

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: LE089027DIM120WDR4BL**

<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>	RKSB190329022-10-3
<b>Test Date:</b>	2019-04-02 to 2019-04-04
<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 2019-03-29 and used for testing.

Model Tested: LE089027DIM120WDR4BL  
 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: 12W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 850lm

## 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 $\pi$  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**

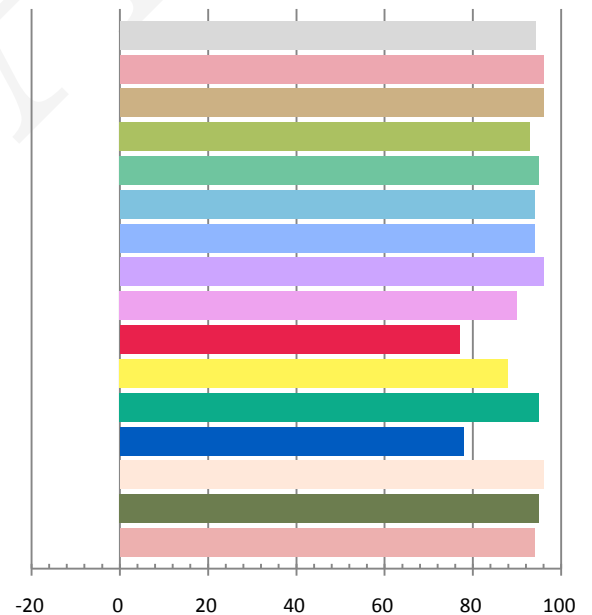
### Photometric and Electrical Measurement Result

Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.1022	12.12	0.9883	914.15	75.42

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.365	2715	-0.00004	0.4586	0.4102	0.2618	0.5270

### Color Rendering Index

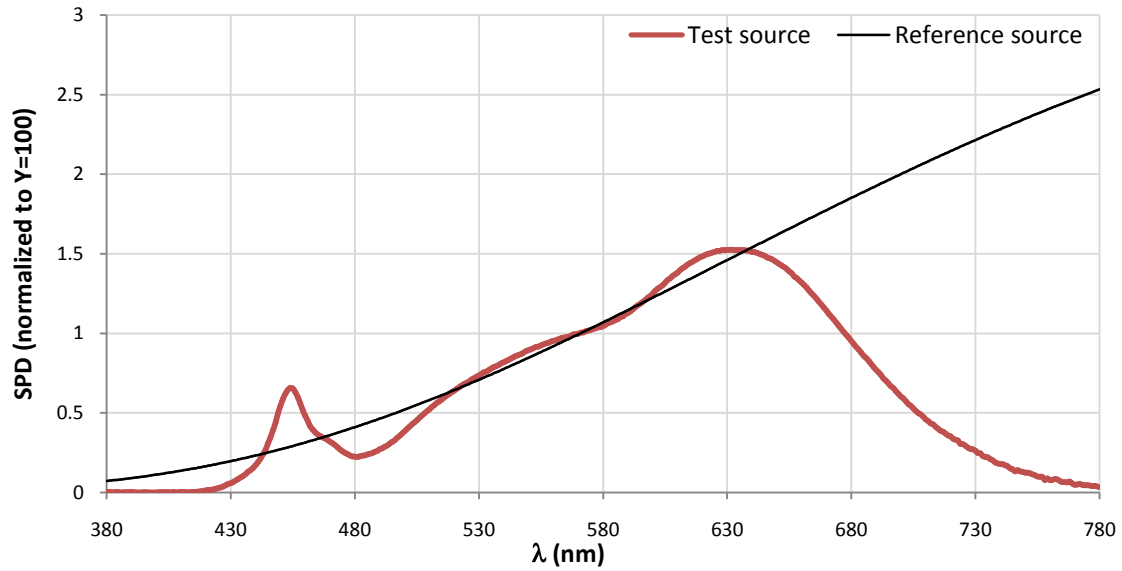
<b>Ra</b>			
94.3			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
96	96	93	95
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
94	94	96	90
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
77	88	95	78
<b>R13</b>	<b>R14</b>	<b>R15</b>	
96	95	94	



