

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: LE109027DIM120NRR4CC

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	RKSB190329016-10-1
Test Date:	2019-04-01 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: LE109027DIM120NRR4CC
 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**

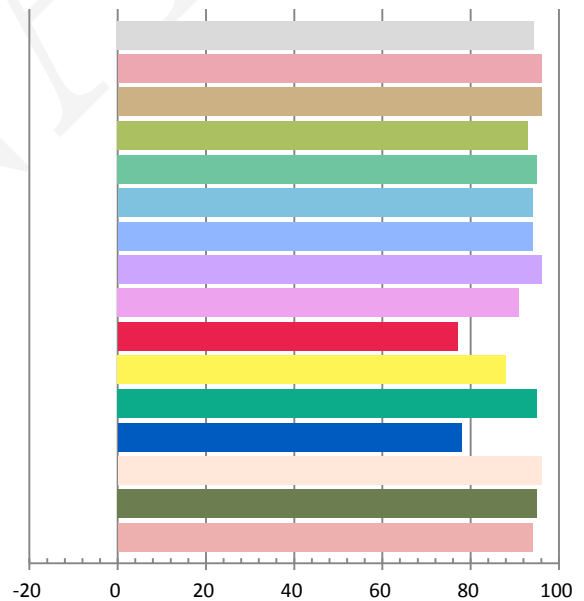
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
119.99	60	0.102	12.1	0.9886	1038.35	85.81

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.827	2712	-0.00010	0.4587	0.4101	0.2620	0.5270

Color Rendering Index

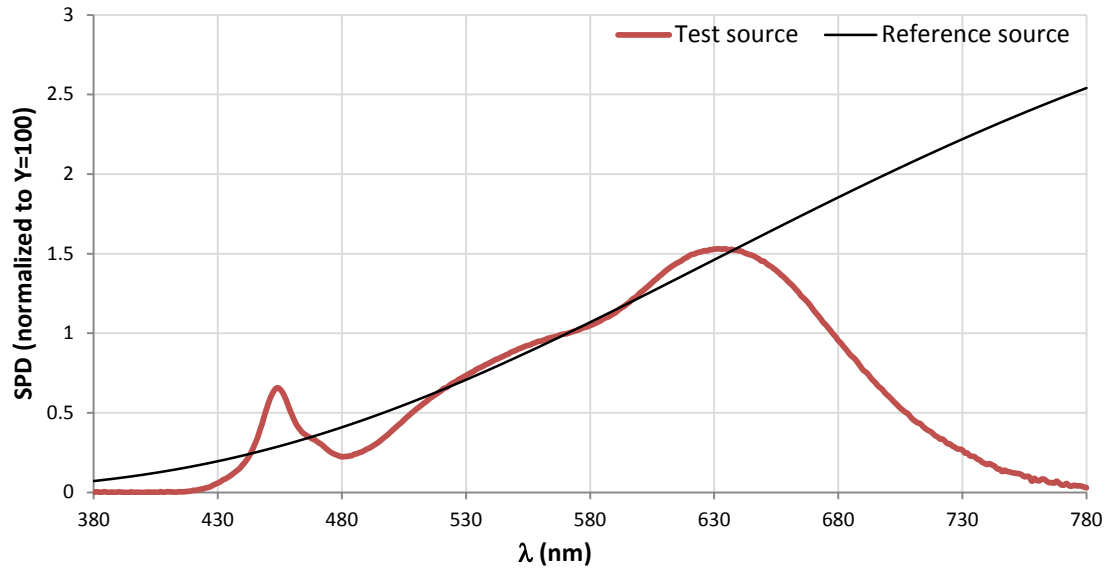
Ra			
94.4			
R1	R2	R3	R4
96	96	93	95
R5	R6	R7	R8
94	94	96	91
R9	R10	R11	R12
77	88	95	78
R13	R14	R15	
96	95	94	



