

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE509027DIM120VVN/ADR6BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329025-10-6
Test Date:	2019-04-03 to 2019-04-06
Report Date:	2019-05-16
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 2019-04-01 and used for testing.

Model Tested: LE509027DIM120VW/ADR6BL
 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: 53W
 Nominal CCT: 2700K
 Nominal Lumen Output: 3400lm

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	2018-04-08	2019-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-08	2019-04-08
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	2018-04-08	2019-04-08
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-04-08	2019-04-08
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-04-08	2019-04-08
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-04-08	2019-04-08
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 $U_{rel}=2.61\%$ ($k=2$), 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 $U_{rel}=0.48\%$ of rdg, AC Voltage $U_{rel}=0.25\%$ of rdg, Power $U_{rel}=0.44\%$, ($k=2$), 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 $U_{rel}=2.6\%$ ($k=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_f , 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**

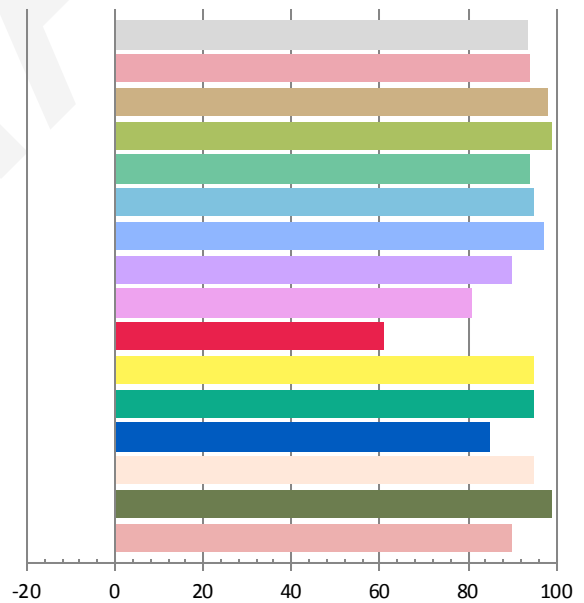
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.4468	53.3	0.9941	3426.69	64.29

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
12.119	2701	-0.00090	0.4583	0.4078	0.2627	0.5260

Color Rendering Index

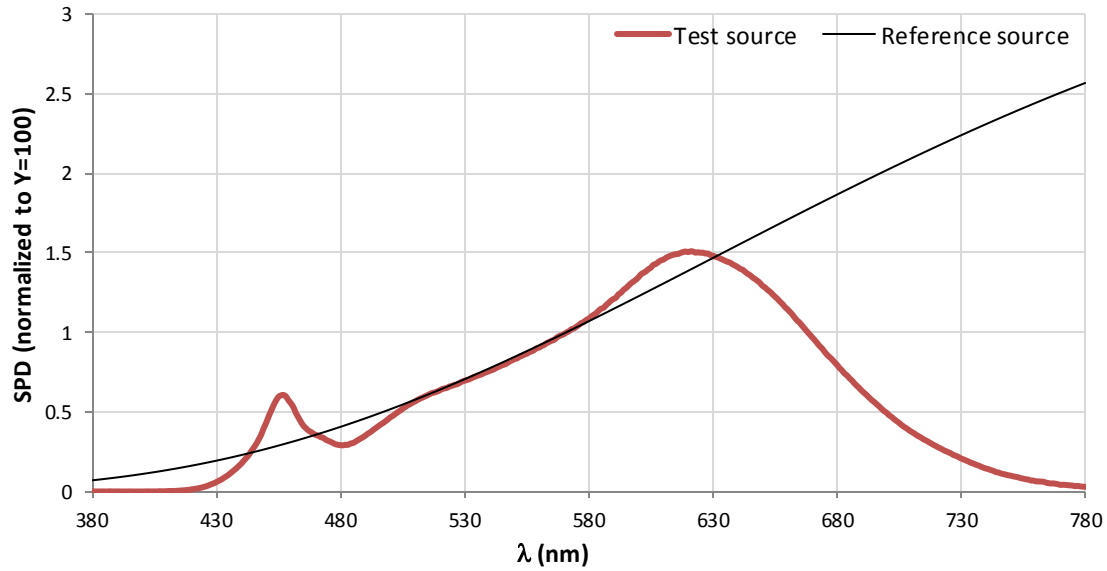
Ra			
93.5			
R1	R2	R3	R4
94	98	99	94
R5	R6	R7	R8
95	97	90	81
R9	R10	R11	R12
61	95	95	85
R13	R14	R15	
95	99	90	



