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/A2

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23060027m

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	11.5T8/4F/8CCTS/EXT/A2 3000K Setting	11.5T8/4F/8CCTS/EXT/A2 3500K Setting	11.5T8/4F/8CCTS/EXT/A2 4000K Setting
Luminous Efficacy (Lumens /Watt)	136.4	140.8	144.1
Total Luminous Flux (Lumens)	1752.2	1791.4	1817.1
Power (Watts)/2	12.85	12.72	12.61
Power Factor	0.9927	0.9925	0.9925
CCT (K)	3012	3474	3950
CRI	82.4	84.6	85.6
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Tested Model	11.5T8/4F/8CCTS/EXT/A2 5000K Setting	11.5T8/4F/8CCTS/EXT/A2 6500K Setting
Luminous Efficacy (Lumens /Watt)	144.4	141.2
Total Luminous Flux (Lumens)	1828.3	1812.1
Power (Watts)/2	12.66	12.83
Power Factor	0.9925	0.9927
CCT (K)	5042	6474
CRI	85.9	84.2
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. 28, 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

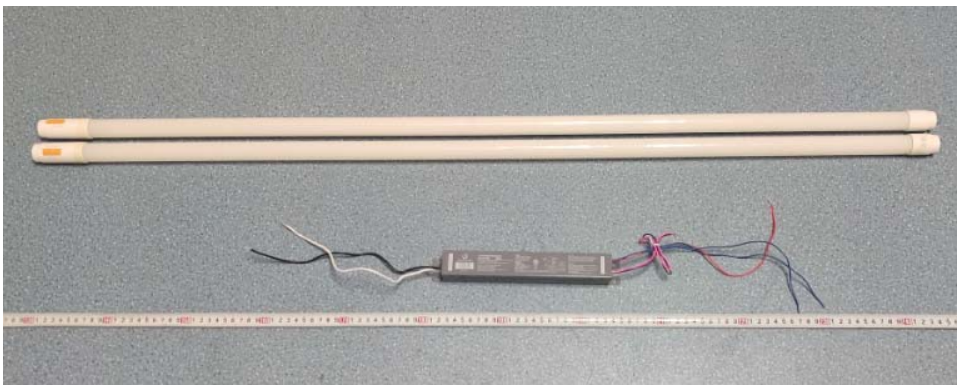


Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: 11.5T8/4F/8CCTS/EXT/A2
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: Color- Tunable 3000K/3500K/4000K/5000K/6500K LED Tube supplied by a LED driver: 15T8T5HEDRIVER/2CH/R
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)	0.216	0.103
Power Factor	0.9927	0.9024
Test Power (W)/2	12.85	12.88
THD A%	5.32	9.42
Luminous Efficacy (lm/W)	136.4	136.4
Total Luminous Flux (lm)	1752.2	1756.3
Color Rendering Index (CRI)	82.4	
R9	6.6	
Correlated Color Temperature (CCT)(K)	3012	
Chromaticity Chroma x	0.4348	
Chromaticity Chroma y	0.4014	
Chromaticity Chroma u	0.2503	
Chromaticity Chroma v	0.3467	
Duv	-0.0008	
Chromaticity Chroma u ’	0.2503	
Chromaticity Chroma v’	0.5200	

Special Color Rendering Indices	
R1	81.8
R2	93.7
R3	92.8
R4	78.9
R5	82.2
R6	92.5
R7	80.4
R8	57.3
R9	6.6
R10	85.7
R11	78.4
R12	73.1
R13	85
R14	96.7

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

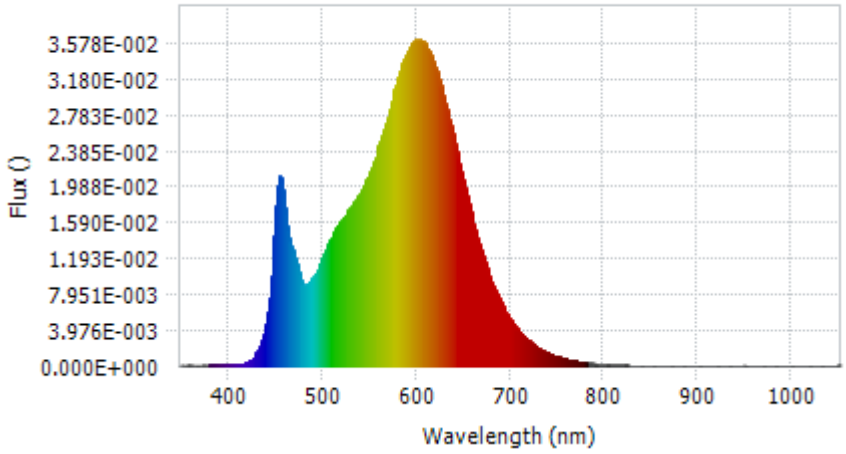
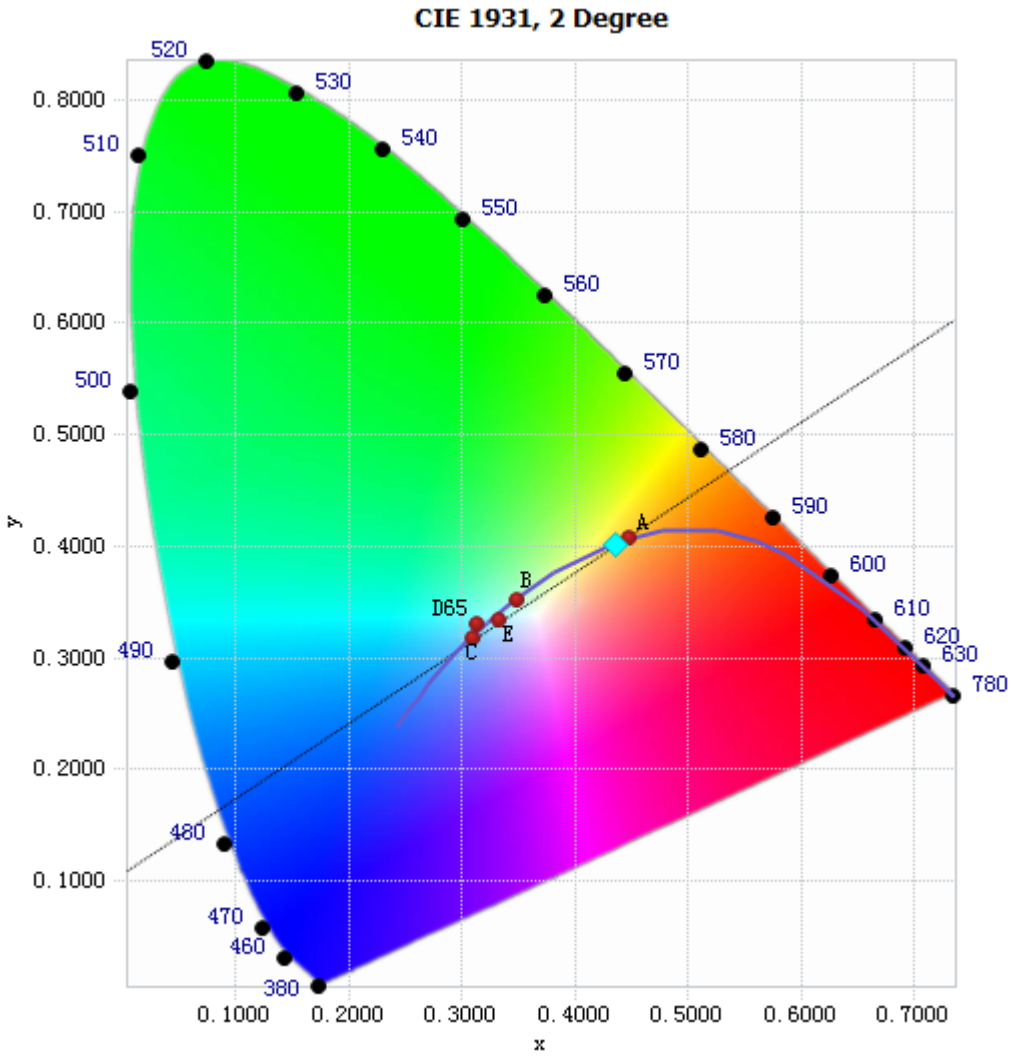


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.41E-04	485	9.15E-03	590	3.47E-02	695	6.05E-03
385	1.10E-04	490	9.74E-03	595	3.55E-02	700	5.19E-03
390	9.54E-05	495	1.07E-02	600	3.61E-02	705	4.43E-03
395	1.10E-04	500	1.20E-02	605	3.60E-02	710	3.79E-03
400	1.23E-04	505	1.32E-02	610	3.55E-02	715	3.24E-03
405	1.14E-04	510	1.43E-02	615	3.46E-02	720	2.77E-03
410	1.65E-04	515	1.53E-02	620	3.31E-02	725	2.37E-03
415	2.54E-04	520	1.59E-02	625	3.15E-02	730	2.00E-03
420	4.31E-04	525	1.68E-02	630	2.95E-02	735	1.71E-03
425	7.62E-04	530	1.75E-02	635	2.74E-02	740	1.45E-03
430	1.34E-03	535	1.82E-02	640	2.52E-02	745	1.24E-03
435	2.50E-03	540	1.91E-02	645	2.29E-02	750	1.05E-03
440	4.58E-03	545	2.01E-02	650	2.05E-02	755	9.07E-04
445	8.73E-03	550	2.12E-02	655	1.83E-02	760	7.72E-04
450	1.61E-02	555	2.25E-02	660	1.62E-02	765	6.66E-04
455	2.11E-02	560	2.41E-02	665	1.43E-02	770	5.60E-04
460	1.76E-02	565	2.58E-02	670	1.25E-02	775	4.86E-04
465	1.39E-02	570	2.76E-02	675	1.09E-02	780	4.17E-04
470	1.24E-02	575	2.96E-02	680	9.43E-03		
475	1.03E-02	580	3.15E-02	685	8.19E-03		
480	8.99E-03	585	3.34E-02	690	7.07E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4348, 0.4014)

