



TL-749



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE199027DIM120NRR4BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329024-10-1
Test Date:	2019-04-04 to 2019-04-09
Report Date:	2019-05-07
Reviewed By:	Ray Gao/EE Engineer <i>Ry 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 2019-03-29 and used for testing.

Model Tested: LE199027DIM120NRR4BL
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Recessed Downlight
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz
 Rated Power: 31W
 Nominal CCT: 2700K
 Nominal Lumen Output: 1950lm

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	2019-01-23	2020-01-23
Power Meter	INVENTFINE	WT500	GSJWQ20009	2019-04-08	2020-04-08
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2019-04-08	2020-04-08
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-12-24	2019-12-24
Thermal Meter	KEJIAN	TA298	N/A	2018-12-01	2019-12-01
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2019-04-08	2020-04-08
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2019-04-08	2020-04-08
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2019-04-08	2020-04-08
Power Meter	INVENTFINE	WT500	GSDSQ200007	2019-04-08	2020-04-08
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2019-01-24	2020-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2018-12-01	2019-12-01
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2019-03-08	2020-03-08

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 $U_{re}=2.61\%$ ($k=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=34\text{K}$ ($k=2$), 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 $U_{re}=0.48\%$ of rdg, AC Voltage $U_{re}=0.25\%$ of rdg, Power $U_{re}=0.44\%$, ($k=2$), 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 $U_{re}=2.6\%$ ($k=2$), 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**

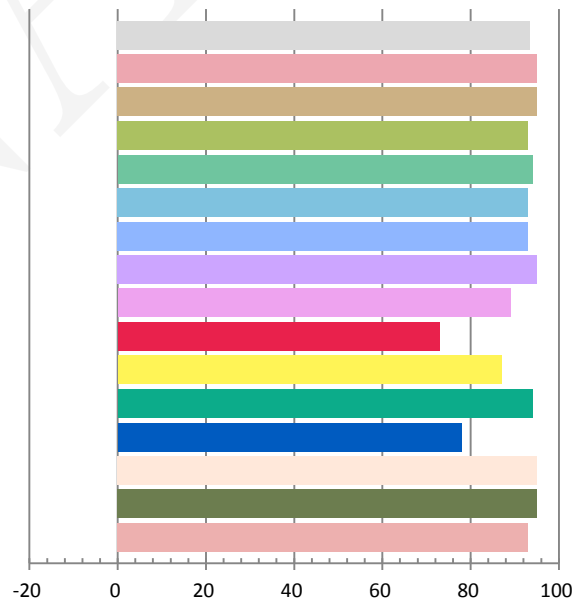
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.2601	30.84	0.9881	1985.08	64.36

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.250	2720	0.00003	0.4583	0.4103	0.2616	0.5270

Color Rendering Index

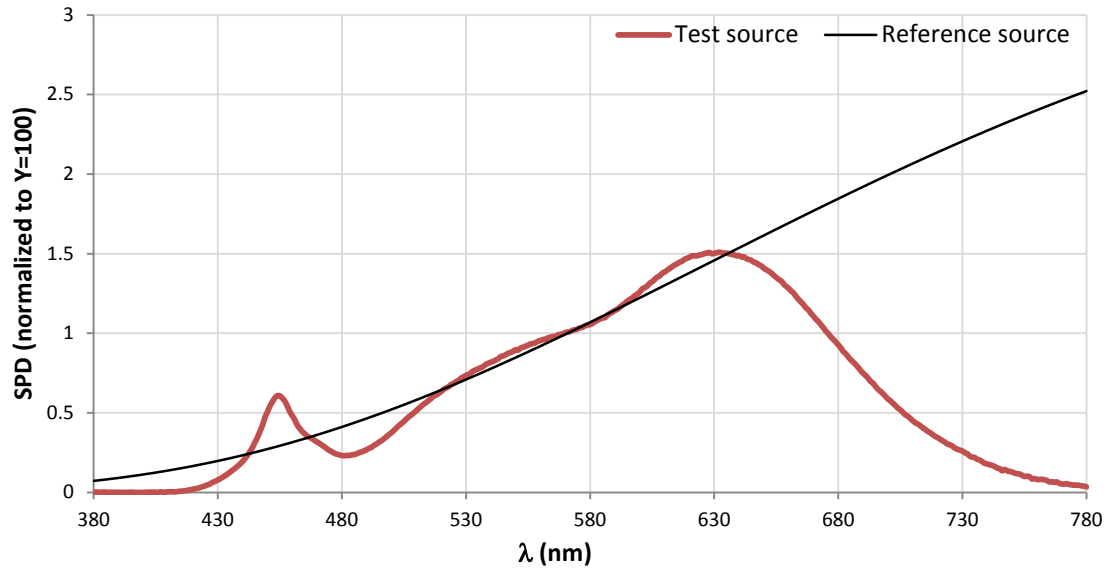
Ra			
93.5			
R1	R2	R3	R4
95	95	93	94
R5	R6	R7	R8
93	93	95	89
R9	R10	R11	R12
73	87	94	78
R13	R14	R15	
95	95	93	



