



# 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/827**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Hill Liu <i>Hill Liu</i>
<b>Report Number:</b>	R1KS181214086-10
<b>Test Date:</b>	2018-12-15 to 2018-12-16
<b>Report Date:</b>	2018-12-19
<b>Reviewed By:</b>	Bill Xiong / EE Engineer <i>Bill Xiong</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
<b>Test Facility:</b>	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.
<b>Accreditation:</b>	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 2018-12-14 and used for testing.

Model Tested: 11BR40DIM/827  
 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: 2700K  
 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.

$4\pi$  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 ( $\gamma$ ) 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**

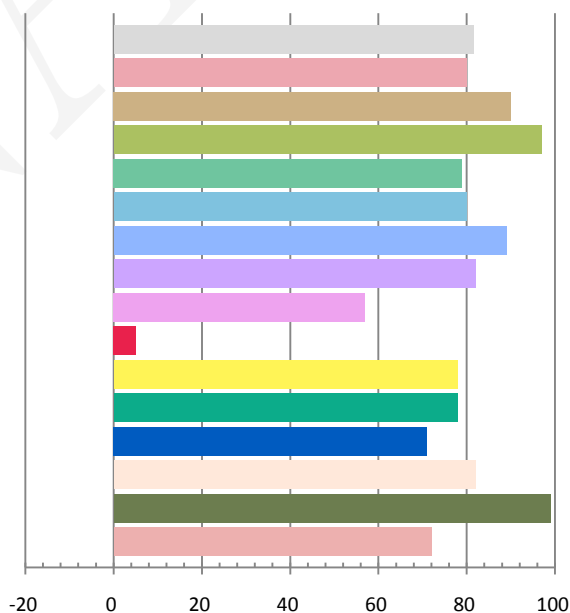
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.1161	10.93	0.7849	1011.60	92.52

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.120	2719	0.00056	0.4593	0.4120	0.2615	0.5278

### Color Rendering Index

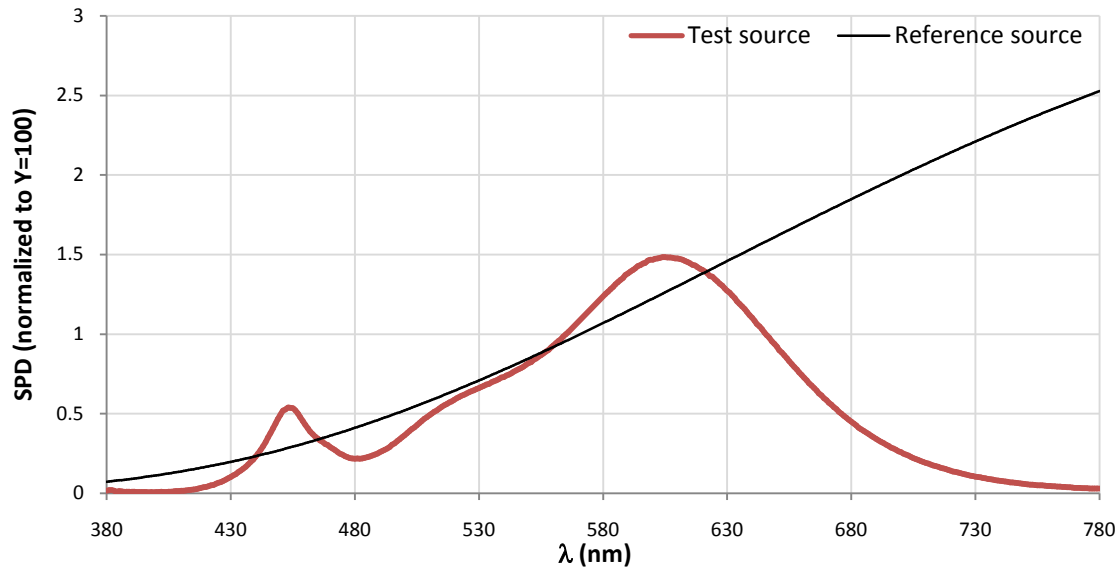
Ra			
81.6			
R1	R2	R3	R4
80	90	97	79
R5	R6	R7	R8
80	89	82	57
R9	R10	R11	R12
5	78	78	71
R13	R14	R15	
82	99	72	



