



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/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:	PKS181030080-10-2
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/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: 8W
 Nominal CCT: 3500K
 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**

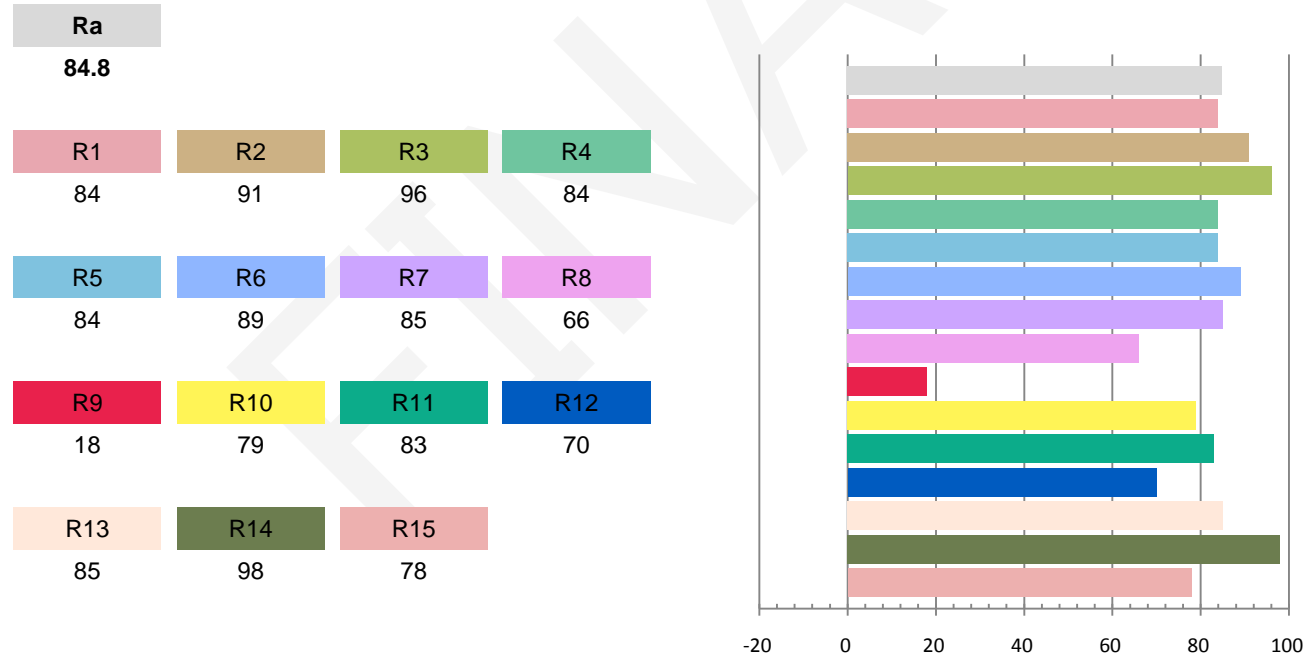
Test orientation: **Downward**

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	7.87	0.9715	953.57	121.17

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.931	3439	-0.00148	0.4072	0.3883	0.2379	0.5105

