

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 6.5PLSV/840/HYB/GX23**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Carl Du <i>Carl Du</i>
<b>Report Number:</b>	RKS170301007-10
<b>Test Date:</b>	2017-03-07 to 2017-03-08
<b>Report Date:</b>	2017-03-09
<b>Reviewed By:</b>	Blake Zhang <i>Blake Zhang</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.

## 1. Product Description

### General Information:

One sample was received on 2017-03-02 and used for testing.

Model Tested: 6.5PLSV/840/HYB/GX23  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED Lamp  
 Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz  
 Rated Power: 6.5W  
 Nominal CCT: 4000K  
 Nominal Lumen Output: 620 lm  
 Nominal CRI: 80

## 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
Integrating Sphere	SENSING	N/A	N/A	25°C	2017-03-09	2018-03-08
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2017-03-03	2018-03-02
Spectral photometer	SENSING	SPR3000	s0902024	350nm~800nm	2017-03-09	2018-03-08
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50Hz	2017-03-03	2018-03-02
Standard Light Source	EVERFINE	D204	G100283CA8351158	24V/100W	2016-08-26	2017-08-25
Thermal Meter	SENSING	N/A	N/A	25°C	2016-03-21	2017-03-20
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2017-03-03	2018-03-02
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2017-03-03	2018-03-02
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2017-03-03	2018-03-02
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2017-03-03	2018-03-02
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2017-03-09	2018-03-08
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	2016-09-07	2017-09-06

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  $U=2.3\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=23\text{K}$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the CRI is  $U=2.3(K=2)$ , 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.

##### **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: **Baseup**

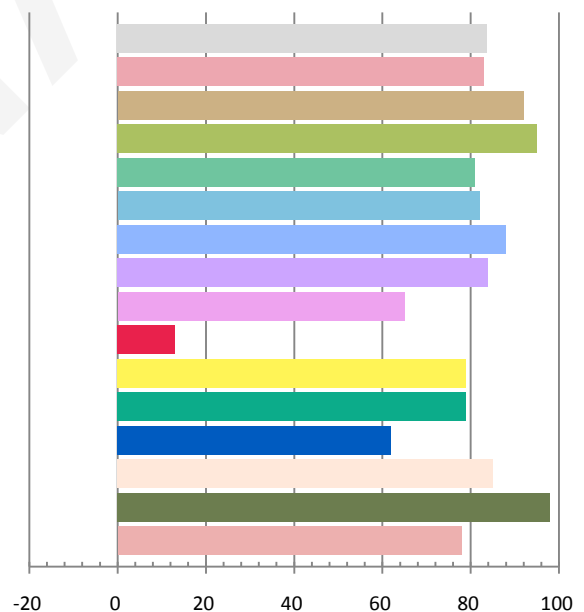
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0562	6.47	0.9591	642.5	99.3

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.970	4114	-0.00149	0.3746	0.3699	0.2240	0.4977

### Color Rendering Index

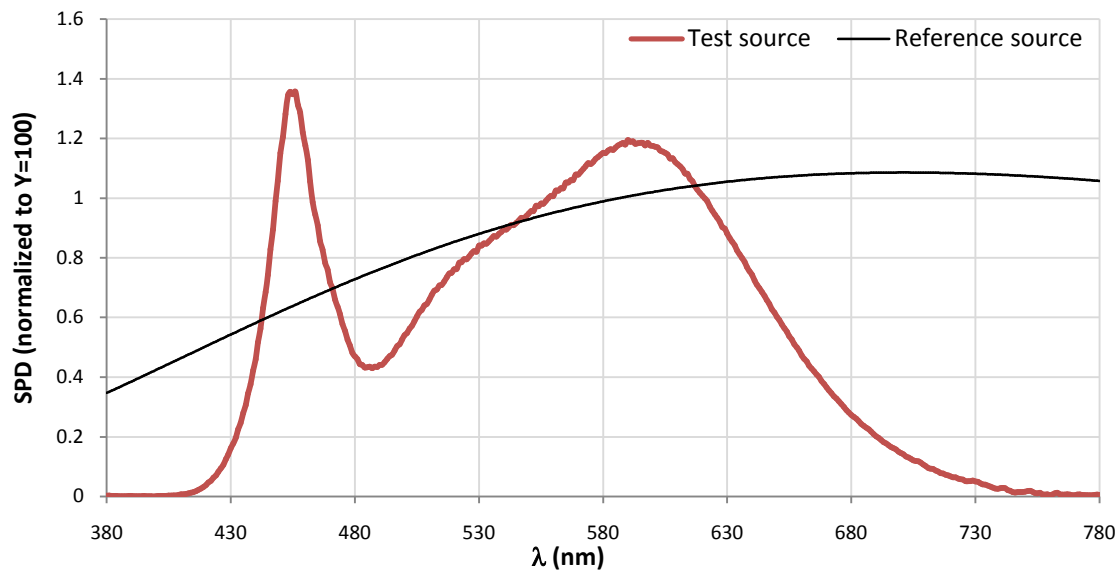
<b>Ra</b>			
<b>83.8</b>			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
83	92	95	81
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
82	88	84	65
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
13	79	79	62
<b>R13</b>	<b>R14</b>	<b>R15</b>	
85	98	78	



