

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEL9027DIM010UNVMDRCC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKS180131082-10-3
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: AD6LEL9027DIM010UNVMDRCC
 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**

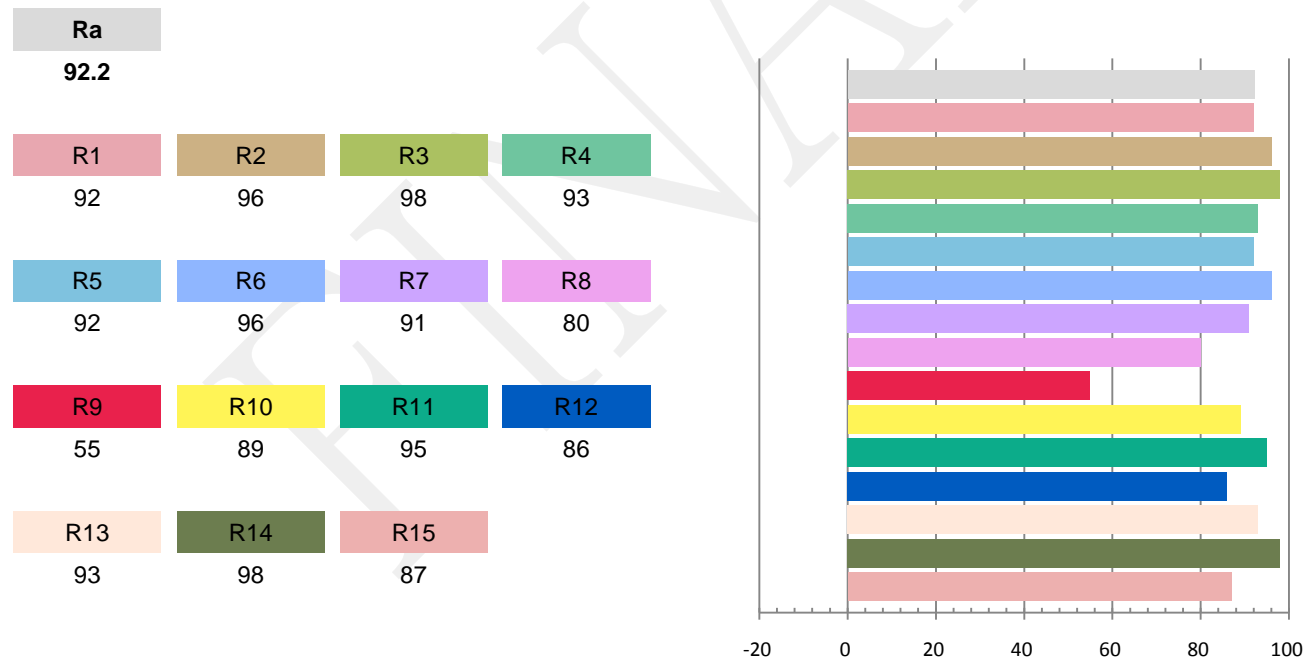
Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.5033	60.07	0.9945	4783	79.62

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
16.682	2694	0.00123	0.4625	0.4145	0.2624	0.5292

