

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: LE249027DIM120NRR4CC**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	George Yang <i>George Yang</i>
<b>Report Number:</b>	RKSB190329018-10-1
<b>Test Date:</b>	2019-04-04 to 2019-04-09
<b>Report Date:</b>	2019-05-15
<b>Reviewed By:</b>	Ray Gao/EE Engineer <i>Ry Gao</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268
<b>Test Facility:</b>	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
<b>Accreditation:</b>	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: LE249027DIM120NRR4CC  
 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.

$4\pi$  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 ( $\gamma$ ) 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**

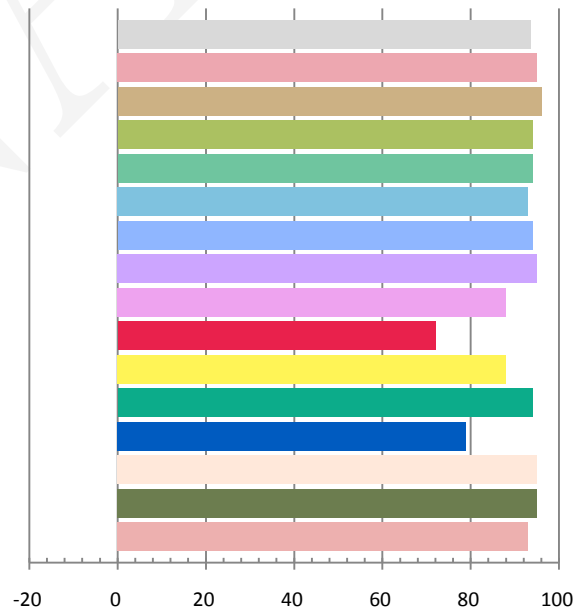
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.2608	30.92	0.988	2446.79	79.13

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.951	2713	-0.00026	0.4583	0.4096	0.2620	0.5267

### Color Rendering Index

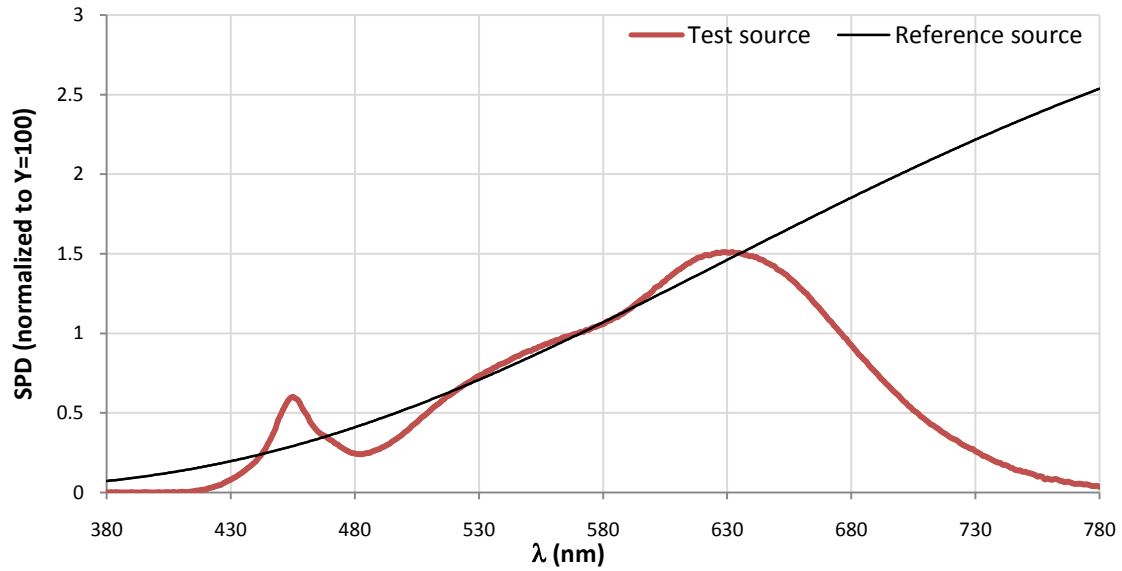
<b>Ra</b>			
93.6			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
95	96	94	94
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
93	94	95	88
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
72	88	94	79
<b>R13</b>	<b>R14</b>	<b>R15</b>	
95	95	93	



