



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 11BR40DIM/830

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu <i>Hill Liu</i>
Report Number:	R1KS181227090-10
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 2018-12-27 and used for testing.

Model Tested: 11BR40DIM/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: 11W
 Nominal CCT: 3000K
 Nominal Lumen Output: 950lm

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**

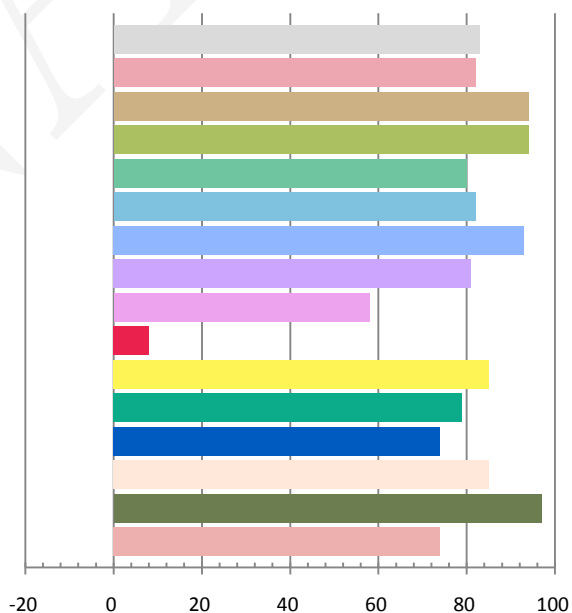
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1149	10.86	0.7877	1042.2	95.97

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.174	3011	0.00048	0.4368	0.4052	0.2500	0.5218

Color Rendering Index

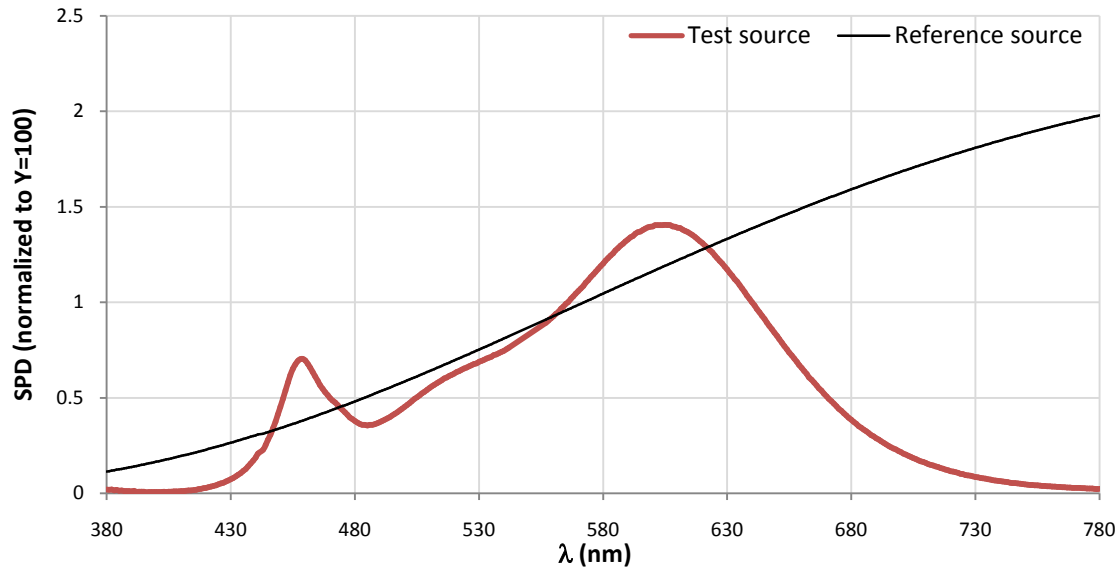
Ra			
82.9			
R1	R2	R3	R4
82	94	94	80
R5	R6	R7	R8
82	93	81	58
R9	R10	R11	R12
8	85	79	74
R13	R14	R15	
85	97	74	



