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/A3

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23060027e

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/A3 3000K Setting	10.5T8/3F/8CCTS/EXT/SD/A3 3500K Setting	10.5T8/3F/8CCTS/EXT/SD/A3 4000K Setting
Luminous Efficacy (Lumens /Watt)	136.6	140.6	144.1
Total Luminous Flux (Lumens)	1649.6	1684.8	1713.4
Power (Watts)/3	12.08	11.98	11.89
Power Factor	0.9916	0.9914	0.9911
CCT (K)	3046	3466	3917
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/A3 5000K Setting	10.5T8/3F/8CCTS/EXT/SD/A3 6500K Setting
Luminous Efficacy (Lumens /Watt)	144.3	141.2
Total Luminous Flux (Lumens)	1724.4	1706.2
Power (Watts)/3	11.95	12.08
Power Factor	0.9913	0.9918
CCT (K)	5088	6516
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

TABLE OF CONTENT

SAMPLE PHOTO

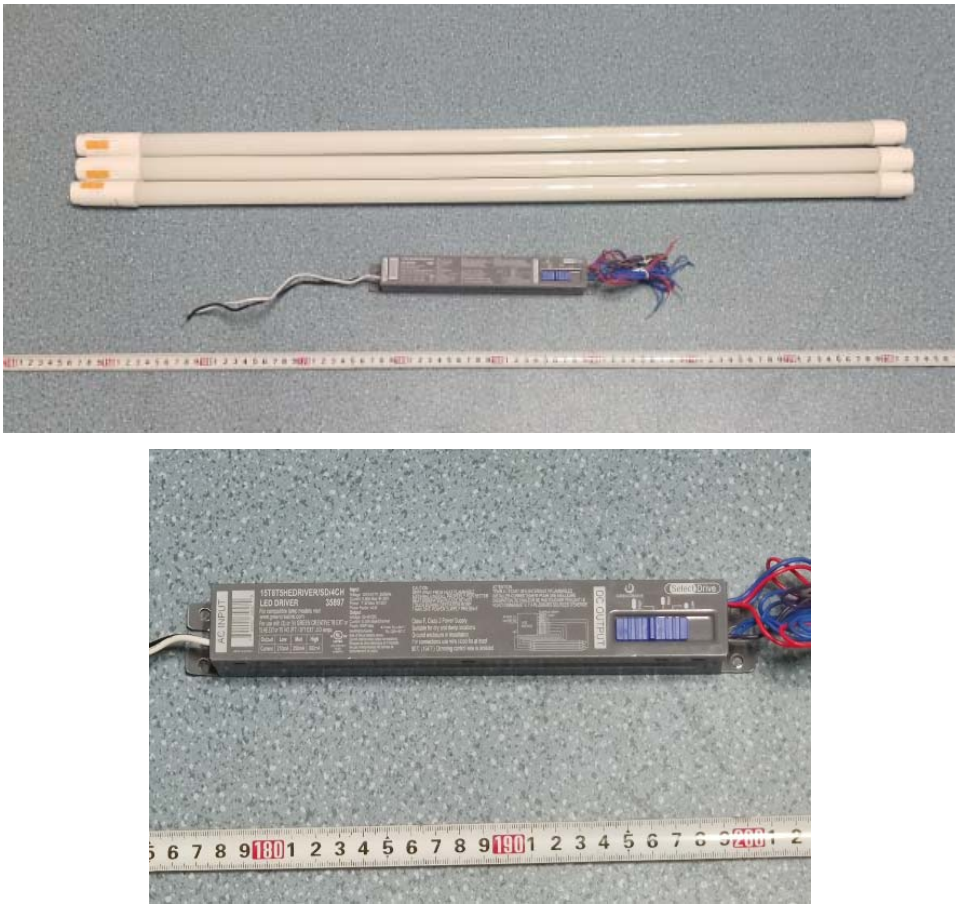


Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: 10.5T8/3F/8CCTS/EXT/SD/A3
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)	0.305	0.145
Power Factor	0.9916	0.9012
Test Power (W)/3	12.08	12.05
THD A%	5.45	9.14
Luminous Efficacy (lm/W)	136.6	137.2
Total Luminous Flux (lm)	1649.6	1652.9
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	0.3463	
Duv	-0.0006	
Chromaticity Chroma u ’	0.2491	
Chromaticity Chroma v’	0.5195	

Special Color Rendering Indices	
R1	82.2
R2	94.4
R3	91.8
R4	78.6
R5	82.6
R6	93.2
R7	80
R8	57.3
R9	7.1
R10	87.3
R11	78.2
R12	73.2
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

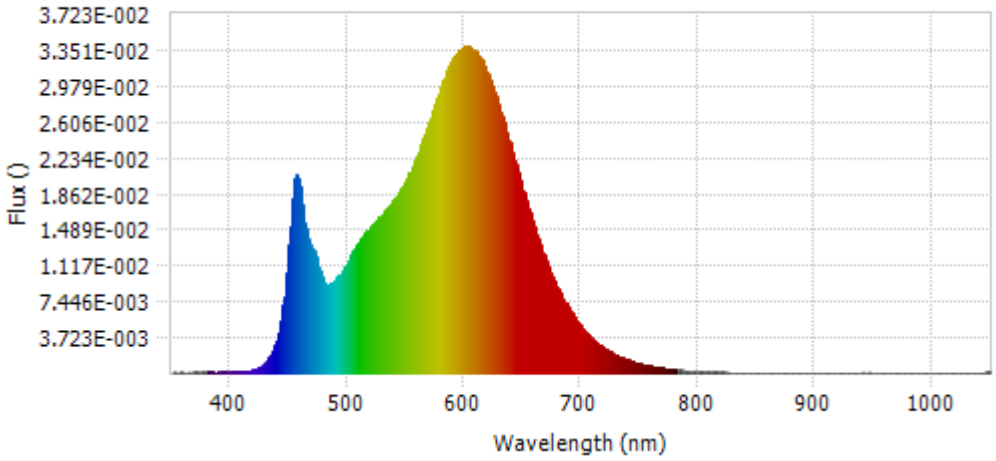
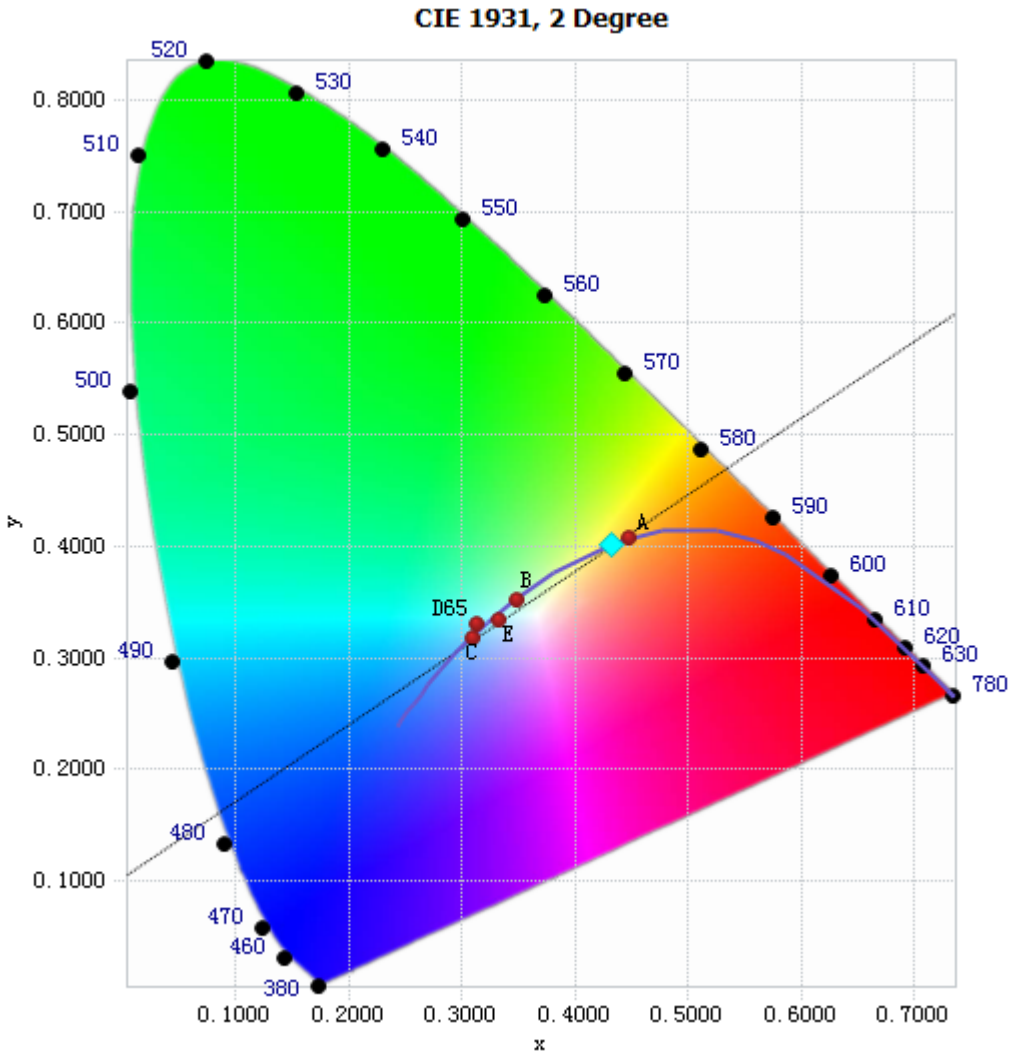


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.23E-04	485	9.21E-03	590	3.26E-02	695	5.63E-03
385	1.06E-04	490	9.76E-03	595	3.34E-02	700	4.83E-03
390	1.09E-04	495	1.05E-02	600	3.38E-02	705	4.09E-03
395	1.18E-04	500	1.15E-02	605	3.37E-02	710	3.52E-03
400	1.17E-04	505	1.26E-02	610	3.32E-02	715	3.02E-03
405	1.17E-04	510	1.36E-02	615	3.24E-02	720	2.57E-03
410	1.55E-04	515	1.45E-02	620	3.10E-02	725	2.21E-03
415	2.32E-04	520	1.51E-02	625	2.94E-02	730	1.87E-03
420	3.67E-04	525	1.58E-02	630	2.75E-02	735	1.57E-03
425	6.22E-04	530	1.65E-02	635	2.54E-02	740	1.36E-03
430	1.12E-03	535	1.72E-02	640	2.34E-02	745	1.16E-03
435	2.03E-03	540	1.80E-02	645	2.13E-02	750	9.84E-04
440	3.74E-03	545	1.89E-02	650	1.90E-02	755	8.37E-04
445	7.01E-03	550	1.99E-02	655	1.70E-02	760	7.12E-04
450	1.34E-02	555	2.12E-02	660	1.51E-02	765	6.10E-04
455	2.01E-02	560	2.26E-02	665	1.33E-02	770	5.34E-04
460	1.86E-02	565	2.43E-02	670	1.16E-02	775	4.47E-04
465	1.43E-02	570	2.61E-02	675	1.01E-02	780	3.88E-04
470	1.29E-02	575	2.78E-02	680	8.74E-03		
475	1.11E-02	580	2.97E-02	685	7.59E-03		
480	9.37E-03	585	3.14E-02	690	6.54E-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