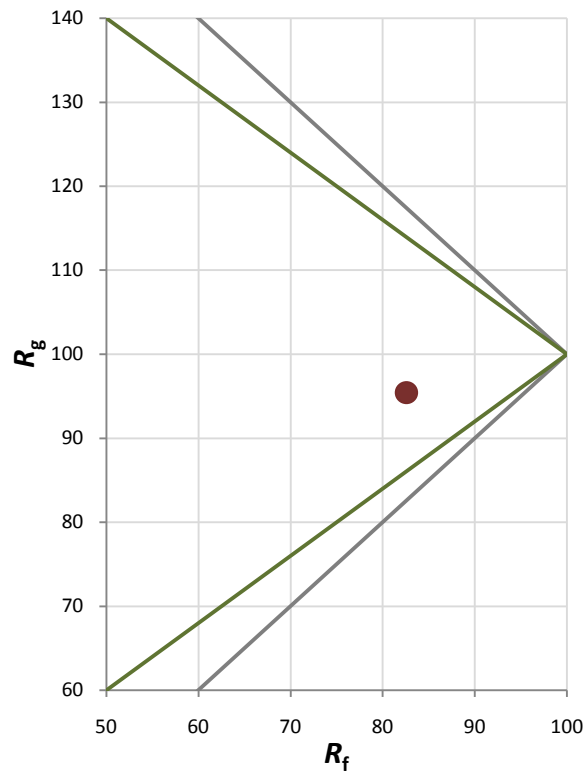
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	83
Gamut Index $R_g$	95

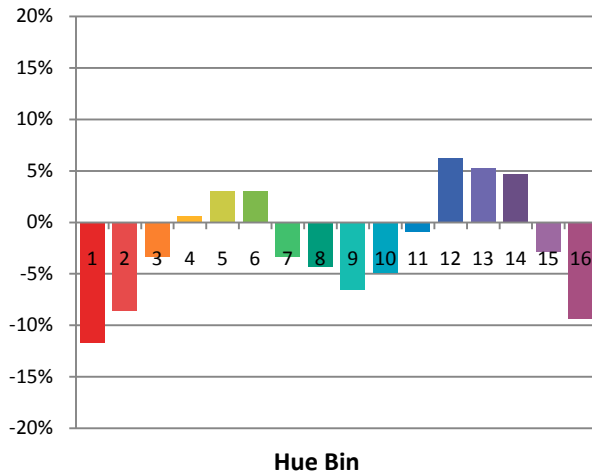
### Spectral Power Distribution Comparison



