



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD4LES9027DIM010UNVNRRBL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180522001-10-1
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.

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 2018-05-22 and used for testing.

Model Tested: AD4LES9027DIM010UNVNRRBL
 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**

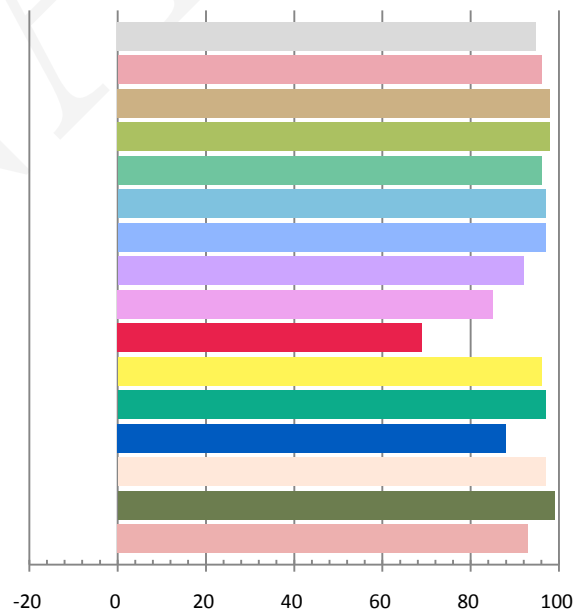
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.104	12.4	0.9933	908.6	73.28

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.252	2747	-0.00159	0.4534	0.4048	0.2609	0.5242

Color Rendering Index

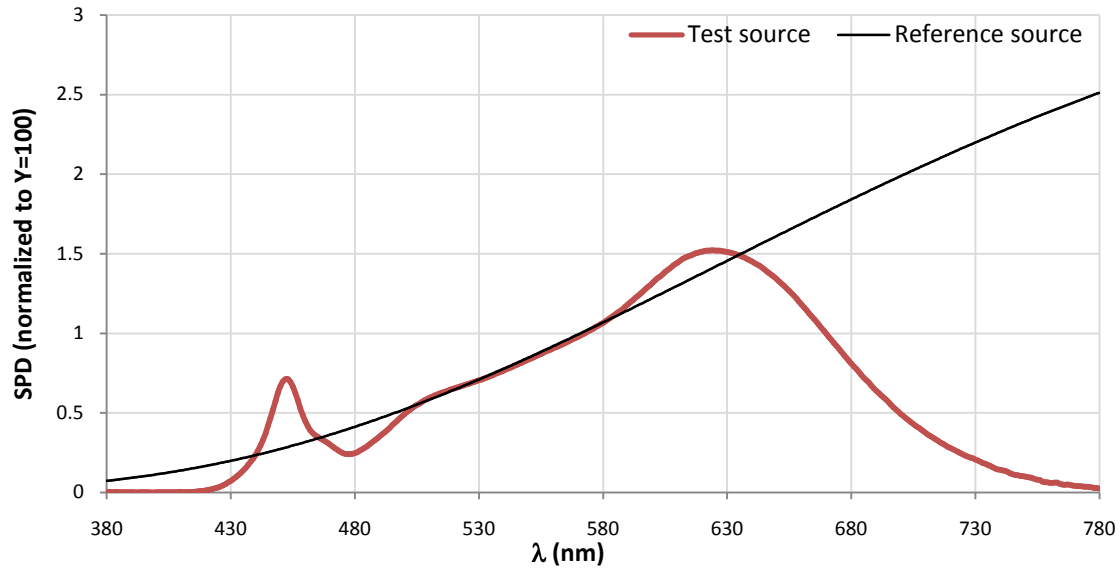
Ra			
94.9			
R1	R2	R3	R4
96	98	98	96
R5	R6	R7	R8
97	97	92	85
R9	R10	R11	R12
69	96	97	88
R13	R14	R15	
97	99	93	



