

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 65HIDHB/840/BYP/EX39**

<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>	PKS180312081-10
<b>Test Date:</b>	2018-03-14 to 2018-03-16
<b>Report Date:</b>	2018-03-16
<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 2018-03-12 and used for testing.

Model Tested: 65HIDHB/840/BYP/EX39  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED Luminaires  
 Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120 VAC 50/60Hz  
 Rated Power: 65W  
 Nominal CCT: 4000K  
 Nominal Lumen Output: 8600lm

## 2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- 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	2017-03-23	2018-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2017-03-23	2018-03-22
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	2017-03-23	2018-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2017-03-23	2018-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2017-03-23	2018-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2017-03-23	2018-03-22
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: **Base Up**

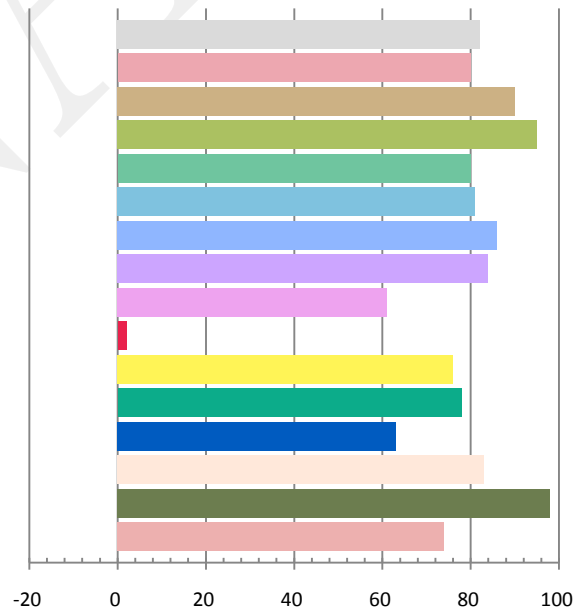
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.5364	63.48	0.986	8607.5	135.59

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
25.910	4009	-0.00090	0.3795	0.3742	0.2255	0.5003

### Color Rendering Index

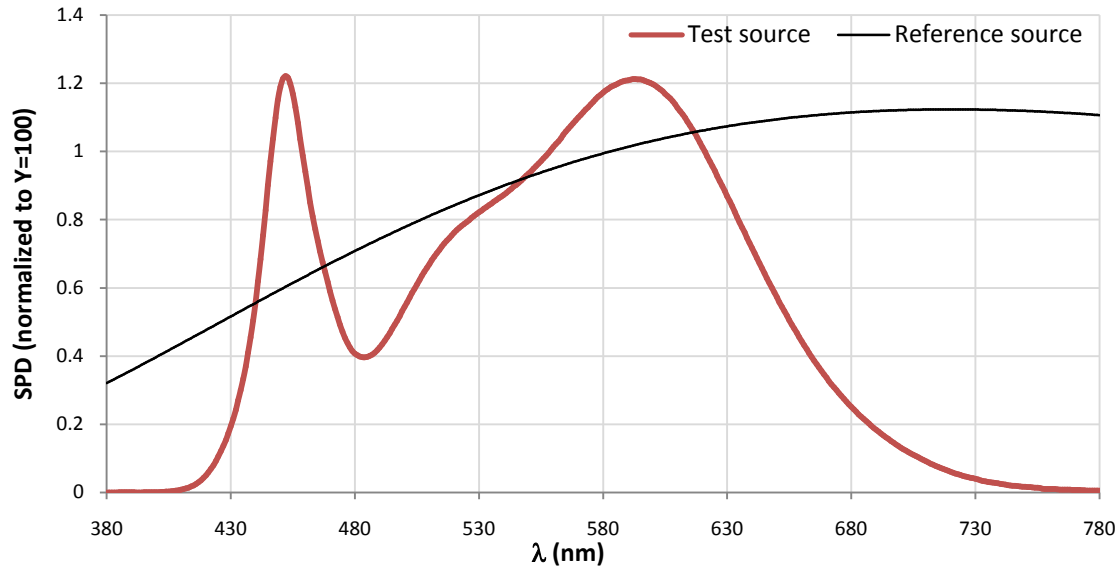
<b>Ra</b> <b>82.2</b>			
<b>R1</b> 80	<b>R2</b> 90	<b>R3</b> 95	<b>R4</b> 80
<b>R5</b> 81	<b>R6</b> 86	<b>R7</b> 84	<b>R8</b> 61
<b>R9</b> 2	<b>R10</b> 76	<b>R11</b> 78	<b>R12</b> 63
<b>R13</b> 83	<b>R14</b> 98	<b>R15</b> 74	



