



## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

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

### LED Panel

**Model: 30PAN22DIM/835/277V**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

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Report No.: HZ17020029a

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: 30PAN22DIM/835/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
112.1	3534.8	31.52	0.9886
CCT (K)	CRI	Stabilization Time (Light & Power)	
3316	84.7	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>	: 30PAN22DIM/835/277V
<b>Electrical Ratings</b>	: 120-277V, 60Hz, 30W
<b>Product Description</b>	: 3500K, 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)	0.266	0.120
Power Factor	0.9886	0.9398
Test Power (W)	31.52	31.37
THD A%	13.02	15.20
Luminous Efficacy (lm/W)	112.1	112.7
Total Luminous Flux (lm)	3534.8	3537.0
Color Rendering Index (CRI)	84.7	
R9	15	
Correlated Color Temperature (CCT) (K)	3316	
Chromaticity (Chroma x, Chroma y)	(0.4166, 0.3971)	
Chromaticity (Chroma u, Chroma v)	(0.2404, 0.3437)	
Chromaticity (Chroma u', Chroma v')	(0.2404, 0.5156)	
Duv	0.0005	
Average Beam Angle (°)	95.1	
Center Beam Candle Power (cd)	1447	
Spacing Criteria	1.32 (0°-180°)/ 1.36 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	86.47%	
Zonal Lumens in the 60°-90°Zone	13.47%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.05%	

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

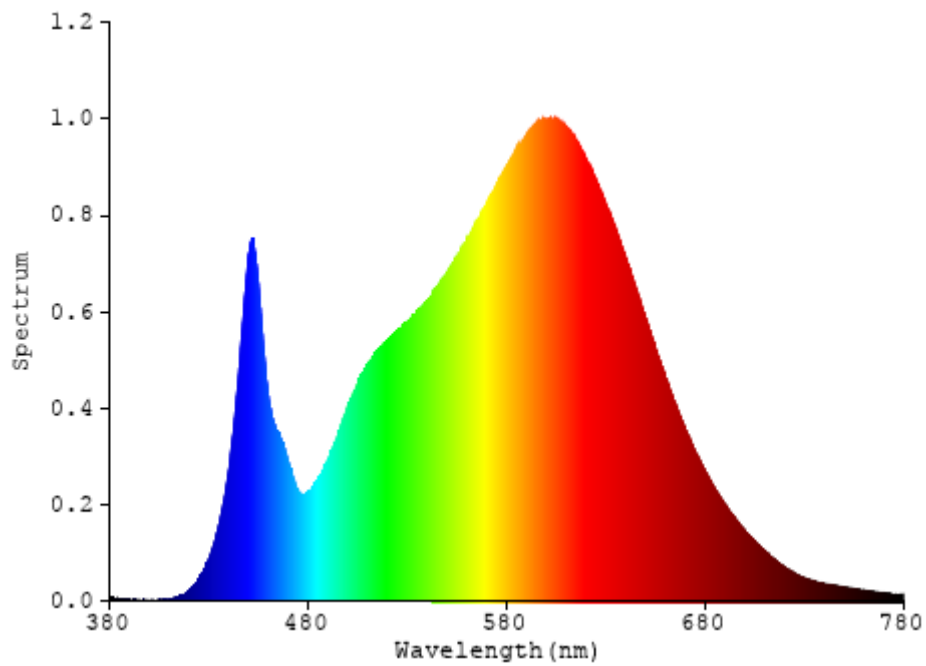


Chart 1: Spectral Power Distribution

## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	137.903	3.90%
10- 20	407.879	11.54%
20- 30	650.12	18.39%
30- 40	787.408	22.28%
40- 50	646.199	18.28%
50- 60	426.872	12.08%
60- 70	266.836	7.55%
70- 80	155.8	4.41%
80- 90	53.55	1.51%
90-100	0.137	0.00%
100-110	0.149	0.00%
110-120	0.216	0.01%
120-130	0.3	0.01%
130-140	0.393	0.01%
140-150	0.409	0.01%
150-160	0.332	0.01%
160-170	0.221	0.01%
170-180	0.083	0.00%
Total	3534.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3056.381	86.47%
60- 90	476.186	13.47%
0-90	3532.567	99.94%
90- 180	2.24	0.06%
0- 180	3534.8	100%

