



## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

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

### LED Panel

**Model: 38PAN24DIM/840/277V**

#### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ17020029d

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/840/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
121.4	4642.4	38.23	0.9854
CCT (K)	CRI	Stabilization Time (Light & Power)	
3729	83.2	60	

Table 1: Executive Data Summary

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

### Test specifications:

<b>Date of Receipt</b>	: Feb. 20, 2017
<b>Date of Test</b>	: Feb. 23, 2017
<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

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## Sample Photos



Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: LED Panel
<b>Model</b>	: 38PAN24DIM/840/277V
<b>Electrical Ratings</b>	: 120-277V, 60Hz, 38W
<b>Product Description</b>	: 4000K, Frosted Lens, CRI80
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 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)	0.323	0.150
Power Factor	0.9854	0.9107
Test Power (W)	38.23	37.87
THD A%	14.45	18.36
Luminous Efficacy (lm/W)	121.4	122.7
Total Luminous Flux (lm)	4642.4	4646.1
Color Rendering Index (CRI)	83.2	
R9	11	
Correlated Color Temperature (CCT) (K)	3729	
Chromaticity (Chroma x, Chroma y)	(0.3954, 0.3910)	
Chromaticity (Chroma u, Chroma v)	(0.2291, 0.3399)	
Chromaticity (Chroma u', Chroma v')	(0.2291, 0.5099)	
Duv	0.0025	
Average Beam Angle (°)	96.2	
Center Beam Candle Power (cd)	1896	
Spacing Criteria	1.33 (0°-180°)/ 1.33 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	86.25%	
Zonal Lumens in the 60°-90°Zone	13.70%	
Zonal Lumens in the 90°-120°Zone	0.02%	
Zonal Lumens in the 120°-180°Zone	0.04%	

Special Color Rendering Indices	
R1	81
R2	89
R3	95
R4	82
R5	81
R6	85
R7	87
R8	65
R9	11
R10	74
R11	81
R12	61
R13	83
R14	98

