

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: 24.5NCDLR8DIM/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>	RKSB180510004-10-3
<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: 24.5NCDLR8DIM/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: 24.5W  
 Nominal CCT: 5000K  
 Nominal Lumen Output: 1920lm

## 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**

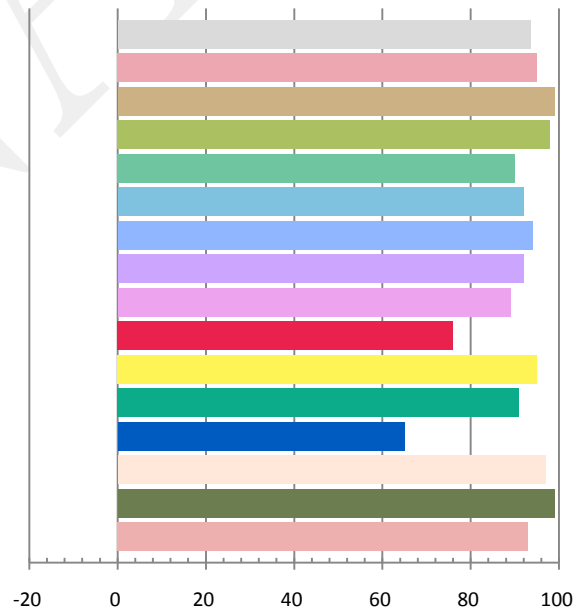
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1977	23.67	0.9976	2271.1	95.95

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.899	4912	0.00023	0.3477	0.3542	0.2122	0.4863

### Color Rendering Index

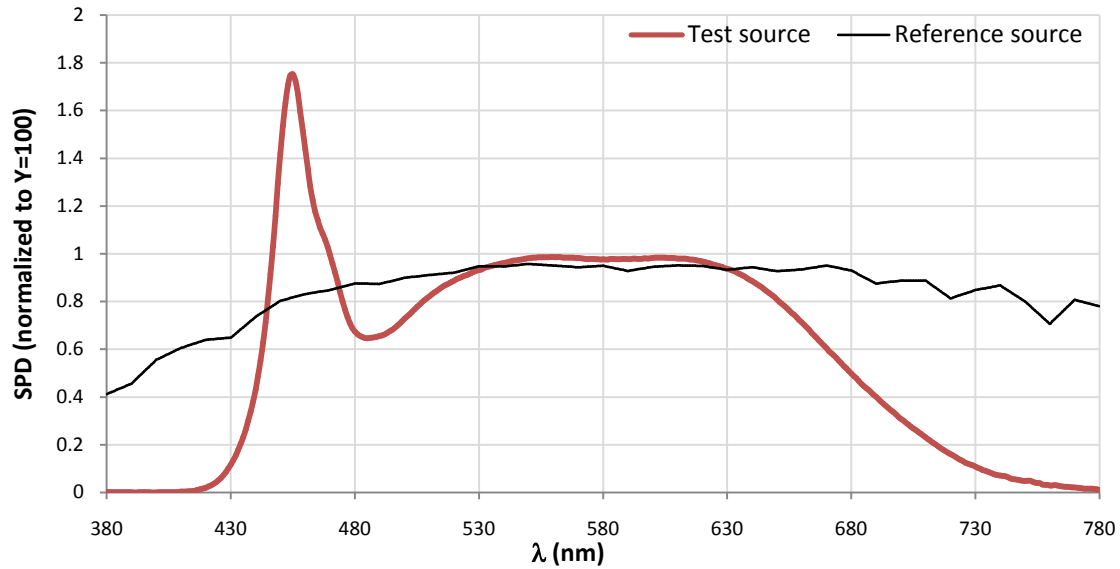
<b>Ra</b> <b>93.6</b>			
<b>R1</b> 95	<b>R2</b> 99	<b>R3</b> 98	<b>R4</b> 90
<b>R5</b> 92	<b>R6</b> 94	<b>R7</b> 92	<b>R8</b> 89
<b>R9</b> 76	<b>R10</b> 95	<b>R11</b> 91	<b>R12</b> 65
<b>R13</b> 97	<b>R14</b> 99	<b>R15</b> 93	



