

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE109027DIM120VWD/ADR4BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329021-10-3
Test Date:	2019-04-03 to 2019-04-04
Report Date:	2019-05-16
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: LE109027DIM120VWD/ADR4BL
 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: 900lm

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	2018-04-23	2019-04-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2019-01-23	2020-01-23
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-04-23	2019-04-22
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	2018-04-23	2019-04-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-04-23	2019-04-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-04-23	2019-04-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-04-23	2019-04-22
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 $U_{rel}=2.61\%$ ($k=2$), 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 $U_{rel}=0.48\%$ of rdg, AC Voltage $U_{rel}=0.25\%$ of rdg, Power $U_{rel}=0.44\%$, ($k=2$), 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 $U_{rel}=2.6\%$ ($k=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_f , 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**

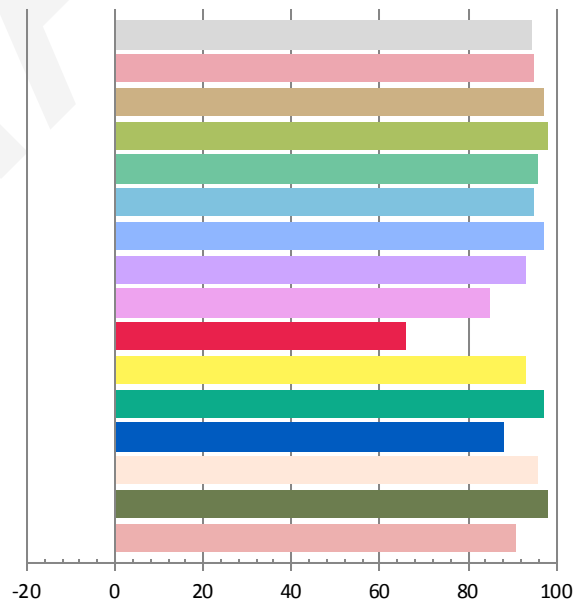
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.1029	12.21	0.9889	971.91	79.6

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.435	2731	-0.00020	0.4570	0.4094	0.2612	0.5265

Color Rendering Index

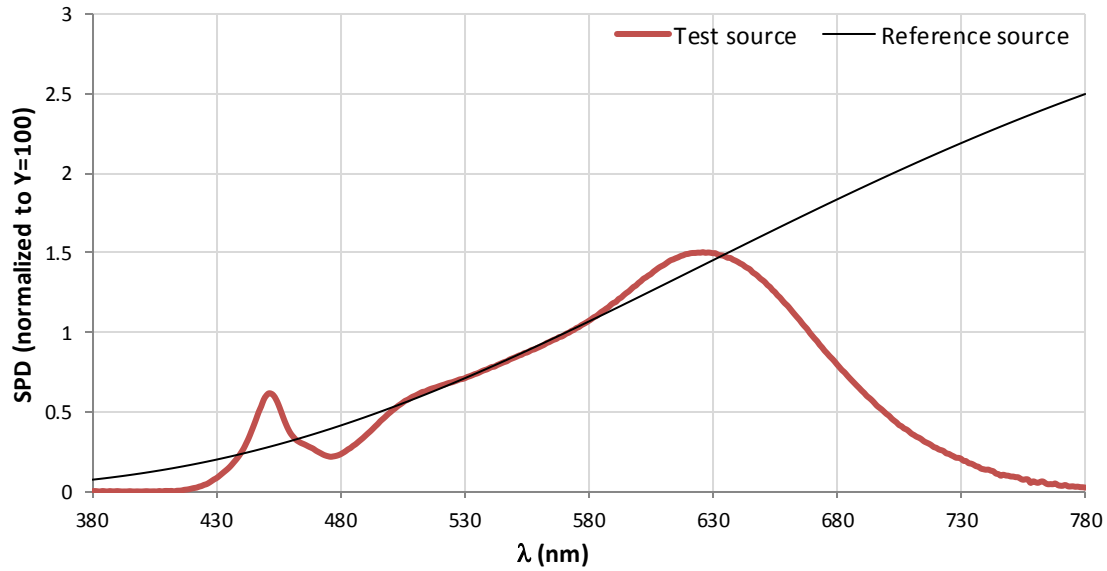
Ra			
94.6			
R1	R2	R3	R4
95	97	98	96
R5	R6	R7	R8
95	97	93	85
R9	R10	R11	R12
66	93	97	88
R13	R14	R15	
96	98	91	



