

LM-79-19 TEST REPORT

for

Industrial Lighting Products, LLC

3224 McCraney Loop, Sanford, FL, 32771

LED Retrofit-kits in Lithonia 2GT8 lensed 2x4

Model: ULB4-40L-U-50-L4

ULB4-40L-U-50-L4-MWS

40LB/4F/850/U/A4

40LB/4F/850/U/A4/MWS

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ25030014aa

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

Review by:

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Approved by:



April Zou

Engineer: Wei Fei
May 28, 2025

Manager: April Zou
May 28, 2025

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: **ULB4-40L-U-50-L4**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
130.0	5027.6	38.68	0.9961
CCT (K)	CRI	Stabilization Time (Light & Power)	
5199	83.9	50	

Table 1: Executive Data Summary

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

Test specifications:

Date of Receipt	: Mar. 18, 2025
Date of Test	: Mar. 27, 2025
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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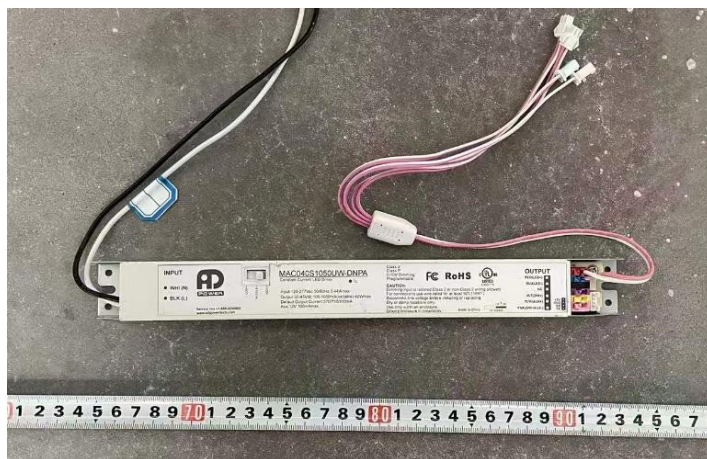
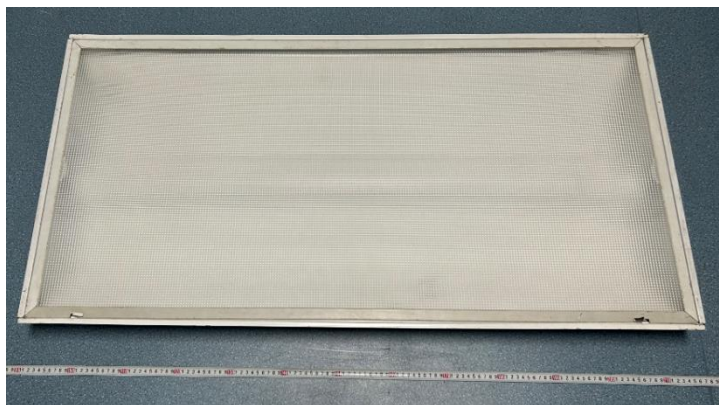


Figure 1- Overview of the sample



Sample in Lithonia 2GT8 lensed 2x4

Equipment Under Test(EUT)

Name	: LED Retrofit-kits		
Model	: ULB4-40L-U-50-L4	ULB4-40L-U-50-L4-MWS	
	40LB/4F/850/U/A4	40LB/4F/850/U/A4/MWS	
Electrical Ratings	: 120-277V, 50/60Hz		
Product Description	: Field-Adjustable 40W/36W/32W, 5000K LED Tube supplied by a LED driver: MAC040S1050UW-DNPA		
Manufacturer	: Industrial Lighting Products, LLC		
Address	: 3224 McCraney Loop, Sanford, FL, 32771		

TEST RESULTS

Test ambient temperature was 26.0 °C.

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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.324	0.145
Power Factor	0.9961	0.9604
Test Power (W)	38.68	38.45
THD A%	7.20	15.30
Luminous Efficacy (lm/W)	130.0	131.2
Total Luminous Flux (lm)	5027.6	5045.5
Color Rendering Index (CRI)	83.9	
R9	16.3	
Correlated Color Temperature (CCT)(K)	5199	
Chromaticity Chroma x	0.3395	
Chromaticity Chroma y	0.3452	
Chromaticity Chroma u	0.2101	
Chromaticity Chroma v	0.3205	
Duv	-0.0009	
Chromaticity Chroma u'	0.2101	
Chromaticity Chroma v'	0.4807	

Special Color Rendering Indices	
R1	83.4
R2	88.1
R3	90.4
R4	84.8
R5	83.9
R6	82.6
R7	87.1
R8	70.8
R9	16.3
R10	71
R11	84.7
R12	61.2
R13	84.5
R14	94.8

Table 2: Test data per Sphere-Spectroradiometer Method

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

Goniophotometer Method

Test ambient temperature was 24.8 °C.

