

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/A2

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23060027g

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

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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/E XT/SD/A2 3000K Setting	11.5T8/4F/8CCTS/E XT/SD/A2 3500K Setting	11.5T8/4F/8CCTS/ EXT/SD/A2 4000K Setting
Luminous Efficacy (Lumens /Watt)	136.8	141.2	144.4
Total Luminous Flux (Lumens)	1824.9	1864.1	1888.9
Power (Watts)/2	13.34	13.20	13.08
Power Factor	0.9938	0.9937	0.9935
CCT (K)	3015	3477	3954
CRI	82.4	84.5	85.5
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Tested Model	11.5T8/4F/8CCTS/E XT/SD/A2 5000K Setting	11.5T8/4F/8CCTS/E XT/SD/A2 6500K Setting
Luminous Efficacy (Lumens /Watt)	144.3	140.9
Total Luminous Flux (Lumens)	1892.0	1874.1
Power (Watts)/2	13.11	13.30
Power Factor	0.9935	0.9938
CCT (K)	5062	6490
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

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SAMPLE PHOTO

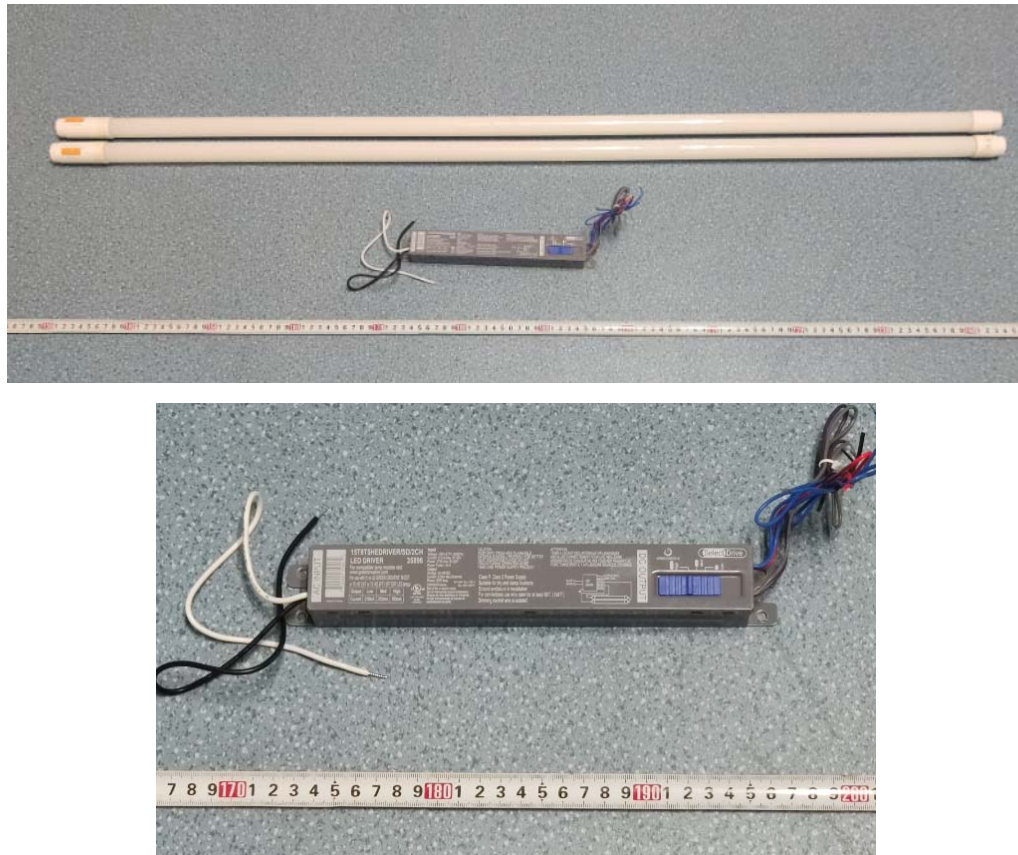


Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Tube
Model	: 11.5T8/4F/8CCTS/EXT/SD/A2
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: Color- Tunable 3000K/3500K/4000K/5000K/6500K LED Tube supplied by a LED driver: 15T8T5HEDRIVER/SD/2CH
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)	0.224	0.106
Power Factor	0.9938	0.9073
Test Power (W)/2	13.34	13.36
THD A%	4.86	8.42
Luminous Efficacy (lm/W)	136.8	136.5
Total Luminous Flux (lm)	1824.9	1823.1
Color Rendering Index (CRI)	82.4	
R9	6.4	
Correlated Color Temperature (CCT)(K)	3015	
Chromaticity Chroma x	0.4345	
Chromaticity Chroma y	0.4012	
Chromaticity Chroma u	0.2502	
Chromaticity Chroma v	0.3466	
Duv	-0.0008	
Chromaticity Chroma u'	0.2502	
Chromaticity Chroma v'	0.5199	

Special Color Rendering Indices	
R1	81.7
R2	93.7
R3	92.7
R4	78.8
R5	82.2
R6	92.4
R7	80.3
R8	57.2
R9	6.4
R10	85.7
R11	78.3
R12	73.1
R13	85
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

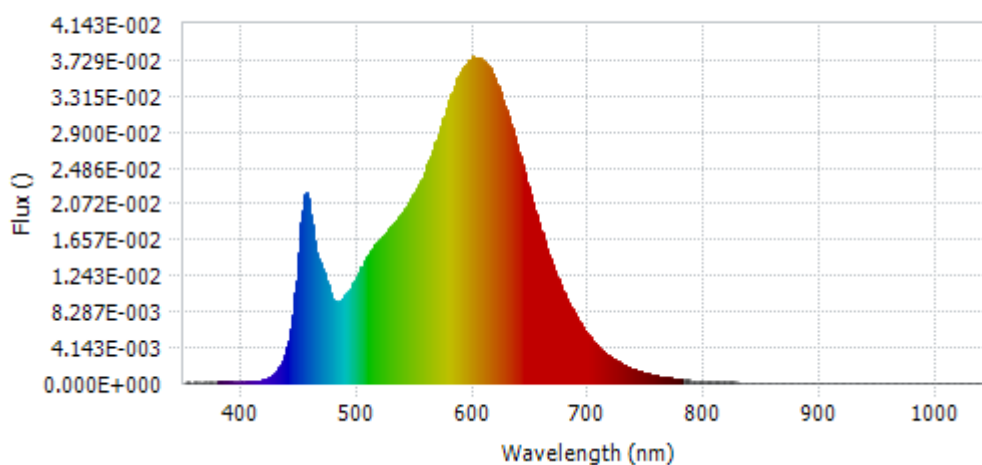


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.21E-04	485	9.57E-03	590	3.62E-02	695	6.31E-03
385	1.16E-04	490	1.02E-02	595	3.71E-02	700	5.37E-03
390	1.16E-04	495	1.12E-02	600	3.77E-02	705	4.59E-03
395	1.15E-04	500	1.24E-02	605	3.74E-02	710	3.92E-03
400	1.17E-04	505	1.38E-02	610	3.69E-02	715	3.36E-03
405	1.29E-04	510	1.48E-02	615	3.60E-02	720	2.87E-03
410	1.71E-04	515	1.59E-02	620	3.44E-02	725	2.46E-03
415	2.73E-04	520	1.67E-02	625	3.27E-02	730	2.09E-03
420	4.68E-04	525	1.75E-02	630	3.07E-02	735	1.76E-03
425	7.92E-04	530	1.82E-02	635	2.85E-02	740	1.51E-03
430	1.42E-03	535	1.90E-02	640	2.62E-02	745	1.30E-03
435	2.59E-03	540	1.98E-02	645	2.37E-02	750	1.10E-03
440	4.79E-03	545	2.09E-02	650	2.13E-02	755	9.36E-04
445	9.14E-03	550	2.21E-02	655	1.91E-02	760	8.01E-04
450	1.68E-02	555	2.35E-02	660	1.69E-02	765	6.92E-04
455	2.19E-02	560	2.51E-02	665	1.48E-02	770	5.94E-04
460	1.84E-02	565	2.69E-02	670	1.30E-02	775	5.05E-04
465	1.45E-02	570	2.88E-02	675	1.13E-02	780	4.23E-04
470	1.30E-02	575	3.08E-02	680	9.76E-03		
475	1.08E-02	580	3.29E-02	685	8.51E-03		
480	9.40E-03	585	3.48E-02	690	7.33E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method

