

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD4LES9027DIM010UNVWDRBL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180522001-10-3
Test Date:	2018-05-22
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 2018-05-22 and used for testing.

Model Tested: AD4LES9027DIM010UNVWDRBL
 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: 12.5W
 Nominal CCT: 2700K
 Nominal Lumen Output: 850lm

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**

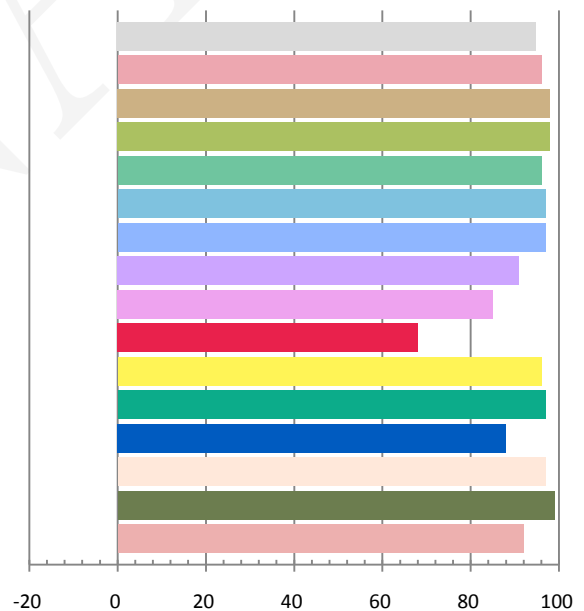
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1043	12.47	0.9961	950.8	76.25

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.396	2738	-0.00175	0.4539	0.4045	0.2614	0.5241

Color Rendering Index

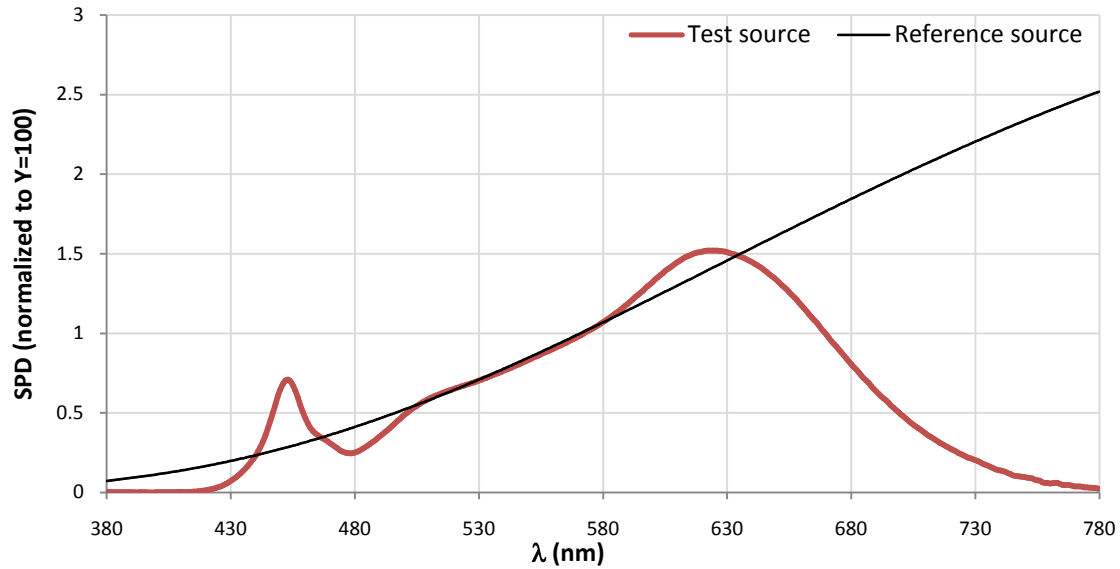
Ra			
94.8			
R1	R2	R3	R4
96	98	98	96
R5	R6	R7	R8
97	97	91	85
R9	R10	R11	R12
68	96	97	88
R13	R14	R15	
97	99	92	



