



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 5.5PLSH/835/HYB/GX23**

<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>	PKS181030082-10-2
<b>Test Date:</b>	2018-11-02 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: 5.5PLSH/835/HYB/GX23  
 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: 5.5W  
 Nominal CCT: 3500K  
 Nominal Lumen Output: 550lm

## 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**

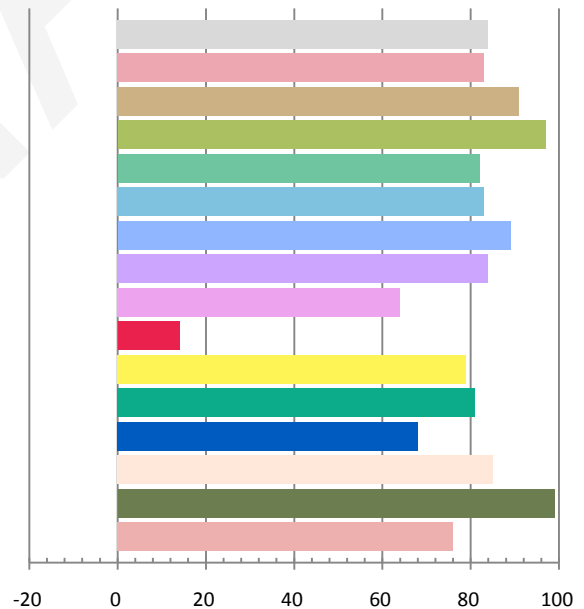
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0465	5.44	0.9752	615.31	113.11

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.869	3389	-0.00034	0.4113	0.3929	0.2387	0.5131

### Color Rendering Index

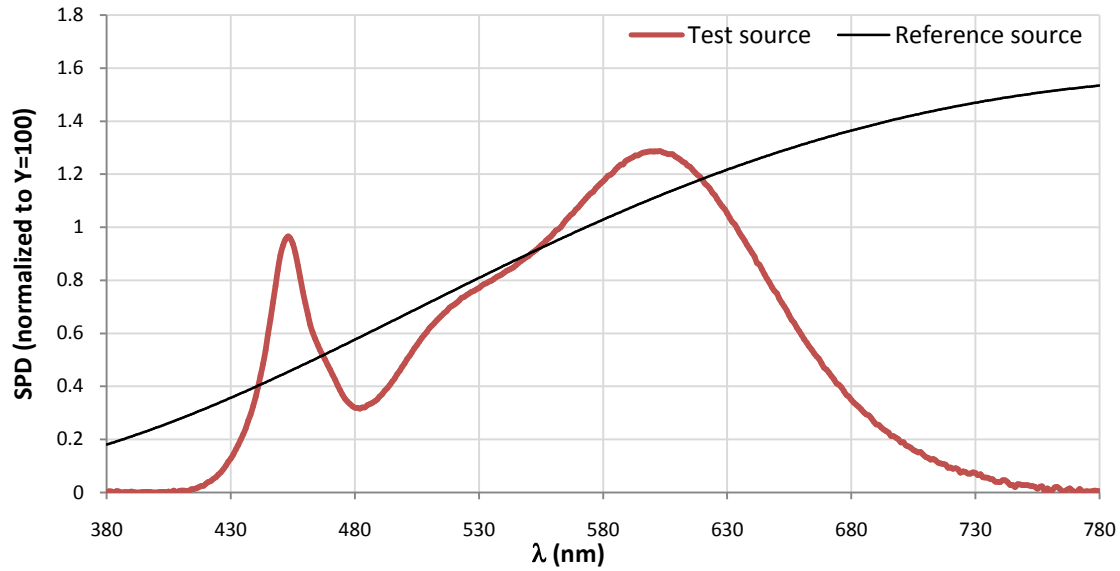
<b>Ra</b> <b>84.0</b>			
<b>R1</b> 83	<b>R2</b> 91	<b>R3</b> 97	<b>R4</b> 82
<b>R5</b> 83	<b>R6</b> 89	<b>R7</b> 84	<b>R8</b> 64
<b>R9</b> 14	<b>R10</b> 79	<b>R11</b> 81	<b>R12</b> 68
<b>R13</b> 85	<b>R14</b> 99	<b>R15</b> 76	