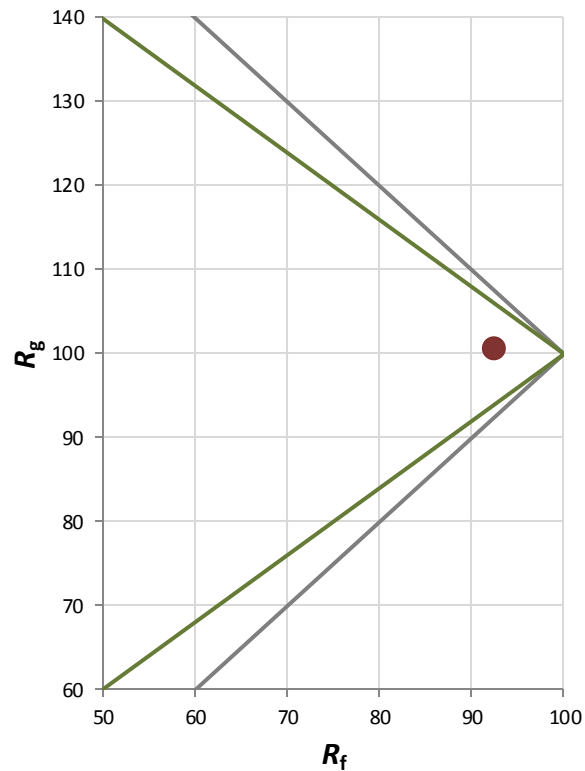
Fidelity Index and Gamut Index

Fidelity Index R_f	92
Gamut Index R_g	101

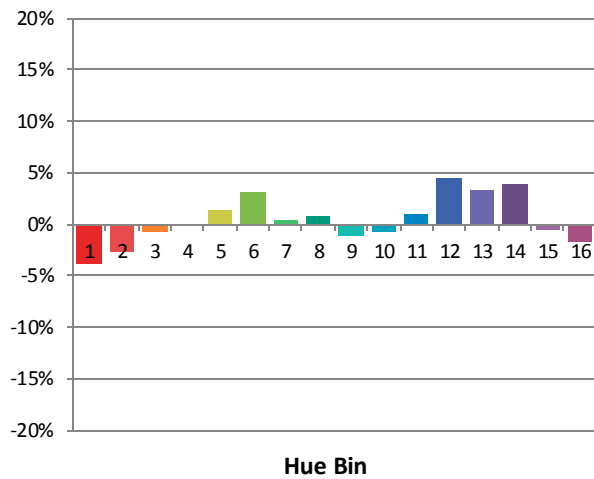
Spectral Power Distribution Comparison



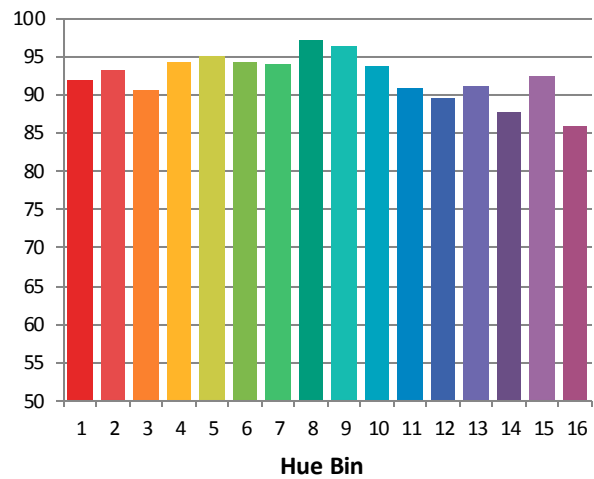
Plot of R_g versus R_f



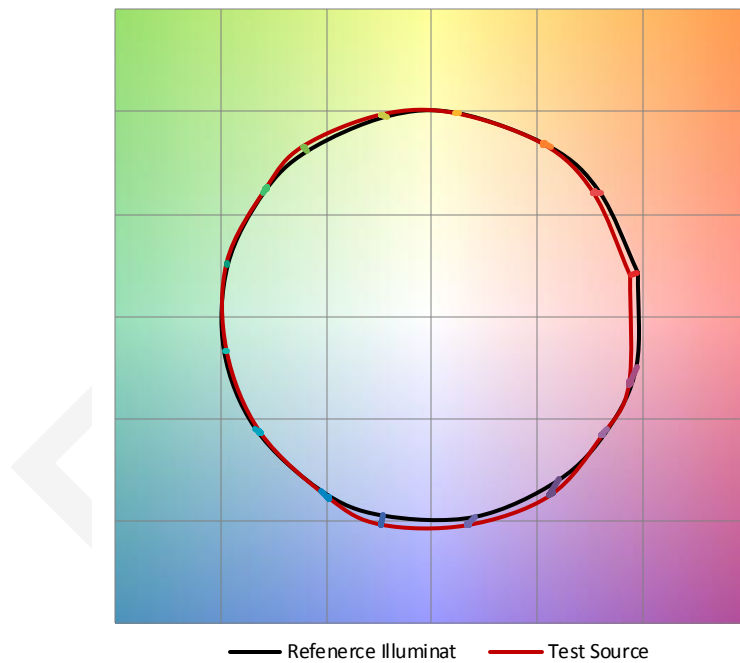
Chroma Shift by Hue



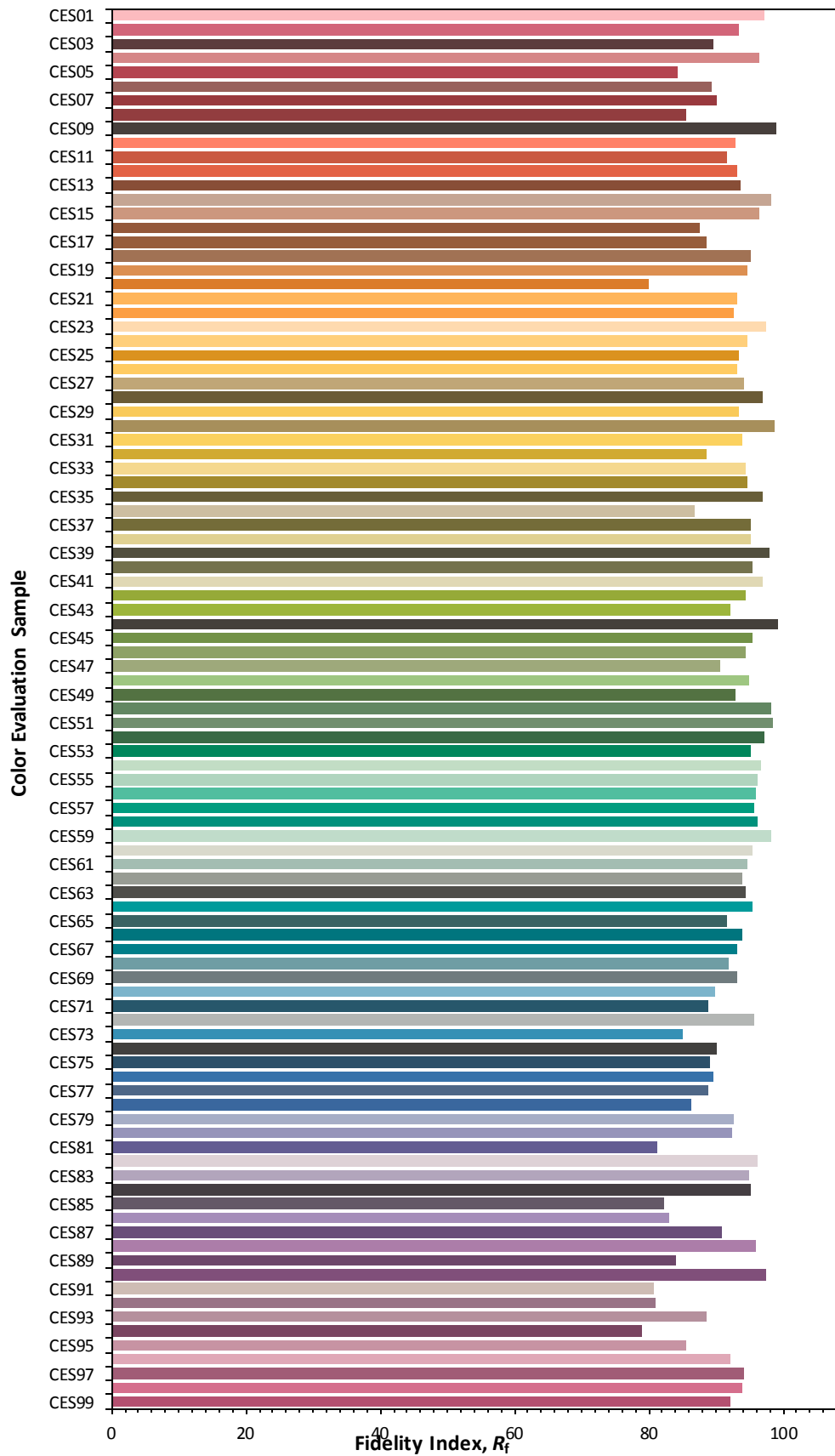
R_f by Hue



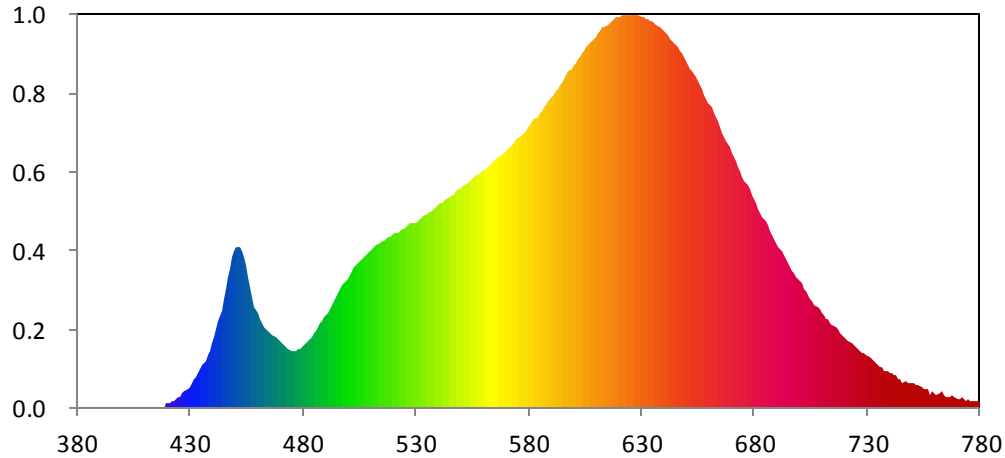
Color Vector Graphic



Color Fidelity by CES Sample



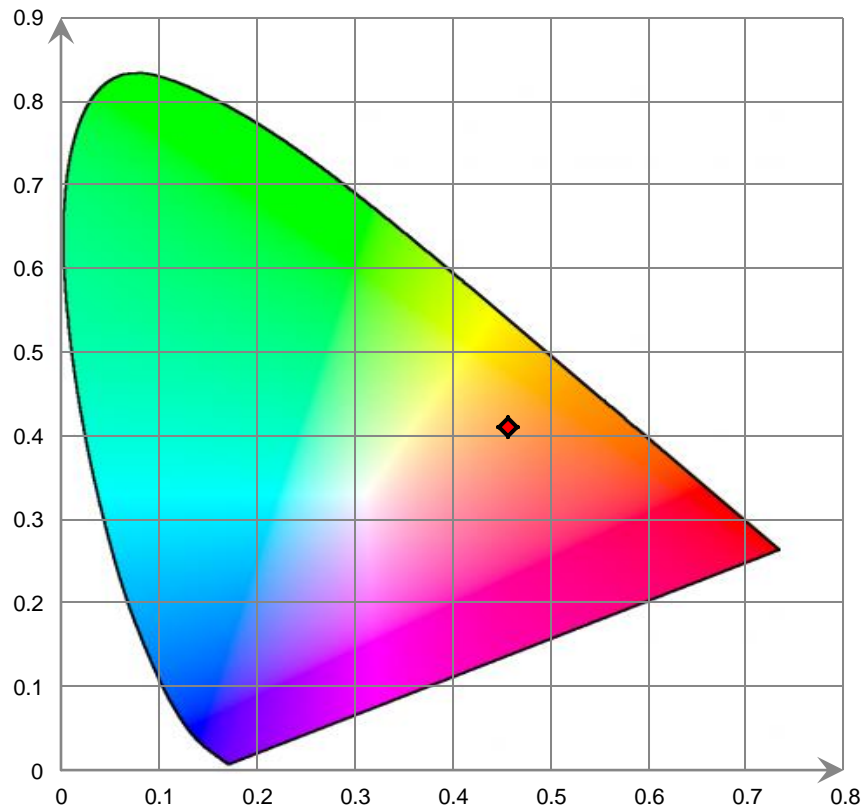
Relative Spectral Power Distribution



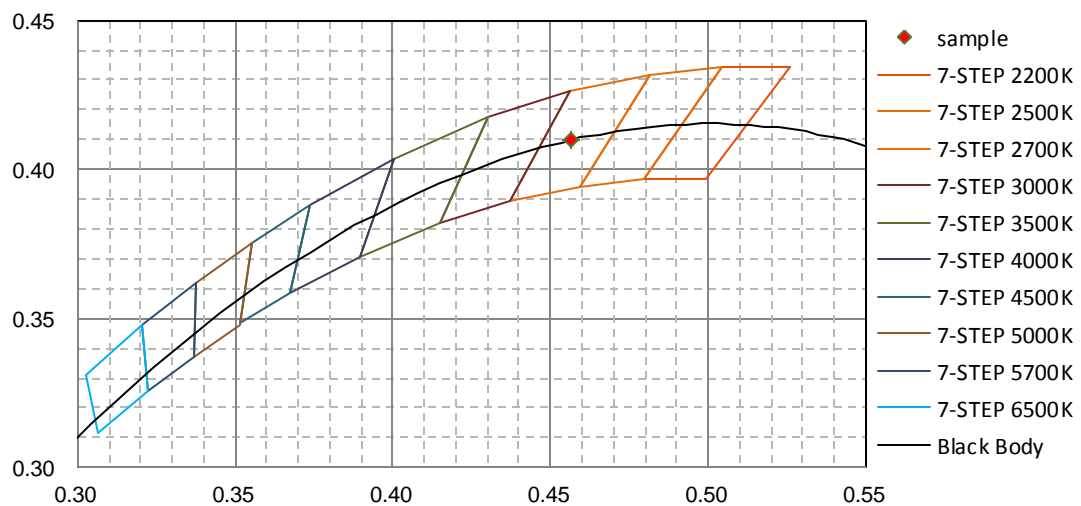
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.010E-02	421	3.123E-01	462	4.629E+00	503	7.630E+00	544	1.139E+01
381	3.940E-02	422	3.506E-01	463	4.477E+00	504	7.780E+00	545	1.149E+01
382	2.120E-02	423	4.335E-01	464	4.346E+00	505	7.939E+00	546	1.158E+01
383	1.000E-03	424	4.921E-01	465	4.253E+00	506	8.103E+00	547	1.165E+01
384	4.140E-02	425	5.923E-01	466	4.151E+00	507	8.201E+00	548	1.179E+01
385	2.070E-02	426	6.596E-01	467	4.033E+00	508	8.338E+00	549	1.188E+01
386	1.600E-03	427	7.844E-01	468	3.930E+00	509	8.471E+00	550	1.197E+01
387	3.680E-02	428	9.286E-01	469	3.821E+00	510	8.558E+00	551	1.207E+01
388	1.340E-02	429	1.076E+00	470	3.662E+00	511	8.672E+00	552	1.217E+01
