

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

Test Model: LES9027DIM010UNVWD/ADR4CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu
Report Number:	RKS180131080-10-4-M1
Test Date:	2018-05-23 to 2018-05-24
Report Date:	2020-09-04
Reviewed By:	Seven Xia/EE Engineer
Revised Note:	The previous report RKS180131080-10-4 is replaced by this report on 2020-09-04
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268
Test Facility:	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
Accreditation:	The IAS Accreditation Number TL-749.

1. Product Description

General Information:

One sample was received on 2018-02-05 and used for testing.

Model Tested: LES9027DIM010UNVWD/ADR4CC
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Recessed Downlight
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 VAC 50/60Hz
 Rated Power: 12.5W
 Nominal CCT: 2700K
 Nominal Lumen Output: 1000lm

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2018-01-24	2019-01-24
Power Meter	INVENTFINE	WT500	GSJWQ20009	2018-03-23	2019-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-03-23	2019-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-01-24	2019-01-24
Thermal Meter	KEJIAN	TA298	N/A	2017-11-14	2018-11-14
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2018-03-23	2019-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-03-23	2019-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-03-23	2019-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-03-23	2019-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2018-01-24	2019-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2017-11-14	2018-11-14
Standard Light Source	INVENTFINE	N/A	JWBYR040007	2018-01-24	2019-01-24

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is $U=2.6\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=24\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.5(K=2)$, at the 95% confidence level.

The uncertainty of power meter AC current $U=0.16\%$ of rdg, AC Voltage $U=0.18\%$ of rdg, Power $U=0.14\%$ ($K=2$), at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

The uncertainty of the luminous flux is $U=2.6\%$ ($K=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_i , R_g was calculated according to IES TM-30-15 by using calculation tools. The calculation was based on the measured SPD from 380nm to 780nm with 1nm intervals. All the colors in this report is for reference only.

5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

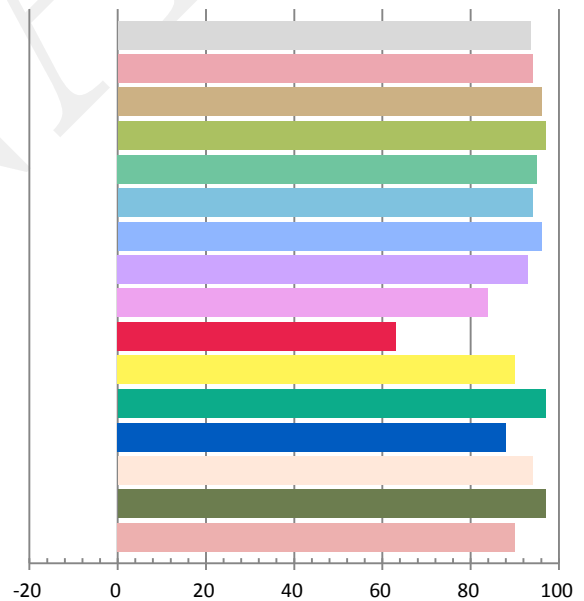
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1042	12.44	0.9948	1166.7	93.79

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.107	2731	0.00132	0.4596	0.4141	0.2607	0.5286

Color Rendering Index

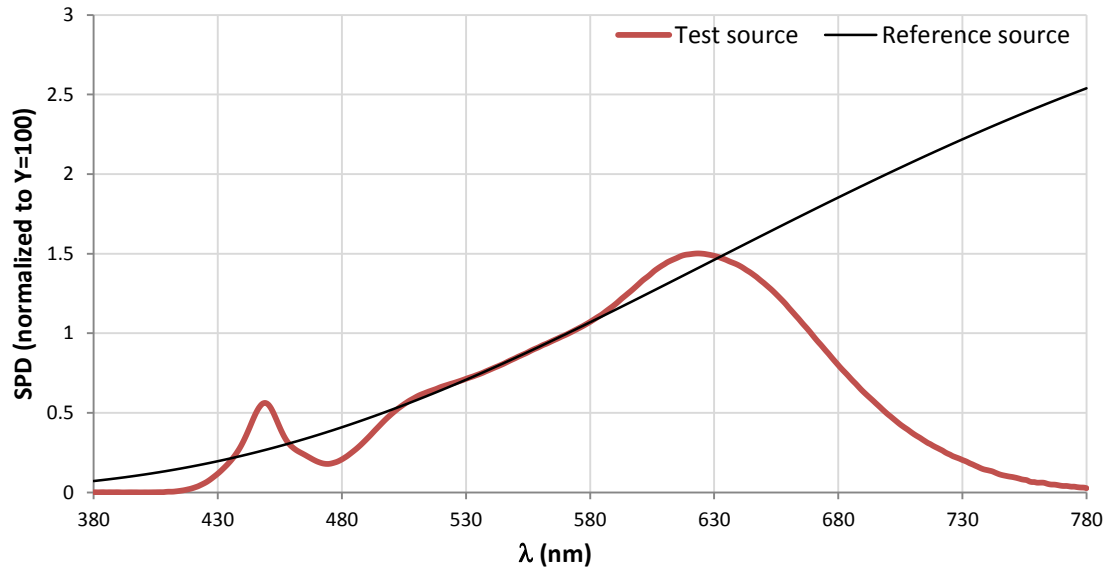
Ra 93.6			
R1 94	R2 96	R3 97	R4 95
R5 94	R6 96	R7 93	R8 84
R9 63	R10 90	R11 97	R12 88
R13 94	R14 97	R15 90	



