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 LUMINAIRES

Model: NOVT/9CCTS/SD/DIM120V/UNV/H/WH

NOVT/9CCTS/SD/DIM120V/UNV/J/WH

NOVT/9CCTS/SD/DIM120V/UNV/H/BL

NOVT/9CCTS/SD/DIM120V/UNV/J/BL

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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

Tel: +86571 86376106

www.ltlqa.com

Report No.: HZ24010032a/R1

This report is replaced the old report No. HZ24010032a dated Jan. 31, 2024

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

Review by: Wei Fei

Engineer: Wei Fei

Feb. 05, 2024

Approved by: April Zou

Manager: April Zou

Feb. 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	NOVT/9CCTS/SD/DIM120V/UNV/J/WH 3000K Setting	NOVT/9CCTS/SD/DIM120V/UNV/J/WH 3500K Setting	NOVT/9CCTS/SD/DIM120V/UNV/J/WH 4000K Setting
Luminous Efficacy (Lumens /Watt)	97.8	111.0	103.7
Total Luminous Flux (Lumens)	4770.2	5283.5	5087.9
Power (Watts)	48.77	47.61	49.06
Power Factor	0.9822	0.9795	0.9807
CCT (K)	2978	3408	3929
CRI	94.0	94.8	93.7
Stabilization Time (Light & Power)	50 mins	50 mins	50 mins
Note	3000K	3500K	4000K

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt : Jan. 24, 2024

Date of Test : Jan. 25, 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 for the 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 LUMINAIRES
Model	: NOVT/9CCTS/SD/DIM120V/UNV/H/WH NOVT/9CCTS/SD/DIM120V/UNV/J/WH NOVT/9CCTS/SD/DIM120V/UNV/H/BL NOVT/9CCTS/SD/DIM120V/UNV/J/BL
Electrical Ratings	: 120V, 60Hz
Product Description	: Field-Adjustable 30W/40W/50W, Color- Tunable 3000K/3500K/4000K
Manufacturer	: GREEN CREATIVE LTD
Address	: Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

TEST RESULTS (3000K Setting)

Test ambient temperature was 26.0 ℃.

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)	0.414
Power Factor	0.9822
Test Power (W)	48.77
THD A%	18.66
Luminous Efficacy (lm/W)	97.8
Total Luminous Flux (lm)	4770.2
Color Rendering Index (CRI)	94.0
R9	66.9
Correlated Color Temperature (CCT)(K)	2978
Chromaticity Chroma x	0.4360
Chromaticity Chroma y	0.3996
Chromaticity Chroma u	0.2519
Chromaticity Chroma v	0.3463
Duv	-0.0017
Chromaticity Chroma u ’	0.2519
Chromaticity Chroma v’	0.5195

Special Color Rendering Indices	
R1	94.7
R2	97
R3	97.5
R4	94.2
R5	94.3
R6	95.7
R7	93
R8	85.1
R9	66.9
R10	92
R11	94.9
R12	82.1
R13	95.5
R14	98

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).

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)	0.416
Power Factor	0.9800
Power (W)	48.85
Luminous Efficacy (lm/W)	98.9
Total Luminous Flux (lm)	4830.5
Beam Angle (°)	59.5 (0^o-180^o) / 95.3 (90^o-270^o)
Center Beam Candle Power (cd)	2036
Maximum Beam Candle Power (cd)	3315 (At: C=350.0, Gamma=24.0)
Spacing Criteria	0.41 (0^o-180^o) / 1.22 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	81.62%
Zonal Lumens in the 60 °-90 °Zone	17.51%
Zonal Lumens in the 90 °-120 °Zone	0.78%
Zonal Lumens in the 120 °-180 °Zone	0.09%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

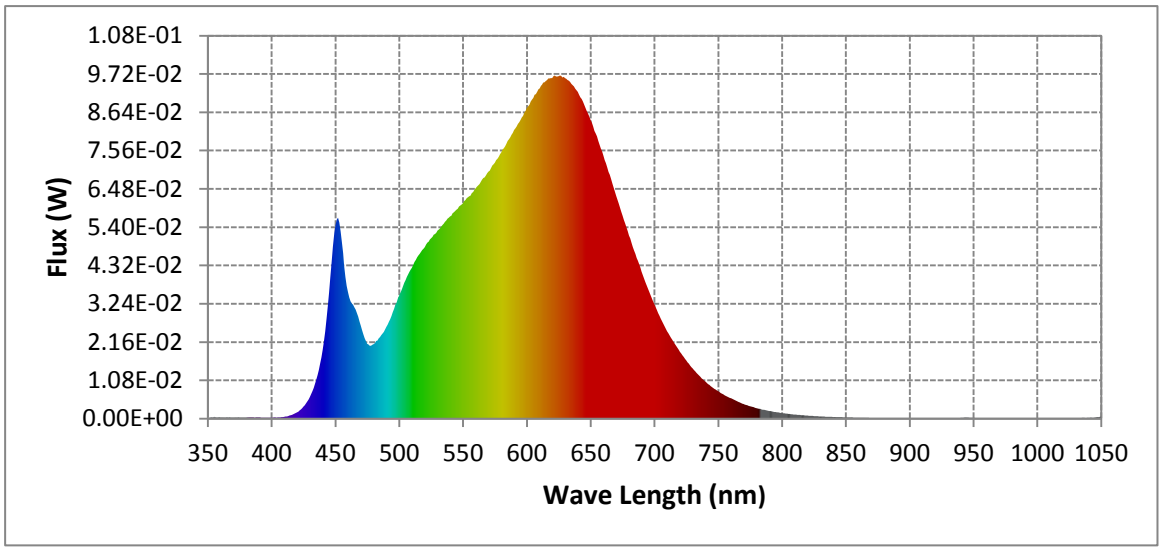
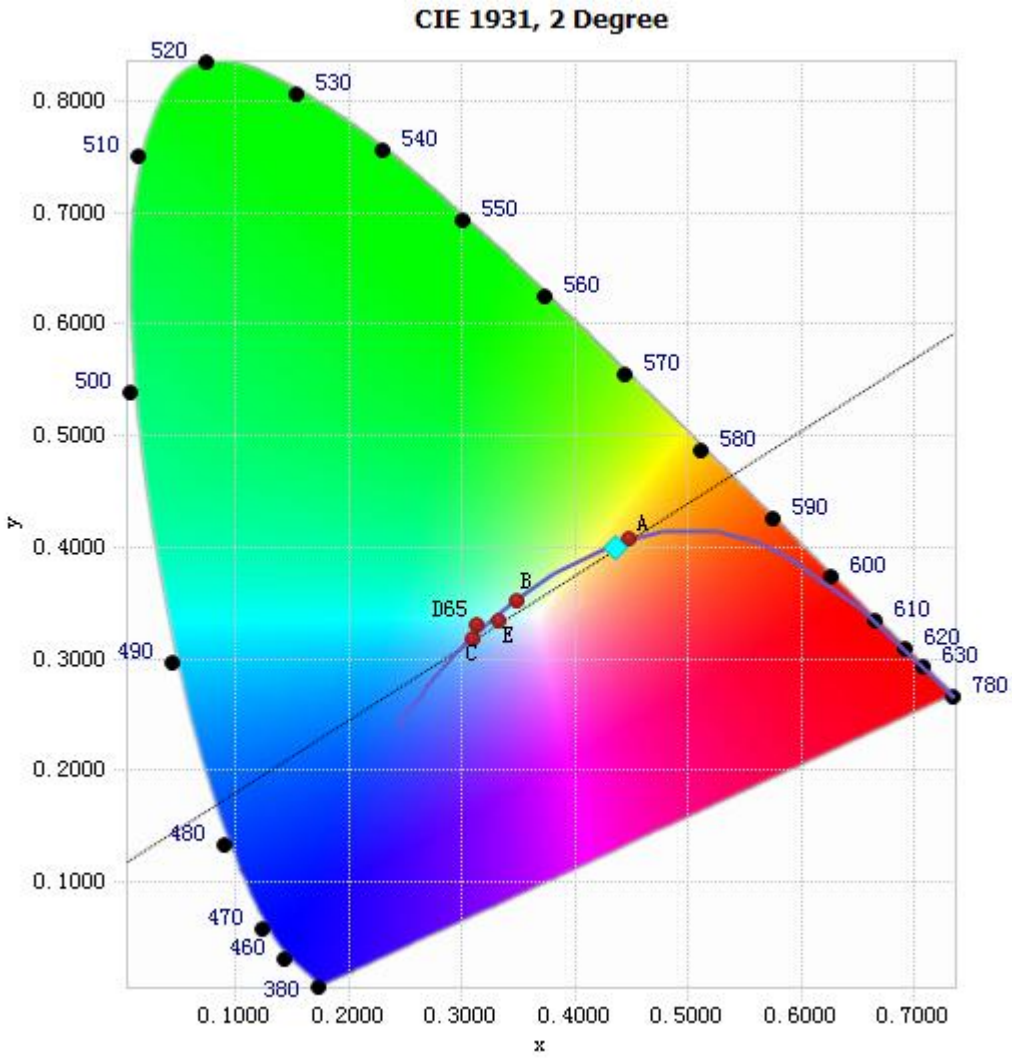


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.47E-04	485	2.30E-02	590	8.14E-02	695	3.67E-02
385	3.49E-04	490	2.59E-02	595	8.42E-02	700	3.23E-02
390	3.13E-04	495	3.00E-02	600	8.76E-02	705	2.83E-02
395	2.93E-04	500	3.48E-02	605	9.04E-02	710	2.47E-02
400	2.65E-04	505	3.91E-02	610	9.31E-02	715	2.16E-02
405	3.20E-04	510	4.26E-02	615	9.52E-02	720	1.89E-02
410	5.35E-04	515	4.60E-02	620	9.61E-02	725	1.64E-02
415	9.70E-04	520	4.84E-02	625	9.66E-02	730	1.41E-02
420	1.82E-03	525	5.09E-02	630	9.60E-02	735	1.22E-02
425	3.38E-03	530	5.30E-02	635	9.44E-02	740	1.05E-02
430	6.11E-03	535	5.49E-02	640	9.21E-02	745	8.96E-03
435	1.10E-02	540	5.70E-02	645	8.85E-02	750	7.73E-03
440	1.94E-02	545	5.89E-02	650	8.42E-02	755	6.60E-03
445	3.56E-02	550	6.08E-02	655	7.96E-02	760	5.78E-03
450	5.46E-02	555	6.27E-02	660	7.42E-02	765	4.87E-03
455	4.98E-02	560	6.50E-02	665	6.87E-02	770	4.12E-03
460	3.57E-02	565	6.74E-02	670	6.28E-02	775	3.52E-03
465	3.14E-02	570	6.97E-02	675	5.72E-02	780	3.00E-03
470	2.63E-02	575	7.22E-02	680	5.16E-02		
475	2.12E-02	580	7.51E-02	685	4.65E-02		
480	2.10E-02	585	7.83E-02	690	4.15E-02		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4360, 0.3996)

