



# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 12NCDLR6DIM/940/277V/EXT**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Test Engineer:</b>	Joker Gu <i>Joker . Gu</i>
<b>Report Number:</b>	RKSB180510003-10-2
<b>Test Date:</b>	2018-05-11 to 2018-05-15
<b>Report Date:</b>	2018-05-16
<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.

**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. (Kunshan). 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 2018-05-10 and used for testing.

Model Tested: 12NCDLR6DIM/940/277V/EXT  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: Slim Downlight  
 Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC 60Hz  
 Rated Power: 12W  
 Nominal CCT: 4000K  
 Nominal Lumen Output: 940lm

## 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

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2018-01-24	2019-01-24
Power Meter	INVENTFINE	WT500	GSJWQ20009	2018-03-23	2019-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2018-01-24	2019-01-24
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2018-03-23	2019-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	2018-01-24	2019-01-24
Thermal Meter	KEJIAN	TA298	N/A	2017-11-14	2018-11-14
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2018-03-23	2019-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2018-03-23	2019-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2018-03-23	2019-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	2018-03-23	2019-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2018-01-24	2019-01-24
Wireless Weather Station	ZHONGXING	KG218	N/A	2017-11-14	2018-11-14
Standard Light Source	INVENTFINE	N/A	JWBYR040007	2018-01-24	2019-01-24

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: **Downward**

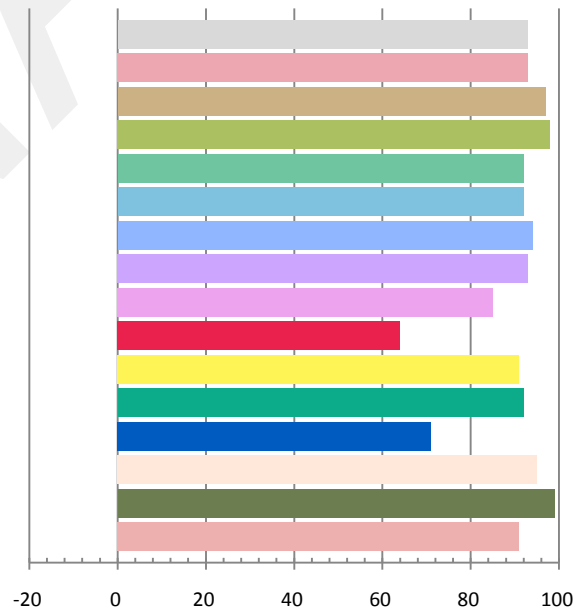
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.0969	11.6	0.9977	1066.7	91.95

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
3.591	4044	0.00069	0.3790	0.3773	0.2239	0.5016

### Color Rendering Index

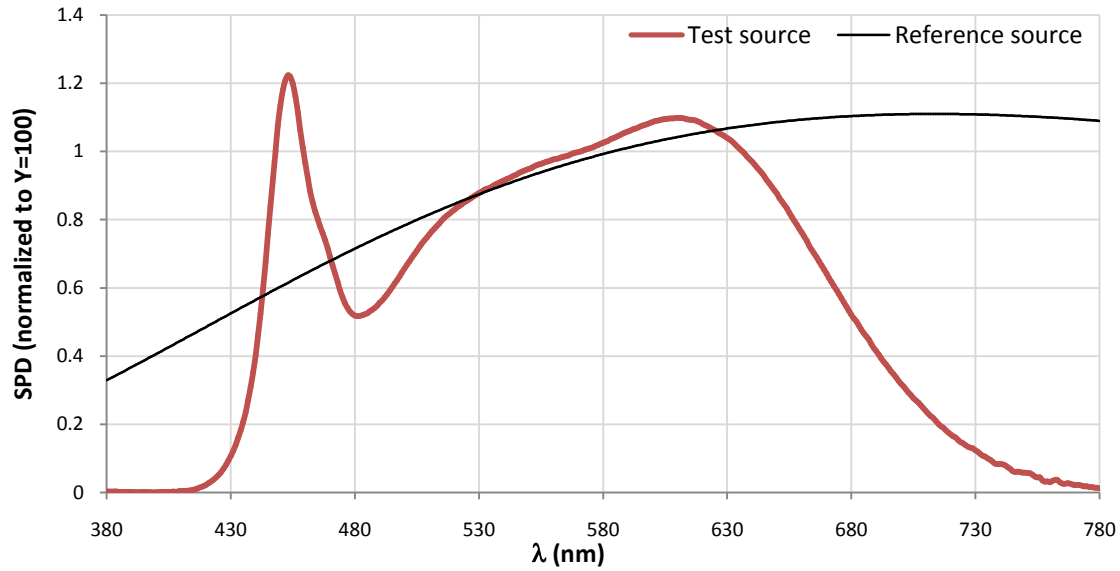
<b>Ra</b> <b>92.9</b>			
<b>R1</b> 93	<b>R2</b> 97	<b>R3</b> 98	<b>R4</b> 92
<b>R5</b> 92	<b>R6</b> 94	<b>R7</b> 93	<b>R8</b> 85
<b>R9</b> 64	<b>R10</b> 91	<b>R11</b> 92	<b>R12</b> 71
<b>R13</b> 95	<b>R14</b> 99	<b>R15</b> 91	



