



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 8.5PLV/830/HYBM**

<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>	PKS181030086-10
<b>Test Date:</b>	2018-11-01 to 2018-11-06
<b>Report Date:</b>	2018-11-09
<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.

**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 2018-10-30 and used for testing.

Model Tested: 8.5PLV/830/HYBM  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED Lamp  
 Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277VAC 60Hz  
 Rated Power: 8.5W  
 Nominal CCT: 3000K  
 Nominal Lumen Output: 1000lm

## 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	2018-04-08	2019-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-08	2019-04-08
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	2018-04-08	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	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**

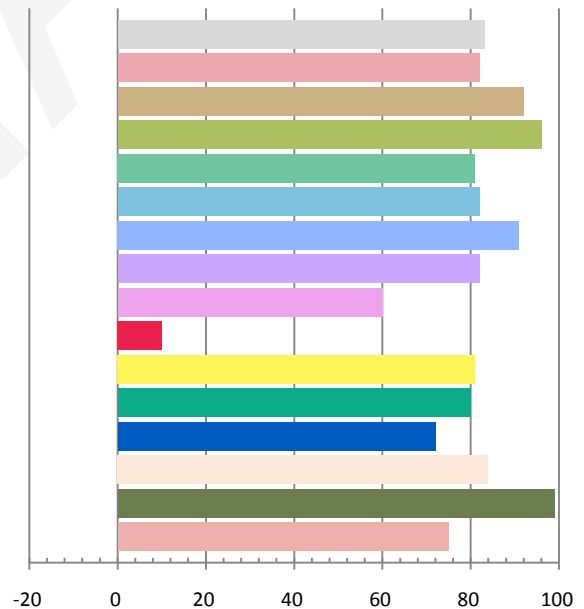
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0721	8.44	0.9756	1032.23	122.3

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.140	2973	-0.00030	0.4384	0.4038	0.2517	0.5215

### Color Rendering Index

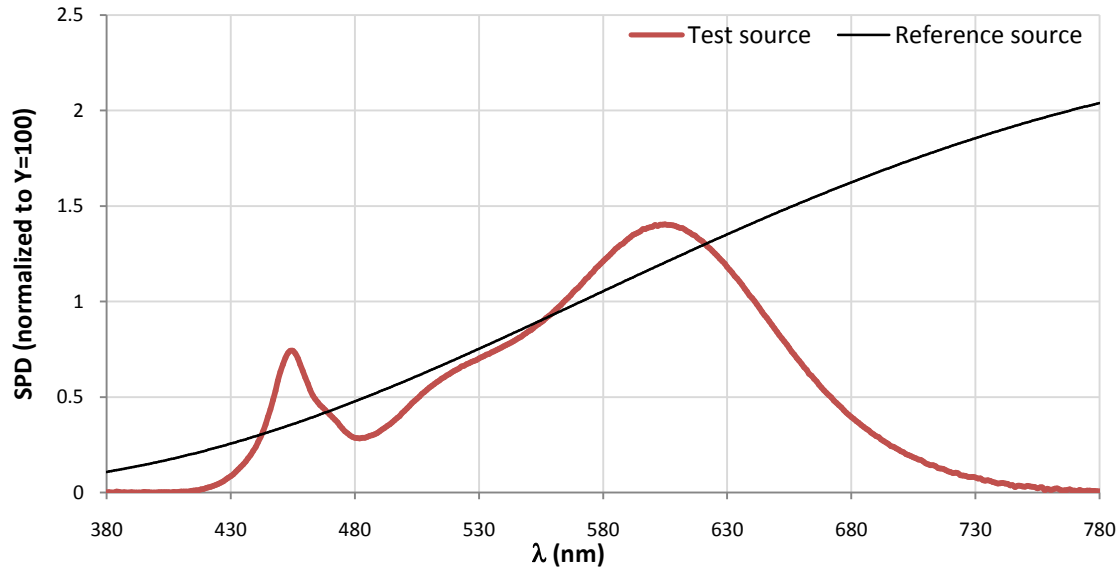
<b>Ra</b> <b>83.1</b>			
<b>R1</b> 82	<b>R2</b> 92	<b>R3</b> 96	<b>R4</b> 81
<b>R5</b> 82	<b>R6</b> 91	<b>R7</b> 82	<b>R8</b> 60
<b>R9</b> 10	<b>R10</b> 81	<b>R11</b> 80	<b>R12</b> 72
<b>R13</b> 84	<b>R14</b> 99	<b>R15</b> 75	