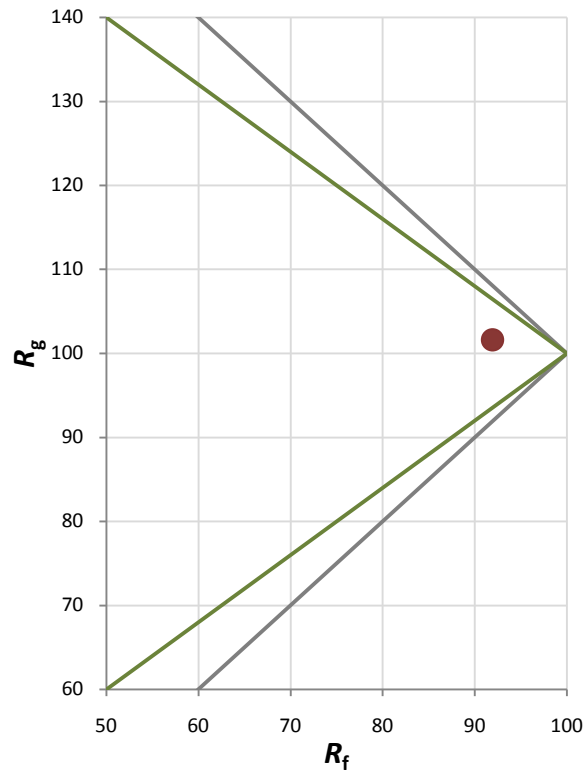
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	102