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

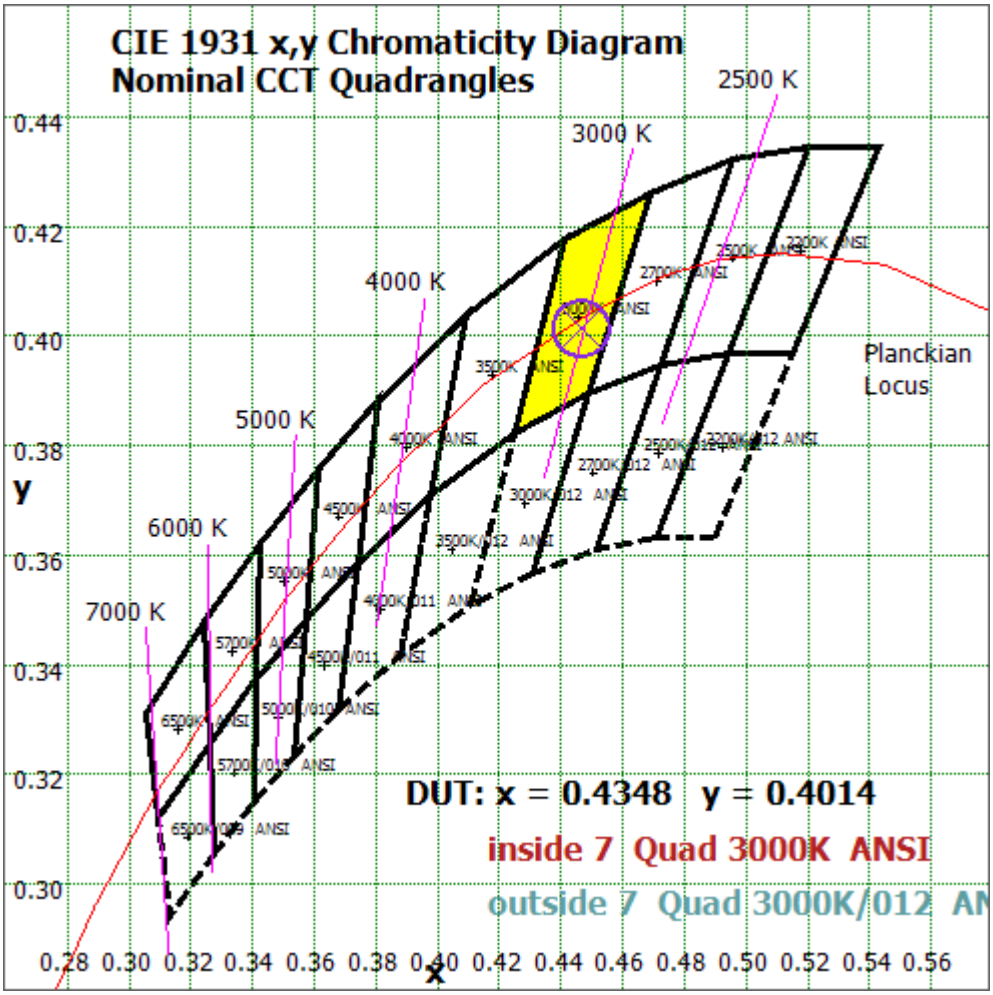


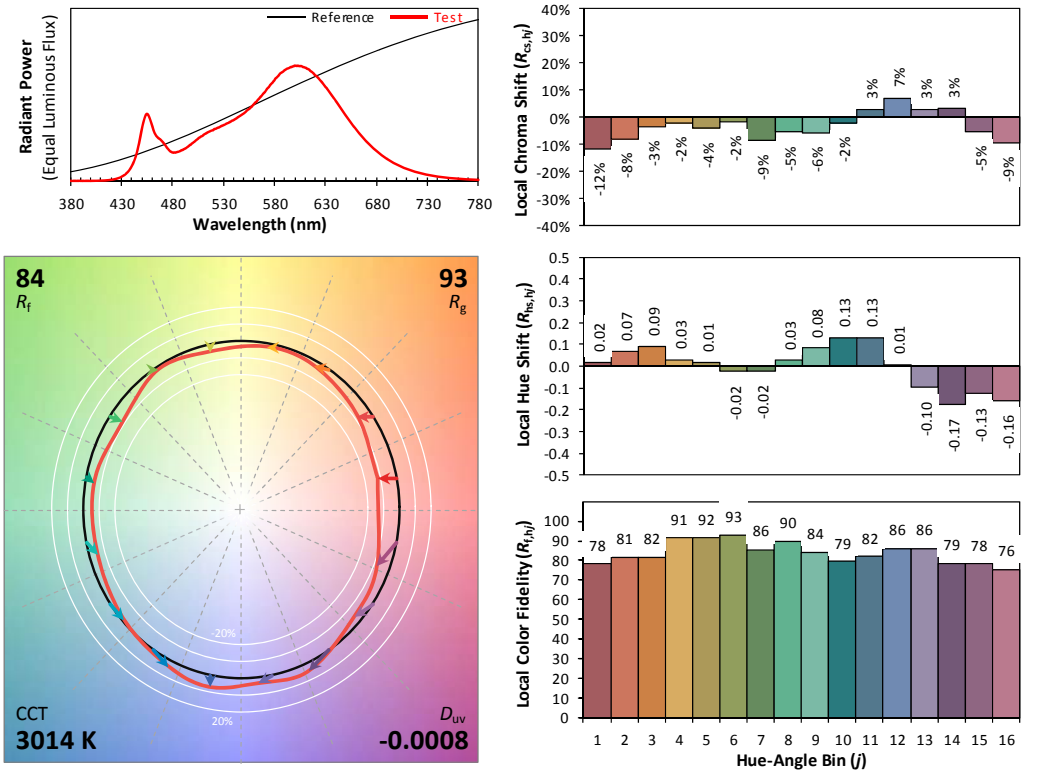
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/28 **Model:** 11.5T8/4F/8CCTS/EXT/A2



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

x	0.4348
y	0.4014
u'	0.2503
v'	0.5200

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)	0.217
Power Factor	0.9907
Power (W)/2	12.88
Luminous Efficacy (lm/W)	137.1
Total Luminous Flux (lm)	1765.8
Beam Angle (°)	115.8 (0^o-180^o) / 247.4 (90^o-270^o)
Center Beam Candle Power (cd)	273
Maximum Beam Candle Power (cd)	273.7 (At: C=90.0, Gamma=1.5)
Spacing Criteria	1.29 (0^o-180^o) / 1.47 (90^o-270^o)
Zonal Lumens in the 0°-60°Zone	41.04%
Zonal Lumens in the 60°-90°Zone	27.17%
Zonal Lumens in the 90°-120°Zone	18.90%
Zonal Lumens in the 120°-180°Zone	12.89%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	25.965	1.47%
10- 20	75.625	4.28%
20- 30	118.693	6.72%
30- 40	151.734	8.59%
40- 50	172.504	9.77%
50- 60	180.162	10.20%
60- 70	175.462	9.94%
70- 80	161.319	9.14%
80- 90	142.973	8.10%
90-100	126.5	7.16%
100-110	111.527	6.32%
110-120	95.728	5.42%
120-130	79.341	4.49%
130-140	62.699	3.55%
140-150	44.953	2.55%
150-160	27.184	1.54%
160-170	11.129	0.63%
170-180	2.264	0.13%
Total	1765.8	100%

γ(°)	Lumens	% Total
0- 60	724.683	41.04%
60- 90	479.754	27.17%
0-90	1204.44	68.21%
90- 180	561.325	31.79%
0- 180	1765.8	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

