



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/827/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
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/827/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: 2700K
 Nominal Lumen Output: 570lm

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**

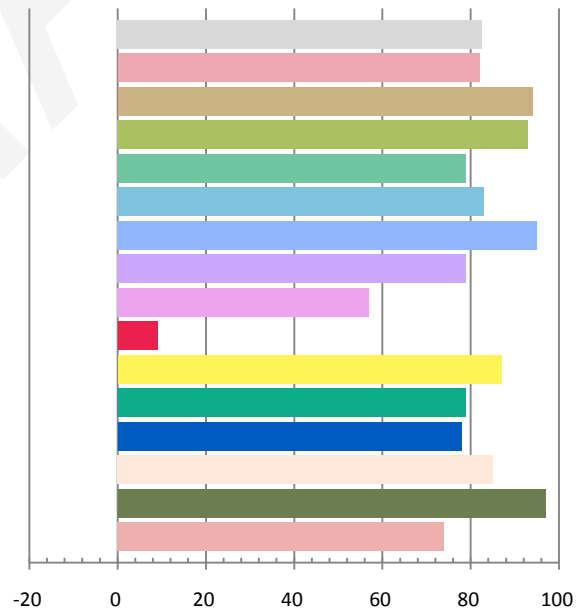
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0467	5.48	0.9779	580.36	105.91

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.794	2663	0.00012	0.4631	0.4116	0.2641	0.5282

Color Rendering Index

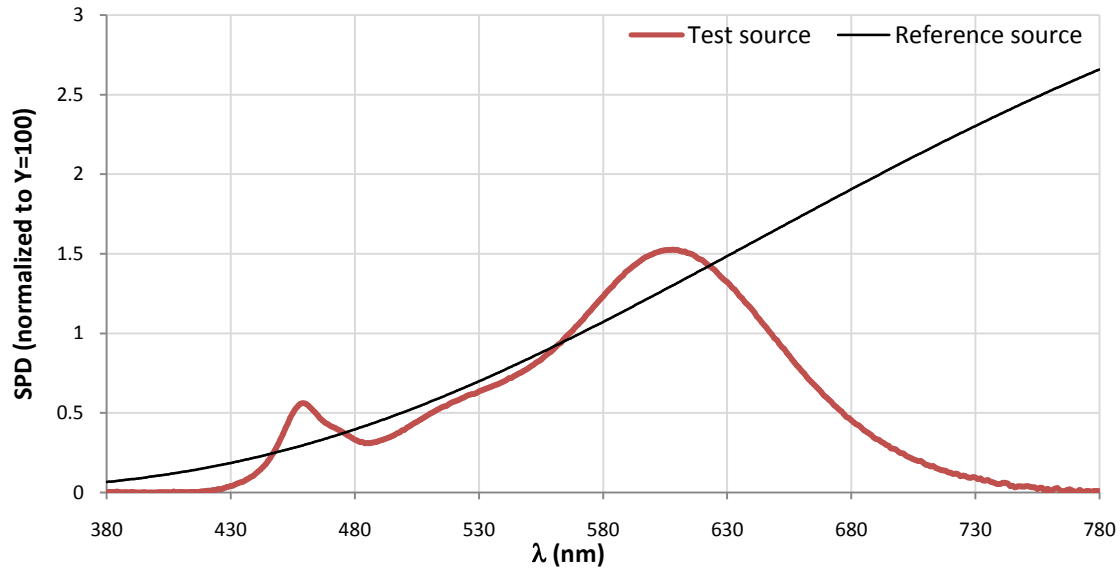
Ra 82.6			
R1 82	R2 94	R3 93	R4 79
R5 83	R6 95	R7 79	R8 57
R9 9	R10 87	R11 79	R12 78
R13 85	R14 97	R15 74	



