



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/840/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:	PKS181030082-10-3
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/840/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: 4000K
 Nominal Lumen Output: 560lm

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**

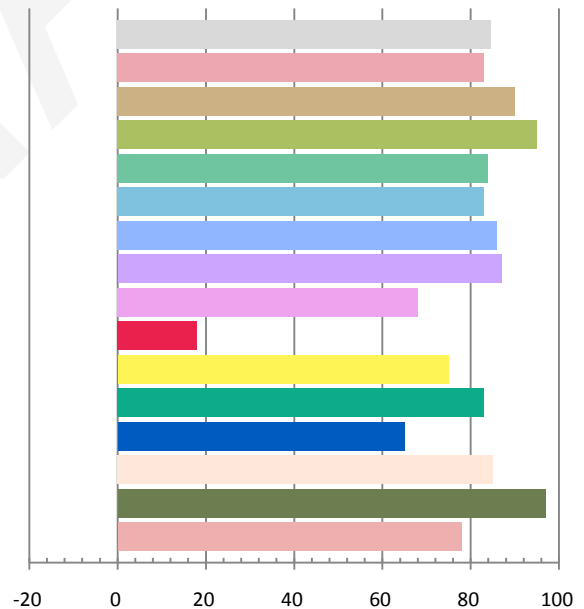
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0461	5.39	0.9747	636.64	118.12

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.949	3947	0.00052	0.3832	0.3796	0.2258	0.5032

Color Rendering Index

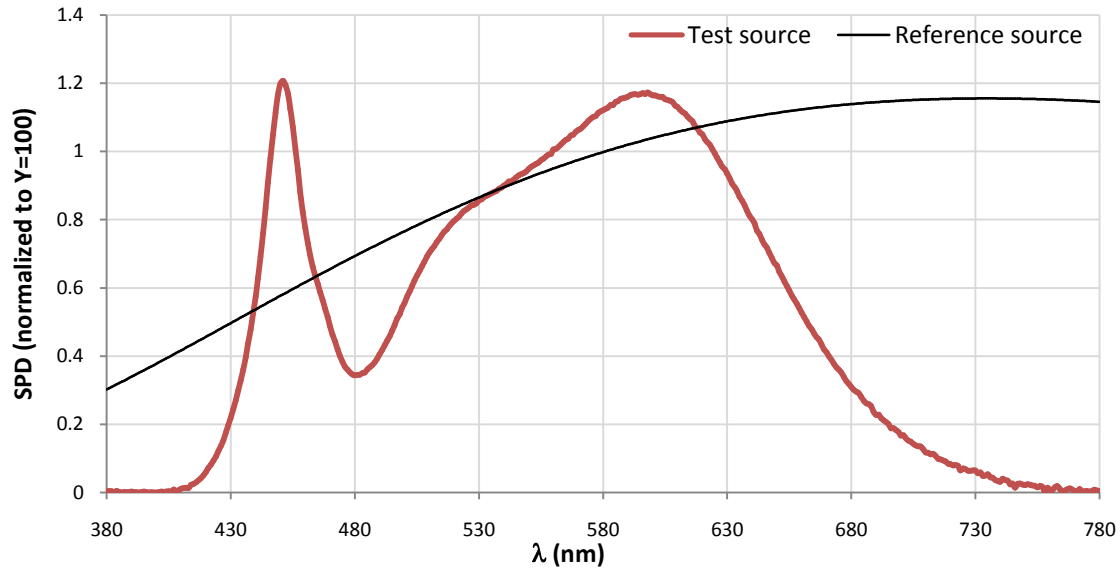
Ra 84.6			
R1 83	R2 90	R3 95	R4 84
R5 83	R6 86	R7 87	R8 68
R9 18	R10 75	R11 83	R12 65
R13 85	R14 97	R15 78	



