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: 9PAR30DIM/9CCTS/BAS

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ23110050g

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

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Jan. 02, 2024

Approved by: April Zou

Manager: April Zou

Jan. 02, 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	9PAR30DIM/9CCTS /BAS 2700K 25° Setting	9PAR30DIM/9CCTS /BAS 2700K 40° Setting	9PAR30DIM/9CCTS/ BAS 5000K 25° Setting	9PAR30DIM/9CCTS /BAS 5000K 40° Setting
Luminous Efficacy (Lumens /Watt)	107.3	110.0	117.2	118.8
Total Luminous Flux (Lumens)	908.6	929.6	995.3	1008.8
Power (Watts)	8.47	8.45	8.49	8.49
Power Factor	0.9767	0.9766	0.9769	0.9768
CCT (K)	2761	2760	5167	5193
CRI	93.6	93.6	94.6	94.4
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins	50 mins
Note	2700K	2700K	5000K	5000K

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Nov. 27, 2023

Date of Test : Nov. 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 Lamp
Model	: 9PAR30DIM/9CCTS/BAS
Electrical Ratings	: 120-277V, 60Hz, 9W
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 of Model 9PAR30DIM/9CCTS/BAS（2700K 25°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)	0.072
Power Factor	0.9767
Test Power (W)	8.47
THD A%	12.51
Luminous Efficacy (lm/W)	107.3
Total Luminous Flux (lm)	908.6
Color Rendering Index (CRI)	93.6
R9	56
Correlated Color Temperature (CCT)(K)	2761
Chromaticity Chroma x	0.4545
Chromaticity Chroma y	0.4088
Chromaticity Chroma u	0.2598
Chromaticity Chroma v	0.3506
Duv	-0.0002
Chromaticity Chroma u ’	0.2598
Chromaticity Chroma v’	0.5259

Special Color Rendering Indices	
R1	97.3
R2	98.9
R3	94.9
R4	98.2
R5	98.7
R6	92.9
R7	89
R8	79
R9	56
R10	97.1
R11	95.7
R12	89.8
R13	99.1
R14	97.8

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

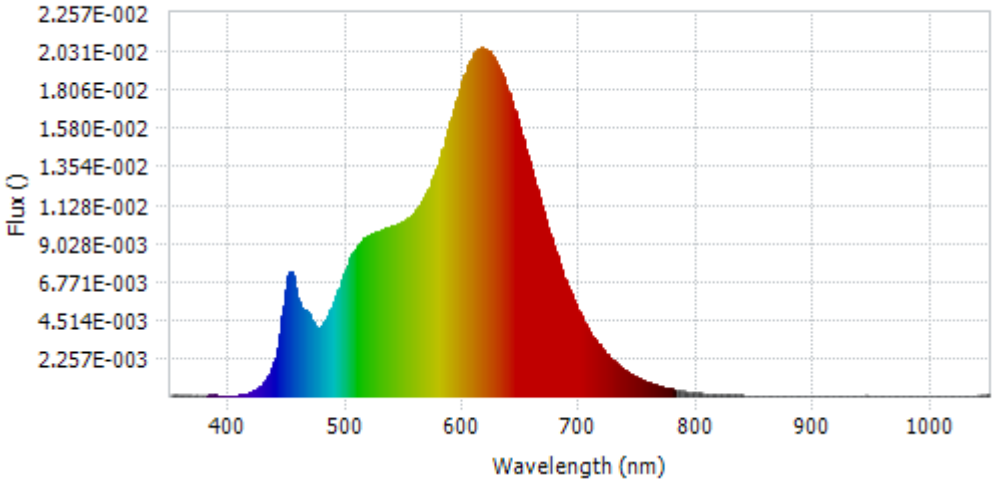
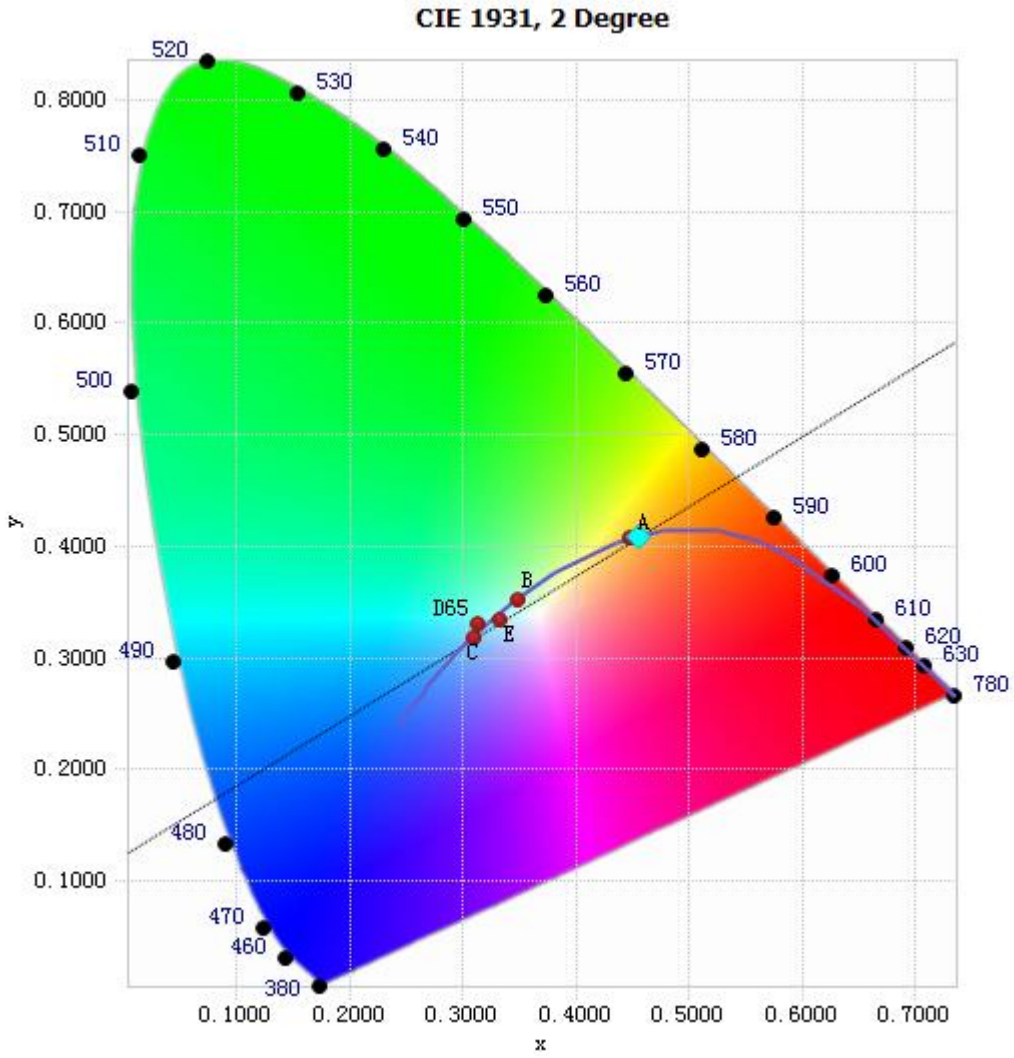


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	6.17E-05	485	4.93E-03	590	1.65E-02	695	5.54E-03
385	4.69E-05	490	5.71E-03	595	1.76E-02	700	4.81E-03
390	5.64E-05	495	6.71E-03	600	1.88E-02	705	4.17E-03
395	6.14E-05	500	7.63E-03	605	1.96E-02	710	3.59E-03
400	4.59E-05	505	8.36E-03	610	2.02E-02	715	3.11E-03
405	5.82E-05	510	8.82E-03	615	2.05E-02	720	2.68E-03
410	1.01E-04	515	9.31E-03	620	2.04E-02	725	2.30E-03
415	1.83E-04	520	9.43E-03	625	2.00E-02	730	1.98E-03
420	3.05E-04	525	9.64E-03	630	1.94E-02	735	1.69E-03
425	5.12E-04	530	9.79E-03	635	1.86E-02	740	1.45E-03
430	8.63E-04	535	9.86E-03	640	1.76E-02	745	1.24E-03
435	1.44E-03	540	1.00E-02	645	1.65E-02	750	1.05E-03
440	2.57E-03	545	1.02E-02	650	1.53E-02	755	8.93E-04
445	4.68E-03	550	1.03E-02	655	1.41E-02	760	7.70E-04
450	7.09E-03	555	1.06E-02	660	1.29E-02	765	6.55E-04
455	6.75E-03	560	1.10E-02	665	1.17E-02	770	5.63E-04
460	5.39E-03	565	1.15E-02	670	1.04E-02	775	4.71E-04
465	5.08E-03	570	1.22E-02	675	9.30E-03	780	4.06E-04
470	4.52E-03	575	1.30E-02	680	8.24E-03		
475	4.01E-03	580	1.41E-02	685	7.29E-03		
480	4.29E-03	585	1.53E-02	690	6.37E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4545, 0.4088)

