



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD6LEL9027DIM010UNVNRCC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKS180131082-10-2
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.

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 2018-02-05 and used for testing.

Model Tested: AD6LEL9027DIM010UNVNRCC
 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.

4 π 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**

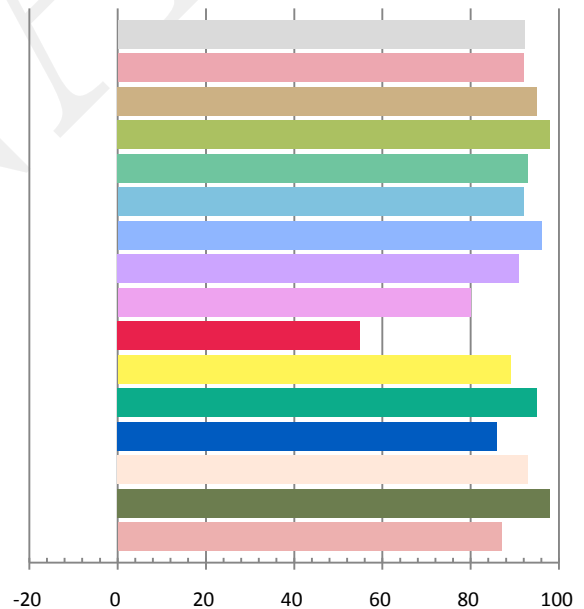
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.5035	60.09	0.9945	4766.2	79.32

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
16.649	2681	0.00134	0.4638	0.4151	0.2630	0.5297

Color Rendering Index

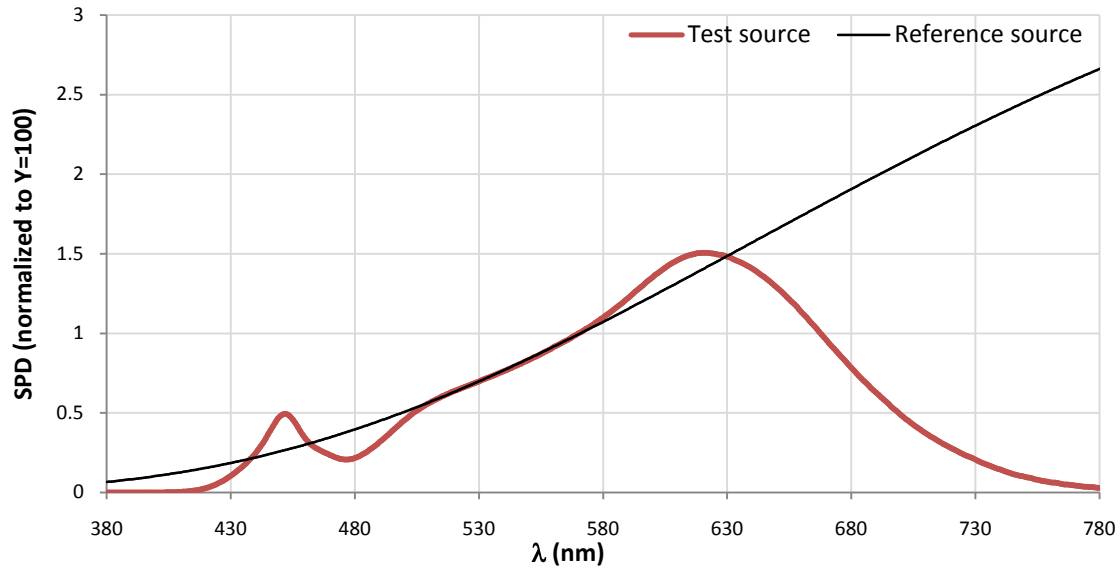
Ra 92.2			
R1 92	R2 95	R3 98	R4 93
R5 92	R6 96	R7 91	R8 80
R9 55	R10 89	R11 95	R12 86
R13 93	R14 98	R15 87	