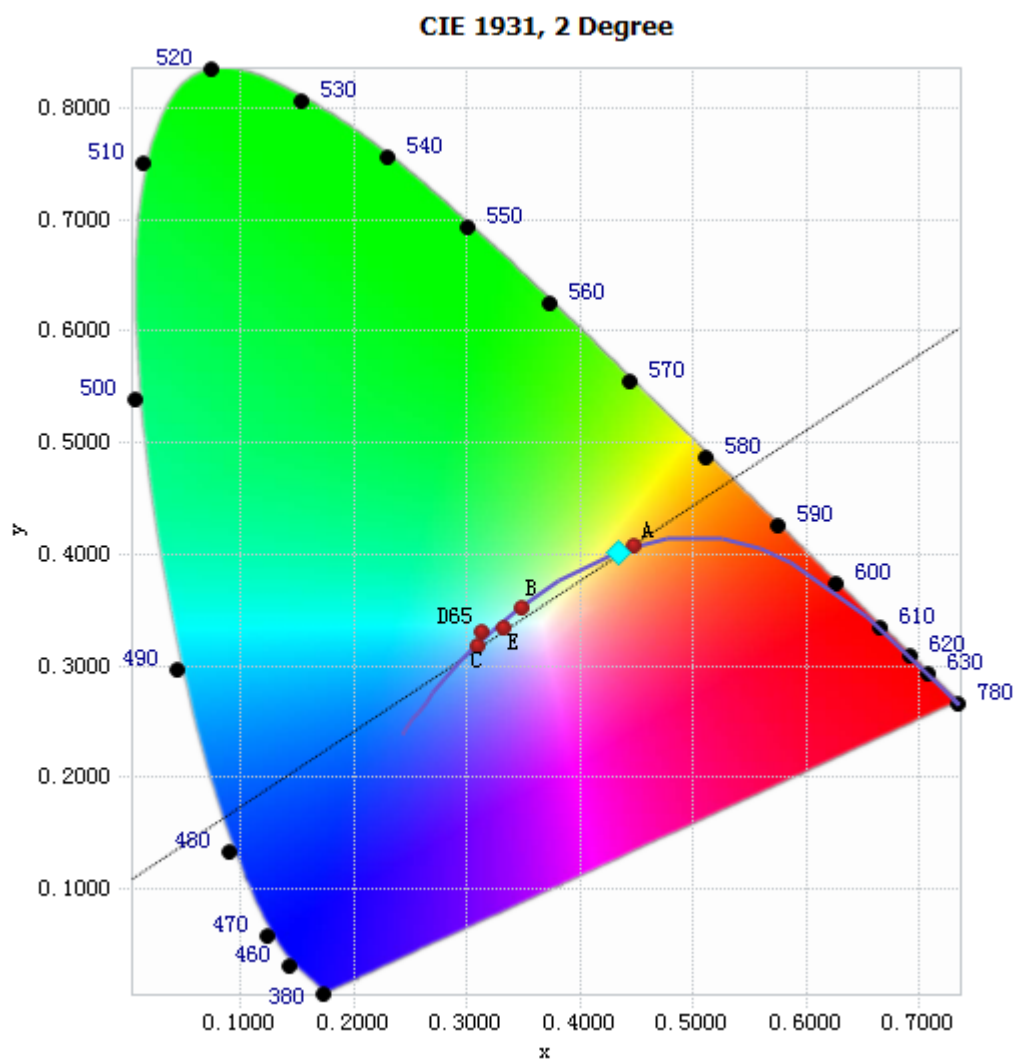


Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

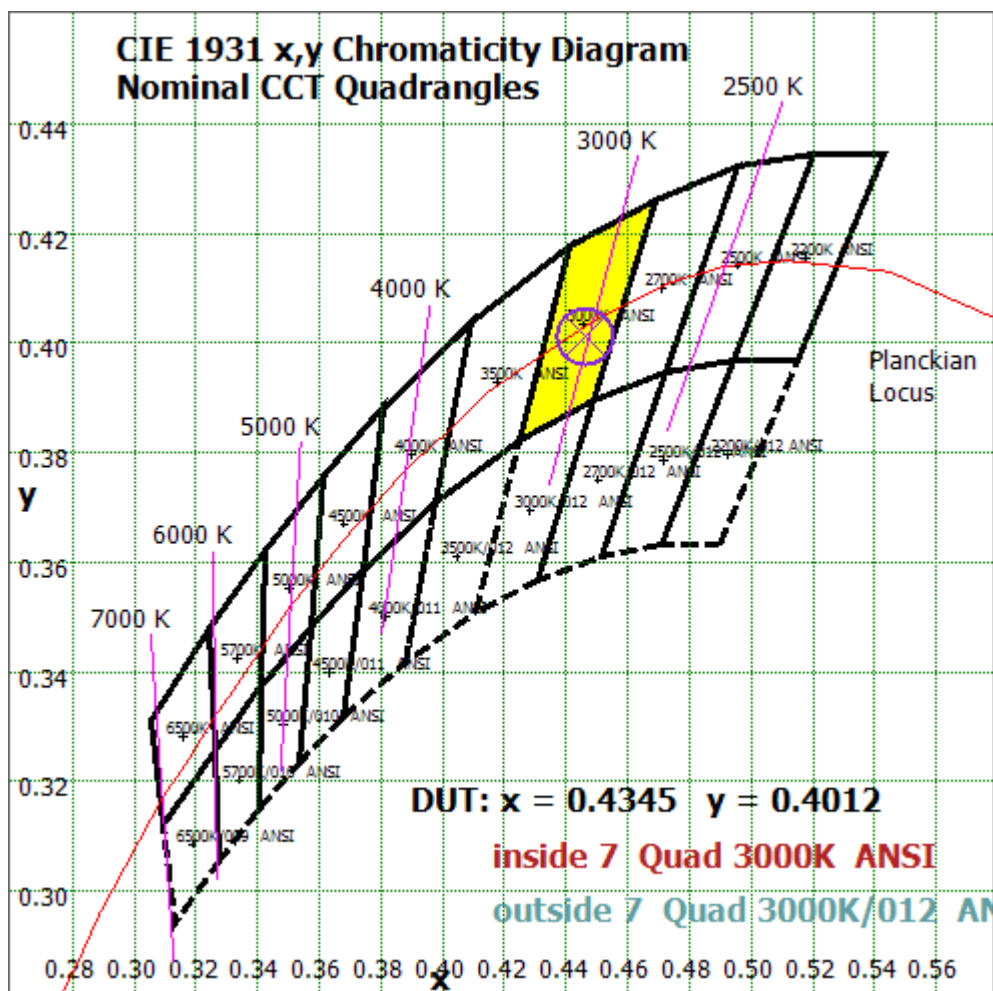


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

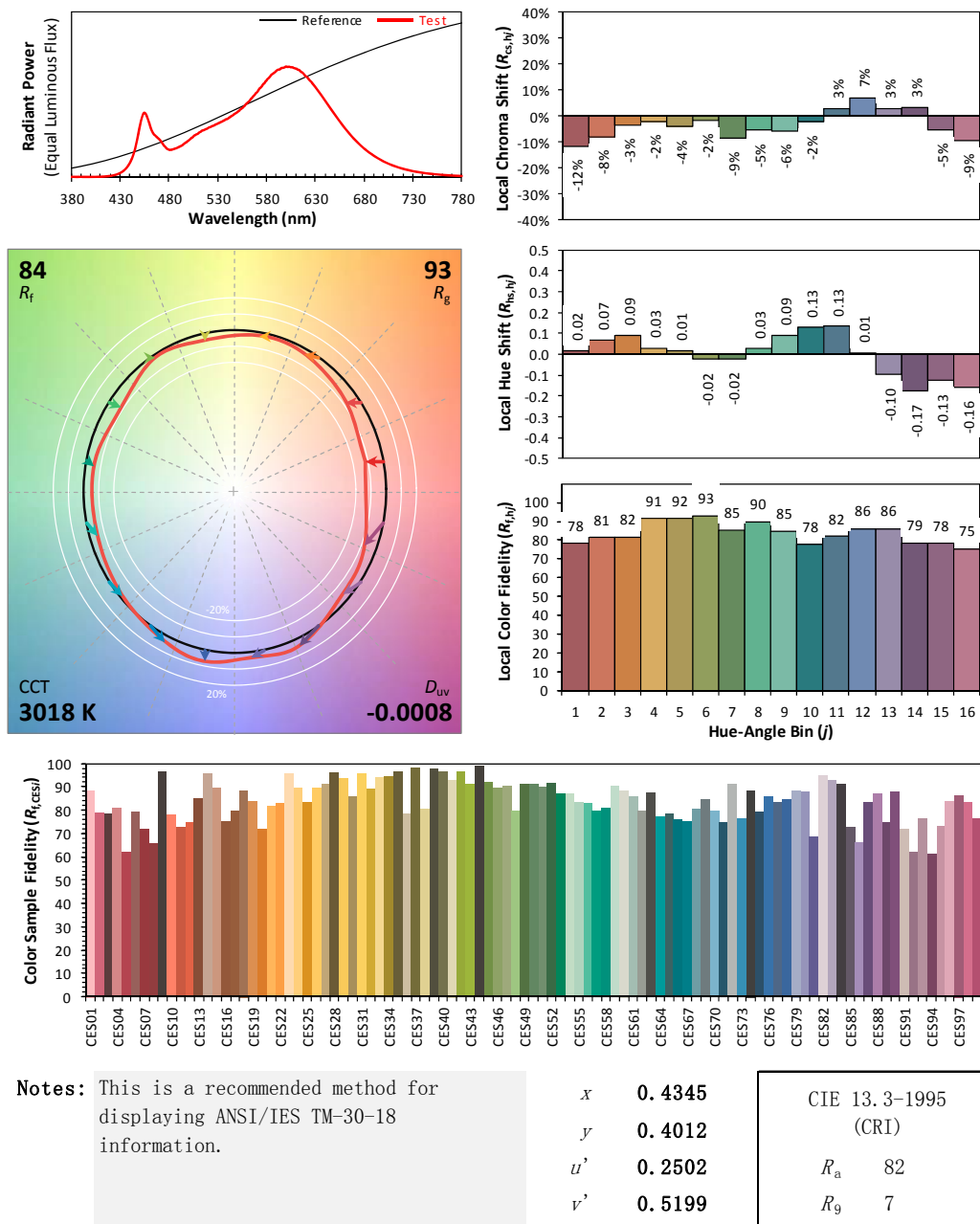
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/28

Model: 11.5T8/4F/8CCTS/EXT/SD/A2



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)	0.225
Power Factor	0.9916
Power (W)/2	13.38
Luminous Efficacy (lm/W)	137.2
Total Luminous Flux (lm)	1836.2
Beam Angle (°)	117.8 (0°-180°) / 254.4 (90°-270°)
Center Beam Candle Power (cd)	277
Maximum Beam Candle Power (cd)	277.2 (At: C=160.0, Gamma=4.0)
Spacing Criteria	1.33 (0°-180°) / 1.49 (90°-270°)
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	13.20%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	26.277	1.43%
10- 20	76.621	4.17%
20- 30	120.562	6.57%
30- 40	154.719	8.43%
40- 50	176.725	9.62%
50- 60	185.589	10.11%
60- 70	181.829	9.90%
70- 80	168.337	9.17%
80- 90	150.472	8.19%
90-100	133.949	7.29%
100-110	117.655	6.41%
110-120	101.08	5.50%
120-130	84.09	4.58%
130-140	66.765	3.64%
140-150	47.954	2.61%
150-160	29.181	1.59%
160-170	11.894	0.65%
170-180	2.492	0.14%
Total	1836.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	740.493	40.33%
60- 90	500.638	27.27%
0-90	1241.13	67.59%
90- 180	595.06	32.41%
0- 180	1836.2	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

