

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

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

**Test Model: AD4LES9027DIM010UNVNRCC**

<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>	RKS180131080-10-2
<b>Test Date:</b>	2018-05-23 to 2018-05-24
<b>Report Date:</b>	2018-05-25
<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 2018-02-05 and used for testing.

Model Tested: AD4LES9027DIM010UNVNRCC  
 Manufacturer: GREEN CREATIVE LTD  
 Brand Name: GREEN CREATIVE  
 Product Designation: LED Downlight  
 Aging Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277 VAC 50/60Hz  
 Rated Power: 12.5W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 1000lm

## 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**

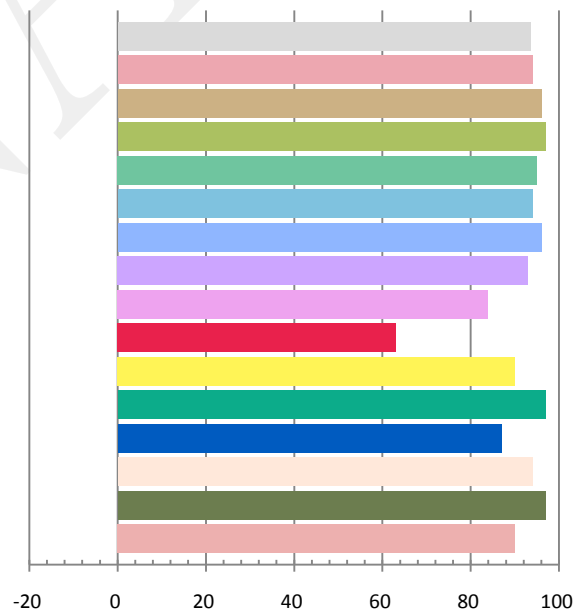
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1043	12.45	0.9946	1139.8	91.55

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.021	2728	0.00139	0.4600	0.4144	0.2609	0.5288

### Color Rendering Index

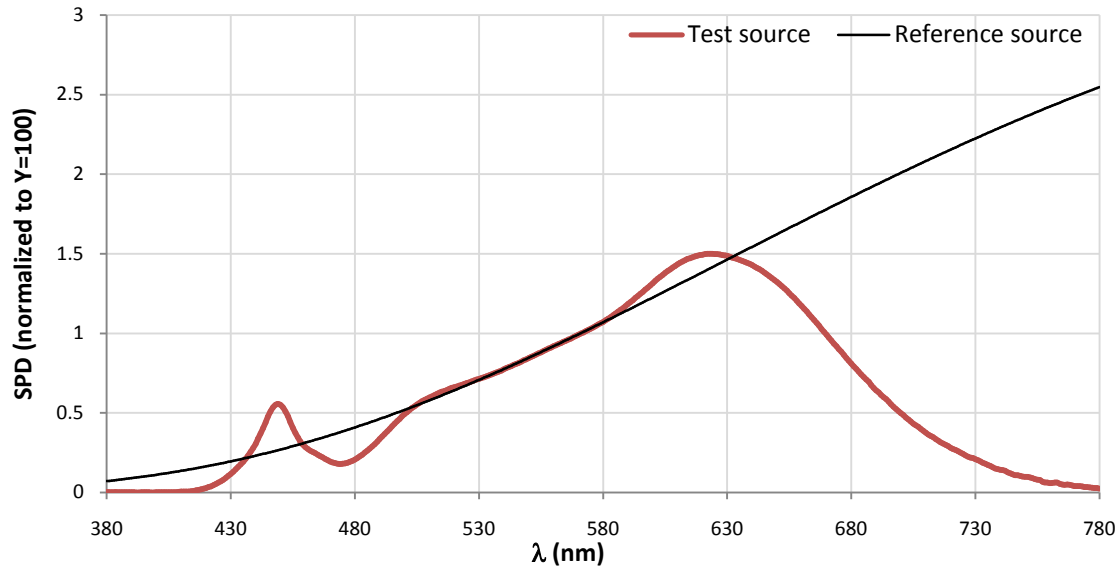
<b>Ra</b> <b>93.6</b>			
<b>R1</b> 94	<b>R2</b> 96	<b>R3</b> 97	<b>R4</b> 95
<b>R5</b> 94	<b>R6</b> 96	<b>R7</b> 93	<b>R8</b> 84
<b>R9</b> 63	<b>R10</b> 90	<b>R11</b> 97	<b>R12</b> 87
<b>R13</b> 94	<b>R14</b> 97	<b>R15</b> 90	



