



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/830/HYBM

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	PKS181030080-10-1
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/830/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: 3000K
 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**

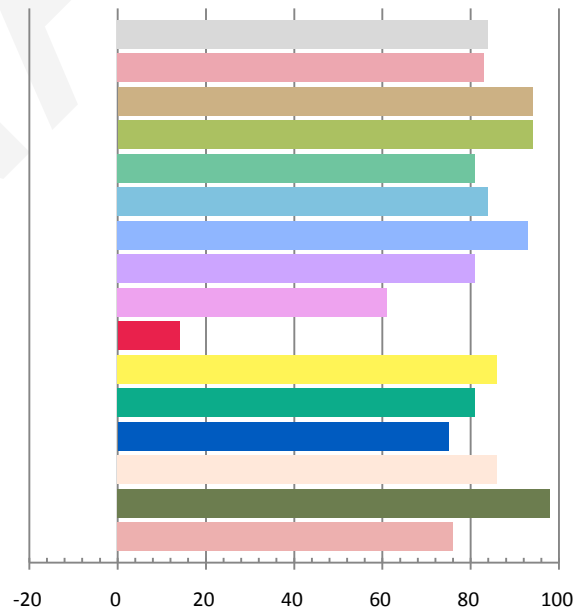
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0678	7.91	0.9721	951.03	120.23

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.929	3002	-0.00156	0.4345	0.3994	0.2511	0.5192

Color Rendering Index

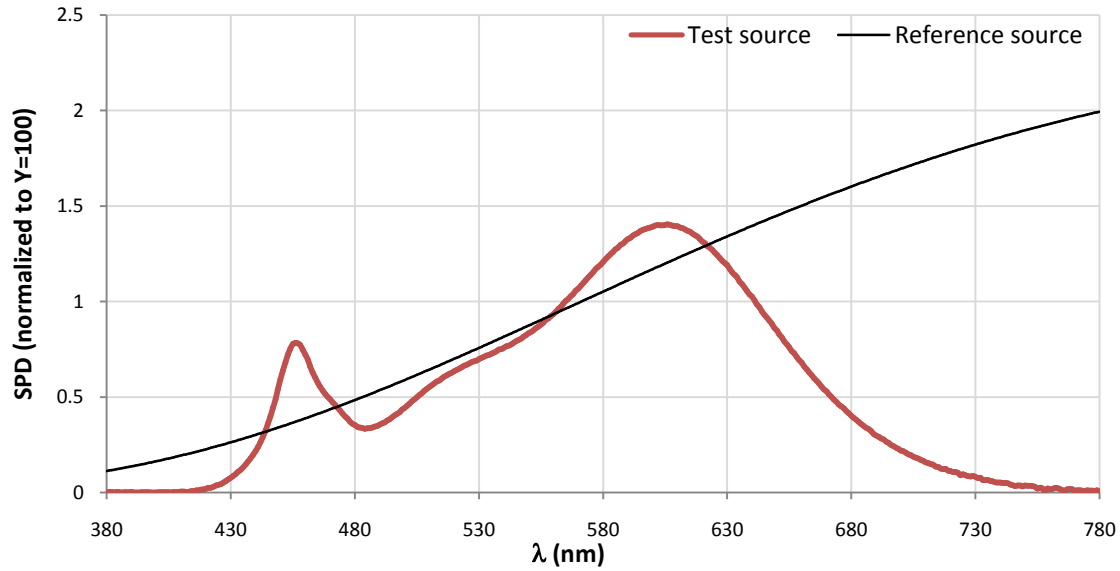
Ra 83.9			
R1 83	R2 94	R3 94	R4 81
R5 84	R6 93	R7 81	R8 61
R9 14	R10 86	R11 81	R12 75
R13 86	R14 98	R15 76	



