

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE109027DIM120WDR4CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329016-10-3
Test Date:	2019-04-02 to 2019-04-04
Report Date:	2019-05-06
Reviewed By:	Ray Gao/EE Engineer <i>Ry Gao</i>
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.

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Kunshan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

1. Product Description

General Information:

One sample was received on 2019-03-29 and used for testing.

Model Tested: LE109027DIM120WDR4CC
 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 60Hz
 Rated Power: 12W
 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	2019-01-23	2020-01-23
Power Meter	INVENTFINE	WT500	GSJWQ20009	2019-04-08	2020-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2019-04-08	2020-04-08
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-12-24	2019-12-24
Thermal Meter	KEJIAN	TA298	N/A	2018-12-01	2019-12-01
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2019-04-08	2020-04-08
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2019-04-08	2020-04-08
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2019-04-08	2020-04-08
Power Meter	INVENTFINE	WT500	GSDSQ200007	2019-04-08	2020-04-08
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2019-01-24	2020-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2018-12-01	2019-12-01
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2019-03-08	2020-03-08

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 $U_{re}=2.61\%$ ($k=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=34\text{K}$ ($k=2$), 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 $U_{re}=0.48\%$ of rdg, AC Voltage $U_{re}=0.25\%$ of rdg, Power $U_{re}=0.44\%$, ($k=2$), 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 $U_{re}=2.6\%$ ($k=2$), 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**

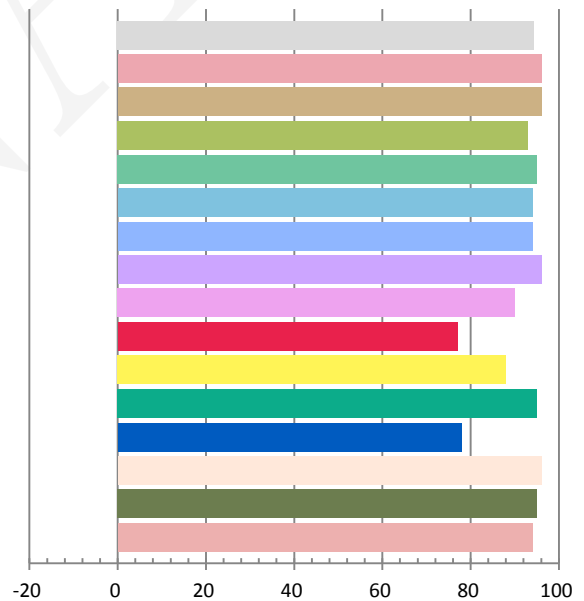
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.03	60	0.1022	12.12	0.988	1065.81	87.94

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.925	2714	-0.00011	0.4585	0.4100	0.2619	0.5269

Color Rendering Index

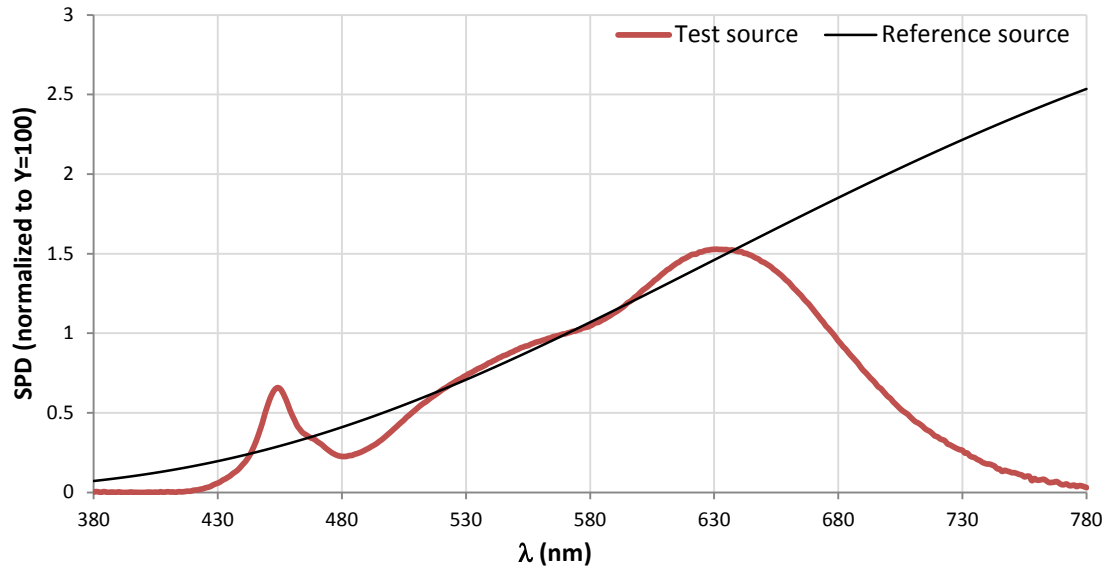
Ra			
94.4			
R1	R2	R3	R4
96	96	93	95
R5	R6	R7	R8
94	94	96	90
R9	R10	R11	R12
77	88	95	78
R13	R14	R15	
96	95	94	



