



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 5.5PLV/835/HYBM

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	PKS181030085-10
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: 5.5PLV/835/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: 5.5W
 Nominal CCT: 3500K
 Nominal Lumen Output: 600lm

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**

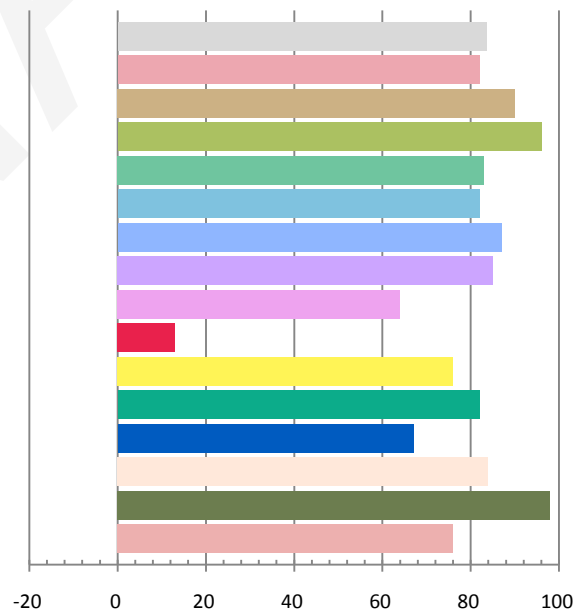
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0463	5.43	0.9777	615.31	113.32

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.866	3378	0.00006	0.4124	0.3943	0.2388	0.5138

Color Rendering Index

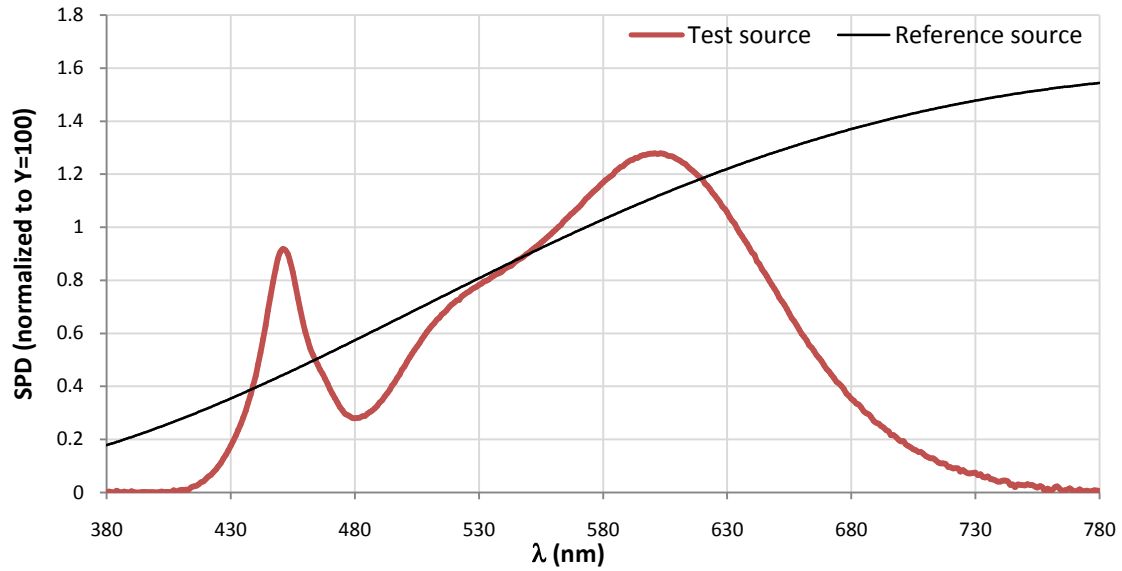
Ra 83.6			
R1 82	R2 90	R3 96	R4 83
R5 82	R6 87	R7 85	R8 64
R9 13	R10 76	R11 82	R12 67
R13 84	R14 98	R15 76	