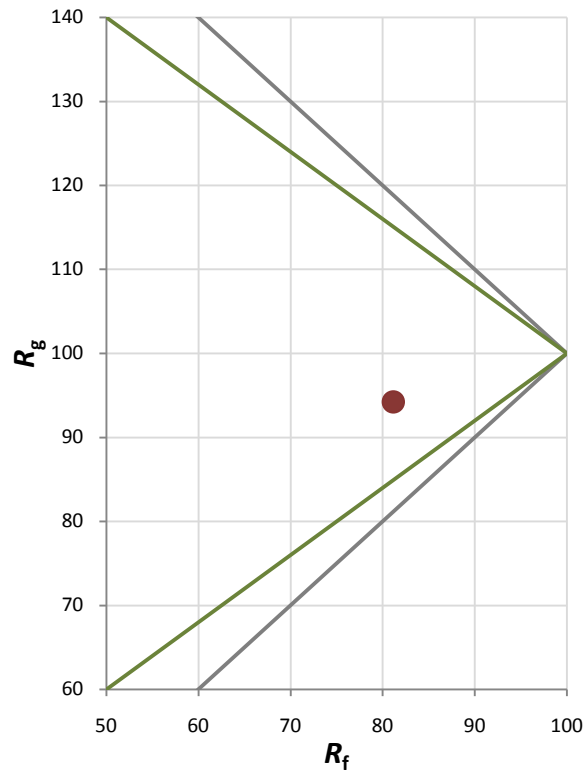
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	81
Gamut Index $R_g$	94

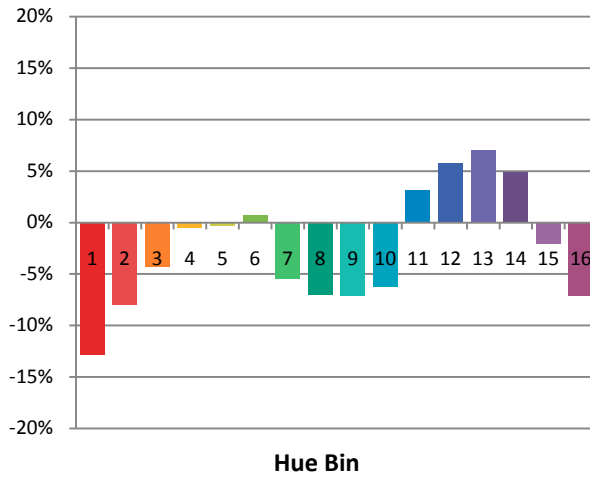
### Spectral Power Distribution Comparison



