



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 5.5PLSH/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:	PKS181030082-10-1
Test Date:	2018-11-02 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: 5.5PLSH/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: 550lm

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**

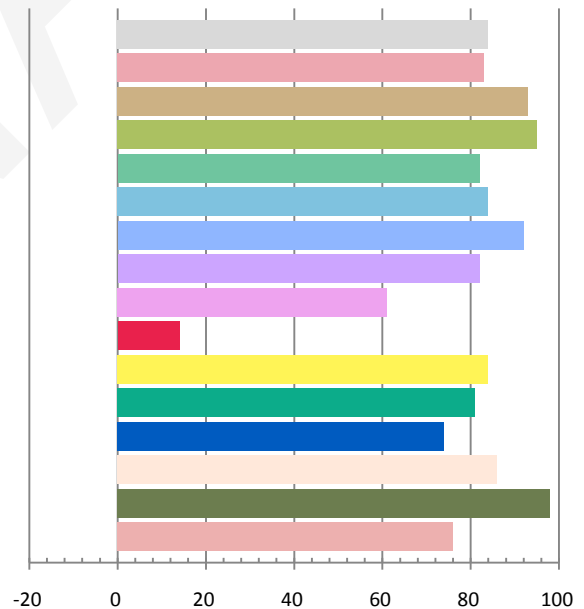
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.046	5.38	0.9749	598.06	111.16

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.839	3006	-0.00134	0.4346	0.3999	0.2508	0.5194

Color Rendering Index

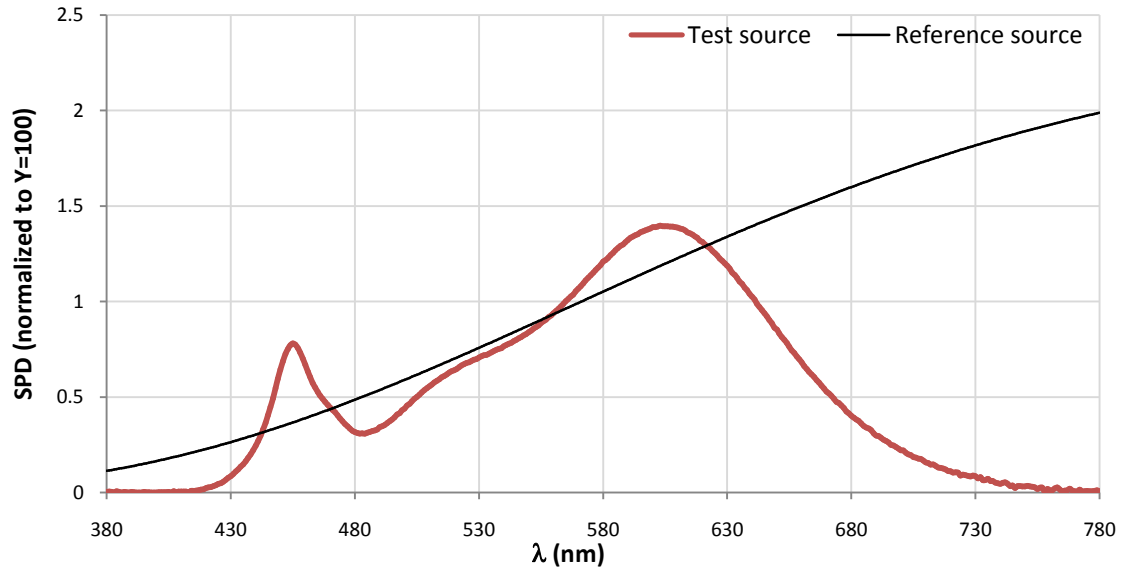
Ra 84.0			
R1 83	R2 93	R3 95	R4 82
R5 84	R6 92	R7 82	R8 61
R9 14	R10 84	R11 81	R12 74
R13 86	R14 98	R15 76	



