

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: LE509027DIM120VWD/ADR6BL**

<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>	RKSB190329025-10-3
<b>Test Date:</b>	2019-04-03 to 2019-04-06
<b>Report Date:</b>	2019-05-16
<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: LE509027DIM120VWD/ADR6BL  
 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: 53W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 3400lm

## 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	2018-04-08	2019-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-08	2019-04-08
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	2018-04-08	2019-04-08
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-04-08	2019-04-08
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-04-08	2019-04-08
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-04-08	2019-04-08
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  $U_{rel}=2.61\%$  ( $k=2$ ), 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  $U_{rel}=0.48\%$  of rdg, AC Voltage  $U_{rel}=0.25\%$  of rdg, Power  $U_{rel}=0.44\%$ , ( $k=2$ ), 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  $U_{rel}=2.6\%$  ( $k=2$ ), 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**

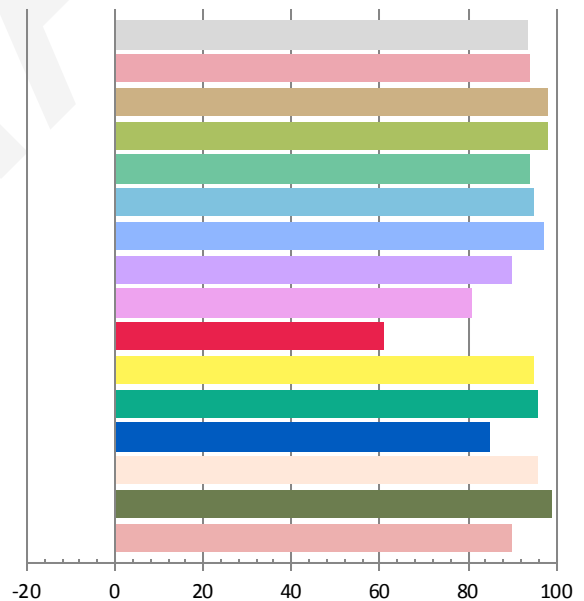
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.447	53.32	0.994	3495.98	65.57

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
12.369	2709	-0.00097	0.4575	0.4075	0.2624	0.5258

### Color Rendering Index

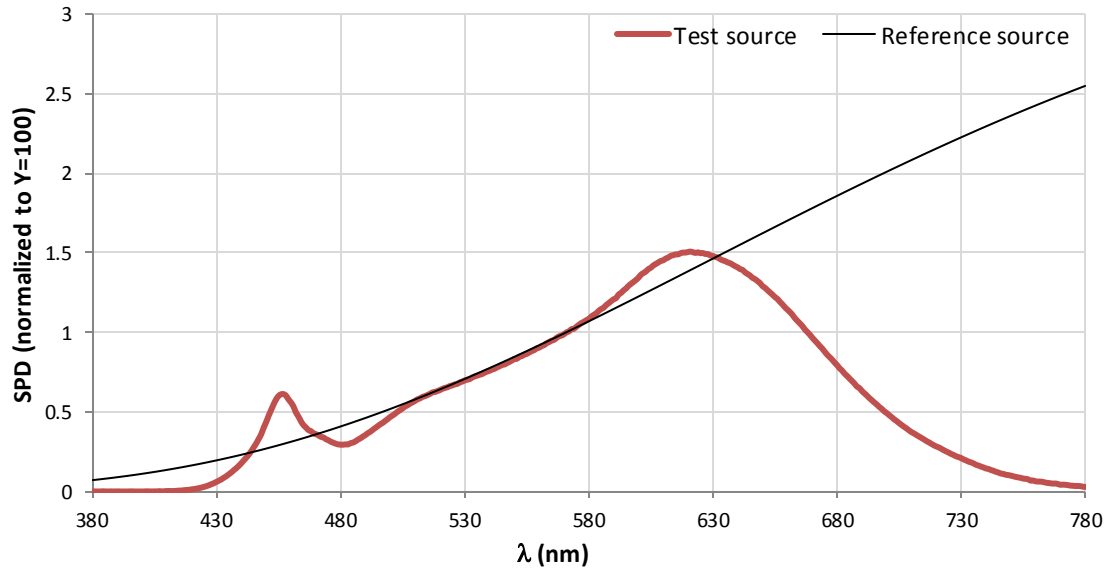
<b>Ra</b>			
93.5			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
94	98	98	94
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
95	97	90	81
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
61	95	96	85
<b>R13</b>	<b>R14</b>	<b>R15</b>	
96	99	90	



