

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE109027DIM120MDR4CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329016-10-2
Test Date:	2019-04-02 to 2019-04-04
Report Date:	2019-05-06
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.

1. Product Description

General Information:

One sample was received on 2019-03-29 and used for testing.

Model Tested: LE109027DIM120MDR4CC
 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: 12W
 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	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**

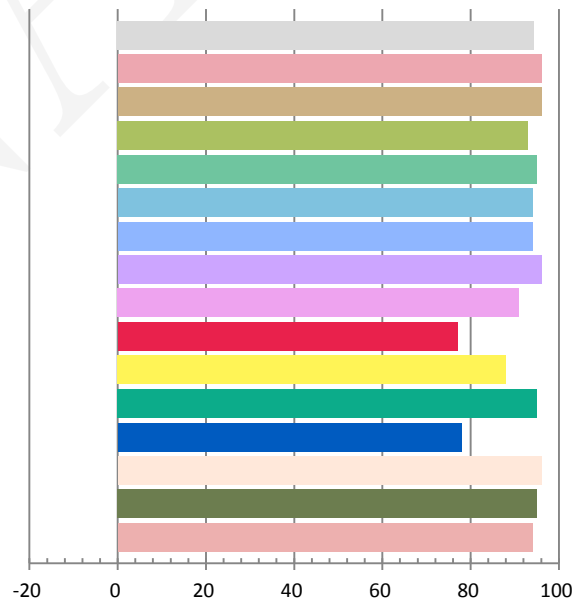
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.01	60	0.1024	12.14	0.9879	1051.91	86.65

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.875	2716	-0.00011	0.4584	0.4100	0.2618	0.5269

Color Rendering Index

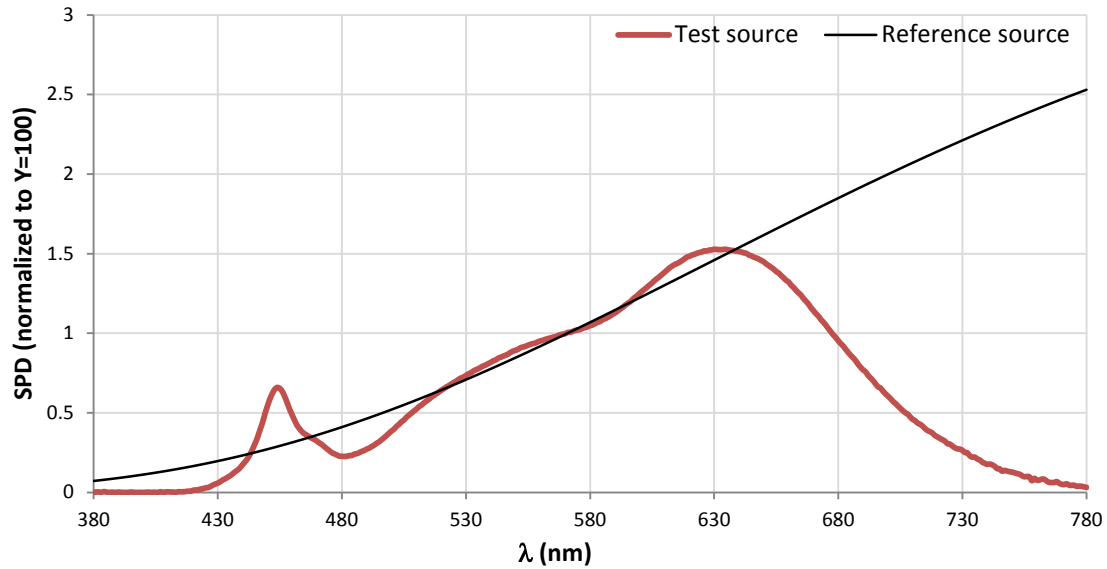
Ra			
94.4			
R1	R2	R3	R4
96	96	93	95
R5	R6	R7	R8
94	94	96	91
R9	R10	R11	R12
77	88	95	78
R13	R14	R15	
96	95	94	



