

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: CLKSEN6/10MIN/927/120V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190117009-10-1
Test Date:	2019-01-22
Report Date:	2019-01-30
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.

1. Product Description

General Information:

One sample was received on 2019-01-17 and used for testing.

Model Tested: CLKSEN6/10MIN/927/120V
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Downlight
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120 VAC 60Hz
 Rated Power: 10W
 Nominal CCT: 2700K
 Nominal Lumen Output: 600lm

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	2019-01-23	2020-01-23
Power Meter	INVENTFINE	WT500	GSJWQ20009	2018-04-08	2019-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-08	2019-04-08
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-12-24	2019-12-24
Thermal Meter	KEJIAN	TA298	N/A	2018-12-01	2019-12-01
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	2019-01-24	2020-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2018-12-01	2019-12-01
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2019-01-24	2020-01-24

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**

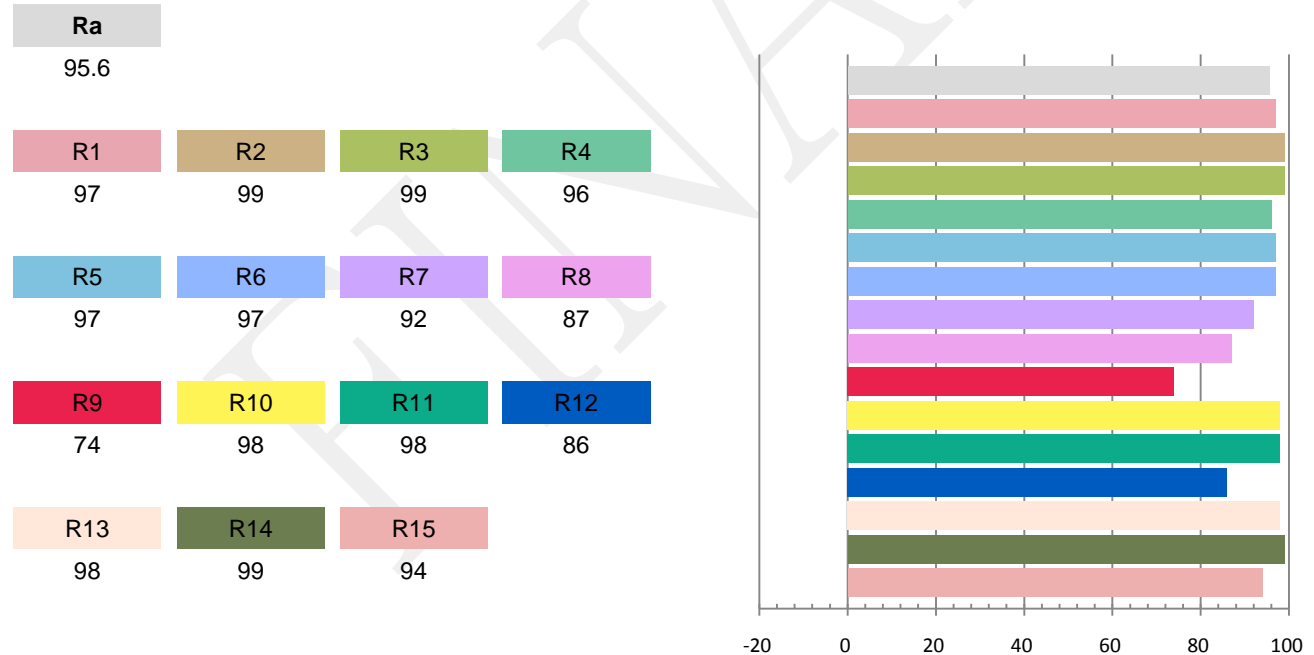
Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.087	9.5	0.91	611.93	64.41

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.270	2617	-0.00147	0.4641	0.4075	0.2667	0.5268

