

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE509027DIM120VMD/ADR6BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329025-10-2
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: LE509027DIM120VMD/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**

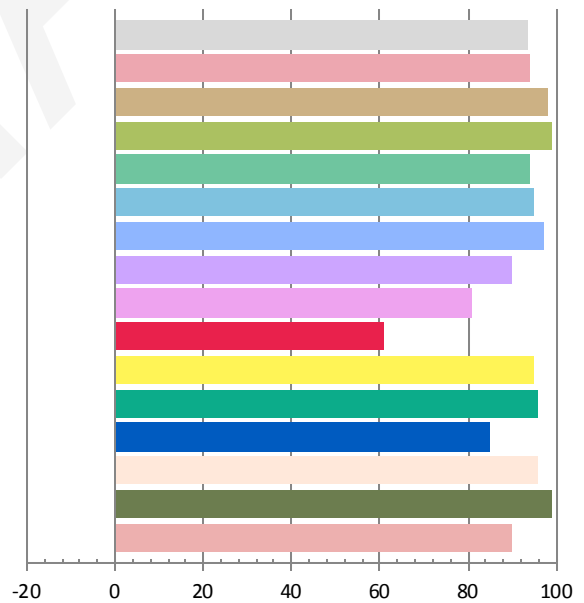
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.4469	53.31	0.9941	3476.8	65.22

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
12.301	2707	-0.00095	0.4577	0.4076	0.2625	0.5259

Color Rendering Index

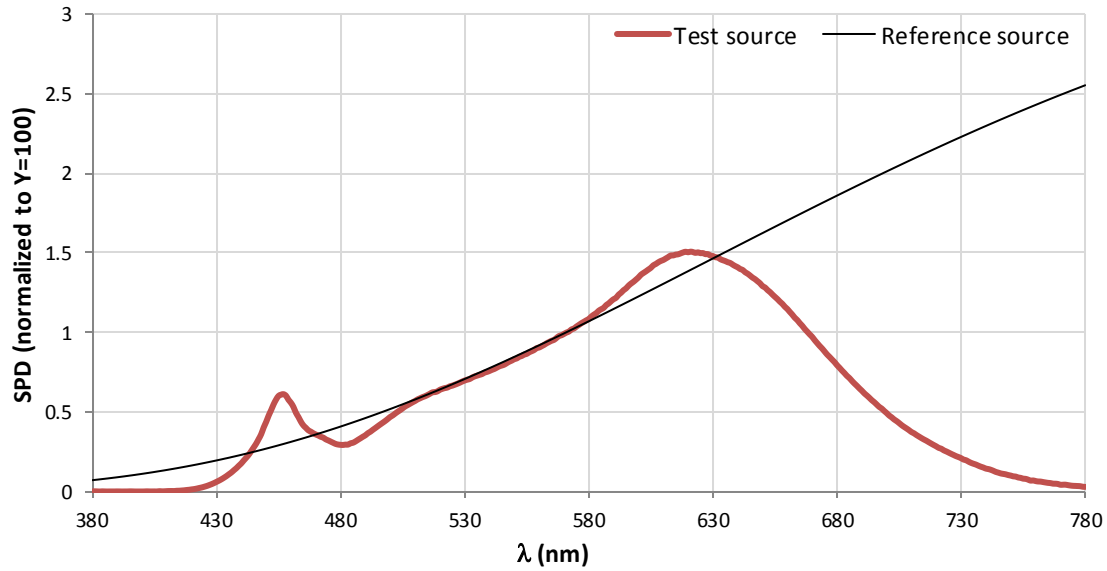
Ra			
93.5			
R1	R2	R3	R4
94	98	99	94
R5	R6	R7	R8
95	97	90	81
R9	R10	R11	R12
61	95	96	85
R13	R14	R15	
96	99	90	



