LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED HID

Model: 37HID/830/277V/EX39

37HID/830/277V/E26

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18030035d/R1

This report is replaced the old report No. HZ18030035d dated May 22, 2018

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

Review by: April Zou

Engineer: April Zou

Jul. 26, 2018

Approved by: Jim Zhang

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/830/277V/EX39**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
128.4	4709.0	36.67	0.9916

CCT (K)	CRI	Stabilization Time (Light & Power)
3128	83.0	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

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EX39

E26

Equipment Under Test (EUT)	
Name	: LED HID
Model	: 37HID/830/277V/EX39, 37HID/830/277V/E26
Electrical Ratings	: 120-277V, 50/60HZ
Product Description	: 3000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

Note: Model 37HID/830/277V/EX39 and model 37HID/830/277V/E26 are identical except their different screw base. Model 37HID/830/277V/EX39 is EX39 base. 37HID/830/277V/E26 is E26 base. Model 37HID/830/277V/EX39 was chosen to be representative model in this report.

TEST RESULTS

Test ambient temperature was 24.9℃.

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)	0.308	0.146
Power Factor	0.9916	0.9102
Test Power (W)	36.67	36.69
THD A%	10.56	13.02
Luminous Efficacy (lm/W)	128.4	129.3
Total Luminous Flux (lm)	4709.0	4744.0
Color Rendering Index (CRI)	83.0	
R9	10.2	
Correlated Color Temperature (CCT)(K)	3128	
Chromaticity Chroma x	0.4261	
Chromaticity Chroma y	0.3967	
Chromaticity Chroma u	0.2467	
Chromaticity Chroma v	0.3445	
Duv	0.0018	
Chromaticity Chroma u ’	0.2467	
Chromaticity Chroma v’	0.5168	

Special Color Rendering Indices	
R1	81.6
R2	91.8
R3	95.7
R4	80.2
R5	81.9
R6	89.6
R7	82.7
R8	60.3
R9	10.2
R10	81
R11	79.2
R12	71.6
R13	84.2
R14	98.4
Rf	83
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 25.1℃.

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)	0.307
Power Factor	0.9912
Test Power (W)	36.49
Luminous Efficacy (lm/W)	123.4
Total Luminous Flux (lm)	4501.9
Beam Angle (°)	313.4
Center Beam Candle Power (cd)	181
Spacing Criteria	2.67 (0°-180°)/ 2.68 (90°-270°)
Zonal Lumens in the 0°-60°Zone	24.39%
Zonal Lumens in the 60°-90°Zone	30.93%
Zonal Lumens in the 90°-120°Zone	29.42%
Zonal Lumens in the 120°-180°Zone	15.25%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

