



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/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:	PKS181030082-10
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/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: 520lm

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**

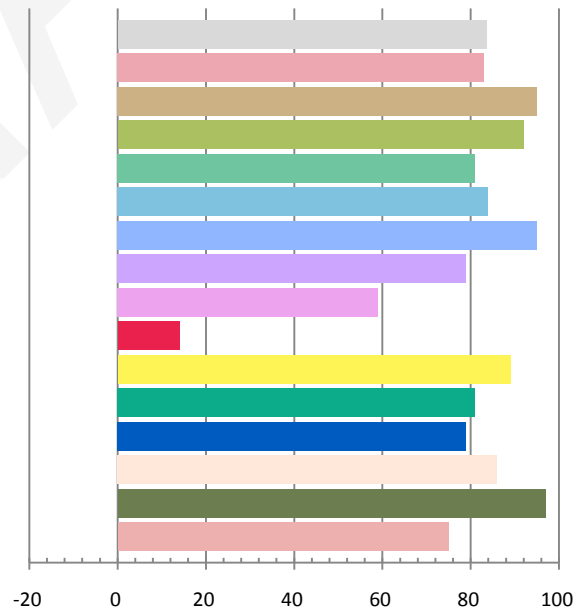
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0463	5.42	0.9758	552.78	101.99

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.727	2676	-0.00050	0.4610	0.4095	0.2637	0.5271

Color Rendering Index

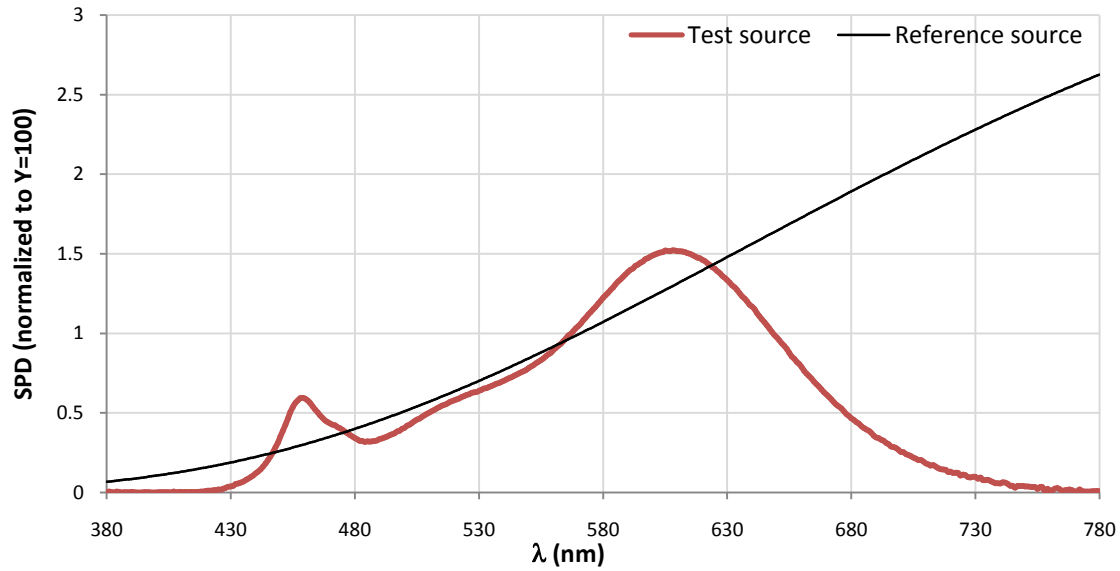
Ra 83.6			
R1 83	R2 95	R3 92	R4 81
R5 84	R6 95	R7 79	R8 59
R9 14	R10 89	R11 81	R12 79
R13 86	R14 97	R15 75	



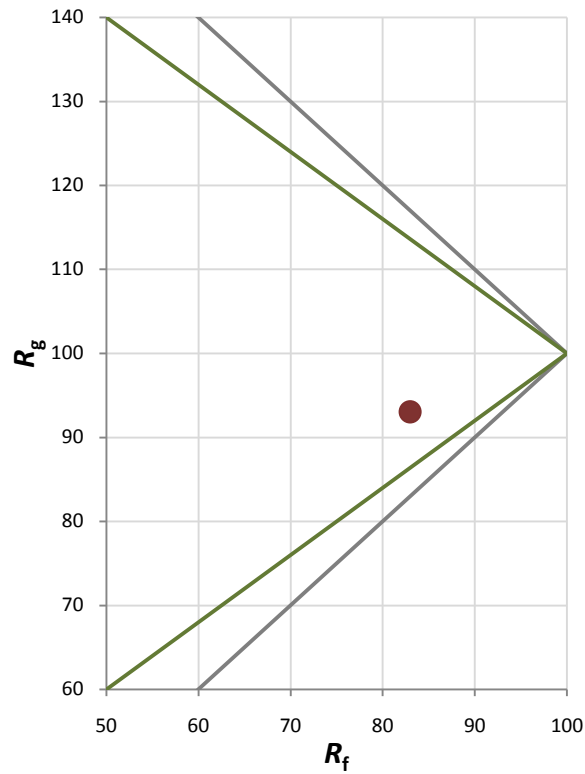
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	93

