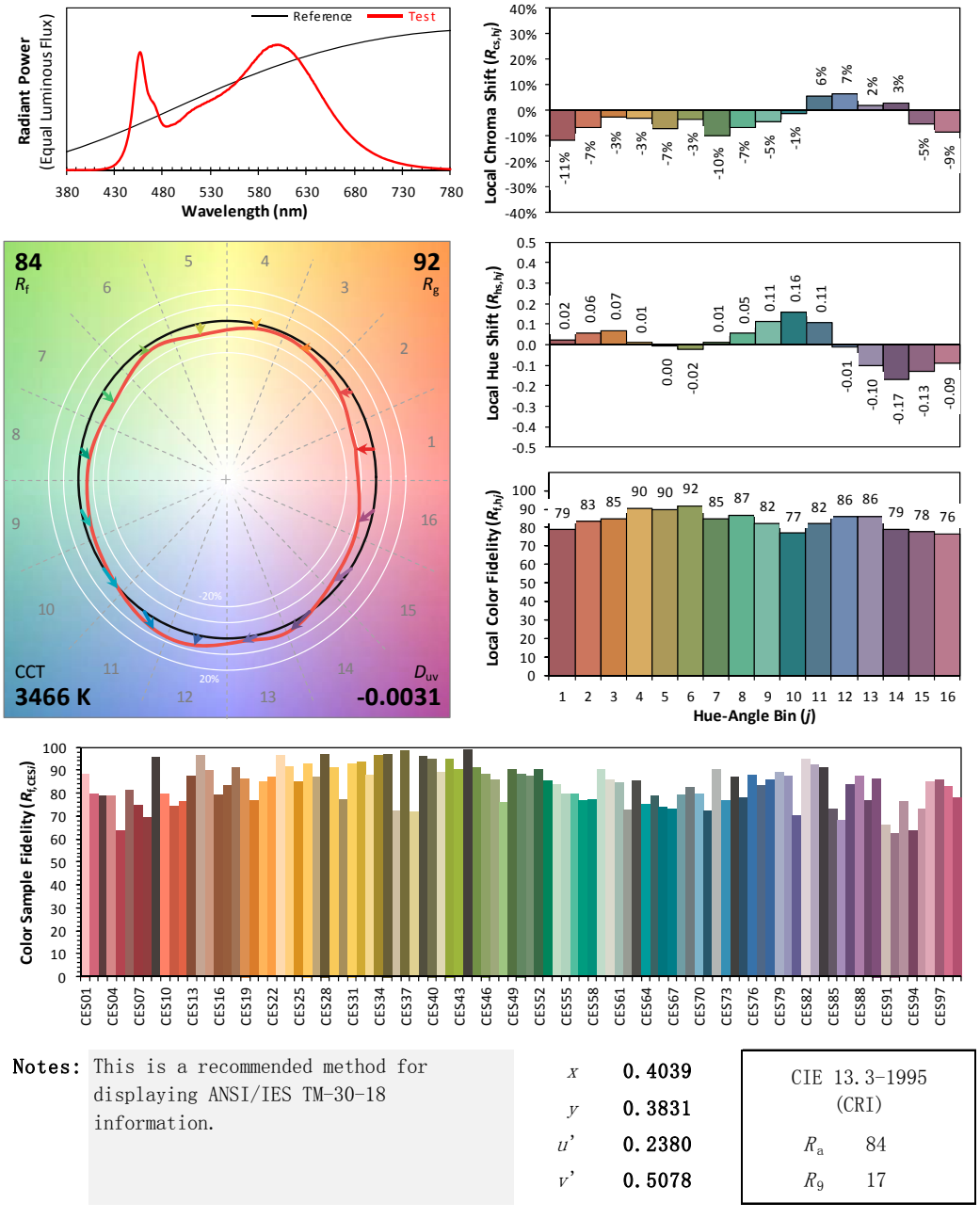
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/29 **Model:** 10.5T8/3F/8CCTS/EXT/SD/A4



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

x	0.4039
y	0.3831
u'	0.2380
v'	0.5078

CIE 13.3-1995 (CRI)

R_a	84
R_9	17

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 8 due to rounding.

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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.398	0.183
Power Factor	0.9942	0.9266
Test Power (W)/4	11.86	11.74
THD A%	6.09	7.13
Luminous Efficacy (lm/W)	144.5	146.1
Total Luminous Flux (lm)	1713.3	1715.1
Color Rendering Index (CRI)	85.4	
R9	22.1	
Correlated Color Temperature (CCT)(K)	3916	
Chromaticity Chroma x	0.3813	
Chromaticity Chroma y	0.3692	
Chromaticity Chroma u	0.2287	
Chromaticity Chroma v	0.3322	
Duv	-0.0038	
Chromaticity Chroma u ’	0.2287	
Chromaticity Chroma v’	0.4983	

Special Color Rendering Indices	
R1	86.9
R2	97.5
R3	91.6
R4	81
R5	86.4
R6	92.5
R7	81.9
R8	65.4
R9	22.1
R10	93.1
R11	81.1
R12	67.8
R13	90.8
R14	96.2