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

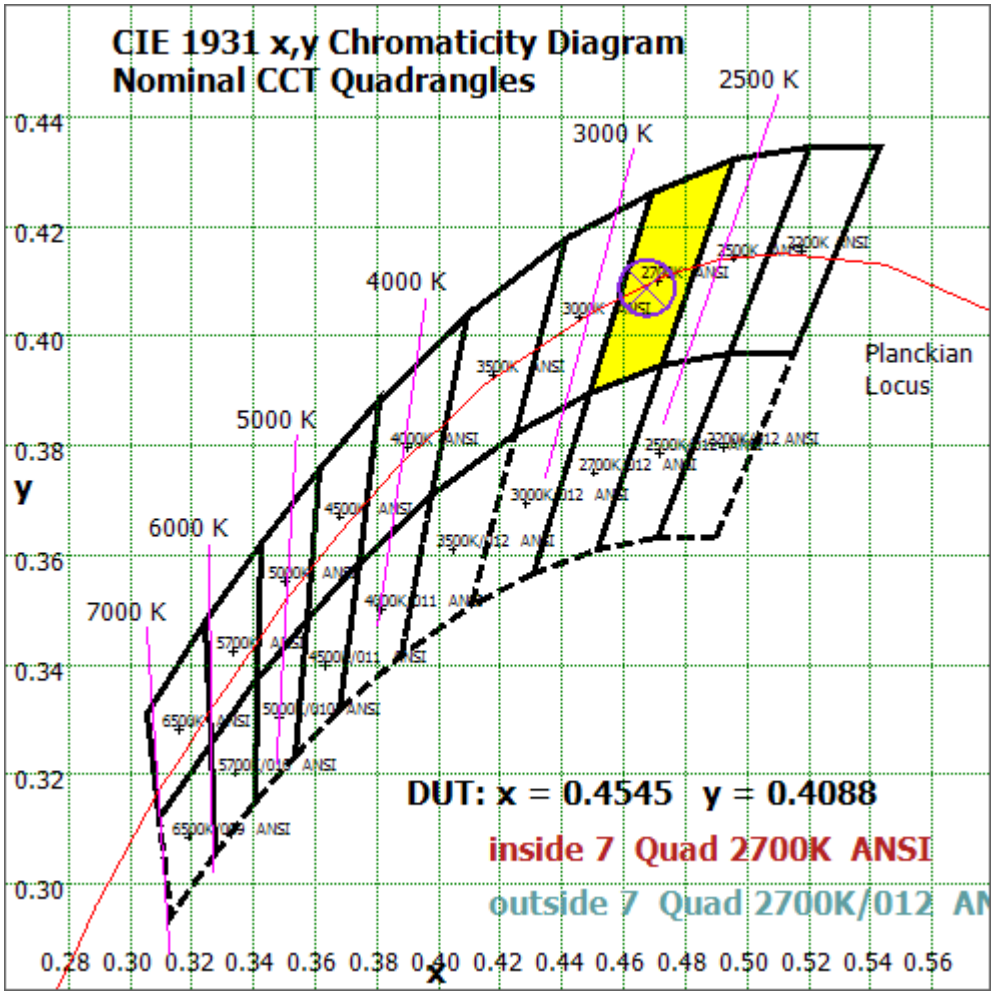


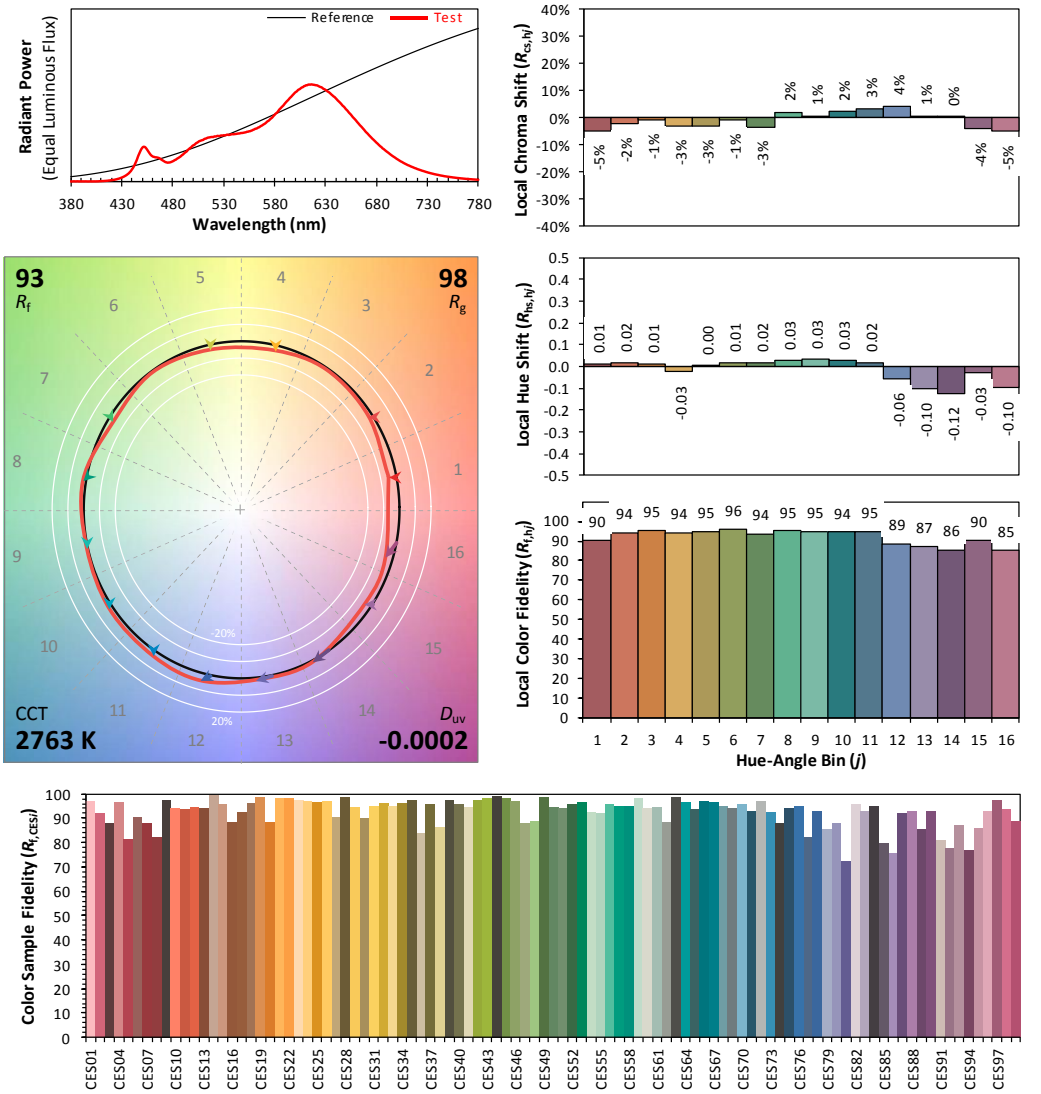
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/11/30 **Model:** 9PAR30DIM/9CCTS/BAS



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.4545
	y	0.4088
	u'	0.2598
	v'	0.5259

CIE 13.3-1995 (CRI)	
R_a	94
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 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)	0.073
Power Factor	0.9766
Power (W)	8.51
Luminous Efficacy (lm/W)	108.1
Total Luminous Flux (lm)	919.9
Beam Angle (°)	25.7 (0^o-180^o) / 25.5 (90^o-270^o)
Center Beam Candle Power (cd)	2944
Maximum Beam Candle Power (cd)	2944 (At: C=0.0, Gamma=0.0)
Spacing Criteria	0.43 (0^o-180^o) / 0.44 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	95.61%
Zonal Lumens in the 60 °-90 °Zone	4.24%
Zonal Lumens in the 90 °-120 °Zone	0.03%
Zonal Lumens in the 120 °-180 °Zone	0.11%

Table 4: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	227.743	24.76%
10- 20	316.015	34.35%
20- 30	161.291	17.53%
30- 40	86.662	9.42%
40- 50	51.707	5.62%
50- 60	36.143	3.93%
60- 70	23.402	2.54%
70- 80	11.977	1.30%
80- 90	3.606	0.39%
90-100	0.3	0.03%
100-110	0.006	0.00%
110-120	0.012	0.00%
120-130	0.039	0.00%
130-140	0.119	0.01%
140-150	0.251	0.03%
150-160	0.319	0.03%
160-170	0.247	0.03%
170-180	0.082	0.01%
Total	919.9	100%

γ(°)	Lumens	% Total
0- 60	879.561	95.61%
60- 90	38.985	4.24%
0-90	918.546	99.85%
90- 180	1.375	0.15%
0- 180	919.9	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

