LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

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

LED Downlight

Model: 35135

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ20010008c

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

Review by:

Engineer: April Zou
Jan. 16, 2020

Approved by:

Manager: Jim Zhang
Jan. 16, 2020

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: **35135**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
101.2	2378.5	23.51	0.9945

CCT (K)	CRI	Stabilization Time (Light & Power)
4095	84.0	60

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Jan. 10, 2020

Date of Test : Jan. 14, 2020

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 PHOTO

Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Downlight
Model	: 35135
Electrical Ratings	: 120-277V, 50/60Hz, 24W
Product Description	: 24CDL8DIM/840/277V
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.1 ℃.

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

The stabilization time of the sample was 70 minutes, and the total operating time including stabilization was 90 minutes.

The photometric distance is 2.47 m.

Luminous data was taken at 0.5 °vertical intervals and 10 °horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.197	0.095
Power Factor	0.9945	0.8961
Test Power (W)	23.51	23.55
THD A%	5.34	9.61
Luminous Efficacy (lm/W)	101.2	100.9
Total Luminous Flux (lm)	2378.5	2376.8
Color Rendering Index (CRI)	84.0	
R9	11	
Correlated Color Temperature (CCT) (K)	4095	
Chromaticity (Chroma x, Chroma y)	(0.3770, 0.3769)	
Chromaticity (Chroma u, Chroma v)	(0.2228, 0.3341)	
Chromaticity (Chroma u', Chroma v')	(0.2228, 0.5011)	
Duv	0.0011	
Average Beam Angle (°)	85.6	
Center Beam Candle Power (cd)	1277	
Spacing Criteria	1.21 (0°-180°)/ 1.19(90°-270°)	
Zonal Lumens in the 0°-60° Zone	93.04%	
Zonal Lumens in the 60°-90° Zone	6.84%	
Zonal Lumens in the 90°-120° Zone	0.01%	
Zonal Lumens in the 120°-180° Zone	0.11%	

Special Color Rendering Indices	
R1	82
R2	90
R3	96
R4	82
R5	82
R6	87
R7	86
R8	65
R9	11
R10	77
R11	82
R12	63
R13	85
R14	98

Table 2: Test data per Goniophotometer Method

Spectral Power Distribution- Goniophotometer Method

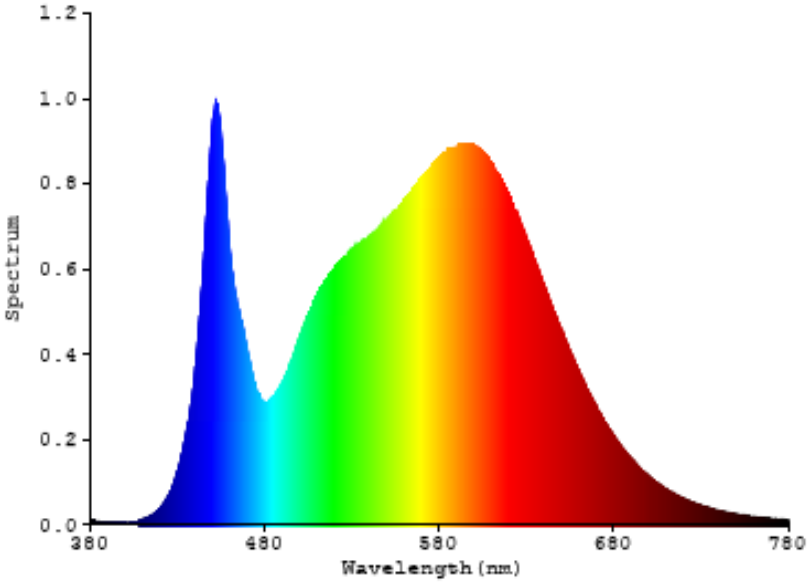


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	120.447	5.06%
10- 20	343.679	14.45%
20- 30	514.745	21.64%
30- 40	551.938	23.21%
40- 50	434.668	18.27%
50- 60	247.455	10.40%
60- 70	105.984	4.46%
70- 80	47.561	2.00%
80- 90	9.192	0.39%
90-100	0.046	0.00%
100-110	0.091	0.00%
110-120	0.173	0.01%
120-130	0.314	0.01%
130-140	0.501	0.02%
140-150	0.615	0.03%
150-160	0.571	0.02%
160-170	0.393	0.02%
170-180	0.141	0.01%
Total	2378.5	100%