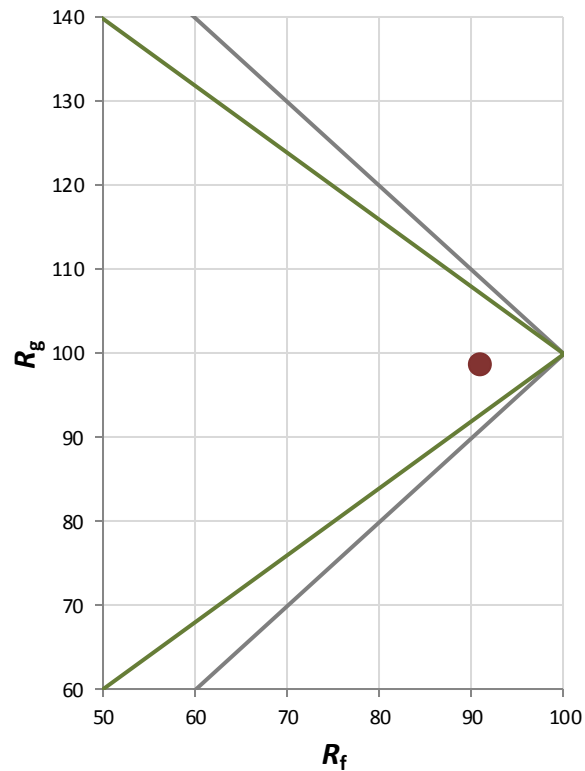
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	91
Gamut Index $R_g$	99

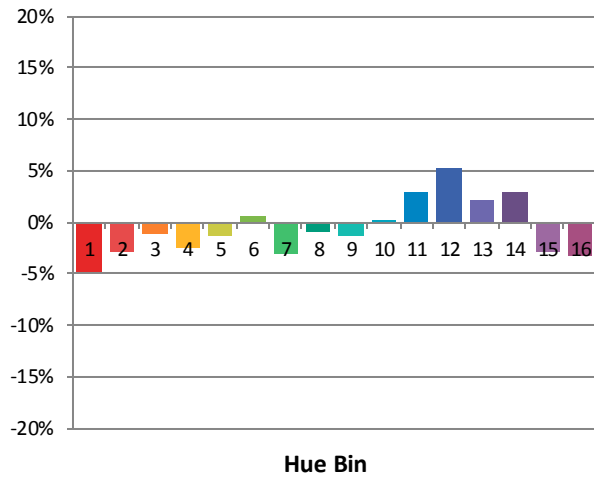
### Spectral Power Distribution Comparison