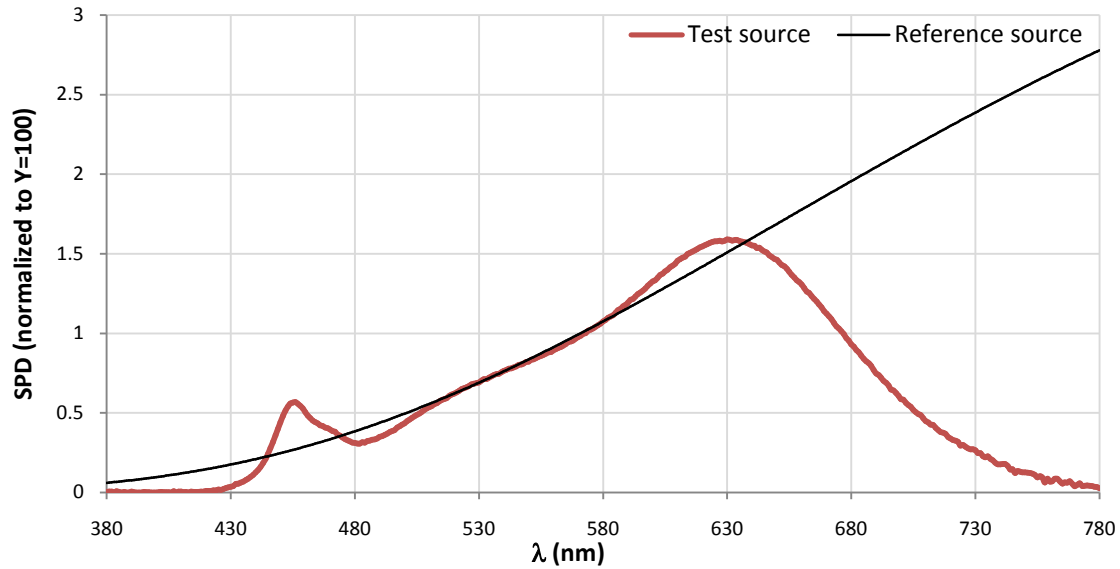
Color Rendering Index



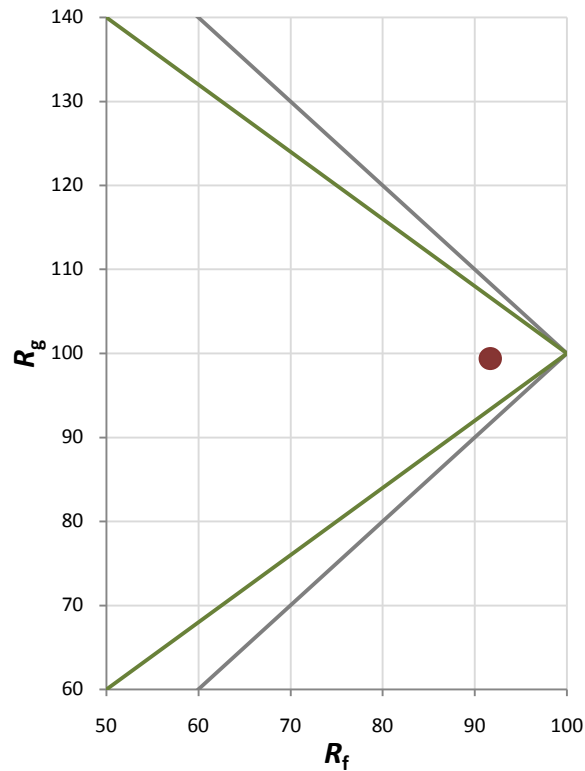
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	99