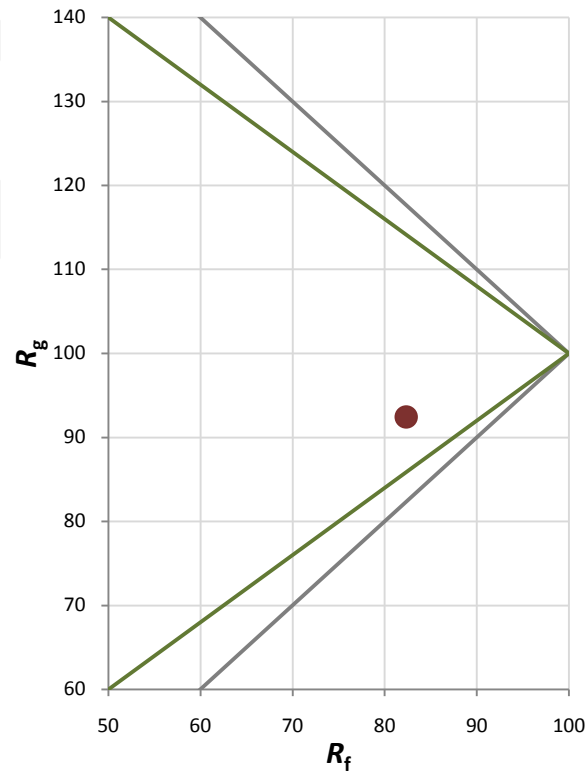
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	92

