

# IES LM-79-08

## MEASUREMENT AND TEST REPORT For

### GREEN CREATIVE LTD

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

**Test Model: LE109027DIM120VNR/ADR4BL**

<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>	RKSB190329021-10-1
<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: LE109027DIM120VNR/ADR4BL  
 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: 12W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 900lm

## 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	2018-04-23	2019-04-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-23	2019-04-22
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	2018-04-23	2019-04-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-04-23	2019-04-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-04-23	2019-04-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-04-23	2019-04-22
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  $U_{rel}=2.61\%$  ( $k=2$ ), 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**

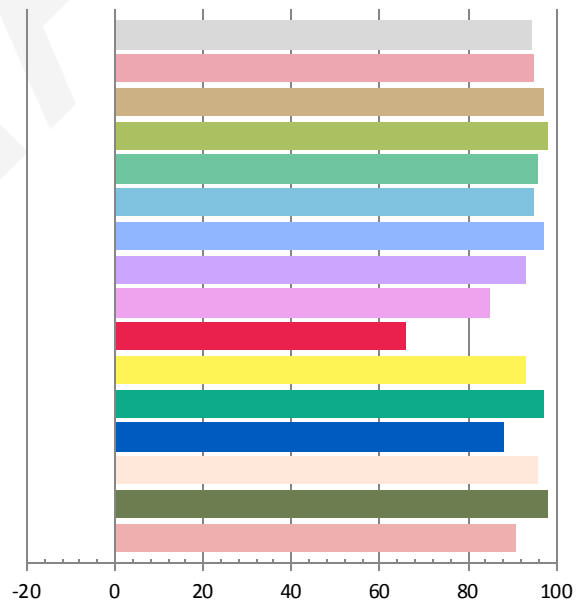
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.1028	12.19	0.9882	934.52	76.66

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.304	2728	-0.00019	0.4573	0.4095	0.2613	0.5265

### Color Rendering Index

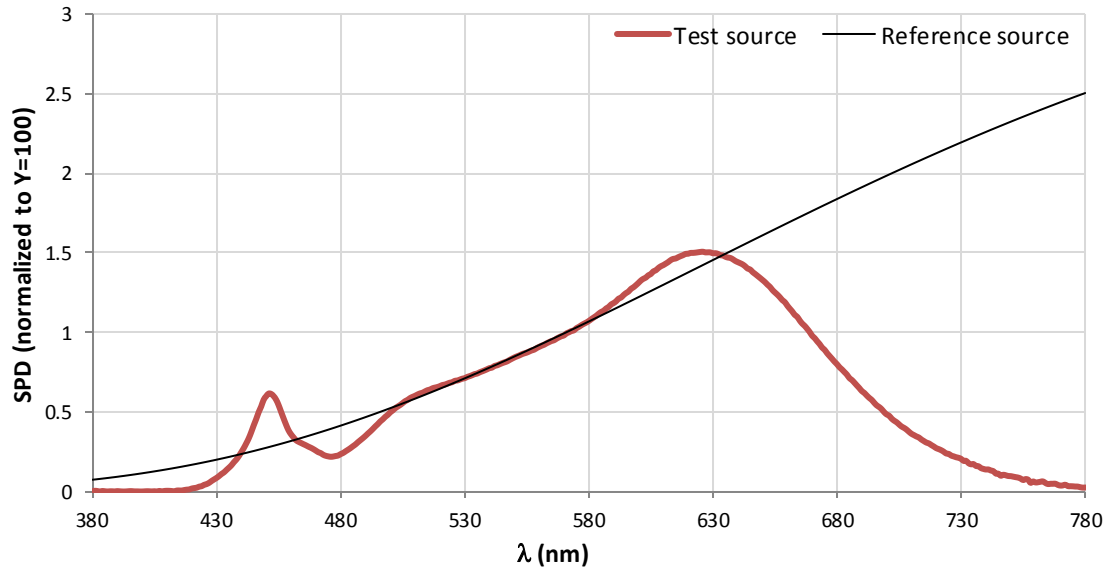
<b>Ra</b>			
94.6			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
95	97	98	96
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
95	97	93	85
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
66	93	97	88
<b>R13</b>	<b>R14</b>	<b>R15</b>	
96	98	91	



