



LM-79-08 Test Report

for

GREEN CREATIVE LTD

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

LED HID

Model: 54HID/850/277V/EX39

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18030035c

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:



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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: **54HID/850/277V/EX39**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
144.7	7560.0	52.25	0.9948
CCT (K)	CRI	Stabilization Time (Light & Power)	
5101	83.6	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. 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	: 54HID/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)	0.438	0.205
Power Factor	0.9948	0.9186
Test Power (W)	52.25	51.72
THD A%	7.45	14.70
Luminous Efficacy (lm/W)	144.7	145.7
Total Luminous Flux (lm)	7560.0	7535.0
Color Rendering Index (CRI)	83.6	
R9	13.9	
Correlated Color Temperature (CCT)(K)	5101	
Chromaticity Chroma x	0.3423	
Chromaticity Chroma y	0.3495	
Chromaticity Chroma u	0.2103	
Chromaticity Chroma v	0.3222	
Duv	0.0005	
Chromaticity Chroma u'	0.2103	
Chromaticity Chroma v'	0.4832	

Special Color Rendering Indices	
R1	82.6
R2	87.9
R3	91.2
R4	84.3
R5	83.5
R6	83
R7	86.9
R8	69.8
R9	13.9
R10	70.9
R11	84.1
R12	65.2
R13	83.7
R14	95.2
Rf	82
Rg	97

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 24.7°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)	0.437
Power Factor	0.9940
Test Power (W)	52.13
Luminous Efficacy (lm/W)	144.9
Total Luminous Flux (lm)	7551.0
Beam Angle (°)	292.1
Center Beam Candle Power (cd)	552
Spacing Criteria	2.03 (0°-180°)/ 2.04 (90°-270°)
Zonal Lumens in the 0°-60°Zone	31.20%
Zonal Lumens in the 60°-90°Zone	29.07%
Zonal Lumens in the 90°-120°Zone	25.81%
Zonal Lumens in the 120°-180°Zone	13.92%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