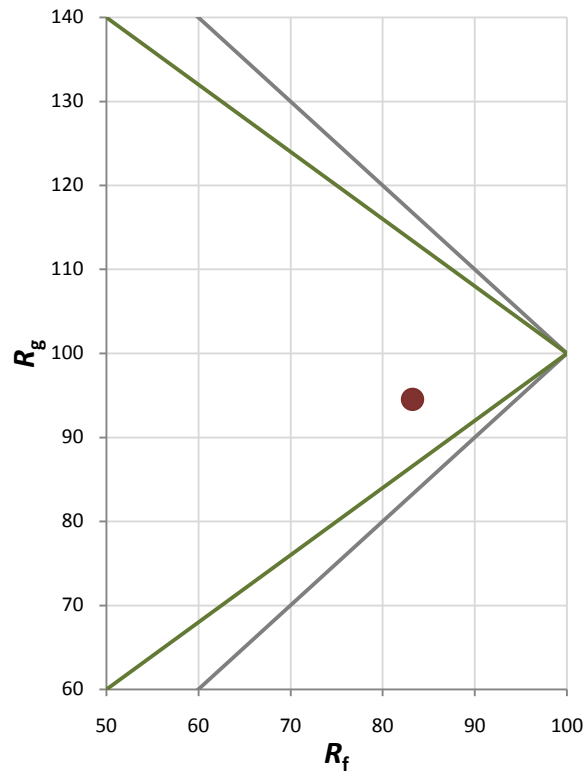
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	95