Table 10: 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

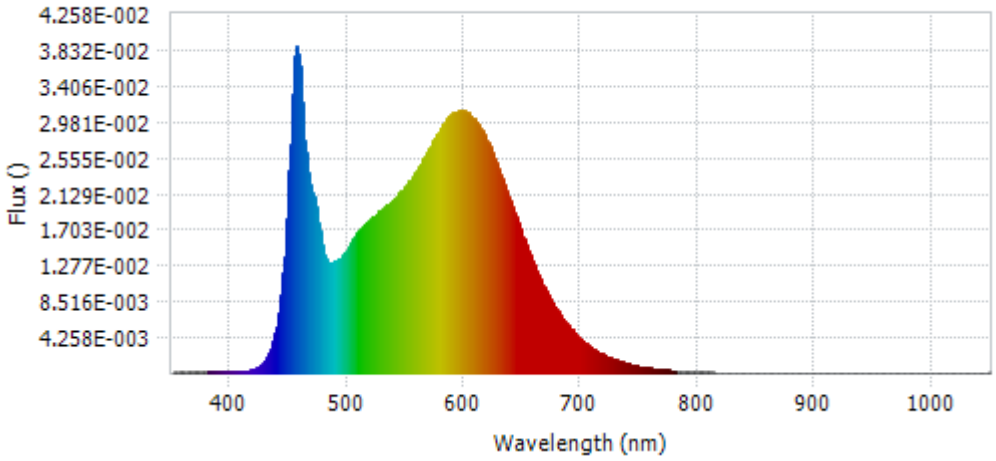
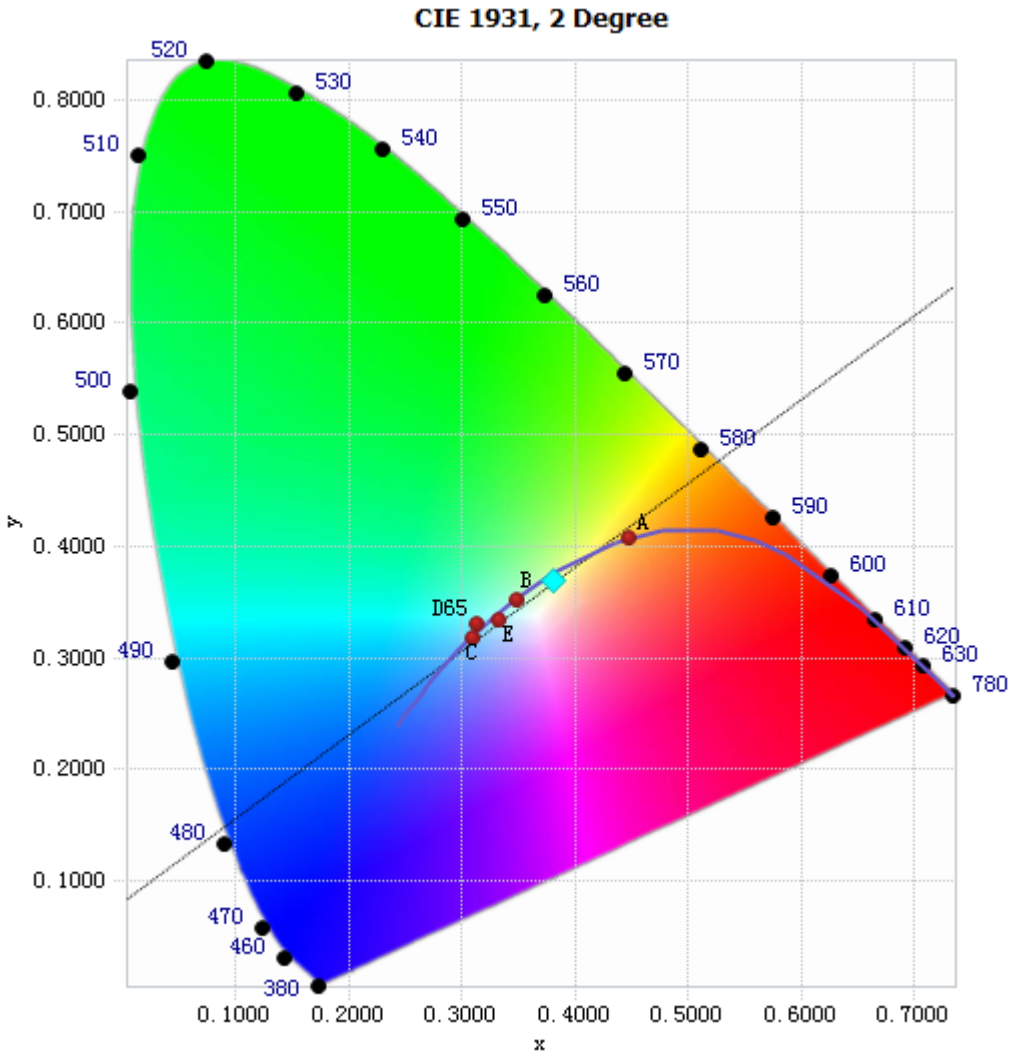


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.76E-04	485	1.32E-02	590	3.09E-02	695	4.69E-03
385	1.59E-04	490	1.34E-02	595	3.11E-02	700	4.01E-03
390	1.69E-04	495	1.38E-02	600	3.11E-02	705	3.42E-03
395	1.55E-04	500	1.47E-02	605	3.06E-02	710	2.92E-03
400	1.57E-04	505	1.59E-02	610	2.98E-02	715	2.49E-03
405	1.70E-04	510	1.69E-02	615	2.88E-02	720	2.13E-03
410	1.92E-04	515	1.77E-02	620	2.73E-02	725	1.82E-03
415	2.94E-04	520	1.83E-02	625	2.57E-02	730	1.56E-03
420	4.89E-04	525	1.89E-02	630	2.39E-02	735	1.32E-03
425	9.44E-04	530	1.96E-02	635	2.20E-02	740	1.12E-03
430	1.67E-03	535	2.00E-02	640	2.01E-02	745	9.59E-04
435	3.26E-03	540	2.06E-02	645	1.82E-02	750	8.17E-04
440	6.26E-03	545	2.14E-02	650	1.62E-02	755	7.01E-04
445	1.20E-02	550	2.22E-02	655	1.45E-02	760	5.93E-04
450	2.40E-02	555	2.31E-02	660	1.27E-02	765	5.14E-04
455	3.76E-02	560	2.42E-02	665	1.12E-02	770	4.41E-04
460	3.43E-02	565	2.54E-02	670	9.71E-03	775	3.81E-04
465	2.47E-02	570	2.67E-02	675	8.45E-03	780	3.29E-04
470	2.15E-02	575	2.79E-02	680	7.32E-03		
475	1.79E-02	580	2.91E-02	685	6.36E-03		
480	1.41E-02	585	3.03E-02	690	5.46E-03		

Table 11: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3813, 0.3692)