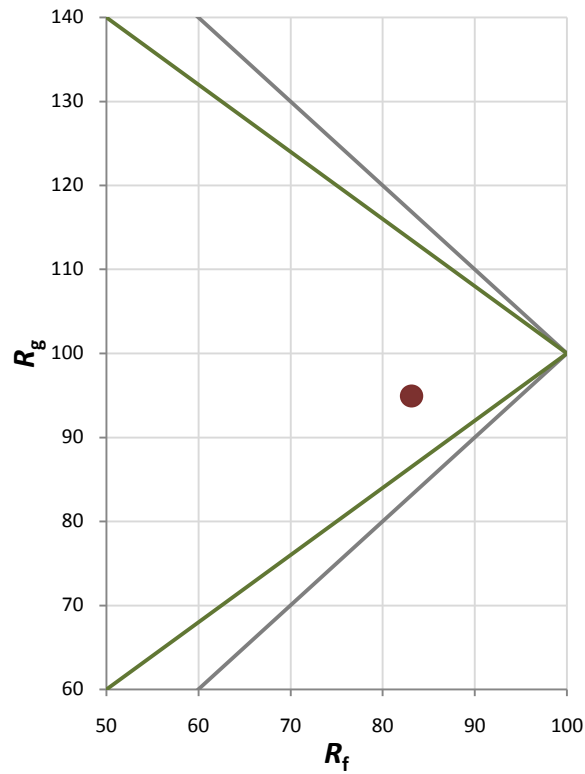
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	83
Gamut Index $R_g$	95

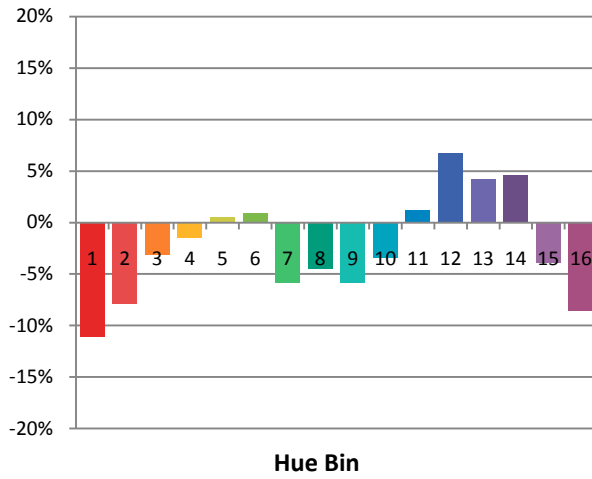
### Spectral Power Distribution Comparison