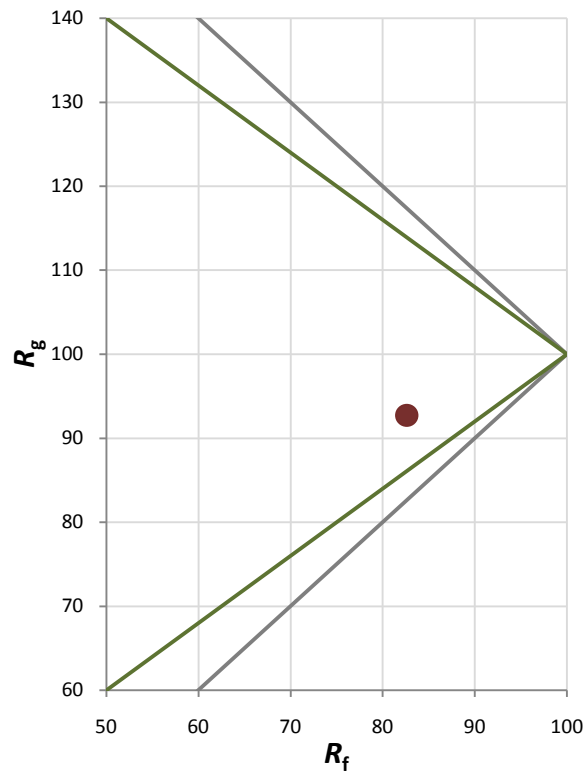
Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	93

