

# IES LM-79-19

## MEASUREMENT AND TEST REPORT

For

### GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

**Test Model: INFTP8/8CCT3S/DIM120V**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
<b>Project Engineer:</b>	Bay Wang
<b>Report Number:</b>	RKSB230301004-10-1
<b>Test Date:</b>	2023-03-02 to 2023-03-06
<b>Report Date:</b>	2023-03-10
<b>Reviewed By:</b>	Seven Xia / EE Engineer
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Kunshan). No. 248 Chenghu Road, Kunshan, Jiangsu, People's Republic of China Tel: +86-0512-86175000 Fax: +86-0512-88934268
<b>Accreditation:</b>	The IAS Accreditation Number TL-1044.

## 1. Product Description#

### General Information:

One sample was received on 2023-03-01 and used for testing.

Model Tested:	INFTP8/8CCT3S/DIM120V
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	LED Recessed Downlight
Burning Time Before Test:	0hour(For New Products)
Color Tunable:	White-Tunable
CCT Range:	3000K, 3500K, 4000K
Least Efficient Setting:	3000K
Most Consumptive Setting:	3000K
Default Setting:	3500K

### Rated Values:

Rated Voltage/Frequency:	120VAC 60Hz
Rated Power:	12W/16W/23W
Nominal CCT:	3000K, 3500K, 4000K
Nominal Lumen Output:	2900lm/3000lm/3000lm @23W

## 2. Standards Used

- IES LM-79-19: Approved Method: Optical and Electrical Measurements of Solid-state Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment
- IES TM-30-18\*: 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	2022-06-21	2023-06-20
Power Meter	INVENTFINE	WT500	GSJWQ20009	2022-11-03	2023-11-02
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2022-06-21	2023-06-20
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2022-06-21	2023-06-20
Standard Light Source	Osram	24V/50W	JWWCR020104	2021-09-15	2023-09-14
Thermal Meter	ANYMETRE	TH-20E	N/A	2022-11-11	2023-11-10
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2022-06-21	2023-06-20
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2022-06-21	2023-06-20
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2022-06-21	2023-06-20
Power Meter	INVENTFINE	WT500	GSDSQ200007	2022-11-03	2023-11-02

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2022-11-14	2023-11-13
Wireless Weather Station	ZHONGXING	KG218	N/A	2022-06-21	2023-06-20
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2021-12-23	2023-12-22

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 ANSI/IES LM-79-19. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at  $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$  during measurement. And relative humidity is maintained between 10% 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  $U_{rel}=2.6\%$  ( $k=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=34\text{K}$  ( $k=2$ ), 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  $U_{rel}=0.48\%$  of rdg, AC Voltage  $U_{rel}=0.25\%$  of rdg, Power  $U_{rel}=0.44\%$ , ( $k=2$ ), 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. For measurement of luminous intensity distribution, The horizontal angle (C plane) test intervals were set 22.5 degree, the vertical angle ( $\gamma$ ) test intervals were set 1 degree while data for 5 degree intervals is reported.

The uncertainty of the luminous flux is  $U_{rel}=2.6\%$  ( $k=2$ ), at the 95% confidence level.

### Fidelity Index and Gamut Index Calculation

The  $R_t$ ,  $R_g$  was calculated according to IES TM-30-18 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]

#### Control Setting: 3000K

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

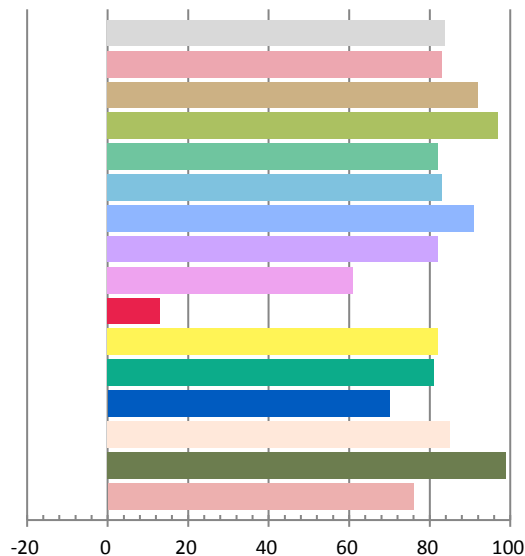
#### Photometric and Electrical Measurement Result

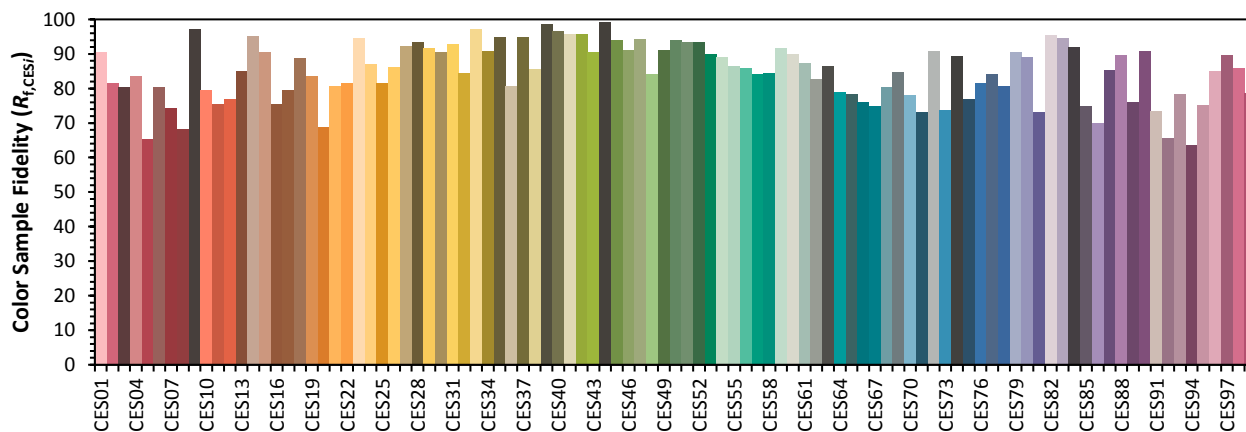
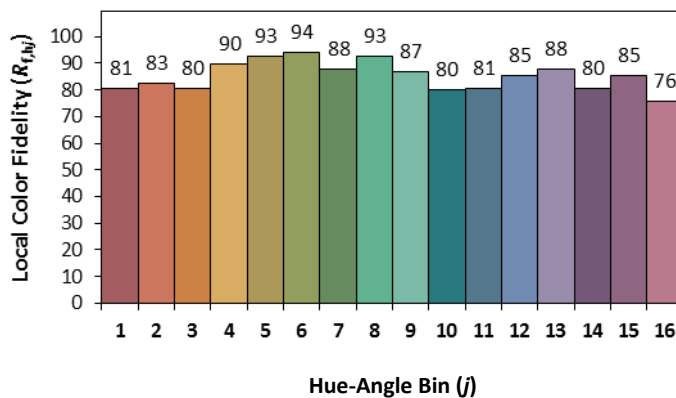
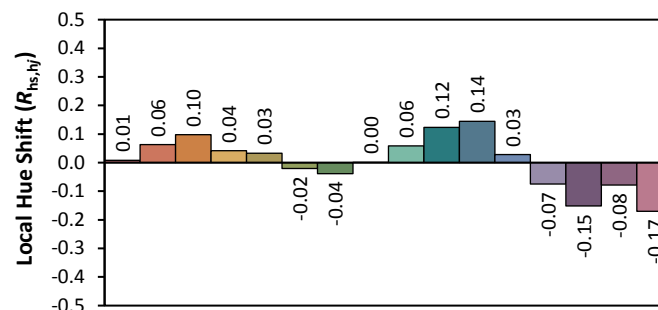
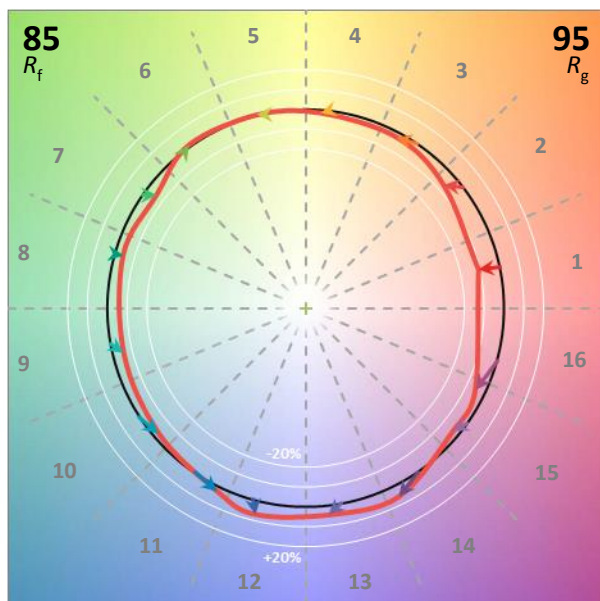
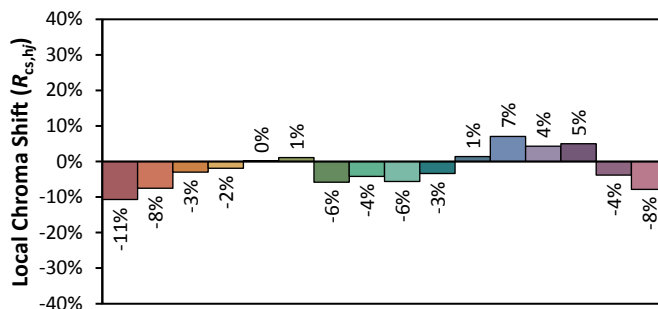
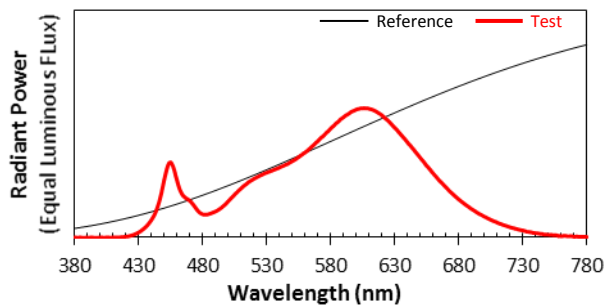
Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.1856	21.82	0.9797	2904	133.09