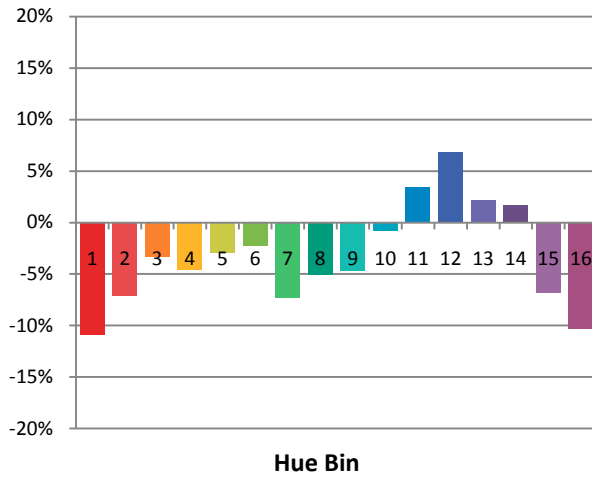
Spectral Power Distribution Comparison



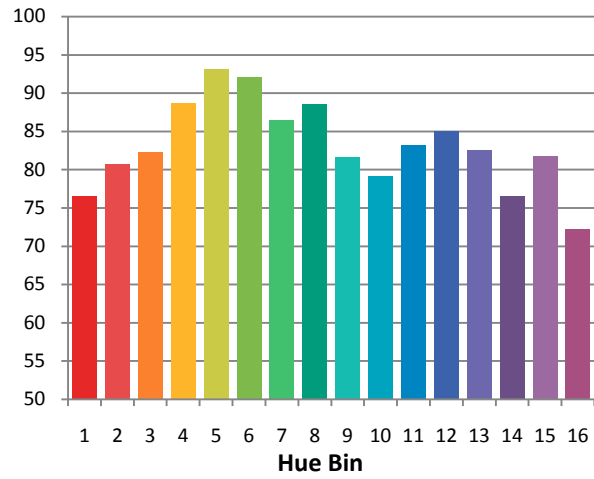
Plot of R_g versus R_f



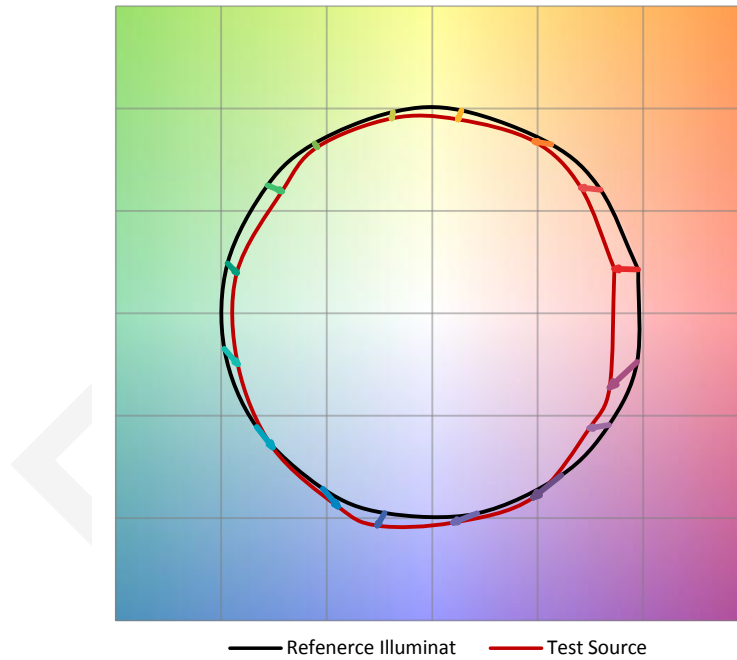
Chroma Shift by Hue



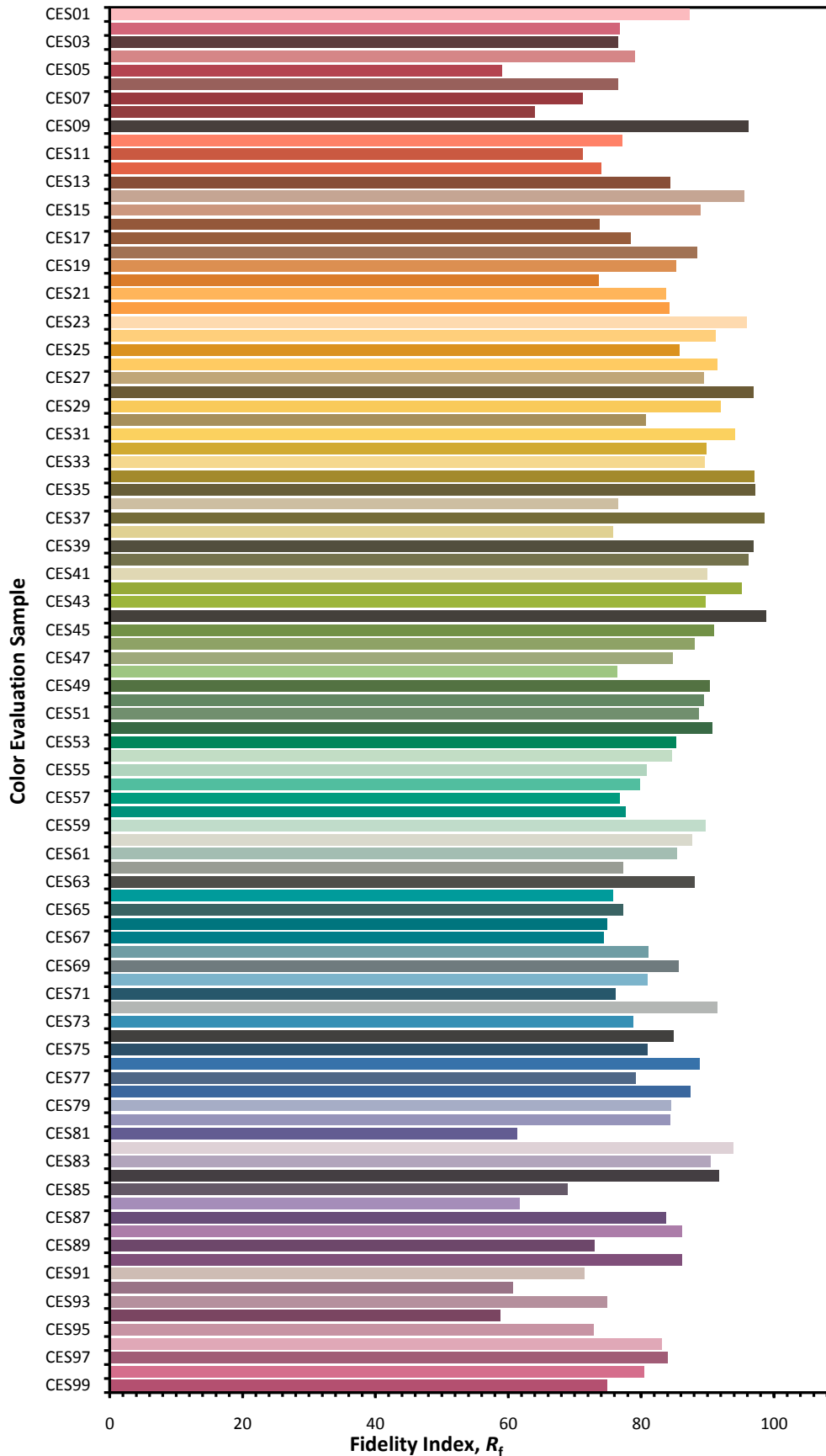
R_f by Hue



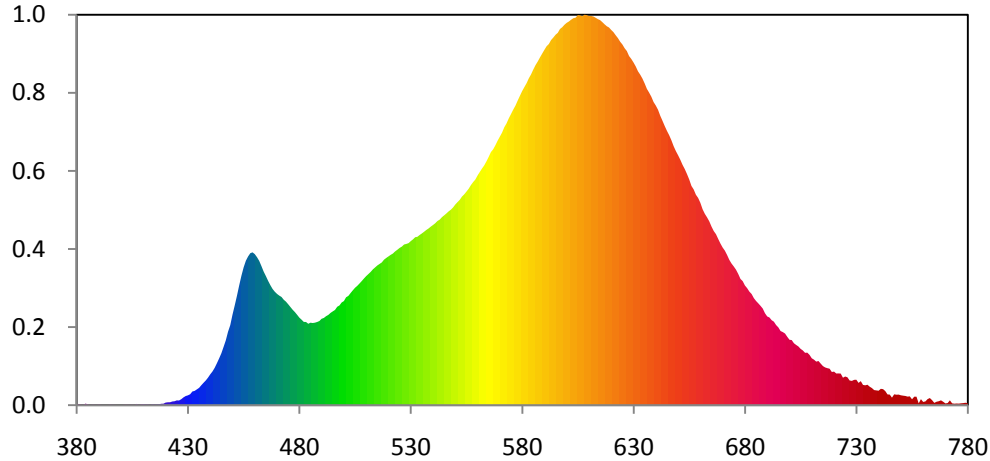
Color Vector Graphic



Color Fidelity by CES Sample



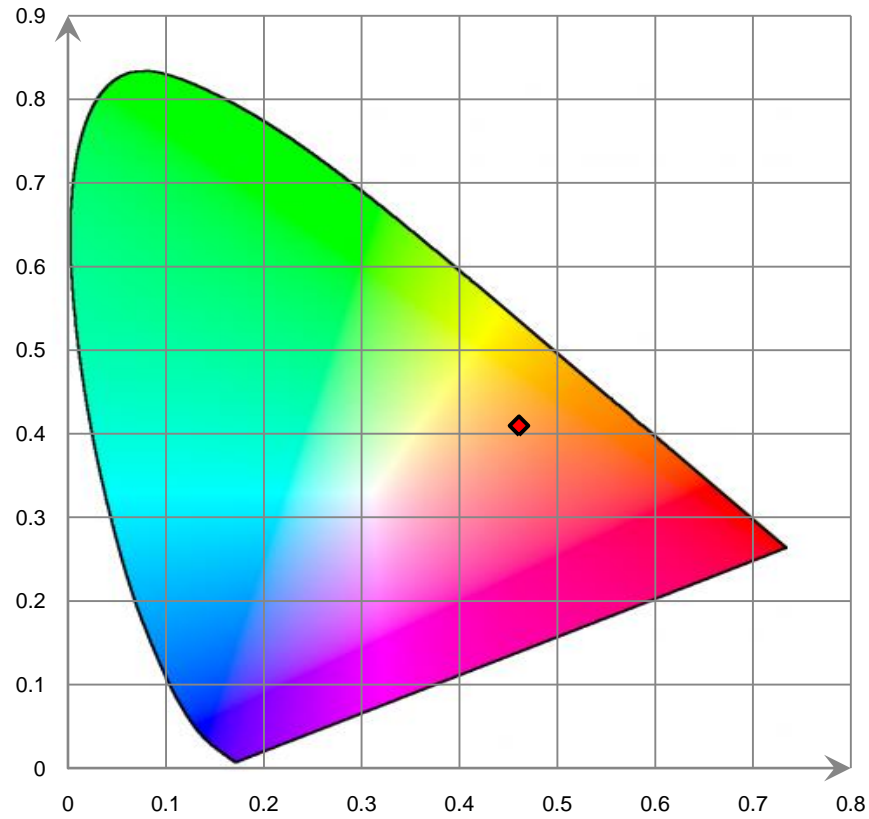
Relative Spectral Power Distribution



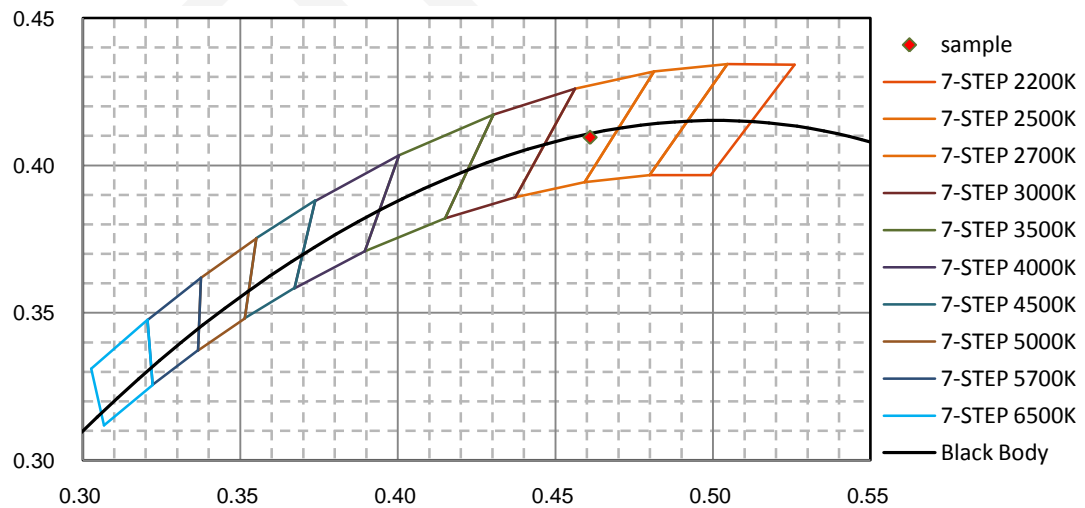
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.780E-02	421	9.130E-02	462	4.548E+00	503	3.536E+00	544	5.926E+00
381	3.980E-02	422	9.190E-02	463	4.382E+00	504	3.620E+00	545	5.986E+00
382	1.800E-02	423	1.175E-01	464	4.210E+00	505	3.702E+00	546	6.044E+00
383	3.800E-03	424	1.240E-01	465	4.068E+00	506	3.762E+00	547	6.109E+00
384	5.020E-02	425	1.516E-01	466	3.919E+00	507	3.836E+00	548	6.162E+00
385	3.010E-02	426	1.475E-01	467	3.783E+00	508	3.913E+00	549	6.234E+00
386	3.200E-03	427	1.881E-01	468	3.664E+00	509	3.994E+00	550	6.326E+00
387	1.760E-02	428	2.450E-01	469	3.576E+00	510	4.068E+00	551	6.402E+00
388	1.620E-02	429	2.884E-01	470	3.508E+00	511	4.135E+00	552	6.474E+00
389	7.400E-03	430	3.106E-01	471	3.455E+00	512	4.200E+00	553	6.577E+00
390	2.840E-02	431	3.447E-01	472	3.412E+00	513	4.280E+00	554	6.646E+00
391	1.140E-02	432	4.319E-01	473	3.325E+00	514	4.343E+00	555	6.734E+00
392	5.000E-04	433	4.509E-01	474	3.264E+00	515	4.404E+00	556	6.823E+00
393	0.000E+00	434	4.969E-01	475	3.182E+00	516	4.453E+00	557	6.937E+00
394	4.600E-03	435	5.459E-01	476	3.094E+00	517	4.500E+00	558	7.033E+00