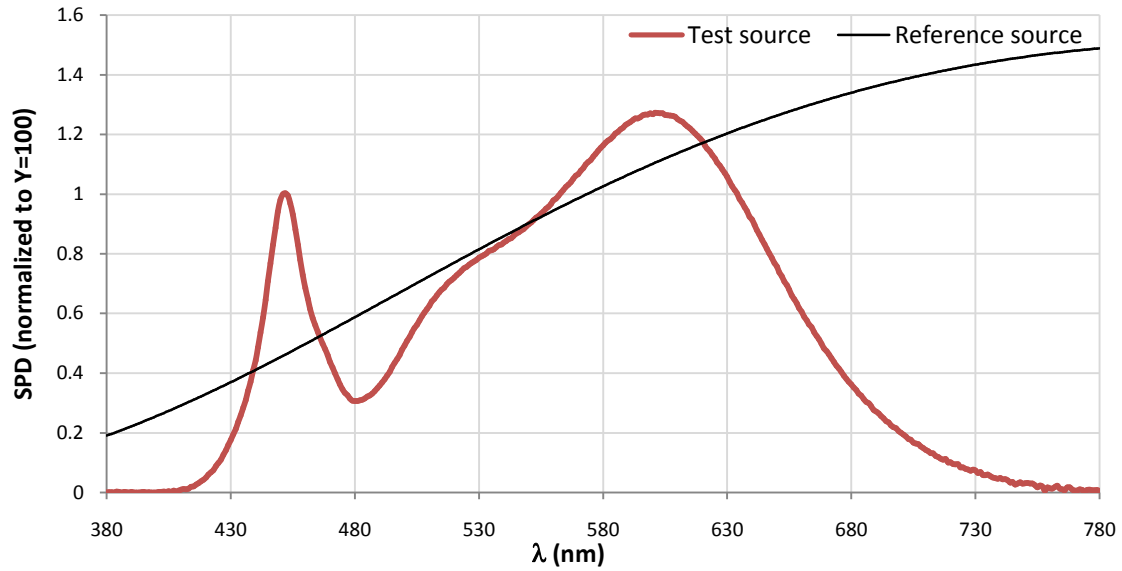
Color Rendering Index



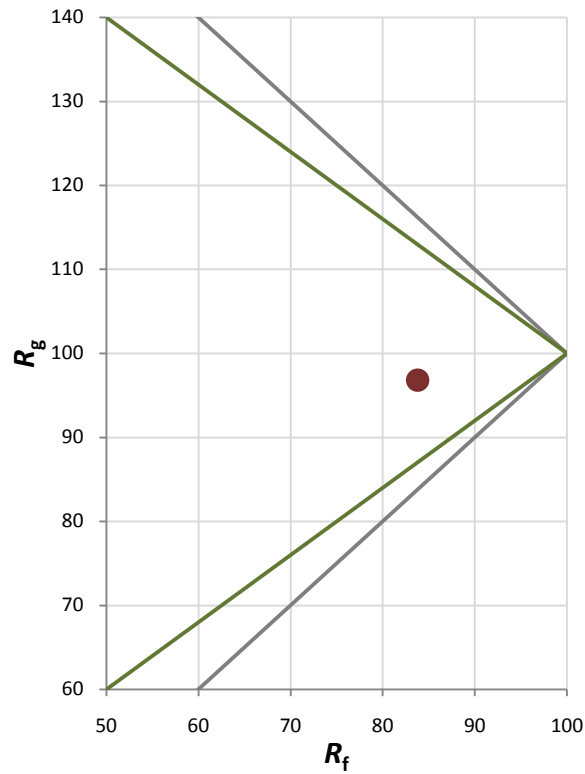
Fidelity Index and Gamut Index

Fidelity Index R_f	84
Gamut Index R_g	97

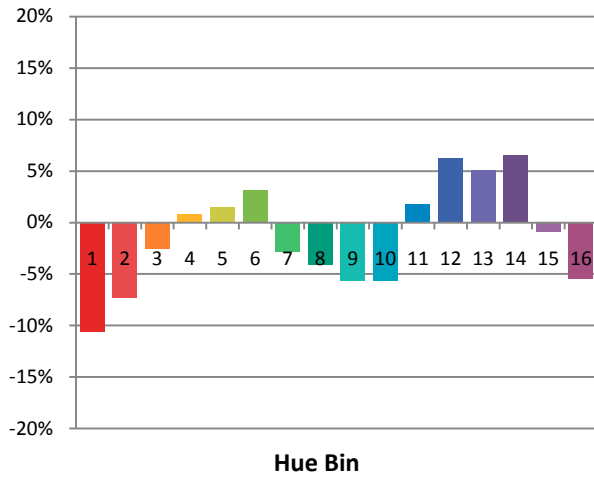
Spectral Power Distribution Comparison



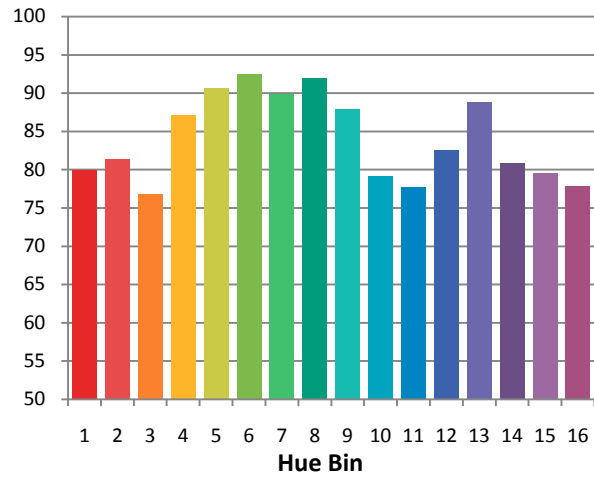
Plot of R_g versus R_f



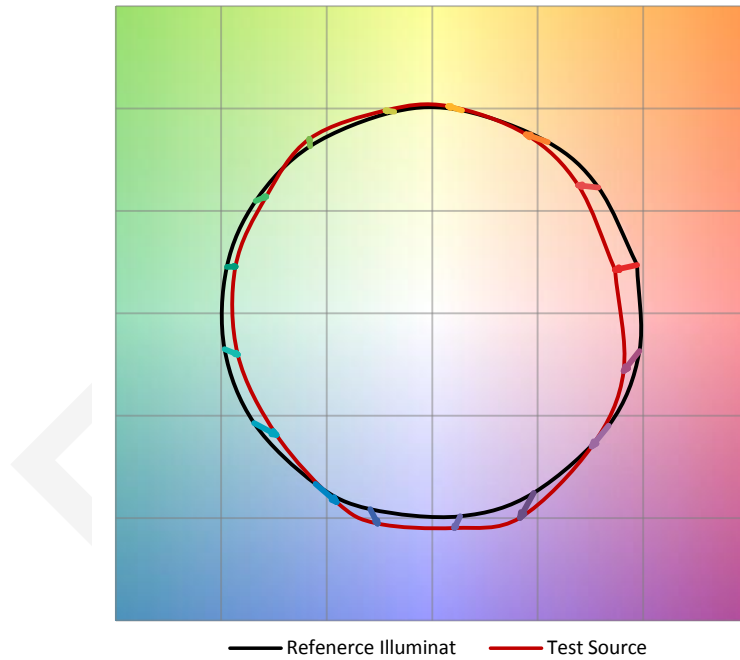
Chroma Shift by Hue



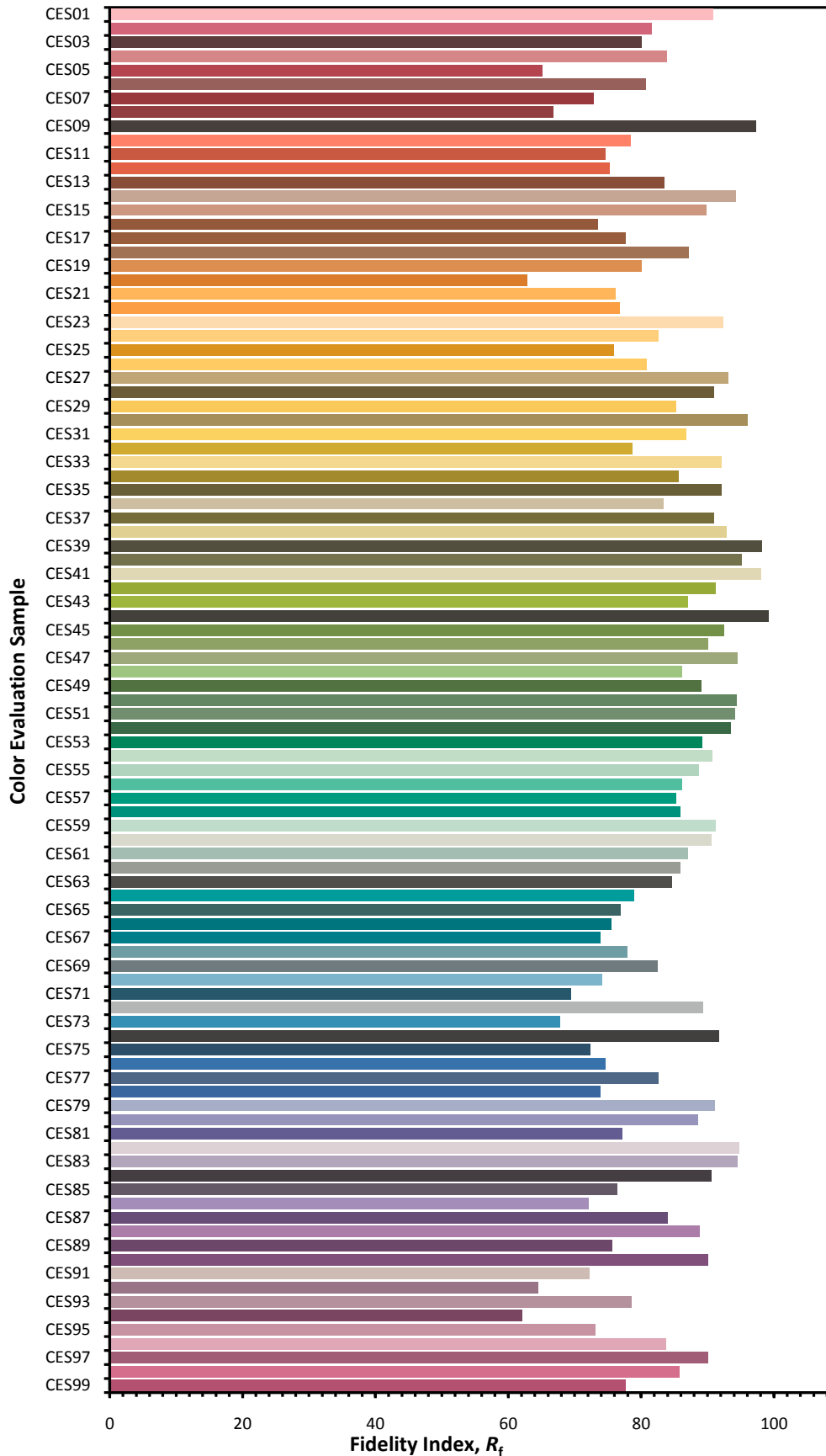
R_f by Hue



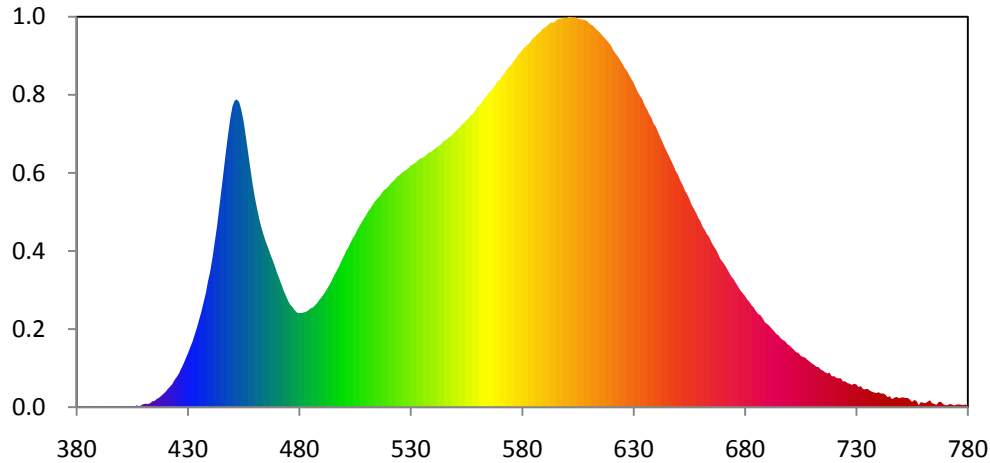
Color Vector Graphic



Color Fidelity by CES Sample



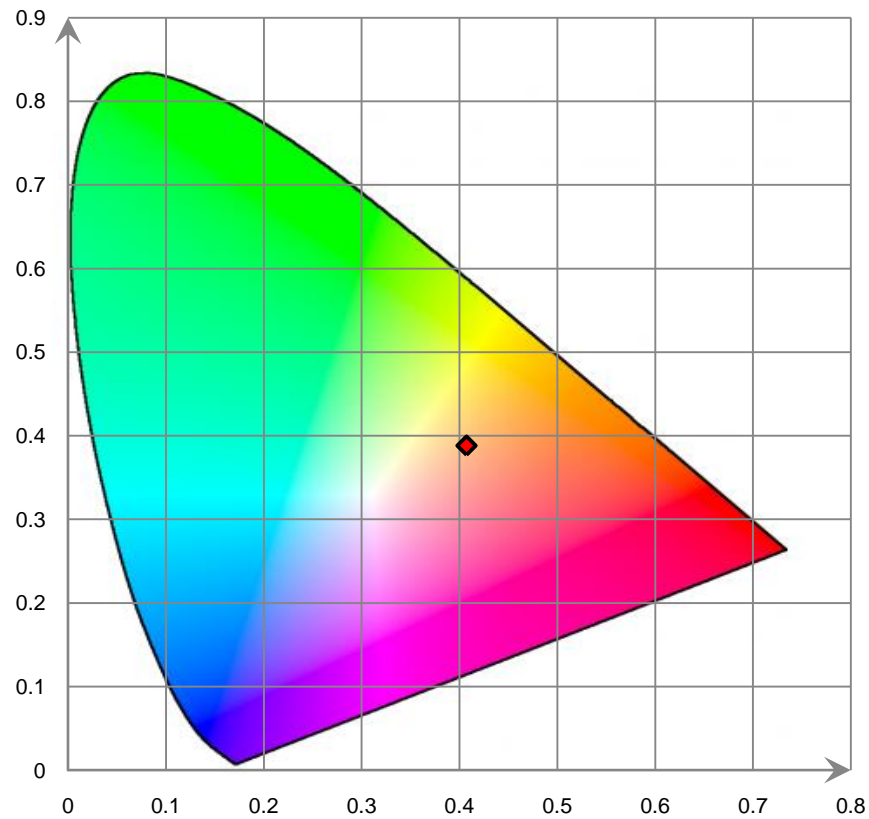
Relative Spectral Power Distribution



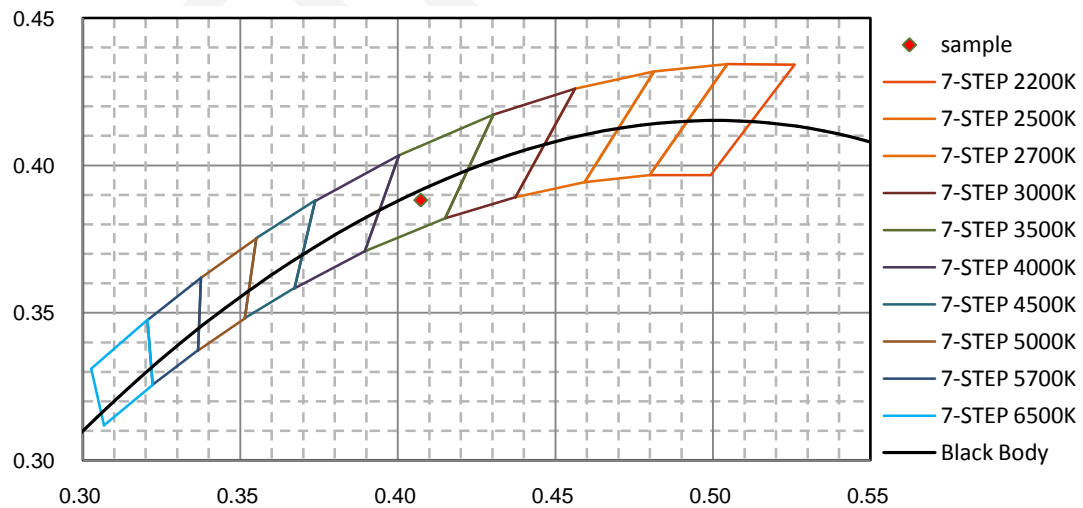
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.310E-02	421	8.331E-01	462	8.570E+00	503	7.477E+00	544	1.201E+01
381	1.580E-02	422	9.362E-01	463	8.164E+00	504	7.689E+00	545	1.212E+01
382	1.240E-02	423	1.053E+00	464	7.824E+00	505	7.844E+00	546	1.216E+01
383	1.100E-03	424	1.239E+00	465	7.515E+00	506	8.058E+00	547	1.226E+01
384	4.350E-02	425	1.375E+00	466	7.247E+00	507	8.238E+00	548	1.232E+01
385	2.970E-02	426	1.533E+00	467	6.959E+00	508	8.416E+00	549	1.244E+01
386	2.200E-03	427	1.763E+00	468	6.702E+00	509	8.579E+00	550	1.254E+01
387	2.640E-02	428	1.970E+00	469	6.418E+00	510	8.739E+00	551	1.263E+01
