



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/840/HYBM

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	PKS181030080-10-3
Test Date:	2018-11-01 to 2018-11-05
Report Date:	2018-11-08
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: 8PLH/840/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: 4000K
 Nominal Lumen Output: 920lm

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**

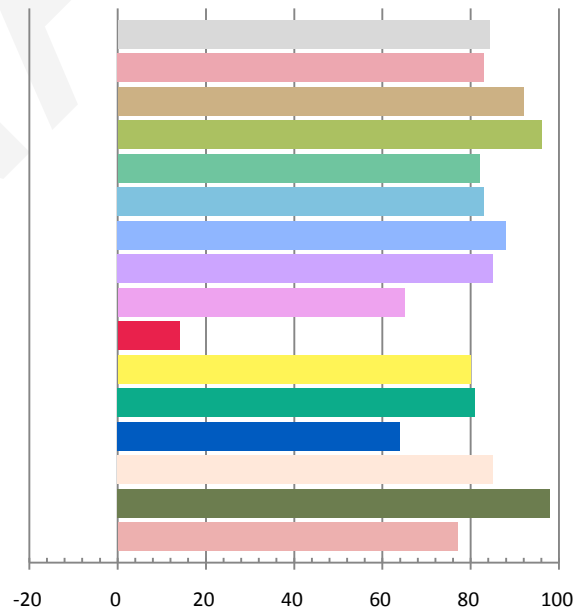
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0675	7.89	0.9739	998.3	126.53

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.039	3969	0.00064	0.3823	0.3793	0.2253	0.5030

Color Rendering Index

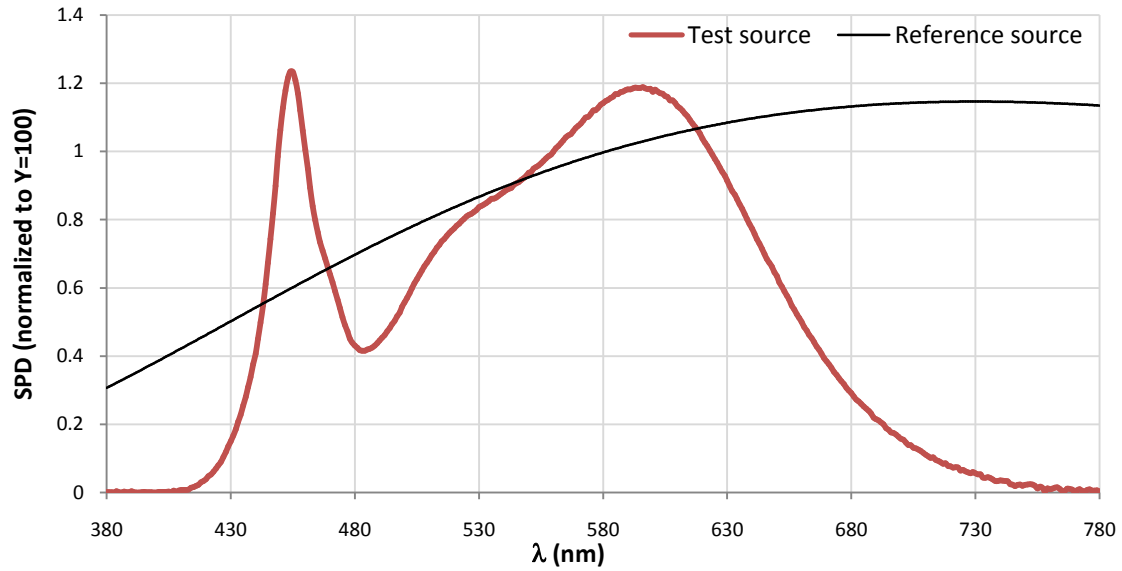
Ra 84.3			
R1 83	R2 92	R3 96	R4 82
R5 83	R6 88	R7 85	R8 65
R9 14	R10 80	R11 81	R12 64
R13 85	R14 98	R15 77	



