



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: LE409027DIM120MDR6CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329020-10-2
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: LE409027DIM120MDR6CC
 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: 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.

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_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**

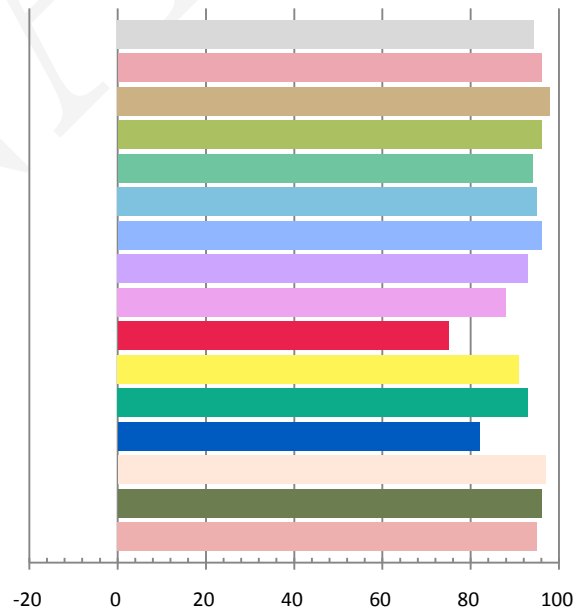
Photometric and Electrical Measurement Result

Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.4336	51.7	0.9936	4062.59	78.58

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
15.215	2669	-0.00377	0.4559	0.3997	0.2649	0.5225

Color Rendering Index

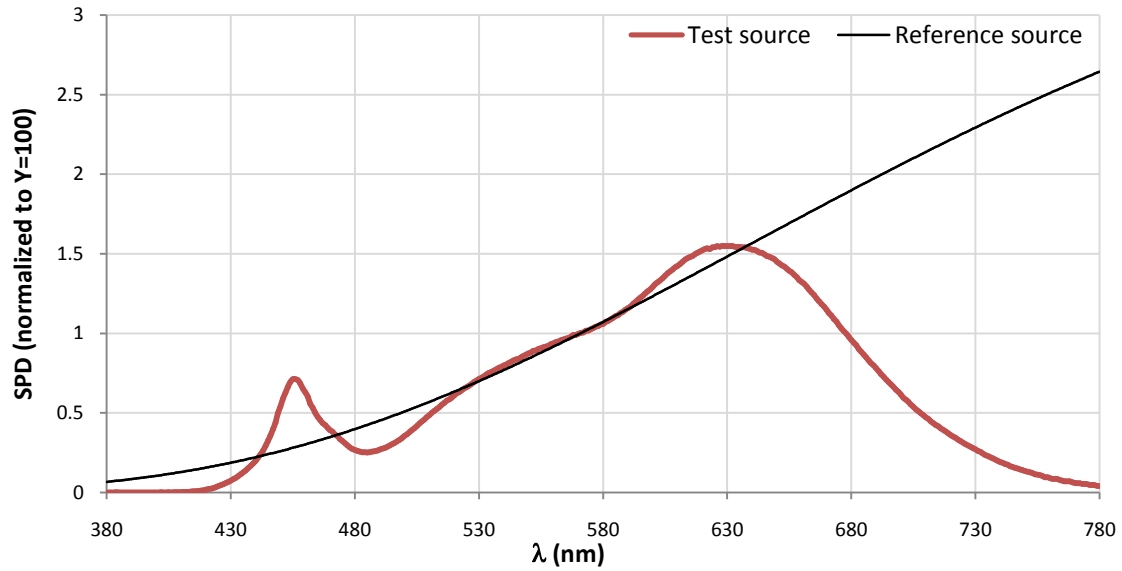
Ra			
94.4			
R1	R2	R3	R4
96	98	96	94
R5	R6	R7	R8
95	96	93	88
R9	R10	R11	R12
75	91	93	82
R13	R14	R15	
97	96	95	



