

# IES LM-79-08

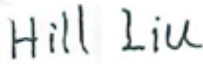
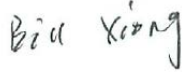
## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 6MR16DIM/830FL35**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Reviewed by:</b>	Hill Liu 
<b>Report Number:</b>	RKS161009003-10
<b>Test Date:</b>	2016-10-13 to 2016-10-14
<b>Report Date:</b>	2016-10-14
<b>Approved by:</b>	Bill Xiong 
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
<b>Test Facility:</b>	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
<b>Accreditation:</b>	The IAS Accreditation Number TL-460.

## 1. Product Description

### General Information:

One sample was received on 2016-10-09 and used for testing.

Model Tested: 6MR16DIM/830FL35  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: Integral LED Lamp  
 Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120 VAC 60Hz  
 Rated Power: 6W  
 Nominal CCT: 3000K  
 Nominal Lumen Output: 500 lm  
 Nominal CRI: 82

## 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 (This method is not in IAS accreditation scope)

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2015-11-09	2016-11-08
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2016-03-10	2017-03-09
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2016-07-11	2017-07-10
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2016-07-07	2017-07-06
Temperature/humidity/clock	Victor	VC230	EE023	0~40°C0~90%	2016-03-21	2017-03-20
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-09-25	2017-09-24
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	30V/5A	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2016-03-10	2017-03-09
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2016-03-21	2017-03-20
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-09-08	2017-09-07

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  $U=1.8\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=20\text{K}$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the CRI is  $U=1.8(K=2)$ , at the 95% confidence level.

The uncertainty of power meter AC current  $U=0.19\%$  of rdg, AC Voltage  $U=0.15\%$  of rdg, Power  $U=0.20\%$  ( $K=2$ ), 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  $U=1.6\%$  ( $K=2$ ), at the 95% confidence level.

### Additional Test

The Additional Test item may not be covered by IESNA LM-79-2008. Additional test including power factor, off-state power and THD, was measured by Digital Power Meter after stabilized at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . Test voltage for THD and power factor test would be equal to rated voltage or, in case of a voltage range, maximum value of that range.

The uncertainty of power meter AC current  $U=0.19\%$  of rdg, AC Voltage  $U=0.15\%$  of rdg, Power  $U=0.20\%$  ( $K=2$ ), 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: **0.5hour**

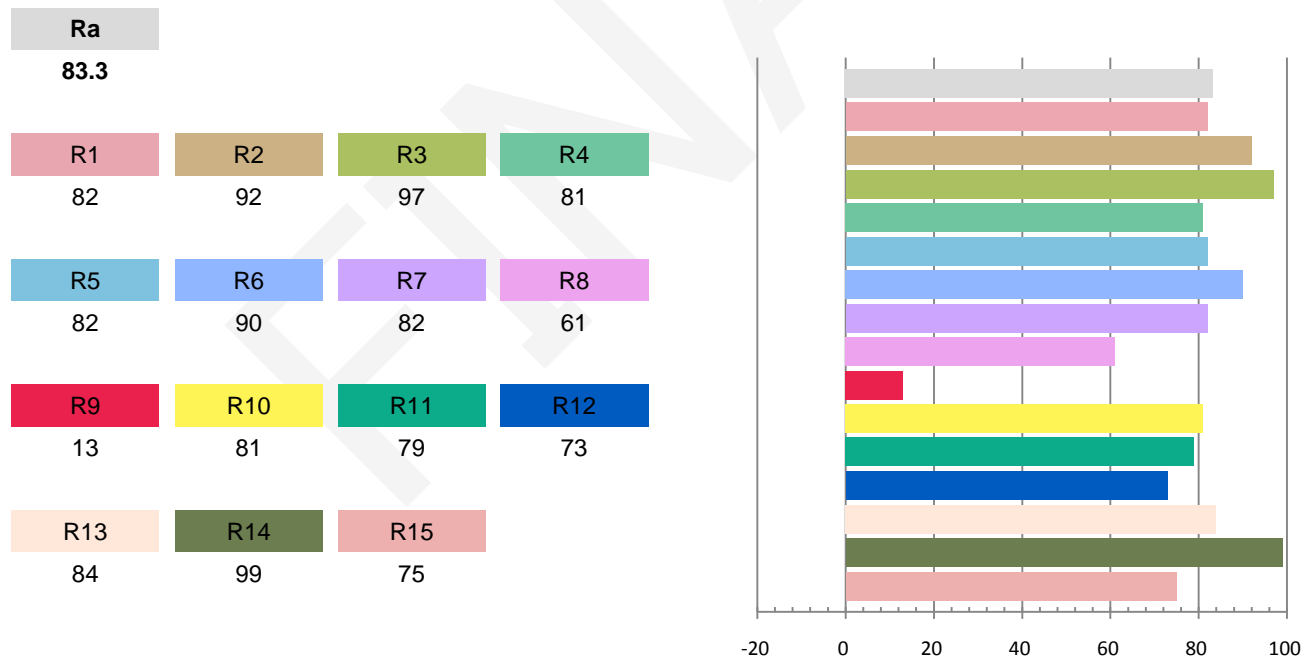
Test orientation: **Downward**

### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
12.0	60	0.5224	5.81	0.9268	549.3	94.55

