



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED HID

Model: 68HID/840/277V/EX39

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18030035g

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/840/277V/EX39

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
144.6	9504.0	65.73	0.9912
CCT (K)	CRI	Stabilization Time (Light & Power)	
4011	83.3	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/840/277V/EX39
Electrical Ratings	: 120-277V, 50/60HZ
Product Description	: 4000K
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)	0.553	0.259
Power Factor	0.9912	0.9045
Test Power (W)	65.73	64.89
THD A%	10.90	19.45
Luminous Efficacy (lm/W)	144.6	147.1
Total Luminous Flux (lm)	9504.0	9546.0
Color Rendering Index (CRI)	83.3	
R9	11.1	
Correlated Color Temperature (CCT)(K)	4011	
Chromaticity Chroma x	0.3788	
Chromaticity Chroma y	0.3724	
Chromaticity Chroma u	0.2258	
Chromaticity Chroma v	0.3329	
Duv	0.0023	
Chromaticity Chroma u'	0.2258	
Chromaticity Chroma v'	0.4994	

Special Color Rendering Indices	
R1	81.8
R2	89.6
R3	94.6
R4	82.2
R5	82.1
R6	85.3
R7	85.8
R8	65.3
R9	11.1
R10	75
R11	81.1
R12	65
R13	83.8
R14	97.2
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 25.1°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)	0.548
Power Factor	0.9909
Test Power (W)	65.14
Luminous Efficacy (lm/W)	145.8
Total Luminous Flux (lm)	9496.5
Beam Angle (°)	315.8
Center Beam Candle Power (cd)	382
Spacing Criteria	2.67 (0°-180°)/ 2.68 (90°-270°)
Zonal Lumens in the 0°-60°Zone	24.69%
Zonal Lumens in the 60°-90°Zone	30.54%
Zonal Lumens in the 90°-120°Zone	28.96%
Zonal Lumens in the 120°-180°Zone	15.80%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