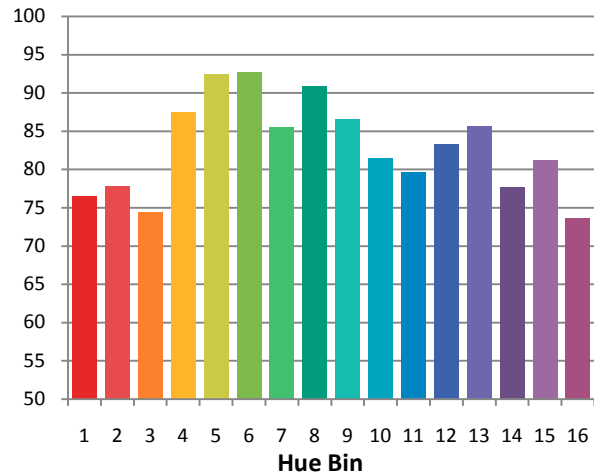
### Plot of $R_g$ versus $R_f$



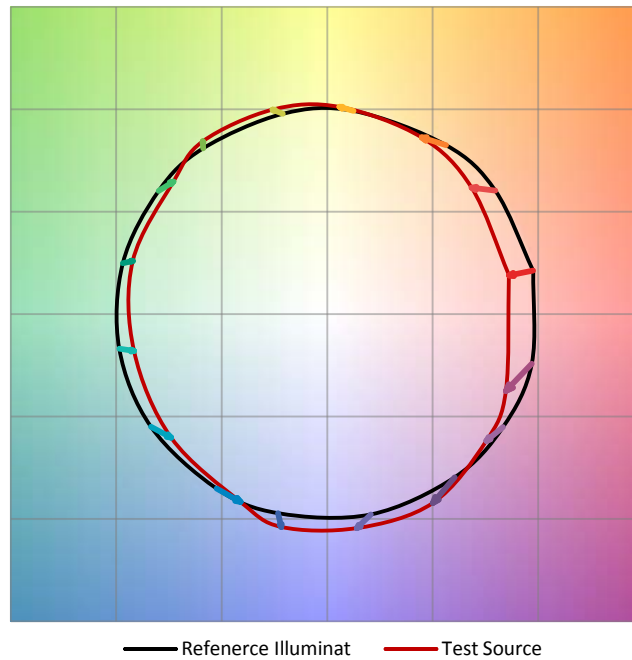
Chroma Shift by Hue