388	1.520E-02	429	2.211E+00	470	6.110E+00	511	8.929E+00	552	1.273E+01
389	2.600E-03	430	2.447E+00	471	5.850E+00	512	9.049E+00	553	1.286E+01
390	3.330E-02	431	2.716E+00	472	5.571E+00	513	9.220E+00	554	1.293E+01
391	4.900E-03	432	2.971E+00	473	5.297E+00	514	9.373E+00	555	1.306E+01
392	2.000E-04	433	3.286E+00	474	5.065E+00	515	9.491E+00	556	1.314E+01
393	0.000E+00	434	3.602E+00	475	4.827E+00	516	9.584E+00	557	1.328E+01
394	1.890E-02	435	3.970E+00	476	4.653E+00	517	9.751E+00	558	1.337E+01
395	2.190E-02	436	4.330E+00	477	4.553E+00	518	9.870E+00	559	1.350E+01
396	6.300E-03	437	4.757E+00	478	4.405E+00	519	9.942E+00	560	1.366E+01
397	1.460E-02	438	5.173E+00	479	4.300E+00	520	1.005E+01	561	1.375E+01
398	7.000E-04	439	5.720E+00	480	4.284E+00	521	1.017E+01	562	1.388E+01
399	0.000E+00	440	6.175E+00	481	4.284E+00	522	1.027E+01	563	1.403E+01
400	0.000E+00	441	6.781E+00	482	4.307E+00	523	1.037E+01	564	1.415E+01
401	2.450E-02	442	7.489E+00	483	4.342E+00	524	1.049E+01	565	1.429E+01
402	3.140E-02	443	8.185E+00	484	4.395E+00	525	1.056E+01	566	1.440E+01
403	3.840E-02	444	9.018E+00	485	4.492E+00	526	1.066E+01	567	1.453E+01
404	2.770E-02	445	9.876E+00	486	4.534E+00	527	1.073E+01	568	1.467E+01
405	5.560E-02	446	1.071E+01	487	4.625E+00	528	1.080E+01	569	1.482E+01
406	2.930E-02	447	1.159E+01	488	4.742E+00	529	1.088E+01	570	1.489E+01
