



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 8PLH/827/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>	PKS181030080-10
<b>Test Date:</b>	2018-11-01 to 2018-11-05
<b>Report Date:</b>	2018-11-08
<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: 8PLH/827/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: 8W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 870lm

## 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**

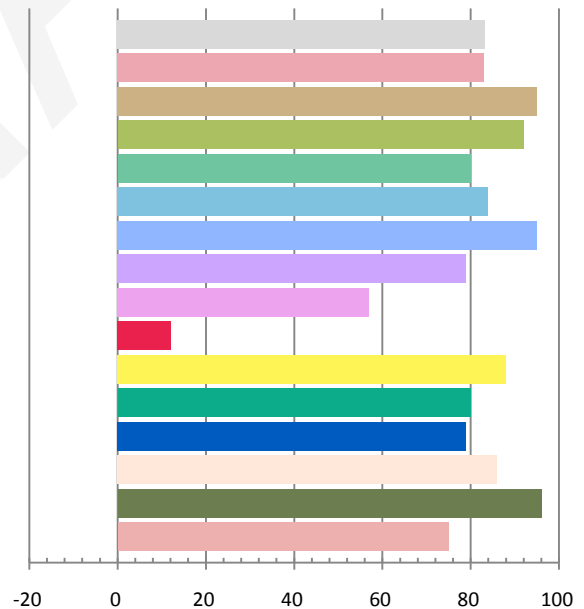
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0676	7.88	0.9713	908.79	115.33

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.838	2665	-0.00081	0.4613	0.4087	0.2643	0.5269

### Color Rendering Index

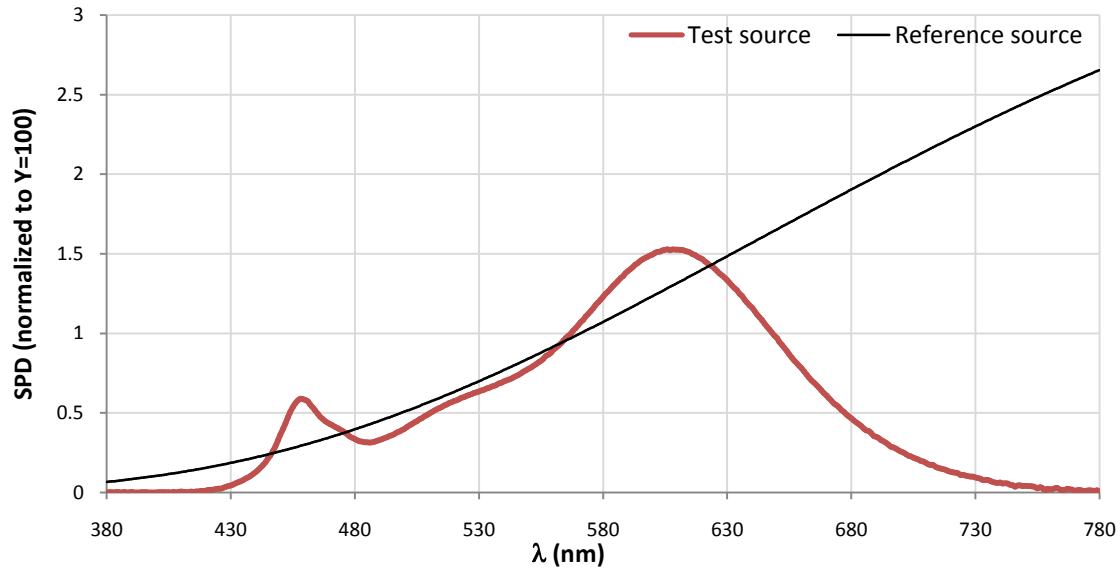
<b>Ra</b> <b>83.2</b>			
<b>R1</b> 83	<b>R2</b> 95	<b>R3</b> 92	<b>R4</b> 80
<b>R5</b> 84	<b>R6</b> 95	<b>R7</b> 79	<b>R8</b> 57
<b>R9</b> 12	<b>R10</b> 88	<b>R11</b> 80	<b>R12</b> 79
<b>R13</b> 86	<b>R14</b> 96	<b>R15</b> 75	