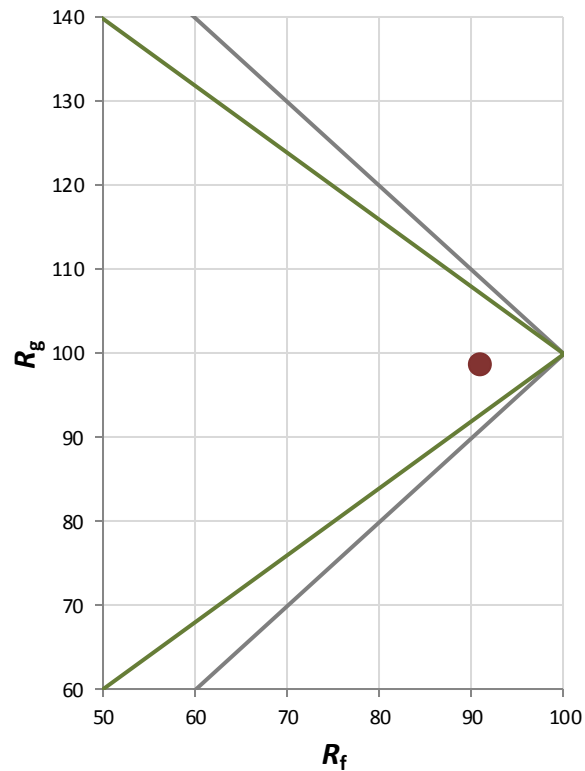
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	99