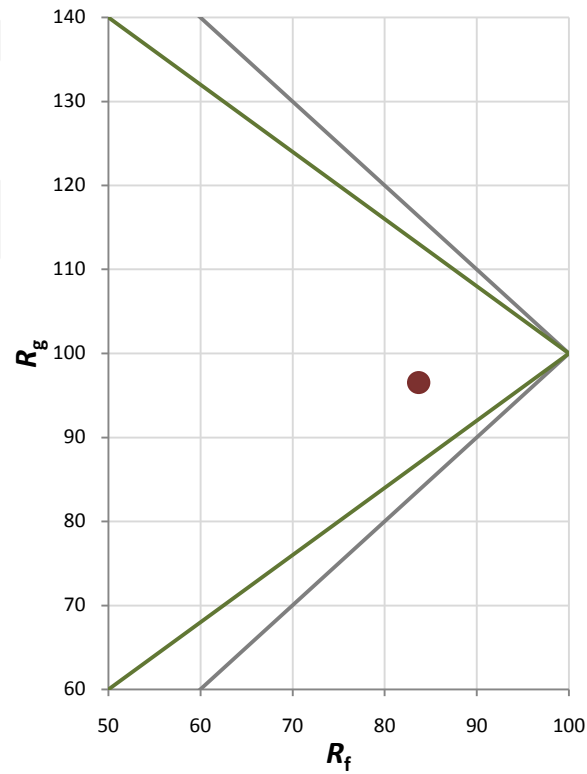
Fidelity Index and Gamut Index

Fidelity Index R_f	84
Gamut Index R_g	97

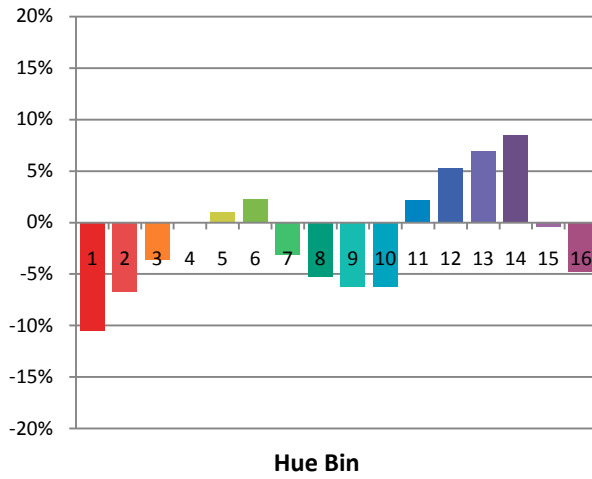
Spectral Power Distribution Comparison



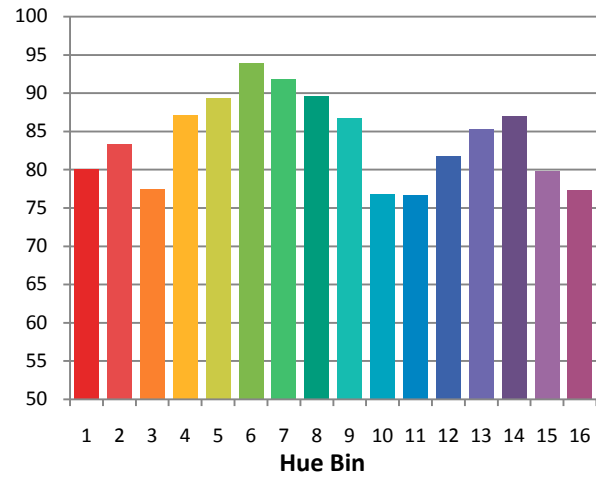
Plot of R_g versus R_f



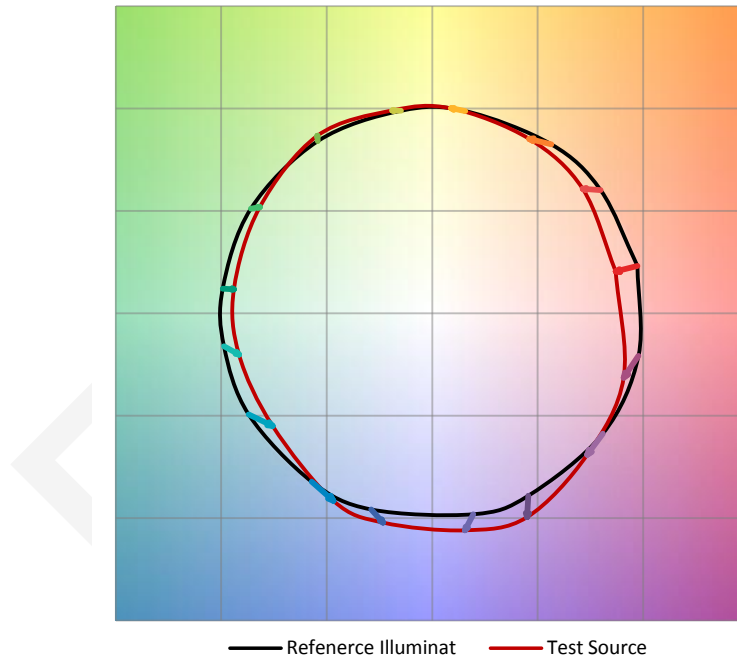
Chroma Shift by Hue



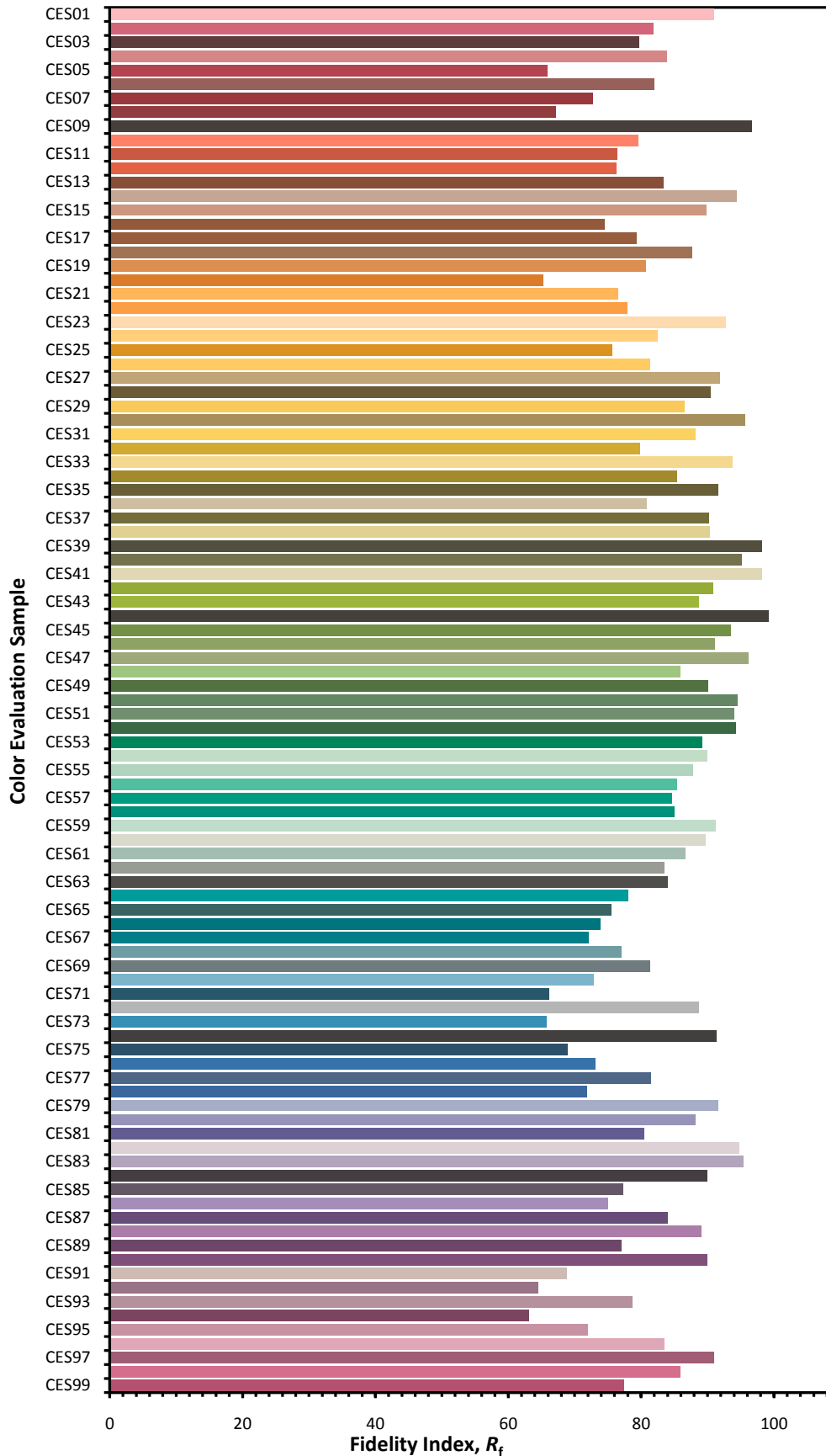
R_f by Hue



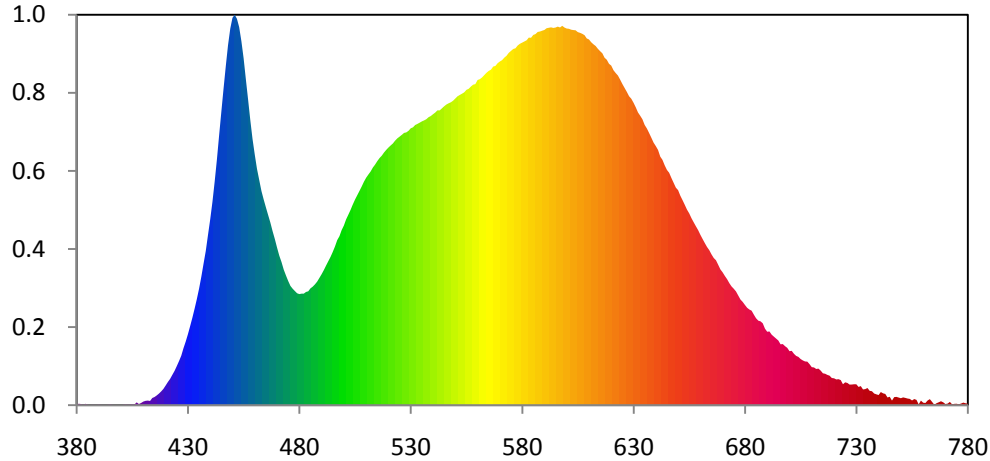
Color Vector Graphic



Color Fidelity by CES Sample



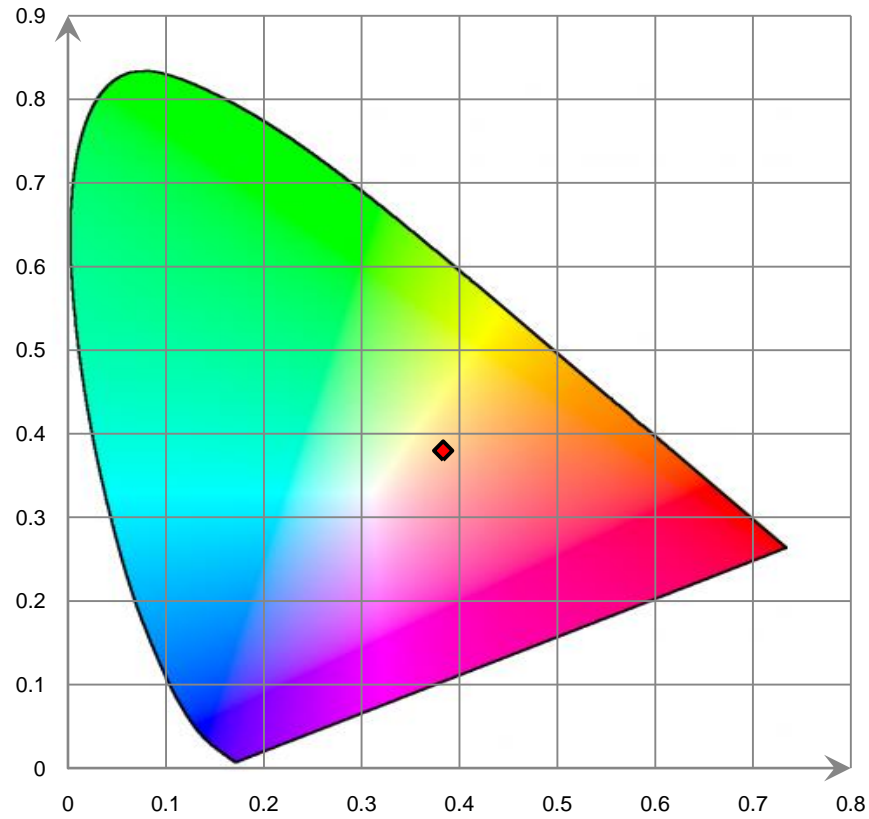
Relative Spectral Power Distribution



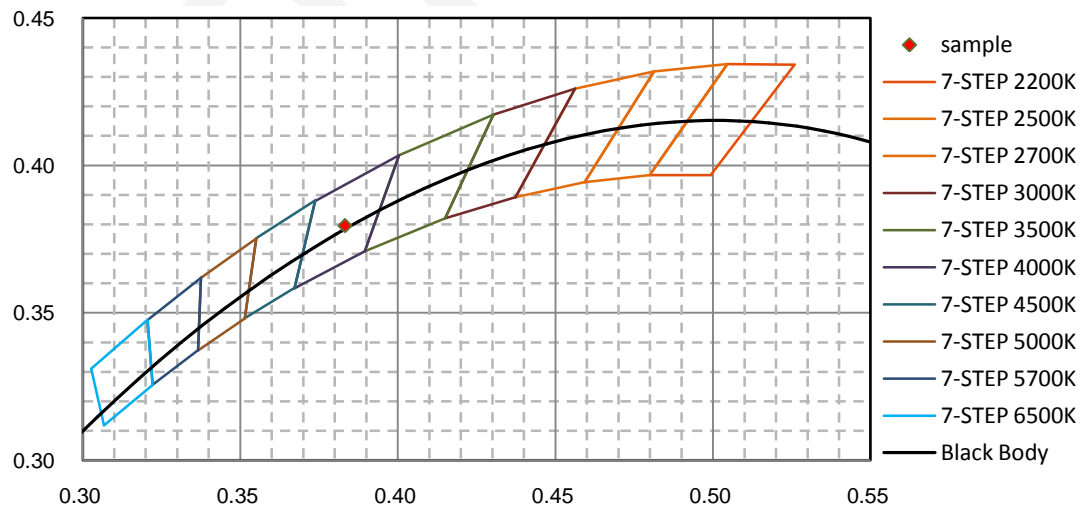
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.170E-02	421	6.686E-01	462	6.490E+00	503	5.630E+00	544	8.555E+00
381	4.210E-02	422	7.573E-01	463	6.170E+00	504	5.785E+00	545	8.615E+00
382	3.380E-02	423	8.742E-01	464	5.928E+00	505	5.927E+00	546	8.665E+00
383	4.500E-03	424	9.883E-01	465	5.700E+00	506	6.051E+00	547	8.701E+00
384	4.030E-02	425	1.128E+00	466	5.480E+00	507	6.177E+00	548	8.729E+00
385	1.420E-02	426	1.270E+00	467	5.262E+00	508	6.303E+00	549	8.774E+00
386	1.000E-03	427	1.426E+00	468	5.015E+00	509	6.442E+00	550	8.837E+00
387	1.300E-02	428	1.642E+00	469	4.790E+00	510	6.556E+00	551	8.902E+00
388	8.900E-03	429	1.833E+00	470	4.543E+00	511	6.648E+00	552	8.941E+00
389	7.500E-03	430	2.044E+00	471	4.310E+00	512	6.735E+00	553	8.977E+00
390	2.490E-02	431	2.280E+00	472	4.124E+00	513	6.847E+00	554	9.016E+00
391	8.900E-03	432	2.523E+00	473	3.907E+00	514	6.935E+00	555	9.088E+00
392	4.800E-03	433	2.783E+00	474	3.737E+00	515	7.035E+00	556	9.118E+00
