

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/850/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:	PKS180312080-10-1
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/850/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: 5000K
 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.

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 $U=2.6\%$ ($K=2$), 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**

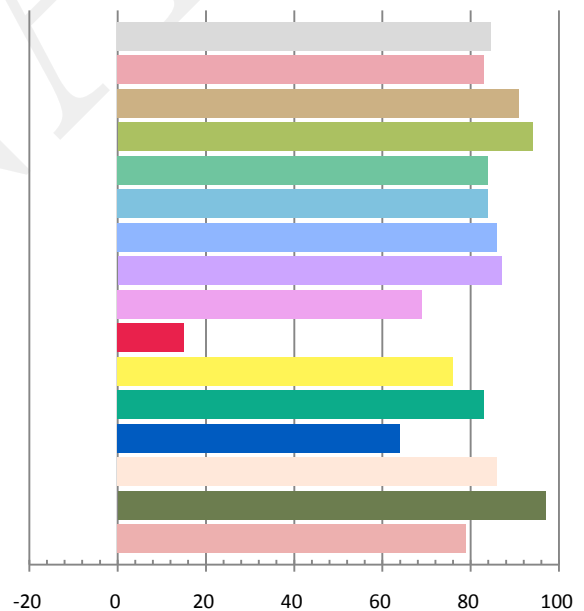
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.2774	32.61	0.9800	4469.2	137.05

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
14.033	5024	0.00044	0.3445	0.3521	0.2109	0.4848

Color Rendering Index

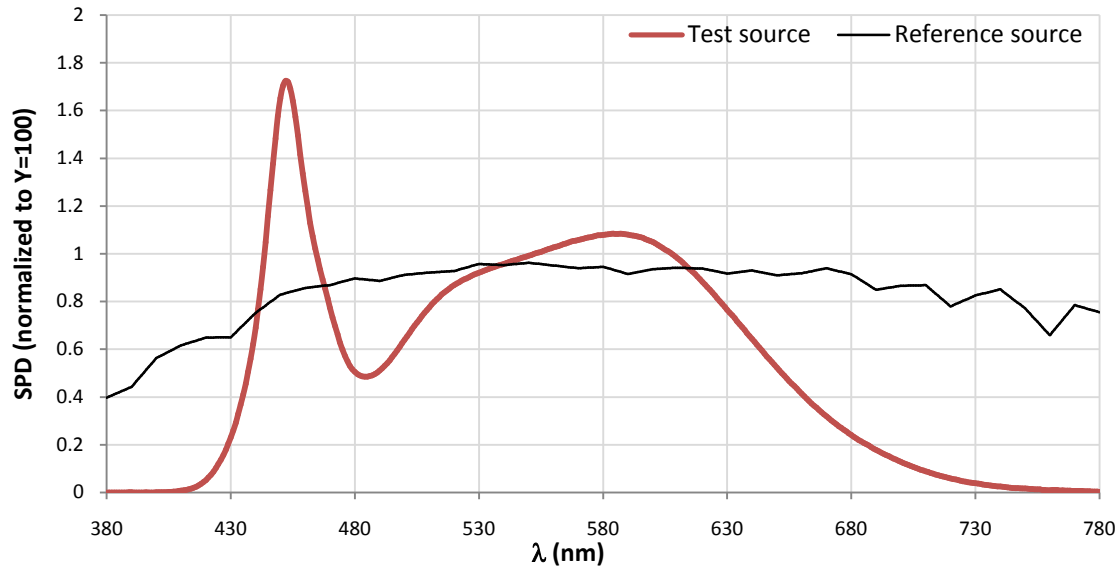
Ra 84.6			
R1 83	R2 91	R3 94	R4 84
R5 84	R6 86	R7 87	R8 69
R9 15	R10 76	R11 83	R12 64
R13 86	R14 97	R15 79	



