

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 14BR40DIM/827**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	George Yang <i>George Yang</i>
<b>Report Number:</b>	RKS171115082-10
<b>Test Date:</b>	2017-11-21
<b>Report Date:</b>	2017-11-22
<b>Reviewed By:</b>	Ray Gao/EE Engineer <i>Ray Gao</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268
<b>Test Facility:</b>	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
<b>Accreditation:</b>	The IAS Accreditation Number TL-749.

## 1. Product Description

### General Information:

One sample was received on 2017-11-20 and used for testing.

Model Tested: 14BR40DIM/827  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED Directional Lamp  
 Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120 VAC 60Hz  
 Rated Power: 14W  
 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 C82.77-2002: 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	Test Range	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	Dia 1.5m	2017-01-25	2018-01-25
Power Meter	INVENTFINE	WT500	GSJWQ20009	20/40/80/150/300/600V	2017-03-23	2018-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	380nm~780nm	2017-01-25	2018-01-25
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	0~150V 4.2A/0~300V 2.1A	2017-03-23	2018-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	24V/50W	2017-01-26	2018-01-26
Thermal Meter	KEJIAN	TA298	N/A	0~60℃	2017-10-17	2018-10-17
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	30V/5A	2017-03-23	2018-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	0-150V, 0-300V, 5KVA	2017-03-23	2018-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	30V/10A	2017-03-23	2018-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	20/40/80/150/300/600V	2017-03-23	2018-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	0.001lx-99999lx	2017-01-25	2018-01-25
Wireless Weather Station	ZHONGXING	KG218	N/A	-40~65℃, 20%~99%RH	2017-10-17	2018-10-17
Standard Light Source	INVENTFINE	N/A	JWBYR040007	24V/150W	2017-01-25	2018-01-25

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.

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

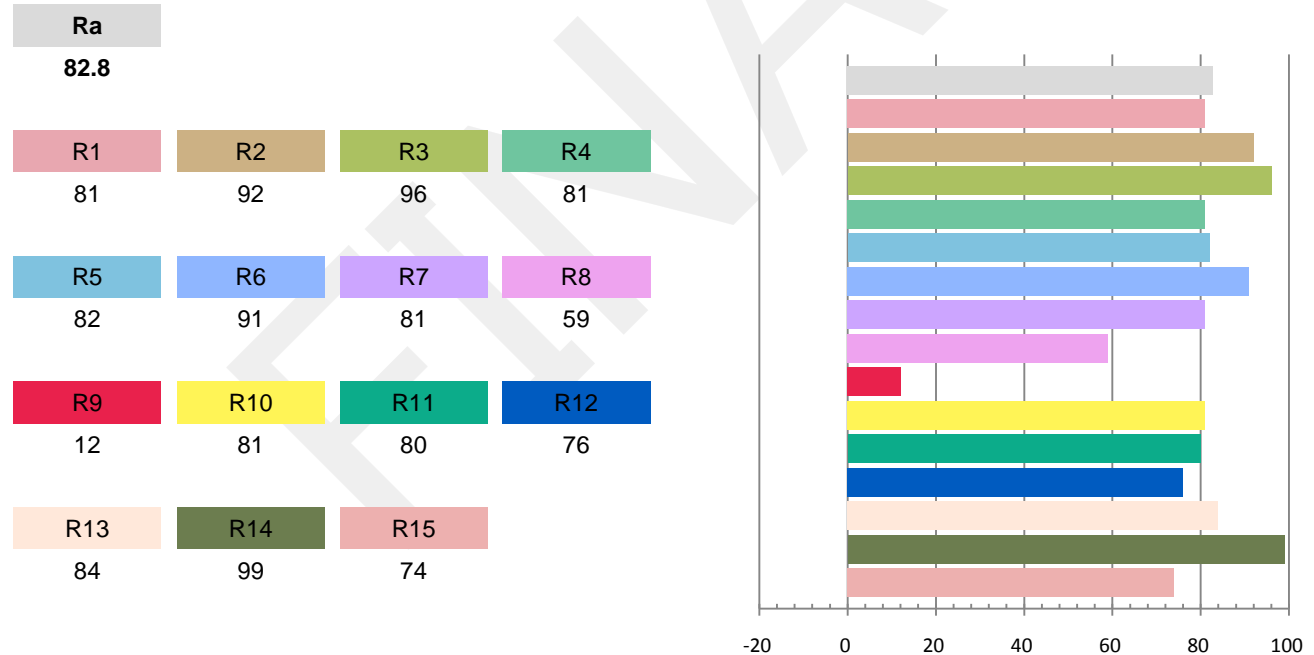
Test orientation: **Baseup**

### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1196	13.13	0.915	1209	92.08

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.811	2667	-0.00014	0.4623	0.4108	0.2640	0.5278

