

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEL9027DIM010UNVWDRCC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKS180131082-10-4
Test Date:	2018-05-23 to 2018-05-24
Report Date:	2018-05-25
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 2018-02-05 and used for testing.

Model Tested: AD6LEL9027DIM010UNVWDRCC
 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: 120-277 VAC 50/60Hz
 Rated Power: 60W
 Nominal CCT: 2700K
 Nominal Lumen Output: 4750lm

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	2018-03-23	2019-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-03-23	2019-03-22
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	2018-03-23	2019-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-03-23	2019-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-03-23	2019-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-03-23	2019-03-22
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**

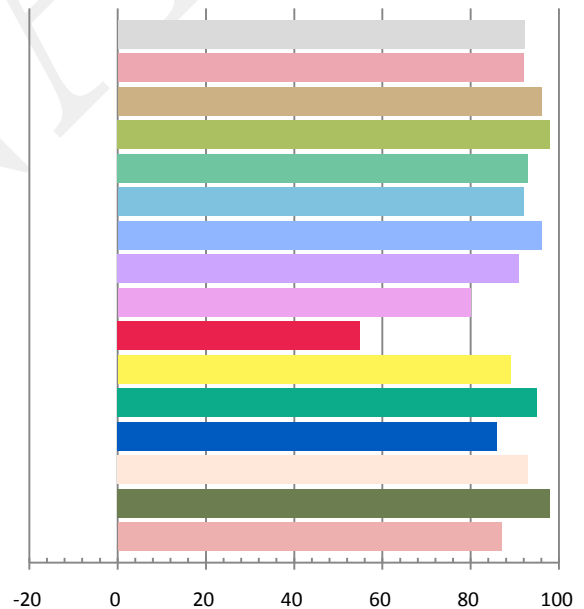
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.5035	60.11	0.9945	4798.9	79.84

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
16.738	2692	0.00126	0.4627	0.4147	0.2625	0.5293

Color Rendering Index

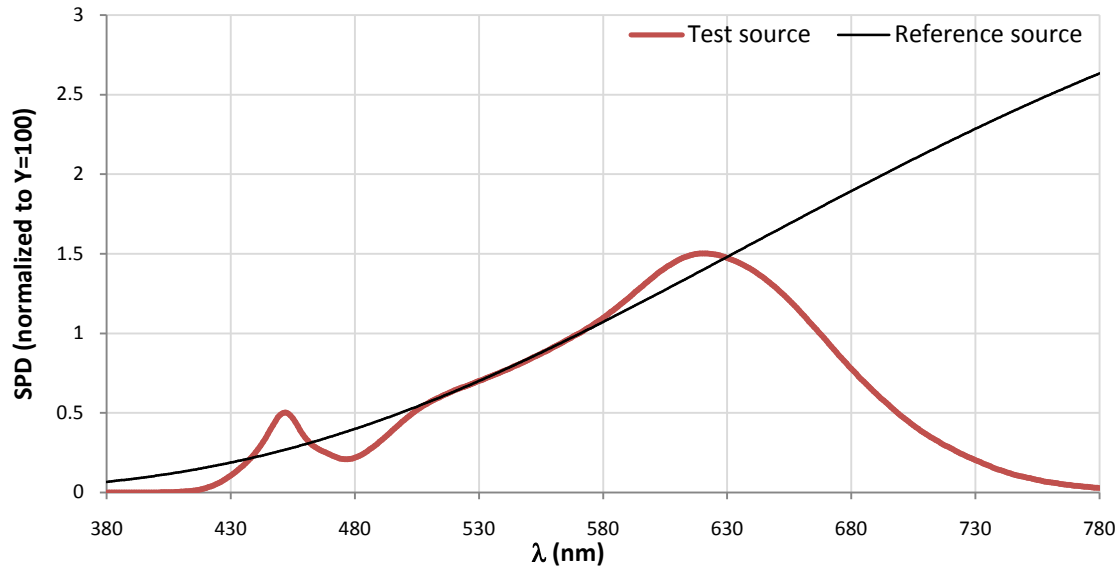
Ra			
92.2			
R1	R2	R3	R4
92	96	98	93
R5	R6	R7	R8
92	96	91	80
R9	R10	R11	R12
55	89	95	86
R13	R14	R15	
93	98	87	



