



## LM-79-08 Test Report

for

### GREEN CREATIVE LTD

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

### LED HID

**Model: 37HID/840/277V/E26**

**37HID/840/277V/EX39**

### Laboratory: Leading Testing Laboratories

**NVLAP CODE: 200960-0**

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, Yuhang Dist,  
Hangzhou, Zhejiang Province, China 311100

Tel: +86 571 86376106

[www.ledtestlab.com](http://www.ledtestlab.com)

Report No.: HZ18030035e/R1

This report is replaced the old report No. HZ18030035e dated May 22, 2018

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

Review by:

Engineer: April Zou

Jul. 26, 2018

Approved by:



Manager: Jim Zhang

Jul. 26, 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: 37HID/840/277V/E26

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
146.5	5211.0	35.57	0.9921
CCT (K)	CRI	Stabilization Time (Light & Power)	
3996	83.2	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. 20, 2018

**Date of Test** : Mar. 22, 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
Test Summary.....	2
Sample Photos.....	4
TEST RESULTS .....	5
Goniophotometer Method .....	6
Spectral Power Distribution - Sphere Spectroradiometer Method .....	7
Chromaticity Diagram - Sphere Spectroradiometer Method.....	8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method .....	9
Zonal Lumen Tabulation- Goniophotometer Method .....	10
Luminous Intensity Distribution Plots- Goniophotometer Method.....	12
Luminous Intensity Data- Goniophotometer Method.....	13
EQUIPMENT LIST .....	15
TEST METHODS .....	15
Seasoning of SSL Product.....	15
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	15
Goniophotometer Method .....	16
Photometric and Electrical Measurements.....	16
Color Characteristics Measurements.....	16
Color Spatial Uniformity .....	16

## Sample Photos



E26



EX39

### Equipment Under Test (EUT)

<b>Name</b>	: LED HID
<b>Model</b>	: 37HID/840/277V/E26, 37HID/840/277V/EX39
<b>Electrical Ratings</b>	: 120-277V, 50/60HZ
<b>Product Description</b>	: 4000K
<b>Manufacturer</b>	: GREEN CREATIVE LTD
<b>Address</b>	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

Note: Model 37HID/840/277V/E26 and model 37HID/840/277V/EX39 are identical except their different screw base. Model 37HID/840/277V/E26 is E26 base. 37HID/840/277V/EX39 is EX39 base. Model 37HID/840/277V/E26 was chosen to be representative model in this report.

## TEST RESULTS

Test ambient temperature was 24.9°C.

Test orientation was light down. 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 65 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.299	0.141
Power Factor	0.9921	0.9091
Test Power (W)	35.57	35.58
THD A%	10.01	12.82
Luminous Efficacy (lm/W)	146.5	147.5
Total Luminous Flux (lm)	5211.0	5248.0
Color Rendering Index (CRI)	83.2	
R9	10.4	
Correlated Color Temperature (CCT)(K)	3996	
Chromaticity Chroma x	0.3797	
Chromaticity Chroma y	0.3738	
Chromaticity Chroma u	0.2258	
Chromaticity Chroma v	0.3334	
Duv	0.0012	
Chromaticity Chroma u'	0.2258	
Chromaticity Chroma v'	0.5002	

Special Color Rendering Indices	
R1	81.6
R2	89.3
R3	94.5
R4	82.2
R5	81.9
R6	85
R7	85.9
R8	65.2
R9	10.4
R10	74.4
R11	81.2
R12	64.6
R13	83.5
R14	97.1
Rf	82
Rg	96

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

## Goniophotometer Method

Test ambient temperature was 25.0°C.

The photometric distance is 2.47m.

