

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: AD4LES9027DIM010UNVVNSCC**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Joker Gu <i>Joker . Gu</i>
<b>Report Number:</b>	RKS180131080-10-1
<b>Test Date:</b>	2018-05-22 to 2018-05-24
<b>Report Date:</b>	2018-05-25
<b>Reviewed By:</b>	Ray Gao/EE Engineer <i>Ray 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 2018-02-05 and used for testing.

Model Tested: AD4LES9027DIM010UNVVNSCC  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED Downlight  
 Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC 50/60Hz  
 Rated Power: 12.5W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 940lm

## 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	2018-01-24	2019-01-24
Power Meter	INVENTFINE	WT500	GSJWQ20009	2018-03-23	2019-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-03-23	2019-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-01-24	2019-01-24
Thermal Meter	KEJIAN	TA298	N/A	2017-11-14	2018-11-14
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2018-03-23	2019-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-03-23	2019-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-03-23	2019-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-03-23	2019-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2018-01-24	2019-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2017-11-14	2018-11-14
Standard Light Source	INVENTFINE	N/A	JWBYR040007	2018-01-24	2019-01-24

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  $U=2.6\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=24\text{K}$  ( $K=2$ ), 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  $U=0.16\%$  of rdg, AC Voltage  $U=0.18\%$  of rdg, Power  $U=0.14\%$  ( $K=2$ ), 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  $U=2.6\%$  ( $K=2$ ), 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**

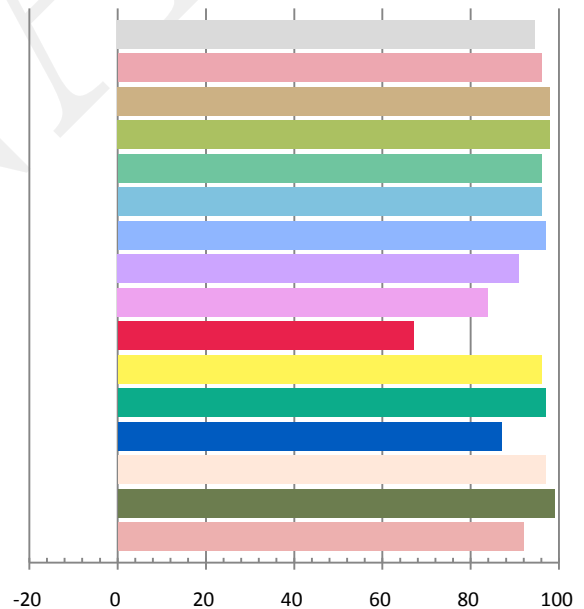
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1043	12.45	0.9944	1127.5	90.56

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.028	2742	-0.00184	0.4534	0.4042	0.2612	0.5239

### Color Rendering Index

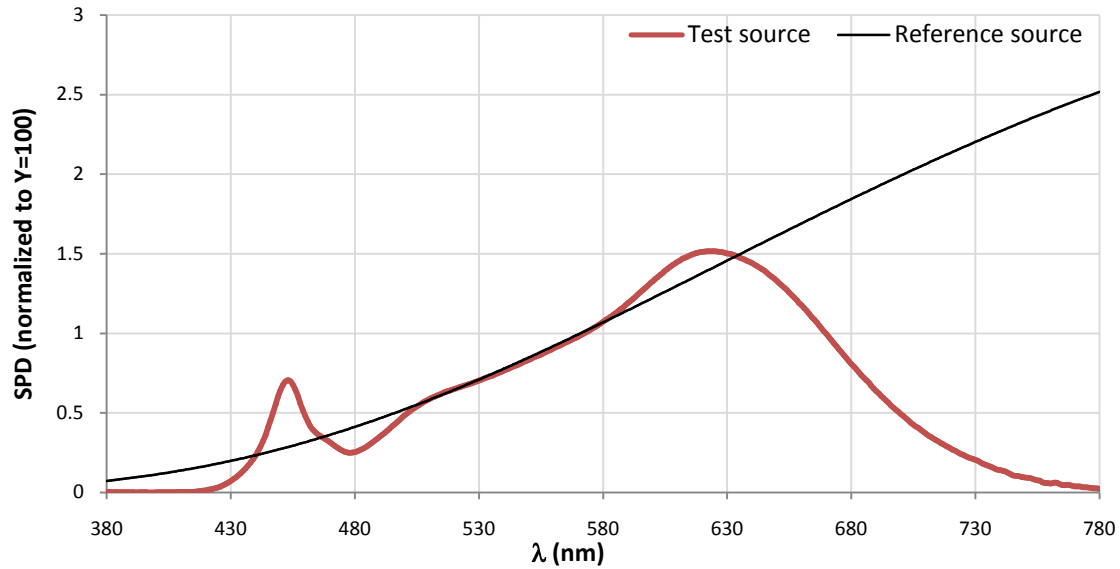
Ra			
94.6			
R1	R2	R3	R4
96	98	98	96
R5	R6	R7	R8
96	97	91	84
R9	R10	R11	R12
67	96	97	87
R13	R14	R15	
97	99	92	



