



TL-749



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: LE409027DIM120VNR6CC**

<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>	RKSB190329020-10-6
<b>Test Date:</b>	2019-04-04 to 2019-04-06
<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.

**Note:** The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Kunshan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

## 1. Product Description

### General Information:

One sample was received on 2019-03-29 and used for testing.

Model Tested: LE409027DIM120VNR6CC  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED Recessed Downlight  
 Aging TimeBefore Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC60Hz  
 Rated Power: 53W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 4000lm

## 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**

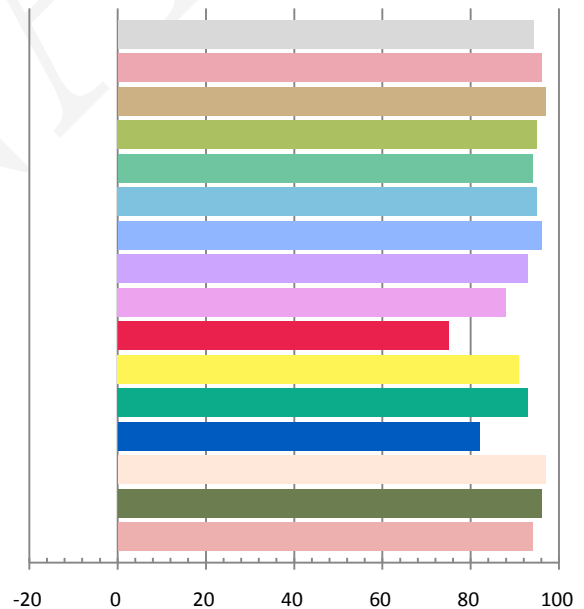
### Photometric and Electrical Measurement Result

Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.4335	51.69	0.9937	4021.12	77.79

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
15.056	2667	-0.00371	0.4562	0.3999	0.2650	0.5226

### Color Rendering Index

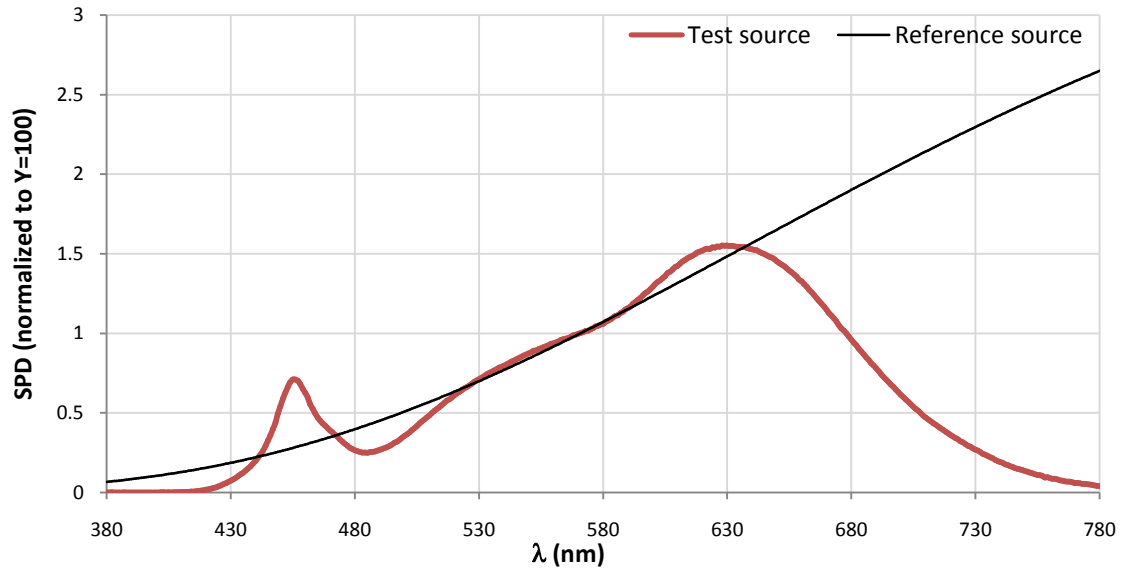
<b>Ra</b>			
94.3			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
96	97	95	94
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
95	96	93	88
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
75	91	93	82
<b>R13</b>	<b>R14</b>	<b>R15</b>	
97	96	94	



