



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED HID

Model: 68HID/850/277V/EX39

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18030035h

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

Review by:

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May 22, 2018

Approved by:



Manager: Jim Zhang
May 22, 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: 68HID/850/277V/EX39

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
144.3	9512.0	65.92	0.9905
CCT (K)	CRI	Stabilization Time (Light & Power)	
5223	84.5	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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Sample Photos



Equipment Under Test (EUT)

Name	: LED HID
Model	: 68HID/850/277V/EX39
Electrical Ratings	: 120-277V, 50/60HZ
Product Description	: 5000K
Manufacturer	: GREEN CREATIVE LTD
Address	: 756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai

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)	0.555	0.261
Power Factor	0.9905	0.9001
Test Power (W)	65.92	65.15
THD A%	11.23	20.27
Luminous Efficacy (lm/W)	144.3	146.5
Total Luminous Flux (lm)	9512.0	9545.0
Color Rendering Index (CRI)	84.5	
R9	14.6	
Correlated Color Temperature (CCT)(K)	5223	
Chromaticity Chroma x	0.3391	
Chromaticity Chroma y	0.3479	
Chromaticity Chroma u	0.2088	
Chromaticity Chroma v	0.3213	
Duv	0.0002	
Chromaticity Chroma u'	0.2088	
Chromaticity Chroma v'	0.4820	

Special Color Rendering Indices	
R1	83.2
R2	89.7
R3	93.1
R4	84.1
R5	83.8
R6	84.8
R7	87.4
R8	69.7
R9	14.6
R10	74.8
R11	83.3
R12	64.7
R13	85.1
R14	96.4
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°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)	0.553
Power Factor	0.9901
Test Power (W)	65.76
Luminous Efficacy (lm/W)	144.4
Total Luminous Flux (lm)	9496.2
Beam Angle (°)	314.9
Center Beam Candle Power (cd)	400
Spacing Criteria	2.60 (0°-180°)/ 2.60 (90°-270°)
Zonal Lumens in the 0°-60°Zone	25.09%
Zonal Lumens in the 60°-90°Zone	30.34%
Zonal Lumens in the 90°-120°Zone	28.72%
Zonal Lumens in the 120°-180°Zone	15.85%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