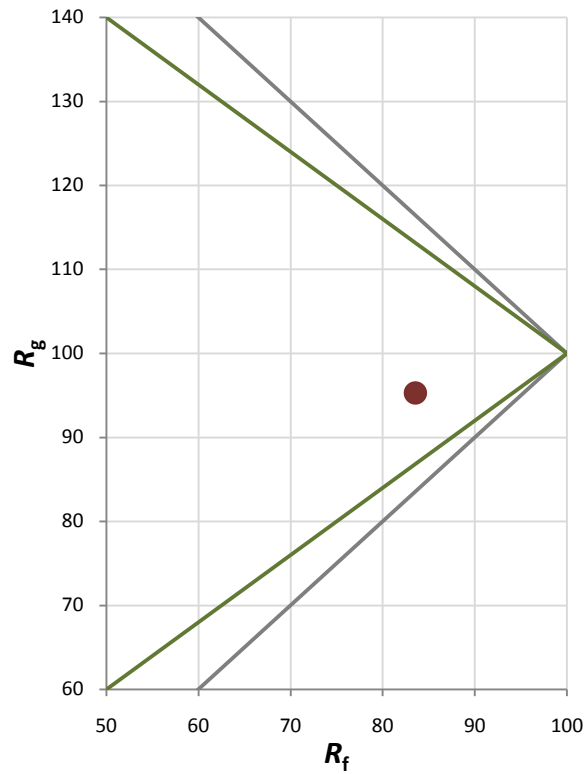
Fidelity Index and Gamut Index

Fidelity Index R_f	84
Gamut Index R_g	95

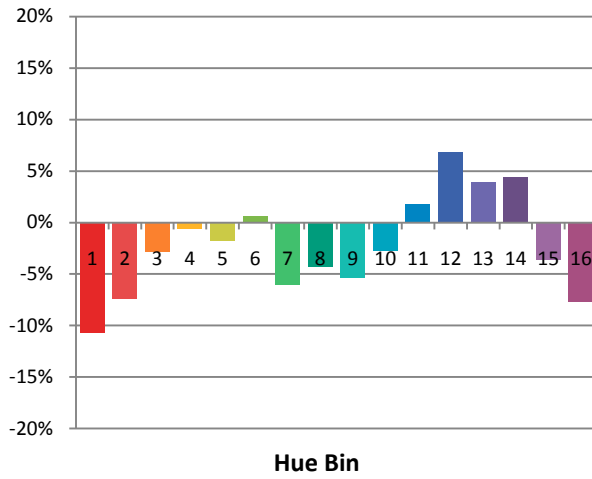
Spectral Power Distribution Comparison



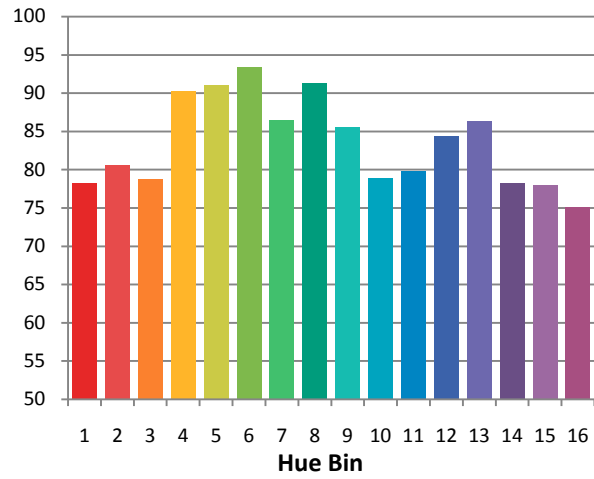
Plot of R_g versus R_f



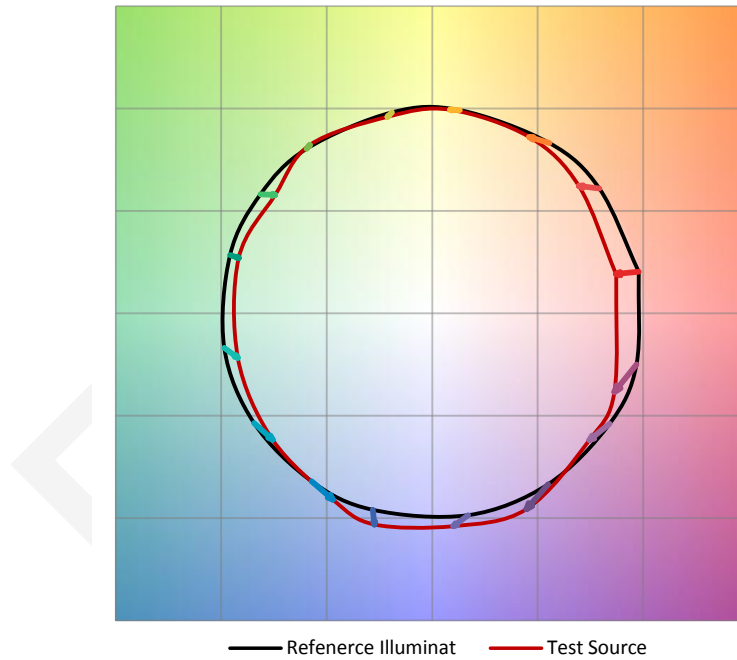
Chroma Shift by Hue



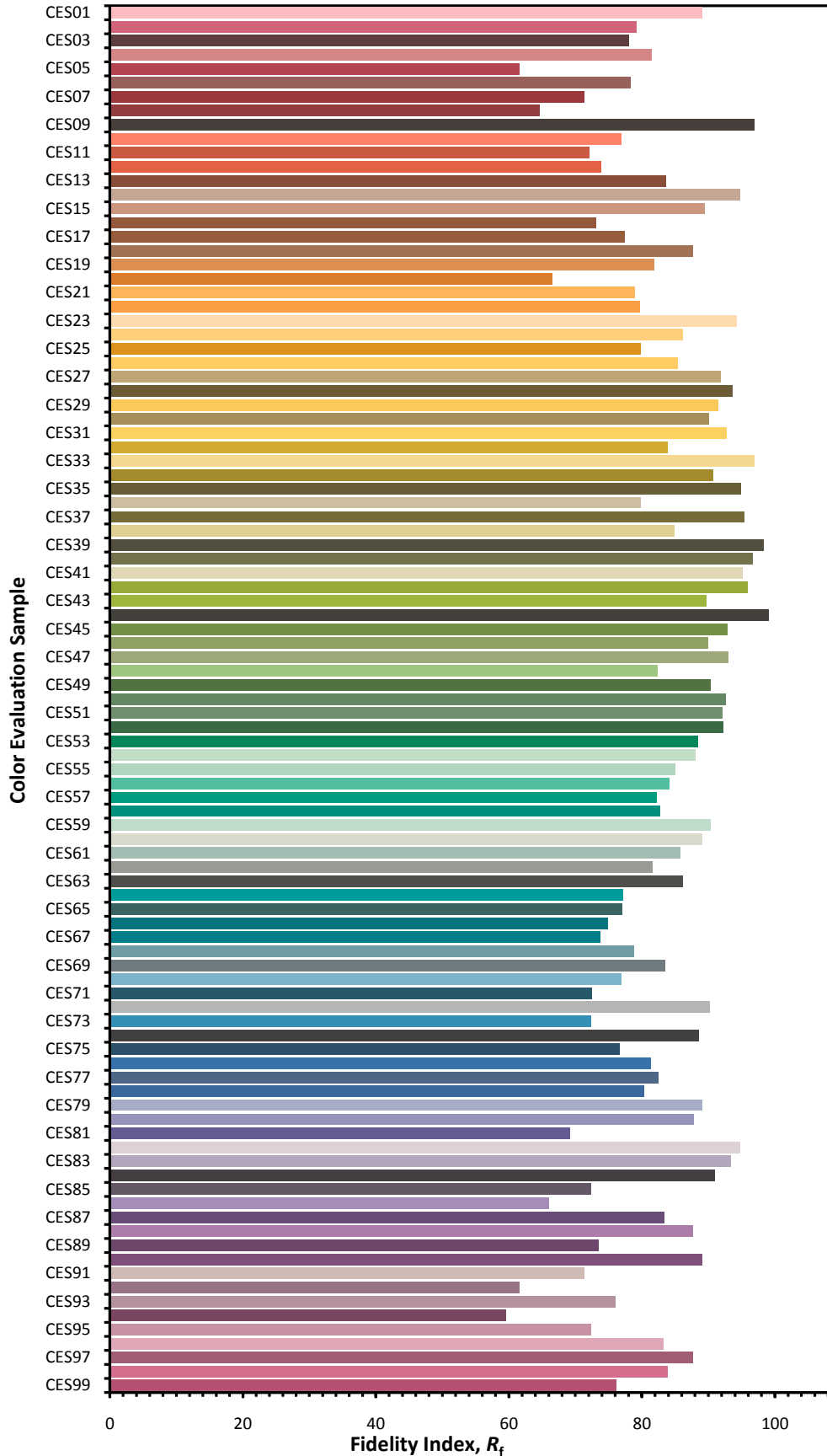
R_f by Hue



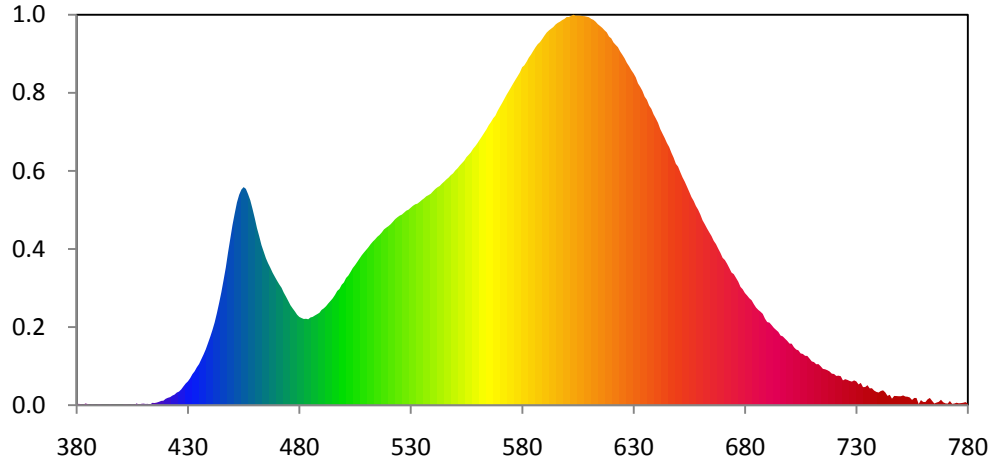
Color Vector Graphic



Color Fidelity by CES Sample



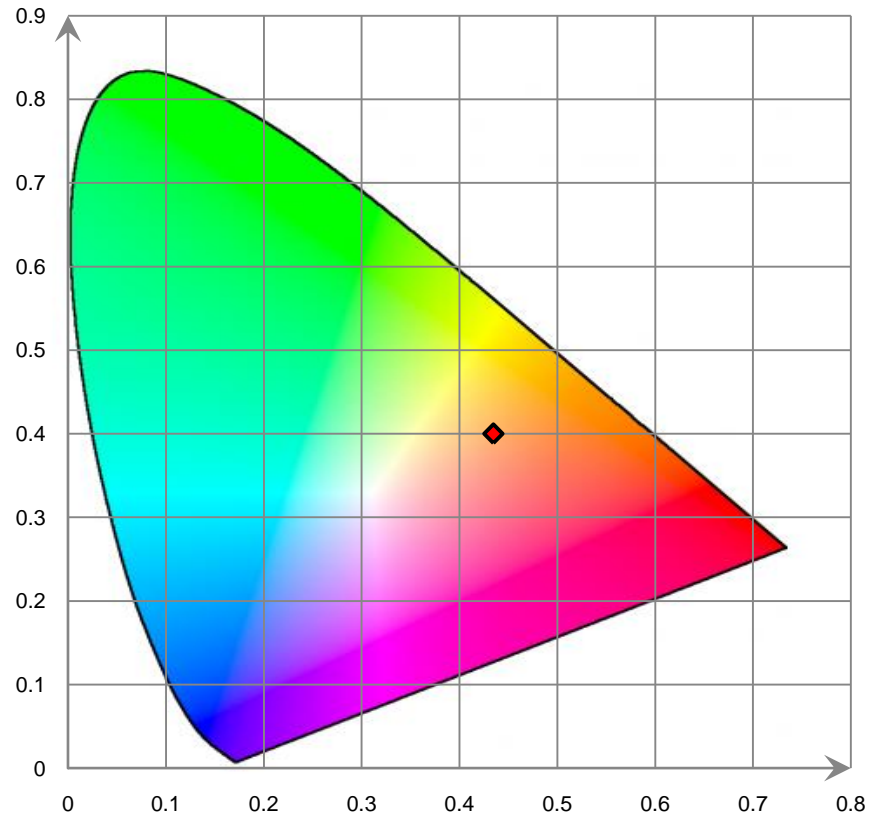
Relative Spectral Power Distribution



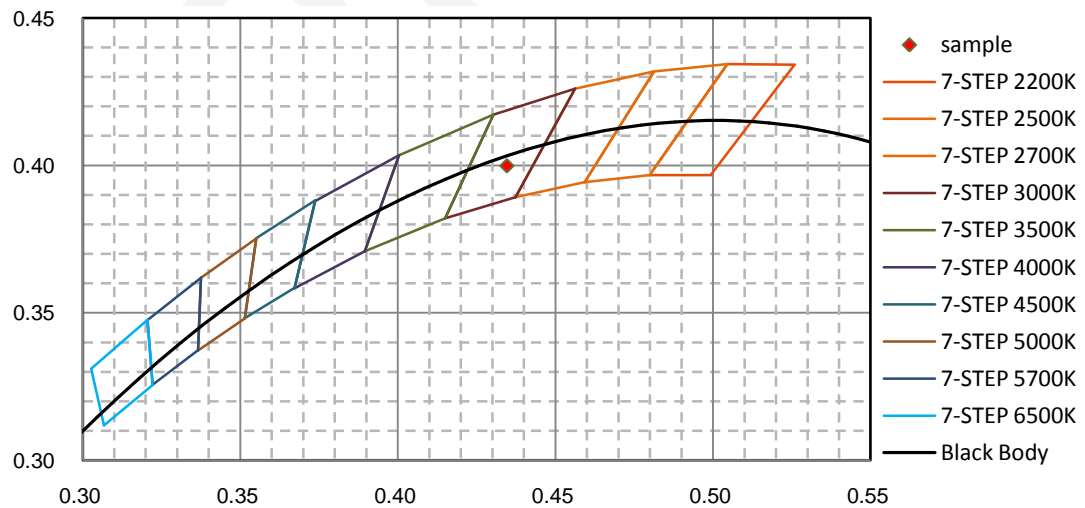
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.710E-02	421	2.311E-01	462	5.290E+00	503	4.175E+00	544	6.940E+00
381	4.250E-02	422	2.521E-01	463	5.015E+00	504	4.297E+00	545	7.003E+00
382	3.210E-02	423	2.991E-01	464	4.810E+00	505	4.386E+00	546	7.072E+00
383	9.100E-03	424	3.330E-01	465	4.603E+00	506	4.488E+00	547	7.130E+00
384	5.430E-02	425	3.947E-01	466	4.442E+00	507	4.591E+00	548	7.205E+00
385	3.570E-02	426	4.268E-01	467	4.303E+00	508	4.694E+00	549	7.261E+00
386	3.800E-03	427	4.948E-01	468	4.151E+00	509	4.781E+00	550	7.350E+00
387	2.190E-02	428	5.898E-01	469	4.023E+00	510	4.862E+00	551	7.418E+00
388	1.200E-02	429	6.793E-01	470	3.900E+00	511	4.947E+00	552	7.506E+00