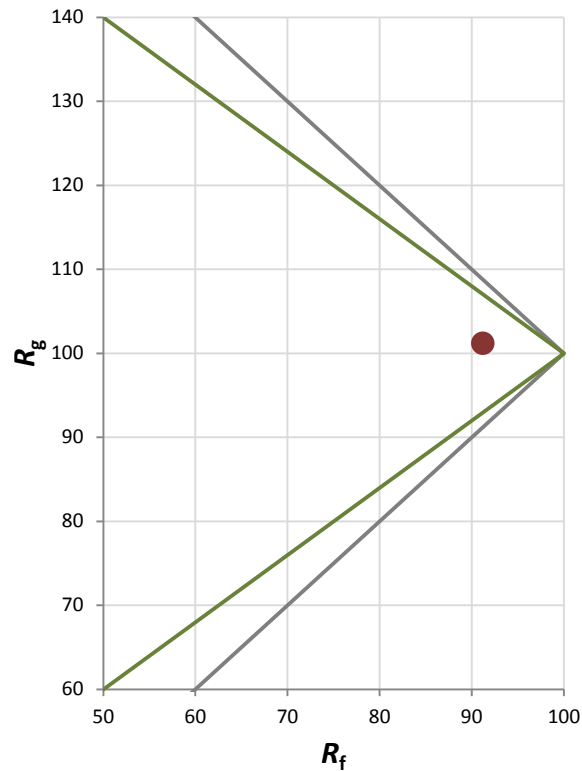
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