Table 3: Zonal Lumen Data

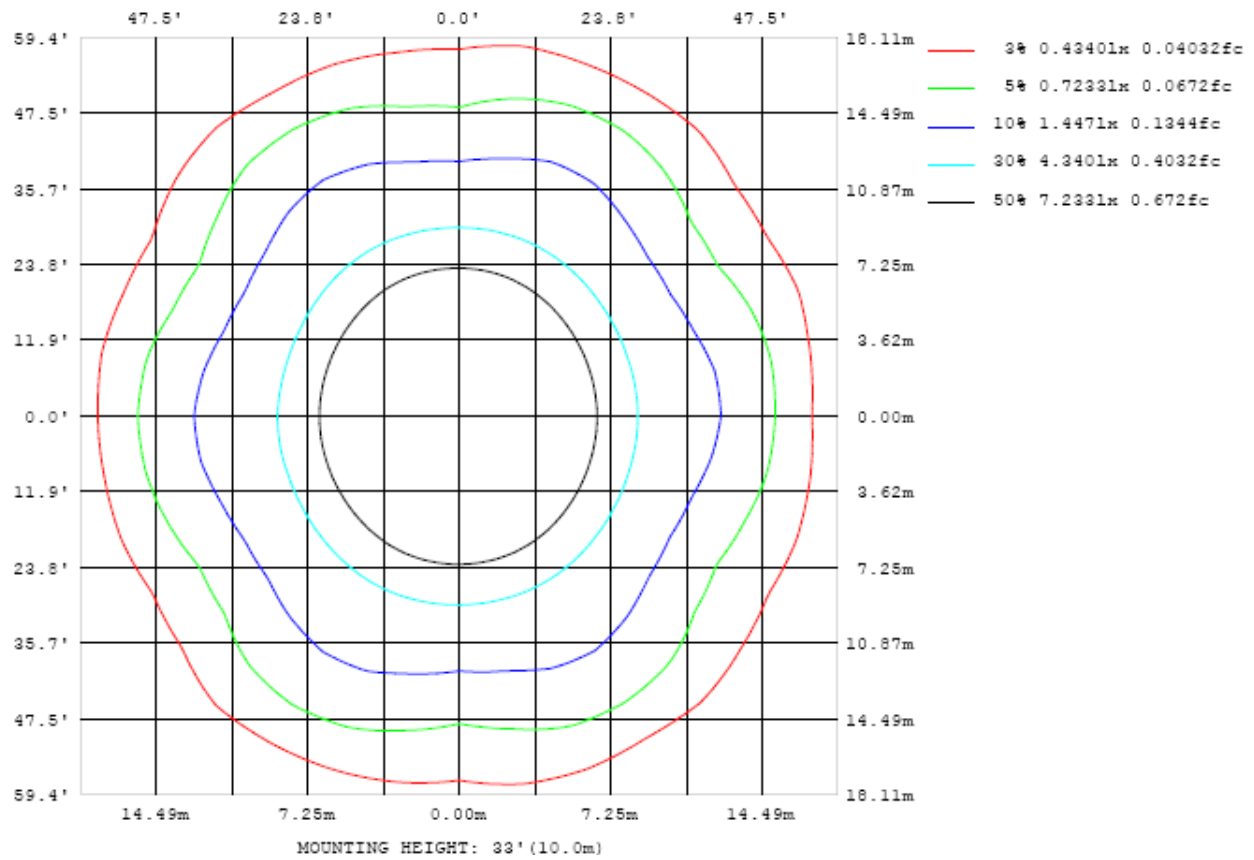


Chart 2: Illuminance Plot (Footcandles)