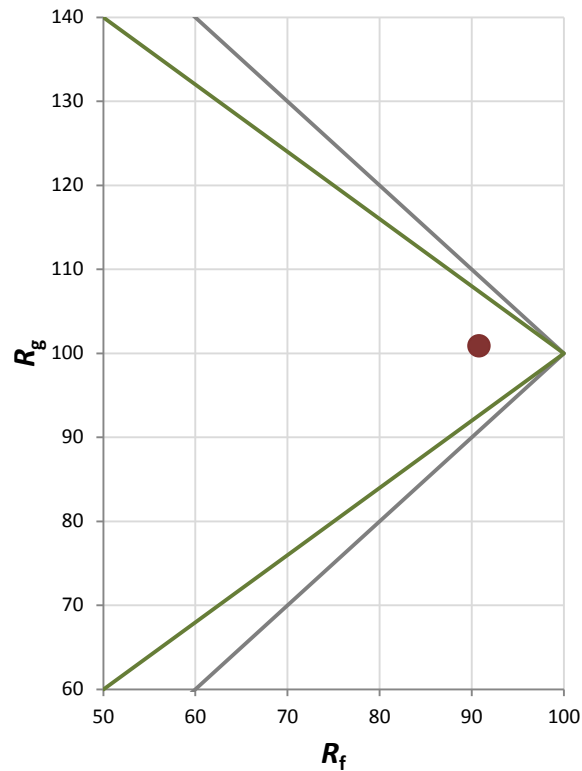
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