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

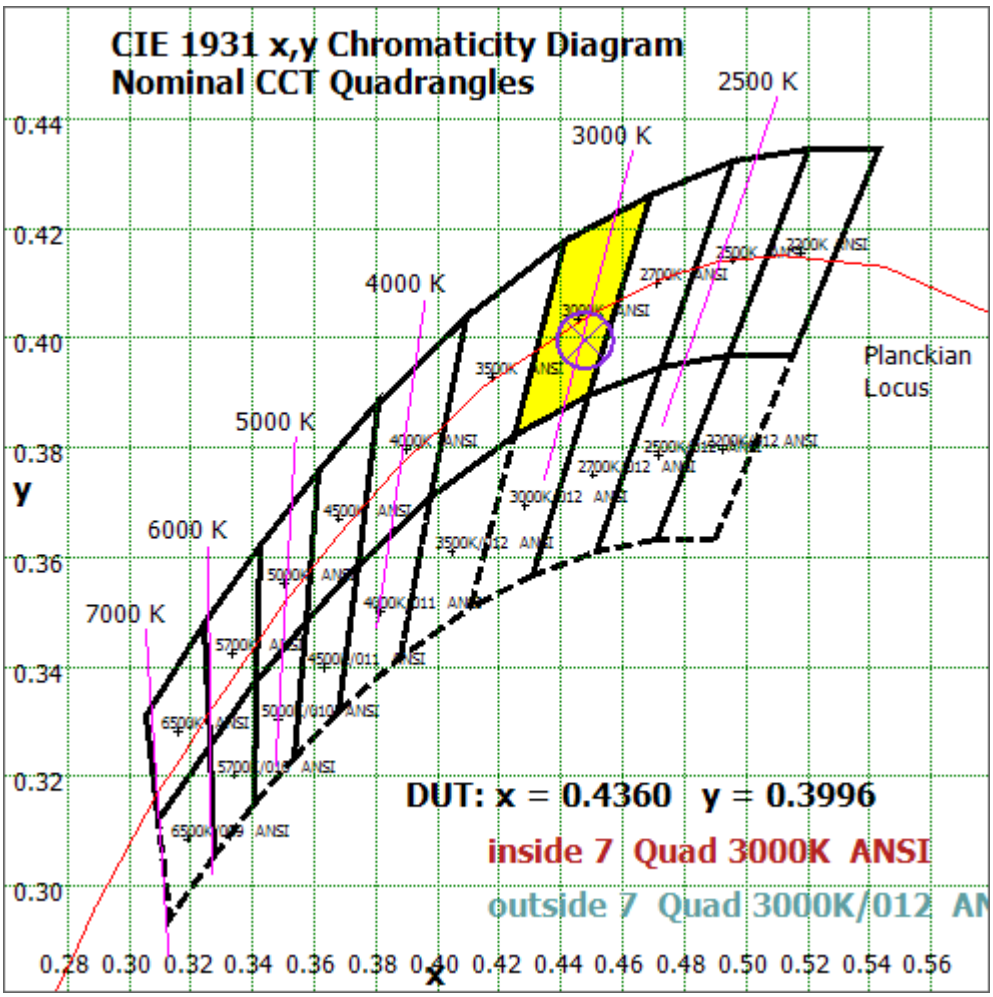


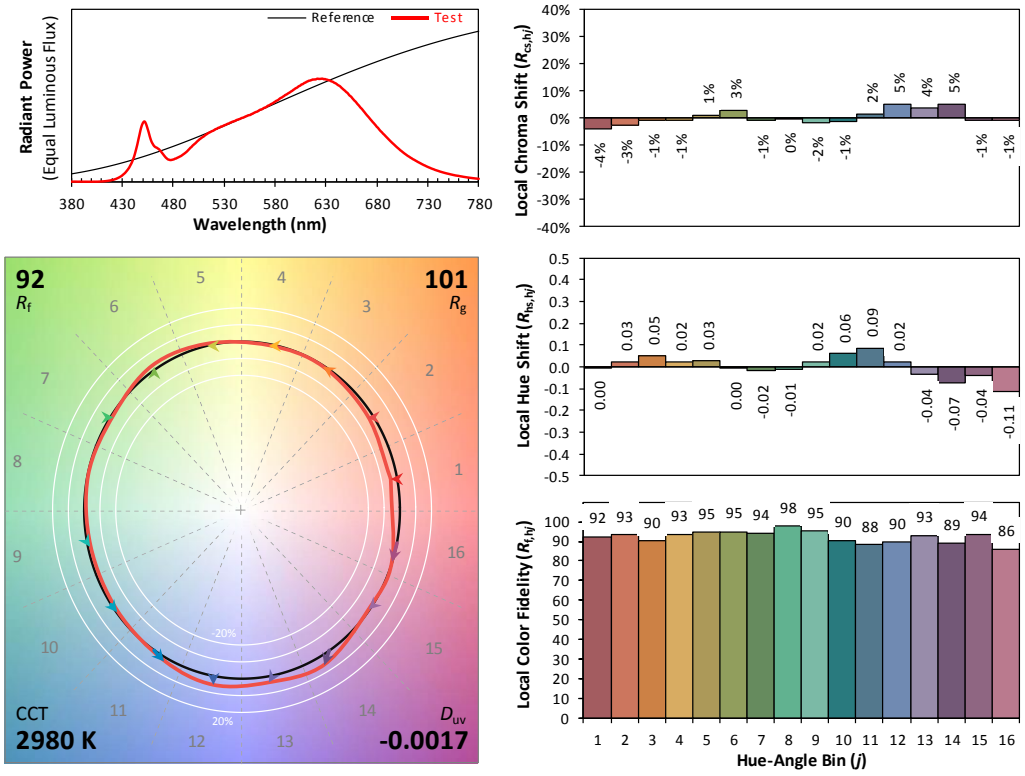
Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/01/25 **Model:** NOVT/9CCTS/SD/DIM120V/UNV/J/WH



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

x	0.4360
y	0.3996
u'	0.2519
v'	0.5195

CIE 13.3-1995 (CRI)	
R_a	94
R_9	67

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.

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	197.636	4.09%
10- 20	552.806	11.44%
20- 30	788.575	16.33%
30- 40	895.781	18.54%
40- 50	840.005	17.39%
50- 60	667.987	13.83%
60- 70	463.271	9.59%
70- 80	266.652	5.52%
80- 90	115.97	2.40%
90-100	34.1	0.71%
100-110	2.747	0.06%
110-120	0.65	0.01%
120-130	0.718	0.01%
130-140	0.872	0.02%
140-150	0.968	0.02%
150-160	0.896	0.02%
160-170	0.607	0.01%
170-180	0.215	0.00%
Total	4830.5	100%

γ(°)	Lumens	% Total
0- 60	3942.79	81.62%
60- 90	845.893	17.51%
0-90	4788.68	99.14%
90- 180	41.773	0.86%
0- 180	4830.5	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

