

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: AD4LES9027DIM010UNVMDRCC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKS180131080-10-3
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: AD4LES9027DIM010UNVMDRCC
 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: 1000lm

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**

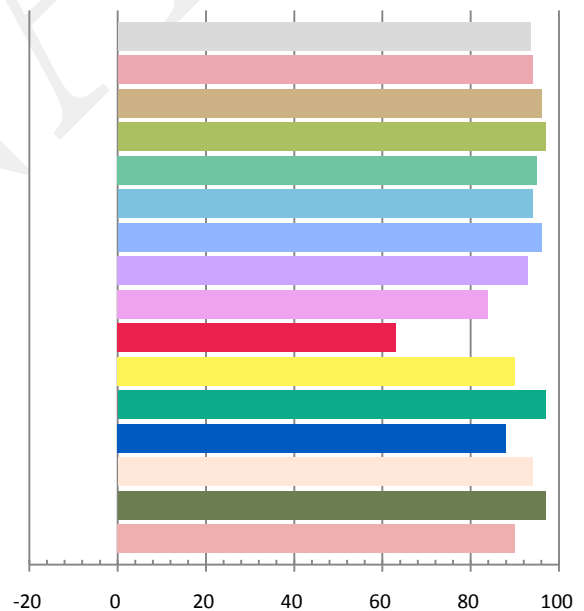
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.104	12.42	0.9953	1151.4	92.7

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.051	2728	0.00122	0.4596	0.4139	0.2609	0.5286

Color Rendering Index

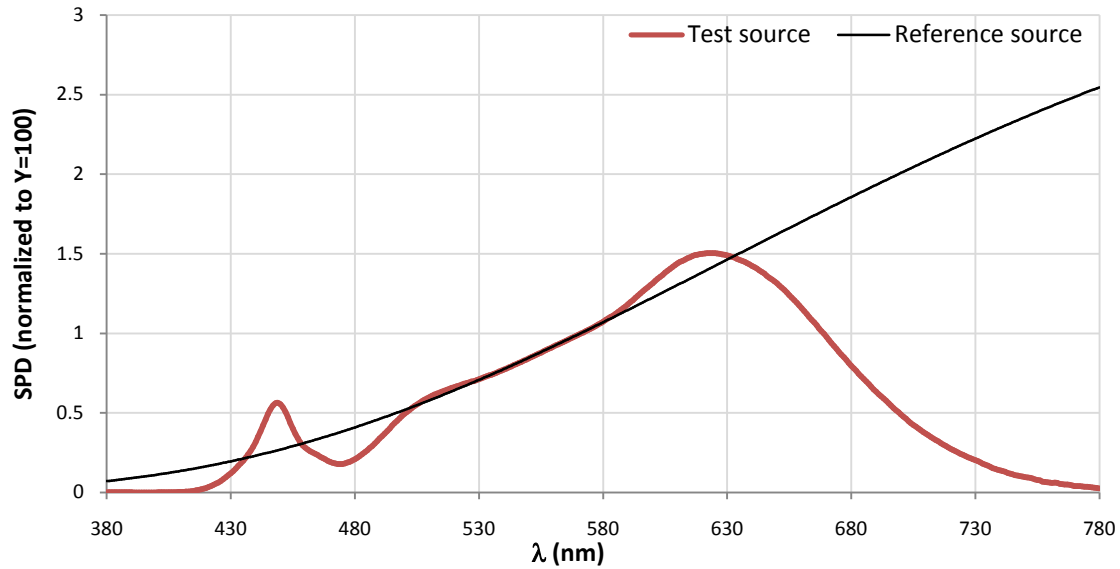
Ra 93.6			
R1 94	R2 96	R3 97	R4 95
R5 94	R6 96	R7 93	R8 84
R9 63	R10 90	R11 97	R12 88
R13 94	R14 97	R15 90	