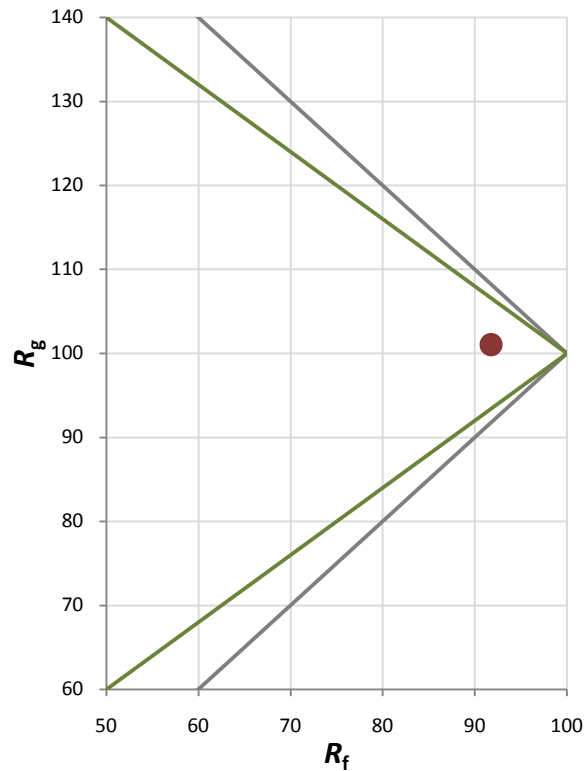
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	92
Gamut Index $R_g$	101

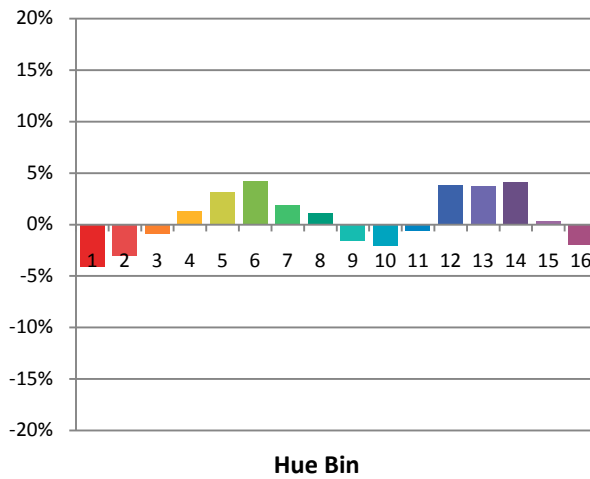
### Spectral Power Distribution Comparison