393	2.500E-03	434	3.060E+00	475	3.580E+00	516	7.122E+00	557	9.183E+00
394	1.130E-02	435	3.359E+00	476	3.438E+00	517	7.191E+00	558	9.237E+00
395	2.650E-02	436	3.699E+00	477	3.356E+00	518	7.281E+00	559	9.253E+00
396	1.130E-02	437	4.073E+00	478	3.289E+00	519	7.356E+00	560	9.372E+00
397	2.700E-03	438	4.442E+00	479	3.225E+00	520	7.426E+00	561	9.395E+00
398	6.000E-03	439	4.901E+00	480	3.201E+00	521	7.486E+00	562	9.445E+00
399	2.500E-03	440	5.355E+00	481	3.215E+00	522	7.543E+00	563	9.513E+00
400	3.000E-04	441	5.856E+00	482	3.215E+00	523	7.624E+00	564	9.579E+00
401	1.230E-02	442	6.442E+00	483	3.263E+00	524	7.691E+00	565	9.634E+00
402	2.640E-02	443	7.079E+00	484	3.281E+00	525	7.741E+00	566	9.669E+00
403	1.690E-02	444	7.776E+00	485	3.367E+00	526	7.791E+00	567	9.759E+00
404	2.260E-02	445	8.462E+00	486	3.415E+00	527	7.847E+00	568	9.777E+00
405	3.350E-02	446	9.129E+00	487	3.482E+00	528	7.862E+00	569	9.855E+00
406	2.220E-02	447	9.776E+00	488	3.560E+00	529	7.907E+00	570	9.905E+00
407	8.150E-02	448	1.038E+01	489	3.667E+00	530	7.980E+00	571	9.945E+00
408	3.390E-02	449	1.085E+01	490	3.774E+00	531	8.008E+00	572	1.001E+01
409	6.450E-02	450	1.116E+01	491	3.894E+00	532	8.075E+00	573	1.007E+01
410	1.042E-01	451	1.125E+01	492	4.023E+00	533	8.107E+00	574	1.015E+01
411	1.253E-01	452	1.113E+01	493	4.149E+00	534	8.141E+00	575	1.021E+01
412	1.320E-01	453	1.090E+01	494	4.274E+00	535	8.178E+00	576	1.027E+01
413	1.213E-01	454	1.049E+01	495	4.417E+00	536	8.209E+00	577	1.029E+01
414	2.068E-01	455	9.997E+00	496	4.575E+00	537	8.242E+00	578	1.037E+01
415	2.349E-01	456	9.392E+00	497	4.755E+00	538	8.299E+00	579	1.042E+01