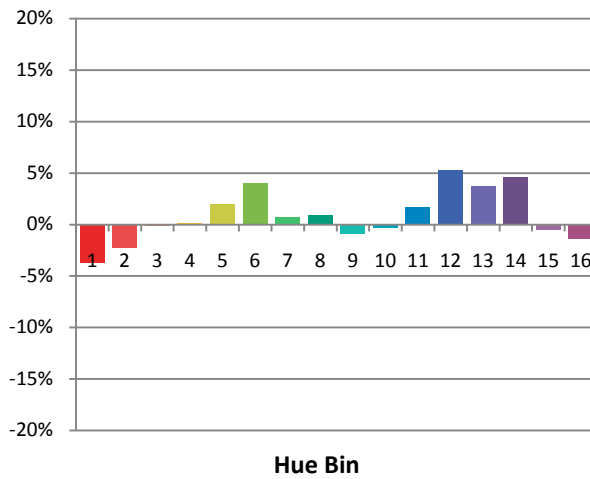
Spectral Power Distribution Comparison



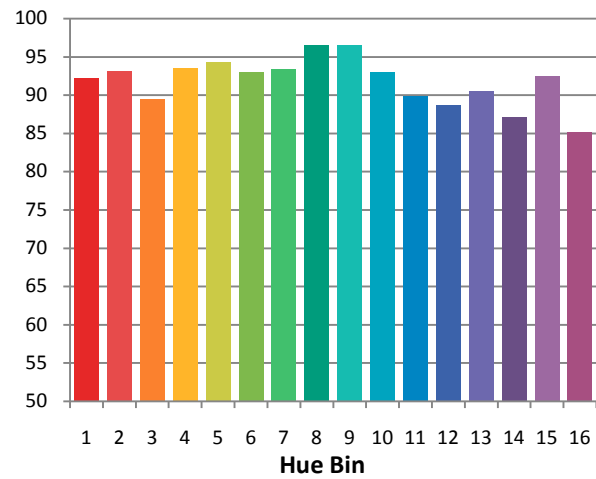
Plot of R_g versus R_f



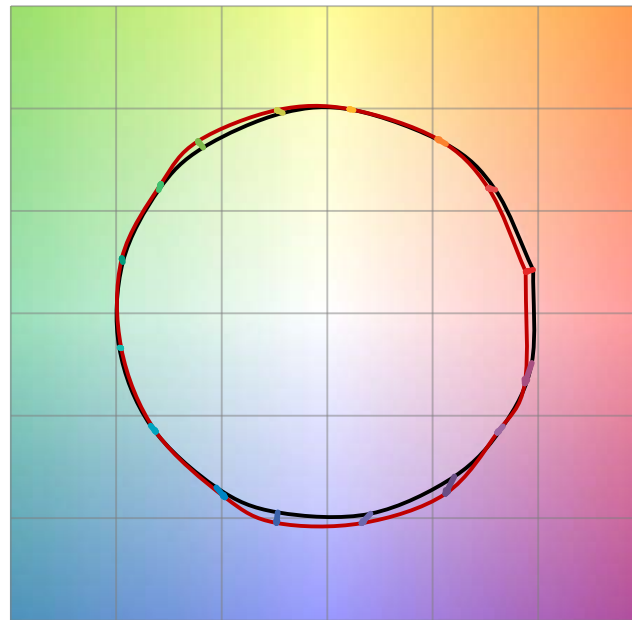
Chroma Shift by Hue



R_t by Hue

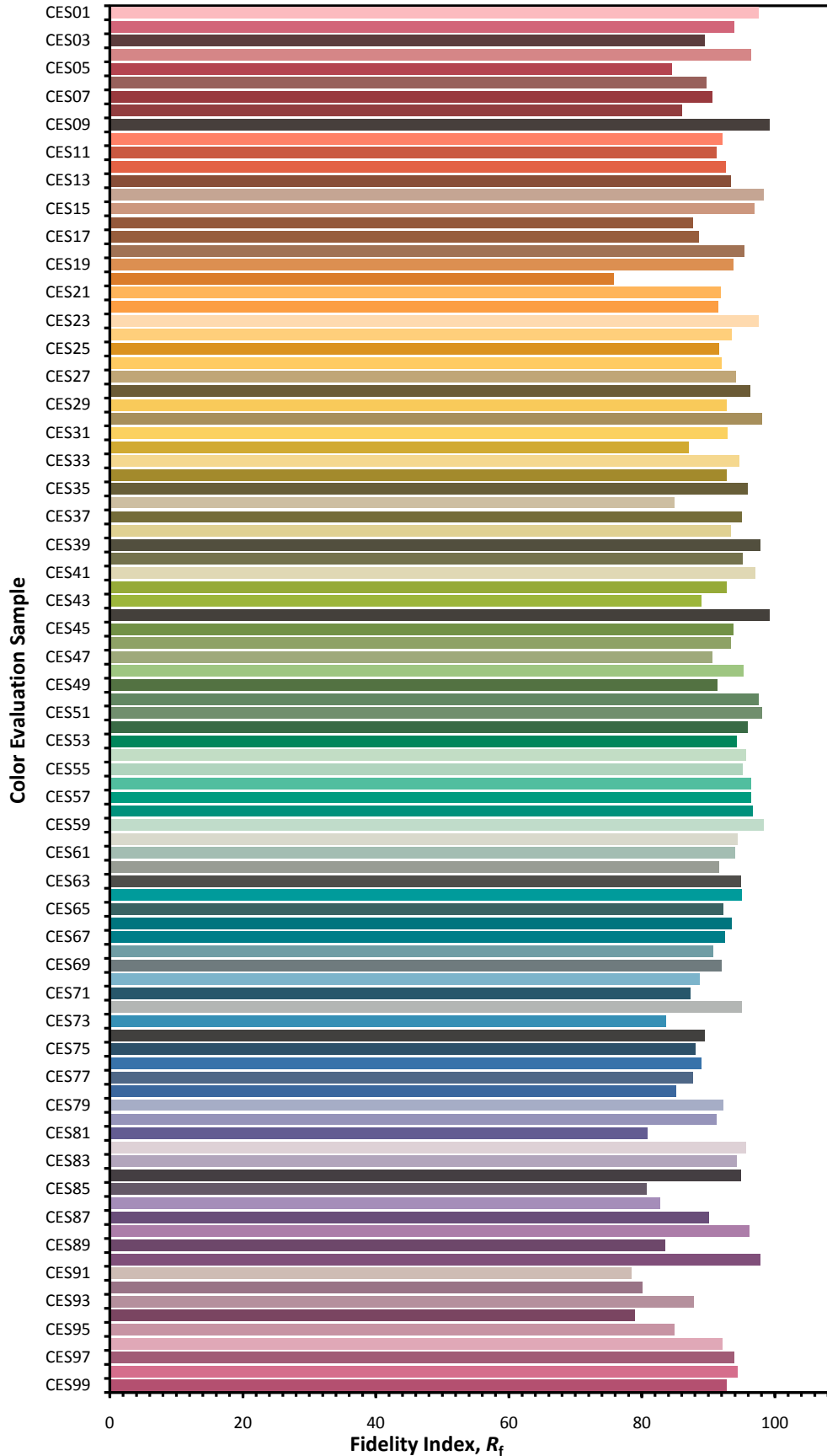


Color Vector Graphic

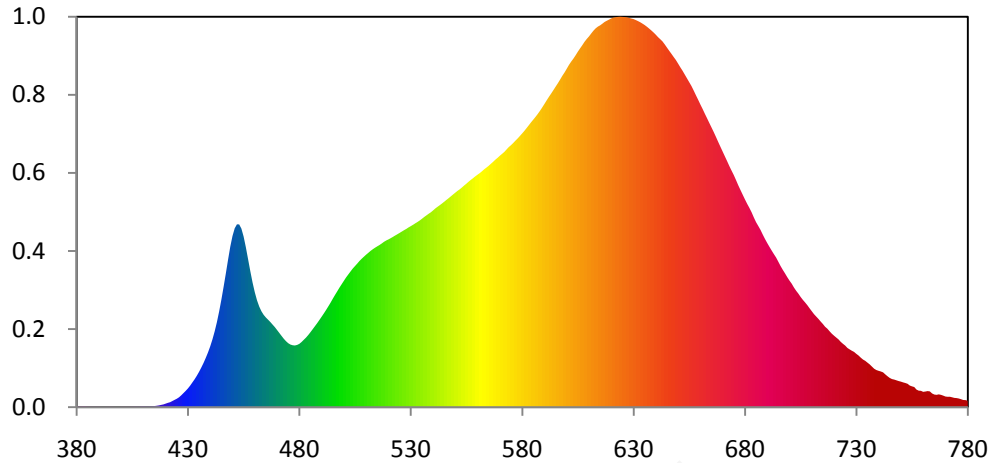


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



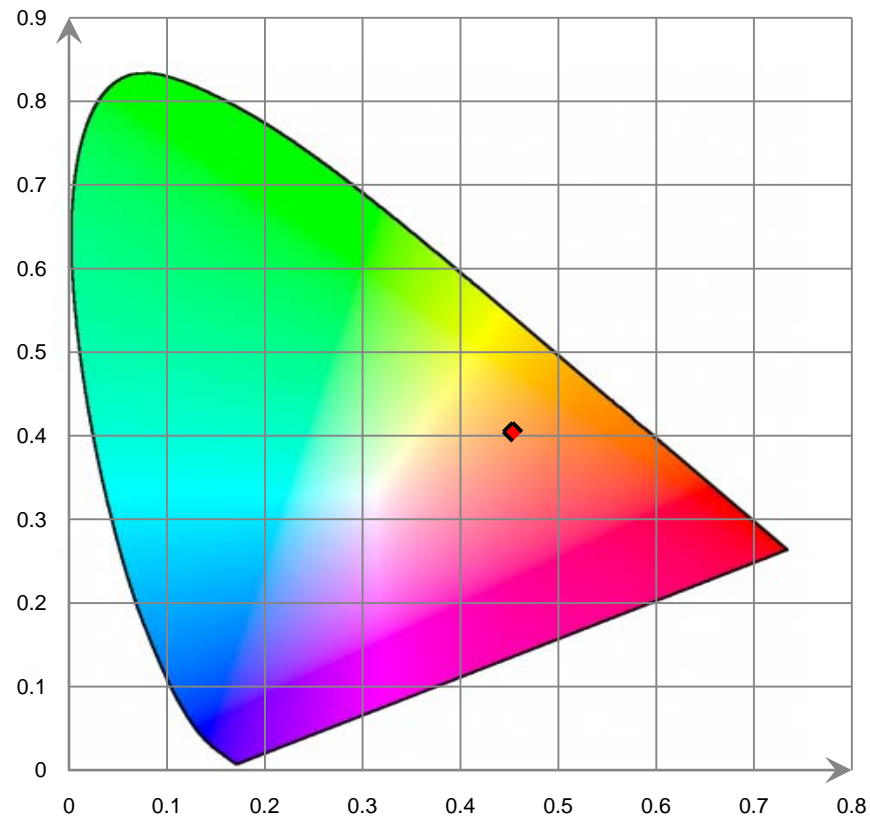
Relative Spectral Power Distribution



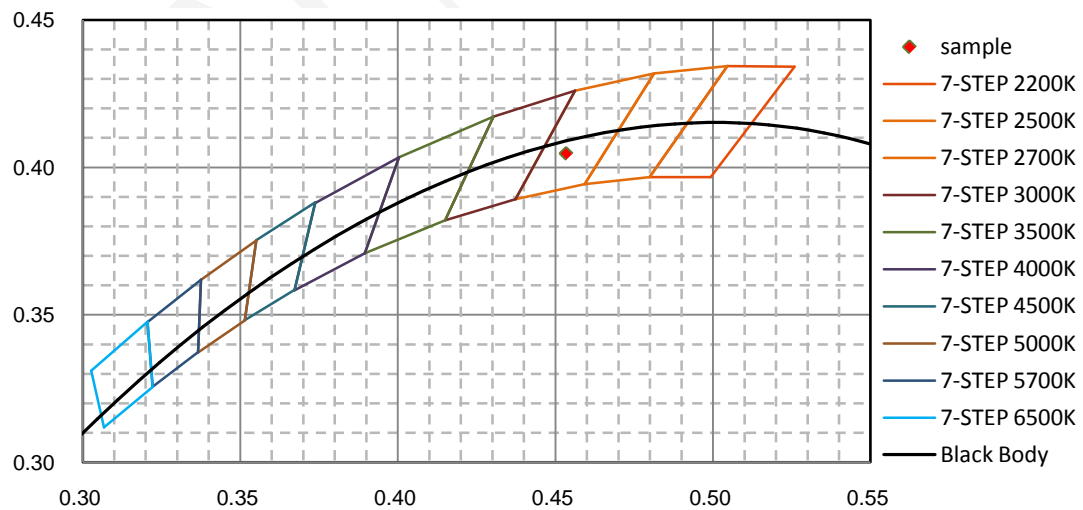
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.780E-02	421	2.246E-01	462	5.214E+00	503	7.036E+00	544	1.055E+01
381	4.480E-02	422	2.565E-01	463	4.968E+00	504	7.187E+00	545	1.064E+01
382	3.610E-02	423	3.179E-01	464	4.783E+00	505	7.315E+00	546	1.074E+01
383	4.690E-02	424	3.775E-01	465	4.646E+00	506	7.442E+00	547	1.083E+01
384	4.630E-02	425	4.361E-01	466	4.530E+00	507	7.577E+00	548	1.093E+01
385	2.730E-02	426	5.112E-01	467	4.410E+00	508	7.694E+00	549	1.102E+01
386	2.460E-02	427	6.157E-01	468	4.280E+00	509	7.800E+00	550	1.112E+01
387	2.200E-02	428	7.298E-01	469	4.151E+00	510	7.906E+00	551	1.121E+01
388	1.980E-02	429	8.452E-01	470	4.001E+00	511	8.002E+00	552	1.129E+01
389	2.660E-02	430	9.717E-01	471	3.849E+00	512	8.102E+00	553	1.139E+01
390	2.630E-02	431	1.116E+00	472	3.696E+00	513	8.188E+00	554	1.149E+01
391	1.280E-02	432	1.284E+00	473	3.549E+00	514	8.266E+00	555	1.158E+01
392	9.300E-03	433	1.447E+00	474	3.421E+00	515	8.337E+00	556	1.169E+01
393	1.510E-02	434	1.631E+00	475	3.316E+00	516	8.405E+00	557	1.178E+01