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

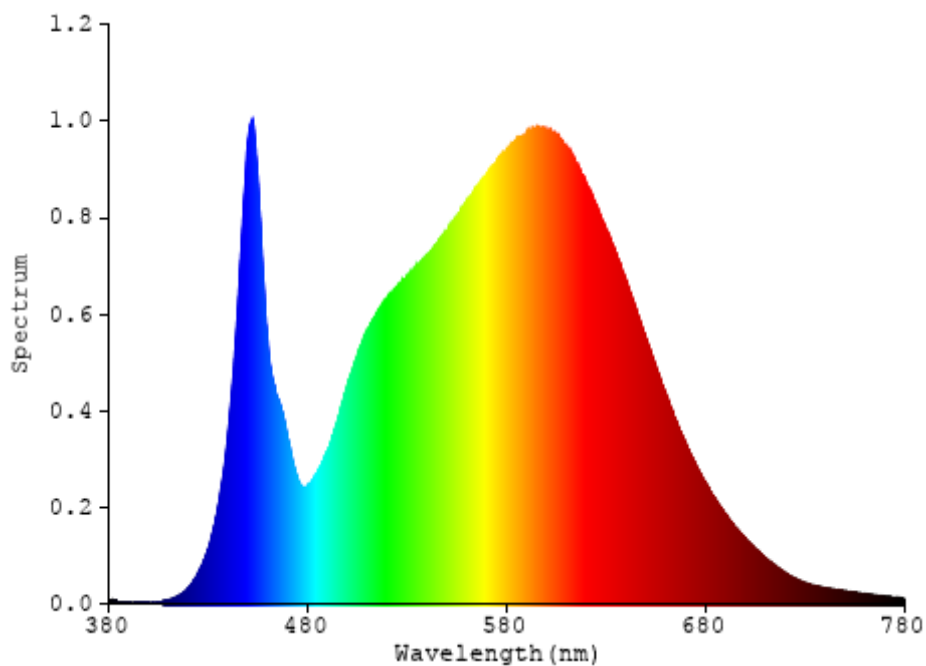


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	180.93	3.90%
10- 20	534.109	11.51%
20- 30	844.508	18.19%
30- 40	1003.472	21.62%
40- 50	860.769	18.54%
50- 60	580.193	12.50%
60- 70	355.169	7.65%
70- 80	207.075	4.46%
80- 90	73.652	1.59%
90-100	0.261	0.01%
100-110	0.19	0.00%
110-120	0.258	0.01%
120-130	0.333	0.01%
130-140	0.419	0.01%
140-150	0.419	0.01%
150-160	0.331	0.01%
160-170	0.228	0.00%
170-180	0.087	0.00%
Total	4642.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	4003.981	86.25%
60- 90	635.896	13.70%
0-90	4639.877	99.95%
90- 180	2.526	0.05%
0- 180	4642.4	100%