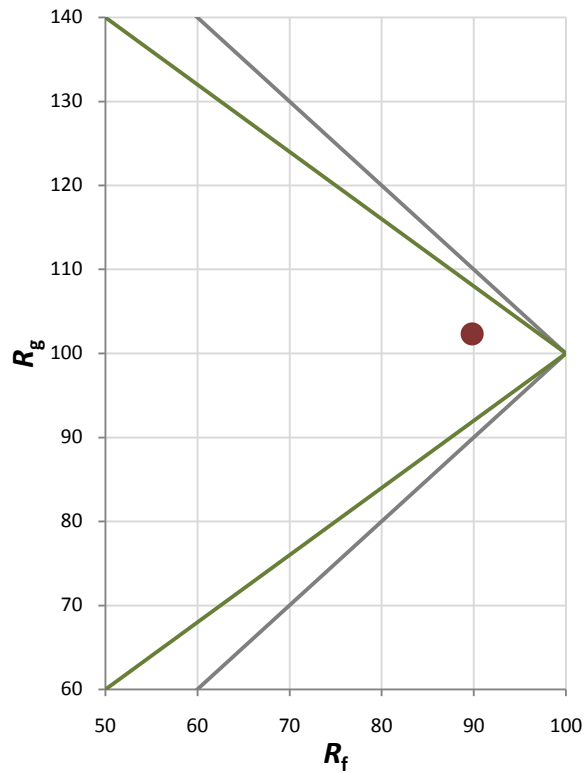
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	90
Gamut Index $R_g$	102

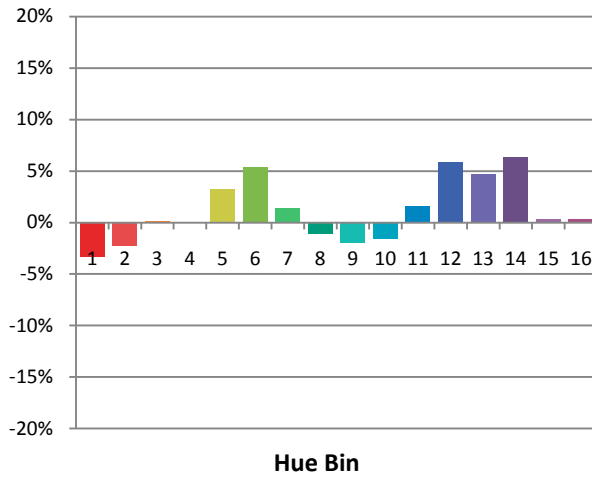
### Spectral Power Distribution Comparison



