



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED Panel

Model: 30PAN22DIM/830/277V

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17010030a

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

Review by:

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Feb. 04, 2017

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Feb. 04, 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/830/277V

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
116.1	3641.5	31.38	0.9942
CCT (K)	CRI	Stabilization Time (Light & Power)	
2930	82.9	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	: Jan. 17, 2017
Date of Test	: Jan. 19, 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	: 30PAN22DIM/830/277V
Electrical Ratings	: 120-277V, 60Hz
Product Description	: 3000K, CRI80
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 24.7°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)	0.263	0.119
Power Factor	0.9942	0.9424
Test Power (W)	31.38	30.98
THD A%	10.09	15.40
Luminous Efficacy (lm/W)	116.1	117.7
Total Luminous Flux (lm)	3641.5	3645.3
Color Rendering Index (CRI)	82.9	
R9	8	
Correlated Color Temperature (CCT) (K)	2930	
Chromaticity (Chroma x, Chroma y)	(0.4439, 0.4095)	
Chromaticity (Chroma u, Chroma v)	(0.2527, 0.3497)	
Chromaticity (Chroma u', Chroma v')	(0.2527, 0.5245)	
Duv	0.0012	
Average Beam Angle (°)	93.4	
Center Beam Candle Power (cd)	1537	
Spacing Criteria	1.27 (0°-180°)/ 1.31 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	87.18%	
Zonal Lumens in the 60°-90°Zone	12.75%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.05%	

Special Color Rendering Indices	
R1	81
R2	91
R3	97
R4	81
R5	81
R6	90
R7	83
R8	59
R9	8
R10	80
R11	81
R12	72
R13	83
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

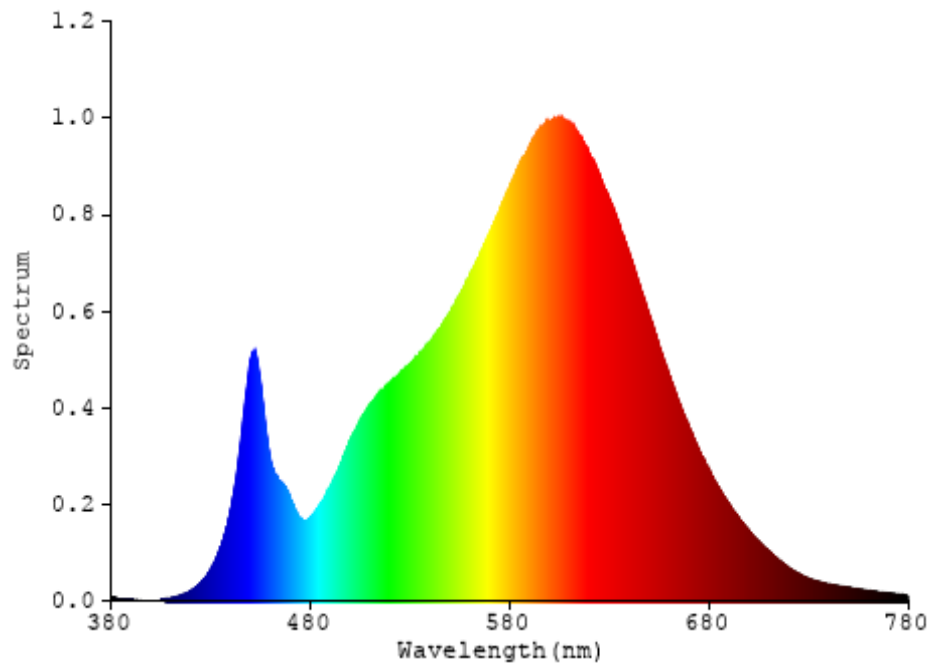


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	146.734	4.03%
10- 20	434.768	11.94%
20- 30	688.796	18.91%
30- 40	819.431	22.50%
40- 50	654.76	17.98%
50- 60	430.34	11.82%
60- 70	259.694	7.13%
70- 80	154.533	4.24%
80- 90	50.162	1.38%
90-100	0.149	0.00%
100-110	0.146	0.00%
110-120	0.217	0.01%
120-130	0.309	0.01%
130-140	0.408	0.01%
140-150	0.425	0.01%
150-160	0.344	0.01%
160-170	0.231	0.01%
170-180	0.087	0.00%
Total	3641.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	3174.829	87.18%
60- 90	464.389	12.75%
0-90	3639.218	99.94%
90- 180	2.316	0.06%
0- 180	3641.5	100%