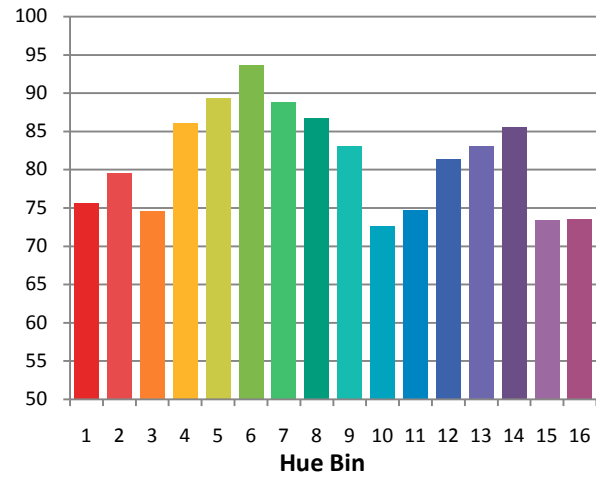
### Plot of $R_g$ versus $R_f$



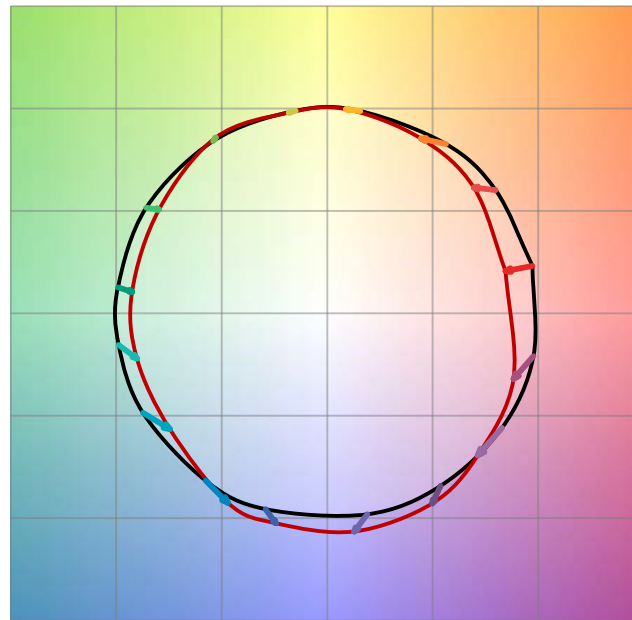
Chroma Shift by Hue



$R_t$  by Hue

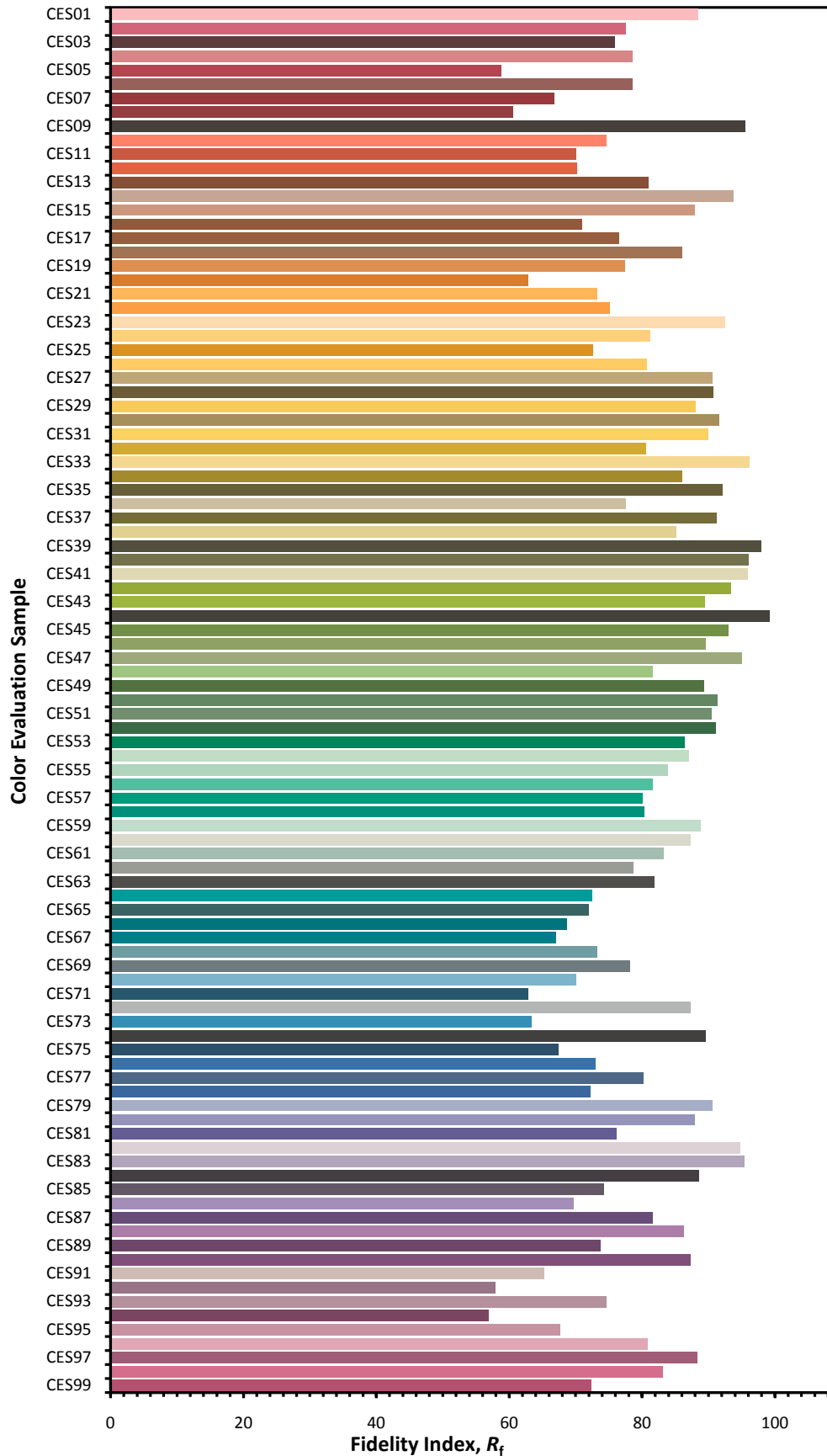


Color Vector Graphic

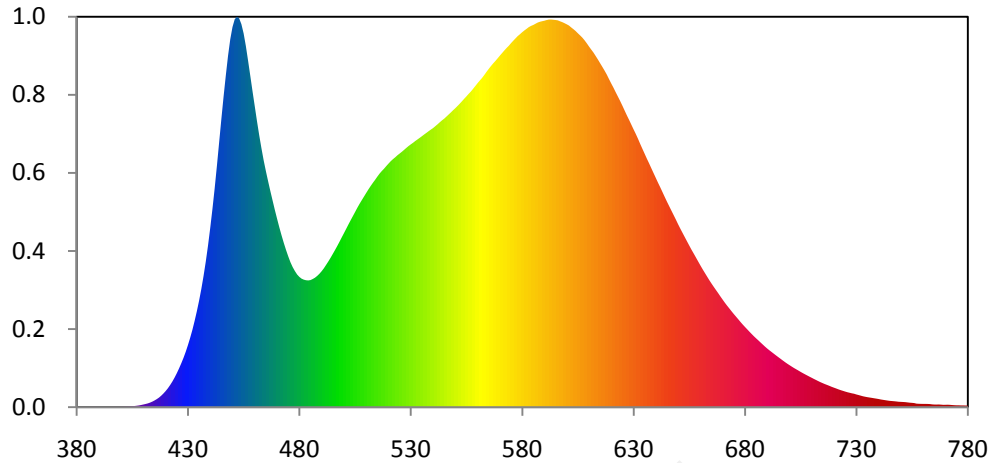


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

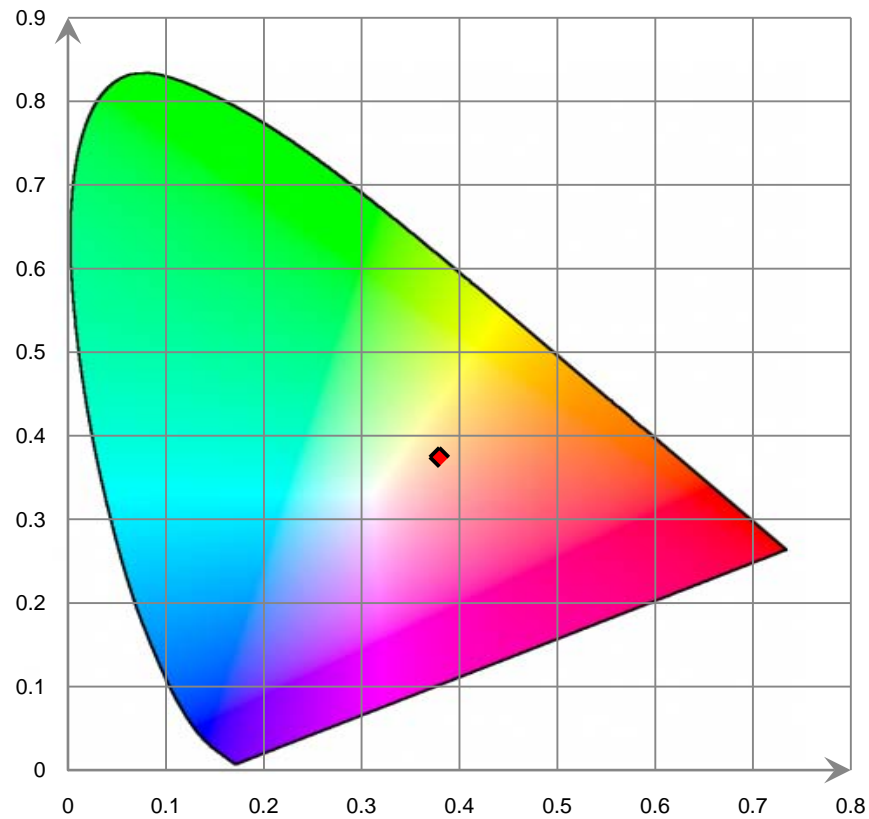


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.870E-02	421	7.450E+00	462	1.071E+02	503	7.360E+01	544	1.130E+02
381	3.400E-02	422	8.707E+00	463	1.020E+02	504	7.524E+01	545	1.137E+02
382	4.620E-02	423	1.009E+01	464	9.725E+01	505	7.688E+01	546	1.145E+02
383	5.010E-02	424	1.165E+01	465	9.298E+01	506	7.854E+01	547	1.153E+02
384	4.900E-02	425	1.338E+01	466	8.900E+01	507	8.009E+01	548	1.161E+02
385	5.230E-02	426	1.524E+01	467	8.514E+01	508	8.154E+01	549	1.170E+02
386	6.510E-02	427	1.726E+01	468	8.144E+01	509	8.296E+01	550	1.178E+02
387	8.720E-02	428	1.942E+01	469	7.777E+01	510	8.440E+01	551	1.187E+02
388	1.001E-01	429	2.181E+01	470	7.431E+01	511	8.582E+01	552	1.196E+02
389	1.075E-01	430	2.445E+01	471	7.093E+01	512	8.714E+01	553	1.206E+02