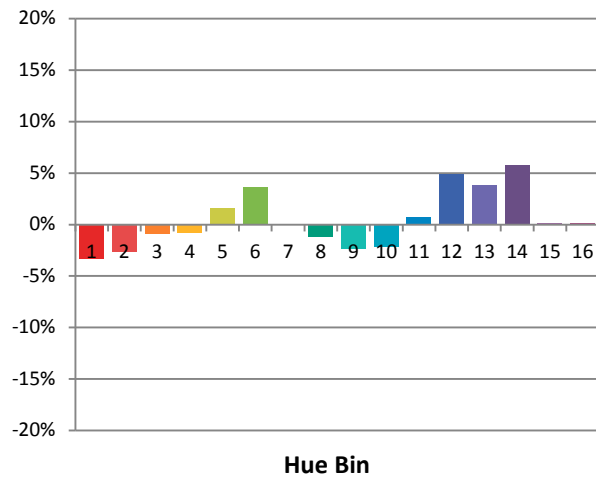
Spectral Power Distribution Comparison



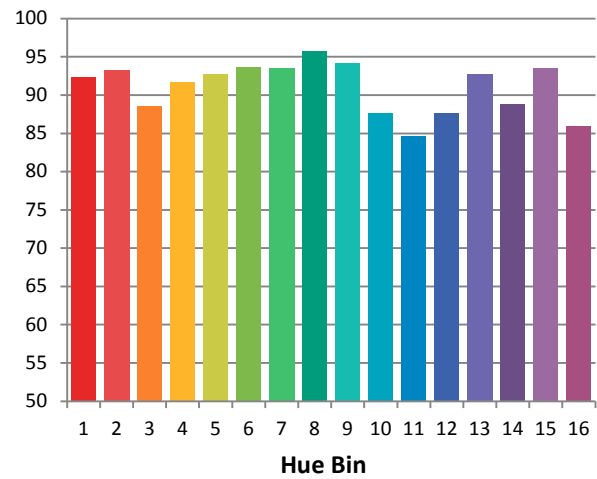
Plot of R_g versus R_f



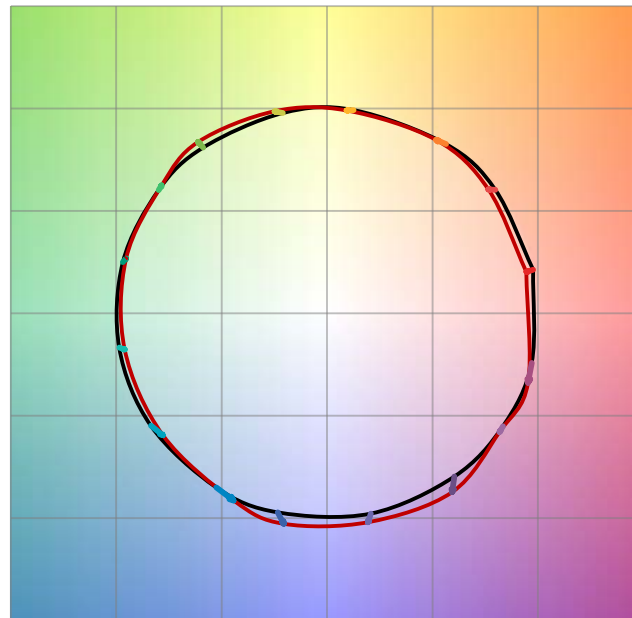
Chroma Shift by Hue



R_t by Hue

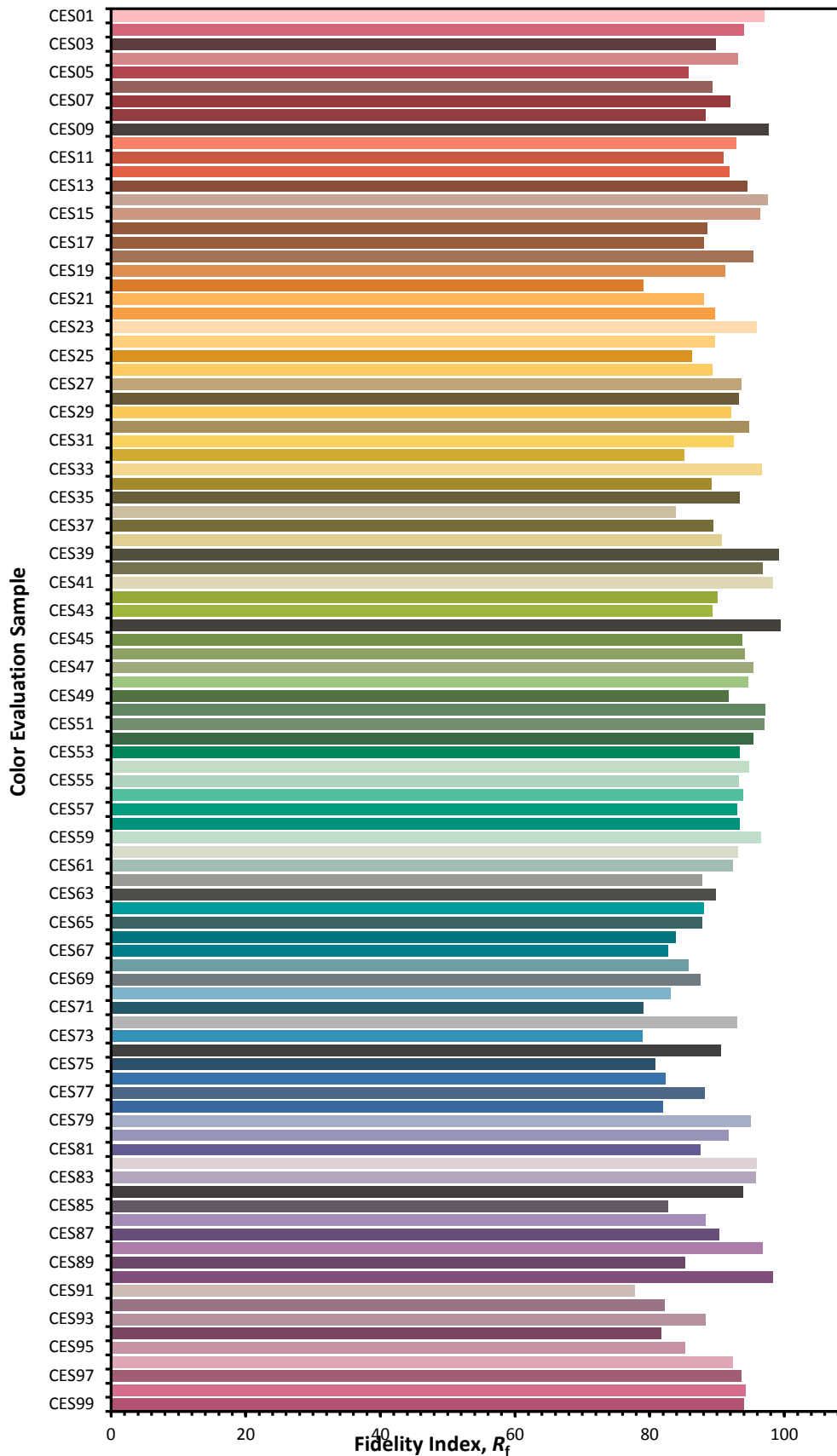


Color Vector Graphic

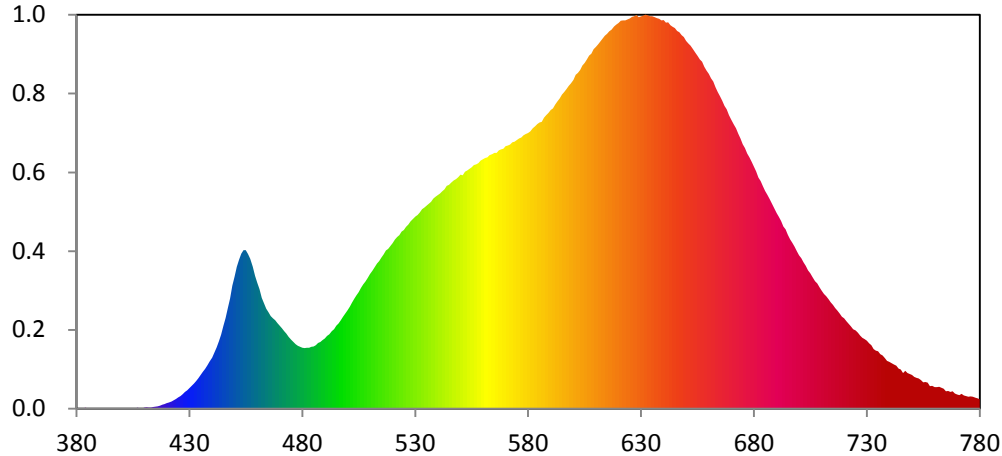


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



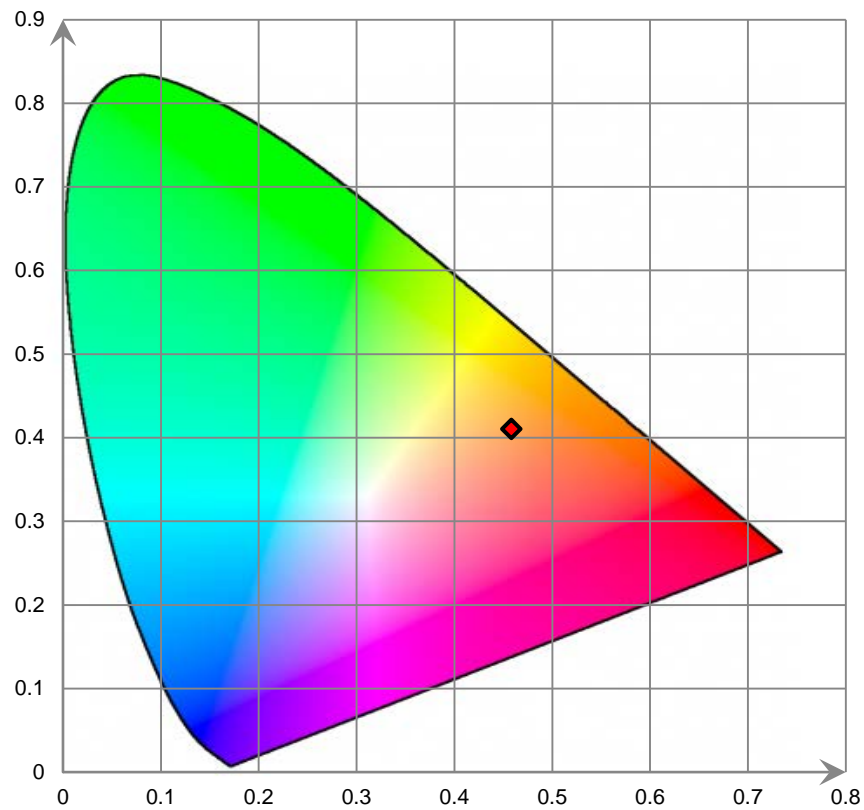
Relative Spectral Power Distribution



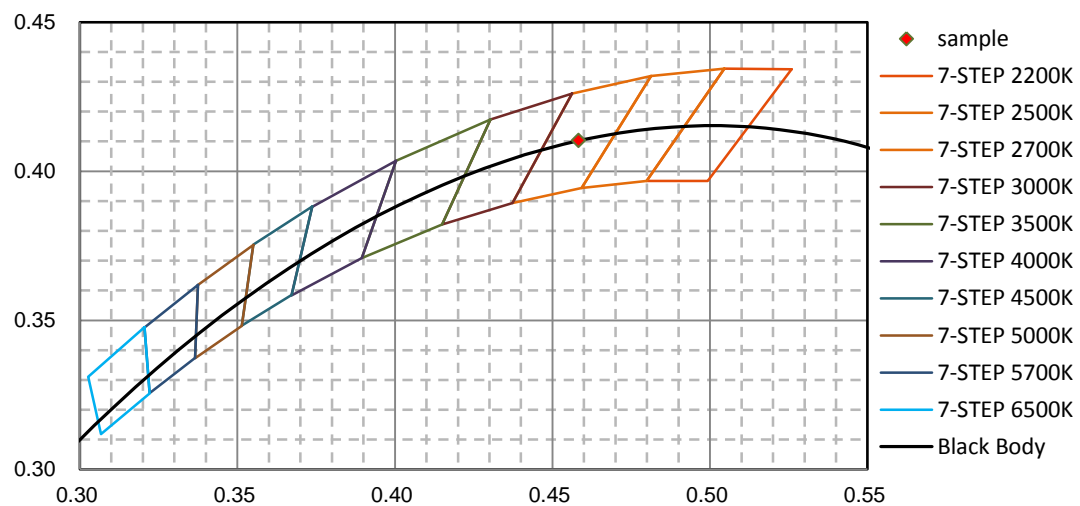
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.870E-02	421	6.838E-01	462	1.232E+01	503	1.222E+01	544	2.482E+01
381	6.810E-02	422	7.861E-01	463	1.171E+01	504	1.261E+01	545	2.492E+01
382	4.560E-02	423	9.213E-01	464	1.113E+01	505	1.296E+01	546	2.515E+01
383	1.440E-02	424	1.060E+00	465	1.073E+01	506	1.342E+01	547	2.541E+01
384	9.480E-02	425	1.232E+00	466	1.031E+01	507	1.383E+01	548	2.557E+01
385	4.420E-02	426	1.403E+00	467	1.004E+01	508	1.416E+01	549	2.577E+01
386	5.300E-03	427	1.607E+00	468	9.840E+00	509	1.454E+01	550	2.606E+01
387	4.590E-02	428	1.850E+00	469	9.497E+00	510	1.496E+01	551	2.598E+01
388	1.910E-02	429	2.041E+00	470	9.212E+00	511	1.535E+01	552	2.637E+01
389	1.690E-02	430	2.283E+00	471	8.944E+00	512	1.576E+01	553	2.652E+01
390	4.480E-02	431	2.512E+00	472	8.633E+00	513	1.615E+01	554	2.671E+01
391	2.100E-02	432	2.790E+00	473	8.325E+00	514	1.644E+01	555	2.688E+01
392	1.020E-02	433	3.074E+00	474	7.963E+00	515	1.682E+01	556	2.712E+01
393	1.040E-02	434	3.389E+00	475	7.663E+00	516	1.716E+01	557	2.719E+01