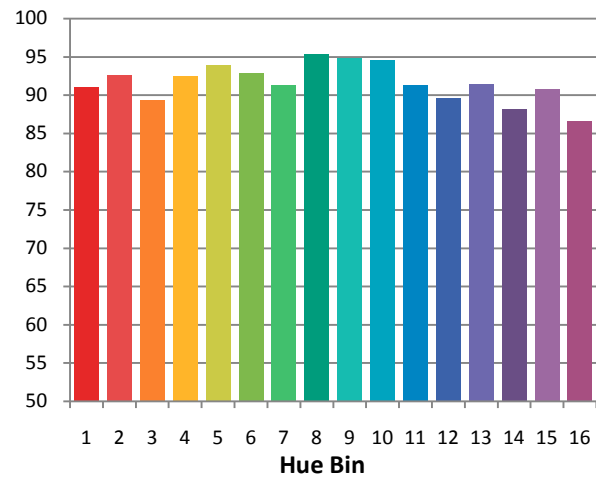
### Plot of $R_g$ versus $R_f$



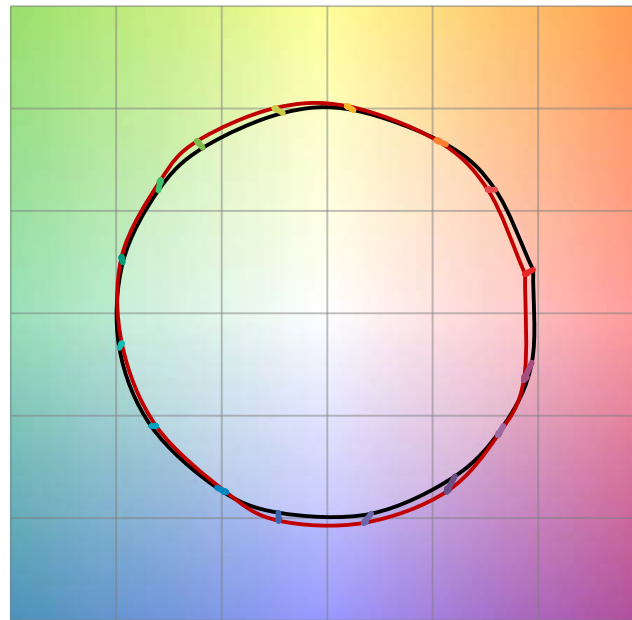
Chroma Shift by Hue



$R_t$  by Hue

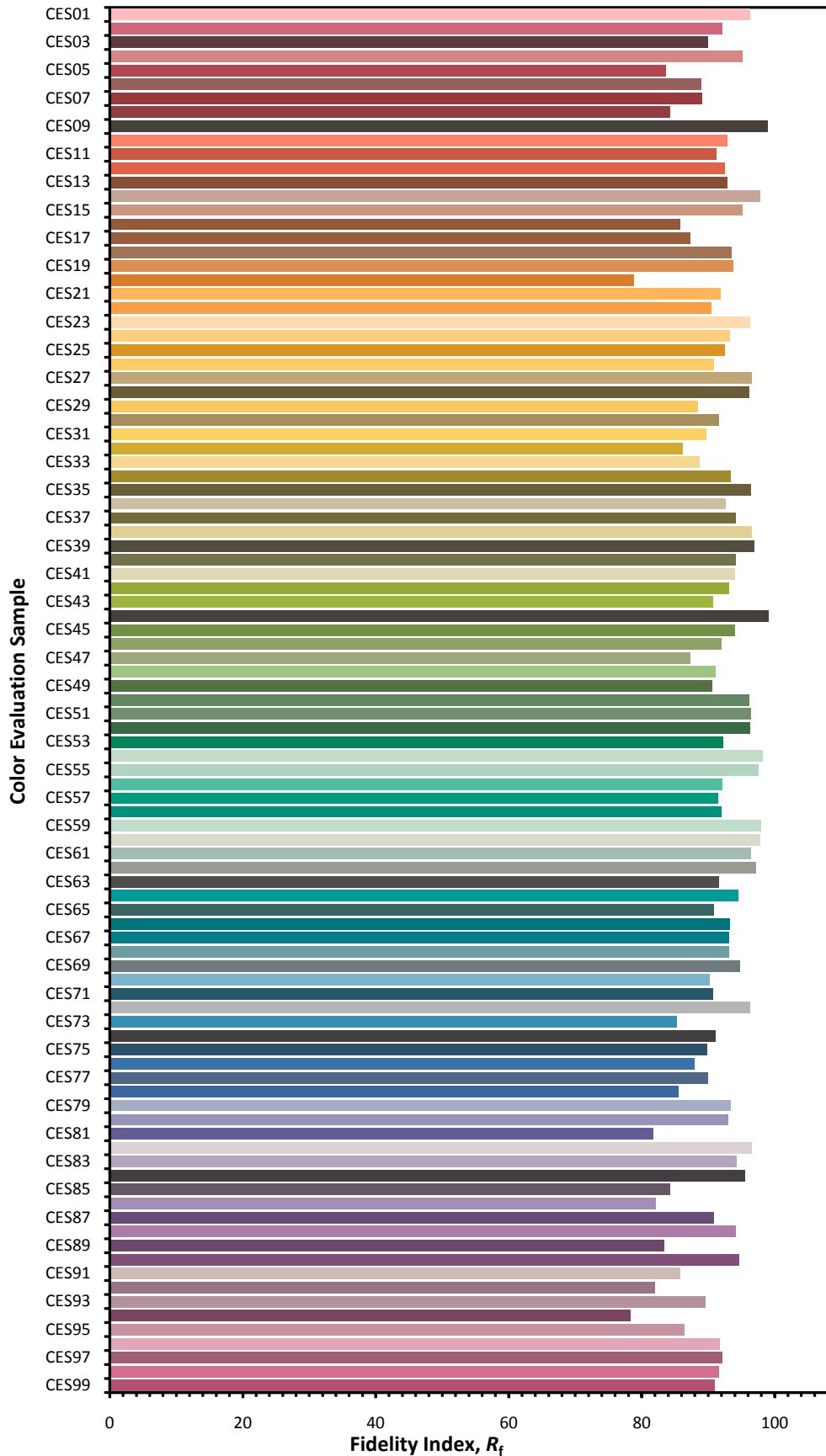


Color Vector Graphic

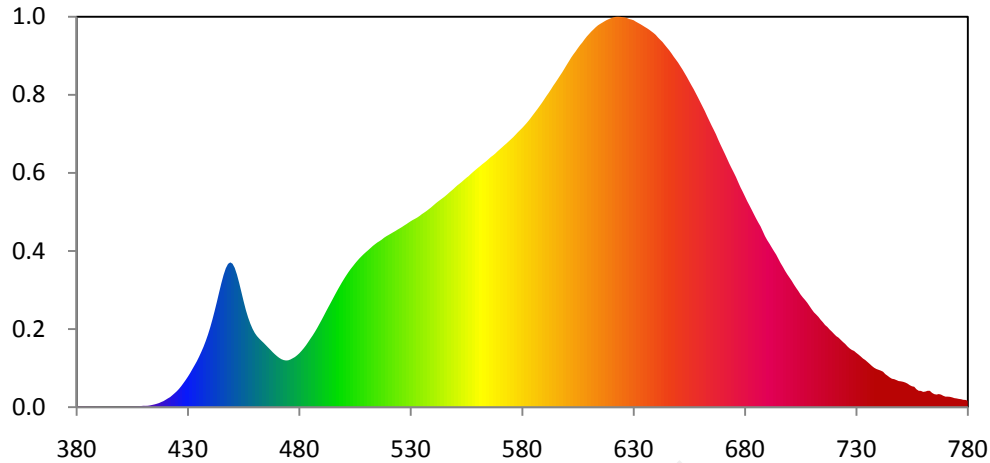


— Reference Illuminat    — Test Source

### Color Fidelity by CES Sample



### Relative Spectral Power Distribution

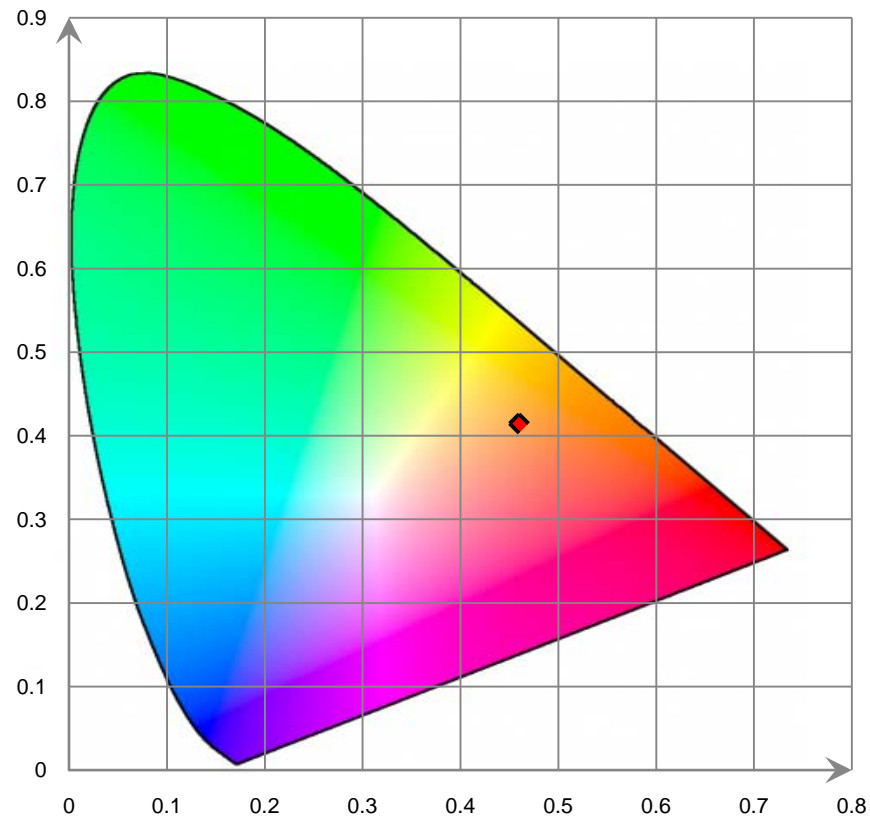


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.050E-02	421	5.620E-01	462	4.398E+00	503	8.848E+00	544	1.337E+01
381	4.510E-02	422	6.460E-01	463	4.255E+00	504	9.028E+00	545	1.348E+01
382	3.250E-02	423	7.657E-01	464	4.121E+00	505	9.211E+00	546	1.360E+01
383	4.470E-02	424	8.911E-01	465	3.972E+00	506	9.383E+00	547	1.372E+01
384	4.570E-02	425	1.022E+00	466	3.826E+00	507	9.543E+00	548	1.385E+01
385	2.630E-02	426	1.173E+00	467	3.683E+00	508	9.688E+00	549	1.397E+01
386	3.260E-02	427	1.349E+00	468	3.529E+00	509	9.827E+00	550	1.410E+01
387	3.260E-02	428	1.545E+00	469	3.394E+00	510	9.954E+00	551	1.423E+01
388	2.650E-02	429	1.745E+00	470	3.268E+00	511	1.008E+01	552	1.434E+01