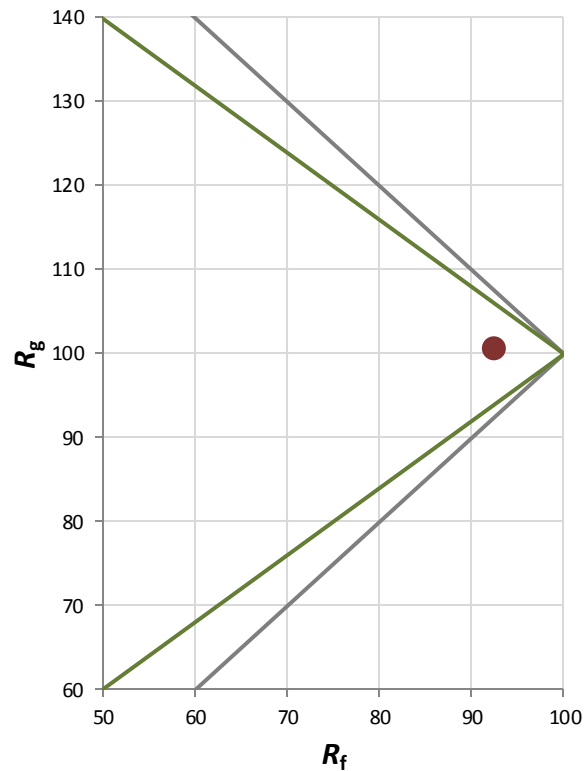
### Fidelity Index and Gamut Index

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

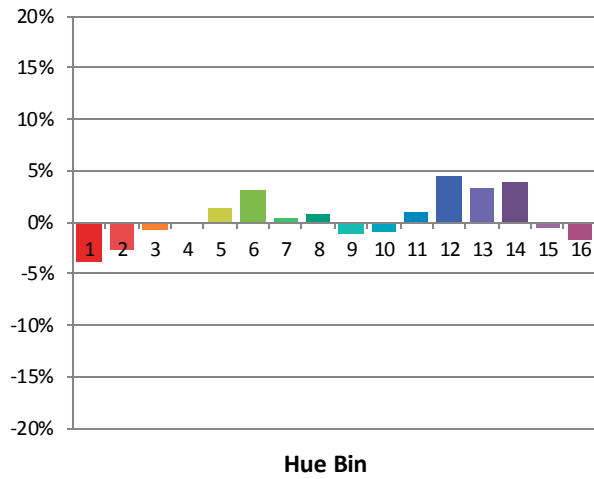
### Spectral Power Distribution Comparison