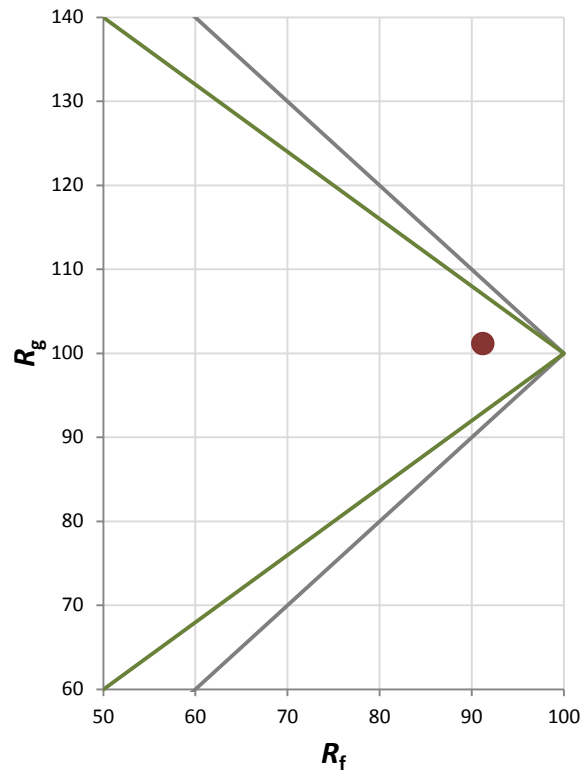
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