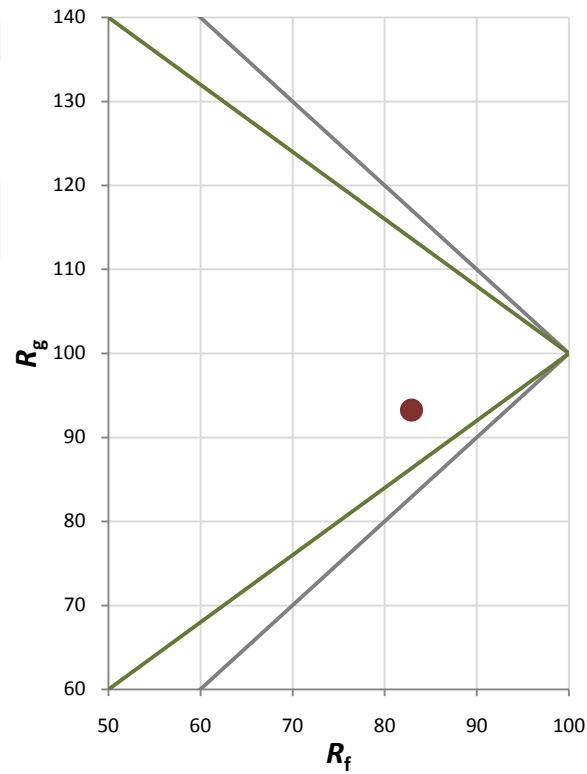
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	83
Gamut Index $R_g$	93

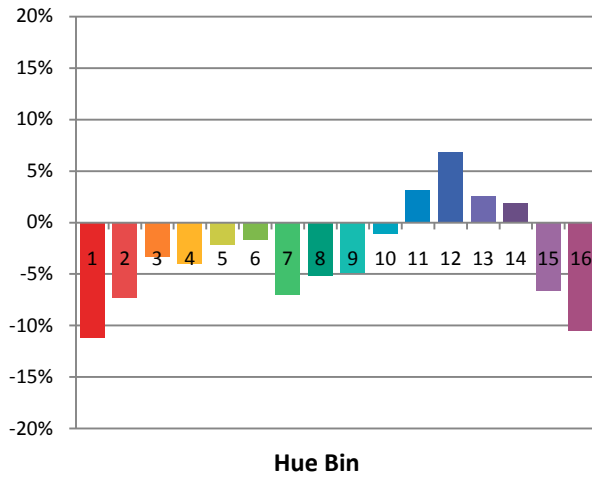
### Spectral Power Distribution Comparison