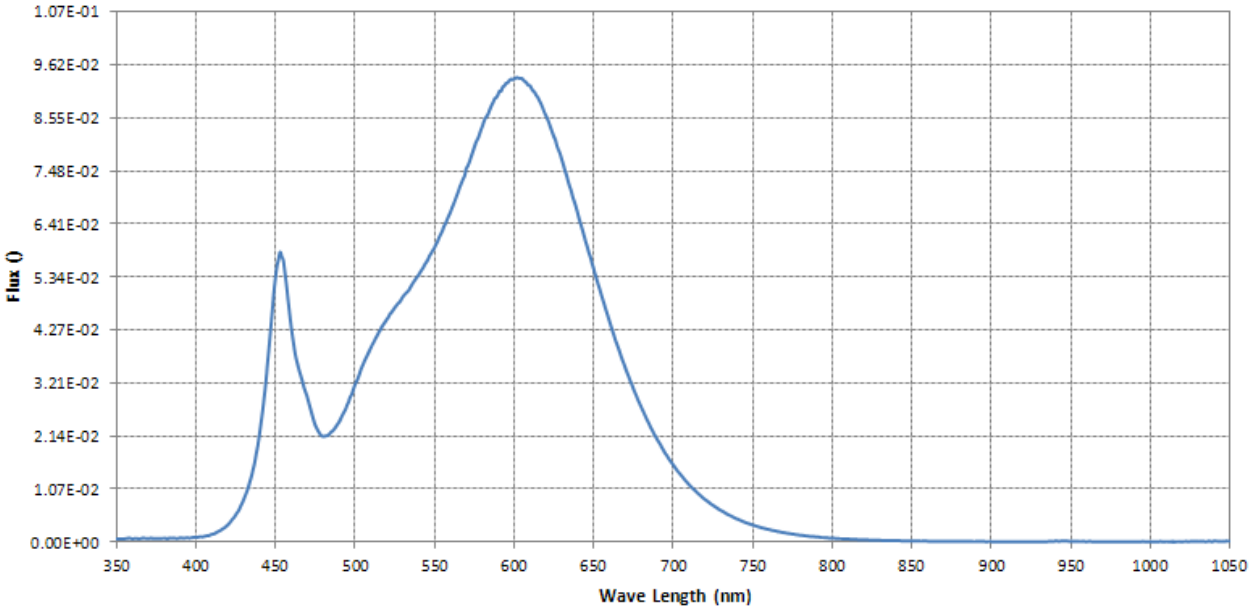
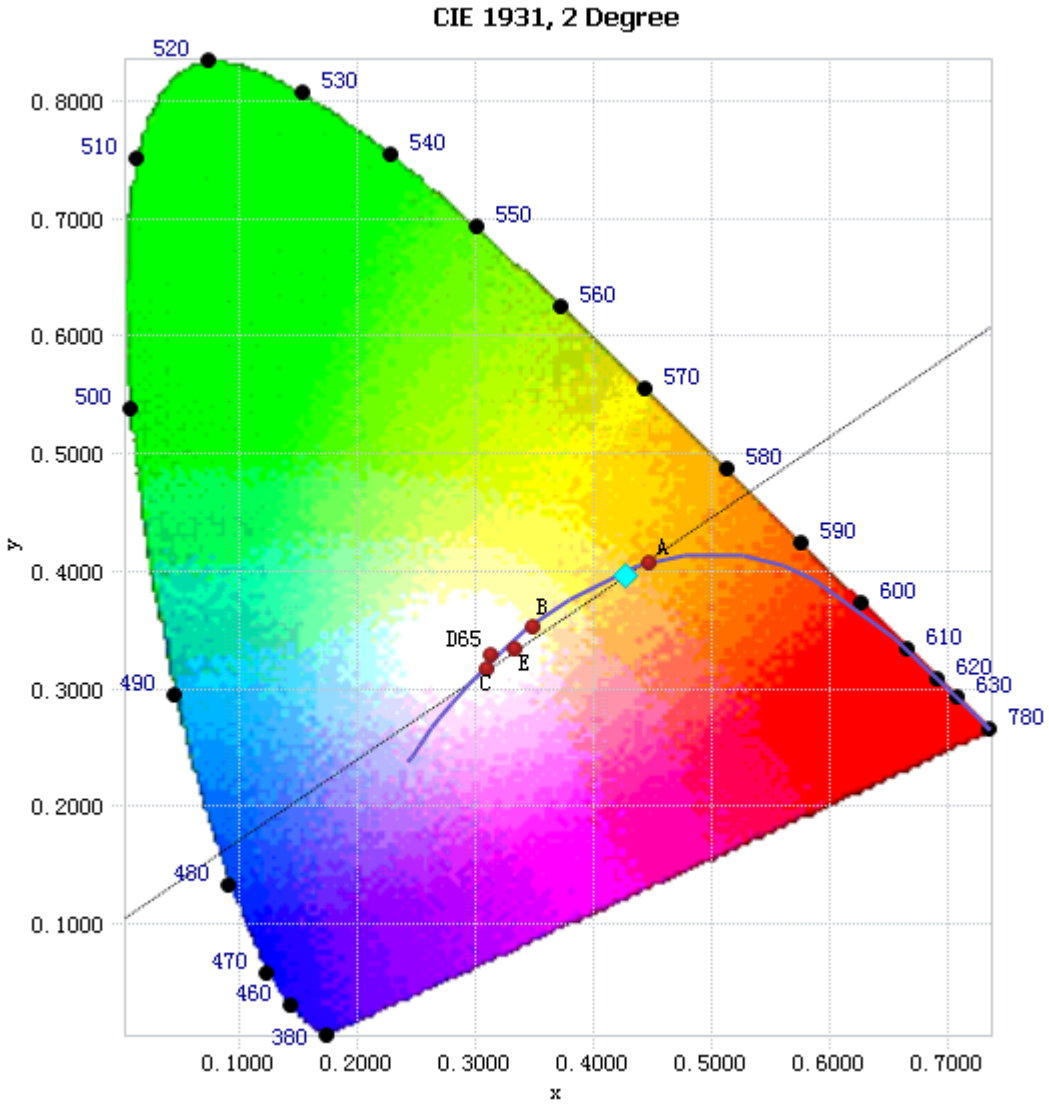


