



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 5.5PLSV/840/HYB/GX23

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	PKS181030084-10-3
Test Date:	2018-11-01 to 2018-11-06
Report Date:	2018-11-09
Reviewed By:	Ray Gao/EE Engineer <i>Ray Gao</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268
Test Facility:	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
Accreditation:	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: 5.5PLSV/840/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: 4000K
 Nominal Lumen Output: 620lm

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.

4π 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 (γ) 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**

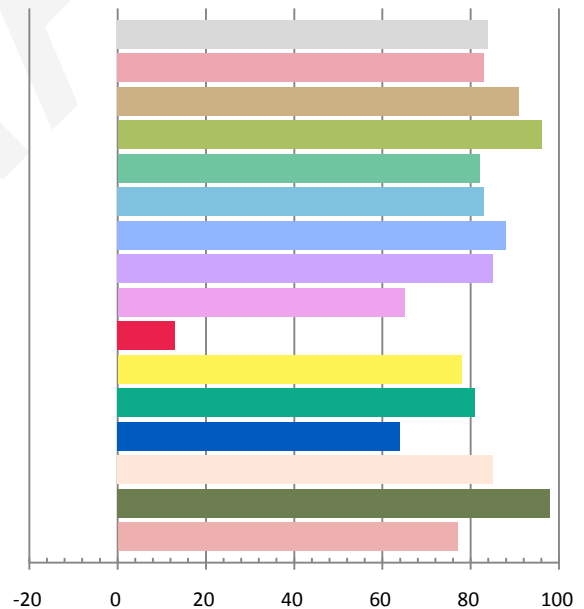
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0464	5.45	0.9792	642.85	117.95

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.955	3881	-0.00018	0.3857	0.3796	0.2274	0.5036

Color Rendering Index

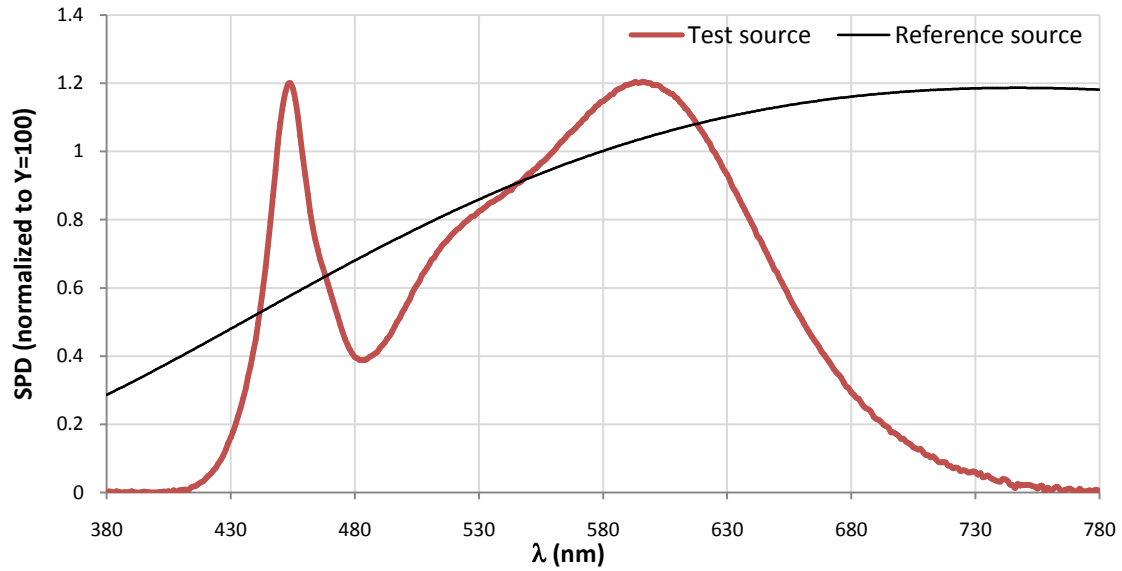
Ra 84.0			
R1 83	R2 91	R3 96	R4 82
R5 83	R6 88	R7 85	R8 65
R9 13	R10 78	R11 81	R12 64
R13 85	R14 98	R15 77	