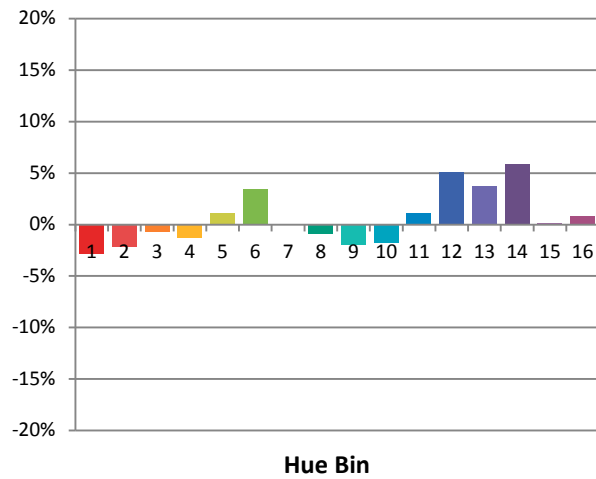
Spectral Power Distribution Comparison



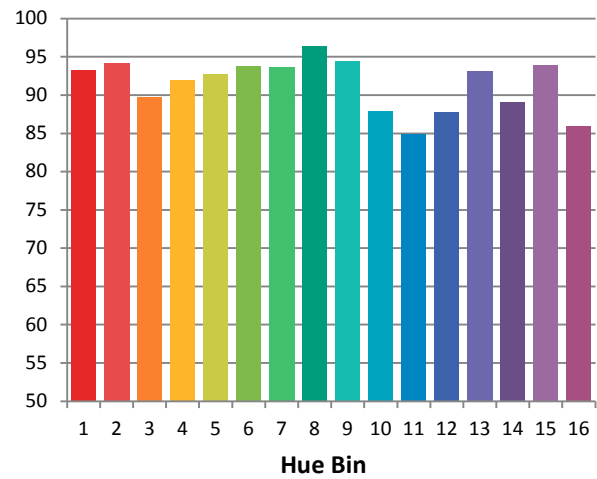
Plot of R_g versus R_f



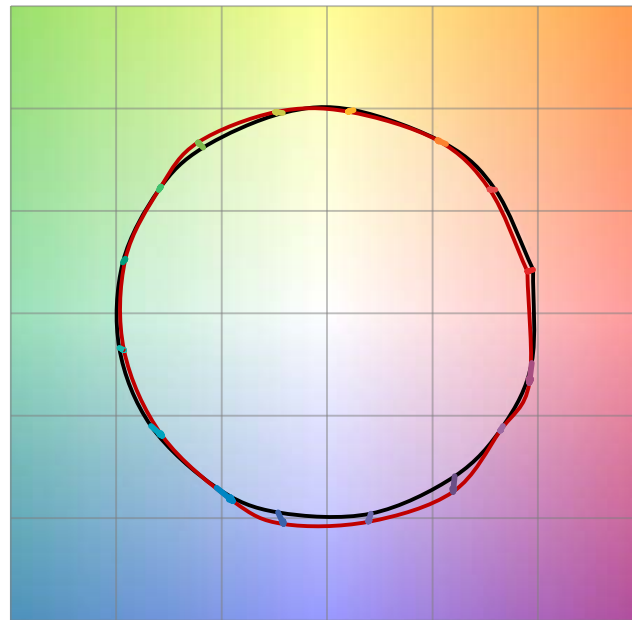
Chroma Shift by Hue



R_t by Hue

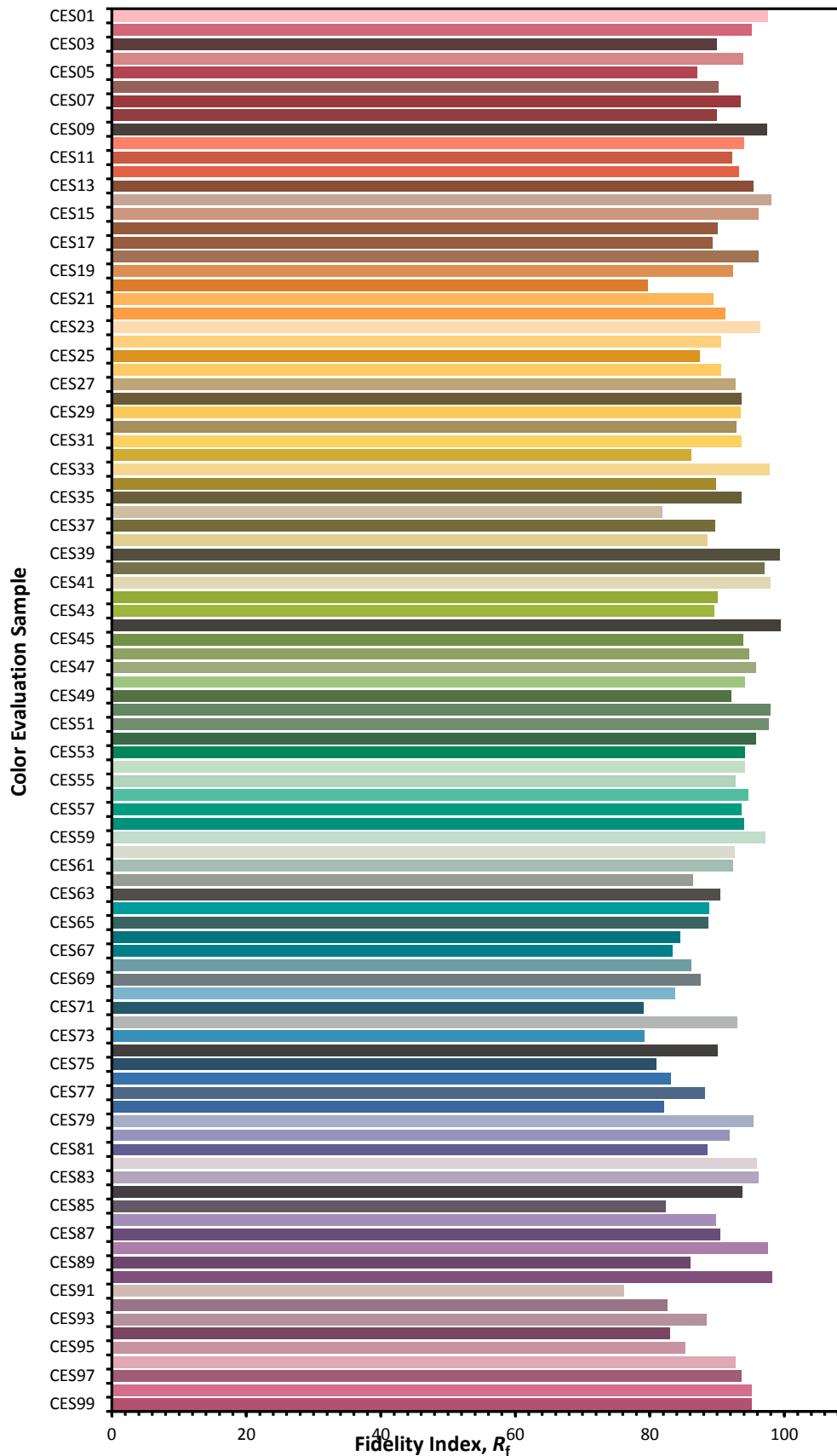


Color Vector Graphic

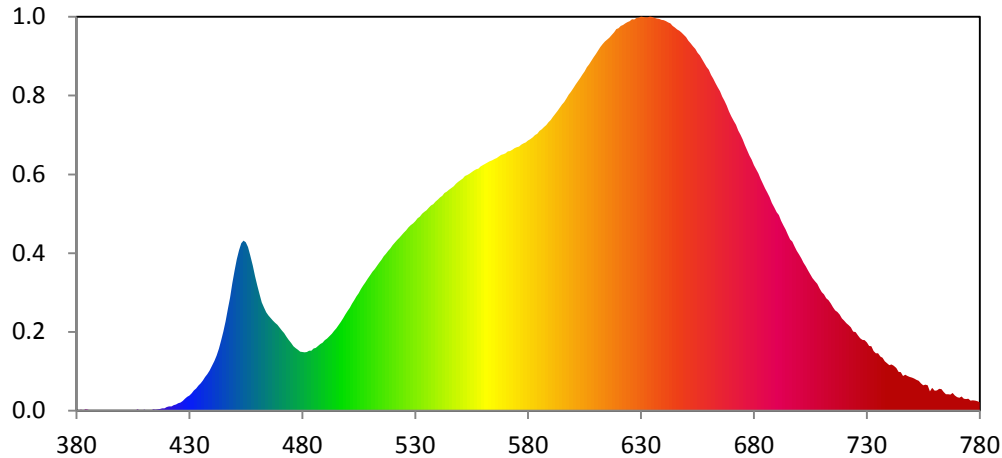


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



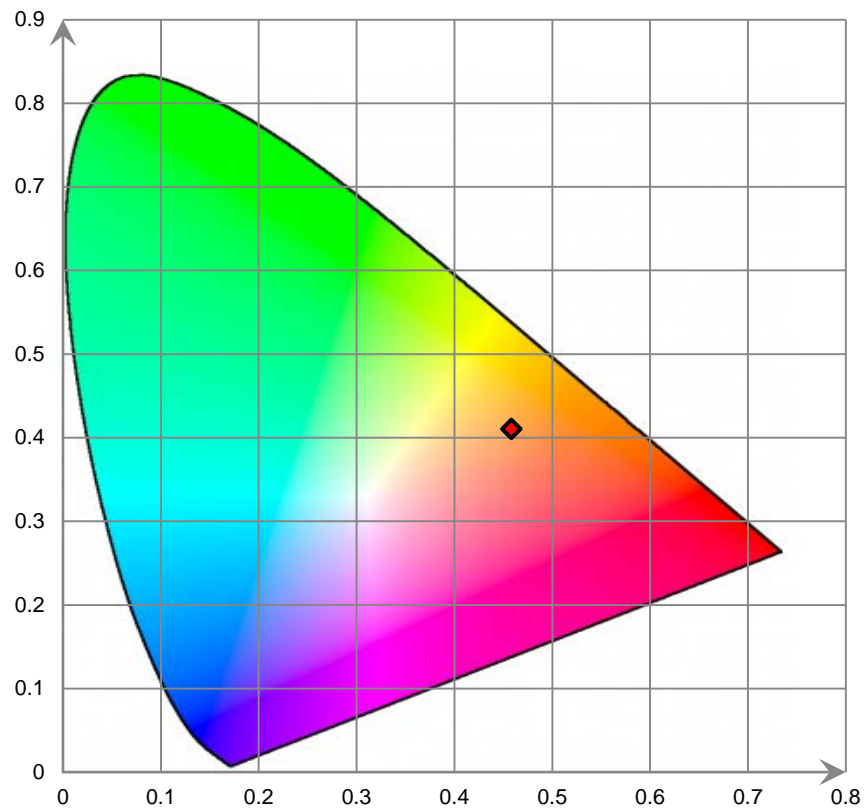
Relative Spectral Power Distribution



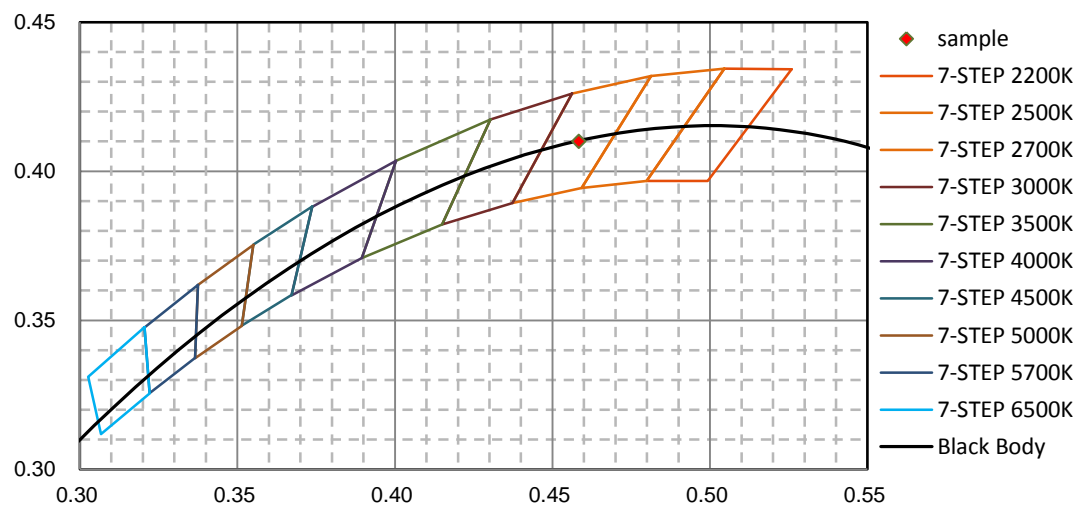
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.120E-02	421	2.431E-01	462	6.469E+00	503	6.588E+00	544	1.308E+01
381	4.370E-02	422	2.483E-01	463	6.151E+00	504	6.834E+00	545	1.319E+01
382	4.860E-02	423	3.277E-01	464	5.859E+00	505	7.013E+00	546	1.328E+01
383	1.100E-02	424	3.618E-01	465	5.668E+00	506	7.269E+00	547	1.340E+01
384	8.140E-02	425	4.410E-01	466	5.526E+00	507	7.477E+00	548	1.355E+01
385	4.750E-02	426	4.754E-01	467	5.373E+00	508	7.671E+00	549	1.367E+01
386	3.300E-03	427	5.745E-01	468	5.229E+00	509	7.880E+00	550	1.376E+01
387	2.810E-02	428	7.097E-01	469	5.114E+00	510	8.061E+00	551	1.386E+01
388	2.120E-02	429	8.133E-01	470	4.955E+00	511	8.293E+00	552	1.401E+01
389	4.200E-03	430	9.068E-01	471	4.780E+00	512	8.448E+00	553	1.407E+01
390	4.010E-02	431	1.037E+00	472	4.624E+00	513	8.648E+00	554	1.415E+01
391	1.720E-02	432	1.209E+00	473	4.418E+00	514	8.838E+00	555	1.425E+01
392	1.900E-03	433	1.324E+00	474	4.220E+00	515	9.000E+00	556	1.434E+01
393	7.000E-04	434	1.479E+00	475	4.028E+00	516	9.210E+00	557	1.441E+01
