

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/930/120V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190117009-10-6
Test Date:	2019-02-15 to 2019-04-13
Report Date:	2019-04-15
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/930/120V
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: 3000K
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	2019-04-08	2020-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2019-04-08	2020-04-08
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	2019-04-08	2020-04-08
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2019-04-08	2020-04-08
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2019-04-08	2020-04-08
Power Meter	INVENTFINE	WT500	GSDSQ200007	2019-04-08	2020-04-08
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	2019-03-08	2020-03-08

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 $U_{re}=2.61\%$ ($k=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=34\text{K}$ ($k=2$), 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 $U_{re}=0.48\%$ of rdg, AC Voltage $U_{re}=0.25\%$ of rdg, Power $U_{re}=0.44\%$, ($k=2$), 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**

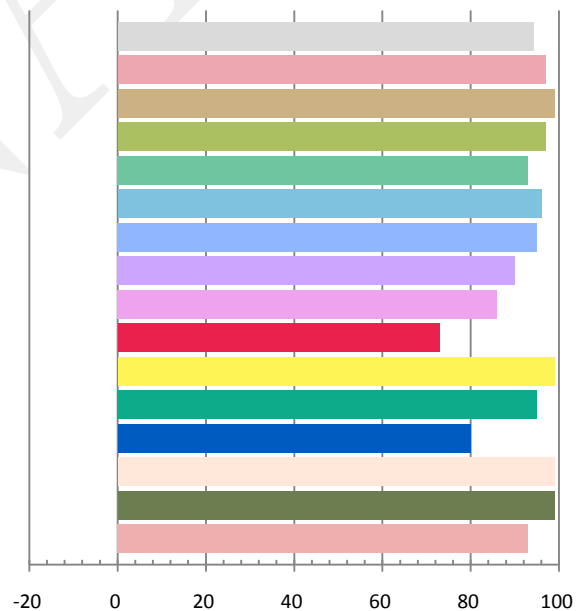
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.0882	9.65	0.9118	622.01	64.46

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.218	2926	-0.00103	0.4408	0.4028	0.2536	0.5214

Color Rendering Index

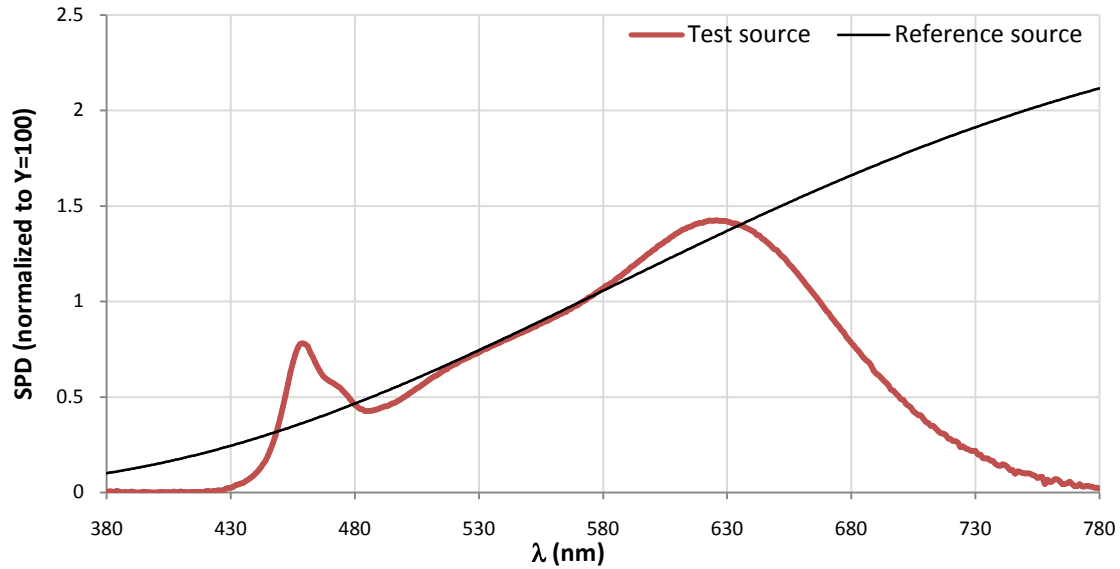
Ra			
94.2			
R1	R2	R3	R4
97	99	97	93
R5	R6	R7	R8
96	95	90	86
R9	R10	R11	R12
73	99	95	80
R13	R14	R15	
99	99	93	