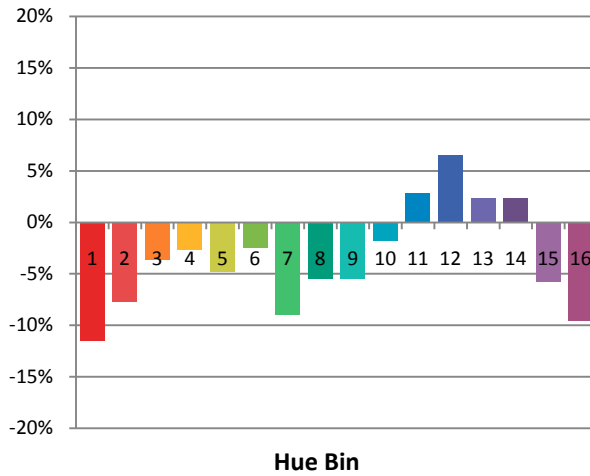
Spectral Power Distribution Comparison



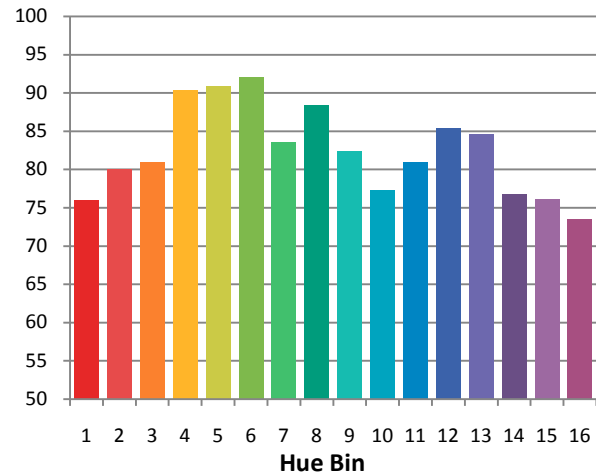
Plot of R_g versus R_f



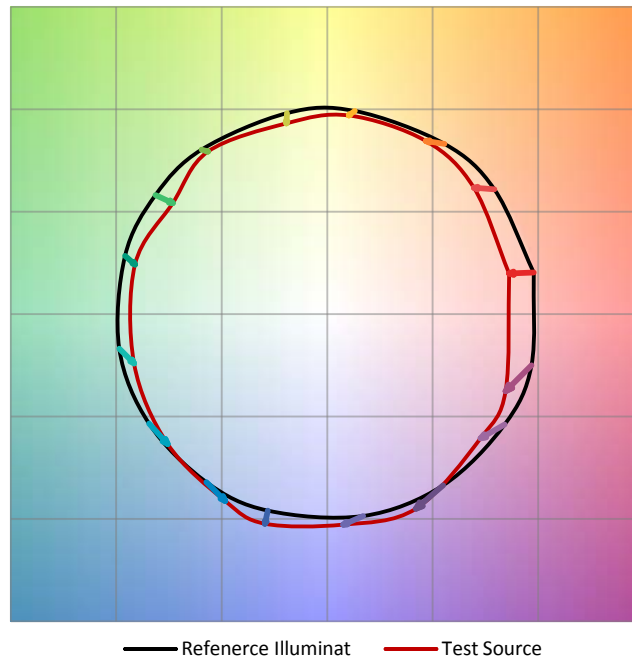
Chroma Shift by Hue



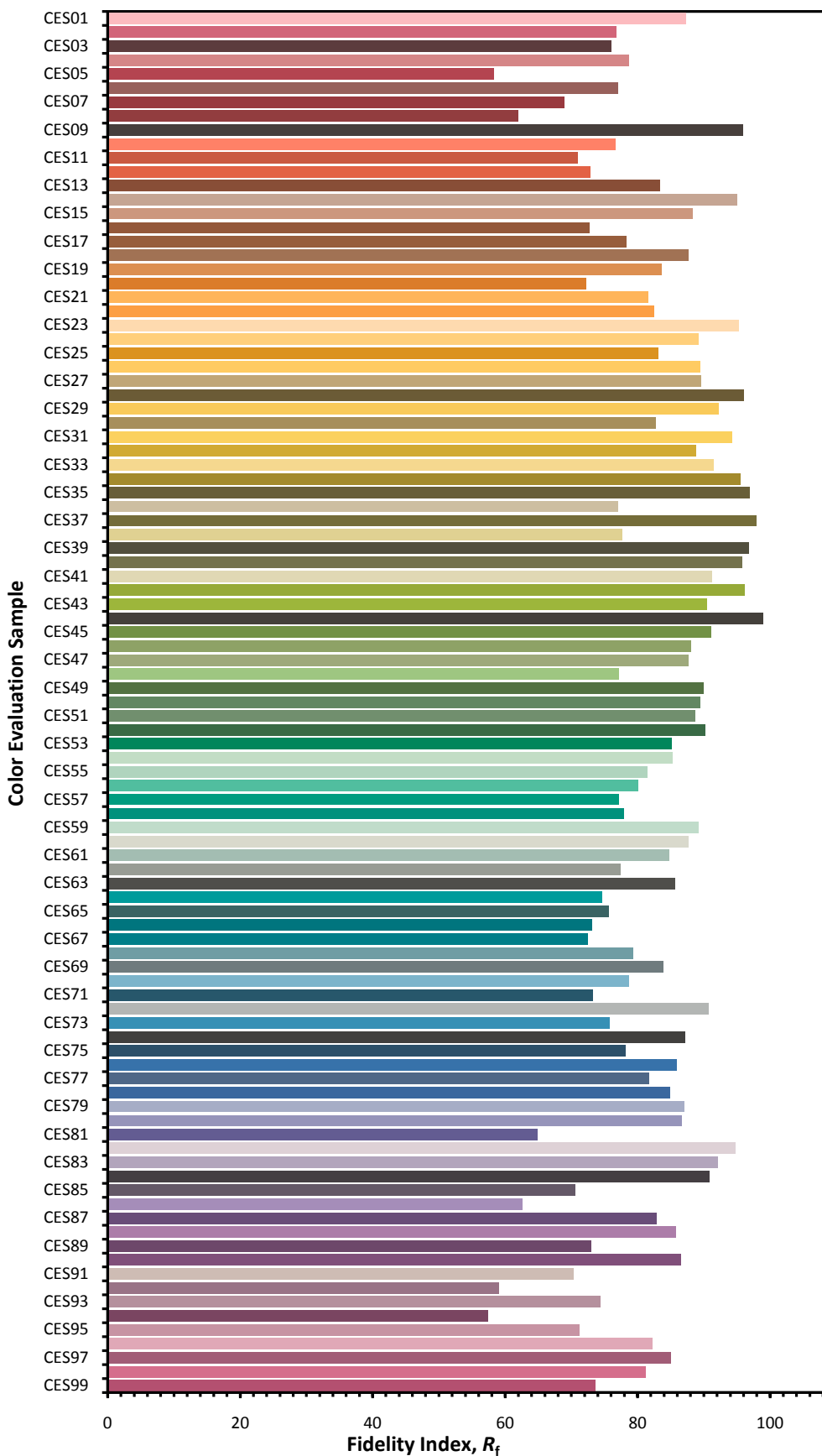
R_f by Hue



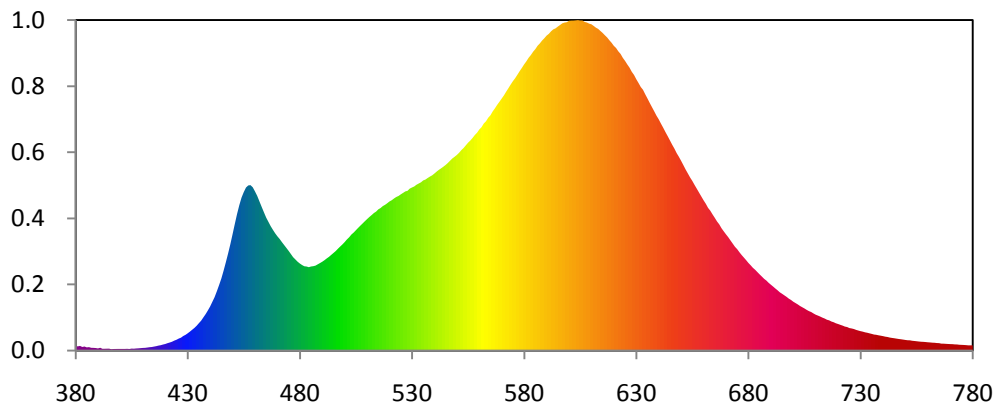
Color Vector Graphic



Color Fidelity by CES Sample



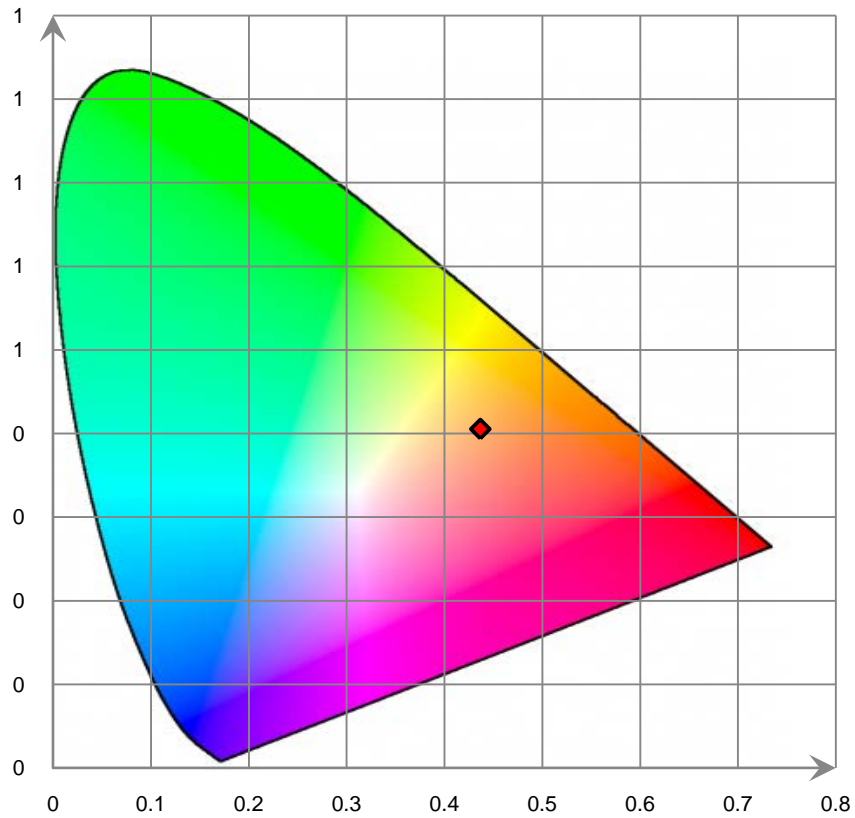
Relative Spectral Power Distribution



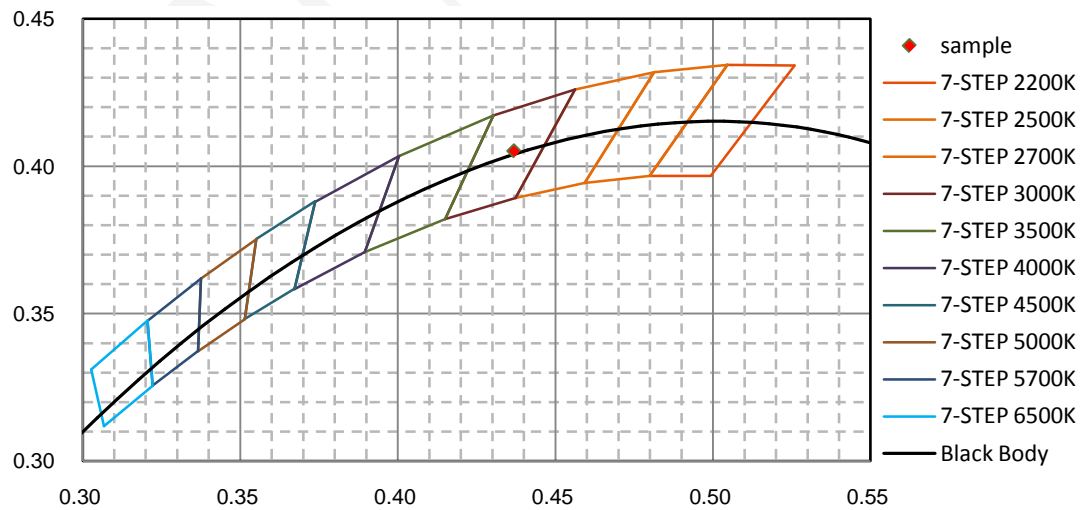
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.134E-01	421	4.844E-01	462	9.683E+00	503	7.535E+00	544	1.194E+01
381	2.766E-01	422	5.285E-01	463	9.327E+00	504	7.664E+00	545	1.205E+01
382	3.095E-01	423	5.779E-01	464	8.975E+00	505	7.815E+00	546	1.218E+01
383	2.390E-01	424	6.497E-01	465	8.632E+00	506	7.967E+00	547	1.233E+01
384	2.690E-01	425	7.062E-01	466	8.355E+00	507	8.114E+00	548	1.247E+01
385	2.118E-01	426	7.830E-01	467	8.079E+00	508	8.255E+00	549	1.258E+01
386	2.274E-01	427	8.404E-01	468	7.840E+00	509	8.399E+00	550	1.270E+01
387	1.842E-01	428	9.492E-01	469	7.615E+00	510	8.538E+00	551	1.284E+01
388	1.807E-01	429	1.023E+00	470	7.417E+00	511	8.674E+00	552	1.301E+01
389	1.694E-01	430	1.125E+00	471	7.246E+00	512	8.795E+00	553	1.315E+01
390	1.445E-01	431	1.235E+00	472	7.045E+00	513	8.927E+00	554	1.332E+01
391	1.869E-01	432	1.357E+00	473	6.855E+00	514	9.022E+00	555	1.349E+01
392	1.205E-01	433	1.473E+00	474	6.667E+00	515	9.169E+00	556	1.363E+01
393	1.214E-01	434	1.615E+00	475	6.477E+00	516	9.256E+00	557	1.380E+01
394	1.264E-01	435	1.783E+00	476	6.273E+00	517	9.381E+00	558	1.399E+01
395	1.286E-01	436	1.945E+00	477	6.067E+00	518	9.464E+00	559	1.414E+01
396	8.720E-02	437	2.158E+00	478	5.921E+00	519	9.569E+00	560	1.435E+01
397	1.070E-01	438	2.369E+00	479	5.773E+00	520	9.684E+00	561	1.450E+01
398	1.100E-01	439	2.610E+00	480	5.654E+00	521	9.763E+00	562	1.474E+01
399	1.124E-01	440	2.864E+00	481	5.556E+00	522	9.875E+00	563	1.489E+01
400	1.122E-01	441	3.170E+00	482	5.476E+00	523	9.972E+00	564	1.512E+01
401	1.126E-01	442	3.472E+00	483	5.459E+00	524	1.004E+01	565	1.528E+01