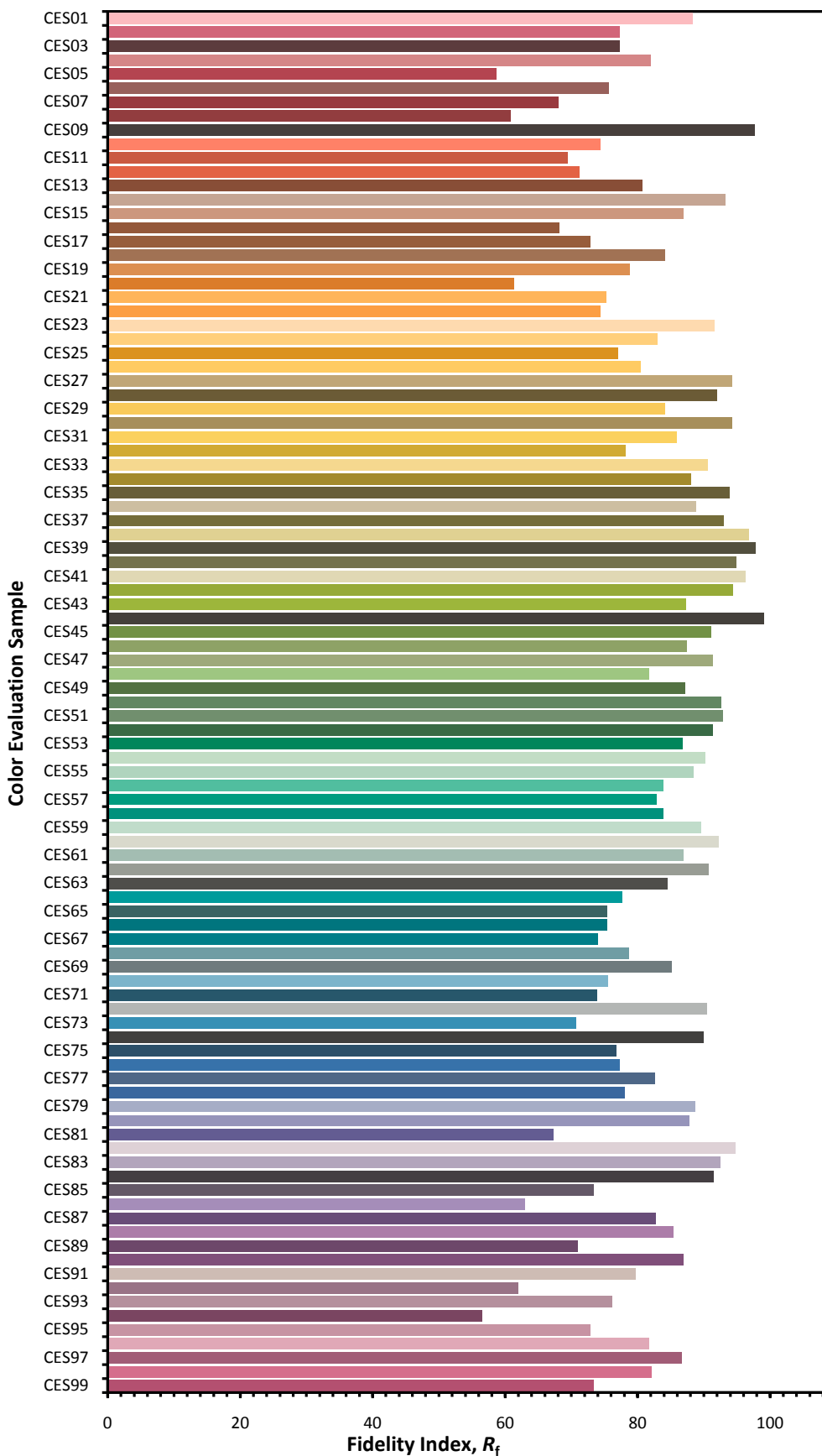
$R_f$  by Hue



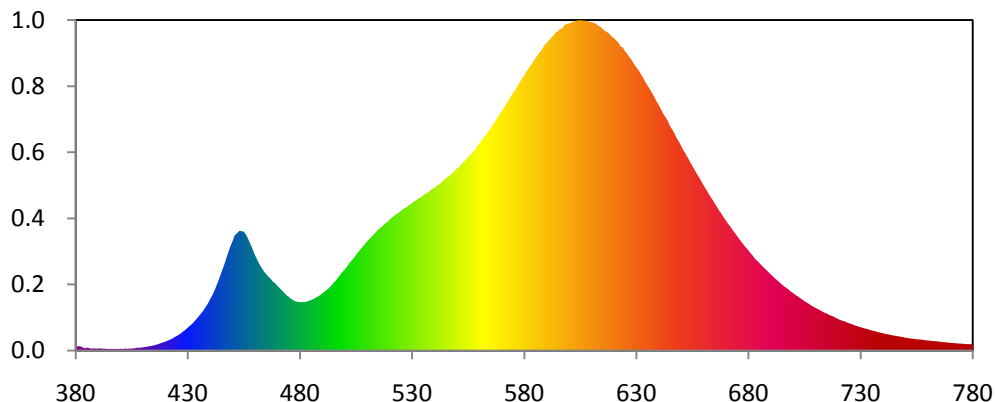
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