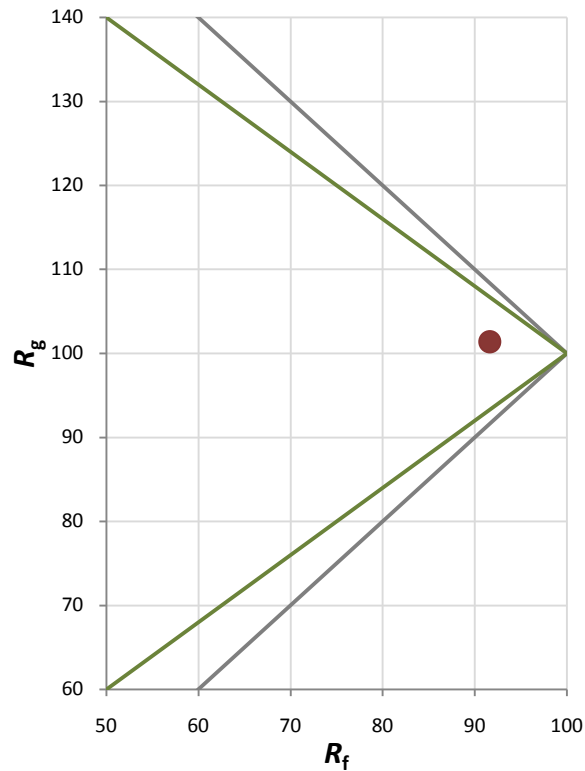
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	92
Gamut Index $R_g$	101

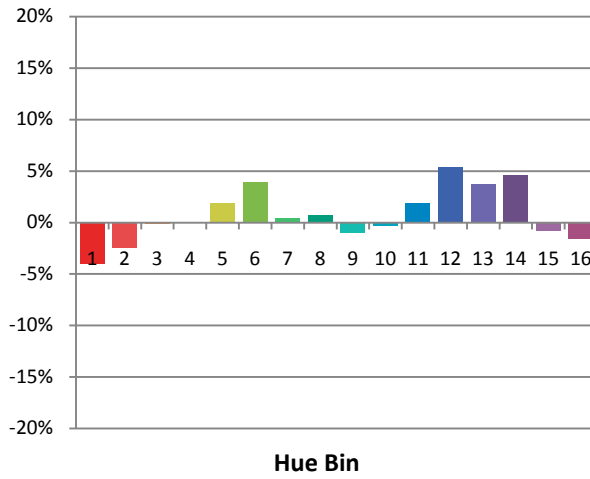
### Spectral Power Distribution Comparison



