



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 24.5NCDLR8DIM/930/277V/EXT

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Joker Gu <i>Joker . Gu</i>
Report Number:	RKSB180510004-10-4
Test Date:	2018-05-11 to 2018-05-15
Report Date:	2018-05-16
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 2018-05-10 and used for testing.

Model Tested: 24.5NCDLR8DIM/930/277V/EXT
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: Slim Downlight
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz
 Rated Power: 24.5W
 Nominal CCT: 3000K
 Nominal Lumen Output: 1920lm

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**

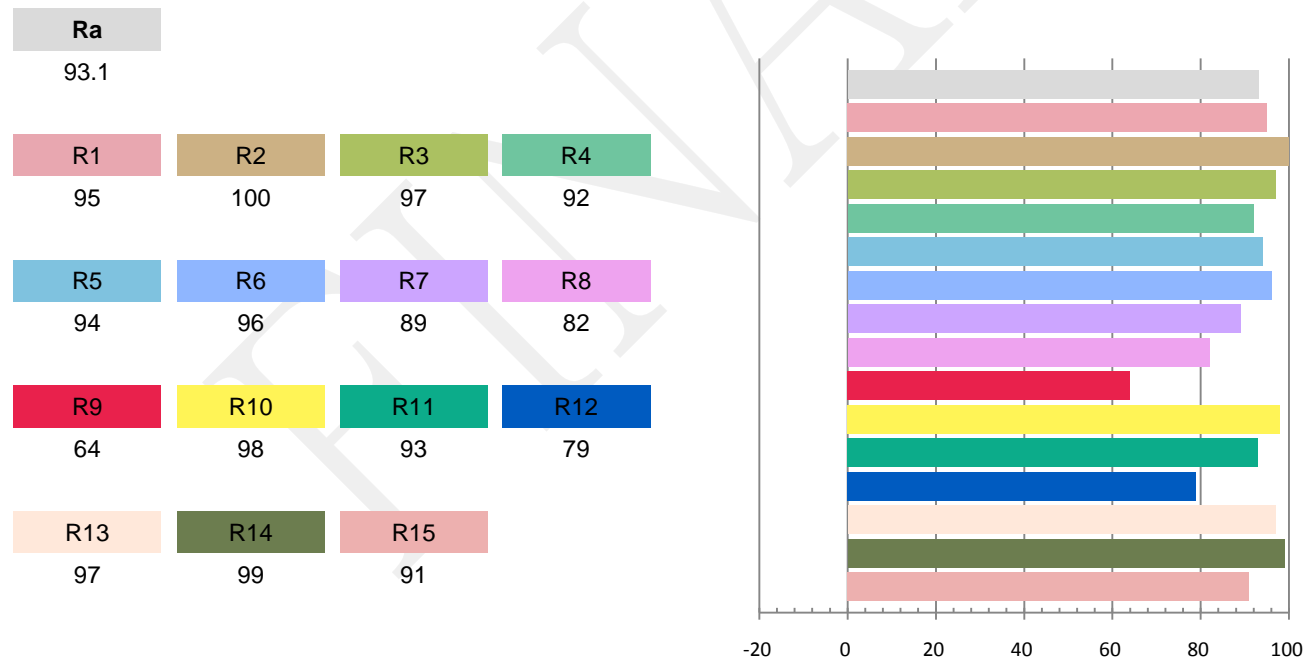
Test orientation: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.02	60	0.1965	23.52	0.9977	2054.1	87.32

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.071	3202	-0.00048	0.4226	0.3975	0.2441	0.5166

