

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 10NCDLR4DIM/950/277V/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>	RKSB180510002-10-3
<b>Test Date:</b>	2018-05-11 to 2018-05-14
<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.

## 1. Product Description

### General Information:

One sample was received on 2018-05-10 and used for testing.

Model Tested: 10NCDLR4DIM/950/277V/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: 10W  
 Nominal CCT: 5000K  
 Nominal Lumen Output: 740lm

## 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**

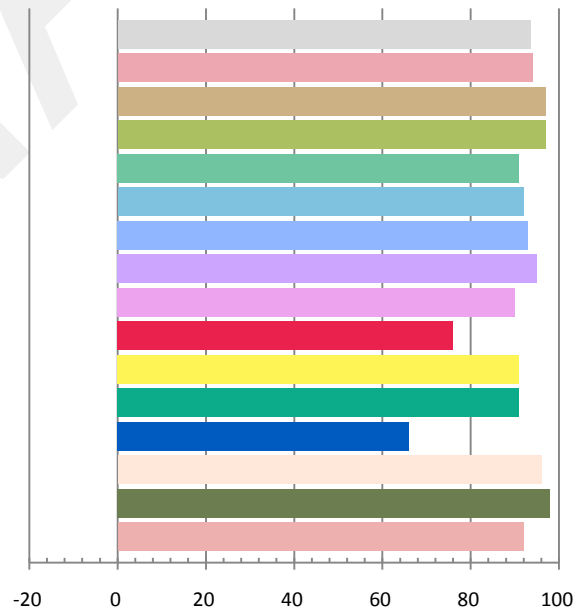
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.0765	9.16	0.9974	781.4	85.3

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.720	4910	0.00158	0.3480	0.3571	0.2113	0.4878

### Color Rendering Index

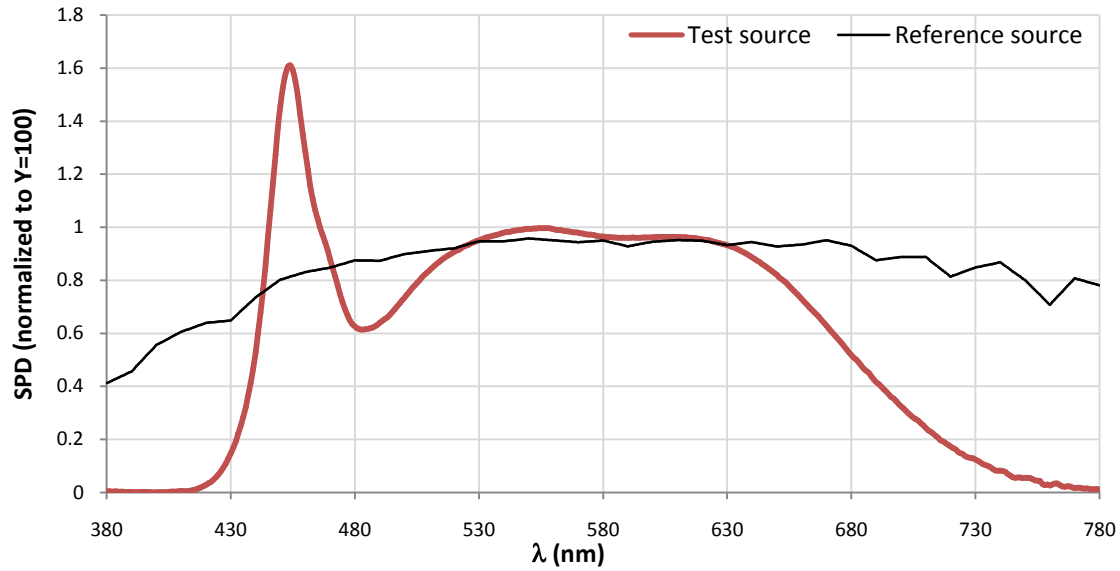
<b>Ra</b> <b>93.6</b>			
R1 94	R2 97	R3 97	R4 91
R5 92	R6 93	R7 95	R8 90
R9 76	R10 91	R11 91	R12 66
R13 96	R14 98	R15 92	