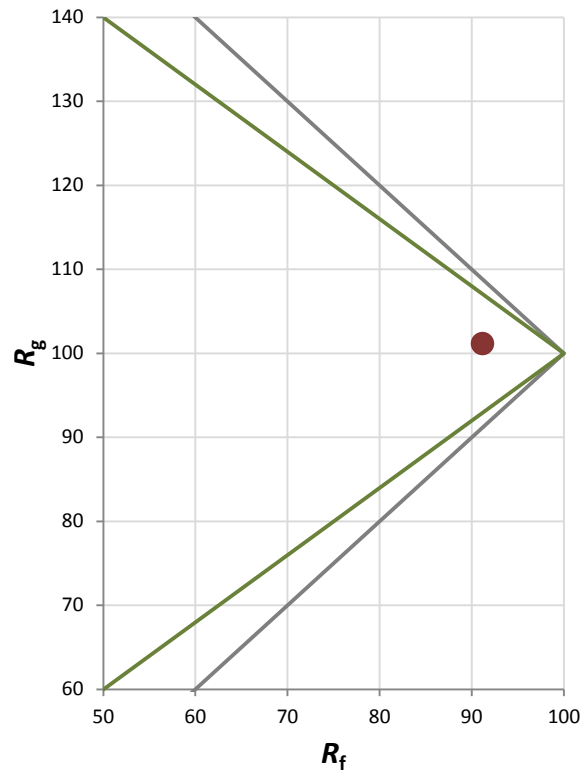
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

