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 Lamp

Model: 10BR30DIM/9CCTS

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24090001a

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

Review by: Wei Fei

Engineer: Wei Fei

Sep. 03, 2024

Approved by: April Zou

Manager: April Zou

Sep. 03, 2024

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	10BR30DIM/9CCTS 2700K Setting	10BR30DIM/9CCTS 3000K Setting	10BR30DIM/9CCTS 3500K Setting
Luminous Efficacy (Lumens /Watt)	106.3	110.6	116.1
Total Luminous Flux (Lumens)	1022.4	1080.5	1160.2
Power (Watts)	9.62	9.77	9.99
Power Factor	0.7921	0.7994	0.8130
CCT (K)	2774	3001	3462
CRI	91.6	93.8	96.0
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	2700K	3000K	3500K

Tested Model	10BR30DIM/9CCTS 4000K Setting	10BR30DIM/9CCTS 5000K Setting
Luminous Efficacy (Lumens /Watt)	114.8	107.9
Total Luminous Flux (Lumens)	1137.4	1031.2
Power (Watts)	9.91	9.56
Power Factor	0.8061	0.7899
CCT (K)	4065	5065
CRI	96.7	95.8
Stabilization Time (Light & Power)	50 mins	50 mins
Note	4000K	5000K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Sep. 02, 2024

Date of Test : Sep. 02, 2024

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 Lamp
Model	: 10BR30DIM/9CCTS
Electrical Ratings	: 120V, 60Hz, 10W
Product Description	: Color- Tunable 2700K/3000K/3500K/4000K/5000K
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 (2700K Setting)

Test ambient temperature was 26.0 ℃.

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
Voltage frequency (Hz)	60
Test Current (A)	0.101
Power Factor	0.7921
Test Power (W)	9.62
THD A%	77.13
Luminous Efficacy (lm/W)	106.3
Total Luminous Flux (lm)	1022.4
Color Rendering Index (CRI)	91.6
R9	55.2
Correlated Color Temperature (CCT)(K)	2774
Chromaticity Chroma x	0.4554
Chromaticity Chroma y	0.4122
Chromaticity Chroma u	0.2589
Chromaticity Chroma v	0.3515
Duv	0.0010
Chromaticity Chroma u ’	0.2589
Chromaticity Chroma v’	0.5273

Special Color Rendering Indices	
R1	93
R2	94.4
R3	93.5
R4	92.9
R5	91.3
R6	94
R7	92.2
R8	81.4
R9	55.2
R10	83.7
R11	92.9
R12	77.9
R13	92.8
R14	94.6

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

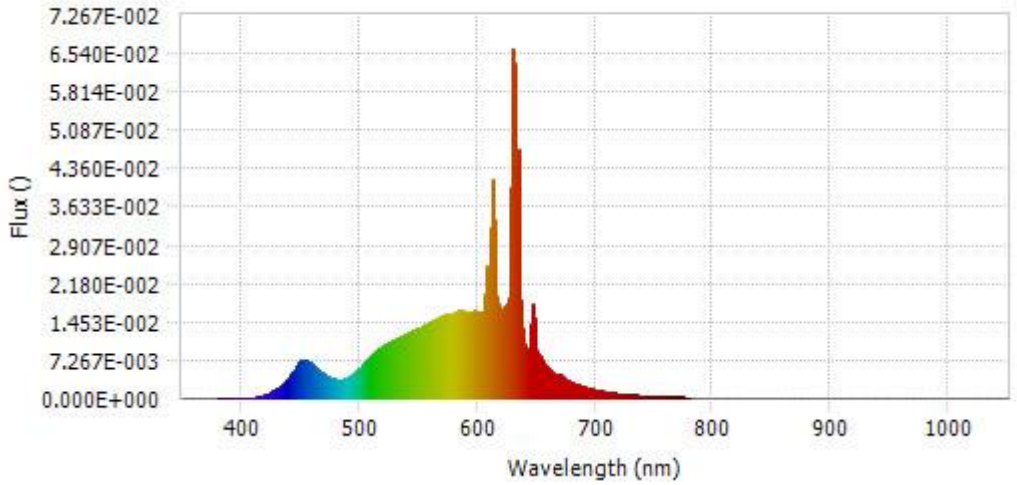
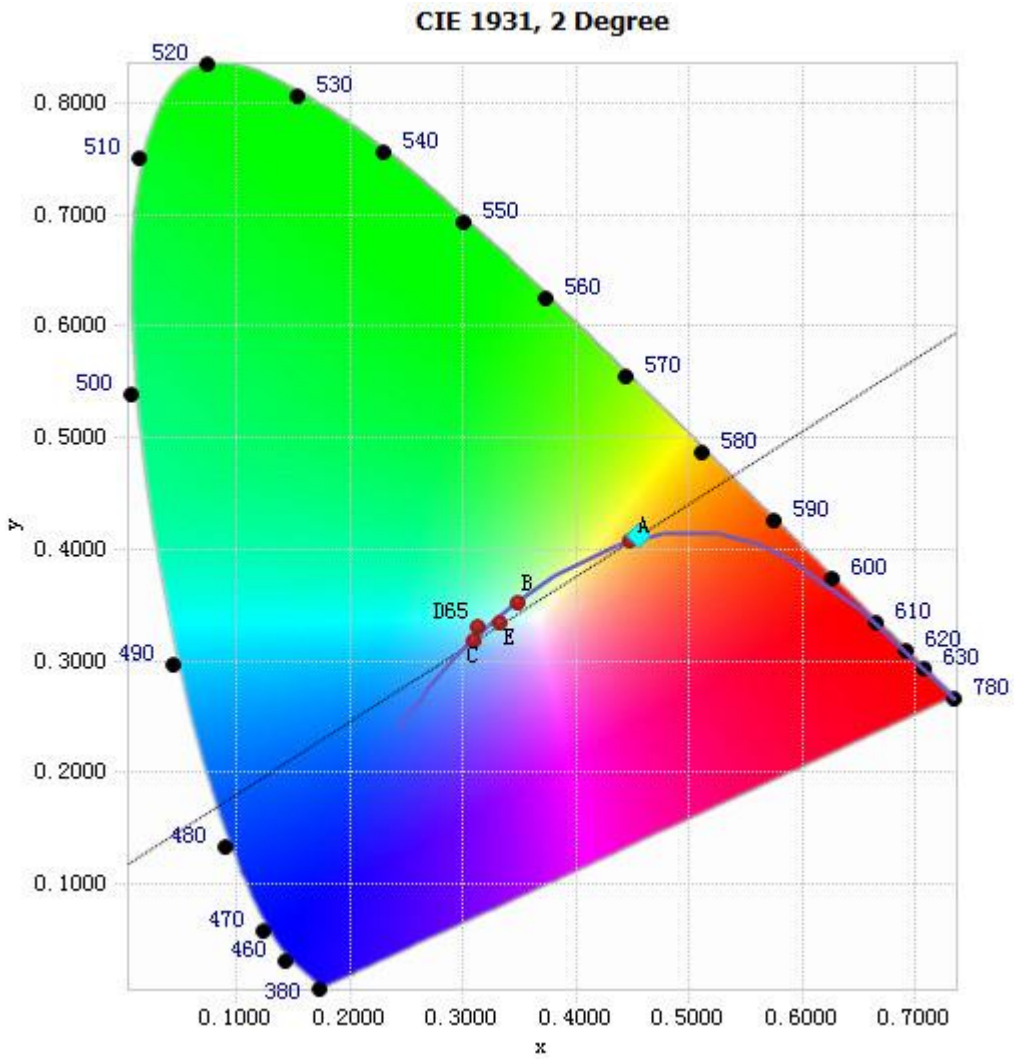


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	4.05E-05	485	3.55E-03	590	1.64E-02	695	1.89E-03
385	3.52E-05	490	3.90E-03	595	1.60E-02	700	1.60E-03
390	3.49E-05	495	4.66E-03	600	1.63E-02	705	1.37E-03
395	4.56E-05	500	5.66E-03	605	1.63E-02	710	1.18E-03
400	4.37E-05	505	6.81E-03	610	2.00E-02	715	1.03E-03
405	6.24E-05	510	7.98E-03	615	2.44E-02	720	8.97E-04
410	1.08E-04	515	9.03E-03	620	1.73E-02	725	7.81E-04
415	3.01E-04	520	9.77E-03	625	1.78E-02	730	6.79E-04
420	6.40E-04	525	1.05E-02	630	6.61E-02	735	5.88E-04
425	1.12E-03	530	1.12E-02	635	4.73E-02	740	5.09E-04
430	1.77E-03	535	1.16E-02	640	1.04E-02	745	4.36E-04
435	2.62E-03	540	1.22E-02	645	9.90E-03	750	3.77E-04
440	3.82E-03	545	1.28E-02	650	9.12E-03	755	3.34E-04
445	5.49E-03	550	1.33E-02	655	7.07E-03	760	2.81E-04
450	7.09E-03	555	1.39E-02	660	5.80E-03	765	2.47E-04
455	7.20E-03	560	1.45E-02	665	4.68E-03	770	2.18E-04
460	6.56E-03	565	1.50E-02	670	4.52E-03	775	1.85E-04
465	5.49E-03	570	1.55E-02	675	3.52E-03	780	1.65E-04
470	4.56E-03	575	1.58E-02	680	2.99E-03		
475	3.96E-03	580	1.62E-02	685	2.57E-03		
480	3.58E-03	585	1.66E-02	690	2.20E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4554, 0.4122)

