

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE259027DIM120VMD/ADR4BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329023-10-2
Test Date:	2019-04-03 to 2019-04-08
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 2019-04-01 and used for testing.

Model Tested: LE259027DIM120VMD/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: 31W
 Nominal CCT: 2700K
 Nominal Lumen Output: 2050lm

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**

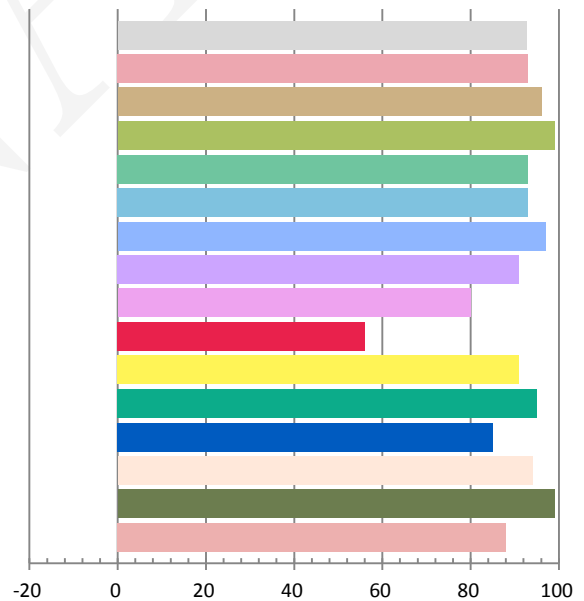
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.2633	31.19	0.9872	2115.36	67.82

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.362	2740	0.00009	0.4567	0.4101	0.2607	0.5267

Color Rendering Index

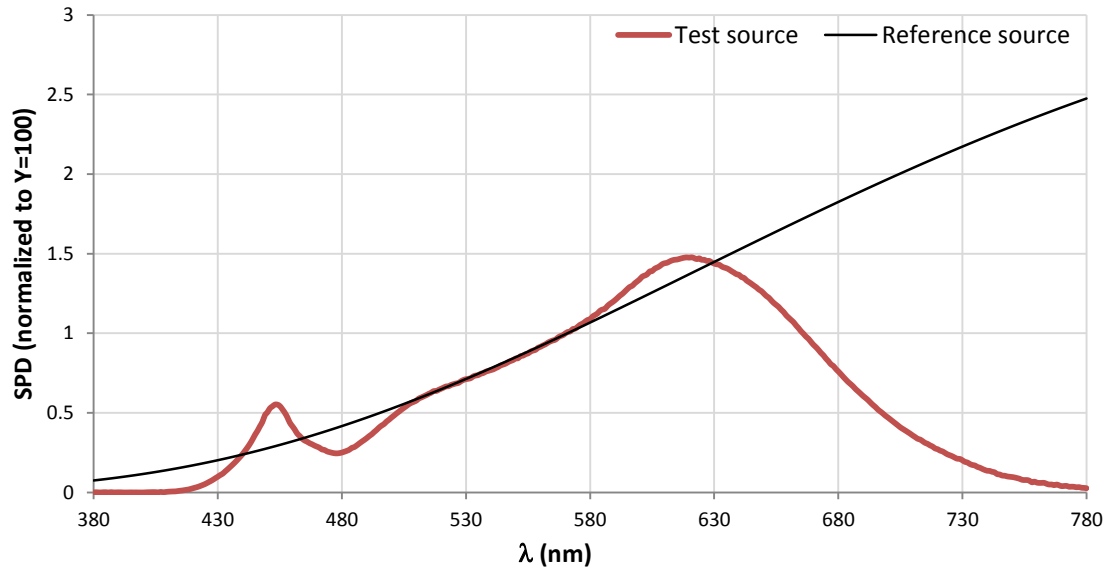
Ra			
92.7			
R1	R2	R3	R4
93	96	99	93
R5	R6	R7	R8
93	97	91	80
R9	R10	R11	R12
56	91	95	85
R13	R14	R15	
94	99	88	



