



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 15.5BR40DIM/830

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu <i>Hill Liu</i>
Report Number:	R1KS181219080-10
Test Date:	2018-12-29
Report Date:	2019-01-03
Reviewed By:	Bill Xiong / EE Engineer <i>Bill Xiong</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.
Accreditation:	The IAS Accreditation Number TL-460.

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

1. Product Description

General Information:

One sample was received on 2018-12-19 and used for testing.

Model Tested: 15.5BR40DIM/830
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Lamp
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120VAC 60Hz
 Rated Power: 15.5W
 Nominal CCT: 3000K
 Nominal Lumen Output: 1100lm

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 (This method is not in IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	2018-12-13	2019-12-13
spectroradiometer	EVERFINE	HAAS-2000	20140912	2018-12-13	2019-12-13
Digital Power Meter	EVERFINE	PF2010A	1011004	2018-07-28	2019-07-28
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	2018-06-15	2019-06-15
Rapid Recording Photometer	EVERFINE	PHOTO-2000F	1007010	2018-12-13	2019-12-13
Standard Light Source	EVERFINE	D204	G100283CA8351158	2018-01-08	2019-01-08
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	2018-03-19	2019-03-19
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2018-03-19	2019-03-19
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2018-03-26	2019-03-26
Digital power meter	YOKOGAWA	WT-210	91j926132	2018-03-26	2019-03-26
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2018-03-18	2019-03-18
Wireless Remote Sensor	N/A	433MHz	N/A	2018-03-17	2019-03-17
Standard Light Source	EVERFINE	D908	1012003	2018-01-05	2019-01-05

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) 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 $U=2.1\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=31\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1(K=2)$, at the 95% confidence level.

The uncertainty of power meter AC current $U=0.19\%$ of rdg, AC Voltage $U=0.18\%$ of rdg, Power $U=0.46\%$ ($K=2$), 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 intensity is $U=2.82\%$ ($K=2$), 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**

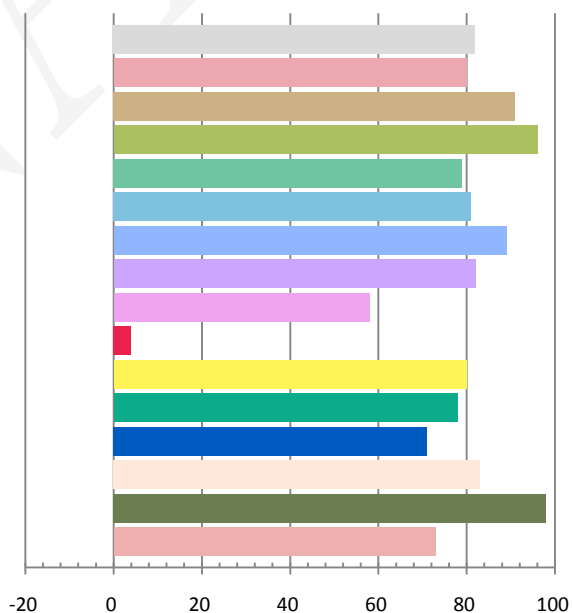
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1656	14.53	0.7309	1253.7	86.28

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.811	3136	-0.00088	0.4264	0.3981	0.2463	0.5174

Color Rendering Index

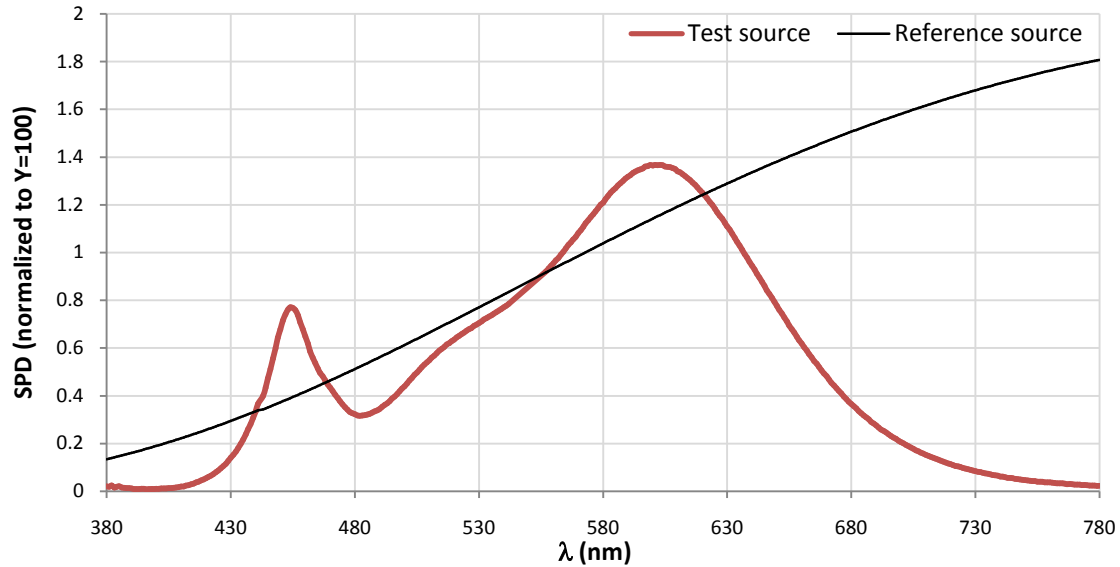
Ra			
81.9			
R1	R2	R3	R4
80	91	96	79
R5	R6	R7	R8
81	89	82	58
R9	R10	R11	R12
4	80	78	71
R13	R14	R15	
83	98	73	



