

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE249027DIM120WDR4CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329018-10-3
Test Date:	2019-04-04 to 2019-04-09
Report Date:	2019-05-15
Reviewed By:	Ray Gao/EE Engineer <i>Ray 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 2019-04-01 and used for testing.

Model Tested: LE249027DIM120WDR4CC
 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: 31W
 Nominal CCT: 2700K
 Nominal Lumen Output: 2400lm

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_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**

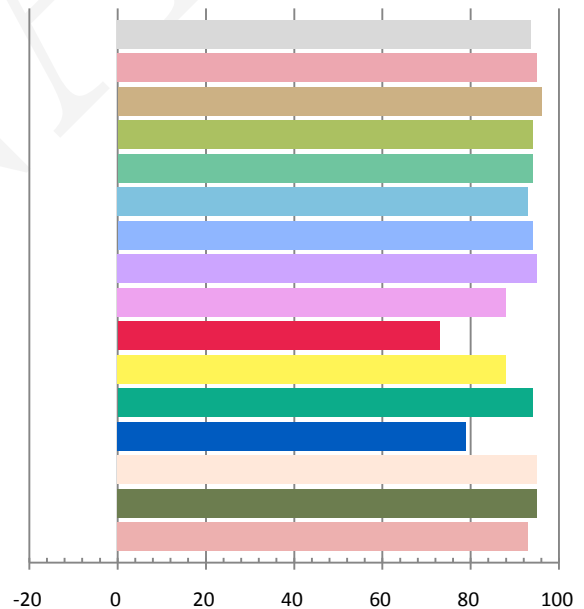
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.2608	30.92	0.988	2491.82	80.59

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.122	2720	-0.00035	0.4576	0.4092	0.2617	0.5265

Color Rendering Index

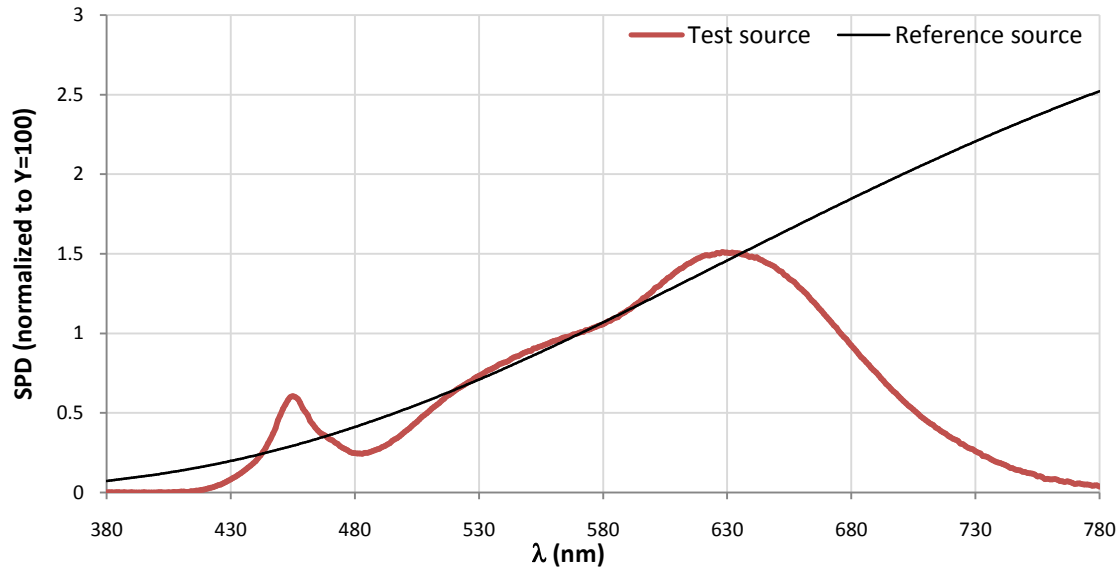
Ra			
93.7			
R1	R2	R3	R4
95	96	94	94
R5	R6	R7	R8
93	94	95	88
R9	R10	R11	R12
73	88	94	79
R13	R14	R15	
95	95	93	