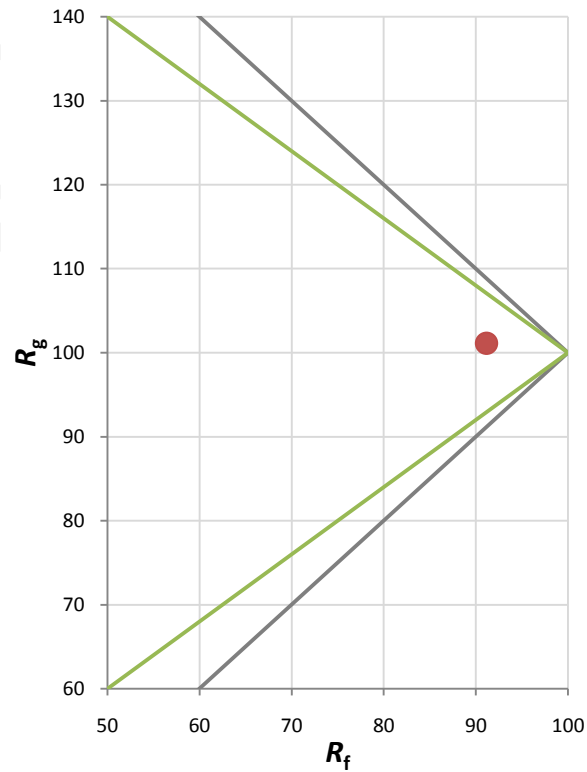
### Fidelity Index and Gamut Index

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

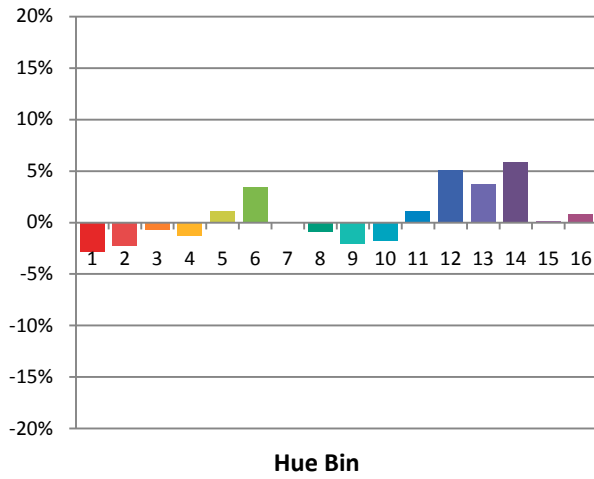
### Spectral Power Distribution Comparison