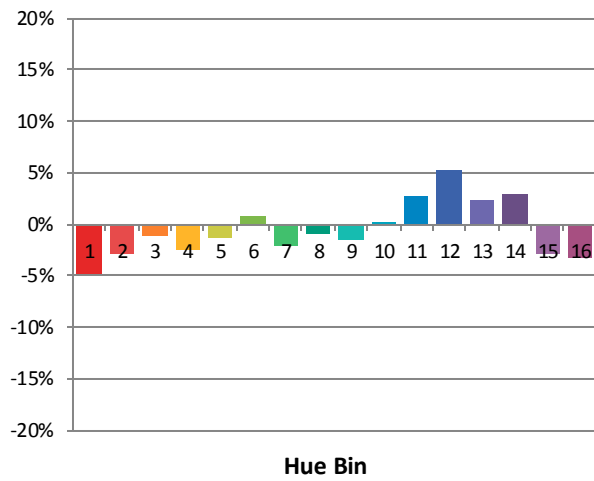
Spectral Power Distribution Comparison



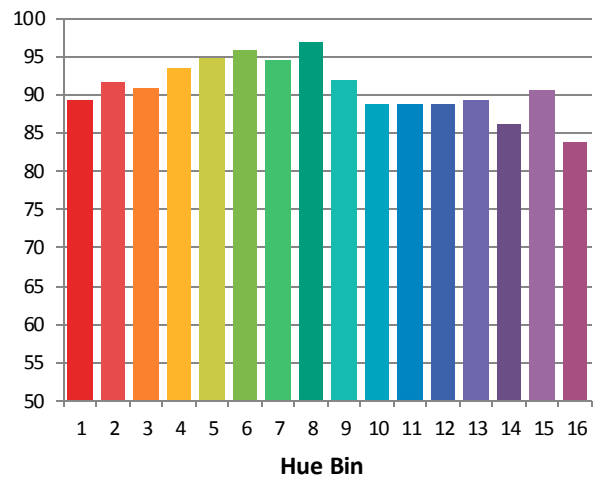
Plot of R_g versus R_f



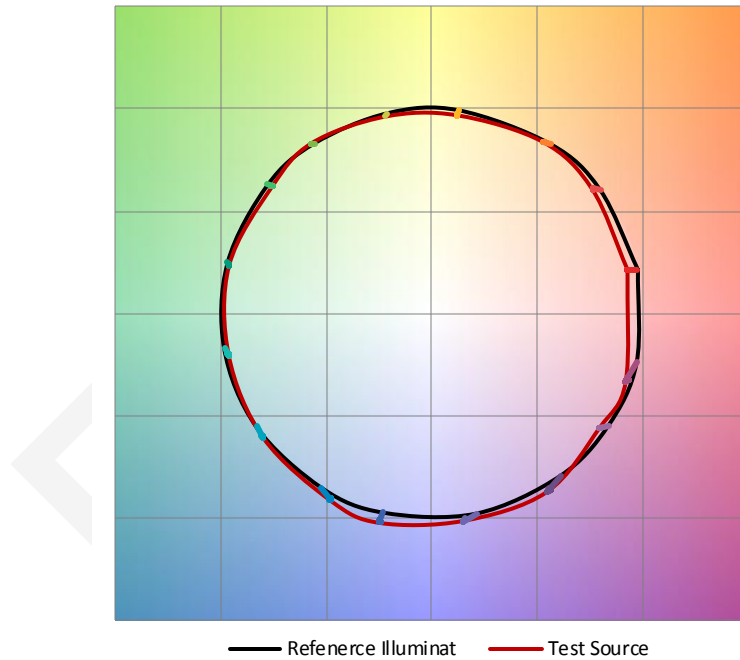
Chroma Shift by Hue



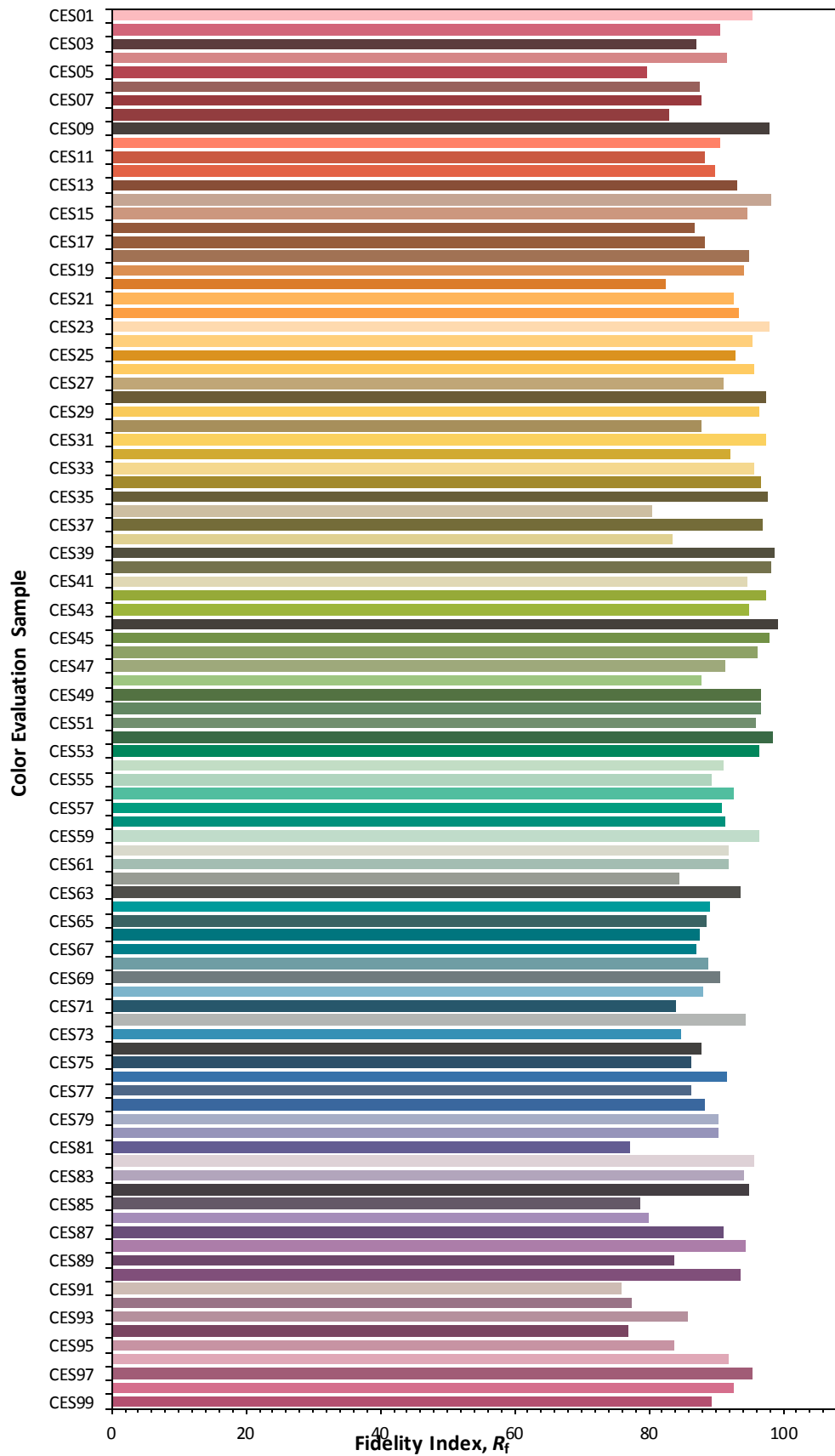
R_f by Hue



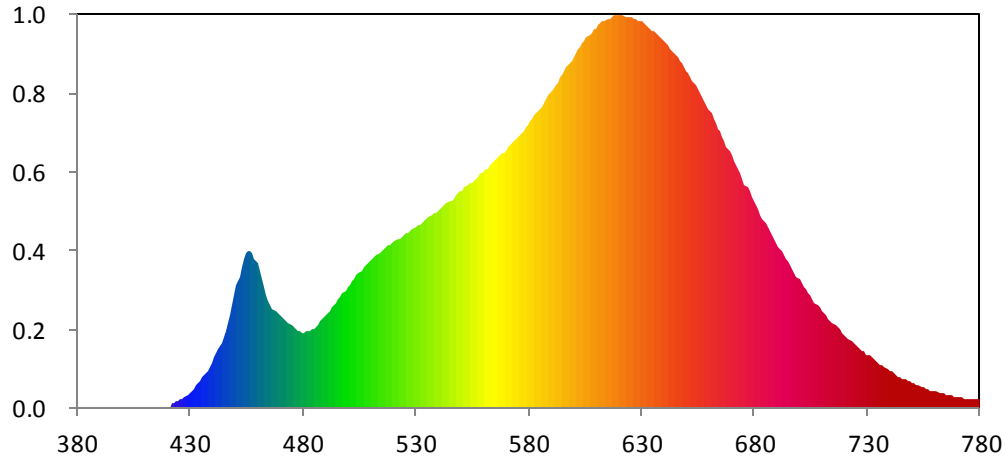
Color Vector Graphic



Color Fidelity by CES Sample



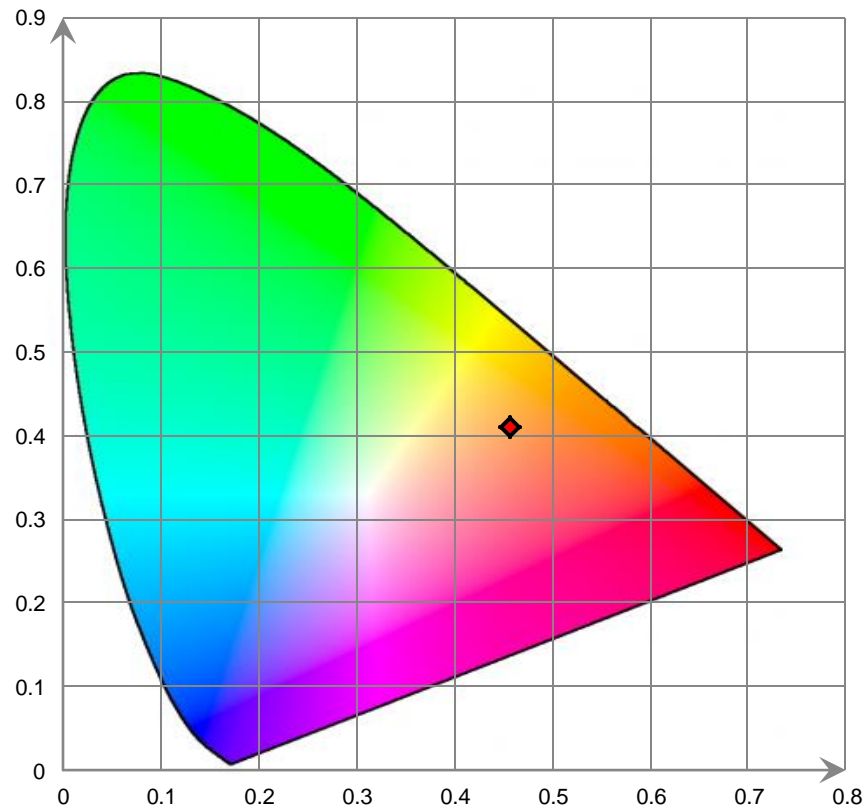
Relative Spectral Power Distribution



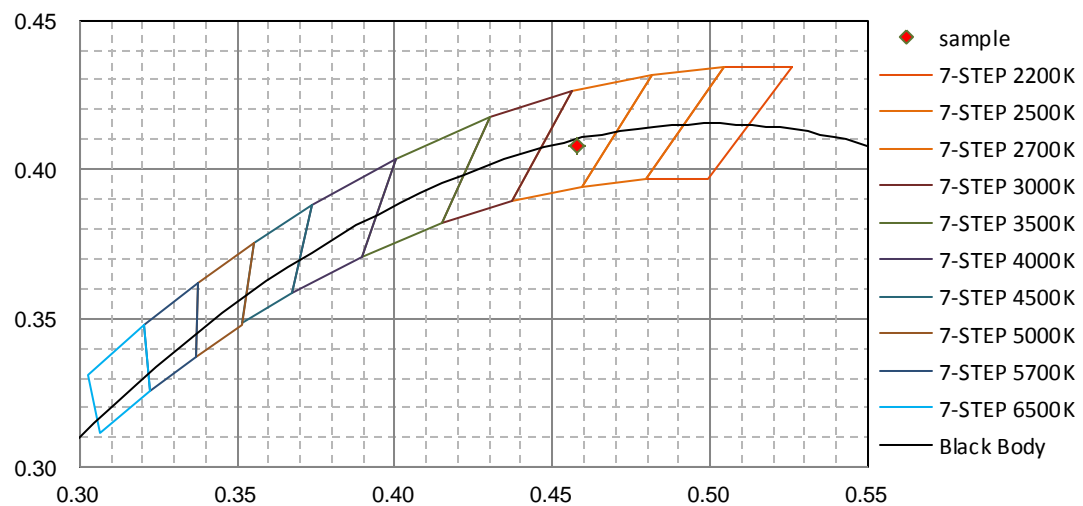
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.710E-02	421	7.882E-01	462	2.472E+01	503	2.500E+01	544	3.939E+01
381	9.200E-03	422	9.287E-01	463	2.333E+01	504	2.551E+01	545	3.979E+01
382	9.700E-03	423	1.062E+00	464	2.193E+01	505	2.608E+01	546	4.002E+01
383	1.930E-02	424	1.249E+00	465	2.076E+01	506	2.661E+01	547	4.041E+01
384	2.130E-02	425	1.466E+00	466	1.997E+01	507	2.715E+01	548	4.097E+01
385	1.660E-02	426	1.685E+00	467	1.924E+01	508	2.754E+01	549	4.129E+01
386	2.400E-03	427	1.985E+00	468	1.878E+01	509	2.802E+01	550	4.174E+01
387	5.890E-02	428	2.317E+00	469	1.824E+01	510	2.840E+01	551	4.192E+01
388	1.780E-02	429	2.625E+00	470	1.784E+01	511	2.886E+01	552	4.244E+01
389	1.060E-02	430	2.998E+00	471	1.758E+01	512	2.926E+01	553	4.276E+01
390	4.190E-02	431	3.406E+00	472	1.712E+01	513	2.961E+01	554	4.318E+01
391	1.500E-02	432	3.799E+00	473	1.694E+01	514	2.998E+01	555	4.341E+01
392	6.000E-04	433	4.315E+00	474	1.634E+01	515	3.034E+01	556	4.391E+01
393	2.800E-03	434	4.798E+00	475	1.600E+01	516	3.075E+01	557	4.419E+01
394	1.100E-03	435	5.374E+00	476	1.565E+01	517	3.108E+01	558	4.460E+01
