



# 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/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>	R1KS181209084-10
<b>Test Date:</b>	2018-12-14 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 2018-12-09 and used for testing.

Model Tested: 15.5BR40DIM/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: 15.5W  
 Nominal CCT: 2700K  
 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.

$4\pi$  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**

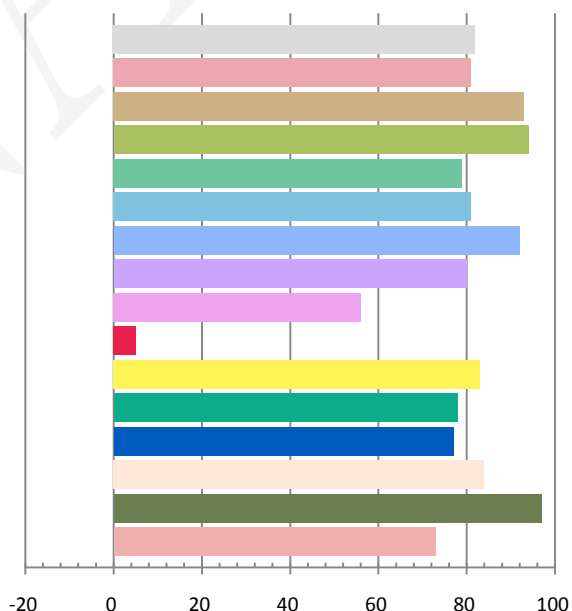
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.1647	14.46	0.7318	1179.4	81.56

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.659	2773	-0.00120	0.4520	0.4055	0.2597	0.5242

### Color Rendering Index

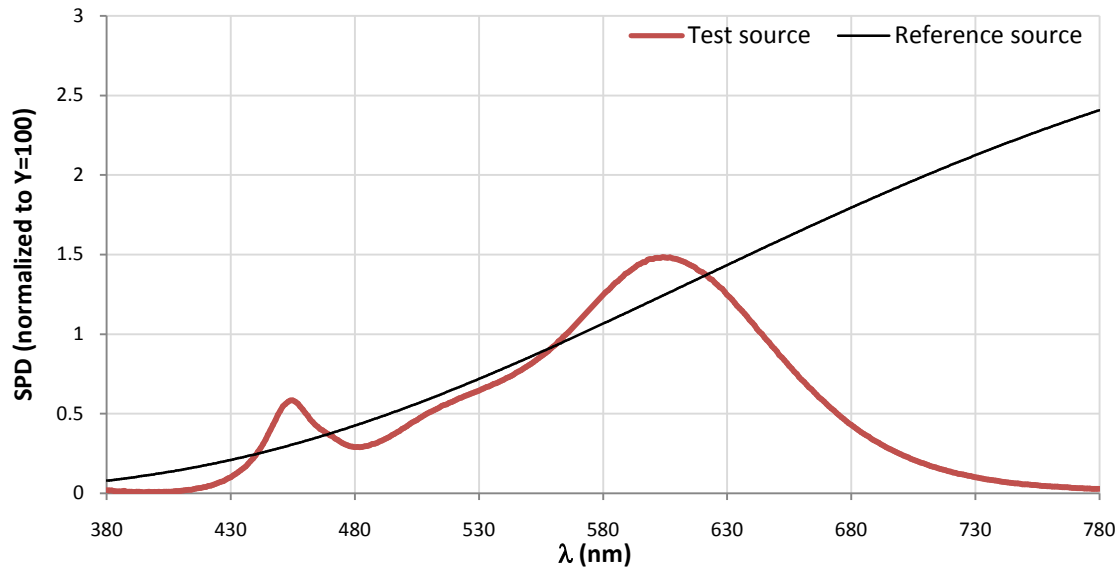
Ra			
81.9			
R1	R2	R3	R4
81	93	94	79
R5	R6	R7	R8
81	92	80	56
R9	R10	R11	R12
5	83	78	77
R13	R14	R15	
84	97	73	