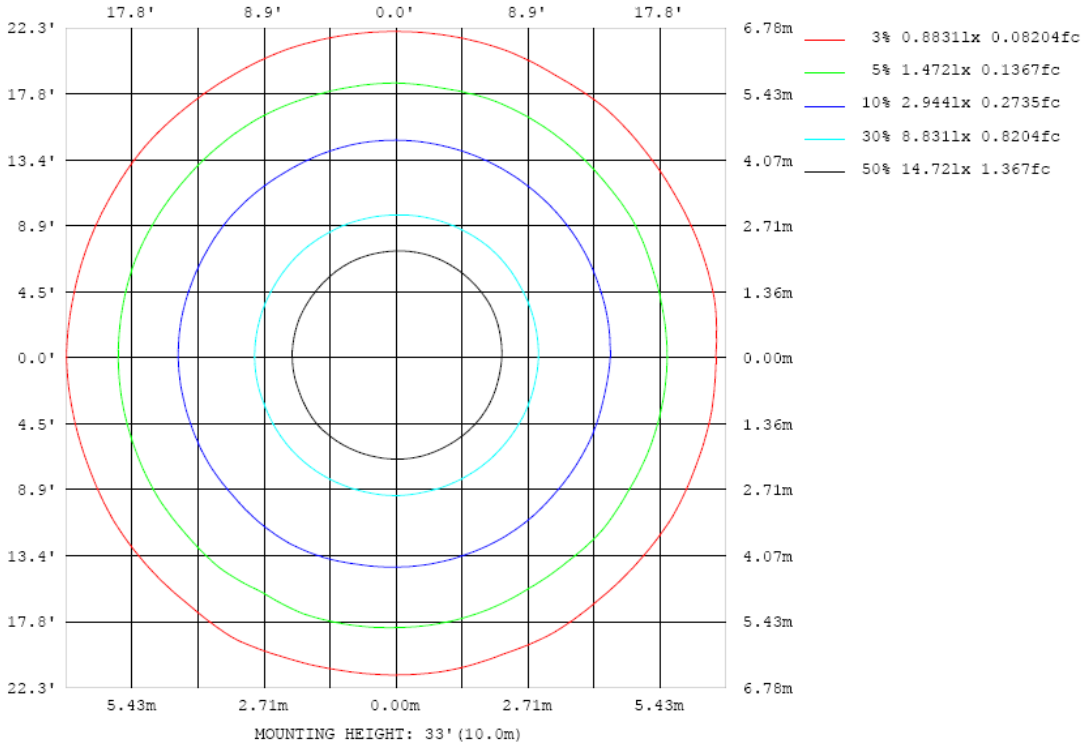


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

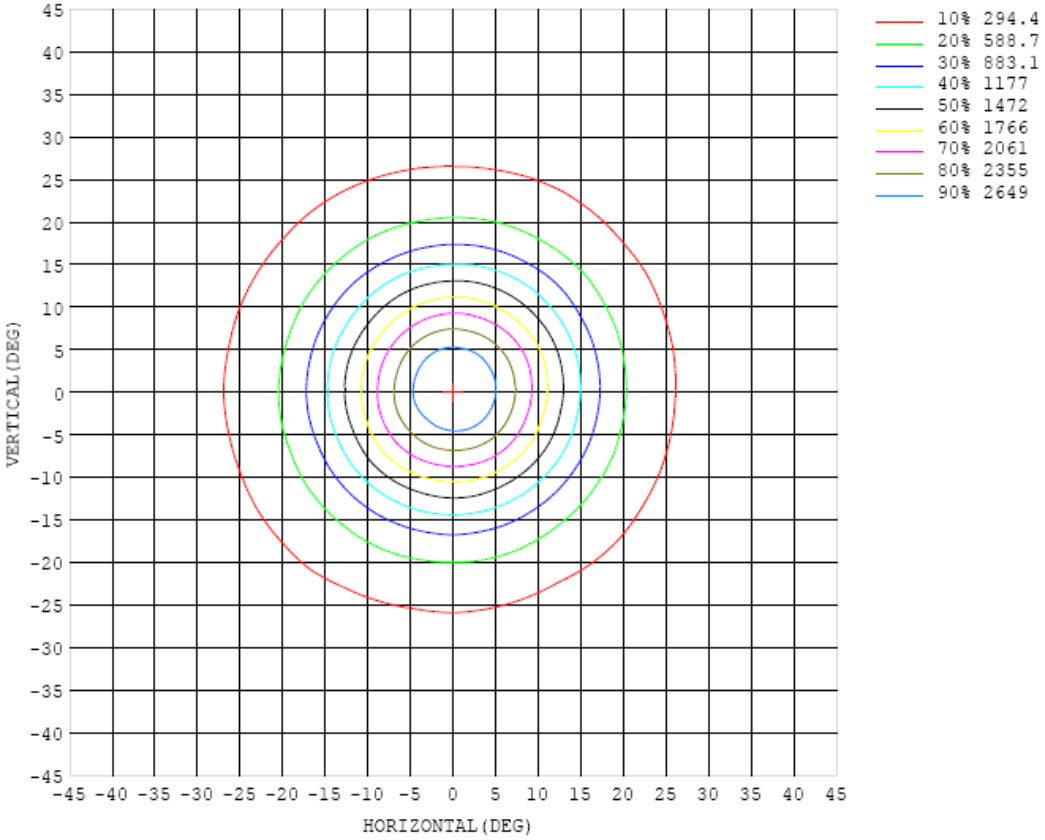


Chart 6: Isocandela Plot

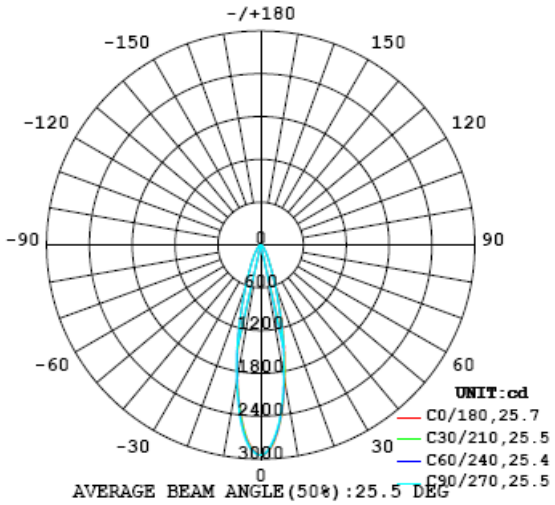


Chart 7: Polar Candela Distribution

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	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944
5	2653	2647	2639	2636	2632	2626	2621	2618	2609	2599	2594	2592	2587	2584	2585	2596	2608	2612	2613
10	1940	1920	1909	1911	1903	1892	1878	1868	1858	1848	1846	1858	1868	1877	1892	1882	1878	1887	1887
15	1173	1152	1142	1131	1116	1111	1102	1094	1091	1100	1096	1101	1106	1113	1120	1121	1124	1140	1146
20	617	603	602	589	583	576	580	587	590	586	591	598	602	602	607	611	607	621	626
25	331	325	323	319	317	315	308	310	314	319	316	325	333	339	338	343	343	348	355
30	204	202	199	196	198	193	198	198	198	200	203	208	204	210	211	215	216	218	220
35	133	132	131	131	128	129	126	126	128	129	129	129	136	134	138	140	140	142	144
40	88.8	88.0	86.2	85.9	83.8	84.2	85.6	86.3	85.8	86.8	86.9	88.9	88.9	91.7	92.5	92.3	93.2	95.1	96.7
45	65.1	65.0	65.0	64.2	64.3	63.9	63.6	63.6	64.1	64.3	64.3	64.4	65.1	65.5	65.4	66.0	66.7	67.1	68.0
50	51.3	51.6	51.6	51.4	51.4	50.8	50.5	50.5	50.5	50.4	50.3	50.5	50.7	51.0	51.5	51.4	51.2	51.3	51.5
55	41.0	40.9	40.9	40.6	40.4	40.5	40.3	40.1	40.3	40.3	40.3	40.3	40.3	40.2	40.0	40.0	39.8	40.1	40.3
60	31.9	32.2	32.3	32.1	31.9	31.6	31.4	31.3	31.1	31.0	31.1	31.4	31.5	31.3	31.1	30.9	30.9	31.0	31.1
65	24.3	24.4	24.5	24.5	24.2	24.0	23.8	23.8	23.7	23.6	23.6	23.7	23.7	23.5	23.4	23.2	23.2	23.1	23.1
70	17.6	17.6	17.8	17.8	17.7	17.5	17.3	17.3	17.2	17.1	17.0	16.9	16.9	16.8	16.7	16.6	16.5	16.4	16.3
75	11.9	12.0	12.1	12.1	12.0	11.9	11.7	11.7	11.6	11.5	11.3	11.2	11.2	11.1	11.0	10.9	10.8	10.6	10.5
80	7.16	7.23	7.38	7.39	7.33	7.15	7.03	7.04	6.94	6.80	6.64	6.49	6.43	6.35	6.26	6.17	6.05	5.93	5.82
85	3.56	3.61	3.70	3.72	3.65	3.53	3.45	3.42	3.35	3.26	3.13	3.02	2.95	2.88	2.82	2.76	2.68	2.59	2.56
90	1.32	1.33	1.37	1.37	1.32	1.28	1.23	1.20	1.15	1.10	1.03	0.97	0.92	0.88	0.84	0.80	0.76	0.72	0.73
95	0.26	0.27	0.27	0.27	0.25	0.23	0.21	0.19	0.18	0.16	0.13	0.11	0.09	0.07	0.06	0.05	0.05	0.04	0.05
100	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
115	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
120	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
125	0.03	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
130	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.10
135	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.18
140	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.24	0.24	0.24	0.23	0.29
145	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.34	0.33	0.44
150	0.41	0.42	0.43	0.44	0.45	0.45	0.46	0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.44	0.59
155	0.49	0.51	0.52	0.53	0.54	0.54	0.55	0.56	0.57	0.57	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.55	0.71
160	0.57	0.59	0.60	0.61	0.62	0.63	0.64	0.65	0.66	0.66	0.67	0.67	0.67	0.67	0.67	0.67	0.66	0.65	0.75
165	0.65	0.66	0.67	0.68	0.69	0.70	0.71	0.71	0.72	0.73	0.73	0.74	0.75	0.75	0.75	0.74	0.74	0.72	0.70
170	0.71	0.72	0.72	0.73	0.74	0.75	0.76	0.77	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.79	0.78	0.77	0.75
175	0.75	0.75	0.76	0.76	0.77	0.77	0.78	0.79	0.79	0.79	0.79	0.79	0.79	0.80	0.81	0.81	0.83	0.85	0.87
180	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76

Table 6: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944	2944		
5	2613	2617	2627	2641	2654	2665	2676	2681	2680	2682	2682	2684	2680	2671	2667	2666	2661		
10	1891	1896	1901	1905	1910	1920	1926	1940	1948	1951	1951	1956	1971	1978	1979	1974	1955		
15	1148	1153	1145	1153	1167	1172	1175	1172	1175	1191	1197	1207	1206	1200	1197	1194	1181		
20	618	614	618	616	618	625	622	623	631	633	632	630	634	638	626	627	618		
25	355	352	349	350	348	346	348	349	349	347	347	346	345	343	344	338	338		
30	220	221	218	216	215	214	213	212	213	209	213	210	211	209	210	207	203		
35	143	143	141	142	141	140	140	139	139	139	140	139	137	136	135	134	136		
40	96.3	95.9	95.0	93.5	93.3	93.6	92.5	91.8	92.1	94.0	93.8	93.0	94.0	93.2	92.5	91.0	90.0		
45	68.5	68.3	67.5	67.0	66.6	65.4	65.3	65.5	66.2	65.9	66.2	66.5	65.8	65.4	65.3	65.2	65.0		
50	51.5	51.5	51.2	51.1	50.6	50.4	50.1	50.1	50.3	50.7	51.1	51.4	51.5	51.3	51.2	51.3	51.4		
55	40.2	39.9	39.9	39.7	39.6	39.3	39.3	39.3	39.4	39.8	40.3	40.5	40.5	40.6	40.5	40.5	40.8		
60	30.8	30.8	30.7	30.6	30.4	30.4	30.3	30.3	30.5	30.7	31.2	31.4	31.4	31.4	31.4	31.6	31.8		
65	23.0	23.1	23.0	22.9	22.7	22.6	22.7	22.7	22.8	23.1	23.4	23.6	23.7	23.7	23.9	24.0	24.2		
70	16.3	16.2	16.2	16.1	16.1	16.1	16.2	16.3	16.4	16.5	16.7	16.9	17.0	17.1	17.3	17.5	17.6		
75	10.4	10.4	10.4	10.4	10.3	10.4	10.5	10.7	10.8	10.9	11.0	11.2	11.4	11.5	11.7	11.8	11.8		
80	5.76	5.78	5.80	5.78	5.76	5.82	5.98	6.11	6.21	6.31	6.40	6.59	6.77	6.95	7.09	7.14	7.17		
85	2.52	2.52	2.52	2.53	2.54	2.60	2.70	2.81	2.90	2.97	3.03	3.16	3.30	3.43	3.53	3.59	3.61		
90	0.71	0.71	0.72	0.72	0.74	0.76	0.81	0.87	0.92	0.97	1.01	1.08	1.15	1.22	1.29	1.32	1.34		
95	0.05	0.06	0.06	0.06	0.07	0.08	0.09	0.11	0.13	0.14	0.15	0.17	0.19	0.21	0.24	0.25	0.26		
100	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02		
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00		
110	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
115	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01		
120	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
125	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		
130	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07		
135	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.14		
140	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.26		
145	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.45	0.46	0.42		
150	0.69	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.66	0.66	0.67	0.58		
155	0.89	0.89	0.89	0.89	0.88	0.88	0.87	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.84	0.87	0.72		
160	1.05	1.04	1.05	1.05	1.04	1.04	1.03	1.02	1.01	1.00	1.00	0.99	0.99	0.98	0.98	1.00	0.77		
165	1.13	1.12	1.13	1.13	1.13	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.06	1.06	1.04	0.75		
170	1.01	1.06	1.09	1.10	1.10	1.09	1.09	1.09	1.09	1.08	1.08	1.07	1.07	1.06	1.08	0.96	0.70		
175	0.89	0.89	0.79	0.84	0.86	0.88	0.90	0.92	0.93	0.94	0.95	0.97	0.98	0.95	0.85	0.73	0.74		
180	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76		

Table 7: Luminous Intensity Data

TEST RESULTS of Model 9PAR30DIM/9CCTS/BAS（2700K 40°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)	0.072
Power Factor	0.9766
Test Power (W)	8.45
THD A%	12.46
Luminous Efficacy (lm/W)	110.0
Total Luminous Flux (lm)	929.6
Color Rendering Index (CRI)	93.6
R9	55.7
Correlated Color Temperature (CCT)(K)	2760
Chromaticity Chroma x	0.4545
Chromaticity Chroma y	0.4087
Chromaticity Chroma u	0.2598
Chromaticity Chroma v	0.3505
Duv	-0.0002
Chromaticity Chroma u ’	0.2598
Chromaticity Chroma v’	0.5258

Special Color Rendering Indices	
R1	97.2
R2	99
R3	95
R4	98.2
R5	98.6
R6	93.1
R7	89
R8	78.9
R9	55.7
R10	97.5
R11	95.7
R12	90.1
R13	99
R14	97.9