389	3.490E-02	430	1.957E+00	471	3.160E+00	512	1.021E+01	553	1.445E+01
390	3.230E-02	431	2.187E+00	472	3.074E+00	513	1.034E+01	554	1.458E+01
391	1.460E-02	432	2.440E+00	473	3.018E+00	514	1.045E+01	555	1.471E+01
392	9.500E-03	433	2.687E+00	474	2.994E+00	515	1.056E+01	556	1.482E+01
393	1.160E-02	434	2.944E+00	475	3.003E+00	516	1.065E+01	557	1.495E+01
394	1.580E-02	435	3.233E+00	476	3.056E+00	517	1.074E+01	558	1.508E+01
395	2.200E-02	436	3.542E+00	477	3.134E+00	518	1.086E+01	559	1.520E+01
396	2.200E-02	437	3.871E+00	478	3.214E+00	519	1.095E+01	560	1.532E+01
397	1.480E-02	438	4.244E+00	479	3.326E+00	520	1.104E+01	561	1.544E+01
398	8.700E-03	439	4.656E+00	480	3.458E+00	521	1.112E+01	562	1.556E+01
399	4.400E-03	440	5.114E+00	481	3.613E+00	522	1.120E+01	563	1.567E+01
400	1.880E-02	441	5.625E+00	482	3.783E+00	523	1.129E+01	564	1.579E+01
401	2.330E-02	442	6.176E+00	483	3.969E+00	524	1.137E+01	565	1.592E+01
402	2.570E-02	443	6.755E+00	484	4.179E+00	525	1.146E+01	566	1.604E+01
403	2.640E-02	444	7.361E+00	485	4.393E+00	526	1.155E+01	567	1.614E+01
404	2.830E-02	445	7.948E+00	486	4.602E+00	527	1.164E+01	568	1.627E+01