389	1.490E-02	430	1.199E+00	471	3.538E+00	512	8.793E+00	553	1.223E+01
390	3.540E-02	431	1.368E+00	472	3.422E+00	513	8.901E+00	554	1.237E+01
391	1.600E-02	432	1.553E+00	473	3.300E+00	514	8.937E+00	555	1.242E+01
392	7.000E-04	433	1.740E+00	474	3.210E+00	515	9.047E+00	556	1.253E+01
393	4.700E-03	434	1.923E+00	475	3.148E+00	516	9.147E+00	557	1.265E+01
394	3.900E-03	435	2.121E+00	476	3.103E+00	517	9.222E+00	558	1.271E+01
395	2.870E-02	436	2.356E+00	477	3.135E+00	518	9.283E+00	559	1.281E+01
396	7.500E-03	437	2.618E+00	478	3.175E+00	519	9.355E+00	560	1.291E+01
397	5.000E-04	438	2.876E+00	479	3.239E+00	520	9.440E+00	561	1.302E+01
398	1.060E-02	439	3.171E+00	480	3.334E+00	521	9.510E+00	562	1.312E+01
399	1.400E-03	440	3.504E+00	481	3.462E+00	522	9.576E+00	563	1.327E+01
400	0.000E+00	441	3.869E+00	482	3.599E+00	523	9.661E+00	564	1.335E+01
401	1.750E-02	442	4.322E+00	483	3.768E+00	524	9.722E+00	565	1.347E+01
402	2.650E-02	443	4.791E+00	484	3.891E+00	525	9.772E+00	566	1.357E+01
403	5.900E-03	444	5.340E+00	485	4.075E+00	526	9.851E+00	567	1.365E+01
404	1.030E-02	445	5.901E+00	486	4.220E+00	527	9.932E+00	568	1.380E+01
405	1.430E-02	446	6.489E+00	487	4.409E+00	528	1.002E+01	569	1.385E+01
406	4.900E-03	447	7.101E+00	488	4.594E+00	529	1.006E+01	570	1.397E+01