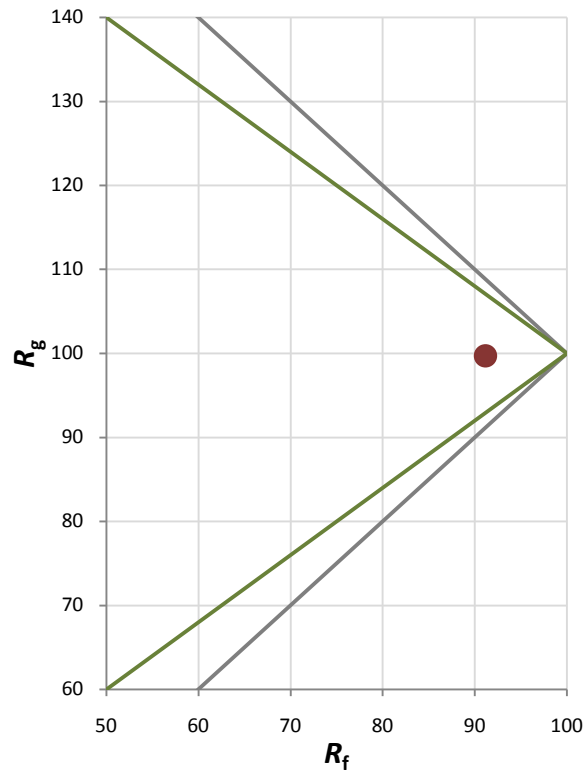
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	100