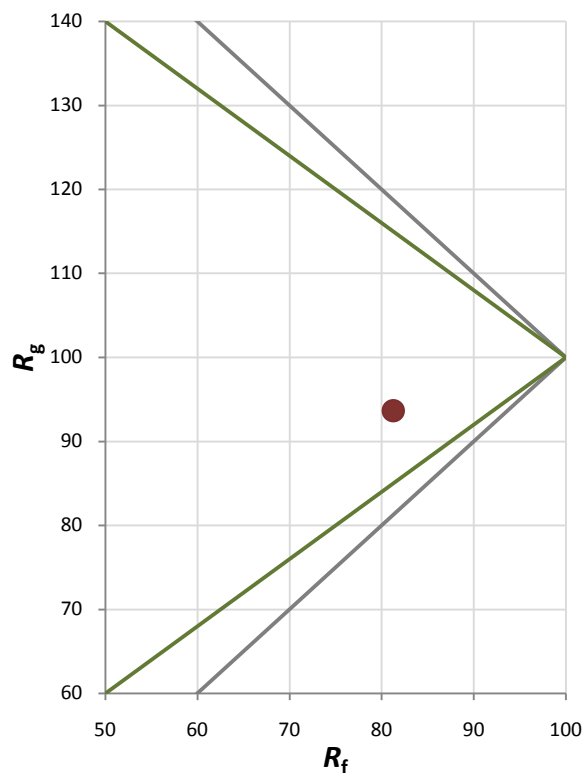
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	81
Gamut Index $R_g$	94

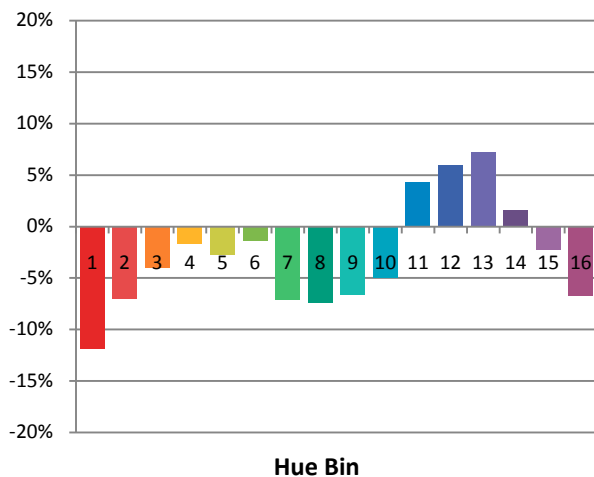
### Spectral Power Distribution Comparison