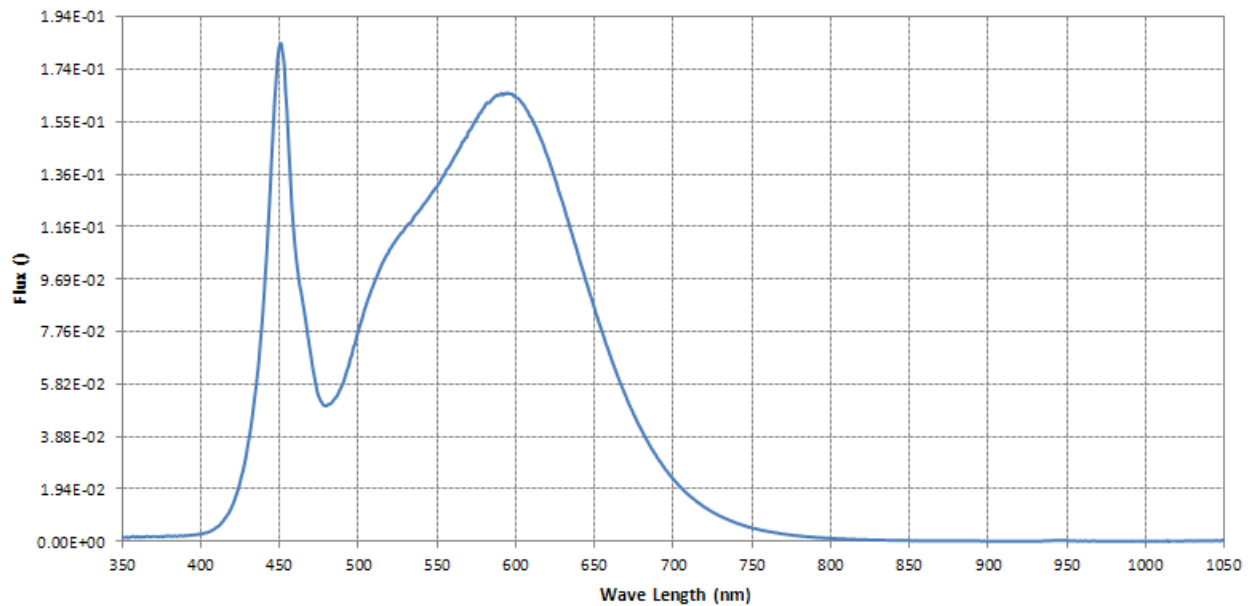
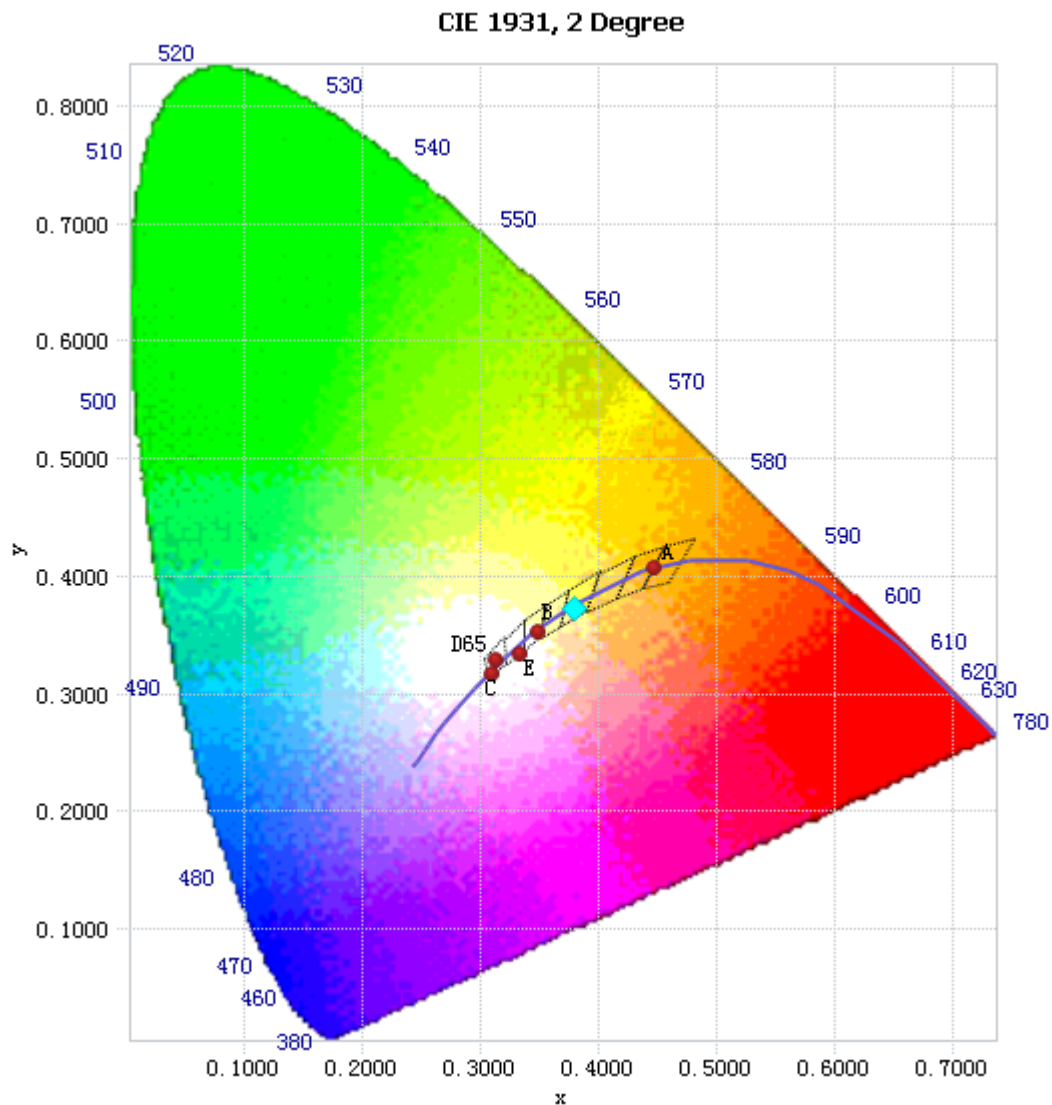