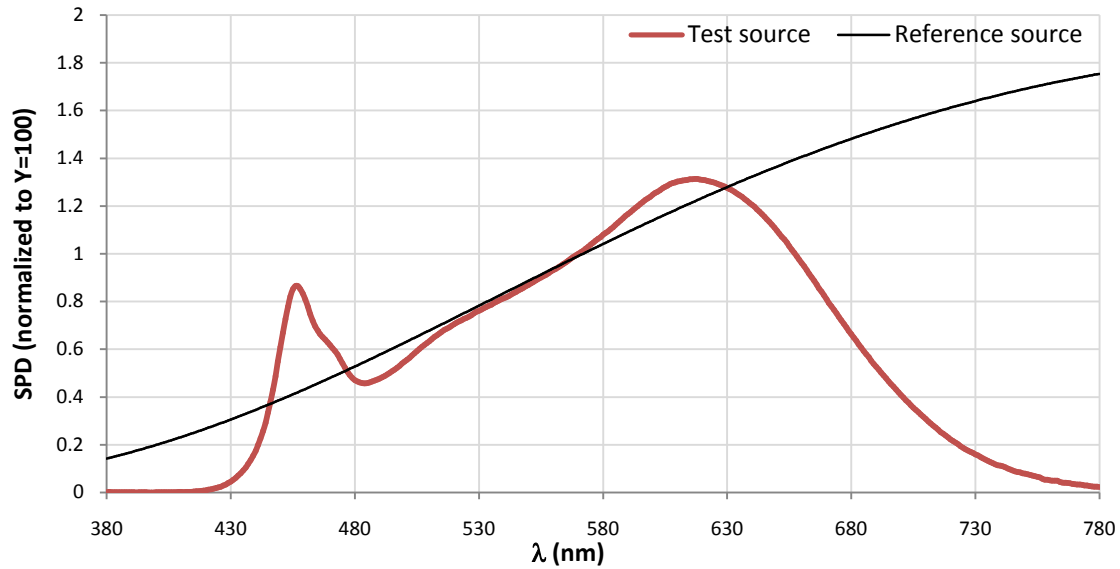
Color Rendering Index



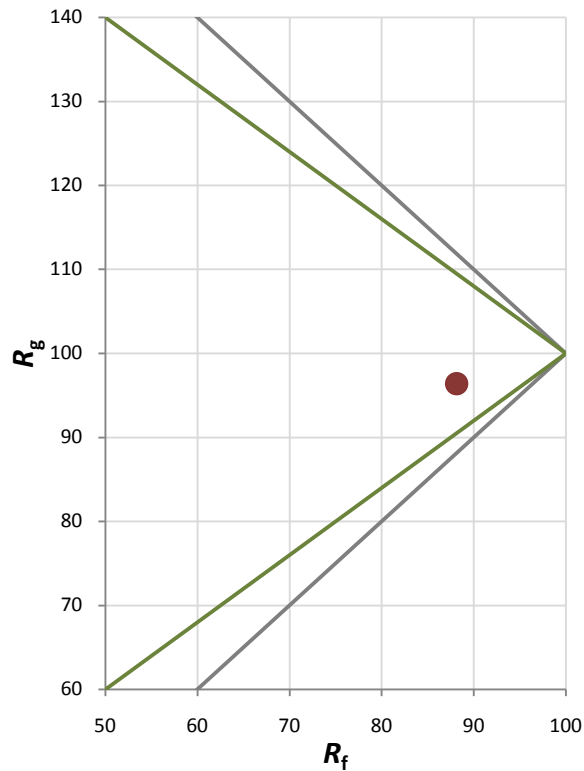
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	96