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

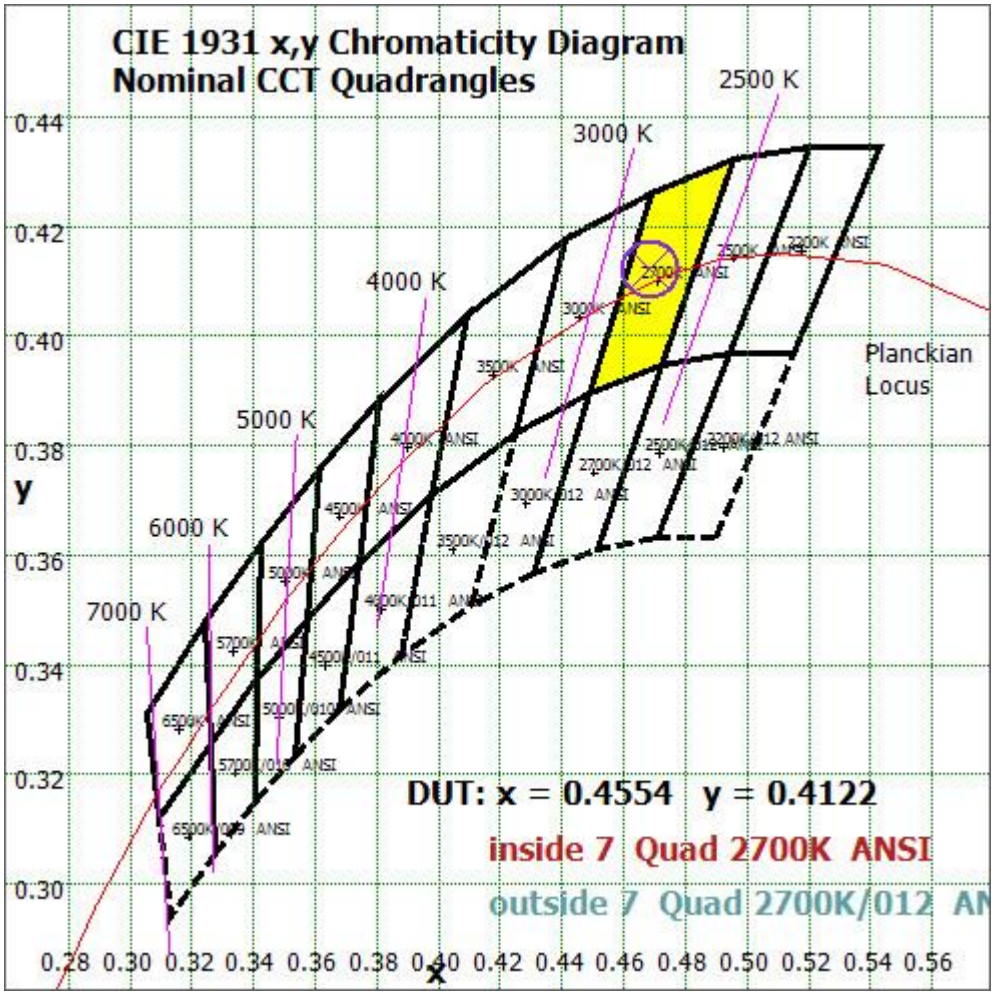


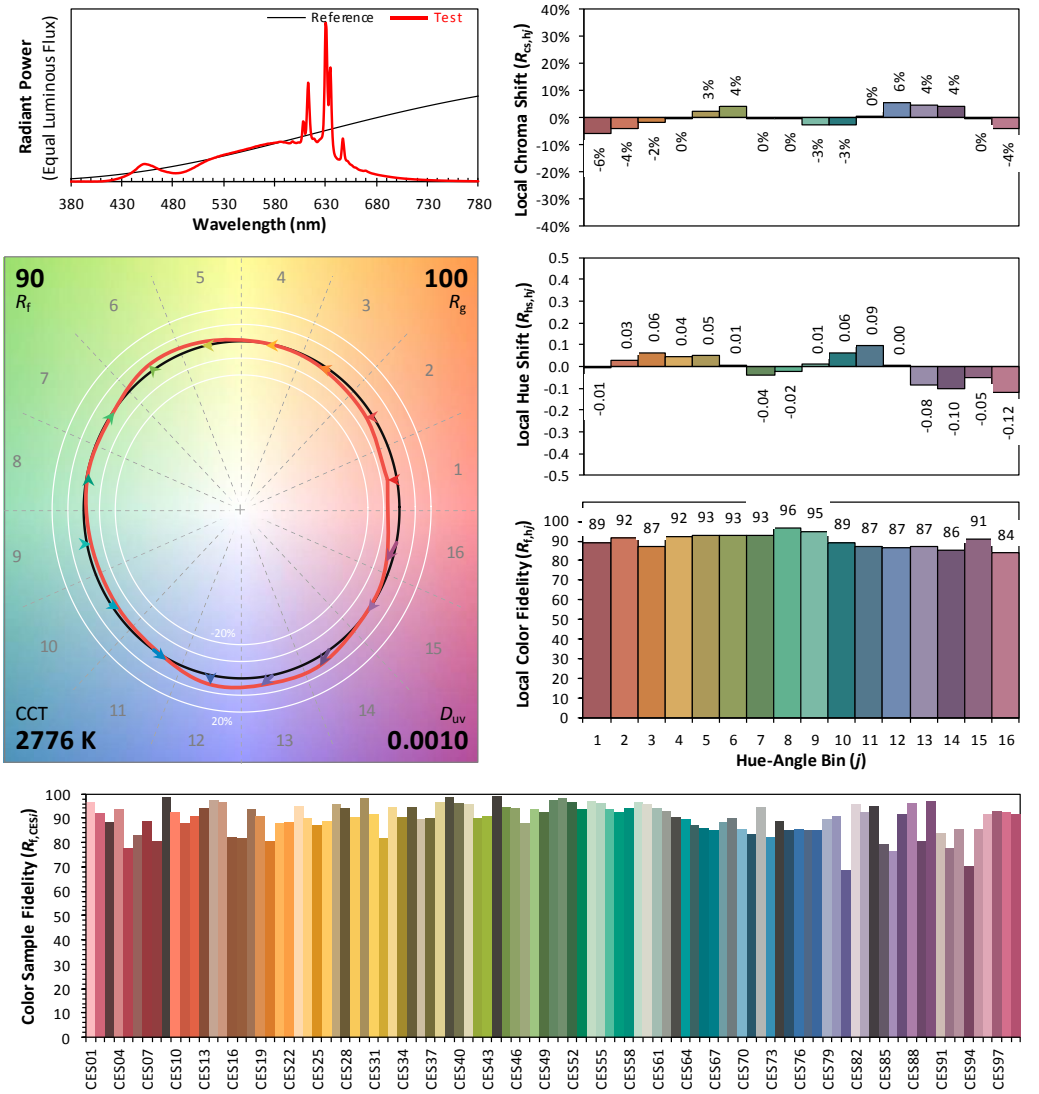
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/09/02 **Model:** 10BR30DIM/9CCTS



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

x	0.4554
y	0.4122
u'	0.2589
v'	0.5273

CIE 13.3-1995 (CRI)

R_a	92
R_9	56

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 ℃.

The photometric distance is 2.47 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)	0.103
Power Factor	0.7819
Power (W)	9.65
Luminous Efficacy (lm/W)	107.2
Total Luminous Flux (lm)	1034.2
Beam Angle (°)	118.1 (0^o-180^o) / 118.2 (90^o-270^o)
Center Beam Candle Power (cd)	293
Maximum Beam Candle Power (cd)	293.5 (At: C=0.0, Gamma=0.0)
Spacing Criteria	1.24 (0^o-180^o) / 1.26 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	65.36%
Zonal Lumens in the 60 °-90 °Zone	25.48%
Zonal Lumens in the 90 °-120 °Zone	7.13%
Zonal Lumens in the 120 °-180 °Zone	2.03%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	27.727	2.68%
10- 20	79.583	7.69%
20- 30	121.002	11.70%
30- 40	146.964	14.21%
40- 50	155.063	14.99%
50- 60	145.63	14.08%
60- 70	120.968	11.70%
70- 80	87.009	8.41%
80- 90	55.56	5.37%
90-100	34.285	3.32%
100-110	23.244	2.25%
110-120	16.248	1.57%
120-130	10.497	1.01%
130-140	6.094	0.59%
140-150	2.994	0.29%
150-160	1.104	0.11%
160-170	0.233	0.02%
170-180	0.031	0.00%
Total	1034.2	100%

γ(°)	Lumens	% Total
0- 60	675.969	65.36%
60- 90	263.537	25.48%
0-90	939.506	90.84%
90- 180	94.73	9.16%
0- 180	1034.2	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