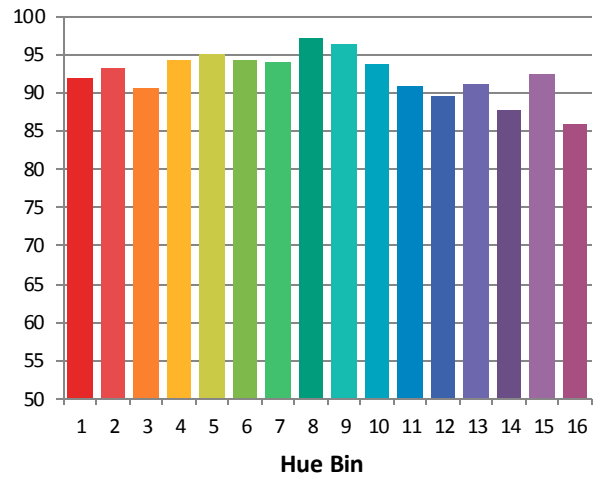
### Plot of $R_g$ versus $R_f$



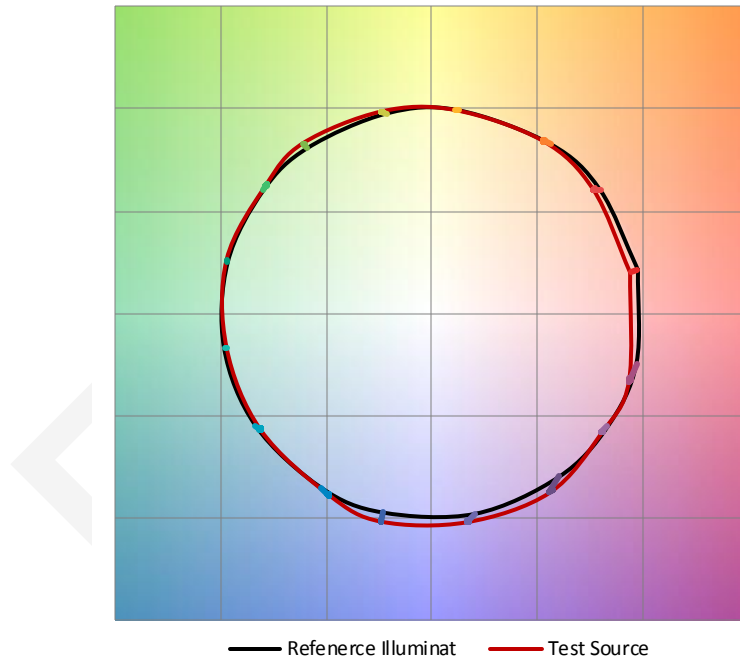
Chroma Shift by Hue



