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: 11.5T8/4F/8CCTS/EXT/SD/A4

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23060027i

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

Review by: Wei Fei

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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	11.5T8/4F/8CCTS/EXT/SD/A4 3000K Setting	11.5T8/4F/8CCTS/EXT/SD/A4 3500K Setting	11.5T8/4F/8CCTS/EXT/SD/A4 4000K Setting
Luminous Efficacy (Lumens /Watt)	137.5	141.8	145.2
Total Luminous Flux (Lumens)	1787.5	1824.4	1850.9
Power (Watts)/4	13.00	12.87	12.75
Power Factor	0.9950	0.9948	0.9948
CCT (K)	3015	3482	3961
CRI	82.5	84.6	85.7
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Tested Model	11.5T8/4F/8CCTS/EXT/SD/A4 5000K Setting	11.5T8/4F/8CCTS/EXT/SD/A4 6500K Setting
Luminous Efficacy (Lumens /Watt)	145.5	142.3
Total Luminous Flux (Lumens)	1862.7	1847.7
Power (Watts)/4	12.80	12.98
Power Factor	0.9947	0.9949
CCT (K)	5073	6522
CRI	86.0	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	: 11.5T8/4F/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)	0.435	0.198
Power Factor	0.9950	0.9359
Test Power (W)/4	13.00	12.83
THD A%	5.38	6.49
Luminous Efficacy (lm/W)	137.6	139.0
Total Luminous Flux (lm)	1787.5	1783.8
Color Rendering Index (CRI)	82.5	
R9	6.8	
Correlated Color Temperature (CCT)(K)	3015	
Chromaticity Chroma x	0.4344	
Chromaticity Chroma y	0.4008	
Chromaticity Chroma u	0.2503	
Chromaticity Chroma v	0.3465	
Duv	-0.0009	
Chromaticity Chroma u ’	0.2503	
Chromaticity Chroma v’	0.5197	

Special Color Rendering Indices	
R1	81.9
R2	93.8
R3	92.7
R4	79
R5	82.4
R6	92.5
R7	80.3
R8	57.3
R9	6.8
R10	85.9
R11	78.5
R12	73.2
R13	85.1
R14	96.6

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

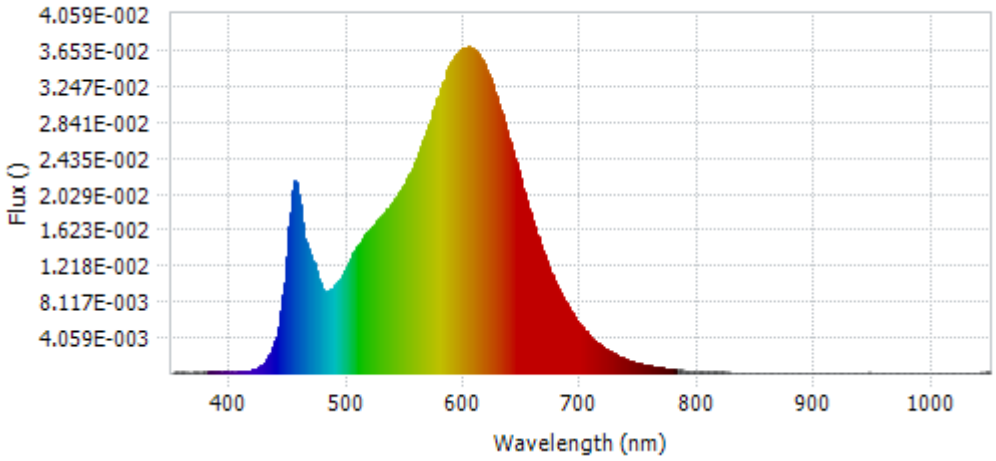
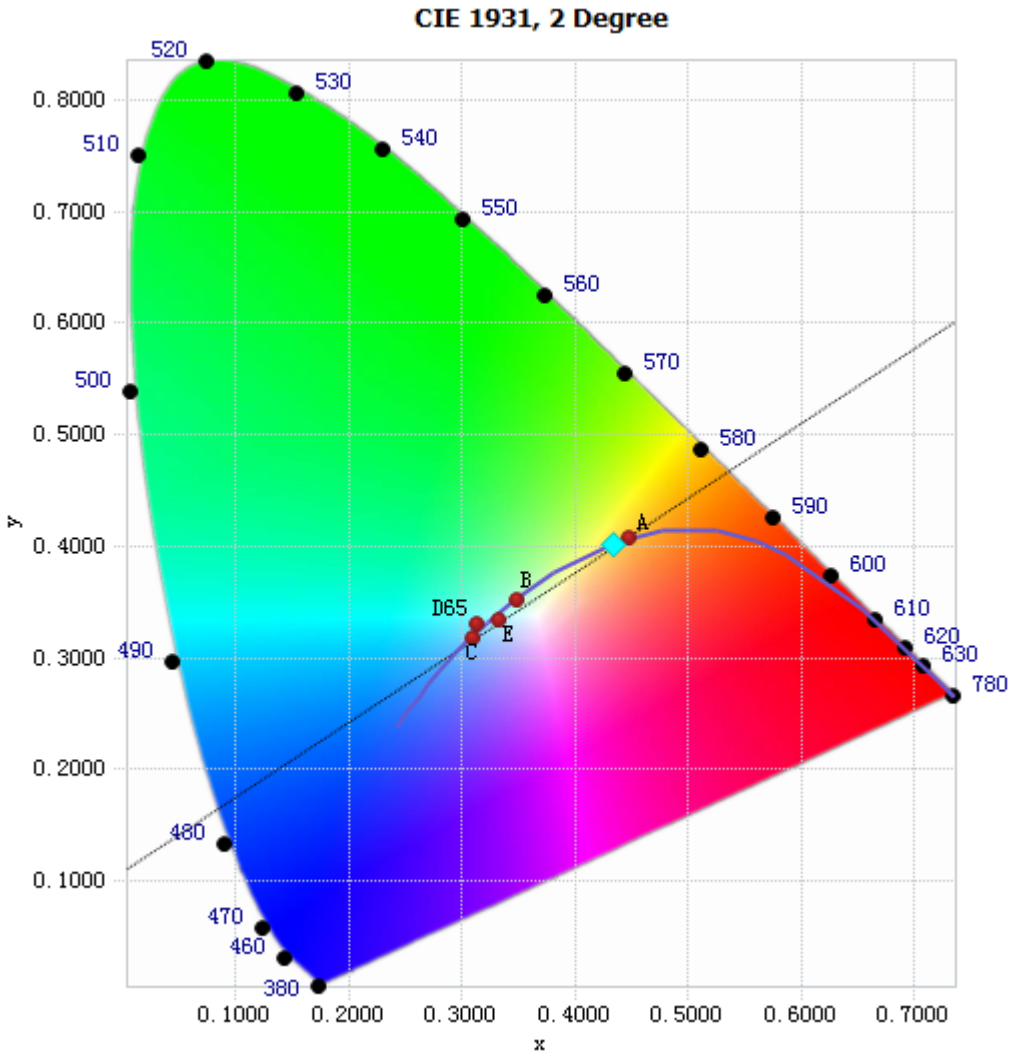


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.08E-04	485	9.35E-03	590	3.54E-02	695	6.20E-03
385	1.35E-04	490	1.01E-02	595	3.63E-02	700	5.30E-03
390	1.21E-04	495	1.09E-02	600	3.68E-02	705	4.54E-03
395	9.09E-05	500	1.23E-02	605	3.67E-02	710	3.85E-03
400	1.20E-04	505	1.35E-02	610	3.63E-02	715	3.29E-03
405	1.20E-04	510	1.46E-02	615	3.53E-02	720	2.83E-03
410	1.65E-04	515	1.56E-02	620	3.39E-02	725	2.41E-03
415	2.46E-04	520	1.63E-02	625	3.22E-02	730	2.05E-03
420	4.36E-04	525	1.71E-02	630	3.01E-02	735	1.74E-03
425	7.83E-04	530	1.79E-02	635	2.80E-02	740	1.48E-03
430	1.36E-03	535	1.86E-02	640	2.57E-02	745	1.25E-03
435	2.53E-03	540	1.94E-02	645	2.33E-02	750	1.07E-03
440	4.68E-03	545	2.05E-02	650	2.09E-02	755	9.28E-04
445	8.94E-03	550	2.16E-02	655	1.87E-02	760	7.90E-04
450	1.65E-02	555	2.29E-02	660	1.65E-02	765	6.74E-04
455	2.18E-02	560	2.46E-02	665	1.46E-02	770	5.76E-04
460	1.81E-02	565	2.63E-02	670	1.27E-02	775	4.97E-04
465	1.43E-02	570	2.82E-02	675	1.11E-02	780	4.22E-04
470	1.28E-02	575	3.02E-02	680	9.62E-03		
475	1.06E-02	580	3.22E-02	685	8.34E-03		
480	9.17E-03	585	3.41E-02	690	7.20E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4344, 0.4008)