390	9.140E-02	431	2.732E+01	472	6.779E+01	513	8.839E+01	554	1.215E+02
391	5.410E-02	432	3.046E+01	473	6.481E+01	514	8.959E+01	555	1.225E+02
392	4.310E-02	433	3.399E+01	474	6.205E+01	515	9.085E+01	556	1.235E+02
393	3.000E-02	434	3.780E+01	475	5.949E+01	516	9.203E+01	557	1.244E+02
394	4.410E-02	435	4.195E+01	476	5.714E+01	517	9.304E+01	558	1.255E+02
395	5.940E-02	436	4.652E+01	477	5.523E+01	518	9.395E+01	559	1.266E+02
396	8.200E-02	437	5.165E+01	478	5.365E+01	519	9.498E+01	560	1.277E+02
397	9.280E-02	438	5.730E+01	479	5.230E+01	520	9.596E+01	561	1.287E+02
398	9.760E-02	439	6.358E+01	480	5.134E+01	521	9.690E+01	562	1.297E+02
399	9.890E-02	440	7.056E+01	481	5.066E+01	522	9.772E+01	563	1.309E+02
400	1.236E-01	441	7.808E+01	482	5.026E+01	523	9.845E+01	564	1.321E+02
401	1.360E-01	442	8.622E+01	483	5.002E+01	524	9.924E+01	565	1.333E+02
402	1.775E-01	443	9.503E+01	484	4.995E+01	525	9.993E+01	566	1.344E+02
403	2.410E-01	444	1.043E+02	485	5.009E+01	526	1.006E+02	567	1.355E+02
404	3.108E-01	445	1.135E+02	486	5.050E+01	527	1.014E+02	568	1.364E+02