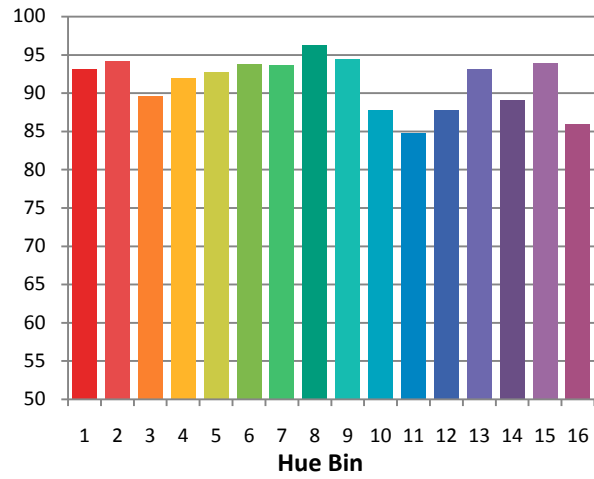
### Plot of $R_g$ versus $R_f$



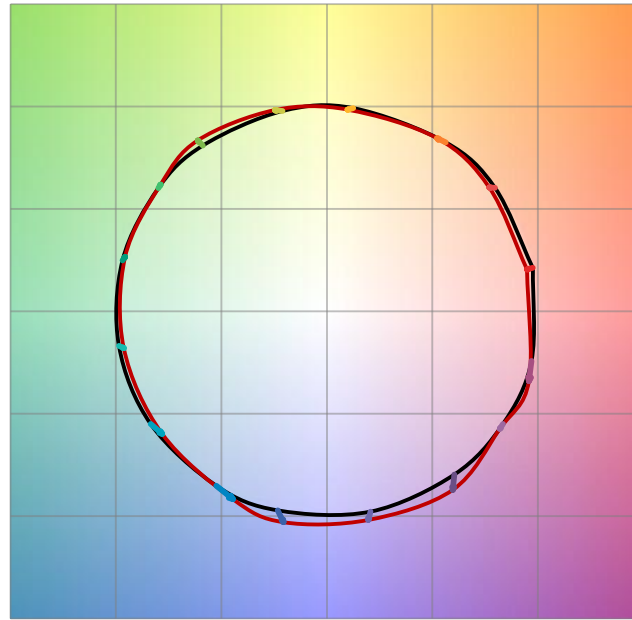
Chroma Shift by Hue



$R_f$  by Hue

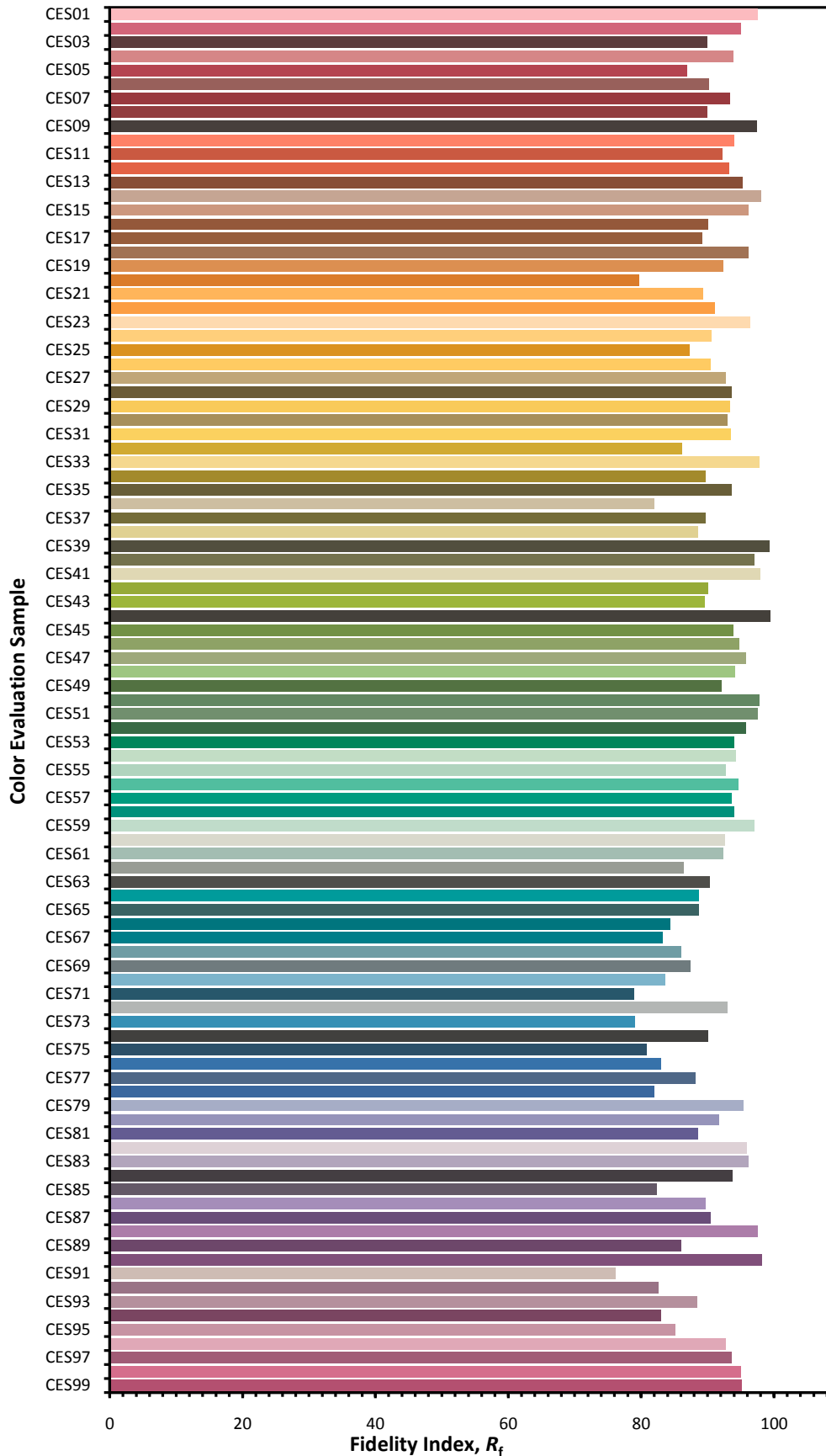


Color Vector Graphic

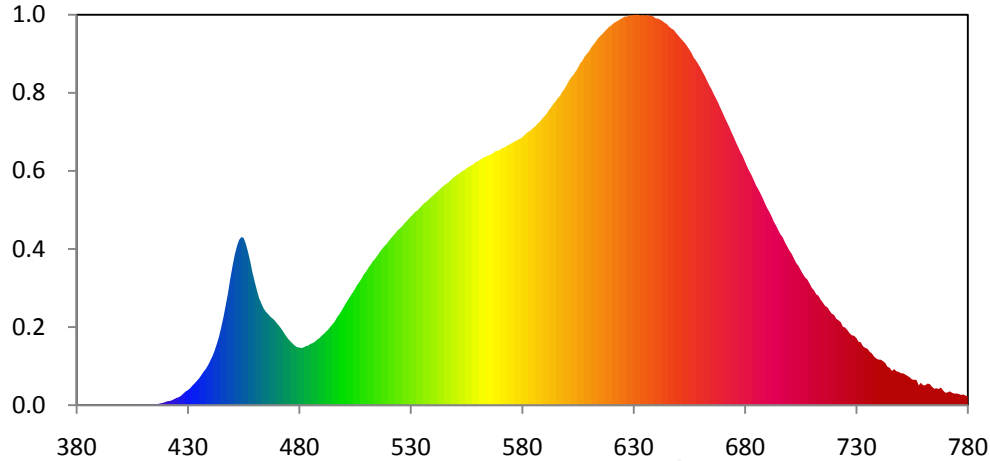


— Reference Illuminant — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

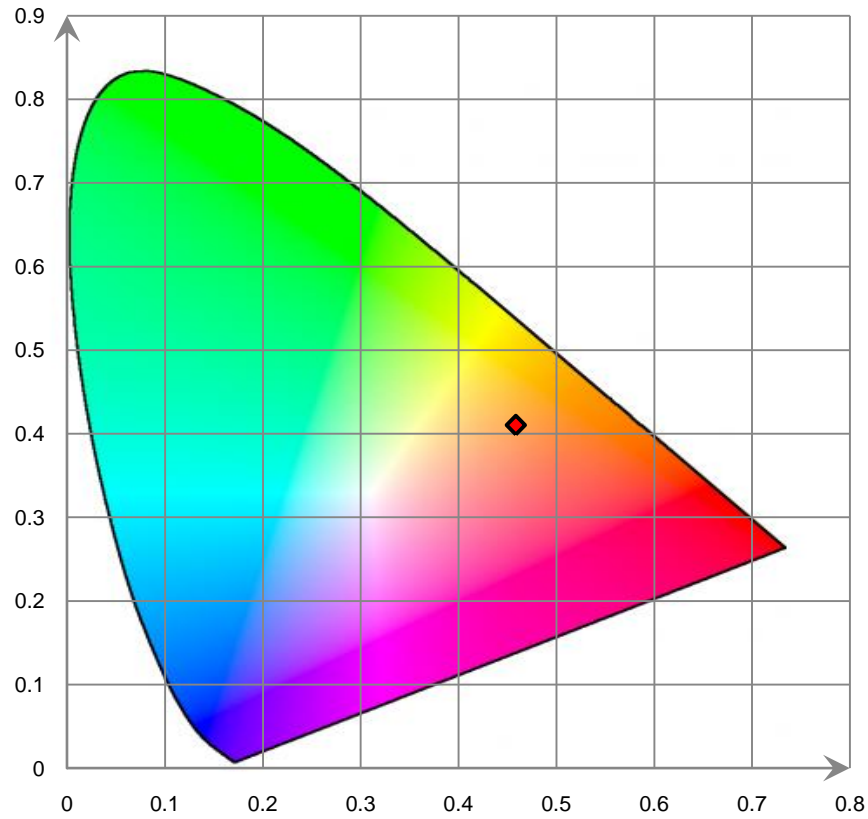


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.250E-02	421	2.127E-01	462	5.577E+00	503	5.722E+00	544	1.139E+01
381	4.170E-02	422	2.229E-01	463	5.304E+00	504	5.898E+00	545	1.149E+01
382	1.430E-02	423	2.701E-01	464	5.056E+00	505	6.092E+00	546	1.158E+01
383	3.900E-03	424	3.263E-01	465	4.881E+00	506	6.291E+00	547	1.165E+01
384	6.040E-02	425	3.856E-01	466	4.764E+00	507	6.453E+00	548	1.177E+01
385	2.440E-02	426	4.252E-01	467	4.624E+00	508	6.637E+00	549	1.189E+01
386	3.400E-03	427	4.992E-01	468	4.534E+00	509	6.841E+00	550	1.197E+01
387	2.030E-02	428	6.094E-01	469	4.419E+00	510	6.991E+00	551	1.206E+01
388	3.040E-02	429	7.173E-01	470	4.272E+00	511	7.184E+00	552	1.213E+01
389	1.480E-02	430	7.887E-01	471	4.136E+00	512	7.344E+00	553	1.224E+01