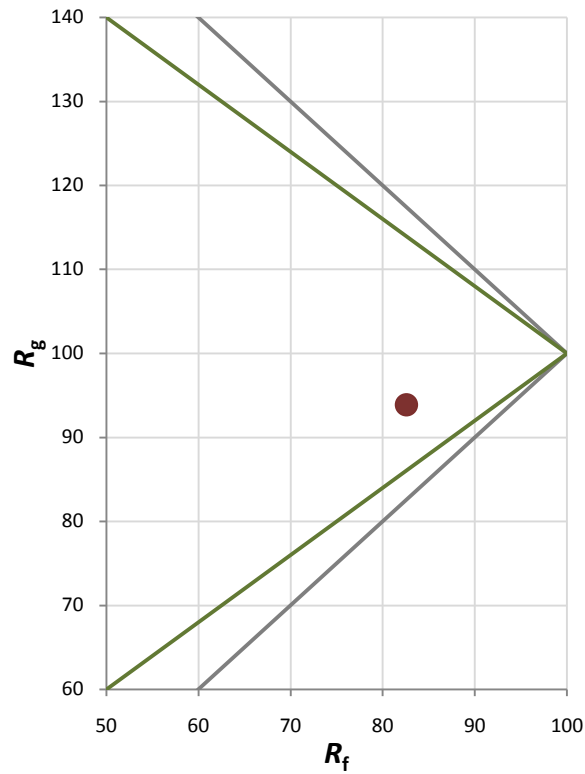
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	94