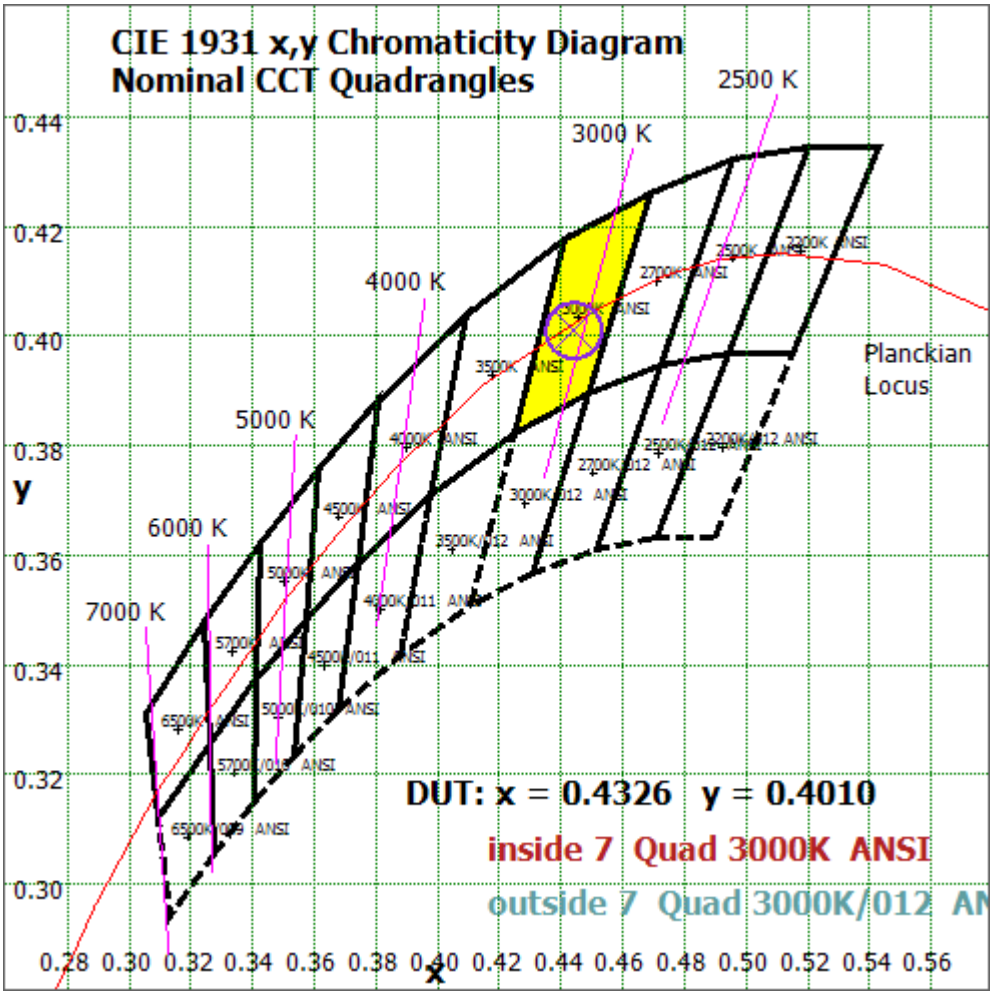


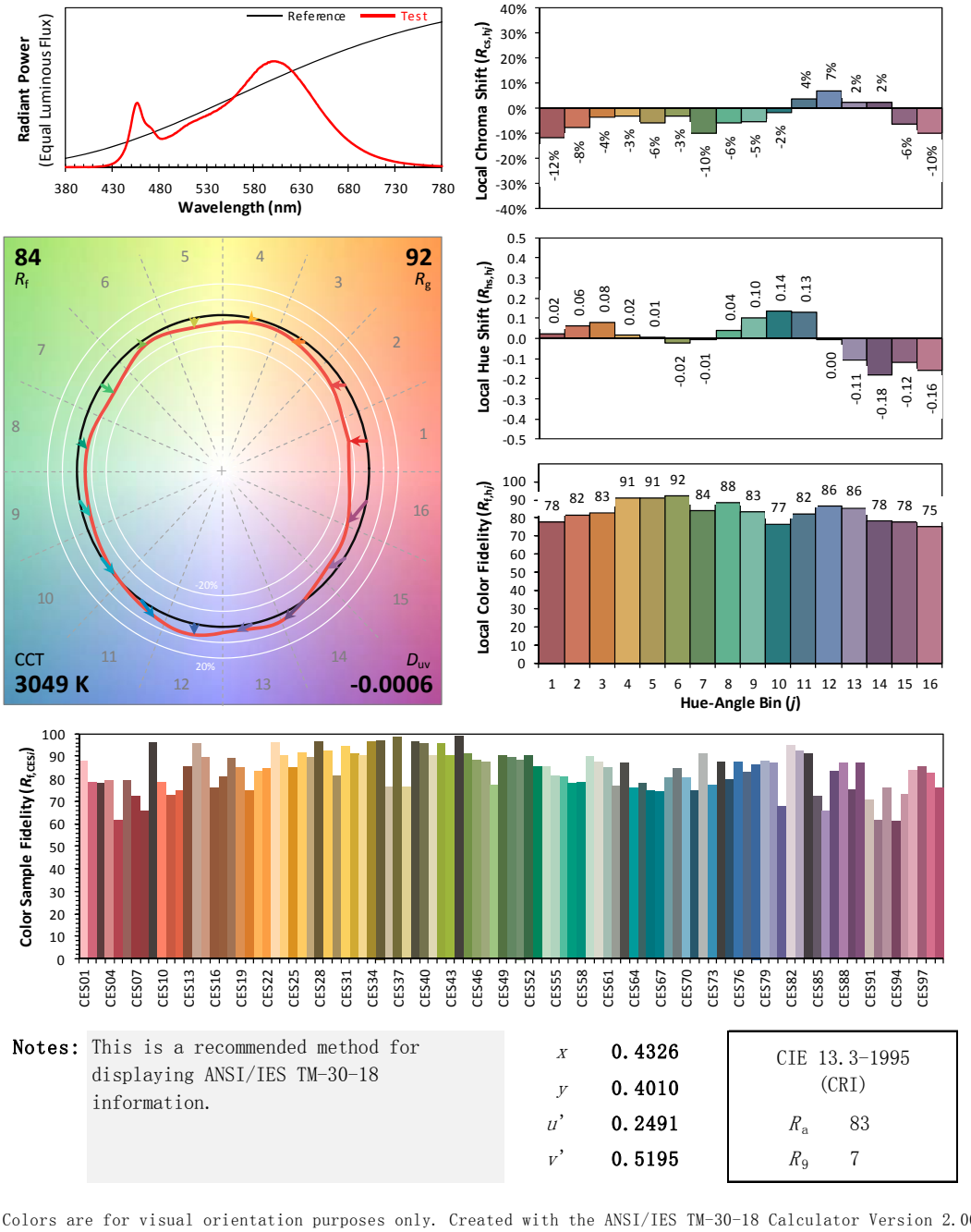
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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/A3



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)	0.306
Power Factor	0.9897
Power (W)/3	12.12
Luminous Efficacy (lm/W)	136.8
Total Luminous Flux (lm)	1658.4
Beam Angle (°)	114.3 (0^o-180^o) / 248.2 (90^o-270^o)
Center Beam Candle Power (cd)	260
Maximum Beam Candle Power (cd)	261.2 (At: C=340.0, Gamma=4.5)
Spacing Criteria	1.24 (0^o-180^o) / 1.47 (90^o-270^o)
Zonal Lumens in the 0°-60°Zone	41.16%
Zonal Lumens in the 60°-90°Zone	27.03%
Zonal Lumens in the 90°-120°Zone	18.87%
Zonal Lumens in the 120°-180°Zone	12.94%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	24.704	1.49%
10- 20	71.74	4.33%
20- 30	112.301	6.77%
30- 40	143.089	8.63%
40- 50	162.041	9.77%
50- 60	168.644	10.17%
60- 70	163.865	9.88%
70- 80	150.618	9.08%
80- 90	133.753	8.07%
90-100	118.45	7.14%
100-110	104.545	6.30%
110-120	89.963	5.42%
120-130	74.348	4.48%
130-140	59.227	3.57%
140-150	43.014	2.59%
150-160	26.412	1.59%
160-170	10.223	0.62%
170-180	1.433	0.09%
Total	1658.4	100%

γ(°)	Lumens	% Total
0- 60	682.519	41.16%
60- 90	448.236	27.03%
0-90	1130.76	68.18%
90- 180	527.615	31.82%
0- 180	1658.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