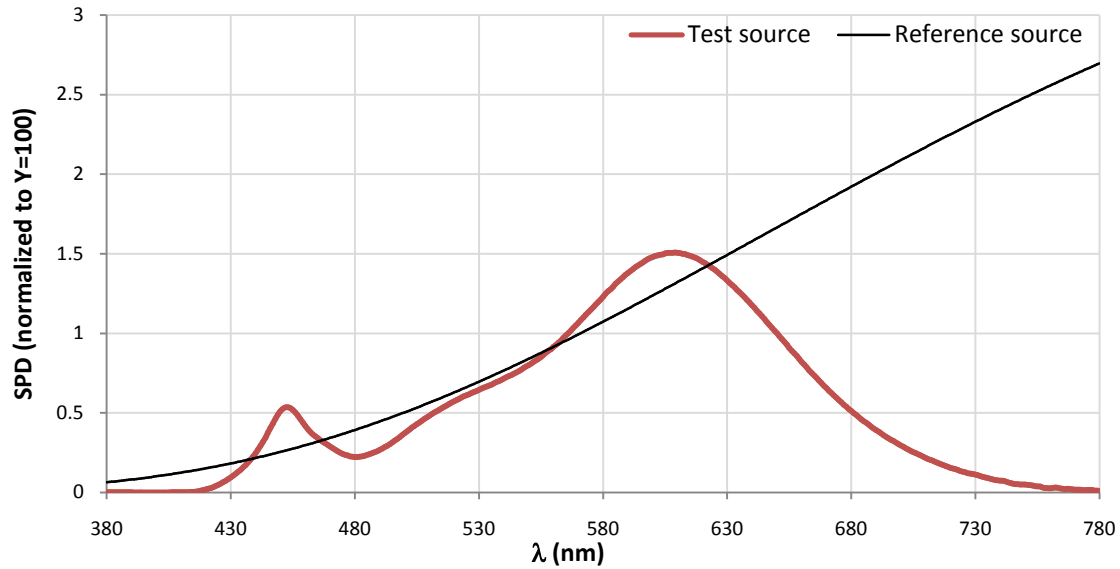
### Color Rendering Index



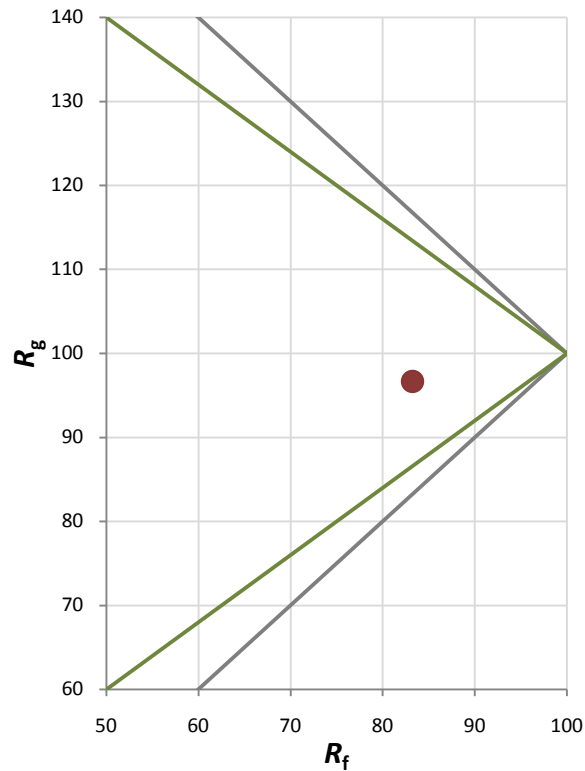
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	83
Gamut Index $R_g$	97

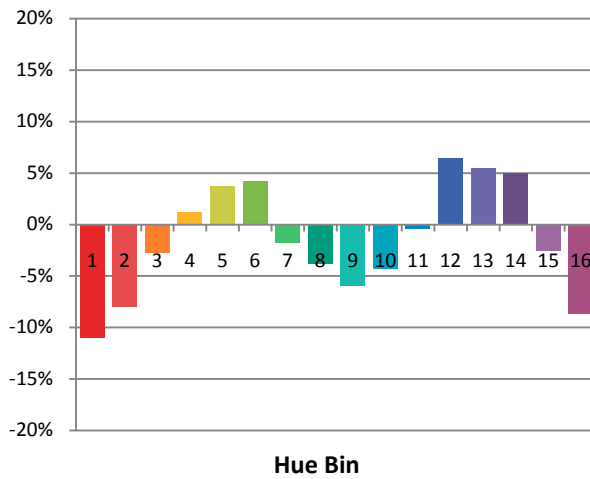
### Spectral Power Distribution Comparison



