

LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

4" new construction Downlight

Model: 10NCDRL4DIM/927/EXT

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18030026a

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

Review by:



Engineer: April Zou
Mar. 21, 2018

Approved by



Manager: Jim Zhang
Mar. 21, 2018

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: 10NCDRL4DIM/927/EXT

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
71.4	720.0	10.09	0.9710
CCT (K)	CRI	Stabilization Time (Light & Power)	
2718	92.6	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	: Mar. 15, 2018
Date of Test	: Mar. 21, 2018
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

TABLE OF CONTENT

LM-79-08 Test Report.....	1
Sample Photos.....	4
TEST RESULTS	5
Spectral Power Distribution	6
Zonal Lumen Tabulation.....	7
Luminous Intensity Distribution Plots.....	9
Luminous Intensity Data	10
EQUIPMENT LIST	12
TEST METHODS	12
Seasoning of SSL Product.....	12
Goniophotometer Method	12
Photometric and Electrical Measurements.....	12
Color Characteristics Measurements.....	13
Color Spatial Uniformity	13

Sample Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: 4" new construction Downlight
Model	: 10NCDRL4DIM/927/EXT
Electrical Ratings	: 120V, 60Hz
Product Description	: 2700K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

TEST RESULTS

Test ambient temperature was 25.1 °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 2.47 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.087
Power Factor	0.9710
Test Power (W)	10.09
THD A%	15.83
Luminous Efficacy (lm/W)	71.4
Total Luminous Flux (lm)	720.0
Color Rendering Index (CRI)	92.6
R9	61
Correlated Color Temperature (CCT) (K)	2718
Chromaticity (Chroma x, Chroma y)	(0.4550, 0.4041)
Chromaticity (Chroma u, Chroma v)	(0.2623, 0.3494)
Chromaticity (Chroma u', Chroma v')	(0.2623, 0.5241)
Duv	0.0020
Average Beam Angle (°)	114.4
Center Beam Candle Power (cd)	248
Spacing Criteria	1.27 (0°-180°)/ 1.28 (90°-270°)
Zonal Lumens in the 0°-60°Zone	78.61%
Zonal Lumens in the 60°-90°Zone	21.27%
Zonal Lumens in the 90°-120°Zone	0.03%
Zonal Lumens in the 120°-180°Zone	0.09%

Special Rendering Indices	Color
R1	95
R2	99
R3	95
R4	92
R5	95
R6	95
R7	89
R8	80
R9	61
R10	99
R11	94
R12	84
R13	97
R14	98
Rf	89
Rg	97