407	4.370E-02	448	7.605E+00	489	4.781E+00	530	1.012E+01	571	1.412E+01
408	3.900E-03	449	8.196E+00	490	4.989E+00	531	1.023E+01	572	1.420E+01
409	4.270E-02	450	8.559E+00	491	5.192E+00	532	1.030E+01	573	1.436E+01
410	4.820E-02	451	8.768E+00	492	5.388E+00	533	1.039E+01	574	1.445E+01
411	4.260E-02	452	8.750E+00	493	5.606E+00	534	1.049E+01	575	1.461E+01
412	5.010E-02	453	8.583E+00	494	5.829E+00	535	1.055E+01	576	1.470E+01
413	1.510E-02	454	8.231E+00	495	6.038E+00	536	1.065E+01	577	1.486E+01
414	6.460E-02	455	7.744E+00	496	6.283E+00	537	1.077E+01	578	1.498E+01
415	7.180E-02	456	7.160E+00	497	6.479E+00	538	1.085E+01	579	1.511E+01
416	9.280E-02	457	6.556E+00	498	6.675E+00	539	1.092E+01	580	1.525E+01
417	1.472E-01	458	6.009E+00	499	6.894E+00	540	1.103E+01	581	1.540E+01
418	1.711E-01	459	5.528E+00	500	7.077E+00	541	1.113E+01	582	1.557E+01
419	2.095E-01	460	5.146E+00	501	7.270E+00	542	1.116E+01	583	1.568E+01
420	2.629E-01	461	4.874E+00	502	7.437E+00	543	1.129E+01	584	1.585E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.605E+01	626	2.140E+01	667	1.476E+01	708	5.543E+00	749	1.412E+00
586	1.618E+01	627	2.134E+01	668	1.452E+01	709	5.373E+00	750	1.343E+00
587	1.635E+01	628	2.137E+01	669	1.420E+01	710	5.173E+00	751	1.335E+00
588	1.649E+01	629	2.135E+01	670	1.393E+01	711	5.049E+00	752	1.281E+00