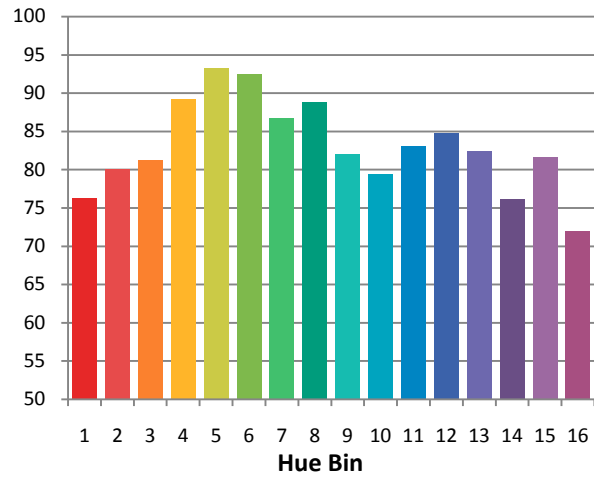
### Plot of $R_g$ versus $R_f$



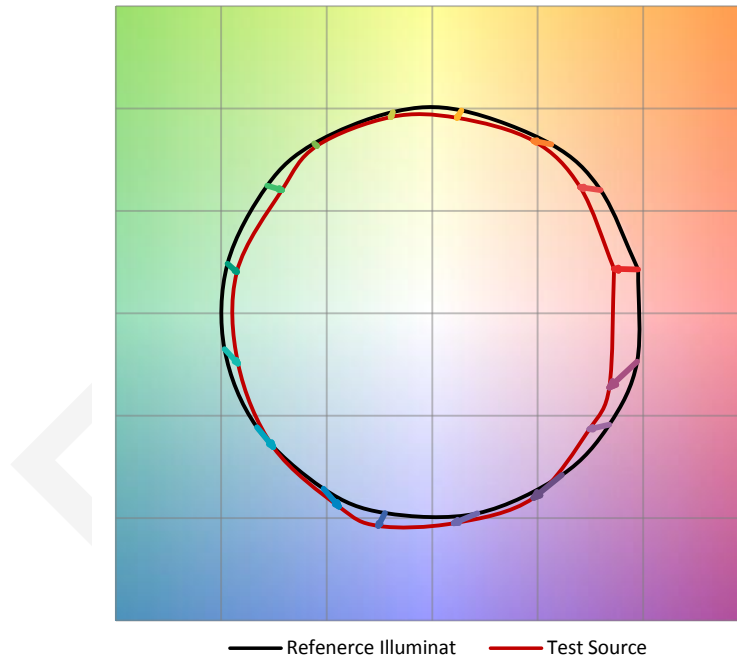
Chroma Shift by Hue