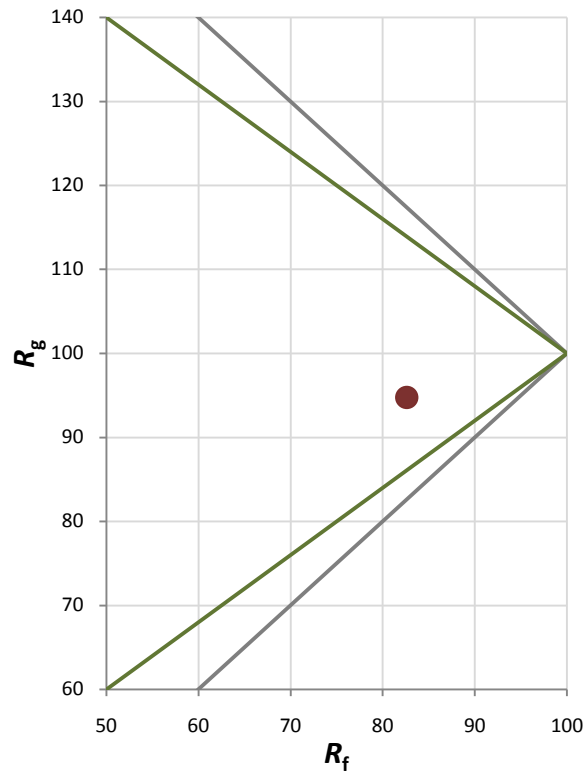
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	95