589	1.671E+01	630	2.131E+01	671	1.367E+01	712	4.903E+00	753	1.270E+00
590	1.686E+01	631	2.130E+01	672	1.343E+01	713	4.808E+00	754	1.135E+00
591	1.697E+01	632	2.117E+01	673	1.313E+01	714	4.676E+00	755	1.049E+00
592	1.721E+01	633	2.112E+01	674	1.288E+01	715	4.495E+00	756	1.094E+00
593	1.733E+01	634	2.109E+01	675	1.259E+01	716	4.380E+00	757	1.062E+00
594	1.754E+01	635	2.100E+01	676	1.236E+01	717	4.276E+00	758	7.707E-01
595	1.773E+01	636	2.089E+01	677	1.210E+01	718	4.144E+00	759	9.114E-01
596	1.788E+01	637	2.088E+01	678	1.188E+01	719	3.974E+00	760	8.272E-01
597	1.808E+01	638	2.074E+01	679	1.164E+01	720	3.903E+00	761	7.757E-01
598	1.828E+01	639	2.064E+01	680	1.136E+01	721	3.764E+00	762	8.714E-01
599	1.842E+01	640	2.053E+01	681	1.111E+01	722	3.696E+00	763	8.929E-01
600	1.864E+01	641	2.039E+01	682	1.085E+01	723	3.604E+00	764	7.413E-01
601	1.881E+01	642	2.028E+01	683	1.066E+01	724	3.414E+00	765	6.483E-01
602	1.902E+01	643	2.010E+01	684	1.040E+01	725	3.369E+00	766	6.630E-01
603	1.914E+01	644	1.998E+01	685	1.016E+01	726	3.244E+00	767	6.517E-01
604	1.931E+01	645	1.984E+01	686	9.923E+00	727	3.139E+00	768	7.146E-01
605	1.944E+01	646	1.960E+01	687	9.693E+00	728	3.018E+00	769	5.686E-01
606	1.964E+01	647	1.945E+01	688	9.463E+00	729	3.006E+00	770	5.175E-01
