LM-79-08 TEST REPORT

for

GREEN CREATIVE LTD

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

LED Downlight

Model: 35128

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ20010008a

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: **35128**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
80.5	1524.9	18.94	0.9925

CCT (K)	CRI	Stabilization Time (Light & Power)
3067	83.4	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	: 35128
Electrical Ratings	: 120-277V, 50/60Hz, 18W
Product Description	: 18CDL6DIM/830/277V
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.0 ℃.

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)	0.159	0.075
Power Factor	0.9925	0.9169
Test Power (W)	18.94	19.00
THD A%	9.91	10.32
Luminous Efficacy (lm/W)	80.5	80.1
Total Luminous Flux (lm)	1524.9	1522.4
Color Rendering Index (CRI)	83.4	
R9	10	
Correlated Color Temperature (CCT) (K)	3067	
Chromaticity (Chroma x, Chroma y)	(0.4318, 0.4015)	
Chromaticity (Chroma u, Chroma v)	(0.2484, 0.3464)	
Chromaticity (Chroma u', Chroma v')	(0.2484, 0.5196)	
Duv	-0.0003	
Average Beam Angle (°)	83.5	
Center Beam Candle Power (cd)	819	
Spacing Criteria	1.16 (0 °-180 °)/ 1.17(90 °-270 °)	
Zonal Lumens in the 0 °-60 °Zone	91.47%	
Zonal Lumens in the 60 °-90 °Zone	8.40%	
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	91
R3	97
R4	82
R5	82
R6	89
R7	84
R8	61
R9	10
R10	80
R11	81
R12	72
R13	84
R14	99

Table 2: Test data per Goniophotometer Method

Spectral Power Distribution- Goniophotometer Method

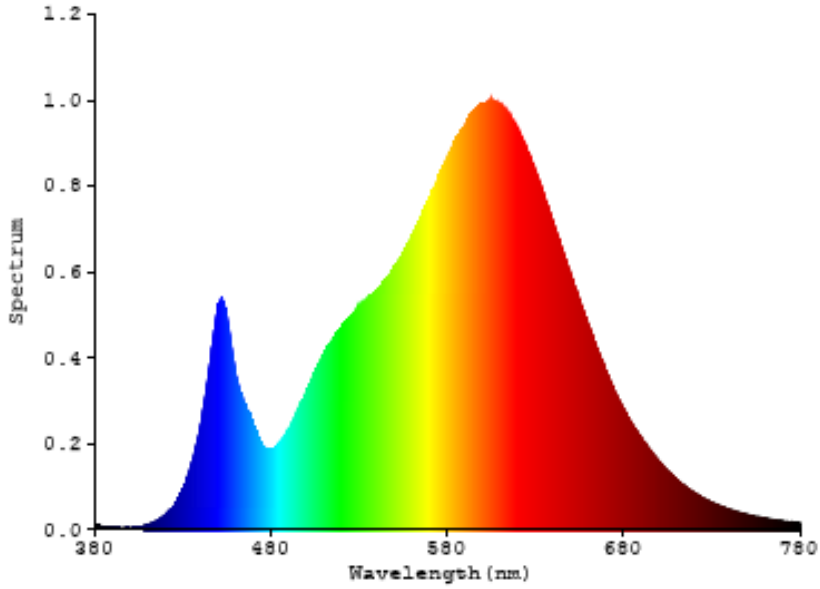


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	77.301	5.07%
10- 20	222.469	14.59%
20- 30	327.399	21.47%
30- 40	339.853	22.29%
40- 50	266.627	17.48%
50- 60	161.293	10.58%
60- 70	80.239	5.26%
70- 80	38.95	2.55%
80- 90	8.981	0.59%
90-100	0.029	0.00%
100-110	0.058	0.00%
110-120	0.109	0.01%
120-130	0.197	0.01%
130-140	0.318	0.02%
140-150	0.395	0.03%
150-160	0.373	0.02%
160-170	0.26	0.02%
170-180	0.093	0.01%
Total	1524.9	100%

γ(°)	Lumens	% Total
0- 60	1394.942	91.47%
60- 90	128.17	8.40%
0-90	1523.112	99.88%
90- 180	1.832	0.12%
0- 180	1524.9	100%