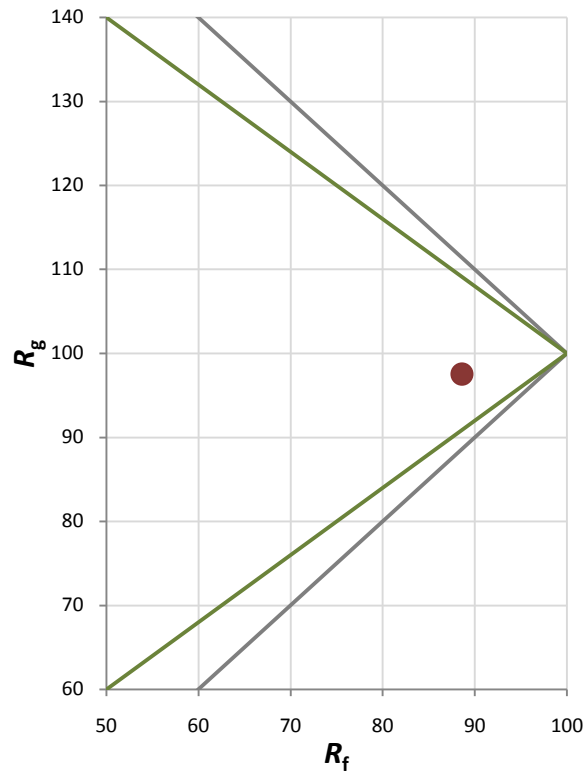
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	89
Gamut Index $R_g$	98

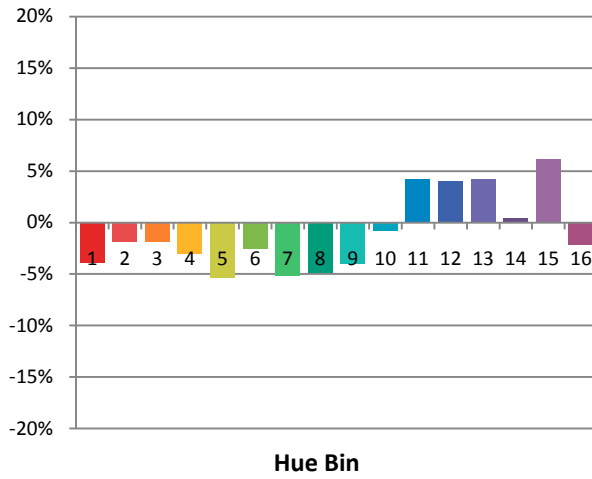
### Spectral Power Distribution Comparison