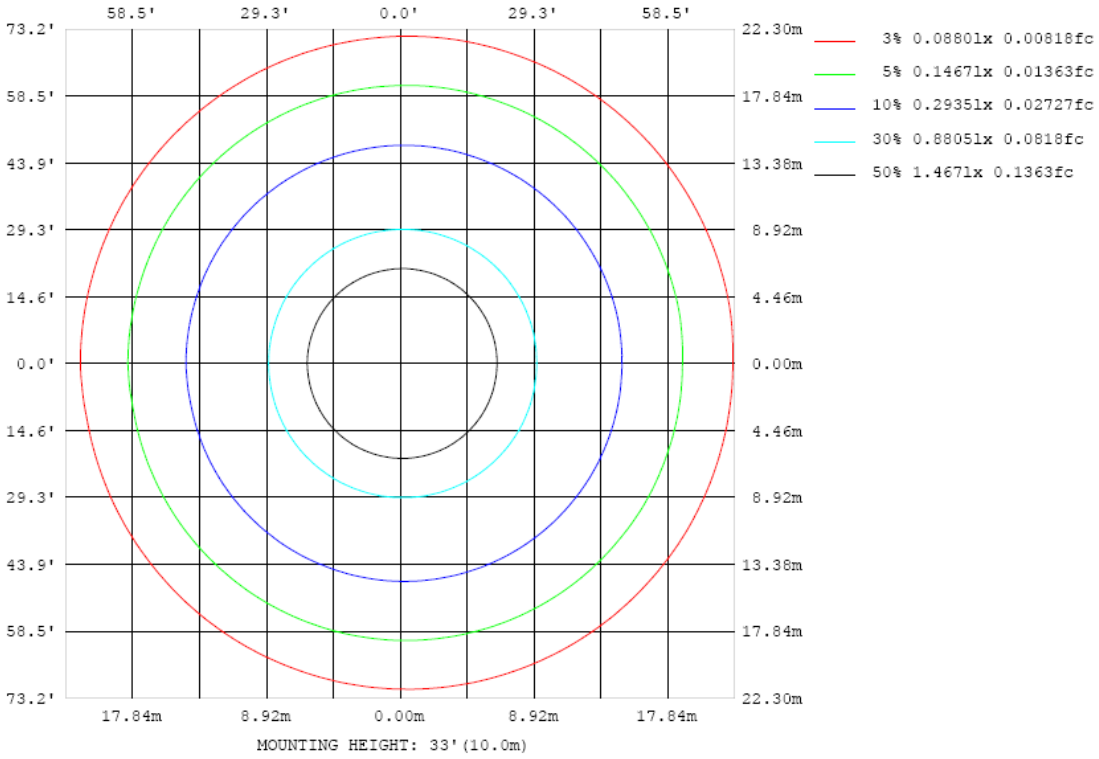


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

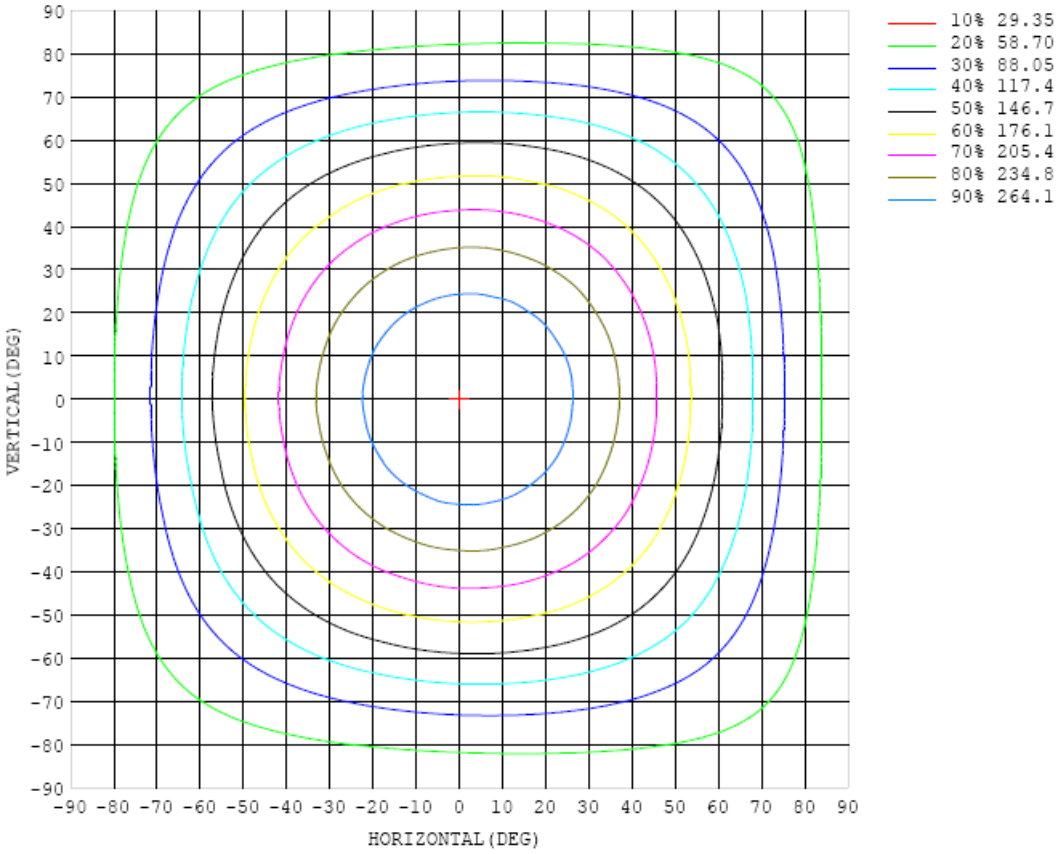


Chart 6: Isocandela Plot

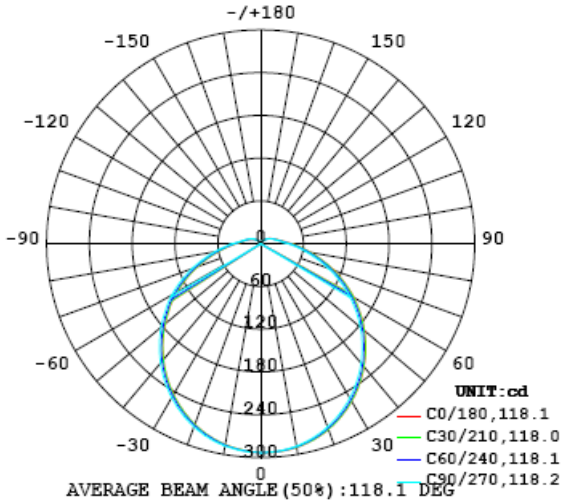


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293
5	292	292	292	292	292	292	292	292	292	292	292	291	292	291	291	291	291	291	291
10	290	290	289	290	289	289	289	289	288	288	288	288	287	287	287	286	286	286	286
15	285	285	284	285	284	284	283	283	283	282	281	281	281	280	280	279	279	279	279
20	277	277	277	277	276	276	275	275	274	274	273	272	272	271	271	270	270	269	270
25	267	267	267	267	266	265	265	264	263	263	262	261	260	259	259	258	258	257	258
30	255	255	254	255	254	253	253	252	251	250	249	247	247	246	245	245	244	244	244
35	241	241	240	240	239	239	238	237	236	235	234	232	232	231	230	229	229	228	229
40	225	225	225	224	224	223	222	221	220	219	217	216	215	214	213	212	212	211	212
45	208	208	208	207	207	206	205	204	202	201	200	198	197	196	195	194	194	193	194
50	190	190	189	189	188	187	186	185	183	182	181	179	178	177	176	175	175	174	175
55	170	170	170	170	168	168	167	165	164	163	161	159	158	157	156	155	154	154	156
60	150	150	150	150	148	148	146	145	144	142	141	139	138	136	135	135	134	133	135
65	130	130	129	129	128	127	126	124	123	121	120	118	117	116	115	114	113	113	114
70	109	109	108	108	107	106	105	104	102	101	99.1	97.8	96.5	95.2	94.2	93.4	92.6	92.2	94.0
75	89.0	88.6	88.3	87.9	86.9	86.0	85.0	83.6	82.5	81.0	79.7	78.4	77.2	76.1	75.2	74.5	73.9	73.4	75.1
80	70.3	70.1	70.0	69.7	69.9	68.5	67.5	66.6	65.7	64.4	63.4	62.1	61.1	60.3	59.5	58.9	58.3	58.1	58.6
85	55.7	55.5	55.1	54.7	54.1	53.4	52.7	51.7	50.9	49.9	49.0	48.1	47.3	46.5	46.0	45.4	45.1	44.8	45.3
90	43.1	42.9	42.7	42.4	41.9	41.3	40.7	40.1	39.3	38.6	38.0	37.3	36.8	36.2	35.8	35.4	35.2	35.0	35.3
95	33.7	33.6	33.4	33.2	32.8	32.5	32.0	31.6	31.1	30.6	30.2	29.7	29.3	29.0	28.7	28.4	28.2	28.1	28.3
100	27.3	27.2	27.0	26.9	26.7	26.5	26.2	25.9	25.5	25.2	24.9	24.6	24.4	24.2	24.0	23.8	23.7	23.6	23.7
105	23.1	23.0	22.9	22.9	22.7	22.6	22.3	22.1	21.9	21.7	21.5	21.2	21.1	20.9	20.7	20.6	20.5	20.4	20.6
110	20.0	20.0	19.9	19.9	19.7	19.6	19.5	19.2	19.0	18.8	18.6	18.4	18.3	18.1	17.9	17.8	17.7	17.6	17.8
115	17.4	17.3	17.2	17.2	17.1	16.9	16.8	16.6	16.4	16.2	16.0	15.8	15.7	15.5	15.4	15.3	15.2	15.1	15.2
120	14.9	14.8	14.8	14.7	14.6	14.5	14.3	14.2	14.0	13.8	13.6	13.4	13.3	13.1	13.0	12.9	12.8	12.8	12.8
125	12.6	12.5	12.5	12.5	12.4	12.2	12.1	11.9	11.8	11.6	11.4	11.2	11.1	11.0	10.8	10.8	10.7	10.6	10.6
130	10.5	10.5	10.4	10.4	10.3	10.2	10.0	9.89	9.73	9.57	9.41	9.23	9.12	8.98	8.89	8.80	8.73	8.70	8.71
135	8.61	8.58	8.54	8.50	8.41	8.32	8.19	8.05	7.90	7.74	7.58	7.42	7.29	7.17	7.08	6.99	6.93	6.90	6.98
140	6.86	6.83	6.79	6.76	6.67	6.58	6.47	6.34	6.20	6.05	5.91	5.78	5.67	5.56	5.48	5.41	5.37	5.34	5.44
145	5.32	5.30	5.27	5.23	5.16	5.08	4.97	4.86	4.73	4.60	4.47	4.34	4.25	4.15	4.08	4.02	3.98	3.96	4.06
150	3.95	3.93	3.91	3.88	3.82	3.75	3.65	3.55	3.43	3.32	3.20	3.08	3.00	2.92	2.86	2.81	2.77	2.76	2.86
155	2.76	2.75	2.74	2.71	2.66	2.59	2.51	2.42	2.32	2.22	2.12	2.02	1.94	1.88	1.83	1.78	1.76	1.76	1.85
160	1.75	1.74	1.74	1.72	1.68	1.63	1.56	1.49	1.41	1.32	1.24	1.16	1.10	1.05	1.01	0.98	0.97	0.97	1.06
165	0.97	0.96	0.96	0.95	0.92	0.89	0.84	0.79	0.73	0.67	0.62	0.57	0.52	0.49	0.46	0.44	0.44	0.46	0.52
170	0.47	0.46	0.46	0.46	0.44	0.43	0.41	0.38	0.36	0.33	0.31	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.32
175	0.32	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.32
180	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31

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	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293		
5	291	290	291	291	291	291	291	292	292	292	292	293	292	293	292	293	293		
10	286	286	286	286	287	287	287	287	288	288	288	289	289	290	290	290	290		
15	279	279	280	280	280	280	281	282	282	282	283	284	284	284	284	285	285		
20	270	269	270	270	271	271	272	273	273	274	274	275	276	277	277	277	277		
25	258	258	258	258	259	260	261	262	263	263	264	266	266	266	266	267	268		
30	244	244	245	245	246	247	247	248	249	251	251	253	253	254	255	255	255		
35	229	229	230	230	230	232	232	234	235	236	237	238	239	240	240	241	241		
40	212	212	212	213	214	215	216	217	218	220	221	223	223	224	225	225	226		
45	194	194	195	195	196	197	198	200	201	202	203	205	206	207	208	208	209		
50	175	175	176	176	176	178	179	181	182	184	185	186	187	189	189	190	190		
55	155	156	157	157	158	159	160	161	163	164	166	167	168	169	170	171	171		
60	135	136	136	137	138	139	141	142	144	145	147	148	149	151	151	152	152		
65	115	115	115	116	117	119	120	121	123	124	126	127	129	130	131	132	132		
70	94.0	94.3	95.1	95.8	96.9	98.1	99.4	101	102	104	105	107	108	109	110	111	111		
75	75.1	75.4	76.1	76.7	77.7	78.9	80.1	81.4	82.7	84.2	85.4	86.9	88.0	89.0	89.8	90.4	90.7		
80	58.7	59.0	59.6	60.2	61.0	61.9	62.9	64.2	65.4	66.5	67.6	68.8	69.7	70.6	71.4	71.9	72.1		
85	45.4	45.6	46.1	46.6	47.2	48.0	48.8	49.8	50.7	51.7	52.6	53.5	54.4	55.1	55.6	56.1	56.3		
90	35.3	35.5	35.8	36.2	36.7	37.3	38.0	38.7	39.4	40.2	40.8	41.6	42.1	42.6	43.0	43.4	43.5		
95	28.4	28.5	28.7	28.9	29.3	29.7	30.2	30.6	31.2	31.7	32.1	32.6	33.0	33.4	33.7	34.0	34.0		
100	23.8	23.8	24.0	24.1	24.4	24.6	24.9	25.3	25.6	26.0	26.3	26.6	26.9	27.1	27.3	27.4	27.5		
105	20.6	20.6	20.8	20.9	21.1	21.3	21.5	21.7	22.0	22.2	22.4	22.6	22.8	23.0	23.1	23.2	23.3		
110	17.8	17.8	18.0	18.1	18.3	18.5	18.7	18.9	19.1	19.3	19.5	19.7	19.8	20.0	20.1	20.2	20.2		
115	15.2	15.3	15.4	15.5	15.7	15.9	16.1	16.3	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.5	17.5		
120	12.8	12.8	12.9	13.0	13.2	13.4	13.5	13.7	13.9	14.1	14.3	14.5	14.6	14.8	14.8	14.9	15.0		
125	10.6	10.7	10.8	10.9	11.0	11.2	11.3	11.5	11.7	11.9	12.0	12.2	12.3	12.4	12.5	12.6	12.6		
130	8.73	8.77	8.87	8.96	9.10	9.24	9.37	9.52	9.67	9.82	9.94	10.1	10.2	10.3	10.4	10.5	10.5		
135	7.00	7.04	7.12	7.21	7.34	7.46	7.58	7.72	7.85	7.99	8.11	8.25	8.35	8.46	8.53	8.61	8.64		
140	5.45	5.48	5.56	5.64	5.75	5.86	5.97	6.09	6.21	6.33	6.44	6.58	6.67	6.77	6.84	6.91	6.95		
145	4.07	4.11	4.17	4.24	4.34	4.43	4.53	4.63	4.74	4.85	4.96	5.07	5.16	5.25	5.32	5.38	5.42		
150	2.88	2.91	2.95	3.02	3.10	3.18	3.26	3.35	3.44	3.54	3.63	3.73	3.81	3.90	3.96	4.02	4.06		
155	1.87	1.89	1.93	1.98	2.04	2.11	2.17	2.24	2.31	2.39	2.47	2.56	2.64	2.71	2.77	2.82	2.86		
160	1.07	1.08	1.11	1.15	1.19	1.24	1.28	1.33	1.39	1.44	1.51	1.58	1.64	1.71	1.76	1.80	1.84		
165	0.53	0.54	0.55	0.57	0.59	0.62	0.64	0.67	0.70	0.74	0.78	0.83	0.88	0.93	0.96	1.00	1.03		
170	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.33	0.35	0.36	0.38	0.40	0.42	0.44	0.46	0.48	0.50		
175	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.33		
180	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31		

Table 7: Luminous Intensity Data

TEST RESULTS (3000K Setting)

Test ambient temperature was 26.0 ℃.

