



TL-749



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE409027DIM120NRR6CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329020-10-1
Test Date:	2019-04-04 to 2019-04-06
Report Date:	2019-05-15
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: LE409027DIM120NRR6CC
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Recessed Downlight
 Aging TimeBefore Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz
 Rated Power: 53W
 Nominal CCT: 2700K
 Nominal Lumen Output: 4000lm

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**

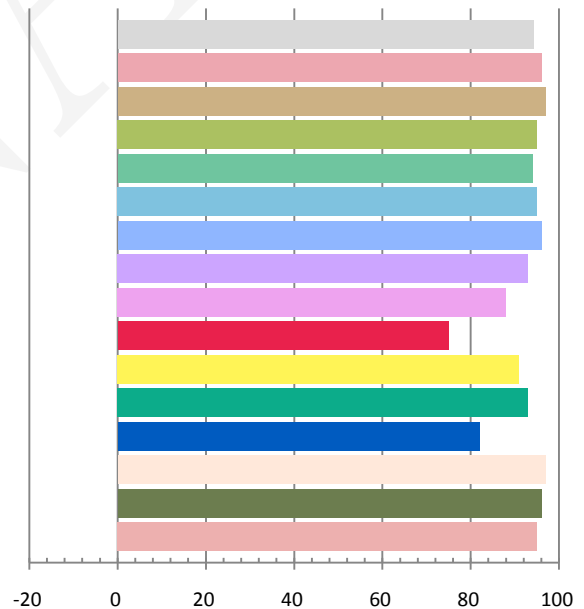
Photometric and Electrical Measurement Result

Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.4336	51.71	0.9938	4039.95	78.13

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
15.128	2668	-0.00373	0.4561	0.3998	0.2650	0.5226

Color Rendering Index

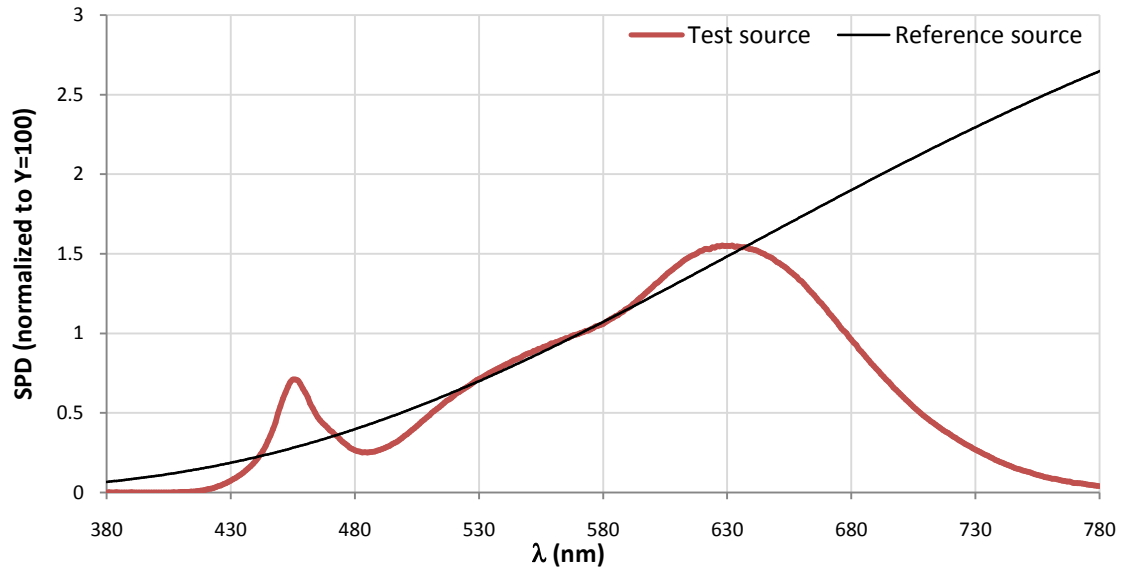
Ra			
94.3			
R1	R2	R3	R4
96	97	95	94
R5	R6	R7	R8
95	96	93	88
R9	R10	R11	R12
75	91	93	82
R13	R14	R15	
97	96	95	