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.694	2987	0.00039	0.4384	0.4056	0.2509	0.5222

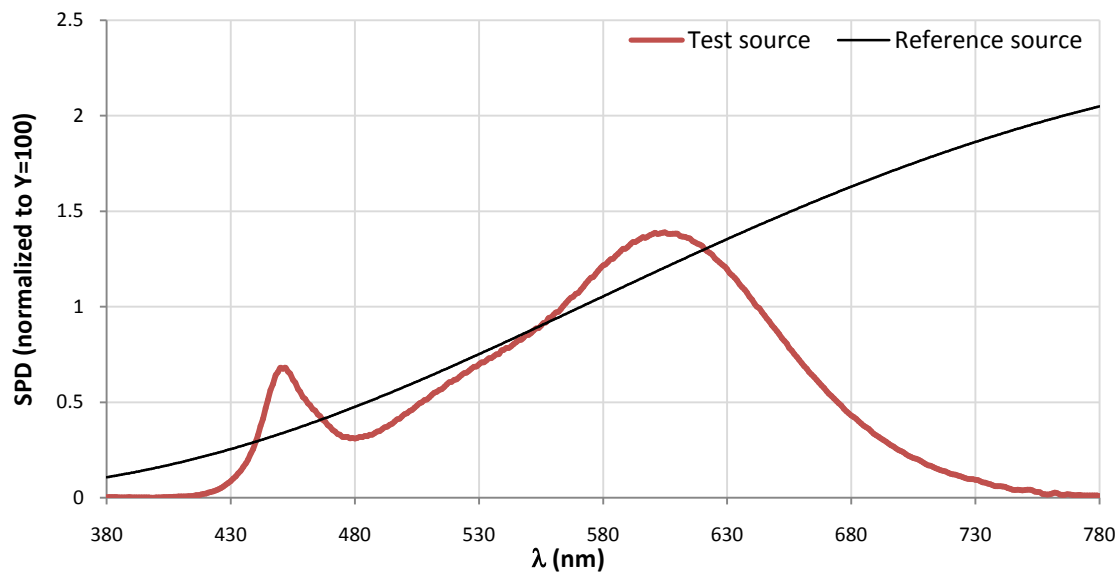
### Color Rendering Index



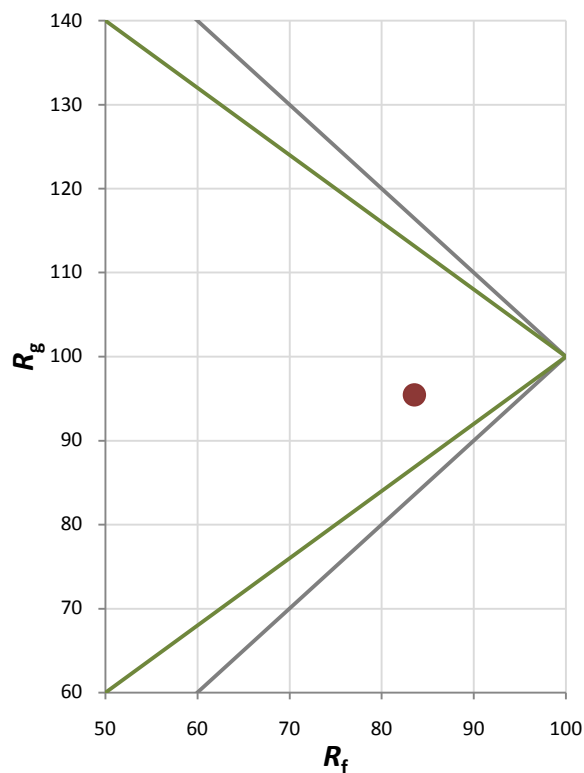
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	84
Gamut Index $R_g$	95

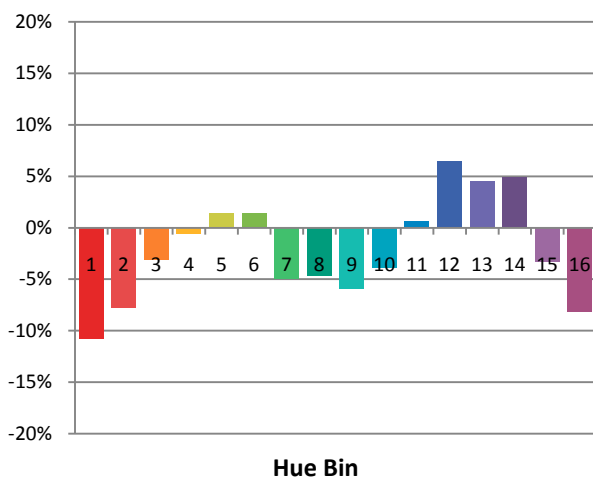
### Spectral Power Distribution Comparison