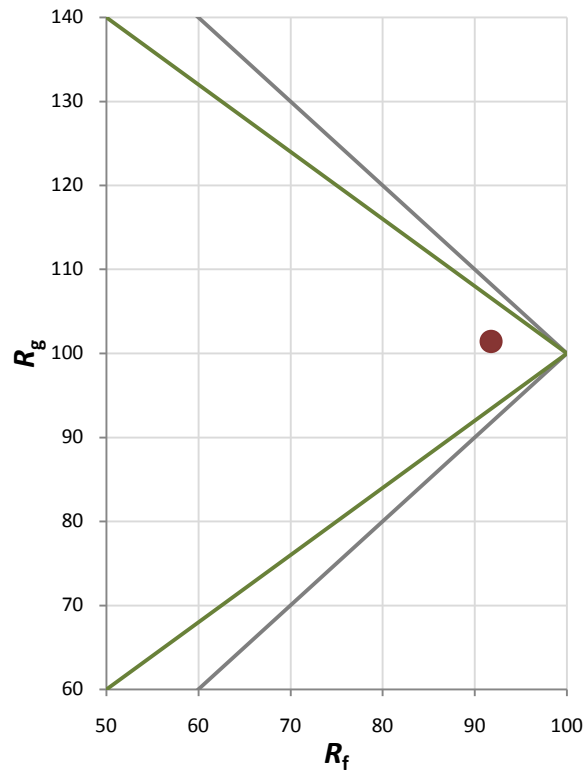
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	101