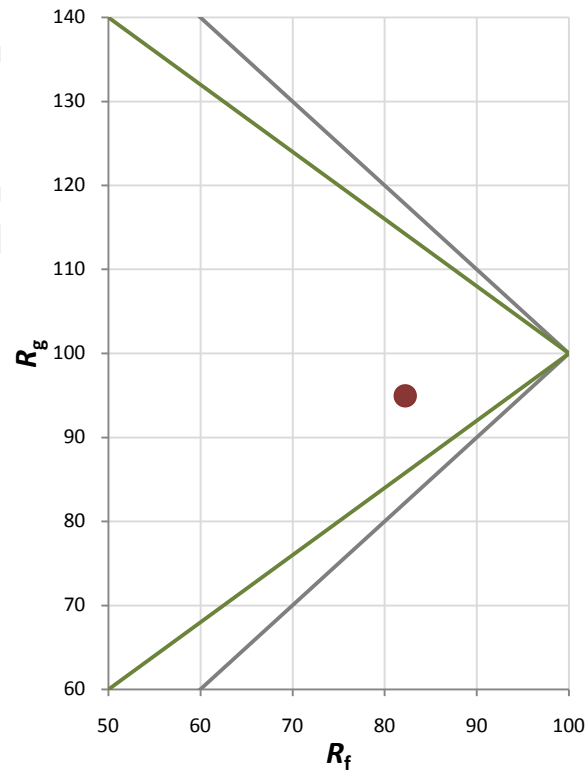
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	95

