

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE089027DIM120NRR4BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329022-10-1
Test Date:	2019-04-02 to 2019-04-04
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.

1. Product Description

General Information:

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

Model Tested: LE089027DIM120NRR4BL
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Recessed Downlight
 Aging Time Before Test: 0 hour (For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz
 Rated Power: 12W
 Nominal CCT: 2700K
 Nominal Lumen Output: 850lm

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	2019-04-23	2020-04-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2019-04-23	2020-04-22
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	2019-04-23	2020-04-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2019-04-23	2020-04-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2019-04-23	2020-04-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2019-04-23	2020-04-22
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.

4 π 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**

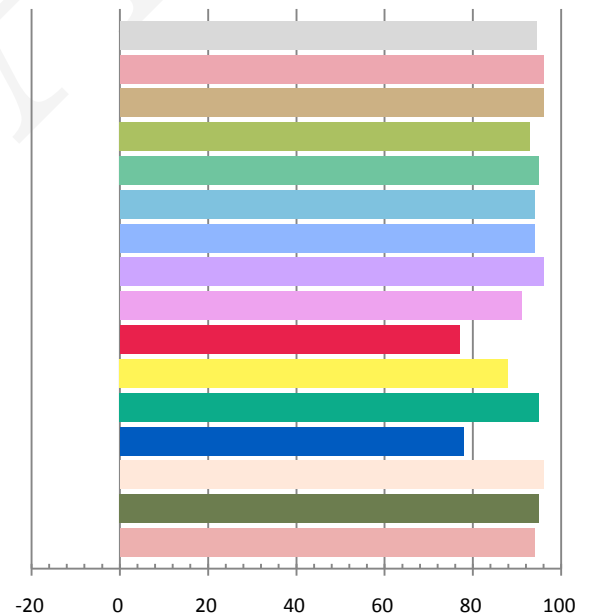
Photometric and Electrical Measurement Result

Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.102	12.1	0.9886	890.24	73.57

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.278	2718	-0.00011	0.4583	0.4100	0.2618	0.5269

Color Rendering Index

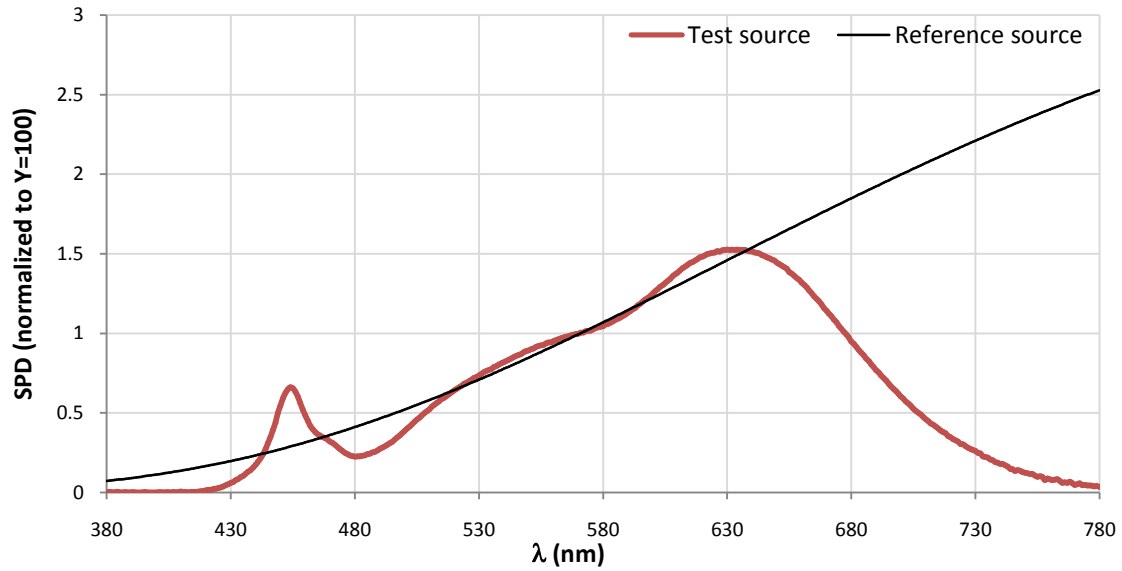
Ra			
94.4			
R1	R2	R3	R4
96	96	93	95
R5	R6	R7	R8
94	94	96	91
R9	R10	R11	R12
77	88	95	78
R13	R14	R15	
96	95	94	