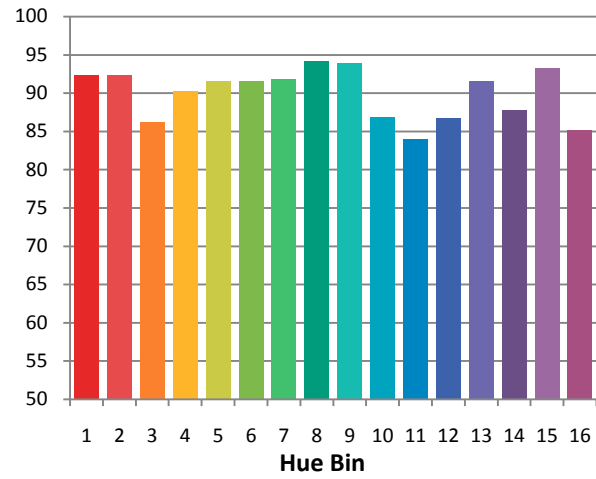
### Plot of $R_g$ versus $R_f$



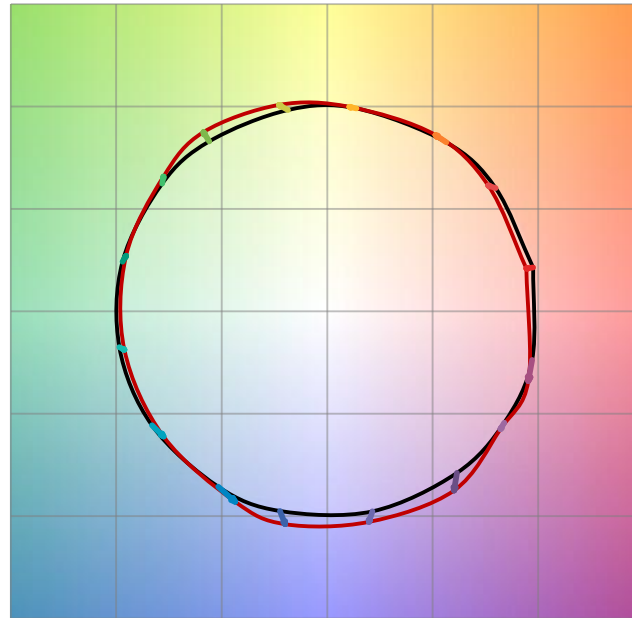
Chroma Shift by Hue



$R_f$  by Hue

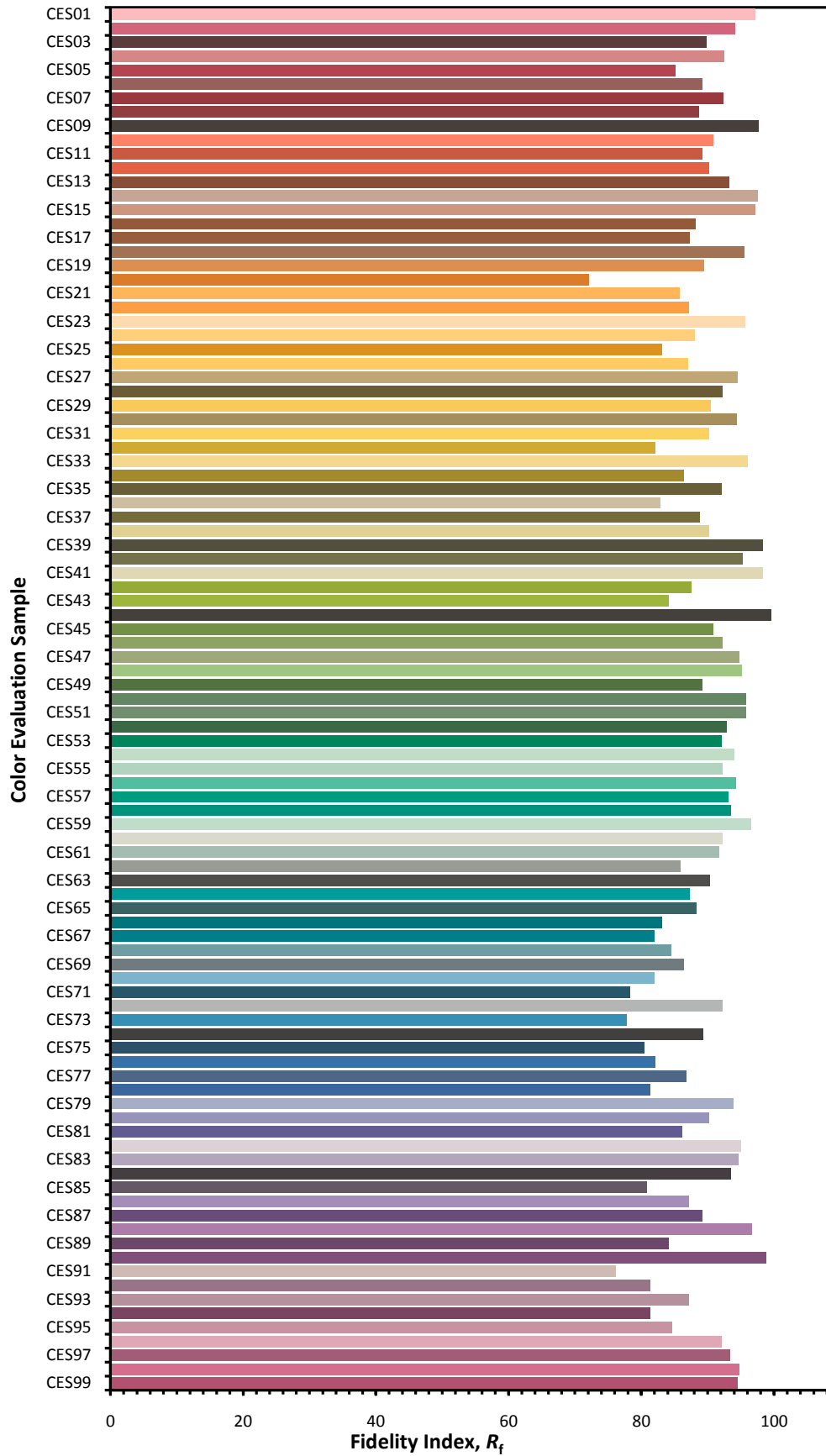


Color Vector Graphic

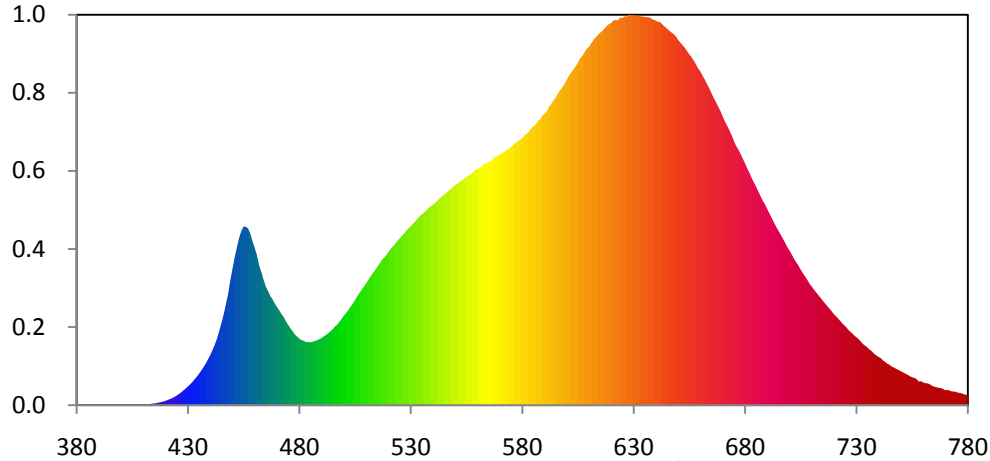


— Reference Illuminant — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

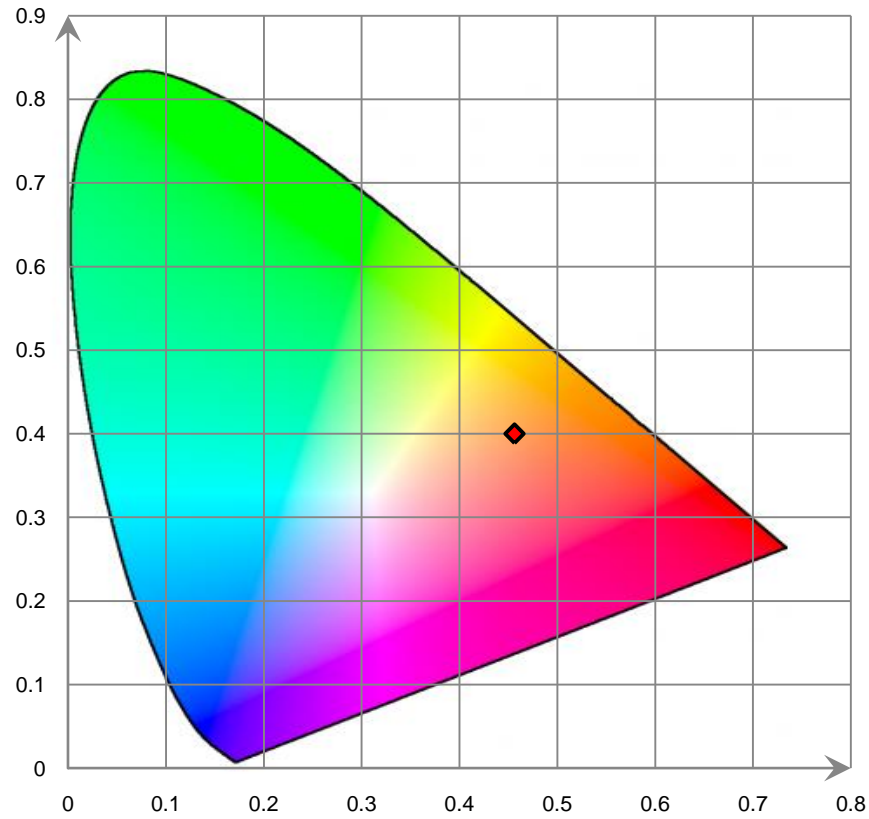


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.800E-02	421	1.222E+00	462	3.265E+01	503	2.304E+01	544	4.880E+01
381	1.540E-02	422	1.451E+00	463	3.104E+01	504	2.380E+01	545	4.926E+01
382	7.310E-02	423	1.662E+00	464	2.926E+01	505	2.457E+01	546	4.969E+01
383	5.700E-03	424	1.945E+00	465	2.768E+01	506	2.551E+01	547	5.014E+01
384	4.560E-02	425	2.272E+00	466	2.666E+01	507	2.627E+01	548	5.062E+01
385	2.730E-02	426	2.604E+00	467	2.552E+01	508	2.702E+01	549	5.101E+01
386	1.700E-03	427	3.028E+00	468	2.476E+01	509	2.777E+01	550	5.150E+01
387	5.120E-02	428	3.462E+00	469	2.377E+01	510	2.849E+01	551	5.181E+01
388	7.300E-03	429	3.875E+00	470	2.294E+01	511	2.939E+01	552	5.238E+01
389	1.190E-02	430	4.385E+00	471	2.219E+01	512	3.013E+01	553	5.257E+01