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

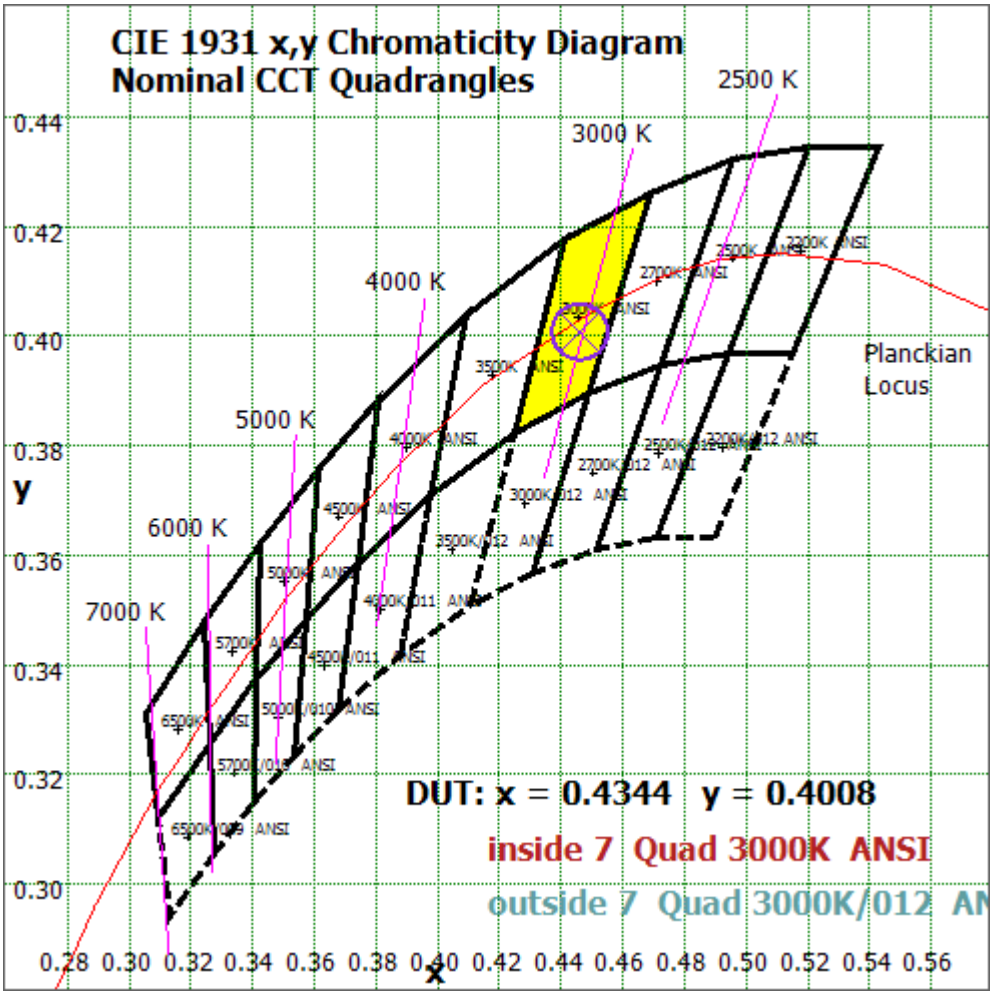


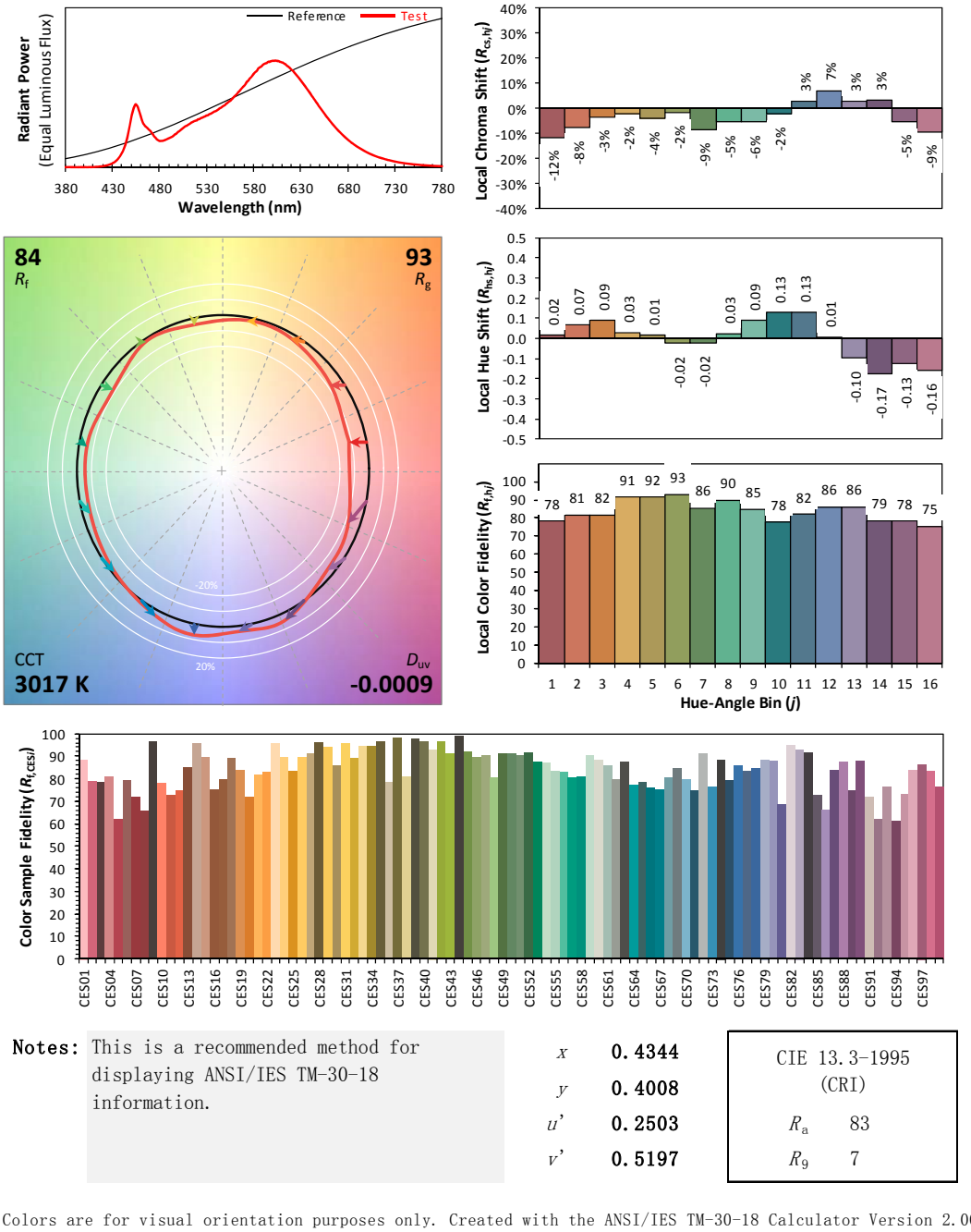
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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:** 11.5T8/4F/8CCTS/EXT/SD/A4



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

x	0.4344
y	0.4008
u'	0.2503
v'	0.5197

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)	0.438
Power Factor	0.9919
Power (W)/4	13.03
Luminous Efficacy (lm/W)	137.9
Total Luminous Flux (lm)	1797.1
Beam Angle (°)	117.7 (0^o-180^o) / 254.8 (90^o-270^o)
Center Beam Candle Power (cd)	271
Maximum Beam Candle Power (cd)	271.3 (At: C=150.0, Gamma=3.0)
Spacing Criteria	1.33 (0^o-180^o) / 1.49 (90^o-270^o)
Zonal Lumens in the 0°-60°Zone	40.33%
Zonal Lumens in the 60°-90°Zone	27.27%
Zonal Lumens in the 90°-120°Zone	19.21%
Zonal Lumens in the 120°-180°Zone	13.19%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	25.712	1.43%
10- 20	74.977	4.17%
20- 30	117.986	6.57%
30- 40	151.411	8.43%
40- 50	172.954	9.62%
50- 60	181.64	10.11%
60- 70	178.032	9.91%
70- 80	164.797	9.17%
80- 90	147.266	8.19%
90-100	130.976	7.29%
100-110	115.037	6.40%
110-120	99.272	5.52%
120-130	82.537	4.59%
130-140	65.353	3.64%
140-150	46.795	2.60%
150-160	28.204	1.57%
160-170	11.588	0.64%
170-180	2.558	0.14%
Total	1797.1	100%

γ(°)	Lumens	% Total
0- 60	724.68	40.33%
60- 90	490.095	27.27%
0-90	1214.78	67.60%
90- 180	582.32	32.40%
0- 180	1797.1	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