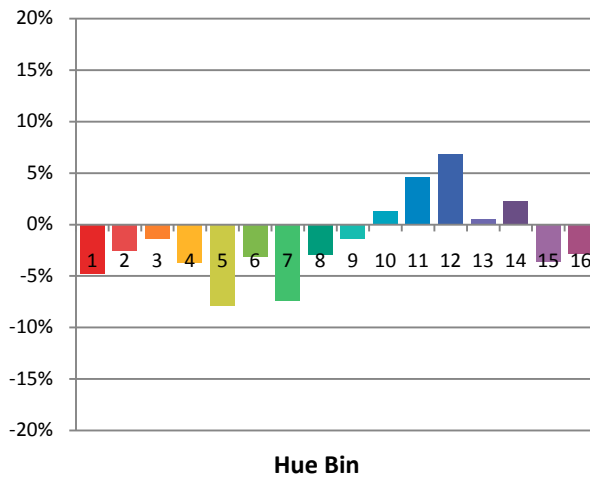
Spectral Power Distribution Comparison



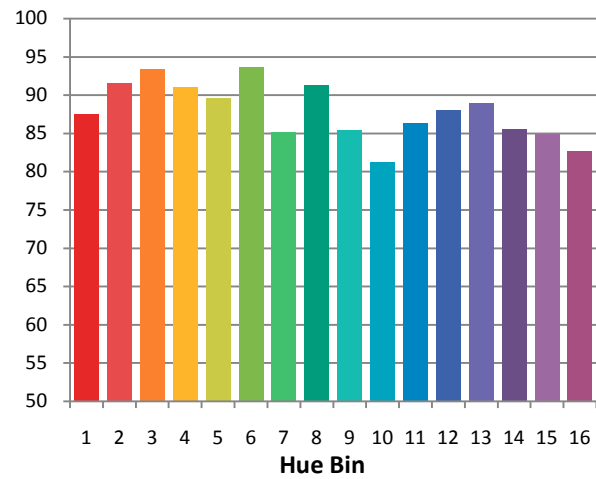
Plot of R_g versus R_f



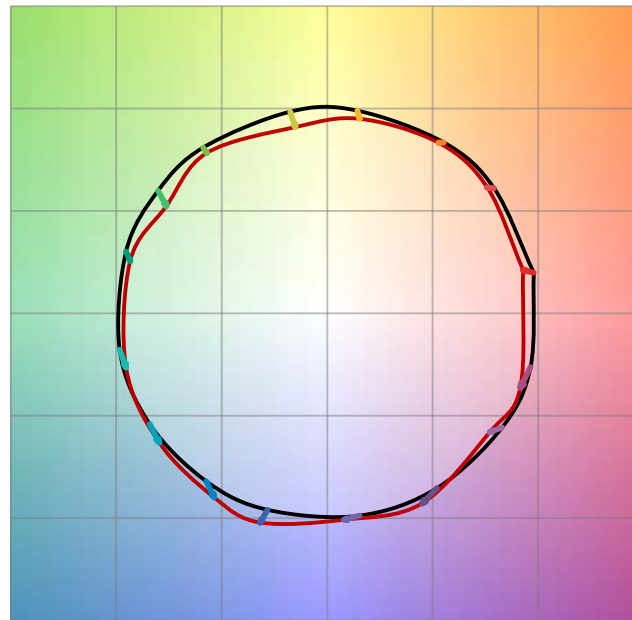
Chroma Shift by Hue



R_t by Hue

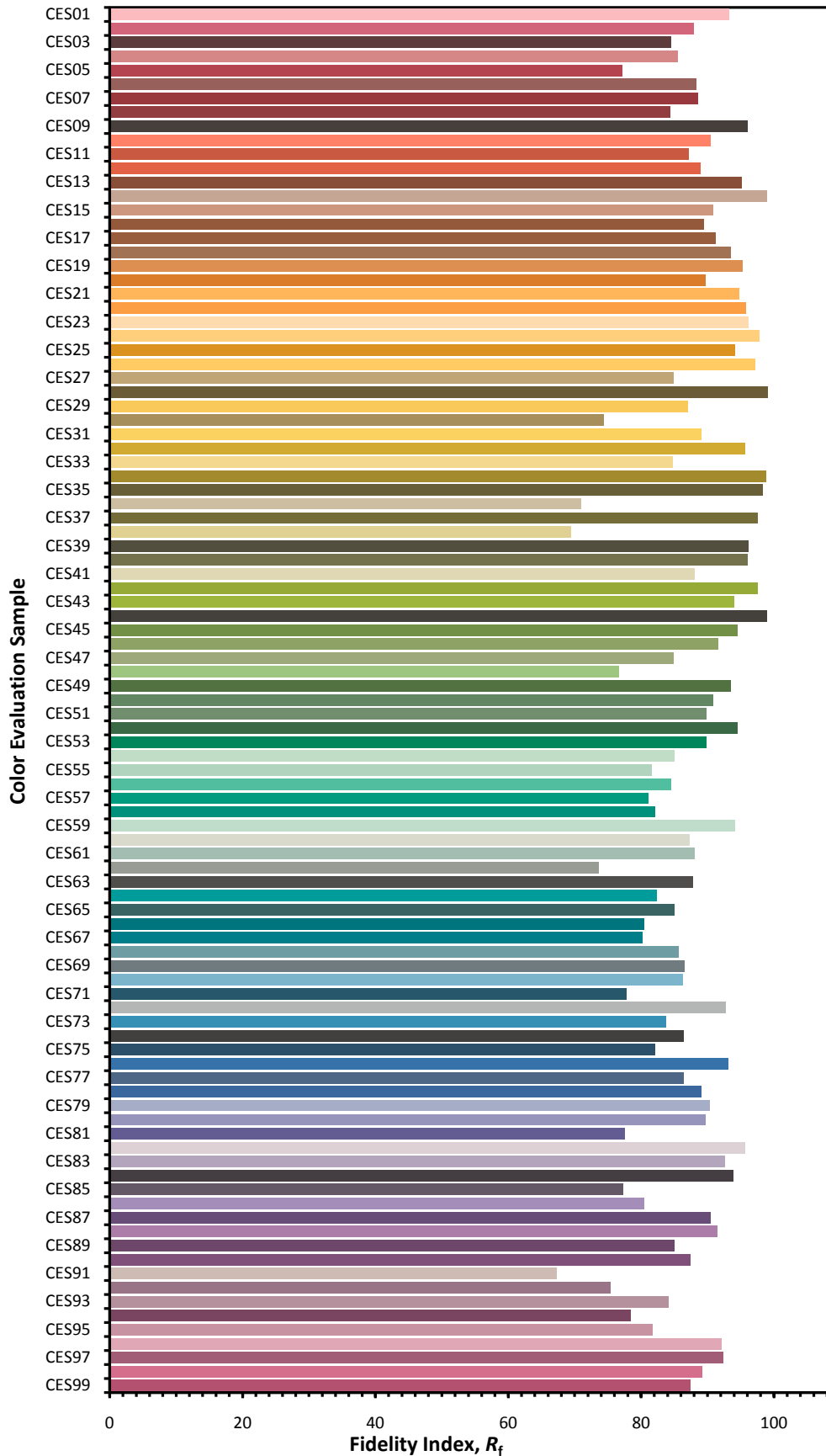


Color Vector Graphic

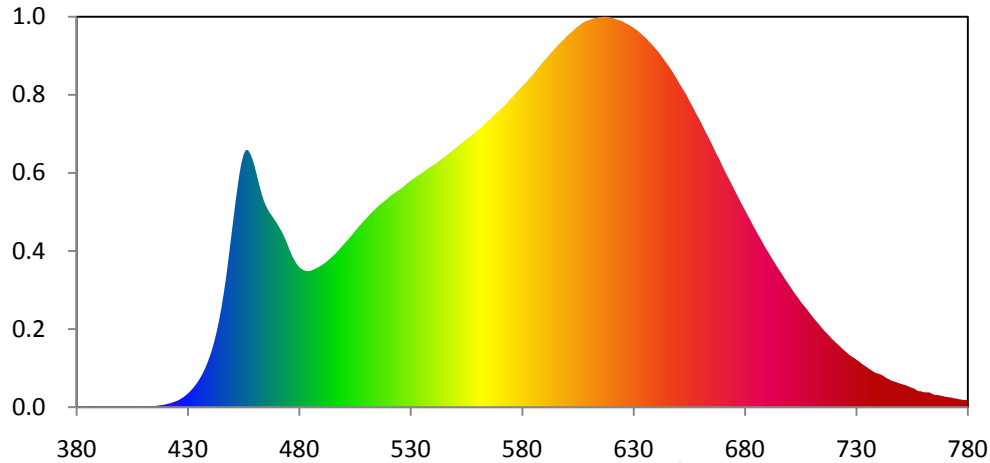


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



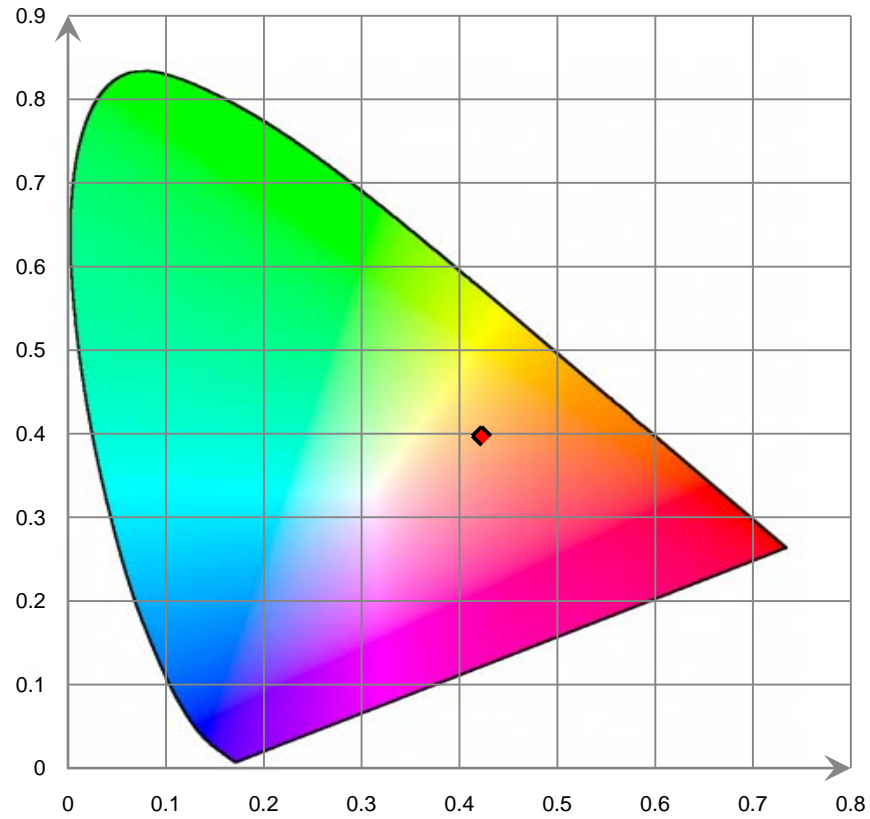
Relative Spectral Power Distribution



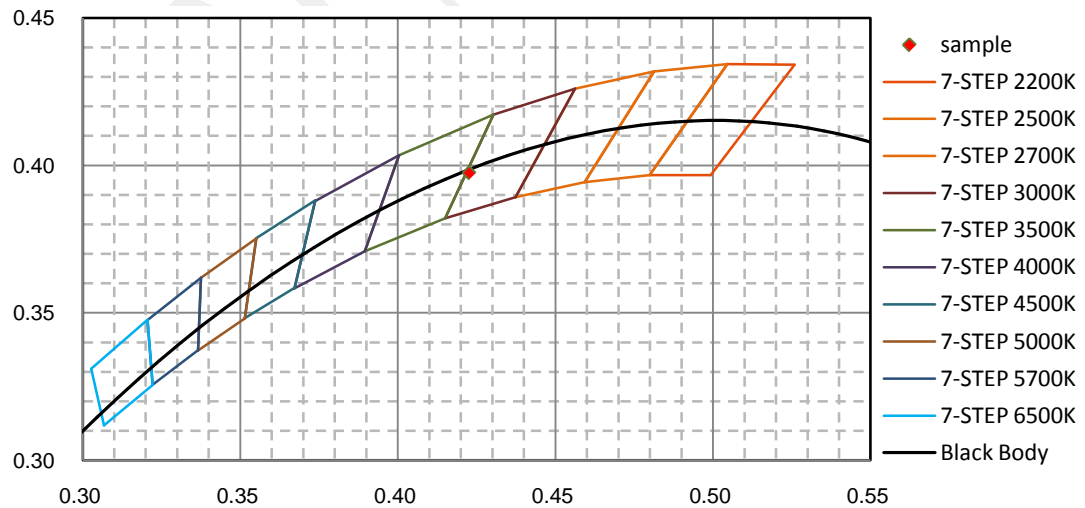
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.720E-02	421	3.461E-01	462	2.250E+01	503	1.724E+01	544	2.511E+01
381	6.290E-02	422	3.961E-01	463	2.166E+01	504	1.752E+01	545	2.528E+01
382	5.740E-02	423	4.751E-01	464	2.092E+01	505	1.780E+01	546	2.546E+01
383	5.010E-02	424	5.532E-01	465	2.038E+01	506	1.808E+01	547	2.562E+01
384	4.490E-02	425	6.308E-01	466	1.993E+01	507	1.834E+01	548	2.580E+01
385	2.900E-02	426	7.338E-01	467	1.957E+01	508	1.859E+01	549	2.600E+01
386	3.440E-02	427	8.662E-01	468	1.926E+01	509	1.884E+01	550	2.617E+01
387	3.920E-02	428	1.019E+00	469	1.891E+01	510	1.907E+01	551	2.634E+01
388	3.320E-02	429	1.193E+00	470	1.858E+01	511	1.932E+01	552	2.653E+01
389	4.200E-02	430	1.386E+00	471	1.819E+01	512	1.957E+01	553	2.673E+01
390	4.110E-02	431	1.606E+00	472	1.779E+01	513	1.980E+01	554	2.691E+01
391	1.980E-02	432	1.854E+00	473	1.736E+01	514	2.001E+01	555	2.708E+01
392	1.260E-02	433	2.125E+00	474	1.683E+01	515	2.024E+01	556	2.725E+01
393	1.800E-02	434	2.430E+00	475	1.628E+01	516	2.045E+01	557	2.740E+01
