

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD4LES9027DIM010UNVMDRBL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180522001-10-2
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: AD4LES9027DIM010UNVMDRBL
 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**

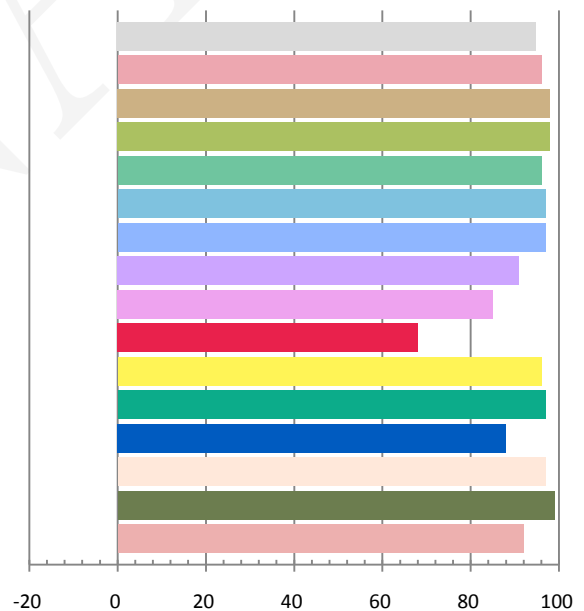
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1042	12.42	0.993	934.4	75.23

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.338	2749	-0.00166	0.4532	0.4046	0.2608	0.5240

Color Rendering Index

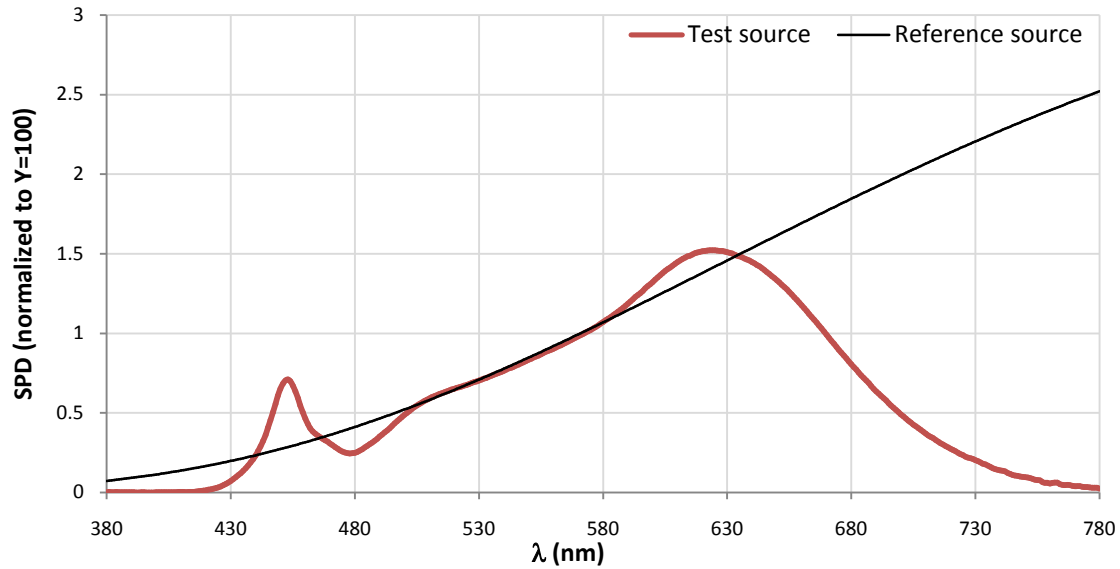
Ra			
94.8			
R1	R2	R3	R4
96	98	98	96
R5	R6	R7	R8
97	97	91	85
R9	R10	R11	R12
68	96	97	88
R13	R14	R15	
97	99	92	