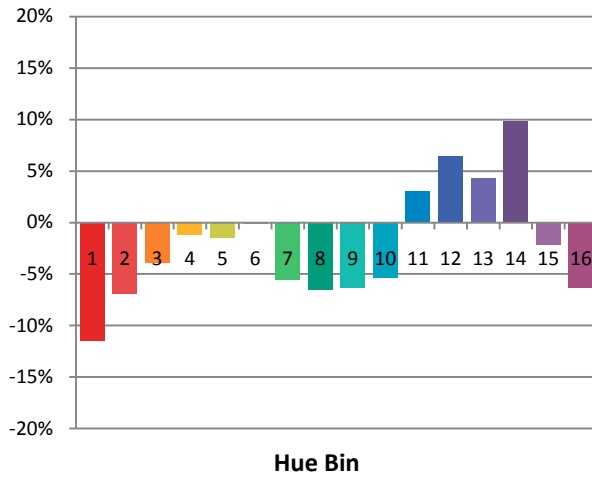
Spectral Power Distribution Comparison



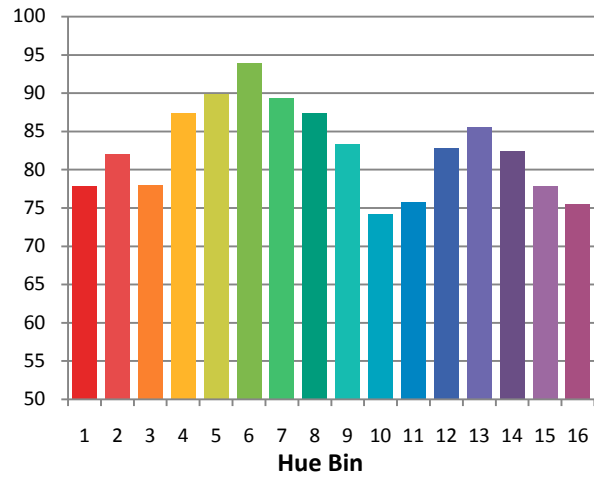
Plot of R_g versus R_f



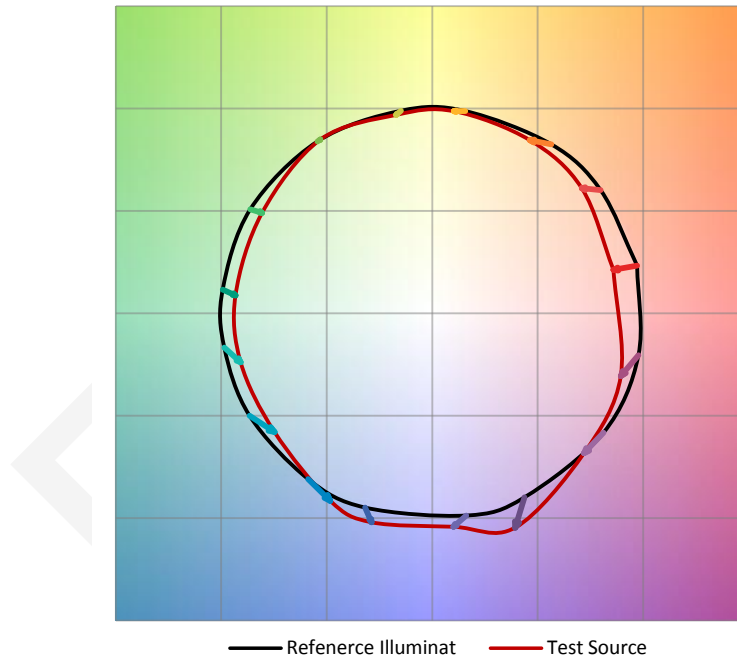
Chroma Shift by Hue



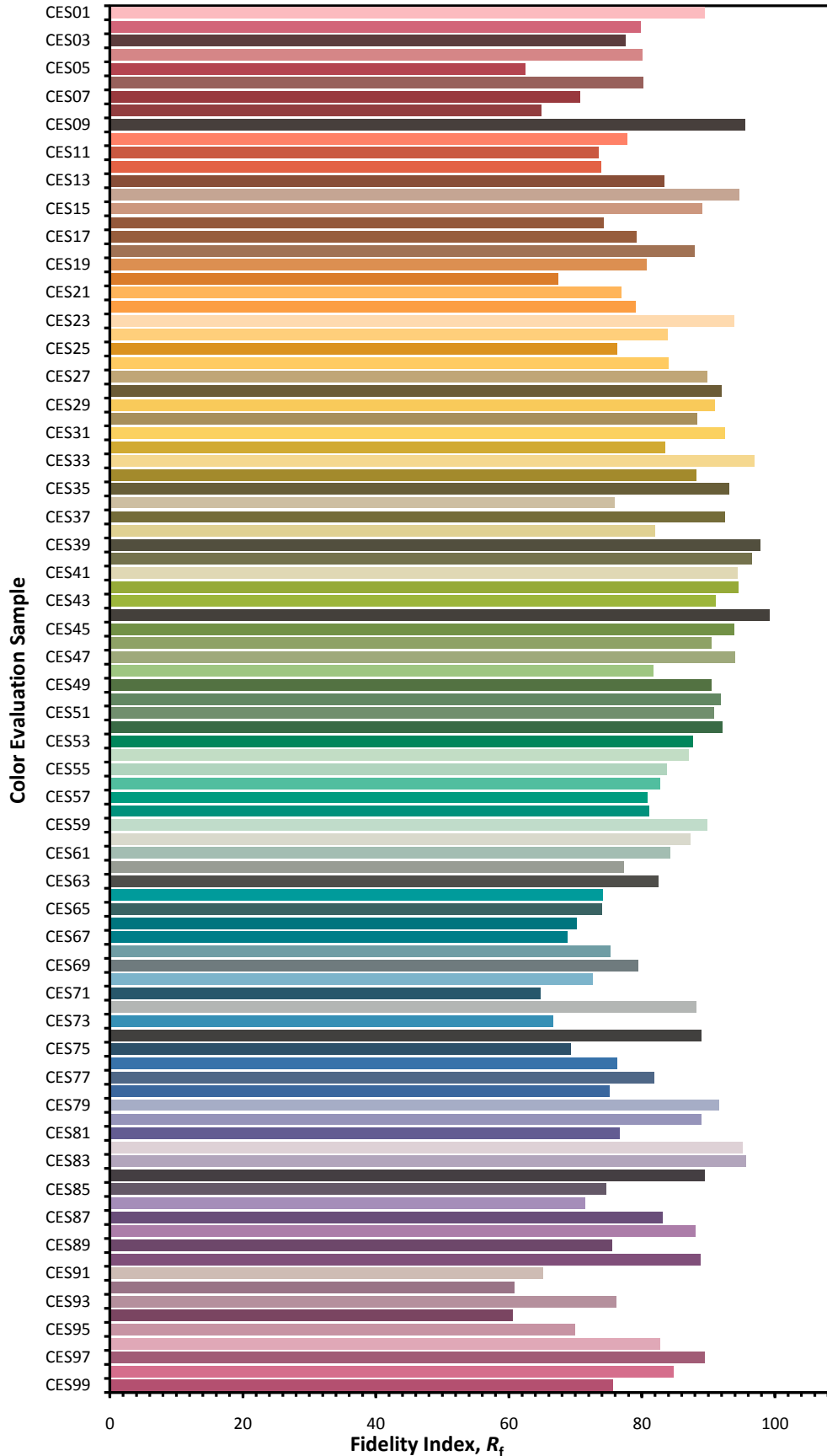
R_f by Hue



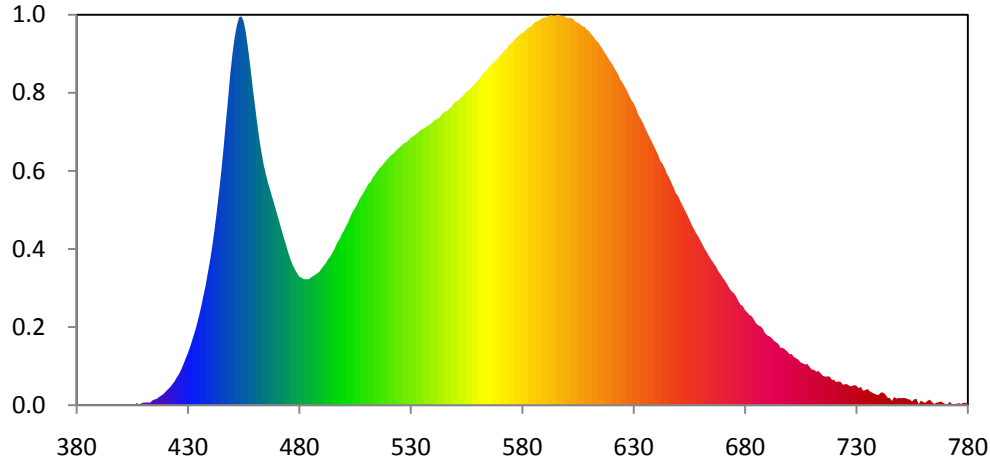
Color Vector Graphic



Color Fidelity by CES Sample



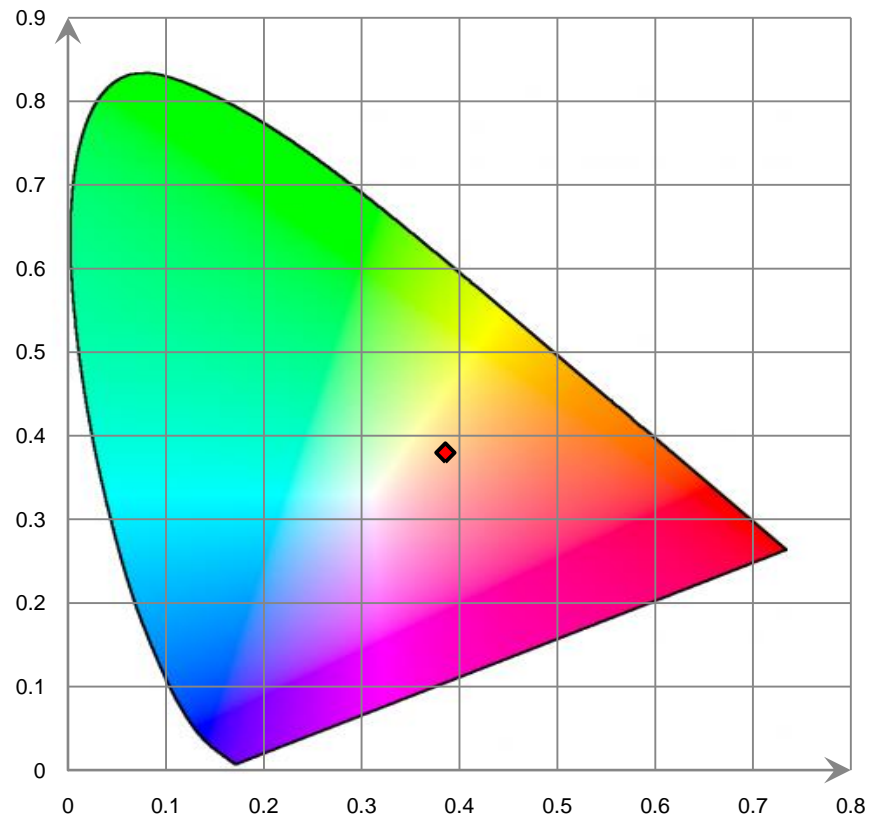
Relative Spectral Power Distribution



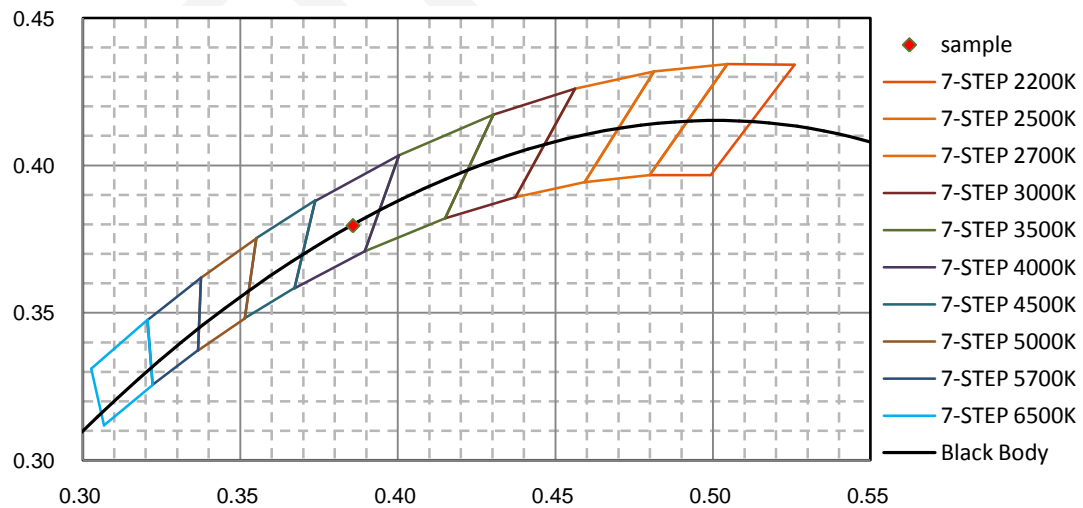
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.500E-03	421	4.597E-01	462	7.751E+00	503	5.483E+00	544	8.445E+00
381	2.940E-02	422	5.200E-01	463	7.339E+00	504	5.624E+00	545	8.508E+00
382	1.420E-02	423	6.066E-01	464	6.986E+00	505	5.728E+00	546	8.536E+00
383	5.800E-03	424	6.905E-01	465	6.704E+00	506	5.838E+00	547	8.584E+00
384	3.570E-02	425	8.073E-01	466	6.447E+00	507	5.982E+00	548	8.650E+00
385	1.530E-02	426	9.011E-01	467	6.228E+00	508	6.087E+00	549	8.732E+00
386	1.600E-03	427	1.035E+00	468	6.005E+00	509	6.188E+00	550	8.802E+00
387	1.150E-02	428	1.193E+00	469	5.778E+00	510	6.306E+00	551	8.831E+00
388	7.000E-03	429	1.358E+00	470	5.559E+00	511	6.429E+00	552	8.902E+00
389	8.100E-03	430	1.518E+00	471	5.333E+00	512	6.481E+00	553	8.949E+00
390	3.620E-02	431	1.694E+00	472	5.097E+00	513	6.612E+00	554	9.026E+00
391	1.120E-02	432	1.907E+00	473	4.870E+00	514	6.699E+00	555	9.095E+00
392	5.000E-04	433	2.106E+00	474	4.664E+00	515	6.795E+00	556	9.142E+00
393	0.000E+00	434	2.339E+00	475	4.438E+00	516	6.881E+00	557	9.201E+00
394	4.700E-03	435	2.602E+00	476	4.241E+00	517	6.940E+00	558	9.282E+00
