

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/A3

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,
Hangzhou, Zhejiang Province, China 311100

Tel: +86571 86376106

www.ltlqa.com

Report No.: HZ23060027h

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/E XT/SD/A3 3000K Setting	11.5T8/4F/8CCTS/E XT/SD/A3 3500K Setting	11.5T8/4F/8CCTS/ EXT/SD/A3 4000K Setting
Luminous Efficacy (Lumens /Watt)	136.9	141.1	144.5
Total Luminous Flux (Lumens)	1782.8	1822.0	1849.3
Power (Watts)/3	13.02	12.91	12.80
Power Factor	0.9936	0.9937	0.9934
CCT (K)	3019	3485	3967
CRI	82.5	84.6	85.7
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Tested Model	11.5T8/4F/8CCTS/E XT/SD/A3 5000K Setting	11.5T8/4F/8CCTS/E XT/SD/A3 6500K Setting
Luminous Efficacy (Lumens /Watt)	144.4	142.0
Total Luminous Flux (Lumens)	1856.1	1847.3
Power (Watts)/3	12.85	13.01
Power Factor	0.9935	0.9937
CCT (K)	5083	6525
CRI	86.1	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. 30, 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

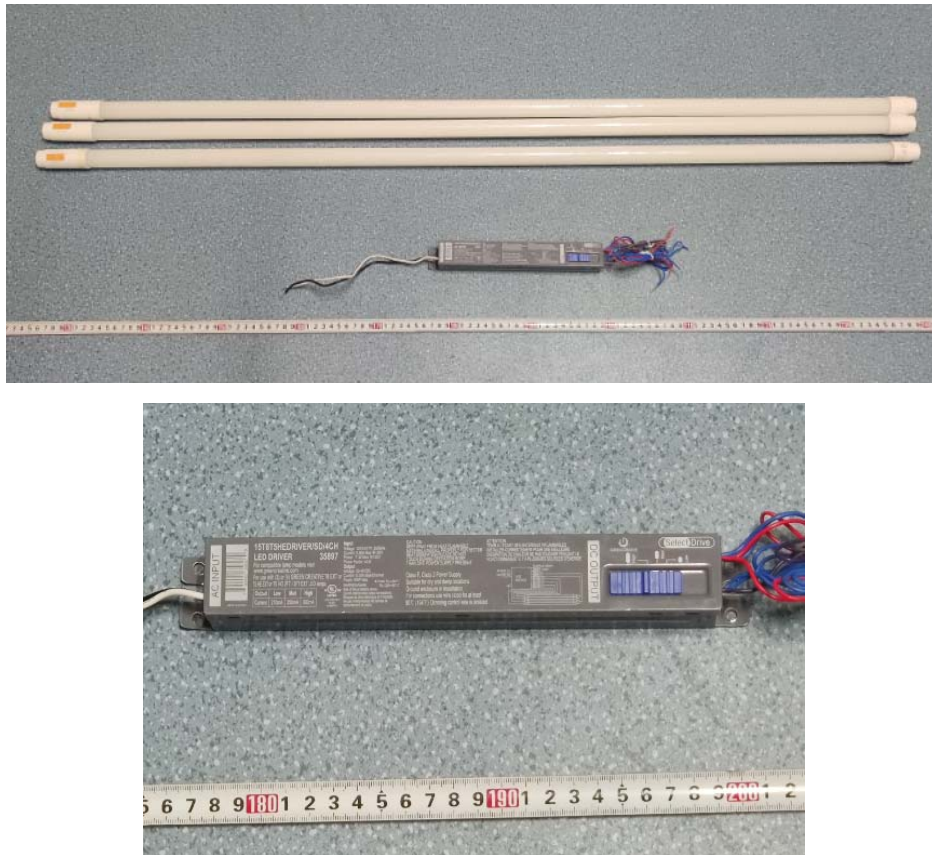


Figure 1- Overview of the sample

Equipment Under Test(EUT)

Name	: LED Tube
Model	: 11.5T8/4F/8CCTS/EXT/SD/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)	0.328	0.156
Power Factor	0.9936	0.9018
Test Power (W)/3	13.02	12.96
THD A%	5.31	8.41
Luminous Efficacy (lm/W)	136.9	137.6
Total Luminous Flux (lm)	1782.8	1783.2
Color Rendering Index (CRI)	82.5	
R9	6.9	
Correlated Color Temperature (CCT)(K)	3019	
Chromaticity Chroma x	0.4341	
Chromaticity Chroma y	0.4007	
Chromaticity Chroma u	0.2502	
Chromaticity Chroma v	0.3464	
Duv	-0.0010	
Chromaticity Chroma u'	0.2502	
Chromaticity Chroma v'	0.5196	

Special Color Rendering Indices	
R1	81.9
R2	93.8
R3	92.7
R4	79
R5	82.4
R6	92.6
R7	80.3
R8	57.3
R9	6.9
R10	85.9
R11	78.5
R12	73.3
R13	85.1
R14	96.6

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

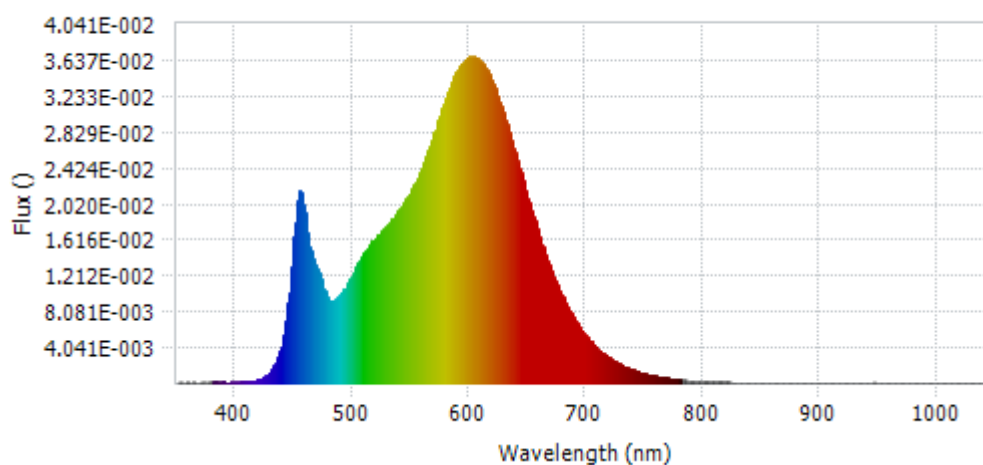
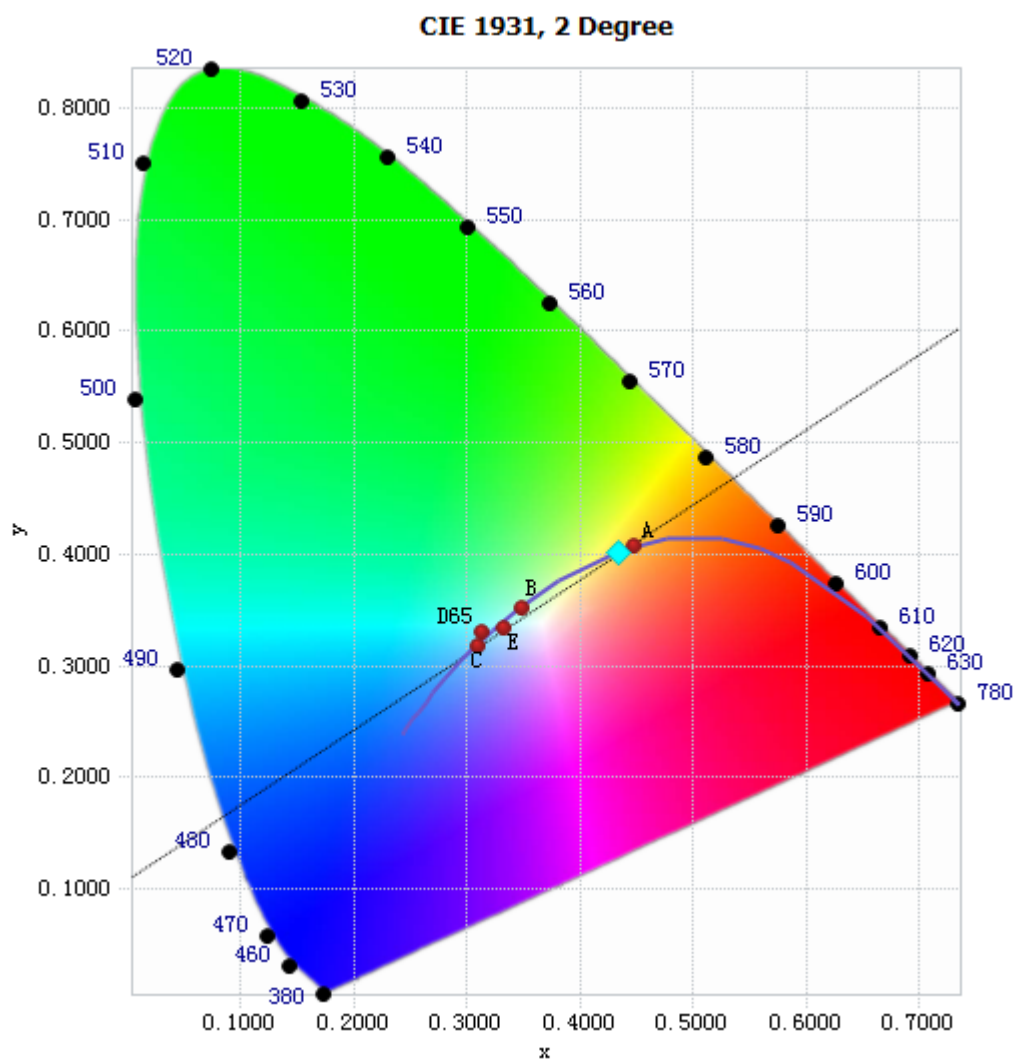


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.25E-04	485	9.36E-03	590	3.53E-02	695	6.18E-03
385	1.09E-04	490	1.01E-02	595	3.62E-02	700	5.31E-03
390	1.27E-04	495	1.10E-02	600	3.67E-02	705	4.51E-03
395	1.12E-04	500	1.22E-02	605	3.66E-02	710	3.85E-03
400	1.14E-04	505	1.35E-02	610	3.60E-02	715	3.30E-03
405	1.24E-04	510	1.46E-02	615	3.51E-02	720	2.84E-03
410	1.69E-04	515	1.55E-02	620	3.36E-02	725	2.41E-03
415	2.61E-04	520	1.62E-02	625	3.20E-02	730	2.04E-03
420	4.26E-04	525	1.71E-02	630	3.00E-02	735	1.74E-03
425	7.84E-04	530	1.79E-02	635	2.78E-02	740	1.48E-03
430	1.41E-03	535	1.85E-02	640	2.56E-02	745	1.27E-03
435	2.55E-03	540	1.95E-02	645	2.32E-02	750	1.08E-03
440	4.71E-03	545	2.05E-02	650	2.08E-02	755	9.28E-04
445	8.96E-03	550	2.15E-02	655	1.87E-02	760	7.97E-04
450	1.65E-02	555	2.29E-02	660	1.65E-02	765	6.66E-04
455	2.17E-02	560	2.45E-02	665	1.46E-02	770	5.79E-04
460	1.81E-02	565	2.62E-02	670	1.27E-02	775	5.01E-04
465	1.43E-02	570	2.81E-02	675	1.11E-02	780	4.19E-04
470	1.28E-02	575	3.01E-02	680	9.61E-03		
475	1.06E-02	580	3.21E-02	685	8.33E-03		
480	9.24E-03	585	3.40E-02	690	7.20E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4341, 0.4007)