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

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.297
Power Factor	0.9917
Test Power (W)	35.29
Luminous Efficacy (lm/W)	147.5
Total Luminous Flux (lm)	5203.4
Beam Angle (°)	314.0
Center Beam Candle Power (cd)	208
Spacing Criteria	2.69 (0°-180°)/ 2.73 (90°-270°)
Zonal Lumens in the 0°-60°Zone	24.54%
Zonal Lumens in the 60°-90°Zone	31.03%
Zonal Lumens in the 90°-120°Zone	29.35%
Zonal Lumens in the 120°-180°Zone	15.08%

Table 3: Test data per Goniophotometer Method

## Spectral Power Distribution - Sphere Spectroradiometer Method

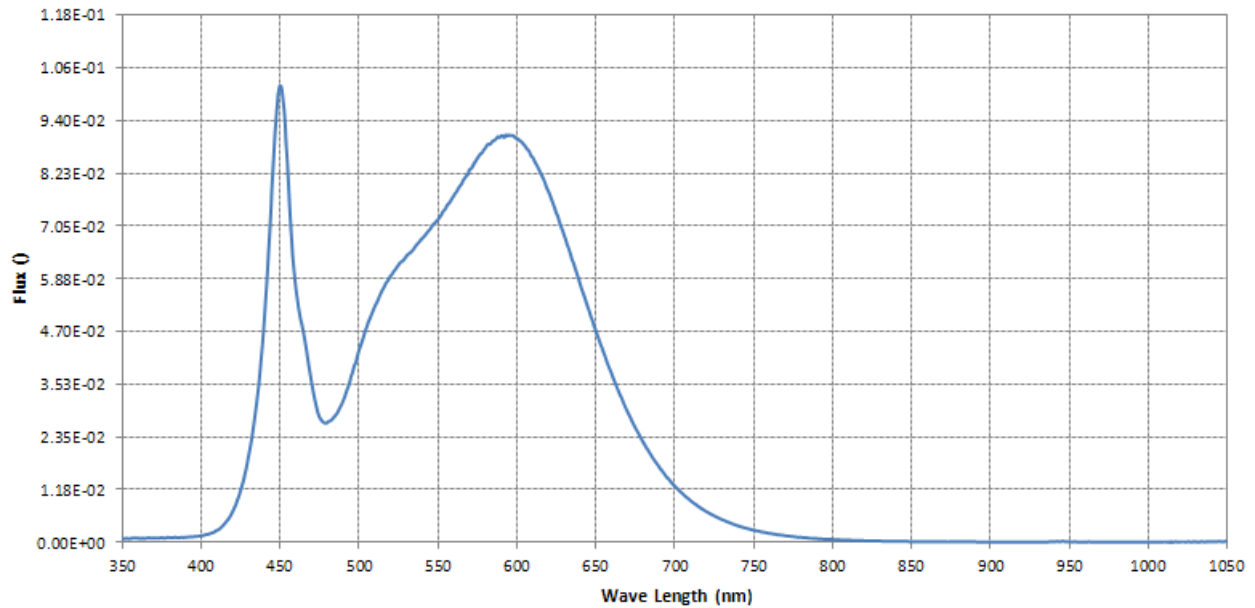


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.08E-03	485	2.82E-02	590	9.06E-02	695	1.45E-02
385	1.02E-03	490	3.15E-02	595	9.08E-02	700	1.26E-02
390	1.17E-03	495	3.69E-02	600	9.01E-02	705	1.09E-02
395	1.22E-03	500	4.27E-02	605	8.85E-02	710	9.30E-03
400	1.45E-03	505	4.80E-02	610	8.59E-02	715	8.03E-03
405	1.85E-03	510	5.25E-02	615	8.24E-02	720	6.89E-03
410	2.68E-03	515	5.63E-02	620	7.83E-02	725	5.93E-03
415	4.18E-03	520	5.93E-02	625	7.35E-02	730	5.08E-03
420	6.81E-03	525	6.17E-02	630	6.85E-02	735	4.36E-03
425	1.14E-02	530	6.37E-02	635	6.30E-02	740	3.70E-03
430	1.90E-02	535	6.55E-02	640	5.78E-02	745	3.20E-03
435	3.04E-02	540	6.77E-02	645	5.24E-02	750	2.75E-03
440	4.92E-02	545	6.97E-02	650	4.73E-02	755	2.35E-03
445	7.91E-02	550	7.19E-02	655	4.23E-02	760	2.03E-03
450	1.02E-01	555	7.44E-02	660	3.77E-02	765	1.72E-03
455	8.30E-02	560	7.72E-02	665	3.33E-02	770	1.48E-03
460	5.69E-02	565	7.99E-02	670	2.93E-02	775	1.29E-03
465	4.65E-02	570	8.30E-02	675	2.56E-02	780	1.11E-03
470	3.59E-02	575	8.56E-02	680	2.24E-02		
475	2.80E-02	580	8.78E-02	685	1.95E-02		
480	2.67E-02	585	8.95E-02	690	1.69E-02		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