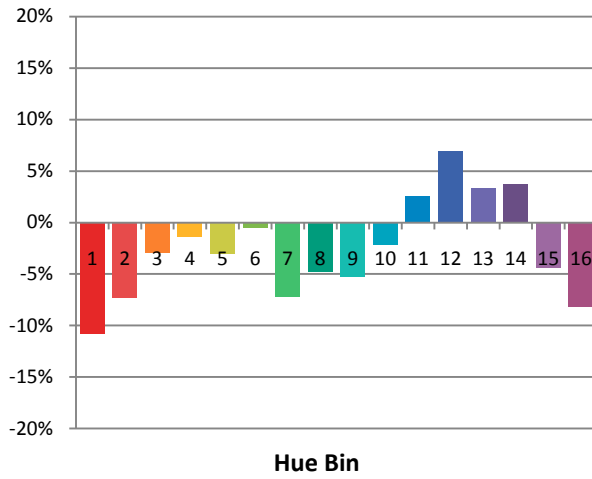
Spectral Power Distribution Comparison



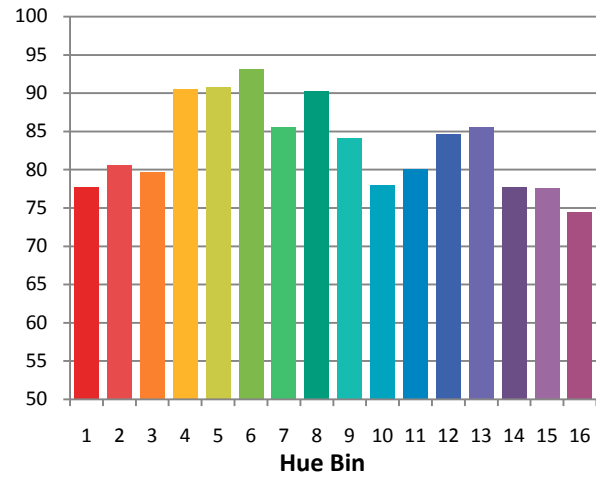
Plot of R_g versus R_f



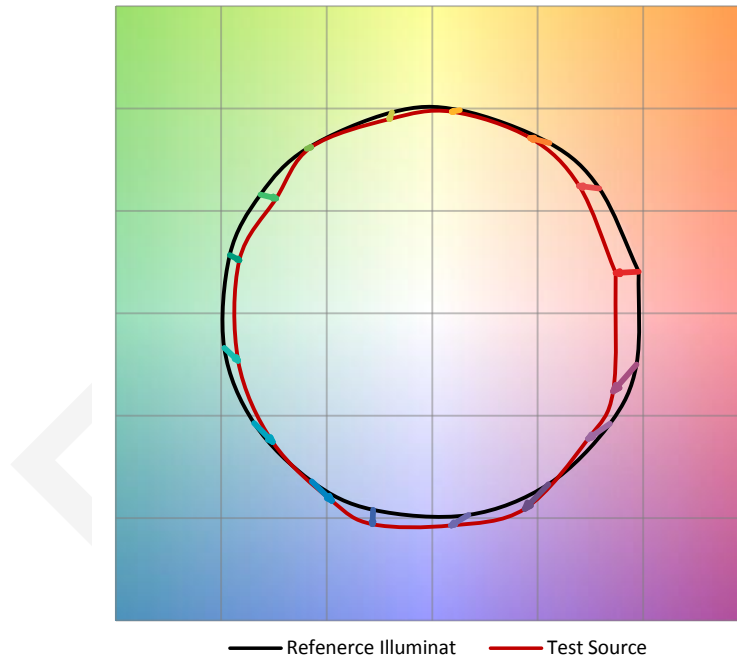
Chroma Shift by Hue



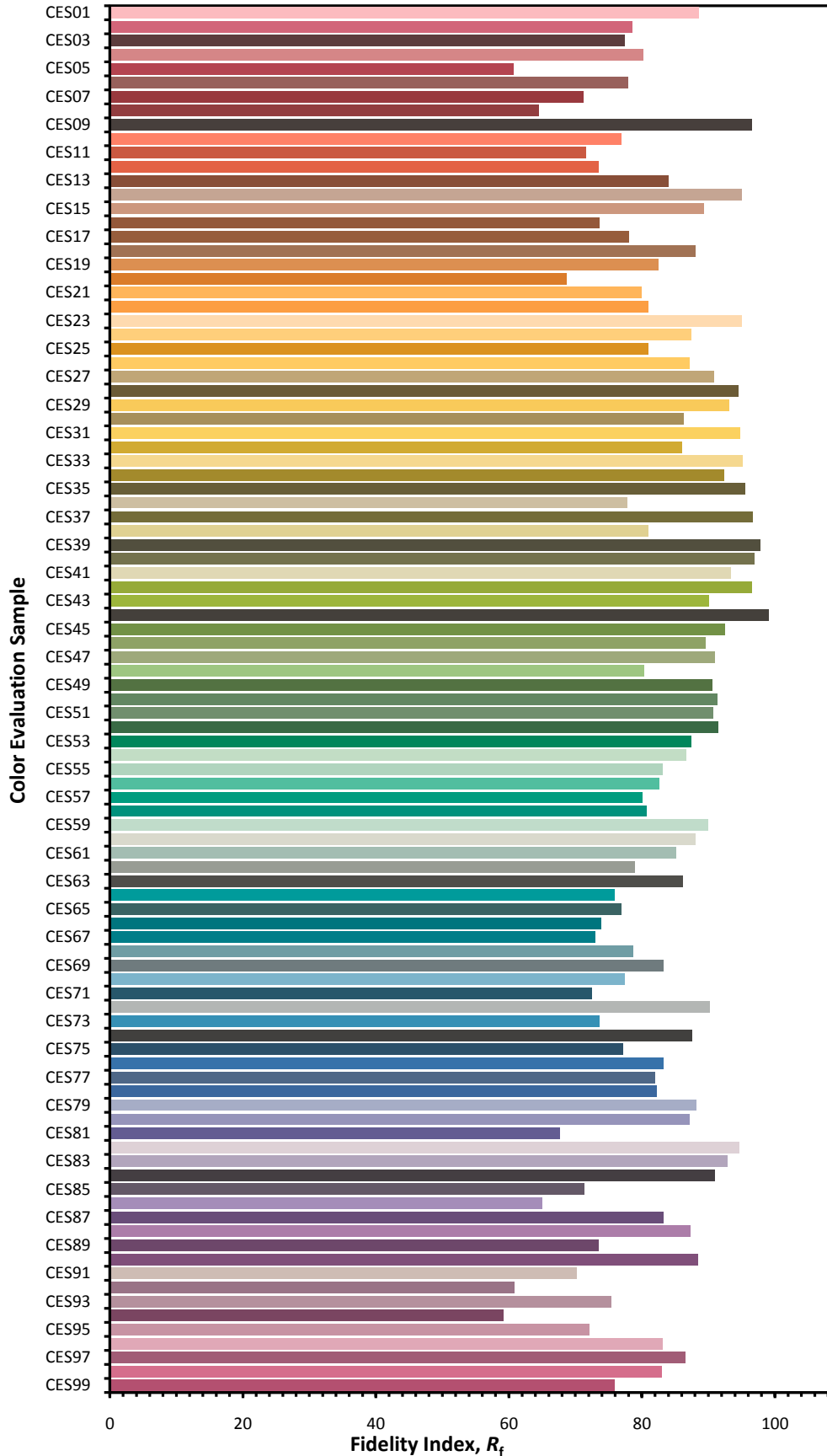
R_f by Hue



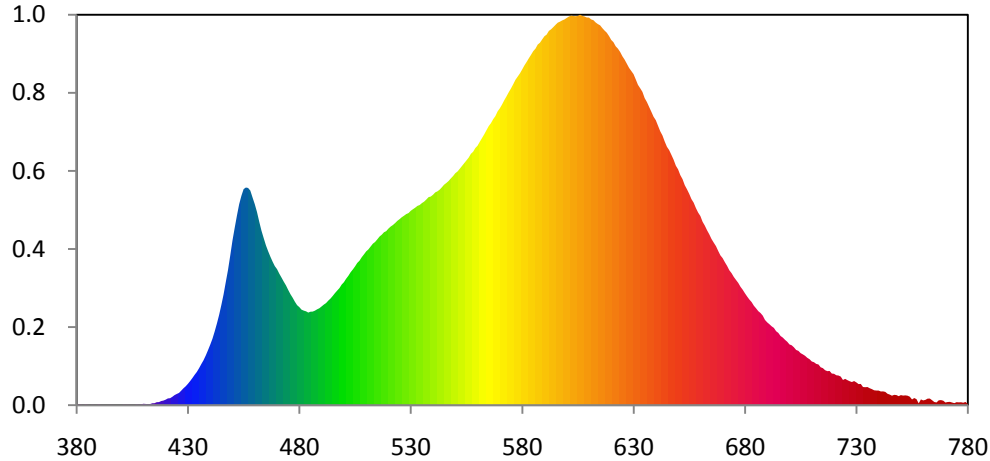
Color Vector Graphic



Color Fidelity by CES Sample



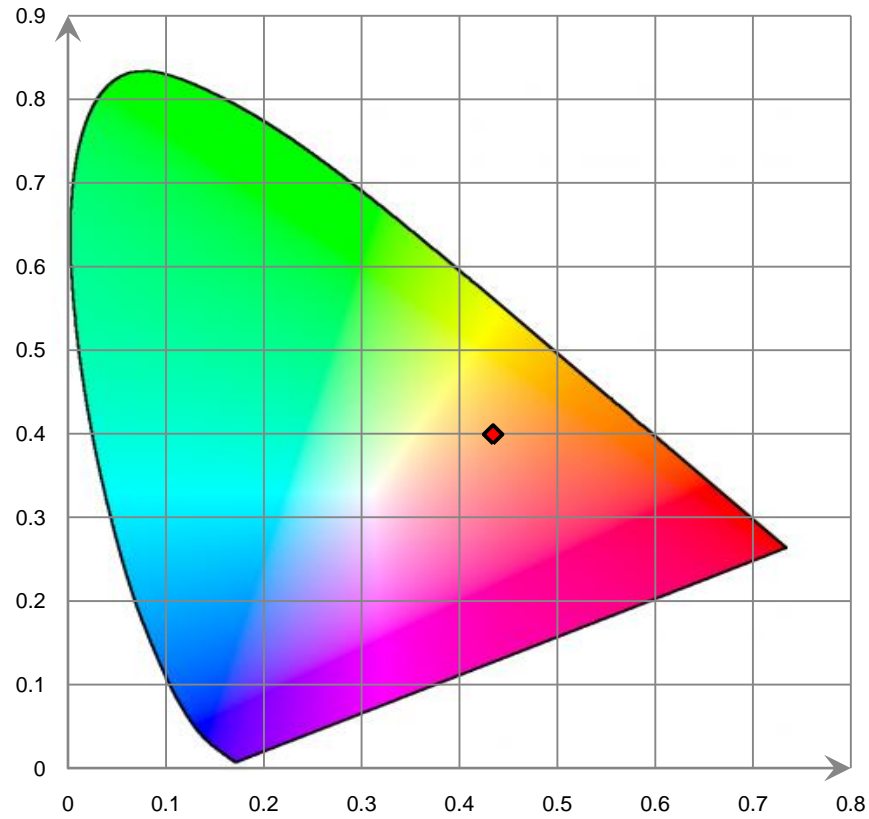
Relative Spectral Power Distribution



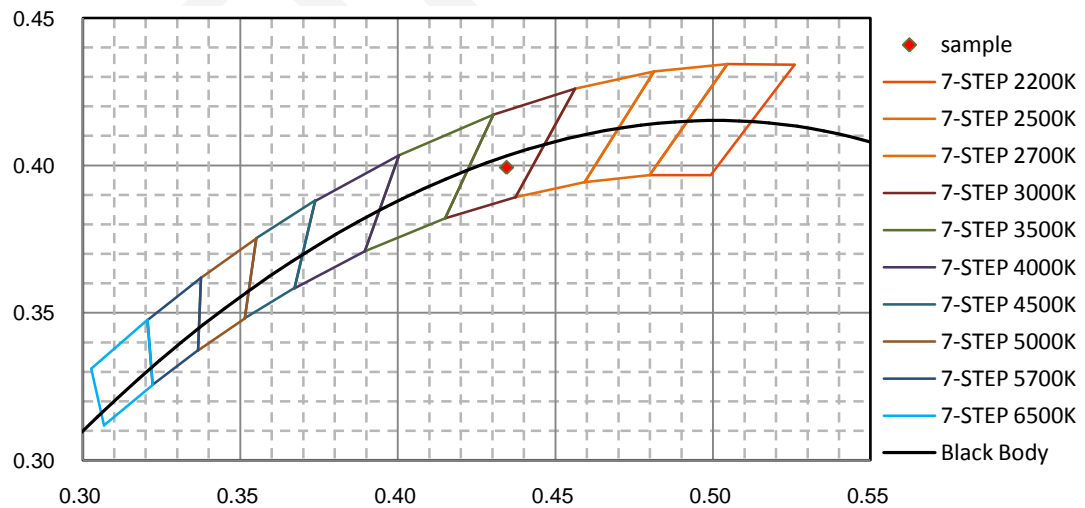
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.710E-02	421	3.391E-01	462	9.190E+00	503	6.654E+00	544	1.091E+01
381	3.780E-02	422	3.502E-01	463	8.737E+00	504	6.792E+00	545	1.104E+01
382	3.370E-02	423	4.206E-01	464	8.370E+00	505	6.948E+00	546	1.113E+01
383	1.200E-03	424	5.045E-01	465	8.004E+00	506	7.123E+00	547	1.123E+01
384	4.350E-02	425	5.623E-01	466	7.709E+00	507	7.234E+00	548	1.135E+01
385	2.390E-02	426	6.133E-01	467	7.437E+00	508	7.406E+00	549	1.147E+01
386	1.400E-03	427	7.298E-01	468	7.186E+00	509	7.550E+00	550	1.161E+01
387	2.640E-02	428	8.471E-01	469	6.963E+00	510	7.699E+00	551	1.170E+01
388	1.410E-02	429	9.464E-01	470	6.811E+00	511	7.802E+00	552	1.184E+01
389	1.440E-02	430	1.070E+00	471	6.588E+00	512	7.944E+00	553	1.198E+01
390	4.810E-02	431	1.209E+00	472	6.390E+00	513	8.085E+00	554	1.212E+01
391	8.100E-03	432	1.359E+00	473	6.187E+00	514	8.171E+00	555	1.225E+01
392	3.000E-04	433	1.519E+00	474	5.999E+00	515	8.303E+00	556	1.240E+01
393	3.200E-03	434	1.665E+00	475	5.772E+00	516	8.444E+00	557	1.259E+01
394	1.250E-02	435	1.852E+00	476	5.559E+00	517	8.536E+00	558	1.269E+01