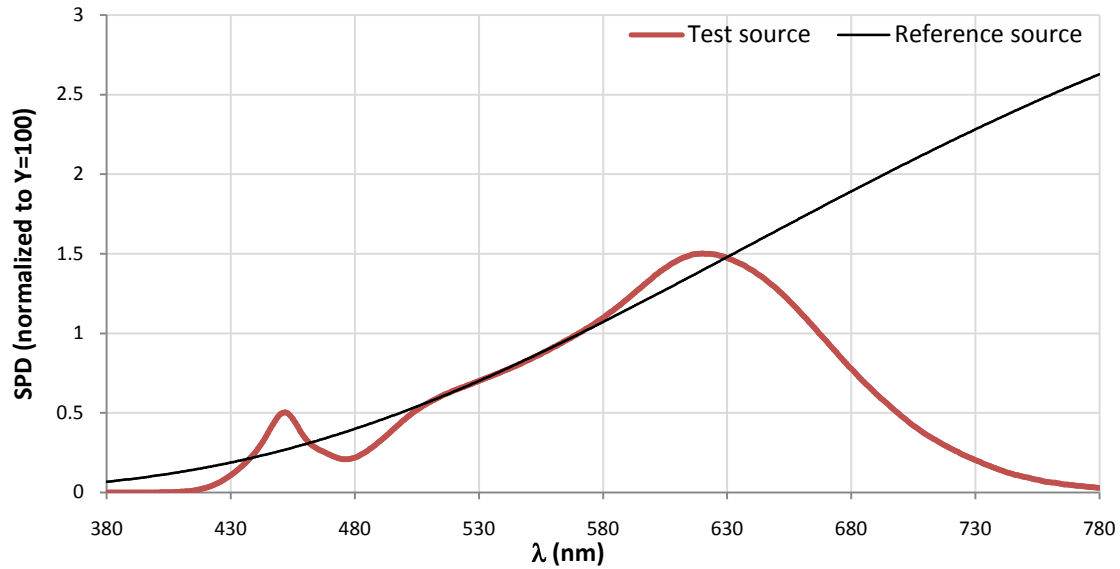
Color Rendering Index



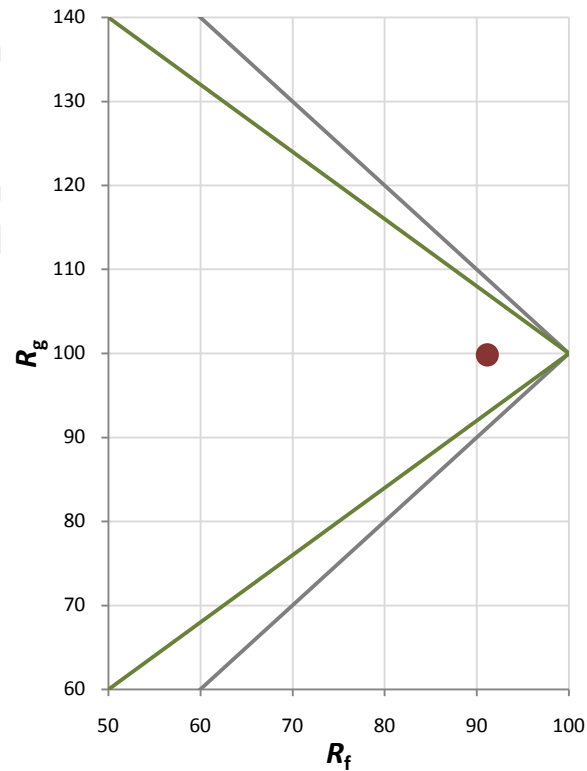
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	100