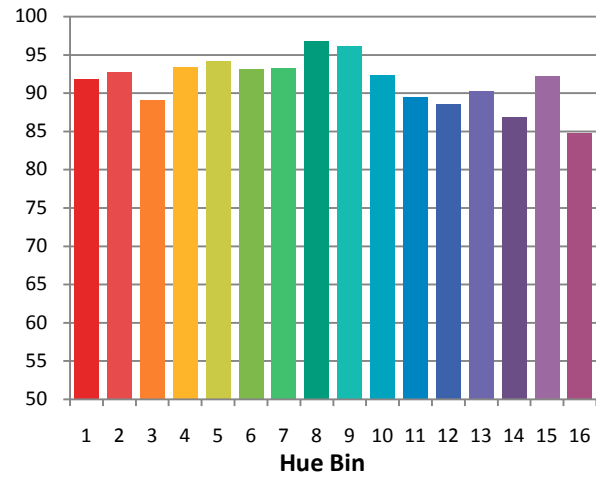
### Plot of $R_g$ versus $R_f$



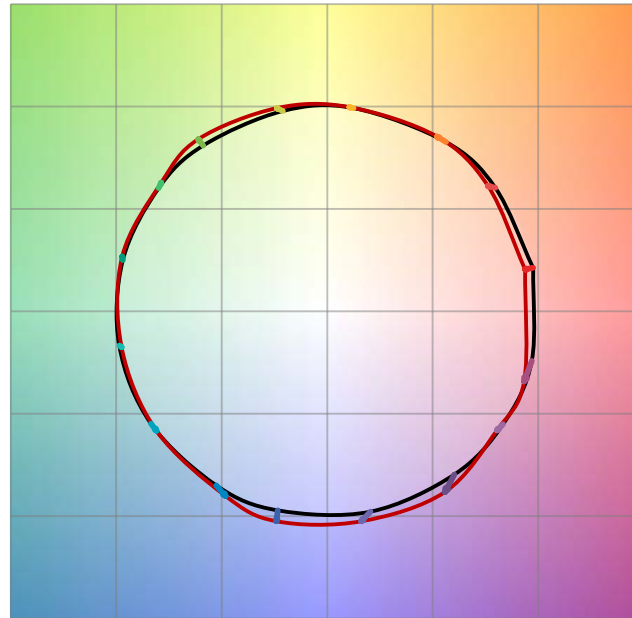
Chroma Shift by Hue



$R_t$  by Hue

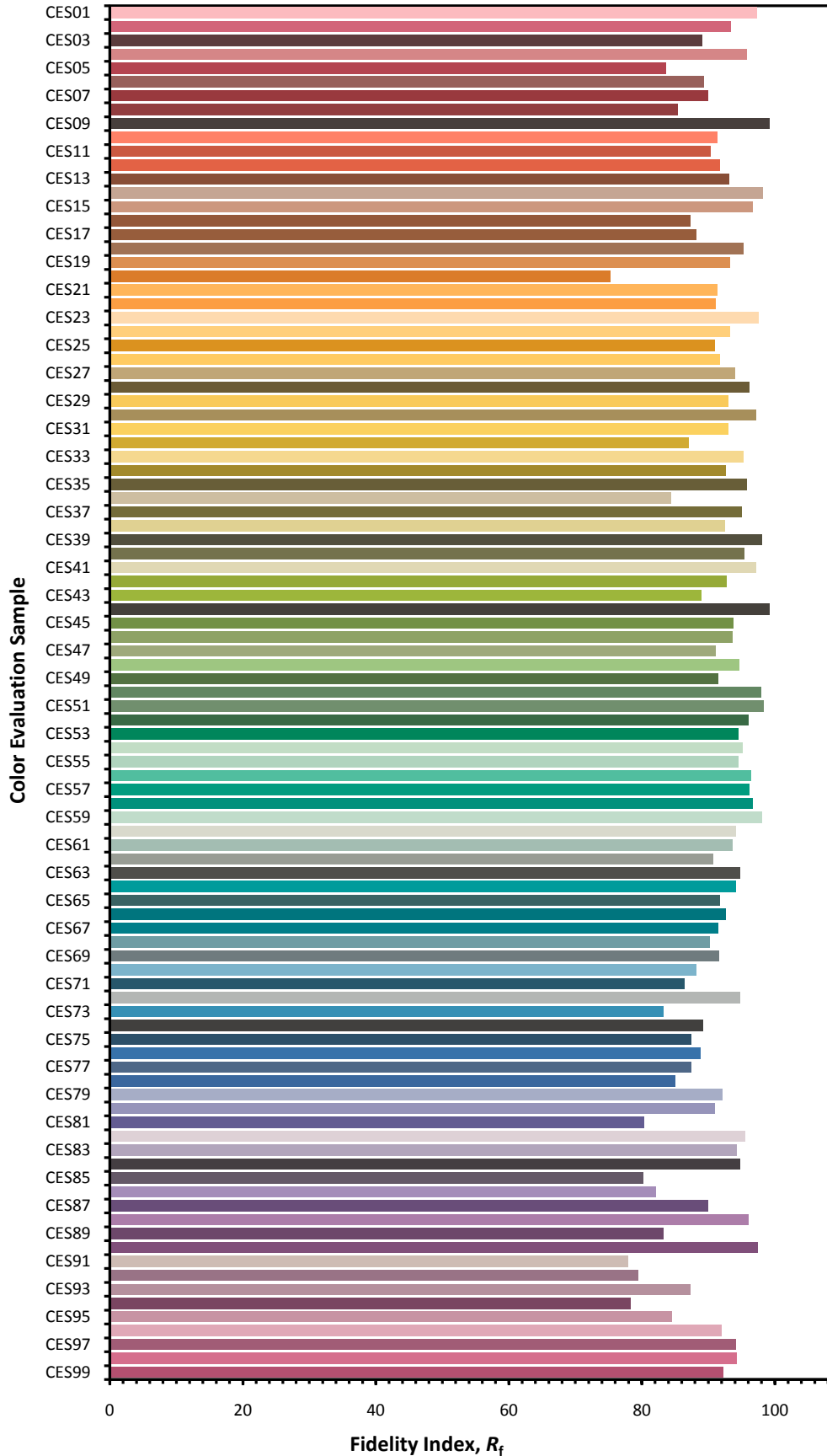


Color Vector Graphic

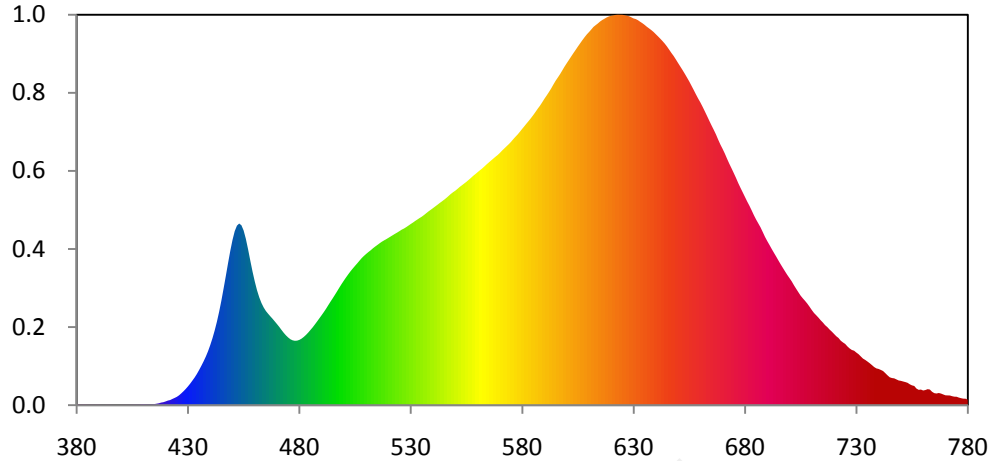


— Reference Illuminant — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

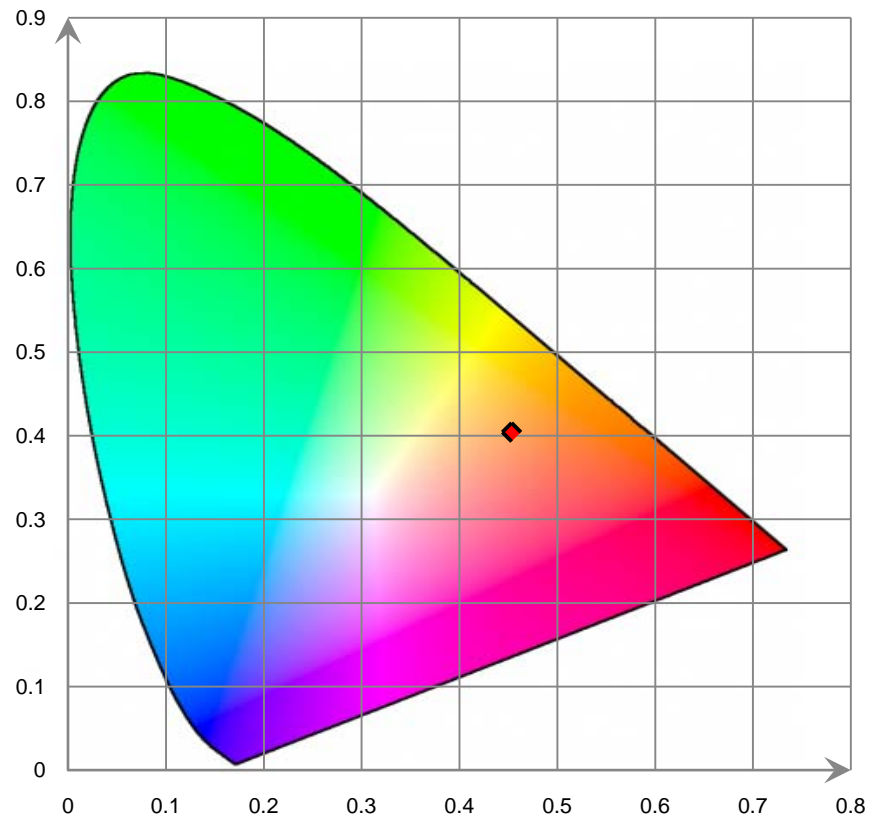


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.200E-02	421	2.948E-01	462	6.916E+00	503	8.585E+00	544	1.306E+01
381	5.250E-02	422	3.290E-01	463	6.550E+00	504	8.761E+00	545	1.317E+01
382	3.610E-02	423	3.968E-01	464	6.260E+00	505	8.928E+00	546	1.328E+01
383	4.320E-02	424	4.622E-01	465	6.034E+00	506	9.091E+00	547	1.341E+01
384	4.520E-02	425	5.341E-01	466	5.857E+00	507	9.263E+00	548	1.354E+01
385	2.850E-02	426	6.307E-01	467	5.694E+00	508	9.427E+00	549	1.365E+01
386	3.240E-02	427	7.548E-01	468	5.537E+00	509	9.568E+00	550	1.375E+01
387	3.020E-02	428	8.915E-01	469	5.366E+00	510	9.696E+00	551	1.387E+01
388	2.650E-02	429	1.038E+00	470	5.193E+00	511	9.815E+00	552	1.399E+01
389	3.700E-02	430	1.201E+00	471	5.014E+00	512	9.927E+00	553	1.410E+01