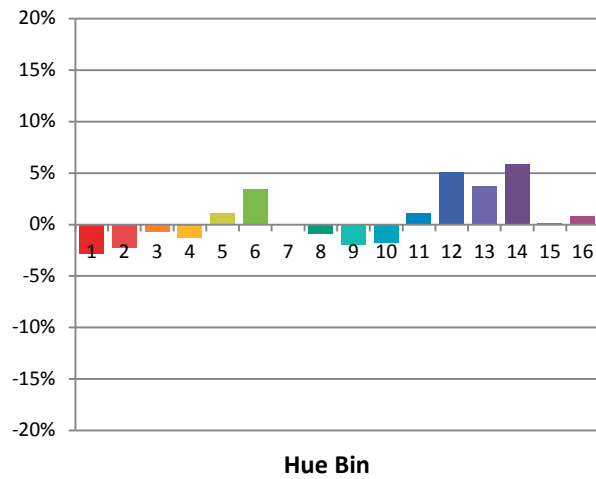
Spectral Power Distribution Comparison



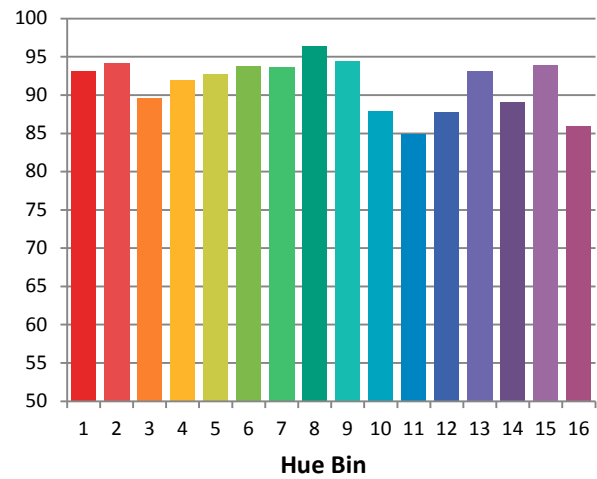
Plot of R_g versus R_f



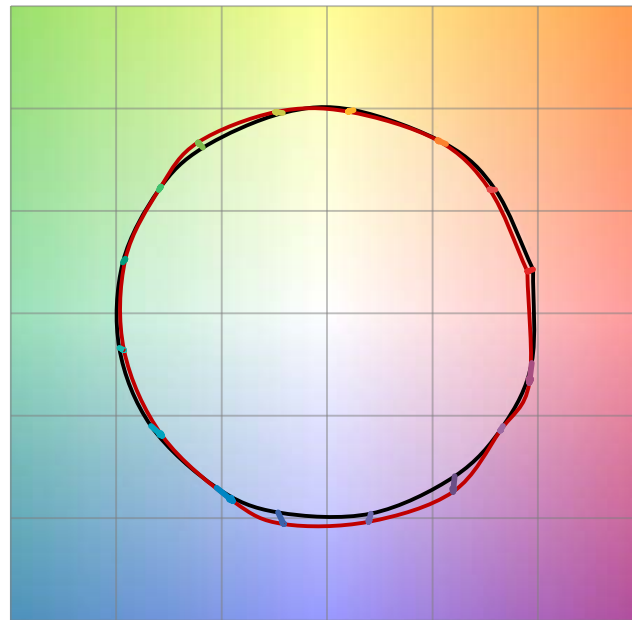
Chroma Shift by Hue



R_t by Hue

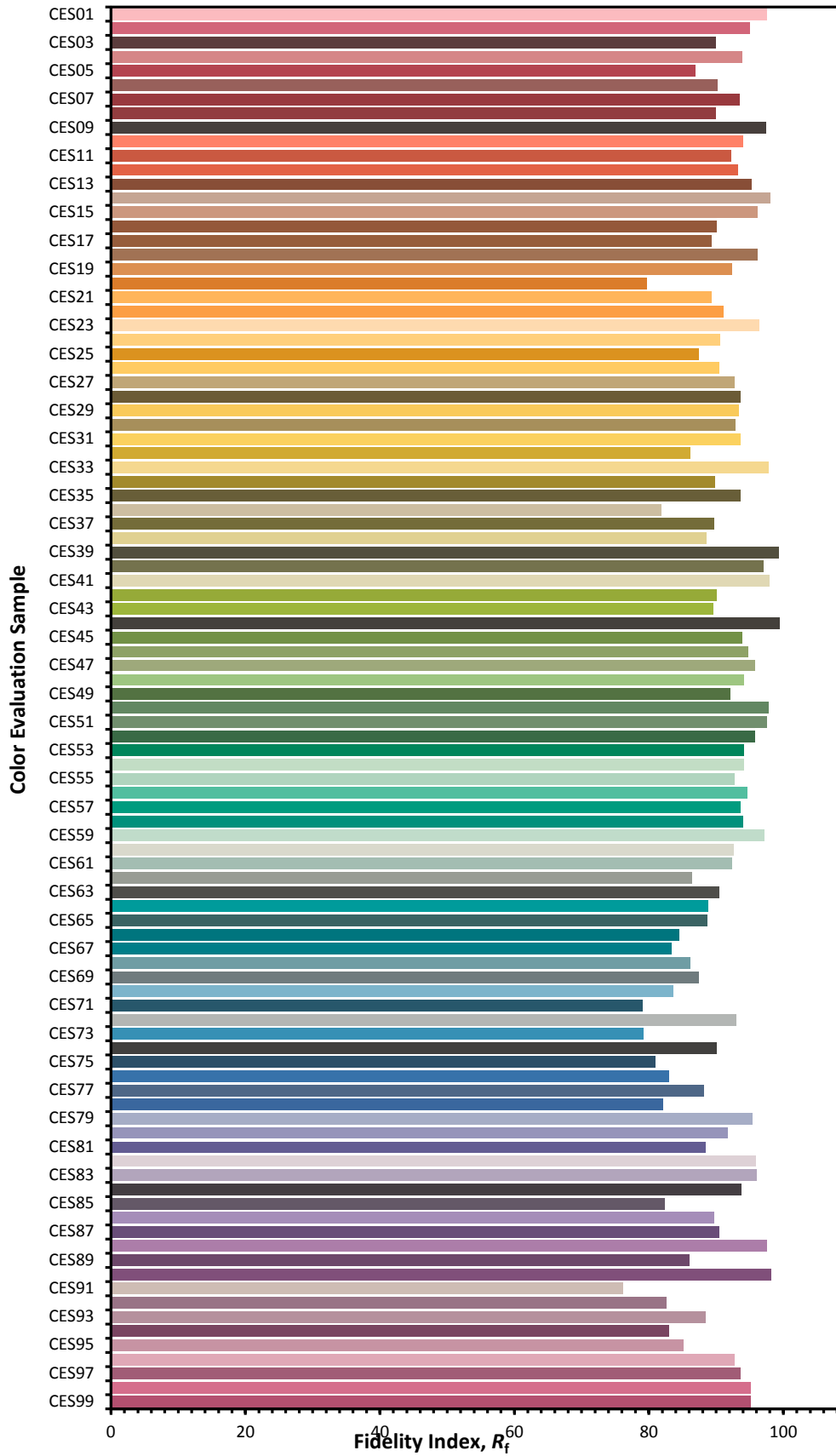


Color Vector Graphic

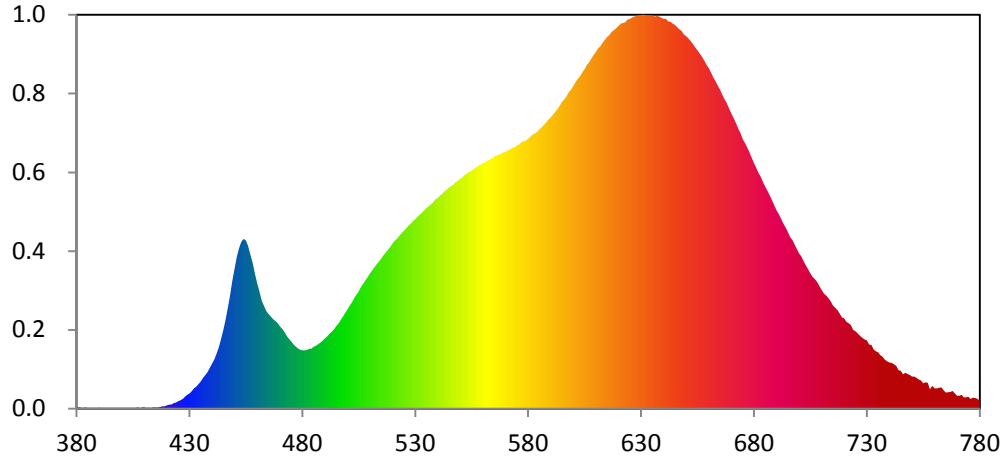


— Refenerce Illuminat — Test Source

Color Fidelity by CES Sample



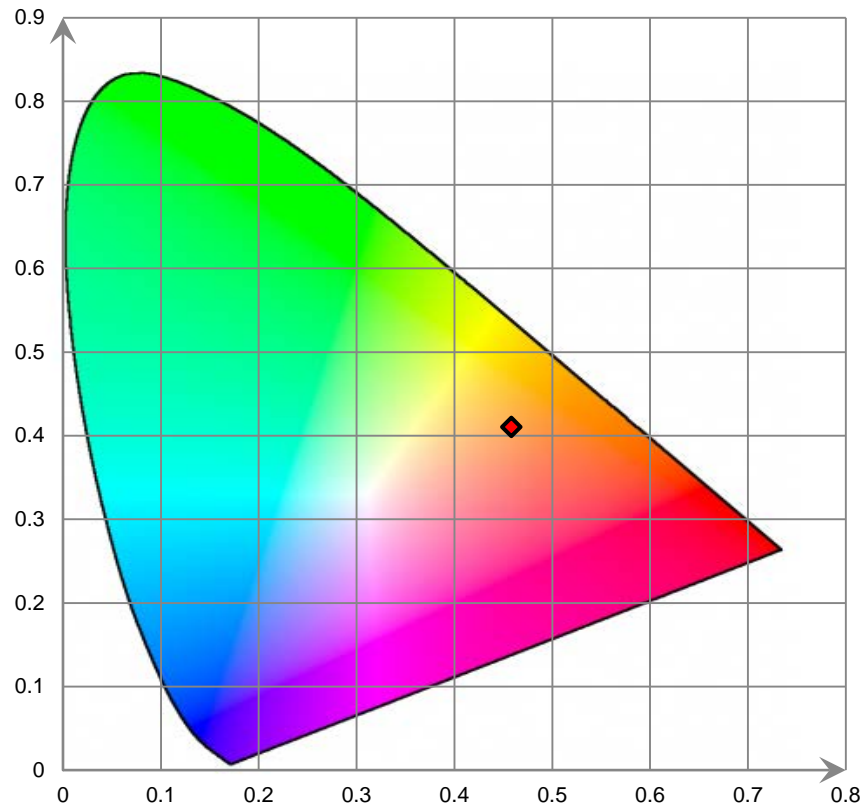
Relative Spectral Power Distribution



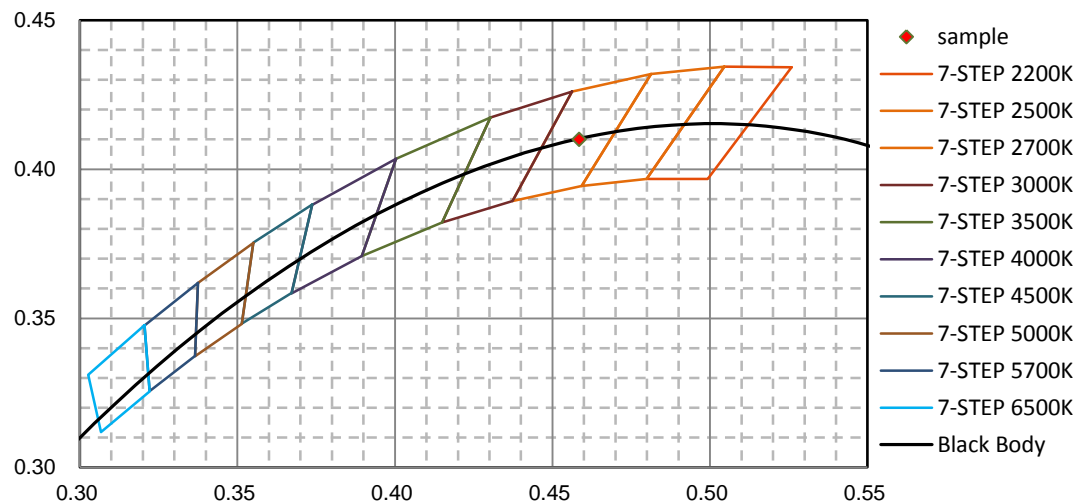
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.020E-02	421	2.325E-01	462	6.535E+00	503	6.677E+00	544	1.326E+01
381	8.310E-02	422	2.540E-01	463	6.220E+00	504	6.892E+00	545	1.340E+01
382	5.170E-02	423	3.195E-01	464	5.907E+00	505	7.098E+00	546	1.347E+01
383	7.300E-03	424	3.569E-01	465	5.730E+00	506	7.358E+00	547	1.358E+01
384	7.980E-02	425	4.505E-01	466	5.580E+00	507	7.550E+00	548	1.371E+01
385	4.250E-02	426	5.012E-01	467	5.415E+00	508	7.770E+00	549	1.381E+01
386	3.600E-03	427	5.858E-01	468	5.302E+00	509	7.968E+00	550	1.394E+01
387	4.010E-02	428	7.170E-01	469	5.197E+00	510	8.178E+00	551	1.403E+01
388	2.870E-02	429	8.320E-01	470	5.002E+00	511	8.393E+00	552	1.417E+01
389	9.100E-03	430	9.166E-01	471	4.840E+00	512	8.591E+00	553	1.425E+01
390	5.410E-02	431	1.036E+00	472	4.675E+00	513	8.763E+00	554	1.434E+01
391	1.970E-02	432	1.215E+00	473	4.445E+00	514	8.910E+00	555	1.439E+01
392	9.000E-04	433	1.322E+00	474	4.249E+00	515	9.114E+00	556	1.452E+01
393	0.000E+00	434	1.478E+00	475	4.063E+00	516	9.299E+00	557	1.461E+01