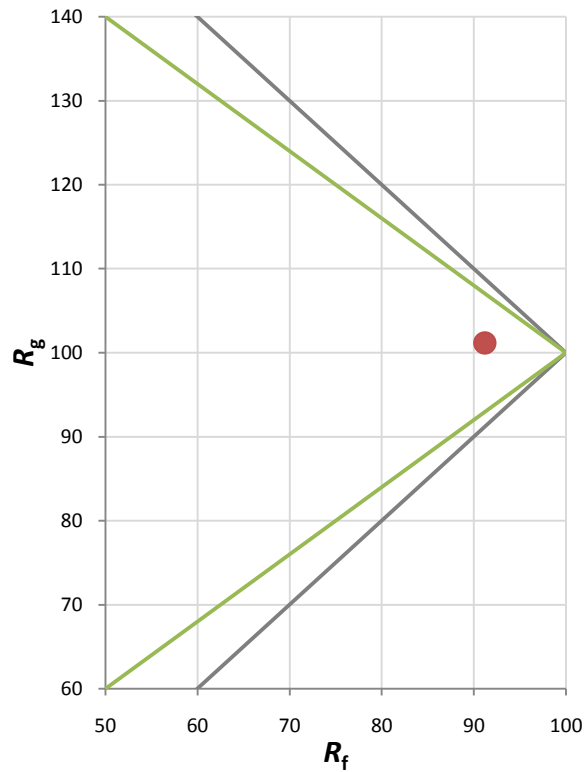
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