390	3.850E-02	431	1.379E+00	472	4.823E+00	513	1.005E+01	554	1.421E+01
391	1.680E-02	432	1.574E+00	473	4.637E+00	514	1.016E+01	555	1.432E+01
392	1.110E-02	433	1.773E+00	474	4.475E+00	515	1.027E+01	556	1.444E+01
393	2.280E-02	434	1.997E+00	475	4.336E+00	516	1.037E+01	557	1.456E+01
394	3.120E-02	435	2.249E+00	476	4.226E+00	517	1.047E+01	558	1.469E+01
395	2.690E-02	436	2.517E+00	477	4.158E+00	518	1.056E+01	559	1.481E+01
396	1.780E-02	437	2.800E+00	478	4.127E+00	519	1.064E+01	560	1.493E+01
397	1.310E-02	438	3.106E+00	479	4.136E+00	520	1.073E+01	561	1.505E+01
398	7.300E-03	439	3.448E+00	480	4.183E+00	521	1.081E+01	562	1.516E+01
399	3.900E-03	440	3.843E+00	481	4.264E+00	522	1.090E+01	563	1.529E+01
400	1.860E-02	441	4.285E+00	482	4.376E+00	523	1.099E+01	564	1.543E+01
401	2.340E-02	442	4.785E+00	483	4.504E+00	524	1.107E+01	565	1.555E+01
402	2.380E-02	443	5.346E+00	484	4.656E+00	525	1.116E+01	566	1.567E+01
403	2.550E-02	444	5.984E+00	485	4.823E+00	526	1.125E+01	567	1.580E+01
404	2.660E-02	445	6.695E+00	486	4.990E+00	527	1.133E+01	568	1.592E+01
