



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/830/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:	PKS181030084-10-1
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/830/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: 3000K
 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**

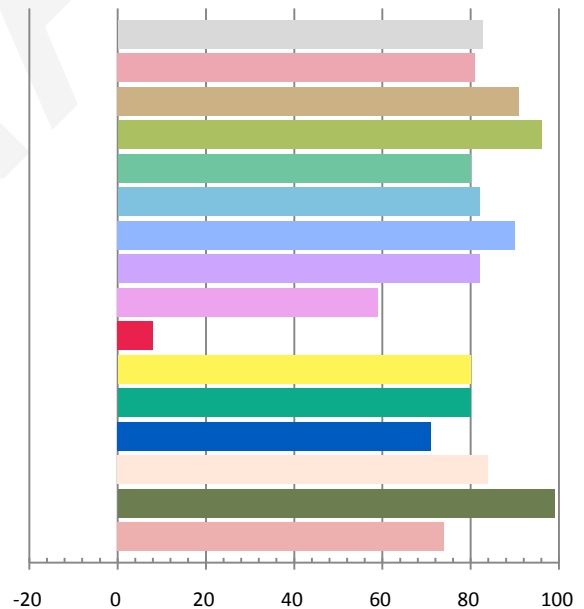
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0462	5.43	0.9798	611.96	112.7

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.853	2977	0.00009	0.4388	0.4049	0.2514	0.5220

Color Rendering Index

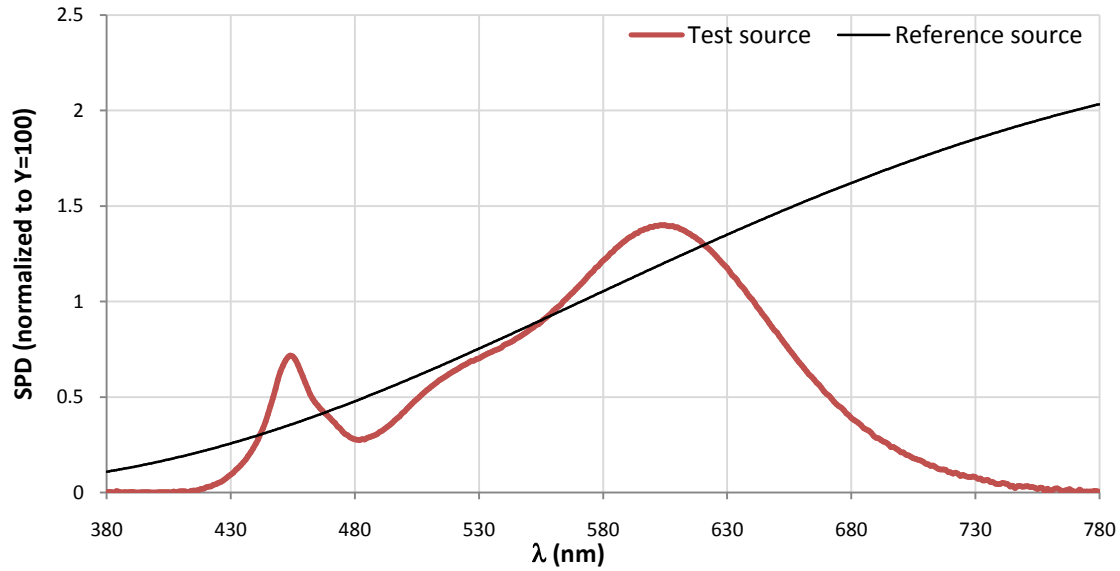
Ra 82.7			
R1 81	R2 91	R3 96	R4 80
R5 82	R6 90	R7 82	R8 59
R9 8	R10 80	R11 80	R12 71
R13 84	R14 99	R15 74	