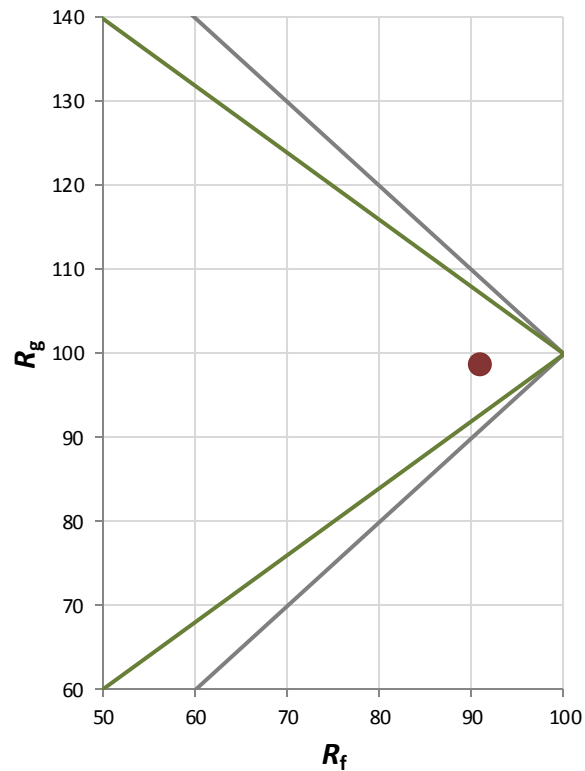
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	99