402	1.125E-01	443	3.852E+00	484	5.417E+00	525	1.014E+01	566	1.553E+01
403	1.184E-01	444	4.256E+00	485	5.462E+00	526	1.023E+01	567	1.573E+01
404	1.073E-01	445	4.675E+00	486	5.481E+00	527	1.033E+01	568	1.595E+01
405	1.326E-01	446	5.185E+00	487	5.520E+00	528	1.037E+01	569	1.615E+01
406	1.269E-01	447	5.727E+00	488	5.603E+00	529	1.051E+01	570	1.636E+01
407	1.414E-01	448	6.295E+00	489	5.684E+00	530	1.059E+01	571	1.657E+01
408	1.508E-01	449	6.895E+00	490	5.770E+00	531	1.065E+01	572	1.681E+01
409	1.632E-01	450	7.547E+00	491	5.870E+00	532	1.077E+01	573	1.703E+01
410	1.765E-01	451	8.214E+00	492	5.984E+00	533	1.084E+01	574	1.727E+01
411	1.829E-01	452	8.859E+00	493	6.087E+00	534	1.092E+01	575	1.749E+01
412	2.023E-01	453	9.434E+00	494	6.215E+00	535	1.104E+01	576	1.768E+01
413	2.233E-01	454	9.930E+00	495	6.340E+00	536	1.110E+01	577	1.791E+01
414	2.358E-01	455	1.029E+01	496	6.464E+00	537	1.120E+01	578	1.814E+01
415	2.646E-01	456	1.059E+01	497	6.615E+00	538	1.129E+01	579	1.835E+01
416	2.917E-01	457	1.072E+01	498	6.758E+00	539	1.138E+01	580	1.858E+01
417	3.285E-01	458	1.074E+01	499	6.896E+00	540	1.149E+01	581	1.878E+01
418	3.546E-01	459	1.060E+01	500	7.046E+00	541	1.162E+01	582	1.900E+01
419	3.974E-01	460	1.033E+01	501	7.215E+00	542	1.173E+01	583	1.918E+01
420	4.303E-01	461	1.005E+01	502	7.357E+00	543	1.183E+01	584	1.940E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.957E+01	626	1.857E+01	667	8.194E+00	708	2.504E+00	749	7.165E-01
586	1.978E+01	627	1.836E+01	668	7.945E+00	709	2.415E+00	750	6.927E-01
587	1.994E+01	628	1.809E+01	669	7.742E+00	710	2.333E+00	751	6.740E-01
588	2.012E+01	629	1.789E+01	670	7.547E+00	711	2.274E+00	752	6.703E-01
589	2.027E+01	630	1.761E+01	671	7.363E+00	712	2.212E+00	753	6.416E-01
590	2.044E+01	631	1.737E+01	672	7.152E+00	713	2.142E+00	754	6.275E-01
591	2.056E+01	632	1.711E+01	673	6.945E+00	714	2.083E+00	755	6.101E-01
592	2.072E+01	633	1.693E+01	674	6.740E+00	715	2.006E+00	756	5.931E-01
593	2.085E+01	634	1.663E+01	675	6.584E+00	716	1.966E+00	757	5.779E-01
594	2.091E+01	635	1.636E+01	676	6.385E+00	717	1.890E+00	758	5.715E-01