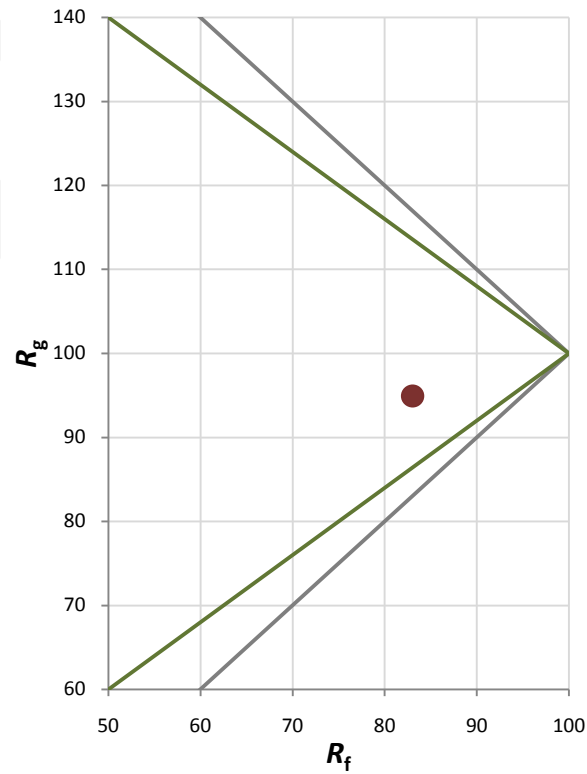
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	95