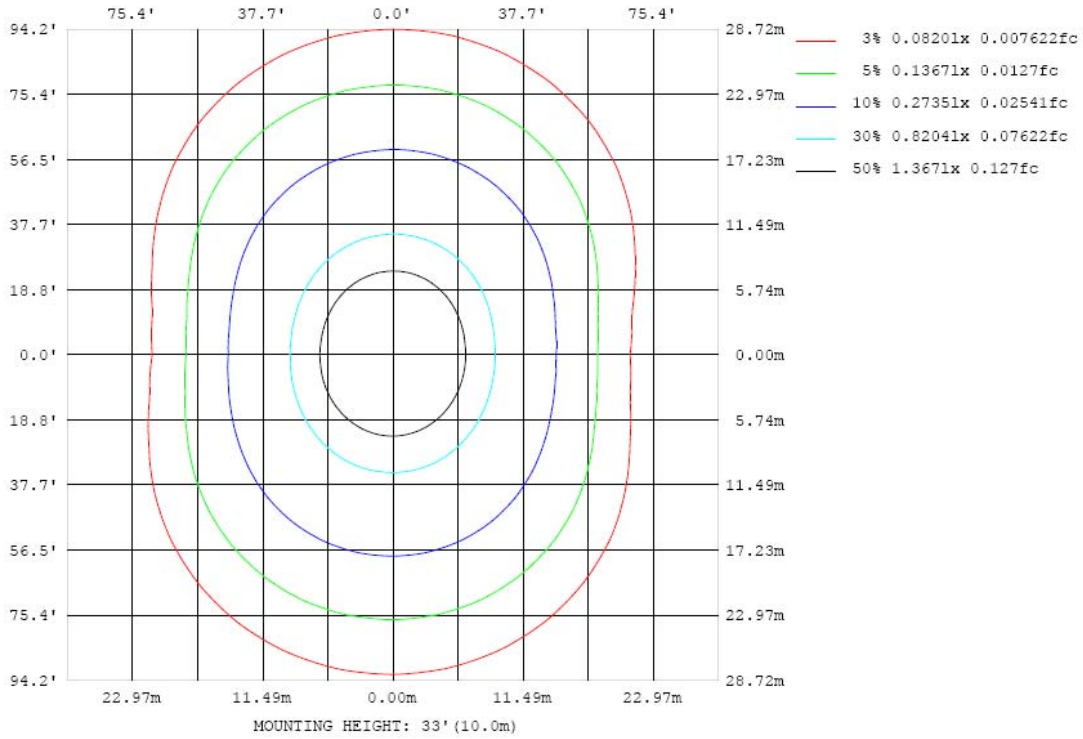


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

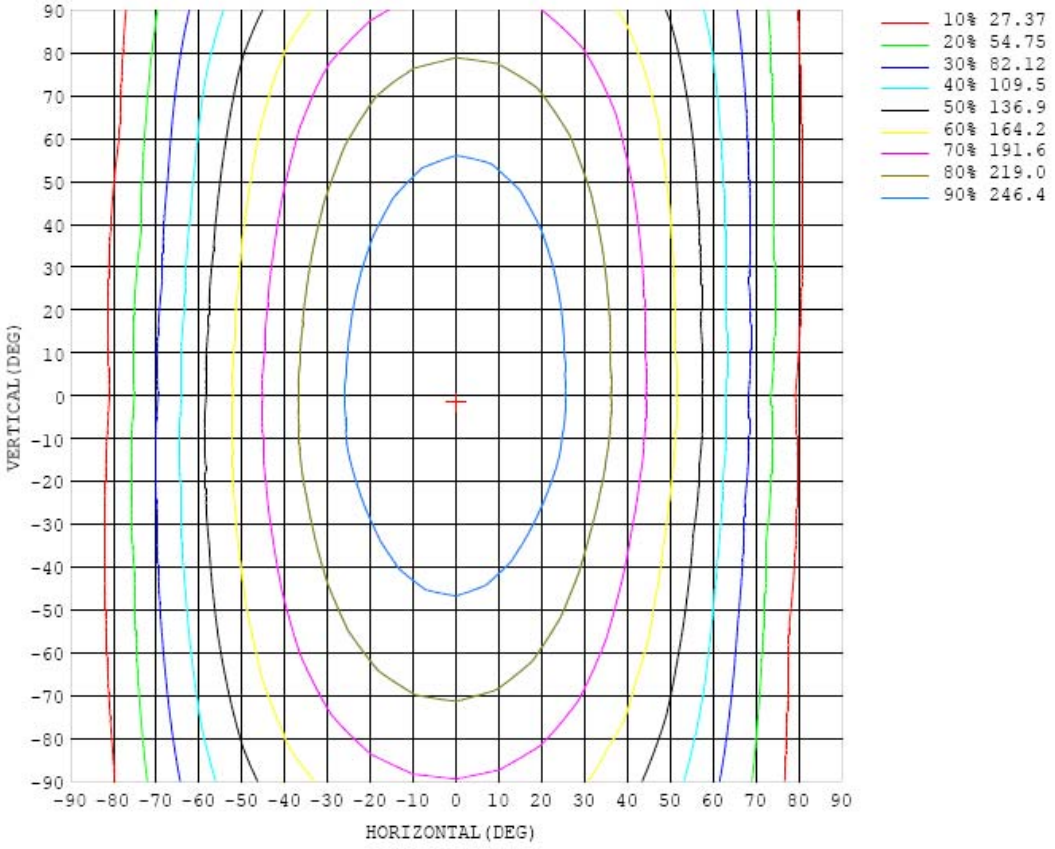


Chart 6: Isocandela Plot

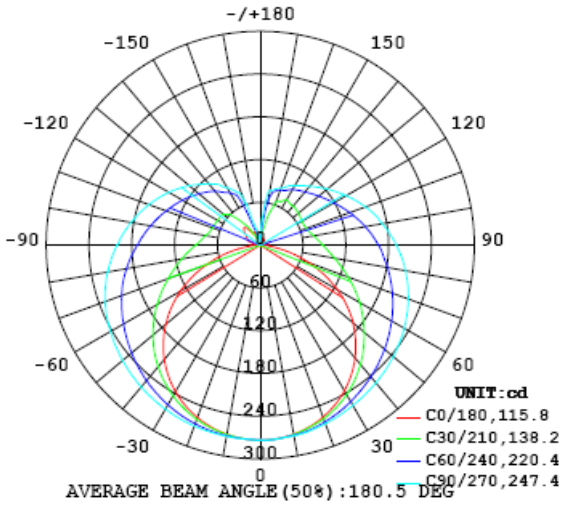


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C (DEG) / γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273
5	272	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273
10	269	270	270	270	270	270	271	271	272	272	272	271	271	271	270	270	270	270	270
15	264	264	265	265	266	268	268	269	270	270	270	269	269	268	267	266	265	265	265
20	257	257	258	259	261	263	264	265	266	267	266	266	265	263	262	260	258	258	257
25	247	248	249	252	254	257	259	261	263	263	263	262	260	258	255	253	251	249	248
30	236	237	239	242	246	250	254	257	259	260	259	258	255	251	248	244	241	238	237
35	222	224	226	231	236	242	247	252	255	256	256	253	249	244	239	234	230	225	224
40	207	208	212	218	226	234	241	247	251	252	251	249	244	237	230	222	216	211	209
45	189	191	196	205	215	225	234	242	246	248	247	243	237	229	220	210	201	195	192
50	170	172	179	190	203	216	227	236	241	243	242	238	231	221	209	197	185	177	173
55	148	152	161	175	192	207	220	230	236	238	237	232	224	213	198	183	169	158	152
60	124	129	142	161	180	198	213	223	230	233	232	226	217	204	187	170	152	137	129
65	99.2	105	122	146	169	189	205	217	224	227	226	220	210	195	177	156	133	115	105
70	73.0	80.1	103	131	158	179	197	210	218	221	219	213	202	186	166	142	115	92.2	79.9
75	47.3	56.7	85.2	118	147	171	189	203	211	214	212	206	194	178	156	129	98.5	70.6	55.5
80	24.0	36.5	70.2	106	137	163	181	195	203	207	205	198	186	169	146	117	83.6	50.9	31.3
85	7.28	22.2	58.9	95.8	128	154	173	187	196	199	197	190	178	161	137	107	71.4	35.5	12.1
90	1.88	15.6	51.4	87.7	120	146	166	179	187	191	189	182	170	152	128	97.8	62.3	26.4	3.13
95	2.07	12.4	46.6	81.4	112	138	158	171	179	182	180	174	162	144	120	90.4	56.3	23.0	2.78
100	6.58	13.3	42.9	76.0	106	130	149	163	171	174	172	166	154	136	113	84.5	52.8	23.3	6.49
105	11.3	16.2	41.8	71.6	99.5	123	141	155	163	166	164	157	146	128	106	79.9	51.3	26.1	11.8
110	13.1	20.0	43.4	68.6	94.2	116	134	146	154	157	155	149	137	121	101	76.6	51.6	30.6	18.3
115	10.2	23.6	46.5	67.4	89.7	110	126	138	145	148	146	140	129	114	95.7	74.5	53.1	36.1	20.3
120	6.77	25.5	50.5	67.7	86.7	104	119	130	137	139	137	132	122	108	91.7	73.4	55.5	42.3	22.2
125	4.09	28.0	54.1	68.6	84.7	99.8	113	122	128	130	129	124	115	103	88.6	73.1	58.5	48.7	24.5
130	2.24	32.4	57.2	69.8	83.3	96.1	107	115	120	122	121	116	109	98.4	86.2	73.4	61.6	54.9	28.9
135	4.01	38.4	58.5	70.8	82.6	93.0	102	109	113	115	114	110	103	94.5	84.5	74.1	63.6	58.6	32.7
140	7.10	40.5	61.5	71.8	81.8	90.4	97.6	103	107	108	107	104	98.3	91.2	83.4	73.3	65.6	59.3	32.1
145	10.3	35.6	58.8	71.8	80.9	88.2	93.7	98.0	101	102	101	98.3	94.1	88.7	81.2	73.6	69.8	56.1	23.4
150	9.01	27.4	64.7	73.8	78.9	85.1	90.3	93.7	95.7	96.4	95.8	93.8	90.7	85.2	78.9	74.4	71.2	57.7	17.6
155	6.99	23.1	53.9	66.7	78.3	81.9	84.7	88.2	90.8	91.4	90.9	88.7	85.1	81.6	78.7	75.3	70.8	55.4	20.0
160	9.80	15.1	38.6	64.0	73.7	79.9	82.1	83.8	84.9	85.1	84.9	84.0	82.3	80.5	77.8	74.9	70.2	45.8	18.3
165	8.00	11.4	20.0	42.1	60.8	72.0	78.1	80.2	81.3	81.8	81.6	80.7	79.3	78.0	76.4	73.2	61.3	39.5	20.0
170	9.80	12.3	15.5	21.2	33.7	47.2	60.9	73.2	76.9	77.0	77.0	76.8	76.7	74.4	68.5	60.7	44.6	28.8	19.7
175	14.2	13.6	12.5	12.7	14.7	17.9	21.9	28.4	37.2	44.1	46.7	46.3	43.8	40.6	35.6	29.9	25.1	20.5	17.9
180	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42

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	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273		
5	272	272	272	273	273	273	273	273	273	273	273	273	273	273	272	272	272		
10	269	269	270	270	271	272	272	272	272	272	272	272	271	271	270	269	269		
15	264	265	266	267	268	270	271	271	272	271	271	270	269	267	266	265	264		
20	257	258	260	262	265	267	269	270	270	270	269	267	265	263	261	259	257		
25	249	250	253	256	260	263	266	268	268	268	266	264	261	257	253	250	248		
30	238	240	244	249	254	259	262	265	266	265	263	260	255	250	245	240	237		
35	225	229	234	241	248	254	259	262	263	262	260	255	249	242	235	228	224		
40	210	215	223	232	240	248	254	258	260	259	255	250	242	233	224	215	209		
45	194	200	210	221	232	242	249	254	256	255	251	244	234	223	211	200	192		
50	175	184	196	210	224	235	244	250	252	251	246	238	226	213	198	184	173		
55	155	166	182	199	215	228	238	245	247	246	240	231	218	202	184	166	152		
60	133	147	167	187	206	221	233	240	243	241	235	224	210	191	170	148	131		
65	110	128	152	176	197	214	226	234	237	235	229	217	201	180	156	130	108		
70	86.6	109	137	165	188	207	220	228	231	230	223	210	193	170	143	113	85.4		
75	63.9	91.1	124	154	179	199	213	221	225	223	216	203	185	160	130	96.4	64.8		
80	42.6	76.1	112	144	170	190	205	214	217	215	208	195	176	151	120	83.0	46.3		
85	25.9	63.6	101	134	161	181	196	205	209	207	200	187	168	142	110	72.6	33.2		
90	16.5	53.4	90.5	124	151	172	188	197	201	199	192	179	160	134	103	65.9	26.8		
95	11.6	46.6	83.2	116	143	164	179	189	193	191	184	171	152	127	96.1	61.2	25.0		
100	11.2	42.4	77.8	109	136	156	171	180	184	182	175	163	144	120	90.6	58.1	26.0		
105	12.6	41.9	73.4	103	128	148	162	171	175	174	167	154	137	114	86.3	56.4	28.4		
110	14.1	41.9	71.5	97.8	122	141	154	163	166	165	158	146	129	108	82.8	56.2	29.0		
115	7.03	41.4	70.4	94.1	116	133	146	154	157	156	149	138	123	103	80.0	57.0	28.0		
120	2.01	41.0	69.3	90.8	110	126	138	145	148	147	141	130	116	97.8	77.9	56.8	27.5		
125	3.67	40.6	68.8	87.4	105	119	130	136	139	138	132	123	110	93.8	74.9	56.9	24.2		
130	2.89	37.5	66.9	84.3	99.8	112	122	128	130	129	124	115	104	90.0	71.8	59.0	21.5		
135	2.81	26.8	60.0	81.5	94.7	106	114	119	121	120	116	108	98.5	84.0	69.8	56.3	16.5		
140	7.05	11.3	45.6	78.2	88.4	99.1	106	111	112	111	108	102	90.7	79.4	67.0	44.7	10.4		
145	8.48	8.01	33.3	72.6	82.9	90.7	97.4	102	104	103	98.5	91.9	84.6	73.9	63.3	27.7	6.03		
150	8.59	8.90	17.4	44.0	79.0	84.6	88.9	91.8	93.0	92.3	89.5	86.1	77.3	63.7	44.0	12.0	4.77		
155	9.75	11.1	9.61	21.9	46.8	75.7	80.1	83.2	84.2	83.5	81.6	74.4	61.5	45.3	20.3	5.52	4.97		
160	8.83	11.5	10.7	12.9	19.8	27.3	47.8	64.2	67.3	66.2	61.4	45.0	31.9	14.6	10.4	4.72	7.73		
165	10.5	9.16	9.31	10.1	13.3	12.6	17.5	22.2	25.6	20.2	14.7	11.4	11.4	11.4	7.13	5.52	7.93		
170	13.6	9.60	9.60	6.47	9.24	10.1	9.29	12.1	12.0	12.9	14.5	10.1	10.1	6.23	6.23	9.84	8.83		
175	15.1	11.9	9.41	9.96	12.3	12.7	11.1	9.02	10.3	13.1	13.6	13.8	13.1	11.5	9.66	8.19	10.6		
180	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42		