390	4.380E-02	431	8.834E-01	472	3.978E+00	513	7.521E+00	554	1.228E+01
391	1.910E-02	432	1.025E+00	473	3.803E+00	514	7.657E+00	555	1.238E+01
392	8.000E-04	433	1.140E+00	474	3.626E+00	515	7.811E+00	556	1.245E+01
393	0.000E+00	434	1.270E+00	475	3.464E+00	516	7.991E+00	557	1.252E+01
394	8.900E-03	435	1.399E+00	476	3.338E+00	517	8.150E+00	558	1.259E+01
395	3.240E-02	436	1.567E+00	477	3.220E+00	518	8.296E+00	559	1.269E+01
396	1.350E-02	437	1.741E+00	478	3.111E+00	519	8.410E+00	560	1.274E+01
397	5.000E-04	438	1.890E+00	479	3.031E+00	520	8.560E+00	561	1.282E+01
398	5.900E-03	439	2.083E+00	480	3.015E+00	521	8.709E+00	562	1.290E+01
399	8.800E-03	440	2.317E+00	481	2.985E+00	522	8.840E+00	563	1.296E+01
400	6.000E-04	441	2.558E+00	482	3.028E+00	523	8.979E+00	564	1.302E+01
401	1.470E-02	442	2.859E+00	483	3.090E+00	524	9.125E+00	565	1.306E+01
402	2.530E-02	443	3.214E+00	484	3.116E+00	525	9.229E+00	566	1.311E+01
403	1.670E-02	444	3.601E+00	485	3.207E+00	526	9.334E+00	567	1.318E+01
404	1.460E-02	445	4.105E+00	486	3.243E+00	527	9.486E+00	568	1.328E+01