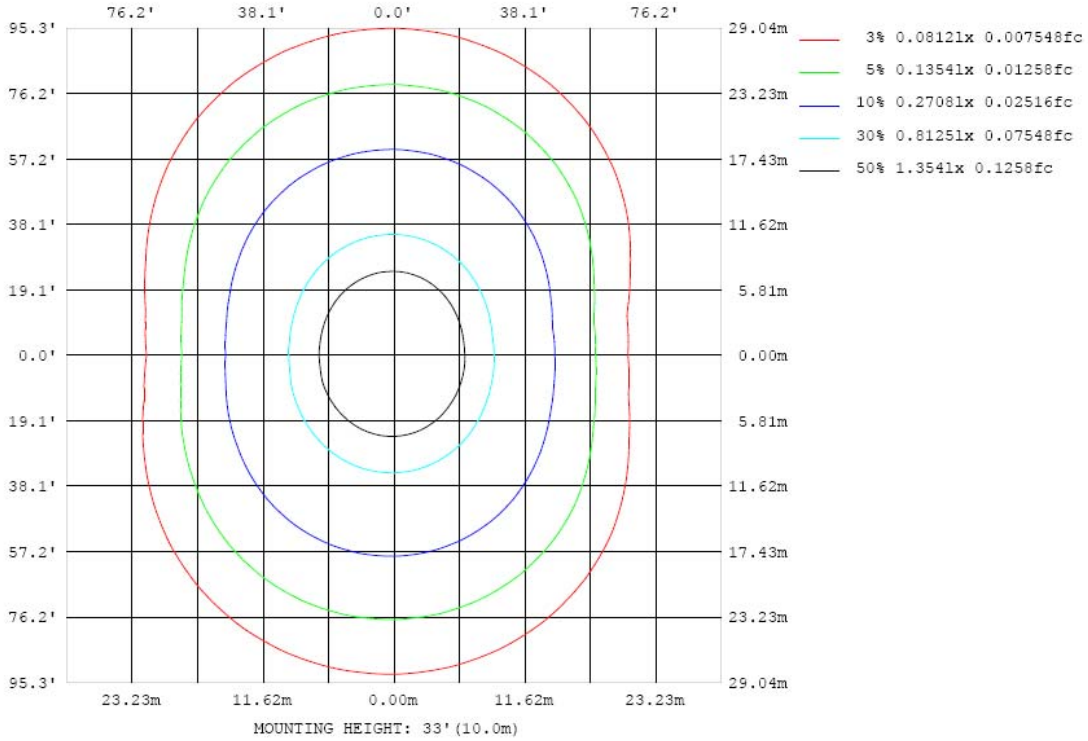


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

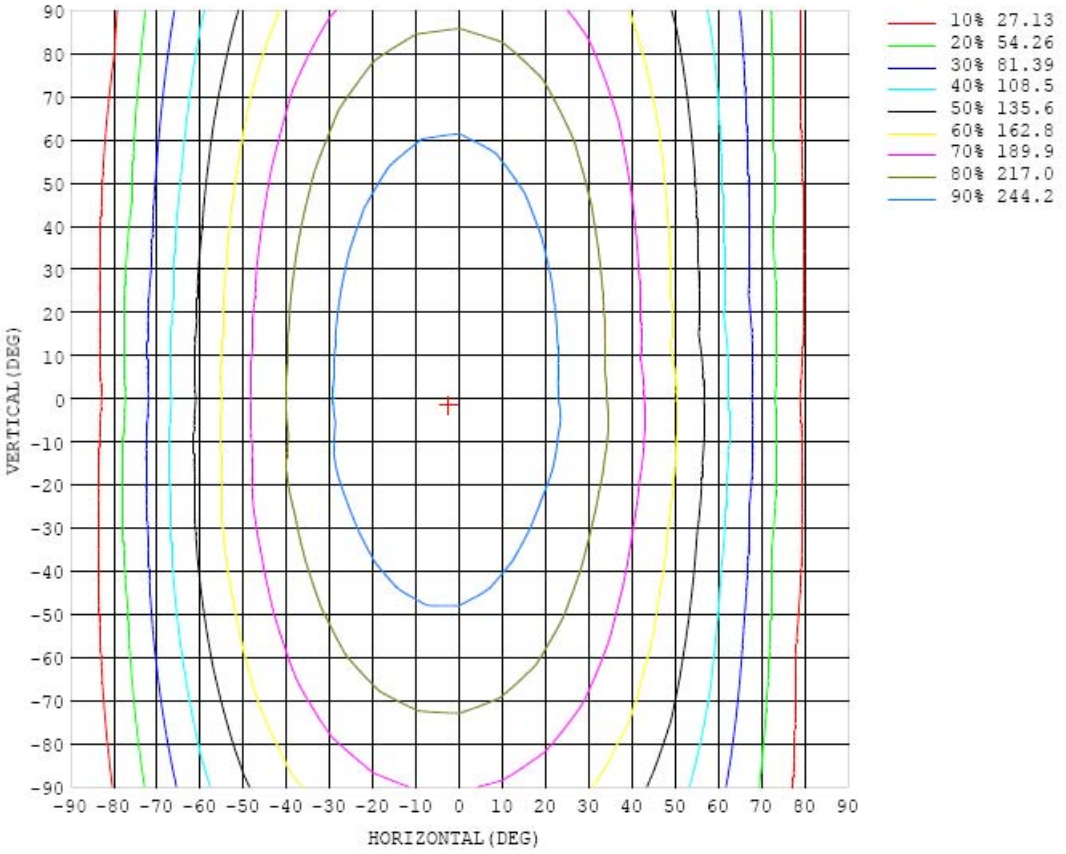


Chart 6: Isocandela Plot

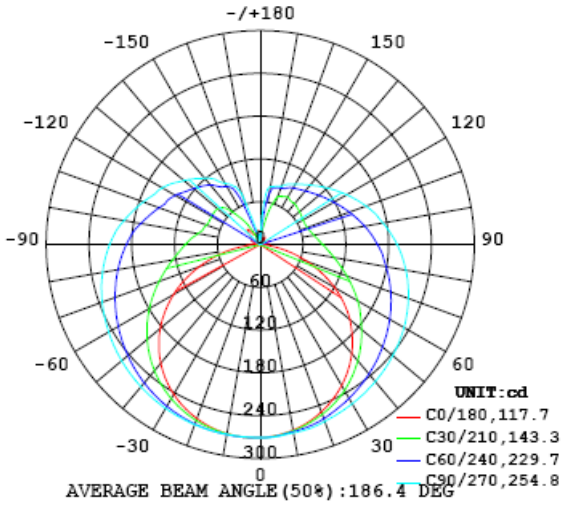


Chart 7: Polar Candela Distribution

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	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271
5	269	269	269	269	269	269	270	270	270	270	270	271	271	271	271	271	271	271	271
10	264	265	265	265	266	266	267	267	268	268	269	269	269	269	269	269	269	269	269
15	258	258	260	260	261	263	264	265	266	267	268	268	268	267	267	266	265	266	265
20	250	251	252	253	256	258	260	261	263	264	265	265	265	265	264	262	260	260	260
25	240	242	243	246	249	251	254	257	259	261	262	261	261	260	258	257	254	252	252
30	228	231	232	236	240	244	249	253	256	258	258	258	256	254	251	249	246	242	242
35	215	217	220	225	231	237	243	248	252	254	255	254	252	248	244	240	237	231	231
40	199	202	206	213	221	229	237	243	248	251	251	250	246	241	235	230	225	218	217
45	182	185	190	199	210	221	230	238	244	247	247	245	241	234	226	218	212	203	201
50	164	167	174	185	199	212	224	233	239	242	243	240	234	226	216	205	196	186	183
55	143	147	157	171	188	203	217	227	234	238	238	234	228	218	206	192	180	167	163
60	120	125	138	158	176	194	209	221	229	233	233	229	221	210	195	178	164	148	141
65	95.4	102	120	143	166	186	202	215	223	227	227	222	214	201	184	165	146	126	117
70	70.2	78.6	101	129	155	177	195	208	217	221	221	216	206	192	173	151	127	104	91.2
75	45.1	56.4	84.7	117	145	169	187	201	210	214	214	208	198	182	162	137	108	81.1	65.9
80	22.5	37.3	70.6	105	136	161	179	194	203	207	207	201	190	174	152	124	91.3	59.6	40.6
85	6.38	23.9	59.8	95.5	127	153	172	186	195	200	199	193	181	165	142	112	76.6	40.8	18.1
90	1.59	17.5	52.4	87.5	119	145	164	178	187	192	191	185	173	157	132	101	64.9	27.9	4.63
95	1.84	15.3	47.9	81.2	111	137	157	171	179	183	182	176	165	148	123	92.6	56.8	21.6	1.45
100	5.90	16.1	45.1	76.3	105	129	149	163	171	175	174	168	157	139	115	85.4	51.7	20.2	3.20
105	9.82	19.0	44.1	72.6	99.2	122	141	154	163	167	166	159	148	131	108	79.8	49.2	21.9	7.22
110	12.4	23.4	45.5	70.1	94.5	116	133	146	154	158	157	150	139	123	101	75.8	48.9	25.9	12.0
115	14.2	28.6	48.3	69.1	90.7	110	126	138	145	149	147	142	131	116	95.9	73.3	50.4	31.3	13.5
120	8.89	30.9	52.4	69.3	87.9	105	119	130	137	140	139	133	123	109	91.7	72.1	53.0	37.7	13.1
125	2.47	33.4	56.4	70.4	86.0	100	113	122	129	131	130	125	116	104	88.4	71.8	56.4	44.8	16.0
130	2.71	40.3	60.3	72.0	84.7	96.8	107	116	121	123	122	117	110	98.9	86.0	72.4	60.0	52.1	18.2
135	3.43	46.7	62.2	73.3	83.9	93.7	102	109	114	116	115	111	104	95.0	84.5	73.6	63.6	56.7	23.5
140	8.46	51.7	65.9	74.9	83.4	91.2	98.2	104	108	109	108	105	99.1	91.9	83.6	74.1	65.8	59.3	27.9
145	11.8	43.7	66.7	74.7	83.0	89.3	94.6	99.0	102	103	102	99.4	95.1	89.4	82.9	74.6	70.4	52.9	19.4
150	11.0	33.3	71.6	76.8	80.5	87.1	91.7	94.8	97.0	97.8	97.1	95.1	91.8	87.5	80.6	75.5	73.4	55.0	15.7
155	7.83	30.4	63.7	73.7	80.7	83.5	87.7	91.1	92.9	93.5	93.0	91.1	87.9	83.2	80.0	77.9	74.4	57.1	16.9
160	8.21	16.3	49.2	71.4	78.5	82.6	84.3	85.6	86.6	87.1	86.8	85.5	84.1	82.6	80.9	79.1	74.8	43.1	17.3
165	9.50	11.1	26.3	52.5	68.6	78.3	82.5	83.8	84.3	84.5	84.3	83.9	82.8	81.8	81.1	78.8	67.8	42.0	19.3
170	10.3	10.4	15.8	26.0	42.4	59.1	72.9	80.9	82.8	82.4	82.4	82.0	81.1	79.7	75.9	67.4	49.2	29.5	19.9
175	12.4	11.0	12.5	14.6	16.8	20.5	27.8	38.6	49.8	57.0	58.7	57.5	54.4	48.4	39.1	31.0	27.4	23.5	19.8
180	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85

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	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271		
5	271	271	271	271	271	271	271	271	271	270	270	270	269	269	269	269	269		
10	269	269	270	270	270	271	271	271	270	270	269	268	267	266	265	265	264		
15	265	266	267	268	269	270	270	270	270	269	268	266	264	262	261	259	258		
20	260	261	263	264	266	268	269	269	269	268	266	263	260	257	254	252	250		
25	252	254	257	260	263	265	267	268	267	266	263	260	255	251	247	243	240		
30	243	246	250	254	258	262	264	266	265	263	260	255	250	244	238	232	229		
35	232	235	241	247	253	258	261	263	263	261	257	251	243	235	227	220	215		
40	218	224	231	239	247	253	258	260	260	258	253	245	236	226	216	206	199		
45	203	210	219	230	240	248	254	257	257	254	248	240	229	216	203	191	182		
50	186	195	207	220	232	242	249	253	254	250	244	234	221	206	190	175	163		
55	167	178	194	210	224	236	245	249	250	246	239	228	213	195	176	157	143		
60	146	160	179	199	216	230	239	245	245	242	234	221	205	184	162	139	122		
65	124	142	165	188	208	223	234	240	241	237	228	215	197	174	148	122	99.6		
70	100	123	151	177	199	217	228	235	236	232	223	209	189	164	136	104	77.6		
75	76.9	105	137	167	191	210	222	229	230	226	217	202	182	155	124	89.0	57.6		
80	54.6	88.7	125	157	183	203	216	223	225	221	211	196	174	147	114	76.3	40.0		
85	35.8	75.3	114	148	175	195	209	216	218	214	204	189	168	140	106	67.4	28.0		
90	23.9	65.3	105	140	167	188	202	209	211	207	198	182	161	133	100	62.6	23.4		
95	17.6	58.0	97.4	132	159	180	194	202	204	200	190	175	154	127	95.0	59.7	23.3		
100	16.3	51.5	88.8	122	150	170	184	192	194	190	181	167	147	121	91.3	58.4	25.3		
105	18.0	49.4	83.2	114	140	160	174	182	184	181	173	159	140	116	88.9	58.3	26.9		
110	20.4	50.2	80.4	109	132	151	164	172	175	172	164	151	134	113	86.5	58.0	27.0		
115	18.4	51.9	78.8	105	128	144	155	162	165	163	157	146	130	108	83.7	58.8	26.9		
120	7.09	52.1	78.9	100	121	138	150	157	159	157	150	139	123	103	81.7	59.5	24.7		
125	5.61	52.4	79.1	97.5	115	129	140	147	150	148	141	131	116	99.2	77.5	60.0	21.2		
130	3.11	49.6	78.2	95.3	110	122	132	138	140	138	132	123	110	94.9	74.9	61.3	15.9		
135	0.00	38.2	73.1	91.3	105	116	124	129	130	129	124	116	104	87.3	74.4	56.1	10.7		
140	5.23	14.4	58.3	87.4	97.5	109	116	120	121	120	116	108	95.5	83.5	71.1	37.1	4.63		
145	11.0	7.17	42.1	83.4	92.0	99.0	105	110	112	110	104	96.6	88.5	78.2	63.5	17.0	2.39		
150	10.0	8.89	21.4	51.8	88.8	93.7	96.5	98.6	99.4	98.2	95.2	90.3	80.3	63.5	37.7	5.69	4.78		
155	11.0	10.6	8.58	21.2	49.4	81.1	89.5	91.1	91.0	89.9	85.4	75.1	59.2	38.3	16.1	6.82	6.42		
160	10.2	14.8	13.4	14.2	18.8	23.8	44.4	59.8	70.1	66.8	57.1	39.7	23.1	11.1	11.1	6.86	7.11		
165	8.56	10.1	14.3	9.51	13.6	12.5	18.2	20.6	21.3	11.4	9.19	10.5	14.5	10.1	6.25	9.32	10.2		
170	14.2	10.7	10.7	9.10	14.4	12.3	9.41	7.76	6.37	9.94	9.79	8.64	11.2	9.06	9.46	9.27	9.57		
175	16.7	13.1	9.88	11.6	13.7	14.2	13.3	10.8	10.2	12.7	12.3	12.1	12.1	12.1	10.7	10.1	11.7		
180	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85		

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)	0.431	0.196
Power Factor	0.9948	0.9353
Test Power (W)/4	12.87	12.72
THD A%	5.49	6.63
Luminous Efficacy (lm/W)	141.8	143.3
Total Luminous Flux (lm)	1824.4	1822.8
Color Rendering Index (CRI)	84.6	
R9	17.2	
Correlated Color Temperature (CCT)(K)	3482	
Chromaticity Chroma x	0.4025	
Chromaticity Chroma y	0.3814	
Chromaticity Chroma u	0.2378	
Chromaticity Chroma v	0.3379	
Duv	-0.0036	
Chromaticity Chroma u ’	0.2378	
Chromaticity Chroma v’	0.5069	

Special Color Rendering Indices	
R1	85.4
R2	96.4
R3	91.8
R4	80.8
R5	85.6
R6	93
R7	81.3
R8	62.6
R9	17.2
R10	91
R11	80.7
R12	71
R13	89
R14	96.3