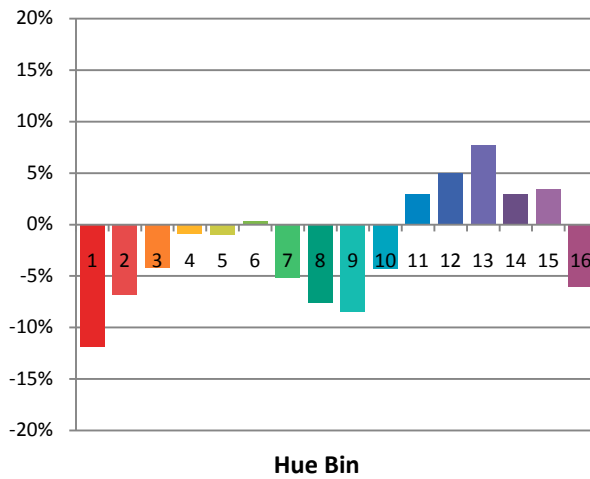
Spectral Power Distribution Comparison



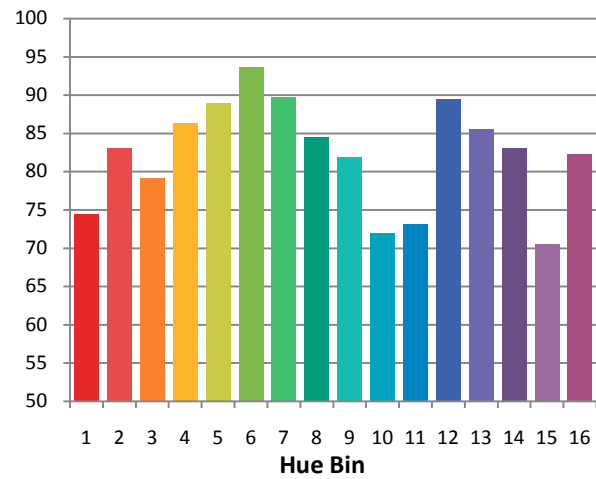
Plot of R_g versus R_f



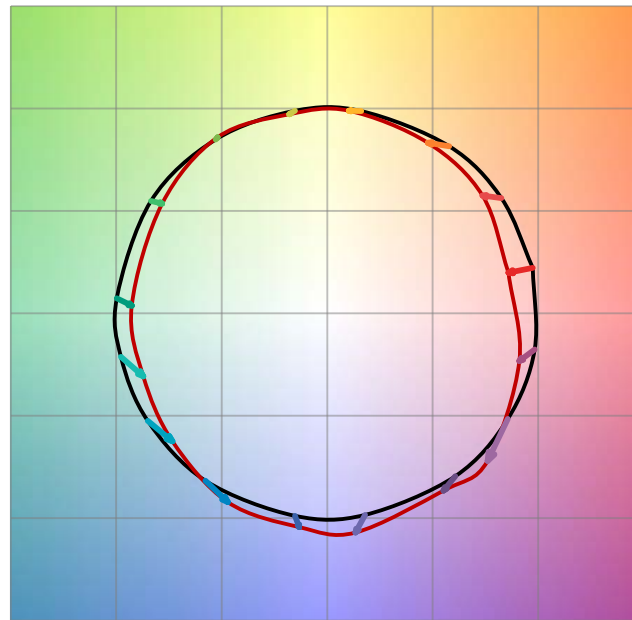
Chroma Shift by Hue



R_t by Hue

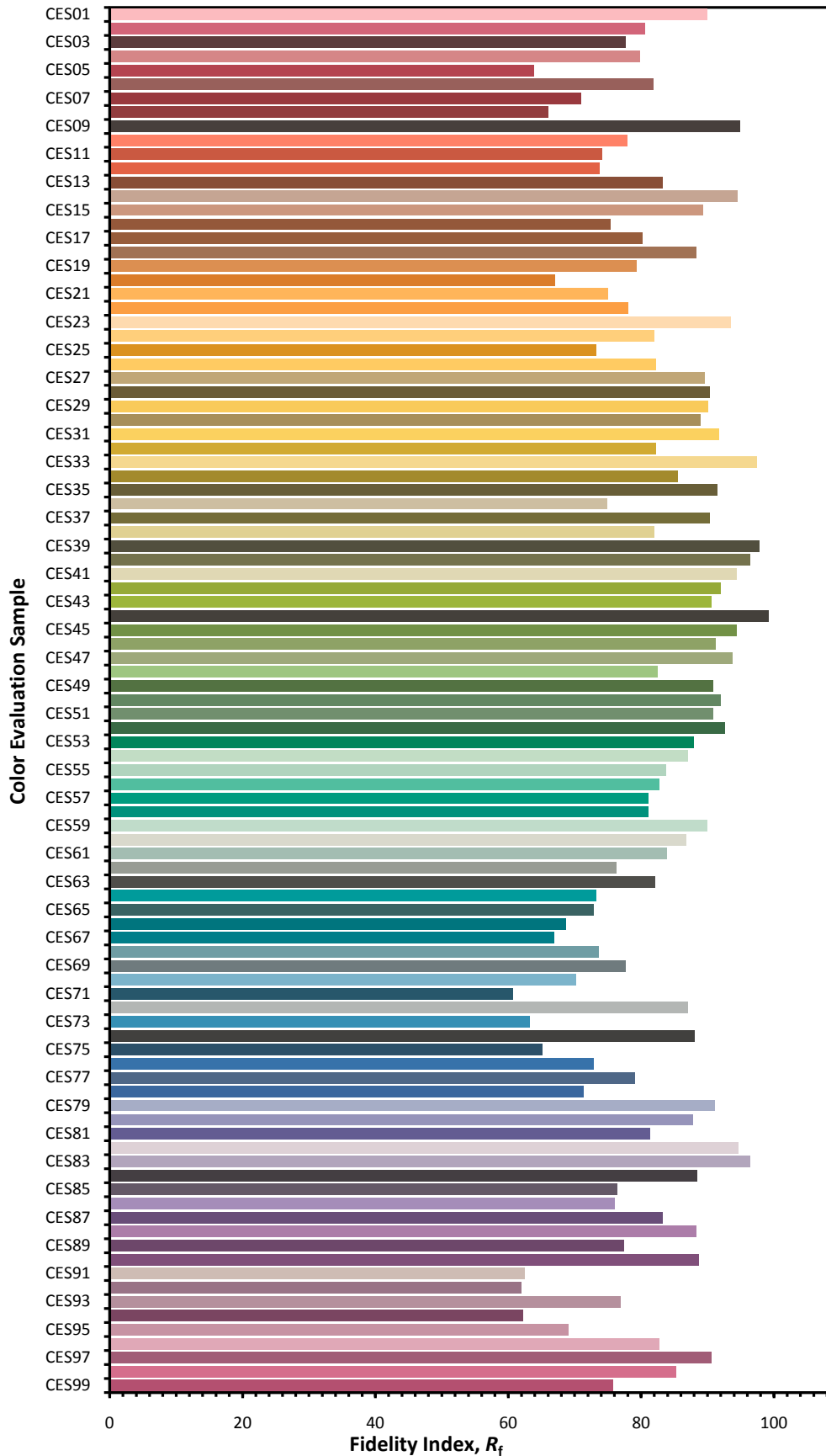


Color Vector Graphic

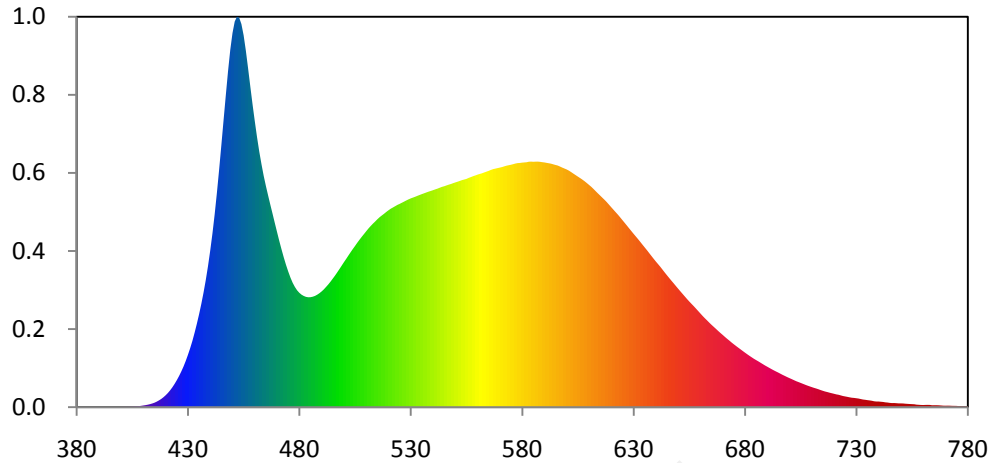


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



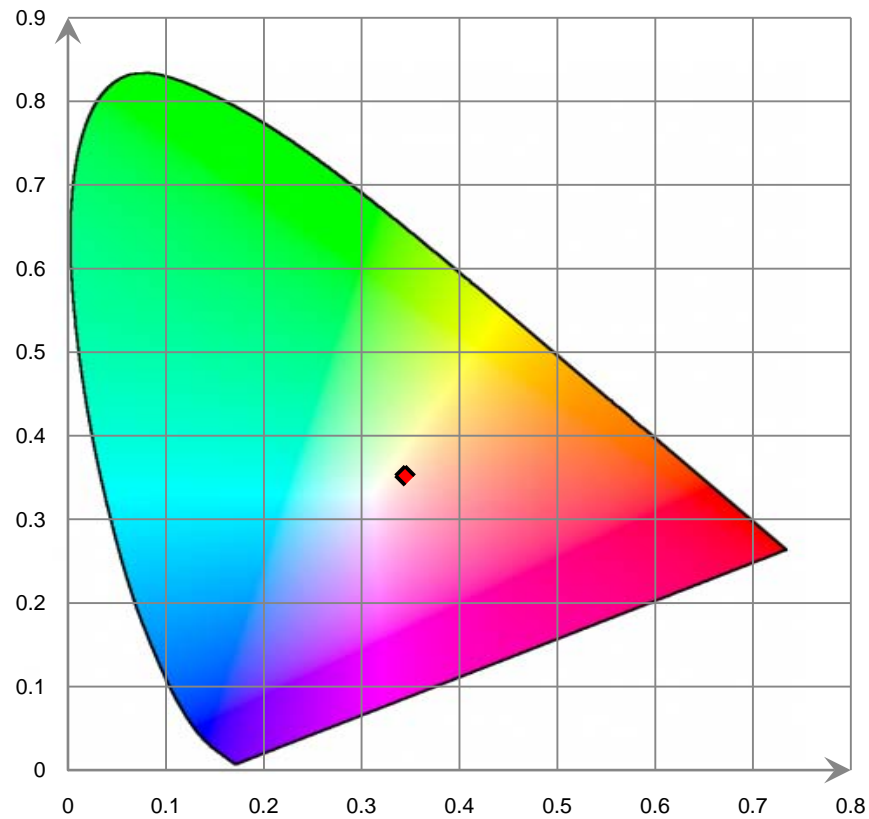
Relative Spectral Power Distribution



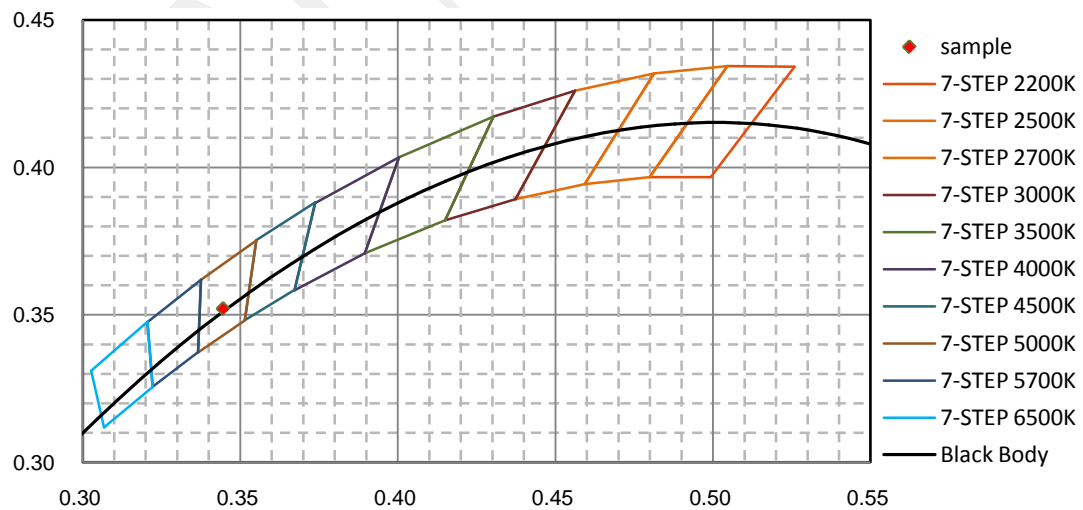
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.950E-02	421	4.097E+00	462	7.387E+01	503	4.472E+01	544	6.361E+01
381	1.980E-02	422	4.855E+00	463	7.021E+01	504	4.566E+01	545	6.379E+01
382	1.770E-02	423	5.732E+00	464	6.682E+01	505	4.656E+01	546	6.401E+01
383	2.580E-02	424	6.712E+00	465	6.386E+01	506	4.748E+01	547	6.424E+01
384	3.390E-02	425	7.789E+00	466	6.111E+01	507	4.834E+01	548	6.443E+01
385	2.720E-02	426	8.976E+00	467	5.842E+01	508	4.918E+01	549	6.467E+01
386	2.210E-02	427	1.028E+01	468	5.582E+01	509	4.999E+01	550	6.489E+01
387	3.110E-02	428	1.172E+01	469	5.317E+01	510	5.078E+01	551	6.510E+01
388	3.580E-02	429	1.332E+01	470	5.057E+01	511	5.158E+01	552	6.532E+01
389	4.820E-02	430	1.511E+01	471	4.801E+01	512	5.229E+01	553	6.556E+01
390	4.460E-02	431	1.703E+01	472	4.559E+01	513	5.297E+01	554	6.574E+01
391	2.220E-02	432	1.913E+01	473	4.329E+01	514	5.359E+01	555	6.592E+01
392	2.030E-02	433	2.151E+01	474	4.114E+01	515	5.424E+01	556	6.621E+01
393	3.450E-02	434	2.407E+01	475	3.920E+01	516	5.484E+01	557	6.644E+01