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)	0.324
Power Factor	0.9959
Power (W)	38.73
Luminous Efficacy (lm/W)	130.1
Total Luminous Flux (lm)	5040.0
Beam Angle (°)	93.7 (0°-180°) / 93.3 (90°-270°)
Center Beam Candle Power (cd)	2299
Maximum Beam Candle Power (cd)	2306 (At: C=40.0, Gamma=1.5)
Spacing Criteria	1.20 (0°-180°) / 1.26 (90°-270°)
Zonal Lumens in the 0 °-60 °Zone	88.52%
Zonal Lumens in the 60 °-90 °Zone	11.23%
Zonal Lumens in the 90 °-120 °Zone	0.09%
Zonal Lumens in the 120 °-180 °Zone	0.16%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

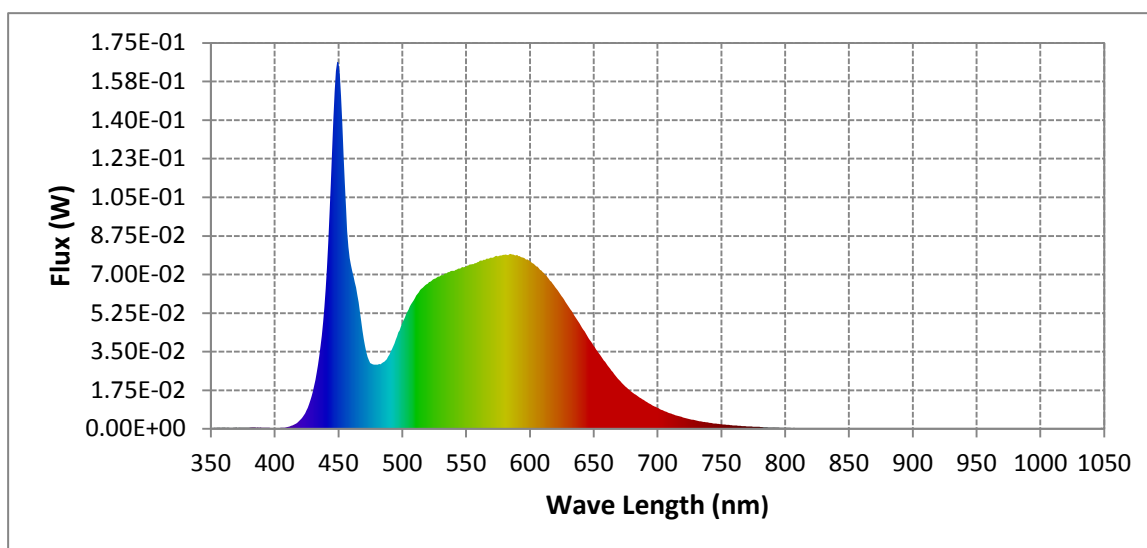
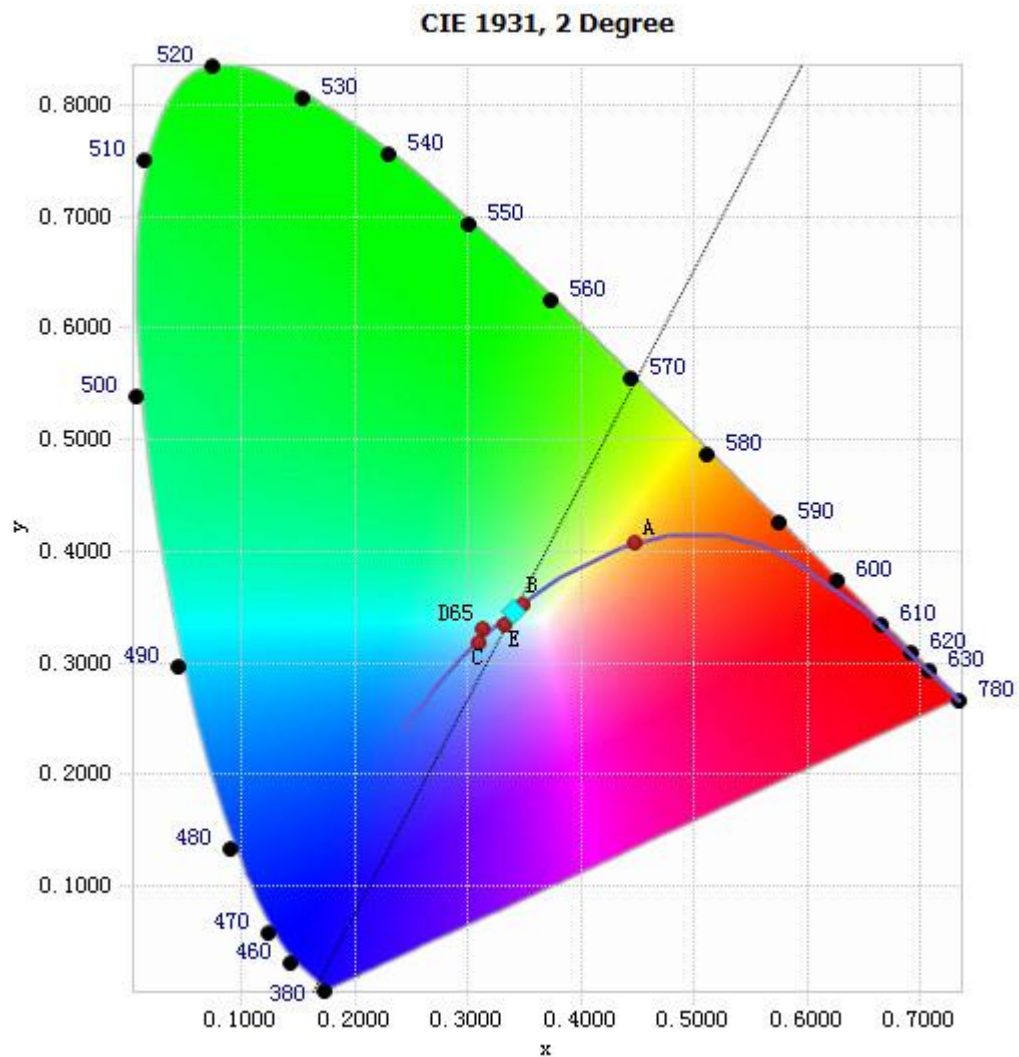