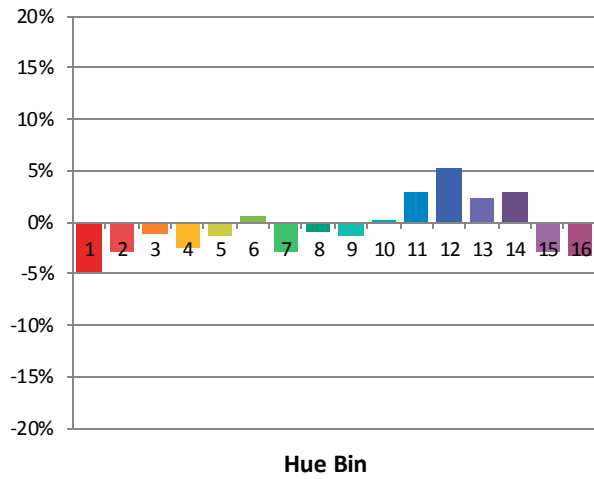
Spectral Power Distribution Comparison



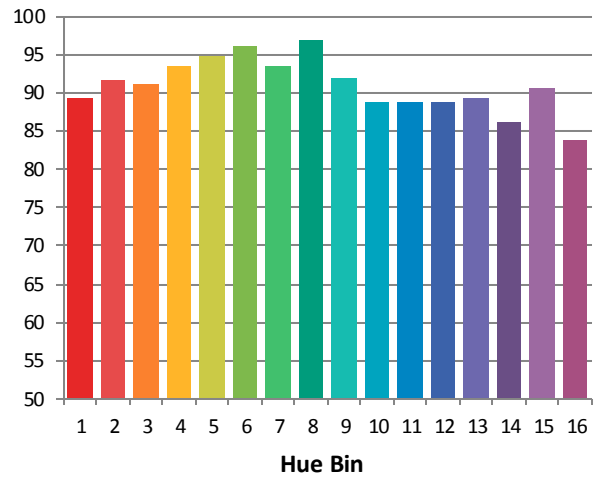
Plot of R_g versus R_f



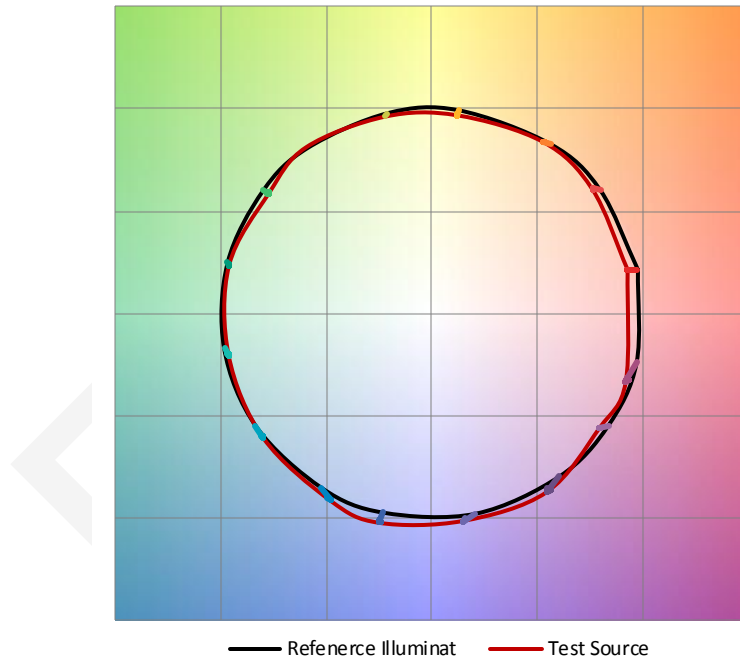
Chroma Shift by Hue



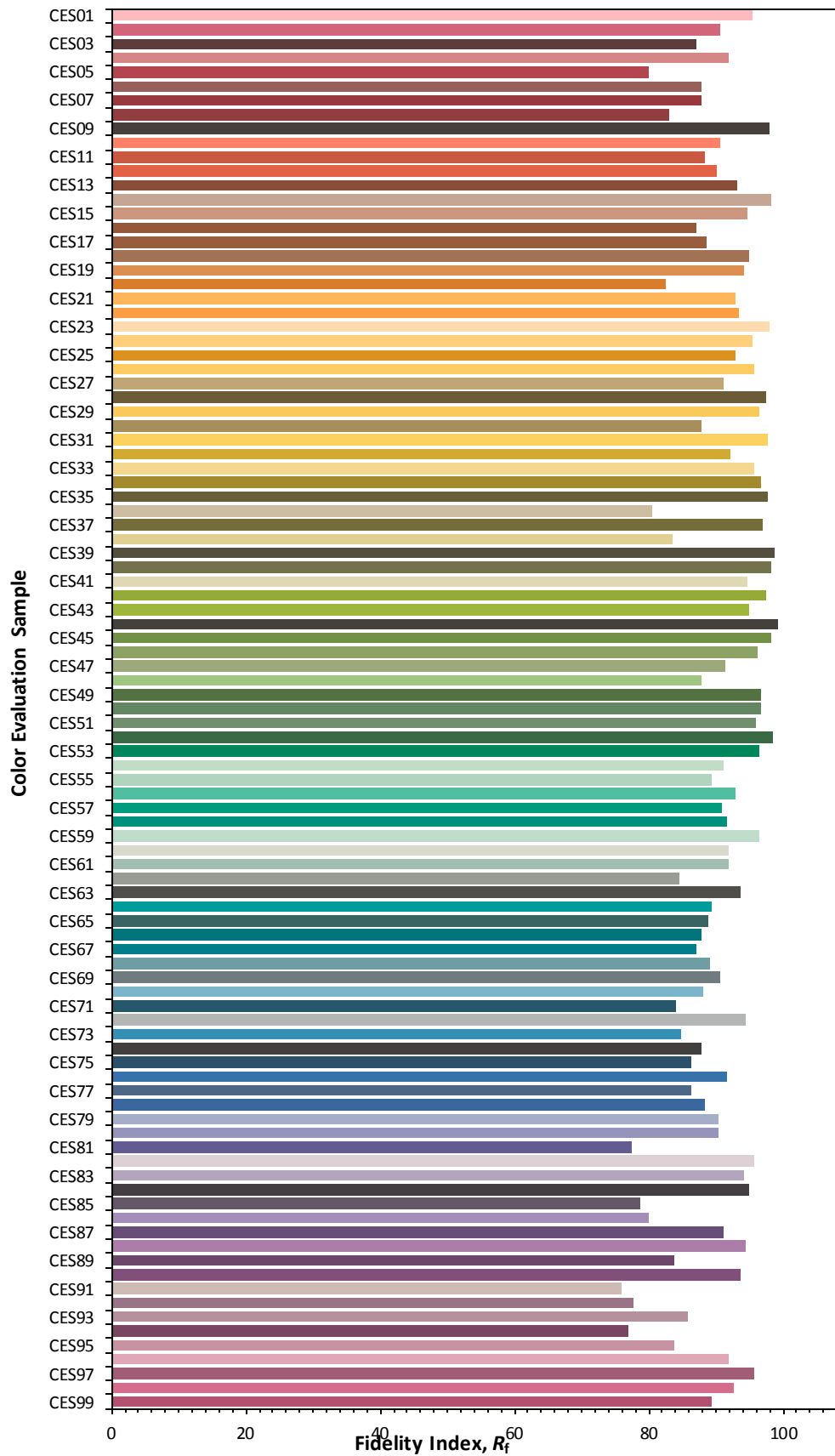
R_f by Hue



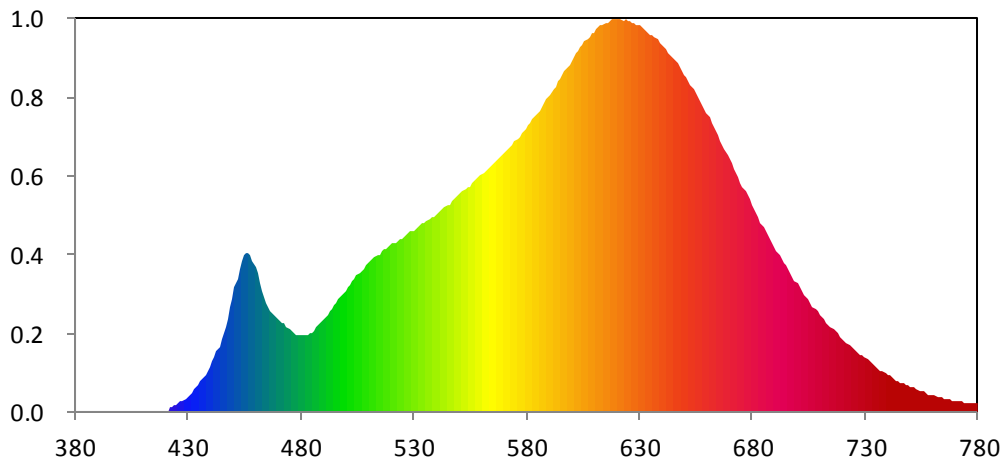
Color Vector Graphic



Color Fidelity by CES Sample



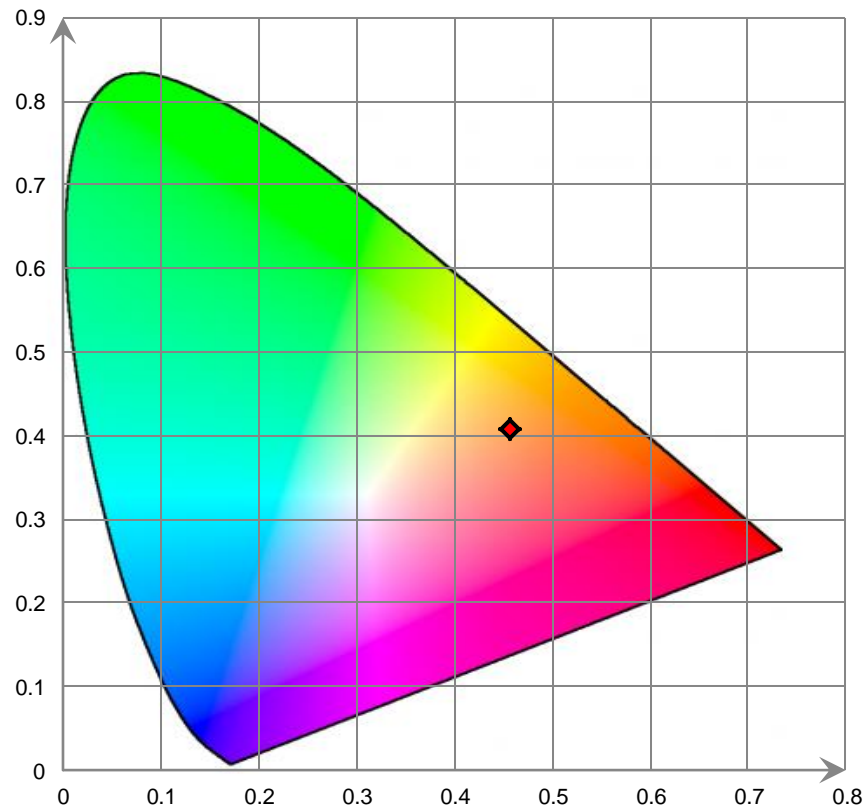
Relative Spectral Power Distribution



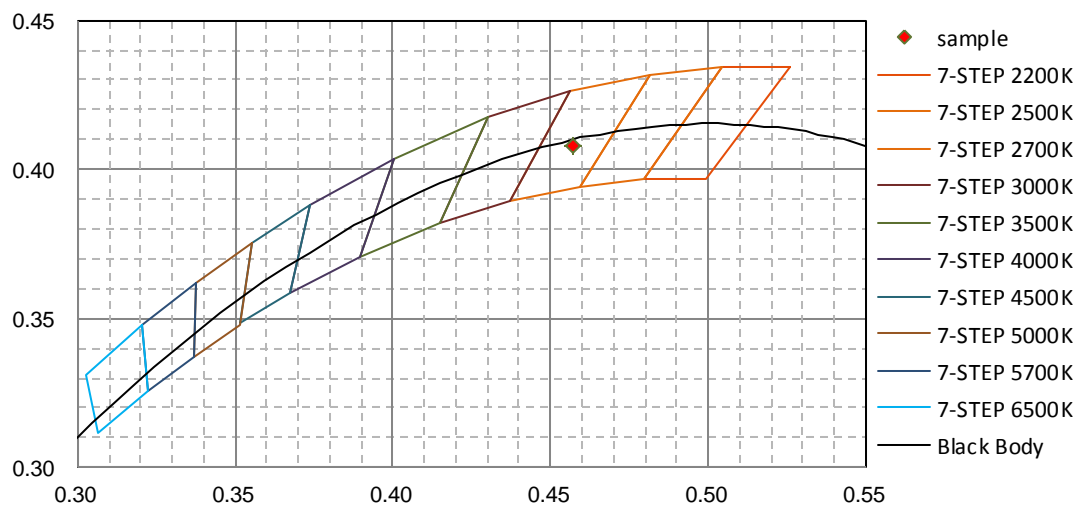
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.570E-02	421	7.774E-01	462	2.517E+01	503	2.551E+01	544	4.005E+01
381	5.830E-02	422	9.248E-01	463	2.382E+01	504	2.603E+01	545	4.031E+01
382	2.120E-02	423	1.115E+00	464	2.233E+01	505	2.661E+01	546	4.059E+01
383	1.100E-03	424	1.284E+00	465	2.114E+01	506	2.719E+01	547	4.108E+01
384	3.870E-02	425	1.513E+00	466	2.036E+01	507	2.763E+01	548	4.154E+01
385	1.270E-02	426	1.746E+00	467	1.958E+01	508	2.808E+01	549	4.189E+01
386	1.600E-03	427	2.038E+00	468	1.914E+01	509	2.853E+01	550	4.233E+01
387	9.000E-03	428	2.348E+00	469	1.864E+01	510	2.896E+01	551	4.257E+01
388	7.400E-03	429	2.696E+00	470	1.823E+01	511	2.945E+01	552	4.309E+01
389	1.020E-02	430	3.084E+00	471	1.792E+01	512	2.981E+01	553	4.336E+01
390	2.210E-02	431	3.480E+00	472	1.750E+01	513	3.017E+01	554	4.380E+01
391	1.240E-02	432	3.911E+00	473	1.724E+01	514	3.047E+01	555	4.403E+01
392	5.000E-04	433	4.404E+00	474	1.670E+01	515	3.084E+01	556	4.454E+01
393	7.800E-03	434	4.924E+00	475	1.635E+01	516	3.127E+01	557	4.488E+01
394	1.080E-02	435	5.514E+00	476	1.595E+01	517	3.171E+01	558	4.527E+01