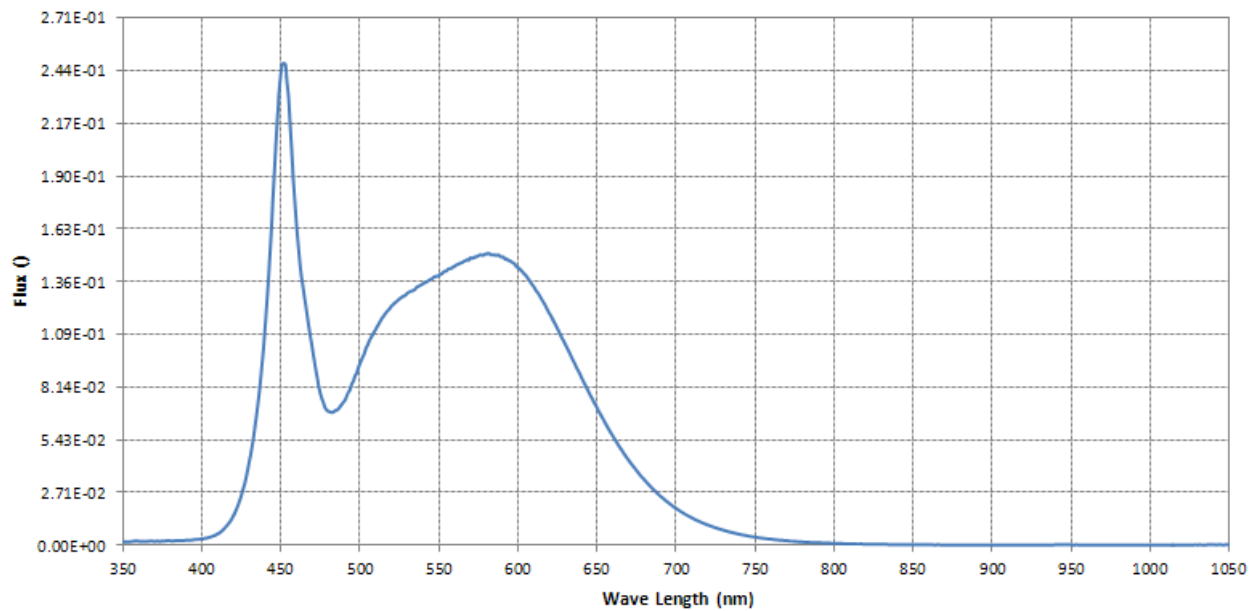
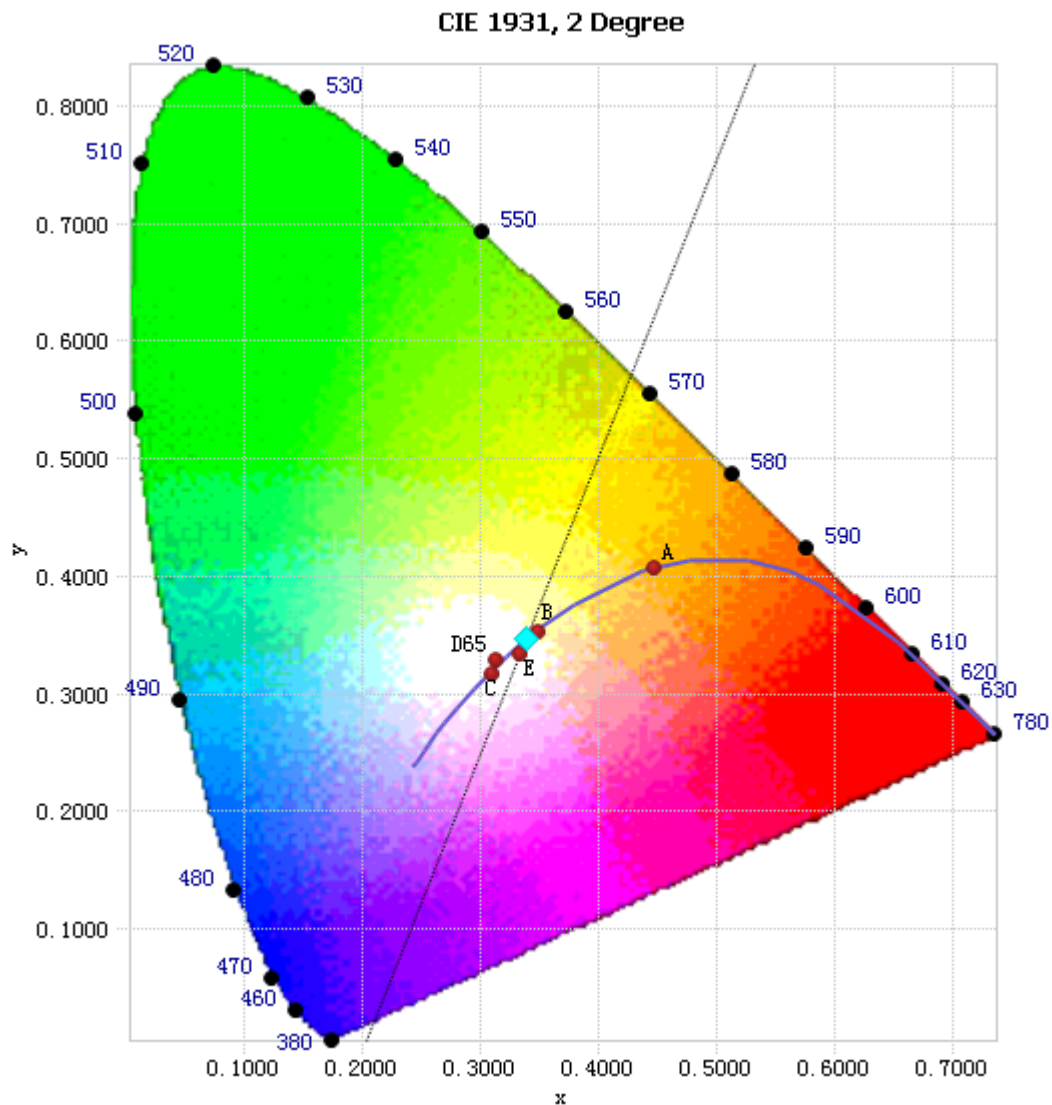