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

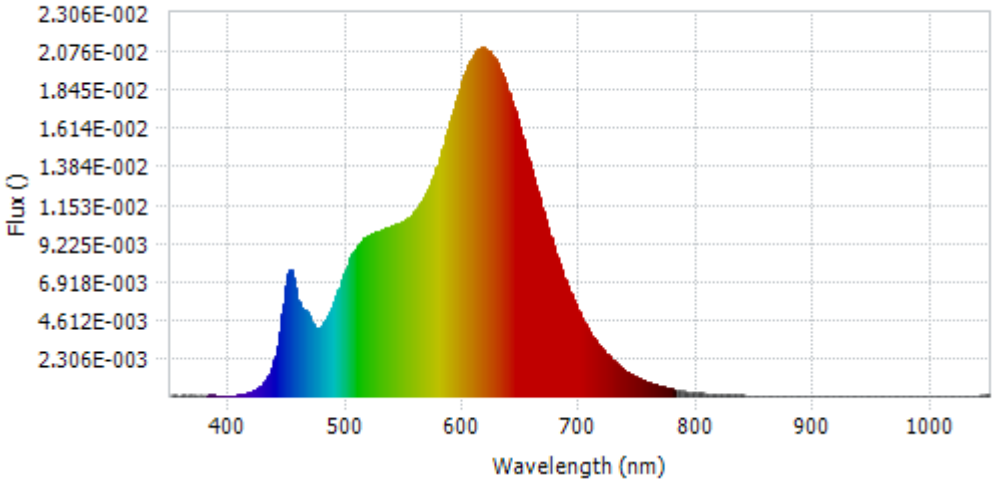
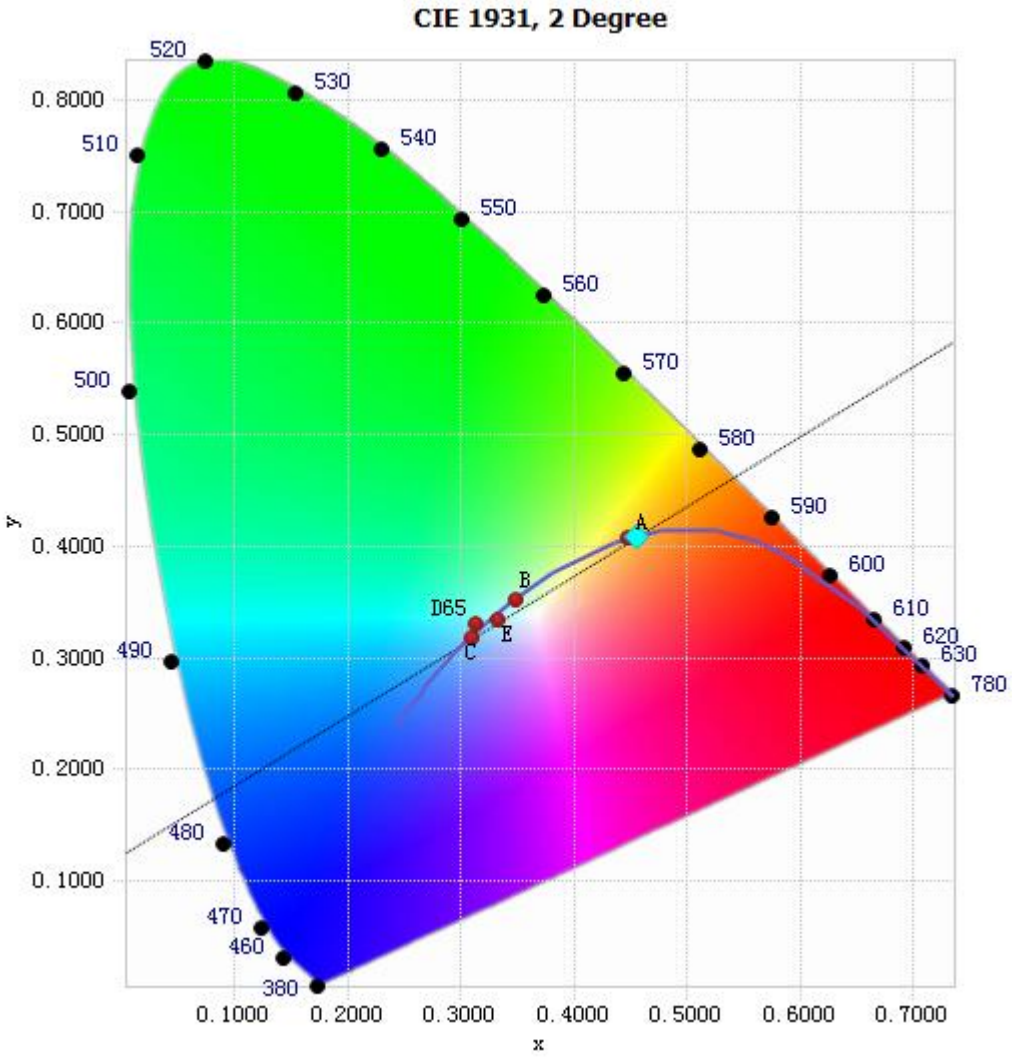


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	6.71E-05	485	4.97E-03	590	1.69E-02	695	5.64E-03
385	5.47E-05	490	5.80E-03	595	1.81E-02	700	4.90E-03
390	5.55E-05	495	6.82E-03	600	1.92E-02	705	4.23E-03
395	5.38E-05	500	7.78E-03	605	2.00E-02	710	3.66E-03
400	4.74E-05	505	8.52E-03	610	2.07E-02	715	3.18E-03
405	6.66E-05	510	9.05E-03	615	2.09E-02	720	2.74E-03
410	1.05E-04	515	9.51E-03	620	2.08E-02	725	2.36E-03
415	1.88E-04	520	9.62E-03	625	2.04E-02	730	2.02E-03
420	3.24E-04	525	9.88E-03	630	1.98E-02	735	1.72E-03
425	5.38E-04	530	1.01E-02	635	1.90E-02	740	1.48E-03
430	9.02E-04	535	1.01E-02	640	1.80E-02	745	1.26E-03
435	1.53E-03	540	1.03E-02	645	1.69E-02	750	1.08E-03
440	2.68E-03	545	1.04E-02	650	1.57E-02	755	9.14E-04
445	4.93E-03	550	1.06E-02	655	1.44E-02	760	7.88E-04
450	7.35E-03	555	1.09E-02	660	1.32E-02	765	6.72E-04
455	6.90E-03	560	1.13E-02	665	1.19E-02	770	5.71E-04
460	5.49E-03	565	1.18E-02	670	1.06E-02	775	4.85E-04
465	5.13E-03	570	1.25E-02	675	9.49E-03	780	4.16E-04
470	4.53E-03	575	1.33E-02	680	8.39E-03		
475	4.01E-03	580	1.43E-02	685	7.41E-03		
480	4.33E-03	585	1.57E-02	690	6.52E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4545, 0.4087)

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

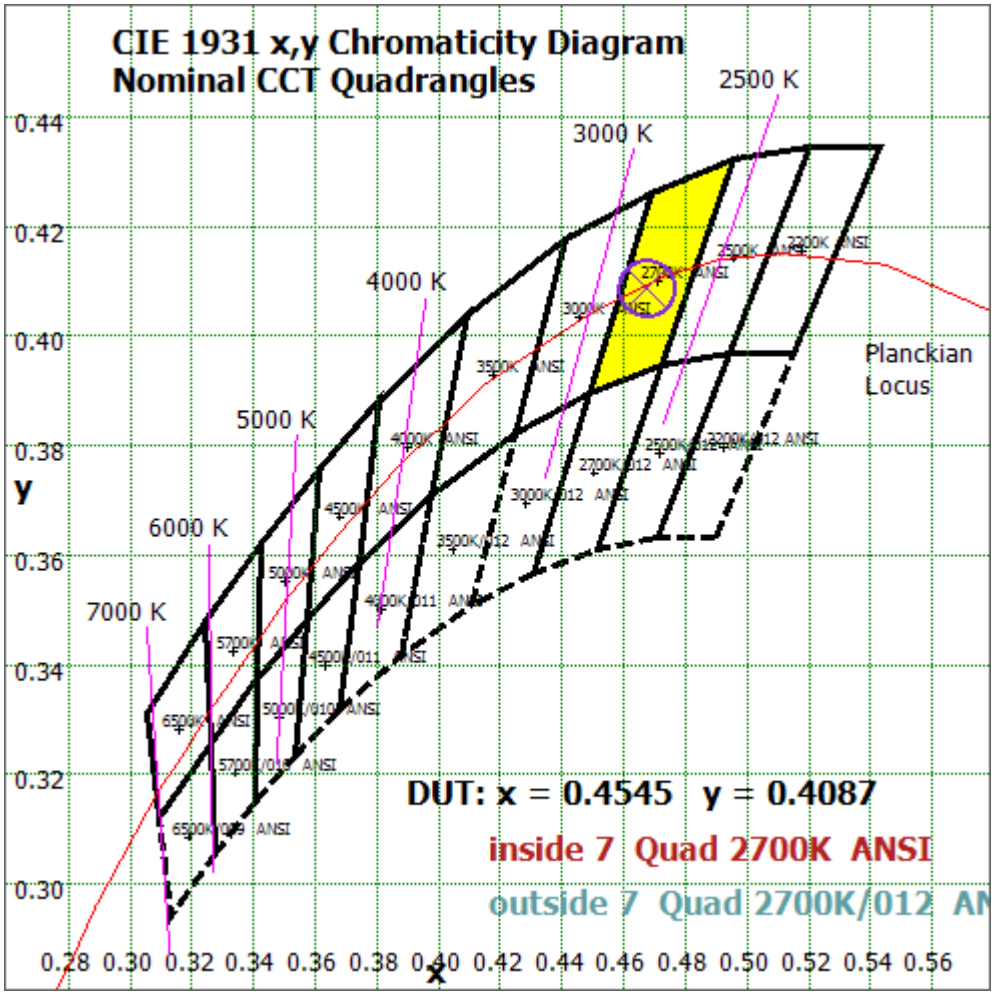


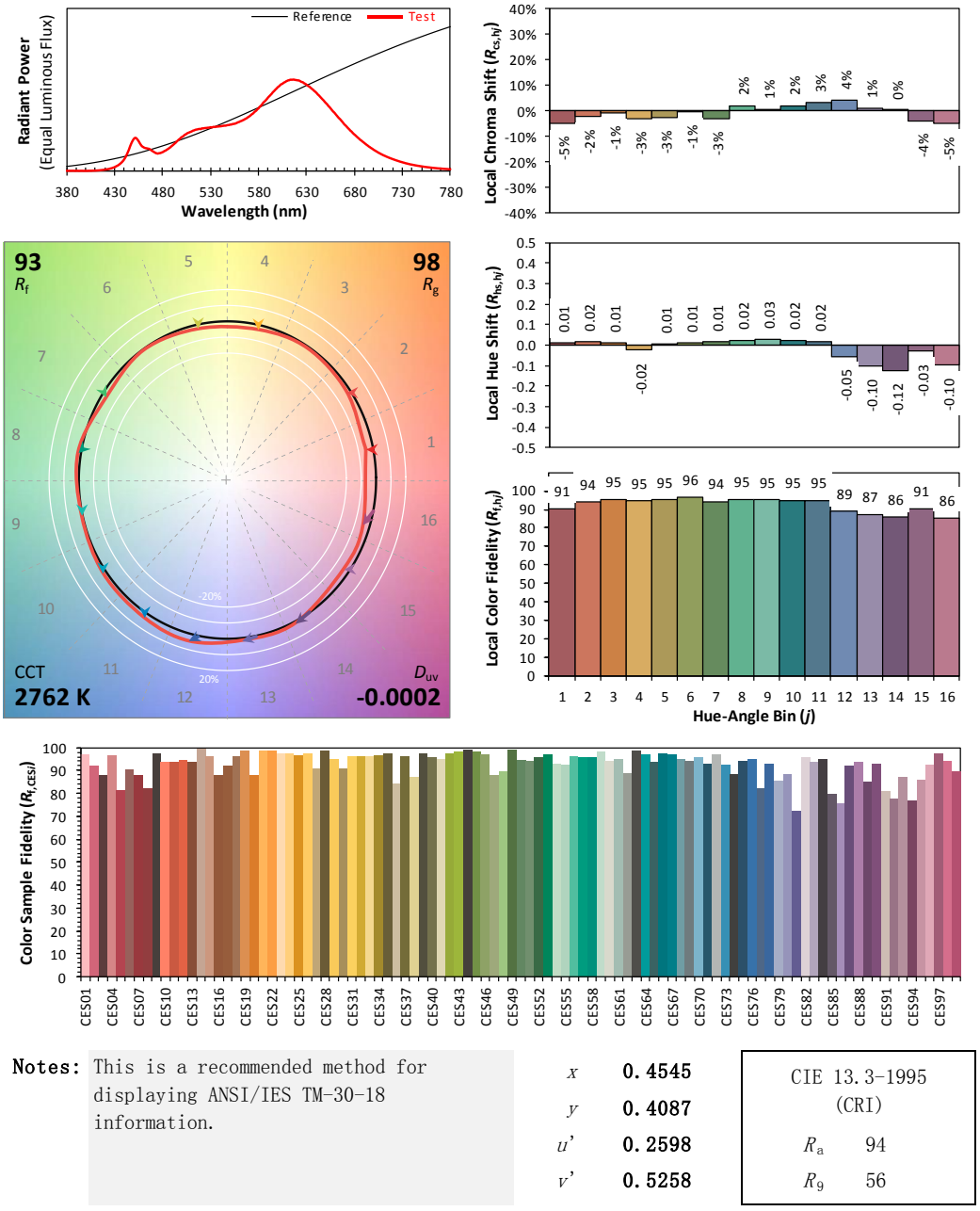
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/11/30 **Model:** 9PAR30DIM/9CCTS/BAS



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.4545	CIE 13.3-1995 (CRI)
	y	0.4087	R_a 94
	u'	0.2598	R_9 56
	v'	0.5258	

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.

Goniophotometer Method

Test ambient temperature was 24.9 ℃.