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

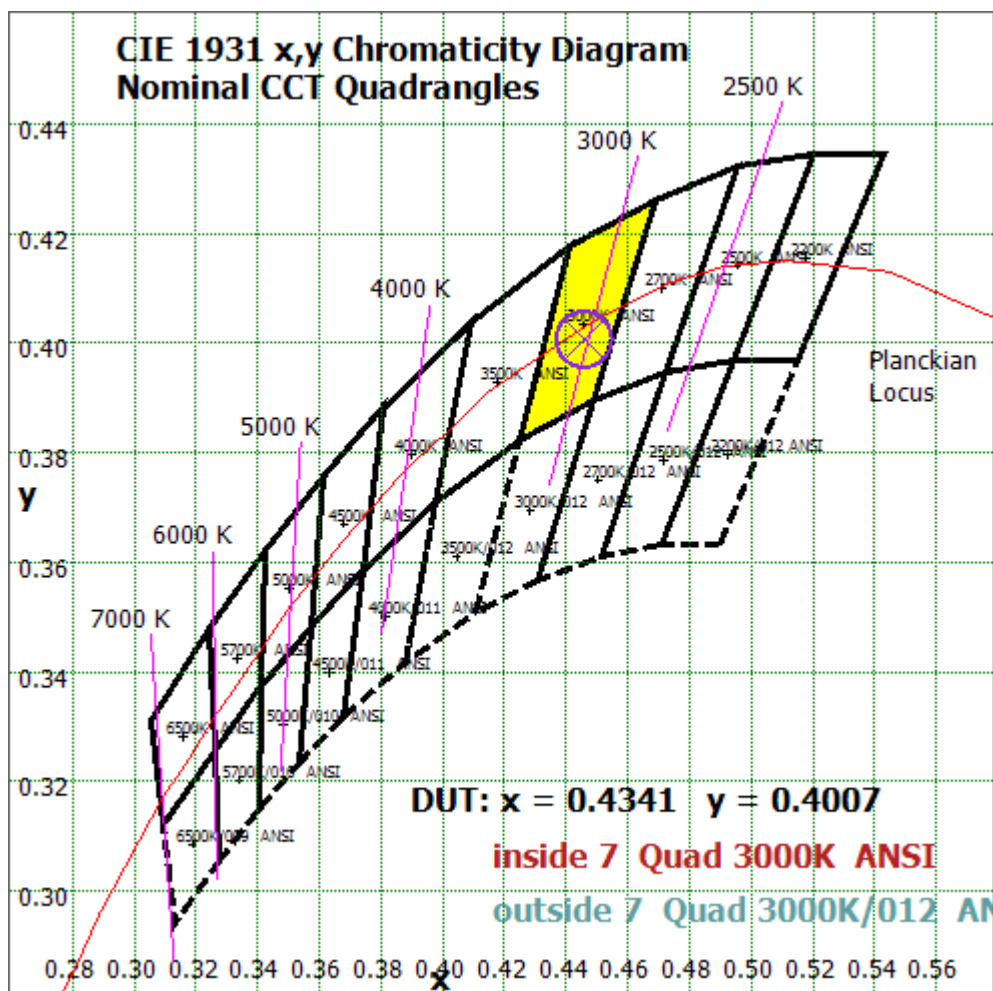


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

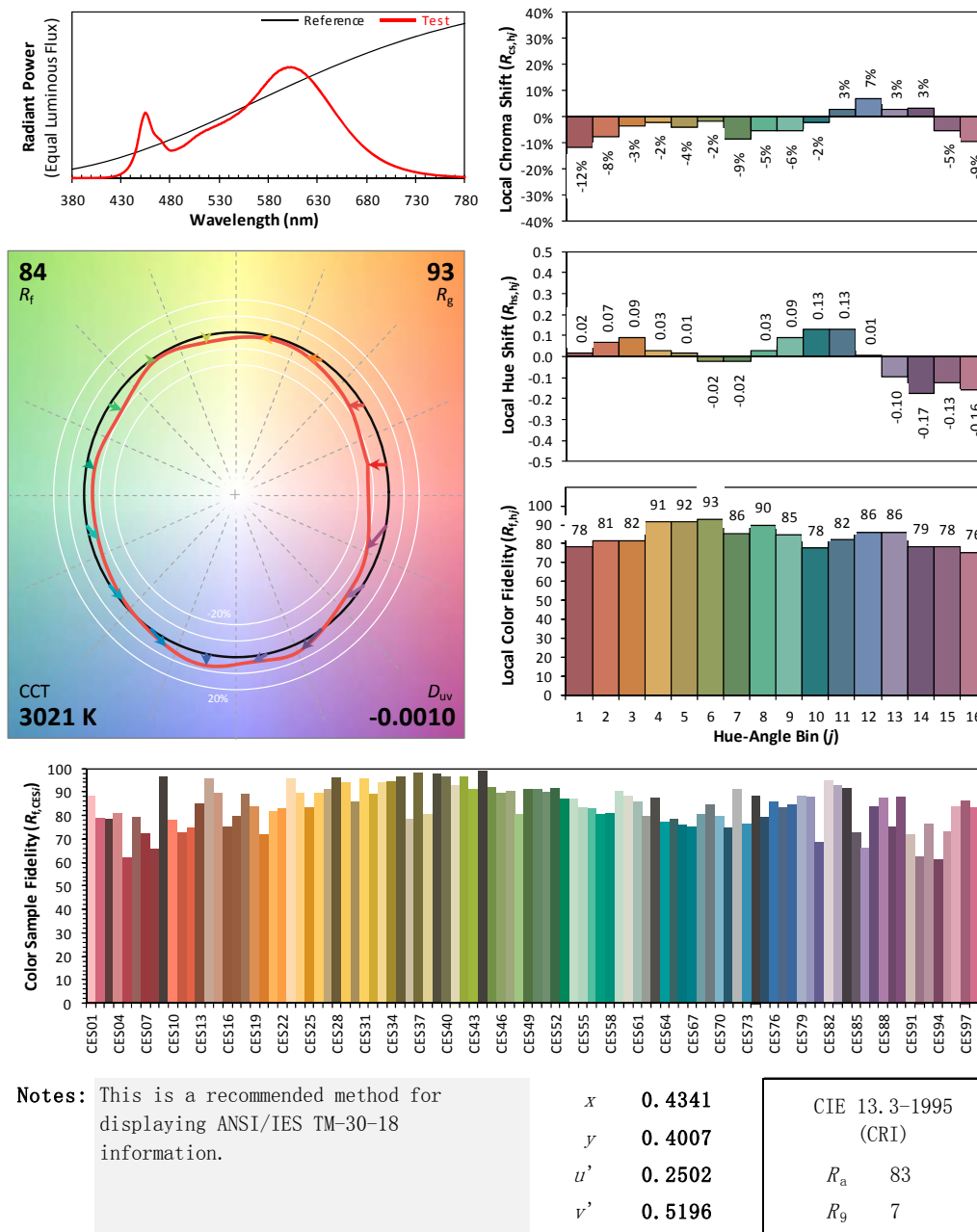
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/30

Model: 11.5T8/4F/8CCTS/EXT/SD/A3



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)	0.330
Power Factor	0.9901
Power (W)/3	13.06
Luminous Efficacy (lm/W)	137.6
Total Luminous Flux (lm)	1796.5
Beam Angle (°)	117.8 (0°-180°) / 254.4 (90°-270°)
Center Beam Candle Power (cd)	271
Maximum Beam Candle Power (cd)	271.2 (At: C=130.0, Gamma=5.5)
Spacing Criteria	1.33 (0°-180°) / 1.48 (90°-270°)
Zonal Lumens in the 0°-60°Zone	40.36%
Zonal Lumens in the 60°-90°Zone	27.29%
Zonal Lumens in the 90°-120°Zone	19.18%
Zonal Lumens in the 120°-180°Zone	13.17%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	25.718	1.43%
10- 20	75.013	4.18%
20- 30	118.069	6.57%
30- 40	151.498	8.43%
40- 50	173.016	9.63%
50- 60	181.677	10.11%
60- 70	178.026	9.91%
70- 80	164.828	9.18%
80- 90	147.339	8.20%
90-100	130.988	7.29%
100-110	114.84	6.39%
110-120	98.8	5.50%
120-130	82.01	4.57%
130-140	64.817	3.61%
140-150	46.337	2.58%
150-160	27.44	1.53%
160-170	12.459	0.69%
170-180	3.605	0.20%
Total	1796.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	724.991	40.36%
60- 90	490.193	27.29%
0-90	1215.18	67.64%
90- 180	581.296	32.36%
0- 180	1796.5	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