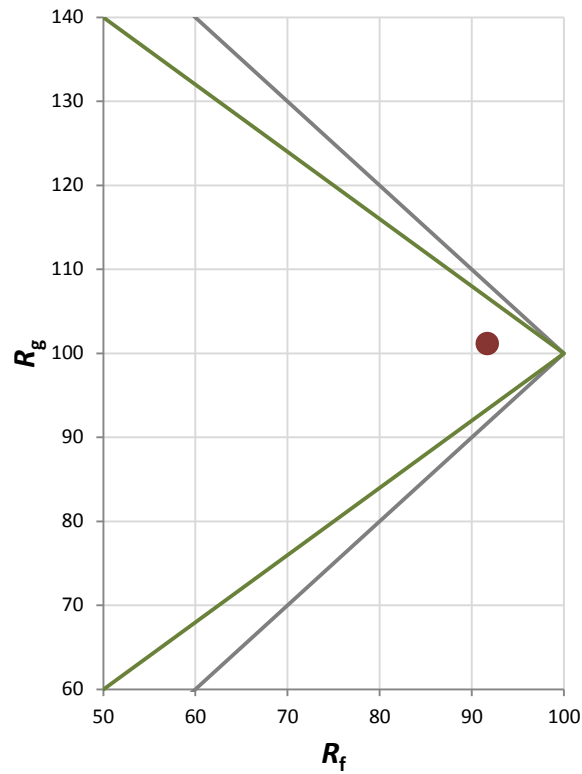
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	101