405	3.816E-01	446	1.224E+02	487	5.100E+01	528	1.022E+02	569	1.375E+02
406	4.616E-01	447	1.307E+02	488	5.171E+01	529	1.029E+02	570	1.385E+02
407	5.746E-01	448	1.384E+02	489	5.257E+01	530	1.036E+02	571	1.395E+02
408	6.951E-01	449	1.450E+02	490	5.357E+01	531	1.042E+02	572	1.406E+02
409	8.640E-01	450	1.498E+02	491	5.472E+01	532	1.049E+02	573	1.415E+02
410	1.061E+00	451	1.529E+02	492	5.605E+01	533	1.055E+02	574	1.424E+02
411	1.259E+00	452	1.539E+02	493	5.741E+01	534	1.061E+02	575	1.434E+02
412	1.491E+00	453	1.532E+02	494	5.884E+01	535	1.068E+02	576	1.444E+02
413	1.807E+00	454	1.509E+02	495	6.036E+01	536	1.075E+02	577	1.453E+02
414	2.188E+00	455	1.473E+02	496	6.191E+01	537	1.081E+02	578	1.462E+02
415	2.642E+00	456	1.423E+02	497	6.349E+01	538	1.087E+02	579	1.470E+02
416	3.176E+00	457	1.365E+02	498	6.515E+01	539	1.094E+02	580	1.477E+02
417	3.768E+00	458	1.305E+02	499	6.686E+01	540	1.100E+02	581	1.485E+02
418	4.519E+00	459	1.245E+02	500	6.854E+01	541	1.107E+02	582	1.491E+02
419	5.386E+00	460	1.186E+02	501	7.023E+01	542	1.114E+02	583	1.498E+02
420	6.350E+00	461	1.127E+02	502	7.195E+01	543	1.122E+02	584	1.503E+02