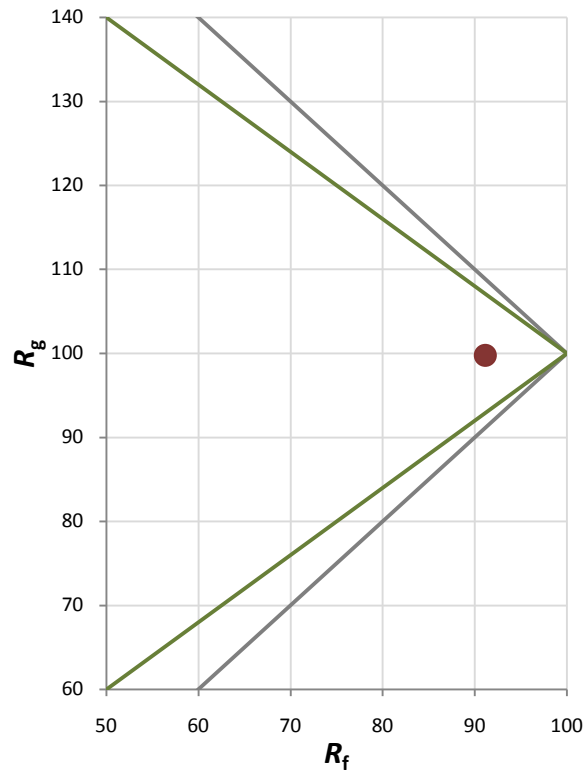
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	100