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	6.37E-04	485	3.01E-02	590	7.88E-02	695	1.11E-02
385	6.38E-04	490	3.36E-02	595	7.76E-02	700	9.56E-03
390	5.29E-04	495	4.04E-02	600	7.61E-02	705	8.22E-03
395	5.02E-04	500	4.78E-02	605	7.37E-02	710	7.08E-03
400	4.07E-04	505	5.40E-02	610	7.10E-02	715	6.05E-03
405	4.65E-04	510	5.93E-02	615	6.80E-02	720	5.20E-03
410	7.72E-04	515	6.35E-02	620	6.43E-02	725	4.46E-03
415	1.78E-03	520	6.58E-02	625	6.01E-02	730	3.81E-03
420	3.95E-03	525	6.79E-02	630	5.58E-02	735	3.27E-03
425	8.30E-03	530	6.95E-02	635	5.13E-02	740	2.79E-03
430	1.69E-02	535	7.04E-02	640	4.68E-02	745	2.42E-03
435	3.31E-02	540	7.15E-02	645	4.22E-02	750	2.06E-03
440	6.33E-02	545	7.27E-02	650	3.77E-02	755	1.78E-03
445	1.26E-01	550	7.34E-02	655	3.36E-02	760	1.55E-03
450	1.66E-01	555	7.46E-02	660	2.95E-02	765	1.33E-03
455	1.11E-01	560	7.56E-02	665	2.57E-02	770	1.15E-03
460	7.42E-02	565	7.65E-02	670	2.21E-02	775	9.85E-04
465	6.06E-02	570	7.75E-02	675	1.91E-02	780	8.74E-04
470	4.07E-02	575	7.82E-02	680	1.67E-02		
475	2.99E-02	580	7.88E-02	685	1.46E-02		
480	2.92E-02	585	7.92E-02	690	1.28E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3395, 0.3452)

