



## LM-79-08 TEST REPORT

for

**P.Q.L., Inc.**

2285 Ward Avenue / Simi Valley, CA 93065

**AREA LIGHT**

**Model: 83439**

**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.ledtestlab.com](http://www.ledtestlab.com)

Report No.: HZ20040020j/R2

This report is replaced the old report No. HZ20040020j/R1 dated Jul. 14, 2020.

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

Review by:

Engineer: April Zou  
Aug. 10, 2020

Approved by:



Manager: Jim Zhang  
Aug. 10, 2020

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## TEST SUMMARY

Sample Tested: **83439**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
123.4	9252.1	74.97	0.9981
CCT (K)	CRI	Stabilization Time (Light & Power)	
4872	73.0	60	

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: Apr. 15, 2020
<b>Date of Test</b>	: Apr. 16, 2020
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

## TABLE OF CONTENT

LM-79-08 TEST REPORT .....	1
TEST SUMMARY .....	2
SAMPLE PHOTO .....	4
TEST RESULTS .....	5
Spectral Power Distribution- Goniophotometer Method.....	6
Chromaticity Diagram - Goniophotometer Method .....	7
Nominal CCT Quadrangles –Goniophotometer Method.....	8
Color Rendition Report –Goniophotometer Method.....	9
Zonal Lumen Tabulation- Goniophotometer Method .....	10
Illuminance Plots- Goniophotometer Method .....	11
Luminous Intensity Distribution Plots- Goniophotometer Method.....	12
Luminous Intensity Data- Goniophotometer Method .....	13
EQUIPMENT LIST .....	15
TEST METHODS .....	15
Seasoning of SSL Product.....	15
Goniophotometer Method .....	15
Photometric and Electrical Measurements.....	15
Color Characteristics Measurements.....	16
Color Spatial Uniformity .....	16

## SAMPLE PHOTO



Figure 1- Overview of the sample

### Equipment Under Test(EUT)

<b>Name</b>	: AREA LIGHT
<b>Model</b>	: 83439
<b>Electrical Ratings</b>	: 120-277V, 50/60Hz, 80W
<b>Product Description</b>	: 5000K
<b>Manufacturer</b>	: P.Q.L., Inc.
<b>Address</b>	: 2285 Ward Avenue / Simi Valley, CA 93065

## TEST RESULTS

Test ambient temperature was 25.2°C.

Test orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 70 minutes, and the total operating time including stabilization was 90 minutes.

The photometric distance is 2.47 m.

Luminous data was taken at 0.5° vertical intervals and 10° horizontal intervals.

Parameter	Result		Special Color Rendering Indices	
Test Voltage (V)	120.0	277.0	R1	71
Voltage frequency (Hz)	60	60	R2	78
Test Current (A)	0.626	0.282	R3	81
Power Factor	0.9981	0.9537	R4	73
Test Power (W)	74.97	74.46	R5	70
THD A%	2.90	8.94	R6	68
Luminous Efficacy (lm/W)	123.4	124.1	R7	84
Total Luminous Flux (lm)	9252.1	9238.1	R8	61
Color Rendering Index (CRI)	73.0		R9	-18
R9	-18		R10	45
Correlated Color Temperature (CCT) (K)	4872		R11	68
Chromaticity (Chroma x, Chroma y)	(0.3493, 0.3594)		R12	37
Chromaticity (Chroma u, Chroma v)	(0.2112, 0.3261)		R13	72
Chromaticity (Chroma u', Chroma v')	(0.2112, 0.4891)		R14	89
Duv	0.0023			
Average Beam Angle (°)	123.9			
Center Beam Candle Power (cd)	1600			
Spacing Criteria	1.84 (0°-180°)/ 1.94 (90°-270°)			
Zonal Lumens in the 0°-60°Zone	80.64%			
Zonal Lumens in the 60°-90°Zone	19.04%			
Zonal Lumens in the 90°-120°Zone	0.21%			
Zonal Lumens in the 120°-180°Zone	0.11%			