394	1.900E-02	435	1.834E+00	476	3.246E+00	517	8.484E+00	558	1.187E+01
395	2.200E-02	436	2.053E+00	477	3.210E+00	518	8.569E+00	559	1.196E+01
396	1.800E-02	437	2.291E+00	478	3.197E+00	519	8.637E+00	560	1.205E+01
397	1.340E-02	438	2.554E+00	479	3.226E+00	520	8.695E+00	561	1.213E+01
398	8.000E-03	439	2.836E+00	480	3.283E+00	521	8.758E+00	562	1.223E+01
399	4.000E-03	440	3.150E+00	481	3.377E+00	522	8.825E+00	563	1.233E+01
400	1.520E-02	441	3.512E+00	482	3.492E+00	523	8.896E+00	564	1.242E+01
401	1.860E-02	442	3.927E+00	483	3.607E+00	524	8.963E+00	565	1.251E+01
402	2.070E-02	443	4.402E+00	484	3.739E+00	525	9.031E+00	566	1.261E+01
403	1.910E-02	444	4.956E+00	485	3.888E+00	526	9.102E+00	567	1.272E+01
404	1.920E-02	445	5.567E+00	486	4.040E+00	527	9.173E+00	568	1.283E+01
405	2.390E-02	446	6.230E+00	487	4.197E+00	528	9.238E+00	569	1.292E+01
406	3.120E-02	447	6.919E+00	488	4.352E+00	529	9.313E+00	570	1.303E+01
407	3.350E-02	448	7.635E+00	489	4.518E+00	530	9.381E+00	571	1.313E+01
408	2.430E-02	449	8.315E+00	490	4.686E+00	531	9.450E+00	572	1.323E+01
409	4.220E-02	450	8.871E+00	491	4.859E+00	532	9.524E+00	573	1.335E+01
410	4.750E-02	451	9.271E+00	492	5.036E+00	533	9.596E+00	574	1.348E+01
411	3.580E-02	452	9.476E+00	493	5.222E+00	534	9.673E+00	575	1.358E+01
412	3.500E-02	453	9.473E+00	494	5.414E+00	535	9.760E+00	576	1.369E+01
413	3.980E-02	454	9.254E+00	495	5.618E+00	536	9.852E+00	577	1.381E+01
414	4.660E-02	455	8.840E+00	496	5.814E+00	537	9.935E+00	578	1.393E+01
415	5.940E-02	456	8.288E+00	497	6.002E+00	538	1.002E+01	579	1.406E+01
416	7.550E-02	457	7.669E+00	498	6.193E+00	539	1.010E+01	580	1.419E+01