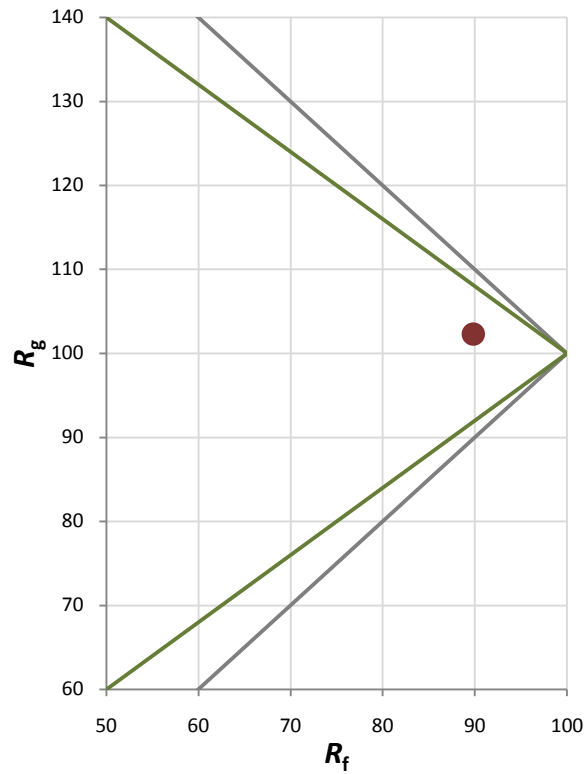
Fidelity Index and Gamut Index

Fidelity Index R_f	90
Gamut Index R_g	102

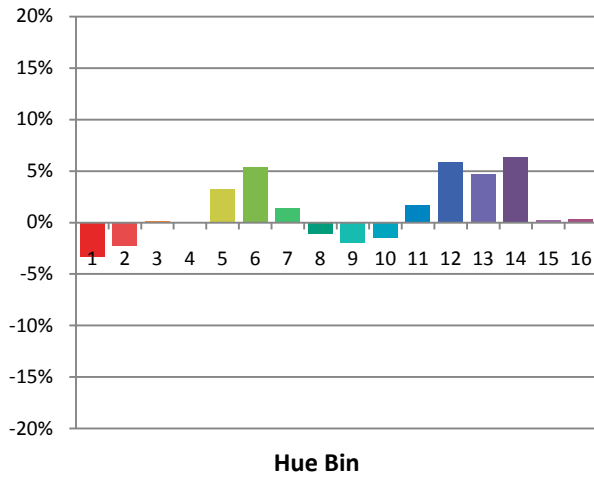
Spectral Power Distribution Comparison



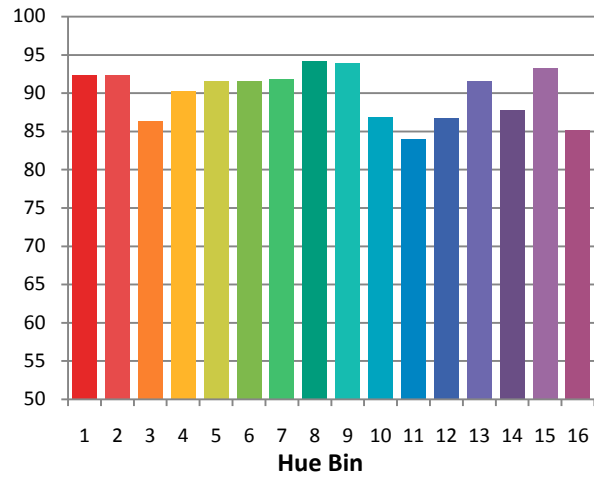
Plot of R_g versus R_f



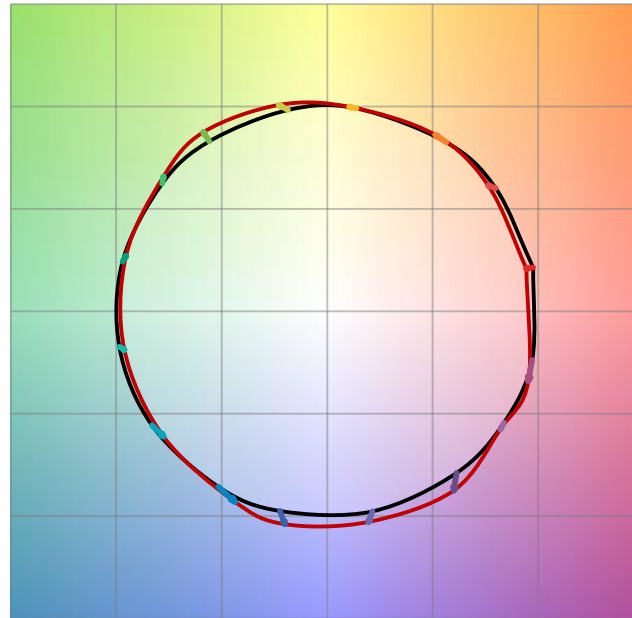
Chroma Shift by Hue



R_f by Hue

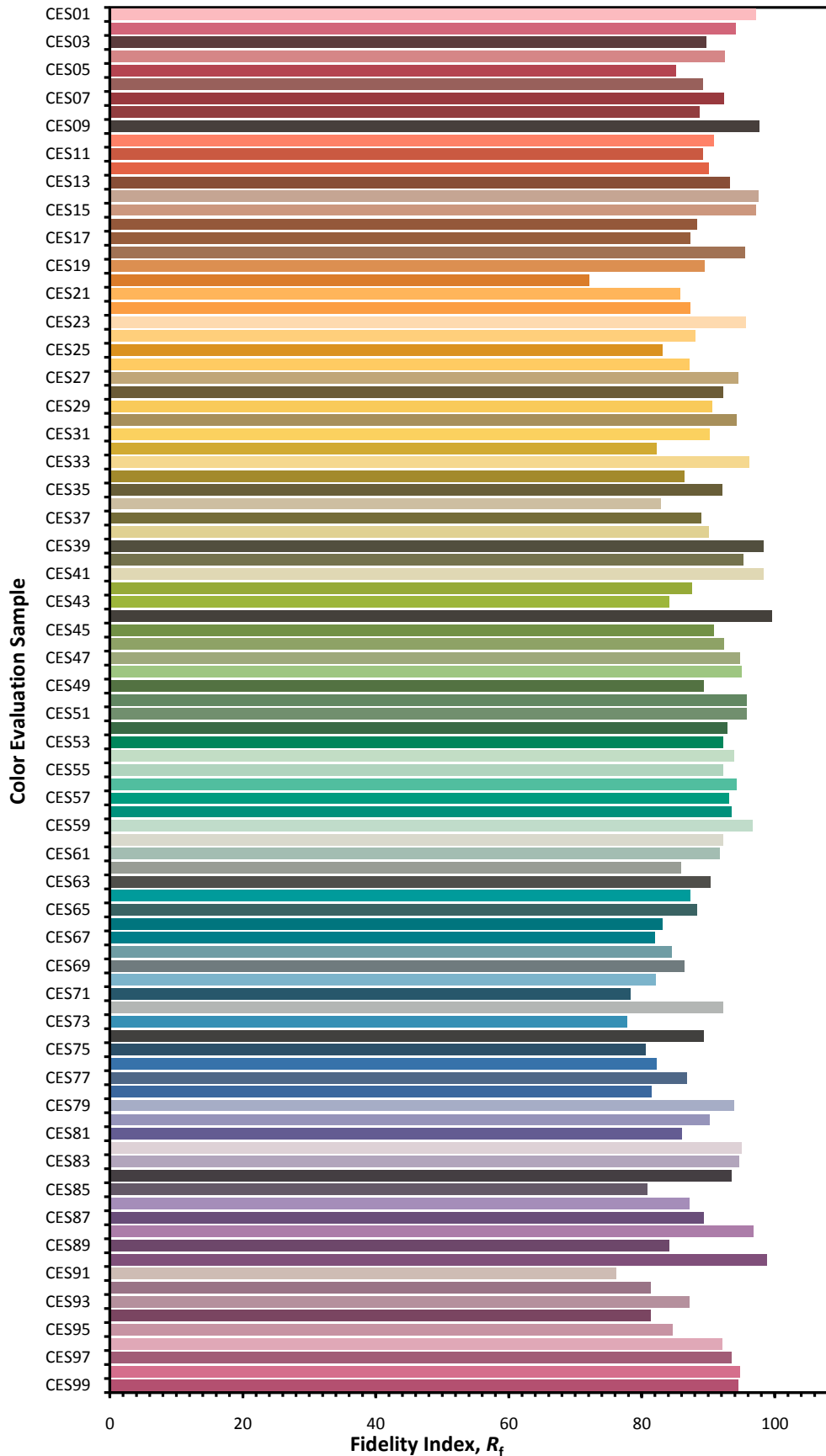


Color Vector Graphic

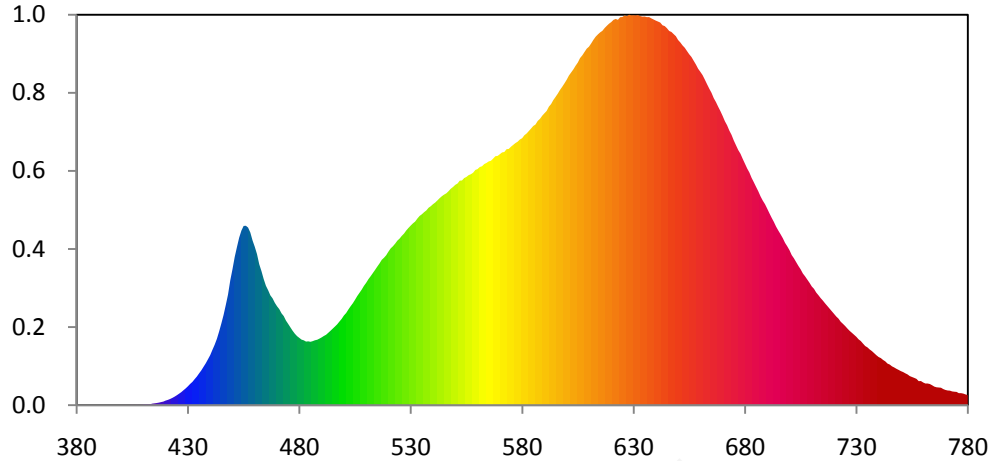


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



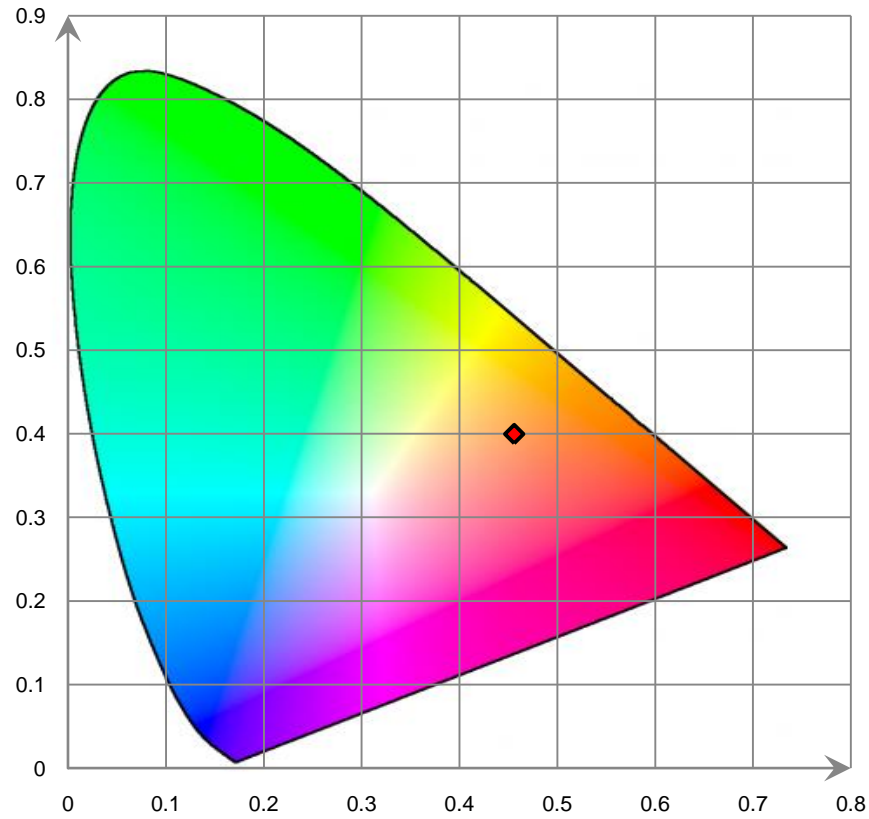
Relative Spectral Power Distribution



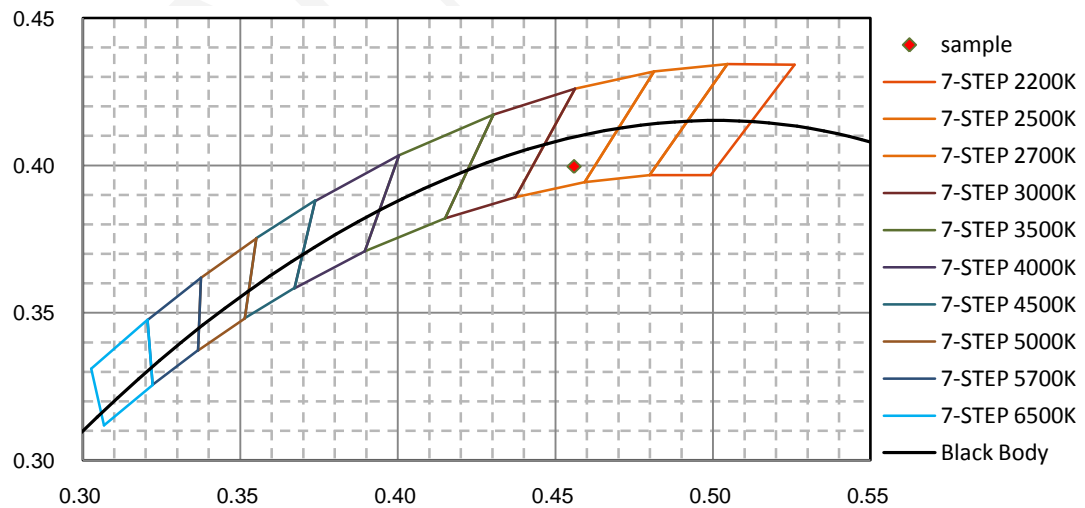
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.970E-02	421	1.258E+00	462	3.329E+01	503	2.335E+01	544	4.935E+01
381	2.400E-02	422	1.464E+00	463	3.165E+01	504	2.406E+01	545	4.973E+01
382	2.550E-02	423	1.712E+00	464	2.978E+01	505	2.489E+01	546	5.003E+01
383	5.800E-03	424	2.009E+00	465	2.820E+01	506	2.577E+01	547	5.054E+01
384	6.670E-02	425	2.339E+00	466	2.714E+01	507	2.653E+01	548	5.111E+01
385	1.450E-02	426	2.699E+00	467	2.592E+01	508	2.729E+01	549	5.152E+01
386	1.000E-03	427	3.073E+00	468	2.522E+01	509	2.817E+01	550	5.203E+01
387	3.150E-02	428	3.526E+00	469	2.418E+01	510	2.888E+01	551	5.234E+01
388	2.040E-02	429	3.965E+00	470	2.336E+01	511	2.974E+01	552	5.301E+01