394	2.090E-02	435	2.768E+00	476	1.571E+01	517	2.063E+01	558	2.761E+01
395	2.490E-02	436	3.150E+00	477	1.520E+01	518	2.080E+01	559	2.784E+01
396	2.260E-02	437	3.581E+00	478	1.479E+01	519	2.098E+01	560	2.801E+01
397	1.540E-02	438	4.076E+00	479	1.442E+01	520	2.119E+01	561	2.817E+01
398	1.240E-02	439	4.632E+00	480	1.416E+01	521	2.139E+01	562	2.838E+01
399	1.030E-02	440	5.255E+00	481	1.397E+01	522	2.155E+01	563	2.859E+01
400	2.290E-02	441	5.973E+00	482	1.385E+01	523	2.169E+01	564	2.879E+01
401	2.840E-02	442	6.799E+00	483	1.377E+01	524	2.187E+01	565	2.899E+01
402	2.780E-02	443	7.733E+00	484	1.376E+01	525	2.202E+01	566	2.922E+01
403	2.460E-02	444	8.801E+00	485	1.379E+01	526	2.217E+01	567	2.947E+01
404	2.810E-02	445	1.002E+01	486	1.388E+01	527	2.234E+01	568	2.968E+01
405	3.860E-02	446	1.140E+01	487	1.398E+01	528	2.256E+01	569	2.986E+01
406	5.250E-02	447	1.292E+01	488	1.410E+01	529	2.276E+01	570	3.008E+01
407	5.590E-02	448	1.462E+01	489	1.422E+01	530	2.290E+01	571	3.028E+01
408	4.450E-02	449	1.647E+01	490	1.435E+01	531	2.305E+01	572	3.049E+01
409	7.070E-02	450	1.830E+01	491	1.451E+01	532	2.323E+01	573	3.073E+01
410	7.520E-02	451	2.012E+01	492	1.467E+01	533	2.339E+01	574	3.095E+01
411	5.780E-02	452	2.184E+01	493	1.486E+01	534	2.352E+01	575	3.122E+01
412	6.040E-02	453	2.342E+01	494	1.507E+01	535	2.366E+01	576	3.146E+01
413	7.160E-02	454	2.468E+01	495	1.526E+01	536	2.384E+01	577	3.171E+01
414	8.300E-02	455	2.557E+01	496	1.548E+01	537	2.400E+01	578	3.194E+01
415	1.120E-01	456	2.601E+01	497	1.572E+01	538	2.416E+01	579	3.218E+01
416	1.463E-01	457	2.599E+01	498	1.597E+01	539	2.433E+01	580	3.247E+01