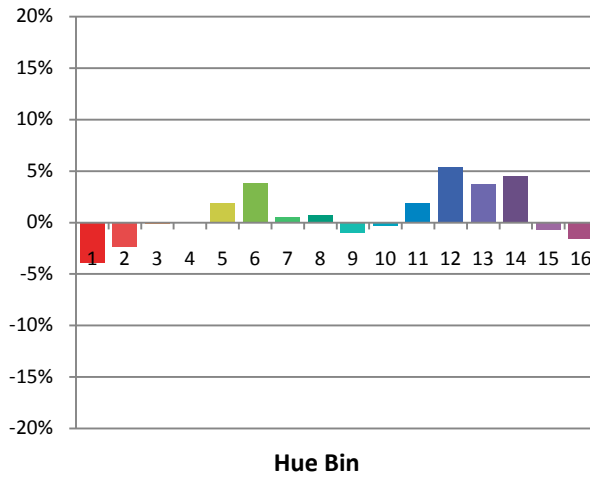
Spectral Power Distribution Comparison



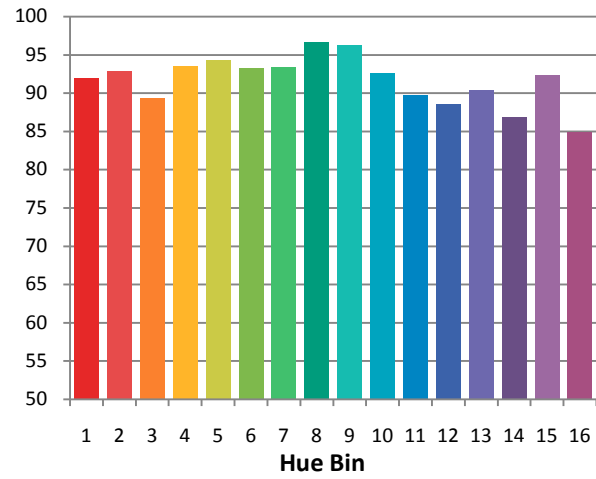
Plot of R_g versus R_f



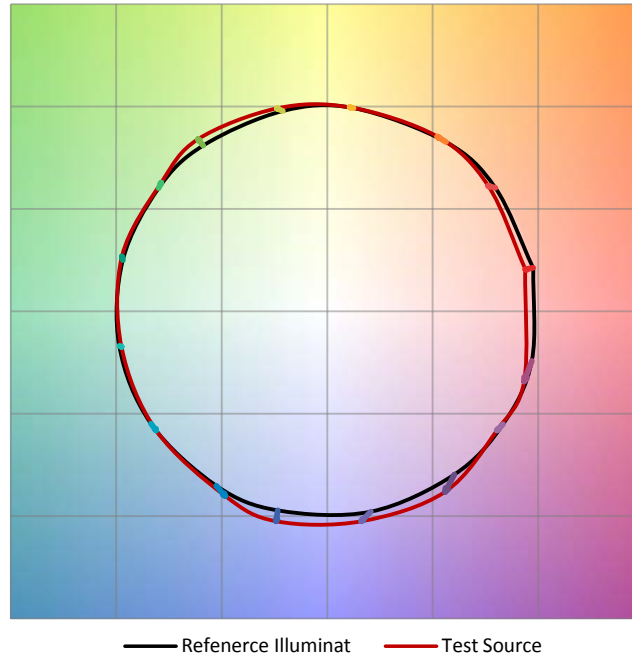
Chroma Shift by Hue



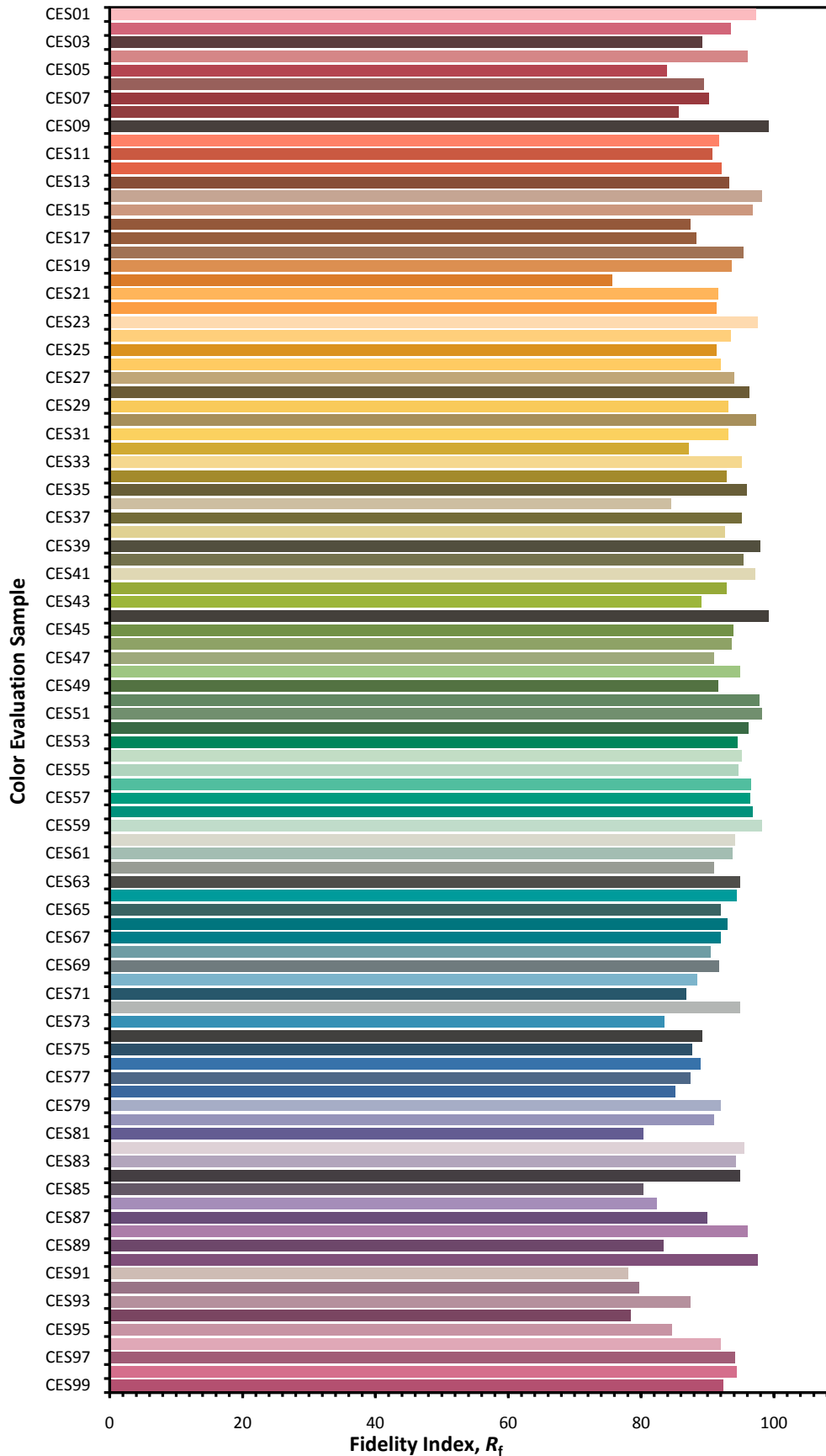
R_t by Hue



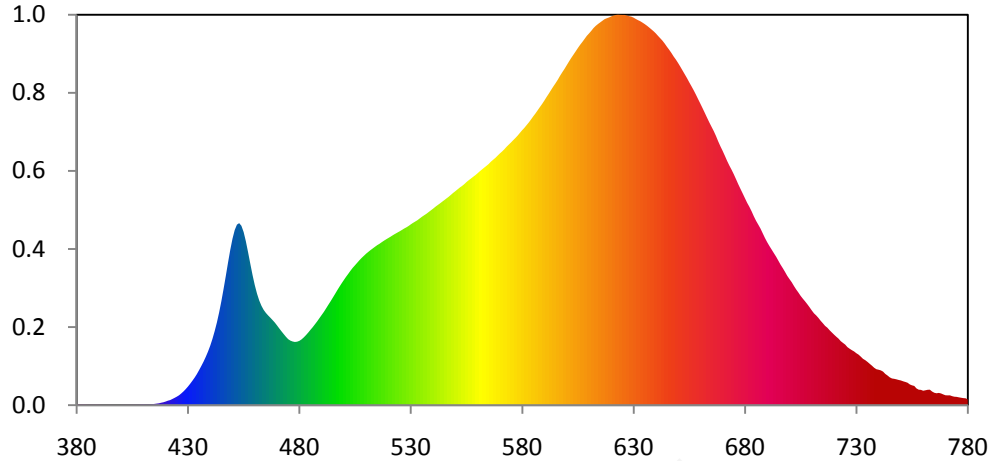
Color Vector Graphic



Color Fidelity by CES Sample



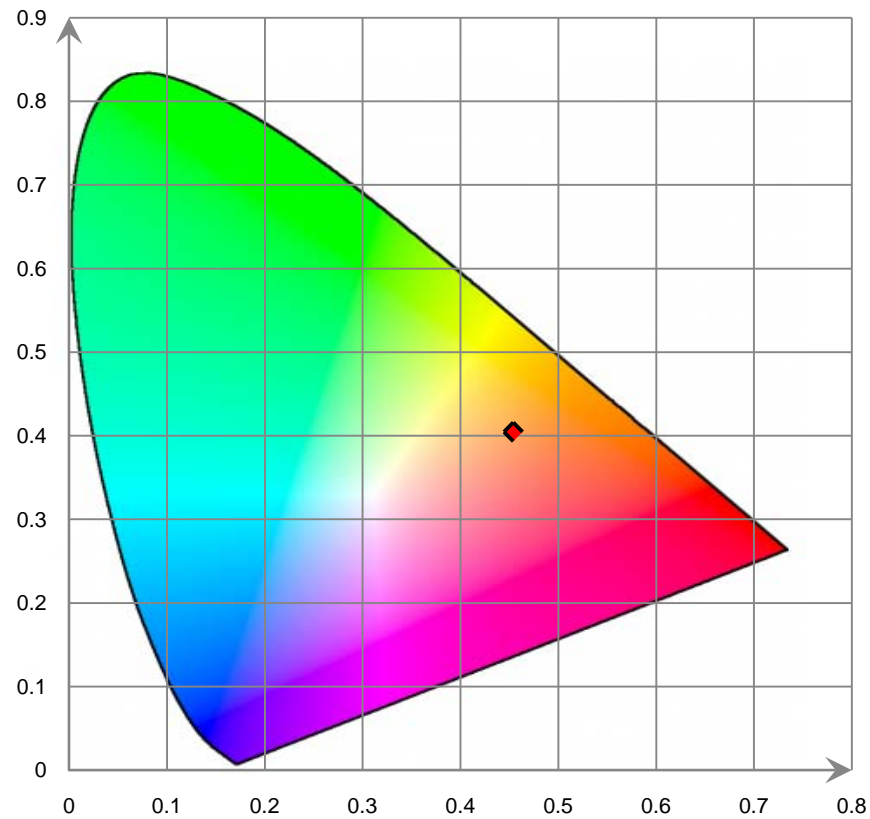
Relative Spectral Power Distribution



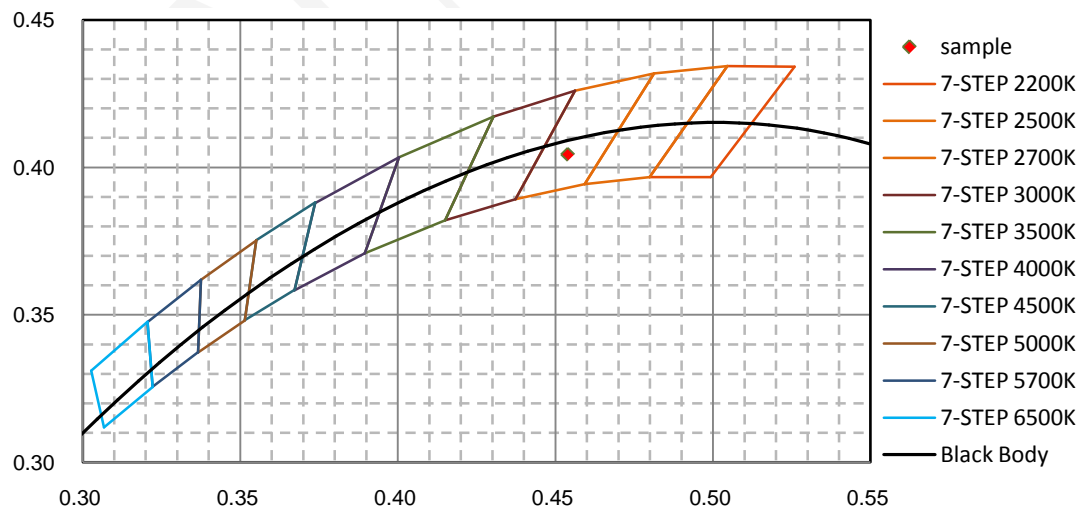
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.580E-02	421	2.428E-01	462	5.675E+00	503	7.296E+00	544	1.102E+01
381	4.630E-02	422	2.747E-01	463	5.386E+00	504	7.452E+00	545	1.111E+01
382	3.500E-02	423	3.348E-01	464	5.166E+00	505	7.586E+00	546	1.120E+01
383	3.820E-02	424	3.955E-01	465	4.999E+00	506	7.724E+00	547	1.130E+01
384	3.870E-02	425	4.605E-01	466	4.864E+00	507	7.861E+00	548	1.140E+01
385	2.190E-02	426	5.357E-01	467	4.742E+00	508	7.986E+00	549	1.151E+01
386	2.690E-02	427	6.356E-01	468	4.612E+00	509	8.101E+00	550	1.160E+01
387	2.780E-02	428	7.460E-01	469	4.480E+00	510	8.215E+00	551	1.170E+01
388	2.640E-02	429	8.698E-01	470	4.322E+00	511	8.316E+00	552	1.180E+01
389	3.300E-02	430	1.007E+00	471	4.159E+00	512	8.412E+00	553	1.188E+01
390	3.040E-02	431	1.160E+00	472	4.004E+00	513	8.502E+00	554	1.198E+01
391	1.380E-02	432	1.324E+00	473	3.852E+00	514	8.592E+00	555	1.209E+01
392	9.700E-03	433	1.492E+00	474	3.706E+00	515	8.678E+00	556	1.219E+01
393	1.230E-02	434	1.683E+00	475	3.578E+00	516	8.751E+00	557	1.228E+01
394	1.570E-02	435	1.898E+00	476	3.500E+00	517	8.837E+00	558	1.238E+01