## Chromaticity Diagram - Sphere Spectroradiometer Method

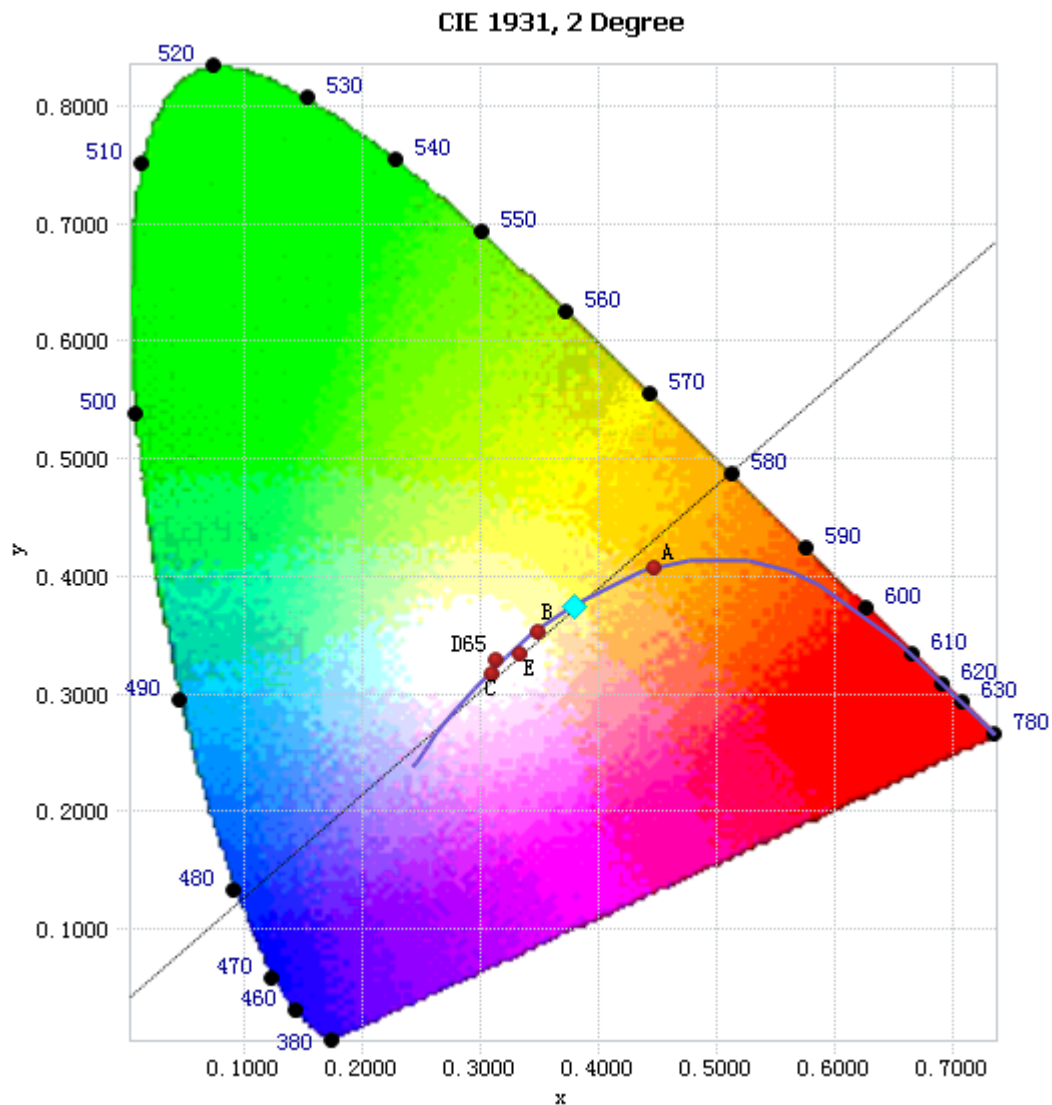


Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.