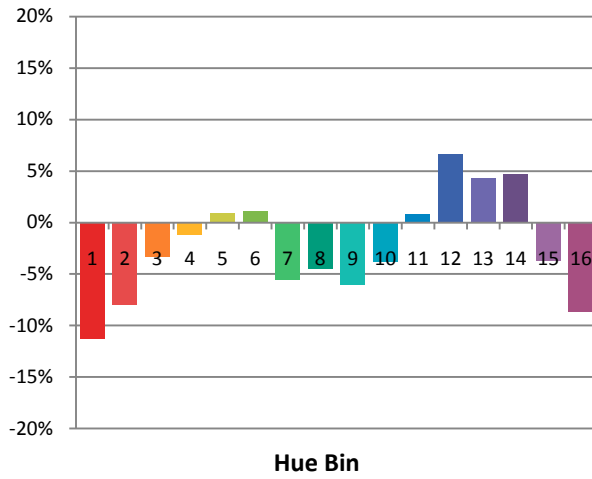
Spectral Power Distribution Comparison



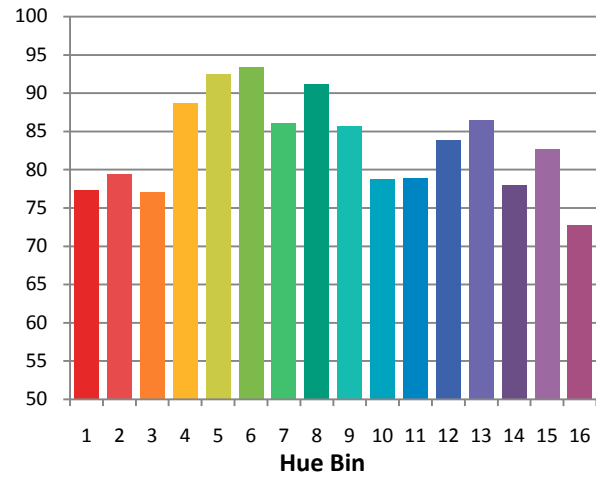
Plot of R_g versus R_f



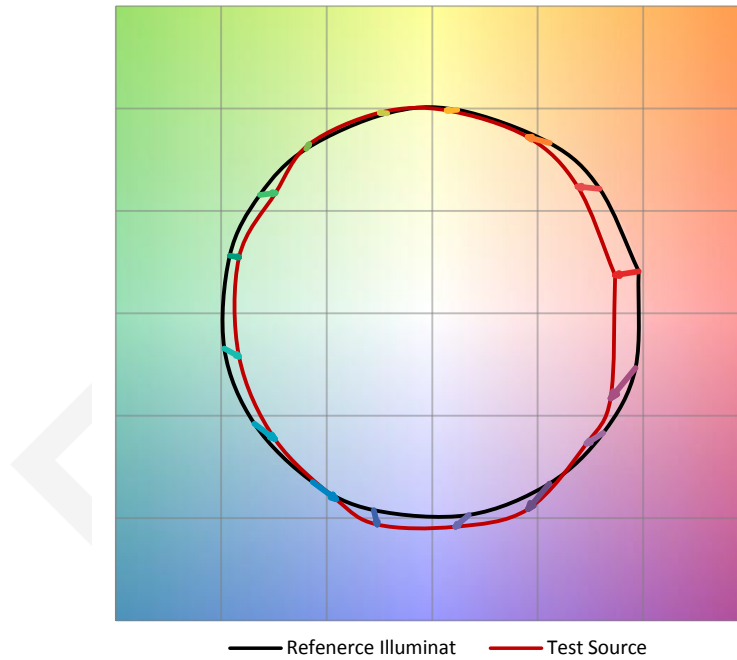
Chroma Shift by Hue



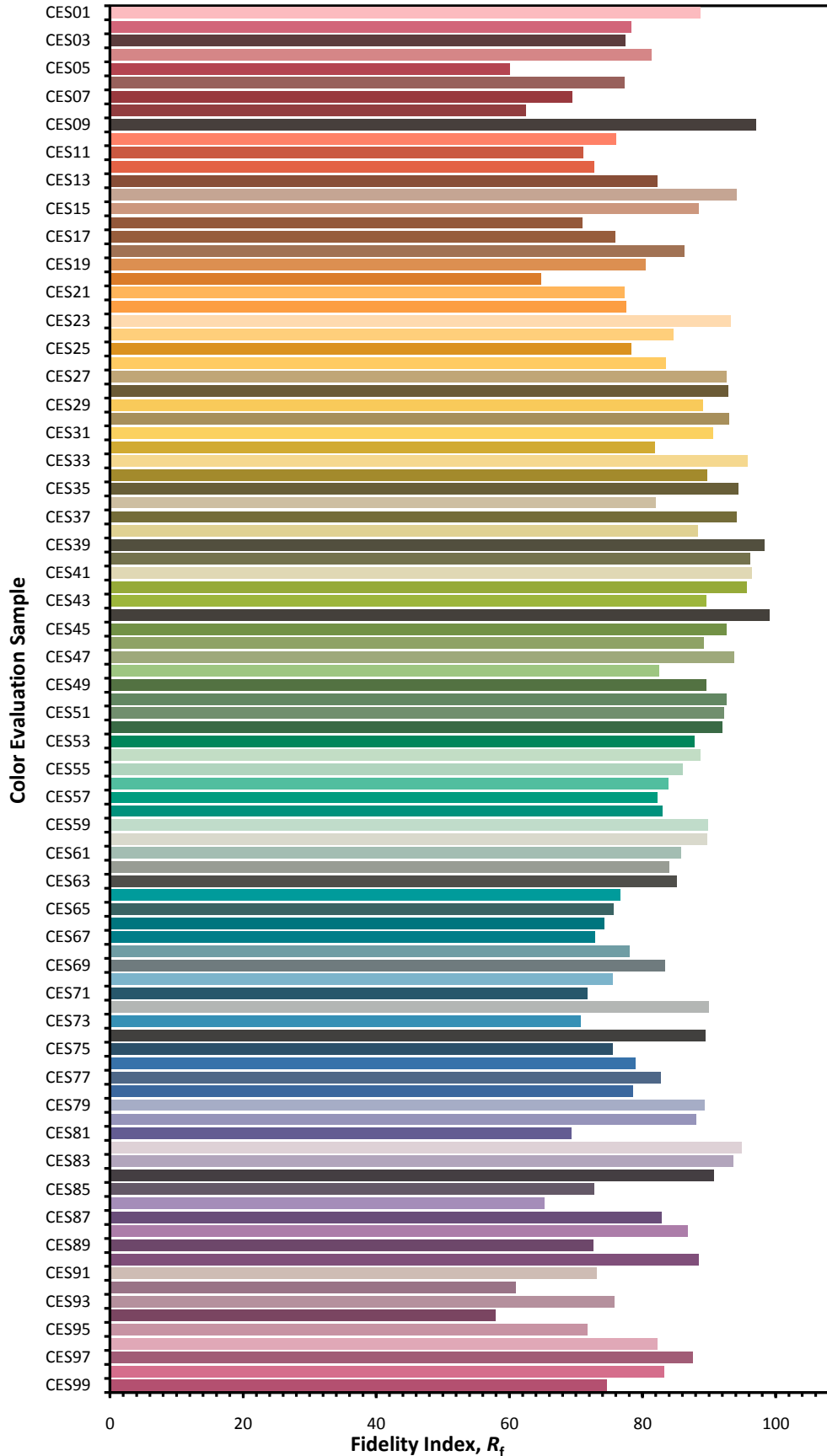
R_f by Hue



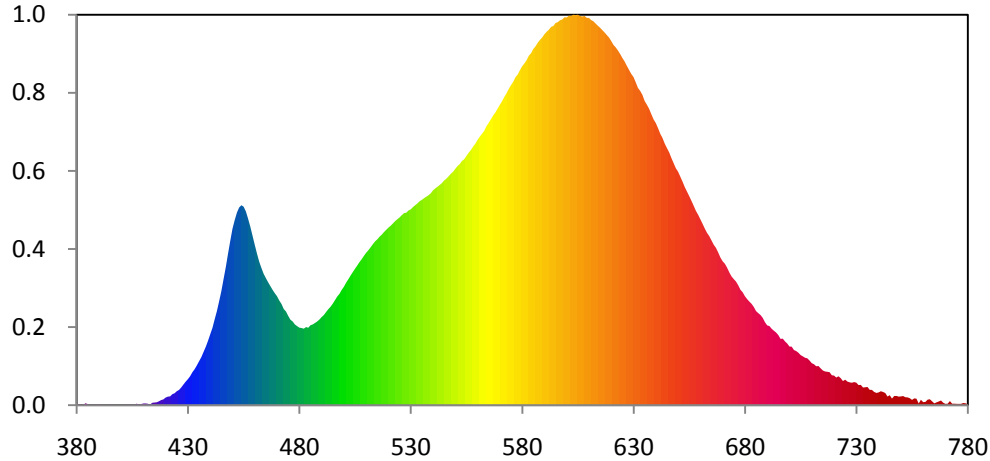
Color Vector Graphic



Color Fidelity by CES Sample



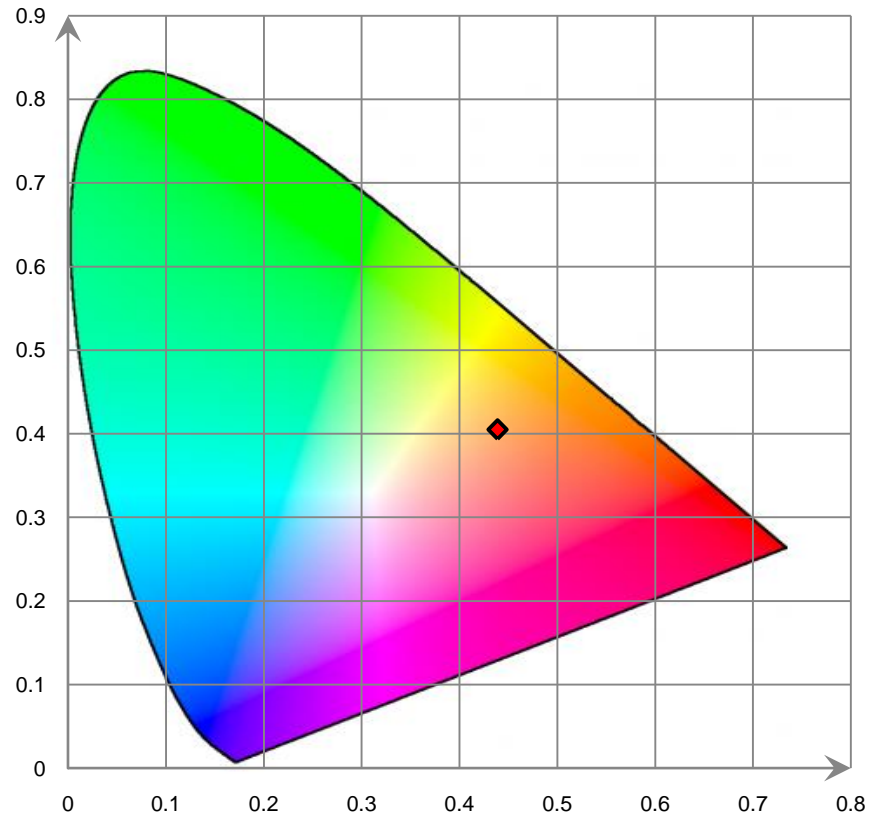
Relative Spectral Power Distribution



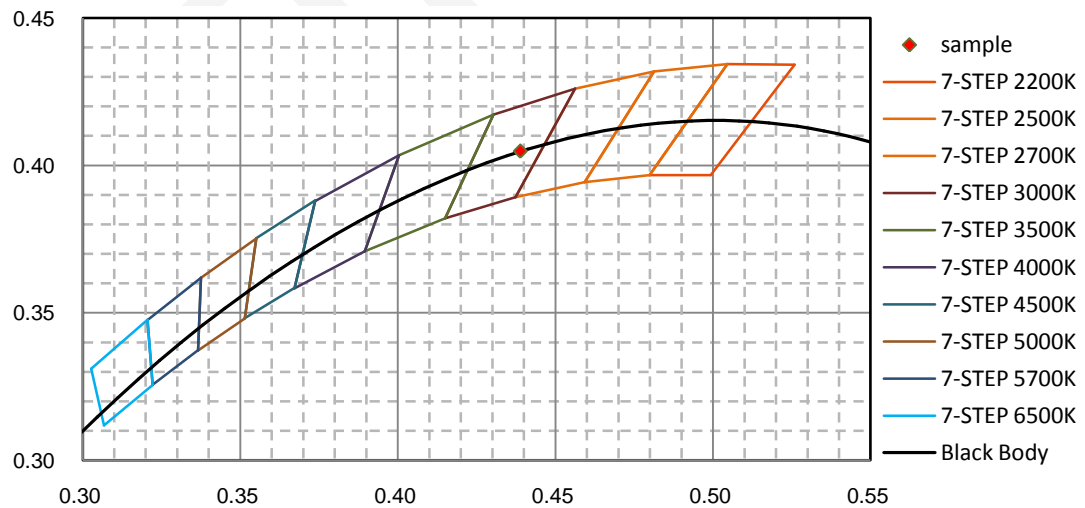
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.710E-02	421	2.741E-01	462	4.605E+00	503	4.161E+00	544	7.131E+00
381	3.570E-02	422	2.821E-01	463	4.401E+00	504	4.275E+00	545	7.218E+00
382	1.590E-02	423	3.536E-01	464	4.217E+00	505	4.383E+00	546	7.274E+00
383	3.400E-03	424	3.825E-01	465	4.079E+00	506	4.486E+00	547	7.350E+00
384	6.320E-02	425	4.485E-01	466	3.946E+00	507	4.596E+00	548	7.430E+00
385	3.610E-02	426	4.893E-01	467	3.825E+00	508	4.690E+00	549	7.497E+00
386	3.000E-03	427	5.712E-01	468	3.704E+00	509	4.796E+00	550	7.589E+00
387	1.120E-02	428	6.649E-01	469	3.594E+00	510	4.896E+00	551	7.679E+00
388	8.300E-03	429	7.560E-01	470	3.497E+00	511	4.977E+00	552	7.745E+00
389	9.000E-03	430	8.362E-01	471	3.360E+00	512	5.071E+00	553	7.844E+00
390	3.340E-02	431	9.315E-01	472	3.250E+00	513	5.169E+00	554	7.898E+00
391	8.700E-03	432	1.060E+00	473	3.090E+00	514	5.261E+00	555	8.006E+00
392	3.100E-03	433	1.155E+00	474	3.010E+00	515	5.326E+00	556	8.109E+00
393	1.500E-03	434	1.278E+00	475	2.869E+00	516	5.409E+00	557	8.193E+00
394	7.300E-03	435	1.411E+00	476	2.745E+00	517	5.478E+00	558	8.304E+00