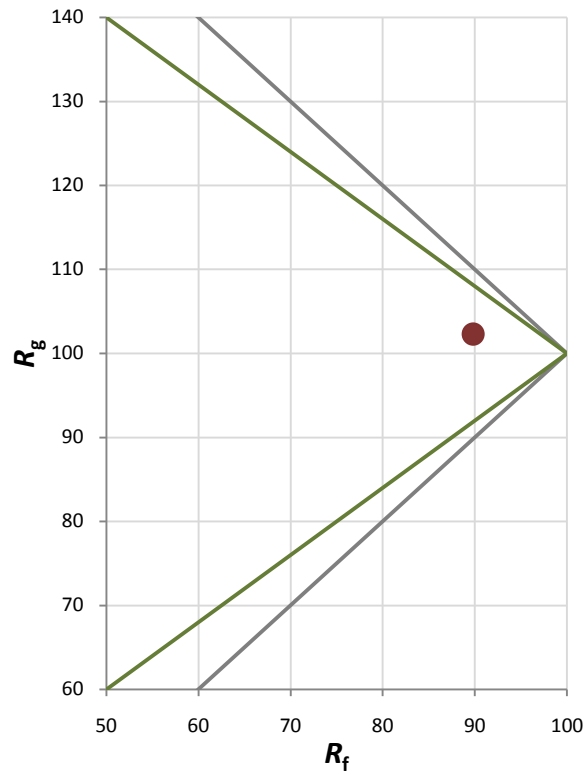
Fidelity Index and Gamut Index

Fidelity Index R_f	90
Gamut Index R_g	102

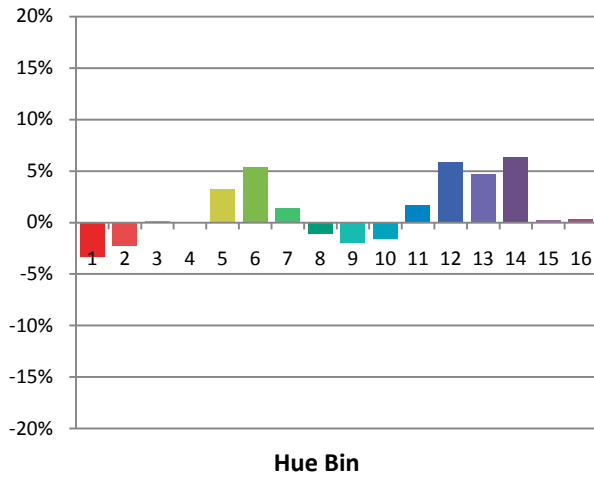
Spectral Power Distribution Comparison



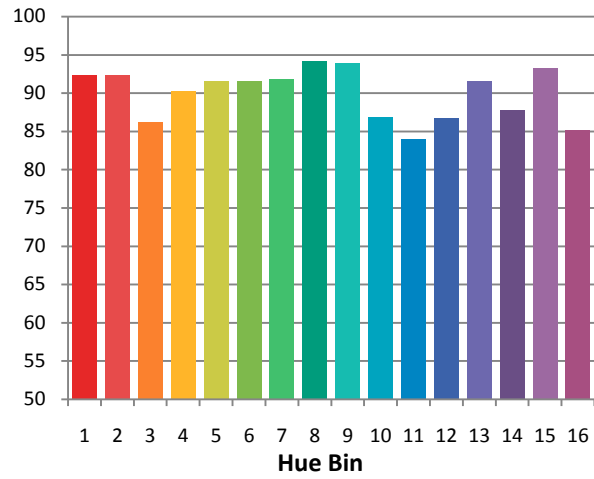
Plot of R_g versus R_f



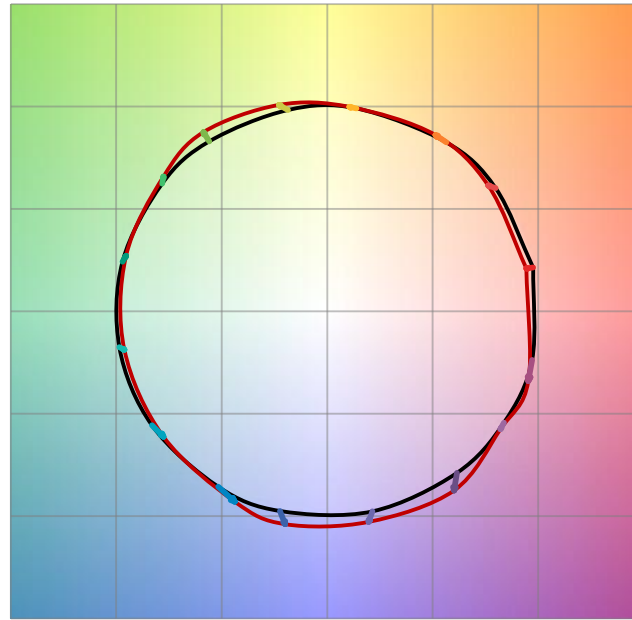
Chroma Shift by Hue



R_f by Hue

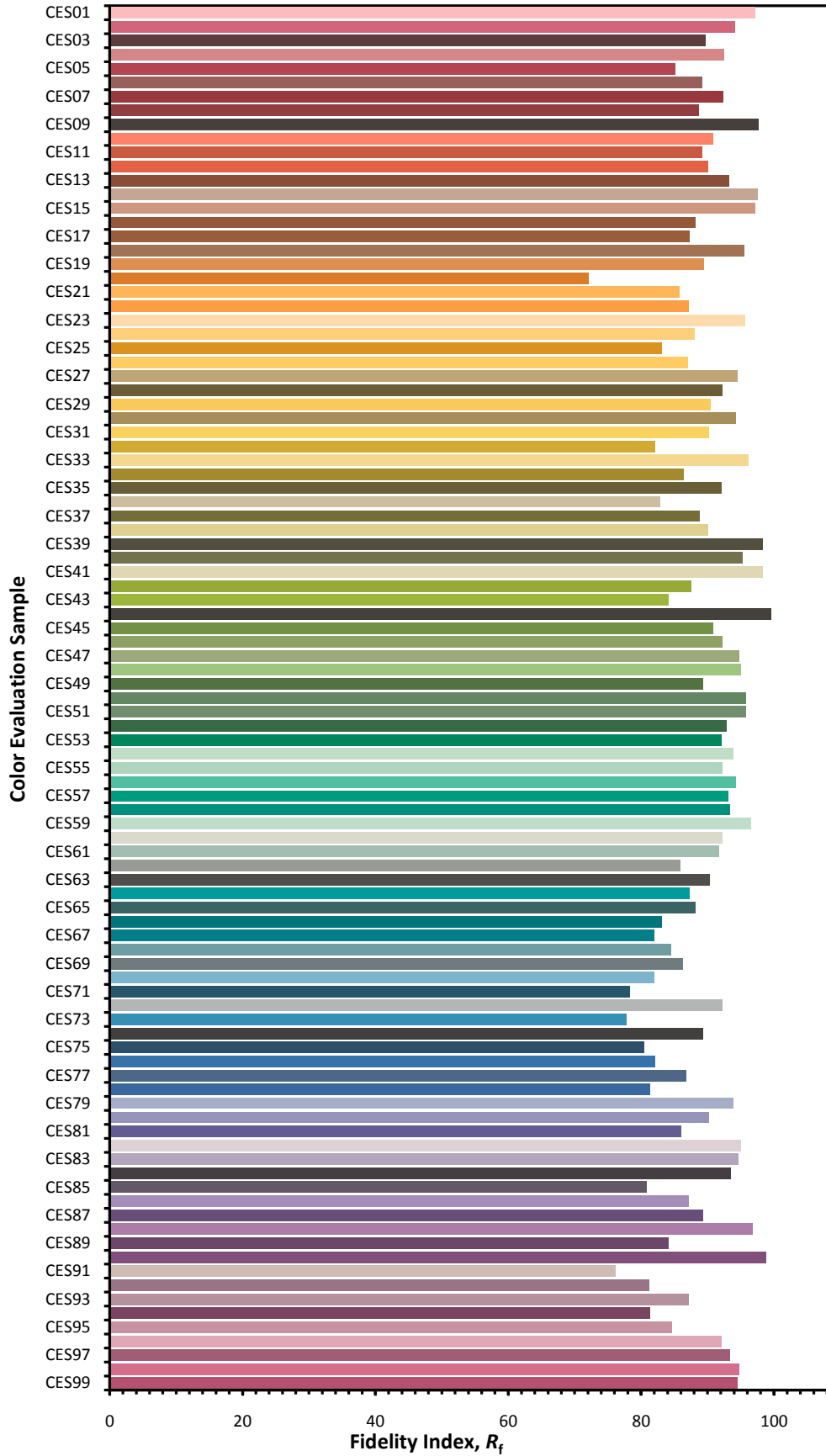


Color Vector Graphic

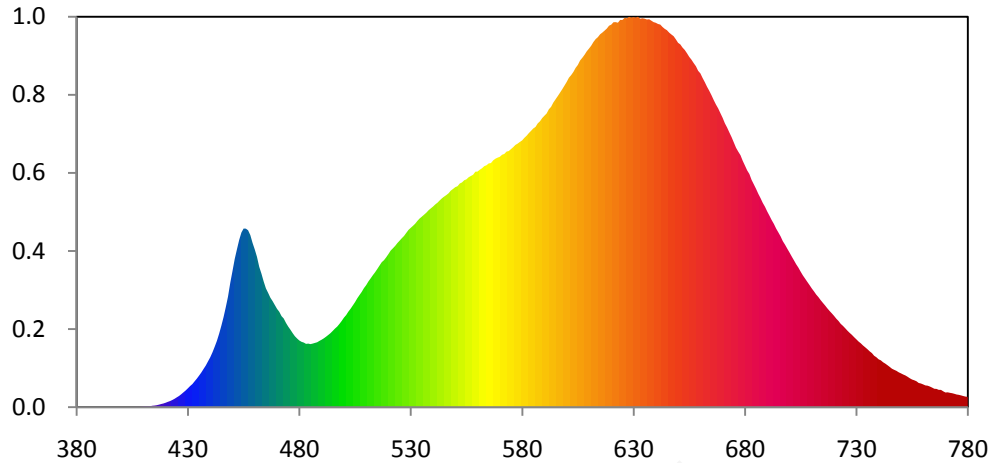


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



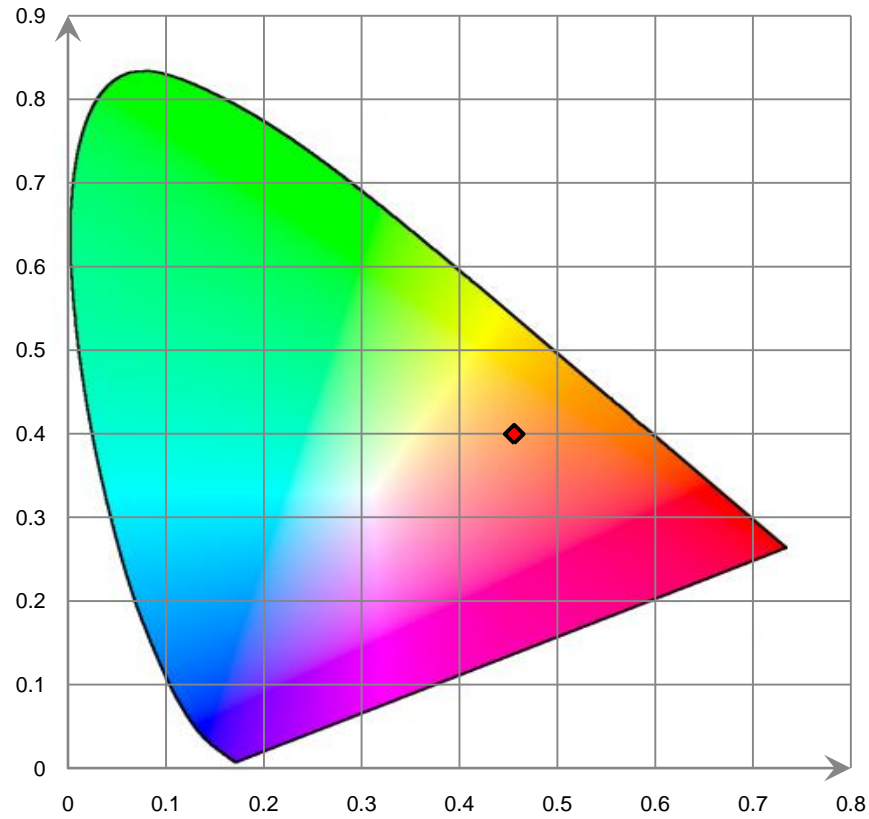
Relative Spectral Power Distribution



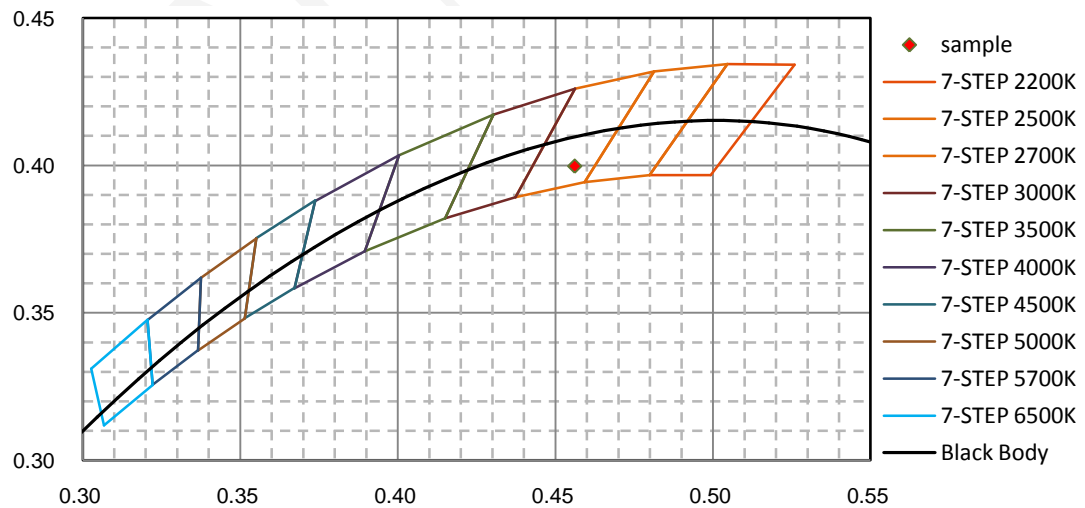
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.330E-02	421	1.256E+00	462	3.300E+01	503	2.314E+01	544	4.910E+01
381	5.590E-02	422	1.439E+00	463	3.138E+01	504	2.391E+01	545	4.951E+01
382	7.300E-03	423	1.690E+00	464	2.955E+01	505	2.470E+01	546	4.987E+01
383	4.000E-04	424	1.973E+00	465	2.792E+01	506	2.559E+01	547	5.029E+01
384	5.360E-02	425	2.314E+00	466	2.687E+01	507	2.637E+01	548	5.091E+01
385	1.220E-02	426	2.638E+00	467	2.574E+01	508	2.710E+01	549	5.131E+01
386	8.000E-04	427	3.050E+00	468	2.494E+01	509	2.799E+01	550	5.173E+01
387	2.440E-02	428	3.491E+00	469	2.401E+01	510	2.868E+01	551	5.195E+01
388	1.750E-02	429	3.939E+00	470	2.311E+01	511	2.956E+01	552	5.258E+01
