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: 11BR40DIM/9CCTS

Laboratory: Lea ding Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ24100047a

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

Review by: Wei Fei

Engineer: Wei Fei

Nov. 05, 2024

Approved by: April Zou

Manager: April Zou

Nov. 05, 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	11BR40DIM/9CCTS 2700K Setting	11BR40DIM/9CCTS 3000K Setting	11BR40DIM/9CCTS 3500K Setting
Luminous Efficacy (Lumens /Watt)	121.0	124.7	129.1
Total Luminous Flux (Lumens)	1195.4	1255.5	1335.3
Power (Watts)	9.88	10.07	10.34
Power Factor	0.7844	0.7925	0.8049
CCT (K)	2804	3041	3432
CRI	91.4	93.5	95.3
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	2700K	3000K	3500K

Tested Model	11BR40DIM/9CCTS 4000K Setting	11BR40DIM/9CCTS 5000K Setting
Luminous Efficacy (Lumens /Watt)	129.9	124.5
Total Luminous Flux (Lumens)	1344.6	1233.5
Power (Watts)	10.35	9.91
Power Factor	0.8055	0.7860
CCT (K)	4039	5126
CRI	96.0	93.9
Stabilization Time (Light & Power)	50 mins	50 mins
Note	4000K	5000K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Oct. 31, 2024

Date of Test : Nov. 04, 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	: 11BR40DIM/9CCTS
Electrical Ratings	: 120V, 60Hz, 11W
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)	0.105
Power Factor	0.7844
Test Power (W)	9.88
THD A%	78.57
Luminous Efficacy (lm/W)	121.0
Total Luminous Flux (lm)	1195.4
Color Rendering Index (CRI)	91.4
R9	61
Correlated Color Temperature (CCT)(K)	2804
Chromaticity Chroma x	0.4537
Chromaticity Chroma y	0.4130
Chromaticity Chroma u	0.2575
Chromaticity Chroma v	0.3516
Duv	0.0015
Chromaticity Chroma u ’	0.2575
Chromaticity Chroma v’	0.5273

Special Color Rendering Indices	
R1	93.9
R2	92.9
R3	89.3
R4	93.3
R5	91.7
R6	91.8
R7	93.2
R8	85
R9	61
R10	80.1
R11	93.8
R12	75.5
R13	92.9
R14	92.2

Table 2: Test data per Sphere-Spectroradiometer Method

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

Spectral Power Distribution - Sphere Spectroradiometer Method

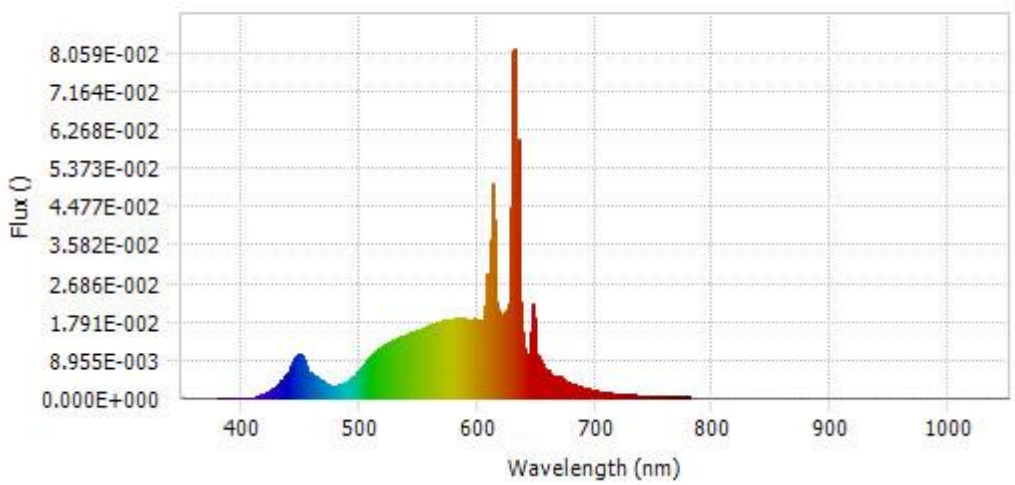
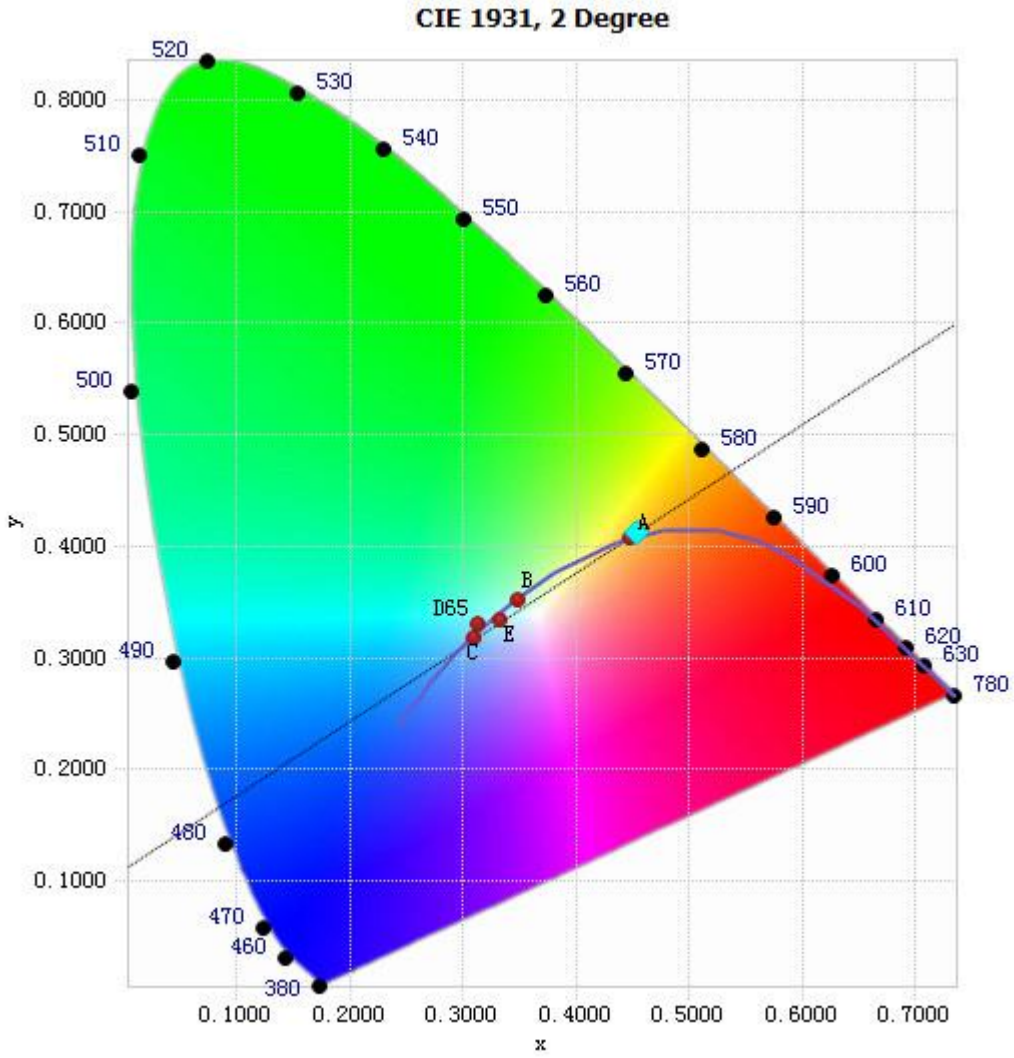


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.23E-04	485	3.20E-03	590	1.85E-02	695	2.04E-03
385	3.47E-05	490	3.86E-03	595	1.80E-02	700	1.70E-03
390	7.68E-05	495	5.03E-03	600	1.83E-02	705	1.45E-03
395	9.99E-05	500	6.57E-03	605	1.83E-02	710	1.25E-03
400	8.23E-06	505	8.14E-03	610	2.28E-02	715	1.09E-03
405	4.12E-05	510	9.69E-03	615	2.87E-02	720	9.49E-04
410	1.61E-04	515	1.11E-02	620	1.98E-02	725	8.43E-04
415	4.35E-04	520	1.20E-02	625	2.04E-02	730	7.30E-04
420	1.00E-03	525	1.29E-02	630	8.09E-02	735	6.27E-04
425	1.79E-03	530	1.37E-02	635	6.03E-02	740	5.47E-04
430	2.91E-03	535	1.42E-02	640	1.16E-02	745	4.86E-04
435	4.20E-03	540	1.48E-02	645	1.09E-02	750	4.10E-04
440	6.26E-03	545	1.53E-02	650	1.04E-02	755	3.63E-04
445	9.10E-03	550	1.58E-02	655	7.97E-03	760	3.08E-04
450	1.01E-02	555	1.64E-02	660	6.47E-03	765	2.76E-04
455	7.32E-03	560	1.70E-02	665	5.13E-03	770	2.24E-04
460	5.36E-03	565	1.75E-02	670	5.08E-03	775	1.97E-04
465	4.52E-03	570	1.79E-02	675	3.86E-03	780	1.71E-04
470	3.56E-03	575	1.82E-02	680	3.20E-03		
475	2.98E-03	580	1.85E-02	685	2.79E-03		
480	2.93E-03	585	1.89E-02	690	2.39E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4537, 0.4130)