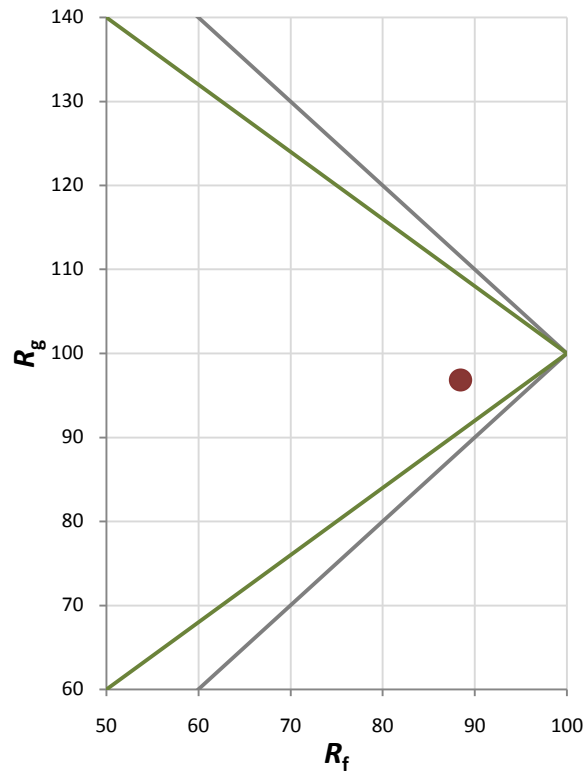
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	88
Gamut Index $R_g$	97

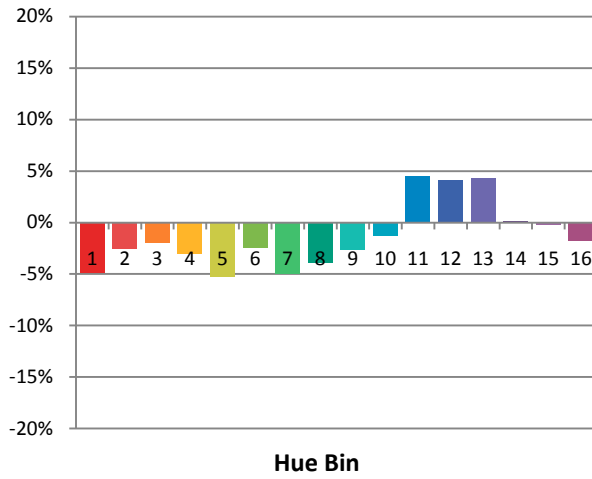
### Spectral Power Distribution Comparison