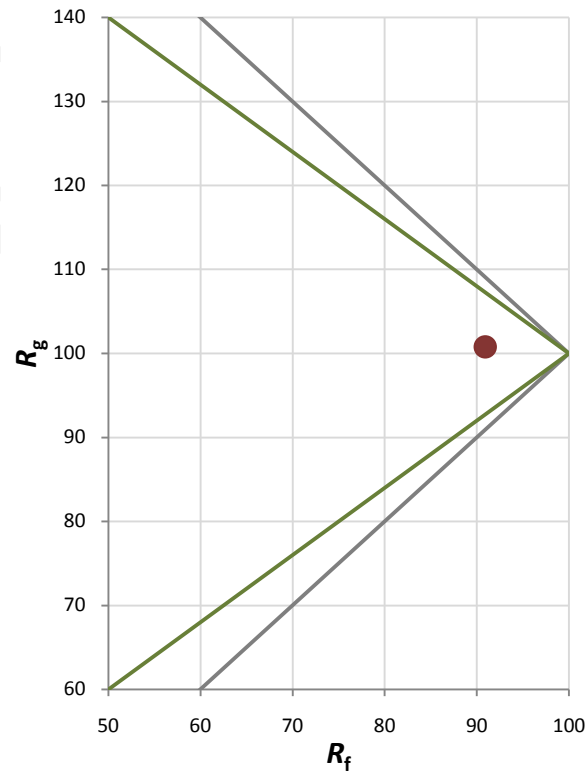
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