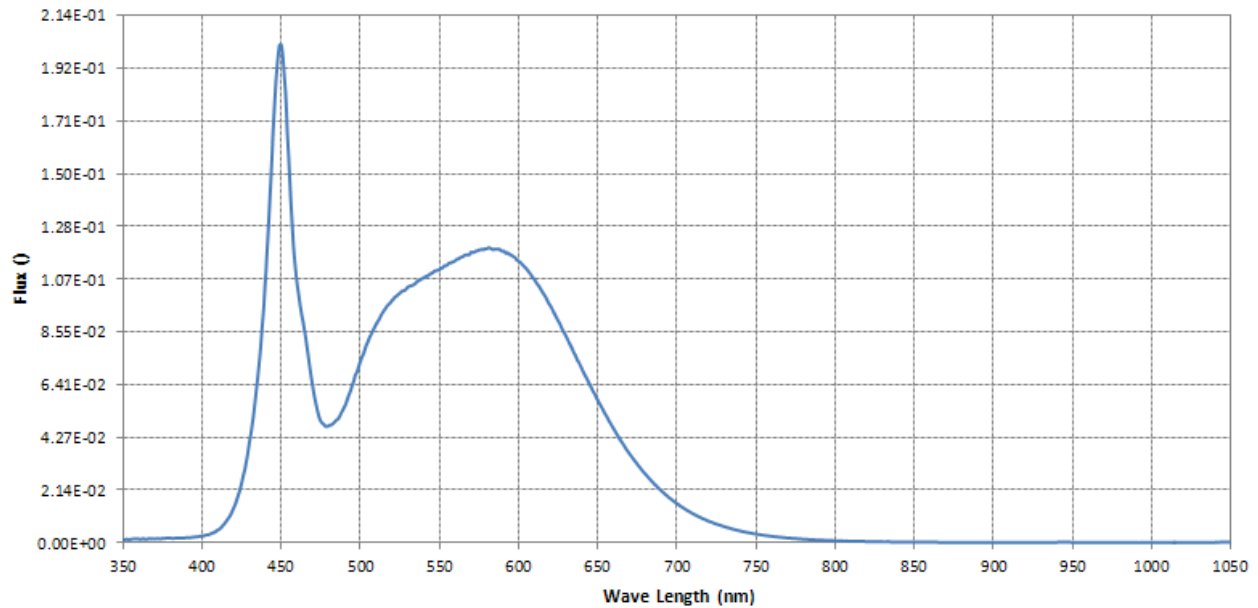
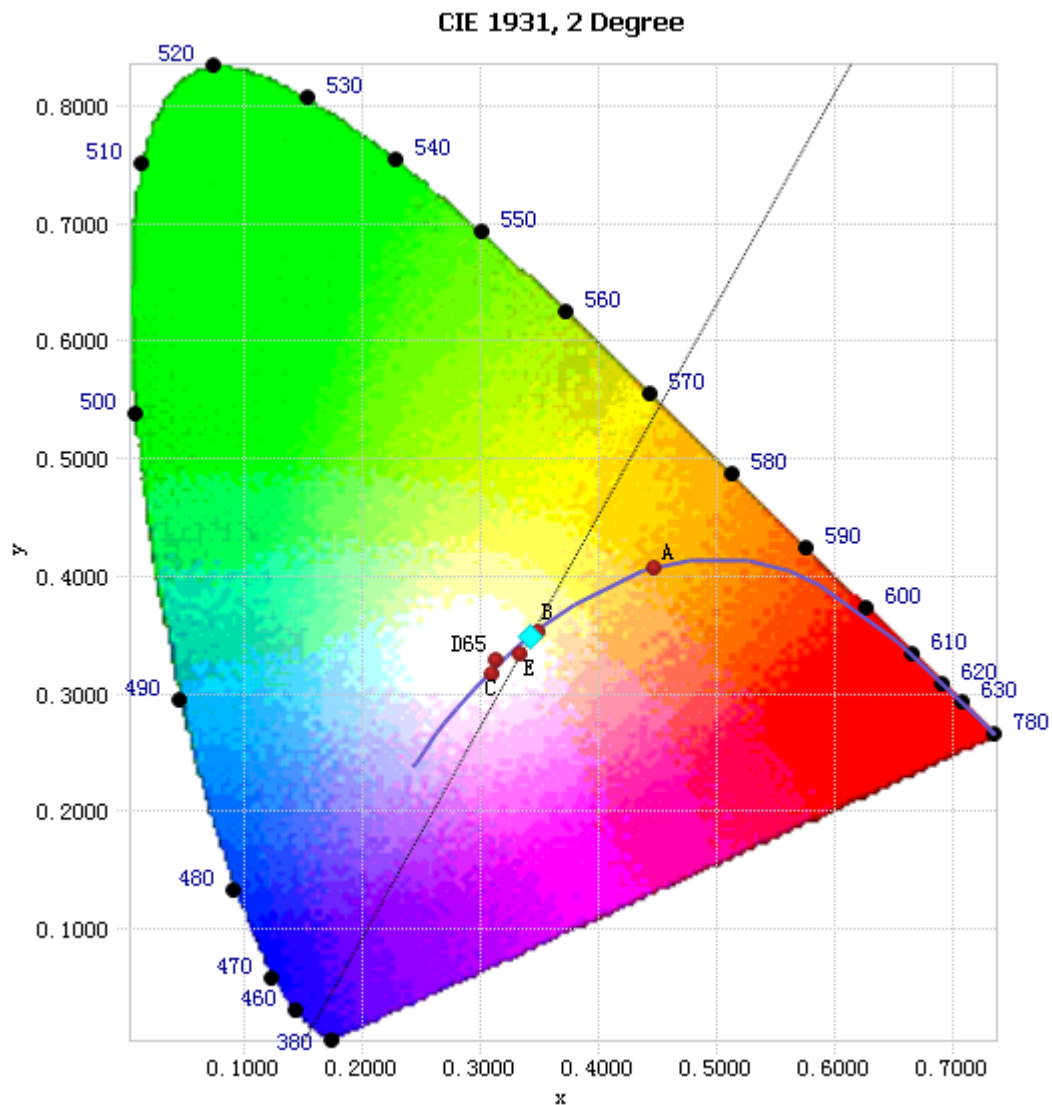