### Nominal CCT Quadrangles – Sphere Spectroradiometer Method

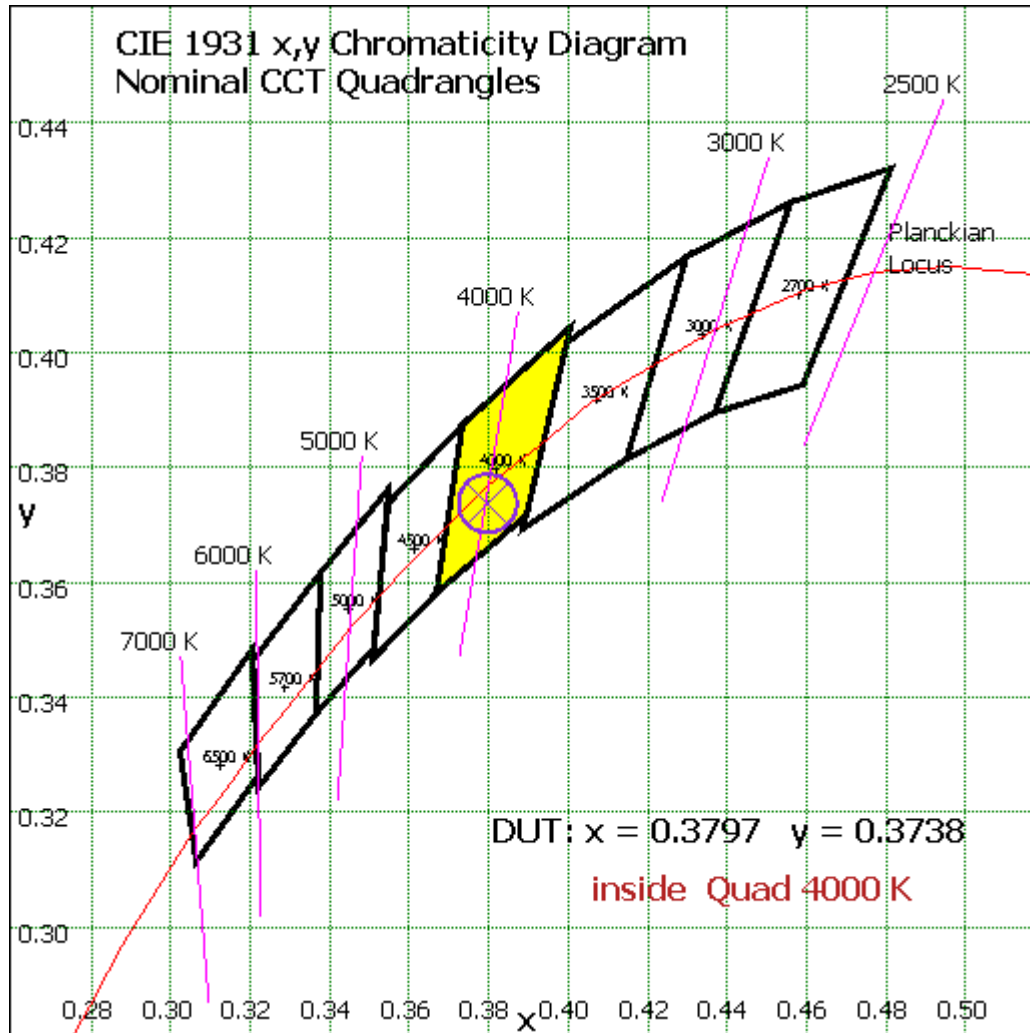


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

### Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	20.485	0.39%
10- 20	69.927	1.34%
20- 30	144.849	2.78%
30- 40	243.894	4.69%
40- 50	349.435	6.72%
50- 60	448.123	8.61%
60- 70	513.408	9.87%
70- 80	543.01	10.44%
80- 90	558.409	10.73%
90-100	555.374	10.67%
100-110	521.362	10.02%
110-120	450.335	8.65%
120-130	342.24	6.58%
130-140	231.879	4.46%
140-150	137.8	2.65%
150-160	58.662	1.13%
160-170	13.207	0.25%
170-180	1.047	0.02%
Total	5203.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1276.713	24.54%
60- 90	1614.827	31.03%
0-90	2891.54	55.57%
90- 180	2311.906	44.43%
0- 180	5203.4	100%