395	2.100E-02	436	6.017E+00	477	1.525E+01	518	3.126E+01	559	4.517E+01
396	4.800E-03	437	6.668E+00	478	1.489E+01	519	3.154E+01	560	4.537E+01
397	6.000E-04	438	7.298E+00	479	1.471E+01	520	3.192E+01	561	4.586E+01
398	0.000E+00	439	8.053E+00	480	1.461E+01	521	3.231E+01	562	4.619E+01
399	0.000E+00	440	8.802E+00	481	1.456E+01	522	3.251E+01	563	4.676E+01
400	0.000E+00	441	9.708E+00	482	1.472E+01	523	3.274E+01	564	4.712E+01
401	1.610E-02	442	1.058E+01	483	1.471E+01	524	3.313E+01	565	4.753E+01
402	2.600E-02	443	1.151E+01	484	1.512E+01	525	3.335E+01	566	4.779E+01
403	4.490E-02	444	1.267E+01	485	1.528E+01	526	3.363E+01	567	4.844E+01
404	1.570E-02	445	1.381E+01	486	1.572E+01	527	3.384E+01	568	4.898E+01
405	3.510E-02	446	1.497E+01	487	1.621E+01	528	3.424E+01	569	4.926E+01
406	6.100E-03	447	1.640E+01	488	1.666E+01	529	3.466E+01	570	4.962E+01
407	9.900E-02	448	1.790E+01	489	1.711E+01	530	3.494E+01	571	5.015E+01
408	5.250E-02	449	1.992E+01	490	1.765E+01	531	3.517E+01	572	5.052E+01
409	8.090E-02	450	2.164E+01	491	1.824E+01	532	3.543E+01	573	5.117E+01
410	1.028E-01	451	2.364E+01	492	1.871E+01	533	3.583E+01	574	5.140E+01
411	1.532E-01	452	2.542E+01	493	1.933E+01	534	3.615E+01	575	5.195E+01
412	1.625E-01	453	2.718E+01	494	1.991E+01	535	3.647E+01	576	5.250E+01
413	1.593E-01	454	2.870E+01	495	2.046E+01	536	3.671E+01	577	5.311E+01
414	2.279E-01	455	2.985E+01	496	2.103E+01	537	3.699E+01	578	5.345E+01
415	2.633E-01	456	3.029E+01	497	2.152E+01	538	3.742E+01	579	5.408E+01
416	3.382E-01	457	3.042E+01	498	2.210E+01	539	3.767E+01	580	5.450E+01