416	2.809E-01	457	8.812E+00	498	4.869E+00	539	8.333E+00	580	1.045E+01
417	3.339E-01	458	8.212E+00	499	5.046E+00	540	8.386E+00	581	1.048E+01
418	3.968E-01	459	7.671E+00	500	5.179E+00	541	8.433E+00	582	1.052E+01
419	4.697E-01	460	7.222E+00	501	5.354E+00	542	8.498E+00	583	1.059E+01
420	5.675E-01	461	6.812E+00	502	5.491E+00	543	8.496E+00	584	1.059E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.067E+01	626	9.143E+00	667	4.177E+00	708	1.254E+00	749	2.190E-01
586	1.070E+01	627	9.027E+00	668	4.047E+00	709	1.183E+00	750	1.999E-01
587	1.076E+01	628	8.905E+00	669	3.912E+00	710	1.096E+00	751	2.238E-01
588	1.077E+01	629	8.831E+00	670	3.829E+00	711	1.087E+00	752	2.093E-01
589	1.079E+01	630	8.716E+00	671	3.723E+00	712	1.043E+00	753	1.918E-01
590	1.081E+01	631	8.585E+00	672	3.631E+00	713	1.054E+00	754	1.809E-01
591	1.086E+01	632	8.437E+00	673	3.516E+00	714	9.969E-01	755	1.360E-01
592	1.088E+01	633	8.342E+00	674	3.422E+00	715	9.197E-01	756	1.764E-01
593	1.089E+01	634	8.240E+00	675	3.354E+00	716	9.059E-01	757	1.528E-01
594	1.087E+01	635	8.078E+00	676	3.278E+00	717	8.731E-01	758	2.370E-02
595	1.088E+01	636	7.973E+00	677	3.160E+00	718	8.496E-01	759	1.333E-01
596	1.091E+01	637	7.844E+00	678	3.044E+00	719	7.833E-01	760	7.240E-02
597	1.089E+01	638	7.707E+00	679	2.977E+00	720	7.746E-01	761	6.260E-02
598	1.093E+01	639	7.568E+00	680	2.889E+00	721	7.413E-01	762	1.351E-01
599	1.088E+01	640	7.467E+00	681	2.807E+00	722	7.498E-01	763	1.729E-01
600	1.085E+01	641	7.356E+00	682	2.757E+00	723	7.241E-01	764	9.410E-02
601	1.085E+01	642	7.164E+00	683	2.723E+00	724	6.031E-01	765	1.390E-02