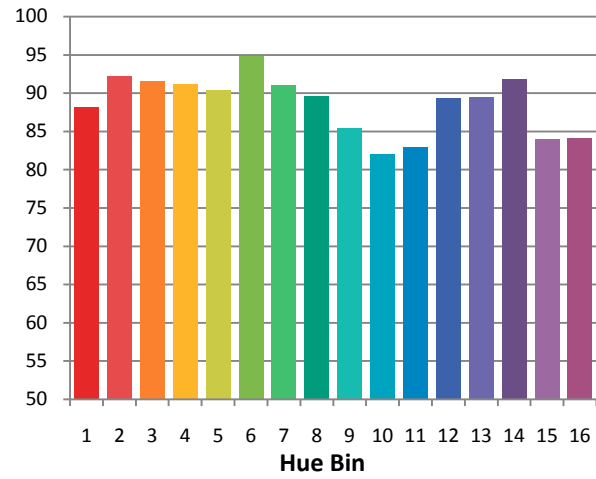
### Plot of $R_g$ versus $R_f$



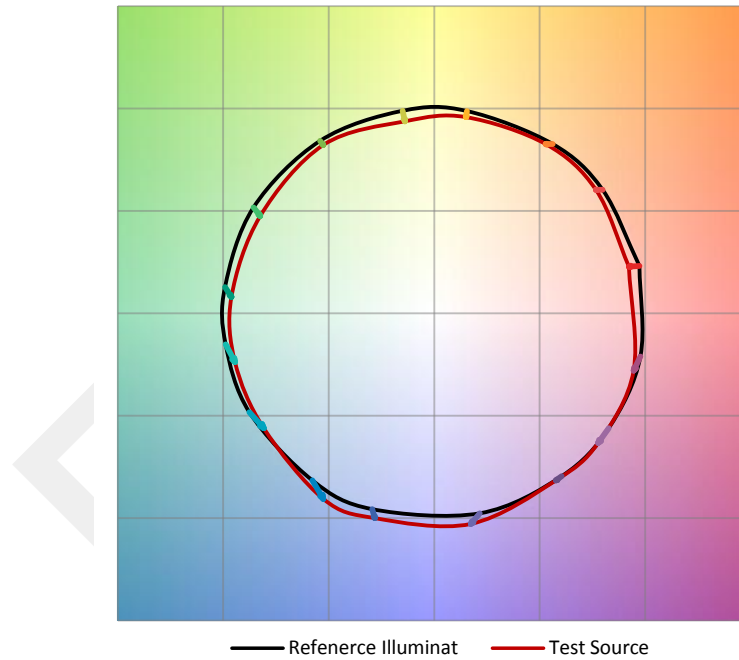
Chroma Shift by Hue