595	2.103E+01	636	1.608E+01	677	6.201E+00	718	1.843E+00	759	5.572E-01
596	2.113E+01	637	1.580E+01	678	6.036E+00	719	1.775E+00	760	5.432E-01
597	2.124E+01	638	1.553E+01	679	5.869E+00	720	1.728E+00	761	5.316E-01
598	2.129E+01	639	1.525E+01	680	5.691E+00	721	1.675E+00	762	5.167E-01
599	2.131E+01	640	1.501E+01	681	5.540E+00	722	1.624E+00	763	5.097E-01
600	2.141E+01	641	1.473E+01	682	5.375E+00	723	1.562E+00	764	4.927E-01
601	2.142E+01	642	1.447E+01	683	5.249E+00	724	1.533E+00	765	4.861E-01
602	2.142E+01	643	1.419E+01	684	5.096E+00	725	1.466E+00	766	4.543E-01
603	2.143E+01	644	1.392E+01	685	4.947E+00	726	1.439E+00	767	4.535E-01
604	2.145E+01	645	1.365E+01	686	4.806E+00	727	1.403E+00	768	4.411E-01
605	2.143E+01	646	1.337E+01	687	4.661E+00	728	1.347E+00	769	4.329E-01
606	2.142E+01	647	1.311E+01	688	4.549E+00	729	1.305E+00	770	4.251E-01
607	2.133E+01	648	1.282E+01	689	4.402E+00	730	1.264E+00	771	4.210E-01
608	2.129E+01	649	1.258E+01	690	4.281E+00	731	1.232E+00	772	4.051E-01
609	2.122E+01	650	1.231E+01	691	4.160E+00	732	1.189E+00	773	4.017E-01
610	2.118E+01	651	1.204E+01	692	4.033E+00	733	1.162E+00	774	3.813E-01
611	2.107E+01	652	1.176E+01	693	3.917E+00	734	1.122E+00	775	3.765E-01
612	2.096E+01	653	1.150E+01	694	3.785E+00	735	1.085E+00	776	3.694E-01
613	2.088E+01	654	1.124E+01	695	3.691E+00	736	1.046E+00	777	3.582E-01
614	2.075E+01	655	1.101E+01	696	3.590E+00	737	1.027E+00	778	3.430E-01
615	2.062E+01	656	1.075E+01	697	3.492E+00	738	9.962E-01	779	3.437E-01
616	2.047E+01	657	1.050E+01	698	3.376E+00	739	9.698E-01	780	3.443E-01
617	2.032E+01	658	1.025E+01	699	3.288E+00	740	9.430E-01		
618	2.014E+01	659	1.001E+01	700	3.175E+00	741	9.081E-01		
619	1.998E+01	660	9.758E+00	701	3.088E+00	742	8.852E-01		
620	1.978E+01	661	9.532E+00	702	3.000E+00	743	8.487E-01		
621	1.964E+01	662	9.265E+00	703	2.900E+00	744	8.271E-01		
622	1.942E+01	663	9.081E+00	704	2.816E+00	745	8.052E-01		
623	1.926E+01	664	8.843E+00	705	2.736E+00	746	7.806E-01		
624	1.900E+01	665	8.619E+00	706	2.644E+00	747	7.564E-01		
625	1.880E+01	666	8.383E+00	707	2.564E+00	748	7.384E-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**