407	8.580E-02	448	1.239E+01	489	4.886E+00	530	1.099E+01	571	1.506E+01
408	3.890E-02	449	1.312E+01	490	5.005E+00	531	1.105E+01	572	1.518E+01
409	8.410E-02	450	1.369E+01	491	5.144E+00	532	1.111E+01	573	1.534E+01
410	1.394E-01	451	1.396E+01	492	5.300E+00	533	1.118E+01	574	1.546E+01
411	1.582E-01	452	1.399E+01	493	5.473E+00	534	1.130E+01	575	1.555E+01
412	1.470E-01	453	1.388E+01	494	5.644E+00	535	1.133E+01	576	1.572E+01
413	1.751E-01	454	1.351E+01	495	5.861E+00	536	1.138E+01	577	1.584E+01
414	2.651E-01	455	1.300E+01	496	6.062E+00	537	1.148E+01	578	1.599E+01
415	2.874E-01	456	1.231E+01	497	6.245E+00	538	1.157E+01	579	1.612E+01
416	3.707E-01	457	1.159E+01	498	6.437E+00	539	1.160E+01	580	1.623E+01
417	4.288E-01	458	1.088E+01	499	6.668E+00	540	1.169E+01	581	1.635E+01
418	5.160E-01	459	1.017E+01	500	6.869E+00	541	1.177E+01	582	1.646E+01
419	6.030E-01	460	9.562E+00	501	7.095E+00	542	1.185E+01	583	1.653E+01
420	6.993E-01	461	9.053E+00	502	7.271E+00	543	1.190E+01	584	1.667E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.680E+01	626	1.544E+01	667	7.169E+00	708	2.156E+00	749	4.123E-01
586	1.687E+01	627	1.530E+01	668	6.960E+00	709	2.078E+00	750	4.291E-01
587	1.699E+01	628	1.512E+01	669	6.735E+00	710	1.991E+00	751	4.486E-01