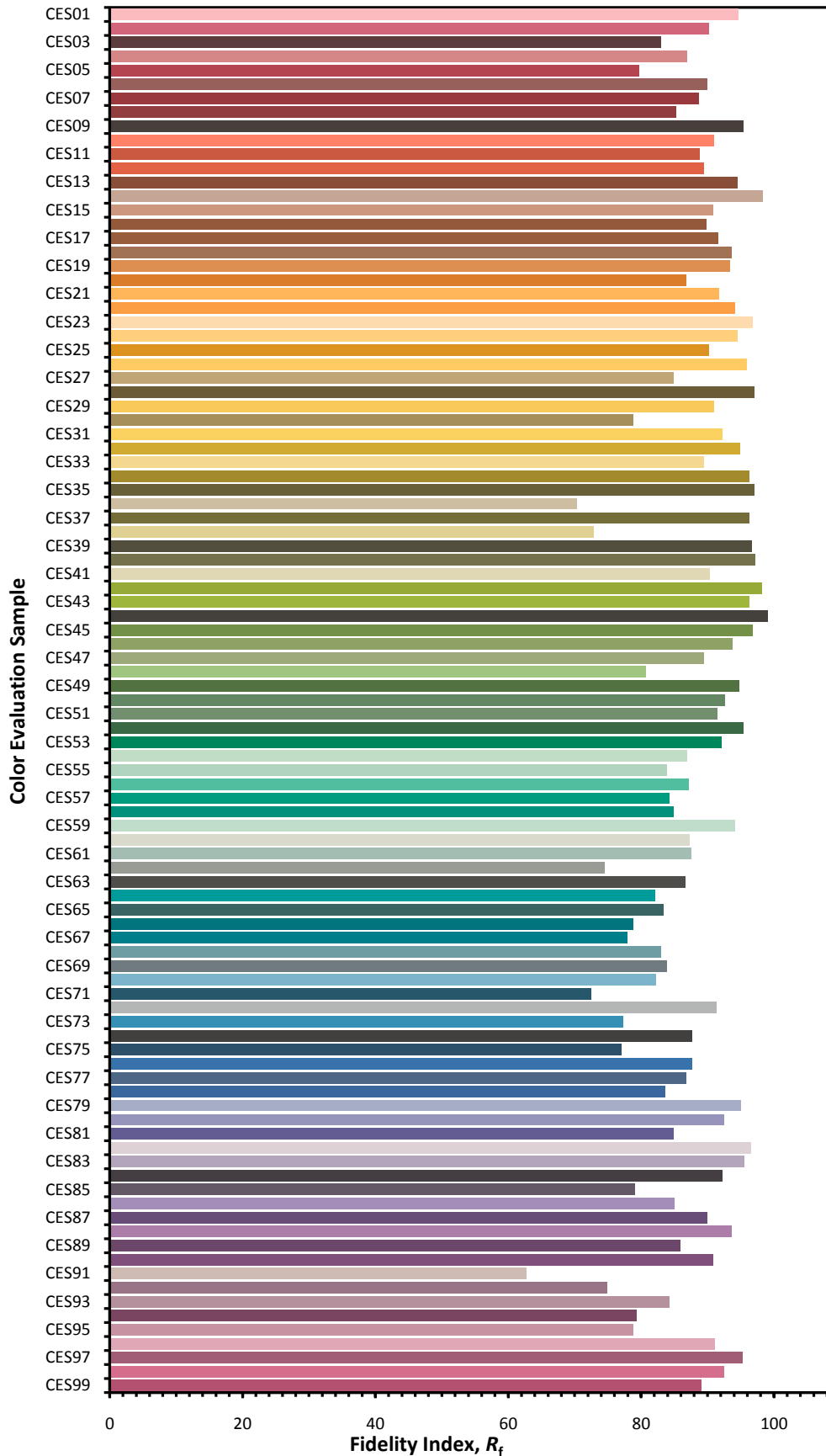
$R_f$  by Hue



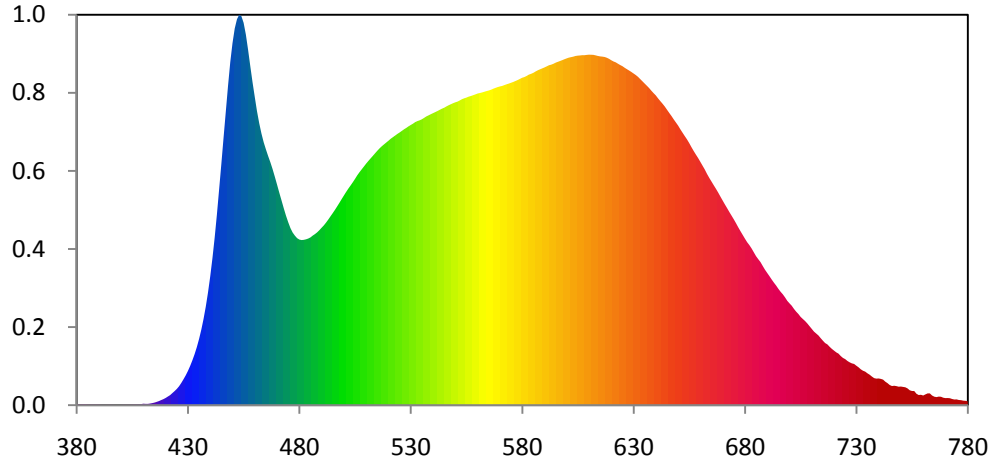
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