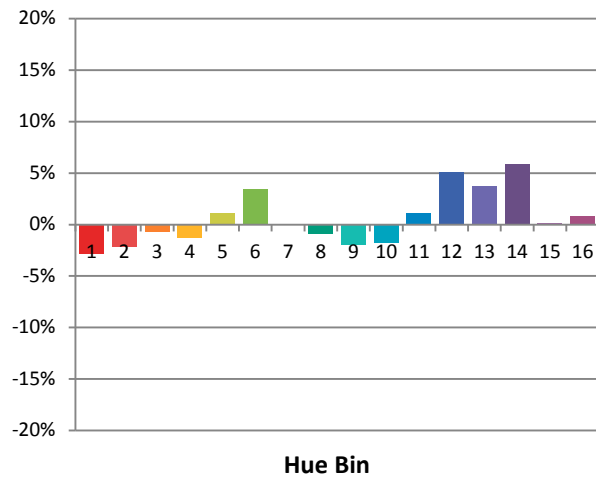
Spectral Power Distribution Comparison



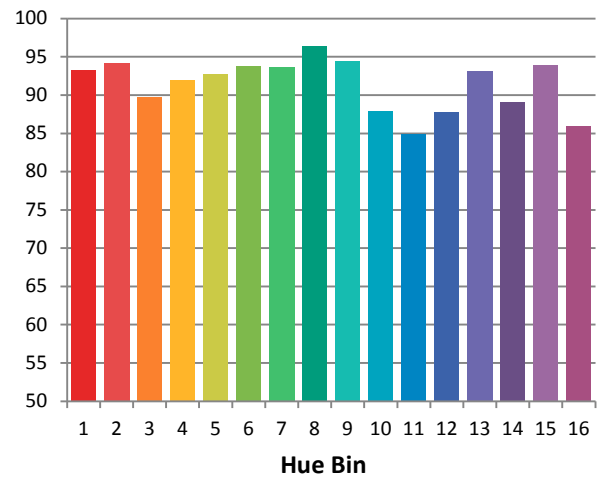
Plot of R_g versus R_f



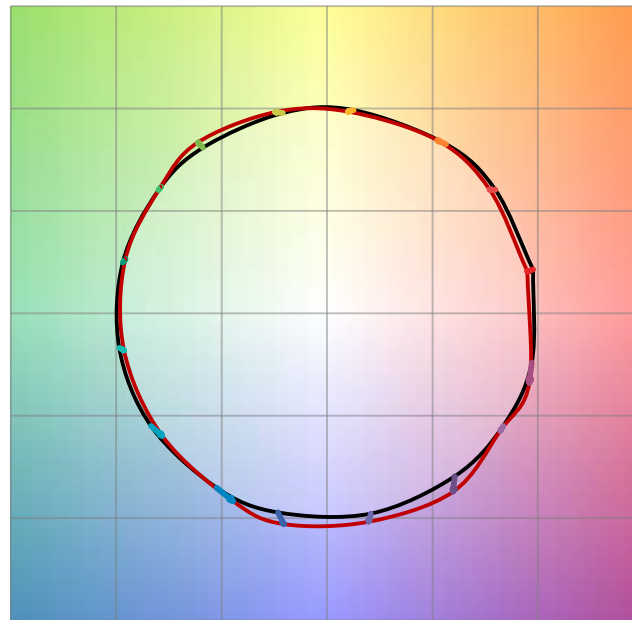
Chroma Shift by Hue



R_t by Hue

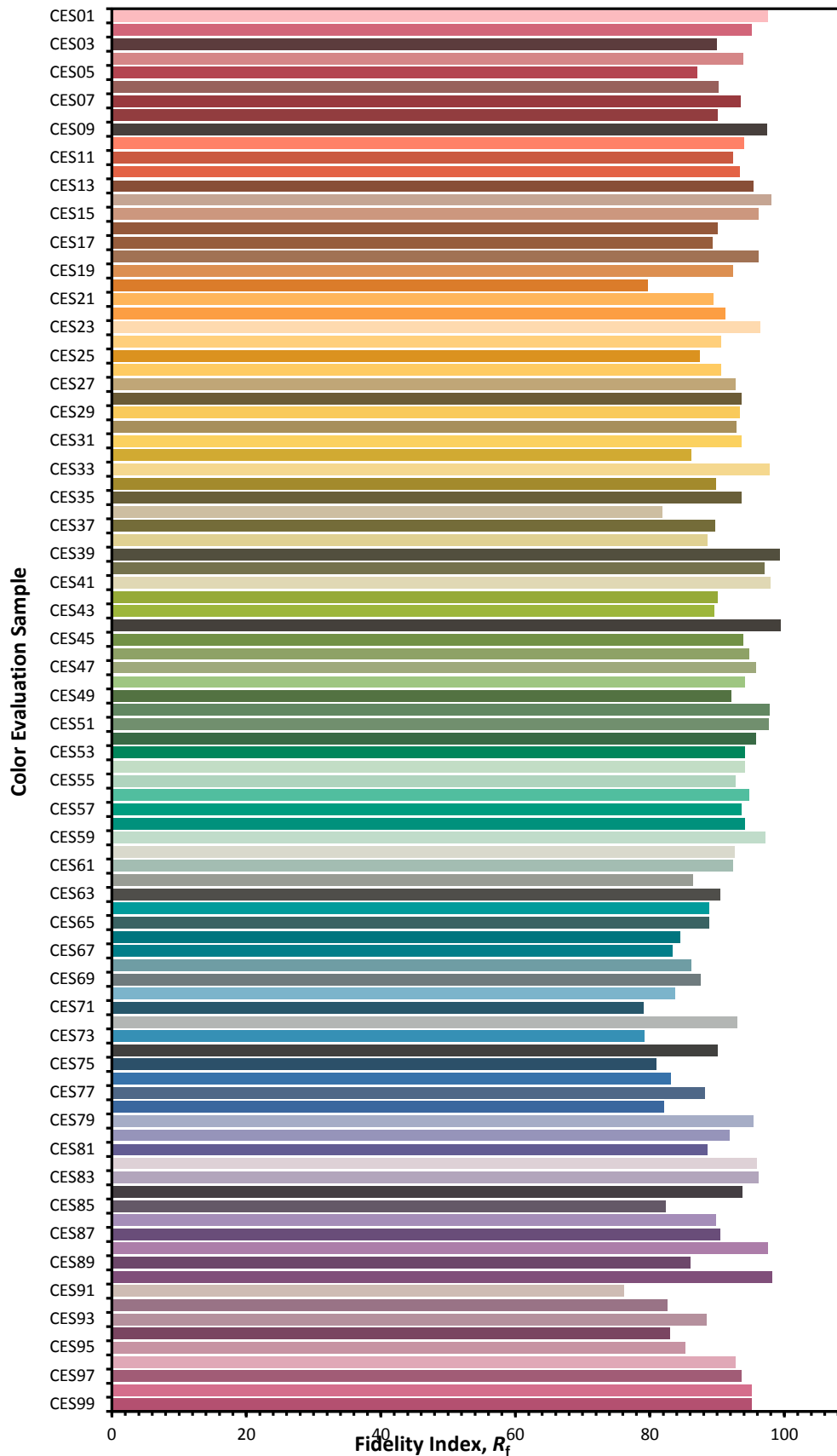


Color Vector Graphic

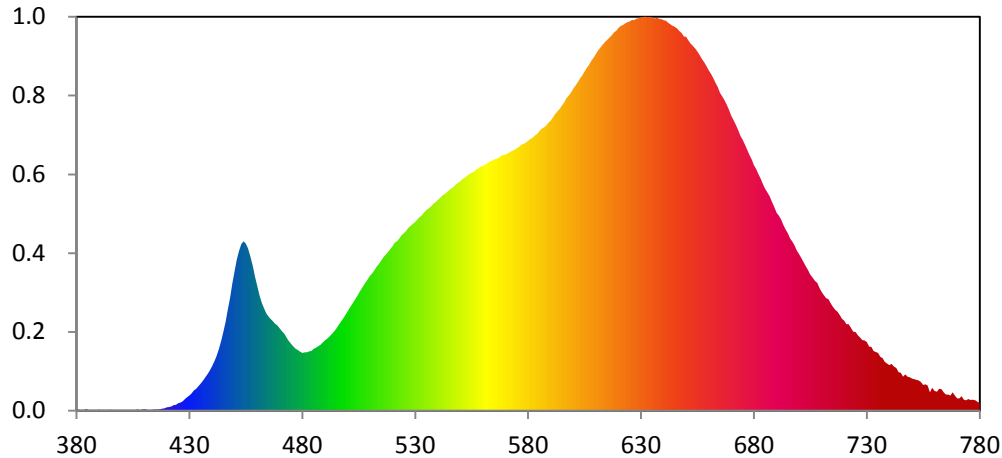


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



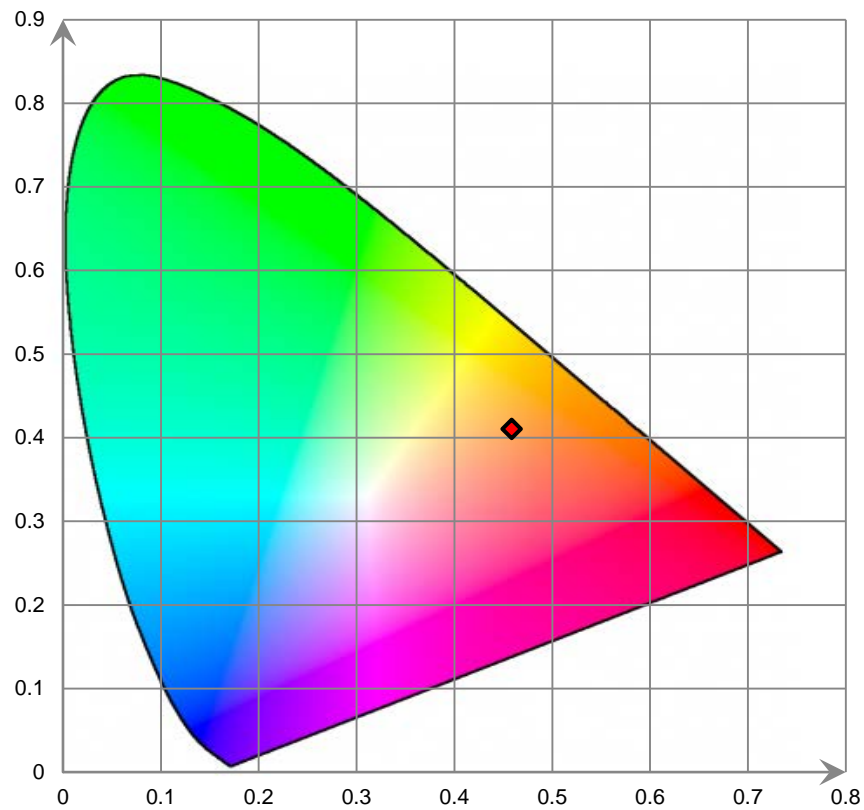
Relative Spectral Power Distribution



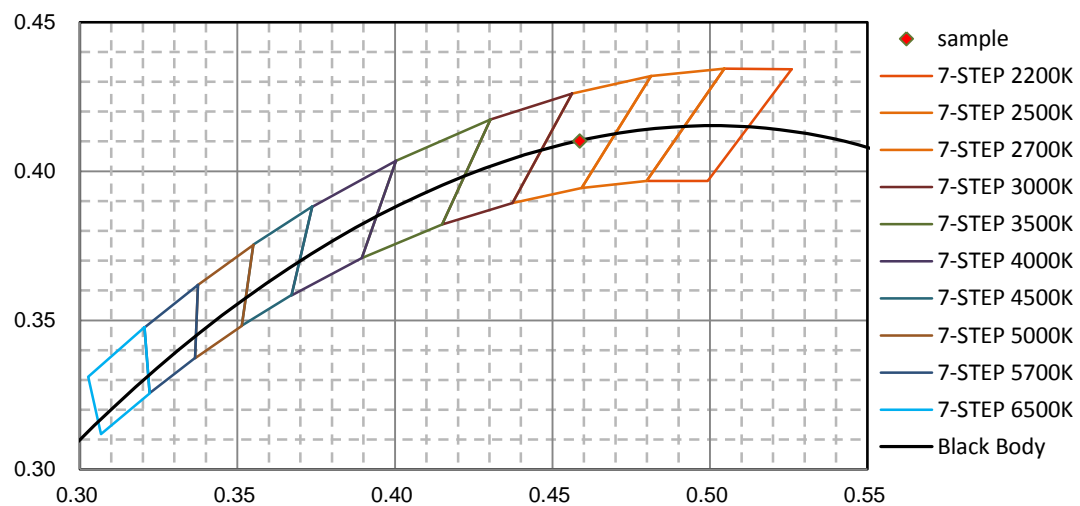
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.110E-02	421	2.052E-01	462	6.372E+00	503	6.494E+00	544	1.290E+01
381	5.370E-02	422	2.524E-01	463	6.051E+00	504	6.684E+00	545	1.301E+01
382	4.380E-02	423	3.125E-01	464	5.748E+00	505	6.929E+00	546	1.312E+01
383	2.900E-03	424	3.376E-01	465	5.567E+00	506	7.143E+00	547	1.322E+01
384	6.950E-02	425	4.256E-01	466	5.401E+00	507	7.354E+00	548	1.337E+01
385	5.010E-02	426	4.719E-01	467	5.271E+00	508	7.569E+00	549	1.347E+01
386	3.800E-03	427	5.478E-01	468	5.131E+00	509	7.757E+00	550	1.356E+01
387	2.820E-02	428	6.785E-01	469	5.038E+00	510	7.959E+00	551	1.369E+01
388	2.270E-02	429	7.977E-01	470	4.862E+00	511	8.136E+00	552	1.378E+01
389	1.110E-02	430	8.928E-01	471	4.698E+00	512	8.325E+00	553	1.387E+01
390	5.420E-02	431	1.016E+00	472	4.549E+00	513	8.520E+00	554	1.398E+01
391	3.280E-02	432	1.192E+00	473	4.327E+00	514	8.680E+00	555	1.405E+01
392	1.230E-02	433	1.289E+00	474	4.126E+00	515	8.894E+00	556	1.411E+01
393	6.100E-03	434	1.427E+00	475	3.925E+00	516	9.071E+00	557	1.424E+01