394	1.220E-02	435	1.626E+00	476	3.888E+00	517	9.461E+00	558	1.472E+01
395	4.500E-02	436	1.839E+00	477	3.757E+00	518	9.633E+00	559	1.478E+01
396	1.560E-02	437	2.007E+00	478	3.645E+00	519	9.810E+00	560	1.484E+01
397	1.460E-02	438	2.188E+00	479	3.572E+00	520	9.996E+00	561	1.493E+01
398	1.200E-03	439	2.442E+00	480	3.532E+00	521	1.016E+01	562	1.499E+01
399	1.200E-03	440	2.726E+00	481	3.522E+00	522	1.030E+01	563	1.510E+01
400	1.000E-04	441	2.989E+00	482	3.546E+00	523	1.046E+01	564	1.515E+01
401	1.410E-02	442	3.323E+00	483	3.614E+00	524	1.062E+01	565	1.526E+01
402	3.200E-02	443	3.715E+00	484	3.627E+00	525	1.076E+01	566	1.532E+01
403	2.640E-02	444	4.214E+00	485	3.731E+00	526	1.092E+01	567	1.537E+01
404	1.030E-02	445	4.762E+00	486	3.802E+00	527	1.106E+01	568	1.544E+01
405	3.350E-02	446	5.396E+00	487	3.888E+00	528	1.118E+01	569	1.553E+01
406	6.600E-03	447	6.103E+00	488	3.991E+00	529	1.135E+01	570	1.555E+01
407	7.210E-02	448	6.849E+00	489	4.110E+00	530	1.147E+01	571	1.564E+01
408	6.800E-03	449	7.725E+00	490	4.241E+00	531	1.163E+01	572	1.570E+01
409	4.710E-02	450	8.475E+00	491	4.363E+00	532	1.173E+01	573	1.580E+01
410	6.740E-02	451	9.175E+00	492	4.513E+00	533	1.187E+01	574	1.582E+01
411	3.980E-02	452	9.709E+00	493	4.648E+00	534	1.202E+01	575	1.592E+01
412	4.800E-02	453	1.009E+01	494	4.799E+00	535	1.215E+01	576	1.599E+01
413	9.400E-03	454	1.027E+01	495	4.992E+00	536	1.225E+01	577	1.612E+01
414	6.700E-02	455	1.019E+01	496	5.162E+00	537	1.238E+01	578	1.617E+01
415	6.480E-02	456	9.857E+00	497	5.364E+00	538	1.250E+01	579	1.622E+01
416	6.370E-02	457	9.365E+00	498	5.574E+00	539	1.267E+01	580	1.633E+01