394	1.200E-02	435	1.615E+00	476	3.841E+00	517	9.372E+00	558	1.446E+01
395	4.470E-02	436	1.804E+00	477	3.735E+00	518	9.536E+00	559	1.458E+01
396	1.690E-02	437	2.007E+00	478	3.621E+00	519	9.702E+00	560	1.466E+01
397	4.100E-03	438	2.168E+00	479	3.514E+00	520	9.882E+00	561	1.473E+01
398	1.000E-04	439	2.393E+00	480	3.501E+00	521	1.003E+01	562	1.481E+01
399	1.080E-02	440	2.695E+00	481	3.484E+00	522	1.019E+01	563	1.489E+01
400	3.000E-04	441	2.969E+00	482	3.503E+00	523	1.033E+01	564	1.495E+01
401	1.620E-02	442	3.280E+00	483	3.565E+00	524	1.047E+01	565	1.502E+01
402	3.040E-02	443	3.686E+00	484	3.580E+00	525	1.063E+01	566	1.508E+01
403	1.310E-02	444	4.183E+00	485	3.710E+00	526	1.077E+01	567	1.517E+01
404	1.940E-02	445	4.731E+00	486	3.752E+00	527	1.094E+01	568	1.527E+01
405	1.710E-02	446	5.327E+00	487	3.857E+00	528	1.107E+01	569	1.531E+01
406	3.200E-03	447	6.050E+00	488	3.973E+00	529	1.118E+01	570	1.536E+01
407	7.180E-02	448	6.750E+00	489	4.060E+00	530	1.132E+01	571	1.549E+01
408	7.200E-03	449	7.600E+00	490	4.196E+00	531	1.148E+01	572	1.550E+01
409	4.460E-02	450	8.359E+00	491	4.295E+00	532	1.158E+01	573	1.558E+01
410	6.080E-02	451	9.039E+00	492	4.442E+00	533	1.176E+01	574	1.568E+01
411	4.100E-02	452	9.584E+00	493	4.579E+00	534	1.188E+01	575	1.573E+01
412	4.030E-02	453	9.996E+00	494	4.755E+00	535	1.198E+01	576	1.577E+01
413	1.050E-02	454	1.016E+01	495	4.904E+00	536	1.212E+01	577	1.589E+01
414	6.930E-02	455	1.006E+01	496	5.102E+00	537	1.225E+01	578	1.596E+01
415	6.260E-02	456	9.763E+00	497	5.294E+00	538	1.234E+01	579	1.603E+01
416	6.590E-02	457	9.263E+00	498	5.511E+00	539	1.248E+01	580	1.614E+01