394	4.000E-04	435	1.589E+00	476	3.781E+00	517	9.231E+00	558	1.431E+01
395	5.040E-02	436	1.763E+00	477	3.655E+00	518	9.381E+00	559	1.443E+01
396	1.430E-02	437	1.949E+00	478	3.572E+00	519	9.552E+00	560	1.445E+01
397	1.250E-02	438	2.132E+00	479	3.471E+00	520	9.711E+00	561	1.452E+01
398	2.160E-02	439	2.341E+00	480	3.410E+00	521	9.930E+00	562	1.461E+01
399	1.600E-03	440	2.636E+00	481	3.430E+00	522	1.000E+01	563	1.472E+01
400	1.000E-04	441	2.903E+00	482	3.435E+00	523	1.017E+01	564	1.477E+01
401	2.200E-02	442	3.239E+00	483	3.491E+00	524	1.036E+01	565	1.484E+01
402	2.990E-02	443	3.622E+00	484	3.519E+00	525	1.048E+01	566	1.488E+01
403	2.950E-02	444	4.103E+00	485	3.651E+00	526	1.061E+01	567	1.495E+01
404	1.330E-02	445	4.653E+00	486	3.701E+00	527	1.079E+01	568	1.506E+01
405	3.290E-02	446	5.228E+00	487	3.801E+00	528	1.091E+01	569	1.512E+01
406	6.400E-03	447	5.965E+00	488	3.875E+00	529	1.104E+01	570	1.514E+01
407	7.850E-02	448	6.660E+00	489	4.002E+00	530	1.116E+01	571	1.520E+01
408	1.080E-02	449	7.514E+00	490	4.132E+00	531	1.131E+01	572	1.528E+01
409	4.930E-02	450	8.228E+00	491	4.232E+00	532	1.144E+01	573	1.536E+01
410	7.090E-02	451	8.922E+00	492	4.374E+00	533	1.156E+01	574	1.542E+01
411	5.060E-02	452	9.433E+00	493	4.524E+00	534	1.173E+01	575	1.551E+01
412	4.380E-02	453	9.825E+00	494	4.677E+00	535	1.186E+01	576	1.558E+01
413	1.350E-02	454	1.000E+01	495	4.845E+00	536	1.196E+01	577	1.572E+01
414	6.060E-02	455	9.878E+00	496	5.043E+00	537	1.207E+01	578	1.576E+01
415	6.370E-02	456	9.578E+00	497	5.235E+00	538	1.222E+01	579	1.583E+01
416	5.720E-02	457	9.130E+00	498	5.422E+00	539	1.231E+01	580	1.594E+01