395	2.170E-02	436	6.294E-01	477	3.010E+00	518	4.586E+00	559	7.115E+00
396	1.260E-02	437	7.049E-01	478	2.936E+00	519	4.642E+00	560	7.243E+00
397	1.260E-02	438	7.779E-01	479	2.851E+00	520	4.690E+00	561	7.352E+00
398	4.400E-03	439	8.671E-01	480	2.762E+00	521	4.740E+00	562	7.461E+00
399	2.000E-04	440	9.710E-01	481	2.696E+00	522	4.782E+00	563	7.560E+00
400	0.000E+00	441	1.061E+00	482	2.626E+00	523	4.847E+00	564	7.689E+00
401	9.700E-03	442	1.176E+00	483	2.623E+00	524	4.901E+00	565	7.831E+00
402	1.920E-02	443	1.322E+00	484	2.567E+00	525	4.958E+00	566	7.981E+00
403	1.700E-02	444	1.474E+00	485	2.600E+00	526	4.999E+00	567	8.067E+00
404	1.070E-02	445	1.636E+00	486	2.590E+00	527	5.066E+00	568	8.193E+00
405	1.720E-02	446	1.837E+00	487	2.601E+00	528	5.085E+00	569	8.339E+00
406	3.700E-03	447	2.045E+00	488	2.623E+00	529	5.108E+00	570	8.466E+00
407	4.050E-02	448	2.315E+00	489	2.653E+00	530	5.171E+00	571	8.595E+00
408	5.400E-03	449	2.524E+00	490	2.724E+00	531	5.226E+00	572	8.762E+00
409	3.070E-02	450	2.851E+00	491	2.750E+00	532	5.295E+00	573	8.884E+00
410	3.640E-02	451	3.145E+00	492	2.806E+00	533	5.309E+00	574	9.041E+00
411	2.330E-02	452	3.450E+00	493	2.846E+00	534	5.366E+00	575	9.178E+00
412	3.040E-02	453	3.774E+00	494	2.909E+00	535	5.415E+00	576	9.319E+00
413	7.600E-03	454	4.080E+00	495	2.957E+00	536	5.469E+00	577	9.443E+00
414	3.220E-02	455	4.344E+00	496	3.002E+00	537	5.524E+00	578	9.604E+00
415	2.110E-02	456	4.553E+00	497	3.102E+00	538	5.572E+00	579	9.752E+00
416	2.790E-02	457	4.689E+00	498	3.144E+00	539	5.629E+00	580	9.901E+00