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.883	2924	-0.00034	0.4420	0.4049	0.2535	0.5225

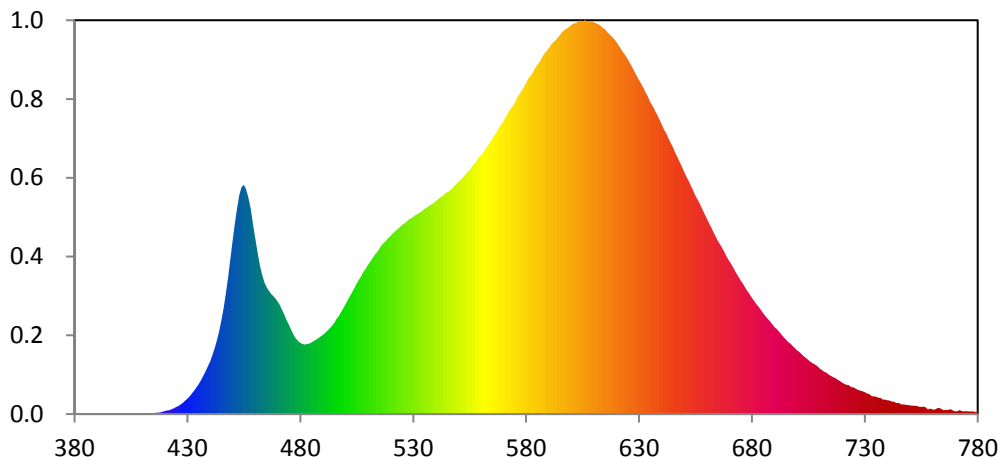
#### Color Rendering Index

<b>Ra</b>			
83.8			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
83	92	97	82
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
83	91	82	61
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
13	82	81	70
<b>R13</b>	<b>R14</b>	<b>R15</b>	
85	99	76	





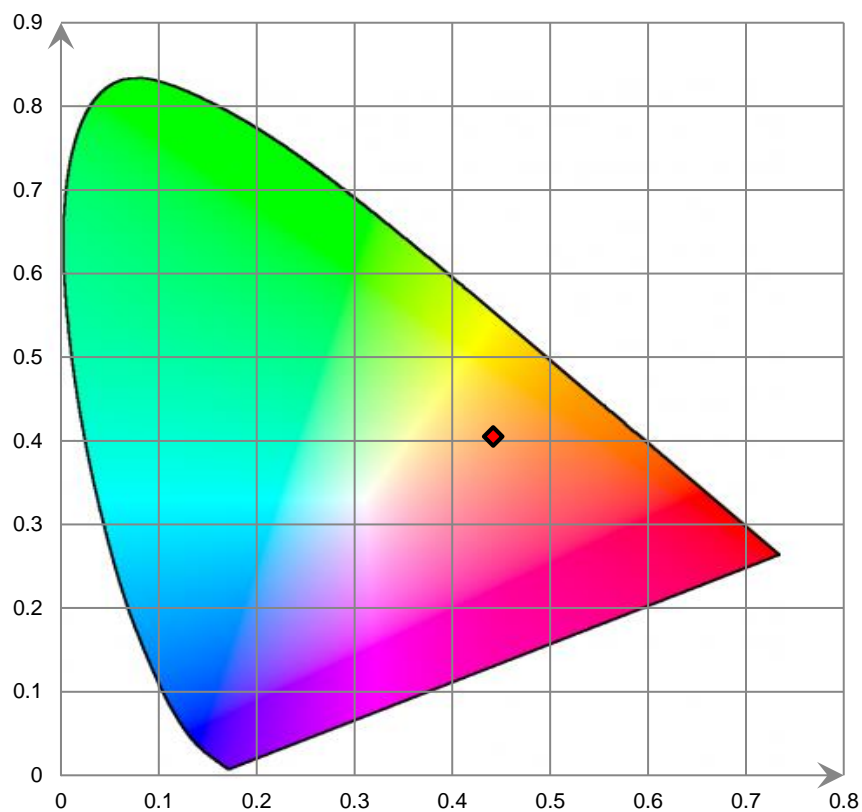
### Relative Spectral Power Distribution



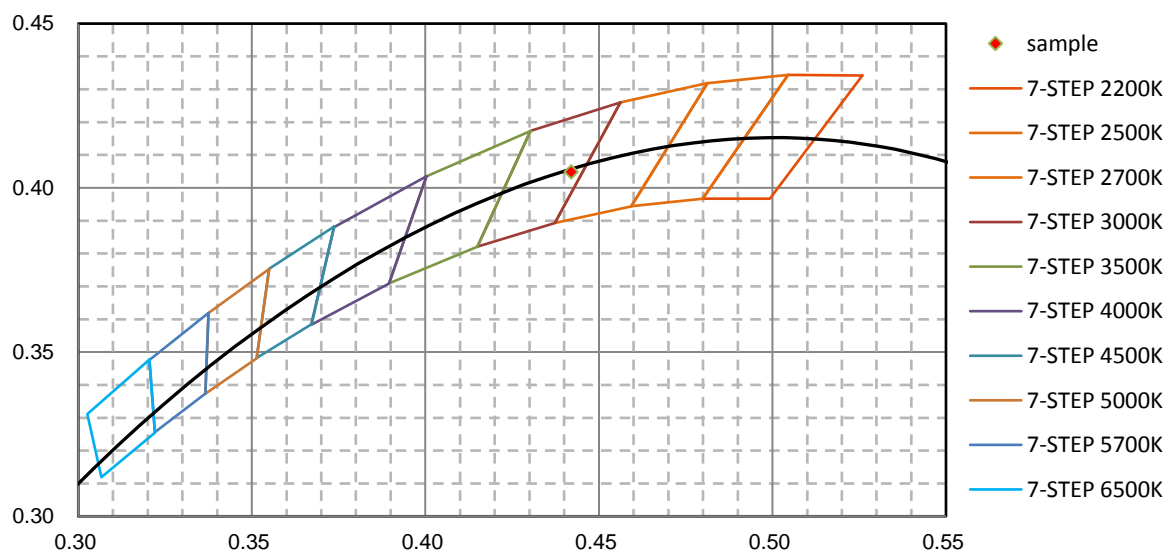
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.810E-02	421	5.471E-01	462	2.295E+01	503	1.875E+01	544	3.378E+01
381	6.600E-03	422	5.825E-01	463	2.149E+01	504	1.940E+01	545	3.407E+01
382	2.870E-02	423	7.416E-01	464	2.033E+01	505	2.005E+01	546	3.425E+01
383	5.800E-03	424	8.972E-01	465	1.952E+01	506	2.067E+01	547	3.457E+01
384	7.840E-02	425	1.101E+00	466	1.900E+01	507	2.118E+01	548	3.499E+01
385	8.800E-02	426	1.231E+00	467	1.847E+01	508	2.184E+01	549	3.529E+01
386	5.700E-03	427	1.494E+00	468	1.813E+01	509	2.235E+01	550	3.569E+01
387	3.320E-02	428	1.755E+00	469	1.775E+01	510	2.295E+01	551	3.597E+01
388	7.200E-03	429	2.072E+00	470	1.727E+01	511	2.347E+01	552	3.636E+01
389	3.000E-04	430	2.378E+00	471	1.671E+01	512	2.401E+01	553	3.672E+01
390	6.620E-02	431	2.728E+00	472	1.599E+01	513	2.450E+01	554	3.721E+01
391	2.140E-02	432	3.134E+00	473	1.527E+01	514	2.489E+01	555	3.754E+01
392	8.300E-03	433	3.614E+00	474	1.442E+01	515	2.542E+01	556	3.803E+01
393	8.800E-03	434	4.066E+00	475	1.364E+01	516	2.595E+01	557	3.848E+01
394	6.700E-03	435	4.596E+00	476	1.284E+01	517	2.631E+01	558	3.884E+01
395	3.820E-02	436	5.161E+00	477	1.217E+01	518	2.664E+01	559	3.944E+01
396	4.000E-03	437	5.798E+00	478	1.164E+01	519	2.703E+01	560	3.969E+01
397	2.820E-02	438	6.512E+00	479	1.124E+01	520	2.742E+01	561	4.022E+01
398	2.500E-03	439	7.244E+00	480	1.091E+01	521	2.776E+01	562	4.061E+01
399	1.000E-04	440	8.093E+00	481	1.077E+01	522	2.806E+01	563	4.128E+01
400	0.000E+00	441	9.072E+00	482	1.070E+01	523	2.838E+01	564	4.170E+01
401	2.410E-02	442	1.008E+01	483	1.078E+01	524	2.868E+01	565	4.233E+01
402	3.230E-02	443	1.130E+01	484	1.085E+01	525	2.903E+01	566	4.282E+01
403	1.860E-02	444	1.272E+01	485	1.103E+01	526	2.925E+01	567	4.338E+01
404	1.000E-02	445	1.438E+01	486	1.121E+01	527	2.950E+01	568	4.400E+01
405	2.160E-02	446	1.624E+01	487	1.139E+01	528	2.986E+01	569	4.454E+01
406	4.500E-03	447	1.849E+01	488	1.164E+01	529	3.012E+01	570	4.498E+01
407	7.350E-02	448	2.095E+01	489	1.189E+01	530	3.029E+01	571	4.570E+01
408	1.450E-02	449	2.376E+01	490	1.213E+01	531	3.057E+01	572	4.626E+01
409	5.770E-02	450	2.657E+01	491	1.244E+01	532	3.075E+01	573	4.689E+01
410	7.760E-02	451	2.923E+01	492	1.280E+01	533	3.105E+01	574	4.725E+01
411	8.000E-02	452	3.157E+01	493	1.319E+01	534	3.119E+01	575	4.785E+01
412	7.030E-02	453	3.364E+01	494	1.361E+01	535	3.151E+01	576	4.852E+01
413	2.600E-02	454	3.489E+01	495	1.403E+01	536	3.172E+01	577	4.911E+01
414	1.124E-01	455	3.522E+01	496	1.460E+01	537	3.195E+01	578	4.963E+01
415	1.361E-01	456	3.458E+01	497	1.508E+01	538	3.223E+01	579	5.024E+01
416	1.943E-01	457	3.335E+01	498	1.562E+01	539	3.242E+01	580	5.085E+01
417	2.252E-01	458	3.152E+01	499	1.625E+01	540	3.269E+01	581	5.152E+01
418	2.708E-01	459	2.911E+01	500	1.686E+01	541	3.299E+01	582	5.198E+01
419	3.430E-01	460	2.702E+01	501	1.753E+01	542	3.328E+01	583	5.254E+01
420	4.345E-01	461	2.487E+01	502	1.817E+01	543	3.347E+01	584	5.322E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.372E+01	626	5.390E+01	667	2.543E+01	708	7.568E+00	749	1.399E+00
586	5.413E+01	627	5.326E+01	668	2.479E+01	709	7.357E+00	750	1.344E+00
587	5.478E+01	628	5.266E+01	669	2.412E+01	710	6.988E+00	751	1.290E+00
588	5.538E+01	629	5.195E+01	670	2.350E+01	711	6.765E+00	752	1.307E+00
589	5.576E+01	630	5.132E+01	671	2.291E+01	712	6.524E+00	753	1.256E+00
590	5.620E+01	631	5.075E+01	672	2.226E+01	713	6.354E+00	754	1.135E+00
591	5.669E+01	632	5.013E+01	673	2.162E+01	714	6.048E+00	755	1.082E+00
592	5.715E+01	633	4.937E+01	674	2.108E+01	715	5.885E+00	756	1.122E+00
593	5.741E+01	634	4.877E+01	675	2.053E+01	716	5.684E+00	757	1.024E+00
594	5.782E+01	635	4.795E+01	676	2.004E+01	717	5.499E+00	758	6.866E-01
595	5.823E+01	636	4.731E+01	677	1.946E+01	718	5.277E+00	759	8.396E-01
596	5.871E+01	637	4.662E+01	678	1.890E+01	719	5.064E+00	760	6.951E-01
597	5.899E+01	638	4.596E+01	679	1.837E+01	720	4.835E+00	761	7.206E-01
598	5.921E+01	639	4.524E+01	680	1.786E+01	721	4.656E+00	762	8.840E-01
599	5.945E+01	640	4.450E+01	681	1.739E+01	722	4.508E+00	763	9.524E-01
600	5.981E+01	641	4.372E+01	682	1.690E+01	723	4.449E+00	764	7.522E-01
601	6.002E+01	642	4.321E+01	683	1.647E+01	724	4.121E+00	765	6.104E-01
602	6.009E+01	643	4.240E+01	684	1.598E+01	725	4.093E+00	766	6.344E-01
603	6.028E+01	644	4.165E+01	685	1.551E+01	726	3.870E+00	767	6.443E-01
604	6.047E+01	645	4.100E+01	686	1.507E+01	727	3.712E+00	768	7.706E-01
605	6.027E+01	646	4.020E+01	687	1.466E+01	728	3.588E+00	769	5.760E-01
606	6.051E+01	647	3.949E+01	688	1.429E+01	729	3.477E+00	770	4.162E-01
607	6.041E+01	648	3.877E+01	689	1.377E+01	730	3.370E+00	771	4.320E-01
608	6.034E+01	649	3.801E+01	690	1.334E+01	731	3.133E+00	772	5.870E-01
609	6.037E+01	650	3.725E+01	691	1.303E+01	732	3.082E+00	773	4.300E-01
610	6.018E+01	651	3.650E+01	692	1.264E+01	733	2.754E+00	774	4.068E-01
611	6.005E+01	652	3.585E+01	693	1.227E+01	734	2.715E+00	775	4.351E-01
612	5.990E+01	653	3.510E+01	694	1.182E+01	735	2.666E+00	776	3.952E-01
613	5.967E+01	654	3.429E+01	695	1.147E+01	736	2.536E+00	777	4.059E-01
614	5.934E+01	655	3.350E+01	696	1.107E+01	737	2.453E+00	778	4.248E-01
615	5.909E+01	656	3.292E+01	697	1.083E+01	738	2.237E+00	779	3.222E-01
616	5.871E+01	657	3.223E+01	698	1.049E+01	739	2.200E+00	780	3.093E-01
617	5.830E+01	658	3.150E+01	699	1.014E+01	740	2.113E+00		
618	5.801E+01	659	3.073E+01	700	9.801E+00	741	2.071E+00		
619	5.759E+01	660	3.005E+01	701	9.543E+00	742	1.940E+00		
620	5.713E+01	661	2.930E+01	702	9.200E+00	743	1.872E+00		
621	5.660E+01	662	2.868E+01	703	8.871E+00	744	1.672E+00		
622	5.608E+01	663	2.793E+01	704	8.596E+00	745	1.756E+00		
623	5.553E+01	664	2.726E+01	705	8.329E+00	746	1.504E+00		
624	5.506E+01	665	2.656E+01	706	8.032E+00	747	1.470E+00		
625	5.455E+01	666	2.601E+01	707	7.763E+00	748	1.419E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles