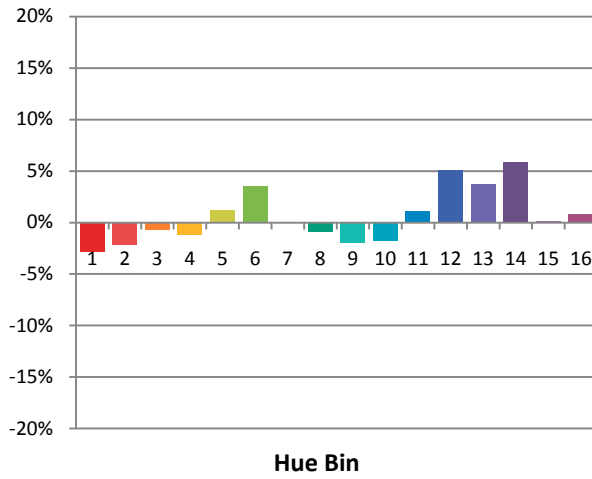
Spectral Power Distribution Comparison



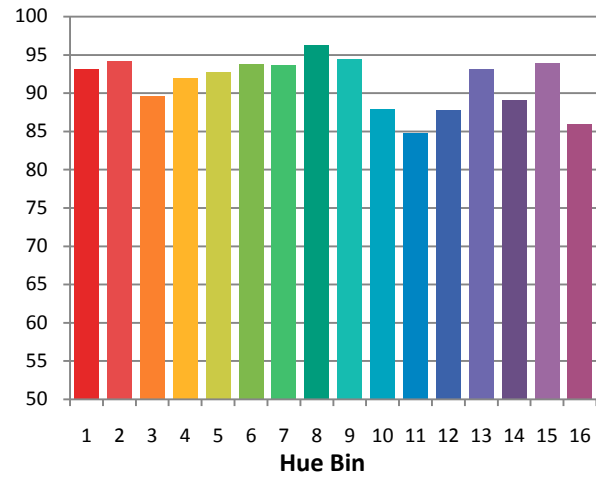
Plot of R_g versus R_f



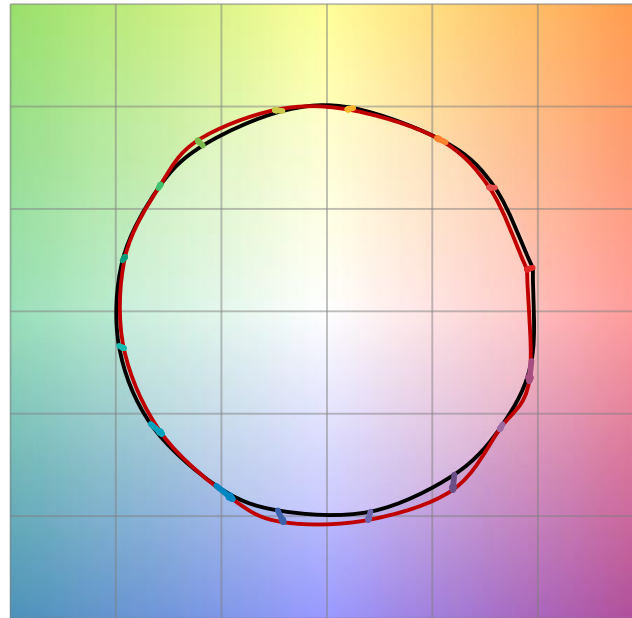
Chroma Shift by Hue



R_f by Hue

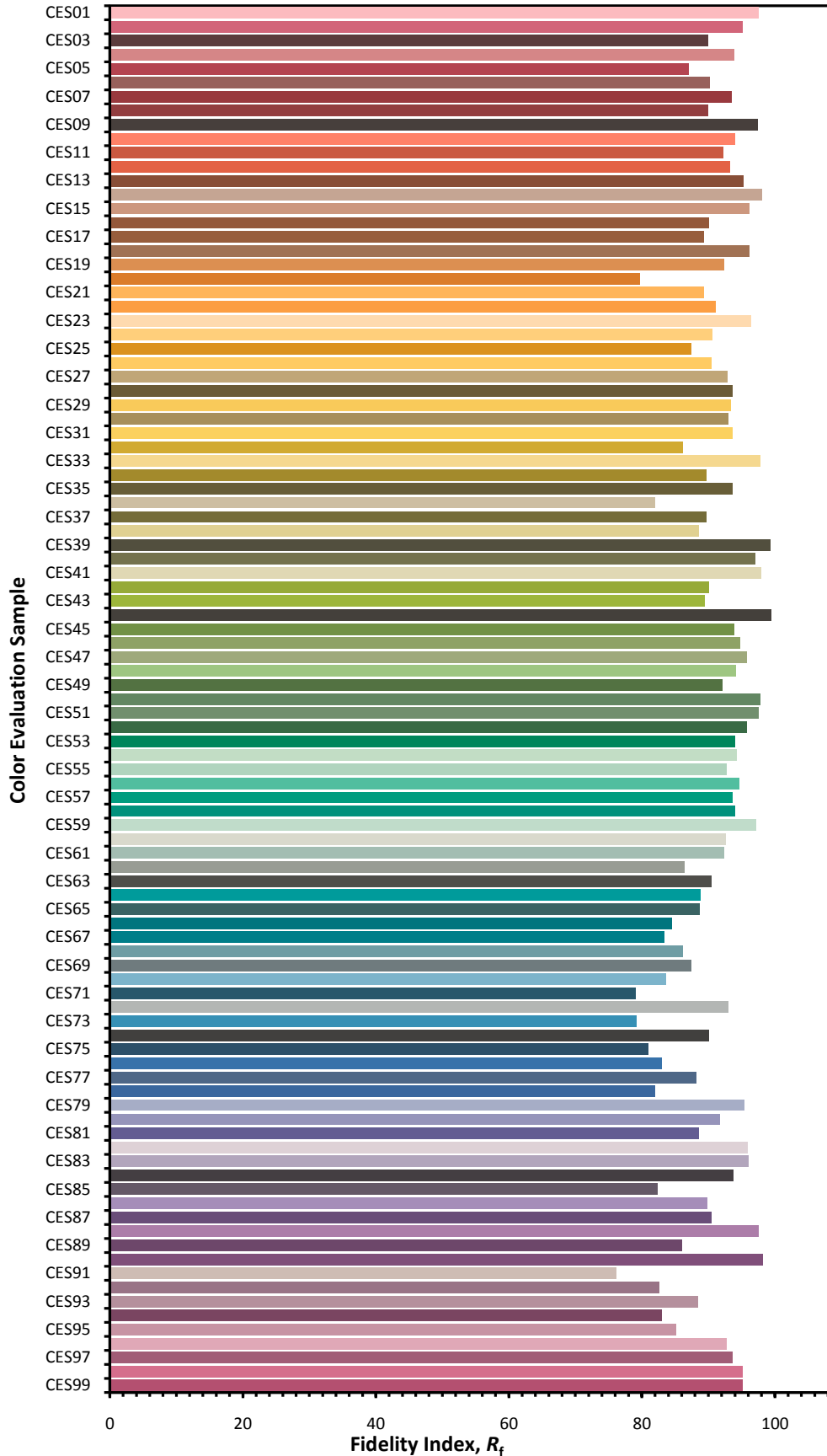


Color Vector Graphic

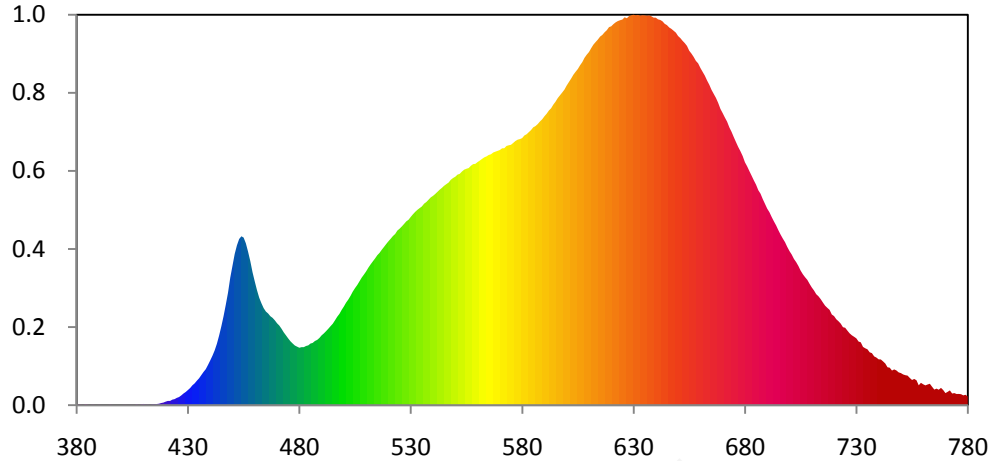


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



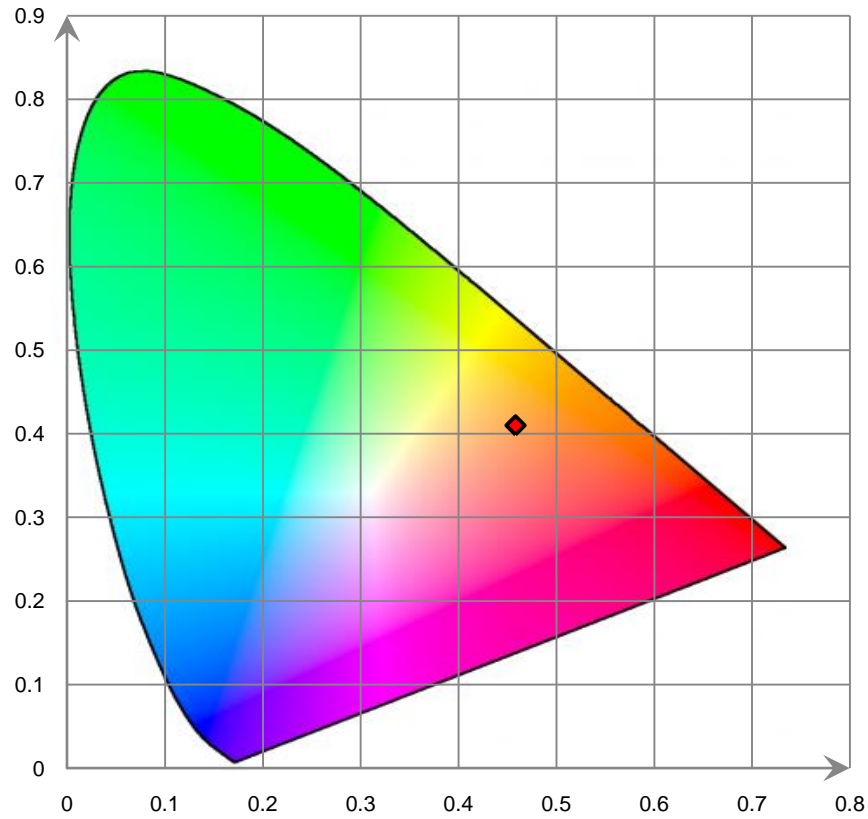
Relative Spectral Power Distribution



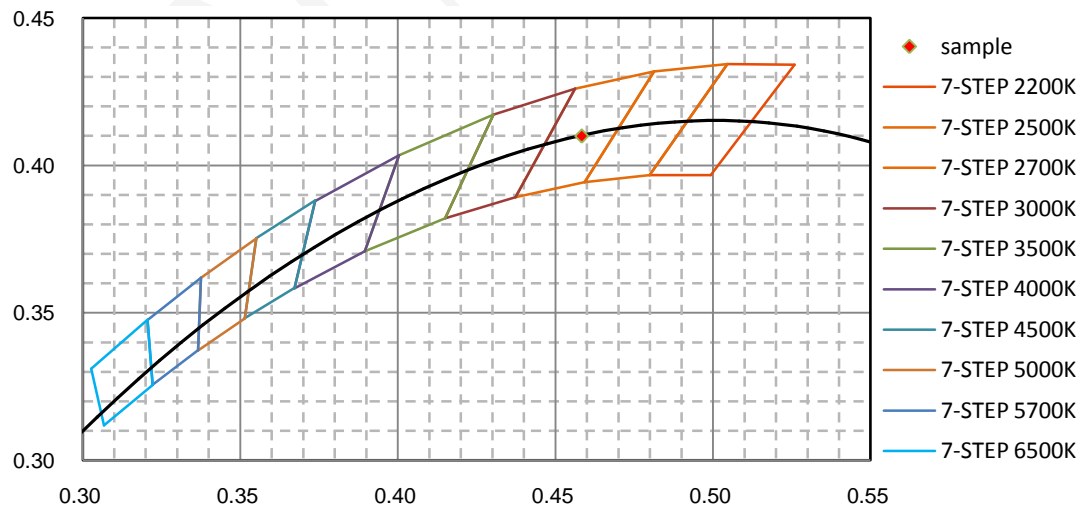
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.430E-02	421	2.171E-01	462	5.474E+00	503	5.577E+00	544	1.108E+01
381	3.840E-02	422	2.172E-01	463	5.189E+00	504	5.790E+00	545	1.118E+01
382	3.110E-02	423	2.827E-01	464	4.943E+00	505	5.968E+00	546	1.127E+01
383	4.200E-03	424	3.082E-01	465	4.772E+00	506	6.125E+00	547	1.135E+01
384	6.210E-02	425	3.721E-01	466	4.672E+00	507	6.313E+00	548	1.149E+01
385	2.930E-02	426	4.129E-01	467	4.533E+00	508	6.501E+00	549	1.158E+01
386	2.100E-03	427	4.981E-01	468	4.449E+00	509	6.657E+00	550	1.164E+01
387	3.330E-02	428	5.922E-01	469	4.323E+00	510	6.819E+00	551	1.175E+01
388	2.410E-02	429	6.733E-01	470	4.175E+00	511	7.011E+00	552	1.179E+01
389	4.500E-03	430	7.724E-01	471	4.060E+00	512	7.175E+00	553	1.191E+01
390	3.380E-02	431	8.754E-01	472	3.896E+00	513	7.329E+00	554	1.200E+01
391	1.310E-02	432	1.012E+00	473	3.714E+00	514	7.481E+00	555	1.205E+01
392	2.500E-03	433	1.111E+00	474	3.558E+00	515	7.643E+00	556	1.208E+01
393	1.100E-03	434	1.246E+00	475	3.403E+00	516	7.762E+00	557	1.220E+01