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	7.52E-04	485	2.21E-02	590	9.02E-02	695	1.79E-02
385	7.51E-04	490	2.41E-02	595	9.25E-02	700	1.56E-02
390	8.26E-04	495	2.75E-02	600	9.33E-02	705	1.35E-02
395	8.44E-04	500	3.16E-02	605	9.34E-02	710	1.16E-02
400	9.08E-04	505	3.56E-02	610	9.20E-02	715	1.00E-02
405	1.10E-03	510	3.91E-02	615	8.96E-02	720	8.62E-03
410	1.55E-03	515	4.23E-02	620	8.60E-02	725	7.43E-03
415	2.28E-03	520	4.48E-02	625	8.18E-02	730	6.38E-03
420	3.39E-03	525	4.72E-02	630	7.71E-02	735	5.47E-03
425	5.40E-03	530	4.93E-02	635	7.16E-02	740	4.68E-03
430	8.46E-03	535	5.14E-02	640	6.64E-02	745	4.00E-03
435	1.32E-02	540	5.38E-02	645	6.06E-02	750	3.43E-03
440	2.17E-02	545	5.64E-02	650	5.52E-02	755	2.97E-03
445	3.56E-02	550	5.92E-02	655	4.97E-02	760	2.56E-03
450	5.30E-02	555	6.26E-02	660	4.45E-02	765	2.20E-03
455	5.68E-02	560	6.64E-02	665	3.97E-02	770	1.89E-03
460	4.33E-02	565	7.06E-02	670	3.51E-02	775	1.62E-03
465	3.46E-02	570	7.52E-02	675	3.10E-02	780	1.38E-03
470	2.93E-02	575	7.95E-02	680	2.72E-02		
475	2.37E-02	580	8.36E-02	685	2.38E-02		
480	2.13E-02	585	8.73E-02	690	2.07E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.4261, 0.3967)