417	9.250E-02	458	7.047E+00	499	6.372E+00	540	1.019E+01	581	1.432E+01
418	1.191E-01	459	6.465E+00	500	6.550E+00	541	1.030E+01	582	1.446E+01
419	1.436E-01	460	5.962E+00	501	6.726E+00	542	1.038E+01	583	1.461E+01
420	1.833E-01	461	5.540E+00	502	6.882E+00	543	1.047E+01	584	1.476E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.490E+01	626	2.022E+01	667	1.401E+01	708	5.287E+00	749	1.354E+00
586	1.504E+01	627	2.021E+01	668	1.375E+01	709	5.128E+00	750	1.324E+00
587	1.519E+01	628	2.017E+01	669	1.350E+01	710	4.973E+00	751	1.285E+00
588	1.536E+01	629	2.014E+01	670	1.325E+01	711	4.821E+00	752	1.252E+00
589	1.553E+01	630	2.011E+01	671	1.300E+01	712	4.697E+00	753	1.212E+00
590	1.571E+01	631	2.006E+01	672	1.275E+01	713	4.573E+00	754	1.122E+00
591	1.590E+01	632	2.001E+01	673	1.250E+01	714	4.438E+00	755	1.079E+00
592	1.608E+01	633	1.995E+01	674	1.226E+01	715	4.310E+00	756	1.044E+00
593	1.625E+01	634	1.988E+01	675	1.203E+01	716	4.167E+00	757	9.116E-01
594	1.642E+01	635	1.980E+01	676	1.177E+01	717	4.068E+00	758	8.561E-01
595	1.660E+01	636	1.972E+01	677	1.150E+01	718	3.934E+00	759	8.482E-01
596	1.678E+01	637	1.962E+01	678	1.125E+01	719	3.808E+00	760	7.949E-01
597	1.697E+01	638	1.952E+01	679	1.101E+01	720	3.705E+00	761	8.121E-01
598	1.716E+01	639	1.942E+01	680	1.077E+01	721	3.609E+00	762	8.337E-01
599	1.734E+01	640	1.930E+01	681	1.054E+01	722	3.514E+00	763	8.180E-01
600	1.753E+01	641	1.918E+01	682	1.033E+01	723	3.386E+00	764	7.129E-01
601	1.773E+01	642	1.907E+01	683	1.010E+01	724	3.285E+00	765	6.564E-01
602	1.791E+01	643	1.896E+01	684	9.833E+00	725	3.192E+00	766	6.390E-01