389	2.100E-02	430	4.443E+00	471	2.242E+01	512	3.027E+01	553	5.283E+01
390	6.630E-02	431	4.974E+00	472	2.141E+01	513	3.102E+01	554	5.334E+01
391	1.350E-02	432	5.436E+00	473	2.085E+01	514	3.172E+01	555	5.356E+01
392	6.000E-04	433	6.074E+00	474	1.982E+01	515	3.250E+01	556	5.405E+01
393	0.000E+00	434	6.711E+00	475	1.895E+01	516	3.330E+01	557	5.435E+01
394	0.000E+00	435	7.415E+00	476	1.821E+01	517	3.409E+01	558	5.464E+01
395	4.370E-02	436	8.150E+00	477	1.742E+01	518	3.456E+01	559	5.535E+01
396	6.300E-03	437	8.965E+00	478	1.668E+01	519	3.523E+01	560	5.540E+01
397	7.400E-03	438	9.778E+00	479	1.615E+01	520	3.601E+01	561	5.583E+01
398	9.100E-03	439	1.075E+01	480	1.567E+01	521	3.682E+01	562	5.617E+01
399	1.130E-02	440	1.172E+01	481	1.536E+01	522	3.735E+01	563	5.665E+01
400	9.100E-03	441	1.287E+01	482	1.519E+01	523	3.790E+01	564	5.687E+01
401	2.730E-02	442	1.419E+01	483	1.488E+01	524	3.857E+01	565	5.731E+01
402	2.320E-02	443	1.560E+01	484	1.494E+01	525	3.913E+01	566	5.738E+01
403	4.660E-02	444	1.727E+01	485	1.482E+01	526	3.972E+01	567	5.802E+01
404	3.240E-02	445	1.915E+01	486	1.496E+01	527	4.026E+01	568	5.840E+01
405	3.580E-02	446	2.118E+01	487	1.511E+01	528	4.097E+01	569	5.866E+01
406	2.980E-02	447	2.354E+01	488	1.526E+01	529	4.167E+01	570	5.886E+01