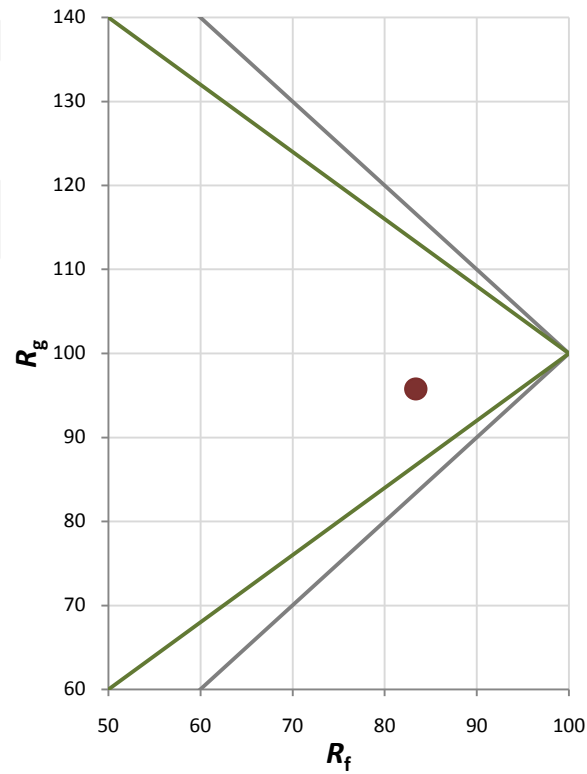
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	83
Gamut Index $R_g$	96

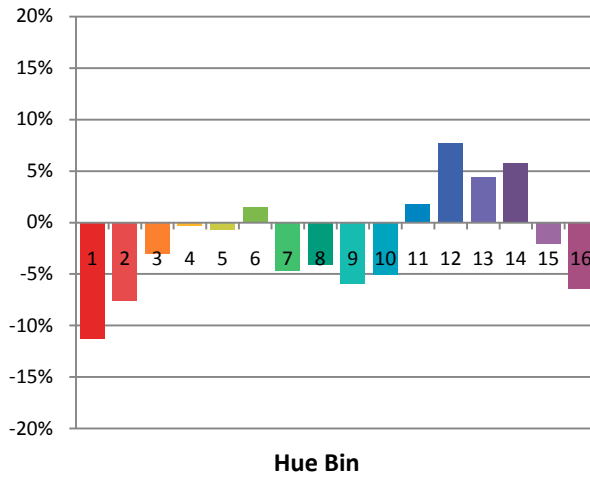
### Spectral Power Distribution Comparison