Table 3: Zonal Lumen Data

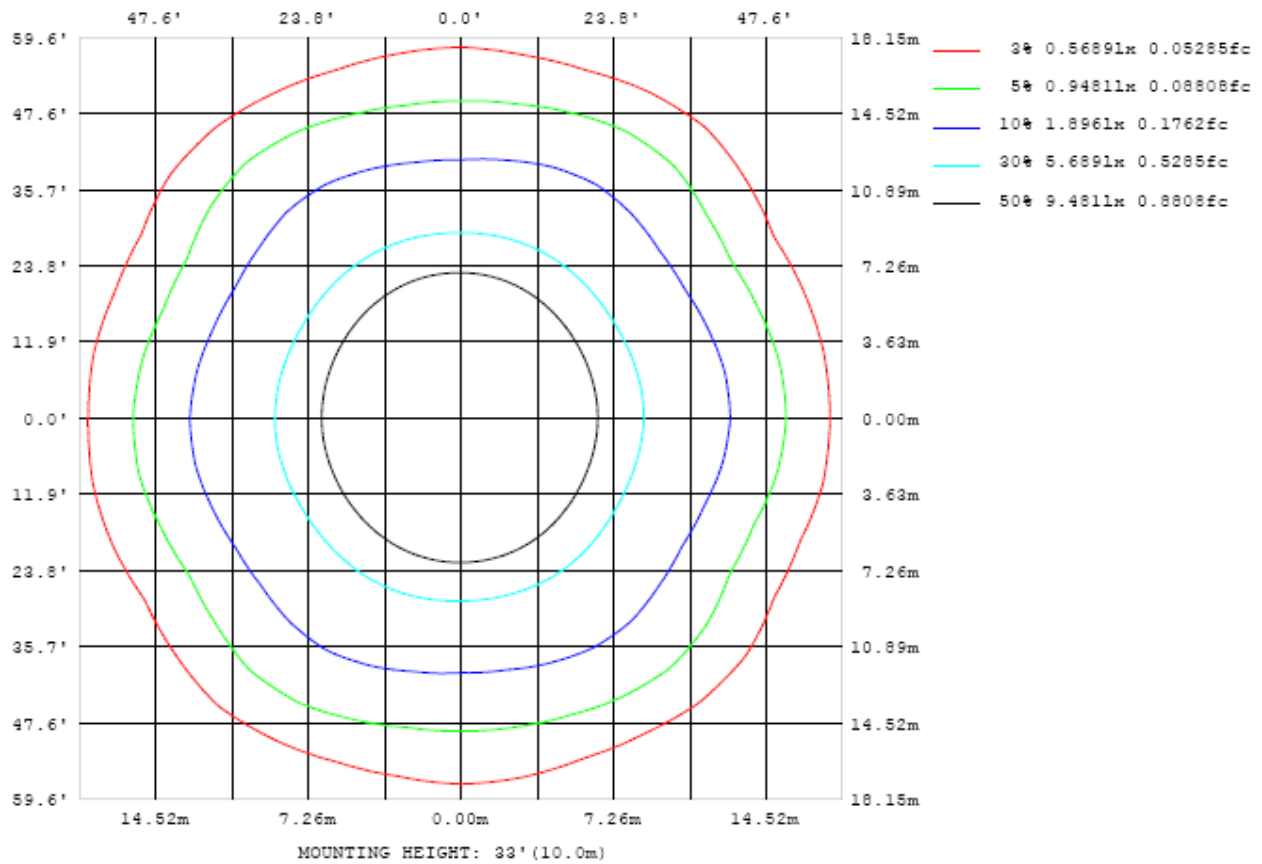


Chart 2: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

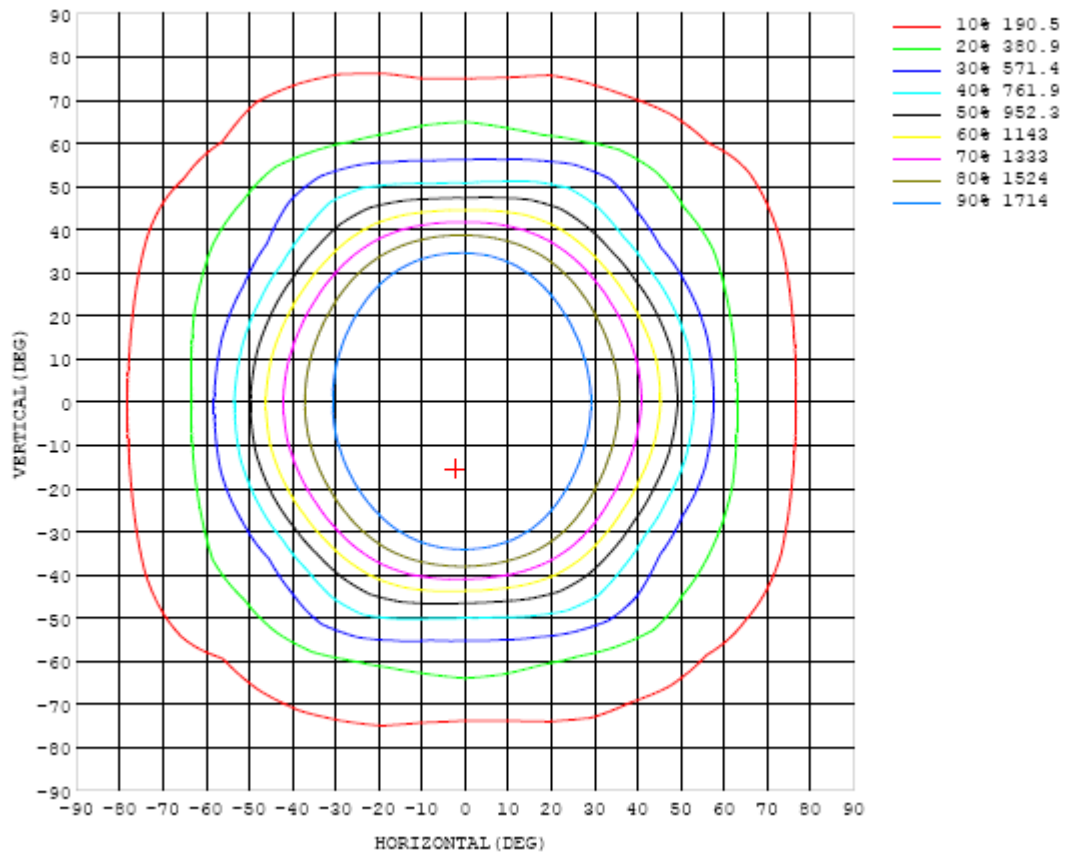


Chart 3: Isocandela Plot

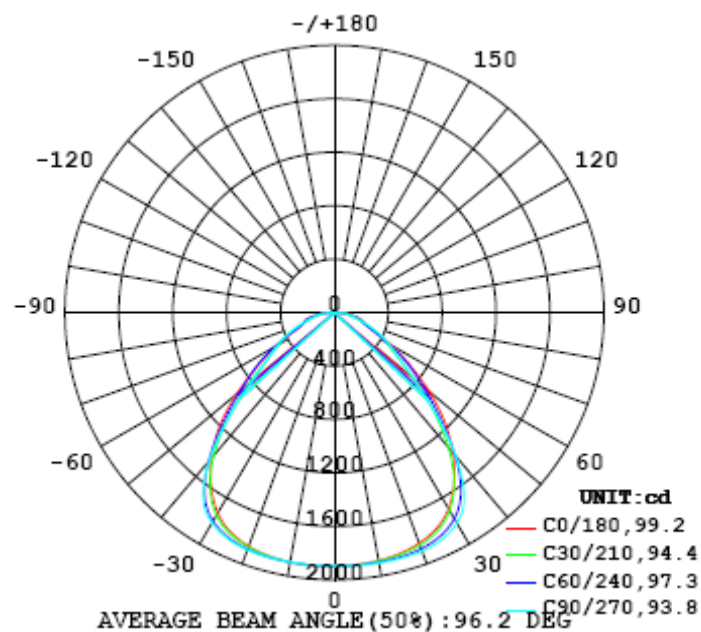


Chart 4: Polar Candela Distribution

## 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	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896
5	1892	1892	1893	1894	1894	1895	1896	1897	1898	1899	1900	1900	1900	1900	1899	1899	1899	1899	1898
10	1883	1884	1886	1888	1890	1893	1896	1899	1901	1902	1903	1903	1902	1901	1899	1898	1897	1896	1896
15	1866	1868	1871	1875	1881	1888	1893	1897	1902	1904	1904	1903	1901	1897	1893	1890	1888	1886	1884
20	1837	1839	1844	1851	1861	1871	1881	1889	1896	1899	1899	1895	1890	1882	1876	1870	1865	1862	1860
25	1786	1788	1794	1803	1817	1833	1849	1862	1871	1875	1875	1870	1860	1847	1836	1828	1822	1818	1816
30	1695	1695	1698	1710	1730	1755	1779	1799	1811	1817	1817	1809	1793	1772	1755	1743	1736	1733	1732
35	1548	1541	1537	1548	1575	1607	1637	1660	1672	1678	1678	1670	1652	1629	1607	1593	1590	1595	1596
40	1366	1347	1322	1316	1339	1371	1391	1396	1395	1399	1412	1423	1421	1401	1381	1377	1394	1416	1422
45	1156	1121	1068	1039	1053	1086	1104	1089	1058	1053	1086	1127	1137	1118	1098	1109	1150	1193	1206