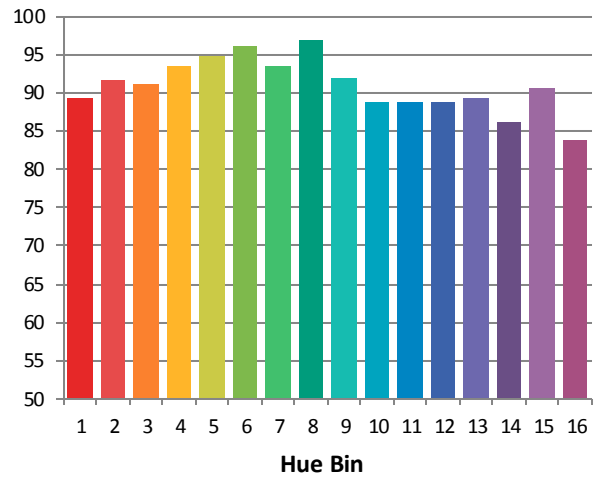
### Plot of $R_g$ versus $R_f$



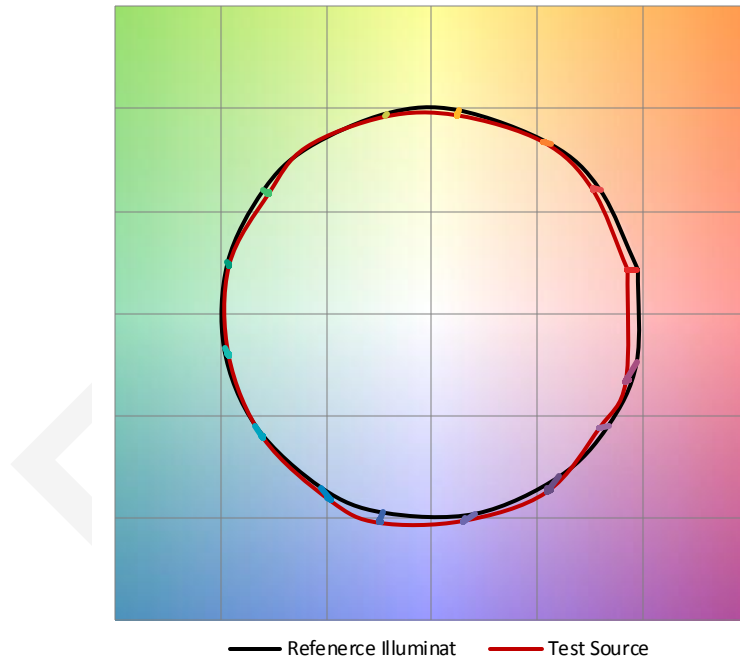
Chroma Shift by Hue