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
Voltage frequency (Hz)	60
Test Current (A)	0.102
Power Factor	0.7994
Test Power (W)	9.77
THD A%	76.1
Luminous Efficacy (lm/W)	110.6
Total Luminous Flux (lm)	1080.5
Color Rendering Index (CRI)	93.8
R9	65.1
Correlated Color Temperature (CCT)(K)	3001
Chromaticity Chroma x	0.4354
Chromaticity Chroma y	0.4014
Chromaticity Chroma u	0.2508
Chromaticity Chroma v	0.3467
Duv	-0.0009
Chromaticity Chroma u ’	0.2508
Chromaticity Chroma v’	0.5201

Special Color Rendering Indices	
R1	95.8
R2	96.6
R3	94.7
R4	94.8
R5	94.3
R6	95.6
R7	93.1
R8	85.5
R9	65.1
R10	88.6
R11	94.8
R12	79.5
R13	95.8
R14	95.4

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

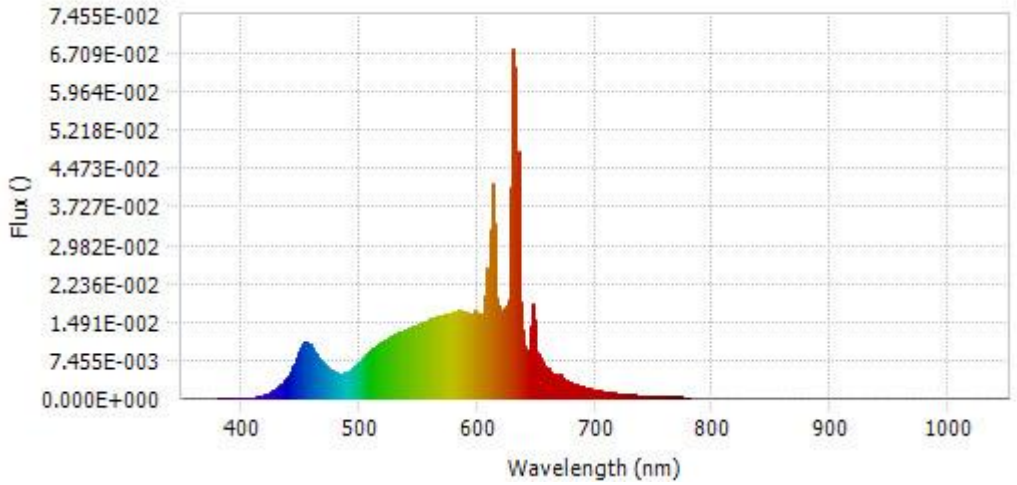
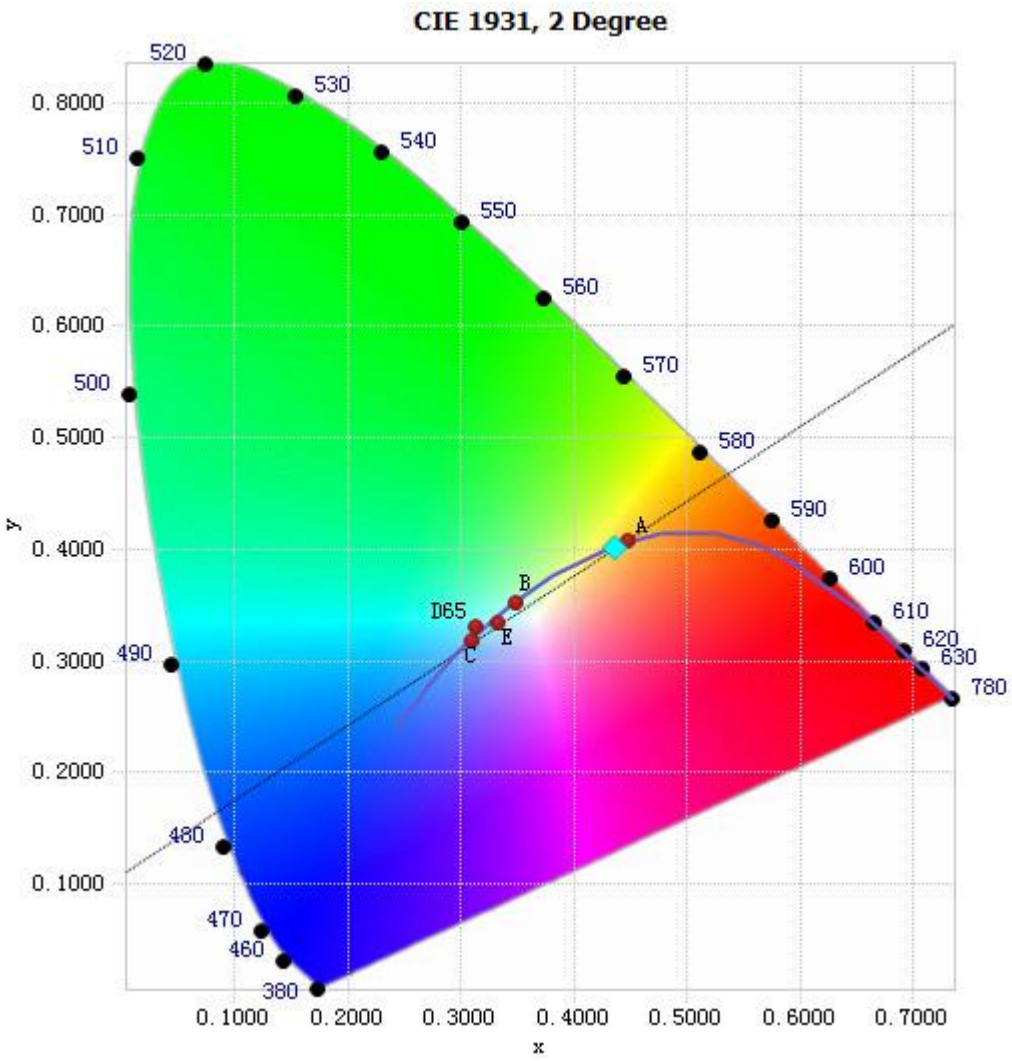


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.43E-05	485	4.79E-03	590	1.67E-02	695	1.86E-03
385	7.48E-05	490	5.14E-03	595	1.62E-02	700	1.58E-03
390	5.73E-05	495	5.91E-03	600	1.64E-02	705	1.36E-03
395	5.66E-05	500	6.96E-03	605	1.65E-02	710	1.16E-03
400	4.08E-05	505	8.15E-03	610	2.00E-02	715	1.01E-03
405	6.29E-05	510	9.29E-03	615	2.43E-02	720	8.81E-04
410	1.33E-04	515	1.03E-02	620	1.73E-02	725	7.70E-04
415	2.99E-04	520	1.10E-02	625	1.79E-02	730	6.63E-04
420	6.21E-04	525	1.17E-02	630	6.78E-02	735	5.76E-04
425	1.13E-03	530	1.24E-02	635	4.80E-02	740	4.94E-04
430	1.82E-03	535	1.28E-02	640	1.03E-02	745	4.29E-04
435	2.85E-03	540	1.33E-02	645	9.93E-03	750	3.71E-04
440	4.37E-03	545	1.38E-02	650	9.07E-03	755	3.26E-04
445	6.75E-03	550	1.43E-02	655	7.05E-03	760	2.77E-04
450	9.72E-03	555	1.48E-02	660	5.76E-03	765	2.40E-04
455	1.10E-02	560	1.53E-02	665	4.63E-03	770	2.11E-04
460	9.83E-03	565	1.57E-02	670	4.50E-03	775	1.84E-04
465	7.86E-03	570	1.62E-02	675	3.48E-03	780	1.65E-04
470	6.59E-03	575	1.64E-02	680	2.94E-03		
475	5.61E-03	580	1.67E-02	685	2.53E-03		
480	4.89E-03	585	1.70E-02	690	2.17E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4354, 0.4014)

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

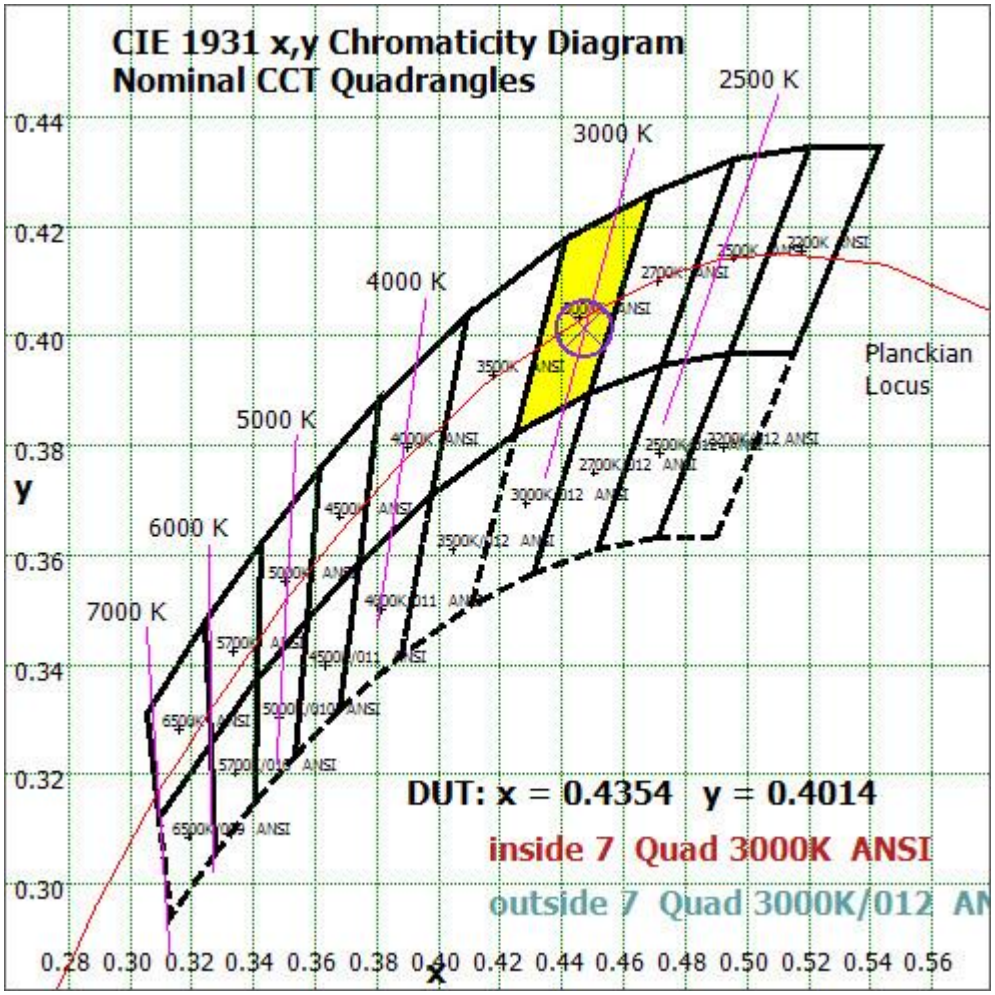


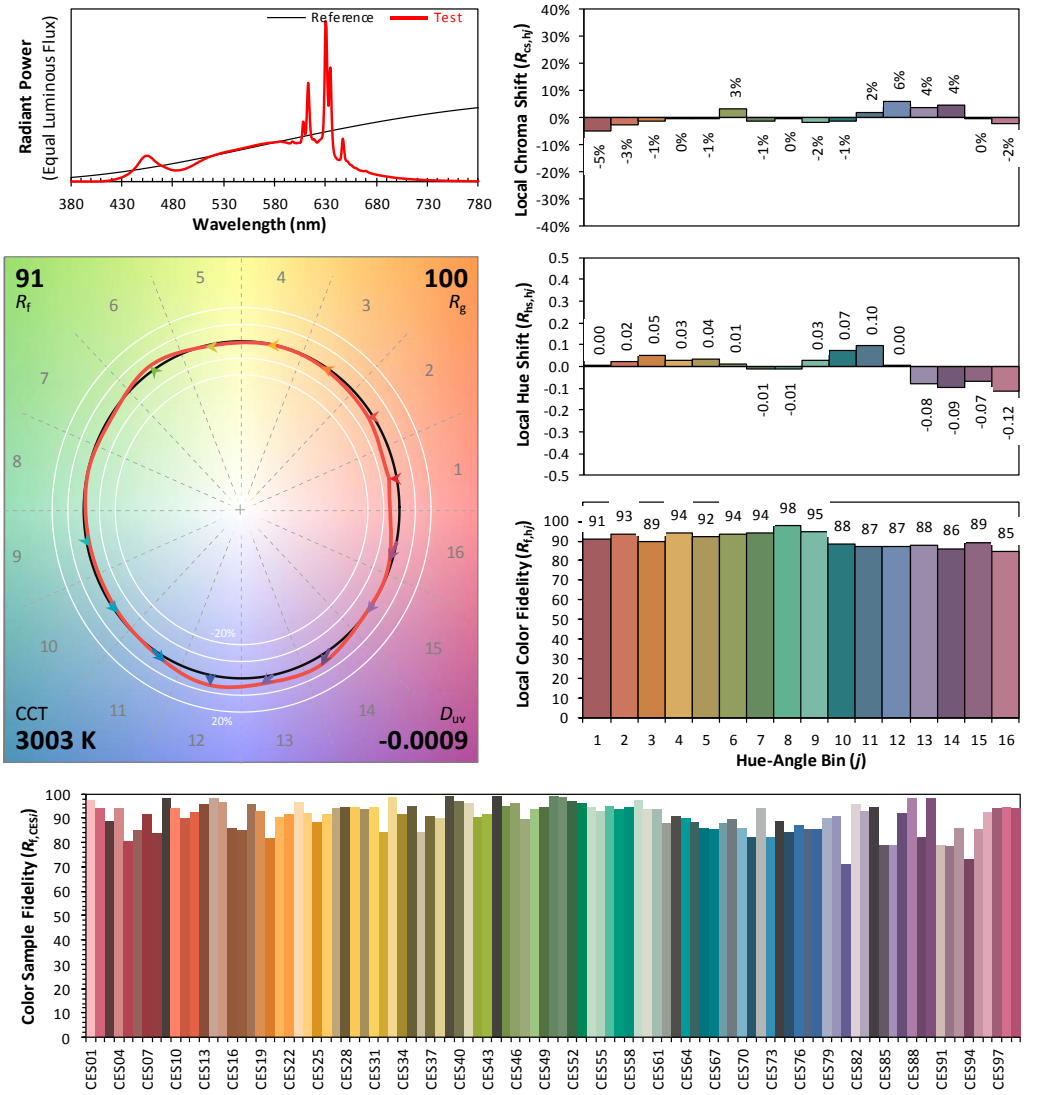
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/09/02 **Model:** 10BR30DIM/9CCTS