405	3.220E-02	446	8.479E+00	487	4.829E+00	528	1.173E+01	569	1.641E+01
406	3.850E-02	447	8.906E+00	488	5.071E+00	529	1.183E+01	570	1.653E+01
407	4.210E-02	448	9.184E+00	489	5.332E+00	530	1.192E+01	571	1.666E+01
408	4.300E-02	449	9.280E+00	490	5.591E+00	531	1.201E+01	572	1.679E+01
409	7.480E-02	450	9.198E+00	491	5.861E+00	532	1.208E+01	573	1.691E+01
410	9.100E-02	451	8.931E+00	492	6.140E+00	533	1.216E+01	574	1.704E+01
411	8.770E-02	452	8.502E+00	493	6.408E+00	534	1.226E+01	575	1.718E+01
412	9.270E-02	453	7.966E+00	494	6.671E+00	535	1.238E+01	576	1.731E+01
413	1.149E-01	454	7.378E+00	495	6.938E+00	536	1.247E+01	577	1.746E+01
414	1.452E-01	455	6.786E+00	496	7.209E+00	537	1.257E+01	578	1.761E+01
415	1.780E-01	456	6.231E+00	497	7.472E+00	538	1.268E+01	579	1.776E+01
416	2.173E-01	457	5.757E+00	498	7.725E+00	539	1.279E+01	580	1.789E+01
417	2.637E-01	458	5.358E+00	499	7.974E+00	540	1.291E+01	581	1.805E+01
418	3.279E-01	459	5.027E+00	500	8.209E+00	541	1.304E+01	582	1.821E+01
419	3.876E-01	460	4.759E+00	501	8.432E+00	542	1.316E+01	583	1.838E+01
420	4.729E-01	461	4.555E+00	502	8.648E+00	543	1.326E+01	584	1.857E+01