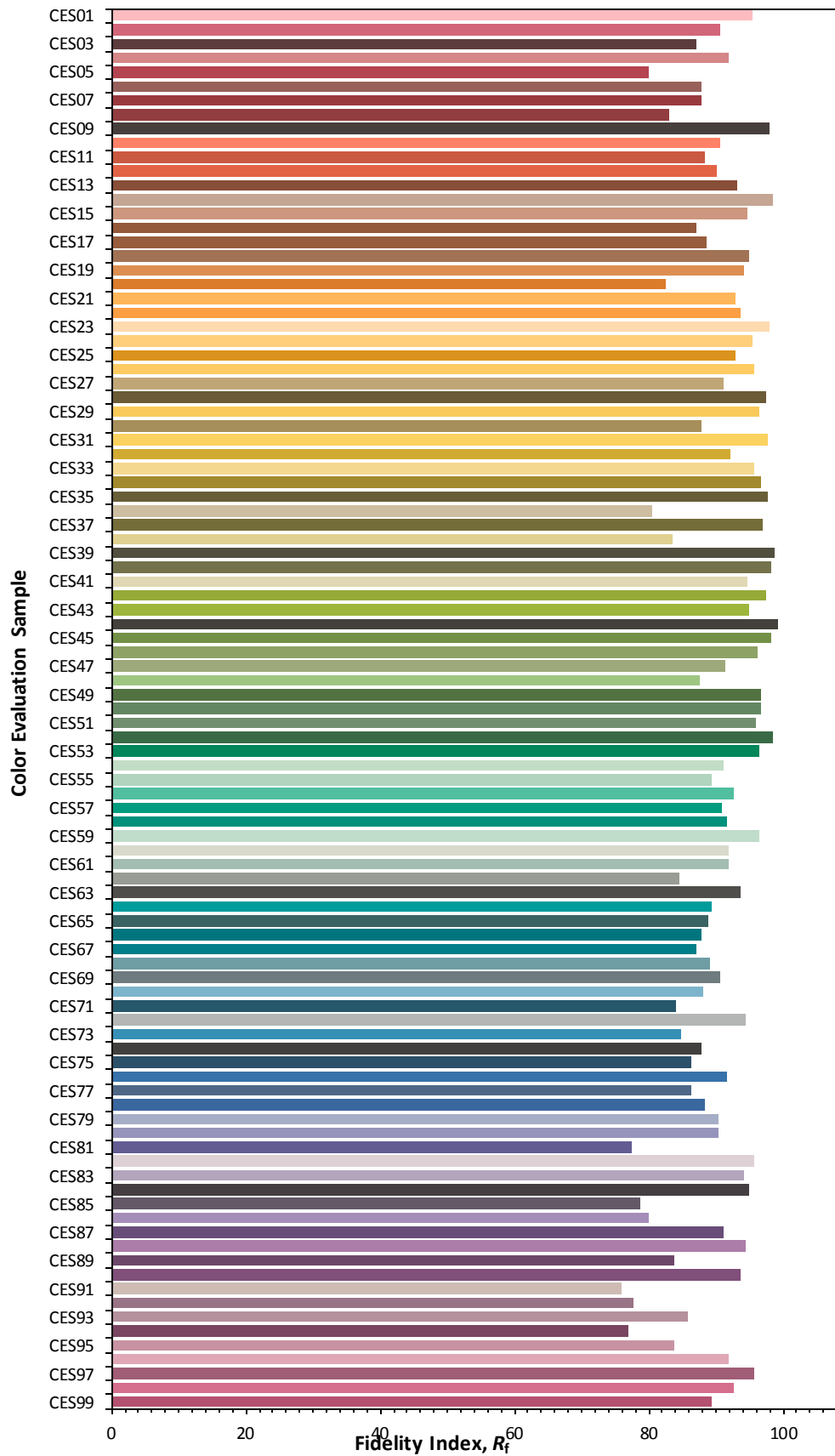
$R_f$  by Hue



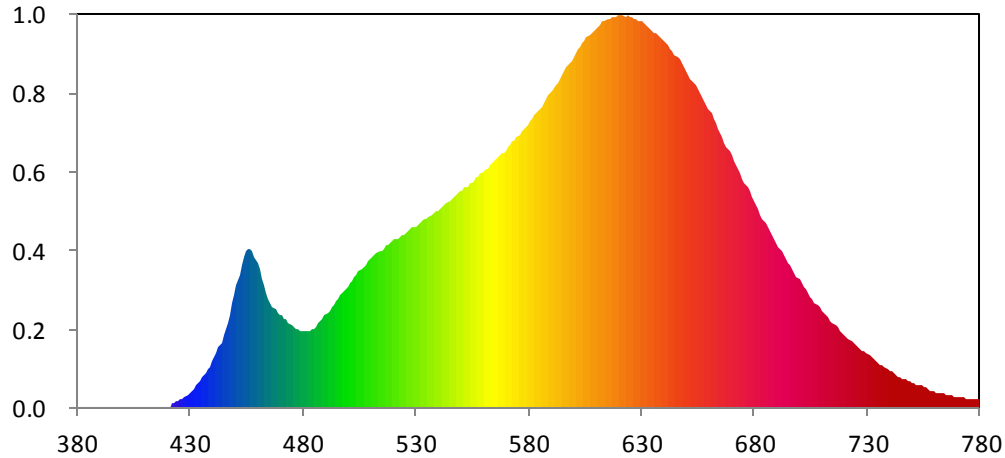
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