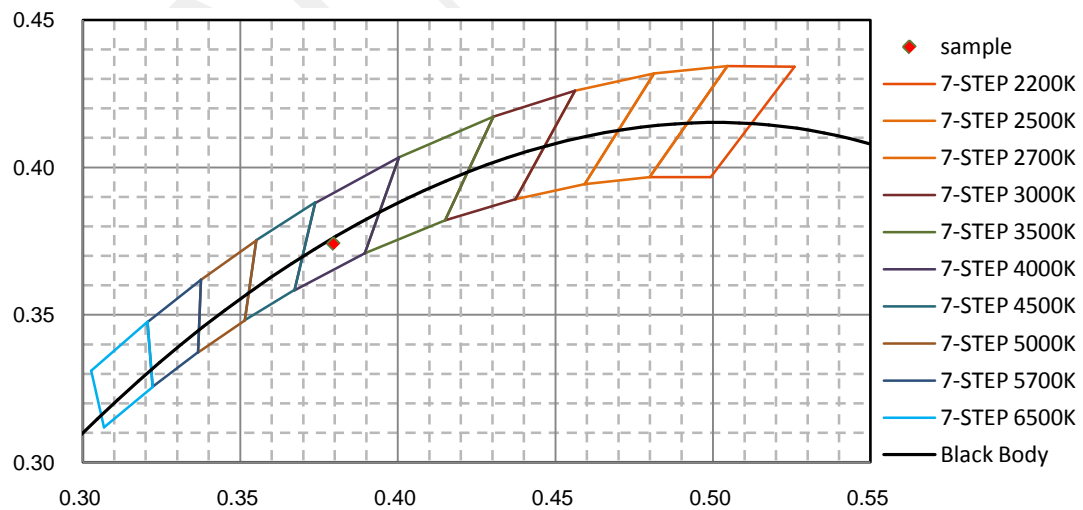


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.506E+02	626	1.169E+02	667	4.618E+01	708	1.247E+01	749	2.132E+00
586	1.511E+02	627	1.150E+02	668	4.493E+01	709	1.202E+01	750	2.086E+00
587	1.516E+02	628	1.132E+02	669	4.363E+01	710	1.157E+01	751	2.053E+00
588	1.519E+02	629	1.114E+02	670	4.239E+01	711	1.111E+01	752	1.978E+00
589	1.521E+02	630	1.095E+02	671	4.116E+01	712	1.068E+01	753	1.873E+00
590	1.523E+02	631	1.077E+02	672	4.001E+01	713	1.023E+01	754	1.774E+00
591	1.526E+02	632	1.058E+02	673	3.891E+01	714	9.819E+00	755	1.713E+00
592	1.527E+02	633	1.037E+02	674	3.779E+01	715	9.426E+00	756	1.622E+00
593	1.528E+02	634	1.018E+02	675	3.672E+01	716	9.058E+00	757	1.404E+00
594	1.527E+02	635	9.984E+01	676	3.568E+01	717	8.728E+00	758	1.337E+00
595	1.526E+02	636	9.790E+01	677	3.465E+01	718	8.366E+00	759	1.301E+00
596	1.524E+02	637	9.606E+01	678	3.359E+01	719	8.004E+00	760	1.288E+00
597	1.521E+02	638	9.414E+01	679	3.259E+01	720	7.673E+00	761	1.291E+00
598	1.517E+02	639	9.224E+01	680	3.163E+01	721	7.361E+00	762	1.276E+00
599	1.513E+02	640	9.034E+01	681	3.071E+01	722	7.024E+00	763	1.231E+00
600	1.509E+02	641	8.845E+01	682	2.978E+01	723	6.702E+00	764	1.113E+00
601	1.504E+02	642	8.664E+01	683	2.886E+01	724	6.436E+00	765	1.040E+00
602	1.497E+02	643	8.476E+01	684	2.798E+01	725	6.153E+00	766	1.036E+00
603	1.490E+02	644	8.285E+01	685	2.715E+01	726	5.896E+00	767	1.058E+00
604	1.482E+02	645	8.100E+01	686	2.634E+01	727	5.674E+00	768	1.005E+00
605	1.474E+02	646	7.922E+01	687	2.552E+01	728	5.465E+00	769	9.274E-01
606	1.465E+02	647	7.745E+01	688	2.470E+01	729	5.287E+00	770	9.342E-01
607	1.456E+02	648	7.571E+01	689	2.389E+01	730	5.023E+00	771	9.629E-01
608	1.446E+02	649	7.394E+01	690	2.311E+01	731	4.786E+00	772	9.273E-01
609	1.434E+02	650	7.211E+01	691	2.241E+01	732	4.535E+00	773	8.494E-01
610	1.421E+02	651	7.036E+01	692	2.173E+01	733	4.295E+00	774	7.830E-01
611	1.409E+02	652	6.869E+01	693	2.105E+01	734	4.115E+00	775	7.445E-01
612	1.398E+02	653	6.702E+01	694	2.037E+01	735	3.938E+00	776	7.326E-01
613	1.384E+02	654	6.536E+01	695	1.971E+01	736	3.802E+00	777	6.868E-01
614	1.370E+02	655	6.371E+01	696	1.906E+01	737	3.668E+00	778	6.970E-01
615	1.356E+02	656	6.209E+01	697	1.840E+01	738	3.508E+00	779	6.667E-01
616	1.341E+02	657	6.056E+01	698	1.776E+01	739	3.375E+00	780	6.482E-01
617	1.326E+02	658	5.901E+01	699	1.714E+01	740	3.211E+00		
618	1.311E+02	659	5.743E+01	700	1.657E+01	741	3.034E+00		
619	1.293E+02	660	5.588E+01	701	1.601E+01	742	2.893E+00		
620	1.276E+02	661	5.438E+01	702	1.545E+01	743	2.752E+00		
621	1.259E+02	662	5.293E+01	703	1.495E+01	744	2.620E+00		
622	1.241E+02	663	5.150E+01	704	1.444E+01	745	2.499E+00		
623	1.224E+02	664	5.008E+01	705	1.392E+01	746	2.417E+00		
624	1.206E+02	665	4.874E+01	706	1.342E+01	747	2.332E+00		
625	1.188E+02	666	4.744E+01	707	1.295E+01	748	2.242E+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: **Base Up**