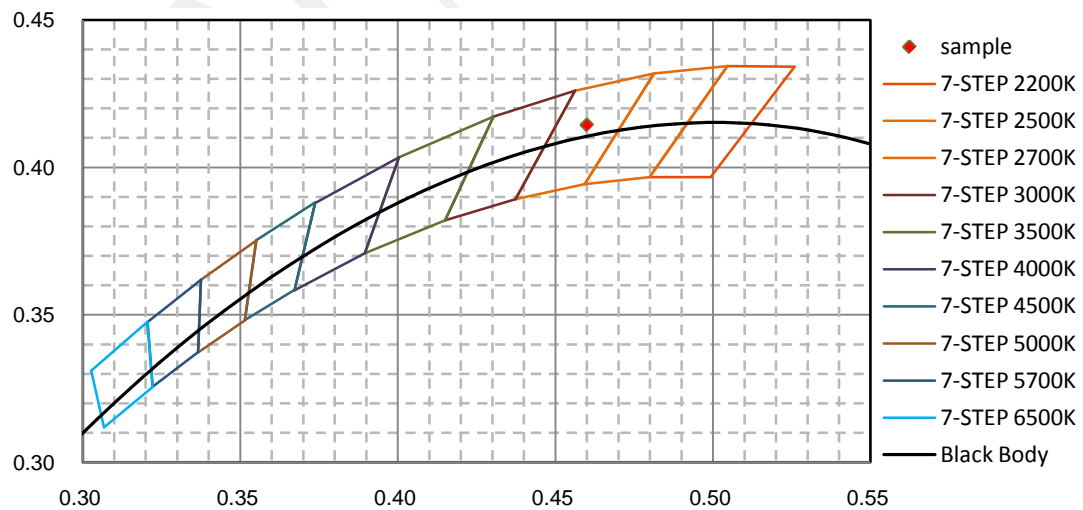


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.876E+01	626	2.499E+01	667	1.749E+01	708	6.690E+00	749	1.673E+00
586	1.895E+01	627	2.495E+01	668	1.716E+01	709	6.480E+00	750	1.658E+00
587	1.914E+01	628	2.489E+01	669	1.684E+01	710	6.271E+00	751	1.626E+00
588	1.933E+01	629	2.485E+01	670	1.654E+01	711	6.078E+00	752	1.580E+00
589	1.953E+01	630	2.481E+01	671	1.624E+01	712	5.938E+00	753	1.509E+00
590	1.975E+01	631	2.472E+01	672	1.593E+01	713	5.788E+00	754	1.410E+00
591	1.996E+01	632	2.464E+01	673	1.561E+01	714	5.601E+00	755	1.340E+00
592	2.017E+01	633	2.456E+01	674	1.532E+01	715	5.441E+00	756	1.308E+00
593	2.038E+01	634	2.447E+01	675	1.504E+01	716	5.265E+00	757	1.145E+00
594	2.061E+01	635	2.438E+01	676	1.475E+01	717	5.144E+00	758	1.053E+00
595	2.082E+01	636	2.430E+01	677	1.442E+01	718	4.982E+00	759	1.043E+00
596	2.103E+01	637	2.420E+01	678	1.410E+01	719	4.847E+00	760	9.803E-01
597	2.125E+01	638	2.409E+01	679	1.381E+01	720	4.695E+00	761	1.001E+00
598	2.147E+01	639	2.399E+01	680	1.352E+01	721	4.553E+00	762	1.050E+00
599	2.170E+01	640	2.386E+01	681	1.321E+01	722	4.457E+00	763	1.049E+00
600	2.194E+01	641	2.370E+01	682	1.294E+01	723	4.317E+00	764	9.163E-01
601	2.217E+01	642	2.355E+01	683	1.267E+01	724	4.181E+00	765	8.353E-01
602	2.241E+01	643	2.341E+01	684	1.238E+01	725	4.055E+00	766	8.085E-01
603	2.262E+01	644	2.323E+01	685	1.210E+01	726	3.898E+00	767	8.420E-01
604	2.281E+01	645	2.306E+01	686	1.184E+01	727	3.768E+00	768	8.090E-01
605	2.301E+01	646	2.288E+01	687	1.159E+01	728	3.669E+00	769	7.302E-01
606	2.321E+01	647	2.269E+01	688	1.128E+01	729	3.605E+00	770	6.766E-01
607	2.338E+01	648	2.248E+01	689	1.097E+01	730	3.481E+00	771	6.748E-01
608	2.358E+01	649	2.229E+01	690	1.071E+01	731	3.372E+00	772	6.626E-01
609	2.376E+01	650	2.209E+01	691	1.049E+01	732	3.249E+00	773	6.272E-01
610	2.392E+01	651	2.187E+01	692	1.024E+01	733	3.119E+00	774	5.800E-01
611	2.408E+01	652	2.164E+01	693	1.001E+01	734	3.024E+00	775	5.614E-01
612	2.421E+01	653	2.140E+01	694	9.787E+00	735	2.899E+00	776	5.310E-01
613	2.435E+01	654	2.115E+01	695	9.514E+00	736	2.774E+00	777	5.117E-01
614	2.448E+01	655	2.089E+01	696	9.242E+00	737	2.641E+00	778	4.724E-01
615	2.457E+01	656	2.063E+01	697	9.003E+00	738	2.529E+00	779	4.653E-01
616	2.465E+01	657	2.039E+01	698	8.749E+00	739	2.448E+00	780	4.121E-01
617	2.474E+01	658	2.011E+01	699	8.518E+00	740	2.395E+00		
618	2.482E+01	659	1.984E+01	700	8.310E+00	741	2.343E+00		
619	2.488E+01	660	1.955E+01	701	8.101E+00	742	2.273E+00		
620	2.494E+01	661	1.927E+01	702	7.862E+00	743	2.121E+00		
621	2.499E+01	662	1.898E+01	703	7.645E+00	744	2.018E+00		
622	2.502E+01	663	1.867E+01	704	7.440E+00	745	1.908E+00		
623	2.503E+01	664	1.837E+01	705	7.216E+00	746	1.822E+00		
624	2.502E+01	665	1.807E+01	706	7.033E+00	747	1.795E+00		
625	2.500E+01	666	1.778E+01	707	6.871E+00	748	1.737E+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**