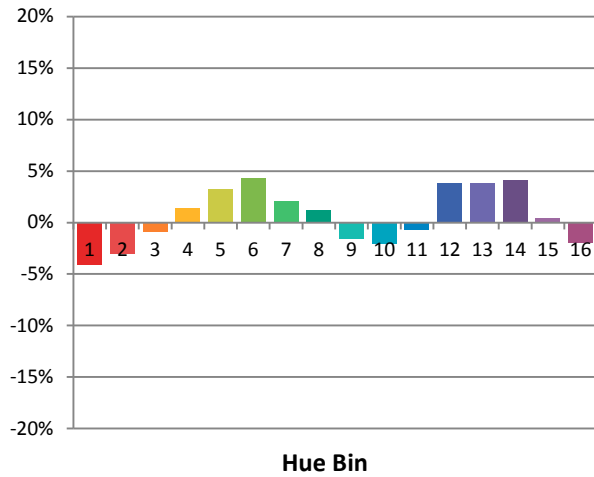
Spectral Power Distribution Comparison



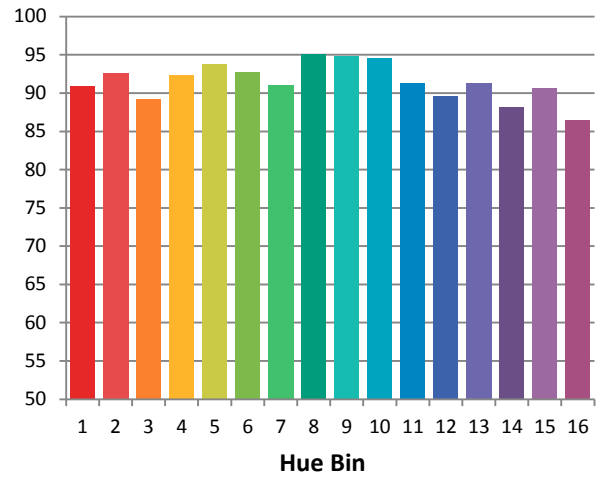
Plot of R_g versus R_f



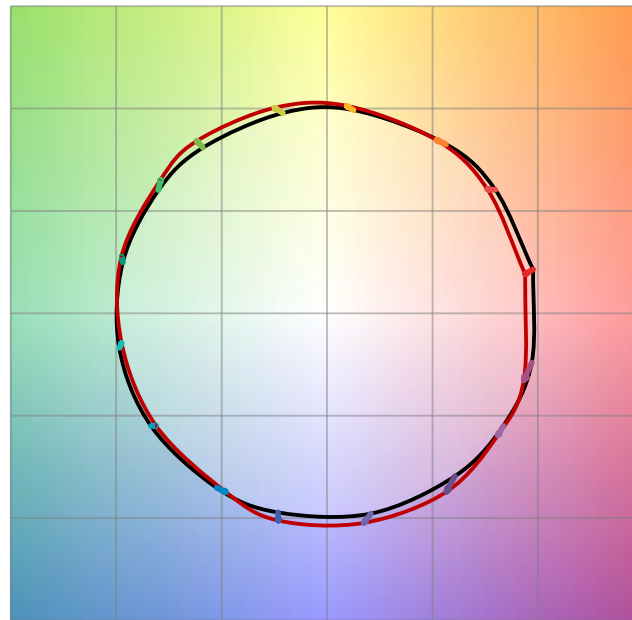
Chroma Shift by Hue



R_f by Hue

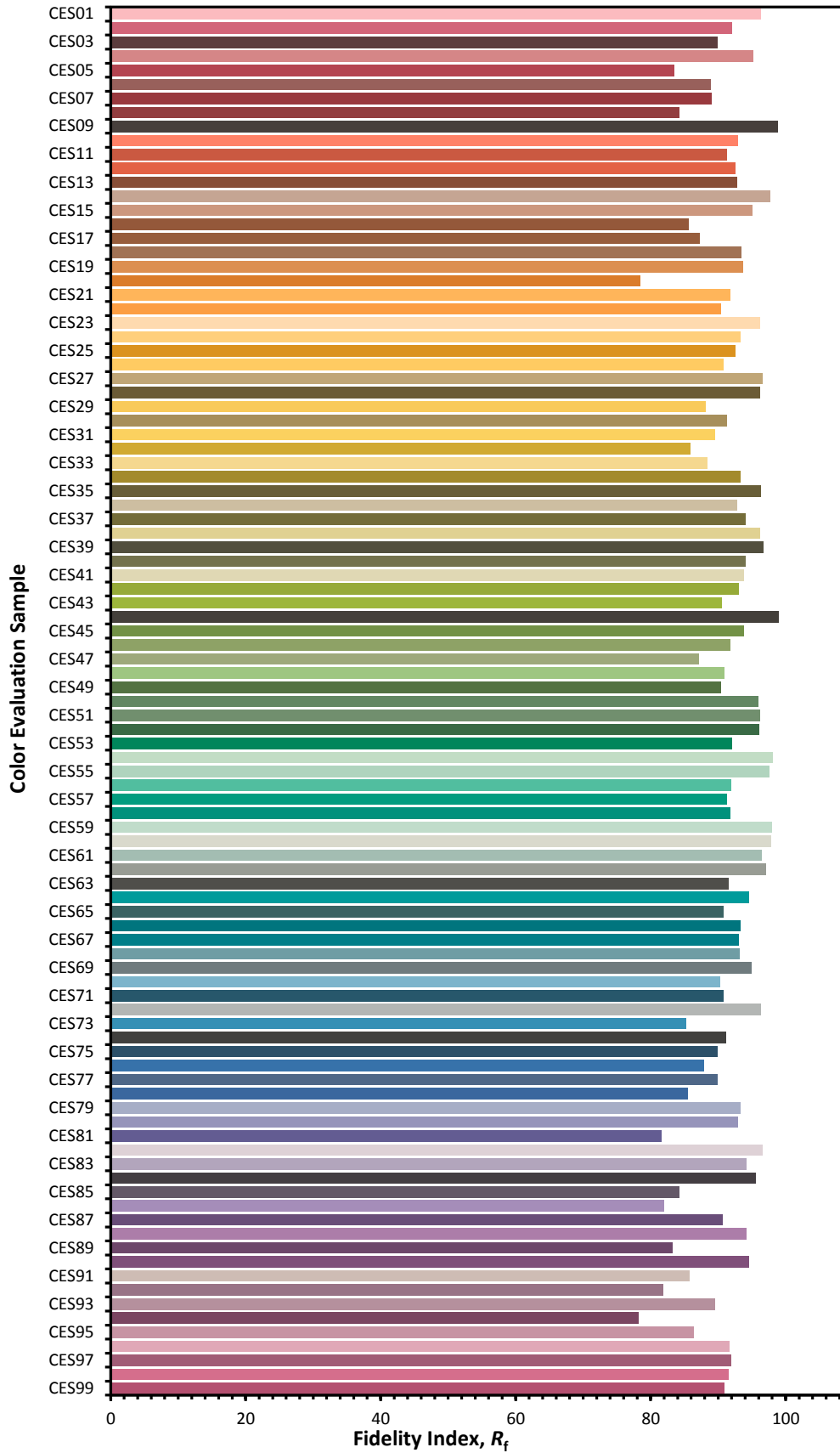


Color Vector Graphic

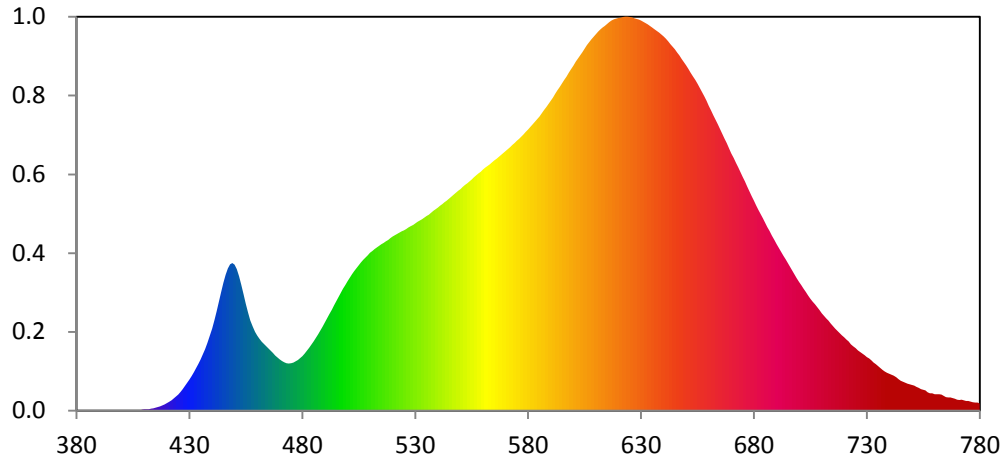


— Refenerce Illuminat — Test Source

Color Fidelity by CES Sample



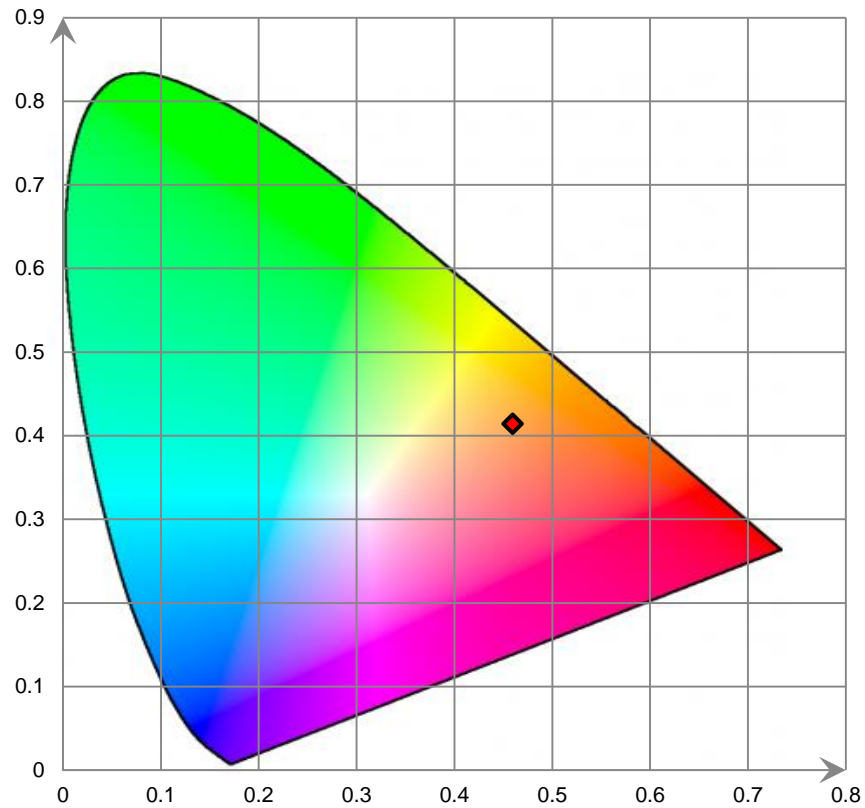
Relative Spectral Power Distribution



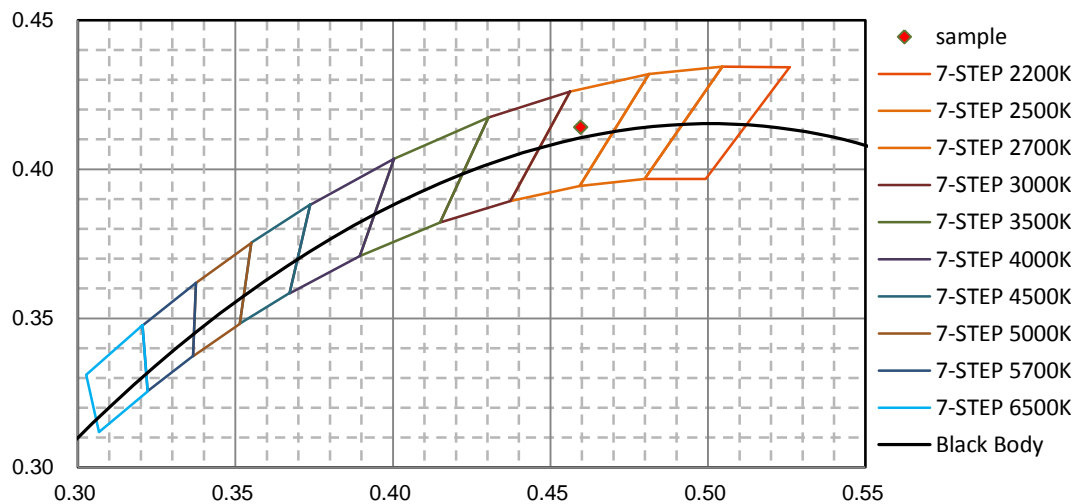
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.070E-02	421	5.640E-01	462	4.480E+00	503	9.078E+00	544	1.368E+01
381	1.890E-02	422	6.583E-01	463	4.326E+00	504	9.273E+00	545	1.379E+01
382	1.430E-02	423	7.828E-01	464	4.186E+00	505	9.460E+00	546	1.392E+01
383	2.670E-02	424	9.113E-01	465	4.044E+00	506	9.641E+00	547	1.406E+01
384	2.790E-02	425	1.049E+00	466	3.893E+00	507	9.816E+00	548	1.419E+01
385	1.650E-02	426	1.209E+00	467	3.742E+00	508	9.969E+00	549	1.431E+01
386	2.130E-02	427	1.394E+00	468	3.591E+00	509	1.011E+01	550	1.443E+01
387	2.400E-02	428	1.597E+00	469	3.451E+00	510	1.027E+01	551	1.456E+01
388	2.080E-02	429	1.802E+00	470	3.326E+00	511	1.040E+01	552	1.468E+01
389	2.410E-02	430	2.018E+00	471	3.225E+00	512	1.052E+01	553	1.480E+01
390	2.220E-02	431	2.252E+00	472	3.140E+00	513	1.062E+01	554	1.492E+01
391	1.000E-02	432	2.507E+00	473	3.085E+00	514	1.073E+01	555	1.505E+01
392	6.400E-03	433	2.767E+00	474	3.062E+00	515	1.083E+01	556	1.519E+01
393	1.010E-02	434	3.040E+00	475	3.073E+00	516	1.092E+01	557	1.532E+01