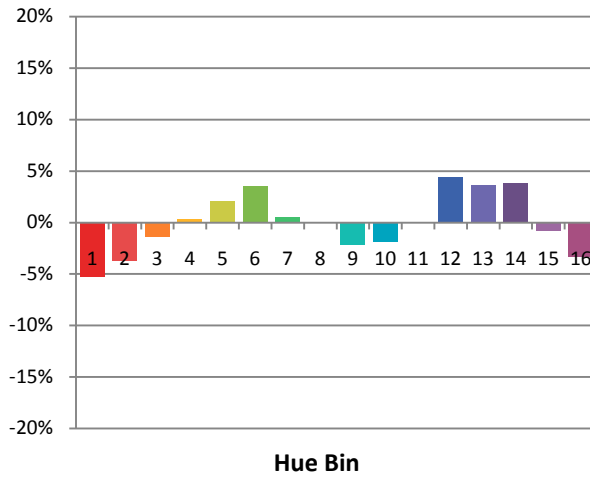
Spectral Power Distribution Comparison



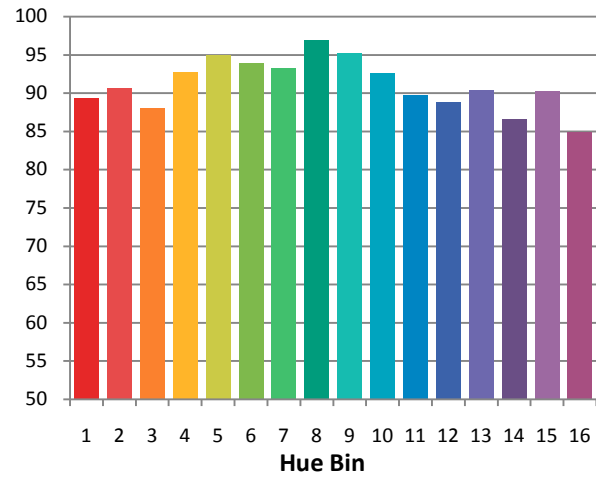
Plot of R_g versus R_f



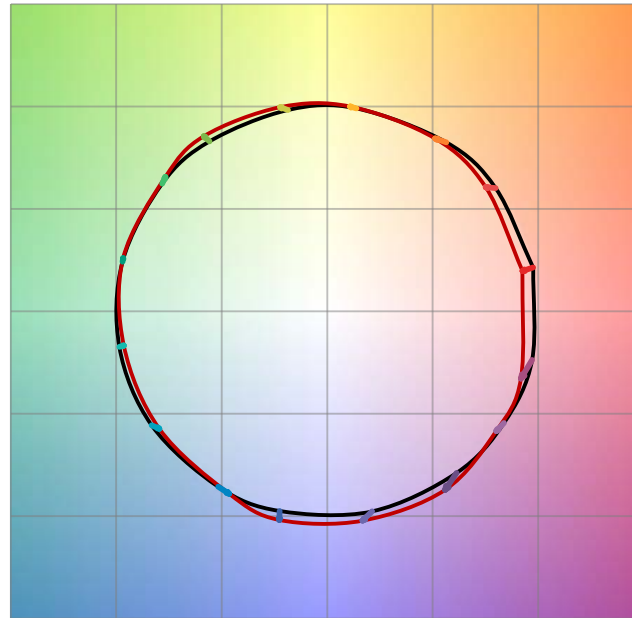
Chroma Shift by Hue



R_t by Hue

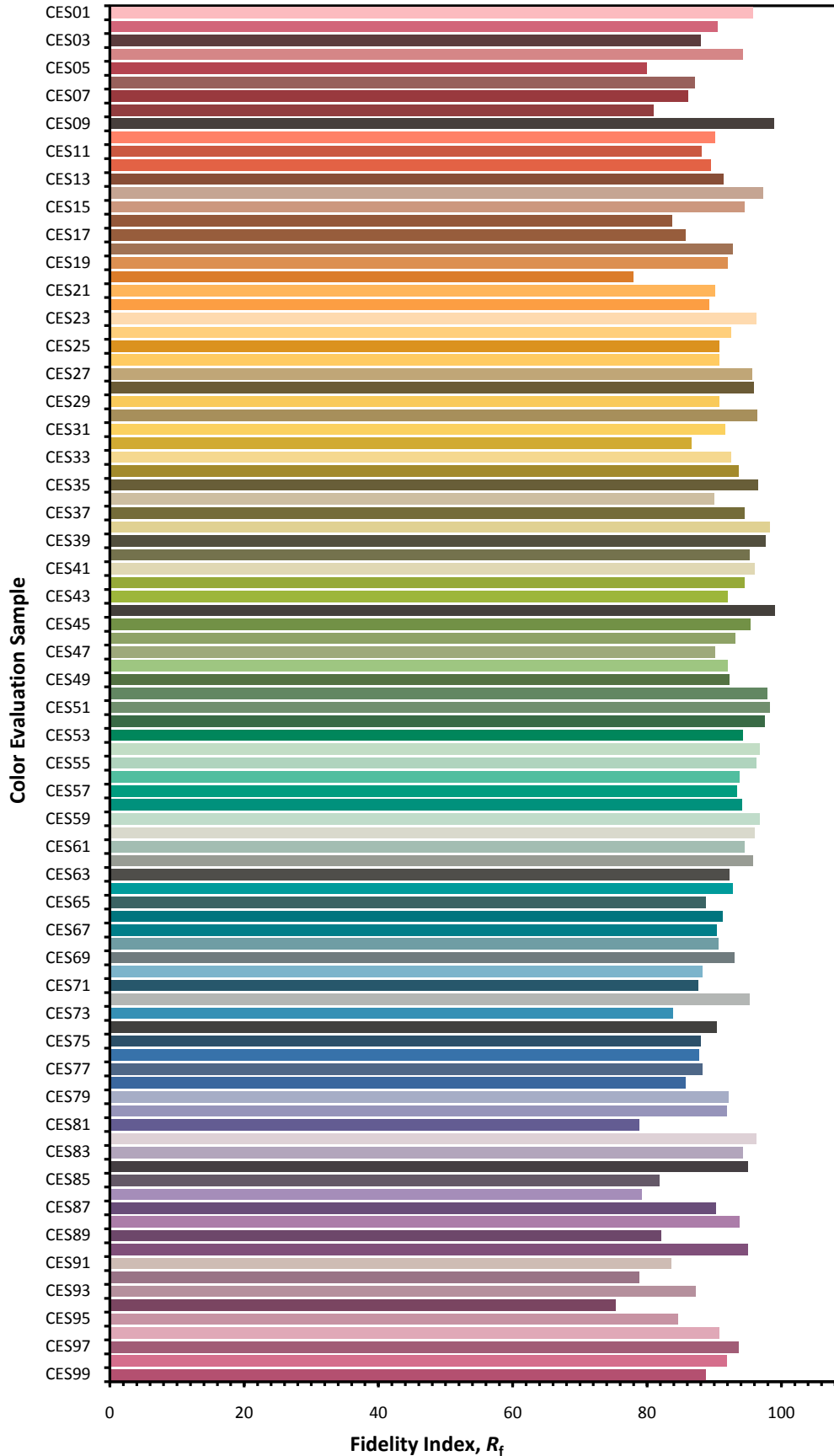


Color Vector Graphic

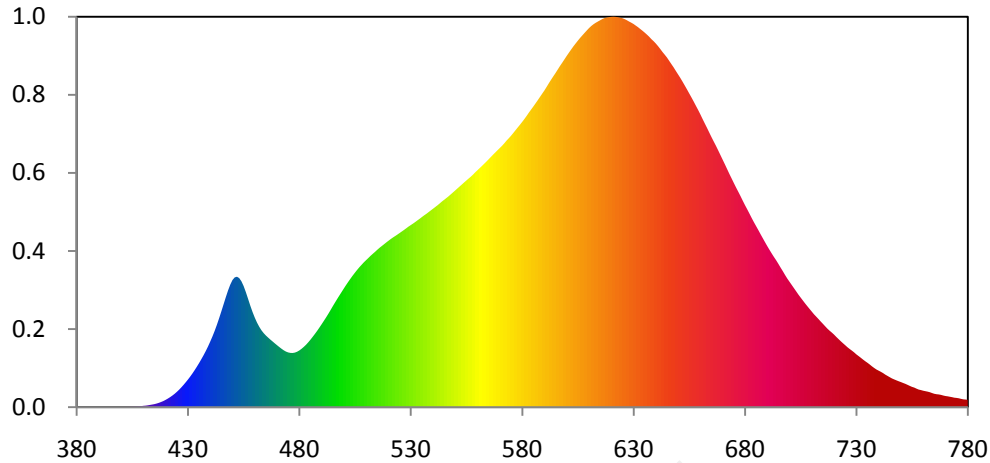


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



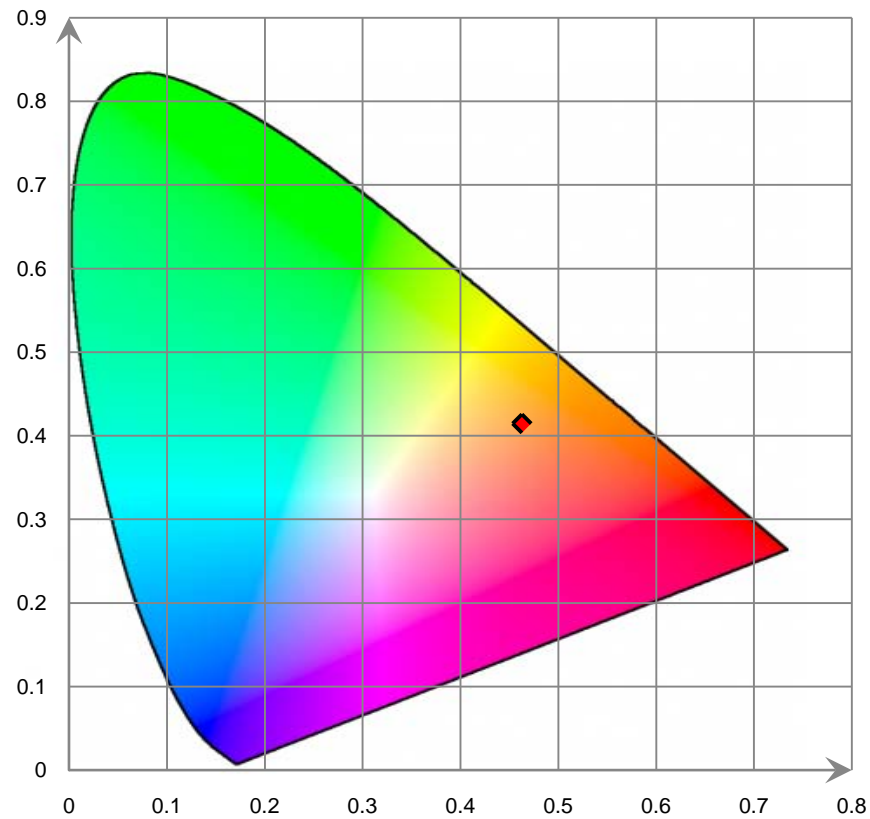
Relative Spectral Power Distribution



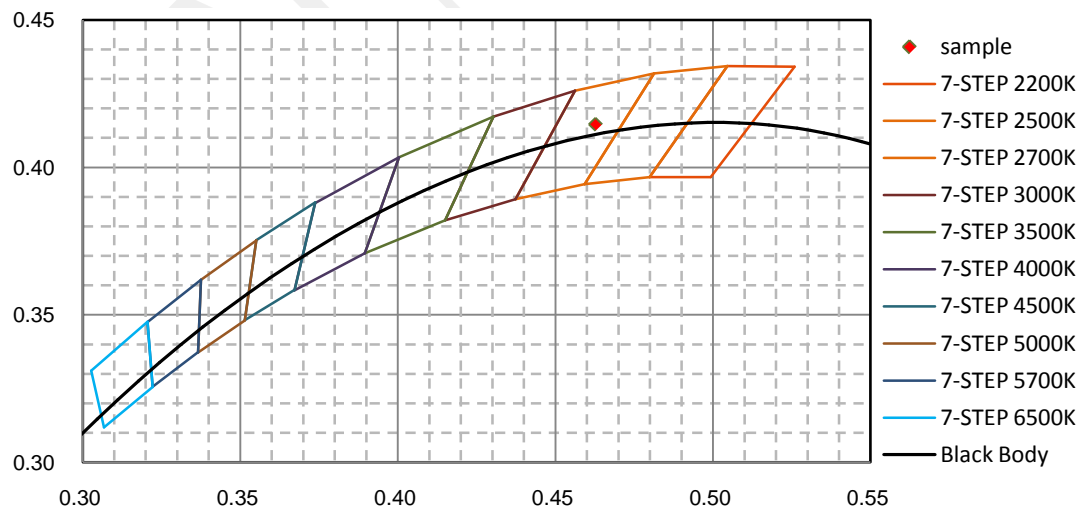
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.470E-02	421	2.331E+00	462	2.174E+01	503	3.478E+01	544	5.559E+01
381	2.960E-02	422	2.711E+00	463	2.079E+01	504	3.561E+01	545	5.606E+01
382	3.090E-02	423	3.131E+00	464	2.002E+01	505	3.640E+01	546	5.653E+01
383	3.900E-02	424	3.599E+00	465	1.937E+01	506	3.716E+01	547	5.702E+01
384	4.290E-02	425	4.125E+00	466	1.881E+01	507	3.787E+01	548	5.754E+01
385	2.400E-02	426	4.693E+00	467	1.828E+01	508	3.853E+01	549	5.807E+01
386	1.580E-02	427	5.325E+00	468	1.777E+01	509	3.918E+01	550	5.861E+01
387	1.280E-02	428	6.007E+00	469	1.725E+01	510	3.976E+01	551	5.915E+01
388	1.960E-02	429	6.719E+00	470	1.675E+01	511	4.034E+01	552	5.969E+01
389	4.490E-02	430	7.465E+00	471	1.626E+01	512	4.093E+01	553	6.023E+01
390	4.950E-02	431	8.259E+00	472	1.580E+01	513	4.147E+01	554	6.077E+01
391	2.190E-02	432	9.103E+00	473	1.538E+01	514	4.200E+01	555	6.130E+01
392	2.130E-02	433	1.000E+01	474	1.503E+01	515	4.256E+01	556	6.182E+01
393	2.550E-02	434	1.094E+01	475	1.480E+01	516	4.309E+01	557	6.233E+01