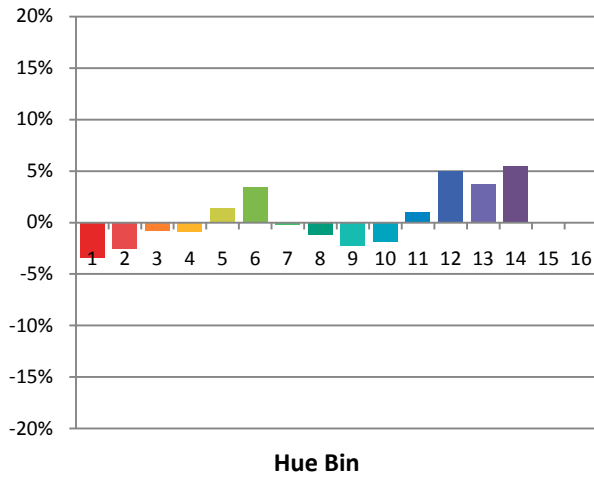
Spectral Power Distribution Comparison



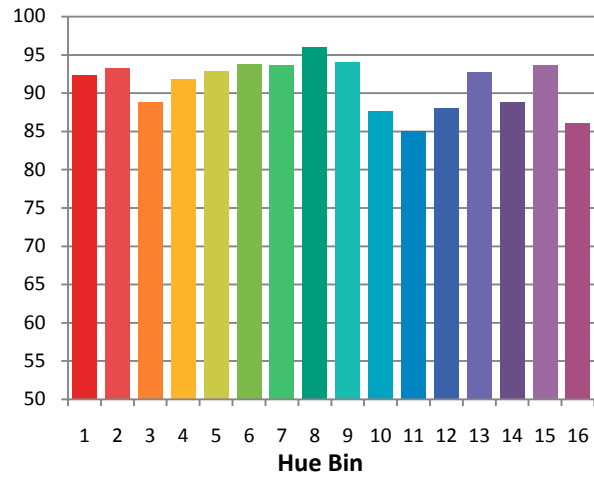
Plot of R_g versus R_f



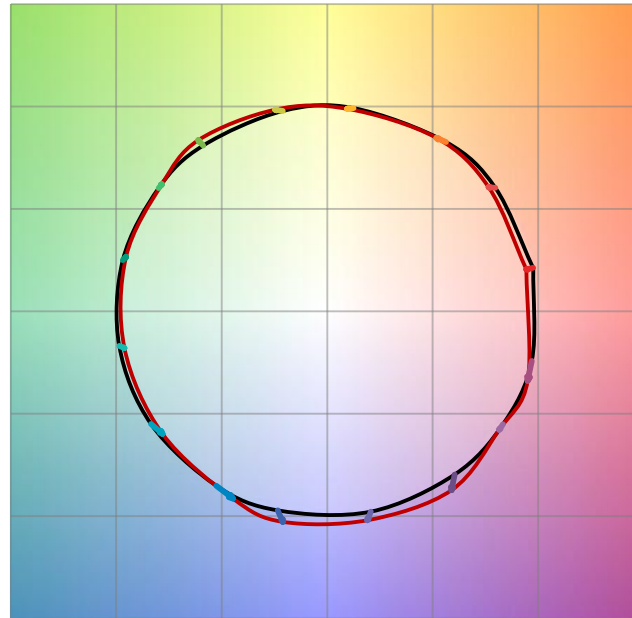
Chroma Shift by Hue



R_f by Hue

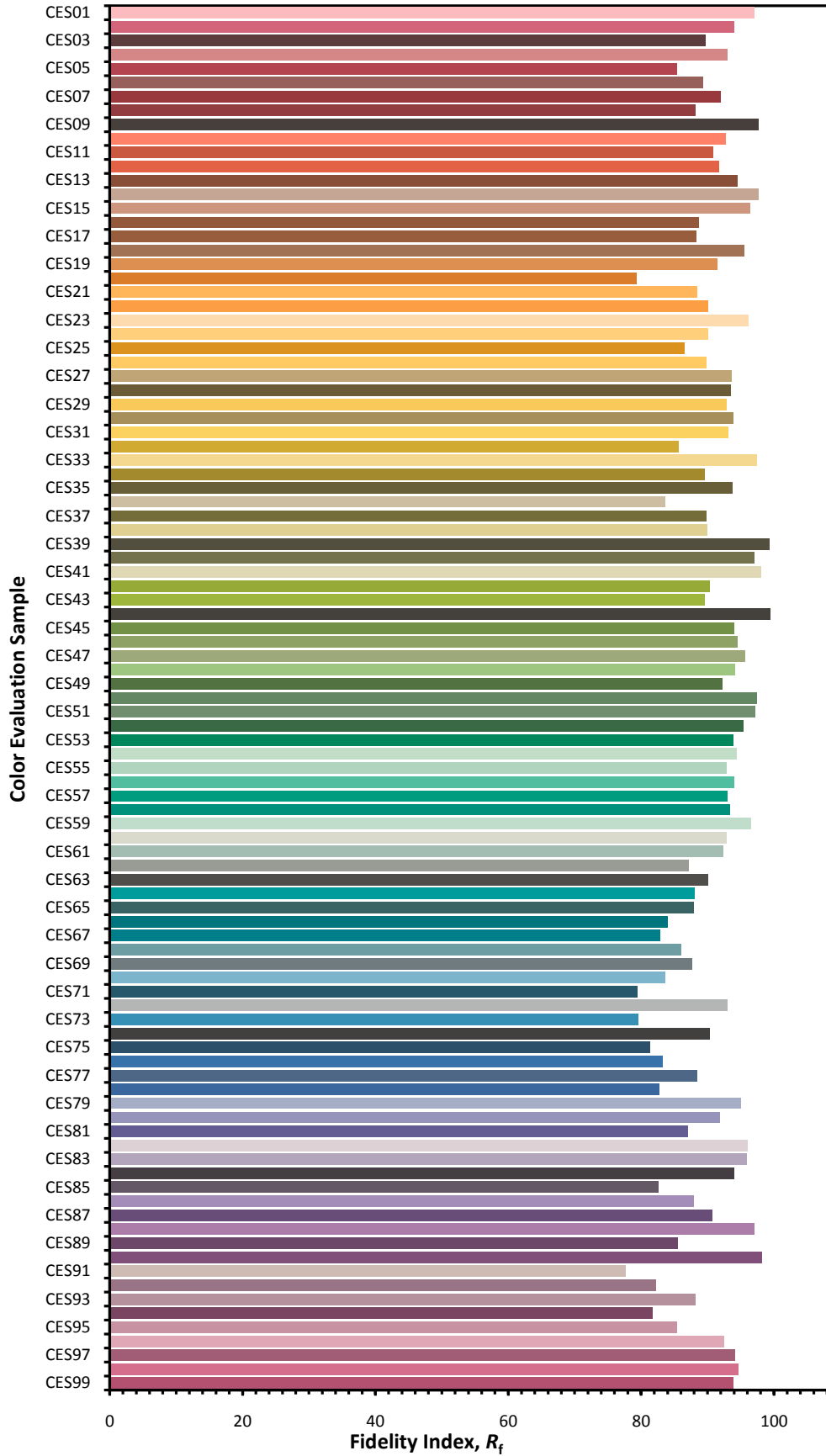


Color Vector Graphic

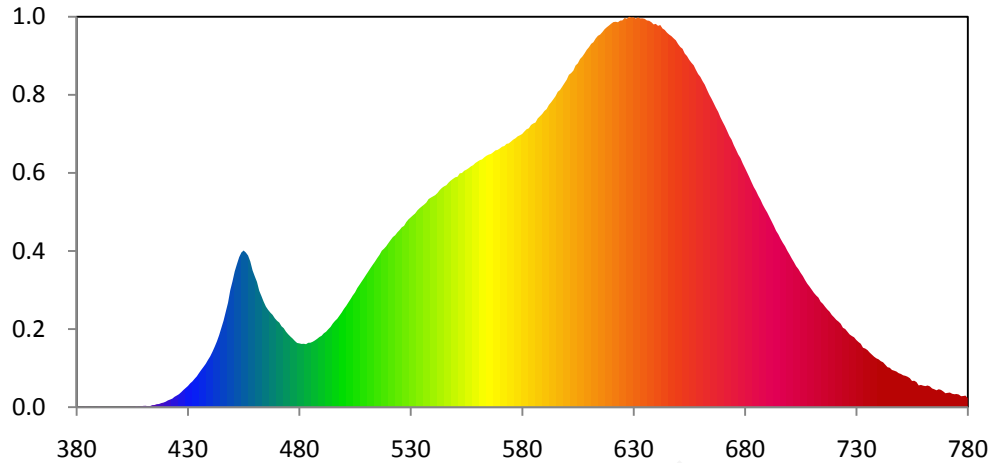


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



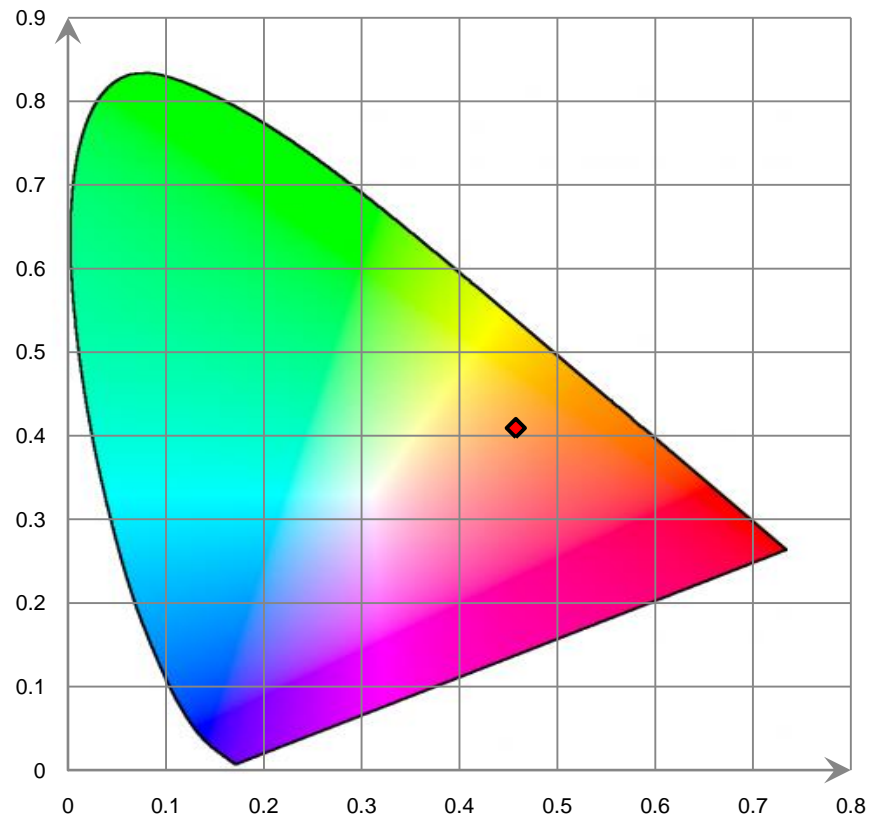
Relative Spectral Power Distribution



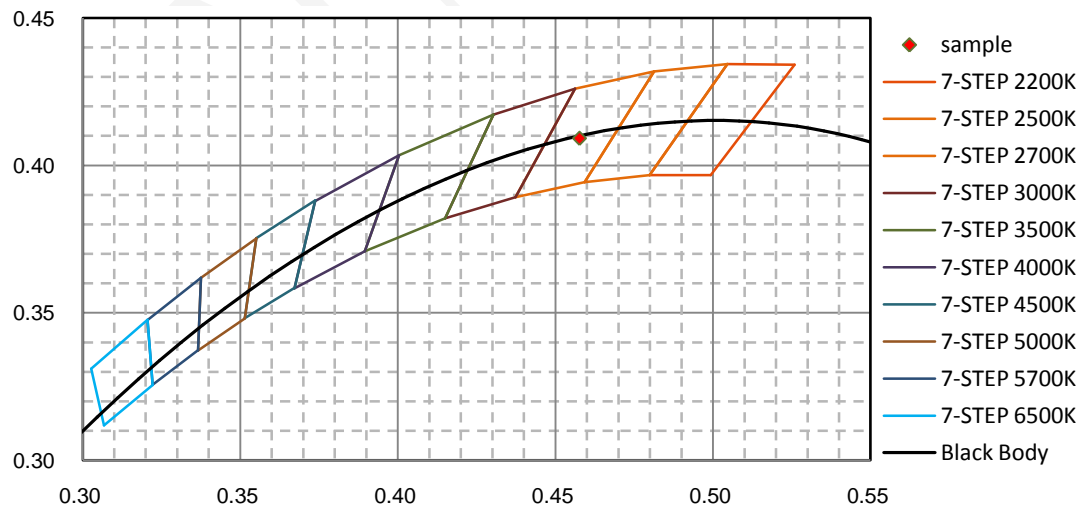
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.410E-02	421	9.611E-01	462	1.643E+01	503	1.526E+01	544	3.094E+01
381	3.210E-02	422	1.073E+00	463	1.567E+01	504	1.577E+01	545	3.117E+01
382	4.090E-02	423	1.208E+00	464	1.487E+01	505	1.620E+01	546	3.132E+01
383	1.340E-02	424	1.468E+00	465	1.419E+01	506	1.680E+01	547	3.169E+01
384	8.870E-02	425	1.648E+00	466	1.373E+01	507	1.727E+01	548	3.199E+01
385	4.030E-02	426	1.836E+00	467	1.334E+01	508	1.774E+01	549	3.222E+01
386	2.000E-03	427	2.121E+00	468	1.303E+01	509	1.821E+01	550	3.244E+01
387	6.530E-02	428	2.437E+00	469	1.254E+01	510	1.869E+01	551	3.252E+01
388	6.100E-03	429	2.711E+00	470	1.219E+01	511	1.918E+01	552	3.299E+01
389	9.000E-03	430	2.993E+00	471	1.193E+01	512	1.966E+01	553	3.305E+01
390	9.690E-02	431	3.354E+00	472	1.141E+01	513	2.011E+01	554	3.336E+01
391	1.820E-02	432	3.635E+00	473	1.115E+01	514	2.057E+01	555	3.352E+01
392	6.000E-04	433	4.006E+00	474	1.066E+01	515	2.105E+01	556	3.372E+01
393	4.400E-03	434	4.359E+00	475	1.028E+01	516	2.150E+01	557	3.398E+01