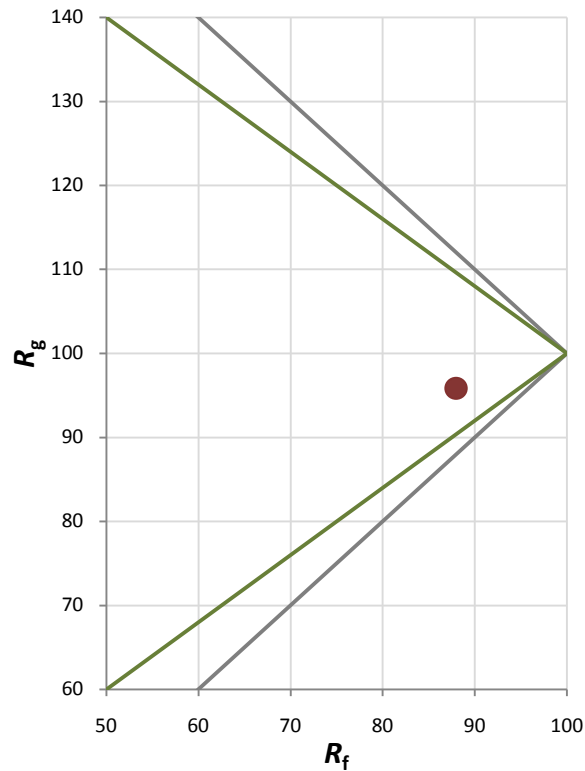
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	96