395	1.650E-02	436	2.123E+00	477	3.452E+00	518	8.919E+00	559	1.247E+01
396	1.220E-02	437	2.359E+00	478	3.427E+00	519	8.994E+00	560	1.257E+01
397	8.900E-03	438	2.618E+00	479	3.442E+00	520	9.066E+00	561	1.268E+01
398	5.800E-03	439	2.902E+00	480	3.486E+00	521	9.137E+00	562	1.278E+01
399	2.800E-03	440	3.222E+00	481	3.568E+00	522	9.217E+00	563	1.288E+01
400	1.420E-02	441	3.593E+00	482	3.675E+00	523	9.289E+00	564	1.298E+01
401	1.710E-02	442	4.013E+00	483	3.800E+00	524	9.356E+00	565	1.308E+01
402	1.950E-02	443	4.484E+00	484	3.938E+00	525	9.424E+00	566	1.320E+01
403	2.140E-02	444	5.025E+00	485	4.086E+00	526	9.495E+00	567	1.331E+01
404	2.020E-02	445	5.635E+00	486	4.226E+00	527	9.573E+00	568	1.341E+01
405	2.070E-02	446	6.303E+00	487	4.383E+00	528	9.637E+00	569	1.353E+01
406	2.630E-02	447	7.005E+00	488	4.543E+00	529	9.711E+00	570	1.365E+01
407	2.820E-02	448	7.731E+00	489	4.714E+00	530	9.800E+00	571	1.375E+01
408	2.710E-02	449	8.421E+00	490	4.885E+00	531	9.882E+00	572	1.387E+01
409	4.550E-02	450	9.024E+00	491	5.056E+00	532	9.954E+00	573	1.401E+01
410	4.940E-02	451	9.497E+00	492	5.246E+00	533	1.003E+01	574	1.413E+01
411	3.690E-02	452	9.788E+00	493	5.437E+00	534	1.012E+01	575	1.424E+01
412	3.670E-02	453	9.869E+00	494	5.626E+00	535	1.021E+01	576	1.437E+01
413	4.310E-02	454	9.725E+00	495	5.822E+00	536	1.029E+01	577	1.449E+01
414	5.280E-02	455	9.387E+00	496	6.023E+00	537	1.037E+01	578	1.462E+01
415	6.880E-02	456	8.887E+00	497	6.226E+00	538	1.047E+01	579	1.476E+01
416	8.620E-02	457	8.290E+00	498	6.420E+00	539	1.056E+01	580	1.490E+01