394	1.060E-02	435	3.733E+00	476	7.426E+00	517	1.760E+01	558	2.734E+01
395	6.700E-02	436	4.081E+00	477	7.146E+00	518	1.780E+01	559	2.761E+01
396	1.520E-02	437	4.428E+00	478	6.996E+00	519	1.811E+01	560	2.775E+01
397	1.740E-02	438	4.803E+00	479	6.859E+00	520	1.843E+01	561	2.791E+01
398	5.000E-03	439	5.225E+00	480	6.755E+00	521	1.883E+01	562	2.798E+01
399	2.000E-04	440	5.664E+00	481	6.718E+00	522	1.909E+01	563	2.822E+01
400	0.000E+00	441	6.230E+00	482	6.761E+00	523	1.932E+01	564	2.835E+01
401	2.540E-02	442	6.801E+00	483	6.753E+00	524	1.970E+01	565	2.847E+01
402	4.590E-02	443	7.490E+00	484	6.864E+00	525	1.990E+01	566	2.848E+01
403	5.280E-02	444	8.243E+00	485	6.927E+00	526	2.023E+01	567	2.877E+01
404	5.400E-02	445	9.200E+00	486	7.058E+00	527	2.048E+01	568	2.886E+01
405	4.220E-02	446	1.009E+01	487	7.299E+00	528	2.086E+01	569	2.895E+01
406	7.100E-03	447	1.117E+01	488	7.403E+00	529	2.112E+01	570	2.922E+01
407	1.142E-01	448	1.225E+01	489	7.614E+00	530	2.138E+01	571	2.929E+01
408	3.210E-02	449	1.369E+01	490	7.816E+00	531	2.156E+01	572	2.938E+01
409	7.810E-02	450	1.470E+01	491	8.081E+00	532	2.184E+01	573	2.964E+01
410	1.093E-01	451	1.578E+01	492	8.265E+00	533	2.220E+01	574	2.971E+01
411	1.329E-01	452	1.656E+01	493	8.608E+00	534	2.239E+01	575	2.989E+01
412	1.172E-01	453	1.726E+01	494	8.849E+00	535	2.260E+01	576	3.006E+01
413	1.014E-01	454	1.765E+01	495	9.211E+00	536	2.280E+01	577	3.019E+01
414	1.904E-01	455	1.764E+01	496	9.465E+00	537	2.302E+01	578	3.044E+01
415	2.175E-01	456	1.722E+01	497	9.816E+00	538	2.339E+01	579	3.059E+01
416	2.609E-01	457	1.666E+01	498	1.021E+01	539	2.359E+01	580	3.067E+01