389	3.500E-03	430	7.462E-01	471	3.783E+00	512	5.042E+00	553	7.581E+00
390	3.220E-02	431	8.437E-01	472	3.678E+00	513	5.124E+00	554	7.657E+00
391	1.400E-02	432	9.710E-01	473	3.528E+00	514	5.194E+00	555	7.769E+00
392	5.000E-03	433	1.061E+00	474	3.401E+00	515	5.274E+00	556	7.842E+00
393	2.500E-03	434	1.187E+00	475	3.269E+00	516	5.332E+00	557	7.921E+00
394	2.000E-03	435	1.289E+00	476	3.132E+00	517	5.411E+00	558	8.033E+00
395	2.200E-02	436	1.439E+00	477	3.034E+00	518	5.505E+00	559	8.115E+00
396	7.900E-03	437	1.585E+00	478	2.937E+00	519	5.560E+00	560	8.211E+00
397	8.800E-03	438	1.748E+00	479	2.834E+00	520	5.608E+00	561	8.319E+00
398	8.000E-04	439	1.942E+00	480	2.765E+00	521	5.669E+00	562	8.424E+00
399	0.000E+00	440	2.141E+00	481	2.730E+00	522	5.745E+00	563	8.532E+00
400	0.000E+00	441	2.353E+00	482	2.700E+00	523	5.826E+00	564	8.640E+00
401	1.250E-02	442	2.593E+00	483	2.707E+00	524	5.885E+00	565	8.769E+00
402	2.010E-02	443	2.885E+00	484	2.692E+00	525	5.936E+00	566	8.868E+00
403	1.560E-02	444	3.201E+00	485	2.746E+00	526	5.968E+00	567	8.985E+00
404	8.900E-03	445	3.539E+00	486	2.766E+00	527	6.029E+00	568	9.068E+00
405	2.750E-02	446	3.918E+00	487	2.810E+00	528	6.091E+00	569	9.219E+00
406	6.000E-03	447	4.313E+00	488	2.851E+00	529	6.123E+00	570	9.342E+00