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

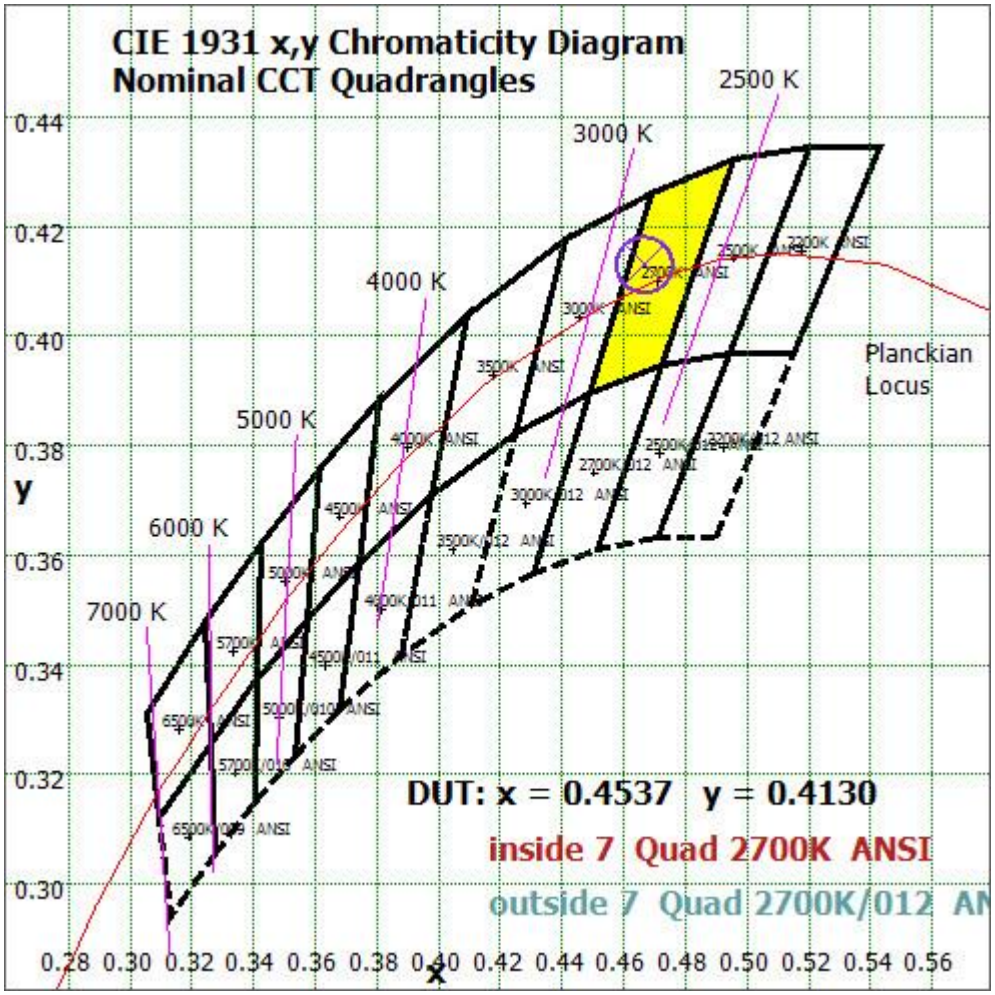


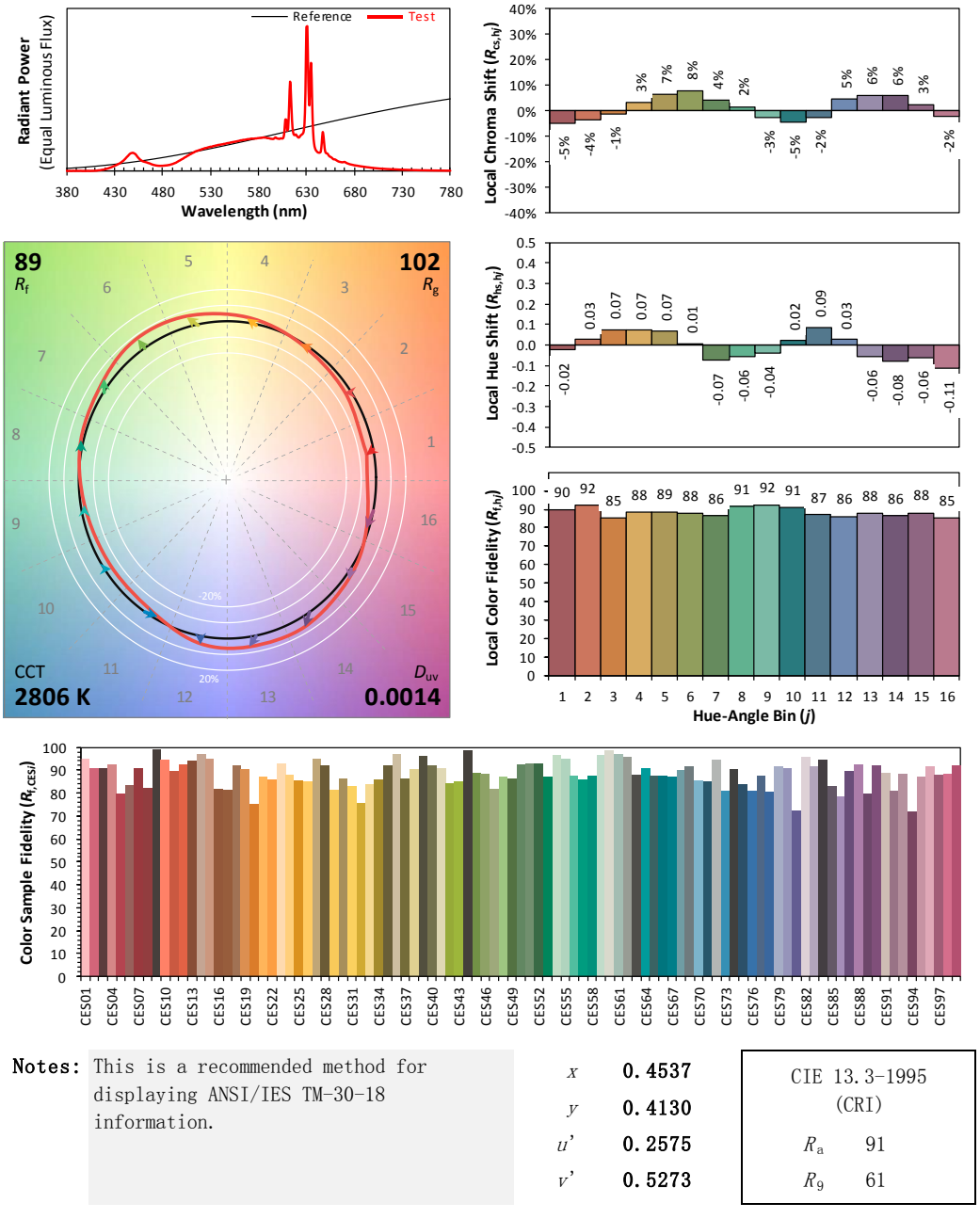
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/11/04 **Model:** 11BR40DIM/9CCTS



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

x	0.4537
y	0.4130
u'	0.2575
v'	0.5273

CIE 13.3-1995 (CRI)

R_a	91
R_9	61

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)	0.106
Power Factor	0.7762
Power (W)	9.90
Luminous Efficacy (lm/W)	122.9
Total Luminous Flux (lm)	1216.4
Beam Angle (°)	120.0 (0^o-180^o) / 119.9 (90^o-270^o)
Center Beam Candle Power (cd)	336
Maximum Beam Candle Power (cd)	336.5 (At: C=240.0, Gamma=2.5)
Spacing Criteria	1.29 (0^o-180^o) / 1.30 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	64.55%
Zonal Lumens in the 60 °-90 °Zone	26.02%
Zonal Lumens in the 90 °-120 °Zone	7.49%
Zonal Lumens in the 120 °-180 °Zone	1.94%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	31.822	2.62%
10- 20	91.441	7.52%
20- 30	139.538	11.47%
30- 40	170.419	14.01%
40- 50	180.993	14.88%
50- 60	170.933	14.05%
60- 70	143.276	11.78%
70- 80	104.717	8.61%
80- 90	68.51	5.63%
90-100	43.083	3.54%
100-110	28.744	2.36%
110-120	19.268	1.58%
120-130	11.898	0.98%
130-140	6.62	0.54%
140-150	3.215	0.26%
150-160	1.324	0.11%
160-170	0.47	0.04%
170-180	0.123	0.01%
Total	1216.4	100%

γ(°)	Lumens	% Total
0- 60	785.146	64.55%
60- 90	316.503	26.02%
0-90	1101.65	90.57%
90- 180	114.745	9.43%
0- 180	1216.4	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