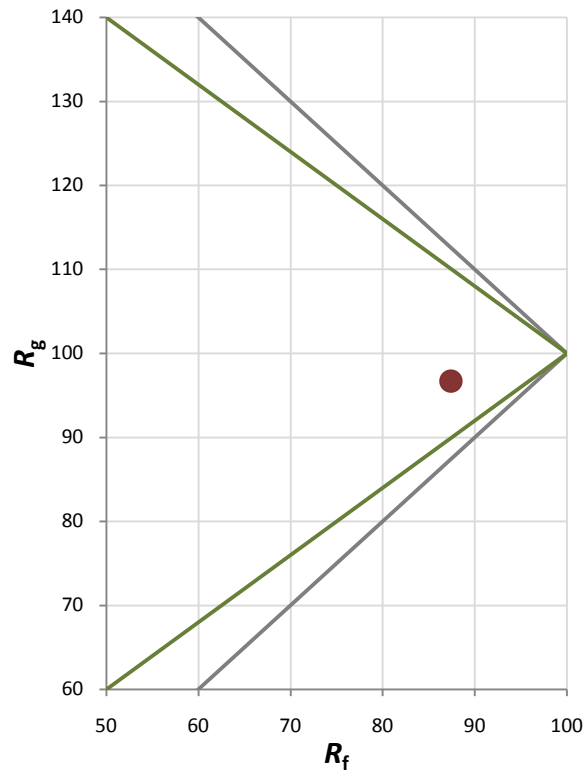
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	87
Gamut Index $R_g$	97

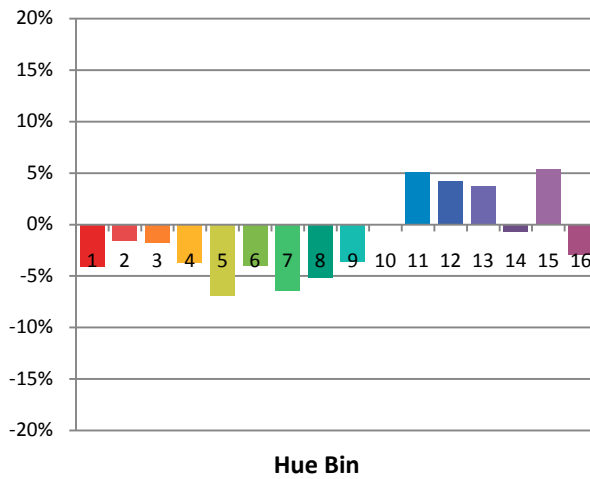
### Spectral Power Distribution Comparison