γ(°)	Lumens	% Total
0- 60	2212.932	93.04%
60- 90	162.737	6.84%
0-90	2375.669	99.88%
90- 180	2.845	0.12%
0- 180	2378.5	100%

Table 3: Zonal Lumen Data

Illuminance Plots- Goniophotometer Method

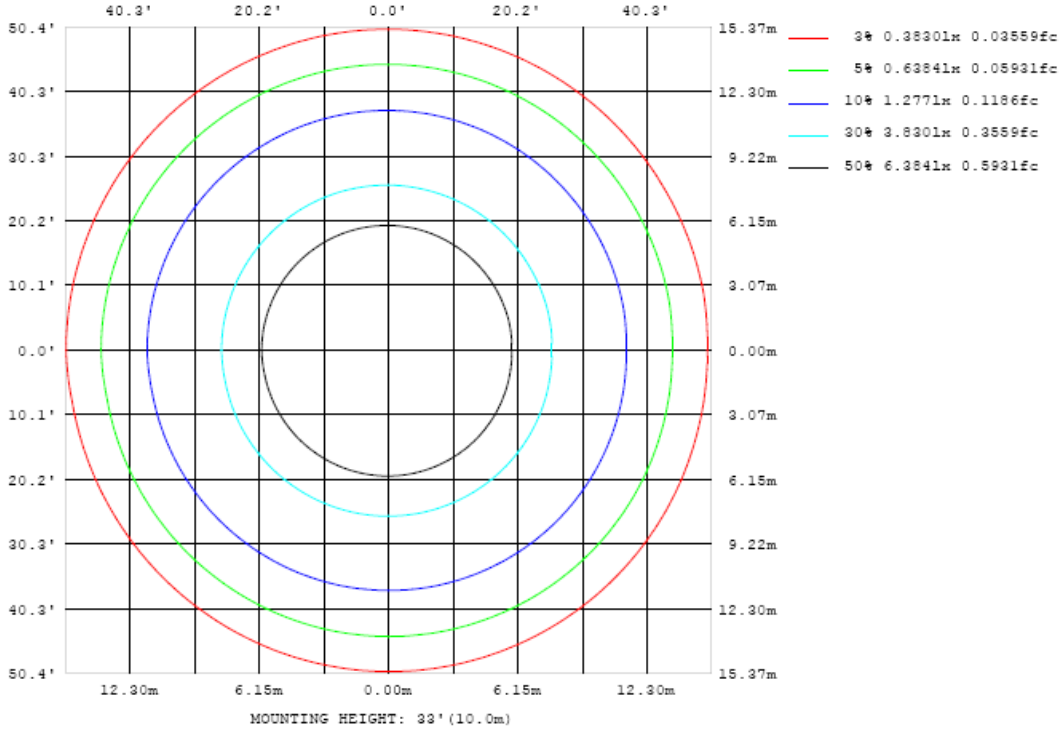


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

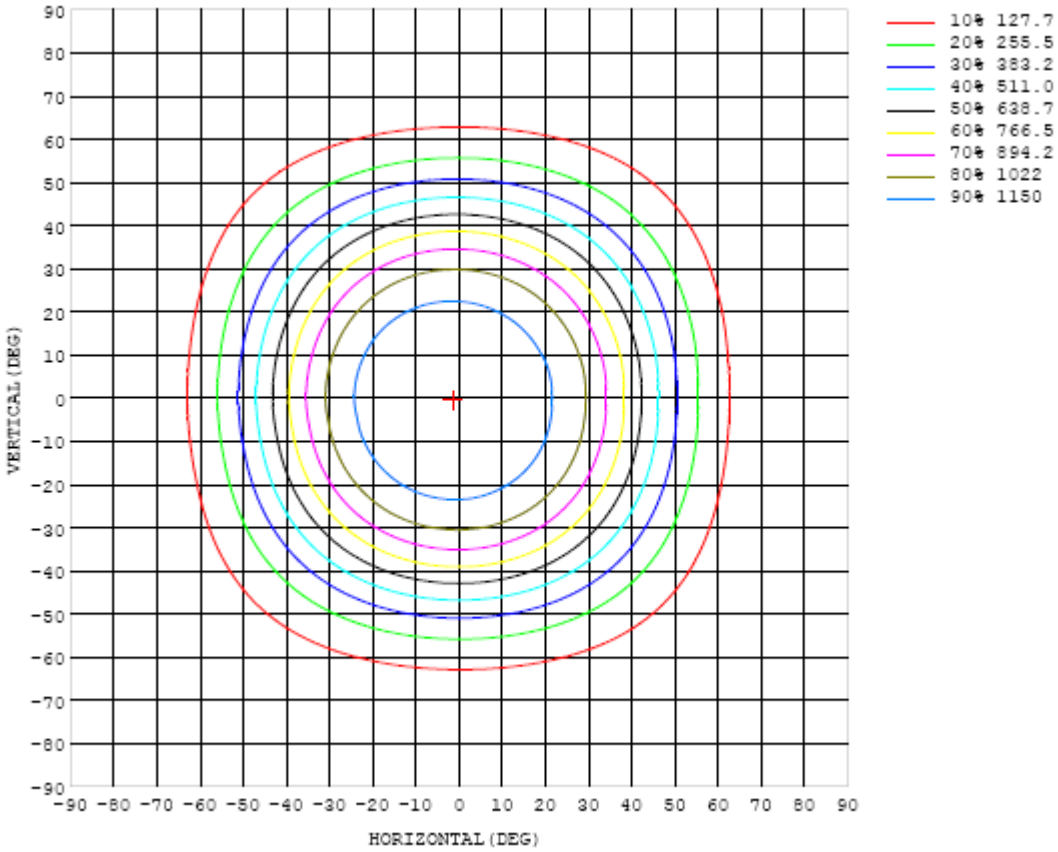


Chart 3: Isocandela Plot

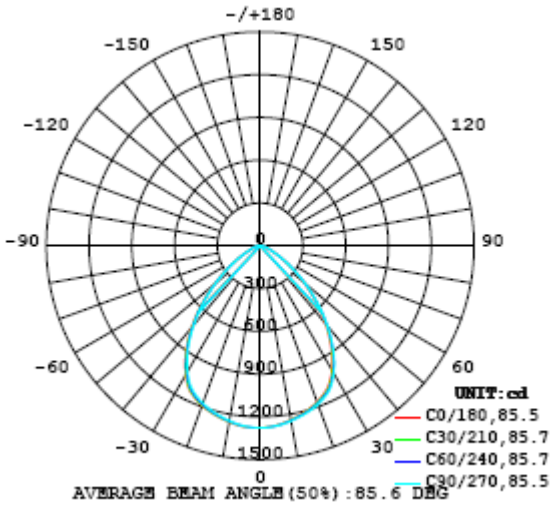


Chart 4: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277
5	1266	1265	1266	1266	1267	1267	1268	1269	1269	1270	1271	1271	1271	1272	1273	1273	1273	1274	1274
10	1240	1240	1241	1241	1243	1244	1245	1246	1248	1249	1250	1251	1252	1252	1253	1254	1254	1254	1255
15	1207	1208	1209	1211	1213	1214	1216	1217	1219	1221	1222	1223	1224	1225	1225	1227	1227	1227	1228
20	1165	1167	1168	1171	1174	1176	1178	1180	1182	1184	1185	1187	1188	1189	1189	1191	1191	1190	1193
25	1108	1110	1113	1117	1120	1123	1125	1128	1130	1132	1134	1135	1137	1137	1138	1139	1140	1139	1142
30	1006	1008	1012	1016	1020	1024	1027	1029	1032	1034	1035	1037	1038	1039	1040	1041	1042	1042	1048
35	867	870	875	879	883	887	890	892	895	896	897	898	899	900	901	902	902	903	911