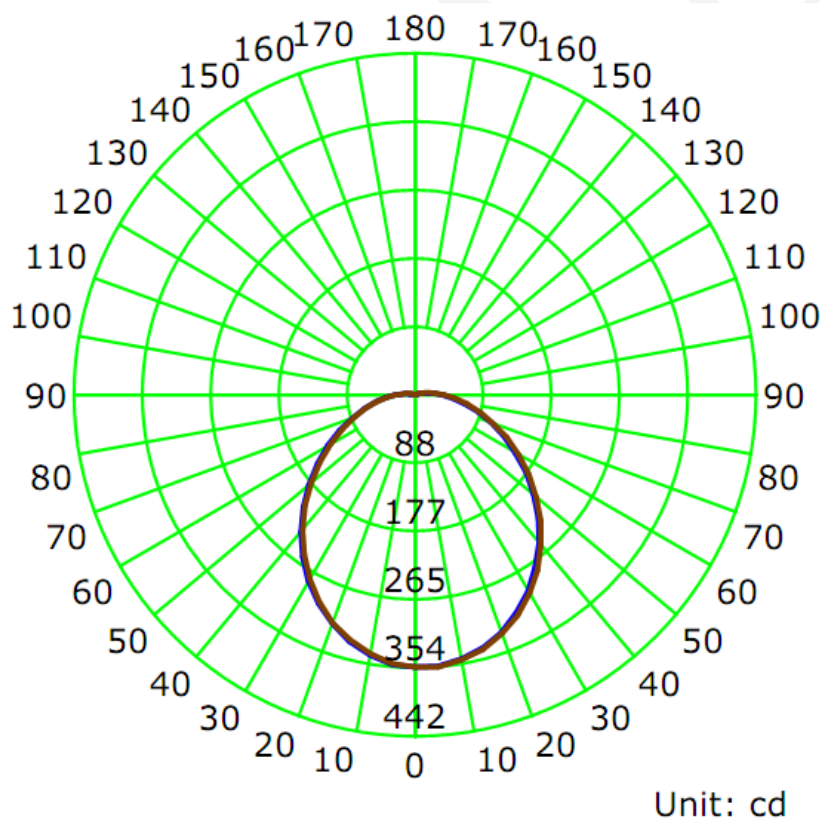
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1150	10.86	0.7880

