



LM-79-08 Test Report

for

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

LED Panel

Model: 38PAN24DIM/835/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17020029c

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

Review by:

April Zou

Engineer: April Zou

Feb. 24, 2017

Approved by  *Jim Zhang*

Manager: Jim Zhang

Feb. 24, 2017

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: 38PAN24DIM/835/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
117.4	4445.2	37.87	0.9855
CCT (K)	CRI	Stabilization Time (Light & Power)	
3259	84.7	60	

Table 1: Executive Data Summary

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

Test specifications:

Date of Receipt	: Feb. 20, 2017
Date of Test	: Feb. 23, 2017
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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Sample Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: LED Panel
Model	: 38PAN24DIM/835/277V
Electrical Ratings	: 120-277V, 60Hz, 38W
Product Description	: 3500K, Frosted Lens, CRI80
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 24.6°C.

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

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 95 minutes.

The photometric distance of Goniophotometer is 30 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.320	0.149
Power Factor	0.9855	0.9107
Test Power (W)	37.87	37.53
THD A%	14.10	18.09
Luminous Efficacy (lm/W)	117.4	118.5
Total Luminous Flux (lm)	4445.2	4446.8
Color Rendering Index (CRI)	84.7	
R9	15	
Correlated Color Temperature (CCT) (K)	3259	
Chromaticity (Chroma x, Chroma y)	(0.4206, 0.3998)	
Chromaticity (Chroma u, Chroma v)	(0.2419, 0.3449)	
Chromaticity (Chroma u', Chroma v')	(0.2419, 0.5173)	
Duv	0.0008	
Average Beam Angle (°)	95.8	
Center Beam Candle Power (cd)	1828	
Spacing Criteria	1.33 (0°-180°)/ 1.32 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	86.37%	
Zonal Lumens in the 60°-90°Zone	13.58%	
Zonal Lumens in the 90°-120°Zone	0.02%	
Zonal Lumens in the 120°-180°Zone	0.04%	

Special Color Rendering Indices	
R1	83
R2	92
R3	97
R4	83
R5	83
R6	89
R7	85
R8	64
R9	15
R10	81
R11	83
R12	70
R13	85
R14	99