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)	0.214	0.102
Power Factor	0.9925	0.9016
Test Power (W)/2	12.72	12.75
THD A%	5.44	9.63
Luminous Efficacy (lm/W)	140.8	140.3
Total Luminous Flux (lm)	1791.4	1789.3
Color Rendering Index (CRI)	84.6	
R9	16.9	
Correlated Color Temperature (CCT)(K)	3474	
Chromaticity Chroma x	0.4031	
Chromaticity Chroma y	0.3820	
Chromaticity Chroma u	0.2379	
Chromaticity Chroma v	0.3382	
Duv	-0.0034	
Chromaticity Chroma u ’	0.2379	
Chromaticity Chroma v’	0.5073	

Special Color Rendering Indices	
R1	85.3
R2	96.3
R3	91.9
R4	80.7
R5	85.4
R6	93
R7	81.3
R8	62.5
R9	16.9
R10	90.7
R11	80.6
R12	71
R13	88.9
R14	96.4

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

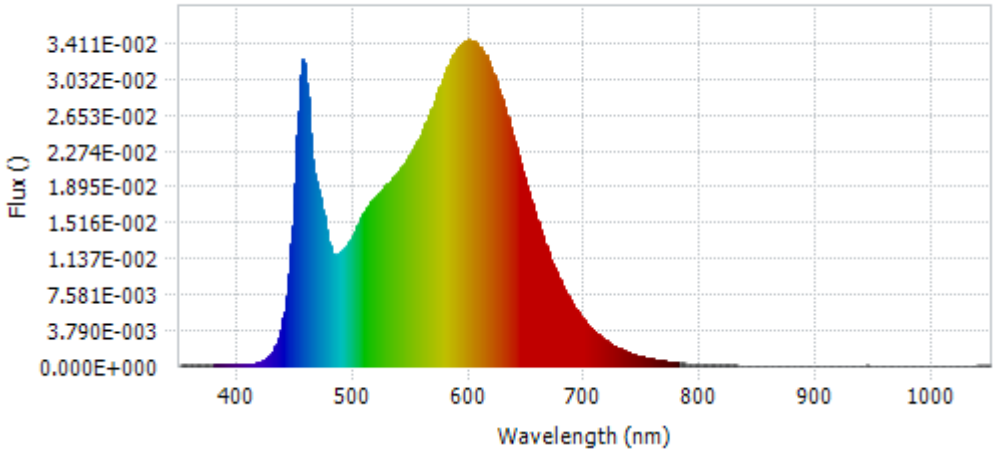
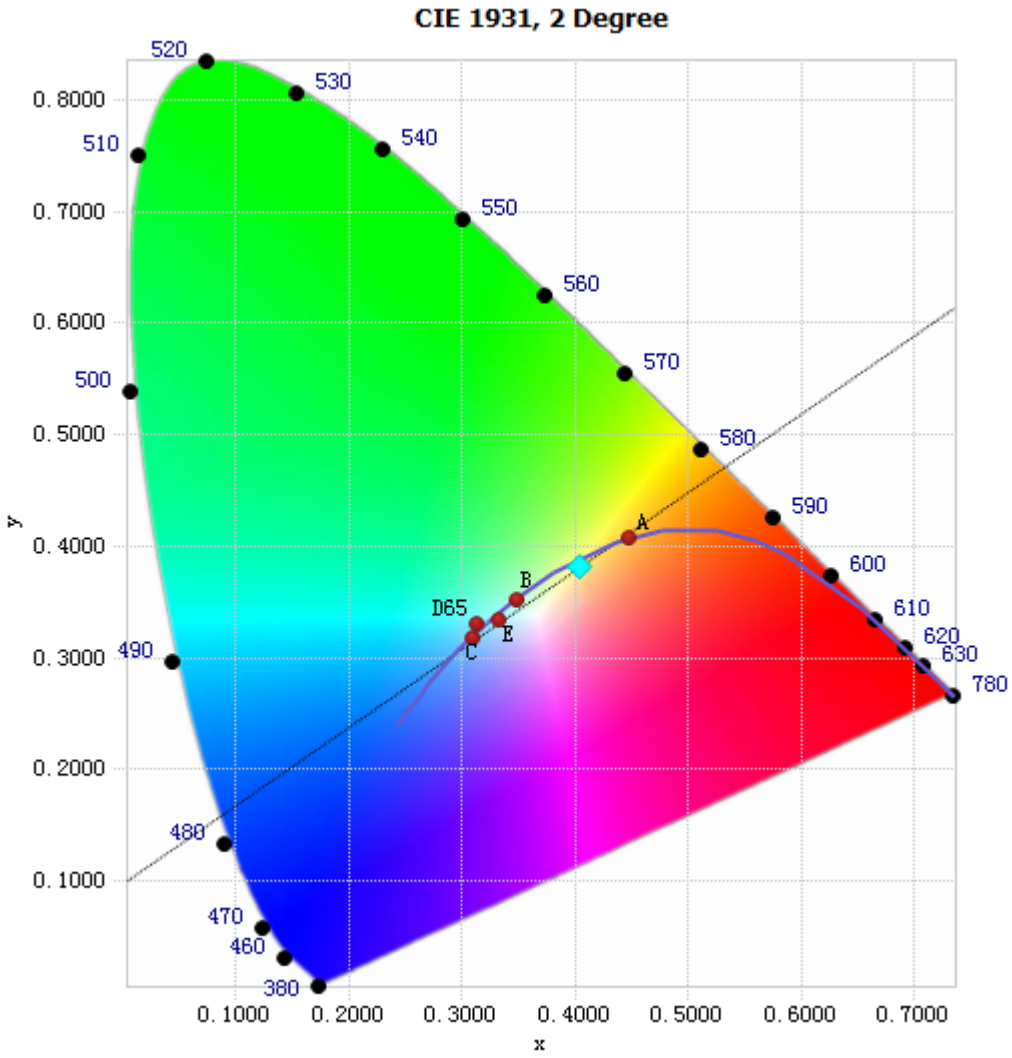


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.62E-04	485	1.17E-02	590	3.36E-02	695	5.47E-03
385	1.49E-04	490	1.21E-02	595	3.41E-02	700	4.68E-03
390	1.68E-04	495	1.29E-02	600	3.44E-02	705	3.99E-03
395	1.59E-04	500	1.40E-02	605	3.41E-02	710	3.39E-03
400	1.49E-04	505	1.53E-02	610	3.35E-02	715	2.91E-03
405	1.68E-04	510	1.64E-02	615	3.24E-02	720	2.48E-03
410	2.01E-04	515	1.73E-02	620	3.08E-02	725	2.12E-03
415	2.96E-04	520	1.79E-02	625	2.92E-02	730	1.80E-03
420	5.06E-04	525	1.87E-02	630	2.73E-02	735	1.53E-03
425	8.51E-04	530	1.94E-02	635	2.52E-02	740	1.30E-03
430	1.57E-03	535	1.99E-02	640	2.31E-02	745	1.12E-03
435	3.04E-03	540	2.07E-02	645	2.09E-02	750	9.53E-04
440	5.76E-03	545	2.16E-02	650	1.87E-02	755	8.09E-04
445	1.12E-02	550	2.25E-02	655	1.67E-02	760	7.04E-04
450	2.18E-02	555	2.37E-02	660	1.48E-02	765	5.89E-04
455	3.19E-02	560	2.51E-02	665	1.30E-02	770	5.10E-04
460	2.83E-02	565	2.65E-02	670	1.13E-02	775	4.33E-04
465	2.08E-02	570	2.80E-02	675	9.86E-03	780	3.80E-04
470	1.82E-02	575	2.96E-02	680	8.52E-03		
475	1.50E-02	580	3.12E-02	685	7.37E-03		
480	1.22E-02	585	3.27E-02	690	6.38E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4031, 0.3820)