405	1.860E-02	446	4.631E+00	487	3.319E+00	528	9.601E+00	569	1.331E+01
406	4.400E-03	447	5.246E+00	488	3.426E+00	529	9.729E+00	570	1.334E+01
407	5.840E-02	448	5.871E+00	489	3.506E+00	530	9.857E+00	571	1.344E+01
408	4.900E-03	449	6.608E+00	490	3.626E+00	531	9.974E+00	572	1.346E+01
409	3.780E-02	450	7.252E+00	491	3.723E+00	532	1.011E+01	573	1.356E+01
410	4.720E-02	451	7.858E+00	492	3.849E+00	533	1.018E+01	574	1.361E+01
411	3.850E-02	452	8.318E+00	493	3.958E+00	534	1.031E+01	575	1.368E+01
412	3.750E-02	453	8.642E+00	494	4.114E+00	535	1.043E+01	576	1.375E+01
413	9.900E-03	454	8.790E+00	495	4.250E+00	536	1.056E+01	577	1.380E+01
414	4.900E-02	455	8.744E+00	496	4.396E+00	537	1.063E+01	578	1.387E+01
415	5.130E-02	456	8.433E+00	497	4.604E+00	538	1.075E+01	579	1.392E+01
416	5.800E-02	457	7.999E+00	498	4.759E+00	539	1.086E+01	580	1.400E+01
417	7.380E-02	458	7.500E+00	499	4.947E+00	540	1.095E+01	581	1.411E+01
418	1.054E-01	459	6.922E+00	500	5.149E+00	541	1.106E+01	582	1.423E+01
419	1.277E-01	460	6.439E+00	501	5.348E+00	542	1.117E+01	583	1.430E+01
420	1.750E-01	461	5.994E+00	502	5.539E+00	543	1.128E+01	584	1.439E+01