394	2.520E-02	435	1.192E+01	476	1.467E+01	517	4.356E+01	558	6.289E+01
395	2.630E-02	436	1.295E+01	477	1.466E+01	518	4.403E+01	559	6.352E+01
396	1.810E-02	437	1.403E+01	478	1.476E+01	519	4.452E+01	560	6.408E+01
397	1.260E-02	438	1.517E+01	479	1.499E+01	520	4.499E+01	561	6.466E+01
398	1.640E-02	439	1.639E+01	480	1.534E+01	521	4.544E+01	562	6.523E+01
399	1.960E-02	440	1.772E+01	481	1.578E+01	522	4.587E+01	563	6.582E+01
400	3.640E-02	441	1.912E+01	482	1.629E+01	523	4.625E+01	564	6.642E+01
401	5.130E-02	442	2.062E+01	483	1.687E+01	524	4.665E+01	565	6.703E+01
402	6.360E-02	443	2.227E+01	484	1.753E+01	525	4.708E+01	566	6.766E+01
403	8.710E-02	444	2.404E+01	485	1.825E+01	526	4.750E+01	567	6.828E+01
404	1.103E-01	445	2.590E+01	486	1.902E+01	527	4.792E+01	568	6.889E+01
405	1.257E-01	446	2.781E+01	487	1.981E+01	528	4.837E+01	569	6.949E+01
406	1.500E-01	447	2.972E+01	488	2.064E+01	529	4.882E+01	570	7.008E+01
407	1.900E-01	448	3.154E+01	489	2.151E+01	530	4.922E+01	571	7.067E+01
408	2.170E-01	449	3.312E+01	490	2.241E+01	531	4.962E+01	572	7.133E+01
409	2.857E-01	450	3.437E+01	491	2.332E+01	532	5.004E+01	573	7.206E+01
410	3.642E-01	451	3.508E+01	492	2.426E+01	533	5.049E+01	574	7.270E+01
411	4.254E-01	452	3.527E+01	493	2.523E+01	534	5.093E+01	575	7.336E+01
412	5.099E-01	453	3.491E+01	494	2.624E+01	535	5.140E+01	576	7.410E+01
413	6.083E-01	454	3.404E+01	495	2.727E+01	536	5.185E+01	577	7.485E+01
414	7.131E-01	455	3.274E+01	496	2.828E+01	537	5.226E+01	578	7.560E+01
415	8.347E-01	456	3.110E+01	497	2.926E+01	538	5.273E+01	579	7.634E+01
416	9.968E-01	457	2.928E+01	498	3.022E+01	539	5.319E+01	580	7.710E+01