394	4.200E-03	435	1.370E+00	476	3.258E+00	517	7.920E+00	558	1.228E+01
395	3.660E-02	436	1.533E+00	477	3.144E+00	518	8.065E+00	559	1.230E+01
396	1.510E-02	437	1.693E+00	478	3.041E+00	519	8.211E+00	560	1.239E+01
397	6.400E-03	438	1.834E+00	479	2.983E+00	520	8.354E+00	561	1.246E+01
398	2.600E-03	439	2.049E+00	480	2.928E+00	521	8.482E+00	562	1.255E+01
399	1.000E-04	440	2.278E+00	481	2.957E+00	522	8.619E+00	563	1.263E+01
400	0.000E+00	441	2.516E+00	482	2.957E+00	523	8.723E+00	564	1.268E+01
401	1.710E-02	442	2.792E+00	483	3.016E+00	524	8.898E+00	565	1.275E+01
402	2.670E-02	443	3.132E+00	484	3.048E+00	525	8.994E+00	566	1.279E+01
403	9.900E-03	444	3.551E+00	485	3.141E+00	526	9.107E+00	567	1.287E+01
404	1.770E-02	445	4.023E+00	486	3.173E+00	527	9.234E+00	568	1.292E+01
405	1.810E-02	446	4.540E+00	487	3.271E+00	528	9.367E+00	569	1.296E+01
406	7.100E-03	447	5.124E+00	488	3.325E+00	529	9.448E+00	570	1.300E+01
407	5.510E-02	448	5.737E+00	489	3.425E+00	530	9.594E+00	571	1.309E+01
408	7.800E-03	449	6.502E+00	490	3.558E+00	531	9.729E+00	572	1.310E+01
409	4.190E-02	450	7.104E+00	491	3.657E+00	532	9.850E+00	573	1.321E+01
410	6.420E-02	451	7.712E+00	492	3.771E+00	533	9.956E+00	574	1.324E+01
411	2.970E-02	452	8.150E+00	493	3.894E+00	534	1.004E+01	575	1.327E+01
412	3.900E-02	453	8.471E+00	494	4.025E+00	535	1.013E+01	576	1.337E+01
413	1.130E-02	454	8.608E+00	495	4.148E+00	536	1.027E+01	577	1.346E+01
414	5.290E-02	455	8.541E+00	496	4.323E+00	537	1.035E+01	578	1.353E+01
415	4.570E-02	456	8.248E+00	497	4.505E+00	538	1.047E+01	579	1.356E+01
416	5.890E-02	457	7.821E+00	498	4.654E+00	539	1.059E+01	580	1.361E+01