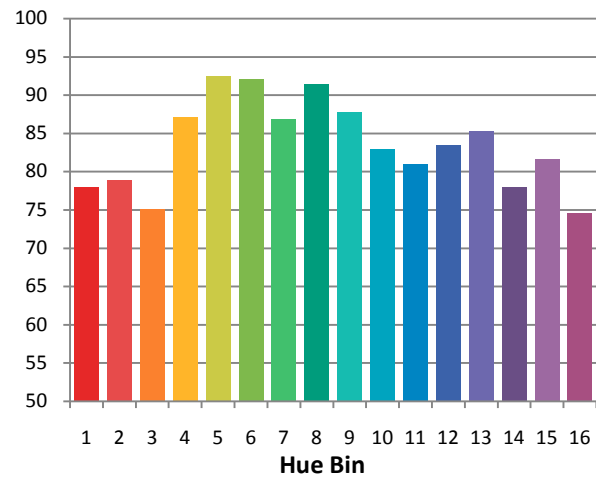
### Plot of $R_g$ versus $R_f$



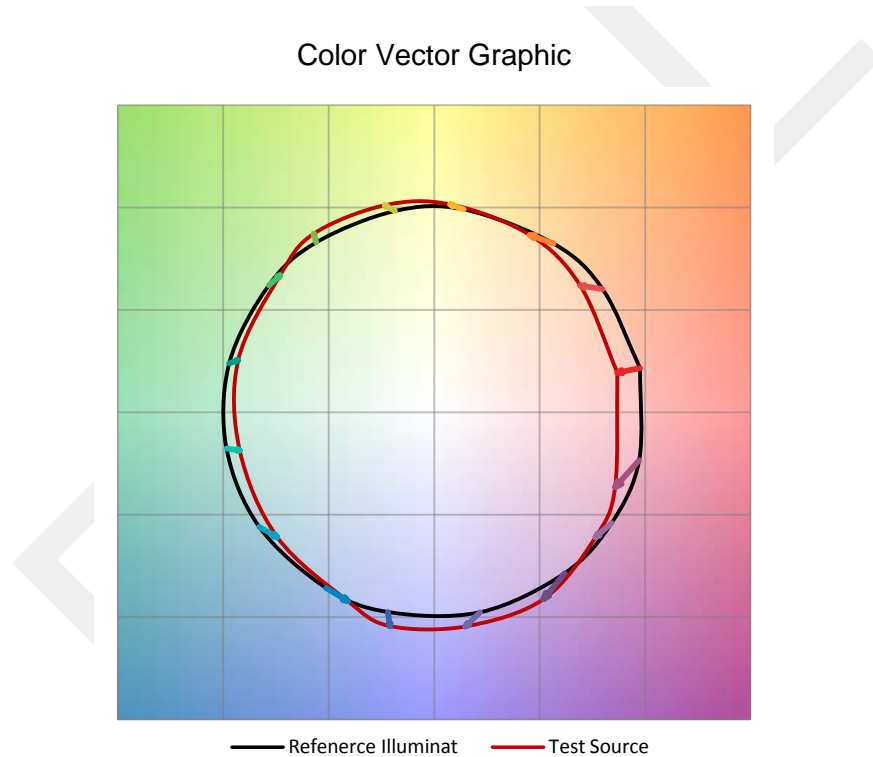
Chroma Shift by Hue