417	1.041E-01	458	7.666E+00	499	6.609E+00	540	1.065E+01	581	1.503E+01
418	1.338E-01	459	7.057E+00	500	6.789E+00	541	1.075E+01	582	1.518E+01
419	1.581E-01	460	6.512E+00	501	6.964E+00	542	1.084E+01	583	1.533E+01
420	1.977E-01	461	6.050E+00	502	7.128E+00	543	1.093E+01	584	1.549E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.566E+01	626	2.116E+01	667	1.460E+01	708	5.475E+00	749	1.367E+00
586	1.582E+01	627	2.113E+01	668	1.430E+01	709	5.311E+00	750	1.340E+00
587	1.599E+01	628	2.109E+01	669	1.403E+01	710	5.138E+00	751	1.295E+00
588	1.617E+01	629	2.106E+01	670	1.379E+01	711	4.979E+00	752	1.260E+00
589	1.633E+01	630	2.101E+01	671	1.352E+01	712	4.865E+00	753	1.217E+00
590	1.652E+01	631	2.094E+01	672	1.324E+01	713	4.729E+00	754	1.126E+00
591	1.671E+01	632	2.087E+01	673	1.300E+01	714	4.575E+00	755	1.076E+00
592	1.690E+01	633	2.082E+01	674	1.277E+01	715	4.439E+00	756	1.043E+00
593	1.709E+01	634	2.074E+01	675	1.252E+01	716	4.297E+00	757	9.072E-01
594	1.728E+01	635	2.066E+01	676	1.225E+01	717	4.200E+00	758	8.402E-01
595	1.746E+01	636	2.057E+01	677	1.198E+01	718	4.063E+00	759	8.292E-01
596	1.764E+01	637	2.048E+01	678	1.173E+01	719	3.943E+00	760	7.830E-01
597	1.785E+01	638	2.038E+01	679	1.148E+01	720	3.824E+00	761	8.056E-01
598	1.805E+01	639	2.027E+01	680	1.122E+01	721	3.712E+00	762	8.343E-01
599	1.823E+01	640	2.016E+01	681	1.097E+01	722	3.610E+00	763	8.403E-01
600	1.843E+01	641	2.002E+01	682	1.075E+01	723	3.472E+00	764	7.414E-01
601	1.863E+01	642	1.989E+01	683	1.051E+01	724	3.376E+00	765	6.726E-01
602	1.882E+01	643	1.976E+01	684	1.024E+01	725	3.284E+00	766	6.452E-01