389	8.000E-04	430	4.465E+00	471	2.268E+01	512	3.045E+01	553	5.306E+01
390	3.270E-02	431	5.013E+00	472	2.168E+01	513	3.119E+01	554	5.362E+01
391	1.800E-02	432	5.493E+00	473	2.104E+01	514	3.196E+01	555	5.390E+01
392	8.000E-04	433	6.136E+00	474	1.997E+01	515	3.273E+01	556	5.432E+01
393	1.590E-02	434	6.760E+00	475	1.919E+01	516	3.347E+01	557	5.453E+01
394	2.500E-03	435	7.492E+00	476	1.837E+01	517	3.432E+01	558	5.488E+01
395	1.420E-02	436	8.216E+00	477	1.756E+01	518	3.482E+01	559	5.553E+01
396	8.000E-04	437	9.057E+00	478	1.686E+01	519	3.540E+01	560	5.575E+01
397	2.990E-02	438	9.894E+00	479	1.630E+01	520	3.626E+01	561	5.624E+01
398	2.700E-03	439	1.084E+01	480	1.588E+01	521	3.701E+01	562	5.641E+01
399	4.500E-03	440	1.182E+01	481	1.548E+01	522	3.752E+01	563	5.693E+01
400	1.000E-04	441	1.307E+01	482	1.531E+01	523	3.813E+01	564	5.719E+01
401	2.640E-02	442	1.427E+01	483	1.501E+01	524	3.885E+01	565	5.756E+01
402	7.050E-02	443	1.567E+01	484	1.507E+01	525	3.934E+01	566	5.771E+01
403	3.160E-02	444	1.740E+01	485	1.496E+01	526	3.999E+01	567	5.822E+01
404	4.180E-02	445	1.930E+01	486	1.512E+01	527	4.052E+01	568	5.878E+01
405	8.960E-02	446	2.129E+01	487	1.532E+01	528	4.126E+01	569	5.886E+01
406	4.070E-02	447	2.368E+01	488	1.544E+01	529	4.185E+01	570	5.926E+01