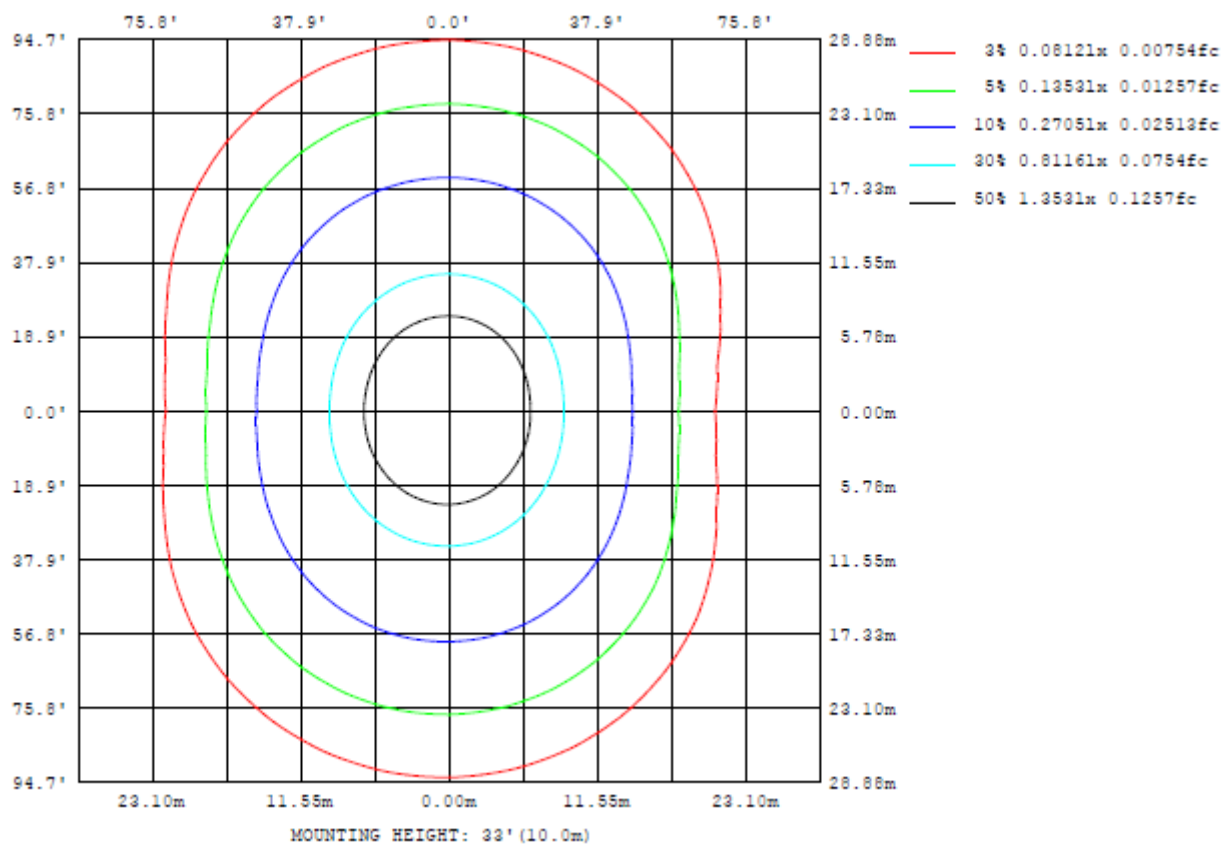


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

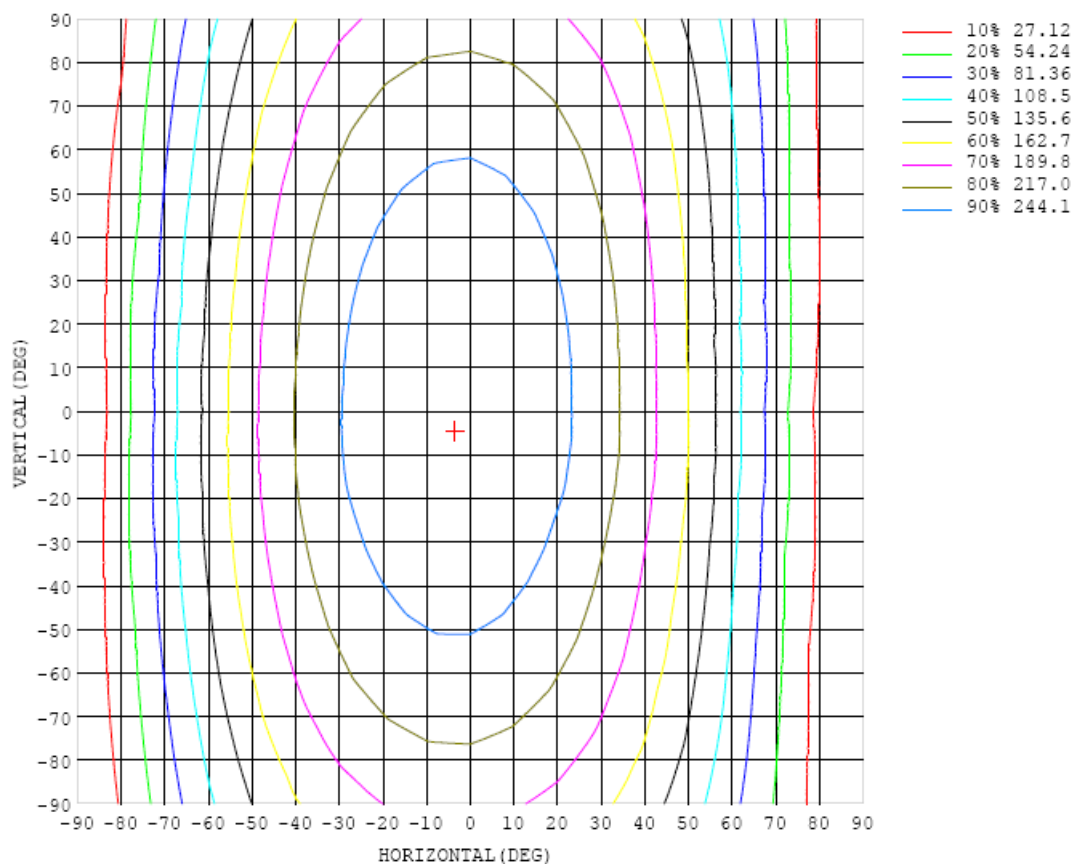


Chart 6: Isocandela Plot

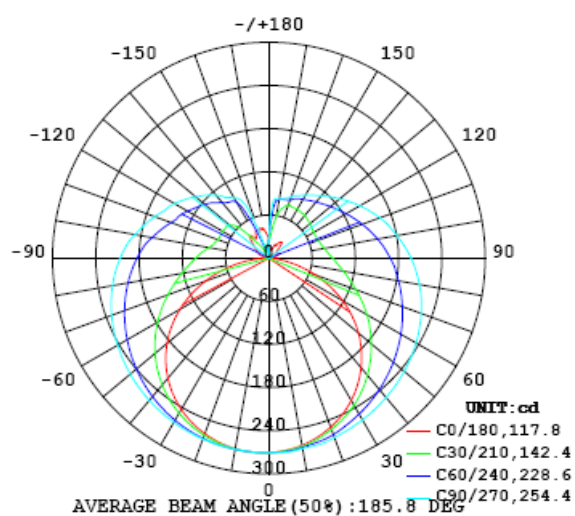


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271
5	268	268	269	269	269	270	270	270	271	271	271	271	271	271	271	271	271	271	271
10	264	264	265	266	266	267	267	268	268	269	269	270	270	270	270	270	270	269	269
15	258	259	260	261	261	263	265	266	267	268	269	269	268	268	267	267	266	266	265
20	250	251	252	254	256	259	261	263	265	266	266	266	266	265	264	262	261	261	260
25	240	241	243	246	249	253	256	259	261	263	263	263	262	261	259	256	254	253	252
30	228	230	232	236	241	245	250	255	258	260	260	260	258	255	252	249	246	244	243
35	215	216	220	225	231	238	245	250	254	257	257	256	253	249	245	240	236	233	232
40	199	201	206	213	221	230	238	245	250	253	253	252	248	243	236	230	224	220	218
45	181	184	190	199	210	222	232	240	246	249	250	247	242	236	227	218	211	205	202
50	162	166	173	185	199	213	225	235	241	245	245	242	236	228	217	206	196	188	185
55	141	145	156	171	188	204	218	229	237	241	241	237	230	220	207	193	179	169	165
60	118	123	137	157	177	196	211	223	232	236	236	232	223	212	196	179	163	149	143
65	93.5	99.9	118	142	167	187	204	217	226	230	230	226	217	203	185	165	145	127	119
70	68.3	76.4	99.8	128	156	178	197	211	220	225	224	219	209	194	175	152	126	104	93.6
75	43.6	54.3	83.0	116	146	171	190	205	214	219	218	213	202	185	164	138	108	81.6	68.7
80	21.3	35.2	69.0	105	137	163	183	198	207	212	211	205	194	177	155	125	91.4	60.1	42.9
85	5.77	22.2	58.8	95.8	128	155	176	190	200	205	204	198	186	169	145	114	77.4	41.5	20.0
90	1.63	16.5	52.0	88.4	121	148	168	183	193	197	196	190	178	161	136	104	66.7	28.8	5.43
95	2.48	15.2	48.3	82.5	114	140	161	176	184	189	188	182	170	152	127	96.0	59.3	23.1	1.82
100	5.99	16.6	46.2	78.2	108	133	153	168	176	180	179	173	162	144	120	89.3	54.8	22.3	3.37
105	10.6	20.0	45.8	74.9	102	126	145	160	169	173	172	165	153	136	113	84.1	52.7	24.4	7.62
110	13.1	25.2	47.4	72.7	97.8	120	138	151	160	164	163	156	145	128	106	80.2	52.5	28.6	12.9
115	15.1	31.0	50.2	71.7	94.1	114	131	143	151	155	154	148	137	121	101	77.7	54.0	34.2	16.1
120	12.0	34.3	54.7	72.0	91.3	109	124	135	142	146	144	139	129	114	96.5	76.3	56.5	41.0	17.1
125	8.50	38.1	59.2	72.9	89.2	104	117	127	134	137	136	131	121	109	93.0	75.8	59.6	48.1	22.8
130	14.0	46.3	63.1	74.5	87.8	101	112	120	126	128	127	123	115	104	90.4	76.1	62.9	55.5	27.8
135	19.7	53.2	65.3	75.9	86.9	97.2	106	114	119	121	120	116	109	99.3	88.3	77.0	66.4	60.9	34.7
140	28.3	59.8	68.8	77.6	86.2	94.3	102	108	112	113	112	109	103	95.7	87.0	77.9	68.7	64.4	40.9
145	26.9	55.7	70.6	77.7	85.6	92.1	97.8	103	106	107	106	103	98.7	92.8	86.3	77.7	72.1	62.6	33.4
150	19.9	54.2	75.8	78.6	84.2	90.1	94.4	97.9	100	101	101	98.3	94.8	90.6	84.5	77.8	76.0	68.1	35.8
155	21.1	55.3	73.8	77.9	82.5	87.0	91.5	94.0	95.6	96.2	95.8	94.2	91.8	87.3	82.4	79.0	77.7	71.4	42.6
160	12.8	44.0	68.8	79.0	82.6	84.1	86.3	88.8	90.8	91.5	91.1	89.2	86.5	84.0	82.1	80.6	80.1	71.4	37.7
165	11.9	30.0	56.9	71.8	80.4	83.5	84.4	85.3	85.9	86.1	86.0	85.4	84.5	83.4	82.4	81.5	80.4	71.2	43.2
170	12.8	22.1	38.4	58.8	71.4	79.3	82.7	83.6	83.8	83.9	83.8	83.6	83.3	82.9	82.5	82.1	77.7	63.1	40.4
175	16.4	20.4	24.8	32.7	45.0	57.9	68.4	75.3	79.4	81.3	81.5	80.9	79.8	77.4	73.0	66.8	58.1	45.5	32.9
180	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7

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	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271	271		
5	271	271	271	271	271	271	271	270	270	270	270	270	269	269	269	268	268		
10	269	269	269	270	270	270	270	270	269	269	269	268	267	266	265	265	264		
15	265	266	267	267	268	269	269	269	269	268	267	266	264	262	261	259	258		
20	260	261	262	264	266	267	268	268	268	267	265	262	260	257	254	252	251		
25	253	254	256	259	262	264	266	266	266	264	262	259	255	251	247	243	241		
30	243	246	249	253	257	260	263	264	264	262	259	254	249	243	238	233	230		
35	232	235	240	246	251	256	259	261	261	259	255	249	243	235	227	221	216		
40	219	223	230	238	245	251	256	258	258	256	251	244	235	226	216	207	201		
45	204	210	219	229	238	246	251	255	255	252	246	238	228	216	204	192	184		
50	187	195	206	219	230	240	247	250	251	248	242	232	220	206	190	176	165		
55	168	178	193	208	222	234	242	246	247	244	236	226	212	195	177	159	145		
60	147	160	178	197	214	227	236	241	242	239	231	219	204	184	163	141	124		
65	125	142	164	186	205	220	231	236	238	234	226	213	196	174	149	123	102		
70	101	123	149	175	196	213	225	231	232	229	220	206	188	164	136	106	79.8		
75	77.5	104	135	164	188	206	218	225	226	223	214	200	180	155	124	90.8	59.6		
80	54.8	87.5	122	154	179	198	212	219	220	217	207	193	172	146	114	77.9	41.7		
85	35.2	73.4	111	144	171	191	204	212	214	210	201	186	165	138	106	68.6	29.3		
90	22.6	62.8	102	135	163	183	197	204	206	203	193	179	158	131	99.3	62.6	24.0		
95	15.8	54.7	93.6	127	155	175	189	197	199	195	186	171	151	124	93.5	58.6	23.2		
100	14.3	47.4	84.1	117	144	165	179	187	189	185	177	163	143	118	88.8	56.0	23.6		
105	15.5	44.9	78.7	109	135	154	168	176	179	176	168	154	136	112	84.7	54.5	25.4		
110	17.7	45.7	75.6	103	126	144	158	166	169	166	158	146	129	107	81.7	53.9	23.7		
115	14.1	45.3	74.2	98.7	121	138	149	156	159	157	151	139	123	102	78.9	55.0	24.2		
120	4.85	43.0	74.4	95.1	114	130	142	149	152	149	143	132	116	97.1	76.4	54.7	21.4		
125	4.73	41.5	73.4	92.7	109	123	133	140	142	140	134	124	110	92.3	73.7	52.6	14.8		
130	2.30	36.5	71.8	89.3	104	116	125	131	133	131	125	116	103	87.9	73.7	49.0	7.93		
135	3.27	22.5	61.7	85.1	98.1	109	118	122	124	122	117	108	96.5	83.8	71.6	40.7	3.61		
140	11.6	5.36	37.2	78.8	92.7	101	109	113	115	113	108	99.1	90.7	81.2	58.8	22.0	2.29		
145	13.1	6.31	22.3	63.5	88.4	95.2	99.6	102	103	101	98.3	93.8	85.1	71.8	39.6	5.61	5.18		
150	9.97	8.44	11.7	25.8	65.4	89.7	94.3	96.4	97.0	95.6	92.8	83.7	68.7	44.6	17.9	4.05	7.26		
155	12.5	11.0	9.44	11.2	22.2	47.8	75.1	83.9	86.0	84.2	72.4	58.1	33.8	16.2	10.5	6.24	5.11		
160	15.0	10.9	15.6	14.3	12.3	17.8	17.4	23.5	30.0	28.7	21.6	13.7	12.2	11.2	8.28	6.07	8.13		
165	20.3	8.86	8.74	14.3	10.4	11.3	13.6	11.7	14.1	12.7	14.3	14.8	8.05	7.17	7.93	6.46	7.27		
170	24.1	16.6	11.1	11.5	12.5	8.62	7.10	15.1	8.47	18.5	11.8	8.36	8.82	8.24	7.62	8.71	8.31		
175	26.9	22.9	18.8	16.0	13.5	10.8	10.6	10.0	6.43	7.74	8.41	9.23	11.2	12.4	10.2	10.1	12.4		
180	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7		