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

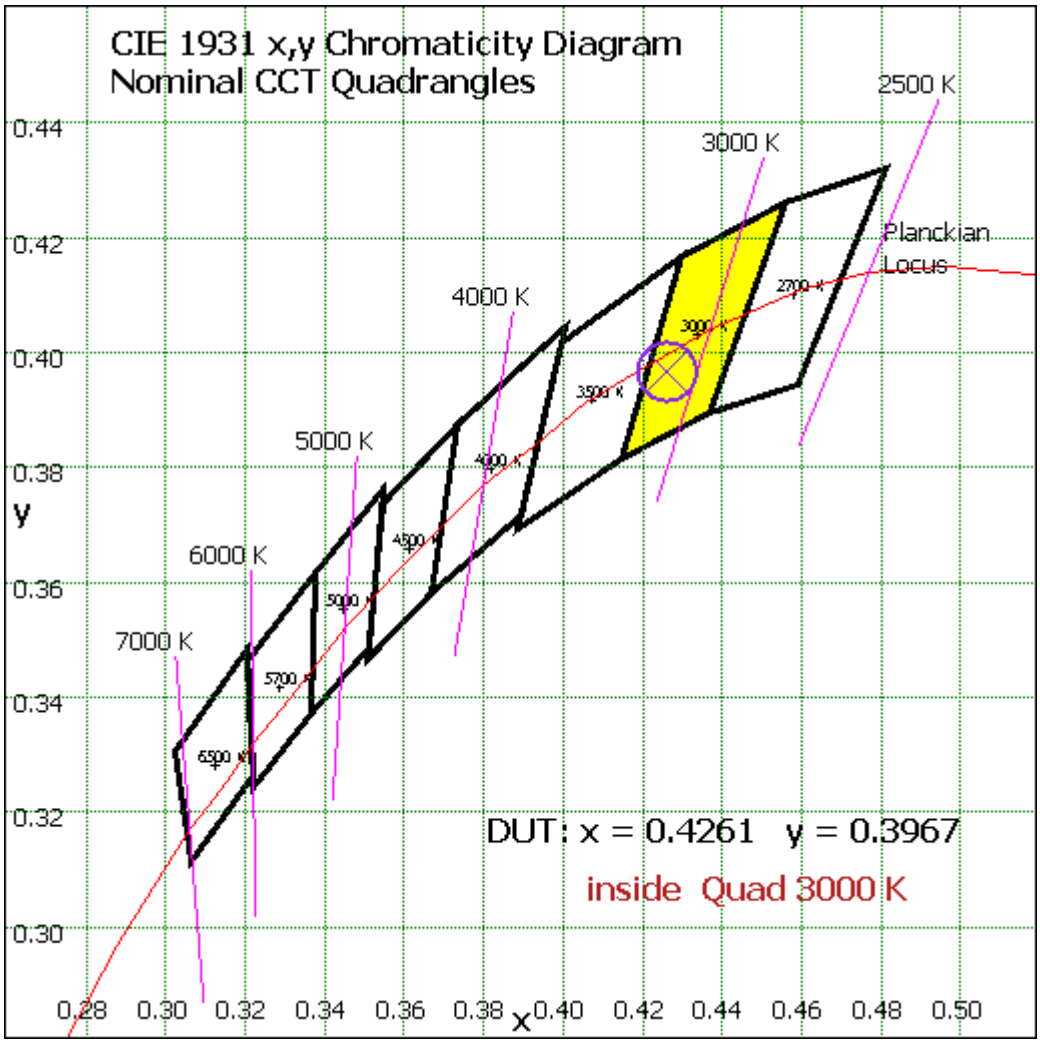


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	17.867	0.40%
10- 20	60.448	1.34%
20- 30	125.288	2.78%
30- 40	209.014	4.64%
40- 50	299.344	6.65%
50- 60	386.119	8.58%
60- 70	439.381	9.76%
70- 80	469.816	10.44%
80- 90	483.357	10.74%
90-100	480.812	10.68%
100-110	451.66	10.03%
110-120	392.034	8.71%
120-130	300.517	6.68%
130-140	202.261	4.49%
140-150	119.796	2.66%
150-160	51.481	1.14%
160-170	11.901	0.26%
170-180	0.774	0.02%
Total	4501.9	100%

γ(°)	Lumens	% Total
0- 60	1098.08	24.39%
60- 90	1392.554	30.93%
0-90	2490.634	55.32%
90- 180	2011.236	44.68%
0- 180	4501.9	100%