417	9.990E-02	458	8.788E+00	499	5.791E+00	540	1.276E+01	581	1.644E+01
418	1.259E-01	459	8.129E+00	500	6.002E+00	541	1.290E+01	582	1.661E+01
419	1.247E-01	460	7.559E+00	501	6.231E+00	542	1.301E+01	583	1.666E+01
420	2.003E-01	461	7.065E+00	502	6.440E+00	543	1.316E+01	584	1.676E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.691E+01	626	2.369E+01	667	1.874E+01	708	7.661E+00	749	2.028E+00
586	1.703E+01	627	2.375E+01	668	1.851E+01	709	7.407E+00	750	1.936E+00
587	1.718E+01	628	2.377E+01	669	1.820E+01	710	7.173E+00	751	1.935E+00
588	1.732E+01	629	2.382E+01	670	1.789E+01	711	6.953E+00	752	1.855E+00
589	1.749E+01	630	2.384E+01	671	1.758E+01	712	6.833E+00	753	1.764E+00
590	1.764E+01	631	2.385E+01	672	1.729E+01	713	6.678E+00	754	1.704E+00
591	1.779E+01	632	2.382E+01	673	1.696E+01	714	6.484E+00	755	1.531E+00
592	1.796E+01	633	2.382E+01	674	1.669E+01	715	6.242E+00	756	1.595E+00
593	1.813E+01	634	2.381E+01	675	1.633E+01	716	6.094E+00	757	1.568E+00
594	1.833E+01	635	2.381E+01	676	1.609E+01	717	5.966E+00	758	1.159E+00
595	1.857E+01	636	2.375E+01	677	1.580E+01	718	5.748E+00	759	1.369E+00
596	1.872E+01	637	2.378E+01	678	1.552E+01	719	5.525E+00	760	1.216E+00
597	1.890E+01	638	2.373E+01	679	1.520E+01	720	5.458E+00	761	1.214E+00
598	1.914E+01	639	2.365E+01	680	1.486E+01	721	5.259E+00	762	1.264E+00
599	1.931E+01	640	2.361E+01	681	1.459E+01	722	5.169E+00	763	1.280E+00
600	1.955E+01	641	2.361E+01	682	1.428E+01	723	5.059E+00	764	1.111E+00
601	1.978E+01	642	2.345E+01	683	1.405E+01	724	4.759E+00	765	9.730E-01
602	1.997E+01	643	2.343E+01	684	1.374E+01	725	4.670E+00	766	9.838E-01