Table 2: Test data per Goniophotometer Method

**Spectral Power Distribution- Goniophotometer Method**

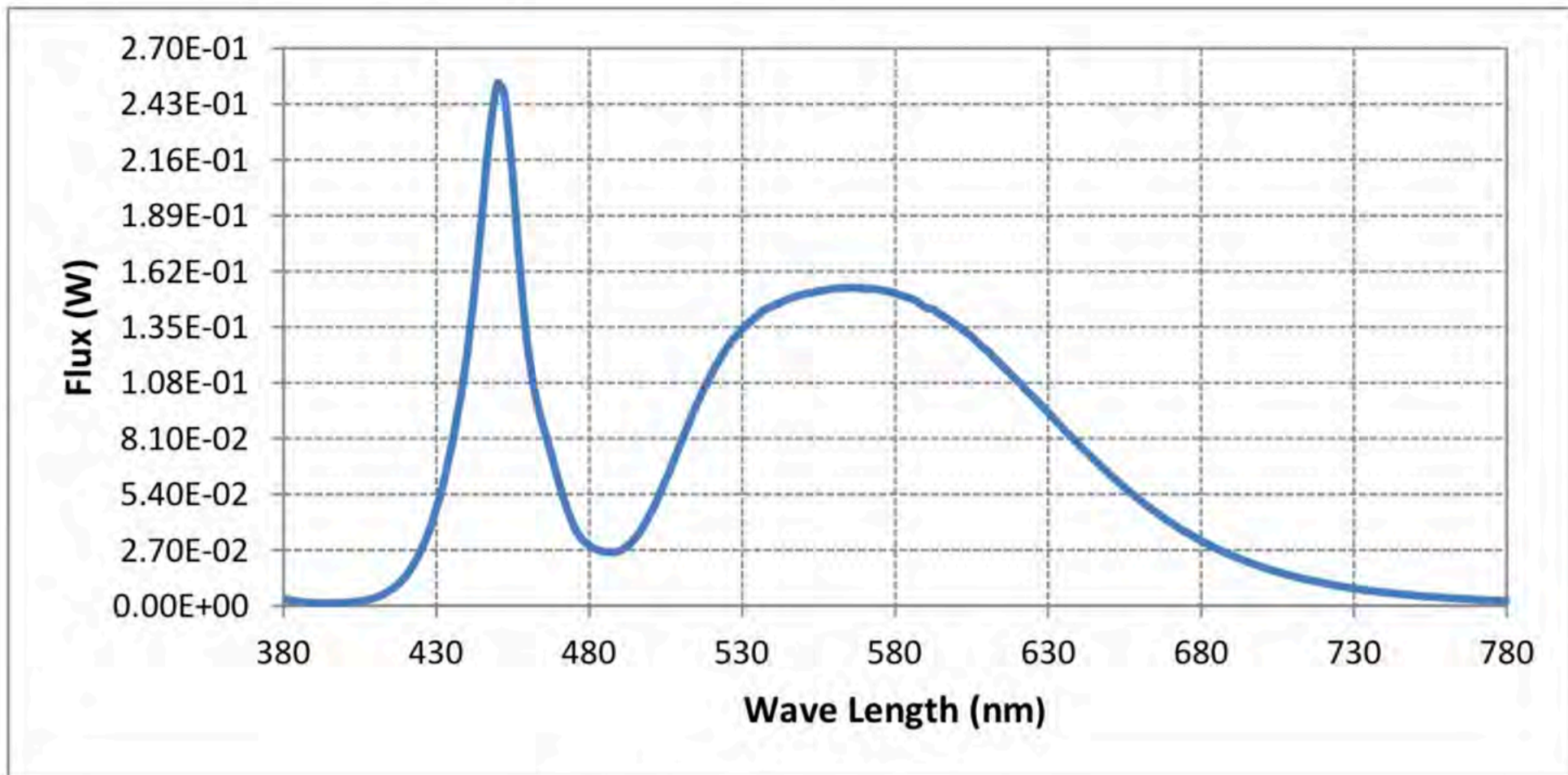
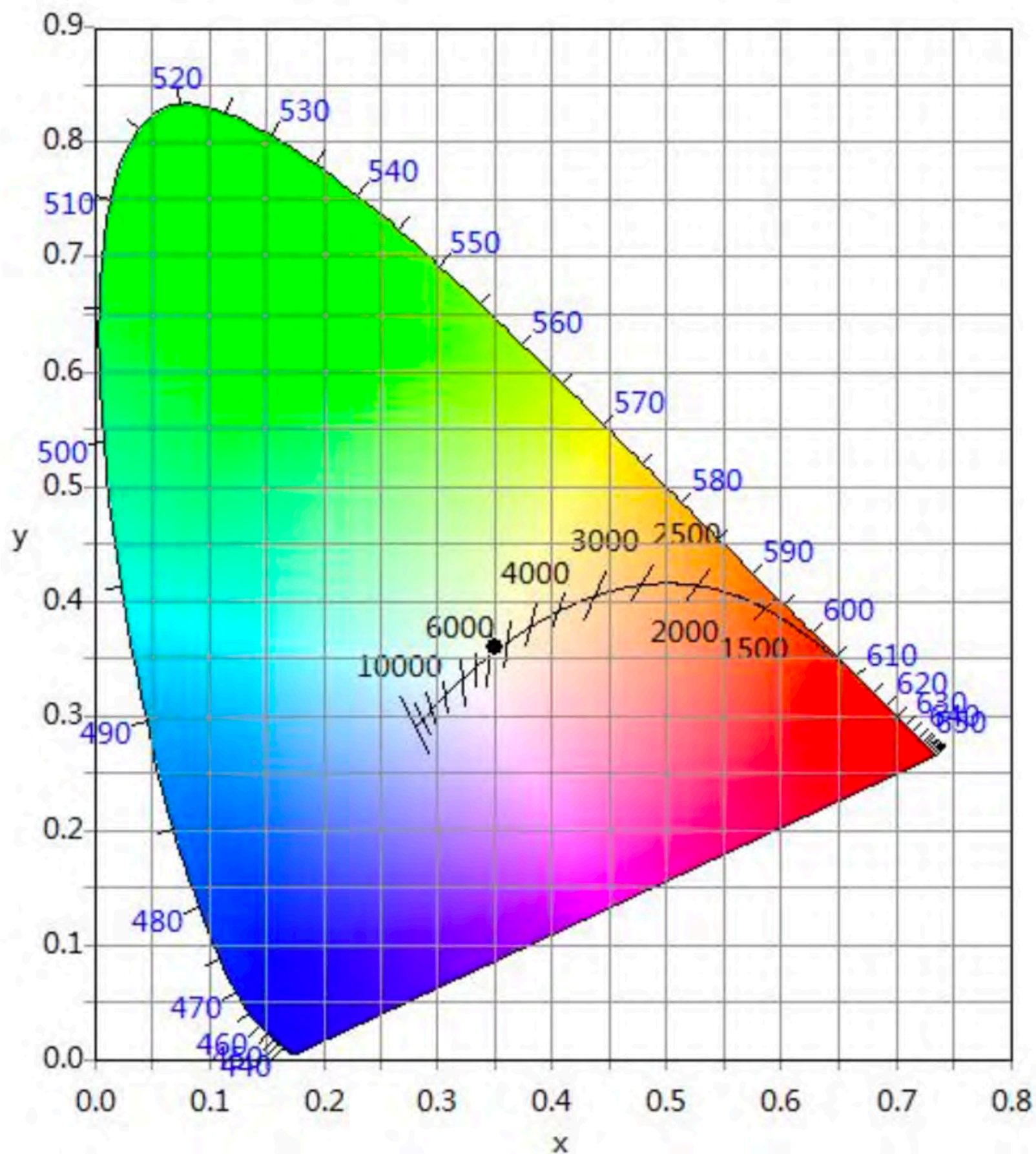


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.57E-03	485	2.61E-02	590	1.44E-01	695	2.14E-02
385	2.09E-03	490	2.66E-02	595	1.41E-01	700	1.88E-02
390	1.42E-03	495	3.28E-02	600	1.36E-01	705	1.64E-02
395	1.29E-03	500	4.48E-02	605	1.30E-01	710	1.44E-02
400	1.51E-03	505	6.11E-02	610	1.24E-01	715	1.26E-02
405	2.14E-03	510	7.91E-02	615	1.16E-01	720	1.10E-02
410	3.70E-03	515	9.72E-02	620	1.09E-01	725	9.62E-03
415	7.67E-03	520	1.12E-01	625	1.01E-01	730	8.45E-03
420	1.43E-02	525	1.25E-01	630	9.36E-02	735	7.37E-03
425	2.71E-02	530	1.34E-01	635	8.58E-02	740	6.49E-03
430	4.76E-02	535	1.40E-01	640	7.83E-02	745	5.66E-03
435	7.76E-02	540	1.45E-01	645	7.09E-02	750	4.97E-03
440	1.21E-01	545	1.49E-01	650	6.39E-02	755	4.40E-03
445	1.91E-01	550	1.51E-01	655	5.74E-02	760	3.82E-03
450	2.53E-01	555	1.53E-01	660	5.12E-02	765	3.37E-03
455	2.07E-01	560	1.54E-01	665	4.56E-02	770	3.00E-03
460	1.23E-01	565	1.54E-01	670	4.05E-02	775	2.63E-03
465	8.64E-02	570	1.53E-01	675	3.57E-02	780	2.47E-03
470	5.99E-02	575	1.53E-01	680	3.15E-02		
475	3.84E-02	580	1.51E-01	685	2.77E-02		
480	2.92E-02	585	1.49E-01	690	2.44E-02		