417	7.880E-02	458	8.540E+00	499	5.631E+00	540	1.244E+01	581	1.603E+01
418	1.073E-01	459	7.907E+00	500	5.848E+00	541	1.257E+01	582	1.614E+01
419	1.260E-01	460	7.348E+00	501	6.069E+00	542	1.270E+01	583	1.626E+01
420	1.949E-01	461	6.813E+00	502	6.278E+00	543	1.278E+01	584	1.636E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.652E+01	626	2.309E+01	667	1.834E+01	708	7.536E+00	749	1.970E+00
586	1.666E+01	627	2.308E+01	668	1.807E+01	709	7.248E+00	750	1.891E+00
587	1.674E+01	628	2.317E+01	669	1.777E+01	710	6.987E+00	751	1.860E+00
588	1.685E+01	629	2.319E+01	670	1.743E+01	711	6.811E+00	752	1.815E+00
589	1.702E+01	630	2.325E+01	671	1.714E+01	712	6.644E+00	753	1.781E+00
590	1.713E+01	631	2.326E+01	672	1.687E+01	713	6.581E+00	754	1.673E+00
591	1.733E+01	632	2.328E+01	673	1.656E+01	714	6.335E+00	755	1.504E+00
592	1.752E+01	633	2.324E+01	674	1.622E+01	715	6.117E+00	756	1.541E+00
593	1.768E+01	634	2.327E+01	675	1.600E+01	716	5.952E+00	757	1.476E+00
594	1.784E+01	635	2.324E+01	676	1.571E+01	717	5.838E+00	758	1.077E+00
595	1.802E+01	636	2.317E+01	677	1.542E+01	718	5.658E+00	759	1.346E+00
596	1.820E+01	637	2.322E+01	678	1.511E+01	719	5.428E+00	760	1.151E+00
597	1.845E+01	638	2.314E+01	679	1.485E+01	720	5.313E+00	761	1.118E+00
598	1.860E+01	639	2.313E+01	680	1.451E+01	721	5.106E+00	762	1.275E+00
599	1.877E+01	640	2.308E+01	681	1.429E+01	722	5.098E+00	763	1.256E+00
600	1.905E+01	641	2.304E+01	682	1.398E+01	723	4.894E+00	764	1.074E+00
601	1.922E+01	642	2.291E+01	683	1.370E+01	724	4.663E+00	765	9.383E-01
602	1.942E+01	643	2.282E+01	684	1.340E+01	725	4.634E+00	766	9.428E-01