417	2.840E-02	458	4.792E+00	499	3.238E+00	540	5.682E+00	581	1.003E+01
418	4.440E-02	459	4.818E+00	500	3.282E+00	541	5.735E+00	582	1.015E+01
419	4.690E-02	460	4.763E+00	501	3.402E+00	542	5.806E+00	583	1.030E+01
420	8.190E-02	461	4.667E+00	502	3.445E+00	543	5.850E+00	584	1.043E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.058E+01	626	1.126E+01	667	5.392E+00	708	1.655E+00	749	3.336E-01
586	1.072E+01	627	1.116E+01	668	5.242E+00	709	1.585E+00	750	3.109E-01
587	1.083E+01	628	1.101E+01	669	5.097E+00	710	1.479E+00	751	3.002E-01
588	1.096E+01	629	1.092E+01	670	4.971E+00	711	1.435E+00	752	2.905E-01
589	1.109E+01	630	1.081E+01	671	4.871E+00	712	1.374E+00	753	2.710E-01
590	1.120E+01	631	1.068E+01	672	4.735E+00	713	1.392E+00	754	2.784E-01
591	1.132E+01	632	1.053E+01	673	4.581E+00	714	1.312E+00	755	1.865E-01
592	1.139E+01	633	1.042E+01	674	4.465E+00	715	1.234E+00	756	2.685E-01
593	1.151E+01	634	1.030E+01	675	4.373E+00	716	1.191E+00	757	2.686E-01
594	1.159E+01	635	1.014E+01	676	4.271E+00	717	1.167E+00	758	5.710E-02
595	1.168E+01	636	9.971E+00	677	4.138E+00	718	1.150E+00	759	1.905E-01
596	1.174E+01	637	9.854E+00	678	3.979E+00	719	1.047E+00	760	1.016E-01
597	1.186E+01	638	9.724E+00	679	3.911E+00	720	1.059E+00	761	1.180E-01
598	1.192E+01	639	9.558E+00	680	3.774E+00	721	9.979E-01	762	1.924E-01
599	1.199E+01	640	9.446E+00	681	3.690E+00	722	1.001E+00	763	2.252E-01
600	1.205E+01	641	9.314E+00	682	3.579E+00	723	9.962E-01	764	1.576E-01
601	1.210E+01	642	9.125E+00	683	3.506E+00	724	8.655E-01	765	7.300E-02
602	1.215E+01	643	8.967E+00	684	3.375E+00	725	9.044E-01	766	1.080E-01
