

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 35HIDLB/840/BYP/EX39

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang <i>George Yang</i>
Report Number:	PKS180312080-10
Test Date:	2018-03-14 to 2018-03-26
Report Date:	2018-03-26
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 2018-03-12 and used for testing.

Model Tested: 35HIDLB/840/BYP/EX39
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Luminaires
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120 VAC 50/60Hz
 Rated Power: 35W
 Nominal CCT: 4000K
 Nominal Lumen Output: 4400lm

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- 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	2018-01-24	2019-01-24
Power Meter	INVENTFINE	WT500	GSJWQ20009	2018-03-23	2019-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-03-23	2019-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-01-24	2019-01-24
Thermal Meter	KEJIAN	TA298	N/A	2017-11-14	2018-11-14
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2018-03-23	2019-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-03-23	2019-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-03-23	2019-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-03-23	2019-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2018-01-24	2019-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2017-11-14	2018-11-14
Standard Light Source	INVENTFINE	N/A	JWBYR040007	2018-01-24	2019-01-24

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.

4 π 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 $U=2.6\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=24\text{K}$ ($K=2$), 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 $U=0.16\%$ of rdg, AC Voltage $U=0.18\%$ of rdg, Power $U=0.14\%$ ($K=2$), 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 $U=2.6\%$ ($K=2$), 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: **Base Up**

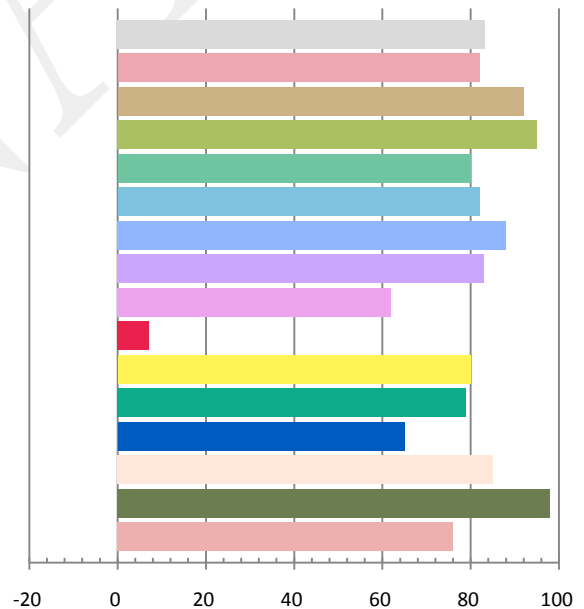
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.281	32.81	0.9728	4442	135.39

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
13.494	4014	-0.00186	0.3786	0.3716	0.2259	0.4990

Color Rendering Index

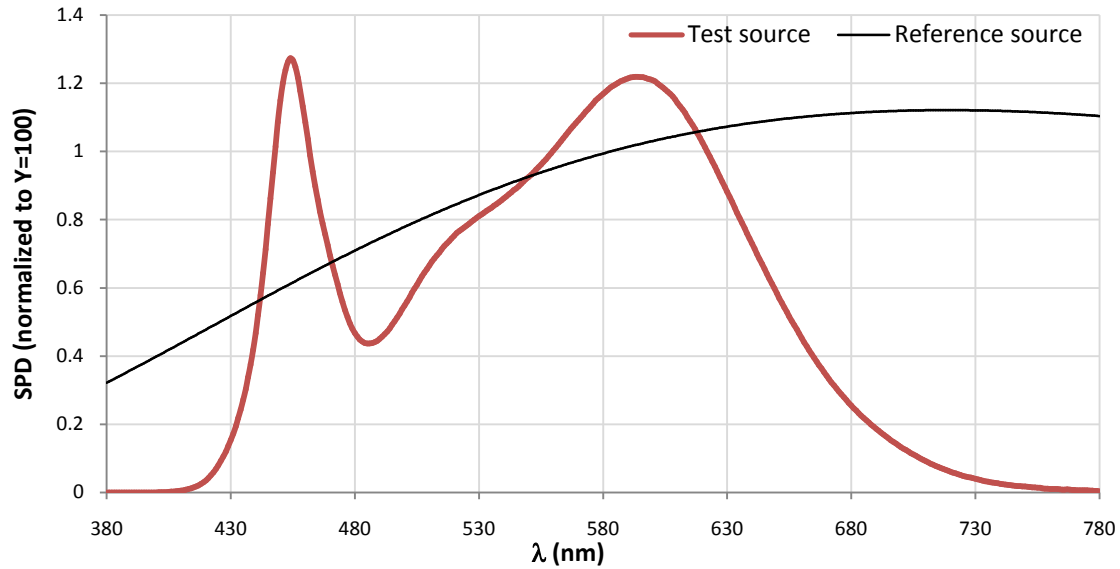
Ra 83.2			
R1 82	R2 92	R3 95	R4 80
R5 82	R6 88	R7 83	R8 62
R9 7	R10 80	R11 79	R12 65
R13 85	R14 98	R15 76	