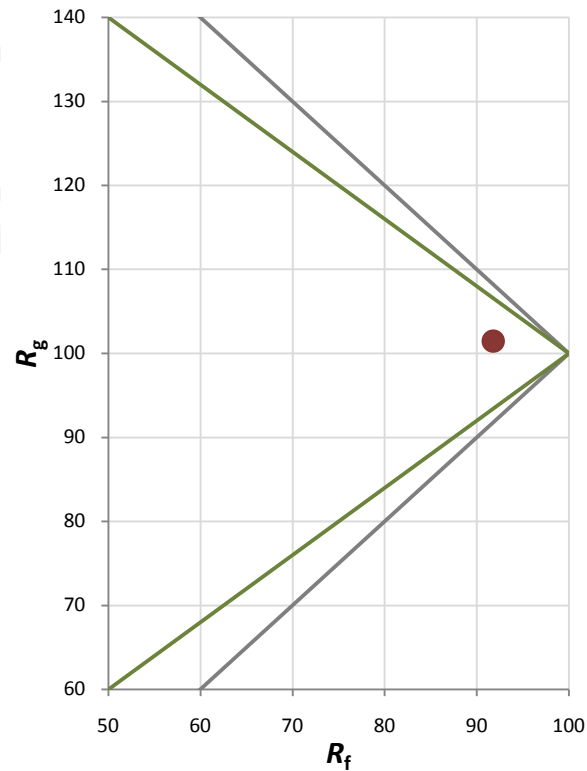
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	101