394	3.690E-02	435	2.683E+01	476	3.744E+01	517	5.535E+01	558	6.670E+01
395	3.720E-02	436	2.980E+01	477	3.593E+01	518	5.583E+01	559	6.691E+01
396	3.830E-02	437	3.309E+01	478	3.473E+01	519	5.636E+01	560	6.716E+01
397	3.010E-02	438	3.668E+01	479	3.375E+01	520	5.684E+01	561	6.735E+01
398	2.420E-02	439	4.069E+01	480	3.302E+01	521	5.729E+01	562	6.753E+01
399	1.380E-02	440	4.519E+01	481	3.248E+01	522	5.766E+01	563	6.778E+01
400	4.380E-02	441	5.013E+01	482	3.211E+01	523	5.803E+01	564	6.801E+01
401	7.710E-02	442	5.568E+01	483	3.185E+01	524	5.840E+01	565	6.825E+01
402	8.960E-02	443	6.186E+01	484	3.174E+01	525	5.869E+01	566	6.851E+01
403	9.760E-02	444	6.858E+01	485	3.176E+01	526	5.902E+01	567	6.874E+01
404	1.208E-01	445	7.565E+01	486	3.190E+01	527	5.935E+01	568	6.889E+01
405	1.540E-01	446	8.291E+01	487	3.212E+01	528	5.969E+01	569	6.904E+01
406	2.014E-01	447	9.005E+01	488	3.247E+01	529	6.000E+01	570	6.918E+01
407	2.530E-01	448	9.699E+01	489	3.290E+01	530	6.028E+01	571	6.934E+01
408	2.944E-01	449	1.032E+02	490	3.341E+01	531	6.052E+01	572	6.955E+01
409	3.926E-01	450	1.080E+02	491	3.401E+01	532	6.076E+01	573	6.974E+01
410	4.935E-01	451	1.114E+02	492	3.472E+01	533	6.103E+01	574	6.987E+01
411	5.964E-01	452	1.127E+02	493	3.545E+01	534	6.128E+01	575	7.000E+01
412	7.196E-01	453	1.125E+02	494	3.625E+01	535	6.153E+01	576	7.017E+01
413	8.803E-01	454	1.106E+02	495	3.712E+01	536	6.176E+01	577	7.036E+01
414	1.066E+00	455	1.074E+02	496	3.798E+01	537	6.199E+01	578	7.048E+01
415	1.301E+00	456	1.029E+02	497	3.892E+01	538	6.224E+01	579	7.053E+01
416	1.597E+00	457	9.786E+01	498	3.988E+01	539	6.244E+01	580	7.062E+01