607	1.981E+01	648	1.928E+01	689	9.243E+00	730	2.920E+00	771	5.145E-01
608	1.997E+01	649	1.906E+01	690	9.006E+00	731	2.746E+00	772	5.838E-01
609	2.011E+01	650	1.889E+01	691	8.797E+00	732	2.713E+00	773	4.687E-01
610	2.023E+01	651	1.871E+01	692	8.542E+00	733	2.537E+00	774	4.477E-01
611	2.037E+01	652	1.845E+01	693	8.366E+00	734	2.493E+00	775	4.649E-01
612	2.054E+01	653	1.828E+01	694	8.171E+00	735	2.398E+00	776	4.203E-01
613	2.068E+01	654	1.801E+01	695	7.937E+00	736	2.267E+00	777	4.325E-01
614	2.075E+01	655	1.782E+01	696	7.685E+00	737	2.207E+00	778	3.882E-01
615	2.085E+01	656	1.755E+01	697	7.502E+00	738	2.051E+00	779	3.813E-01
616	2.093E+01	657	1.735E+01	698	7.333E+00	739	1.993E+00	780	3.482E-01
617	2.105E+01	658	1.708E+01	699	7.125E+00	740	1.945E+00		
618	2.111E+01	659	1.683E+01	700	6.924E+00	741	1.957E+00		
619	2.121E+01	660	1.663E+01	701	6.764E+00	742	1.859E+00		
620	2.124E+01	661	1.637E+01	702	6.526E+00	743	1.810E+00		
621	2.130E+01	662	1.609E+01	703	6.340E+00	744	1.603E+00		
622	2.133E+01	663	1.582E+01	704	6.169E+00	745	1.558E+00		
623	2.133E+01	664	1.556E+01	705	5.944E+00	746	1.413E+00		
624	2.136E+01	665	1.531E+01	706	5.830E+00	747	1.500E+00		
625	2.135E+01	666	1.502E+01	707	5.640E+00	748	1.428E+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**