417	7.620E-02	458	7.337E+00	499	4.855E+00	540	1.067E+01	581	1.374E+01
418	1.100E-01	459	6.775E+00	500	5.030E+00	541	1.076E+01	582	1.381E+01
419	1.325E-01	460	6.303E+00	501	5.228E+00	542	1.087E+01	583	1.391E+01
420	1.818E-01	461	5.863E+00	502	5.387E+00	543	1.098E+01	584	1.402E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.416E+01	626	1.977E+01	667	1.566E+01	708	6.388E+00	749	1.671E+00
586	1.422E+01	627	1.972E+01	668	1.540E+01	709	6.186E+00	750	1.636E+00
587	1.433E+01	628	1.983E+01	669	1.510E+01	710	6.001E+00	751	1.567E+00
588	1.446E+01	629	1.987E+01	670	1.489E+01	711	5.844E+00	752	1.528E+00
589	1.457E+01	630	1.990E+01	671	1.466E+01	712	5.657E+00	753	1.507E+00
590	1.472E+01	631	1.987E+01	672	1.445E+01	713	5.549E+00	754	1.388E+00
591	1.485E+01	632	1.989E+01	673	1.416E+01	714	5.407E+00	755	1.284E+00
592	1.501E+01	633	1.985E+01	674	1.393E+01	715	5.232E+00	756	1.337E+00
593	1.513E+01	634	1.987E+01	675	1.366E+01	716	5.070E+00	757	1.270E+00
594	1.532E+01	635	1.987E+01	676	1.341E+01	717	4.959E+00	758	1.013E+00
595	1.547E+01	636	1.985E+01	677	1.316E+01	718	4.857E+00	759	1.139E+00
596	1.565E+01	637	1.986E+01	678	1.294E+01	719	4.620E+00	760	1.066E+00
597	1.579E+01	638	1.982E+01	679	1.269E+01	720	4.541E+00	761	1.009E+00
598	1.594E+01	639	1.975E+01	680	1.238E+01	721	4.380E+00	762	1.055E+00
599	1.608E+01	640	1.975E+01	681	1.217E+01	722	4.277E+00	763	1.090E+00
600	1.629E+01	641	1.966E+01	682	1.193E+01	723	4.157E+00	764	9.399E-01
601	1.647E+01	642	1.963E+01	683	1.170E+01	724	3.974E+00	765	7.964E-01
602	1.664E+01	643	1.956E+01	684	1.145E+01	725	3.947E+00	766	8.443E-01