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

x	0.4354
y	0.4014
u'	0.2508
v'	0.5201

CIE 13.3-1995 (CRI)

R_a	94
R_9	65

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 (3500K Setting)

Test ambient temperature was 26.0 ℃.

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
Voltage frequency (Hz)	60
Test Current (A)	0.102
Power Factor	0.8130
Test Power (W)	9.99
THD A%	73.75
Luminous Efficacy (lm/W)	116.1
Total Luminous Flux (lm)	1160.2
Color Rendering Index (CRI)	96.0
R9	78.2
Correlated Color Temperature (CCT)(K)	3462
Chromaticity Chroma x	0.4049
Chromaticity Chroma y	0.3853
Chromaticity Chroma u	0.2377
Chromaticity Chroma v	0.3393
Duv	-0.0023
Chromaticity Chroma u ’	0.2377
Chromaticity Chroma v’	0.5089

Special Color Rendering Indices	
R1	98.6
R2	98.4
R3	95.1
R4	97.2
R5	97
R6	95.5
R7	95
R8	91.3
R9	78.2
R10	92.9
R11	96.4
R12	77.8
R13	98.8
R14	95.8

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

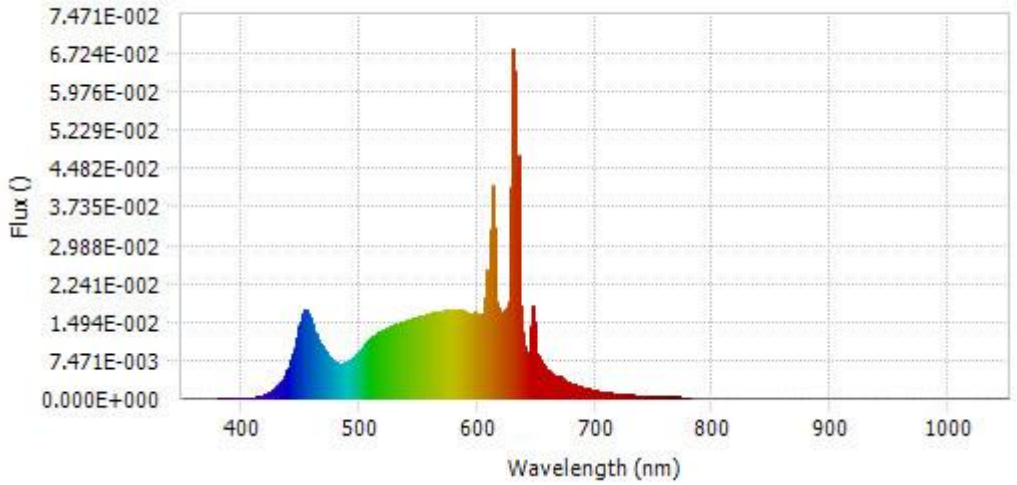
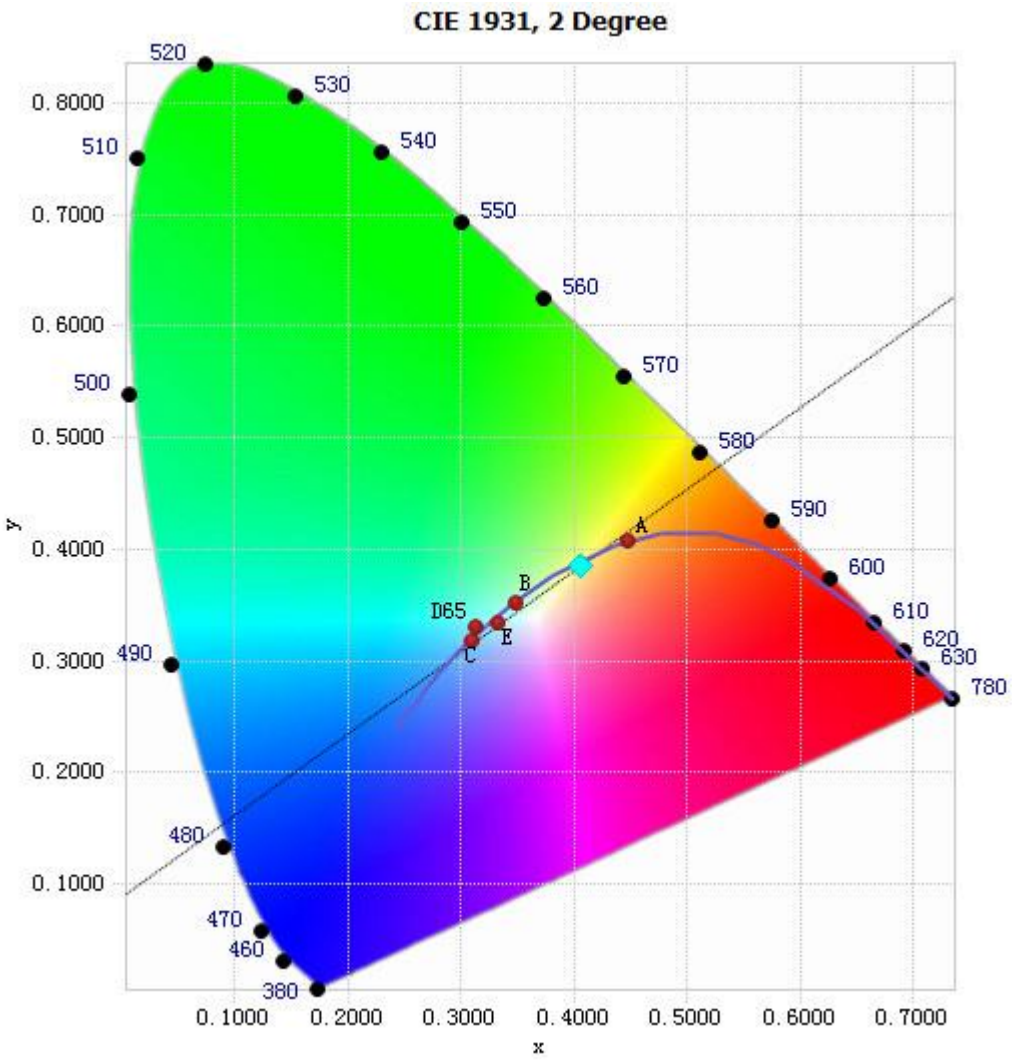


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.08E-04	485	6.74E-03	590	1.68E-02	695	1.77E-03
385	1.12E-04	490	7.14E-03	595	1.63E-02	700	1.50E-03
390	8.44E-05	495	8.00E-03	600	1.63E-02	705	1.27E-03
395	6.87E-05	500	9.16E-03	605	1.63E-02	710	1.09E-03
400	8.67E-05	505	1.04E-02	610	1.96E-02	715	9.53E-04
405	7.71E-05	510	1.15E-02	615	2.37E-02	720	8.36E-04
410	1.36E-04	515	1.26E-02	620	1.70E-02	725	7.24E-04
415	3.11E-04	520	1.32E-02	625	1.75E-02	730	6.30E-04
420	6.86E-04	525	1.38E-02	630	6.79E-02	735	5.35E-04
425	1.24E-03	530	1.44E-02	635	4.75E-02	740	4.68E-04
430	2.20E-03	535	1.47E-02	640	1.00E-02	745	4.02E-04
435	3.65E-03	540	1.51E-02	645	9.64E-03	750	3.54E-04
440	5.97E-03	545	1.55E-02	650	8.76E-03	755	3.08E-04
445	9.79E-03	550	1.58E-02	655	6.79E-03	760	2.66E-04
450	1.50E-02	555	1.61E-02	660	5.54E-03	765	2.32E-04
455	1.71E-02	560	1.65E-02	665	4.42E-03	770	2.04E-04
460	1.44E-02	565	1.68E-02	670	4.31E-03	775	1.76E-04
465	1.14E-02	570	1.70E-02	675	3.32E-03	780	1.49E-04
470	9.57E-03	575	1.71E-02	680	2.79E-03		
475	7.91E-03	580	1.71E-02	685	2.42E-03		
480	6.85E-03	585	1.73E-02	690	2.06E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4049, 0.3853)