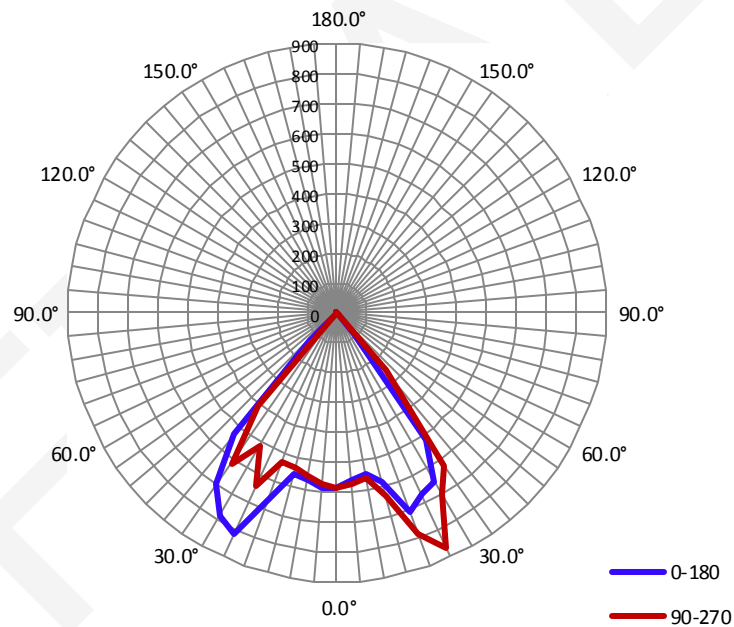
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1060	12.2	0.9590