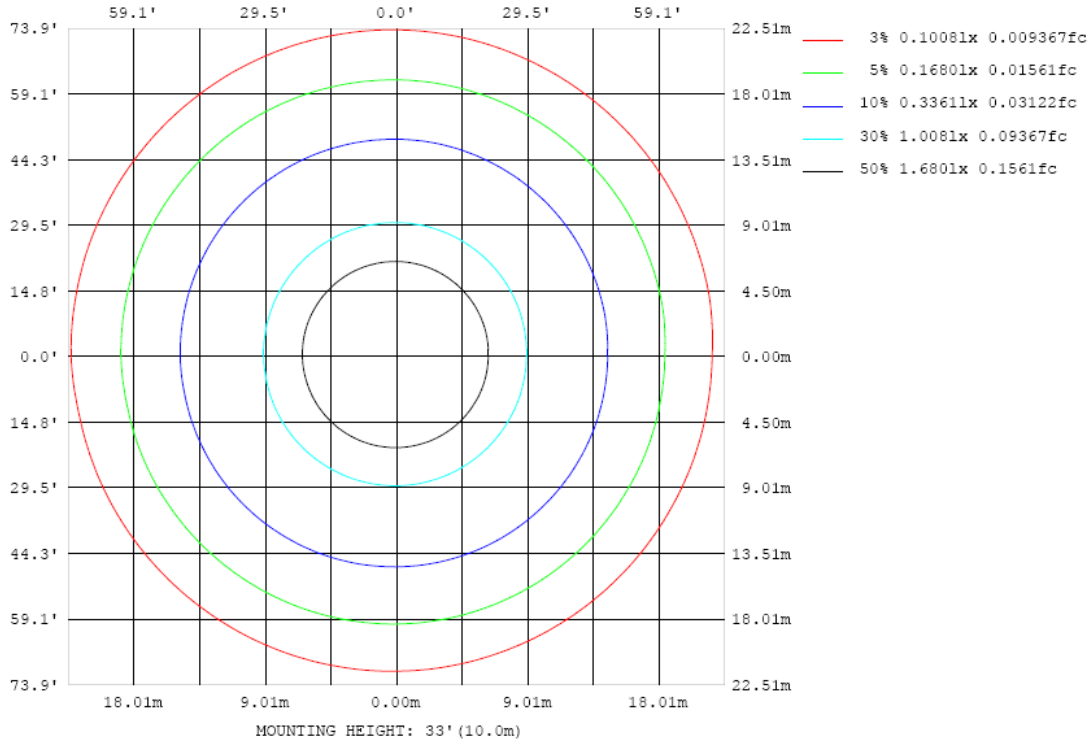


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

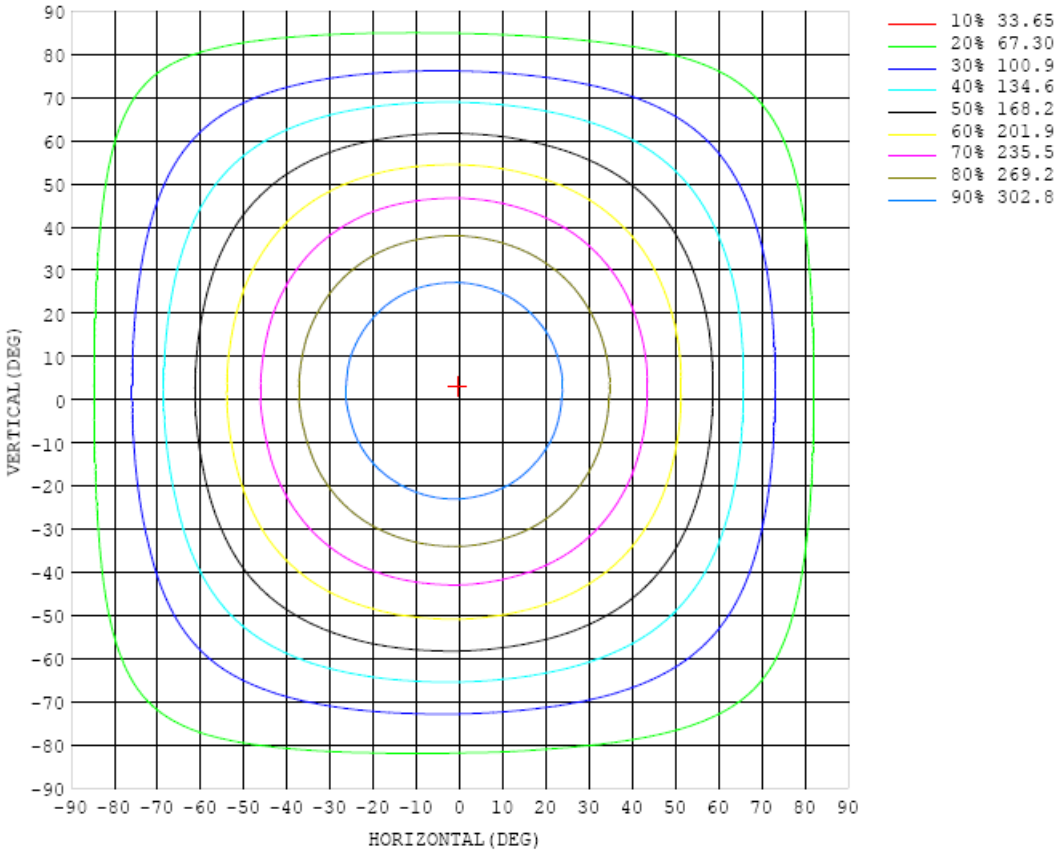


Chart 6: Isocandela Plot

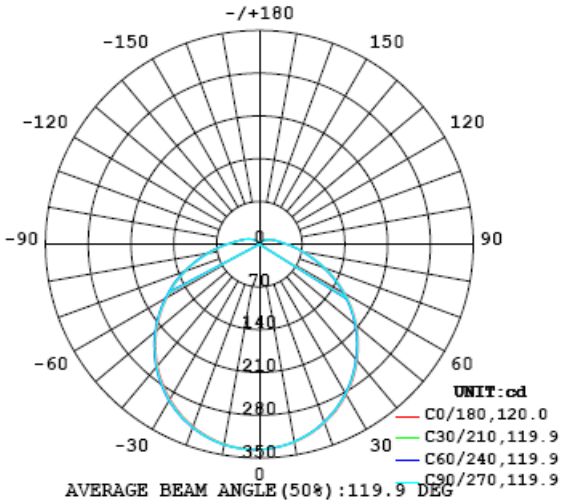


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

C(DEG) / γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336
5	334	334	334	334	333	333	333	333	333	334	334	334	334	334	335	335	335	335	335
10	329	329	329	328	328	328	328	328	328	329	329	329	329	330	330	331	331	331	332
15	322	321	321	320	320	320	320	320	320	321	321	321	322	322	323	324	324	325	326
20	312	311	311	310	310	310	310	309	310	310	311	311	312	313	314	314	315	316	317
25	299	298	298	297	297	297	297	296	297	298	298	299	299	300	301	303	304	305	306
30	285	283	283	282	282	281	282	281	282	283	283	284	285	286	287	288	290	291	293
35	268	266	266	265	265	264	265	265	265	266	266	267	268	270	271	272	274	275	277
40	249	248	247	246	246	246	246	246	246	247	248	249	250	251	253	254	256	257	260
45	229	228	227	226	226	226	226	226	226	227	228	229	230	232	233	235	236	238	240
50	208	206	206	204	204	204	204	204	205	206	206	208	209	210	212	214	215	217	219
55	185	184	183	182	182	181	182	182	182	183	184	186	187	188	190	192	193	195	197
60	162	160	160	159	158	158	158	159	159	160	161	162	164	165	167	169	170	172	174
65	138	137	136	135	135	134	135	135	136	137	138	139	140	142	143	145	147	148	152
70	114	113	113	112	111	111	112	112	113	113	114	115	117	118	120	121	123	124	128
75	92.6	91.7	91.0	90.3	90.1	90.0	90.1	90.5	91.1	91.9	92.7	93.8	95.0	96.3	97.6	99.1	100	102	105
80	73.4	72.3	72.4	71.8	71.7	71.5	71.6	72.0	73.4	72.6	73.6	74.6	75.6	76.7	77.9	79.1	80.3	81.3	84.2
85	58.2	57.7	57.3	56.8	56.7	56.7	56.8	57.0	57.4	57.9	58.5	59.3	60.1	61.0	62.0	63.0	63.8	64.8	66.4
90	45.8	45.4	45.1	44.8	44.7	44.6	44.7	44.9	45.3	45.7	46.1	46.7	47.3	48.1	48.7	49.5	50.2	50.9	52.1
95	36.7	36.4	36.2	35.9	35.9	35.9	36.0	36.1	36.3	36.6	37.0	37.4	37.9	38.3	38.9	39.5	39.9	40.4	41.4
100	30.3	30.1	30.0	29.8	29.8	29.8	29.9	30.0	30.2	30.4	30.6	30.9	31.2	31.6	32.0	32.4	32.7	33.0	33.7
105	25.7	25.6	25.5	25.3	25.3	25.3	25.4	25.4	25.6	25.8	26.0	26.2	26.5	26.8	27.0	27.3	27.6	27.8	28.4
110	21.8	21.7	21.6	21.5	21.5	21.5	21.5	21.6	21.7	21.9	22.1	22.3	22.5	22.8	23.0	23.3	23.5	23.7	24.2
115	18.3	18.2	18.1	18.0	18.0	18.0	18.1	18.1	18.3	18.5	18.6	18.8	19.0	19.2	19.4	19.7	19.8	20.0	20.4
120	15.1	15.1	15.0	14.9	14.9	14.9	15.0	15.1	15.2	15.3	15.5	15.7	15.9	16.0	16.2	16.4	16.6	16.8	17.1
125	12.4	12.3	12.2	12.2	12.2	12.2	12.2	12.3	12.4	12.6	12.7	12.9	13.0	13.2	13.4	13.5	13.7	13.8	14.0
130	9.91	9.85	9.81	9.77	9.78	9.81	9.84	9.92	10.0	10.2	10.3	10.4	10.6	10.7	10.8	11.0	11.1	11.2	11.4
135	7.80	7.76	7.73	7.69	7.71	7.73	7.76	7.85	7.94	8.05	8.16	8.28	8.40	8.52	8.66	8.77	8.88	8.99	9.15
140	5.97	5.94	5.91	5.90	5.91	5.92	5.95	6.02	6.11	6.20	6.30	6.41	6.52	6.63	6.73	6.83	6.93	7.01	7.22
145	4.49	4.46	4.45	4.44	4.45	4.47	4.50	4.55	4.63	4.72	4.80	4.90	4.99	5.08	5.17	5.26	5.33	5.40	5.59
150	3.30	3.28	3.27	3.26	3.28	3.30	3.32	3.37	3.44	3.52	3.59	3.67	3.74	3.82	3.90	3.97	4.02	4.08	4.25
155	2.38	2.37	2.37	2.36	2.38	2.41	2.43	2.46	2.52	2.59	2.65	2.72	2.78	2.84	2.91	2.97	3.01	3.05	3.18
160	1.72	1.72	1.72	1.73	1.75	1.77	1.79	1.83	1.87	1.92	1.98	2.03	2.08	2.13	2.19	2.23	2.26	2.28	2.39
165	1.30	1.31	1.32	1.33	1.35	1.38	1.41	1.45	1.48	1.51	1.55	1.59	1.63	1.68	1.72	1.75	1.76	1.76	1.85
170	1.15	1.17	1.18	1.19	1.22	1.24	1.28	1.32	1.33	1.37	1.40	1.43	1.46	1.49	1.52	1.53	1.52	1.52	1.56
175	1.13	1.19	1.22	1.23	1.24	1.24	1.27	1.31	1.36	1.40	1.44	1.47	1.46	1.45	1.49	1.50	1.51	1.50	1.50
180	0.35	0.35	0.35	0.35	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.18	0.12	0.05	0.00	0.00	0.35

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	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336		
5	335	336	336	336	336	336	336	336	336	336	336	335	335	335	335	334	334		
10	332	333	333	333	333	333	333	333	333	333	332	332	332	331	331	330	330		
15	326	327	327	328	328	328	328	328	327	327	326	326	325	324	324	323	323		
20	318	319	319	319	320	320	320	319	319	318	318	317	316	315	315	314	313		
25	307	308	308	308	309	309	309	308	308	307	306	306	305	304	303	302	301		
30	294	295	295	295	296	296	296	295	295	294	293	292	291	289	289	288	286		
35	278	279	280	280	280	280	280	280	279	278	277	276	275	273	272	271	270		
40	260	262	262	263	263	263	263	262	262	260	259	258	257	255	254	253	251		
45	241	243	243	243	244	244	244	243	242	241	240	238	237	236	234	233	231		
50	220	222	222	223	223	223	223	222	221	220	219	217	216	214	213	212	210		
55	198	200	200	201	201	201	201	200	199	198	197	195	194	192	191	189	188		
60	176	177	177	178	178	178	177	177	176	175	173	172	170	169	167	166	164		
65	153	154	155	155	155	155	155	154	153	152	151	149	148	146	144	143	142		
70	129	130	131	131	131	131	131	130	129	128	127	125	124	122	121	119	118		
75	106	107	107	108	108	108	107	107	106	105	103	102	101	99.4	98.1	96.8	95.7		
80	85.0	85.8	86.2	86.5	86.5	86.5	86.0	85.3	84.6	83.7	82.7	81.4	80.4	79.3	78.1	77.0	76.1		
85	67.1	67.7	68.0	68.2	68.3	68.2	67.8	67.3	66.7	65.9	65.0	64.1	63.1	62.2	61.3	60.5	59.7		
90	52.6	53.1	53.3	53.5	53.4	53.4	53.1	52.7	52.2	51.6	50.9	50.2	49.4	48.7	48.1	47.4	46.8		
95	41.7	42.0	42.2	42.3	42.3	42.2	42.0	41.7	41.3	40.9	40.3	39.8	39.3	38.8	38.3	37.8	37.5		
100	33.9	34.2	34.3	34.3	34.2	34.2	34.0	33.8	33.6	33.2	32.9	32.5	32.1	31.8	31.4	31.2	30.9		
105	28.5	28.7	28.7	28.7	28.7	28.6	28.5	28.4	28.2	27.9	27.7	27.4	27.1	26.8	26.6	26.3	26.1		
110	24.3	24.4	24.5	24.5	24.4	24.4	24.2	24.1	23.9	23.7	23.5	23.2	23.0	22.8	22.5	22.3	22.1		
115	20.6	20.6	20.7	20.6	20.6	20.5	20.4	20.3	20.1	20.0	19.7	19.5	19.3	19.1	18.9	18.7	18.5		
120	17.2	17.3	17.3	17.3	17.2	17.1	17.1	16.9	16.8	16.6	16.4	16.2	16.0	15.8	15.7	15.5	15.4		
125	14.1	14.1	14.1	14.1	14.0	14.0	13.9	13.8	13.7	13.5	13.3	13.2	13.0	12.8	12.7	12.6	12.5		
130	11.5	11.5	11.5	11.5	11.4	11.4	11.3	11.2	11.1	11.0	10.8	10.6	10.5	10.3	10.2	10.1	10.0		
135	9.20	9.25	9.24	9.20	9.14	9.09	9.02	8.94	8.83	8.72	8.59	8.44	8.30	8.18	8.07	7.97	7.91		
140	7.25	7.29	7.28	7.24	7.19	7.14	7.08	7.00	6.92	6.82	6.70	6.57	6.45	6.34	6.25	6.18	6.13		
145	5.62	5.65	5.63	5.60	5.55	5.51	5.44	5.37	5.30	5.22	5.11	5.00	4.90	4.81	4.73	4.67	4.63		
150	4.27	4.29	4.27	4.24	4.20	4.17	4.11	4.04	3.98	3.90	3.82	3.73	3.64	3.56	3.50	3.45	3.42		
155	3.20	3.21	3.19	3.16	3.13	3.09	3.04	2.98	2.93	2.87	2.80	2.72	2.65	2.58	2.54	2.50	2.47		
160	2.39	2.40	2.39	2.36	2.33	2.30	2.26	2.20	2.15	2.11	2.05	1.99	1.93	1.88	1.84	1.82	1.80		
165	1.85	1.85	1.84	1.82	1.80	1.77	1.74	1.68	1.64	1.60	1.55	1.51	1.47	1.43	1.39	1.38	1.37		
170	1.56	1.55	1.54	1.53	1.52	1.50	1.46	1.42	1.38	1.34	1.30	1.27	1.21	1.21	1.18	1.18	1.18		
175	1.50	1.50	1.49	1.48	1.46	1.44	1.39	1.34	1.32	1.29	1.27	1.25	1.23	1.20	1.16	1.15	1.17		
180	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35		

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)	0.106
Power Factor	0.7925
Test Power (W)	10.07
THD A%	77.19
Luminous Efficacy (lm/W)	124.7
Total Luminous Flux (lm)	1255.5
Color Rendering Index (CRI)	93.5
R9	69.7
Correlated Color Temperature (CCT)(K)	3041
Chromaticity Chroma x	0.4339
Chromaticity Chroma y	0.4030
Chromaticity Chroma u	0.2491
Chromaticity Chroma v	0.3470
Duv	0
Chromaticity Chroma u ’	0.2491
Chromaticity Chroma v’	0.5205