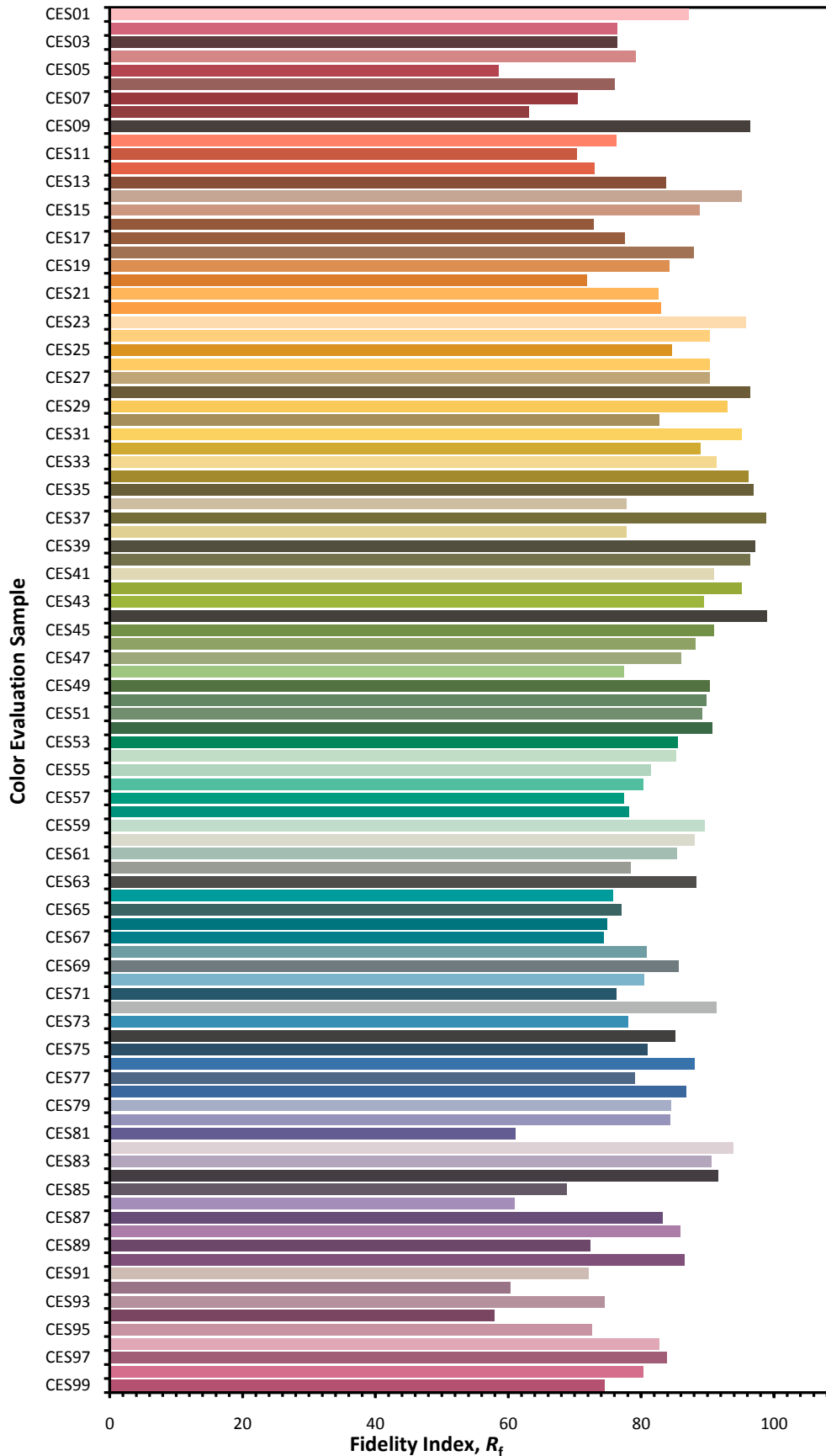
$R_f$  by Hue



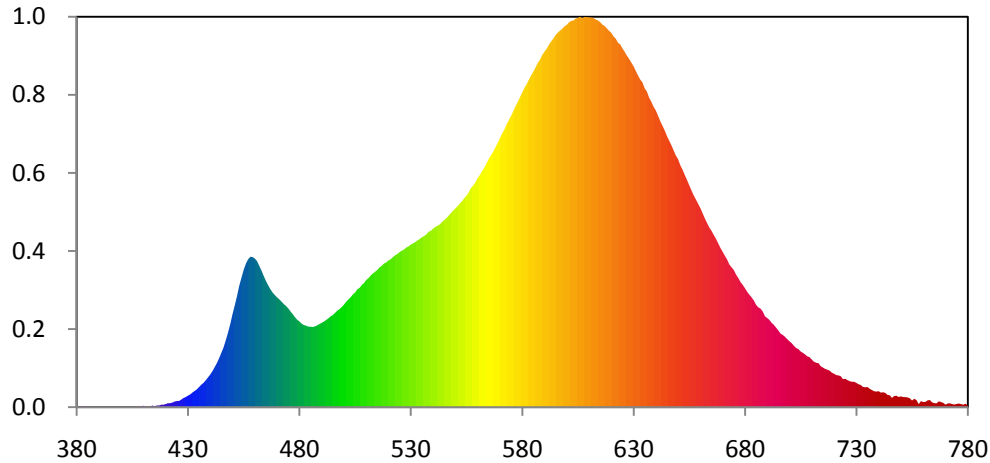
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