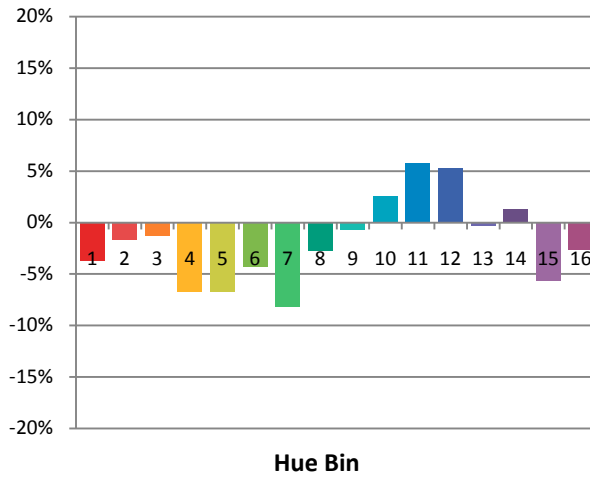
Spectral Power Distribution Comparison



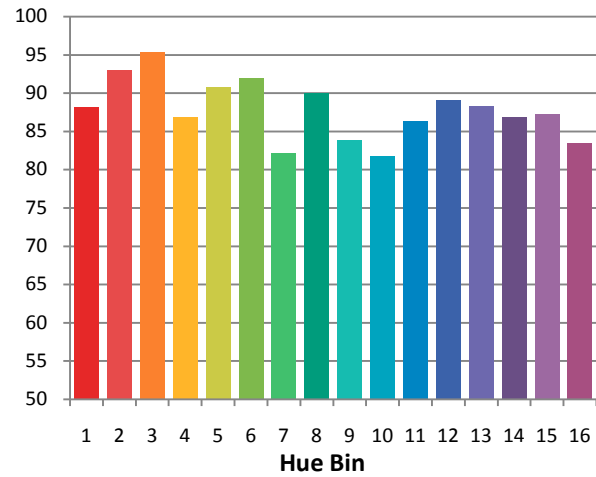
Plot of R_g versus R_f



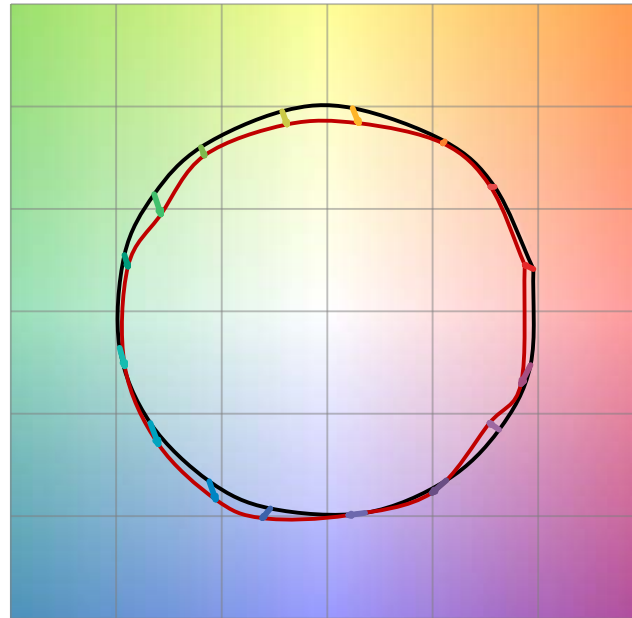
Chroma Shift by Hue



R_t by Hue

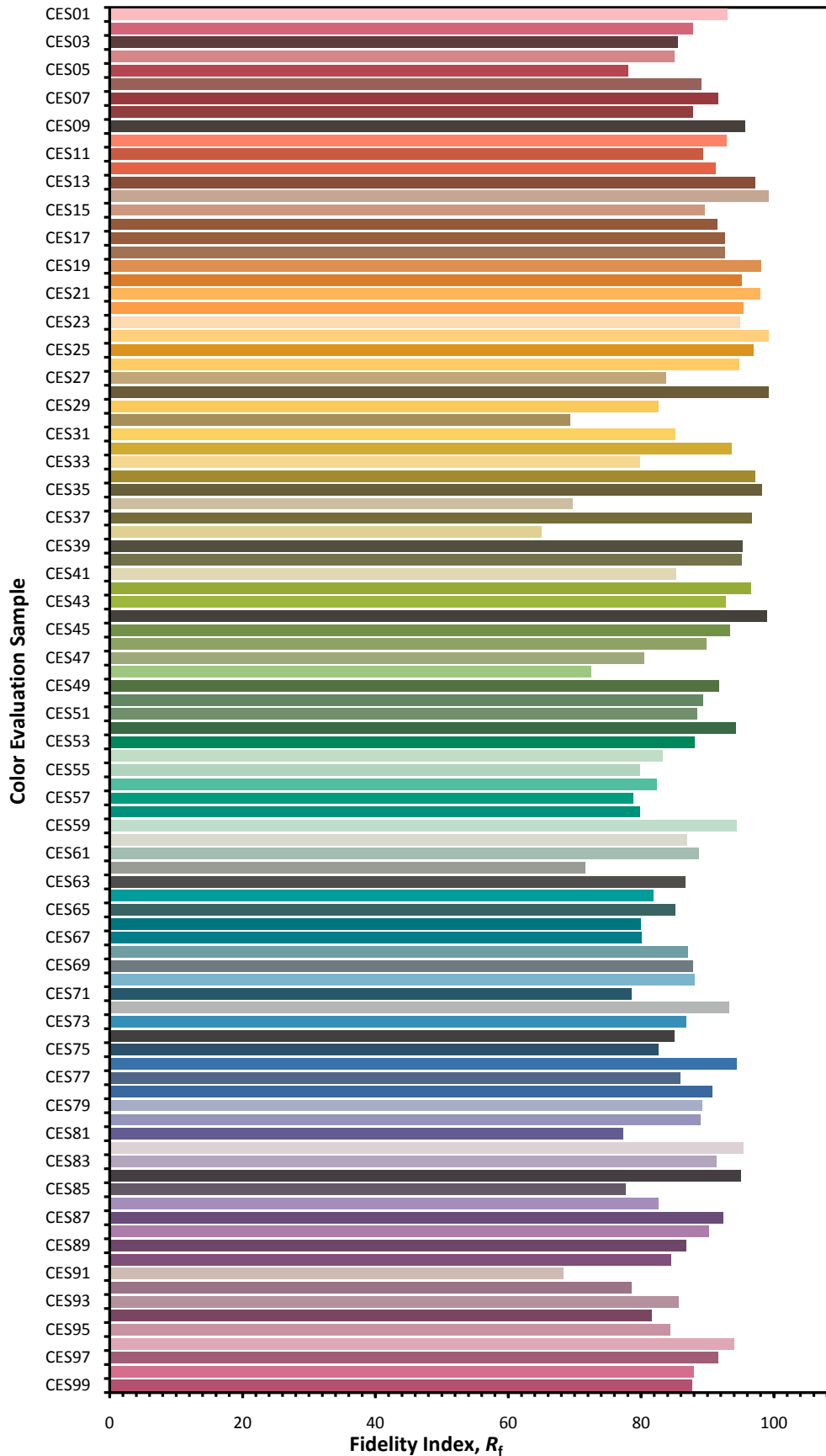


Color Vector Graphic

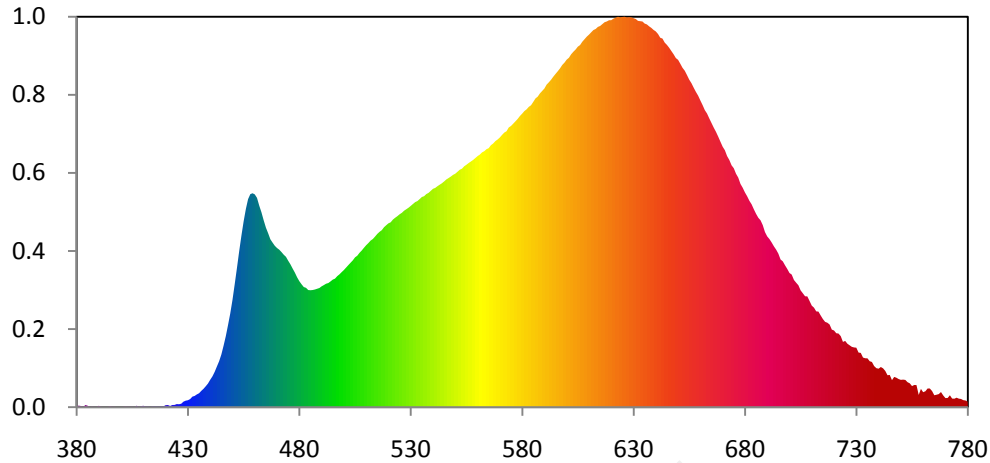


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



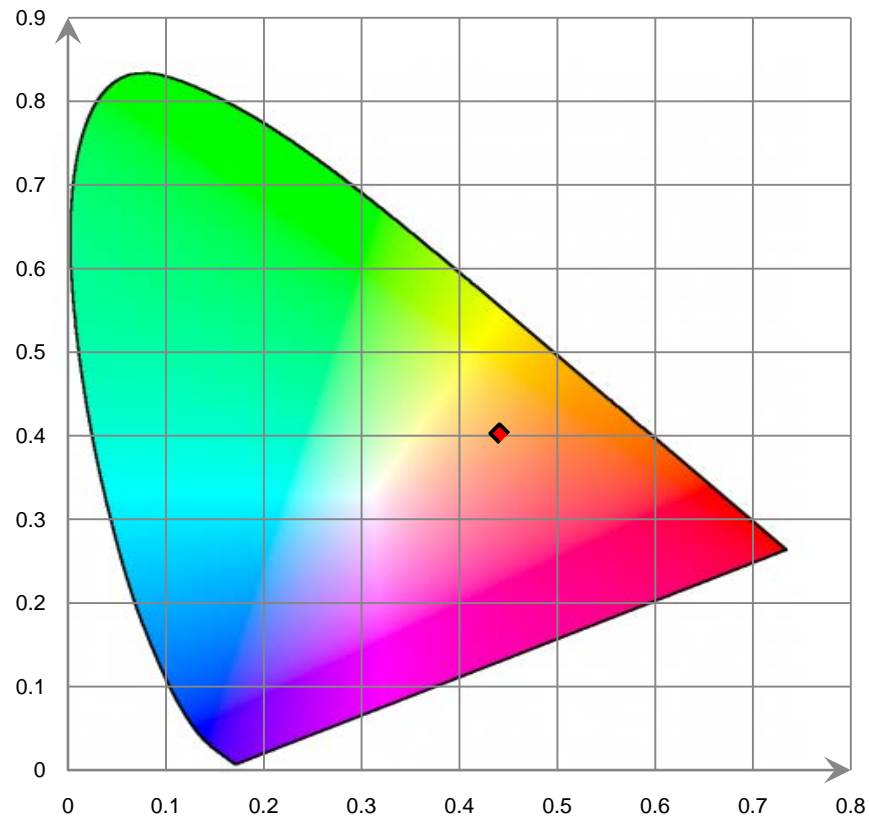
Relative Spectral Power Distribution



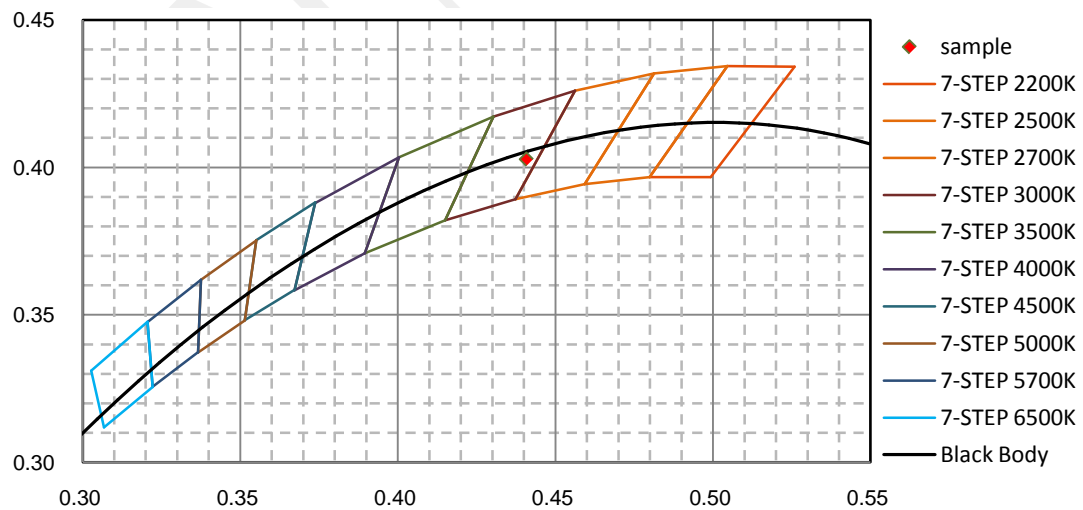
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.640E-02	421	7.250E-02	462	6.698E+00	503	4.800E+00	544	7.440E+00
381	5.220E-02	422	4.050E-02	463	6.474E+00	504	4.878E+00	545	7.501E+00
382	3.890E-02	423	7.300E-02	464	6.209E+00	505	4.978E+00	546	7.568E+00
383	1.080E-02	424	7.480E-02	465	5.966E+00	506	5.033E+00	547	7.614E+00
384	7.280E-02	425	1.039E-01	466	5.779E+00	507	5.128E+00	548	7.664E+00
385	4.820E-02	426	9.760E-02	467	5.579E+00	508	5.205E+00	549	7.719E+00
386	3.400E-03	427	1.160E-01	468	5.466E+00	509	5.296E+00	550	7.758E+00
387	2.240E-02	428	1.841E-01	469	5.362E+00	510	5.382E+00	551	7.823E+00
388	1.010E-02	429	2.172E-01	470	5.288E+00	511	5.454E+00	552	7.889E+00
389	1.160E-02	430	2.305E-01	471	5.232E+00	512	5.535E+00	553	7.924E+00
390	4.670E-02	431	2.699E-01	472	5.153E+00	513	5.588E+00	554	8.003E+00
391	1.430E-02	432	3.497E-01	473	5.066E+00	514	5.671E+00	555	8.055E+00
392	6.000E-04	433	3.738E-01	474	4.997E+00	515	5.758E+00	556	8.112E+00
393	0.000E+00	434	4.248E-01	475	4.867E+00	516	5.826E+00	557	8.162E+00
394	8.000E-03	435	4.637E-01	476	4.747E+00	517	5.880E+00	558	8.215E+00
395	3.700E-02	436	5.426E-01	477	4.606E+00	518	5.978E+00	559	8.279E+00
396	1.050E-02	437	6.105E-01	478	4.471E+00	519	6.045E+00	560	8.342E+00
397	1.770E-02	438	6.955E-01	479	4.316E+00	520	6.109E+00	561	8.392E+00
398	1.200E-03	439	7.862E-01	480	4.186E+00	521	6.143E+00	562	8.464E+00
399	0.000E+00	440	9.105E-01	481	4.084E+00	522	6.233E+00	563	8.505E+00
400	0.000E+00	441	1.024E+00	482	3.992E+00	523	6.293E+00	564	8.572E+00
401	1.450E-02	442	1.172E+00	483	3.966E+00	524	6.347E+00	565	8.607E+00