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1044.9	96.27	352.8	1.21	1.21

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	105.9	105.7	105.9	106.0	105.9
Field Angle (10% I_{max}):	177.4	177.5	177.7	177.8	177.6

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	353	353	353	353	353	353	353	353
5.0°	353	354	354	353	354	352	352	350
10.0°	348	350	351	349	349	347	346	344
15.0°	340	341	343	342	341	339	337	334
20.0°	328	331	331	331	329	327	324	320
25.0°	312	317	317	317	316	312	309	304
30.0°	294	297	300	299	297	294	290	284
35.0°	273	278	279	279	277	272	268	262
40.0°	250	256	257	258	255	251	245	240
45.0°	226	231	234	233	230	226	221	214
50.0°	201	207	208	208	206	201	196	188
55.0°	176	182	183	183	181	176	170	164
60.0°	150	157	158	158	155	151	146	139
65.0°	127	132	134	133	131	127	122	116
70.0°	105	110	111	111	108	105	100	95
75.0°	85	89	90	90	88	84	80	75
80.0°	66	69	71	71	69	66	62	57
85.0°	50	53	54	54	52	50	47	43
90.0°	37	39	41	41	39	37	35	32
95.0°	27	28	29	29	28	26	25	22
100.0°	18	19	20	20	20	18	16	15
105.0°	12	13	13	14	13	12	11	11
110.0°	8	9	9	9	9	9	8	7
115.0°	5	6	6	6	6	6	5	5
120.0°	4	4	4	5	5	4	4	4
125.0°	2	3	3	3	3	3	3	2
130.0°	1	1	2	2	2	2	2	2
135.0°	0	1	2	1	1	1	1	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	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