50	914	870	800	766	800	850	859	818	771	758	790	853	891	868	823	821	873	929	944
55	680	647	576	566	627	675	658	612	585	577	588	645	698	691	628	592	641	689	699
60	481	474	442	443	489	494	461	445	458	466	455	465	500	523	489	459	486	507	504
65	323	352	348	340	355	328	309	320	345	358	345	332	329	361	367	362	385	355	332
70	242	272	259	238	245	229	230	242	250	254	254	252	236	250	259	253	286	268	250
75	206	208	182	167	179	184	193	189	179	174	183	200	197	196	186	171	207	225	227
80	150	142	125	121	124	132	132	126	124	123	126	133	142	135	130	132	139	153	160
85	82.9	74.3	63.0	56.8	56.3	59.4	58.5	55.1	52.5	53.4	55.9	59.3	62.8	61.1	59.2	62.2	64.9	75.5	82.0
90	4.40	3.95	3.53	2.60	2.11	1.54	1.59	1.38	2.16	1.19	1.45	1.89	2.20	2.05	3.62	2.96	3.60	3.40	0.67
95	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	0.09	0.09	0.09	0.09	0.12
100	0.11	0.11	0.11	0.10	0.10	0.11	0.12	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.16
105	0.14	0.13	0.13	0.13	0.13	0.13	0.15	0.15	0.14	0.14	0.15	0.15	0.16	0.15	0.15	0.15	0.14	0.14	0.21
110	0.16	0.16	0.16	0.15	0.15	0.16	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.25
115	0.20	0.19	0.19	0.18	0.18	0.19	0.20	0.22	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.20	0.20	0.28