395	2.080E-02	436	2.058E+00	477	5.383E+00	518	8.660E+00	559	1.288E+01
396	1.340E-02	437	2.251E+00	478	5.181E+00	519	8.714E+00	560	1.299E+01
397	1.050E-02	438	2.487E+00	479	5.008E+00	520	8.844E+00	561	1.319E+01
398	1.900E-03	439	2.751E+00	480	4.910E+00	521	8.944E+00	562	1.338E+01
399	1.000E-04	440	3.027E+00	481	4.782E+00	522	9.021E+00	563	1.356E+01
400	0.000E+00	441	3.322E+00	482	4.735E+00	523	9.118E+00	564	1.377E+01
401	2.520E-02	442	3.690E+00	483	4.700E+00	524	9.231E+00	565	1.397E+01
402	2.070E-02	443	4.090E+00	484	4.638E+00	525	9.316E+00	566	1.412E+01
403	2.690E-02	444	4.521E+00	485	4.681E+00	526	9.411E+00	567	1.432E+01
404	1.540E-02	445	5.019E+00	486	4.686E+00	527	9.488E+00	568	1.447E+01
405	1.430E-02	446	5.547E+00	487	4.733E+00	528	9.571E+00	569	1.471E+01
406	7.100E-03	447	6.170E+00	488	4.800E+00	529	9.617E+00	570	1.487E+01
407	4.570E-02	448	6.776E+00	489	4.855E+00	530	9.733E+00	571	1.506E+01
408	1.750E-02	449	7.503E+00	490	4.944E+00	531	9.813E+00	572	1.527E+01
409	4.380E-02	450	8.244E+00	491	5.037E+00	532	9.887E+00	573	1.547E+01
410	7.070E-02	451	8.885E+00	492	5.112E+00	533	9.978E+00	574	1.567E+01
411	6.300E-02	452	9.499E+00	493	5.236E+00	534	1.002E+01	575	1.586E+01
412	3.570E-02	453	1.007E+01	494	5.341E+00	535	1.012E+01	576	1.607E+01
413	5.550E-02	454	1.048E+01	495	5.473E+00	536	1.019E+01	577	1.629E+01
414	9.840E-02	455	1.082E+01	496	5.613E+00	537	1.030E+01	578	1.645E+01
415	1.005E-01	456	1.090E+01	497	5.738E+00	538	1.042E+01	579	1.661E+01
416	1.511E-01	457	1.088E+01	498	5.861E+00	539	1.045E+01	580	1.681E+01