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)	0.325	0.154
Power Factor	0.9937	0.9008
Test Power (W)/3	12.91	12.84
THD A%	5.28	8.56
Luminous Efficacy (lm/W)	141.1	141.9
Total Luminous Flux (lm)	1822.0	1821.7
Color Rendering Index (CRI)	84.6	
R9	17.3	
Correlated Color Temperature (CCT)(K)	3485	
Chromaticity Chroma x	0.4023	
Chromaticity Chroma y	0.3812	
Chromaticity Chroma u	0.2377	
Chromaticity Chroma v	0.3379	
Duv	-0.0036	
Chromaticity Chroma u'	0.2377	
Chromaticity Chroma v'	0.5068	

Special Color Rendering Indices	
R1	85.4
R2	96.5
R3	91.8
R4	80.8
R5	85.6
R6	93
R7	81.3
R8	62.6
R9	17.3
R10	91.1
R11	80.6
R12	71.1
R13	89
R14	96.3

Table 8: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

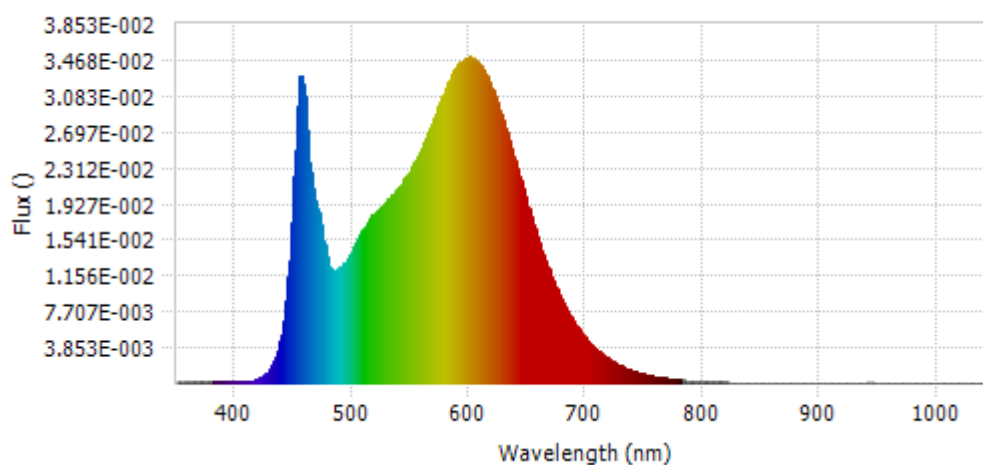


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.44E-04	485	1.21E-02	590	3.41E-02	695	5.59E-03
385	1.55E-04	490	1.25E-02	595	3.48E-02	700	4.76E-03
390	1.53E-04	495	1.31E-02	600	3.50E-02	705	4.07E-03
395	1.58E-04	500	1.43E-02	605	3.46E-02	710	3.48E-03
400	1.66E-04	505	1.56E-02	610	3.39E-02	715	2.97E-03
405	1.54E-04	510	1.66E-02	615	3.28E-02	720	2.54E-03
410	1.82E-04	515	1.76E-02	620	3.14E-02	725	2.17E-03
415	3.10E-04	520	1.83E-02	625	2.97E-02	730	1.85E-03
420	4.94E-04	525	1.90E-02	630	2.77E-02	735	1.57E-03
425	9.03E-04	530	1.98E-02	635	2.57E-02	740	1.34E-03
430	1.65E-03	535	2.03E-02	640	2.35E-02	745	1.13E-03
435	3.12E-03	540	2.10E-02	645	2.13E-02	750	9.76E-04
440	5.92E-03	545	2.19E-02	650	1.90E-02	755	8.25E-04
445	1.14E-02	550	2.29E-02	655	1.70E-02	760	7.13E-04
450	2.23E-02	555	2.41E-02	660	1.50E-02	765	6.06E-04
455	3.29E-02	560	2.54E-02	665	1.32E-02	770	5.23E-04
460	2.90E-02	565	2.69E-02	670	1.15E-02	775	4.41E-04
465	2.14E-02	570	2.85E-02	675	1.00E-02	780	3.71E-04
470	1.87E-02	575	3.01E-02	680	8.68E-03		
475	1.54E-02	580	3.17E-02	685	7.53E-03		
480	1.25E-02	585	3.32E-02	690	6.51E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method