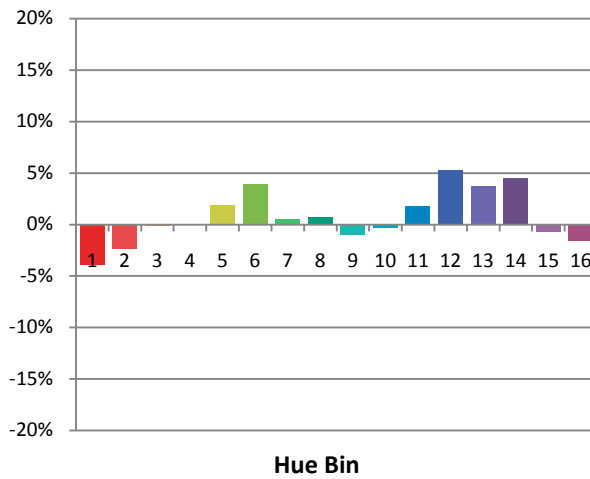
Spectral Power Distribution Comparison



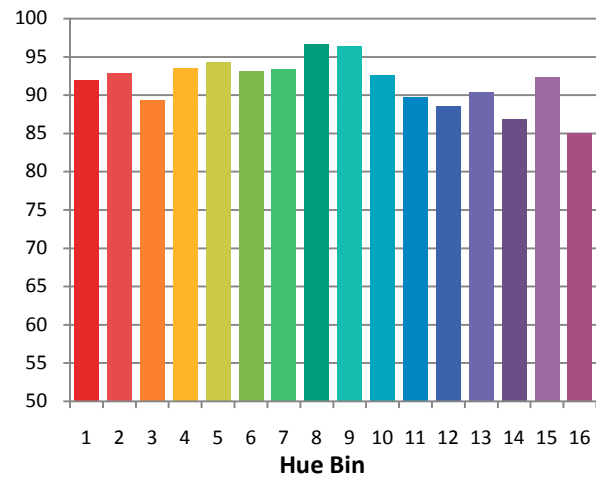
Plot of R_g versus R_f



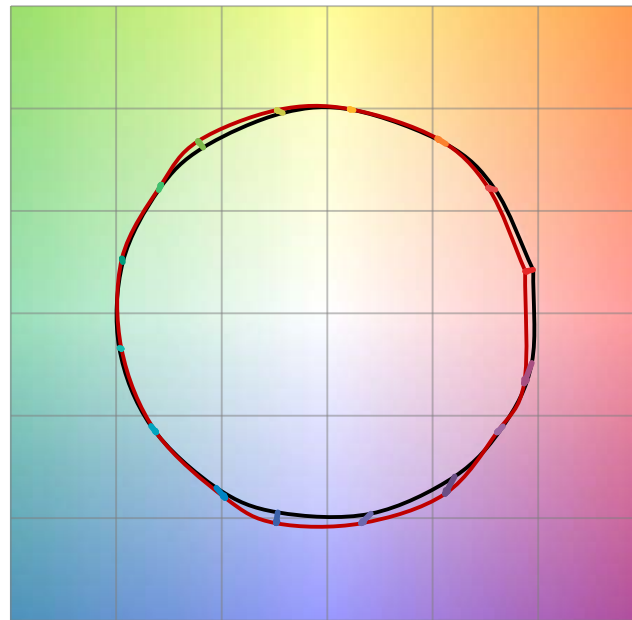
Chroma Shift by Hue



R_t by Hue

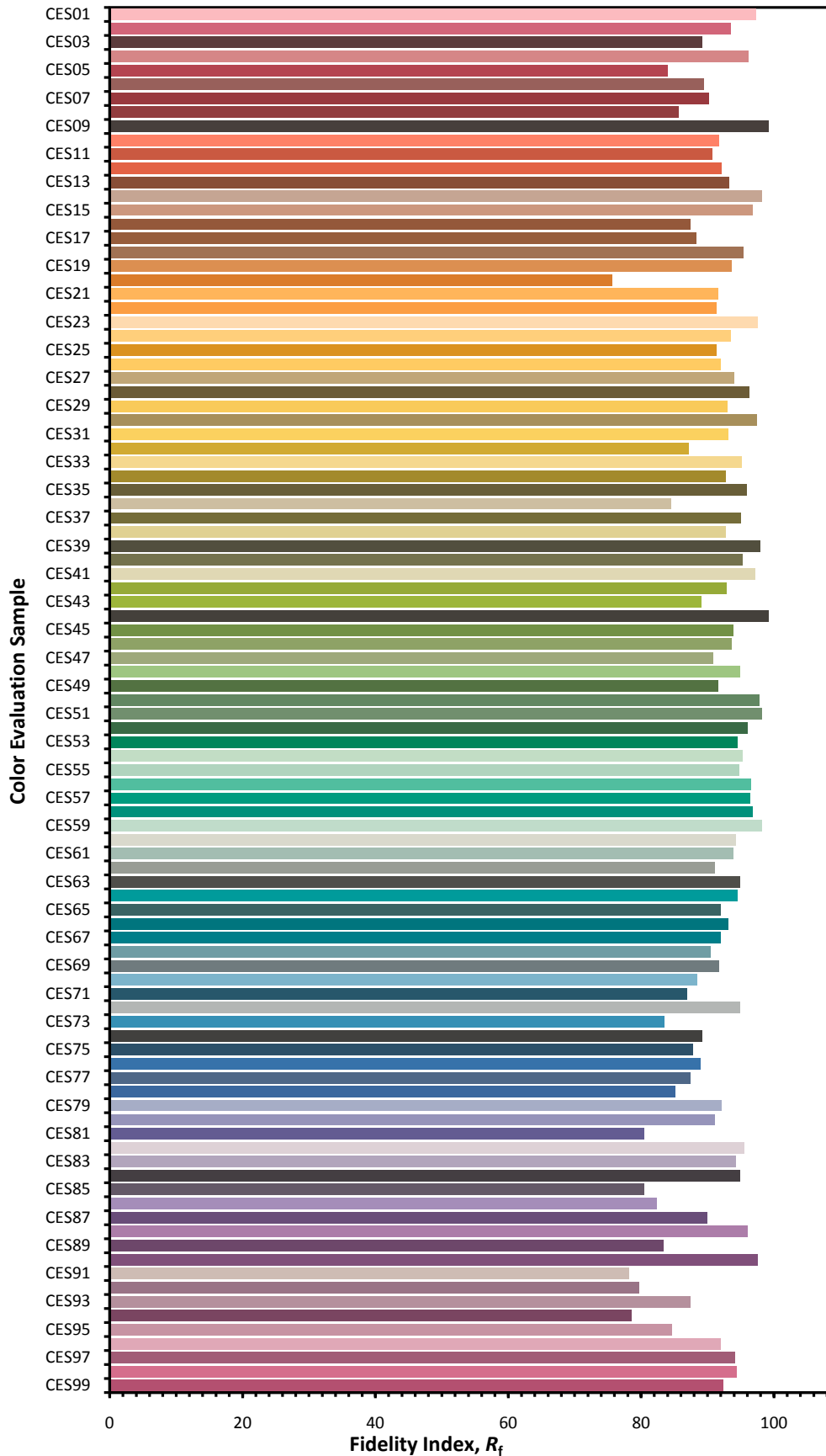


Color Vector Graphic

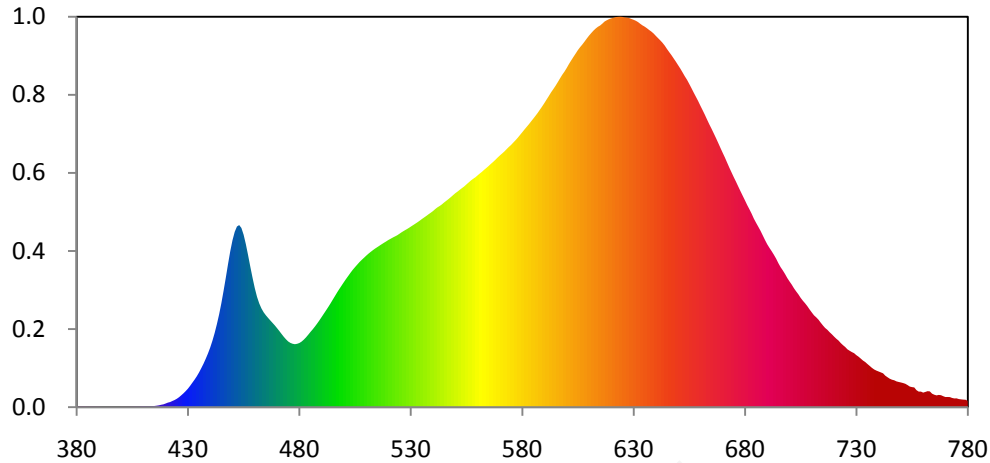


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



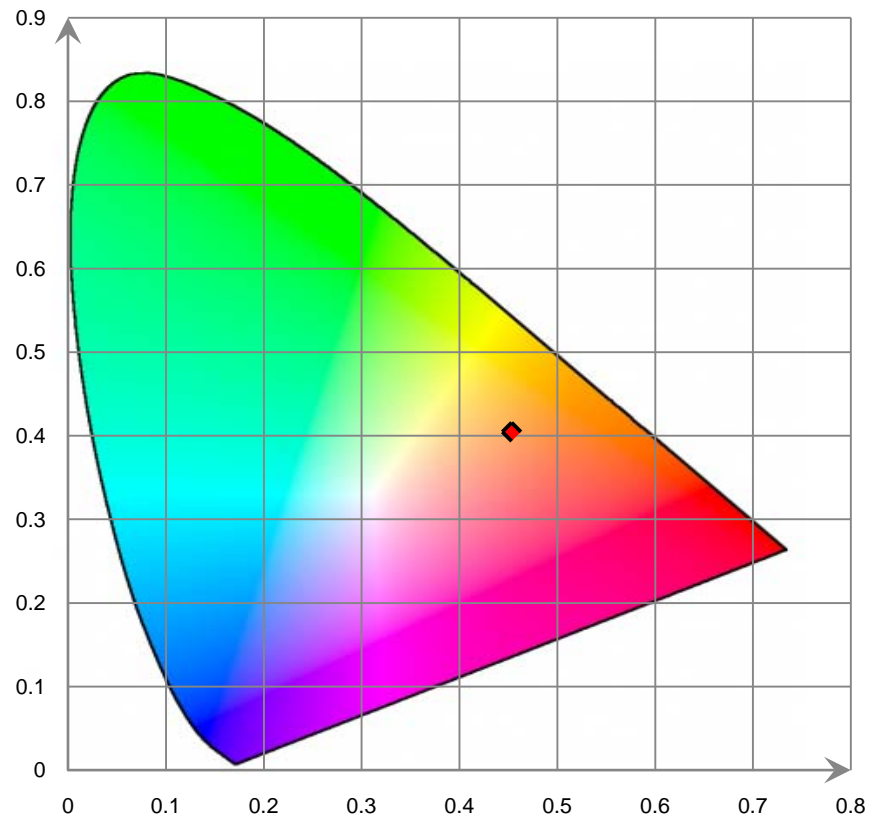
Relative Spectral Power Distribution



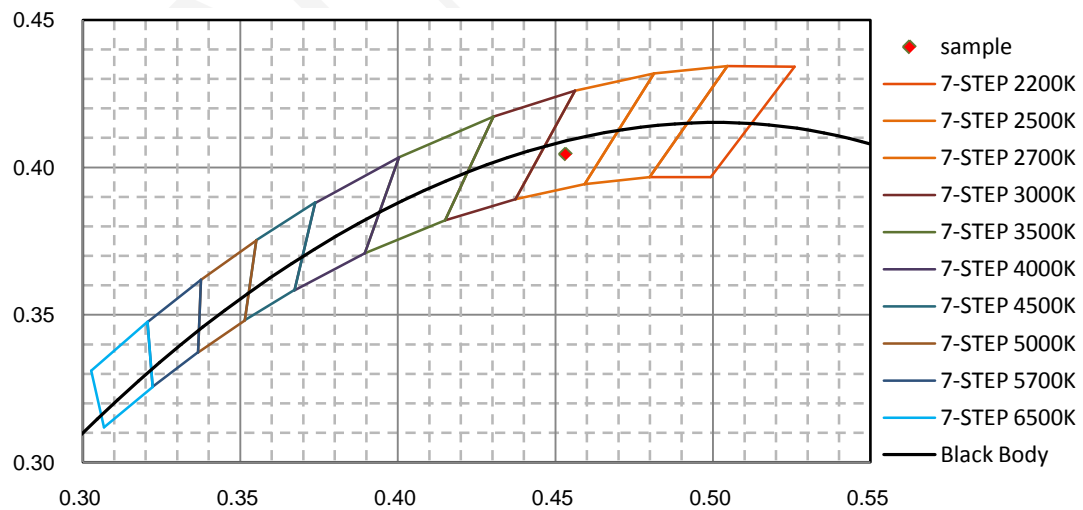
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.770E-02	421	2.429E-01	462	5.534E+00	503	7.172E+00	544	1.081E+01
381	3.990E-02	422	2.720E-01	463	5.263E+00	504	7.329E+00	545	1.092E+01
382	3.320E-02	423	3.288E-01	464	5.057E+00	505	7.468E+00	546	1.101E+01
383	3.740E-02	424	3.817E-01	465	4.897E+00	506	7.603E+00	547	1.110E+01
384	4.020E-02	425	4.477E-01	466	4.757E+00	507	7.738E+00	548	1.120E+01
385	2.630E-02	426	5.315E-01	467	4.622E+00	508	7.853E+00	549	1.131E+01
386	2.730E-02	427	6.324E-01	468	4.490E+00	509	7.964E+00	550	1.141E+01
387	3.070E-02	428	7.388E-01	469	4.360E+00	510	8.076E+00	551	1.150E+01
388	2.510E-02	429	8.581E-01	470	4.213E+00	511	8.182E+00	552	1.159E+01
389	3.010E-02	430	9.870E-01	471	4.065E+00	512	8.279E+00	553	1.168E+01
390	2.820E-02	431	1.141E+00	472	3.908E+00	513	8.370E+00	554	1.177E+01
391	1.260E-02	432	1.307E+00	473	3.756E+00	514	8.457E+00	555	1.188E+01
392	9.300E-03	433	1.472E+00	474	3.621E+00	515	8.534E+00	556	1.198E+01
393	1.110E-02	434	1.652E+00	475	3.505E+00	516	8.612E+00	557	1.209E+01