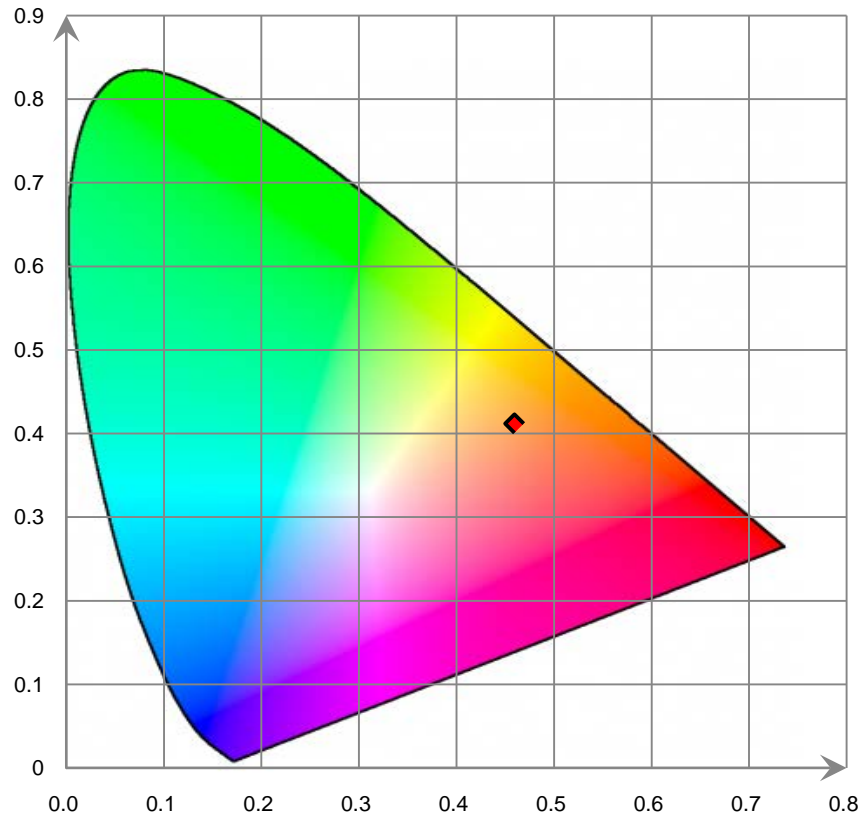


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.446E-01	421	6.587E-01	462	5.738E+00	503	5.970E+00	544	1.131E+01
381	2.907E-01	422	7.285E-01	463	5.501E+00	504	6.145E+00	545	1.143E+01
382	2.954E-01	423	7.834E-01	464	5.265E+00	505	6.337E+00	546	1.155E+01
383	2.372E-01	424	8.899E-01	465	5.091E+00	506	6.549E+00	547	1.166E+01
384	1.522E-01	425	9.660E-01	466	4.910E+00	507	6.733E+00	548	1.180E+01
385	1.981E-01	426	1.054E+00	467	4.783E+00	508	6.922E+00	549	1.196E+01
386	1.690E-01	427	1.154E+00	468	4.585E+00	509	7.085E+00	550	1.212E+01
387	1.321E-01	428	1.274E+00	469	4.488E+00	510	7.276E+00	551	1.221E+01
388	1.526E-01	429	1.386E+00	470	4.305E+00	511	7.414E+00	552	1.240E+01
389	1.403E-01	430	1.523E+00	471	4.166E+00	512	7.578E+00	553	1.254E+01
390	1.345E-01	431	1.655E+00	472	4.014E+00	513	7.721E+00	554	1.270E+01
391	1.563E-01	432	1.781E+00	473	3.849E+00	514	7.897E+00	555	1.286E+01
392	1.279E-01	433	1.953E+00	474	3.690E+00	515	8.039E+00	556	1.301E+01
393	1.274E-01	434	2.115E+00	475	3.592E+00	516	8.186E+00	557	1.319E+01
394	1.195E-01	435	2.293E+00	476	3.457E+00	517	8.296E+00	558	1.335E+01
395	1.046E-01	436	2.477E+00	477	3.361E+00	518	8.445E+00	559	1.358E+01
396	1.195E-01	437	2.668E+00	478	3.279E+00	519	8.555E+00	560	1.376E+01
397	1.009E-01	438	2.904E+00	479	3.248E+00	520	8.700E+00	561	1.396E+01
398	1.144E-01	439	3.131E+00	480	3.226E+00	521	8.838E+00	562	1.417E+01
399	1.002E-01	440	3.417E+00	481	3.231E+00	522	8.959E+00	563	1.435E+01
400	1.271E-01	441	3.690E+00	482	3.223E+00	523	9.078E+00	564	1.458E+01
401	1.076E-01	442	4.009E+00	483	3.254E+00	524	9.170E+00	565	1.479E+01
402	1.371E-01	443	4.384E+00	484	3.311E+00	525	9.288E+00	566	1.501E+01
403	1.242E-01	444	4.765E+00	485	3.363E+00	526	9.402E+00	567	1.521E+01
404	1.309E-01	445	5.190E+00	486	3.428E+00	527	9.498E+00	568	1.548E+01
405	1.365E-01	446	5.584E+00	487	3.512E+00	528	9.577E+00	569	1.571E+01
406	1.490E-01	447	6.034E+00	488	3.596E+00	529	9.704E+00	570	1.591E+01
407	1.798E-01	448	6.503E+00	489	3.688E+00	530	9.807E+00	571	1.615E+01
408	1.955E-01	449	6.915E+00	490	3.798E+00	531	9.924E+00	572	1.643E+01
409	1.977E-01	450	7.284E+00	491	3.921E+00	532	9.994E+00	573	1.661E+01
410	2.215E-01	451	7.679E+00	492	4.039E+00	533	1.013E+01	574	1.689E+01
411	2.402E-01	452	7.797E+00	493	4.166E+00	534	1.019E+01	575	1.713E+01
412	2.702E-01	453	7.970E+00	494	4.326E+00	535	1.032E+01	576	1.732E+01
413	2.959E-01	454	7.948E+00	495	4.509E+00	536	1.043E+01	577	1.761E+01
414	3.239E-01	455	7.910E+00	496	4.653E+00	537	1.051E+01	578	1.782E+01
415	3.487E-01	456	7.716E+00	497	4.846E+00	538	1.062E+01	579	1.810E+01
416	3.932E-01	457	7.412E+00	498	5.037E+00	539	1.077E+01	580	1.828E+01
417	4.410E-01	458	7.086E+00	499	5.221E+00	540	1.081E+01	581	1.856E+01
418	4.976E-01	459	6.726E+00	500	5.392E+00	541	1.096E+01	582	1.876E+01
419	5.512E-01	460	6.356E+00	501	5.581E+00	542	1.105E+01	583	1.898E+01
420	5.979E-01	461	6.039E+00	502	5.802E+00	543	1.116E+01	584	1.919E+01