417	1.957E+00	458	9.260E+01	499	4.086E+01	540	6.265E+01	581	7.067E+01
418	2.373E+00	459	8.746E+01	500	4.185E+01	541	6.289E+01	582	7.073E+01
419	2.865E+00	460	8.262E+01	501	4.279E+01	542	6.311E+01	583	7.087E+01
420	3.436E+00	461	7.804E+01	502	4.377E+01	543	6.336E+01	584	7.091E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	7.086E+01	626	5.325E+01	667	2.261E+01	708	6.249E+00	749	1.095E+00
586	7.089E+01	627	5.246E+01	668	2.201E+01	709	6.018E+00	750	1.094E+00
587	7.090E+01	628	5.166E+01	669	2.143E+01	710	5.790E+00	751	1.066E+00
588	7.084E+01	629	5.087E+01	670	2.089E+01	711	5.586E+00	752	9.987E-01
589	7.075E+01	630	5.008E+01	671	2.031E+01	712	5.386E+00	753	9.540E-01
590	7.067E+01	631	4.931E+01	672	1.976E+01	713	5.171E+00	754	9.086E-01
591	7.055E+01	632	4.855E+01	673	1.923E+01	714	4.942E+00	755	8.796E-01
592	7.043E+01	633	4.776E+01	674	1.868E+01	715	4.725E+00	756	8.506E-01
593	7.031E+01	634	4.695E+01	675	1.818E+01	716	4.526E+00	757	7.300E-01
594	7.012E+01	635	4.614E+01	676	1.768E+01	717	4.361E+00	758	6.895E-01
595	6.994E+01	636	4.536E+01	677	1.719E+01	718	4.181E+00	759	6.474E-01
596	6.977E+01	637	4.453E+01	678	1.672E+01	719	4.028E+00	760	6.234E-01
597	6.949E+01	638	4.370E+01	679	1.624E+01	720	3.866E+00	761	6.561E-01
598	6.918E+01	639	4.288E+01	680	1.576E+01	721	3.700E+00	762	6.704E-01
599	6.891E+01	640	4.208E+01	681	1.530E+01	722	3.590E+00	763	6.541E-01
600	6.864E+01	641	4.132E+01	682	1.485E+01	723	3.405E+00	764	5.472E-01
601	6.831E+01	642	4.055E+01	683	1.442E+01	724	3.220E+00	765	5.676E-01
602	6.788E+01	643	3.973E+01	684	1.400E+01	725	3.100E+00	766	5.596E-01