394	1.330E-02	435	1.856E+00	476	3.427E+00	517	8.693E+00	558	1.218E+01
395	1.430E-02	436	2.083E+00	477	3.382E+00	518	8.767E+00	559	1.226E+01
396	1.110E-02	437	2.320E+00	478	3.359E+00	519	8.841E+00	560	1.236E+01
397	6.800E-03	438	2.584E+00	479	3.379E+00	520	8.917E+00	561	1.246E+01
398	3.400E-03	439	2.868E+00	480	3.422E+00	521	8.982E+00	562	1.255E+01
399	1.900E-03	440	3.182E+00	481	3.495E+00	522	9.048E+00	563	1.266E+01
400	1.360E-02	441	3.546E+00	482	3.600E+00	523	9.109E+00	564	1.276E+01
401	1.670E-02	442	3.959E+00	483	3.724E+00	524	9.172E+00	565	1.286E+01
402	1.750E-02	443	4.429E+00	484	3.864E+00	525	9.253E+00	566	1.298E+01
403	1.790E-02	444	4.949E+00	485	4.012E+00	526	9.334E+00	567	1.308E+01
404	2.170E-02	445	5.542E+00	486	4.149E+00	527	9.407E+00	568	1.319E+01
405	2.510E-02	446	6.206E+00	487	4.300E+00	528	9.476E+00	569	1.331E+01
406	3.130E-02	447	6.905E+00	488	4.460E+00	529	9.546E+00	570	1.342E+01
407	3.280E-02	448	7.630E+00	489	4.628E+00	530	9.624E+00	571	1.353E+01
408	2.670E-02	449	8.318E+00	490	4.806E+00	531	9.703E+00	572	1.363E+01
409	4.600E-02	450	8.903E+00	491	4.985E+00	532	9.780E+00	573	1.375E+01
410	5.260E-02	451	9.351E+00	492	5.164E+00	533	9.858E+00	574	1.387E+01
411	4.080E-02	452	9.633E+00	493	5.345E+00	534	9.942E+00	575	1.398E+01
412	3.920E-02	453	9.710E+00	494	5.534E+00	535	1.003E+01	576	1.411E+01
413	4.260E-02	454	9.557E+00	495	5.732E+00	536	1.011E+01	577	1.423E+01
414	4.920E-02	455	9.195E+00	496	5.927E+00	537	1.020E+01	578	1.436E+01
415	6.450E-02	456	8.693E+00	497	6.125E+00	538	1.029E+01	579	1.451E+01
416	8.160E-02	457	8.106E+00	498	6.312E+00	539	1.037E+01	580	1.465E+01