603	1.220E+01	644	8.803E+00	685	3.286E+00	726	8.788E-01	767	1.247E-01
604	1.222E+01	645	8.649E+00	686	3.210E+00	727	7.778E-01	768	1.530E-01
605	1.230E+01	646	8.512E+00	687	3.132E+00	728	7.657E-01	769	1.075E-01
606	1.229E+01	647	8.352E+00	688	3.047E+00	729	7.995E-01	770	5.550E-02
607	1.226E+01	648	8.167E+00	689	2.900E+00	730	8.025E-01	771	6.790E-02
608	1.231E+01	649	8.012E+00	690	2.798E+00	731	7.029E-01	772	1.527E-01
609	1.230E+01	650	7.879E+00	691	2.765E+00	732	7.582E-01	773	5.810E-02
610	1.227E+01	651	7.737E+00	692	2.680E+00	733	6.384E-01	774	4.660E-02
611	1.227E+01	652	7.579E+00	693	2.632E+00	734	6.271E-01	775	5.330E-02
612	1.225E+01	653	7.444E+00	694	2.526E+00	735	6.445E-01	776	4.880E-02
613	1.221E+01	654	7.288E+00	695	2.452E+00	736	5.841E-01	777	5.860E-02
614	1.217E+01	655	7.116E+00	696	2.337E+00	737	5.395E-01	778	6.470E-02
615	1.214E+01	656	6.912E+00	697	2.304E+00	738	4.768E-01	779	7.660E-02
616	1.208E+01	657	6.802E+00	698	2.259E+00	739	4.659E-01	780	6.130E-02
617	1.201E+01	658	6.634E+00	699	2.156E+00	740	4.572E-01		
618	1.195E+01	659	6.534E+00	700	2.062E+00	741	5.164E-01		
619	1.191E+01	660	6.379E+00	701	2.054E+00	742	5.044E-01		
620	1.183E+01	661	6.177E+00	702	1.953E+00	743	4.442E-01		
621	1.176E+01	662	6.033E+00	703	1.900E+00	744	3.389E-01		
622	1.166E+01	663	5.922E+00	704	1.852E+00	745	3.352E-01		
623	1.157E+01	664	5.796E+00	705	1.776E+00	746	2.376E-01		
624	1.146E+01	665	5.632E+00	706	1.725E+00	747	3.420E-01		
625	1.137E+01	666	5.491E+00	707	1.650E+00	748	3.301E-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**