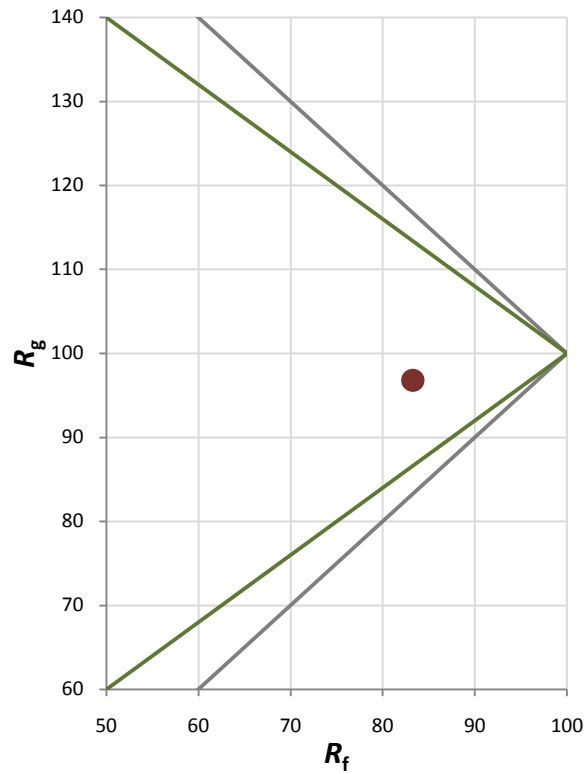
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	97