Table 2: Test data per Goniophotometer Method

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

Spectral Power Distribution

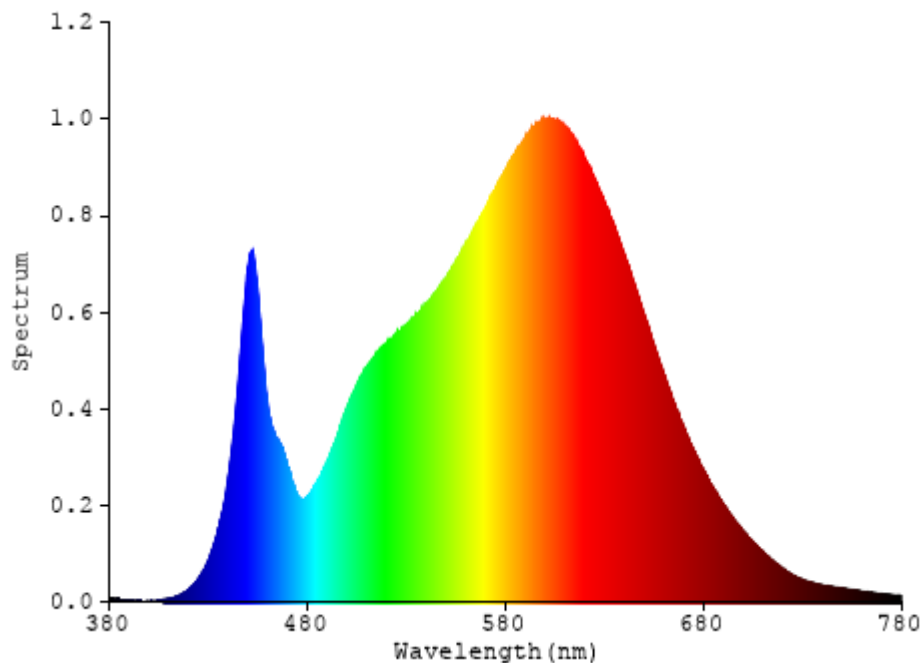


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	174.463	3.92%
10- 20	515.229	11.59%
20- 30	813.743	18.31%
30- 40	962.844	21.66%
40- 50	821.213	18.47%
50- 60	551.767	12.41%
60- 70	335.954	7.56%
70- 80	197.448	4.44%
80- 90	70.061	1.58%
90-100	0.242	0.01%
100-110	0.183	0.00%
110-120	0.249	0.01%
120-130	0.322	0.01%
130-140	0.405	0.01%
140-150	0.405	0.01%
150-160	0.32	0.01%
160-170	0.22	0.00%
170-180	0.084	0.00%
Total	4445.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3839.259	86.37%
60- 90	603.463	13.58%
0-90	4442.722	99.95%
90- 180	2.43	0.05%
0- 180	4445.2	100%