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.98E-03	485	5.27E-02	590	1.65E-01	695	2.67E-02
385	1.92E-03	490	5.81E-02	595	1.66E-01	700	2.31E-02
390	2.19E-03	495	6.74E-02	600	1.64E-01	705	1.99E-02
395	2.39E-03	500	7.76E-02	605	1.61E-01	710	1.71E-02
400	2.79E-03	505	8.71E-02	610	1.57E-01	715	1.48E-02
405	3.51E-03	510	9.52E-02	615	1.50E-01	720	1.27E-02
410	5.26E-03	515	1.02E-01	620	1.43E-01	725	1.09E-02
415	8.20E-03	520	1.08E-01	625	1.34E-01	730	9.33E-03
420	1.31E-02	525	1.12E-01	630	1.25E-01	735	8.05E-03
425	2.19E-02	530	1.16E-01	635	1.15E-01	740	6.86E-03
430	3.58E-02	535	1.19E-01	640	1.05E-01	745	5.89E-03
435	5.64E-02	540	1.23E-01	645	9.55E-02	750	5.05E-03
440	8.93E-02	545	1.27E-01	650	8.64E-02	755	4.34E-03
445	1.40E-01	550	1.31E-01	655	7.72E-02	760	3.75E-03
450	1.83E-01	555	1.36E-01	660	6.88E-02	765	3.22E-03
455	1.57E-01	560	1.41E-01	665	6.08E-02	770	2.78E-03
460	1.08E-01	565	1.46E-01	670	5.37E-02	775	2.39E-03
465	8.77E-02	570	1.51E-01	675	4.70E-02	780	2.05E-03
470	6.88E-02	575	1.56E-01	680	4.12E-02		
475	5.36E-02	580	1.60E-01	685	3.57E-02		
480	5.01E-02	585	1.63E-01	690	3.10E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.3788, 0.3724)