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)	0.072
Power Factor	0.9766
Power (W)	8.46
Luminous Efficacy (lm/W)	111.4
Total Luminous Flux (lm)	942.1
Beam Angle (°)	38.1 (0^o-180^o) / 38.4 (90^o-270^o)
Center Beam Candle Power (cd)	1466
Maximum Beam Candle Power (cd)	1466 (At: C=130.0, Gamma=0.5)
Spacing Criteria	0.60 (0^o-180^o) / 0.62 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	95.57%
Zonal Lumens in the 60 °-90 °Zone	4.28%
Zonal Lumens in the 90 °-120 °Zone	0.04%
Zonal Lumens in the 120 °-180 °Zone	0.11%

Table 10: Test data per Goniophotometer Method

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	127.815	13.57%
10- 20	263.884	28.01%
20- 30	214.926	22.81%
30- 40	148.474	15.76%
40- 50	94.767	10.06%
50- 60	50.527	5.36%
60- 70	25.149	2.67%
70- 80	11.639	1.24%
80- 90	3.558	0.38%
90-100	0.318	0.03%
100-110	0.012	0.00%
110-120	0.025	0.00%
120-130	0.067	0.01%
130-140	0.151	0.02%
140-150	0.242	0.03%
150-160	0.271	0.03%
160-170	0.206	0.02%
170-180	0.072	0.01%
Total	942.1	100%

γ(°)	Lumens	% Total
0- 60	900.393	95.57%
60- 90	40.346	4.28%
0-90	940.739	99.86%
90- 180	1.364	0.14%
0- 180	942.1	100%

Table 11: Zonal Lumen

Illuminance Plots- Goniophotometer Method

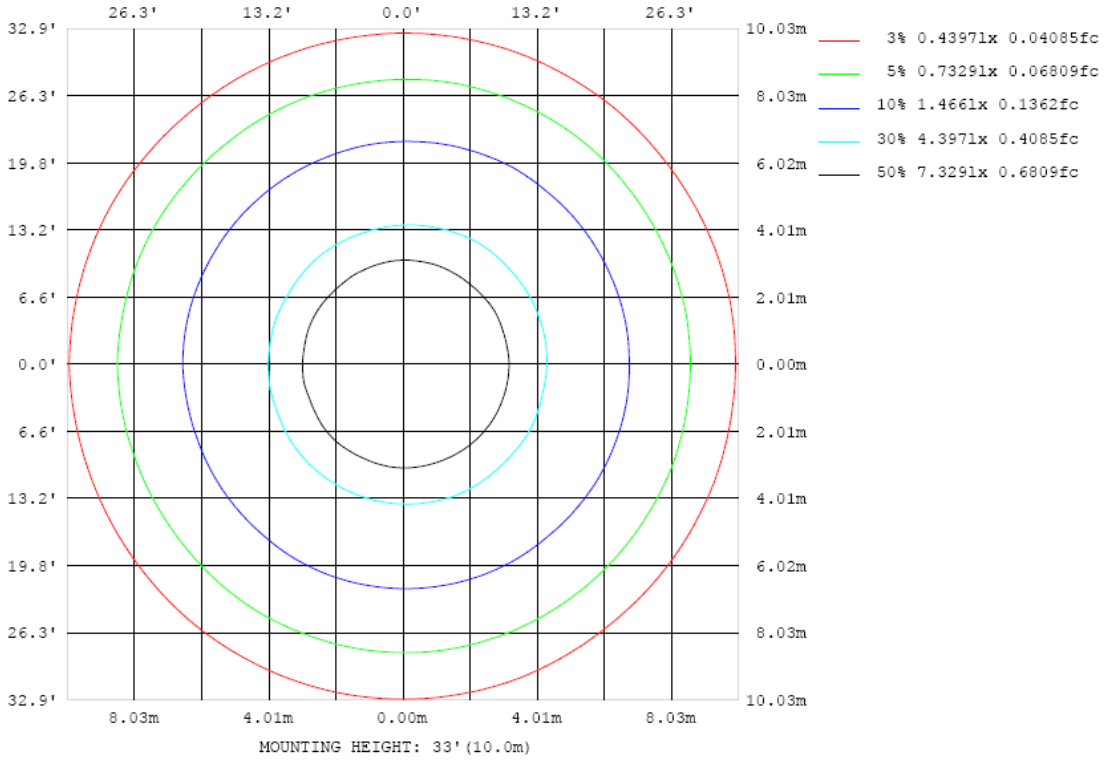


Chart 12: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

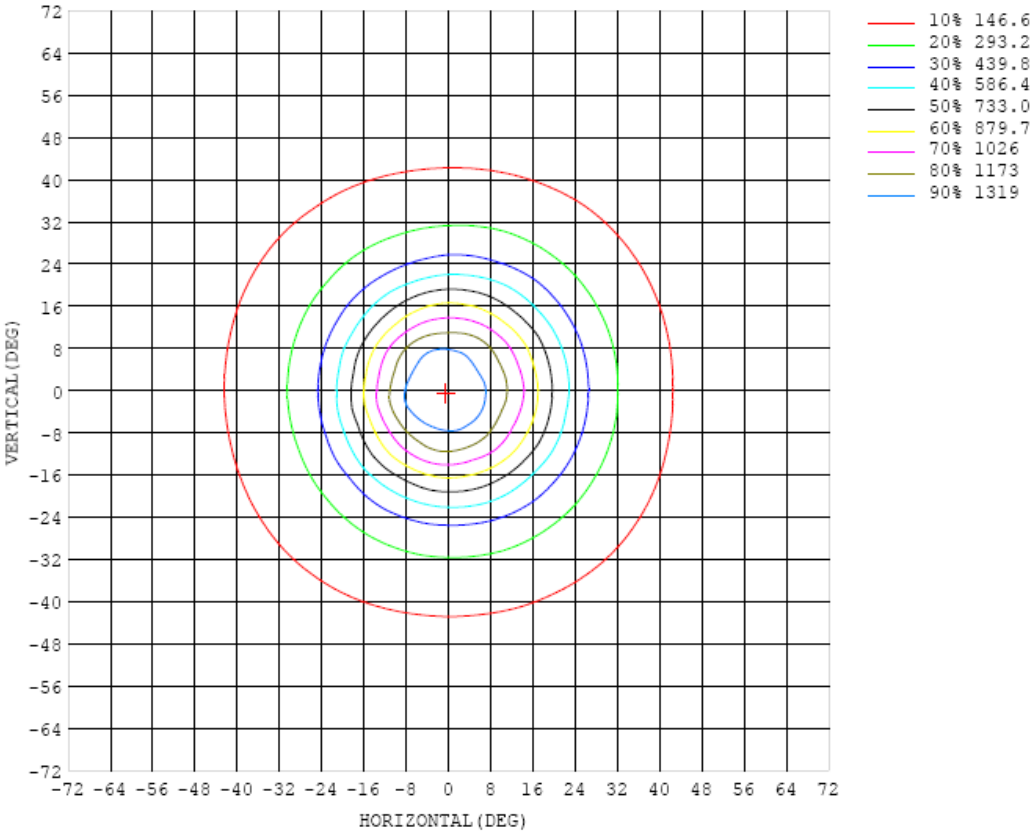


Chart 13: Isocandela Plot

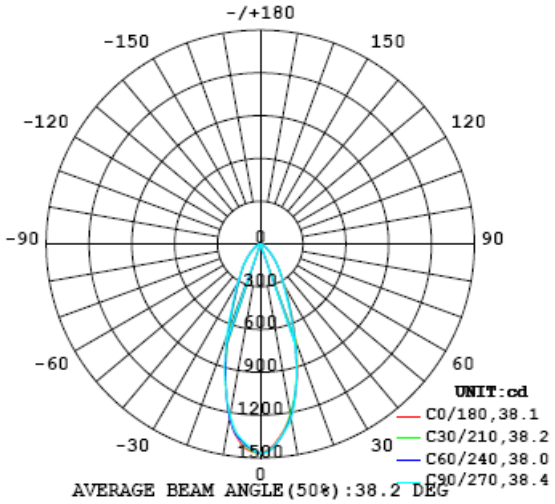


Chart 14: Polar Candela Distribution

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	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466
5	1378	1388	1393	1392	1399	1397	1394	1394	1392	1393	1396	1399	1402	1406	1414	1423	1428	1427	1421
10	1217	1215	1207	1208	1212	1222	1228	1234	1239	1245	1245	1234	1222	1222	1226	1229	1241	1244	1230
15	990	983	979	975	983	985	979	969	967	971	971	965	961	960	949	935	932	945	940
20	717	716	718	717	705	702	700	699	696	691	687	678	668	671	667	657	646	655	648
25	497	488	488	489	480	479	477	474	464	460	459	455	453	444	433	435	428	429	431
30	340	340	336	334	333	332	329	329	328	327	321	317	312	307	302	300	298	300	303
35	243	245	243	244	242	241	242	242	240	240	239	238	236	232	230	228	227	228	231
40	175	176	176	175	176	176	177	178	178	177	177	175	175	172	170	169	169	171	172
45	121	121	122	122	122	122	123	125	125	125	125	124	124	123	122	121	121	122	123
50	81.4	81.8	82.6	82.9	82.5	83.1	84.3	84.0	84.7	85.0	84.7	84.9	84.8	84.7	83.9	83.3	83.4	83.4	84.2
55	55.0	55.1	55.4	55.4	55.8	56.3	56.1	56.7	57.1	56.9	57.0	57.2	57.2	57.0	57.0	56.5	56.3	56.1	56.7
60	37.3	37.6	37.5	37.8	37.9	38.0	37.8	37.8	37.9	37.7	37.8	38.0	37.8	37.9	37.4	37.1	36.8	36.9	37.3
65	25.8	25.8	25.7	25.7	25.8	26.0	25.8	25.6	25.7	25.5	25.4	25.3	25.0	24.9	24.7	24.3	24.1	24.3	24.3
70	17.6	17.8	17.7	17.8	17.9	17.9	17.8	17.6	17.4	17.3	17.1	16.8	16.6	16.4	16.3	16.0	15.8	15.8	15.9
75	11.8	11.9	12.0	12.1	12.1	12.1	11.9	11.8	11.6	11.4	11.1	10.8	10.6	10.4	10.3	10.0	9.86	9.74	9.69
80	7.33	7.47	7.54	7.56	7.57	7.49	7.35	7.22	7.05	6.86	6.57	6.30	6.01	5.88	5.73	5.51	5.38	5.27	5.27
85	3.87	3.96	4.00	4.02	3.99	3.91	3.80	3.68	3.54	3.38	3.17	2.97	2.78	2.67	2.57	2.44	2.31	2.22	2.21
90	1.54	1.59	1.61	1.62	1.58	1.53	1.45	1.37	1.27	1.18	1.06	0.95	0.84	0.77	0.70	0.64	0.58	0.55	0.55
95	0.36	0.37	0.38	0.37	0.35	0.33	0.29	0.26	0.22	0.19	0.14	0.11	0.08	0.05	0.04	0.03	0.02	0.01	0.02
100	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
110	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
115	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03
120	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05
125	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.09
130	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.16
135	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.24
140	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.33
145	0.30	0.31	0.31	0.31	0.31	0.32	0.32	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.43
150	0.38	0.39	0.39	0.39	0.40	0.40	0.40	0.40	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.43	0.43	0.42	0.52
155	0.45	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.49	0.49	0.50	0.50	0.51	0.52	0.52	0.52	0.52	0.51	0.59
160	0.53	0.54	0.54	0.54	0.55	0.56	0.56	0.57	0.57	0.58	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.61
165	0.61	0.62	0.62	0.62	0.63	0.63	0.64	0.64	0.64	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.65	0.63
170	0.66	0.66	0.66	0.66	0.67	0.67	0.68	0.68	0.69	0.69	0.69	0.70	0.70	0.71	0.71	0.71	0.70	0.71	0.70
175	0.69	0.69	0.69	0.70	0.70	0.70	0.70	0.71	0.71	0.72	0.72	0.72	0.72	0.73	0.74	0.76	0.78	0.80	0.82
180	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72