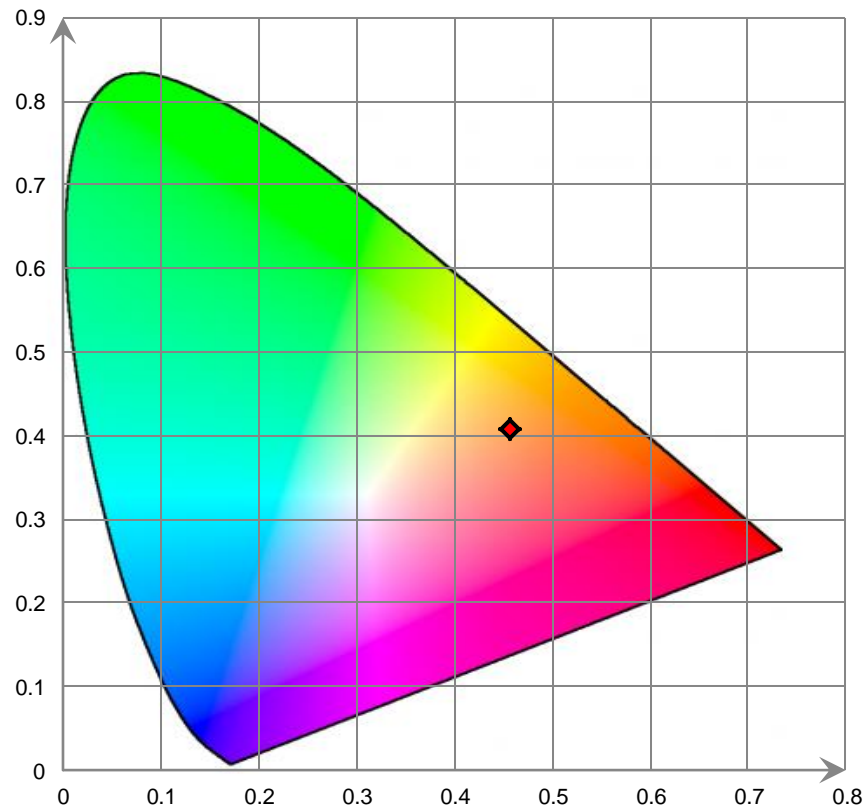


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	8.100E-03	421	7.953E-01	462	2.543E+01	503	2.569E+01	544	4.026E+01
381	2.390E-02	422	9.286E-01	463	2.413E+01	504	2.619E+01	545	4.068E+01
382	7.400E-03	423	1.095E+00	464	2.261E+01	505	2.675E+01	546	4.085E+01
383	1.110E-02	424	1.282E+00	465	2.140E+01	506	2.735E+01	547	4.128E+01
384	5.700E-02	425	1.495E+00	466	2.063E+01	507	2.777E+01	548	4.168E+01
385	3.470E-02	426	1.739E+00	467	1.978E+01	508	2.828E+01	549	4.212E+01
386	3.700E-03	427	2.035E+00	468	1.942E+01	509	2.870E+01	550	4.257E+01
387	2.080E-02	428	2.369E+00	469	1.879E+01	510	2.915E+01	551	4.267E+01
388	1.540E-02	429	2.705E+00	470	1.843E+01	511	2.965E+01	552	4.331E+01
389	6.900E-03	430	3.099E+00	471	1.811E+01	512	2.996E+01	553	4.355E+01
390	3.210E-02	431	3.512E+00	472	1.760E+01	513	3.042E+01	554	4.399E+01
391	1.930E-02	432	3.928E+00	473	1.742E+01	514	3.067E+01	555	4.428E+01
392	8.000E-04	433	4.454E+00	474	1.688E+01	515	3.102E+01	556	4.473E+01
393	7.000E-03	434	4.947E+00	475	1.651E+01	516	3.141E+01	557	4.516E+01
394	2.700E-03	435	5.558E+00	476	1.605E+01	517	3.187E+01	558	4.547E+01
395	2.550E-02	436	6.161E+00	477	1.571E+01	518	3.202E+01	559	4.603E+01
396	3.570E-02	437	6.875E+00	478	1.539E+01	519	3.230E+01	560	4.629E+01
397	3.400E-03	438	7.530E+00	479	1.516E+01	520	3.262E+01	561	4.676E+01
398	3.600E-03	439	8.275E+00	480	1.506E+01	521	3.301E+01	562	4.709E+01
399	2.000E-04	440	9.105E+00	481	1.505E+01	522	3.330E+01	563	4.768E+01
400	0.000E+00	441	1.001E+01	482	1.516E+01	523	3.352E+01	564	4.807E+01
401	1.990E-02	442	1.088E+01	483	1.515E+01	524	3.391E+01	565	4.851E+01
402	5.580E-02	443	1.188E+01	484	1.553E+01	525	3.411E+01	566	4.877E+01
403	2.900E-02	444	1.296E+01	485	1.574E+01	526	3.445E+01	567	4.940E+01
404	1.530E-02	445	1.421E+01	486	1.614E+01	527	3.461E+01	568	4.990E+01
405	3.950E-02	446	1.546E+01	487	1.668E+01	528	3.508E+01	569	5.016E+01
406	2.960E-02	447	1.691E+01	488	1.711E+01	529	3.535E+01	570	5.059E+01
407	1.009E-01	448	1.841E+01	489	1.768E+01	530	3.572E+01	571	5.120E+01
408	3.570E-02	449	2.051E+01	490	1.816E+01	531	3.597E+01	572	5.148E+01
409	8.070E-02	450	2.232E+01	491	1.878E+01	532	3.614E+01	573	5.220E+01
410	1.457E-01	451	2.435E+01	492	1.925E+01	533	3.667E+01	574	5.233E+01
411	1.567E-01	452	2.619E+01	493	1.987E+01	534	3.700E+01	575	5.298E+01
412	1.464E-01	453	2.801E+01	494	2.045E+01	535	3.726E+01	576	5.360E+01
413	1.518E-01	454	2.960E+01	495	2.103E+01	536	3.755E+01	577	5.416E+01
414	2.307E-01	455	3.072E+01	496	2.162E+01	537	3.779E+01	578	5.458E+01
415	2.861E-01	456	3.125E+01	497	2.210E+01	538	3.821E+01	579	5.508E+01
416	3.219E-01	457	3.131E+01	498	2.273E+01	539	3.857E+01	580	5.552E+01
417	4.205E-01	458	3.082E+01	499	2.330E+01	540	3.882E+01	581	5.626E+01
418	4.894E-01	459	2.963E+01	500	2.398E+01	541	3.920E+01	582	5.681E+01
419	5.536E-01	460	2.863E+01	501	2.447E+01	542	3.945E+01	583	5.732E+01
420	6.870E-01	461	2.736E+01	502	2.506E+01	543	3.992E+01	584	5.810E+01