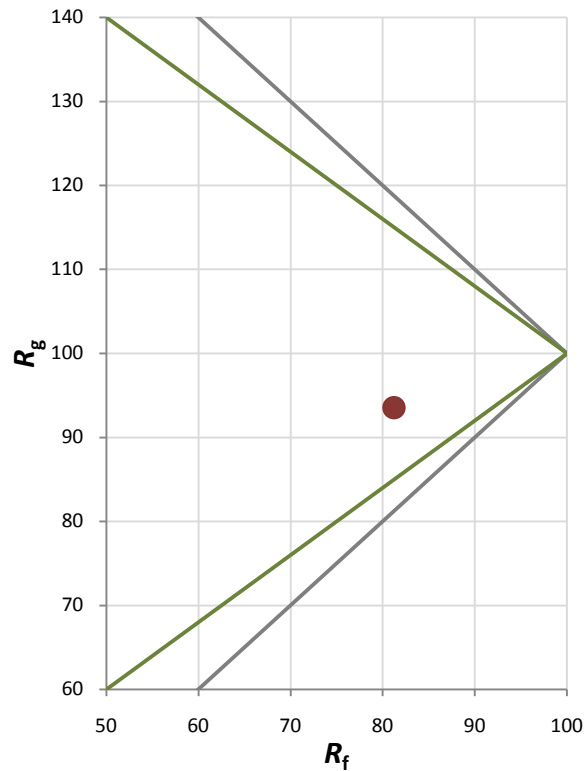
Fidelity Index and Gamut Index

Fidelity Index R_f	81
Gamut Index R_g	94

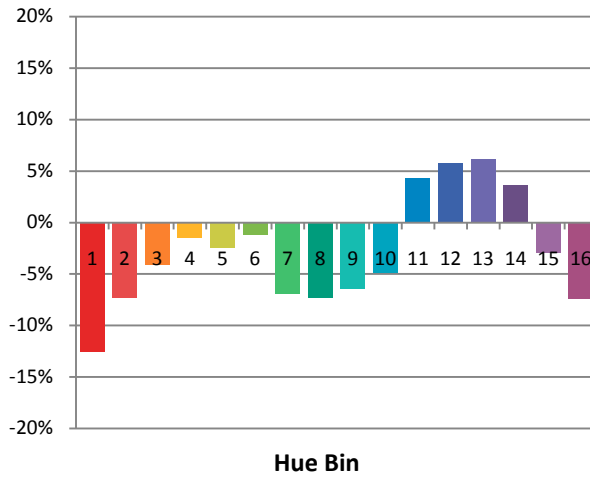
Spectral Power Distribution Comparison



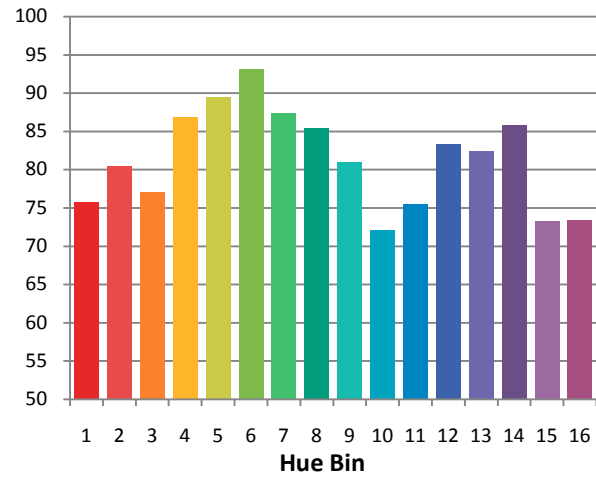
Plot of R_g versus R_f



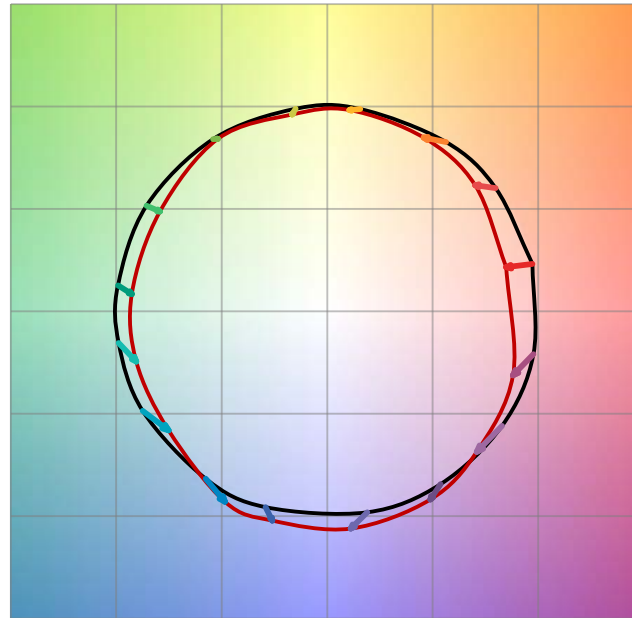
Chroma Shift by Hue



R_t by Hue

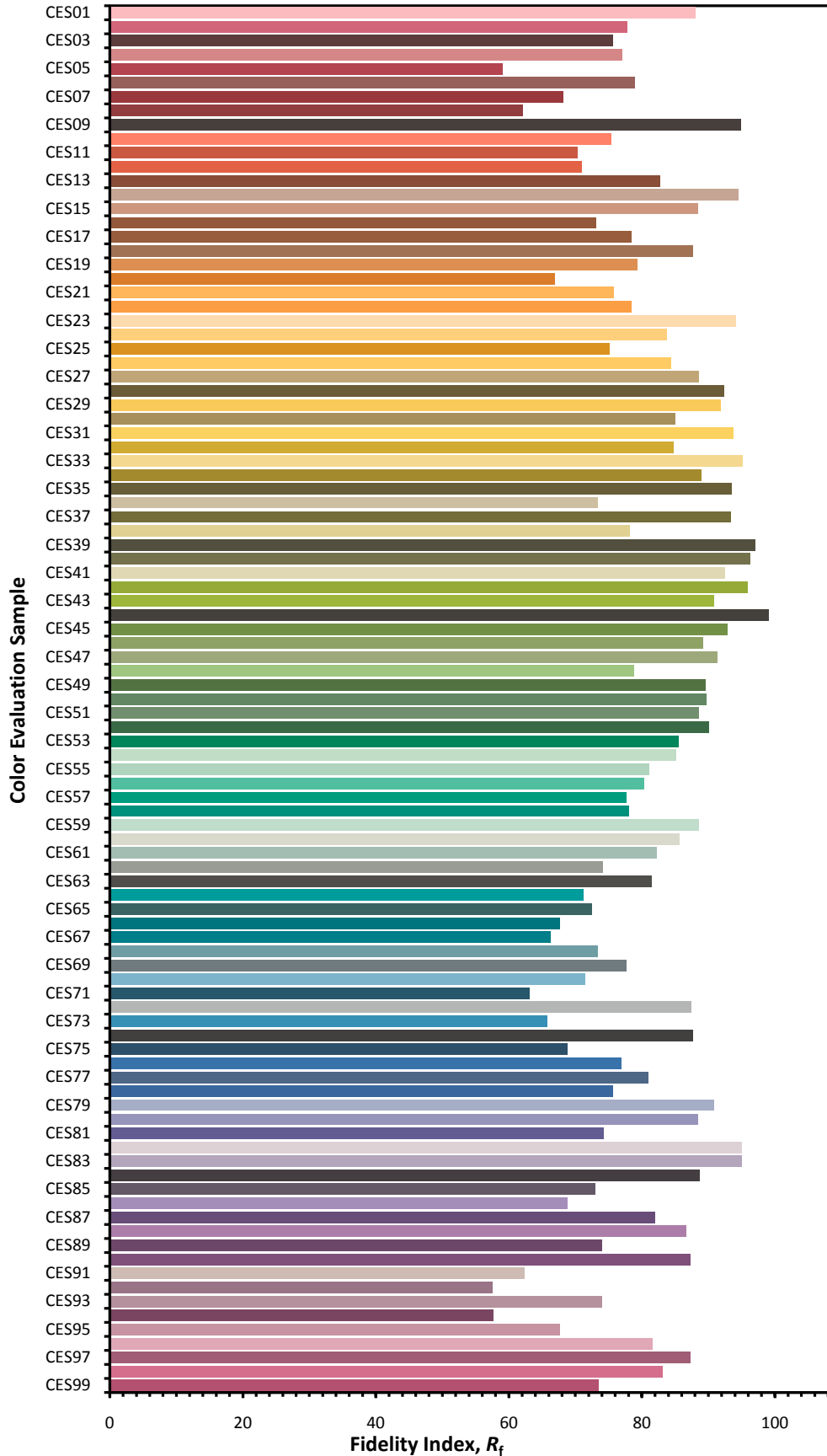


Color Vector Graphic

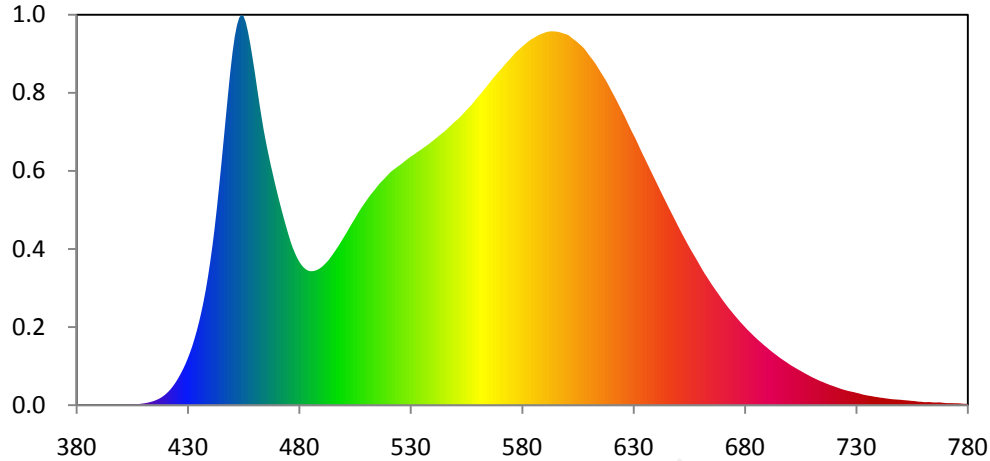


— Reference Illuminant — Test Source

Color Fidelity by CES Sample



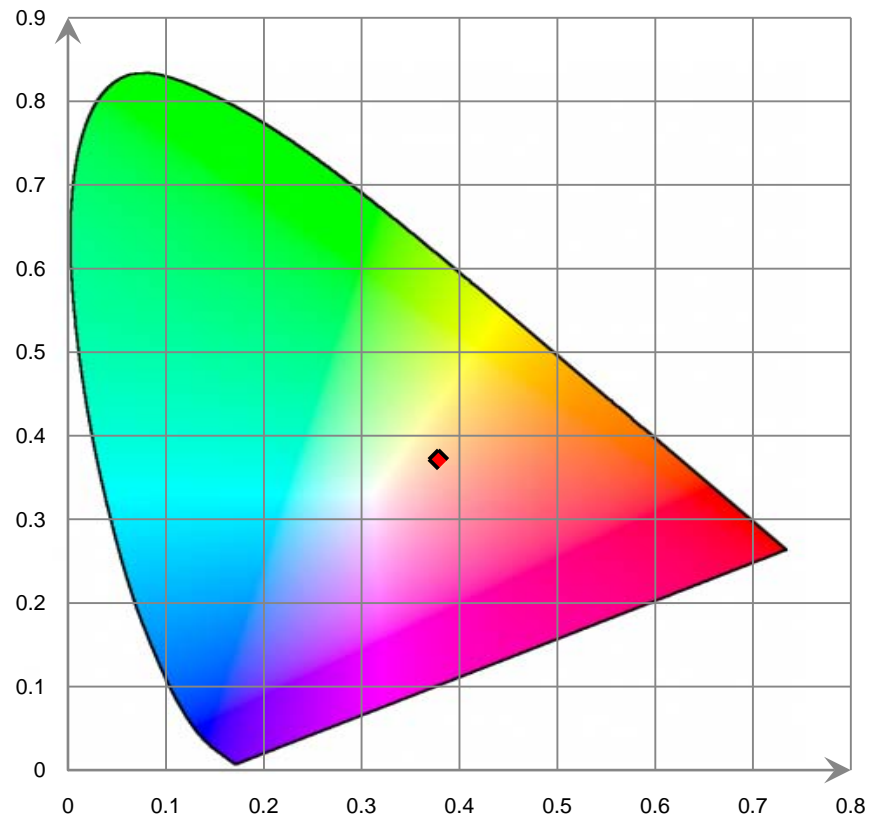
Relative Spectral Power Distribution



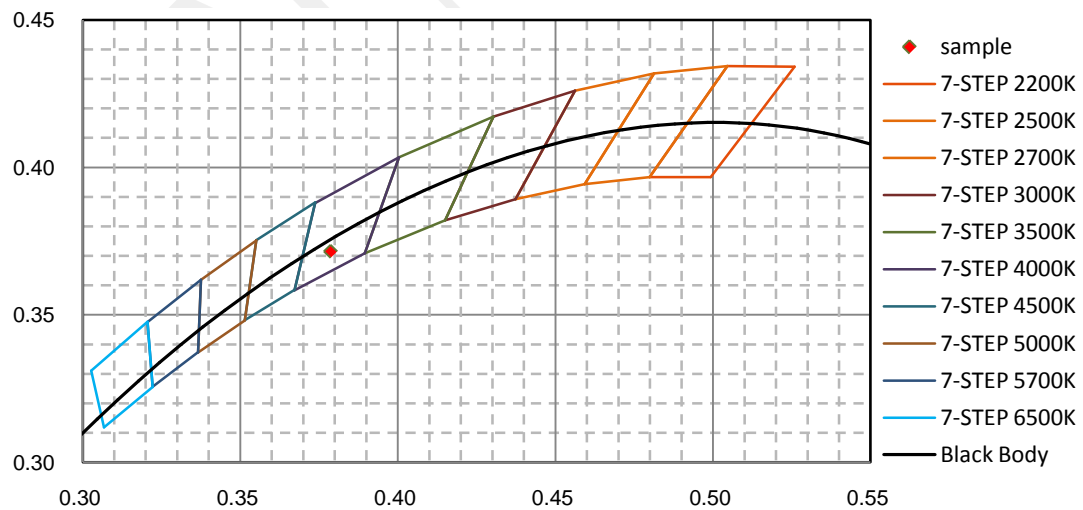
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.390E-02	421	2.756E+00	462	6.422E+01	503	3.806E+01	544	5.764E+01
381	1.660E-02	422	3.262E+00	463	6.121E+01	504	3.884E+01	545	5.798E+01
382	2.030E-02	423	3.838E+00	464	5.836E+01	505	3.960E+01	546	5.841E+01
383	1.820E-02	424	4.488E+00	465	5.584E+01	506	4.042E+01	547	5.887E+01
384	1.810E-02	425	5.212E+00	466	5.351E+01	507	4.120E+01	548	5.931E+01
385	1.030E-02	426	6.012E+00	467	5.129E+01	508	4.192E+01	549	5.976E+01
386	1.560E-02	427	6.883E+00	468	4.921E+01	509	4.261E+01	550	6.019E+01
387	1.680E-02	428	7.826E+00	469	4.715E+01	510	4.329E+01	551	6.059E+01
388	1.590E-02	429	8.853E+00	470	4.520E+01	511	4.398E+01	552	6.104E+01