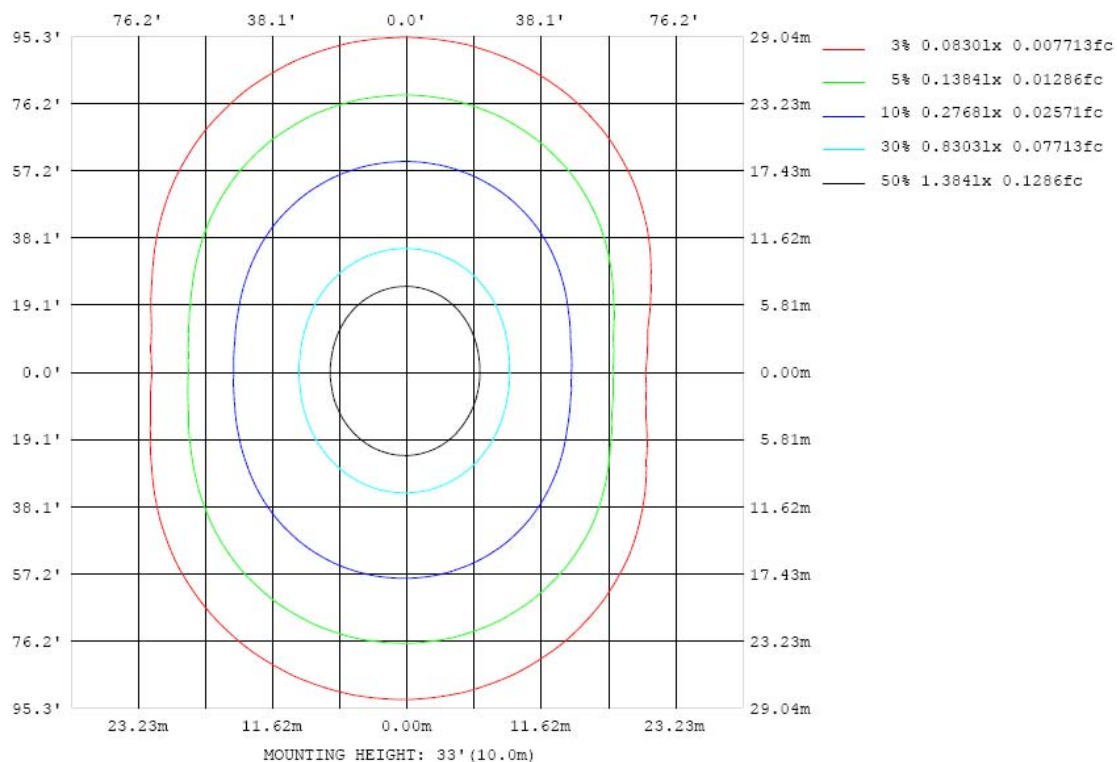


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

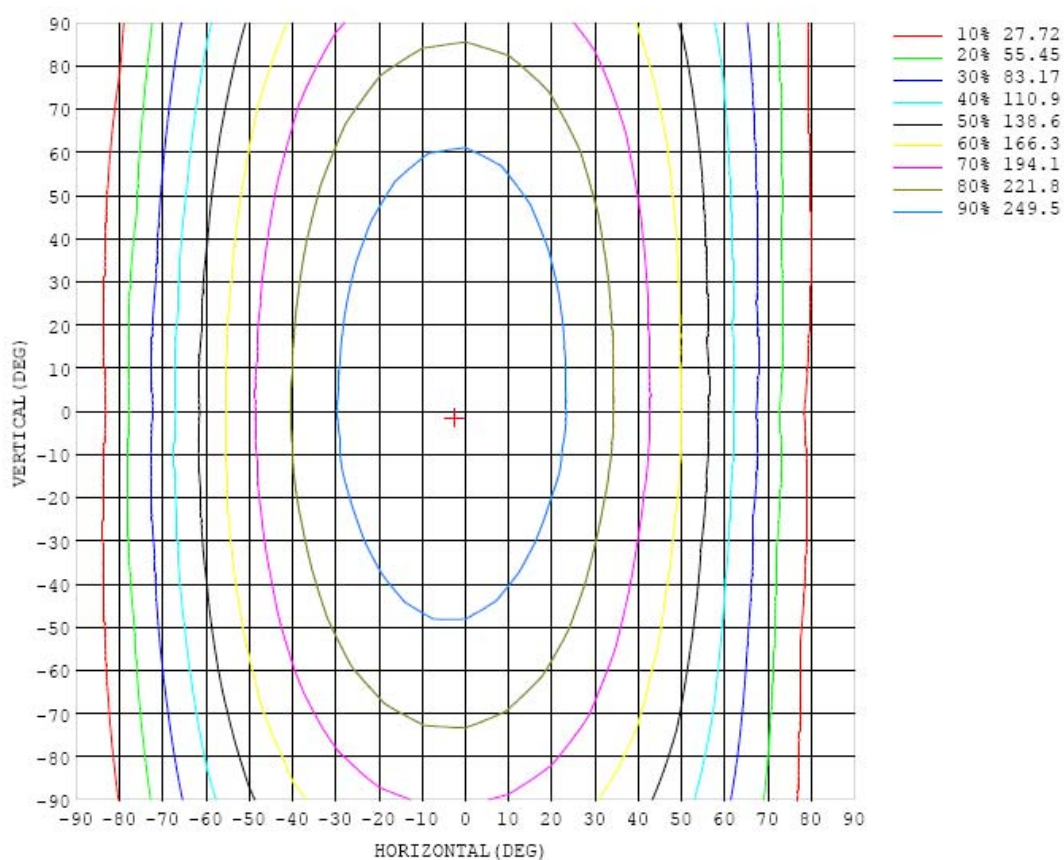


Chart 6: Isocandela Plot

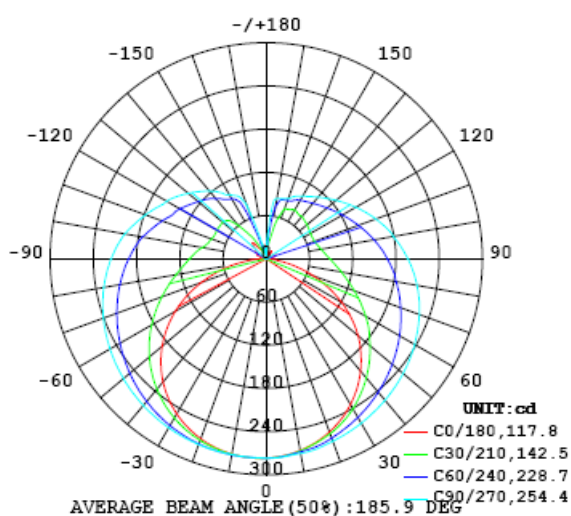


Chart 7: Polar Candela Distribution

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	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277	
5	275	275	275	275	275	275	275	276	276	276	276	276	277	277	277	277	277	277	277	
10	270	271	271	271	271	272	272	273	274	274	275	275	275	275	275	275	275	275	275	
15	264	265	265	265	267	268	270	271	272	273	273	274	274	273	272	272	272	272	272	
20	256	256	257	259	261	263	265	267	268	270	270	270	270	270	269	267	266	266	266	
25	246	246	247	250	253	256	260	263	265	267	267	267	266	265	263	262	259	259	258	
30	234	234	236	240	244	249	254	258	261	264	264	263	262	259	256	254	251	249	249	
35	219	221	224	229	235	242	248	254	258	260	261	259	257	253	248	244	241	237	237	
40	203	205	209	216	224	233	242	248	253	256	257	255	251	246	240	234	229	224	223	
45	185	187	193	202	214	225	235	243	249	252	253	250	246	239	230	222	214	209	207	
50	166	169	176	188	202	216	228	238	244	248	248	245	239	231	220	209	199	191	189	
55	144	148	158	174	191	207	221	232	239	243	243	240	233	223	210	195	182	172	168	
60	121	125	139	159	179	198	214	226	234	238	238	234	226	214	199	182	166	152	146	
65	95.3	101	120	144	169	189	206	219	228	232	232	227	218	205	187	168	147	129	122	
70	69.4	77.4	101	130	157	180	198	212	222	226	226	221	210	195	176	153	128	106	95.8	
75	43.8	54.9	84.1	117	147	172	191	206	215	220	219	214	203	187	166	139	109	82.8	70.3	
80	21.1	35.6	69.9	106	138	164	183	198	208	212	212	206	194	178	155	126	91.9	60.6	43.9	
85	5.48	22.3	59.3	96.2	129	156	176	190	200	205	204	198	186	170	145	114	77.5	41.5	20.4	
90	1.67	16.7	52.1	88.3	120	147	168	182	192	197	196	189	178	161	135	104	66.3	28.6	5.55	
95	2.48	14.8	47.9	82.0	113	139	160	175	183	188	187	181	170	151	126	95.1	58.4	22.5	1.69	
100	6.09	16.1	45.4	77.3	107	132	152	167	176	179	178	173	161	143	118	87.9	53.6	21.4	3.12	
105	10.8	19.3	44.7	73.7	101	125	144	158	167	171	170	164	152	134	111	82.4	51.3	23.4	7.29	
110	12.6	24.4	46.4	71.4	96.3	118	136	149	158	162	161	154	143	126	104	78.4	51.1	27.6	12.5	
115	13.4	29.4	49.4	70.5	92.6	112	129	141	149	153	151	145	134	119	98.9	75.9	52.6	33.1	14.7	
120	8.09	31.5	54.0	70.9	89.9	107	122	133	140	143	142	137	127	112	94.6	74.7	55.3	39.7	13.5	
125	1.11	33.9	58.2	72.2	88.0	103	116	125	132	135	134	128	119	107	91.3	74.5	58.7	46.8	17.4	
130	2.66	41.9	61.9	73.8	86.8	99.2	110	119	124	126	125	121	113	102	88.8	75.0	62.4	54.3	19.7	
135	3.48	48.7	63.8	75.2	86.1	96.0	105	112	117	119	118	114	107	97.8	87.1	76.1	65.7	59.2	24.6	
140	9.24	54.3	67.5	76.8	85.6	93.5	101	106	110	112	111	108	102	94.5	86.1	76.4	68.0	62.0	29.2	
145	12.7	44.8	69.5	76.6	85.0	91.6	97.0	101	104	106	105	102	97.6	91.9	85.4	76.8	72.9	54.6	19.9	
150	10.1	33.6	74.1	78.6	82.5	89.1	94.0	97.2	99.4	100	99.6	97.6	94.2	89.8	82.9	77.6	76.9	58.5	15.0	
155	6.44	31.4	66.3	75.8	82.6	85.5	89.6	93.1	95.1	95.9	95.3	93.4	90.0	85.3	82.3	80.0	77.2	58.7	17.0	
160	8.86	16.3	51.0	73.4	80.3	84.6	86.4	87.7	88.7	89.2	88.8	87.7	86.3	84.7	83.0	81.6	79.2	44.0	17.8	
165	8.21	10.6	25.5	54.2	71.0	78.8	85.0	85.9	86.3	86.5	86.3	85.9	85.2	84.3	83.5	82.8	69.7	39.8	18.6	
170	9.45	9.14	15.3	24.4	41.2	58.9	74.1	83.5	85.2	84.7	84.8	84.8	84.4	83.2	79.5	67.7	45.7	27.8	19.2	
175	12.9	11.0	11.0	14.1	17.6	21.3	25.9	34.3	45.4	53.1	54.7	53.5	49.5	42.6	34.6	29.0	25.6	21.2	17.1	
180	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277	277		
5	277	277	277	277	277	277	277	277	276	276	276	276	275	275	275	275	274		
10	275	275	276	276	276	276	277	276	276	276	275	274	273	272	271	271	270		
15	272	272	273	274	275	275	276	276	276	275	274	272	270	268	267	265	264		
20	266	267	269	270	272	274	275	275	275	273	271	269	266	263	260	258	256		
25	259	260	263	266	268	271	273	273	273	271	269	265	261	257	253	249	246		
30	249	252	255	260	264	267	270	271	271	269	266	261	256	250	243	238	235		
35	238	241	246	252	258	263	267	269	269	266	262	256	249	241	233	226	221		
40	224	229	236	244	252	259	263	266	266	263	258	251	242	232	221	212	205		
45	209	215	225	235	245	253	259	262	263	260	254	245	234	222	209	197	188		
50	191	200	212	225	237	247	255	258	259	256	249	239	226	211	195	180	169		
55	172	183	198	214	229	241	250	254	255	251	244	233	218	201	181	163	149		
60	151	165	184	203	221	235	244	250	251	247	239	226	210	190	167	145	127		
65	128	146	169	192	212	228	239	245	246	242	233	220	202	179	153	126	104		
70	104	127	154	181	203	221	233	239	241	237	228	213	194	169	140	109	81.6		
75	80.2	108	140	170	195	214	227	234	235	231	222	207	186	160	128	93.2	60.9		
80	56.9	90.9	127	160	186	206	220	227	229	225	216	200	179	152	118	80.1	42.6		
85	37.0	76.6	116	150	178	199	213	221	223	219	209	193	172	144	110	70.5	30.0		
90	24.0	66.1	107	142	170	191	205	213	215	212	202	186	165	137	103	65.0	24.9		
95	17.5	58.7	98.8	134	162	183	198	206	208	204	195	179	158	131	97.9	61.5	24.4		
100	15.7	51.4	90.4	125	153	175	189	197	199	196	186	171	150	124	93.5	59.5	25.3		
105	17.2	48.9	83.8	116	143	164	178	186	189	186	177	163	143	119	89.7	58.4	27.7		
110	19.7	49.8	80.8	109	134	154	168	176	179	176	168	154	136	113	87.0	58.5	26.6		
115	17.7	51.5	79.1	105	128	144	157	165	168	166	158	147	130	109	84.1	60.2	27.9		
120	7.10	52.2	79.3	101	122	139	151	158	160	158	151	140	124	104	81.5	61.5	26.7		
125	5.97	52.9	79.1	98.3	116	131	142	149	151	149	143	132	117	99.6	78.5	61.4	21.7		
130	2.68	51.8	79.4	95.6	111	124	133	139	142	140	134	124	111	94.6	77.2	61.4	14.9		
135	0.00	40.4	75.3	92.1	105	117	125	130	132	130	125	117	105	88.8	77.8	58.0	10.2		
140	5.01	13.9	59.8	89.5	98.5	109	117	122	123	121	116	108	96.5	86.5	73.8	38.7	5.12		
145	12.1	6.17	40.7	84.8	93.7	101	107	112	113	111	106	99.3	92.6	83.4	63.3	16.4	3.79		
150	10.5	8.72	22.8	52.8	90.2	96.5	100	102	103	102	99.1	95.1	86.2	65.4	40.2	5.68	5.89		
155	11.4	10.2	8.66	19.7	54.4	86.6	92.6	96.4	96.8	95.9	91.3	77.9	61.4	39.1	17.1	8.92	5.20		
160	11.0	15.7	13.3	16.4	17.1	26.7	51.2	67.6	74.8	71.9	61.7	41.9	22.9	10.9	12.5	8.26	5.98		
165	7.83	10.6	15.9	8.66	13.5	14.7	20.5	19.7	18.4	11.0	9.55	11.2	14.4	10.1	6.42	8.15	7.85		
170	13.1	11.6	11.3	9.52	15.4	10.8	8.86	11.2	8.66	13.2	12.5	9.63	11.0	8.38	8.25	7.91	8.02		
175	14.1	10.4	10.2	12.4	13.3	12.5	11.0	8.83	8.79	11.0	11.0	10.7	10.6	11.0	10.2	9.10	10.7		
180	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54	6.54		