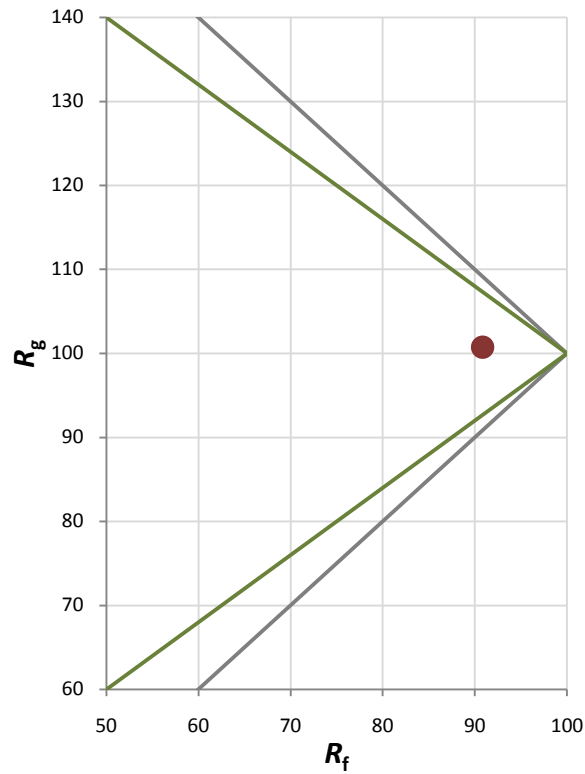
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	91
Gamut Index $R_g$	101

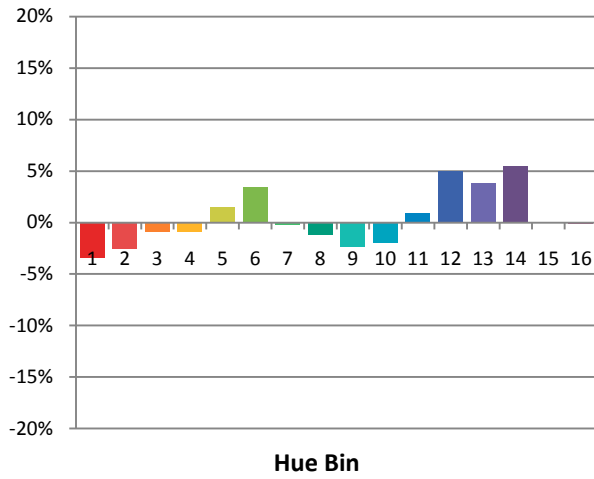
### Spectral Power Distribution Comparison