395	2.610E-02	436	2.875E+00	477	4.076E+00	518	7.030E+00	559	9.349E+00
396	1.620E-02	437	3.192E+00	478	3.946E+00	519	7.104E+00	560	9.414E+00
397	7.200E-03	438	3.492E+00	479	3.831E+00	520	7.182E+00	561	9.492E+00
398	2.500E-03	439	3.863E+00	480	3.730E+00	521	7.249E+00	562	9.587E+00
399	1.900E-03	440	4.223E+00	481	3.704E+00	522	7.295E+00	563	9.665E+00
400	1.000E-04	441	4.651E+00	482	3.657E+00	523	7.359E+00	564	9.725E+00
401	1.130E-02	442	5.126E+00	483	3.659E+00	524	7.432E+00	565	9.798E+00
402	1.610E-02	443	5.654E+00	484	3.654E+00	525	7.487E+00	566	9.889E+00
403	2.590E-02	444	6.215E+00	485	3.694E+00	526	7.549E+00	567	9.942E+00
404	2.200E-02	445	6.808E+00	486	3.744E+00	527	7.610E+00	568	9.996E+00
405	3.190E-02	446	7.466E+00	487	3.781E+00	528	7.633E+00	569	1.006E+01
406	7.800E-03	447	8.195E+00	488	3.827E+00	529	7.693E+00	570	1.014E+01
407	6.090E-02	448	8.885E+00	489	3.877E+00	530	7.763E+00	571	1.021E+01
408	8.500E-03	449	9.615E+00	490	3.970E+00	531	7.801E+00	572	1.030E+01
409	5.100E-02	450	1.020E+01	491	4.052E+00	532	7.849E+00	573	1.034E+01
410	7.260E-02	451	1.069E+01	492	4.136E+00	533	7.902E+00	574	1.045E+01
411	7.500E-02	452	1.104E+01	493	4.250E+00	534	7.969E+00	575	1.050E+01
412	8.220E-02	453	1.127E+01	494	4.325E+00	535	8.013E+00	576	1.056E+01
413	7.140E-02	454	1.129E+01	495	4.444E+00	536	8.038E+00	577	1.065E+01
414	1.366E-01	455	1.115E+01	496	4.569E+00	537	8.090E+00	578	1.070E+01
415	1.666E-01	456	1.082E+01	497	4.716E+00	538	8.122E+00	579	1.077E+01
416	1.822E-01	457	1.035E+01	498	4.816E+00	539	8.168E+00	580	1.080E+01