407	5.700E-02	448	4.779E+00	489	2.893E+00	530	6.186E+00	571	9.462E+00
408	1.200E-02	449	5.213E+00	490	2.986E+00	531	6.247E+00	572	9.591E+00
409	4.120E-02	450	5.639E+00	491	3.034E+00	532	6.291E+00	573	9.720E+00
410	4.900E-02	451	6.007E+00	492	3.101E+00	533	6.313E+00	574	9.836E+00
411	3.830E-02	452	6.352E+00	493	3.188E+00	534	6.367E+00	575	9.956E+00
412	4.120E-02	453	6.592E+00	494	3.267E+00	535	6.427E+00	576	1.008E+01
413	1.810E-02	454	6.754E+00	495	3.348E+00	536	6.480E+00	577	1.019E+01
414	7.320E-02	455	6.830E+00	496	3.453E+00	537	6.544E+00	578	1.031E+01
415	6.780E-02	456	6.777E+00	497	3.577E+00	538	6.580E+00	579	1.042E+01
416	8.230E-02	457	6.609E+00	498	3.640E+00	539	6.622E+00	580	1.059E+01
417	1.046E-01	458	6.416E+00	499	3.771E+00	540	6.699E+00	581	1.065E+01
418	1.337E-01	459	6.147E+00	500	3.845E+00	541	6.769E+00	582	1.076E+01
419	1.410E-01	460	5.856E+00	501	3.985E+00	542	6.826E+00	583	1.088E+01
420	1.999E-01	461	5.546E+00	502	4.060E+00	543	6.867E+00	584	1.098E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.110E+01	626	1.086E+01	667	5.046E+00	708	1.542E+00	749	2.804E-01
586	1.121E+01	627	1.072E+01	668	4.904E+00	709	1.459E+00	750	2.801E-01
587	1.131E+01	628	1.062E+01	669	4.770E+00	710	1.372E+00	751	3.063E-01
588	1.137E+01	629	1.050E+01	670	4.615E+00	711	1.349E+00	752	2.713E-01