603	1.900E+01	644	1.960E+01	685	9.995E+00	726	3.148E+00	767	6.654E-01
604	1.918E+01	645	1.943E+01	686	9.785E+00	727	3.062E+00	768	6.372E-01
605	1.936E+01	646	1.927E+01	687	9.572E+00	728	2.983E+00	769	5.852E-01
606	1.953E+01	647	1.909E+01	688	9.317E+00	729	2.912E+00	770	5.379E-01
607	1.969E+01	648	1.890E+01	689	9.062E+00	730	2.817E+00	771	5.311E-01
608	1.985E+01	649	1.874E+01	690	8.834E+00	731	2.742E+00	772	5.327E-01
609	2.002E+01	650	1.855E+01	691	8.629E+00	732	2.632E+00	773	4.891E-01
610	2.015E+01	651	1.835E+01	692	8.436E+00	733	2.512E+00	774	4.595E-01
611	2.029E+01	652	1.815E+01	693	8.240E+00	734	2.442E+00	775	4.502E-01
612	2.044E+01	653	1.794E+01	694	8.051E+00	735	2.347E+00	776	4.251E-01
613	2.056E+01	654	1.773E+01	695	7.835E+00	736	2.243E+00	777	4.052E-01
614	2.066E+01	655	1.751E+01	696	7.619E+00	737	2.142E+00	778	3.825E-01
615	2.075E+01	656	1.729E+01	697	7.427E+00	738	2.029E+00	779	3.740E-01
616	2.084E+01	657	1.707E+01	698	7.225E+00	739	1.951E+00	780	3.160E-01
617	2.093E+01	658	1.684E+01	699	7.011E+00	740	1.922E+00		
618	2.098E+01	659	1.659E+01	700	6.836E+00	741	1.886E+00		
619	2.102E+01	660	1.634E+01	701	6.665E+00	742	1.821E+00		
620	2.108E+01	661	1.610E+01	702	6.463E+00	743	1.696E+00		
621	2.112E+01	662	1.584E+01	703	6.275E+00	744	1.608E+00		
622	2.115E+01	663	1.559E+01	704	6.107E+00	745	1.509E+00		
623	2.117E+01	664	1.533E+01	705	5.928E+00	746	1.448E+00		
624	2.116E+01	665	1.510E+01	706	5.772E+00	747	1.430E+00		
625	2.116E+01	666	1.486E+01	707	5.629E+00	748	1.402E+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**