603	1.806E+01	644	1.880E+01	685	9.587E+00	726	3.070E+00	767	6.637E-01
604	1.823E+01	645	1.864E+01	686	9.389E+00	727	2.994E+00	768	6.397E-01
605	1.842E+01	646	1.847E+01	687	9.187E+00	728	2.923E+00	769	5.984E-01
606	1.859E+01	647	1.831E+01	688	8.947E+00	729	2.864E+00	770	5.517E-01
607	1.876E+01	648	1.815E+01	689	8.720E+00	730	2.764E+00	771	5.377E-01
608	1.893E+01	649	1.799E+01	690	8.509E+00	731	2.677E+00	772	5.400E-01
609	1.908E+01	650	1.781E+01	691	8.311E+00	732	2.565E+00	773	5.129E-01
610	1.921E+01	651	1.761E+01	692	8.118E+00	733	2.469E+00	774	4.822E-01
611	1.937E+01	652	1.744E+01	693	7.931E+00	734	2.401E+00	775	4.714E-01
612	1.951E+01	653	1.724E+01	694	7.754E+00	735	2.309E+00	776	4.489E-01
613	1.963E+01	654	1.704E+01	695	7.535E+00	736	2.217E+00	777	4.136E-01
614	1.972E+01	655	1.684E+01	696	7.316E+00	737	2.104E+00	778	3.716E-01
615	1.979E+01	656	1.664E+01	697	7.117E+00	738	1.994E+00	779	3.660E-01
616	1.987E+01	657	1.641E+01	698	6.932E+00	739	1.925E+00	780	3.319E-01
617	1.996E+01	658	1.617E+01	699	6.739E+00	740	1.885E+00		
618	2.003E+01	659	1.593E+01	700	6.560E+00	741	1.849E+00		
619	2.009E+01	660	1.569E+01	701	6.400E+00	742	1.805E+00		
620	2.015E+01	661	1.546E+01	702	6.203E+00	743	1.700E+00		
621	2.019E+01	662	1.521E+01	703	6.033E+00	744	1.602E+00		
622	2.021E+01	663	1.497E+01	704	5.882E+00	745	1.516E+00		
623	2.023E+01	664	1.473E+01	705	5.712E+00	746	1.457E+00		
624	2.023E+01	665	1.450E+01	706	5.563E+00	747	1.430E+00		
625	2.023E+01	666	1.426E+01	707	5.430E+00	748	1.392E+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**

