

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE199027DIM120MDR4BL

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329024-10-2
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.

1. Product Description

General Information:

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

Model Tested: LE199027DIM120MDR4BL
 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**

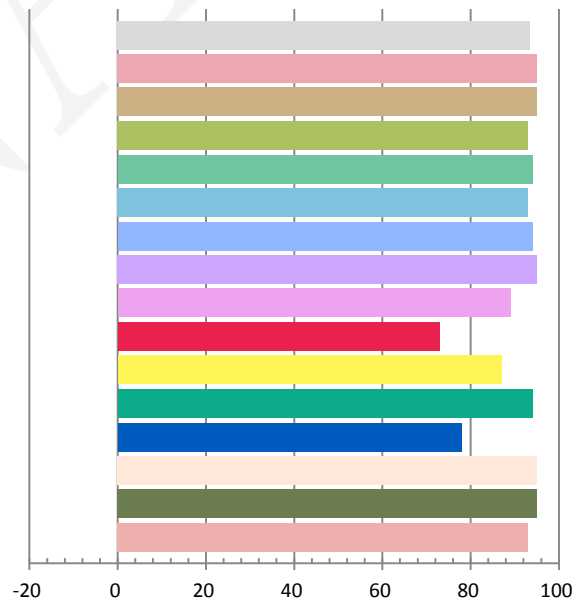
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.2612	30.97	0.9881	2016.77	65.12

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.367	2721	-0.00003	0.4581	0.4101	0.2616	0.5269

Color Rendering Index

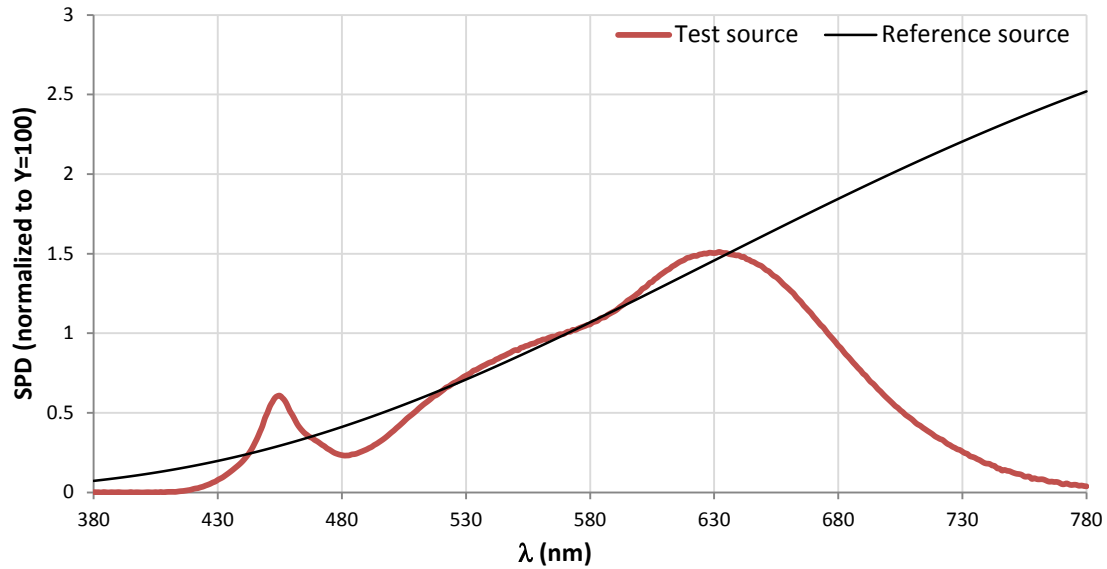
Ra			
93.5			
R1	R2	R3	R4
95	95	93	94
R5	R6	R7	R8
93	94	95	89
R9	R10	R11	R12
73	87	94	78
R13	R14	R15	
95	95	93	