394	7.900E-03	435	4.826E+00	476	9.965E+00	517	2.207E+01	558	3.415E+01
395	4.900E-02	436	5.270E+00	477	9.681E+00	518	2.236E+01	559	3.445E+01
396	6.300E-03	437	5.683E+00	478	9.345E+00	519	2.271E+01	560	3.466E+01
397	2.900E-03	438	6.127E+00	479	9.064E+00	520	2.317E+01	561	3.486E+01
398	6.000E-03	439	6.664E+00	480	9.003E+00	521	2.359E+01	562	3.496E+01
399	3.800E-03	440	7.175E+00	481	8.926E+00	522	2.401E+01	563	3.524E+01
400	2.000E-04	441	7.815E+00	482	8.947E+00	523	2.425E+01	564	3.548E+01
401	5.760E-02	442	8.518E+00	483	8.891E+00	524	2.466E+01	565	3.564E+01
402	4.880E-02	443	9.284E+00	484	9.083E+00	525	2.499E+01	566	3.574E+01
403	2.980E-02	444	1.016E+01	485	9.098E+00	526	2.538E+01	567	3.596E+01
404	3.070E-02	445	1.120E+01	486	9.229E+00	527	2.559E+01	568	3.623E+01
405	7.440E-02	446	1.221E+01	487	9.422E+00	528	2.612E+01	569	3.631E+01
406	1.500E-02	447	1.349E+01	488	9.641E+00	529	2.651E+01	570	3.651E+01
407	1.454E-01	448	1.474E+01	489	9.901E+00	530	2.679E+01	571	3.675E+01
408	3.770E-02	449	1.651E+01	490	1.008E+01	531	2.707E+01	572	3.685E+01
409	1.285E-01	450	1.774E+01	491	1.043E+01	532	2.734E+01	573	3.715E+01
410	1.845E-01	451	1.916E+01	492	1.065E+01	533	2.777E+01	574	3.722E+01
411	2.008E-01	452	2.020E+01	493	1.100E+01	534	2.808E+01	575	3.748E+01
412	1.376E-01	453	2.117E+01	494	1.132E+01	535	2.834E+01	576	3.776E+01
413	1.533E-01	454	2.183E+01	495	1.179E+01	536	2.859E+01	577	3.794E+01
414	2.905E-01	455	2.211E+01	496	1.217E+01	537	2.887E+01	578	3.822E+01
415	3.105E-01	456	2.182E+01	497	1.247E+01	538	2.936E+01	579	3.836E+01
416	4.234E-01	457	2.139E+01	498	1.292E+01	539	2.956E+01	580	3.855E+01