120	0.26	0.23	0.22	0.22	0.21	0.22	0.23	0.23	0.24	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.25	0.25	0.33
125	0.32	0.29	0.26	0.26	0.25	0.26	0.27	0.27	0.29	0.29	0.30	0.31	0.32	0.32	0.32	0.32	0.31	0.31	0.42
130	0.38	0.35	0.33	0.32	0.30	0.31	0.32	0.32	0.34	0.36	0.36	0.38	0.38	0.39	0.39	0.39	0.38	0.38	0.50
135	0.46	0.44	0.42	0.40	0.38	0.37	0.39	0.39	0.39	0.42	0.43	0.44	0.45	0.46	0.47	0.47	0.45	0.47	0.58
140	0.54	0.51	0.50	0.49	0.47	0.46	0.46	0.46	0.46	0.48	0.48	0.50	0.52	0.53	0.53	0.53	0.52	0.55	0.64
145	0.61	0.59	0.58	0.55	0.53	0.52	0.50	0.51	0.52	0.53	0.52	0.54	0.55	0.56	0.57	0.57	0.58	0.61	0.71
150	0.67	0.64	0.63	0.59	0.55	0.54	0.50	0.51	0.51	0.50	0.51	0.53	0.56	0.58	0.58	0.58	0.61	0.66	0.78
155	0.73	0.69	0.69	0.66	0.61	0.55	0.51	0.51	0.50	0.48	0.51	0.54	0.58	0.60	0.62	0.65	0.66	0.71	0.81
160	0.83	0.75	0.75	0.71	0.67	0.59	0.52	0.50	0.48	0.47	0.52	0.58	0.64	0.68	0.70	0.71	0.73	0.80	0.89
165	0.88	0.81	0.82	0.80	0.76	0.68	0.60	0.57	0.56	0.57	0.62	0.69	0.74	0.78	0.80	0.82	0.81	0.86	0.90
170	0.92	0.88	0.89	0.87	0.85	0.79	0.71	0.70	0.73	0.71	0.71	0.78	0.84	0.85	0.86	0.88	0.88	0.92	0.93
175	0.92	0.92	0.95	0.96	0.96	0.96	0.92	0.86	0.89	0.80	0.81	0.87	0.87	0.87	0.89	0.93	0.94	0.94	0.97
180	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88