407	1.240E-01	448	2.613E+01	489	1.571E+01	530	4.241E+01	571	5.967E+01
408	5.910E-02	449	2.948E+01	490	1.600E+01	531	4.294E+01	572	5.978E+01
409	1.131E-01	450	3.209E+01	491	1.634E+01	532	4.336E+01	573	6.044E+01
410	1.672E-01	451	3.500E+01	492	1.662E+01	533	4.407E+01	574	6.051E+01
411	2.398E-01	452	3.735E+01	493	1.709E+01	534	4.470E+01	575	6.103E+01
412	2.364E-01	453	3.956E+01	494	1.758E+01	535	4.508E+01	576	6.147E+01
413	2.130E-01	454	4.122E+01	495	1.808E+01	536	4.557E+01	577	6.189E+01
414	3.726E-01	455	4.232E+01	496	1.858E+01	537	4.598E+01	578	6.222E+01
415	4.426E-01	456	4.236E+01	497	1.910E+01	538	4.661E+01	579	6.273E+01
416	5.118E-01	457	4.193E+01	498	1.975E+01	539	4.698E+01	580	6.303E+01
417	6.046E-01	458	4.077E+01	499	2.037E+01	540	4.746E+01	581	6.373E+01
418	7.346E-01	459	3.890E+01	500	2.116E+01	541	4.785E+01	582	6.414E+01
419	8.581E-01	460	3.740E+01	501	2.175E+01	542	4.836E+01	583	6.472E+01
420	1.086E+00	461	3.569E+01	502	2.257E+01	543	4.889E+01	584	6.531E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.593E+01	626	9.204E+01	667	7.156E+01	708	2.965E+01	749	8.323E+00
586	6.626E+01	627	9.185E+01	668	7.046E+01	709	2.888E+01	750	8.038E+00
587	6.711E+01	628	9.219E+01	669	6.942E+01	710	2.803E+01	751	7.821E+00
588	6.761E+01	629	9.205E+01	670	6.829E+01	711	2.746E+01	752	7.520E+00