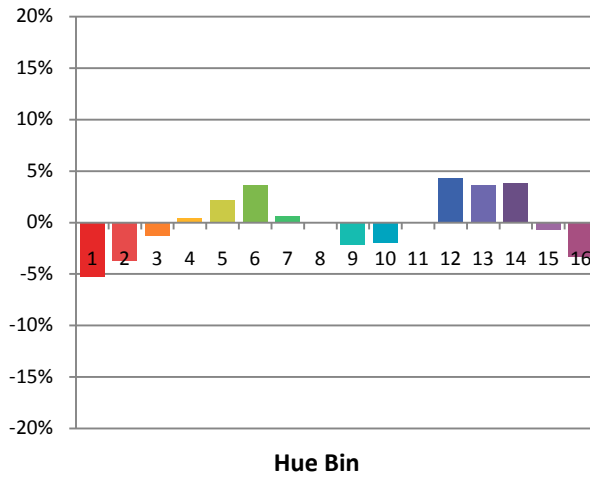
Spectral Power Distribution Comparison



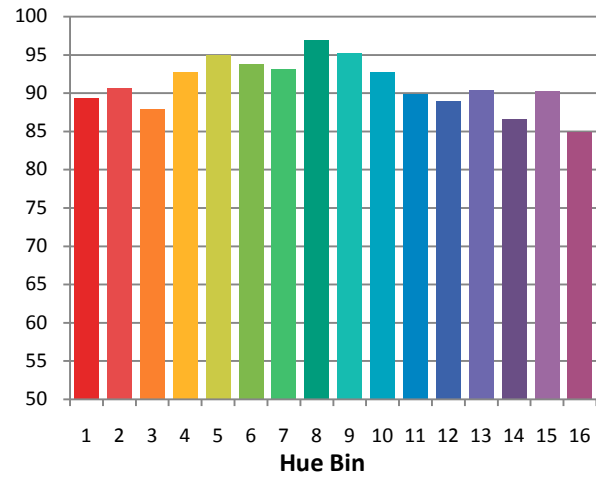
Plot of R_g versus R_f



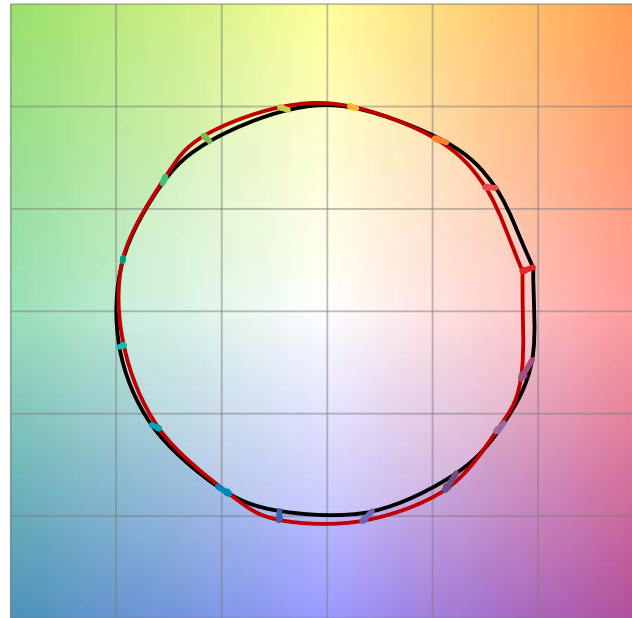
Chroma Shift by Hue



R_t by Hue

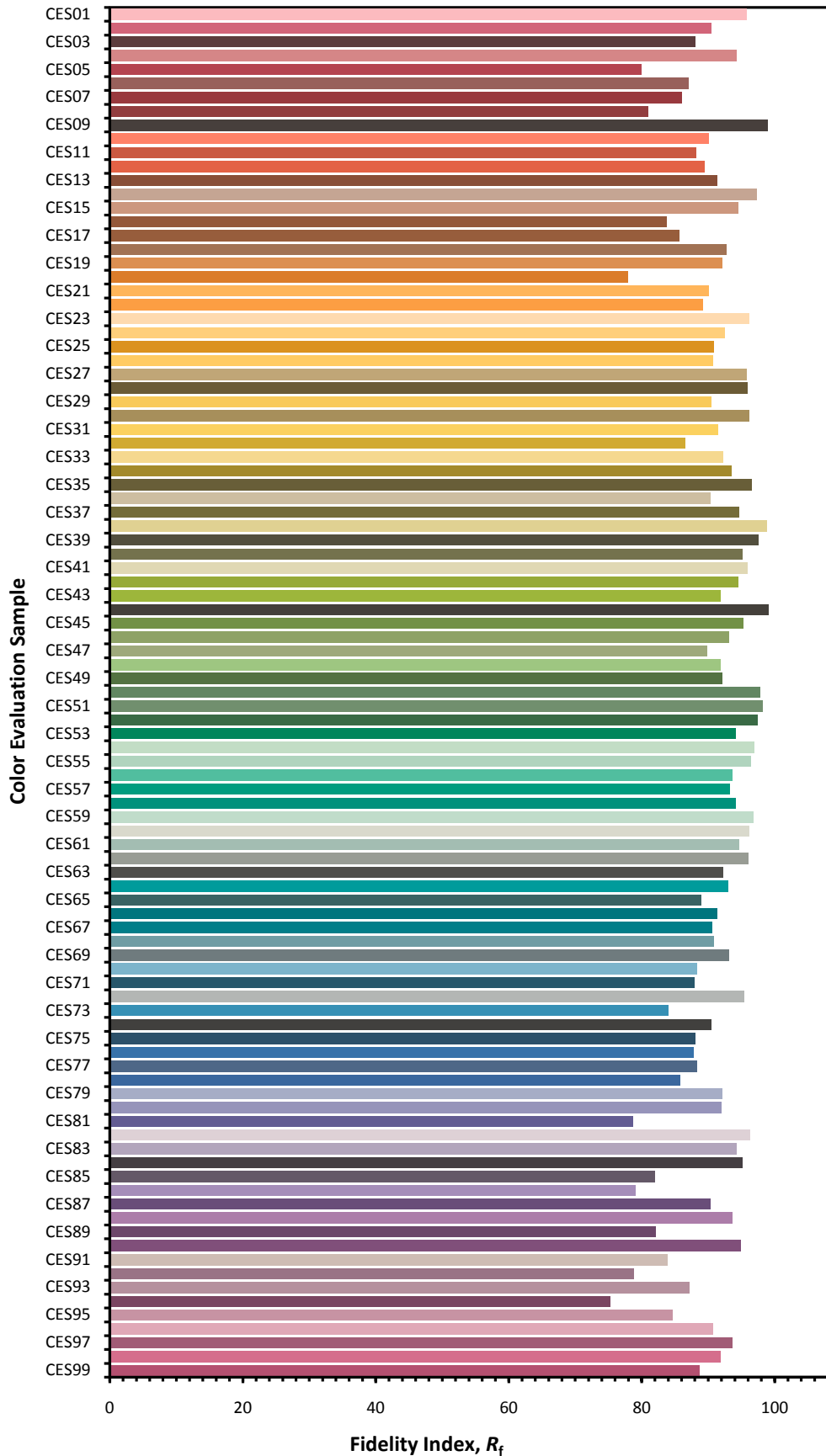


Color Vector Graphic

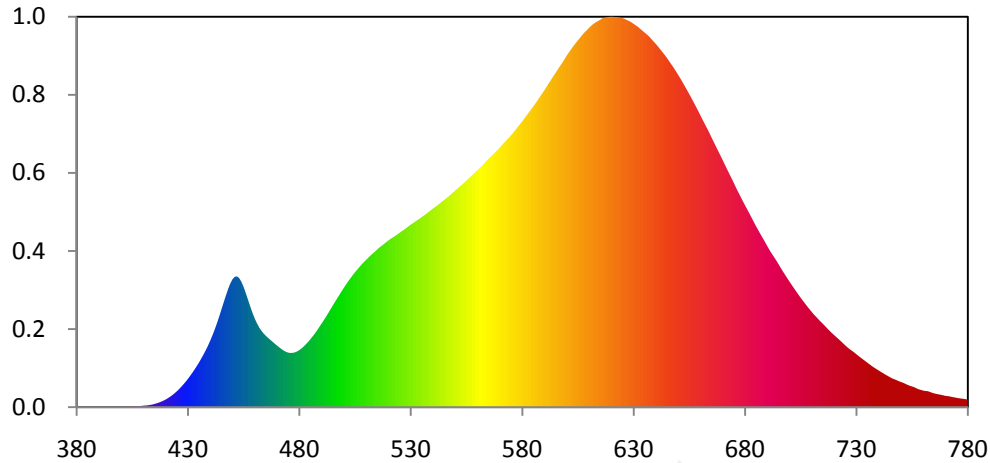


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



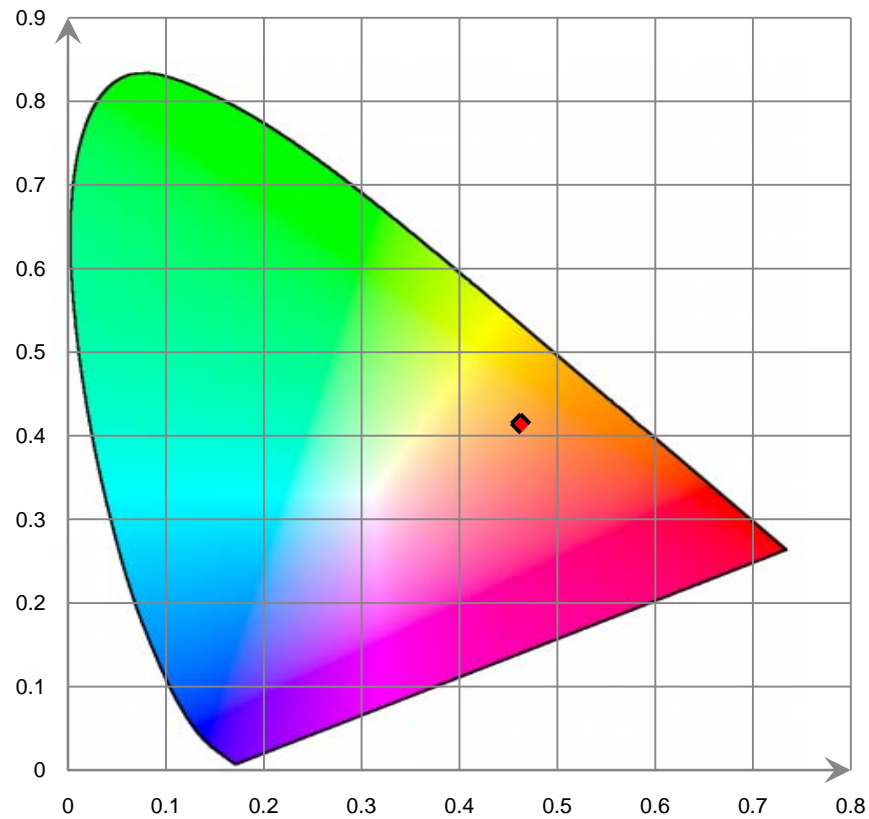
Relative Spectral Power Distribution



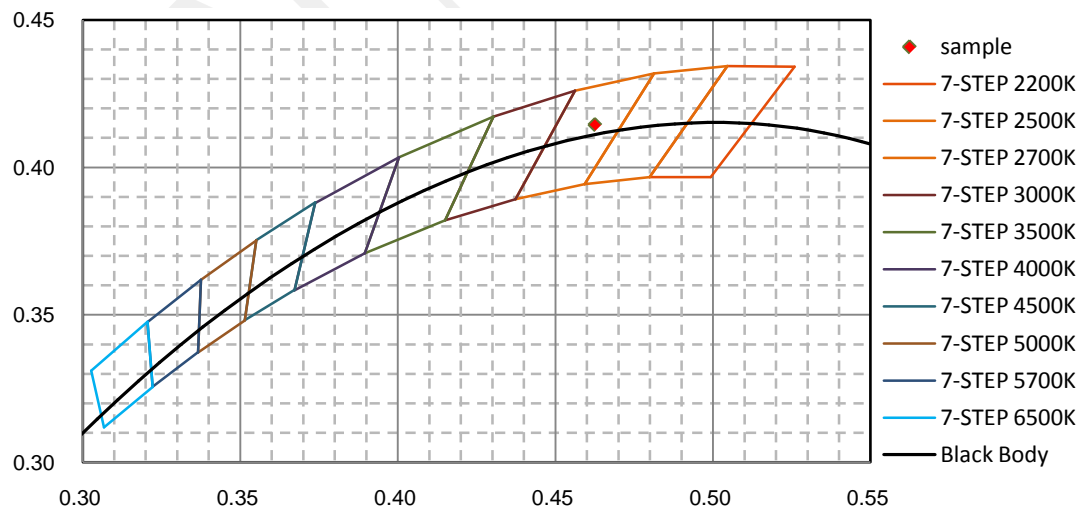
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.580E-02	421	2.426E+00	462	2.145E+01	503	3.475E+01	544	5.533E+01
381	2.750E-02	422	2.816E+00	463	2.056E+01	504	3.556E+01	545	5.578E+01
382	3.870E-02	423	3.250E+00	464	1.983E+01	505	3.633E+01	546	5.625E+01
383	5.450E-02	424	3.743E+00	465	1.920E+01	506	3.705E+01	547	5.676E+01
384	4.840E-02	425	4.266E+00	466	1.864E+01	507	3.776E+01	548	5.728E+01
385	3.480E-02	426	4.848E+00	467	1.812E+01	508	3.844E+01	549	5.781E+01
386	3.570E-02	427	5.482E+00	468	1.760E+01	509	3.907E+01	550	5.833E+01
387	4.630E-02	428	6.158E+00	469	1.708E+01	510	3.967E+01	551	5.884E+01
388	4.090E-02	429	6.859E+00	470	1.658E+01	511	4.028E+01	552	5.939E+01
389	4.440E-02	430	7.624E+00	471	1.610E+01	512	4.086E+01	553	5.991E+01
390	3.710E-02	431	8.437E+00	472	1.564E+01	513	4.141E+01	554	6.043E+01
391	1.660E-02	432	9.279E+00	473	1.523E+01	514	4.192E+01	555	6.101E+01
392	1.040E-02	433	1.016E+01	474	1.491E+01	515	4.248E+01	556	6.159E+01
393	2.310E-02	434	1.109E+01	475	1.469E+01	516	4.302E+01	557	6.211E+01