417	1.722E-01	458	2.563E+01	499	1.622E+01	540	2.445E+01	581	3.268E+01
418	2.088E-01	459	2.506E+01	500	1.648E+01	541	2.460E+01	582	3.291E+01
419	2.410E-01	460	2.432E+01	501	1.672E+01	542	2.476E+01	583	3.318E+01
420	2.896E-01	461	2.340E+01	502	1.699E+01	543	2.495E+01	584	3.343E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.370E+01	626	3.889E+01	667	2.571E+01	708	9.843E+00	749	2.432E+00
586	3.396E+01	627	3.877E+01	668	2.530E+01	709	9.539E+00	750	2.363E+00
587	3.426E+01	628	3.866E+01	669	2.483E+01	710	9.251E+00	751	2.294E+00
588	3.456E+01	629	3.852E+01	670	2.434E+01	711	8.964E+00	752	2.232E+00
589	3.482E+01	630	3.836E+01	671	2.388E+01	712	8.703E+00	753	2.145E+00
590	3.506E+01	631	3.820E+01	672	2.344E+01	713	8.433E+00	754	2.041E+00
591	3.532E+01	632	3.805E+01	673	2.301E+01	714	8.161E+00	755	1.954E+00
592	3.559E+01	633	3.785E+01	674	2.257E+01	715	7.896E+00	756	1.885E+00
593	3.584E+01	634	3.764E+01	675	2.212E+01	716	7.633E+00	757	1.716E+00
594	3.609E+01	635	3.745E+01	676	2.167E+01	717	7.411E+00	758	1.622E+00
595	3.634E+01	636	3.722E+01	677	2.122E+01	718	7.176E+00	759	1.607E+00
596	3.659E+01	637	3.698E+01	678	2.078E+01	719	6.925E+00	760	1.523E+00
597	3.684E+01	638	3.674E+01	679	2.036E+01	720	6.700E+00	761	1.496E+00
598	3.704E+01	639	3.649E+01	680	1.994E+01	721	6.489E+00	762	1.500E+00
599	3.725E+01	640	3.622E+01	681	1.951E+01	722	6.295E+00	763	1.481E+00
600	3.751E+01	641	3.598E+01	682	1.909E+01	723	6.077E+00	764	1.345E+00
601	3.773E+01	642	3.569E+01	683	1.866E+01	724	5.854E+00	765	1.262E+00
602	3.790E+01	643	3.537E+01	684	1.824E+01	725	5.658E+00	766	1.226E+00