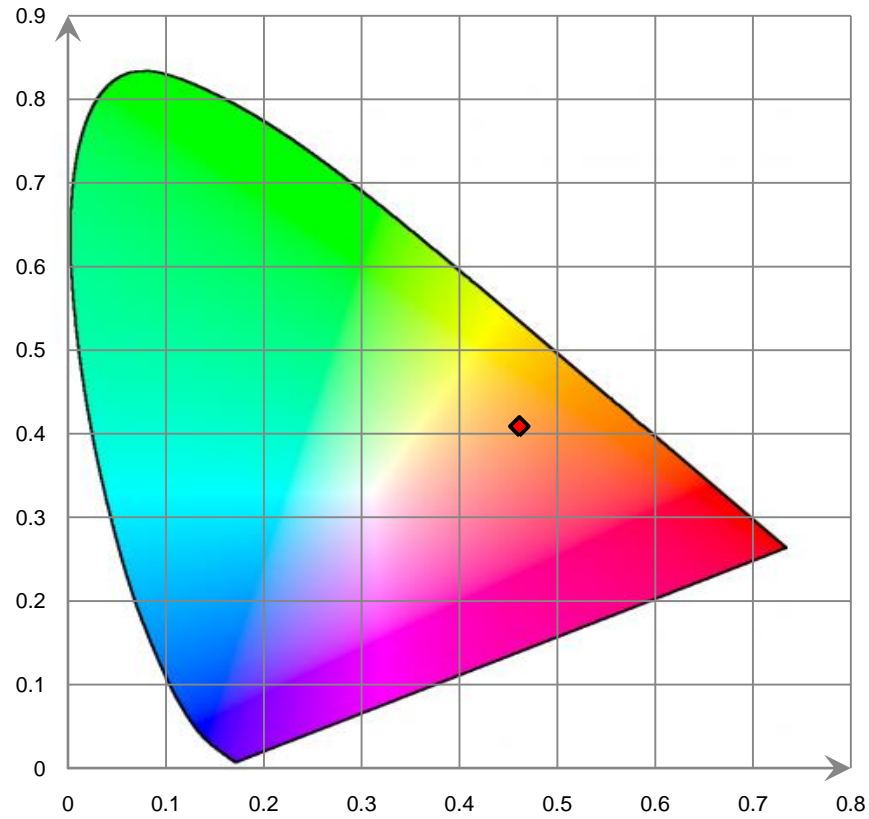


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.360E-02	421	2.038E-01	462	7.364E+00	503	5.724E+00	544	9.632E+00
381	2.960E-02	422	2.067E-01	463	7.115E+00	504	5.866E+00	545	9.746E+00
382	2.310E-02	423	2.377E-01	464	6.839E+00	505	5.965E+00	546	9.839E+00
383	5.500E-03	424	2.923E-01	465	6.575E+00	506	6.133E+00	547	9.969E+00
384	4.810E-02	425	3.195E-01	466	6.349E+00	507	6.211E+00	548	1.010E+01
385	3.770E-02	426	3.243E-01	467	6.145E+00	508	6.354E+00	549	1.023E+01
386	2.200E-03	427	3.945E-01	468	5.969E+00	509	6.461E+00	550	1.034E+01
387	4.410E-02	428	4.766E-01	469	5.838E+00	510	6.616E+00	551	1.047E+01
388	1.140E-02	429	5.296E-01	470	5.717E+00	511	6.718E+00	552	1.060E+01
389	3.200E-03	430	5.996E-01	471	5.619E+00	512	6.850E+00	553	1.072E+01
390	5.250E-02	431	6.620E-01	472	5.494E+00	513	6.957E+00	554	1.088E+01
391	8.500E-03	432	7.616E-01	473	5.373E+00	514	7.053E+00	555	1.102E+01
392	6.400E-03	433	8.463E-01	474	5.272E+00	515	7.145E+00	556	1.118E+01
393	7.000E-03	434	9.263E-01	475	5.150E+00	516	7.282E+00	557	1.141E+01
394	1.390E-02	435	1.046E+00	476	4.991E+00	517	7.361E+00	558	1.153E+01
395	2.030E-02	436	1.171E+00	477	4.850E+00	518	7.481E+00	559	1.170E+01
396	2.190E-02	437	1.266E+00	478	4.691E+00	519	7.535E+00	560	1.193E+01
397	5.600E-03	438	1.401E+00	479	4.560E+00	520	7.643E+00	561	1.209E+01
398	2.000E-04	439	1.549E+00	480	4.467E+00	521	7.703E+00	562	1.229E+01
399	0.000E+00	440	1.697E+00	481	4.354E+00	522	7.810E+00	563	1.246E+01
400	0.000E+00	441	1.875E+00	482	4.280E+00	523	7.910E+00	564	1.269E+01
401	2.610E-02	442	2.084E+00	483	4.242E+00	524	7.978E+00	565	1.293E+01
402	2.260E-02	443	2.299E+00	484	4.195E+00	525	8.074E+00	566	1.311E+01
403	2.500E-02	444	2.550E+00	485	4.190E+00	526	8.148E+00	567	1.330E+01
404	1.200E-02	445	2.833E+00	486	4.175E+00	527	8.210E+00	568	1.353E+01
405	1.590E-02	446	3.115E+00	487	4.207E+00	528	8.313E+00	569	1.375E+01
406	4.600E-03	447	3.488E+00	488	4.259E+00	529	8.366E+00	570	1.400E+01
407	5.180E-02	448	3.886E+00	489	4.329E+00	530	8.464E+00	571	1.425E+01
408	5.100E-03	449	4.323E+00	490	4.387E+00	531	8.529E+00	572	1.445E+01
409	4.270E-02	450	4.833E+00	491	4.453E+00	532	8.590E+00	573	1.471E+01
410	7.310E-02	451	5.296E+00	492	4.538E+00	533	8.682E+00	574	1.494E+01
411	4.530E-02	452	5.776E+00	493	4.623E+00	534	8.754E+00	575	1.516E+01
412	2.490E-02	453	6.305E+00	494	4.720E+00	535	8.845E+00	576	1.540E+01
413	3.290E-02	454	6.732E+00	495	4.795E+00	536	8.910E+00	577	1.566E+01
414	8.440E-02	455	7.147E+00	496	4.905E+00	537	8.993E+00	578	1.589E+01
415	5.380E-02	456	7.466E+00	497	5.024E+00	538	9.130E+00	579	1.612E+01
416	8.780E-02	457	7.699E+00	498	5.103E+00	539	9.182E+00	580	1.638E+01
417	8.840E-02	458	7.830E+00	499	5.217E+00	540	9.293E+00	581	1.661E+01
418	1.285E-01	459	7.820E+00	500	5.332E+00	541	9.374E+00	582	1.681E+01
419	1.299E-01	460	7.739E+00	501	5.487E+00	542	9.448E+00	583	1.704E+01
420	1.632E-01	461	7.611E+00	502	5.612E+00	543	9.510E+00	584	1.727E+01