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

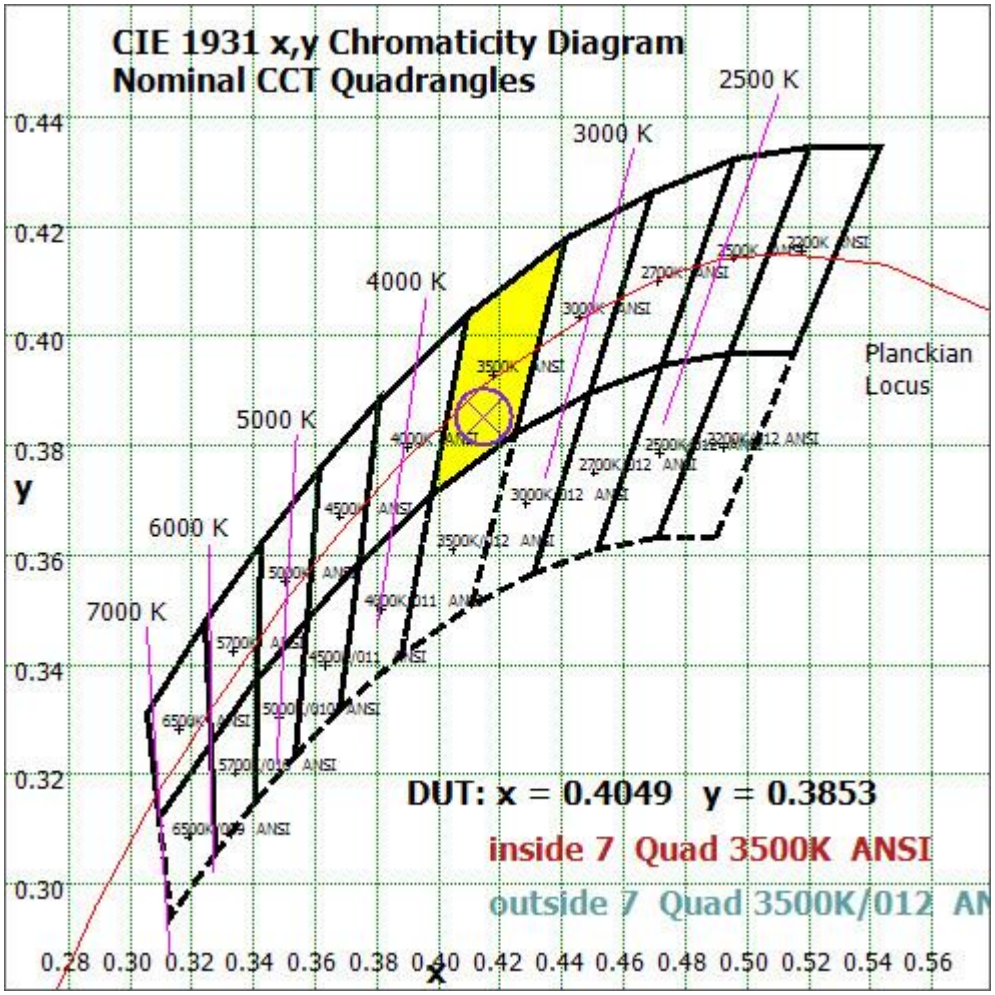


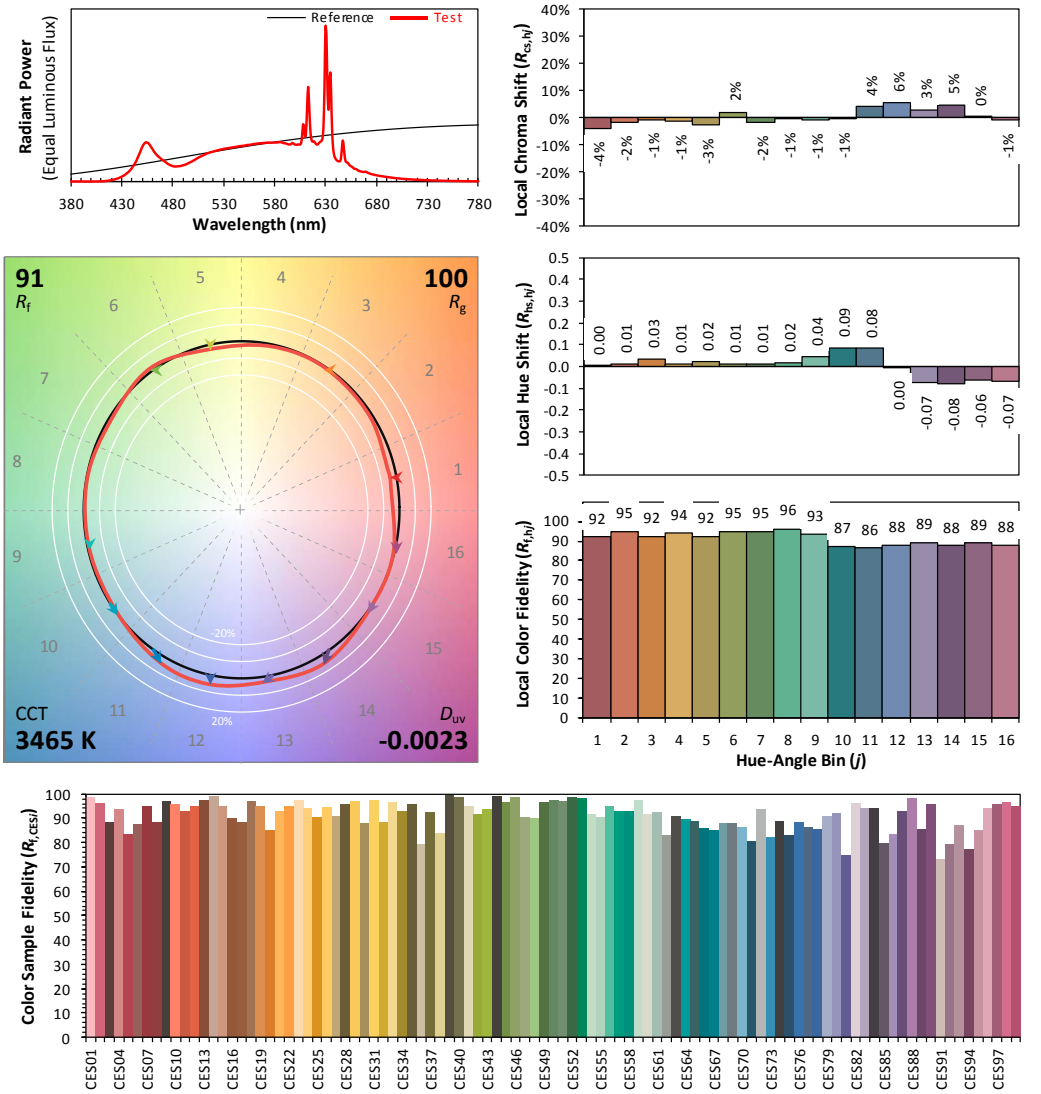
Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/09/02 **Model:** 10BR30DIM/9CCTS



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.4049	CIE 13.3-1995 (CRI)
	y	0.3853	R_a 96
	u'	0.2377	R_9 79
	v'	0.5089	

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 (4000K Setting)

Test ambient temperature was 26.0 ℃.

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
Voltage frequency (Hz)	60
Test Current (A)	0.102
Power Factor	0.8061
Test Power (W)	9.91
THD A%	74.97
Luminous Efficacy (lm/W)	114.8
Total Luminous Flux (lm)	1137.4
Color Rendering Index (CRI)	96.7
R9	86.1
Correlated Color Temperature (CCT)(K)	4065
Chromaticity Chroma x	0.3764
Chromaticity Chroma y	0.3707
Chromaticity Chroma u	0.2249
Chromaticity Chroma v	0.3322
Duv	-0.0017
Chromaticity Chroma u ’	0.2249
Chromaticity Chroma v’	0.4983

Special Color Rendering Indices	
R1	98.7
R2	98.7
R3	94.7
R4	98.1
R5	97
R6	95.1
R7	96.6
R8	94.8
R9	86.1
R10	93.5
R11	96.9
R12	73.9
R13	99.6
R14	95.8

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

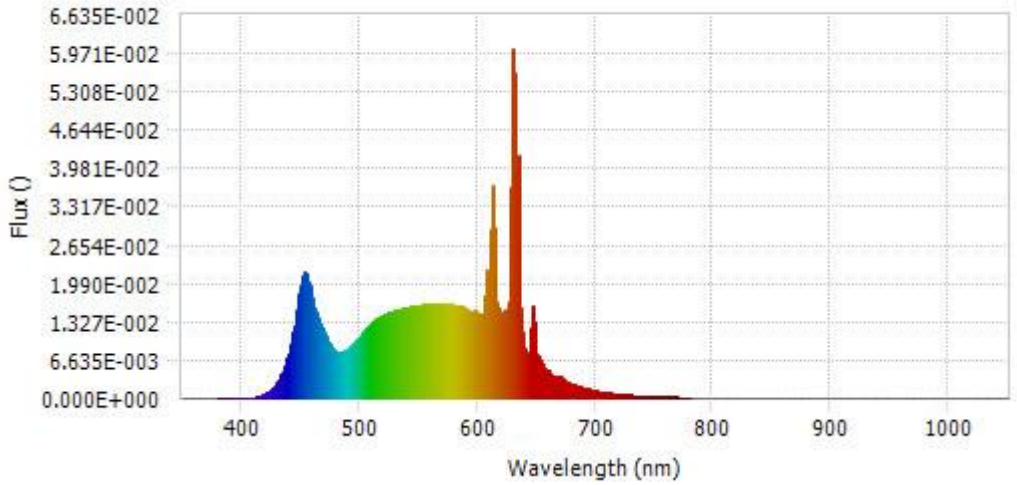
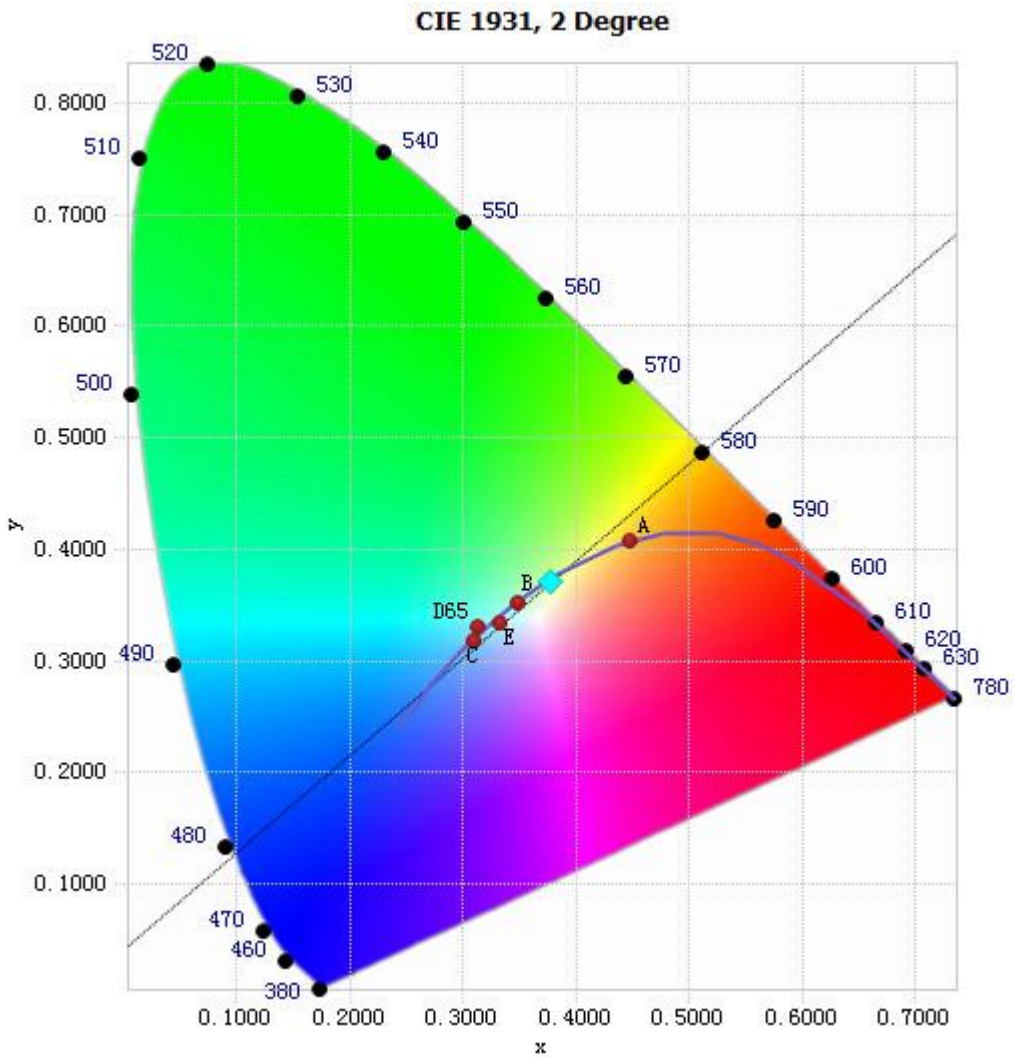