407	1.026E-01	448	2.601E+01	489	1.558E+01	530	4.216E+01	571	5.935E+01
408	4.420E-02	449	2.923E+01	490	1.586E+01	531	4.262E+01	572	5.953E+01
409	8.950E-02	450	3.198E+01	491	1.618E+01	532	4.314E+01	573	6.009E+01
410	1.822E-01	451	3.485E+01	492	1.656E+01	533	4.379E+01	574	6.021E+01
411	2.065E-01	452	3.713E+01	493	1.699E+01	534	4.436E+01	575	6.067E+01
412	2.300E-01	453	3.930E+01	494	1.741E+01	535	4.479E+01	576	6.113E+01
413	2.217E-01	454	4.105E+01	495	1.794E+01	536	4.526E+01	577	6.165E+01
414	3.390E-01	455	4.199E+01	496	1.848E+01	537	4.572E+01	578	6.196E+01
415	3.901E-01	456	4.196E+01	497	1.895E+01	538	4.629E+01	579	6.235E+01
416	4.636E-01	457	4.159E+01	498	1.958E+01	539	4.673E+01	580	6.271E+01
417	5.934E-01	458	4.046E+01	499	2.025E+01	540	4.717E+01	581	6.331E+01
418	7.393E-01	459	3.864E+01	500	2.103E+01	541	4.766E+01	582	6.381E+01
419	8.684E-01	460	3.708E+01	501	2.163E+01	542	4.807E+01	583	6.441E+01
420	1.050E+00	461	3.533E+01	502	2.245E+01	543	4.860E+01	584	6.495E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.552E+01	626	9.152E+01	667	7.114E+01	708	2.945E+01	749	8.207E+00
586	6.588E+01	627	9.143E+01	668	7.023E+01	709	2.870E+01	750	7.955E+00
587	6.671E+01	628	9.176E+01	669	6.911E+01	710	2.793E+01	751	7.696E+00
588	6.720E+01	629	9.159E+01	670	6.803E+01	711	2.722E+01	752	7.459E+00