## Control Setting: 3500K

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

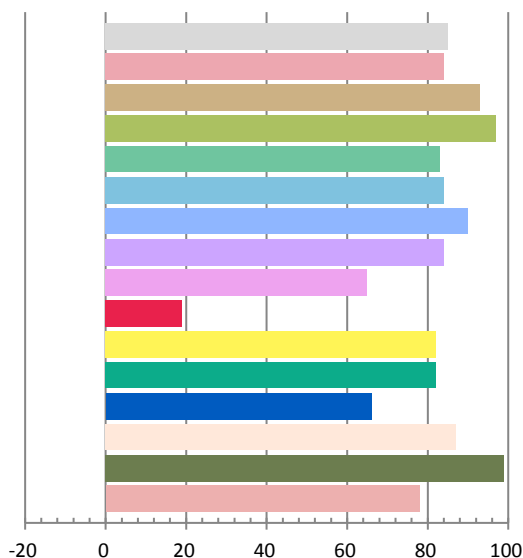
## Photometric and Electrical Measurement Result

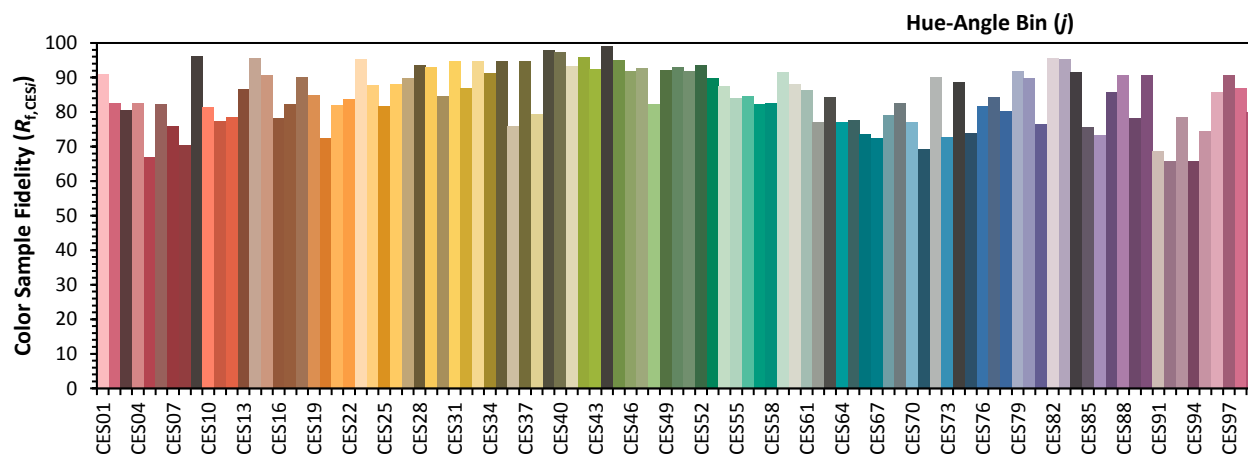
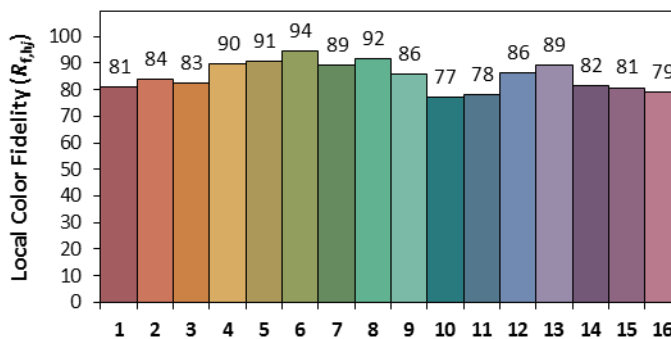
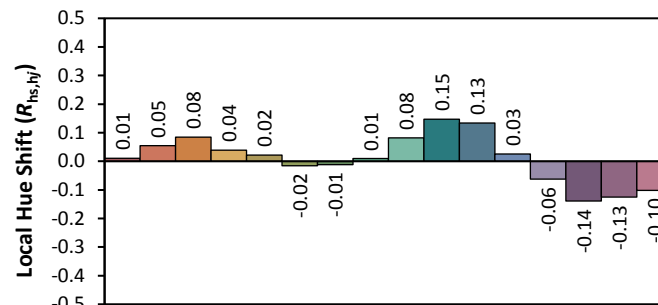
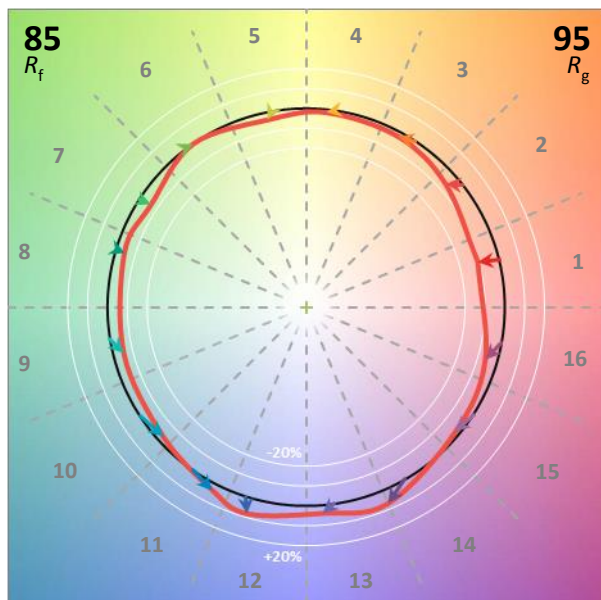
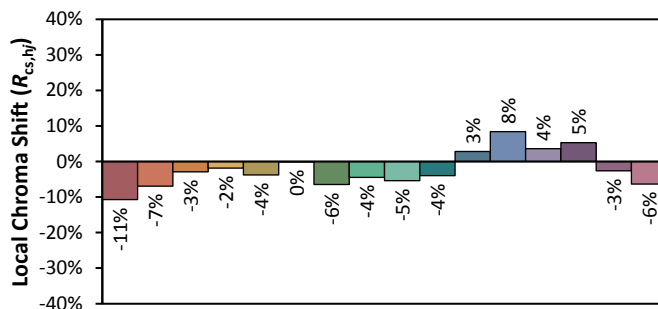
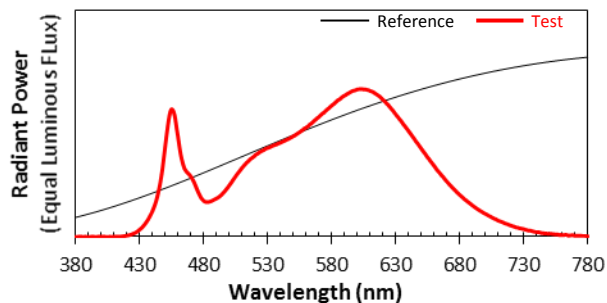
Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.1839	21.61	0.9792	3083.4	142.68