40	710	713	717	722	726	729	731	733	735	736	736	737	738	738	739	739	741	741	750
45	549	552	556	560	563	565	567	568	569	569	569	569	569	569	570	571	571	572	582
50	396	399	403	405	408	410	410	411	411	411	411	410	410	410	410	410	410	411	421
55	265	267	270	272	273	275	275	275	275	275	275	274	273	272	272	272	273	274	281
60	165	166	168	169	170	171	171	171	171	171	170	170	169	169	168	168	168	169	176
65	99.8	100	101	102	102	102	103	103	103	102	102	102	101	100	100	99.8	99.8	100.0	104
70	67.3	67.5	67.7	67.6	67.5	67.4	67.2	66.9	66.7	66.3	66.0	65.7	65.3	65.1	65.0	65.1	65.6	65.5	67.2
75	45.0	44.9	44.8	44.7	44.6	44.4	44.3	44.1	43.8	43.6	43.4	43.1	42.9	42.7	42.7	42.8	43.0	43.2	44.7
80	24.0	23.9	23.8	23.7	23.6	23.5	23.4	23.3	23.2	23.1	23.0	22.8	22.6	22.5	22.4	22.5	22.6	22.8	24.1
85	7.01	6.94	6.86	7.01	6.97	6.94	6.88	6.59	6.54	6.46	6.33	6.18	6.06	6.08	5.89	5.86	5.89	5.96	6.74
90	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
95	0.03	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.05
100	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07
105	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.10
110	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.14
115	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.20
120	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.28
125	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.40
130	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.40	0.39	0.56
135	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.52	0.52	0.52	0.77
140	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.65	0.65	0.65	0.65	0.66	0.66	0.65	0.97
145	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.76	1.15
150	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.90	0.90	0.90	0.91	0.88	1.29
155	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.02	1.02	1.03	1.03	1.03	1.03	1.04	1.01	1.38
160	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.12	1.44
165	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.22	1.22	1.23	1.23	1.23	1.21	1.45
170	1.31	1.31	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.31	1.31	1.31	1.32	1.32	1.32	1.33	1.33	1.31	1.42
175	1.43	1.43	1.42	1.41	1.41	1.41	1.41	1.41	1.42	1.43	1.44	1.45	1.46	1.47	1.48	1.48	1.49	1.50	1.49
180	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57