402	2.600E-02	443	1.352E+00	484	3.893E+00	525	6.408E+00	566	8.705E+00
403	1.870E-02	444	1.527E+00	485	3.885E+00	526	6.456E+00	567	8.761E+00
404	1.430E-02	445	1.750E+00	486	3.893E+00	527	6.526E+00	568	8.841E+00
405	1.630E-02	446	2.044E+00	487	3.910E+00	528	6.576E+00	569	8.895E+00
406	3.200E-03	447	2.360E+00	488	3.935E+00	529	6.627E+00	570	8.962E+00
407	5.100E-02	448	2.730E+00	489	3.959E+00	530	6.687E+00	571	9.048E+00
408	4.200E-03	449	3.116E+00	490	4.015E+00	531	6.751E+00	572	9.124E+00
409	3.550E-02	450	3.566E+00	491	4.057E+00	532	6.814E+00	573	9.170E+00
410	4.610E-02	451	4.088E+00	492	4.102E+00	533	6.849E+00	574	9.294E+00
411	2.120E-02	452	4.624E+00	493	4.125E+00	534	6.913E+00	575	9.344E+00
412	2.930E-02	453	5.180E+00	494	4.178E+00	535	6.983E+00	576	9.420E+00
413	5.200E-03	454	5.697E+00	495	4.238E+00	536	7.011E+00	577	9.497E+00
414	2.570E-02	455	6.173E+00	496	4.271E+00	537	7.081E+00	578	9.579E+00
415	2.320E-02	456	6.584E+00	497	4.352E+00	538	7.121E+00	579	9.674E+00
416	2.710E-02	457	6.913E+00	498	4.413E+00	539	7.188E+00	580	9.752E+00
417	1.630E-02	458	7.078E+00	499	4.488E+00	540	7.256E+00	581	9.837E+00
418	3.060E-02	459	7.108E+00	500	4.557E+00	541	7.285E+00	582	9.895E+00
419	2.720E-02	460	7.071E+00	501	4.640E+00	542	7.342E+00	583	9.979E+00
420	6.760E-02	461	6.955E+00	502	4.722E+00	543	7.392E+00	584	1.003E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.014E+01	626	1.297E+01	667	9.151E+00	708	3.681E+00	749	9.344E-01
586	1.026E+01	627	1.295E+01	668	8.991E+00	709	3.530E+00	750	9.076E-01
587	1.032E+01	628	1.296E+01	669	8.821E+00	710	3.374E+00	751	9.160E-01
588	1.043E+01	629	1.295E+01	670	8.656E+00	711	3.308E+00	752	9.054E-01
589	1.051E+01	630	1.293E+01	671	8.538E+00	712	3.183E+00	753	8.308E-01
590	1.059E+01	631	1.290E+01	672	8.343E+00	713	3.176E+00	754	7.924E-01
591	1.072E+01	632	1.284E+01	673	8.213E+00	714	3.048E+00	755	7.003E-01
592	1.079E+01	633	1.283E+01	674	8.037E+00	715	2.928E+00	756	7.384E-01
593	1.088E+01	634	1.281E+01	675	7.940E+00	716	2.834E+00	757	7.344E-01
594	1.098E+01	635	1.275E+01	676	7.757E+00	717	2.806E+00	758	4.074E-01