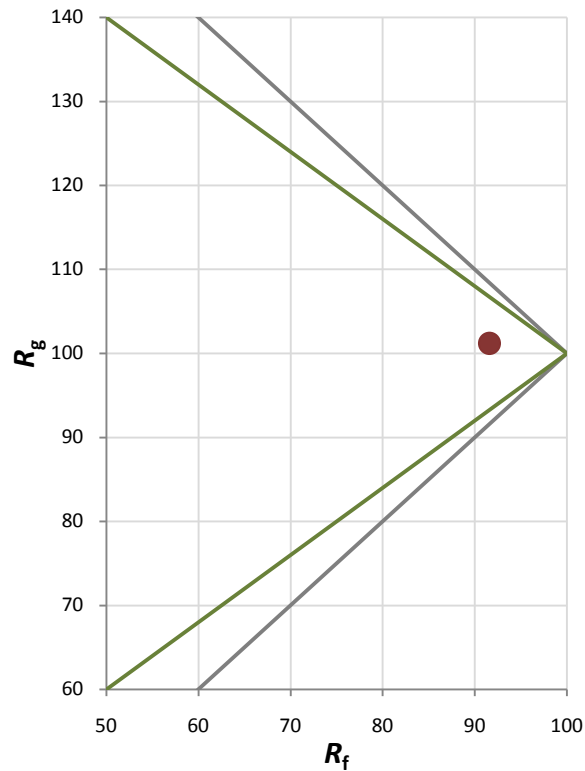
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	101