Table 12: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466		
5	1413	1404	1400	1399	1399	1398	1396	1391	1385	1379	1371	1366	1363	1361	1362	1366	1373		
10	1219	1215	1224	1234	1240	1240	1234	1224	1219	1226	1235	1237	1231	1219	1210	1212	1216		
15	936	942	949	947	942	944	954	961	965	967	965	970	973	981	982	976	982		
20	639	648	647	649	655	663	669	681	688	695	702	705	703	709	722	718	716		
25	429	430	429	434	436	437	442	450	462	468	472	482	489	489	492	494	498		
30	303	302	302	301	305	308	311	313	319	328	332	331	333	338	340	342	341		
35	229	228	228	227	227	228	230	232	235	237	238	240	238	240	242	243	243		
40	170	170	169	167	166	167	168	169	170	172	172	173	173	173	173	175	176		
45	123	122	121	120	118	118	119	119	120	120	120	120	121	120	121	122	122		
50	83.8	83.0	81.8	81.2	80.4	80.0	80.1	80.7	81.1	81.0	81.3	81.2	81.0	81.1	81.5	81.9	82.3		
55	56.4	55.5	54.6	53.9	53.9	53.6	53.3	53.3	53.7	54.0	54.1	54.0	53.7	54.0	54.2	54.6	54.9		
60	36.8	36.6	36.2	35.6	35.6	35.5	35.3	35.4	35.8	36.2	36.4	36.2	36.6	36.6	36.7	37.0	37.4		
65	24.1	23.9	23.6	23.7	23.6	23.6	23.7	23.9	24.2	24.4	24.6	24.7	24.8	24.8	24.8	25.2	25.6		
70	15.8	15.6	15.4	15.5	15.5	15.5	15.7	16.0	16.3	16.5	16.7	16.8	17.0	17.0	17.2	17.4	17.6		
75	9.62	9.51	9.47	9.50	9.59	9.66	9.88	10.2	10.4	10.6	10.8	10.9	11.2	11.4	11.5	11.6	11.7		
80	5.21	5.15	5.14	5.19	5.25	5.34	5.52	5.75	6.00	6.20	6.35	6.51	6.78	6.99	7.10	7.19	7.27		
85	2.18	2.15	2.15	2.18	2.24	2.30	2.42	2.58	2.76	2.92	3.06	3.21	3.43	3.62	3.72	3.79	3.84		
90	0.54	0.53	0.53	0.54	0.57	0.61	0.67	0.76	0.85	0.94	1.03	1.12	1.24	1.36	1.45	1.49	1.53		
95	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.09	0.11	0.14	0.16	0.19	0.23	0.27	0.30	0.33	0.35		
100	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
105	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
110	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
115	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
120	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04		
125	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06		
130	0.16	0.17	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.13	0.13	0.12	0.11	0.11	0.11	0.10	0.10		
135	0.26	0.25	0.25	0.25	0.25	0.24	0.24	0.23	0.23	0.22	0.21	0.20	0.19	0.19	0.18	0.17	0.16		
140	0.37	0.37	0.36	0.36	0.36	0.35	0.35	0.34	0.34	0.33	0.32	0.31	0.30	0.30	0.29	0.29	0.27		
145	0.49	0.49	0.49	0.48	0.48	0.48	0.47	0.47	0.46	0.46	0.45	0.44	0.43	0.43	0.42	0.42	0.38		
150	0.62	0.61	0.61	0.61	0.61	0.60	0.60	0.59	0.59	0.58	0.58	0.57	0.57	0.56	0.56	0.56	0.49		
155	0.75	0.74	0.74	0.73	0.73	0.72	0.72	0.71	0.70	0.69	0.69	0.69	0.69	0.68	0.68	0.69	0.58		
160	0.85	0.84	0.84	0.84	0.83	0.82	0.81	0.80	0.80	0.79	0.78	0.78	0.77	0.77	0.77	0.78	0.62		
165	0.90	0.89	0.90	0.89	0.89	0.88	0.87	0.87	0.86	0.85	0.84	0.84	0.84	0.83	0.84	0.81	0.64		
170	0.73	0.87	0.88	0.88	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.77	0.64		
175	0.83	0.83	0.72	0.74	0.76	0.77	0.78	0.79	0.80	0.80	0.81	0.82	0.82	0.78	0.71	0.68	0.69		
180	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72		

Table 13: Luminous Intensity Data

TEST RESULTS of Model 9PAR30DIM/9CCTS/BAS（5000K 25°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)	0.072
Power Factor	0.9769
Test Power (W)	8.49
THD A%	12.59
Luminous Efficacy (lm/W)	117.2
Total Luminous Flux (lm)	995.3
Color Rendering Index (CRI)	94.6
R9	65.8
Correlated Color Temperature (CCT)(K)	5167
Chromaticity Chroma x	0.3407
Chromaticity Chroma y	0.3516
Chromaticity Chroma u	0.2084
Chromaticity Chroma v	0.3227
Duv	0.0018
Chromaticity Chroma u ’	0.2084
Chromaticity Chroma v’	0.4840

Special Color Rendering Indices	
R1	95.3
R2	98
R3	98.1
R4	95.1
R5	94.8
R6	94.6
R7	93.7
R8	86.7
R9	65.8
R10	94.6
R11	96.5
R12	75.9
R13	96.9
R14	99.4

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

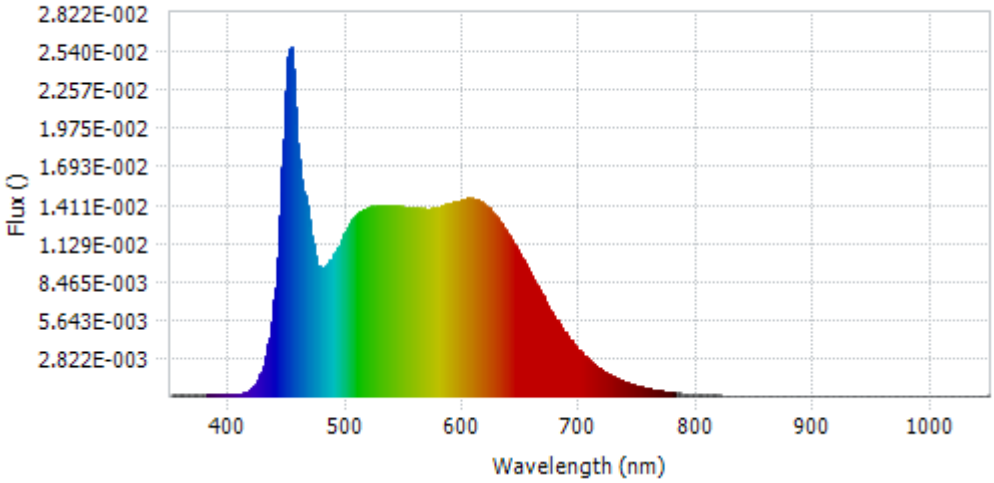
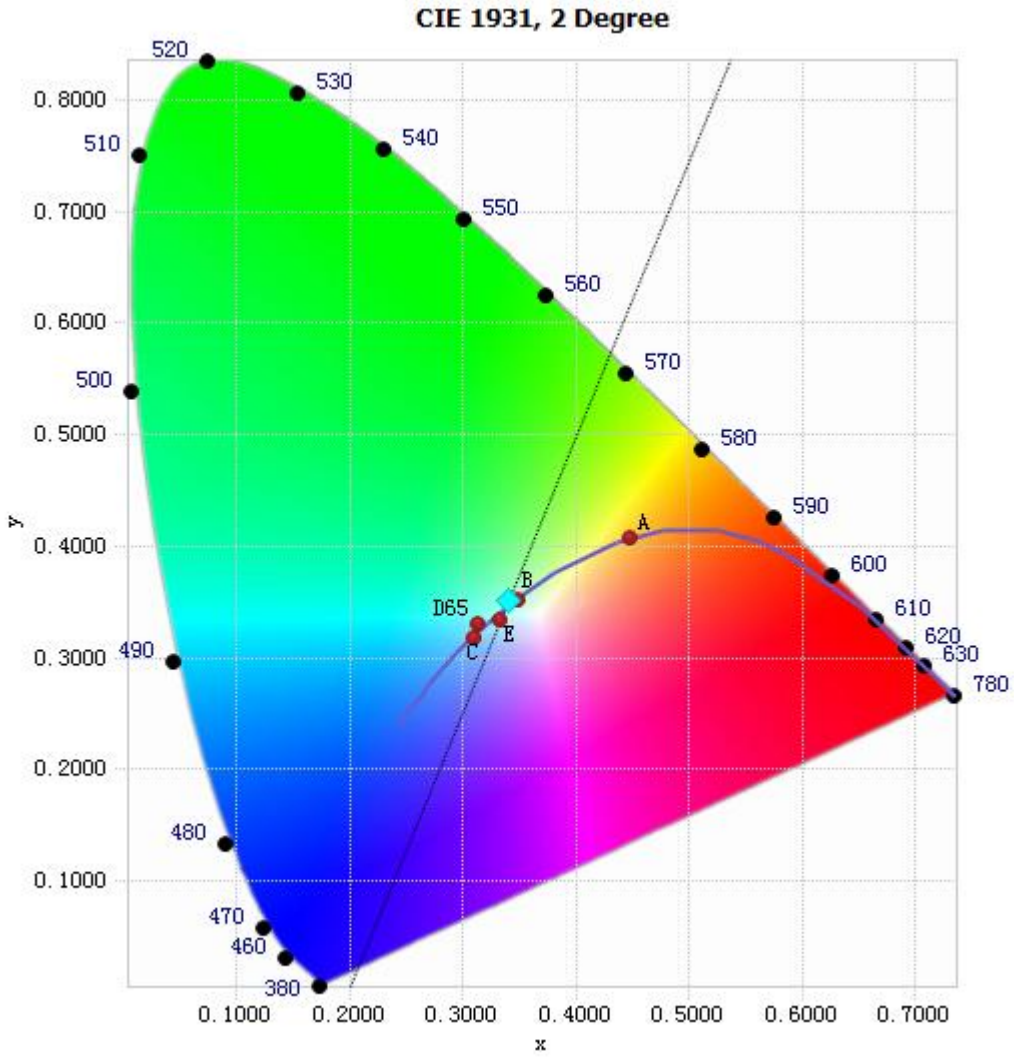


Chart 15: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.94E-05	485	9.94E-03	590	1.43E-02	695	3.77E-03
385	1.10E-04	490	1.06E-02	595	1.44E-02	700	3.29E-03
390	9.88E-05	495	1.14E-02	600	1.45E-02	705	2.84E-03
395	9.08E-05	500	1.23E-02	605	1.45E-02	710	2.46E-03
400	8.48E-05	505	1.30E-02	610	1.45E-02	715	2.13E-03
405	1.02E-04	510	1.34E-02	615	1.43E-02	720	1.84E-03
410	1.78E-04	515	1.38E-02	620	1.40E-02	725	1.59E-03
415	3.73E-04	520	1.38E-02	625	1.35E-02	730	1.36E-03
420	7.06E-04	525	1.39E-02	630	1.30E-02	735	1.17E-03
425	1.37E-03	530	1.41E-02	635	1.23E-02	740	9.95E-04
430	2.63E-03	535	1.40E-02	640	1.17E-02	745	8.55E-04
435	4.91E-03	540	1.40E-02	645	1.09E-02	750	7.27E-04
440	9.11E-03	545	1.40E-02	650	1.02E-02	755	6.26E-04
445	1.68E-02	550	1.39E-02	655	9.39E-03	760	5.36E-04
450	2.50E-02	555	1.39E-02	660	8.58E-03	765	4.50E-04
455	2.27E-02	560	1.38E-02	665	7.80E-03	770	3.86E-04
460	1.66E-02	565	1.38E-02	670	6.99E-03	775	3.29E-04
465	1.44E-02	570	1.38E-02	675	6.25E-03	780	2.81E-04
470	1.19E-02	575	1.38E-02	680	5.57E-03		
475	9.66E-03	580	1.39E-02	685	4.92E-03		
480	9.47E-03	585	1.41E-02	690	4.33E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3407, 0.3516)