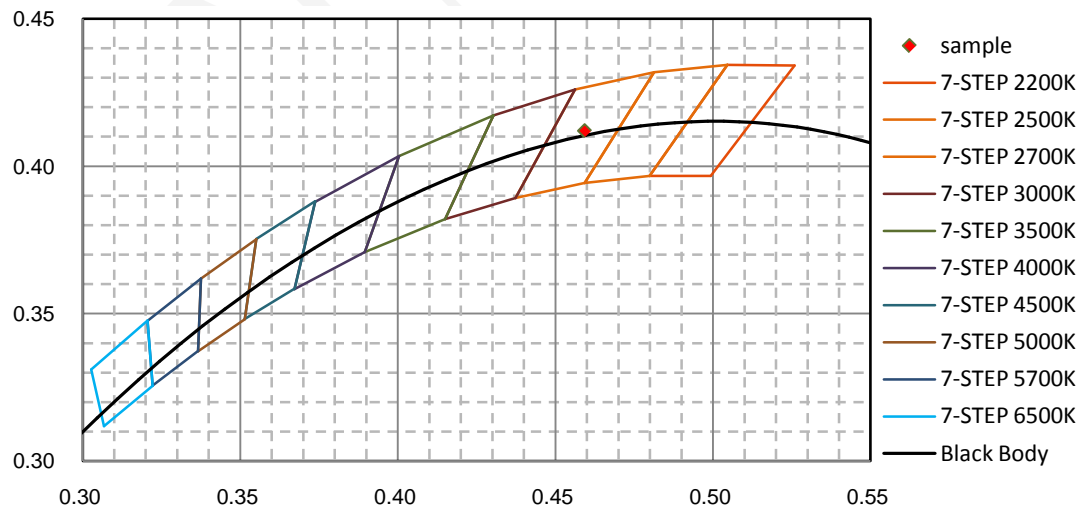


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.944E+01	626	1.973E+01	667	9.302E+00	708	3.003E+00	749	8.974E-01
586	1.966E+01	627	1.950E+01	668	9.105E+00	709	2.915E+00	750	8.581E-01
587	1.985E+01	628	1.931E+01	669	8.850E+00	710	2.838E+00	751	8.416E-01
588	2.004E+01	629	1.905E+01	670	8.648E+00	711	2.761E+00	752	8.142E-01
589	2.030E+01	630	1.884E+01	671	8.416E+00	712	2.686E+00	753	7.982E-01
590	2.045E+01	631	1.866E+01	672	8.246E+00	713	2.594E+00	754	7.802E-01
591	2.062E+01	632	1.841E+01	673	8.007E+00	714	2.514E+00	755	7.570E-01
592	2.079E+01	633	1.816E+01	674	7.823E+00	715	2.461E+00	756	7.459E-01
593	2.093E+01	634	1.786E+01	675	7.604E+00	716	2.376E+00	757	7.365E-01
594	2.114E+01	635	1.763E+01	676	7.412E+00	717	2.319E+00	758	7.099E-01
595	2.123E+01	636	1.740E+01	677	7.216E+00	718	2.255E+00	759	6.871E-01
596	2.139E+01	637	1.714E+01	678	7.013E+00	719	2.181E+00	760	6.759E-01
597	2.143E+01	638	1.688E+01	679	6.834E+00	720	2.103E+00	761	6.639E-01
598	2.164E+01	639	1.658E+01	680	6.667E+00	721	2.034E+00	762	6.428E-01
599	2.172E+01	640	1.633E+01	681	6.474E+00	722	1.987E+00	763	6.308E-01
600	2.174E+01	641	1.605E+01	682	6.304E+00	723	1.938E+00	764	6.230E-01
601	2.182E+01	642	1.576E+01	683	6.093E+00	724	1.874E+00	765	5.963E-01
602	2.186E+01	643	1.553E+01	684	5.967E+00	725	1.818E+00	766	5.829E-01
603	2.192E+01	644	1.528E+01	685	5.806E+00	726	1.767E+00	767	5.688E-01
604	2.197E+01	645	1.494E+01	686	5.654E+00	727	1.709E+00	768	5.522E-01
605	2.196E+01	646	1.471E+01	687	5.495E+00	728	1.647E+00	769	5.410E-01
606	2.195E+01	647	1.446E+01	688	5.367E+00	729	1.614E+00	770	5.150E-01
607	2.194E+01	648	1.413E+01	689	5.206E+00	730	1.560E+00	771	5.127E-01
608	2.192E+01	649	1.390E+01	690	5.070E+00	731	1.510E+00	772	4.978E-01
609	2.186E+01	650	1.362E+01	691	4.923E+00	732	1.472E+00	773	4.806E-01
610	2.184E+01	651	1.332E+01	692	4.778E+00	733	1.435E+00	774	4.715E-01
611	2.180E+01	652	1.309E+01	693	4.660E+00	734	1.385E+00	775	4.644E-01
612	2.173E+01	653	1.282E+01	694	4.518E+00	735	1.340E+00	776	4.500E-01
613	2.161E+01	654	1.255E+01	695	4.392E+00	736	1.307E+00	777	4.379E-01
614	2.153E+01	655	1.230E+01	696	4.265E+00	737	1.265E+00	778	4.335E-01
615	2.140E+01	656	1.203E+01	697	4.163E+00	738	1.225E+00	779	4.341E-01
616	2.125E+01	657	1.175E+01	698	4.053E+00	739	1.192E+00	780	4.345E-01
617	2.119E+01	658	1.153E+01	699	3.906E+00	740	1.154E+00		
618	2.106E+01	659	1.126E+01	700	3.827E+00	741	1.119E+00		
619	2.089E+01	660	1.100E+01	701	3.695E+00	742	1.089E+00		
620	2.078E+01	661	1.075E+01	702	3.609E+00	743	1.063E+00		
621	2.063E+01	662	1.050E+01	703	3.499E+00	744	1.024E+00		
622	2.049E+01	663	1.025E+01	704	3.397E+00	745	9.997E-01		
623	2.022E+01	664	1.003E+01	705	3.288E+00	746	9.778E-01		
624	2.016E+01	665	9.793E+00	706	3.197E+00	747	9.527E-01		
625	1.991E+01	666	9.550E+00	707	3.104E+00	748	9.214E-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**