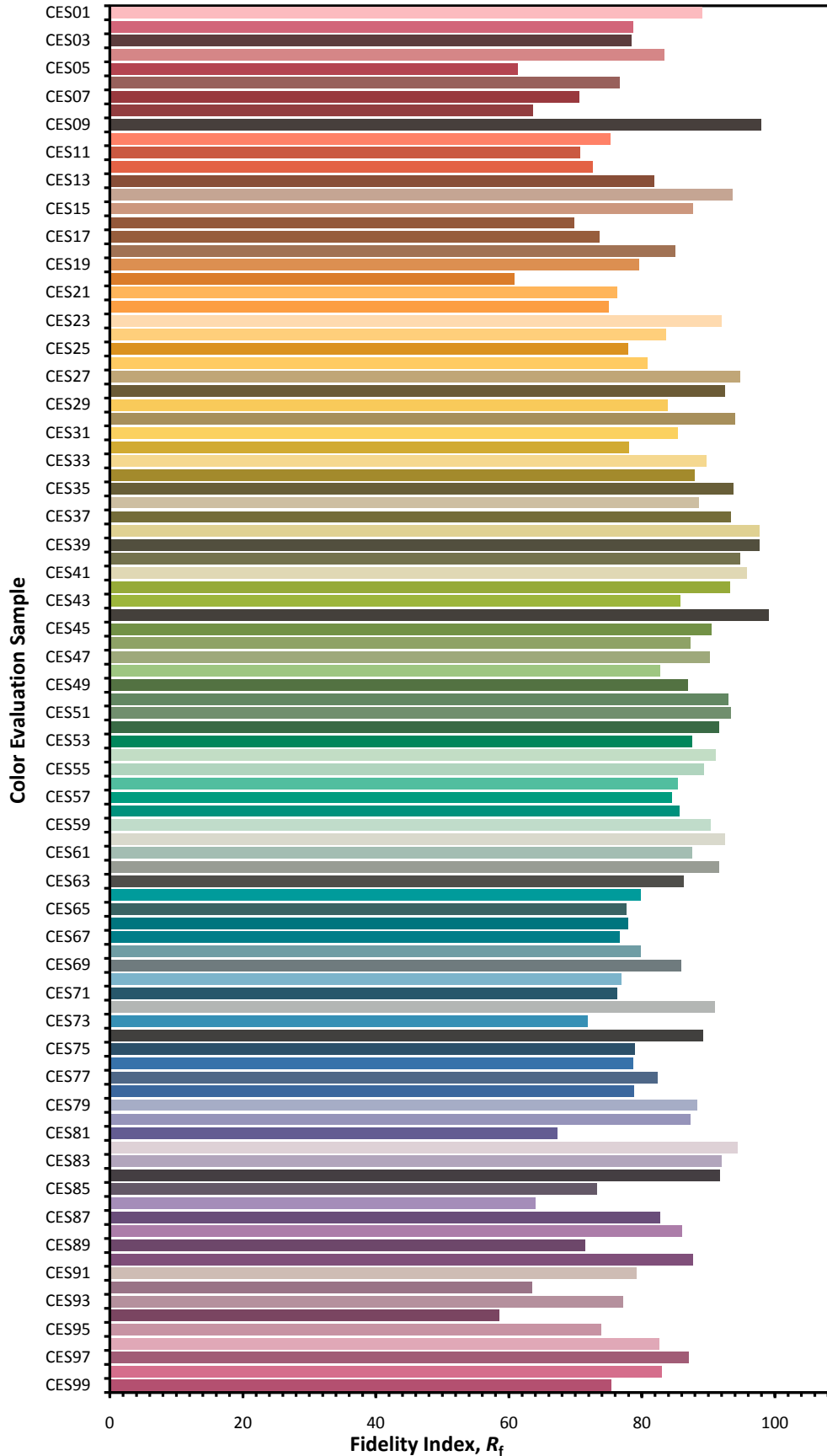
$R_t$  by Hue



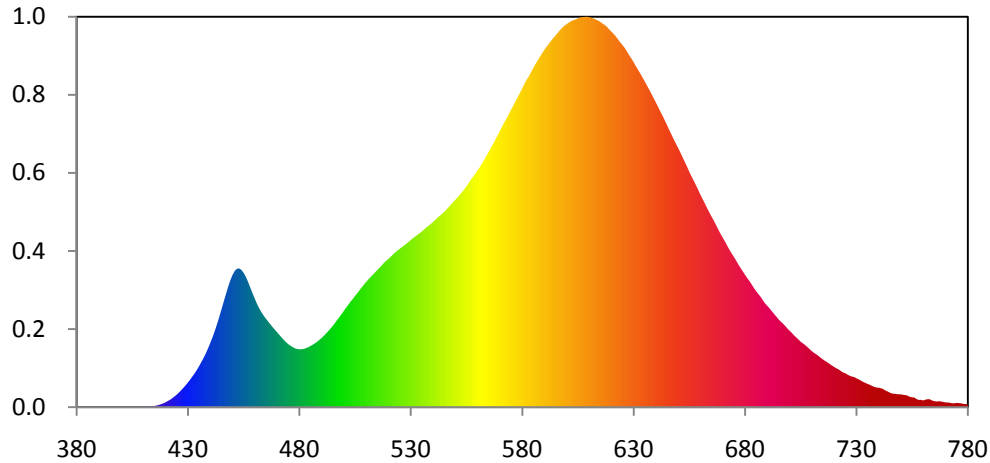
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