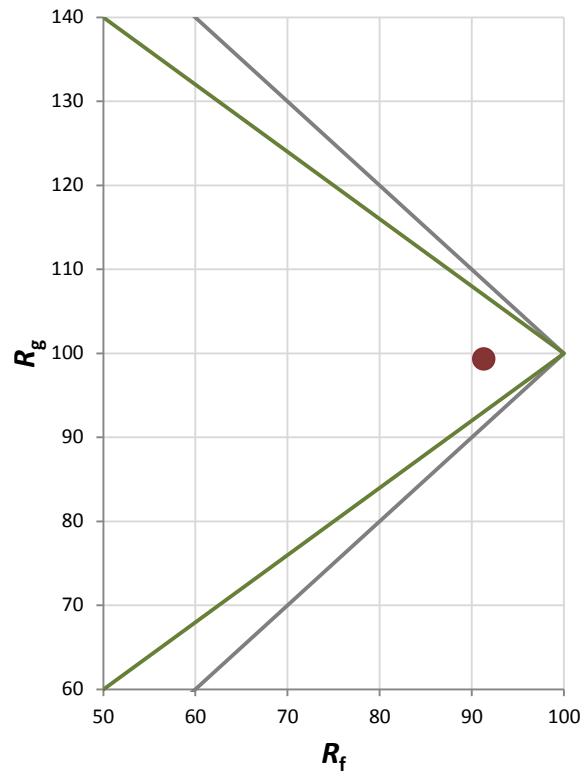
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	99