417	9.990E-02	458	7.491E+00	499	6.489E+00	540	1.046E+01	581	1.480E+01
418	1.289E-01	459	6.902E+00	500	6.668E+00	541	1.056E+01	582	1.494E+01
419	1.526E-01	460	6.351E+00	501	6.842E+00	542	1.066E+01	583	1.508E+01
420	1.961E-01	461	5.889E+00	502	7.006E+00	543	1.073E+01	584	1.524E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.538E+01	626	2.078E+01	667	1.435E+01	708	5.388E+00	749	1.345E+00
586	1.554E+01	627	2.077E+01	668	1.409E+01	709	5.216E+00	750	1.318E+00
587	1.569E+01	628	2.075E+01	669	1.383E+01	710	5.053E+00	751	1.287E+00
588	1.587E+01	629	2.070E+01	670	1.357E+01	711	4.899E+00	752	1.248E+00
589	1.604E+01	630	2.066E+01	671	1.332E+01	712	4.790E+00	753	1.178E+00
590	1.622E+01	631	2.061E+01	672	1.304E+01	713	4.668E+00	754	1.100E+00
591	1.641E+01	632	2.054E+01	673	1.277E+01	714	4.509E+00	755	1.071E+00
592	1.660E+01	633	2.045E+01	674	1.252E+01	715	4.360E+00	756	1.054E+00
593	1.679E+01	634	2.036E+01	675	1.226E+01	716	4.224E+00	757	9.068E-01
594	1.696E+01	635	2.029E+01	676	1.202E+01	717	4.127E+00	758	8.310E-01
595	1.714E+01	636	2.021E+01	677	1.177E+01	718	4.000E+00	759	8.315E-01
596	1.733E+01	637	2.011E+01	678	1.152E+01	719	3.888E+00	760	7.775E-01
597	1.753E+01	638	2.003E+01	679	1.127E+01	720	3.767E+00	761	8.140E-01
598	1.772E+01	639	1.993E+01	680	1.103E+01	721	3.651E+00	762	8.539E-01
599	1.789E+01	640	1.980E+01	681	1.078E+01	722	3.553E+00	763	8.406E-01
600	1.809E+01	641	1.968E+01	682	1.056E+01	723	3.420E+00	764	7.210E-01
601	1.830E+01	642	1.956E+01	683	1.032E+01	724	3.308E+00	765	6.644E-01
602	1.849E+01	643	1.943E+01	684	1.006E+01	725	3.211E+00	766	6.294E-01