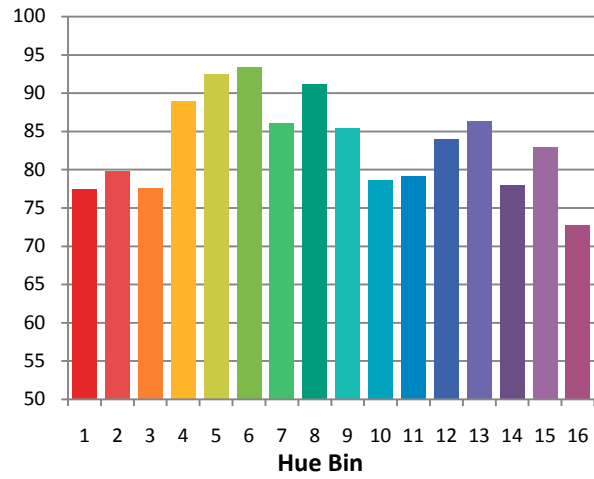
### Plot of $R_g$ versus $R_f$



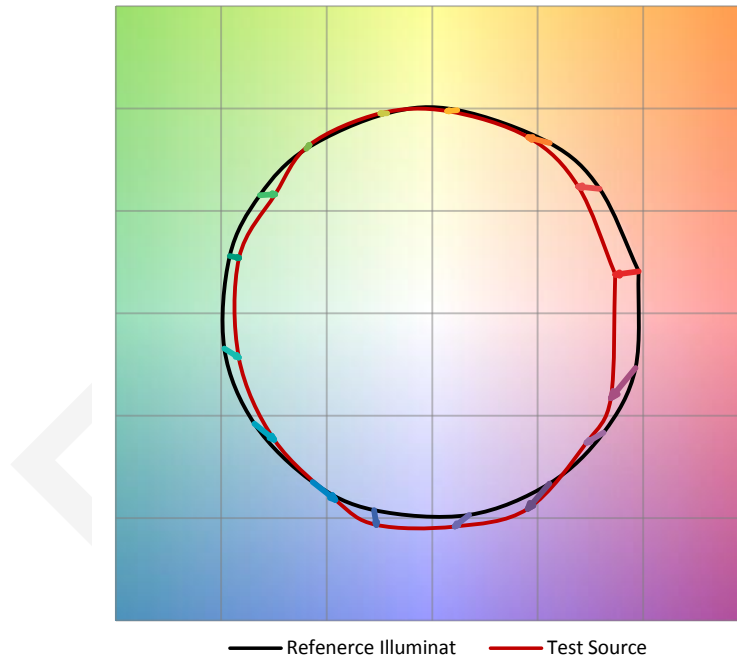
Chroma Shift by Hue