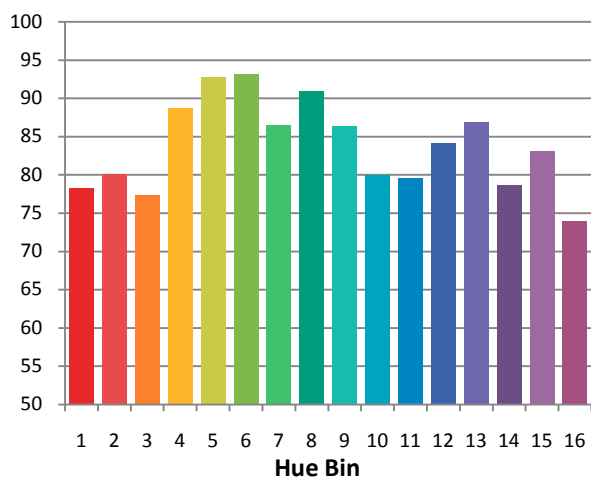
### Plot of $R_g$ versus $R_f$



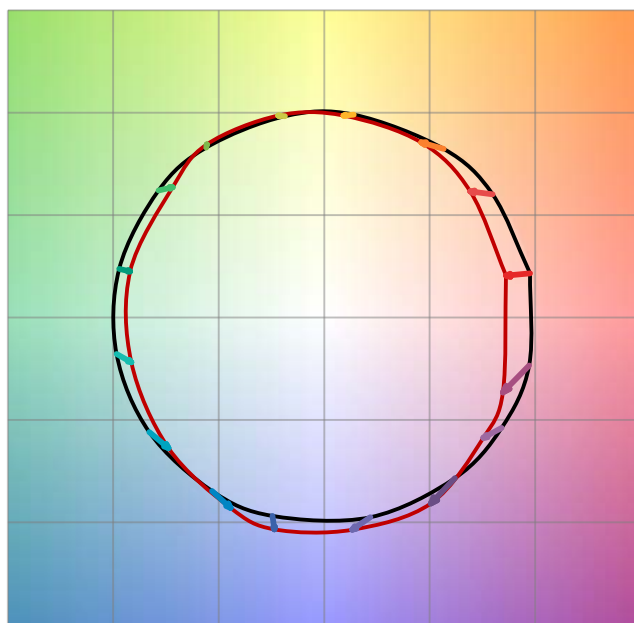
Chroma Shift by Hue



$R_f$  by Hue

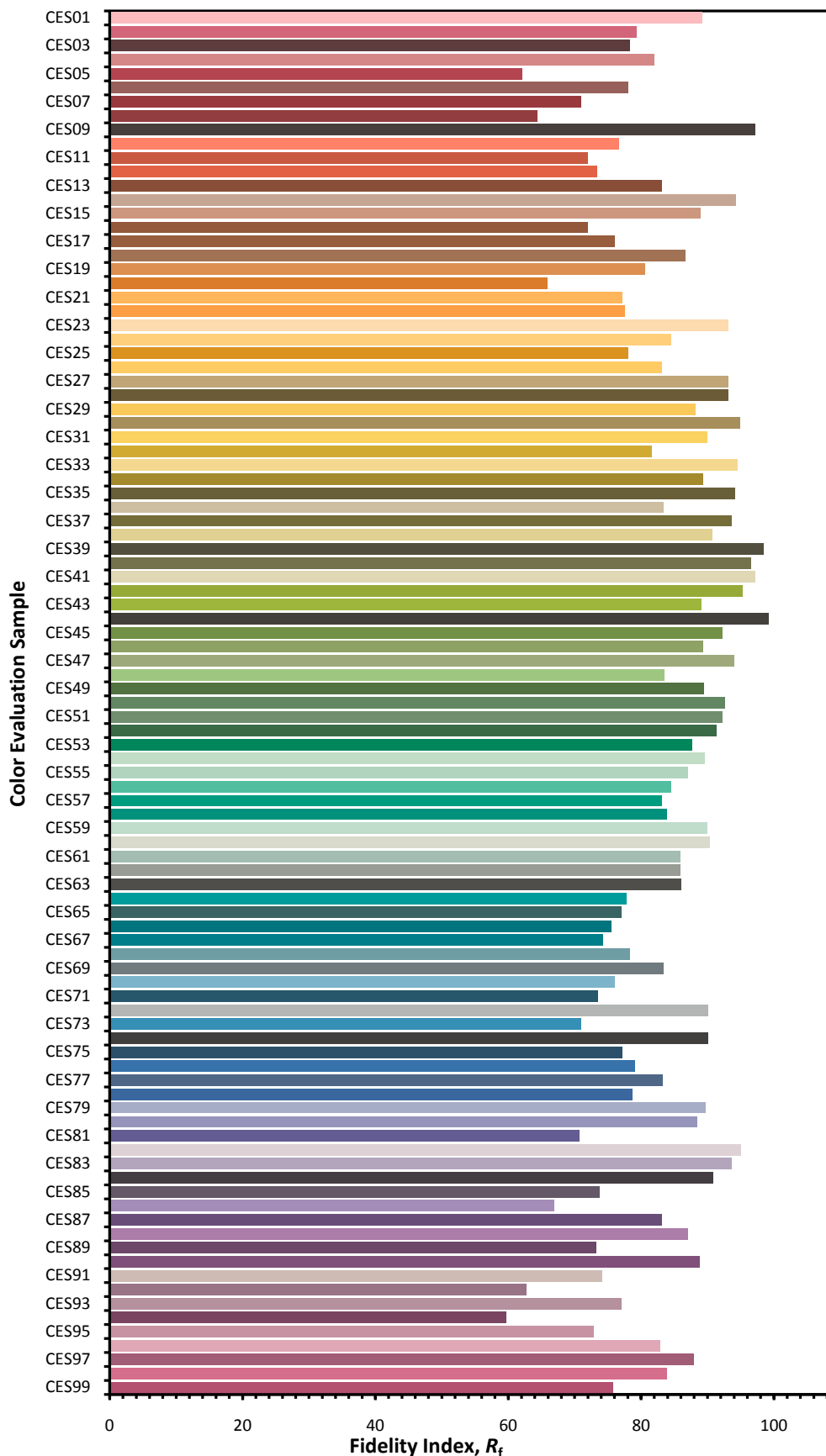


Color Vector Graphic

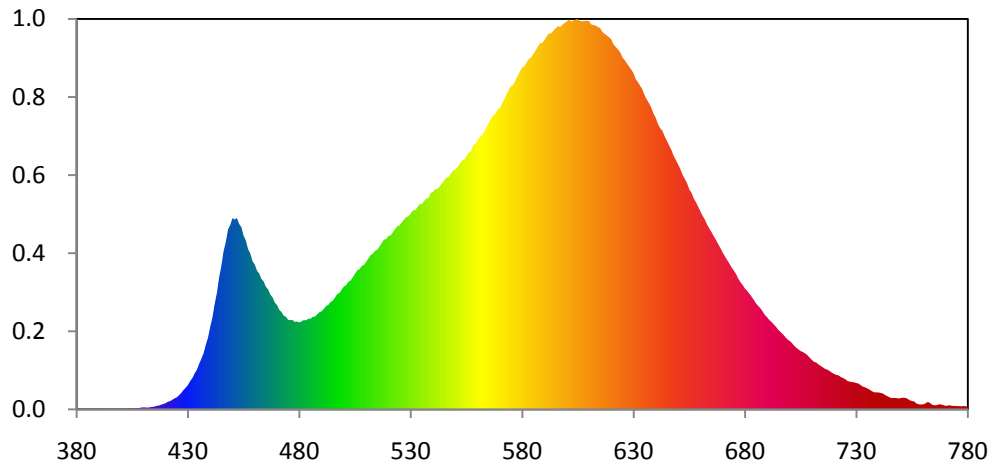


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

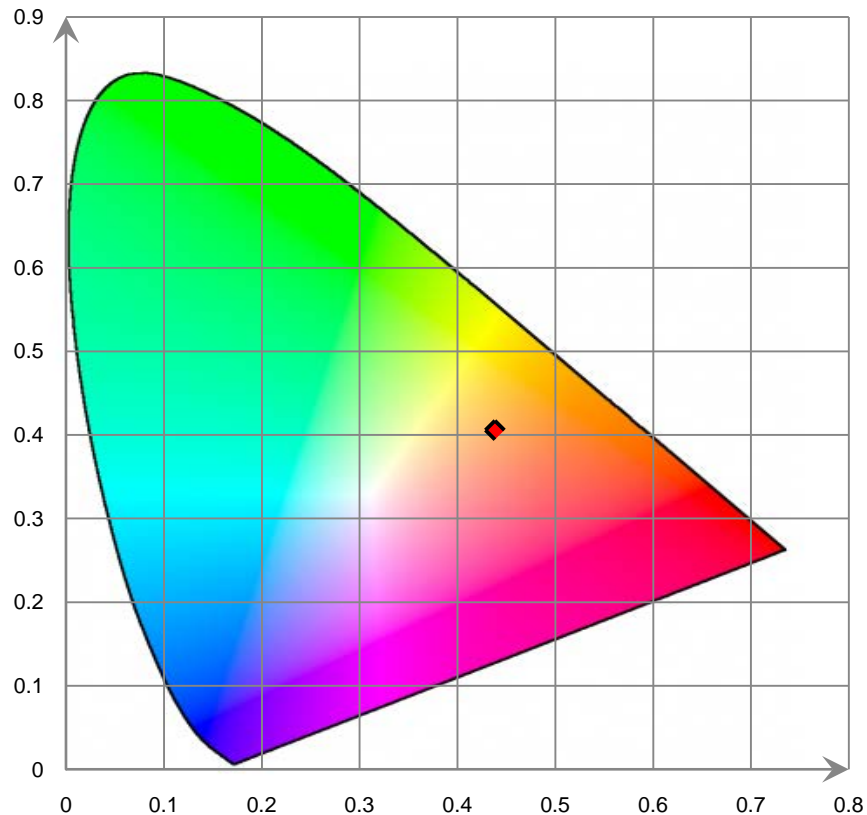


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.980E-02	421	2.177E-01	462	3.888E+00	503	3.686E+00	544	6.466E+00
381	2.250E-02	422	2.361E-01	463	3.730E+00	504	3.783E+00	545	6.549E+00
382	2.050E-02	423	2.750E-01	464	3.661E+00	505	3.882E+00	546	6.633E+00
383	2.260E-02	424	3.156E-01	465	3.506E+00	506	3.979E+00	547	6.650E+00
384	1.970E-02	425	3.447E-01	466	3.434E+00	507	4.012E+00	548	6.738E+00
385	1.260E-02	426	4.059E-01	467	3.282E+00	508	4.105E+00	549	6.839E+00
386	1.280E-02	427	4.683E-01	468	3.206E+00	509	4.133E+00	550	6.857E+00
387	1.530E-02	428	5.542E-01	469	3.058E+00	510	4.224E+00	551	6.940E+00
388	1.680E-02	429	6.180E-01	470	2.985E+00	511	4.319E+00	552	7.026E+00
389	1.950E-02	430	6.977E-01	471	2.849E+00	512	4.418E+00	553	7.122E+00