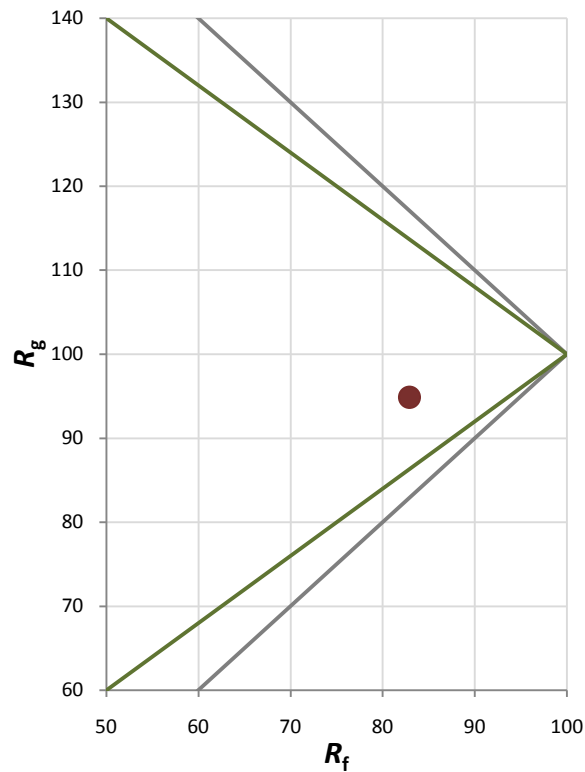
### Fidelity Index and Gamut Index

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

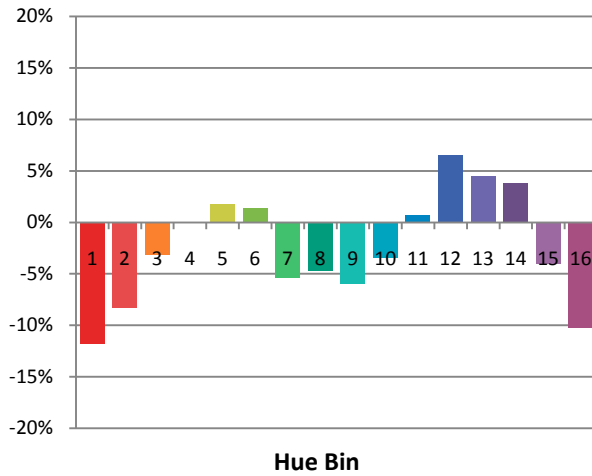
### Spectral Power Distribution Comparison