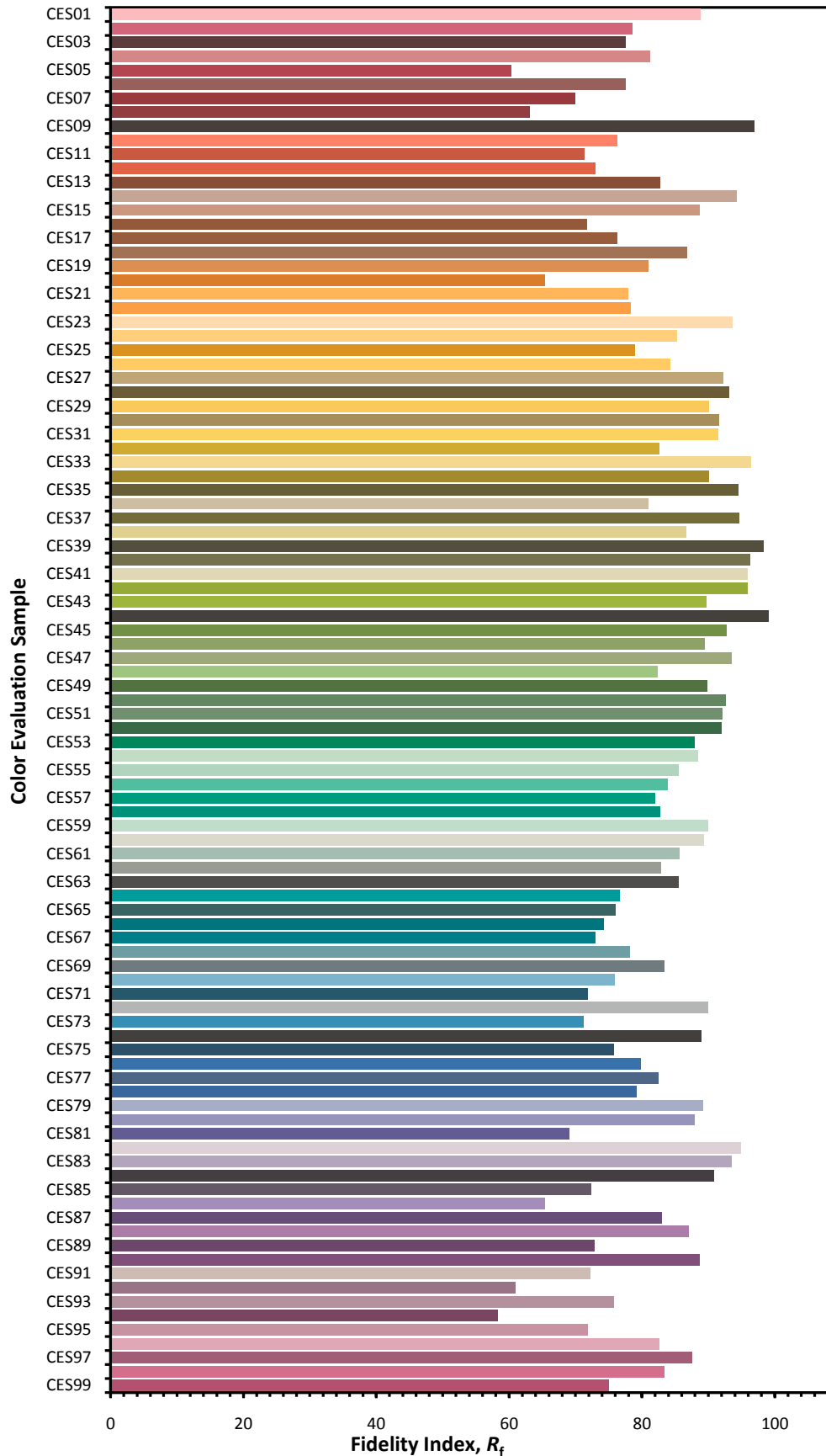
$R_f$  by Hue



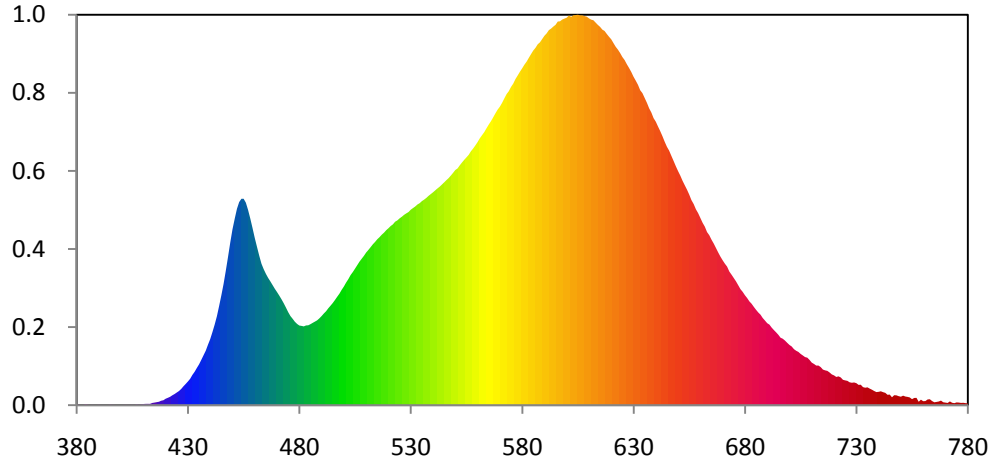
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