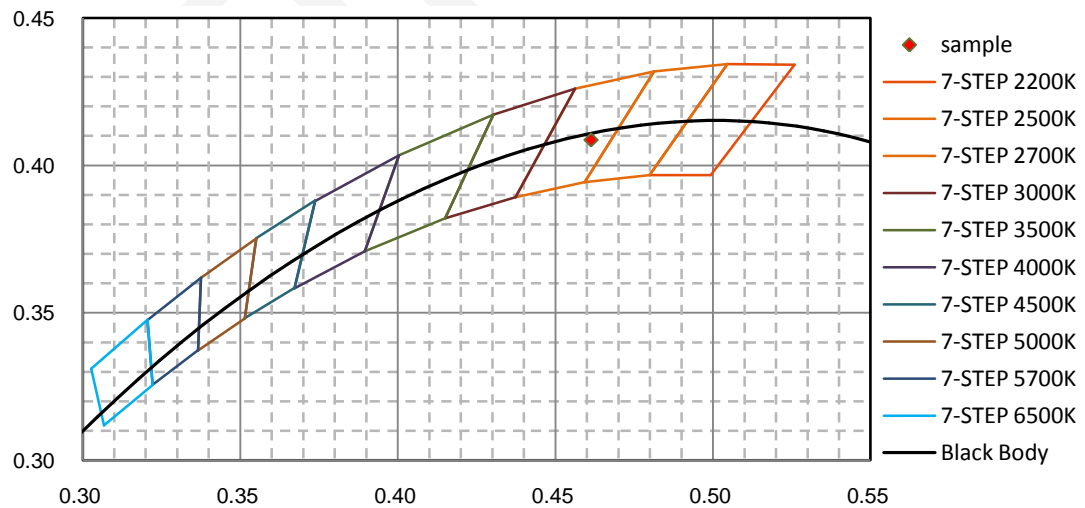


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.747E+01	626	1.851E+01	667	8.769E+00	708	2.648E+00	749	5.302E-01
586	1.768E+01	627	1.830E+01	668	8.532E+00	709	2.603E+00	750	5.630E-01
587	1.792E+01	628	1.814E+01	669	8.293E+00	710	2.480E+00	751	5.274E-01
588	1.809E+01	629	1.794E+01	670	8.092E+00	711	2.364E+00	752	5.266E-01
589	1.833E+01	630	1.775E+01	671	7.883E+00	712	2.312E+00	753	5.079E-01
590	1.851E+01	631	1.751E+01	672	7.688E+00	713	2.293E+00	754	4.662E-01
591	1.866E+01	632	1.728E+01	673	7.430E+00	714	2.137E+00	755	3.454E-01
592	1.887E+01	633	1.706E+01	674	7.288E+00	715	2.064E+00	756	4.393E-01
593	1.904E+01	634	1.691E+01	675	7.141E+00	716	1.994E+00	757	3.705E-01
594	1.919E+01	635	1.660E+01	676	6.910E+00	717	1.952E+00	758	1.593E-01
595	1.937E+01	636	1.643E+01	677	6.731E+00	718	1.905E+00	759	3.131E-01
596	1.950E+01	637	1.611E+01	678	6.520E+00	719	1.796E+00	760	2.703E-01
597	1.961E+01	638	1.590E+01	679	6.371E+00	720	1.745E+00	761	2.758E-01
598	1.970E+01	639	1.564E+01	680	6.195E+00	721	1.671E+00	762	3.514E-01
599	1.983E+01	640	1.545E+01	681	6.009E+00	722	1.652E+00	763	3.745E-01
600	1.990E+01	641	1.518E+01	682	5.854E+00	723	1.613E+00	764	2.519E-01
601	2.004E+01	642	1.489E+01	683	5.718E+00	724	1.462E+00	765	2.064E-01
602	2.011E+01	643	1.465E+01	684	5.551E+00	725	1.477E+00	766	1.984E-01
603	2.013E+01	644	1.440E+01	685	5.335E+00	726	1.413E+00	767	3.059E-01
604	2.024E+01	645	1.412E+01	686	5.198E+00	727	1.356E+00	768	2.660E-01
605	2.026E+01	646	1.388E+01	687	5.132E+00	728	1.324E+00	769	2.276E-01
606	2.033E+01	647	1.363E+01	688	4.982E+00	729	1.323E+00	770	1.320E-01
607	2.025E+01	648	1.337E+01	689	4.731E+00	730	1.266E+00	771	1.906E-01
608	2.032E+01	649	1.310E+01	690	4.643E+00	731	1.194E+00	772	2.053E-01
609	2.031E+01	650	1.291E+01	691	4.542E+00	732	1.157E+00	773	1.616E-01
610	2.030E+01	651	1.259E+01	692	4.390E+00	733	1.051E+00	774	1.407E-01
611	2.028E+01	652	1.237E+01	693	4.283E+00	734	1.036E+00	775	1.671E-01
612	2.027E+01	653	1.209E+01	694	4.141E+00	735	1.050E+00	776	1.906E-01
613	2.019E+01	654	1.183E+01	695	3.995E+00	736	9.594E-01	777	1.635E-01
614	2.013E+01	655	1.156E+01	696	3.832E+00	737	8.927E-01	778	1.274E-01
615	2.005E+01	656	1.129E+01	697	3.759E+00	738	8.309E-01	779	1.845E-01
616	1.992E+01	657	1.103E+01	698	3.660E+00	739	8.108E-01	780	8.770E-02
617	1.985E+01	658	1.081E+01	699	3.540E+00	740	8.335E-01		
618	1.972E+01	659	1.059E+01	700	3.429E+00	741	7.582E-01		
619	1.960E+01	660	1.037E+01	701	3.331E+00	742	7.760E-01		
620	1.950E+01	661	1.010E+01	702	3.198E+00	743	7.441E-01		
621	1.931E+01	662	9.831E+00	703	3.076E+00	744	6.376E-01		
622	1.919E+01	663	9.595E+00	704	3.023E+00	745	6.231E-01		
623	1.898E+01	664	9.358E+00	705	2.901E+00	746	4.867E-01		
624	1.889E+01	665	9.183E+00	706	2.830E+00	747	5.788E-01		
625	1.869E+01	666	8.969E+00	707	2.746E+00	748	5.956E-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**