603	6.745E+01	644	3.889E+01	685	1.361E+01	726	2.977E+00	767	5.398E-01
604	6.702E+01	645	3.809E+01	686	1.324E+01	727	2.840E+00	768	4.930E-01
605	6.659E+01	646	3.731E+01	687	1.284E+01	728	2.725E+00	769	4.342E-01
606	6.617E+01	647	3.653E+01	688	1.244E+01	729	2.668E+00	770	4.278E-01
607	6.573E+01	648	3.577E+01	689	1.205E+01	730	2.576E+00	771	4.360E-01
608	6.526E+01	649	3.500E+01	690	1.169E+01	731	2.489E+00	772	4.287E-01
609	6.474E+01	650	3.423E+01	691	1.133E+01	732	2.346E+00	773	3.915E-01
610	6.420E+01	651	3.348E+01	692	1.097E+01	733	2.213E+00	774	3.792E-01
611	6.365E+01	652	3.273E+01	693	1.062E+01	734	2.127E+00	775	3.752E-01
612	6.304E+01	653	3.199E+01	694	1.030E+01	735	2.029E+00	776	3.203E-01
613	6.238E+01	654	3.124E+01	695	9.976E+00	736	1.946E+00	777	2.813E-01
614	6.175E+01	655	3.054E+01	696	9.640E+00	737	1.845E+00	778	2.421E-01
615	6.112E+01	656	2.985E+01	697	9.307E+00	738	1.708E+00	779	2.228E-01
616	6.049E+01	657	2.920E+01	698	8.996E+00	739	1.637E+00	780	1.990E-01
617	5.987E+01	658	2.849E+01	699	8.687E+00	740	1.639E+00		
618	5.921E+01	659	2.778E+01	700	8.388E+00	741	1.563E+00		
619	5.847E+01	660	2.707E+01	701	8.102E+00	742	1.508E+00		
620	5.774E+01	661	2.635E+01	702	7.804E+00	743	1.404E+00		
621	5.702E+01	662	2.570E+01	703	7.513E+00	744	1.344E+00		
622	5.630E+01	663	2.507E+01	704	7.259E+00	745	1.244E+00		
623	5.559E+01	664	2.442E+01	705	7.009E+00	746	1.186E+00		
624	5.482E+01	665	2.379E+01	706	6.749E+00	747	1.191E+00		
625	5.403E+01	666	2.320E+01	707	6.490E+00	748	1.152E+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**