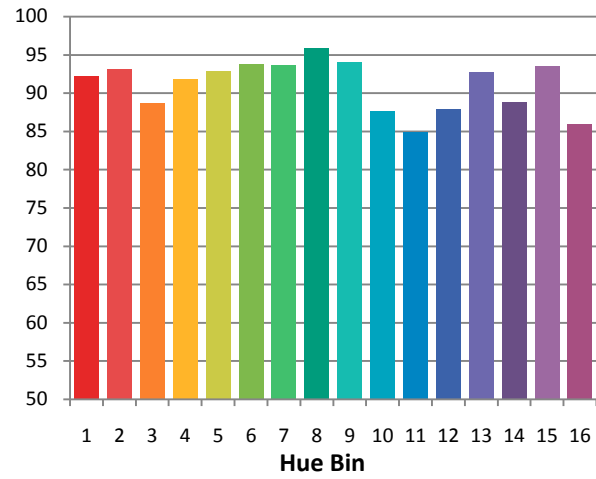
### Plot of $R_g$ versus $R_f$



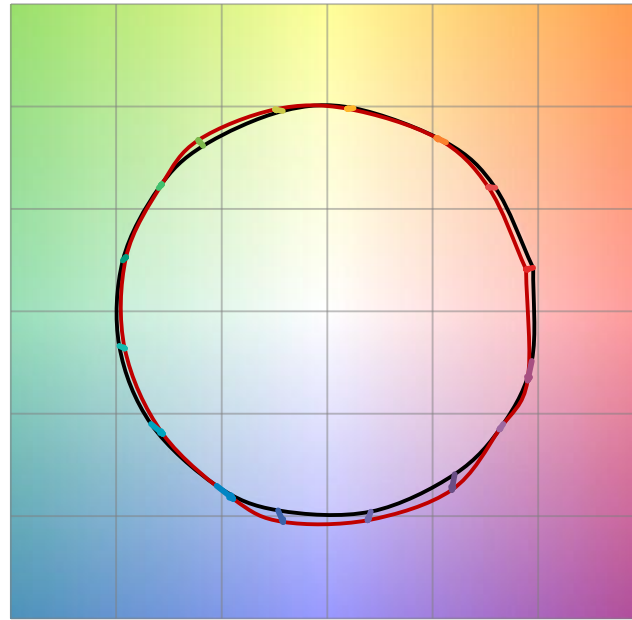
Chroma Shift by Hue



$R_f$  by Hue

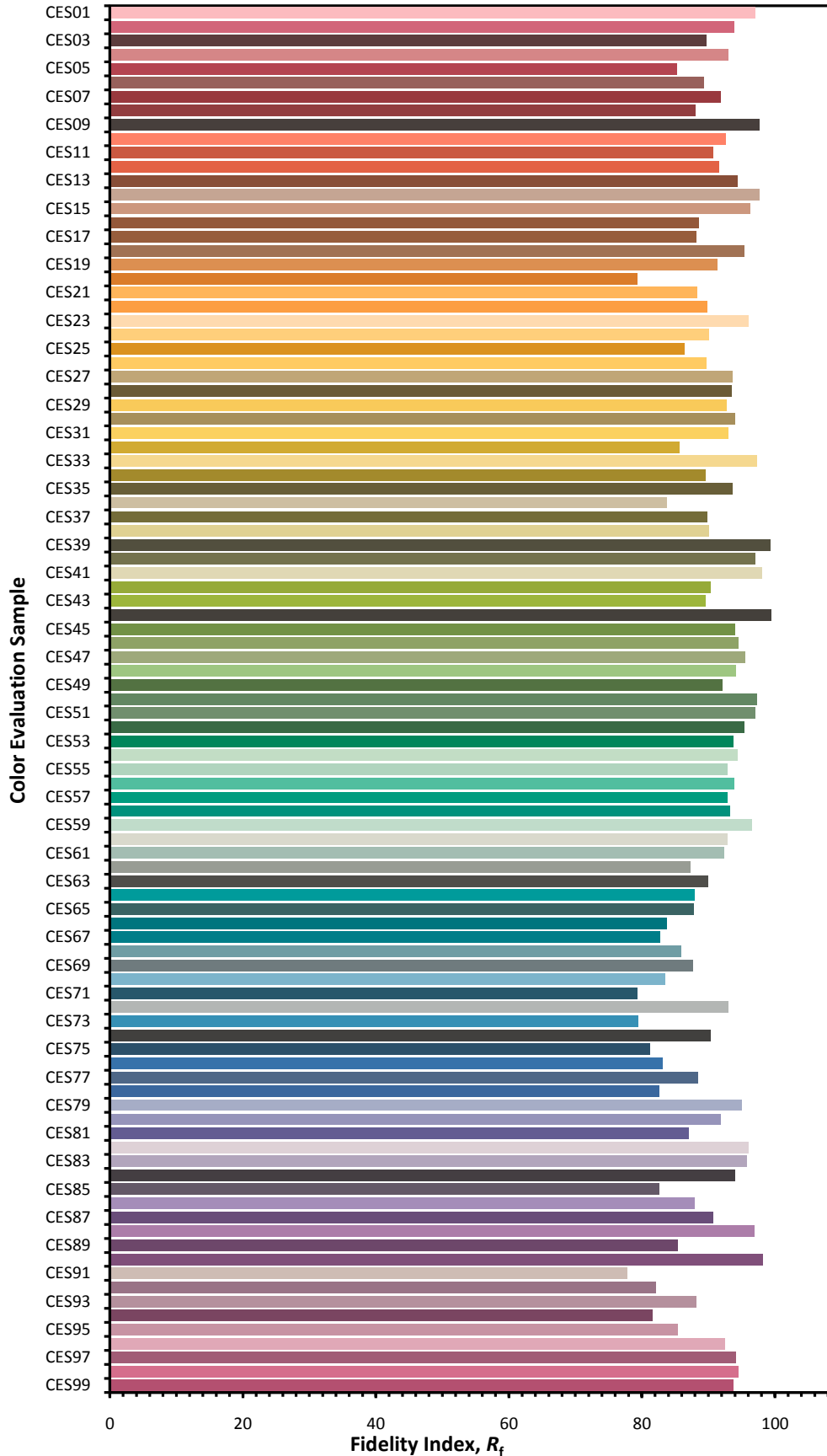


Color Vector Graphic

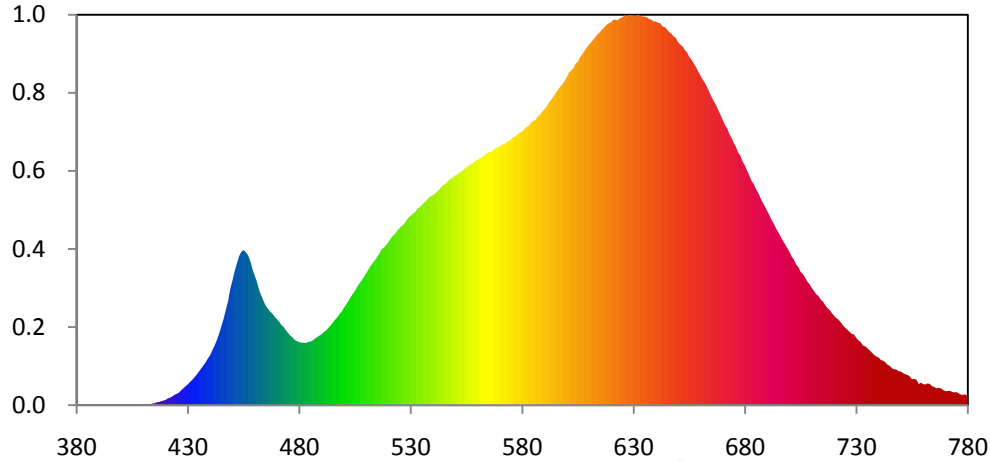


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

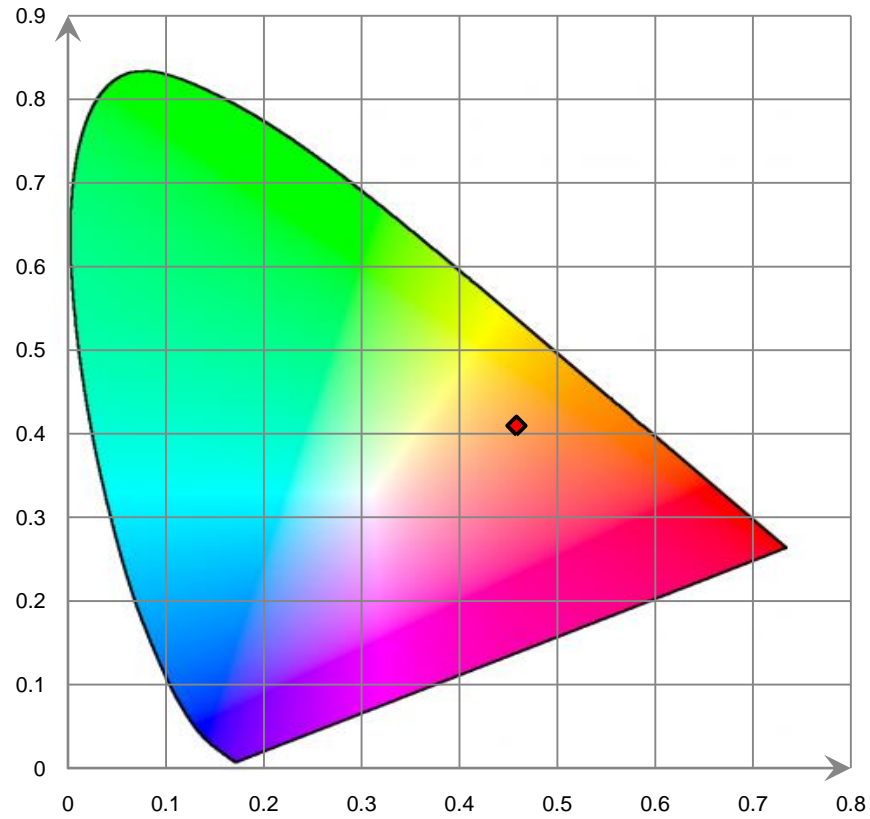


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.530E-02	421	9.429E-01	462	1.593E+01	503	1.494E+01	544	3.033E+01
381	1.250E-02	422	1.044E+00	463	1.513E+01	504	1.542E+01	545	3.059E+01
382	4.560E-02	423	1.216E+00	464	1.441E+01	505	1.587E+01	546	3.076E+01
383	1.140E-02	424	1.445E+00	465	1.374E+01	506	1.641E+01	547	3.114E+01
384	7.770E-02	425	1.581E+00	466	1.334E+01	507	1.689E+01	548	3.140E+01
385	2.090E-02	426	1.746E+00	467	1.295E+01	508	1.731E+01	549	3.160E+01
386	1.000E-03	427	2.072E+00	468	1.266E+01	509	1.778E+01	550	3.186E+01
387	1.700E-02	428	2.353E+00	469	1.221E+01	510	1.825E+01	551	3.192E+01
388	1.970E-02	429	2.647E+00	470	1.190E+01	511	1.879E+01	552	3.229E+01
389	2.700E-03	430	2.902E+00	471	1.156E+01	512	1.929E+01	553	3.241E+01