417	8.640E-02	458	8.656E+00	499	5.736E+00	540	1.259E+01	581	1.621E+01
418	1.237E-01	459	8.021E+00	500	5.942E+00	541	1.274E+01	582	1.633E+01
419	1.282E-01	460	7.477E+00	501	6.129E+00	542	1.283E+01	583	1.646E+01
420	2.045E-01	461	6.952E+00	502	6.389E+00	543	1.299E+01	584	1.654E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.671E+01	626	2.338E+01	667	1.850E+01	708	7.575E+00	749	2.013E+00
586	1.681E+01	627	2.337E+01	668	1.822E+01	709	7.296E+00	750	1.972E+00
587	1.693E+01	628	2.345E+01	669	1.787E+01	710	7.071E+00	751	1.903E+00
588	1.705E+01	629	2.347E+01	670	1.760E+01	711	6.931E+00	752	1.825E+00
589	1.723E+01	630	2.353E+01	671	1.730E+01	712	6.708E+00	753	1.771E+00
590	1.736E+01	631	2.352E+01	672	1.706E+01	713	6.595E+00	754	1.627E+00
591	1.754E+01	632	2.350E+01	673	1.672E+01	714	6.406E+00	755	1.518E+00
592	1.772E+01	633	2.350E+01	674	1.648E+01	715	6.172E+00	756	1.543E+00
593	1.789E+01	634	2.353E+01	675	1.619E+01	716	5.986E+00	757	1.512E+00
594	1.809E+01	635	2.352E+01	676	1.586E+01	717	5.879E+00	758	1.142E+00
595	1.828E+01	636	2.346E+01	677	1.555E+01	718	5.729E+00	759	1.364E+00
596	1.842E+01	637	2.342E+01	678	1.524E+01	719	5.502E+00	760	1.192E+00
597	1.865E+01	638	2.340E+01	679	1.498E+01	720	5.370E+00	761	1.195E+00
598	1.887E+01	639	2.335E+01	680	1.467E+01	721	5.219E+00	762	1.289E+00
599	1.905E+01	640	2.332E+01	681	1.441E+01	722	5.101E+00	763	1.275E+00
600	1.928E+01	641	2.326E+01	682	1.416E+01	723	4.960E+00	764	1.102E+00
601	1.949E+01	642	2.318E+01	683	1.385E+01	724	4.722E+00	765	9.698E-01
602	1.968E+01	643	2.314E+01	684	1.355E+01	725	4.674E+00	766	9.656E-01