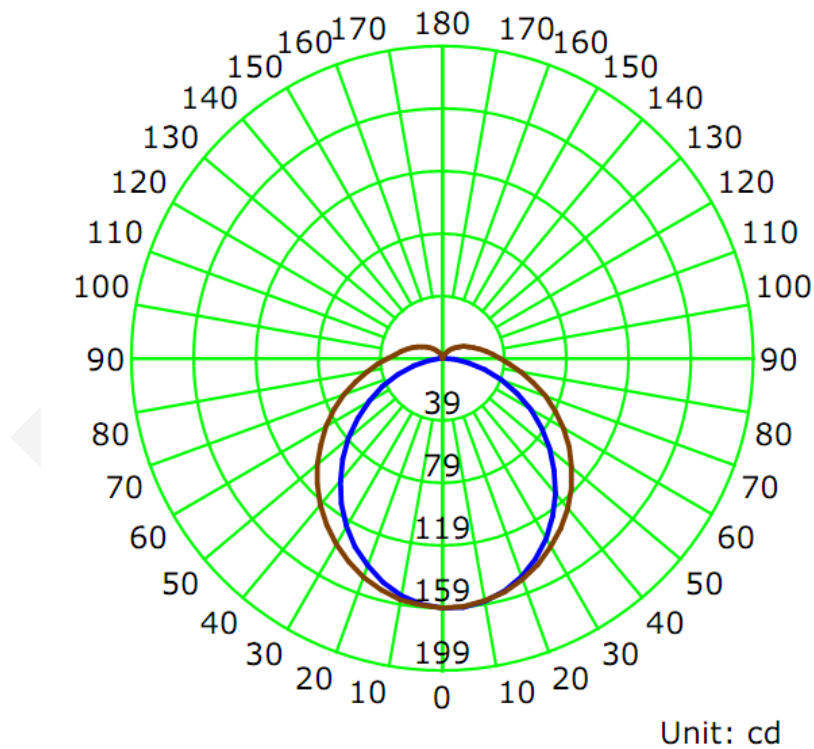
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0460	5.44	0.9860