Special Color Rendering Indices	
R1	96.3
R2	94.8
R3	90.8
R4	94.8
R5	94.3
R6	93.9
R7	94.5
R8	88.7
R9	69.7
R10	84.5
R11	94.6
R12	77.8
R13	95.4
R14	93.1

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

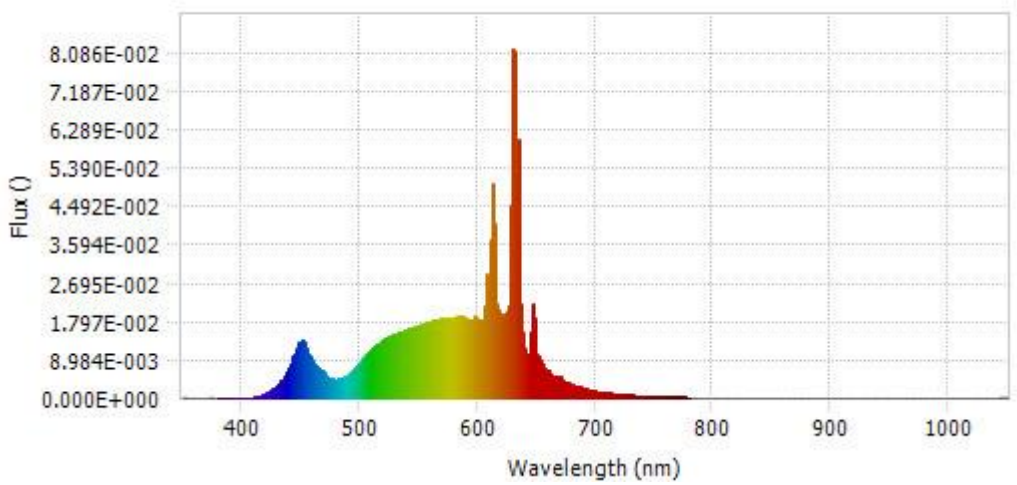
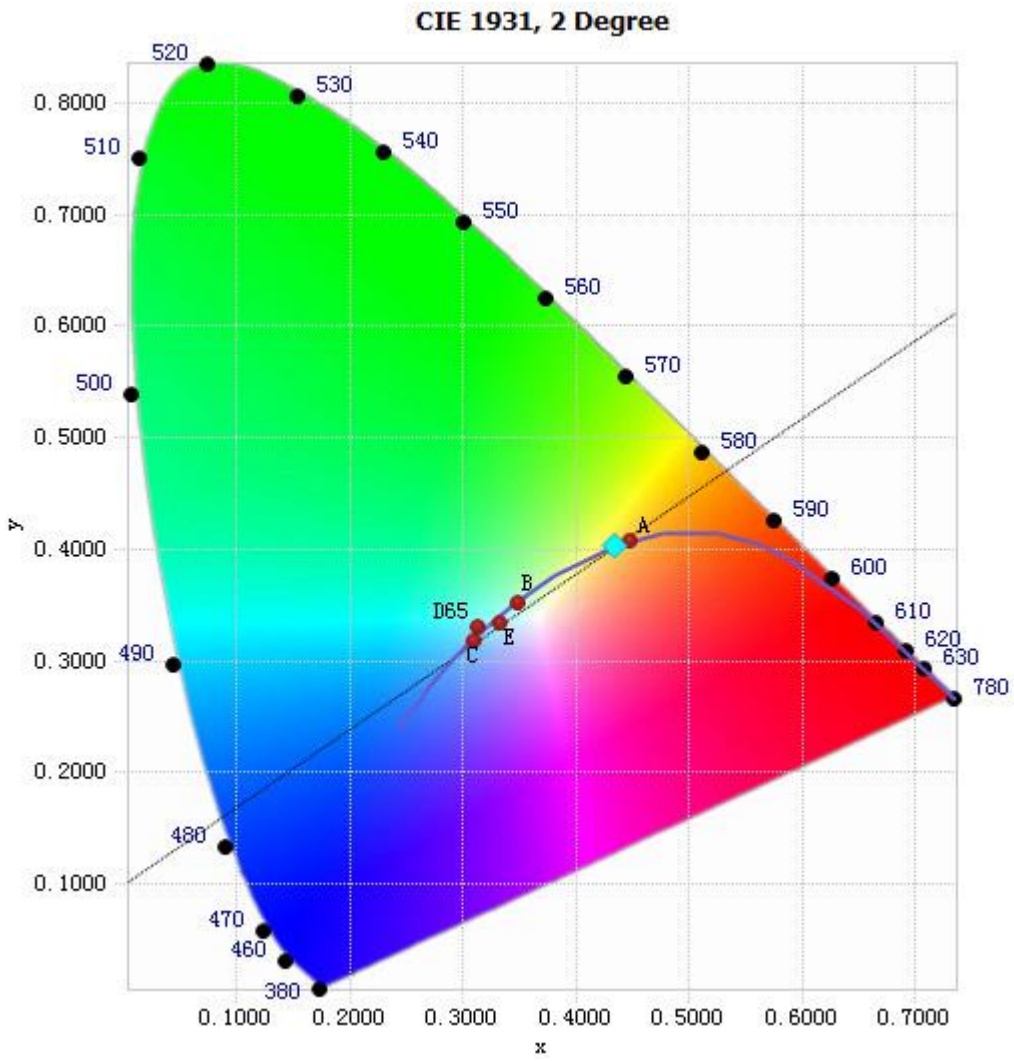


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.00E-05	485	4.63E-03	590	1.88E-02	695	1.98E-03
385	9.67E-05	490	5.25E-03	595	1.82E-02	700	1.66E-03
390	7.09E-05	495	6.48E-03	600	1.84E-02	705	1.40E-03
395	6.36E-05	500	8.11E-03	605	1.83E-02	710	1.22E-03
400	7.60E-05	505	9.74E-03	610	2.26E-02	715	1.06E-03
405	7.73E-05	510	1.12E-02	615	2.83E-02	720	9.36E-04
410	1.19E-04	515	1.26E-02	620	1.96E-02	725	8.22E-04
415	4.26E-04	520	1.35E-02	625	2.03E-02	730	7.15E-04
420	9.51E-04	525	1.43E-02	630	8.16E-02	735	6.04E-04
425	1.73E-03	530	1.50E-02	635	6.05E-02	740	5.31E-04
430	2.89E-03	535	1.55E-02	640	1.15E-02	745	4.59E-04
435	4.38E-03	540	1.60E-02	645	1.09E-02	750	4.01E-04
440	6.80E-03	545	1.66E-02	650	1.02E-02	755	3.52E-04
445	1.04E-02	550	1.69E-02	655	7.83E-03	760	3.02E-04
450	1.33E-02	555	1.73E-02	660	6.40E-03	765	2.57E-04
455	1.18E-02	560	1.79E-02	665	5.09E-03	770	2.21E-04
460	8.71E-03	565	1.83E-02	670	5.01E-03	775	2.02E-04
465	7.08E-03	570	1.85E-02	675	3.79E-03	780	1.82E-04
470	5.84E-03	575	1.88E-02	680	3.20E-03		
475	4.70E-03	580	1.90E-02	685	2.74E-03		
480	4.32E-03	585	1.92E-02	690	2.36E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4339, 0.4030)