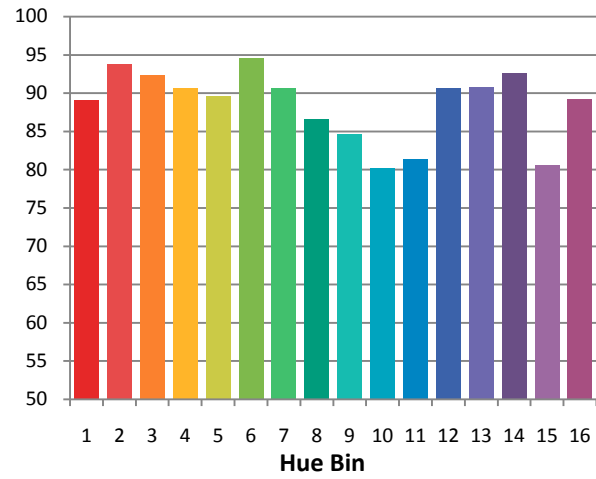
### Plot of $R_g$ versus $R_f$



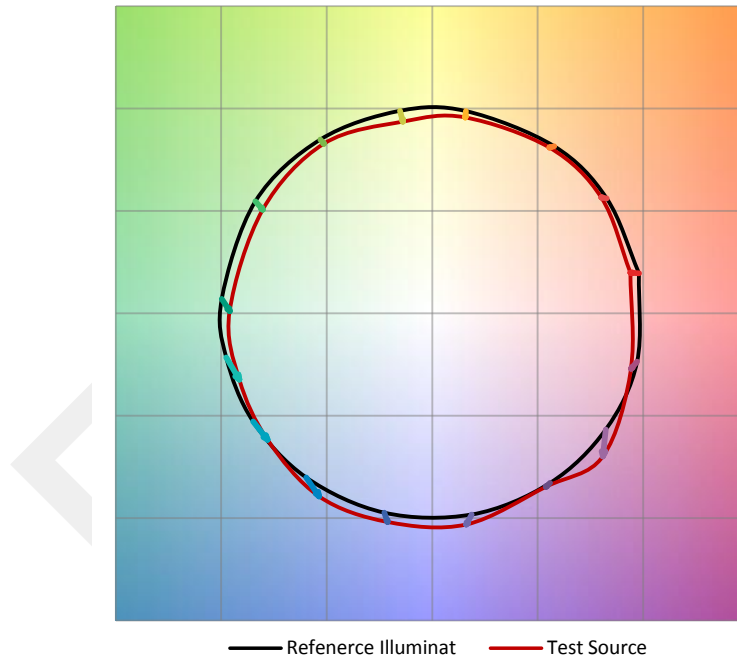
Chroma Shift by Hue



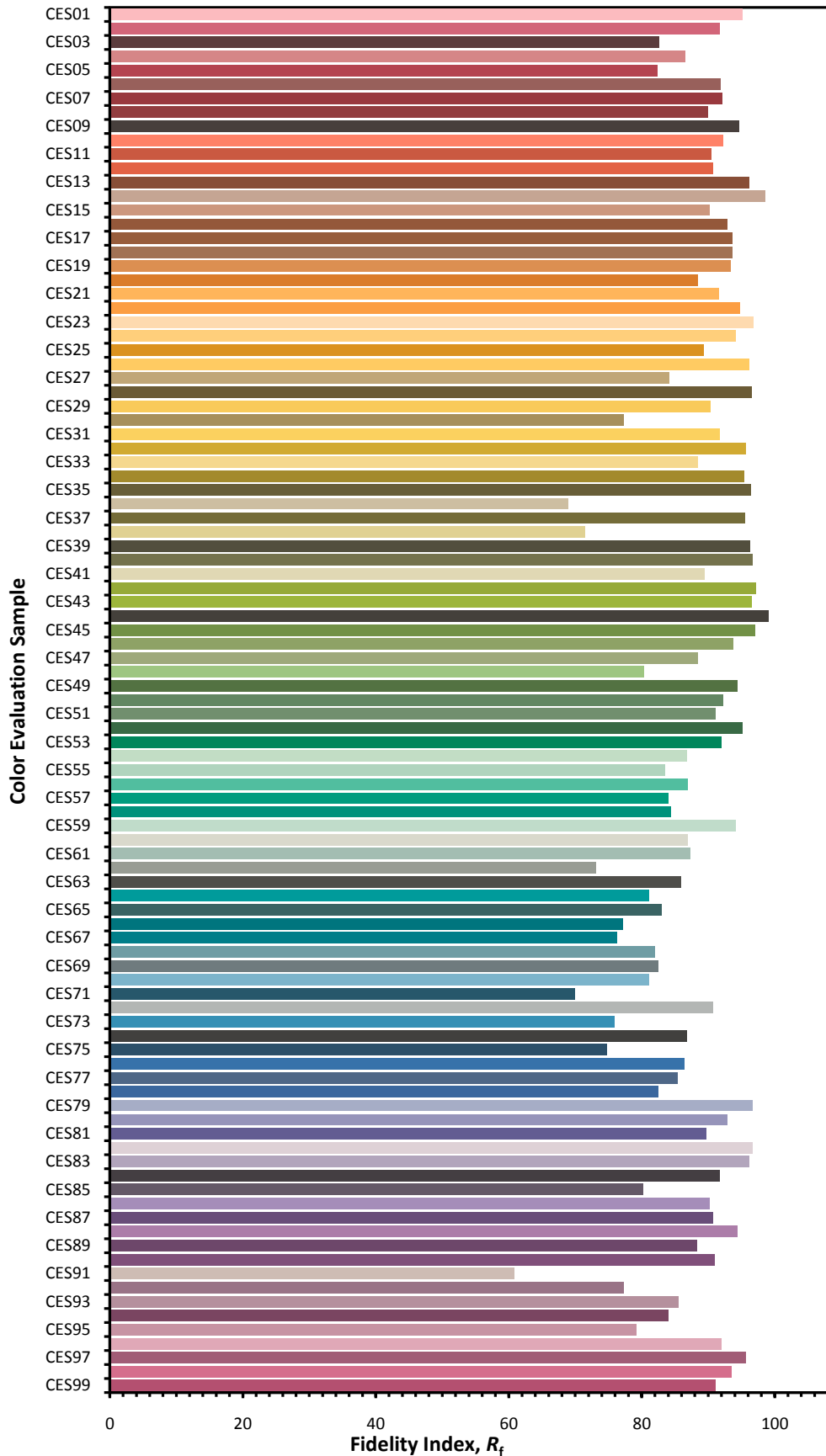
$R_f$  by Hue



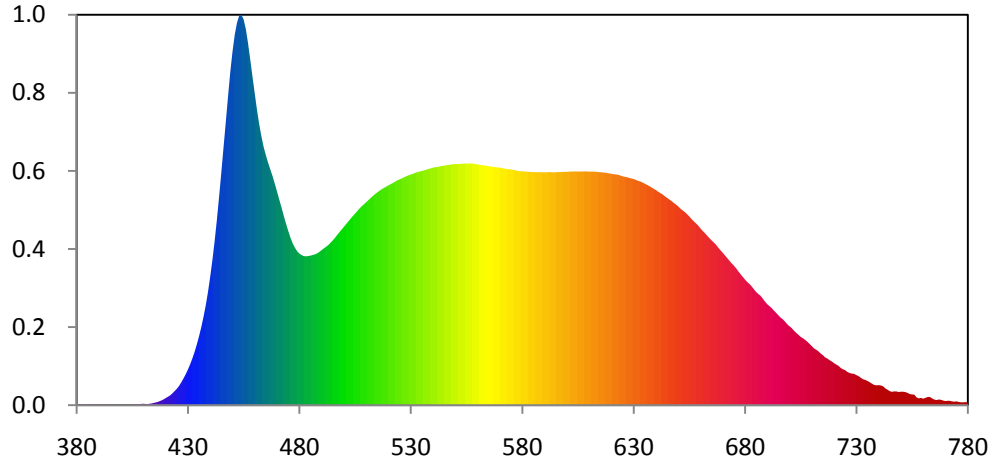
Color Vector Graphic



### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

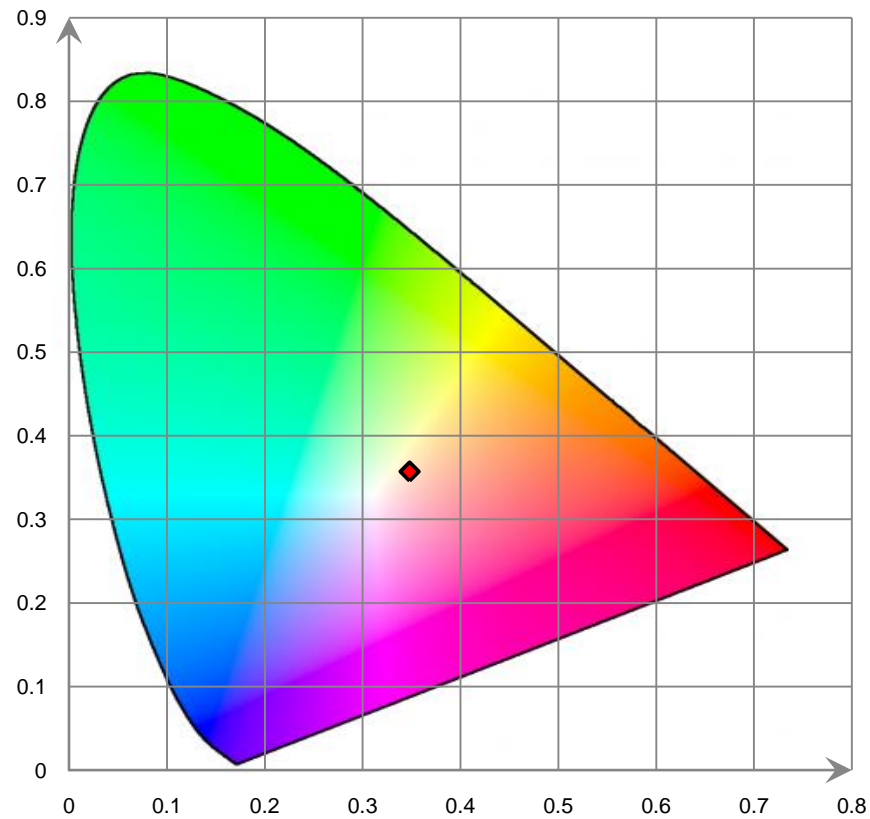


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.580E-02	421	3.976E-01	462	1.325E+01	503	8.797E+00	544	1.128E+01
381	4.930E-02	422	4.612E-01	463	1.267E+01	504	8.917E+00	545	1.130E+01
382	3.530E-02	423	5.565E-01	464	1.217E+01	505	9.033E+00	546	1.132E+01
383	4.710E-02	424	6.603E-01	465	1.178E+01	506	9.155E+00	547	1.133E+01
384	4.920E-02	425	7.713E-01	466	1.143E+01	507	9.276E+00	548	1.135E+01
385	3.350E-02	426	9.050E-01	467	1.111E+01	508	9.380E+00	549	1.137E+01
386	3.450E-02	427	1.075E+00	468	1.080E+01	509	9.475E+00	550	1.137E+01
387	3.120E-02	428	1.260E+00	469	1.044E+01	510	9.571E+00	551	1.137E+01
388	2.240E-02	429	1.461E+00	470	1.007E+01	511	9.673E+00	552	1.138E+01
389	3.070E-02	430	1.680E+00	471	9.694E+00	512	9.770E+00	553	1.139E+01