417	2.360E-01	458	9.840E+00	499	4.954E+00	540	8.229E+00	581	1.085E+01
418	2.778E-01	459	9.266E+00	500	5.067E+00	541	8.282E+00	582	1.091E+01
419	3.216E-01	460	8.753E+00	501	5.205E+00	542	8.335E+00	583	1.097E+01
420	3.943E-01	461	8.233E+00	502	5.328E+00	543	8.347E+00	584	1.099E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.108E+01	626	9.251E+00	667	4.026E+00	708	1.198E+00	749	2.129E-01
586	1.113E+01	627	9.140E+00	668	3.896E+00	709	1.109E+00	750	1.999E-01
587	1.115E+01	628	8.990E+00	669	3.805E+00	710	1.033E+00	751	2.104E-01
588	1.119E+01	629	8.866E+00	670	3.708E+00	711	1.026E+00	752	2.066E-01
589	1.124E+01	630	8.774E+00	671	3.616E+00	712	9.715E-01	753	1.781E-01
590	1.125E+01	631	8.636E+00	672	3.514E+00	713	9.937E-01	754	1.612E-01
591	1.127E+01	632	8.453E+00	673	3.397E+00	714	9.237E-01	755	1.078E-01
592	1.130E+01	633	8.339E+00	674	3.308E+00	715	8.507E-01	756	1.727E-01
593	1.133E+01	634	8.226E+00	675	3.252E+00	716	8.293E-01	757	1.800E-01
594	1.131E+01	635	8.082E+00	676	3.163E+00	717	8.351E-01	758	3.230E-02
595	1.132E+01	636	7.940E+00	677	3.029E+00	718	8.334E-01	759	1.331E-01
596	1.134E+01	637	7.807E+00	678	2.920E+00	719	7.429E-01	760	9.160E-02
597	1.132E+01	638	7.679E+00	679	2.881E+00	720	7.302E-01	761	6.870E-02
598	1.130E+01	639	7.545E+00	680	2.767E+00	721	6.707E-01	762	1.289E-01
599	1.129E+01	640	7.409E+00	681	2.698E+00	722	6.915E-01	763	1.601E-01
600	1.124E+01	641	7.274E+00	682	2.616E+00	723	6.739E-01	764	8.750E-02
601	1.124E+01	642	7.096E+00	683	2.588E+00	724	5.931E-01	765	3.330E-02
602	1.124E+01	643	7.012E+00	684	2.485E+00	725	6.116E-01	766	7.320E-02