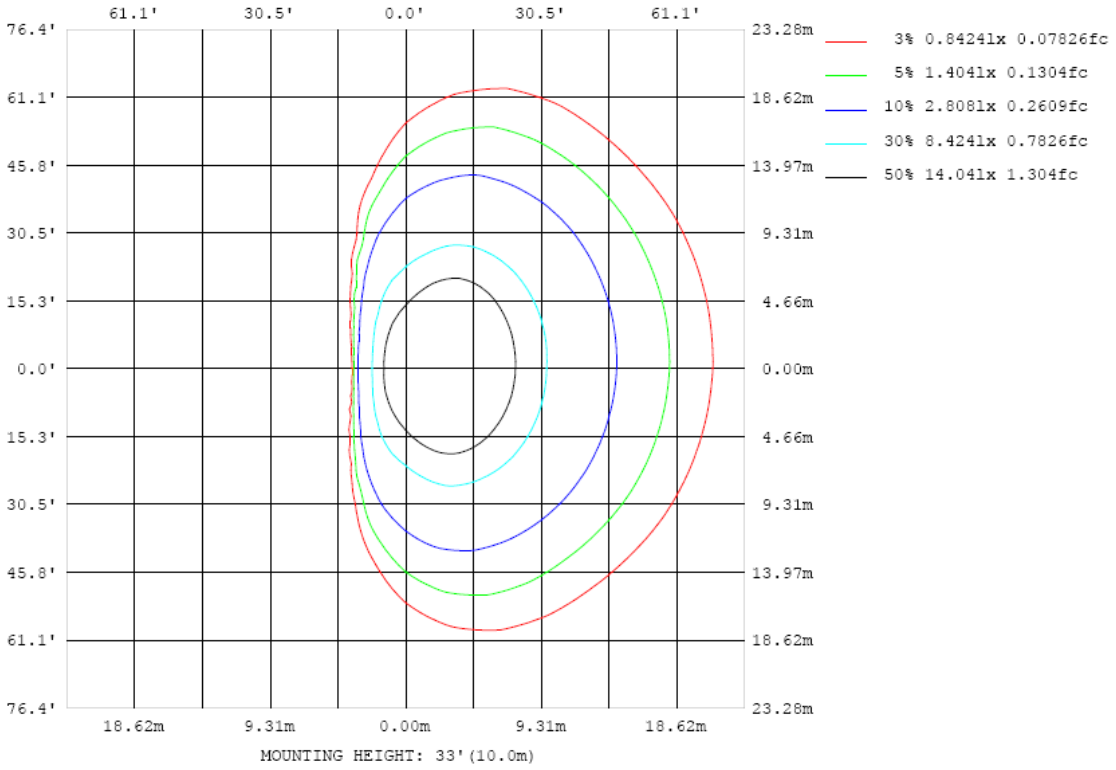


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

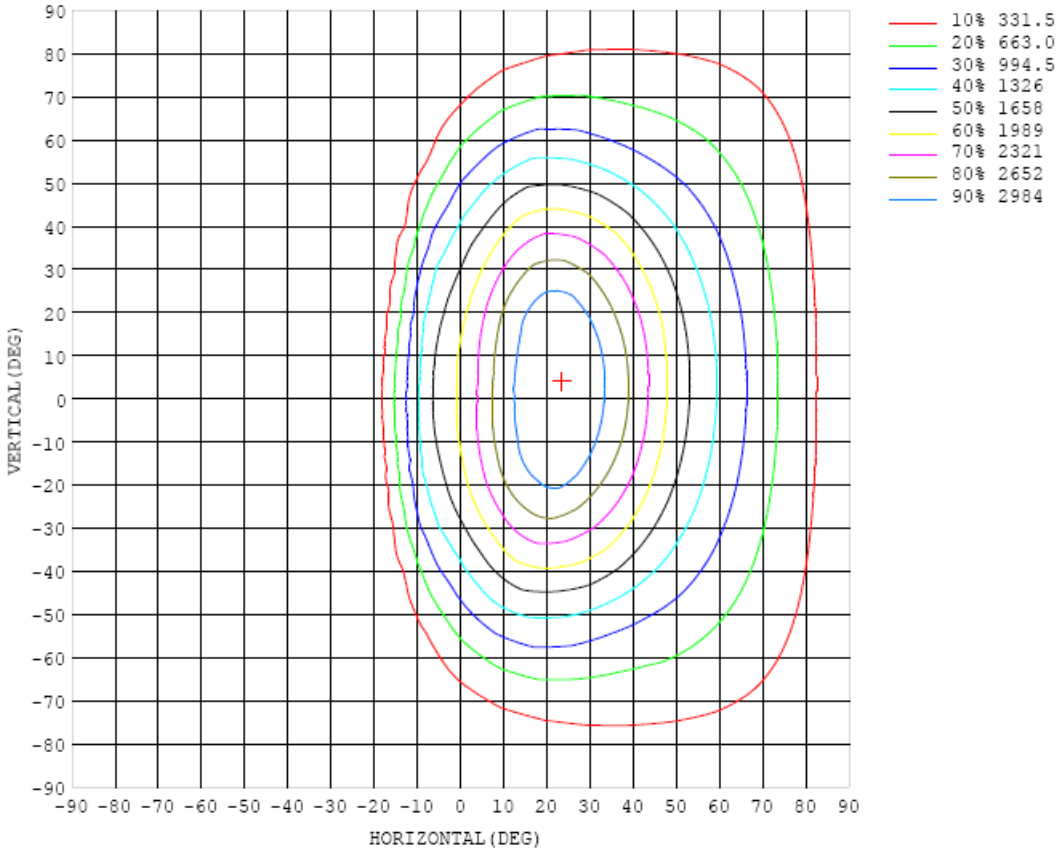


Chart 6: Isocandela Plot

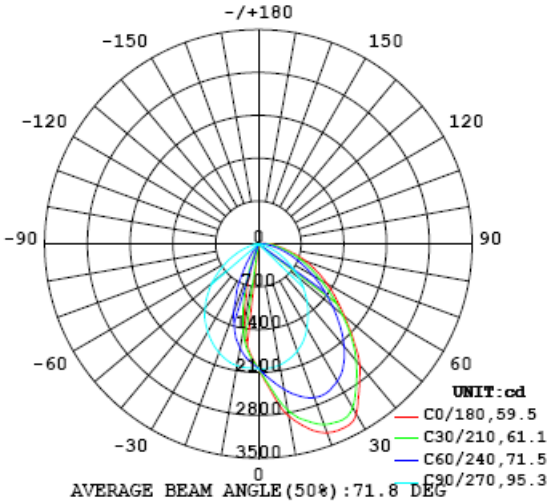


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036
5	2418	2413	2397	2367	2326	2276	2219	2159	2096	2037	1988	1944	1900	1857	1820	1792	1773	1759	1753
10	2852	2840	2812	2754	2668	2550	2409	2271	2136	2009	1901	1803	1712	1627	1548	1460	1353	1289	1273
15	3113	3090	3047	2983	2900	2765	2571	2350	2135	1946	1785	1639	1498	1302	1081	904	774	729	711
20	3282	3253	3211	3139	3037	2893	2671	2387	2107	1863	1651	1459	1209	889	601	387	231	135	130
25	3313	3286	3246	3185	3076	2909	2673	2351	2034	1745	1498	1226	850	472	182	48.1	45.6	38.1	36.3
30	3202	3166	3133	3087	3002	2834	2585	2270	1911	1586	1324	972	492	158	31.6	25.0	19.3	15.0	14.2
35	2882	2860	2830	2793	2741	2623	2426	2133	1757	1417	1106	674	220	23.8	16.5	8.11	2.04	0.51	0.68
40	2584	2563	2532	2488	2438	2337	2182	1951	1598	1244	897	418	56.4	9.68	3.79	0.16	0.56	0.55	0.55
45	2196	2175	2168	2149	2122	2034	1888	1712	1411	1057	677	231	8.46	2.78	0.03	0.47	0.44	0.43	0.43
50	1840	1816	1803	1790	1774	1707	1585	1455	1209	870	484	105	0.00	0.00	0.40	0.36	0.34	0.33	0.33
55	1549	1515	1489	1463	1425	1367	1300	1197	988	686	313	18.0	0.00	0.23	0.30	0.26	0.25	0.24	0.24
60	1293	1259	1225	1180	1119	1068	1036	954	772	506	188	0.00	0.00	0.25	0.21	0.18	0.16	0.16	0.16
65	1053	1020	983	936	875	825	792	723	575	350	104	0.00	0.06	0.17	0.13	0.11	0.09	0.09	0.09
70	826	800	765	723	674	623	582	518	395	202	35.0	0.00	0.13	0.10	0.07	0.06	0.05	0.05	0.06
75	599	571	551	528	495	453	408	343	238	92.4	0.00	0.00	0.09	0.08	0.08	0.08	0.08	0.09	0.10
80	405	392	379	361	335	301	261	201	120	34.9	0.00	0.08	0.08	0.10	0.10	0.10	0.10	0.12	0.15
85	271	261	252	239	215	182	144	95.6	40.6	3.77	0.00	0.11	0.13	0.14	0.15	0.15	0.15	0.18	0.22
90	176	167	157	145	125	96.8	62.4	28.3	5.03	0.00	0.13	0.17	0.20	0.22	0.23	0.23	0.23	0.27	0.32
95	106	99.0	88.1	74.8	56.7	32.2	10.6	1.77	0.07	0.12	0.19	0.24	0.29	0.32	0.33	0.34	0.33	0.38	0.44
100	45.9	39.8	30.2	17.3	6.03	1.66	0.74	0.49	0.20	0.19	0.26	0.33	0.39	0.43	0.45	0.45	0.45	0.50	0.57
105	6.42	4.63	2.16	0.85	0.85	0.74	0.54	0.32	0.21	0.26	0.34	0.43	0.51	0.56	0.58	0.59	0.57	0.64	0.74
110	0.89	0.86	0.78	0.70	0.61	0.50	0.37	0.26	0.25	0.34	0.44	0.56	0.66	0.72	0.74	0.75	0.73	0.80	0.91
115	0.66	0.64	0.57	0.50	0.43	0.37	0.30	0.27	0.34	0.45	0.59	0.73	0.85	0.93	0.96	0.97	0.95	0.99	1.05
120	0.47	0.45	0.41	0.36	0.33	0.30	0.28	0.32	0.44	0.58	0.75	0.92	1.06	1.15	1.19	1.21	1.20	1.21	1.21
125	0.34	0.33	0.30	0.28	0.28	0.28	0.33	0.43	0.57	0.74	0.93	1.13	1.28	1.39	1.45	1.48	1.48	1.46	1.42
130	0.24	0.24	0.24	0.25	0.27	0.33	0.42	0.56	0.72	0.91	1.13	1.34	1.51	1.63	1.71	1.76	1.77	1.77	1.75
135	0.19	0.21	0.23	0.27	0.33	0.43	0.56	0.72	0.90	1.10	1.32	1.53	1.71	1.84	1.93	2.00	2.02	2.08	2.15
140	0.21	0.23	0.27	0.34	0.44	0.56	0.71	0.87	1.06	1.27	1.49	1.70	1.89	2.02	2.13	2.20	2.24	2.37	2.53
145	0.29	0.33	0.39	0.48	0.59	0.72	0.87	1.03	1.21	1.41	1.63	1.83	2.02	2.15	2.26	2.35	2.38	2.58	2.85
150	0.45	0.50	0.57	0.67	0.78	0.92	1.06	1.21	1.37	1.56	1.76	1.97	2.14	2.27	2.39	2.48	2.51	2.73	3.03
155	0.69	0.74	0.83	0.92	1.04	1.17	1.29	1.43	1.58	1.75	1.95	2.13	2.29	2.45	2.57	2.66	2.70	2.84	3.03
160	0.96	1.02	1.11	1.20	1.30	1.40	1.50	1.62	1.74	1.86	2.03	2.19	2.34	2.49	2.61	2.70	2.75	2.82	2.91
165	1.27	1.33	1.39	1.46	1.52	1.58	1.66	1.74	1.81	1.90	2.03	2.15	2.26	2.38	2.49	2.58	2.63	2.62	2.58
170	1.53	1.58	1.63	1.67	1.72	1.78	1.84	1.90	1.99	2.09	2.21	2.33	2.44	2.54	2.62	2.68	2.74	2.51	2.15
175	1.70	1.75	1.81	1.86	1.92	1.98	2.06	2.16	2.27	2.39	2.51	2.63	2.74	2.83	2.91	2.96	3.05	2.59	1.90
180	1.76	1.79	1.82	1.85	1.89	1.96	2.05	2.14	2.22	2.31	2.41	2.51	2.58	2.63	2.69	2.77	2.88	2.42	1.71

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	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036	2036		
5	1756	1771	1794	1824	1862	1902	1943	1983	2032	2093	2153	2210	2263	2313	2358	2394	2414		
10	1290	1340	1425	1531	1631	1731	1829	1925	2021	2139	2263	2393	2531	2654	2746	2810	2847		
15	728	776	891	1074	1275	1493	1669	1817	1971	2150	2361	2582	2775	2904	2990	3061	3108		
20	150	243	379	574	869	1193	1480	1687	1888	2133	2428	2720	2925	3058	3164	3241	3283		
25	38.6	46.7	49.3	155	461	838	1231	1544	1784	2081	2438	2786	3009	3142	3231	3285	3315		
30	15.9	20.3	26.7	31.2	139	470	964	1395	1659	1995	2382	2742	2991	3137	3194	3221	3230		
35	0.40	2.17	9.09	18.0	20.4	196	677	1167	1526	1872	2274	2636	2866	2967	2973	2950	2913		
40	0.55	0.57	0.00	4.05	9.42	64.3	406	960	1357	1716	2120	2436	2610	2684	2669	2644	2618		
45	0.44	0.46	0.49	0.00	3.32	7.14	205	719	1177	1548	1936	2179	2314	2370	2356	2319	2256		
50	0.34	0.36	0.39	0.43	0.00	0.00	102	513	994	1360	1696	1873	1989	2033	1996	1946	1888		
55	0.25	0.27	0.29	0.34	0.00	0.00	29.8	325	796	1152	1447	1571	1650	1672	1643	1614	1579		
60	0.17	0.19	0.21	0.25	0.30	0.00	0.00	193	607	942	1193	1285	1321	1339	1337	1326	1319		
65	0.10	0.12	0.14	0.17	0.22	0.00	0.00	107	431	736	940	1021	1031	1046	1070	1072	1066		
70	0.06	0.07	0.09	0.11	0.15	0.17	0.00	49.7	280	548	713	780	793	812	836	845	841		
75	0.10	0.09	0.09	0.09	0.11	0.14	0.00	11.5	150	373	510	573	595	618	633	629	618		
80	0.14	0.13	0.13	0.12	0.10	0.10	0.00	0.00	60.9	221	332	394	425	443	447	438	423		
85	0.20	0.19	0.18	0.17	0.15	0.13	0.11	0.00	20.9	104	192	247	276	292	301	297	284		
90	0.30	0.29	0.27	0.25	0.23	0.20	0.17	0.00	1.69	31.4	87.9	132	163	182	192	190	183		
95	0.42	0.40	0.38	0.36	0.33	0.29	0.24	0.18	0.00	3.54	22.8	52.4	79.7	99.8	110	112	110		
100	0.54	0.52	0.50	0.48	0.44	0.40	0.34	0.26	0.16	0.19	0.26	4.58	18.0	33.6	44.2	49.3	49.4		
105	0.71	0.68	0.66	0.63	0.59	0.54	0.46	0.36	0.25	0.21	0.40	0.73	0.84	1.44	3.46	5.64	6.65		
110	0.88	0.85	0.83	0.80	0.75	0.69	0.59	0.47	0.35	0.24	0.26	0.45	0.61	0.72	0.79	0.83	0.87		
115	1.02	1.00	0.97	0.94	0.89	0.81	0.69	0.56	0.43	0.30	0.24	0.30	0.40	0.48	0.56	0.61	0.65		
120	1.19	1.17	1.14	1.10	1.04	0.95	0.82	0.67	0.52	0.39	0.28	0.24	0.29	0.34	0.38	0.43	0.45		
125	1.40	1.37	1.34	1.29	1.21	1.11	0.96	0.79	0.63	0.49	0.36	0.27	0.25	0.26	0.28	0.30	0.33		
130	1.72	1.69	1.65	1.58	1.48	1.36	1.19	1.00	0.82	0.66	0.51	0.37	0.28	0.25	0.23	0.23	0.24		
135	2.12	2.08	2.02	1.94	1.82	1.68	1.50	1.30	1.09	0.90	0.73	0.57	0.43	0.33	0.28	0.24	0.22		
140	2.49	2.45	2.38	2.28	2.15	1.99	1.80	1.59	1.37	1.17	0.98	0.81	0.65	0.50	0.39	0.33	0.27		
145	2.81	2.77	2.70	2.59	2.46	2.30	2.11	1.89	1.68	1.47	1.28	1.10	0.93	0.77	0.63	0.54	0.42		
150	3.00	2.98	2.91	2.81	2.67	2.52	2.34	2.14	1.94	1.76	1.58	1.41	1.24	1.09	0.95	0.84	0.66		
155	3.03	3.02	2.97	2.88	2.77	2.63	2.48	2.31	2.15	2.00	1.86	1.71	1.57	1.43	1.30	1.21	0.98		
160	2.94	2.96	2.94	2.87	2.78	2.68	2.56	2.43	2.31	2.21	2.11	2.01	1.91	1.80	1.70	1.63	1.37		
165	2.61	2.66	2.68	2.65	2.61	2.54	2.46	2.38	2.32	2.27	2.23	2.20	2.17	2.12	2.06	2.05	1.77		
170	2.21	2.27	2.32	2.33	2.32	2.32	2.31	2.29	2.28	2.29	2.32	2.34	2.35	2.38	2.40	2.45	2.15		
175	1.97	2.03	2.07	2.12	2.15	2.18	2.21	2.25	2.29	2.34	2.39	2.45	2.52	2.58	2.62	2.71	2.39		
180	1.77	1.80	1.84	1.88	1.92	1.97	2.04	2.11	2.19	2.29	2.38	2.48	2.57	2.65	2.73	2.85	2.52		

Table 7: Luminous Intensity Data

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)	0.405
Power Factor	0.9795
Test Power (W)	47.61
THD A%	18.71
Luminous Efficacy (lm/W)	111.0
Total Luminous Flux (lm)	5283.5
Color Rendering Index (CRI)	94.8
R9	74
Correlated Color Temperature (CCT)(K)	3408
Chromaticity Chroma x	0.4074
Chromaticity Chroma y	0.3855
Chromaticity Chroma u	0.2392
Chromaticity Chroma v	0.3396
Duv	-0.0027
Chromaticity Chroma u ’	0.2392
Chromaticity Chroma v’	0.5094

Special Color Rendering Indices	
R1	96.5
R2	99.2
R3	98
R4	93.7
R5	95.3
R6	95.6
R7	92.4
R8	87.3
R9	74
R10	97.6
R11	94.6
R12	76.8
R13	98.2
R14	99.6

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).

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)	0.406
Power Factor	0.9793
Power (W)	47.66
Luminous Efficacy (lm/W)	112.1
Total Luminous Flux (lm)	5344.5
Beam Angle (°)	59.7 (0^o-180^o) / 95.4 (90^o-270^o)
Center Beam Candle Power (cd)	2261
Maximum Beam Candle Power (cd)	3664 (At: C=350.0, Gamma=24.5)
Spacing Criteria	0.41 (0^o-180^o) / 1.22 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	81.66%
Zonal Lumens in the 60 °-90 °Zone	17.49%
Zonal Lumens in the 90 °-120 °Zone	0.77%
Zonal Lumens in the 120 °-180 °Zone	0.09%