394	1.590E-02	435	3.338E+00	476	3.127E+00	517	1.102E+01	558	1.544E+01
395	2.050E-02	436	3.658E+00	477	3.203E+00	518	1.111E+01	559	1.555E+01
396	1.760E-02	437	4.010E+00	478	3.288E+00	519	1.122E+01	560	1.568E+01
397	1.680E-02	438	4.401E+00	479	3.408E+00	520	1.133E+01	561	1.582E+01
398	1.110E-02	439	4.831E+00	480	3.550E+00	521	1.142E+01	562	1.592E+01
399	7.700E-03	440	5.324E+00	481	3.710E+00	522	1.150E+01	563	1.604E+01
400	1.220E-02	441	5.870E+00	482	3.885E+00	523	1.158E+01	564	1.617E+01
401	1.360E-02	442	6.459E+00	483	4.082E+00	524	1.167E+01	565	1.629E+01
402	1.240E-02	443	7.078E+00	484	4.290E+00	525	1.174E+01	566	1.641E+01
403	1.510E-02	444	7.712E+00	485	4.501E+00	526	1.183E+01	567	1.653E+01
404	1.880E-02	445	8.310E+00	486	4.719E+00	527	1.192E+01	568	1.666E+01
405	2.290E-02	446	8.835E+00	487	4.954E+00	528	1.200E+01	569	1.678E+01
406	2.850E-02	447	9.245E+00	488	5.202E+00	529	1.210E+01	570	1.690E+01
407	3.190E-02	448	9.518E+00	489	5.465E+00	530	1.220E+01	571	1.702E+01
408	3.160E-02	449	9.609E+00	490	5.733E+00	531	1.229E+01	572	1.715E+01
409	5.950E-02	450	9.506E+00	491	6.000E+00	532	1.238E+01	573	1.729E+01
410	7.880E-02	451	9.218E+00	492	6.281E+00	533	1.247E+01	574	1.743E+01
411	8.000E-02	452	8.757E+00	493	6.571E+00	534	1.257E+01	575	1.756E+01
412	8.590E-02	453	8.193E+00	494	6.849E+00	535	1.266E+01	576	1.770E+01
413	1.128E-01	454	7.580E+00	495	7.123E+00	536	1.276E+01	577	1.784E+01
414	1.451E-01	455	6.965E+00	496	7.401E+00	537	1.287E+01	578	1.799E+01
415	1.835E-01	456	6.390E+00	497	7.673E+00	538	1.300E+01	579	1.815E+01
416	2.242E-01	457	5.880E+00	498	7.935E+00	539	1.311E+01	580	1.830E+01