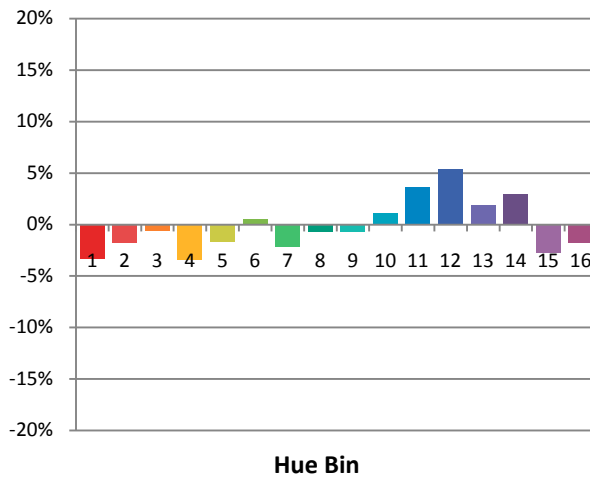
Spectral Power Distribution Comparison



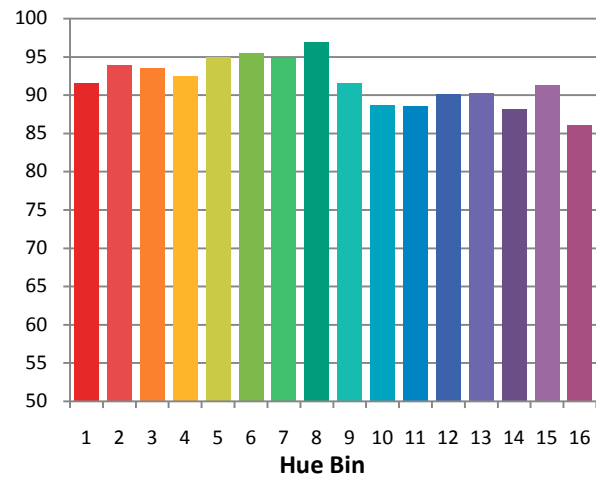
Plot of R_g versus R_f



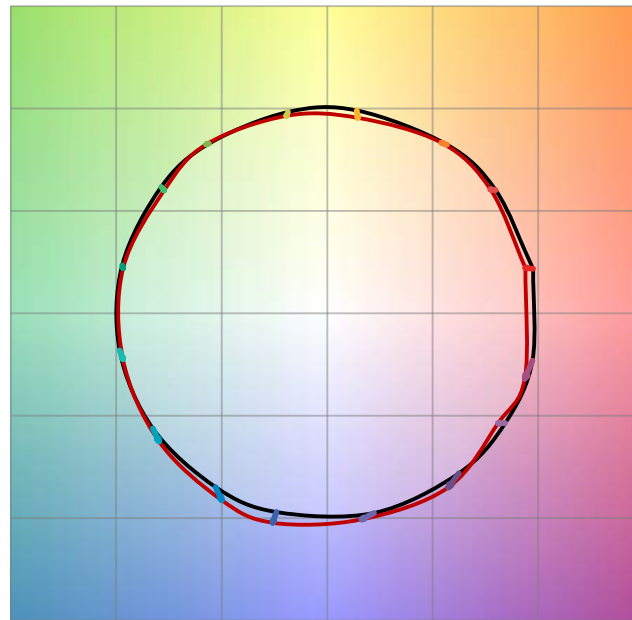
Chroma Shift by Hue



R_t by Hue

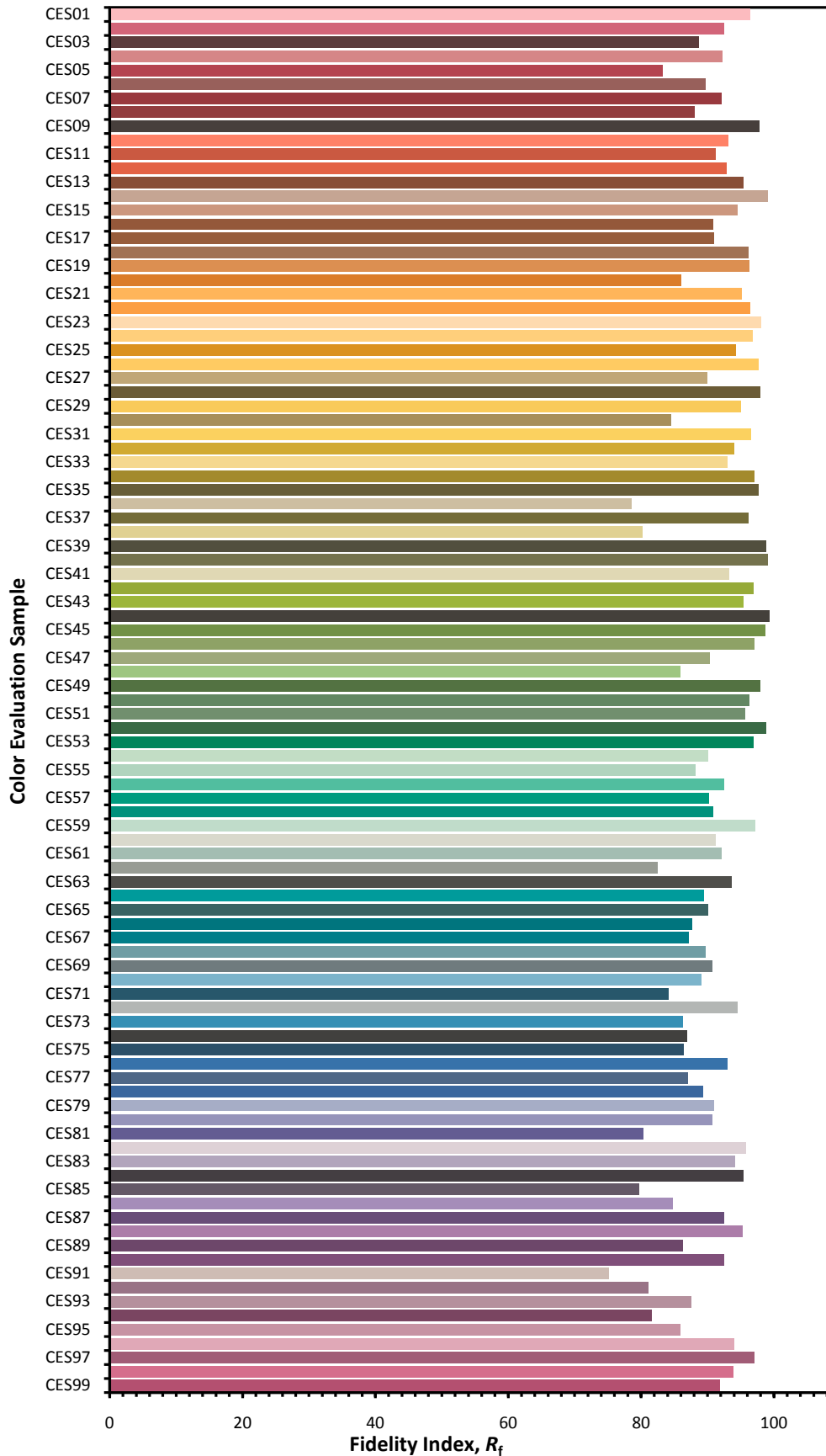


Color Vector Graphic

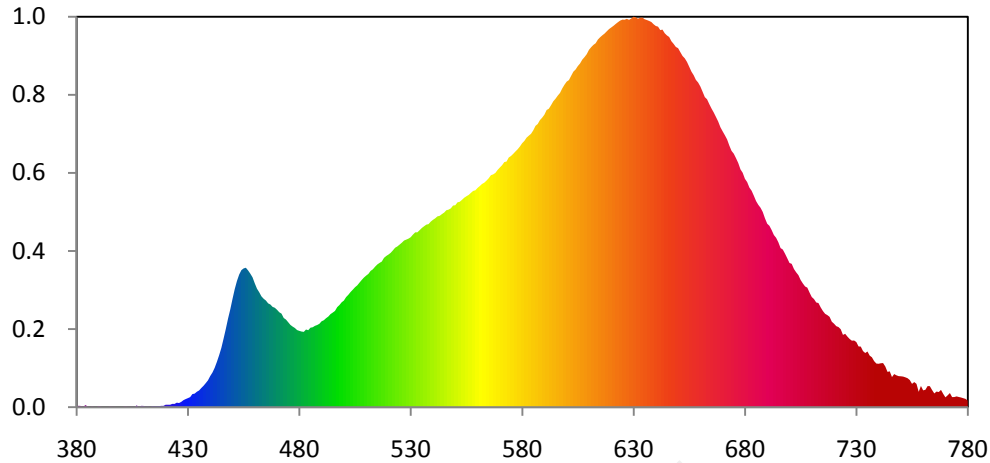


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



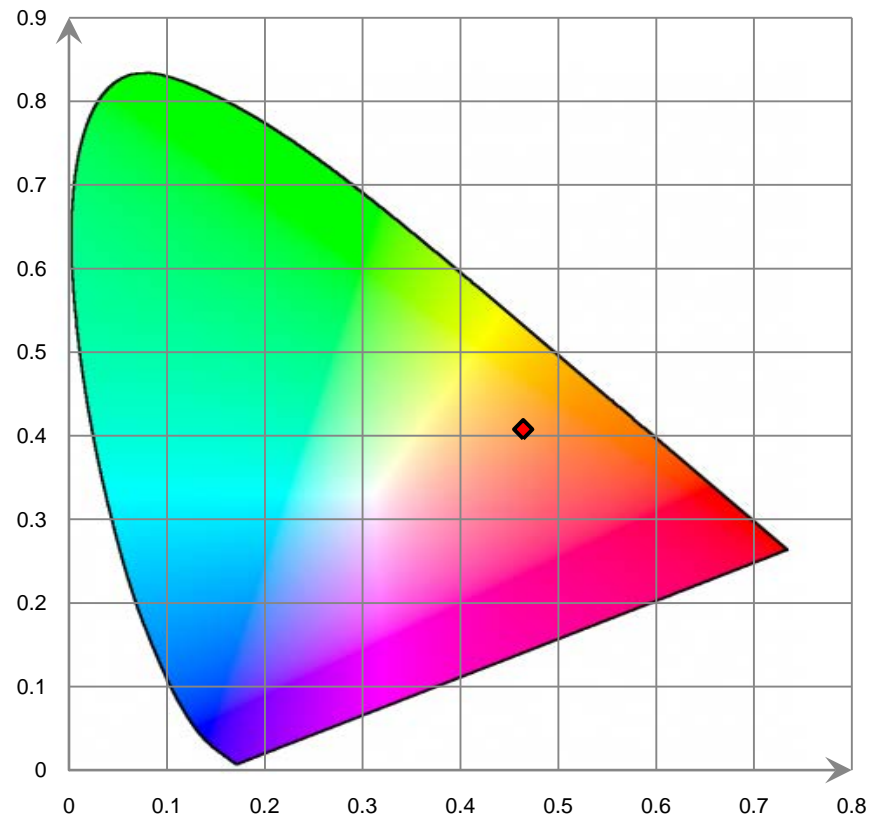
Relative Spectral Power Distribution



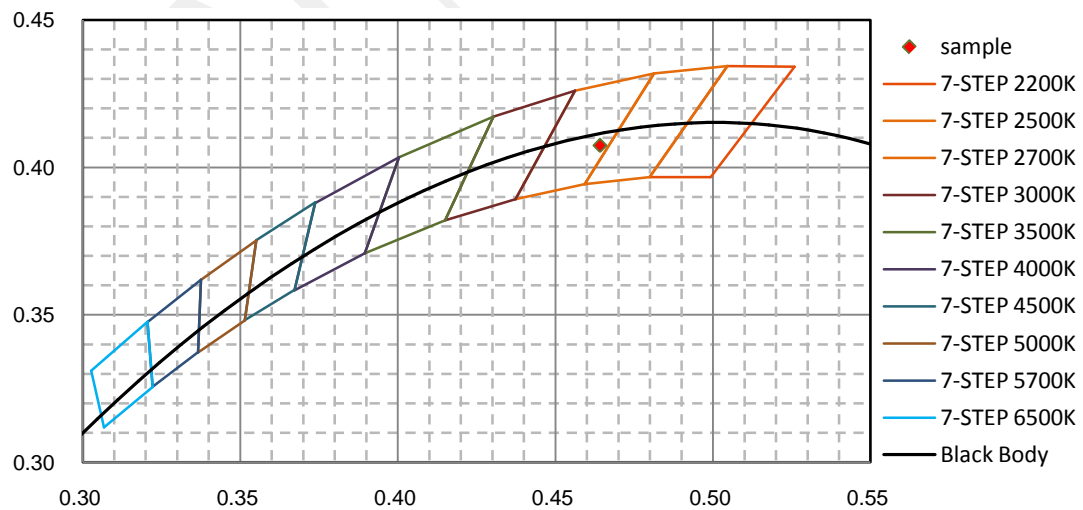
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.880E-02	421	9.040E-02	462	4.192E+00	503	4.202E+00	544	7.045E+00
381	5.160E-02	422	8.930E-02	463	4.043E+00	504	4.287E+00	545	7.100E+00
382	4.400E-02	423	1.217E-01	464	3.954E+00	505	4.376E+00	546	7.185E+00
383	1.360E-02	424	1.194E-01	465	3.890E+00	506	4.445E+00	547	7.208E+00
384	7.690E-02	425	1.649E-01	466	3.787E+00	507	4.545E+00	548	7.254E+00
385	2.670E-02	426	1.511E-01	467	3.747E+00	508	4.641E+00	549	7.356E+00
386	1.700E-03	427	1.938E-01	468	3.660E+00	509	4.730E+00	550	7.367E+00
387	3.190E-02	428	2.565E-01	469	3.627E+00	510	4.800E+00	551	7.474E+00