588	1.706E+01	629	1.494E+01	670	6.609E+00	711	1.928E+00	752	4.173E-01
589	1.719E+01	630	1.477E+01	671	6.461E+00	712	1.838E+00	753	4.237E-01
590	1.727E+01	631	1.453E+01	672	6.291E+00	713	1.830E+00	754	3.485E-01
591	1.733E+01	632	1.432E+01	673	6.104E+00	714	1.713E+00	755	2.422E-01
592	1.743E+01	633	1.415E+01	674	5.931E+00	715	1.663E+00	756	3.225E-01
593	1.750E+01	634	1.400E+01	675	5.807E+00	716	1.585E+00	757	2.901E-01
594	1.749E+01	635	1.373E+01	676	5.641E+00	717	1.536E+00	758	8.710E-02
595	1.756E+01	636	1.356E+01	677	5.470E+00	718	1.567E+00	759	2.421E-01
596	1.765E+01	637	1.333E+01	678	5.311E+00	719	1.402E+00	760	1.984E-01
597	1.767E+01	638	1.317E+01	679	5.183E+00	720	1.415E+00	761	1.851E-01
598	1.768E+01	639	1.290E+01	680	5.065E+00	721	1.335E+00	762	2.463E-01
599	1.773E+01	640	1.276E+01	681	4.905E+00	722	1.312E+00	763	3.126E-01
600	1.770E+01	641	1.252E+01	682	4.790E+00	723	1.319E+00	764	1.860E-01
601	1.776E+01	642	1.228E+01	683	4.632E+00	724	1.175E+00	765	1.430E-01
602	1.775E+01	643	1.206E+01	684	4.528E+00	725	1.176E+00	766	1.058E-01
603	1.774E+01	644	1.182E+01	685	4.365E+00	726	1.100E+00	767	2.363E-01
604	1.774E+01	645	1.161E+01	686	4.237E+00	727	1.069E+00	768	2.442E-01
605	1.767E+01	646	1.140E+01	687	4.177E+00	728	1.014E+00	769	1.381E-01
606	1.765E+01	647	1.119E+01	688	4.038E+00	729	1.068E+00	770	9.000E-02