589	6.796E+01	630	9.169E+01	671	6.673E+01	712	2.647E+01	753	7.147E+00
590	6.851E+01	631	9.159E+01	672	6.575E+01	713	2.587E+01	754	6.802E+00
591	6.904E+01	632	9.179E+01	673	6.460E+01	714	2.516E+01	755	6.509E+00
592	7.003E+01	633	9.131E+01	674	6.350E+01	715	2.452E+01	756	6.324E+00
593	7.060E+01	634	9.143E+01	675	6.225E+01	716	2.390E+01	757	6.090E+00
594	7.160E+01	635	9.132E+01	676	6.100E+01	717	2.323E+01	758	5.687E+00
595	7.237E+01	636	9.113E+01	677	6.008E+01	718	2.261E+01	759	5.561E+00
596	7.314E+01	637	9.119E+01	678	5.924E+01	719	2.205E+01	760	5.353E+00
597	7.392E+01	638	9.086E+01	679	5.794E+01	720	2.146E+01	761	5.121E+00
598	7.474E+01	639	9.052E+01	680	5.681E+01	721	2.080E+01	762	5.046E+00
599	7.559E+01	640	9.035E+01	681	5.567E+01	722	2.027E+01	763	4.855E+00
600	7.646E+01	641	9.009E+01	682	5.482E+01	723	1.959E+01	764	4.611E+00
601	7.745E+01	642	8.994E+01	683	5.342E+01	724	1.911E+01	765	4.335E+00
602	7.806E+01	643	8.938E+01	684	5.238E+01	725	1.857E+01	766	4.296E+00
603	7.880E+01	644	8.894E+01	685	5.133E+01	726	1.799E+01	767	4.077E+00
604	7.976E+01	645	8.862E+01	686	5.016E+01	727	1.747E+01	768	4.069E+00
605	8.045E+01	646	8.805E+01	687	4.914E+01	728	1.701E+01	769	3.722E+00
606	8.149E+01	647	8.761E+01	688	4.803E+01	729	1.646E+01	770	3.453E+00