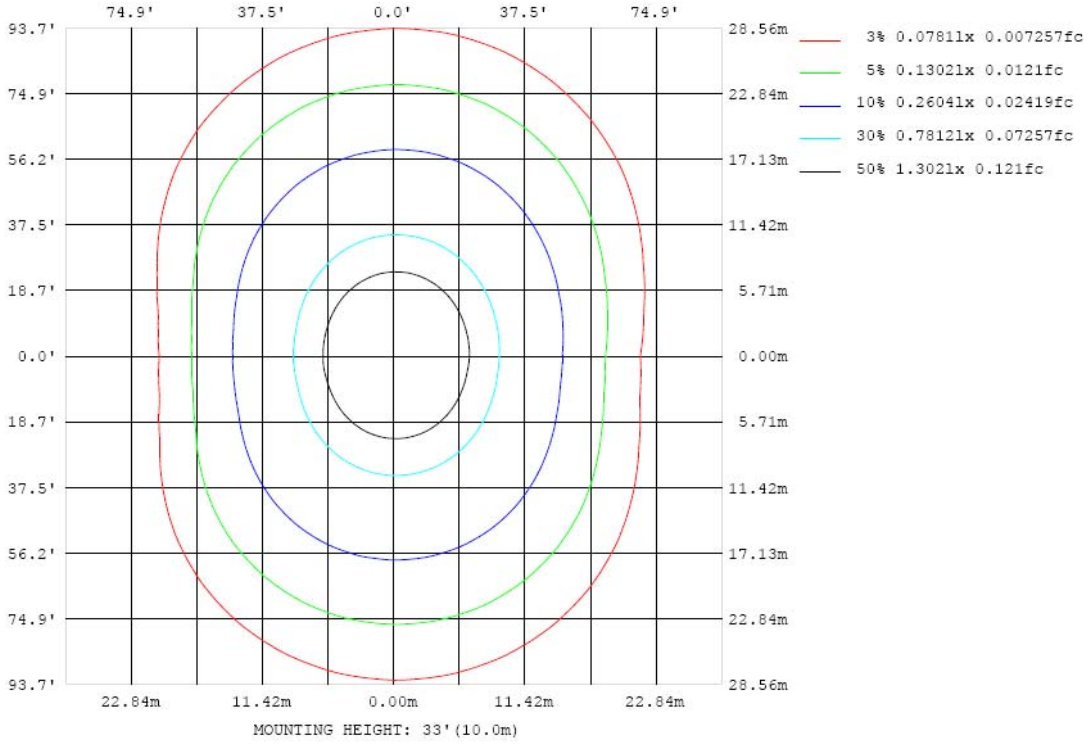


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

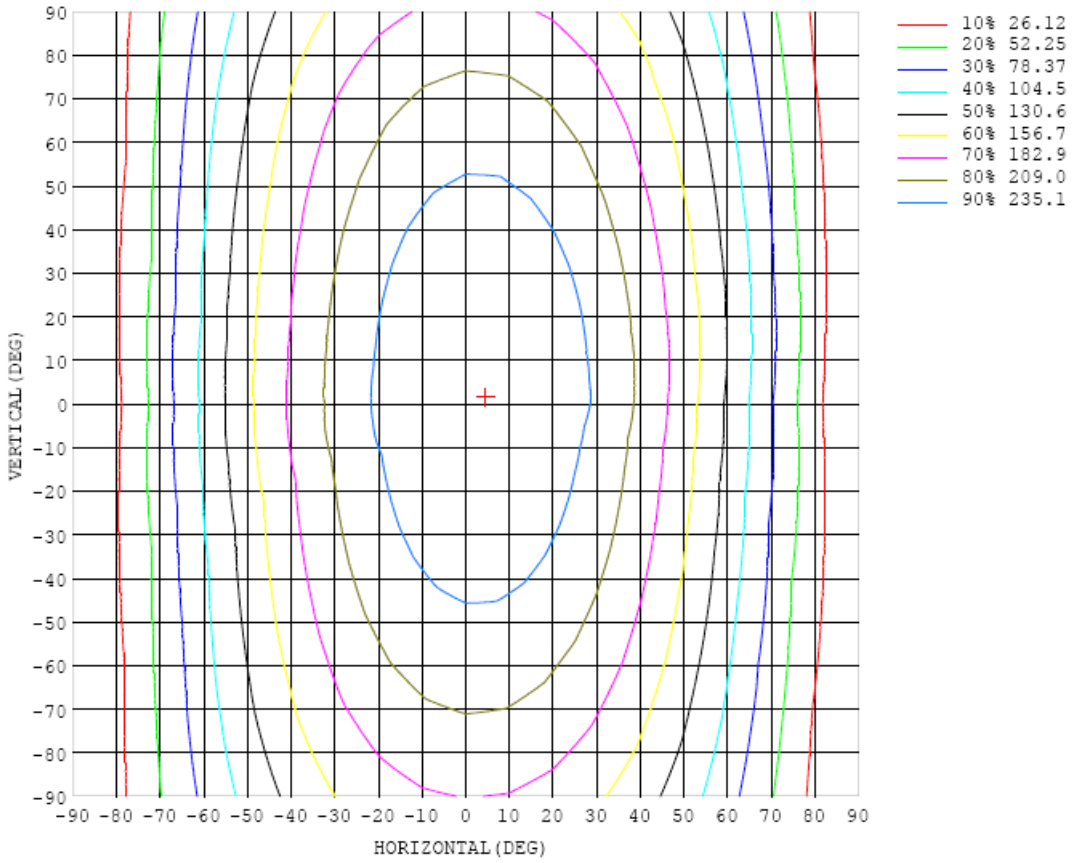


Chart 6: Isocandela Plot

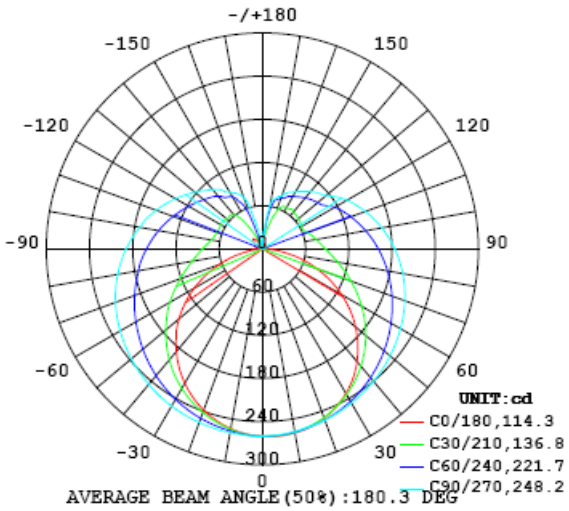


Chart 7: Polar Candela Distribution

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	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
5	261	261	261	260	260	260	260	260	260	259	259	259	259	258	258	258	258	258	258
10	260	259	259	259	258	258	258	258	258	258	257	256	255	255	254	254	253	253	253
15	256	256	255	255	255	256	256	256	256	256	255	253	252	250	248	248	247	247	247
20	250	249	249	249	250	252	253	254	254	253	252	250	247	245	242	239	239	238	238
25	242	241	241	242	245	247	249	251	251	250	249	246	243	238	234	230	229	228	228
30	232	230	231	234	237	241	245	247	248	247	245	242	237	232	226	220	217	216	216
35	219	217	219	224	229	235	239	243	244	244	241	237	231	224	217	209	204	202	202
40	204	203	206	213	220	227	233	238	240	240	237	232	225	216	207	197	189	187	186
45	187	187	192	200	210	219	227	233	236	236	233	227	218	208	196	184	174	170	170
50	169	169	176	187	199	211	220	227	231	231	228	221	212	199	185	171	158	153	151
55	149	150	159	173	188	202	213	222	226	226	223	216	205	191	175	157	141	133	131
60	127	129	142	159	177	193	206	215	221	221	218	210	198	182	164	144	124	113	110
65	104	108	124	145	166	184	199	209	215	216	212	204	191	174	153	131	107	91.7	87.1
70	80.2	86.5	106	131	155	175	191	203	209	210	207	198	184	166	144	118	91.4	71.3	64.2
75	57.1	65.9	89.6	118	144	167	184	196	203	204	201	191	177	158	135	107	77.4	52.3	42.7
80	34.0	46.2	75.0	106	135	158	176	189	196	198	194	185	170	151	126	97.4	65.6	35.8	21.7
85	14.4	29.9	63.0	96.0	126	150	169	182	189	191	187	178	164	144	119	89.8	57.3	24.3	6.72
90	3.01	19.8	54.1	87.5	117	142	161	174	182	184	180	171	157	137	112	83.4	51.5	19.3	1.64
95	1.39	15.5	48.4	81.4	110	134	153	167	174	176	173	164	150	130	106	78.4	48.3	19.3	2.47
100	3.00	12.7	44.1	75.8	104	127	146	159	166	168	165	157	143	124	101	74.6	46.9	21.2	5.87
105	6.41	13.0	40.0	71.5	97.9	120	138	151	158	160	157	149	136	118	96.7	72.7	46.1	24.9	9.92
110	8.99	15.5	38.6	66.0	93.1	114	131	143	150	152	149	142	129	113	92.7	70.4	47.7	29.2	12.0
115	6.94	16.4	41.6	62.6	86.2	108	124	135	142	144	141	134	123	107	88.8	69.0	50.2	34.5	11.4
120	2.52	17.3	45.1	63.3	81.1	99.2	116	127	133	136	133	127	116	102	85.3	68.8	52.6	39.1	10.9
125	0.99	21.9	47.8	64.3	79.6	92.5	106	117	124	126	124	118	109	96.9	83.2	69.4	55.4	44.2	11.4
130	1.93	27.1	50.4	65.3	78.8	90.2	100	108	113	115	114	110	103	93.1	81.4	69.8	56.5	47.3	15.0
135	2.47	28.3	52.4	66.2	77.6	87.9	96.7	103	108	110	109	105	98.6	89.9	80.7	70.5	59.1	48.2	18.8
140	4.64	18.1	53.1	67.9	76.4	84.8	92.6	98.6	102	104	103	99.4	94.1	87.2	79.5	69.5	59.7	45.0	17.8
145	4.33	12.9	52.7	67.4	76.2	82.3	88.3	93.3	96.4	97.7	97.0	94.5	90.1	84.1	77.8	69.5	61.9	44.6	14.0
150	6.74	16.1	48.6	65.7	72.7	79.6	84.5	88.1	90.8	91.9	91.4	89.2	85.8	81.3	74.8	68.6	60.7	43.8	14.9
155	7.71	12.5	36.4	64.8	71.0	74.6	79.7	83.7	85.8	86.6	86.3	84.6	80.5	76.3	72.6	67.0	57.5	32.3	11.8
160	7.84	13.2	26.2	51.7	68.5	72.2	74.9	76.8	78.0	78.5	78.0	77.3	76.3	73.2	68.9	63.5	49.2	23.9	10.3
165	7.62	11.8	17.9	33.9	53.8	66.4	70.4	71.6	72.6	73.2	73.0	72.4	71.2	68.7	61.8	49.7	32.2	15.4	8.54
170	6.61	10.8	16.6	19.5	28.2	40.0	48.6	55.7	59.8	61.2	60.9	58.8	54.6	48.7	38.0	24.7	16.2	10.7	7.90
175	7.51	8.25	11.2	15.6	17.6	18.6	19.4	20.2	20.8	21.3	21.4	21.2	20.8	19.0	15.6	12.6	10.2	8.30	7.62
180	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55

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	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260		
5	258	258	259	259	259	259	260	260	260	260	261	261	261	261	261	261	261		
10	254	254	255	255	256	257	258	258	259	260	260	260	260	260	260	260	260		
15	248	248	249	250	252	254	256	257	258	259	259	258	258	257	257	256	256		
20	239	240	242	245	248	251	253	255	257	257	257	256	255	254	252	251	250		
25	229	230	234	238	242	246	250	253	255	255	255	253	251	249	246	244	243		
30	217	219	224	230	236	241	246	250	252	253	252	250	246	242	238	235	233		
35	203	207	213	221	229	236	242	247	249	250	248	245	240	235	229	224	221		
40	188	193	201	211	221	230	237	243	246	246	244	240	233	226	218	211	207		
45	171	178	188	201	213	223	232	239	242	242	239	234	226	216	206	197	191		
50	154	163	176	190	204	217	227	234	238	238	234	227	217	206	193	182	174		
55	135	146	162	179	195	210	221	229	233	233	228	220	209	195	180	166	157		
60	114	129	149	168	187	203	216	224	228	228	222	213	200	183	166	149	136		
65	93.5	111	135	158	178	196	210	219	223	222	216	206	191	172	152	131	115		
70	72.4	94.6	121	148	171	189	203	213	217	216	210	198	182	162	138	113	92.6		
75	52.4	79.1	110	138	163	182	197	207	211	210	203	190	173	151	124	95.4	70.8		
80	34.9	66.1	99.2	129	155	175	190	200	204	203	195	183	165	141	112	79.6	50.4		
85	22.6	56.1	90.4	121	148	168	183	193	197	195	188	175	157	131	101	66.3	33.4		
90	15.8	49.1	83.2	114	140	161	175	185	189	188	180	167	148	122	91.4	56.2	22.3		
95	11.3	43.0	77.0	107	133	154	169	177	181	179	172	160	140	114	83.8	49.5	17.8		
100	11.7	39.6	72.2	102	127	147	161	170	173	172	165	151	132	107	77.8	45.8	17.7		
105	13.7	39.3	68.9	96.7	120	139	153	162	166	164	156	143	125	101	73.4	44.3	20.2		
110	15.7	40.2	67.3	92.5	114	132	145	154	157	155	148	135	117	95.4	70.2	44.6	24.4		
115	15.8	41.6	66.6	89.1	109	125	137	145	148	146	139	127	111	90.8	68.2	46.5	27.8		
120	13.7	42.5	66.7	86.2	104	118	130	137	140	138	131	120	105	87.0	67.2	49.6	28.8		
125	4.22	40.9	67.6	84.0	99.3	112	122	129	131	129	123	113	99.8	84.0	67.1	53.3	27.4		
130	1.60	37.3	64.8	81.2	95.6	107	115	121	123	121	116	107	95.2	81.7	67.7	56.9	24.1		
135	0.20	31.8	64.9	78.7	91.0	101	109	113	115	113	109	101	91.3	79.7	68.8	58.8	20.2		
140	2.29	24.3	61.5	75.7	85.4	95.5	103	106	108	106	102	96.0	84.7	75.6	66.9	54.4	15.3		
145	3.82	16.2	49.2	74.9	81.5	87.7	93.0	98.5	100	98.7	93.6	86.7	81.2	74.5	64.4	42.3	10.1		
150	5.13	9.61	29.1	65.1	75.7	83.8	87.3	89.7	90.8	90.0	87.5	83.9	78.9	72.3	55.8	23.1	8.35		
155	5.57	6.56	11.5	32.4	61.8	71.1	80.6	84.1	85.1	84.6	82.8	79.8	75.3	64.9	36.0	12.8	8.02		
160	6.28	5.97	7.73	9.14	17.1	38.9	57.7	70.3	76.4	76.7	75.8	72.1	61.3	40.2	15.0	9.66	5.90		
165	4.51	4.87	5.82	5.66	8.57	8.65	9.45	24.0	40.9	46.1	44.0	36.1	25.2	13.0	9.05	6.61	6.37		
170	6.47	4.23	3.26	6.34	7.48	6.83	6.34	8.90	7.73	9.88	9.10	8.58	10.6	9.89	5.54	6.12	6.24		
175	7.75	8.01	7.38	6.08	5.40	4.56	3.49	2.49	0.62	3.86	3.81	3.88	4.56	6.26	7.21	6.62	6.26		
180	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55		