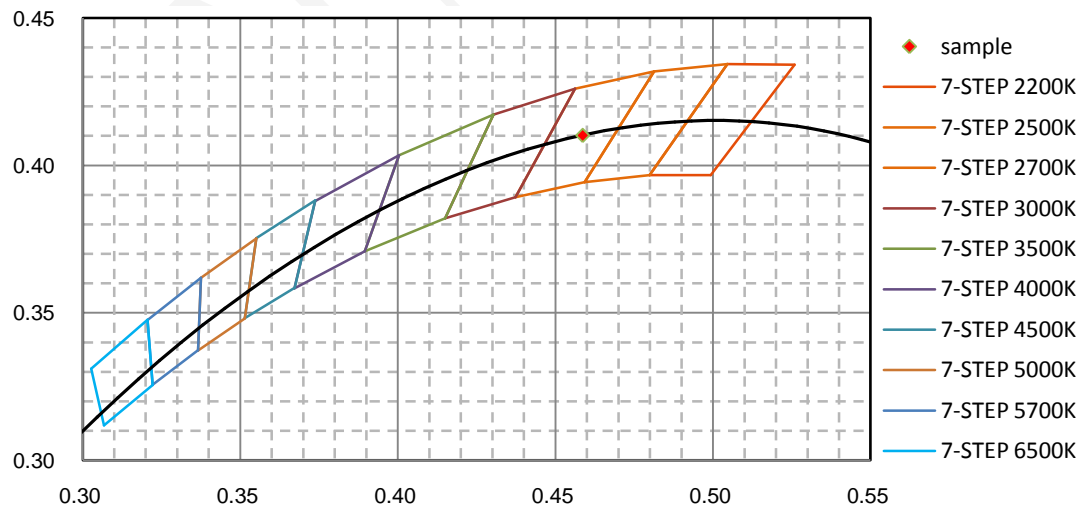


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.449E+01	626	2.032E+01	667	1.604E+01	708	6.574E+00	749	1.739E+00
586	1.459E+01	627	2.031E+01	668	1.580E+01	709	6.363E+00	750	1.672E+00
587	1.473E+01	628	2.039E+01	669	1.554E+01	710	6.141E+00	751	1.663E+00
588	1.482E+01	629	2.038E+01	670	1.529E+01	711	6.004E+00	752	1.600E+00
589	1.498E+01	630	2.041E+01	671	1.502E+01	712	5.801E+00	753	1.529E+00
590	1.510E+01	631	2.040E+01	672	1.478E+01	713	5.722E+00	754	1.456E+00
591	1.524E+01	632	2.041E+01	673	1.453E+01	714	5.517E+00	755	1.343E+00
592	1.542E+01	633	2.037E+01	674	1.426E+01	715	5.358E+00	756	1.329E+00
593	1.557E+01	634	2.040E+01	675	1.401E+01	716	5.188E+00	757	1.322E+00
594	1.574E+01	635	2.037E+01	676	1.373E+01	717	5.119E+00	758	1.037E+00
595	1.588E+01	636	2.040E+01	677	1.349E+01	718	4.940E+00	759	1.173E+00
596	1.605E+01	637	2.037E+01	678	1.323E+01	719	4.779E+00	760	1.038E+00
597	1.617E+01	638	2.035E+01	679	1.302E+01	720	4.722E+00	761	1.047E+00
598	1.638E+01	639	2.032E+01	680	1.274E+01	721	4.520E+00	762	1.132E+00
599	1.653E+01	640	2.021E+01	681	1.247E+01	722	4.437E+00	763	1.097E+00
600	1.674E+01	641	2.021E+01	682	1.223E+01	723	4.345E+00	764	9.574E-01
601	1.695E+01	642	2.015E+01	683	1.202E+01	724	4.097E+00	765	8.595E-01
602	1.714E+01	643	2.008E+01	684	1.176E+01	725	4.060E+00	766	8.824E-01
603	1.726E+01	644	1.999E+01	685	1.149E+01	726	3.924E+00	767	8.475E-01
604	1.744E+01	645	1.992E+01	686	1.129E+01	727	3.763E+00	768	9.227E-01
605	1.762E+01	646	1.978E+01	687	1.106E+01	728	3.652E+00	769	7.586E-01
606	1.786E+01	647	1.969E+01	688	1.082E+01	729	3.627E+00	770	6.517E-01
607	1.800E+01	648	1.963E+01	689	1.055E+01	730	3.514E+00	771	6.694E-01
608	1.821E+01	649	1.947E+01	690	1.030E+01	731	3.315E+00	772	7.235E-01
609	1.836E+01	650	1.933E+01	691	1.009E+01	732	3.291E+00	773	6.495E-01
610	1.850E+01	651	1.920E+01	692	9.866E+00	733	3.078E+00	774	6.042E-01
611	1.870E+01	652	1.907E+01	693	9.580E+00	734	2.994E+00	775	6.110E-01
612	1.885E+01	653	1.894E+01	694	9.387E+00	735	2.952E+00	776	5.816E-01
613	1.900E+01	654	1.878E+01	695	9.142E+00	736	2.791E+00	777	5.354E-01
614	1.916E+01	655	1.860E+01	696	8.924E+00	737	2.704E+00	778	5.584E-01
615	1.929E+01	656	1.842E+01	697	8.765E+00	738	2.535E+00	779	5.031E-01
616	1.941E+01	657	1.817E+01	698	8.508E+00	739	2.437E+00	780	4.599E-01
617	1.953E+01	658	1.803E+01	699	8.294E+00	740	2.381E+00		
618	1.965E+01	659	1.784E+01	700	8.076E+00	741	2.380E+00		
619	1.978E+01	660	1.764E+01	701	7.911E+00	742	2.298E+00		
620	1.985E+01	661	1.742E+01	702	7.669E+00	743	2.204E+00		
621	1.996E+01	662	1.721E+01	703	7.436E+00	744	2.006E+00		
622	2.004E+01	663	1.696E+01	704	7.282E+00	745	1.953E+00		
623	2.010E+01	664	1.672E+01	705	7.071E+00	746	1.787E+00		
624	2.017E+01	665	1.652E+01	706	6.858E+00	747	1.886E+00		
625	2.023E+01	666	1.627E+01	707	6.681E+00	748	1.769E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles