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

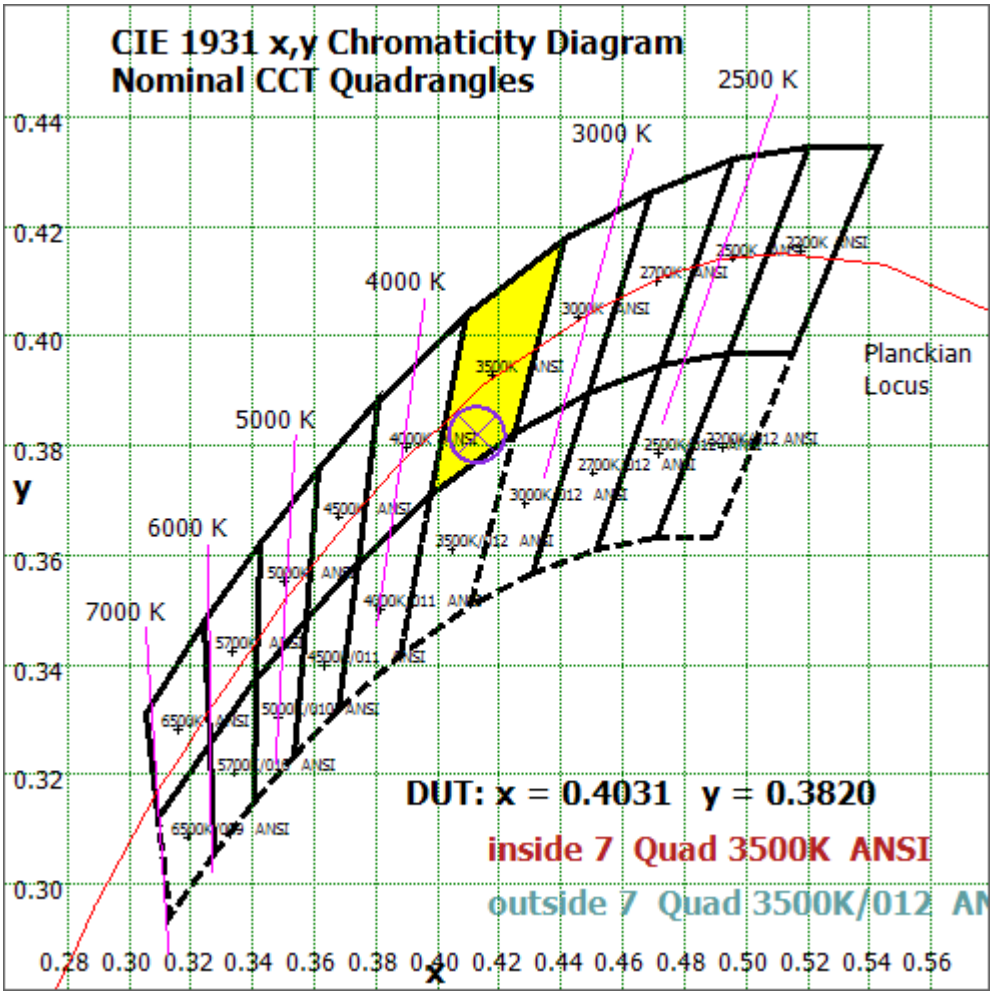


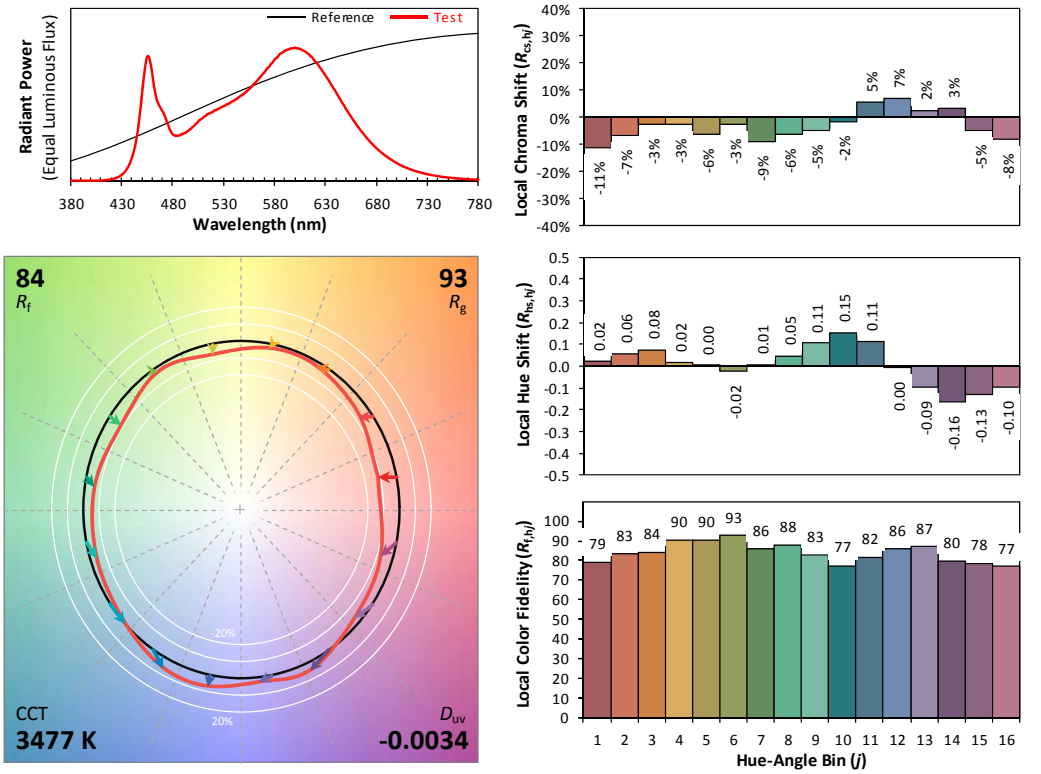
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/28 **Model:** 11.5T8/4F/8CCTS/EXT/A2



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

x	0.4031
y	0.3820
u'	0.2379
v'	0.5073

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)	0.212	0.101
Power Factor	0.9925	0.9019
Test Power (W)/2	12.61	12.65
THD A%	5.42	9.56
Luminous Efficacy (lm/W)	144.1	143.5
Total Luminous Flux (lm)	1817.1	1815.6
Color Rendering Index (CRI)	85.6	
R9	22.6	
Correlated Color Temperature (CCT)(K)	3950	
Chromaticity Chroma x	0.3798	
Chromaticity Chroma y	0.3681	
Chromaticity Chroma u	0.2282	
Chromaticity Chroma v	0.3317	
Duv	-0.0039	
Chromaticity Chroma u ’	0.2282	
Chromaticity Chroma v’	0.4976	

Special Color Rendering Indices	
R1	86.9
R2	97.2
R3	92.2
R4	81.4
R5	86.4
R6	92.3
R7	82.4
R8	65.9
R9	22.6
R10	92.3
R11	81.5
R12	67.5
R13	90.7
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

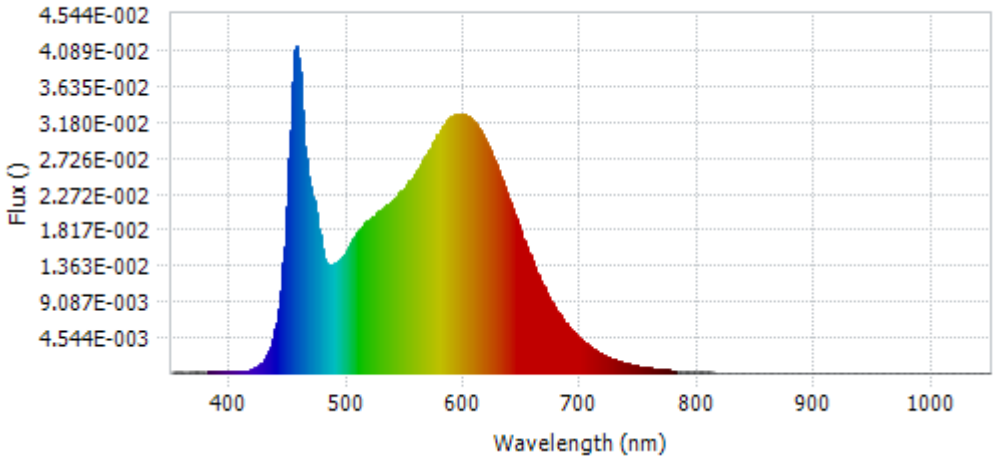
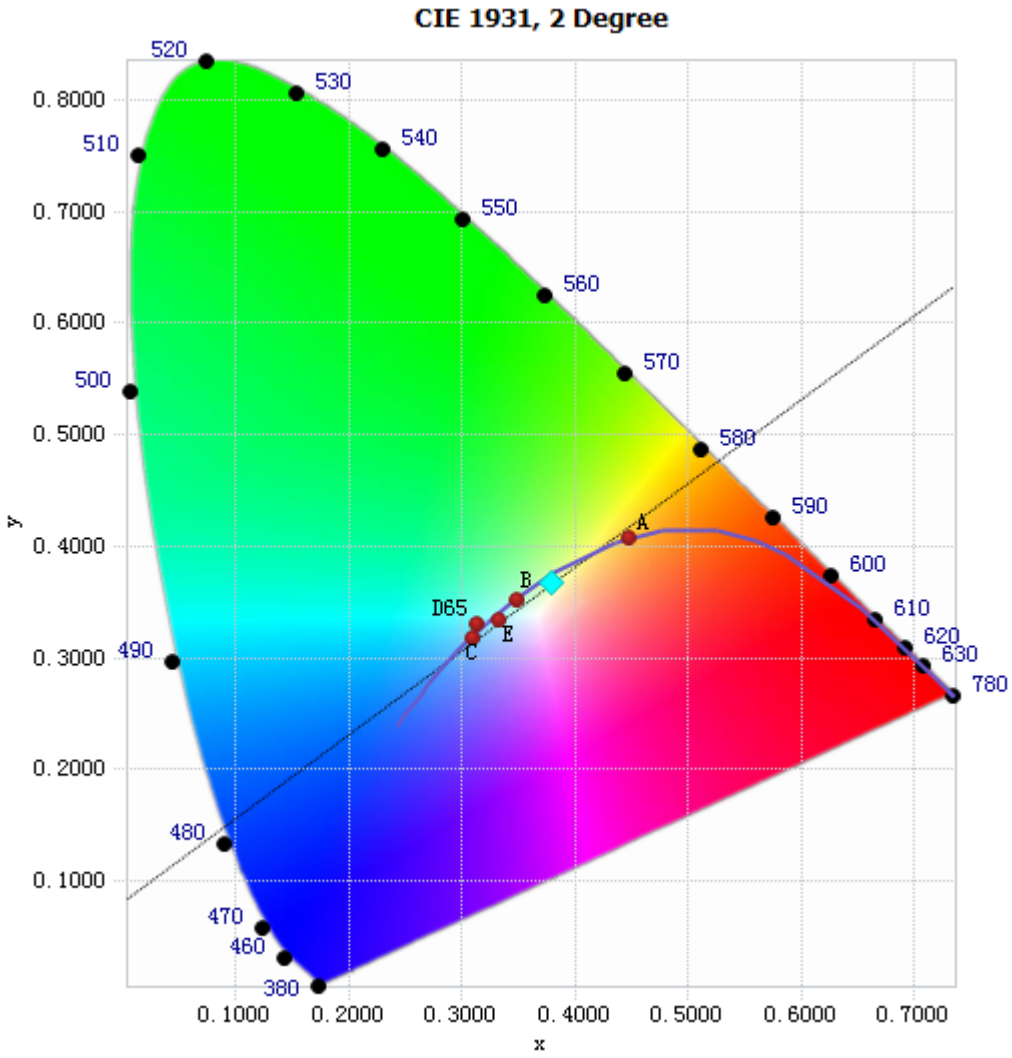


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.75E-04	485	1.37E-02	590	3.26E-02	695	4.96E-03
385	1.69E-04	490	1.40E-02	595	3.28E-02	700	4.21E-03
390	1.81E-04	495	1.46E-02	600	3.28E-02	705	3.61E-03
395	1.91E-04	500	1.56E-02	605	3.23E-02	710	3.07E-03
400	1.91E-04	505	1.69E-02	610	3.15E-02	715	2.62E-03
405	1.86E-04	510	1.80E-02	615	3.03E-02	720	2.26E-03
410	2.22E-04	515	1.90E-02	620	2.88E-02	725	1.91E-03
415	3.56E-04	520	1.95E-02	625	2.71E-02	730	1.63E-03
420	5.81E-04	525	2.02E-02	630	2.52E-02	735	1.38E-03
425	1.02E-03	530	2.09E-02	635	2.33E-02	740	1.17E-03
430	1.92E-03	535	2.14E-02	640	2.12E-02	745	1.00E-03
435	3.72E-03	540	2.20E-02	645	1.92E-02	750	8.63E-04
440	7.14E-03	545	2.29E-02	650	1.71E-02	755	7.40E-04
445	1.39E-02	550	2.36E-02	655	1.52E-02	760	6.41E-04
450	2.73E-02	555	2.46E-02	660	1.35E-02	765	5.42E-04
455	4.08E-02	560	2.57E-02	665	1.18E-02	770	4.65E-04
460	3.58E-02	565	2.69E-02	670	1.03E-02	775	3.94E-04
465	2.58E-02	570	2.83E-02	675	8.93E-03	780	3.34E-04
470	2.24E-02	575	2.95E-02	680	7.72E-03		
475	1.82E-02	580	3.08E-02	685	6.69E-03		
480	1.45E-02	585	3.19E-02	690	5.75E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3798, 0.3681)