607	1.764E+01	648	1.098E+01	689	3.856E+00	730	1.036E+00	771	9.170E-02
608	1.761E+01	649	1.073E+01	690	3.784E+00	731	9.164E-01	772	1.474E-01
609	1.758E+01	650	1.056E+01	691	3.697E+00	732	9.611E-01	773	1.187E-01
610	1.747E+01	651	1.030E+01	692	3.573E+00	733	8.216E-01	774	7.610E-02
611	1.740E+01	652	1.012E+01	693	3.470E+00	734	8.129E-01	775	1.189E-01
612	1.734E+01	653	9.868E+00	694	3.337E+00	735	8.388E-01	776	1.268E-01
613	1.722E+01	654	9.699E+00	695	3.279E+00	736	7.568E-01	777	1.100E-01
614	1.713E+01	655	9.493E+00	696	3.142E+00	737	7.059E-01	778	1.004E-01
615	1.703E+01	656	9.218E+00	697	3.056E+00	738	6.694E-01	779	1.186E-01
616	1.691E+01	657	9.046E+00	698	3.002E+00	739	6.429E-01	780	6.800E-02
617	1.680E+01	658	8.852E+00	699	2.873E+00	740	6.796E-01		
618	1.669E+01	659	8.628E+00	700	2.802E+00	741	6.185E-01		
619	1.657E+01	660	8.460E+00	701	2.707E+00	742	6.247E-01		
620	1.643E+01	661	8.212E+00	702	2.612E+00	743	5.715E-01		
621	1.622E+01	662	8.056E+00	703	2.497E+00	744	4.606E-01		
622	1.608E+01	663	7.865E+00	704	2.471E+00	745	4.989E-01		
623	1.596E+01	664	7.731E+00	705	2.339E+00	746	3.685E-01		
624	1.577E+01	665	7.499E+00	706	2.286E+00	747	4.233E-01		
625	1.563E+01	666	7.319E+00	707	2.257E+00	748	4.734E-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**