Table 4: Zonal Lumen Data

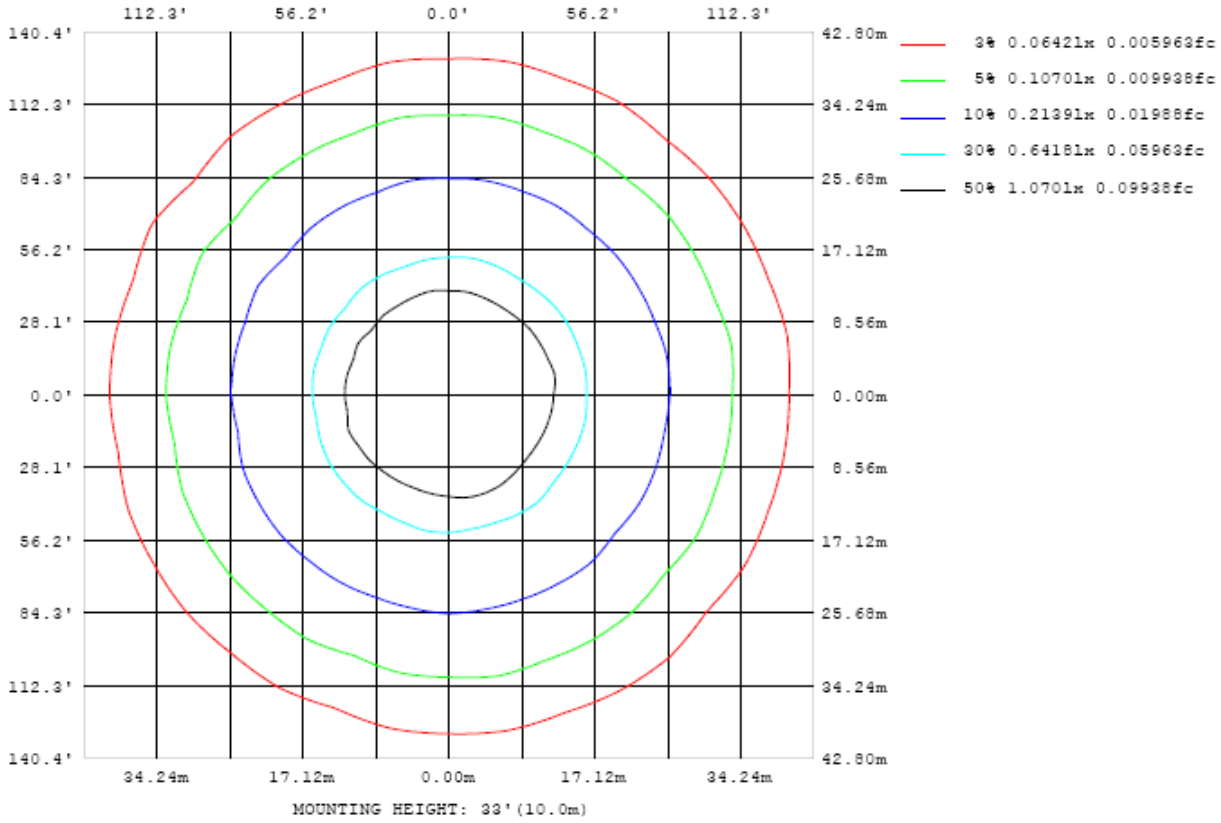


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

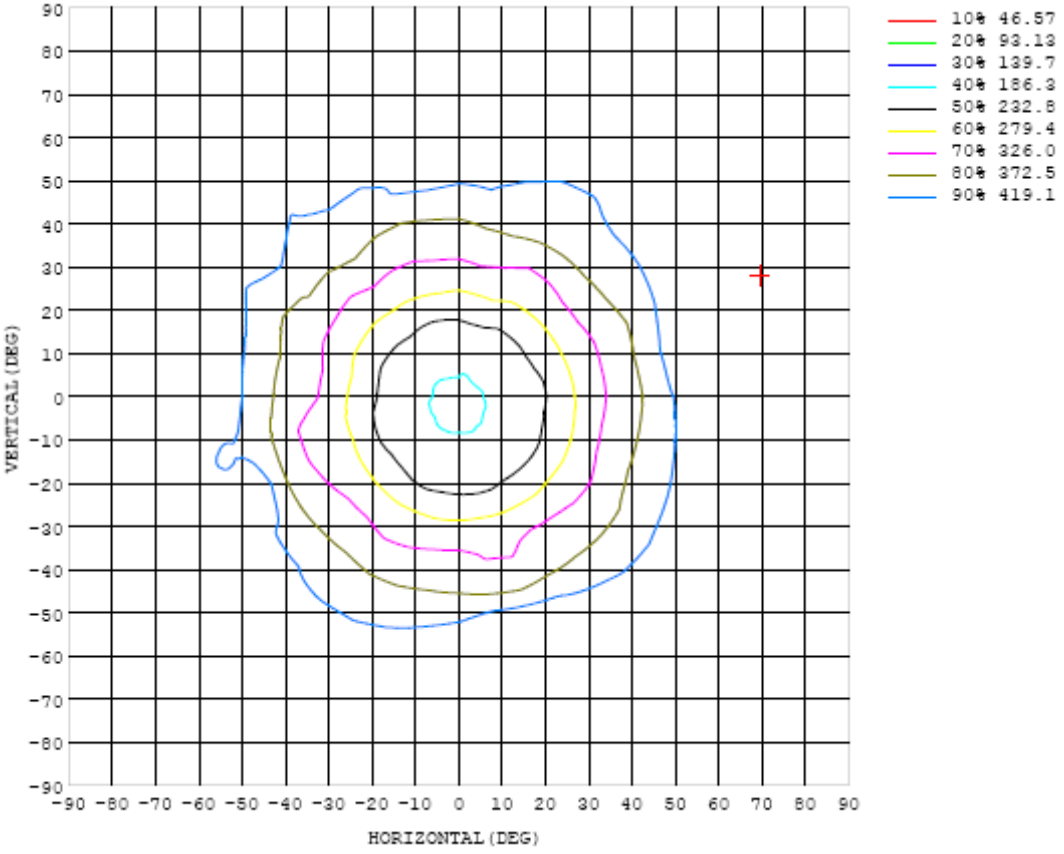


Chart 5: Isocandela Plot

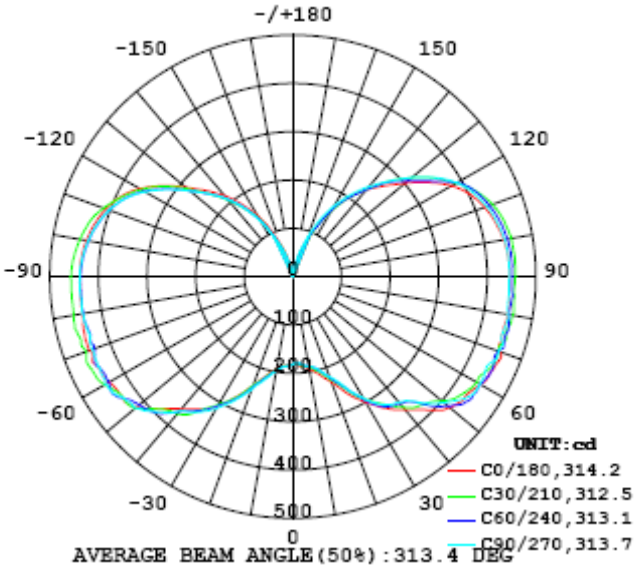


Chart 6: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181
5	186	185	184	184	183	182	181	180	180	180	180	181	182	183	184	184	184	185	185
10	193	192	190	190	190	189	188	188	188	188	188	189	188	189	190	191	191	191	193
15	209	208	206	203	202	201	199	199	199	198	200	201	202	203	204	204	206	209	213
20	232	233	230	226	225	223	222	220	220	220	220	222	224	228	230	229	230	232	239
25	267	267	264	256	253	253	252	245	248	251	249	248	251	262	266	264	268	268	274
30	299	301	298	292	295	291	293	292	293	290	290	291	292	298	299	300	301	299	312
35	332	335	333	322	324	329	328	318	320	324	323	320	319	328	330	323	319	317	334
40	360	361	362	352	352	350	342	329	330	339	343	340	340	350	353	345	339	337	358
45	390	392	386	376	374	375	370	358	359	368	371	370	372	383	384	387	395	380	387
50	421	415	406	400	397	405	416	418	419	406	399	392	395	399	412	417	441	410	419
55	433	432	435	424	426	444	444	448	435	436	427	419	417	421	427	428	431	416	431
60	446	453	441	437	437	449	445	423	432	444	450	427	427	445	443	445	439	421	437
65	454	455	443	448	435	447	453	436	454	440	439	424	435	439	448	442	447	430	442
70	453	450	452	450	432	452	449	440	445	451	441	429	440	445	448	450	449	423	445
75	447	450	445	453	438	457	455	443	453	448	444	429	448	444	450	447	449	431	444
80	449	451	450	459	433	450	452	440	451	449	446	429	449	441	450	451	449	427	440
85	446	447	446	458	432	452	454	442	453	446	445	425	448	439	445	449	446	428	439