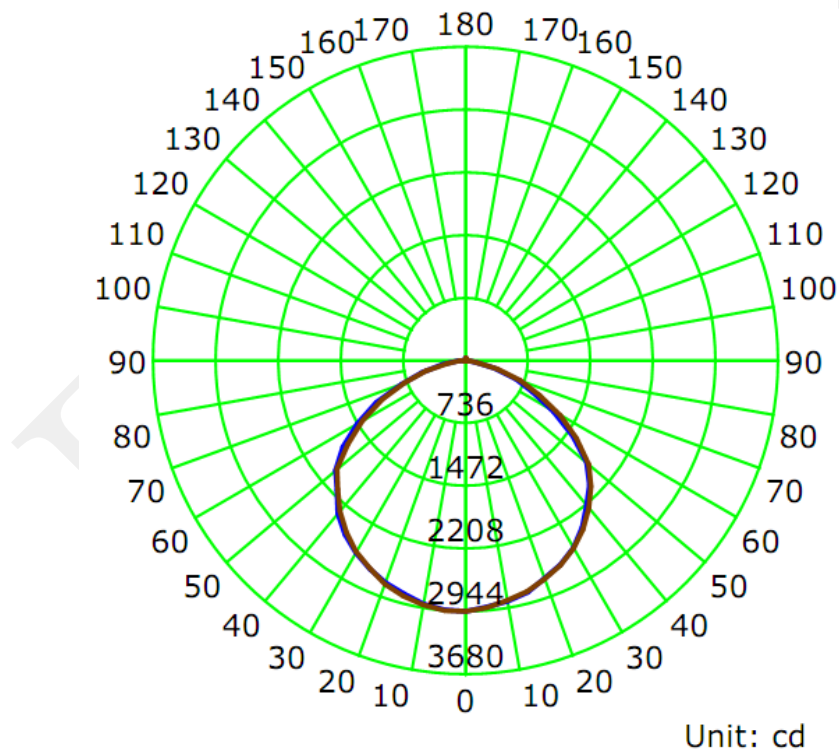
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5350	63.46	0.9880

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
8615	135.80	2944.4	1.30	1.30