395	4.060E-02	436	6.097E+00	477	1.558E+01	518	3.180E+01	559	4.587E+01
396	3.570E-02	437	6.797E+00	478	1.521E+01	519	3.203E+01	560	4.606E+01
397	4.000E-03	438	7.463E+00	479	1.502E+01	520	3.253E+01	561	4.648E+01
398	2.000E-04	439	8.254E+00	480	1.492E+01	521	3.284E+01	562	4.690E+01
399	0.000E+00	440	9.005E+00	481	1.489E+01	522	3.307E+01	563	4.741E+01
400	0.000E+00	441	9.947E+00	482	1.500E+01	523	3.325E+01	564	4.781E+01
401	1.970E-02	442	1.081E+01	483	1.500E+01	524	3.364E+01	565	4.821E+01
402	5.120E-02	443	1.179E+01	484	1.541E+01	525	3.385E+01	566	4.851E+01
403	2.140E-02	444	1.292E+01	485	1.560E+01	526	3.415E+01	567	4.913E+01
404	1.990E-02	445	1.412E+01	486	1.601E+01	527	3.446E+01	568	4.972E+01
405	2.420E-02	446	1.533E+01	487	1.653E+01	528	3.480E+01	569	4.998E+01
406	1.600E-02	447	1.679E+01	488	1.702E+01	529	3.518E+01	570	5.040E+01
407	1.017E-01	448	1.832E+01	489	1.753E+01	530	3.550E+01	571	5.084E+01
408	4.850E-02	449	2.047E+01	490	1.800E+01	531	3.576E+01	572	5.116E+01
409	6.320E-02	450	2.225E+01	491	1.865E+01	532	3.597E+01	573	5.183E+01
410	1.193E-01	451	2.427E+01	492	1.913E+01	533	3.644E+01	574	5.212E+01
411	1.480E-01	452	2.601E+01	493	1.974E+01	534	3.681E+01	575	5.274E+01
412	1.495E-01	453	2.787E+01	494	2.029E+01	535	3.707E+01	576	5.327E+01
413	1.480E-01	454	2.940E+01	495	2.089E+01	536	3.733E+01	577	5.382E+01
414	2.273E-01	455	3.057E+01	496	2.146E+01	537	3.756E+01	578	5.427E+01
415	2.455E-01	456	3.096E+01	497	2.201E+01	538	3.803E+01	579	5.475E+01
416	3.154E-01	457	3.112E+01	498	2.257E+01	539	3.826E+01	580	5.519E+01