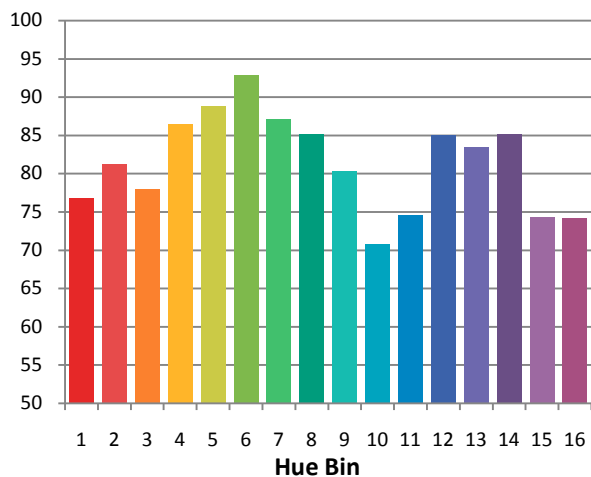
### Plot of $R_g$ versus $R_f$



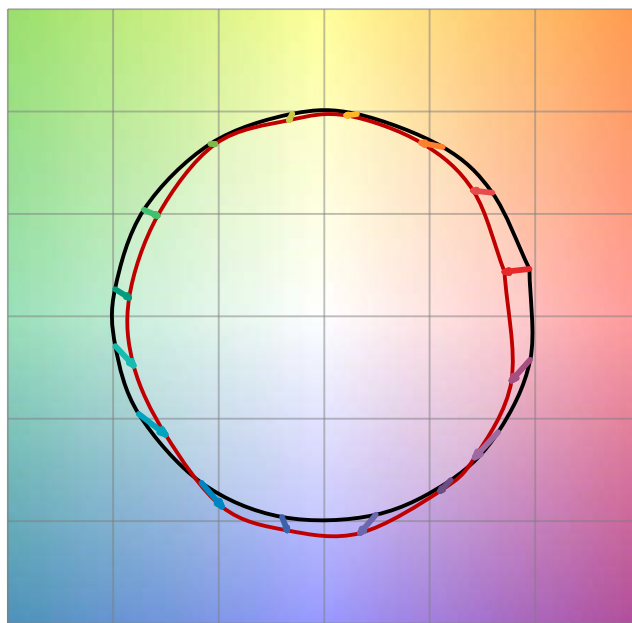
**Chroma Shift by Hue**



**$R_t$  by Hue**

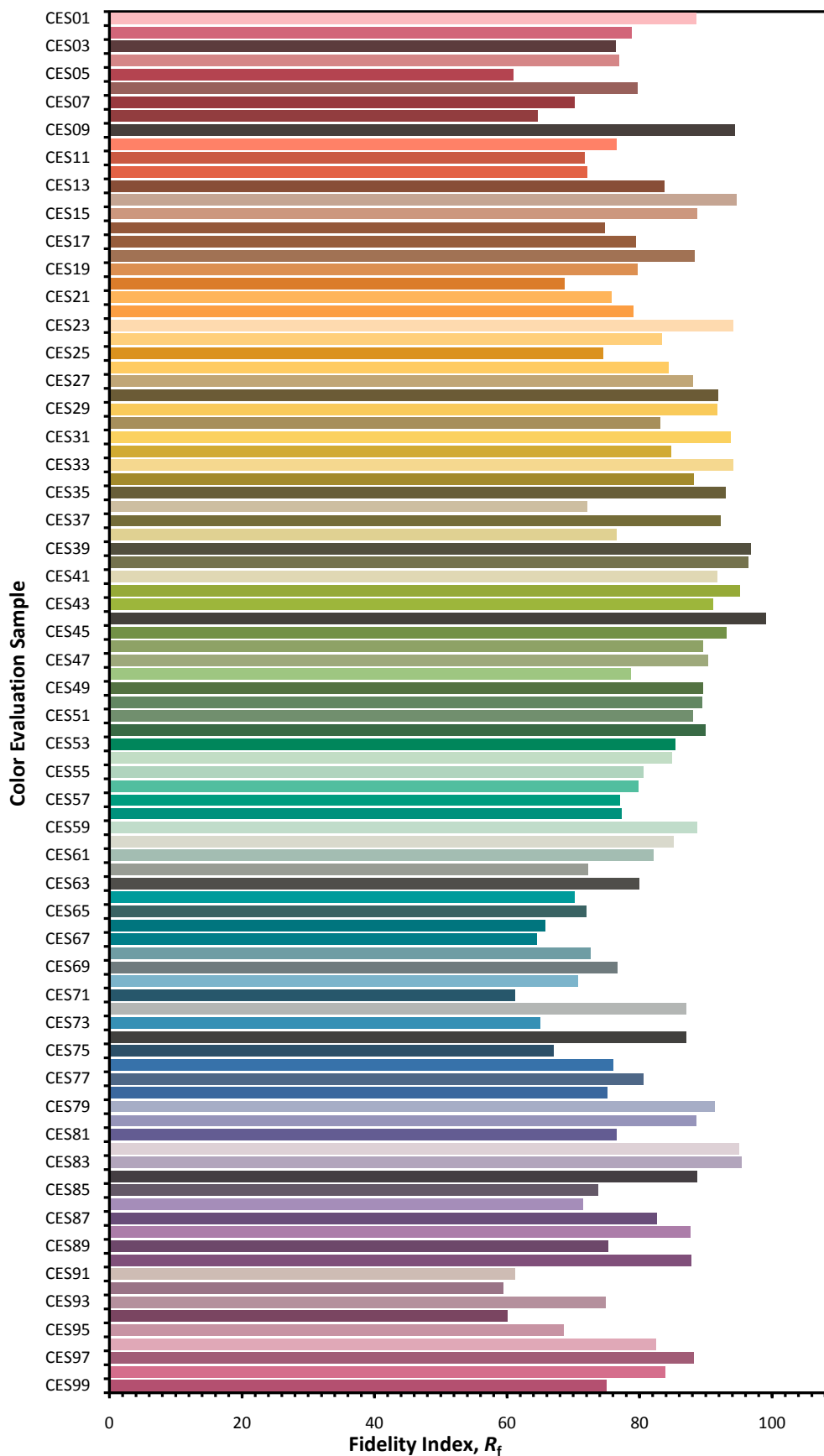


**Color Vector Graphic**

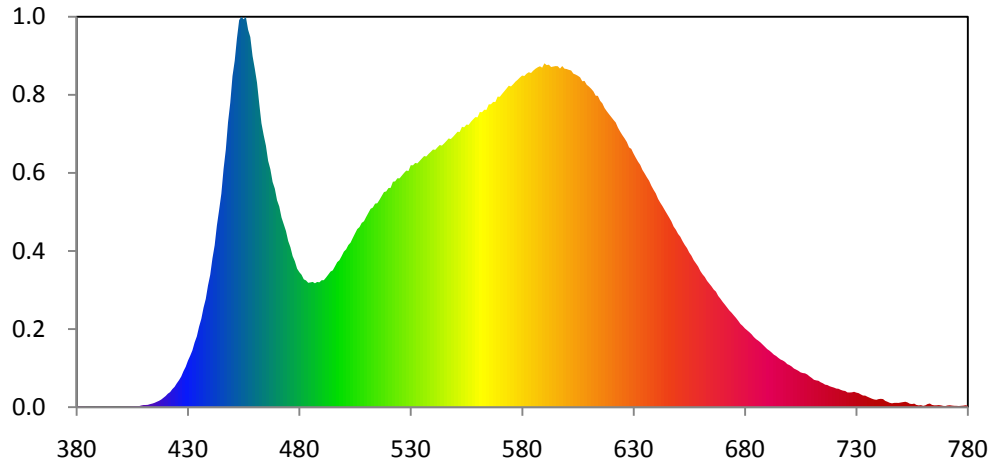


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



**Relative Spectral Power Distribution**

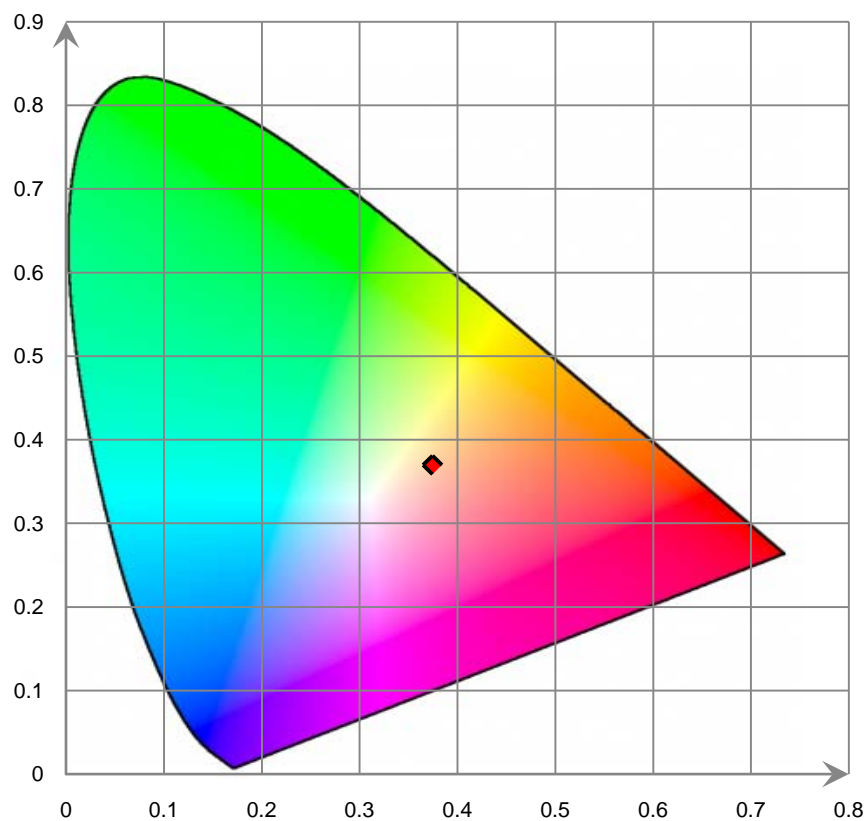


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.820E-02	421	4.415E-01	462	9.923E+00	503	5.378E+00	544	8.548E+00
381	2.480E-02	422	4.919E-01	463	9.278E+00	504	5.531E+00	545	8.620E+00
382	2.040E-02	423	5.899E-01	464	8.889E+00	505	5.677E+00	546	8.697E+00
383	1.990E-02	424	6.634E-01	465	8.546E+00	506	5.820E+00	547	8.780E+00
384	1.840E-02	425	7.796E-01	466	8.049E+00	507	5.884E+00	548	8.763E+00
385	9.700E-03	426	8.821E-01	467	7.776E+00	508	6.023E+00	549	8.834E+00
386	1.040E-02	427	1.002E+00	468	7.362E+00	509	6.075E+00	550	8.916E+00
387	1.010E-02	428	1.176E+00	469	7.141E+00	510	6.216E+00	551	8.999E+00
388	9.900E-03	429	1.319E+00	470	6.762E+00	511	6.350E+00	552	8.995E+00