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

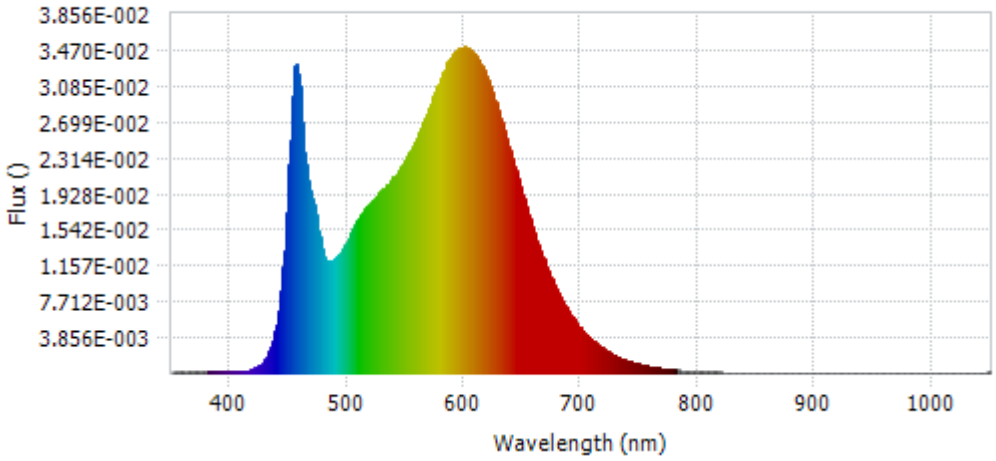
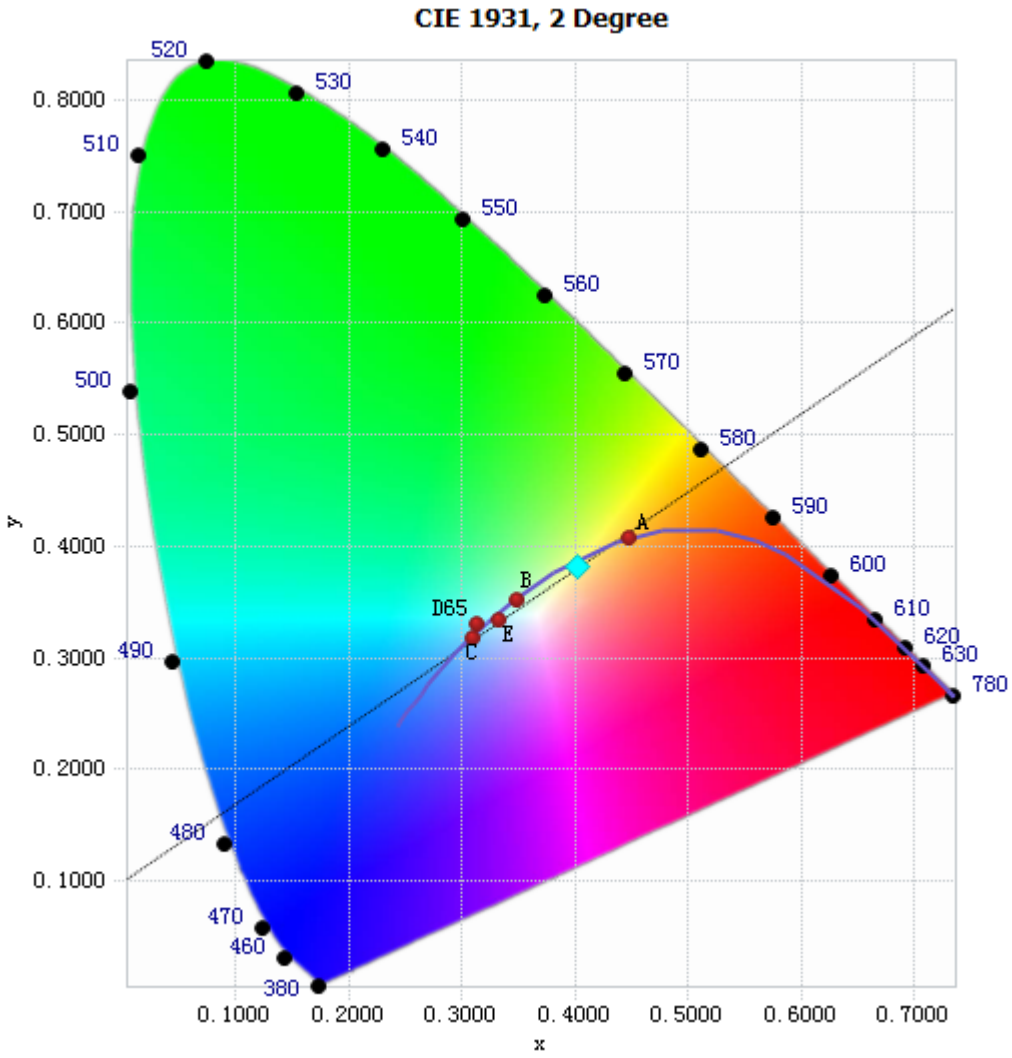


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.86E-04	485	1.20E-02	590	3.43E-02	695	5.58E-03
385	1.42E-04	490	1.25E-02	595	3.48E-02	700	4.76E-03
390	1.54E-04	495	1.32E-02	600	3.51E-02	705	4.07E-03
395	1.51E-04	500	1.43E-02	605	3.47E-02	710	3.47E-03
400	1.48E-04	505	1.56E-02	610	3.40E-02	715	2.96E-03
405	1.48E-04	510	1.66E-02	615	3.29E-02	720	2.54E-03
410	1.92E-04	515	1.76E-02	620	3.14E-02	725	2.17E-03
415	2.90E-04	520	1.82E-02	625	2.97E-02	730	1.84E-03
420	5.00E-04	525	1.90E-02	630	2.78E-02	735	1.56E-03
425	8.85E-04	530	1.98E-02	635	2.57E-02	740	1.33E-03
430	1.62E-03	535	2.03E-02	640	2.35E-02	745	1.13E-03
435	3.08E-03	540	2.11E-02	645	2.13E-02	750	9.61E-04
440	5.91E-03	545	2.20E-02	650	1.91E-02	755	8.25E-04
445	1.15E-02	550	2.29E-02	655	1.70E-02	760	7.15E-04
450	2.23E-02	555	2.41E-02	660	1.50E-02	765	6.02E-04
455	3.30E-02	560	2.55E-02	665	1.32E-02	770	5.16E-04
460	2.90E-02	565	2.69E-02	670	1.15E-02	775	4.39E-04
465	2.15E-02	570	2.85E-02	675	1.01E-02	780	3.68E-04
470	1.87E-02	575	3.02E-02	680	8.71E-03		
475	1.54E-02	580	3.18E-02	685	7.52E-03		
480	1.25E-02	585	3.33E-02	690	6.48E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4025, 0.3814)

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

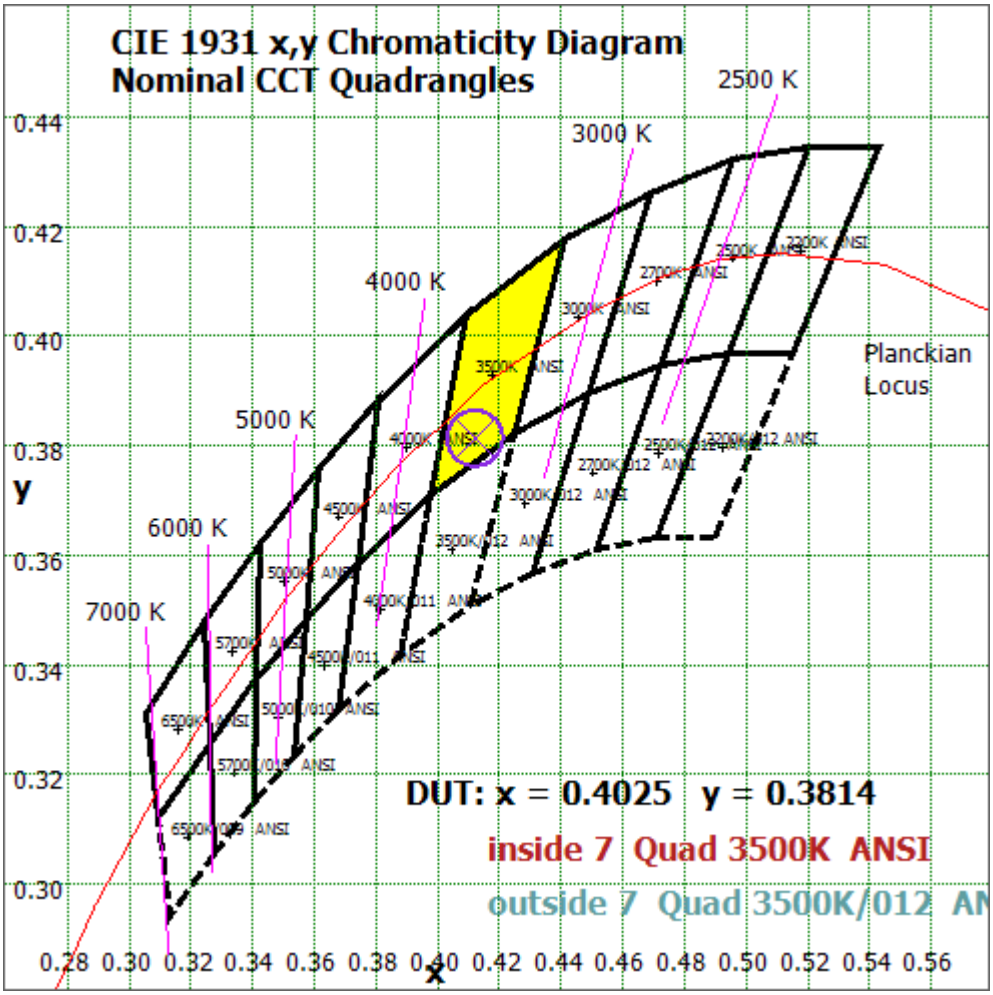


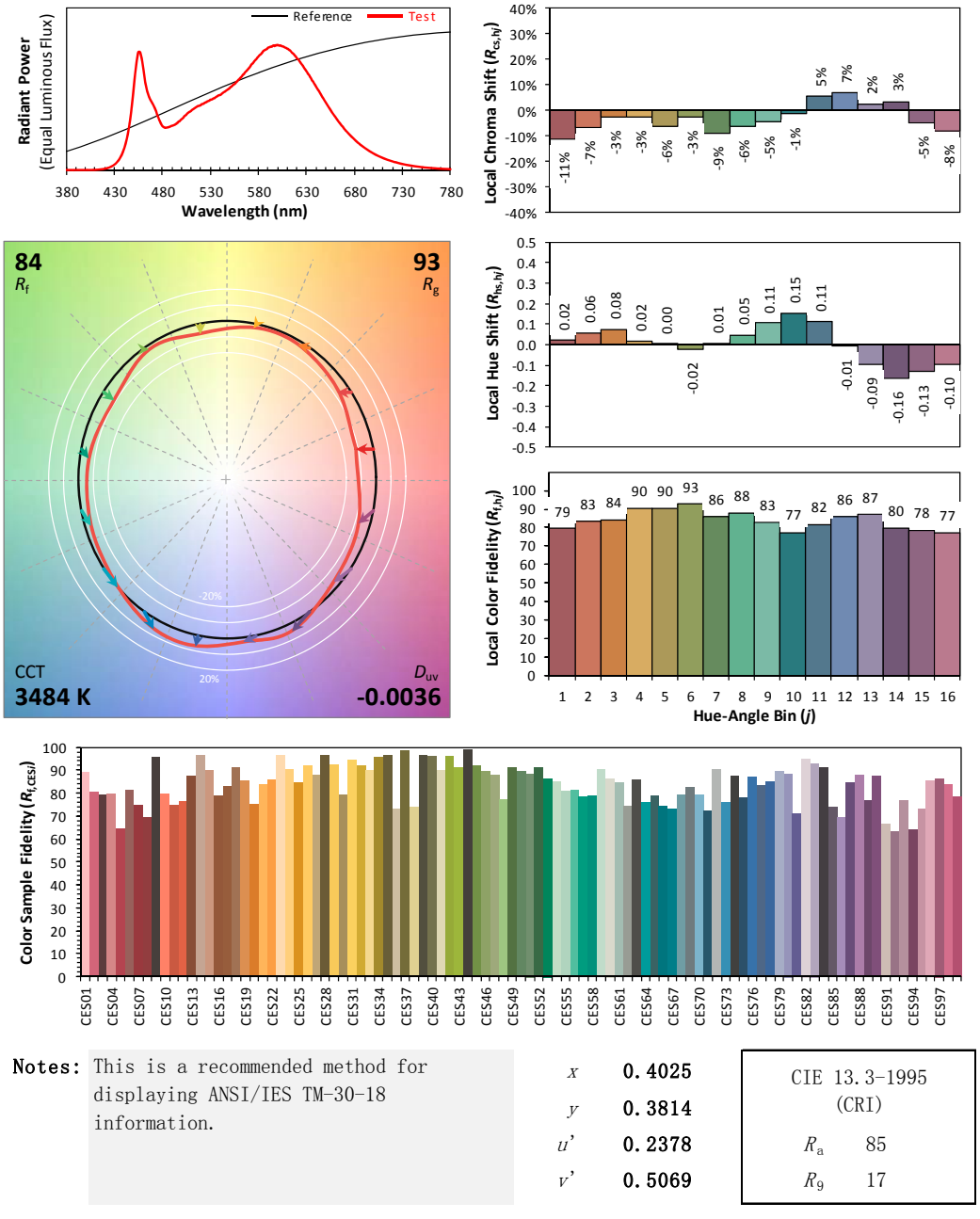
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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:** 11.5T8/4F/8CCTS/EXT/SD/A4