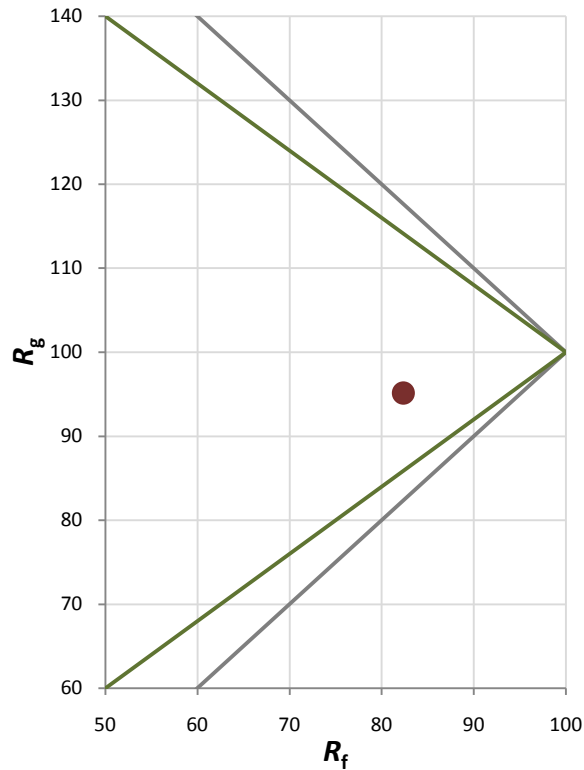
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	95