417	2.740E-01	458	5.463E+00	499	8.177E+00	540	1.322E+01	581	1.847E+01
418	3.352E-01	459	5.131E+00	500	8.418E+00	541	1.334E+01	582	1.864E+01
419	3.959E-01	460	4.876E+00	501	8.646E+00	542	1.345E+01	583	1.882E+01
420	4.737E-01	461	4.662E+00	502	8.868E+00	543	1.356E+01	584	1.898E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.915E+01	626	2.561E+01	667	1.772E+01	708	6.737E+00	749	1.703E+00
586	1.936E+01	627	2.556E+01	668	1.742E+01	709	6.537E+00	750	1.665E+00
587	1.956E+01	628	2.552E+01	669	1.710E+01	710	6.344E+00	751	1.612E+00
588	1.976E+01	629	2.546E+01	670	1.676E+01	711	6.166E+00	752	1.550E+00
589	1.995E+01	630	2.540E+01	671	1.644E+01	712	6.007E+00	753	1.479E+00
590	2.017E+01	631	2.533E+01	672	1.613E+01	713	5.849E+00	754	1.403E+00
591	2.039E+01	632	2.525E+01	673	1.584E+01	714	5.668E+00	755	1.359E+00
592	2.063E+01	633	2.515E+01	674	1.553E+01	715	5.499E+00	756	1.316E+00
593	2.086E+01	634	2.505E+01	675	1.521E+01	716	5.326E+00	757	1.185E+00
594	2.108E+01	635	2.494E+01	676	1.491E+01	717	5.196E+00	758	1.118E+00
595	2.130E+01	636	2.482E+01	677	1.459E+01	718	5.037E+00	759	1.115E+00
596	2.152E+01	637	2.471E+01	678	1.427E+01	719	4.895E+00	760	1.052E+00
597	2.175E+01	638	2.461E+01	679	1.397E+01	720	4.764E+00	761	1.051E+00
598	2.198E+01	639	2.449E+01	680	1.366E+01	721	4.628E+00	762	1.057E+00
599	2.222E+01	640	2.436E+01	681	1.336E+01	722	4.493E+00	763	1.034E+00
600	2.247E+01	641	2.421E+01	682	1.308E+01	723	4.320E+00	764	9.491E-01
601	2.272E+01	642	2.404E+01	683	1.280E+01	724	4.178E+00	765	8.816E-01
602	2.293E+01	643	2.386E+01	684	1.252E+01	725	4.064E+00	766	8.475E-01