Table 4: Zonal Lumen Data

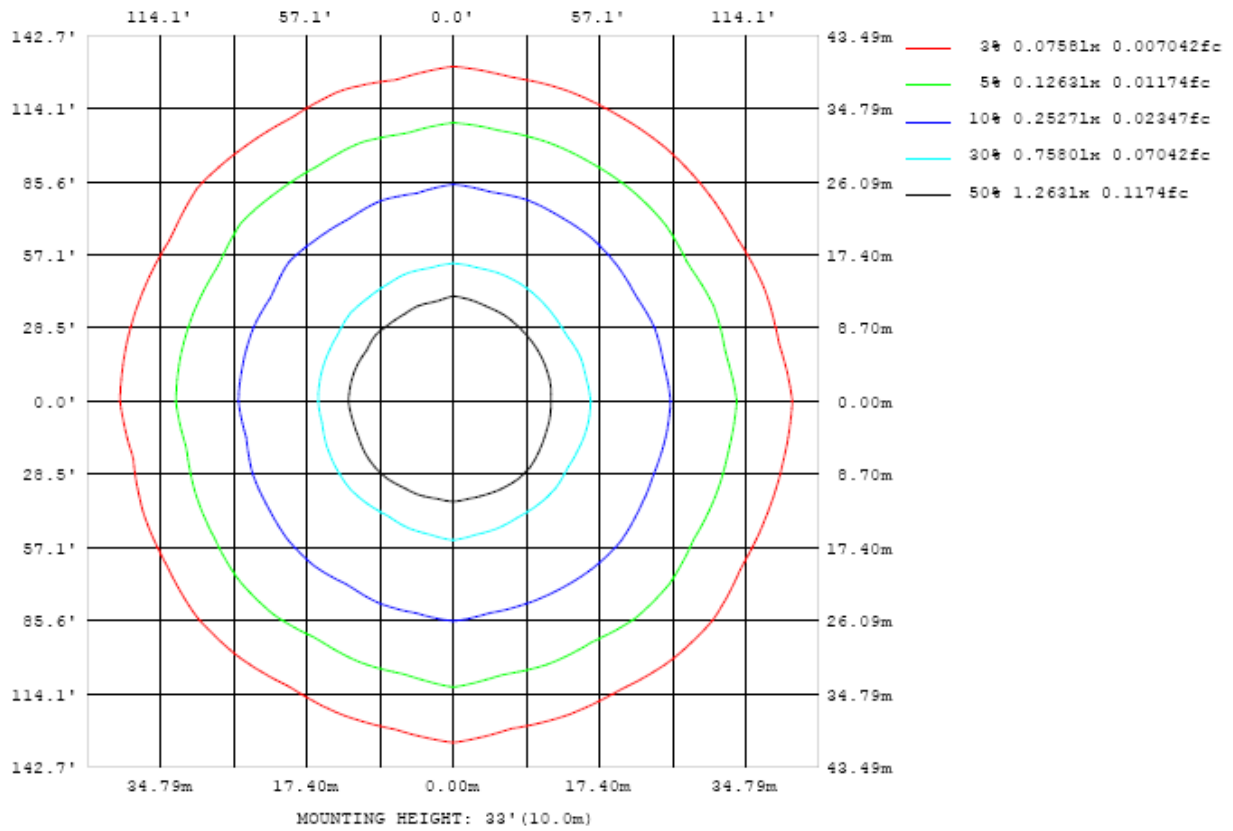


Chart 4: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

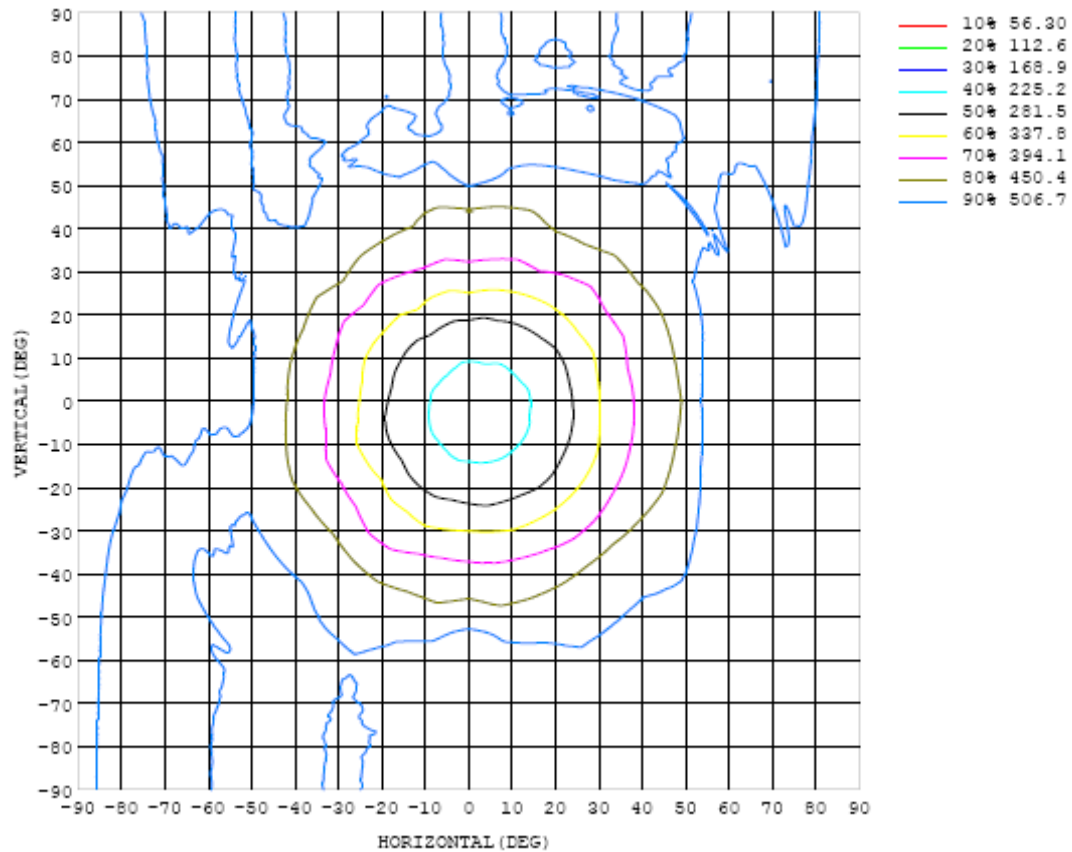


Chart 5: Isocandela Plot

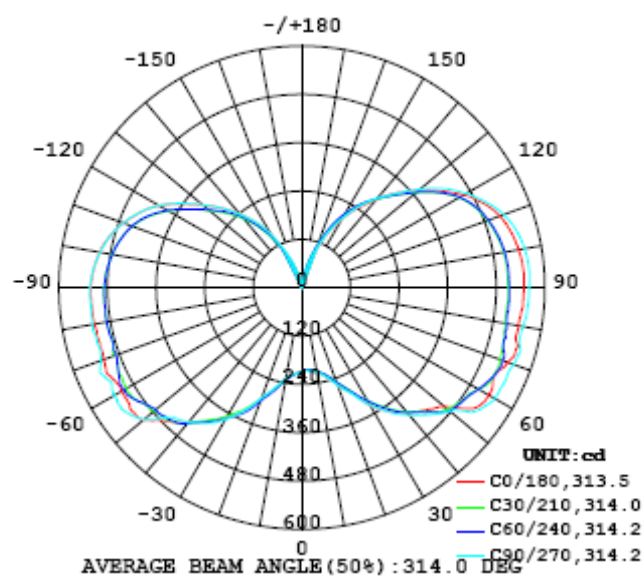


Chart 6: Polar Candela Distribution

## Luminous Intensity Data- Goniophotometer Method

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	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208
5	207	206	204	204	204	205	204	205	206	208	209	210	211	211	212	212	213	213	214
10	214	214	213	213	213	213	213	213	213	214	214	216	218	218	220	223	226	229	229
15	229	227	225	224	224	224	224	225	227	229	229	233	236	240	246	247	251	257	259
20	256	253	252	250	248	248	251	252	254	257	259	259	265	272	278	278	280	284	292
25	288	286	284	282	278	279	283	285	285	291	298	297	303	311	320	319	320	329	336
30	337	332	325	324	322	325	325	327	332	337	337	334	343	346	359	364	355	368	372
35	375	372	367	365	361	362	368	371	371	377	380	380	372	377	394	397	393	403	405
40	404	404	402	402	400	401	404	407	410	413	414	413	405	411	427	429	420	432	436
45	430	431	428	435	445	444	438	437	436	446	439	445	443	456	472	467	459	463	469