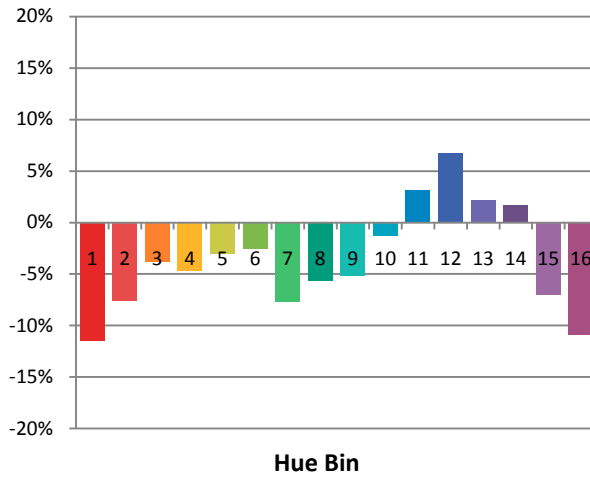
Spectral Power Distribution Comparison



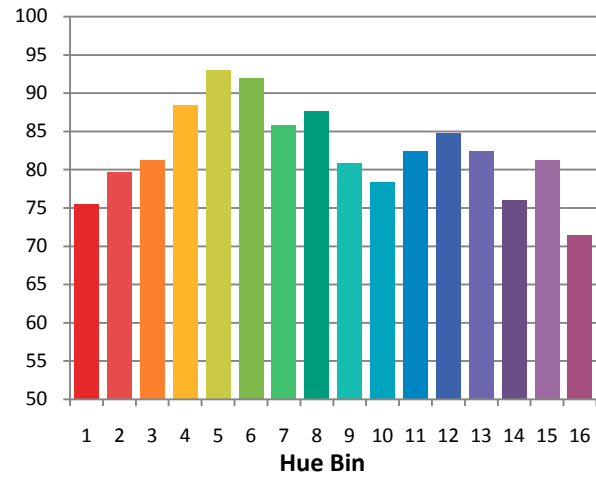
Plot of R_g versus R_f



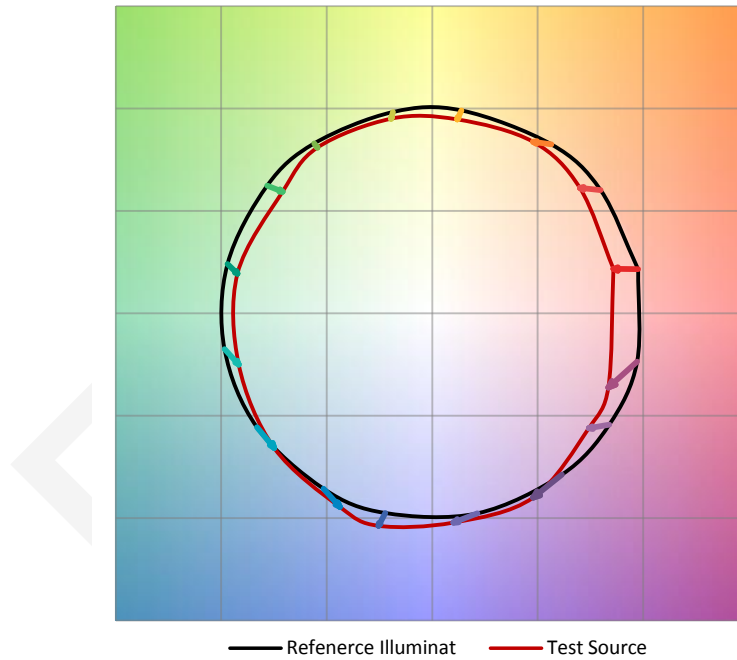
Chroma Shift by Hue



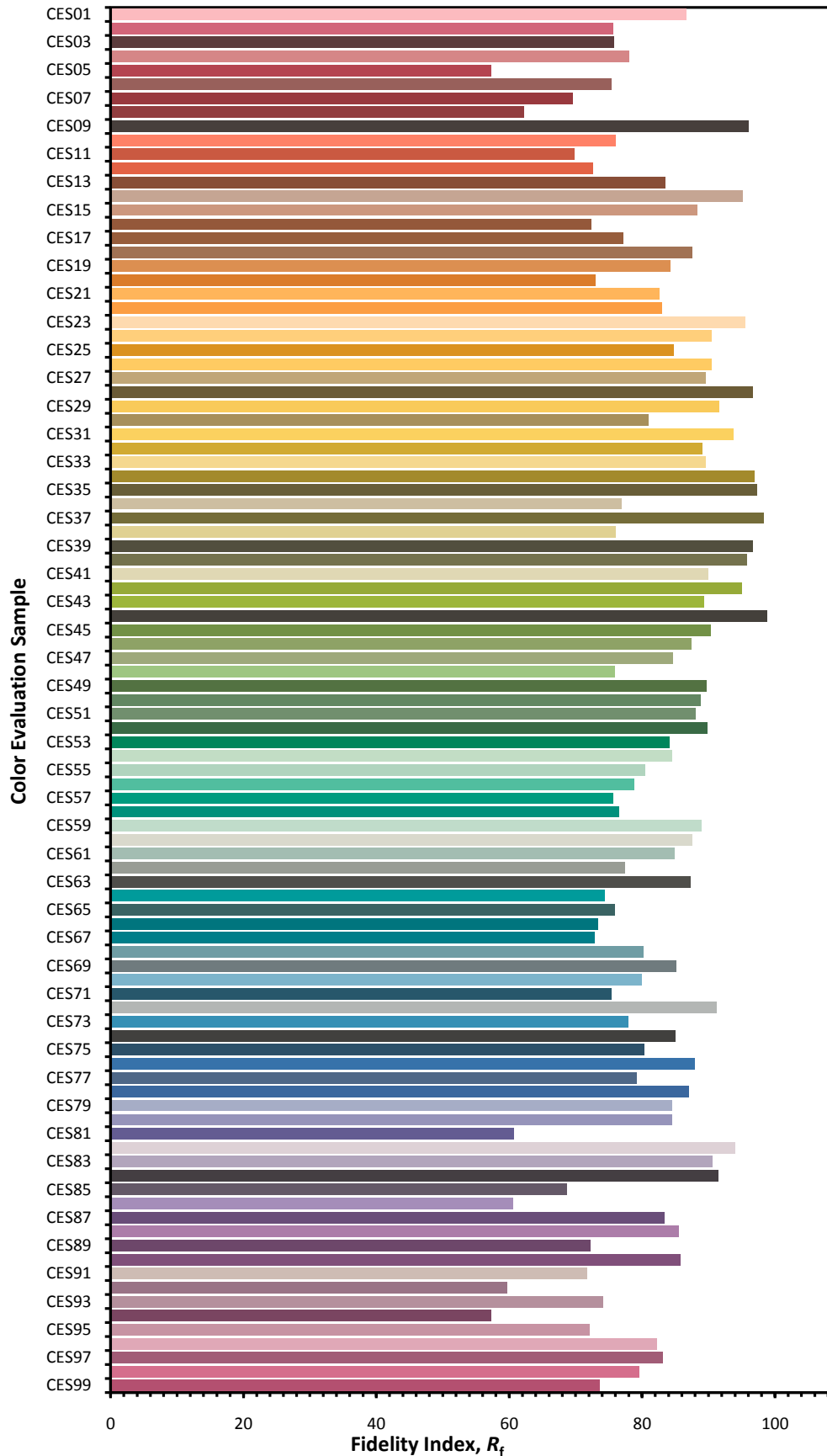
R_f by Hue



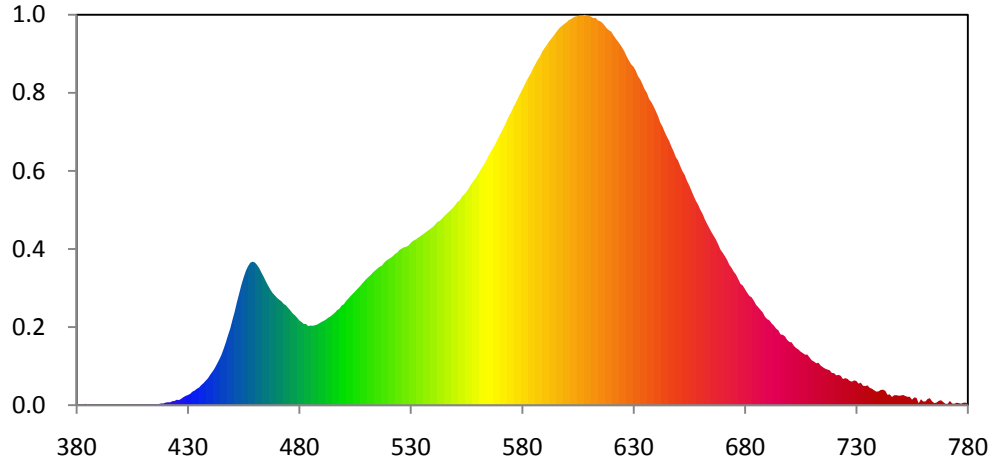
Color Vector Graphic



Color Fidelity by CES Sample



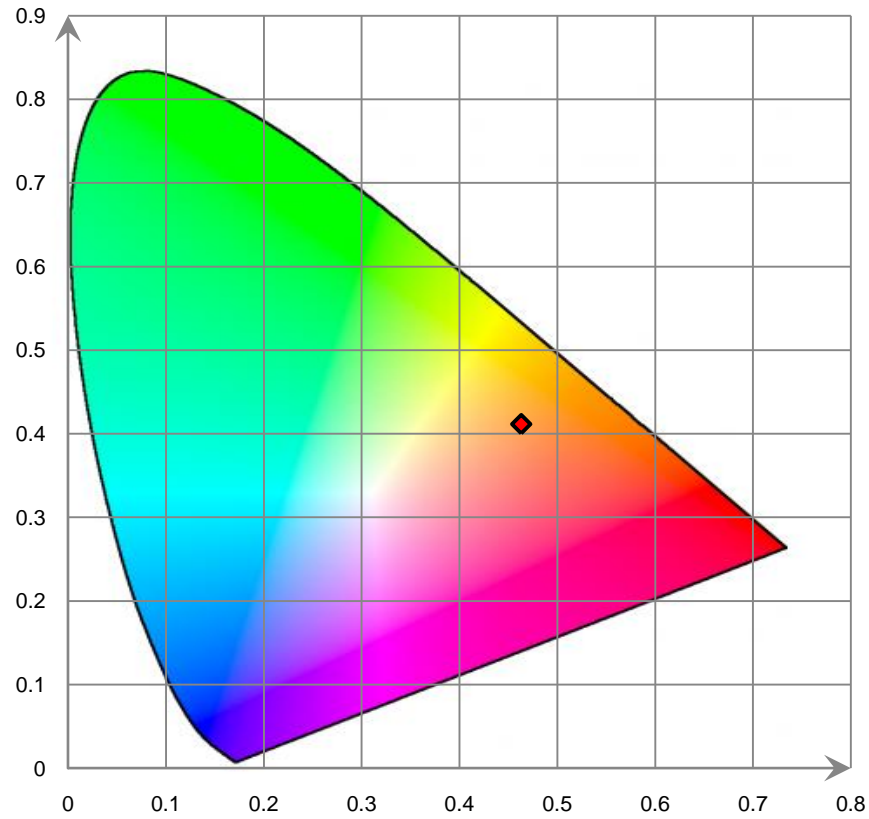
Relative Spectral Power Distribution



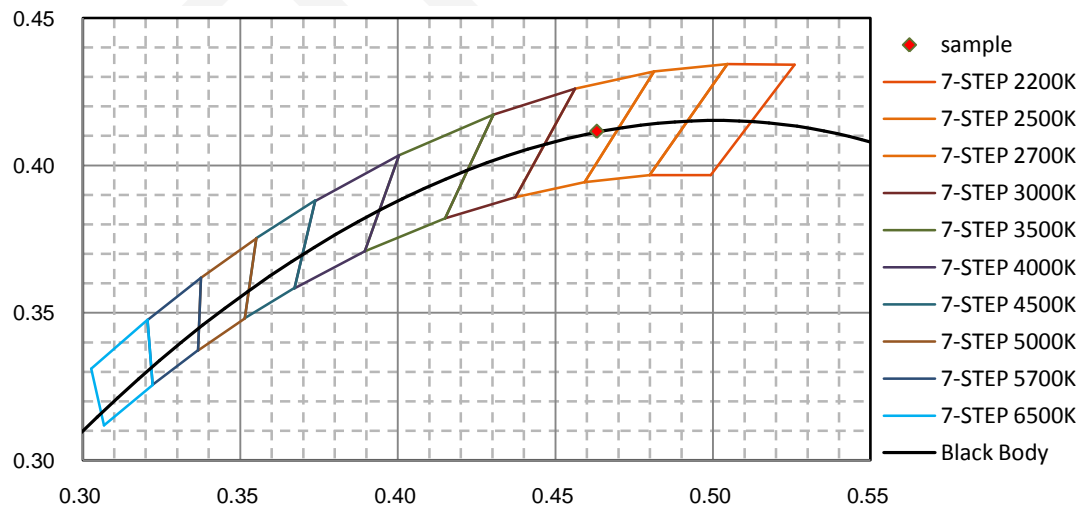
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.230E-02	421	9.850E-02	462	4.551E+00	503	3.622E+00	544	6.192E+00
381	2.600E-02	422	9.660E-02	463	4.402E+00	504	3.703E+00	545	6.275E+00
382	2.940E-02	423	1.327E-01	464	4.266E+00	505	3.777E+00	546	6.347E+00
383	1.140E-02	424	1.411E-01	465	4.111E+00	506	3.858E+00	547	6.411E+00
384	4.640E-02	425	1.805E-01	466	3.969E+00	507	3.934E+00	548	6.487E+00
385	2.890E-02	426	1.696E-01	467	3.841E+00	508	4.021E+00	549	6.560E+00
386	3.200E-03	427	2.142E-01	468	3.728E+00	509	4.103E+00	550	6.650E+00
387	1.530E-02	428	2.682E-01	469	3.647E+00	510	4.186E+00	551	6.754E+00
388	1.080E-02	429	3.097E-01	470	3.564E+00	511	4.259E+00	552	6.807E+00
389	5.100E-03	430	3.384E-01	471	3.503E+00	512	4.320E+00	553	6.927E+00
390	2.680E-02	431	3.760E-01	472	3.447E+00	513	4.405E+00	554	7.002E+00
391	9.500E-03	432	4.487E-01	473	3.362E+00	514	4.473E+00	555	7.087E+00
392	4.000E-04	433	4.860E-01	474	3.317E+00	515	4.536E+00	556	7.203E+00
393	1.600E-03	434	5.450E-01	475	3.228E+00	516	4.596E+00	557	7.323E+00
394	1.900E-03	435	5.870E-01	476	3.145E+00	517	4.633E+00	558	7.436E+00