Table 4: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277		
5	1273	1273	1272	1272	1271	1270	1270	1269	1269	1268	1267	1267	1266	1266	1266	1266	1267		
10	1254	1254	1253	1252	1251	1249	1248	1247	1245	1244	1243	1242	1241	1241	1240	1241	1241		
15	1228	1226	1226	1224	1223	1221	1219	1217	1215	1213	1211	1210	1209	1208	1207	1209	1208		
20	1192	1190	1189	1188	1185	1183	1180	1178	1175	1172	1170	1168	1167	1166	1165	1166	1166		
25	1141	1139	1138	1135	1132	1129	1125	1122	1119	1116	1113	1111	1109	1108	1108	1109	1109		
30	1046	1043	1040	1037	1033	1029	1026	1022	1018	1015	1012	1009	1007	1006	1006	1008	1009		
35	908	905	903	899	896	892	889	885	882	878	874	872	870	869	869	871	872		
40	748	745	742	740	737	734	730	727	724	721	718	716	714	713	712	714	715		
45	580	577	575	573	570	568	566	563	561	558	556	554	552	552	552	553	554		
50	419	417	416	414	412	411	409	408	406	405	403	401	400	399	399	400	401		
55	280	278	278	277	275	274	274	273	272	271	270	269	268	268	268	269	270		
60	175	174	173	172	172	172	172	171	171	170	170	169	169	169	169	170	170		
65	103	103	103	103	103	103	103	103	103	103	103	103	103	102	103	103	103		
70	67.3	67.2	67.4	67.6	67.7	68.0	68.3	68.6	68.8	69.0	69.1	69.0	68.9	68.7	68.5	68.5	68.3		
75	44.7	44.8	44.9	45.0	45.2	45.4	45.7	46.0	46.3	46.5	46.7	46.8	46.8	46.7	46.6	46.4	46.2		
80	24.1	24.2	24.2	24.3	24.4	24.5	24.7	24.9	25.0	25.3	25.5	25.6	25.7	25.7	25.6	25.5	25.2		
85	6.68	6.66	6.66	6.69	6.75	6.86	6.92	7.06	7.17	7.32	7.46	7.59	7.75	7.82	7.87	7.83	7.71		
90	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
95	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
100	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07		
105	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
110	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14		
115	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20		
120	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.27		
125	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.38		
130	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.56	0.54		
135	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.79	0.79	0.78	0.78	0.78	0.77	0.77	0.74		
140	1.02	1.02	1.02	1.03	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.00	1.00	0.99	0.99	0.99	0.95		
145	1.23	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.20	1.20	1.19	1.19	1.20	1.15		
150	1.38	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.35	1.35	1.36	1.30		
155	1.49	1.48	1.48	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.47	1.48	1.40		
160	1.59	1.56	1.56	1.56	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.54	1.54	1.55	1.56	1.47		
165	1.62	1.59	1.59	1.59	1.58	1.58	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.58	1.48		
170	1.61	1.59	1.59	1.58	1.58	1.57	1.57	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.57	1.57	1.46		
175	1.56	1.59	1.59	1.58	1.58	1.57	1.57	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.56	1.52	1.44		
180	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 02, 2019	Aug. 01, 2020
Digital Power Meter	PF2010A	HZTE028-01	Aug. 02, 2019	Aug. 01, 2020
AC Power Supply	DPS1060	HZTE001-06	Aug. 02, 2019	Aug. 01, 2020
DC Power Supply	WY12010	HZTE004-03	Aug. 02, 2019	Aug. 01, 2020
Standard Source	D908	HZTE012-01	Aug. 02, 2019	Aug. 01, 2020
Standard source	SCL-1400	HZTE012-02	Aug. 02, 2019	Aug. 01, 2020
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 02, 2019	Aug. 01, 2020
Temperature recorder	JM624U	HZTE018-08	Aug. 02, 2019	Aug. 01, 2020

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

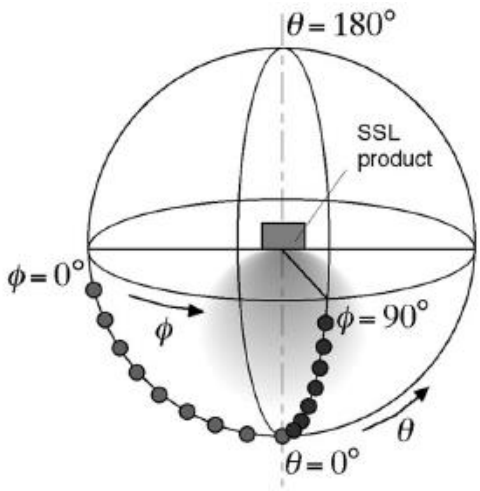
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured 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 lamps) 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 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.

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°/180° and C=90°/270°) 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, Δu'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 ***