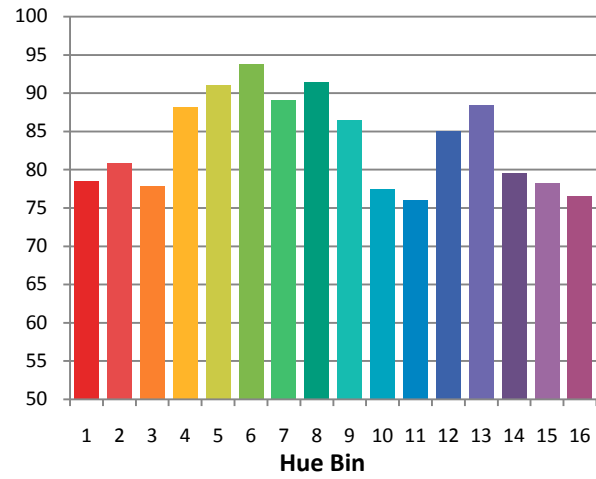
### Plot of $R_g$ versus $R_f$



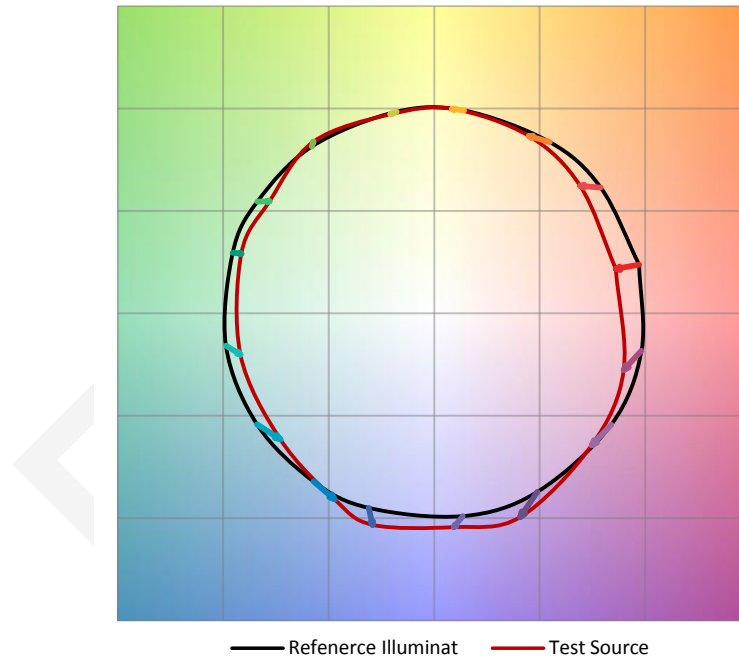
Chroma Shift by Hue