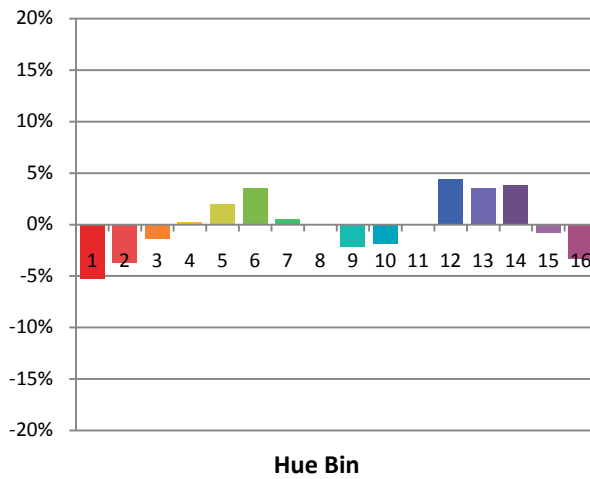
Spectral Power Distribution Comparison



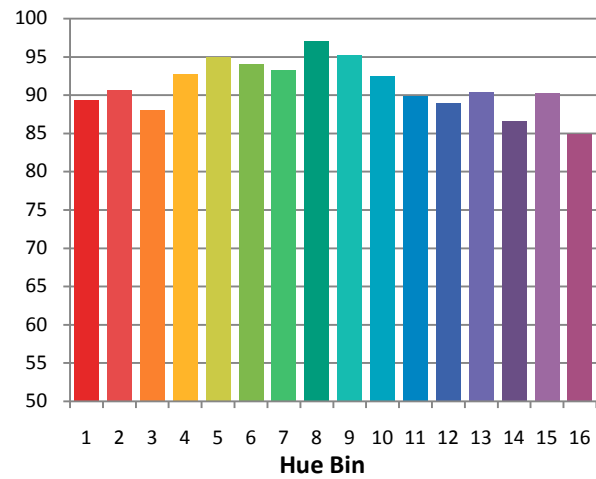
Plot of R_g versus R_f



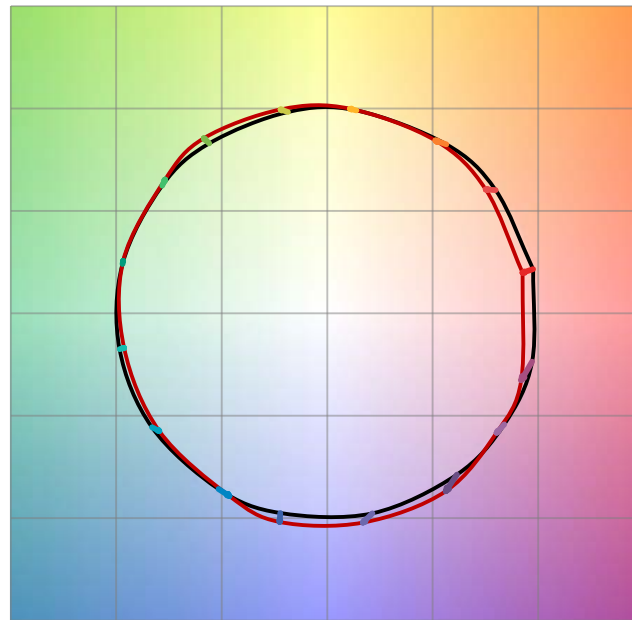
Chroma Shift by Hue



R_t by Hue

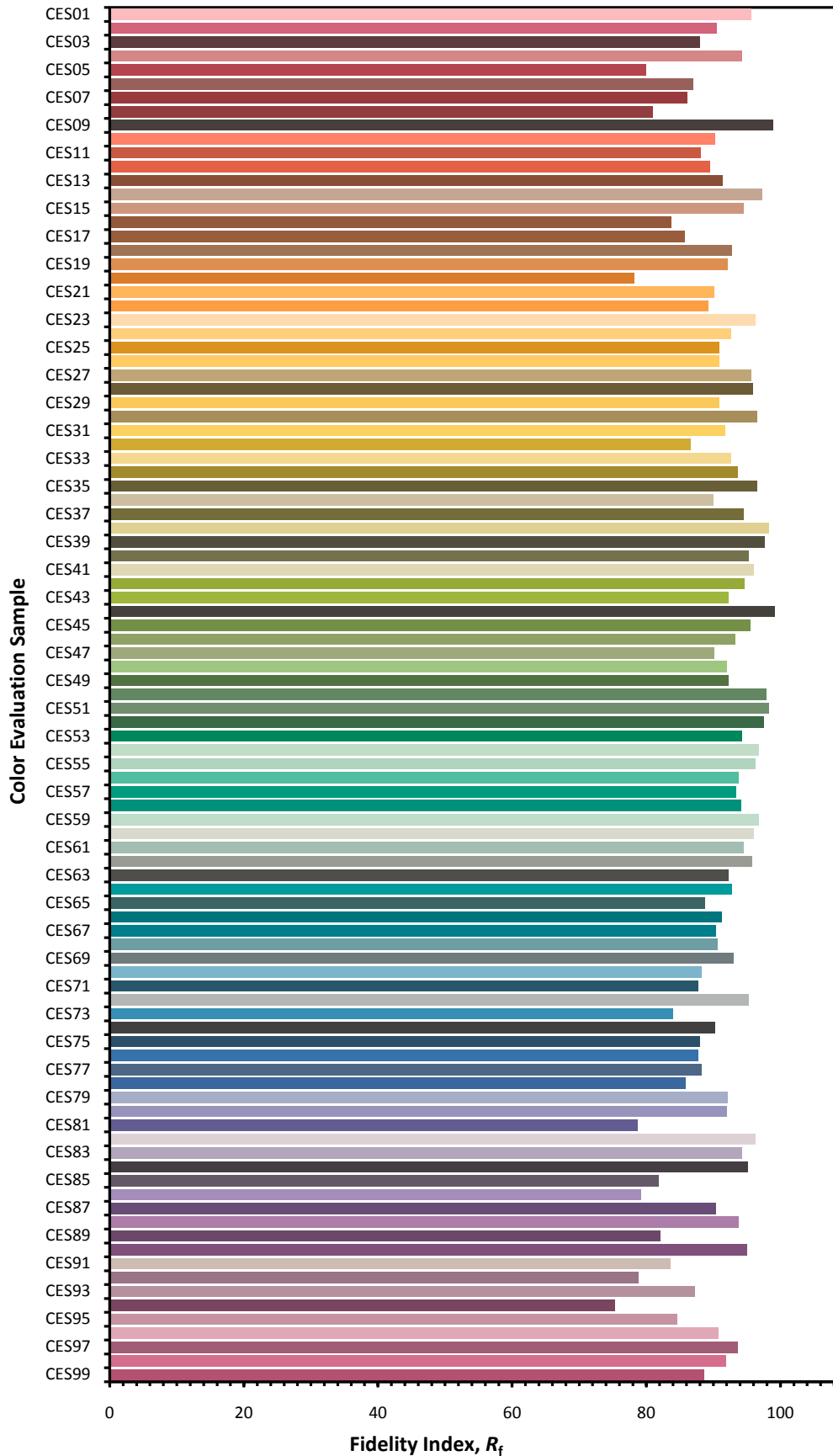


Color Vector Graphic

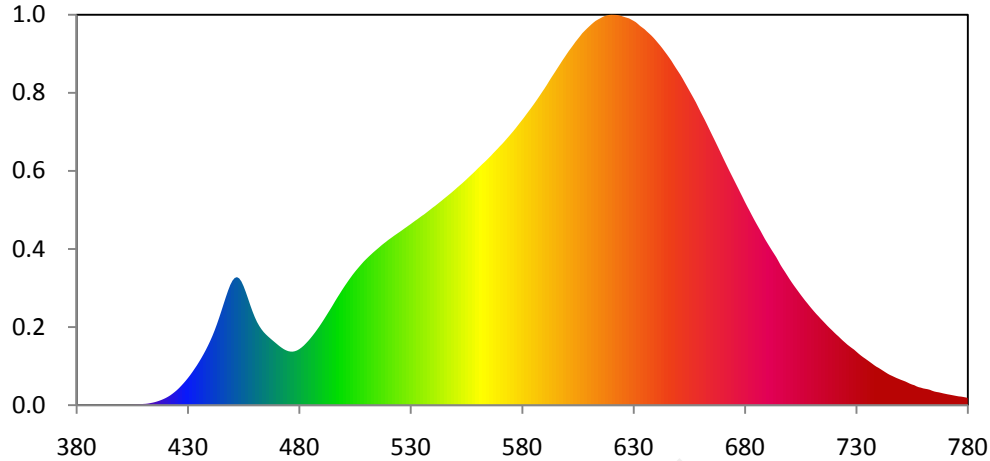


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



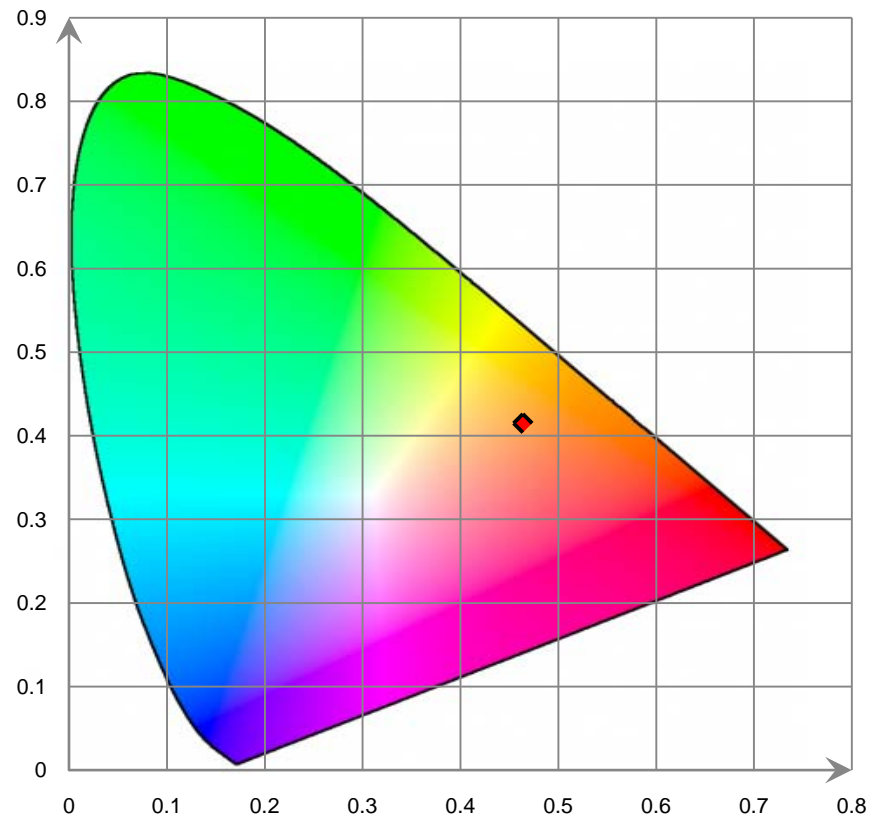
Relative Spectral Power Distribution



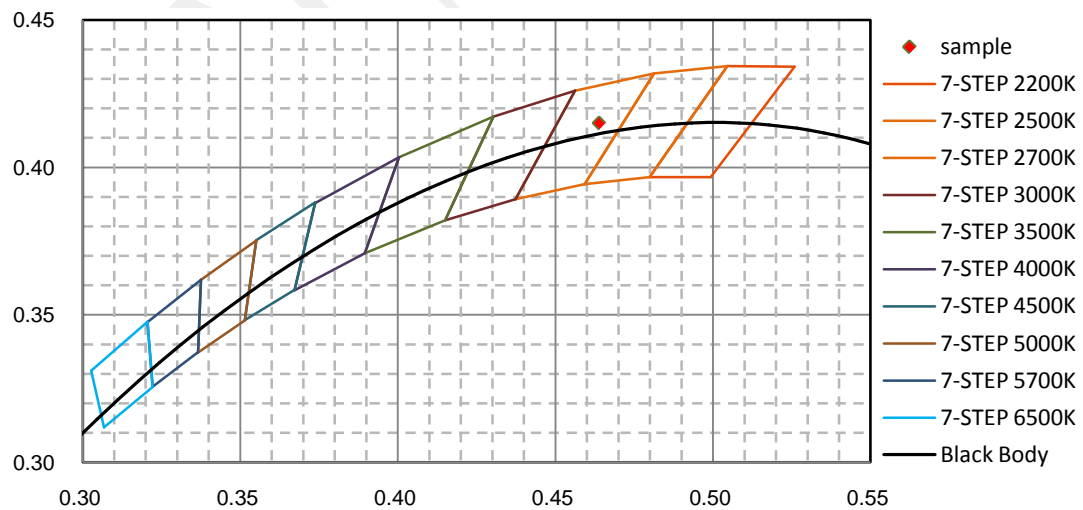
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.630E-02	421	2.248E+00	462	2.133E+01	503	3.432E+01	544	5.508E+01
381	1.740E-02	422	2.620E+00	463	2.043E+01	504	3.514E+01	545	5.559E+01
382	1.280E-02	423	3.046E+00	464	1.967E+01	505	3.591E+01	546	5.607E+01
383	2.540E-02	424	3.519E+00	465	1.904E+01	506	3.663E+01	547	5.657E+01
384	3.000E-02	425	4.024E+00	466	1.847E+01	507	3.734E+01	548	5.705E+01
385	1.670E-02	426	4.589E+00	467	1.794E+01	508	3.803E+01	549	5.756E+01
386	3.100E-02	427	5.218E+00	468	1.743E+01	509	3.870E+01	550	5.808E+01
387	3.140E-02	428	5.870E+00	469	1.692E+01	510	3.930E+01	551	5.862E+01
388	2.020E-02	429	6.564E+00	470	1.642E+01	511	3.989E+01	552	5.914E+01
389	2.030E-02	430	7.299E+00	471	1.593E+01	512	4.045E+01	553	5.965E+01
390	1.810E-02	431	8.082E+00	472	1.548E+01	513	4.100E+01	554	6.019E+01
391	8.600E-03	432	8.918E+00	473	1.509E+01	514	4.153E+01	555	6.074E+01
392	8.500E-03	433	9.798E+00	474	1.477E+01	515	4.204E+01	556	6.132E+01
393	1.740E-02	434	1.069E+01	475	1.455E+01	516	4.255E+01	557	6.188E+01