Table 9: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

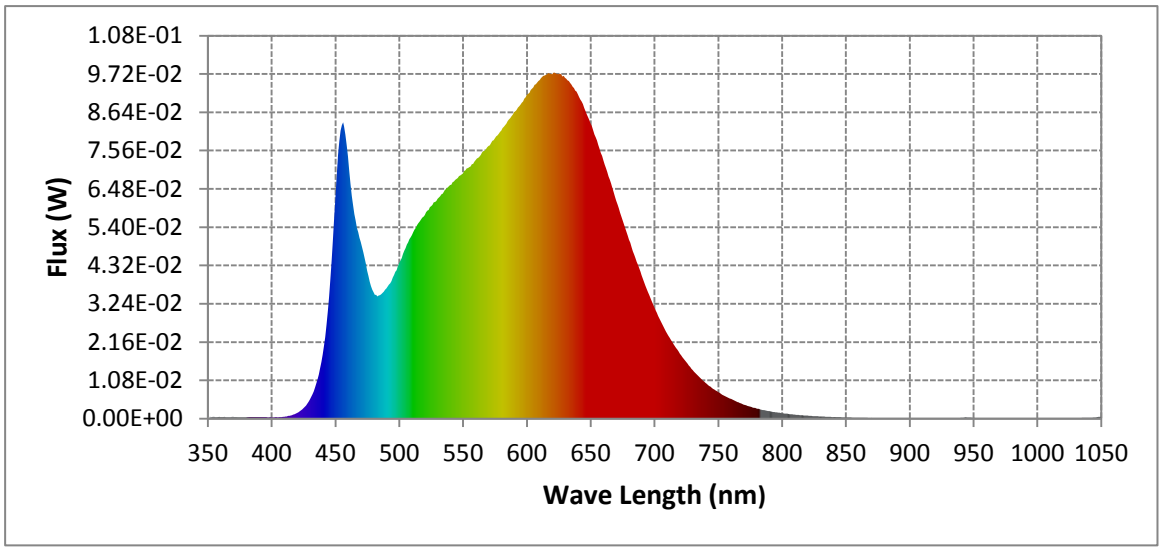
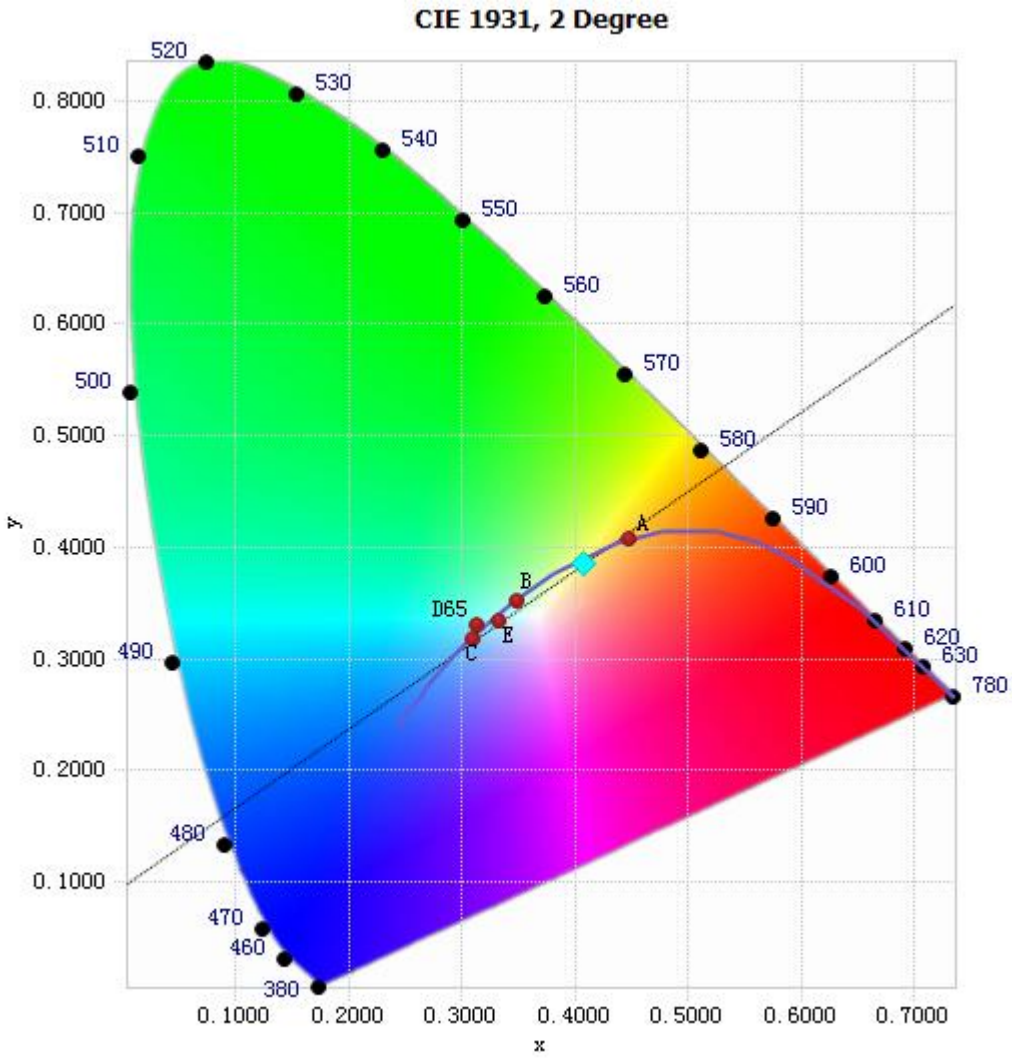


Chart 8: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	4.53E-04	485	3.48E-02	590	8.64E-02	695	3.57E-02
385	4.29E-04	490	3.68E-02	595	8.86E-02	700	3.14E-02
390	4.31E-04	495	3.98E-02	600	9.14E-02	705	2.75E-02
395	4.21E-04	500	4.38E-02	605	9.34E-02	710	2.40E-02
400	3.96E-04	505	4.81E-02	610	9.55E-02	715	2.10E-02
405	3.86E-04	510	5.18E-02	615	9.70E-02	720	1.84E-02
410	5.31E-04	515	5.51E-02	620	9.71E-02	725	1.59E-02
415	8.97E-04	520	5.74E-02	625	9.71E-02	730	1.37E-02
420	1.60E-03	525	5.99E-02	630	9.61E-02	735	1.18E-02
425	2.96E-03	530	6.21E-02	635	9.42E-02	740	1.01E-02
430	5.38E-03	535	6.39E-02	640	9.15E-02	745	8.69E-03
435	9.93E-03	540	6.59E-02	645	8.77E-02	750	7.49E-03
440	1.81E-02	545	6.76E-02	650	8.32E-02	755	6.40E-03
445	3.43E-02	550	6.92E-02	655	7.84E-02	760	5.59E-03
450	6.26E-02	555	7.10E-02	660	7.29E-02	765	4.72E-03
455	8.28E-02	560	7.29E-02	665	6.74E-02	770	4.00E-03
460	7.40E-02	565	7.51E-02	670	6.15E-02	775	3.41E-03
465	5.77E-02	570	7.69E-02	675	5.60E-02	780	2.90E-03
470	4.98E-02	575	7.90E-02	680	5.04E-02		
475	4.17E-02	580	8.13E-02	685	4.53E-02		
480	3.56E-02	585	8.40E-02	690	4.05E-02		

Table10: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4074, 0.3855)

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

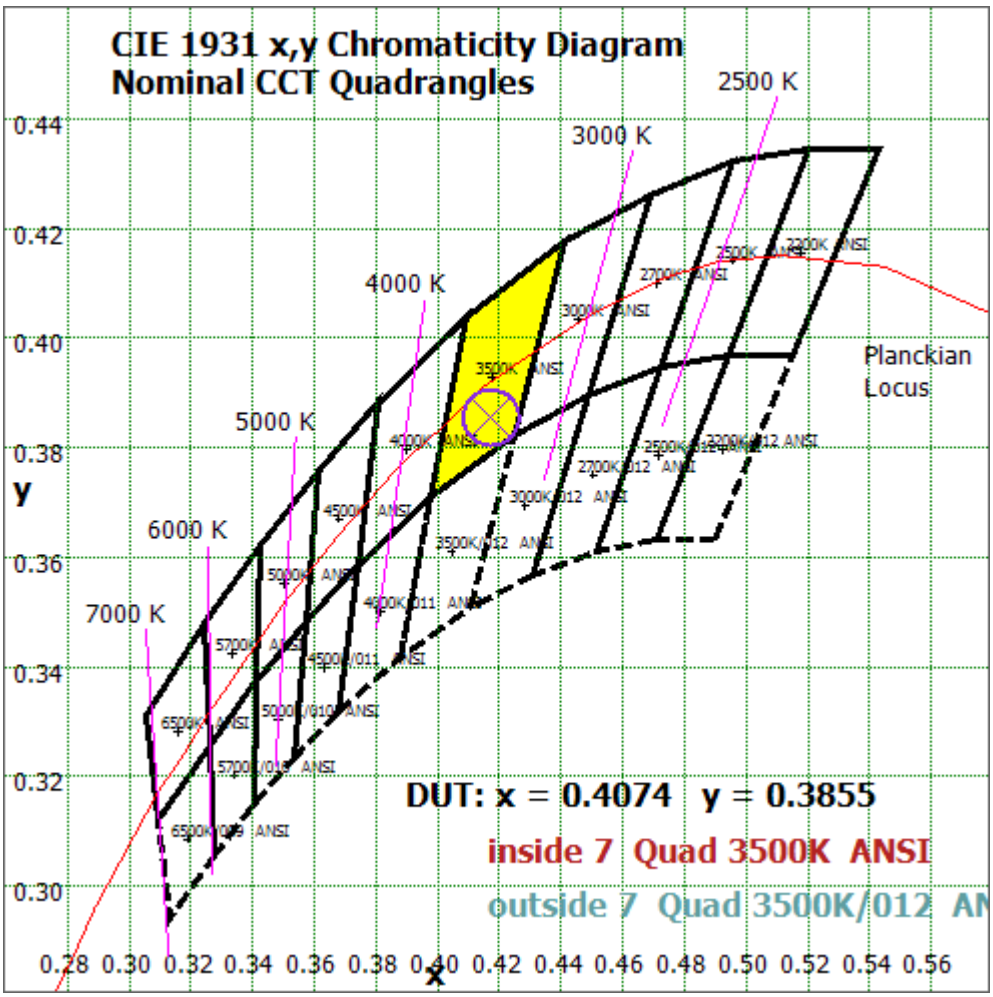


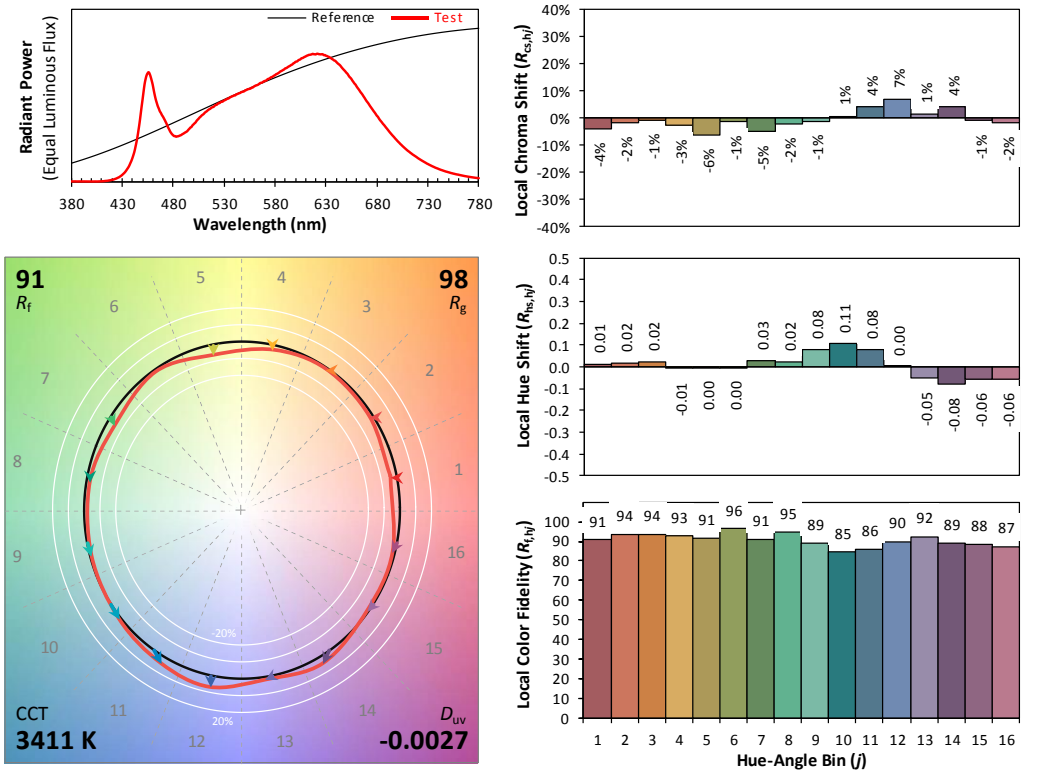
Chart 10: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

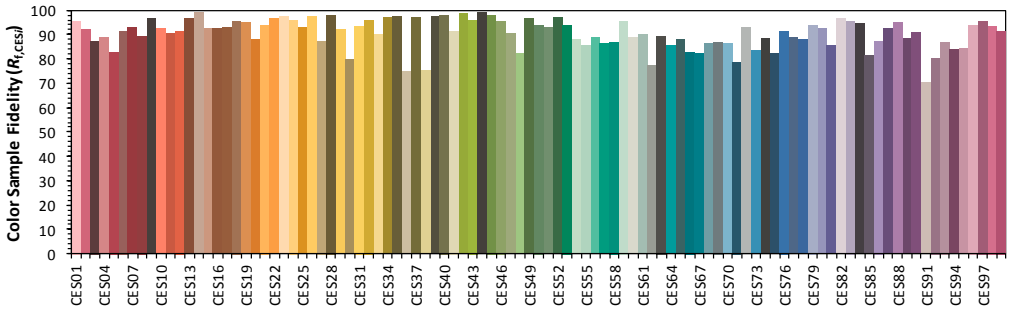
Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/01/25 **Model:** NOVT/9CCTS/SD/DIM120V/UNV/J/WH





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

x	0.4074
y	0.3855
u'	0.2392
v'	0.5094

CIE 13.3-1995 (CRI)

R_a	95
R_9	74

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.