390	1.760E-02	431	8.073E-01	472	2.788E+00	513	4.455E+00	554	7.147E+00
391	9.900E-03	432	8.960E-01	473	2.681E+00	514	4.540E+00	555	7.245E+00
392	7.200E-03	433	1.027E+00	474	2.650E+00	515	4.570E+00	556	7.355E+00
393	1.130E-02	434	1.132E+00	475	2.563E+00	516	4.664E+00	557	7.382E+00
394	1.390E-02	435	1.298E+00	476	2.556E+00	517	4.766E+00	558	7.558E+00
395	1.360E-02	436	1.444E+00	477	2.556E+00	518	4.858E+00	559	7.592E+00
396	9.300E-03	437	1.600E+00	478	2.503E+00	519	4.876E+00	560	7.696E+00
397	6.400E-03	438	1.844E+00	479	2.517E+00	520	4.962E+00	561	7.801E+00
398	4.700E-03	439	2.052E+00	480	2.486E+00	521	4.980E+00	562	7.834E+00
399	2.200E-03	440	2.361E+00	481	2.520E+00	522	5.072E+00	563	7.950E+00
400	1.220E-02	441	2.627E+00	482	2.557E+00	523	5.161E+00	564	8.074E+00
401	1.560E-02	442	3.017E+00	483	2.548E+00	524	5.243E+00	565	8.195E+00
402	1.800E-02	443	3.332E+00	484	2.594E+00	525	5.267E+00	566	8.311E+00
403	2.000E-02	444	3.778E+00	485	2.593E+00	526	5.354E+00	567	8.419E+00
404	1.950E-02	445	4.104E+00	486	2.648E+00	527	5.434E+00	568	8.462E+00