389	1.950E-02	430	9.991E+00	471	4.329E+01	512	4.462E+01	553	6.153E+01
390	2.120E-02	431	1.124E+01	472	4.146E+01	513	4.520E+01	554	6.202E+01
391	1.260E-02	432	1.260E+01	473	3.970E+01	514	4.577E+01	555	6.254E+01
392	7.300E-03	433	1.414E+01	474	3.800E+01	515	4.639E+01	556	6.306E+01
393	4.000E-03	434	1.582E+01	475	3.636E+01	516	4.698E+01	557	6.353E+01
394	3.100E-03	435	1.766E+01	476	3.481E+01	517	4.747E+01	558	6.410E+01
395	7.800E-03	436	1.968E+01	477	3.343E+01	518	4.794E+01	559	6.469E+01
396	1.170E-02	437	2.194E+01	478	3.229E+01	519	4.845E+01	560	6.525E+01
397	1.380E-02	438	2.443E+01	479	3.125E+01	520	4.896E+01	561	6.580E+01
398	1.590E-02	439	2.724E+01	480	3.040E+01	521	4.945E+01	562	6.637E+01
399	1.050E-02	440	3.038E+01	481	2.971E+01	522	4.983E+01	563	6.696E+01
400	2.500E-02	441	3.380E+01	482	2.916E+01	523	5.017E+01	564	6.754E+01
401	3.960E-02	442	3.760E+01	483	2.877E+01	524	5.053E+01	565	6.814E+01
402	5.250E-02	443	4.183E+01	484	2.852E+01	525	5.086E+01	566	6.875E+01
403	6.040E-02	444	4.637E+01	485	2.840E+01	526	5.123E+01	567	6.936E+01
404	8.690E-02	445	5.113E+01	486	2.842E+01	527	5.160E+01	568	6.989E+01
405	1.255E-01	446	5.605E+01	487	2.849E+01	528	5.198E+01	569	7.043E+01
406	1.660E-01	447	6.099E+01	488	2.869E+01	529	5.236E+01	570	7.098E+01