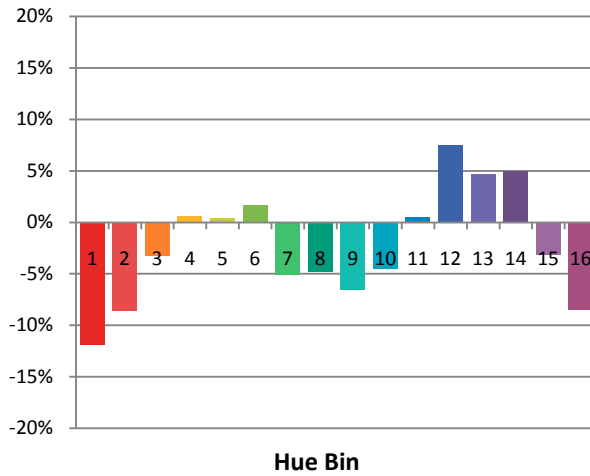
Spectral Power Distribution Comparison



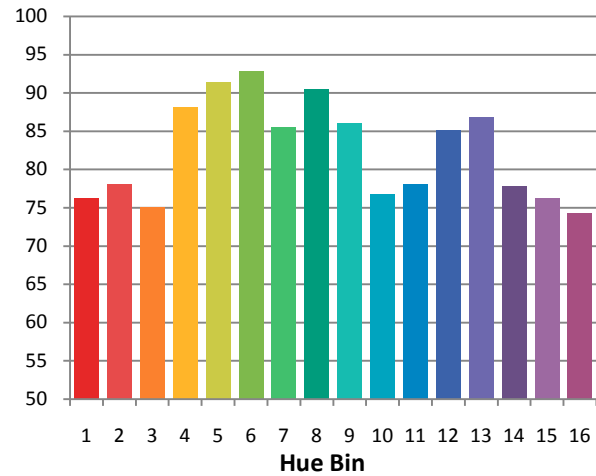
Plot of R_g versus R_f



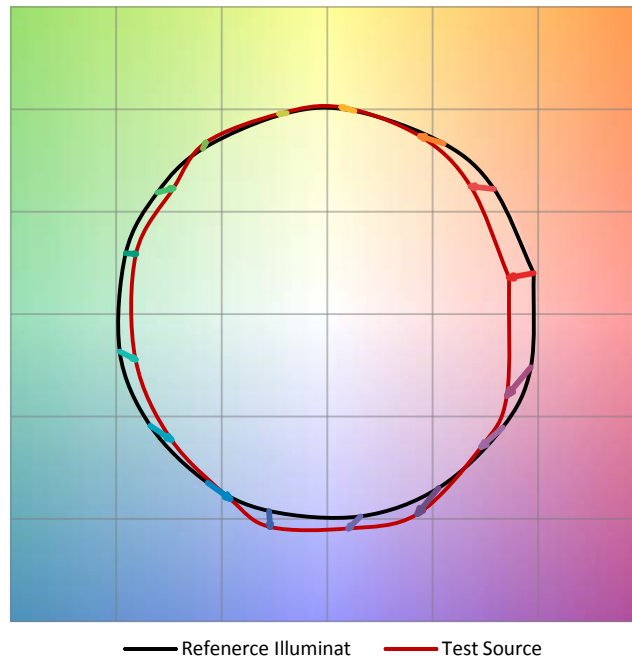
Chroma Shift by Hue



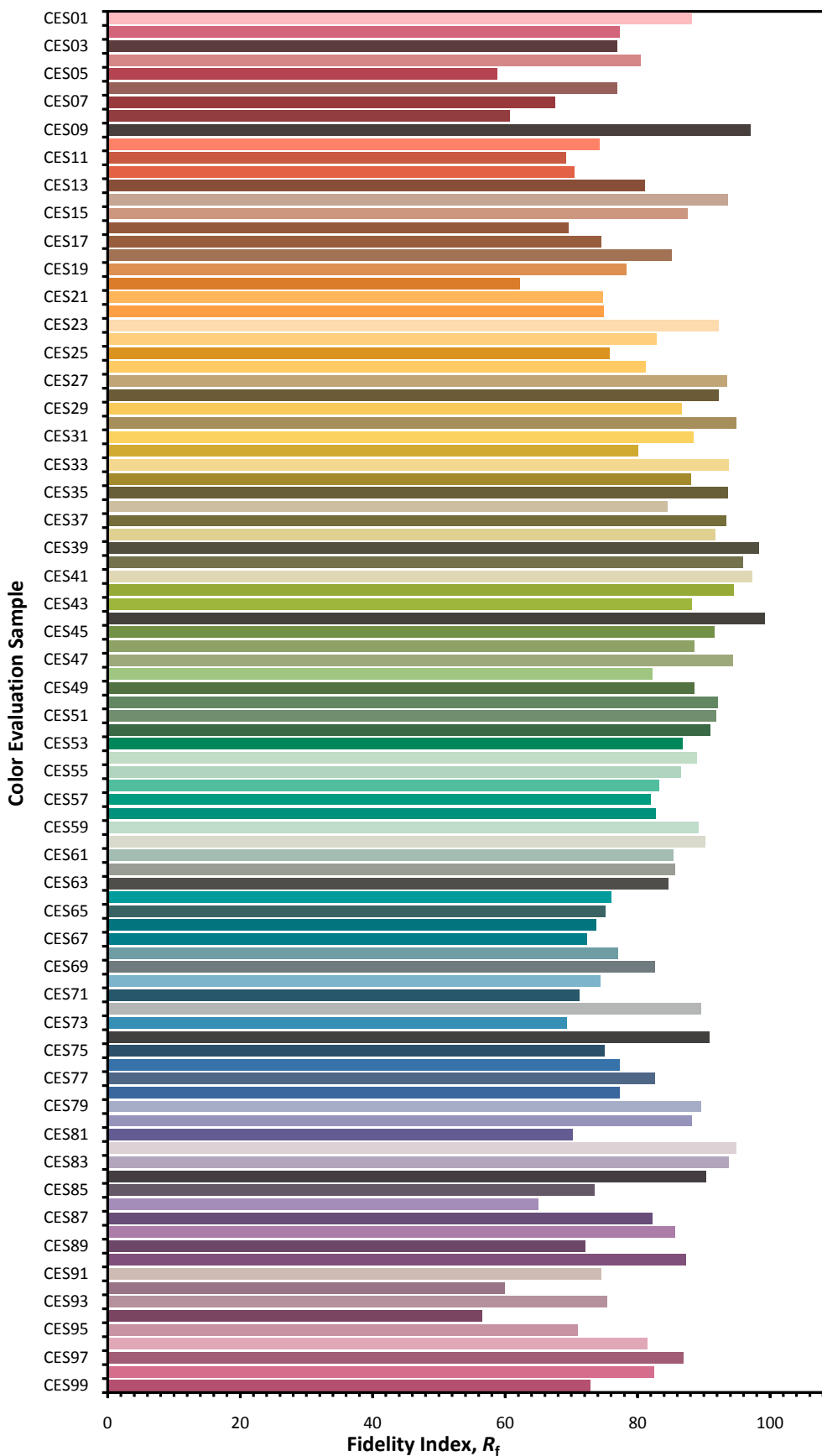
R_f by Hue



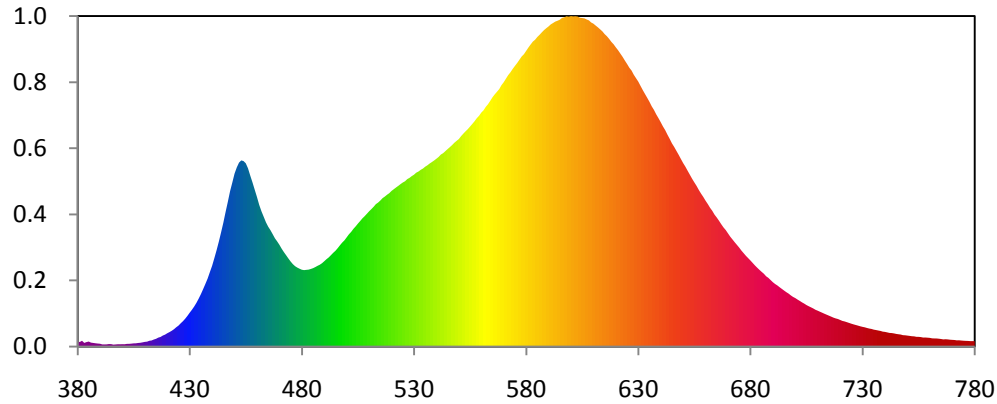
Color Vector Graphic



Color Fidelity by CES Sample



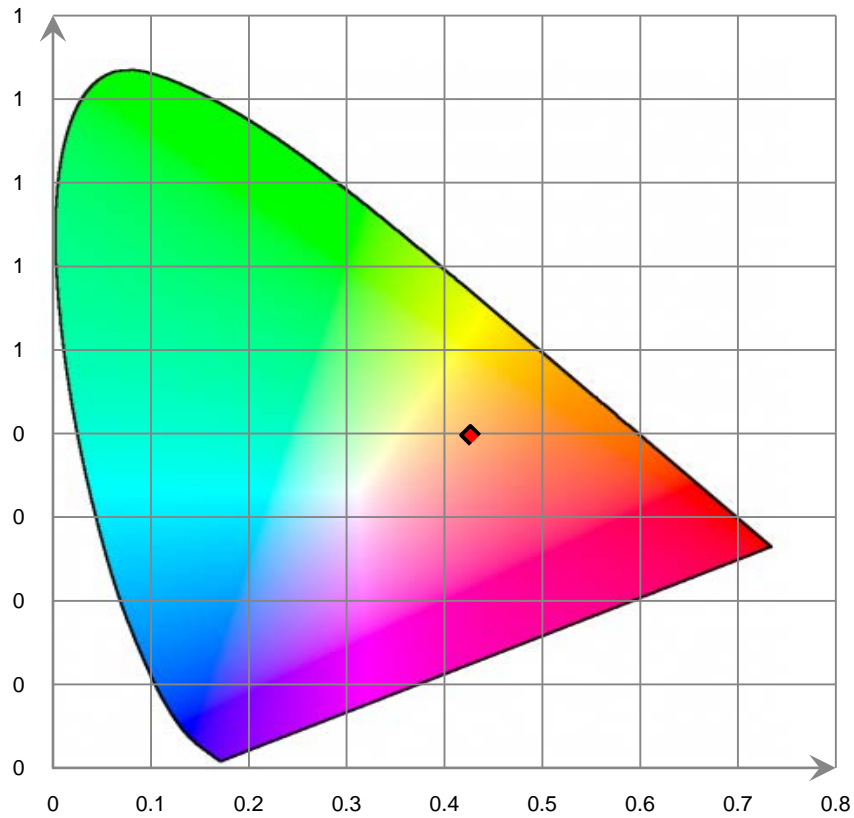
Relative Spectral Power Distribution



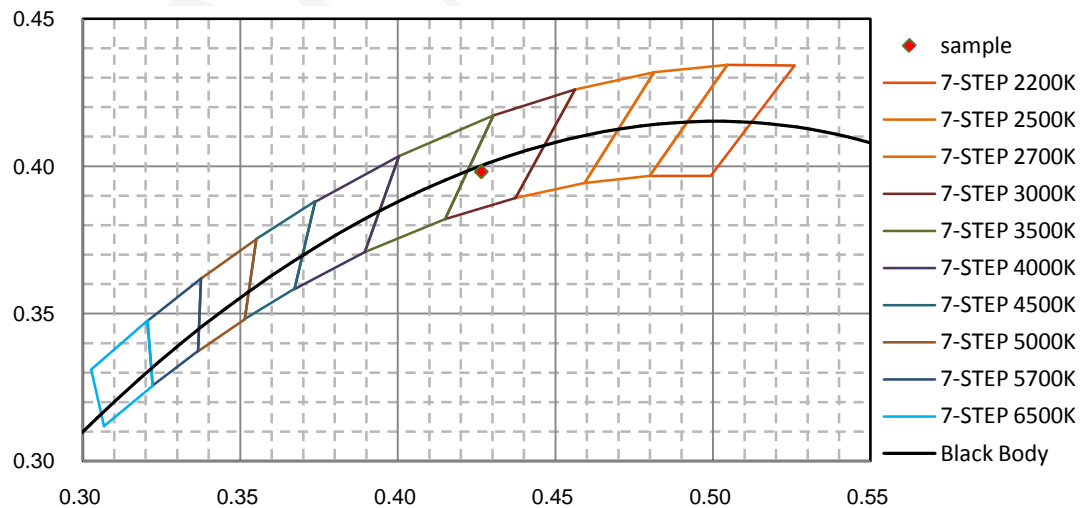
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.000E-01	421	1.104E+00	462	1.028E+01	503	8.944E+00	544	1.484E+01
381	3.506E-01	422	1.205E+00	463	9.861E+00	504	9.131E+00	545	1.500E+01
382	4.466E-01	423	1.323E+00	464	9.442E+00	505	9.341E+00	546	1.515E+01
383	2.838E-01	424	1.470E+00	465	9.108E+00	506	9.537E+00	547	1.531E+01
384	3.468E-01	425	1.596E+00	466	8.844E+00	507	9.738E+00	548	1.548E+01
385	3.870E-01	426	1.771E+00	467	8.541E+00	508	9.903E+00	549	1.562E+01
386	3.058E-01	427	1.933E+00	468	8.226E+00	509	1.009E+01	550	1.576E+01
387	2.803E-01	428	2.121E+00	469	7.991E+00	510	1.028E+01	551	1.598E+01
388	2.549E-01	429	2.338E+00	470	7.732E+00	511	1.044E+01	552	1.617E+01
389	2.359E-01	430	2.575E+00	471	7.438E+00	512	1.062E+01	553	1.635E+01
390	2.205E-01	431	2.800E+00	472	7.178E+00	513	1.082E+01	554	1.651E+01
391	1.717E-01	432	3.046E+00	473	6.940E+00	514	1.094E+01	555	1.671E+01
392	1.674E-01	433	3.325E+00	474	6.696E+00	515	1.110E+01	556	1.691E+01
393	1.728E-01	434	3.643E+00	475	6.465E+00	516	1.128E+01	557	1.711E+01
394	1.992E-01	435	3.986E+00	476	6.263E+00	517	1.139E+01	558	1.734E+01