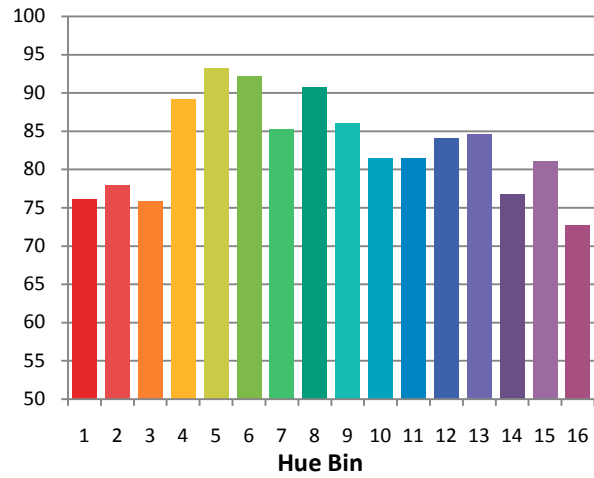
### Plot of $R_g$ versus $R_f$



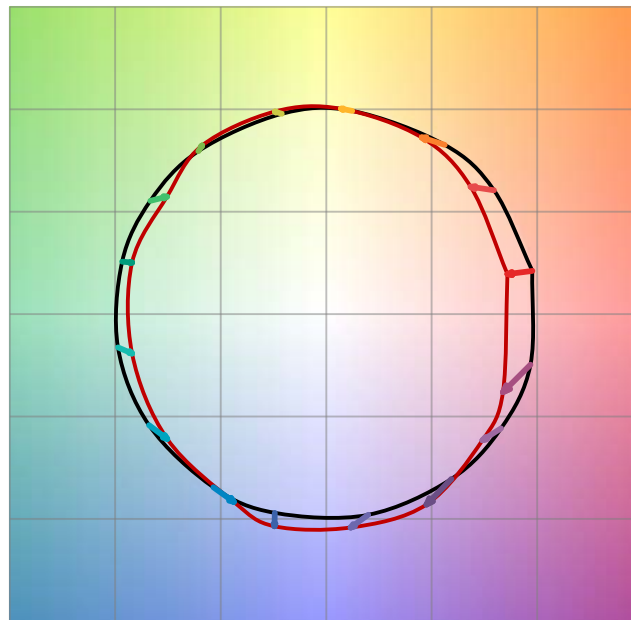
**Chroma Shift by Hue**



**$R_f$  by Hue**

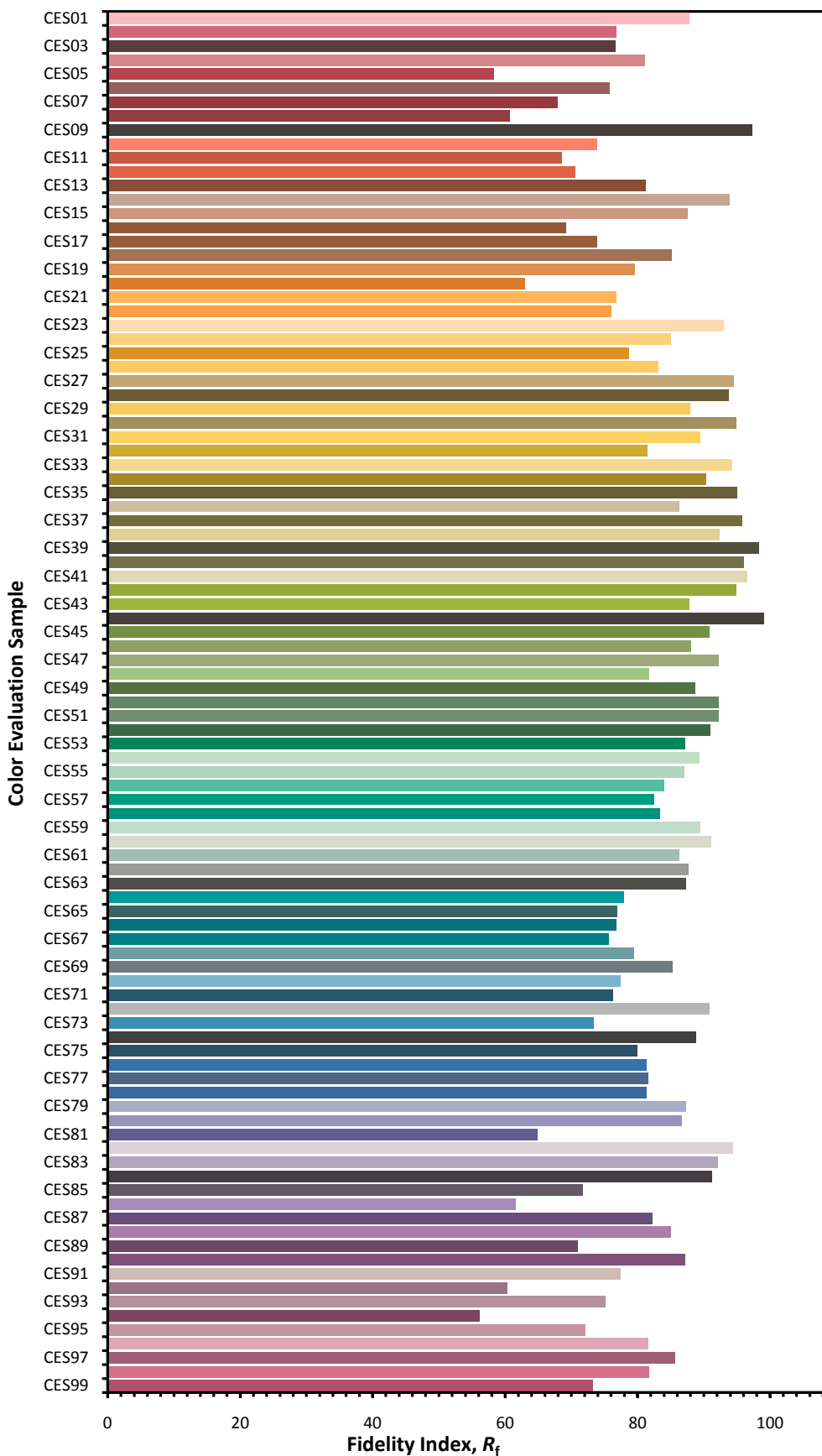


**Color Vector Graphic**

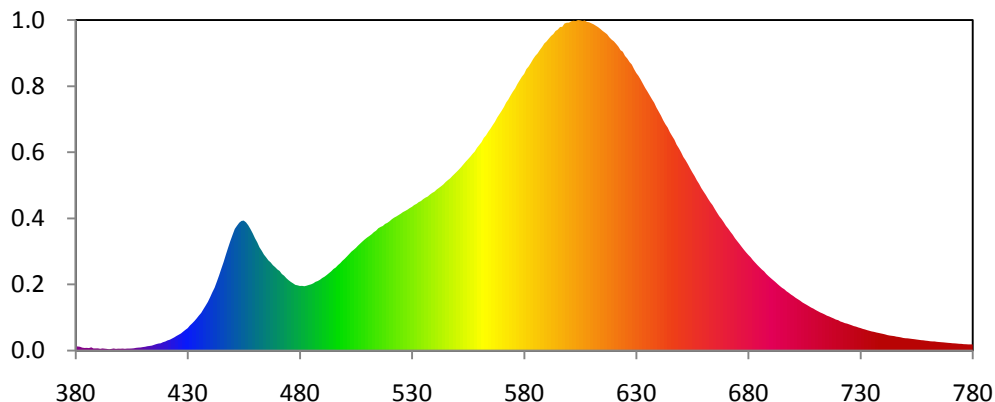


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

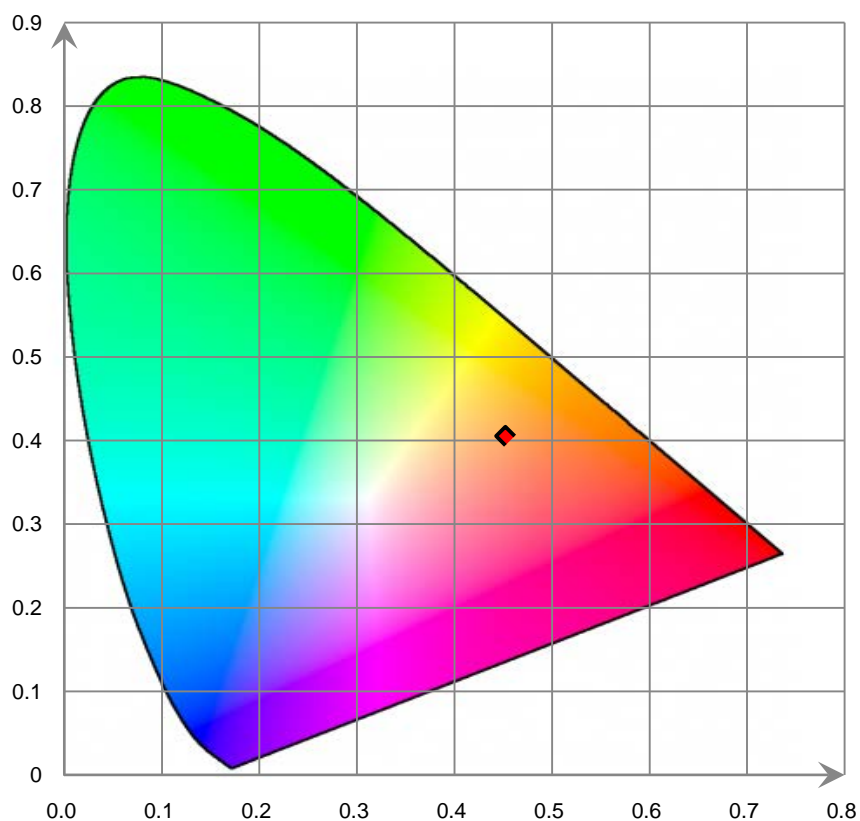


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.423E-01	421	7.941E-01	462	8.012E+00	503	7.672E+00	544	1.288E+01
381	3.224E-01	422	8.448E-01	463	7.743E+00	504	7.813E+00	545	1.307E+01
382	3.006E-01	423	9.347E-01	464	7.443E+00	505	7.962E+00	546	1.321E+01
383	2.330E-01	424	1.028E+00	465	7.225E+00	506	8.147E+00	547	1.335E+01
384	2.065E-01	425	1.138E+00	466	6.990E+00	507	8.311E+00	548	1.353E+01
385	2.151E-01	426	1.232E+00	467	6.835E+00	508	8.473E+00	549	1.370E+01
386	1.989E-01	427	1.332E+00	468	6.621E+00	509	8.626E+00	550	1.387E+01
387	2.581E-01	428	1.476E+00	469	6.470E+00	510	8.766E+00	551	1.405E+01
388	1.728E-01	429	1.614E+00	470	6.292E+00	511	8.887E+00	552	1.424E+01
389	1.755E-01	430	1.743E+00	471	6.169E+00	512	9.015E+00	553	1.445E+01