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
555.6	102.19	159.8	1.20	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	103.9	117.7	128.9	114.1	116.2
Field Angle (10% I_{max}):	157.4	208.4	239.1	194.9	200.0

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	160	160	160	160	160	160	160	160
5.0°	160	160	160	159	159	159	159	158
10.0°	158	158	158	158	158	156	155	154
15.0°	154	155	155	155	154	153	151	149
20.0°	149	149	151	151	151	148	146	143
25.0°	142	143	145	147	146	142	139	135
30.0°	133	135	138	140	139	136	130	126
35.0°	124	126	131	134	133	128	122	116
40.0°	113	117	122	126	125	120	112	105
45.0°	102	106	112	118	117	111	102	94
50.0°	90	95	103	109	108	102	92	83
55.0°	78	84	93	99	99	92	82	72
60.0°	66	73	83	90	90	83	71	60
65.0°	53	61	72	80	80	73	61	49
70.0°	40	49	62	70	70	63	51	38
75.0°	28	39	51	60	61	54	41	27
80.0°	17	29	42	51	52	45	32	18
85.0°	8	21	34	43	44	37	25	11
90.0°	3	15	28	36	37	32	20	7
95.0°	1	11	23	31	33	27	17	5
100.0°	1	8	20	27	28	24	14	3
105.0°	0	7	17	24	25	21	12	2
110.0°	0	5	14	21	22	18	10	2
115.0°	0	4	12	18	19	15	8	2
120.0°	0	4	10	15	16	13	7	1
125.0°	0	3	9	13	14	11	6	1
130.0°	0	3	7	11	11	9	5	1
135.0°	0	2	6	9	9	7	4	1
140.0°	0	2	5	7	7	6	3	0
145.0°	0	1	4	6	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	1	1	2	2	1	0	0
165.0°	0	0	1	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