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

**Chromaticity Diagram - Goniophotometer Method**



Tristimulus values(x, y): (0.3493, 0.3594)

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 –Goniophotometer Method**

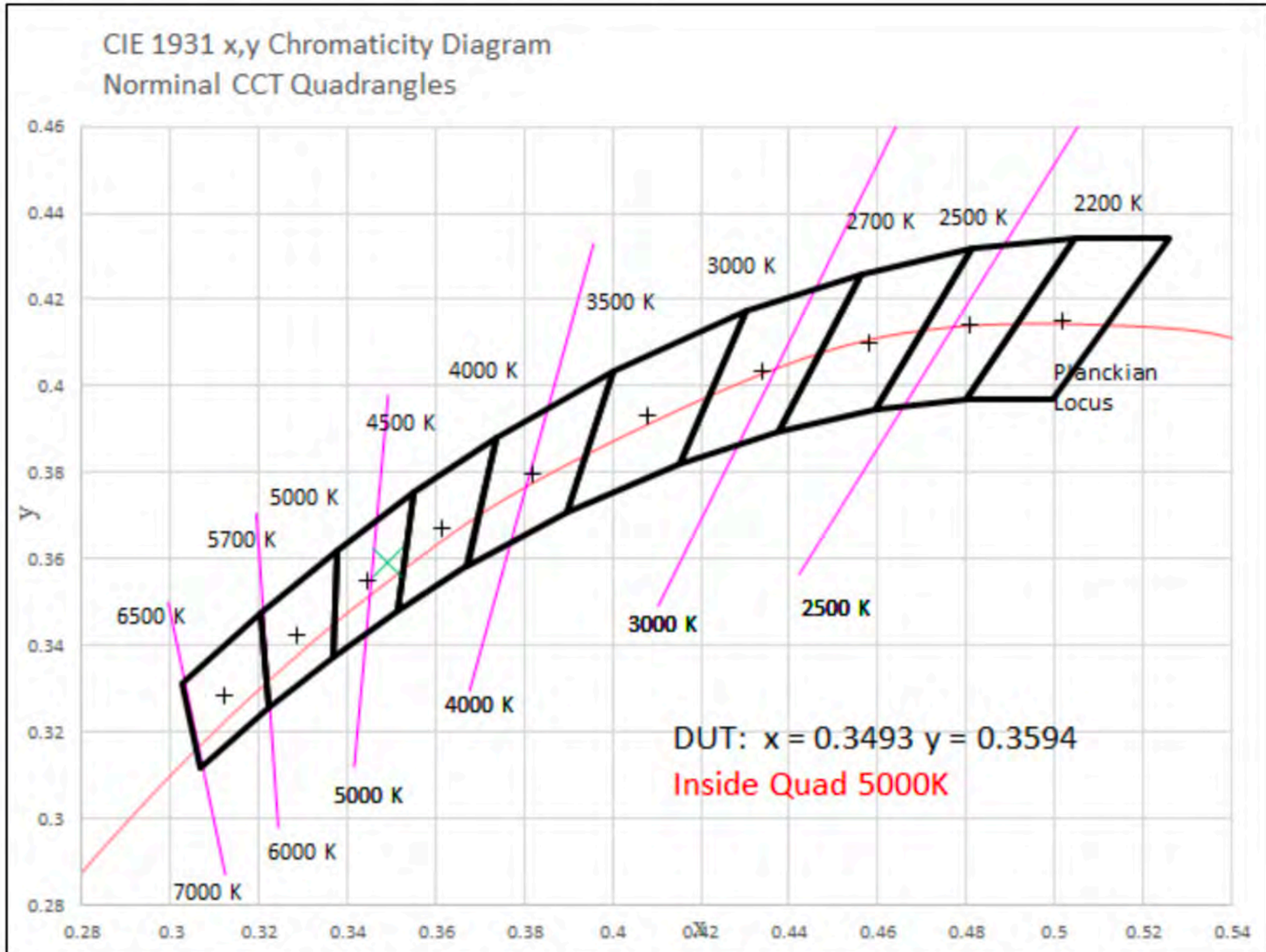


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram