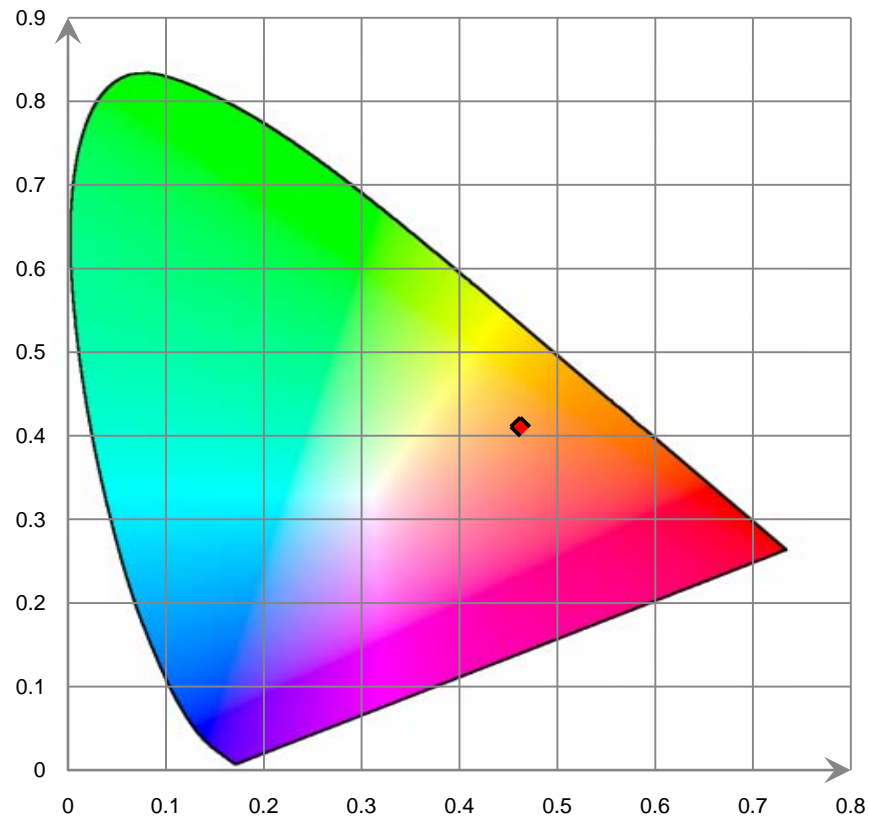


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.010E-02	421	4.243E-01	462	6.748E+00	503	7.211E+00	544	1.321E+01
381	3.180E-02	422	5.062E-01	463	6.486E+00	504	7.397E+00	545	1.335E+01
382	1.970E-02	423	6.165E-01	464	6.254E+00	505	7.597E+00	546	1.350E+01
383	3.160E-02	424	7.364E-01	465	6.049E+00	506	7.787E+00	547	1.366E+01
384	3.650E-02	425	8.595E-01	466	5.851E+00	507	7.985E+00	548	1.384E+01
385	2.480E-02	426	1.003E+00	467	5.665E+00	508	8.186E+00	549	1.401E+01
386	2.130E-02	427	1.163E+00	468	5.472E+00	509	8.373E+00	550	1.417E+01
387	2.110E-02	428	1.330E+00	469	5.298E+00	510	8.554E+00	551	1.433E+01
388	2.040E-02	429	1.503E+00	470	5.122E+00	511	8.731E+00	552	1.451E+01
389	3.030E-02	430	1.687E+00	471	4.947E+00	512	8.893E+00	553	1.469E+01
390	2.670E-02	431	1.886E+00	472	4.772E+00	513	9.049E+00	554	1.488E+01
391	1.210E-02	432	2.097E+00	473	4.606E+00	514	9.216E+00	555	1.509E+01
392	1.050E-02	433	2.311E+00	474	4.452E+00	515	9.370E+00	556	1.531E+01
393	1.470E-02	434	2.539E+00	475	4.308E+00	516	9.527E+00	557	1.554E+01
394	1.490E-02	435	2.800E+00	476	4.201E+00	517	9.691E+00	558	1.575E+01
395	1.290E-02	436	3.076E+00	477	4.109E+00	518	9.863E+00	559	1.596E+01
396	9.000E-03	437	3.358E+00	478	4.024E+00	519	1.001E+01	560	1.618E+01
397	6.500E-03	438	3.667E+00	479	3.978E+00	520	1.013E+01	561	1.641E+01
398	5.400E-03	439	4.008E+00	480	3.958E+00	521	1.028E+01	562	1.665E+01
399	2.300E-03	440	4.377E+00	481	3.958E+00	522	1.043E+01	563	1.691E+01
400	1.250E-02	441	4.764E+00	482	3.984E+00	523	1.057E+01	564	1.718E+01
401	1.500E-02	442	5.183E+00	483	4.032E+00	524	1.070E+01	565	1.746E+01
402	1.270E-02	443	5.642E+00	484	4.098E+00	525	1.082E+01	566	1.773E+01
403	1.110E-02	444	6.130E+00	485	4.181E+00	526	1.093E+01	567	1.800E+01
404	1.240E-02	445	6.650E+00	486	4.267E+00	527	1.105E+01	568	1.829E+01
405	1.260E-02	446	7.177E+00	487	4.364E+00	528	1.116E+01	569	1.857E+01
406	2.070E-02	447	7.695E+00	488	4.472E+00	529	1.129E+01	570	1.887E+01
407	2.310E-02	448	8.204E+00	489	4.597E+00	530	1.142E+01	571	1.917E+01
408	1.960E-02	449	8.657E+00	490	4.727E+00	531	1.155E+01	572	1.945E+01
409	3.660E-02	450	9.032E+00	491	4.874E+00	532	1.166E+01	573	1.973E+01
410	4.630E-02	451	9.312E+00	492	5.034E+00	533	1.178E+01	574	2.002E+01
411	4.110E-02	452	9.459E+00	493	5.205E+00	534	1.189E+01	575	2.031E+01
412	4.310E-02	453	9.479E+00	494	5.370E+00	535	1.201E+01	576	2.060E+01
413	4.790E-02	454	9.382E+00	495	5.555E+00	536	1.214E+01	577	2.089E+01
414	6.280E-02	455	9.182E+00	496	5.756E+00	537	1.228E+01	578	2.118E+01
415	8.630E-02	456	8.907E+00	497	5.957E+00	538	1.240E+01	579	2.147E+01
416	1.180E-01	457	8.553E+00	498	6.160E+00	539	1.252E+01	580	2.176E+01
417	1.558E-01	458	8.172E+00	499	6.368E+00	540	1.266E+01	581	2.208E+01
418	2.116E-01	459	7.791E+00	500	6.588E+00	541	1.280E+01	582	2.237E+01
419	2.650E-01	460	7.417E+00	501	6.803E+00	542	1.295E+01	583	2.261E+01
420	3.373E-01	461	7.062E+00	502	7.010E+00	543	1.307E+01	584	2.289E+01