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.88E-03	485	4.97E-02	590	1.18E-01	695	1.84E-02
385	1.85E-03	490	5.50E-02	595	1.17E-01	700	1.59E-02
390	2.11E-03	495	6.40E-02	600	1.14E-01	705	1.37E-02
395	2.27E-03	500	7.33E-02	605	1.11E-01	710	1.18E-02
400	2.64E-03	505	8.16E-02	610	1.07E-01	715	1.02E-02
405	3.45E-03	510	8.84E-02	615	1.02E-01	720	8.79E-03
410	5.18E-03	515	9.41E-02	620	9.62E-02	725	7.59E-03
415	8.31E-03	520	9.81E-02	625	9.00E-02	730	6.53E-03
420	1.40E-02	525	1.01E-01	630	8.38E-02	735	5.60E-03
425	2.39E-02	530	1.04E-01	635	7.70E-02	740	4.82E-03
430	4.07E-02	535	1.05E-01	640	7.07E-02	745	4.13E-03
435	6.54E-02	540	1.07E-01	645	6.42E-02	750	3.56E-03
440	1.05E-01	545	1.09E-01	650	5.79E-02	755	3.05E-03
445	1.66E-01	550	1.11E-01	655	5.20E-02	760	2.63E-03
450	2.02E-01	555	1.12E-01	660	4.63E-02	765	2.27E-03
455	1.55E-01	560	1.14E-01	665	4.11E-02	770	1.94E-03
460	1.06E-01	565	1.16E-01	670	3.62E-02	775	1.69E-03
465	8.52E-02	570	1.18E-01	675	3.19E-02	780	1.44E-03
470	6.36E-02	575	1.19E-01	680	2.80E-02		
475	4.94E-02	580	1.19E-01	685	2.44E-02		
480	4.73E-02	585	1.19E-01	690	2.13E-02		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.3423, 0.3495)