**Color Rendition Report –Goniophotometer Method**

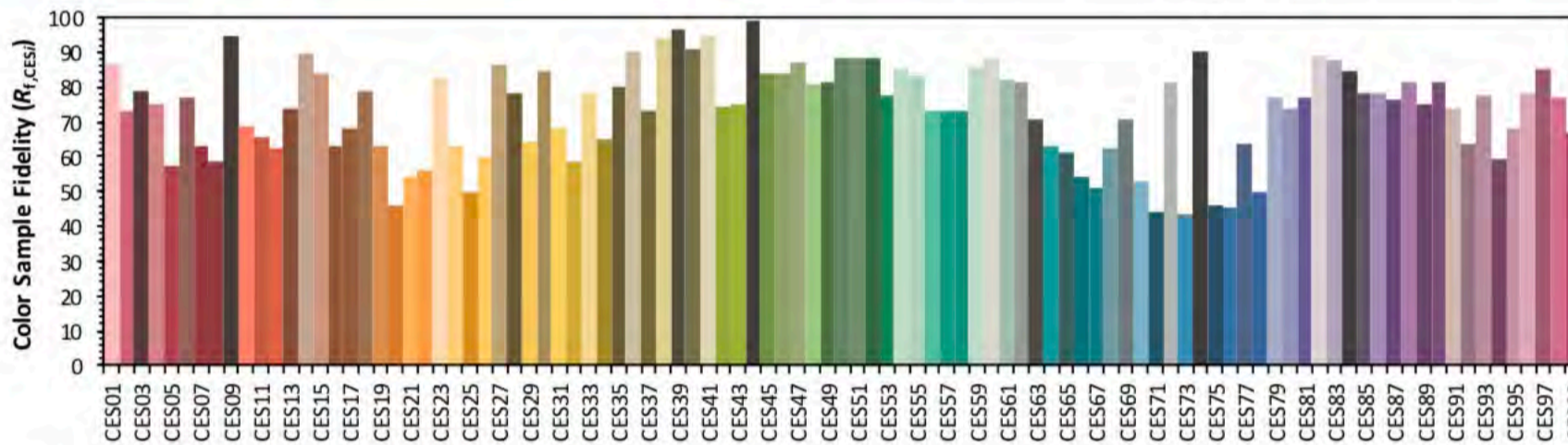
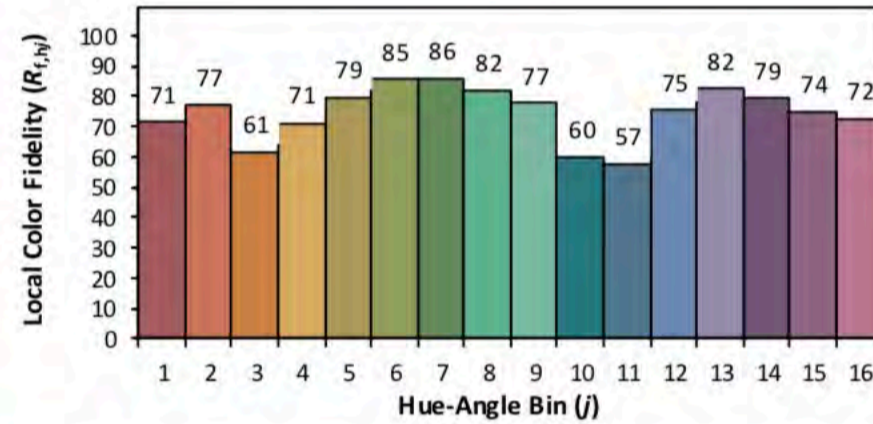
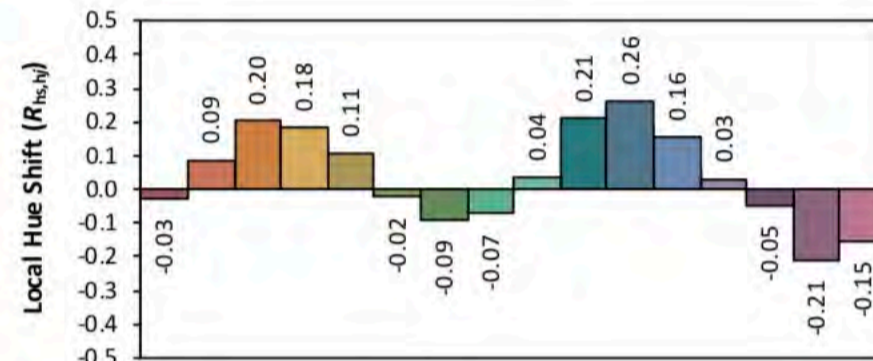
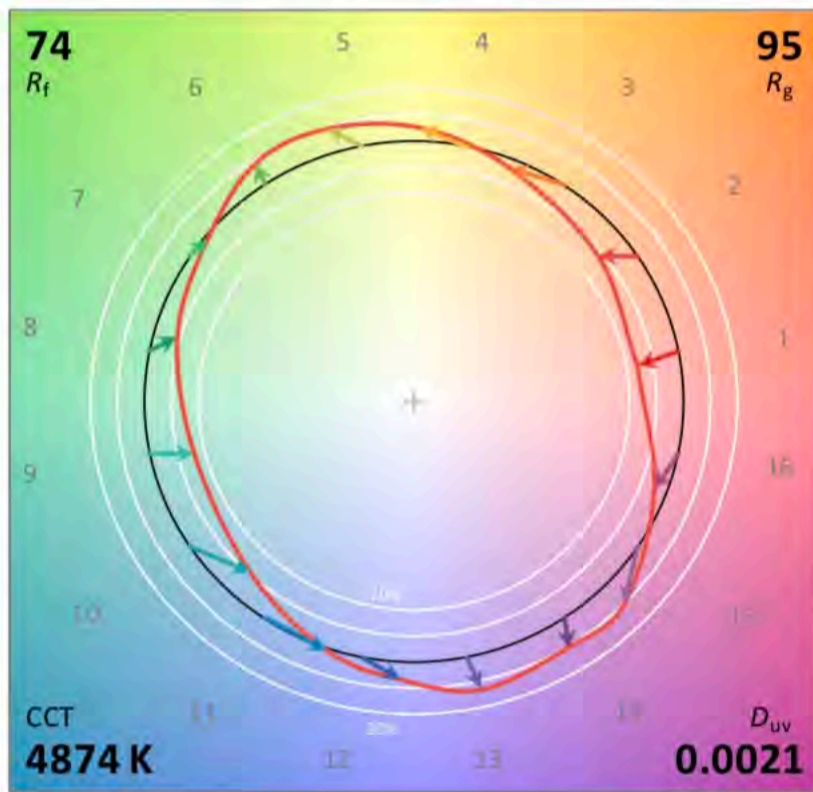
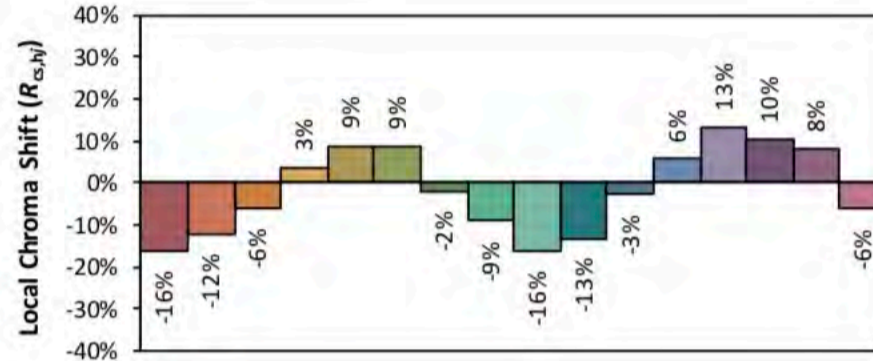
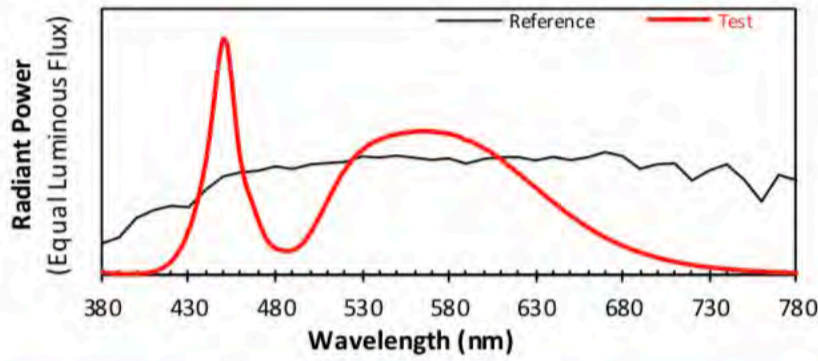
**ANSI/IES TM-30-18 Color Rendition Report**

Source: LED

Manufacturer: P.Q.L., INC.