602	1.082E+01	643	7.070E+00	684	2.610E+00	725	6.582E-01	766	5.620E-02
603	1.081E+01	644	6.912E+00	685	2.505E+00	726	6.398E-01	767	8.300E-02
604	1.080E+01	645	6.780E+00	686	2.436E+00	727	5.928E-01	768	1.134E-01
605	1.075E+01	646	6.697E+00	687	2.416E+00	728	5.957E-01	769	8.240E-02
606	1.073E+01	647	6.547E+00	688	2.359E+00	729	6.033E-01	770	3.270E-02
607	1.070E+01	648	6.409E+00	689	2.205E+00	730	6.025E-01	771	4.590E-02
608	1.066E+01	649	6.269E+00	690	2.117E+00	731	5.271E-01	772	9.420E-02
609	1.057E+01	650	6.199E+00	691	2.124E+00	732	5.502E-01	773	2.340E-02
610	1.054E+01	651	6.037E+00	692	2.033E+00	733	4.540E-01	774	3.780E-02
611	1.046E+01	652	5.909E+00	693	1.975E+00	734	4.637E-01	775	4.180E-02
612	1.040E+01	653	5.775E+00	694	1.920E+00	735	4.946E-01	776	2.570E-02
613	1.035E+01	654	5.637E+00	695	1.864E+00	736	4.134E-01	777	4.600E-02
614	1.027E+01	655	5.528E+00	696	1.755E+00	737	4.025E-01	778	7.430E-02
615	1.020E+01	656	5.390E+00	697	1.761E+00	738	3.362E-01	779	5.470E-02
616	1.014E+01	657	5.271E+00	698	1.701E+00	739	3.132E-01	780	4.530E-02
617	1.001E+01	658	5.155E+00	699	1.651E+00	740	2.927E-01		
618	9.955E+00	659	5.045E+00	700	1.556E+00	741	3.796E-01		
619	9.839E+00	660	4.911E+00	701	1.566E+00	742	3.413E-01		
620	9.787E+00	661	4.790E+00	702	1.481E+00	743	3.246E-01		
621	9.654E+00	662	4.671E+00	703	1.420E+00	744	2.215E-01		
622	9.573E+00	663	4.559E+00	704	1.392E+00	745	2.428E-01		
623	9.501E+00	664	4.468E+00	705	1.330E+00	746	1.327E-01		
624	9.382E+00	665	4.348E+00	706	1.289E+00	747	2.313E-01		
625	9.257E+00	666	4.242E+00	707	1.261E+00	748	2.400E-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**