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

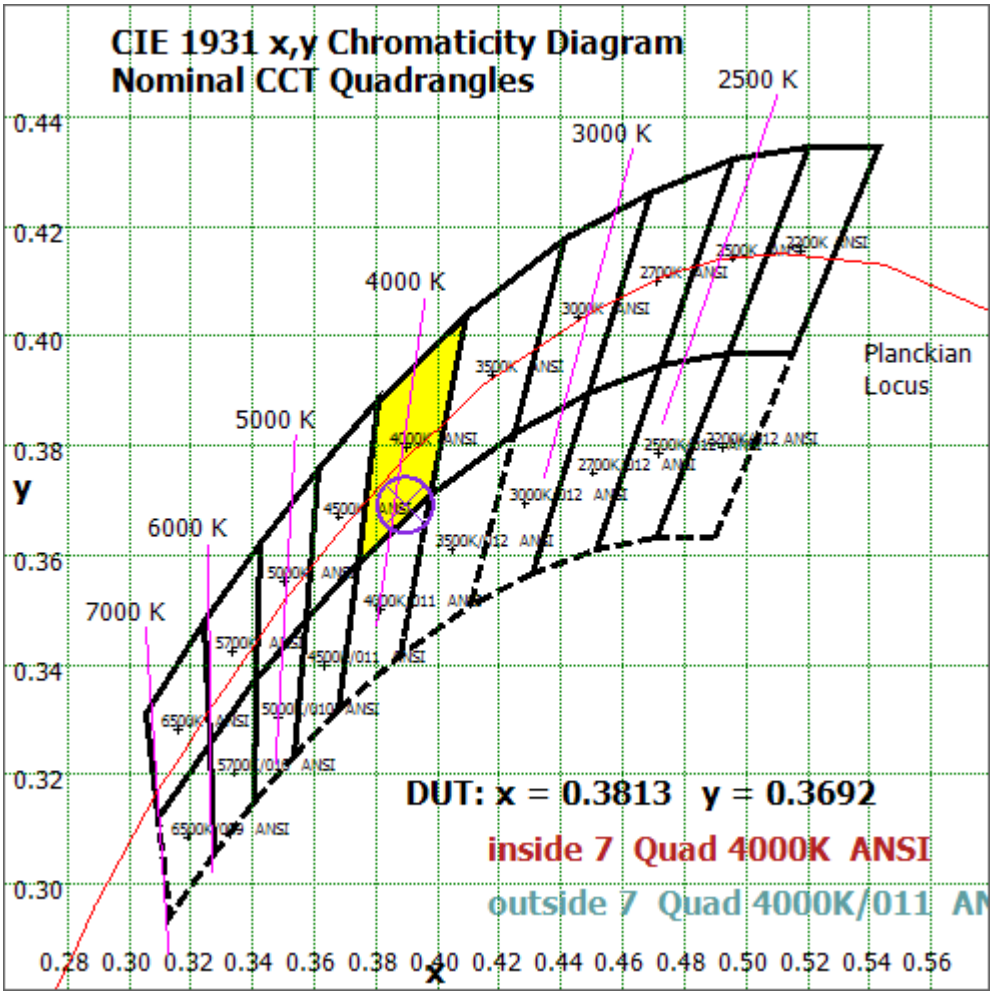


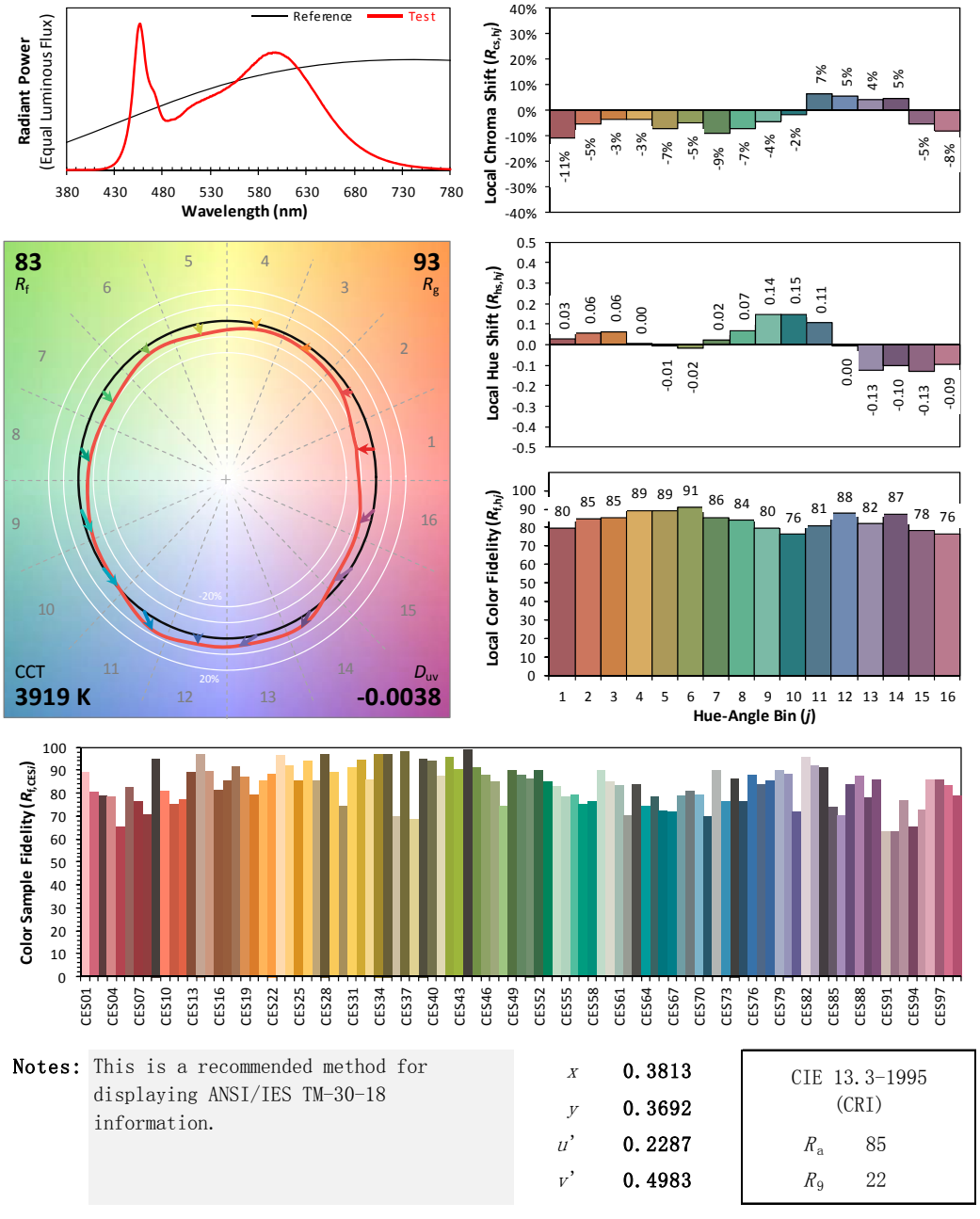
Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/29 **Model:** 10.5T8/3F/8CCTS/EXT/SD/A4



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

x	0.3813
y	0.3692
u'	0.2287
v'	0.4983

CIE 13.3-1995 (CRI)

R_a	85
R_9	22

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.