390	2.970E-02	431	1.930E+00	472	9.324E+00	513	9.866E+00	554	1.140E+01
391	1.620E-02	432	2.210E+00	473	8.942E+00	514	9.955E+00	555	1.140E+01
392	1.200E-02	433	2.518E+00	474	8.571E+00	515	1.004E+01	556	1.140E+01
393	1.430E-02	434	2.866E+00	475	8.226E+00	516	1.011E+01	557	1.140E+01
394	2.100E-02	435	3.258E+00	476	7.904E+00	517	1.019E+01	558	1.139E+01
395	2.610E-02	436	3.688E+00	477	7.641E+00	518	1.025E+01	559	1.138E+01
396	2.440E-02	437	4.170E+00	478	7.429E+00	519	1.031E+01	560	1.136E+01
397	1.690E-02	438	4.711E+00	479	7.264E+00	520	1.037E+01	561	1.133E+01
398	1.160E-02	439	5.336E+00	480	7.155E+00	521	1.043E+01	562	1.132E+01
399	5.500E-03	440	6.058E+00	481	7.080E+00	522	1.048E+01	563	1.131E+01
400	1.650E-02	441	6.856E+00	482	7.034E+00	523	1.054E+01	564	1.129E+01
401	1.880E-02	442	7.752E+00	483	7.020E+00	524	1.060E+01	565	1.127E+01
402	1.800E-02	443	8.754E+00	484	7.034E+00	525	1.065E+01	566	1.126E+01
403	1.720E-02	444	9.842E+00	485	7.052E+00	526	1.069E+01	567	1.124E+01
404	1.850E-02	445	1.099E+01	486	7.085E+00	527	1.075E+01	568	1.122E+01