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

x	0.4025
y	0.3814
u'	0.2378
v'	0.5069

CIE 13.3-1995 (CRI)

R_a	85
R_9	17

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

Chart 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)	0.427	0.195
Power Factor	0.9948	0.9343
Test Power (W)/4	12.75	12.61
THD A%	5.58	6.72
Luminous Efficacy (lm/W)	145.2	146.8
Total Luminous Flux (lm)	1850.9	1850.7
Color Rendering Index (CRI)	85.7	
R9	23	
Correlated Color Temperature (CCT)(K)	3961	
Chromaticity Chroma x	0.3792	
Chromaticity Chroma y	0.3674	
Chromaticity Chroma u	0.2281	
Chromaticity Chroma v	0.3315	
Duv	-0.0041	
Chromaticity Chroma u ’	0.2281	
Chromaticity Chroma v’	0.4972	

Special Color Rendering Indices	
R1	87.1
R2	97.3
R3	92.1
R4	81.5
R5	86.5
R6	92.3
R7	82.3
R8	66.1
R9	23
R10	92.5
R11	81.6
R12	67.5
R13	90.9
R14	96.6

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

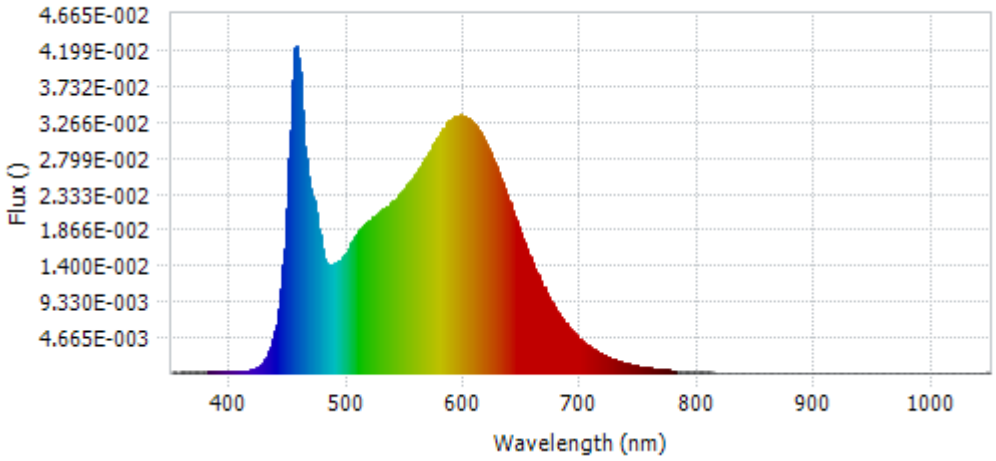
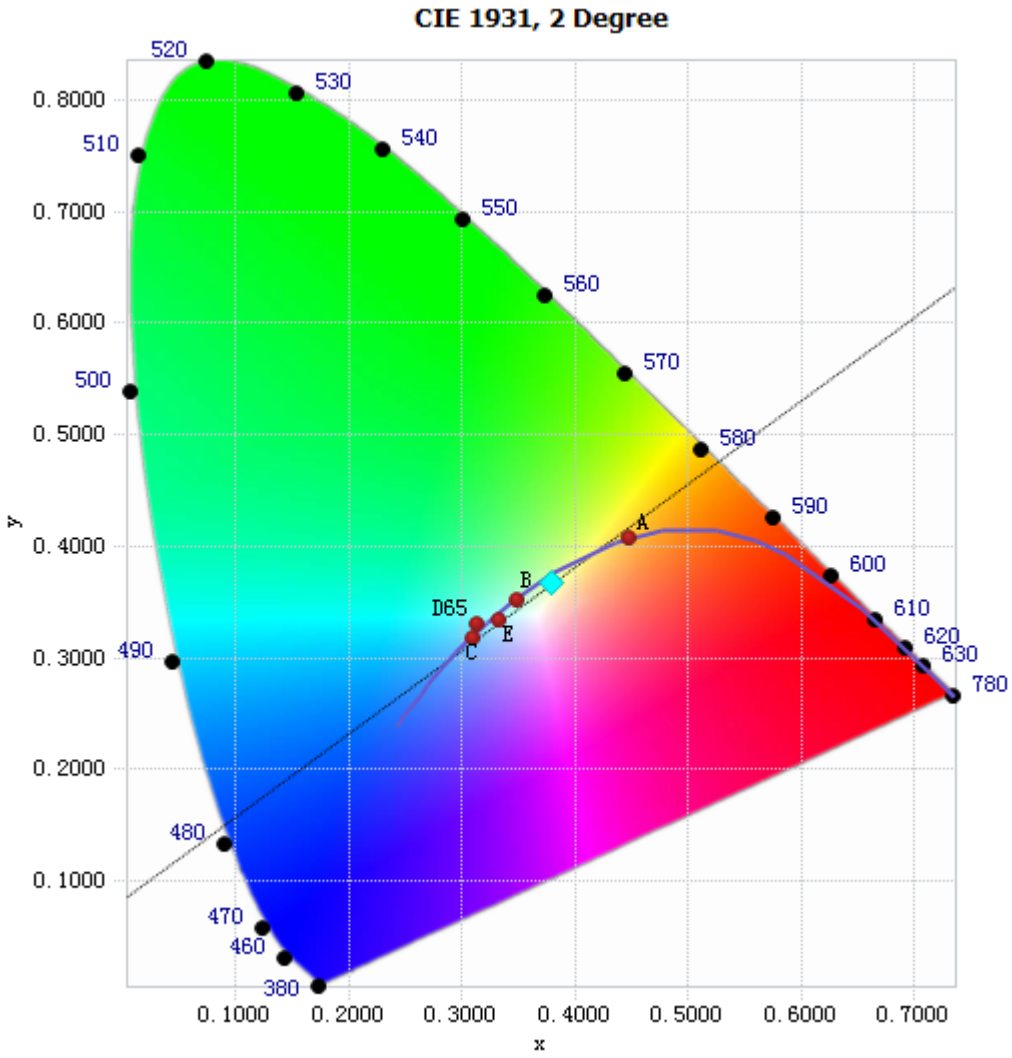


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.98E-04	485	1.41E-02	590	3.32E-02	695	5.03E-03
385	1.77E-04	490	1.44E-02	595	3.34E-02	700	4.30E-03
390	1.63E-04	495	1.49E-02	600	3.34E-02	705	3.67E-03
395	1.72E-04	500	1.60E-02	605	3.29E-02	710	3.12E-03
400	1.83E-04	505	1.73E-02	610	3.20E-02	715	2.67E-03
405	1.90E-04	510	1.84E-02	615	3.09E-02	720	2.29E-03
410	2.22E-04	515	1.93E-02	620	2.93E-02	725	1.95E-03
415	3.48E-04	520	1.99E-02	625	2.76E-02	730	1.65E-03
420	5.71E-04	525	2.06E-02	630	2.57E-02	735	1.41E-03
425	1.04E-03	530	2.13E-02	635	2.37E-02	740	1.19E-03
430	1.95E-03	535	2.18E-02	640	2.16E-02	745	1.02E-03
435	3.79E-03	540	2.25E-02	645	1.95E-02	750	8.70E-04
440	7.34E-03	545	2.33E-02	650	1.74E-02	755	7.53E-04
445	1.41E-02	550	2.40E-02	655	1.55E-02	760	6.39E-04
450	2.80E-02	555	2.50E-02	660	1.37E-02	765	5.43E-04
455	4.22E-02	560	2.62E-02	665	1.20E-02	770	4.68E-04
460	3.68E-02	565	2.75E-02	670	1.04E-02	775	4.00E-04
465	2.66E-02	570	2.87E-02	675	9.09E-03	780	3.44E-04
470	2.30E-02	575	3.01E-02	680	7.87E-03		
475	1.87E-02	580	3.13E-02	685	6.83E-03		
480	1.48E-02	585	3.26E-02	690	5.87E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3792, 0.3674)