407	2.069E-01	448	6.593E+01	489	2.895E+01	530	5.270E+01	571	7.150E+01
408	2.447E-01	449	7.061E+01	490	2.928E+01	531	5.300E+01	572	7.208E+01
409	3.066E-01	450	7.472E+01	491	2.969E+01	532	5.333E+01	573	7.262E+01
410	3.757E-01	451	7.811E+01	492	3.017E+01	533	5.367E+01	574	7.309E+01
411	4.460E-01	452	8.055E+01	493	3.069E+01	534	5.400E+01	575	7.364E+01
412	5.398E-01	453	8.215E+01	494	3.131E+01	535	5.432E+01	576	7.418E+01
413	6.519E-01	454	8.279E+01	495	3.197E+01	536	5.466E+01	577	7.473E+01
414	7.879E-01	455	8.246E+01	496	3.265E+01	537	5.500E+01	578	7.517E+01
415	9.456E-01	456	8.116E+01	497	3.335E+01	538	5.533E+01	579	7.557E+01
416	1.133E+00	457	7.907E+01	498	3.408E+01	539	5.571E+01	580	7.602E+01
417	1.361E+00	458	7.655E+01	499	3.487E+01	540	5.608E+01	581	7.641E+01
418	1.627E+00	459	7.365E+01	500	3.564E+01	541	5.646E+01	582	7.680E+01
419	1.954E+00	460	7.062E+01	501	3.641E+01	542	5.685E+01	583	7.722E+01
420	2.327E+00	461	6.739E+01	502	3.724E+01	543	5.726E+01	584	7.755E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	7.781E+01	626	6.123E+01	667	2.431E+01	708	6.472E+00	749	1.166E+00
586	7.809E+01	627	6.025E+01	668	2.364E+01	709	6.213E+00	750	1.140E+00
587	7.837E+01	628	5.923E+01	669	2.296E+01	710	5.959E+00	751	1.078E+00
588	7.859E+01	629	5.825E+01	670	2.229E+01	711	5.732E+00	752	1.039E+00