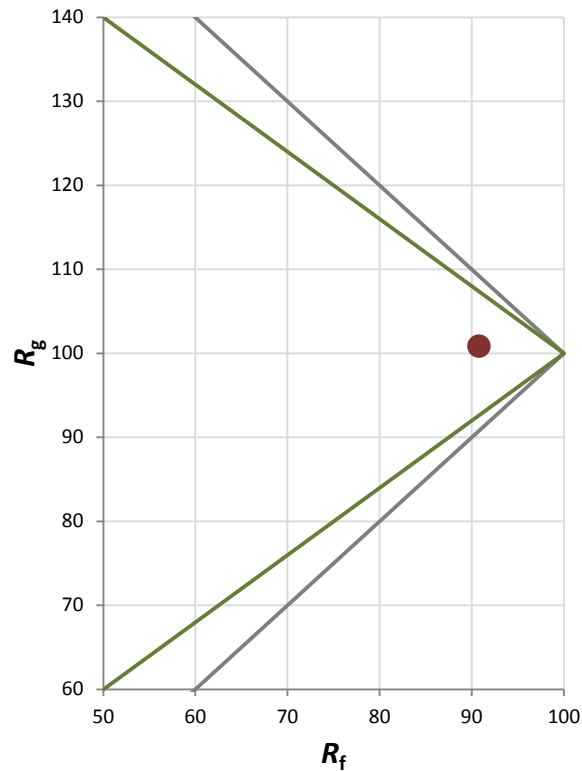
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