390	2.210E-02	431	4.883E+00	472	2.128E+01	513	3.091E+01	554	5.299E+01
391	2.400E-02	432	5.426E+00	473	2.061E+01	514	3.156E+01	555	5.339E+01
392	1.100E-03	433	6.045E+00	474	1.960E+01	515	3.235E+01	556	5.371E+01
393	1.390E-02	434	6.682E+00	475	1.876E+01	516	3.313E+01	557	5.403E+01
394	1.700E-03	435	7.371E+00	476	1.798E+01	517	3.395E+01	558	5.445E+01
395	3.940E-02	436	8.121E+00	477	1.731E+01	518	3.447E+01	559	5.506E+01
396	1.200E-02	437	8.897E+00	478	1.655E+01	519	3.508E+01	560	5.519E+01
397	6.300E-03	438	9.738E+00	479	1.603E+01	520	3.585E+01	561	5.556E+01
398	9.500E-03	439	1.071E+01	480	1.557E+01	521	3.658E+01	562	5.586E+01
399	3.800E-03	440	1.166E+01	481	1.524E+01	522	3.714E+01	563	5.641E+01
400	1.000E-04	441	1.286E+01	482	1.505E+01	523	3.772E+01	564	5.671E+01
401	2.810E-02	442	1.409E+01	483	1.475E+01	524	3.841E+01	565	5.695E+01
402	6.930E-02	443	1.550E+01	484	1.477E+01	525	3.897E+01	566	5.715E+01
403	5.850E-02	444	1.726E+01	485	1.472E+01	526	3.958E+01	567	5.767E+01
404	3.370E-02	445	1.916E+01	486	1.485E+01	527	4.014E+01	568	5.813E+01