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	219.149	4.10%
10- 20	613.154	11.47%
20- 30	873.446	16.34%
30- 40	991.517	18.55%
40- 50	928.45	17.37%
50- 60	738.466	13.82%
60- 70	512.454	9.59%
70- 80	294.306	5.51%
80- 90	127.843	2.39%
90-100	37.32	0.70%
100-110	2.967	0.06%
110-120	0.717	0.01%
120-130	0.794	0.01%
130-140	0.967	0.02%
140-150	1.072	0.02%
150-160	0.994	0.02%
160-170	0.673	0.01%
170-180	0.238	0.00%
Total	5344.5	100%

γ(°)	Lumens	% Total
0- 60	4364.18	81.66%
60- 90	934.603	17.49%
0-90	5298.79	99.14%
90- 180	45.742	0.86%
0- 180	5344.5	100%

Table 11: Zonal Lumen

Illuminance Plots- Goniophotometer Method

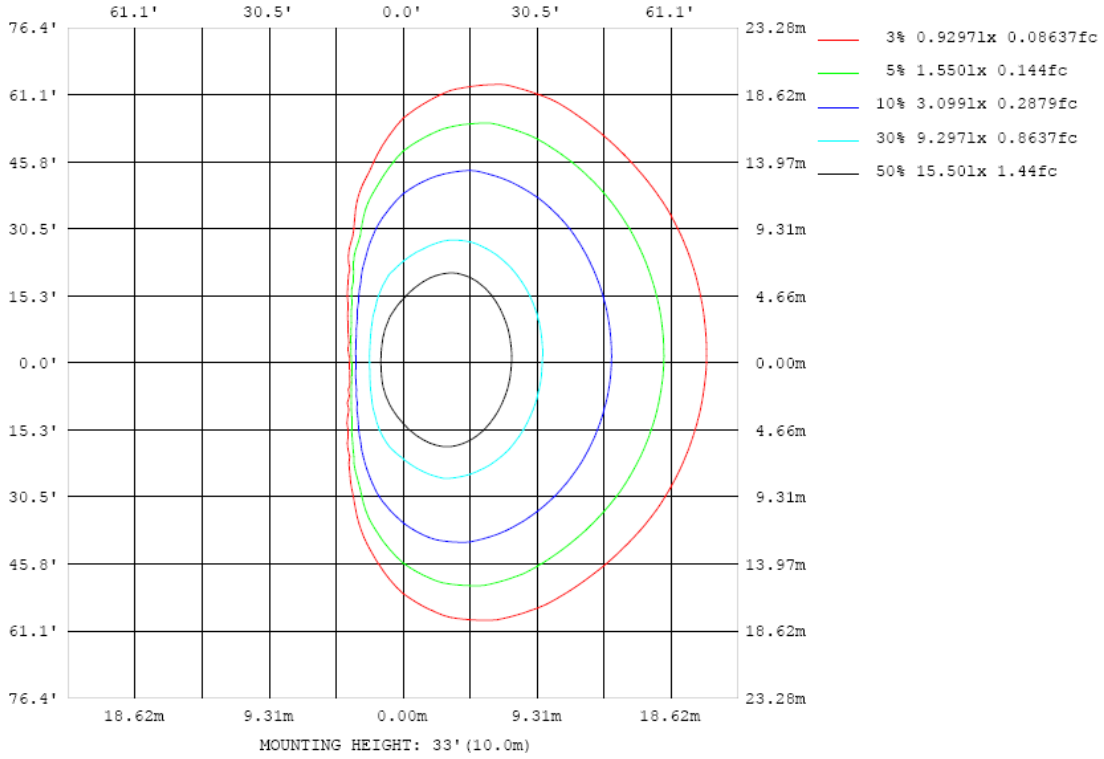


Chart 12: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

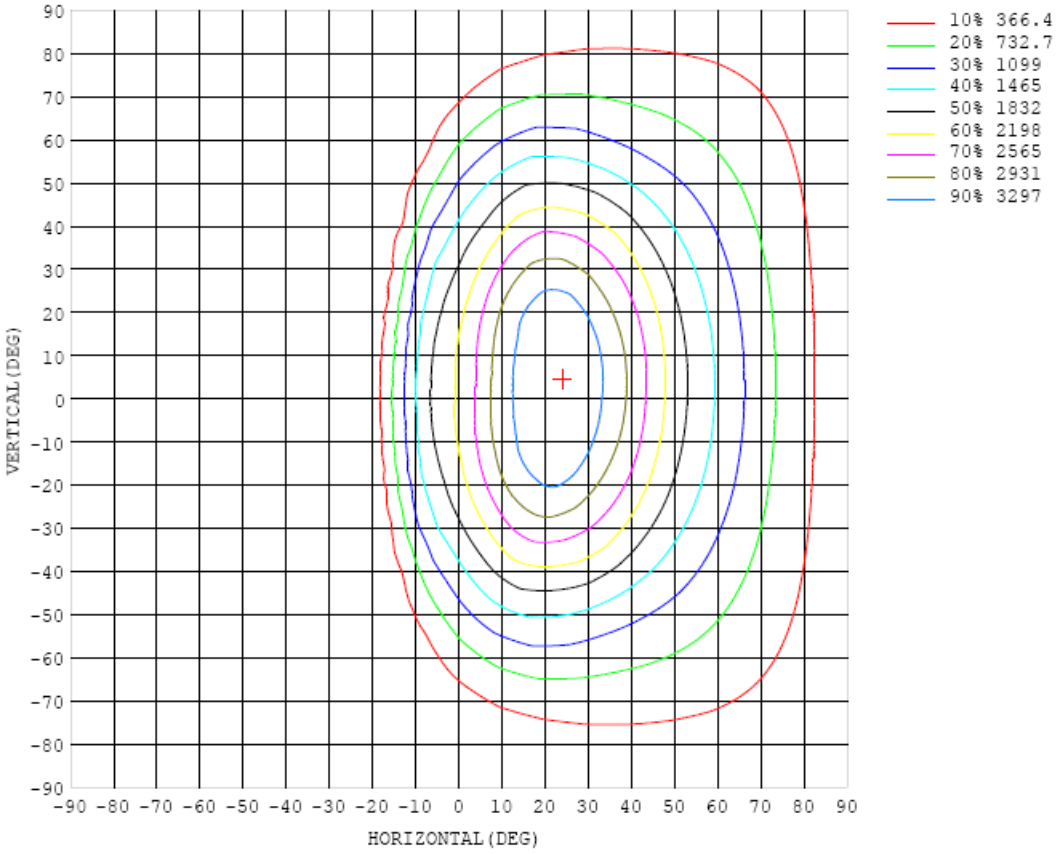


Chart 13: Isocandela Plot

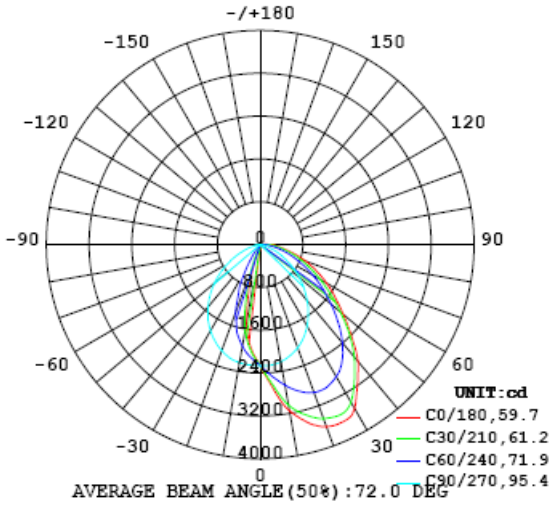


Chart 14: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261
5	2677	2671	2650	2618	2572	2518	2459	2395	2328	2260	2203	2154	2107	2061	2023	1993	1969	1954	1949
10	3146	3133	3099	3037	2942	2814	2664	2511	2363	2223	2104	1998	1899	1801	1715	1628	1514	1453	1455
15	3437	3410	3359	3290	3194	3044	2835	2596	2362	2149	1971	1813	1664	1451	1205	1014	865	815	801
20	3618	3586	3538	3459	3346	3183	2936	2623	2320	2051	1819	1618	1347	986	677	447	265	158	151
25	3651	3619	3575	3513	3388	3202	2940	2588	2238	1920	1652	1355	950	537	202	54.5	51.6	43.3	41.3
30	3530	3489	3450	3396	3300	3118	2847	2497	2106	1753	1465	1076	542	173	35.1	28.2	21.8	17.3	16.6
35	3176	3146	3115	3074	3014	2881	2664	2348	1939	1566	1218	740	241	26.6	18.5	9.17	2.36	0.57	0.76
40	2846	2816	2781	2735	2683	2566	2392	2146	1759	1365	984	460	59.7	11.0	4.20	0.18	0.62	0.62	0.61
45	2413	2390	2378	2358	2331	2233	2068	1876	1548	1162	742	252	9.33	2.99	0.05	0.52	0.49	0.48	0.48
50	2026	2003	1982	1959	1939	1866	1733	1591	1324	955	528	110	0.00	0.00	0.44	0.40	0.38	0.37	0.37
55	1705	1673	1638	1605	1556	1493	1422	1309	1080	750	339	16.3	0.00	0.28	0.33	0.30	0.28	0.27	0.27
60	1427	1391	1346	1293	1227	1170	1132	1038	842	551	203	0.00	0.00	0.27	0.23	0.20	0.18	0.18	0.18
65	1159	1123	1076	1024	960	906	865	787	626	377	110	0.00	0.09	0.18	0.15	0.12	0.10	0.10	0.11
70	905	875	835	789	740	687	638	564	428	216	34.0	0.00	0.15	0.11	0.08	0.06	0.05	0.06	0.07
75	656	627	602	574	539	494	444	370	256	97.8	0.00	0.00	0.11	0.09	0.09	0.09	0.09	0.10	0.11
80	446	429	413	394	364	327	281	216	126	35.1	0.00	0.09	0.10	0.11	0.12	0.12	0.11	0.13	0.17
85	299	286	274	259	233	197	154	100	41.1	3.22	0.00	0.12	0.14	0.16	0.17	0.17	0.17	0.20	0.24
90	193	183	170	156	135	103	65.9	28.8	4.39	0.00	0.14	0.19	0.22	0.25	0.26	0.26	0.26	0.30	0.35
95	116	108	95.0	79.8	59.2	32.0	9.35	0.92	0.18	0.14	0.21	0.27	0.32	0.36	0.37	0.38	0.37	0.41	0.48
100	49.3	42.0	30.9	16.9	5.58	1.57	0.81	0.52	0.22	0.21	0.29	0.37	0.44	0.48	0.50	0.50	0.49	0.55	0.62
105	6.59	4.68	2.07	0.92	0.92	0.79	0.58	0.34	0.23	0.29	0.38	0.48	0.57	0.62	0.65	0.65	0.64	0.71	0.81
110	0.97	0.94	0.85	0.76	0.65	0.54	0.41	0.29	0.28	0.38	0.50	0.63	0.73	0.80	0.83	0.83	0.81	0.89	1.00
115	0.73	0.70	0.62	0.54	0.47	0.40	0.33	0.31	0.38	0.51	0.66	0.82	0.95	1.03	1.07	1.07	1.06	1.09	1.15
120	0.51	0.49	0.45	0.40	0.36	0.33	0.31	0.37	0.50	0.65	0.84	1.03	1.18	1.28	1.32	1.34	1.33	1.33	1.34
125	0.37	0.36	0.33	0.31	0.31	0.32	0.37	0.49	0.64	0.83	1.05	1.26	1.43	1.54	1.61	1.64	1.64	1.61	1.56
130	0.26	0.26	0.26	0.27	0.31	0.37	0.48	0.63	0.81	1.02	1.27	1.50	1.68	1.81	1.90	1.95	1.97	1.95	1.92
135	0.21	0.23	0.26	0.30	0.37	0.48	0.63	0.81	1.01	1.23	1.48	1.72	1.91	2.05	2.15	2.22	2.25	2.30	2.36
140	0.23	0.26	0.31	0.39	0.50	0.64	0.80	0.98	1.19	1.42	1.67	1.90	2.11	2.25	2.36	2.45	2.48	2.62	2.78
145	0.33	0.37	0.44	0.54	0.66	0.81	0.97	1.15	1.35	1.58	1.82	2.04	2.25	2.39	2.51	2.60	2.63	2.84	3.14
150	0.51	0.56	0.65	0.75	0.88	1.03	1.19	1.35	1.53	1.74	1.98	2.18	2.38	2.51	2.65	2.75	2.78	3.00	3.33
155	0.76	0.82	0.92	1.03	1.16	1.30	1.44	1.60	1.76	1.95	2.17	2.36	2.54	2.71	2.84	2.94	2.98	3.13	3.36
160	1.06	1.14	1.24	1.34	1.45	1.56	1.67	1.80	1.93	2.07	2.26	2.44	2.59	2.75	2.89	2.98	3.04	3.11	3.23
165	1.41	1.48	1.55	1.62	1.69	1.76	1.84	1.93	2.01	2.12	2.25	2.39	2.51	2.64	2.76	2.85	2.91	2.89	2.85
170	1.70	1.76	1.81	1.86	1.91	1.98	2.05	2.11	2.21	2.32	2.45	2.58	2.71	2.81	2.90	2.96	3.03	2.78	2.38
175	1.88	1.95	2.01	2.07	2.13	2.20	2.29	2.40	2.52	2.65	2.79	2.92	3.04	3.14	3.22	3.28	3.37	2.86	2.09
180	1.97	2.01	2.05	2.08	2.13	2.20	2.28	2.38	2.50	2.63	2.74	2.86	2.97	3.06	3.15	3.21	3.25	2.70	1.87