395	1.904E-01	436	4.369E+00	477	6.108E+00	518	1.153E+01	559	1.752E+01
396	1.532E-01	437	4.762E+00	478	6.001E+00	519	1.165E+01	560	1.777E+01
397	1.683E-01	438	5.169E+00	479	5.915E+00	520	1.182E+01	561	1.794E+01
398	1.827E-01	439	5.658E+00	480	5.840E+00	521	1.195E+01	562	1.820E+01
399	1.795E-01	440	6.139E+00	481	5.809E+00	522	1.208E+01	563	1.841E+01
400	1.855E-01	441	6.721E+00	482	5.829E+00	523	1.221E+01	564	1.866E+01
401	1.830E-01	442	7.325E+00	483	5.847E+00	524	1.234E+01	565	1.893E+01
402	2.107E-01	443	7.977E+00	484	5.897E+00	525	1.246E+01	566	1.915E+01
403	2.128E-01	444	8.676E+00	485	5.957E+00	526	1.255E+01	567	1.935E+01
404	2.283E-01	445	9.405E+00	486	6.041E+00	527	1.272E+01	568	1.955E+01
405	2.482E-01	446	1.022E+01	487	6.137E+00	528	1.281E+01	569	1.985E+01
406	2.535E-01	447	1.099E+01	488	6.219E+00	529	1.295E+01	570	2.007E+01
407	2.796E-01	448	1.180E+01	489	6.333E+00	530	1.306E+01	571	2.035E+01
408	2.941E-01	449	1.245E+01	490	6.484E+00	531	1.321E+01	572	2.061E+01
409	3.272E-01	450	1.313E+01	491	6.640E+00	532	1.330E+01	573	2.083E+01
410	3.612E-01	451	1.361E+01	492	6.775E+00	533	1.342E+01	574	2.109E+01
411	3.794E-01	452	1.398E+01	493	6.948E+00	534	1.352E+01	575	2.131E+01
412	4.441E-01	453	1.414E+01	494	7.125E+00	535	1.366E+01	576	2.153E+01
413	4.672E-01	454	1.409E+01	495	7.280E+00	536	1.377E+01	577	2.178E+01
414	5.410E-01	455	1.392E+01	496	7.480E+00	537	1.391E+01	578	2.203E+01
415	5.956E-01	456	1.354E+01	497	7.697E+00	538	1.402E+01	579	2.220E+01
416	6.860E-01	457	1.299E+01	498	7.900E+00	539	1.414E+01	580	2.245E+01