390	1.762E-01	431	1.949E+00	472	5.936E+00	513	9.180E+00	554	1.465E+01
391	1.397E-01	432	2.113E+00	473	5.806E+00	514	9.298E+00	555	1.484E+01
392	1.743E-01	433	2.293E+00	474	5.614E+00	515	9.485E+00	556	1.503E+01
393	1.550E-01	434	2.496E+00	475	5.458E+00	516	9.584E+00	557	1.525E+01
394	1.361E-01	435	2.719E+00	476	5.325E+00	517	9.662E+00	558	1.543E+01
395	1.008E-01	436	2.918E+00	477	5.215E+00	518	9.819E+00	559	1.572E+01
396	1.363E-01	437	3.205E+00	478	5.096E+00	519	9.901E+00	560	1.593E+01
397	1.681E-01	438	3.488E+00	479	5.061E+00	520	1.003E+01	561	1.615E+01
398	1.369E-01	439	3.778E+00	480	5.011E+00	521	1.018E+01	562	1.648E+01
399	1.526E-01	440	4.139E+00	481	5.019E+00	522	1.030E+01	563	1.668E+01
400	1.482E-01	441	4.524E+00	482	4.991E+00	523	1.039E+01	564	1.696E+01
401	1.602E-01	442	4.877E+00	483	5.032E+00	524	1.050E+01	565	1.720E+01
402	1.416E-01	443	5.344E+00	484	5.088E+00	525	1.061E+01	566	1.747E+01
403	1.626E-01	444	5.829E+00	485	5.136E+00	526	1.074E+01	567	1.773E+01
404	1.625E-01	445	6.348E+00	486	5.215E+00	527	1.083E+01	568	1.806E+01