417	4.466E-01	458	2.055E+01	499	1.335E+01	540	2.975E+01	581	3.890E+01
418	5.730E-01	459	1.932E+01	500	1.385E+01	541	2.992E+01	582	3.922E+01
419	6.469E-01	460	1.847E+01	501	1.427E+01	542	3.023E+01	583	3.935E+01
420	7.739E-01	461	1.767E+01	502	1.477E+01	543	3.062E+01	584	3.982E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.003E+01	626	5.491E+01	667	4.224E+01	708	1.742E+01	749	4.797E+00
586	4.017E+01	627	5.480E+01	668	4.167E+01	709	1.701E+01	750	4.688E+00
587	4.074E+01	628	5.509E+01	669	4.090E+01	710	1.657E+01	751	4.500E+00
588	4.105E+01	629	5.498E+01	670	4.027E+01	711	1.612E+01	752	4.424E+00
589	4.137E+01	630	5.502E+01	671	3.967E+01	712	1.576E+01	753	4.296E+00
590	4.179E+01	631	5.483E+01	672	3.899E+01	713	1.546E+01	754	4.099E+00
591	4.206E+01	632	5.500E+01	673	3.827E+01	714	1.487E+01	755	3.696E+00
592	4.264E+01	633	5.486E+01	674	3.775E+01	715	1.458E+01	756	3.728E+00
593	4.302E+01	634	5.487E+01	675	3.698E+01	716	1.416E+01	757	3.548E+00
594	4.344E+01	635	5.480E+01	676	3.633E+01	717	1.378E+01	758	3.075E+00
595	4.388E+01	636	5.457E+01	677	3.565E+01	718	1.347E+01	759	3.143E+00
596	4.450E+01	637	5.452E+01	678	3.514E+01	719	1.301E+01	760	3.037E+00
597	4.476E+01	638	5.432E+01	679	3.440E+01	720	1.268E+01	761	2.974E+00
598	4.523E+01	639	5.401E+01	680	3.376E+01	721	1.232E+01	762	3.058E+00
599	4.572E+01	640	5.409E+01	681	3.311E+01	722	1.207E+01	763	2.936E+00
600	4.620E+01	641	5.380E+01	682	3.244E+01	723	1.177E+01	764	2.646E+00
601	4.690E+01	642	5.393E+01	683	3.173E+01	724	1.120E+01	765	2.526E+00
602	4.715E+01	643	5.344E+01	684	3.105E+01	725	1.104E+01	766	2.388E+00