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.34E-03	485	6.95E-02	590	1.48E-01	695	2.21E-02
385	2.37E-03	490	7.41E-02	595	1.47E-01	700	1.90E-02
390	2.62E-03	495	8.31E-02	600	1.43E-01	705	1.64E-02
395	2.82E-03	500	9.33E-02	605	1.39E-01	710	1.41E-02
400	3.36E-03	505	1.03E-01	610	1.33E-01	715	1.22E-02
405	4.18E-03	510	1.11E-01	615	1.27E-01	720	1.05E-02
410	5.89E-03	515	1.18E-01	620	1.19E-01	725	9.09E-03
415	9.27E-03	520	1.23E-01	625	1.12E-01	730	7.83E-03
420	1.50E-02	525	1.27E-01	630	1.04E-01	735	6.70E-03
425	2.53E-02	530	1.30E-01	635	9.50E-02	740	5.72E-03
430	4.26E-02	535	1.32E-01	640	8.69E-02	745	4.93E-03
435	6.88E-02	540	1.35E-01	645	7.86E-02	750	4.26E-03
440	1.11E-01	545	1.37E-01	650	7.10E-02	755	3.66E-03
445	1.76E-01	550	1.39E-01	655	6.34E-02	760	3.16E-03
450	2.42E-01	555	1.41E-01	660	5.63E-02	765	2.71E-03
455	2.30E-01	560	1.44E-01	665	4.99E-02	770	2.35E-03
460	1.65E-01	565	1.46E-01	670	4.40E-02	775	2.05E-03
465	1.28E-01	570	1.48E-01	675	3.86E-02	780	1.75E-03
470	1.02E-01	575	1.49E-01	680	3.38E-02		
475	7.84E-02	580	1.50E-01	685	2.94E-02		
480	6.90E-02	585	1.50E-01	690	2.55E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.3391, 0.3479)