603	3.810E+01	644	3.504E+01	685	1.783E+01	726	5.449E+00	767	1.217E+00
604	3.833E+01	645	3.473E+01	686	1.742E+01	727	5.266E+00	768	1.162E+00
605	3.851E+01	646	3.443E+01	687	1.704E+01	728	5.109E+00	769	1.105E+00
606	3.866E+01	647	3.409E+01	688	1.662E+01	729	4.979E+00	770	1.056E+00
607	3.884E+01	648	3.374E+01	689	1.621E+01	730	4.810E+00	771	1.017E+00
608	3.898E+01	649	3.336E+01	690	1.584E+01	731	4.668E+00	772	9.937E-01
609	3.907E+01	650	3.297E+01	691	1.547E+01	732	4.482E+00	773	9.538E-01
610	3.916E+01	651	3.259E+01	692	1.509E+01	733	4.302E+00	774	8.923E-01
611	3.923E+01	652	3.221E+01	693	1.473E+01	734	4.159E+00	775	8.695E-01
612	3.932E+01	653	3.186E+01	694	1.437E+01	735	3.999E+00	776	8.063E-01
613	3.936E+01	654	3.147E+01	695	1.400E+01	736	3.842E+00	777	7.794E-01
614	3.939E+01	655	3.103E+01	696	1.367E+01	737	3.698E+00	778	7.340E-01
615	3.945E+01	656	3.060E+01	697	1.332E+01	738	3.545E+00	779	7.384E-01
616	3.948E+01	657	3.018E+01	698	1.296E+01	739	3.436E+00	780	6.719E-01
617	3.948E+01	658	2.975E+01	699	1.262E+01	740	3.387E+00		
618	3.949E+01	659	2.932E+01	700	1.230E+01	741	3.298E+00		
619	3.944E+01	660	2.892E+01	701	1.196E+01	742	3.182E+00		
620	3.939E+01	661	2.848E+01	702	1.161E+01	743	3.019E+00		
621	3.934E+01	662	2.800E+01	703	1.131E+01	744	2.886E+00		
622	3.924E+01	663	2.756E+01	704	1.101E+01	745	2.777E+00		
623	3.917E+01	664	2.713E+01	705	1.068E+01	746	2.664E+00		
624	3.911E+01	665	2.667E+01	706	1.039E+01	747	2.592E+00		
625	3.902E+01	666	2.620E+01	707	1.013E+01	748	2.522E+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**