405	3.050E-02	446	7.474E+00	487	5.178E+00	528	1.141E+01	569	1.603E+01
406	3.860E-02	447	8.274E+00	488	5.370E+00	529	1.151E+01	570	1.617E+01
407	4.200E-02	448	9.096E+00	489	5.567E+00	530	1.161E+01	571	1.632E+01
408	3.620E-02	449	9.885E+00	490	5.767E+00	531	1.171E+01	572	1.646E+01
409	6.610E-02	450	1.058E+01	491	5.969E+00	532	1.181E+01	573	1.659E+01
410	7.520E-02	451	1.115E+01	492	6.182E+00	533	1.190E+01	574	1.673E+01
411	5.750E-02	452	1.151E+01	493	6.411E+00	534	1.200E+01	575	1.688E+01
412	5.190E-02	453	1.164E+01	494	6.637E+00	535	1.209E+01	576	1.704E+01
413	5.250E-02	454	1.153E+01	495	6.854E+00	536	1.219E+01	577	1.720E+01
414	5.720E-02	455	1.120E+01	496	7.080E+00	537	1.231E+01	578	1.735E+01
415	7.140E-02	456	1.066E+01	497	7.310E+00	538	1.242E+01	579	1.753E+01
416	9.760E-02	457	9.990E+00	498	7.545E+00	539	1.253E+01	580	1.771E+01
417	1.255E-01	458	9.262E+00	499	7.774E+00	540	1.263E+01	581	1.788E+01
418	1.665E-01	459	8.560E+00	500	7.989E+00	541	1.274E+01	582	1.806E+01
419	1.934E-01	460	7.930E+00	501	8.196E+00	542	1.285E+01	583	1.823E+01
420	2.405E-01	461	7.373E+00	502	8.396E+00	543	1.296E+01	584	1.841E+01