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.407	3336	-0.00027	0.4146	0.3945	0.2401	0.5142

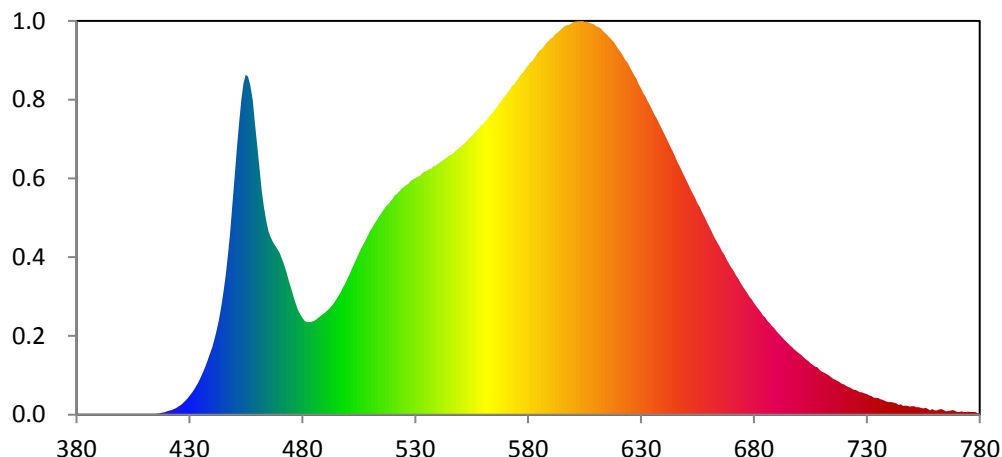
## Color Rendering Index

Ra			
85.1			
R1	R2	R3	R4
84	93	97	83
R5	R6	R7	R8
84	90	84	65
R9	R10	R11	R12
19	82	82	66
R13	R14	R15	
87	99	78	





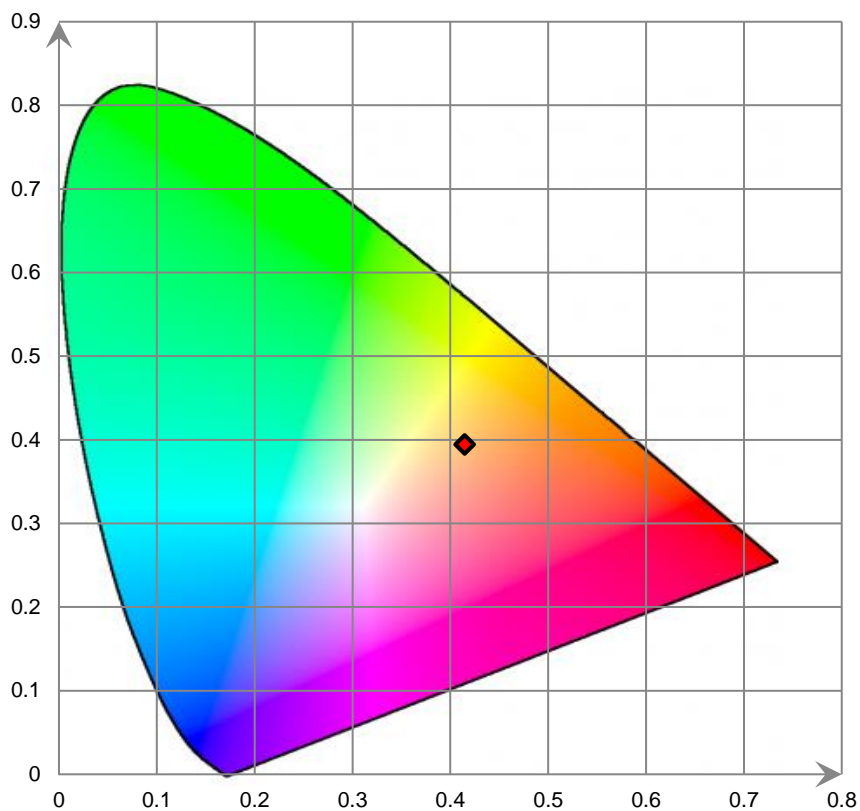
### Relative Spectral Power Distribution