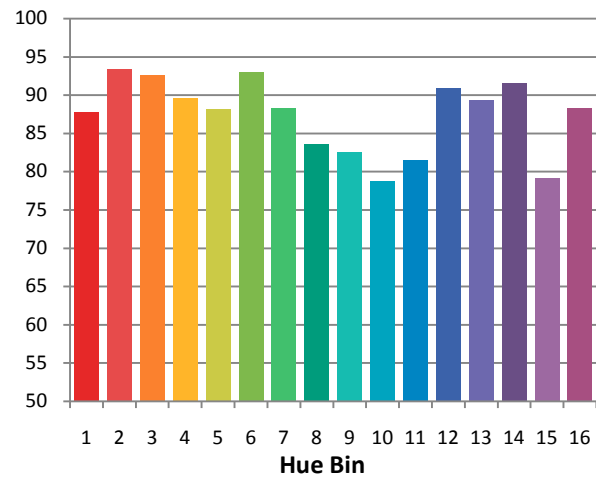
### Plot of $R_g$ versus $R_f$



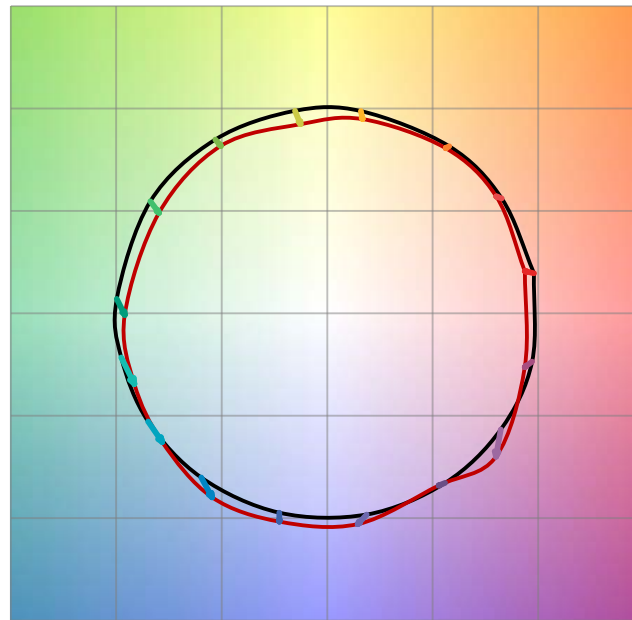
Chroma Shift by Hue



$R_t$  by Hue

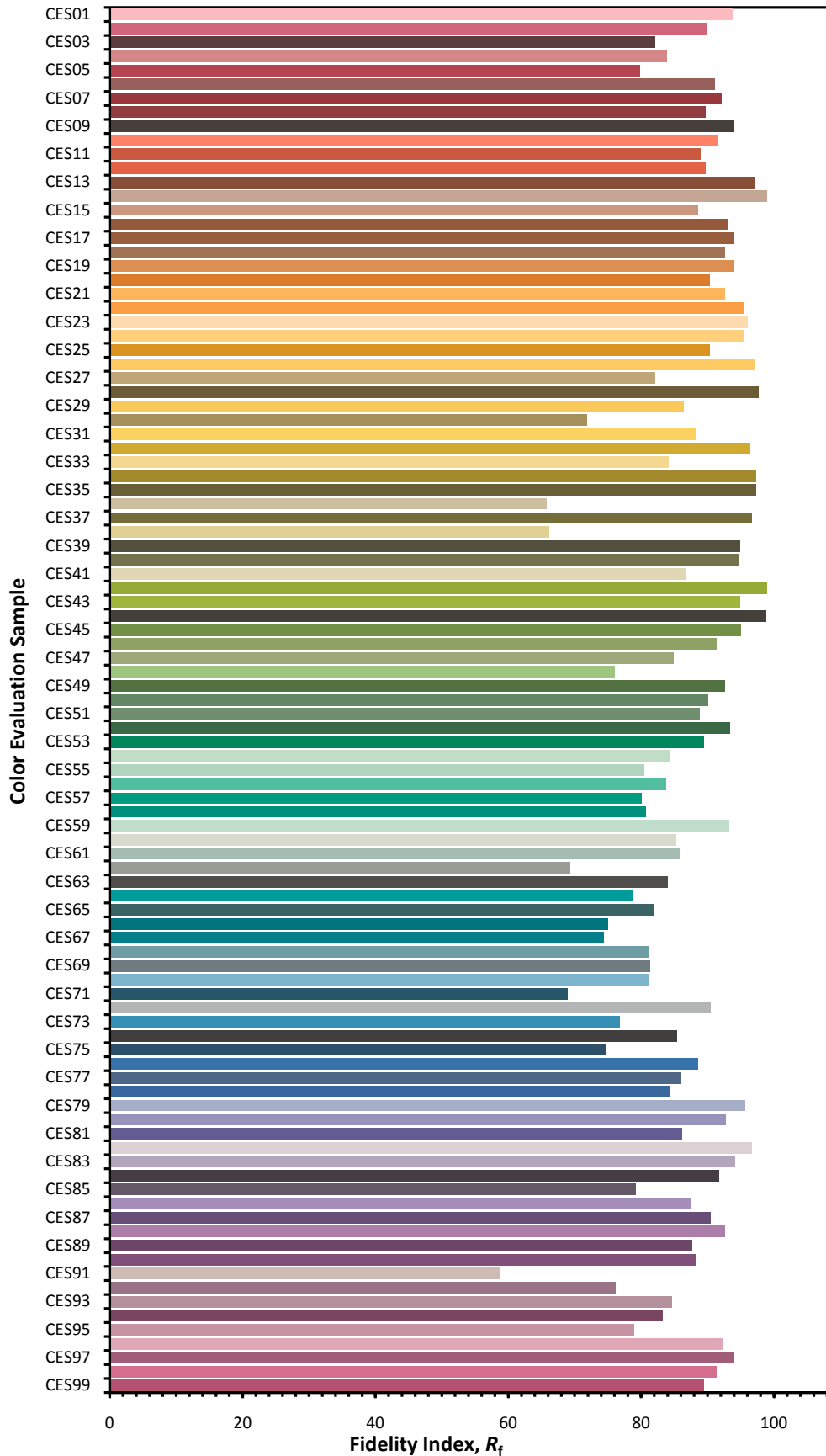


Color Vector Graphic