405	6.070E-02	446	2.115E+01	487	1.502E+01	528	4.077E+01	569	5.834E+01
406	3.820E-02	447	2.351E+01	488	1.519E+01	529	4.137E+01	570	5.864E+01
407	1.055E-01	448	2.590E+01	489	1.545E+01	530	4.192E+01	571	5.901E+01
408	6.820E-02	449	2.916E+01	490	1.571E+01	531	4.246E+01	572	5.924E+01
409	1.083E-01	450	3.187E+01	491	1.612E+01	532	4.300E+01	573	5.981E+01
410	1.715E-01	451	3.464E+01	492	1.644E+01	533	4.361E+01	574	5.986E+01
411	2.023E-01	452	3.699E+01	493	1.686E+01	534	4.418E+01	575	6.037E+01
412	2.042E-01	453	3.919E+01	494	1.732E+01	535	4.465E+01	576	6.087E+01
413	2.647E-01	454	4.080E+01	495	1.780E+01	536	4.507E+01	577	6.139E+01
414	3.775E-01	455	4.180E+01	496	1.841E+01	537	4.553E+01	578	6.164E+01
415	4.004E-01	456	4.174E+01	497	1.886E+01	538	4.617E+01	579	6.209E+01
416	5.007E-01	457	4.134E+01	498	1.952E+01	539	4.654E+01	580	6.242E+01
417	6.211E-01	458	4.016E+01	499	2.019E+01	540	4.690E+01	581	6.307E+01
418	7.350E-01	459	3.830E+01	500	2.092E+01	541	4.730E+01	582	6.351E+01
419	8.558E-01	460	3.677E+01	501	2.157E+01	542	4.786E+01	583	6.401E+01
420	1.042E+00	461	3.503E+01	502	2.226E+01	543	4.842E+01	584	6.470E+01