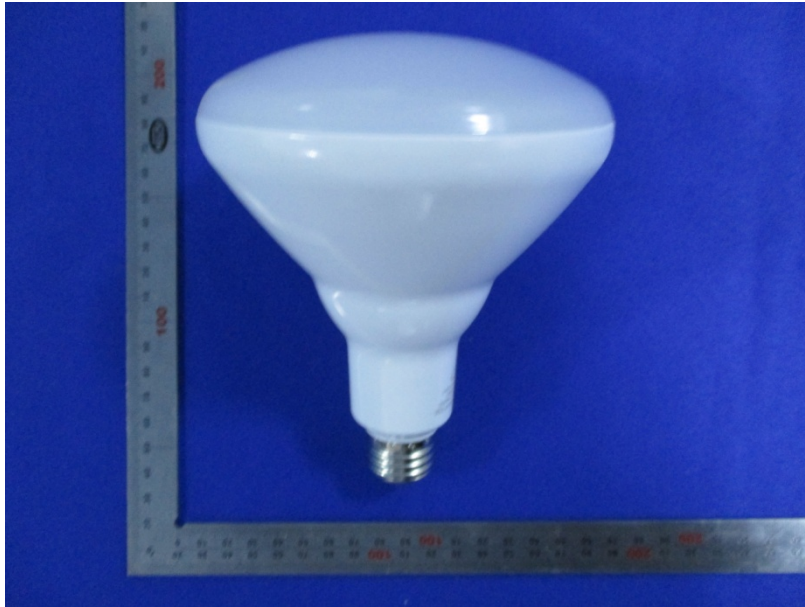
Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	353	353	353	353	353	353	353	353
5.0°	351	350	348	348	350	349	350	351
10.0°	342	342	339	340	341	342	344	346
15.0°	331	330	328	328	329	331	333	337
20.0°	316	315	313	313	315	317	320	323
25.0°	299	297	295	294	296	298	304	307
30.0°	278	276	274	274	276	279	284	288
35.0°	256	253	251	250	253	257	262	267
40.0°	232	229	227	226	229	233	238	243
45.0°	207	204	201	201	203	207	213	220
50.0°	181	178	175	176	177	181	187	194
55.0°	156	152	150	150	152	156	163	168
60.0°	131	128	126	126	128	132	137	144
65.0°	109	105	103	104	105	109	115	119
70.0°	88	85	83	83	85	88	93	98
75.0°	69	66	65	65	67	70	74	78
80.0°	52	50	49	49	51	53	57	61
85.0°	39	37	36	36	37	39	43	46
90.0°	28	27	26	26	27	29	31	33
95.0°	19	18	17	18	19	20	22	24
100.0°	13	13	12	12	13	13	15	16
105.0°	8	8	8	8	9	9	10	11
110.0°	6	5	6	6	6	7	7	7
115.0°	4	4	4	4	4	4	5	5
120.0°	2	3	2	2	3	3	4	4
125.0°	1	1	1	1	1	2	2	3
130.0°	0	0	0	0	1	1	1	1
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	8.4	0.81	0-5	8.4	0.81
5-10	24.9	2.38	0-10	33.3	3.19
10-15	40.3	3.86	0-15	73.7	7.05
15-20	54.2	5.18	0-20	127.8	12.23
20-25	65.8	6.30	0-25	193.6	18.53
25-30	74.9	7.17	0-30	268.6	25.70
30-35	81.2	7.77	0-35	349.7	33.47
35-40	84.5	8.09	0-40	434.2	41.56
40-45	84.9	8.12	0-45	519.1	49.68
45-50	82.5	7.89	0-50	601.6	57.57
50-55	77.8	7.45	0-55	679.4	65.02
55-60	71.2	6.81	0-60	750.6	71.83
60-65	63.1	6.04	0-65	813.7	77.87
65-70	54.4	5.21	0-70	868.1	83.08
70-75	45.4	4.35	0-75	913.6	87.43
75-80	36.6	3.50	0-80	950.1	90.93
80-85	28.4	2.71	0-85	978.5	93.64
85-90	21.3	2.04	0-90	999.7	95.67
90-95	15.4	1.47	0-95	1015.1	97.14
95-100	10.6	1.02	0-100	1025.7	98.16
100-105	7.1	0.68	0-105	1032.8	98.83
105-110	4.7	0.45	0-110	1037.4	99.28
110-115	3.1	0.30	0-115	1040.5	99.58
115-120	2.0	0.19	0-120	1042.6	99.77
120-125	1.3	0.12	0-125	1043.9	99.90
125-130	0.7	0.07	0-130	1044.6	99.96
130-135	0.3	0.03	0-135	1044.9	99.99
135-140	0.1	0.01	0-140	1044.9	100.00
140-145	0.0	0.00	0-145	1044.9	100.00
145-150	0.0	0.00	0-150	1044.9	100.00
150-155	0.0	0.00	0-155	1044.9	100.00
155-160	0.0	0.00	0-160	1044.9	100.00
160-165	0.0	0.00	0-165	1044.9	100.00
165-170	0.0	0.00	0-170	1044.9	100.00
170-175	0.0	0.00	0-175	1044.9	100.00
175-180	0.0	0.00	0-180	1044.9	100.00

6. Product Photo



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