Table 3: Zonal Lumen Data

Illuminance Plots- Goniophotometer Method

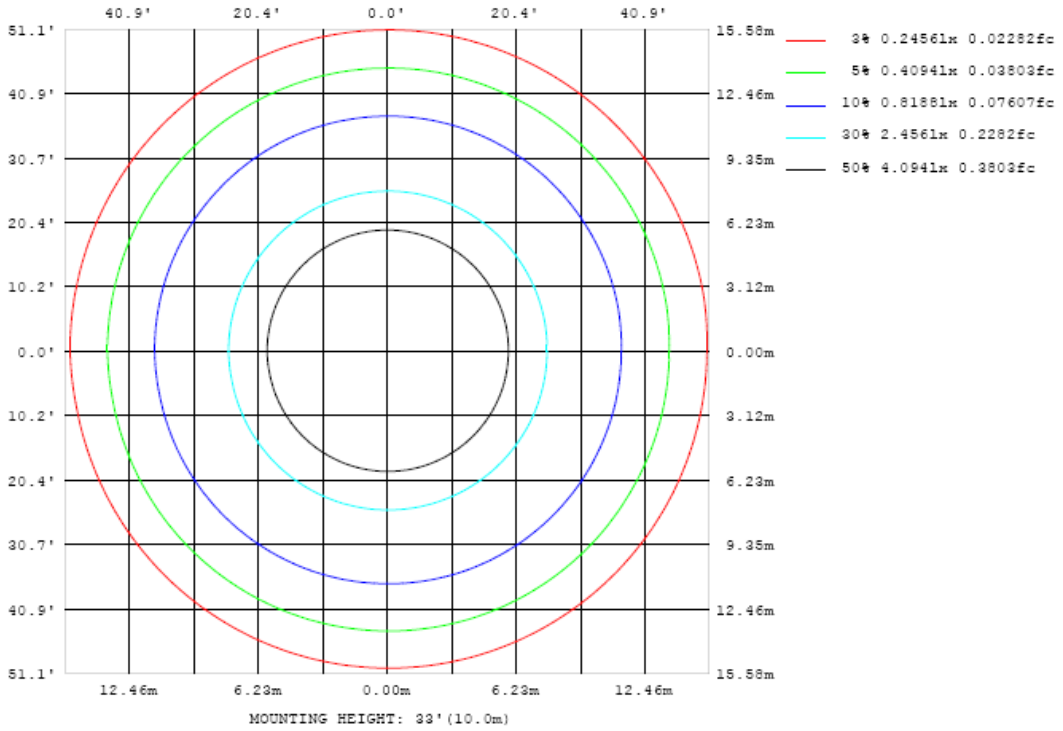


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

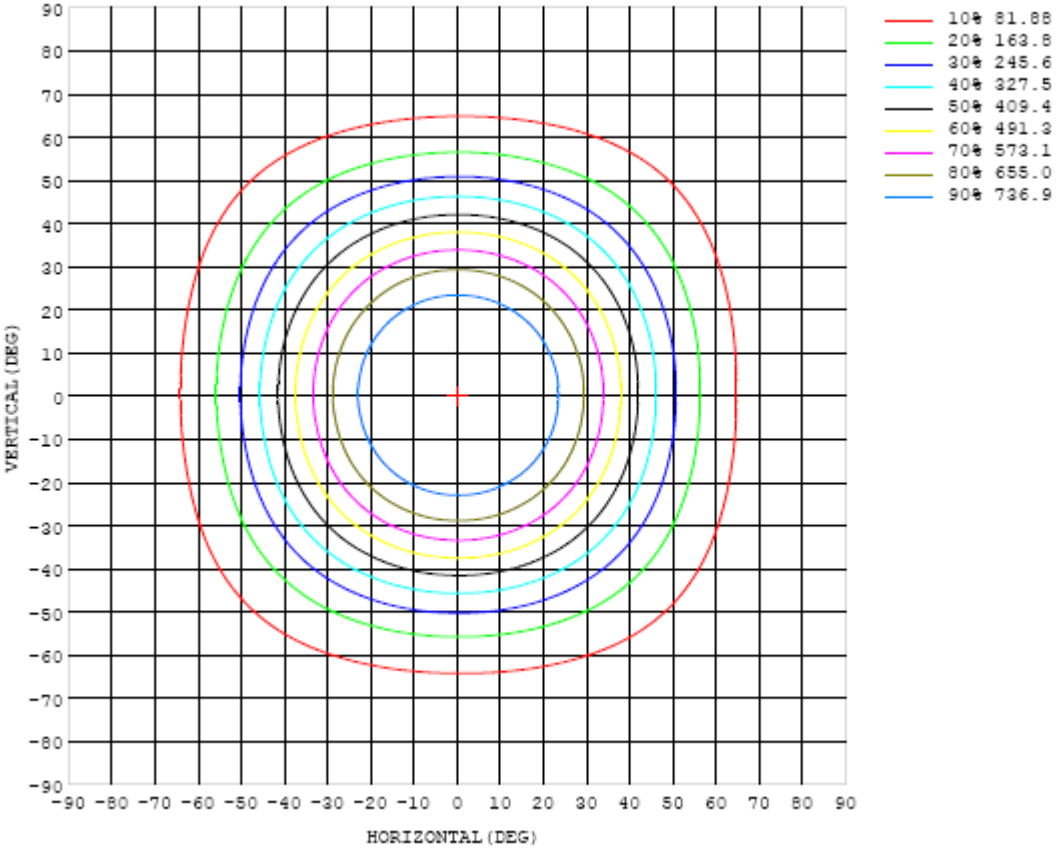


Chart 3: Isocandela Plot

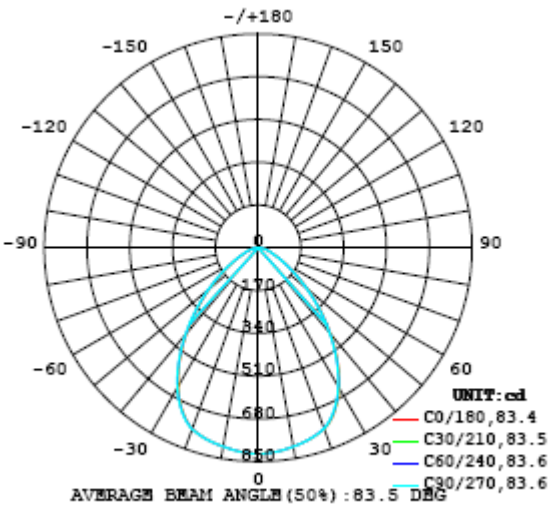


Chart 4: Polar Candela Distribution

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	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819
5	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	813	814	814
10	802	802	802	802	802	802	802	803	802	802	802	802	802	802	802	802	802	802	802
15	788	788	788	788	788	787	787	788	788	788	788	788	788	788	788	788	788	788	788
20	766	766	766	765	765	765	764	765	764	764	764	764	764	764	764	764	764	764	765
25	718	718	718	717	716	715	714	714	713	712	712	711	711	711	711	711	711	711	713
30	644	643	642	641	640	639	638	637	636	635	635	634	634	634	634	633	633	634	636
35	550	549	548	548	546	545	544	544	543	542	541	540	539	539	539	538	538	539	542
40	448	447	446	445	444	443	443	442	441	440	439	438	438	437	437	437	437	438	441
45	348	347	346	345	345	344	343	342	341	341	340	339	338	338	338	338	338	338	342
50	257	256	255	254	254	253	252	251	250	250	249	249	248	248	248	247	247	248	251
55	180	180	179	178	177	176	176	175	174	174	173	173	173	172	172	172	172	172	175
60	121	121	120	120	119	119	118	118	117	117	116	116	115	115	115	115	114	115	117
65	80.0	79.8	79.4	79.1	78.7	78.3	77.9	77.5	76.9	76.4	75.8	75.4	75.3	75.4	75.3	75.1	75.2	75.3	76.4
70	55.1	55.0	54.8	54.7	54.5	54.4	54.3	54.2	54.0	53.8	53.5	53.3	53.1	52.9	52.8	52.7	52.6	52.6	53.0
75	38.4	38.3	38.1	38.0	37.8	37.6	37.4	37.2	36.9	36.5	36.2	35.9	35.5	35.2	35.0	34.7	34.5	34.5	34.9
80	22.3	22.2	22.1	21.9	21.8	21.6	21.3	21.0	20.7	20.4	20.0	19.7	19.4	19.1	18.9	18.7	18.5	18.5	18.8
85	8.67	8.62	8.50	8.38	8.23	8.05	7.86	7.62	7.41	7.18	6.94	6.69	6.52	6.34	6.18	6.05	5.97	5.91	6.09
90	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
95	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03
100	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
105	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.05	0.05	0.04	0.04	0.05	0.05	0.06
110	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.09
115	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	0.10	0.10	0.09	0.10	0.10	0.13
120	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.13	0.14	0.14	0.18
125	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.25
130	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.25	0.26	0.26	0.36
135	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.50
140	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.42	0.42	0.43	0.42	0.64
145	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.51	0.50	0.51	0.51	0.51	0.51	0.50	0.77
150	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.87
155	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.94
160	0.75	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.75	1.00
165	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.82	0.82	0.81	1.03
170	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	0.87	0.87	0.86	0.87	0.86	1.02
175	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.96	0.96	0.96	0.96	0.96	0.97	0.97	0.97	0.97	1.01
180	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03