394	3.240E-02	435	1.206E+01	476	1.460E+01	517	4.348E+01	558	6.270E+01
395	3.550E-02	436	1.311E+01	477	1.462E+01	518	4.394E+01	559	6.330E+01
396	2.630E-02	437	1.419E+01	478	1.476E+01	519	4.443E+01	560	6.384E+01
397	1.840E-02	438	1.533E+01	479	1.501E+01	520	4.489E+01	561	6.439E+01
398	1.600E-02	439	1.656E+01	480	1.536E+01	521	4.532E+01	562	6.498E+01
399	1.010E-02	440	1.791E+01	481	1.582E+01	522	4.572E+01	563	6.565E+01
400	3.700E-02	441	1.934E+01	482	1.636E+01	523	4.610E+01	564	6.631E+01
401	5.680E-02	442	2.089E+01	483	1.696E+01	524	4.652E+01	565	6.692E+01
402	6.890E-02	443	2.256E+01	484	1.762E+01	525	4.696E+01	566	6.748E+01
403	7.770E-02	444	2.436E+01	485	1.833E+01	526	4.738E+01	567	6.805E+01
404	9.220E-02	445	2.623E+01	486	1.908E+01	527	4.779E+01	568	6.865E+01
405	1.158E-01	446	2.813E+01	487	1.985E+01	528	4.822E+01	569	6.930E+01
406	1.432E-01	447	2.998E+01	488	2.070E+01	529	4.869E+01	570	6.993E+01
407	1.879E-01	448	3.175E+01	489	2.162E+01	530	4.915E+01	571	7.057E+01
408	2.406E-01	449	3.328E+01	490	2.254E+01	531	4.954E+01	572	7.125E+01
409	3.327E-01	450	3.444E+01	491	2.343E+01	532	4.994E+01	573	7.188E+01
410	4.001E-01	451	3.508E+01	492	2.437E+01	533	5.036E+01	574	7.250E+01
411	4.503E-01	452	3.521E+01	493	2.536E+01	534	5.076E+01	575	7.318E+01
412	5.039E-01	453	3.475E+01	494	2.637E+01	535	5.120E+01	576	7.387E+01
413	6.004E-01	454	3.375E+01	495	2.736E+01	536	5.164E+01	577	7.464E+01
414	7.180E-01	455	3.237E+01	496	2.834E+01	537	5.207E+01	578	7.540E+01
415	8.729E-01	456	3.066E+01	497	2.930E+01	538	5.252E+01	579	7.615E+01
416	1.053E+00	457	2.886E+01	498	3.027E+01	539	5.300E+01	580	7.692E+01