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)	0.399	0.183
Power Factor	0.9942	0.9271
Test Power (W)/4	11.89	11.77
THD A%	6.02	7.24
Luminous Efficacy (lm/W)	144.9	146.3
Total Luminous Flux (lm)	1722.3	1722.2
Color Rendering Index (CRI)	85.9	
R9	22.4	
Correlated Color Temperature (CCT)(K)	5085	
Chromaticity Chroma x	0.3424	
Chromaticity Chroma y	0.3458	
Chromaticity Chroma u	0.2118	
Chromaticity Chroma v	0.3209	
Duv	-0.0018	
Chromaticity Chroma u ’	0.2118	
Chromaticity Chroma v’	0.4814	

Special Color Rendering Indices	
R1	87.2
R2	96.9
R3	92.8
R4	81.8
R5	86.4
R6	90.7
R7	83.5
R8	68.3
R9	22.4
R10	91.4
R11	82.1
R12	66.2
R13	91.2
R14	97

Table 12: 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

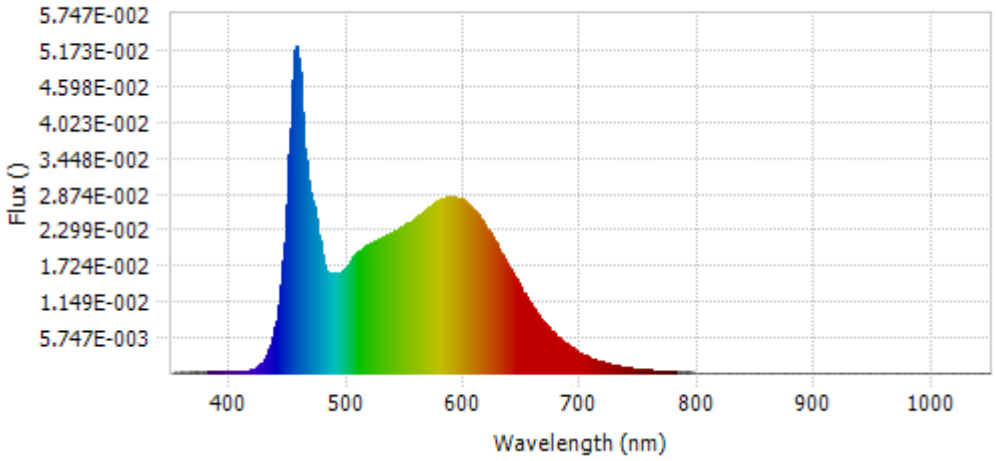
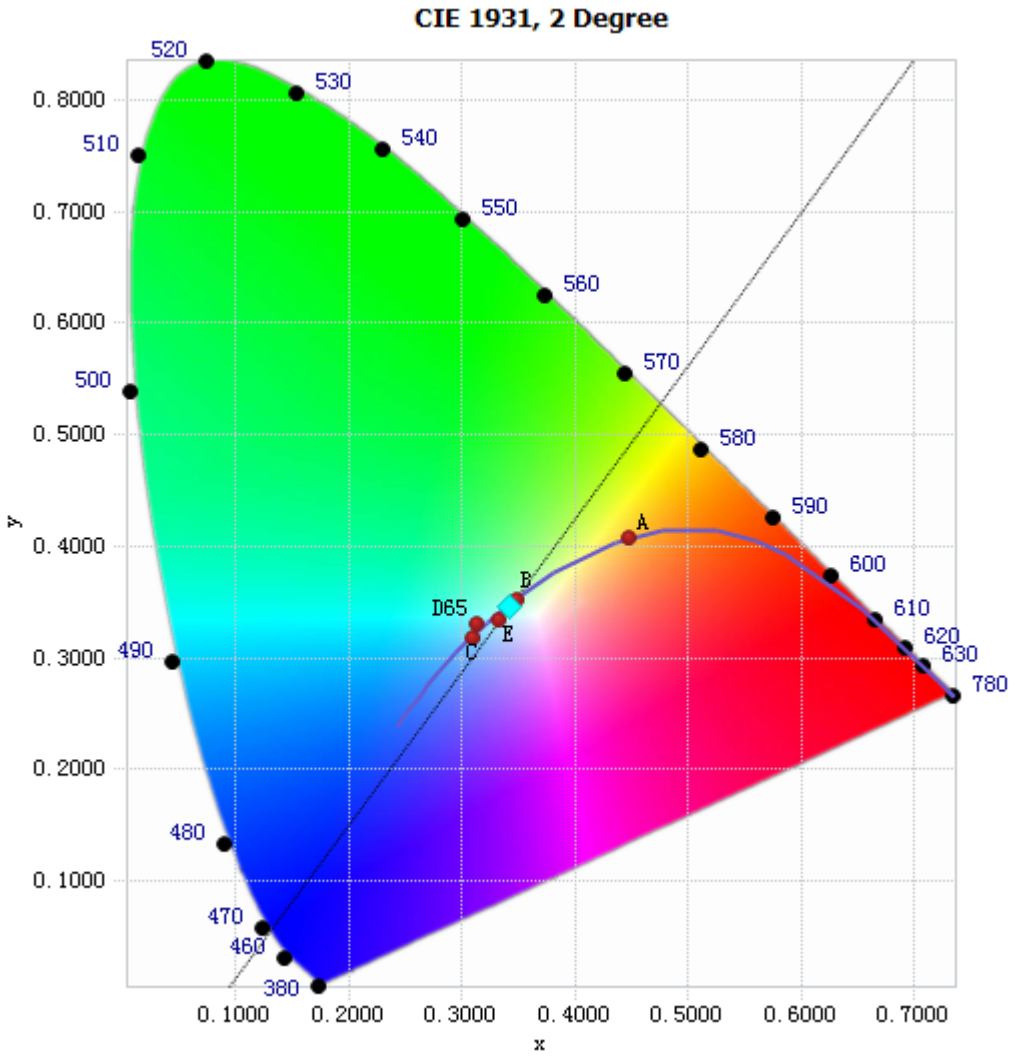