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

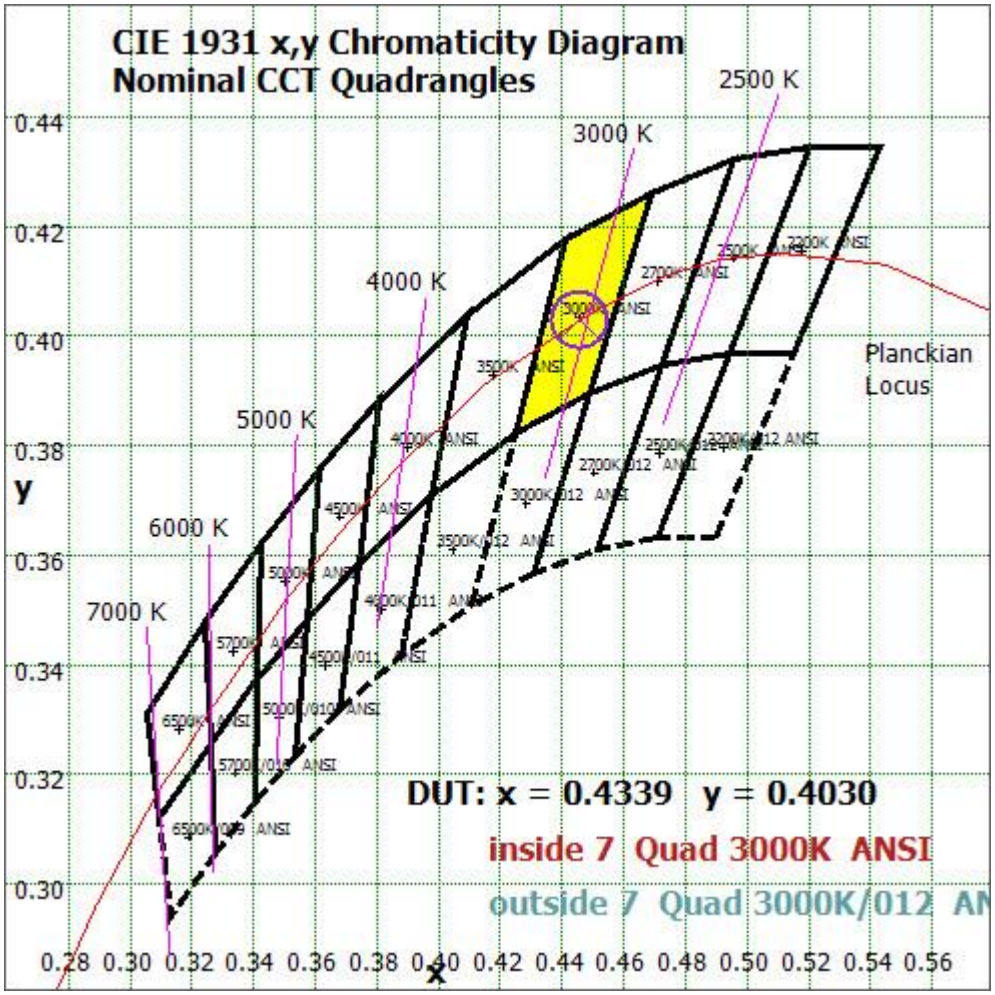


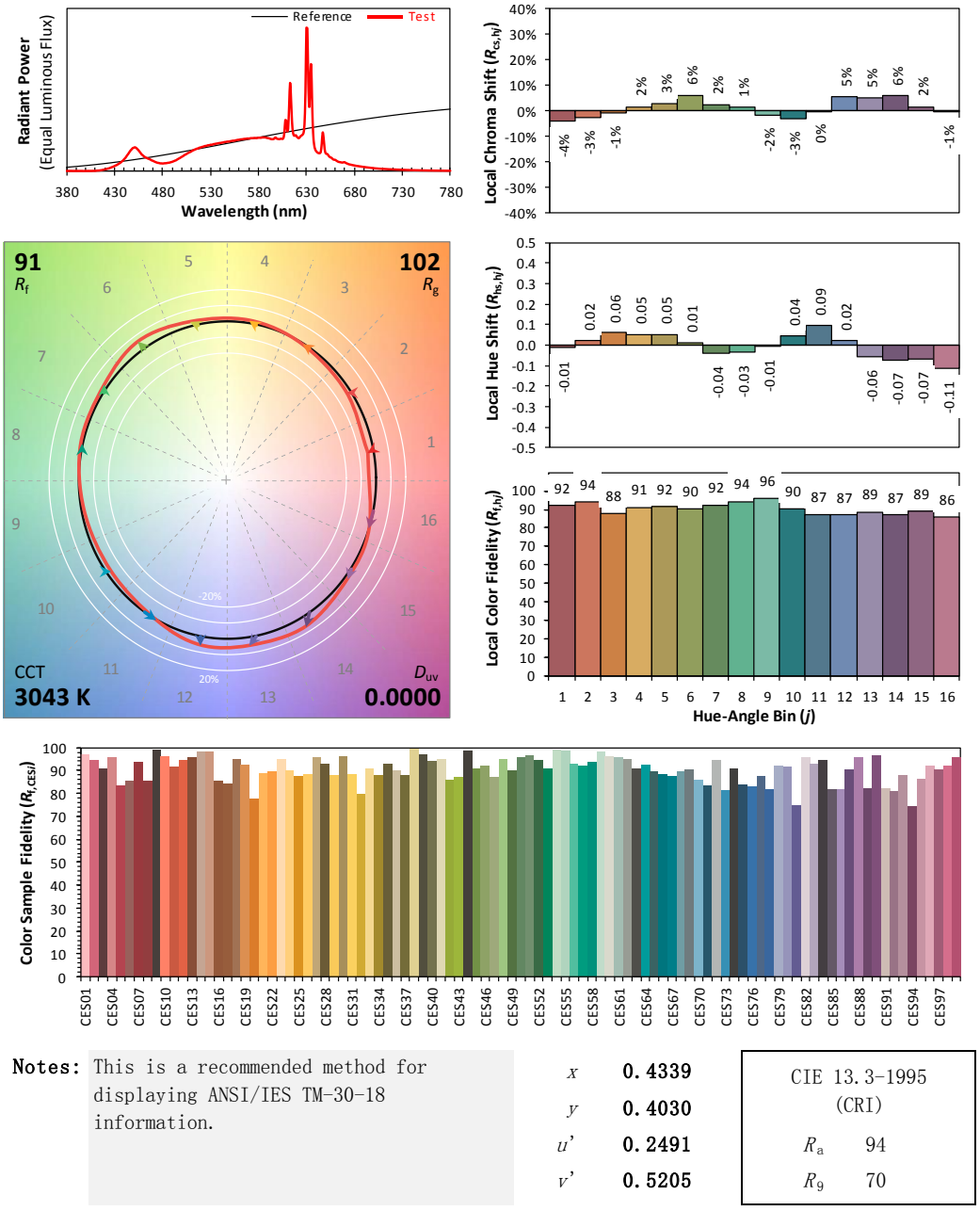
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/11/04 **Model:** 11BR40DIM/9CCTS



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

x	0.4339
y	0.4030
u'	0.2491
v'	0.5205

CIE 13.3-1995 (CRI)

R_a	94
R_9	70

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)	0.107
Power Factor	0.8049
Test Power (W)	10.34
THD A%	75.11
Luminous Efficacy (lm/W)	129.1
Total Luminous Flux (lm)	1335.3
Color Rendering Index (CRI)	95.3
R9	79.1
Correlated Color Temperature (CCT)(K)	3432
Chromaticity Chroma x	0.4082
Chromaticity Chroma y	0.3903
Chromaticity Chroma u	0.2377
Chromaticity Chroma v	0.3410
Duv	-0.0008
Chromaticity Chroma u ’	0.2377
Chromaticity Chroma v’	0.5115

Special Color Rendering Indices	
R1	98.3
R2	96.4
R3	91.8
R4	96.2
R5	96.4
R6	94.7
R7	96.1
R8	92.9
R9	79.1
R10	88.1
R11	95.1
R12	76.9
R13	97.5
R14	93.9

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

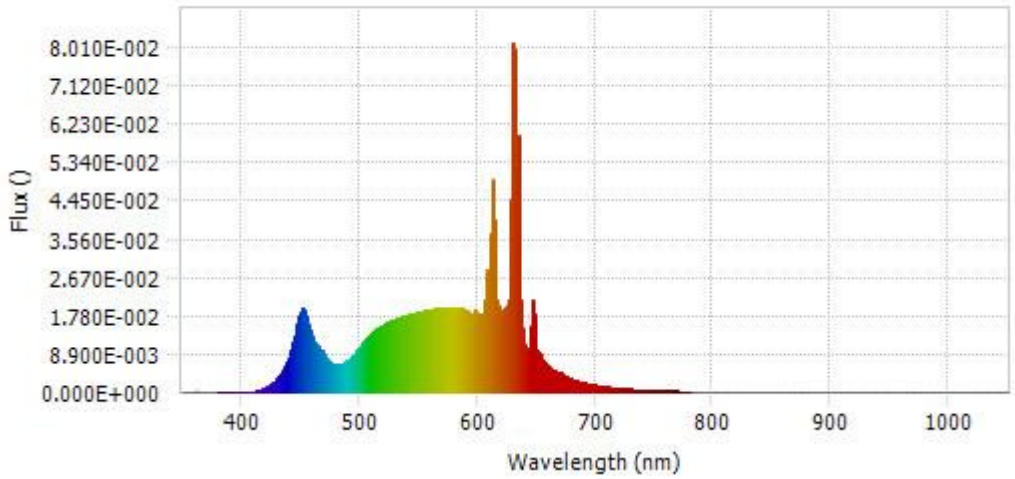
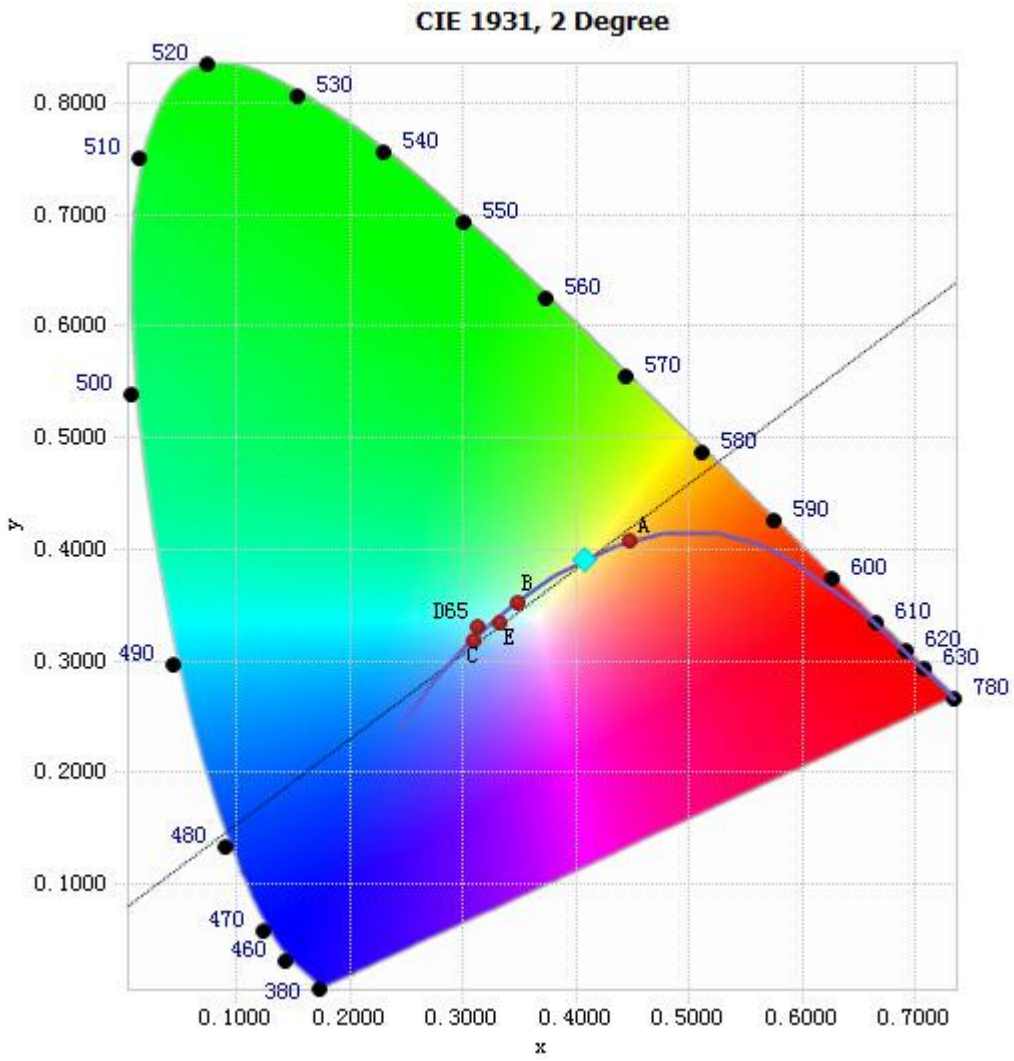


Chart 12: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.29E-04	485	6.60E-03	590	1.90E-02	695	1.91E-03
385	1.19E-04	490	7.32E-03	595	1.83E-02	700	1.63E-03
390	6.49E-05	495	8.58E-03	600	1.83E-02	705	1.37E-03
395	1.21E-04	500	1.04E-02	605	1.82E-02	710	1.19E-03
400	5.52E-05	505	1.20E-02	610	2.22E-02	715	1.04E-03
405	9.94E-05	510	1.35E-02	615	2.77E-02	720	9.09E-04
410	1.58E-04	515	1.48E-02	620	1.93E-02	725	7.96E-04
415	3.93E-04	520	1.55E-02	625	2.00E-02	730	6.86E-04
420	9.66E-04	525	1.64E-02	630	8.09E-02	735	5.94E-04
425	1.78E-03	530	1.69E-02	635	5.95E-02	740	5.12E-04
430	3.07E-03	535	1.73E-02	640	1.13E-02	745	4.46E-04
435	4.90E-03	540	1.78E-02	645	1.06E-02	750	3.71E-04
440	7.92E-03	545	1.81E-02	650	9.95E-03	755	3.31E-04
445	1.30E-02	550	1.85E-02	655	7.59E-03	760	2.84E-04
450	1.87E-02	555	1.89E-02	660	6.20E-03	765	2.42E-04
455	1.78E-02	560	1.92E-02	665	4.93E-03	770	2.27E-04
460	1.30E-02	565	1.94E-02	670	4.84E-03	775	1.87E-04
465	1.06E-02	570	1.94E-02	675	3.66E-03	780	1.72E-04
470	8.74E-03	575	1.96E-02	680	3.09E-03		
475	6.83E-03	580	1.95E-02	685	2.66E-03		
480	6.27E-03	585	1.96E-02	690	2.26E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4082, 0.3903)