395	1.780E-02	436	1.541E+00	477	2.688E+00	518	5.561E+00	559	8.400E+00
396	1.300E-02	437	1.706E+00	478	2.593E+00	519	5.630E+00	560	8.521E+00
397	1.070E-02	438	1.873E+00	479	2.540E+00	520	5.704E+00	561	8.624E+00
398	1.700E-03	439	2.064E+00	480	2.490E+00	521	5.762E+00	562	8.718E+00
399	4.800E-03	440	2.275E+00	481	2.478E+00	522	5.835E+00	563	8.811E+00
400	1.000E-04	441	2.479E+00	482	2.457E+00	523	5.911E+00	564	8.960E+00
401	9.200E-03	442	2.757E+00	483	2.508E+00	524	5.973E+00	565	9.069E+00
402	1.480E-02	443	3.022E+00	484	2.487E+00	525	6.030E+00	566	9.185E+00
403	1.730E-02	444	3.336E+00	485	2.567E+00	526	6.103E+00	567	9.304E+00
404	1.020E-02	445	3.664E+00	486	2.593E+00	527	6.168E+00	568	9.402E+00
405	1.950E-02	446	4.051E+00	487	2.639E+00	528	6.181E+00	569	9.527E+00
406	6.500E-03	447	4.436E+00	488	2.687E+00	529	6.254E+00	570	9.646E+00
407	5.110E-02	448	4.864E+00	489	2.750E+00	530	6.288E+00	571	9.766E+00
408	8.100E-03	449	5.277E+00	490	2.829E+00	531	6.361E+00	572	9.897E+00
409	3.820E-02	450	5.665E+00	491	2.896E+00	532	6.421E+00	573	1.002E+01
410	5.440E-02	451	5.946E+00	492	2.991E+00	533	6.480E+00	574	1.016E+01
411	5.600E-02	452	6.189E+00	493	3.082E+00	534	6.551E+00	575	1.028E+01
412	4.600E-02	453	6.350E+00	494	3.162E+00	535	6.594E+00	576	1.039E+01
413	2.180E-02	454	6.422E+00	495	3.259E+00	536	6.650E+00	577	1.053E+01
414	7.670E-02	455	6.375E+00	496	3.374E+00	537	6.695E+00	578	1.062E+01
415	8.610E-02	456	6.224E+00	497	3.487E+00	538	6.744E+00	579	1.076E+01
416	9.310E-02	457	5.990E+00	498	3.576E+00	539	6.805E+00	580	1.088E+01