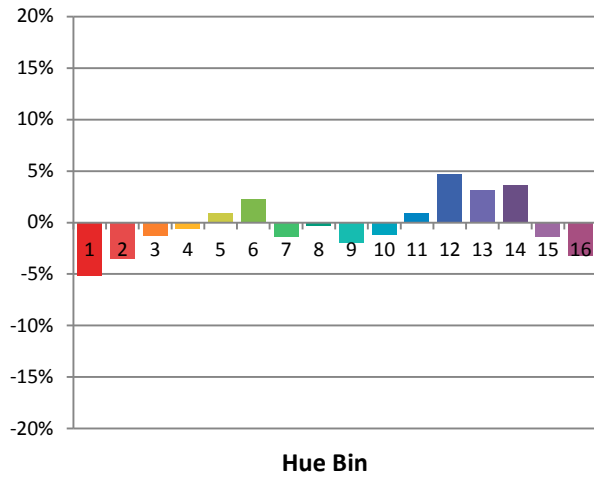
Spectral Power Distribution Comparison



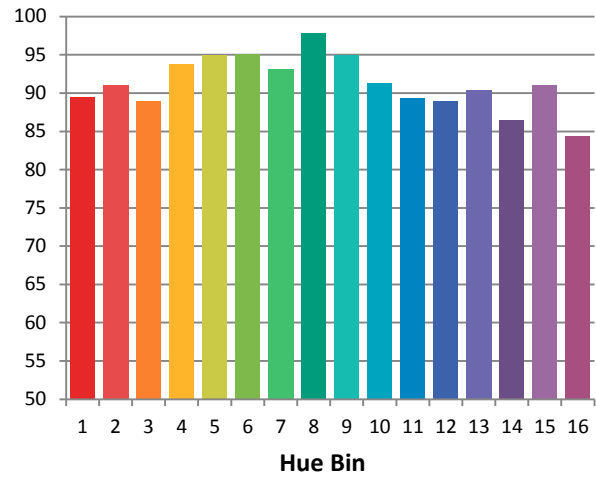
Plot of R_g versus R_f



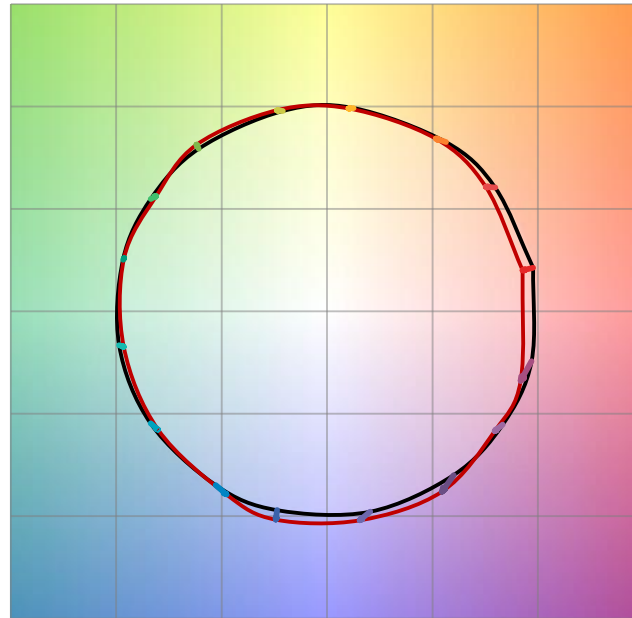
Chroma Shift by Hue



R_f by Hue

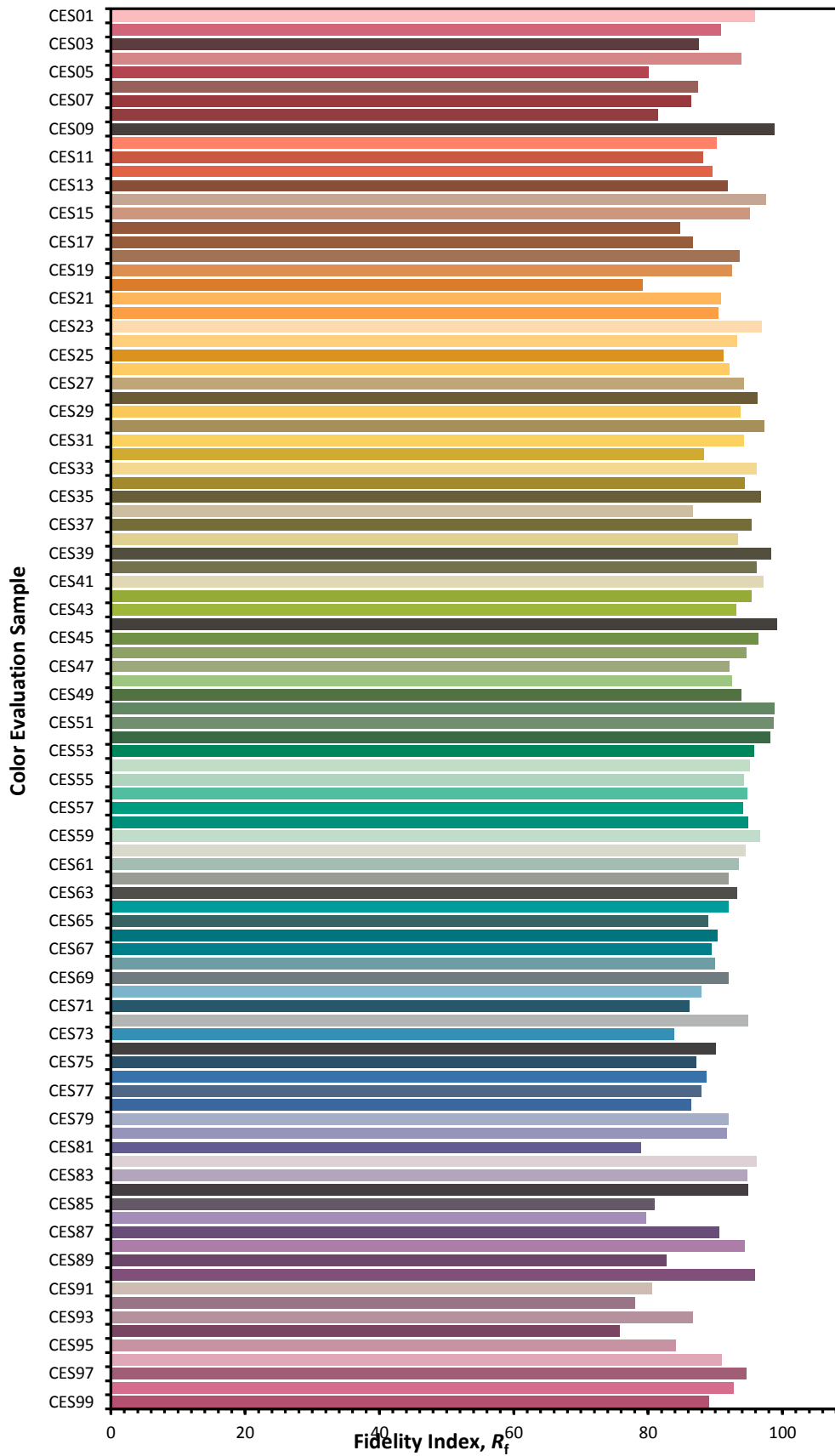


Color Vector Graphic

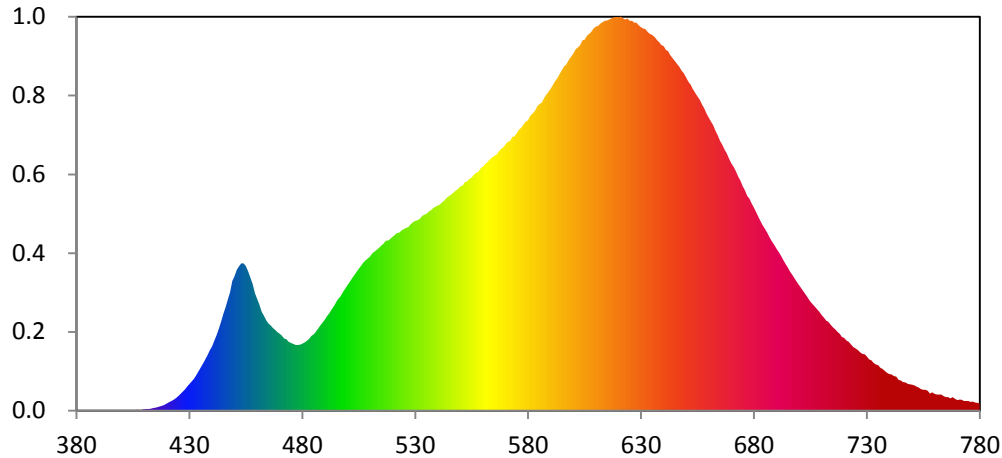


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



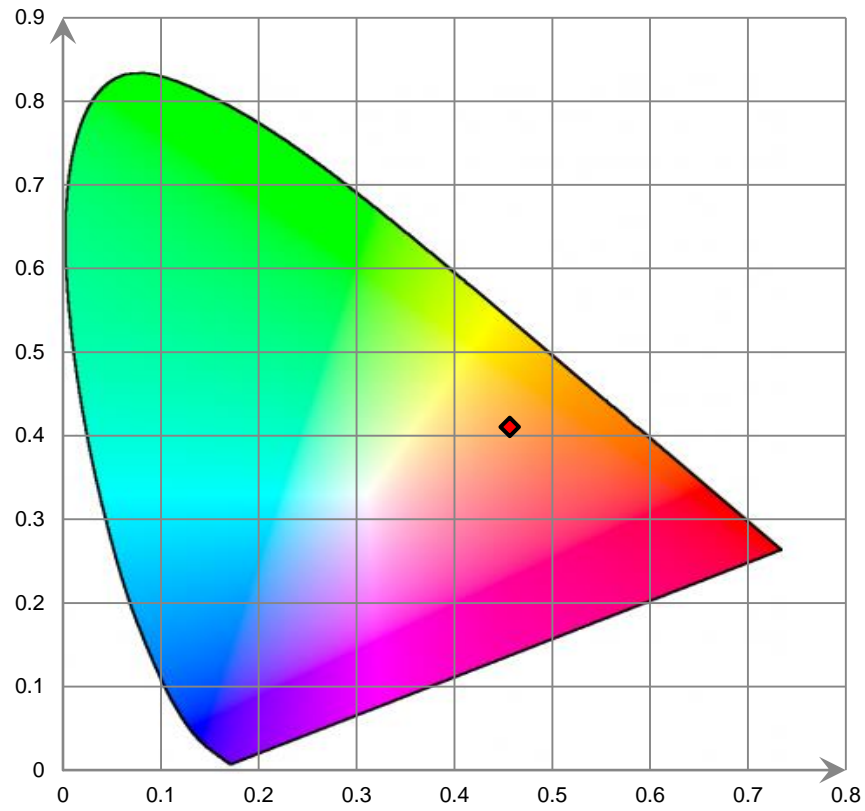
Relative Spectral Power Distribution



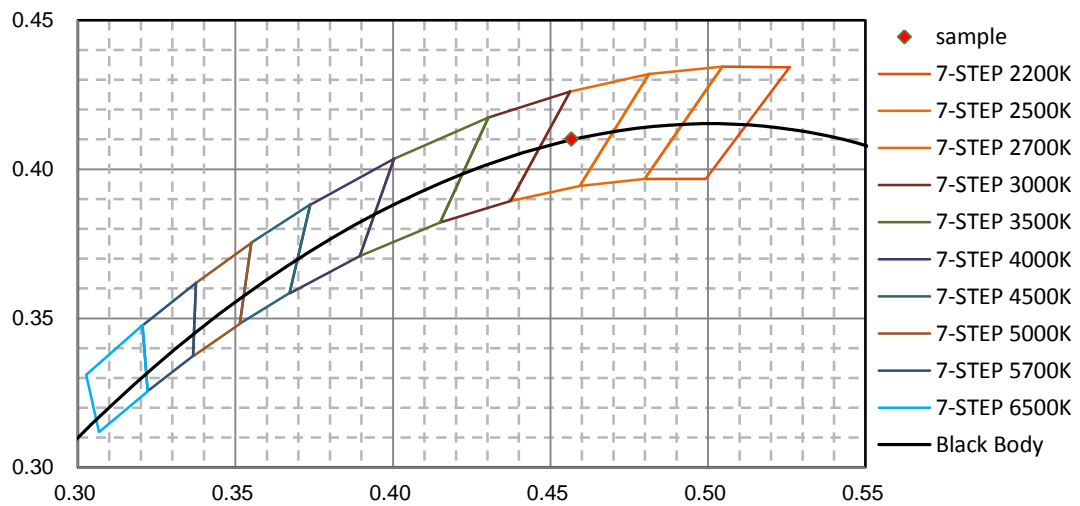
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.530E-02	421	9.516E-01	462	1.146E+01	503	1.573E+01	544	2.473E+01
381	4.130E-02	422	1.094E+00	463	1.099E+01	504	1.611E+01	545	2.489E+01
382	1.220E-02	423	1.271E+00	464	1.048E+01	505	1.647E+01	546	2.508E+01
383	2.500E-03	424	1.460E+00	465	1.010E+01	506	1.681E+01	547	2.536E+01
384	4.590E-02	425	1.668E+00	466	9.878E+00	507	1.717E+01	548	2.559E+01
385	4.060E-02	426	1.925E+00	467	9.583E+00	508	1.744E+01	549	2.577E+01
386	3.500E-03	427	2.181E+00	468	9.378E+00	509	1.764E+01	550	2.607E+01
387	5.820E-02	428	2.452E+00	469	9.114E+00	510	1.788E+01	551	2.612E+01
388	1.140E-02	429	2.769E+00	470	8.914E+00	511	1.827E+01	552	2.654E+01
389	1.620E-02	430	3.067E+00	471	8.691E+00	512	1.849E+01	553	2.662E+01
390	3.110E-02	431	3.388E+00	472	8.362E+00	513	1.871E+01	554	2.691E+01
391	2.280E-02	432	3.669E+00	473	8.272E+00	514	1.893E+01	555	2.706E+01
392	1.000E-03	433	4.105E+00	474	7.992E+00	515	1.920E+01	556	2.740E+01
393	0.000E+00	434	4.518E+00	475	7.851E+00	516	1.942E+01	557	2.761E+01