Date: 2020/4/16

Model: 83439



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

x 0.3493  
y 0.3592  
u' 0.2113  
v' 0.4889

CIE 13.3-1995 (CRI)	
$R_a$	73
$R_g$	-18

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**

$\gamma(^{\circ})$	Lumens	% Total
0- 10	200.031	2.16%
10- 20	802.519	8.67%
20- 30	1368.564	14.79%
30- 40	1718.186	18.57%
40- 50	1800.454	19.46%
50- 60	1571.481	16.99%
60- 70	1095.936	11.85%
70- 80	544.482	5.88%
80- 90	121.167	1.31%
90-100	10.09	0.11%
100-110	6.394	0.07%
110-120	3.006	0.03%
120-130	2.25	0.02%
130-140	2.243	0.02%
140-150	2.191	0.02%
150-160	1.712	0.02%
160-170	1.034	0.01%
170-180	0.33	0.00%
Total	9252.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	7461.235	80.64%
60- 90	1761.585	19.04%
0-90	9222.82	99.68%
90- 180	29.25	0.32%
0- 180	9252.1	100%

Table 4: Zonal Lumen Data

**Illuminance Plots- Goniophotometer Method**

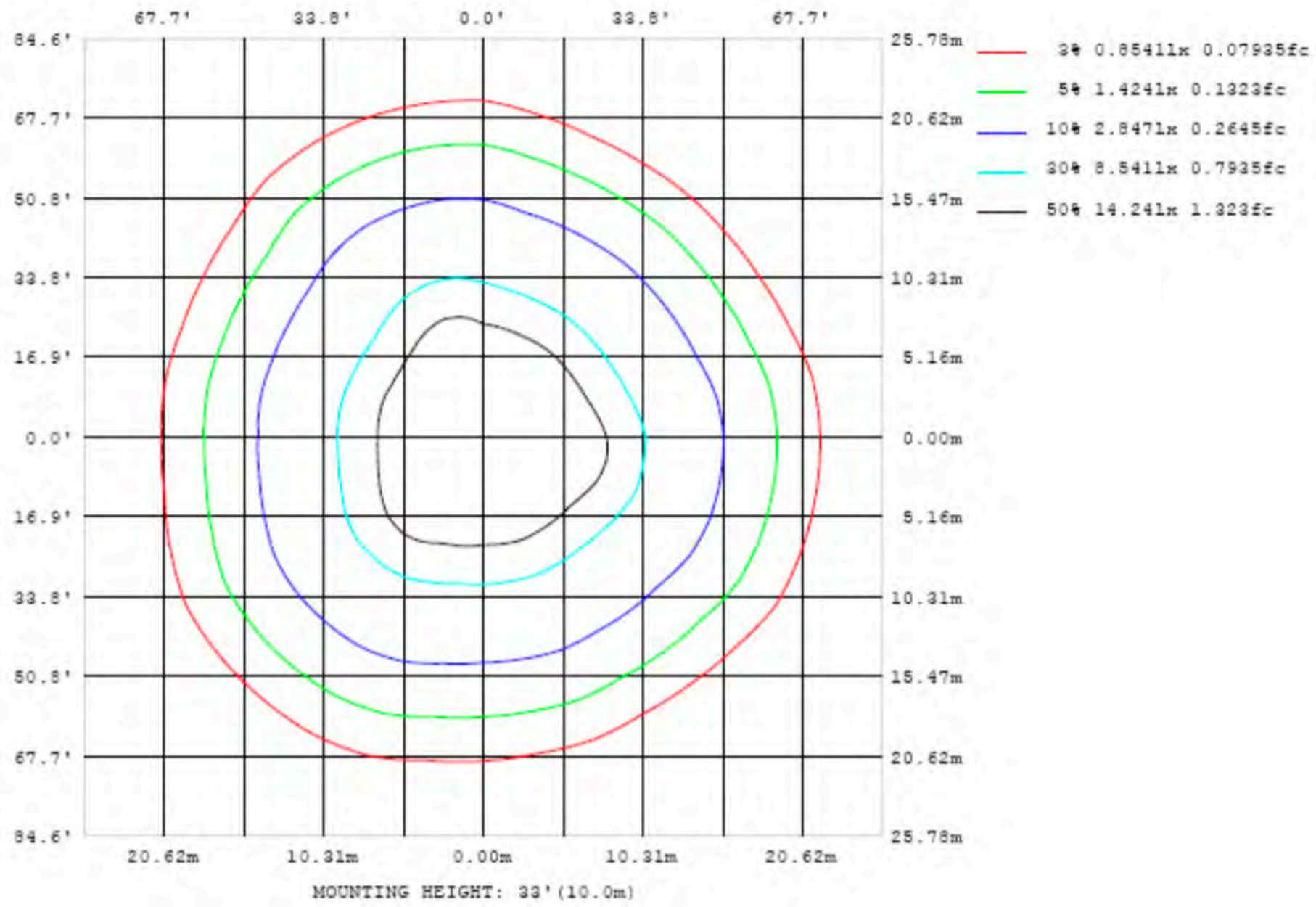


Chart 5: Illuminance Plot (Footcandles)