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	116.2	116.2	115.9	115.2	115.9
Field Angle (10% I <sub>max</sub> ):	156.0	156.0	155.8	155.9	155.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2937	2937	2937	2937	2937	2937	2937	2937
5.0°	2898	2883	2882	2873	2905	2915	2927	2933
10.0°	2865	2852	2838	2831	2854	2877	2899	2898
15.0°	2814	2795	2795	2783	2802	2832	2858	2845
20.0°	2723	2716	2729	2724	2725	2760	2786	2778
25.0°	2640	2636	2638	2629	2647	2667	2700	2699
30.0°	2535	2527	2529	2531	2541	2563	2576	2598
35.0°	2390	2394	2396	2403	2416	2440	2449	2478
40.0°	2216	2211	2226	2234	2261	2297	2321	2352
45.0°	2066	2063	2056	2078	2089	2121	2157	2177
50.0°	1864	1829	1837	1872	1898	1930	1978	1994
55.0°	1542	1530	1537	1576	1593	1659	1725	1771
60.0°	1203	1213	1221	1218	1289	1341	1371	1455
65.0°	876	873	879	894	959	1008	1092	1127
70.0°	634	599	608	625	687	733	786	810
75.0°	354	327	340	340	385	452	496	542
80.0°	121	112	117	128	149	194	229	268
85.0°	41	38	37	43	51	67	77	92
90.0°	20	21	20	23	26	32	31	35
95.0°	11	10	12	14	15	20	22	22
100.0°	4	5	5	5	7	9	12	12
105.0°	3	4	4	4	4	4	4	5
110.0°	6	7	6	6	6	6	5	5
115.0°	12	13	11	9	9	8	7	6
120.0°	11	11	11	10	9	10	10	9
125.0°	12	12	12	12	11	11	11	10
130.0°	13	14	13	14	14	14	13	13
135.0°	16	16	17	16	17	16	15	15
140.0°	18	19	19	19	20	19	18	18
145.0°	22	21	22	22	23	22	21	21
150.0°	25	24	25	24	26	25	24	23
155.0°	27	27	27	27	28	28	28	26
160.0°	30	30	30	30	31	31	30	29
165.0°	31	33	34	33	34	34	32	32
170.0°	34	35	36	38	35	36	34	34
175.0°	30	30	32	32	32	32	34	31
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°	2937	2937	2937	2937	2937	2937	2937	2937
5.0°	2938	2944	2942	2943	2942	2937	2914	2904
10.0°	2901	2895	2902	2897	2909	2888	2890	2880
15.0°	2835	2837	2838	2858	2858	2843	2832	2811
20.0°	2775	2768	2775	2795	2790	2749	2732	2721
25.0°	2692	2689	2701	2692	2687	2651	2636	2613
30.0°	2601	2604	2609	2594	2587	2543	2527	2507
35.0°	2488	2496	2483	2475	2458	2434	2421	2380
40.0°	2344	2359	2348	2341	2309	2299	2274	2228
45.0°	2154	2186	2172	2165	2142	2109	2097	2066
50.0°	2005	2016	2030	1999	1983	1924	1893	1845
55.0°	1766	1797	1813	1771	1701	1625	1566	1556
60.0°	1478	1491	1483	1429	1409	1318	1255	1205
65.0°	1166	1180	1155	1133	1087	1013	947	884
70.0°	809	838	831	813	768	725	665	622
75.0°	539	553	544	543	496	436	392	341
80.0°	279	301	294	272	234	198	155	127
85.0°	92	104	98	92	81	67	55	43
90.0°	34	39	36	34	30	27	24	21
95.0°	21	21	20	19	19	18	14	13
100.0°	12	12	12	11	9	9	6	5
105.0°	5	5	5	5	4	4	4	4
110.0°	4	5	4	4	5	7	5	8
115.0°	5	8	6	8	9	12	13	13
120.0°	8	9	10	12	12	13	13	12
125.0°	9	9	11	11	12	11	12	11
130.0°	11	11	12	12	12	12	12	12
135.0°	13	14	14	14	14	14	15	14
140.0°	17	17	17	16	17	17	17	17
145.0°	19	20	19	19	20	20	20	20
150.0°	22	23	23	22	23	23	23	23
155.0°	25	26	25	25	25	26	26	26
160.0°	28	29	28	26	26	28	27	28
165.0°	32	32	30	30	27	30	29	31
170.0°	33	33	32	31	30	30	32	32
175.0°	30	31	32	28	30	30	26	28
180.0°	0	0	0	0	0	0	0	0

### Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	70.0	0.81	0-5	70.0	0.81
5-10	207.4	2.41	0-10	277.4	3.22
10-15	338.5	3.93	0-15	615.9	7.15
15-20	459.9	5.34	0-20	1075.8	12.49
20-25	568.1	6.59	0-25	1643.8	19.08
25-30	661.1	7.67	0-30	2305.0	26.76
30-35	736.0	8.54	0-35	3041.0	35.30
35-40	788.5	9.15	0-40	3829.6	44.45
40-45	816.1	9.47	0-45	4645.6	53.93
45-50	818.3	9.50	0-50	5463.9	63.42
50-55	780.4	9.06	0-55	6244.3	72.48
55-60	692.1	8.03	0-60	6936.4	80.52
60-65	572.1	6.64	0-65	7508.5	87.16
65-70	440.4	5.11	0-70	7948.8	92.27
70-75	304.4	3.53	0-75	8253.2	95.80
75-80	171.5	1.99	0-80	8424.7	97.79
80-85	72.2	0.84	0-85	8497.0	98.63
85-90	26.1	0.30	0-90	8523.1	98.93
90-95	12.3	0.14	0-95	8535.4	99.08
95-100	6.9	0.08	0-100	8542.3	99.16
100-105	3.4	0.04	0-105	8545.6	99.20
105-110	2.5	0.03	0-110	8548.2	99.22
110-115	3.7	0.04	0-115	8551.9	99.27
115-120	4.8	0.06	0-120	8556.7	99.32
120-125	5.0	0.06	0-125	8561.7	99.38
125-130	5.1	0.06	0-130	8566.8	99.44
130-135	5.6	0.06	0-135	8572.4	99.51
135-140	6.1	0.07	0-140	8578.4	99.58
140-145	6.4	0.07	0-145	8584.8	99.65
145-150	6.5	0.08	0-150	8591.3	99.73
150-155	6.3	0.07	0-155	8597.7	99.80
155-160	5.8	0.07	0-160	8603.5	99.87
160-165	5.0	0.06	0-165	8608.4	99.92
165-170	3.9	0.04	0-170	8612.3	99.97
170-175	2.3	0.03	0-175	8614.6	100.00
175-180	0.4	0.00	0-180	8615.0	100.00

## 6. Product Photo



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