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	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261	2261		
5	1955	1969	1995	2028	2066	2109	2154	2200	2256	2322	2390	2452	2507	2561	2607	2644	2669		
10	1474	1539	1629	1723	1818	1924	2028	2134	2239	2369	2510	2655	2805	2936	3039	3102	3137		
15	819	872	1011	1213	1444	1695	1861	2024	2193	2389	2623	2869	3075	3212	3311	3389	3435		
20	187	296	440	658	978	1354	1672	1884	2107	2375	2702	3024	3243	3386	3501	3583	3629		
25	44.0	53.4	56.8	182	531	947	1382	1730	1996	2323	2717	3096	3335	3477	3576	3633	3659		
30	18.4	23.1	30.8	35.7	163	544	1090	1561	1858	2229	2657	3051	3315	3469	3535	3567	3571		
35	0.41	2.71	11.1	21.2	23.0	232	787	1322	1705	2090	2536	2931	3179	3287	3297	3269	3225		
40	0.62	0.64	0.00	4.93	10.7	82.7	483	1093	1518	1914	2369	2719	2900	2971	2958	2932	2897		
45	0.49	0.52	0.56	0.00	3.99	8.55	241	824	1325	1731	2159	2432	2574	2625	2608	2562	2486		
50	0.38	0.40	0.44	0.45	0.00	0.00	126	595	1117	1522	1897	2093	2217	2256	2207	2145	2077		
55	0.28	0.30	0.33	0.38	0.00	0.00	40.7	380	903	1297	1619	1754	1840	1860	1819	1777	1735		
60	0.19	0.21	0.24	0.28	0.34	0.00	0.00	223	691	1061	1336	1437	1473	1489	1480	1465	1453		
65	0.12	0.13	0.16	0.20	0.25	0.00	0.00	129	495	831	1059	1144	1149	1163	1190	1189	1176		
70	0.07	0.08	0.10	0.13	0.17	0.16	0.00	59.9	322	620	801	873	882	903	928	935	926		
75	0.11	0.10	0.10	0.10	0.13	0.16	0.00	16.0	175	423	574	642	664	687	701	697	682		
80	0.16	0.15	0.14	0.13	0.11	0.12	0.00	0.00	71.0	252	376	444	474	492	496	485	468		
85	0.22	0.21	0.20	0.19	0.17	0.14	0.12	0.00	25.4	121	217	278	309	325	334	329	313		
90	0.33	0.32	0.30	0.28	0.25	0.22	0.18	0.00	2.87	37.9	101	149	182	203	213	211	202		
95	0.46	0.44	0.42	0.39	0.36	0.32	0.27	0.20	0.00	4.63	27.3	59.7	89.5	111	122	124	122		
100	0.60	0.58	0.55	0.52	0.48	0.44	0.37	0.29	0.18	0.20	0.31	6.21	21.4	37.4	49.4	54.6	54.1		
105	0.78	0.75	0.73	0.69	0.65	0.59	0.50	0.40	0.28	0.23	0.45	0.82	0.93	1.67	3.97	6.26	7.11		
110	0.96	0.94	0.91	0.88	0.82	0.75	0.64	0.52	0.38	0.27	0.30	0.50	0.67	0.80	0.87	0.92	0.95		
115	1.12	1.10	1.07	1.03	0.97	0.89	0.76	0.62	0.47	0.33	0.27	0.34	0.44	0.53	0.62	0.68	0.71		
120	1.31	1.28	1.25	1.21	1.14	1.04	0.90	0.73	0.57	0.43	0.30	0.27	0.32	0.37	0.43	0.47	0.50		
125	1.54	1.51	1.47	1.41	1.33	1.21	1.06	0.87	0.69	0.54	0.40	0.30	0.28	0.28	0.31	0.34	0.36		
130	1.90	1.86	1.81	1.74	1.63	1.49	1.31	1.10	0.90	0.72	0.56	0.41	0.31	0.27	0.26	0.26	0.26		
135	2.34	2.29	2.23	2.13	2.01	1.85	1.65	1.42	1.20	0.99	0.81	0.63	0.48	0.36	0.31	0.27	0.24		
140	2.75	2.70	2.62	2.51	2.37	2.20	1.98	1.75	1.51	1.29	1.08	0.89	0.71	0.55	0.43	0.36	0.30		
145	3.11	3.06	2.98	2.85	2.71	2.53	2.32	2.09	1.85	1.62	1.42	1.22	1.03	0.85	0.71	0.60	0.46		
150	3.32	3.29	3.22	3.10	2.95	2.78	2.58	2.36	2.15	1.94	1.75	1.56	1.38	1.20	1.05	0.93	0.74		
155	3.37	3.36	3.29	3.19	3.06	2.91	2.74	2.56	2.38	2.21	2.06	1.90	1.74	1.59	1.45	1.35	1.10		
160	3.27	3.29	3.26	3.19	3.08	2.97	2.83	2.69	2.56	2.45	2.34	2.23	2.12	2.00	1.89	1.82	1.52		
165	2.91	2.96	2.97	2.95	2.89	2.82	2.72	2.64	2.57	2.52	2.47	2.44	2.41	2.35	2.29	2.28	1.97		
170	2.46	2.53	2.58	2.60	2.58	2.57	2.56	2.54	2.53	2.55	2.57	2.59	2.61	2.64	2.66	2.71	2.38		
175	2.19	2.25	2.31	2.36	2.39	2.43	2.46	2.50	2.54	2.60	2.66	2.73	2.79	2.86	2.91	3.00	2.65		
180	1.97	2.00	2.04	2.09	2.14	2.20	2.26	2.34	2.44	2.54	2.65	2.75	2.85	2.94	3.02	3.15	2.79		

Table 13: Luminous Intensity Data

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)	0.417
Power Factor	0.9807
Test Power (W)	49.06
THD A%	18.27
Luminous Efficacy (lm/W)	103.7
Total Luminous Flux (lm)	5087.9
Color Rendering Index (CRI)	93.7
R9	72.5
Correlated Color Temperature (CCT)(K)	3929
Chromaticity Chroma x	0.3823
Chromaticity Chroma y	0.3744
Chromaticity Chroma u	0.2273
Chromaticity Chroma v	0.3339
Duv	-0.0016
Chromaticity Chroma u ’	0.2273
Chromaticity Chroma v’	0.5008

Special Color Rendering Indices	
R1	95.6
R2	99.5
R3	97.4
R4	90.8
R5	93.4
R6	95.1
R7	91.2
R8	86.4
R9	72.5
R10	97.7
R11	92
R12	71.6
R13	97.9
R14	99.6

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).

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)	0.418
Power Factor	0.9802
Power (W)	49.16
Luminous Efficacy (lm/W)	104.8
Total Luminous Flux (lm)	5149.3
Beam Angle (°)	59.6 (0^o-180^o) / 95.3 (90^o-270^o)
Center Beam Candle Power (cd)	2177
Maximum Beam Candle Power (cd)	3518 (At: C=0.0, Gamma=23.0)
Spacing Criteria	0.41 (0^o-180^o) / 1.19 (90^o-270^o)
Zonal Lumens in the 0 °-60 °Zone	81.75%
Zonal Lumens in the 60 °-90 °Zone	17.43%
Zonal Lumens in the 90 °-120 °Zone	0.74%
Zonal Lumens in the 120 °-180 °Zone	0.09%

Table 15: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

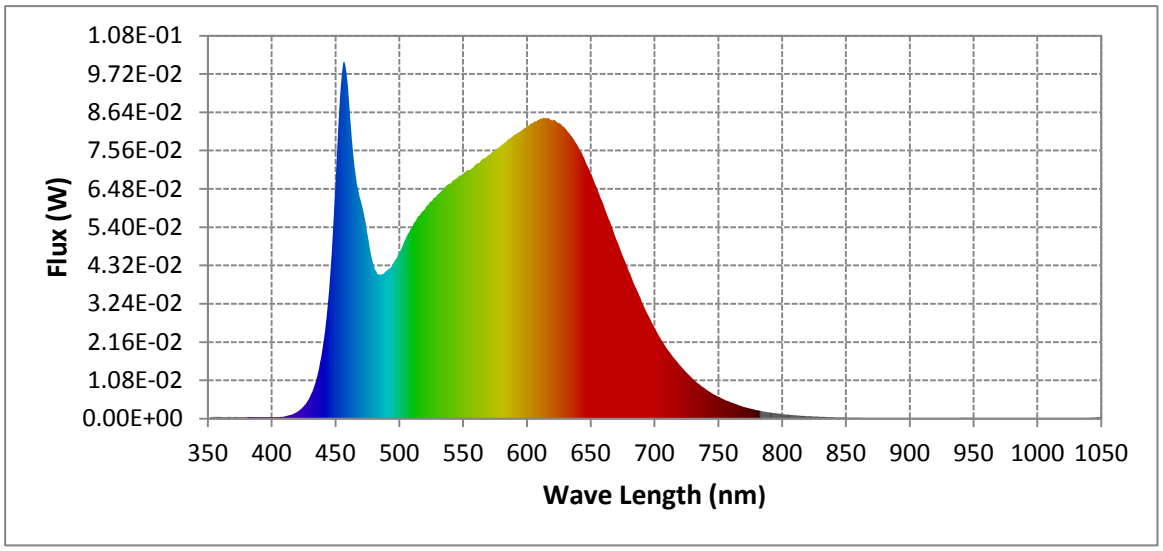
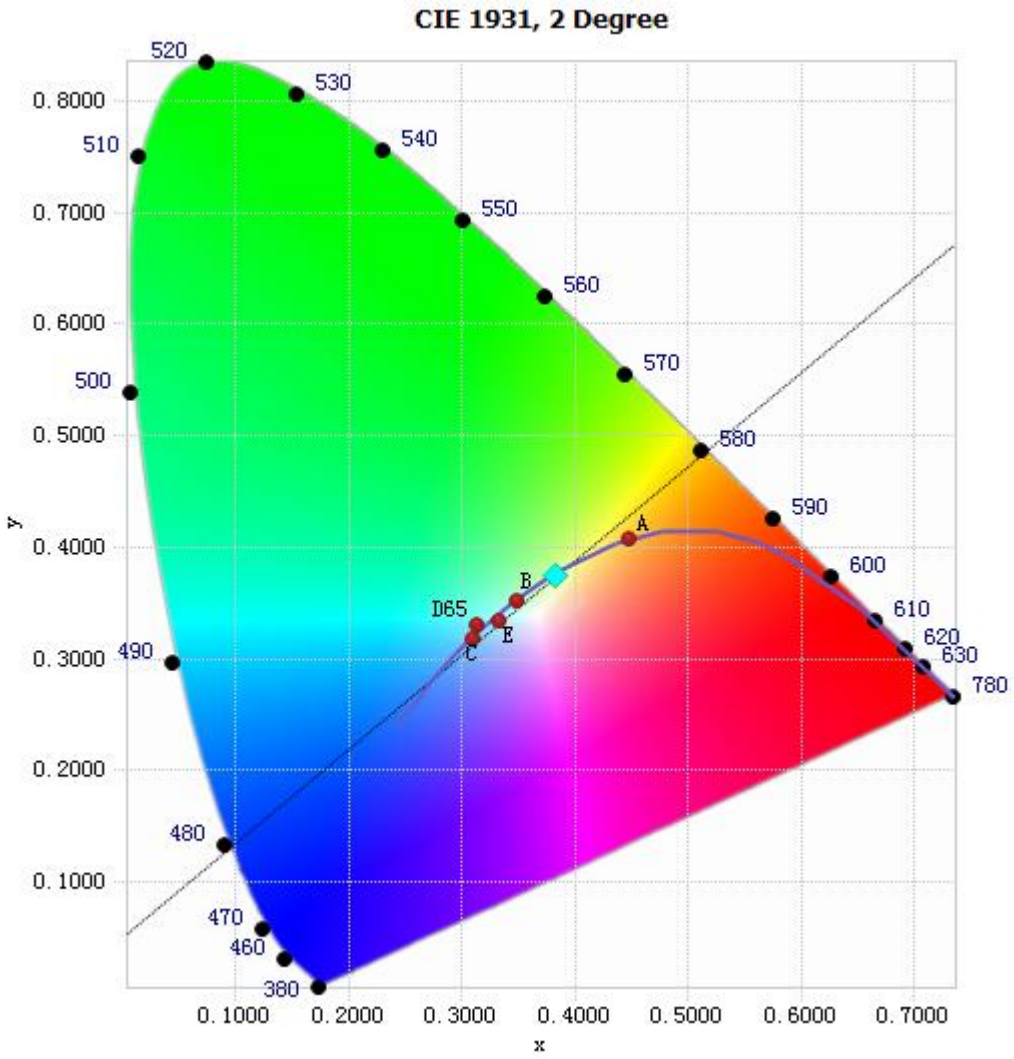