417	3.138E-01	458	1.579E+01	499	1.057E+01	540	2.379E+01	581	3.088E+01
418	4.130E-01	459	1.477E+01	500	1.093E+01	541	2.393E+01	582	3.121E+01
419	4.912E-01	460	1.402E+01	501	1.134E+01	542	2.419E+01	583	3.145E+01
420	5.914E-01	461	1.328E+01	502	1.179E+01	543	2.440E+01	584	3.167E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.186E+01	626	4.361E+01	667	3.370E+01	708	1.392E+01	749	3.841E+00
586	3.192E+01	627	4.371E+01	668	3.331E+01	709	1.352E+01	750	3.739E+00
587	3.238E+01	628	4.383E+01	669	3.269E+01	710	1.310E+01	751	3.538E+00
588	3.269E+01	629	4.359E+01	670	3.217E+01	711	1.275E+01	752	3.434E+00
589	3.294E+01	630	4.368E+01	671	3.163E+01	712	1.249E+01	753	3.362E+00
590	3.324E+01	631	4.377E+01	672	3.121E+01	713	1.219E+01	754	3.154E+00
591	3.344E+01	632	4.386E+01	673	3.062E+01	714	1.182E+01	755	2.923E+00
592	3.385E+01	633	4.380E+01	674	3.009E+01	715	1.153E+01	756	2.965E+00
593	3.420E+01	634	4.370E+01	675	2.945E+01	716	1.118E+01	757	2.886E+00
594	3.452E+01	635	4.369E+01	676	2.901E+01	717	1.090E+01	758	2.477E+00
595	3.495E+01	636	4.359E+01	677	2.841E+01	718	1.058E+01	759	2.545E+00
596	3.524E+01	637	4.347E+01	678	2.796E+01	719	1.024E+01	760	2.376E+00
597	3.556E+01	638	4.341E+01	679	2.747E+01	720	1.003E+01	761	2.369E+00
598	3.592E+01	639	4.322E+01	680	2.696E+01	721	9.717E+00	762	2.403E+00
599	3.621E+01	640	4.327E+01	681	2.642E+01	722	9.437E+00	763	2.308E+00
600	3.660E+01	641	4.299E+01	682	2.574E+01	723	9.170E+00	764	2.198E+00
601	3.717E+01	642	4.302E+01	683	2.533E+01	724	8.838E+00	765	1.936E+00
602	3.740E+01	643	4.270E+01	684	2.477E+01	725	8.704E+00	766	1.962E+00