603	1.962E+01	644	2.273E+01	685	1.310E+01	726	4.435E+00	767	8.965E-01
604	1.982E+01	645	2.267E+01	686	1.290E+01	727	4.311E+00	768	1.074E+00
605	2.004E+01	646	2.258E+01	687	1.267E+01	728	4.161E+00	769	8.783E-01
606	2.026E+01	647	2.243E+01	688	1.235E+01	729	4.131E+00	770	7.118E-01
607	2.045E+01	648	2.231E+01	689	1.202E+01	730	4.054E+00	771	7.127E-01
608	2.067E+01	649	2.211E+01	690	1.169E+01	731	3.775E+00	772	8.515E-01
609	2.086E+01	650	2.209E+01	691	1.152E+01	732	3.757E+00	773	6.490E-01
610	2.107E+01	651	2.188E+01	692	1.129E+01	733	3.508E+00	774	6.038E-01
611	2.127E+01	652	2.170E+01	693	1.097E+01	734	3.458E+00	775	6.871E-01
612	2.144E+01	653	2.156E+01	694	1.070E+01	735	3.398E+00	776	6.311E-01
613	2.161E+01	654	2.138E+01	695	1.047E+01	736	3.181E+00	777	6.327E-01
614	2.176E+01	655	2.120E+01	696	1.017E+01	737	3.100E+00	778	6.012E-01
615	2.191E+01	656	2.099E+01	697	9.985E+00	738	2.882E+00	779	5.114E-01
616	2.202E+01	657	2.077E+01	698	9.759E+00	739	2.775E+00	780	4.600E-01
617	2.216E+01	658	2.058E+01	699	9.461E+00	740	2.675E+00		
618	2.235E+01	659	2.035E+01	700	9.249E+00	741	2.758E+00		
619	2.244E+01	660	2.009E+01	701	9.021E+00	742	2.617E+00		
620	2.262E+01	661	1.989E+01	702	8.765E+00	743	2.509E+00		
621	2.273E+01	662	1.965E+01	703	8.528E+00	744	2.261E+00		
622	2.278E+01	663	1.937E+01	704	8.298E+00	745	2.225E+00		
623	2.288E+01	664	1.912E+01	705	8.044E+00	746	1.999E+00		
624	2.295E+01	665	1.878E+01	706	7.872E+00	747	2.128E+00		
625	2.300E+01	666	1.857E+01	707	7.664E+00	748	2.002E+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**