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

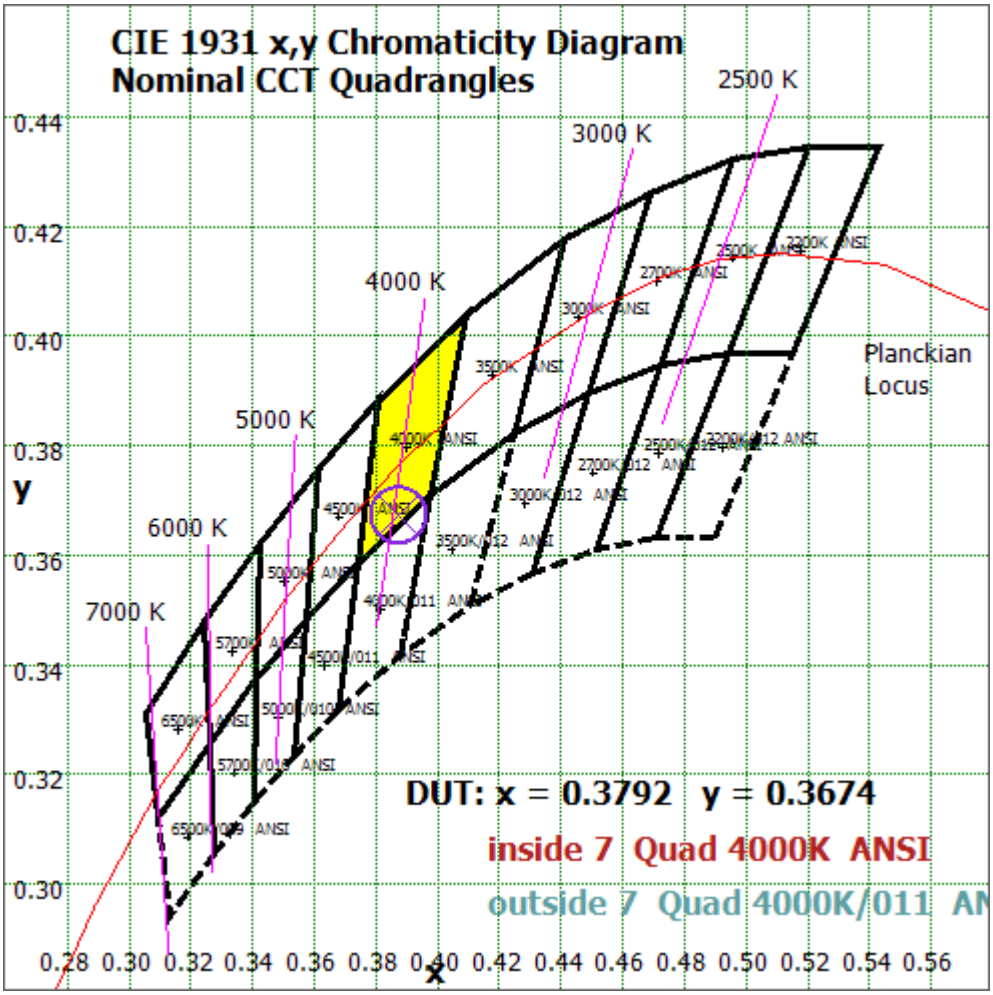


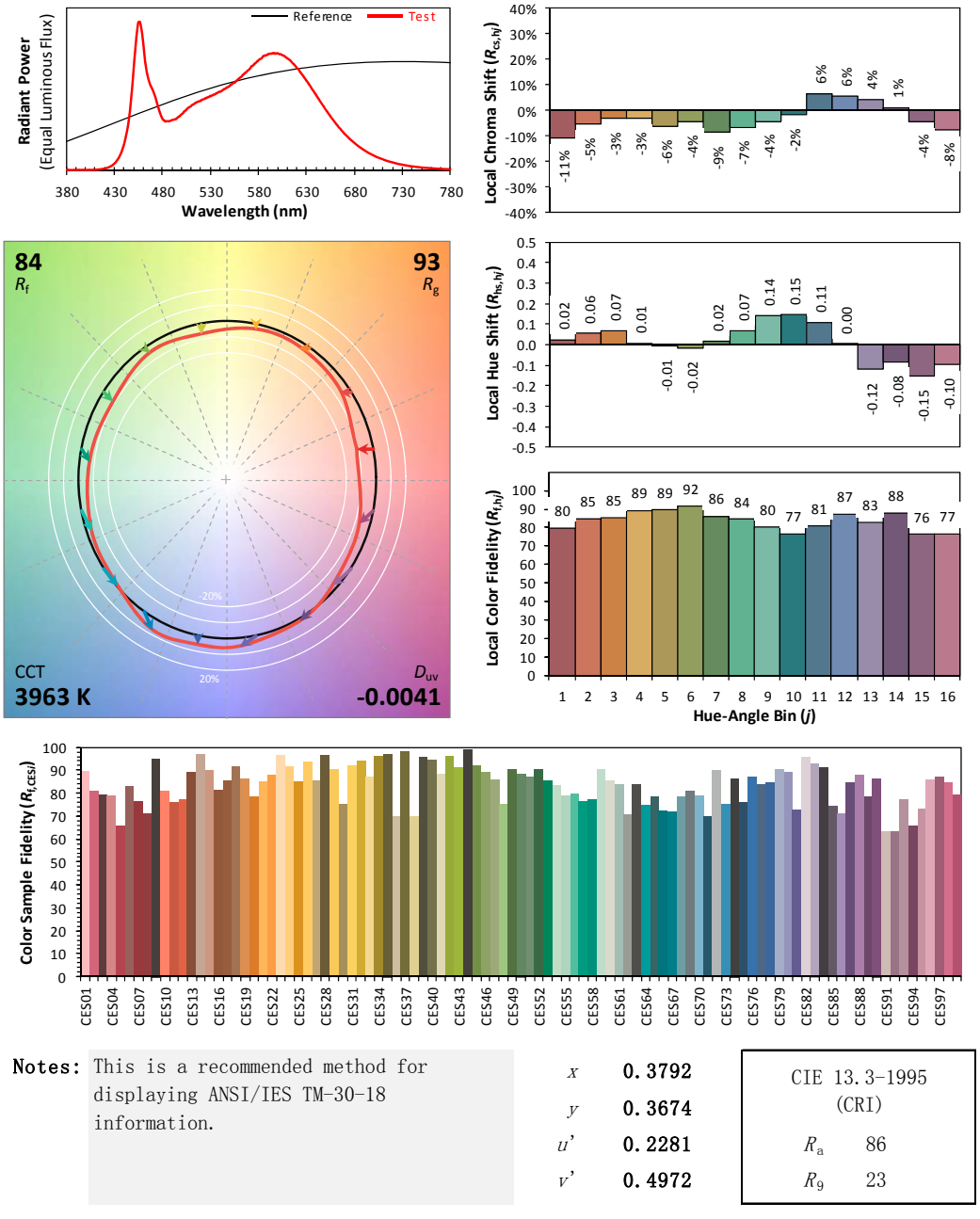
Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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:** 11.5T8/4F/8CCTS/EXT/SD/A4



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

x	0.3792
y	0.3674
u'	0.2281
v'	0.4972

CIE 13.3-1995 (CRI)

R_a	86
R_9	23

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)	0.429	0.196
Power Factor	0.9947	0.9346
Test Power (W)/4	12.80	12.66
THD A%	5.47	6.64
Luminous Efficacy (lm/W)	145.5	147.2
Total Luminous Flux (lm)	1862.7	1863.1
Color Rendering Index (CRI)	86.0	
R9	22.7	
Correlated Color Temperature (CCT)(K)	5073	
Chromaticity Chroma x	0.3427	
Chromaticity Chroma y	0.3458	
Chromaticity Chroma u	0.2120	
Chromaticity Chroma v	0.3210	
Duv	-0.0019	
Chromaticity Chroma u ’	0.2120	
Chromaticity Chroma v’	0.4815	

Special Color Rendering Indices	
R1	87.2
R2	96.8
R3	93
R4	82
R5	86.5
R6	90.6
R7	83.6
R8	68.5
R9	22.7
R10	91.1
R11	82.3
R12	66.2
R13	91.2
R14	97.1

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

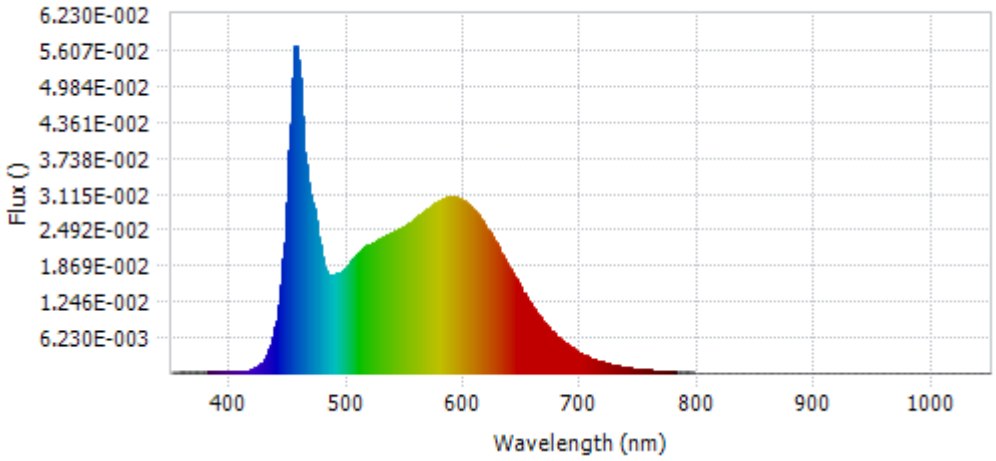
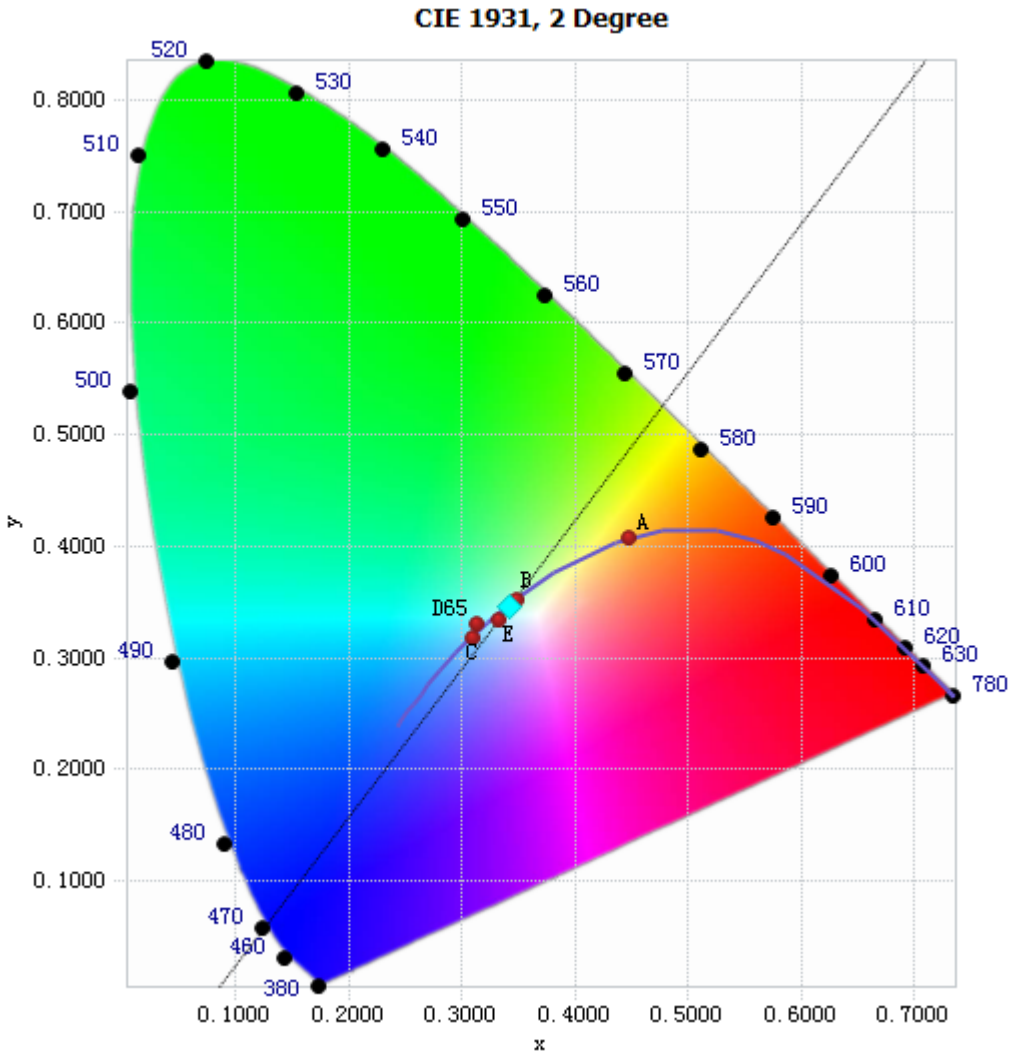