390	8.450E-02	431	3.229E+00	472	1.109E+01	513	1.974E+01	554	3.274E+01
391	1.360E-02	432	3.546E+00	473	1.082E+01	514	2.010E+01	555	3.293E+01
392	5.000E-04	433	3.885E+00	474	1.038E+01	515	2.062E+01	556	3.322E+01
393	0.000E+00	434	4.252E+00	475	9.989E+00	516	2.106E+01	557	3.341E+01
394	1.180E-02	435	4.685E+00	476	9.637E+00	517	2.163E+01	558	3.354E+01
395	4.780E-02	436	5.125E+00	477	9.375E+00	518	2.182E+01	559	3.387E+01
396	3.150E-02	437	5.514E+00	478	9.040E+00	519	2.220E+01	560	3.399E+01
397	2.340E-02	438	5.967E+00	479	8.864E+00	520	2.261E+01	561	3.428E+01
398	1.300E-03	439	6.506E+00	480	8.750E+00	521	2.307E+01	562	3.435E+01
399	6.000E-04	440	6.946E+00	481	8.644E+00	522	2.348E+01	563	3.467E+01
400	0.000E+00	441	7.638E+00	482	8.665E+00	523	2.378E+01	564	3.490E+01
401	5.360E-02	442	8.291E+00	483	8.617E+00	524	2.422E+01	565	3.505E+01
402	2.720E-02	443	9.041E+00	484	8.778E+00	525	2.454E+01	566	3.514E+01
403	2.370E-02	444	9.907E+00	485	8.826E+00	526	2.486E+01	567	3.534E+01
404	4.490E-02	445	1.094E+01	486	8.951E+00	527	2.511E+01	568	3.560E+01