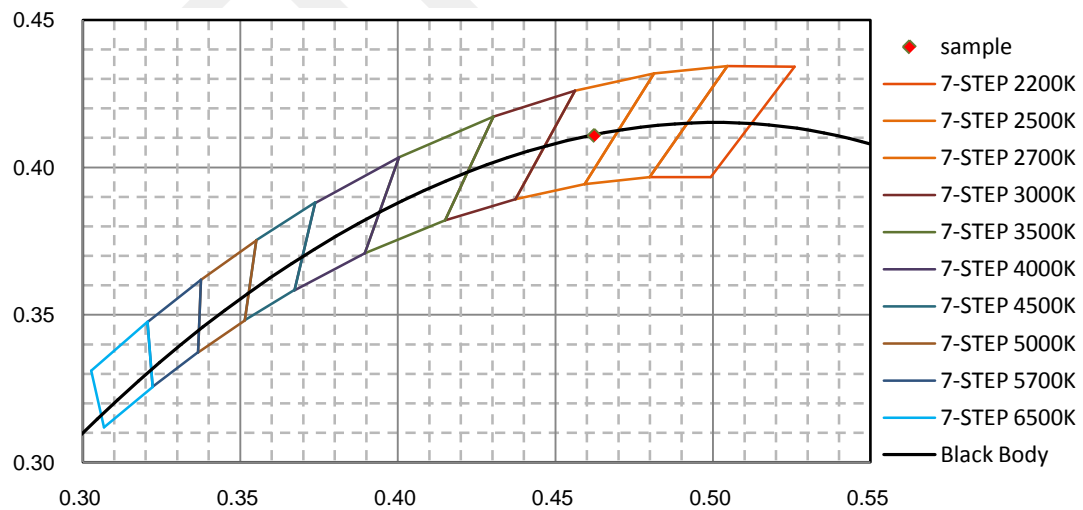


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.319E+01	626	2.456E+01	667	1.246E+01	708	4.113E+00	749	8.824E-01
586	2.345E+01	627	2.431E+01	668	1.215E+01	709	3.971E+00	750	8.757E-01
587	2.370E+01	628	2.406E+01	669	1.186E+01	710	3.835E+00	751	8.458E-01
588	2.395E+01	629	2.383E+01	670	1.159E+01	711	3.713E+00	752	8.271E-01
589	2.419E+01	630	2.359E+01	671	1.133E+01	712	3.612E+00	753	7.891E-01
590	2.442E+01	631	2.332E+01	672	1.105E+01	713	3.507E+00	754	7.071E-01
591	2.464E+01	632	2.306E+01	673	1.077E+01	714	3.379E+00	755	6.713E-01
592	2.483E+01	633	2.281E+01	674	1.052E+01	715	3.265E+00	756	6.641E-01
593	2.504E+01	634	2.254E+01	675	1.028E+01	716	3.158E+00	757	5.537E-01
594	2.523E+01	635	2.227E+01	676	1.003E+01	717	3.068E+00	758	4.956E-01
595	2.540E+01	636	2.199E+01	677	9.764E+00	718	2.954E+00	759	5.027E-01
596	2.558E+01	637	2.171E+01	678	9.524E+00	719	2.853E+00	760	4.589E-01
597	2.576E+01	638	2.143E+01	679	9.294E+00	720	2.753E+00	761	5.097E-01
598	2.593E+01	639	2.112E+01	680	9.059E+00	721	2.660E+00	762	5.478E-01
599	2.607E+01	640	2.083E+01	681	8.831E+00	722	2.583E+00	763	5.384E-01
600	2.618E+01	641	2.052E+01	682	8.623E+00	723	2.479E+00	764	4.562E-01
601	2.628E+01	642	2.021E+01	683	8.396E+00	724	2.375E+00	765	4.097E-01
602	2.638E+01	643	1.992E+01	684	8.151E+00	725	2.323E+00	766	3.867E-01
603	2.645E+01	644	1.961E+01	685	7.933E+00	726	2.233E+00	767	4.062E-01
604	2.649E+01	645	1.928E+01	686	7.740E+00	727	2.148E+00	768	3.915E-01
605	2.656E+01	646	1.895E+01	687	7.550E+00	728	2.092E+00	769	3.554E-01
606	2.664E+01	647	1.864E+01	688	7.318E+00	729	2.060E+00	770	3.317E-01