603	2.312E+01	644	2.370E+01	685	1.222E+01	726	3.916E+00	767	8.438E-01
604	2.334E+01	645	2.353E+01	686	1.194E+01	727	3.810E+00	768	8.085E-01
605	2.357E+01	646	2.333E+01	687	1.168E+01	728	3.711E+00	769	7.586E-01
606	2.380E+01	647	2.314E+01	688	1.139E+01	729	3.610E+00	770	7.125E-01
607	2.400E+01	648	2.291E+01	689	1.110E+01	730	3.487E+00	771	6.963E-01
608	2.418E+01	649	2.269E+01	690	1.083E+01	731	3.387E+00	772	6.967E-01
609	2.435E+01	650	2.248E+01	691	1.058E+01	732	3.267E+00	773	6.573E-01
610	2.451E+01	651	2.225E+01	692	1.034E+01	733	3.127E+00	774	6.210E-01
611	2.469E+01	652	2.202E+01	693	1.010E+01	734	3.023E+00	775	6.244E-01
612	2.482E+01	653	2.178E+01	694	9.855E+00	735	2.895E+00	776	5.810E-01
613	2.494E+01	654	2.153E+01	695	9.602E+00	736	2.778E+00	777	5.460E-01
614	2.506E+01	655	2.127E+01	696	9.359E+00	737	2.654E+00	778	5.280E-01
615	2.517E+01	656	2.100E+01	697	9.111E+00	738	2.538E+00	779	5.192E-01
616	2.530E+01	657	2.073E+01	698	8.857E+00	739	2.456E+00	780	4.590E-01
617	2.541E+01	658	2.046E+01	699	8.615E+00	740	2.398E+00		
618	2.548E+01	659	2.016E+01	700	8.382E+00	741	2.335E+00		
619	2.553E+01	660	1.984E+01	701	8.170E+00	742	2.269E+00		
620	2.556E+01	661	1.954E+01	702	7.947E+00	743	2.158E+00		
621	2.560E+01	662	1.924E+01	703	7.728E+00	744	2.043E+00		
622	2.563E+01	663	1.894E+01	704	7.504E+00	745	1.941E+00		
623	2.565E+01	664	1.865E+01	705	7.289E+00	746	1.866E+00		
624	2.565E+01	665	1.833E+01	706	7.098E+00	747	1.809E+00		
625	2.563E+01	666	1.802E+01	707	6.915E+00	748	1.754E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hours**