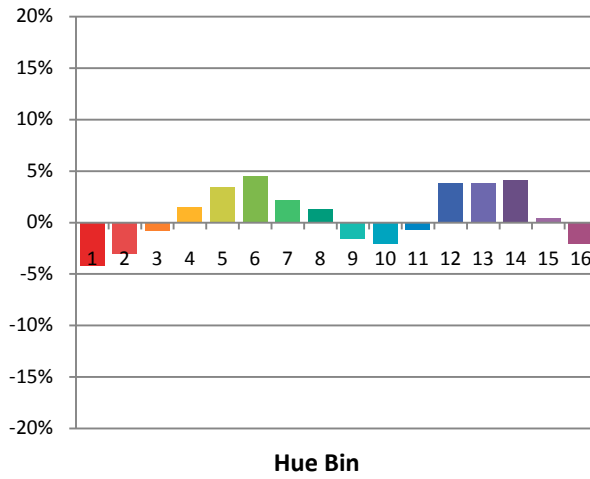
Spectral Power Distribution Comparison



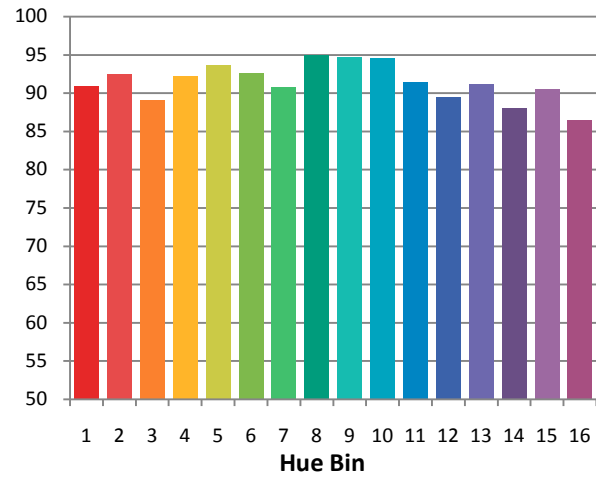
Plot of R_g versus R_f



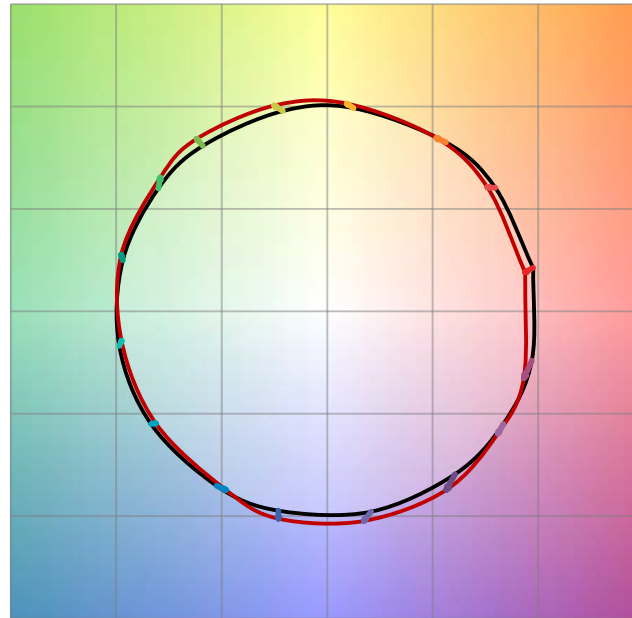
Chroma Shift by Hue



R_t by Hue

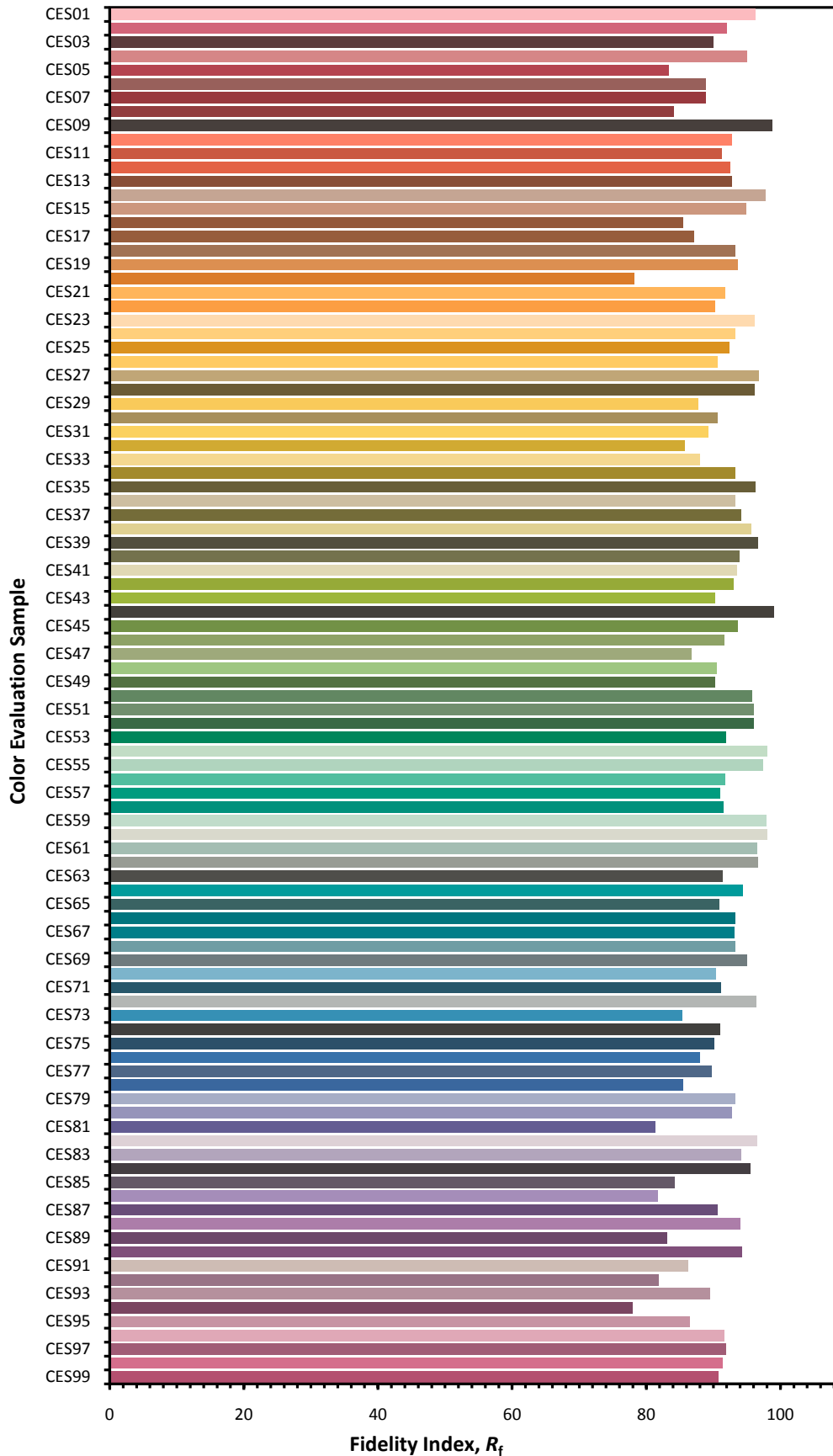


Color Vector Graphic

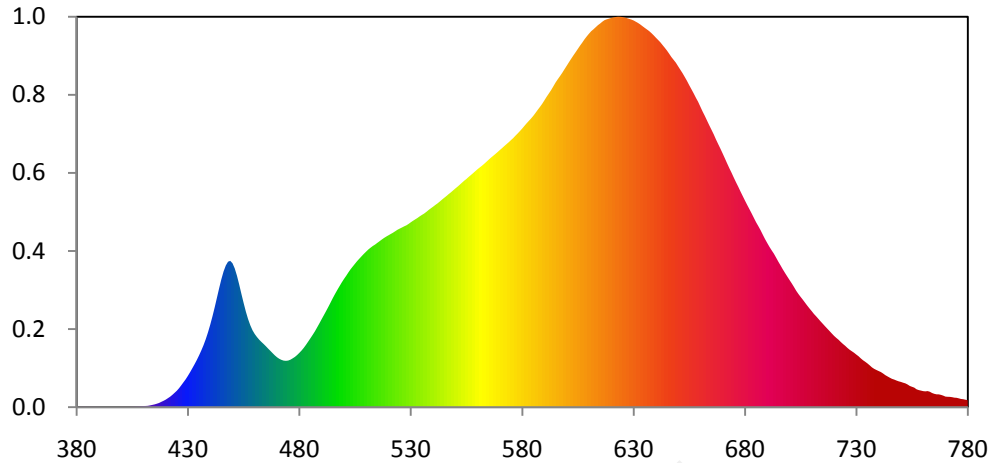


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



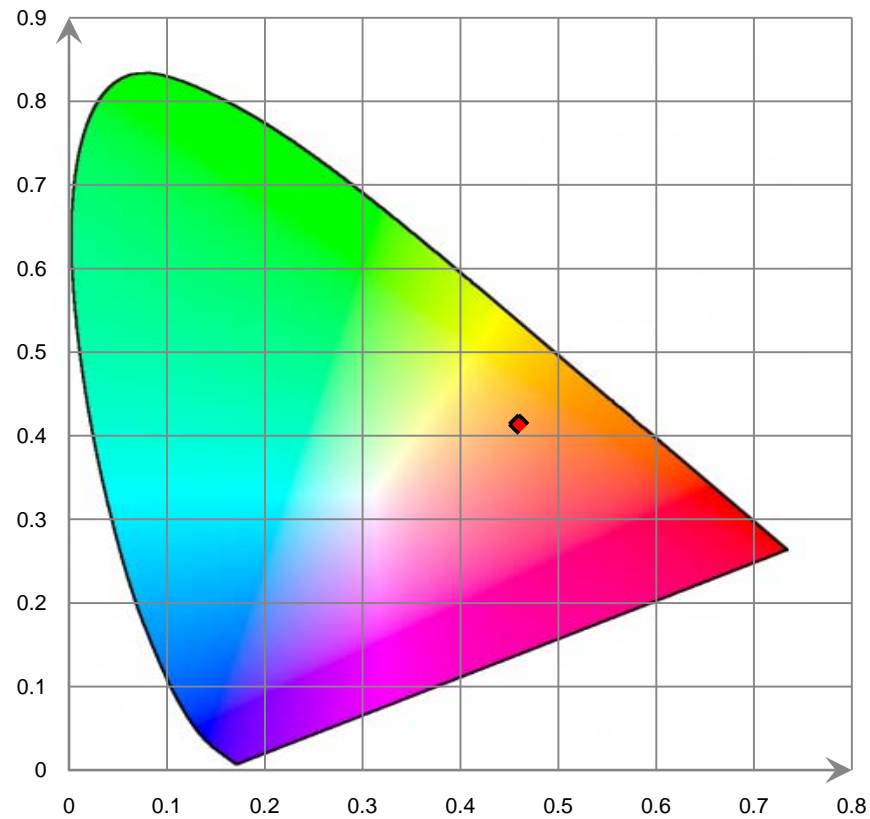
Relative Spectral Power Distribution



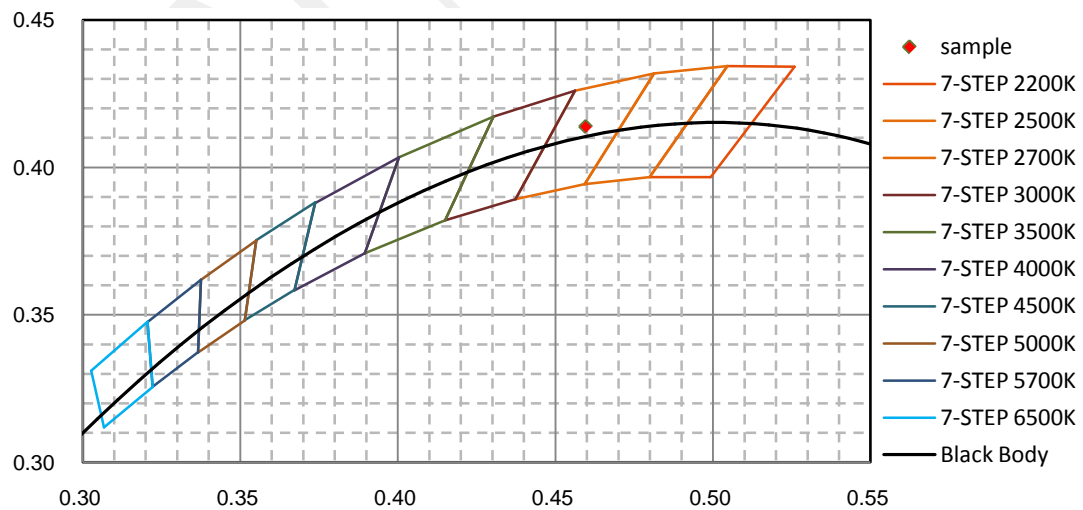
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.370E-02	421	5.838E-01	462	4.382E+00	503	8.956E+00	544	1.348E+01
381	1.790E-02	422	6.806E-01	463	4.235E+00	504	9.140E+00	545	1.360E+01
382	1.830E-02	423	7.998E-01	464	4.100E+00	505	9.321E+00	546	1.371E+01
383	2.270E-02	424	9.303E-01	465	3.955E+00	506	9.496E+00	547	1.384E+01
384	2.350E-02	425	1.064E+00	466	3.804E+00	507	9.654E+00	548	1.395E+01
385	1.950E-02	426	1.231E+00	467	3.659E+00	508	9.812E+00	549	1.407E+01
386	2.020E-02	427	1.419E+00	468	3.511E+00	509	9.965E+00	550	1.420E+01
387	1.910E-02	428	1.617E+00	469	3.366E+00	510	1.011E+01	551	1.432E+01
388	1.660E-02	429	1.814E+00	470	3.241E+00	511	1.024E+01	552	1.445E+01
389	2.030E-02	430	2.039E+00	471	3.141E+00	512	1.036E+01	553	1.458E+01
390	1.890E-02	431	2.279E+00	472	3.070E+00	513	1.047E+01	554	1.471E+01
391	8.400E-03	432	2.535E+00	473	3.022E+00	514	1.056E+01	555	1.482E+01
392	5.600E-03	433	2.795E+00	474	3.009E+00	515	1.067E+01	556	1.496E+01
393	9.900E-03	434	3.068E+00	475	3.028E+00	516	1.078E+01	557	1.508E+01
394	1.260E-02	435	3.364E+00	476	3.084E+00	517	1.089E+01	558	1.520E+01
395	1.380E-02	436	3.682E+00	477	3.169E+00	518	1.099E+01	559	1.533E+01
396	1.030E-02	437	4.026E+00	478	3.264E+00	519	1.108E+01	560	1.546E+01
397	8.500E-03	438	4.418E+00	479	3.385E+00	520	1.116E+01	561	1.557E+01
398	5.600E-03	439	4.858E+00	480	3.527E+00	521	1.125E+01	562	1.569E+01
399	2.700E-03	440	5.352E+00	481	3.681E+00	522	1.133E+01	563	1.581E+01
400	1.420E-02	441	5.893E+00	482	3.856E+00	523	1.142E+01	564	1.594E+01
401	1.700E-02	442	6.478E+00	483	4.054E+00	524	1.152E+01	565	1.608E+01