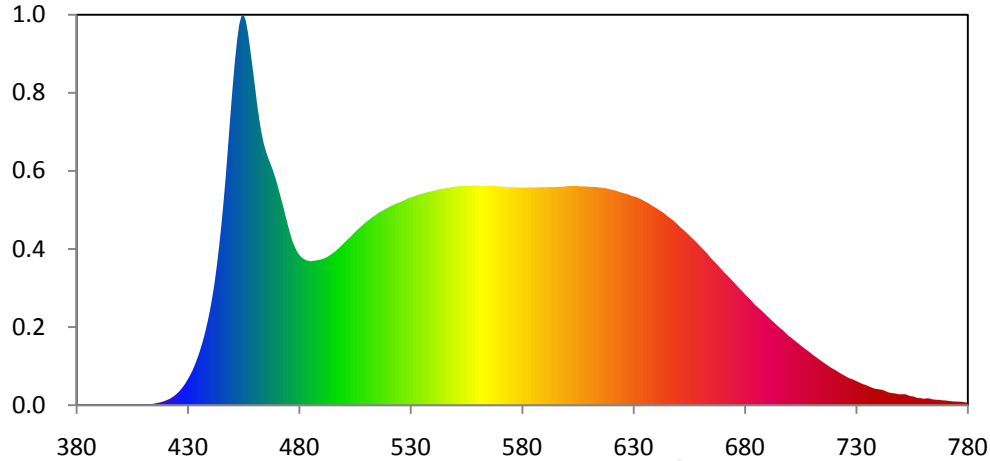


— Reference Illuminat — Test Source

### Color Fidelity by CES Sample



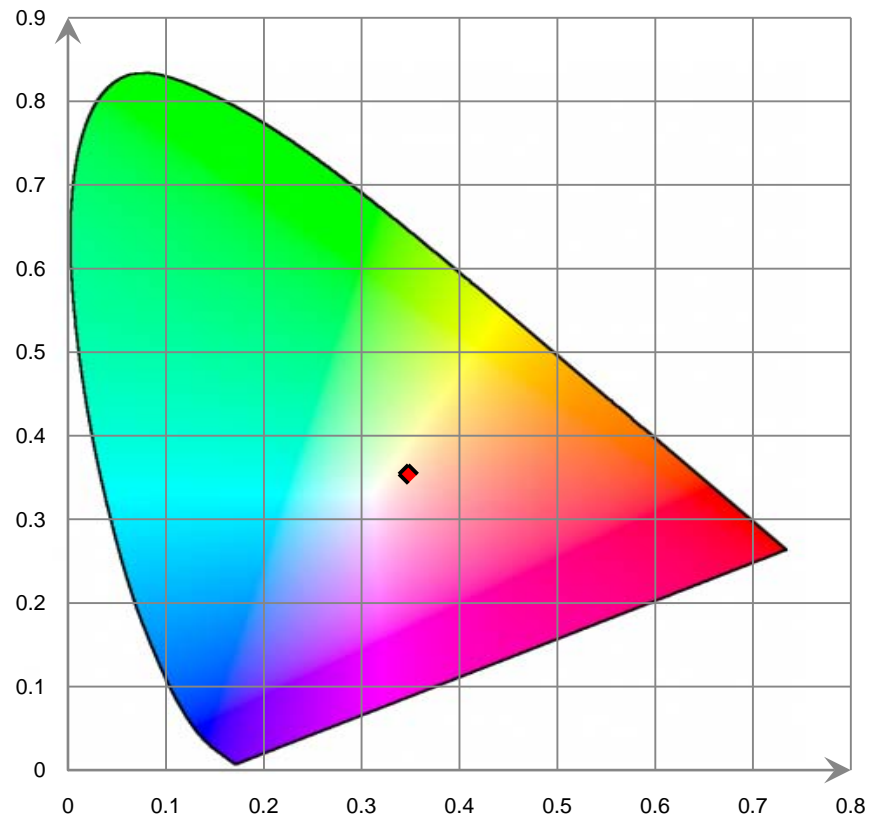
### Relative Spectral Power Distribution