388	7.500E-03	429	2.958E-01	470	3.553E+00	511	4.863E+00	552	7.494E+00
389	5.200E-03	430	3.301E-01	471	3.463E+00	512	4.973E+00	553	7.565E+00
390	4.630E-02	431	3.678E-01	472	3.413E+00	513	5.030E+00	554	7.642E+00
391	1.660E-02	432	4.785E-01	473	3.253E+00	514	5.125E+00	555	7.695E+00
392	7.000E-04	433	4.939E-01	474	3.196E+00	515	5.207E+00	556	7.744E+00
393	0.000E+00	434	5.624E-01	475	3.100E+00	516	5.264E+00	557	7.819E+00
394	6.000E-03	435	6.093E-01	476	3.002E+00	517	5.312E+00	558	7.889E+00
395	2.780E-02	436	6.994E-01	477	2.940E+00	518	5.447E+00	559	7.914E+00
396	1.340E-02	437	7.802E-01	478	2.889E+00	519	5.516E+00	560	7.999E+00
397	1.420E-02	438	8.774E-01	479	2.813E+00	520	5.569E+00	561	8.069E+00
398	6.700E-03	439	9.805E-01	480	2.784E+00	521	5.631E+00	562	8.145E+00
399	3.000E-04	440	1.136E+00	481	2.760E+00	522	5.721E+00	563	8.190E+00
400	0.000E+00	441	1.263E+00	482	2.747E+00	523	5.818E+00	564	8.265E+00
401	1.620E-02	442	1.436E+00	483	2.834E+00	524	5.865E+00	565	8.352E+00
402	3.010E-02	443	1.653E+00	484	2.809E+00	525	5.931E+00	566	8.465E+00
403	1.630E-02	444	1.895E+00	485	2.901E+00	526	6.000E+00	567	8.493E+00
404	1.310E-02	445	2.162E+00	486	2.917E+00	527	6.079E+00	568	8.547E+00