417	1.543E-01	458	1.074E+01	499	6.038E+00	540	1.054E+01	581	1.701E+01
418	2.077E-01	459	1.040E+01	500	6.156E+00	541	1.065E+01	582	1.718E+01
419	2.316E-01	460	1.006E+01	501	6.329E+00	542	1.071E+01	583	1.737E+01
420	2.750E-01	461	9.673E+00	502	6.477E+00	543	1.079E+01	584	1.754E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.773E+01	626	1.730E+01	667	7.963E+00	708	2.372E+00	749	4.521E-01
586	1.785E+01	627	1.710E+01	668	7.725E+00	709	2.301E+00	750	5.050E-01
587	1.806E+01	628	1.689E+01	669	7.500E+00	710	2.190E+00	751	4.813E-01
588	1.815E+01	629	1.673E+01	670	7.363E+00	711	2.150E+00	752	4.905E-01
589	1.831E+01	630	1.658E+01	671	7.157E+00	712	2.068E+00	753	4.753E-01
590	1.847E+01	631	1.631E+01	672	6.977E+00	713	2.039E+00	754	4.247E-01
591	1.856E+01	632	1.604E+01	673	6.755E+00	714	1.898E+00	755	2.872E-01
592	1.874E+01	633	1.587E+01	674	6.611E+00	715	1.854E+00	756	3.571E-01
593	1.882E+01	634	1.569E+01	675	6.423E+00	716	1.750E+00	757	3.031E-01
594	1.893E+01	635	1.537E+01	676	6.271E+00	717	1.704E+00	758	9.030E-02
595	1.905E+01	636	1.518E+01	677	6.123E+00	718	1.714E+00	759	2.899E-01
596	1.915E+01	637	1.494E+01	678	5.929E+00	719	1.583E+00	760	2.388E-01
597	1.921E+01	638	1.469E+01	679	5.782E+00	720	1.572E+00	761	2.653E-01
598	1.927E+01	639	1.444E+01	680	5.602E+00	721	1.500E+00	762	3.283E-01
599	1.931E+01	640	1.427E+01	681	5.441E+00	722	1.485E+00	763	3.308E-01
600	1.939E+01	641	1.399E+01	682	5.289E+00	723	1.433E+00	764	2.479E-01
601	1.946E+01	642	1.371E+01	683	5.163E+00	724	1.263E+00	765	1.591E-01
602	1.951E+01	643	1.350E+01	684	4.982E+00	725	1.317E+00	766	1.368E-01