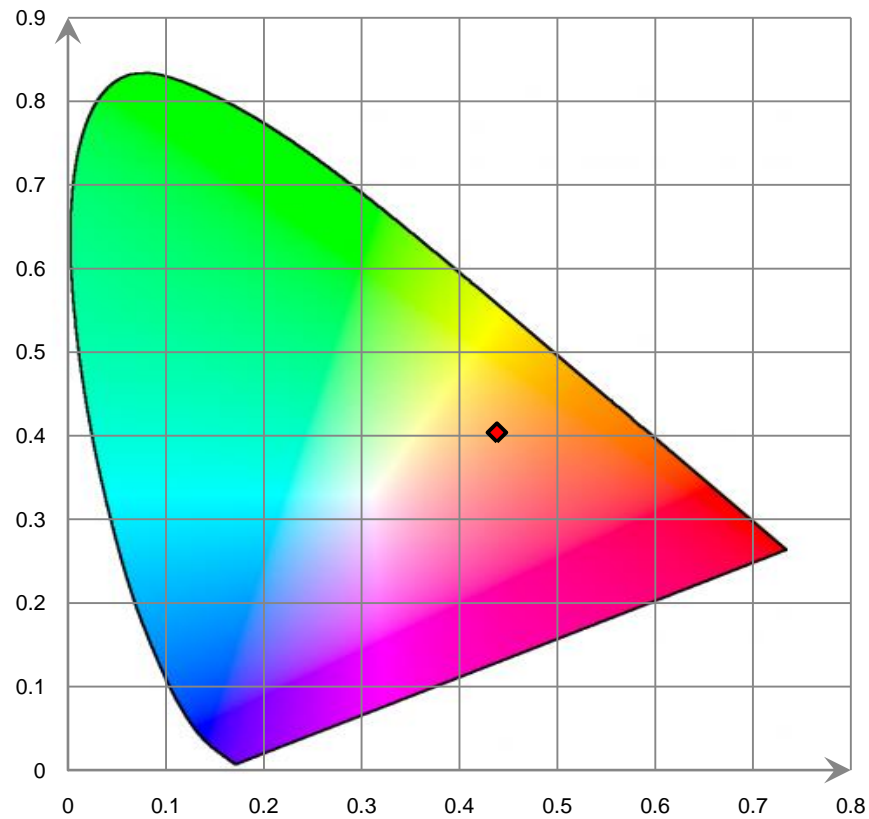


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.280E-02	421	4.009E-01	462	8.120E+00	503	7.067E+00	544	1.198E+01
381	3.170E-02	422	4.558E-01	463	7.684E+00	504	7.230E+00	545	1.210E+01
382	7.900E-03	423	5.369E-01	464	7.388E+00	505	7.417E+00	546	1.222E+01
383	5.100E-03	424	6.041E-01	465	7.132E+00	506	7.604E+00	547	1.233E+01
384	6.480E-02	425	6.887E-01	466	6.913E+00	507	7.796E+00	548	1.247E+01
385	3.660E-02	426	7.707E-01	467	6.724E+00	508	7.956E+00	549	1.262E+01
386	2.100E-03	427	8.836E-01	468	6.524E+00	509	8.115E+00	550	1.277E+01
387	2.050E-02	428	1.026E+00	469	6.322E+00	510	8.291E+00	551	1.286E+01
388	7.400E-03	429	1.154E+00	470	6.141E+00	511	8.435E+00	552	1.302E+01
389	7.700E-03	430	1.287E+00	471	5.951E+00	512	8.582E+00	553	1.318E+01
390	3.310E-02	431	1.433E+00	472	5.749E+00	513	8.737E+00	554	1.332E+01
391	9.600E-03	432	1.644E+00	473	5.535E+00	514	8.869E+00	555	1.346E+01
392	4.000E-04	433	1.812E+00	474	5.297E+00	515	9.013E+00	556	1.359E+01
393	6.500E-03	434	2.022E+00	475	5.053E+00	516	9.125E+00	557	1.379E+01
394	8.200E-03	435	2.218E+00	476	4.841E+00	517	9.259E+00	558	1.394E+01
395	4.000E-02	436	2.463E+00	477	4.694E+00	518	9.369E+00	559	1.411E+01
396	1.960E-02	437	2.709E+00	478	4.530E+00	519	9.503E+00	560	1.429E+01
397	2.010E-02	438	2.959E+00	479	4.414E+00	520	9.612E+00	561	1.449E+01
398	3.800E-03	439	3.283E+00	480	4.327E+00	521	9.730E+00	562	1.466E+01
399	2.200E-03	440	3.587E+00	481	4.306E+00	522	9.822E+00	563	1.483E+01
400	1.000E-04	441	3.968E+00	482	4.279E+00	523	9.966E+00	564	1.504E+01
401	1.300E-02	442	4.378E+00	483	4.329E+00	524	1.004E+01	565	1.524E+01
402	2.530E-02	443	4.833E+00	484	4.338E+00	525	1.015E+01	566	1.542E+01
403	1.630E-02	444	5.387E+00	485	4.401E+00	526	1.023E+01	567	1.563E+01
404	1.620E-02	445	5.970E+00	486	4.471E+00	527	1.034E+01	568	1.585E+01
405	2.280E-02	446	6.585E+00	487	4.538E+00	528	1.042E+01	569	1.605E+01
406	6.800E-03	447	7.304E+00	488	4.609E+00	529	1.049E+01	570	1.621E+01
407	5.700E-02	448	8.052E+00	489	4.717E+00	530	1.062E+01	571	1.642E+01
408	1.660E-02	449	8.837E+00	490	4.839E+00	531	1.071E+01	572	1.666E+01
409	4.820E-02	450	9.550E+00	491	4.980E+00	532	1.079E+01	573	1.689E+01
410	6.450E-02	451	1.013E+01	492	5.101E+00	533	1.090E+01	574	1.705E+01
411	7.140E-02	452	1.067E+01	493	5.263E+00	534	1.097E+01	575	1.728E+01
412	7.320E-02	453	1.103E+01	494	5.403E+00	535	1.108E+01	576	1.746E+01
413	7.130E-02	454	1.121E+01	495	5.548E+00	536	1.116E+01	577	1.771E+01
414	1.219E-01	455	1.121E+01	496	5.716E+00	537	1.126E+01	578	1.791E+01
415	1.429E-01	456	1.100E+01	497	5.889E+00	538	1.137E+01	579	1.811E+01
416	1.660E-01	457	1.060E+01	498	6.058E+00	539	1.147E+01	580	1.829E+01
417	1.865E-01	458	1.013E+01	499	6.265E+00	540	1.156E+01	581	1.849E+01
418	2.410E-01	459	9.619E+00	500	6.446E+00	541	1.167E+01	582	1.866E+01
419	2.691E-01	460	9.080E+00	501	6.658E+00	542	1.177E+01	583	1.886E+01
420	3.494E-01	461	8.600E+00	502	6.848E+00	543	1.187E+01	584	1.907E+01