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

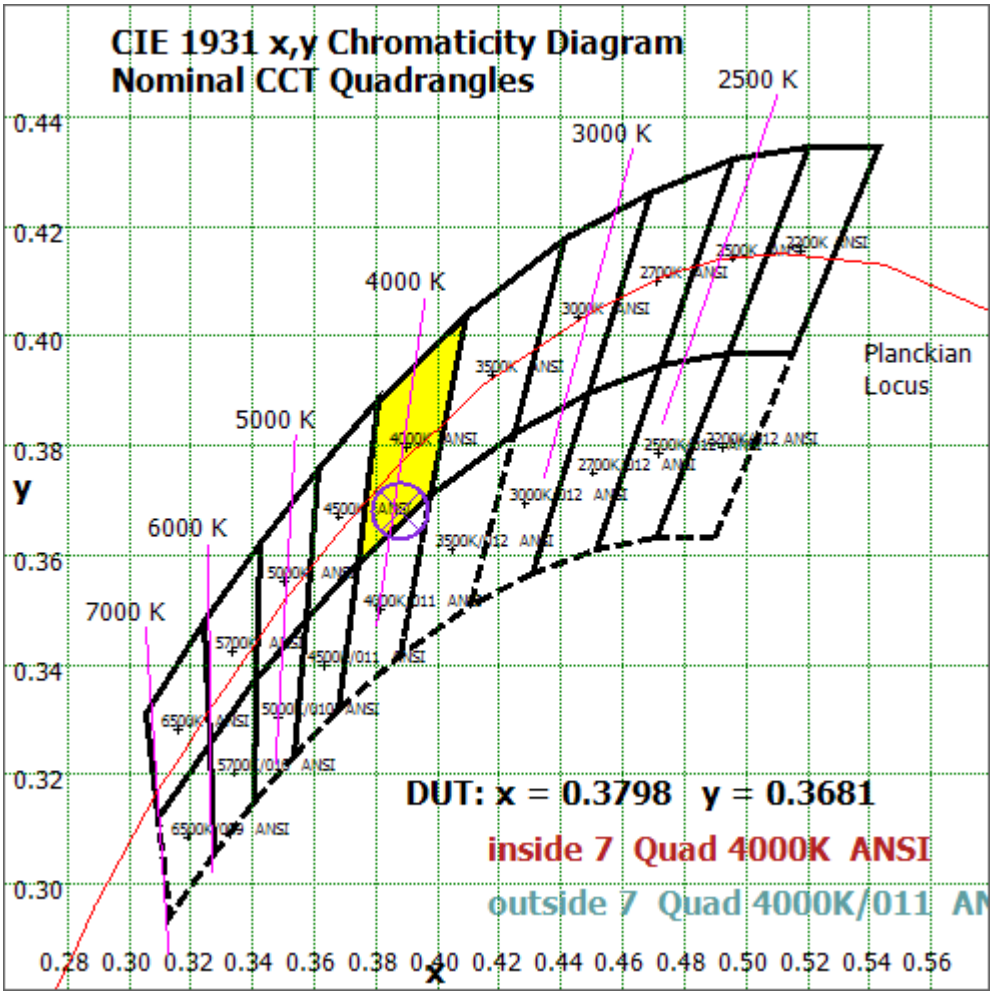


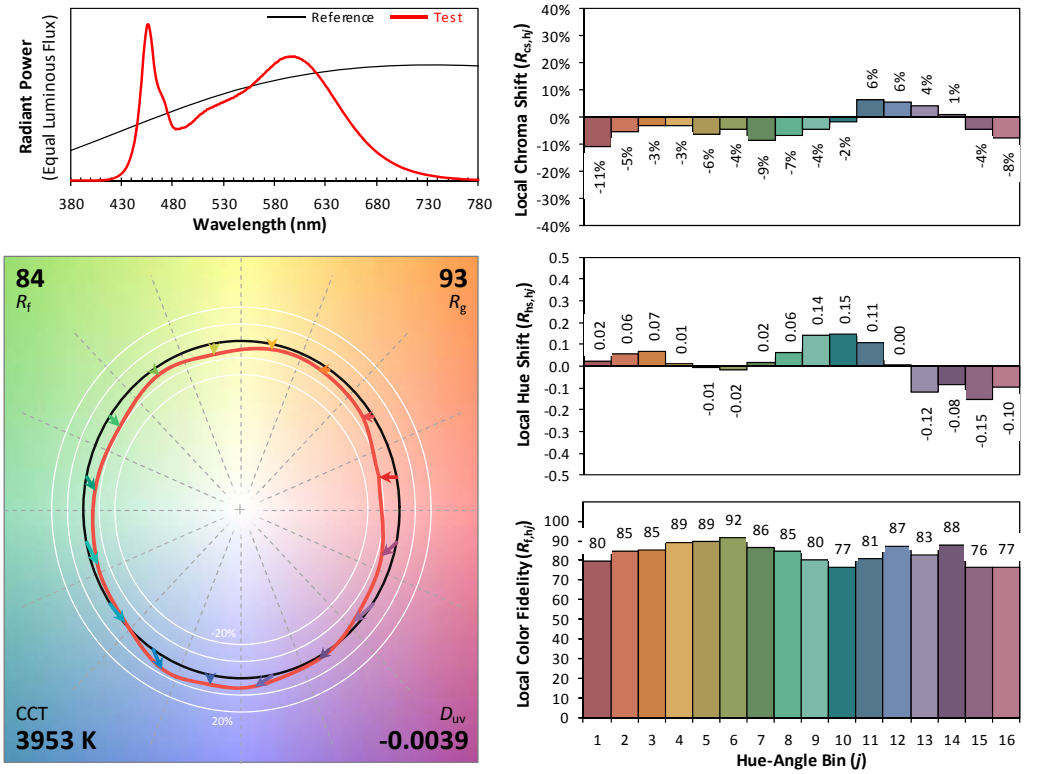
Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/28 **Model:** 11.5T8/4F/8CCTS/EXT/A2



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

x	0.3798
y	0.3681
u'	0.2282
v'	0.4976

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)	0.213	0.102
Power Factor	0.9925	0.9018
Test Power (W)/2	12.66	12.69
THD A%	5.46	9.42
Luminous Efficacy (lm/W)	144.4	144.2
Total Luminous Flux (lm)	1828.3	1830.1
Color Rendering Index (CRI)	85.9	
R9	22	
Correlated Color Temperature (CCT)(K)	5042	
Chromaticity Chroma x	0.3435	
Chromaticity Chroma y	0.3468	
Chromaticity Chroma u	0.2122	
Chromaticity Chroma v	0.3214	
Duv	-0.0018	
Chromaticity Chroma u ’	0.2122	
Chromaticity Chroma v’	0.4821	

Special Color Rendering Indices	
R1	87
R2	96.7
R3	93
R4	81.9
R5	86.3
R6	90.7
R7	83.6
R8	68.2
R9	22
R10	90.9
R11	82.2
R12	66.2
R13	91
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

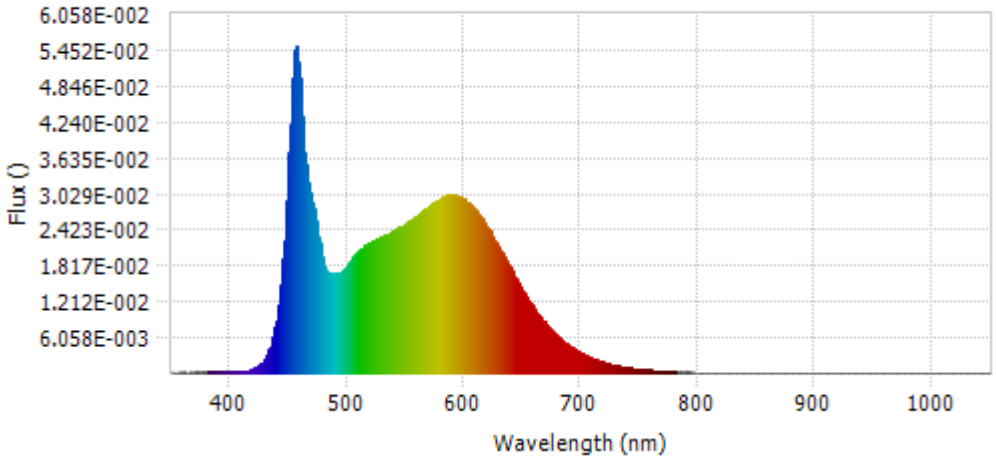
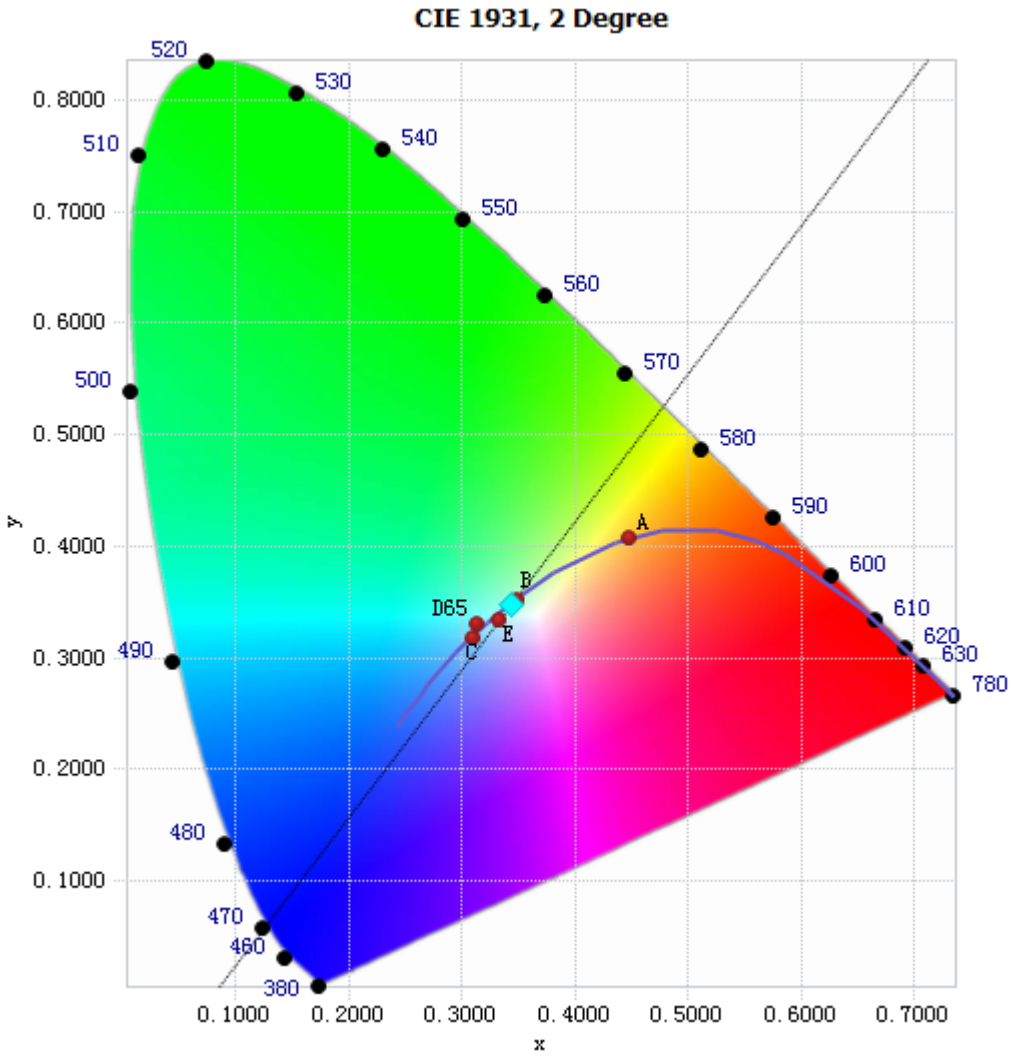