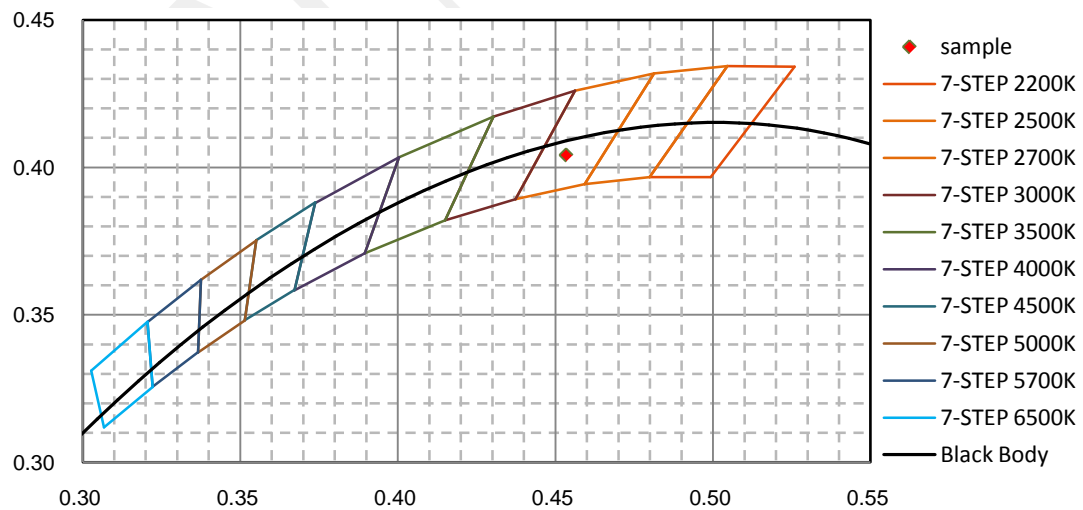


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.859E+01	626	2.500E+01	667	1.736E+01	708	6.509E+00	749	1.585E+00
586	1.880E+01	627	2.497E+01	668	1.702E+01	709	6.312E+00	750	1.558E+00
587	1.900E+01	628	2.493E+01	669	1.670E+01	710	6.102E+00	751	1.520E+00
588	1.919E+01	629	2.486E+01	670	1.642E+01	711	5.911E+00	752	1.480E+00
589	1.941E+01	630	2.479E+01	671	1.612E+01	712	5.763E+00	753	1.435E+00
590	1.964E+01	631	2.475E+01	672	1.579E+01	713	5.611E+00	754	1.340E+00
591	1.985E+01	632	2.467E+01	673	1.547E+01	714	5.442E+00	755	1.270E+00
592	2.006E+01	633	2.457E+01	674	1.518E+01	715	5.296E+00	756	1.232E+00
593	2.029E+01	634	2.448E+01	675	1.488E+01	716	5.128E+00	757	1.064E+00
594	2.054E+01	635	2.437E+01	676	1.456E+01	717	5.002E+00	758	9.823E-01
595	2.079E+01	636	2.425E+01	677	1.424E+01	718	4.847E+00	759	1.002E+00
596	2.100E+01	637	2.415E+01	678	1.393E+01	719	4.716E+00	760	9.415E-01
597	2.121E+01	638	2.404E+01	679	1.364E+01	720	4.566E+00	761	9.718E-01
598	2.145E+01	639	2.392E+01	680	1.335E+01	721	4.421E+00	762	1.026E+00
599	2.169E+01	640	2.378E+01	681	1.306E+01	722	4.306E+00	763	1.003E+00
600	2.191E+01	641	2.364E+01	682	1.279E+01	723	4.135E+00	764	8.575E-01
601	2.213E+01	642	2.349E+01	683	1.249E+01	724	4.022E+00	765	7.718E-01
602	2.235E+01	643	2.334E+01	684	1.218E+01	725	3.927E+00	766	7.491E-01
603	2.256E+01	644	2.318E+01	685	1.191E+01	726	3.767E+00	767	7.806E-01
604	2.277E+01	645	2.299E+01	686	1.165E+01	727	3.637E+00	768	7.467E-01