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)	0.222	0.105
Power Factor	0.9937	0.9058
Test Power (W)/2	13.20	13.22
THD A%	4.71	8.43
Luminous Efficacy (lm/W)	141.2	140.8
Total Luminous Flux (lm)	1864.1	1861.4
Color Rendering Index (CRI)	84.5	
R9	16.7	
Correlated Color Temperature (CCT)(K)	3477	
Chromaticity Chroma x	0.4029	
Chromaticity Chroma y	0.3819	
Chromaticity Chroma u	0.2378	
Chromaticity Chroma v	0.3381	
Duv	-0.0034	
Chromaticity Chroma u'	0.2378	
Chromaticity Chroma v'	0.5072	

Special Color Rendering Indices	
R1	85.3
R2	96.3
R3	91.8
R4	80.7
R5	85.4
R6	93
R7	81.2
R8	62.4
R9	16.7
R10	90.8
R11	80.5
R12	70.9
R13	88.9
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

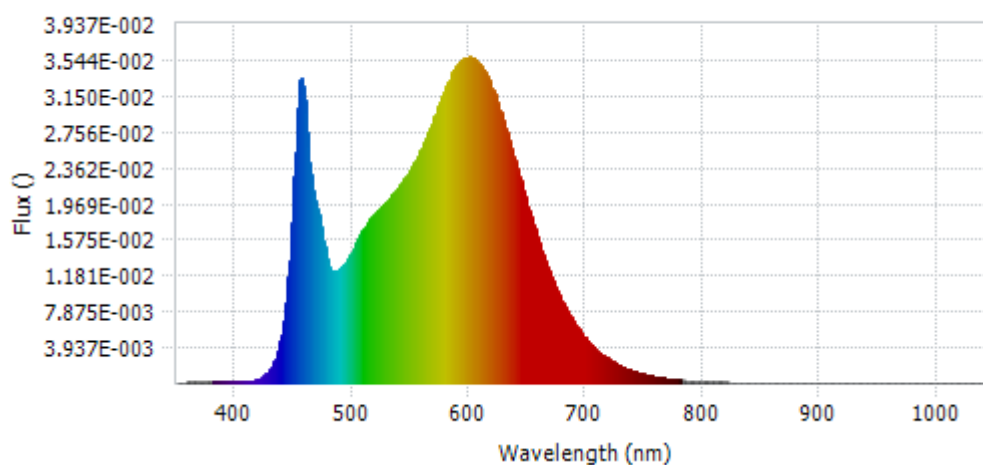
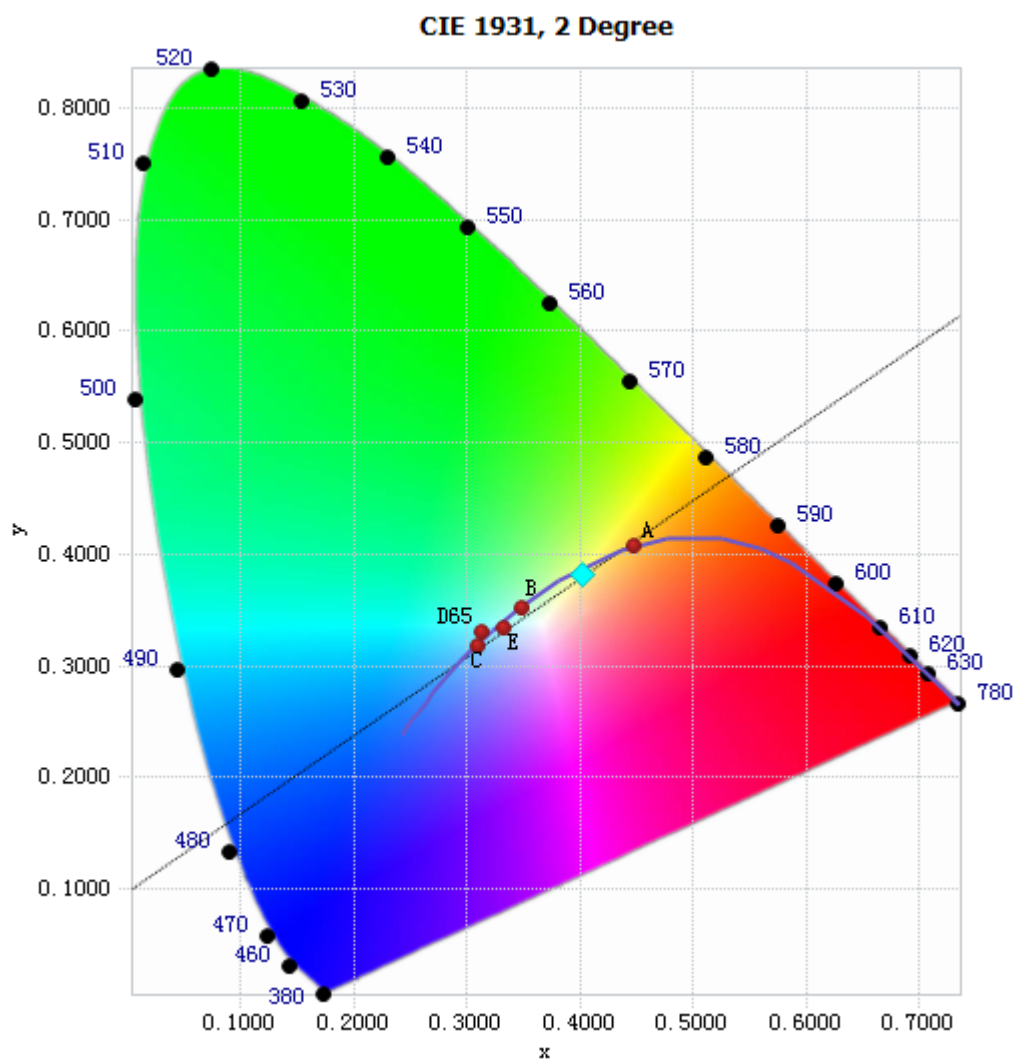


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.77E-04	485	1.23E-02	590	3.50E-02	695	5.69E-03
385	1.28E-04	490	1.27E-02	595	3.55E-02	700	4.86E-03
390	1.49E-04	495	1.34E-02	600	3.58E-02	705	4.14E-03
395	1.39E-04	500	1.46E-02	605	3.54E-02	710	3.53E-03
400	1.54E-04	505	1.59E-02	610	3.47E-02	715	3.02E-03
405	1.55E-04	510	1.70E-02	615	3.37E-02	720	2.59E-03
410	1.92E-04	515	1.80E-02	620	3.21E-02	725	2.21E-03
415	2.86E-04	520	1.86E-02	625	3.04E-02	730	1.86E-03
420	4.97E-04	525	1.94E-02	630	2.83E-02	735	1.58E-03
425	9.02E-04	530	2.01E-02	635	2.62E-02	740	1.37E-03
430	1.64E-03	535	2.08E-02	640	2.40E-02	745	1.16E-03
435	3.15E-03	540	2.15E-02	645	2.18E-02	750	9.91E-04
440	6.03E-03	545	2.25E-02	650	1.94E-02	755	8.45E-04
445	1.16E-02	550	2.35E-02	655	1.74E-02	760	7.14E-04
450	2.27E-02	555	2.47E-02	660	1.53E-02	765	6.19E-04
455	3.32E-02	560	2.60E-02	665	1.35E-02	770	5.29E-04
460	2.96E-02	565	2.76E-02	670	1.17E-02	775	4.49E-04
465	2.17E-02	570	2.92E-02	675	1.02E-02	780	3.88E-04
470	1.91E-02	575	3.08E-02	680	8.84E-03		
475	1.57E-02	580	3.25E-02	685	7.68E-03		
480	1.28E-02	585	3.40E-02	690	6.63E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4029, 0.3819)