589	7.878E+01	630	5.732E+01	671	2.166E+01	712	5.517E+00	753	1.001E+00
590	7.897E+01	631	5.639E+01	672	2.101E+01	713	5.293E+00	754	9.485E-01
591	7.912E+01	632	5.538E+01	673	2.042E+01	714	5.075E+00	755	8.996E-01
592	7.922E+01	633	5.432E+01	674	1.984E+01	715	4.898E+00	756	8.823E-01
593	7.927E+01	634	5.334E+01	675	1.926E+01	716	4.694E+00	757	8.052E-01
594	7.926E+01	635	5.237E+01	676	1.871E+01	717	4.504E+00	758	7.377E-01
595	7.922E+01	636	5.139E+01	677	1.815E+01	718	4.316E+00	759	7.310E-01
596	7.917E+01	637	5.041E+01	678	1.760E+01	719	4.156E+00	760	6.639E-01
597	7.905E+01	638	4.943E+01	679	1.709E+01	720	3.984E+00	761	6.393E-01
598	7.889E+01	639	4.847E+01	680	1.658E+01	721	3.809E+00	762	6.517E-01
599	7.876E+01	640	4.748E+01	681	1.607E+01	722	3.652E+00	763	6.597E-01
600	7.861E+01	641	4.651E+01	682	1.561E+01	723	3.468E+00	764	5.995E-01
601	7.838E+01	642	4.553E+01	683	1.514E+01	724	3.326E+00	765	5.748E-01
602	7.799E+01	643	4.456E+01	684	1.467E+01	725	3.187E+00	766	5.731E-01
603	7.761E+01	644	4.361E+01	685	1.421E+01	726	3.058E+00	767	5.944E-01
604	7.726E+01	645	4.265E+01	686	1.378E+01	727	2.944E+00	768	5.615E-01
605	7.686E+01	646	4.171E+01	687	1.338E+01	728	2.848E+00	769	5.070E-01
606	7.646E+01	647	4.077E+01	688	1.296E+01	729	2.750E+00	770	4.537E-01