417	3.780E-01	458	3.062E+01	499	2.319E+01	540	3.856E+01	581	5.593E+01
418	4.768E-01	459	2.935E+01	500	2.384E+01	541	3.892E+01	582	5.655E+01
419	5.577E-01	460	2.837E+01	501	2.433E+01	542	3.922E+01	583	5.706E+01
420	6.742E-01	461	2.704E+01	502	2.494E+01	543	3.965E+01	584	5.781E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.830E+01	626	7.626E+01	667	5.198E+01	708	2.017E+01	749	5.253E+00
586	5.875E+01	627	7.590E+01	668	5.113E+01	709	1.963E+01	750	5.090E+00
587	5.960E+01	628	7.593E+01	669	5.026E+01	710	1.903E+01	751	4.855E+00
588	6.015E+01	629	7.544E+01	670	4.945E+01	711	1.862E+01	752	4.765E+00
589	6.088E+01	630	7.531E+01	671	4.842E+01	712	1.807E+01	753	4.486E+00
590	6.151E+01	631	7.491E+01	672	4.749E+01	713	1.759E+01	754	4.356E+00
591	6.197E+01	632	7.485E+01	673	4.657E+01	714	1.710E+01	755	4.112E+00
592	6.293E+01	633	7.430E+01	674	4.573E+01	715	1.665E+01	756	4.043E+00
593	6.357E+01	634	7.397E+01	675	4.478E+01	716	1.624E+01	757	3.795E+00
594	6.438E+01	635	7.370E+01	676	4.384E+01	717	1.576E+01	758	3.480E+00
595	6.495E+01	636	7.333E+01	677	4.303E+01	718	1.530E+01	759	3.531E+00
596	6.582E+01	637	7.308E+01	678	4.219E+01	719	1.485E+01	760	3.345E+00
597	6.650E+01	638	7.255E+01	679	4.137E+01	720	1.443E+01	761	3.205E+00
598	6.708E+01	639	7.209E+01	680	4.040E+01	721	1.395E+01	762	3.174E+00
599	6.776E+01	640	7.170E+01	681	3.958E+01	722	1.368E+01	763	3.025E+00
600	6.847E+01	641	7.117E+01	682	3.869E+01	723	1.318E+01	764	2.889E+00
601	6.932E+01	642	7.085E+01	683	3.787E+01	724	1.283E+01	765	2.765E+00
602	6.988E+01	643	7.013E+01	684	3.699E+01	725	1.244E+01	766	2.689E+00