## Luminous Intensity Distribution Plots

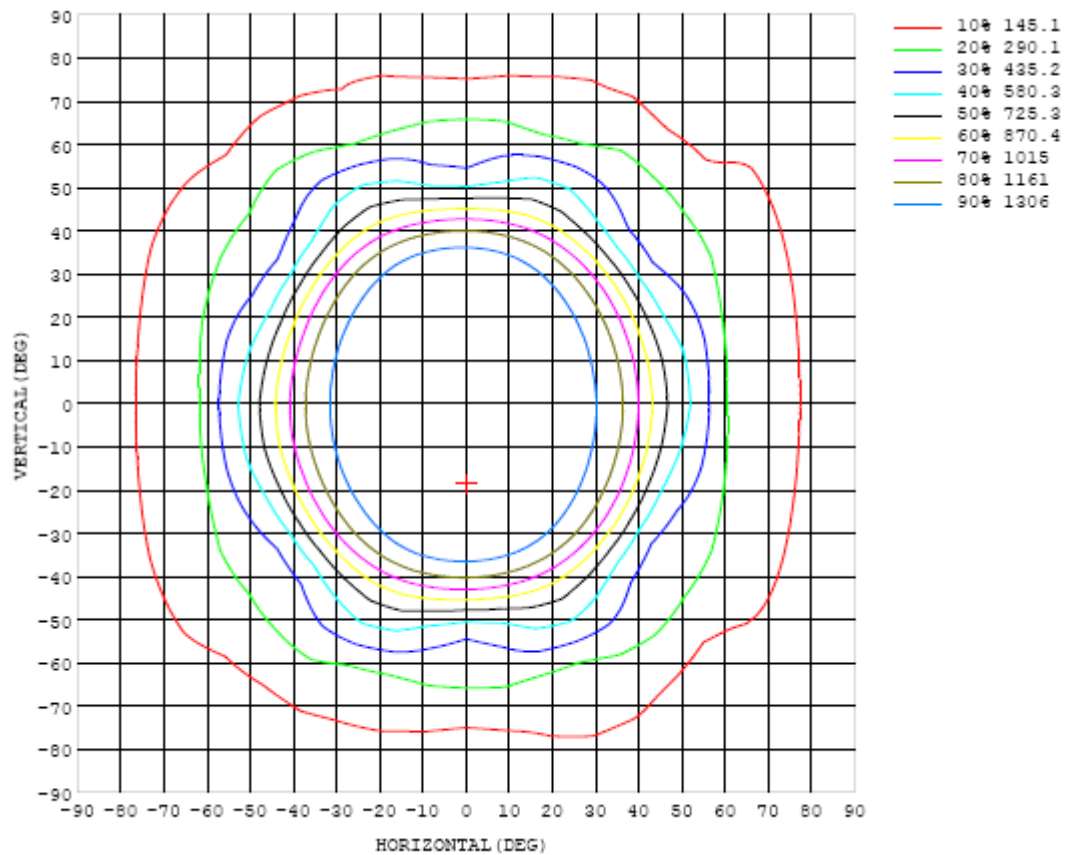


Chart 3: Isocandela Plot

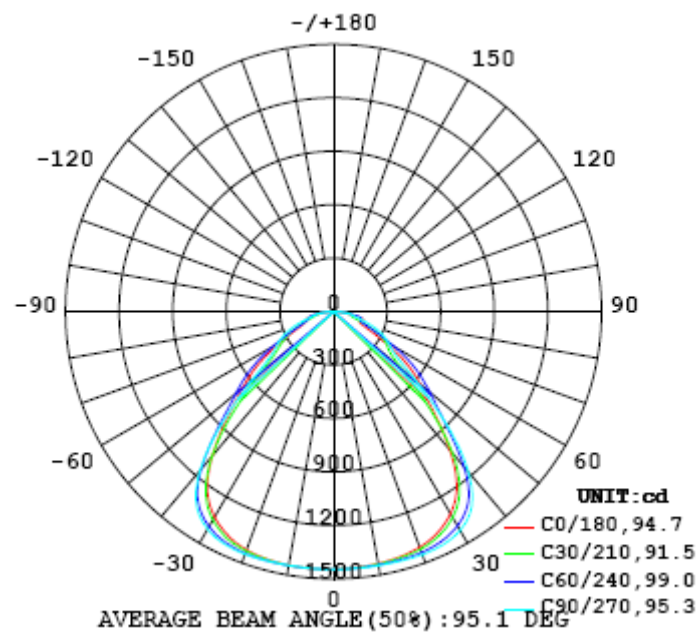


Chart 4: Polar Candela Distribution

## 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	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447
5	1442	1442	1443	1443	1444	1444	1445	1445	1446	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447
10	1436	1436	1437	1439	1440	1442	1443	1445	1445	1447	1447	1447	1447	1447	1446	1446	1445	1445	1445
15	1426	1427	1430	1432	1435	1439	1442	1445	1447	1449	1449	1448	1447	1445	1444	1442	1440	1438	1438
20	1408	1409	1414	1420	1426	1432	1439	1444	1448	1451	1450	1448	1444	1440	1435	1430	1427	1424	1423
25	1372	1374	1381	1390	1401	1412	1423	1434	1441	1445	1443	1438	1430	1422	1413	1404	1397	1392	1390
30	1308	1311	1320	1334	1351	1369	1387	1402	1412	1417	1414	1407	1395	1380	1364	1351	1340	1334	1331
35	1203	1205	1212	1230	1255	1285	1312	1330	1340	1346	1344	1337	1320	1294	1268	1248	1236	1233	1231
40	1012	1010	1015	1035	1064	1100	1134	1156	1167	1173	1173	1168	1150	1119	1085	1060	1049	1054	1054
45	788	771	747	747	781	837	884	897	892	894	907	920	906	860	813	792	802	831	838
50	632	586	518	493	540	635	703	690	635	600	663	713	712	644	560	536	581	641	661
55	484	456	407	378	414	507	563	547	467	423	480	559	574	511	418	392	439	493	514
60	306	326	339	333	358	395	394	403	384	354	379	405	416	407	347	325	341	340	345
65	183	224	258	255	282	280	244	271	305	301	298	272	266	301	276	259	265	229	216
70	156	189	188	159	189	200	167	191	223	224	225	189	177	208	196	187	208	182	168
75	172	166	141	107	129	159	161	156	155	145	158	151	147	148	127	123	151	158	155
80	98.9	91.4	95.5	101	99.6	106	126	121	109	102	106	120	117	104	96.9	93.8	95.9	105	107
85	50.7	51.5	45.5	43.1	44.3	48.0	51.6	52.5	50.5	54.7	49.8	51.2	52.9	48.0	43.9	43.3	48.4	53.1	55.6