Chart 16: 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

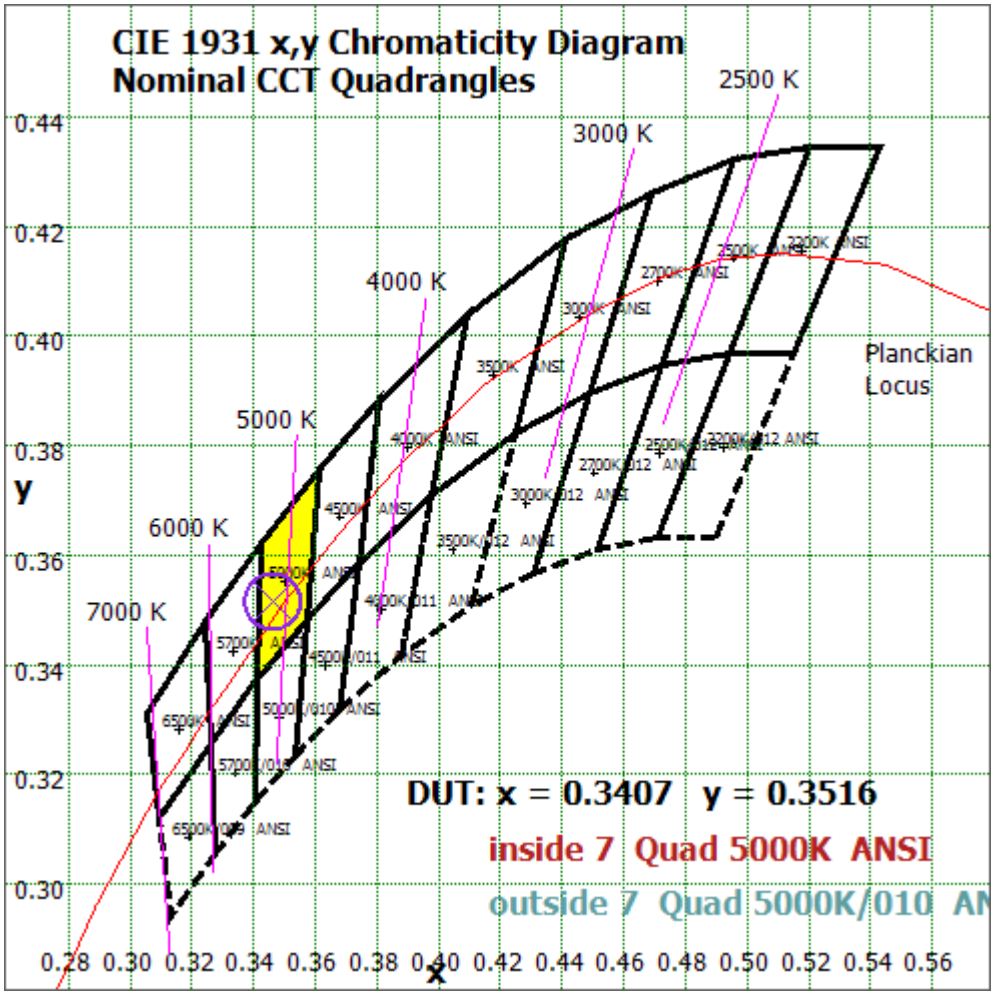


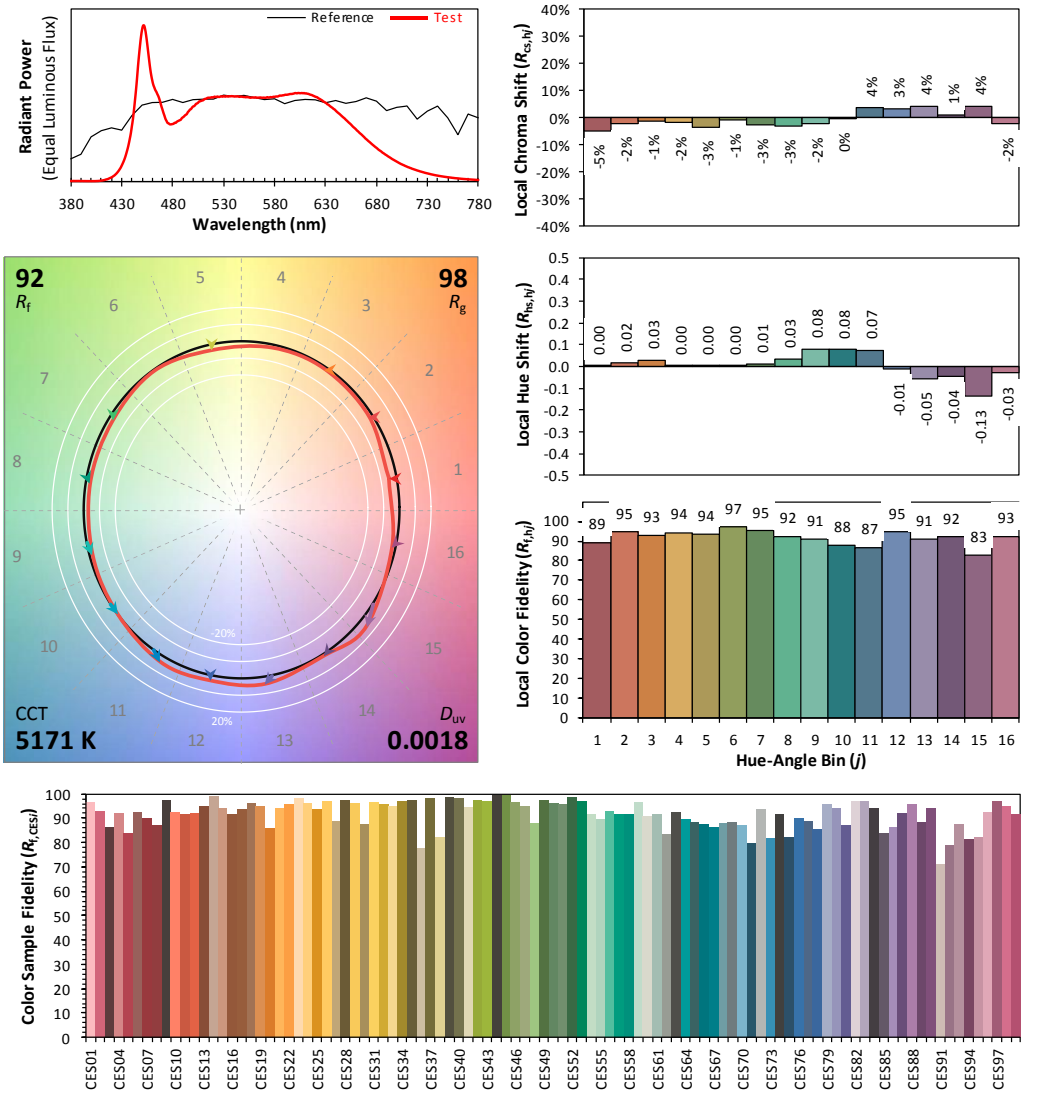
Chart17: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/11/30 **Model:** 9PAR30DIM/9CCTS/BAS



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.	x	0.3407	CIE 13.3-1995 (CRI)
	y	0.3516	
	u'	0.2084	R_a 95
	v'	0.4840	R_9 66

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

Chart 18: 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.

TEST RESULTS of Model 9PAR30DIM/9CCTS/BAS（5000K 40°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)	0.072
Power Factor	0.9768
Test Power (W)	8.49
THD A%	12.49
Luminous Efficacy (lm/W)	118.8
Total Luminous Flux (lm)	1008.8
Color Rendering Index (CRI)	94.4
R9	65.4
Correlated Color Temperature (CCT)(K)	5193
Chromaticity Chroma x	0.3400
Chromaticity Chroma y	0.3510
Chromaticity Chroma u	0.2082
Chromaticity Chroma v	0.3224
Duv	0.0018
Chromaticity Chroma u ’	0.2082
Chromaticity Chroma v’	0.4836

Special Color Rendering Indices	
R1	95.2
R2	97.8
R3	98
R4	95
R5	94.7
R6	94.4
R7	93.8
R8	86.7
R9	65.4
R10	94
R11	96.3
R12	75.7
R13	96.7
R14	99.3

Table 16: 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

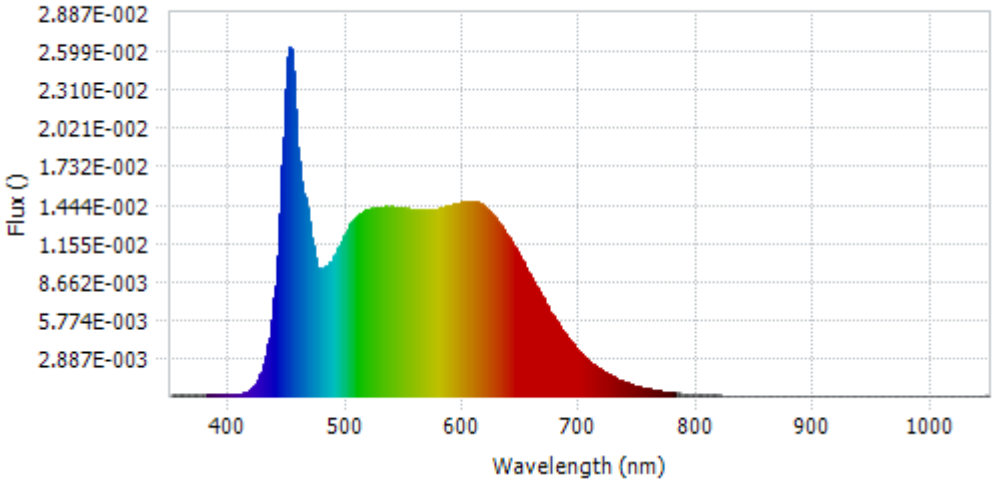
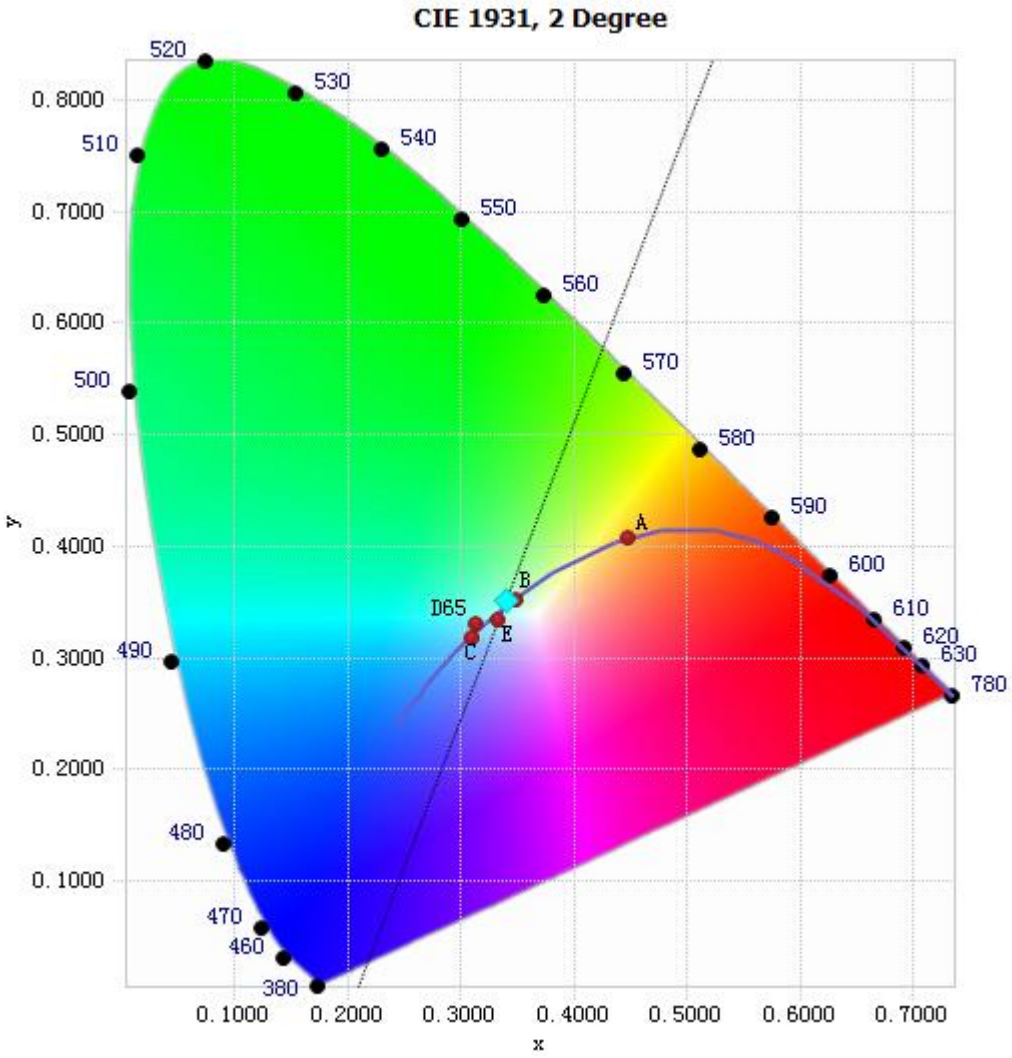