402	1.480E-02	443	7.100E+00	484	4.266E+00	525	1.159E+01	566	1.620E+01
403	1.640E-02	444	7.719E+00	485	4.482E+00	526	1.167E+01	567	1.632E+01
404	1.580E-02	445	8.307E+00	486	4.699E+00	527	1.174E+01	568	1.645E+01
405	2.560E-02	446	8.817E+00	487	4.927E+00	528	1.181E+01	569	1.657E+01
406	3.050E-02	447	9.203E+00	488	5.183E+00	529	1.190E+01	570	1.670E+01
407	3.740E-02	448	9.449E+00	489	5.443E+00	530	1.201E+01	571	1.683E+01
408	4.490E-02	449	9.503E+00	490	5.710E+00	531	1.210E+01	572	1.696E+01
409	6.410E-02	450	9.348E+00	491	5.972E+00	532	1.220E+01	573	1.709E+01
410	7.590E-02	451	9.015E+00	492	6.239E+00	533	1.229E+01	574	1.721E+01
411	7.950E-02	452	8.541E+00	493	6.509E+00	534	1.239E+01	575	1.735E+01
412	8.840E-02	453	7.970E+00	494	6.792E+00	535	1.248E+01	576	1.748E+01
413	1.161E-01	454	7.361E+00	495	7.078E+00	536	1.257E+01	577	1.763E+01
414	1.472E-01	455	6.768E+00	496	7.346E+00	537	1.268E+01	578	1.778E+01
415	1.811E-01	456	6.208E+00	497	7.603E+00	538	1.280E+01	579	1.793E+01
416	2.242E-01	457	5.721E+00	498	7.849E+00	539	1.291E+01	580	1.809E+01
417	2.707E-01	458	5.318E+00	499	8.091E+00	540	1.302E+01	581	1.826E+01
418	3.422E-01	459	4.991E+00	500	8.319E+00	541	1.313E+01	582	1.843E+01
419	4.098E-01	460	4.747E+00	501	8.527E+00	542	1.323E+01	583	1.859E+01
420	4.861E-01	461	4.553E+00	502	8.748E+00	543	1.335E+01	584	1.875E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.892E+01	626	2.531E+01	667	1.739E+01	708	6.590E+00	749	1.678E+00
586	1.911E+01	627	2.527E+01	668	1.709E+01	709	6.409E+00	750	1.641E+00
587	1.931E+01	628	2.522E+01	669	1.679E+01	710	6.233E+00	751	1.591E+00
588	1.950E+01	629	2.518E+01	670	1.648E+01	711	6.051E+00	752	1.547E+00
589	1.970E+01	630	2.512E+01	671	1.616E+01	712	5.897E+00	753	1.473E+00
590	1.993E+01	631	2.504E+01	672	1.584E+01	713	5.732E+00	754	1.380E+00
591	2.016E+01	632	2.496E+01	673	1.552E+01	714	5.567E+00	755	1.323E+00
592	2.038E+01	633	2.486E+01	674	1.523E+01	715	5.409E+00	756	1.271E+00
593	2.059E+01	634	2.475E+01	675	1.491E+01	716	5.250E+00	757	1.165E+00
594	2.084E+01	635	2.464E+01	676	1.461E+01	717	5.094E+00	758	1.110E+00