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

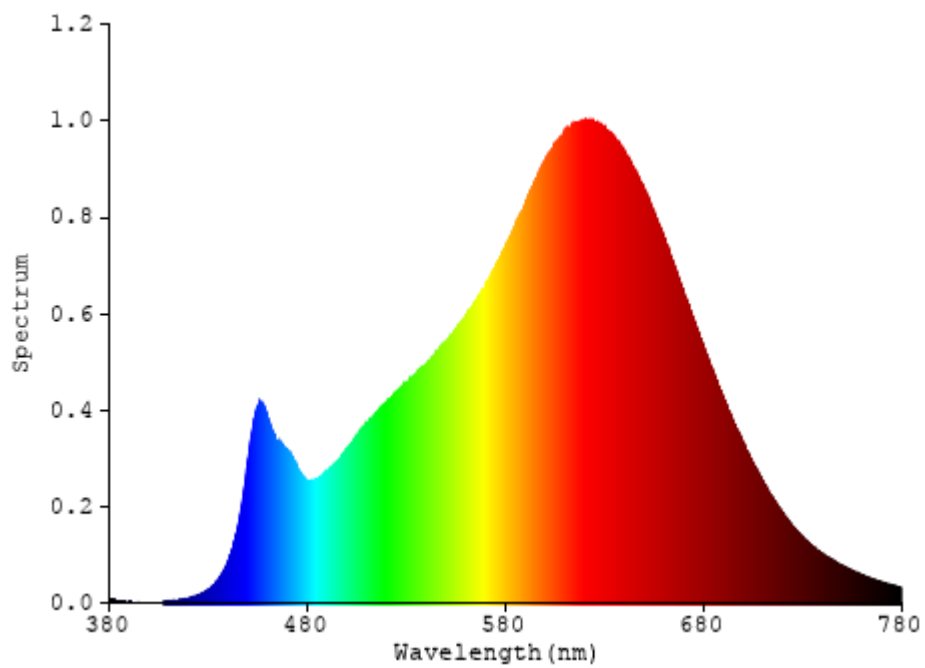


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	23.512	3.27%
10- 20	67.428	9.36%
20- 30	102.467	14.23%
30- 40	124.128	17.24%
40- 50	129.762	18.02%
50- 60	118.727	16.49%
60- 70	91.13	12.66%
70- 80	50.526	7.02%
80- 90	11.524	1.60%
90-100	0.058	0.01%
100-110	0.066	0.01%
110-120	0.091	0.01%
120-130	0.117	0.02%
130-140	0.14	0.02%
140-150	0.144	0.02%
150-160	0.119	0.02%
160-170	0.078	0.01%
170-180	0.027	0.00%
Total	720.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	566.024	78.61%
60- 90	153.18	21.27%
0-90	719.204	99.88%
90- 180	0.84	0.12%
0- 180	720.0	100%