417	1.184E+00	458	2.744E+01	499	3.116E+01	540	5.365E+01	581	7.788E+01
418	1.414E+00	459	2.574E+01	500	3.211E+01	541	5.411E+01	582	7.872E+01
419	1.670E+00	460	2.421E+01	501	3.304E+01	542	5.457E+01	583	7.960E+01
420	1.981E+00	461	2.288E+01	502	3.393E+01	543	5.508E+01	584	8.043E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	8.125E+01	626	1.049E+02	667	7.066E+01	708	2.731E+01	749	7.013E+00
586	8.211E+01	627	1.046E+02	668	6.943E+01	709	2.657E+01	750	6.786E+00
587	8.298E+01	628	1.043E+02	669	6.817E+01	710	2.584E+01	751	6.540E+00
588	8.387E+01	629	1.039E+02	670	6.691E+01	711	2.511E+01	752	6.310E+00
589	8.475E+01	630	1.036E+02	671	6.567E+01	712	2.447E+01	753	6.041E+00
590	8.563E+01	631	1.032E+02	672	6.437E+01	713	2.383E+01	754	5.750E+00
591	8.659E+01	632	1.027E+02	673	6.309E+01	714	2.317E+01	755	5.491E+00
592	8.758E+01	633	1.022E+02	674	6.186E+01	715	2.253E+01	756	5.303E+00
593	8.853E+01	634	1.018E+02	675	6.063E+01	716	2.188E+01	757	5.016E+00
594	8.944E+01	635	1.013E+02	676	5.941E+01	717	2.123E+01	758	4.763E+00
595	9.034E+01	636	1.007E+02	677	5.826E+01	718	2.068E+01	759	4.626E+00
596	9.129E+01	637	1.002E+02	678	5.708E+01	719	2.017E+01	760	4.453E+00
597	9.224E+01	638	9.951E+01	679	5.585E+01	720	1.962E+01	761	4.327E+00
598	9.313E+01	639	9.894E+01	680	5.465E+01	721	1.900E+01	762	4.198E+00
599	9.404E+01	640	9.831E+01	681	5.352E+01	722	1.842E+01	763	4.040E+00
600	9.496E+01	641	9.761E+01	682	5.236E+01	723	1.784E+01	764	3.823E+00
601	9.583E+01	642	9.684E+01	683	5.119E+01	724	1.729E+01	765	3.622E+00
602	9.668E+01	643	9.602E+01	684	5.004E+01	725	1.677E+01	766	3.501E+00