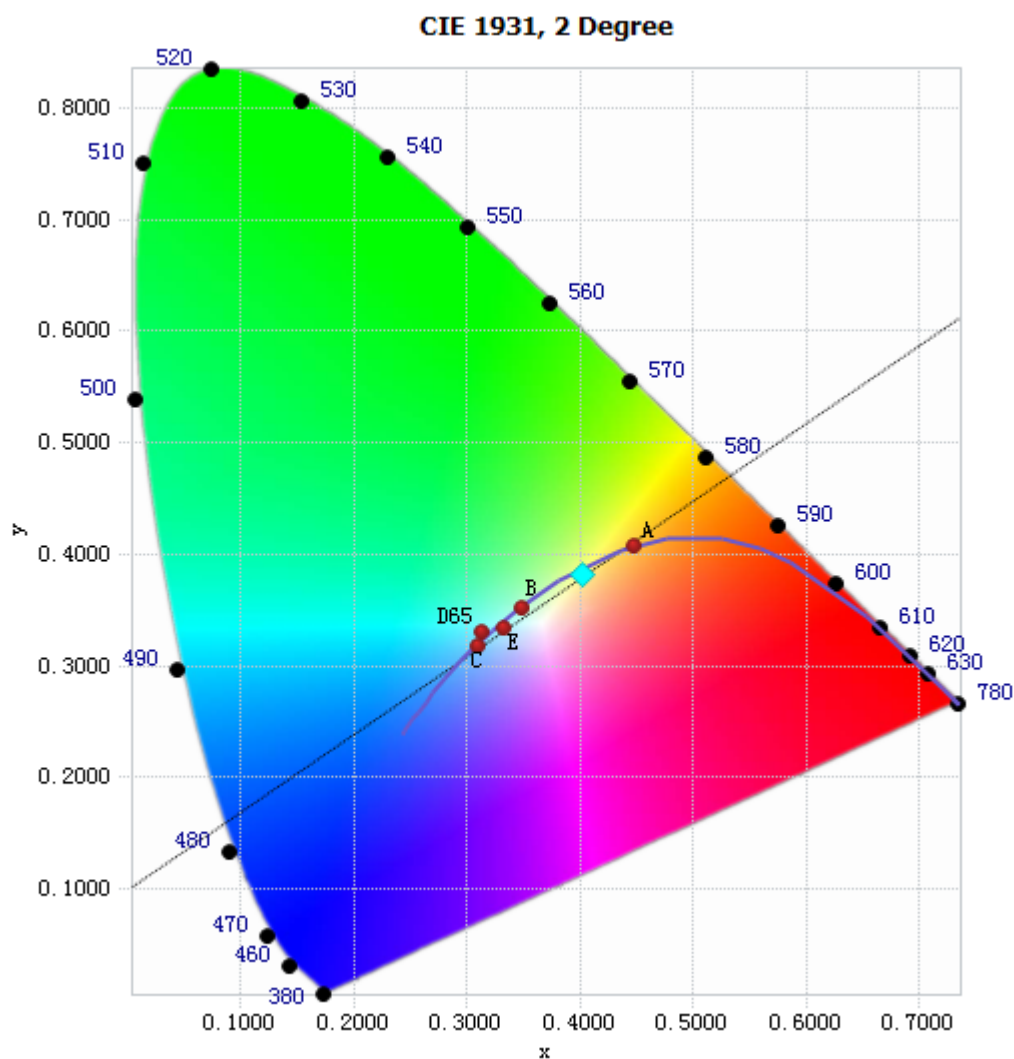


Chart 9: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

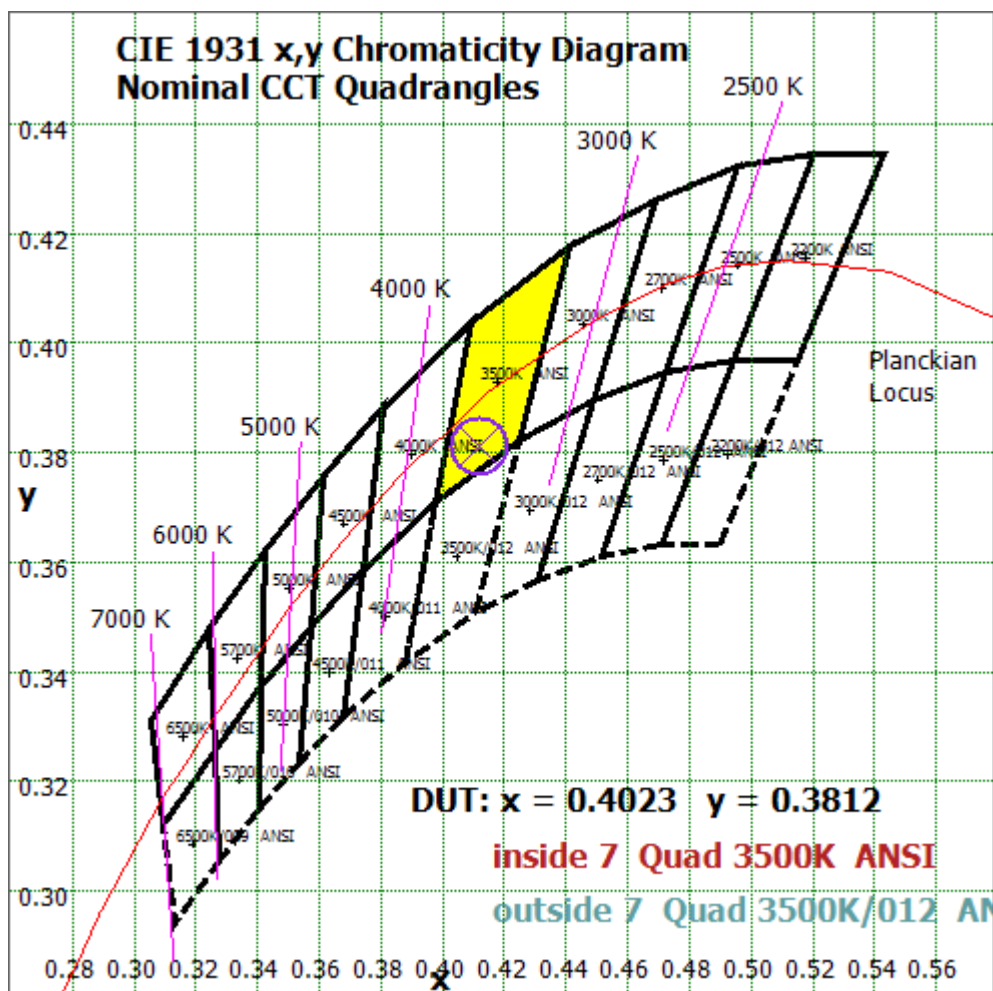


Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

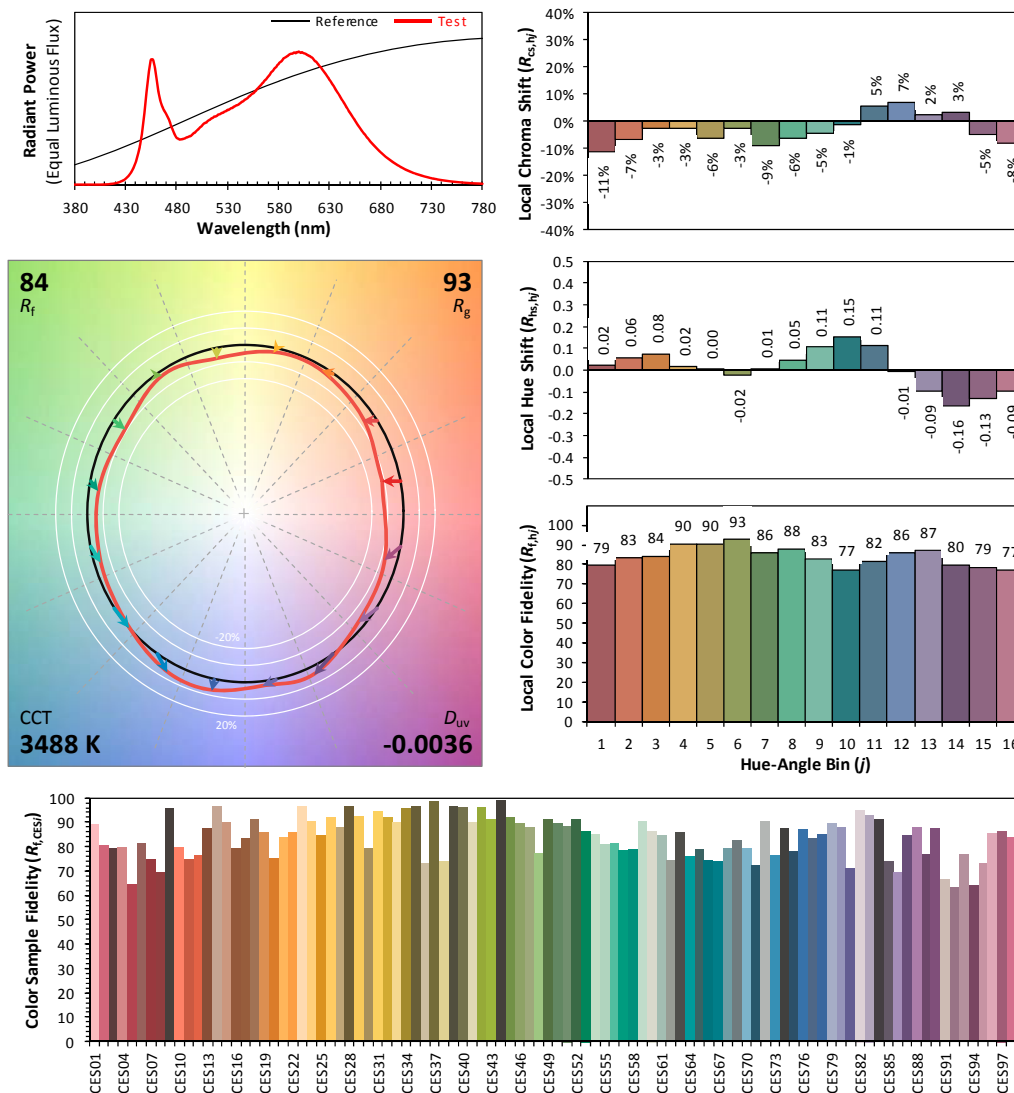
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/30

Model: 11.5T8/4F/8CCTS/EXT/SD/A3



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

x 0.4023
 y 0.3812
 u' 0.2377
 v' 0.5068

CIE 13.3-1995
(CRI)

R_a 85
 R_g 18

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)	0.323	0.153
Power Factor	0.9934	0.9015
Test Power (W)/3	12.80	12.75
THD A%	5.31	8.52
Luminous Efficacy (lm/W)	144.5	145.0
Total Luminous Flux (lm)	1849.3	1848.6
Color Rendering Index (CRI)	85.7	
R9	23.2	
Correlated Color Temperature (CCT)(K)	3967	
Chromaticity Chroma x	0.3789	
Chromaticity Chroma y	0.3671	
Chromaticity Chroma u	0.2280	
Chromaticity Chroma v	0.3314	
Duv	-0.0041	
Chromaticity Chroma u'	0.2280	
Chromaticity Chroma v'	0.4970	

Special Color Rendering Indices	
R1	87.1
R2	97.4
R3	92.1
R4	81.5
R5	86.5
R6	92.3
R7	82.3
R8	66.2
R9	23.2
R10	92.6
R11	81.6
R12	67.6
R13	90.9
R14	96.6

Table 10: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

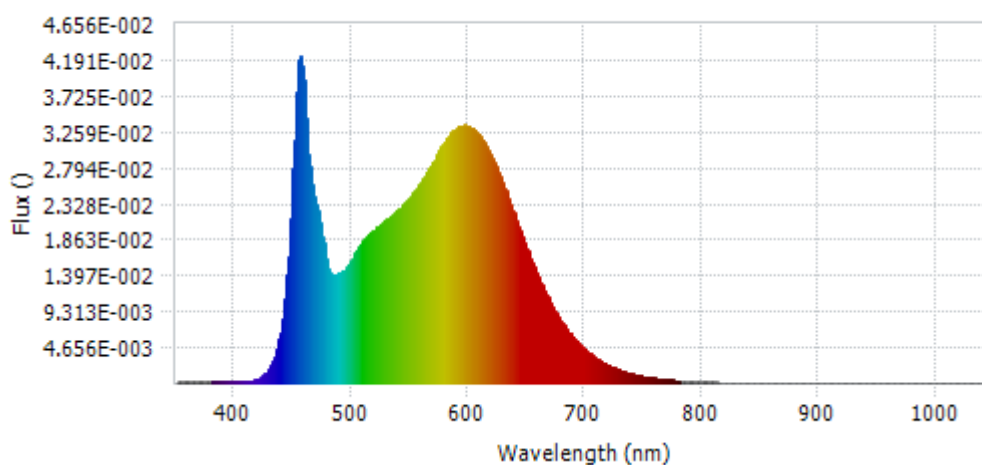


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.89E-04	485	1.41E-02	590	3.32E-02	695	5.04E-03
385	1.72E-04	490	1.44E-02	595	3.34E-02	700	4.32E-03
390	1.80E-04	495	1.49E-02	600	3.34E-02	705	3.69E-03
395	1.72E-04	500	1.60E-02	605	3.28E-02	710	3.14E-03
400	1.94E-04	505	1.73E-02	610	3.19E-02	715	2.68E-03
405	1.76E-04	510	1.84E-02	615	3.08E-02	720	2.30E-03
410	2.28E-04	515	1.93E-02	620	2.92E-02	725	1.96E-03
415	3.48E-04	520	1.99E-02	625	2.76E-02	730	1.66E-03
420	5.98E-04	525	2.06E-02	630	2.56E-02	735	1.41E-03
425	1.07E-03	530	2.12E-02	635	2.37E-02	740	1.21E-03
430	1.97E-03	535	2.17E-02	640	2.16E-02	745	1.03E-03
435	3.82E-03	540	2.24E-02	645	1.95E-02	750	8.85E-04
440	7.37E-03	545	2.32E-02	650	1.74E-02	755	7.55E-04
445	1.42E-02	550	2.40E-02	655	1.55E-02	760	6.40E-04
450	2.79E-02	555	2.50E-02	660	1.37E-02	765	5.55E-04
455	4.20E-02	560	2.62E-02	665	1.20E-02	770	4.74E-04
460	3.69E-02	565	2.74E-02	670	1.04E-02	775	4.10E-04
465	2.66E-02	570	2.87E-02	675	9.11E-03	780	3.44E-04
470	2.31E-02	575	3.01E-02	680	7.90E-03		
475	1.89E-02	580	3.13E-02	685	6.82E-03		
480	1.49E-02	585	3.25E-02	690	5.88E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method