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)	0.302	0.144
Power Factor	0.9914	0.9002
Test Power (W)/3	11.98	11.95
THD A%	5.51	9.33
Luminous Efficacy (lm/W)	140.6	141.0
Total Luminous Flux (lm)	1684.8	1685.0
Color Rendering Index (CRI)	84.4	
R9	16.5	
Correlated Color Temperature (CCT)(K)	3466	
Chromaticity Chroma x	0.4038	
Chromaticity Chroma y	0.3830	
Chromaticity Chroma u	0.2379	
Chromaticity Chroma v	0.3385	
Duv	-0.0031	
Chromaticity Chroma u ’	0.2379	
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
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

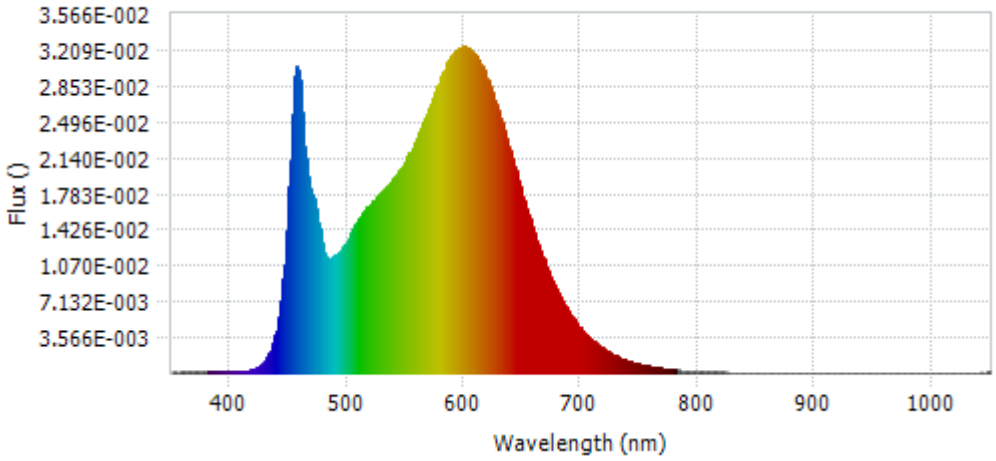
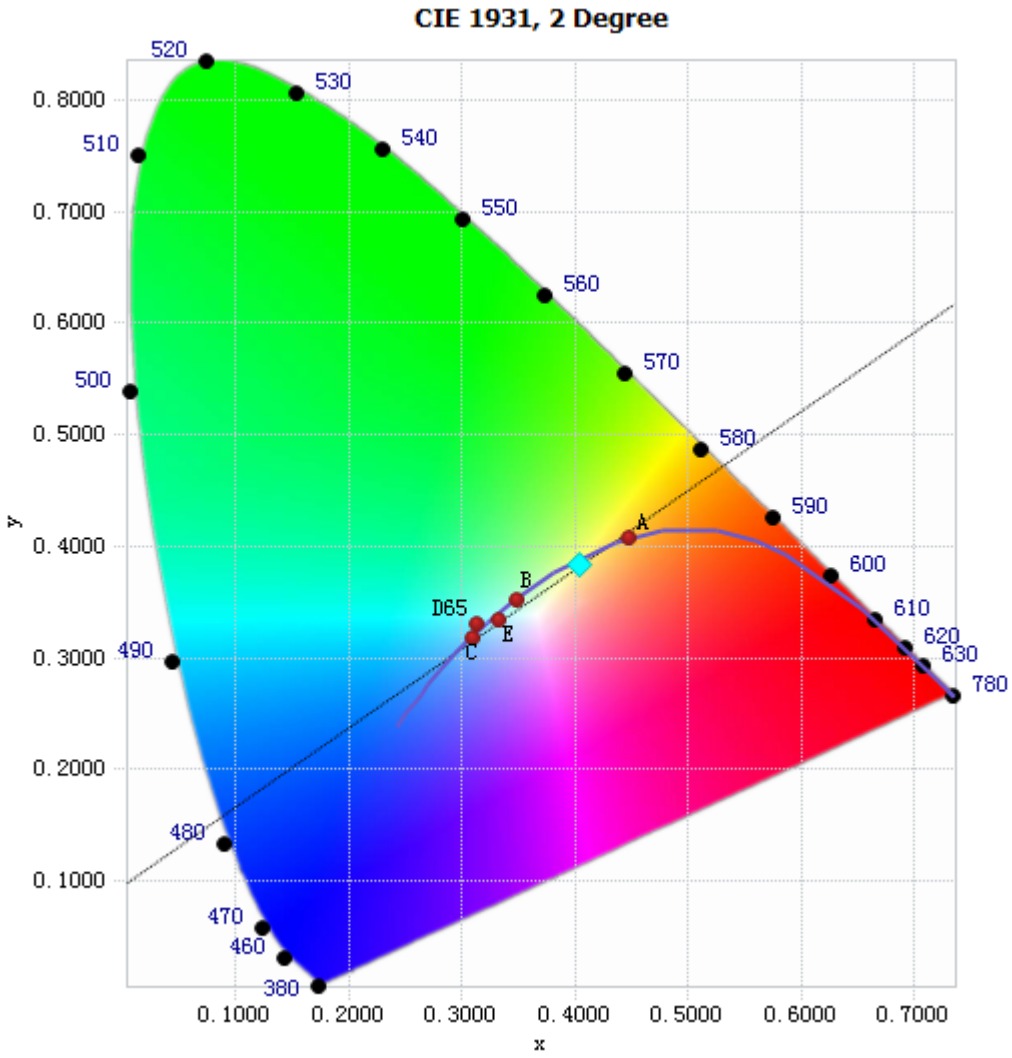


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.19E-04	485	1.14E-02	590	3.17E-02	695	5.15E-03
385	1.23E-04	490	1.18E-02	595	3.22E-02	700	4.38E-03
390	1.54E-04	495	1.23E-02	600	3.24E-02	705	3.74E-03
395	1.49E-04	500	1.32E-02	605	3.21E-02	710	3.19E-03
400	1.45E-04	505	1.44E-02	610	3.15E-02	715	2.74E-03
405	1.60E-04	510	1.54E-02	615	3.05E-02	720	2.35E-03
410	1.80E-04	515	1.62E-02	620	2.91E-02	725	1.99E-03
415	2.55E-04	520	1.68E-02	625	2.75E-02	730	1.70E-03
420	4.19E-04	525	1.75E-02	630	2.57E-02	735	1.44E-03
425	7.65E-04	530	1.81E-02	635	2.37E-02	740	1.24E-03
430	1.39E-03	535	1.87E-02	640	2.17E-02	745	1.06E-03
435	2.56E-03	540	1.94E-02	645	1.96E-02	750	8.92E-04
440	4.91E-03	545	2.02E-02	650	1.76E-02	755	7.71E-04
445	9.35E-03	550	2.11E-02	655	1.57E-02	760	6.55E-04
450	1.86E-02	555	2.22E-02	660	1.39E-02	765	5.47E-04
455	2.94E-02	560	2.34E-02	665	1.22E-02	770	4.82E-04
460	2.76E-02	565	2.49E-02	670	1.06E-02	775	4.14E-04
465	2.02E-02	570	2.63E-02	675	9.25E-03	780	3.52E-04
470	1.77E-02	575	2.79E-02	680	8.03E-03		
475	1.50E-02	580	2.94E-02	685	6.94E-03		
480	1.20E-02	585	3.08E-02	690	5.98E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4038, 0.3830)