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

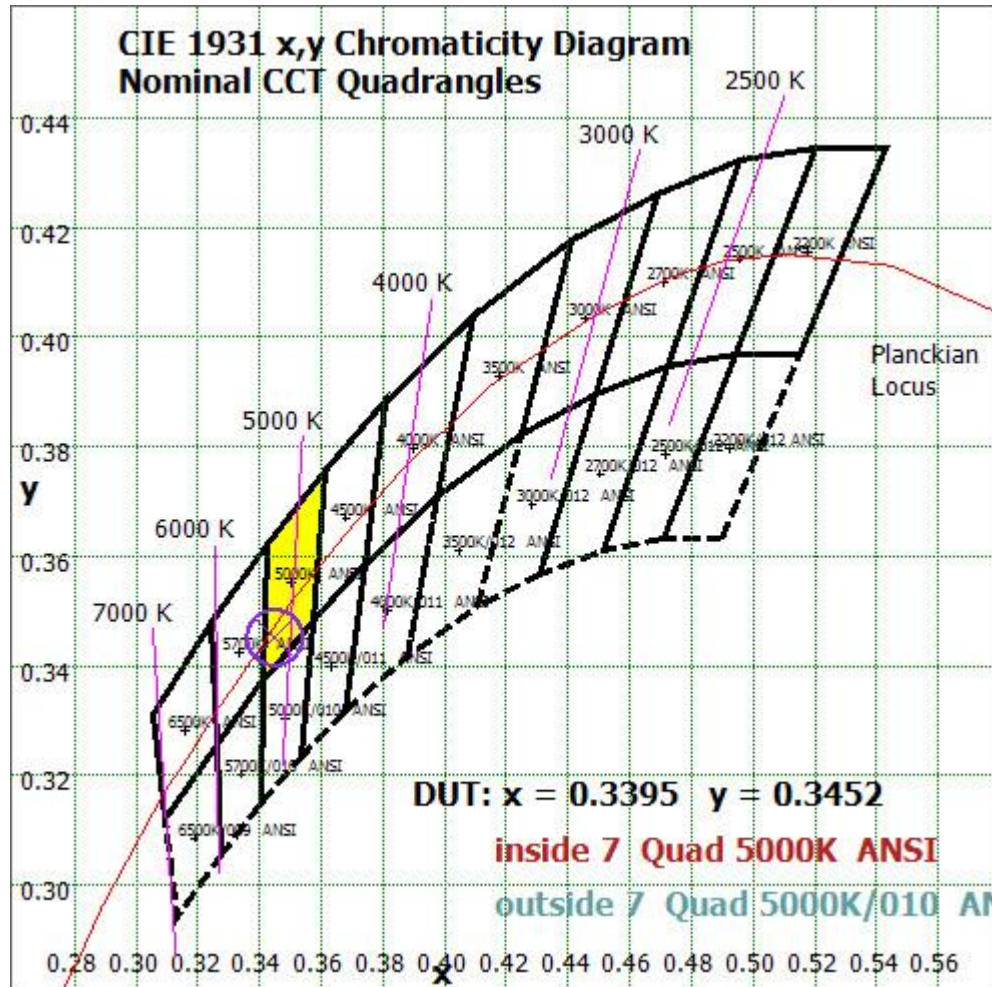


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram



Quality Assured
Color Rendition Report – Sphere Spectroradiometer Method

Report No.: HZ25030014aa

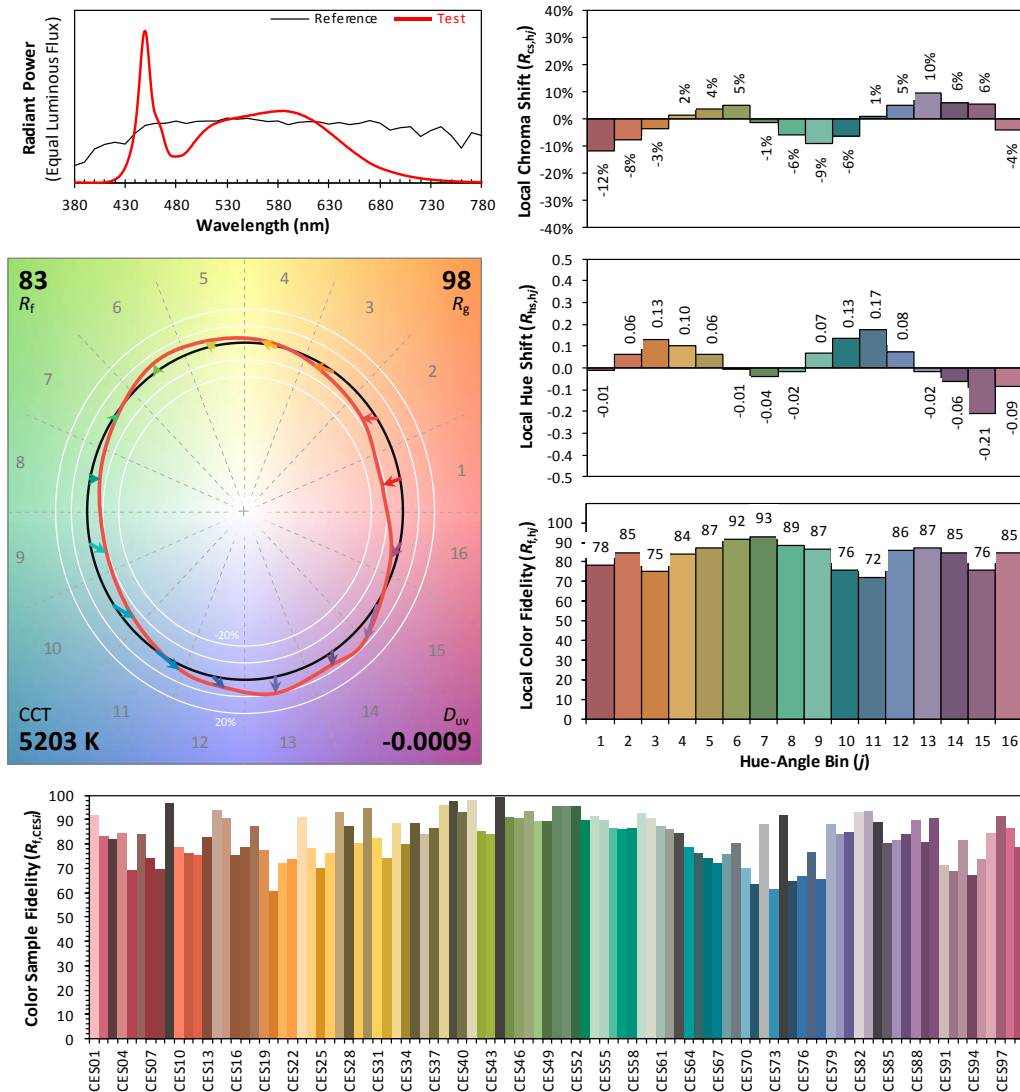
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: Industrial Lighting Products, LLC

Date: 2025/03/27

Model: ULB4-40L-U-50-L4



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

x 0.3395
 y 0.3452
 u' 0.2101
 v' 0.4807

CIE 13.3-1995
(CRI)