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

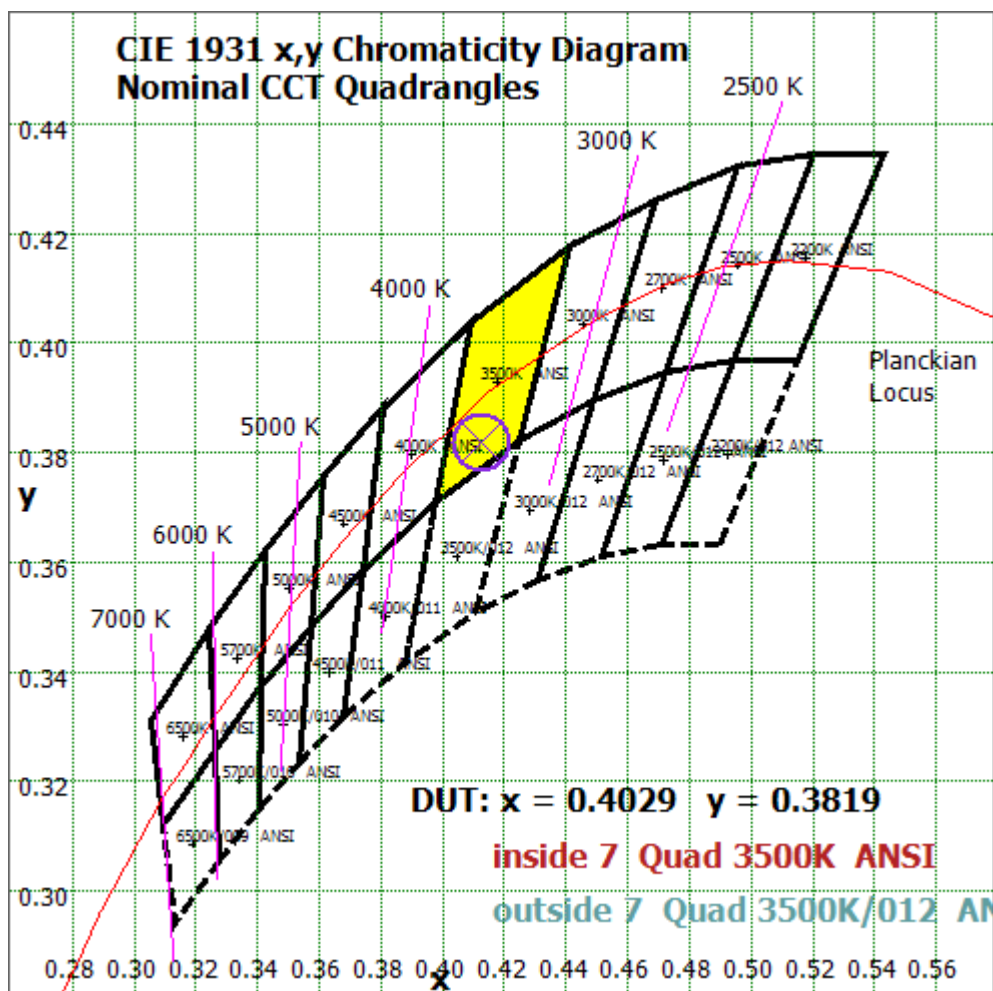


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

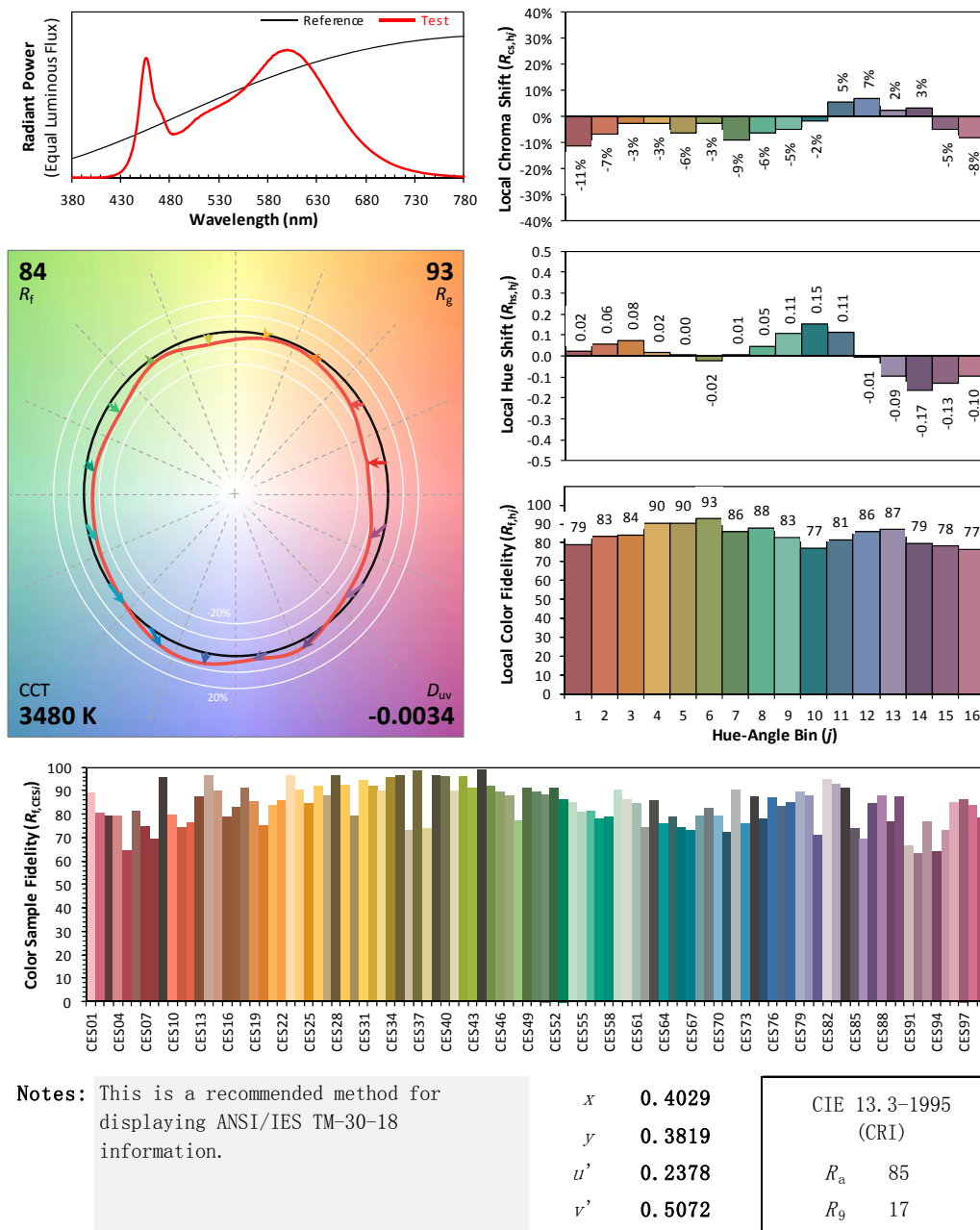
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/28

Model: 11.5T8/4F/8CCTS/EXT/SD/A2



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)	0.220	0.105
Power Factor	0.9935	0.9041
Test Power (W)/2	13.08	13.11
THD A%	4.56	8.46
Luminous Efficacy (lm/W)	144.4	144.2
Total Luminous Flux (lm)	1888.9	1891.1
Color Rendering Index (CRI)	85.5	
R9	22.4	
Correlated Color Temperature (CCT)(K)	3954	
Chromaticity Chroma x	0.3796	
Chromaticity Chroma y	0.3680	
Chromaticity Chroma u	0.2281	
Chromaticity Chroma v	0.3317	
Duv	-0.0039	
Chromaticity Chroma u'	0.2281	
Chromaticity Chroma v'	0.4975	

Special Color Rendering Indices	
R1	86.9
R2	97.2
R3	92.1
R4	81.3
R5	86.3
R6	92.3
R7	82.3
R8	65.9
R9	22.4
R10	92.3
R11	81.4
R12	67.5
R13	90.6
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

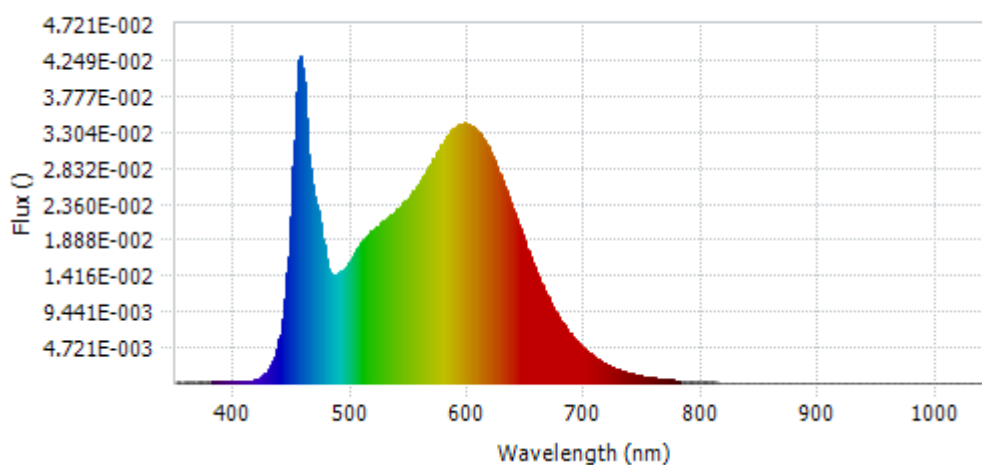
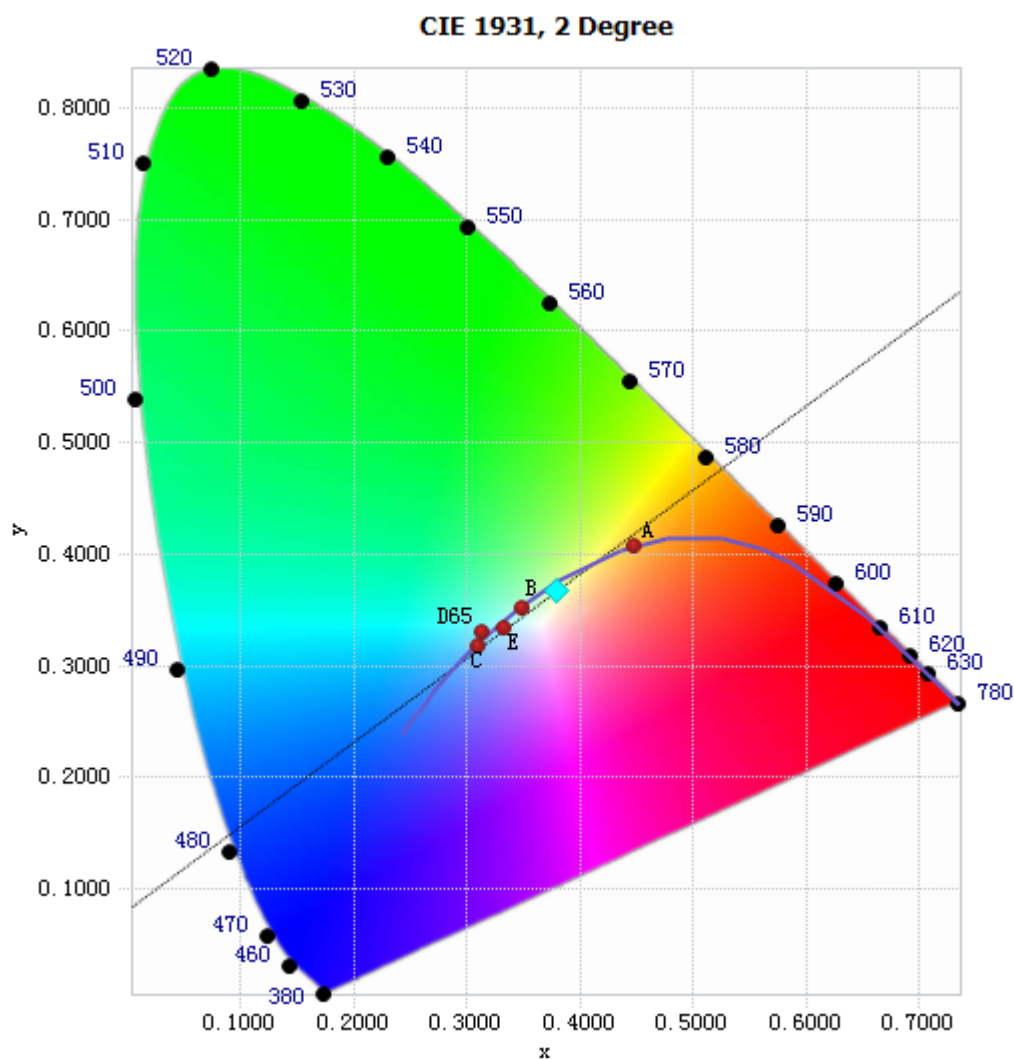


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.95E-04	485	1.43E-02	590	3.39E-02	695	5.13E-03
385	1.96E-04	490	1.46E-02	595	3.42E-02	700	4.38E-03
390	1.93E-04	495	1.52E-02	600	3.41E-02	705	3.74E-03
395	1.99E-04	500	1.63E-02	605	3.35E-02	710	3.18E-03
400	1.78E-04	505	1.76E-02	610	3.27E-02	715	2.72E-03
405	1.67E-04	510	1.87E-02	615	3.15E-02	720	2.33E-03
410	2.31E-04	515	1.97E-02	620	2.99E-02	725	1.98E-03
415	3.34E-04	520	2.03E-02	625	2.81E-02	730	1.69E-03
420	5.77E-04	525	2.10E-02	630	2.62E-02	735	1.44E-03
425	1.06E-03	530	2.17E-02	635	2.41E-02	740	1.24E-03
430	2.00E-03	535	2.22E-02	640	2.20E-02	745	1.04E-03
435	3.83E-03	540	2.29E-02	645	1.99E-02	750	8.95E-04
440	7.42E-03	545	2.37E-02	650	1.78E-02	755	7.59E-04
445	1.45E-02	550	2.45E-02	655	1.58E-02	760	6.51E-04
450	2.84E-02	555	2.56E-02	660	1.40E-02	765	5.54E-04
455	4.24E-02	560	2.68E-02	665	1.22E-02	770	4.82E-04
460	3.74E-02	565	2.81E-02	670	1.06E-02	775	4.09E-04
465	2.69E-02	570	2.94E-02	675	9.27E-03	780	3.53E-04
470	2.34E-02	575	3.07E-02	680	8.02E-03		
475	1.91E-02	580	3.20E-02	685	6.92E-03		
480	1.51E-02	585	3.32E-02	690	5.98E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3796, 0.3680)