595	2.108E+01	636	2.454E+01	677	1.432E+01	718	4.943E+00	759	1.079E+00
596	2.130E+01	637	2.443E+01	678	1.401E+01	719	4.785E+00	760	1.043E+00
597	2.150E+01	638	2.430E+01	679	1.372E+01	720	4.633E+00	761	1.028E+00
598	2.172E+01	639	2.416E+01	680	1.343E+01	721	4.502E+00	762	1.045E+00
599	2.195E+01	640	2.400E+01	681	1.314E+01	722	4.384E+00	763	1.003E+00
600	2.217E+01	641	2.386E+01	682	1.287E+01	723	4.238E+00	764	9.194E-01
601	2.240E+01	642	2.371E+01	683	1.259E+01	724	4.105E+00	765	8.678E-01
602	2.263E+01	643	2.353E+01	684	1.230E+01	725	3.985E+00	766	8.342E-01
603	2.285E+01	644	2.335E+01	685	1.201E+01	726	3.851E+00	767	8.318E-01
604	2.306E+01	645	2.316E+01	686	1.176E+01	727	3.731E+00	768	7.985E-01
605	2.327E+01	646	2.296E+01	687	1.150E+01	728	3.633E+00	769	7.515E-01
606	2.348E+01	647	2.274E+01	688	1.121E+01	729	3.534E+00	770	6.875E-01
607	2.368E+01	648	2.256E+01	689	1.093E+01	730	3.416E+00	771	6.747E-01
608	2.389E+01	649	2.238E+01	690	1.067E+01	731	3.308E+00	772	6.693E-01
609	2.408E+01	650	2.215E+01	691	1.042E+01	732	3.169E+00	773	6.492E-01
610	2.426E+01	651	2.192E+01	692	1.019E+01	733	3.049E+00	774	6.196E-01
611	2.442E+01	652	2.169E+01	693	9.970E+00	734	2.950E+00	775	6.081E-01
612	2.454E+01	653	2.145E+01	694	9.714E+00	735	2.840E+00	776	5.728E-01
613	2.468E+01	654	2.119E+01	695	9.449E+00	736	2.719E+00	777	5.334E-01
614	2.481E+01	655	2.091E+01	696	9.205E+00	737	2.587E+00	778	5.177E-01
615	2.492E+01	656	2.065E+01	697	8.953E+00	738	2.490E+00	779	4.833E-01
616	2.504E+01	657	2.038E+01	698	8.716E+00	739	2.417E+00	780	4.524E-01
617	2.514E+01	658	2.010E+01	699	8.489E+00	740	2.348E+00		
618	2.519E+01	659	1.983E+01	700	8.265E+00	741	2.282E+00		
619	2.524E+01	660	1.952E+01	701	8.045E+00	742	2.189E+00		
620	2.528E+01	661	1.921E+01	702	7.810E+00	743	2.081E+00		
621	2.532E+01	662	1.892E+01	703	7.565E+00	744	2.000E+00		
622	2.534E+01	663	1.861E+01	704	7.355E+00	745	1.918E+00		
623	2.536E+01	664	1.831E+01	705	7.163E+00	746	1.842E+00		
624	2.536E+01	665	1.802E+01	706	6.979E+00	747	1.793E+00		
625	2.534E+01	666	1.772E+01	707	6.783E+00	748	1.733E+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**