R_a 84
 R_g 16

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	217.525	4.32%
10- 20	622.673	12.35%
20- 30	940.548	18.66%
30- 40	1106.639	21.96%
40- 50	980.531	19.45%
50- 60	593.589	11.78%
60- 70	321.338	6.38%
70- 80	181.206	3.60%
80- 90	63.265	1.26%
90-100	1.086	0.02%
100-110	1.744	0.03%
110-120	1.648	0.03%
120-130	1.961	0.04%
130-140	2.13	0.04%
140-150	1.793	0.04%
150-160	1.307	0.03%
160-170	0.783	0.02%
170-180	0.234	0.00%
Total	5040.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	4461.505	88.52%
60- 90	565.809	11.23%
0-90	5027.314	99.75%
90- 180	12.686	0.25%
0- 180	5040.0	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

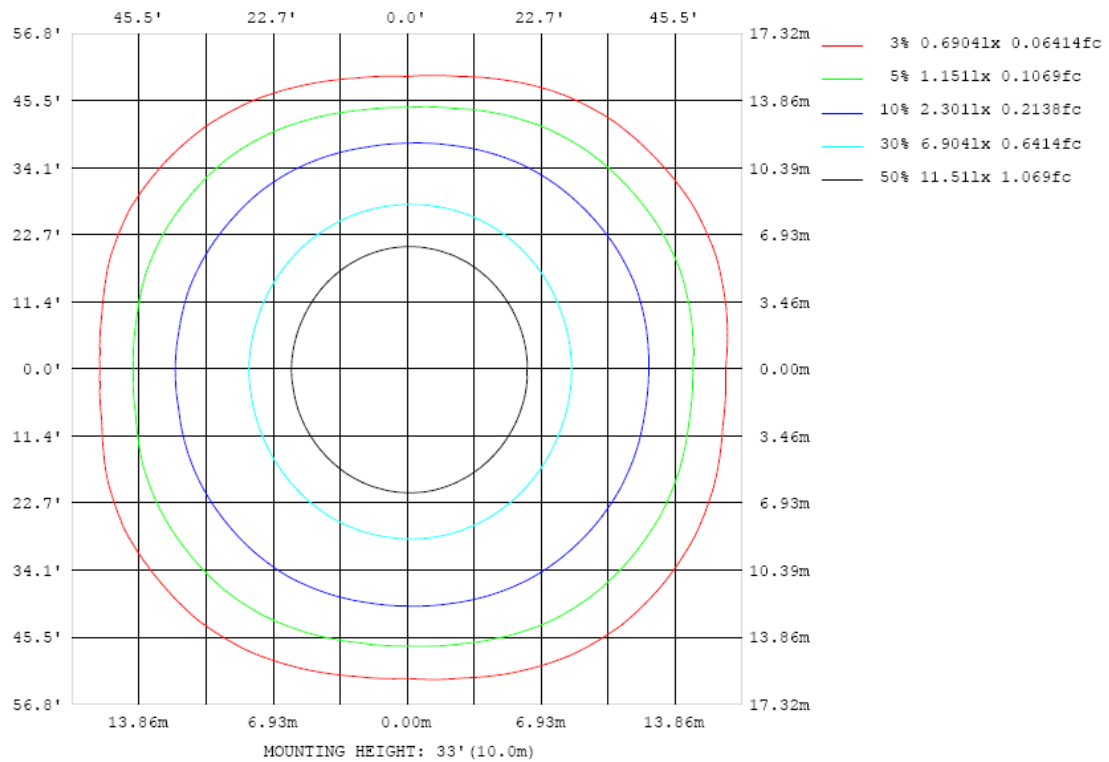


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

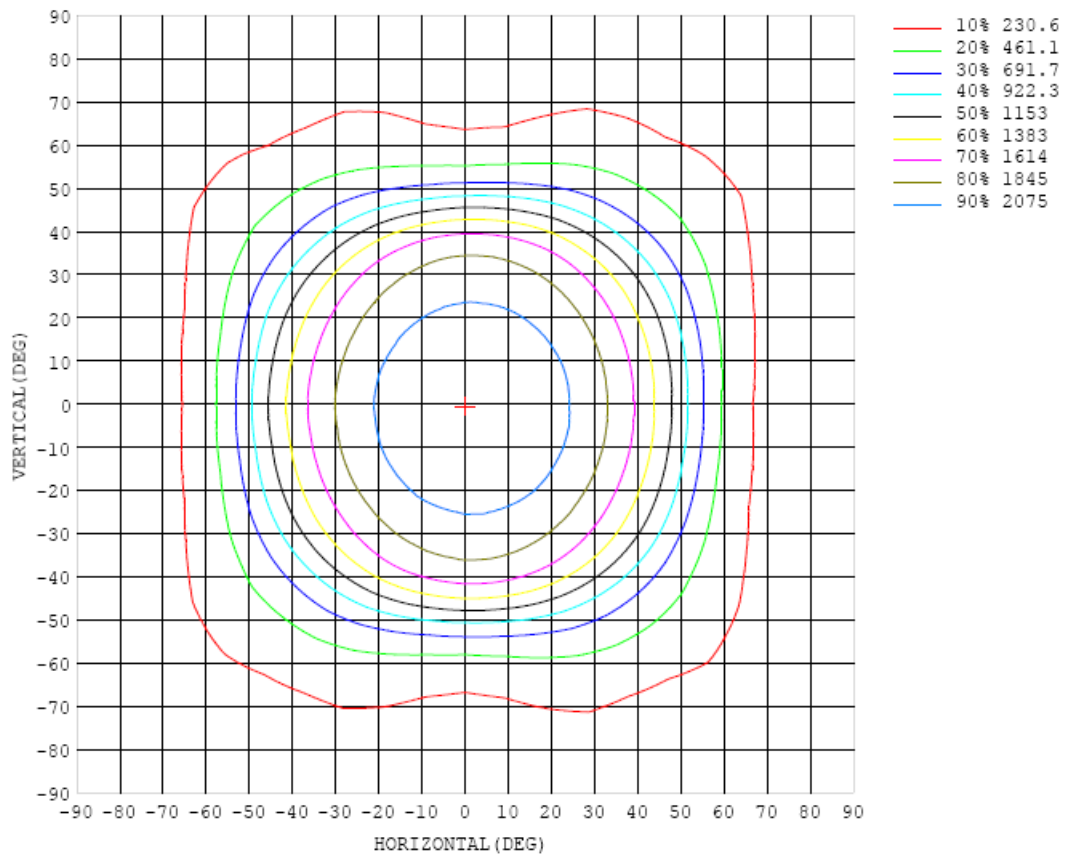


Chart 6: Isocandela Plot

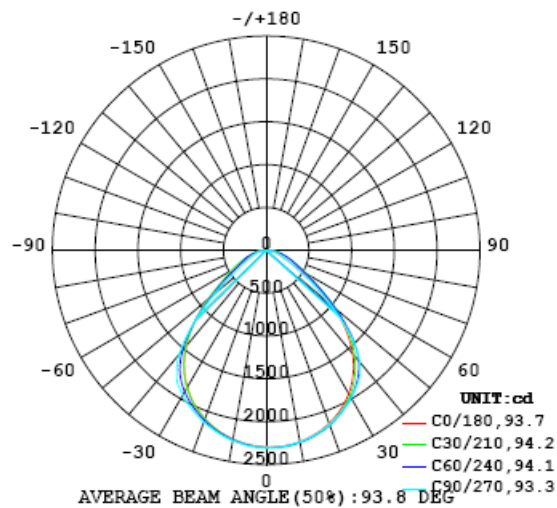


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299
5	2291	2304	2295	2304	2303	2301	2300	2297	2288	2302	2296	2289	2297	2284	2286	2281	2281	2278	2278
10	2268	2271	2280	2274	2276	2271	2273	2268	2264	2269	2272	2259	2255	2258	2250	2248	2242	2245	2233
15	2219	2228	2223	2230	2233	2232	2233	2232	2226	2225	2219	2214	2217	2198	2194	2187	2179	2182	2179
20	2149	2161	2160	2165	2170	2169	2173	2166	2159	2169	2165	2147	2139	2132	2120	2109	2100	2094	2094
25	2058	2060	2069	2072	2080	2079	2085	2087	2085	2083	2074	2063	2057	2032	2020	2006	1995	1994	1984