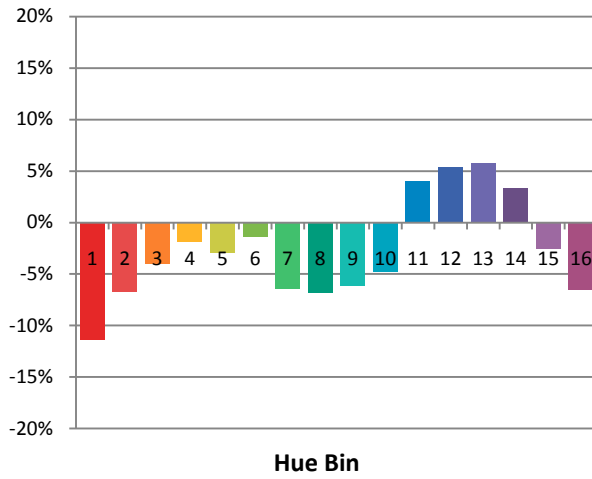
Spectral Power Distribution Comparison



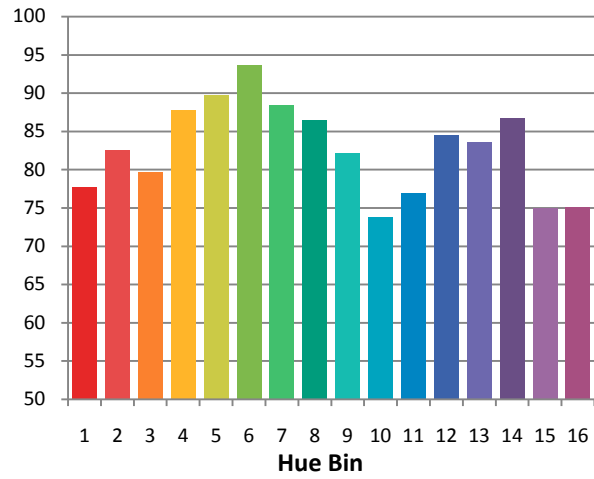
Plot of R_g versus R_f



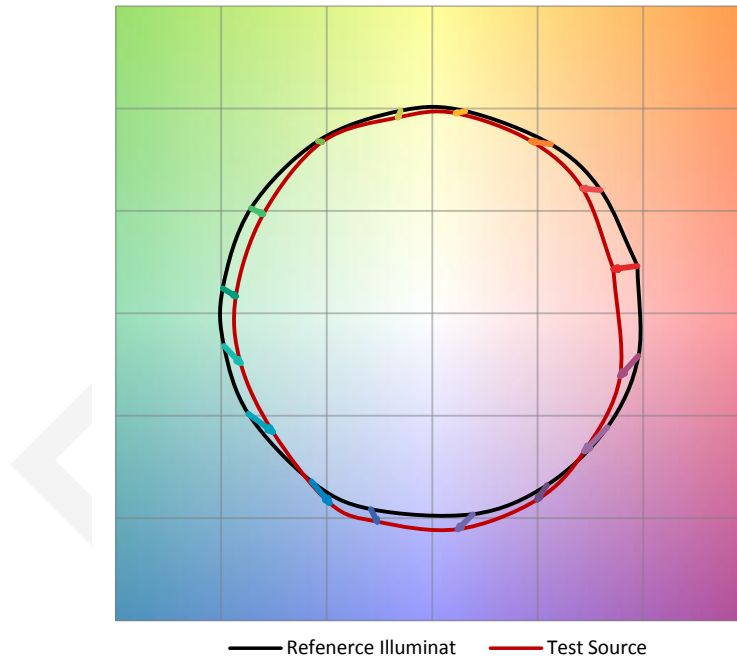
Chroma Shift by Hue



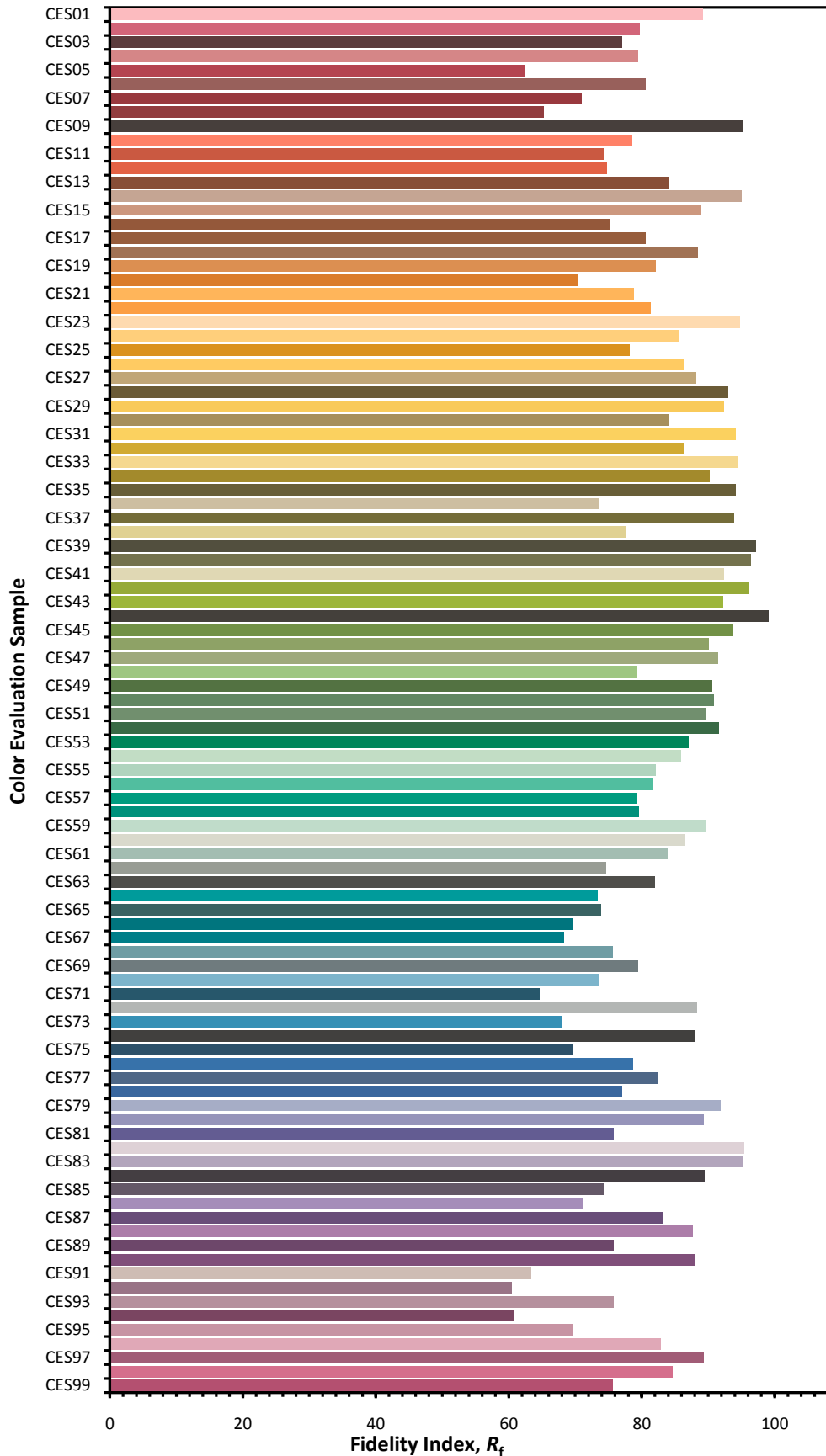
R_f by Hue



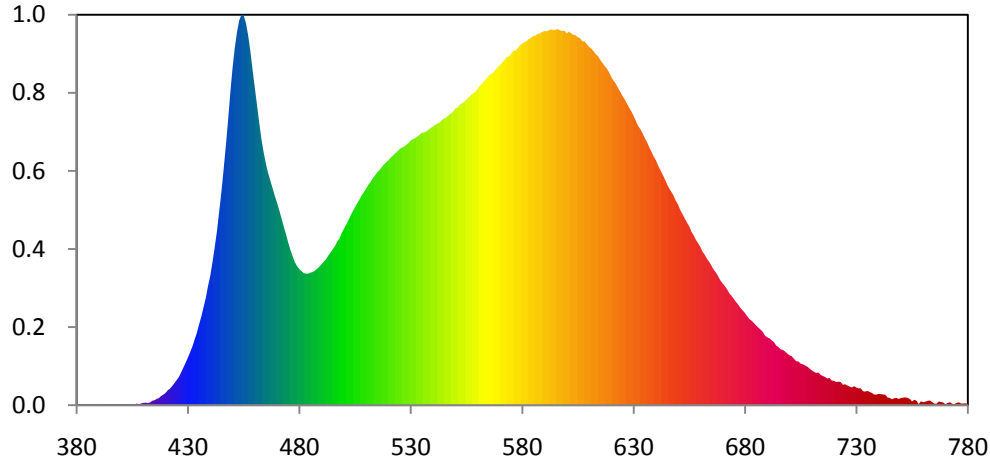
Color Vector Graphic



Color Fidelity by CES Sample



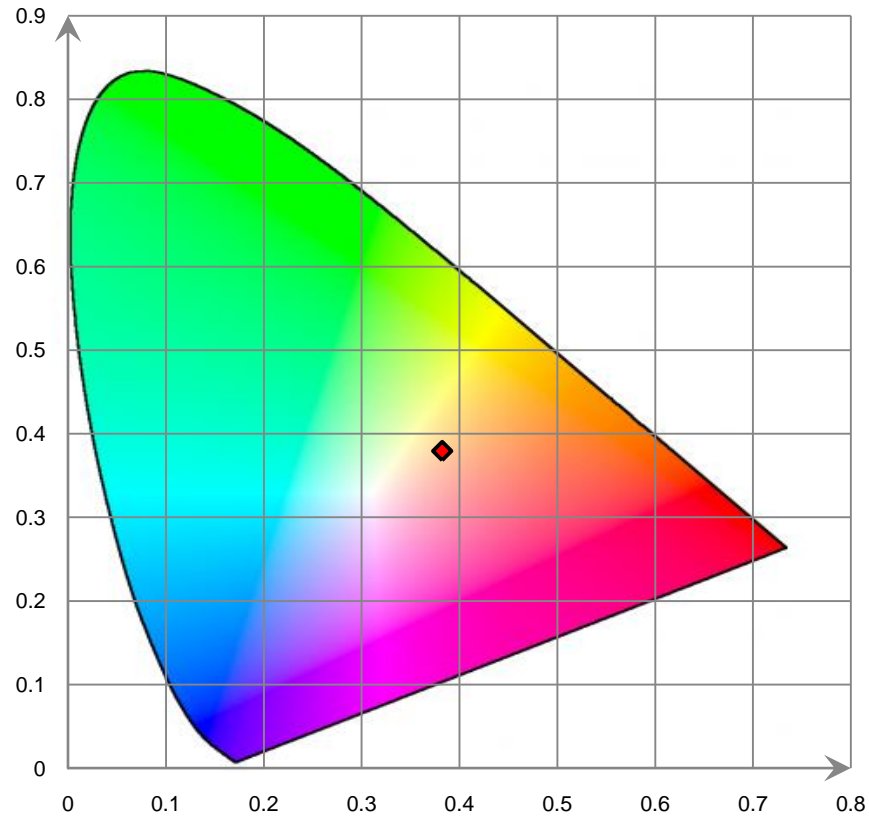
Relative Spectral Power Distribution



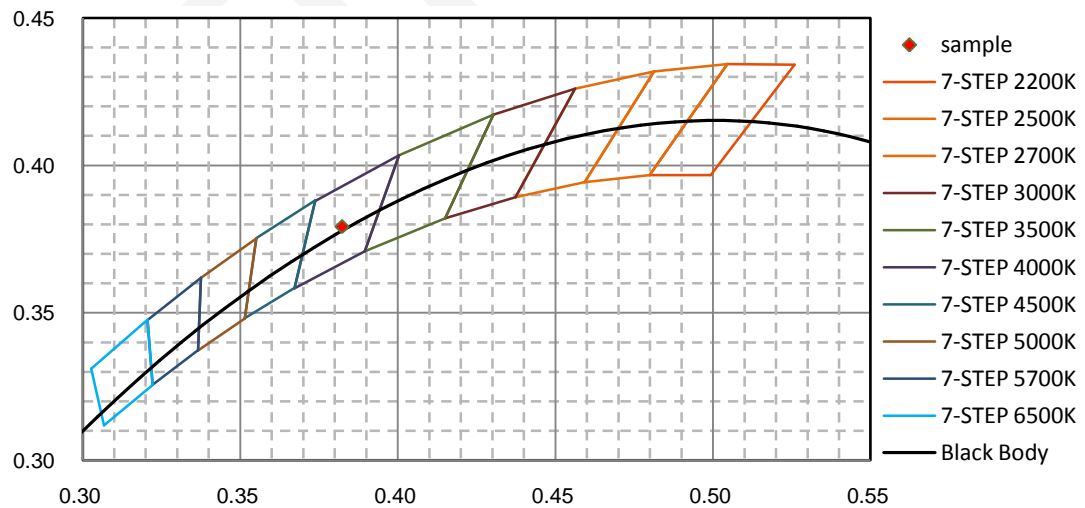
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.780E-02	421	6.942E-01	462	1.305E+01	503	8.754E+00	544	1.317E+01
381	1.370E-02	422	7.690E-01	463	1.228E+01	504	8.961E+00	545	1.324E+01
382	8.100E-03	423	8.904E-01	464	1.167E+01	505	9.148E+00	546	1.330E+01
383	4.900E-03	424	1.027E+00	465	1.115E+01	506	9.332E+00	547	1.339E+01
384	5.790E-02	425	1.164E+00	466	1.072E+01	507	9.499E+00	548	1.347E+01
385	1.360E-02	426	1.308E+00	467	1.037E+01	508	9.697E+00	549	1.356E+01
386	8.000E-04	427	1.525E+00	468	1.002E+01	509	9.840E+00	550	1.370E+01
387	3.420E-02	428	1.745E+00	469	9.665E+00	510	1.001E+01	551	1.374E+01
388	1.220E-02	429	1.968E+00	470	9.352E+00	511	1.018E+01	552	1.388E+01
389	1.480E-02	430	2.196E+00	471	9.006E+00	512	1.031E+01	553	1.394E+01
390	5.940E-02	431	2.446E+00	472	8.628E+00	513	1.049E+01	554	1.401E+01
391	9.500E-03	432	2.710E+00	473	8.253E+00	514	1.062E+01	555	1.411E+01
392	1.600E-03	433	3.032E+00	474	7.908E+00	515	1.076E+01	556	1.421E+01
393	3.200E-03	434	3.336E+00	475	7.513E+00	516	1.087E+01	557	1.432E+01
394	8.400E-03	435	3.730E+00	476	7.173E+00	517	1.099E+01	558	1.441E+01