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

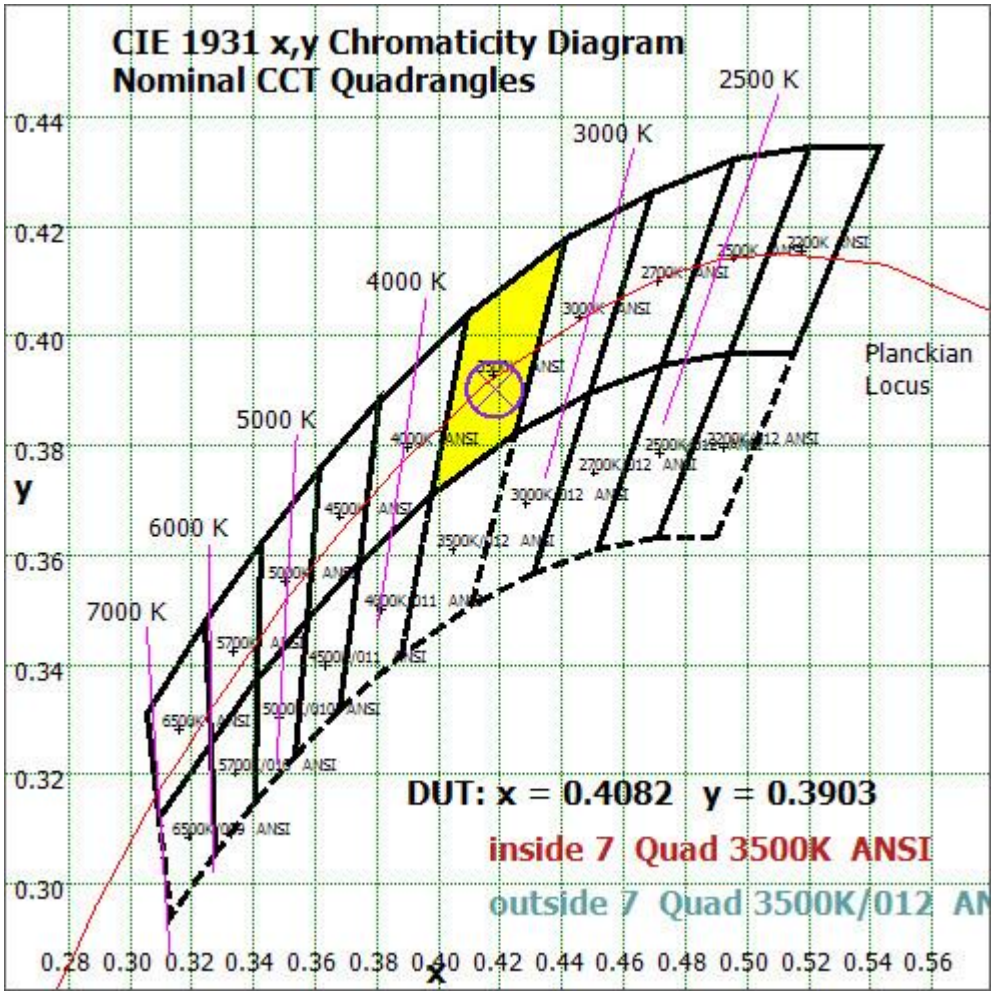


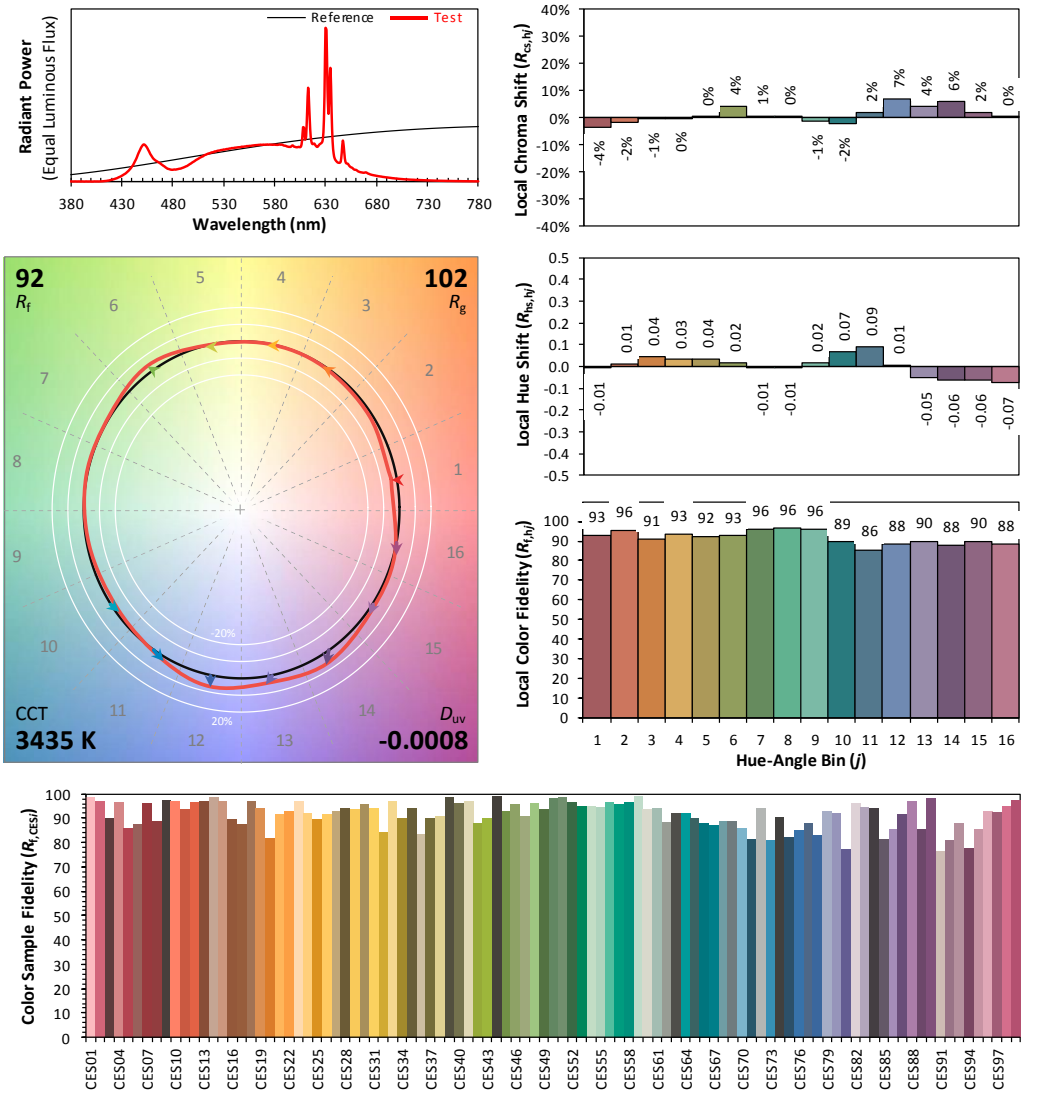
Chart14: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/11/04 **Model:** 11BR40DIM/9CCTS



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

x	0.4082
y	0.3903
u'	0.2377
v'	0.5115

CIE 13.3-1995 (CRI)

R_a	95
R_9	79

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)	0.107
Power Factor	0.8055
Test Power (W)	10.35
THD A%	74.98
Luminous Efficacy (lm/W)	129.9
Total Luminous Flux (lm)	1344.6
Color Rendering Index (CRI)	96.0
R9	84.6
Correlated Color Temperature (CCT)(K)	4039
Chromaticity Chroma x	0.3788
Chromaticity Chroma y	0.3762
Chromaticity Chroma u	0.2242
Chromaticity Chroma v	0.3340
Duv	0.0003
Chromaticity Chroma u ’	0.2242
Chromaticity Chroma v’	0.5011

Special Color Rendering Indices	
R1	98.4
R2	96.6
R3	92.1
R4	97.2
R5	96.3
R6	94.2
R7	97.7
R8	95.4
R9	84.6
R10	88.8
R11	95.5
R12	72.6
R13	97.8
R14	94.4

Table 12: Test data per Sphere-Spectroradiometer Method

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

Spectral Power Distribution - Sphere Spectroradiometer Method

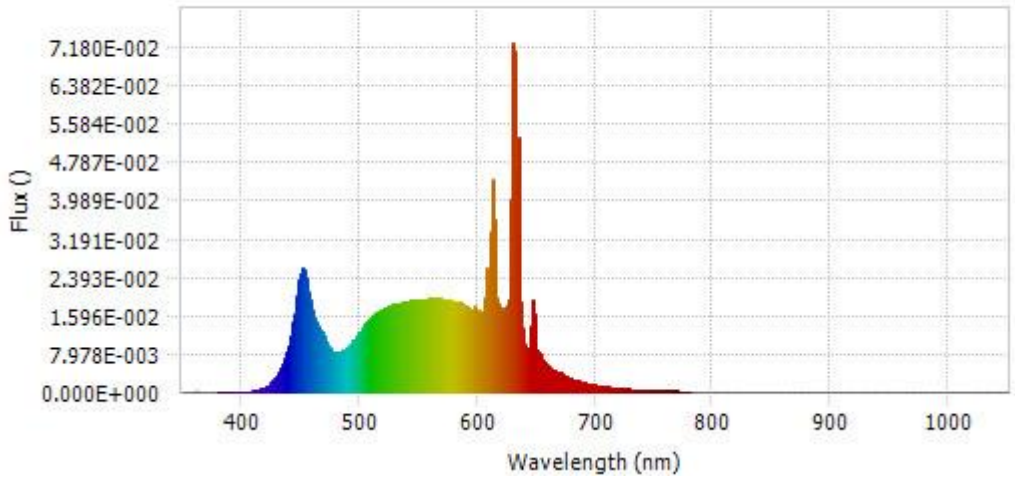
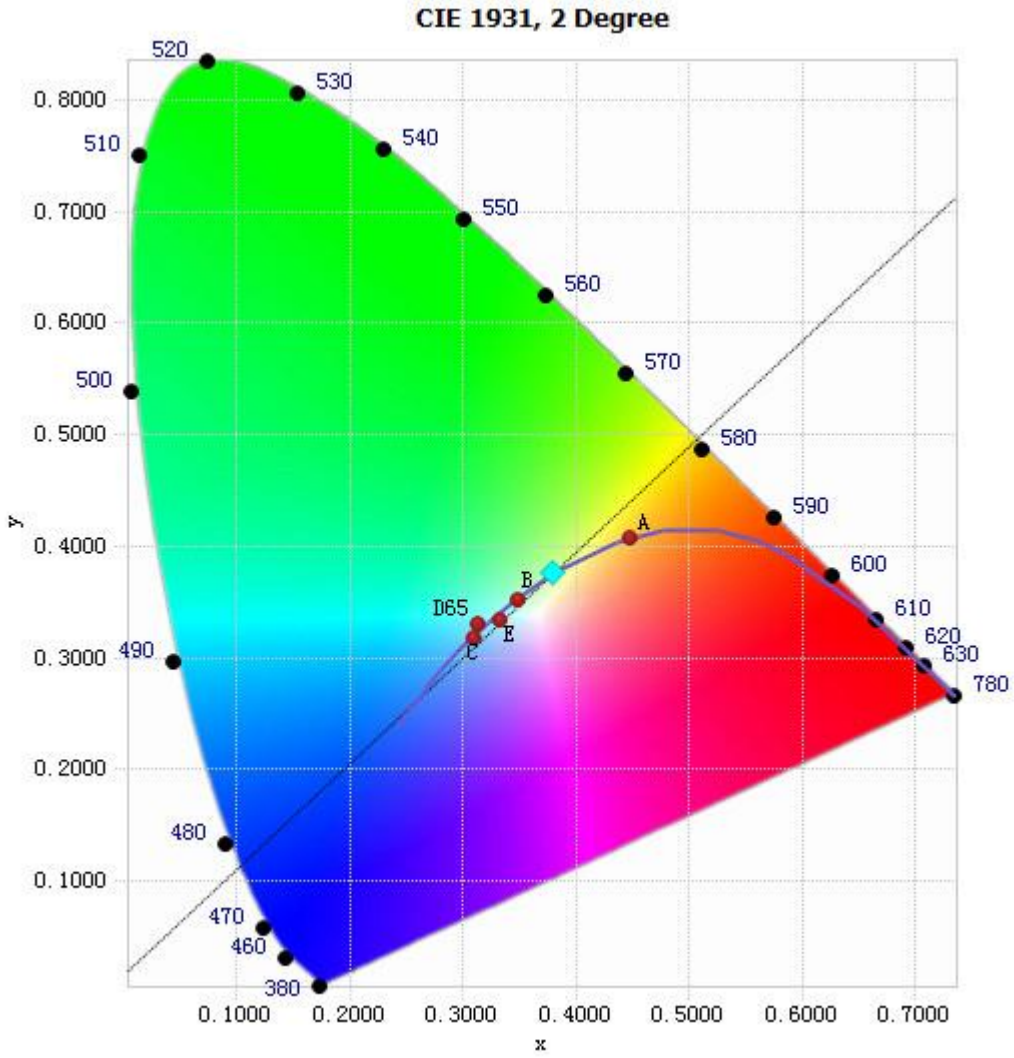