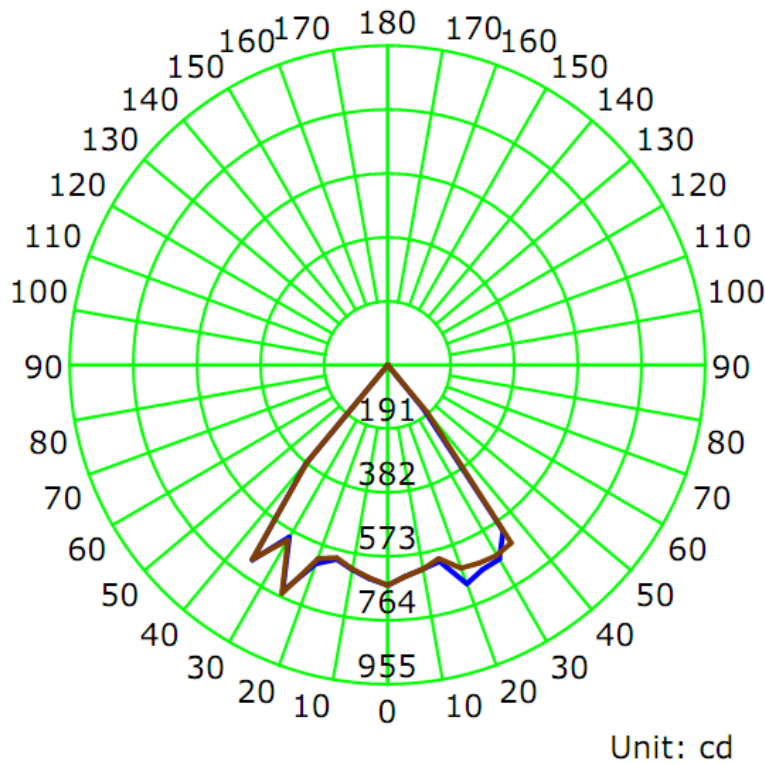
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1040	12.43	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
952.7	76.70	764.1	1.43	1.44

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	77.8	78.2	77.9	77.2	77.9
Field Angle (10% I_{max}):	86.9	86.2	87.1	87.2	86.9

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	658	658	658	658	658	658	658	658
5.0°	635	634	634	634	635	640	641	644
10.0°	620	618	617	617	619	621	624	628
15.0°	608	608	608	600	598	602	605	612
20.0°	697	695	700	668	646	647	643	625
25.0°	675	653	647	630	653	693	738	752
30.0°	671	680	674	668	657	660	657	637
35.0°	607	607	607	629	649	670	688	697
40.0°	166	133	123	144	184	223	288	369
45.0°	3	4	4	4	4	3	5	5
50.0°	0	1	1	2	1	1	1	2
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