Chart 15: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	5.13E-04	485	4.06E-02	590	8.01E-02	695	2.93E-02
385	4.34E-04	490	4.16E-02	595	8.11E-02	700	2.58E-02
390	4.60E-04	495	4.37E-02	600	8.26E-02	705	2.26E-02
395	4.52E-04	500	4.67E-02	605	8.34E-02	710	1.97E-02
400	4.36E-04	505	5.06E-02	610	8.44E-02	715	1.73E-02
405	4.82E-04	510	5.39E-02	615	8.47E-02	720	1.51E-02
410	6.40E-04	515	5.71E-02	620	8.41E-02	725	1.31E-02
415	1.09E-03	520	5.90E-02	625	8.34E-02	730	1.13E-02
420	1.91E-03	525	6.13E-02	630	8.18E-02	735	9.73E-03
425	3.43E-03	530	6.33E-02	635	7.97E-02	740	8.38E-03
430	6.11E-03	535	6.47E-02	640	7.69E-02	745	7.20E-03
435	1.10E-02	540	6.64E-02	645	7.34E-02	750	6.19E-03
440	1.99E-02	545	6.78E-02	650	6.93E-02	755	5.31E-03
445	3.60E-02	550	6.89E-02	655	6.51E-02	760	4.64E-03
450	6.60E-02	555	7.02E-02	660	6.03E-02	765	3.93E-03
455	9.72E-02	560	7.17E-02	665	5.57E-02	770	3.34E-03
460	9.37E-02	565	7.31E-02	670	5.06E-02	775	2.87E-03
465	7.15E-02	570	7.44E-02	675	4.61E-02	780	2.43E-03
470	6.15E-02	575	7.56E-02	680	4.14E-02		
475	5.24E-02	580	7.70E-02	685	3.72E-02		
480	4.33E-02	585	7.87E-02	690	3.32E-02		

Table 16: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3823, 0.3744)

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

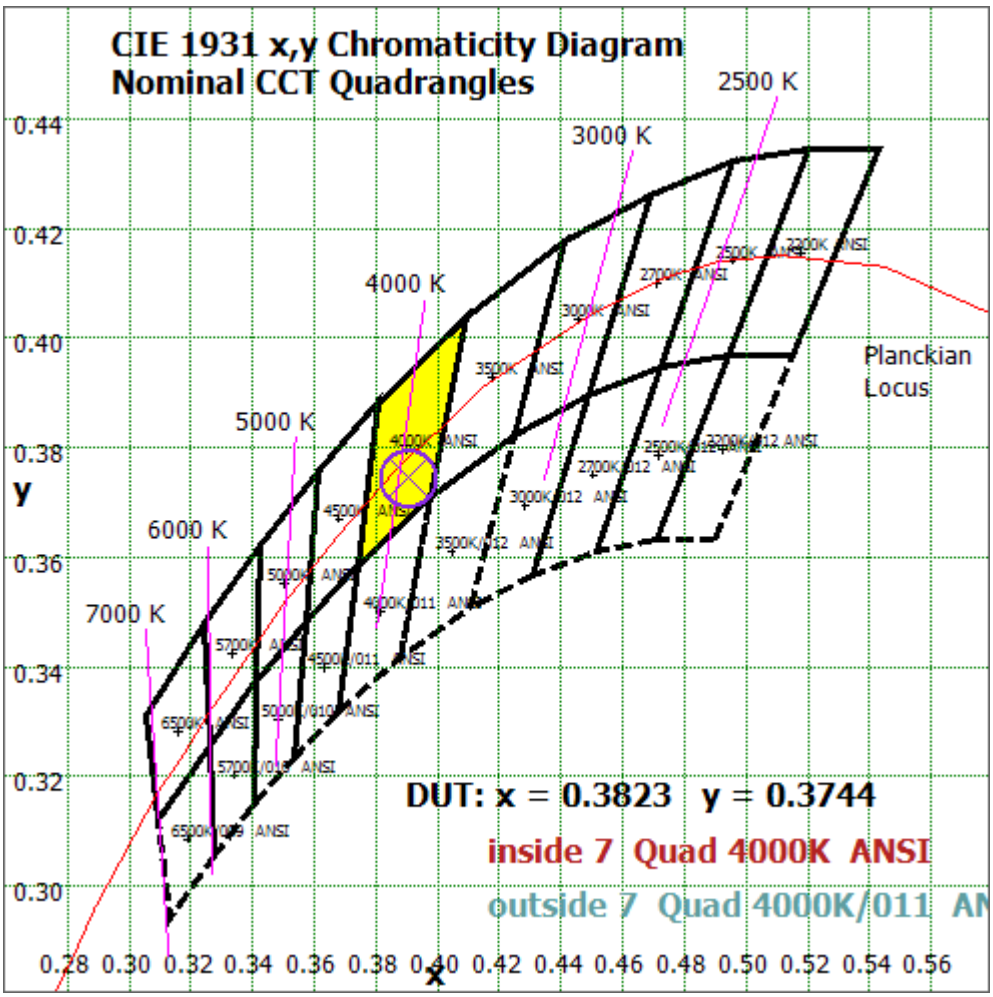


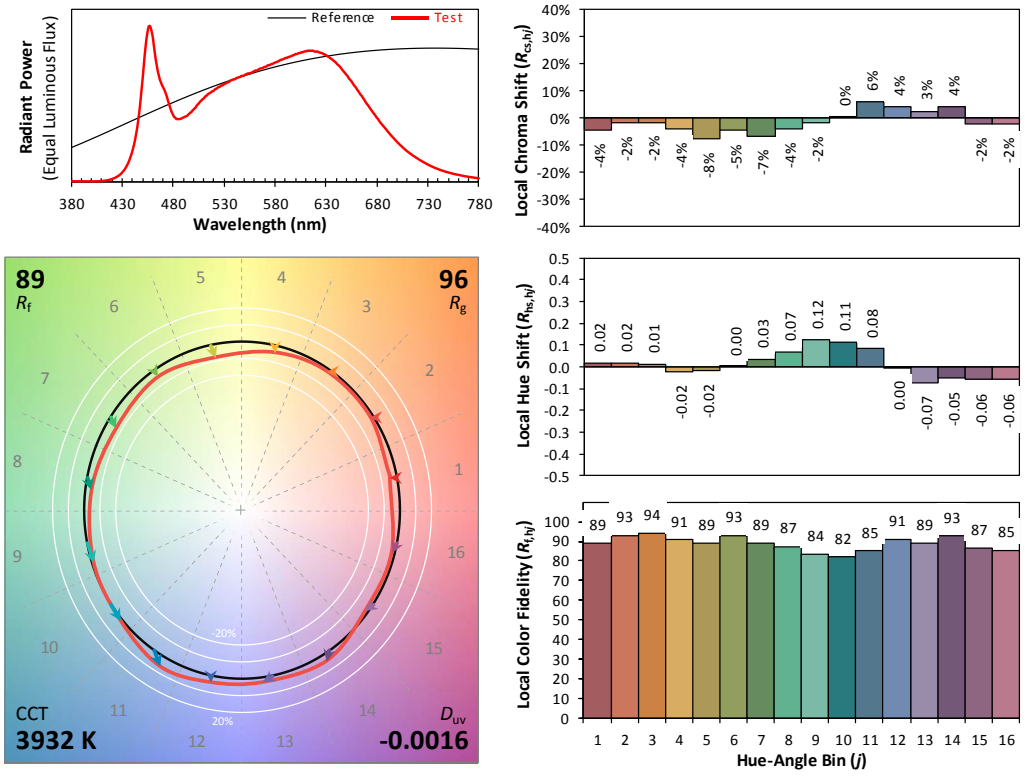
Chart 17: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2024/01/25 **Model:** NOVT/9CCTS/SD/DIM120V/UNV/J/WH



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

x	0.3823
y	0.3744
u'	0.2273
v'	0.5008

CIE 13.3-1995 (CRI)

R_a	94
R_9	73

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.

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	210.951	4.10%
10- 20	591.017	11.48%
20- 30	842.467	16.36%
30- 40	957.503	18.59%
40- 50	895.491	17.39%
50- 60	711.878	13.82%
60- 70	493.356	9.58%
70- 80	282.276	5.48%
80- 90	121.696	2.36%
90-100	34.865	0.68%
100-110	2.566	0.05%
110-120	0.683	0.01%
120-130	0.764	0.01%
130-140	0.941	0.02%
140-150	1.04	0.02%
150-160	0.951	0.02%
160-170	0.64	0.01%
170-180	0.227	0.00%
Total	5149.3	100%

γ(°)	Lumens	% Total
0- 60	4209.31	81.75%
60- 90	897.328	17.43%
0-90	5106.64	99.17%
90- 180	42.677	0.83%
0- 180	5149.3	100%