389	1.700E-02	430	1.518E+00	471	6.555E+00	512	6.483E+00	553	9.162E+00
390	1.670E-02	431	1.678E+00	472	6.201E+00	513	6.523E+00	554	9.146E+00
391	8.000E-03	432	1.856E+00	473	5.979E+00	514	6.651E+00	555	9.234E+00
392	5.200E-03	433	2.113E+00	474	5.757E+00	515	6.664E+00	556	9.224E+00
393	8.200E-03	434	2.314E+00	475	5.431E+00	516	6.778E+00	557	9.324E+00
394	1.360E-02	435	2.631E+00	476	5.228E+00	517	6.904E+00	558	9.405E+00
395	1.450E-02	436	2.884E+00	477	4.937E+00	518	7.030E+00	559	9.479E+00
396	1.030E-02	437	3.249E+00	478	4.767E+00	519	7.051E+00	560	9.473E+00
397	7.300E-03	438	3.535E+00	479	4.526E+00	520	7.161E+00	561	9.645E+00
398	5.300E-03	439	3.975E+00	480	4.413E+00	521	7.168E+00	562	9.638E+00
399	2.500E-03	440	4.324E+00	481	4.327E+00	522	7.367E+00	563	9.719E+00
400	1.330E-02	441	4.862E+00	482	4.177E+00	523	7.379E+00	564	9.716E+00
401	1.640E-02	442	5.290E+00	483	4.142E+00	524	7.479E+00	565	9.895E+00
402	1.650E-02	443	5.939E+00	484	4.063E+00	525	7.478E+00	566	9.898E+00
403	1.690E-02	444	6.443E+00	485	4.078E+00	526	7.566E+00	567	9.975E+00
404	2.140E-02	445	6.979E+00	486	4.093E+00	527	7.654E+00	568	9.973E+00