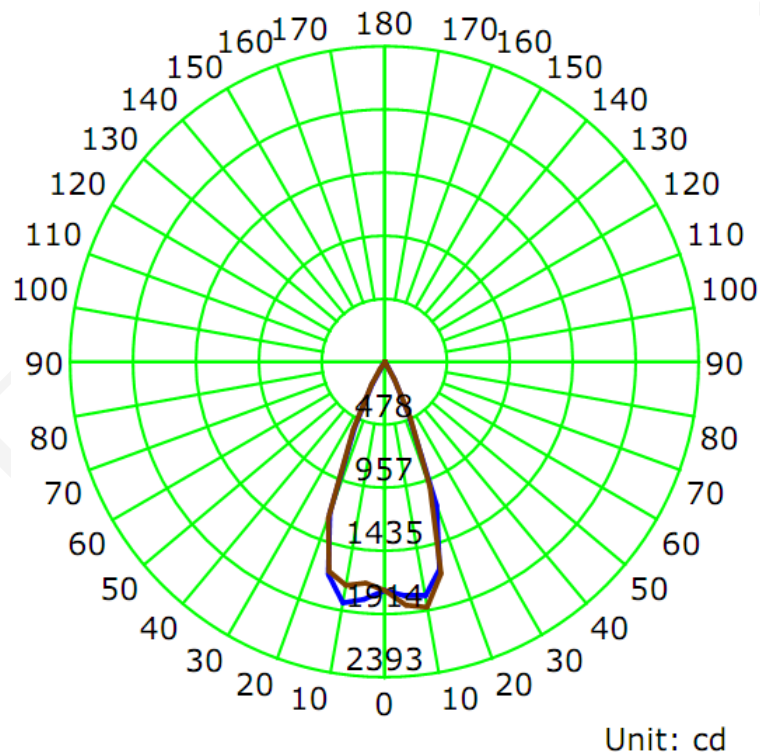
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1040	12.44	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
912.3	73.38	1914.6	0.76	0.75

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	43.8	43.6	42.9	43.0	43.4
Field Angle (10% I_{max}):	60.0	60.3	59.9	59.7	60.0

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1732	1732	1732	1732	1732	1732	1732	1732
5.0°	1782	1806	1835	1851	1855	1864	1852	1838
10.0°	1799	1805	1825	1854	1889	1904	1915	1901
15.0°	1631	1631	1634	1643	1660	1675	1710	1719
20.0°	1156	1096	1029	996	1012	1053	1108	1188
25.0°	444	425	427	433	468	508	532	552
30.0°	166	159	149	147	149	160	175	191
35.0°	31	27	25	25	25	28	29	34
40.0°	5	5	5	6	6	7	7	8
45.0°	1	0	0	0	1	1	1	2
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°	1	1	1	1	2	1	1	1
165.0°	2	2	2	2	2	2	1	1
170.0°	2	3	3	2	2	2	2	2
175.0°	3	3	3	4	3	3	3	3
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