Test orientation: **Downward**

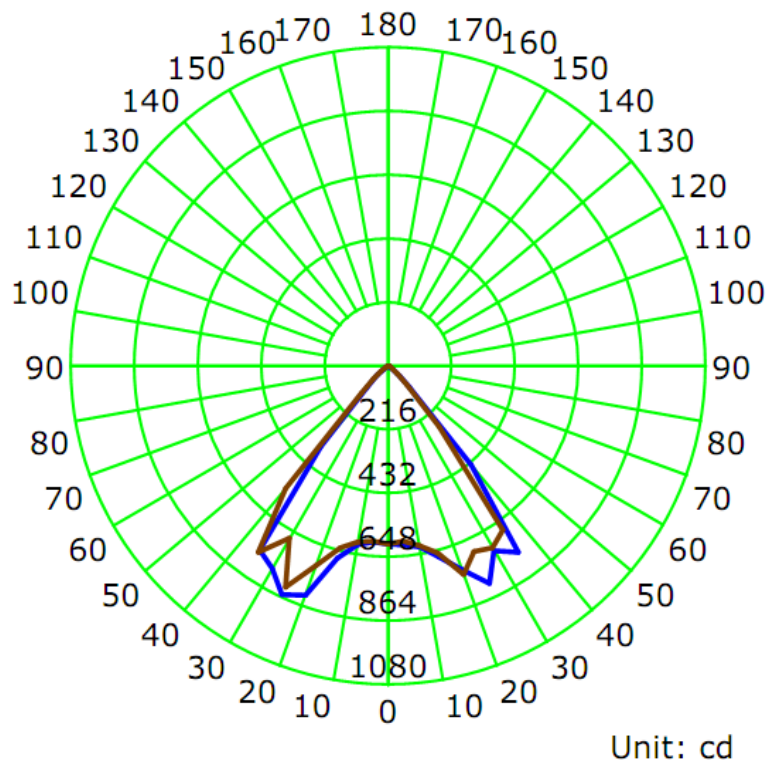
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1040	12.44	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1168.5	93.98	864.5	1.52	1.51

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	79.3	79.5	79.8	79.8	79.6
Field Angle (10% I_{max}):	93.4	93.6	94.5	94.4	94.0

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	604	604	604	604	604	604	604	604
5.0°	608	606	603	600	597	596	596	596
10.0°	623	622	620	620	619	620	621	623
15.0°	670	666	659	658	657	654	659	668
20.0°	734	738	747	755	752	747	771	797
25.0°	815	763	728	705	695	722	781	836
30.0°	723	724	709	695	712	749	768	781
35.0°	772	739	717	683	681	700	711	736
40.0°	439	367	331	300	272	265	294	336
45.0°	103	97	93	90	89	89	95	103
50.0°	51	47	45	43	43	44	47	51
55.0°	24	22	20	20	20	21	22	24
60.0°	11	10	9	9	9	9	10	11
65.0°	5	4	4	3	4	4	5	5
70.0°	1	1	1	1	1	1	1	2
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