589	6.833E+01	630	9.208E+01	671	6.705E+01	712	2.660E+01	753	7.260E+00
590	6.892E+01	631	9.202E+01	672	6.609E+01	713	2.597E+01	754	6.865E+00
591	6.946E+01	632	9.211E+01	673	6.483E+01	714	2.528E+01	755	6.652E+00
592	7.047E+01	633	9.187E+01	674	6.383E+01	715	2.469E+01	756	6.446E+00
593	7.109E+01	634	9.174E+01	675	6.250E+01	716	2.403E+01	757	6.211E+00
594	7.204E+01	635	9.177E+01	676	6.137E+01	717	2.342E+01	758	5.675E+00
595	7.279E+01	636	9.162E+01	677	6.024E+01	718	2.279E+01	759	5.701E+00
596	7.356E+01	637	9.164E+01	678	5.936E+01	719	2.217E+01	760	5.357E+00
597	7.443E+01	638	9.132E+01	679	5.818E+01	720	2.156E+01	761	5.114E+00
598	7.518E+01	639	9.107E+01	680	5.703E+01	721	2.094E+01	762	5.113E+00
599	7.598E+01	640	9.080E+01	681	5.590E+01	722	2.043E+01	763	4.997E+00
600	7.684E+01	641	9.058E+01	682	5.494E+01	723	1.970E+01	764	4.715E+00
601	7.783E+01	642	9.034E+01	683	5.367E+01	724	1.921E+01	765	4.384E+00
602	7.856E+01	643	8.970E+01	684	5.263E+01	725	1.869E+01	766	4.226E+00
603	7.929E+01	644	8.951E+01	685	5.156E+01	726	1.810E+01	767	4.173E+00
604	8.015E+01	645	8.901E+01	686	5.050E+01	727	1.756E+01	768	4.118E+00
605	8.092E+01	646	8.836E+01	687	4.930E+01	728	1.709E+01	769	3.809E+00
606	8.195E+01	647	8.813E+01	688	4.831E+01	729	1.662E+01	770	3.598E+00