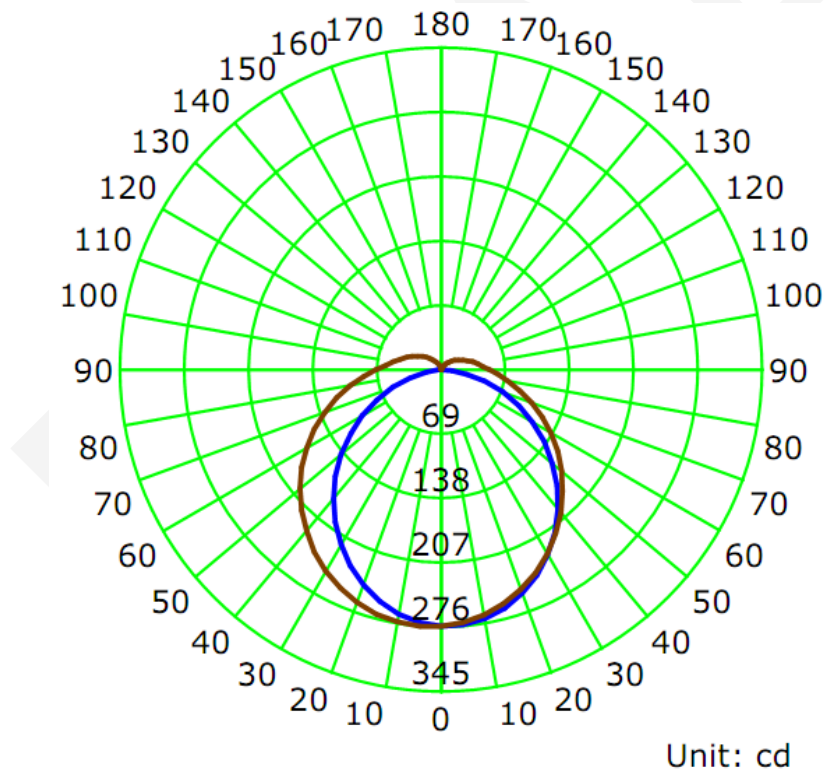
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0670	7.88	0.9800

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
955.8	121.34	276.1	1.21	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	105.4	116.3	128.4	116.7	116.7
Field Angle (10% I_{max}):	157.3	197.8	235.6	200.0	197.7