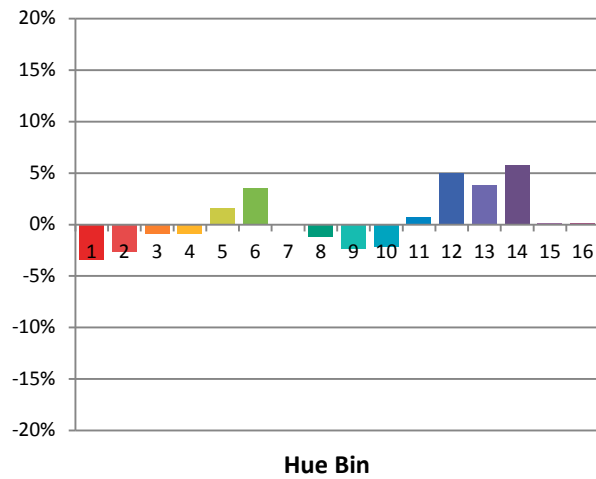
Spectral Power Distribution Comparison



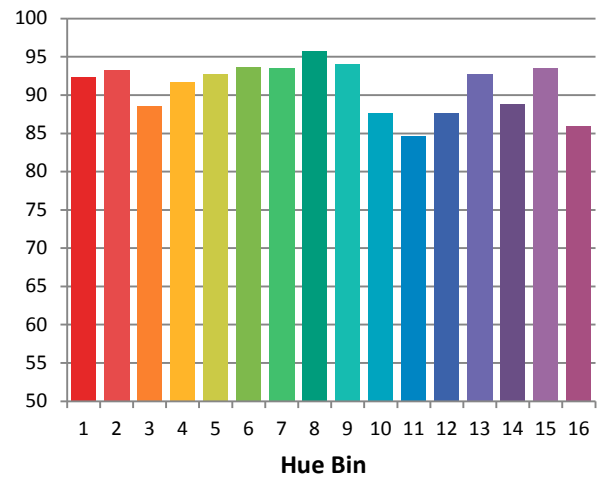
Plot of R_g versus R_f



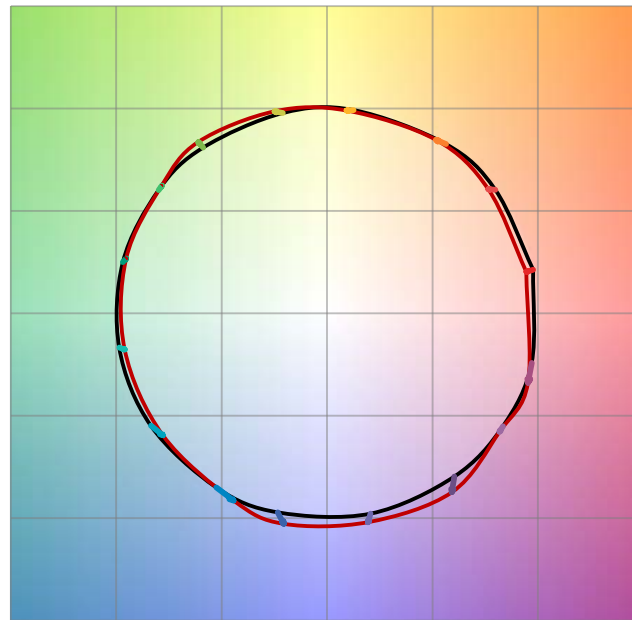
Chroma Shift by Hue



R_t by Hue

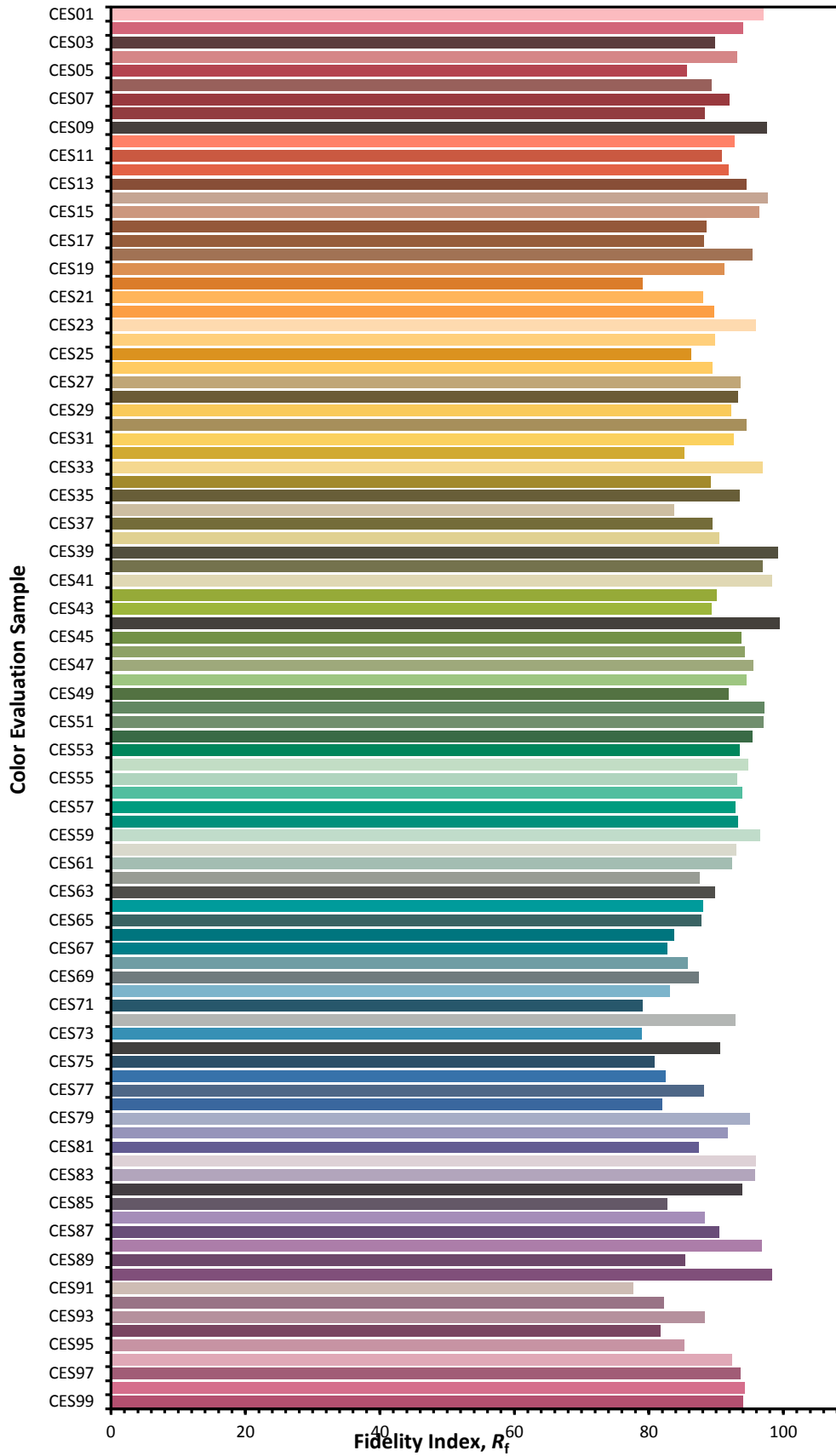


Color Vector Graphic

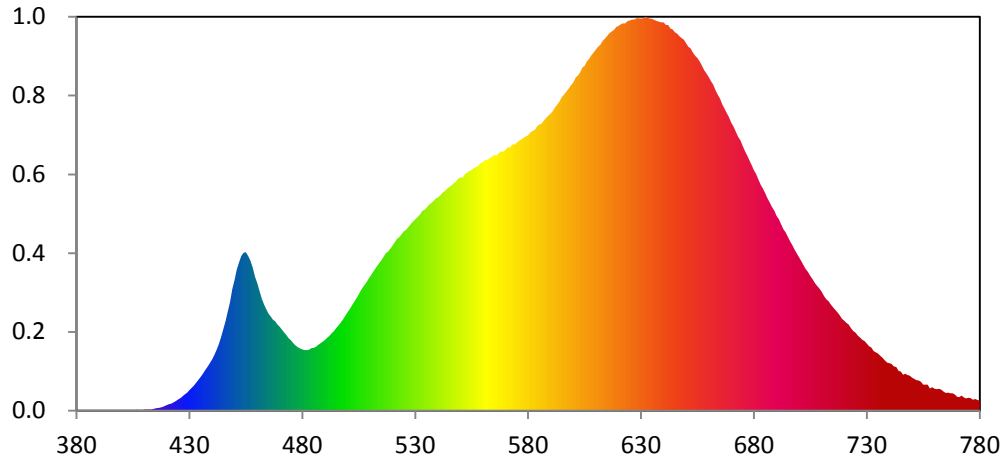


— Refenerce Illuminat — Test Source

Color Fidelity by CES Sample



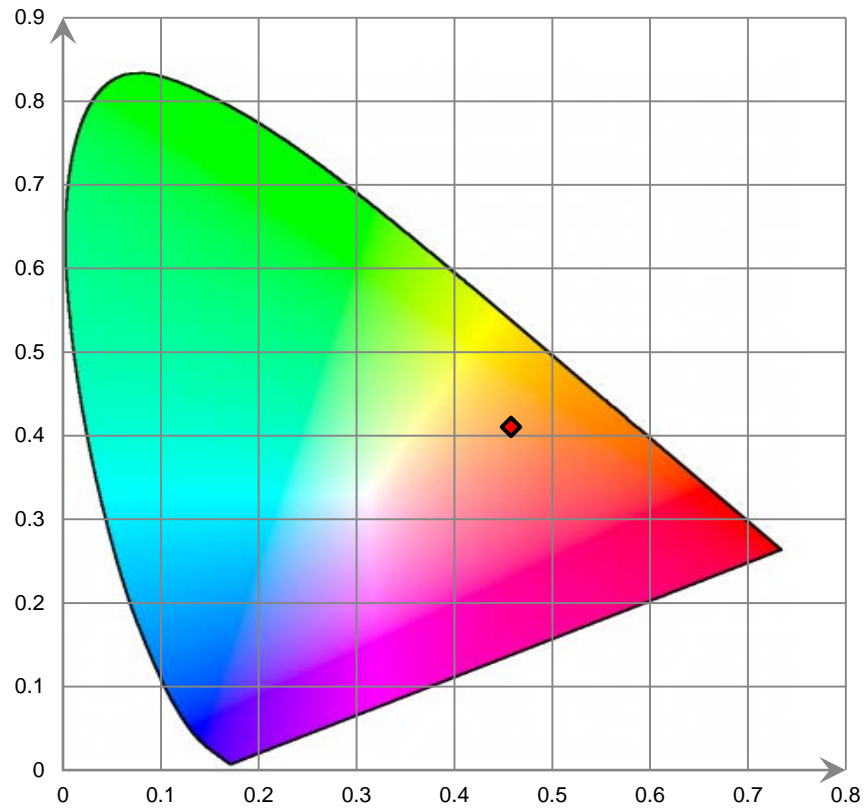
Relative Spectral Power Distribution



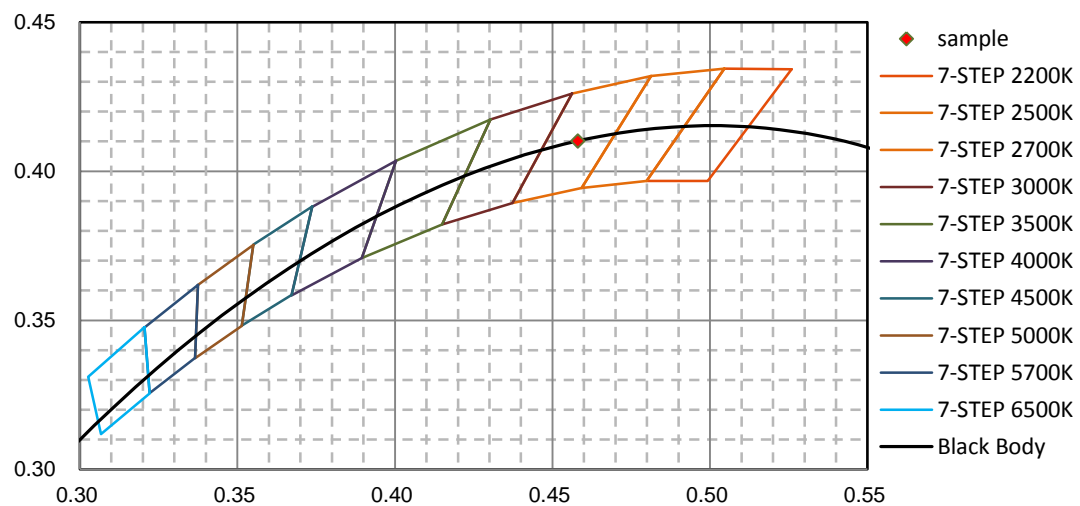
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.570E-02	421	7.381E-01	462	1.270E+01	503	1.233E+01	544	2.510E+01
381	4.130E-02	422	8.013E-01	463	1.203E+01	504	1.275E+01	545	2.529E+01
382	4.390E-02	423	9.523E-01	464	1.148E+01	505	1.317E+01	546	2.550E+01
383	2.400E-03	424	1.071E+00	465	1.100E+01	506	1.363E+01	547	2.575E+01
384	7.240E-02	425	1.260E+00	466	1.066E+01	507	1.401E+01	548	2.596E+01
385	3.580E-02	426	1.424E+00	467	1.030E+01	508	1.437E+01	549	2.626E+01
386	2.700E-03	427	1.613E+00	468	1.012E+01	509	1.475E+01	550	2.642E+01
387	4.880E-02	428	1.850E+00	469	9.748E+00	510	1.514E+01	551	2.640E+01
388	2.960E-02	429	2.024E+00	470	9.497E+00	511	1.558E+01	552	2.682E+01
389	3.010E-02	430	2.330E+00	471	9.180E+00	512	1.598E+01	553	2.693E+01
390	6.200E-02	431	2.568E+00	472	8.832E+00	513	1.637E+01	554	2.716E+01
391	2.430E-02	432	2.812E+00	473	8.565E+00	514	1.670E+01	555	2.727E+01
392	1.300E-03	433	3.139E+00	474	8.181E+00	515	1.705E+01	556	2.751E+01
393	2.600E-03	434	3.468E+00	475	7.931E+00	516	1.743E+01	557	2.762E+01