603	1.987E+01	644	2.297E+01	685	1.327E+01	726	4.489E+00	767	9.590E-01
604	2.008E+01	645	2.289E+01	686	1.303E+01	727	4.322E+00	768	1.056E+00
605	2.027E+01	646	2.277E+01	687	1.275E+01	728	4.219E+00	769	8.908E-01
606	2.052E+01	647	2.269E+01	688	1.241E+01	729	4.195E+00	770	7.941E-01
607	2.070E+01	648	2.258E+01	689	1.211E+01	730	4.072E+00	771	7.625E-01
608	2.089E+01	649	2.244E+01	690	1.186E+01	731	3.868E+00	772	8.387E-01
609	2.110E+01	650	2.231E+01	691	1.167E+01	732	3.839E+00	773	7.104E-01
610	2.130E+01	651	2.211E+01	692	1.133E+01	733	3.547E+00	774	6.844E-01
611	2.152E+01	652	2.195E+01	693	1.108E+01	734	3.420E+00	775	7.053E-01
612	2.173E+01	653	2.177E+01	694	1.082E+01	735	3.420E+00	776	5.951E-01
613	2.189E+01	654	2.160E+01	695	1.052E+01	736	3.238E+00	777	6.126E-01
614	2.205E+01	655	2.138E+01	696	1.022E+01	737	3.143E+00	778	5.978E-01
615	2.215E+01	656	2.123E+01	697	1.010E+01	738	2.937E+00	779	5.438E-01
616	2.227E+01	657	2.098E+01	698	9.809E+00	739	2.826E+00	780	4.905E-01
617	2.243E+01	658	2.076E+01	699	9.548E+00	740	2.718E+00		
618	2.259E+01	659	2.053E+01	700	9.329E+00	741	2.747E+00		
619	2.278E+01	660	2.037E+01	701	9.098E+00	742	2.672E+00		
620	2.285E+01	661	2.006E+01	702	8.825E+00	743	2.532E+00		
621	2.297E+01	662	1.983E+01	703	8.615E+00	744	2.306E+00		
622	2.303E+01	663	1.955E+01	704	8.381E+00	745	2.287E+00		
623	2.314E+01	664	1.931E+01	705	8.142E+00	746	2.060E+00		
624	2.321E+01	665	1.909E+01	706	7.920E+00	747	2.135E+00		
625	2.327E+01	666	1.876E+01	707	7.714E+00	748	2.066E+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**