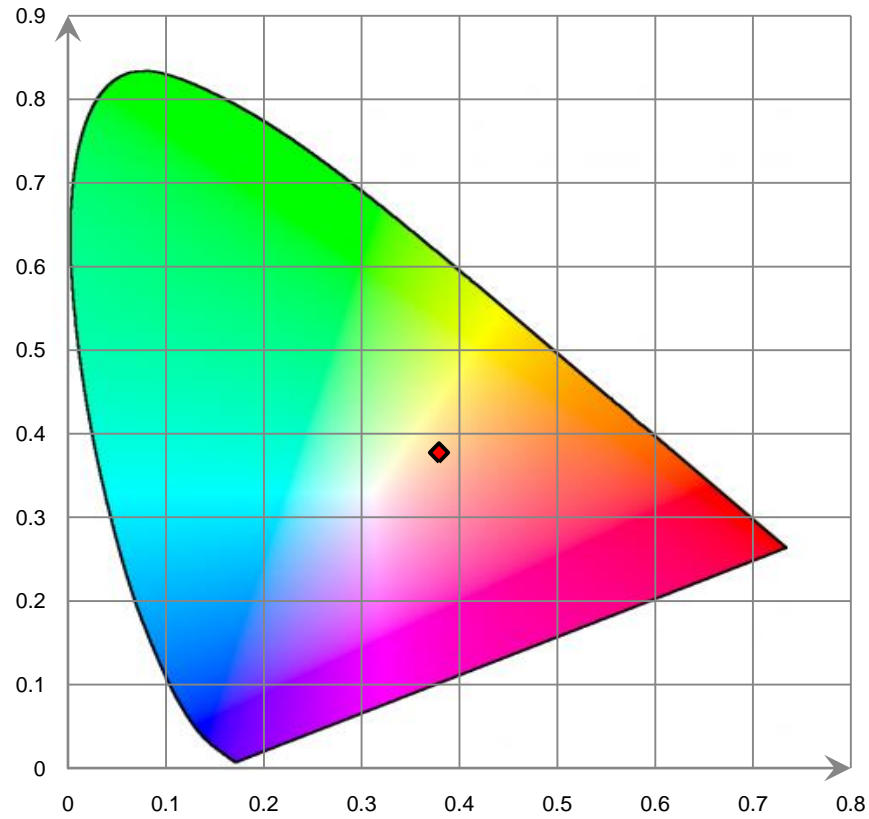


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.110E-02	421	4.241E-01	462	1.379E+01	503	1.075E+01	544	1.451E+01
381	4.400E-02	422	4.902E-01	463	1.329E+01	504	1.091E+01	545	1.455E+01
382	3.890E-02	423	5.907E-01	464	1.287E+01	505	1.107E+01	546	1.462E+01
383	4.720E-02	424	6.879E-01	465	1.252E+01	506	1.125E+01	547	1.467E+01
384	4.800E-02	425	7.940E-01	466	1.219E+01	507	1.140E+01	548	1.472E+01
385	3.210E-02	426	9.223E-01	467	1.188E+01	508	1.154E+01	549	1.478E+01
386	2.970E-02	427	1.084E+00	468	1.155E+01	509	1.168E+01	550	1.482E+01
387	3.180E-02	428	1.264E+00	469	1.118E+01	510	1.182E+01	551	1.485E+01
388	2.850E-02	429	1.457E+00	470	1.079E+01	511	1.195E+01	552	1.491E+01
389	3.340E-02	430	1.673E+00	471	1.040E+01	512	1.208E+01	553	1.497E+01
390	3.230E-02	431	1.919E+00	472	1.002E+01	513	1.220E+01	554	1.501E+01
391	1.490E-02	432	2.197E+00	473	9.639E+00	514	1.233E+01	555	1.505E+01
392	9.800E-03	433	2.500E+00	474	9.276E+00	515	1.245E+01	556	1.510E+01
393	1.500E-02	434	2.845E+00	475	8.956E+00	516	1.257E+01	557	1.513E+01
394	1.950E-02	435	3.240E+00	476	8.665E+00	517	1.267E+01	558	1.517E+01
395	2.220E-02	436	3.692E+00	477	8.448E+00	518	1.276E+01	559	1.521E+01
396	1.670E-02	437	4.212E+00	478	8.295E+00	519	1.285E+01	560	1.525E+01
397	1.270E-02	438	4.814E+00	479	8.173E+00	520	1.294E+01	561	1.527E+01
398	7.400E-03	439	5.504E+00	480	8.103E+00	521	1.303E+01	562	1.530E+01
399	5.400E-03	440	6.295E+00	481	8.079E+00	522	1.311E+01	563	1.533E+01
400	1.500E-02	441	7.183E+00	482	8.089E+00	523	1.319E+01	564	1.537E+01
401	2.030E-02	442	8.197E+00	483	8.116E+00	524	1.327E+01	565	1.540E+01
402	2.340E-02	443	9.330E+00	484	8.153E+00	525	1.334E+01	566	1.543E+01
403	2.460E-02	444	1.055E+01	485	8.210E+00	526	1.342E+01	567	1.548E+01
404	2.390E-02	445	1.181E+01	486	8.296E+00	527	1.350E+01	568	1.552E+01
405	2.710E-02	446	1.310E+01	487	8.370E+00	528	1.357E+01	569	1.556E+01
406	3.500E-02	447	1.437E+01	488	8.455E+00	529	1.364E+01	570	1.560E+01
407	3.820E-02	448	1.562E+01	489	8.562E+00	530	1.371E+01	571	1.562E+01
408	3.170E-02	449	1.678E+01	490	8.682E+00	531	1.377E+01	572	1.566E+01
409	5.410E-02	450	1.771E+01	491	8.797E+00	532	1.385E+01	573	1.570E+01
410	7.210E-02	451	1.843E+01	492	8.934E+00	533	1.390E+01	574	1.574E+01
411	6.580E-02	452	1.888E+01	493	9.085E+00	534	1.394E+01	575	1.578E+01
412	6.550E-02	453	1.910E+01	494	9.242E+00	535	1.399E+01	576	1.582E+01
413	8.120E-02	454	1.903E+01	495	9.398E+00	536	1.406E+01	577	1.586E+01
414	1.007E-01	455	1.871E+01	496	9.560E+00	537	1.413E+01	578	1.591E+01
415	1.276E-01	456	1.813E+01	497	9.729E+00	538	1.418E+01	579	1.596E+01
416	1.632E-01	457	1.739E+01	498	9.904E+00	539	1.424E+01	580	1.602E+01
417	2.012E-01	458	1.658E+01	499	1.008E+01	540	1.429E+01	581	1.605E+01
418	2.501E-01	459	1.580E+01	500	1.026E+01	541	1.434E+01	582	1.611E+01
419	2.956E-01	460	1.508E+01	501	1.043E+01	542	1.439E+01	583	1.617E+01
420	3.532E-01	461	1.439E+01	502	1.060E+01	543	1.445E+01	584	1.621E+01