417	1.248E+00	458	2.707E+01	499	3.121E+01	540	5.348E+01	581	7.773E+01
418	1.498E+00	459	2.536E+01	500	3.216E+01	541	5.392E+01	582	7.853E+01
419	1.754E+00	460	2.385E+01	501	3.306E+01	542	5.435E+01	583	7.934E+01
420	2.060E+00	461	2.256E+01	502	3.393E+01	543	5.483E+01	584	8.014E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	8.094E+01	626	1.045E+02	667	7.017E+01	708	2.710E+01	749	7.018E+00
586	8.181E+01	627	1.042E+02	668	6.896E+01	709	2.637E+01	750	6.787E+00
587	8.267E+01	628	1.039E+02	669	6.777E+01	710	2.564E+01	751	6.572E+00
588	8.356E+01	629	1.036E+02	670	6.655E+01	711	2.493E+01	752	6.299E+00
589	8.446E+01	630	1.032E+02	671	6.527E+01	712	2.430E+01	753	6.012E+00
590	8.532E+01	631	1.028E+02	672	6.404E+01	713	2.364E+01	754	5.769E+00
591	8.628E+01	632	1.024E+02	673	6.283E+01	714	2.303E+01	755	5.580E+00
592	8.724E+01	633	1.018E+02	674	6.162E+01	715	2.244E+01	756	5.369E+00
593	8.814E+01	634	1.014E+02	675	6.039E+01	716	2.181E+01	757	5.068E+00
594	8.907E+01	635	1.008E+02	676	5.911E+01	717	2.117E+01	758	4.817E+00
595	9.000E+01	636	1.003E+02	677	5.791E+01	718	2.056E+01	759	4.641E+00
596	9.093E+01	637	9.978E+01	678	5.673E+01	719	1.998E+01	760	4.469E+00
597	9.182E+01	638	9.910E+01	679	5.553E+01	720	1.943E+01	761	4.364E+00
598	9.272E+01	639	9.846E+01	680	5.442E+01	721	1.888E+01	762	4.310E+00
599	9.366E+01	640	9.780E+01	681	5.328E+01	722	1.835E+01	763	4.123E+00
600	9.462E+01	641	9.708E+01	682	5.214E+01	723	1.780E+01	764	3.881E+00
601	9.552E+01	642	9.634E+01	683	5.102E+01	724	1.723E+01	765	3.705E+00
602	9.636E+01	643	9.558E+01	684	4.984E+01	725	1.666E+01	766	3.559E+00