394	2.030E-02	435	1.165E+01	476	1.442E+01	517	4.307E+01	558	6.243E+01
395	1.960E-02	436	1.265E+01	477	1.440E+01	518	4.355E+01	559	6.301E+01
396	1.350E-02	437	1.371E+01	478	1.451E+01	519	4.400E+01	560	6.362E+01
397	1.160E-02	438	1.483E+01	479	1.473E+01	520	4.449E+01	561	6.420E+01
398	8.600E-03	439	1.603E+01	480	1.508E+01	521	4.491E+01	562	6.479E+01
399	4.500E-03	440	1.729E+01	481	1.552E+01	522	4.535E+01	563	6.534E+01
400	1.500E-02	441	1.865E+01	482	1.604E+01	523	4.579E+01	564	6.591E+01
401	2.460E-02	442	2.014E+01	483	1.665E+01	524	4.619E+01	565	6.652E+01
402	3.120E-02	443	2.177E+01	484	1.729E+01	525	4.660E+01	566	6.711E+01
403	4.240E-02	444	2.350E+01	485	1.799E+01	526	4.702E+01	567	6.777E+01
404	6.570E-02	445	2.532E+01	486	1.874E+01	527	4.746E+01	568	6.839E+01
405	9.500E-02	446	2.719E+01	487	1.952E+01	528	4.789E+01	569	6.901E+01
406	1.362E-01	447	2.904E+01	488	2.035E+01	529	4.832E+01	570	6.966E+01
407	1.681E-01	448	3.080E+01	489	2.120E+01	530	4.873E+01	571	7.027E+01
408	1.938E-01	449	3.235E+01	490	2.210E+01	531	4.918E+01	572	7.092E+01
409	2.632E-01	450	3.351E+01	491	2.303E+01	532	4.963E+01	573	7.162E+01
410	3.353E-01	451	3.423E+01	492	2.399E+01	533	5.004E+01	574	7.231E+01
411	3.673E-01	452	3.444E+01	493	2.495E+01	534	5.049E+01	575	7.301E+01
412	4.404E-01	453	3.412E+01	494	2.591E+01	535	5.093E+01	576	7.370E+01
413	5.440E-01	454	3.328E+01	495	2.690E+01	536	5.133E+01	577	7.444E+01
414	6.622E-01	455	3.198E+01	496	2.792E+01	537	5.179E+01	578	7.521E+01
415	8.023E-01	456	3.040E+01	497	2.890E+01	538	5.226E+01	579	7.599E+01
416	9.671E-01	457	2.866E+01	498	2.985E+01	539	5.274E+01	580	7.674E+01