395	1.460E-02	436	6.699E-01	477	3.051E+00	518	4.727E+00	559	7.523E+00
396	4.100E-03	437	7.331E-01	478	2.986E+00	519	4.797E+00	560	7.643E+00
397	3.400E-03	438	8.148E-01	479	2.908E+00	520	4.852E+00	561	7.770E+00
398	1.000E-04	439	8.945E-01	480	2.815E+00	521	4.895E+00	562	7.902E+00
399	0.000E+00	440	1.012E+00	481	2.763E+00	522	4.950E+00	563	8.001E+00
400	0.000E+00	441	1.111E+00	482	2.699E+00	523	5.026E+00	564	8.144E+00
401	9.600E-03	442	1.226E+00	483	2.696E+00	524	5.071E+00	565	8.298E+00
402	1.460E-02	443	1.366E+00	484	2.626E+00	525	5.162E+00	566	8.430E+00
403	8.800E-03	444	1.508E+00	485	2.646E+00	526	5.206E+00	567	8.552E+00
404	7.500E-03	445	1.668E+00	486	2.637E+00	527	5.247E+00	568	8.672E+00
405	2.100E-02	446	1.863E+00	487	2.656E+00	528	5.263E+00	569	8.841E+00
406	3.200E-03	447	2.085E+00	488	2.677E+00	529	5.305E+00	570	8.974E+00
407	4.160E-02	448	2.324E+00	489	2.723E+00	530	5.390E+00	571	9.117E+00
408	4.300E-03	449	2.552E+00	490	2.767E+00	531	5.457E+00	572	9.266E+00
409	2.850E-02	450	2.836E+00	491	2.802E+00	532	5.493E+00	573	9.429E+00
410	3.130E-02	451	3.111E+00	492	2.848E+00	533	5.549E+00	574	9.591E+00
411	1.300E-02	452	3.429E+00	493	2.909E+00	534	5.595E+00	575	9.726E+00
412	2.350E-02	453	3.707E+00	494	2.950E+00	535	5.650E+00	576	9.890E+00
413	8.700E-03	454	4.002E+00	495	3.010E+00	536	5.704E+00	577	1.002E+01
414	2.980E-02	455	4.243E+00	496	3.076E+00	537	5.758E+00	578	1.018E+01
415	3.230E-02	456	4.461E+00	497	3.157E+00	538	5.810E+00	579	1.033E+01
416	3.160E-02	457	4.618E+00	498	3.207E+00	539	5.870E+00	580	1.048E+01