607	7.603E+01	648	3.985E+01	689	1.256E+01	730	2.628E+00	771	4.316E-01
608	7.553E+01	649	3.892E+01	690	1.217E+01	731	2.520E+00	772	4.284E-01
609	7.490E+01	650	3.798E+01	691	1.176E+01	732	2.380E+00	773	4.318E-01
610	7.424E+01	651	3.706E+01	692	1.138E+01	733	2.244E+00	774	4.050E-01
611	7.364E+01	652	3.616E+01	693	1.101E+01	734	2.155E+00	775	4.026E-01
612	7.303E+01	653	3.527E+01	694	1.066E+01	735	2.050E+00	776	3.898E-01
613	7.234E+01	654	3.441E+01	695	1.030E+01	736	1.978E+00	777	3.548E-01
614	7.160E+01	655	3.354E+01	696	9.950E+00	737	1.909E+00	778	2.989E-01
615	7.082E+01	656	3.271E+01	697	9.625E+00	738	1.804E+00	779	2.979E-01
616	7.007E+01	657	3.192E+01	698	9.309E+00	739	1.743E+00	780	2.588E-01
617	6.932E+01	658	3.112E+01	699	8.990E+00	740	1.667E+00		
618	6.851E+01	659	3.030E+01	700	8.650E+00	741	1.583E+00		
619	6.764E+01	660	2.947E+01	701	8.362E+00	742	1.538E+00		
620	6.675E+01	661	2.863E+01	702	8.083E+00	743	1.448E+00		
621	6.586E+01	662	2.786E+01	703	7.796E+00	744	1.397E+00		
622	6.497E+01	663	2.714E+01	704	7.522E+00	745	1.335E+00		
623	6.405E+01	664	2.641E+01	705	7.266E+00	746	1.270E+00		
624	6.311E+01	665	2.567E+01	706	6.995E+00	747	1.237E+00		
625	6.219E+01	666	2.498E+01	707	6.729E+00	748	1.201E+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: **Base Up**