417	1.163E+00	458	2.689E+01	499	3.080E+01	540	5.321E+01	581	7.752E+01
418	1.382E+00	459	2.521E+01	500	3.172E+01	541	5.364E+01	582	7.834E+01
419	1.636E+00	460	2.371E+01	501	3.261E+01	542	5.413E+01	583	7.914E+01
420	1.926E+00	461	2.240E+01	502	3.348E+01	543	5.461E+01	584	7.995E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	8.077E+01	626	1.044E+02	667	7.058E+01	708	2.743E+01	749	7.077E+00
586	8.162E+01	627	1.043E+02	668	6.933E+01	709	2.668E+01	750	6.831E+00
587	8.249E+01	628	1.041E+02	669	6.806E+01	710	2.595E+01	751	6.603E+00
588	8.338E+01	629	1.037E+02	670	6.680E+01	711	2.525E+01	752	6.380E+00
589	8.428E+01	630	1.034E+02	671	6.554E+01	712	2.457E+01	753	6.098E+00
590	8.516E+01	631	1.031E+02	672	6.431E+01	713	2.393E+01	754	5.794E+00
591	8.609E+01	632	1.026E+02	673	6.309E+01	714	2.327E+01	755	5.562E+00
592	8.707E+01	633	1.020E+02	674	6.189E+01	715	2.264E+01	756	5.378E+00
593	8.803E+01	634	1.016E+02	675	6.070E+01	716	2.200E+01	757	5.077E+00
594	8.896E+01	635	1.011E+02	676	5.951E+01	717	2.137E+01	758	4.841E+00
595	8.987E+01	636	1.006E+02	677	5.832E+01	718	2.077E+01	759	4.710E+00
596	9.081E+01	637	1.000E+02	678	5.709E+01	719	2.021E+01	760	4.513E+00
597	9.174E+01	638	9.946E+01	679	5.590E+01	720	1.961E+01	761	4.403E+00
598	9.268E+01	639	9.884E+01	680	5.469E+01	721	1.903E+01	762	4.292E+00
599	9.356E+01	640	9.816E+01	681	5.351E+01	722	1.850E+01	763	4.144E+00
600	9.446E+01	641	9.744E+01	682	5.239E+01	723	1.792E+01	764	3.886E+00
601	9.534E+01	642	9.674E+01	683	5.124E+01	724	1.735E+01	765	3.684E+00
602	9.614E+01	643	9.597E+01	684	5.010E+01	725	1.681E+01	766	3.556E+00