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

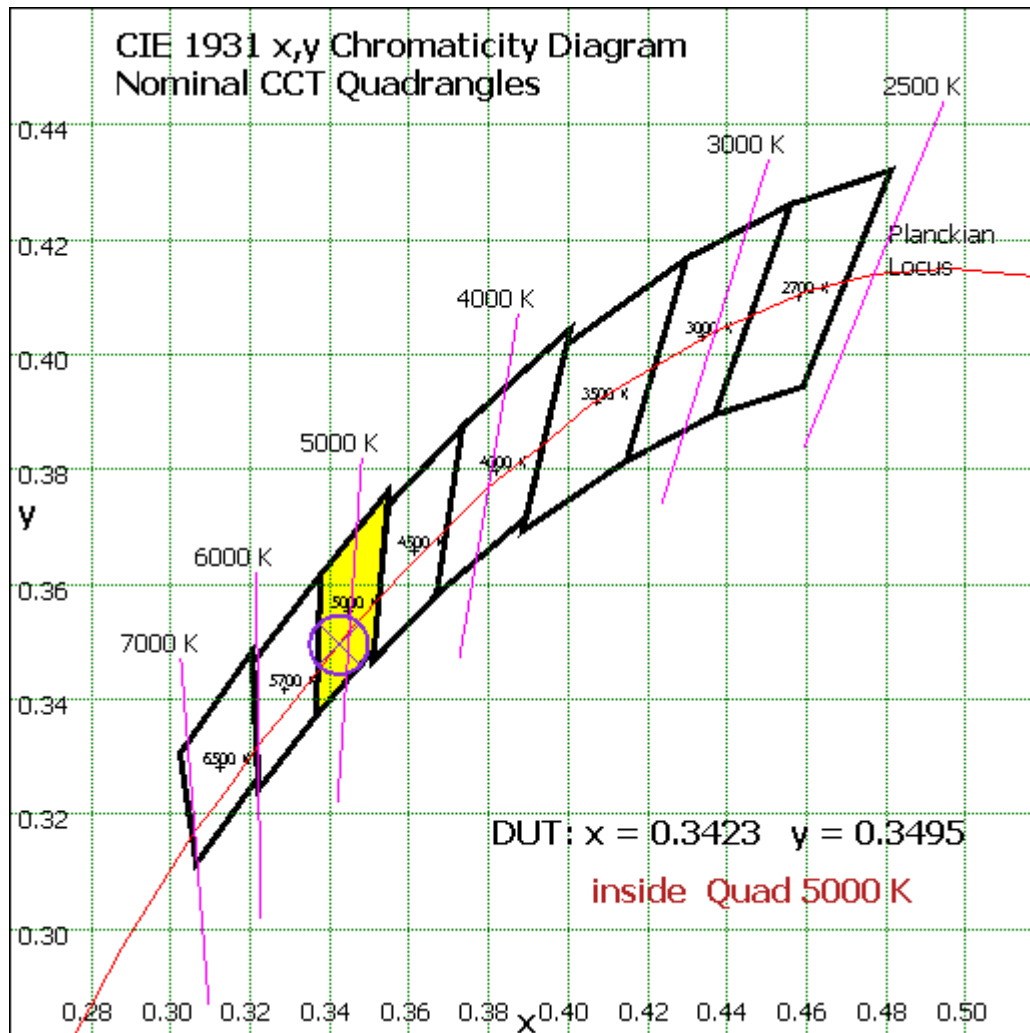


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	53.502	0.71%
10- 20	170.898	2.26%
20- 30	315.053	4.17%
30- 40	481.099	6.37%
40- 50	624.127	8.27%
50- 60	711.437	9.42%
60- 70	749.339	9.92%
70- 80	728.565	9.65%
80- 90	717.022	9.50%
90-100	707.779	9.37%
100-110	662.944	8.78%
110-120	577.957	7.65%
120-130	454.794	6.02%
130-140	310.525	4.11%
140-150	183.896	2.44%
150-160	81.717	1.08%
160-170	19.17	0.25%
170-180	1.15	0.02%
Total	7551.0	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2356.116	31.20%
60- 90	2194.926	29.07%
0-90	4551.042	60.27%
90- 180	2999.932	39.73%
0- 180	7551.0	100%