589	1.147E+01	630	1.039E+01	671	4.546E+00	712	1.282E+00	753	2.647E-01
590	1.157E+01	631	1.027E+01	672	4.429E+00	713	1.287E+00	754	2.403E-01
591	1.167E+01	632	1.008E+01	673	4.294E+00	714	1.220E+00	755	1.646E-01
592	1.174E+01	633	9.970E+00	674	4.154E+00	715	1.138E+00	756	2.258E-01
593	1.179E+01	634	9.843E+00	675	4.103E+00	716	1.124E+00	757	2.262E-01
594	1.184E+01	635	9.664E+00	676	3.989E+00	717	1.095E+00	758	3.520E-02
595	1.192E+01	636	9.563E+00	677	3.869E+00	718	1.056E+00	759	1.607E-01
596	1.198E+01	637	9.387E+00	678	3.705E+00	719	9.872E-01	760	1.025E-01
597	1.201E+01	638	9.281E+00	679	3.630E+00	720	9.772E-01	761	9.760E-02
598	1.206E+01	639	9.111E+00	680	3.513E+00	721	9.158E-01	762	1.835E-01
599	1.210E+01	640	8.982E+00	681	3.434E+00	722	9.249E-01	763	2.266E-01
600	1.216E+01	641	8.844E+00	682	3.348E+00	723	9.073E-01	764	1.359E-01
601	1.216E+01	642	8.649E+00	683	3.286E+00	724	7.750E-01	765	5.210E-02
602	1.220E+01	643	8.508E+00	684	3.164E+00	725	8.151E-01	766	8.130E-02
603	1.223E+01	644	8.367E+00	685	3.058E+00	726	7.910E-01	767	1.045E-01
604	1.220E+01	645	8.212E+00	686	2.984E+00	727	7.597E-01	768	1.704E-01
605	1.220E+01	646	8.085E+00	687	2.928E+00	728	7.387E-01	769	9.020E-02
606	1.220E+01	647	7.906E+00	688	2.861E+00	729	7.748E-01	770	5.770E-02