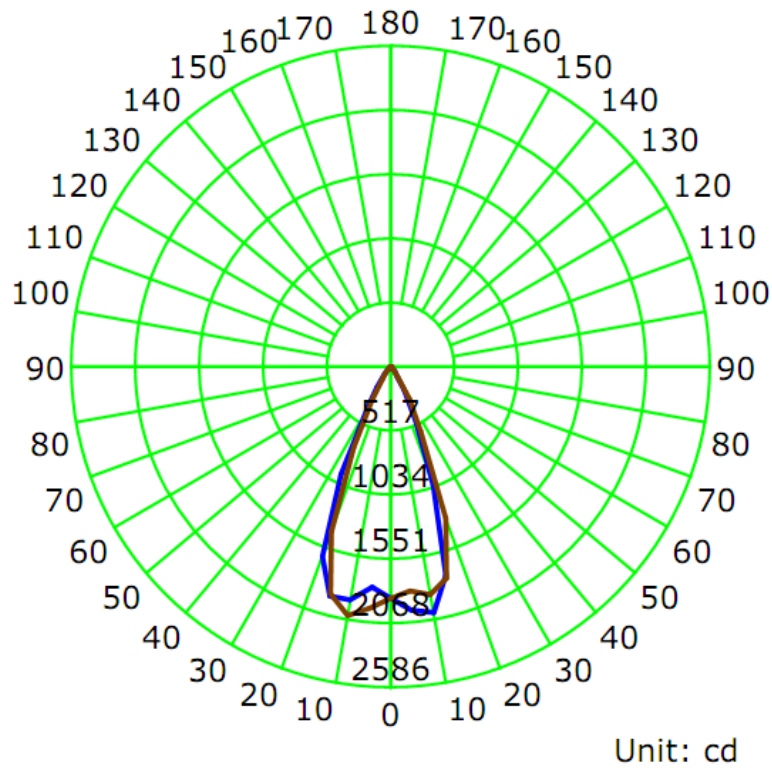
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1040	12.46	0.9960

### Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
1141.8	91.68	2068.9	0.78	0.79

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	44.7	45.3	44.8	44.1	44.8
Field Angle (10% I <sub>max</sub> ):	65.9	66.2	65.4	65.4	65.7

Luminous Intensity (cd) Distribution Data

C Y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1866	1866	1866	1866	1866	1866	1866	1866
5.0°	1973	1943	1889	1844	1813	1786	1762	1749
10.0°	2014	1977	1923	1900	1863	1863	1877	1886
15.0°	1742	1734	1742	1744	1762	1807	1847	1894
20.0°	1012	1039	1097	1215	1302	1390	1486	1584
25.0°	495	480	490	518	575	671	813	927
30.0°	219	226	253	276	305	323	336	349
35.0°	94	95	96	101	115	142	179	204
40.0°	57	57	58	60	65	70	74	78
45.0°	30	30	31	33	35	39	43	45
50.0°	12	13	13	14	16	17	20	22
55.0°	5	5	6	6	6	8	9	9
60.0°	1	2	2	2	2	3	3	4
65.0°	0	0	0	0	1	1	1	1
70.0°	0	0	0	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
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°	1	1	1	1	1	1	0	0
155.0°	2	2	2	2	2	2	2	2
160.0°	3	3	3	3	3	2	3	3
165.0°	3	4	4	4	3	3	3	3
170.0°	4	4	4	4	4	4	4	4
175.0°	5	5	6	5	5	4	4	5
180.0°	0	0	0	0	0	0	0	0