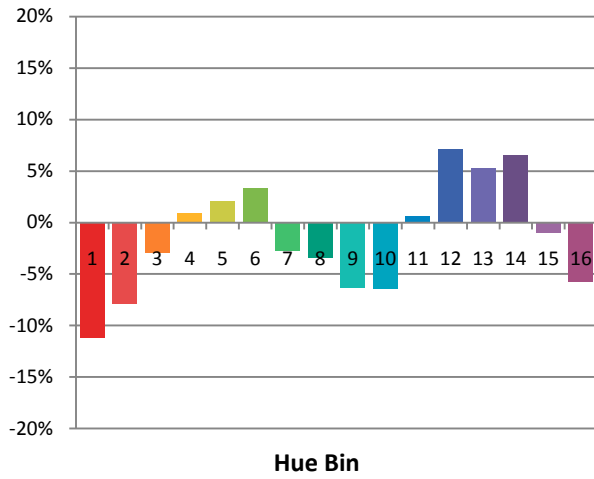
Spectral Power Distribution Comparison



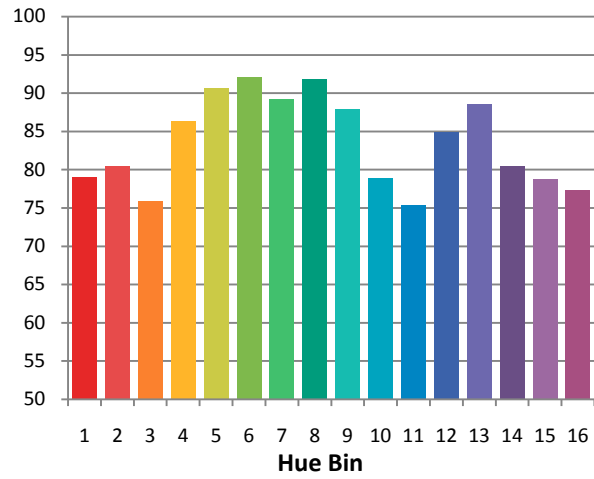
Plot of R_g versus R_f



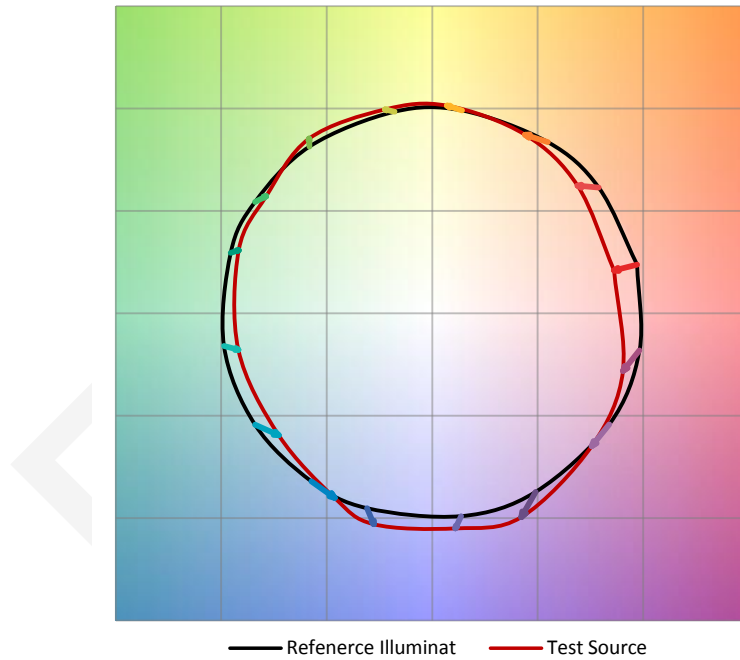
Chroma Shift by Hue



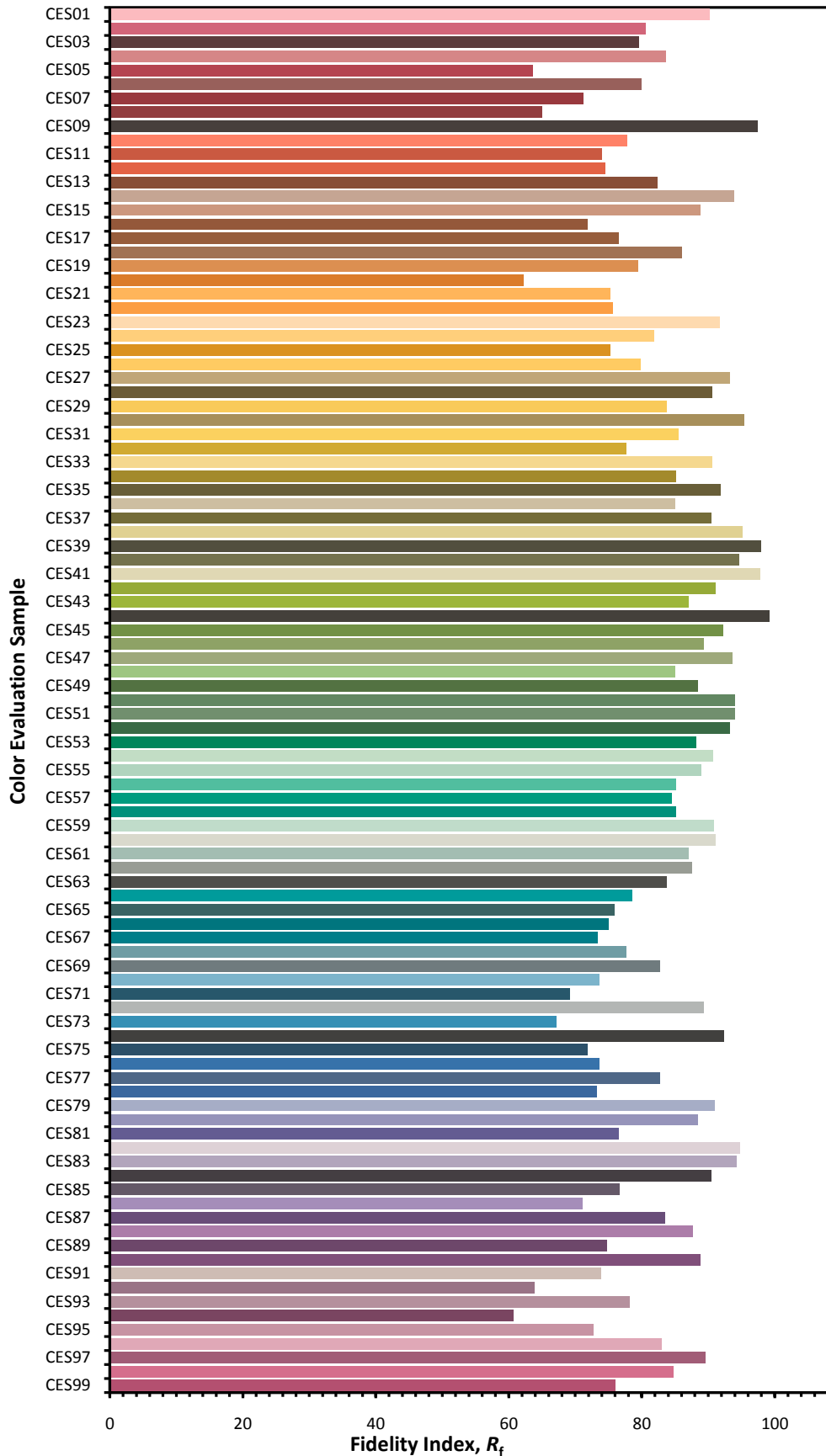
R_f by Hue



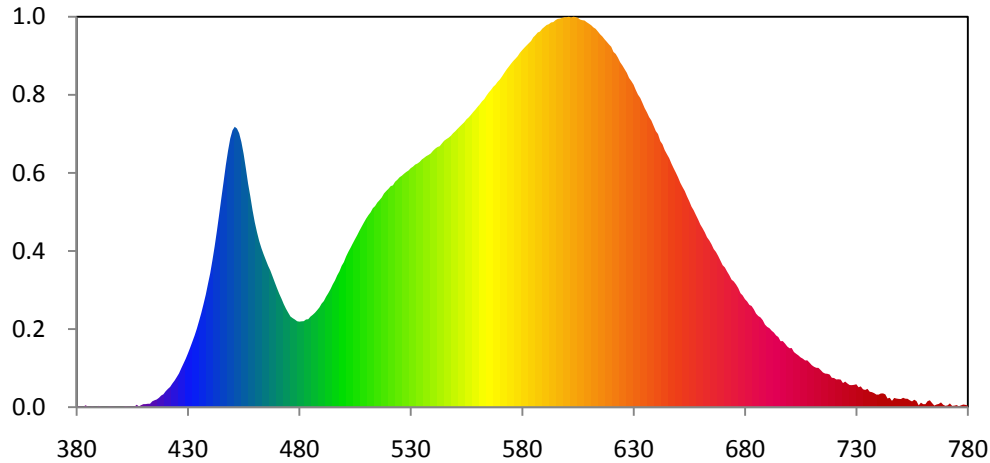
Color Vector Graphic



Color Fidelity by CES Sample



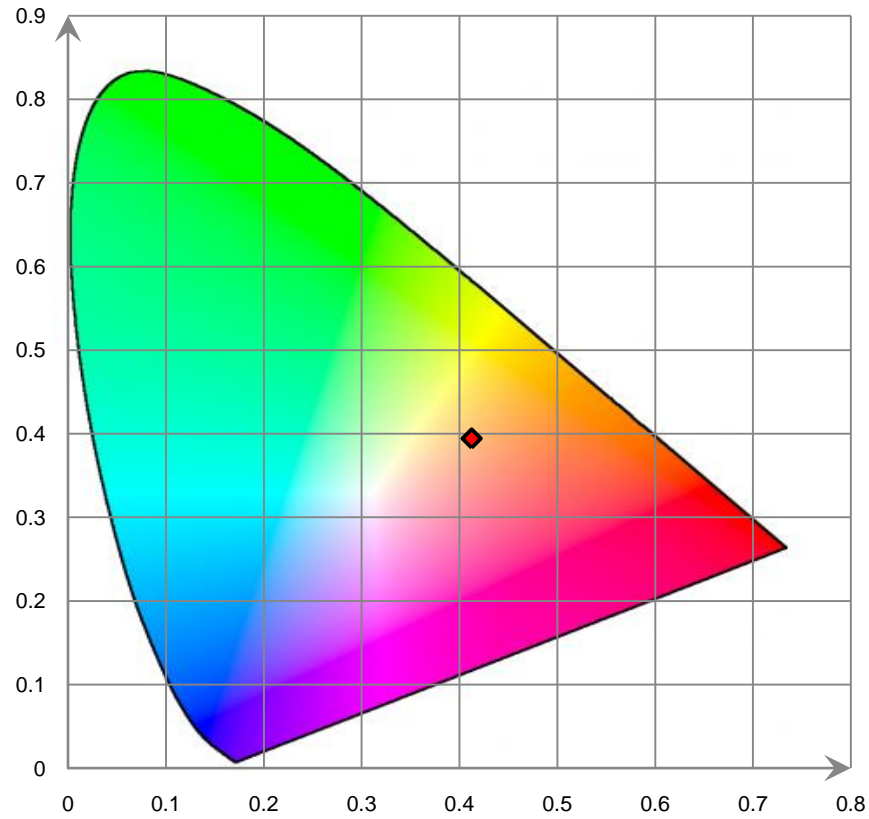
Relative Spectral Power Distribution



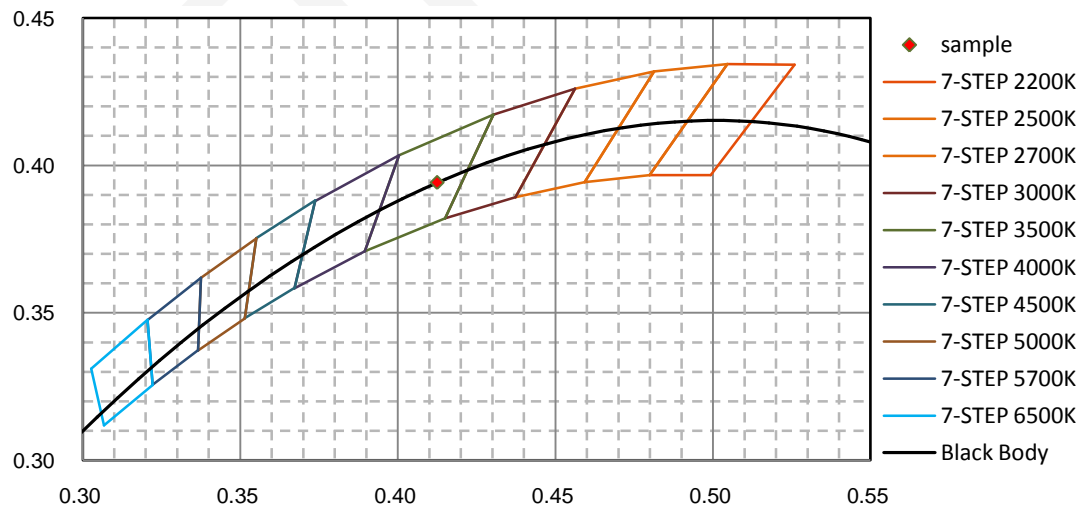
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.040E-02	421	5.387E-01	462	4.901E+00	503	4.706E+00	544	7.782E+00
381	3.300E-02	422	5.976E-01	463	4.688E+00	504	4.833E+00	545	7.861E+00
382	1.400E-02	423	6.975E-01	464	4.505E+00	505	4.958E+00	546	7.908E+00
383	3.900E-03	424	7.846E-01	465	4.337E+00	506	5.078E+00	547	7.952E+00
384	5.620E-02	425	8.899E-01	466	4.170E+00	507	5.209E+00	548	8.007E+00
385	2.590E-02	426	9.971E-01	467	4.030E+00	508	5.329E+00	549	8.082E+00
386	2.300E-03	427	1.147E+00	468	3.856E+00	509	5.450E+00	550	8.141E+00
387	2.770E-02	428	1.286E+00	469	3.679E+00	510	5.563E+00	551	8.213E+00
388	1.020E-02	429	1.428E+00	470	3.509E+00	511	5.664E+00	552	8.278E+00
389	2.100E-03	430	1.586E+00	471	3.344E+00	512	5.749E+00	553	8.343E+00
390	3.770E-02	431	1.756E+00	472	3.199E+00	513	5.870E+00	554	8.406E+00
391	9.500E-03	432	1.936E+00	473	3.042E+00	514	5.934E+00	555	8.491E+00
392	3.300E-03	433	2.114E+00	474	2.905E+00	515	6.036E+00	556	8.550E+00
393	1.600E-03	434	2.317E+00	475	2.789E+00	516	6.109E+00	557	8.622E+00
394	1.150E-02	435	2.545E+00	476	2.678E+00	517	6.189E+00	558	8.706E+00