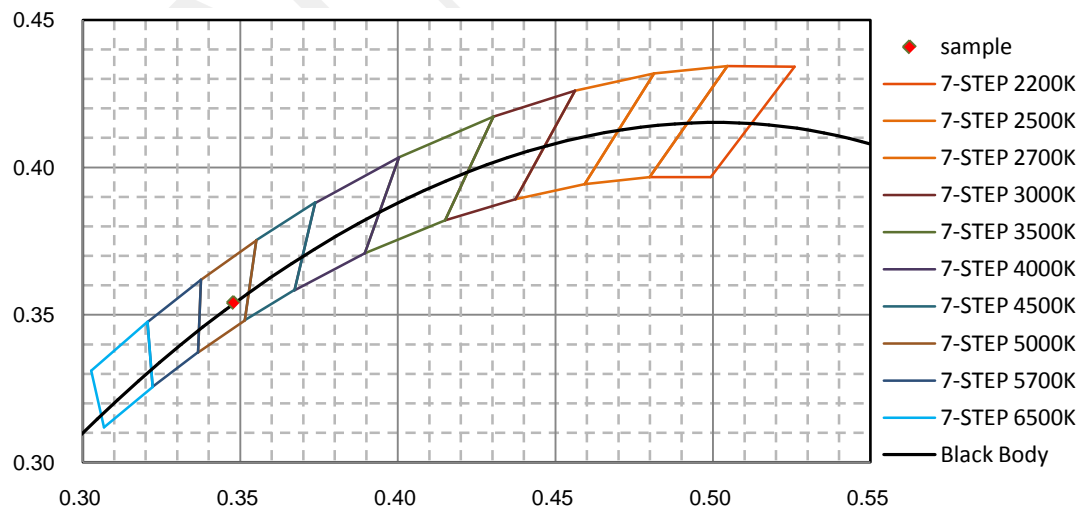
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	7.120E-02	421	8.295E-01	462	4.271E+01	503	2.514E+01	544	3.229E+01
381	5.460E-02	422	9.767E-01	463	4.072E+01	504	2.549E+01	545	3.232E+01
382	3.980E-02	423	1.190E+00	464	3.909E+01	505	2.582E+01	546	3.238E+01
383	4.080E-02	424	1.428E+00	465	3.790E+01	506	2.617E+01	547	3.244E+01
384	4.150E-02	425	1.701E+00	466	3.691E+01	507	2.646E+01	548	3.250E+01
385	3.280E-02	426	2.024E+00	467	3.606E+01	508	2.676E+01	549	3.258E+01
386	5.130E-02	427	2.411E+00	468	3.519E+01	509	2.706E+01	550	3.260E+01
387	5.580E-02	428	2.836E+00	469	3.419E+01	510	2.733E+01	551	3.264E+01
388	3.970E-02	429	3.335E+00	470	3.310E+01	511	2.758E+01	552	3.270E+01
389	4.100E-02	430	3.889E+00	471	3.185E+01	512	2.784E+01	553	3.273E+01
390	3.840E-02	431	4.486E+00	472	3.061E+01	513	2.809E+01	554	3.275E+01
391	1.750E-02	432	5.147E+00	473	2.934E+01	514	2.834E+01	555	3.276E+01
392	1.130E-02	433	5.925E+00	474	2.799E+01	515	2.857E+01	556	3.277E+01
393	2.030E-02	434	6.789E+00	475	2.670E+01	516	2.879E+01	557	3.274E+01
394	2.650E-02	435	7.717E+00	476	2.547E+01	517	2.896E+01	558	3.276E+01
395	2.940E-02	436	8.769E+00	477	2.442E+01	518	2.914E+01	559	3.278E+01
396	2.770E-02	437	9.942E+00	478	2.361E+01	519	2.934E+01	560	3.278E+01
397	2.120E-02	438	1.124E+01	479	2.292E+01	520	2.952E+01	561	3.276E+01
398	1.070E-02	439	1.270E+01	480	2.243E+01	521	2.971E+01	562	3.278E+01
399	6.100E-03	440	1.436E+01	481	2.206E+01	522	2.985E+01	563	3.276E+01
400	1.900E-02	441	1.621E+01	482	2.182E+01	523	3.001E+01	564	3.272E+01
401	2.140E-02	442	1.836E+01	483	2.164E+01	524	3.015E+01	565	3.271E+01
402	2.850E-02	443	2.086E+01	484	2.154E+01	525	3.028E+01	566	3.271E+01
403	3.790E-02	444	2.369E+01	485	2.148E+01	526	3.041E+01	567	3.273E+01
404	3.220E-02	445	2.684E+01	486	2.154E+01	527	3.056E+01	568	3.270E+01
405	4.100E-02	446	3.037E+01	487	2.158E+01	528	3.074E+01	569	3.266E+01
406	5.250E-02	447	3.426E+01	488	2.162E+01	529	3.090E+01	570	3.265E+01
407	5.810E-02	448	3.855E+01	489	2.169E+01	530	3.098E+01	571	3.261E+01
408	5.510E-02	449	4.299E+01	490	2.177E+01	531	3.107E+01	572	3.258E+01
409	8.920E-02	450	4.719E+01	491	2.188E+01	532	3.123E+01	573	3.255E+01
410	1.188E-01	451	5.106E+01	492	2.203E+01	533	3.137E+01	574	3.250E+01
411	1.248E-01	452	5.428E+01	493	2.221E+01	534	3.145E+01	575	3.252E+01
412	1.343E-01	453	5.676E+01	494	2.244E+01	535	3.153E+01	576	3.251E+01
413	1.532E-01	454	5.806E+01	495	2.266E+01	536	3.165E+01	577	3.250E+01
414	1.880E-01	455	5.826E+01	496	2.292E+01	537	3.173E+01	578	3.247E+01
415	2.379E-01	456	5.736E+01	497	2.320E+01	538	3.182E+01	579	3.246E+01
416	3.135E-01	457	5.548E+01	498	2.353E+01	539	3.190E+01	580	3.247E+01
417	3.812E-01	458	5.303E+01	499	2.386E+01	540	3.195E+01	581	3.245E+01
418	4.674E-01	459	5.043E+01	500	2.418E+01	541	3.204E+01	582	3.246E+01
419	5.573E-01	460	4.779E+01	501	2.451E+01	542	3.213E+01	583	3.252E+01