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

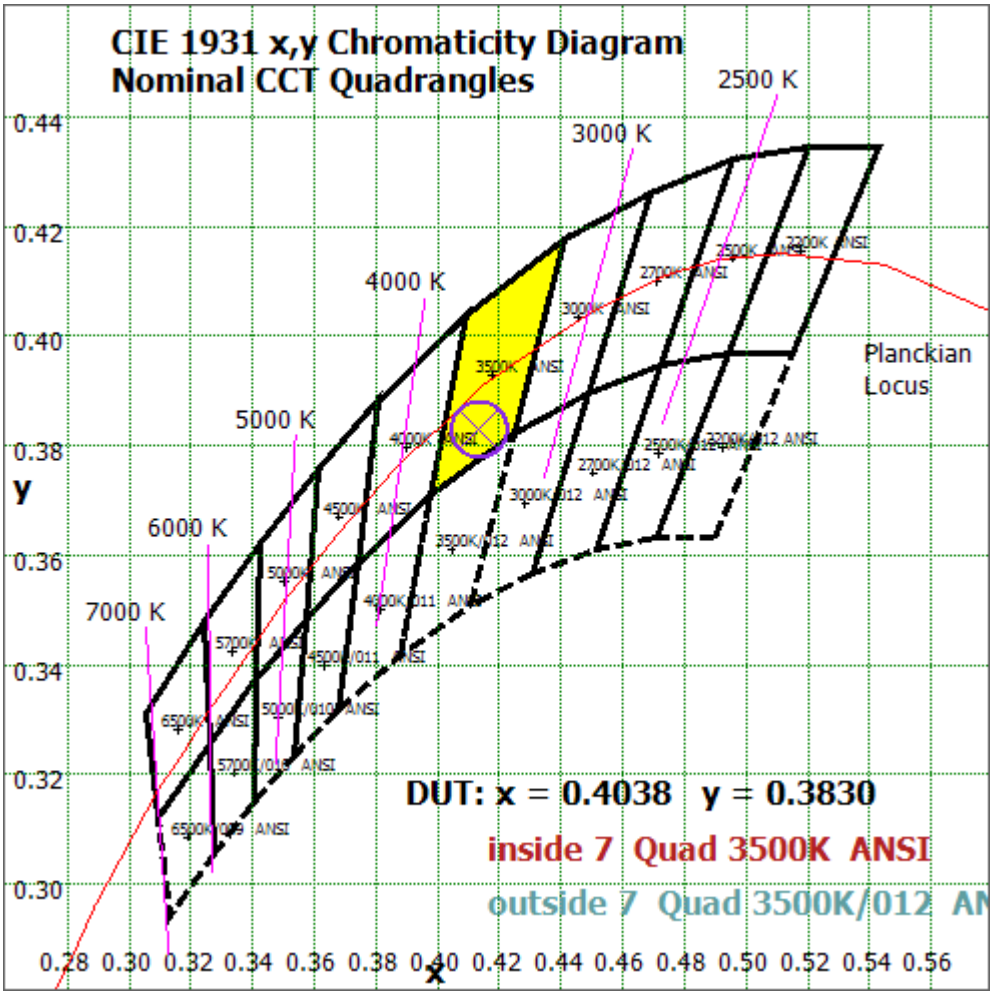


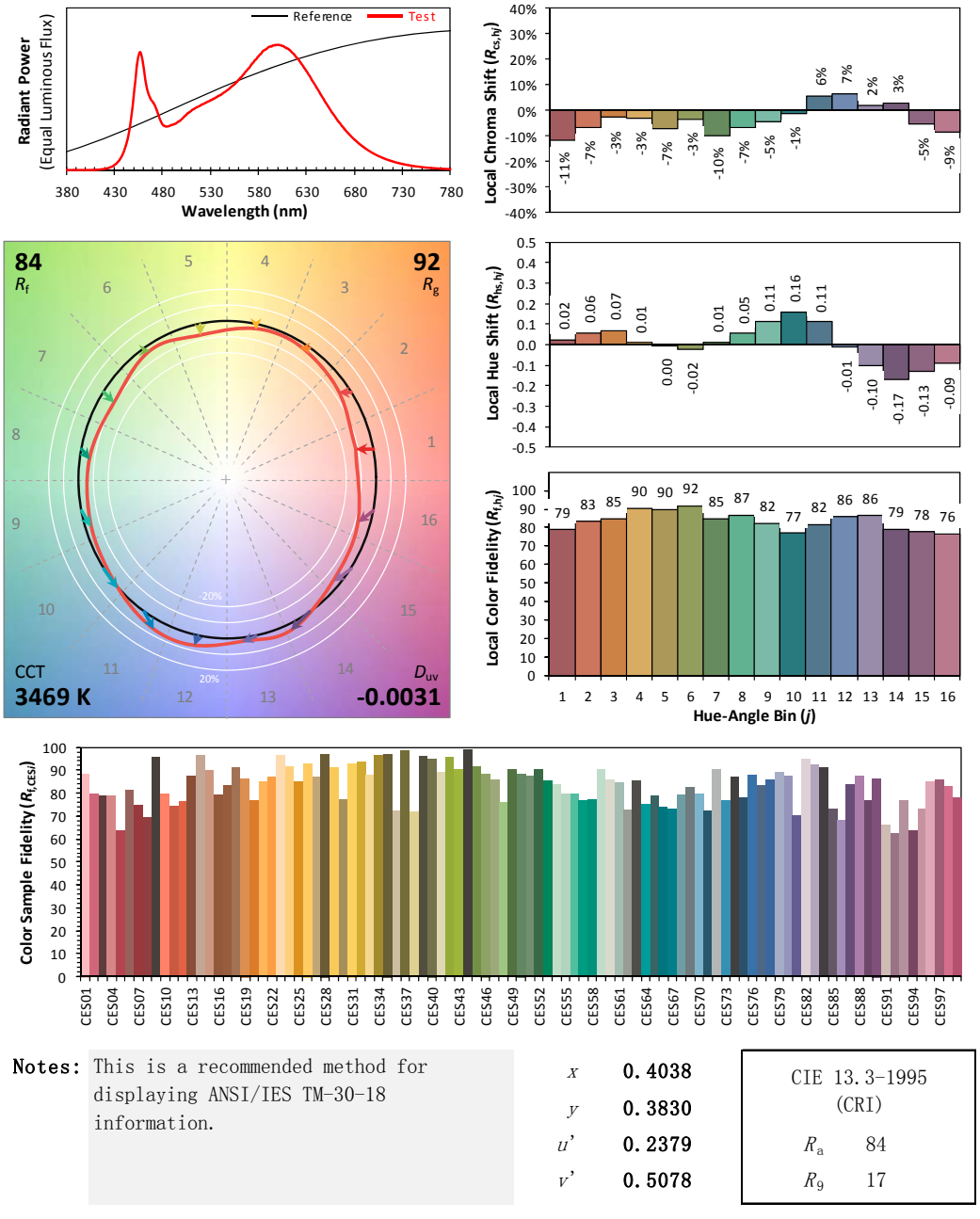
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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/A3



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

x	0.4038
y	0.3830
u'	0.2379
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)	0.300	0.143
Power Factor	0.9911	0.9004
Test Power (W)/3	11.89	11.86
THD A%	5.48	9.22
Luminous Efficacy (lm/W)	144.1	144.1
Total Luminous Flux (lm)	1713.4	1708.7
Color Rendering Index (CRI)	85.4	
R9	22.2	
Correlated Color Temperature (CCT)(K)	3917	
Chromaticity Chroma x	0.3812	
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	65.5
R9	22.2
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

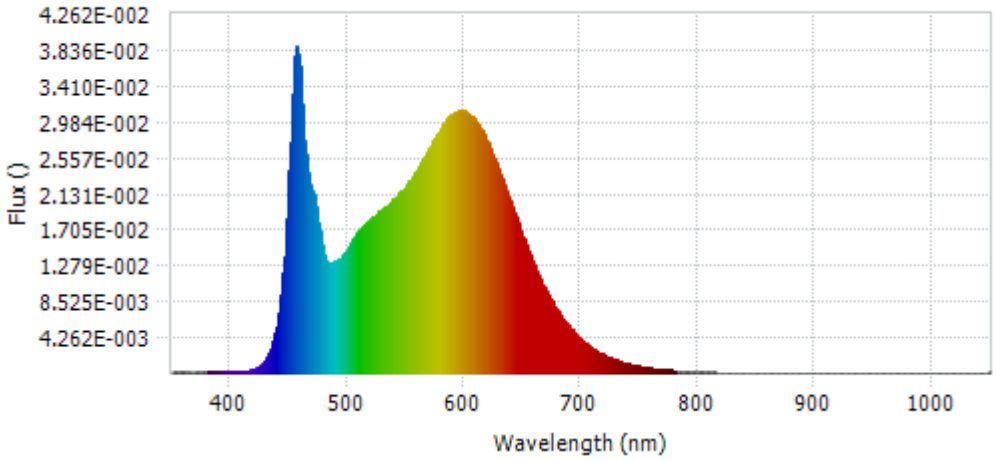
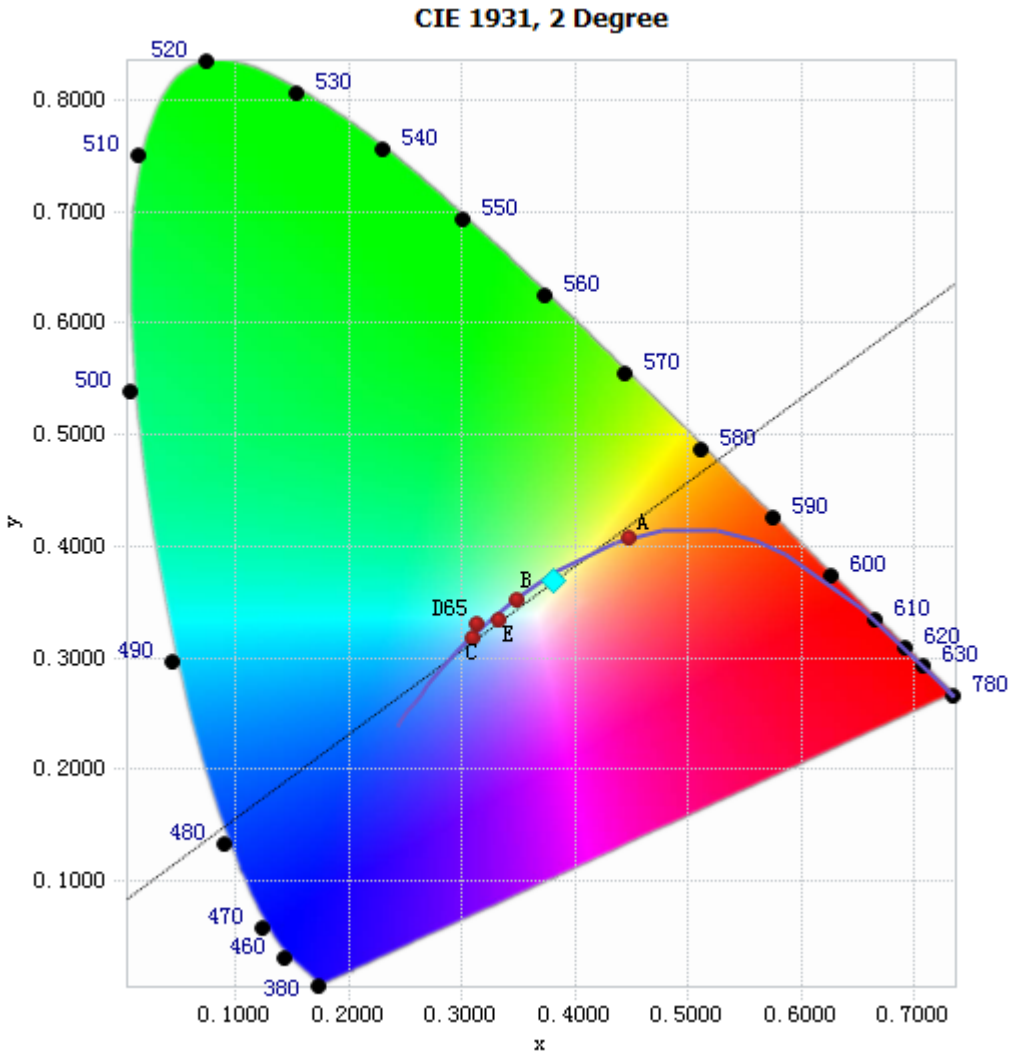


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.55E-04	485	1.31E-02	590	3.08E-02	695	4.68E-03
385	1.47E-04	490	1.34E-02	595	3.11E-02	700	4.00E-03
390	1.56E-04	495	1.38E-02	600	3.11E-02	705	3.42E-03
395	1.53E-04	500	1.47E-02	605	3.06E-02	710	2.92E-03
400	1.56E-04	505	1.59E-02	610	2.99E-02	715	2.49E-03
405	1.50E-04	510	1.69E-02	615	2.87E-02	720	2.12E-03
410	1.93E-04	515	1.77E-02	620	2.73E-02	725	1.82E-03
415	2.92E-04	520	1.83E-02	625	2.57E-02	730	1.56E-03
420	5.17E-04	525	1.89E-02	630	2.39E-02	735	1.31E-03
425	9.20E-04	530	1.96E-02	635	2.20E-02	740	1.12E-03
430	1.68E-03	535	2.00E-02	640	2.01E-02	745	9.56E-04
435	3.27E-03	540	2.06E-02	645	1.81E-02	750	8.20E-04
440	6.27E-03	545	2.14E-02	650	1.62E-02	755	7.05E-04
445	1.20E-02	550	2.22E-02	655	1.45E-02	760	5.95E-04
450	2.40E-02	555	2.31E-02	660	1.27E-02	765	5.08E-04
455	3.77E-02	560	2.42E-02	665	1.12E-02	770	4.40E-04
460	3.43E-02	565	2.54E-02	670	9.72E-03	775	3.74E-04
465	2.46E-02	570	2.67E-02	675	8.47E-03	780	3.30E-04
470	2.16E-02	575	2.79E-02	680	7.32E-03		
475	1.79E-02	580	2.91E-02	685	6.33E-03		
480	1.41E-02	585	3.02E-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): (0.3812, 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