394	3.900E-03	435	4.970E+00	476	7.726E+00	517	1.973E+01	558	2.775E+01
395	1.720E-02	436	5.423E+00	477	7.634E+00	518	1.974E+01	559	2.815E+01
396	7.100E-03	437	5.894E+00	478	7.609E+00	519	1.998E+01	560	2.835E+01
397	9.500E-03	438	6.405E+00	479	7.660E+00	520	2.019E+01	561	2.861E+01
398	8.000E-04	439	6.936E+00	480	7.770E+00	521	2.041E+01	562	2.883E+01
399	0.000E+00	440	7.479E+00	481	7.929E+00	522	2.063E+01	563	2.915E+01
400	0.000E+00	441	8.120E+00	482	8.103E+00	523	2.067E+01	564	2.939E+01
401	2.310E-02	442	8.780E+00	483	8.319E+00	524	2.092E+01	565	2.958E+01
402	4.360E-02	443	9.500E+00	484	8.668E+00	525	2.107E+01	566	2.972E+01
403	5.660E-02	444	1.032E+01	485	8.831E+00	526	2.121E+01	567	3.013E+01
404	6.640E-02	445	1.122E+01	486	9.160E+00	527	2.132E+01	568	3.042E+01
405	5.700E-02	446	1.199E+01	487	9.527E+00	528	2.164E+01	569	3.059E+01
406	2.140E-02	447	1.289E+01	488	9.881E+00	529	2.190E+01	570	3.094E+01
407	1.052E-01	448	1.375E+01	489	1.021E+01	530	2.204E+01	571	3.123E+01
408	4.460E-02	449	1.504E+01	490	1.057E+01	531	2.213E+01	572	3.132E+01
409	9.080E-02	450	1.561E+01	491	1.097E+01	532	2.227E+01	573	3.179E+01
410	1.470E-01	451	1.637E+01	492	1.131E+01	533	2.261E+01	574	3.188E+01
411	1.745E-01	452	1.675E+01	493	1.176E+01	534	2.275E+01	575	3.224E+01
412	1.971E-01	453	1.710E+01	494	1.217E+01	535	2.286E+01	576	3.264E+01
413	2.145E-01	454	1.709E+01	495	1.263E+01	536	2.311E+01	577	3.287E+01
414	2.785E-01	455	1.682E+01	496	1.301E+01	537	2.325E+01	578	3.322E+01
415	3.446E-01	456	1.620E+01	497	1.332E+01	538	2.352E+01	579	3.356E+01
416	4.060E-01	457	1.551E+01	498	1.380E+01	539	2.366E+01	580	3.371E+01