Table 17: Zonal Lumen

Illuminance Plots- Goniophotometer Method

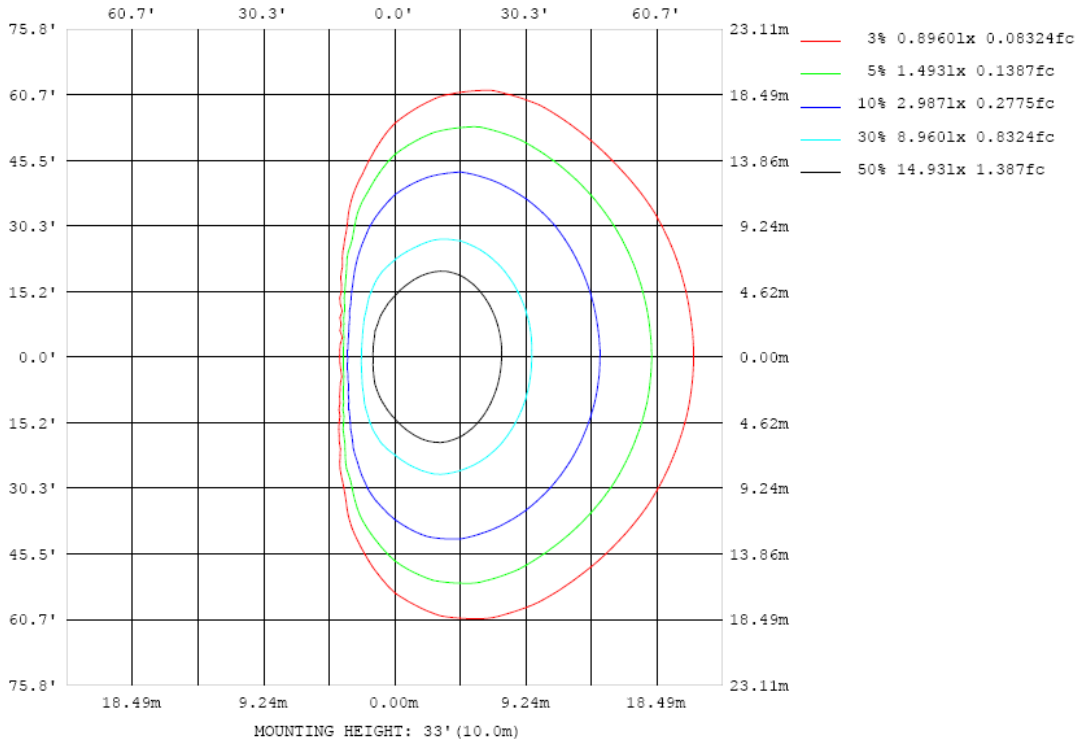


Chart 19: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

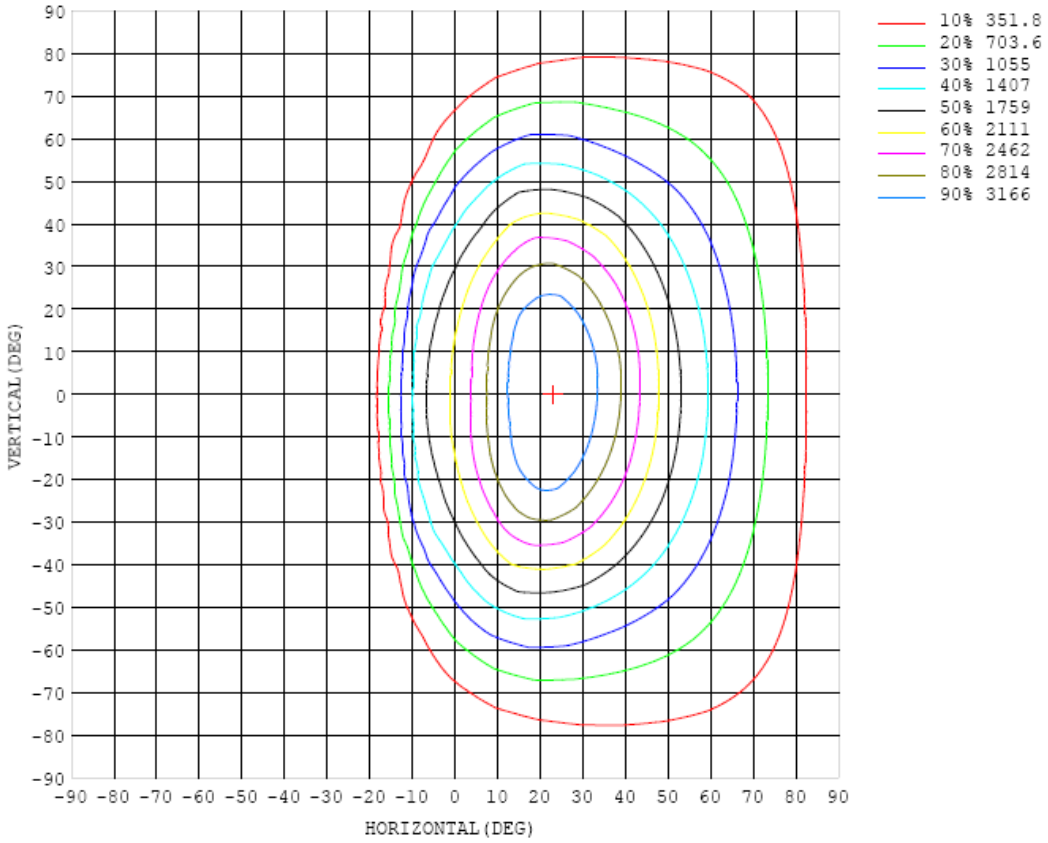


Chart 20: Isocandela Plot

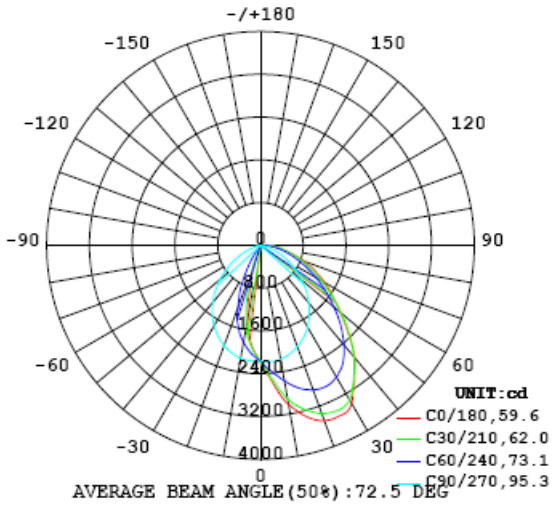


Chart 21: Polar Candela Distribution

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	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177
5	2566	2562	2543	2513	2469	2421	2364	2308	2246	2183	2125	2079	2038	1996	1959	1929	1905	1888	1882
10	3019	3007	2980	2917	2833	2713	2569	2434	2296	2163	2051	1949	1854	1758	1662	1584	1478	1414	1385
15	3314	3290	3239	3174	3082	2946	2759	2533	2312	2102	1931	1781	1627	1400	1192	985	844	797	771
20	3487	3460	3417	3348	3239	3098	2876	2582	2281	2013	1790	1598	1301	944	688	425	271	189	174
25	3512	3492	3453	3408	3307	3140	2906	2564	2214	1900	1643	1347	924	514	174	64.8	51.3	43.7	40.6
30	3407	3382	3365	3333	3258	3100	2841	2488	2109	1761	1472	1094	569	151	38.4	29.9	22.2	18.1	16.5
35	3061	3051	3047	3037	3004	2898	2686	2370	1963	1591	1262	806	246	25.1	20.9	10.5	3.67	0.86	0.75
40	2741	2730	2727	2711	2690	2601	2430	2180	1788	1400	1029	502	96.1	11.5	4.52	0.10	0.63	0.61	0.59
45	2321	2326	2342	2349	2348	2277	2123	1931	1595	1208	791	269	12.3	4.05	0.05	0.54	0.49	0.48	0.47
50	1951	1960	1963	1965	1971	1926	1795	1653	1375	1003	580	141	0.00	0.02	0.47	0.41	0.38	0.36	0.36
55	1641	1640	1630	1620	1597	1557	1483	1375	1147	805	386	41.3	0.00	0.08	0.35	0.30	0.28	0.26	0.26
60	1376	1369	1342	1313	1269	1224	1194	1106	907	610	236	0.00	0.00	0.31	0.25	0.21	0.19	0.18	0.18
65	1116	1105	1076	1045	997	955	926	854	690	431	136	0.00	0.01	0.20	0.16	0.13	0.11	0.10	0.10
70	871	860	837	810	774	733	692	626	490	270	58.0	0.00	0.17	0.13	0.09	0.07	0.06	0.06	0.06
75	628	622	617	599	573	537	495	427	313	133	2.05	0.00	0.11	0.09	0.07	0.07	0.07	0.09	0.11
80	430	427	421	414	395	366	327	264	169	55.1	0.00	0.05	0.09	0.10	0.10	0.11	0.10	0.13	0.16
85	288	284	281	276	256	228	190	137	67.4	11.9	0.00	0.10	0.12	0.13	0.14	0.15	0.15	0.18	0.23
90	186	182	177	170	154	127	91.0	49.9	14.0	0.00	0.03	0.15	0.18	0.21	0.22	0.23	0.23	0.27	0.34
95	111	108	101	90.4	74.1	50.9	24.4	4.79	0.00	0.12	0.18	0.23	0.28	0.31	0.33	0.34	0.34	0.39	0.46
100	46.9	44.0	37.3	26.3	13.4	3.20	0.64	0.58	0.22	0.17	0.25	0.32	0.38	0.42	0.45	0.46	0.46	0.51	0.60
105	6.24	5.44	3.13	1.22	0.85	0.85	0.64	0.37	0.21	0.25	0.33	0.42	0.50	0.55	0.58	0.60	0.59	0.66	0.78
110	0.93	0.91	0.84	0.77	0.68	0.57	0.43	0.28	0.24	0.33	0.43	0.54	0.64	0.71	0.74	0.76	0.76	0.83	0.96
115	0.69	0.68	0.62	0.55	0.48	0.41	0.33	0.28	0.33	0.44	0.57	0.71	0.84	0.92	0.96	0.98	0.98	1.03	1.11
120	0.49	0.48	0.44	0.40	0.36	0.33	0.29	0.32	0.43	0.57	0.73	0.90	1.04	1.14	1.20	1.23	1.24	1.26	1.29
125	0.35	0.35	0.32	0.31	0.30	0.30	0.34	0.43	0.56	0.73	0.92	1.11	1.27	1.39	1.47	1.51	1.54	1.54	1.51
130	0.25	0.26	0.26	0.27	0.29	0.33	0.42	0.56	0.71	0.90	1.12	1.33	1.51	1.64	1.74	1.80	1.84	1.85	1.85
135	0.21	0.23	0.25	0.29	0.35	0.44	0.57	0.73	0.90	1.11	1.34	1.56	1.75	1.89	1.99	2.08	2.12	2.17	2.28
140	0.23	0.26	0.30	0.36	0.46	0.58	0.72	0.89	1.07	1.28	1.51	1.73	1.93	2.08	2.20	2.29	2.35	2.43	2.68
145	0.32	0.36	0.43	0.52	0.62	0.75	0.90	1.07	1.25	1.47	1.70	1.90	2.10	2.25	2.37	2.46	2.52	2.60	3.00
150	0.50	0.55	0.62	0.71	0.82	0.95	1.09	1.25	1.41	1.60	1.82	2.01	2.21	2.35	2.47	2.59	2.65	2.72	3.18
155	0.75	0.81	0.89	0.97	1.08	1.20	1.32	1.46	1.60	1.81	2.03	2.17	2.34	2.50	2.64	2.75	2.83	2.88	3.20
160	1.06	1.13	1.21	1.29	1.38	1.47	1.58	1.72	1.84	1.98	2.16	2.32	2.47	2.64	2.76	2.86	2.93	2.94	3.07
165	1.40	1.44	1.49	1.54	1.59	1.66	1.73	1.81	1.90	2.00	2.13	2.28	2.39	2.51	2.62	2.71	2.79	2.81	2.79
170	1.70	1.74	1.77	1.80	1.84	1.89	1.93	1.98	2.05	2.14	2.24	2.33	2.44	2.55	2.65	2.74	2.82	2.89	2.80
175	1.95	1.97	1.99	2.01	2.03	2.06	2.11	2.17	2.25	2.33	2.43	2.52	2.61	2.70	2.80	2.90	2.98	3.06	3.15
180	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57

Table 18: 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	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177		
5	1885	1898	1920	1951	1987	2028	2071	2116	2168	2227	2291	2353	2410	2462	2506	2539	2559		
10	1406	1469	1554	1659	1746	1838	1937	2037	2142	2264	2405	2539	2691	2821	2914	2977	3012		
15	785	840	952	1168	1368	1590	1768	1921	2086	2275	2497	2740	2942	3085	3179	3248	3300		
20	191	269	401	655	918	1242	1550	1786	1996	2245	2550	2870	3105	3247	3356	3425	3478		
25	42.4	50.6	57.4	182	478	890	1309	1625	1881	2186	2546	2909	3163	3318	3413	3469	3506		
30	17.5	21.9	28.3	36.6	145	486	1026	1448	1739	2082	2472	2845	3116	3286	3363	3400	3415		
35	0.44	2.29	9.13	19.9	24.3	210	690	1208	1572	1927	2341	2713	2958	3078	3109	3106	3095		
40	0.59	0.65	0.02	5.11	11.1	45.0	402	974	1385	1755	2177	2504	2681	2769	2780	2778	2774		
45	0.47	0.49	0.55	0.00	4.42	4.04	218	726	1197	1573	1966	2217	2363	2430	2434	2413	2368		
50	0.36	0.38	0.41	0.48	0.00	0.00	95.9	500	998	1370	1713	1890	2011	2078	2050	2012	1975		
55	0.27	0.28	0.31	0.36	0.11	0.00	16.4	307	786	1150	1449	1572	1658	1699	1680	1661	1644		
60	0.18	0.20	0.22	0.25	0.31	0.00	0.00	187	589	928	1182	1278	1313	1346	1364	1370	1378		
65	0.11	0.12	0.14	0.17	0.22	0.00	0.00	97.6	405	712	919	1006	1017	1042	1089	1109	1111		
70	0.07	0.07	0.09	0.11	0.15	0.19	0.00	42.7	253	516	682	756	776	809	845	866	872		
75	0.10	0.10	0.10	0.10	0.11	0.14	0.00	2.16	119	336	472	544	578	607	629	638	636		
80	0.15	0.15	0.14	0.13	0.12	0.11	0.01	0.00	47.0	186	297	366	401	424	438	442	437		
85	0.22	0.22	0.21	0.20	0.18	0.16	0.13	0.00	12.6	77.4	160	217	253	277	293	298	292		
90	0.33	0.32	0.31	0.30	0.28	0.25	0.20	0.00	0.00	17.5	63.2	108	143	168	183	188	188		
95	0.45	0.44	0.43	0.41	0.38	0.35	0.29	0.22	0.04	0.03	9.54	34.6	62.8	86.4	101	109	112		
100	0.59	0.58	0.56	0.54	0.51	0.46	0.40	0.31	0.21	0.22	0.54	1.05	6.98	21.6	33.9	42.6	46.7		
105	0.76	0.76	0.75	0.73	0.69	0.63	0.55	0.44	0.32	0.23	0.36	0.66	0.87	0.95	1.55	4.02	5.61		
110	0.94	0.93	0.91	0.88	0.84	0.77	0.67	0.54	0.40	0.27	0.26	0.42	0.57	0.70	0.79	0.85	0.90		
115	1.09	1.08	1.06	1.04	0.99	0.91	0.79	0.64	0.49	0.35	0.27	0.30	0.38	0.47	0.55	0.62	0.67		
120	1.28	1.27	1.26	1.22	1.17	1.07	0.94	0.77	0.60	0.45	0.31	0.25	0.29	0.33	0.38	0.43	0.47		
125	1.50	1.50	1.48	1.44	1.38	1.27	1.11	0.93	0.74	0.58	0.43	0.31	0.26	0.26	0.28	0.31	0.34		
130	1.86	1.85	1.83	1.78	1.70	1.57	1.40	1.19	0.98	0.79	0.62	0.45	0.33	0.27	0.25	0.24	0.24		
135	2.28	2.27	2.24	2.17	2.07	1.93	1.74	1.51	1.28	1.07	0.87	0.68	0.51	0.38	0.30	0.26	0.22		
140	2.68	2.66	2.61	2.53	2.42	2.26	2.06	1.83	1.59	1.36	1.15	0.94	0.75	0.58	0.44	0.36	0.26		
145	3.01	3.00	2.95	2.85	2.73	2.57	2.37	2.14	1.91	1.68	1.47	1.26	1.06	0.87	0.71	0.59	0.38		
150	3.20	3.20	3.15	3.06	2.92	2.77	2.59	2.38	2.17	1.98	1.79	1.59	1.40	1.21	1.04	0.91	0.58		
155	3.23	3.23	3.19	3.11	3.00	2.86	2.70	2.53	2.36	2.22	2.07	1.91	1.75	1.58	1.42	1.30	0.82		
160	3.11	3.13	3.12	3.06	2.97	2.86	2.73	2.59	2.49	2.39	2.30	2.20	2.09	1.96	1.84	1.71	1.08		
165	2.74	2.75	2.76	2.76	2.69	2.64	2.56	2.50	2.45	2.42	2.41	2.40	2.36	2.30	2.26	2.06	1.37		
170	2.32	2.32	2.37	2.41	2.43	2.42	2.42	2.43	2.44	2.48	2.52	2.59	2.62	2.62	2.67	2.05	1.66		
175	3.21	2.28	2.02	2.07	2.13	2.19	2.24	2.30	2.41	2.54	2.67	2.78	2.84	2.90	1.89	1.85	1.91		
180	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57		

Table 19: Luminous Intensity Data

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

Table 20: 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.

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, YuhangDist,
Hangzhou, Zhejiang Province, China 311100
Tel: +86 571 86376106 www.ltlqa.com

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 ***