417	3.758E-01	458	2.995E+01	499	2.270E+01	540	3.799E+01	581	5.518E+01
418	4.698E-01	459	2.876E+01	500	2.336E+01	541	3.828E+01	582	5.572E+01
419	5.351E-01	460	2.776E+01	501	2.383E+01	542	3.862E+01	583	5.625E+01
420	6.754E-01	461	2.656E+01	502	2.442E+01	543	3.908E+01	584	5.702E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.764E+01	626	7.528E+01	667	5.130E+01	708	1.990E+01	749	5.130E+00
586	5.795E+01	627	7.501E+01	668	5.038E+01	709	1.933E+01	750	4.972E+00
587	5.879E+01	628	7.502E+01	669	4.950E+01	710	1.881E+01	751	4.784E+00
588	5.946E+01	629	7.452E+01	670	4.860E+01	711	1.837E+01	752	4.627E+00
589	6.020E+01	630	7.434E+01	671	4.774E+01	712	1.780E+01	753	4.478E+00
590	6.071E+01	631	7.400E+01	672	4.679E+01	713	1.737E+01	754	4.212E+00
591	6.114E+01	632	7.381E+01	673	4.585E+01	714	1.693E+01	755	4.057E+00
592	6.219E+01	633	7.341E+01	674	4.507E+01	715	1.638E+01	756	3.871E+00
593	6.268E+01	634	7.308E+01	675	4.405E+01	716	1.603E+01	757	3.774E+00
594	6.357E+01	635	7.270E+01	676	4.310E+01	717	1.555E+01	758	3.474E+00
595	6.413E+01	636	7.240E+01	677	4.238E+01	718	1.511E+01	759	3.456E+00
596	6.489E+01	637	7.210E+01	678	4.164E+01	719	1.465E+01	760	3.230E+00
597	6.562E+01	638	7.157E+01	679	4.075E+01	720	1.426E+01	761	3.175E+00
598	6.618E+01	639	7.118E+01	680	3.992E+01	721	1.383E+01	762	3.140E+00
599	6.678E+01	640	7.074E+01	681	3.894E+01	722	1.347E+01	763	3.103E+00
600	6.751E+01	641	7.020E+01	682	3.817E+01	723	1.300E+01	764	2.851E+00
601	6.844E+01	642	6.989E+01	683	3.724E+01	724	1.268E+01	765	2.671E+00
602	6.892E+01	643	6.924E+01	684	3.661E+01	725	1.232E+01	766	2.535E+00