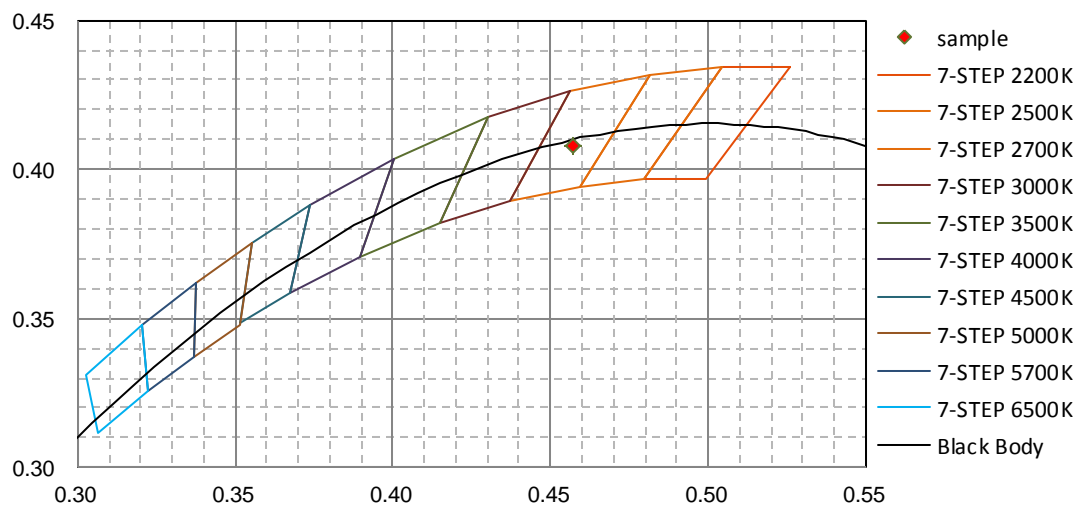


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.870E+01	626	7.668E+01	667	5.218E+01	708	2.029E+01	749	5.278E+00
586	5.913E+01	627	7.638E+01	668	5.133E+01	709	1.968E+01	750	5.108E+00
587	5.996E+01	628	7.633E+01	669	5.049E+01	710	1.911E+01	751	4.909E+00
588	6.055E+01	629	7.591E+01	670	4.951E+01	711	1.869E+01	752	4.696E+00
589	6.122E+01	630	7.575E+01	671	4.862E+01	712	1.818E+01	753	4.545E+00
590	6.182E+01	631	7.542E+01	672	4.777E+01	713	1.771E+01	754	4.392E+00
591	6.221E+01	632	7.523E+01	673	4.685E+01	714	1.724E+01	755	4.170E+00
592	6.332E+01	633	7.468E+01	674	4.601E+01	715	1.676E+01	756	4.068E+00
593	6.388E+01	634	7.433E+01	675	4.501E+01	716	1.625E+01	757	3.911E+00
594	6.467E+01	635	7.406E+01	676	4.404E+01	717	1.582E+01	758	3.491E+00
595	6.529E+01	636	7.366E+01	677	4.323E+01	718	1.534E+01	759	3.549E+00
596	6.614E+01	637	7.339E+01	678	4.243E+01	719	1.488E+01	760	3.279E+00
597	6.680E+01	638	7.292E+01	679	4.148E+01	720	1.449E+01	761	3.200E+00
598	6.738E+01	639	7.245E+01	680	4.066E+01	721	1.418E+01	762	3.186E+00
599	6.804E+01	640	7.207E+01	681	3.967E+01	722	1.375E+01	763	3.067E+00
600	6.876E+01	641	7.152E+01	682	3.891E+01	723	1.329E+01	764	2.871E+00
601	6.970E+01	642	7.123E+01	683	3.796E+01	724	1.289E+01	765	2.741E+00
602	7.026E+01	643	7.046E+01	684	3.720E+01	725	1.251E+01	766	2.646E+00
603	7.078E+01	644	6.995E+01	685	3.637E+01	726	1.207E+01	767	2.538E+00
604	7.151E+01	645	6.942E+01	686	3.556E+01	727	1.173E+01	768	2.567E+00
605	7.198E+01	646	6.871E+01	687	3.475E+01	728	1.132E+01	769	2.403E+00