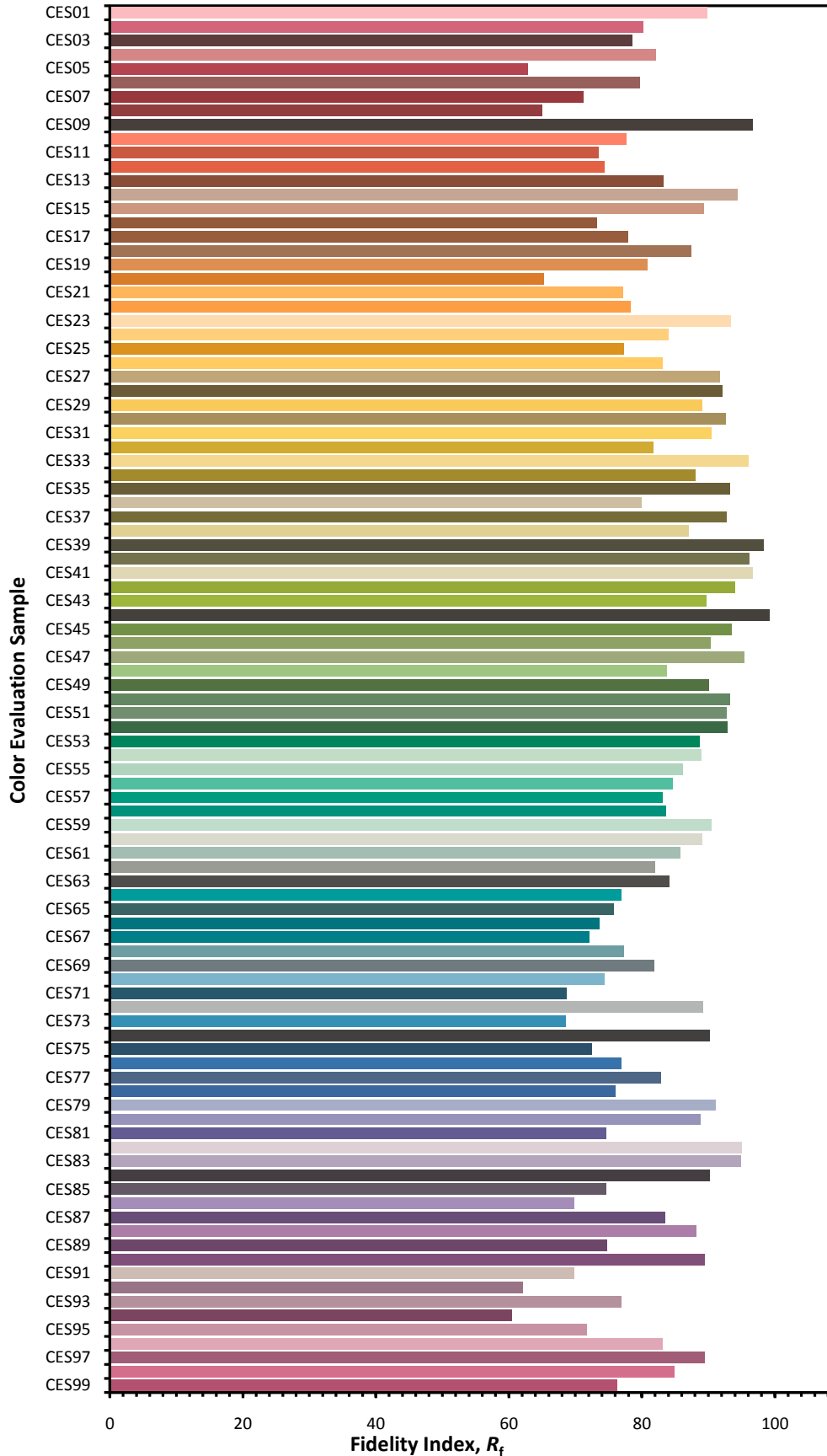
$R_f$  by Hue



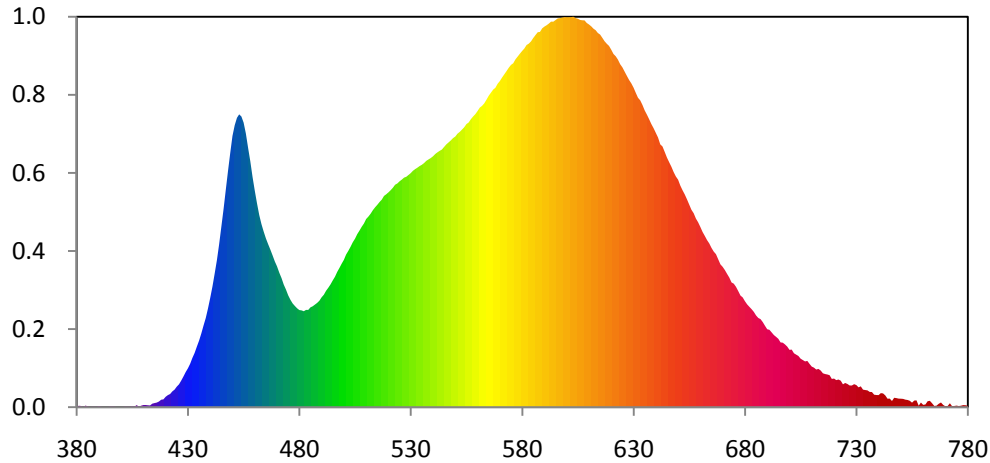
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