603	1.867E+01	644	1.928E+01	685	9.833E+00	726	3.086E+00	767	6.533E-01
604	1.885E+01	645	1.910E+01	686	9.622E+00	727	3.008E+00	768	6.393E-01
605	1.904E+01	646	1.894E+01	687	9.405E+00	728	2.938E+00	769	5.849E-01
606	1.919E+01	647	1.878E+01	688	9.162E+00	729	2.879E+00	770	5.413E-01
607	1.934E+01	648	1.860E+01	689	8.917E+00	730	2.776E+00	771	5.438E-01
608	1.949E+01	649	1.842E+01	690	8.689E+00	731	2.692E+00	772	5.361E-01
609	1.966E+01	650	1.824E+01	691	8.497E+00	732	2.590E+00	773	4.924E-01
610	1.981E+01	651	1.805E+01	692	8.317E+00	733	2.487E+00	774	4.667E-01
611	1.995E+01	652	1.785E+01	693	8.125E+00	734	2.406E+00	775	4.699E-01
612	2.008E+01	653	1.765E+01	694	7.920E+00	735	2.300E+00	776	4.335E-01
613	2.019E+01	654	1.746E+01	695	7.681E+00	736	2.200E+00	777	4.154E-01
614	2.028E+01	655	1.724E+01	696	7.468E+00	737	2.096E+00	778	4.035E-01
615	2.035E+01	656	1.701E+01	697	7.294E+00	738	2.012E+00	779	3.983E-01
616	2.045E+01	657	1.678E+01	698	7.101E+00	739	1.952E+00	780	3.367E-01
617	2.057E+01	658	1.655E+01	699	6.889E+00	740	1.904E+00		
618	2.063E+01	659	1.632E+01	700	6.709E+00	741	1.856E+00		
619	2.069E+01	660	1.608E+01	701	6.537E+00	742	1.805E+00		
620	2.073E+01	661	1.584E+01	702	6.342E+00	743	1.681E+00		
621	2.077E+01	662	1.560E+01	703	6.172E+00	744	1.596E+00		
622	2.080E+01	663	1.534E+01	704	6.015E+00	745	1.517E+00		
623	2.081E+01	664	1.509E+01	705	5.831E+00	746	1.465E+00		
624	2.082E+01	665	1.485E+01	706	5.678E+00	747	1.435E+00		
625	2.081E+01	666	1.460E+01	707	5.540E+00	748	1.376E+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**