Table 3: Zonal Lumen Data

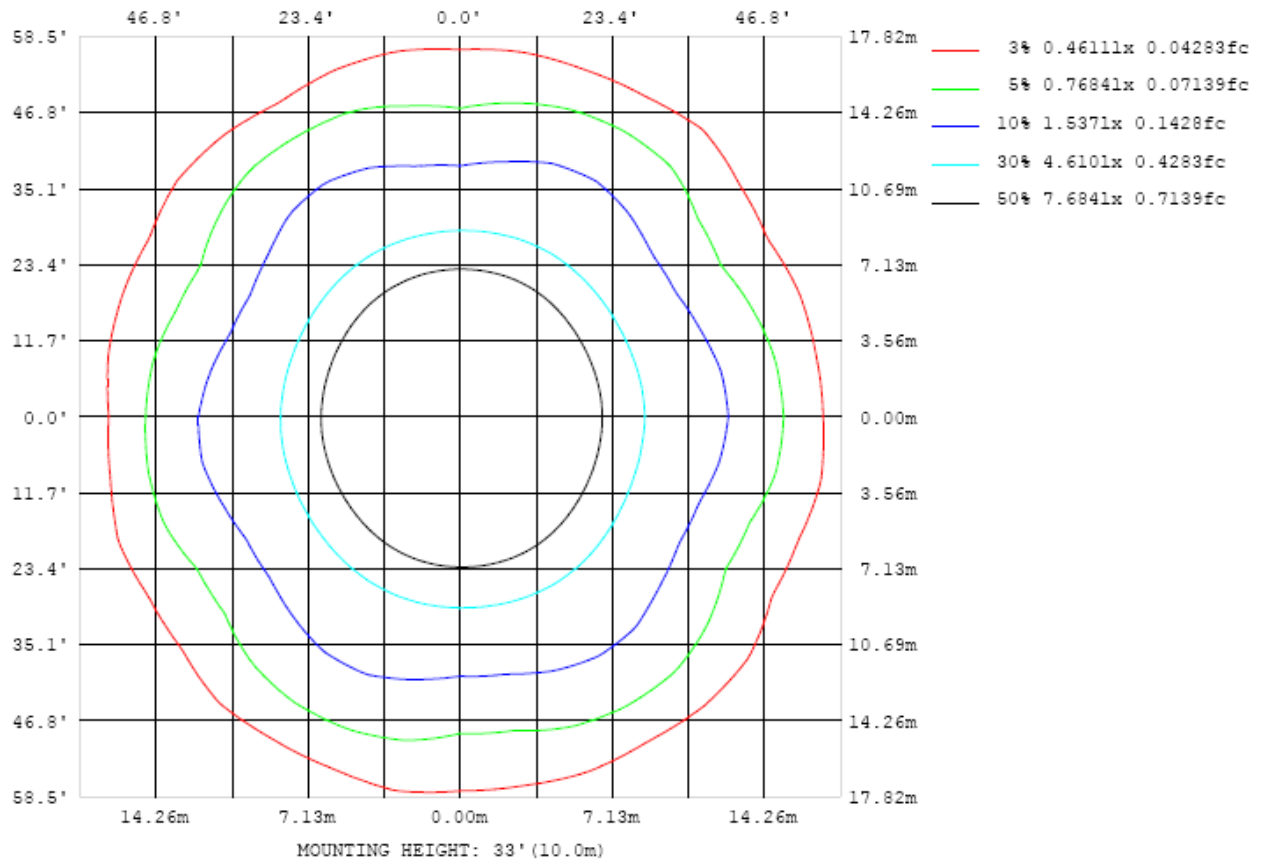


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

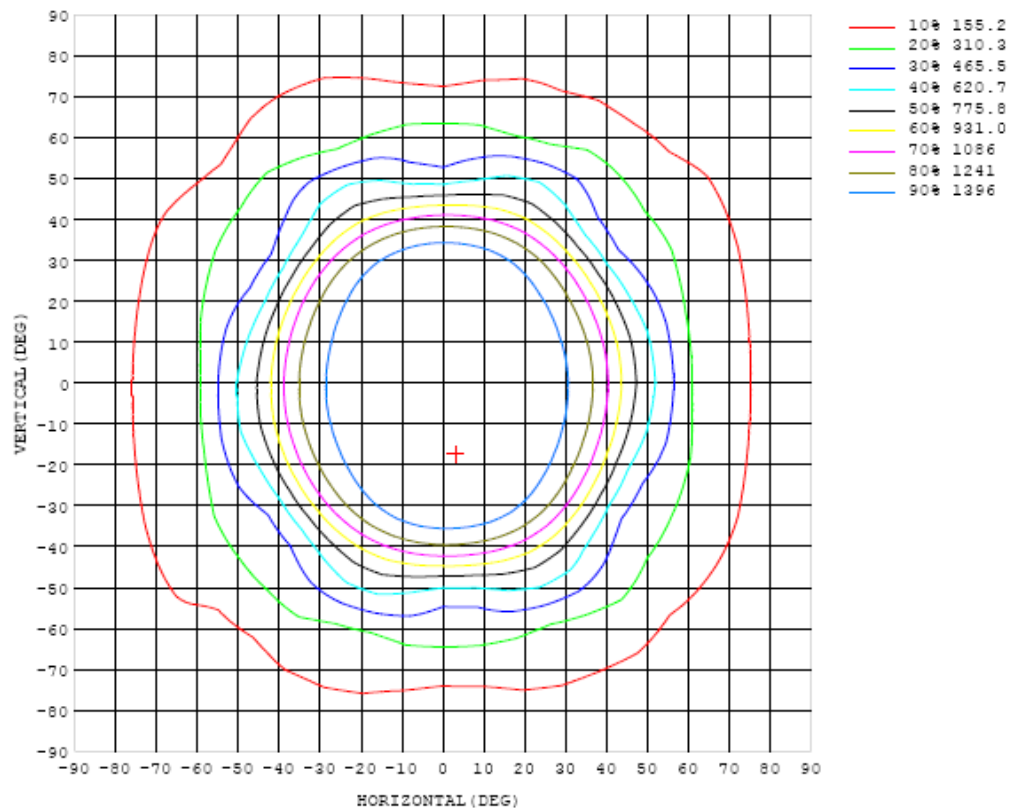


Chart 3: Isocandela Plot

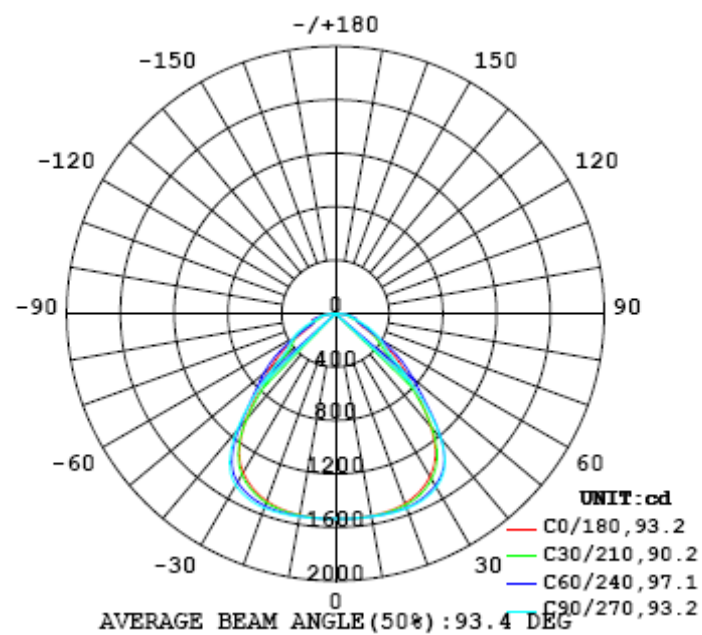


Chart 4: Polar Candela Distribution

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	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537
5	1538	1537	1538	1538	1538	1539	1539	1538	1538	1538	1538	1537	1536	1536	1535	1535	1534	1535	1534
10	1537	1537	1537	1539	1540	1541	1542	1543	1543	1542	1541	1540	1538	1536	1534	1532	1530	1530	1530
15	1530	1531	1533	1537	1540	1543	1546	1549	1549	1549	1546	1543	1539	1534	1529	1524	1520	1518	1518
20	1512	1514	1519	1525	1531	1538	1545	1550	1551	1550	1546	1539	1530	1522	1512	1504	1497	1494	1493
25	1474	1476	1483	1493	1504	1516	1527	1536	1540	1539	1532	1521	1506	1491	1476	1463	1454	1449	1447
30	1407	1410	1417	1430	1448	1469	1486	1497	1501	1500	1493	1479	1458	1435	1411	1394	1382	1377	1373
35	1296	1295	1300	1317	1346	1379	1403	1415	1416	1414	1407	1393	1367	1332	1297	1272	1259	1253	1248
40	1104	1097	1097	1118	1157	1197	1223	1230	1226	1221	1212	1194	1164	1122	1081	1052	1039	1039	1033
45	870	846	822	833	882	934	960	954	931	918	925	928	900	842	782	757	774	800	799
50	679	649	572	563	638	721	751	713	643	627	682	731	710	625	537	514	571	635	633
55	515	489	422	412	490	566	581	539	468	459	525	567	553	491	415	403	452	476	466
60	338	356	337	337	391	407	394	400	385	384	407	390	384	386	347	338	348	306	289
65	214	261	264	261	295	268	247	290	303	303	300	250	248	288	264	253	256	205	186
70	173	201	194	181	210	189	180	217	219	215	217	182	185	209	173	168	199	182	176
75	157	155	138	124	146	154	159	165	148	145	159	164	164	152	122	130	156	166	171