90	446	447	445	457	430	452	451	441	452	445	445	424	450	439	446	446	446	430	439
95	445	446	444	458	430	453	452	442	452	445	445	424	451	438	445	445	443	431	437
100	440	442	440	456	427	449	448	438	449	442	442	420	449	435	441	441	436	429	432
105	432	434	430	450	419	442	441	433	441	435	435	412	442	426	432	433	425	423	422
110	420	423	418	437	408	431	430	421	430	424	426	402	431	414	421	420	411	413	410
115	403	407	400	417	394	417	416	404	413	410	411	388	409	398	405	404	393	396	392
120	377	382	375	388	368	390	390	378	388	389	390	366	385	374	384	381	368	373	365
125	341	346	339	356	328	341	346	346	354	358	358	337	358	344	350	347	336	345	328
130	301	306	303	319	292	306	309	313	321	319	320	302	322	308	310	305	296	306	288
135	266	270	266	280	262	277	277	276	281	279	281	263	280	268	270	267	259	270	252
140	235	238	231	236	225	233	236	236	242	244	246	231	239	234	237	234	228	231	219
145	200	201	193	199	189	202	200	198	203	207	213	200	204	199	205	201	194	191	183
150	159	162	154	157	153	158	161	160	167	169	176	166	166	162	166	163	158	154	146
155	116	118	113	110	107	109	113	115	128	129	134	129	128	124	126	122	118	107	104
160	75.2	76.0	70.4	69.8	71.3	73.2	76.0	74.5	79.7	82.9	89.8	84.9	83.1	82.2	82.8	80.2	77.0	69.2	66.4
165	40.2	40.2	37.5	37.3	36.5	37.9	41.3	43.0	47.9	52.2	55.5	54.8	53.0	50.7	48.7	47.8	44.2	38.0	34.8
170	15.1	16.0	15.9	16.0	17.0	17.9	17.8	19.0	21.2	23.3	24.6	24.9	25.0	23.2	21.5	19.8	18.5	17.0	15.2
175	4.31	4.78	4.31	3.60	4.03	5.27	6.67	7.89	8.24	8.03	7.73	7.64	7.81	7.99	7.50	7.60	7.32	6.93	6.09