603	1.121E+01	644	6.881E+00	685	2.378E+00	726	6.041E-01	767	8.480E-02
604	1.114E+01	645	6.722E+00	686	2.319E+00	727	5.543E-01	768	1.094E-01
605	1.110E+01	646	6.606E+00	687	2.288E+00	728	5.523E-01	769	6.580E-02
606	1.106E+01	647	6.458E+00	688	2.225E+00	729	5.826E-01	770	3.290E-02
607	1.101E+01	648	6.317E+00	689	2.091E+00	730	5.669E-01	771	2.960E-02
608	1.099E+01	649	6.152E+00	690	2.031E+00	731	4.950E-01	772	1.012E-01
609	1.091E+01	650	6.075E+00	691	2.000E+00	732	5.320E-01	773	1.660E-02
610	1.087E+01	651	5.924E+00	692	1.951E+00	733	4.233E-01	774	3.270E-02
611	1.077E+01	652	5.798E+00	693	1.874E+00	734	4.366E-01	775	3.900E-02
612	1.070E+01	653	5.663E+00	694	1.827E+00	735	4.683E-01	776	5.850E-02
613	1.061E+01	654	5.540E+00	695	1.780E+00	736	4.055E-01	777	3.370E-02
614	1.055E+01	655	5.399E+00	696	1.664E+00	737	3.690E-01	778	6.490E-02
615	1.045E+01	656	5.252E+00	697	1.663E+00	738	3.369E-01	779	7.160E-02
616	1.035E+01	657	5.127E+00	698	1.616E+00	739	3.065E-01	780	3.660E-02
617	1.025E+01	658	5.003E+00	699	1.558E+00	740	2.976E-01		
618	1.015E+01	659	4.904E+00	700	1.480E+00	741	3.675E-01		
619	1.004E+01	660	4.783E+00	701	1.483E+00	742	3.653E-01		
620	9.946E+00	661	4.656E+00	702	1.399E+00	743	3.143E-01		
621	9.836E+00	662	4.533E+00	703	1.362E+00	744	2.149E-01		
622	9.718E+00	663	4.429E+00	704	1.321E+00	745	2.061E-01		
623	9.631E+00	664	4.315E+00	705	1.240E+00	746	1.251E-01		
624	9.459E+00	665	4.210E+00	706	1.214E+00	747	2.379E-01		
625	9.376E+00	666	4.118E+00	707	1.182E+00	748	1.894E-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**