417	4.891E-01	458	1.466E+01	499	1.416E+01	540	2.381E+01	581	3.423E+01
418	5.673E-01	459	1.360E+01	500	1.459E+01	541	2.395E+01	582	3.453E+01
419	6.777E-01	460	1.292E+01	501	1.496E+01	542	2.420E+01	583	3.485E+01
420	8.196E-01	461	1.225E+01	502	1.537E+01	543	2.443E+01	584	3.535E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.560E+01	626	4.529E+01	667	3.032E+01	708	1.175E+01	749	3.060E+00
586	3.575E+01	627	4.505E+01	668	2.990E+01	709	1.143E+01	750	3.002E+00
587	3.629E+01	628	4.507E+01	669	2.931E+01	710	1.108E+01	751	2.922E+00
588	3.670E+01	629	4.477E+01	670	2.874E+01	711	1.077E+01	752	2.801E+00
589	3.703E+01	630	4.454E+01	671	2.828E+01	712	1.045E+01	753	2.673E+00
590	3.740E+01	631	4.440E+01	672	2.776E+01	713	1.029E+01	754	2.470E+00
591	3.783E+01	632	4.432E+01	673	2.717E+01	714	9.972E+00	755	2.418E+00
592	3.828E+01	633	4.399E+01	674	2.670E+01	715	9.645E+00	756	2.417E+00
593	3.864E+01	634	4.377E+01	675	2.607E+01	716	9.453E+00	757	2.290E+00
594	3.910E+01	635	4.363E+01	676	2.556E+01	717	9.156E+00	758	1.978E+00
595	3.957E+01	636	4.338E+01	677	2.495E+01	718	8.931E+00	759	2.106E+00
596	3.999E+01	637	4.306E+01	678	2.461E+01	719	8.567E+00	760	1.918E+00
597	4.022E+01	638	4.277E+01	679	2.404E+01	720	8.422E+00	761	1.856E+00
598	4.070E+01	639	4.247E+01	680	2.355E+01	721	8.148E+00	762	1.869E+00
599	4.108E+01	640	4.235E+01	681	2.305E+01	722	7.987E+00	763	1.863E+00
600	4.148E+01	641	4.191E+01	682	2.250E+01	723	7.697E+00	764	1.669E+00
601	4.199E+01	642	4.175E+01	683	2.198E+01	724	7.415E+00	765	1.547E+00
602	4.221E+01	643	4.127E+01	684	2.149E+01	725	7.226E+00	766	1.552E+00