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

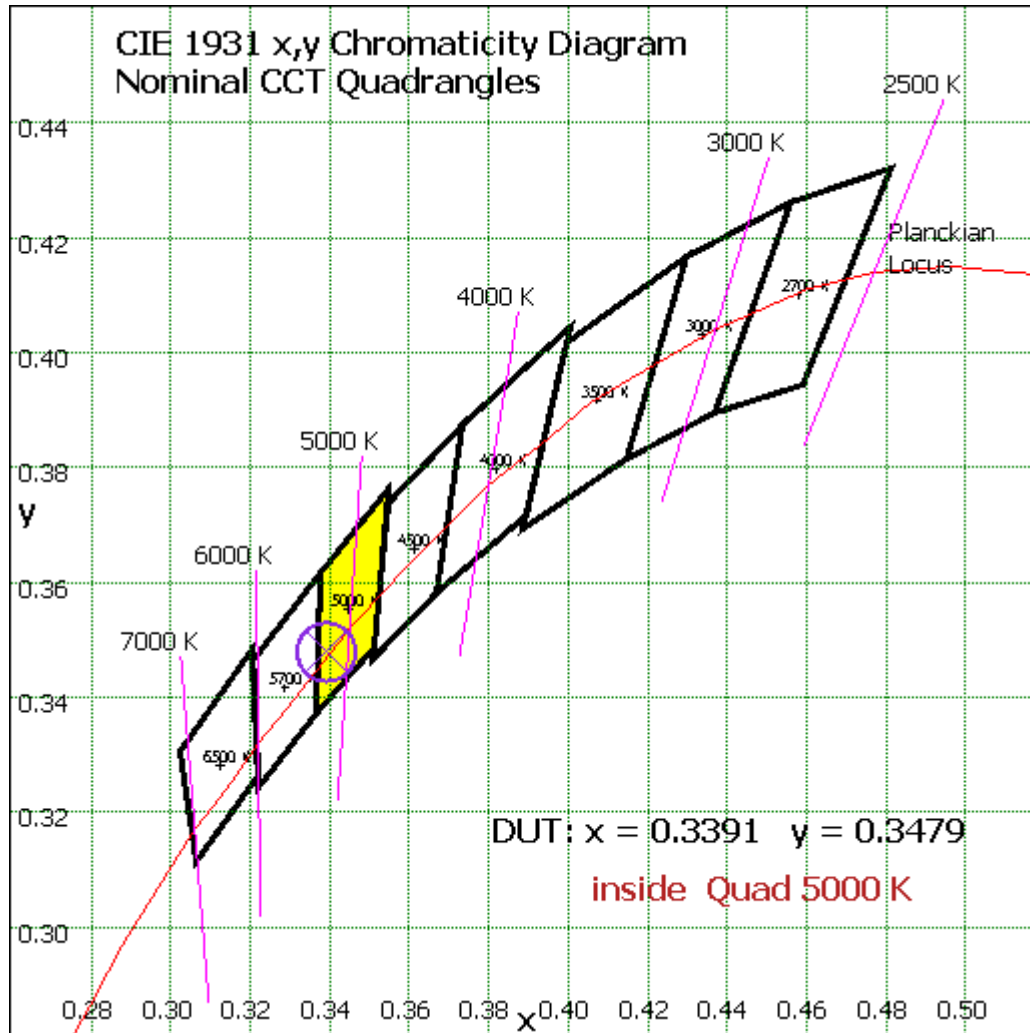


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	39.53	0.42%
10- 20	136.196	1.43%
20- 30	279.396	2.94%
30- 40	457.964	4.82%
40- 50	650.798	6.85%
50- 60	818.356	8.62%
60- 70	919.553	9.68%
70- 80	968.578	10.20%
80- 90	993.387	10.46%
90-100	988.984	10.41%
100-110	928.189	9.77%
110-120	810.237	8.53%
120-130	643.823	6.78%
130-140	447.768	4.72%
140-150	264.727	2.79%
150-160	117.377	1.24%
160-170	29.268	0.31%
170-180	2.06	0.02%
Total	9496.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2382.24	25.09%
60- 90	2881.518	30.34%
0-90	5263.758	55.43%
90- 180	4232.433	44.57%
0- 180	9496.2	100%