603	4.749E+01	644	5.323E+01	685	3.051E+01	726	1.065E+01	767	2.529E+00
604	4.822E+01	645	5.286E+01	686	2.984E+01	727	1.027E+01	768	2.440E+00
605	4.851E+01	646	5.257E+01	687	2.927E+01	728	1.005E+01	769	2.226E+00
606	4.913E+01	647	5.235E+01	688	2.858E+01	729	9.861E+00	770	1.969E+00
607	4.946E+01	648	5.204E+01	689	2.800E+01	730	9.474E+00	771	2.021E+00
608	4.991E+01	649	5.176E+01	690	2.747E+01	731	9.190E+00	772	2.069E+00
609	5.042E+01	650	5.123E+01	691	2.683E+01	732	8.946E+00	773	1.893E+00
610	5.080E+01	651	5.082E+01	692	2.621E+01	733	8.391E+00	774	1.829E+00
611	5.127E+01	652	5.057E+01	693	2.557E+01	734	8.273E+00	775	1.855E+00
612	5.150E+01	653	4.989E+01	694	2.488E+01	735	8.061E+00	776	1.785E+00
613	5.202E+01	654	4.954E+01	695	2.438E+01	736	7.710E+00	777	1.547E+00
614	5.240E+01	655	4.901E+01	696	2.376E+01	737	7.408E+00	778	1.576E+00
615	5.258E+01	656	4.860E+01	697	2.320E+01	738	7.126E+00	779	1.628E+00
616	5.292E+01	657	4.824E+01	698	2.272E+01	739	6.891E+00	780	1.280E+00
617	5.332E+01	658	4.760E+01	699	2.210E+01	740	6.749E+00		
618	5.361E+01	659	4.701E+01	700	2.156E+01	741	6.489E+00		
619	5.385E+01	660	4.660E+01	701	2.099E+01	742	6.336E+00		
620	5.412E+01	661	4.601E+01	702	2.046E+01	743	5.992E+00		
621	5.434E+01	662	4.549E+01	703	1.989E+01	744	5.640E+00		
622	5.438E+01	663	4.478E+01	704	1.949E+01	745	5.565E+00		
623	5.432E+01	664	4.410E+01	705	1.896E+01	746	5.252E+00		
624	5.455E+01	665	4.353E+01	706	1.850E+01	747	5.153E+00		
625	5.458E+01	666	4.290E+01	707	1.793E+01	748	5.028E+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**