603	4.245E+01	644	4.094E+01	685	2.107E+01	726	7.028E+00	767	1.415E+00
604	4.300E+01	645	4.061E+01	686	2.062E+01	727	6.765E+00	768	1.547E+00
605	4.308E+01	646	4.025E+01	687	2.011E+01	728	6.564E+00	769	1.381E+00
606	4.353E+01	647	3.992E+01	688	1.968E+01	729	6.524E+00	770	1.235E+00
607	4.376E+01	648	3.949E+01	689	1.923E+01	730	6.262E+00	771	1.260E+00
608	4.402E+01	649	3.918E+01	690	1.877E+01	731	5.964E+00	772	1.270E+00
609	4.440E+01	650	3.871E+01	691	1.839E+01	732	5.834E+00	773	1.112E+00
610	4.460E+01	651	3.824E+01	692	1.797E+01	733	5.541E+00	774	1.126E+00
611	4.469E+01	652	3.790E+01	693	1.747E+01	734	5.347E+00	775	1.097E+00
612	4.494E+01	653	3.737E+01	694	1.701E+01	735	5.258E+00	776	1.010E+00
613	4.515E+01	654	3.688E+01	695	1.660E+01	736	4.983E+00	777	1.039E+00
614	4.527E+01	655	3.649E+01	696	1.611E+01	737	4.822E+00	778	9.173E-01
615	4.532E+01	656	3.609E+01	697	1.574E+01	738	4.593E+00	779	8.931E-01
616	4.545E+01	657	3.556E+01	698	1.535E+01	739	4.387E+00	780	8.252E-01
617	4.558E+01	658	3.510E+01	699	1.493E+01	740	4.226E+00		
618	4.568E+01	659	3.448E+01	700	1.458E+01	741	4.194E+00		
619	4.574E+01	660	3.401E+01	701	1.420E+01	742	4.014E+00		
620	4.569E+01	661	3.356E+01	702	1.382E+01	743	3.921E+00		
621	4.576E+01	662	3.312E+01	703	1.344E+01	744	3.563E+00		
622	4.559E+01	663	3.251E+01	704	1.306E+01	745	3.508E+00		
623	4.541E+01	664	3.196E+01	705	1.267E+01	746	3.291E+00		
624	4.555E+01	665	3.136E+01	706	1.236E+01	747	3.259E+00		
625	4.526E+01	666	3.088E+01	707	1.206E+01	748	3.131E+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**