405	2.760E-02	446	7.787E+00	487	4.048E+00	528	7.731E+00	569	1.015E+01
406	3.170E-02	447	8.415E+00	488	4.091E+00	529	7.718E+00	570	1.014E+01
407	3.450E-02	448	9.311E+00	489	4.081E+00	530	7.907E+00	571	1.024E+01
408	3.280E-02	449	9.947E+00	490	4.147E+00	531	7.904E+00	572	1.032E+01
409	5.480E-02	450	1.082E+01	491	4.151E+00	532	7.981E+00	573	1.041E+01
410	6.970E-02	451	1.132E+01	492	4.238E+00	533	7.967E+00	574	1.050E+01
411	7.170E-02	452	1.205E+01	493	4.332E+00	534	8.046E+00	575	1.048E+01
412	7.710E-02	453	1.265E+01	494	4.431E+00	535	8.126E+00	576	1.055E+01
413	9.980E-02	454	1.276E+01	495	4.471E+00	536	8.205E+00	577	1.064E+01
414	1.178E-01	455	1.268E+01	496	4.602E+00	537	8.193E+00	578	1.070E+01
415	1.412E-01	456	1.276E+01	497	4.738E+00	538	8.276E+00	579	1.077E+01
416	1.743E-01	457	1.234E+01	498	4.803E+00	539	8.345E+00	580	1.084E+01
417	2.069E-01	458	1.210E+01	499	4.938E+00	540	8.420E+00	581	1.082E+01
418	2.493E-01	459	1.148E+01	500	5.084E+00	541	8.409E+00	582	1.090E+01
419	3.059E-01	460	1.107E+01	501	5.157E+00	542	8.491E+00	583	1.095E+01
420	3.645E-01	461	1.061E+01	502	5.298E+00	543	8.566E+00	584	1.092E+01