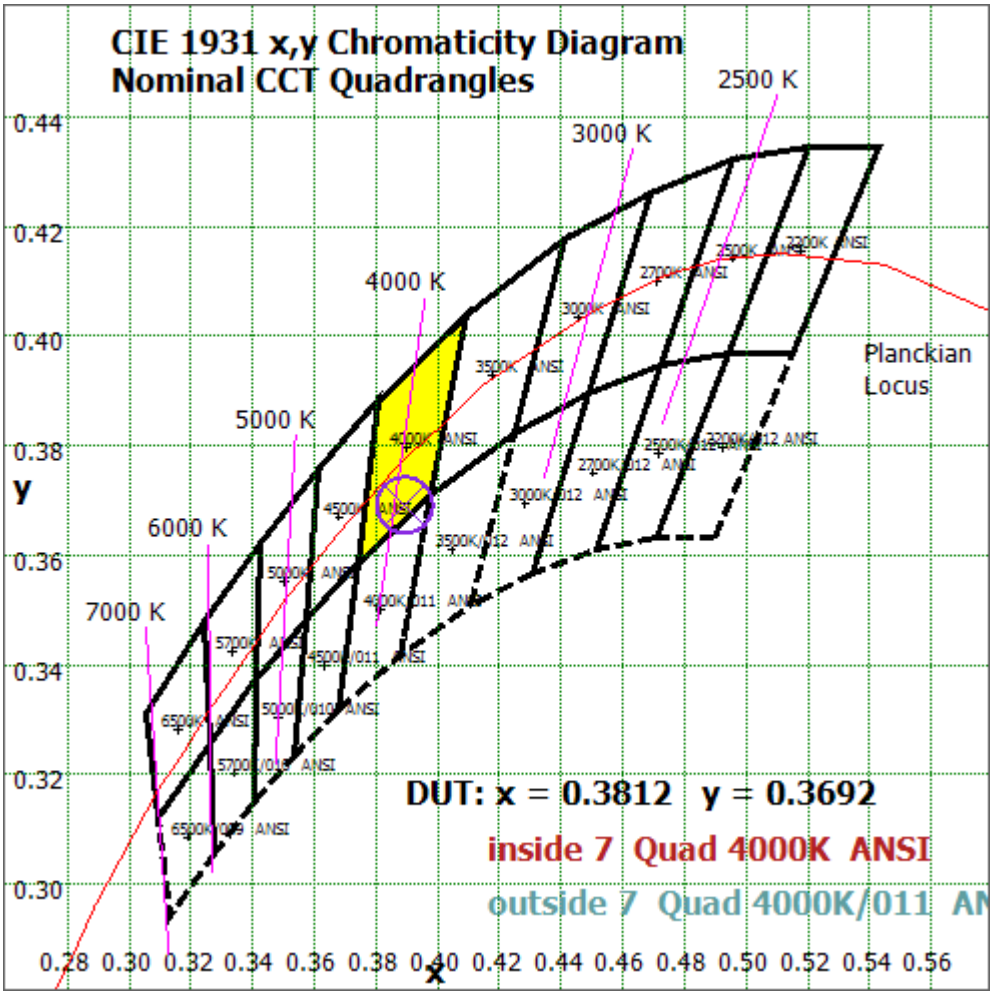


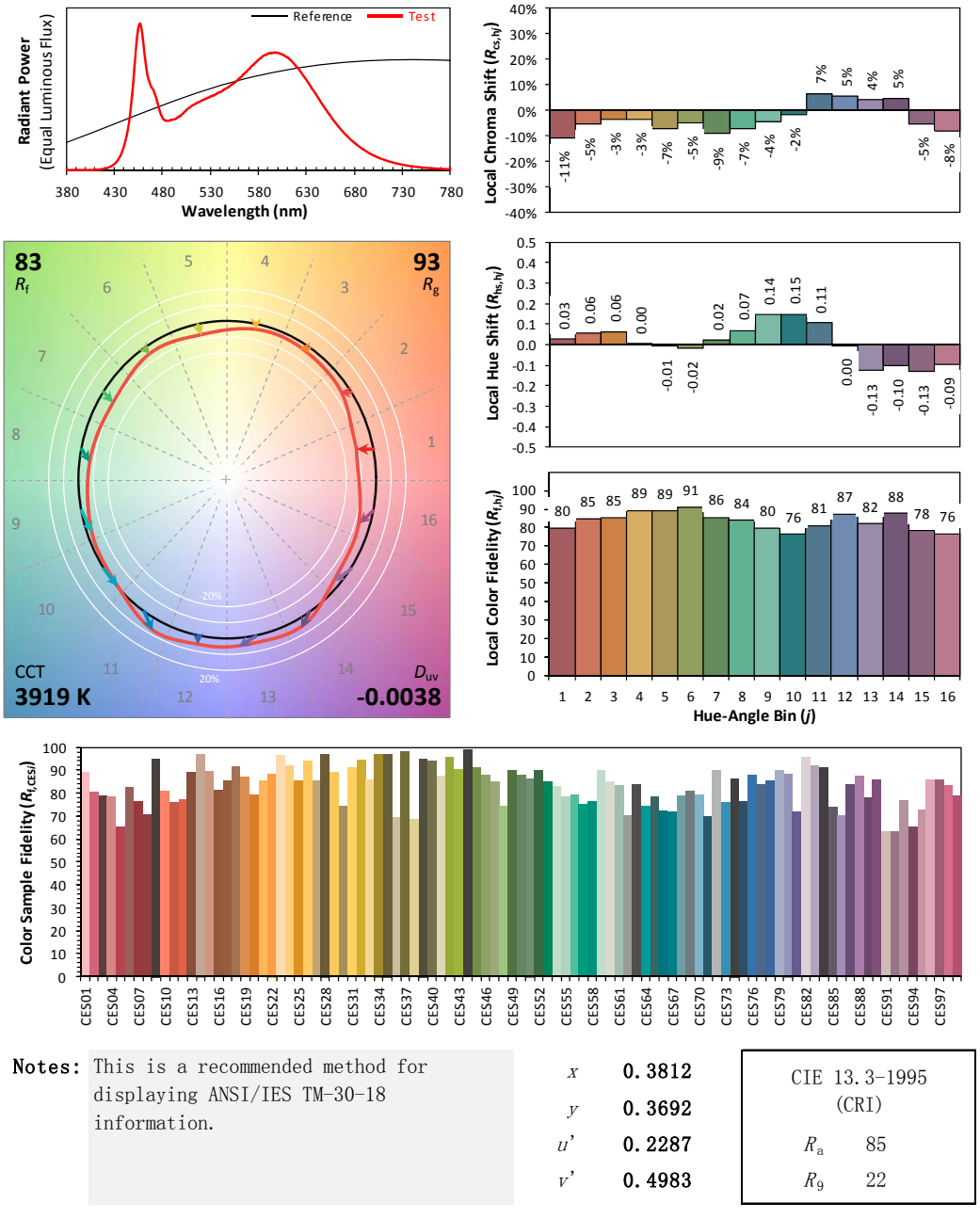
Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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/A3



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

x	0.3812
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)	0.302	0.143
Power Factor	0.9913	0.9005
Test Power (W)/3	11.95	11.91
THD A%	5.52	9.24
Luminous Efficacy (lm/W)	144.3	144.6
Total Luminous Flux (lm)	1724.4	1721.8
Color Rendering Index (CRI)	85.9	
R9	22.4	
Correlated Color Temperature (CCT)(K)	5088	
Chromaticity Chroma x	0.3423	
Chromaticity Chroma y	0.3457	
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

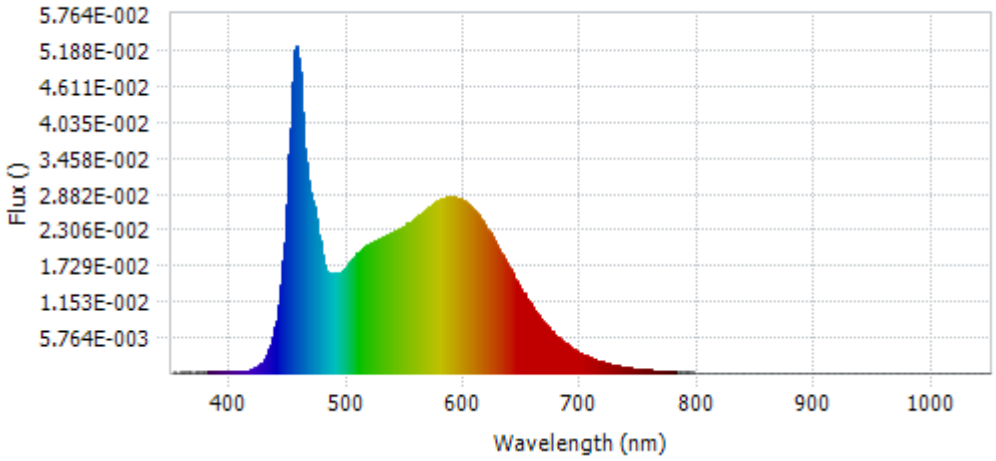
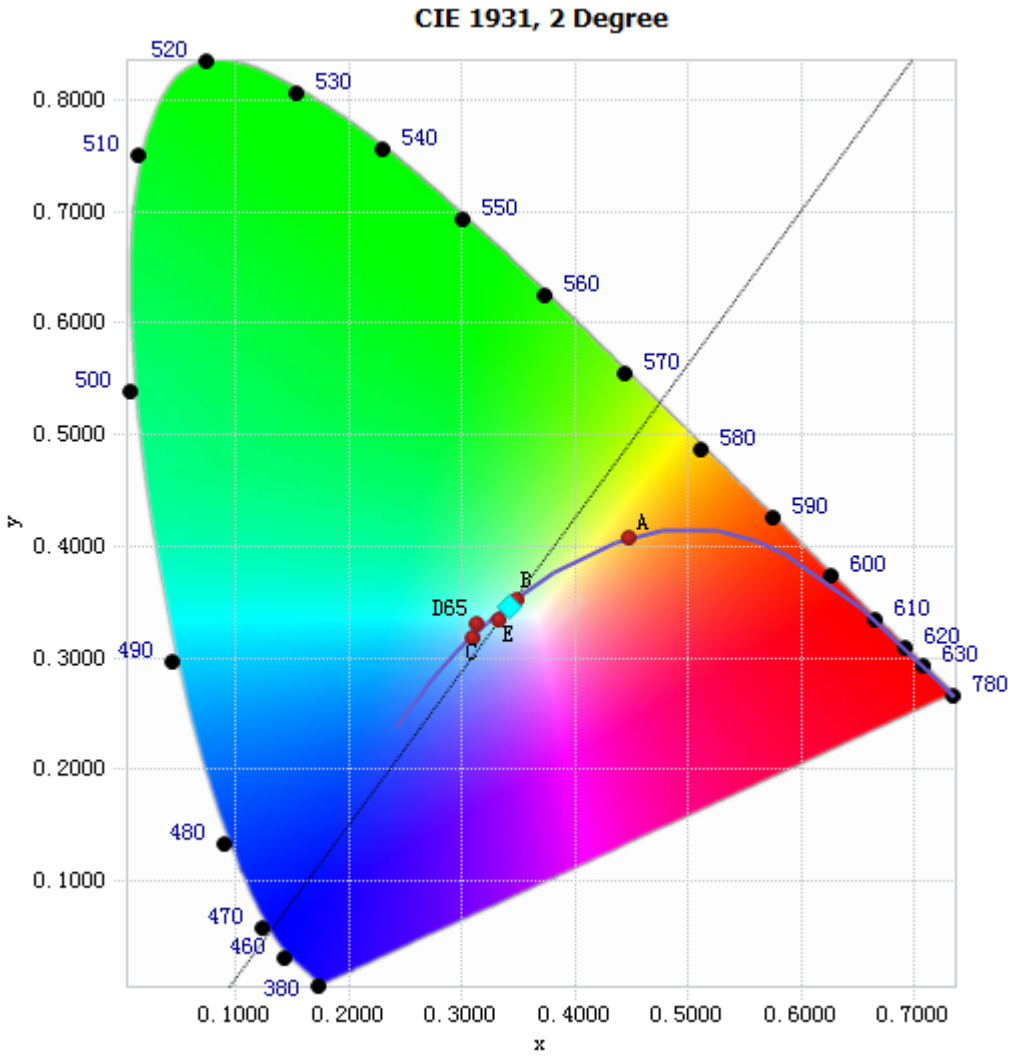