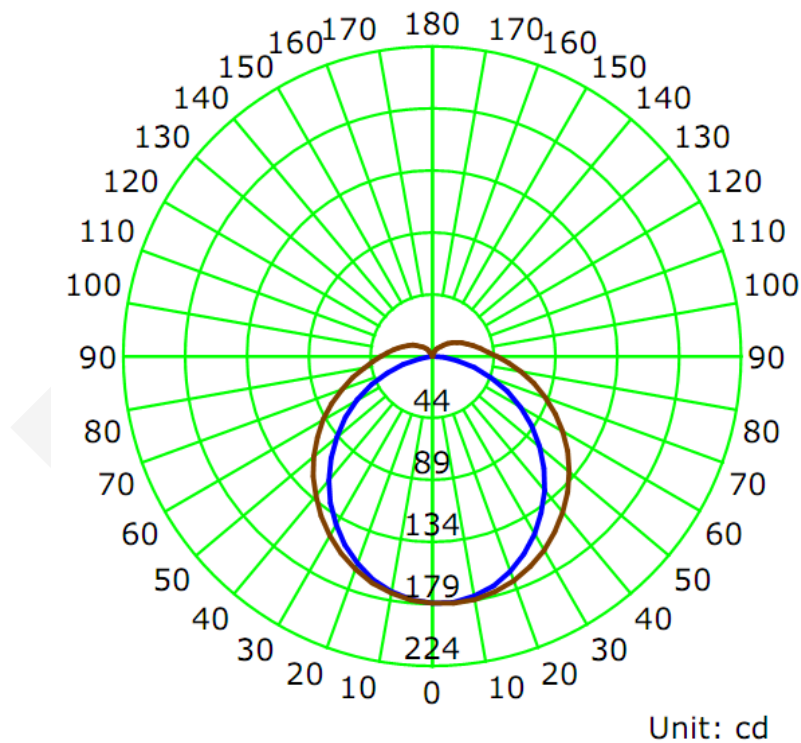
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0460	5.41	0.9800