603	1.949E+01	644	1.320E+01	685	4.851E+00	726	1.253E+00	767	2.433E-01
604	1.947E+01	645	1.294E+01	686	4.709E+00	727	1.200E+00	768	2.546E-01
605	1.949E+01	646	1.277E+01	687	4.614E+00	728	1.159E+00	769	2.240E-01
606	1.955E+01	647	1.253E+01	688	4.485E+00	729	1.208E+00	770	1.347E-01
607	1.950E+01	648	1.229E+01	689	4.268E+00	730	1.142E+00	771	1.579E-01
608	1.946E+01	649	1.199E+01	690	4.146E+00	731	1.056E+00	772	1.654E-01
609	1.941E+01	650	1.181E+01	691	4.052E+00	732	1.063E+00	773	1.330E-01
610	1.941E+01	651	1.152E+01	692	3.950E+00	733	9.087E-01	774	1.010E-01
611	1.932E+01	652	1.132E+01	693	3.870E+00	734	8.999E-01	775	1.508E-01
612	1.928E+01	653	1.101E+01	694	3.705E+00	735	9.084E-01	776	1.398E-01
613	1.916E+01	654	1.081E+01	695	3.618E+00	736	8.488E-01	777	1.472E-01
614	1.908E+01	655	1.058E+01	696	3.464E+00	737	8.034E-01	778	1.240E-01
615	1.902E+01	656	1.032E+01	697	3.384E+00	738	7.441E-01	779	1.615E-01
616	1.888E+01	657	1.014E+01	698	3.271E+00	739	7.331E-01	780	6.440E-02
617	1.876E+01	658	9.869E+00	699	3.176E+00	740	7.308E-01		
618	1.865E+01	659	9.645E+00	700	3.043E+00	741	6.870E-01		
619	1.848E+01	660	9.472E+00	701	2.998E+00	742	6.905E-01		
620	1.829E+01	661	9.184E+00	702	2.896E+00	743	6.672E-01		
621	1.818E+01	662	8.989E+00	703	2.765E+00	744	5.716E-01		
622	1.797E+01	663	8.759E+00	704	2.719E+00	745	5.327E-01		
623	1.785E+01	664	8.556E+00	705	2.606E+00	746	4.747E-01		
624	1.769E+01	665	8.323E+00	706	2.543E+00	747	5.174E-01		
625	1.747E+01	666	8.139E+00	707	2.473E+00	748	5.054E-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**