395	2.120E-02	436	4.093E+00	477	6.890E+00	518	1.112E+01	559	1.448E+01
396	1.230E-02	437	4.516E+00	478	6.600E+00	519	1.122E+01	560	1.461E+01
397	1.160E-02	438	4.945E+00	479	6.421E+00	520	1.132E+01	561	1.475E+01
398	1.250E-02	439	5.493E+00	480	6.288E+00	521	1.144E+01	562	1.485E+01
399	6.000E-04	440	5.956E+00	481	6.192E+00	522	1.152E+01	563	1.497E+01
400	3.000E-03	441	6.588E+00	482	6.101E+00	523	1.163E+01	564	1.509E+01
401	2.980E-02	442	7.286E+00	483	6.078E+00	524	1.172E+01	565	1.522E+01
402	2.160E-02	443	8.020E+00	484	6.076E+00	525	1.183E+01	566	1.530E+01
403	2.350E-02	444	8.921E+00	485	6.124E+00	526	1.190E+01	567	1.536E+01
404	2.610E-02	445	9.830E+00	486	6.151E+00	527	1.195E+01	568	1.549E+01
405	3.440E-02	446	1.086E+01	487	6.217E+00	528	1.203E+01	569	1.562E+01
406	1.890E-02	447	1.196E+01	488	6.299E+00	529	1.211E+01	570	1.571E+01
407	7.540E-02	448	1.313E+01	489	6.400E+00	530	1.223E+01	571	1.581E+01
408	3.080E-02	449	1.440E+01	490	6.512E+00	531	1.228E+01	572	1.595E+01
409	7.860E-02	450	1.553E+01	491	6.630E+00	532	1.234E+01	573	1.606E+01
410	1.065E-01	451	1.648E+01	492	6.748E+00	533	1.241E+01	574	1.610E+01
411	1.149E-01	452	1.723E+01	493	6.908E+00	534	1.249E+01	575	1.622E+01
412	1.053E-01	453	1.777E+01	494	7.054E+00	535	1.258E+01	576	1.638E+01
413	1.226E-01	454	1.804E+01	495	7.208E+00	536	1.259E+01	577	1.638E+01
414	2.033E-01	455	1.802E+01	496	7.347E+00	537	1.264E+01	578	1.649E+01
415	2.283E-01	456	1.766E+01	497	7.556E+00	538	1.273E+01	579	1.662E+01
416	2.899E-01	457	1.710E+01	498	7.700E+00	539	1.281E+01	580	1.669E+01