595	1.107E+01	636	1.272E+01	677	7.629E+00	718	2.748E+00	759	6.086E-01
596	1.116E+01	637	1.265E+01	678	7.418E+00	719	2.578E+00	760	4.980E-01
597	1.126E+01	638	1.260E+01	679	7.292E+00	720	2.548E+00	761	5.295E-01
598	1.137E+01	639	1.254E+01	680	7.136E+00	721	2.457E+00	762	6.214E-01
599	1.145E+01	640	1.248E+01	681	7.009E+00	722	2.447E+00	763	6.197E-01
600	1.155E+01	641	1.240E+01	682	6.857E+00	723	2.361E+00	764	5.356E-01
601	1.161E+01	642	1.228E+01	683	6.741E+00	724	2.169E+00	765	3.968E-01
602	1.173E+01	643	1.225E+01	684	6.576E+00	725	2.202E+00	766	4.139E-01
603	1.181E+01	644	1.211E+01	685	6.424E+00	726	2.108E+00	767	4.347E-01
604	1.188E+01	645	1.204E+01	686	6.295E+00	727	2.056E+00	768	5.039E-01
605	1.198E+01	646	1.194E+01	687	6.210E+00	728	2.004E+00	769	3.908E-01
606	1.203E+01	647	1.183E+01	688	6.051E+00	729	1.985E+00	770	3.028E-01
607	1.214E+01	648	1.172E+01	689	5.819E+00	730	1.977E+00	771	3.056E-01
608	1.223E+01	649	1.160E+01	690	5.675E+00	731	1.815E+00	772	3.962E-01
609	1.231E+01	650	1.154E+01	691	5.586E+00	732	1.803E+00	773	2.863E-01
610	1.238E+01	651	1.141E+01	692	5.473E+00	733	1.648E+00	774	2.814E-01
611	1.246E+01	652	1.127E+01	693	5.344E+00	734	1.625E+00	775	3.150E-01
612	1.253E+01	653	1.118E+01	694	5.237E+00	735	1.623E+00	776	2.845E-01
613	1.257E+01	654	1.103E+01	695	5.102E+00	736	1.527E+00	777	2.731E-01
614	1.263E+01	655	1.088E+01	696	4.906E+00	737	1.502E+00	778	2.330E-01
615	1.267E+01	656	1.076E+01	697	4.846E+00	738	1.366E+00	779	2.225E-01
616	1.273E+01	657	1.062E+01	698	4.715E+00	739	1.296E+00	780	1.844E-01
617	1.279E+01	658	1.048E+01	699	4.593E+00	740	1.279E+00		
618	1.282E+01	659	1.035E+01	700	4.458E+00	741	1.335E+00		
619	1.286E+01	660	1.019E+01	701	4.405E+00	742	1.291E+00		
620	1.286E+01	661	1.004E+01	702	4.226E+00	743	1.204E+00		
621	1.291E+01	662	9.870E+00	703	4.136E+00	744	1.061E+00		
622	1.294E+01	663	9.756E+00	704	4.051E+00	745	1.071E+00		
623	1.297E+01	664	9.594E+00	705	3.880E+00	746	8.987E-01		
624	1.296E+01	665	9.442E+00	706	3.784E+00	747	1.005E+00		
625	1.297E+01	666	9.289E+00	707	3.685E+00	748	9.777E-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**