417	1.258E-01	458	5.734E+00	499	3.701E+00	540	6.900E+00	581	1.097E+01
418	1.643E-01	459	5.442E+00	500	3.804E+00	541	6.960E+00	582	1.108E+01
419	1.863E-01	460	5.149E+00	501	3.933E+00	542	7.015E+00	583	1.122E+01
420	2.442E-01	461	4.868E+00	502	4.047E+00	543	7.072E+00	584	1.130E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.144E+01	626	1.104E+01	667	5.052E+00	708	1.505E+00	749	2.749E-01
586	1.152E+01	627	1.090E+01	668	4.904E+00	709	1.433E+00	750	2.808E-01
587	1.164E+01	628	1.077E+01	669	4.741E+00	710	1.349E+00	751	2.931E-01
588	1.173E+01	629	1.064E+01	670	4.623E+00	711	1.314E+00	752	2.553E-01
589	1.181E+01	630	1.054E+01	671	4.543E+00	712	1.249E+00	753	2.495E-01
590	1.191E+01	631	1.037E+01	672	4.416E+00	713	1.259E+00	754	2.249E-01
591	1.199E+01	632	1.019E+01	673	4.263E+00	714	1.183E+00	755	1.703E-01
592	1.206E+01	633	1.009E+01	674	4.135E+00	715	1.114E+00	756	2.183E-01
593	1.215E+01	634	9.965E+00	675	4.048E+00	716	1.082E+00	757	2.080E-01
594	1.218E+01	635	9.769E+00	676	3.971E+00	717	1.073E+00	758	5.400E-02
595	1.227E+01	636	9.649E+00	677	3.850E+00	718	1.059E+00	759	1.746E-01
596	1.230E+01	637	9.516E+00	678	3.706E+00	719	9.621E-01	760	9.820E-02
597	1.236E+01	638	9.343E+00	679	3.625E+00	720	9.504E-01	761	1.043E-01
598	1.239E+01	639	9.179E+00	680	3.499E+00	721	8.875E-01	762	1.766E-01
599	1.246E+01	640	9.058E+00	681	3.406E+00	722	9.284E-01	763	1.904E-01
600	1.245E+01	641	8.897E+00	682	3.325E+00	723	8.679E-01	764	1.243E-01
601	1.251E+01	642	8.716E+00	683	3.254E+00	724	7.745E-01	765	5.800E-02
602	1.251E+01	643	8.582E+00	684	3.153E+00	725	8.188E-01	766	8.980E-02