607	8.259E+01	648	8.762E+01	689	4.747E+01	730	1.615E+01	771	3.465E+00
608	8.340E+01	649	8.712E+01	690	4.640E+01	731	1.556E+01	772	3.427E+00
609	8.418E+01	650	8.622E+01	691	4.530E+01	732	1.515E+01	773	3.241E+00
610	8.465E+01	651	8.564E+01	692	4.425E+01	733	1.454E+01	774	3.179E+00
611	8.543E+01	652	8.495E+01	693	4.325E+01	734	1.396E+01	775	3.131E+00
612	8.626E+01	653	8.439E+01	694	4.215E+01	735	1.364E+01	776	2.843E+00
613	8.700E+01	654	8.362E+01	695	4.122E+01	736	1.316E+01	777	2.842E+00
614	8.754E+01	655	8.285E+01	696	4.036E+01	737	1.277E+01	778	2.738E+00
615	8.801E+01	656	8.223E+01	697	3.943E+01	738	1.229E+01	779	2.545E+00
616	8.838E+01	657	8.132E+01	698	3.833E+01	739	1.180E+01	780	2.383E+00
617	8.903E+01	658	8.044E+01	699	3.751E+01	740	1.137E+01		
618	8.957E+01	659	7.943E+01	700	3.659E+01	741	1.112E+01		
619	9.007E+01	660	7.870E+01	701	3.544E+01	742	1.068E+01		
620	9.046E+01	661	7.793E+01	702	3.467E+01	743	1.034E+01		
621	9.098E+01	662	7.688E+01	703	3.378E+01	744	9.818E+00		
622	9.120E+01	663	7.580E+01	704	3.287E+01	745	9.593E+00		
623	9.099E+01	664	7.472E+01	705	3.208E+01	746	9.171E+00		
624	9.161E+01	665	7.376E+01	706	3.110E+01	747	8.904E+00		
625	9.166E+01	666	7.250E+01	707	3.042E+01	748	8.594E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