Table 3: Zonal Lumen Data

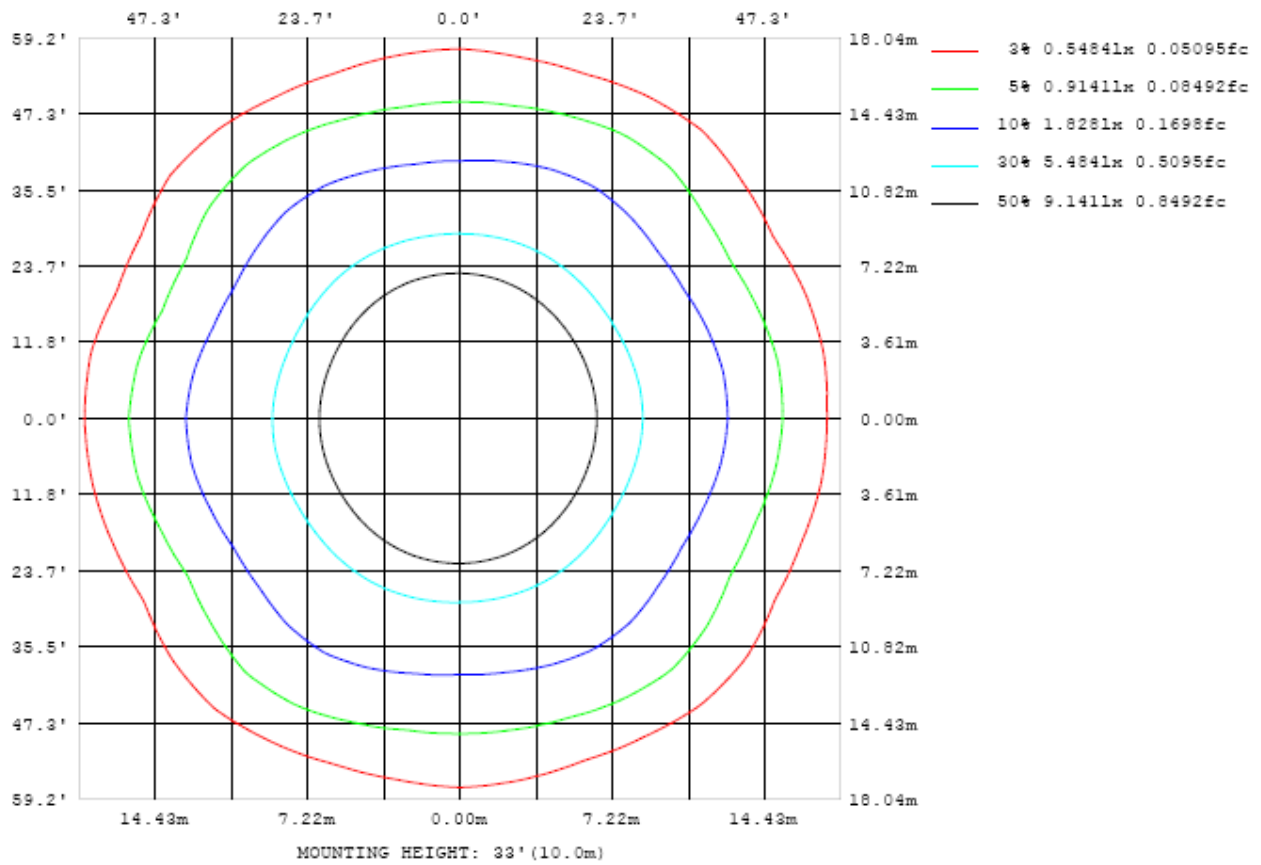


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

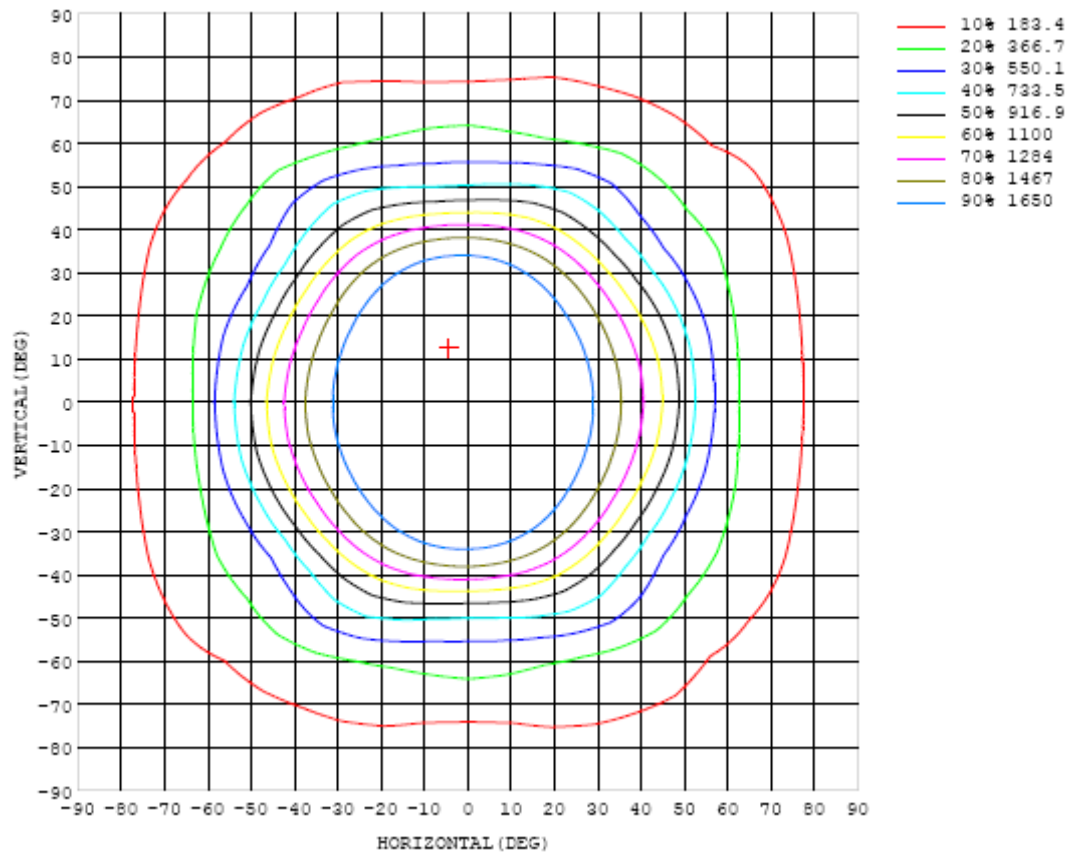


Chart 3: Isocandela Plot

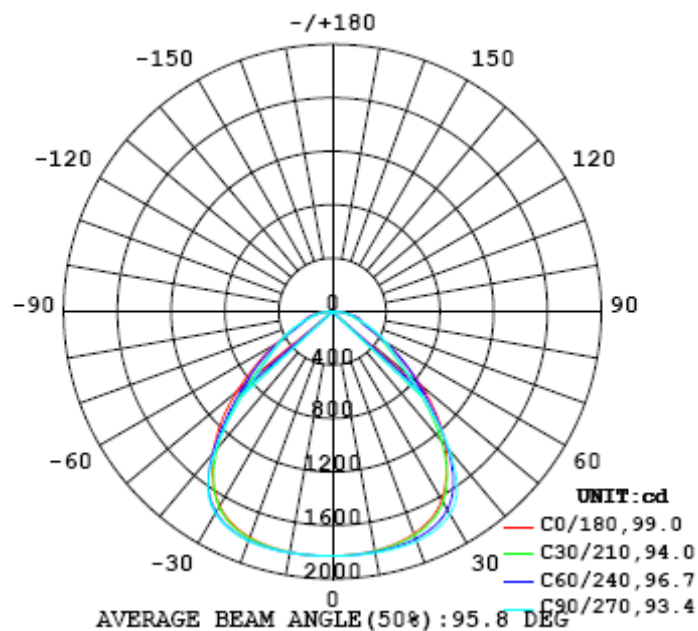


Chart 4: Polar Candela Distribution

Luminous Intensity Data

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	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828
5	1824	1824	1825	1825	1826	1826	1827	1828	1828	1829	1830	1830	1830	1831	1831	1830	1830	1830	1830
10	1816	1817	1817	1819	1821	1824	1826	1829	1830	1832	1832	1832	1832	1831	1830	1829	1829	1828	1828
15	1800	1801	1803	1806	1811	1817	1822	1827	1831	1833	1834	1833	1831	1828	1825	1823	1821	1819	1818
20	1770	1772	1775	1782	1790	1799	1809	1818	1824	1828	1828	1827	1822	1816	1810	1805	1801	1799	1798
25	1719	1721	1725	1734	1746	1762	1777	1791	1799	1805	1805	1802	1794	1784	1774	1766	1761	1758	1757
30	1626	1628	1633	1644	1662	1686	1710	1729	1741	1747	1749	1743	1731	1714	1697	1686	1681	1680	1679
35	1479	1477	1476	1486	1509	1539	1568	1592	1606	1615	1617	1613	1600	1580	1558	1544	1544	1549	1549
40	1304	1289	1268	1259	1276	1306	1333	1344	1346	1351	1362	1373	1374	1361	1343	1337	1353	1376	1380
45	1097	1070	1024	991	1000	1036	1064	1056	1026	1016	1045	1087	1103	1087	1064	1071	1112	1159	1171