607	2.666E+01	648	1.832E+01	689	7.101E+00	730	1.978E+00	771	3.198E-01
608	2.667E+01	649	1.801E+01	690	6.932E+00	731	1.904E+00	772	3.040E-01
609	2.668E+01	650	1.772E+01	691	6.762E+00	732	1.816E+00	773	2.676E-01
610	2.666E+01	651	1.741E+01	692	6.568E+00	733	1.730E+00	774	2.643E-01
611	2.661E+01	652	1.708E+01	693	6.383E+00	734	1.666E+00	775	2.924E-01
612	2.656E+01	653	1.676E+01	694	6.207E+00	735	1.594E+00	776	2.774E-01
613	2.650E+01	654	1.644E+01	695	6.021E+00	736	1.535E+00	777	2.679E-01
614	2.642E+01	655	1.610E+01	696	5.860E+00	737	1.463E+00	778	2.250E-01
615	2.633E+01	656	1.578E+01	697	5.720E+00	738	1.389E+00	779	2.168E-01
616	2.623E+01	657	1.549E+01	698	5.562E+00	739	1.343E+00	780	1.907E-01
617	2.612E+01	658	1.518E+01	699	5.388E+00	740	1.331E+00		
618	2.600E+01	659	1.486E+01	700	5.231E+00	741	1.297E+00		
619	2.582E+01	660	1.452E+01	701	5.086E+00	742	1.243E+00		
620	2.567E+01	661	1.422E+01	702	4.916E+00	743	1.142E+00		
621	2.552E+01	662	1.392E+01	703	4.773E+00	744	1.079E+00		
622	2.534E+01	663	1.361E+01	704	4.630E+00	745	9.982E-01		
623	2.514E+01	664	1.331E+01	705	4.475E+00	746	9.328E-01		
624	2.494E+01	665	1.303E+01	706	4.364E+00	747	9.167E-01		
625	2.475E+01	666	1.275E+01	707	4.248E+00	748	8.938E-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: **Baseup**

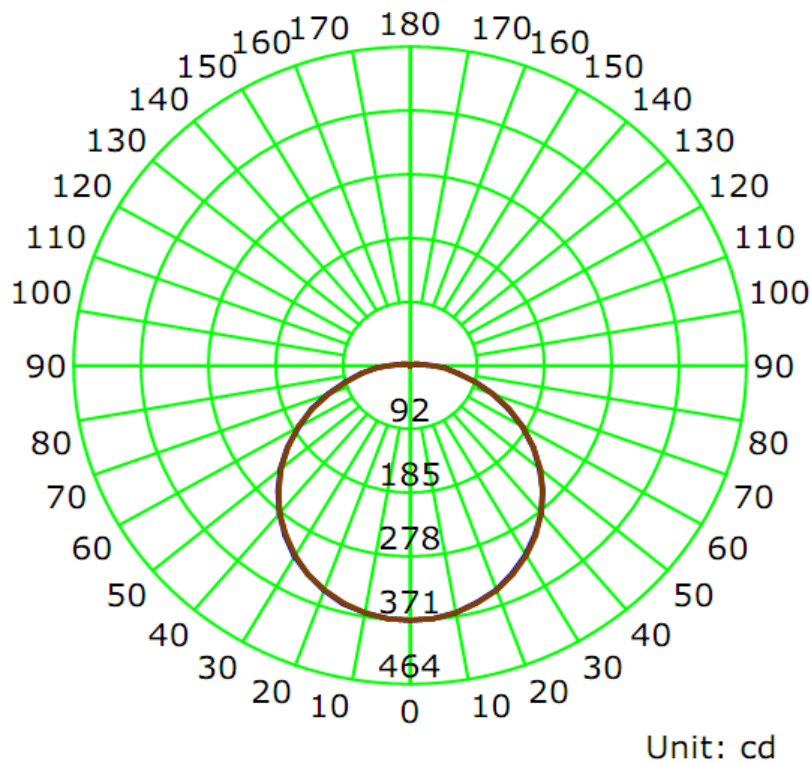
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1200	13.31	0.9210

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
1210.3	90.93	371.7	1.28	1.28

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	117.7	117.6	117.7	117.7	117.7
Field Angle (10% $I_{max}$ ):	176.5	176.0	176.4	177.0	176.5

### Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	372	372	372	372	372	372	372	372
5.0°	370	370	370	370	370	370	371	371
10.0°	366	365	365	366	366	366	366	366
15.0°	358	358	358	358	359	359	359	360
20.0°	348	347	348	348	348	349	350	350
25.0°	335	335	335	335	336	336	337	337
30.0°	319	319	319	320	320	321	322	322
35.0°	301	301	301	302	302	303	304	305
40.0°	281	281	281	282	282	283	284	285
45.0°	258	258	258	259	260	260	261	262
50.0°	234	233	233	234	235	236	237	238
55.0°	207	207	207	207	208	209	210	211
60.0°	179	179	179	179	180	181	182	182
65.0°	150	150	150	150	150	152	153	153
70.0°	121	120	121	121	121	123	124	124
75.0°	94	93	93	93	94	95	96	96
80.0°	69	68	68	68	69	69	71	71
85.0°	48	47	47	47	48	49	49	50
90.0°	32	31	31	31	32	33	33	33
95.0°	21	20	20	20	21	21	22	22
100.0°	14	13	13	13	14	14	14	14
105.0°	10	9	9	9	9	10	10	10
110.0°	7	7	7	7	7	7	7	7
115.0°	6	5	5	5	5	6	6	6
120.0°	4	4	4	4	4	4	4	4
125.0°	3	3	3	3	3	3	3	3
130.0°	2	2	2	2	2	2	2	2
135.0°	2	1	1	1	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	1	1
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.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	372	372	372	372	372	372	372	372
5.0°	370	371	371	370	370	370	370	370
10.0°	366	366	366	366	365	365	365	365
15.0°	359	359	359	359	358	358	358	358
20.0°	349	349	349	348	348	347	347	346
25.0°	336	336	336	336	335	334	334	334
30.0°	321	321	321	320	319	319	318	318
35.0°	303	303	303	302	301	301	300	300
40.0°	282	283	282	282	281	280	279	279
45.0°	259	260	259	259	258	257	257	256
50.0°	235	235	234	234	233	233	232	231
55.0°	208	208	208	207	207	206	205	205
60.0°	180	180	179	179	179	178	177	176
65.0°	151	151	150	150	150	149	148	148
70.0°	121	121	121	121	121	120	120	119
75.0°	93	93	93	93	93	93	93	91
80.0°	68	68	68	68	68	68	68	67
85.0°	47	47	47	47	47	48	47	47
90.0°	31	31	31	31	31	32	32	31
95.0°	20	20	20	20	20	21	21	20
100.0°	14	13	13	13	14	14	14	14
105.0°	9	9	9	9	9	10	10	10
110.0°	7	7	7	7	7	7	7	7
115.0°	5	5	5	5	5	6	6	5
120.0°	4	4	4	4	4	4	4	4
125.0°	3	3	3	3	3	3	3	3
130.0°	2	2	2	2	2	2	2	2
135.0°	2	2	1	1	2	2	2	1
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	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	8.9	0.73	0-5	8.9	0.73
5-10	26.3	2.18	0-10	35.2	2.91
10-15	43.0	3.55	0-15	78.2	6.46
15-20	58.2	4.81	0-20	136.4	11.27
20-25	71.7	5.92	0-25	208.1	17.19
25-30	82.9	6.85	0-30	291.0	24.04
30-35	91.6	7.57	0-35	382.6	31.61
35-40	97.4	8.04	0-40	479.9	39.65
40-45	100.1	8.27	0-45	580.0	47.92
45-50	99.6	8.23	0-50	679.6	56.15
50-55	96.0	7.93	0-55	775.6	64.08
55-60	89.4	7.39	0-60	865.0	71.47
60-65	80.1	6.62	0-65	945.1	78.09
65-70	68.7	5.67	0-70	1013.8	83.76
70-75	56.0	4.63	0-75	1069.8	88.39
75-80	43.3	3.57	0-80	1113.1	91.97
80-85	31.5	2.60	0-85	1144.6	94.57
85-90	21.6	1.79	0-90	1166.2	96.36
90-95	14.3	1.18	0-95	1180.5	97.54
95-100	9.3	0.77	0-100	1189.8	98.30
100-105	6.2	0.51	0-105	1196.0	98.81
105-110	4.3	0.36	0-110	1200.3	99.17
110-115	3.1	0.26	0-115	1203.4	99.43
115-120	2.3	0.19	0-120	1205.7	99.62
120-125	1.6	0.14	0-125	1207.4	99.76
125-130	1.1	0.09	0-130	1208.5	99.85
130-135	0.7	0.06	0-135	1209.2	99.91
135-140	0.4	0.04	0-140	1209.7	99.95
140-145	0.3	0.02	0-145	1209.9	99.97
145-150	0.1	0.01	0-150	1210.1	99.98
150-155	0.1	0.01	0-155	1210.2	99.99
155-160	0.1	0.00	0-160	1210.2	99.99
160-165	0.0	0.00	0-165	1210.3	100.00
165-170	0.0	0.00	0-170	1210.3	100.00
170-175	0.0	0.00	0-175	1210.3	100.00
175-180	0.0	0.00	0-180	1210.3	100.00

## 6. Product Photo



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