Table 4: Zonal Lumen Data

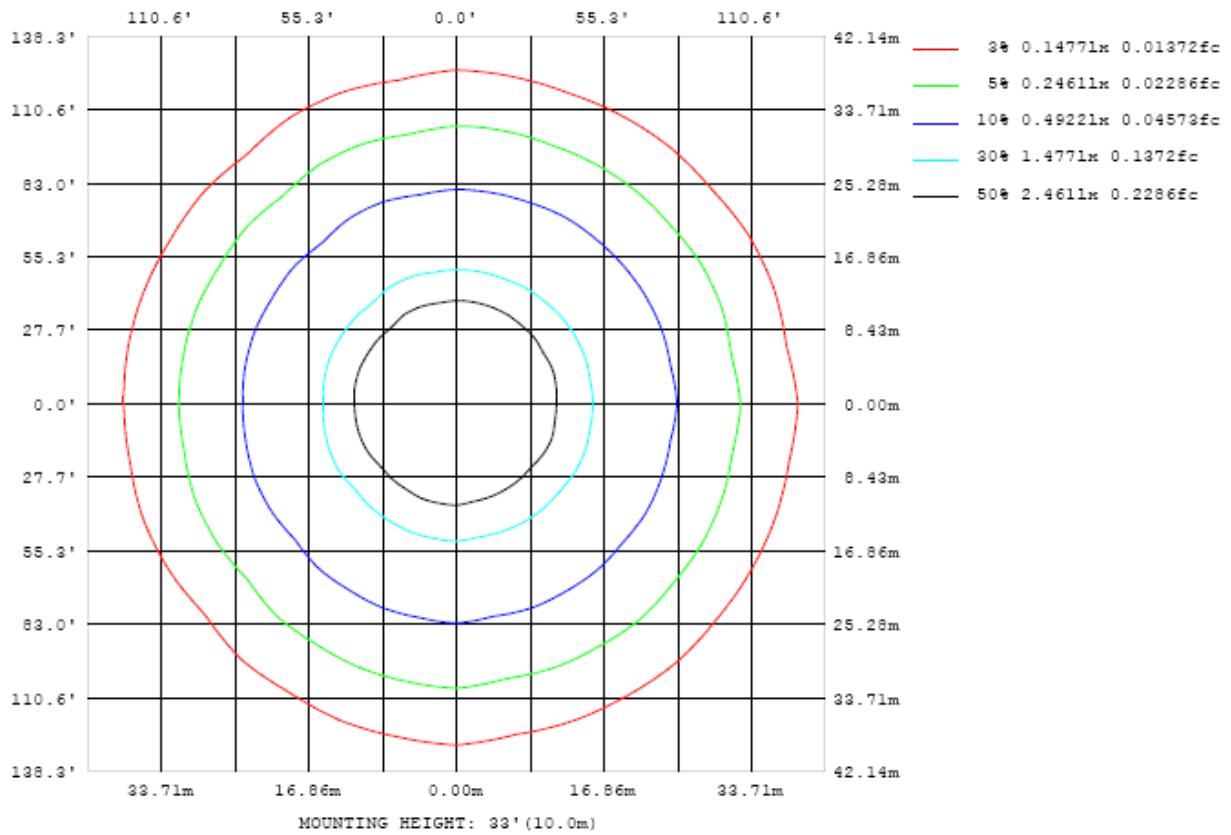


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

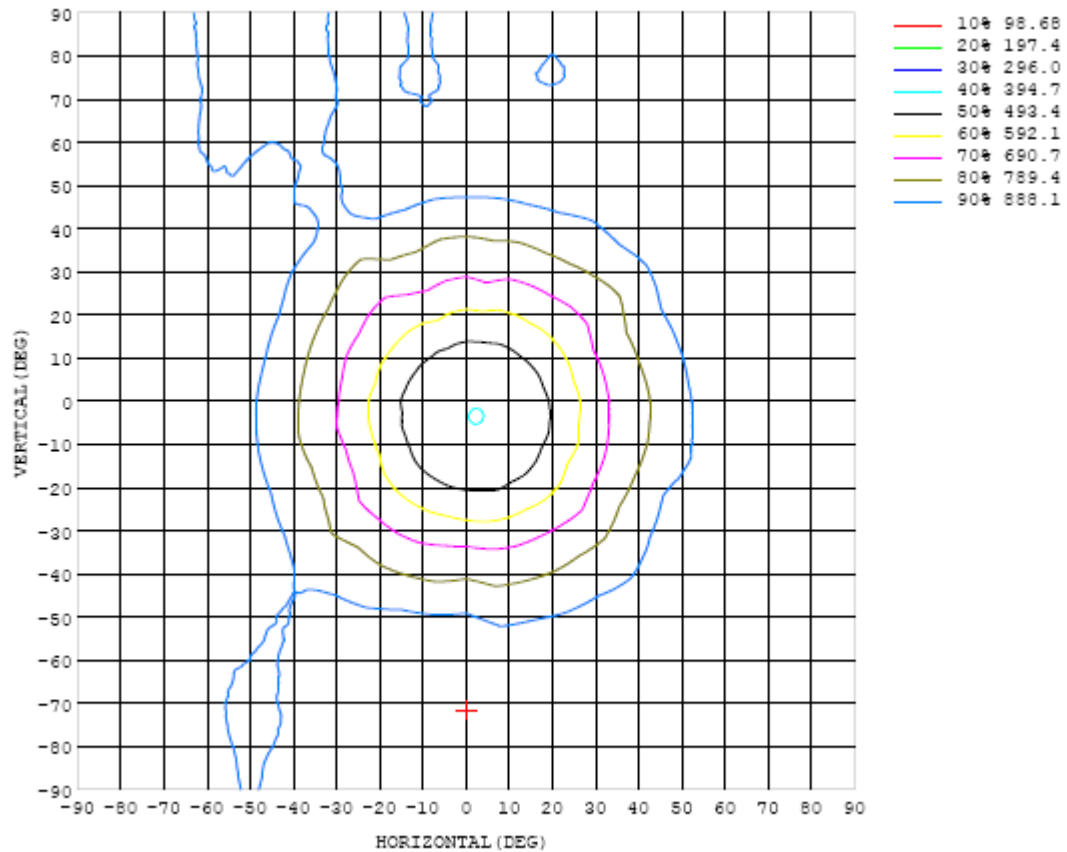


Chart 5: Isocandela Plot

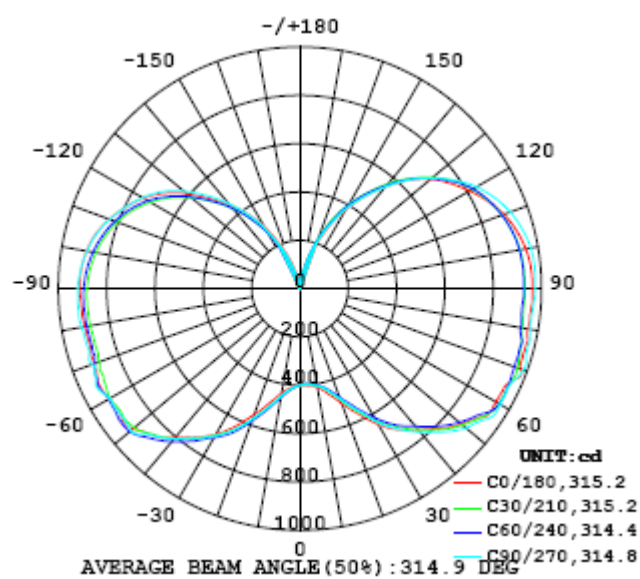


Chart 6: Polar Candela Distribution

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	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
5	402	400	398	396	394	394	394	394	395	398	400	401	402	404	406	407	407	409	410
10	416	411	411	409	406	406	405	406	407	407	410	411	415	420	426	430	434	437	439
15	450	444	439	435	431	428	429	427	433	434	437	444	449	455	470	477	481	493	491
20	505	498	488	488	477	473	477	471	480	486	491	499	508	515	526	541	544	551	554
25	570	570	556	559	543	536	542	536	544	553	564	565	570	576	590	614	623	623	628
30	649	647	631	631	614	612	617	614	621	637	641	633	642	649	657	683	692	685	697
35	713	707	699	697	679	683	688	686	695	710	705	700	700	711	706	744	753	738	750
40	763	757	765	763	741	745	743	752	757	776	763	762	763	774	764	797	805	797	805
45	819	816	826	826	803	806	806	810	807	838	826	830	818	824	812	846	865	860	860
50	870	866	892	877	848	859	861	866	867	896	889	888	867	868	847	882	896	899	902
55	928	914	931	922	905	913	908	909	907	941	937	931	910	911	882	926	925	917	908
60	936	925	945	951	942	946	952	945	923	956	946	946	922	921	886	924	931	918	914
65	941	917	938	952	941	953	949	940	930	955	944	948	921	916	881	911	934	922	922
70	973	949	952	959	943	956	945	954	938	984	960	952	930	923	875	909	925	905	911
75	964	936	943	943	937	958	943	946	930	972	948	940	910	917	868	897	910	892	901
80	958	921	929	932	926	939	927	928	906	968	931	927	902	907	865	898	907	895	904
85	960	925	925	929	921	935	922	921	906	968	935	925	906	911	876	906	912	895	908
90	962	925	929	931	923	939	927	924	909	973	934	927	908	915	882	910	912	896	912
95	959	925	929	930	923	940	927	924	910	976	934	927	908	915	884	909	907	891	909
100	949	920	923	925	918	936	922	919	905	970	927	919	901	906	878	899	896	880	897
105	928	906	910	910	904	925	910	907	893	952	912	905	887	889	866	879	877	861	875
110	898	885	890	891	882	905	890	887	874	927	890	883	865	861	849	850	850	834	840