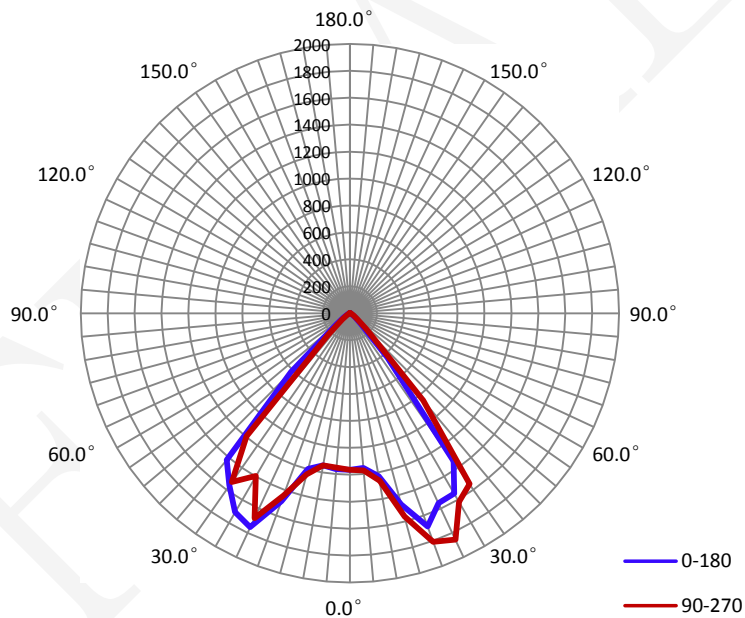
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2680	30.95	0.9620

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2493.6	80.62	1883.3	1.54	1.58

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	80.9	80.8	80.8	80.3	80.9
Field Angle (10% I _{max}):	93.6	93.5	91.4	92.9	92.9