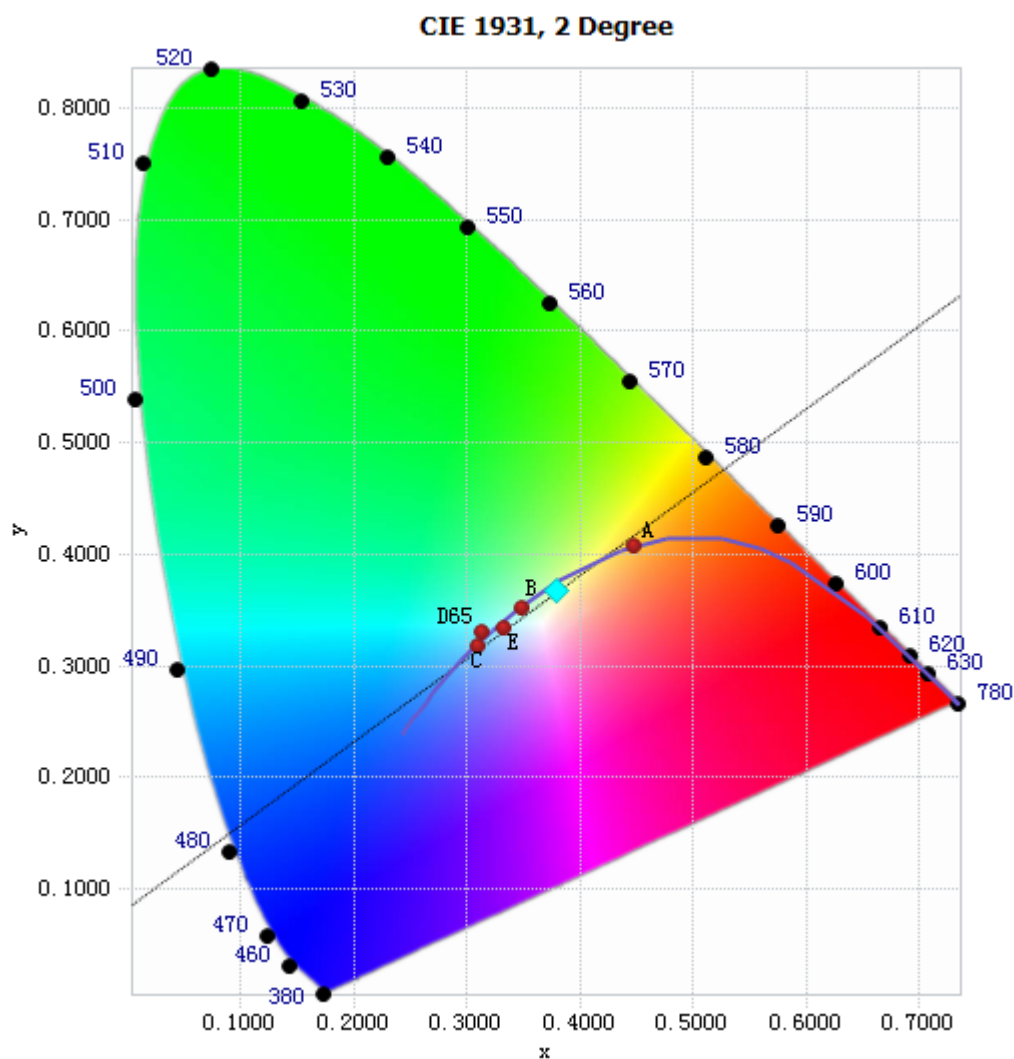


Chart 13: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

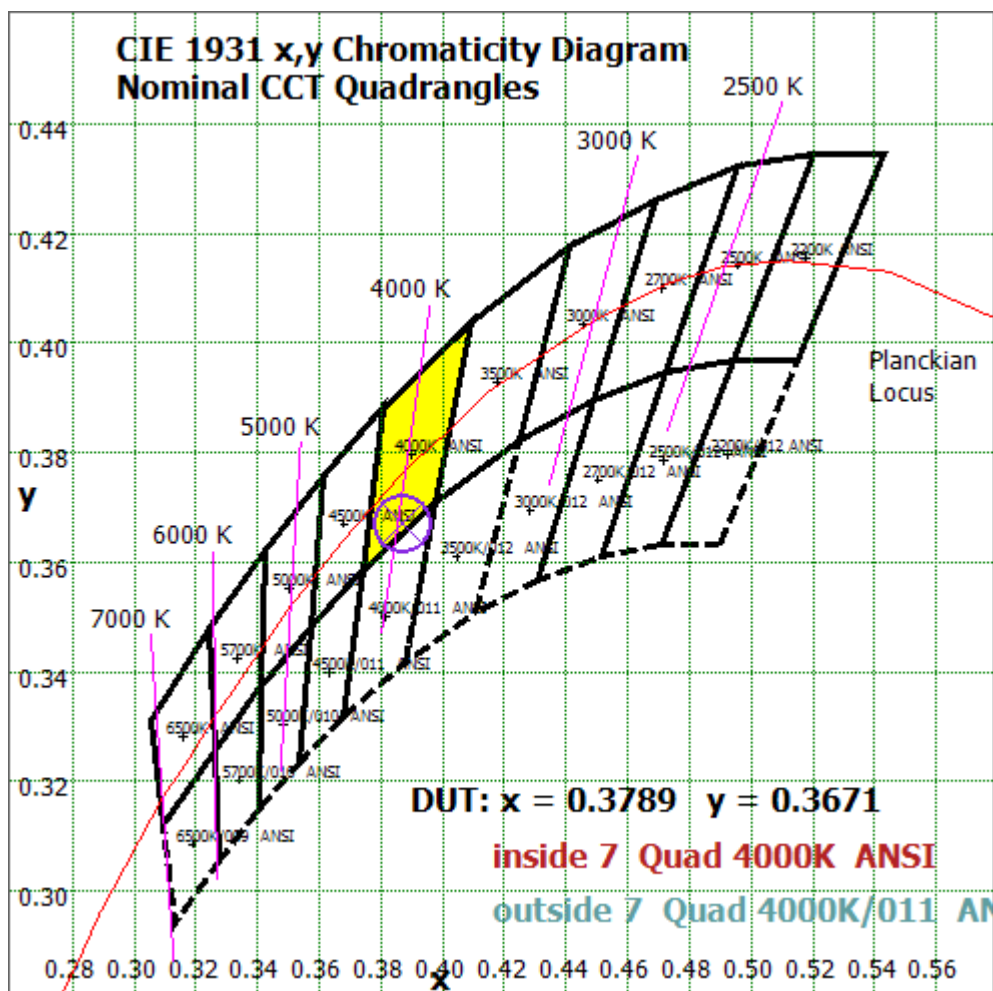


Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

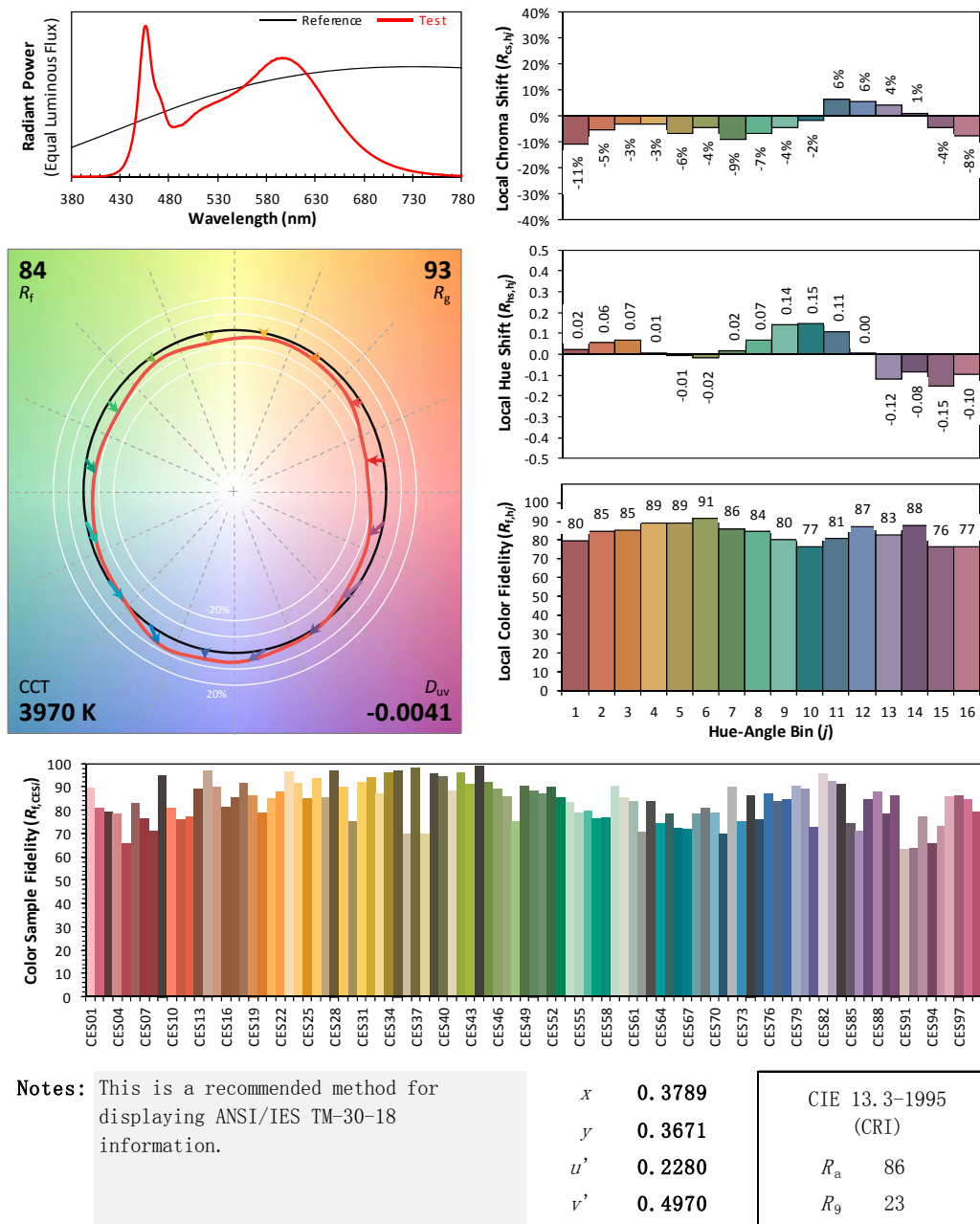
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/30

Model: 11.5T8/4F/8CCTS/EXT/SD/A3



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)	0.324	0.154
Power Factor	0.9935	0.9001
Test Power (W)/3	12.85	12.80
THD A%	5.26	8.33
Luminous Efficacy (lm/W)	144.4	145.1
Total Luminous Flux (lm)	1856.1	1857.3
Color Rendering Index (CRI)	86.1	
R9	23.1	
Correlated Color Temperature (CCT)(K)	5083	
Chromaticity Chroma x	0.3424	
Chromaticity Chroma y	0.3456	
Chromaticity Chroma u	0.2119	
Chromaticity Chroma v	0.3209	
Duv	-0.0020	
Chromaticity Chroma u'	0.2119	
Chromaticity Chroma v'	0.4813	

Special Color Rendering Indices	
R1	87.3
R2	96.9
R3	92.9
R4	82
R5	86.5
R6	90.7
R7	83.6
R8	68.6
R9	23.1
R10	91.4
R11	82.4
R12	66.3
R13	91.3
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

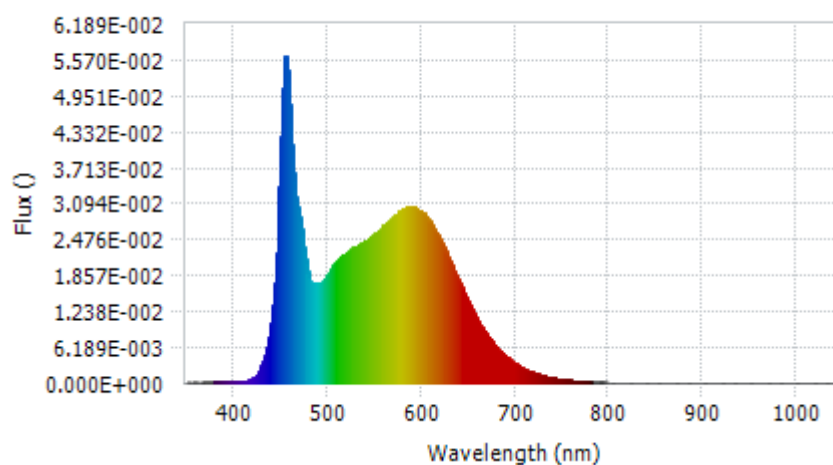


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.21E-04	485	1.72E-02	590	3.06E-02	695	3.98E-03
385	1.89E-04	490	1.73E-02	595	3.02E-02	700	3.41E-03
390	2.19E-04	495	1.76E-02	600	2.97E-02	705	2.90E-03
395	2.20E-04	500	1.86E-02	605	2.88E-02	710	2.48E-03
400	2.25E-04	505	1.99E-02	610	2.77E-02	715	2.11E-03
405	2.27E-04	510	2.10E-02	615	2.63E-02	720	1.81E-03
410	2.75E-04	515	2.18E-02	620	2.48E-02	725	1.54E-03
415	4.61E-04	520	2.23E-02	625	2.31E-02	730	1.31E-03
420	7.89E-04	525	2.30E-02	630	2.13E-02	735	1.13E-03
425	1.51E-03	530	2.36E-02	635	1.95E-02	740	9.58E-04
430	2.83E-03	535	2.39E-02	640	1.77E-02	745	8.19E-04
435	5.43E-03	540	2.44E-02	645	1.58E-02	750	7.02E-04
440	1.05E-02	545	2.50E-02	650	1.41E-02	755	5.96E-04
445	1.97E-02	550	2.55E-02	655	1.25E-02	760	5.16E-04
450	3.81E-02	555	2.62E-02	660	1.10E-02	765	4.41E-04
455	5.62E-02	560	2.70E-02	665	9.60E-03	770	3.78E-04
460	4.82E-02	565	2.78E-02	670	8.31E-03	775	3.27E-04
465	3.45E-02	570	2.86E-02	675	7.22E-03	780	2.81E-04
470	2.96E-02	575	2.93E-02	680	6.24E-03		
475	2.37E-02	580	3.00E-02	685	5.40E-03		
480	1.85E-02	585	3.05E-02	690	4.66E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method