603	1.684E+01	644	1.944E+01	685	1.124E+01	726	3.799E+00	767	7.887E-01
604	1.699E+01	645	1.937E+01	686	1.096E+01	727	3.661E+00	768	8.818E-01
605	1.713E+01	646	1.925E+01	687	1.078E+01	728	3.561E+00	769	7.691E-01
606	1.732E+01	647	1.918E+01	688	1.050E+01	729	3.485E+00	770	6.158E-01
607	1.748E+01	648	1.908E+01	689	1.026E+01	730	3.406E+00	771	6.797E-01
608	1.770E+01	649	1.899E+01	690	1.002E+01	731	3.244E+00	772	7.521E-01
609	1.786E+01	650	1.881E+01	691	9.834E+00	732	3.203E+00	773	5.949E-01
610	1.800E+01	651	1.871E+01	692	9.593E+00	733	2.970E+00	774	6.147E-01
611	1.820E+01	652	1.857E+01	693	9.368E+00	734	2.899E+00	775	5.720E-01
612	1.837E+01	653	1.845E+01	694	9.162E+00	735	2.847E+00	776	5.736E-01
613	1.851E+01	654	1.831E+01	695	8.918E+00	736	2.695E+00	777	5.585E-01
614	1.863E+01	655	1.806E+01	696	8.695E+00	737	2.650E+00	778	4.996E-01
615	1.878E+01	656	1.792E+01	697	8.492E+00	738	2.488E+00	779	5.296E-01
616	1.887E+01	657	1.775E+01	698	8.306E+00	739	2.427E+00	780	4.479E-01
617	1.900E+01	658	1.754E+01	699	8.064E+00	740	2.336E+00		
618	1.911E+01	659	1.742E+01	700	7.852E+00	741	2.329E+00		
619	1.927E+01	660	1.719E+01	701	7.676E+00	742	2.231E+00		
620	1.931E+01	661	1.699E+01	702	7.452E+00	743	2.123E+00		
621	1.942E+01	662	1.679E+01	703	7.290E+00	744	1.932E+00		
622	1.951E+01	663	1.655E+01	704	7.091E+00	745	1.910E+00		
623	1.958E+01	664	1.633E+01	705	6.858E+00	746	1.766E+00		
624	1.962E+01	665	1.607E+01	706	6.672E+00	747	1.822E+00		
625	1.965E+01	666	1.586E+01	707	6.520E+00	748	1.768E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