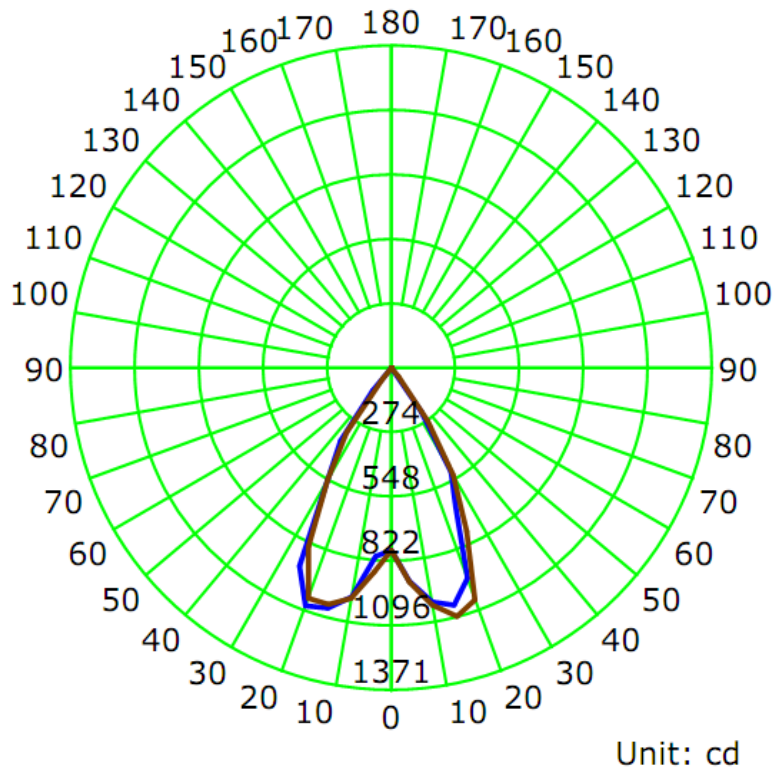
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1040	12.4	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
936.7	75.59	1096.8	1.11	1.12

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	59.3	58.9	59.6	59.7	59.4
Field Angle (10% I _{max}):	78.6	78.2	77.9	78.5	78.3

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	777	777	777	777	777	777	777	777
5.0°	910	919	926	921	914	889	850	817
10.0°	1011	1020	1028	1028	1025	1022	1005	986
15.0°	1045	1053	1083	1097	1095	1070	1058	1051
20.0°	952	983	1005	1026	1050	1051	1046	1046
25.0°	649	649	672	723	767	829	881	924
30.0°	514	504	503	510	530	533	544	557
35.0°	226	206	229	252	278	306	343	372
40.0°	18	17	21	33	52	79	106	125
45.0°	0	1	1	1	2	2	3	5
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	1	1	0	0	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	2	2	1	2	1	1
175.0°	2	2	2	2	2	2	2	2
180.0°	0	0	0	0	0	0	0	0