605	2.298E+01	646	2.279E+01	687	1.140E+01	728	3.540E+00	769	6.887E-01
606	2.318E+01	647	2.258E+01	688	1.110E+01	729	3.490E+00	770	6.342E-01
607	2.339E+01	648	2.238E+01	689	1.079E+01	730	3.373E+00	771	6.256E-01
608	2.358E+01	649	2.216E+01	690	1.052E+01	731	3.267E+00	772	6.204E-01
609	2.376E+01	650	2.193E+01	691	1.027E+01	732	3.127E+00	773	5.761E-01
610	2.391E+01	651	2.171E+01	692	1.002E+01	733	2.984E+00	774	5.446E-01
611	2.407E+01	652	2.148E+01	693	9.772E+00	734	2.899E+00	775	5.406E-01
612	2.424E+01	653	2.125E+01	694	9.533E+00	735	2.799E+00	776	4.887E-01
613	2.436E+01	654	2.100E+01	695	9.281E+00	736	2.689E+00	777	4.491E-01
614	2.447E+01	655	2.075E+01	696	9.039E+00	737	2.571E+00	778	4.186E-01
615	2.459E+01	656	2.048E+01	697	8.806E+00	738	2.446E+00	779	4.166E-01
616	2.469E+01	657	2.021E+01	698	8.576E+00	739	2.356E+00	780	3.549E-01
617	2.477E+01	658	1.993E+01	699	8.351E+00	740	2.322E+00		
618	2.486E+01	659	1.965E+01	700	8.145E+00	741	2.259E+00		
619	2.492E+01	660	1.941E+01	701	7.935E+00	742	2.190E+00		
620	2.496E+01	661	1.913E+01	702	7.687E+00	743	2.055E+00		
621	2.499E+01	662	1.883E+01	703	7.461E+00	744	1.912E+00		
622	2.501E+01	663	1.854E+01	704	7.238E+00	745	1.787E+00		
623	2.503E+01	664	1.823E+01	705	7.020E+00	746	1.739E+00		
624	2.502E+01	665	1.794E+01	706	6.845E+00	747	1.719E+00		
625	2.502E+01	666	1.765E+01	707	6.685E+00	748	1.653E+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**

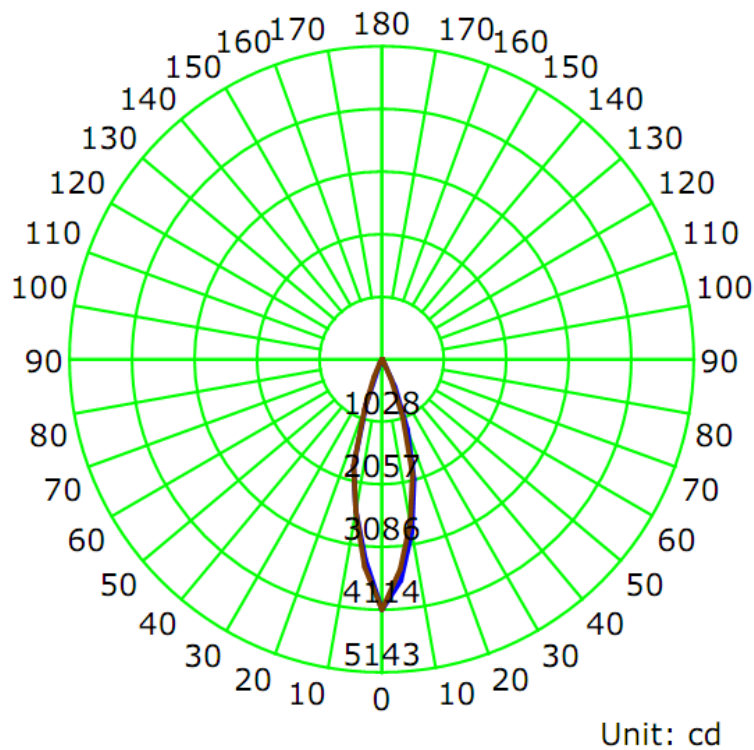
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1040	12.45	0.9960