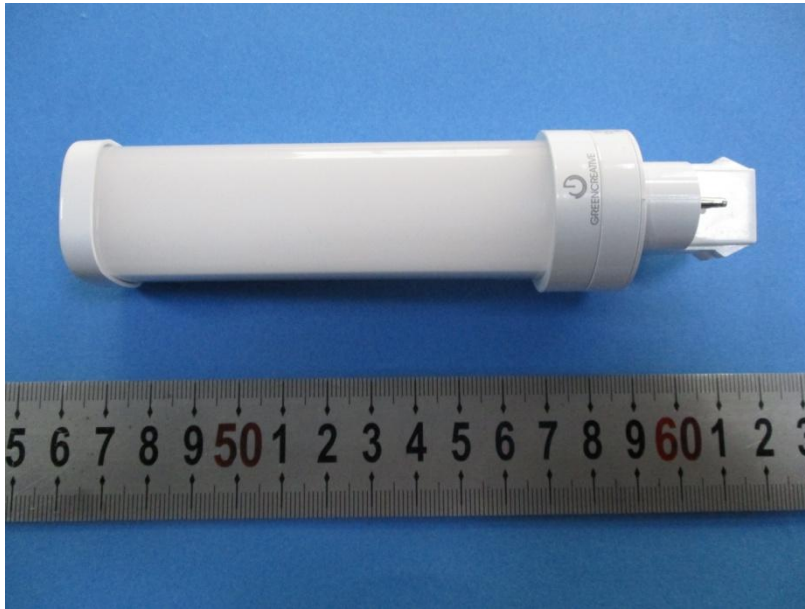
Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	160	160	160	160	160	160	160	160
5.0°	158	158	158	158	159	159	160	159
10.0°	154	154	155	156	157	157	158	157
15.0°	148	149	150	152	153	154	154	154
20.0°	141	142	145	148	149	149	149	148
25.0°	133	135	138	142	144	144	143	141
30.0°	124	126	130	135	137	136	135	133
35.0°	113	116	122	127	130	129	127	123
40.0°	102	106	112	119	122	121	117	113
45.0°	91	95	103	110	114	112	108	102
50.0°	79	84	93	101	105	103	97	91
55.0°	67	73	83	92	96	94	87	79
60.0°	55	62	73	83	87	84	76	67
65.0°	43	51	63	73	77	74	66	55
70.0°	31	40	53	64	68	64	55	44
75.0°	19	30	44	54	58	55	45	32
80.0°	10	22	36	46	49	46	36	22
85.0°	3	15	28	38	42	38	28	14
90.0°	0	11	23	33	36	32	22	9
95.0°	0	8	20	28	31	27	18	6
100.0°	0	6	17	25	27	24	15	4
105.0°	0	5	14	22	24	21	13	3
110.0°	0	4	12	19	21	18	11	3
115.0°	0	4	11	16	18	16	9	2
120.0°	0	3	9	14	16	13	8	2
125.0°	0	3	8	12	13	11	6	2
130.0°	0	2	6	10	11	10	5	1
135.0°	0	2	5	8	9	8	5	1
140.0°	0	1	4	7	8	6	4	1
145.0°	0	0	3	5	6	5	3	1
150.0°	0	1	3	4	4	4	2	1
155.0°	0	1	2	3	3	3	1	0
160.0°	0	0	1	2	2	2	1	0
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	3.8	0.68	0-5	3.8	0.68
5-10	11.3	2.03	0-10	15.1	2.71
10-15	18.3	3.30	0-15	33.4	6.01
15-20	24.7	4.45	0-20	58.1	10.46
20-25	30.2	5.44	0-25	88.4	15.90
25-30	34.7	6.25	0-30	123.1	22.15
30-35	38.0	6.85	0-35	161.1	29.00
35-40	40.2	7.23	0-40	201.3	36.23
40-45	41.1	7.39	0-45	242.4	43.62
45-50	40.8	7.35	0-50	283.2	50.97
50-55	39.5	7.10	0-55	322.6	58.07
55-60	37.1	6.68	0-60	359.8	64.75
60-65	33.9	6.10	0-65	393.6	70.84
65-70	29.9	5.39	0-70	423.6	76.23
70-75	25.5	4.59	0-75	449.0	80.82
75-80	20.9	3.76	0-80	470.0	84.58
80-85	16.6	3.00	0-85	486.6	87.57
85-90	13.2	2.38	0-90	499.8	89.95
90-95	10.7	1.93	0-95	510.5	91.88
95-100	9.0	1.62	0-100	519.5	93.50
100-105	7.6	1.36	0-105	527.1	94.86
105-110	6.3	1.14	0-110	533.4	96.00
110-115	5.3	0.95	0-115	538.7	96.95
115-120	4.3	0.78	0-120	543.0	97.72
120-125	3.5	0.63	0-125	546.5	98.35
125-130	2.8	0.50	0-130	549.2	98.85
130-135	2.1	0.38	0-135	551.3	99.23
135-140	1.6	0.28	0-140	552.9	99.51
140-145	1.1	0.20	0-145	554.0	99.71
145-150	0.7	0.13	0-150	554.8	99.85
150-155	0.5	0.08	0-155	555.3	99.93
155-160	0.2	0.04	0-160	555.5	99.98
160-165	0.1	0.02	0-165	555.6	99.99
165-170	0.0	0.01	0-170	555.6	100.00
170-175	0.0	0.00	0-175	555.6	100.00
175-180	0.0	0.00	0-180	555.6	100.00

6. Product Photo



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