607	1.219E+01	648	7.753E+00	689	2.710E+00	730	7.450E-01	771	5.030E-02
608	1.218E+01	649	7.560E+00	690	2.604E+00	731	6.488E-01	772	1.313E-01
609	1.217E+01	650	7.472E+00	691	2.585E+00	732	6.988E-01	773	4.170E-02
610	1.215E+01	651	7.296E+00	692	2.507E+00	733	5.652E-01	774	5.190E-02
611	1.210E+01	652	7.135E+00	693	2.421E+00	734	5.686E-01	775	7.760E-02
612	1.207E+01	653	6.999E+00	694	2.356E+00	735	6.261E-01	776	5.850E-02
613	1.201E+01	654	6.845E+00	695	2.294E+00	736	5.267E-01	777	6.490E-02
614	1.193E+01	655	6.683E+00	696	2.182E+00	737	5.312E-01	778	7.640E-02
615	1.188E+01	656	6.520E+00	697	2.154E+00	738	4.579E-01	779	9.670E-02
616	1.182E+01	657	6.397E+00	698	2.082E+00	739	4.172E-01	780	5.190E-02
617	1.174E+01	658	6.238E+00	699	2.015E+00	740	3.971E-01		
618	1.168E+01	659	6.123E+00	700	1.930E+00	741	4.446E-01		
619	1.155E+01	660	5.969E+00	701	1.927E+00	742	4.653E-01		
620	1.149E+01	661	5.790E+00	702	1.814E+00	743	4.015E-01		
621	1.136E+01	662	5.666E+00	703	1.744E+00	744	2.927E-01		
622	1.128E+01	663	5.536E+00	704	1.717E+00	745	3.258E-01		
623	1.121E+01	664	5.415E+00	705	1.621E+00	746	2.039E-01		
624	1.108E+01	665	5.299E+00	706	1.604E+00	747	2.901E-01		
625	1.097E+01	666	5.148E+00	707	1.547E+00	748	2.865E-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**