420	6.853E-01	461	4.508E+01	502	2.484E+01	543	3.223E+01	584	3.251E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.249E+01	626	3.160E+01	667	2.118E+01	708	8.177E+00	749	1.634E+00
586	3.247E+01	627	3.151E+01	668	2.081E+01	709	7.919E+00	750	1.617E+00
587	3.249E+01	628	3.140E+01	669	2.045E+01	710	7.644E+00	751	1.635E+00
588	3.253E+01	629	3.126E+01	670	2.009E+01	711	7.377E+00	752	1.630E+00
589	3.253E+01	630	3.115E+01	671	1.971E+01	712	7.157E+00	753	1.510E+00
590	3.249E+01	631	3.105E+01	672	1.940E+01	713	6.922E+00	754	1.378E+00
591	3.250E+01	632	3.094E+01	673	1.906E+01	714	6.664E+00	755	1.325E+00
592	3.256E+01	633	3.078E+01	674	1.871E+01	715	6.422E+00	756	1.278E+00
593	3.256E+01	634	3.061E+01	675	1.835E+01	716	6.195E+00	757	1.109E+00
594	3.253E+01	635	3.043E+01	676	1.798E+01	717	5.974E+00	758	1.060E+00
595	3.254E+01	636	3.026E+01	677	1.761E+01	718	5.729E+00	759	1.055E+00
596	3.257E+01	637	3.008E+01	678	1.727E+01	719	5.532E+00	760	9.619E-01
597	3.260E+01	638	2.985E+01	679	1.694E+01	720	5.346E+00	761	9.846E-01
598	3.259E+01	639	2.965E+01	680	1.656E+01	721	5.150E+00	762	1.025E+00
599	3.261E+01	640	2.944E+01	681	1.620E+01	722	4.959E+00	763	9.934E-01
600	3.268E+01	641	2.923E+01	682	1.589E+01	723	4.723E+00	764	8.742E-01
601	3.271E+01	642	2.900E+01	683	1.555E+01	724	4.538E+00	765	8.398E-01
602	3.270E+01	643	2.879E+01	684	1.517E+01	725	4.365E+00	766	8.049E-01
603	3.271E+01	644	2.855E+01	685	1.482E+01	726	4.156E+00	767	8.099E-01
604	3.272E+01	645	2.827E+01	686	1.453E+01	727	4.008E+00	768	7.520E-01
605	3.269E+01	646	2.801E+01	687	1.426E+01	728	3.884E+00	769	7.143E-01
606	3.265E+01	647	2.777E+01	688	1.395E+01	729	3.766E+00	770	6.989E-01
607	3.265E+01	648	2.751E+01	689	1.361E+01	730	3.596E+00	771	6.639E-01
608	3.264E+01	649	2.721E+01	690	1.330E+01	731	3.447E+00	772	6.144E-01
609	3.262E+01	650	2.688E+01	691	1.298E+01	732	3.288E+00	773	5.841E-01
610	3.259E+01	651	2.656E+01	692	1.265E+01	733	3.136E+00	774	5.506E-01
611	3.257E+01	652	2.627E+01	693	1.235E+01	734	3.039E+00	775	5.488E-01
612	3.258E+01	653	2.598E+01	694	1.205E+01	735	2.903E+00	776	5.288E-01
613	3.257E+01	654	2.567E+01	695	1.173E+01	736	2.748E+00	777	5.154E-01
614	3.251E+01	655	2.535E+01	696	1.144E+01	737	2.617E+00	778	4.668E-01
615	3.246E+01	656	2.502E+01	697	1.118E+01	738	2.495E+00	779	4.252E-01
616	3.243E+01	657	2.471E+01	698	1.088E+01	739	2.416E+00	780	3.585E-01
617	3.239E+01	658	2.440E+01	699	1.053E+01	740	2.380E+00		
618	3.233E+01	659	2.404E+01	700	1.025E+01	741	2.324E+00		
619	3.226E+01	660	2.369E+01	701	1.003E+01	742	2.260E+00		
620	3.218E+01	661	2.335E+01	702	9.728E+00	743	2.114E+00		
621	3.210E+01	662	2.301E+01	703	9.449E+00	744	1.960E+00		
622	3.200E+01	663	2.266E+01	704	9.193E+00	745	1.860E+00		
623	3.190E+01	664	2.225E+01	705	8.924E+00	746	1.805E+00		
624	3.179E+01	665	2.186E+01	706	8.668E+00	747	1.770E+00		
625	3.169E+01	666	2.151E+01	707	8.415E+00	748	1.708E+00		