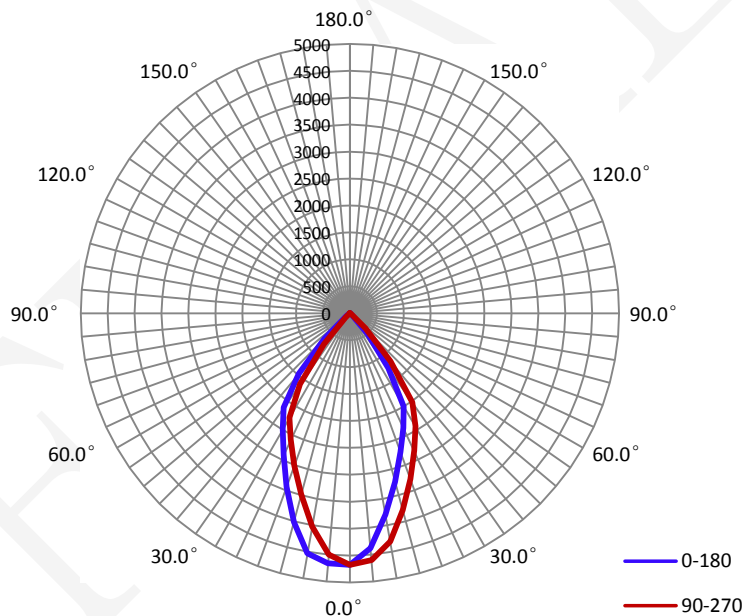
Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.4490	51.73	0.9600

Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	$I_{max}(cd)$	S/MH(C0/180)	S/MH(C90/270)
4067.1	78.67	4676.1	0.80	0.82