405	7.040E-02	446	1.196E+01	487	9.227E+00	528	2.560E+01	569	3.574E+01
406	1.720E-02	447	1.319E+01	488	9.430E+00	529	2.598E+01	570	3.589E+01
407	1.068E-01	448	1.439E+01	489	9.636E+00	530	2.628E+01	571	3.616E+01
408	1.790E-02	449	1.612E+01	490	9.826E+00	531	2.652E+01	572	3.617E+01
409	9.940E-02	450	1.728E+01	491	1.012E+01	532	2.679E+01	573	3.649E+01
410	1.715E-01	451	1.861E+01	492	1.035E+01	533	2.722E+01	574	3.654E+01
411	1.549E-01	452	1.968E+01	493	1.072E+01	534	2.743E+01	575	3.686E+01
412	1.020E-01	453	2.069E+01	494	1.102E+01	535	2.776E+01	576	3.714E+01
413	1.415E-01	454	2.125E+01	495	1.145E+01	536	2.808E+01	577	3.727E+01
414	2.272E-01	455	2.150E+01	496	1.184E+01	537	2.832E+01	578	3.754E+01
415	2.651E-01	456	2.120E+01	497	1.214E+01	538	2.875E+01	579	3.777E+01
416	3.934E-01	457	2.079E+01	498	1.263E+01	539	2.895E+01	580	3.788E+01
417	4.465E-01	458	1.996E+01	499	1.295E+01	540	2.912E+01	581	3.823E+01
418	5.525E-01	459	1.882E+01	500	1.350E+01	541	2.934E+01	582	3.861E+01
419	6.380E-01	460	1.794E+01	501	1.393E+01	542	2.967E+01	583	3.871E+01
420	7.494E-01	461	1.709E+01	502	1.443E+01	543	2.999E+01	584	3.915E+01