417	3.308E-01	458	1.637E+01	499	7.949E+00	540	1.287E+01	581	1.676E+01
418	4.318E-01	459	1.551E+01	500	8.147E+00	541	1.295E+01	582	1.682E+01
419	4.872E-01	460	1.468E+01	501	8.333E+00	542	1.302E+01	583	1.690E+01
420	5.716E-01	461	1.388E+01	502	8.540E+00	543	1.306E+01	584	1.697E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.707E+01	626	1.414E+01	667	6.125E+00	708	1.780E+00	749	2.885E-01
586	1.707E+01	627	1.394E+01	668	5.951E+00	709	1.693E+00	750	3.315E-01
587	1.715E+01	628	1.375E+01	669	5.762E+00	710	1.611E+00	751	3.486E-01
588	1.718E+01	629	1.357E+01	670	5.625E+00	711	1.543E+00	752	3.584E-01
589	1.724E+01	630	1.338E+01	671	5.501E+00	712	1.487E+00	753	3.387E-01
590	1.728E+01	631	1.314E+01	672	5.349E+00	713	1.508E+00	754	2.926E-01
591	1.727E+01	632	1.291E+01	673	5.167E+00	714	1.392E+00	755	1.728E-01
592	1.731E+01	633	1.276E+01	674	5.050E+00	715	1.351E+00	756	2.496E-01
593	1.735E+01	634	1.257E+01	675	4.908E+00	716	1.297E+00	757	2.090E-01
594	1.733E+01	635	1.235E+01	676	4.770E+00	717	1.233E+00	758	4.740E-02
595	1.734E+01	636	1.216E+01	677	4.644E+00	718	1.252E+00	759	1.793E-01
596	1.737E+01	637	1.193E+01	678	4.487E+00	719	1.133E+00	760	1.400E-01
597	1.731E+01	638	1.172E+01	679	4.378E+00	720	1.128E+00	761	1.605E-01
598	1.729E+01	639	1.150E+01	680	4.258E+00	721	1.066E+00	762	1.983E-01
599	1.730E+01	640	1.132E+01	681	4.114E+00	722	1.088E+00	763	2.187E-01
600	1.717E+01	641	1.108E+01	682	3.983E+00	723	1.071E+00	764	1.488E-01
601	1.726E+01	642	1.086E+01	683	3.902E+00	724	9.417E-01	765	7.130E-02
602	1.718E+01	643	1.067E+01	684	3.798E+00	725	9.660E-01	766	6.790E-02