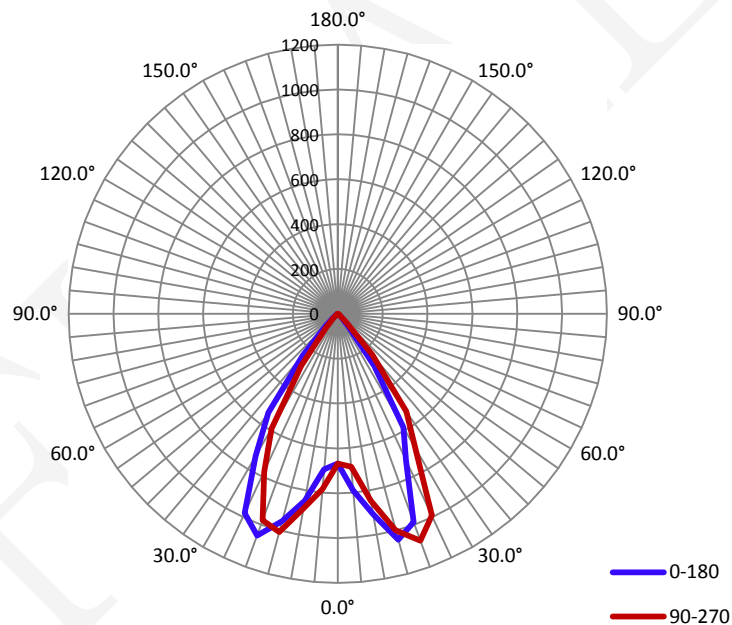
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1060	12.16	0.9580

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1052.6	86.61	1075.8	1.26	1.25

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	66.2	64.7	65.7	66.0	65.7
Field Angle (10% I _{max}):	83.4	83.4	82.9	82.9	83.2

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	668	668	668	668	668	668	668	668
5.0°	790	769	743	715	684	668	664	671
10.0°	909	910	898	884	846	815	801	814
15.0°	1043	1042	1029	1015	999	967	949	948
20.0°	988	1023	1055	1066	1076	1070	1061	1057
25.0°	719	781	872	969	992	1012	1013	999
30.0°	585	606	632	656	690	745	783	793
35.0°	285	334	400	478	531	565	577	584
40.0°	74	94	120	158	239	260	278	292
45.0°	25	29	33	40	52	66	77	82
50.0°	11	12	13	16	19	25	30	33
55.0°	5	5	6	7	8	10	12	13
60.0°	3	3	3	4	4	5	6	6
65.0°	1	2	1	2	2	2	3	3
70.0°	0	0	0	1	1	1	2	1
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