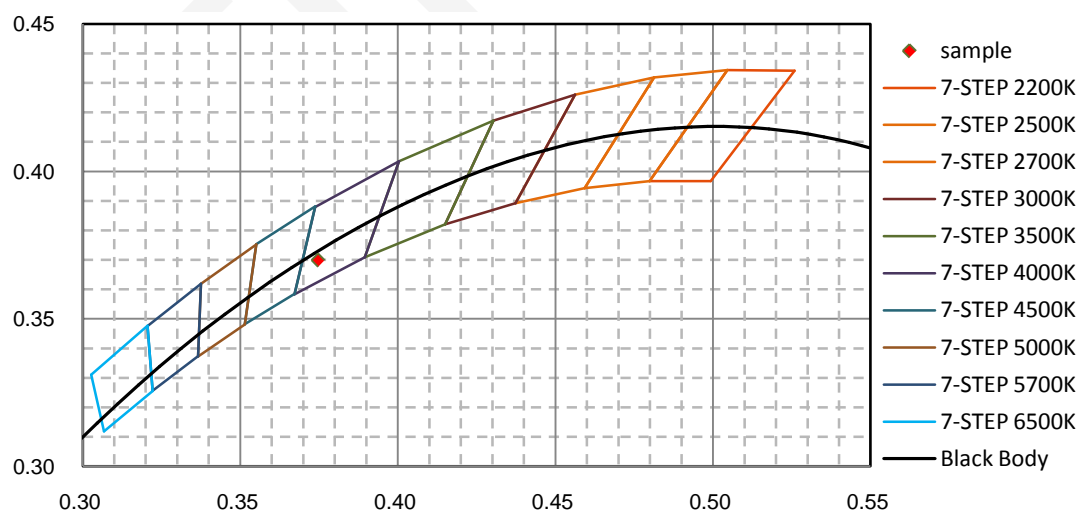


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.100E+01	626	8.782E+00	667	3.775E+00	708	1.067E+00	749	1.396E-01
586	1.106E+01	627	8.665E+00	668	3.637E+00	709	1.006E+00	750	1.532E-01
587	1.111E+01	628	8.490E+00	669	3.545E+00	710	9.538E-01	751	1.660E-01
588	1.114E+01	629	8.440E+00	670	3.443E+00	711	8.946E-01	752	1.770E-01
589	1.109E+01	630	8.288E+00	671	3.352E+00	712	8.758E-01	753	1.544E-01
590	1.124E+01	631	8.153E+00	672	3.258E+00	713	8.623E-01	754	1.119E-01
591	1.118E+01	632	8.026E+00	673	3.161E+00	714	8.141E-01	755	1.036E-01
592	1.119E+01	633	7.920E+00	674	3.088E+00	715	7.814E-01	756	1.156E-01
593	1.112E+01	634	7.753E+00	675	3.001E+00	716	7.362E-01	757	7.320E-02
594	1.113E+01	635	7.636E+00	676	2.917E+00	717	7.233E-01	758	5.810E-02
595	1.115E+01	636	7.512E+00	677	2.822E+00	718	6.846E-01	759	6.720E-02
596	1.114E+01	637	7.397E+00	678	2.721E+00	719	6.605E-01	760	4.280E-02
597	1.106E+01	638	7.236E+00	679	2.654E+00	720	6.392E-01	761	6.150E-02
598	1.115E+01	639	7.103E+00	680	2.574E+00	721	6.088E-01	762	1.039E-01
599	1.106E+01	640	6.985E+00	681	2.512E+00	722	6.009E-01	763	1.182E-01
600	1.105E+01	641	6.808E+00	682	2.451E+00	723	5.664E-01	764	7.420E-02
601	1.102E+01	642	6.681E+00	683	2.381E+00	724	5.411E-01	765	6.030E-02
602	1.100E+01	643	6.568E+00	684	2.293E+00	725	5.293E-01	766	6.090E-02
603	1.090E+01	644	6.442E+00	685	2.224E+00	726	4.819E-01	767	6.850E-02
604	1.087E+01	645	6.320E+00	686	2.173E+00	727	4.796E-01	768	6.010E-02
605	1.083E+01	646	6.197E+00	687	2.115E+00	728	4.848E-01	769	4.210E-02
606	1.078E+01	647	6.070E+00	688	2.043E+00	729	5.023E-01	770	3.850E-02
607	1.065E+01	648	5.902E+00	689	1.971E+00	730	4.754E-01	771	5.790E-02
608	1.066E+01	649	5.798E+00	690	1.899E+00	731	4.594E-01	772	6.410E-02
609	1.053E+01	650	5.663E+00	691	1.847E+00	732	4.175E-01	773	5.290E-02
610	1.048E+01	651	5.569E+00	692	1.785E+00	733	3.803E-01	774	4.470E-02
611	1.041E+01	652	5.426E+00	693	1.716E+00	734	3.773E-01	775	4.380E-02
612	1.032E+01	653	5.302E+00	694	1.673E+00	735	3.402E-01	776	3.880E-02
613	1.018E+01	654	5.198E+00	695	1.612E+00	736	3.085E-01	777	4.420E-02
614	1.017E+01	655	5.053E+00	696	1.558E+00	737	2.775E-01	778	5.040E-02
615	1.001E+01	656	4.947E+00	697	1.526E+00	738	2.525E-01	779	6.430E-02
616	9.929E+00	657	4.805E+00	698	1.479E+00	739	2.407E-01	780	5.030E-02
617	9.774E+00	658	4.701E+00	699	1.407E+00	740	2.641E-01		
618	9.670E+00	659	4.595E+00	700	1.376E+00	741	2.735E-01		
619	9.575E+00	660	4.448E+00	701	1.328E+00	742	2.646E-01		
620	9.482E+00	661	4.340E+00	702	1.263E+00	743	2.049E-01		
621	9.390E+00	662	4.253E+00	703	1.227E+00	744	1.764E-01		
622	9.304E+00	663	4.129E+00	704	1.188E+00	745	1.434E-01		
623	9.136E+00	664	4.039E+00	705	1.137E+00	746	1.257E-01		
624	9.005E+00	665	3.947E+00	706	1.115E+00	747	1.403E-01		
625	8.888E+00	666	3.843E+00	707	1.105E+00	748	1.420E-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**