603	2.014E+01	644	2.332E+01	685	1.345E+01	726	4.536E+00	767	1.012E+00
604	2.037E+01	645	2.324E+01	686	1.319E+01	727	4.401E+00	768	1.068E+00
605	2.056E+01	646	2.309E+01	687	1.292E+01	728	4.283E+00	769	9.123E-01
606	2.081E+01	647	2.297E+01	688	1.264E+01	729	4.187E+00	770	7.694E-01
607	2.097E+01	648	2.286E+01	689	1.229E+01	730	4.131E+00	771	7.677E-01
608	2.119E+01	649	2.265E+01	690	1.199E+01	731	3.867E+00	772	8.318E-01
609	2.141E+01	650	2.256E+01	691	1.175E+01	732	3.861E+00	773	6.774E-01
610	2.160E+01	651	2.242E+01	692	1.149E+01	733	3.586E+00	774	6.704E-01
611	2.182E+01	652	2.226E+01	693	1.120E+01	734	3.476E+00	775	7.188E-01
612	2.194E+01	653	2.210E+01	694	1.098E+01	735	3.402E+00	776	5.828E-01
613	2.214E+01	654	2.186E+01	695	1.070E+01	736	3.234E+00	777	6.625E-01
614	2.232E+01	655	2.169E+01	696	1.038E+01	737	3.136E+00	778	6.469E-01
615	2.249E+01	656	2.149E+01	697	1.022E+01	738	2.962E+00	779	5.699E-01
616	2.262E+01	657	2.129E+01	698	9.948E+00	739	2.859E+00	780	4.760E-01
617	2.282E+01	658	2.105E+01	699	9.665E+00	740	2.789E+00		
618	2.292E+01	659	2.081E+01	700	9.400E+00	741	2.778E+00		
619	2.305E+01	660	2.062E+01	701	9.222E+00	742	2.687E+00		
620	2.319E+01	661	2.034E+01	702	8.924E+00	743	2.574E+00		
621	2.332E+01	662	2.005E+01	703	8.679E+00	744	2.329E+00		
622	2.336E+01	663	1.981E+01	704	8.440E+00	745	2.292E+00		
623	2.339E+01	664	1.955E+01	705	8.194E+00	746	2.067E+00		
624	2.356E+01	665	1.932E+01	706	7.993E+00	747	2.167E+00		
625	2.358E+01	666	1.901E+01	707	7.826E+00	748	2.099E+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**