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

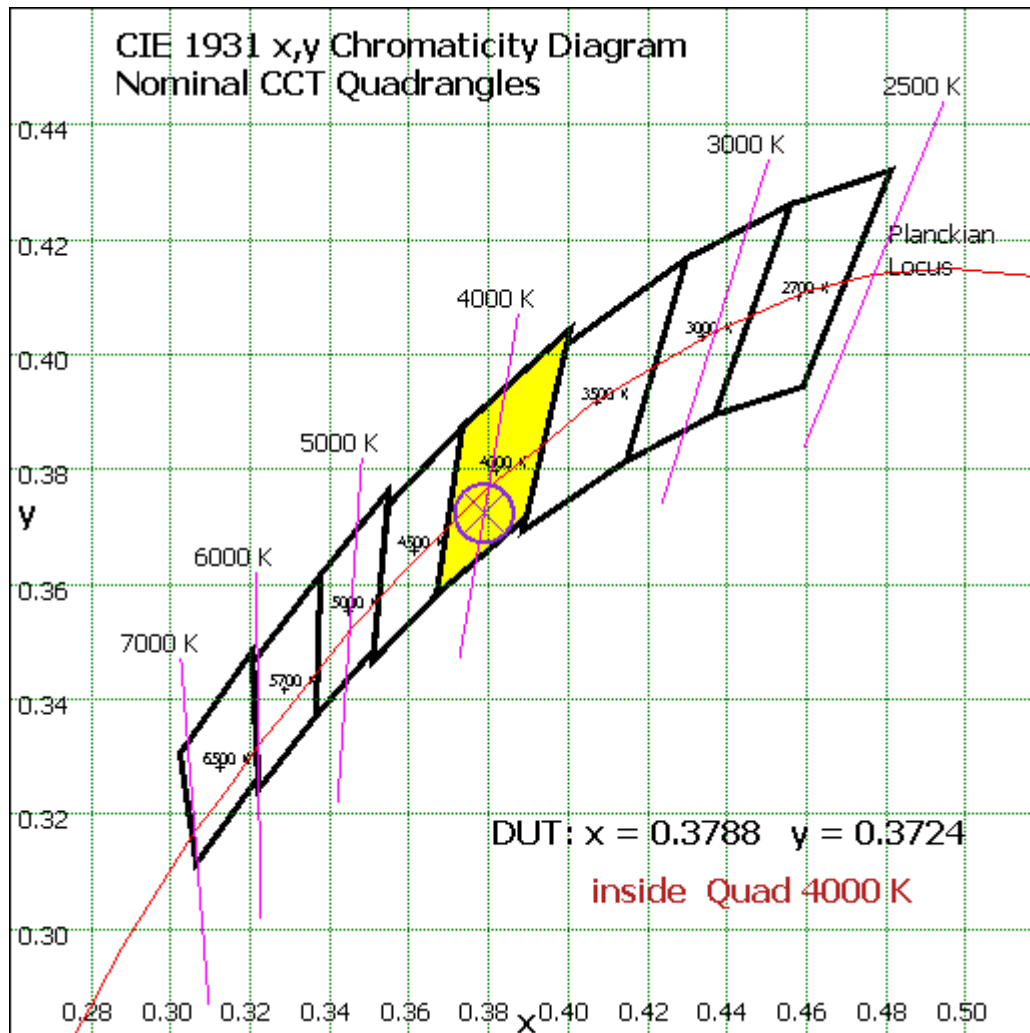


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	37.756	0.40%
10- 20	130.859	1.38%
20- 30	271.237	2.86%
30- 40	448.779	4.73%
40- 50	641.707	6.76%
50- 60	814.326	8.58%
60- 70	921.845	9.71%
70- 80	974.997	10.27%
80- 90	1003.62	10.57%
90-100	998.306	10.51%
100-110	936.361	9.86%
110-120	815.979	8.59%
120-130	646.003	6.80%
130-140	447.054	4.71%
140-150	262.724	2.77%
150-160	115.396	1.22%
160-170	27.781	0.29%
170-180	1.768	0.02%
Total	9496.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2344.664	24.69%
60- 90	2900.462	30.54%
0-90	5245.126	55.23%
90- 180	4251.372	44.77%
0- 180	9496.5	100%