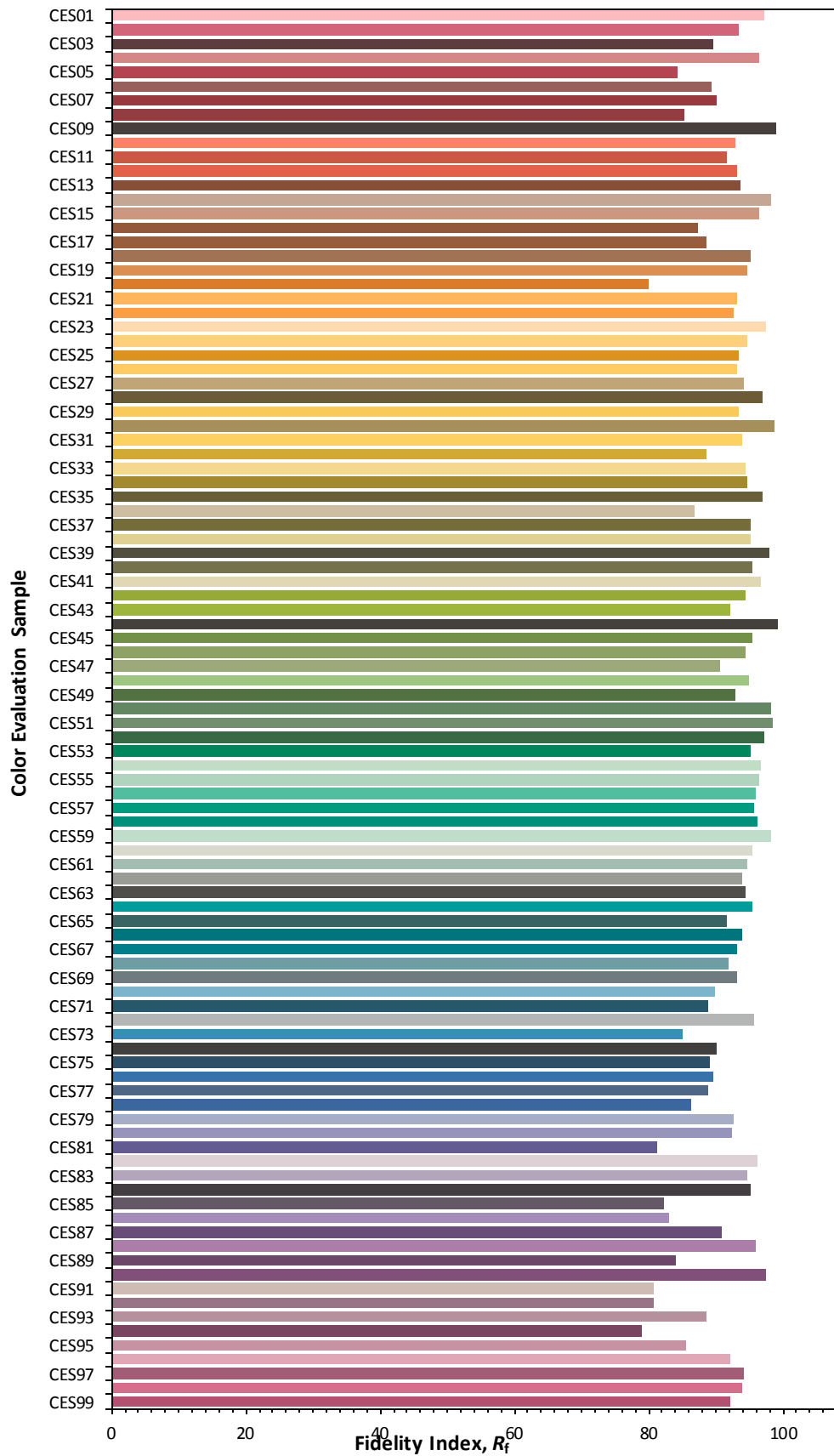
$R_f$  by Hue



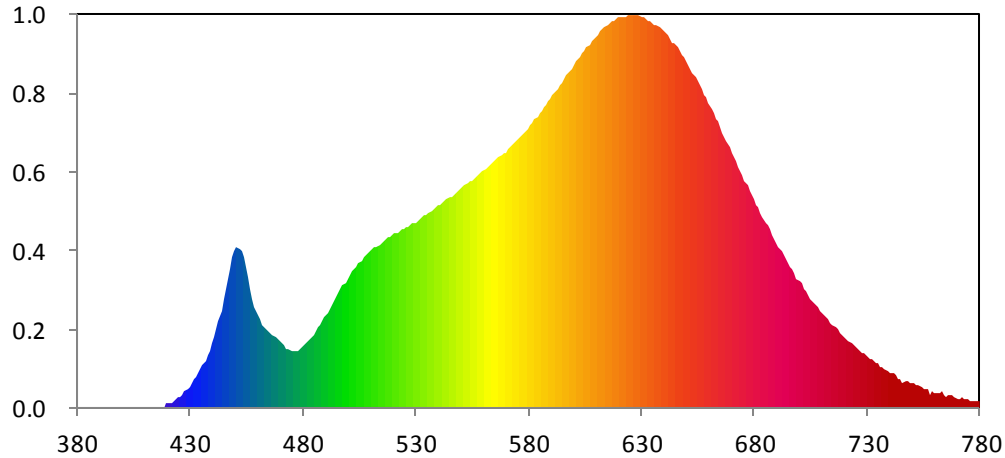
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