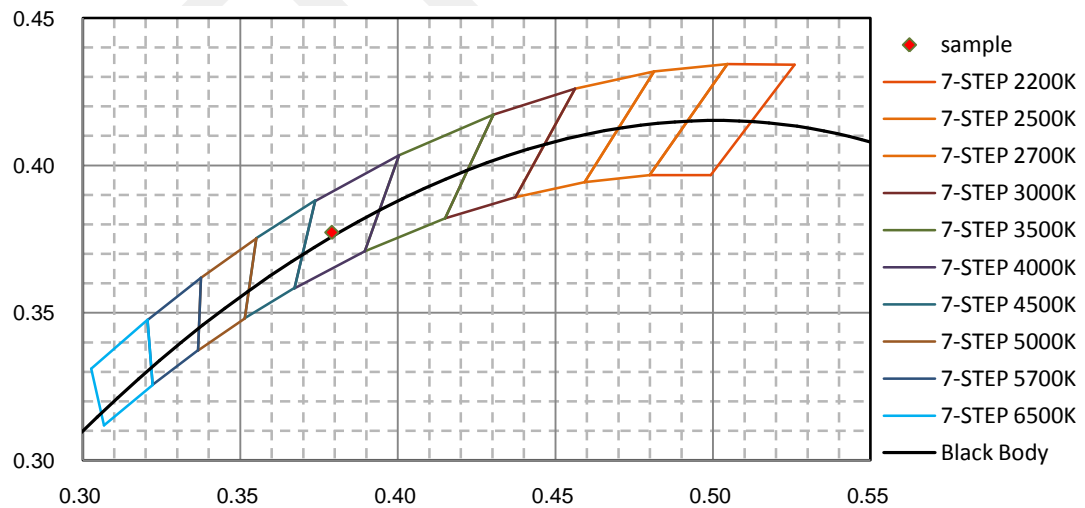


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.626E+01	626	1.651E+01	667	1.059E+01	708	3.998E+00	749	9.041E-01
586	1.632E+01	627	1.644E+01	668	1.040E+01	709	3.864E+00	750	9.106E-01
587	1.638E+01	628	1.638E+01	669	1.021E+01	710	3.732E+00	751	8.950E-01
588	1.643E+01	629	1.631E+01	670	1.001E+01	711	3.600E+00	752	8.741E-01
589	1.648E+01	630	1.623E+01	671	9.824E+00	712	3.505E+00	753	8.193E-01
590	1.652E+01	631	1.616E+01	672	9.643E+00	713	3.409E+00	754	7.273E-01
591	1.658E+01	632	1.607E+01	673	9.454E+00	714	3.280E+00	755	6.931E-01
592	1.663E+01	633	1.596E+01	674	9.275E+00	715	3.155E+00	756	6.912E-01
593	1.666E+01	634	1.585E+01	675	9.093E+00	716	3.040E+00	757	5.588E-01
594	1.670E+01	635	1.574E+01	676	8.905E+00	717	2.975E+00	758	4.967E-01
595	1.676E+01	636	1.563E+01	677	8.703E+00	718	2.858E+00	759	5.076E-01
596	1.680E+01	637	1.552E+01	678	8.513E+00	719	2.756E+00	760	4.736E-01
597	1.684E+01	638	1.539E+01	679	8.331E+00	720	2.669E+00	761	5.282E-01
598	1.688E+01	639	1.527E+01	680	8.148E+00	721	2.585E+00	762	5.769E-01
599	1.693E+01	640	1.516E+01	681	7.975E+00	722	2.521E+00	763	5.761E-01
600	1.697E+01	641	1.501E+01	682	7.831E+00	723	2.406E+00	764	4.747E-01
601	1.701E+01	642	1.488E+01	683	7.668E+00	724	2.312E+00	765	4.158E-01
602	1.703E+01	643	1.475E+01	684	7.478E+00	725	2.254E+00	766	3.953E-01
603	1.705E+01	644	1.462E+01	685	7.291E+00	726	2.165E+00	767	4.197E-01
604	1.709E+01	645	1.446E+01	686	7.142E+00	727	2.098E+00	768	4.131E-01
605	1.710E+01	646	1.430E+01	687	6.999E+00	728	2.045E+00	769	3.673E-01
606	1.711E+01	647	1.415E+01	688	6.811E+00	729	2.017E+00	770	3.462E-01
607	1.712E+01	648	1.399E+01	689	6.628E+00	730	1.931E+00	771	3.500E-01
608	1.712E+01	649	1.384E+01	690	6.471E+00	731	1.853E+00	772	3.401E-01
609	1.714E+01	650	1.368E+01	691	6.314E+00	732	1.757E+00	773	3.020E-01
610	1.715E+01	651	1.350E+01	692	6.151E+00	733	1.685E+00	774	2.770E-01
611	1.715E+01	652	1.333E+01	693	5.997E+00	734	1.640E+00	775	2.820E-01
612	1.714E+01	653	1.317E+01	694	5.855E+00	735	1.556E+00	776	2.543E-01
613	1.712E+01	654	1.301E+01	695	5.694E+00	736	1.491E+00	777	2.441E-01
614	1.709E+01	655	1.282E+01	696	5.551E+00	737	1.401E+00	778	2.216E-01
615	1.707E+01	656	1.263E+01	697	5.425E+00	738	1.323E+00	779	2.122E-01
616	1.705E+01	657	1.244E+01	698	5.274E+00	739	1.300E+00	780	1.905E-01
617	1.704E+01	658	1.226E+01	699	5.107E+00	740	1.307E+00		
618	1.700E+01	659	1.209E+01	700	4.982E+00	741	1.285E+00		
619	1.695E+01	660	1.190E+01	701	4.868E+00	742	1.250E+00		
620	1.688E+01	661	1.172E+01	702	4.711E+00	743	1.153E+00		
621	1.682E+01	662	1.153E+01	703	4.577E+00	744	1.077E+00		
622	1.677E+01	663	1.131E+01	704	4.461E+00	745	9.858E-01		
623	1.671E+01	664	1.112E+01	705	4.320E+00	746	9.357E-01		
624	1.664E+01	665	1.094E+01	706	4.216E+00	747	9.520E-01		
625	1.659E+01	666	1.076E+01	707	4.116E+00	748	9.317E-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**