606	7.269E+01	647	6.828E+01	688	3.380E+01	729	1.106E+01	770	2.173E+00
607	7.317E+01	648	6.766E+01	689	3.328E+01	730	1.075E+01	771	2.204E+00
608	7.366E+01	649	6.700E+01	690	3.236E+01	731	1.032E+01	772	2.151E+00
609	7.412E+01	650	6.605E+01	691	3.160E+01	732	9.996E+00	773	2.062E+00
610	7.437E+01	651	6.548E+01	692	3.088E+01	733	9.610E+00	774	1.906E+00
611	7.491E+01	652	6.473E+01	693	3.007E+01	734	9.352E+00	775	1.858E+00
612	7.525E+01	653	6.400E+01	694	2.937E+01	735	9.033E+00	776	1.768E+00
613	7.577E+01	654	6.331E+01	695	2.865E+01	736	8.602E+00	777	1.773E+00
614	7.599E+01	655	6.253E+01	696	2.801E+01	737	8.344E+00	778	1.722E+00
615	7.624E+01	656	6.191E+01	697	2.722E+01	738	8.009E+00	779	1.559E+00
616	7.627E+01	657	6.100E+01	698	2.660E+01	739	7.739E+00	780	1.450E+00
617	7.663E+01	658	6.020E+01	699	2.582E+01	740	7.413E+00		
618	7.683E+01	659	5.925E+01	700	2.525E+01	741	7.250E+00		
619	7.685E+01	660	5.852E+01	701	2.457E+01	742	6.920E+00		
620	7.702E+01	661	5.773E+01	702	2.393E+01	743	6.674E+00		
621	7.715E+01	662	5.687E+01	703	2.324E+01	744	6.337E+00		
622	7.695E+01	663	5.579E+01	704	2.267E+01	745	6.105E+00		
623	7.673E+01	664	5.492E+01	705	2.201E+01	746	5.791E+00		
624	7.691E+01	665	5.409E+01	706	2.142E+01	747	5.654E+00		
625	7.663E+01	666	5.324E+01	707	2.082E+01	748	5.395E+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**

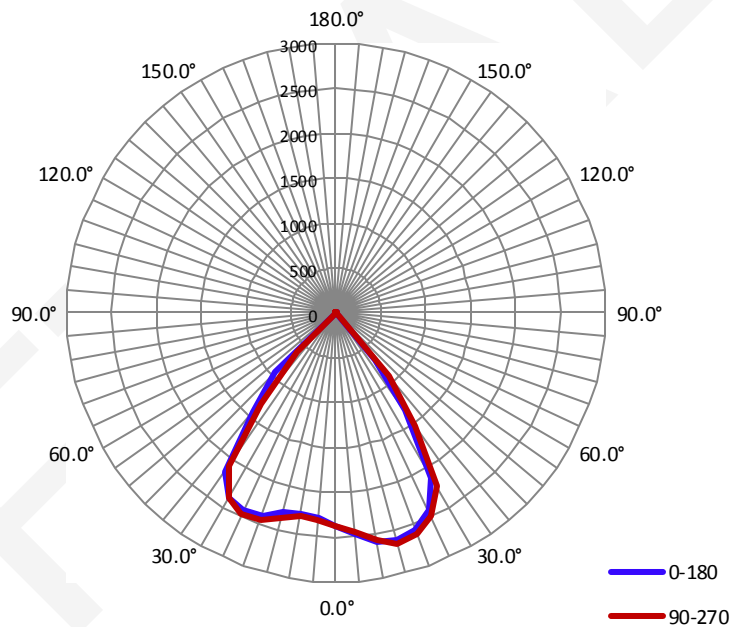
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.4620	53.31	0.9620

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
3498.5	65.67	2712.8	1.28	1.30