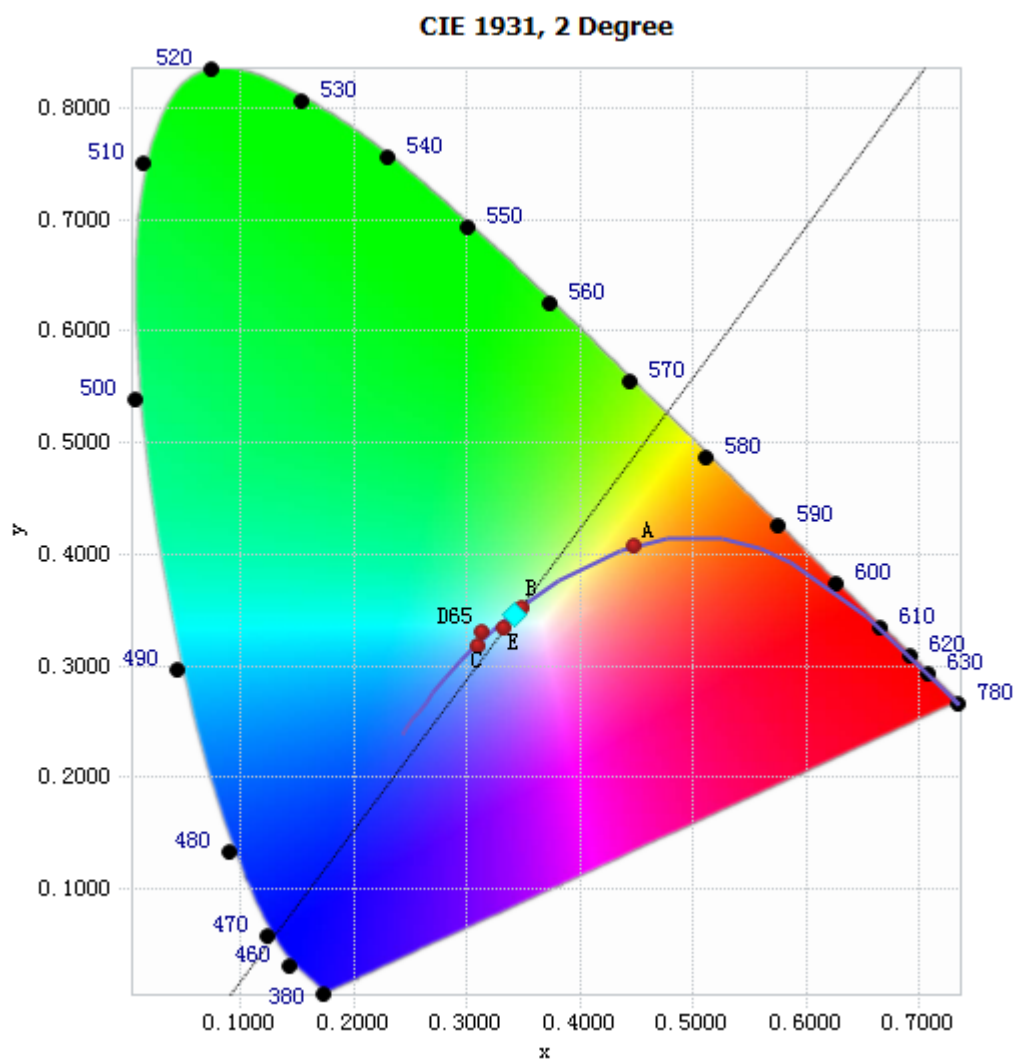


Chart 17: Chromaticity Diagram per Sphere - Spectroradiometer Method

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

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

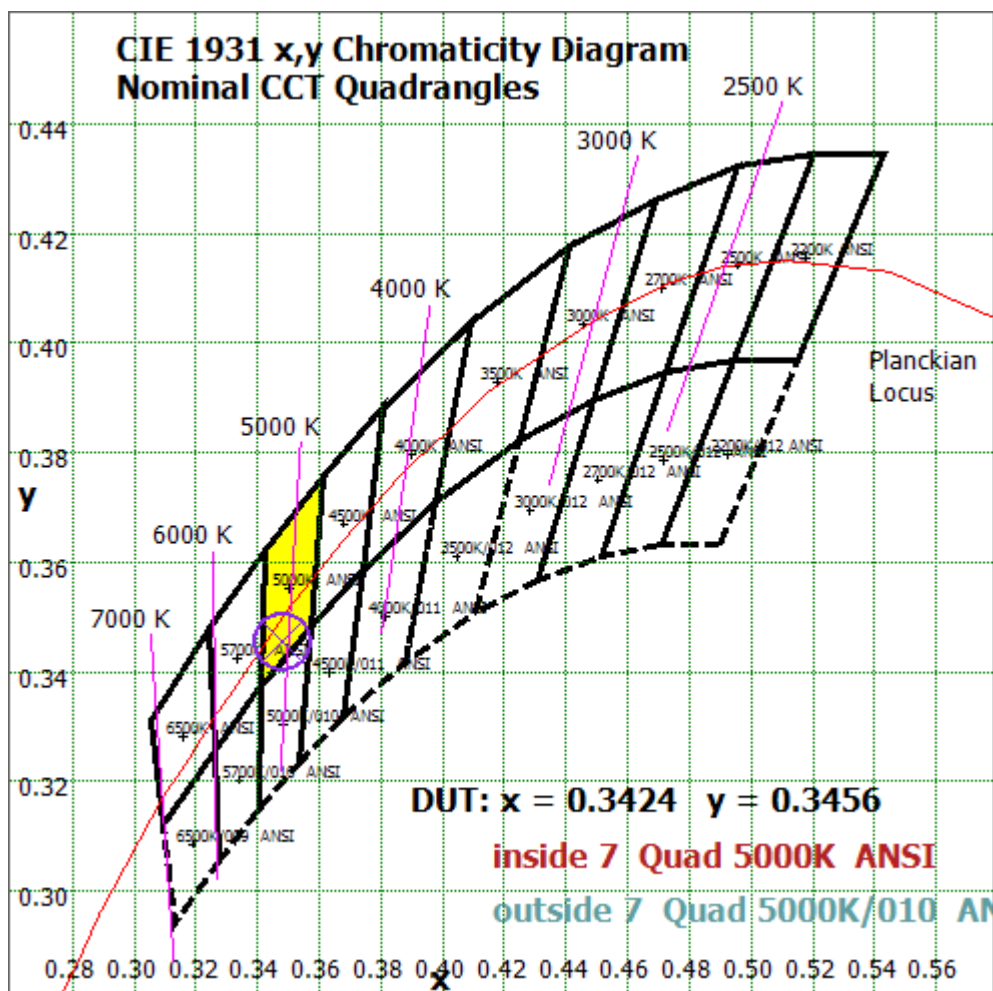


Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

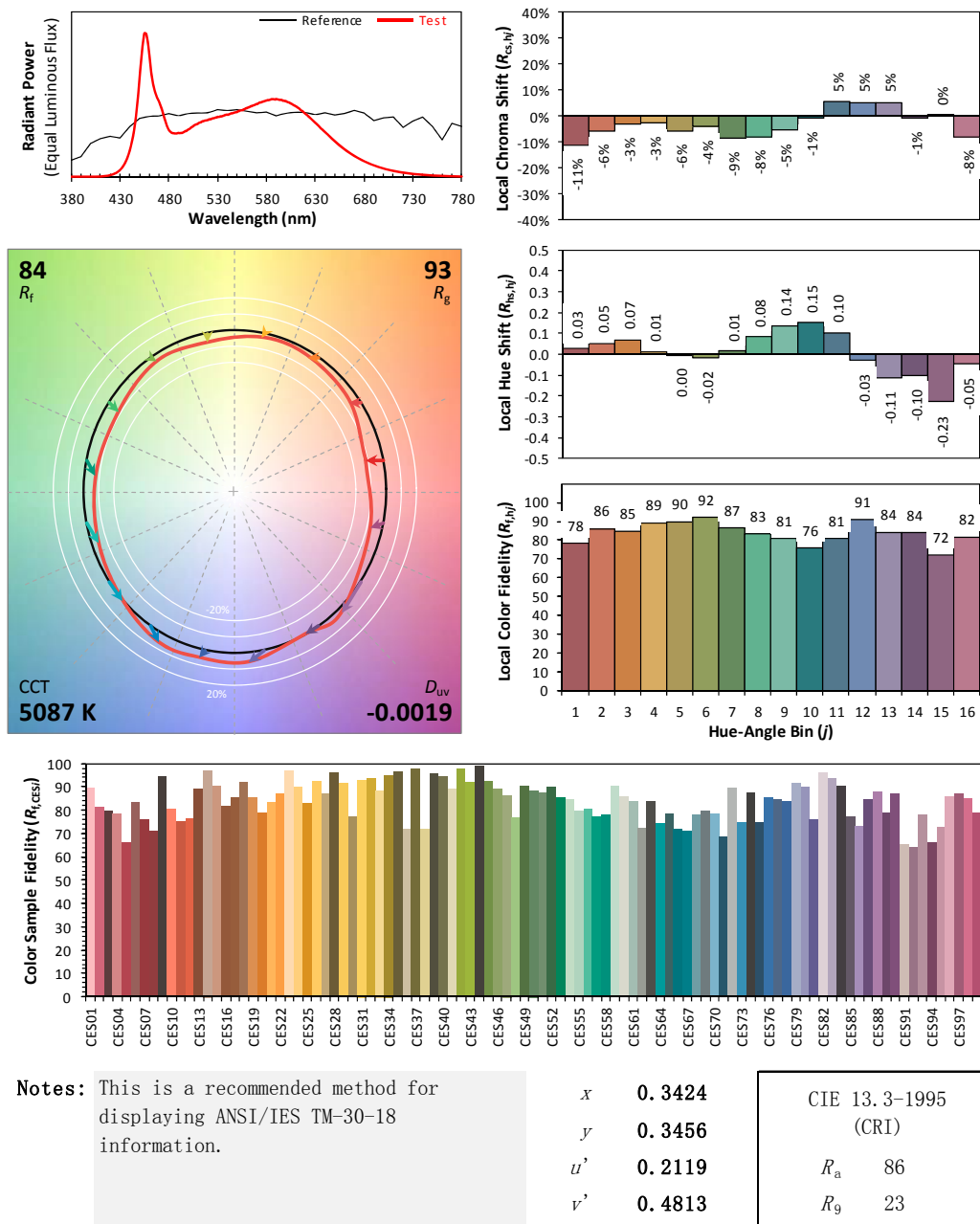
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/30

Model: 11.5T8/4F/8CCTS/EXT/SD/A3



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)	0.327	0.155
Power Factor	0.9937	0.9019
Test Power (W)/3	13.01	12.94
THD A%	5.34	8.36
Luminous Efficacy (lm/W)	142.0	143.0
Total Luminous Flux (lm)	1847.3	1850.9
Color Rendering Index (CRI)	84.3	
R9	11.9	
Correlated Color Temperature (CCT)(K)	6525	
Chromaticity Chroma x	0.3123	
Chromaticity Chroma y	0.3284	
Chromaticity Chroma u	0.1978	
Chromaticity Chroma v	0.3120	
Duv	0.0031	
Chromaticity Chroma u'	0.1978	
Chromaticity Chroma v'	0.4680	

Special Color Rendering Indices	
R1	84.2
R2	95.2
R3	93.2
R4	78.4
R5	83.1
R6	88.8
R7	84.3
R8	67.6
R9	11.9
R10	86.5
R11	78.8
R12	59
R13	88.7
R14	96.9