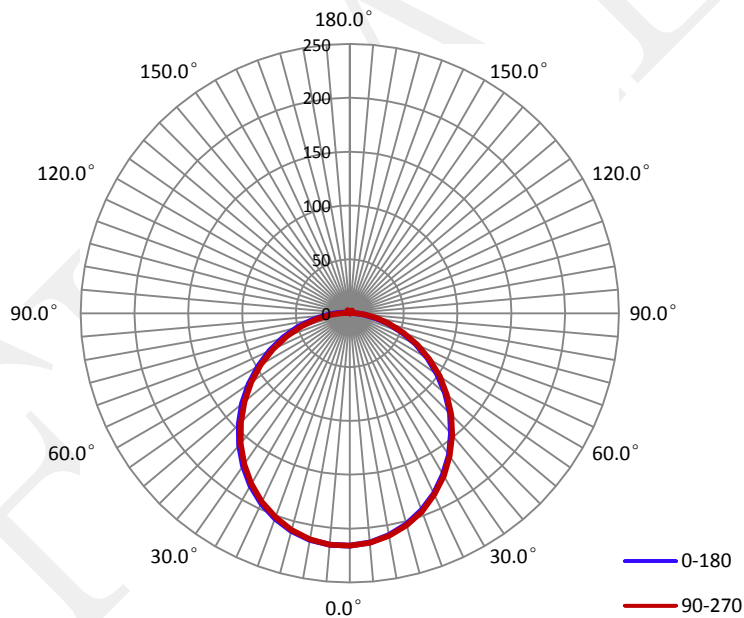
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0880	9.65	0.9100