603	9.753E+01	644	9.529E+01	685	4.896E+01	726	1.622E+01	767	3.445E+00
604	9.831E+01	645	9.453E+01	686	4.789E+01	727	1.574E+01	768	3.325E+00
605	9.907E+01	646	9.363E+01	687	4.678E+01	728	1.530E+01	769	3.153E+00
606	9.981E+01	647	9.274E+01	688	4.571E+01	729	1.482E+01	770	3.022E+00
607	1.005E+02	648	9.186E+01	689	4.463E+01	730	1.428E+01	771	2.934E+00
608	1.012E+02	649	9.089E+01	690	4.357E+01	731	1.383E+01	772	2.820E+00
609	1.018E+02	650	8.995E+01	691	4.256E+01	732	1.337E+01	773	2.706E+00
610	1.025E+02	651	8.902E+01	692	4.158E+01	733	1.288E+01	774	2.563E+00
611	1.030E+02	652	8.800E+01	693	4.063E+01	734	1.243E+01	775	2.501E+00
612	1.035E+02	653	8.695E+01	694	3.973E+01	735	1.200E+01	776	2.411E+00
613	1.039E+02	654	8.590E+01	695	3.876E+01	736	1.155E+01	777	2.253E+00
614	1.043E+02	655	8.482E+01	696	3.775E+01	737	1.106E+01	778	2.121E+00
615	1.046E+02	656	8.374E+01	697	3.678E+01	738	1.061E+01	779	2.066E+00
616	1.049E+02	657	8.262E+01	698	3.575E+01	739	1.020E+01	780	1.981E+00
617	1.052E+02	658	8.148E+01	699	3.478E+01	740	9.881E+00		
618	1.053E+02	659	8.034E+01	700	3.391E+01	741	9.565E+00		
619	1.054E+02	660	7.916E+01	701	3.305E+01	742	9.210E+00		
620	1.055E+02	661	7.790E+01	702	3.218E+01	743	8.801E+00		
621	1.056E+02	662	7.669E+01	703	3.132E+01	744	8.460E+00		
622	1.055E+02	663	7.548E+01	704	3.044E+01	745	8.102E+00		
623	1.054E+02	664	7.423E+01	705	2.964E+01	746	7.770E+00		
624	1.053E+02	665	7.300E+01	706	2.884E+01	747	7.500E+00		
625	1.051E+02	666	7.182E+01	707	2.805E+01	748	7.250E+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**