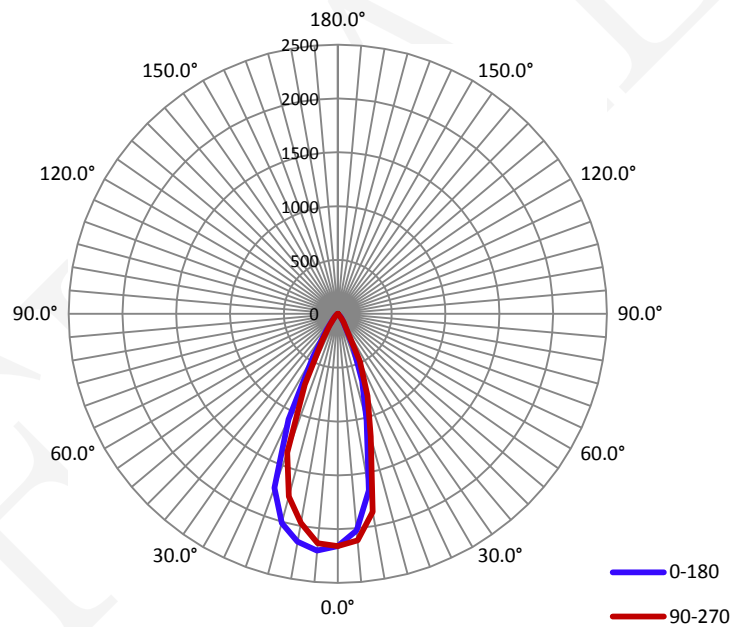
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1060	12.14	0.9580