603	1.711E+01	644	1.045E+01	685	3.684E+00	726	9.091E-01	767	1.702E-01
604	1.709E+01	645	1.022E+01	686	3.588E+00	727	8.613E-01	768	1.460E-01
605	1.698E+01	646	1.001E+01	687	3.491E+00	728	8.186E-01	769	1.227E-01
606	1.695E+01	647	9.850E+00	688	3.390E+00	729	8.743E-01	770	4.590E-02
607	1.680E+01	648	9.676E+00	689	3.210E+00	730	8.181E-01	771	1.019E-01
608	1.680E+01	649	9.434E+00	690	3.136E+00	731	7.745E-01	772	1.380E-01
609	1.668E+01	650	9.264E+00	691	3.084E+00	732	7.793E-01	773	7.000E-02
610	1.656E+01	651	9.003E+00	692	2.997E+00	733	6.446E-01	774	4.480E-02
611	1.647E+01	652	8.824E+00	693	2.919E+00	734	6.303E-01	775	1.035E-01
612	1.636E+01	653	8.622E+00	694	2.757E+00	735	6.576E-01	776	1.356E-01
613	1.621E+01	654	8.435E+00	695	2.690E+00	736	6.124E-01	777	7.790E-02
614	1.613E+01	655	8.264E+00	696	2.579E+00	737	5.647E-01	778	7.670E-02
615	1.596E+01	656	8.014E+00	697	2.556E+00	738	4.934E-01	779	8.890E-02
616	1.581E+01	657	7.847E+00	698	2.480E+00	739	4.905E-01	780	3.990E-02
617	1.568E+01	658	7.636E+00	699	2.388E+00	740	5.222E-01		
618	1.555E+01	659	7.480E+00	700	2.304E+00	741	5.065E-01		
619	1.538E+01	660	7.308E+00	701	2.261E+00	742	4.970E-01		
620	1.517E+01	661	7.084E+00	702	2.143E+00	743	4.850E-01		
621	1.499E+01	662	6.942E+00	703	2.031E+00	744	3.558E-01		
622	1.485E+01	663	6.757E+00	704	2.022E+00	745	3.355E-01		
623	1.466E+01	664	6.618E+00	705	1.919E+00	746	2.729E-01		
624	1.448E+01	665	6.438E+00	706	1.889E+00	747	3.228E-01		
625	1.429E+01	666	6.256E+00	707	1.839E+00	748	3.375E-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**