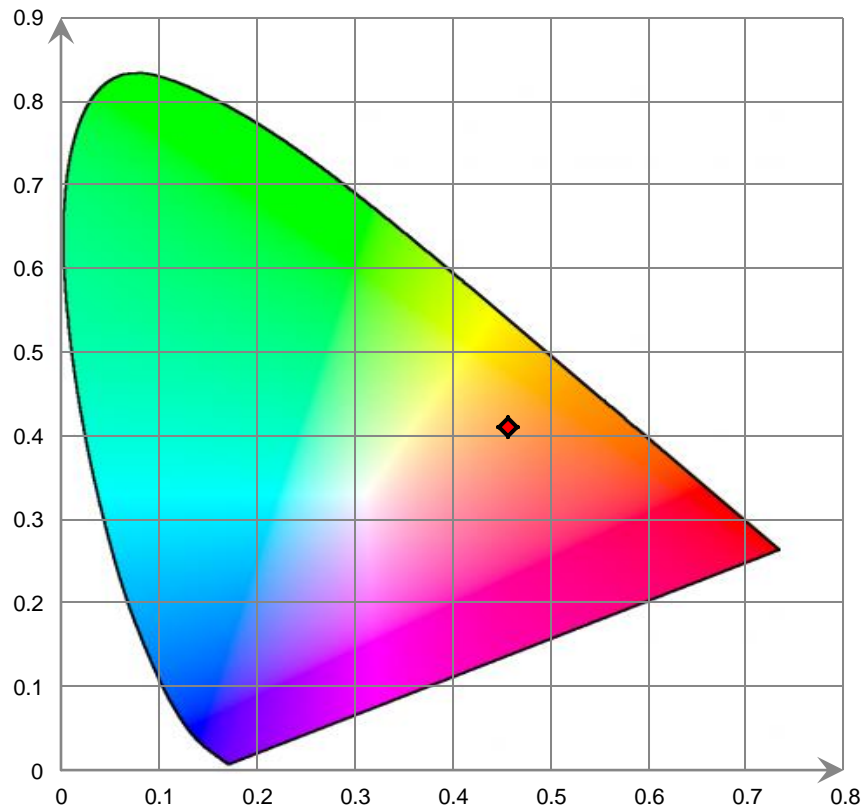


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.060E-02	421	2.943E-01	462	4.416E+00	503	7.302E+00	544	1.093E+01
381	6.010E-02	422	3.272E-01	463	4.279E+00	504	7.437E+00	545	1.103E+01
382	3.780E-02	423	4.149E-01	464	4.176E+00	505	7.600E+00	546	1.110E+01
383	2.500E-03	424	4.585E-01	465	4.072E+00	506	7.763E+00	547	1.118E+01
384	4.100E-02	425	5.710E-01	466	3.973E+00	507	7.877E+00	548	1.130E+01
385	1.930E-02	426	6.372E-01	467	3.859E+00	508	8.030E+00	549	1.141E+01
386	1.400E-03	427	7.453E-01	468	3.763E+00	509	8.135E+00	550	1.152E+01
387	1.470E-02	428	8.976E-01	469	3.648E+00	510	8.228E+00	551	1.161E+01
388	1.680E-02	429	1.035E+00	470	3.517E+00	511	8.337E+00	552	1.170E+01
389	4.300E-03	430	1.167E+00	471	3.382E+00	512	8.431E+00	553	1.180E+01
390	3.100E-02	431	1.323E+00	472	3.299E+00	513	8.491E+00	554	1.187E+01
391	1.470E-02	432	1.501E+00	473	3.158E+00	514	8.603E+00	555	1.194E+01
392	1.000E-03	433	1.646E+00	474	3.071E+00	515	8.706E+00	556	1.203E+01
393	2.000E-04	434	1.848E+00	475	3.021E+00	516	8.763E+00	557	1.213E+01
394	1.120E-02	435	2.045E+00	476	2.987E+00	517	8.870E+00	558	1.220E+01
395	2.930E-02	436	2.254E+00	477	3.005E+00	518	8.932E+00	559	1.233E+01
396	2.730E-02	437	2.519E+00	478	3.052E+00	519	8.981E+00	560	1.243E+01
397	7.800E-03	438	2.750E+00	479	3.092E+00	520	9.058E+00	561	1.253E+01
398	9.700E-03	439	3.043E+00	480	3.214E+00	521	9.151E+00	562	1.262E+01
399	5.000E-04	440	3.384E+00	481	3.312E+00	522	9.192E+00	563	1.274E+01
400	0.000E+00	441	3.738E+00	482	3.454E+00	523	9.271E+00	564	1.284E+01
401	1.050E-02	442	4.142E+00	483	3.589E+00	524	9.350E+00	565	1.294E+01
402	2.300E-02	443	4.577E+00	484	3.735E+00	525	9.399E+00	566	1.300E+01
403	1.550E-02	444	5.107E+00	485	3.894E+00	526	9.512E+00	567	1.314E+01
404	5.900E-03	445	5.688E+00	486	4.048E+00	527	9.541E+00	568	1.325E+01
405	1.970E-02	446	6.228E+00	487	4.240E+00	528	9.614E+00	569	1.335E+01
406	3.300E-03	447	6.821E+00	488	4.414E+00	529	9.697E+00	570	1.342E+01
407	4.680E-02	448	7.304E+00	489	4.592E+00	530	9.743E+00	571	1.359E+01
408	1.070E-02	449	7.889E+00	490	4.777E+00	531	9.847E+00	572	1.369E+01
409	4.450E-02	450	8.187E+00	491	4.980E+00	532	9.917E+00	573	1.380E+01
410	5.880E-02	451	8.417E+00	492	5.172E+00	533	1.000E+01	574	1.385E+01
411	5.500E-02	452	8.388E+00	493	5.379E+00	534	1.009E+01	575	1.404E+01
412	3.980E-02	453	8.200E+00	494	5.600E+00	535	1.014E+01	576	1.415E+01
413	1.720E-02	454	7.898E+00	495	5.800E+00	536	1.024E+01	577	1.429E+01
414	8.110E-02	455	7.435E+00	496	6.027E+00	537	1.033E+01	578	1.442E+01
415	8.560E-02	456	6.863E+00	497	6.205E+00	538	1.041E+01	579	1.453E+01
416	8.220E-02	457	6.300E+00	498	6.418E+00	539	1.051E+01	580	1.466E+01
417	1.237E-01	458	5.756E+00	499	6.588E+00	540	1.060E+01	581	1.481E+01
418	1.587E-01	459	5.271E+00	500	6.803E+00	541	1.065E+01	582	1.496E+01
419	1.792E-01	460	4.927E+00	501	6.966E+00	542	1.079E+01	583	1.511E+01
420	2.511E-01	461	4.660E+00	502	7.155E+00	543	1.085E+01	584	1.528E+01