Table 3: Zonal Lumen Data

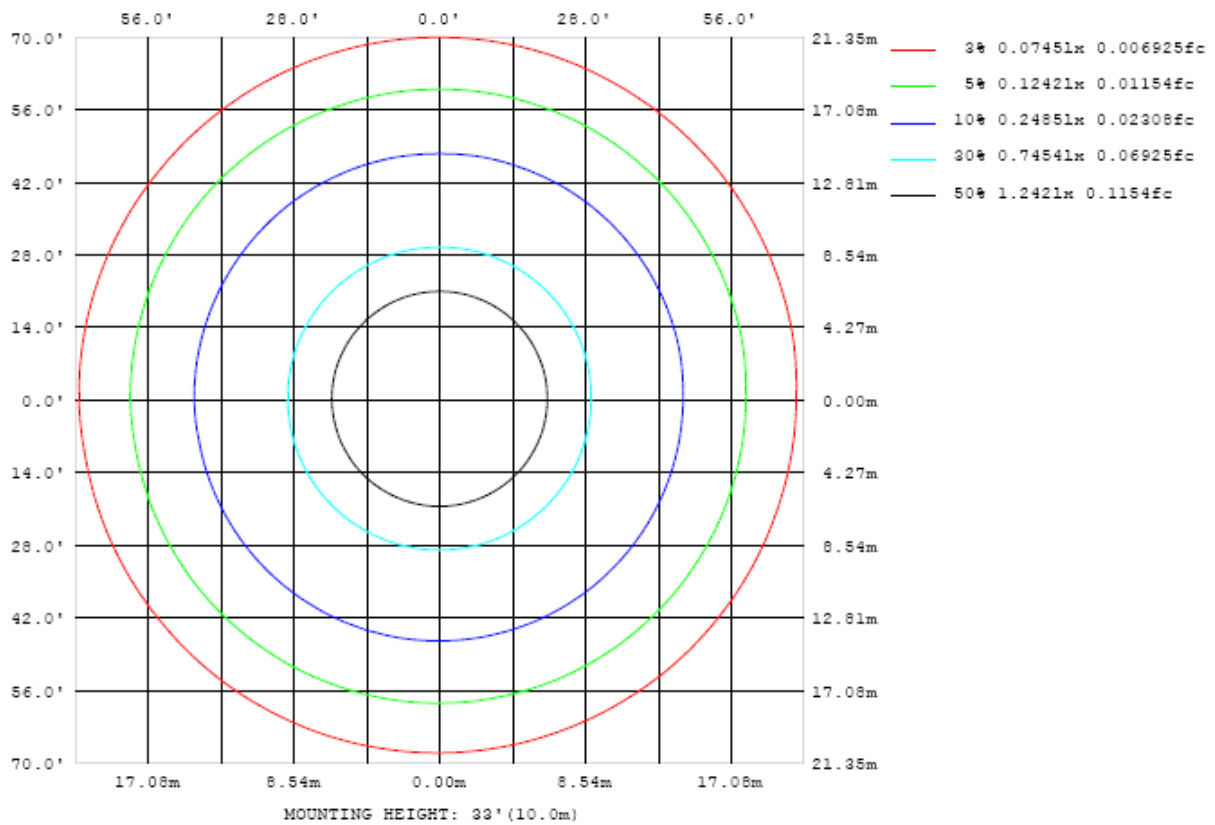


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

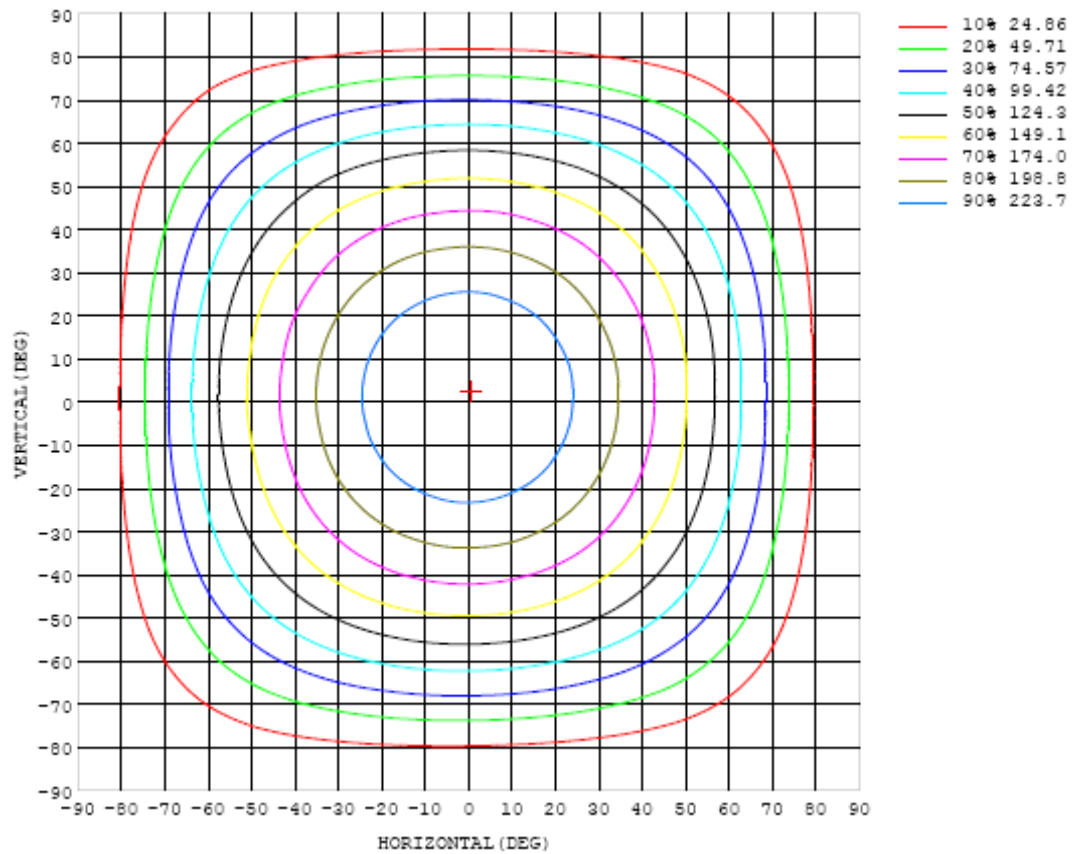


Chart 3: Isocandela Plot

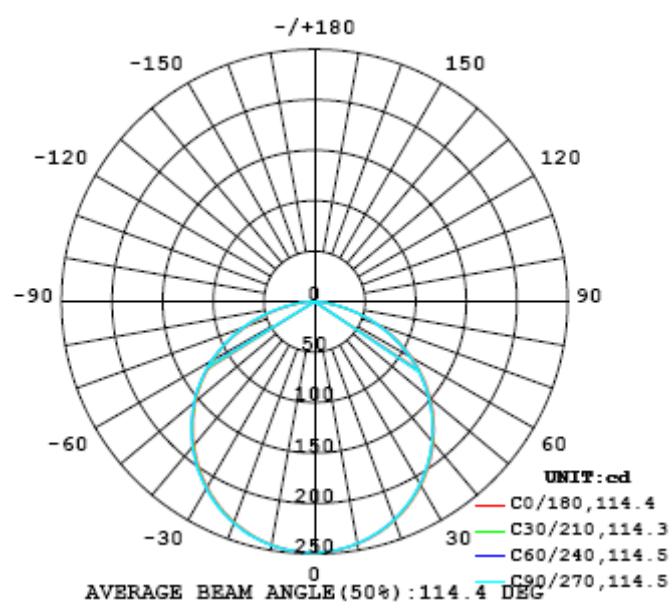


Chart 4: Polar Candela Distribution

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	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248
5	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	248
10	244	244	244	243	243	243	243	243	243	243	243	243	243	244	244	244	244	244	244
15	239	238	238	238	238	238	237	237	237	237	238	238	238	238	238	238	239	239	239
20	231	231	230	230	230	230	230	229	230	230	230	230	230	230	231	231	231	232	232
25	222	221	221	220	220	220	220	220	220	220	220	220	220	221	221	222	222	222	223
30	210	210	209	209	209	209	208	208	208	209	209	209	209	210	210	210	211	211	212
35	197	197	196	196	196	195	195	195	195	195	196	196	196	196	197	197	198	198	199
40	183	182	182	181	181	181	180	180	180	181	181	181	181	182	183	183	184	184	185
45	167	166	166	165	165	165	164	164	164	164	165	165	166	166	167	167	168	168	170
50	150	149	148	148	147	147	147	147	147	147	147	148	148	149	149	150	151	151	153
55	131	130	130	129	129	128	128	128	128	128	129	129	130	130	131	132	132	133	135
60	111	110	110	109	109	109	108	108	108	109	109	109	110	110	111	112	113	113	115
65	90.1	89.5	88.4	87.9	87.8	87.3	87.1	87.3	87.4	87.7	88.1	88.7	89.4	89.8	90.4	91.2	92.0	92.8	94.6
70	66.7	66.3	65.6	65.8	65.7	65.5	65.3	65.4	65.6	65.9	66.9	66.8	67.7	68.3	68.7	69.4	69.7	69.5	71.3
75	44.0	43.2	42.8	43.0	43.8	43.6	43.4	43.4	43.8	44.2	44.7	45.3	45.9	46.5	47.3	47.1	46.5	46.9	48.4
80	22.8	21.8	21.5	22.4	22.7	22.6	22.6	22.7	23.0	23.5	24.0	24.8	25.2	26.1	26.4	26.1	25.5	25.7	26.7
85	7.19	6.67	6.35	6.16	6.04	5.92	5.90	6.02	6.26	6.62	6.98	7.49	8.04	8.57	9.06	9.39	9.61	9.87	10.6
90	0.11	0.13	0.13	0.12	0.11	0.11	0.10	0.10	0.10	0.07	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.06
95	0.08	0.08	0.08	0.09	0.09	0.08	0.07	0.05	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
100	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.05	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.05
105	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.07
110	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
115	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.09	0.09	0.09	0.09	0.10
120	0.13	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.11	0.11	0.11	0.12
125	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.13	0.14
130	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.15	0.17
135	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.17	0.20
140	0.19	0.19	0.19	0.19	0.19	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.23
145	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.20	0.26
150	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.21	0.20	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.28
155	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.21	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.29
160	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.24	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.29
165	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.29
170	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.25	0.25	0.26	0.26	0.26	0.26	0.28
175	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.28
180	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27