394	1.570E-02	435	3.814E+00	476	7.626E+00	517	1.784E+01	558	2.776E+01
395	7.070E-02	436	4.174E+00	477	7.350E+00	518	1.804E+01	559	2.804E+01
396	4.400E-03	437	4.556E+00	478	7.172E+00	519	1.836E+01	560	2.815E+01
397	3.340E-02	438	4.931E+00	479	7.021E+00	520	1.872E+01	561	2.838E+01
398	3.000E-02	439	5.337E+00	480	6.922E+00	521	1.907E+01	562	2.839E+01
399	1.900E-03	440	5.794E+00	481	6.841E+00	522	1.947E+01	563	2.863E+01
400	1.000E-04	441	6.326E+00	482	6.858E+00	523	1.966E+01	564	2.881E+01
401	3.000E-02	442	6.907E+00	483	6.891E+00	524	1.999E+01	565	2.893E+01
402	4.690E-02	443	7.554E+00	484	7.060E+00	525	2.030E+01	566	2.892E+01
403	1.910E-02	444	8.329E+00	485	7.104E+00	526	2.050E+01	567	2.921E+01
404	1.810E-02	445	9.241E+00	486	7.218E+00	527	2.079E+01	568	2.937E+01
405	5.890E-02	446	1.017E+01	487	7.417E+00	528	2.110E+01	569	2.935E+01
406	2.040E-02	447	1.126E+01	488	7.598E+00	529	2.144E+01	570	2.957E+01
407	8.850E-02	448	1.234E+01	489	7.794E+00	530	2.168E+01	571	2.983E+01
408	2.800E-02	449	1.379E+01	490	7.988E+00	531	2.192E+01	572	2.981E+01
409	7.320E-02	450	1.478E+01	491	8.235E+00	532	2.220E+01	573	3.016E+01
410	1.051E-01	451	1.598E+01	492	8.449E+00	533	2.260E+01	574	3.014E+01
411	1.102E-01	452	1.677E+01	493	8.784E+00	534	2.274E+01	575	3.035E+01
412	1.125E-01	453	1.753E+01	494	9.032E+00	535	2.299E+01	576	3.056E+01
413	1.083E-01	454	1.787E+01	495	9.344E+00	536	2.327E+01	577	3.073E+01
414	1.772E-01	455	1.796E+01	496	9.650E+00	537	2.351E+01	578	3.089E+01
415	2.353E-01	456	1.755E+01	497	9.980E+00	538	2.373E+01	579	3.110E+01
416	2.711E-01	457	1.703E+01	498	1.034E+01	539	2.399E+01	580	3.118E+01