405	1.678E-01	446	6.856E+00	487	5.332E+00	528	1.092E+01	569	1.833E+01
406	1.849E-01	447	7.420E+00	488	5.396E+00	529	1.105E+01	570	1.859E+01
407	2.178E-01	448	7.962E+00	489	5.496E+00	530	1.115E+01	571	1.888E+01
408	2.360E-01	449	8.486E+00	490	5.630E+00	531	1.128E+01	572	1.923E+01
409	2.458E-01	450	8.966E+00	491	5.730E+00	532	1.137E+01	573	1.947E+01
410	2.766E-01	451	9.431E+00	492	5.861E+00	533	1.151E+01	574	1.979E+01
411	3.009E-01	452	9.682E+00	493	6.005E+00	534	1.159E+01	575	2.007E+01
412	3.403E-01	453	9.916E+00	494	6.148E+00	535	1.174E+01	576	2.032E+01
413	3.640E-01	454	1.005E+01	495	6.330E+00	536	1.186E+01	577	2.066E+01
414	3.901E-01	455	1.008E+01	496	6.440E+00	537	1.194E+01	578	2.094E+01
415	4.489E-01	456	9.940E+00	497	6.626E+00	538	1.209E+01	579	2.123E+01
416	5.073E-01	457	9.712E+00	498	6.774E+00	539	1.222E+01	580	2.144E+01
417	5.504E-01	458	9.419E+00	499	6.963E+00	540	1.232E+01	581	2.181E+01
418	5.717E-01	459	9.088E+00	500	7.117E+00	541	1.248E+01	582	2.202E+01
419	6.549E-01	460	8.715E+00	501	7.298E+00	542	1.261E+01	583	2.229E+01
420	7.083E-01	461	8.400E+00	502	7.484E+00	543	1.274E+01	584	2.259E+01