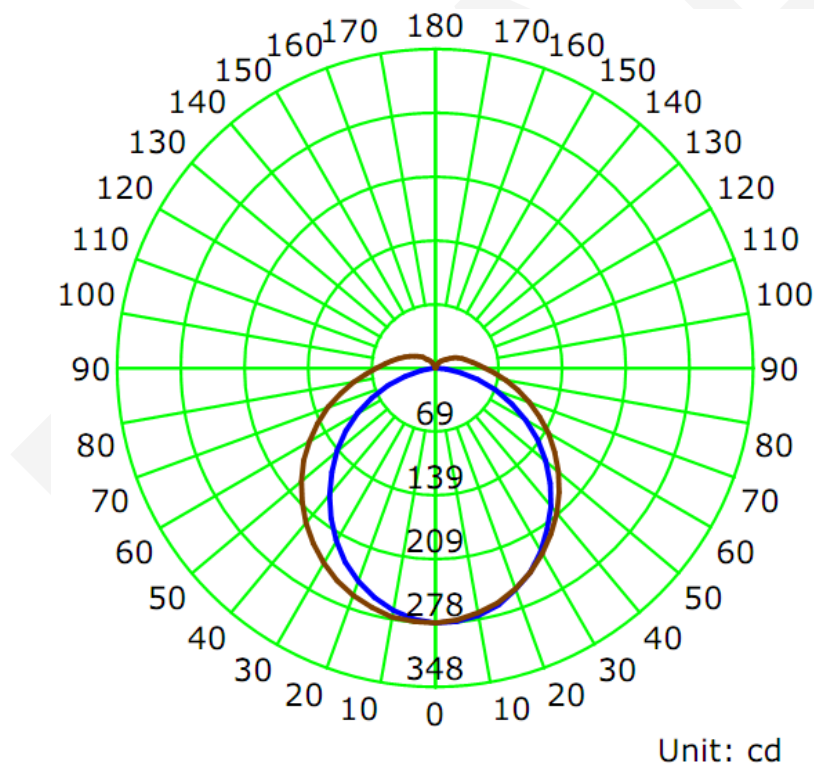
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0680	7.93	0.9720

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
954	120.35	278.8	1.20	1.28

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	104.8	115.4	127.4	115.5	115.8
Field Angle (10% I_{max}):	157.0	196.5	233.0	196.4	195.7