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.07E-04	485	1.60E-02	590	2.84E-02	695	3.66E-03
385	1.89E-04	490	1.61E-02	595	2.81E-02	700	3.14E-03
390	1.84E-04	495	1.64E-02	600	2.76E-02	705	2.66E-03
395	2.07E-04	500	1.73E-02	605	2.67E-02	710	2.28E-03
400	2.07E-04	505	1.85E-02	610	2.57E-02	715	1.95E-03
405	2.10E-04	510	1.95E-02	615	2.45E-02	720	1.67E-03
410	2.77E-04	515	2.03E-02	620	2.30E-02	725	1.43E-03
415	4.03E-04	520	2.08E-02	625	2.14E-02	730	1.22E-03
420	7.45E-04	525	2.13E-02	630	1.97E-02	735	1.02E-03
425	1.36E-03	530	2.18E-02	635	1.80E-02	740	8.82E-04
430	2.57E-03	535	2.22E-02	640	1.63E-02	745	7.54E-04
435	5.00E-03	540	2.26E-02	645	1.46E-02	750	6.41E-04
440	9.56E-03	545	2.32E-02	650	1.30E-02	755	5.55E-04
445	1.81E-02	550	2.37E-02	655	1.15E-02	760	4.73E-04
450	3.50E-02	555	2.44E-02	660	1.01E-02	765	4.09E-04
455	5.18E-02	560	2.51E-02	665	8.85E-03	770	3.49E-04
460	4.51E-02	565	2.59E-02	670	7.67E-03	775	3.02E-04
465	3.21E-02	570	2.66E-02	675	6.65E-03	780	2.63E-04
470	2.76E-02	575	2.72E-02	680	5.75E-03		
475	2.23E-02	580	2.79E-02	685	4.98E-03		
480	1.73E-02	585	2.84E-02	690	4.27E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3423, 0.3457)

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

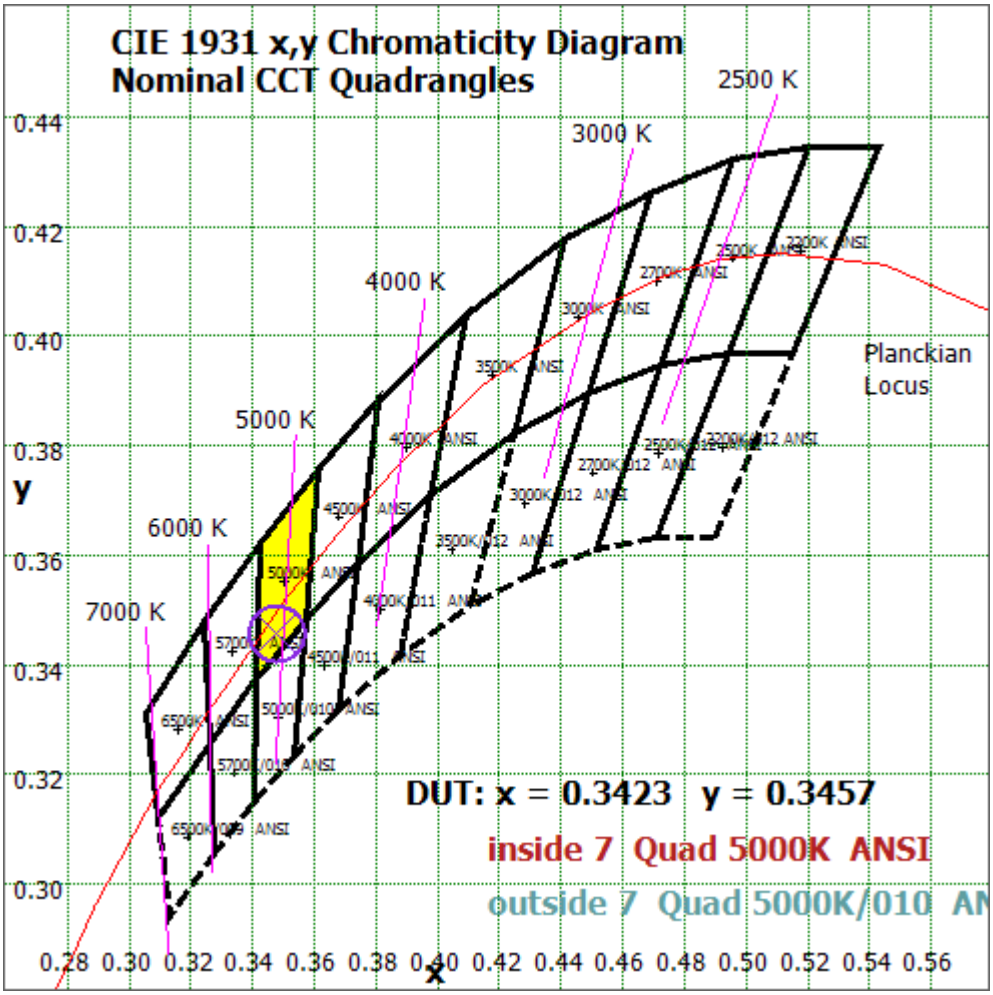


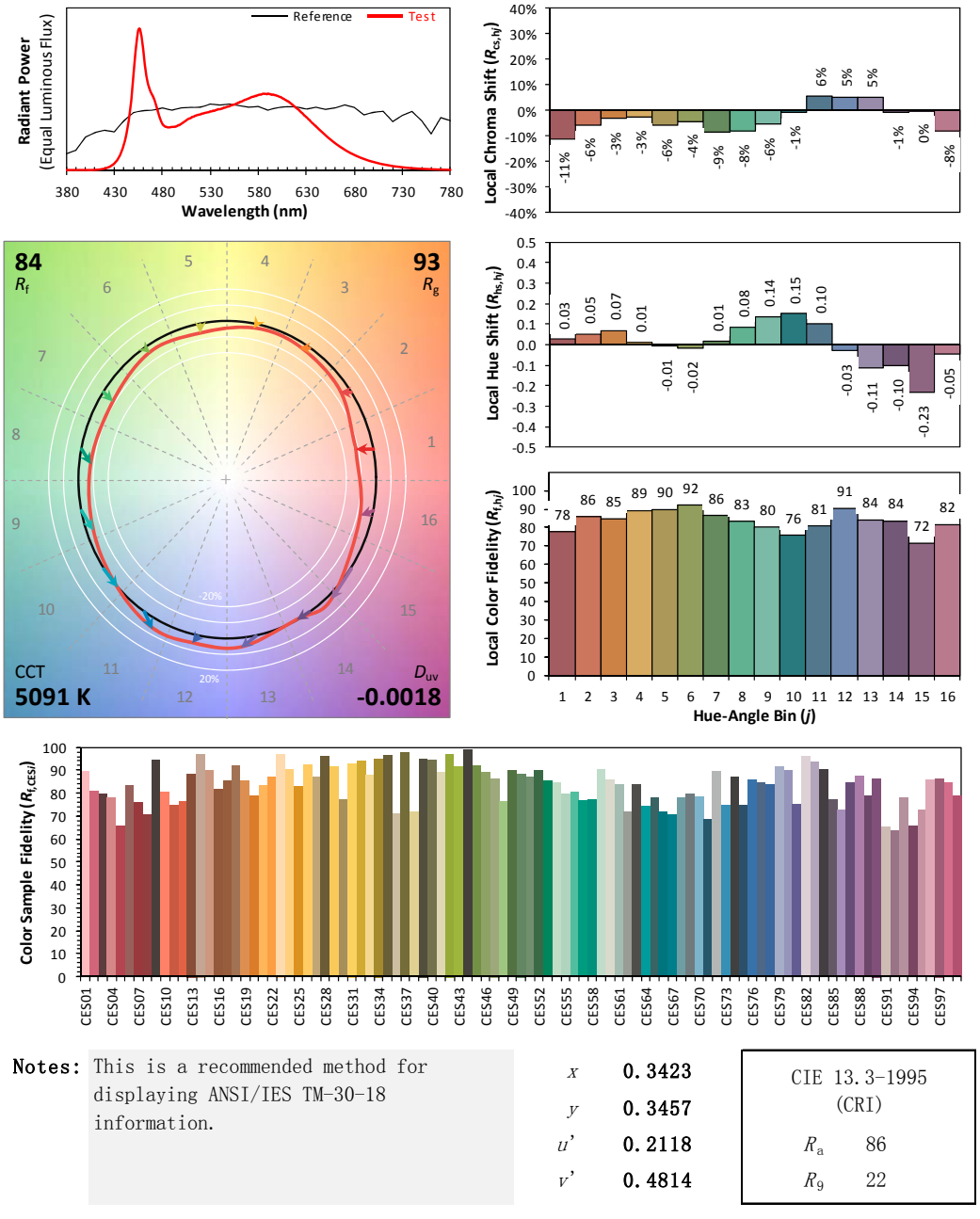
Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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/A3



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

x	0.3423
y	0.3457
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)	0.305	0.145
Power Factor	0.9918	0.9012
Test Power (W)/3	12.08	12.05
THD A%	5.38	8.93
Luminous Efficacy (lm/W)	141.2	141.7
Total Luminous Flux (lm)	1706.2	1707.6
Color Rendering Index (CRI)	84.3	
R9	11.8	
Correlated Color Temperature (CCT)(K)	6516	
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	78.5
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	97