115	858	855	861	861	852	875	863	858	846	890	859	852	836	827	823	814	815	800	798
120	810	815	825	824	813	832	827	821	810	844	817	813	798	782	784	768	771	757	750
125	761	765	777	778	762	776	774	770	758	781	757	765	749	729	733	710	715	702	689
130	706	703	716	716	697	717	711	697	690	713	694	703	687	666	673	637	645	634	611
135	637	629	645	646	630	651	640	628	620	638	626	634	616	595	592	553	566	557	528
140	551	547	565	567	546	564	558	546	541	550	540	551	539	517	504	470	491	483	450
145	465	466	486	484	460	485	480	469	463	465	465	469	460	440	425	399	416	406	376
150	377	385	401	402	376	399	399	382	379	382	388	383	377	359	345	326	328	324	297
155	285	300	315	315	297	307	303	291	284	293	309	294	293	274	256	243	230	231	209
160	195	210	221	221	209	213	213	205	197	206	221	198	202	187	177	163	151	153	137
165	119	130	139	135	134	135	135	125	116	124	130	124	120	112	103	94.0	86.3	77.6	71.6
170	56.5	64.7	69.3	67.7	69.3	69.0	67.7	60.7	54.1	56.8	62.1	62.6	57.0	51.6	47.6	43.7	37.5	32.3	26.7
175	13.5	11.8	13.9	17.3	18.2	17.4	15.2	15.0	16.4	16.4	17.8	19.5	19.6	18.4	16.3	13.5	12.3	10.9	8.02
180	0.31	0.30	0.29	0.26	0.23	0.19	0.15	0.10	0.05	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																	
C (DEG)	y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	
0	0	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
5	5	414	415	416	417	418	418	417	416	415	415	414	412	410	408	405	403	402	
10	10	445	450	454	455	459	457	457	454	452	451	447	441	434	431	428	423	419	
15	15	500	505	511	513	518	516	519	511	509	507	502	491	483	479	471	466	457	
20	20	569	569	575	577	579	584	595	580	574	575	557	552	546	540	530	522	518	
25	25	640	635	645	645	642	656	661	647	645	657	633	621	617	606	596	589	587	
30	30	699	698	701	692	688	711	727	711	704	716	693	685	681	671	662	669	657	
35	35	754	756	757	746	741	770	775	761	755	762	749	747	740	721	710	735	727	
40	40	814	821	811	796	788	826	834	814	811	813	810	811	798	783	767	791	781	
45	45	869	872	854	843	833	875	876	863	860	861	867	865	841	837	823	848	834	
50	50	916	911	894	892	872	920	920	900	914	916	909	906	895	902	880	898	882	
55	55	916	918	901	902	866	921	920	895	909	912	901	919	918	930	923	938	922	
60	60	914	920	907	895	863	914	926	904	909	905	900	913	909	932	936	940	925	