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6: 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	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181		
5	185	185	186	186	186	186	186	187	187	186	186	186	187	187	187	186	186		
10	193	194	195	195	196	196	197	198	197	198	199	198	198	197	195	194	193		
15	213	214	214	215	217	217	218	219	220	221	222	220	219	216	216	214	210		
20	239	237	239	242	250	244	244	246	248	253	252	244	244	244	246	241	234		
25	278	274	275	275	280	279	282	284	282	287	289	280	280	279	277	275	271		
30	313	305	305	304	316	308	312	315	315	322	318	306	308	314	312	305	303		
35	343	336	339	336	345	338	336	342	342	350	348	335	338	344	345	336	335		
40	366	362	370	370	379	364	361	365	363	378	381	375	375	377	372	364	364		
45	387	377	388	378	402	398	392	398	395	408	404	397	398	401	399	390	399		
50	417	405	423	399	413	412	421	431	422	425	414	410	411	420	420	424	442		
55	433	423	430	420	440	436	424	438	432	446	433	421	424	437	440	438	447		
60	442	431	447	429	451	438	430	445	445	451	442	435	433	444	448	438	451		
65	447	431	456	430	449	441	434	446	442	448	441	445	434	447	448	440	458		
70	444	435	454	419	445	436	433	451	440	444	438	446	437	445	445	445	461		
75	444	433	458	422	443	434	430	444	437	447	438	445	432	445	448	445	460		
80	442	432	458	422	445	438	430	447	439	448	439	448	433	444	445	450	460		
85	442	432	457	421	444	437	430	446	439	448	438	448	432	444	443	450	456		
90	443	433	457	420	443	437	429	446	439	448	437	449	432	443	442	454	454		
95	441	431	452	418	440	434	426	442	435	444	434	448	429	441	440	455	450		
100	435	426	445	411	433	427	419	435	428	437	427	443	423	436	434	452	442		
105	427	416	434	401	423	416	409	424	418	426	417	432	413	427	424	445	432		