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.91E-04	485	1.68E-02	590	3.01E-02	695	3.93E-03
385	2.11E-04	490	1.68E-02	595	2.98E-02	700	3.35E-03
390	2.17E-04	495	1.72E-02	600	2.93E-02	705	2.86E-03
395	2.38E-04	500	1.83E-02	605	2.84E-02	710	2.42E-03
400	2.22E-04	505	1.95E-02	610	2.74E-02	715	2.08E-03
405	2.20E-04	510	2.06E-02	615	2.60E-02	720	1.77E-03
410	2.85E-04	515	2.16E-02	620	2.44E-02	725	1.51E-03
415	4.51E-04	520	2.20E-02	625	2.28E-02	730	1.29E-03
420	7.69E-04	525	2.26E-02	630	2.10E-02	735	1.11E-03
425	1.43E-03	530	2.32E-02	635	1.92E-02	740	9.42E-04
430	2.70E-03	535	2.35E-02	640	1.74E-02	745	8.08E-04
435	5.24E-03	540	2.40E-02	645	1.56E-02	750	6.87E-04
440	1.01E-02	545	2.47E-02	650	1.39E-02	755	5.86E-04
445	1.93E-02	550	2.51E-02	655	1.23E-02	760	5.07E-04
450	3.74E-02	555	2.58E-02	660	1.08E-02	765	4.33E-04
455	5.45E-02	560	2.66E-02	665	9.43E-03	770	3.70E-04
460	4.68E-02	565	2.74E-02	670	8.20E-03	775	3.16E-04
465	3.33E-02	570	2.81E-02	675	7.12E-03	780	2.77E-04
470	2.87E-02	575	2.89E-02	680	6.14E-03		
475	2.30E-02	580	2.96E-02	685	5.32E-03		
480	1.80E-02	585	3.01E-02	690	4.57E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3435, 0.3468)

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

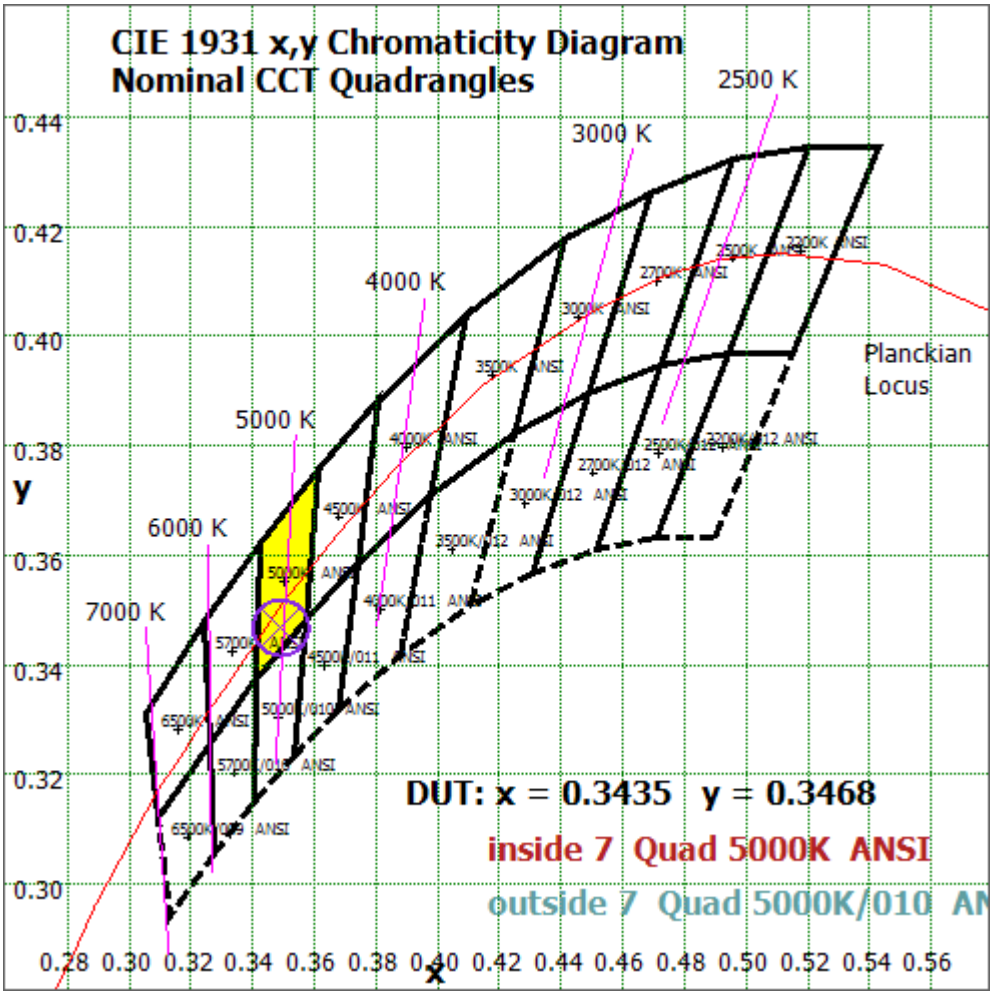


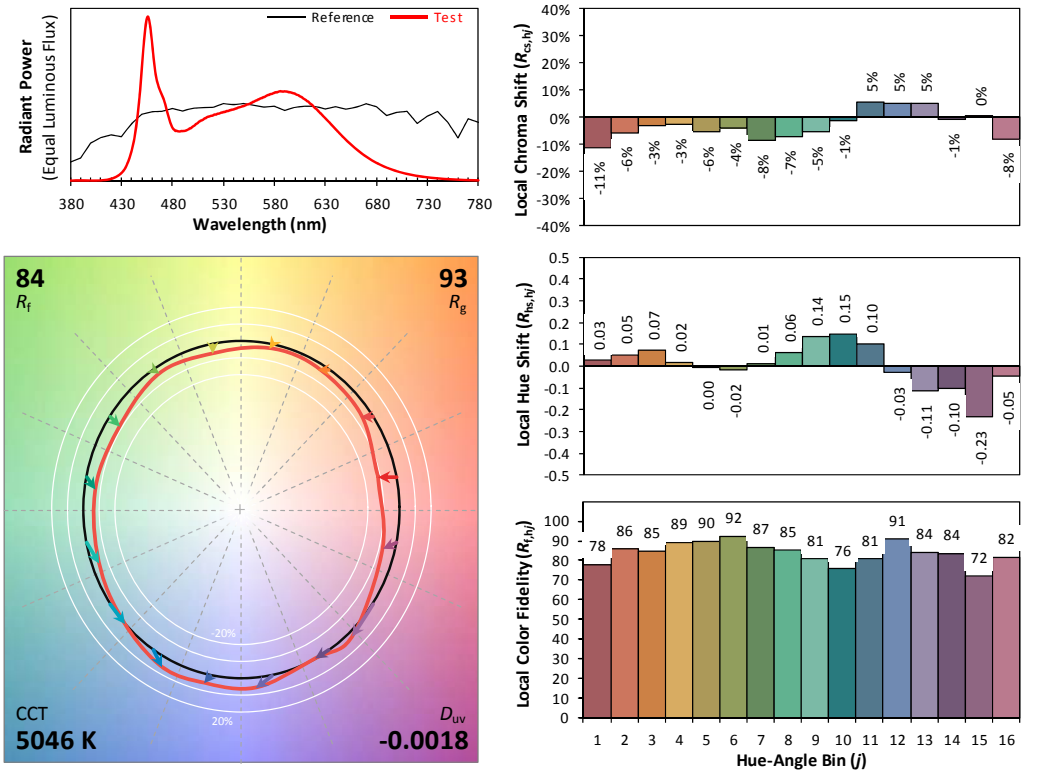
Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/28 **Model:** 11.5T8/4F/8CCTS/EXT/A2



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

x	0.3435
y	0.3468
u'	0.2122
v'	0.4821

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)	0.216	0.103
Power Factor	0.9927	0.9017
Test Power (W)/2	12.83	12.86
THD A%	5.34	9.56
Luminous Efficacy (lm/W)	141.2	141.3
Total Luminous Flux (lm)	1812.1	1817.3
Color Rendering Index (CRI)	84.2	
R9	11.2	
Correlated Color Temperature (CCT)(K)	6474	
Chromaticity Chroma x	0.3131	
Chromaticity Chroma y	0.3295	
Chromaticity Chroma u	0.1979	
Chromaticity Chroma v	0.3124	
Duv	0.0033	
Chromaticity Chroma u ’	0.1979	
Chromaticity Chroma v’	0.4687	

Special Color Rendering Indices	
R1	84
R2	95
R3	93.2
R4	78.3
R5	82.9
R6	88.7
R7	84.2
R8	67.4
R9	11.2
R10	86.2
R11	78.7
R12	59
R13	88.5
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