Table 4: Zonal Lumen Data

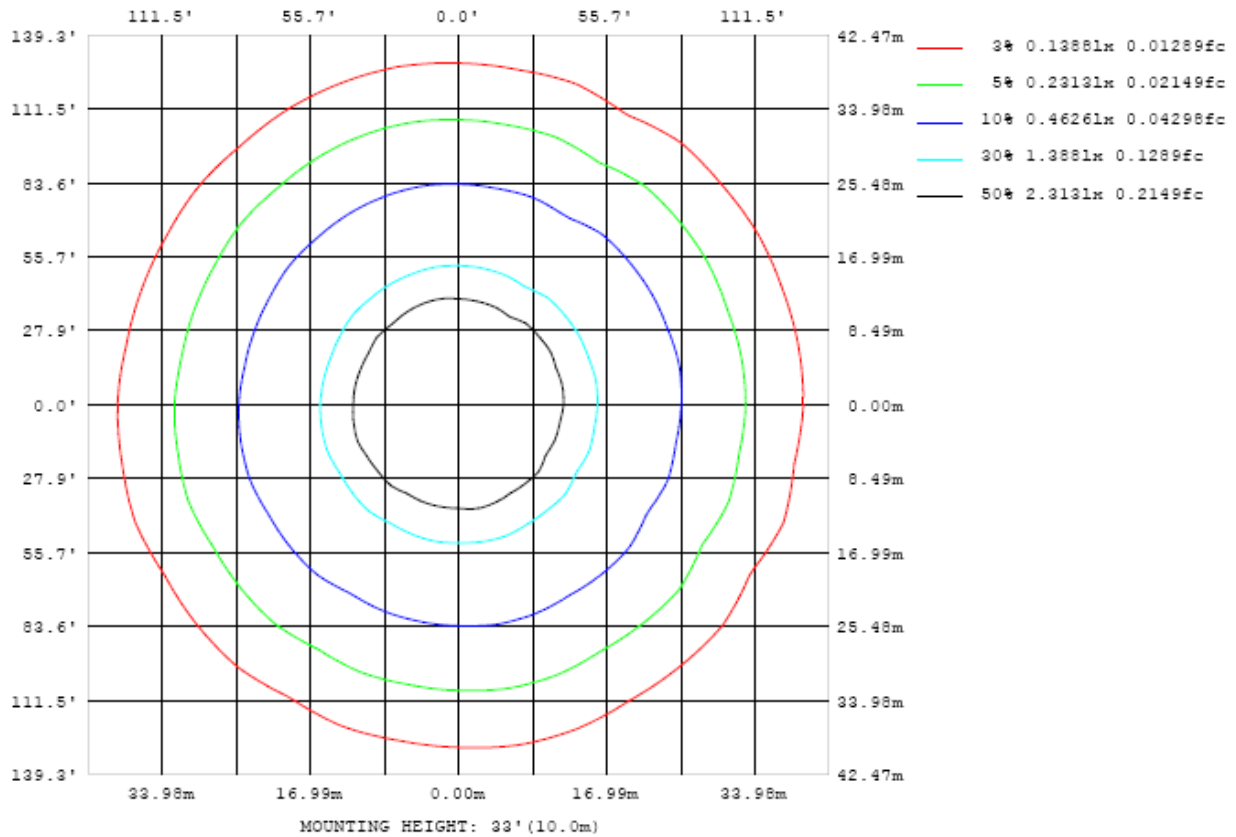


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

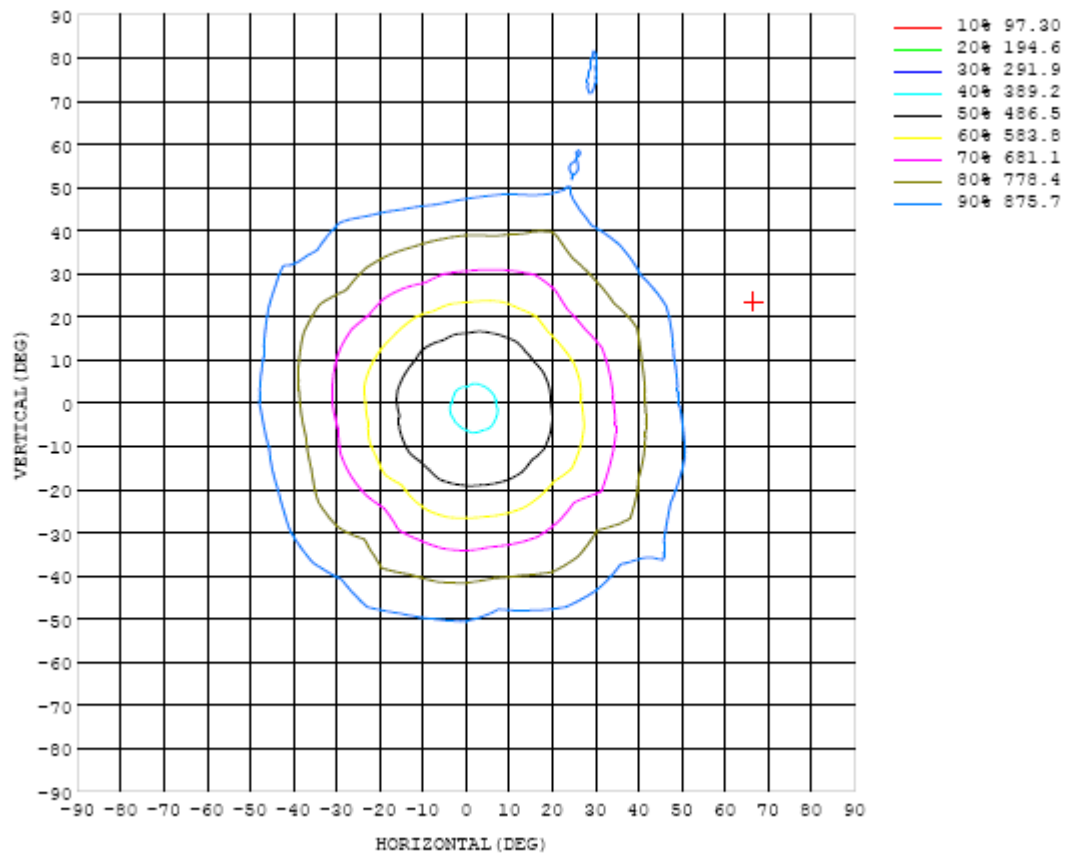


Chart 5: Isocandela Plot

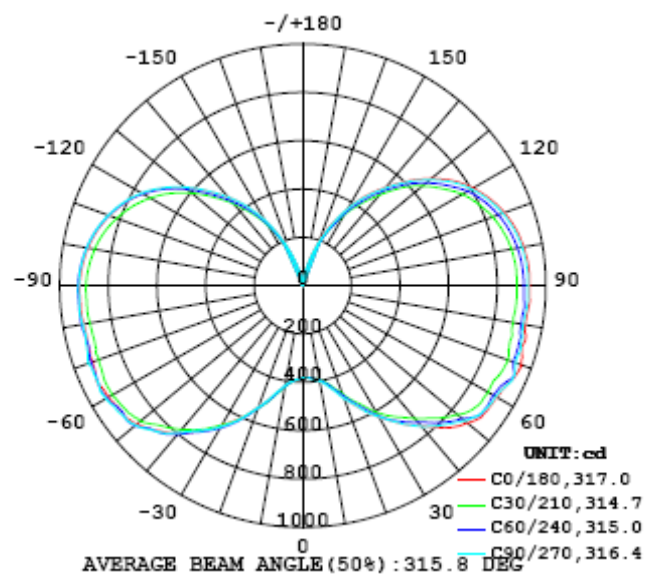


Chart 6: Polar Candela Distribution

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	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382
5	385	384	383	382	382	382	384	385	386	386	388	388	389	390	390	391	392	392	393
10	398	397	396	396	395	396	398	398	399	401	403	407	410	410	412	416	418	421	421
15	434	429	425	424	429	427	430	433	436	437	443	447	456	457	456	463	467	476	473
20	492	483	478	476	487	482	485	491	497	496	501	505	519	526	518	530	532	540	536
25	559	544	537	536	554	549	548	554	561	559	560	566	580	600	586	596	597	610	607
30	626	614	610	605	629	623	622	629	630	626	629	640	652	674	666	667	667	678	667
35	694	678	671	662	704	692	685	691	699	694	694	703	703	739	724	719	728	742	734
40	758	749	739	718	764	749	738	757	766	760	759	766	758	793	773	771	799	809	796
45	829	807	799	776	825	805	801	827	838	816	807	810	804	841	829	825	849	857	849
50	885	855	857	830	878	862	856	879	893	869	870	870	861	895	882	888	919	909	890
55	915	901	910	872	922	904	906	935	927	906	914	906	892	926	904	894	931	915	913
60	922	905	922	881	932	914	906	934	931	917	924	913	899	936	924	906	937	924	925
65	939	907	933	886	948	942	931	955	960	944	937	920	897	938	932	923	955	945	936
70	956	935	955	897	952	940	923	950	958	933	930	925	908	942	930	919	945	931	922
75	938	911	948	883	943	929	921	950	951	929	920	927	894	932	923	907	940	918	919
80	929	906	941	879	935	922	914	940	943	921	913	928	895	928	920	906	939	924	916