417	4.020E-02	458	4.732E+00	499	3.312E+00	540	5.926E+00	581	1.062E+01
418	5.700E-02	459	4.766E+00	500	3.355E+00	541	6.000E+00	582	1.078E+01
419	5.870E-02	460	4.744E+00	501	3.461E+00	542	6.089E+00	583	1.091E+01
420	8.590E-02	461	4.661E+00	502	3.542E+00	543	6.122E+00	584	1.104E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.121E+01	626	1.174E+01	667	5.499E+00	708	1.682E+00	749	3.151E-01
586	1.134E+01	627	1.157E+01	668	5.344E+00	709	1.584E+00	750	3.194E-01
587	1.148E+01	628	1.144E+01	669	5.167E+00	710	1.492E+00	751	3.402E-01
588	1.158E+01	629	1.132E+01	670	5.066E+00	711	1.448E+00	752	3.040E-01
589	1.174E+01	630	1.124E+01	671	4.951E+00	712	1.393E+00	753	2.786E-01
590	1.185E+01	631	1.111E+01	672	4.826E+00	713	1.410E+00	754	2.776E-01
591	1.196E+01	632	1.093E+01	673	4.664E+00	714	1.316E+00	755	1.824E-01
592	1.207E+01	633	1.082E+01	674	4.562E+00	715	1.261E+00	756	2.582E-01
593	1.217E+01	634	1.067E+01	675	4.432E+00	716	1.215E+00	757	2.440E-01
594	1.226E+01	635	1.049E+01	676	4.339E+00	717	1.184E+00	758	6.370E-02
595	1.236E+01	636	1.037E+01	677	4.188E+00	718	1.161E+00	759	1.977E-01
596	1.246E+01	637	1.017E+01	678	4.031E+00	719	1.073E+00	760	1.245E-01
597	1.255E+01	638	1.007E+01	679	3.977E+00	720	1.063E+00	761	1.222E-01
598	1.261E+01	639	9.931E+00	680	3.859E+00	721	9.909E-01	762	2.077E-01
599	1.267E+01	640	9.768E+00	681	3.736E+00	722	1.006E+00	763	2.320E-01
600	1.272E+01	641	9.602E+00	682	3.630E+00	723	9.774E-01	764	1.268E-01
601	1.280E+01	642	9.389E+00	683	3.584E+00	724	8.671E-01	765	6.890E-02
602	1.283E+01	643	9.254E+00	684	3.471E+00	725	8.980E-01	766	8.660E-02