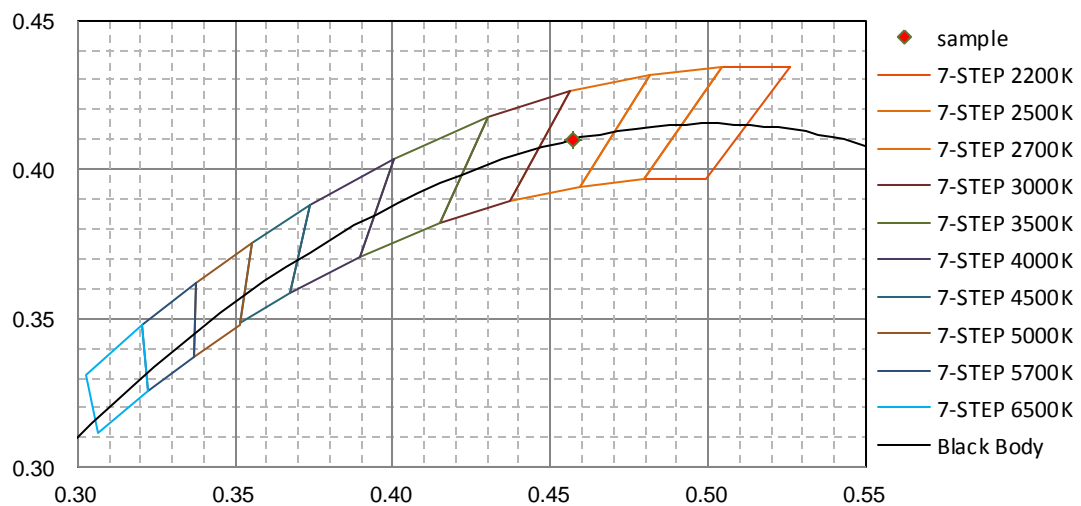


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.544E+01	626	2.061E+01	667	1.423E+01	708	5.322E+00	749	1.333E+00
586	1.555E+01	627	2.056E+01	668	1.398E+01	709	5.135E+00	750	1.321E+00
587	1.574E+01	628	2.056E+01	669	1.371E+01	710	4.964E+00	751	1.277E+00
588	1.587E+01	629	2.055E+01	670	1.339E+01	711	4.848E+00	752	1.234E+00
589	1.608E+01	630	2.048E+01	671	1.318E+01	712	4.732E+00	753	1.195E+00
590	1.620E+01	631	2.048E+01	672	1.292E+01	713	4.637E+00	754	1.111E+00
591	1.636E+01	632	2.043E+01	673	1.267E+01	714	4.471E+00	755	9.851E-01
592	1.657E+01	633	2.031E+01	674	1.237E+01	715	4.336E+00	756	1.066E+00
593	1.667E+01	634	2.029E+01	675	1.218E+01	716	4.208E+00	757	1.012E+00
594	1.688E+01	635	2.018E+01	676	1.189E+01	717	4.132E+00	758	7.454E-01
595	1.706E+01	636	2.011E+01	677	1.165E+01	718	3.994E+00	759	8.600E-01
596	1.719E+01	637	2.008E+01	678	1.141E+01	719	3.867E+00	760	7.785E-01
597	1.742E+01	638	1.997E+01	679	1.116E+01	720	3.726E+00	761	7.969E-01
598	1.756E+01	639	1.983E+01	680	1.094E+01	721	3.642E+00	762	8.391E-01
599	1.774E+01	640	1.972E+01	681	1.069E+01	722	3.546E+00	763	8.656E-01
600	1.793E+01	641	1.963E+01	682	1.049E+01	723	3.421E+00	764	7.304E-01
601	1.814E+01	642	1.952E+01	683	1.027E+01	724	3.266E+00	765	6.406E-01
602	1.829E+01	643	1.936E+01	684	1.004E+01	725	3.232E+00	766	6.617E-01
603	1.839E+01	644	1.916E+01	685	9.751E+00	726	3.091E+00	767	6.631E-01
604	1.859E+01	645	1.909E+01	686	9.584E+00	727	3.021E+00	768	6.667E-01
605	1.870E+01	646	1.887E+01	687	9.359E+00	728	2.946E+00	769	5.671E-01
606	1.892E+01	647	1.870E+01	688	9.119E+00	729	2.894E+00	770	5.110E-01
607	1.902E+01	648	1.853E+01	689	8.890E+00	730	2.803E+00	771	5.255E-01
608	1.921E+01	649	1.836E+01	690	8.635E+00	731	2.633E+00	772	5.841E-01
609	1.936E+01	650	1.818E+01	691	8.473E+00	732	2.637E+00	773	4.644E-01
610	1.946E+01	651	1.800E+01	692	8.251E+00	733	2.435E+00	774	4.549E-01
611	1.959E+01	652	1.778E+01	693	8.046E+00	734	2.341E+00	775	4.465E-01
612	1.973E+01	653	1.758E+01	694	7.872E+00	735	2.356E+00	776	4.270E-01
613	1.989E+01	654	1.732E+01	695	7.625E+00	736	2.196E+00	777	4.206E-01
614	1.999E+01	655	1.711E+01	696	7.405E+00	737	2.168E+00	778	3.688E-01
615	2.003E+01	656	1.692E+01	697	7.260E+00	738	2.016E+00	779	3.347E-01
616	2.014E+01	657	1.669E+01	698	7.072E+00	739	1.942E+00	780	3.429E-01
617	2.024E+01	658	1.645E+01	699	6.823E+00	740	1.891E+00		
618	2.032E+01	659	1.628E+01	700	6.626E+00	741	1.895E+00		
619	2.043E+01	660	1.597E+01	701	6.515E+00	742	1.802E+00		
620	2.044E+01	661	1.572E+01	702	6.273E+00	743	1.748E+00		
621	2.051E+01	662	1.547E+01	703	6.092E+00	744	1.539E+00		
622	2.051E+01	663	1.518E+01	704	5.957E+00	745	1.528E+00		
623	2.053E+01	664	1.501E+01	705	5.769E+00	746	1.357E+00		
624	2.057E+01	665	1.469E+01	706	5.588E+00	747	1.438E+00		
625	2.060E+01	666	1.443E+01	707	5.470E+00	748	1.390E+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**