603	9.695E+01	644	9.516E+01	685	4.901E+01	726	1.629E+01	767	3.460E+00
604	9.780E+01	645	9.436E+01	686	4.795E+01	727	1.582E+01	768	3.320E+00
605	9.854E+01	646	9.353E+01	687	4.690E+01	728	1.537E+01	769	3.169E+00
606	9.930E+01	647	9.266E+01	688	4.578E+01	729	1.493E+01	770	3.050E+00
607	1.001E+02	648	9.168E+01	689	4.470E+01	730	1.441E+01	771	2.923E+00
608	1.007E+02	649	9.074E+01	690	4.369E+01	731	1.388E+01	772	2.811E+00
609	1.013E+02	650	8.983E+01	691	4.271E+01	732	1.338E+01	773	2.704E+00
610	1.019E+02	651	8.892E+01	692	4.175E+01	733	1.293E+01	774	2.586E+00
611	1.024E+02	652	8.791E+01	693	4.082E+01	734	1.253E+01	775	2.468E+00
612	1.029E+02	653	8.682E+01	694	3.988E+01	735	1.209E+01	776	2.362E+00
613	1.034E+02	654	8.577E+01	695	3.881E+01	736	1.166E+01	777	2.310E+00
614	1.038E+02	655	8.470E+01	696	3.771E+01	737	1.122E+01	778	2.207E+00
615	1.041E+02	656	8.363E+01	697	3.675E+01	738	1.077E+01	779	2.091E+00
616	1.044E+02	657	8.256E+01	698	3.584E+01	739	1.036E+01	780	1.966E+00
617	1.047E+02	658	8.147E+01	699	3.490E+01	740	1.003E+01		
618	1.049E+02	659	8.025E+01	700	3.395E+01	741	9.653E+00		
619	1.050E+02	660	7.903E+01	701	3.305E+01	742	9.261E+00		
620	1.051E+02	661	7.788E+01	702	3.218E+01	743	8.879E+00		
621	1.050E+02	662	7.673E+01	703	3.137E+01	744	8.496E+00		
622	1.050E+02	663	7.551E+01	704	3.055E+01	745	8.166E+00		
623	1.050E+02	664	7.426E+01	705	2.973E+01	746	7.890E+00		
624	1.048E+02	665	7.302E+01	706	2.894E+01	747	7.609E+00		
625	1.046E+02	666	7.180E+01	707	2.816E+01	748	7.325E+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**