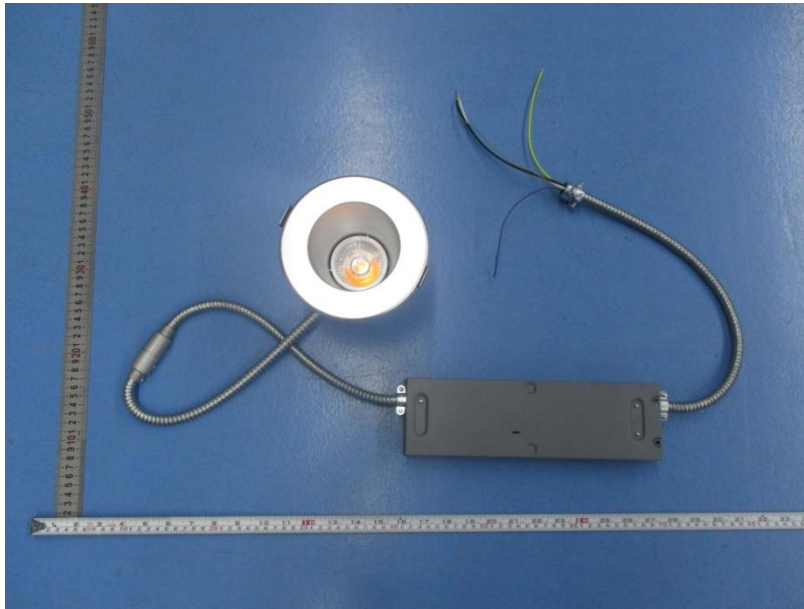
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	604	604	604	604	604	604	604	604
5.0°	598	599	598	598	596	597	598	600
10.0°	617	617	613	610	607	608	610	615
15.0°	676	671	660	649	639	636	642	651
20.0°	828	806	777	754	722	688	699	734
25.0°	857	865	857	848	827	820	817	824
30.0°	793	759	720	697	674	662	668	696
35.0°	763	784	783	767	772	773	765	765
40.0°	357	418	485	521	544	534	499	453
45.0°	105	112	119	125	131	125	115	109
50.0°	51	55	60	64	67	65	60	56
55.0°	23	25	28	30	31	30	29	27
60.0°	10	12	13	13	15	14	14	12
65.0°	4	5	6	6	6	7	6	6
70.0°	1	1	2	3	3	3	3	3
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	14.4	1.23	0-5	14.4	1.23
5-10	43.5	3.72	0-10	57.9	4.95
10-15	75.6	6.47	0-15	133.4	11.42
15-20	116.2	9.95	0-20	249.7	21.37
20-25	162.6	13.92	0-25	412.3	35.28
25-30	192.1	16.44	0-30	604.4	51.72
30-35	215.7	18.46	0-35	820.1	70.18
35-40	191.1	16.35	0-40	1011.2	86.54
40-45	93.9	8.04	0-45	1105.1	94.57
45-50	32.1	2.75	0-50	1137.2	97.32
50-55	16.9	1.44	0-55	1154.1	98.77
55-60	8.3	0.71	0-60	1162.4	99.48
60-65	4.0	0.34	0-65	1166.4	99.82
65-70	1.7	0.14	0-70	1168.1	99.96
70-75	0.4	0.04	0-75	1168.5	100.00
75-80	0.0	0.00	0-80	1168.5	100.00
80-85	0.0	0.00	0-85	1168.5	100.00
85-90	0.0	0.00	0-90	1168.5	100.00
90-95	0.0	0.00	0-95	1168.5	100.00
95-100	0.0	0.00	0-100	1168.5	100.00
100-105	0.0	0.00	0-105	1168.5	100.00
105-110	0.0	0.00	0-110	1168.5	100.00
110-115	0.0	0.00	0-115	1168.5	100.00
115-120	0.0	0.00	0-120	1168.5	100.00
120-125	0.0	0.00	0-125	1168.5	100.00
125-130	0.0	0.00	0-130	1168.5	100.00
130-135	0.0	0.00	0-135	1168.5	100.00
135-140	0.0	0.00	0-140	1168.5	100.00
140-145	0.0	0.00	0-145	1168.5	100.00
145-150	0.0	0.00	0-150	1168.5	100.00
150-155	0.0	0.00	0-155	1168.5	100.00
155-160	0.0	0.00	0-160	1168.5	100.00
160-165	0.0	0.00	0-165	1168.5	100.00
165-170	0.0	0.00	0-170	1168.5	100.00
170-175	0.0	0.00	0-175	1168.5	100.00
175-180	0.0	0.00	0-180	1168.5	100.00

6. Product Photo



Directions

1. The information marked “superscript #” is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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*****END OF REPORT*****