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
634.2	117.28	179.9	1.20	1.30

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	105.1	116.3	130.1	118.0	117.4
Field Angle (10% I_{max}):	157.2	200.4	242.2	208.1	202.0

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	179	179	179	179	179	179	179	179
5.0°	179	179	180	180	180	180	179	178
10.0°	177	178	179	179	179	178	176	175
15.0°	172	174	175	177	177	175	173	170
20.0°	166	168	171	173	173	171	167	163
25.0°	158	161	165	168	168	166	161	155
30.0°	149	152	157	162	163	159	153	146
35.0°	139	142	149	154	156	151	144	136
40.0°	127	131	139	146	148	143	134	124
45.0°	115	120	129	137	139	134	124	113
50.0°	102	108	118	127	130	124	113	100
55.0°	88	95	107	117	120	114	101	88
60.0°	75	82	95	106	110	103	90	75
65.0°	60	69	83	95	99	93	78	62
70.0°	46	56	71	83	88	81	67	50
75.0°	32	43	60	72	77	71	56	38
80.0°	19	31	49	62	66	60	46	27
85.0°	9	21	39	52	56	50	37	19
90.0°	2	14	31	43	47	42	30	13
95.0°	0	10	25	37	41	36	25	9
100.0°	0	7	21	32	36	32	21	8
105.0°	0	6	18	28	31	28	18	6
110.0°	0	4	15	24	27	24	16	5
115.0°	0	4	13	21	24	21	13	4
120.0°	0	3	11	18	21	18	11	4
125.0°	0	3	9	15	18	15	10	3
130.0°	0	2	8	13	15	13	8	3
135.0°	0	2	7	11	12	11	7	2
140.0°	0	2	6	9	10	9	5	2
145.0°	0	2	5	7	8	7	4	1
150.0°	0	1	4	6	6	5	3	1
155.0°	0	1	3	4	5	4	2	0
160.0°	0	1	2	3	3	2	0	0
165.0°	0	0	1	2	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