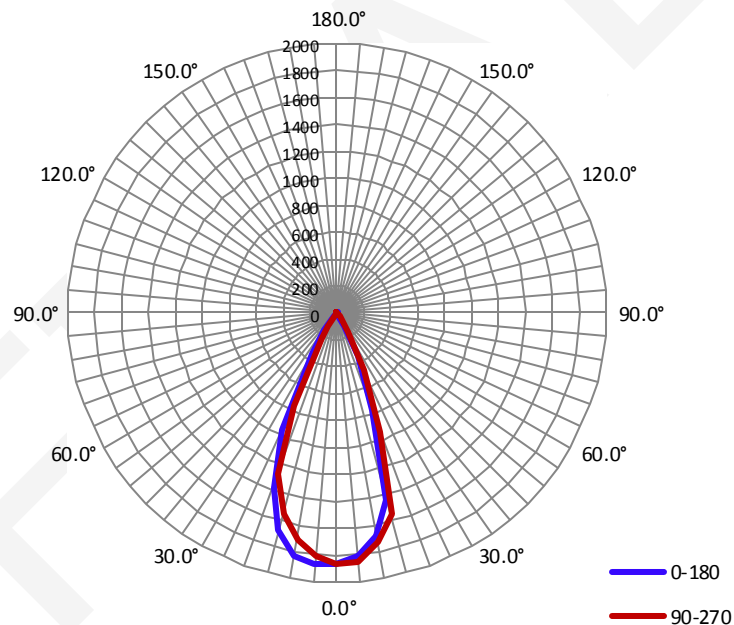
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1060	12.22	0.9610

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
937.3	76.75	1905.3	0.71	0.72

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	43.9	44.3	43.5	43.5	43.8
Field Angle (10% I <sub>max</sub> ):	62.7	62.6	61.5	61.6	62.1

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1864	1864	1864	1864	1864	1864	1864	1864
5.0°	1808	1816	1817	1832	1862	1869	1901	1905
10.0°	1682	1670	1674	1696	1731	1787	1823	1825
15.0°	1435	1428	1435	1490	1551	1596	1618	1668
20.0°	770	721	726	809	948	1166	1315	1397
25.0°	352	329	343	400	471	556	661	844
30.0°	111	93	94	122	169	208	261	346
35.0°	19	17	17	20	27	43	85	143
40.0°	5	5	6	6	8	11	14	20
45.0°	1	1	2	2	2	4	5	6
50.0°	1	0	0	0	1	1	2	2
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