603	9.721E+01	644	9.483E+01	685	4.870E+01	726	1.611E+01	767	3.451E+00
604	9.799E+01	645	9.401E+01	686	4.764E+01	727	1.562E+01	768	3.330E+00
605	9.871E+01	646	9.314E+01	687	4.656E+01	728	1.520E+01	769	3.191E+00
606	9.945E+01	647	9.226E+01	688	4.554E+01	729	1.477E+01	770	3.051E+00
607	1.002E+02	648	9.140E+01	689	4.448E+01	730	1.426E+01	771	2.983E+00
608	1.009E+02	649	9.047E+01	690	4.340E+01	731	1.379E+01	772	2.879E+00
609	1.015E+02	650	8.948E+01	691	4.234E+01	732	1.332E+01	773	2.740E+00
610	1.021E+02	651	8.852E+01	692	4.137E+01	733	1.287E+01	774	2.643E+00
611	1.027E+02	652	8.749E+01	693	4.048E+01	734	1.242E+01	775	2.522E+00
612	1.032E+02	653	8.644E+01	694	3.956E+01	735	1.196E+01	776	2.413E+00
613	1.036E+02	654	8.538E+01	695	3.859E+01	736	1.151E+01	777	2.331E+00
614	1.039E+02	655	8.430E+01	696	3.758E+01	737	1.107E+01	778	2.261E+00
615	1.043E+02	656	8.320E+01	697	3.659E+01	738	1.066E+01	779	2.163E+00
616	1.047E+02	657	8.207E+01	698	3.565E+01	739	1.027E+01	780	2.022E+00
617	1.049E+02	658	8.094E+01	699	3.472E+01	740	9.897E+00		
618	1.050E+02	659	7.978E+01	700	3.382E+01	741	9.527E+00		
619	1.051E+02	660	7.857E+01	701	3.291E+01	742	9.160E+00		
620	1.051E+02	661	7.739E+01	702	3.204E+01	743	8.787E+00		
621	1.051E+02	662	7.623E+01	703	3.116E+01	744	8.450E+00		
622	1.050E+02	663	7.508E+01	704	3.032E+01	745	8.109E+00		
623	1.050E+02	664	7.387E+01	705	2.947E+01	746	7.776E+00		
624	1.049E+02	665	7.263E+01	706	2.866E+01	747	7.536E+00		
625	1.047E+02	666	7.140E+01	707	2.789E+01	748	7.297E+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**