405	2.500E-02	446	1.218E+01	487	7.112E+00	528	1.079E+01	569	1.121E+01
406	3.460E-02	447	1.336E+01	488	7.159E+00	529	1.084E+01	570	1.120E+01
407	3.700E-02	448	1.456E+01	489	7.230E+00	530	1.088E+01	571	1.118E+01
408	3.420E-02	449	1.570E+01	490	7.311E+00	531	1.091E+01	572	1.116E+01
409	5.870E-02	450	1.666E+01	491	7.393E+00	532	1.096E+01	573	1.114E+01
410	6.830E-02	451	1.747E+01	492	7.472E+00	533	1.099E+01	574	1.113E+01
411	5.640E-02	452	1.803E+01	493	7.554E+00	534	1.102E+01	575	1.112E+01
412	5.410E-02	453	1.837E+01	494	7.658E+00	535	1.105E+01	576	1.110E+01
413	6.930E-02	454	1.842E+01	495	7.770E+00	536	1.108E+01	577	1.108E+01
414	8.850E-02	455	1.820E+01	496	7.894E+00	537	1.111E+01	578	1.105E+01
415	1.151E-01	456	1.773E+01	497	8.028E+00	538	1.114E+01	579	1.104E+01
416	1.394E-01	457	1.706E+01	498	8.160E+00	539	1.117E+01	580	1.104E+01
417	1.741E-01	458	1.628E+01	499	8.285E+00	540	1.120E+01	581	1.103E+01
418	2.197E-01	459	1.547E+01	500	8.409E+00	541	1.123E+01	582	1.101E+01
419	2.685E-01	460	1.469E+01	501	8.540E+00	542	1.124E+01	583	1.101E+01
420	3.342E-01	461	1.393E+01	502	8.668E+00	543	1.126E+01	584	1.100E+01