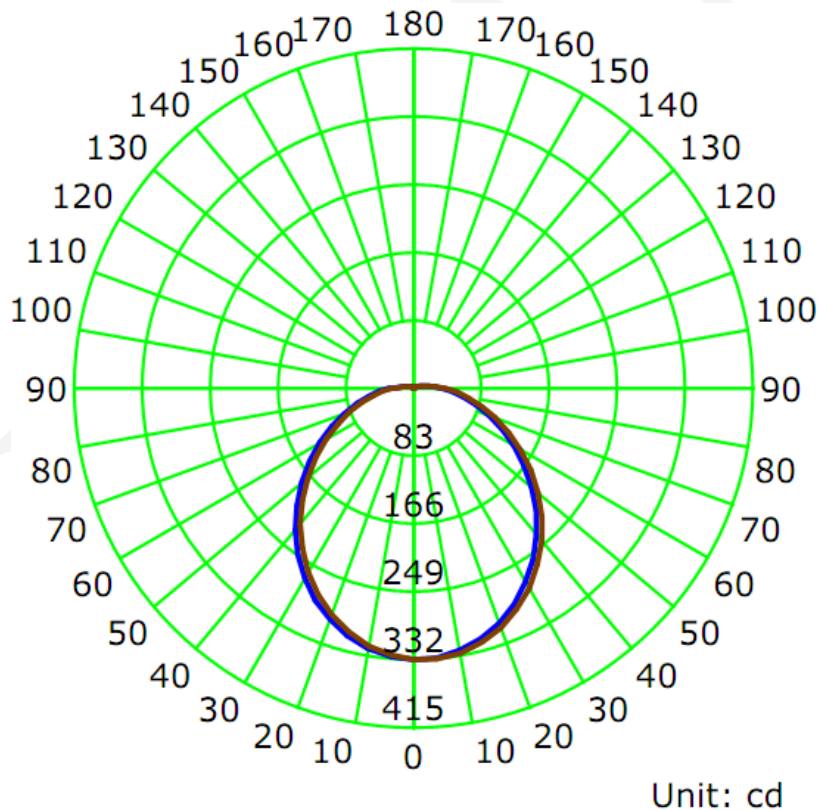
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1180	10.93	0.7740

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
1013.5	92.78	332.5	1.22	1.22

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	107.7	107.8	107.7	107.6	107.7
Field Angle (10% $I_{max}$ ):	180.1	180.1	180.1	180.0	180.1

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	333	333	333	333	333	333	333	333
5.0°	331	332	332	333	333	333	332	331
10.0°	326	328	329	330	329	329	327	326
15.0°	318	320	322	323	322	321	320	317
20.0°	306	309	311	312	312	311	308	306
25.0°	292	295	297	299	299	297	294	291
30.0°	275	279	281	283	283	281	278	274
35.0°	255	260	263	265	264	262	259	255
40.0°	235	239	243	244	244	242	238	234
45.0°	212	217	221	222	222	220	216	211
50.0°	189	194	198	199	199	197	192	187
55.0°	165	171	174	176	175	173	169	163
60.0°	142	147	151	152	151	149	145	140
65.0°	120	124	128	129	129	126	122	118
70.0°	99	103	106	107	107	105	101	97
75.0°	80	83	86	87	87	85	81	78
80.0°	63	66	68	69	69	67	64	61
85.0°	48	51	52	53	53	51	49	46
90.0°	35	38	39	40	40	38	36	34
95.0°	25	27	28	29	29	28	26	24
100.0°	18	19	20	20	20	20	19	17
105.0°	13	14	14	14	14	14	13	12
110.0°	9	10	10	10	10	10	9	9
115.0°	7	7	7	8	8	7	7	7
120.0°	5	5	6	6	6	5	5	5
125.0°	4	4	4	4	4	4	4	4
130.0°	3	3	3	3	3	3	3	3
135.0°	2	2	2	2	2	2	2	2
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
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.)**