417	7.355E-01	458	1.247E+01	499	8.070E+00	540	1.427E+01	581	2.271E+01
418	8.421E-01	459	1.191E+01	500	8.301E+00	541	1.441E+01	582	2.294E+01
419	9.124E-01	460	1.136E+01	501	8.530E+00	542	1.459E+01	583	2.316E+01
420	1.017E+00	461	1.076E+01	502	8.713E+00	543	1.469E+01	584	2.330E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.351E+01	626	2.118E+01	667	9.294E+00	708	2.901E+00	749	8.623E-01
586	2.368E+01	627	2.096E+01	668	9.052E+00	709	2.799E+00	750	8.395E-01
587	2.386E+01	628	2.064E+01	669	8.850E+00	710	2.729E+00	751	8.168E-01
588	2.404E+01	629	2.038E+01	670	8.598E+00	711	2.650E+00	752	7.915E-01
589	2.418E+01	630	2.012E+01	671	8.349E+00	712	2.576E+00	753	7.807E-01
590	2.431E+01	631	1.980E+01	672	8.139E+00	713	2.498E+00	754	7.447E-01
591	2.447E+01	632	1.948E+01	673	7.927E+00	714	2.426E+00	755	7.437E-01
592	2.457E+01	633	1.918E+01	674	7.722E+00	715	2.353E+00	756	7.249E-01
593	2.468E+01	634	1.889E+01	675	7.520E+00	716	2.279E+00	757	6.908E-01
594	2.474E+01	635	1.858E+01	676	7.290E+00	717	2.205E+00	758	6.929E-01
595	2.482E+01	636	1.824E+01	677	7.093E+00	718	2.145E+00	759	6.800E-01
596	2.496E+01	637	1.797E+01	678	6.894E+00	719	2.100E+00	760	6.656E-01
597	2.500E+01	638	1.764E+01	679	6.720E+00	720	2.026E+00	761	6.295E-01
598	2.508E+01	639	1.735E+01	680	6.543E+00	721	1.953E+00	762	6.229E-01
599	2.505E+01	640	1.704E+01	681	6.358E+00	722	1.914E+00	763	6.189E-01
600	2.510E+01	641	1.672E+01	682	6.168E+00	723	1.858E+00	764	6.028E-01
601	2.507E+01	642	1.644E+01	683	5.998E+00	724	1.801E+00	765	5.803E-01