Chart16: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.74E-04	485	8.57E-03	590	1.80E-02	695	1.71E-03
385	8.20E-05	490	9.33E-03	595	1.72E-02	700	1.44E-03
390	1.26E-04	495	1.07E-02	600	1.70E-02	705	1.21E-03
395	1.27E-04	500	1.25E-02	605	1.68E-02	710	1.04E-03
400	7.74E-05	505	1.41E-02	610	2.02E-02	715	9.25E-04
405	9.75E-05	510	1.54E-02	615	2.48E-02	720	7.97E-04
410	1.93E-04	515	1.66E-02	620	1.74E-02	725	7.03E-04
415	4.31E-04	520	1.72E-02	625	1.79E-02	730	6.07E-04
420	9.60E-04	525	1.79E-02	630	7.25E-02	735	5.23E-04
425	1.96E-03	530	1.84E-02	635	5.29E-02	740	4.58E-04
430	3.46E-03	535	1.85E-02	640	1.01E-02	745	3.92E-04
435	5.76E-03	540	1.89E-02	645	9.53E-03	750	3.42E-04
440	9.55E-03	545	1.91E-02	650	8.89E-03	755	2.91E-04
445	1.63E-02	550	1.92E-02	655	6.79E-03	760	2.54E-04
450	2.44E-02	555	1.94E-02	660	5.52E-03	765	2.25E-04
455	2.37E-02	560	1.94E-02	665	4.40E-03	770	1.96E-04
460	1.70E-02	565	1.94E-02	670	4.33E-03	775	1.71E-04
465	1.39E-02	570	1.93E-02	675	3.27E-03	780	1.49E-04
470	1.15E-02	575	1.91E-02	680	2.77E-03		
475	9.03E-03	580	1.89E-02	685	2.37E-03		
480	8.19E-03	585	1.87E-02	690	2.04E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3788, 0.3762)

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

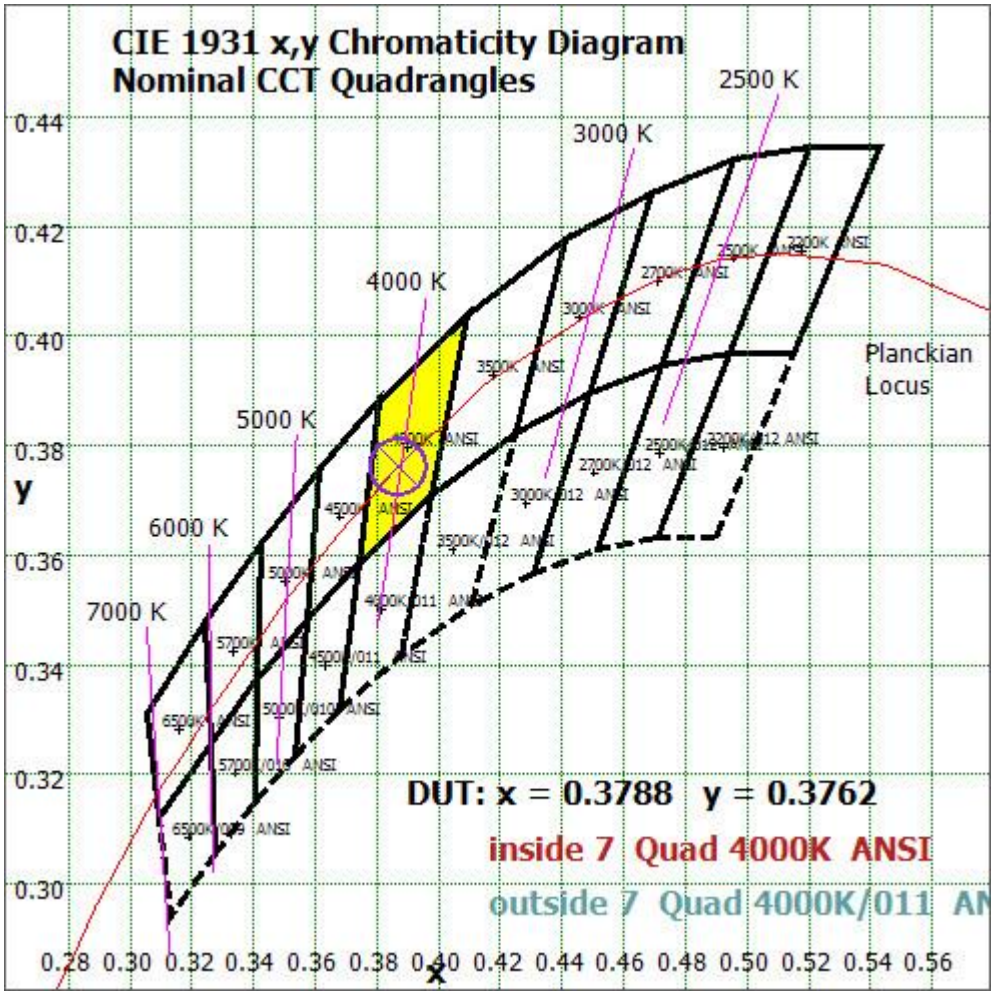


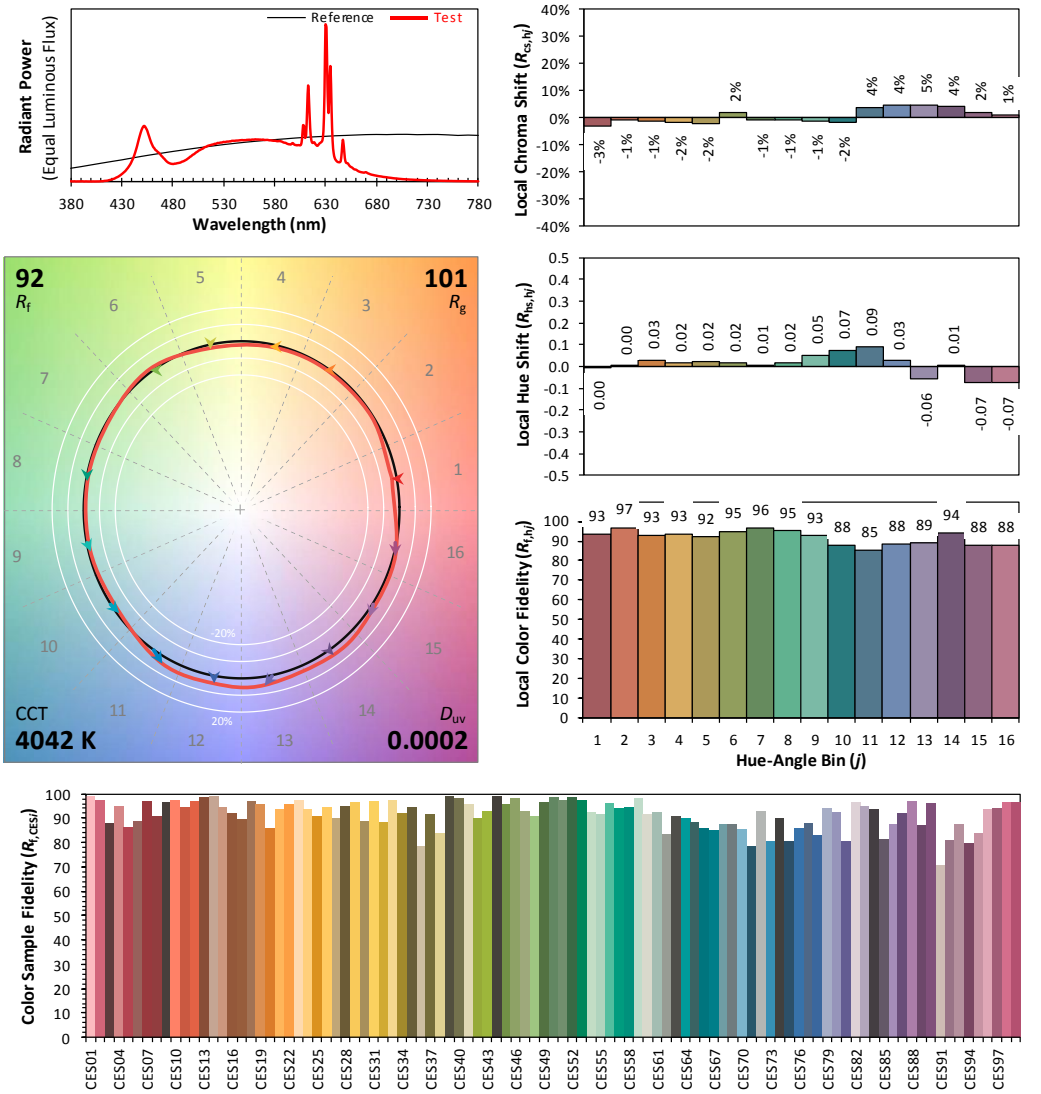
Chart 18: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/11/04 **Model:** 11BR40DIM/9CCTS



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

x	0.3788
y	0.3762
u'	0.2242
v'	0.5011

CIE 13.3-1995 (CRI)

R_a	96
R_9	85

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)	0.105
Power Factor	0.7860
Test Power (W)	9.91
THD A%	78.29
Luminous Efficacy (lm/W)	124.5
Total Luminous Flux (lm)	1233.5
Color Rendering Index (CRI)	93.9
R9	76
Correlated Color Temperature (CCT)(K)	5126
Chromaticity Chroma x	0.3423
Chromaticity Chroma y	0.3588
Chromaticity Chroma u	0.2068
Chromaticity Chroma v	0.3251
Duv	0.0047
Chromaticity Chroma u ’	0.2068
Chromaticity Chroma v’	0.4877

Special Color Rendering Indices	
R1	95
R2	94.5
R3	92.3
R4	95
R5	93.5
R6	91.8
R7	96.8
R8	92.5
R9	76
R10	85.1
R11	94
R12	70.8
R13	94.6
R14	95.2