603	1.254E+01	644	8.401E+00	685	3.022E+00	726	7.592E-01	767	1.183E-01
604	1.253E+01	645	8.258E+00	686	2.956E+00	727	7.339E-01	768	1.500E-01
605	1.254E+01	646	8.118E+00	687	2.894E+00	728	7.198E-01	769	7.830E-02
606	1.250E+01	647	7.937E+00	688	2.803E+00	729	7.425E-01	770	4.230E-02
607	1.248E+01	648	7.774E+00	689	2.663E+00	730	7.228E-01	771	4.710E-02
608	1.250E+01	649	7.609E+00	690	2.562E+00	731	6.460E-01	772	1.325E-01
609	1.244E+01	650	7.498E+00	691	2.541E+00	732	6.522E-01	773	4.740E-02
610	1.244E+01	651	7.339E+00	692	2.455E+00	733	5.676E-01	774	4.720E-02
611	1.237E+01	652	7.179E+00	693	2.391E+00	734	5.740E-01	775	4.240E-02
612	1.233E+01	653	7.003E+00	694	2.333E+00	735	5.862E-01	776	4.200E-02
613	1.226E+01	654	6.860E+00	695	2.251E+00	736	4.940E-01	777	4.200E-02
614	1.219E+01	655	6.713E+00	696	2.128E+00	737	4.906E-01	778	6.980E-02
615	1.212E+01	656	6.564E+00	697	2.137E+00	738	4.264E-01	779	6.040E-02
616	1.205E+01	657	6.404E+00	698	2.048E+00	739	3.943E-01	780	3.530E-02
617	1.197E+01	658	6.239E+00	699	1.979E+00	740	4.085E-01		
618	1.189E+01	659	6.115E+00	700	1.884E+00	741	4.480E-01		
619	1.181E+01	660	5.970E+00	701	1.880E+00	742	4.239E-01		
620	1.169E+01	661	5.823E+00	702	1.771E+00	743	3.902E-01		
621	1.157E+01	662	5.670E+00	703	1.739E+00	744	2.775E-01		
622	1.149E+01	663	5.534E+00	704	1.684E+00	745	3.212E-01		
623	1.139E+01	664	5.429E+00	705	1.610E+00	746	2.121E-01		
624	1.128E+01	665	5.291E+00	706	1.568E+00	747	2.942E-01		
625	1.115E+01	666	5.153E+00	707	1.523E+00	748	2.967E-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**