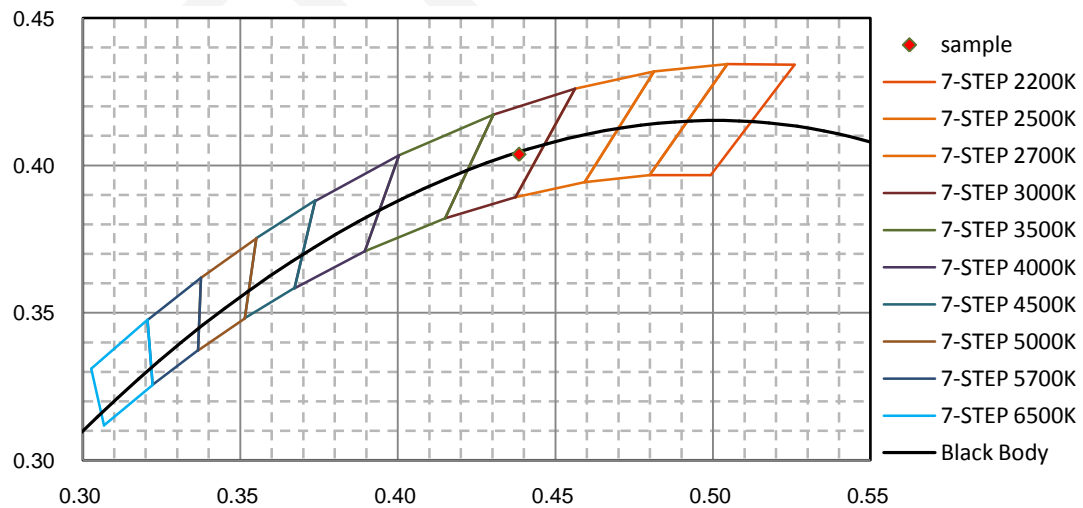


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.926E+01	626	1.875E+01	667	8.536E+00	708	2.581E+00	749	4.898E-01
586	1.941E+01	627	1.852E+01	668	8.296E+00	709	2.457E+00	750	4.594E-01
587	1.960E+01	628	1.831E+01	669	8.069E+00	710	2.312E+00	751	5.181E-01
588	1.971E+01	629	1.809E+01	670	7.870E+00	711	2.239E+00	752	4.714E-01
589	1.989E+01	630	1.784E+01	671	7.686E+00	712	2.153E+00	753	4.506E-01
590	2.006E+01	631	1.763E+01	672	7.526E+00	713	2.153E+00	754	4.208E-01
591	2.019E+01	632	1.740E+01	673	7.258E+00	714	2.069E+00	755	3.276E-01
592	2.037E+01	633	1.711E+01	674	7.087E+00	715	1.934E+00	756	3.920E-01
593	2.045E+01	634	1.695E+01	675	6.905E+00	716	1.893E+00	757	3.977E-01
594	2.056E+01	635	1.669E+01	676	6.725E+00	717	1.862E+00	758	1.844E-01
595	2.066E+01	636	1.643E+01	677	6.512E+00	718	1.776E+00	759	2.999E-01
596	2.084E+01	637	1.613E+01	678	6.300E+00	719	1.672E+00	760	2.168E-01
597	2.085E+01	638	1.589E+01	679	6.153E+00	720	1.618E+00	761	2.237E-01
598	2.094E+01	639	1.559E+01	680	5.972E+00	721	1.533E+00	762	3.117E-01
599	2.100E+01	640	1.540E+01	681	5.819E+00	722	1.565E+00	763	3.233E-01
600	2.105E+01	641	1.513E+01	682	5.637E+00	723	1.508E+00	764	2.256E-01
601	2.117E+01	642	1.488E+01	683	5.510E+00	724	1.378E+00	765	1.580E-01
602	2.109E+01	643	1.461E+01	684	5.337E+00	725	1.346E+00	766	1.764E-01
603	2.118E+01	644	1.430E+01	685	5.181E+00	726	1.322E+00	767	1.997E-01
604	2.119E+01	645	1.403E+01	686	5.034E+00	727	1.243E+00	768	2.489E-01
605	2.121E+01	646	1.382E+01	687	4.913E+00	728	1.218E+00	769	1.583E-01
606	2.118E+01	647	1.354E+01	688	4.734E+00	729	1.234E+00	770	1.391E-01
607	2.117E+01	648	1.326E+01	689	4.596E+00	730	1.197E+00	771	1.209E-01
608	2.113E+01	649	1.297E+01	690	4.453E+00	731	1.102E+00	772	2.068E-01
609	2.110E+01	650	1.271E+01	691	4.375E+00	732	1.110E+00	773	1.324E-01
610	2.101E+01	651	1.247E+01	692	4.213E+00	733	9.803E-01	774	1.081E-01
611	2.094E+01	652	1.219E+01	693	4.080E+00	734	9.478E-01	775	1.504E-01
612	2.091E+01	653	1.194E+01	694	3.957E+00	735	9.695E-01	776	1.421E-01
613	2.078E+01	654	1.171E+01	695	3.825E+00	736	9.019E-01	777	1.221E-01
614	2.065E+01	655	1.144E+01	696	3.665E+00	737	8.410E-01	778	1.299E-01
615	2.055E+01	656	1.114E+01	697	3.608E+00	738	7.718E-01	779	1.113E-01
616	2.040E+01	657	1.092E+01	698	3.505E+00	739	7.116E-01	780	1.021E-01
617	2.032E+01	658	1.064E+01	699	3.385E+00	740	7.261E-01		
618	2.016E+01	659	1.043E+01	700	3.270E+00	741	7.560E-01		
619	2.001E+01	660	1.017E+01	701	3.187E+00	742	7.056E-01		
620	1.987E+01	661	9.908E+00	702	3.044E+00	743	6.698E-01		
621	1.967E+01	662	9.696E+00	703	2.957E+00	744	5.641E-01		
622	1.947E+01	663	9.404E+00	704	2.894E+00	745	5.771E-01		
623	1.931E+01	664	9.232E+00	705	2.784E+00	746	4.301E-01		
624	1.912E+01	665	8.990E+00	706	2.700E+00	747	5.402E-01		
625	1.891E+01	666	8.777E+00	707	2.612E+00	748	5.345E-01		