50	460	465	460	469	483	483	476	467	461	476	466	473	471	487	494	490	483	494	511
55	521	510	488	486	495	495	487	492	501	531	501	497	481	499	509	508	506	497	519
60	533	526	515	503	517	513	504	519	518	550	517	517	499	510	527	516	508	497	515
65	523	521	519	521	533	528	522	523	526	553	524	526	508	524	529	515	507	497	521
70	542	525	517	521	546	541	528	528	522	556	521	523	503	527	529	512	511	491	520
75	552	532	517	516	547	545	516	523	515	557	517	520	499	522	524	506	502	484	518
80	543	524	509	510	539	537	514	518	511	554	516	512	496	520	528	506	505	486	520
85	547	522	510	509	539	540	512	518	511	559	521	513	500	520	529	506	504	486	521
90	548	522	509	509	539	541	512	517	510	563	526	512	501	512	523	502	501	482	517
95	548	522	509	508	540	541	512	517	510	563	526	512	501	512	523	502	501	482	517
100	544	517	505	506	537	538	509	514	506	559	522	507	497	504	513	495	495	475	507
105	535	509	498	499	528	530	501	505	499	548	513	499	489	491	502	485	485	464	492
110	520	494	488	488	516	516	490	495	487	531	497	486	476	471	481	470	470	449	469
115	496	475	472	472	495	493	475	479	471	502	477	468	456	446	454	447	447	425	442