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

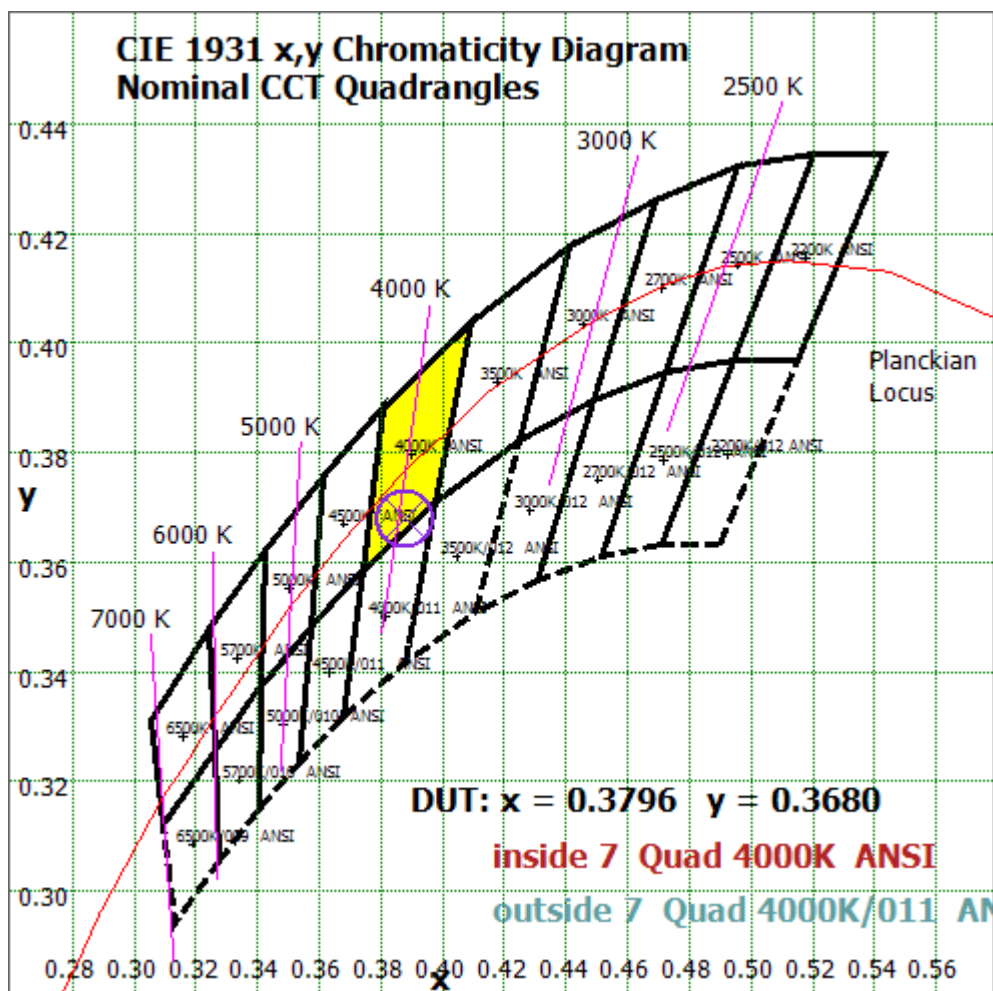


Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

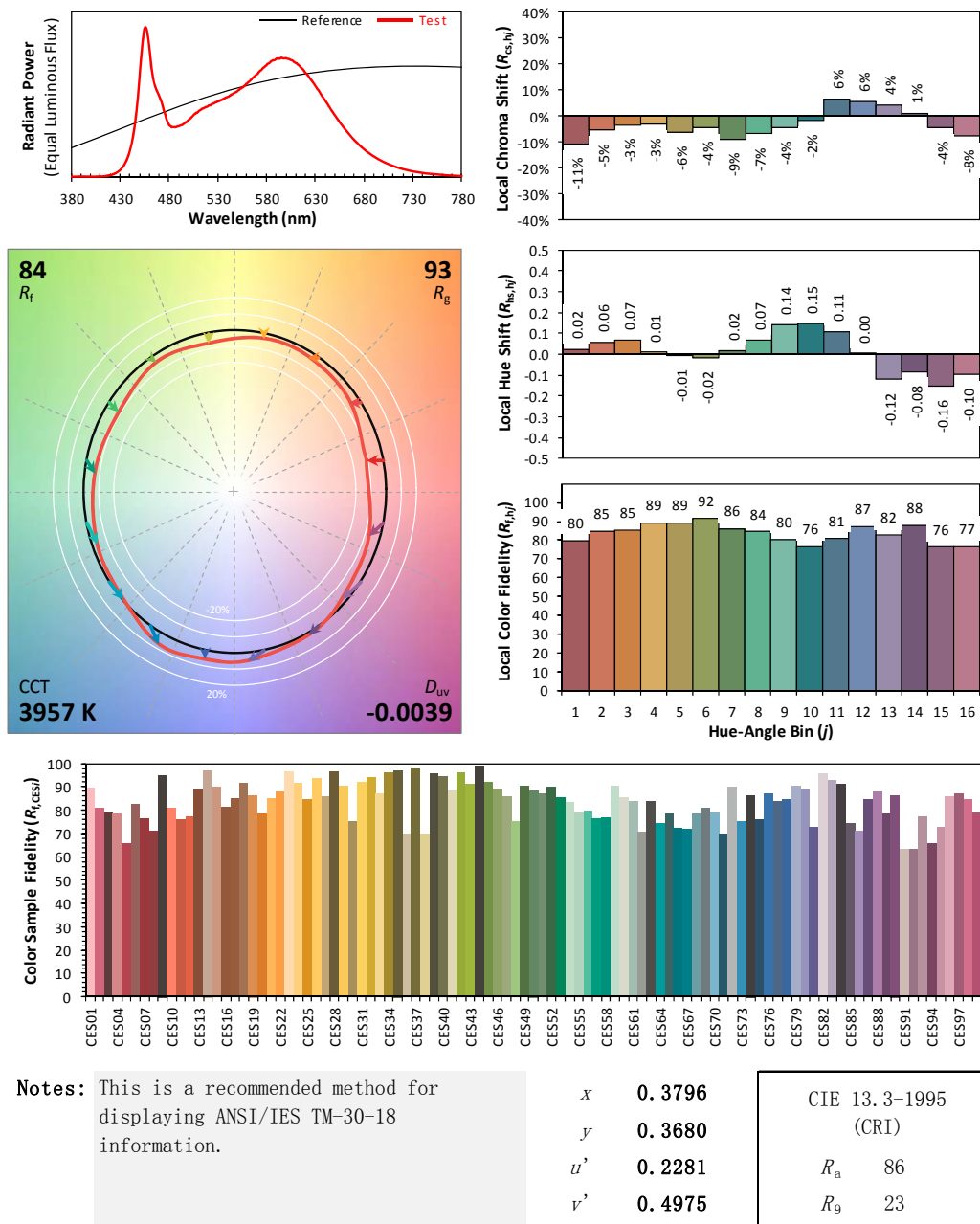
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/28

Model: 11.5T8/4F/8CCTS/EXT/SD/A2



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)	0.220	0.105
Power Factor	0.9935	0.9046
Test Power (W)/2	13.11	13.16
THD A%	4.73	8.53
Luminous Efficacy (lm/W)	144.3	143.9
Total Luminous Flux (lm)	1892.0	1893.1
Color Rendering Index (CRI)	85.9	
R9	21.9	
Correlated Color Temperature (CCT)(K)	5062	
Chromaticity Chroma x	0.3430	
Chromaticity Chroma y	0.3465	
Chromaticity Chroma u	0.2120	
Chromaticity Chroma v	0.3212	
Duv	-0.0018	
Chromaticity Chroma u'	0.2120	
Chromaticity Chroma v'	0.4818	

Special Color Rendering Indices	
R1	87
R2	96.7
R3	93
R4	81.9
R5	86.3
R6	90.6
R7	83.6
R8	68.2
R9	21.9
R10	90.9
R11	82.1
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

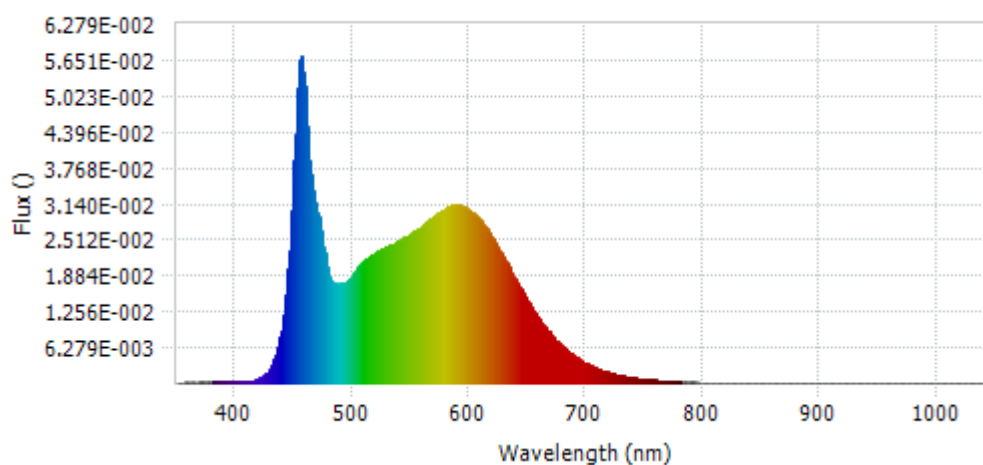
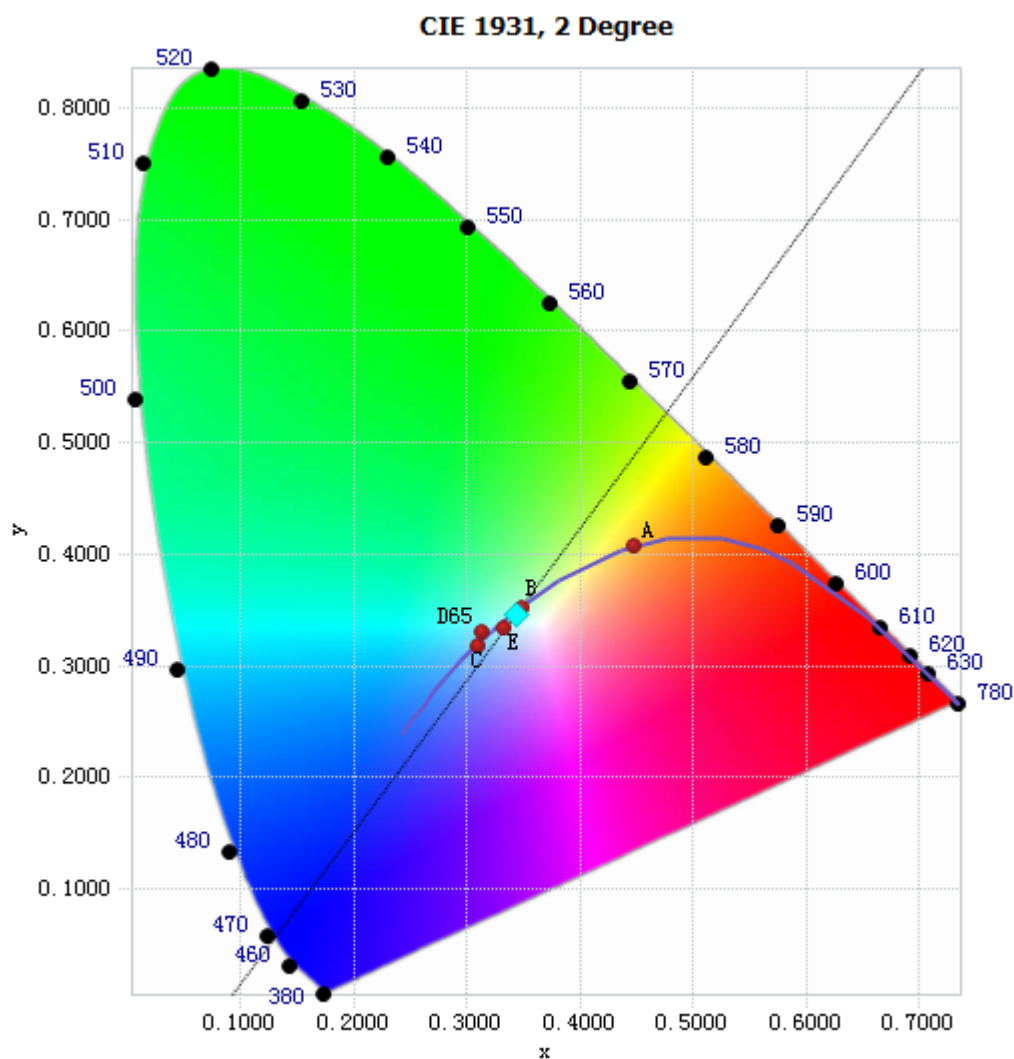