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
624.3	64.74	216.1	1.23	1.23

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	109.4	109.4	109.1	109.2	109.3
Field Angle (10% I _{max}):	166.8	166.4	165.4	165.8	166.1

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	216	216	216	216	216	216	216	216
5.0°	214	213	213	214	214	214	215	216
10.0°	209	209	209	209	210	211	212	213
15.0°	203	202	202	203	204	205	207	208
20.0°	195	194	194	195	196	198	200	202
25.0°	185	184	184	184	186	188	191	193
30.0°	173	172	172	173	175	177	180	183
35.0°	160	159	159	160	162	165	168	171
40.0°	146	145	145	146	148	151	155	158
45.0°	131	130	130	131	133	136	140	144
50.0°	116	114	114	115	117	121	125	129
55.0°	99	98	98	99	102	105	109	113
60.0°	83	82	82	83	85	89	93	97
65.0°	67	66	66	67	69	73	77	81
70.0°	51	50	50	51	53	57	61	65
75.0°	36	35	35	36	38	41	45	49
80.0°	24	23	22	23	25	28	31	35
85.0°	14	13	12	13	14	17	19	22
90.0°	6	6	6	6	7	8	11	13
95.0°	2	2	1	1	2	3	5	6
100.0°	0	0	0	0	0	0	0	2
105.0°	1	1	0	0	0	0	0	0
110.0°	1	1	1	1	0	0	1	0
115.0°	1	1	1	2	1	1	1	1
120.0°	2	2	2	2	2	1	1	2
125.0°	2	3	3	3	2	2	2	4
130.0°	2	3	3	3	3	2	3	3
135.0°	3	3	3	3	3	3	2	3
140.0°	3	3	3	3	3	3	3	3
145.0°	2	2	2	3	3	3	3	3
150.0°	2	2	2	3	3	2	2	3
155.0°	2	2	2	2	1	1	2	2
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