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	76.5	76.1	76.6	78.1	76.8
Field Angle (10% I <sub>max</sub> ):	91.9	91.5	91.7	92.0	91.8

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2373	2373	2373	2373	2373	2373	2373	2373
5.0°	2470	2500	2501	2479	2450	2423	2393	2332
10.0°	2582	2640	2664	2646	2578	2500	2413	2342
15.0°	2624	2685	2713	2709	2660	2593	2484	2383
20.0°	2579	2628	2665	2668	2629	2548	2483	2448
25.0°	2432	2475	2496	2510	2498	2446	2412	2409
30.0°	2126	2138	2147	2177	2236	2264	2283	2319
35.0°	1331	1284	1290	1365	1536	1774	2016	2099
40.0°	693	598	605	723	927	1135	1309	1406
45.0°	12	11	12	16	56	291	612	887
50.0°	5	5	5	5	5	7	10	14
55.0°	3	3	3	3	4	4	4	5
60.0°	2	2	2	2	2	2	3	2
65.0°	1	1	1	2	1	1	2	2
70.0°	0	0	1	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°	2373	2373	2373	2373	2373	2373	2373	2373
5.0°	2290	2268	2249	2276	2311	2363	2394	2422
10.0°	2284	2229	2215	2246	2309	2354	2446	2526
15.0°	2300	2267	2243	2285	2361	2438	2492	2542
20.0°	2409	2386	2379	2423	2457	2469	2456	2489
25.0°	2431	2464	2459	2473	2482	2420	2367	2371
30.0°	2376	2464	2464	2458	2384	2260	2153	2104
35.0°	2169	2247	2263	2205	2091	1803	1538	1361
40.0°	1452	1535	1518	1415	1311	1167	985	792
45.0°	946	1008	960	851	630	315	71	13
50.0°	22	65	37	12	9	5	6	5
55.0°	5	5	5	5	4	4	3	3
60.0°	3	3	3	2	2	2	2	2
65.0°	2	1	2	1	1	1	1	1
70.0°	1	1	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	56.9	1.63	0-5	56.9	1.63
5-10	172.4	4.93	0-10	229.2	6.55
10-15	292.0	8.35	0-15	521.2	14.90
15-20	411.5	11.76	0-20	932.7	26.66
20-25	519.6	14.85	0-25	1452.2	41.51
25-30	597.1	17.07	0-30	2049.4	58.58
30-35	595.7	17.03	0-35	2645.1	75.61
35-40	479.1	13.69	0-40	3124.2	89.30
40-45	280.7	8.02	0-45	3404.9	97.33
45-50	87.2	2.49	0-50	3492.1	99.82
50-55	3.8	0.11	0-55	3495.8	99.93
55-60	1.4	0.04	0-60	3497.2	99.96
60-65	0.8	0.02	0-65	3498.0	99.99
65-70	0.4	0.01	0-70	3498.4	100.00
70-75	0.0	0.00	0-75	3498.5	100.00
75-80	0.0	0.00	0-80	3498.5	100.00
80-85	0.0	0.00	0-85	3498.5	100.00
85-90	0.0	0.00	0-90	3498.5	100.00
90-95	0.0	0.00	0-95	3498.5	100.00
95-100	0.0	0.00	0-100	3498.5	100.00
100-105	0.0	0.00	0-105	3498.5	100.00
105-110	0.0	0.00	0-110	3498.5	100.00
110-115	0.0	0.00	0-115	3498.5	100.00
115-120	0.0	0.00	0-120	3498.5	100.00
120-125	0.0	0.00	0-125	3498.5	100.00
125-130	0.0	0.00	0-130	3498.5	100.00
130-135	0.0	0.00	0-135	3498.5	100.00
135-140	0.0	0.00	0-140	3498.5	100.00
140-145	0.0	0.00	0-145	3498.5	100.00
145-150	0.0	0.00	0-150	3498.5	100.00
150-155	0.0	0.00	0-155	3498.5	100.00
155-160	0.0	0.00	0-160	3498.5	100.00
160-165	0.0	0.00	0-165	3498.5	100.00
165-170	0.0	0.00	0-170	3498.5	100.00
170-175	0.0	0.00	0-175	3498.5	100.00
175-180	0.0	0.00	0-180	3498.5	100.00

## 6. Product Photo



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