## [Goniophotometer System]

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

Test orientation: **Downward**

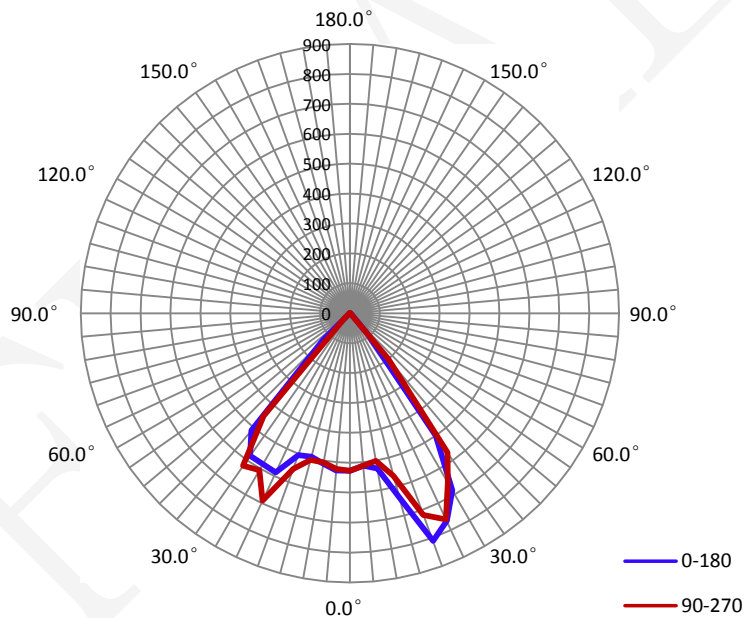
### Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.1050	12.13	0.9580

### Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	$I_{max}(cd)$	S/MH(C0/180)	S/MH(C90/270)
917.3	75.67	821.0	1.45	1.49

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50% $I_{max}$ ):	77.5	77.6	78.4	78.5	78.0
Field Angle(10% $I_{max}$ ):	87.5	87.2	87.6	87.7	87.5

**Luminous Intensity (cd) Distribution Data**

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	527	527	527	527	527	527	527	527
5.0°	513	510	510	509	513	516	522	526
10.0°	528	530	523	511	502	500	505	510
15.0°	639	653	642	604	564	529	500	497
20.0°	810	821	808	786	718	632	559	519
25.0°	766	756	733	729	761	758	703	621
30.0°	684	689	679	661	655	624	581	587
35.0°	500	477	488	517	569	605	620	603
40.0°	92	64	74	124	199	307	423	501
45.0°	5	4	3	4	5	5	15	94
50.0°	3	2	2	2	3	2	3	4
55.0°	0	1	0	0	1	0	1	1
60.0°	0	0	0	0	0	0	0	1
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