395	2.600E-02	436	2.780E+00	477	2.628E+00	518	6.305E+00	559	8.779E+00
396	1.420E-02	437	3.042E+00	478	2.587E+00	519	6.377E+00	560	8.860E+00
397	1.130E-02	438	3.316E+00	479	2.537E+00	520	6.443E+00	561	8.935E+00
398	8.300E-03	439	3.638E+00	480	2.524E+00	521	6.520E+00	562	9.024E+00
399	6.700E-03	440	3.952E+00	481	2.532E+00	522	6.546E+00	563	9.087E+00
400	5.000E-04	441	4.334E+00	482	2.538E+00	523	6.652E+00	564	9.192E+00
401	1.000E-02	442	4.746E+00	483	2.587E+00	524	6.711E+00	565	9.284E+00
402	3.530E-02	443	5.202E+00	484	2.596E+00	525	6.785E+00	566	9.358E+00
403	2.000E-02	444	5.677E+00	485	2.672E+00	526	6.829E+00	567	9.450E+00
404	1.610E-02	445	6.172E+00	486	2.724E+00	527	6.888E+00	568	9.510E+00
405	2.590E-02	446	6.645E+00	487	2.785E+00	528	6.940E+00	569	9.600E+00
406	1.680E-02	447	7.139E+00	488	2.861E+00	529	6.982E+00	570	9.668E+00
407	7.150E-02	448	7.564E+00	489	2.942E+00	530	7.052E+00	571	9.761E+00
408	2.540E-02	449	7.931E+00	490	3.056E+00	531	7.096E+00	572	9.862E+00
409	5.940E-02	450	8.167E+00	491	3.131E+00	532	7.158E+00	573	9.961E+00
410	8.990E-02	451	8.273E+00	492	3.258E+00	533	7.188E+00	574	1.004E+01
411	9.110E-02	452	8.221E+00	493	3.365E+00	534	7.237E+00	575	1.013E+01
412	1.001E-01	453	8.084E+00	494	3.484E+00	535	7.308E+00	576	1.021E+01
413	1.019E-01	454	7.822E+00	495	3.624E+00	536	7.356E+00	577	1.028E+01
414	1.724E-01	455	7.475E+00	496	3.740E+00	537	7.407E+00	578	1.036E+01
415	2.036E-01	456	7.046E+00	497	3.890E+00	538	7.443E+00	579	1.045E+01
416	2.276E-01	457	6.597E+00	498	4.008E+00	539	7.486E+00	580	1.053E+01