603	3.769E+01	644	4.253E+01	685	2.424E+01	726	8.449E+00	767	1.848E+00
604	3.820E+01	645	4.239E+01	686	2.381E+01	727	8.104E+00	768	1.935E+00
605	3.848E+01	646	4.204E+01	687	2.336E+01	728	7.889E+00	769	1.680E+00
606	3.889E+01	647	4.191E+01	688	2.283E+01	729	7.727E+00	770	1.563E+00
607	3.931E+01	648	4.157E+01	689	2.227E+01	730	7.566E+00	771	1.501E+00
608	3.953E+01	649	4.137E+01	690	2.176E+01	731	7.255E+00	772	1.619E+00
609	4.000E+01	650	4.095E+01	691	2.136E+01	732	7.051E+00	773	1.461E+00
610	4.026E+01	651	4.067E+01	692	2.088E+01	733	6.633E+00	774	1.400E+00
611	4.056E+01	652	4.040E+01	693	2.029E+01	734	6.448E+00	775	1.329E+00
612	4.089E+01	653	4.007E+01	694	1.994E+01	735	6.373E+00	776	1.331E+00
613	4.121E+01	654	3.963E+01	695	1.937E+01	736	6.038E+00	777	1.318E+00
614	4.152E+01	655	3.928E+01	696	1.884E+01	737	5.916E+00	778	1.204E+00
615	4.173E+01	656	3.890E+01	697	1.846E+01	738	5.622E+00	779	1.142E+00
616	4.203E+01	657	3.862E+01	698	1.803E+01	739	5.320E+00	780	1.015E+00
617	4.220E+01	658	3.806E+01	699	1.755E+01	740	5.212E+00		
618	4.256E+01	659	3.762E+01	700	1.707E+01	741	5.060E+00		
619	4.276E+01	660	3.729E+01	701	1.674E+01	742	4.930E+00		
620	4.294E+01	661	3.678E+01	702	1.630E+01	743	4.757E+00		
621	4.320E+01	662	3.641E+01	703	1.589E+01	744	4.462E+00		
622	4.321E+01	663	3.578E+01	704	1.540E+01	745	4.345E+00		
623	4.321E+01	664	3.525E+01	705	1.509E+01	746	3.971E+00		
624	4.335E+01	665	3.477E+01	706	1.464E+01	747	4.205E+00		
625	4.343E+01	666	3.428E+01	707	1.420E+01	748	3.957E+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**