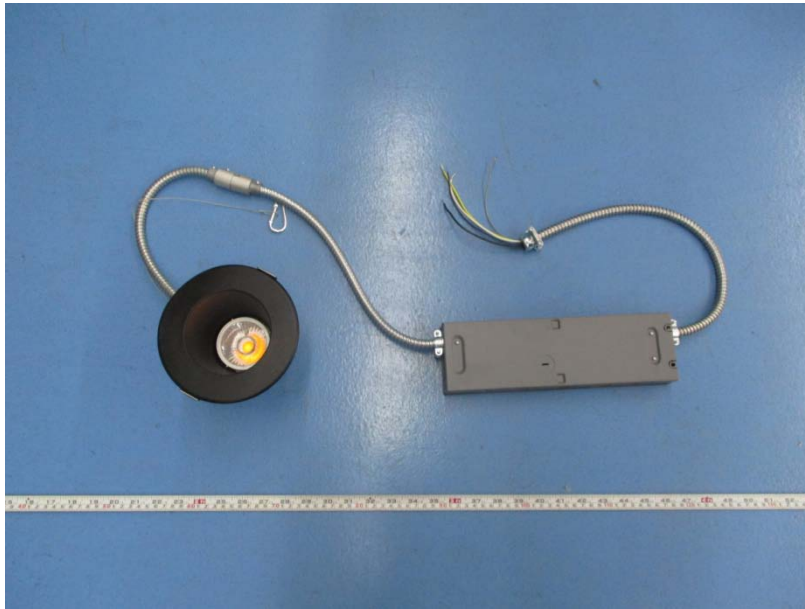
C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1732	1732	1732	1732	1732	1732	1732	1732
5.0°	1806	1761	1709	1693	1683	1706	1730	1762
10.0°	1856	1799	1758	1718	1723	1765	1774	1781
15.0°	1666	1672	1658	1629	1644	1627	1605	1606
20.0°	1224	1281	1290	1297	1266	1233	1202	1162
25.0°	552	564	591	601	568	520	464	418
30.0°	196	206	211	204	203	196	187	178
35.0°	35	46	59	67	65	56	47	35
40.0°	8	9	9	9	8	7	7	6
45.0°	2	2	2	2	2	1	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°	1	1	1	2	1	1	1	1
165.0°	2	2	2	2	2	2	2	2
170.0°	3	3	3	3	3	2	3	2
175.0°	3	3	4	3	3	3	3	3
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	42.0	4.61
5-10	128.8	14.12
10-15	205.7	22.55
15-20	231.8	25.41
20-25	174.8	19.16
25-30	86.6	9.49
30-35	32.3	3.54
35-40	7.8	0.85
40-45	1.5	0.16
45-50	0.2	0.02
50-55	0.0	0.00
55-60	0.0	0.00
60-65	0.0	0.00
65-70	0.0	0.00
70-75	0.0	0.00
75-80	0.0	0.00
80-85	0.0	0.00
85-90	0.0	0.00
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.0	0.00
145-150	0.0	0.00
150-155	0.0	0.00
155-160	0.1	0.01
160-165	0.2	0.03
165-170	0.3	0.03
170-175	0.2	0.02
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	42.0	4.61
0-10	170.8	18.72
0-15	376.5	41.27
0-20	608.3	66.68
0-25	783.0	85.83
0-30	869.6	95.32
0-35	901.9	98.86
0-40	909.7	99.72
0-45	911.2	99.88
0-50	911.4	99.90
0-55	911.4	99.90
0-60	911.4	99.90
0-65	911.4	99.90
0-70	911.4	99.90
0-75	911.4	99.90
0-80	911.4	99.90
0-85	911.4	99.90
0-90	911.4	99.90
0-95	911.4	99.90
0-100	911.4	99.90
0-105	911.4	99.90
0-110	911.4	99.90
0-115	911.4	99.90
0-120	911.4	99.90
0-125	911.4	99.90
0-130	911.4	99.90
0-135	911.4	99.90
0-140	911.4	99.90
0-145	911.4	99.90
0-150	911.4	99.90
0-155	911.4	99.90
0-160	911.5	99.92
0-165	911.8	99.94
0-170	912.0	99.97
0-175	912.2	100.00
0-180	912.3	100.00

6. Product Photo



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