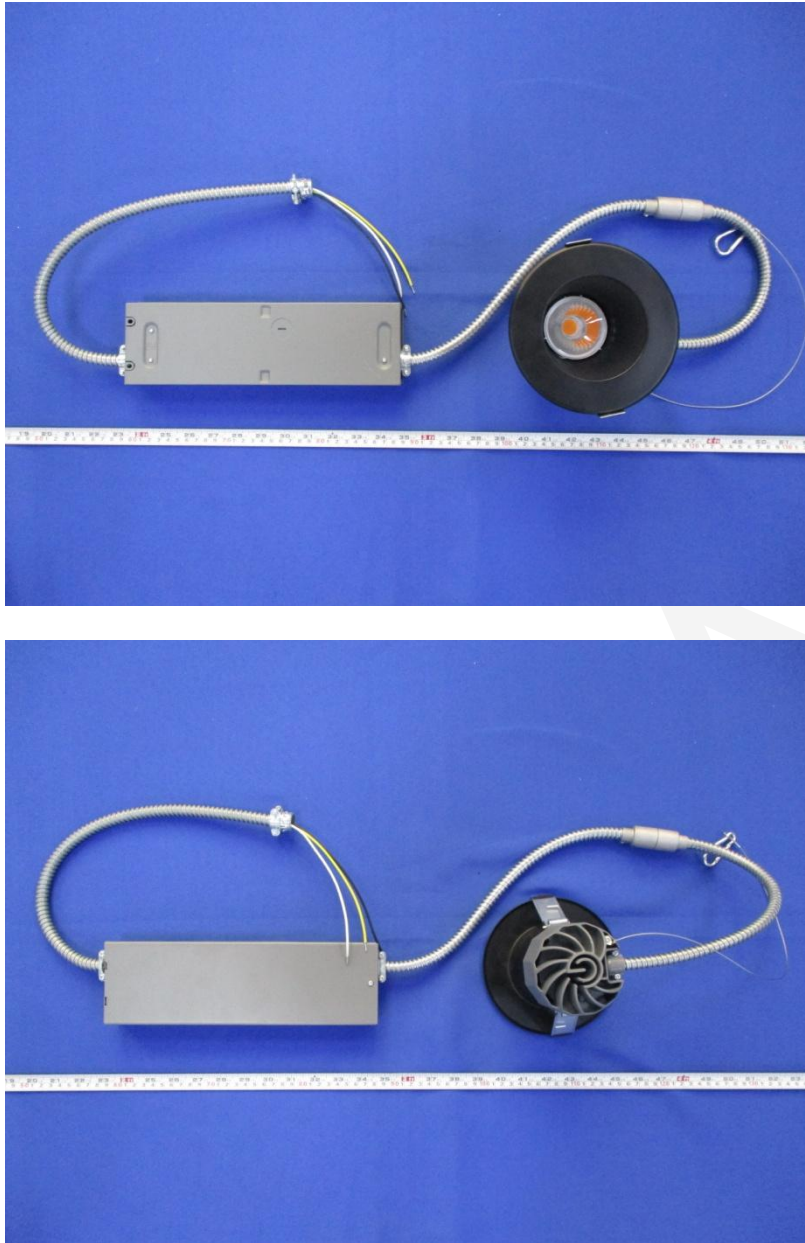
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1864	1864	1864	1864	1864	1864	1864	1864
5.0°	1878	1805	1794	1809	1820	1835	1826	1814
10.0°	1829	1771	1709	1706	1708	1723	1709	1689
15.0°	1670	1632	1600	1562	1546	1503	1477	1449
20.0°	1382	1389	1378	1351	1280	1192	1036	851
25.0°	956	1028	1031	932	756	566	444	361
30.0°	358	373	356	297	221	196	169	129
35.0°	160	170	166	155	125	72	35	22
40.0°	24	35	32	21	15	11	8	6
45.0°	6	7	6	6	4	4	2	2
50.0°	2	2	2	1	1	0	1	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	44.2	4.72	0-5	44.2	4.72
5-10	127.7	13.63	0-10	172.0	18.35
10-15	194.2	20.72	0-15	366.2	39.07
15-20	218.2	23.28	0-20	584.4	62.35
20-25	181.8	19.40	0-25	766.3	81.75
25-30	107.0	11.42	0-30	873.3	93.17
30-35	44.0	4.69	0-35	917.3	97.86
35-40	15.6	1.67	0-40	932.9	99.53
40-45	3.3	0.35	0-45	936.2	99.88
45-50	0.9	0.10	0-50	937.1	99.98
50-55	0.2	0.02	0-55	937.3	100.00
55-60	0.0	0.00	0-60	937.3	100.00
60-65	0.0	0.00	0-65	937.3	100.00
65-70	0.0	0.00	0-70	937.3	100.00
70-75	0.0	0.00	0-75	937.3	100.00
75-80	0.0	0.00	0-80	937.3	100.00
80-85	0.0	0.00	0-85	937.3	100.00
85-90	0.0	0.00	0-90	937.3	100.00
90-95	0.0	0.00	0-95	937.3	100.00
95-100	0.0	0.00	0-100	937.3	100.00
100-105	0.0	0.00	0-105	937.3	100.00
105-110	0.0	0.00	0-110	937.3	100.00
110-115	0.0	0.00	0-115	937.3	100.00
115-120	0.0	0.00	0-120	937.3	100.00
120-125	0.0	0.00	0-125	937.3	100.00
125-130	0.0	0.00	0-130	937.3	100.00
130-135	0.0	0.00	0-135	937.3	100.00
135-140	0.0	0.00	0-140	937.3	100.00
140-145	0.0	0.00	0-145	937.3	100.00
145-150	0.0	0.00	0-150	937.3	100.00
150-155	0.0	0.00	0-155	937.3	100.00
155-160	0.0	0.00	0-160	937.3	100.00
160-165	0.0	0.00	0-165	937.3	100.00
165-170	0.0	0.00	0-170	937.3	100.00
170-175	0.0	0.00	0-175	937.3	100.00
175-180	0.0	0.00	0-180	937.3	100.00

## 6. Product Photo



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