417	3.379E-01	458	1.619E+01	499	1.074E+01	540	2.417E+01	581	3.153E+01
418	4.112E-01	459	1.516E+01	500	1.114E+01	541	2.432E+01	582	3.169E+01
419	4.896E-01	460	1.442E+01	501	1.151E+01	542	2.465E+01	583	3.184E+01
420	6.293E-01	461	1.356E+01	502	1.194E+01	543	2.484E+01	584	3.223E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.243E+01	626	4.434E+01	667	3.423E+01	708	1.412E+01	749	3.956E+00
586	3.252E+01	627	4.431E+01	668	3.373E+01	709	1.380E+01	750	3.750E+00
587	3.290E+01	628	4.448E+01	669	3.327E+01	710	1.344E+01	751	3.577E+00
588	3.317E+01	629	4.445E+01	670	3.264E+01	711	1.298E+01	752	3.453E+00
589	3.343E+01	630	4.441E+01	671	3.212E+01	712	1.263E+01	753	3.400E+00
590	3.367E+01	631	4.447E+01	672	3.157E+01	713	1.239E+01	754	3.249E+00
591	3.400E+01	632	4.464E+01	673	3.102E+01	714	1.203E+01	755	2.948E+00
592	3.440E+01	633	4.450E+01	674	3.062E+01	715	1.172E+01	756	2.932E+00
593	3.472E+01	634	4.442E+01	675	3.000E+01	716	1.141E+01	757	2.938E+00
594	3.507E+01	635	4.441E+01	676	2.941E+01	717	1.111E+01	758	2.507E+00
595	3.555E+01	636	4.423E+01	677	2.890E+01	718	1.079E+01	759	2.652E+00
596	3.583E+01	637	4.415E+01	678	2.838E+01	719	1.042E+01	760	2.468E+00
597	3.614E+01	638	4.407E+01	679	2.783E+01	720	1.017E+01	761	2.433E+00
598	3.647E+01	639	4.397E+01	680	2.723E+01	721	9.918E+00	762	2.454E+00
599	3.685E+01	640	4.398E+01	681	2.681E+01	722	9.752E+00	763	2.358E+00
600	3.720E+01	641	4.369E+01	682	2.620E+01	723	9.371E+00	764	2.151E+00
601	3.774E+01	642	4.371E+01	683	2.562E+01	724	9.010E+00	765	1.997E+00
602	3.799E+01	643	4.330E+01	684	2.517E+01	725	8.792E+00	766	2.021E+00