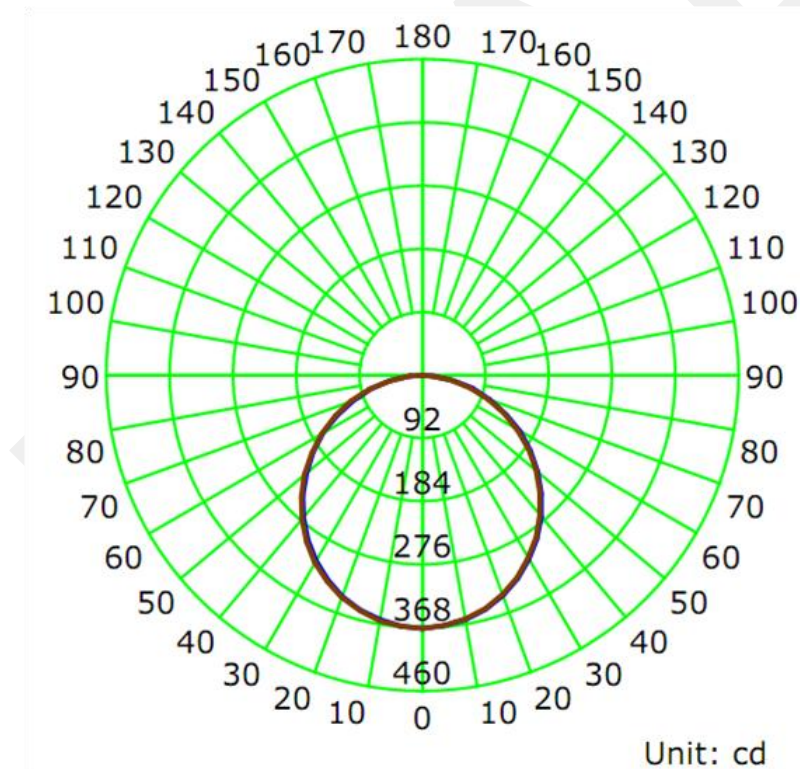
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0970	11.56	0.9980

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
1068.9	92.52	368.3	1.25	1.26

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	113.3	113.3	113.4	113.3	113.3
Field Angle (10% $I_{max}$ ):	163.4	163.4	163.1	163.3	163.3

**Luminous Intensity (cd) Distribution Data**

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	368	368	368	368	368	368	368	368
5.0°	366	366	366	366	366	366	366	367
10.0°	361	361	360	360	360	361	361	362
15.0°	353	352	352	351	352	352	353	354
20.0°	341	340	340	340	340	340	342	343
25.0°	327	326	325	325	325	326	328	329
30.0°	310	309	307	307	308	309	310	312
35.0°	290	289	288	287	288	289	291	293
40.0°	269	267	266	265	266	267	269	271
45.0°	245	243	241	241	242	243	245	247
50.0°	219	217	216	215	216	217	220	222
55.0°	192	190	188	188	189	190	193	195
60.0°	164	162	160	160	161	162	164	167
65.0°	134	133	131	130	131	133	136	138
70.0°	104	103	101	101	101	104	106	109
75.0°	74	72	71	71	71	73	75	79
80.0°	45	43	41	41	41	43	46	49
85.0°	16	15	14	13	13	15	18	21
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
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.)