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	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248		
5	248	248	248	248	248	248	248	248	248	248	248	248	248	248	247	247	247		
10	245	245	245	245	245	245	245	245	245	245	245	245	245	245	245	244	244		
15	240	240	240	240	240	240	240	240	240	241	240	240	240	240	240	239	239		
20	232	233	233	233	233	233	234	234	233	234	233	233	233	232	232	232	232		
25	223	224	224	224	225	225	225	225	225	225	224	224	224	223	223	223	222		
30	212	213	213	213	214	214	214	214	214	214	214	214	213	213	212	212	211		
35	200	200	201	201	201	202	202	202	202	201	201	201	200	200	199	199	198		
40	186	186	187	187	187	187	188	188	188	188	187	187	186	186	185	184	184		
45	170	171	171	172	172	172	172	172	172	172	172	171	170	170	169	169	168		
50	153	154	155	155	155	155	156	155	155	155	155	155	154	153	153	152	152		
55	136	136	136	137	138	138	138	138	137	138	137	136	136	135	134	134	133		
60	116	116	117	118	118	118	118	118	118	117	117	117	116	115	114	114	113		
65	95.2	95.5	95.9	96.2	96.7	97.1	97.2	97.1	97.1	96.7	96.4	95.5	95.3	94.5	93.8	93.0	92.2		
70	72.1	73.6	74.2	74.4	74.9	74.9	75.0	75.1	75.2	74.5	74.4	73.8	72.9	72.6	71.7	70.8	69.3		
75	48.7	49.6	50.9	52.2	52.5	52.8	52.9	52.6	52.9	52.4	52.1	51.6	50.8	50.3	48.9	46.7	45.5		
80	27.3	27.6	29.4	31.0	31.4	31.5	31.6	31.8	31.7	31.6	31.4	30.9	30.1	29.3	27.3	25.0	24.1		
85	11.0	11.7	12.5	13.3	13.7	14.0	14.1	14.1	13.9	13.6	13.3	12.7	12.1	11.4	10.3	9.18	8.28		
90	0.08	0.09	0.09	0.10	0.09	0.09	0.09	0.08	0.07	0.07	0.06	0.05	0.04	0.04	0.06	0.09	0.11		
95	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.06	0.07	0.08		
100	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.07	0.08		
105	0.08	0.06	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06	0.06	0.07	0.08		
110	0.09	0.08	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.09		
115	0.10	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	0.10	0.10		
120	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.11	0.10	0.11	0.10	0.11	0.11	0.11	0.12		
125	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14		
130	0.17	0.16	0.16	0.17	0.16	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17		
135	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20		
140	0.23	0.23	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24		
145	0.26	0.26	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.27		
150	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.30	0.30	0.30		
155	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.30	0.30	0.31	0.31	0.31		
160	0.30	0.29	0.30	0.30	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31		
165	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31		
170	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.30	0.31	0.31	0.31	0.30		
175	0.28	0.28	0.28	0.28	0.29	0.28	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.29		
180	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Standard Source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018

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 expanded uncertainty is 2.3% with a coverage factor k=2.

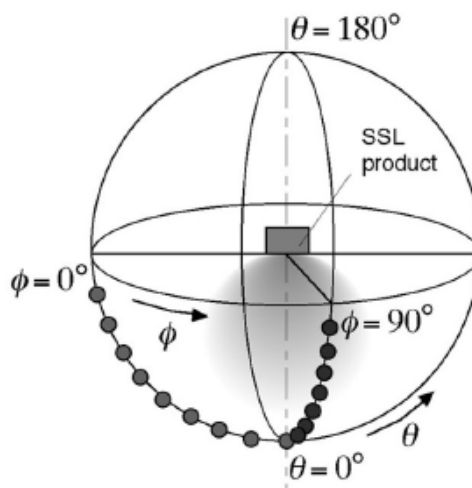
Color Characteristics Measurements

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 ($C=0^\circ/180^\circ$ 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.