603	7.041E+01	644	6.967E+01	685	3.629E+01	726	1.204E+01	767	2.518E+00
604	7.099E+01	645	6.904E+01	686	3.539E+01	727	1.167E+01	768	2.489E+00
605	7.155E+01	646	6.840E+01	687	3.456E+01	728	1.130E+01	769	2.404E+00
606	7.234E+01	647	6.790E+01	688	3.381E+01	729	1.100E+01	770	2.157E+00
607	7.277E+01	648	6.724E+01	689	3.299E+01	730	1.065E+01	771	2.168E+00
608	7.330E+01	649	6.659E+01	690	3.224E+01	731	1.021E+01	772	2.180E+00
609	7.373E+01	650	6.569E+01	691	3.140E+01	732	9.992E+00	773	2.044E+00
610	7.405E+01	651	6.524E+01	692	3.072E+01	733	9.551E+00	774	1.916E+00
611	7.451E+01	652	6.444E+01	693	3.000E+01	734	9.167E+00	775	1.822E+00
612	7.499E+01	653	6.379E+01	694	2.922E+01	735	8.873E+00	776	1.790E+00
613	7.549E+01	654	6.299E+01	695	2.857E+01	736	8.602E+00	777	1.744E+00
614	7.550E+01	655	6.225E+01	696	2.782E+01	737	8.244E+00	778	1.697E+00
615	7.576E+01	656	6.154E+01	697	2.707E+01	738	7.926E+00	779	1.522E+00
616	7.587E+01	657	6.072E+01	698	2.653E+01	739	7.655E+00	780	1.476E+00
617	7.616E+01	658	6.000E+01	699	2.578E+01	740	7.323E+00		
618	7.646E+01	659	5.909E+01	700	2.509E+01	741	7.175E+00		
619	7.668E+01	660	5.836E+01	701	2.432E+01	742	6.934E+00		
620	7.651E+01	661	5.743E+01	702	2.374E+01	743	6.615E+00		
621	7.671E+01	662	5.656E+01	703	2.306E+01	744	6.261E+00		
622	7.657E+01	663	5.557E+01	704	2.253E+01	745	6.033E+00		
623	7.632E+01	664	5.482E+01	705	2.191E+01	746	5.774E+00		
624	7.649E+01	665	5.385E+01	706	2.125E+01	747	5.631E+00		
625	7.622E+01	666	5.299E+01	707	2.069E+01	748	5.480E+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**