405	2.050E-02	446	2.502E+00	487	2.967E+00	528	6.115E+00	569	8.657E+00
406	3.900E-03	447	2.853E+00	488	2.997E+00	529	6.150E+00	570	8.744E+00
407	6.700E-02	448	3.231E+00	489	3.043E+00	530	6.203E+00	571	8.828E+00
408	5.200E-03	449	3.565E+00	490	3.134E+00	531	6.297E+00	572	8.941E+00
409	4.810E-02	450	3.946E+00	491	3.173E+00	532	6.378E+00	573	8.962E+00
410	4.670E-02	451	4.305E+00	492	3.247E+00	533	6.380E+00	574	9.110E+00
411	1.420E-02	452	4.605E+00	493	3.307E+00	534	6.459E+00	575	9.164E+00
412	3.170E-02	453	4.840E+00	494	3.396E+00	535	6.538E+00	576	9.243E+00
413	4.000E-03	454	5.001E+00	495	3.451E+00	536	6.602E+00	577	9.329E+00
414	4.420E-02	455	5.062E+00	496	3.511E+00	537	6.660E+00	578	9.411E+00
415	3.080E-02	456	5.088E+00	497	3.650E+00	538	6.680E+00	579	9.510E+00
416	3.800E-02	457	4.990E+00	498	3.727E+00	539	6.771E+00	580	9.630E+00
417	3.740E-02	458	4.872E+00	499	3.826E+00	540	6.836E+00	581	9.714E+00
418	4.780E-02	459	4.738E+00	500	3.890E+00	541	6.891E+00	582	9.834E+00
419	4.800E-02	460	4.519E+00	501	4.018E+00	542	6.962E+00	583	9.907E+00
420	8.940E-02	461	4.322E+00	502	4.101E+00	543	6.981E+00	584	9.975E+00