Table 4: Zonal Lumen Data

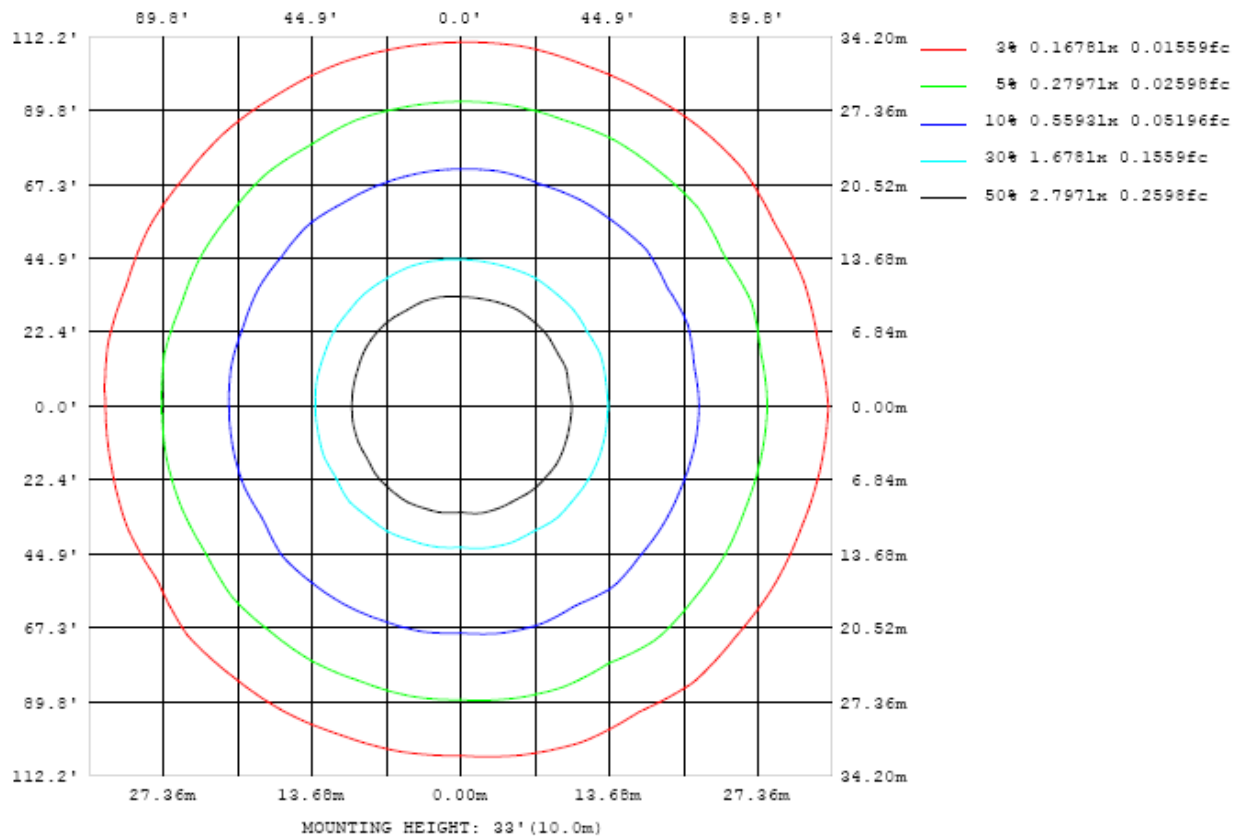


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

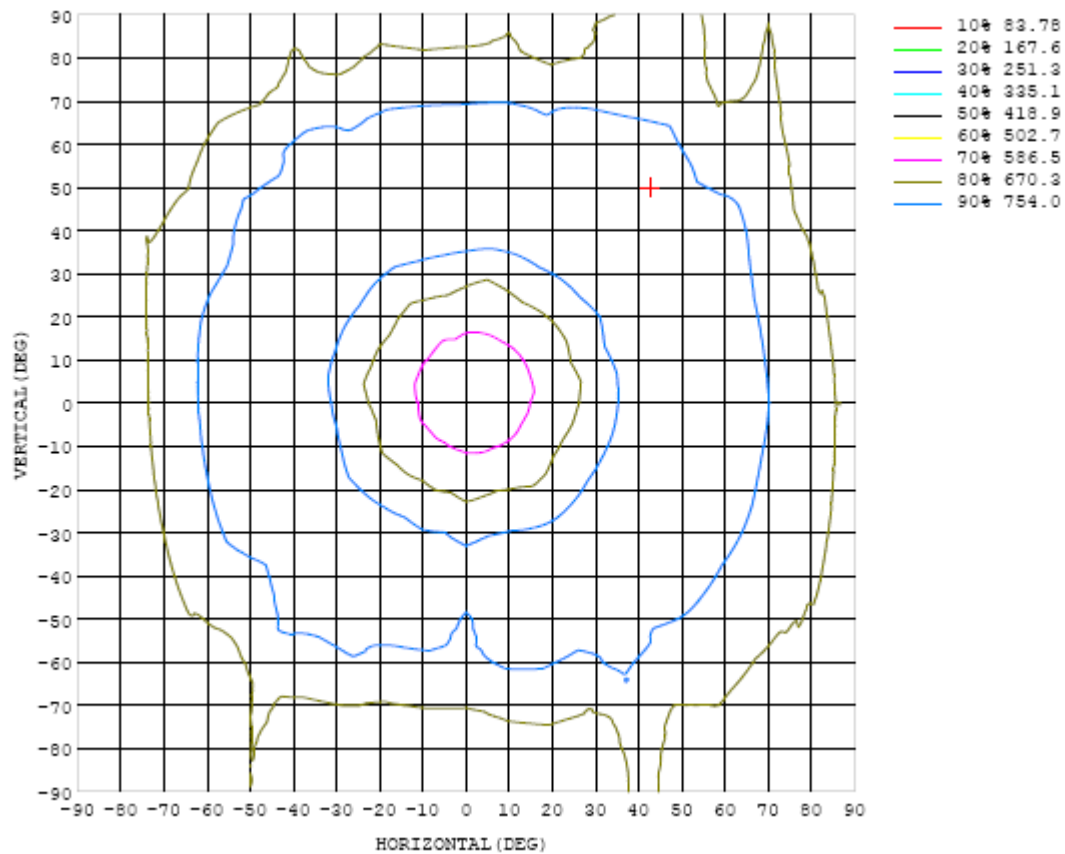


Chart 5: Isocandela Plot

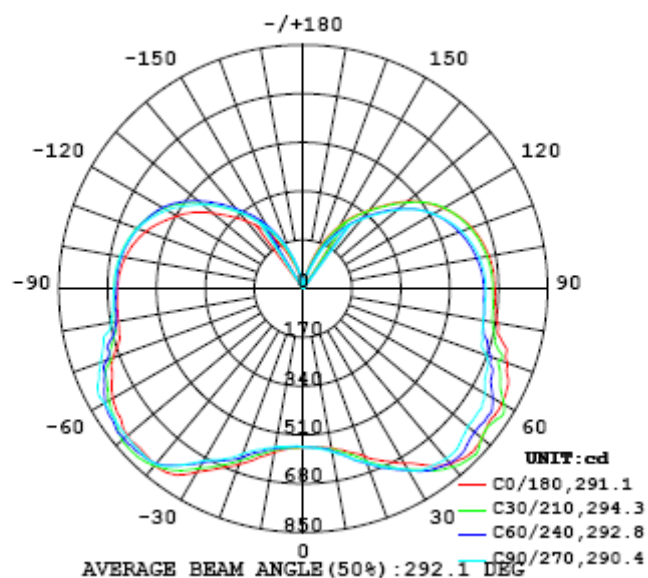


Chart 6: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552
5	556	556	556	556	557	557	557	558	559	559	559	559	559	559	559	560	558	558	559
10	565	566	567	569	571	573	574	575	577	578	580	582	584	582	583	582	579	580	580
15	588	590	596	596	596	599	608	608	608	607	615	617	623	618	618	614	612	616	610
20	621	628	637	639	641	640	649	657	652	646	660	659	665	660	660	653	656	659	652
25	663	670	682	682	673	675	691	704	696	689	706	710	715	705	699	693	697	702	691
30	703	713	723	729	713	716	731	745	744	730	752	748	756	750	743	735	747	748	738
35	752	759	767	774	777	775	771	778	779	761	772	761	779	792	787	775	784	793	789
40	796	793	796	811	817	812	793	806	800	774	778	778	800	809	812	785	795	810	803
45	817	810	817	830	820	818	794	801	801	767	795	797	811	804	803	775	793	797	796
50	810	807	811	810	802	804	778	795	784	748	783	778	797	785	802	765	794	790	797
55	796	797	803	810	798	814	781	795	774	746	763	764	785	777	797	767	788	776	778
60	798	794	802	806	790	804	762	781	766	730	745	739	760	759	767	734	763	763	762
65	787	778	759	757	750	778	723	744	731	701	717	710	724	731	749	702	730	733	733
70	756	740	724	728	728	755	695	712	700	678	681	672	686	685	701	673	694	703	703
75	717	712	690	690	680	699	655	674	661	646	651	642	659	658	679	635	662	659	660
80	686	676	660	668	661	691	638	657	649	636	639	634	652	652	674	630	652	649	653
85	672	666	651	663	658	684	632	652	644	634	636	630	648	648	671	624	648	643	648
90	667	662	647	659	655	683	629	650	643	634	637	628	647	646	669	623	647	642	646
95	665	659	644	657	653	679	624	647	639	632	632	622	641	640	662	617	642	637	641
100	657	652	637	649	644	669	613	637	630	622	620	612	630	628	651	606	632	627	628
105	643	640	624	637	630	654	598	621	616	608	604	596	614	611	633	591	617	611	609
110	624	622	605	619	610	632	578	602	597	586	581	575	593	590	608	570	597	591	583