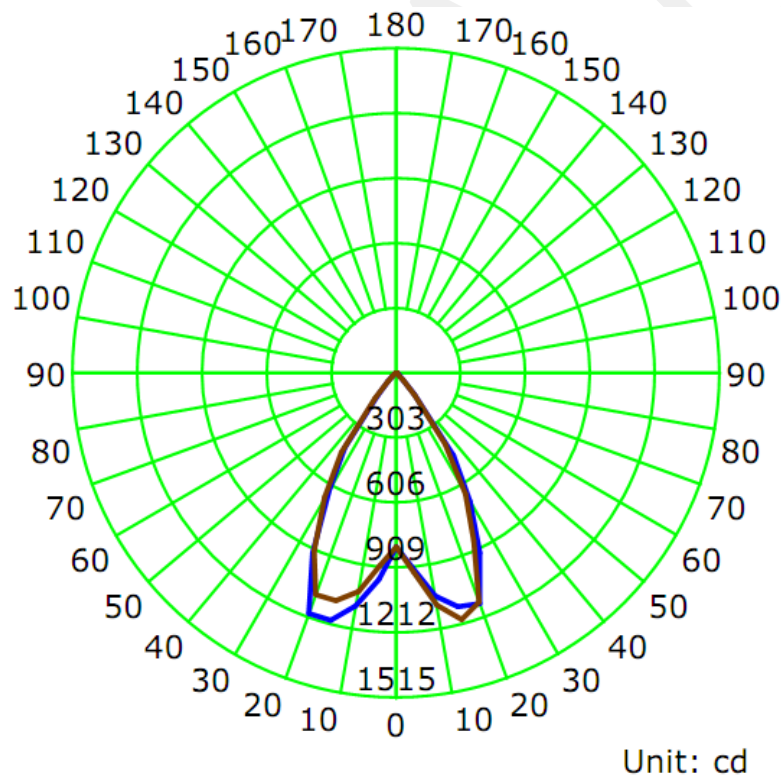
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1040	12.42	0.9960