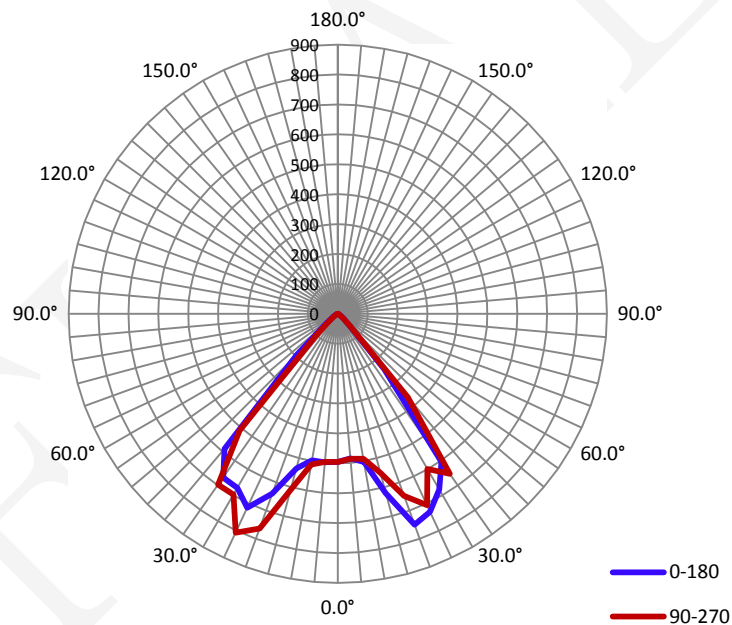
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1050	12.13	0.9580