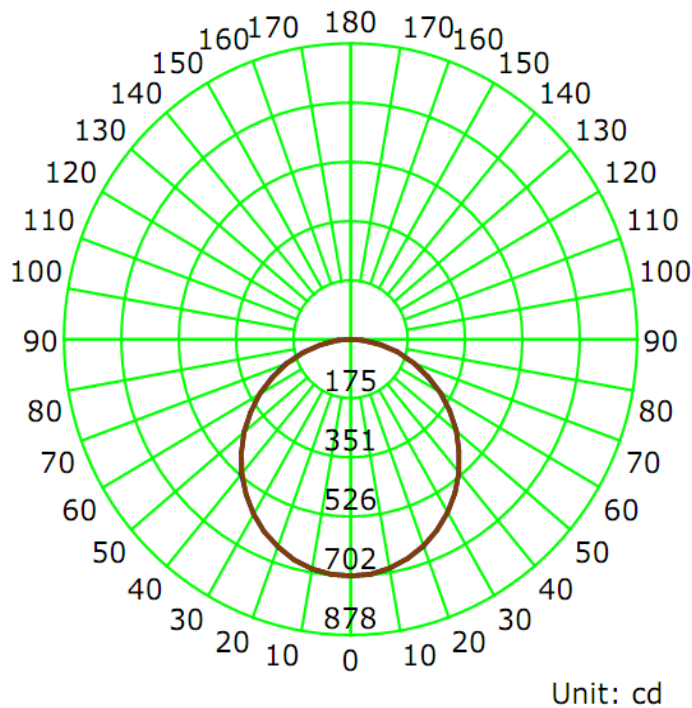
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1970	23.56	0.9980

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2061.7	87.56	702.4	1.26	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	114.0	114.1	114.0	114.1	114.0
Field Angle (10% I_{max}):	164.4	164.4	164.5	164.5	164.5

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	702	702	702	702	702	702	702	702
5.0°	699	699	698	699	699	700	700	700
10.0°	690	689	689	689	689	689	691	691
15.0°	674	673	672	673	674	675	676	677
20.0°	653	652	651	652	652	653	655	656
25.0°	625	625	623	624	625	627	629	631
30.0°	594	592	591	591	594	595	597	599
35.0°	557	555	554	555	556	559	561	563
40.0°	515	514	513	513	515	518	520	522
45.0°	470	469	468	468	469	473	476	478
50.0°	421	420	419	420	421	424	428	429
55.0°	370	368	369	369	370	373	376	379
60.0°	317	316	315	315	317	319	323	325
65.0°	261	260	259	260	262	264	267	270
70.0°	205	203	203	204	206	209	211	214
75.0°	148	147	146	148	150	152	155	158
80.0°	93	91	91	92	95	96	99	101
85.0°	35	36	37	38	39	42	44	45
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