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	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819	819
5	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814
10	802	802	802	802	802	802	802	802	802	802	802	802	802	802	802	802	802
15	788	788	789	788	789	789	789	789	789	789	788	788	788	788	788	788	788
20	765	766	766	766	767	767	768	768	767	767	767	767	767	766	767	766	766
25	714	714	715	715	716	717	718	719	719	719	719	719	720	720	720	720	720
30	637	638	639	640	641	642	643	644	644	645	645	645	645	645	646	646	646
35	543	544	545	546	548	549	551	551	552	552	553	553	553	553	553	553	553
40	442	444	445	445	447	448	450	451	451	452	452	453	453	453	452	452	452
45	343	344	345	346	348	349	350	351	352	353	353	353	353	353	353	352	352
50	252	253	254	255	257	258	259	260	261	261	261	262	262	261	261	261	260
55	176	176	177	179	180	181	182	183	184	184	184	184	184	184	184	184	183
60	117	118	119	120	121	122	123	123	124	124	124	124	124	125	124	124	124
65	76.5	76.9	77.3	77.9	78.5	79.2	80.0	80.6	81.0	81.4	81.7	81.9	81.9	82.1	82.1	82.0	81.8
70	52.9	53.0	53.1	53.3	53.7	54.0	54.5	54.8	55.1	55.3	55.5	55.7	55.8	55.8	55.8	55.7	55.6
75	34.8	34.8	34.9	35.1	35.4	35.8	36.2	36.5	37.1	37.5	37.8	38.2	38.4	38.6	38.7	38.8	38.8
80	18.8	18.9	18.9	19.1	19.4	19.7	20.0	20.4	20.8	21.2	21.5	21.8	22.1	22.3	22.5	22.6	22.7
85	6.11	6.16	6.23	6.37	6.55	6.77	7.03	7.29	7.55	7.82	8.08	8.30	8.50	8.67	8.79	8.89	8.93
90	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.06	0.07	0.08
95	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
100	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
105	0.07	0.07	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
110	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	0.09	0.09
115	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
120	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
125	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
130	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
135	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48
140	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.62
145	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.76	0.76	0.76
150	0.88	0.88	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
155	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94
160	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.00
165	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.04	1.03	1.04	1.03
170	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.05	1.03
175	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.02
180	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03

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

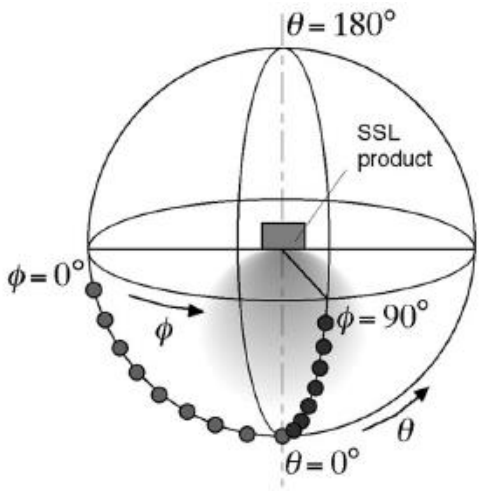
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured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