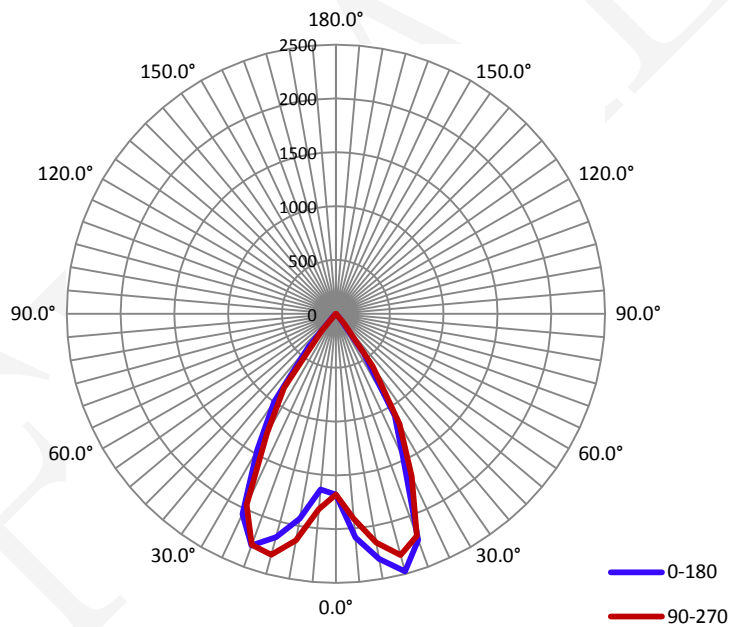
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2700	31.2	0.9630