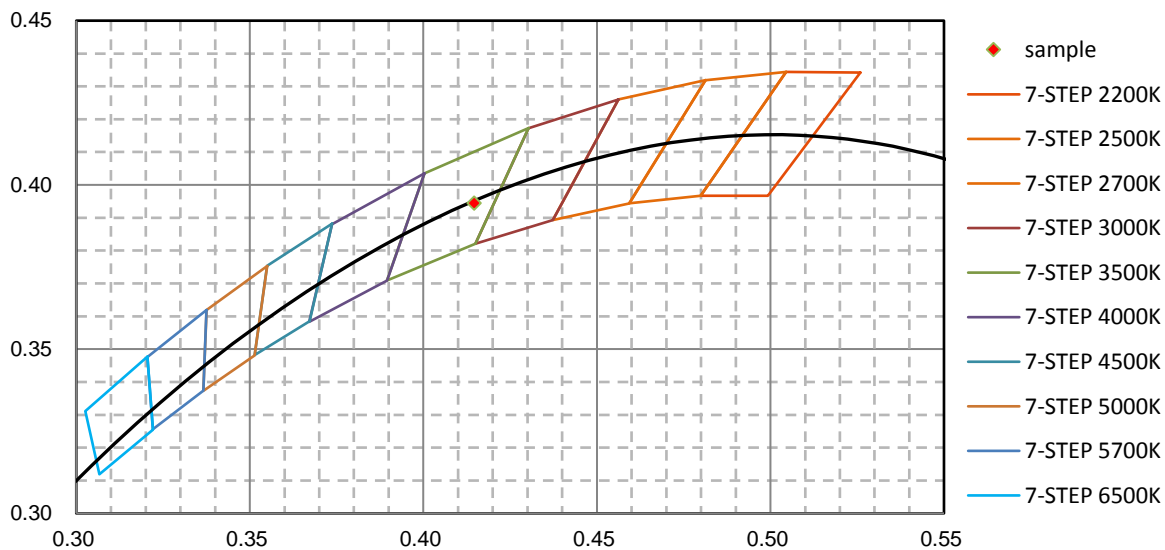
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.850E-02	421	5.781E-01	462	3.348E+01	503	2.258E+01	544	3.841E+01
381	8.100E-03	422	6.829E-01	463	3.098E+01	504	2.330E+01	545	3.870E+01
382	9.000E-03	423	8.373E-01	464	2.898E+01	505	2.403E+01	546	3.886E+01
383	8.000E-03	424	9.833E-01	465	2.743E+01	506	2.478E+01	547	3.914E+01
384	4.640E-02	425	1.207E+00	466	2.651E+01	507	2.541E+01	548	3.947E+01
385	3.100E-02	426	1.411E+00	467	2.578E+01	508	2.605E+01	549	3.971E+01
386	1.400E-03	427	1.693E+00	468	2.528E+01	509	2.672E+01	550	4.005E+01
387	3.120E-02	428	2.030E+00	469	2.475E+01	510	2.742E+01	551	4.028E+01
388	4.710E-02	429	2.377E+00	470	2.416E+01	511	2.802E+01	552	4.064E+01
389	1.760E-02	430	2.818E+00	471	2.332E+01	512	2.862E+01	553	4.096E+01
390	2.510E-02	431	3.236E+00	472	2.243E+01	513	2.911E+01	554	4.136E+01
391	1.310E-02	432	3.689E+00	473	2.135E+01	514	2.968E+01	555	4.165E+01
392	6.000E-04	433	4.276E+00	474	2.012E+01	515	3.015E+01	556	4.203E+01
393	4.400E-03	434	4.870E+00	475	1.888E+01	516	3.063E+01	557	4.239E+01
394	4.000E-04	435	5.569E+00	476	1.768E+01	517	3.114E+01	558	4.271E+01
395	3.770E-02	436	6.288E+00	477	1.664E+01	518	3.144E+01	559	4.323E+01
396	2.400E-03	437	7.079E+00	478	1.564E+01	519	3.188E+01	560	4.341E+01
397	1.170E-02	438	8.002E+00	479	1.502E+01	520	3.226E+01	561	4.384E+01
398	1.000E-03	439	8.959E+00	480	1.445E+01	521	3.277E+01	562	4.415E+01
399	0.000E+00	440	1.004E+01	481	1.404E+01	522	3.302E+01	563	4.477E+01
400	0.000E+00	441	1.127E+01	482	1.386E+01	523	3.341E+01	564	4.503E+01
401	2.460E-02	442	1.260E+01	483	1.383E+01	524	3.378E+01	565	4.550E+01
402	4.880E-02	443	1.414E+01	484	1.388E+01	525	3.404E+01	566	4.594E+01
403	2.700E-02	444	1.602E+01	485	1.401E+01	526	3.432E+01	567	4.646E+01
404	9.600E-03	445	1.825E+01	486	1.419E+01	527	3.451E+01	568	4.685E+01
405	1.940E-02	446	2.070E+01	487	1.445E+01	528	3.492E+01	569	4.736E+01
406	4.400E-03	447	2.373E+01	488	1.472E+01	529	3.520E+01	570	4.769E+01
407	7.990E-02	448	2.708E+01	489	1.498E+01	530	3.536E+01	571	4.825E+01
408	1.390E-02	449	3.128E+01	490	1.521E+01	531	3.555E+01	572	4.866E+01
409	4.200E-02	450	3.544E+01	491	1.551E+01	532	3.572E+01	573	4.921E+01
410	7.930E-02	451	3.967E+01	492	1.585E+01	533	3.603E+01	574	4.941E+01
411	7.170E-02	452	4.351E+01	493	1.627E+01	534	3.631E+01	575	4.996E+01
412	6.380E-02	453	4.700E+01	494	1.670E+01	535	3.640E+01	576	5.045E+01
413	3.000E-02	454	4.955E+01	495	1.724E+01	536	3.666E+01	577	5.091E+01
414	7.840E-02	455	5.081E+01	496	1.777E+01	537	3.676E+01	578	5.126E+01
415	1.403E-01	456	5.051E+01	497	1.836E+01	538	3.711E+01	579	5.175E+01
416	1.597E-01	457	4.930E+01	498	1.902E+01	539	3.723E+01	580	5.219E+01
417	2.021E-01	458	4.700E+01	499	1.964E+01	540	3.747E+01	581	5.265E+01
418	2.909E-01	459	4.342E+01	500	2.037E+01	541	3.769E+01	582	5.299E+01
419	3.710E-01	460	4.015E+01	501	2.107E+01	542	3.796E+01	583	5.350E+01
420	4.872E-01	461	3.679E+01	502	2.182E+01	543	3.817E+01	584	5.397E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.443E+01	626	5.135E+01	667	2.391E+01	708	7.084E+00	749	1.235E+00
586	5.465E+01	627	5.074E+01	668	2.318E+01	709	6.741E+00	750	1.285E+00
587	5.506E+01	628	5.020E+01	669	2.257E+01	710	6.455E+00	751	1.276E+00
588	5.554E+01	629	4.939E+01	670	2.201E+01	711	6.296E+00	752	1.150E+00
589	5.590E+01	630	4.881E+01	671	2.144E+01	712	6.115E+00	753	1.124E+00
590	5.622E+01	631	4.809E+01	672	2.080E+01	713	5.914E+00	754	1.027E+00
591	5.642E+01	632	4.754E+01	673	2.034E+01	714	5.691E+00	755	9.537E-01
592	5.687E+01	633	4.682E+01	674	1.972E+01	715	5.396E+00	756	1.004E+00
593	5.710E+01	634	4.625E+01	675	1.921E+01	716	5.248E+00	757	9.056E-01
594	5.743E+01	635	4.556E+01	676	1.867E+01	717	5.066E+00	758	6.400E-01
595	5.770E+01	636	4.481E+01	677	1.822E+01	718	4.853E+00	759	8.263E-01
596	5.803E+01	637	4.419E+01	678	1.761E+01	719	4.627E+00	760	6.273E-01
597	5.817E+01	638	4.349E+01	679	1.722E+01	720	4.504E+00	761	6.569E-01
598	5.828E+01	639	4.284E+01	680	1.670E+01	721	4.272E+00	762	7.962E-01
599	5.844E+01	640	4.215E+01	681	1.626E+01	722	4.153E+00	763	8.460E-01
600	5.871E+01	641	4.147E+01	682	1.580E+01	723	3.993E+00	764	6.765E-01
601	5.874E+01	642	4.079E+01	683	1.537E+01	724	3.749E+00	765	4.877E-01
602	5.880E+01	643	4.006E+01	684	1.484E+01	725	3.709E+00	766	5.644E-01
603	5.880E+01	644	3.938E+01	685	1.455E+01	726	3.514E+00	767	6.105E-01
604	5.885E+01	645	3.865E+01	686	1.404E+01	727	3.395E+00	768	7.116E-01
605	5.870E+01	646	3.787E+01	687	1.369E+01	728	3.317E+00	769	5.860E-01
606	5.877E+01	647	3.725E+01	688	1.328E+01	729	3.178E+00	770	4.102E-01
607	5.863E+01	648	3.653E+01	689	1.290E+01	730	3.095E+00	771	4.255E-01
608	5.846E+01	649	3.582E+01	690	1.247E+01	731	2.871E+00	772	4.816E-01
609	5.837E+01	650	3.511E+01	691	1.210E+01	732	2.795E+00	773	3.896E-01
610	5.807E+01	651	3.440E+01	692	1.173E+01	733	2.576E+00	774	3.909E-01
611	5.793E+01	652	3.368E+01	693	1.137E+01	734	2.503E+00	775	4.459E-01
612	5.778E+01	653	3.307E+01	694	1.102E+01	735	2.528E+00	776	3.871E-01
613	5.743E+01	654	3.231E+01	695	1.071E+01	736	2.339E+00	777	4.252E-01
614	5.706E+01	655	3.154E+01	696	1.034E+01	737	2.211E+00	778	4.013E-01
615	5.677E+01	656	3.100E+01	697	1.006E+01	738	2.078E+00	779	2.237E-01
616	5.640E+01	657	3.024E+01	698	9.747E+00	739	1.957E+00	780	2.304E-01
617	5.607E+01	658	2.961E+01	699	9.431E+00	740	1.914E+00		
618	5.567E+01	659	2.892E+01	700	9.152E+00	741	1.892E+00		
619	5.512E+01	660	2.825E+01	701	8.942E+00	742	1.819E+00		
620	5.460E+01	661	2.758E+01	702	8.585E+00	743	1.685E+00		
621	5.417E+01	662	2.684E+01	703	8.306E+00	744	1.466E+00		
622	5.366E+01	663	2.620E+01	704	8.067E+00	745	1.575E+00		
623	5.301E+01	664	2.563E+01	705	7.719E+00	746	1.313E+00		
624	5.261E+01	665	2.503E+01	706	7.492E+00	747	1.368E+00		
625	5.195E+01	666	2.436E+01	707	7.200E+00	748	1.305E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles



## Control Setting: 4000K

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

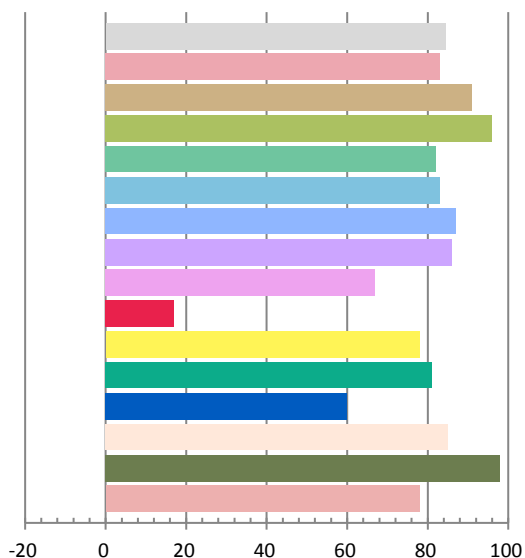
## Photometric and Electrical Measurement Result