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
1129	90.73	4114.8	0.46	0.45

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	28.2	27.8	27.6	28.0	27.9
Field Angle (10% $I_{max}$ ):	49.4	56.5	48.9	56.7	52.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	4115	4115	4115	4115	4115	4115	4115	4115
5.0°	3639	3603	3581	3520	3468	3453	3451	3388
10.0°	2879	2882	2819	2752	2712	2669	2631	2599
15.0°	2035	2032	2038	2007	1949	1892	1834	1828
20.0°	1225	1370	1385	1266	1039	1182	1251	1036
25.0°	511	594	789	499	371	473	656	416
30.0°	102	147	326	100	74	112	262	91
35.0°	58	62	92	47	53	58	49	46
40.0°	33	35	22	33	29	25	18	22
45.0°	0	0	0	0	0	0	0	0
50.0°	0	0	0	0	0	0	0	0
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	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

Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	4115	4115	4115	4115	4115	4115	4115	4115
5.0°	3293	3307	3322	3361	3416	3443	3450	3507
10.0°	2523	2458	2467	2479	2534	2578	2676	2750
15.0°	1818	1795	1770	1755	1804	1904	1970	1985
20.0°	792	916	1113	993	866	1122	1332	1290
25.0°	193	358	578	434	322	479	725	537
30.0°	63	72	236	88	75	98	291	118
35.0°	45	47	49	57	62	67	73	61
40.0°	17	21	16	28	33	33	28	37
45.0°	0	0	0	0	0	0	0	0
50.0°	0	0	0	0	0	0	0	0
55.0°	0	0	0	0	0	0	0	0
60.0°	0	0	0	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	90.4	8.01	0-5	90.4	8.01
5-10	218.2	19.33	0-10	308.7	27.34
10-15	270.0	23.91	0-15	578.6	51.25
15-20	250.3	22.17	0-20	828.9	73.42
20-25	171.2	15.16	0-25	1000.1	88.58
25-30	80.6	7.14	0-30	1080.7	95.72
30-35	29.3	2.59	0-35	1109.9	98.31
35-40	14.1	1.25	0-40	1124.0	99.56
40-45	5.0	0.44	0-45	1129.0	100.00
45-50	0.0	0.00	0-50	1129.0	100.00
50-55	0.0	0.00	0-55	1129.0	100.00
55-60	0.0	0.00	0-60	1129.0	100.00
60-65	0.0	0.00	0-65	1129.0	100.00
65-70	0.0	0.00	0-70	1129.0	100.00
70-75	0.0	0.00	0-75	1129.0	100.00
75-80	0.0	0.00	0-80	1129.0	100.00
80-85	0.0	0.00	0-85	1129.0	100.00
85-90	0.0	0.00	0-90	1129.0	100.00
90-95	0.0	0.00	0-95	1129.0	100.00
95-100	0.0	0.00	0-100	1129.0	100.00
100-105	0.0	0.00	0-105	1129.0	100.00
105-110	0.0	0.00	0-110	1129.0	100.00
110-115	0.0	0.00	0-115	1129.0	100.00
115-120	0.0	0.00	0-120	1129.0	100.00
120-125	0.0	0.00	0-125	1129.0	100.00
125-130	0.0	0.00	0-130	1129.0	100.00
130-135	0.0	0.00	0-135	1129.0	100.00
135-140	0.0	0.00	0-140	1129.0	100.00
140-145	0.0	0.00	0-145	1129.0	100.00
145-150	0.0	0.00	0-150	1129.0	100.00
150-155	0.0	0.00	0-155	1129.0	100.00
155-160	0.0	0.00	0-160	1129.0	100.00
160-165	0.0	0.00	0-165	1129.0	100.00
165-170	0.0	0.00	0-170	1129.0	100.00
170-175	0.0	0.00	0-175	1129.0	100.00
175-180	0.0	0.00	0-180	1129.0	100.00

## 6. Product Photo



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