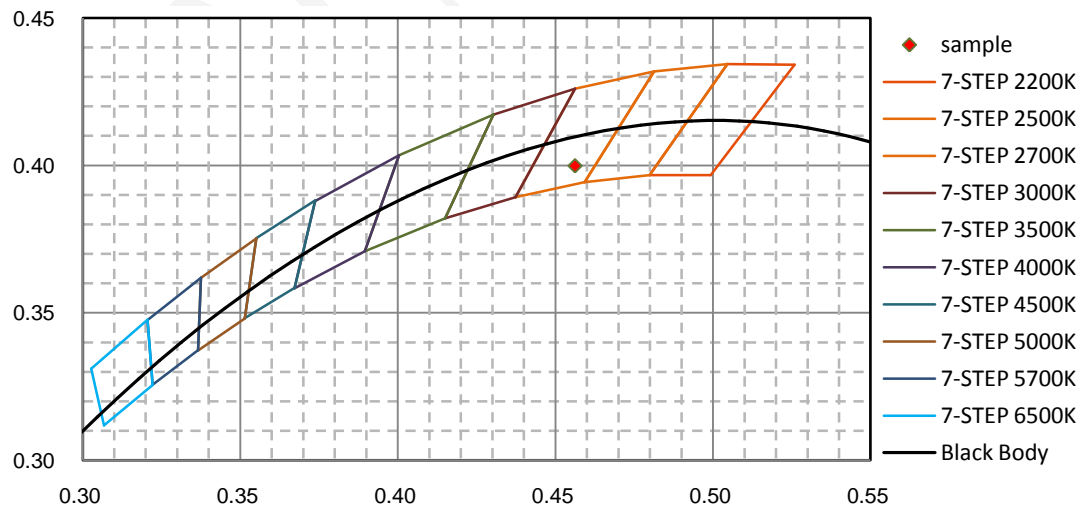


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	6.528E+01	626	9.100E+01	667	7.094E+01	708	2.932E+01	749	8.229E+00
586	6.555E+01	627	9.090E+01	668	6.986E+01	709	2.842E+01	750	7.921E+00
587	6.638E+01	628	9.135E+01	669	6.880E+01	710	2.775E+01	751	7.669E+00
588	6.686E+01	629	9.123E+01	670	6.760E+01	711	2.702E+01	752	7.381E+00
589	6.764E+01	630	9.132E+01	671	6.640E+01	712	2.636E+01	753	7.116E+00
590	6.818E+01	631	9.109E+01	672	6.541E+01	713	2.569E+01	754	6.794E+00
591	6.874E+01	632	9.125E+01	673	6.434E+01	714	2.510E+01	755	6.529E+00
592	6.979E+01	633	9.099E+01	674	6.323E+01	715	2.440E+01	756	6.414E+00
593	7.045E+01	634	9.093E+01	675	6.189E+01	716	2.379E+01	757	6.136E+00
594	7.129E+01	635	9.087E+01	676	6.071E+01	717	2.318E+01	758	5.539E+00
595	7.196E+01	636	9.076E+01	677	5.986E+01	718	2.254E+01	759	5.619E+00
596	7.287E+01	637	9.075E+01	678	5.882E+01	719	2.192E+01	760	5.306E+00
597	7.369E+01	638	9.047E+01	679	5.773E+01	720	2.124E+01	761	5.139E+00
598	7.434E+01	639	9.015E+01	680	5.662E+01	721	2.076E+01	762	5.095E+00
599	7.512E+01	640	8.998E+01	681	5.544E+01	722	2.017E+01	763	4.896E+00
600	7.609E+01	641	8.967E+01	682	5.438E+01	723	1.958E+01	764	4.545E+00
601	7.705E+01	642	8.960E+01	683	5.321E+01	724	1.898E+01	765	4.316E+00
602	7.784E+01	643	8.904E+01	684	5.214E+01	725	1.853E+01	766	4.182E+00
603	7.852E+01	644	8.857E+01	685	5.115E+01	726	1.788E+01	767	4.059E+00
604	7.932E+01	645	8.813E+01	686	5.000E+01	727	1.732E+01	768	3.988E+00
605	8.004E+01	646	8.764E+01	687	4.895E+01	728	1.688E+01	769	3.800E+00