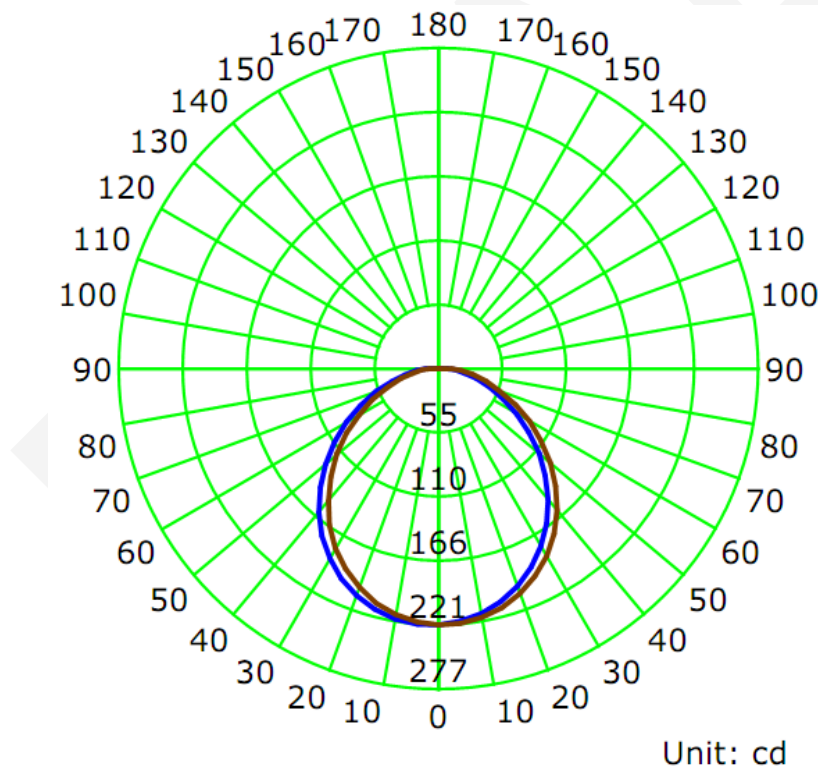
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0460	5.44	0.9860

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
611.3	112.43	221.7	1.23	1.23

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	105.8	105.7	105.7	105.6	105.7
Field Angle (10% I_{max}):	164.3	164.4	164.3	164.0	164.3