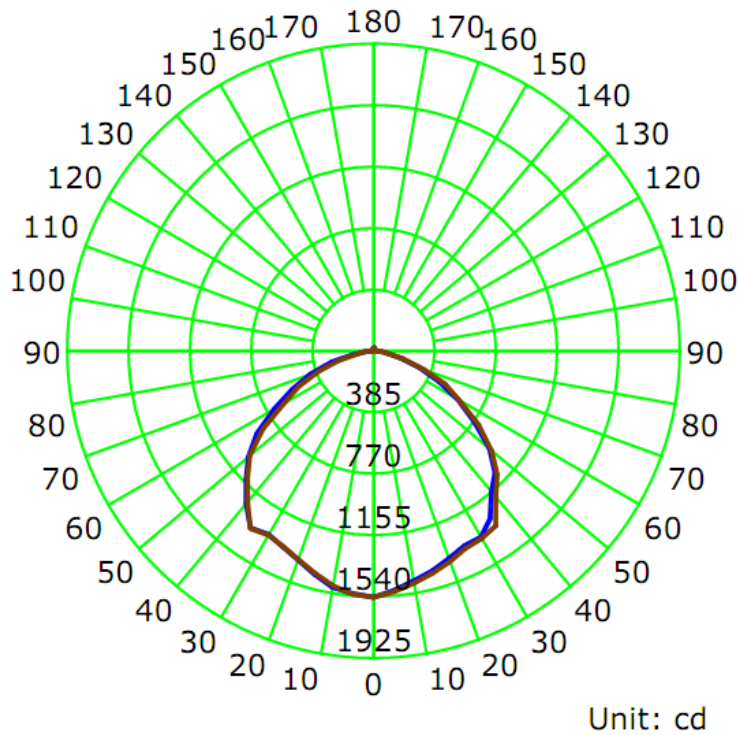
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2810	32.92	0.9760

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4456.8	135.43	1540.8	1.32	1.34

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	113.7	113.2	113.1	112.8	113.2
Field Angle (10% I_{max}):	155.2	155.1	154.9	154.6	155.0