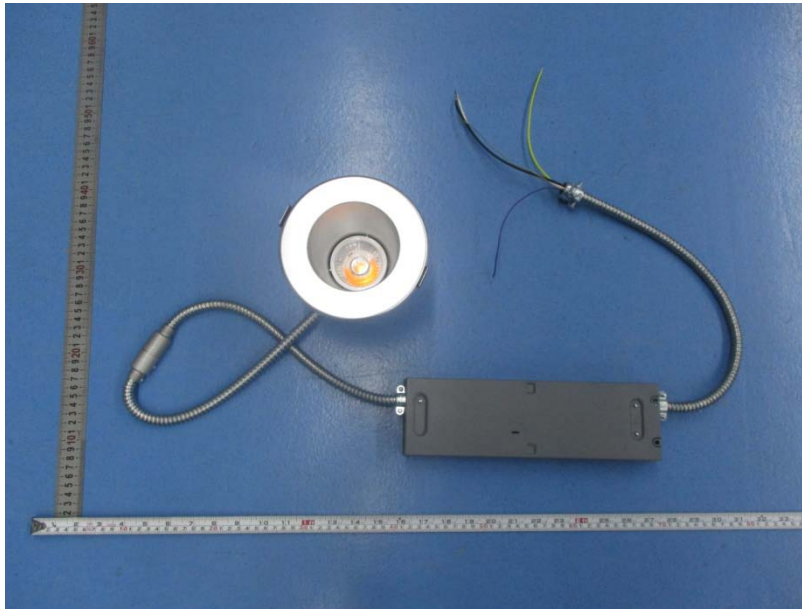
Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1866	1866	1866	1866	1866	1866	1866	1866
5.0°	1783	1830	1896	1929	1955	1987	1993	1984
10.0°	1907	1929	1953	1996	2039	2069	2067	2034
15.0°	1914	1914	1925	1915	1893	1845	1804	1748
20.0°	1629	1651	1621	1535	1418	1276	1110	1005
25.0°	961	964	881	796	721	645	560	499
30.0°	364	366	354	335	312	284	245	219
35.0°	206	192	171	144	118	104	98	93
40.0°	76	75	74	71	66	62	59	57
45.0°	44	44	44	41	38	36	33	31
50.0°	21	21	21	20	18	17	15	13
55.0°	9	9	8	8	8	7	6	6
60.0°	3	3	3	4	3	3	2	2
65.0°	1	1	1	1	1	1	0	0
70.0°	0	0	0	0	0	0	0	0
75.0°	0	0	0	0	0	0	0	0
80.0°	0	0	0	0	0	0	0	0
85.0°	0	0	0	0	0	0	0	0
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	1	1	1	1	1
155.0°	1	1	2	2	2	2	2	2
160.0°	2	2	3	3	3	3	3	3
165.0°	3	3	4	3	4	4	4	4
170.0°	3	4	4	4	4	5	4	5
175.0°	5	5	5	5	5	6	5	5
180.0°	0	0	0	0	0	0	0	0

### Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	44.8	3.92	0-5	44.8	3.92
5-10	137.3	12.03	0-10	182.1	15.95
10-15	224.4	19.65	0-15	406.5	35.60
15-20	260.6	22.83	0-20	667.1	58.43
20-25	212.2	18.58	0-25	879.3	77.01
25-30	124.7	10.92	0-30	1003.9	87.93
30-35	63.7	5.58	0-35	1067.6	93.51
35-40	33.4	2.93	0-40	1101.0	96.43
40-45	19.1	1.68	0-45	1120.2	98.11
45-50	11.0	0.96	0-50	1131.1	99.07
50-55	5.2	0.46	0-55	1136.4	99.53
55-60	2.2	0.20	0-60	1138.6	99.73
60-65	0.8	0.07	0-65	1139.4	99.80
65-70	0.1	0.01	0-70	1139.6	99.81
70-75	0.0	0.00	0-75	1139.6	99.81
75-80	0.0	0.00	0-80	1139.6	99.81
80-85	0.0	0.00	0-85	1139.6	99.81
85-90	0.0	0.00	0-90	1139.6	99.81
90-95	0.0	0.00	0-95	1139.6	99.81
95-100	0.0	0.00	0-100	1139.6	99.81
100-105	0.0	0.00	0-105	1139.6	99.81
105-110	0.0	0.00	0-110	1139.6	99.81
110-115	0.0	0.00	0-115	1139.6	99.81
115-120	0.0	0.00	0-120	1139.6	99.81
120-125	0.0	0.00	0-125	1139.6	99.81
125-130	0.0	0.00	0-130	1139.6	99.81
130-135	0.0	0.00	0-135	1139.6	99.81
135-140	0.0	0.00	0-140	1139.6	99.81
140-145	0.0	0.00	0-145	1139.6	99.81
145-150	0.1	0.01	0-150	1139.7	99.82
150-155	0.3	0.03	0-155	1140.0	99.84
155-160	0.5	0.04	0-160	1140.4	99.88
160-165	0.5	0.04	0-165	1140.9	99.93
165-170	0.5	0.04	0-170	1141.4	99.97
170-175	0.3	0.03	0-175	1141.7	99.99
175-180	0.1	0.01	0-180	1141.7	100.00

## 6. Product Photo



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