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	275	275	275	275	275	275	275	275
5.0°	274	273	274	272	272	271	271	271
10.0°	271	269	270	267	267	266	265	265
15.0°	265	263	262	261	260	258	257	256
20.0°	255	253	253	252	250	248	246	245
25.0°	243	241	242	241	240	237	233	232
30.0°	229	227	228	229	228	224	220	216
35.0°	213	211	213	215	214	210	204	200
40.0°	195	194	197	200	201	195	187	182
45.0°	177	176	180	184	185	180	171	163
50.0°	156	156	163	168	169	164	153	144
55.0°	136	136	145	151	153	147	135	124
60.0°	114	116	126	135	137	130	117	104
65.0°	92	95	108	118	120	113	99	84
70.0°	70	75	90	100	103	97	82	65
75.0°	48	56	72	84	87	81	66	48
80.0°	28	39	57	69	73	67	51	32
85.0°	12	25	44	57	61	55	40	20
90.0°	2	16	35	48	52	47	33	14
95.0°	0	11	29	42	46	41	27	10
100.0°	0	8	24	36	40	35	23	7
105.0°	0	6	20	31	35	31	19	6
110.0°	0	5	17	27	30	26	16	4
115.0°	0	4	14	23	26	22	13	3
120.0°	0	3	12	19	22	19	11	3
125.0°	0	2	9	16	19	16	9	2
130.0°	0	2	8	13	15	13	7	2
135.0°	0	1	6	11	12	10	6	1
140.0°	0	1	5	9	10	8	4	1
145.0°	0	1	4	7	7	6	3	1
150.0°	0	1	3	5	5	4	2	0
155.0°	0	1	2	3	3	2	1	0
160.0°	0	0	1	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 γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	275	275	275	275	275	275	275	275
5.0°	272	272	275	275	276	276	275	275
10.0°	266	268	272	272	275	275	274	272
15.0°	257	260	266	268	271	271	270	267
20.0°	246	250	257	262	266	265	262	259
25.0°	232	237	247	253	258	257	254	247
30.0°	216	223	234	243	249	248	242	234
35.0°	200	207	220	231	238	236	229	219
40.0°	181	190	205	218	226	224	215	203
45.0°	162	171	188	204	213	210	199	185
50.0°	141	152	171	189	198	195	182	166
55.0°	120	132	153	173	183	179	165	146
60.0°	98	112	135	156	167	163	147	126
65.0°	77	92	118	140	151	146	128	106
70.0°	56	73	100	123	134	129	110	86
75.0°	35	54	83	105	116	111	92	66
80.0°	17	38	66	89	100	95	75	48
85.0°	4	24	52	74	84	79	60	33
90.0°	0	16	42	62	71	66	48	22
95.0°	0	12	34	53	60	56	39	16
100.0°	0	9	29	46	53	48	33	12
105.0°	0	7	25	40	46	42	28	10
110.0°	0	6	21	34	40	36	24	8
115.0°	0	5	18	29	35	31	20	7
120.0°	0	4	15	25	30	27	17	6
125.0°	0	2	13	22	26	23	15	5
130.0°	0	3	11	18	21	19	12	4
135.0°	0	3	9	15	18	16	10	4
140.0°	0	2	7	12	15	13	8	3
145.0°	0	2	5	10	12	11	7	2
150.0°	0	1	4	8	9	8	5	2
155.0°	0	1	3	5	6	6	4	1
160.0°	0	1	2	4	4	4	2	1
165.0°	0	0	1	2	3	2	1	1
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	6.6	0.69	0-5	6.6	0.69
5-10	19.4	2.03	0-10	26.0	2.72
10-15	31.6	3.31	0-15	57.6	6.02
15-20	42.6	4.46	0-20	100.2	10.48
20-25	52.2	5.46	0-25	152.4	15.94
25-30	60.0	6.28	0-30	212.4	22.22
30-35	65.8	6.88	0-35	278.2	29.10
35-40	69.6	7.28	0-40	347.7	36.38
40-45	71.2	7.45	0-45	419.0	43.84
45-50	70.8	7.41	0-50	489.8	51.25
50-55	68.5	7.17	0-55	558.3	58.42
55-60	64.4	6.74	0-60	622.8	65.16
60-65	58.8	6.15	0-65	681.6	71.31
65-70	51.9	5.43	0-70	733.5	76.74
70-75	44.1	4.61	0-75	777.6	81.35
75-80	35.9	3.76	0-80	813.5	85.12
80-85	28.3	2.96	0-85	841.9	88.08
85-90	22.2	2.32	0-90	864.1	90.40
90-95	17.9	1.87	0-95	882.0	92.27
95-100	14.9	1.56	0-100	896.8	93.83
100-105	12.5	1.30	0-105	909.3	95.13
105-110	10.4	1.09	0-110	919.7	96.22
110-115	8.6	0.90	0-115	928.3	97.12
115-120	7.0	0.74	0-120	935.3	97.86
120-125	5.6	0.59	0-125	941.0	98.45
125-130	4.4	0.46	0-130	945.4	98.91
130-135	3.4	0.36	0-135	948.8	99.27
135-140	2.6	0.27	0-140	951.4	99.54
140-145	1.8	0.19	0-145	953.2	99.73
145-150	1.2	0.13	0-150	954.4	99.85
150-155	0.7	0.08	0-155	955.2	99.93
155-160	0.4	0.04	0-160	955.6	99.97
160-165	0.2	0.02	0-165	955.7	99.99
165-170	0.1	0.01	0-170	955.8	100.00
170-175	0.0	0.00	0-175	955.8	100.00
175-180	0.0	0.00	0-180	955.8	100.00