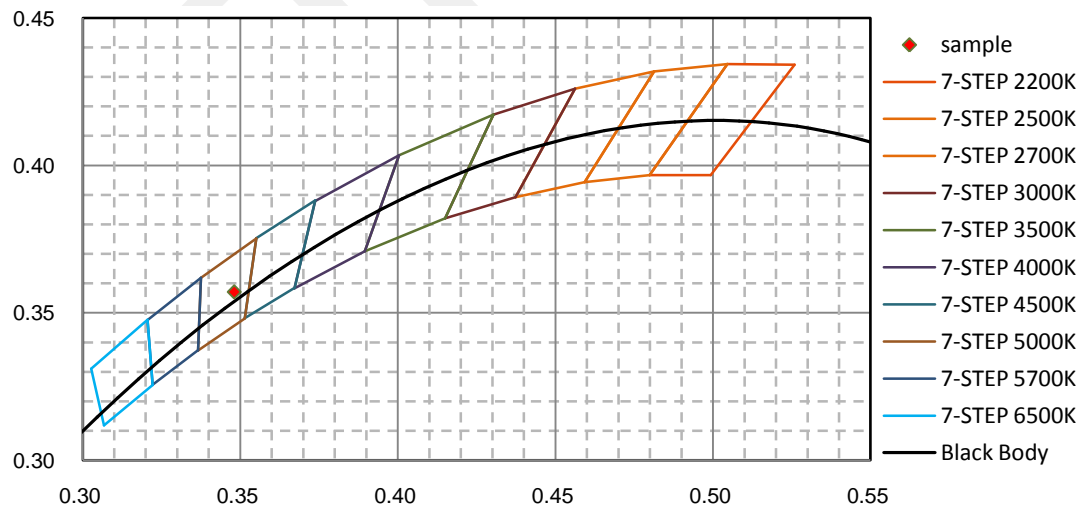


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.100E+01	626	1.077E+01	667	7.571E+00	708	2.993E+00	749	6.204E-01
586	1.099E+01	627	1.075E+01	668	7.434E+00	709	2.892E+00	750	6.349E-01
587	1.099E+01	628	1.072E+01	669	7.309E+00	710	2.788E+00	751	6.354E-01
588	1.099E+01	629	1.070E+01	670	7.195E+00	711	2.680E+00	752	6.185E-01
589	1.098E+01	630	1.067E+01	671	7.067E+00	712	2.616E+00	753	5.791E-01
590	1.098E+01	631	1.063E+01	672	6.945E+00	713	2.540E+00	754	5.247E-01
591	1.099E+01	632	1.058E+01	673	6.819E+00	714	2.439E+00	755	5.062E-01
592	1.100E+01	633	1.055E+01	674	6.696E+00	715	2.357E+00	756	5.013E-01
593	1.099E+01	634	1.050E+01	675	6.587E+00	716	2.254E+00	757	3.695E-01
594	1.098E+01	635	1.045E+01	676	6.464E+00	717	2.200E+00	758	3.197E-01
595	1.099E+01	636	1.039E+01	677	6.318E+00	718	2.123E+00	759	3.461E-01
596	1.099E+01	637	1.034E+01	678	6.183E+00	719	2.061E+00	760	3.062E-01
597	1.100E+01	638	1.028E+01	679	6.056E+00	720	1.984E+00	761	3.453E-01
598	1.100E+01	639	1.021E+01	680	5.928E+00	721	1.915E+00	762	3.852E-01
599	1.100E+01	640	1.015E+01	681	5.814E+00	722	1.856E+00	763	3.894E-01
600	1.101E+01	641	1.007E+01	682	5.722E+00	723	1.755E+00	764	3.205E-01
601	1.101E+01	642	1.001E+01	683	5.610E+00	724	1.695E+00	765	2.657E-01
602	1.102E+01	643	9.942E+00	684	5.472E+00	725	1.650E+00	766	2.433E-01
603	1.102E+01	644	9.858E+00	685	5.343E+00	726	1.565E+00	767	2.673E-01
604	1.102E+01	645	9.784E+00	686	5.246E+00	727	1.518E+00	768	2.545E-01
605	1.102E+01	646	9.709E+00	687	5.160E+00	728	1.490E+00	769	2.171E-01
606	1.102E+01	647	9.632E+00	688	5.029E+00	729	1.479E+00	770	1.960E-01
607	1.102E+01	648	9.546E+00	689	4.888E+00	730	1.421E+00	771	2.090E-01
608	1.102E+01	649	9.465E+00	690	4.764E+00	731	1.369E+00	772	2.043E-01
609	1.102E+01	650	9.379E+00	691	4.674E+00	732	1.295E+00	773	1.783E-01
610	1.102E+01	651	9.274E+00	692	4.581E+00	733	1.225E+00	774	1.644E-01
611	1.102E+01	652	9.192E+00	693	4.462E+00	734	1.192E+00	775	1.812E-01
612	1.101E+01	653	9.109E+00	694	4.357E+00	735	1.141E+00	776	1.482E-01
613	1.101E+01	654	9.014E+00	695	4.242E+00	736	1.087E+00	777	1.368E-01
614	1.100E+01	655	8.906E+00	696	4.132E+00	737	1.017E+00	778	1.337E-01
615	1.099E+01	656	8.785E+00	697	4.049E+00	738	9.556E-01	779	1.476E-01
616	1.098E+01	657	8.677E+00	698	3.942E+00	739	9.371E-01	780	1.263E-01
617	1.097E+01	658	8.575E+00	699	3.816E+00	740	9.443E-01		
618	1.095E+01	659	8.473E+00	700	3.721E+00	741	9.294E-01		
619	1.093E+01	660	8.347E+00	701	3.635E+00	742	8.953E-01		
620	1.091E+01	661	8.222E+00	702	3.515E+00	743	7.942E-01		
621	1.089E+01	662	8.118E+00	703	3.413E+00	744	7.304E-01		
622	1.088E+01	663	8.001E+00	704	3.320E+00	745	6.617E-01		
623	1.087E+01	664	7.887E+00	705	3.222E+00	746	6.323E-01		
624	1.084E+01	665	7.778E+00	706	3.156E+00	747	6.493E-01		
625	1.080E+01	666	7.675E+00	707	3.087E+00	748	6.475E-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**