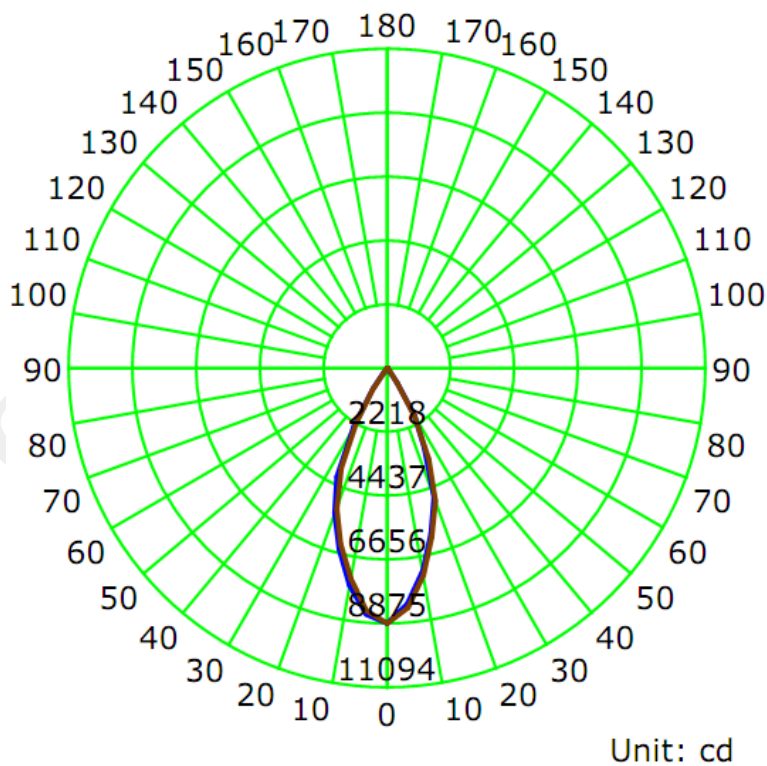
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.5030	60.09	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4768.7	79.41	8875.3	0.69	0.69

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	44.8	44.9	44.4	44.2	44.6
Field Angle (10% I _{max}):	68.9	69.9	69.4	68.8	69.3

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	8875	8875	8875	8875	8875	8875	8875	8875
5.0°	8225	8238	8246	8306	8348	8438	8494	8550
10.0°	7132	7123	7162	7207	7288	7411	7484	7667
15.0°	5932	5903	5959	5988	6074	6141	6307	6422
20.0°	4770	4726	4746	4798	4910	5018	5112	5279
25.0°	3073	3024	3103	3282	3476	3733	3937	4076
30.0°	1927	1906	1903	1915	1937	2013	2121	2288
35.0°	630	613	607	620	664	693	760	865
40.0°	150	133	126	128	131	139	177	226
45.0°	42	38	30	31	33	36	43	48
50.0°	0	0	0	0	0	0	0	0
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