603	1.288E+01	644	9.075E+00	685	3.335E+00	726	8.749E-01	767	1.424E-01
604	1.291E+01	645	8.918E+00	686	3.252E+00	727	8.075E-01	768	1.641E-01
605	1.292E+01	646	8.775E+00	687	3.164E+00	728	7.820E-01	769	1.038E-01
606	1.295E+01	647	8.589E+00	688	3.081E+00	729	8.224E-01	770	4.730E-02
607	1.295E+01	648	8.432E+00	689	2.938E+00	730	8.051E-01	771	4.620E-02
608	1.297E+01	649	8.236E+00	690	2.859E+00	731	7.165E-01	772	1.421E-01
609	1.295E+01	650	8.125E+00	691	2.817E+00	732	7.486E-01	773	5.420E-02
610	1.294E+01	651	7.935E+00	692	2.716E+00	733	6.459E-01	774	4.760E-02
611	1.290E+01	652	7.768E+00	693	2.642E+00	734	6.324E-01	775	8.020E-02
612	1.286E+01	653	7.645E+00	694	2.544E+00	735	6.585E-01	776	6.710E-02
613	1.287E+01	654	7.450E+00	695	2.486E+00	736	5.772E-01	777	4.870E-02
614	1.278E+01	655	7.303E+00	696	2.351E+00	737	5.477E-01	778	8.030E-02
615	1.276E+01	656	7.126E+00	697	2.339E+00	738	4.967E-01	779	8.350E-02
616	1.270E+01	657	6.950E+00	698	2.282E+00	739	4.493E-01	780	6.400E-02
617	1.262E+01	658	6.787E+00	699	2.165E+00	740	4.602E-01		
618	1.251E+01	659	6.658E+00	700	2.100E+00	741	5.073E-01		
619	1.245E+01	660	6.489E+00	701	2.084E+00	742	5.151E-01		
620	1.241E+01	661	6.356E+00	702	1.968E+00	743	4.777E-01		
621	1.228E+01	662	6.174E+00	703	1.897E+00	744	3.431E-01		
622	1.218E+01	663	6.027E+00	704	1.851E+00	745	3.609E-01		
623	1.208E+01	664	5.886E+00	705	1.779E+00	746	2.741E-01		
624	1.198E+01	665	5.747E+00	706	1.730E+00	747	3.313E-01		
625	1.187E+01	666	5.624E+00	707	1.679E+00	748	3.319E-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**