417	2.762E-01	458	6.222E+00	499	4.170E+00	540	7.566E+00	581	1.060E+01
418	3.428E-01	459	5.815E+00	500	4.281E+00	541	7.627E+00	582	1.067E+01
419	3.817E-01	460	5.457E+00	501	4.448E+00	542	7.675E+00	583	1.074E+01
420	4.694E-01	461	5.164E+00	502	4.584E+00	543	7.700E+00	584	1.080E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.091E+01	626	9.972E+00	667	4.580E+00	708	1.381E+00	749	2.439E-01
586	1.098E+01	627	9.864E+00	668	4.460E+00	709	1.314E+00	750	2.410E-01
587	1.106E+01	628	9.714E+00	669	4.324E+00	710	1.239E+00	751	2.765E-01
588	1.108E+01	629	9.623E+00	670	4.190E+00	711	1.192E+00	752	2.509E-01
589	1.116E+01	630	9.517E+00	671	4.122E+00	712	1.162E+00	753	2.478E-01
590	1.122E+01	631	9.361E+00	672	4.002E+00	713	1.159E+00	754	2.023E-01
591	1.128E+01	632	9.222E+00	673	3.892E+00	714	1.095E+00	755	1.702E-01
592	1.130E+01	633	9.124E+00	674	3.764E+00	715	1.025E+00	756	2.202E-01
593	1.135E+01	634	8.979E+00	675	3.709E+00	716	9.919E-01	757	1.809E-01
594	1.136E+01	635	8.823E+00	676	3.623E+00	717	9.850E-01	758	5.390E-02
595	1.142E+01	636	8.701E+00	677	3.515E+00	718	9.646E-01	759	1.338E-01
596	1.146E+01	637	8.560E+00	678	3.362E+00	719	8.675E-01	760	9.000E-02
597	1.147E+01	638	8.458E+00	679	3.296E+00	720	8.605E-01	761	8.920E-02
598	1.149E+01	639	8.304E+00	680	3.187E+00	721	8.175E-01	762	1.785E-01
599	1.151E+01	640	8.146E+00	681	3.118E+00	722	8.222E-01	763	2.030E-01
600	1.151E+01	641	8.058E+00	682	3.018E+00	723	8.137E-01	764	1.213E-01
601	1.152E+01	642	7.853E+00	683	2.986E+00	724	7.108E-01	765	4.830E-02
602	1.150E+01	643	7.756E+00	684	2.887E+00	725	7.552E-01	766	7.880E-02