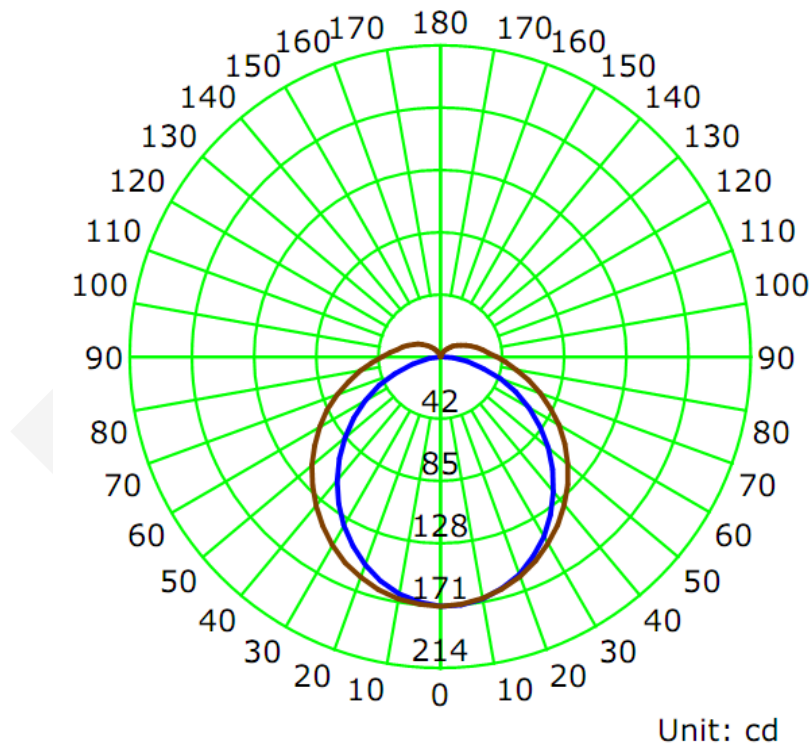
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0460	5.4	0.9780

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
600.8	111.30	171.6	1.20	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	104.8	117.5	129.5	115.6	116.9
Field Angle (10% I_{max}):	157.2	205.6	240.5	198.6	200.5