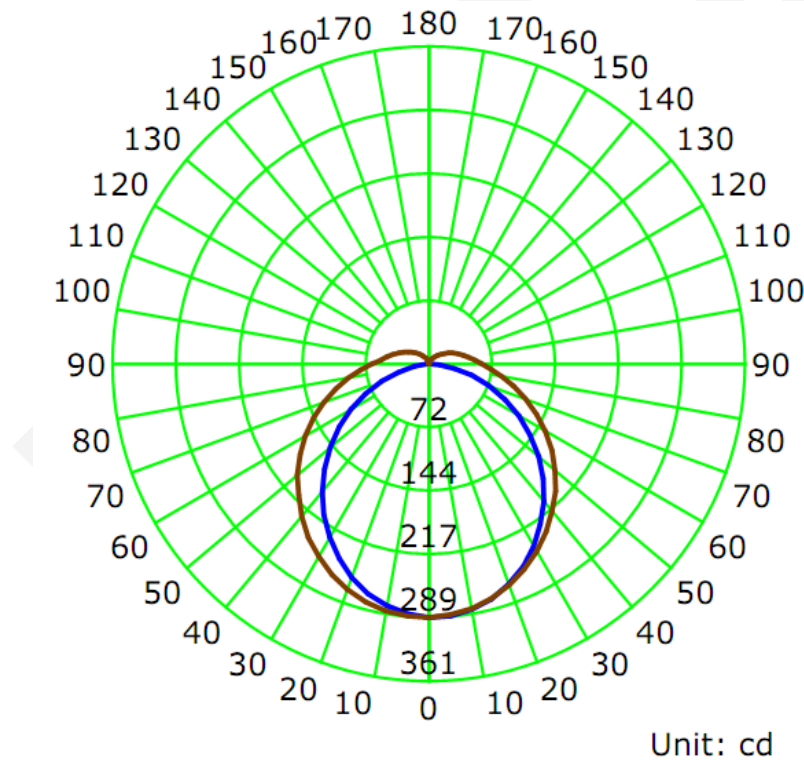
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0670	7.9	0.9830

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
999.2	126.53	289.6	1.21	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	105.2	117.0	128.2	115.4	116.5
Field Angle (10% I _{max}):	157.2	201.2	235.4	195.0	197.2