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.010E+01	626	1.414E+01	667	1.059E+01	708	4.363E+00	749	1.132E+00
586	1.026E+01	627	1.417E+01	668	1.042E+01	709	4.183E+00	750	1.128E+00
587	1.033E+01	628	1.413E+01	669	1.021E+01	710	4.019E+00	751	1.117E+00
588	1.048E+01	629	1.418E+01	670	1.006E+01	711	3.944E+00	752	1.090E+00
589	1.056E+01	630	1.425E+01	671	9.923E+00	712	3.821E+00	753	1.057E+00
590	1.067E+01	631	1.422E+01	672	9.770E+00	713	3.800E+00	754	9.907E-01
591	1.084E+01	632	1.417E+01	673	9.545E+00	714	3.641E+00	755	8.524E-01
592	1.089E+01	633	1.421E+01	674	9.351E+00	715	3.508E+00	756	9.162E-01
593	1.102E+01	634	1.421E+01	675	9.248E+00	716	3.406E+00	757	8.514E-01
594	1.116E+01	635	1.415E+01	676	9.084E+00	717	3.360E+00	758	5.616E-01
595	1.126E+01	636	1.412E+01	677	8.910E+00	718	3.296E+00	759	7.750E-01
596	1.137E+01	637	1.409E+01	678	8.677E+00	719	3.119E+00	760	6.141E-01
597	1.147E+01	638	1.405E+01	679	8.552E+00	720	3.046E+00	761	6.358E-01
598	1.163E+01	639	1.397E+01	680	8.332E+00	721	2.957E+00	762	7.702E-01
599	1.176E+01	640	1.391E+01	681	8.214E+00	722	2.923E+00	763	7.666E-01
600	1.188E+01	641	1.388E+01	682	8.013E+00	723	2.844E+00	764	6.270E-01
601	1.193E+01	642	1.376E+01	683	7.897E+00	724	2.638E+00	765	5.018E-01
602	1.209E+01	643	1.378E+01	684	7.715E+00	725	2.677E+00	766	5.704E-01
603	1.224E+01	644	1.364E+01	685	7.520E+00	726	2.576E+00	767	5.522E-01
604	1.232E+01	645	1.356E+01	686	7.383E+00	727	2.489E+00	768	6.315E-01
605	1.245E+01	646	1.351E+01	687	7.277E+00	728	2.426E+00	769	4.851E-01
606	1.254E+01	647	1.335E+01	688	7.123E+00	729	2.433E+00	770	3.585E-01
607	1.268E+01	648	1.325E+01	689	6.890E+00	730	2.377E+00	771	4.331E-01
608	1.277E+01	649	1.314E+01	690	6.694E+00	731	2.217E+00	772	5.153E-01
609	1.288E+01	650	1.310E+01	691	6.617E+00	732	2.211E+00	773	3.680E-01
610	1.304E+01	651	1.295E+01	692	6.461E+00	733	2.047E+00	774	3.704E-01
611	1.314E+01	652	1.281E+01	693	6.280E+00	734	1.975E+00	775	3.935E-01
612	1.322E+01	653	1.273E+01	694	6.180E+00	735	2.031E+00	776	3.714E-01
613	1.328E+01	654	1.260E+01	695	6.017E+00	736	1.882E+00	777	3.532E-01
614	1.341E+01	655	1.242E+01	696	5.805E+00	737	1.820E+00	778	3.283E-01
615	1.350E+01	656	1.224E+01	697	5.751E+00	738	1.680E+00	779	3.041E-01
616	1.357E+01	657	1.211E+01	698	5.600E+00	739	1.592E+00	780	2.405E-01
617	1.363E+01	658	1.194E+01	699	5.433E+00	740	1.584E+00		
618	1.371E+01	659	1.184E+01	700	5.262E+00	741	1.603E+00		
619	1.379E+01	660	1.170E+01	701	5.230E+00	742	1.609E+00		
620	1.385E+01	661	1.151E+01	702	5.041E+00	743	1.486E+00		
621	1.391E+01	662	1.131E+01	703	4.921E+00	744	1.288E+00		
622	1.398E+01	663	1.123E+01	704	4.818E+00	745	1.307E+00		
623	1.405E+01	664	1.106E+01	705	4.641E+00	746	1.100E+00		
624	1.410E+01	665	1.090E+01	706	4.515E+00	747	1.207E+00		
625	1.414E+01	666	1.075E+01	707	4.405E+00	748	1.162E+00		