90	2.05	3.41	1.97	1.82	1.83	1.94	3.55	2.18	3.43	1.83	1.93	1.94	1.87	1.67	1.43	2.53	2.94	1.59	0.10
95	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.09
100	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.08	0.08	0.08	0.13
105	0.11	0.11	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	0.10	0.10	0.10	0.17
110	0.13	0.14	0.13	0.13	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.21
115	0.17	0.17	0.17	0.16	0.15	0.16	0.17	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.16	0.17	0.25
120	0.22	0.22	0.21	0.20	0.19	0.20	0.20	0.21	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.20	0.21	0.31
125	0.28	0.27	0.26	0.26	0.24	0.26	0.26	0.26	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.27	0.26	0.27	0.39
130	0.34	0.33	0.33	0.32	0.30	0.31	0.32	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.32	0.33	0.32	0.33	0.49
135	0.42	0.41	0.40	0.40	0.37	0.37	0.39	0.40	0.37	0.40	0.39	0.39	0.38	0.39	0.40	0.41	0.40	0.40	0.60
140	0.49	0.47	0.47	0.47	0.44	0.45	0.45	0.46	0.44	0.46	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.48	0.69
145	0.56	0.54	0.53	0.51	0.50	0.49	0.51	0.51	0.53	0.53	0.52	0.52	0.51	0.51	0.51	0.51	0.52	0.54	0.76
150	0.61	0.59	0.58	0.56	0.53	0.52	0.51	0.53	0.53	0.54	0.54	0.54	0.54	0.55	0.55	0.55	0.55	0.59	0.81
155	0.65	0.63	0.62	0.62	0.57	0.54	0.54	0.54	0.54	0.54	0.55	0.56	0.57	0.58	0.60	0.61	0.61	0.64	0.86
160	0.72	0.68	0.67	0.66	0.63	0.58	0.54	0.54	0.55	0.52	0.58	0.60	0.61	0.63	0.65	0.65	0.65	0.70	0.91
165	0.77	0.72	0.73	0.71	0.70	0.64	0.61	0.60	0.60	0.61	0.65	0.68	0.68	0.70	0.71	0.72	0.70	0.74	0.90
170	0.85	0.78	0.78	0.77	0.76	0.71	0.68	0.67	0.70	0.70	0.69	0.74	0.75	0.76	0.78	0.78	0.78	0.84	0.93
175	0.95	0.88	0.90	0.89	0.89	0.87	0.84	0.85	0.83	0.78	0.83	0.86	0.86	0.88	0.90	0.91	0.90	0.93	0.95
180	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85