405	3.090E-02	446	4.531E+00	487	2.655E+00	528	5.506E+00	569	8.577E+00
406	3.120E-02	447	4.789E+00	488	2.718E+00	529	5.522E+00	570	8.624E+00
407	3.520E-02	448	5.147E+00	489	2.782E+00	530	5.611E+00	571	8.752E+00
408	3.730E-02	449	5.280E+00	490	2.805E+00	531	5.695E+00	572	8.882E+00
409	5.230E-02	450	5.472E+00	491	2.878E+00	532	5.702E+00	573	9.013E+00
410	5.800E-02	451	5.435E+00	492	2.959E+00	533	5.784E+00	574	9.136E+00
411	5.580E-02	452	5.476E+00	493	2.988E+00	534	5.870E+00	575	9.256E+00
412	4.910E-02	453	5.306E+00	494	3.073E+00	535	5.881E+00	576	9.290E+00
413	6.150E-02	454	5.217E+00	495	3.107E+00	536	5.959E+00	577	9.413E+00
414	7.170E-02	455	4.970E+00	496	3.199E+00	537	6.033E+00	578	9.546E+00
415	7.910E-02	456	4.833E+00	497	3.298E+00	538	6.045E+00	579	9.670E+00
416	1.018E-01	457	4.581E+00	498	3.334E+00	539	6.202E+00	580	9.783E+00
417	1.103E-01	458	4.463E+00	499	3.426E+00	540	6.221E+00	581	9.818E+00
418	1.350E-01	459	4.238E+00	500	3.519E+00	541	6.303E+00	582	9.928E+00
419	1.553E-01	460	4.148E+00	501	3.554E+00	542	6.308E+00	583	1.003E+01
420	1.779E-01	461	3.969E+00	502	3.651E+00	543	6.382E+00	584	1.006E+01