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.46E-04	485	1.71E-02	590	3.07E-02	695	3.99E-03
385	2.16E-04	490	1.73E-02	595	3.03E-02	700	3.41E-03
390	2.22E-04	495	1.76E-02	600	2.99E-02	705	2.90E-03
395	2.29E-04	500	1.87E-02	605	2.89E-02	710	2.48E-03
400	2.27E-04	505	2.00E-02	610	2.78E-02	715	2.11E-03
405	2.31E-04	510	2.10E-02	615	2.64E-02	720	1.81E-03
410	2.95E-04	515	2.20E-02	620	2.48E-02	725	1.54E-03
415	4.38E-04	520	2.24E-02	625	2.32E-02	730	1.32E-03
420	7.72E-04	525	2.31E-02	630	2.13E-02	735	1.12E-03
425	1.45E-03	530	2.37E-02	635	1.96E-02	740	9.50E-04
430	2.75E-03	535	2.40E-02	640	1.77E-02	745	8.14E-04
435	5.40E-03	540	2.45E-02	645	1.59E-02	750	6.88E-04
440	1.05E-02	545	2.51E-02	650	1.41E-02	755	5.92E-04
445	1.97E-02	550	2.56E-02	655	1.25E-02	760	5.14E-04
450	3.85E-02	555	2.63E-02	660	1.10E-02	765	4.38E-04
455	5.66E-02	560	2.71E-02	665	9.64E-03	770	3.78E-04
460	4.81E-02	565	2.79E-02	670	8.32E-03	775	3.24E-04
465	3.43E-02	570	2.87E-02	675	7.23E-03	780	2.77E-04
470	2.95E-02	575	2.95E-02	680	6.24E-03		
475	2.35E-02	580	3.01E-02	685	5.41E-03		
480	1.84E-02	585	3.06E-02	690	4.65E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3427, 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

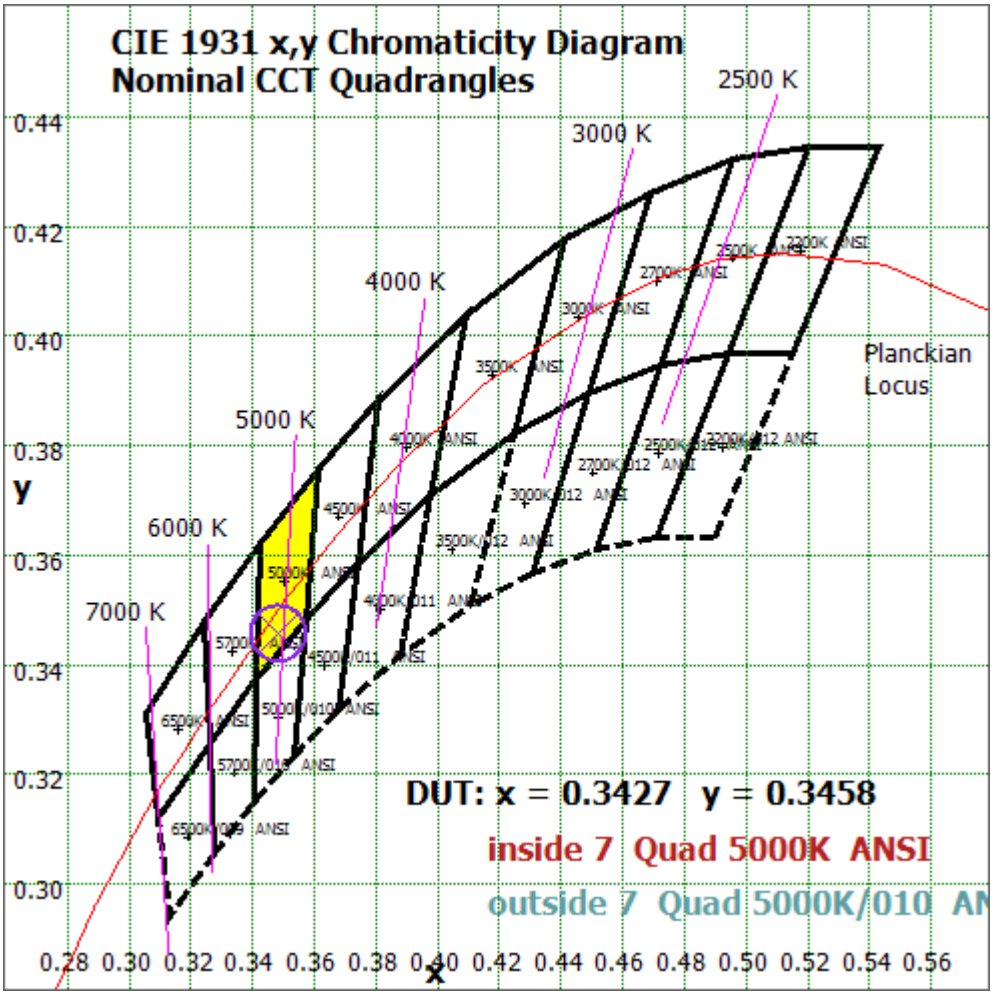


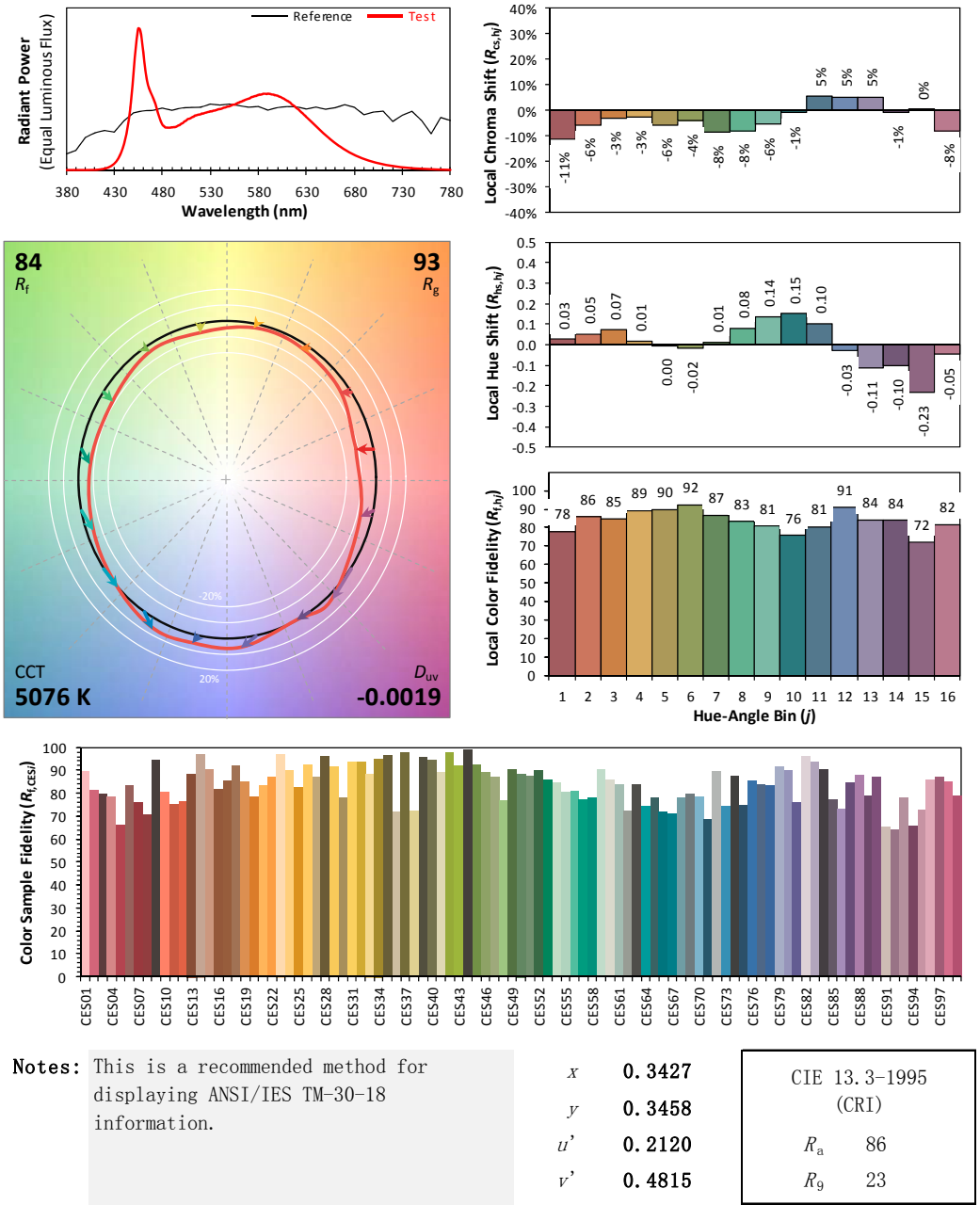
Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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:** 11.5T8/4F/8CCTS/EXT/SD/A4



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

x	0.3427
y	0.3458
u'	0.2120
v'	0.4815

CIE 13.3-1995 (CRI)

R_a	86
R_9	23

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)	0.435	0.198
Power Factor	0.9949	0.9358
Test Power (W)/4	12.98	12.83
THD A%	5.37	6.36
Luminous Efficacy (lm/W)	142.3	144.2
Total Luminous Flux (lm)	1847.7	1850.0
Color Rendering Index (CRI)	84.3	
R9	11.9	
Correlated Color Temperature (CCT)(K)	6522	
Chromaticity Chroma x	0.3124	
Chromaticity Chroma y	0.3285	
Chromaticity Chroma u	0.1978	
Chromaticity Chroma v	0.3120	
Duv	0.0031	
Chromaticity Chroma u ’	0.1978	
Chromaticity Chroma v’	0.4680	

Special Color Rendering Indices	
R1	84.2
R2	95.2
R3	93.2
R4	78.4
R5	83
R6	88.8
R7	84.3
R8	67.6
R9	11.9
R10	86.5
R11	78.8
R12	58.9
R13	88.7
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