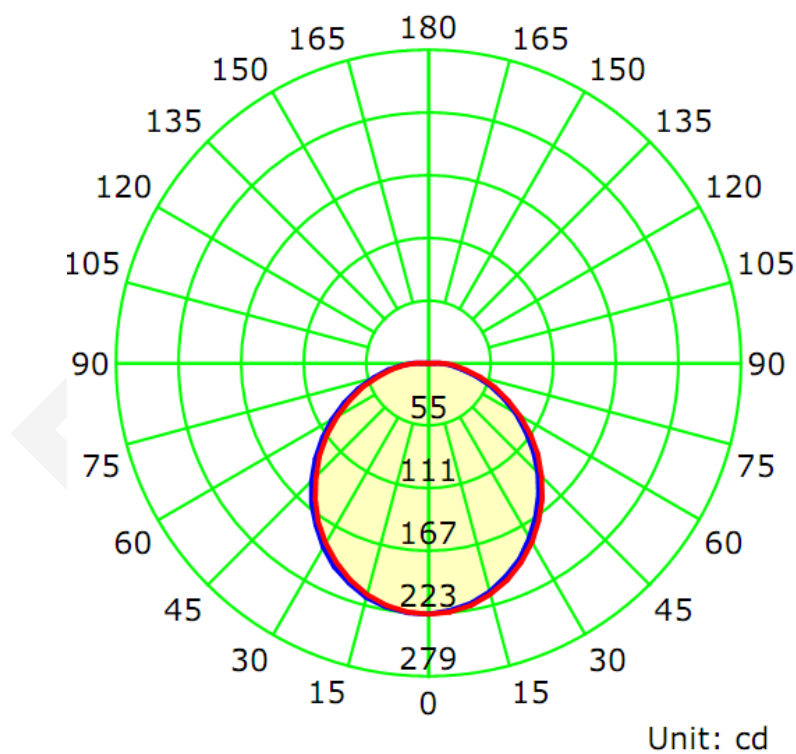
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0560	6.48	0.9640

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
651.8	100.59	223.9	1.23	1.23

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	109.7	109.7	109.7	109.6	109.7
Field Angle (10% I <sub>max</sub> ):	169.7	169.7	169.4	169.5	169.6

**Luminous Intensity (cd) Distribution Data**

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	224	224	224	224	224	224	224	224
5.0°	222	222	222	223	223	223	223	224
10.0°	218	218	218	219	220	220	221	221
15.0°	212	211	212	213	214	215	216	216
20.0°	203	203	203	205	206	207	209	210
25.0°	193	193	193	195	196	198	199	201
30.0°	181	181	182	183	185	187	189	190
35.0°	168	168	169	170	172	174	176	178
40.0°	153	154	154	156	158	160	162	164
45.0°	138	138	139	141	143	146	147	149
50.0°	123	123	124	126	128	130	132	134
55.0°	106	106	108	109	112	114	116	117
60.0°	91	91	92	93	95	98	99	101
65.0°	74	74	75	77	79	81	83	85
70.0°	58	59	60	61	63	65	67	69
75.0°	44	44	45	46	48	50	52	53
80.0°	30	31	31	33	34	36	37	38
85.0°	19	20	20	21	22	24	25	26
90.0°	11	11	11	12	13	14	14	15
95.0°	5	5	5	6	6	7	7	8
100.0°	2	2	2	2	2	3	3	3
105.0°	1	1	1	1	1	1	1	1
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
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