603	6.938E+01	644	6.863E+01	685	3.573E+01	726	1.196E+01	767	2.541E+00
604	7.007E+01	645	6.816E+01	686	3.501E+01	727	1.149E+01	768	2.457E+00
605	7.056E+01	646	6.747E+01	687	3.411E+01	728	1.121E+01	769	2.297E+00
606	7.144E+01	647	6.696E+01	688	3.331E+01	729	1.086E+01	770	2.086E+00
607	7.173E+01	648	6.638E+01	689	3.258E+01	730	1.041E+01	771	2.123E+00
608	7.230E+01	649	6.573E+01	690	3.174E+01	731	1.011E+01	772	2.083E+00
609	7.283E+01	650	6.483E+01	691	3.105E+01	732	9.767E+00	773	1.990E+00
610	7.309E+01	651	6.431E+01	692	3.034E+01	733	9.435E+00	774	1.931E+00
611	7.359E+01	652	6.355E+01	693	2.957E+01	734	9.040E+00	775	1.840E+00
612	7.403E+01	653	6.298E+01	694	2.884E+01	735	8.803E+00	776	1.707E+00
613	7.435E+01	654	6.218E+01	695	2.821E+01	736	8.449E+00	777	1.740E+00
614	7.461E+01	655	6.142E+01	696	2.751E+01	737	8.186E+00	778	1.626E+00
615	7.480E+01	656	6.073E+01	697	2.683E+01	738	7.823E+00	779	1.518E+00
616	7.489E+01	657	5.988E+01	698	2.604E+01	739	7.526E+00	780	1.493E+00
617	7.521E+01	658	5.912E+01	699	2.536E+01	740	7.236E+00		
618	7.548E+01	659	5.818E+01	700	2.481E+01	741	7.062E+00		
619	7.566E+01	660	5.746E+01	701	2.403E+01	742	6.741E+00		
620	7.545E+01	661	5.665E+01	702	2.350E+01	743	6.518E+00		
621	7.571E+01	662	5.579E+01	703	2.282E+01	744	6.122E+00		
622	7.565E+01	663	5.476E+01	704	2.223E+01	745	5.997E+00		
623	7.528E+01	664	5.386E+01	705	2.165E+01	746	5.678E+00		
624	7.542E+01	665	5.318E+01	706	2.098E+01	747	5.508E+00		
625	7.525E+01	666	5.220E+01	707	2.039E+01	748	5.308E+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**