603	1.152E+01	644	7.585E+00	685	2.762E+00	726	6.994E-01	767	9.580E-02
604	1.151E+01	645	7.465E+00	686	2.690E+00	727	6.529E-01	768	1.408E-01
605	1.149E+01	646	7.348E+00	687	2.647E+00	728	6.510E-01	769	7.130E-02
606	1.144E+01	647	7.188E+00	688	2.567E+00	729	6.591E-01	770	3.990E-02
607	1.142E+01	648	7.050E+00	689	2.436E+00	730	6.757E-01	771	5.420E-02
608	1.141E+01	649	6.918E+00	690	2.369E+00	731	5.883E-01	772	1.104E-01
609	1.136E+01	650	6.781E+00	691	2.330E+00	732	6.142E-01	773	3.850E-02
610	1.131E+01	651	6.619E+00	692	2.257E+00	733	5.277E-01	774	4.440E-02
611	1.127E+01	652	6.495E+00	693	2.201E+00	734	5.090E-01	775	6.210E-02
612	1.121E+01	653	6.377E+00	694	2.118E+00	735	5.419E-01	776	2.920E-02
613	1.116E+01	654	6.221E+00	695	2.070E+00	736	4.560E-01	777	5.390E-02
614	1.108E+01	655	6.080E+00	696	1.948E+00	737	4.430E-01	778	7.830E-02
615	1.100E+01	656	5.922E+00	697	1.950E+00	738	4.150E-01	779	6.740E-02
616	1.094E+01	657	5.808E+00	698	1.876E+00	739	3.722E-01	780	4.940E-02
617	1.085E+01	658	5.669E+00	699	1.792E+00	740	3.708E-01		
618	1.078E+01	659	5.536E+00	700	1.740E+00	741	4.049E-01		
619	1.070E+01	660	5.387E+00	701	1.744E+00	742	4.065E-01		
620	1.063E+01	661	5.279E+00	702	1.627E+00	743	3.792E-01		
621	1.048E+01	662	5.156E+00	703	1.575E+00	744	2.568E-01		
622	1.042E+01	663	5.013E+00	704	1.527E+00	745	2.760E-01		
623	1.031E+01	664	4.921E+00	705	1.469E+00	746	1.872E-01		
624	1.018E+01	665	4.806E+00	706	1.431E+00	747	2.715E-01		
625	1.008E+01	666	4.664E+00	707	1.379E+00	748	2.549E-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**