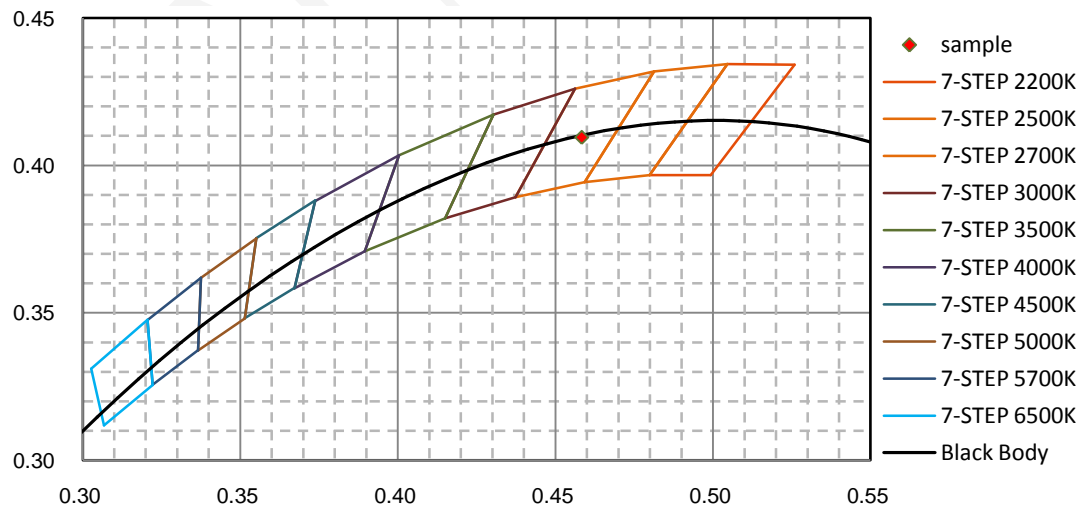


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.939E+01	626	5.403E+01	667	4.161E+01	708	1.712E+01	749	4.694E+00
586	3.954E+01	627	5.387E+01	668	4.092E+01	709	1.677E+01	750	4.667E+00
587	4.004E+01	628	5.408E+01	669	4.027E+01	710	1.624E+01	751	4.429E+00
588	4.029E+01	629	5.405E+01	670	3.955E+01	711	1.583E+01	752	4.287E+00
589	4.067E+01	630	5.400E+01	671	3.887E+01	712	1.537E+01	753	4.194E+00
590	4.103E+01	631	5.395E+01	672	3.839E+01	713	1.513E+01	754	3.972E+00
591	4.138E+01	632	5.412E+01	673	3.760E+01	714	1.465E+01	755	3.591E+00
592	4.195E+01	633	5.394E+01	674	3.704E+01	715	1.436E+01	756	3.652E+00
593	4.231E+01	634	5.387E+01	675	3.634E+01	716	1.389E+01	757	3.520E+00
594	4.275E+01	635	5.385E+01	676	3.577E+01	717	1.349E+01	758	2.930E+00
595	4.325E+01	636	5.375E+01	677	3.499E+01	718	1.320E+01	759	3.130E+00
596	4.367E+01	637	5.352E+01	678	3.456E+01	719	1.278E+01	760	2.916E+00
597	4.412E+01	638	5.344E+01	679	3.376E+01	720	1.239E+01	761	2.864E+00
598	4.443E+01	639	5.316E+01	680	3.322E+01	721	1.207E+01	762	3.016E+00
599	4.490E+01	640	5.320E+01	681	3.249E+01	722	1.185E+01	763	2.935E+00
600	4.540E+01	641	5.299E+01	682	3.180E+01	723	1.149E+01	764	2.625E+00
601	4.609E+01	642	5.295E+01	683	3.108E+01	724	1.106E+01	765	2.522E+00
602	4.638E+01	643	5.248E+01	684	3.064E+01	725	1.074E+01	766	2.333E+00
603	4.668E+01	644	5.240E+01	685	2.993E+01	726	1.045E+01	767	2.411E+00
604	4.735E+01	645	5.210E+01	686	2.942E+01	727	1.015E+01	768	2.334E+00
605	4.760E+01	646	5.169E+01	687	2.869E+01	728	9.879E+00	769	2.096E+00
606	4.822E+01	647	5.147E+01	688	2.809E+01	729	9.792E+00	770	1.949E+00