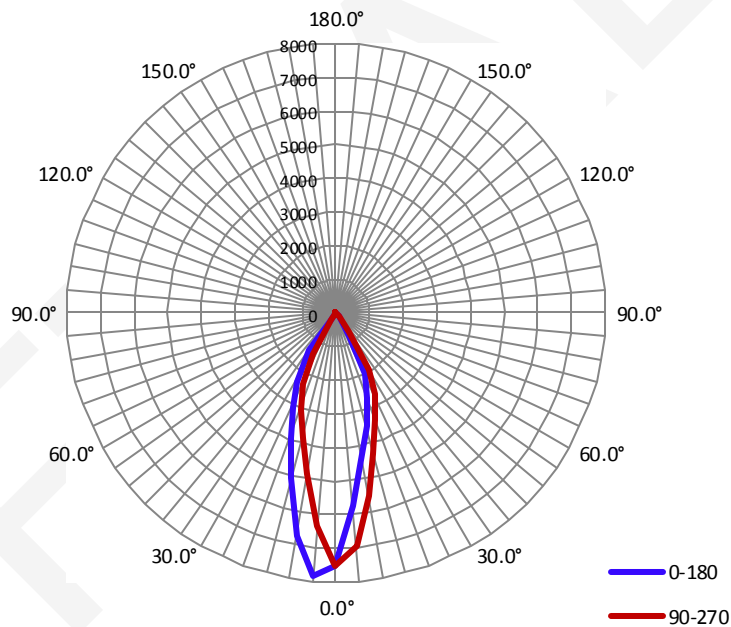
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.4630	53.33	0.9600