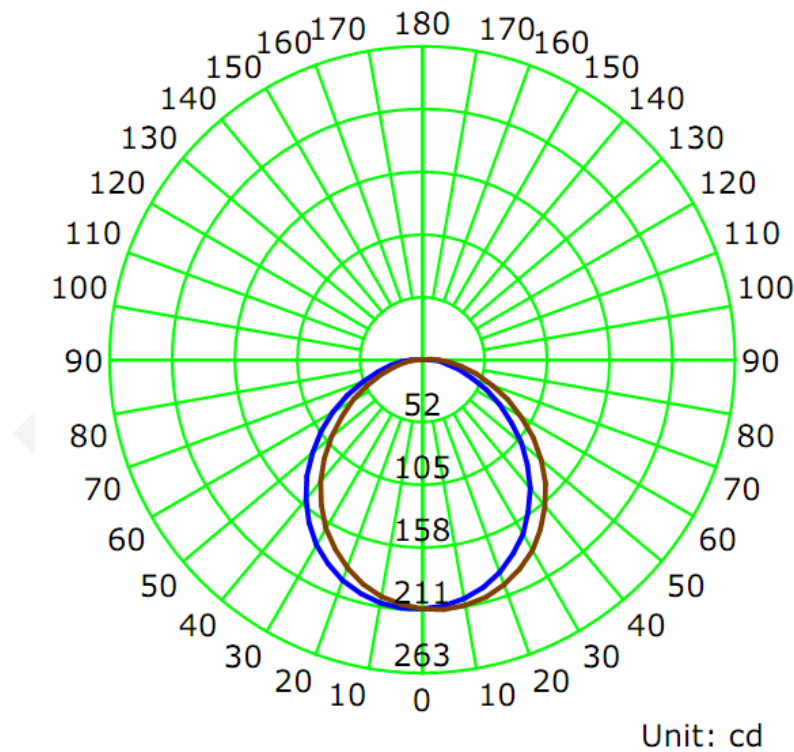
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0460	5.47	0.9910

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
581.7	106.39	211.1	1.23	1.23

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	106.1	106.1	106.2	106.0	106.1
Field Angle (10% I_{max}):	163.7	163.6	163.6	163.5	163.6