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	172	172	172	172	172	172	172	172
5.0°	171	171	171	171	171	171	170	170
10.0°	169	169	169	169	169	168	167	166
15.0°	165	165	166	166	166	164	162	161
20.0°	159	160	161	162	161	159	156	154
25.0°	152	153	155	156	156	152	149	145
30.0°	143	144	147	149	149	145	140	136
35.0°	133	135	138	141	141	137	131	126
40.0°	122	124	129	133	133	128	121	114
45.0°	110	113	119	124	124	119	110	103
50.0°	97	101	108	114	115	109	99	91
55.0°	85	89	97	104	105	98	88	78
60.0°	71	77	86	94	95	88	77	66
65.0°	58	64	75	83	84	77	65	53
70.0°	44	52	63	72	73	67	54	41
75.0°	31	40	52	62	63	56	44	30
80.0°	19	29	42	52	54	47	35	20
85.0°	9	20	34	43	45	39	27	13
90.0°	2	14	28	37	39	34	22	8
95.0°	0	10	23	32	34	29	18	5
100.0°	0	8	19	28	30	25	15	4
105.0°	0	6	16	24	26	22	13	3
110.0°	0	5	14	21	23	19	11	3
115.0°	0	4	12	18	20	16	9	2
120.0°	0	3	10	15	17	14	8	2
125.0°	0	3	8	13	14	11	6	1
130.0°	0	2	7	11	12	10	5	1
135.0°	0	2	5	9	10	8	4	1
140.0°	0	2	4	7	8	6	3	1
145.0°	0	1	3	5	6	4	2	0
150.0°	0	1	3	4	4	3	1	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	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°	172	172	172	172	172	172	172	172
5.0°	170	170	170	171	171	171	171	171
10.0°	166	166	167	168	169	170	169	169
15.0°	160	161	163	165	166	166	166	165
20.0°	153	154	157	160	162	162	161	159
25.0°	144	146	150	154	156	156	154	152
30.0°	134	137	142	147	150	149	147	143
35.0°	123	126	133	139	142	141	138	134
40.0°	112	115	123	130	134	133	128	123
45.0°	99	104	113	121	125	124	118	112
50.0°	87	92	102	111	116	114	107	100
55.0°	74	80	91	101	107	104	96	87
60.0°	60	68	80	91	97	94	85	75
65.0°	47	56	69	81	86	84	74	63
70.0°	34	44	59	71	76	73	63	50
75.0°	21	33	49	61	66	63	52	38
80.0°	8	24	39	51	56	53	42	27
85.0°	1	16	31	43	48	44	33	18
90.0°	0	10	25	36	41	37	26	12
95.0°	0	7	21	31	35	32	21	8
100.0°	0	5	18	27	31	28	18	6
105.0°	0	5	16	24	27	24	15	5
110.0°	0	4	12	21	24	21	13	4
115.0°	0	4	11	18	21	18	11	3
120.0°	0	3	9	16	18	16	9	3
125.0°	0	3	8	12	15	13	8	2
130.0°	0	2	7	11	13	11	7	2
135.0°	0	2	5	9	10	9	5	2
140.0°	0	1	4	7	8	7	4	2
145.0°	0	1	4	6	7	6	3	1
150.0°	0	1	3	4	5	4	3	1
155.0°	0	1	2	3	4	3	2	1
160.0°	0	0	1	2	2	2	1	1
165.0°	0	0	1	1	1	1	1	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	4.1	0.68	0-5	4.1	0.68
5-10	12.1	2.02	0-10	16.2	2.70
10-15	19.7	3.28	0-15	35.9	5.98
15-20	26.6	4.43	0-20	62.5	10.41
20-25	32.6	5.42	0-25	95.1	15.83
25-30	37.4	6.23	0-30	132.5	22.05
30-35	41.0	6.83	0-35	173.5	28.89
35-40	43.4	7.22	0-40	216.9	36.11
40-45	44.4	7.39	0-45	261.3	43.50
45-50	44.2	7.35	0-50	305.5	50.86
50-55	42.8	7.12	0-55	348.3	57.97
55-60	40.3	6.70	0-60	388.5	64.67
60-65	36.8	6.12	0-65	425.3	70.79
65-70	32.5	5.41	0-70	457.8	76.20
70-75	27.7	4.61	0-75	485.5	80.81
75-80	22.7	3.78	0-80	508.2	84.59
80-85	18.0	3.00	0-85	526.2	87.59
85-90	14.3	2.38	0-90	540.5	89.97
90-95	11.6	1.93	0-95	552.1	91.91
95-100	9.7	1.61	0-100	561.8	93.52
100-105	8.2	1.36	0-105	570.0	94.88
105-110	6.9	1.14	0-110	576.9	96.02
110-115	5.7	0.95	0-115	582.5	96.97
115-120	4.7	0.78	0-120	587.2	97.74
120-125	3.7	0.62	0-125	590.9	98.37
125-130	2.9	0.49	0-130	593.9	98.86
130-135	2.3	0.38	0-135	596.2	99.23
135-140	1.7	0.28	0-140	597.8	99.51
140-145	1.2	0.20	0-145	599.0	99.71
145-150	0.8	0.13	0-150	599.8	99.84
150-155	0.5	0.08	0-155	600.3	99.93
155-160	0.3	0.05	0-160	600.6	99.97
160-165	0.1	0.02	0-165	600.7	99.99
165-170	0.0	0.01	0-170	600.8	100.00
170-175	0.0	0.00	0-175	600.8	100.00
175-180	0.0	0.00	0-180	600.8	100.00

6. Product Photo



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