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.94E-04	485	1.60E-02	590	2.83E-02	695	3.65E-03
385	2.02E-04	490	1.61E-02	595	2.80E-02	700	3.12E-03
390	2.13E-04	495	1.64E-02	600	2.75E-02	705	2.67E-03
395	2.24E-04	500	1.73E-02	605	2.67E-02	710	2.26E-03
400	2.04E-04	505	1.85E-02	610	2.57E-02	715	1.95E-03
405	2.00E-04	510	1.94E-02	615	2.44E-02	720	1.67E-03
410	2.62E-04	515	2.03E-02	620	2.29E-02	725	1.42E-03
415	4.19E-04	520	2.08E-02	625	2.14E-02	730	1.21E-03
420	7.37E-04	525	2.13E-02	630	1.97E-02	735	1.03E-03
425	1.39E-03	530	2.18E-02	635	1.80E-02	740	8.82E-04
430	2.55E-03	535	2.21E-02	640	1.64E-02	745	7.49E-04
435	4.99E-03	540	2.27E-02	645	1.47E-02	750	6.44E-04
440	9.56E-03	545	2.31E-02	650	1.30E-02	755	5.49E-04
445	1.81E-02	550	2.37E-02	655	1.15E-02	760	4.69E-04
450	3.49E-02	555	2.43E-02	660	1.01E-02	765	4.06E-04
455	5.18E-02	560	2.51E-02	665	8.83E-03	770	3.46E-04
460	4.49E-02	565	2.58E-02	670	7.65E-03	775	2.99E-04
465	3.20E-02	570	2.66E-02	675	6.66E-03	780	2.60E-04
470	2.75E-02	575	2.72E-02	680	5.73E-03		
475	2.22E-02	580	2.78E-02	685	4.97E-03		
480	1.73E-02	585	2.83E-02	690	4.28E-03		

Table 13: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3424, 0.3458)