30	1931	1945	1942	1963	1969	1977	1983	1987	1985	1987	1978	1957	1939	1916	1894	1875	1855	1847	1850
35	1772	1786	1793	1799	1819	1835	1858	1867	1871	1877	1863	1835	1807	1766	1734	1705	1684	1673	1672
40	1576	1581	1587	1609	1636	1655	1681	1701	1702	1697	1681	1650	1617	1571	1528	1492	1468	1455	1456
45	1323	1333	1341	1366	1384	1399	1413	1410	1392	1388	1372	1357	1337	1300	1269	1241	1207	1185	1189
50	1027	1028	1052	1064	1070	1062	1056	1027	991	973	972	981	994	980	964	946	923	888	884
55	707	720	748	770	764	760	740	692	642	617	628	662	694	706	694	683	654	602	588
60	433	454	505	538	549	546	520	471	417	390	408	445	483	501	498	495	457	395	374
65	268	290	356	397	396	392	384	344	287	262	281	325	358	359	356	367	334	268	240
70	176	196	262	293	276	280	289	254	209	187	209	246	272	263	254	271	252	188	168
75	130	144	199	213	189	190	211	188	162	146	161	187	203	181	182	196	194	148	137
80	101	114	149	146	121	122	141	134	122	114	121	132	137	117	113	129	137	117	97.9
85	58.6	70.2	82.1	80.8	67.2	66.6	73.7	74.1	67.4	64.6	66.8	70.8	66.4	58.6	53.8	62.4	66.4	59.8	51.0
90	4.61	4.16	5.82	5.57	4.61	3.77	2.97	5.88	3.99	3.36	3.03	2.87	2.70	2.24	3.94	4.11	2.62	2.32	1.06
95	0.63	0.80	0.88	0.97	0.72	0.64	0.58	0.48	0.39	0.38	0.42	0.42	0.50	0.55	0.67	0.77	0.97	0.96	0.89
100	0.72	0.69	0.80	1.65	1.55	1.80	1.79	1.60	1.50	1.44	1.51	1.64	1.91	1.75	1.78	1.33	1.07	1.11	1.34
105	1.02	1.09	1.02	1.16	1.66	2.40	2.45	2.18	2.20	2.16	2.34	2.46	2.66	2.39	1.59	1.12	1.33	1.44	1.43