**Luminous Intensity Distribution Plots- Goniophotometer Method**

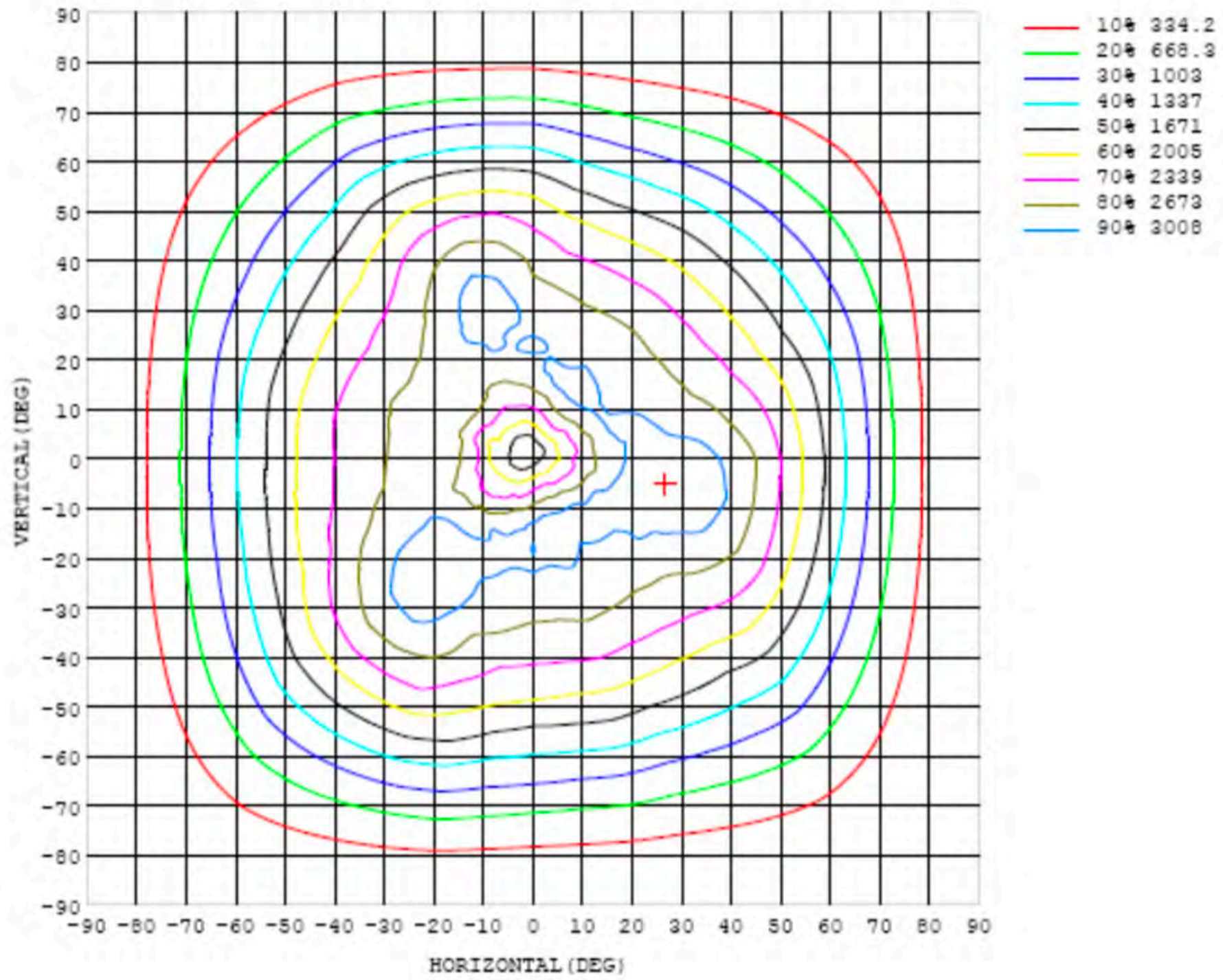


Chart 6: Isocandela Plot

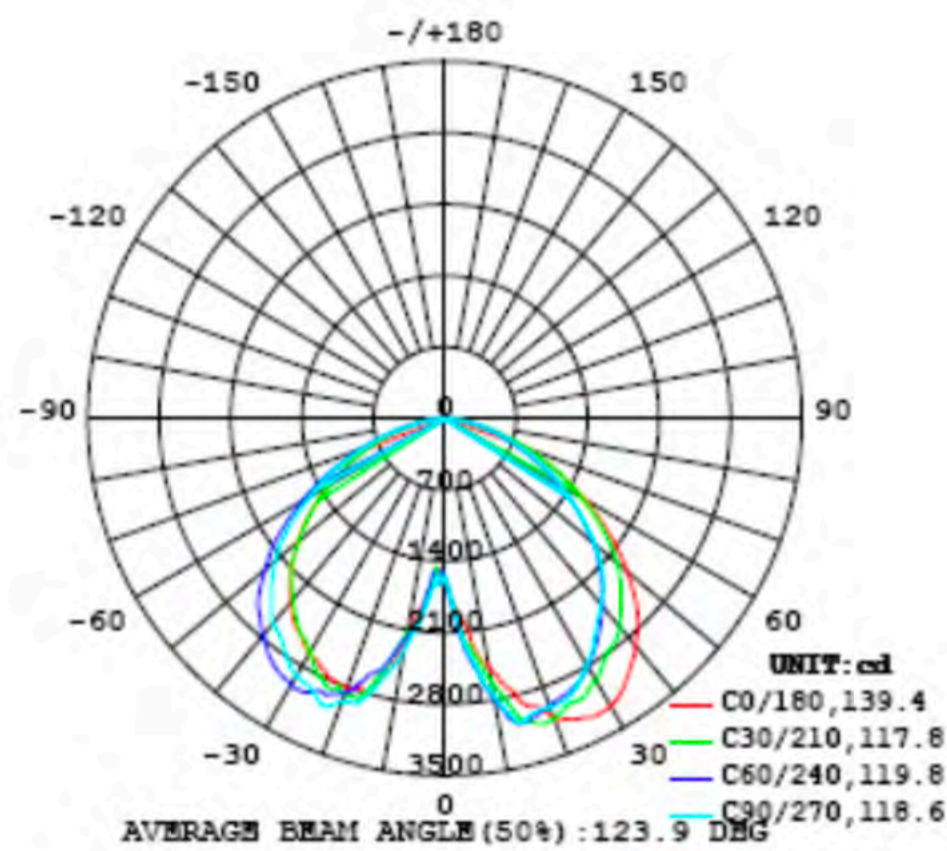


Chart 7: Polar Candela Distribution

**Luminous Intensity Data- Goniophotometer Method**

Table--1 UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
5	1980	2059	2101	2194	2200	2207	2274	2284	2259	2208	2135	2045	1975	1922	1890	1840	1767	1693	1699
10	2457	2565	2494	2619	2699	2838	2787	2866	2849	2753	2645	2556	2455	2335	2272	2217	2224	2195	2189
15	2873	2904	2941	3070	3096	3104	3075	3141	3129	3054	3041	2968	2899	2755	2660	2587	2568	2640	2704
20	3131	3113	3138	3128	3045	3034	2996	3073	3041	3012	3055	3078	3057	3008	2981	2936	2906	2764	2804
25	3236	3292	3204	3057	2976	2928	2935	2966	2931	2964	2895	3015	3099	3206	3186	3014	2845	2765	2765
30	3252	3343	3140	2969	2858	2783	2807	2819	2770	2791	2801	2898	3099	3319	3269	2971	2777	2686	2665
35	3113	3238	3070	2795	2658	2625	2616	2642	2593	2571	2678	2768	2993	3195	3146	2888	2690	2554	2527
40	2912	2983	2879	2668	2482	2434	2403	2431	2396	2386	2445	2574	2879	3003	2962	2737	2536	2376	2346
45	2670	2684	2651	2445	2271	2175	2169	2191	2159	2190	2223	2416	2637	2716	2714	2535	2294	2182	2132
50	2336	2347	2342	2204	1997	1924	1900	1922	1894	1918	1995	2161	2372	2394	2389	2276	2028	1945	1884
55	1966	1973	1975	1892	1695	1639	1595	1628	1603	1604	1700	1888	2031	2038	2032	1957	1765	1652	1609
60	1581	1589	1592	1547	1395	1329	1282	1318	1297	1313	1388	1568	1653	1657	1658	1622	1459	1342	1314
65	1199	1207	1212	1205	1084	1014	981	1013	1000	1036	1087	1225	1278	1281	1281	1270	1146	1037	1014
70	848	855	859	864	781	724	699	725	717	745	803	895	922	923	923	917	835	753	731
75	535	544	550	551	507	470	453	468	467	482	527	591	602	603	605	601	550	497	478
80	272	278	283	284	263	248	242	249	250	260	286	319	329	330	329	327	297	268	257