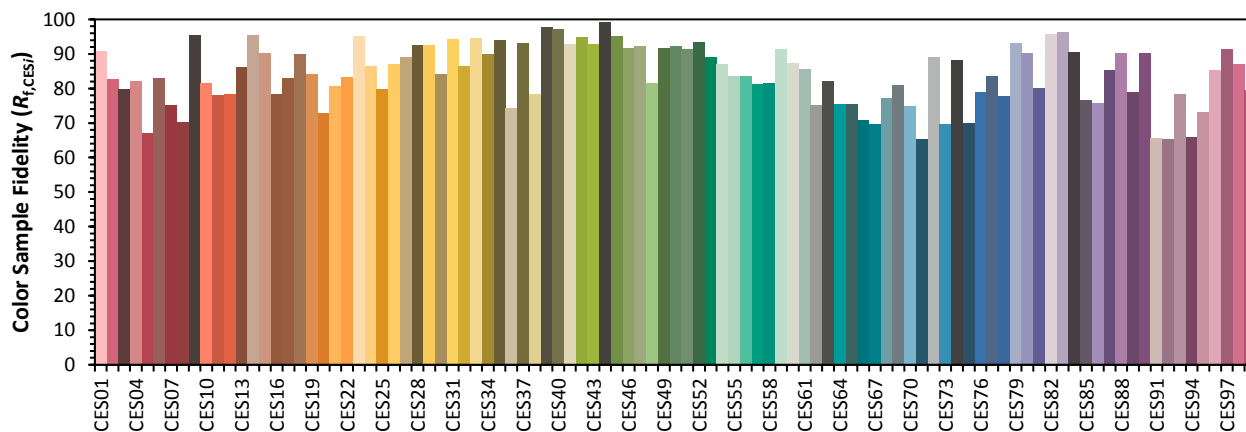
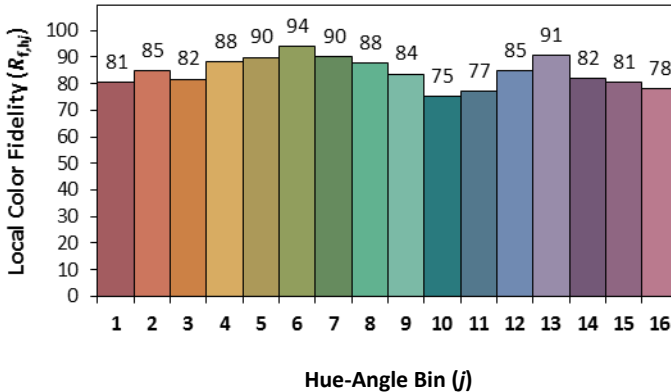
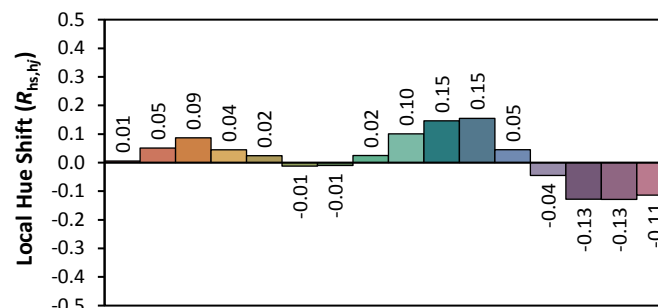
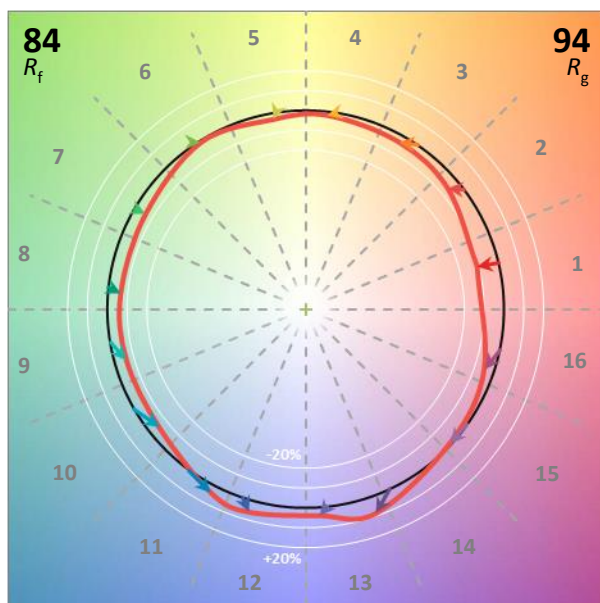
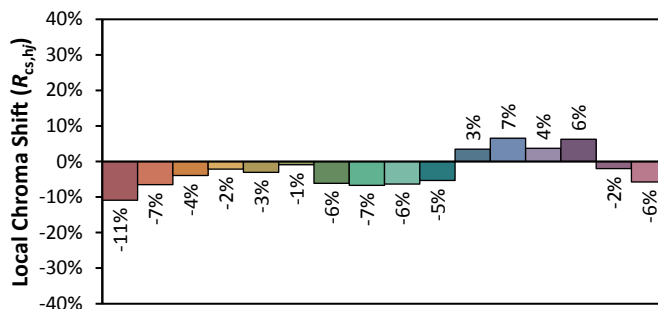
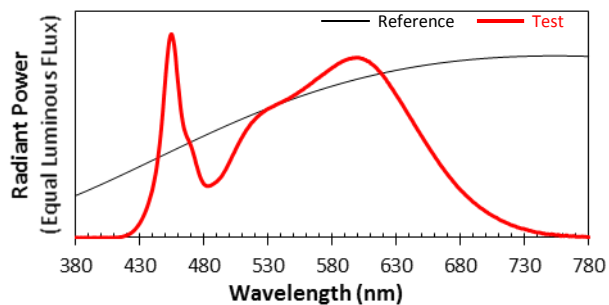
Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.1935	22.75	0.9797	3048.9	134.02

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
9.251	3847	0.00123	0.3884	0.3843	0.2273	0.5060