Chart 19: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.15E-04	485	1.00E-02	590	1.44E-02	695	3.79E-03
385	1.05E-04	490	1.06E-02	595	1.45E-02	700	3.29E-03
390	1.04E-04	495	1.16E-02	600	1.47E-02	705	2.85E-03
395	9.56E-05	500	1.24E-02	605	1.47E-02	710	2.46E-03
400	7.76E-05	505	1.32E-02	610	1.46E-02	715	2.14E-03
405	9.66E-05	510	1.36E-02	615	1.44E-02	720	1.85E-03
410	1.88E-04	515	1.40E-02	620	1.41E-02	725	1.60E-03
415	3.70E-04	520	1.40E-02	625	1.36E-02	730	1.37E-03
420	7.38E-04	525	1.42E-02	630	1.31E-02	735	1.17E-03
425	1.41E-03	530	1.43E-02	635	1.25E-02	740	9.96E-04
430	2.70E-03	535	1.42E-02	640	1.18E-02	745	8.53E-04
435	5.08E-03	540	1.42E-02	645	1.10E-02	750	7.28E-04
440	9.43E-03	545	1.42E-02	650	1.02E-02	755	6.26E-04
445	1.74E-02	550	1.41E-02	655	9.44E-03	760	5.35E-04
450	2.56E-02	555	1.41E-02	660	8.63E-03	765	4.54E-04
455	2.31E-02	560	1.41E-02	665	7.82E-03	770	3.83E-04
460	1.69E-02	565	1.40E-02	670	7.01E-03	775	3.29E-04
465	1.45E-02	570	1.40E-02	675	6.27E-03	780	2.82E-04
470	1.19E-02	575	1.41E-02	680	5.59E-03		
475	9.72E-03	580	1.41E-02	685	4.93E-03		
480	9.54E-03	585	1.43E-02	690	4.33E-03		

Table 17: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3400, 0.3510)

Chart 20: 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

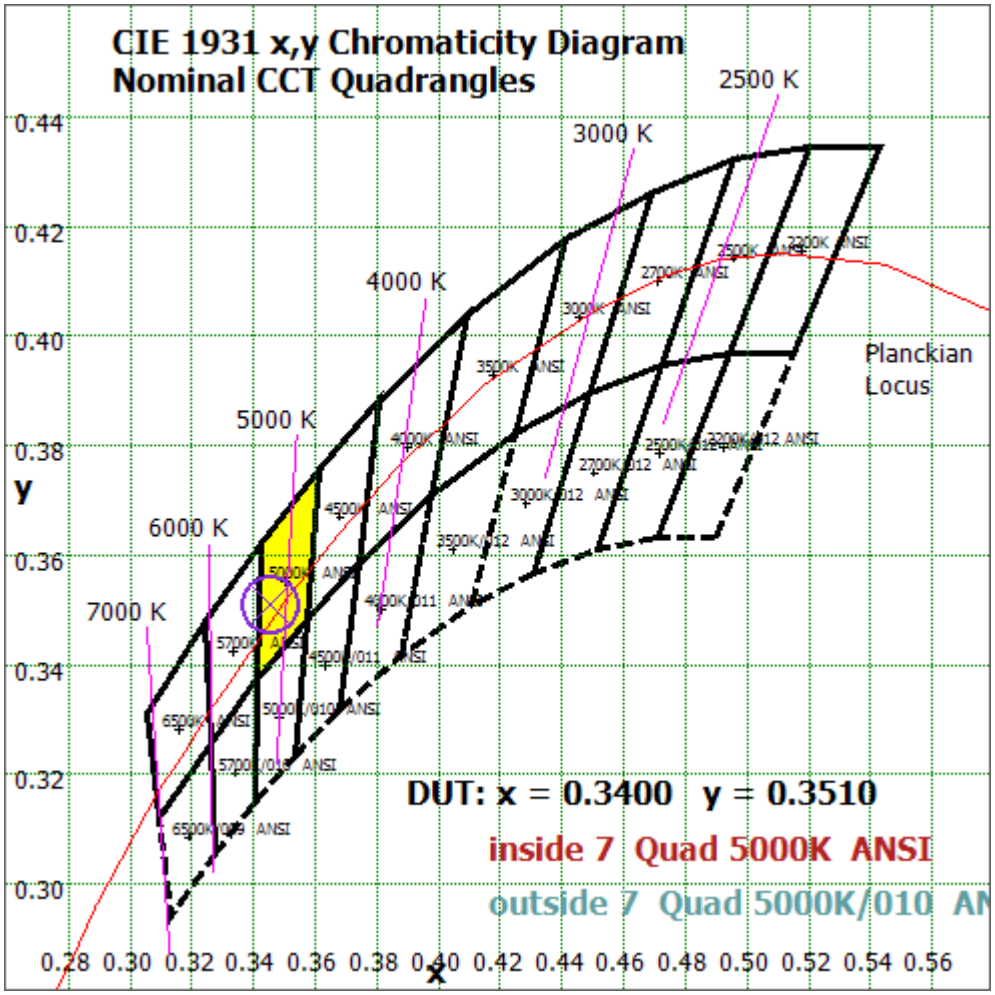


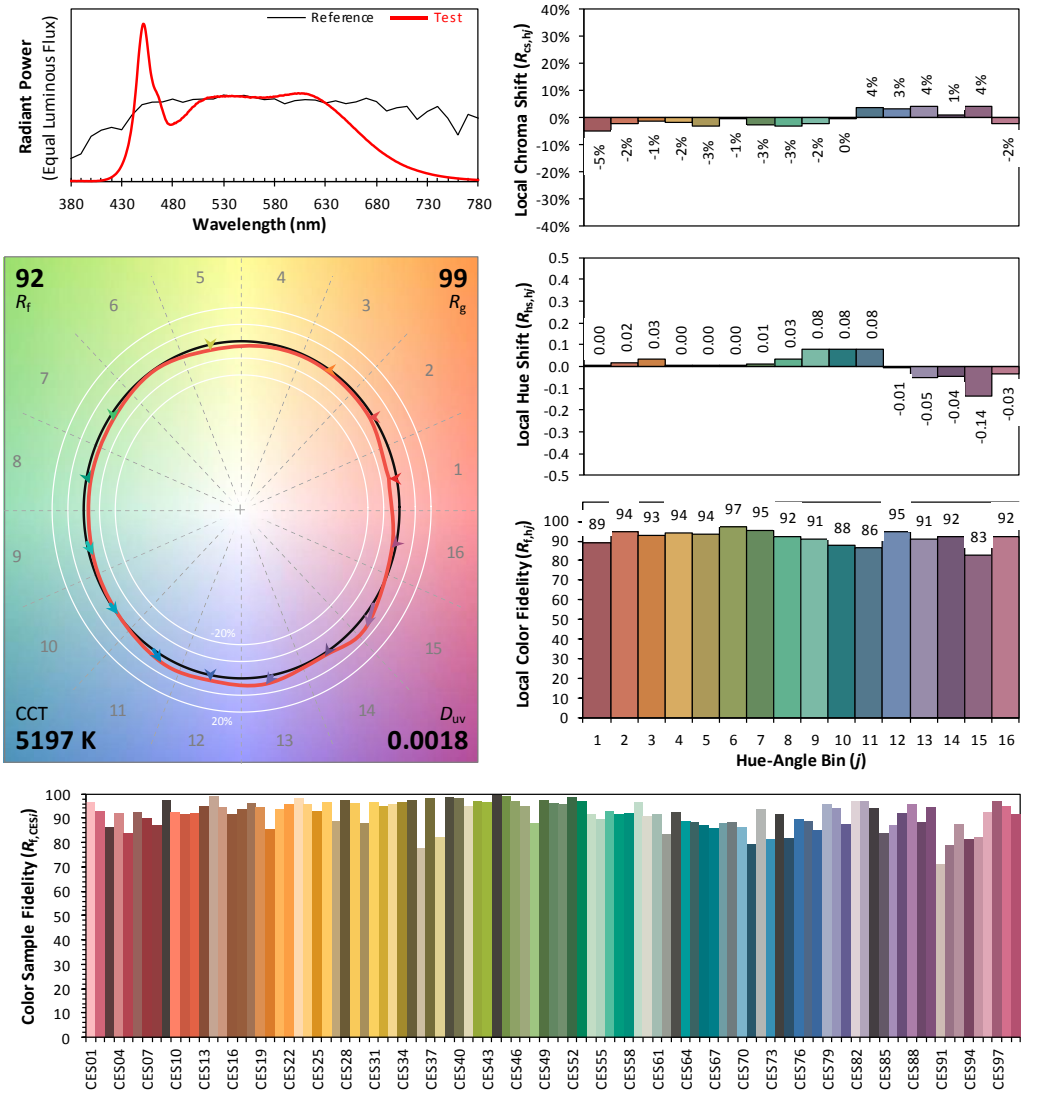
Chart 21: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/11/30 **Model:** 9PAR30DIM/9CCTS/BAS



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

x	0.3400
y	0.3510
u'	0.2082
v'	0.4836

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 22: 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 16 due to rounding.

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jun. 05, 2023	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	DPS1060	HZTE001-06	Aug. 01, 2023	Jul. 31, 2024
DC Power Supply	WY12010	HZTE004-03	Aug. 01, 2023	Jul. 31, 2024
Temperature recorder	JM624U	HZTE018-08	Aug. 04, 2023	Aug. 03, 2024
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 04, 2023	Aug. 03, 2024
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Jul. 24, 2023	-
Digital Power Meter	WT210	HZTE008-01	Aug. 01, 2023	Jul. 31, 2024
AC Power Supply	PCR 500L	HZTE001-07	Aug. 01, 2023	Jul.31, 2024
DC Power Supply	IT6154	HZTE004-04	Aug. 01, 2023	Jul. 31, 2024
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 04, 2023	Aug. 03, 2024
Temperature Meter	TES1310	HZTE017-01	Aug. 04, 2023	Aug. 03, 2024
Multi-Meter	FLUKE15B	HZTE020-01	Aug. 01, 2023	Jul. 31, 2024

Table 26: 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 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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