85	89.6	93.1	95.9	97.8	89.3	88.5	87.7	90.3	92.6	98.3	104	122	127	127	128	127	109	100	94.2
90	13.9	14.3	14.9	15.2	11.4	14.7	15.8	16.6	17.5	18.9	16.2	23.4	25.8	26.8	27.1	26.9	18.2	21.3	21.9
95	8.50	8.31	8.11	7.96	5.84	6.53	8.17	8.35	8.27	7.91	4.23	9.47	11.0	11.9	12.6	13.3	9.93	10.4	11.2
100	6.87	6.78	6.54	6.23	5.57	4.12	6.74	7.16	7.17	6.64	4.89	7.72	8.83	9.53	10.1	10.7	10.2	6.87	9.73
105	5.68	5.68	5.57	5.19	4.65	2.79	5.58	6.00	5.92	5.05	5.20	6.47	7.07	7.64	7.84	8.21	8.35	4.23	7.97
110	4.01	3.94	3.90	3.77	3.35	1.84	3.94	4.03	4.00	3.28	3.82	4.15	4.61	4.98	5.09	5.32	5.46	2.90	5.06
115	2.74	2.74	2.77	2.73	2.39	1.64	2.44	2.53	2.56	2.24	2.56	2.53	2.58	2.62	2.69	2.81	2.85	2.11	3.07
120	2.42	2.40	2.48	2.49	2.30	1.76	2.13	2.29	2.29	2.09	2.35	2.35	2.38	2.32	2.36	2.38	2.36	1.91	2.66
125	2.33	2.34	2.47	2.49	2.40	2.04	2.04	2.30	2.27	2.21	2.39	2.39	2.37	2.34	2.32	2.34	2.31	1.96	2.55
130	2.49	2.43	2.56	2.58	2.43	2.34	2.07	2.38	2.40	2.46	2.50	2.51	2.48	2.43	2.46	2.46	2.36	2.18	2.71
135	2.35	2.35	2.41	2.44	2.39	2.36	2.31	2.70	2.58	2.56	2.62	2.67	2.75	2.74	2.74	2.66	2.55	2.45	3.09
140	2.59	2.62	2.70	2.72	2.70	2.68	2.72	2.72	2.78	2.85	2.92	2.89	2.91	2.88	2.92	2.96	2.87	2.74	3.52
145	2.88	2.87	2.93	3.02	3.07	3.07	3.00	3.08	3.02	3.18	3.09	3.18	3.02	3.09	3.04	3.13	3.08	2.98	3.89
150	3.11	3.06	3.09	3.16	3.28	3.33	3.30	3.27	3.30	3.35	3.48	3.62	3.50	3.49	3.42	3.40	3.32	3.28	4.25
155	3.15	3.15	3.11	3.18	3.14	3.21	2.89	2.72	2.98	3.12	3.09	3.11	3.35	3.27	3.48	3.33	3.20	3.18	3.88
160	3.23	3.33	3.20	3.43	3.34	3.37	3.15	3.29	3.20	3.42	3.48	3.66	3.51	3.59	3.53	3.64	3.50	3.41	3.97
165	3.36	3.32	3.25	3.20	3.10	3.03	3.02	2.99	3.14	3.40	3.21	3.55	3.63	3.62	3.57	3.62	3.57	3.61	4.20
170	3.11	3.07	3.05	3.04	3.03	3.04	3.02	3.06	3.07	3.10	3.17	3.15	3.17	3.11	3.04	3.07	3.06	3.05	3.57
175	3.47	3.45	3.43	3.43	3.41	3.44	3.43	3.47	3.48	3.50	3.49	3.48	3.46	3.47	3.49	3.50	3.48	3.53	3.77
180	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63