Table 4: 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	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896	1896		
5	1898	1898	1898	1897	1897	1897	1896	1896	1895	1895	1894	1893	1893	1892	1892	1892	1892		
10	1895	1895	1895	1896	1896	1897	1896	1896	1895	1894	1892	1890	1888	1886	1884	1883	1883		
15	1884	1885	1887	1889	1892	1894	1895	1896	1895	1893	1889	1884	1879	1874	1871	1868	1867		
20	1861	1864	1867	1872	1879	1884	1889	1891	1889	1886	1879	1870	1861	1853	1845	1840	1837		
25	1817	1822	1828	1838	1848	1858	1867	1870	1868	1863	1853	1839	1823	1810	1798	1789	1786		
30	1734	1741	1750	1766	1785	1803	1815	1820	1817	1810	1795	1773	1748	1726	1708	1698	1694		
35	1596	1598	1608	1630	1655	1679	1697	1703	1699	1690	1671	1641	1606	1574	1552	1544	1547		
40	1413	1397	1394	1408	1433	1455	1458	1454	1447	1442	1432	1412	1380	1350	1335	1343	1361		
45	1185	1146	1118	1123	1152	1170	1155	1122	1108	1128	1151	1142	1104	1070	1070	1105	1146		
50	915	862	830	855	904	913	869	814	801	837	889	905	863	808	798	844	899		
55	666	616	609	670	727	712	652	610	604	624	674	714	690	617	580	614	664		
60	499	475	476	531	549	518	485	482	487	477	487	525	538	489	445	462	479		
65	374	385	375	391	364	344	352	371	380	359	340	348	377	374	353	362	338		
70	286	278	259	270	250	251	265	271	277	265	253	240	252	262	257	280	259		
75	223	190	180	207	210	218	214	192	190	195	206	196	190	185	176	202	210		
80	148	141	140	143	153	155	147	141	139	139	146	148	140	134	129	135	148		
85	78.9	70.3	69.7	69.5	75.3	78.2	74.1	73.4	71.3	72.6	74.0	76.7	73.6	68.3	68.8	73.0	82.0		
90	1.14	1.45	1.55	2.11	3.64	5.27	4.04	3.95	4.32	5.03	7.55	7.21	5.78	4.50	5.23	3.95	4.56		
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	0.13		
100	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16		
105	0.21	0.20	0.21	0.21	0.22	0.23	0.22	0.22	0.22	0.22	0.23	0.23	0.22	0.21	0.21	0.21	0.22		
110	0.24	0.25	0.26	0.27	0.28	0.29	0.29	0.29	0.28	0.29	0.29	0.29	0.28	0.27	0.26	0.25	0.26		
115	0.28	0.28	0.29	0.30	0.32	0.33	0.34	0.34	0.34	0.35	0.35	0.34	0.32	0.31	0.30	0.29	0.29		
120	0.33	0.34	0.34	0.35	0.36	0.38	0.39	0.40	0.40	0.40	0.40	0.39	0.37	0.36	0.36	0.35	0.34		
125	0.41	0.42	0.42	0.43	0.43	0.45	0.46	0.47	0.48	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.43		
130	0.50	0.51	0.53	0.53	0.55	0.57	0.58	0.60	0.61	0.60	0.60	0.58	0.57	0.55	0.54	0.52	0.51		
135	0.58	0.60	0.62	0.64	0.67	0.69	0.71	0.74	0.76	0.75	0.73	0.71	0.68	0.67	0.65	0.62	0.59		
140	0.65	0.67	0.70	0.73	0.76	0.79	0.82	0.85	0.86	0.86	0.83	0.81	0.77	0.74	0.71	0.67	0.64		
145	0.72	0.73	0.75	0.79	0.82	0.84	0.87	0.90	0.91	0.90	0.85	0.82	0.80	0.77	0.74	0.71	0.71		
150	0.78	0.78	0.78	0.83	0.85	0.85	0.88	0.89	0.90	0.84	0.82	0.82	0.81	0.78	0.77	0.78	0.79		
155	0.81	0.82	0.83	0.84	0.85	0.84	0.86	0.82	0.80	0.81	0.81	0.81	0.80	0.81	0.84	0.84	0.84		
160	0.88	0.87	0.87	0.89	0.88	0.85	0.84	0.82	0.80	0.82	0.82	0.81	0.83	0.87	0.90	0.92	0.93		
165	0.90	0.91	0.92	0.94	0.93	0.91	0.89	0.87	0.84	0.81	0.81	0.81	0.84	0.87	0.89	0.91	0.93		
170	0.96	0.99	1.01	1.03	1.02	1.00	0.98	0.95	0.93	0.91	0.87	0.86	0.87	0.89	0.92	0.94	0.94		
175	0.99	1.00	1.01	1.02	1.03	1.02	0.99	0.96	0.94	0.95	0.98	0.97	0.91	0.86	0.89	0.93	0.94		
180	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88		

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 expanded uncertainty is 1.94% with a coverage factor k=2.

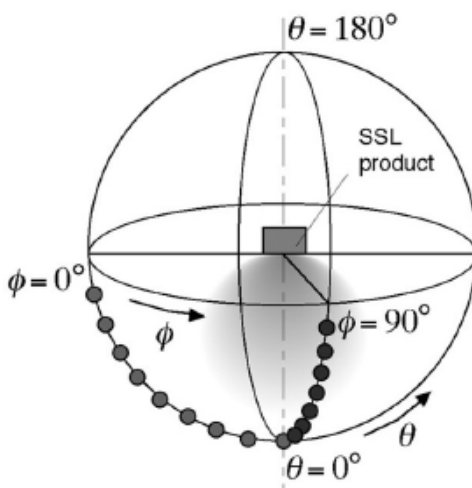
## Color Characteristics Measurements

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  $10^\circ$  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 \*\*\*

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