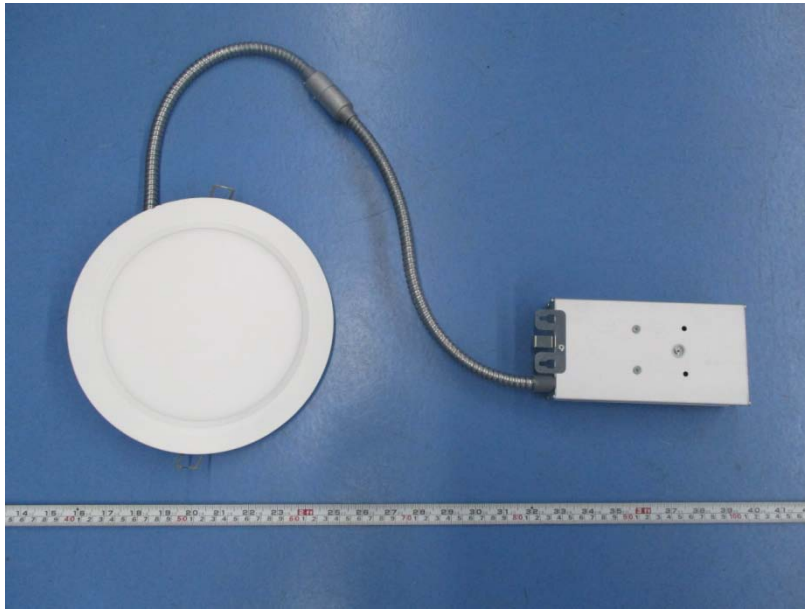
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	702	702	702	702	702	702	702	702
5.0°	700	700	700	700	700	700	699	698
10.0°	692	691	692	692	691	691	690	690
15.0°	677	677	677	677	677	675	674	673
20.0°	655	657	656	657	655	654	654	652
25.0°	629	631	631	631	629	628	626	625
30.0°	598	600	599	599	597	596	594	592
35.0°	562	563	563	563	562	560	557	555
40.0°	521	522	522	522	520	519	516	514
45.0°	476	477	477	477	476	473	470	467
50.0°	427	429	429	428	427	424	421	419
55.0°	376	378	378	377	376	373	370	367
60.0°	322	324	324	323	321	320	317	313
65.0°	267	269	268	268	266	264	260	257
70.0°	211	213	212	211	210	208	204	201
75.0°	153	154	154	154	152	150	148	145
80.0°	97	98	98	96	96	93	91	88
85.0°	42	43	43	41	40	38	36	32
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	16.8	0.81	0-5	16.8	0.81
5-10	49.7	2.41	0-10	66.5	3.22
10-15	81.0	3.93	0-15	147.5	7.15
15-20	109.5	5.31	0-20	257.0	12.46
20-25	134.4	6.52	0-25	391.4	18.98
25-30	154.8	7.51	0-30	546.1	26.49
30-35	170.0	8.25	0-35	716.1	34.73
35-40	179.7	8.71	0-40	895.8	43.45
40-45	183.4	8.90	0-45	1079.2	52.34
45-50	181.2	8.79	0-50	1260.5	61.14
50-55	173.3	8.41	0-55	1433.8	69.54
55-60	160.1	7.76	0-60	1593.9	77.31
60-65	141.8	6.88	0-65	1735.7	84.19
65-70	119.4	5.79	0-70	1855.1	89.98
70-75	93.7	4.55	0-75	1948.9	94.53
75-80	65.6	3.18	0-80	2014.5	97.71
80-85	36.4	1.77	0-85	2050.9	99.48
85-90	10.8	0.52	0-90	2061.7	100.00
90-95	0.0	0.00	0-95	2061.7	100.00
95-100	0.0	0.00	0-100	2061.7	100.00
100-105	0.0	0.00	0-105	2061.7	100.00
105-110	0.0	0.00	0-110	2061.7	100.00
110-115	0.0	0.00	0-115	2061.7	100.00
115-120	0.0	0.00	0-120	2061.7	100.00
120-125	0.0	0.00	0-125	2061.7	100.00
125-130	0.0	0.00	0-130	2061.7	100.00
130-135	0.0	0.00	0-135	2061.7	100.00
135-140	0.0	0.00	0-140	2061.7	100.00
140-145	0.0	0.00	0-145	2061.7	100.00
145-150	0.0	0.00	0-150	2061.7	100.00
150-155	0.0	0.00	0-155	2061.7	100.00
155-160	0.0	0.00	0-160	2061.7	100.00
160-165	0.0	0.00	0-165	2061.7	100.00
165-170	0.0	0.00	0-170	2061.7	100.00
170-175	0.0	0.00	0-175	2061.7	100.00
175-180	0.0	0.00	0-180	2061.7	100.00

6. Product Photo



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