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1165	1165	1165	1165	1165	1165	1165	1165
5.0°	1155	1158	1165	1170	1172	1173	1172	1170
10.0°	1231	1257	1283	1282	1264	1224	1190	1168
15.0°	1471	1509	1547	1567	1564	1479	1362	1263
20.0°	1687	1734	1755	1784	1807	1790	1694	1580
25.0°	1557	1565	1640	1743	1856	1883	1838	1814
30.0°	1548	1594	1600	1620	1617	1598	1689	1751
35.0°	1343	1328	1362	1453	1548	1603	1626	1621
40.0°	431	391	444	585	847	1103	1282	1398
45.0°	114	117	124	141	176	223	347	536
50.0°	48	51	51	57	69	89	111	131
55.0°	24	25	25	27	33	40	48	55
60.0°	13	14	13	15	17	21	24	27
65.0°	8	8	7	8	10	11	14	15
70.0°	4	3	4	5	6	7	6	8
75.0°	2	2	2	3	2	3	4	5
80.0°	0	0	0	0	1	2	2	2
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°	1165	1165	1165	1165	1165	1165	1165	1165
5.0°	1165	1160	1156	1152	1151	1148	1148	1151
10.0°	1150	1136	1132	1135	1147	1166	1192	1216
15.0°	1198	1162	1161	1185	1238	1295	1375	1455
20.0°	1488	1406	1399	1414	1441	1465	1545	1653
25.0°	1754	1717	1655	1663	1680	1607	1540	1517
30.0°	1707	1722	1650	1544	1397	1362	1433	1499
35.0°	1559	1566	1546	1524	1530	1530	1449	1375
40.0°	1422	1458	1434	1352	1195	941	667	468
45.0°	618	666	562	421	230	145	120	107
50.0°	134	146	114	93	74	58	48	44
55.0°	57	62	48	40	32	27	23	22
60.0°	28	29	23	20	17	14	12	12
65.0°	15	15	13	11	9	8	7	7
70.0°	8	9	8	6	5	4	4	3
75.0°	5	6	4	4	3	2	2	2
80.0°	3	3	2	2	2	1	1	0
85.0°	1	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	27.8	1.11	0-5	27.8	1.11
5-10	84.4	3.38	0-10	112.2	4.50
10-15	152.0	6.10	0-15	264.2	10.59
15-20	244.5	9.81	0-20	508.7	20.40
20-25	345.3	13.85	0-25	854.0	34.25
25-30	414.1	16.61	0-30	1268.1	50.86
30-35	453.7	18.19	0-35	1721.8	69.05
35-40	410.6	16.47	0-40	2132.4	85.52
40-45	232.2	9.31	0-45	2364.5	94.83
45-50	75.3	3.02	0-50	2439.9	97.85
50-55	25.9	1.04	0-55	2465.7	98.88
55-60	12.8	0.51	0-60	2478.5	99.40
60-65	7.1	0.28	0-65	2485.6	99.68
65-70	4.0	0.16	0-70	2489.7	99.84
70-75	2.3	0.09	0-75	2492.0	99.94
75-80	1.2	0.05	0-80	2493.2	99.98
80-85	0.4	0.01	0-85	2493.5	100.00
85-90	0.0	0.00	0-90	2493.6	100.00
90-95	0.0	0.00	0-95	2493.6	100.00
95-100	0.0	0.00	0-100	2493.6	100.00
100-105	0.0	0.00	0-105	2493.6	100.00
105-110	0.0	0.00	0-110	2493.6	100.00
110-115	0.0	0.00	0-115	2493.6	100.00
115-120	0.0	0.00	0-120	2493.6	100.00
120-125	0.0	0.00	0-125	2493.6	100.00
125-130	0.0	0.00	0-130	2493.6	100.00
130-135	0.0	0.00	0-135	2493.6	100.00
135-140	0.0	0.00	0-140	2493.6	100.00
140-145	0.0	0.00	0-145	2493.6	100.00
145-150	0.0	0.00	0-150	2493.6	100.00
150-155	0.0	0.00	0-155	2493.6	100.00
155-160	0.0	0.00	0-160	2493.6	100.00
160-165	0.0	0.00	0-165	2493.6	100.00
165-170	0.0	0.00	0-170	2493.6	100.00
170-175	0.0	0.00	0-175	2493.6	100.00
175-180	0.0	0.00	0-180	2493.6	100.00

6. Product Photo



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