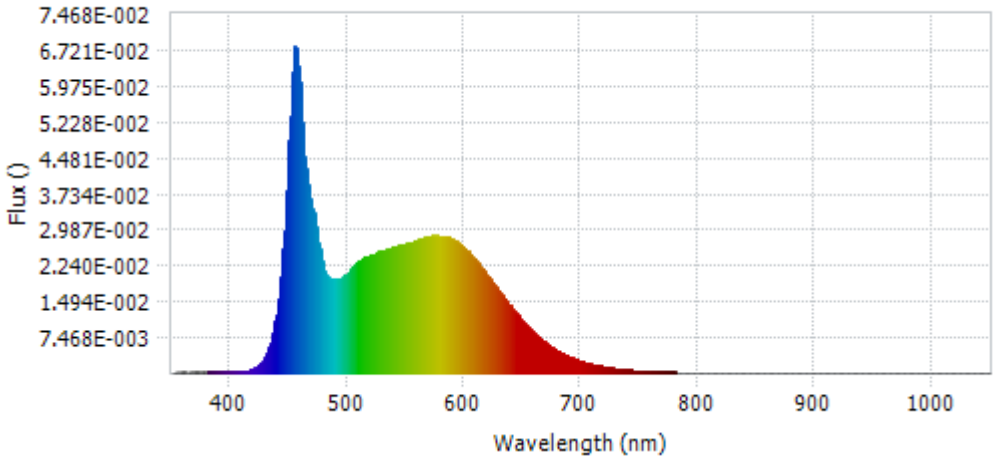
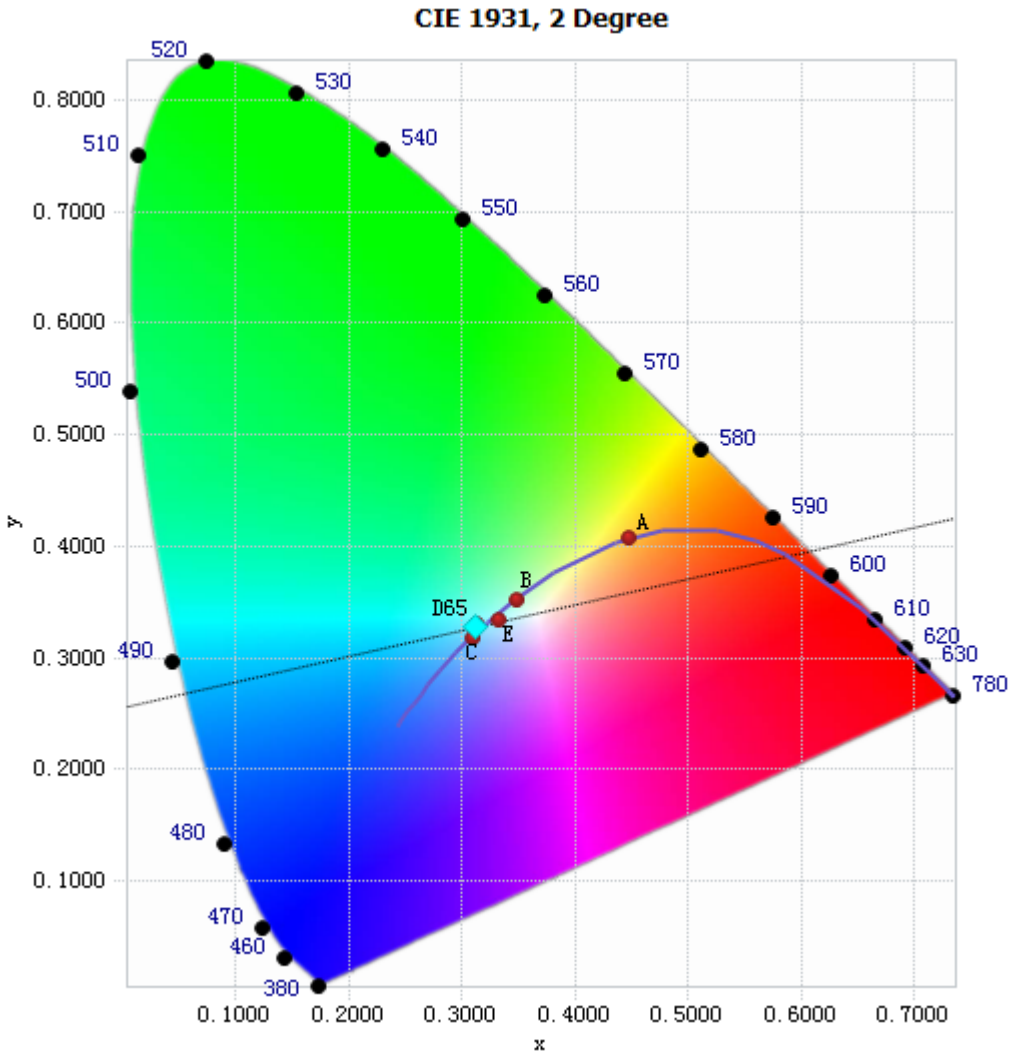


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.74E-04	485	1.96E-02	590	2.79E-02	695	2.94E-03
385	2.42E-04	490	1.96E-02	595	2.70E-02	700	2.50E-03
390	2.66E-04	495	1.98E-02	600	2.61E-02	705	2.14E-03
395	2.75E-04	500	2.09E-02	605	2.47E-02	710	1.82E-03
400	2.53E-04	505	2.22E-02	610	2.34E-02	715	1.55E-03
405	2.74E-04	510	2.32E-02	615	2.19E-02	720	1.35E-03
410	3.38E-04	515	2.41E-02	620	2.02E-02	725	1.14E-03
415	5.61E-04	520	2.45E-02	625	1.86E-02	730	9.74E-04
420	1.05E-03	525	2.51E-02	630	1.69E-02	735	8.31E-04
425	1.98E-03	530	2.56E-02	635	1.53E-02	740	7.20E-04
430	3.80E-03	535	2.58E-02	640	1.37E-02	745	6.13E-04
435	7.33E-03	540	2.62E-02	645	1.22E-02	750	5.29E-04
440	1.38E-02	545	2.65E-02	650	1.07E-02	755	4.51E-04
445	2.58E-02	550	2.68E-02	655	9.49E-03	760	3.90E-04
450	4.83E-02	555	2.72E-02	660	8.26E-03	765	3.39E-04
455	6.79E-02	560	2.76E-02	665	7.18E-03	770	2.88E-04
460	5.65E-02	565	2.80E-02	670	6.19E-03	775	2.51E-04
465	4.05E-02	570	2.83E-02	675	5.37E-03	780	2.19E-04
470	3.44E-02	575	2.85E-02	680	4.63E-03		
475	2.72E-02	580	2.85E-02	685	3.99E-03		
480	2.12E-02	585	2.84E-02	690	3.43E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3124, 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

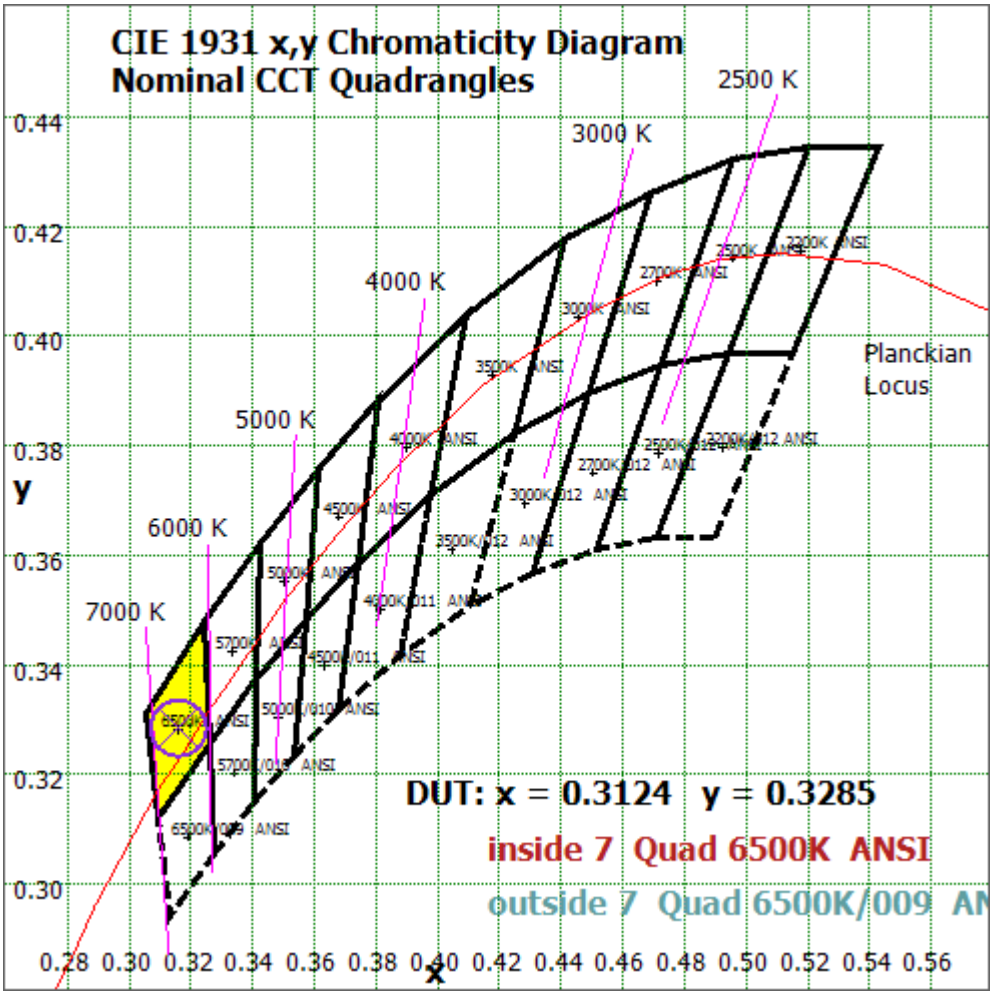


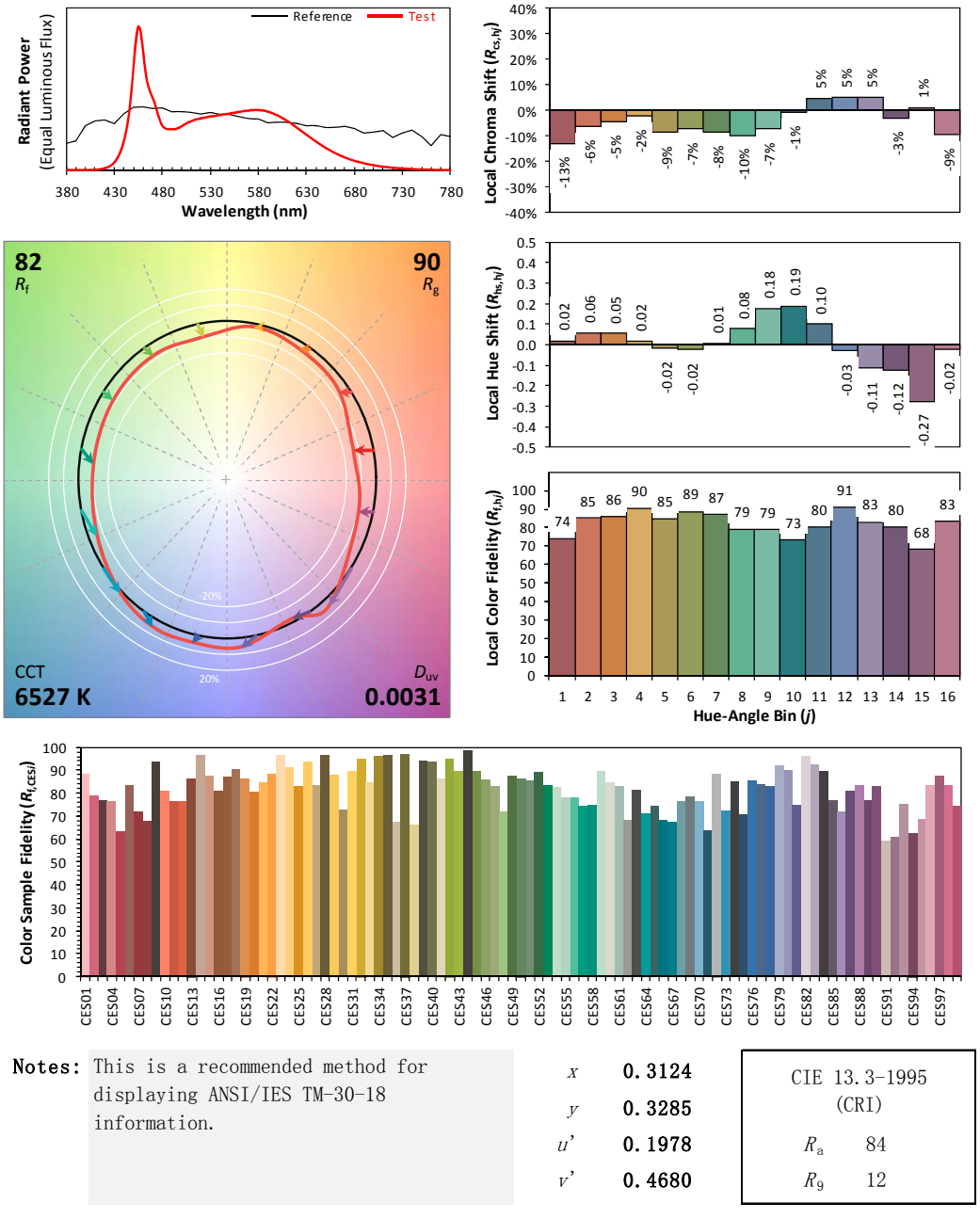
Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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:** 11.5T8/4F/8CCTS/EXT/SD/A4



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

x	0.3124
y	0.3285
u'	0.1978
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.

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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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