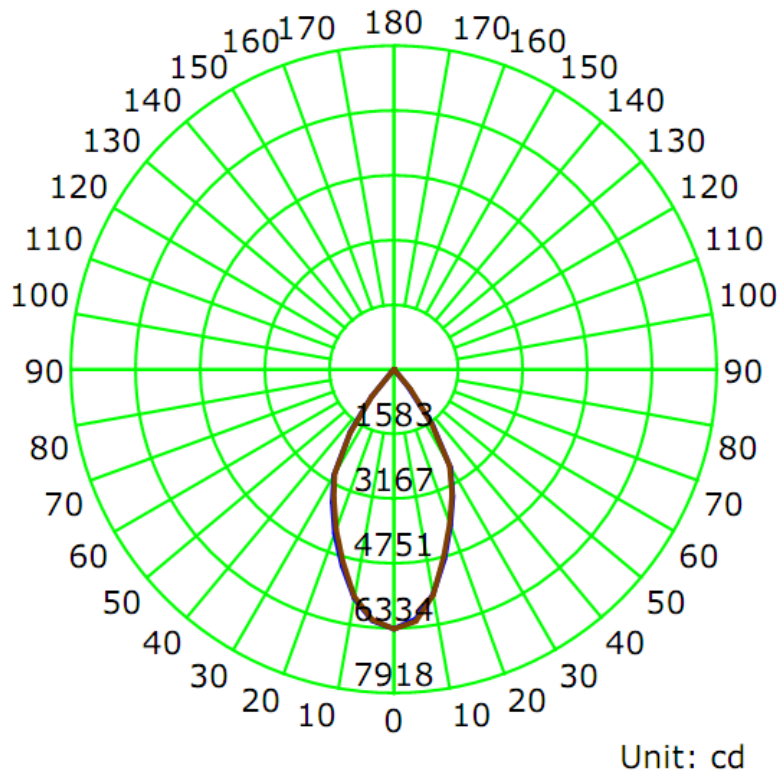
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5030	60.08	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4784.8	79.69	6334.8	0.79	0.78

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	55.4	56.3	54.5	53.8	54.9
Field Angle (10% I _{max}):	81.2	81.3	81.6	81.1	81.3

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	6335	6335	6335	6335	6335	6335	6335	6335
5.0°	6129	6132	6141	6155	6176	6215	6236	6215
10.0°	5578	5561	5557	5577	5594	5610	5677	5697
15.0°	4792	4809	4808	4765	4731	4739	4807	4883
20.0°	4053	4093	4088	4029	4004	3995	4069	4175
25.0°	3415	3464	3469	3412	3370	3347	3413	3503
30.0°	2779	2814	2768	2753	2727	2720	2791	2852
35.0°	1657	1629	1613	1610	1622	1663	1737	1821
40.0°	559	540	525	560	635	715	806	896
45.0°	51	44	42	41	47	48	64	90
50.0°	0	0	0	0	0	0	0	12
55.0°	0	0	0	0	0	0	0	0
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