110	413	402	415	387	409	402	392	406	403	411	402	413	400	414	411	431	416		
115	395	383	389	367	390	383	371	382	382	391	380	389	381	395	393	409	395		
120	368	357	361	340	360	354	345	354	352	360	352	363	354	366	365	383	369		
125	332	324	326	307	321	317	311	319	315	322	317	328	319	328	328	349	337		
130	292	285	283	267	281	277	270	276	276	282	278	284	279	288	288	308	296		
135	256	250	242	235	245	242	236	241	242	248	244	247	246	254	254	270	261		
140	224	218	207	203	213	210	201	206	210	216	210	212	216	222	223	232	229		
145	190	183	171	168	178	174	167	171	173	179	173	175	180	187	187	193	193		
150	150	146	137	133	136	135	131	133	132	138	136	138	142	146	148	155	155		
155	106	103	91.0	90.4	90.7	90.5	84.0	85.6	86.7	93.8	88.0	90.2	96.1	102	102	107	111		
160	65.4	66.6	60.8	57.5	55.4	56.2	52.2	52.1	52.4	56.2	54.6	57.4	60.5	64.6	65.1	69.6	72.4		
165	33.8	33.0	30.9	29.1	27.0	25.8	25.2	24.3	24.2	25.6	27.0	27.8	29.7	32.2	32.7	34.1	37.3		
170	15.1	13.5	11.7	11.0	10.4	9.20	8.43	9.32	8.69	8.49	9.32	9.85	9.96	11.2	12.1	13.3	14.7		
175	6.13	5.01	4.24	3.32	1.93	1.00	1.04	1.38	1.41	1.59	1.99	2.58	3.23	3.55	4.17	4.52	4.63		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

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 4π. 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 expended 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 expended uncertainty is 2.3% with a coverage factor k=2.

Color Characteristics Measurements

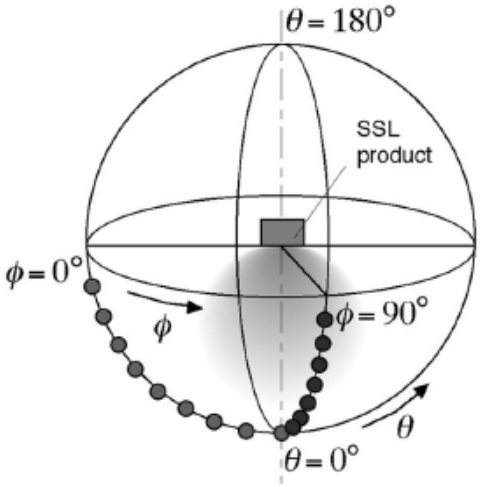
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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 ***