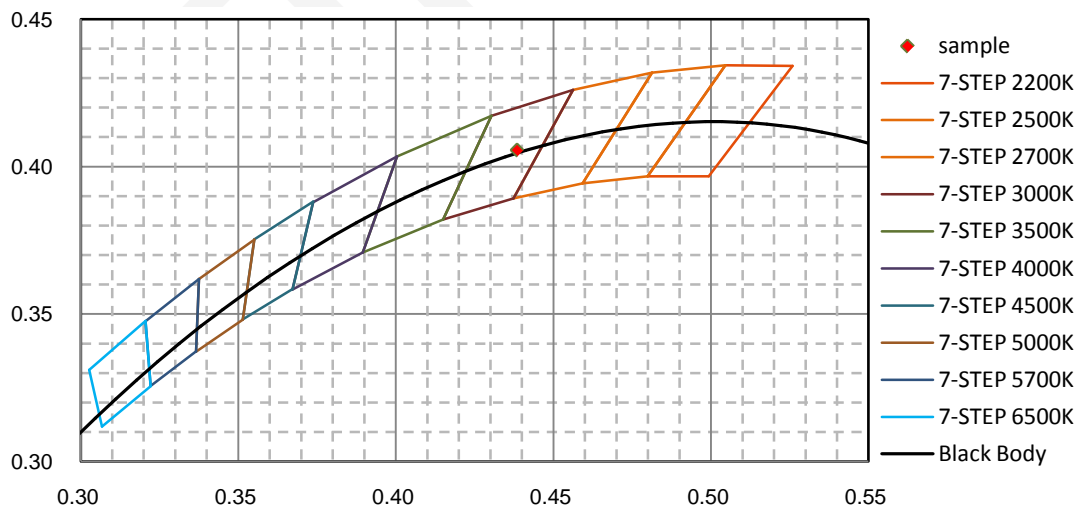


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.017E+01	626	9.997E+00	667	4.853E+00	708	1.555E+00	749	3.101E-01
586	1.027E+01	627	9.905E+00	668	4.730E+00	709	1.487E+00	750	3.257E-01
587	1.037E+01	628	9.813E+00	669	4.618E+00	710	1.418E+00	751	3.330E-01
588	1.048E+01	629	9.725E+00	670	4.489E+00	711	1.361E+00	752	3.303E-01
589	1.049E+01	630	9.619E+00	671	4.382E+00	712	1.341E+00	753	3.043E-01
590	1.057E+01	631	9.453E+00	672	4.278E+00	713	1.287E+00	754	2.603E-01
591	1.067E+01	632	9.362E+00	673	4.175E+00	714	1.245E+00	755	2.392E-01
592	1.076E+01	633	9.259E+00	674	4.065E+00	715	1.203E+00	756	2.270E-01
593	1.076E+01	634	9.153E+00	675	3.976E+00	716	1.159E+00	757	1.661E-01
594	1.084E+01	635	8.984E+00	676	3.876E+00	717	1.136E+00	758	1.460E-01
595	1.090E+01	636	8.866E+00	677	3.745E+00	718	1.098E+00	759	1.393E-01
596	1.097E+01	637	8.757E+00	678	3.642E+00	719	1.053E+00	760	1.441E-01
597	1.094E+01	638	8.630E+00	679	3.559E+00	720	1.016E+00	761	1.703E-01
598	1.100E+01	639	8.459E+00	680	3.459E+00	721	9.877E-01	762	2.114E-01
599	1.106E+01	640	8.341E+00	681	3.397E+00	722	9.738E-01	763	1.888E-01
600	1.110E+01	641	8.162E+00	682	3.310E+00	723	9.284E-01	764	1.357E-01
601	1.115E+01	642	8.042E+00	683	3.225E+00	724	8.998E-01	765	1.182E-01
602	1.110E+01	643	7.970E+00	684	3.131E+00	725	8.659E-01	766	1.212E-01
603	1.113E+01	644	7.811E+00	685	3.031E+00	726	8.144E-01	767	1.441E-01
604	1.116E+01	645	7.686E+00	686	2.958E+00	727	7.934E-01	768	1.397E-01
605	1.117E+01	646	7.548E+00	687	2.889E+00	728	7.832E-01	769	1.253E-01
606	1.111E+01	647	7.424E+00	688	2.797E+00	729	7.740E-01	770	1.008E-01
607	1.111E+01	648	7.259E+00	689	2.700E+00	730	7.523E-01	771	1.099E-01
608	1.111E+01	649	7.140E+00	690	2.632E+00	731	7.384E-01	772	1.182E-01
609	1.112E+01	650	7.010E+00	691	2.555E+00	732	6.918E-01	773	9.830E-02
610	1.111E+01	651	6.882E+00	692	2.496E+00	733	6.500E-01	774	9.940E-02
611	1.102E+01	652	6.718E+00	693	2.428E+00	734	6.296E-01	775	9.550E-02
612	1.100E+01	653	6.598E+00	694	2.358E+00	735	5.979E-01	776	9.390E-02
613	1.098E+01	654	6.480E+00	695	2.276E+00	736	5.648E-01	777	8.830E-02
614	1.094E+01	655	6.300E+00	696	2.212E+00	737	5.201E-01	778	9.340E-02
615	1.091E+01	656	6.202E+00	697	2.154E+00	738	4.904E-01	779	9.220E-02
616	1.080E+01	657	6.044E+00	698	2.080E+00	739	4.862E-01	780	6.960E-02
617	1.075E+01	658	5.933E+00	699	2.008E+00	740	4.837E-01		
618	1.070E+01	659	5.802E+00	700	1.962E+00	741	4.709E-01		
619	1.065E+01	660	5.671E+00	701	1.907E+00	742	4.536E-01		
620	1.059E+01	661	5.543E+00	702	1.826E+00	743	4.064E-01		
621	1.045E+01	662	5.436E+00	703	1.767E+00	744	3.759E-01		
622	1.038E+01	663	5.289E+00	704	1.717E+00	745	3.420E-01		
623	1.030E+01	664	5.181E+00	705	1.669E+00	746	3.208E-01		
624	1.022E+01	665	5.075E+00	706	1.643E+00	747	3.298E-01		
625	1.008E+01	666	4.958E+00	707	1.603E+00	748	3.230E-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: **Downward**