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1152.8	92.87	1212.5	1.18	1.18

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	63.0	63.9	62.9	62.2	62.9
Field Angle (10% I _{max}):	81.9	83.4	83.0	82.9	82.8

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	812	812	812	812	812	812	812	812
5.0°	914	924	931	935	934	939	948	954
10.0°	1059	1074	1074	1084	1100	1119	1134	1134
15.0°	1129	1136	1158	1173	1190	1202	1208	1213
20.0°	1145	1139	1125	1133	1138	1149	1173	1187
25.0°	927	901	874	860	867	887	924	967
30.0°	694	679	673	666	651	636	636	647
35.0°	470	455	434	424	406	398	398	430
40.0°	132	131	138	139	140	151	148	147
45.0°	48	46	46	47	49	50	53	57
50.0°	21	21	20	21	22	23	25	26
55.0°	9	9	9	9	9	10	11	11
60.0°	3	3	3	4	4	4	4	5
65.0°	0	0	0	1	0	1	1	1
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	1	1	0	1	0	0	0
160.0°	1	1	1	1	1	1	1	1
165.0°	1	2	2	2	2	1	1	1
170.0°	2	2	2	2	2	2	1	2
175.0°	2	2	2	3	3	2	2	3
180.0°	0	0	0	0	0	0	0	0