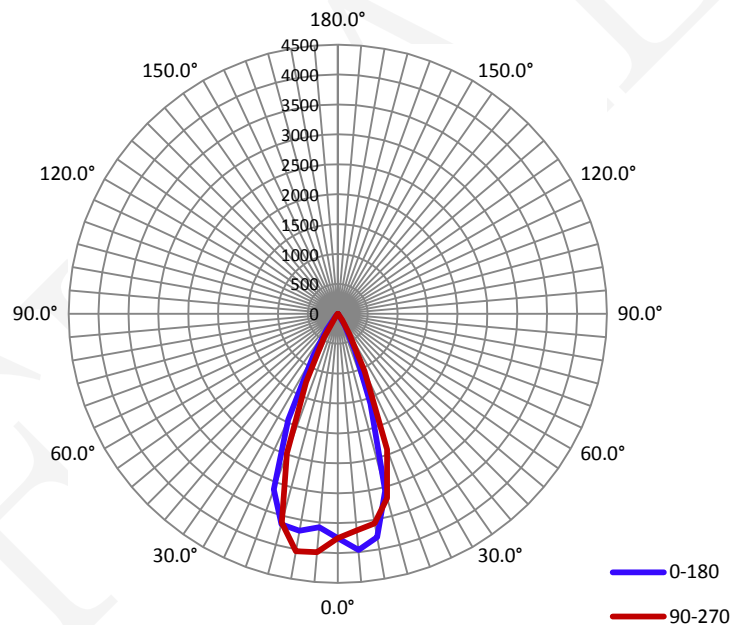
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2670	30.82	0.9620