80	105	102	96.1	96.0	98.9	113	119	110	108	111	108	120	115	99.5	98.9	102	90.7	96.0	95.3
85	52.8	51.3	47.6	45.9	47.7	54.8	56.3	53.5	54.3	55.3	53.6	57.5	55.3	49.2	46.4	44.6	45.8	47.7	49.6
90	1.64	1.96	2.23	2.12	3.76	2.69	3.60	3.70	3.64	3.59	3.68	3.84	3.02	2.38	2.10	1.89	1.73	1.37	0.07
95	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.09
100	0.08	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08	0.12
105	0.11	0.10	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.17
110	0.13	0.13	0.13	0.12	0.12	0.12	0.13	0.14	0.13	0.13	0.14	0.13	0.13	0.14	0.14	0.14	0.13	0.13	0.21
115	0.17	0.16	0.16	0.15	0.15	0.15	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.26
120	0.22	0.21	0.20	0.19	0.19	0.19	0.20	0.20	0.21	0.21	0.21	0.20	0.20	0.21	0.21	0.22	0.21	0.21	0.32
125	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.25	0.27	0.27	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.27	0.41
130	0.34	0.33	0.33	0.32	0.30	0.30	0.32	0.33	0.32	0.33	0.32	0.33	0.32	0.33	0.33	0.34	0.34	0.33	0.52
135	0.41	0.40	0.40	0.40	0.36	0.37	0.38	0.40	0.38	0.40	0.39	0.39	0.39	0.40	0.41	0.42	0.41	0.41	0.63
140	0.48	0.47	0.47	0.47	0.44	0.45	0.45	0.46	0.45	0.46	0.46	0.46	0.46	0.48	0.49	0.48	0.48	0.49	0.73
145	0.54	0.54	0.53	0.51	0.51	0.51	0.52	0.52	0.54	0.53	0.53	0.54	0.53	0.54	0.54	0.53	0.54	0.56	0.82
150	0.58	0.59	0.58	0.56	0.54	0.52	0.53	0.55	0.55	0.55	0.56	0.56	0.55	0.57	0.58	0.57	0.58	0.59	0.87
155	0.63	0.64	0.63	0.62	0.57	0.55	0.55	0.56	0.56	0.56	0.57	0.58	0.58	0.60	0.62	0.63	0.63	0.64	0.91
160	0.69	0.70	0.68	0.67	0.63	0.59	0.56	0.57	0.58	0.54	0.60	0.62	0.63	0.66	0.67	0.68	0.68	0.69	0.94
165	0.73	0.74	0.74	0.73	0.71	0.65	0.63	0.62	0.62	0.61	0.66	0.70	0.70	0.73	0.74	0.75	0.74	0.74	0.95