50	857	823	769	736	761	814	830	795	750	732	763	827	868	847	796	786	840	905	926
55	628	600	554	548	603	653	638	593	567	559	571	622	681	679	618	565	602	667	691
60	446	444	429	430	473	484	450	431	443	453	443	450	485	514	483	437	453	478	492
65	301	337	346	331	342	320	300	309	335	348	334	319	316	348	363	344	356	333	325
70	233	263	252	228	239	229	232	242	244	248	243	241	225	234	251	247	274	254	240
75	206	203	175	166	187	192	201	197	177	172	177	193	191	183	179	168	194	206	204
80	147	135	127	127	125	131	132	127	124	125	125	127	134	130	126	125	128	142	149
85	75.6	71.2	62.5	59.7	58.2	62.8	63.9	59.8	57.0	56.0	57.6	60.4	63.4	62.7	58.9	60.9	66.5	75.6	80.1
90	4.09	4.12	3.80	3.35	3.26	4.32	4.50	2.19	3.70	3.66	0.12	2.59	2.78	4.36	3.35	3.54	3.89	3.25	0.52
95	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.12
100	0.11	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.15
105	0.13	0.13	0.12	0.12	0.12	0.13	0.14	0.14	0.13	0.13	0.14	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.21
110	0.16	0.15	0.15	0.15	0.15	0.15	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.17	0.16	0.16	0.24
115	0.20	0.18	0.18	0.17	0.17	0.18	0.19	0.21	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.20	0.19	0.20	0.27