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**

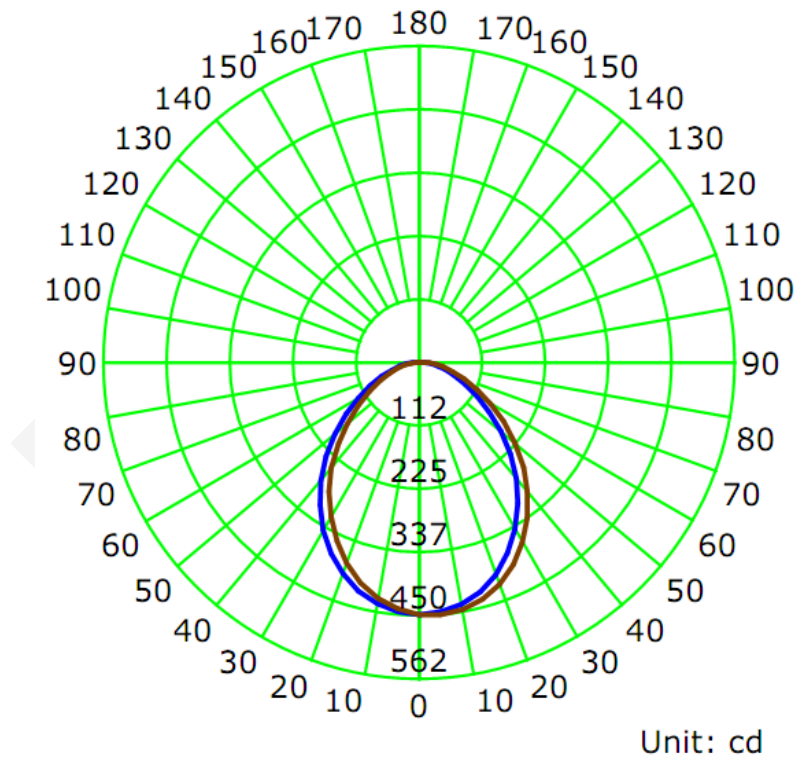
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0720	8.46	0.9790

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
1032.6	122.10	450.4	1.15	1.15

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	92.4	92.6	92.3	92.3	92.4
Field Angle (10% $I_{max}$ ):	153.0	153.1	153.0	152.8	153.0

### Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	448	448	448	448	448	448	448	448
5.0°	445	448	449	450	450	449	449	448
10.0°	437	440	444	446	446	445	444	441
15.0°	422	428	433	435	435	435	432	429
20.0°	401	408	415	418	420	418	415	410
25.0°	374	383	391	395	397	395	392	386
30.0°	343	352	361	367	369	368	364	357
35.0°	306	317	328	335	337	335	330	323
40.0°	269	280	291	299	301	300	295	288
45.0°	230	241	252	260	264	262	258	250
50.0°	191	202	213	220	224	223	219	211
55.0°	153	165	174	181	185	185	181	173
60.0°	121	129	138	145	148	148	145	138
65.0°	91	99	105	111	115	115	112	107
70.0°	66	72	78	83	86	86	84	79
75.0°	48	51	56	60	62	63	61	57
80.0°	33	36	39	42	44	44	43	40
85.0°	21	24	26	29	31	30	29	28
90.0°	13	15	16	18	19	20	18	17
95.0°	6	7	9	10	11	10	10	9
100.0°	2	3	4	5	5	5	5	4
105.0°	0	0	0	2	1	2	2	2
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°	448	448	448	448	448	448	448	448
5.0°	445	443	442	440	439	440	442	443
10.0°	435	432	429	427	426	426	429	432
15.0°	421	415	411	407	406	406	410	415
20.0°	400	393	387	382	379	381	384	391
25.0°	375	367	359	353	350	351	355	363
30.0°	343	335	327	320	316	317	322	329
35.0°	309	301	292	285	281	281	286	293
40.0°	274	264	256	248	245	244	247	255
45.0°	236	227	218	211	205	205	209	216
50.0°	198	188	180	173	169	167	171	177
55.0°	161	152	145	138	134	132	136	141
60.0°	127	119	112	107	104	102	105	109
65.0°	97	90	84	80	77	76	78	82
70.0°	72	66	62	58	56	55	56	59
75.0°	51	47	44	41	39	39	39	42
80.0°	36	33	30	28	27	25	27	28
85.0°	24	21	19	18	17	16	17	18
90.0°	14	13	11	10	9	9	9	10
95.0°	7	6	5	5	4	3	4	4
100.0°	3	2	2	2	1	1	0	1
105.0°	1	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	10.7	1.03	0-5	10.7	1.03
5-10	31.5	3.05	0-10	42.2	4.09
10-15	50.8	4.92	0-15	93.0	9.01
15-20	67.7	6.56	0-20	160.7	15.57
20-25	81.2	7.86	0-25	241.9	23.43
25-30	90.7	8.79	0-30	332.7	32.22
30-35	96.0	9.30	0-35	428.6	41.51
35-40	96.9	9.39	0-40	525.6	50.90
40-45	93.7	9.07	0-45	619.3	59.97
45-50	86.7	8.40	0-50	706.0	68.37
50-55	76.9	7.45	0-55	782.9	75.82
55-60	65.4	6.34	0-60	848.4	82.16
60-65	53.4	5.17	0-65	901.8	87.33
65-70	41.8	4.04	0-70	943.5	91.38
70-75	31.4	3.04	0-75	974.9	94.41
75-80	22.7	2.20	0-80	997.6	96.61
80-85	15.7	1.52	0-85	1013.2	98.12
85-90	10.0	0.97	0-90	1023.3	99.10
90-95	5.7	0.55	0-95	1028.9	99.65
95-100	2.6	0.26	0-100	1031.6	99.90
100-105	0.9	0.08	0-105	1032.4	99.99
105-110	0.1	0.01	0-110	1032.6	100.00
110-115	0.0	0.00	0-115	1032.6	100.00
115-120	0.0	0.00	0-120	1032.6	100.00
120-125	0.0	0.00	0-125	1032.6	100.00
125-130	0.0	0.00	0-130	1032.6	100.00
130-135	0.0	0.00	0-135	1032.6	100.00
135-140	0.0	0.00	0-140	1032.6	100.00
140-145	0.0	0.00	0-145	1032.6	100.00
145-150	0.0	0.00	0-150	1032.6	100.00
150-155	0.0	0.00	0-155	1032.6	100.00
155-160	0.0	0.00	0-160	1032.6	100.00
160-165	0.0	0.00	0-165	1032.6	100.00
165-170	0.0	0.00	0-170	1032.6	100.00
170-175	0.0	0.00	0-175	1032.6	100.00
175-180	0.0	0.00	0-180	1032.6	100.00

## 6. Product Photo



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