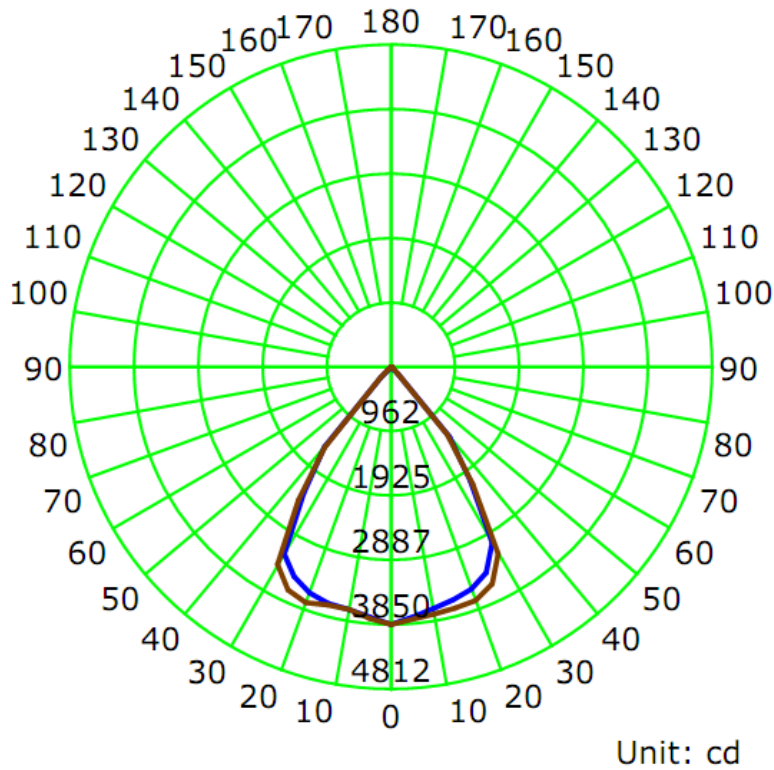
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5030	60.12	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4800.9	79.90	3850.3	1.18	1.21

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	73.6	73.9	74.2	73.8	73.9
Field Angle (10% I_{max}):	88.4	88.6	88.5	88.3	88.5

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3850	3850	3850	3850	3850	3850	3850	3850
5.0°	3749	3760	3770	3764	3778	3779	3779	3771
10.0°	3663	3701	3723	3723	3745	3741	3742	3713
15.0°	3593	3663	3712	3723	3725	3709	3667	3640
20.0°	3532	3616	3701	3711	3714	3695	3610	3570
25.0°	3384	3465	3554	3577	3578	3549	3481	3450
30.0°	3034	3079	3139	3185	3223	3218	3178	3163
35.0°	2079	2054	2065	2104	2141	2178	2208	2263
40.0°	1365	1299	1248	1266	1316	1407	1467	1550
45.0°	144	148	138	130	135	148	180	248
50.0°	54	64	57	51	51	53	57	60
55.0°	17	22	19	16	11	13	15	17
60.0°	0	0	0	0	0	0	0	0
65.0°	0	0	0	0	0	0	0	0
70.0°	0	0	0	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	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