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1044.1	86.06	2246.0	0.68	0.65

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	39.2	39.7	38.7	38.7	39.1
Field Angle (10% I _{max}):	62.1	62.5	61.3	60.9	61.7

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2157	2157	2157	2157	2157	2157	2157	2157
5.0°	2019	2017	2038	2062	2112	2144	2167	2182
10.0°	1666	1619	1634	1730	1867	2007	2094	2131
15.0°	1028	993	998	1045	1183	1514	1821	1966
20.0°	665	654	679	734	811	913	1173	1570
25.0°	329	311	334	392	484	597	727	888
30.0°	137	133	132	136	147	175	277	418
35.0°	85	78	77	83	93	97	110	143
40.0°	51	50	51	52	53	55	62	71
45.0°	25	24	25	27	32	36	39	41
50.0°	9	8	8	10	12	15	19	21
55.0°	3	3	3	4	4	6	7	8
60.0°	2	2	1	2	2	2	3	4
65.0°	0	1	0	0	1	1	1	2
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°	2157	2157	2157	2157	2157	2157	2157	2157
5.0°	2209	2231	2246	2191	2138	2080	2054	2028
10.0°	2148	2194	2144	2031	1973	1905	1835	1735
15.0°	2011	2007	1956	1861	1757	1624	1420	1160
20.0°	1720	1748	1696	1547	1372	1081	802	689
25.0°	1082	1259	1232	1047	725	543	454	357
30.0°	466	518	467	362	285	223	166	139
35.0°	180	213	216	194	135	101	93	88
40.0°	73	77	75	70	65	57	53	50
45.0°	42	42	41	37	34	31	28	26
50.0°	21	20	18	17	15	12	9	9
55.0°	8	7	7	7	6	5	4	4
60.0°	4	3	2	3	3	2	2	2
65.0°	1	2	2	1	1	2	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	51.1	4.90	0-5	51.1	4.90
5-10	144.5	13.84	0-10	195.6	18.74
10-15	204.1	19.55	0-15	399.7	38.28
15-20	217.3	20.82	0-20	617.1	59.10
20-25	187.6	17.96	0-25	804.6	77.06
25-30	118.2	11.32	0-30	922.8	88.38
30-35	56.7	5.43	0-35	979.5	93.81
35-40	30.8	2.95	0-40	1010.3	96.76
40-45	17.3	1.66	0-45	1027.6	98.42
45-50	9.5	0.91	0-50	1037.1	99.33
50-55	4.2	0.40	0-55	1041.3	99.73
55-60	1.8	0.17	0-60	1043.1	99.90
60-65	0.8	0.08	0-65	1043.9	99.98
65-70	0.2	0.02	0-70	1044.1	100.00
70-75	0.0	0.00	0-75	1044.1	100.00
75-80	0.0	0.00	0-80	1044.1	100.00
80-85	0.0	0.00	0-85	1044.1	100.00
85-90	0.0	0.00	0-90	1044.1	100.00
90-95	0.0	0.00	0-95	1044.1	100.00
95-100	0.0	0.00	0-100	1044.1	100.00
100-105	0.0	0.00	0-105	1044.1	100.00
105-110	0.0	0.00	0-110	1044.1	100.00
110-115	0.0	0.00	0-115	1044.1	100.00
115-120	0.0	0.00	0-120	1044.1	100.00
120-125	0.0	0.00	0-125	1044.1	100.00
125-130	0.0	0.00	0-130	1044.1	100.00
130-135	0.0	0.00	0-135	1044.1	100.00
135-140	0.0	0.00	0-140	1044.1	100.00
140-145	0.0	0.00	0-145	1044.1	100.00
145-150	0.0	0.00	0-150	1044.1	100.00
150-155	0.0	0.00	0-155	1044.1	100.00
155-160	0.0	0.00	0-160	1044.1	100.00
160-165	0.0	0.00	0-165	1044.1	100.00
165-170	0.0	0.00	0-170	1044.1	100.00
170-175	0.0	0.00	0-175	1044.1	100.00
175-180	0.0	0.00	0-180	1044.1	100.00

6. Product Photo



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