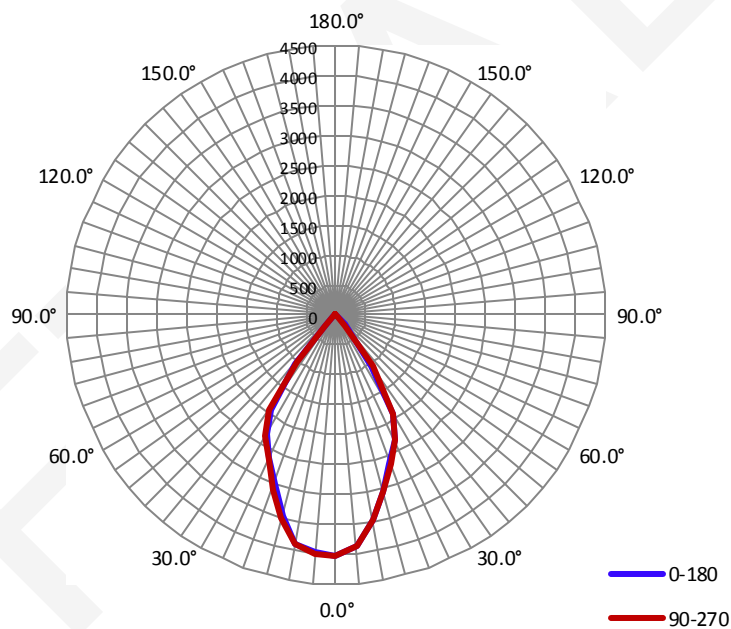
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.4630	53.32	0.9600