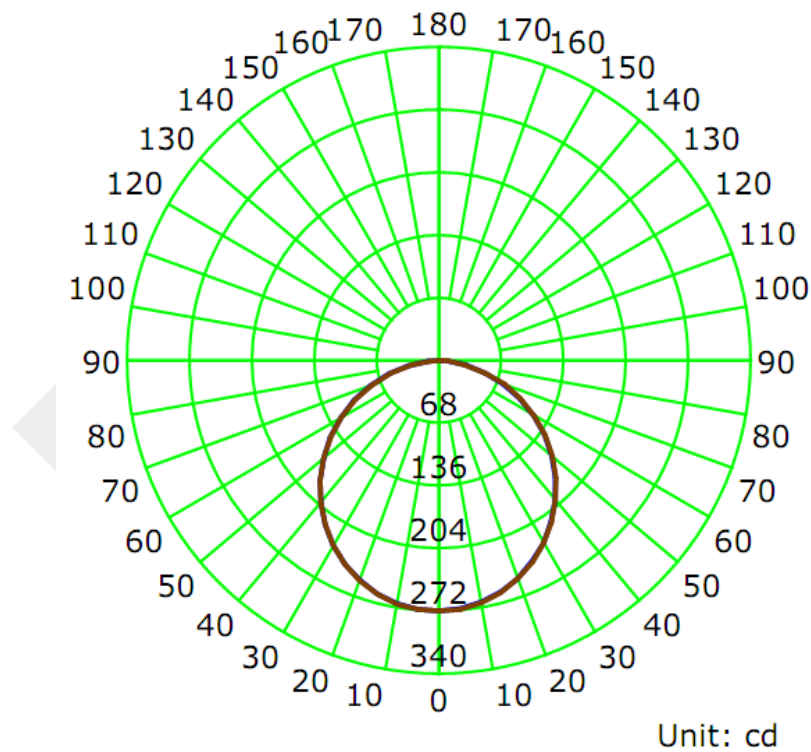
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0770	9.18	0.9980

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
784.9	85.55	272.4	1.26	1.25

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	113.2	113.3	113.3	113.2	113.3
Field Angle (10% $I_{max}$ ):	162.3	162.3	161.2	162.3	162.0

**Luminous Intensity (cd) Distribution Data**

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	272	272	272	272	272	272	272	272
5.0°	271	271	271	271	271	271	271	271
10.0°	267	267	267	267	267	267	268	268
15.0°	260	260	260	260	261	261	262	262
20.0°	252	252	251	252	252	253	254	254
25.0°	241	241	241	241	242	242	243	244
30.0°	229	228	228	228	229	230	231	232
35.0°	214	214	213	213	214	215	217	218
40.0°	198	197	197	197	198	199	201	202
45.0°	180	179	179	179	181	182	183	184
50.0°	161	160	160	160	162	163	164	166
55.0°	141	140	140	140	142	143	145	146
60.0°	119	119	119	119	121	122	124	125
65.0°	98	97	97	98	99	100	102	104
70.0°	75	74	74	75	76	78	79	81
75.0°	52	52	51	51	52	54	56	58
80.0°	30	29	29	28	29	30	34	35
85.0°	7	8	8	9	9	11	13	14
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