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

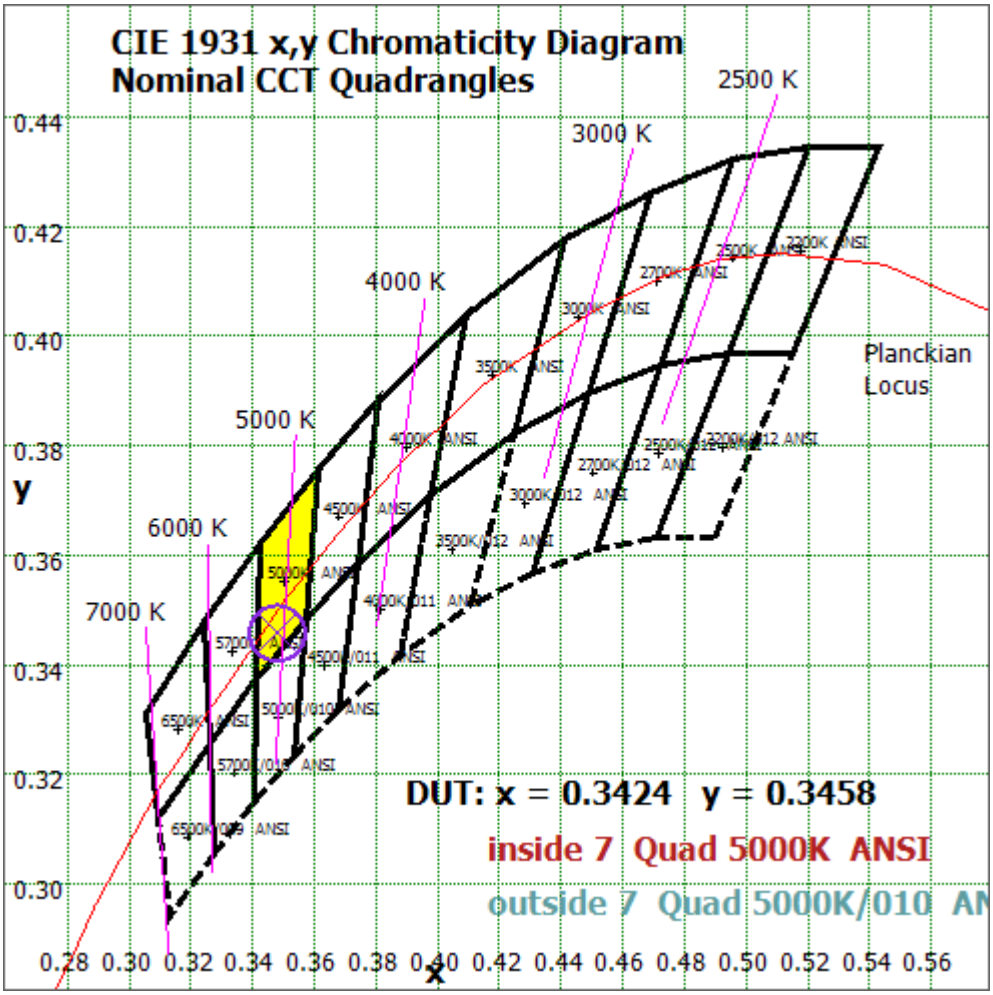


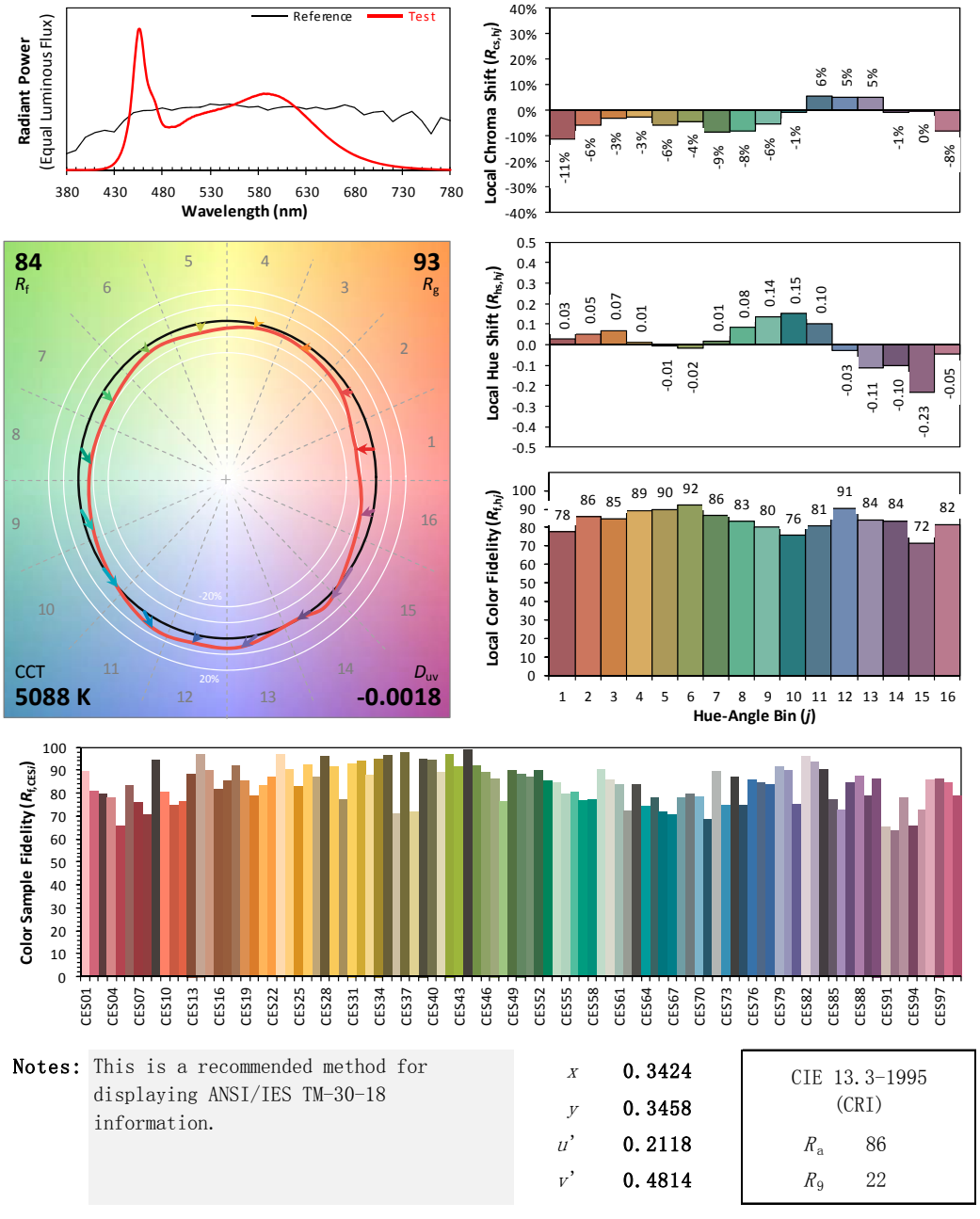
Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/29 **Model:** 10.5T8/3F/8CCTS/EXT/SD/A4



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

x	0.3424
y	0.3458
u'	0.2118
v'	0.4814

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 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 12 due to rounding.

TEST RESULTS (6500K 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)	0.404	0.186
Power Factor	0.9942	0.9279
Test Power (W)/4	12.04	11.92
THD A%	5.97	7.08
Luminous Efficacy (lm/W)	141.8	143.4
Total Luminous Flux (lm)	1706.9	1709.7
Color Rendering Index (CRI)	84.3	
R9	11.8	
Correlated Color Temperature (CCT)(K)	6513	
Chromaticity Chroma x	0.3125	
Chromaticity Chroma y	0.3285	
Chromaticity Chroma u	0.1979	
Chromaticity Chroma v	0.3120	
Duv	0.0030	
Chromaticity Chroma u ’	0.1979	
Chromaticity Chroma v’	0.4680	

Special Color Rendering Indices	
R1	84.2
R2	95.1
R3	93.3
R4	78.4
R5	83
R6	88.7
R7	84.3
R8	67.6
R9	11.8
R10	86.3
R11	78.8
R12	59
R13	88.6
R14	96.9