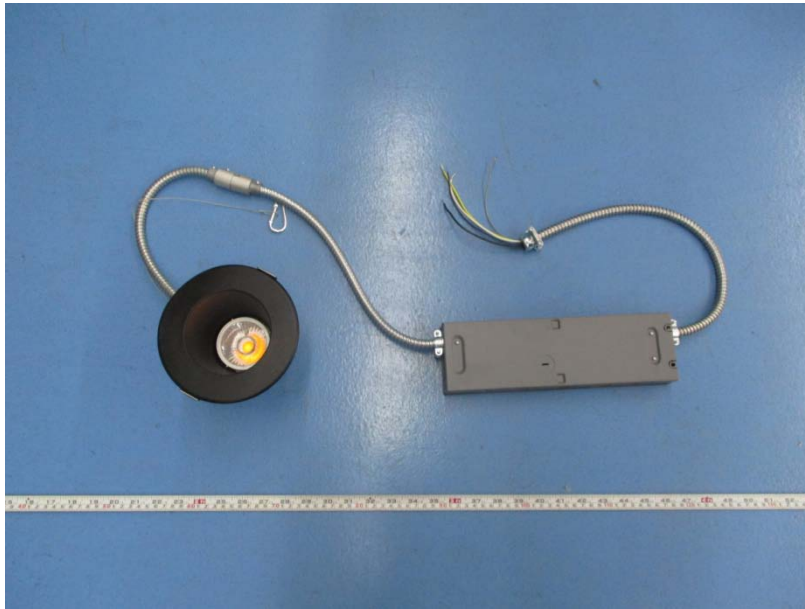
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	777	777	777	777	777	777	777	777
5.0°	804	800	822	850	873	887	893	902
10.0°	989	989	987	994	996	991	986	995
15.0°	1056	1051	1057	1057	1040	1026	1016	1013
20.0°	1079	1090	1087	1069	1044	1004	960	942
25.0°	930	952	929	906	841	735	667	631
30.0°	547	545	546	554	546	526	506	496
35.0°	379	375	369	362	336	297	269	243
40.0°	125	126	116	94	64	49	36	27
45.0°	4	5	5	3	3	2	1	1
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	1	1	1	1	0
165.0°	0	0	1	1	1	1	1	1
170.0°	0	1	1	2	1	1	2	1
175.0°	1	1	2	2	2	2	2	2
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	19.7	2.11	0-5	19.7	2.11
5-10	67.1	7.17	0-10	86.9	9.27
10-15	122.1	13.03	0-15	208.9	22.30
15-20	171.5	18.31	0-20	380.4	40.62
20-25	190.9	20.38	0-25	571.3	60.99
25-30	167.2	17.86	0-30	738.6	78.85
30-35	122.4	13.07	0-35	861.0	91.92
35-40	61.8	6.60	0-40	922.8	98.52
40-45	13.0	1.39	0-45	935.8	99.91
45-50	0.5	0.05	0-50	936.3	99.96
50-55	0.0	0.00	0-55	936.3	99.96
55-60	0.0	0.00	0-60	936.3	99.96
60-65	0.0	0.00	0-65	936.3	99.96
65-70	0.0	0.00	0-70	936.3	99.96
70-75	0.0	0.00	0-75	936.3	99.96
75-80	0.0	0.00	0-80	936.3	99.96
80-85	0.0	0.00	0-85	936.3	99.96
85-90	0.0	0.00	0-90	936.3	99.96
90-95	0.0	0.00	0-95	936.3	99.96
95-100	0.0	0.00	0-100	936.3	99.96
100-105	0.0	0.00	0-105	936.3	99.96
105-110	0.0	0.00	0-110	936.3	99.96
110-115	0.0	0.00	0-115	936.3	99.96
115-120	0.0	0.00	0-120	936.3	99.96
120-125	0.0	0.00	0-125	936.3	99.96
125-130	0.0	0.00	0-130	936.3	99.96
130-135	0.0	0.00	0-135	936.3	99.96
135-140	0.0	0.00	0-140	936.3	99.96
140-145	0.0	0.00	0-145	936.3	99.96
145-150	0.0	0.00	0-150	936.3	99.96
150-155	0.0	0.00	0-155	936.3	99.96
155-160	0.0	0.00	0-160	936.3	99.96
160-165	0.1	0.01	0-165	936.4	99.97
165-170	0.1	0.01	0-170	936.6	99.99
170-175	0.1	0.01	0-175	936.7	100.00
175-180	0.0	0.00	0-180	936.7	100.00

6. Product Photo



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