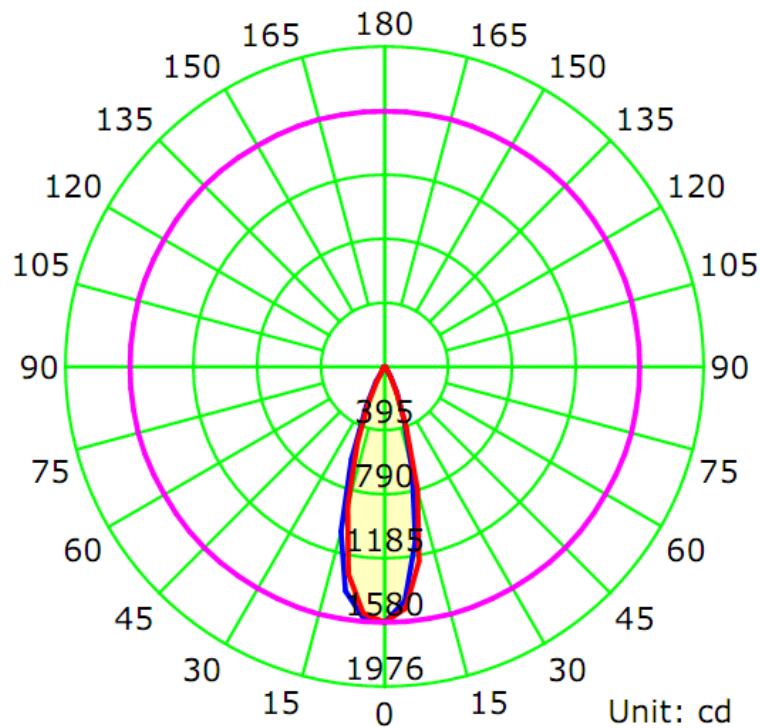
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
12.0	60	0.5310	5.91	0.9270

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
554.4	93.81	1580.9	0.53	0.52

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	31.6	31.4	31.3	31.5	31.5
Field Angle (10% $I_{max}$ ):	54.4	53.2	54.3	54.5	54.1

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1581	1581	1581	1581	1581	1581	1581	1581
5.0°	1451	1445	1453	1473	1497	1520	1546	1559
10.0°	1092	1090	1105	1152	1220	1291	1356	1399
15.0°	674	653	671	716	786	883	976	1048
20.0°	356	336	332	357	402	459	529	602
25.0°	174	156	148	161	181	207	234	271
30.0°	77	68	62	65	76	87	95	110
35.0°	35	31	28	30	36	39	42	47
40.0°	18	17	16	17	19	21	22	23
45.0°	13	12	12	12	12	13	13	14
50.0°	11	11	10	10	10	10	10	11
55.0°	11	10	9	9	9	9	9	9
60.0°	10	9	9	9	9	9	9	9
65.0°	9	9	8	8	8	9	9	9
70.0°	7	7	7	7	7	8	8	8
75.0°	6	6	6	6	6	6	7	7
80.0°	4	5	5	5	5	5	6	6
85.0°	3	3	3	3	4	4	4	4
90.0°	2	2	2	2	2	2	3	3
95.0°	1	1	1	1	1	2	2	2
100.0°	1	1	1	1	1	1	1	1
105.0°	1	1	1	1	1	1	1	1
110.0°	1	1	1	1	1	1	1	1
115.0°	1	1	1	1	1	1	1	1
120.0°	1	1	1	1	1	1	1	1
125.0°	1	1	1	1	1	1	1	1
130.0°	1	1	1	1	1	1	1	1
135.0°	1	1	1	1	1	1	1	1
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	1	1	1	1	1	1	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
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°	1581	1581	1581	1581	1581	1581	1581	1581
5.0°	1558	1566	1567	1552	1531	1501	1475	1445
10.0°	1407	1417	1399	1358	1300	1226	1157	1096
15.0°	1052	1060	1035	971	898	821	745	689
20.0°	610	611	597	548	503	455	407	368
25.0°	273	279	267	257	246	228	199	179
30.0°	111	111	108	108	109	101	86	79
35.0°	48	47	45	45	47	43	35	33
40.0°	24	23	21	22	23	22	20	18
45.0°	14	14	14	13	14	14	13	13
50.0°	11	11	11	11	11	11	11	11
55.0°	10	10	9	10	10	10	10	10
60.0°	9	9	9	9	10	10	10	10
65.0°	9	9	9	9	9	9	9	8
70.0°	8	8	8	8	8	8	8	7
75.0°	7	7	7	7	6	6	6	6
80.0°	6	6	6	5	5	5	4	4
85.0°	4	4	4	4	3	3	3	3
90.0°	3	3	3	2	2	2	2	2
95.0°	2	2	2	2	2	2	1	1
100.0°	1	1	1	1	1	1	1	1
105.0°	1	1	1	1	1	1	1	1
110.0°	1	1	1	1	1	1	1	1
115.0°	1	1	1	1	1	1	1	1
120.0°	1	1	1	1	1	1	1	1
125.0°	1	1	1	1	1	1	1	1
130.0°	1	1	1	1	1	1	1	1
135.0°	1	1	1	1	1	1	1	1
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	1	1	1	1	1	1	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