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3479.2	65.30	4080.9	0.86	0.87

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	62.6	63.0	62.8	61.3	62.7
Field Angle (10% I_{max}):	82.9	83.4	83.1	83.7	83.3

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	4032	4032	4032	4032	4032	4032	4032	4032
5.0°	3864	3830	3819	3835	3872	3919	3938	3977
10.0°	3491	3437	3420	3439	3483	3574	3668	3796
15.0°	3052	3022	3003	3035	3068	3130	3215	3357
20.0°	2640	2612	2616	2635	2650	2703	2786	2939
25.0°	2313	2299	2300	2308	2313	2335	2407	2533
30.0°	1929	1855	1838	1845	1927	2026	2106	2212
35.0°	1036	910	875	908	1054	1253	1481	1790
40.0°	219	105	88	108	233	444	659	911
45.0°	0	0	0	0	10	19	51	113
50.0°	0	0	0	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

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	4032	4032	4032	4032	4032	4032	4032	4032
5.0°	3988	4006	4081	4061	4007	3967	3936	3898
10.0°	3873	3930	3959	3954	3888	3766	3616	3511
15.0°	3463	3604	3666	3629	3529	3344	3210	3084
20.0°	3022	3196	3251	3232	3097	2921	2780	2658
25.0°	2621	2748	2834	2800	2682	2540	2424	2333
30.0°	2282	2373	2447	2433	2348	2216	2092	1959
35.0°	1922	2008	2074	2024	1933	1766	1417	1146
40.0°	1054	1192	1242	1156	1036	820	576	336
45.0°	241	402	441	392	264	87	39	10
50.0°	0	15	21	14	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	95.3	2.74	0-5	95.3	2.74
5-10	272.3	7.83	0-10	367.6	10.57
10-15	412.3	11.85	0-15	779.9	22.42
15-20	505.6	14.53	0-20	1285.5	36.95
20-25	560.6	16.11	0-25	1846.1	53.06
25-30	582.7	16.75	0-30	2428.8	69.81
30-35	529.0	15.21	0-35	2957.9	85.02
35-40	352.2	10.12	0-40	3310.1	95.14
40-45	141.7	4.07	0-45	3451.8	99.21
45-50	26.8	0.77	0-50	3478.5	99.98
50-55	0.7	0.02	0-55	3479.2	100.00
55-60	0.0	0.00	0-60	3479.2	100.00
60-65	0.0	0.00	0-65	3479.2	100.00
65-70	0.0	0.00	0-70	3479.2	100.00
70-75	0.0	0.00	0-75	3479.2	100.00
75-80	0.0	0.00	0-80	3479.2	100.00
80-85	0.0	0.00	0-85	3479.2	100.00
85-90	0.0	0.00	0-90	3479.2	100.00
90-95	0.0	0.00	0-95	3479.2	100.00
95-100	0.0	0.00	0-100	3479.2	100.00
100-105	0.0	0.00	0-105	3479.2	100.00
105-110	0.0	0.00	0-110	3479.2	100.00
110-115	0.0	0.00	0-115	3479.2	100.00
115-120	0.0	0.00	0-120	3479.2	100.00
120-125	0.0	0.00	0-125	3479.2	100.00
125-130	0.0	0.00	0-130	3479.2	100.00
130-135	0.0	0.00	0-135	3479.2	100.00
135-140	0.0	0.00	0-140	3479.2	100.00
140-145	0.0	0.00	0-145	3479.2	100.00
145-150	0.0	0.00	0-150	3479.2	100.00
150-155	0.0	0.00	0-155	3479.2	100.00
155-160	0.0	0.00	0-160	3479.2	100.00
160-165	0.0	0.00	0-165	3479.2	100.00
165-170	0.0	0.00	0-170	3479.2	100.00
170-175	0.0	0.00	0-175	3479.2	100.00
175-180	0.0	0.00	0-180	3479.2	100.00

6. Product Photo



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