603	3.834E+01	644	4.318E+01	685	2.465E+01	726	8.484E+00	767	1.942E+00
604	3.888E+01	645	4.289E+01	686	2.410E+01	727	8.274E+00	768	1.953E+00
605	3.907E+01	646	4.273E+01	687	2.361E+01	728	8.004E+00	769	1.815E+00
606	3.955E+01	647	4.245E+01	688	2.308E+01	729	7.880E+00	770	1.564E+00
607	3.985E+01	648	4.221E+01	689	2.264E+01	730	7.578E+00	771	1.524E+00
608	4.025E+01	649	4.202E+01	690	2.204E+01	731	7.300E+00	772	1.694E+00
609	4.058E+01	650	4.163E+01	691	2.168E+01	732	7.153E+00	773	1.485E+00
610	4.091E+01	651	4.124E+01	692	2.109E+01	733	6.749E+00	774	1.380E+00
611	4.123E+01	652	4.104E+01	693	2.055E+01	734	6.606E+00	775	1.437E+00
612	4.147E+01	653	4.058E+01	694	2.019E+01	735	6.444E+00	776	1.394E+00
613	4.188E+01	654	4.018E+01	695	1.971E+01	736	6.184E+00	777	1.239E+00
614	4.214E+01	655	3.993E+01	696	1.917E+01	737	5.991E+00	778	1.289E+00
615	4.245E+01	656	3.953E+01	697	1.876E+01	738	5.697E+00	779	1.192E+00
616	4.275E+01	657	3.906E+01	698	1.825E+01	739	5.446E+00	780	1.133E+00
617	4.295E+01	658	3.857E+01	699	1.779E+01	740	5.350E+00		
618	4.316E+01	659	3.819E+01	700	1.736E+01	741	5.295E+00		
619	4.349E+01	660	3.778E+01	701	1.692E+01	742	5.006E+00		
620	4.359E+01	661	3.733E+01	702	1.648E+01	743	4.923E+00		
621	4.377E+01	662	3.692E+01	703	1.602E+01	744	4.485E+00		
622	4.390E+01	663	3.630E+01	704	1.571E+01	745	4.414E+00		
623	4.389E+01	664	3.580E+01	705	1.525E+01	746	4.062E+00		
624	4.414E+01	665	3.535E+01	706	1.490E+01	747	4.181E+00		
625	4.421E+01	666	3.471E+01	707	1.444E+01	748	4.019E+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**