170	0.81	0.81	0.81	0.81	0.78	0.73	0.71	0.70	0.74	0.73	0.72	0.78	0.79	0.81	0.82	0.82	0.82	0.83	0.98
175	0.92	0.94	0.94	0.93	0.93	0.89	0.89	0.88	0.86	0.81	0.87	0.88	0.89	0.90	0.93	0.93	0.92	0.92	1.00
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) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537	1537		
5	1534	1534	1535	1535	1536	1537	1537	1538	1538	1538	1538	1538	1538	1538	1538	1538	1537	1537	
10	1530	1531	1533	1535	1537	1539	1540	1541	1542	1542	1542	1541	1540	1539	1537	1537	1536		
15	1519	1522	1525	1530	1535	1539	1543	1546	1548	1548	1546	1543	1540	1537	1534	1531	1531		
20	1494	1498	1505	1513	1523	1531	1539	1545	1548	1547	1543	1538	1532	1525	1519	1515	1512		
25	1448	1453	1463	1477	1492	1506	1518	1526	1530	1529	1523	1514	1504	1492	1483	1476	1473		
30	1373	1378	1391	1411	1435	1455	1470	1479	1483	1482	1476	1464	1447	1429	1414	1406	1404		
35	1244	1246	1261	1289	1321	1345	1361	1369	1374	1373	1372	1362	1337	1309	1290	1285	1291		
40	1022	1017	1027	1052	1085	1113	1128	1136	1144	1149	1152	1142	1119	1094	1076	1077	1094		
45	765	724	717	759	826	863	855	826	823	856	890	888	847	797	784	813	854		
50	575	502	484	554	653	696	657	579	549	614	695	709	646	554	529	586	657		
55	443	402	390	445	513	528	512	452	421	471	532	552	517	427	392	439	494		
60	322	335	334	366	361	336	365	373	361	370	365	371	394	349	323	339	332		
65	237	249	240	268	240	206	252	281	281	282	241	228	277	269	254	264	225		
70	198	173	149	185	187	170	190	198	192	207	181	167	191	183	178	204	183		
75	151	133	119	138	157	171	158	140	127	146	157	150	143	127	123	146	156		
80	87.8	90.5	96.5	88.7	89.2	99.5	93.3	96.7	101	91.7	97.4	103	93.2	93.9	92.2	91.8	103		
85	46.5	40.0	36.3	36.6	40.8	41.5	39.8	36.6	36.9	38.7	41.8	42.5	40.6	37.9	40.5	46.3	52.3		