602	2.509E+01	643	1.610E+01	684	5.836E+00	725	1.743E+00	766	5.503E-01
603	2.506E+01	644	1.578E+01	685	5.678E+00	726	1.690E+00	767	5.621E-01
604	2.497E+01	645	1.544E+01	686	5.533E+00	727	1.642E+00	768	5.503E-01
605	2.495E+01	646	1.517E+01	687	5.342E+00	728	1.593E+00	769	5.271E-01
606	2.492E+01	647	1.487E+01	688	5.223E+00	729	1.544E+00	770	5.159E-01
607	2.484E+01	648	1.457E+01	689	5.056E+00	730	1.502E+00	771	5.042E-01
608	2.477E+01	649	1.425E+01	690	4.894E+00	731	1.466E+00	772	4.770E-01
609	2.461E+01	650	1.394E+01	691	4.757E+00	732	1.417E+00	773	4.810E-01
610	2.452E+01	651	1.367E+01	692	4.647E+00	733	1.373E+00	774	4.654E-01
611	2.438E+01	652	1.335E+01	693	4.514E+00	734	1.343E+00	775	4.483E-01
612	2.424E+01	653	1.305E+01	694	4.385E+00	735	1.290E+00	776	4.402E-01
613	2.409E+01	654	1.275E+01	695	4.261E+00	736	1.259E+00	777	4.347E-01
614	2.394E+01	655	1.247E+01	696	4.138E+00	737	1.225E+00	778	4.182E-01
615	2.373E+01	656	1.220E+01	697	4.029E+00	738	1.194E+00	779	4.190E-01
616	2.357E+01	657	1.189E+01	698	3.894E+00	739	1.139E+00	780	4.198E-01
617	2.337E+01	658	1.162E+01	699	3.777E+00	740	1.120E+00		
618	2.314E+01	659	1.136E+01	700	3.689E+00	741	1.081E+00		
619	2.296E+01	660	1.108E+01	701	3.575E+00	742	1.042E+00		
620	2.272E+01	661	1.083E+01	702	3.473E+00	743	1.033E+00		
621	2.250E+01	662	1.054E+01	703	3.361E+00	744	1.005E+00		
622	2.225E+01	663	1.031E+01	704	3.267E+00	745	9.671E-01		
623	2.201E+01	664	1.002E+01	705	3.157E+00	746	9.404E-01		
624	2.173E+01	665	9.803E+00	706	3.068E+00	747	9.177E-01		
625	2.146E+01	666	9.556E+00	707	2.985E+00	748	8.720E-01		