85	934	907	943	881	938	925	916	943	948	927	914	935	898	933	925	905	939	926	918
90	932	906	944	881	939	926	909	940	949	926	914	938	893	934	926	904	937	928	918
95	932	906	943	880	939	925	906	938	948	925	911	935	885	931	922	898	931	922	912
100	922	897	934	871	931	917	897	930	940	916	901	924	872	922	910	884	916	909	898
105	907	881	916	855	916	902	880	915	923	900	883	904	850	904	891	863	896	891	877
110	883	858	890	831	894	879	857	894	900	876	858	875	820	879	864	834	868	862	848
115	849	827	854	798	863	846	824	858	866	843	825	835	783	845	829	797	825	823	810
120	808	787	808	758	822	806	783	807	822	801	783	785	739	800	786	752	771	773	763
125	757	735	747	701	762	744	725	744	760	749	731	723	687	745	730	698	712	712	703
130	690	673	686	643	690	672	663	686	692	682	667	655	630	677	660	631	644	639	632
135	613	603	612	573	616	602	591	614	615	608	594	580	553	596	580	553	560	555	554
140	532	521	524	491	536	516	512	524	523	527	514	498	478	508	502	477	479	470	478
145	454	440	443	413	455	444	430	442	439	449	437	418	408	423	427	400	399	389	397
150	366	355	354	338	365	351	348	362	353	366	351	338	335	336	344	316	317	307	312
155	282	270	269	255	271	265	258	274	268	275	264	252	251	241	251	225	222	215	223
160	191	180	179	175	185	182	172	182	178	184	177	167	169	157	165	147	140	139	140
165	110	105	105	103	106	101	97.4	105	105	107	102	94.2	91.0	86.6	89.7	81.9	74.4	71.4	71.0
170	50.0	48.5	47.7	48.3	47.5	45.3	40.9	42.8	46.1	46.2	46.7	43.6	40.0	37.1	35.0	32.9	29.3	27.5	25.5
175	14.3	13.6	14.4	13.4	10.8	9.09	9.56	11.7	14.1	14.8	14.2	13.3	12.6	11.8	10.1	10.2	10.0	9.42	6.50
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