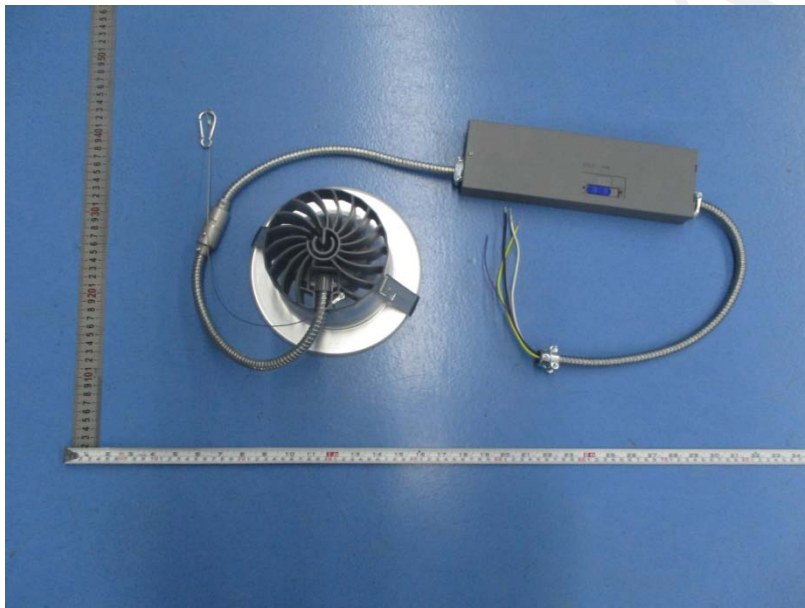
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	8875	8875	8875	8875	8875	8875	8875	8875
5.0°	8580	8679	8590	8587	8448	8379	8250	8144
10.0°	7666	7740	7709	7625	7424	7245	7141	7049
15.0°	6492	6573	6549	6450	6324	6158	5984	5903
20.0°	5372	5403	5392	5302	5196	5058	4889	4770
25.0°	4161	4179	4175	4042	3816	3484	3237	3049
30.0°	2337	2409	2359	2314	2215	2083	2000	1925
35.0°	871	963	1034	1036	923	820	708	628
40.0°	227	253	254	237	198	175	164	149
45.0°	47	52	51	55	49	51	46	26
50.0°	0	0	0	0	0	0	0	0
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	206.6	4.33	0-5	206.6	4.33
5-10	564.7	11.84	0-10	771.3	16.17
10-15	805.4	16.89	0-15	1576.7	33.06
15-20	926.6	19.43	0-20	2503.3	52.49
20-25	908.4	19.05	0-25	3411.7	71.54
25-30	723.7	15.18	0-30	4135.4	86.72
30-35	424.1	8.89	0-35	4559.6	95.62
35-40	159.5	3.35	0-40	4719.1	98.96
40-45	41.0	0.86	0-45	4760.1	99.82
45-50	8.6	0.18	0-50	4768.7	100.00
50-55	0.0	0.00	0-55	4768.7	100.00
55-60	0.0	0.00	0-60	4768.7	100.00
60-65	0.0	0.00	0-65	4768.7	100.00
65-70	0.0	0.00	0-70	4768.7	100.00
70-75	0.0	0.00	0-75	4768.7	100.00
75-80	0.0	0.00	0-80	4768.7	100.00
80-85	0.0	0.00	0-85	4768.7	100.00
85-90	0.0	0.00	0-90	4768.7	100.00
90-95	0.0	0.00	0-95	4768.7	100.00
95-100	0.0	0.00	0-100	4768.7	100.00
100-105	0.0	0.00	0-105	4768.7	100.00
105-110	0.0	0.00	0-110	4768.7	100.00
110-115	0.0	0.00	0-115	4768.7	100.00
115-120	0.0	0.00	0-120	4768.7	100.00
120-125	0.0	0.00	0-125	4768.7	100.00
125-130	0.0	0.00	0-130	4768.7	100.00
130-135	0.0	0.00	0-135	4768.7	100.00
135-140	0.0	0.00	0-140	4768.7	100.00
140-145	0.0	0.00	0-145	4768.7	100.00
145-150	0.0	0.00	0-150	4768.7	100.00
150-155	0.0	0.00	0-155	4768.7	100.00
155-160	0.0	0.00	0-160	4768.7	100.00
160-165	0.0	0.00	0-165	4768.7	100.00
165-170	0.0	0.00	0-170	4768.7	100.00
170-175	0.0	0.00	0-175	4768.7	100.00
175-180	0.0	0.00	0-180	4768.7	100.00

6. Product Photo



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