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**

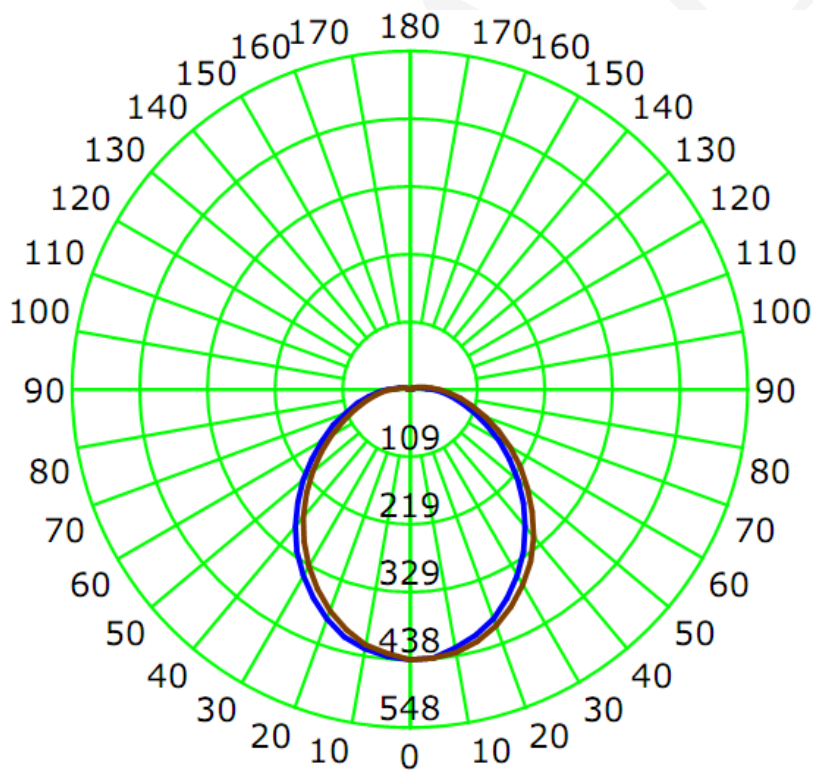
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1660	14.51	0.7290

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1256.8	86.67	437.5	1.19	1.19

Luminous Intensity Distribution



Unit: cd

	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	103.0	103.1	103.1	103.0	103.1
Field Angle (10% I_{max}):	176.0	176.1	176.0	175.9	176.0

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	438	438	438	438	438	438	438	438
5.0°	437	436	438	438	437	439	437	438
10.0°	426	430	431	434	433	433	431	430
15.0°	413	415	420	423	423	423	420	418
20.0°	395	398	404	407	409	407	405	400
25.0°	374	379	383	387	389	388	385	380
30.0°	349	355	360	364	366	364	361	356
35.0°	321	328	334	338	341	338	334	330
40.0°	291	298	305	309	312	310	306	299
45.0°	260	267	274	279	281	280	275	269
50.0°	228	235	243	247	249	248	244	238
55.0°	197	205	211	216	218	216	214	207
60.0°	167	174	181	185	188	186	182	177
65.0°	139	145	152	156	158	157	154	149
70.0°	112	119	125	129	131	129	127	122
75.0°	90	95	101	104	106	104	102	98
80.0°	69	75	79	83	84	83	80	77
85.0°	52	57	60	63	64	63	62	59
90.0°	38	42	44	47	47	47	45	43
95.0°	28	31	32	34	35	34	33	32
100.0°	19	21	23	24	25	25	23	22
105.0°	13	15	16	17	17	17	16	15
110.0°	9	10	11	11	12	11	11	11
115.0°	6	8	8	8	8	9	8	7
120.0°	4	5	5	6	6	6	6	4
125.0°	3	4	4	5	5	5	4	4
130.0°	2	2	3	3	3	3	3	3
135.0°	1	2	2	2	2	2	2	2
140.0°	0	0	1	2	1	1	1	1
145.0°	0	0	0	1	1	1	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	1	0	0	0
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