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382		
5	394	394	394	394	393	393	393	393	392	391	390	389	388	387	387	386	386		
10	421	424	426	426	422	422	423	423	418	415	413	409	407	403	403	401	400		
15	471	474	479	482	474	477	478	473	469	462	457	451	447	448	446	438	435		
20	531	537	540	543	539	539	546	539	536	525	520	518	506	510	506	495	493		
25	598	604	608	613	611	612	624	612	610	598	587	584	575	585	575	562	558		
30	663	661	666	680	674	681	688	677	674	662	654	647	648	659	653	638	634		
35	730	721	726	748	734	739	743	734	733	728	714	698	705	726	721	695	694		
40	782	773	777	804	800	802	806	802	793	787	769	745	769	774	773	747	757		
45	839	826	821	845	837	852	859	862	853	837	811	792	830	831	832	808	832		
50	890	877	871	901	880	901	917	922	897	887	877	845	892	888	896	870	888		
55	895	888	891	921	900	909	919	931	919	912	903	877	930	920	921	910	931		
60	900	895	904	923	919	931	937	943	935	930	903	875	935	932	934	913	929		
65	910	902	903	923	915	932	944	951	933	926	926	887	951	949	951	929	936		
70	899	894	894	915	907	927	938	938	939	922	925	881	953	954	947	939	955		
75	889	886	887	907	896	916	927	934	924	909	920	872	936	932	948	940	943		
80	890	890	890	907	899	924	930	939	919	911	923	871	935	924	935	920	925		
85	891	893	893	909	901	925	931	938	923	914	927	878	940	932	943	926	929		
90	890	893	892	908	900	925	929	938	922	914	926	878	939	930	943	926	926		
95	883	885	884	901	893	918	923	930	916	911	921	876	935	926	941	927	924		
100	870	871	870	887	879	903	910	916	903	900	909	867	923	915	932	921	915		
105	849	848	848	865	856	881	889	894	882	882	887	848	905	897	917	904	899		
110	820	819	815	835	826	851	854	864	852	855	857	819	878	870	894	877	877		
115	783	779	775	798	787	811	809	826	814	819	819	782	842	835	861	838	846		
120	736	730	725	751	740	761	760	779	767	773	772	738	798	793	819	790	806		
125	679	672	667	692	679	697	703	720	706	715	722	687	743	739	764	736	755		
130	612	602	597	621	606	622	627	650	635	645	659	623	675	670	693	673	691		
135	535	522	519	539	525	536	539	571	556	565	577	548	598	593	610	597	617		
140	458	444	444	462	451	457	457	492	479	481	493	472	517	512	526	515	539		
145	379	366	366	380	374	381	381	409	401	399	412	400	439	439	444	437	461		
150	292	286	288	294	289	298	301	318	314	314	327	321	351	354	356	360	377		
155	204	197	203	203	199	208	212	225	223	223	231	233	259	262	263	272	284		
160	130	125	127	128	121	133	137	145	143	145	155	153	172	175	175	184	194		
165	68.7	63.5	62.5	63.6	59.1	64.9	69.2	73.4	71.5	75.8	80.5	82.3	95.1	98.0	98.2	107	113		
170	25.3	23.7	23.1	20.4	22.3	21.4	25.0	25.7	26.8	28.4	30.1	33.8	39.7	41.6	42.6	47.1	51.2		
175	6.66	5.03	4.60	3.26	4.30	5.01	5.39	5.97	7.80	8.10	9.01	10.9	11.5	12.7	13.8	14.2	14.9		
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 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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