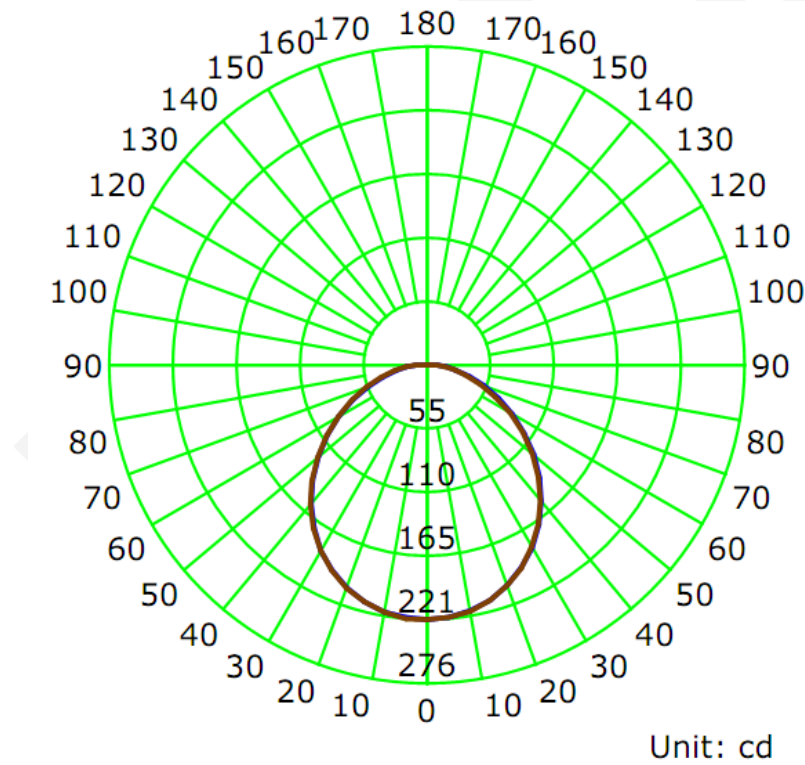
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0460	5.45	0.9870

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
617.7	113.38	221.3	1.24	1.24

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	106.7	106.7	106.6	106.7	106.7
Field Angle (10% I _{max}):	165.1	164.9	164.6	165.0	164.9