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2119.8	67.99	2477.6	1.15	1.14

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	60.5	61.6	61.5	59.8	61.0
Field Angle (10% I _{max}):	79.6	79.3	78.6	78.6	79.0

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1678	1678	1678	1678	1678	1678	1678	1678
5.0°	2087	2088	2062	2006	1912	1814	1720	1648
10.0°	2313	2295	2257	2210	2158	2101	2034	1942
15.0°	2478	2451	2403	2340	2319	2304	2257	2175
20.0°	2236	2204	2170	2164	2196	2237	2281	2301
25.0°	1477	1432	1444	1508	1668	1883	1997	2059
30.0°	1096	1103	1113	1136	1182	1209	1253	1399
35.0°	444	416	422	482	594	749	864	960
40.0°	60	34	37	69	121	173	268	378
45.0°	5	5	4	6	8	10	21	38
50.0°	3	2	3	2	3	4	4	6
55.0°	1	1	0	1	1	3	3	3
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

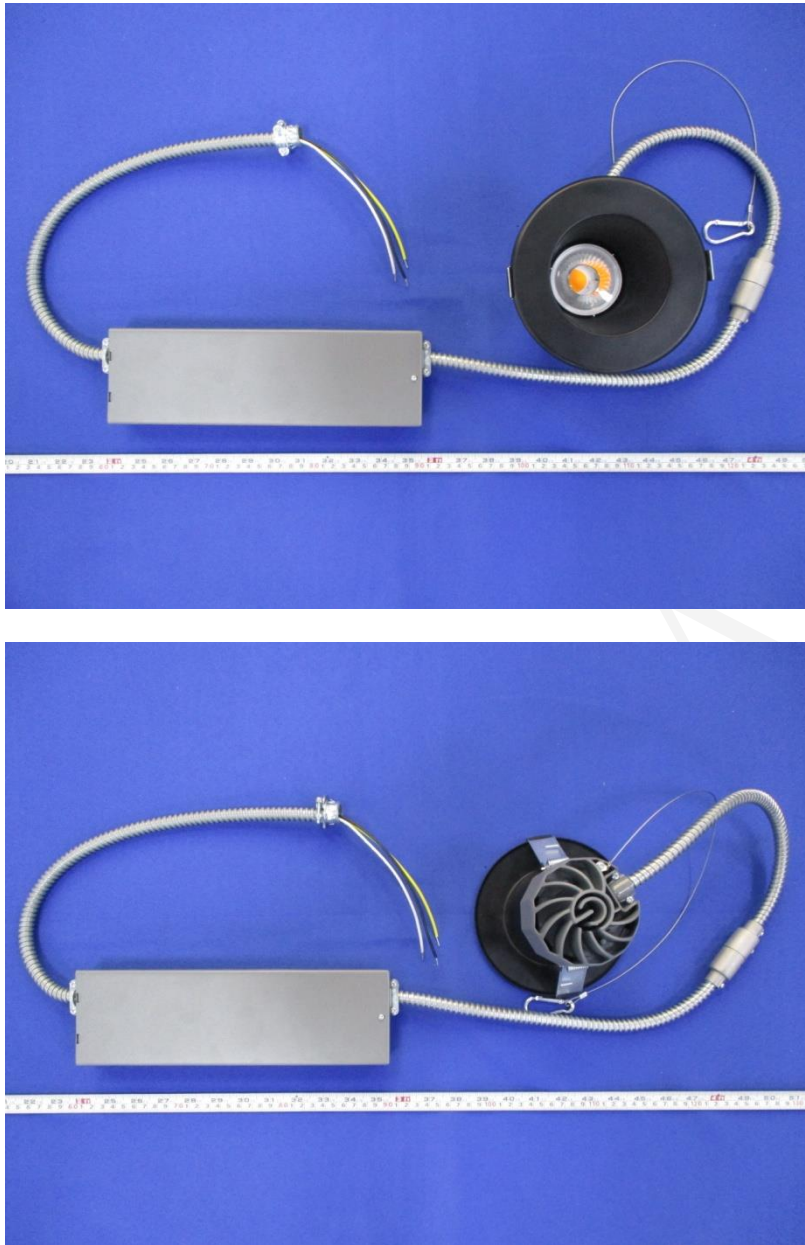
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1678	1678	1678	1678	1678	1678	1678	1678
5.0°	1638	1634	1652	1722	1820	1929	2023	2069
10.0°	1930	1936	1964	2037	2136	2209	2267	2305
15.0°	2148	2163	2186	2237	2315	2398	2445	2450
20.0°	2291	2296	2291	2269	2283	2270	2247	2229
25.0°	2052	2070	2040	2018	1959	1902	1705	1493
30.0°	1461	1531	1488	1355	1276	1223	1156	1069
35.0°	998	1023	1001	938	837	693	530	432
40.0°	395	401	372	319	208	109	71	57
45.0°	41	43	38	28	14	8	7	5
50.0°	6	7	6	5	4	3	3	3
55.0°	2	3	3	3	3	2	1	1
60.0°	1	2	2	1	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	42.3	2.00	0-5	42.3	2.00
5-10	142.9	6.74	0-10	185.2	8.74
10-15	263.8	12.45	0-15	449.1	21.18
15-20	376.2	17.75	0-20	825.3	38.93
20-25	423.9	20.00	0-25	1249.2	58.93
25-30	385.6	18.19	0-30	1634.8	77.12
30-35	289.3	13.65	0-35	1924.1	90.77
35-40	150.7	7.11	0-40	2074.8	97.88
40-45	38.8	1.83	0-45	2113.5	99.71
45-50	4.3	0.20	0-50	2117.8	99.91
50-55	1.2	0.06	0-55	2119.1	99.97
55-60	0.6	0.03	0-60	2119.6	99.99
60-65	0.1	0.01	0-65	2119.8	100.00
65-70	0.0	0.00	0-70	2119.8	100.00
70-75	0.0	0.00	0-75	2119.8	100.00
75-80	0.0	0.00	0-80	2119.8	100.00
80-85	0.0	0.00	0-85	2119.8	100.00
85-90	0.0	0.00	0-90	2119.8	100.00
90-95	0.0	0.00	0-95	2119.8	100.00
95-100	0.0	0.00	0-100	2119.8	100.00
100-105	0.0	0.00	0-105	2119.8	100.00
105-110	0.0	0.00	0-110	2119.8	100.00
110-115	0.0	0.00	0-115	2119.8	100.00
115-120	0.0	0.00	0-120	2119.8	100.00
120-125	0.0	0.00	0-125	2119.8	100.00
125-130	0.0	0.00	0-130	2119.8	100.00
130-135	0.0	0.00	0-135	2119.8	100.00
135-140	0.0	0.00	0-140	2119.8	100.00
140-145	0.0	0.00	0-145	2119.8	100.00
145-150	0.0	0.00	0-150	2119.8	100.00
150-155	0.0	0.00	0-155	2119.8	100.00
155-160	0.0	0.00	0-160	2119.8	100.00
160-165	0.0	0.00	0-165	2119.8	100.00
165-170	0.0	0.00	0-170	2119.8	100.00
170-175	0.0	0.00	0-175	2119.8	100.00
175-180	0.0	0.00	0-180	2119.8	100.00

6. Product Photo



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