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

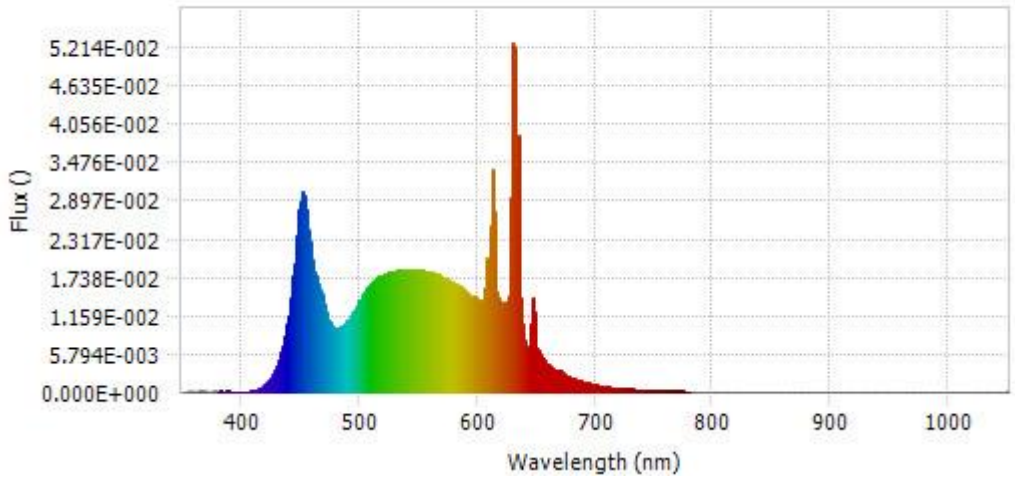
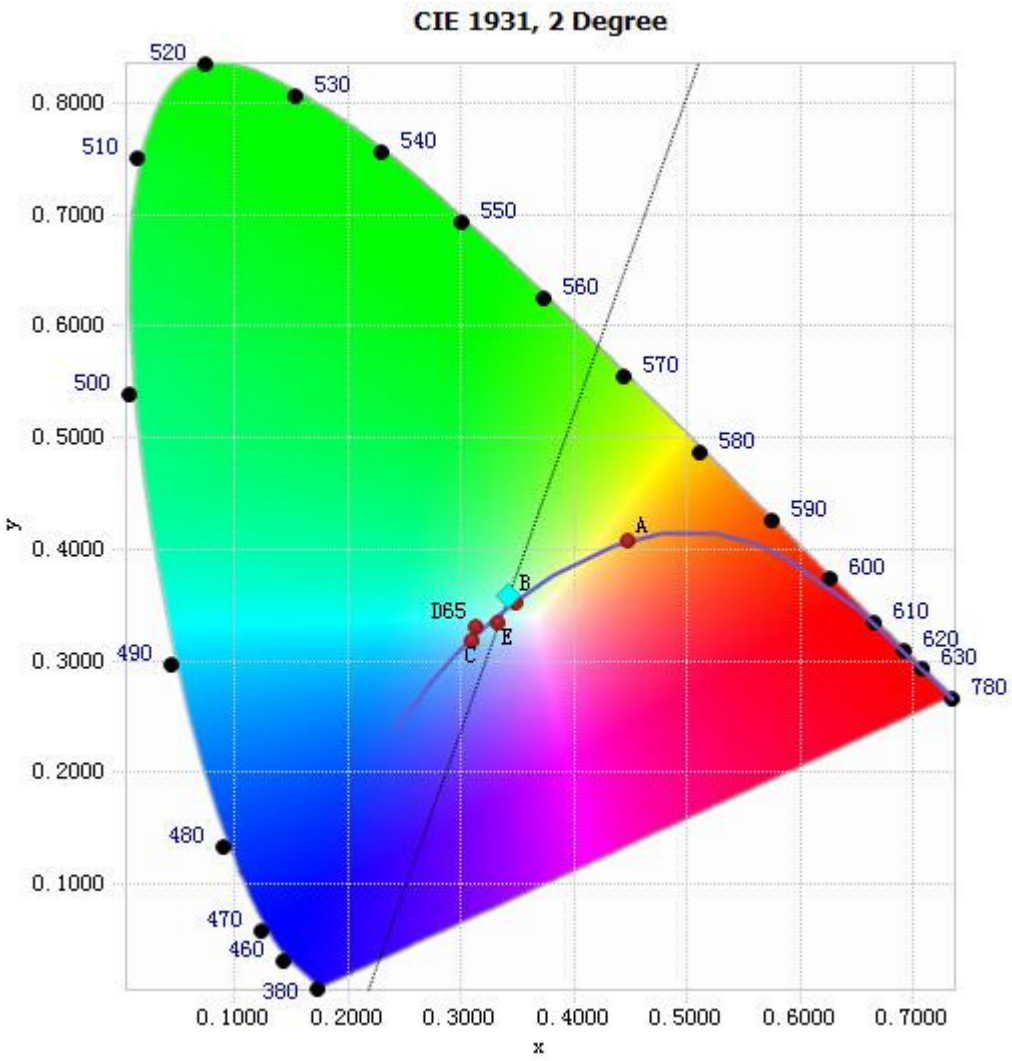


Chart 20: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.27E-04	485	9.97E-03	590	1.52E-02	695	1.31E-03
385	1.20E-04	490	1.08E-02	595	1.44E-02	700	1.10E-03
390	1.13E-04	495	1.22E-02	600	1.40E-02	705	9.24E-04
395	9.50E-05	500	1.39E-02	605	1.36E-02	710	8.12E-04
400	1.00E-04	505	1.53E-02	610	1.59E-02	715	7.17E-04
405	1.09E-04	510	1.63E-02	615	1.92E-02	720	6.18E-04
410	1.83E-04	515	1.73E-02	620	1.36E-02	725	5.45E-04
415	5.04E-04	520	1.77E-02	625	1.37E-02	730	4.75E-04
420	1.16E-03	525	1.81E-02	630	5.27E-02	735	4.04E-04
425	2.21E-03	530	1.83E-02	635	3.88E-02	740	3.51E-04
430	4.03E-03	535	1.84E-02	640	7.77E-03	745	3.12E-04
435	6.84E-03	540	1.85E-02	645	7.23E-03	750	2.61E-04
440	1.15E-02	545	1.85E-02	650	6.79E-03	755	2.39E-04
445	1.95E-02	550	1.84E-02	655	5.22E-03	760	2.00E-04
450	2.88E-02	555	1.83E-02	660	4.27E-03	765	1.82E-04
455	2.77E-02	560	1.81E-02	665	3.39E-03	770	1.61E-04
460	2.01E-02	565	1.79E-02	670	3.30E-03	775	1.28E-04
465	1.64E-02	570	1.74E-02	675	2.54E-03	780	1.24E-04
470	1.34E-02	575	1.70E-02	680	2.10E-03		
475	1.05E-02	580	1.65E-02	685	1.83E-03		
480	9.61E-03	585	1.61E-02	690	1.55E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3423, 0.3588)

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

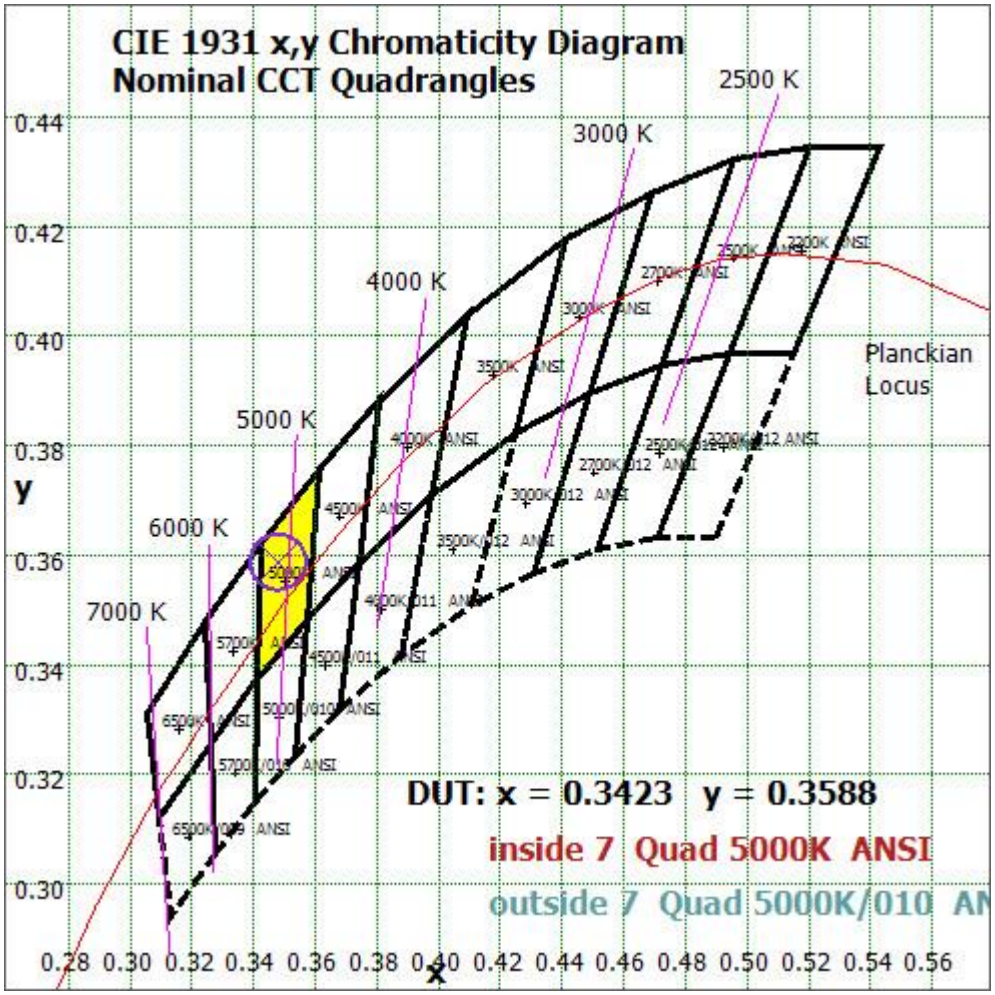


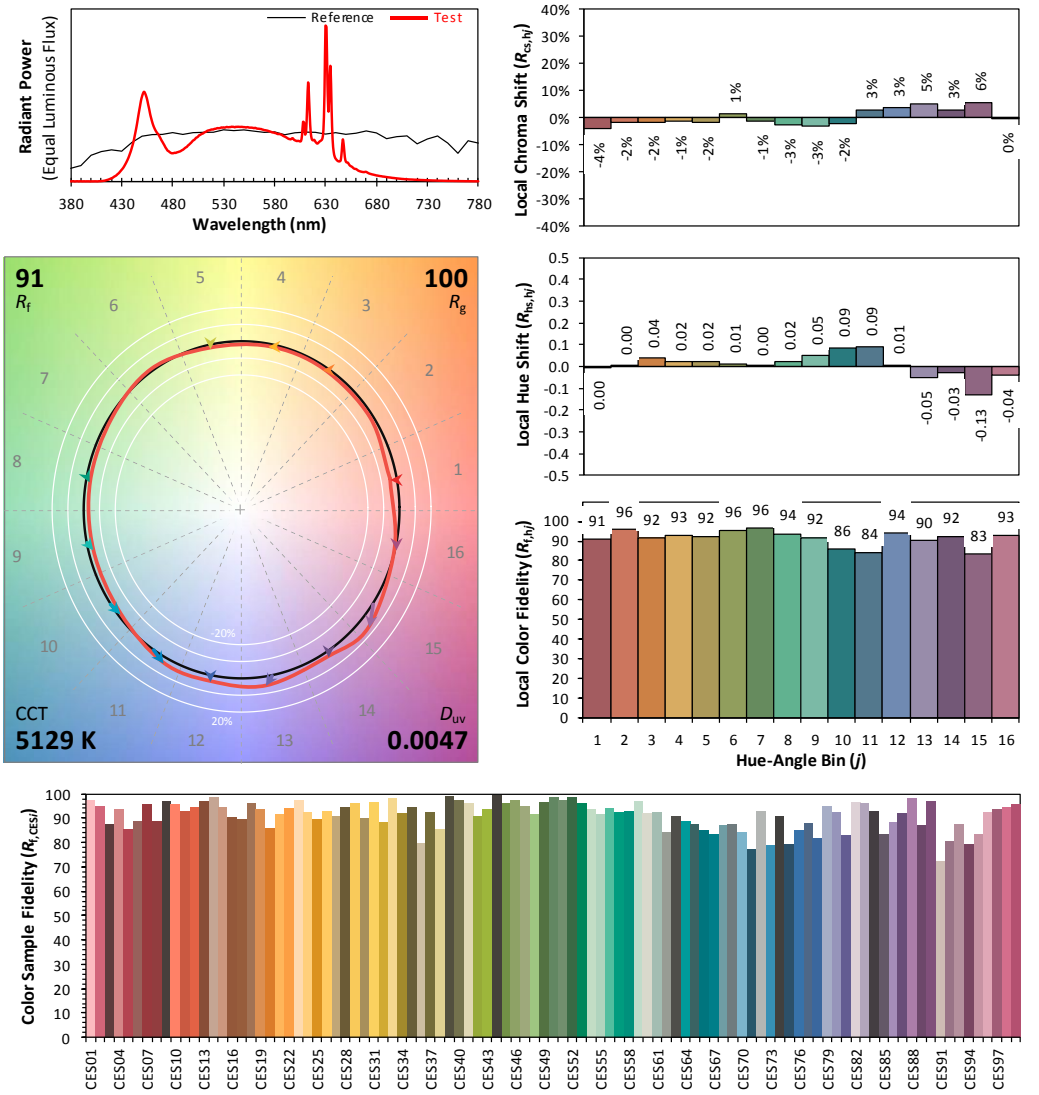
Chart 22: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/11/04 **Model:** 11BR40DIM/9CCTS



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

x	0.3423
y	0.3588
u'	0.2068
v'	0.4877

CIE 13.3-1995 (CRI)

R_a	94
R_9	76

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 ***