115	597	598	581	595	586	601	554	576	571	558	550	549	566	561	573	543	571	564	547
120	562	566	551	565	555	564	522	541	536	523	514	514	530	525	539	506	534	528	507
125	522	528	511	524	513	519	483	493	491	481	470	468	480	477	494	460	485	481	464
130	474	480	460	468	461	462	433	438	437	427	416	414	422	421	433	405	428	426	411
135	415	420	406	409	403	397	377	381	382	369	355	359	366	365	374	351	373	369	357
140	357	361	355	354	351	338	323	327	330	316	301	309	315	315	316	303	321	319	308
145	307	304	303	301	301	284	269	275	278	259	243	254	262	259	260	250	269	268	259
150	252	247	241	245	245	226	216	214	218	202	186	194	200	198	201	193	209	208	205
155	196	189	185	182	181	169	159	152	154	144	130	135	139	136	135	133	146	146	148
160	134	127	120	115	116	104	96.5	91.2	92.9	85.2	77.4	79.8	79.8	77.7	77.1	76.9	86.6	85.3	90.5
165	79.3	75.5	70.0	66.1	64.9	60.0	52.0	47.1	45.5	40.4	36.8	36.0	34.7	33.9	34.5	34.4	39.8	40.3	45.0
170	35.7	33.4	30.1	27.5	25.0	23.1	19.5	17.0	14.9	13.0	12.2	11.2	10.4	10.2	11.0	11.2	11.8	13.4	16.4
175	9.93	9.45	8.64	8.41	7.82	6.92	6.23	5.68	4.79	3.87	3.17	2.36	1.85	1.49	1.62	1.95	2.54	3.45	4.02
180	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552	552		
5	558	557	558	558	556	554	555	554	552	550	549	549	548	548	549	550	552		
10	575	572	570	570	568	565	564	562	560	560	560	559	559	559	560	560	560		
15	603	599	599	597	596	589	583	586	580	577	577	578	578	576	579	581	581		
20	643	644	636	640	634	627	621	626	612	606	608	613	609	606	611	616	614		
25	676	680	680	682	670	662	665	667	655	644	650	655	653	650	654	662	655		
30	725	727	724	728	711	700	711	710	692	678	691	699	696	697	697	710	700		
35	785	778	773	774	761	752	760	759	751	737	742	751	749	749	740	761	749		
40	796	792	804	807	806	795	802	800	798	794	798	793	796	803	788	800	788		
45	799	800	823	827	828	809	826	819	802	801	814	827	822	828	806	824	797		
50	798	802	821	818	818	814	827	817	801	798	809	831	831	832	811	826	804		
55	790	782	797	800	818	807	819	810	799	797	797	815	802	817	792	819	799		