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50% I_{max}):	57.4	59.6	59.8	58.3	58.8
Field Angle(10% I_{max}):	87.1	87.0	86.8	87.4	87.1

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	4676	4676	4676	4676	4676	4676	4676	4676
5.0°	4381	4400	4462	4533	4605	4619	4644	4672
10.0°	3800	3875	4002	4142	4310	4421	4552	4559
15.0°	3247	3334	3472	3645	3787	3937	4045	4102
20.0°	2746	2844	2985	3133	3282	3390	3479	3511
25.0°	2354	2442	2558	2697	2820	2908	2958	2975
30.0°	2000	2073	2227	2351	2432	2492	2538	2552
35.0°	1249	1366	1586	1864	2021	2131	2165	2209
40.0°	507	623	787	996	1175	1351	1524	1614
45.0°	63	76	104	189	407	631	764	801
50.0°	21	27	29	34	38	81	92	99
55.0°	8	12	15	13	17	16	22	21
60.0°	0	0	0	0	0	14	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°	4676	4676	4676	4676	4676	4676	4676	4676
5.0°	4664	4647	4634	4574	4505	4414	4342	4326
10.0°	4531	4445	4350	4188	4026	3888	3793	3750
15.0°	4019	3919	3793	3646	3488	3348	3229	3178
20.0°	3435	3375	3281	3159	3011	2868	2749	2677
25.0°	2912	2886	2825	2706	2591	2487	2388	2329
30.0°	2494	2477	2446	2368	2242	2095	1988	1910
35.0°	2141	2105	2038	1894	1611	1360	1204	1143
40.0°	1475	1354	1183	952	751	605	483	403
45.0°	661	585	415	205	108	79	61	48
50.0°	82	75	49	37	27	23	21	21
55.0°	21	19	21	14	8	13	0	9
60.0°	0	11	11	0	0	0	0	0
65.0°	0	9	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	110.0	2.70	0-5	110.0	2.70
5-10	310.9	7.64	0-10	420.9	10.35
10-15	462.8	11.38	0-15	883.7	21.73
15-20	556.9	13.69	0-20	1440.5	35.42
20-25	608.1	14.95	0-25	2048.6	50.37
25-30	629.0	15.46	0-30	2677.6	65.83
30-35	596.1	14.66	0-35	3273.7	80.49
35-40	457.5	11.25	0-40	3731.1	91.74
40-45	242.8	5.97	0-45	3973.9	97.71
45-50	75.2	1.85	0-50	4049.1	99.56
50-55	13.4	0.33	0-55	4062.5	99.89
55-60	3.8	0.09	0-60	4066.3	99.98
60-65	0.7	0.02	0-65	4067.0	100.00
65-70	0.1	0.00	0-70	4067.1	100.00
70-75	0.0	0.00	0-75	4067.1	100.00
75-80	0.0	0.00	0-80	4067.1	100.00
80-85	0.0	0.00	0-85	4067.1	100.00
85-90	0.0	0.00	0-90	4067.1	100.00
90-95	0.0	0.00	0-95	4067.1	100.00
95-100	0.0	0.00	0-100	4067.1	100.00
100-105	0.0	0.00	0-105	4067.1	100.00
105-110	0.0	0.00	0-110	4067.1	100.00
110-115	0.0	0.00	0-115	4067.1	100.00
115-120	0.0	0.00	0-120	4067.1	100.00
120-125	0.0	0.00	0-125	4067.1	100.00
125-130	0.0	0.00	0-130	4067.1	100.00
130-135	0.0	0.00	0-135	4067.1	100.00
135-140	0.0	0.00	0-140	4067.1	100.00
140-145	0.0	0.00	0-145	4067.1	100.00
145-150	0.0	0.00	0-150	4067.1	100.00
150-155	0.0	0.00	0-155	4067.1	100.00
155-160	0.0	0.00	0-160	4067.1	100.00
160-165	0.0	0.00	0-165	4067.1	100.00
165-170	0.0	0.00	0-170	4067.1	100.00
170-175	0.0	0.00	0-175	4067.1	100.00
175-180	0.0	0.00	0-180	4067.1	100.00

6. Product Photo



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