90	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08		
95	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09		
100	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.13	0.13	0.12	0.12	0.12	0.12		
105	0.17	0.16	0.16	0.17	0.18	0.19	0.19	0.18	0.18	0.18	0.19	0.18	0.17	0.17	0.16	0.17	0.17		
110	0.21	0.21	0.21	0.22	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.22	0.21	0.21	0.20	0.21		
115	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.27	0.26	0.25	0.25	0.25	0.25		
120	0.32	0.33	0.33	0.34	0.34	0.35	0.36	0.36	0.36	0.36	0.35	0.33	0.32	0.32	0.32	0.32	0.32		
125	0.41	0.41	0.42	0.43	0.43	0.44	0.45	0.46	0.46	0.45	0.44	0.42	0.41	0.41	0.41	0.40	0.39		
130	0.52	0.53	0.54	0.54	0.55	0.56	0.57	0.59	0.59	0.58	0.57	0.54	0.53	0.52	0.52	0.51	0.50		
135	0.63	0.65	0.67	0.68	0.69	0.70	0.71	0.72	0.72	0.71	0.69	0.67	0.66	0.66	0.65	0.63	0.62		
140	0.74	0.75	0.77	0.79	0.80	0.80	0.81	0.82	0.82	0.80	0.78	0.76	0.75	0.75	0.73	0.72	0.71		
145	0.82	0.83	0.85	0.86	0.87	0.87	0.88	0.88	0.88	0.84	0.83	0.83	0.83	0.81	0.80	0.79	0.79		
150	0.87	0.88	0.89	0.90	0.90	0.90	0.91	0.90	0.86	0.86	0.87	0.85	0.86	0.85	0.88	0.87	0.86		
155	0.92	0.92	0.92	0.92	0.90	0.90	0.89	0.88	0.86	0.88	0.85	0.85	0.85	0.88	0.92	0.90	0.90		
160	0.94	0.94	0.95	0.95	0.94	0.93	0.92	0.91	0.87	0.86	0.86	0.86	0.87	0.91	0.94	0.96	0.95		
165	0.95	0.97	0.97	0.98	0.98	0.97	0.97	0.93	0.91	0.87	0.85	0.86	0.87	0.91	0.93	0.96	0.95		
170	0.99	1.01	1.03	1.03	1.02	1.02	1.01	0.97	0.95	0.93	0.92	0.90	0.88	0.92	0.96	0.98	0.97		
175	1.01	1.03	1.03	1.04	1.02	1.02	1.00	0.97	0.94	0.92	0.96	0.95	0.92	0.94	0.98	0.99	1.00		
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° 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.