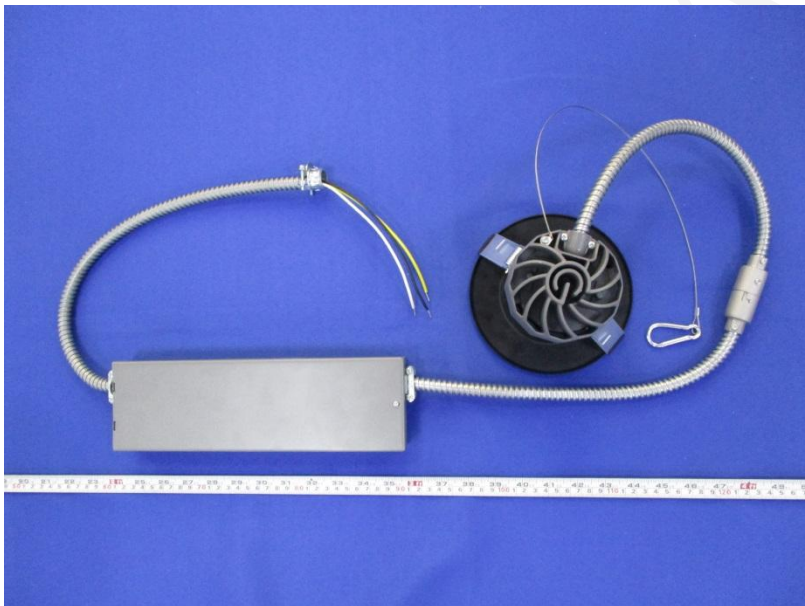
Luminous Intensity (cd) Distribution Data (cont.)

C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	527	527	527	527	527	527	527	527
5.0°	529	530	529	527	523	520	517	513
10.0°	511	514	513	510	507	503	507	520
15.0°	498	499	498	499	508	519	547	601
20.0°	505	501	510	521	554	620	688	758
25.0°	588	563	578	631	692	740	746	736
30.0°	583	593	608	608	606	608	650	666
35.0°	583	565	580	610	623	611	575	527
40.0°	513	524	524	496	449	335	224	128
45.0°	125	148	145	98	30	7	5	5
50.0°	4	4	4	4	4	3	3	3
55.0°	2	2	2	2	2	2	1	1
60.0°	0	0	0	0	0	0	0	1
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	12.5	1.36	0-5	12.5	1.36
5-10	36.9	4.02	0-10	49.4	5.39
10-15	63.0	6.87	0-15	112.4	12.25
15-20	98.4	10.73	0-20	210.8	22.98
20-25	140.3	15.30	0-25	351.1	38.28
25-30	167.5	18.26	0-30	518.6	56.54
30-35	176.1	19.20	0-35	694.7	75.74
35-40	146.3	15.95	0-40	841.0	91.68
40-45	65.7	7.16	0-45	906.7	98.84
45-50	9.4	1.03	0-50	916.1	99.87
50-55	0.9	0.10	0-55	917.0	99.96
55-60	0.3	0.03	0-60	917.3	100.00
60-65	0.0	0.00	0-65	917.3	100.00
65-70	0.0	0.00	0-70	917.3	100.00
70-75	0.0	0.00	0-75	917.3	100.00
75-80	0.0	0.00	0-80	917.3	100.00
80-85	0.0	0.00	0-85	917.3	100.00
85-90	0.0	0.00	0-90	917.3	100.00
90-95	0.0	0.00	0-95	917.3	100.00
95-100	0.0	0.00	0-100	917.3	100.00
100-105	0.0	0.00	0-105	917.3	100.00
105-110	0.0	0.00	0-110	917.3	100.00
110-115	0.0	0.00	0-115	917.3	100.00
115-120	0.0	0.00	0-120	917.3	100.00
120-125	0.0	0.00	0-125	917.3	100.00
125-130	0.0	0.00	0-130	917.3	100.00
130-135	0.0	0.00	0-135	917.3	100.00
135-140	0.0	0.00	0-140	917.3	100.00
140-145	0.0	0.00	0-145	917.3	100.00
145-150	0.0	0.00	0-150	917.3	100.00
150-155	0.0	0.00	0-155	917.3	100.00
155-160	0.0	0.00	0-160	917.3	100.00
160-165	0.0	0.00	0-165	917.3	100.00
165-170	0.0	0.00	0-170	917.3	100.00
170-175	0.0	0.00	0-175	917.3	100.00
175-180	0.0	0.00	0-180	917.3	100.00

## 6. Product Photo



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