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.12E-04	485	1.74E-02	590	3.11E-02	695	4.04E-03
385	2.06E-04	490	1.75E-02	595	3.08E-02	700	3.44E-03
390	2.29E-04	495	1.79E-02	600	3.03E-02	705	2.94E-03
395	2.17E-04	500	1.89E-02	605	2.93E-02	710	2.49E-03
400	2.26E-04	505	2.02E-02	610	2.83E-02	715	2.14E-03
405	2.29E-04	510	2.13E-02	615	2.69E-02	720	1.83E-03
410	2.92E-04	515	2.23E-02	620	2.52E-02	725	1.57E-03
415	4.74E-04	520	2.28E-02	625	2.35E-02	730	1.33E-03
420	8.03E-04	525	2.34E-02	630	2.17E-02	735	1.14E-03
425	1.52E-03	530	2.40E-02	635	1.98E-02	740	9.70E-04
430	2.85E-03	535	2.44E-02	640	1.80E-02	745	8.24E-04
435	5.49E-03	540	2.49E-02	645	1.61E-02	750	7.05E-04
440	1.05E-02	545	2.55E-02	650	1.43E-02	755	6.09E-04
445	2.02E-02	550	2.61E-02	655	1.26E-02	760	5.29E-04
450	3.89E-02	555	2.68E-02	660	1.12E-02	765	4.51E-04
455	5.65E-02	560	2.76E-02	665	9.76E-03	770	3.80E-04
460	4.87E-02	565	2.84E-02	670	8.44E-03	775	3.31E-04
465	3.46E-02	570	2.92E-02	675	7.34E-03	780	2.81E-04
470	2.98E-02	575	2.99E-02	680	6.33E-03		
475	2.40E-02	580	3.06E-02	685	5.47E-03		
480	1.87E-02	585	3.11E-02	690	4.70E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3430, 0.3465)

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

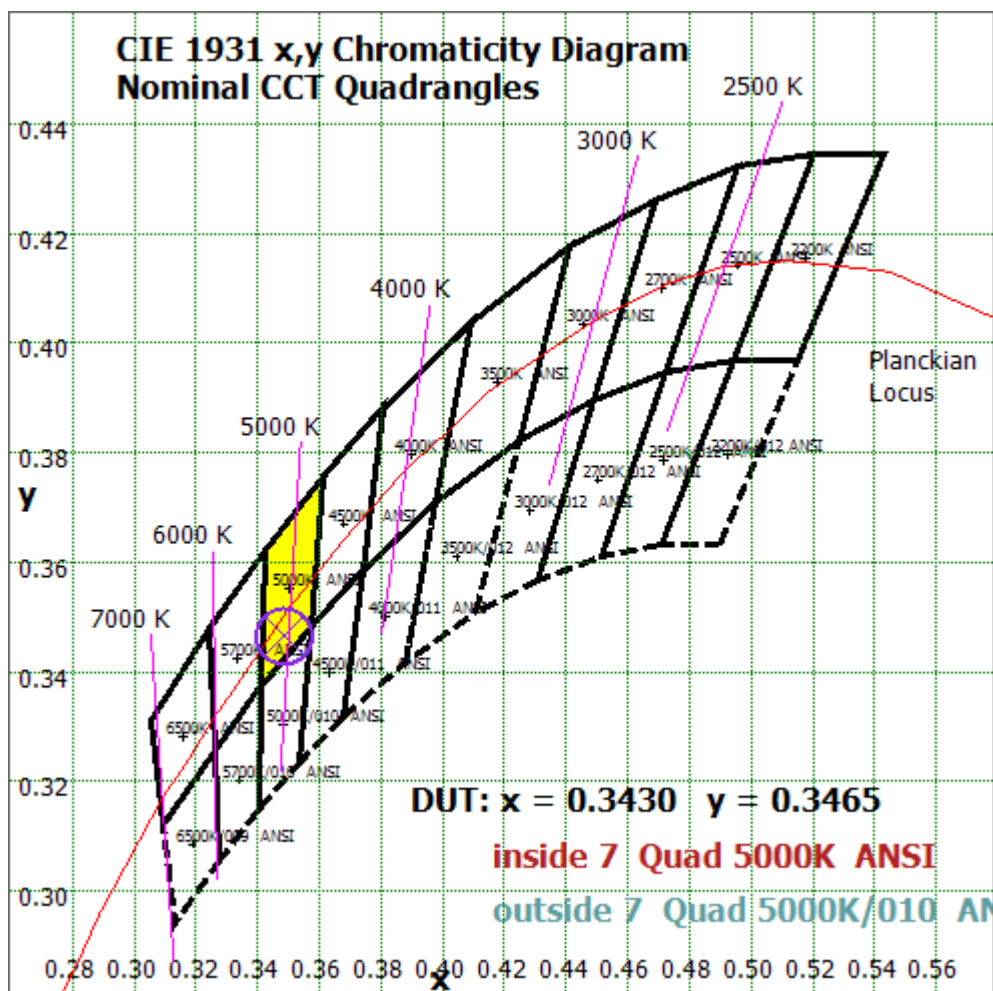


Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

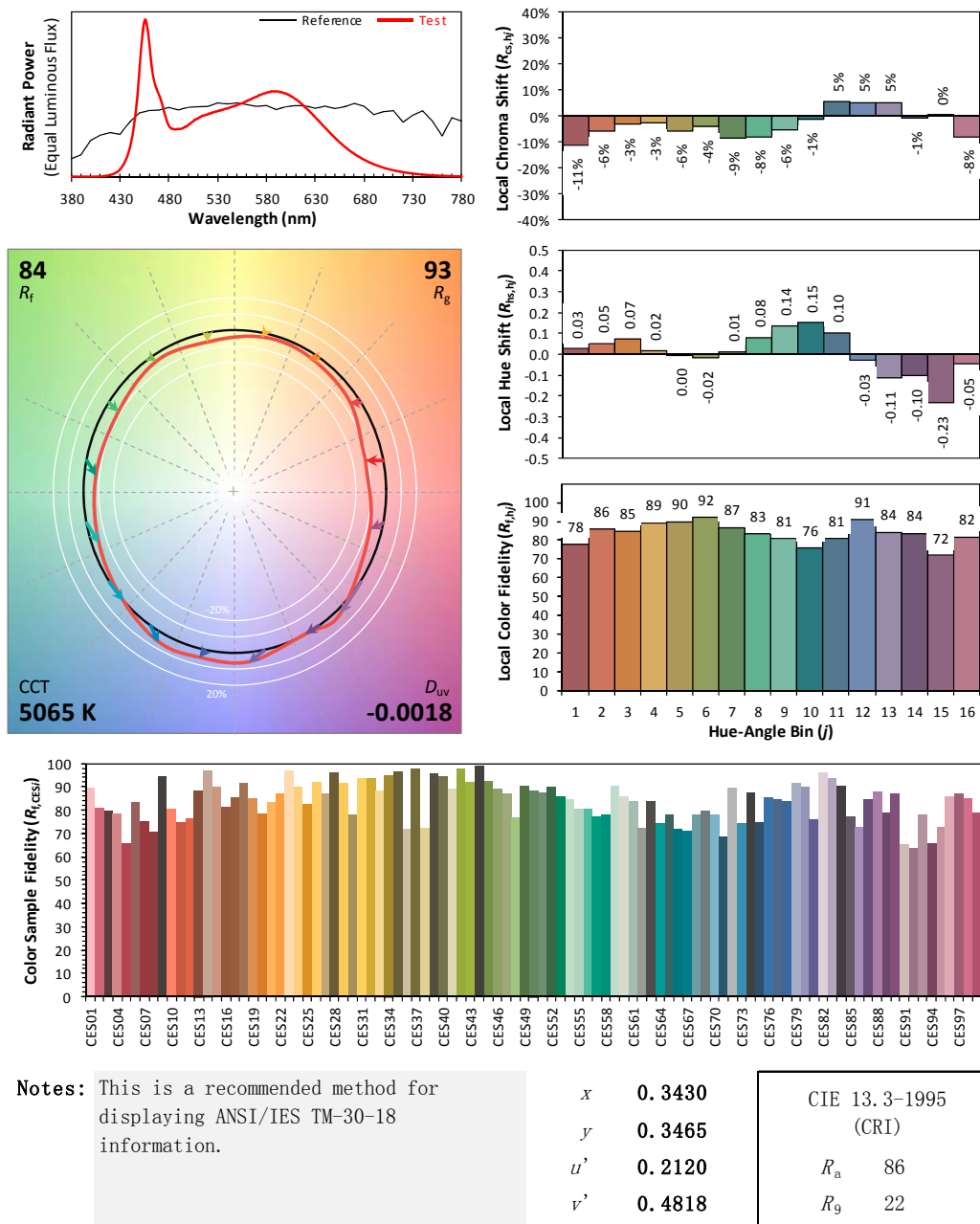
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/28

Model: 11.5T8/4F/8CCTS/EXT/SD/A2



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)	0.223	0.106
Power Factor	0.9938	0.9068
Test Power (W)/2	13.30	13.33
THD A%	4.84	8.35
Luminous Efficacy (lm/W)	140.9	139.2
Total Luminous Flux (lm)	1874.1	1855.7
Color Rendering Index (CRI)	84.2	
R9	11.1	
Correlated Color Temperature (CCT)(K)	6490	
Chromaticity Chroma x	0.3128	
Chromaticity Chroma y	0.3293	
Chromaticity Chroma u	0.1978	
Chromaticity Chroma v	0.3123	
Duv	0.0033	
Chromaticity Chroma u'	0.1978	
Chromaticity Chroma v'	0.4685	

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	11.1
R10	86.2
R11	78.6
R12	58.9
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