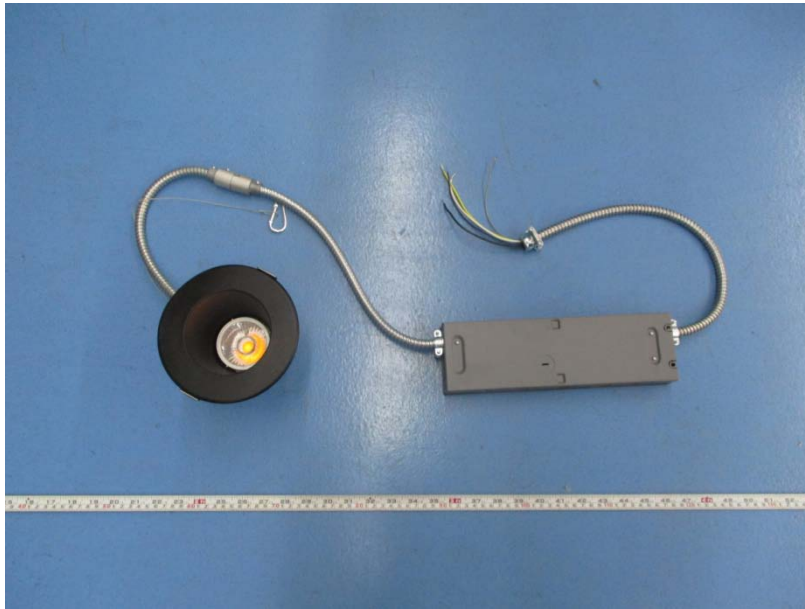
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	658	658	658	658	658	658	658	658
5.0°	640	641	642	641	639	638	635	634
10.0°	621	624	625	622	620	617	616	614
15.0°	601	603	604	600	596	596	597	600
20.0°	632	617	613	609	617	672	724	734
25.0°	747	732	745	735	753	764	755	719
30.0°	593	561	556	553	603	669	688	666
35.0°	711	706	691	696	710	687	663	623
40.0°	387	424	438	410	376	296	236	183
45.0°	3	5	6	6	6	6	5	4
50.0°	1	1	2	2	2	2	1	1
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	15.5	1.63	0-5	15.5	1.63
5-10	45.0	4.72	0-10	60.5	6.35
10-15	72.5	7.61	0-15	133.0	13.96
15-20	103.9	10.91	0-20	236.9	24.87
20-25	143.7	15.09	0-25	380.7	39.95
25-30	170.7	17.92	0-30	551.4	57.88
30-35	191.8	20.13	0-35	743.1	78.00
35-40	156.6	16.44	0-40	899.7	94.44
40-45	51.5	5.41	0-45	951.2	99.85
45-50	1.2	0.12	0-50	952.4	99.97
50-55	0.3	0.03	0-55	952.7	100.00
55-60	0.0	0.00	0-60	952.7	100.00
60-65	0.0	0.00	0-65	952.7	100.00
65-70	0.0	0.00	0-70	952.7	100.00
70-75	0.0	0.00	0-75	952.7	100.00
75-80	0.0	0.00	0-80	952.7	100.00
80-85	0.0	0.00	0-85	952.7	100.00
85-90	0.0	0.00	0-90	952.7	100.00
90-95	0.0	0.00	0-95	952.7	100.00
95-100	0.0	0.00	0-100	952.7	100.00
100-105	0.0	0.00	0-105	952.7	100.00
105-110	0.0	0.00	0-110	952.7	100.00
110-115	0.0	0.00	0-115	952.7	100.00
115-120	0.0	0.00	0-120	952.7	100.00
120-125	0.0	0.00	0-125	952.7	100.00
125-130	0.0	0.00	0-130	952.7	100.00
130-135	0.0	0.00	0-135	952.7	100.00
135-140	0.0	0.00	0-140	952.7	100.00
140-145	0.0	0.00	0-145	952.7	100.00
145-150	0.0	0.00	0-150	952.7	100.00
150-155	0.0	0.00	0-155	952.7	100.00
155-160	0.0	0.00	0-160	952.7	100.00
160-165	0.0	0.00	0-165	952.7	100.00
165-170	0.0	0.00	0-170	952.7	100.00
170-175	0.0	0.00	0-175	952.7	100.00
175-180	0.0	0.00	0-180	952.7	100.00

6. Product Photo



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