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	8.87E-05	485	7.99E-03	590	1.55E-02	695	1.52E-03
385	8.46E-05	490	8.49E-03	595	1.48E-02	700	1.29E-03
390	8.46E-05	495	9.40E-03	600	1.47E-02	705	1.10E-03
395	9.01E-05	500	1.06E-02	605	1.46E-02	710	9.39E-04
400	7.42E-05	505	1.18E-02	610	1.74E-02	715	8.16E-04
405	9.02E-05	510	1.29E-02	615	2.10E-02	720	7.15E-04
410	1.34E-04	515	1.38E-02	620	1.50E-02	725	6.23E-04
415	3.54E-04	520	1.43E-02	625	1.54E-02	730	5.38E-04
420	7.51E-04	525	1.47E-02	630	6.03E-02	735	4.63E-04
425	1.47E-03	530	1.52E-02	635	4.20E-02	740	4.03E-04
430	2.60E-03	535	1.53E-02	640	8.72E-03	745	3.44E-04
435	4.53E-03	540	1.57E-02	645	8.42E-03	750	3.01E-04
440	7.60E-03	545	1.59E-02	650	7.63E-03	755	2.62E-04
445	1.26E-02	550	1.60E-02	655	5.88E-03	760	2.23E-04
450	1.94E-02	555	1.62E-02	660	4.81E-03	765	1.93E-04
455	2.14E-02	560	1.63E-02	665	3.84E-03	770	1.68E-04
460	1.75E-02	565	1.64E-02	670	3.73E-03	775	1.46E-04
465	1.38E-02	570	1.63E-02	675	2.88E-03	780	1.28E-04
470	1.15E-02	575	1.62E-02	680	2.43E-03		
475	9.34E-03	580	1.61E-02	685	2.09E-03		
480	8.09E-03	585	1.61E-02	690	1.78E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3764, 0.3707)

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

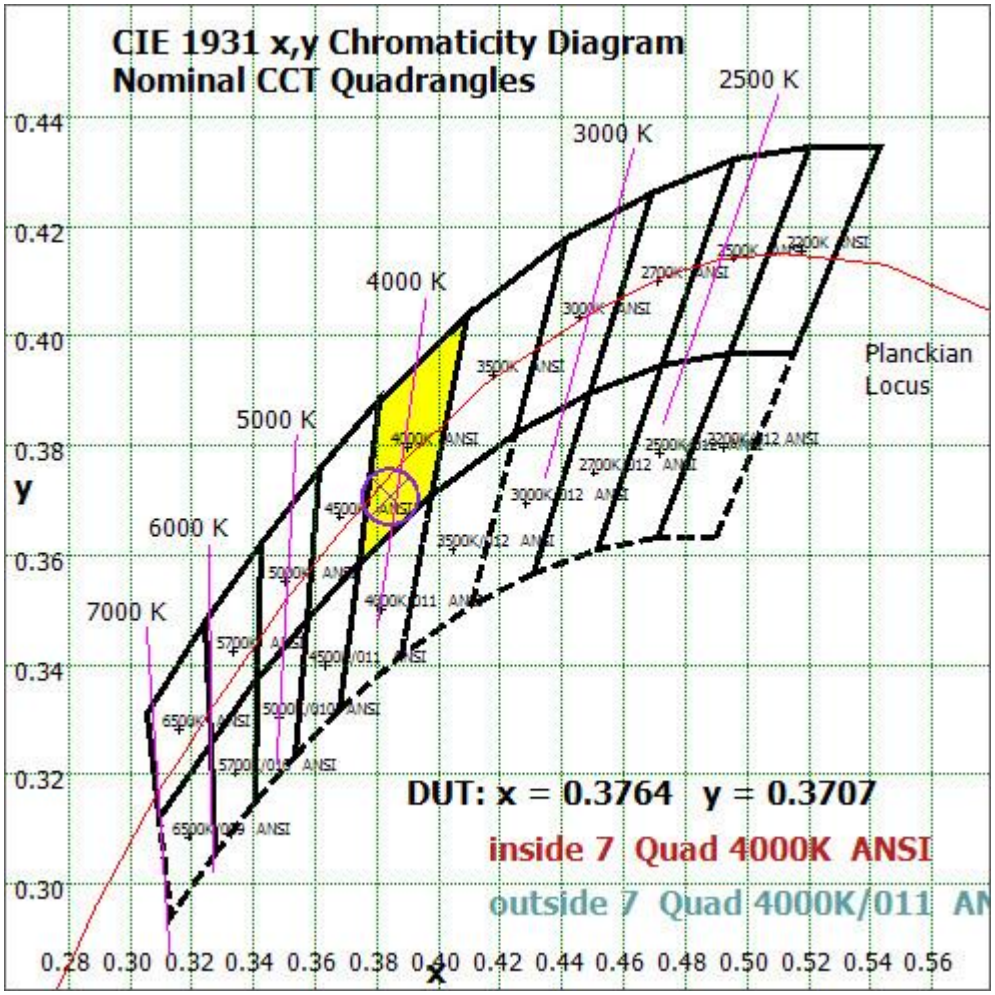


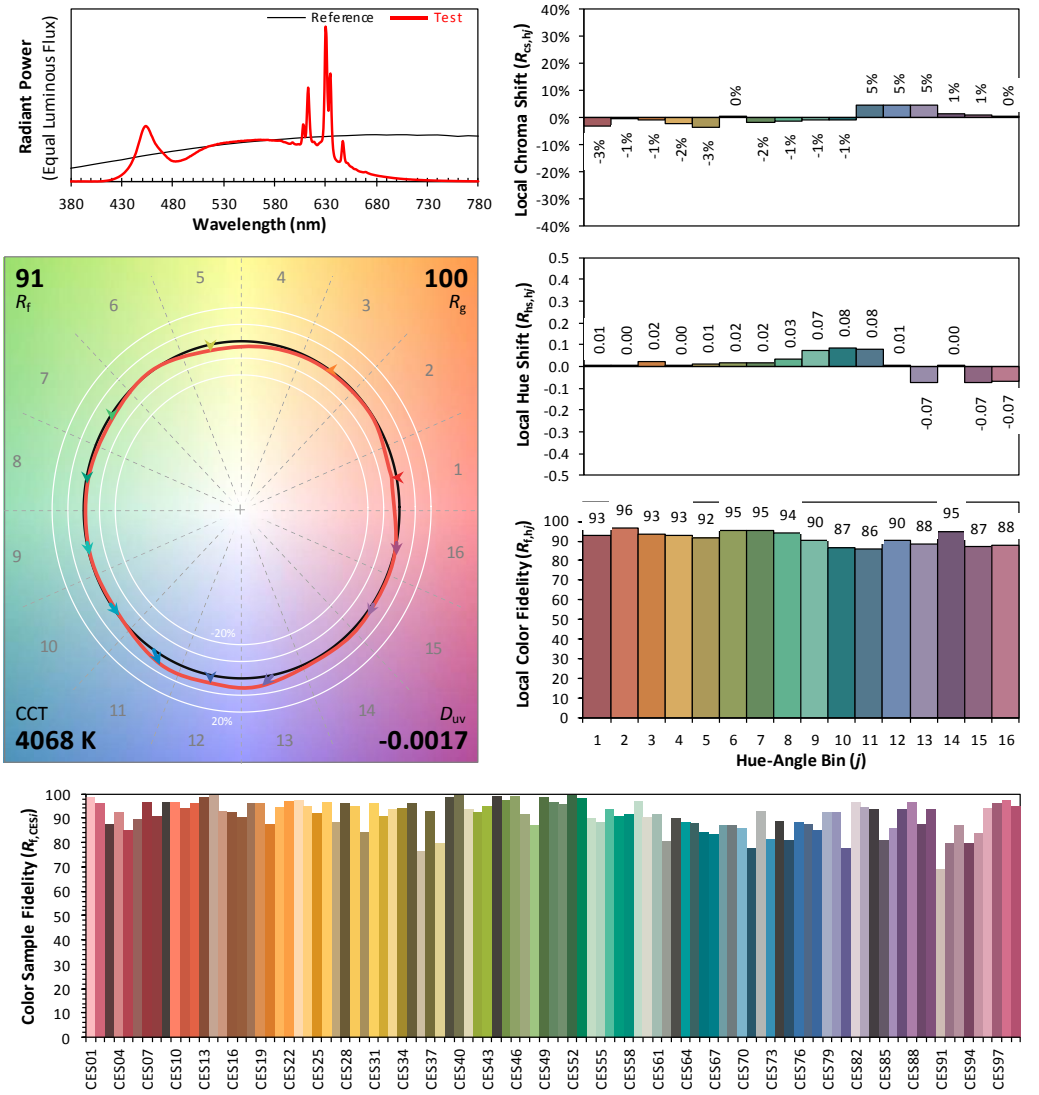
Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/09/02 **Model:** 10BR30DIM/9CCTS



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

x	0.3764
y	0.3707
u'	0.2249
v'	0.4983

CIE 13.3-1995 (CRI)

R_a	97
R_9	86

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 (5000K Setting)

Test ambient temperature was 26.0 ℃.

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
Voltage frequency (Hz)	60
Test Current (A)	0.101
Power Factor	0.7899
Test Power (W)	9.56
THD A%	77.69
Luminous Efficacy (lm/W)	107.9
Total Luminous Flux (lm)	1031.2
Color Rendering Index (CRI)	95.8
R9	83.8
Correlated Color Temperature (CCT)(K)	5065
Chromaticity Chroma x	0.3435
Chromaticity Chroma y	0.3538
Chromaticity Chroma u	0.2095
Chromaticity Chroma v	0.3237
Duv	0.0018
Chromaticity Chroma u ’	0.2095
Chromaticity Chroma v’	0.4855

Special Color Rendering Indices	
R1	97.7
R2	97.1
R3	93.6
R4	96.9
R5	95.9
R6	93.7
R7	97.1
R8	94.6
R9	83.8
R10	90.2
R11	95.9
R12	73.4
R13	97.8
R14	95.7

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

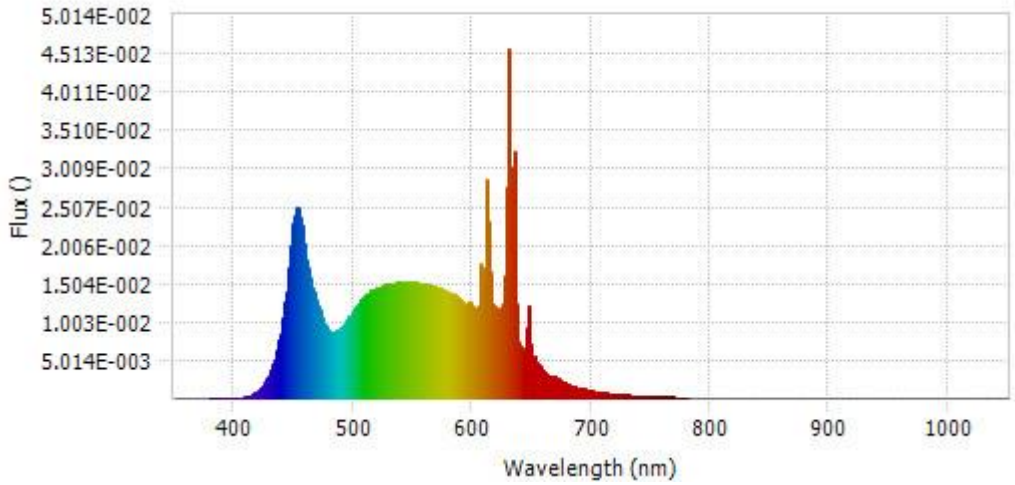
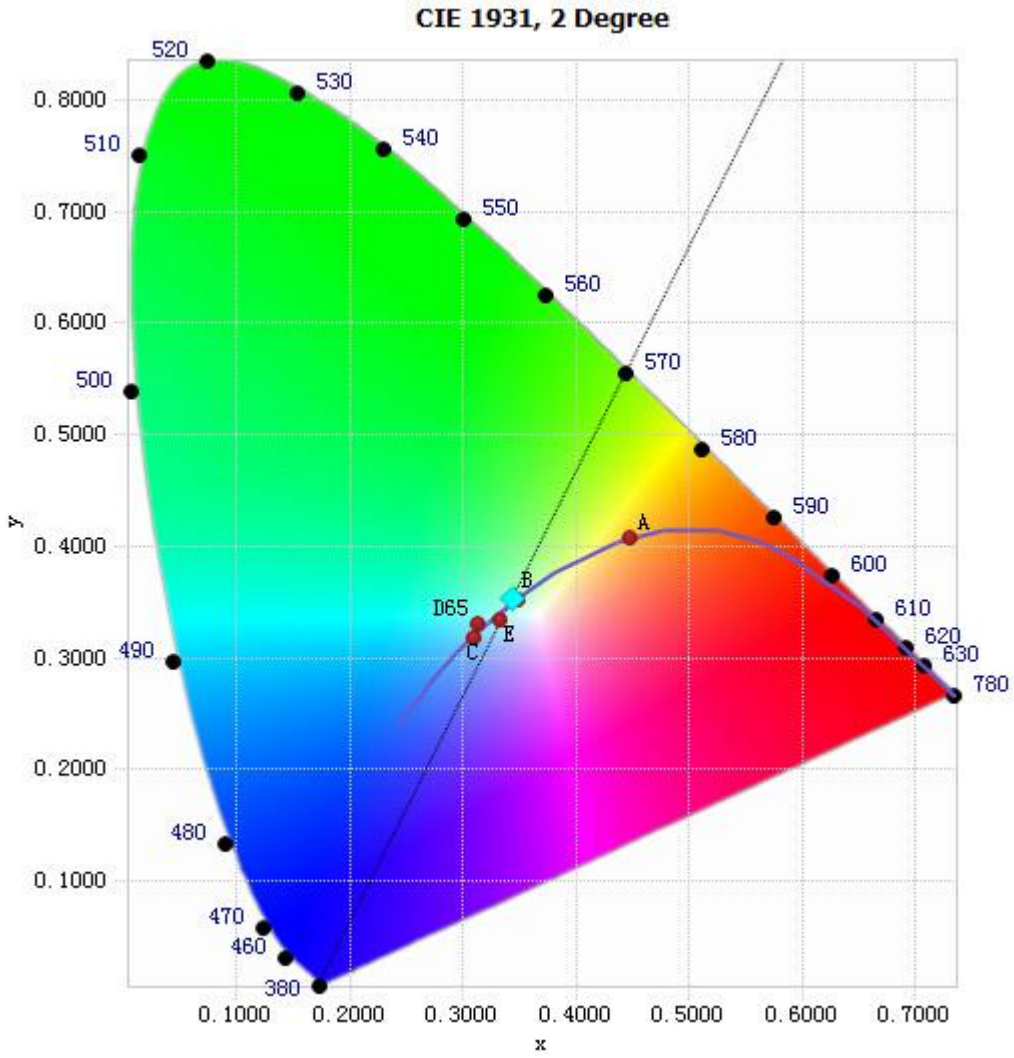