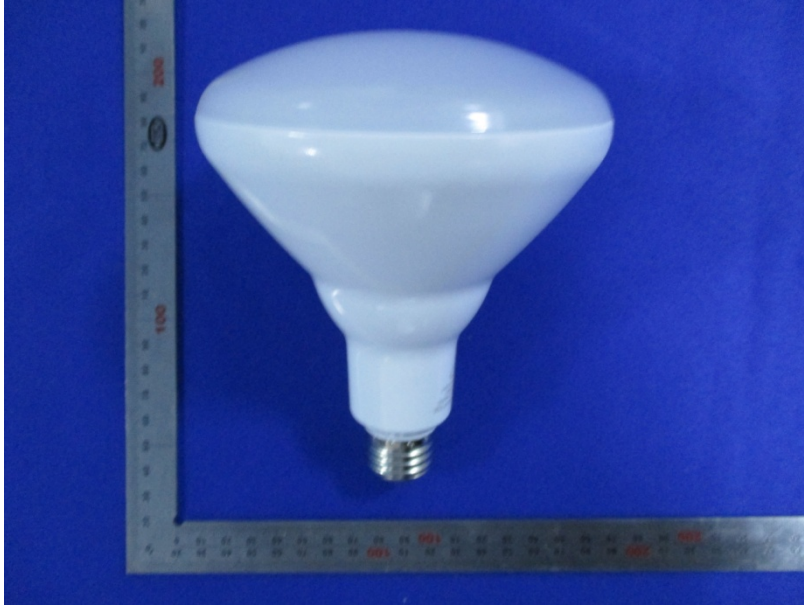
$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	333	333	333	333	333	333	333	333
5.0°	330	329	328	328	328	329	329	330
10.0°	324	322	321	321	320	321	322	324
15.0°	314	312	310	310	309	311	312	314
20.0°	302	299	297	295	295	297	299	302
25.0°	286	283	280	279	279	280	283	286
30.0°	269	265	262	260	260	262	265	269
35.0°	249	244	241	239	239	241	245	249
40.0°	227	223	219	217	217	219	223	227
45.0°	204	199	195	194	194	196	200	205
50.0°	180	175	171	170	170	172	176	181
55.0°	157	152	148	146	147	149	153	158
60.0°	133	129	125	124	124	127	130	135
65.0°	111	107	104	103	103	105	109	113
70.0°	91	87	84	83	83	85	89	93
75.0°	72	69	67	66	66	68	71	74
80.0°	56	53	51	51	51	52	55	58
85.0°	42	40	38	38	38	39	41	44
90.0°	31	29	28	27	28	29	30	32
95.0°	22	21	20	20	20	20	22	23
100.0°	16	15	14	14	14	14	15	16
105.0°	11	11	10	10	10	10	11	12
110.0°	8	8	8	7	7	8	8	8
115.0°	6	6	6	6	6	6	6	6
120.0°	5	4	4	4	4	4	5	5
125.0°	3	3	3	3	3	3	3	4
130.0°	2	2	2	2	2	2	2	3
135.0°	2	2	1	1	1	1	2	2
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	0	1	1
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)	%
0-5	7.9	0.78
5-10	23.4	2.31
10-15	38.0	3.75
15-20	51.1	5.04
20-25	62.1	6.13
25-30	70.9	6.99
30-35	77.1	7.60
35-40	80.5	7.94
40-45	81.2	8.01
45-50	79.3	7.82
50-55	75.1	7.41
55-60	69.1	6.81
60-65	61.6	6.08
65-70	53.3	5.26
70-75	44.8	4.42
75-80	36.3	3.59
80-85	28.5	2.81
85-90	21.5	2.12
90-95	15.7	1.55
95-100	11.1	1.10
100-105	7.8	0.77
105-110	5.4	0.53
110-115	3.9	0.38
115-120	2.8	0.27
120-125	2.0	0.19
125-130	1.3	0.13
130-135	0.9	0.09
135-140	0.5	0.05
140-145	0.3	0.03
145-150	0.1	0.01
150-155	0.1	0.01
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	7.9	0.78
0-10	31.4	3.10
0-15	69.4	6.85
0-20	120.5	11.88
0-25	182.6	18.02
0-30	253.5	25.01
0-35	330.5	32.61
0-40	411.1	40.56
0-45	492.2	48.57
0-50	571.5	56.39
0-55	646.6	63.80
0-60	715.7	70.61
0-65	777.3	76.69
0-70	830.6	81.95
0-75	875.4	86.37
0-80	911.7	89.95
0-85	940.2	92.76
0-90	961.7	94.89
0-95	977.4	96.44
0-100	988.5	97.53
0-105	996.3	98.30
0-110	1001.7	98.83
0-115	1005.6	99.21
0-120	1008.3	99.49
0-125	1010.3	99.68
0-130	1011.7	99.82
0-135	1012.5	99.90
0-140	1013.0	99.95
0-145	1013.3	99.98
0-150	1013.4	99.99
0-155	1013.5	100.00
0-160	1013.5	100.00
0-165	1013.5	100.00
0-170	1013.5	100.00
0-175	1013.5	100.00
0-180	1013.5	100.00

## 6. Product Photo



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