120	462	447	447	448	467	464	450	454	445	468	449	439	425	414	423	415	411	391	408
125	419	407	409	411	431	427	413	416	409	429	413	398	385	373	381	374	367	349	364
130	376	363	364	367	385	384	369	371	365	381	369	354	342	327	334	333	325	308	319
135	333	321	323	325	337	336	326	328	323	332	323	314	304	287	293	297	289	271	280
140	286	284	286	288	295	295	289	291	287	289	284	278	269	252	254	260	253	237	239
145	242	243	249	251	255	254	253	254	249	247	243	239	228	213	214	218	213	196	198
150	196	201	205	209	210	211	212	212	205	198	191	197	173	168	172	173	166	151	151
155	149	154	159	162	165	168	165	163	158	152	145	134	117	110	119	118	116	102	99.3
160	94.9	101	107	111	109	110	110	111	106	100	84.3	77.0	90.4	71.8	73.1	74.8	71.4	61.4	59.2
165	58.1	63.7	67.5	69.9	70.2	72.9	70.6	69.0	66.3	60.8	42.4	37.6	37.7	20.7	13.7	10.6	20.0	21.9	29.1
170	26.8	29.9	32.5	34.5	34.7	35.0	35.2	33.8	30.2	23.1	19.2	18.4	21.4	18.6	15.8	14.9	13.7	12.5	10.2
175	10.7	11.3	11.9	12.8	13.7	14.2	13.9	13.3	11.6	9.59	8.58	8.83	9.16	9.26	8.76	8.08	6.88	6.17	2.94
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38