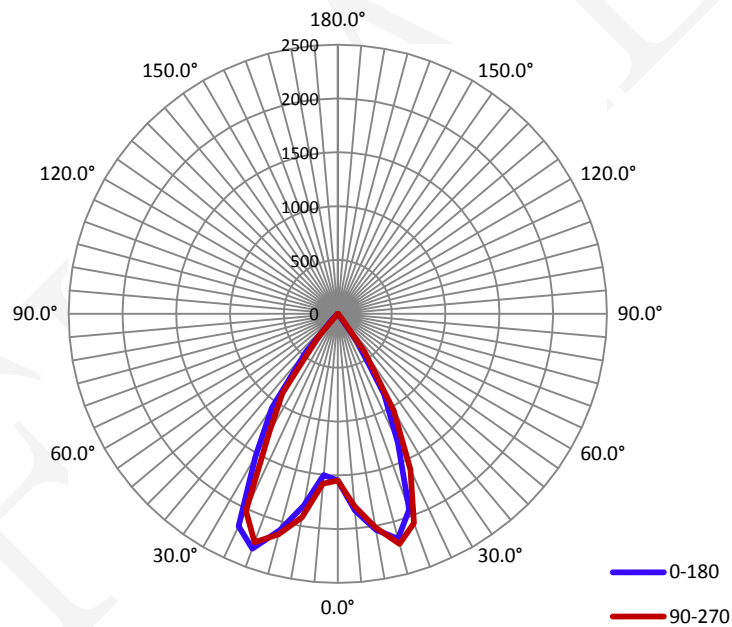
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2680	30.97	0.9630