65	65	921	917	896	900	871	926	931	905	933	941	918	925	920	936	940	947	931	
70	70	909	913	885	884	859	904	917	883	915	911	896	915	924	931	942	949	933	
75	75	904	896	879	881	849	893	898	874	912	897	885	900	910	907	933	939	914	
80	80	910	901	882	883	853	897	902	880	918	904	887	896	904	894	926	924	903	
85	85	909	902	883	884	855	898	901	880	922	905	891	899	908	895	927	928	905	
90	90	908	901	882	883	854	896	900	879	921	905	892	898	907	890	926	928	905	
95	95	899	893	874	874	844	886	890	869	911	896	886	891	899	886	919	926	902	
100	100	883	878	859	858	827	870	875	854	896	881	873	876	883	874	905	916	892	
105	105	861	855	836	837	803	847	851	832	872	859	852	855	861	851	884	899	876	
110	110	829	825	806	806	769	816	821	801	839	829	824	824	831	817	857	874	852	
115	115	787	788	766	766	729	777	783	761	798	789	789	787	791	781	823	841	823	
120	120	737	739	717	716	685	728	733	713	753	738	743	740	742	736	781	800	783	
125	125	682	677	656	656	632	666	669	652	700	678	682	682	686	683	731	748	734	
130	130	610	606	587	585	564	591	594	581	629	606	613	614	617	623	667	680	674	
135	135	529	529	510	505	488	512	515	506	546	526	536	540	543	550	592	602	604	
140	140	453	453	434	427	417	436	441	432	462	447	462	466	470	474	515	518	524	
145	145	379	371	352	349	345	353	356	354	376	369	379	390	402	403	439	439	444	
150	150	299	288	272	264	263	265	271	267	285	286	293	306	323	326	355	351	363	
155	155	210	195	185	180	176	177	181	181	192	194	203	214	230	237	265	265	275	
160	160	128	119	114	109	105	104	106	108	115	118	125	139	150	159	177	180	189	
165	165	66.7	61.9	53.2	50.8	48.6	48.4	46.5	49.8	52.9	55.7	60.9	71.4	79.5	86.2	96.3	102	114	
170	170	26.3	23.3	20.1	16.4	16.1	15.7	15.7	17.3	18.8	20.0	22.9	28.0	31.9	34.2	40.1	46.2	50.7	
175	175	8.09	6.71	4.61	2.23	0.97	0.86	0.89	1.60	3.08	4.15	7.21	7.69	10.2	11.6	13.1	15.7	16.8	
180	180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.15	0.19	0.23	0.26	0.29	0.30	

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 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° 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 ***

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