60	780	760	780	794	826	796	797	801	797	796	786	812	806	832	786	809	775		
65	744	731	754	748	782	764	773	780	788	791	771	793	801	828	786	814	772		
70	718	695	712	715	740	726	750	748	749	753	744	772	766	782	734	768	743		
75	679	663	684	678	693	694	710	703	719	729	709	722	730	741	704	721	707		
80	664	646	663	657	675	661	682	675	676	681	666	684	682	707	667	693	670		
85	658	643	660	652	668	656	668	664	664	671	651	671	677	698	647	676	656		
90	653	641	657	647	662	650	663	657	658	666	648	668	673	692	643	669	652		
95	645	638	655	643	657	649	662	655	655	663	646	666	669	692	641	667	652		
100	634	630	647	634	649	642	656	649	647	655	642	660	662	686	635	662	646		
105	618	616	634	620	635	630	646	637	632	641	632	651	652	674	624	652	637		
110	597	598	616	602	616	613	629	621	613	623	616	635	636	657	608	637	621		
115	571	574	592	578	589	592	606	598	584	600	595	615	614	633	588	616	601		
120	538	543	561	545	561	565	578	570	547	569	568	589	585	597	560	589	574		
125	495	499	518	507	528	526	540	531	503	522	521	540	539	550	521	552	536		
130	441	444	463	462	478	476	489	481	457	476	465	482	486	504	472	500	488		
135	381	389	404	408	419	420	433	428	406	423	416	431	433	449	421	441	431		
140	326	336	350	353	358	364	374	374	351	370	367	383	384	389	368	385	375		
145	273	285	299	298	301	313	321	321	292	313	306	319	327	325	316	332	324		
150	215	229	240	237	239	259	266	262	244	256	254	266	269	268	258	275	271		
155	157	166	178	178	183	198	203	198	188	199	193	202	208	201	197	211	210		
160	95.8	107	114	112	118	135	140	137	132	134	129	133	142	136	139	146	149		
165	48.3	55.0	61.2	64.6	65.3	75.8	80.5	75.3	74.4	76.6	74.2	76.7	83.9	80.5	79.4	81.3	86.8		
170	18.0	19.7	21.1	24.1	27.3	32.5	33.5	31.1	31.1	31.5	30.2	30.5	35.4	34.9	35.4	36.2	37.6		
175	4.06	4.71	5.37	6.44	6.93	8.16	8.93	8.53	8.23	8.67	9.03	8.58	9.50	10.2	10.9	11.1	11.1		
180	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84		

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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