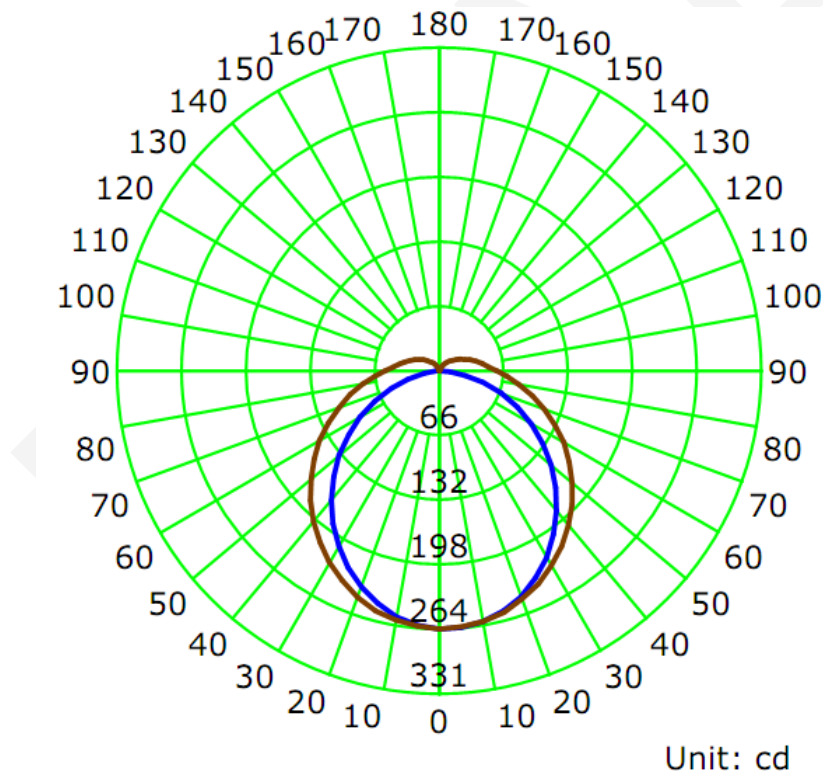
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0680	7.91	0.9690

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
913.2	115.50	264.8	1.21	1.28

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	105.2	116.4	127.9	115.5	116.3
Field Angle (10% $I_{max}$ ):	157.3	200.0	235.3	196.0	197.2

### Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	265	265	265	265	265	265	265	265
5.0°	264	265	265	264	263	263	262	262
10.0°	261	261	260	262	260	260	258	257
15.0°	255	255	256	258	256	254	251	249
20.0°	246	247	248	250	249	246	242	238
25.0°	234	236	239	242	241	237	230	226
30.0°	221	223	228	232	230	225	218	212
35.0°	204	208	215	220	219	213	204	195
40.0°	188	192	200	207	206	200	188	179
45.0°	170	174	184	193	193	185	173	161
50.0°	150	156	168	178	179	170	156	142
55.0°	130	137	150	162	163	155	138	124
60.0°	110	118	133	146	148	138	122	104
65.0°	88	99	115	129	131	122	104	85
70.0°	67	79	98	112	115	105	87	66
75.0°	46	61	81	96	99	89	70	48
80.0°	27	44	65	80	83	75	56	33
85.0°	11	29	51	67	70	62	43	21
90.0°	2	20	41	56	59	52	35	13
95.0°	0	14	34	48	51	44	29	8
100.0°	0	11	28	41	45	38	24	5
105.0°	0	9	24	36	39	33	20	5
110.0°	0	7	20	31	34	29	17	4
115.0°	0	6	17	26	29	24	14	4
120.0°	0	5	14	22	25	21	12	3
125.0°	0	4	12	19	21	18	10	3
130.0°	0	3	10	16	18	15	8	2
135.0°	0	3	8	13	14	12	7	2
140.0°	0	2	7	11	12	10	5	1
145.0°	0	2	5	8	9	7	3	1
150.0°	0	2	4	6	7	5	2	0
155.0°	0	1	3	5	4	3	1	0
160.0°	0	1	2	3	3	2	0	0
165.0°	0	0	1	1	1	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