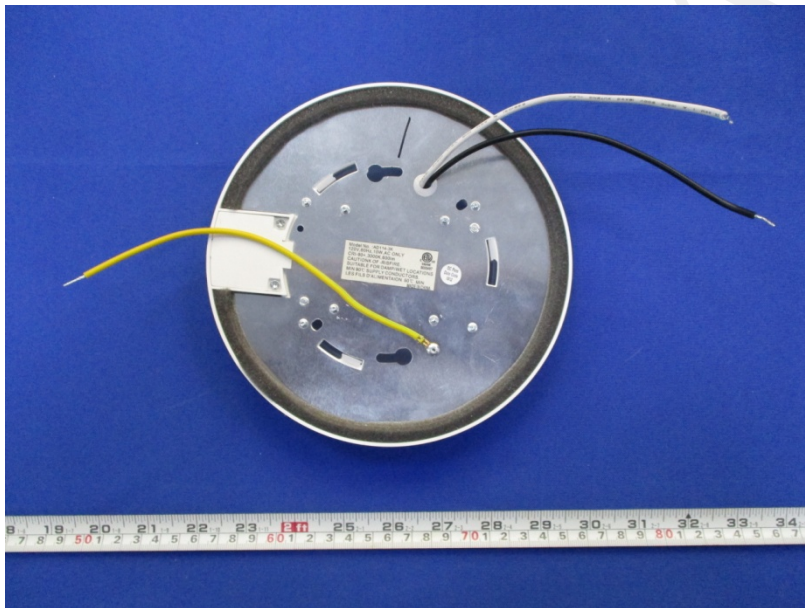
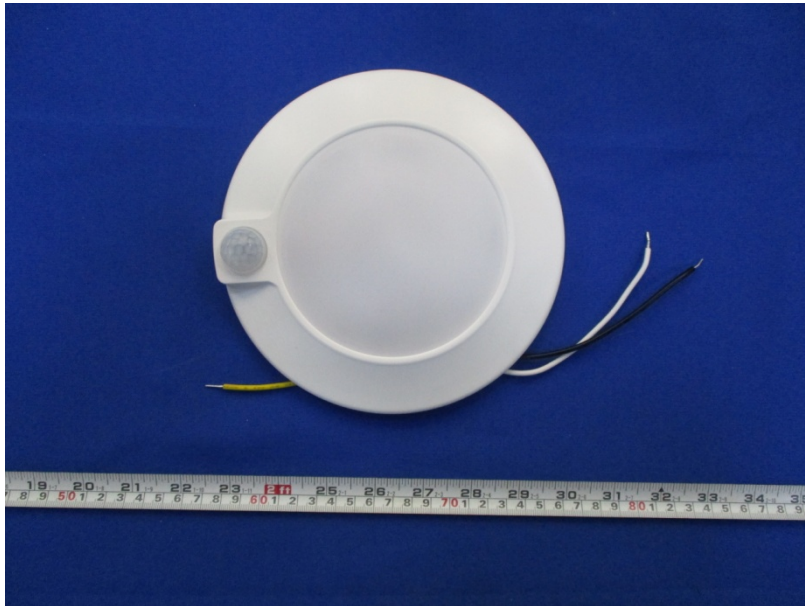
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	216	216	216	216	216	216	216	216
5.0°	216	216	216	216	216	215	215	214
10.0°	214	214	214	214	213	212	211	210
15.0°	209	210	210	210	208	207	205	204
20.0°	203	204	204	203	202	200	198	196
25.0°	195	196	196	195	193	191	188	186
30.0°	185	186	186	185	183	180	177	175
35.0°	173	174	174	173	171	168	165	162
40.0°	160	161	161	160	158	154	151	148
45.0°	146	147	147	146	143	140	136	133
50.0°	131	132	132	131	128	124	120	117
55.0°	115	116	116	115	112	108	104	101
60.0°	98	100	100	98	95	91	88	84
65.0°	82	84	84	82	79	75	71	68
70.0°	66	67	67	65	62	59	55	52
75.0°	50	51	51	49	46	43	39	37
80.0°	36	37	36	35	31	28	26	24
85.0°	23	24	24	22	19	16	14	14
90.0°	13	14	14	12	9	7	7	7
95.0°	7	7	7	6	4	2	2	2
100.0°	2	3	1	1	1	1	0	0
105.0°	1	0	0	0	0	0	0	1
110.0°	1	1	1	1	0	1	1	1
115.0°	1	1	1	1	1	1	1	1
120.0°	1	1	1	3	2	1	2	2
125.0°	2	3	3	4	2	2	2	2
130.0°	2	3	3	2	3	2	2	2
135.0°	2	4	3	3	3	2	2	3
140.0°	2	3	3	3	3	2	3	3
145.0°	2	3	3	3	4	2	3	3
150.0°	2	3	3	3	3	2	2	2
155.0°	1	3	3	2	1	1	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	5.1	0.82	0-5	5.1	0.82
5-10	15.2	2.44	0-10	20.4	3.27
10-15	24.8	3.97	0-15	45.2	7.24
15-20	33.4	5.35	0-20	78.5	12.58
20-25	40.7	6.52	0-25	119.3	19.11
25-30	46.6	7.47	0-30	165.9	26.57
30-35	50.8	8.14	0-35	216.7	34.71
35-40	53.3	8.53	0-40	270.0	43.25
40-45	53.9	8.63	0-45	323.9	51.88
45-50	52.8	8.45	0-50	376.6	60.33
50-55	49.9	8.00	0-55	426.6	68.33
55-60	45.6	7.31	0-60	472.2	75.64
60-65	40.1	6.42	0-65	512.3	82.06
65-70	33.5	5.37	0-70	545.8	87.43
70-75	26.4	4.22	0-75	572.2	91.65
75-80	19.1	3.07	0-80	591.3	94.72
80-85	12.6	2.01	0-85	603.9	96.73
85-90	7.3	1.16	0-90	611.2	97.90
90-95	3.5	0.56	0-95	614.6	98.45
95-100	1.2	0.19	0-100	615.8	98.64
100-105	0.3	0.04	0-105	616.1	98.69
105-110	0.2	0.04	0-110	616.3	98.72
110-115	0.4	0.07	0-115	616.7	98.79
115-120	0.6	0.10	0-120	617.4	98.89
120-125	0.9	0.15	0-125	618.3	99.04
125-130	1.1	0.17	0-130	619.4	99.21
130-135	1.0	0.17	0-135	620.4	99.38
135-140	1.1	0.17	0-140	621.5	99.55
140-145	0.9	0.15	0-145	622.4	99.70
145-150	0.7	0.12	0-150	623.2	99.82
150-155	0.5	0.08	0-155	623.7	99.90
155-160	0.3	0.04	0-160	623.9	99.94
160-165	0.2	0.02	0-165	624.1	99.97
165-170	0.1	0.02	0-170	624.2	99.99
170-175	0.1	0.01	0-175	624.3	100.00
175-180	0.0	0.00	0-180	624.3	100.00

6. Product Photo



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