110	1.17	1.43	1.37	1.37	1.43	1.46	1.68	2.11	2.27	2.45	2.18	1.85	1.41	1.28	1.51	1.27	1.64	1.50	1.42
115	1.48	1.90	1.74	1.70	1.64	1.73	1.67	1.47	1.42	1.33	1.33	1.30	1.36	1.39	1.58	1.42	2.03	1.83	1.80
120	1.76	2.24	1.62	2.15	2.01	1.91	1.86	1.71	1.58	1.55	1.51	1.47	1.54	1.62	1.76	1.66	2.21	2.53	1.87
125	2.00	2.45	1.80	2.60	2.46	2.23	2.13	2.07	1.83	1.82	1.88	1.79	1.86	1.96	2.38	2.24	2.06	2.80	2.14
130	1.40	1.88	2.26	2.36	3.00	2.60	2.57	2.36	2.30	2.35	2.18	2.20	2.32	2.41	3.11	2.76	2.23	2.54	2.42
135	1.65	2.87	3.23	1.49	3.03	3.20	2.96	2.71	2.62	2.78	2.68	2.73	2.84	3.28	3.12	1.58	2.24	2.24	2.42
140	1.74	2.84	3.04	3.03	1.73	3.11	3.20	3.14	3.01	3.12	3.22	3.30	3.44	3.10	1.77	2.13	3.03	2.49	1.61
145	1.65	2.91	3.22	3.43	2.43	1.80	2.80	2.87	2.93	2.79	3.05	3.06	3.05	1.68	1.79	3.52	3.18	2.87	1.65
150	1.88	2.77	3.03	3.33	3.57	2.74	1.61	1.80	2.11	2.55	2.40	1.70	1.65	1.81	3.26	3.63	3.17	3.04	1.84
155	1.88	2.69	3.13	3.45	3.50	2.58	3.04	2.59	1.93	1.79	1.78	2.31	3.38	3.60	3.35	2.65	2.69	2.69	1.89
160	1.75	2.27	2.70	2.66	2.70	3.05	3.62	3.45	3.36	3.16	3.11	3.63	3.60	3.42	3.35	2.82	2.27	2.12	1.81
165	1.73	1.92	2.25	2.61	3.06	3.16	3.21	3.29	3.32	3.04	2.90	3.23	3.10	3.00	2.49	2.33	2.21	2.13	1.82
170	1.97	2.11	2.33	2.69	2.72	2.80	2.94	3.00	3.01	2.78	2.79	2.87	2.32	2.35	2.27	2.35	2.40	2.35	2.03
175	2.18	2.25	2.35	2.55	2.70	2.71	2.65	2.67	2.64	2.59	2.40	2.11	2.17	2.64	2.76	2.72	2.58	2.43	2.19
180	2.21	2.26	2.30	2.27	2.25	2.23	2.17	2.16	1.92	2.11	2.09	2.11	2.12	2.19	2.18	2.18	2.22	2.24	2.20