Table 14: 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

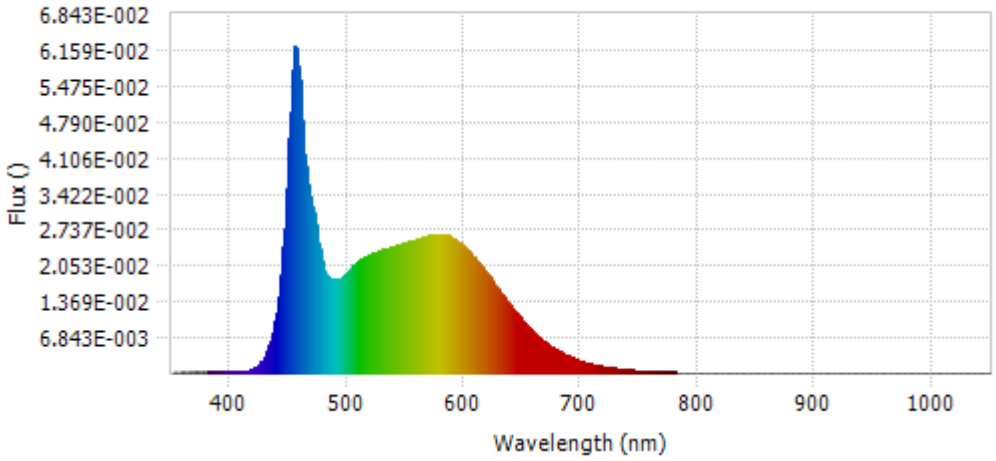
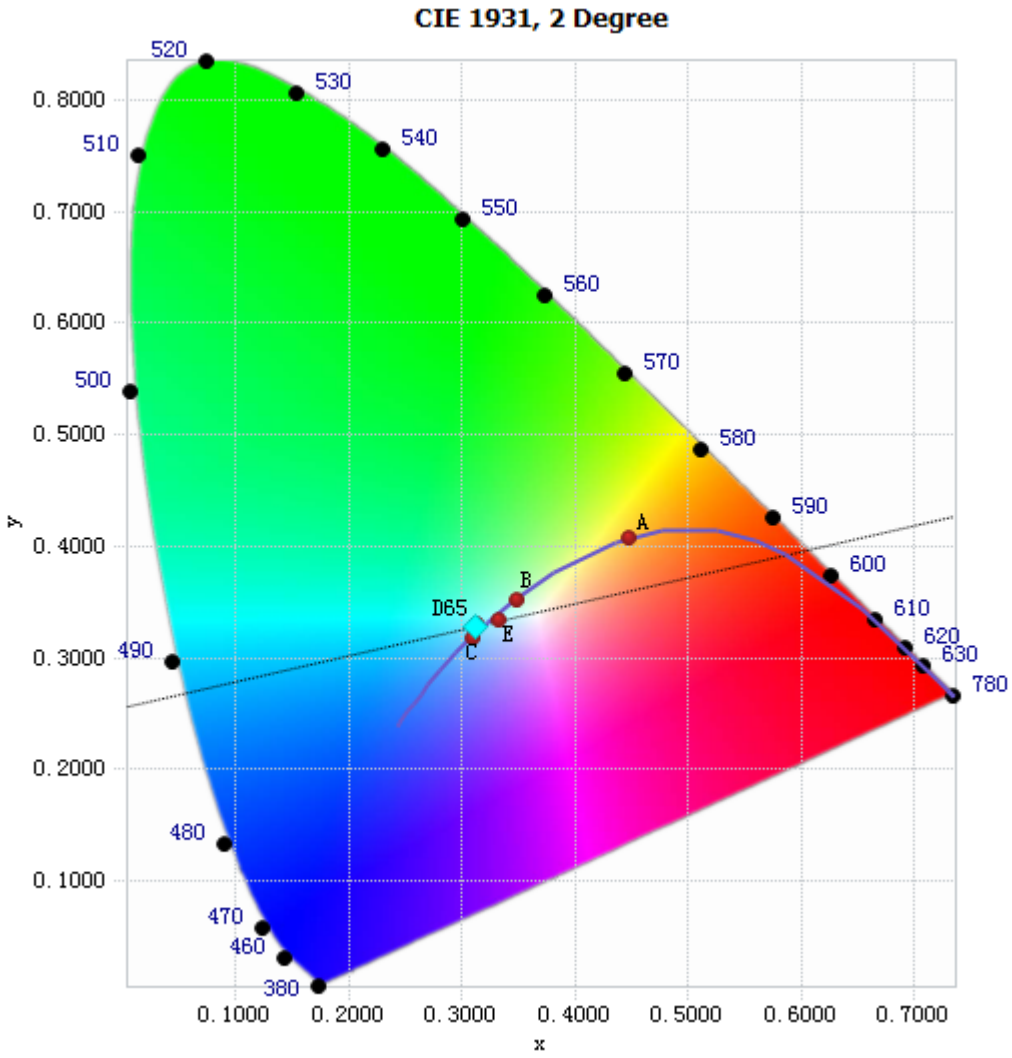


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.43E-04	485	1.81E-02	590	2.57E-02	695	2.71E-03
385	2.48E-04	490	1.80E-02	595	2.50E-02	700	2.32E-03
390	2.41E-04	495	1.83E-02	600	2.41E-02	705	1.98E-03
395	2.41E-04	500	1.92E-02	605	2.28E-02	710	1.69E-03
400	2.36E-04	505	2.05E-02	610	2.16E-02	715	1.45E-03
405	2.37E-04	510	2.14E-02	615	2.02E-02	720	1.24E-03
410	3.29E-04	515	2.22E-02	620	1.87E-02	725	1.06E-03
415	5.56E-04	520	2.27E-02	625	1.72E-02	730	9.01E-04
420	9.89E-04	525	2.31E-02	630	1.57E-02	735	7.77E-04
425	1.89E-03	530	2.36E-02	635	1.41E-02	740	6.70E-04
430	3.57E-03	535	2.38E-02	640	1.27E-02	745	5.69E-04
435	6.88E-03	540	2.41E-02	645	1.13E-02	750	4.86E-04
440	1.29E-02	545	2.45E-02	650	9.94E-03	755	4.19E-04
445	2.40E-02	550	2.48E-02	655	8.75E-03	760	3.60E-04
450	4.46E-02	555	2.52E-02	660	7.63E-03	765	3.15E-04
455	6.22E-02	560	2.55E-02	665	6.66E-03	770	2.71E-04
460	5.20E-02	565	2.59E-02	670	5.73E-03	775	2.36E-04
465	3.73E-02	570	2.62E-02	675	4.97E-03	780	2.00E-04
470	3.17E-02	575	2.63E-02	680	4.30E-03		
475	2.50E-02	580	2.64E-02	685	3.68E-03		
480	1.95E-02	585	2.63E-02	690	3.16E-03		

Table 15: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3125, 0.3285)