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

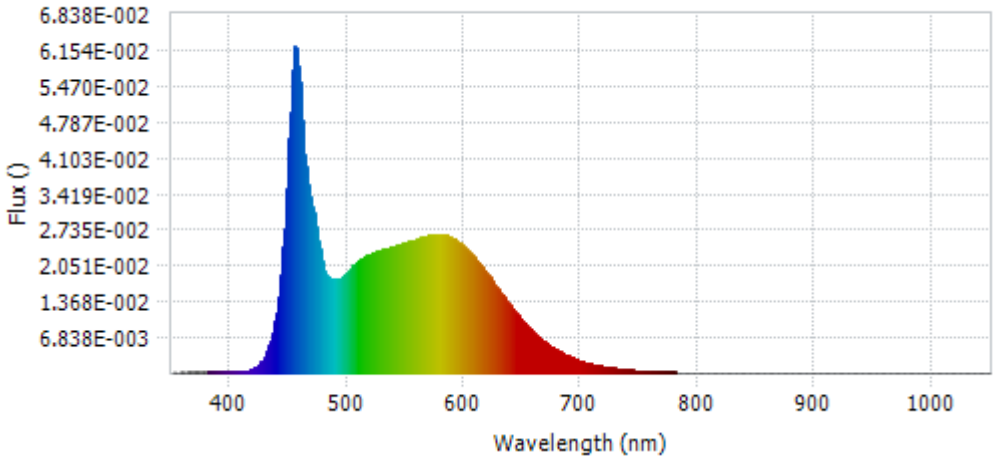
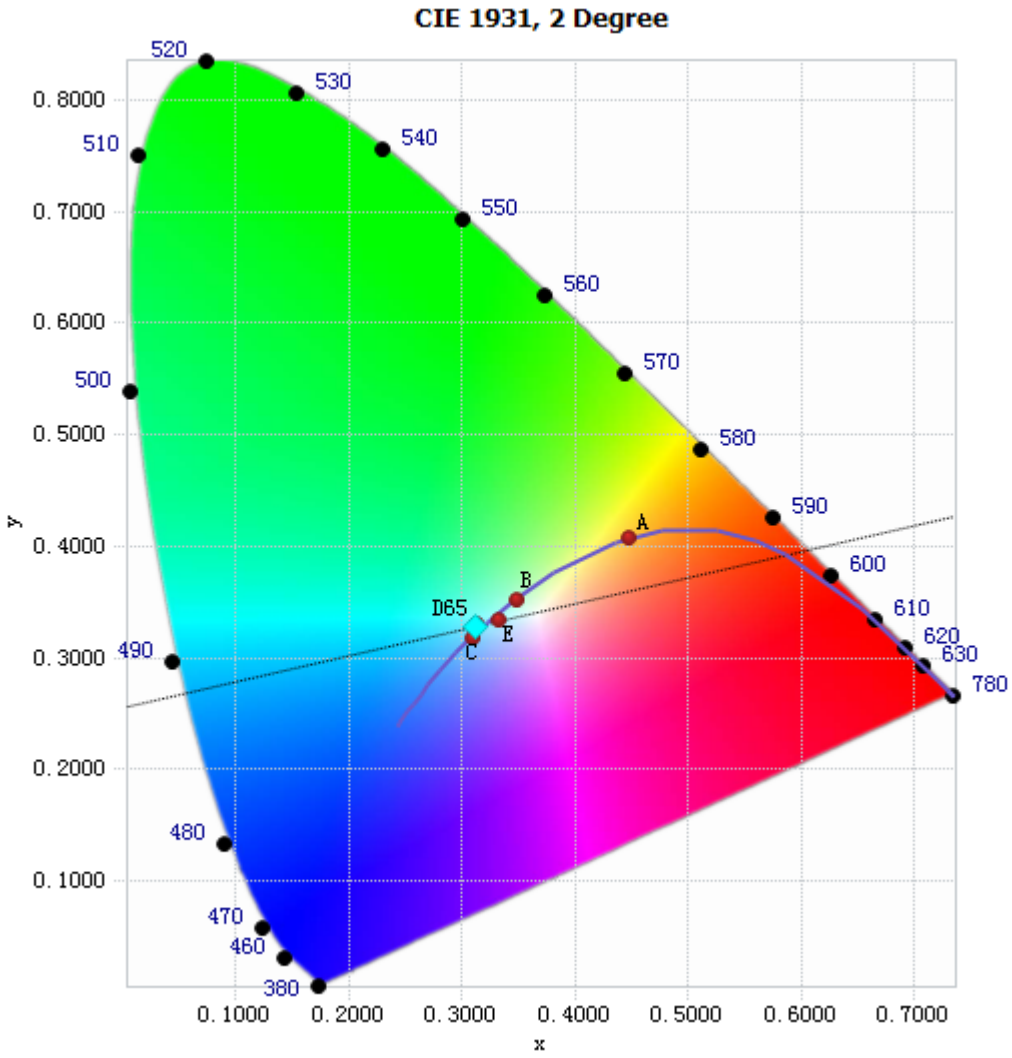


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.53E-04	485	1.81E-02	590	2.57E-02	695	2.74E-03
385	2.32E-04	490	1.79E-02	595	2.49E-02	700	2.33E-03
390	2.27E-04	495	1.83E-02	600	2.41E-02	705	1.97E-03
395	2.46E-04	500	1.92E-02	605	2.28E-02	710	1.68E-03
400	2.29E-04	505	2.05E-02	610	2.16E-02	715	1.45E-03
405	2.46E-04	510	2.14E-02	615	2.02E-02	720	1.24E-03
410	3.31E-04	515	2.22E-02	620	1.87E-02	725	1.05E-03
415	5.38E-04	520	2.26E-02	625	1.72E-02	730	9.05E-04
420	9.94E-04	525	2.31E-02	630	1.56E-02	735	7.71E-04
425	1.88E-03	530	2.36E-02	635	1.41E-02	740	6.64E-04
430	3.56E-03	535	2.38E-02	640	1.27E-02	745	5.65E-04
435	6.86E-03	540	2.41E-02	645	1.13E-02	750	4.81E-04
440	1.30E-02	545	2.45E-02	650	9.93E-03	755	4.17E-04
445	2.40E-02	550	2.48E-02	655	8.74E-03	760	3.61E-04
450	4.46E-02	555	2.52E-02	660	7.63E-03	765	3.08E-04
455	6.22E-02	560	2.55E-02	665	6.65E-03	770	2.70E-04
460	5.19E-02	565	2.59E-02	670	5.74E-03	775	2.36E-04
465	3.72E-02	570	2.62E-02	675	4.97E-03	780	2.02E-04
470	3.16E-02	575	2.63E-02	680	4.27E-03		
475	2.51E-02	580	2.63E-02	685	3.69E-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

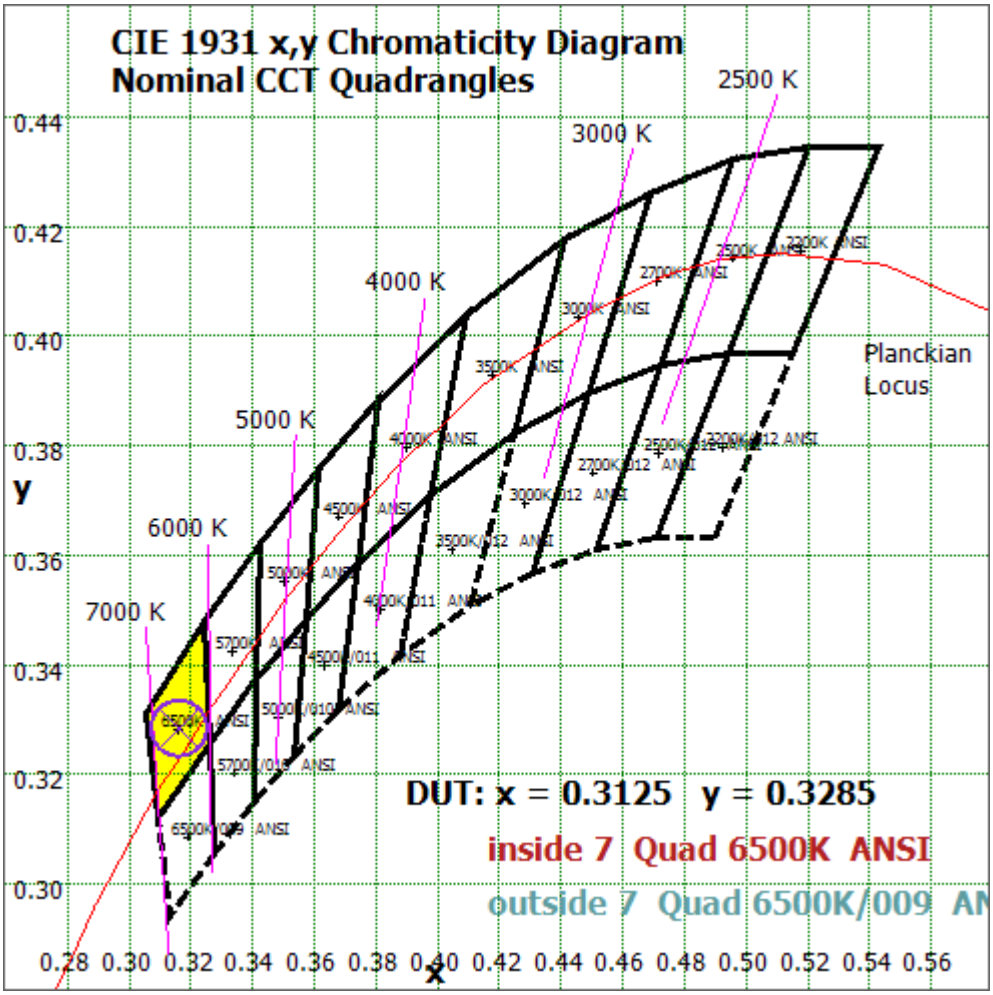


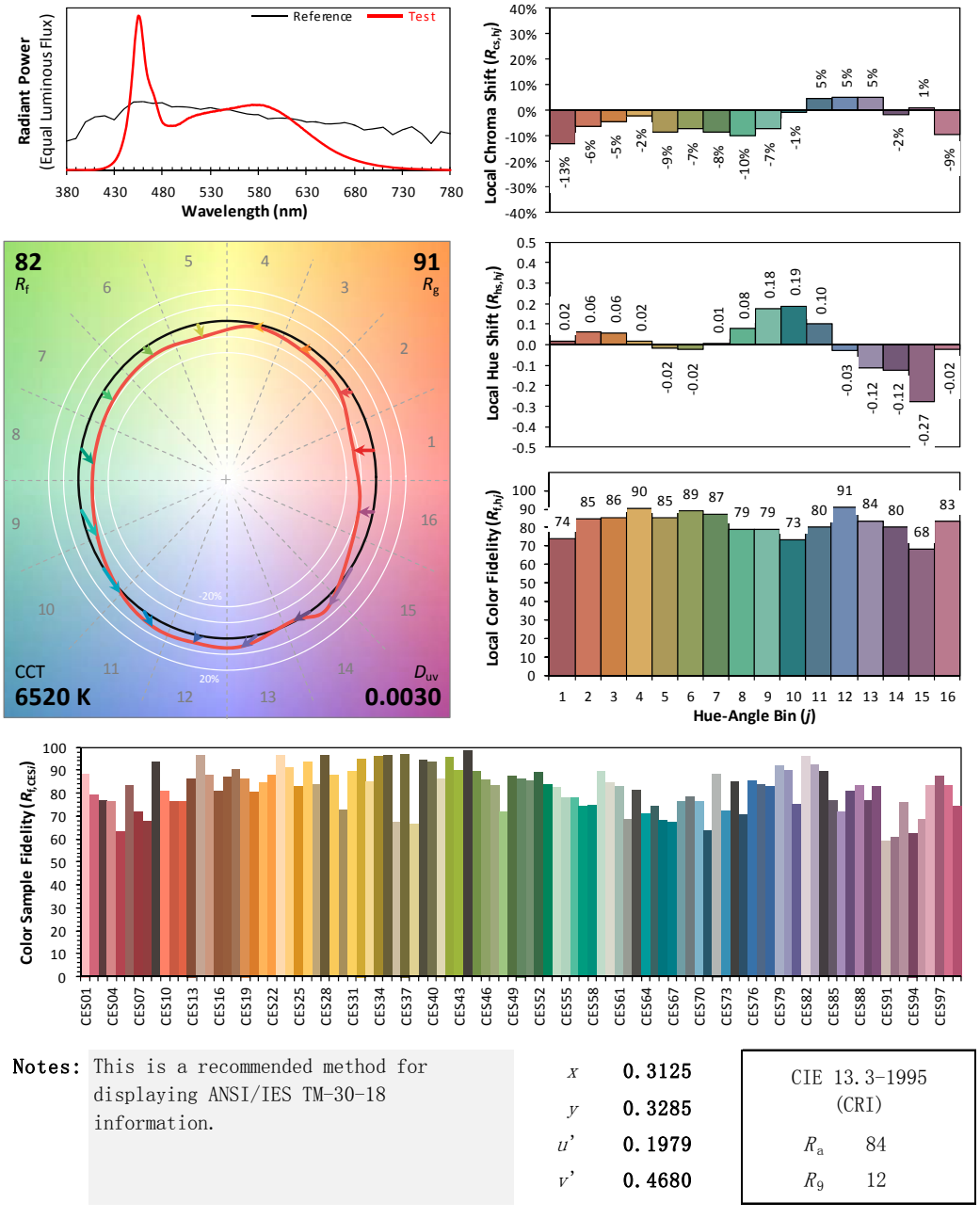
Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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/A3



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.

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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 ***

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.

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