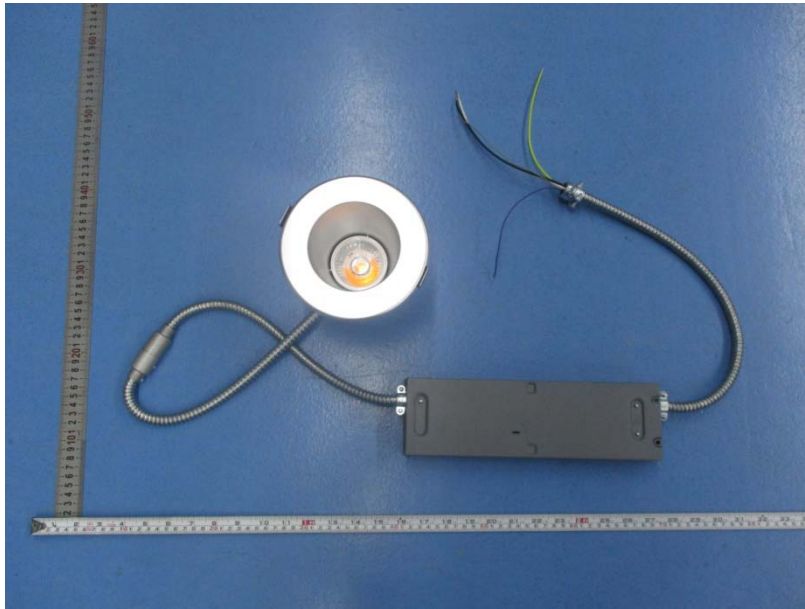
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	812	812	812	812	812	812	812	812
5.0°	968	956	940	925	905	892	895	910
10.0°	1104	1082	1071	1047	1035	1040	1038	1048
15.0°	1196	1164	1137	1108	1100	1089	1096	1110
20.0°	1196	1167	1138	1119	1103	1113	1131	1155
25.0°	929	951	949	938	916	911	922	900
30.0°	634	645	659	671	671	663	664	668
35.0°	424	443	453	453	454	463	465	457
40.0°	140	150	159	158	156	159	150	139
45.0°	55	57	59	58	57	53	51	49
50.0°	25	26	27	27	26	24	23	22
55.0°	11	11	11	11	10	10	10	9
60.0°	4	4	4	4	4	4	4	4
65.0°	1	1	1	1	1	1	1	1
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	1	1	1	1	1	1	0
165.0°	0	1	1	2	2	1	1	1
170.0°	2	2	2	2	2	2	2	2
175.0°	2	2	2	2	2	3	2	2
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	20.8	1.81	0-5	20.8	1.81
5-10	71.8	6.23	0-10	92.6	8.03
10-15	132.2	11.46	0-15	224.8	19.50
15-20	189.1	16.40	0-20	413.9	35.90
20-25	215.9	18.73	0-25	629.8	54.63
25-30	199.2	17.28	0-30	828.9	71.90
30-35	161.8	14.04	0-35	990.7	85.94
35-40	97.6	8.47	0-40	1088.4	94.41
40-45	36.7	3.18	0-45	1125.1	97.59
45-50	15.3	1.33	0-50	1140.4	98.92
50-55	7.3	0.64	0-55	1147.7	99.56
55-60	3.2	0.28	0-60	1150.9	99.83
60-65	1.1	0.10	0-65	1152.0	99.93
65-70	0.2	0.02	0-70	1152.2	99.94
70-75	0.0	0.00	0-75	1152.2	99.94
75-80	0.0	0.00	0-80	1152.2	99.94
80-85	0.0	0.00	0-85	1152.2	99.94
85-90	0.0	0.00	0-90	1152.2	99.94
90-95	0.0	0.00	0-95	1152.2	99.94
95-100	0.0	0.00	0-100	1152.2	99.94
100-105	0.0	0.00	0-105	1152.2	99.94
105-110	0.0	0.00	0-110	1152.2	99.94
110-115	0.0	0.00	0-115	1152.2	99.94
115-120	0.0	0.00	0-120	1152.2	99.94
120-125	0.0	0.00	0-125	1152.2	99.94
125-130	0.0	0.00	0-130	1152.2	99.94
130-135	0.0	0.00	0-135	1152.2	99.94
135-140	0.0	0.00	0-140	1152.2	99.94
140-145	0.0	0.00	0-145	1152.2	99.94
145-150	0.0	0.00	0-150	1152.2	99.94
150-155	0.0	0.00	0-155	1152.2	99.95
155-160	0.1	0.01	0-160	1152.3	99.95
160-165	0.2	0.01	0-165	1152.5	99.97
165-170	0.2	0.02	0-170	1152.7	99.98
170-175	0.1	0.01	0-175	1152.8	100.00
175-180	0.0	0.00	0-180	1152.8	100.00

6. Product Photo



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