Table 5: Luminous Intensity Data

Table--2 UNIT: cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600		
5	1665	1708	1638	1653	1607	1639	1655	1654	1754	1853	1928	1932	1988	1943	1951	1983	1999		
10	2180	2032	2118	2238	2237	2186	2205	2223	2294	2411	2552	2611	2614	2539	2525	2448	2484		
15	2707	2641	2663	2718	2633	2555	2575	2632	2756	2885	3001	3058	3056	3000	2949	2926	2911		
20	2798	2824	2858	2898	2929	2861	2781	2885	2957	3026	2993	3031	3006	2969	2968	3092	3046		
25	2797	2829	2823	2848	2917	2941	3043	2981	3002	2937	2897	2918	2903	2866	2869	2962	3075		
30	2657	2694	2648	2686	2819	3007	3196	3084	2910	2795	2764	2758	2758	2725	2740	2795	2939		
35	2530	2537	2502	2550	2683	2936	3142	3007	2745	2656	2581	2574	2572	2551	2571	2645	2844		
40	2373	2342	2316	2376	2514	2775	2966	2861	2625	2436	2383	2360	2360	2347	2371	2470	2653		
45	2151	2124	2129	2159	2347	2592	2702	2632	2401	2227	2145	2122	2125	2113	2137	2235	2444		
50	1906	1869	1872	1934	2123	2299	2367	2337	2167	1957	1855	1844	1856	1847	1878	1963	2180		
55	1628	1588	1599	1668	1844	1987	1998	1973	1874	1664	1581	1552	1562	1556	1588	1657	1854		
60	1325	1294	1307	1361	1545	1610	1614	1592	1531	1364	1283	1247	1253	1249	1283	1355	1510		
65	1026	999	1023	1076	1199	1234	1234	1216	1189	1061	975	946	949	947	972	1045	1165		
70	737	721	738	785	868	879	878	863	847	761	690	665	666	664	679	743	831		
75	475	462	476	510	564	566	563	551	540	489	442	421	419	419	431	473	528		
80	252	241	246	265	294	293	291	283	276	248	225	215	211	212	218	238	268		
85	88.6	86.2	87.5	89.1	103	104	101	95.8	91.4	77.9	74.2	69.6	67.5	69.1	72.1	74.8	88.6		
90	19.7	18.9	18.8	13.2	20.4	20.1	19.4	18.2	15.8	8.61	11.1	10.5	10.1	10.4	11.0	7.66	15.4		
95	10.6	10.3	9.84	5.19	10.0	9.78	9.59	9.43	9.09	6.93	6.97	7.38	7.19	7.13	6.95	4.82	8.35		
100	9.48	9.18	8.11	5.46	8.44	8.16	8.20	8.24	8.06	7.27	5.05	6.95	6.72	6.47	5.70	5.02	6.92		
105	8.41	8.02	6.09	5.70	6.89	6.65	6.89	6.93	6.80	6.44	4.08	6.20	6.01	5.72	4.46	4.90	5.83		
110	5.74	5.75	4.10	4.31	4.75	4.74	4.81	4.84	4.87	4.73	3.07	4.53	4.34	4.29	3.27	4.04	4.38		
115	2.99	3.25	2.61	2.92	3.17	3.25	3.40	3.47	3.47	3.42	2.61	3.18	3.11	3.16	2.32	2.93	3.03		
120	2.63	2.65	2.30	2.65	2.84	2.89	2.95	3.02	2.95	2.92	2.55	2.81	2.84	2.75	1.99	2.59	2.69		
125	2.56	2.47	2.42	2.68	2.79	2.84	2.86	2.88	2.92	2.88	2.68	2.73	2.82	2.74	2.17	2.69	2.74		
130	2.74	2.67	2.72	2.87	2.95	2.98	3.10	3.09	3.14	3.13	3.04	2.97	2.97	2.71	2.52	2.81	3.01		
135	3.09	3.07	3.06	3.18	3.36	3.43	3.60	3.55	3.52	3.40	3.26	3.30	3.47	3.05	2.87	3.22	2.99		
140	3.47	3.46	3.52	3.60	3.83	3.87	3.86	3.79	3.83	3.96	3.93	3.80	3.51	3.43	3.31	3.34	3.35		
145	3.84	3.80	3.82	3.83	4.03	4.11	4.34	4.08	4.29	4.08	4.07	3.94	3.86	3.75	3.73	3.75	3.77		
150	4.09	4.11	4.13	4.21	4.28	4.27	4.43	4.39	4.47	4.43	4.35	4.25	4.11	3.99	4.05	4.05	4.05		
155	3.78	3.78	4.02	4.09	4.21	4.50	4.45	4.50	4.27	4.33	4.04	3.87	3.63	3.58	3.76	3.95	3.90		
160	3.74	3.84	4.14	4.33	4.11	4.53	4.45	4.40	4.43	4.26	4.08	3.85	3.67	3.52	3.68	3.72	3.71		
165	4.11	3.91	4.07	3.92	4.22	4.02	4.33	4.47	4.46	4.48	4.30	4.03	3.80	3.69	3.67	3.73	3.66		
170	3.58	3.53	3.53	3.54	3.57	3.56	3.58	3.66	3.71	3.66	3.63	3.58	3.53	3.51	3.51	3.52	3.54		
175	3.78	3.74	3.65	3.62	3.63	3.62	3.65	3.65	3.68	3.70	3.71	3.70	3.67	3.65	3.64	3.64	3.66		
180	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63		

Table 6: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 02, 2019	Aug. 01, 2020
Digital Power Meter	PF2010A	HZTE028-01	Aug. 02, 2019	Aug. 01, 2020
AC Power Supply	DPS1060	HZTE001-06	Aug. 02, 2019	Aug. 01, 2020
DC Power Supply	WY12010	HZTE004-03	Aug. 02, 2019	Aug. 01, 2020
Standard Source	D908	HZTE012-01	Aug. 02, 2019	Aug. 01, 2020
Standard source	SCL-1400	HZTE012-02	Aug. 02, 2019	Aug. 01, 2020
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 02, 2019	Aug. 01, 2020
Temperature recorder	JM624U	HZTE018-08	Aug. 02, 2019	Aug. 01, 2020

Table 7: 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.

### 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 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 2.3% with a coverage factor  $k=2$ .

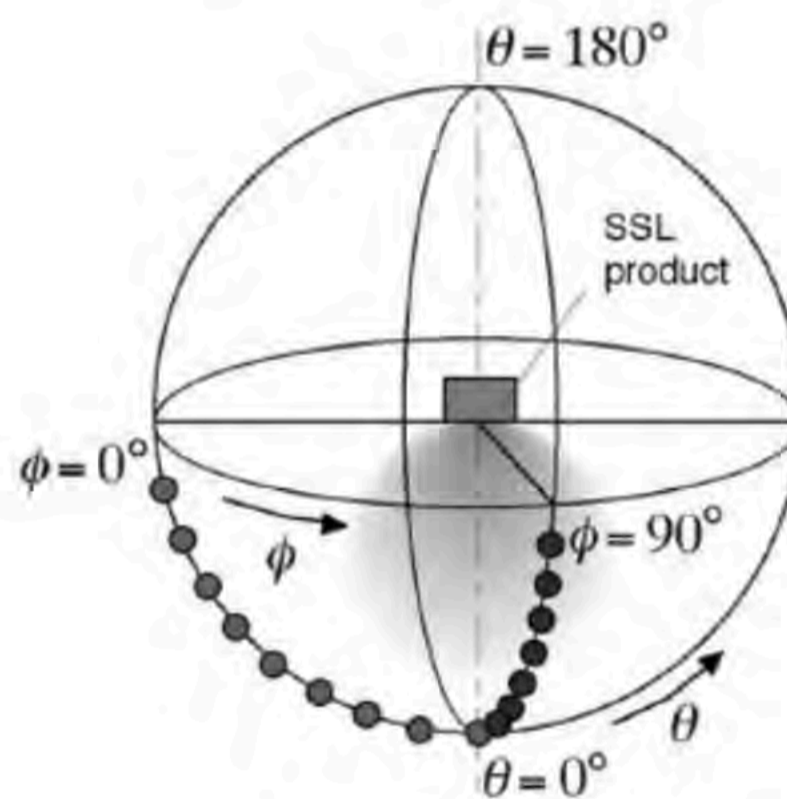
## Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

## Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ( $C=0^\circ/180^\circ$  and  $C=90^\circ/270^\circ$ ) and at  $10^\circ$  or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the  $u'$ ,  $v'$  chromaticity coordinates. The spatial non-uniformity of chromaticity,  $\Delta u'v'$ , is determined as the maximum deviation (distance on the CIE ( $u'$ ,  $v'$ ) diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



\*\*\* End of Report \*\*\*

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.