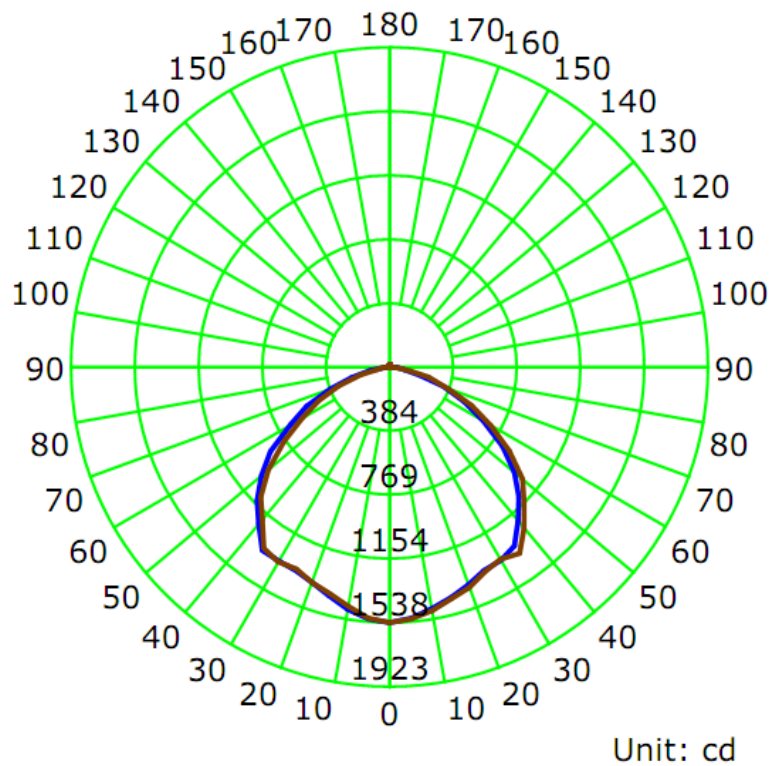
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.2770	32.72	0.9830