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**

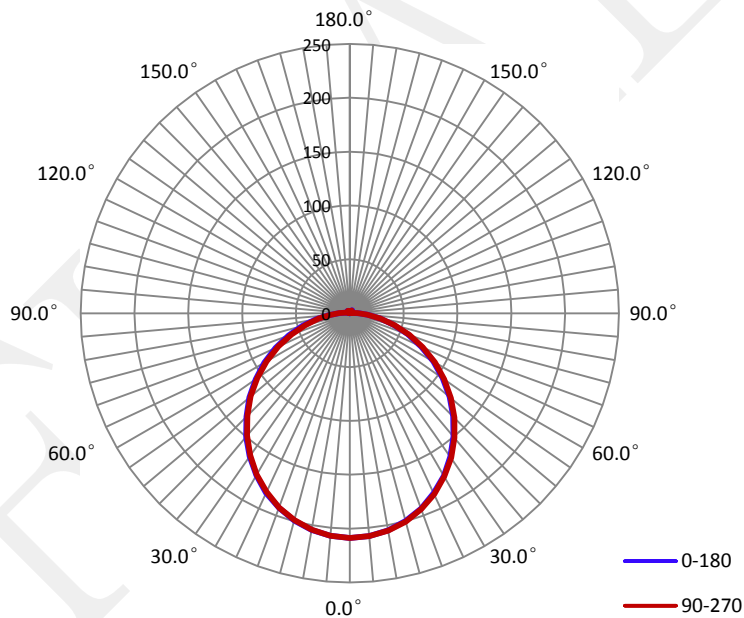
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0870	9.53	0.9080

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
614.5	64.53	208.9	1.24	1.24

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	111.0	111.0	111.1	111.0	111.0
Field Angle (10% I _{max}):	168.1	167.3	166.9	167.7	167.5

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	209	209	209	209	209	209	209	209
5.0°	208	208	208	208	208	208	208	208
10.0°	205	205	205	205	205	205	205	205
15.0°	200	200	201	201	201	201	200	200
20.0°	193	193	194	194	194	194	194	194
25.0°	185	185	185	186	185	185	185	185
30.0°	175	175	175	175	175	176	176	176
35.0°	163	163	163	164	164	164	164	164
40.0°	150	150	150	151	151	151	152	152
45.0°	136	136	136	137	137	138	138	138
50.0°	121	121	122	122	123	123	123	124
55.0°	105	106	106	106	107	108	108	109
60.0°	90	90	90	91	91	92	93	93
65.0°	73	74	74	74	75	76	77	78
70.0°	57	58	58	58	59	60	61	62
75.0°	42	42	42	42	43	44	46	47
80.0°	29	28	28	28	29	30	32	33
85.0°	17	17	16	15	16	18	20	18
90.0°	9	9	8	6	7	10	11	9
95.0°	4	4	3	2	2	4	4	4
100.0°	1	0	0	0	0	1	0	1
105.0°	0	0	0	0	0	0	0	0
110.0°	0	1	0	0	0	0	1	0
115.0°	1	1	1	1	1	1	1	1
120.0°	1	1	1	2	2	1	1	1
125.0°	2	3	2	2	2	2	2	1
130.0°	3	3	3	2	2	3	2	2
135.0°	3	3	3	2	3	3	3	2
140.0°	3	3	3	2	3	3	3	3
145.0°	4	3	3	3	3	3	3	3
150.0°	2	2	2	2	2	2	2	1
155.0°	2	2	1	0	1	1	1	1
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