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1988.5	64.57	4044.8	0.74	0.75

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	43.6	43.2	43.4	42.9	43.3
Field Angle (10% I _{max}):	62.3	62.3	60.6	61.8	61.8

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3751	3751	3751	3751	3751	3751	3751	3751
5.0°	3963	3890	3833	3757	3637	3578	3450	3424
10.0°	3794	3736	3682	3635	3557	3483	3484	3517
15.0°	3065	3069	3081	3090	3188	3288	3411	3491
20.0°	1602	1639	1830	2119	2412	2641	2852	3015
25.0°	672	653	703	814	1060	1391	1729	1988
30.0°	231	251	306	352	387	426	573	757
35.0°	37	40	46	71	132	223	283	316
40.0°	12	12	14	16	23	31	42	57
45.0°	3	3	4	4	8	11	13	16
50.0°	1	2	1	2	2	3	4	5
55.0°	0	0	0	1	1	2	2	2
60.0°	0	0	0	0	0	0	0	1
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

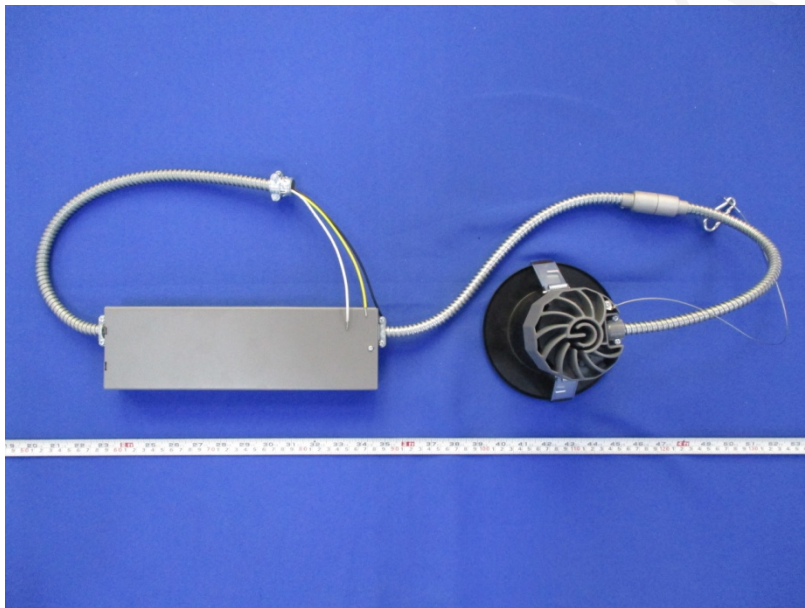
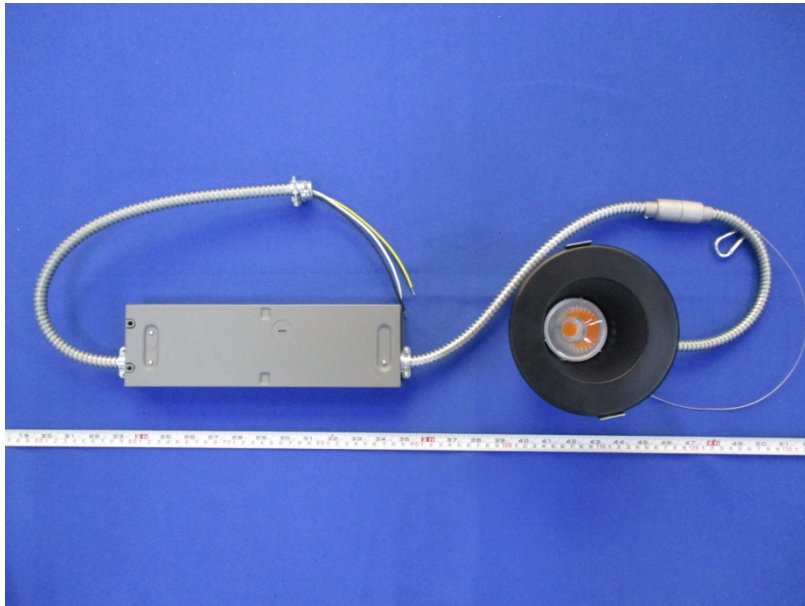
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	3751	3751	3751	3751	3751	3751	3751	3751
5.0°	3579	3770	3861	3956	3999	4020	4016	3973
10.0°	3681	3833	3977	4045	4032	3984	3915	3810
15.0°	3642	3738	3796	3734	3615	3477	3296	3069
20.0°	3123	3183	3115	2904	2482	2077	1730	1566
25.0°	1956	1881	1648	1412	1256	1089	875	691
30.0°	818	849	772	604	455	352	263	208
35.0°	313	286	224	151	87	57	44	35
40.0°	58	55	45	32	23	18	14	12
45.0°	15	15	13	12	9	6	3	3
50.0°	5	4	4	3	3	3	2	2
55.0°	2	2	2	1	1	1	1	0
60.0°	1	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	90.2	4.54	0-5	90.2	4.54
5-10	270.2	13.59	0-10	360.4	18.13
10-15	423.4	21.29	0-15	783.9	39.42
15-20	475.6	23.92	0-20	1259.5	63.34
20-25	380.9	19.16	0-25	1640.4	82.49
25-30	216.9	10.91	0-30	1857.3	93.40
30-35	91.6	4.60	0-35	1948.8	98.00
35-40	29.3	1.47	0-40	1978.1	99.48
40-45	6.9	0.35	0-45	1985.1	99.83
45-50	2.3	0.12	0-50	1987.4	99.94
50-55	0.8	0.04	0-55	1988.2	99.98
55-60	0.3	0.01	0-60	1988.5	100.00
60-65	0.0	0.00	0-65	1988.5	100.00
65-70	0.0	0.00	0-70	1988.5	100.00
70-75	0.0	0.00	0-75	1988.5	100.00
75-80	0.0	0.00	0-80	1988.5	100.00
80-85	0.0	0.00	0-85	1988.5	100.00
85-90	0.0	0.00	0-90	1988.5	100.00
90-95	0.0	0.00	0-95	1988.5	100.00
95-100	0.0	0.00	0-100	1988.5	100.00
100-105	0.0	0.00	0-105	1988.5	100.00
105-110	0.0	0.00	0-110	1988.5	100.00
110-115	0.0	0.00	0-115	1988.5	100.00
115-120	0.0	0.00	0-120	1988.5	100.00
120-125	0.0	0.00	0-125	1988.5	100.00
125-130	0.0	0.00	0-130	1988.5	100.00
130-135	0.0	0.00	0-135	1988.5	100.00
135-140	0.0	0.00	0-140	1988.5	100.00
140-145	0.0	0.00	0-145	1988.5	100.00
145-150	0.0	0.00	0-150	1988.5	100.00
150-155	0.0	0.00	0-155	1988.5	100.00
155-160	0.0	0.00	0-160	1988.5	100.00
160-165	0.0	0.00	0-165	1988.5	100.00
165-170	0.0	0.00	0-170	1988.5	100.00
170-175	0.0	0.00	0-175	1988.5	100.00
175-180	0.0	0.00	0-180	1988.5	100.00

6. Product Photo



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