606	8.115E+01	647	8.721E+01	688	4.781E+01	729	1.634E+01	770	3.485E+00
607	8.171E+01	648	8.683E+01	689	4.700E+01	730	1.590E+01	771	3.575E+00
608	8.254E+01	649	8.626E+01	690	4.588E+01	731	1.548E+01	772	3.402E+00
609	8.339E+01	650	8.545E+01	691	4.489E+01	732	1.488E+01	773	3.196E+00
610	8.385E+01	651	8.487E+01	692	4.380E+01	733	1.430E+01	774	3.205E+00
611	8.464E+01	652	8.424E+01	693	4.276E+01	734	1.392E+01	775	3.053E+00
612	8.541E+01	653	8.363E+01	694	4.178E+01	735	1.348E+01	776	2.897E+00
613	8.604E+01	654	8.285E+01	695	4.085E+01	736	1.297E+01	777	2.788E+00
614	8.660E+01	655	8.210E+01	696	3.994E+01	737	1.261E+01	778	2.637E+00
615	8.713E+01	656	8.145E+01	697	3.903E+01	738	1.203E+01	779	2.453E+00
616	8.754E+01	657	8.062E+01	698	3.803E+01	739	1.164E+01	780	2.348E+00
617	8.816E+01	658	7.978E+01	699	3.700E+01	740	1.127E+01		
618	8.875E+01	659	7.874E+01	700	3.615E+01	741	1.102E+01		
619	8.915E+01	660	7.807E+01	701	3.526E+01	742	1.045E+01		
620	8.946E+01	661	7.706E+01	702	3.428E+01	743	1.012E+01		
621	9.000E+01	662	7.615E+01	703	3.345E+01	744	9.672E+00		
622	9.017E+01	663	7.507E+01	704	3.267E+01	745	9.416E+00		
623	9.001E+01	664	7.414E+01	705	3.173E+01	746	8.996E+00		
624	9.068E+01	665	7.297E+01	706	3.087E+01	747	8.798E+00		
625	9.058E+01	666	7.186E+01	707	3.015E+01	748	8.460E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles



## [Goniophotometer System]

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

Test orientation: **Downward**

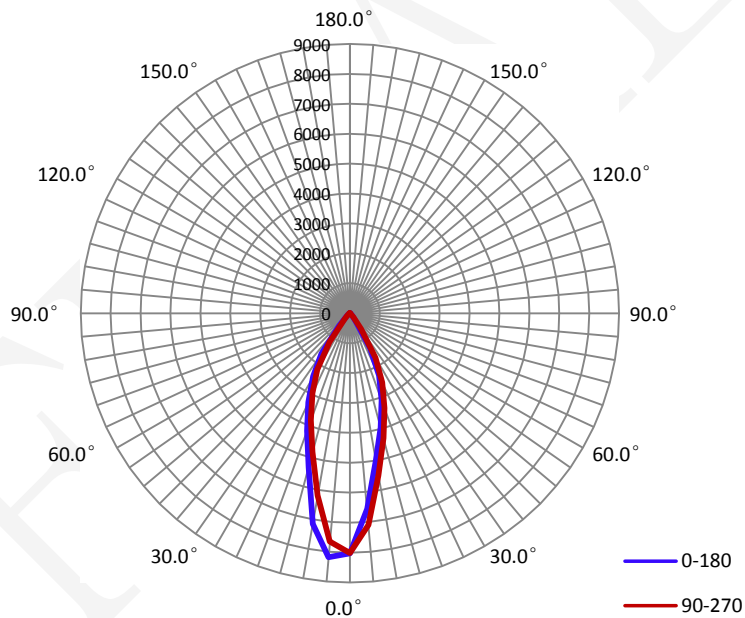
### Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.4490	51.72	0.9600

### Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	$I_{max}(cd)$	S/MH(C0/180)	S/MH(C90/270)
4021.4	77.80	8215.2	0.56	0.55

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50% $I_{max}$ ):	34.9	35.3	35.7	35.8	35.4
Field Angle(10% $I_{max}$ ):	71.5	71.7	71.5	71.4	71.5

### Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	8024	8024	8024	8024	8024	8024	8024	8024
5.0°	6564	6497	6593	6794	7109	7484	7828	8144
10.0°	5000	4927	5017	5217	5521	5878	6364	6984
15.0°	3962	3897	3944	4087	4334	4608	4906	5252
20.0°	3092	3032	3067	3171	3387	3647	3890	4120
25.0°	2301	2272	2320	2425	2564	2800	3016	3244
30.0°	1354	1243	1300	1467	1726	2079	2267	2452
35.0°	344	307	329	413	653	916	1213	1517
40.0°	155	151	146	154	186	232	285	466
45.0°	79	68	73	84	101	123	137	160
50.0°	21	20	21	22	29	43	64	95
55.0°	12	0	10	0	14	14	17	27
60.0°	0	0	0	0	0	0	9	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°	8024	8024	8024	8024	8024	8024	8024	8024
5.0°	8185	8215	8161	8012	7664	7204	6828	6602
10.0°	7154	7291	7105	6736	6196	5793	5402	5104
15.0°	5328	5533	5498	5213	4812	4524	4278	4053
20.0°	4182	4302	4264	4087	3810	3552	3337	3152
25.0°	3287	3354	3307	3143	2955	2692	2475	2313
30.0°	2444	2524	2496	2370	2185	2008	1734	1445
35.0°	1658	1787	1698	1490	1193	899	619	391
40.0°	563	684	647	448	289	229	188	156
45.0°	170	199	182	165	145	121	105	81
50.0°	99	110	101	87	66	36	31	14
55.0°	25	37	33	23	20	15	0	10
60.0°	10	19	16	11	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	184.0	4.58	0-5	184.0	4.58
5-10	477.5	11.87	0-10	661.5	16.45
10-15	630.0	15.67	0-15	1291.5	32.11
15-20	681.6	16.95	0-20	1973.0	49.06
20-25	672.3	16.72	0-25	2645.3	65.78
25-30	597.7	14.86	0-30	3243.0	80.64
30-35	428.2	10.65	0-35	3671.1	91.29
35-40	212.8	5.29	0-40	3883.9	96.58
40-45	80.7	2.01	0-45	3964.6	98.59
45-50	36.0	0.90	0-50	4000.6	99.48
50-55	15.2	0.38	0-55	4015.8	99.86
55-60	4.7	0.12	0-60	4020.4	99.98
60-65	1.0	0.02	0-65	4021.4	100.00
65-70	0.0	0.00	0-70	4021.4	100.00
70-75	0.0	0.00	0-75	4021.4	100.00
75-80	0.0	0.00	0-80	4021.4	100.00
80-85	0.0	0.00	0-85	4021.4	100.00
85-90	0.0	0.00	0-90	4021.4	100.00
90-95	0.0	0.00	0-95	4021.4	100.00
95-100	0.0	0.00	0-100	4021.4	100.00
100-105	0.0	0.00	0-105	4021.4	100.00
105-110	0.0	0.00	0-110	4021.4	100.00
110-115	0.0	0.00	0-115	4021.4	100.00
115-120	0.0	0.00	0-120	4021.4	100.00
120-125	0.0	0.00	0-125	4021.4	100.00
125-130	0.0	0.00	0-130	4021.4	100.00
130-135	0.0	0.00	0-135	4021.4	100.00
135-140	0.0	0.00	0-140	4021.4	100.00
140-145	0.0	0.00	0-145	4021.4	100.00
145-150	0.0	0.00	0-150	4021.4	100.00
150-155	0.0	0.00	0-155	4021.4	100.00
155-160	0.0	0.00	0-160	4021.4	100.00
160-165	0.0	0.00	0-165	4021.4	100.00
165-170	0.0	0.00	0-170	4021.4	100.00
170-175	0.0	0.00	0-175	4021.4	100.00
175-180	0.0	0.00	0-180	4021.4	100.00

## 6. Product Photo



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