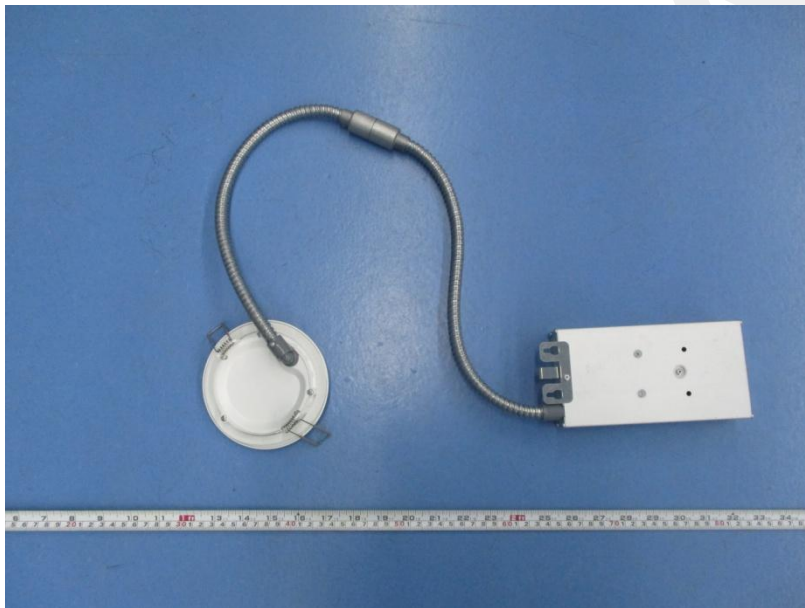
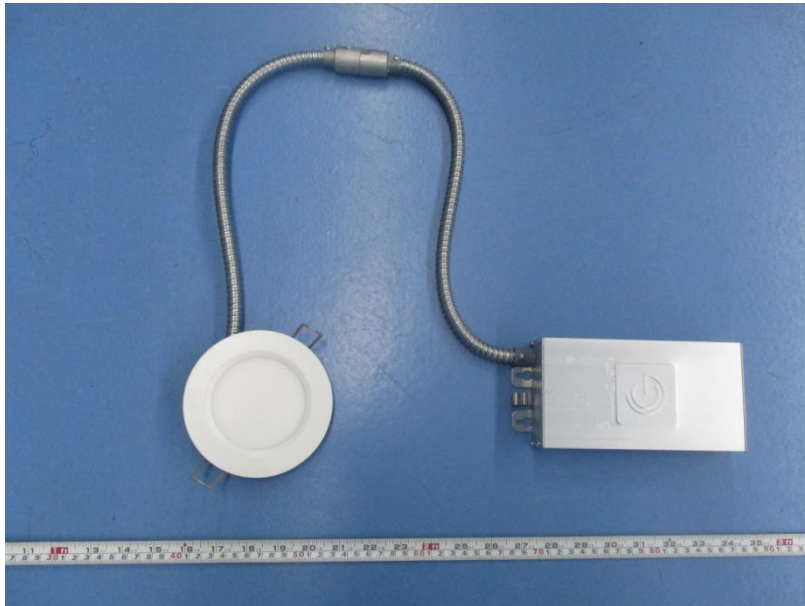
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	272	272	272	272	272	272	272	272
5.0°	271	272	272	272	272	271	271	271
10.0°	268	269	269	268	269	267	267	267
15.0°	262	263	263	263	263	262	261	261
20.0°	254	255	255	255	255	253	253	252
25.0°	244	245	245	244	244	243	242	241
30.0°	232	232	233	232	232	230	229	228
35.0°	218	218	218	218	217	216	215	214
40.0°	202	203	202	202	202	200	198	197
45.0°	184	185	185	185	184	182	181	179
50.0°	165	166	166	165	165	163	162	160
55.0°	145	146	146	146	145	143	141	140
60.0°	124	125	125	124	124	122	120	119
65.0°	103	103	104	103	102	100	98	97
70.0°	80	81	80	80	79	78	76	74
75.0°	57	58	58	57	54	53	53	51
80.0°	34	35	35	33	31	30	31	29
85.0°	13	13	14	13	11	10	8	6
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)	%	Deg	Flux (lm)	%
0-5	6.5	0.83	0-5	6.5	0.83
5-10	19.3	2.46	0-10	25.8	3.28
10-15	31.4	4.00	0-15	57.2	7.28
15-20	42.4	5.40	0-20	99.6	12.69
20-25	52.0	6.62	0-25	151.6	19.31
25-30	59.8	7.62	0-30	211.4	26.93
30-35	65.6	8.36	0-35	277.0	35.29
35-40	69.3	8.83	0-40	346.3	44.12
40-45	70.6	9.00	0-45	417.0	53.12
45-50	69.7	8.88	0-50	486.7	62.00
50-55	66.5	8.48	0-55	553.2	70.48
55-60	61.3	7.80	0-60	614.5	78.28
60-65	54.0	6.88	0-65	668.5	85.16
65-70	45.0	5.73	0-70	713.4	90.89
70-75	34.4	4.39	0-75	747.9	95.28
75-80	22.9	2.92	0-80	770.8	98.20
80-85	11.3	1.44	0-85	782.1	99.64
85-90	2.8	0.36	0-90	784.9	100.00
90-95	0.0	0.00	0-95	784.9	100.00
95-100	0.0	0.00	0-100	784.9	100.00
100-105	0.0	0.00	0-105	784.9	100.00
105-110	0.0	0.00	0-110	784.9	100.00
110-115	0.0	0.00	0-115	784.9	100.00
115-120	0.0	0.00	0-120	784.9	100.00
120-125	0.0	0.00	0-125	784.9	100.00
125-130	0.0	0.00	0-130	784.9	100.00
130-135	0.0	0.00	0-135	784.9	100.00
135-140	0.0	0.00	0-140	784.9	100.00
140-145	0.0	0.00	0-145	784.9	100.00
145-150	0.0	0.00	0-150	784.9	100.00
150-155	0.0	0.00	0-155	784.9	100.00
155-160	0.0	0.00	0-160	784.9	100.00
160-165	0.0	0.00	0-165	784.9	100.00
165-170	0.0	0.00	0-170	784.9	100.00
170-175	0.0	0.00	0-175	784.9	100.00
175-180	0.0	0.00	0-180	784.9	100.00

## 6. Product Photo



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