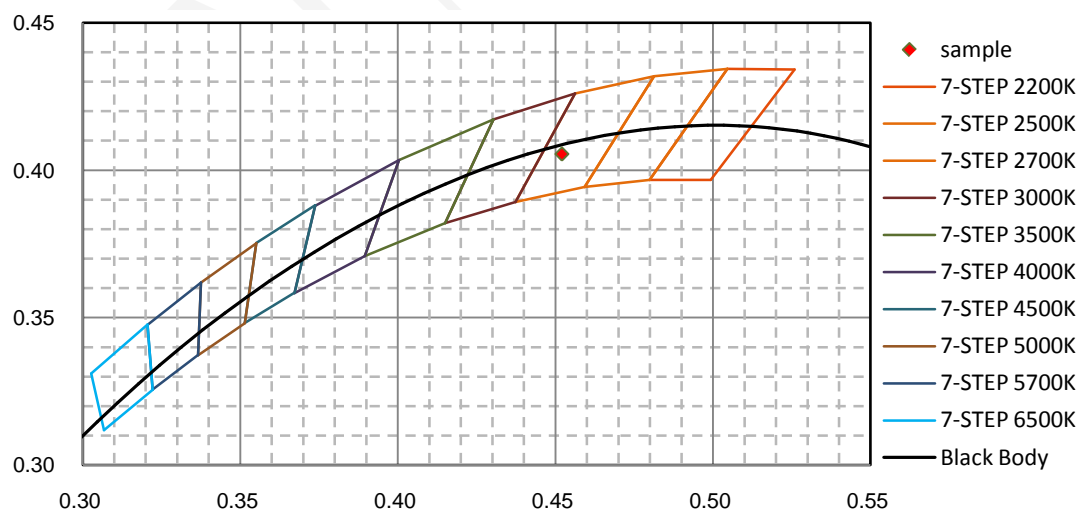


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.284E+01	626	2.263E+01	667	1.042E+01	708	3.336E+00	749	9.841E-01
586	2.303E+01	627	2.236E+01	668	1.020E+01	709	3.255E+00	750	9.601E-01
587	2.330E+01	628	2.217E+01	669	9.946E+00	710	3.146E+00	751	9.530E-01
588	2.353E+01	629	2.182E+01	670	9.668E+00	711	3.053E+00	752	9.300E-01
589	2.380E+01	630	2.151E+01	671	9.451E+00	712	2.961E+00	753	9.062E-01
590	2.396E+01	631	2.128E+01	672	9.206E+00	713	2.889E+00	754	8.873E-01
591	2.417E+01	632	2.099E+01	673	8.983E+00	714	2.805E+00	755	8.607E-01
592	2.438E+01	633	2.067E+01	674	8.711E+00	715	2.712E+00	756	8.377E-01
593	2.453E+01	634	2.035E+01	675	8.488E+00	716	2.649E+00	757	8.135E-01
594	2.477E+01	635	2.007E+01	676	8.271E+00	717	2.569E+00	758	7.990E-01
595	2.488E+01	636	1.978E+01	677	8.039E+00	718	2.495E+00	759	7.731E-01
596	2.507E+01	637	1.948E+01	678	7.817E+00	719	2.407E+00	760	7.566E-01
597	2.509E+01	638	1.921E+01	679	7.607E+00	720	2.362E+00	761	7.271E-01
598	2.535E+01	639	1.883E+01	680	7.411E+00	721	2.261E+00	762	7.142E-01
599	2.541E+01	640	1.852E+01	681	7.235E+00	722	2.203E+00	763	7.123E-01
600	2.542E+01	641	1.821E+01	682	7.013E+00	723	2.132E+00	764	6.853E-01
601	2.553E+01	642	1.785E+01	683	6.823E+00	724	2.093E+00	765	6.681E-01
602	2.556E+01	643	1.754E+01	684	6.634E+00	725	2.031E+00	766	6.538E-01
603	2.554E+01	644	1.728E+01	685	6.458E+00	726	1.970E+00	767	6.416E-01
604	2.562E+01	645	1.692E+01	686	6.288E+00	727	1.902E+00	768	6.233E-01
605	2.560E+01	646	1.663E+01	687	6.141E+00	728	1.859E+00	769	6.046E-01
606	2.554E+01	647	1.635E+01	688	5.938E+00	729	1.795E+00	770	5.911E-01
607	2.559E+01	648	1.596E+01	689	5.770E+00	730	1.746E+00	771	5.705E-01
608	2.547E+01	649	1.568E+01	690	5.618E+00	731	1.687E+00	772	5.627E-01
609	2.544E+01	650	1.536E+01	691	5.467E+00	732	1.640E+00	773	5.485E-01
610	2.536E+01	651	1.500E+01	692	5.320E+00	733	1.583E+00	774	5.300E-01
611	2.528E+01	652	1.474E+01	693	5.160E+00	734	1.535E+00	775	5.251E-01
612	2.517E+01	653	1.445E+01	694	5.009E+00	735	1.487E+00	776	5.033E-01
613	2.506E+01	654	1.412E+01	695	4.867E+00	736	1.455E+00	777	4.978E-01
614	2.493E+01	655	1.381E+01	696	4.757E+00	737	1.408E+00	778	4.841E-01
615	2.477E+01	656	1.353E+01	697	4.600E+00	738	1.374E+00	779	4.847E-01
616	2.465E+01	657	1.320E+01	698	4.480E+00	739	1.335E+00	780	4.852E-01
617	2.451E+01	658	1.293E+01	699	4.346E+00	740	1.299E+00		
618	2.428E+01	659	1.260E+01	700	4.233E+00	741	1.256E+00		
619	2.410E+01	660	1.233E+01	701	4.099E+00	742	1.204E+00		
620	2.397E+01	661	1.207E+01	702	3.990E+00	743	1.171E+00		
621	2.377E+01	662	1.177E+01	703	3.879E+00	744	1.147E+00		
622	2.356E+01	663	1.150E+01	704	3.746E+00	745	1.125E+00		
623	2.328E+01	664	1.128E+01	705	3.644E+00	746	1.085E+00		
624	2.316E+01	665	1.098E+01	706	3.545E+00	747	1.061E+00		
625	2.283E+01	666	1.069E+01	707	3.441E+00	748	1.028E+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**