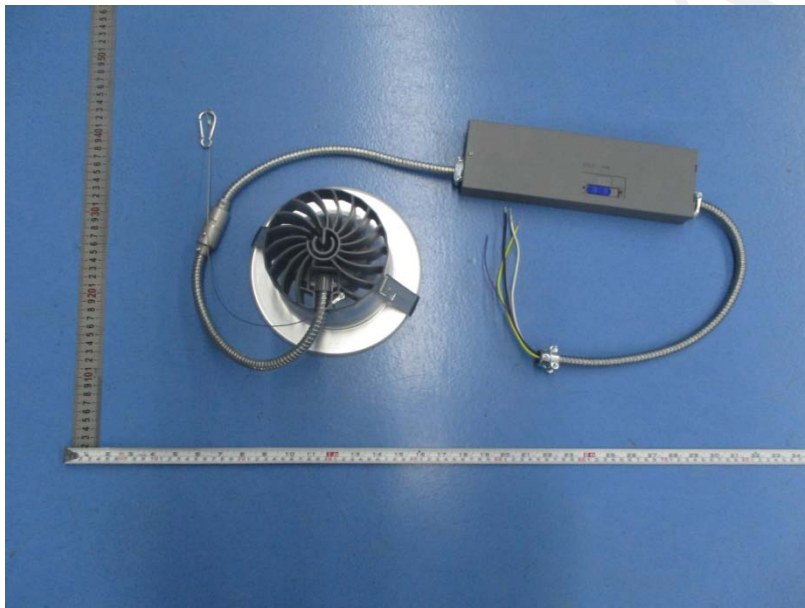
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	3850	3850	3850	3850	3850	3850	3850	3850
5.0°	3748	3758	3758	3754	3766	3760	3737	3723
10.0°	3676	3699	3687	3673	3673	3661	3628	3609
15.0°	3654	3685	3697	3673	3680	3648	3598	3566
20.0°	3595	3679	3746	3746	3748	3700	3601	3550
25.0°	3453	3568	3657	3659	3673	3582	3469	3404
30.0°	3220	3316	3407	3419	3403	3320	3189	3099
35.0°	2296	2373	2440	2469	2426	2326	2209	2123
40.0°	1553	1595	1586	1581	1565	1510	1445	1368
45.0°	229	306	314	285	257	221	160	134
50.0°	57	62	66	63	65	58	63	50
55.0°	14	24	18	21	21	23	20	18
60.0°	0	0	0	0	0	0	0	0
65.0°	0	0	0	0	0	0	0	0
70.0°	0	0	0	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	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	91.0	1.89	0-5	91.0	1.89
5-10	266.5	5.55	0-10	357.5	7.45
10-15	436.3	9.09	0-15	793.8	16.54
15-20	603.4	12.57	0-20	1397.2	29.10
20-25	753.9	15.70	0-25	2151.2	44.81
25-30	855.0	17.81	0-30	3006.1	62.62
30-35	803.9	16.74	0-35	3810.0	79.36
35-40	613.9	12.79	0-40	4423.9	92.15
40-45	304.3	6.34	0-45	4728.3	98.49
45-50	51.9	1.08	0-50	4780.1	99.57
50-55	16.6	0.35	0-55	4796.7	99.91
55-60	4.2	0.09	0-60	4800.9	100.00
60-65	0.0	0.00	0-65	4800.9	100.00
65-70	0.0	0.00	0-70	4800.9	100.00
70-75	0.0	0.00	0-75	4800.9	100.00
75-80	0.0	0.00	0-80	4800.9	100.00
80-85	0.0	0.00	0-85	4800.9	100.00
85-90	0.0	0.00	0-90	4800.9	100.00
90-95	0.0	0.00	0-95	4800.9	100.00
95-100	0.0	0.00	0-100	4800.9	100.00
100-105	0.0	0.00	0-105	4800.9	100.00
105-110	0.0	0.00	0-110	4800.9	100.00
110-115	0.0	0.00	0-115	4800.9	100.00
115-120	0.0	0.00	0-120	4800.9	100.00
120-125	0.0	0.00	0-125	4800.9	100.00
125-130	0.0	0.00	0-130	4800.9	100.00
130-135	0.0	0.00	0-135	4800.9	100.00
135-140	0.0	0.00	0-140	4800.9	100.00
140-145	0.0	0.00	0-145	4800.9	100.00
145-150	0.0	0.00	0-150	4800.9	100.00
150-155	0.0	0.00	0-155	4800.9	100.00
155-160	0.0	0.00	0-160	4800.9	100.00
160-165	0.0	0.00	0-165	4800.9	100.00
165-170	0.0	0.00	0-170	4800.9	100.00
170-175	0.0	0.00	0-175	4800.9	100.00
175-180	0.0	0.00	0-180	4800.9	100.00

6. Product Photo



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