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.01E-04	485	8.70E-03	590	1.29E-02	695	1.16E-03
385	1.10E-04	490	9.24E-03	595	1.22E-02	700	9.79E-04
390	9.30E-05	495	1.02E-02	600	1.20E-02	705	8.34E-04
395	8.87E-05	500	1.13E-02	605	1.17E-02	710	7.16E-04
400	7.85E-05	505	1.24E-02	610	1.39E-02	715	6.25E-04
405	8.59E-05	510	1.33E-02	615	1.66E-02	720	5.45E-04
410	1.69E-04	515	1.41E-02	620	1.17E-02	725	4.73E-04
415	4.03E-04	520	1.44E-02	625	1.20E-02	730	4.13E-04
420	8.99E-04	525	1.47E-02	630	4.56E-02	735	3.58E-04
425	1.78E-03	530	1.50E-02	635	3.22E-02	740	3.03E-04
430	3.24E-03	535	1.50E-02	640	6.75E-03	745	2.68E-04
435	5.62E-03	540	1.52E-02	645	6.46E-03	750	2.31E-04
440	9.44E-03	545	1.52E-02	650	5.88E-03	755	2.01E-04
445	1.53E-02	550	1.51E-02	655	4.51E-03	760	1.74E-04
450	2.28E-02	555	1.51E-02	660	3.67E-03	765	1.51E-04
455	2.43E-02	560	1.50E-02	665	2.93E-03	770	1.32E-04
460	1.93E-02	565	1.48E-02	670	2.85E-03	775	1.15E-04
465	1.50E-02	570	1.46E-02	675	2.19E-03	780	1.00E-04
470	1.24E-02	575	1.42E-02	680	1.84E-03		
475	1.00E-02	580	1.39E-02	685	1.58E-03		
480	8.69E-03	585	1.36E-02	690	1.35E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3435, 0.3538)

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

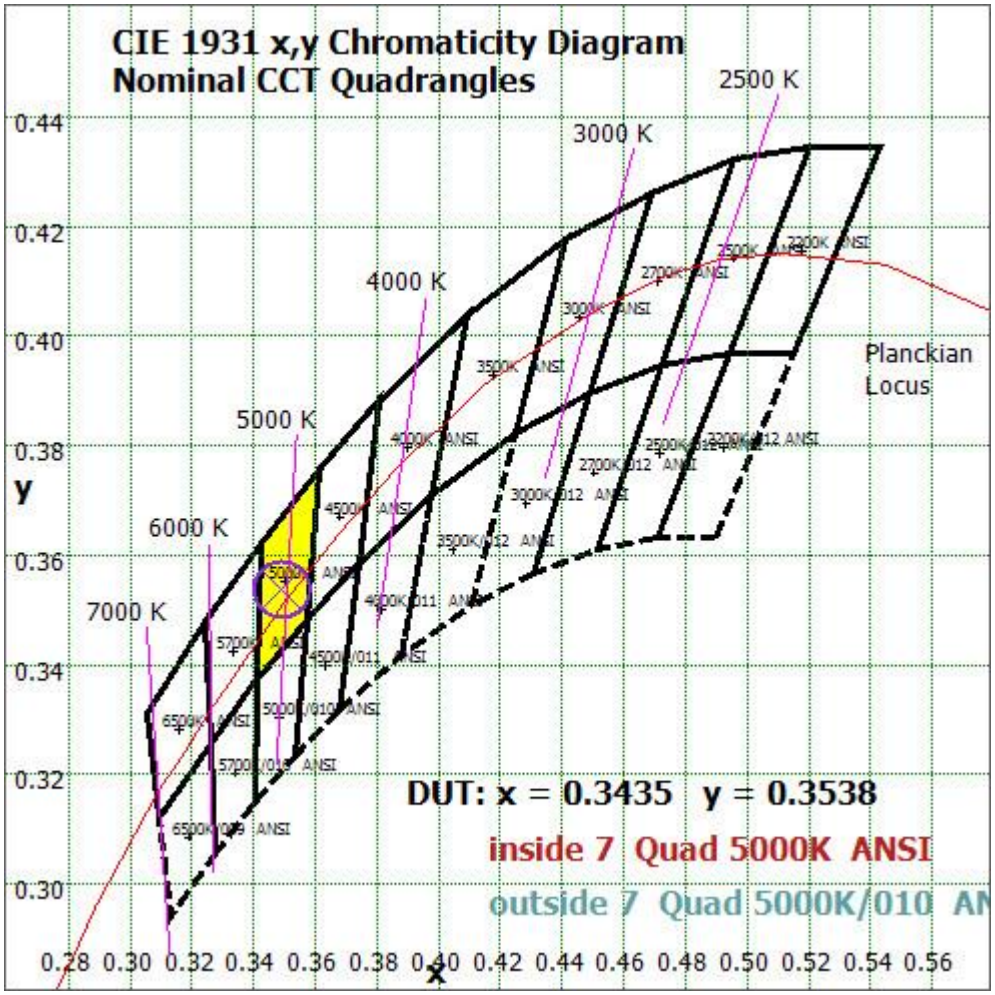


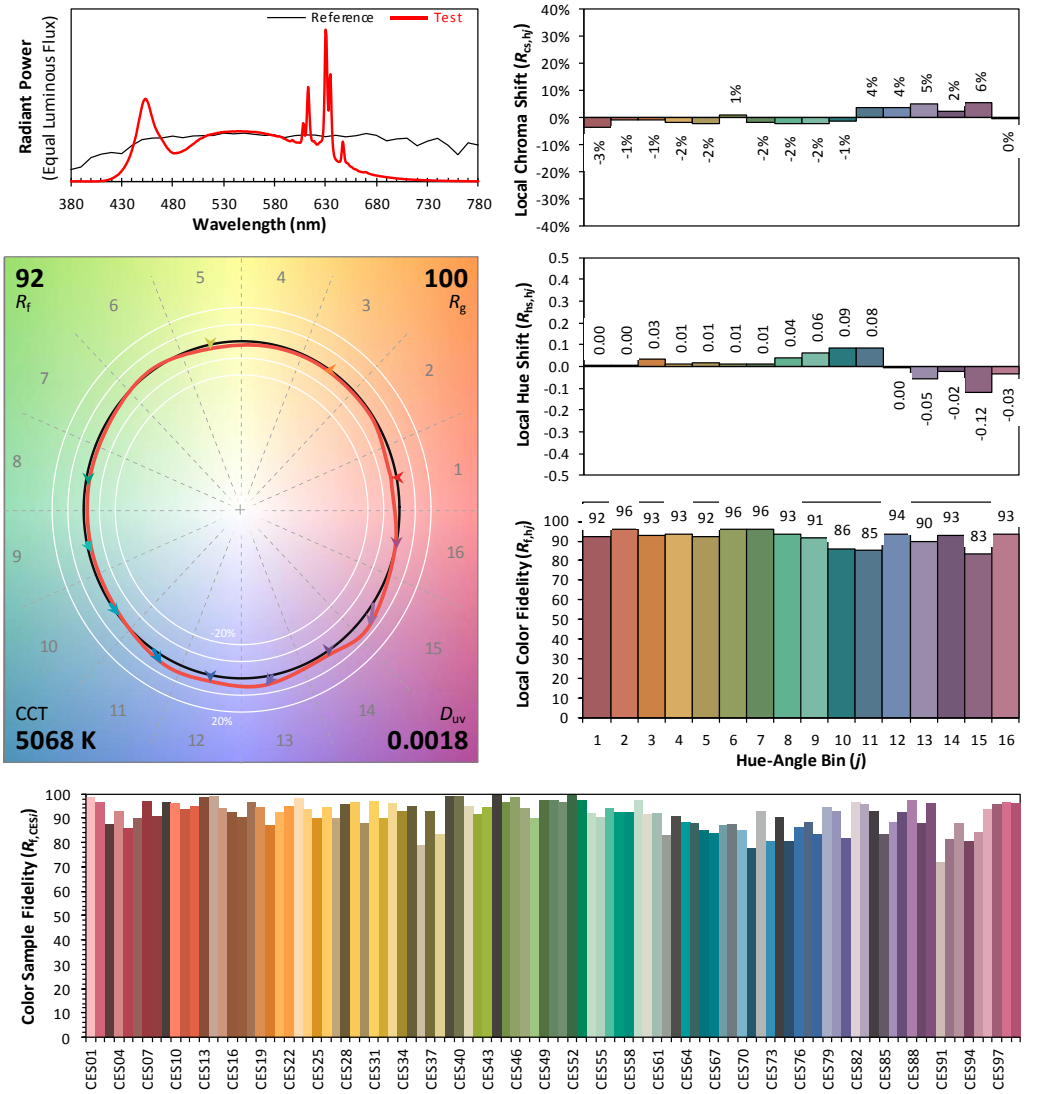
Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/09/02 **Model:** 10BR30DIM/9CCTS



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

x	0.3435
y	0.3538
u'	0.2095
v'	0.4855

CIE 13.3-1995 (CRI)

R_a	96
R_9	84

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	Jun. 18, 2024	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	DPS1060	HZTE001-06	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	WY12010	HZTE004-03	Aug. 08, 2024	Aug. 07, 2025
Temperature recorder	JM624U	HZTE018-08	Aug. 08, 2024	Aug. 07, 2025
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 08, 2024	Aug. 07, 2025
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Jun. 18, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	PCR 500L	HZTE001-07	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	IT6154	HZTE004-04	Aug. 08, 2024	Aug. 07, 2025
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 08, 2024	Aug. 07, 2025
Temperature Meter	TES1310	HZTE017-01	Aug. 08, 2024	Aug. 07, 2025

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 expended uncertainty is 2.1% with a

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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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