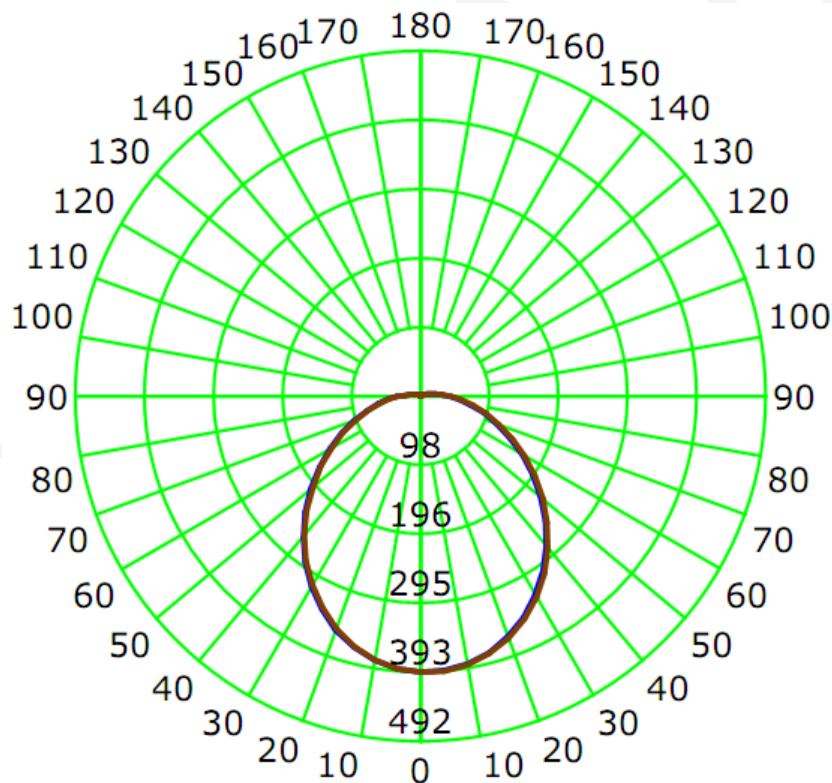
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1660	14.47	0.7250

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
1181.4	81.69	393.6	1.21	1.21

### Luminous Intensity Distribution



Unit: cd

	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	106.0	106.2	106.2	106.1	106.1
Field Angle (10% $I_{max}$ ):	179.0	179.1	179.1	179.1	179.1

**Luminous Intensity (cd) Distribution Data**

$\gamma \backslash C$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	394	394	394	394	394	394	394	394
5.0°	393	393	394	394	393	393	392	391
10.0°	388	389	389	389	389	388	386	385
15.0°	378	380	381	381	380	378	376	374
20.0°	365	367	368	368	367	365	362	359
25.0°	348	350	352	352	350	348	345	341
30.0°	327	331	332	332	330	327	324	319
35.0°	304	308	310	309	308	304	300	295
40.0°	278	282	284	284	283	279	274	269
45.0°	251	255	258	258	255	252	247	241
50.0°	223	227	229	230	228	224	218	213
55.0°	194	198	201	201	199	195	190	185
60.0°	167	170	173	173	171	167	162	157
65.0°	140	144	146	146	144	141	136	131
70.0°	115	119	120	120	119	116	112	107
75.0°	93	96	97	98	96	94	90	86
80.0°	73	76	77	77	76	74	70	67
85.0°	56	58	59	59	58	56	54	51
90.0°	42	43	44	44	44	42	40	38
95.0°	30	32	32	33	32	31	29	27
100.0°	22	23	23	23	23	22	21	20
105.0°	16	16	17	17	16	16	15	14
110.0°	12	12	12	12	12	12	11	10
115.0°	9	9	9	9	9	9	8	8
120.0°	7	7	7	7	7	7	6	6
125.0°	5	5	5	5	5	5	5	4
130.0°	4	4	4	4	4	4	3	3
135.0°	2	3	3	3	3	2	2	2
140.0°	2	2	2	2	2	2	2	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	0	1	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