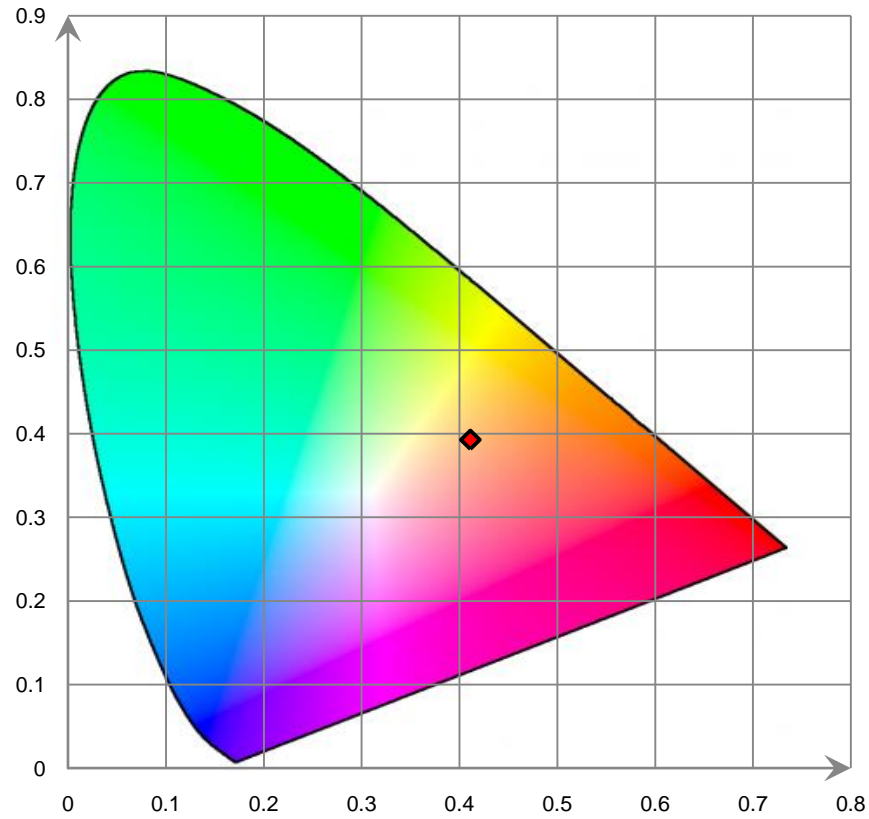


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.380E-02	421	3.579E-01	462	5.707E+00	503	4.764E+00	544	7.650E+00
381	4.300E-02	422	3.904E-01	463	5.435E+00	504	4.898E+00	545	7.729E+00
382	3.540E-02	423	4.688E-01	464	5.213E+00	505	5.004E+00	546	7.804E+00
383	1.400E-03	424	5.217E-01	465	5.010E+00	506	5.138E+00	547	7.863E+00
384	4.810E-02	425	6.111E-01	466	4.840E+00	507	5.244E+00	548	7.921E+00
385	2.720E-02	426	6.796E-01	467	4.677E+00	508	5.356E+00	549	7.989E+00
386	2.600E-03	427	7.905E-01	468	4.506E+00	509	5.454E+00	550	8.035E+00
387	1.490E-02	428	9.129E-01	469	4.326E+00	510	5.587E+00	551	8.121E+00
388	1.410E-02	429	1.043E+00	470	4.180E+00	511	5.660E+00	552	8.174E+00
389	9.700E-03	430	1.154E+00	471	3.993E+00	512	5.744E+00	553	8.242E+00
390	3.510E-02	431	1.289E+00	472	3.834E+00	513	5.848E+00	554	8.309E+00
391	1.400E-02	432	1.463E+00	473	3.641E+00	514	5.935E+00	555	8.404E+00
392	1.400E-03	433	1.609E+00	474	3.492E+00	515	6.009E+00	556	8.452E+00
393	5.000E-04	434	1.797E+00	475	3.321E+00	516	6.090E+00	557	8.550E+00
394	7.300E-03	435	1.975E+00	476	3.188E+00	517	6.161E+00	558	8.630E+00
395	2.390E-02	436	2.188E+00	477	3.081E+00	518	6.272E+00	559	8.700E+00
396	2.060E-02	437	2.422E+00	478	3.005E+00	519	6.320E+00	560	8.793E+00
397	1.740E-02	438	2.647E+00	479	2.936E+00	520	6.379E+00	561	8.894E+00
398	6.000E-03	439	2.929E+00	480	2.883E+00	521	6.443E+00	562	8.947E+00
399	3.000E-04	440	3.244E+00	481	2.874E+00	522	6.516E+00	563	9.020E+00
400	0.000E+00	441	3.577E+00	482	2.849E+00	523	6.604E+00	564	9.129E+00
401	1.030E-02	442	3.966E+00	483	2.888E+00	524	6.642E+00	565	9.247E+00
402	2.190E-02	443	4.365E+00	484	2.888E+00	525	6.706E+00	566	9.338E+00
403	1.750E-02	444	4.834E+00	485	2.964E+00	526	6.756E+00	567	9.429E+00
404	1.370E-02	445	5.360E+00	486	2.995E+00	527	6.816E+00	568	9.483E+00
405	3.560E-02	446	5.884E+00	487	3.045E+00	528	6.841E+00	569	9.603E+00
406	1.770E-02	447	6.458E+00	488	3.095E+00	529	6.895E+00	570	9.682E+00
407	6.290E-02	448	7.016E+00	489	3.160E+00	530	6.948E+00	571	9.788E+00
408	1.400E-02	449	7.553E+00	490	3.262E+00	531	7.020E+00	572	9.883E+00
409	4.350E-02	450	8.055E+00	491	3.339E+00	532	7.069E+00	573	9.979E+00
410	6.320E-02	451	8.373E+00	492	3.454E+00	533	7.111E+00	574	1.008E+01
411	6.440E-02	452	8.591E+00	493	3.546E+00	534	7.160E+00	575	1.016E+01
412	5.670E-02	453	8.695E+00	494	3.646E+00	535	7.196E+00	576	1.021E+01
413	5.110E-02	454	8.630E+00	495	3.763E+00	536	7.249E+00	577	1.033E+01
414	1.045E-01	455	8.447E+00	496	3.873E+00	537	7.314E+00	578	1.041E+01
415	1.217E-01	456	8.125E+00	497	4.016E+00	538	7.357E+00	579	1.050E+01
416	1.373E-01	457	7.704E+00	498	4.134E+00	539	7.397E+00	580	1.058E+01
417	1.683E-01	458	7.299E+00	499	4.259E+00	540	7.449E+00	581	1.065E+01
418	2.215E-01	459	6.839E+00	500	4.375E+00	541	7.516E+00	582	1.075E+01
419	2.317E-01	460	6.430E+00	501	4.532E+00	542	7.568E+00	583	1.079E+01
420	3.086E-01	461	6.055E+00	502	4.643E+00	543	7.610E+00	584	1.086E+01