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1066.9	88.00	812.2	1.56	1.58

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	80.9	80.8	80.6	80.4	80.7
Field Angle (10% I _{max}):	93.6	93.4	91.5	92.0	92.6

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	495	495	495	495	495	495	495	495
5.0°	485	484	484	485	487	490	493	496
10.0°	503	499	495	493	492	492	493	495
15.0°	621	614	595	574	550	537	532	531
20.0°	751	747	720	689	647	612	605	628
25.0°	730	720	705	709	706	693	681	701
30.0°	678	682	661	639	599	573	582	643
35.0°	605	610	616	636	653	657	643	641
40.0°	241	233	237	290	365	458	536	579
45.0°	55	56	48	51	58	73	114	181
50.0°	24	23	20	21	24	30	36	45
55.0°	12	11	9	9	11	12	15	19
60.0°	5	6	5	5	5	6	7	10
65.0°	3	3	3	3	4	4	4	5
70.0°	2	2	2	2	2	2	2	3
75.0°	0	1	0	0	1	1	1	2
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°	495	495	495	495	495	495	495	495
5.0°	498	499	501	501	497	494	490	488
10.0°	497	499	505	510	511	512	512	510
15.0°	535	546	564	593	611	621	633	644
20.0°	640	657	687	742	764	759	769	765
25.0°	716	741	760	793	807	812	792	742
30.0°	671	705	718	714	698	700	698	682
35.0°	668	688	694	702	697	670	640	609
40.0°	589	611	591	571	510	412	314	245
45.0°	194	206	193	155	104	84	68	56
50.0°	49	55	52	46	39	33	28	24
55.0°	21	23	22	19	18	15	14	12
60.0°	11	11	9	9	9	8	7	7
65.0°	5	7	6	5	5	5	4	4
70.0°	3	3	3	3	3	2	2	1
75.0°	2	2	2	2	1	2	1	0
80.0°	0	1	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	11.8	1.11	0-5	11.8	1.11
5-10	35.5	3.33	0-10	47.3	4.44
10-15	64.2	6.02	0-15	111.5	10.45
15-20	105.5	9.89	0-20	217.0	20.34
20-25	150.7	14.12	0-25	367.7	34.47
25-30	177.6	16.64	0-30	545.3	51.11
30-35	193.9	18.18	0-35	739.2	69.29
35-40	179.5	16.82	0-40	918.7	86.11
40-45	98.1	9.20	0-45	1016.8	95.31
45-50	28.3	2.66	0-50	1045.1	97.96
50-55	10.7	1.01	0-55	1055.9	98.97
55-60	5.2	0.49	0-60	1061.1	99.46
60-65	2.9	0.27	0-65	1064.0	99.73
65-70	1.7	0.16	0-70	1065.6	99.89
70-75	0.9	0.08	0-75	1066.5	99.97
75-80	0.3	0.03	0-80	1066.8	100.00
80-85	0.0	0.00	0-85	1066.9	100.00
85-90	0.0	0.00	0-90	1066.9	100.00
90-95	0.0	0.00	0-95	1066.9	100.00
95-100	0.0	0.00	0-100	1066.9	100.00
100-105	0.0	0.00	0-105	1066.9	100.00
105-110	0.0	0.00	0-110	1066.9	100.00
110-115	0.0	0.00	0-115	1066.9	100.00
115-120	0.0	0.00	0-120	1066.9	100.00
120-125	0.0	0.00	0-125	1066.9	100.00
125-130	0.0	0.00	0-130	1066.9	100.00
130-135	0.0	0.00	0-135	1066.9	100.00
135-140	0.0	0.00	0-140	1066.9	100.00
140-145	0.0	0.00	0-145	1066.9	100.00
145-150	0.0	0.00	0-150	1066.9	100.00
150-155	0.0	0.00	0-155	1066.9	100.00
155-160	0.0	0.00	0-160	1066.9	100.00
160-165	0.0	0.00	0-165	1066.9	100.00
165-170	0.0	0.00	0-170	1066.9	100.00
170-175	0.0	0.00	0-175	1066.9	100.00
175-180	0.0	0.00	0-180	1066.9	100.00

6. Product Photo



*****END OF REPORT*****