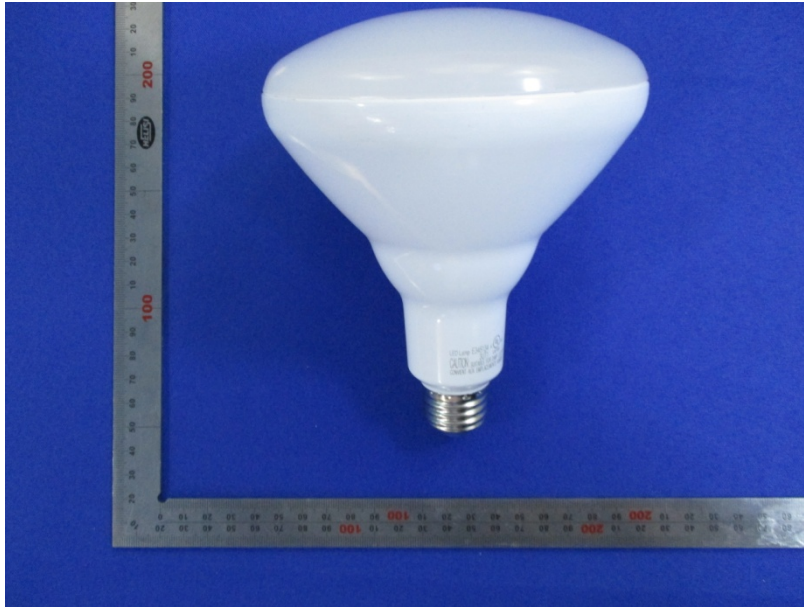
**Luminous Intensity (cd) Distribution Data (cont.)**

$\gamma \backslash C$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	394	394	394	394	394	394	394	394
5.0°	390	390	389	389	390	390	391	392
10.0°	382	381	381	381	381	383	384	386
15.0°	371	369	368	368	369	371	373	375
20.0°	355	353	351	352	353	355	358	361
25.0°	336	333	332	332	333	336	339	343
30.0°	313	310	308	309	311	313	317	321
35.0°	288	285	284	284	286	289	292	297
40.0°	262	258	256	256	258	262	266	271
45.0°	234	230	228	228	230	234	238	243
50.0°	205	201	199	199	201	205	210	215
55.0°	177	173	171	171	173	177	182	186
60.0°	150	146	145	144	146	150	154	159
65.0°	125	121	120	119	121	125	128	133
70.0°	101	98	96	97	98	102	105	109
75.0°	80	78	76	77	78	80	84	87
80.0°	62	60	59	59	60	62	65	68
85.0°	47	45	44	44	45	47	49	52
90.0°	35	33	32	32	33	35	36	39
95.0°	25	24	23	23	24	25	26	28
100.0°	18	17	17	17	17	18	19	20
105.0°	13	13	12	12	12	13	14	15
110.0°	10	9	9	9	9	10	10	11
115.0°	7	7	7	7	7	7	8	8
120.0°	5	5	5	5	5	6	6	6
125.0°	4	4	4	4	4	4	4	5
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	0	0	1	0	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)	%	Deg	Flux (lm)	%
0-5	9.4	0.79	0-5	9.4	0.79
5-10	27.8	2.35	0-10	37.2	3.15
10-15	45.0	3.81	0-15	82.2	6.96
15-20	60.5	5.12	0-20	142.7	12.08
20-25	73.6	6.23	0-25	216.3	18.31
25-30	83.8	7.09	0-30	300.1	25.40
30-35	90.8	7.69	0-35	390.9	33.09
35-40	94.5	8.00	0-40	485.4	41.09
40-45	94.9	8.03	0-45	580.3	49.12
45-50	92.3	7.81	0-50	672.6	56.93
50-55	87.0	7.36	0-55	759.6	64.30
55-60	79.6	6.74	0-60	839.2	71.04
60-65	70.7	5.99	0-65	910.0	77.02
65-70	61.0	5.16	0-70	970.9	82.19
70-75	51.0	4.32	0-75	1021.9	86.50
75-80	41.3	3.50	0-80	1063.2	90.00
80-85	32.4	2.74	0-85	1095.6	92.74
85-90	24.6	2.08	0-90	1120.2	94.82
90-95	18.1	1.53	0-95	1138.3	96.35
95-100	13.0	1.10	0-100	1151.2	97.45
100-105	9.2	0.78	0-105	1160.4	98.22
105-110	6.5	0.55	0-110	1166.9	98.78
110-115	4.7	0.40	0-115	1171.6	99.17
115-120	3.4	0.29	0-120	1175.0	99.46
120-125	2.4	0.20	0-125	1177.5	99.67
125-130	1.6	0.14	0-130	1179.1	99.81
130-135	1.1	0.09	0-135	1180.2	99.90
135-140	0.6	0.05	0-140	1180.8	99.95
140-145	0.3	0.03	0-145	1181.1	99.98
145-150	0.2	0.01	0-150	1181.3	99.99
150-155	0.1	0.01	0-155	1181.4	100.00
155-160	0.0	0.00	0-160	1181.4	100.00
160-165	0.0	0.00	0-165	1181.4	100.00
165-170	0.0	0.00	0-170	1181.4	100.00
170-175	0.0	0.00	0-175	1181.4	100.00
175-180	0.0	0.00	0-180	1181.4	100.00

## 6. Product Photo



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