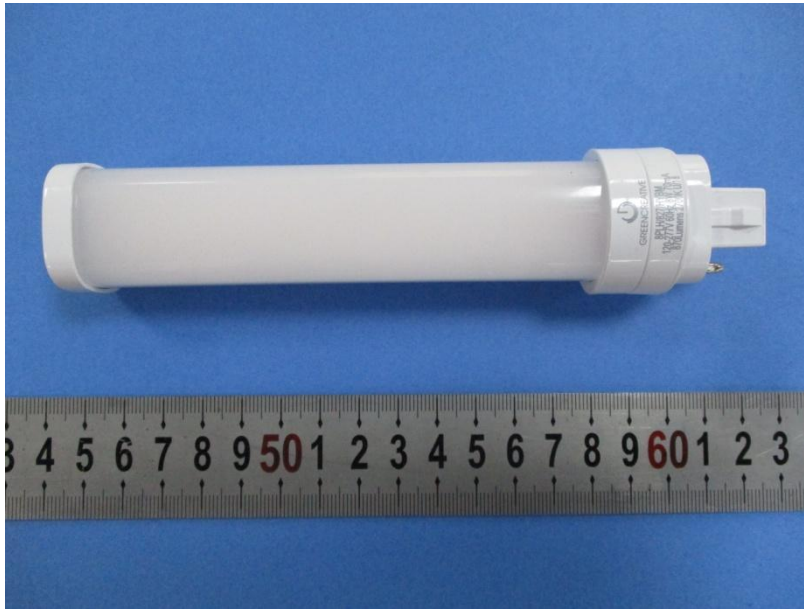
Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	265	265	265	265	265	265	265	265
5.0°	262	262	262	264	263	263	263	264
10.0°	256	256	256	259	259	260	260	261
15.0°	247	248	250	253	254	255	255	254
20.0°	236	237	240	245	247	248	246	245
25.0°	223	225	229	235	237	238	236	234
30.0°	207	210	215	223	227	227	224	221
35.0°	192	194	201	210	214	215	210	205
40.0°	173	177	186	196	201	201	195	189
45.0°	154	160	170	181	187	186	179	171
50.0°	135	141	153	166	172	171	163	152
55.0°	115	122	136	151	158	155	145	134
60.0°	94	104	119	135	142	139	128	114
65.0°	74	85	103	119	126	123	110	94
70.0°	53	66	86	103	111	106	93	75
75.0°	34	49	70	87	95	90	76	57
80.0°	16	34	56	73	80	75	60	40
85.0°	4	22	44	60	67	62	47	26
90.0°	0	15	35	51	57	52	37	16
95.0°	0	11	29	43	49	44	30	12
100.0°	0	8	25	38	43	38	25	9
105.0°	0	7	21	33	37	33	21	7
110.0°	0	5	18	29	33	29	18	5
115.0°	0	4	15	25	28	25	15	4
120.0°	0	4	13	21	24	21	13	4
125.0°	0	3	11	18	21	18	11	3
130.0°	0	2	9	15	17	15	9	3
135.0°	0	1	7	12	14	12	7	2
140.0°	0	1	6	10	11	10	6	2
145.0°	0	1	4	8	9	8	4	1
150.0°	0	1	2	6	7	6	3	1
155.0°	0	1	2	4	5	4	2	1
160.0°	0	0	1	2	2	2	1	1
165.0°	0	0	1	1	1	1	1	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	6.3	0.69	0-5	6.3	0.69
5-10	18.7	2.05	0-10	25.0	2.74
10-15	30.4	3.33	0-15	55.4	6.06
15-20	41.0	4.49	0-20	96.4	10.55
20-25	50.1	5.49	0-25	146.5	16.04
25-30	57.6	6.31	0-30	204.1	22.35
30-35	63.1	6.91	0-35	267.2	29.26
35-40	66.7	7.30	0-40	333.9	36.57
40-45	68.2	7.47	0-45	402.2	44.04
45-50	67.8	7.43	0-50	470.0	51.47
50-55	65.6	7.18	0-55	535.6	58.65
55-60	61.7	6.75	0-60	597.3	65.40
60-65	56.2	6.15	0-65	653.5	71.55
65-70	49.5	5.42	0-70	703.0	76.98
70-75	42.0	4.60	0-75	745.0	81.57
75-80	34.2	3.74	0-80	779.1	85.32
80-85	26.8	2.94	0-85	806.0	88.26
85-90	21.0	2.29	0-90	826.9	90.55
90-95	16.8	1.84	0-95	843.8	92.39
95-100	14.0	1.53	0-100	857.8	93.93
100-105	11.7	1.29	0-105	869.5	95.21
105-110	9.8	1.08	0-110	879.3	96.29
110-115	8.1	0.89	0-115	887.5	97.18
115-120	6.6	0.73	0-120	894.1	97.90
120-125	5.3	0.58	0-125	899.4	98.49
125-130	4.2	0.46	0-130	903.6	98.95
130-135	3.2	0.35	0-135	906.8	99.30
135-140	2.4	0.26	0-140	909.2	99.56
140-145	1.7	0.19	0-145	910.9	99.74
145-150	1.1	0.12	0-150	912.0	99.87
150-155	0.7	0.07	0-155	912.7	99.94
155-160	0.4	0.04	0-160	913.0	99.98
160-165	0.1	0.02	0-165	913.2	99.99
165-170	0.0	0.00	0-170	913.2	100.00
170-175	0.0	0.00	0-175	913.2	100.00
175-180	0.0	0.00	0-180	913.2	100.00

## 6. Product Photo



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