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
972.2	79.74	918.4	1.45	1.46

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	77.9	78.5	77.0	76.5	77.5
Field Angle (10% I _{max}):	87.5	87.8	87.5	87.0	87.5

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	583	583	583	583	583	583	583	583
5.0°	562	562	566	570	573	580	583	587
10.0°	547	550	557	559	561	563	564	569
15.0°	582	601	622	631	633	616	591	571
20.0°	707	737	767	779	786	789	758	705
25.0°	666	694	725	781	864	918	900	846
30.0°	652	667	674	685	700	743	799	816
35.0°	522	510	532	569	621	662	706	715
40.0°	93	71	97	162	252	351	442	518
45.0°	4	5	5	6	7	9	31	100
50.0°	3	2	2	3	4	4	5	6
55.0°	0	0	0	1	2	2	3	4
60.0°	0	0	0	0	0	0	1	2
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

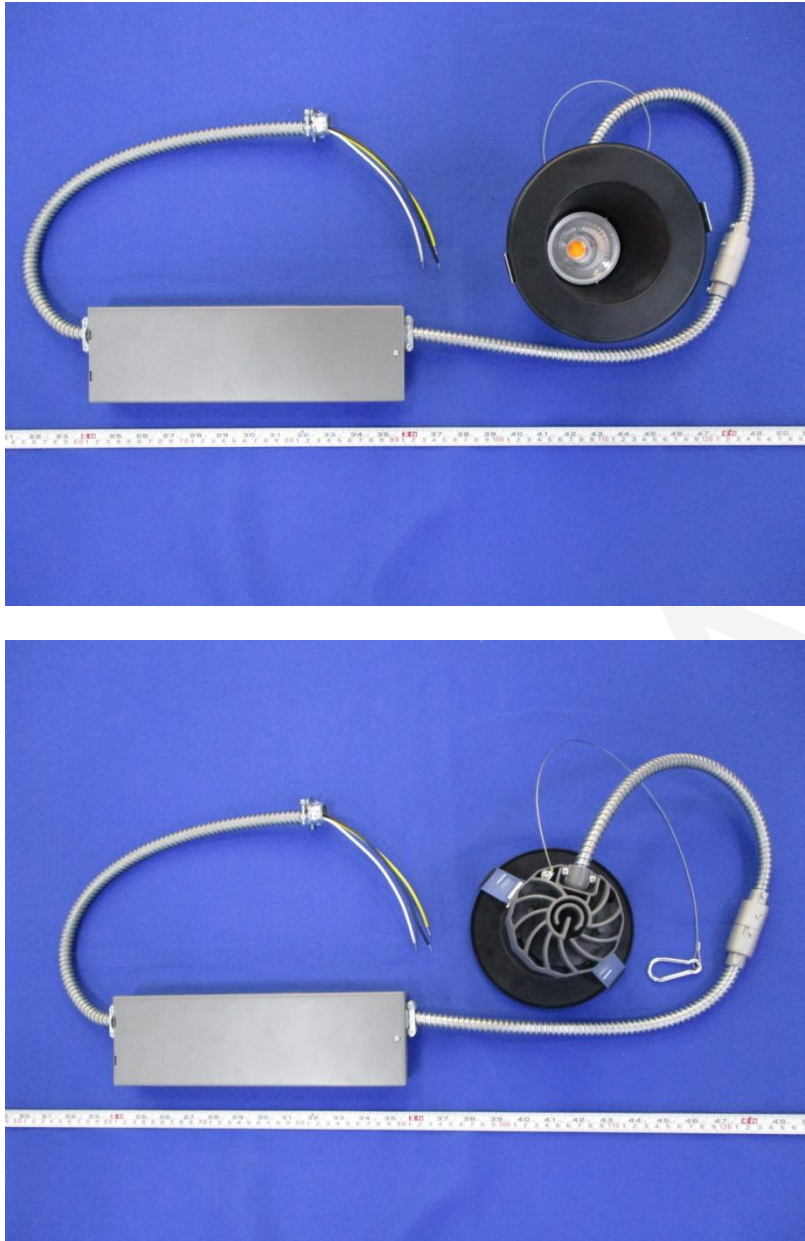
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	583	583	583	583	583	583	583	583
5.0°	586	584	582	577	572	568	563	561
10.0°	567	566	563	557	552	547	544	545
15.0°	556	549	546	541	536	534	544	567
20.0°	658	605	575	557	529	537	598	669
25.0°	812	743	683	647	640	637	630	640
30.0°	784	740	664	568	511	537	586	633
35.0°	701	677	639	608	616	602	573	533
40.0°	532	552	539	498	408	286	188	111
45.0°	124	140	112	62	14	6	6	5
50.0°	5	5	5	4	3	3	2	2
55.0°	3	2	3	2	2	2	1	2
60.0°	1	2	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	13.8	1.42	0-5	13.8	1.42
5-10	40.4	4.16	0-10	54.3	5.58
10-15	67.2	6.91	0-15	121.5	12.49
15-20	102.9	10.58	0-20	224.4	23.08
20-25	148.0	15.22	0-25	372.4	38.30
25-30	178.6	18.37	0-30	551.0	56.67
30-35	189.1	19.45	0-35	740.1	76.12
35-40	155.2	15.97	0-40	895.3	92.09
40-45	66.4	6.83	0-45	961.7	98.91
45-50	8.8	0.90	0-50	970.5	99.82
50-55	1.2	0.12	0-55	971.7	99.94
55-60	0.5	0.05	0-60	972.2	99.99
60-65	0.1	0.01	0-65	972.2	100.00
65-70	0.0	0.00	0-70	972.2	100.00
70-75	0.0	0.00	0-75	972.2	100.00
75-80	0.0	0.00	0-80	972.2	100.00
80-85	0.0	0.00	0-85	972.2	100.00
85-90	0.0	0.00	0-90	972.2	100.00
90-95	0.0	0.00	0-95	972.2	100.00
95-100	0.0	0.00	0-100	972.2	100.00
100-105	0.0	0.00	0-105	972.2	100.00
105-110	0.0	0.00	0-110	972.2	100.00
110-115	0.0	0.00	0-115	972.2	100.00
115-120	0.0	0.00	0-120	972.2	100.00
120-125	0.0	0.00	0-125	972.2	100.00
125-130	0.0	0.00	0-130	972.2	100.00
130-135	0.0	0.00	0-135	972.2	100.00
135-140	0.0	0.00	0-140	972.2	100.00
140-145	0.0	0.00	0-145	972.2	100.00
145-150	0.0	0.00	0-150	972.2	100.00
150-155	0.0	0.00	0-155	972.2	100.00
155-160	0.0	0.00	0-160	972.2	100.00
160-165	0.0	0.00	0-165	972.2	100.00
165-170	0.0	0.00	0-170	972.2	100.00
170-175	0.0	0.00	0-175	972.2	100.00
175-180	0.0	0.00	0-180	972.2	100.00

6. Product Photo



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