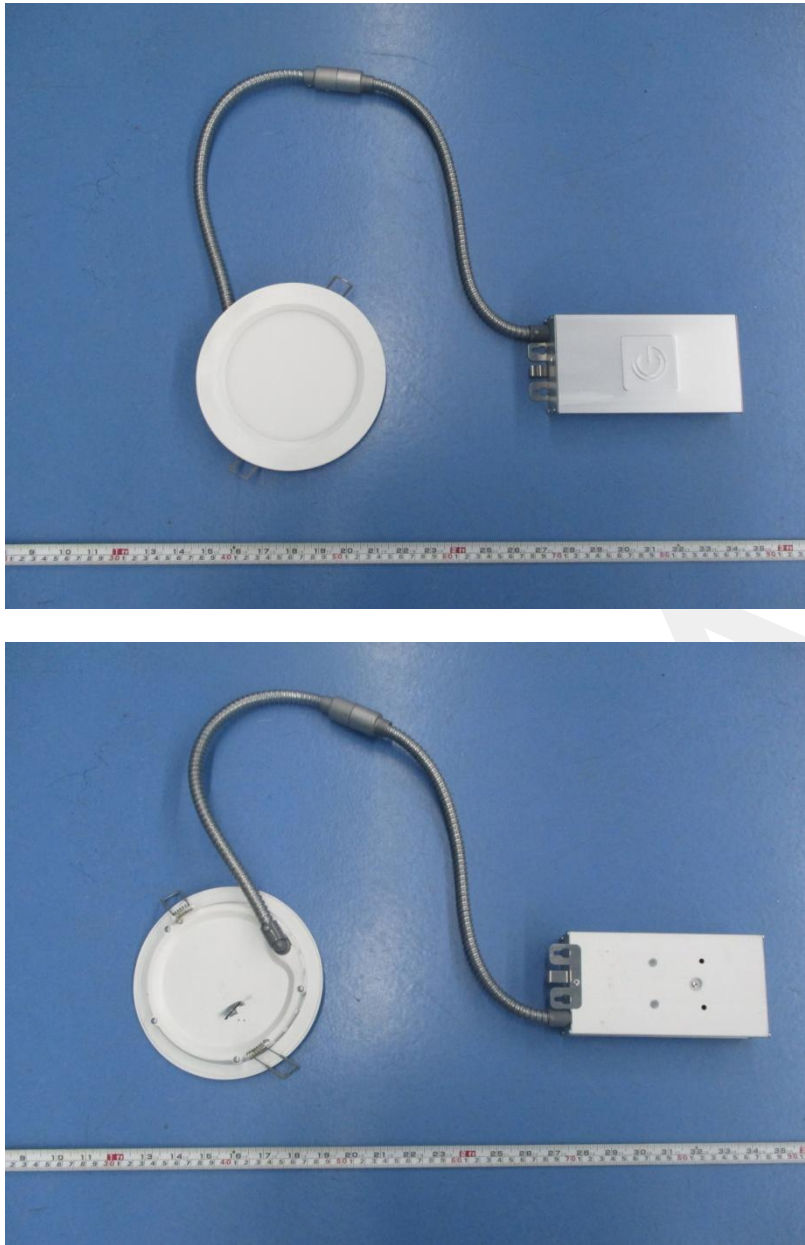
C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	368	368	368	368	368	368	368	368
5.0°	367	368	367	368	367	367	367	366
10.0°	362	363	363	363	363	363	362	361
15.0°	354	355	356	356	356	355	354	353
20.0°	343	345	345	345	345	344	343	342
25.0°	329	331	332	332	331	330	329	327
30.0°	312	314	315	316	315	314	312	310
35.0°	293	295	296	297	296	295	293	291
40.0°	272	274	275	275	275	273	271	269
45.0°	247	250	251	252	251	249	247	245
50.0°	222	224	225	226	226	223	221	219
55.0°	195	198	199	199	199	197	194	192
60.0°	167	170	171	171	171	169	166	163
65.0°	138	141	142	142	142	139	137	134
70.0°	108	110	112	112	112	110	107	105
75.0°	78	80	82	82	81	80	77	74
80.0°	48	51	52	52	51	49	47	44
85.0°	20	22	23	22	21	20	18	15
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
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)	%
0-5	8.8	0.82
5-10	26.1	2.44
10-15	42.4	3.97
15-20	57.3	5.37
20-25	70.3	6.58
25-30	80.9	7.57
30-35	88.8	8.31
35-40	93.7	8.77
40-45	95.6	8.94
45-50	94.3	8.82
50-55	90.0	8.42
55-60	83.0	7.76
60-65	73.3	6.86
65-70	61.5	5.75
70-75	47.8	4.47
75-80	32.8	3.07
80-85	17.4	1.63
85-90	4.9	0.46
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.0	0.00
145-150	0.0	0.00
150-155	0.0	0.00
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	8.8	0.82
0-10	34.8	3.26
0-15	77.3	7.23
0-20	134.6	12.59
0-25	204.9	19.17
0-30	285.9	26.74
0-35	374.7	35.05
0-40	468.4	43.82
0-45	564.0	52.76
0-50	658.3	61.58
0-55	748.3	70.01
0-60	831.3	77.77
0-65	904.6	84.63
0-70	966.1	90.38
0-75	1013.8	94.85
0-80	1046.6	97.91
0-85	1064.1	99.54
0-90	1068.9	100.00
0-95	1068.9	100.00
0-100	1068.9	100.00
0-105	1068.9	100.00
0-110	1068.9	100.00
0-115	1068.9	100.00
0-120	1068.9	100.00
0-125	1068.9	100.00
0-130	1068.9	100.00
0-135	1068.9	100.00
0-140	1068.9	100.00
0-145	1068.9	100.00
0-150	1068.9	100.00
0-155	1068.9	100.00
0-160	1068.9	100.00
0-165	1068.9	100.00
0-170	1068.9	100.00
0-175	1068.9	100.00
0-180	1068.9	100.00

## 6. Product Photo



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