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	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447	1447		
5	1447	1447	1447	1447	1447	1447	1446	1446	1446	1445	1445	1445	1444	1443	1443	1442	1442		
10	1445	1445	1446	1446	1446	1447	1446	1446	1446	1444	1443	1442	1441	1440	1438	1436	1436		
15	1439	1440	1441	1443	1445	1447	1448	1448	1448	1446	1444	1441	1438	1434	1431	1428	1426		
20	1424	1427	1431	1435	1440	1444	1447	1449	1449	1445	1441	1435	1429	1422	1417	1411	1408		
25	1391	1395	1407	1413	1421	1429	1436	1441	1440	1435	1427	1417	1407	1396	1384	1375	1371		
30	1333	1340	1350	1364	1379	1393	1404	1412	1410	1402	1390	1375	1357	1340	1325	1313	1307		
35	1229	1234	1247	1268	1295	1318	1332	1336	1335	1328	1316	1294	1266	1238	1217	1205	1200		
40	1044	1041	1058	1088	1125	1152	1163	1163	1161	1155	1143	1118	1081	1046	1021	1006	1006		
45	810	783	787	823	873	906	906	888	878	886	891	867	817	765	742	750	776		
50	619	554	532	582	666	714	687	617	592	643	698	682	601	522	500	546	614		
55	483	415	392	449	534	567	529	450	426	492	553	546	475	397	384	434	482		
60	352	333	326	372	408	398	391	368	360	393	398	394	383	339	330	346	324		
65	255	263	256	292	283	250	278	299	303	302	260	257	291	269	254	256	210		
70	201	199	179	208	195	171	205	226	225	221	178	176	209	179	169	198	175		
75	158	141	118	139	148	145	158	156	148	157	148	151	149	113	119	158	170		
80	106	96.1	92.5	97.6	110	119	115	102	102	109	122	118	101	94.8	101	96.3	98.6		
85	54.6	46.0	42.4	43.8	51.9	51.7	48.7	51.5	53.9	49.8	53.2	53.1	46.6	45.2	44.6	46.9	53.0		
90	0.05	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.02	0.00	0.00	0.05	0.06	0.07	0.11	0.12		
95	0.09	0.09	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
100	0.12	0.12	0.12	0.12	0.13	0.14	0.14	0.13	0.14	0.14	0.14	0.14	0.13	0.12	0.12	0.12	0.13		
105	0.16	0.16	0.16	0.17	0.18	0.19	0.19	0.18	0.18	0.18	0.19	0.18	0.18	0.17	0.17	0.17	0.17		
110	0.20	0.20	0.20	0.21	0.22	0.23	0.24	0.24	0.24	0.24	0.24	0.23	0.22	0.21	0.21	0.21	0.21		
115	0.24	0.25	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.25	0.25		
120	0.30	0.30	0.31	0.32	0.32	0.33	0.34	0.35	0.35	0.35	0.34	0.32	0.32	0.32	0.32	0.31	0.31		
125	0.38	0.38	0.39	0.39	0.40	0.41	0.41	0.43	0.43	0.43	0.42	0.40	0.39	0.39	0.39	0.39	0.39		
130	0.49	0.49	0.50	0.50	0.51	0.52	0.53	0.55	0.55	0.54	0.53	0.51	0.51	0.50	0.51	0.50	0.50		
135	0.59	0.60	0.62	0.63	0.63	0.64	0.65	0.67	0.68	0.67	0.65	0.63	0.62	0.63	0.63	0.62	0.61		
140	0.68	0.69	0.72	0.73	0.74	0.75	0.76	0.77	0.77	0.76	0.74	0.73	0.72	0.73	0.72	0.71	0.70		
145	0.76	0.76	0.78	0.80	0.82	0.81	0.82	0.83	0.83	0.82	0.80	0.80	0.80	0.79	0.79	0.79	0.79		
150	0.81	0.82	0.83	0.84	0.84	0.84	0.85	0.85	0.83	0.82	0.84	0.83	0.83	0.83	0.86	0.87	0.87		
155	0.86	0.87	0.87	0.85	0.84	0.84	0.84	0.82	0.83	0.84	0.83	0.83	0.83	0.85	0.89	0.89	0.90		
160	0.90	0.89	0.89	0.89	0.88	0.86	0.86	0.86	0.82	0.83	0.82	0.82	0.84	0.87	0.91	0.93	0.95		
165	0.89	0.90	0.91	0.91	0.91	0.90	0.89	0.87	0.85	0.82	0.81	0.82	0.83	0.86	0.89	0.93	0.95		
170	0.93	0.95	0.96	0.96	0.95	0.94	0.93	0.91	0.90	0.88	0.86	0.86	0.84	0.87	0.91	0.94	0.95		
175	0.96	0.97	0.97	0.96	0.95	0.94	0.93	0.91	0.90	0.88	0.92	0.91	0.89	0.88	0.92	0.95	0.96		
180	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		

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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