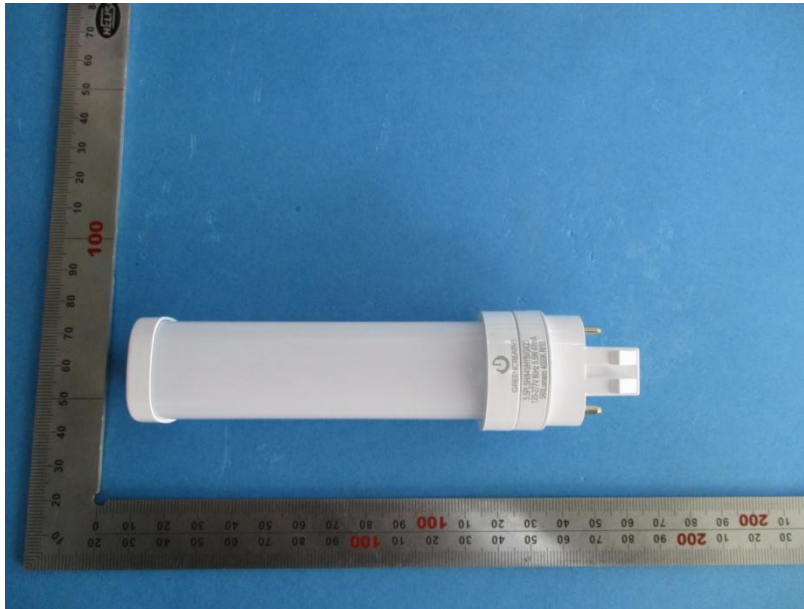
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	179	179	179	179	179	179	179	179
5.0°	177	177	177	177	178	178	178	178
10.0°	174	173	173	173	174	175	175	176
15.0°	168	167	167	169	170	171	171	171
20.0°	160	159	161	162	164	165	165	165
25.0°	151	151	153	155	158	158	157	157
30.0°	141	141	143	147	150	150	149	148
35.0°	130	130	133	138	142	142	140	138
40.0°	118	118	122	128	132	133	130	127
45.0°	105	105	111	118	123	123	119	115
50.0°	91	93	100	108	113	112	108	102
55.0°	77	80	88	97	103	102	96	90
60.0°	64	66	76	86	92	91	85	77
65.0°	49	53	65	76	81	80	73	64
70.0°	35	41	54	65	71	69	62	51
75.0°	22	30	43	55	61	59	51	39
80.0°	9	20	34	46	51	50	41	28
85.0°	2	13	27	38	44	42	33	20
90.0°	0	8	22	33	38	36	27	14
95.0°	0	6	18	29	33	31	23	10
100.0°	0	4	16	25	29	28	20	8
105.0°	0	3	13	22	26	24	17	6
110.0°	0	3	11	19	23	21	14	5
115.0°	0	2	9	16	20	18	12	4
120.0°	0	1	8	14	17	15	10	3
125.0°	0	1	6	12	14	13	8	3
130.0°	0	1	5	10	12	11	7	2
135.0°	0	1	4	8	10	9	5	2
140.0°	0	1	3	6	8	7	4	1
145.0°	0	0	2	5	6	5	3	1
150.0°	0	0	2	3	4	4	2	1
155.0°	0	0	1	2	3	2	1	0
160.0°	0	0	1	1	2	1	1	0
165.0°	0	0	0	1	1	1	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	4.3	0.67	0-5	4.3	0.67
5-10	12.7	2.00	0-10	16.9	2.67
10-15	20.6	3.25	0-15	37.5	5.92
15-20	27.8	4.39	0-20	65.4	10.31
20-25	34.1	5.37	0-25	99.4	15.67
25-30	39.2	6.17	0-30	138.6	21.85
30-35	43.0	6.78	0-35	181.5	28.63
35-40	45.5	7.17	0-40	227.0	35.80
40-45	46.6	7.35	0-45	273.6	43.15
45-50	46.4	7.32	0-50	320.0	50.46
50-55	45.0	7.09	0-55	365.0	57.55
55-60	42.4	6.68	0-60	407.4	64.24
60-65	38.8	6.11	0-65	446.2	70.35
65-70	34.3	5.41	0-70	480.5	75.76
70-75	29.3	4.63	0-75	509.8	80.39
75-80	24.1	3.81	0-80	534.0	84.20
80-85	19.3	3.04	0-85	553.3	87.24
85-90	15.4	2.42	0-90	568.6	89.66
90-95	12.5	1.98	0-95	581.2	91.64
95-100	10.5	1.66	0-100	591.7	93.29
100-105	8.9	1.40	0-105	600.5	94.69
105-110	7.5	1.18	0-110	608.0	95.87
110-115	6.2	0.98	0-115	614.2	96.84
115-120	5.1	0.80	0-120	619.3	97.64
120-125	4.1	0.65	0-125	623.3	98.29
125-130	3.2	0.51	0-130	626.6	98.80
130-135	2.5	0.39	0-135	629.1	99.20
135-140	1.9	0.29	0-140	631.0	99.49
140-145	1.3	0.21	0-145	632.3	99.70
145-150	0.9	0.14	0-150	633.2	99.84
150-155	0.5	0.09	0-155	633.7	99.93
155-160	0.3	0.05	0-160	634.0	99.97
160-165	0.1	0.02	0-165	634.2	99.99
165-170	0.0	0.01	0-170	634.2	100.00
170-175	0.0	0.00	0-175	634.2	100.00
175-180	0.0	0.00	0-180	634.2	100.00

6. Product Photo



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