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299	2299		
5	2280	2284	2287	2288	2279	2285	2283	2271	2289	2298	2287	2296	2293	2292	2293	2293	2298		
10	2245	2237	2241	2238	2243	2246	2245	2246	2259	2255	2256	2261	2262	2266	2264	2266	2270		
15	2177	2175	2178	2187	2181	2187	2190	2189	2199	2208	2207	2215	2211	2213	2217	2216	2225		
20	2094	2096	2098	2096	2105	2114	2119	2120	2137	2141	2136	2146	2148	2144	2145	2150	2155		
25	1988	1981	1986	2002	2007	2017	2028	2038	2052	2051	2056	2057	2054	2054	2052	2053	2057		
30	1844	1843	1857	1866	1884	1908	1926	1933	1950	1966	1955	1959	1948	1938	1938	1930	1936		
35	1667	1669	1677	1702	1727	1760	1786	1804	1827	1829	1827	1818	1806	1794	1780	1776	1778		
40	1448	1444	1462	1476	1495	1518	1541	1554	1581	1594	1600	1610	1602	1591	1582	1570	1575		
45	1176	1185	1187	1179	1179	1190	1182	1173	1194	1221	1255	1289	1306	1317	1328	1327	1331		
50	878	888	878	864	858	839	808	775	783	811	867	923	958	989	1021	1040	1040		
55	599	626	631	619	609	574	525	482	467	497	558	622	666	696	725	743	732		
60	396	445	468	453	430	404	366	322	304	327	384	437	475	496	516	511	480		
65	269	330	353	314	307	307	276	232	209	223	276	331	347	358	378	369	316		
70	186	248	251	223	221	236	216	178	152	164	205	245	255	248	271	276	212		
75	146	190	179	156	147	171	161	138	124	131	152	180	172	169	190	206	154		
80	112	129	115	92.5	90.9	106	106	99.9	91.1	96.0	107	121	109	102	129	148	119		
85	57.0	59.8	51.2	41.1	38.5	41.1	44.3	42.6	41.2	44.1	52.1	55.7	55.5	55.9	71.1	74.9	72.3		
90	1.81	2.30	0.73	1.67	1.10	0.53	0.36	0.28	0.28	0.30	0.31	0.35	0.51	0.66	0.88	0.98	1.68		
95	1.12	1.64	0.96	1.29	1.08	0.75	0.63	0.54	0.49	0.50	0.50	0.55	0.61	0.64	0.80	0.89	1.02		
100	1.33	1.62	1.09	1.72	1.27	1.19	1.41	1.58	1.51	1.63	1.60	1.45	1.24	1.31	1.35	0.90	0.77		
105	1.56	1.86	1.15	1.54	1.71	1.92	1.98	2.03	2.00	2.04	2.03	2.02	1.97	1.64	1.16	1.03	1.18		
110	1.77	1.97	1.25	1.85	1.53	1.43	1.49	1.74	1.84	1.91	1.77	1.57	1.43	1.48	1.41	1.25	1.34		
115	2.24	2.36	1.49	1.86	1.70	1.58	1.44	1.48	1.50	1.53	1.51	1.62	1.65	1.73	1.71	1.65	1.84		
120	2.68	2.07	1.70	2.19	1.93	1.84	1.71	1.67	1.71	1.66	1.80	1.88	2.03	2.07	2.15	1.67	2.44		
125	2.84	2.29	1.92	2.79	2.28	2.35	2.21	2.10	2.04	2.00	2.14	2.53	2.37	2.50	2.70	1.64	2.49		
130	2.76	2.74	1.80	3.12	2.95	2.78	2.63	2.72	2.65	2.66	2.75	2.76	2.84	3.27	2.50	2.40	1.86		
135	2.78	2.28	1.58	3.13	3.51	3.53	3.12	3.01	3.08	3.04	3.10	3.23	3.47	3.27	1.52	3.29	2.95		
140	2.71	3.20	3.29	1.89	3.49	3.45	3.70	3.63	3.45	3.37	3.61	3.38	3.49	1.88	2.84	3.13	2.80		
145	2.82	3.43	3.81	3.47	1.97	2.79	3.62	3.66	3.69	3.57	3.34	2.75	1.93	2.85	3.27	3.04	2.73		
150	2.96	3.32	3.67	3.66	2.98	2.20	2.21	2.24	2.29	2.10	2.08	1.92	3.02	3.44	3.30	2.95	2.75		
155	2.64	2.74	2.74	3.15	3.75	3.69	3.67	3.04	2.53	2.84	3.26	3.51	2.76	3.22	3.35	2.97	2.77		
160	1.94	2.20	2.48	2.95	3.43	3.60	3.71	3.62	3.45	3.77	3.66	3.71	3.44	2.75	2.73	2.59	2.39		
165	1.83	2.11	2.15	2.28	2.54	3.22	3.27	3.24	3.23	3.32	3.37	3.28	3.31	3.06	2.72	2.48	2.06		
170	2.04	2.15	2.39	2.42	2.32	2.31	2.36	2.89	2.80	2.74	2.94	2.86	2.73	2.64	2.57	2.53	2.07		
175	2.19	2.21	2.31	2.52	2.65	2.70	2.38	2.14	2.22	2.55	2.52	2.53	2.48	2.48	2.43	2.21	2.12		
180	2.21	2.24	2.27	2.27	2.27	2.28	2.22	2.23	2.10	2.11	2.09	2.17	2.16	2.22	2.19	2.18	2.19		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Feb. 05, 2025	-
Digital Power Meter	PF2010A	HZTE028-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	DPS1060	HZTE001-06	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	WY12010	HZTE004-03	Aug. 08, 2024	Aug. 07, 2025
Temperature recorder	JM624U	HZTE018-08	Aug. 08, 2024	Aug. 07, 2025
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 08, 2024	Aug. 07, 2025
Standard source	D908	HZTE012-01	Aug. 14, 2018	-
Integrate Sphere system	3M	HZTE015-04	Dec. 10, 2024	-
Digital Power Meter	WT210	HZTE008-01	Aug. 08, 2024	Aug. 07, 2025
AC Power Supply	PCR 500L	HZTE001-07	Aug. 08, 2024	Aug. 07, 2025
DC Power Supply	IT6154	HZTE004-04	Aug. 08, 2024	Aug. 07, 2025
Standard source	SCL-1400	HZTE012-06	Nov. 04, 2021	-
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 08, 2024	Aug. 07, 2025
Temperature Meter	TES1310	HZTE017-01	Aug. 08, 2024	Aug. 07, 2025

Table 8: 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 Tubes) 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 expanded 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 Tubes) 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 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.

*** End of Report ***

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