607	8.213E+01	648	8.721E+01	689	4.711E+01	730	1.596E+01	771	3.491E+00
608	8.283E+01	649	8.646E+01	690	4.601E+01	731	1.543E+01	772	3.382E+00
609	8.366E+01	650	8.565E+01	691	4.502E+01	732	1.501E+01	773	3.284E+00
610	8.429E+01	651	8.528E+01	692	4.399E+01	733	1.450E+01	774	3.149E+00
611	8.498E+01	652	8.454E+01	693	4.308E+01	734	1.407E+01	775	2.986E+00
612	8.584E+01	653	8.397E+01	694	4.200E+01	735	1.363E+01	776	2.896E+00
613	8.653E+01	654	8.320E+01	695	4.109E+01	736	1.313E+01	777	2.770E+00
614	8.699E+01	655	8.235E+01	696	4.017E+01	737	1.272E+01	778	2.617E+00
615	8.766E+01	656	8.169E+01	697	3.904E+01	738	1.209E+01	779	2.490E+00
616	8.807E+01	657	8.089E+01	698	3.820E+01	739	1.174E+01	780	2.421E+00
617	8.852E+01	658	8.015E+01	699	3.727E+01	740	1.125E+01		
618	8.900E+01	659	7.908E+01	700	3.637E+01	741	1.101E+01		
619	8.967E+01	660	7.847E+01	701	3.543E+01	742	1.057E+01		
620	8.993E+01	661	7.739E+01	702	3.453E+01	743	1.024E+01		
621	9.049E+01	662	7.639E+01	703	3.360E+01	744	9.858E+00		
622	9.051E+01	663	7.532E+01	704	3.280E+01	745	9.466E+00		
623	9.039E+01	664	7.437E+01	705	3.187E+01	746	9.041E+00		
624	9.104E+01	665	7.333E+01	706	3.099E+01	747	8.784E+00		
625	9.102E+01	666	7.219E+01	707	3.023E+01	748	8.547E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