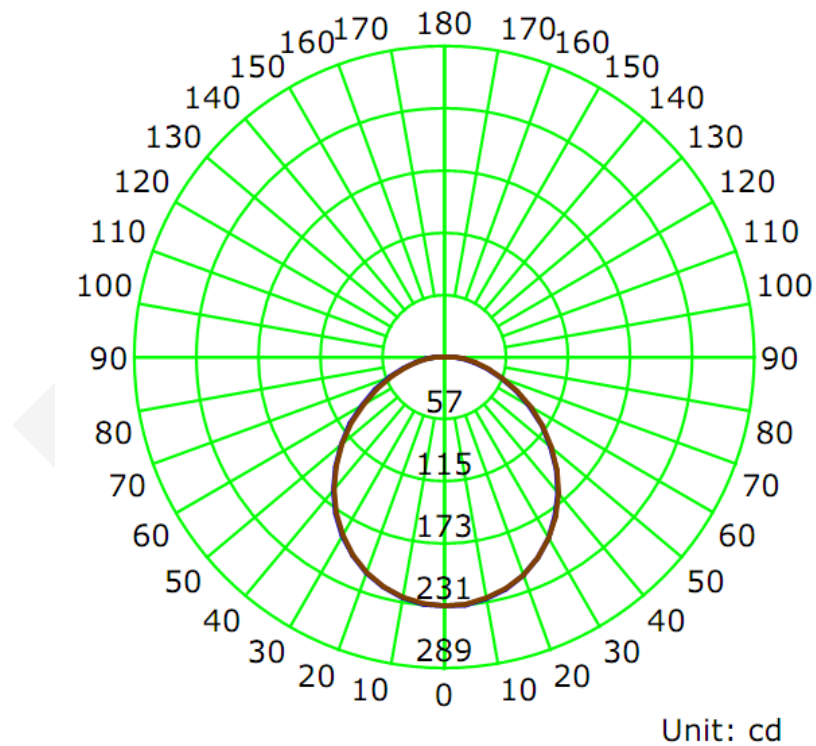
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0460	5.47	0.9910

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
644.6	117.90	231.7	1.24	1.24

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	106.6	106.4	106.5	106.6	106.5
Field Angle (10% I_{max}):	164.7	164.7	164.6	164.5	164.6