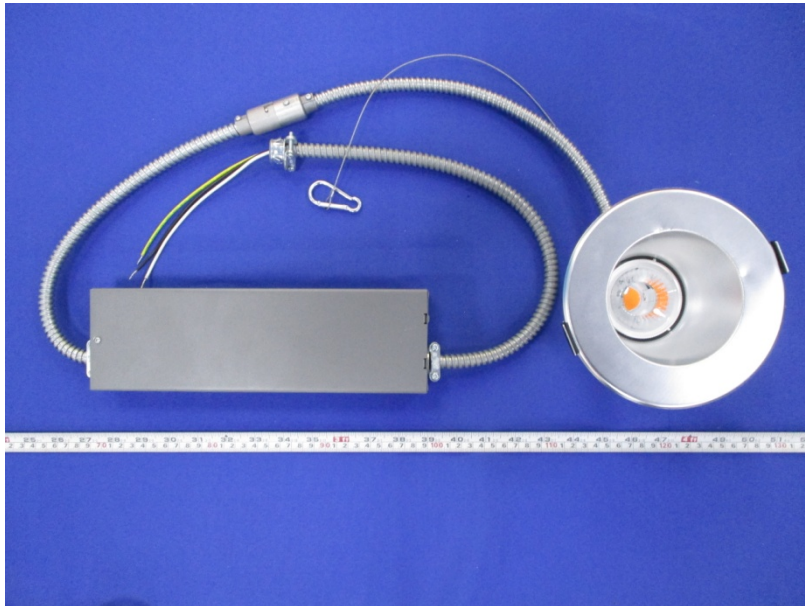
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	668	668	668	668	668	668	668	668
5.0°	696	717	741	766	785	801	803	802
10.0°	846	859	872	883	880	887	893	903
15.0°	956	958	980	996	1007	1005	1007	1017
20.0°	1051	1040	1024	1007	979	963	951	956
25.0°	981	953	914	862	777	703	653	663
30.0°	732	672	622	612	591	563	545	548
35.0°	538	484	431	369	283	232	227	231
40.0°	244	216	164	123	83	66	59	58
45.0°	76	66	53	40	30	25	22	21
50.0°	30	27	20	15	12	10	9	9
55.0°	12	11	8	7	5	5	5	5
60.0°	6	5	4	3	2	2	2	2
65.0°	3	3	2	2	1	2	0	1
70.0°	2	1	1	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	16.8	1.60	0-5	16.8	1.60
5-10	57.5	5.46	0-10	74.3	7.06
10-15	110.6	10.50	0-15	184.9	17.56
15-20	166.3	15.80	0-20	351.2	33.36
20-25	198.2	18.83	0-25	549.3	52.19
25-30	191.7	18.21	0-30	741.0	70.40
30-35	155.8	14.80	0-35	896.8	85.20
35-40	94.6	8.99	0-40	991.4	94.19
40-45	37.8	3.59	0-45	1029.2	97.78
45-50	12.9	1.23	0-50	1042.1	99.01
50-55	5.6	0.53	0-55	1047.7	99.54
55-60	2.7	0.25	0-60	1050.4	99.79
60-65	1.4	0.13	0-65	1051.8	99.92
65-70	0.6	0.06	0-70	1052.4	99.98
70-75	0.2	0.02	0-75	1052.6	100.00
75-80	0.0	0.00	0-80	1052.6	100.00
80-85	0.0	0.00	0-85	1052.6	100.00
85-90	0.0	0.00	0-90	1052.6	100.00
90-95	0.0	0.00	0-95	1052.6	100.00
95-100	0.0	0.00	0-100	1052.6	100.00
100-105	0.0	0.00	0-105	1052.6	100.00
105-110	0.0	0.00	0-110	1052.6	100.00
110-115	0.0	0.00	0-115	1052.6	100.00
115-120	0.0	0.00	0-120	1052.6	100.00
120-125	0.0	0.00	0-125	1052.6	100.00
125-130	0.0	0.00	0-130	1052.6	100.00
130-135	0.0	0.00	0-135	1052.6	100.00
135-140	0.0	0.00	0-140	1052.6	100.00
140-145	0.0	0.00	0-145	1052.6	100.00
145-150	0.0	0.00	0-150	1052.6	100.00
150-155	0.0	0.00	0-155	1052.6	100.00
155-160	0.0	0.00	0-160	1052.6	100.00
160-165	0.0	0.00	0-165	1052.6	100.00
165-170	0.0	0.00	0-170	1052.6	100.00
170-175	0.0	0.00	0-175	1052.6	100.00
175-180	0.0	0.00	0-180	1052.6	100.00

6. Product Photo



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