120	0.24	0.22	0.21	0.21	0.20	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.25	0.25	0.24	0.23	0.24	0.33
125	0.30	0.27	0.25	0.25	0.24	0.25	0.26	0.25	0.27	0.28	0.28	0.30	0.30	0.31	0.31	0.30	0.29	0.30	0.41
130	0.37	0.34	0.32	0.31	0.29	0.29	0.30	0.30	0.32	0.33	0.34	0.35	0.36	0.36	0.37	0.37	0.36	0.37	0.49
135	0.45	0.42	0.40	0.38	0.36	0.35	0.36	0.37	0.37	0.40	0.40	0.42	0.43	0.44	0.45	0.45	0.43	0.45	0.57
140	0.52	0.50	0.48	0.47	0.45	0.44	0.44	0.43	0.44	0.46	0.46	0.47	0.49	0.50	0.51	0.51	0.50	0.52	0.62
145	0.59	0.57	0.56	0.53	0.51	0.49	0.48	0.49	0.50	0.51	0.50	0.51	0.53	0.54	0.54	0.55	0.56	0.58	0.69
150	0.64	0.63	0.61	0.57	0.53	0.52	0.49	0.49	0.49	0.49	0.49	0.51	0.54	0.55	0.56	0.56	0.59	0.63	0.75
155	0.69	0.68	0.66	0.64	0.58	0.53	0.50	0.50	0.48	0.47	0.49	0.52	0.55	0.58	0.59	0.62	0.63	0.68	0.78
160	0.78	0.74	0.73	0.68	0.64	0.57	0.50	0.49	0.47	0.46	0.50	0.55	0.60	0.64	0.66	0.68	0.70	0.76	0.86
165	0.83	0.80	0.79	0.76	0.72	0.64	0.57	0.54	0.53	0.54	0.59	0.65	0.70	0.74	0.76	0.78	0.79	0.82	0.87
170	0.89	0.86	0.87	0.85	0.81	0.75	0.67	0.66	0.69	0.67	0.67	0.74	0.80	0.82	0.84	0.85	0.86	0.89	0.91
175	0.89	0.91	0.94	0.94	0.93	0.93	0.87	0.84	0.86	0.78	0.79	0.83	0.85	0.84	0.86	0.88	0.91	0.92	0.93
180	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86