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	232	232	232	232	232	232	232	232
5.0°	231	231	231	231	231	231	231	231
10.0°	228	228	228	228	228	228	228	227
15.0°	223	224	223	223	223	223	223	222
20.0°	216	216	216	216	216	215	215	215
25.0°	206	207	206	206	206	206	206	205
30.0°	195	195	195	195	195	195	194	193
35.0°	181	181	181	181	181	181	180	180
40.0°	165	166	166	166	166	166	165	164
45.0°	148	149	149	149	149	149	148	147
50.0°	130	131	131	131	131	131	130	129
55.0°	111	112	112	112	112	112	111	111
60.0°	92	93	94	94	94	93	93	92
65.0°	74	74	75	76	75	75	75	74
70.0°	56	57	58	58	58	58	58	57
75.0°	41	42	42	42	43	43	42	42
80.0°	28	29	29	29	30	30	29	29
85.0°	18	18	19	19	19	19	19	19
90.0°	10	11	11	12	12	12	12	11
95.0°	5	6	6	6	6	6	6	6
100.0°	2	3	3	3	3	3	3	3
105.0°	1	1	1	1	1	1	1	1
110.0°	0	0	1	1	1	1	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°	232	232	232	232	232	232	232	232
5.0°	231	230	230	230	230	231	231	230
10.0°	227	227	227	227	227	227	227	227
15.0°	222	221	221	221	221	221	222	222
20.0°	214	213	213	213	213	214	214	215
25.0°	204	203	203	203	203	203	204	205
30.0°	192	191	190	191	191	191	192	192
35.0°	178	177	176	177	177	177	178	178
40.0°	162	161	161	161	161	161	162	162
45.0°	145	144	143	143	144	144	145	145
50.0°	126	126	125	125	125	126	126	127
55.0°	108	107	106	106	106	107	108	108
60.0°	89	89	88	88	88	88	89	89
65.0°	72	71	70	70	70	69	70	71
70.0°	55	54	53	53	53	53	53	54
75.0°	40	39	39	38	38	38	38	39
80.0°	28	27	27	26	26	26	26	26
85.0°	18	18	17	17	16	16	16	17
90.0°	11	10	10	10	10	10	10	10
95.0°	5	5	5	5	5	5	5	5
100.0°	2	2	2	2	2	2	2	2
105.0°	1	1	1	1	1	1	1	1
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	5.5	0.86	0-5	5.5	0.86
5-10	16.4	2.54	0-10	21.9	3.40
10-15	26.7	4.14	0-15	48.6	7.53
15-20	36.0	5.58	0-20	84.6	13.12
20-25	44.0	6.82	0-25	128.5	19.94
25-30	50.3	7.81	0-30	178.9	27.75
30-35	54.8	8.50	0-35	233.6	36.24
35-40	57.1	8.86	0-40	290.7	45.10
40-45	57.3	8.89	0-45	348.1	53.99
45-50	55.4	8.60	0-50	403.5	62.59
50-55	51.6	8.00	0-55	455.1	70.59
55-60	46.2	7.17	0-60	501.3	77.77
60-65	39.7	6.15	0-65	541.0	83.92
65-70	32.4	5.02	0-70	573.3	88.94
70-75	25.0	3.88	0-75	598.3	92.82
75-80	18.2	2.83	0-80	616.6	95.65
80-85	12.4	1.92	0-85	629.0	97.57
85-90	7.8	1.21	0-90	636.7	98.78
90-95	4.4	0.68	0-95	641.1	99.46
95-100	2.2	0.34	0-100	643.3	99.79
100-105	0.9	0.14	0-105	644.2	99.93
105-110	0.3	0.05	0-110	644.5	99.98
110-115	0.1	0.01	0-115	644.6	100.00
115-120	0.0	0.00	0-120	644.6	100.00
120-125	0.0	0.00	0-125	644.6	100.00
125-130	0.0	0.00	0-130	644.6	100.00
130-135	0.0	0.00	0-135	644.6	100.00
135-140	0.0	0.00	0-140	644.6	100.00
140-145	0.0	0.00	0-145	644.6	100.00
145-150	0.0	0.00	0-150	644.6	100.00
150-155	0.0	0.00	0-155	644.6	100.00
155-160	0.0	0.00	0-160	644.6	100.00
160-165	0.0	0.00	0-165	644.6	100.00
165-170	0.0	0.00	0-170	644.6	100.00
170-175	0.0	0.00	0-175	644.6	100.00
175-180	0.0	0.00	0-180	644.6	100.00

6. Product Photo



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