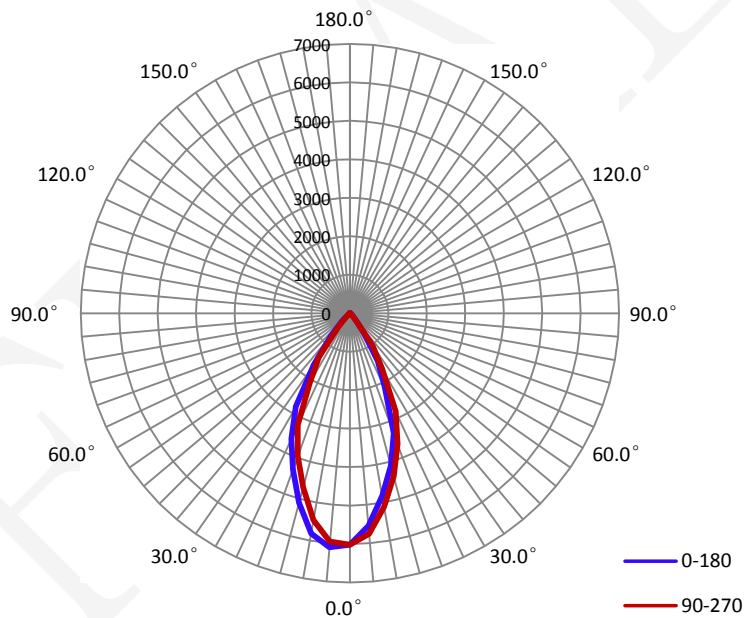
Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.4490	51.7	0.9600

Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	$I_{max}(cd)$	S/MH(C0/180)	S/MH(C90/270)
4041.4	78.22	6139.4	0.76	0.76

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50% I_{max}):	49.6	49.4	49.7	49.4	49.5
Field Angle(10% I_{max}):	76.6	77.1	77.0	76.9	76.9

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	6018	6018	6018	6018	6018	6018	6018	6018
5.0°	5552	5577	5588	5657	5754	5914	6011	6108
10.0°	4819	4766	4827	4928	5108	5355	5619	5785
15.0°	4109	4075	4119	4219	4388	4603	4830	5064
20.0°	3323	3297	3339	3443	3622	3868	4109	4322
25.0°	2132	2111	2211	2469	2816	3098	3352	3556
30.0°	1444	1432	1465	1544	1680	1956	2422	2739
35.0°	618	580	639	796	1033	1237	1400	1568
40.0°	146	143	150	194	252	381	505	696
45.0°	51	54	50	58	62	91	137	222
50.0°	16	18	25	21	24	35	46	51
55.0°	0	12	9	10	10	10	16	16
60.0°	0	0	0	0	0	0	9	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°	6018	6018	6018	6018	6018	6018	6018	6018
5.0°	6110	6078	6139	6007	5960	5850	5691	5563
10.0°	5817	5786	5749	5639	5463	5214	4996	4869
15.0°	5108	5131	5092	4968	4687	4513	4305	4174
20.0°	4329	4398	4333	4174	3954	3777	3574	3356
25.0°	3607	3623	3620	3443	3206	2881	2453	2176
30.0°	2807	2854	2749	2451	2086	1803	1616	1475
35.0°	1648	1734	1666	1543	1402	1224	970	688
40.0°	774	861	833	683	466	318	221	162
45.0°	257	280	249	170	117	74	66	52
50.0°	52	61	64	54	46	29	20	22
55.0°	13	25	25	21	10	13	11	0
60.0°	0	12	10	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	141.8	3.51	0-5	141.8	3.51
5-10	398.6	9.86	0-10	540.5	13.37
10-15	586.2	14.51	0-15	1126.7	27.88
15-20	693.3	17.16	0-20	1820.1	45.04
20-25	707.8	17.51	0-25	2527.8	62.55
25-30	627.0	15.52	0-30	3154.9	78.06
30-35	471.8	11.68	0-35	3626.7	89.74
35-40	266.2	6.59	0-40	3892.9	96.33
40-45	101.5	2.51	0-45	3994.5	98.84
45-50	32.5	0.80	0-50	4026.9	99.64
50-55	10.6	0.26	0-55	4037.6	99.91
55-60	3.3	0.08	0-60	4040.9	99.99
60-65	0.5	0.01	0-65	4041.4	100.00
65-70	0.0	0.00	0-70	4041.4	100.00
70-75	0.0	0.00	0-75	4041.4	100.00
75-80	0.0	0.00	0-80	4041.4	100.00
80-85	0.0	0.00	0-85	4041.4	100.00
85-90	0.0	0.00	0-90	4041.4	100.00
90-95	0.0	0.00	0-95	4041.4	100.00
95-100	0.0	0.00	0-100	4041.4	100.00
100-105	0.0	0.00	0-105	4041.4	100.00
105-110	0.0	0.00	0-110	4041.4	100.00
110-115	0.0	0.00	0-115	4041.4	100.00
115-120	0.0	0.00	0-120	4041.4	100.00
120-125	0.0	0.00	0-125	4041.4	100.00
125-130	0.0	0.00	0-130	4041.4	100.00
130-135	0.0	0.00	0-135	4041.4	100.00
135-140	0.0	0.00	0-140	4041.4	100.00
140-145	0.0	0.00	0-145	4041.4	100.00
145-150	0.0	0.00	0-150	4041.4	100.00
150-155	0.0	0.00	0-155	4041.4	100.00
155-160	0.0	0.00	0-160	4041.4	100.00
160-165	0.0	0.00	0-165	4041.4	100.00
165-170	0.0	0.00	0-170	4041.4	100.00
170-175	0.0	0.00	0-175	4041.4	100.00
175-180	0.0	0.00	0-180	4041.4	100.00

6. Product Photo



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