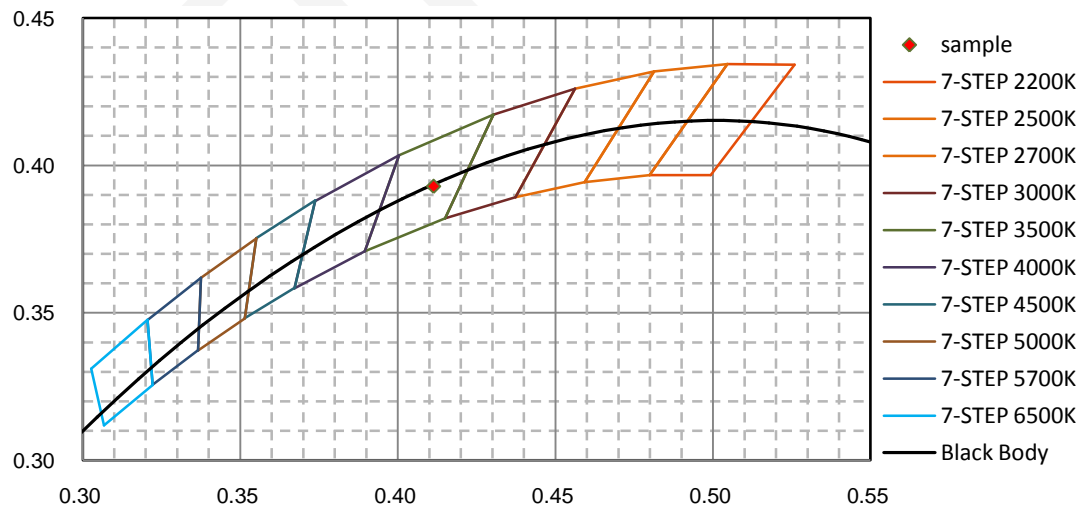


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.096E+01	626	9.964E+00	667	4.543E+00	708	1.374E+00	749	2.541E-01
586	1.105E+01	627	9.838E+00	668	4.392E+00	709	1.284E+00	750	2.513E-01
587	1.113E+01	628	9.716E+00	669	4.241E+00	710	1.205E+00	751	2.462E-01
588	1.114E+01	629	9.615E+00	670	4.167E+00	711	1.173E+00	752	2.237E-01
589	1.125E+01	630	9.489E+00	671	4.070E+00	712	1.117E+00	753	2.129E-01
590	1.130E+01	631	9.335E+00	672	3.957E+00	713	1.136E+00	754	1.902E-01
591	1.134E+01	632	9.188E+00	673	3.847E+00	714	1.088E+00	755	1.340E-01
592	1.139E+01	633	9.111E+00	674	3.703E+00	715	1.006E+00	756	1.960E-01
593	1.145E+01	634	8.975E+00	675	3.666E+00	716	9.838E-01	757	2.027E-01
594	1.145E+01	635	8.813E+00	676	3.573E+00	717	9.708E-01	758	4.370E-02
595	1.149E+01	636	8.685E+00	677	3.447E+00	718	9.491E-01	759	1.385E-01
596	1.154E+01	637	8.550E+00	678	3.314E+00	719	8.395E-01	760	6.940E-02
597	1.155E+01	638	8.406E+00	679	3.259E+00	720	8.501E-01	761	8.020E-02
598	1.157E+01	639	8.284E+00	680	3.147E+00	721	8.035E-01	762	1.760E-01
599	1.158E+01	640	8.144E+00	681	3.053E+00	722	8.212E-01	763	1.889E-01
600	1.158E+01	641	8.007E+00	682	2.980E+00	723	7.868E-01	764	1.157E-01
601	1.158E+01	642	7.803E+00	683	2.909E+00	724	6.778E-01	765	3.680E-02
602	1.158E+01	643	7.740E+00	684	2.828E+00	725	7.189E-01	766	4.540E-02
603	1.159E+01	644	7.578E+00	685	2.724E+00	726	6.897E-01	767	1.012E-01
604	1.155E+01	645	7.413E+00	686	2.649E+00	727	6.443E-01	768	1.386E-01
605	1.153E+01	646	7.272E+00	687	2.615E+00	728	6.428E-01	769	6.680E-02
606	1.150E+01	647	7.138E+00	688	2.527E+00	729	6.827E-01	770	2.510E-02
607	1.149E+01	648	6.981E+00	689	2.417E+00	730	6.571E-01	771	3.650E-02
608	1.148E+01	649	6.849E+00	690	2.314E+00	731	5.892E-01	772	1.154E-01
609	1.141E+01	650	6.755E+00	691	2.297E+00	732	6.193E-01	773	2.810E-02
610	1.136E+01	651	6.579E+00	692	2.220E+00	733	5.205E-01	774	3.550E-02
611	1.131E+01	652	6.441E+00	693	2.141E+00	734	5.088E-01	775	4.590E-02
612	1.124E+01	653	6.316E+00	694	2.087E+00	735	4.980E-01	776	3.350E-02
613	1.119E+01	654	6.171E+00	695	2.029E+00	736	4.537E-01	777	4.400E-02
614	1.111E+01	655	6.015E+00	696	1.924E+00	737	4.501E-01	778	6.180E-02
615	1.106E+01	656	5.860E+00	697	1.915E+00	738	3.707E-01	779	5.810E-02
616	1.097E+01	657	5.758E+00	698	1.862E+00	739	3.607E-01	780	4.320E-02
617	1.087E+01	658	5.599E+00	699	1.798E+00	740	3.580E-01		
618	1.079E+01	659	5.489E+00	700	1.702E+00	741	4.172E-01		
619	1.073E+01	660	5.350E+00	701	1.710E+00	742	4.078E-01		
620	1.061E+01	661	5.202E+00	702	1.601E+00	743	3.496E-01		
621	1.049E+01	662	5.083E+00	703	1.561E+00	744	2.513E-01		
622	1.042E+01	663	4.961E+00	704	1.520E+00	745	2.550E-01		
623	1.032E+01	664	4.860E+00	705	1.440E+00	746	1.836E-01		
624	1.018E+01	665	4.728E+00	706	1.399E+00	747	2.790E-01		
625	1.009E+01	666	4.620E+00	707	1.359E+00	748	2.690E-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**