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	221	221	221	221	221	221	221	221
5.0°	220	220	220	220	220	220	220	221
10.0°	217	216	216	216	217	217	217	218
15.0°	211	211	211	211	211	212	212	213
20.0°	204	204	203	203	204	205	205	206
25.0°	194	193	193	194	195	195	196	197
30.0°	183	182	182	182	182	184	185	186
35.0°	169	169	168	168	169	170	171	172
40.0°	154	154	153	153	154	155	156	158
45.0°	138	137	137	137	137	139	140	142
50.0°	121	120	119	119	120	121	123	124
55.0°	103	102	101	101	102	103	105	107
60.0°	86	84	83	83	84	85	87	89
65.0°	68	67	65	65	66	67	69	72
70.0°	52	51	49	49	50	51	53	55
75.0°	38	37	36	35	36	37	38	40
80.0°	26	25	24	24	24	25	26	28
85.0°	17	16	16	15	16	16	17	18
90.0°	10	10	9	9	9	10	10	11
95.0°	5	5	5	5	5	5	6	6
100.0°	2	3	3	3	3	3	3	3
105.0°	1	1	1	2	2	1	1	1
110.0°	1	1	1	1	1	1	1	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°	221	221	221	221	221	221	221	221
5.0°	220	220	221	221	221	221	220	220
10.0°	218	218	218	218	218	218	217	216
15.0°	213	213	213	213	213	213	212	212
20.0°	205	206	206	206	206	206	204	204
25.0°	197	197	198	197	197	196	195	194
30.0°	186	186	187	187	186	185	184	183
35.0°	173	173	174	174	173	172	170	169
40.0°	158	159	159	159	158	157	156	154
45.0°	141	143	143	143	142	141	139	137
50.0°	124	125	126	126	125	124	122	121
55.0°	106	108	109	108	108	106	105	103
60.0°	89	90	91	90	90	89	87	86
65.0°	71	73	73	73	72	71	70	68
70.0°	55	56	57	57	56	55	54	52
75.0°	41	42	42	42	41	41	39	38
80.0°	28	29	30	30	29	28	27	26
85.0°	18	19	19	19	19	18	18	17
90.0°	11	11	12	12	11	11	10	10
95.0°	6	6	6	6	6	6	5	5
100.0°	3	3	3	3	3	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	5.3	0.85	0-5	5.3	0.85
5-10	15.6	2.53	0-10	20.9	3.39
10-15	25.5	4.12	0-15	46.4	7.51
15-20	34.3	5.56	0-20	80.7	13.07
20-25	42.0	6.80	0-25	122.7	19.87
25-30	48.1	7.78	0-30	170.8	27.65
30-35	52.3	8.47	0-35	223.1	36.12
35-40	54.6	8.83	0-40	277.6	44.95
40-45	54.8	8.87	0-45	332.4	53.82
45-50	53.0	8.58	0-50	385.4	62.40
50-55	49.4	8.00	0-55	434.8	70.40
55-60	44.3	7.17	0-60	479.1	77.57
60-65	38.0	6.16	0-65	517.1	83.73
65-70	31.1	5.03	0-70	548.2	88.76
70-75	24.1	3.90	0-75	572.3	92.66
75-80	17.6	2.85	0-80	589.9	95.51
80-85	12.0	1.95	0-85	602.0	97.46
85-90	7.6	1.23	0-90	609.6	98.69
90-95	4.4	0.70	0-95	613.9	99.39
95-100	2.2	0.36	0-100	616.1	99.75
100-105	1.0	0.16	0-105	617.1	99.91
105-110	0.4	0.06	0-110	617.5	99.97
110-115	0.1	0.02	0-115	617.6	99.99
115-120	0.0	0.01	0-120	617.7	100.00
120-125	0.0	0.00	0-125	617.7	100.00
125-130	0.0	0.00	0-130	617.7	100.00
130-135	0.0	0.00	0-135	617.7	100.00
135-140	0.0	0.00	0-140	617.7	100.00
140-145	0.0	0.00	0-145	617.7	100.00
145-150	0.0	0.00	0-150	617.7	100.00
150-155	0.0	0.00	0-155	617.7	100.00
155-160	0.0	0.00	0-160	617.7	100.00
160-165	0.0	0.00	0-165	617.7	100.00
165-170	0.0	0.00	0-170	617.7	100.00
170-175	0.0	0.00	0-175	617.7	100.00
175-180	0.0	0.00	0-180	617.7	100.00

6. Product Photo



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