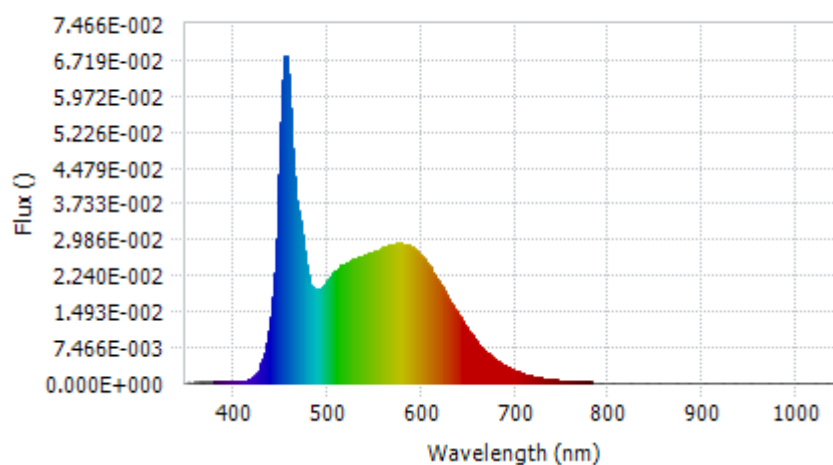
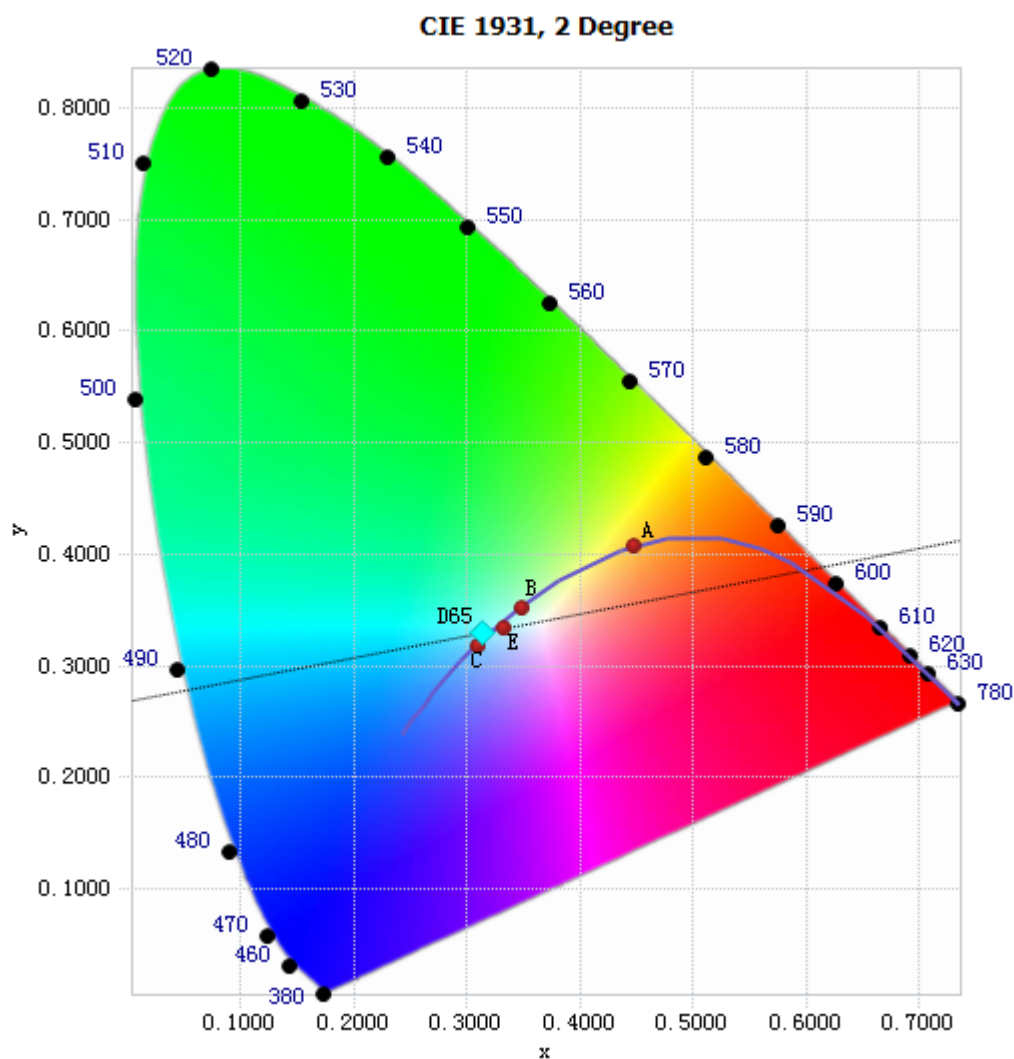


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.29E-04	485	1.99E-02	590	2.83E-02	695	2.98E-03
385	2.24E-04	490	1.98E-02	595	2.74E-02	700	2.54E-03
390	2.40E-04	495	2.00E-02	600	2.64E-02	705	2.15E-03
395	2.72E-04	500	2.11E-02	605	2.51E-02	710	1.85E-03
400	2.55E-04	505	2.24E-02	610	2.37E-02	715	1.57E-03
405	2.55E-04	510	2.35E-02	615	2.22E-02	720	1.36E-03
410	3.60E-04	515	2.44E-02	620	2.05E-02	725	1.15E-03
415	5.95E-04	520	2.49E-02	625	1.88E-02	730	9.91E-04
420	1.08E-03	525	2.54E-02	630	1.72E-02	735	8.43E-04
425	1.99E-03	530	2.59E-02	635	1.55E-02	740	7.26E-04
430	3.84E-03	535	2.61E-02	640	1.39E-02	745	6.19E-04
435	7.35E-03	540	2.65E-02	645	1.24E-02	750	5.31E-04
440	1.39E-02	545	2.69E-02	650	1.09E-02	755	4.53E-04
445	2.61E-02	550	2.73E-02	655	9.56E-03	760	3.97E-04
450	4.87E-02	555	2.77E-02	660	8.40E-03	765	3.38E-04
455	6.78E-02	560	2.81E-02	665	7.28E-03	770	2.90E-04
460	5.71E-02	565	2.85E-02	670	6.29E-03	775	2.52E-04
465	4.08E-02	570	2.87E-02	675	5.44E-03	780	2.23E-04
470	3.47E-02	575	2.89E-02	680	4.68E-03		
475	2.75E-02	580	2.89E-02	685	4.05E-03		
480	2.15E-02	585	2.89E-02	690	3.47E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3128, 0.3293)

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

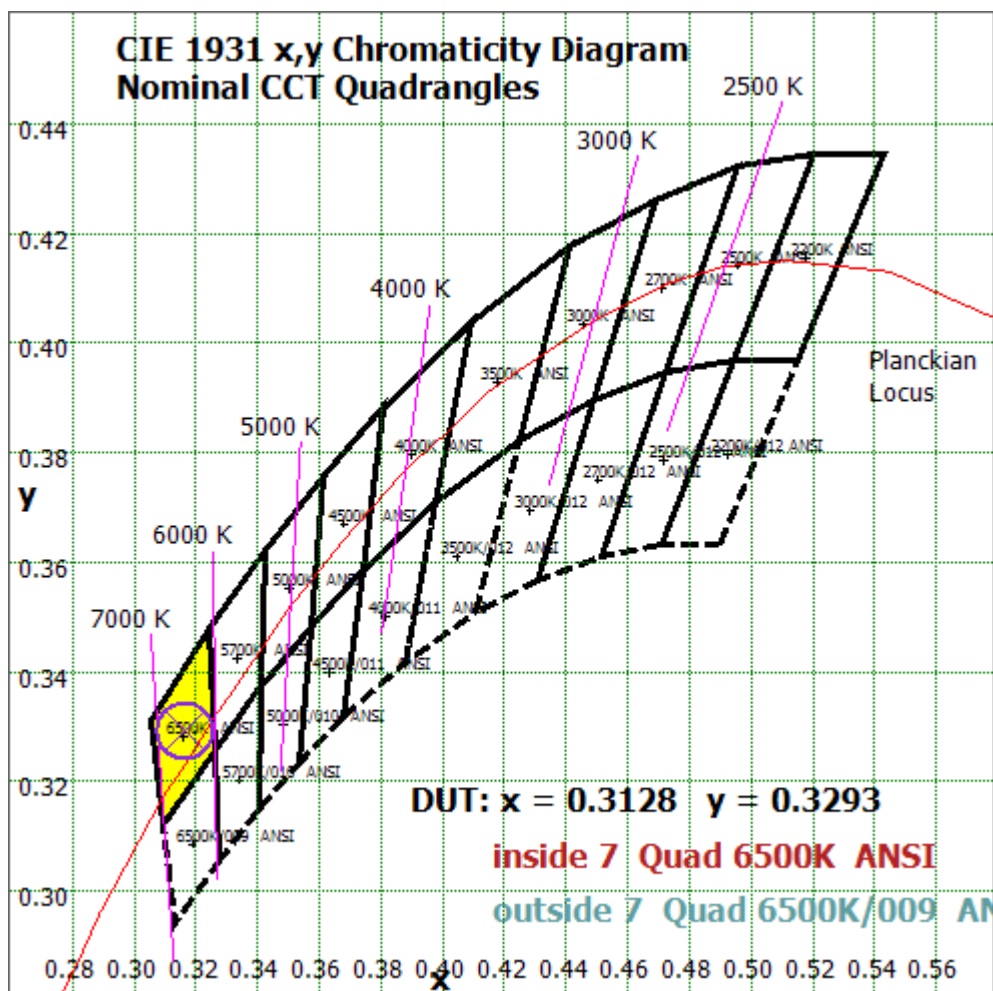


Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

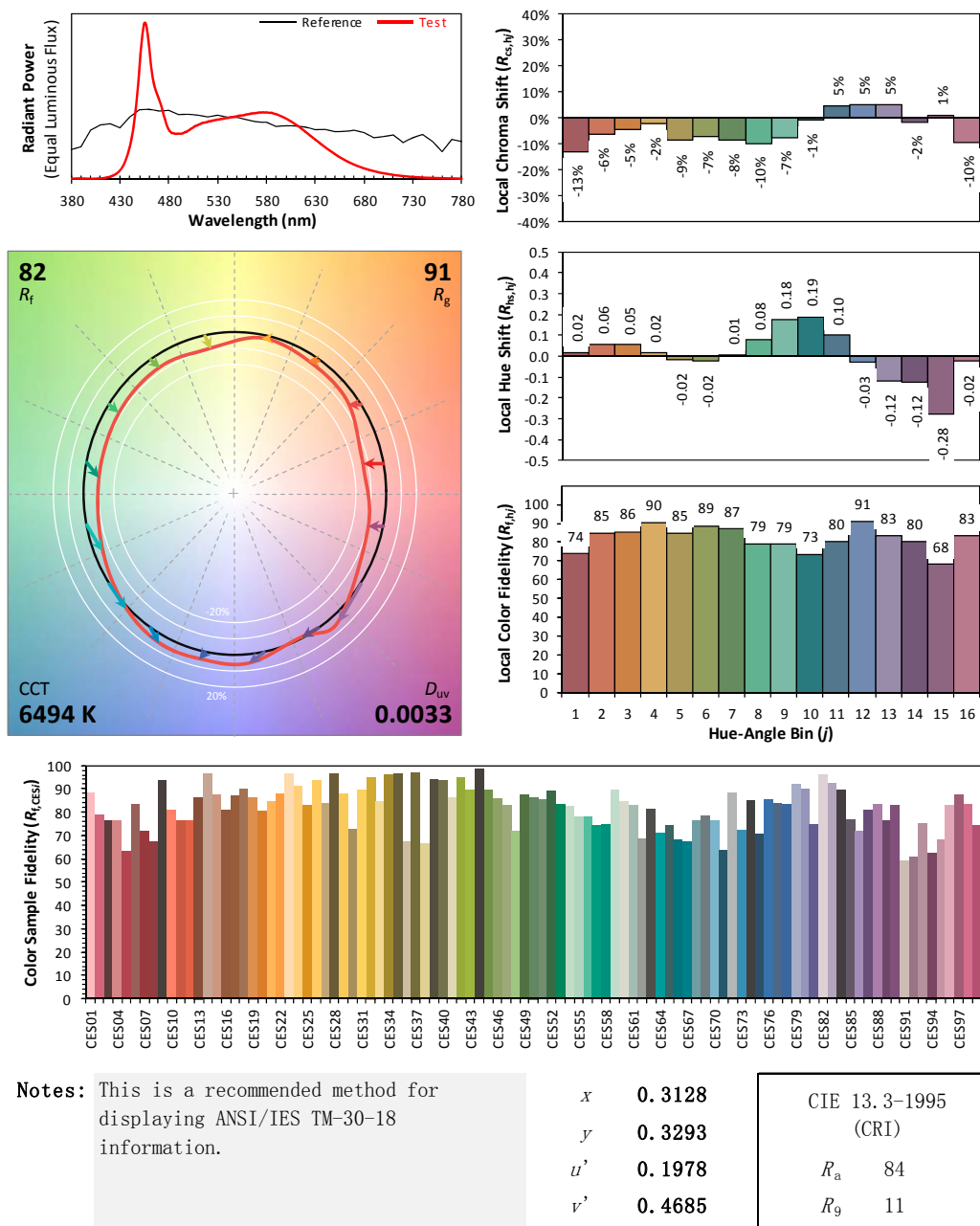
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/28

Model: 11.5T8/4F/8CCTS/EXT/SD/A2



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

Chart 23: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 14 due to rounding.

EQUIPMENT LIST

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

Table 16: Test Equipment List

TEST METHODS

Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and 3 Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is 4π . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 20 min, taken 10 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 2.1% with a coverage factor $k=2$.

Goniophotometer Method

Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 20 min, taken 10 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 2.3% with a coverage factor $k=2$.

Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

*** End of Report ***

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.