Table 4: 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	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828	1828		
5	1830	1830	1830	1830	1830	1830	1830	1830	1829	1829	1828	1827	1826	1825	1825	1825	1825		
10	1828	1828	1829	1830	1831	1832	1833	1832	1831	1830	1828	1826	1823	1821	1818	1817	1816		
15	1819	1820	1823	1826	1829	1831	1834	1833	1832	1830	1825	1820	1815	1809	1805	1802	1800		
20	1798	1801	1805	1811	1817	1822	1827	1827	1825	1821	1814	1804	1794	1786	1778	1773	1770		
25	1757	1761	1767	1776	1786	1795	1802	1803	1801	1794	1783	1769	1753	1740	1729	1722	1719		
30	1678	1680	1687	1702	1719	1734	1745	1747	1743	1735	1720	1698	1674	1651	1636	1629	1625		
35	1544	1539	1546	1566	1590	1610	1622	1621	1616	1605	1584	1556	1525	1497	1478	1473	1477		
40	1363	1342	1337	1355	1376	1385	1377	1366	1357	1354	1348	1329	1297	1267	1259	1276	1297		
45	1140	1091	1067	1081	1104	1108	1080	1040	1030	1053	1075	1064	1029	1000	1007	1048	1088		
50	884	814	787	821	863	858	803	750	745	777	822	836	801	756	754	803	849		
55	652	581	576	641	681	655	600	568	567	579	615	652	636	577	553	585	623		
60	483	440	448	499	498	465	445	450	454	440	442	475	489	451	424	445	457		
65	356	346	346	360	327	312	324	342	349	330	312	318	343	339	333	353	326		
70	273	257	244	249	226	232	243	247	251	246	240	228	238	240	238	268	250		
75	206	180	171	182	185	193	187	176	174	183	196	188	184	177	167	196	207		
80	141	127	124	128	137	136	130	128	125	128	135	139	132	127	126	133	145		
85	73.7	65.4	61.1	63.0	67.4	66.9	64.0	62.0	63.1	65.9	67.8	70.2	66.4	63.9	65.5	66.6	73.3		
90	0.64	0.39	0.44	0.50	0.59	0.83	1.19	1.24	1.38	1.76	2.38	2.67	2.41	2.39	2.37	2.39	1.96		
95	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12		
100	0.15	0.15	0.15	0.16	0.16	0.17	0.17	0.16	0.16	0.16	0.17	0.17	0.16	0.16	0.15	0.15	0.16		
105	0.20	0.20	0.20	0.21	0.22	0.22	0.22	0.22	0.21	0.22	0.22	0.23	0.22	0.21	0.21	0.21	0.21		
110	0.24	0.24	0.25	0.26	0.27	0.28	0.28	0.28	0.28	0.28	0.29	0.28	0.27	0.26	0.26	0.25	0.25		
115	0.27	0.27	0.28	0.29	0.31	0.32	0.33	0.33	0.33	0.34	0.34	0.33	0.31	0.30	0.30	0.29	0.28		
120	0.32	0.33	0.33	0.34	0.35	0.36	0.38	0.39	0.39	0.39	0.39	0.38	0.36	0.36	0.35	0.35	0.34		
125	0.40	0.41	0.42	0.42	0.43	0.44	0.45	0.46	0.47	0.47	0.47	0.45	0.45	0.43	0.43	0.43	0.42		
130	0.48	0.50	0.51	0.52	0.53	0.56	0.57	0.59	0.60	0.59	0.59	0.57	0.55	0.54	0.53	0.51	0.50		
135	0.56	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.74	0.73	0.72	0.70	0.67	0.66	0.63	0.60	0.58		
140	0.62	0.65	0.68	0.71	0.74	0.77	0.80	0.83	0.84	0.84	0.81	0.79	0.75	0.72	0.68	0.65	0.62		
145	0.69	0.71	0.73	0.77	0.79	0.81	0.84	0.87	0.88	0.87	0.83	0.79	0.77	0.74	0.72	0.69	0.69		
150	0.76	0.76	0.76	0.80	0.82	0.83	0.85	0.86	0.85	0.80	0.79	0.80	0.79	0.75	0.75	0.75	0.77		
155	0.78	0.79	0.81	0.81	0.82	0.82	0.83	0.79	0.78	0.78	0.79	0.78	0.78	0.79	0.82	0.81	0.82		
160	0.86	0.85	0.84	0.86	0.86	0.82	0.82	0.80	0.78	0.80	0.80	0.79	0.81	0.85	0.87	0.89	0.90		
165	0.88	0.89	0.90	0.91	0.91	0.89	0.88	0.85	0.83	0.79	0.80	0.79	0.82	0.84	0.86	0.89	0.90		
170	0.93	0.96	0.98	1.00	1.00	0.97	0.95	0.93	0.90	0.88	0.85	0.84	0.85	0.87	0.90	0.92	0.92		
175	0.96	0.97	0.98	0.99	1.00	1.00	0.97	0.94	0.92	0.93	0.96	0.93	0.87	0.85	0.89	0.92	0.90		
180	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 2017

Table 6: 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 Panels) 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 expended uncertainty is 1.94% with a coverage factor k=2.

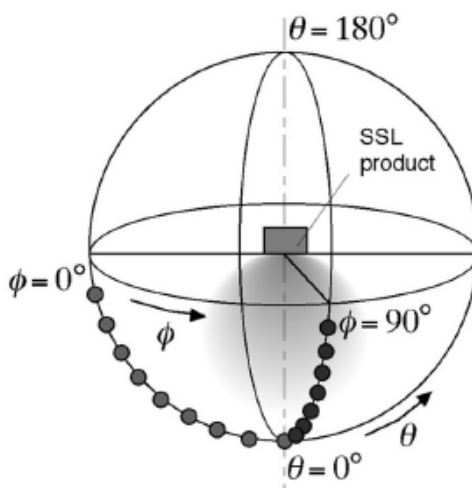
Color Characteristics Measurements

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° 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 ***

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