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4486.8	137.18	1539.0	1.33	1.35

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	114.8	114.0	113.6	113.9	114.1
Field Angle (10% I _{max}):	155.6	155.4	155.4	155.2	155.4

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1539	1539	1539	1539	1539	1539	1539	1539
5.0°	1517	1518	1520	1522	1521	1520	1519	1520
10.0°	1476	1471	1485	1486	1487	1494	1491	1484
15.0°	1435	1431	1436	1444	1443	1447	1443	1434
20.0°	1393	1395	1398	1408	1409	1407	1402	1394
25.0°	1351	1358	1367	1375	1362	1362	1358	1361
30.0°	1342	1339	1345	1345	1337	1339	1332	1343
35.0°	1312	1334	1330	1359	1367	1363	1367	1364
40.0°	1206	1214	1223	1227	1262	1262	1288	1264
45.0°	1106	1106	1127	1124	1150	1135	1181	1138
50.0°	983	996	1002	1025	1046	1046	1050	1049
55.0°	833	830	839	869	880	905	910	894
60.0°	653	669	687	699	705	714	706	712
65.0°	495	517	523	533	545	561	576	569
70.0°	349	361	367	378	380	412	421	429
75.0°	194	203	219	234	241	255	261	278
80.0°	87	96	101	111	131	128	133	141
85.0°	41	45	48	50	56	57	58	58
90.0°	22	22	24	23	25	24	26	25
95.0°	13	15	15	16	15	15	16	17
100.0°	5	6	7	7	7	7	8	8
105.0°	3	5	3	4	3	5	3	4
110.0°	8	10	9	10	8	7	11	10
115.0°	7	7	8	7	7	9	9	10
120.0°	7	7	7	7	8	7	8	7
125.0°	7	8	7	7	6	7	7	8
130.0°	8	9	8	7	7	8	8	8
135.0°	9	10	9	9	8	9	10	9
140.0°	12	11	11	11	10	10	11	11
145.0°	14	13	13	12	12	12	13	13
150.0°	16	15	16	14	15	14	16	14
155.0°	18	17	18	16	17	15	18	17
160.0°	19	19	19	18	17	17	19	18
165.0°	22	22	21	20	20	20	20	21
170.0°	22	23	22	21	21	20	20	21
175.0°	17	17	17	18	18	17	16	14
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1539	1539	1539	1539	1539	1539	1539	1539
5.0°	1518	1516	1511	1510	1514	1512	1512	1511
10.0°	1477	1476	1466	1461	1461	1457	1461	1466
15.0°	1425	1422	1422	1413	1410	1410	1411	1412
20.0°	1380	1391	1384	1373	1377	1373	1374	1374
25.0°	1351	1353	1351	1335	1342	1340	1343	1332
30.0°	1345	1356	1351	1342	1352	1347	1351	1335
35.0°	1346	1331	1322	1332	1330	1305	1311	1302
40.0°	1232	1222	1222	1193	1200	1158	1192	1156
45.0°	1134	1108	1116	1099	1104	1082	1103	1061
50.0°	1016	1003	991	976	963	970	967	948
55.0°	884	856	827	801	786	788	784	793
60.0°	697	683	661	640	611	618	617	625
65.0°	556	543	525	508	479	482	467	485
70.0°	381	392	357	354	330	325	304	315
75.0°	243	223	214	200	183	169	174	166
80.0°	122	111	99	93	80	73	75	71
85.0°	52	50	46	42	38	34	36	33
90.0°	21	20	20	20	19	18	19	20
95.0°	14	13	13	13	11	11	11	12
100.0°	6	6	6	6	5	5	5	4
105.0°	3	8	7	6	7	7	6	5
110.0°	11	12	11	14	12	11	9	9
115.0°	7	8	7	9	8	8	8	7
120.0°	6	7	7	8	8	7	7	7
125.0°	6	7	7	7	7	7	7	7
130.0°	7	7	7	8	8	9	7	7
135.0°	8	9	9	10	9	10	9	9
140.0°	10	10	11	12	11	11	11	11
145.0°	12	13	13	14	14	13	14	12
150.0°	15	14	15	15	16	15	16	14
155.0°	17	16	17	17	18	17	18	17
160.0°	19	18	19	19	19	20	17	18
165.0°	21	21	20	21	18	21	19	22
170.0°	21	22	21	20	21	18	20	22
175.0°	17	18	15	15	13	13	13	16
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	36.5	0.81	0-5	36.5	0.81
5-10	107.0	2.38	0-10	143.5	3.20
10-15	172.2	3.84	0-15	315.7	7.04
15-20	232.1	5.17	0-20	547.8	12.21
20-25	287.6	6.41	0-25	835.4	18.62
25-30	341.2	7.61	0-30	1176.6	26.22
30-35	394.6	8.79	0-35	1571.2	35.02
35-40	426.4	9.50	0-40	1997.7	44.52
40-45	432.8	9.65	0-45	2430.4	54.17
45-50	428.1	9.54	0-50	2858.6	63.71
50-55	401.0	8.94	0-55	3259.6	72.65
55-60	349.2	7.78	0-60	3608.8	80.43
60-65	289.6	6.45	0-65	3898.4	86.89
65-70	225.0	5.01	0-70	4123.3	91.90
70-75	152.1	3.39	0-75	4275.5	95.29
75-80	85.4	1.90	0-80	4360.9	97.19
80-85	40.7	0.91	0-85	4401.6	98.10
85-90	18.6	0.42	0-90	4420.2	98.52
90-95	9.7	0.22	0-95	4429.9	98.73
95-100	5.3	0.12	0-100	4435.2	98.85
100-105	2.9	0.06	0-105	4438.1	98.92
105-110	3.9	0.09	0-110	4442.0	99.00
110-115	4.6	0.10	0-115	4446.6	99.10
115-120	3.7	0.08	0-120	4450.2	99.19
120-125	3.3	0.07	0-125	4453.5	99.26
125-130	3.2	0.07	0-130	4456.7	99.33
130-135	3.4	0.08	0-135	4460.1	99.40
135-140	3.7	0.08	0-140	4463.8	99.49
140-145	4.0	0.09	0-145	4467.7	99.58
145-150	4.1	0.09	0-150	4471.8	99.67
150-155	4.0	0.09	0-155	4475.9	99.76
155-160	3.7	0.08	0-160	4479.6	99.84
160-165	3.2	0.07	0-165	4482.8	99.91
165-170	2.5	0.05	0-170	4485.3	99.97
170-175	1.3	0.03	0-175	4486.6	100.00
175-180	0.2	0.00	0-180	4486.8	100.00

6. Product Photo



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