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	289	289	289	289	289	289	289	289
5.0°	288	289	288	287	287	287	287	287
10.0°	284	284	284	284	283	282	281	280
15.0°	278	278	278	277	277	275	273	272
20.0°	268	268	269	269	268	266	263	260
25.0°	255	256	258	259	259	254	250	246
30.0°	241	241	244	247	247	242	235	230
35.0°	223	225	230	234	234	228	220	213
40.0°	205	207	213	220	219	213	203	194
45.0°	185	188	197	204	205	197	185	174
50.0°	164	169	178	187	189	180	167	154
55.0°	142	148	160	170	172	163	148	132
60.0°	120	127	141	152	154	145	128	111
65.0°	97	106	122	134	136	127	109	90
70.0°	73	84	102	116	118	109	90	60
75.0°	51	64	83	98	101	91	73	38
80.0°	30	46	67	82	85	75	57	32
85.0°	13	31	53	68	72	63	44	20
90.0°	3	21	43	58	61	53	35	13
95.0°	0	16	36	50	53	46	29	9
100.0°	0	12	30	43	47	40	25	6
105.0°	0	9	25	38	41	34	21	5
110.0°	0	7	21	32	35	29	17	4
115.0°	0	6	18	27	30	25	14	3
120.0°	0	5	15	23	26	21	12	3
125.0°	0	4	12	19	22	18	10	2
130.0°	0	3	10	16	18	15	8	2
135.0°	0	2	8	13	15	12	6	1
140.0°	0	2	7	10	12	9	3	1
145.0°	0	2	5	8	9	7	3	1
150.0°	0	1	4	6	6	4	2	0
155.0°	0	1	3	4	4	3	1	0
160.0°	0	0	2	2	2	1	0	0
165.0°	0	0	0	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.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	289	289	289	289	289	289	289	289
5.0°	286	287	287	288	289	289	290	289
10.0°	280	281	283	285	286	286	286	285
15.0°	271	273	276	279	281	281	280	278
20.0°	259	262	266	271	274	274	272	269
25.0°	245	249	255	261	265	264	261	257
30.0°	228	233	241	250	253	253	248	242
35.0°	210	216	226	236	242	239	234	226
40.0°	191	197	210	222	227	225	217	208
45.0°	170	178	192	206	212	209	200	189
50.0°	148	158	174	189	197	193	182	169
55.0°	126	137	156	172	180	176	163	148
60.0°	103	116	137	155	163	159	144	126
65.0°	81	96	119	138	146	141	125	105
70.0°	58	76	101	120	129	123	106	84
75.0°	36	56	83	103	111	105	87	64
80.0°	17	39	66	86	94	88	70	45
85.0°	4	26	52	71	79	73	54	29
90.0°	0	17	41	59	66	60	42	18
95.0°	0	11	34	50	56	50	34	12
100.0°	0	9	29	43	49	43	28	9
105.0°	0	7	25	38	43	38	24	7
110.0°	0	6	21	33	37	33	20	6
115.0°	0	6	18	29	33	28	17	5
120.0°	0	5	15	25	28	24	15	4
125.0°	0	4	13	21	24	21	13	4
130.0°	0	4	11	18	20	17	10	3
135.0°	0	2	9	15	17	15	9	3
140.0°	0	2	7	12	14	12	7	2
145.0°	0	2	6	10	11	9	6	2
150.0°	0	2	4	7	8	7	4	1
155.0°	0	1	3	5	6	5	3	1
160.0°	0	1	2	3	4	3	2	1
165.0°	0	0	1	2	2	2	1	0
170.0°	0	0	0	1	1	1	1	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	6.9	0.69	0-5	6.9	0.69
5-10	20.4	2.04	0-10	27.3	2.73
10-15	33.2	3.32	0-15	60.5	6.06
15-20	44.8	4.49	0-20	105.4	10.54
20-25	54.9	5.49	0-25	160.2	16.03
25-30	63.0	6.31	0-30	223.2	22.34
30-35	69.1	6.92	0-35	292.4	29.26
35-40	73.1	7.31	0-40	365.4	36.57
40-45	74.8	7.48	0-45	440.2	44.06
45-50	74.4	7.44	0-50	514.6	51.50
50-55	71.9	7.19	0-55	586.4	58.69
55-60	67.5	6.76	0-60	654.0	65.45
60-65	61.6	6.16	0-65	715.5	71.61
65-70	54.1	5.41	0-70	769.6	77.02
70-75	45.6	4.56	0-75	815.2	81.59
75-80	37.2	3.72	0-80	852.4	85.31
80-85	29.4	2.94	0-85	881.8	88.24
85-90	22.9	2.30	0-90	904.7	90.54
90-95	18.4	1.84	0-95	923.1	92.38
95-100	15.3	1.53	0-100	938.4	93.91
100-105	12.8	1.28	0-105	951.2	95.20
105-110	10.7	1.07	0-110	961.9	96.27
110-115	8.9	0.89	0-115	970.8	97.16
115-120	7.3	0.73	0-120	978.1	97.88
120-125	5.9	0.59	0-125	983.9	98.47
125-130	4.6	0.46	0-130	988.5	98.93
130-135	3.5	0.35	0-135	992.1	99.29
135-140	2.6	0.26	0-140	994.7	99.55
140-145	1.9	0.19	0-145	996.5	99.73
145-150	1.3	0.13	0-150	997.8	99.86
150-155	0.8	0.08	0-155	998.6	99.93
155-160	0.4	0.04	0-160	999.0	99.98
160-165	0.2	0.02	0-165	999.1	99.99
165-170	0.1	0.01	0-170	999.2	100.00
170-175	0.0	0.00	0-175	999.2	100.00
175-180	0.0	0.00	0-180	999.2	100.00

6. Product Photo



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