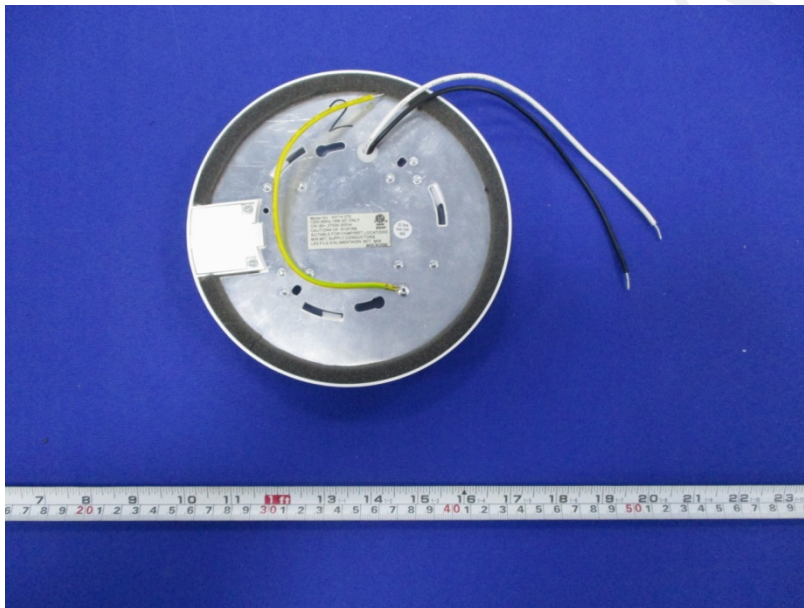
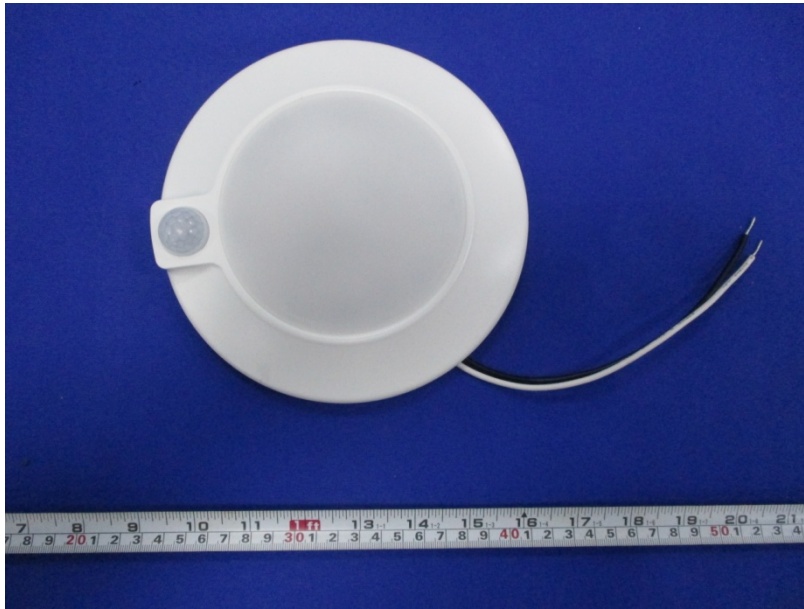
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	209	209	209	209	209	209	209	209
5.0°	208	208	208	208	208	208	207	208
10.0°	205	205	205	204	204	204	204	205
15.0°	200	200	199	199	199	199	199	200
20.0°	193	193	192	193	192	192	192	192
25.0°	184	184	184	184	183	184	183	184
30.0°	174	174	174	173	173	173	173	173
35.0°	163	162	162	162	162	162	162	162
40.0°	150	150	149	149	149	149	148	148
45.0°	136	136	136	135	135	135	134	134
50.0°	122	122	121	121	120	120	119	119
55.0°	107	107	106	106	105	104	104	104
60.0°	92	92	91	90	89	89	88	88
65.0°	76	76	75	74	73	73	72	72
70.0°	61	60	60	59	58	57	56	56
75.0°	46	46	45	44	43	42	41	41
80.0°	32	32	31	30	29	29	28	28
85.0°	20	20	20	19	18	17	17	17
90.0°	11	11	11	10	10	9	9	9
95.0°	5	5	5	5	4	4	3	3
100.0°	2	1	0	0	1	1	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	1	0	0	0
115.0°	1	1	1	1	1	1	0	1
120.0°	1	1	1	1	1	1	2	1
125.0°	2	2	3	1	2	2	2	3
130.0°	3	2	3	2	2	2	2	3
135.0°	3	2	3	2	3	2	3	3
140.0°	3	3	3	3	3	2	3	3
145.0°	2	2	3	3	3	2	3	3
150.0°	2	2	2	2	2	1	2	2
155.0°	0	0	0	0	1	0	0	2
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	0.81	0-5	5.0	0.81
5-10	14.8	2.40	0-10	19.7	3.21
10-15	24.0	3.91	0-15	43.7	7.12
15-20	32.4	5.27	0-20	76.1	12.39
20-25	39.6	6.44	0-25	115.7	18.83
25-30	45.4	7.39	0-30	161.1	26.22
30-35	49.6	8.08	0-35	210.8	34.30
35-40	52.2	8.49	0-40	262.9	42.78
40-45	52.9	8.62	0-45	315.9	51.40
45-50	52.0	8.46	0-50	367.9	59.87
50-55	49.5	8.05	0-55	417.3	67.91
55-60	45.4	7.39	0-60	462.8	75.30
60-65	40.1	6.52	0-65	502.9	81.83
65-70	33.7	5.49	0-70	536.6	87.32
70-75	26.7	4.34	0-75	563.3	91.66
75-80	19.5	3.18	0-80	582.8	94.84
80-85	12.9	2.10	0-85	595.7	96.94
85-90	7.4	1.21	0-90	603.1	98.15
90-95	3.6	0.58	0-95	606.7	98.73
95-100	1.2	0.19	0-100	607.9	98.92
100-105	0.1	0.02	0-105	608.0	98.94
105-110	0.1	0.01	0-110	608.1	98.96
110-115	0.3	0.04	0-115	608.4	99.00
115-120	0.5	0.08	0-120	608.8	99.08
120-125	0.7	0.12	0-125	609.6	99.20
125-130	0.9	0.15	0-130	610.5	99.35
130-135	1.0	0.16	0-135	611.5	99.51
135-140	1.0	0.16	0-140	612.5	99.67
140-145	0.9	0.15	0-145	613.4	99.82
145-150	0.7	0.11	0-150	614.1	99.94
150-155	0.3	0.05	0-155	614.5	99.99
155-160	0.1	0.01	0-160	614.5	100.00
160-165	0.0	0.00	0-165	614.5	100.00
165-170	0.0	0.00	0-170	614.5	100.00
170-175	0.0	0.00	0-175	614.5	100.00
175-180	0.0	0.00	0-180	614.5	100.00

6. Product Photo



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