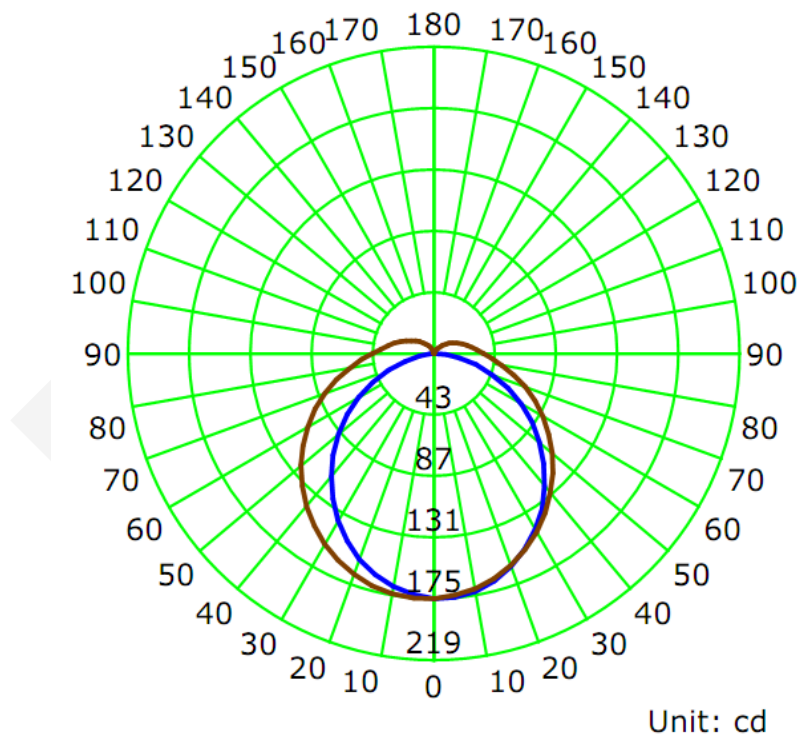
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0470	5.46	0.9680

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
613.7	112.45	175.4	1.20	1.29

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	105.2	117.9	129.2	115.5	117.0
Field Angle (10% $I_{max}$ ):	157.7	206.3	239.8	197.6	200.4

### Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	175	175	175	175	175	175	175	175
5.0°	175	174	174	174	174	173	173	173
10.0°	173	172	172	172	171	170	169	169
15.0°	168	168	167	168	167	165	164	163
20.0°	162	162	162	162	161	159	157	156
25.0°	154	154	155	156	155	152	149	148
30.0°	145	145	147	148	147	144	141	138
35.0°	135	135	137	140	139	135	131	127
40.0°	124	124	127	131	130	126	120	116
45.0°	112	113	117	121	121	116	109	104
50.0°	99	101	106	111	111	106	98	92
55.0°	86	88	95	101	101	95	86	79
60.0°	73	76	84	90	90	85	75	66
65.0°	59	63	72	79	80	74	64	53
70.0°	45	51	61	69	70	63	53	41
75.0°	31	39	50	58	59	53	42	29
80.0°	19	28	40	49	50	44	33	19
85.0°	9	20	32	41	42	37	26	12
90.0°	2	14	26	35	36	31	20	8
95.0°	0	10	22	30	32	27	17	5
100.0°	0	8	18	26	28	23	14	3
105.0°	0	6	16	23	25	20	12	3
110.0°	0	5	13	20	21	18	10	2
115.0°	0	4	11	17	19	15	9	2
120.0°	0	3	9	14	16	13	7	2
125.0°	0	3	8	12	13	11	6	1
130.0°	0	2	6	10	11	9	5	1
135.0°	0	2	5	8	9	7	4	1
140.0°	0	1	4	7	7	6	3	1
145.0°	0	1	3	5	6	4	2	0
150.0°	0	1	3	4	4	3	1	0
155.0°	0	1	2	3	3	2	0	0
160.0°	0	0	1	2	2	1	0	0
165.0°	0	0	0	1	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°	175	175	175	175	175	175	175	175
5.0°	173	174	174	175	175	175	175	175
10.0°	169	170	172	174	174	174	174	173
15.0°	164	165	168	171	172	172	170	169
20.0°	157	159	163	167	168	168	166	163
25.0°	148	151	156	161	163	163	160	156
30.0°	138	142	148	154	157	156	152	148
35.0°	127	132	139	147	150	149	143	138
40.0°	115	121	130	138	143	141	134	127
45.0°	103	109	119	130	134	131	124	116
50.0°	90	97	109	120	125	122	113	103
55.0°	76	85	98	110	115	111	102	91
60.0°	63	72	87	99	105	101	90	78
65.0°	49	60	75	89	94	90	79	65
70.0°	35	47	64	78	83	79	67	52
75.0°	22	35	53	67	72	68	56	40
80.0°	11	24	43	57	62	58	45	29
85.0°	3	17	35	48	53	48	36	19
90.0°	0	12	28	40	45	41	29	13
95.0°	0	8	24	35	39	35	23	9
100.0°	0	7	20	30	34	30	20	6
105.0°	0	6	17	26	30	26	17	5
110.0°	0	4	15	23	26	23	14	4
115.0°	0	4	13	20	22	19	12	4
120.0°	0	3	11	17	19	17	10	3
125.0°	0	3	8	14	16	14	9	3
130.0°	0	2	7	12	14	12	7	2
135.0°	0	2	6	9	12	10	6	2
140.0°	0	2	5	8	9	8	5	2
145.0°	0	1	4	6	7	6	4	1
150.0°	0	1	3	5	5	5	3	1
155.0°	0	1	2	3	4	3	2	1
160.0°	0	0	1	2	3	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	4.2	0.68	0-5	4.2	0.68
5-10	12.4	2.02	0-10	16.5	2.70
10-15	20.1	3.28	0-15	36.7	5.97
15-20	27.2	4.42	0-20	63.8	10.40
20-25	33.2	5.42	0-25	97.1	15.82
25-30	38.2	6.23	0-30	135.3	22.04
30-35	41.9	6.83	0-35	177.2	28.87
35-40	44.3	7.22	0-40	221.5	36.10
40-45	45.4	7.40	0-45	266.9	43.50
45-50	45.2	7.36	0-50	312.1	50.86
50-55	43.7	7.13	0-55	355.8	57.98
55-60	41.2	6.71	0-60	397.0	64.69
60-65	37.6	6.13	0-65	434.6	70.82
65-70	33.3	5.42	0-70	467.9	76.24
70-75	28.3	4.61	0-75	496.2	80.85
75-80	23.2	3.78	0-80	519.4	84.63
80-85	18.4	3.00	0-85	537.8	87.63
85-90	14.6	2.38	0-90	552.4	90.01
90-95	11.8	1.93	0-95	564.2	91.94
95-100	9.9	1.61	0-100	574.1	93.55
100-105	8.3	1.36	0-105	582.4	94.91
105-110	7.0	1.14	0-110	589.4	96.04
110-115	5.8	0.94	0-115	595.2	96.99
115-120	4.8	0.78	0-120	600.0	97.76
120-125	3.8	0.62	0-125	603.8	98.38
125-130	3.0	0.49	0-130	606.8	98.87
130-135	2.3	0.37	0-135	609.1	99.25
135-140	1.7	0.28	0-140	610.8	99.52
140-145	1.2	0.20	0-145	612.0	99.72
145-150	0.8	0.13	0-150	612.8	99.85
150-155	0.5	0.08	0-155	613.3	99.93
155-160	0.3	0.04	0-160	613.5	99.97
160-165	0.1	0.02	0-165	613.7	99.99
165-170	0.0	0.01	0-170	613.7	100.00
170-175	0.0	0.00	0-175	613.7	100.00
175-180	0.0	0.00	0-180	613.7	100.00

## 6. Product Photo



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