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°	219	220	220	220	221	222	222	222
10.0°	215	216	217	217	218	219	220	220
15.0°	209	210	211	212	214	215	216	216
20.0°	200	202	203	205	207	209	210	210
25.0°	190	191	194	196	198	200	201	202
30.0°	177	179	181	184	187	190	191	191
35.0°	163	165	168	171	174	177	178	179
40.0°	148	150	152	156	160	163	164	165
45.0°	131	133	136	140	144	147	148	149
50.0°	114	116	119	123	127	130	131	132
55.0°	96	99	101	105	109	112	113	114
60.0°	79	81	84	87	91	94	95	96
65.0°	63	65	67	71	74	76	78	78
70.0°	47	49	52	54	57	59	61	61
75.0°	34	36	38	40	42	44	45	45
80.0°	23	24	26	28	30	31	32	32
85.0°	15	15	17	18	19	20	21	21
90.0°	8	9	10	11	12	13	13	13
95.0°	4	4	5	6	6	7	7	7
100.0°	2	2	2	3	3	3	4	3
105.0°	1	1	1	1	1	1	1	1
110.0°	0	0	0	0	1	0	1	1
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°	221	221	220	220	219	219	219	219
10.0°	219	219	218	216	216	215	214	214
15.0°	215	214	213	211	210	209	208	208
20.0°	209	207	205	203	201	200	199	199
25.0°	200	199	196	194	191	190	188	188
30.0°	189	187	185	182	179	177	175	175
35.0°	177	174	171	168	165	163	161	161
40.0°	162	159	156	153	149	147	145	145
45.0°	146	143	140	136	133	130	128	128
50.0°	129	126	123	119	115	113	111	110
55.0°	111	108	105	101	98	95	93	93
60.0°	93	90	87	84	80	78	76	76
65.0°	75	73	69	66	64	61	60	60
70.0°	58	56	53	50	48	46	45	45
75.0°	43	41	39	36	34	33	32	32
80.0°	30	29	27	25	23	22	21	21
85.0°	20	19	17	16	15	14	13	13
90.0°	12	11	10	9	8	8	7	7
95.0°	6	6	5	5	4	4	4	3
100.0°	3	3	2	2	2	2	1	1
105.0°	1	1	1	1	1	0	0	0
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	0.86	0-5	5.3	0.86
5-10	15.6	2.56	0-10	20.9	3.42
10-15	25.4	4.16	0-15	46.4	7.58
15-20	34.3	5.61	0-20	80.7	13.19
20-25	41.9	6.85	0-25	122.5	20.04
25-30	47.8	7.82	0-30	170.3	27.86
30-35	52.0	8.50	0-35	222.3	36.36
35-40	54.1	8.85	0-40	276.4	45.21
40-45	54.2	8.87	0-45	330.6	54.08
45-50	52.4	8.57	0-50	383.0	62.65
50-55	48.8	7.97	0-55	431.7	70.62
55-60	43.7	7.14	0-60	475.4	77.77
60-65	37.5	6.14	0-65	512.9	83.90
65-70	30.7	5.02	0-70	543.6	88.92
70-75	23.8	3.89	0-75	567.4	92.81
75-80	17.3	2.84	0-80	584.7	95.64
80-85	11.8	1.93	0-85	596.5	97.57
85-90	7.4	1.21	0-90	603.9	98.79
90-95	4.2	0.68	0-95	608.1	99.47
95-100	2.1	0.34	0-100	610.1	99.80
100-105	0.8	0.14	0-105	611.0	99.94
105-110	0.3	0.05	0-110	611.3	99.99
110-115	0.1	0.01	0-115	611.3	100.00
115-120	0.0	0.00	0-120	611.3	100.00
120-125	0.0	0.00	0-125	611.3	100.00
125-130	0.0	0.00	0-130	611.3	100.00
130-135	0.0	0.00	0-135	611.3	100.00
135-140	0.0	0.00	0-140	611.3	100.00
140-145	0.0	0.00	0-145	611.3	100.00
145-150	0.0	0.00	0-150	611.3	100.00
150-155	0.0	0.00	0-155	611.3	100.00
155-160	0.0	0.00	0-160	611.3	100.00
160-165	0.0	0.00	0-165	611.3	100.00
165-170	0.0	0.00	0-170	611.3	100.00
170-175	0.0	0.00	0-175	611.3	100.00
175-180	0.0	0.00	0-180	611.3	100.00

6. Product Photo



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