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1541	1541	1541	1541	1541	1541	1541	1541
5.0°	1504	1498	1508	1512	1512	1519	1526	1525
10.0°	1462	1458	1461	1470	1477	1487	1497	1507
15.0°	1427	1422	1425	1435	1440	1445	1449	1453
20.0°	1386	1378	1391	1398	1403	1402	1402	1407
25.0°	1346	1346	1360	1362	1365	1356	1362	1361
30.0°	1348	1340	1352	1361	1356	1337	1331	1328
35.0°	1280	1301	1290	1303	1337	1359	1361	1359
40.0°	1153	1161	1169	1178	1192	1225	1247	1280
45.0°	1080	1072	1062	1091	1096	1126	1146	1164
50.0°	950	932	941	962	970	999	1029	1047
55.0°	775	770	769	787	809	834	873	902
60.0°	611	601	606	619	622	653	681	702
65.0°	458	462	462	468	495	518	558	565
70.0°	309	307	313	322	342	362	392	425
75.0°	168	163	168	181	190	209	239	282
80.0°	73	74	74	80	89	105	121	142
85.0°	37	37	37	39	44	49	55	61
90.0°	20	20	20	22	21	21	24	27
95.0°	13	12	12	13	12	13	15	17
100.0°	5	5	4	5	5	6	7	8
105.0°	5	5	5	5	5	5	4	4
110.0°	8	9	8	7	9	11	12	11
115.0°	8	8	7	7	8	8	8	9
120.0°	8	8	8	8	7	7	8	7
125.0°	8	8	8	8	7	8	8	7
130.0°	10	10	8	9	8	8	9	8
135.0°	11	12	10	10	10	10	10	10
140.0°	13	14	13	12	12	11	12	12
145.0°	16	16	15	14	13	13	14	14
150.0°	18	18	17	16	16	15	16	16
155.0°	20	20	18	18	17	17	19	18
160.0°	22	22	21	20	20	19	21	20
165.0°	24	24	23	24	22	22	22	21
170.0°	22	22	23	23	22	22	22	22
175.0°	17	16	16	17	16	15	15	15
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°	1541	1541	1541	1541	1541	1541	1541	1541
5.0°	1528	1531	1537	1534	1531	1518	1512	1506
10.0°	1503	1503	1506	1497	1492	1475	1467	1453
15.0°	1451	1448	1451	1446	1440	1428	1417	1418
20.0°	1393	1404	1406	1393	1391	1384	1382	1366
25.0°	1355	1362	1369	1355	1351	1347	1344	1336
30.0°	1326	1336	1337	1323	1331	1334	1351	1339
35.0°	1354	1335	1337	1345	1357	1330	1307	1291
40.0°	1249	1237	1255	1236	1235	1180	1181	1152
45.0°	1138	1140	1147	1126	1125	1092	1090	1039
50.0°	1035	1024	1020	1037	1021	982	959	921
55.0°	902	895	880	888	851	804	776	765
60.0°	720	729	712	686	655	643	614	582
65.0°	568	579	575	556	522	493	482	460
70.0°	427	439	428	410	369	344	313	299
75.0°	276	279	268	257	228	194	172	159
80.0°	140	142	139	130	109	89	82	73
85.0°	60	62	61	57	50	44	39	34
90.0°	27	27	27	26	22	21	19	19
95.0°	17	17	17	17	14	13	12	11
100.0°	8	9	8	8	6	6	6	5
105.0°	4	4	4	5	4	4	5	5
110.0°	10	8	6	6	8	9	10	8
115.0°	8	8	7	7	8	8	7	7
120.0°	7	6	7	7	7	8	8	7
125.0°	7	7	6	8	8	8	8	8
130.0°	8	8	7	8	9	9	9	9
135.0°	9	9	9	10	10	11	10	11
140.0°	11	11	11	12	13	13	12	13
145.0°	14	13	13	14	14	15	14	15
150.0°	16	15	16	17	16	17	16	17
155.0°	18	18	17	19	17	18	18	19
160.0°	20	20	19	20	19	20	18	20
165.0°	22	22	21	21	19	20	20	23
170.0°	22	22	22	20	21	19	21	22
175.0°	17	18	15	15	14	14	15	16
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	36.6	0.82	0-5	36.6	0.82
5-10	107.4	2.41	0-10	143.9	3.23
10-15	173.2	3.89	0-15	317.1	7.11
15-20	233.2	5.23	0-20	550.3	12.35
20-25	288.2	6.47	0-25	838.5	18.81
25-30	341.0	7.65	0-30	1179.4	26.46
30-35	392.8	8.81	0-35	1572.2	35.28
35-40	423.1	9.49	0-40	1995.3	44.77
40-45	428.9	9.62	0-45	2424.2	54.39
45-50	423.8	9.51	0-50	2848.0	63.90
50-55	395.5	8.87	0-55	3243.5	72.78
55-60	342.6	7.69	0-60	3586.1	80.46
60-65	283.4	6.36	0-65	3869.5	86.82
65-70	221.9	4.98	0-70	4091.4	91.80
70-75	150.8	3.38	0-75	4242.1	95.18
75-80	85.1	1.91	0-80	4327.2	97.09
80-85	41.2	0.93	0-85	4368.5	98.02
85-90	19.3	0.43	0-90	4387.8	98.45
90-95	10.0	0.22	0-95	4397.8	98.68
95-100	5.5	0.12	0-100	4403.3	98.80
100-105	2.9	0.06	0-105	4406.1	98.86
105-110	3.4	0.08	0-110	4409.6	98.94
110-115	4.1	0.09	0-115	4413.7	99.03
115-120	3.6	0.08	0-120	4417.3	99.11
120-125	3.4	0.08	0-125	4420.7	99.19
125-130	3.4	0.08	0-130	4424.2	99.27
130-135	3.7	0.08	0-135	4427.9	99.35
135-140	4.1	0.09	0-140	4432.0	99.44
140-145	4.4	0.10	0-145	4436.4	99.54
145-150	4.5	0.10	0-150	4440.9	99.64
150-155	4.4	0.10	0-155	4445.3	99.74
155-160	4.0	0.09	0-160	4449.3	99.83
160-165	3.4	0.08	0-165	4452.7	99.91
165-170	2.6	0.06	0-170	4455.3	99.97
170-175	1.3	0.03	0-175	4456.6	100.00
175-180	0.2	0.00	0-180	4456.8	100.00

6. Product Photo



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