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	278	278	278	278	278	278	278	278
5.0°	278	279	277	277	276	276	276	275
10.0°	275	274	272	272	272	271	270	269
15.0°	268	268	266	266	265	263	262	261
20.0°	258	258	257	258	257	254	251	249
25.0°	246	246	247	247	246	243	239	236
30.0°	232	232	233	235	235	231	225	220
35.0°	214	216	218	222	221	217	209	203
40.0°	197	198	202	207	207	202	193	185
45.0°	178	180	185	191	192	186	175	166
50.0°	158	160	167	175	176	170	157	146
55.0°	137	140	149	159	160	153	139	126
60.0°	115	120	131	142	144	136	121	106
65.0°	92	99	112	124	127	119	103	86
70.0°	70	79	95	107	110	102	86	67
75.0°	48	59	76	90	93	86	69	49
80.0°	28	41	60	75	78	71	54	33
85.0°	12	27	47	61	65	58	41	20
90.0°	2	17	37	51	55	48	33	13
95.0°	0	12	30	43	47	42	27	9
100.0°	0	9	25	38	41	36	23	7
105.0°	0	7	21	33	36	31	19	6
110.0°	0	5	18	28	31	27	16	4
115.0°	0	4	15	24	27	23	14	4
120.0°	0	4	13	20	23	20	12	3
125.0°	0	3	11	17	20	17	10	3
130.0°	0	3	9	14	16	14	8	2
135.0°	0	2	7	12	13	11	6	2
140.0°	0	2	6	10	11	9	5	1
145.0°	0	1	5	7	8	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	1	2	2	2	2	0	0
165.0°	0	0	1	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 γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	278	278	278	278	278	278	278	278
5.0°	275	277	276	277	278	279	279	279
10.0°	269	271	271	274	276	276	276	275
15.0°	260	263	264	268	271	272	271	269
20.0°	248	252	256	261	265	265	263	260
25.0°	234	239	244	252	256	256	253	249
30.0°	217	224	231	240	246	245	241	235
35.0°	200	206	216	227	234	233	227	219
40.0°	181	189	200	214	221	220	211	202
45.0°	161	170	184	199	207	205	195	183
50.0°	141	150	166	183	192	189	178	164
55.0°	120	131	148	167	176	173	160	144
60.0°	99	111	130	150	160	156	141	124
65.0°	77	91	113	133	143	139	123	104
70.0°	56	71	95	116	126	121	104	83
75.0°	35	53	77	98	108	104	86	63
80.0°	16	34	62	82	92	87	69	45
85.0°	4	21	48	68	77	72	54	30
90.0°	0	15	39	57	65	60	43	20
95.0°	0	11	32	49	56	51	36	14
100.0°	0	9	27	42	49	44	30	11
105.0°	0	7	23	37	42	38	25	8
110.0°	0	3	19	32	37	33	21	7
115.0°	0	4	16	27	32	28	18	6
120.0°	0	3	13	23	27	24	15	5
125.0°	0	3	7	19	23	20	13	4
130.0°	0	2	9	16	19	17	10	3
135.0°	0	2	7	11	15	13	8	3
140.0°	0	2	6	10	12	11	7	2
145.0°	0	1	4	8	10	9	5	2
150.0°	0	1	4	6	7	6	4	1
155.0°	0	1	2	4	5	5	3	1
160.0°	0	0	2	3	3	3	2	1
165.0°	0	0	1	1	2	2	1	0
170.0°	0	0	0	1	1	1	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	6.6	0.70	0-5	6.6	0.70
5-10	19.7	2.06	0-10	26.3	2.76
10-15	32.0	3.35	0-15	58.3	6.11
15-20	43.1	4.52	0-20	101.3	10.62
20-25	52.7	5.53	0-25	154.1	16.15
25-30	60.5	6.34	0-30	214.6	22.49
30-35	66.3	6.95	0-35	280.9	29.44
35-40	70.0	7.34	0-40	350.8	36.78
40-45	71.6	7.50	0-45	422.4	44.28
45-50	71.1	7.45	0-50	493.5	51.73
50-55	68.7	7.20	0-55	562.2	58.93
55-60	64.5	6.76	0-60	626.7	65.69
60-65	58.8	6.16	0-65	685.5	71.86
65-70	51.8	5.43	0-70	737.3	77.28
70-75	43.8	4.59	0-75	781.1	81.88
75-80	35.5	3.72	0-80	816.6	85.60
80-85	27.7	2.91	0-85	844.3	88.51
85-90	21.6	2.26	0-90	865.9	90.77
90-95	17.3	1.82	0-95	883.2	92.58
95-100	14.4	1.51	0-100	897.7	94.10
100-105	12.1	1.27	0-105	909.7	95.36
105-110	10.0	1.05	0-110	919.8	96.41
110-115	8.3	0.87	0-115	928.0	97.28
115-120	6.8	0.71	0-120	934.8	97.99
120-125	5.4	0.56	0-125	940.1	98.55
125-130	4.2	0.44	0-130	944.3	98.99
130-135	3.2	0.34	0-135	947.5	99.32
135-140	2.4	0.25	0-140	949.9	99.57
140-145	1.7	0.18	0-145	951.6	99.75
145-150	1.1	0.12	0-150	952.7	99.87
150-155	0.7	0.07	0-155	953.4	99.94
155-160	0.4	0.04	0-160	953.8	99.98
160-165	0.2	0.02	0-165	953.9	99.99
165-170	0.0	0.01	0-170	954.0	100.00
170-175	0.0	0.00	0-175	954.0	100.00
175-180	0.0	0.00	0-180	954.0	100.00

6. Product Photo



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