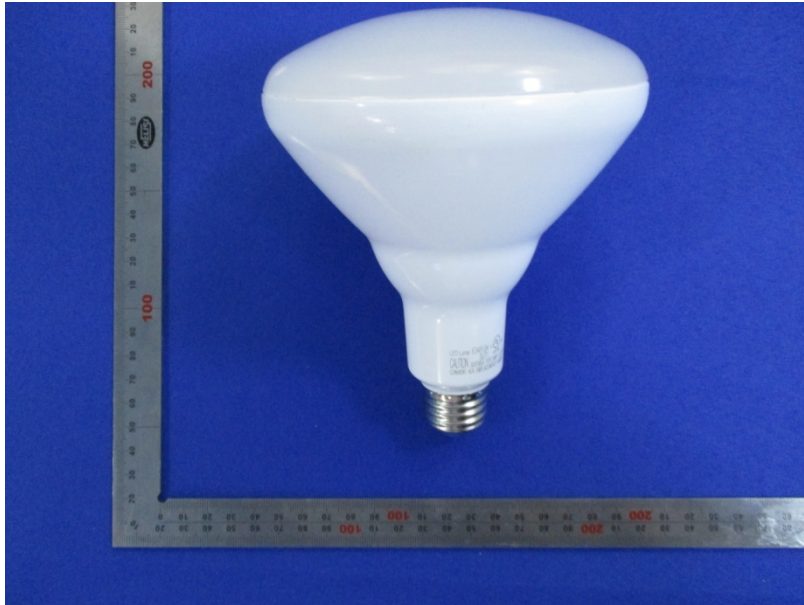
$\gamma \backslash C$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	438	438	438	438	438	438	438	438
5.0°	435	434	431	431	430	431	432	433
10.0°	427	424	420	419	420	420	422	424
15.0°	415	409	405	403	403	402	406	409
20.0°	396	391	386	383	382	382	386	390
25.0°	374	368	362	359	357	359	361	367
30.0°	349	342	337	332	331	331	335	339
35.0°	321	313	308	303	301	302	305	312
40.0°	291	283	277	272	271	270	274	280
45.0°	259	251	246	241	238	239	243	249
50.0°	228	220	215	209	207	208	212	217
55.0°	196	190	184	179	176	177	181	187
60.0°	166	160	154	150	148	148	151	157
65.0°	138	132	127	123	121	122	124	129
70.0°	112	107	102	99	97	97	100	105
75.0°	89	84	81	78	76	77	79	83
80.0°	69	65	62	59	58	59	60	63
85.0°	52	49	46	44	43	44	45	48
90.0°	38	35	33	32	31	31	33	35
95.0°	27	25	23	22	22	22	23	25
100.0°	19	18	16	15	15	15	16	17
105.0°	13	12	11	11	11	11	11	12
110.0°	8	8	8	8	8	8	8	9
115.0°	6	6	5	5	6	6	6	6
120.0°	4	4	4	4	4	4	4	4
125.0°	2	2	2	2	2	3	3	3
130.0°	1	1	1	1	1	1	2	2
135.0°	0	0	0	0	0	0	0	1
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	1	0	1	0	0
175.0°	0	0	0	1	0	0	1	0
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	10.4	0.83
5-10	30.8	2.45
10-15	49.8	3.96
15-20	66.6	5.30
20-25	80.6	6.41
25-30	91.3	7.26
30-35	98.5	7.83
35-40	101.9	8.11
40-45	101.8	8.10
45-50	98.5	7.84
50-55	92.4	7.35
55-60	84.2	6.70
60-65	74.4	5.92
65-70	63.9	5.08
70-75	53.2	4.23
75-80	42.9	3.42
80-85	33.5	2.66
85-90	25.2	2.00
90-95	18.3	1.46
95-100	12.9	1.03
100-105	8.8	0.70
105-110	6.0	0.48
110-115	4.1	0.33
115-120	2.8	0.22
120-125	1.8	0.15
125-130	1.1	0.09
130-135	0.6	0.05
135-140	0.3	0.02
140-145	0.1	0.01
145-150	0.0	0.00
150-155	0.0	0.00
155-160	0.0	0.00
160-165	0.0	0.00
165-170	0.0	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	10.4	0.83
0-10	41.2	3.28
0-15	91.0	7.24
0-20	157.6	12.54
0-25	238.2	18.95
0-30	329.5	26.21
0-35	427.9	34.05
0-40	529.9	42.16
0-45	631.7	50.26
0-50	730.2	58.10
0-55	822.6	65.45
0-60	906.8	72.15
0-65	981.2	78.07
0-70	1045.1	83.16
0-75	1098.4	87.39
0-80	1141.3	90.81
0-85	1174.7	93.47
0-90	1199.9	95.47
0-95	1218.2	96.93
0-100	1231.1	97.96
0-105	1240.0	98.66
0-110	1246.0	99.14
0-115	1250.1	99.46
0-120	1252.9	99.68
0-125	1254.7	99.83
0-130	1255.8	99.92
0-135	1256.4	99.97
0-140	1256.7	99.99
0-145	1256.8	100.00
0-150	1256.8	100.00
0-155	1256.8	100.00
0-160	1256.8	100.00
0-165	1256.8	100.00
0-170	1256.8	100.00
0-175	1256.8	100.00
0-180	1256.8	100.00

6. Product Photo



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