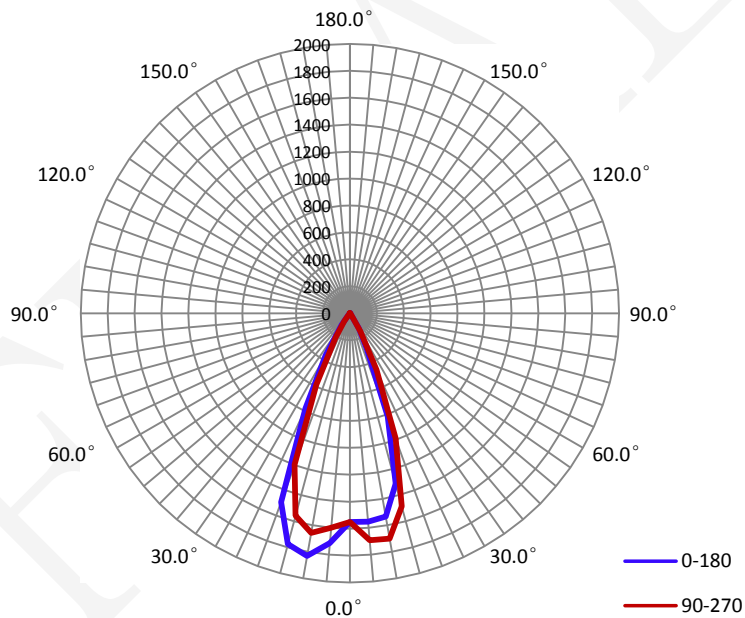
Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.1050	12.12	0.9580

Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	$I_{max}(cd)$	S/MH(C0/180)	S/MH(C90/270)
891.5	73.61	1830.1	0.79	0.78

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50% I_{max}):	43.1	43.5	44.2	43.5	43.6
Field Angle(10% I_{max}):	61.9	62.3	61.3	61.7	61.8

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1552	1552	1552	1552	1552	1552	1552	1552
5.0°	1553	1585	1637	1665	1694	1719	1745	1737
10.0°	1534	1543	1580	1638	1702	1753	1796	1808
15.0°	1309	1300	1326	1401	1487	1589	1681	1744
20.0°	816	789	799	864	993	1143	1305	1443
25.0°	288	287	312	371	464	550	631	737
30.0°	132	130	130	142	158	192	261	339
35.0°	22	21	21	25	31	44	66	97
40.0°	6	7	6	6	7	10	13	16
45.0°	2	1	2	2	2	3	4	5
50.0°	0	0	0	0	0	0	1	2
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 γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1552	1552	1552	1552	1552	1552	1552	1552
5.0°	1714	1692	1683	1644	1602	1550	1528	1542
10.0°	1830	1817	1785	1742	1658	1582	1534	1522
15.0°	1776	1780	1742	1659	1557	1441	1373	1316
20.0°	1493	1507	1444	1351	1200	1066	950	838
25.0°	781	833	814	702	588	480	376	295
30.0°	361	375	342	276	211	179	161	142
35.0°	107	123	119	98	75	55	32	23
40.0°	16	17	17	16	12	10	8	6
45.0°	5	5	5	4	4	3	2	2
50.0°	1	1	1	1	0	0	0	1
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	38.2	4.28	0-5	38.2	4.28
5-10	118.7	13.32	0-10	156.9	17.60
10-15	190.2	21.33	0-15	347.1	38.94
15-20	218.8	24.54	0-20	566.0	63.48
20-25	173.8	19.49	0-25	739.7	82.97
25-30	95.2	10.68	0-30	835.0	93.65
30-35	41.3	4.63	0-35	876.3	98.29
35-40	11.8	1.32	0-40	888.1	99.61
40-45	2.6	0.29	0-45	890.7	99.90
45-50	0.8	0.09	0-50	891.4	99.99
50-55	0.1	0.01	0-55	891.5	100.00
55-60	0.0	0.00	0-60	891.5	100.00
60-65	0.0	0.00	0-65	891.5	100.00
65-70	0.0	0.00	0-70	891.5	100.00
70-75	0.0	0.00	0-75	891.5	100.00
75-80	0.0	0.00	0-80	891.5	100.00
80-85	0.0	0.00	0-85	891.5	100.00
85-90	0.0	0.00	0-90	891.5	100.00
90-95	0.0	0.00	0-95	891.5	100.00
95-100	0.0	0.00	0-100	891.5	100.00
100-105	0.0	0.00	0-105	891.5	100.00
105-110	0.0	0.00	0-110	891.5	100.00
110-115	0.0	0.00	0-115	891.5	100.00
115-120	0.0	0.00	0-120	891.5	100.00
120-125	0.0	0.00	0-125	891.5	100.00
125-130	0.0	0.00	0-130	891.5	100.00
130-135	0.0	0.00	0-135	891.5	100.00
135-140	0.0	0.00	0-140	891.5	100.00
140-145	0.0	0.00	0-145	891.5	100.00
145-150	0.0	0.00	0-150	891.5	100.00
150-155	0.0	0.00	0-155	891.5	100.00
155-160	0.0	0.00	0-160	891.5	100.00
160-165	0.0	0.00	0-165	891.5	100.00
165-170	0.0	0.00	0-170	891.5	100.00
170-175	0.0	0.00	0-175	891.5	100.00
175-180	0.0	0.00	0-180	891.5	100.00

6. Product Photo



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