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	210	210	210	210	210	210	210	210
5.0°	208	209	210	210	211	211	211	211
10.0°	204	206	207	209	210	210	210	209
15.0°	198	201	203	205	207	207	207	206
20.0°	191	193	197	199	202	203	203	201
25.0°	181	185	189	192	195	195	195	193
30.0°	169	174	178	183	185	187	186	184
35.0°	156	161	166	171	174	176	175	173
40.0°	142	147	153	158	161	163	162	160
45.0°	126	131	137	143	147	149	148	145
50.0°	109	115	121	127	131	133	132	129
55.0°	92	98	104	110	114	116	115	112
60.0°	76	81	87	93	97	99	98	94
65.0°	60	65	71	76	80	81	80	77
70.0°	45	50	55	60	63	65	63	60
75.0°	32	36	41	45	47	48	47	45
80.0°	22	25	28	32	34	35	34	32
85.0°	14	16	19	21	23	23	23	21
90.0°	8	9	11	13	14	15	14	13
95.0°	4	5	6	7	8	8	8	7
100.0°	2	2	3	4	4	4	4	3
105.0°	1	1	1	1	2	2	2	1
110.0°	0	0	0	0	1	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

Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	210	210	210	210	210	210	210	210
5.0°	210	209	208	208	207	207	207	207
10.0°	208	206	204	203	202	202	202	203
15.0°	204	201	199	197	195	194	195	196
20.0°	198	195	191	189	186	185	186	187
25.0°	190	186	182	178	176	174	175	177
30.0°	179	175	170	166	163	162	162	165
35.0°	167	162	157	153	149	148	148	151
40.0°	153	148	142	137	134	132	133	136
45.0°	138	132	126	121	118	116	117	120
50.0°	122	116	109	104	101	99	100	103
55.0°	105	99	92	87	84	83	83	86
60.0°	87	81	76	71	67	66	67	69
65.0°	70	64	59	54	52	50	51	54
70.0°	54	49	44	40	38	37	37	40
75.0°	39	35	31	28	26	25	26	28
80.0°	27	24	21	18	17	16	17	18
85.0°	18	15	13	11	10	10	10	11
90.0°	10	9	7	6	5	5	5	6
95.0°	5	4	3	3	2	2	2	3
100.0°	2	2	1	1	1	1	1	1
105.0°	1	1	0	0	0	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	5.0	0.86	0-5	5.0	0.86
5-10	14.8	2.55	0-10	19.8	3.41
10-15	24.1	4.15	0-15	44.0	7.56
15-20	32.5	5.60	0-20	76.5	13.16
20-25	39.8	6.84	0-25	116.3	19.99
25-30	45.5	7.82	0-30	161.8	27.81
30-35	49.5	8.51	0-35	211.3	36.32
35-40	51.6	8.87	0-40	262.9	45.19
40-45	51.8	8.90	0-45	314.6	54.09
45-50	50.0	8.60	0-50	364.7	62.69
50-55	46.6	8.01	0-55	411.2	70.70
55-60	41.7	7.17	0-60	453.0	77.87
60-65	35.7	6.15	0-65	488.7	84.01
65-70	29.1	5.01	0-70	517.9	89.02
70-75	22.5	3.87	0-75	540.3	92.89
75-80	16.3	2.81	0-80	556.7	95.70
80-85	11.1	1.91	0-85	567.8	97.61
85-90	7.0	1.20	0-90	574.8	98.81
90-95	3.9	0.68	0-95	578.7	99.48
95-100	1.9	0.33	0-100	580.6	99.81
100-105	0.8	0.14	0-105	581.4	99.95
105-110	0.2	0.04	0-110	581.7	99.99
110-115	0.0	0.01	0-115	581.7	100.00
115-120	0.0	0.00	0-120	581.7	100.00
120-125	0.0	0.00	0-125	581.7	100.00
125-130	0.0	0.00	0-130	581.7	100.00
130-135	0.0	0.00	0-135	581.7	100.00
135-140	0.0	0.00	0-140	581.7	100.00
140-145	0.0	0.00	0-145	581.7	100.00
145-150	0.0	0.00	0-150	581.7	100.00
150-155	0.0	0.00	0-155	581.7	100.00
155-160	0.0	0.00	0-160	581.7	100.00
160-165	0.0	0.00	0-165	581.7	100.00
165-170	0.0	0.00	0-170	581.7	100.00
170-175	0.0	0.00	0-175	581.7	100.00
175-180	0.0	0.00	0-180	581.7	100.00

6. Product Photo



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