### 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**

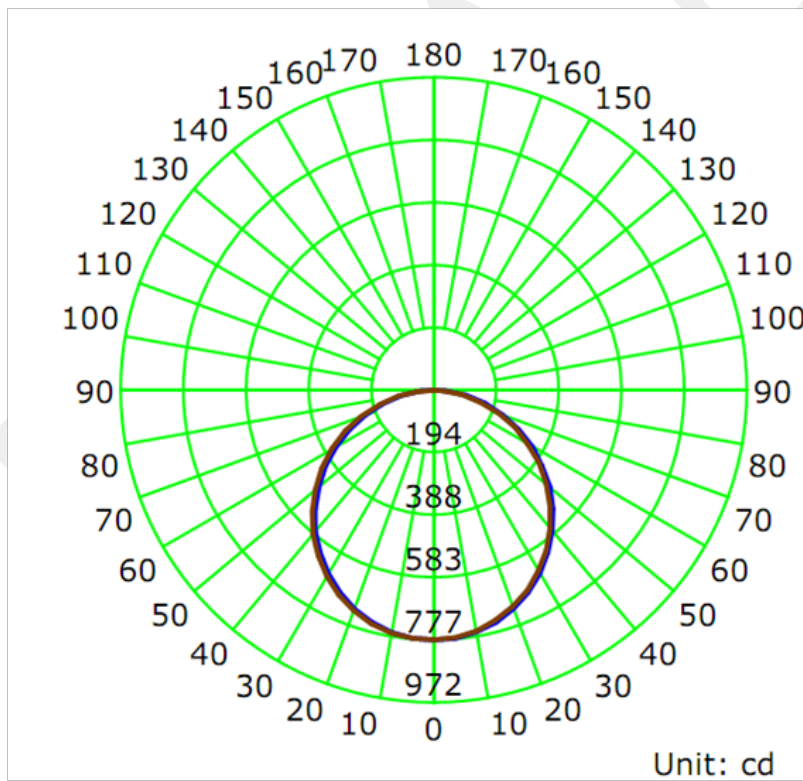
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1980	23.68	0.9980

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
2273.2	96.05	777.9	1.26	1.26

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{max}$ ):	113.9	113.8	113.8	113.8	113.8
Field Angle (10% $I_{max}$ ):	163.9	164.0	164.0	163.4	163.8

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	778	778	778	778	778	778	778	778
5.0°	774	774	772	772	772	774	773	776
10.0°	764	762	762	760	761	762	762	765
15.0°	747	745	742	741	742	743	745	747
20.0°	723	720	718	717	717	719	720	724
25.0°	694	690	688	685	686	688	689	695
30.0°	658	654	651	649	650	652	653	659
35.0°	618	613	609	608	608	610	613	619
40.0°	573	567	563	561	561	564	567	572
45.0°	523	517	512	510	511	513	516	522
50.0°	470	463	458	455	456	459	462	469
55.0°	411	406	401	398	398	401	405	412
60.0°	353	347	341	338	339	341	346	352
65.0°	290	285	280	277	277	279	284	290
70.0°	228	221	218	215	215	216	222	228
75.0°	165	158	155	152	152	154	157	164
80.0°	102	97	92	89	89	91	90	96
85.0°	37	35	33	31	31	33	33	39
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