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

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	224	224	224	224	224	224	224	224
5.0°	224	224	224	224	223	222	222	222
10.0°	221	221	221	220	220	219	218	218
15.0°	217	216	216	215	214	213	212	211
20.0°	209	210	209	208	206	205	203	203
25.0°	201	200	200	199	197	195	193	192
30.0°	190	190	189	187	186	183	181	180
35.0°	177	177	176	174	173	170	169	167
40.0°	163	163	163	161	159	156	154	153
45.0°	149	148	148	146	144	141	139	137
50.0°	133	133	132	130	128	125	123	121
55.0°	117	117	116	114	111	109	107	105
60.0°	100	100	99	97	95	93	90	89
65.0°	84	84	70	81	79	76	64	73
70.0°	68	67	66	65	63	60	58	57
75.0°	52	52	51	49	47	45	44	43
80.0°	37	37	36	35	33	31	30	29
85.0°	25	25	24	23	21	20	19	18
90.0°	15	15	14	13	12	11	11	10
95.0°	7	7	7	7	6	5	5	5
100.0°	3	3	3	3	2	2	2	2
105.0°	1	1	1	1	1	1	1	1
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
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

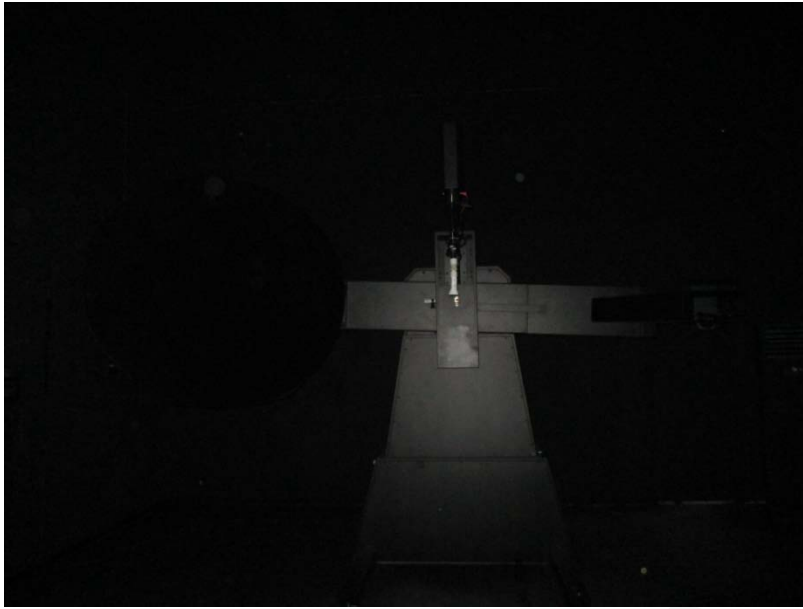
**Zonal Lumen Density Measurement**

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	5.3	0.82	0-5	5.3	0.82
5-10	15.8	2.43	0-10	21.2	3.25
10-15	25.7	3.94	0-15	46.9	7.19
15-20	34.6	5.31	0-20	81.5	12.50
20-25	42.2	6.48	0-25	123.7	18.98
25-30	48.3	7.41	0-30	172.0	26.39
30-35	52.6	8.08	0-35	224.6	34.47
35-40	55.2	8.46	0-40	279.8	42.93
40-45	55.9	8.57	0-45	335.7	51.50
45-50	54.8	8.40	0-50	390.4	59.90
50-55	52.0	7.97	0-55	442.4	67.87
55-60	47.8	7.33	0-60	490.2	75.20
60-65	42.0	6.44	0-65	532.1	81.64
65-70	35.5	5.45	0-70	567.7	87.09
70-75	28.9	4.43	0-75	596.6	91.53
75-80	21.8	3.34	0-80	618.3	94.87
80-85	15.1	2.32	0-85	633.4	97.19
85-90	9.4	1.44	0-90	642.8	98.63
90-95	5.1	0.78	0-95	648.0	99.41
95-100	2.3	0.36	0-100	650.3	99.77
100-105	0.9	0.13	0-105	651.1	99.90
105-110	0.3	0.04	0-110	651.4	99.94
110-115	0.1	0.01	0-115	651.5	99.96
115-120	0.0	0.01	0-120	651.5	99.96
120-125	0.0	0.01	0-125	651.6	99.97
125-130	0.0	0.01	0-130	651.6	99.97
130-135	0.0	0.00	0-135	651.6	99.98
135-140	0.0	0.00	0-140	651.7	99.98
140-145	0.0	0.00	0-145	651.7	99.99
145-150	0.0	0.00	0-150	651.7	99.99
150-155	0.0	0.00	0-155	651.7	99.99
155-160	0.0	0.00	0-160	651.8	100.00
160-165	0.0	0.00	0-165	651.8	100.00
165-170	0.0	0.00	0-170	651.8	100.00
170-175	0.0	0.00	0-175	651.8	100.00
175-180	0.0	0.00	0-180	651.8	100.00

## 6. Product Photo



## 7. Product Test orientation in the Goniophotometer



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