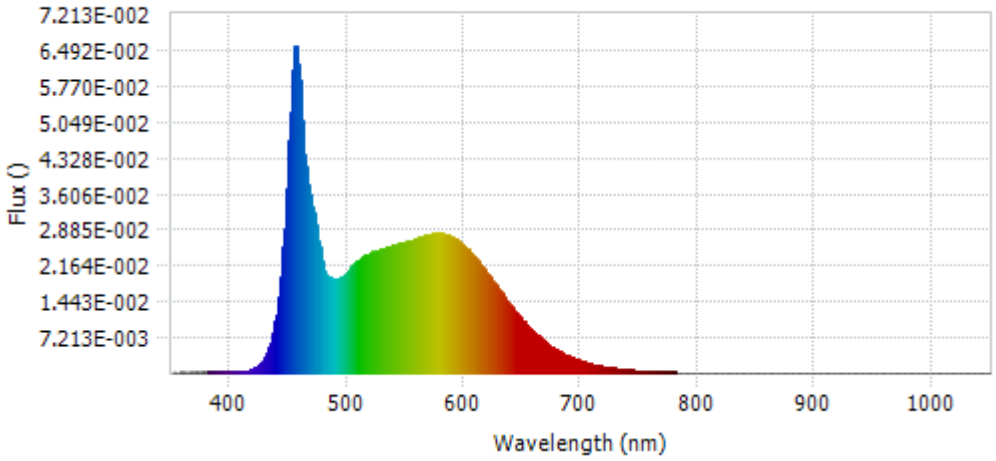
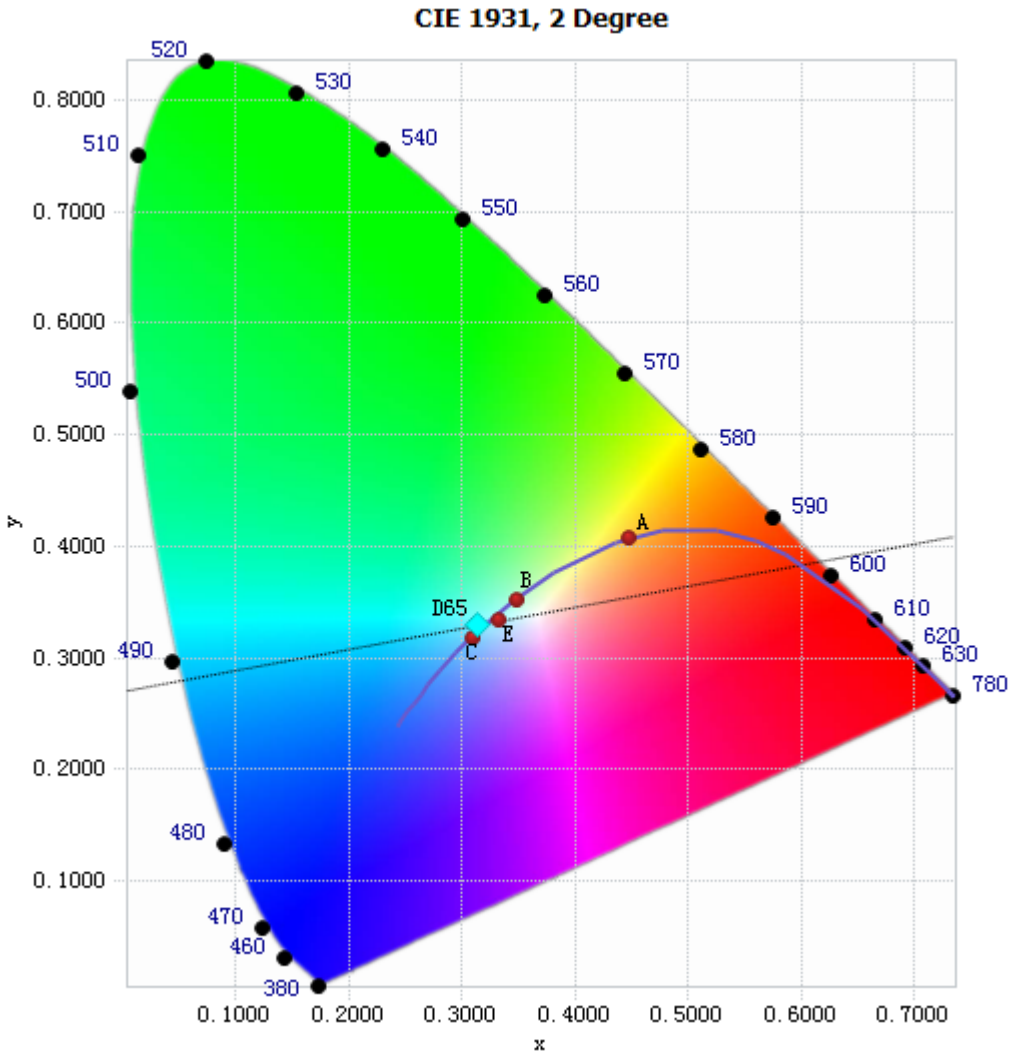


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.75E-04	485	1.92E-02	590	2.73E-02	695	2.89E-03
385	2.50E-04	490	1.91E-02	595	2.65E-02	700	2.45E-03
390	2.70E-04	495	1.94E-02	600	2.56E-02	705	2.11E-03
395	2.62E-04	500	2.04E-02	605	2.42E-02	710	1.79E-03
400	2.63E-04	505	2.17E-02	610	2.30E-02	715	1.54E-03
405	2.78E-04	510	2.27E-02	615	2.15E-02	720	1.31E-03
410	3.52E-04	515	2.37E-02	620	1.99E-02	725	1.13E-03
415	5.94E-04	520	2.41E-02	625	1.83E-02	730	9.62E-04
420	1.04E-03	525	2.46E-02	630	1.66E-02	735	8.19E-04
425	1.94E-03	530	2.50E-02	635	1.50E-02	740	7.01E-04
430	3.67E-03	535	2.52E-02	640	1.35E-02	745	6.04E-04
435	7.15E-03	540	2.57E-02	645	1.20E-02	750	5.15E-04
440	1.34E-02	545	2.61E-02	650	1.06E-02	755	4.46E-04
445	2.52E-02	550	2.63E-02	655	9.31E-03	760	3.86E-04
450	4.69E-02	555	2.67E-02	660	8.12E-03	765	3.33E-04
455	6.56E-02	560	2.72E-02	665	7.06E-03	770	2.82E-04
460	5.50E-02	565	2.75E-02	670	6.10E-03	775	2.43E-04
465	3.93E-02	570	2.78E-02	675	5.27E-03	780	2.15E-04
470	3.34E-02	575	2.80E-02	680	4.54E-03		
475	2.65E-02	580	2.80E-02	685	3.91E-03		
480	2.07E-02	585	2.79E-02	690	3.37E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3131, 0.3295)

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

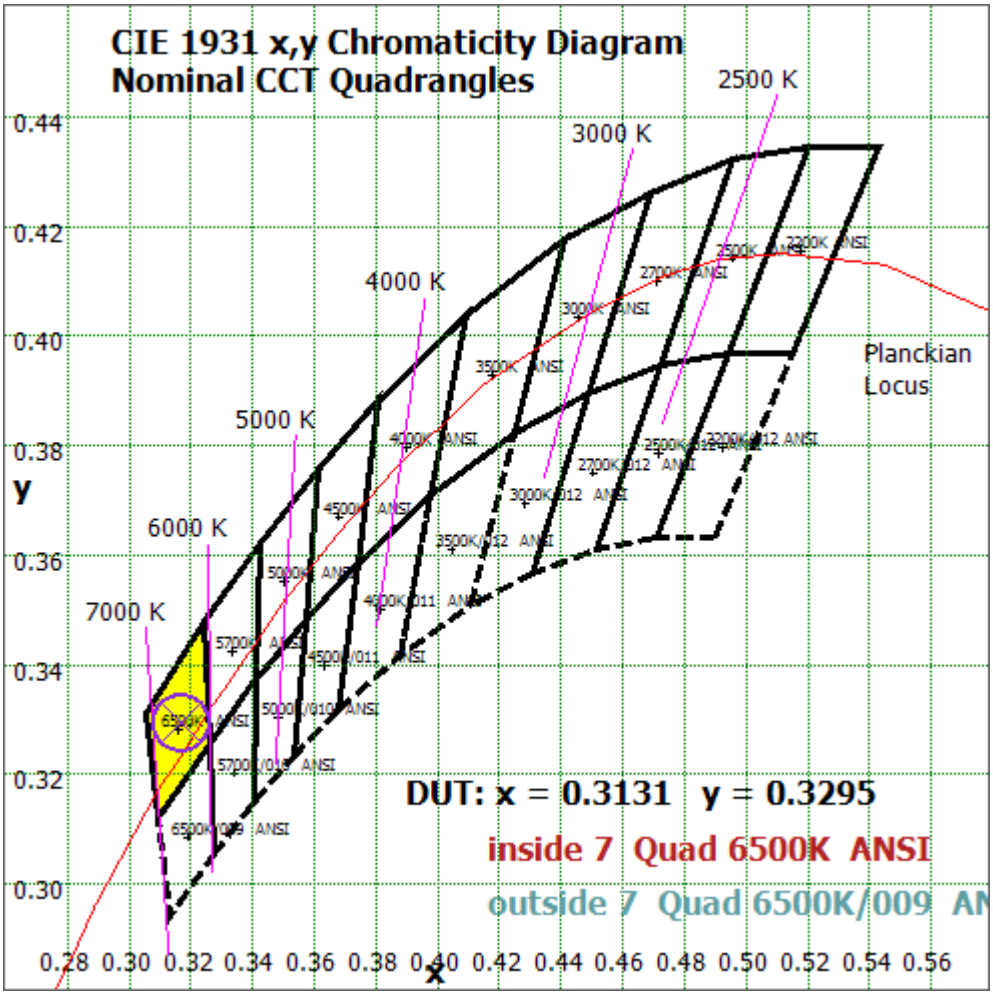


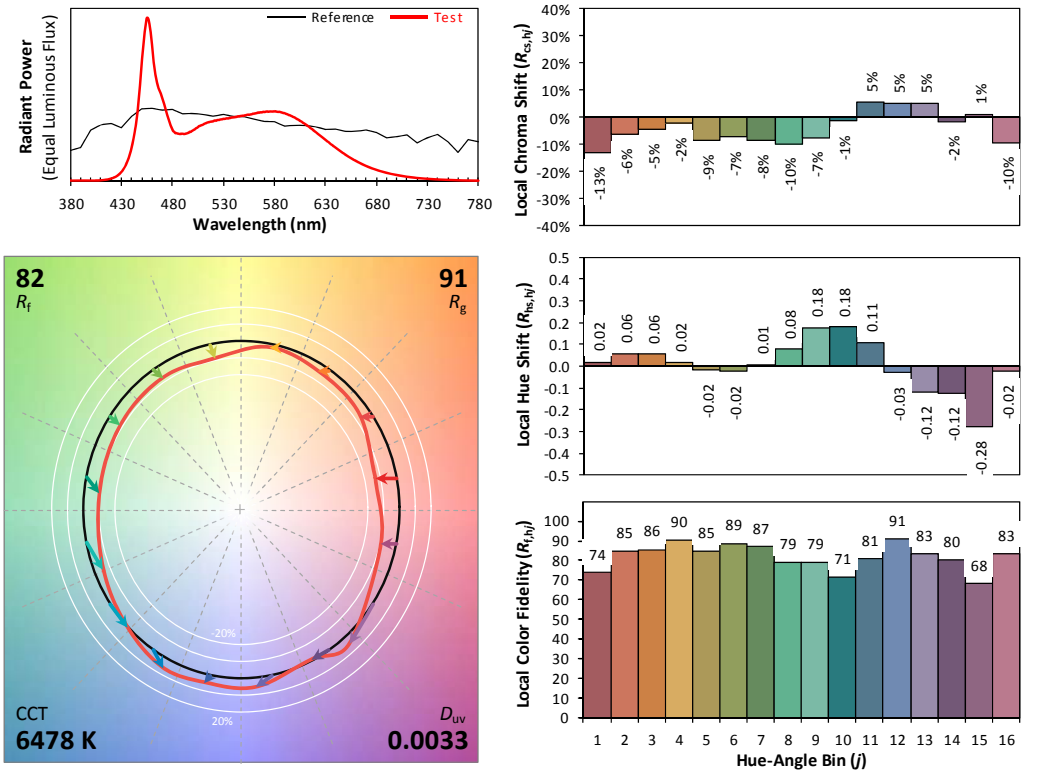
Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/06/28 **Model:** 11.5T8/4F/8CCTS/EXT/A2



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

x	0.3131
y	0.3295
u'	0.1979
v'	0.4687

CIE 13.3-1995 (CRI)

R_a	84
R_9	11

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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