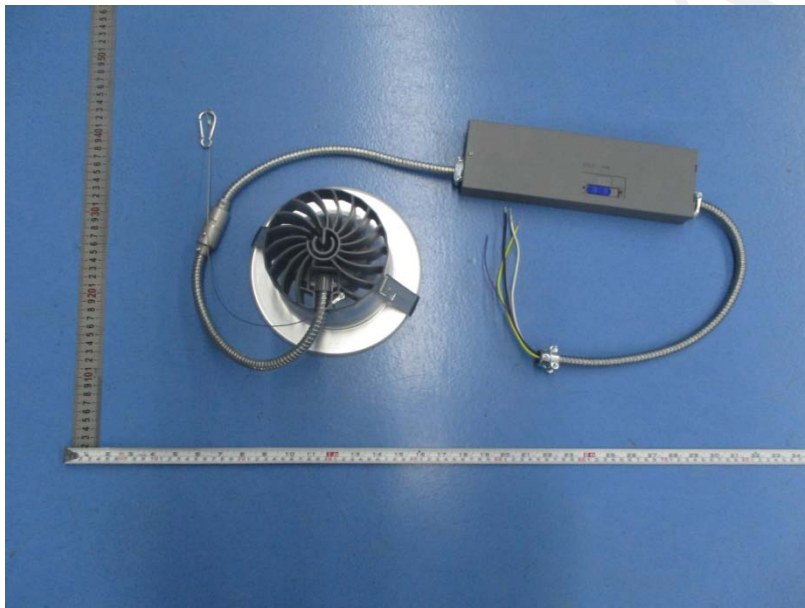
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	6335	6335	6335	6335	6335	6335	6335	6335
5.0°	6173	6176	6165	6132	6143	6108	6084	6074
10.0°	5670	5688	5687	5665	5638	5556	5507	5494
15.0°	4958	5014	5022	4977	4876	4769	4706	4720
20.0°	4268	4326	4340	4282	4161	4080	4043	4018
25.0°	3586	3655	3672	3578	3490	3409	3387	3392
30.0°	2980	3046	3064	3025	2936	2850	2798	2800
35.0°	1863	1933	1945	1944	1921	1858	1758	1680
40.0°	874	922	923	921	875	745	626	538
45.0°	79	92	98	96	91	71	58	42
50.0°	0	0	0	8	12	7	0	7
55.0°	0	0	0	0	0	0	0	0
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	149.3	3.12	0-5	149.3	3.12
5-10	420.8	8.79	0-10	570.1	11.91
10-15	619.6	12.95	0-15	1189.7	24.86
15-20	738.6	15.44	0-20	1928.3	40.30
20-25	797.0	16.66	0-25	2725.4	56.96
25-30	801.0	16.74	0-30	3526.3	73.70
30-35	680.7	14.23	0-35	4207.0	87.92
35-40	416.2	8.70	0-40	4623.2	96.62
40-45	147.1	3.07	0-45	4770.3	99.70
45-50	13.9	0.29	0-50	4784.1	99.99
50-55	0.6	0.01	0-55	4784.8	100.00
55-60	0.0	0.00	0-60	4784.8	100.00
60-65	0.0	0.00	0-65	4784.8	100.00
65-70	0.0	0.00	0-70	4784.8	100.00
70-75	0.0	0.00	0-75	4784.8	100.00
75-80	0.0	0.00	0-80	4784.8	100.00
80-85	0.0	0.00	0-85	4784.8	100.00
85-90	0.0	0.00	0-90	4784.8	100.00
90-95	0.0	0.00	0-95	4784.8	100.00
95-100	0.0	0.00	0-100	4784.8	100.00
100-105	0.0	0.00	0-105	4784.8	100.00
105-110	0.0	0.00	0-110	4784.8	100.00
110-115	0.0	0.00	0-115	4784.8	100.00
115-120	0.0	0.00	0-120	4784.8	100.00
120-125	0.0	0.00	0-125	4784.8	100.00
125-130	0.0	0.00	0-130	4784.8	100.00
130-135	0.0	0.00	0-135	4784.8	100.00
135-140	0.0	0.00	0-140	4784.8	100.00
140-145	0.0	0.00	0-145	4784.8	100.00
145-150	0.0	0.00	0-150	4784.8	100.00
150-155	0.0	0.00	0-155	4784.8	100.00
155-160	0.0	0.00	0-160	4784.8	100.00
160-165	0.0	0.00	0-165	4784.8	100.00
165-170	0.0	0.00	0-170	4784.8	100.00
170-175	0.0	0.00	0-175	4784.8	100.00
175-180	0.0	0.00	0-180	4784.8	100.00

6. Product Photo



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