Table 6: 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	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208		
5	214	215	216	216	218	217	216	215	215	214	214	214	212	211	211	210	209		
10	229	230	232	232	234	234	232	229	229	228	228	225	221	220	219	218	216		
15	259	257	261	261	263	264	259	254	257	256	251	248	241	240	238	234	231		
20	298	296	295	296	295	299	295	290	290	284	283	277	272	270	264	262	256		
25	338	331	333	337	336	344	333	329	337	329	322	318	312	303	294	291	293		
30	377	375	369	374	370	375	377	371	377	367	360	359	348	343	342	333	337		
35	410	408	402	412	404	406	410	403	411	406	397	402	386	375	379	374	378		
40	438	440	439	456	442	441	438	421	437	431	423	431	422	409	414	403	409		
45	472	473	466	478	466	463	461	447	455	446	444	460	457	445	443	435	428		
50	505	498	476	491	475	473	485	480	508	492	474	474	467	464	464	465	468		
55	506	505	493	514	493	493	515	501	534	511	498	490	485	478	477	496	507		
60	520	507	500	523	506	506	519	513	535	521	527	528	515	500	492	511	513		
65	519	517	501	524	509	500	515	498	533	513	516	520	514	509	504	507	510		
70	517	503	491	519	503	489	505	489	528	502	518	506	519	509	497	521	520		
75	511	500	486	518	501	486	503	487	524	498	506	506	505	502	490	512	509		
80	514	502	489	519	503	489	505	495	525	503	509	504	511	506	486	506	502		
85	514	501	489	518	503	489	503	495	523	502	506	503	514	508	487	506	505		
90	512	500	489	518	502	488	502	497	523	500	506	501	514	510	486	504	503		
95	508	496	484	514	499	484	498	495	517	495	503	498	513	511	486	504	502		
100	498	489	476	505	490	476	490	488	506	487	496	490	509	508	482	500	497		
105	485	478	464	490	477	463	478	475	492	477	486	478	501	499	474	492	489		
110	467	461	446	467	457	447	461	457	470	460	470	463	484	485	462	480	477		
115	440	434	419	438	430	421	434	430	442	434	447	438	457	461	443	462	461		
120	405	395	381	402	397	384	394	394	408	397	410	404	420	422	404	424	428		
125	362	352	340	356	353	341	349	350	365	354	368	363	380	381	360	375	388		
130	320	312	299	311	309	302	309	308	320	311	327	321	332	337	326	341	350		
135	283	274	261	272	270	267	273	275	279	275	290	283	285	293	291	306	316		
140	242	236	224	230	229	230	234	239	238	240	254	244	240	251	245	258	277		
145	198	191	182	187	188	187	189	200	199	199	208	204	197	207	209	223	233		
150	151	145	138	139	140	141	141	154	153	153	159	165	154	162	159	177	187		
155	99.8	98.1	89.6	89.9	91.2	92.2	92.5	98.8	102	104	109	114	107	113	108	125	135		
160	59.7	56.8	52.7	52.3	54.0	55.6	55.1	60.7	64.4	65.1	67.1	70.8	66.7	69.3	68.6	83.2	88.1		
165	28.3	25.6	23.5	23.5	25.1	24.5	24.0	27.7	30.9	31.7	33.3	34.1	33.5	34.4	34.0	41.9	49.9		
170	10.3	10.7	9.47	9.32	9.56	9.57	10.2	11.2	11.4	11.8	13.6	14.7	14.3	14.6	16.5	20.0	22.7		
175	3.00	1.92	1.05	0.62	0.62	0.85	1.44	2.54	3.02	3.71	4.86	5.84	5.07	7.34	7.81	9.17	10.2		
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38		

Table 7: 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
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Standard source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Integrate Sphere system	2M	HZTE015-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	WT210	HZTE008-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	PCR 500L	HZTE001-07	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	IT6154	HZTE004-04	Aug. 10, 2017	Aug. 09, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 16, 2017	Aug. 15, 2018
Temperature Meter	TES1310	HZTE017-01	Aug. 17, 2017	Aug. 16, 2018

Table 8: 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.

### Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is  $4\pi$ . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. 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 Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.



The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 2.1% with a coverage factor  $k=2$ .

## **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  $10^\circ$  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 \*\*\*

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.