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

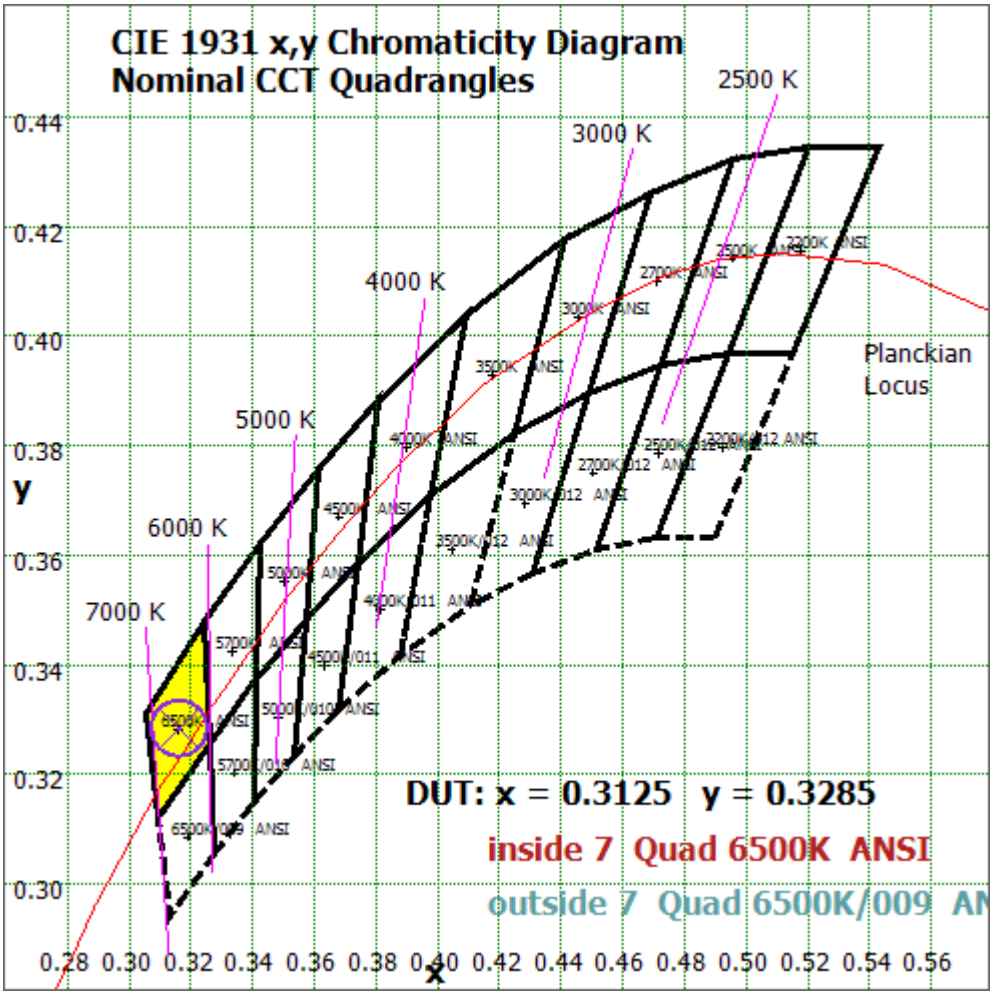


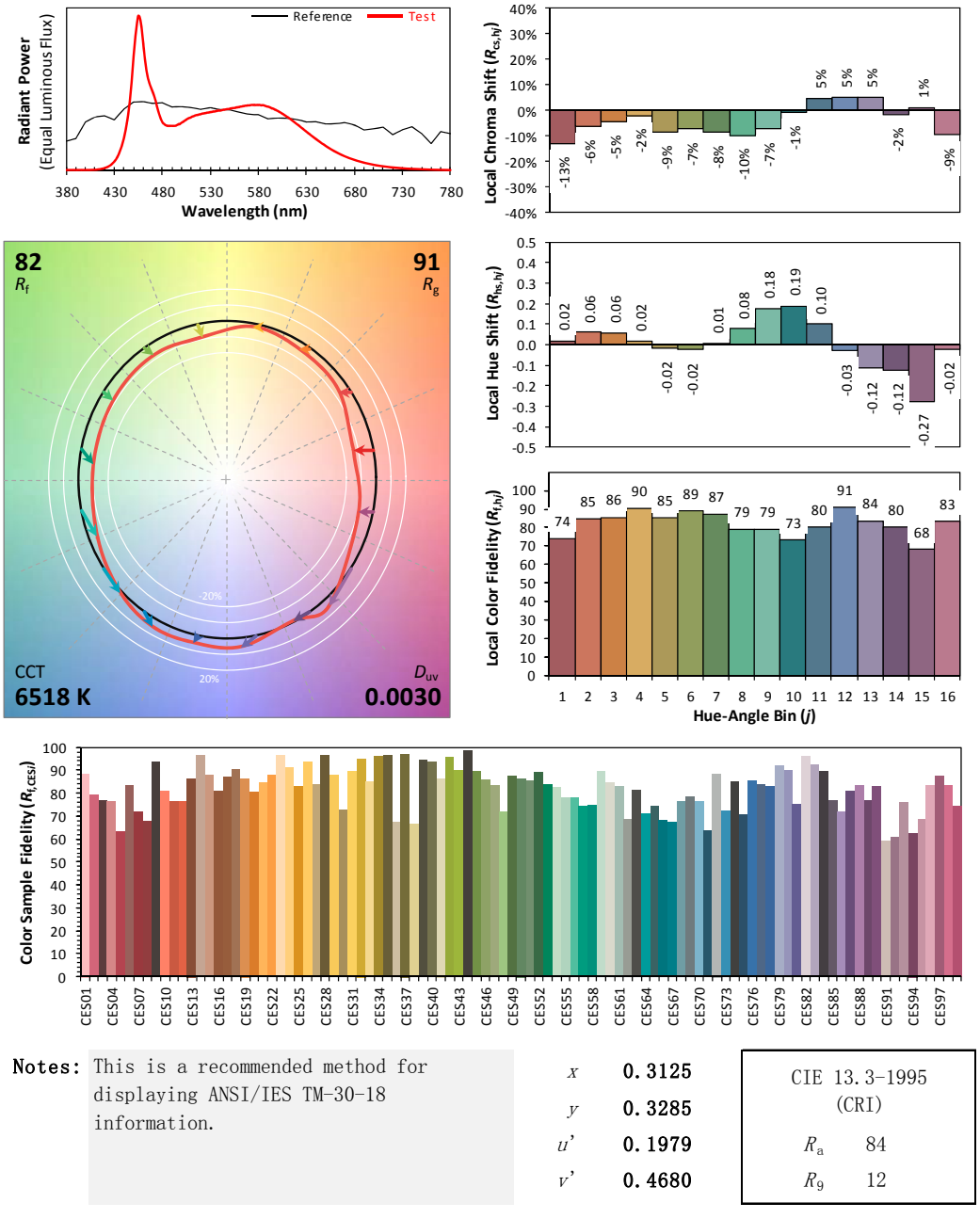
Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/29 **Model:** 10.5T8/3F/8CCTS/EXT/SD/A4



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

x	0.3125
y	0.3285
u'	0.1979
v'	0.4680

CIE 13.3-1995 (CRI)

R_a	84
R_9	12

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 14 due to rounding.

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 05, 2022	Aug. 04, 2023
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2022	Aug. 04, 2023
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2022	Aug. 04, 2023
Standard source	D908	HZTE012-01	Aug. 05, 2022	Aug. 04, 2023
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2022	Aug. 04, 2023
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2022	Aug. 04, 2023
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2022	Aug. 04, 2023
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2022	Aug. 04, 2023
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2022	Aug. 04, 2023
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2022	Aug. 04, 2023
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2022	Aug. 04, 2023
Multi-Meter	FLUKE15B	HZTE020-01	Aug. 05, 2022	Aug. 04, 2023

Table 16: 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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