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2019.2	65.25	2322.5	1.16	1.14

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	60.8	61.7	61.1	61.1	61.2
Field Angle (10% I _{max}):	79.4	78.7	78.8	78.2	78.8

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1548	1548	1548	1548	1548	1548	1548	1548
5.0°	1834	1853	1854	1843	1792	1728	1638	1542
10.0°	2038	2058	2054	2045	2017	1987	1940	1865
15.0°	2163	2150	2188	2204	2213	2204	2142	2085
20.0°	1935	1924	1928	1991	2069	2148	2250	2281
25.0°	1325	1279	1297	1408	1596	1859	2008	2125
30.0°	865	811	819	910	1041	1185	1269	1455
35.0°	316	281	272	316	433	624	841	1019
40.0°	30	25	25	34	51	100	239	380
45.0°	4	5	6	6	8	9	17	40
50.0°	3	3	2	3	3	4	4	4
55.0°	1	1	1	1	1	2	2	2
60.0°	0	0	0	0	0	0	1	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

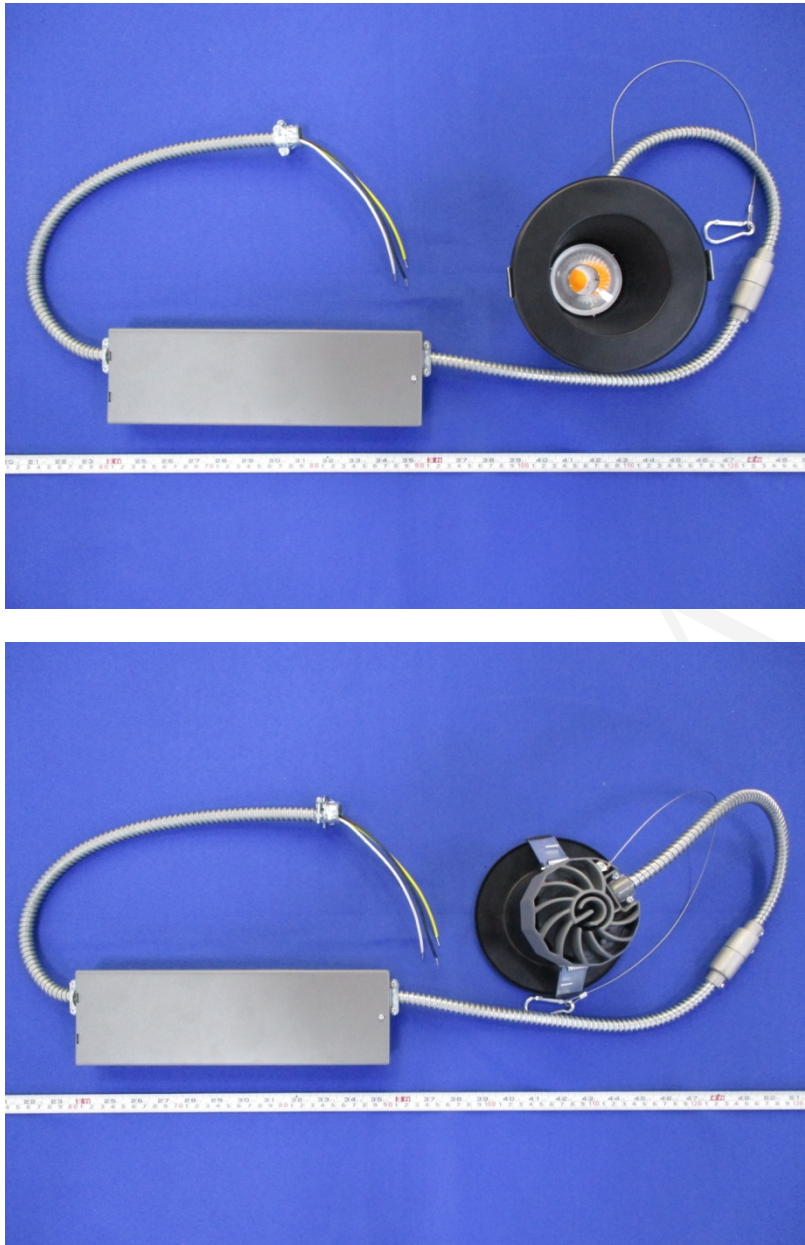
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1548	1548	1548	1548	1548	1548	1548	1548
5.0°	1504	1477	1478	1512	1585	1684	1763	1802
10.0°	1808	1753	1765	1827	1921	1953	1975	2020
15.0°	2079	2054	2064	2075	2120	2172	2189	2167
20.0°	2323	2318	2291	2291	2257	2156	2065	1950
25.0°	2177	2234	2207	2137	2021	1842	1575	1369
30.0°	1528	1633	1603	1404	1269	1185	1063	910
35.0°	1067	1155	1161	1054	898	677	445	342
40.0°	457	523	468	390	285	137	64	34
45.0°	72	73	50	45	16	8	7	6
50.0°	5	5	5	4	3	3	3	2
55.0°	2	3	2	2	2	2	2	1
60.0°	0	1	1	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	38.6	1.91	0-5	38.6	1.91
5-10	129.5	6.41	0-10	168.1	8.32
10-15	242.1	11.99	0-15	410.2	20.31
15-20	352.5	17.46	0-20	762.7	37.77
20-25	410.6	20.33	0-25	1173.2	58.10
25-30	375.0	18.57	0-30	1548.2	76.67
30-35	274.8	13.61	0-35	1823.0	90.28
35-40	147.5	7.30	0-40	1970.4	97.58
40-45	41.8	2.07	0-45	2012.2	99.65
45-50	5.4	0.27	0-50	2017.6	99.92
50-55	1.1	0.06	0-55	2018.8	99.98
55-60	0.4	0.02	0-60	2019.2	100.00
60-65	0.0	0.00	0-65	2019.2	100.00
65-70	0.0	0.00	0-70	2019.2	100.00
70-75	0.0	0.00	0-75	2019.2	100.00
75-80	0.0	0.00	0-80	2019.2	100.00
80-85	0.0	0.00	0-85	2019.2	100.00
85-90	0.0	0.00	0-90	2019.2	100.00
90-95	0.0	0.00	0-95	2019.2	100.00
95-100	0.0	0.00	0-100	2019.2	100.00
100-105	0.0	0.00	0-105	2019.2	100.00
105-110	0.0	0.00	0-110	2019.2	100.00
110-115	0.0	0.00	0-115	2019.2	100.00
115-120	0.0	0.00	0-120	2019.2	100.00
120-125	0.0	0.00	0-125	2019.2	100.00
125-130	0.0	0.00	0-130	2019.2	100.00
130-135	0.0	0.00	0-135	2019.2	100.00
135-140	0.0	0.00	0-140	2019.2	100.00
140-145	0.0	0.00	0-145	2019.2	100.00
145-150	0.0	0.00	0-150	2019.2	100.00
150-155	0.0	0.00	0-155	2019.2	100.00
155-160	0.0	0.00	0-160	2019.2	100.00
160-165	0.0	0.00	0-165	2019.2	100.00
165-170	0.0	0.00	0-170	2019.2	100.00
170-175	0.0	0.00	0-175	2019.2	100.00
175-180	0.0	0.00	0-180	2019.2	100.00

6. Product Photo



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