**Zonal Lumen Density Measurement**

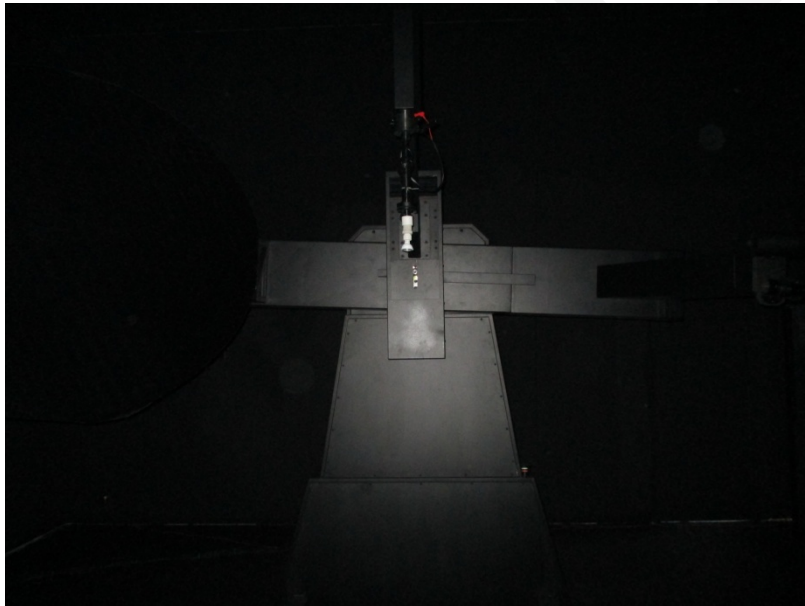
Deg	Flux (lm)	%
0-5	36.9	6.66
5-10	98.8	17.83
10-15	125.1	22.56
15-20	108.9	19.65
20-25	71.6	12.92
25-30	38.8	7.00
30-35	19.2	3.46
35-40	10.0	1.80
40-45	6.2	1.12
45-50	4.8	0.87
50-55	4.4	0.80
55-60	4.4	0.79
60-65	4.3	0.78
65-70	4.1	0.74
70-75	3.6	0.65
75-80	3.0	0.54
80-85	2.3	0.42
85-90	1.6	0.29
90-95	1.0	0.19
95-100	0.7	0.13
100-105	0.5	0.10
105-110	0.5	0.08
110-115	0.4	0.08
115-120	0.4	0.07
120-125	0.4	0.07
125-130	0.4	0.07
130-135	0.3	0.06
135-140	0.3	0.06
140-145	0.3	0.05
145-150	0.2	0.05
150-155	0.2	0.04
155-160	0.2	0.03
160-165	0.1	0.03
165-170	0.1	0.02
170-175	0.1	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	36.9	6.66
0-10	135.8	24.49
0-15	260.9	47.05
0-20	369.8	66.70
0-25	441.4	79.62
0-30	480.3	86.63
0-35	499.4	90.08
0-40	509.4	91.88
0-45	515.6	93.00
0-50	520.4	93.87
0-55	524.8	94.66
0-60	529.2	95.45
0-65	533.6	96.23
0-70	537.7	96.98
0-75	541.3	97.63
0-80	544.3	98.17
0-85	546.6	98.59
0-90	548.2	98.87
0-95	549.2	99.06
0-100	550.0	99.19
0-105	550.5	99.29
0-110	551.0	99.37
0-115	551.4	99.45
0-120	551.8	99.52
0-125	552.2	99.59
0-130	552.5	99.66
0-135	552.9	99.72
0-140	553.2	99.77
0-145	553.5	99.83
0-150	553.7	99.87
0-155	553.9	99.91
0-160	554.1	99.94
0-165	554.2	99.97
0-170	554.4	99.99
0-175	554.4	100.00
0-180	554.4	100.00

## 6. Product Photo



## 7. Product Test orientation in the Goniophotometer



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