Table 14: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

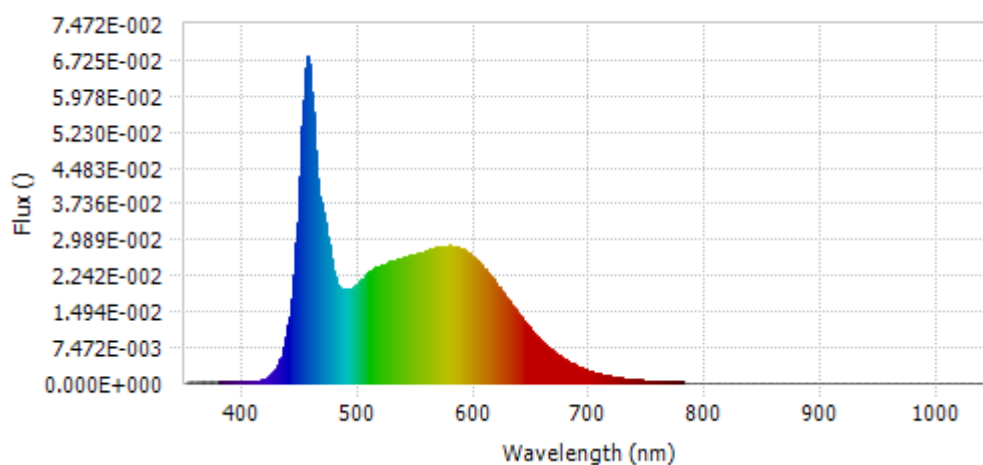
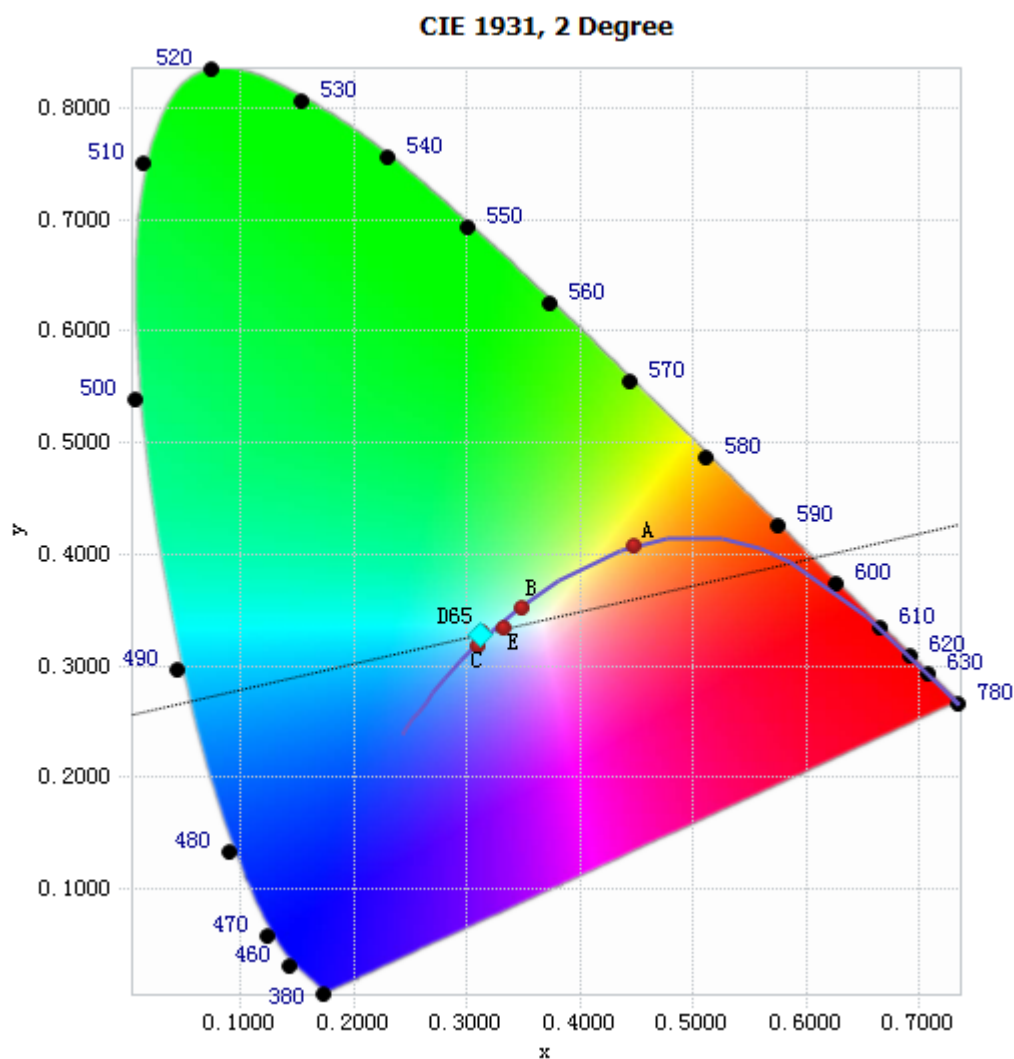


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.74E-04	485	1.96E-02	590	2.78E-02	695	2.94E-03
385	2.50E-04	490	1.95E-02	595	2.70E-02	700	2.51E-03
390	2.69E-04	495	1.98E-02	600	2.60E-02	705	2.13E-03
395	2.64E-04	500	2.09E-02	605	2.48E-02	710	1.82E-03
400	2.68E-04	505	2.21E-02	610	2.34E-02	715	1.56E-03
405	2.39E-04	510	2.32E-02	615	2.19E-02	720	1.36E-03
410	3.59E-04	515	2.41E-02	620	2.02E-02	725	1.15E-03
415	5.55E-04	520	2.45E-02	625	1.86E-02	730	9.73E-04
420	1.03E-03	525	2.51E-02	630	1.69E-02	735	8.28E-04
425	1.99E-03	530	2.55E-02	635	1.53E-02	740	7.19E-04
430	3.80E-03	535	2.58E-02	640	1.38E-02	745	6.11E-04
435	7.32E-03	540	2.62E-02	645	1.22E-02	750	5.28E-04
440	1.38E-02	545	2.65E-02	650	1.07E-02	755	4.54E-04
445	2.58E-02	550	2.68E-02	655	9.49E-03	760	3.92E-04
450	4.83E-02	555	2.72E-02	660	8.28E-03	765	3.38E-04
455	6.79E-02	560	2.77E-02	665	7.19E-03	770	2.92E-04
460	5.65E-02	565	2.80E-02	670	6.21E-03	775	2.47E-04
465	4.05E-02	570	2.83E-02	675	5.36E-03	780	2.19E-04
470	3.44E-02	575	2.85E-02	680	4.60E-03		
475	2.72E-02	580	2.85E-02	685	4.00E-03		
480	2.12E-02	585	2.84E-02	690	3.44E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3123, 0.3284)

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

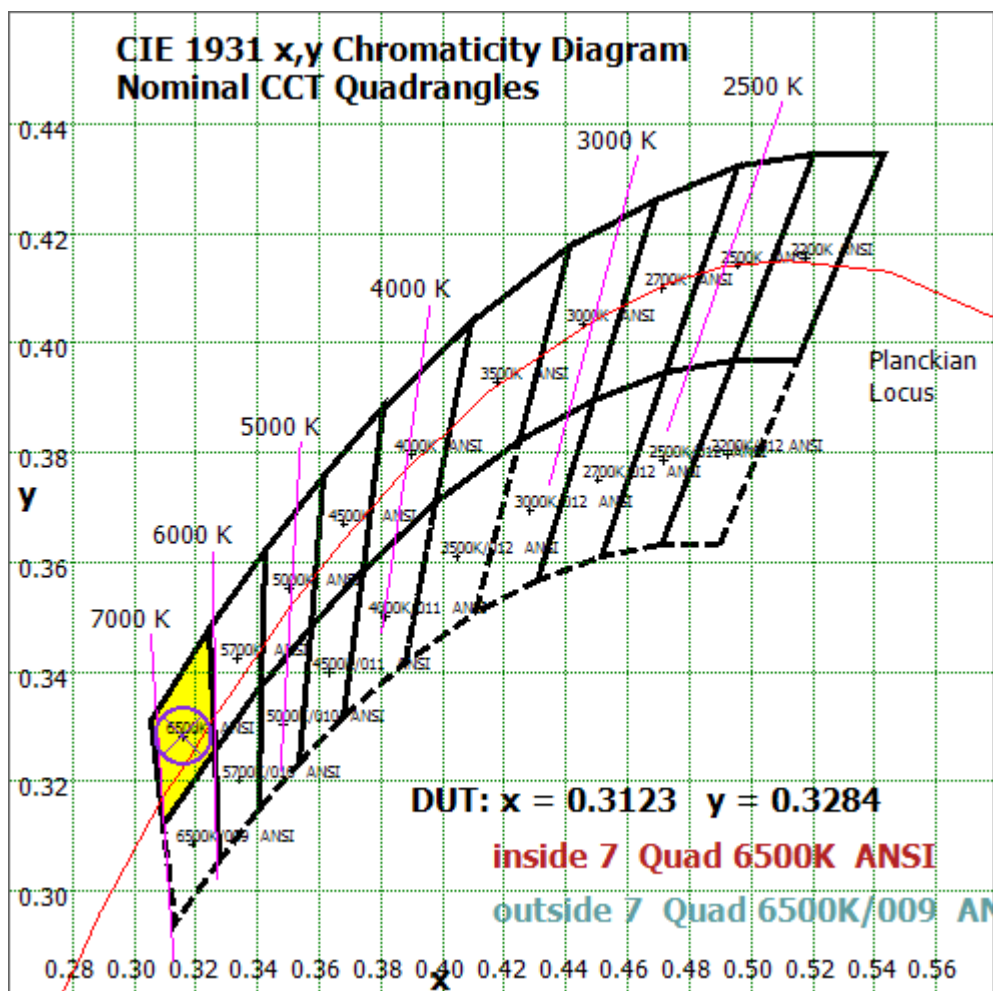


Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

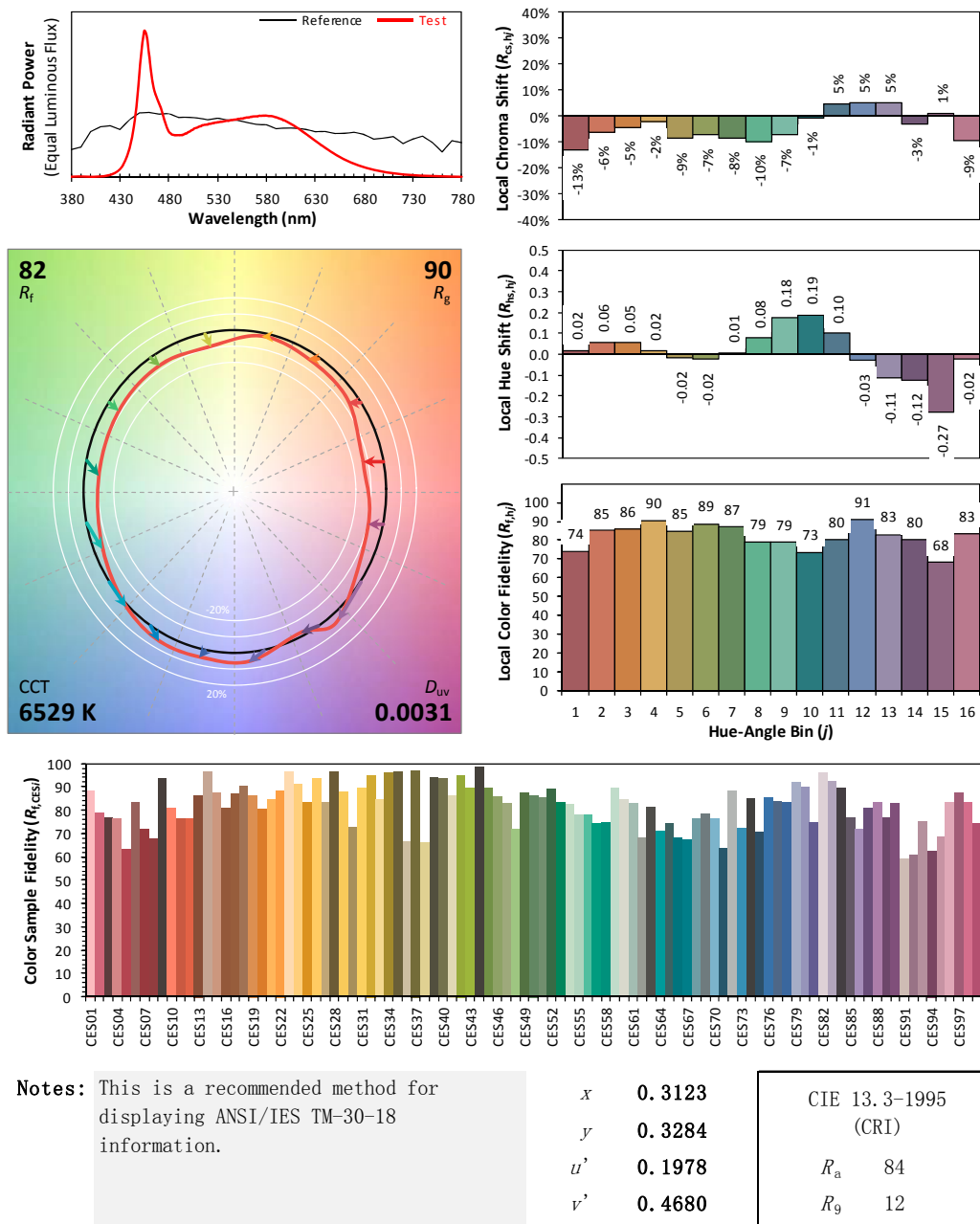
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: GREEN CREATIVE LTD

Date: 2023/06/30

Model: 11.5T8/4F/8CCTS/EXT/SD/A3



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.