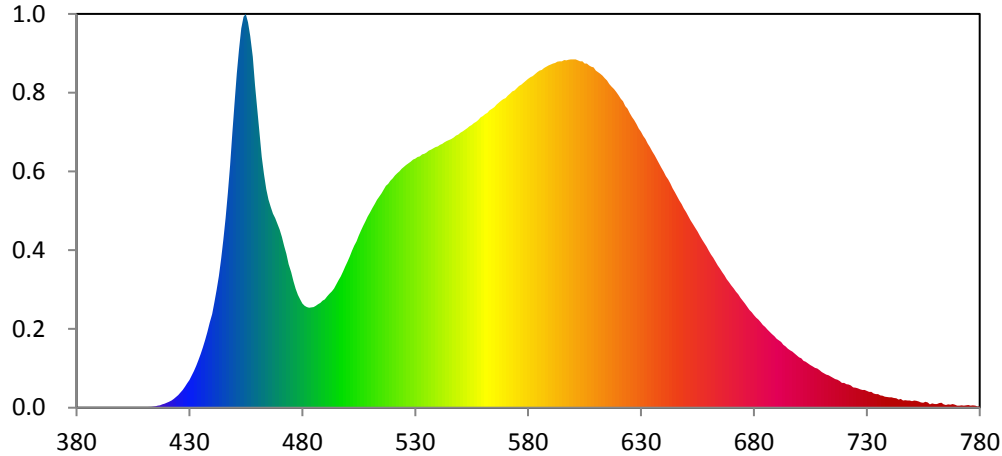
## Color Rendering Index

Ra			
84.4			
R1	R2	R3	R4
83	91	96	82
R5	R6	R7	R8
83	87	86	67
R9	R10	R11	R12
17	78	81	60
R13	R14	R15	
85	98	78	





### Relative Spectral Power Distribution

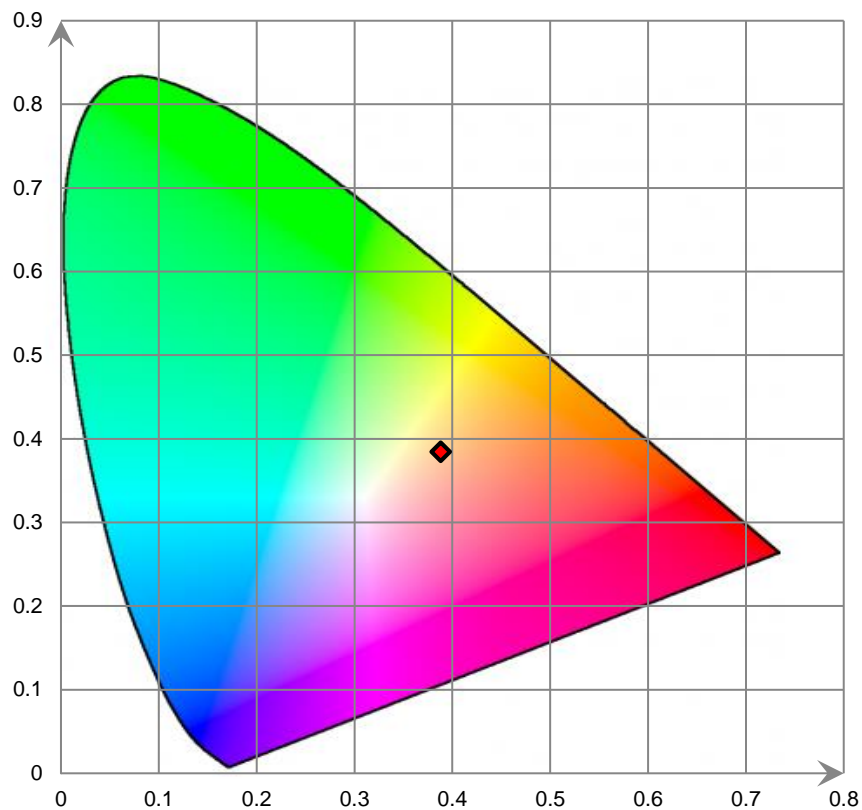


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.560E-02	421	8.926E-01	462	3.831E+01	503	2.473E+01	544	4.074E+01
381	3.940E-02	422	1.124E+00	463	3.563E+01	504	2.541E+01	545	4.087E+01
382	3.860E-02	423	1.360E+00	464	3.339E+01	505	2.629E+01	546	4.101E+01
383	2.700E-03	424	1.616E+00	465	3.181E+01	506	2.703E+01	547	4.129E+01
384	5.360E-02	425	1.955E+00	466	3.065E+01	507	2.779E+01	548	4.157E+01
385	7.380E-02	426	2.301E+00	467	2.966E+01	508	2.845E+01	549	4.171E+01
386	6.700E-03	427	2.726E+00	468	2.895E+01	509	2.920E+01	550	4.203E+01
387	4.840E-02	428	3.197E+00	469	2.808E+01	510	2.982E+01	551	4.219E+01
388	3.520E-02	429	3.718E+00	470	2.721E+01	511	3.050E+01	552	4.242E+01
389	2.070E-02	430	4.253E+00	471	2.607E+01	512	3.110E+01	553	4.271E+01
390	4.850E-02	431	4.898E+00	472	2.473E+01	513	3.175E+01	554	4.300E+01
391	1.840E-02	432	5.601E+00	473	2.349E+01	514	3.223E+01	555	4.320E+01
392	4.400E-03	433	6.386E+00	474	2.192E+01	515	3.274E+01	556	4.350E+01
393	2.000E-03	434	7.246E+00	475	2.068E+01	516	3.332E+01	557	4.369E+01
394	8.500E-03	435	8.173E+00	476	1.934E+01	517	3.387E+01	558	4.394E+01
395	4.600E-02	436	9.223E+00	477	1.816E+01	518	3.420E+01	559	4.433E+01
396	3.850E-02	437	1.033E+01	478	1.723E+01	519	3.466E+01	560	4.454E+01
397	6.500E-03	438	1.159E+01	479	1.655E+01	520	3.503E+01	561	4.482E+01
398	1.140E-02	439	1.293E+01	480	1.592E+01	521	3.548E+01	562	4.503E+01
399	4.300E-03	440	1.432E+01	481	1.559E+01	522	3.583E+01	563	4.541E+01
400	5.000E-04	441	1.609E+01	482	1.535E+01	523	3.611E+01	564	4.565E+01
401	2.090E-02	442	1.800E+01	483	1.526E+01	524	3.650E+01	565	4.592E+01
402	2.580E-02	443	2.010E+01	484	1.532E+01	525	3.678E+01	566	4.629E+01
403	4.220E-02	444	2.272E+01	485	1.537E+01	526	3.709E+01	567	4.661E+01
404	2.670E-02	445	2.571E+01	486	1.558E+01	527	3.732E+01	568	4.690E+01
405	2.990E-02	446	2.894E+01	487	1.581E+01	528	3.758E+01	569	4.716E+01
406	4.200E-03	447	3.279E+01	488	1.603E+01	529	3.790E+01	570	4.731E+01
407	9.530E-02	448	3.695E+01	489	1.633E+01	530	3.805E+01	571	4.770E+01
408	2.780E-02	449	4.190E+01	490	1.655E+01	531	3.828E+01	572	4.797E+01
409	4.720E-02	450	4.655E+01	491	1.696E+01	532	3.840E+01	573	4.832E+01
410	8.750E-02	451	5.104E+01	492	1.735E+01	533	3.867E+01	574	4.844E+01
411	9.410E-02	452	5.474E+01	493	1.775E+01	534	3.880E+01	575	4.881E+01
412	1.110E-01	453	5.794E+01	494	1.820E+01	535	3.899E+01	576	4.912E+01
413	1.008E-01	454	5.969E+01	495	1.882E+01	536	3.926E+01	577	4.936E+01
414	1.898E-01	455	6.015E+01	496	1.949E+01	537	3.941E+01	578	4.966E+01
415	2.389E-01	456	5.885E+01	497	2.008E+01	538	3.962E+01	579	4.990E+01
416	2.980E-01	457	5.675E+01	498	2.078E+01	539	3.980E+01	580	5.021E+01
417	3.895E-01	458	5.361E+01	499	2.157E+01	540	3.992E+01	581	5.047E+01
418	4.955E-01	459	4.923E+01	500	2.233E+01	541	4.013E+01	582	5.066E+01
419	6.142E-01	460	4.557E+01	501	2.310E+01	542	4.032E+01	583	5.096E+01
420	7.426E-01	461	4.194E+01	502	2.396E+01	543	4.054E+01	584	5.123E+01

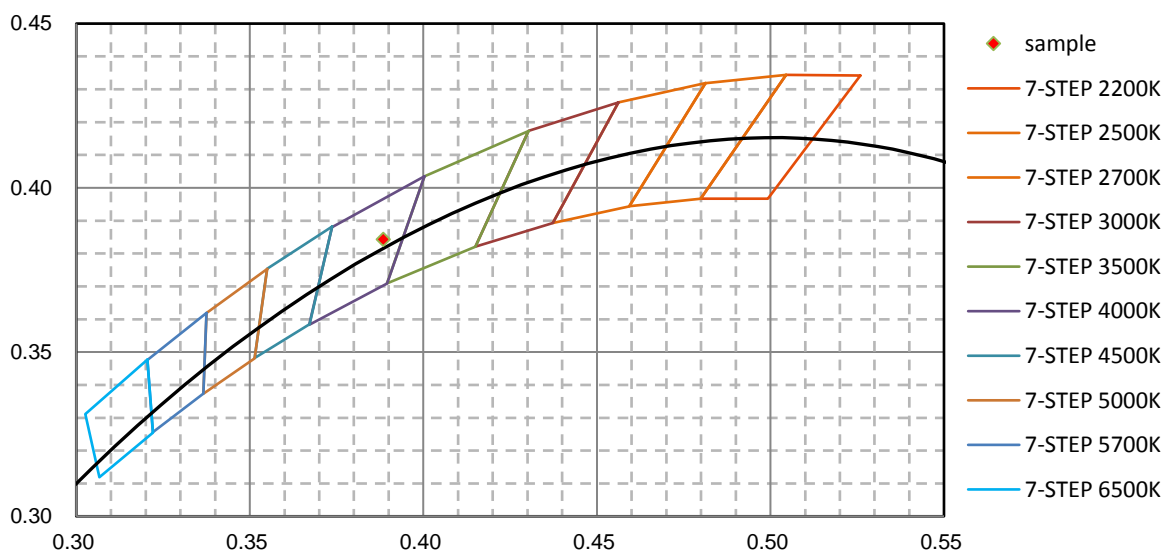


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.149E+01	626	4.441E+01	667	2.022E+01	708	6.008E+00	749	1.079E+00
586	5.161E+01	627	4.392E+01	668	1.962E+01	709	5.740E+00	750	1.020E+00
587	5.187E+01	628	4.332E+01	669	1.920E+01	710	5.467E+00	751	1.109E+00
588	5.208E+01	629	4.267E+01	670	1.868E+01	711	5.244E+00	752	1.028E+00
589	5.225E+01	630	4.213E+01	671	1.819E+01	712	5.077E+00	753	9.680E-01
590	5.240E+01	631	4.150E+01	672	1.771E+01	713	4.935E+00	754	8.317E-01
591	5.257E+01	632	4.102E+01	673	1.731E+01	714	4.760E+00	755	7.671E-01
592	5.267E+01	633	4.034E+01	674	1.679E+01	715	4.584E+00	756	9.176E-01
593	5.284E+01	634	3.978E+01	675	1.633E+01	716	4.394E+00	757	8.231E-01
594	5.292E+01	635	3.918E+01	676	1.592E+01	717	4.275E+00	758	5.038E-01
595	5.291E+01	636	3.853E+01	677	1.543E+01	718	4.071E+00	759	6.602E-01
596	5.312E+01	637	3.790E+01	678	1.494E+01	719	3.812E+00	760	5.752E-01
597	5.306E+01	638	3.726E+01	679	1.460E+01	720	3.768E+00	761	5.511E-01
598	5.317E+01	639	3.662E+01	680	1.413E+01	721	3.587E+00	762	7.295E-01
599	5.321E+01	640	3.607E+01	681	1.377E+01	722	3.538E+00	763	7.636E-01
600	5.320E+01	641	3.538E+01	682	1.345E+01	723	3.391E+00	764	5.034E-01
601	5.320E+01	642	3.485E+01	683	1.307E+01	724	3.118E+00	765	4.417E-01
602	5.303E+01	643	3.422E+01	684	1.262E+01	725	3.069E+00	766	5.320E-01
603	5.291E+01	644	3.352E+01	685	1.232E+01	726	2.949E+00	767	4.529E-01
604	5.293E+01	645	3.292E+01	686	1.197E+01	727	2.788E+00	768	5.653E-01
605	5.258E+01	646	3.230E+01	687	1.161E+01	728	2.706E+00	769	4.867E-01
606	5.258E+01	647	3.167E+01	688	1.128E+01	729	2.714E+00	770	3.404E-01
607	5.226E+01	648	3.113E+01	689	1.091E+01	730	2.577E+00	771	3.271E-01
608	5.208E+01	649	3.044E+01	690	1.051E+01	731	2.439E+00	772	3.558E-01
609	5.199E+01	650	2.991E+01	691	1.029E+01	732	2.419E+00	773	3.069E-01
610	5.151E+01	651	2.926E+01	692	1.003E+01	733	2.180E+00	774	3.605E-01
611	5.127E+01	652	2.863E+01	693	9.632E+00	734	2.078E+00	775	4.289E-01
612	5.101E+01	653	2.808E+01	694	9.376E+00	735	2.094E+00	776	3.131E-01
613	5.069E+01	654	2.745E+01	695	9.030E+00	736	1.887E+00	777	3.888E-01
614	5.031E+01	655	2.690E+01	696	8.765E+00	737	1.851E+00	778	3.001E-01
615	4.997E+01	656	2.629E+01	697	8.581E+00	738	1.702E+00	779	1.936E-01
616	4.942E+01	657	2.570E+01	698	8.281E+00	739	1.631E+00	780	2.007E-01
617	4.905E+01	658	2.516E+01	699	8.010E+00	740	1.592E+00		
618	4.867E+01	659	2.461E+01	700	7.705E+00	741	1.600E+00		
619	4.821E+01	660	2.399E+01	701	7.528E+00	742	1.511E+00		
620	4.774E+01	661	2.340E+01	702	7.178E+00	743	1.442E+00		
621	4.719E+01	662	2.292E+01	703	6.998E+00	744	1.254E+00		
622	4.679E+01	663	2.232E+01	704	6.772E+00	745	1.331E+00		
623	4.604E+01	664	2.174E+01	705	6.528E+00	746	1.089E+00		
624	4.566E+01	665	2.122E+01	706	6.332E+00	747	1.145E+00		
625	4.499E+01	666	2.071E+01	707	6.102E+00	748	1.097E+00		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles