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3430.8	64.38	7909.4	0.55	0.53

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	32.7	33.7	33.7	32.9	33.2
Field Angle (10% I_{max}):	67.7	68.2	67.7	67.8	67.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	7519	7519	7519	7519	7519	7519	7519	7519
5.0°	5781	5927	6158	6519	6964	7435	7809	7909
10.0°	4434	4522	4753	5142	5551	6024	6531	6945
15.0°	3472	3541	3708	3992	4320	4666	4960	5300
20.0°	2668	2776	2938	3143	3410	3697	3891	4017
25.0°	2016	2119	2248	2428	2674	2902	3074	3190
30.0°	808	915	1165	1555	1956	2211	2369	2462
35.0°	133	151	183	361	718	985	1323	1493
40.0°	67	76	78	98	127	159	221	316
45.0°	0	13	28	54	68	71	87	91
50.0°	0	0	0	0	0	28	36	49
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	0	0	0	0	0
65.0°	0	0	0	0	0	0	0	0
70.0°	0	0	0	0	0	0	0	0
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°	7519	7519	7519	7519	7519	7519	7519	7519
5.0°	7861	7741	7406	6879	6338	5971	5746	5689
10.0°	6705	6333	5815	5291	4884	4602	4442	4361
15.0°	5067	4841	4491	4161	3863	3657	3523	3457
20.0°	3949	3805	3555	3295	3043	2848	2742	2647
25.0°	3091	2999	2773	2532	2338	2171	2025	1943
30.0°	2339	2254	2089	1785	1389	1034	826	727
35.0°	1358	1186	915	618	264	163	132	121
40.0°	242	189	145	115	75	75	72	68
45.0°	80	79	66	62	46	28	0	0
50.0°	35	34	15	0	0	0	0	0
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	0	0	0	0	0
65.0°	0	0	0	0	0	0	0	0
70.0°	0	0	0	0	0	0	0	0
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	170.7	4.97	0-5	170.7	4.97
5-10	434.8	12.67	0-10	605.5	17.65
10-15	568.5	16.57	0-15	1174.0	34.22
15-20	615.2	17.93	0-20	1789.2	52.15
20-25	609.3	17.76	0-25	2398.5	69.91
25-30	525.2	15.31	0-30	2923.8	85.22
30-35	331.2	9.65	0-35	3255.0	94.87
35-40	127.5	3.72	0-40	3382.5	98.59
40-45	33.5	0.98	0-45	3415.9	99.57
45-50	12.2	0.36	0-50	3428.2	99.92
50-55	2.7	0.08	0-55	3430.8	100.00
55-60	0.0	0.00	0-60	3430.8	100.00
60-65	0.0	0.00	0-65	3430.8	100.00
65-70	0.0	0.00	0-70	3430.8	100.00
70-75	0.0	0.00	0-75	3430.8	100.00
75-80	0.0	0.00	0-80	3430.8	100.00
80-85	0.0	0.00	0-85	3430.8	100.00
85-90	0.0	0.00	0-90	3430.8	100.00
90-95	0.0	0.00	0-95	3430.8	100.00
95-100	0.0	0.00	0-100	3430.8	100.00
100-105	0.0	0.00	0-105	3430.8	100.00
105-110	0.0	0.00	0-110	3430.8	100.00
110-115	0.0	0.00	0-115	3430.8	100.00
115-120	0.0	0.00	0-120	3430.8	100.00
120-125	0.0	0.00	0-125	3430.8	100.00
125-130	0.0	0.00	0-130	3430.8	100.00
130-135	0.0	0.00	0-135	3430.8	100.00
135-140	0.0	0.00	0-140	3430.8	100.00
140-145	0.0	0.00	0-145	3430.8	100.00
145-150	0.0	0.00	0-150	3430.8	100.00
150-155	0.0	0.00	0-155	3430.8	100.00
155-160	0.0	0.00	0-160	3430.8	100.00
160-165	0.0	0.00	0-165	3430.8	100.00
165-170	0.0	0.00	0-170	3430.8	100.00
170-175	0.0	0.00	0-175	3430.8	100.00
175-180	0.0	0.00	0-180	3430.8	100.00

6. Product Photo



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