607	4.864E+01	648	5.112E+01	689	2.751E+01	730	9.307E+00	771	1.955E+00
608	4.910E+01	649	5.090E+01	690	2.692E+01	731	8.984E+00	772	1.996E+00
609	4.958E+01	650	5.030E+01	691	2.632E+01	732	8.711E+00	773	1.841E+00
610	4.995E+01	651	4.997E+01	692	2.564E+01	733	8.258E+00	774	1.767E+00
611	5.027E+01	652	4.972E+01	693	2.513E+01	734	8.160E+00	775	1.810E+00
612	5.069E+01	653	4.924E+01	694	2.449E+01	735	7.880E+00	776	1.631E+00
613	5.110E+01	654	4.889E+01	695	2.395E+01	736	7.591E+00	777	1.448E+00
614	5.146E+01	655	4.830E+01	696	2.340E+01	737	7.282E+00	778	1.435E+00
615	5.173E+01	656	4.790E+01	697	2.281E+01	738	6.953E+00	779	1.501E+00
616	5.211E+01	657	4.737E+01	698	2.229E+01	739	6.737E+00	780	1.222E+00
617	5.241E+01	658	4.688E+01	699	2.179E+01	740	6.622E+00		
618	5.277E+01	659	4.625E+01	700	2.122E+01	741	6.260E+00		
619	5.295E+01	660	4.572E+01	701	2.060E+01	742	6.170E+00		
620	5.310E+01	661	4.516E+01	702	2.017E+01	743	5.956E+00		
621	5.342E+01	662	4.469E+01	703	1.950E+01	744	5.606E+00		
622	5.342E+01	663	4.409E+01	704	1.913E+01	745	5.451E+00		
623	5.336E+01	664	4.342E+01	705	1.847E+01	746	5.113E+00		
624	5.367E+01	665	4.273E+01	706	1.818E+01	747	4.975E+00		
625	5.377E+01	666	4.214E+01	707	1.769E+01	748	4.934E+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**

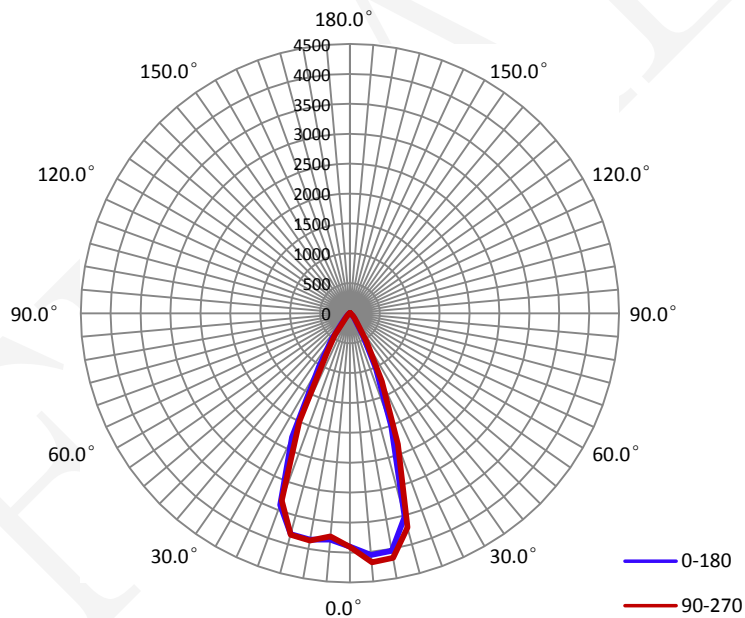
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2680	30.96	0.9630

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
2449.5	79.17	4178.9	0.78	0.79

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	46.0	46.1	45.8	46.0	45.9
Field Angle (10% I <sub>max</sub> ):	67.5	66.8	67.3	66.5	67.0

### Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3904	3904	3904	3904	3904	3904	3904	3904
5.0°	4057	4113	4162	4178	4179	4130	4106	3976
10.0°	4036	4017	4044	4070	4150	4177	4124	3993
15.0°	3528	3457	3486	3599	3709	3834	3908	3906
20.0°	2009	1880	1885	2016	2333	2788	3166	3384
25.0°	1020	949	961	1068	1263	1457	1659	2029
30.0°	439	390	386	435	549	646	771	970
35.0°	174	167	166	175	197	245	344	474
40.0°	106	104	103	109	119	135	154	178
45.0°	51	50	49	53	62	74	90	105
50.0°	21	21	21	22	25	30	38	49
55.0°	11	10	9	11	11	13	16	20
60.0°	6	4	5	5	6	7	8	10
65.0°	3	3	3	3	4	4	5	5
70.0°	1	1	0	1	2	2	2	3
75.0°	0	0	0	0	0	0	1	1
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°	3904	3904	3904	3904	3904	3904	3904	3904
5.0°	3802	3535	3444	3590	3745	3932	4020	4053
10.0°	3845	3636	3630	3738	3858	3963	4031	4022
15.0°	3825	3744	3774	3838	3834	3802	3745	3617
20.0°	3411	3488	3561	3544	3335	3071	2696	2181
25.0°	2289	2531	2584	2397	1997	1620	1337	1080
30.0°	1040	1123	1118	969	786	669	582	485
35.0°	533	572	564	521	445	328	217	180
40.0°	197	216	209	183	157	138	119	107
45.0°	110	115	110	101	87	73	60	52
50.0°	52	55	50	44	36	29	24	21
55.0°	21	22	20	18	16	13	10	10
60.0°	11	11	10	9	8	7	6	6
65.0°	6	6	5	5	4	3	3	3
70.0°	2	3	3	3	2	1	2	1
75.0°	2	1	2	1	1	0	0	0
80.0°	0	1	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	93.8	3.83	0-5	93.8	3.83
5-10	282.5	11.53	0-10	376.3	15.36
10-15	455.8	18.61	0-15	832.1	33.97
15-20	537.5	21.94	0-20	1369.6	55.91
20-25	465.3	19.00	0-25	1834.9	74.91
25-30	297.4	12.14	0-30	2132.3	87.05
30-35	153.3	6.26	0-35	2285.5	93.31
35-40	79.6	3.25	0-40	2365.2	96.56
40-45	41.4	1.69	0-45	2406.5	98.25
45-50	22.5	0.92	0-50	2429.0	99.17
50-55	10.5	0.43	0-55	2439.5	99.59
55-60	5.0	0.20	0-60	2444.5	99.80
60-65	2.7	0.11	0-65	2447.2	99.91
65-70	1.4	0.06	0-70	2448.7	99.97
70-75	0.6	0.03	0-75	2449.3	99.99
75-80	0.2	0.01	0-80	2449.4	100.00
80-85	0.0	0.00	0-85	2449.4	100.00
85-90	0.0	0.00	0-90	2449.4	100.00
90-95	0.0	0.00	0-95	2449.4	100.00
95-100	0.0	0.00	0-100	2449.4	100.00
100-105	0.0	0.00	0-105	2449.4	100.00
105-110	0.0	0.00	0-110	2449.4	100.00
110-115	0.0	0.00	0-115	2449.4	100.00
115-120	0.0	0.00	0-120	2449.4	100.00
120-125	0.0	0.00	0-125	2449.4	100.00
125-130	0.0	0.00	0-130	2449.4	100.00
130-135	0.0	0.00	0-135	2449.4	100.00
135-140	0.0	0.00	0-140	2449.4	100.00
140-145	0.0	0.00	0-145	2449.4	100.00
145-150	0.0	0.00	0-150	2449.4	100.00
150-155	0.0	0.00	0-155	2449.4	100.00
155-160	0.0	0.00	0-160	2449.4	100.00
160-165	0.0	0.00	0-165	2449.4	100.00
165-170	0.0	0.00	0-170	2449.4	100.00
170-175	0.0	0.00	0-175	2449.4	100.00
175-180	0.0	0.00	0-180	2449.4	100.00

## 6. Product Photo



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