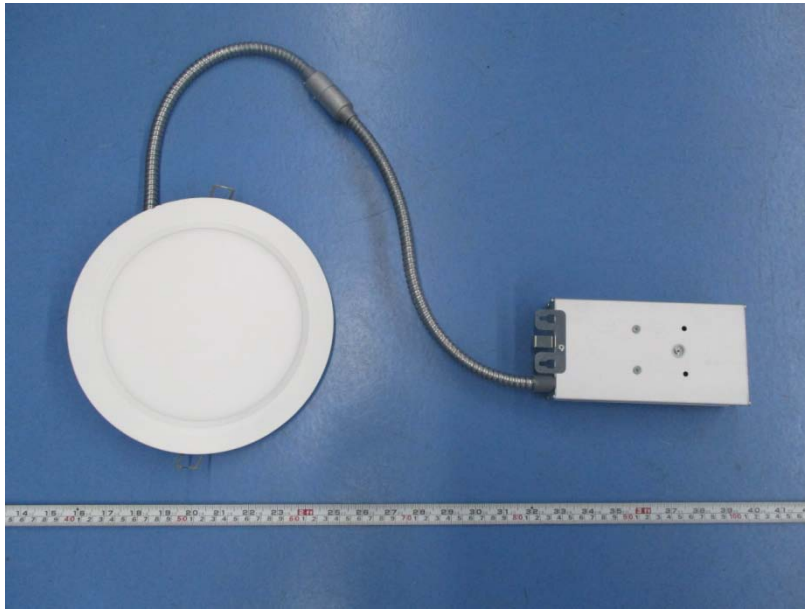
Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	778	778	778	778	778	778	778	778
5.0°	775	775	776	775	776	777	776	776
10.0°	765	766	767	767	767	767	765	765
15.0°	748	750	751	752	753	752	750	749
20.0°	725	727	729	730	731	730	728	725
25.0°	695	698	701	702	702	701	698	695
30.0°	659	664	667	668	669	667	662	660
35.0°	619	624	627	629	629	628	623	620
40.0°	574	578	582	584	585	582	578	574
45.0°	523	528	532	535	535	533	529	523
50.0°	469	476	479	481	482	479	475	469
55.0°	412	419	422	425	425	422	418	413
60.0°	353	359	362	365	366	364	358	353
65.0°	291	296	301	304	305	302	297	291
70.0°	228	234	238	241	242	239	234	229
75.0°	164	170	175	177	177	176	171	164
80.0°	101	108	112	114	114	112	108	101
85.0°	42	47	51	52	53	51	45	36
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	18.6	0.82	0-5	18.6	0.82
5-10	55.0	2.42	0-10	73.6	3.24
10-15	89.7	3.94	0-15	163.3	7.18
15-20	121.2	5.33	0-20	284.5	12.52
20-25	148.7	6.54	0-25	433.2	19.06
25-30	171.2	7.53	0-30	604.5	26.59
30-35	188.1	8.28	0-35	792.6	34.87
35-40	198.7	8.74	0-40	991.3	43.61
40-45	202.8	8.92	0-45	1194.1	52.53
45-50	200.3	8.81	0-50	1394.4	61.34
50-55	191.5	8.42	0-55	1585.9	69.77
55-60	176.6	7.77	0-60	1762.5	77.54
60-65	156.3	6.88	0-65	1918.8	84.41
65-70	131.3	5.77	0-70	2050.1	90.19
70-75	102.5	4.51	0-75	2152.6	94.70
75-80	71.0	3.13	0-80	2223.6	97.82
80-85	38.5	1.69	0-85	2262.1	99.51
85-90	11.1	0.49	0-90	2273.2	100.00
90-95	0.0	0.00	0-95	2273.2	100.00
95-100	0.0	0.00	0-100	2273.2	100.00
100-105	0.0	0.00	0-105	2273.2	100.00
105-110	0.0	0.00	0-110	2273.2	100.00
110-115	0.0	0.00	0-115	2273.2	100.00
115-120	0.0	0.00	0-120	2273.2	100.00
120-125	0.0	0.00	0-125	2273.2	100.00
125-130	0.0	0.00	0-130	2273.2	100.00
130-135	0.0	0.00	0-135	2273.2	100.00
135-140	0.0	0.00	0-140	2273.2	100.00
140-145	0.0	0.00	0-145	2273.2	100.00
145-150	0.0	0.00	0-150	2273.2	100.00
150-155	0.0	0.00	0-155	2273.2	100.00
155-160	0.0	0.00	0-160	2273.2	100.00
160-165	0.0	0.00	0-165	2273.2	100.00
165-170	0.0	0.00	0-170	2273.2	100.00
170-175	0.0	0.00	0-175	2273.2	100.00
175-180	0.0	0.00	0-180	2273.2	100.00

## 6. Product Photo



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