## [Goniophotometer System]

### Control Setting: 3000K

Total operating time for luminous intensity distribution: **1.0 hour**

Test orientation: **Downward**

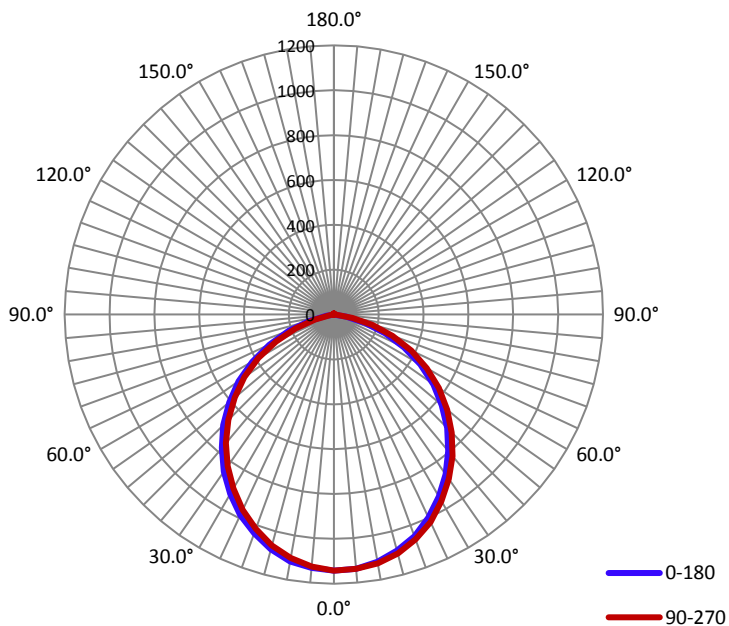
### Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.1850	21.83	0.9820

### Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	I <sub>max</sub> (cd)	S/MH(C0/180)	S/MH(C90/270)
2911.6	133.43	1147.8	1.21	1.21

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50%I <sub>max</sub> ):	105.5	105.6	105.4	105.4	105.5
Field Angle(10%I <sub>max</sub> ):	151.8	151.9	151.9	152.0	151.9

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1142	1142	1142	1142	1142	1142	1142	1142
5.0°	1139	1136	1140	1144	1138	1142	1141	1136
10.0°	1118	1124	1126	1132	1127	1126	1126	1115
15.0°	1090	1098	1101	1105	1102	1103	1098	1085
20.0°	1051	1058	1063	1068	1067	1063	1062	1047
25.0°	998	1005	1015	1021	1020	1017	1005	996
30.0°	937	947	959	963	960	959	951	933
35.0°	870	881	891	901	894	890	883	869
40.0°	794	808	818	826	824	819	808	791
45.0°	715	729	739	745	744	740	727	711
50.0°	629	644	657	662	660	654	645	627
55.0°	543	556	570	575	572	566	556	539
60.0°	445	461	475	483	479	472	461	443
65.0°	345	363	375	384	381	374	361	343
70.0°	243	260	275	281	278	271	258	240
75.0°	146	161	174	180	179	172	160	142
80.0°	57	70	80	85	84	79	69	54
85.0°	5	7	10	13	12	10	8	6
90.0°	0	0	0	1	1	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	1
140.0°	0	1	0	1	1	1	1	1
145.0°	1	1	2	1	2	2	2	2
150.0°	1	2	3	2	2	3	2	3
155.0°	2	3	3	3	3	3	3	4
160.0°	3	3	3	3	3	4	4	4
165.0°	2	4	3	4	4	4	4	4
170.0°	3	4	4	3	4	4	4	4
175.0°	4	4	4	4	4	5	5	5
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

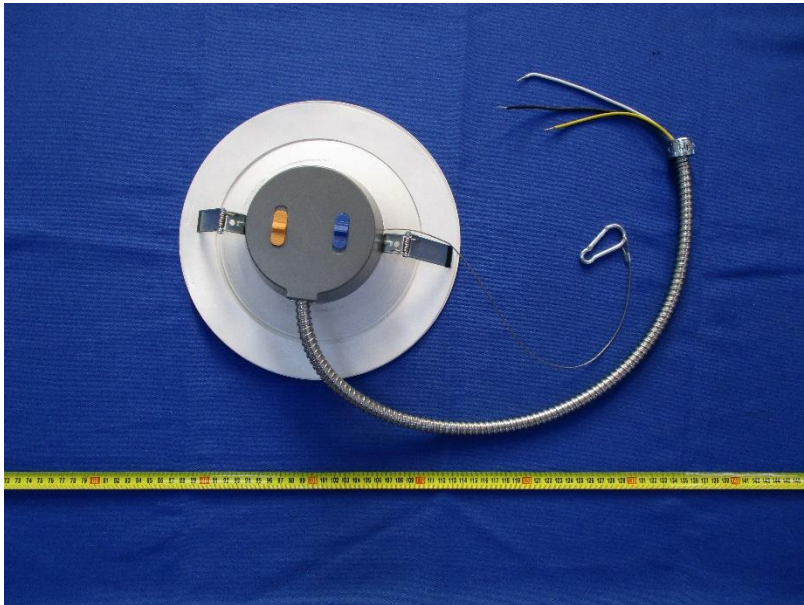
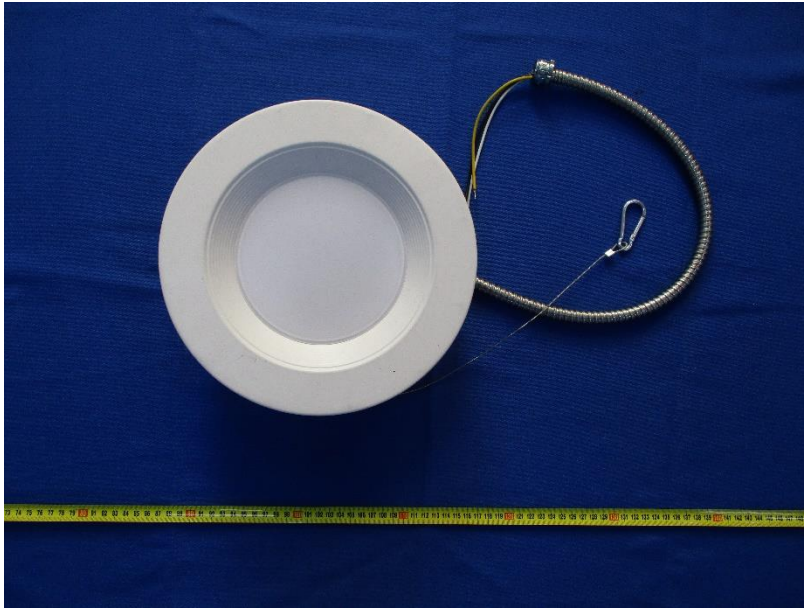
C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1142	1142	1142	1142	1142	1142	1142	1142
5.0°	1134	1134	1130	1131	1128	1130	1132	1132
10.0°	1118	1107	1106	1106	1102	1107	1109	1114
15.0°	1083	1074	1071	1069	1065	1070	1075	1076
20.0°	1038	1029	1027	1021	1017	1023	1031	1035
25.0°	986	973	966	963	961	966	976	982
30.0°	923	911	903	901	896	904	913	919
35.0°	855	840	830	828	825	832	840	850
40.0°	776	764	755	751	748	757	763	775
45.0°	697	681	671	668	664	673	684	695
50.0°	608	596	587	581	577	586	598	610
55.0°	518	505	494	488	487	496	506	519
60.0°	420	405	393	388	388	397	406	422
65.0°	318	302	291	286	285	293	303	320
70.0°	213	199	189	184	182	189	204	219
75.0°	115	101	92	88	87	94	105	120
80.0°	32	24	17	15	15	20	26	37
85.0°	2	2	2	1	2	2	3	4
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	1	0	0	0	0
145.0°	0	0	1	1	1	1	2	2
150.0°	1	1	2	2	2	2	2	2
155.0°	1	2	3	3	2	2	3	2
160.0°	2	2	3	3	3	3	4	3
165.0°	3	3	3	4	3	4	3	4
170.0°	3	3	4	4	4	4	4	4
175.0°	3	4	4	5	5	4	4	4
180.0°	0	0	0	0	0	0	0	0

### Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	27.3	0.94
5-10	80.5	2.77
10-15	130.7	4.48
15-20	175.6	6.03
20-25	213.3	7.33
25-30	243.1	8.36
30-35	263.6	9.04
35-40	274.7	9.44
40-45	276.0	9.47
45-50	267.6	9.19
50-55	250.3	8.59
55-60	222.9	7.66
60-65	186.1	6.40
65-70	142.4	4.89
70-75	94.4	3.24
75-80	47.1	1.61
80-85	11.8	0.41
85-90	1.1	0.04
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	0.3	0.00
145-150	0.5	0.00
150-155	0.5	0.00
155-160	0.5	0.00
160-165	0.5	0.00
165-170	0.5	0.00
170-175	0.4	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	27.2	0.93
0-10	107.8	3.70
0-15	238.4	8.19
0-20	413.9	14.21
0-25	627.2	21.54
0-30	870.2	29.89
0-35	1133.8	38.94
0-40	1408.6	48.38
0-45	1684.5	57.85
0-50	1952.2	67.05
0-55	2202.4	75.64
0-60	2425.3	83.30
0-65	2611.5	89.69
0-70	2753.9	94.58
0-75	2848.3	97.82
0-80	2895.4	99.44
0-85	2907.3	99.85
0-90	2908.3	99.89
0-95	2908.3	99.89
0-100	2908.3	99.89
0-105	2908.3	99.89
0-110	2908.3	99.89
0-115	2908.3	99.89
0-120	2908.3	99.89
0-125	2908.3	99.89
0-130	2908.3	99.89
0-135	2908.3	99.89
0-140	2908.4	99.89
0-145	2908.7	99.90
0-150	2909.1	99.91
0-155	2909.7	99.93
0-160	2910.3	99.95
0-165	2910.8	99.97
0-170	2911.2	99.99
0-175	2911.5	100.00
0-180	2911.6	100.00

## 6. Product Photo



## Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".
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\*\*\*\*\*END OF REPORT\*\*\*\*\*