

# 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: INFTP6/8CCT3S/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>	RKSB230301003-10-1
<b>Test Date:</b>	2023-03-01 to 2023-03-07
<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:	INFTP6/8CCT3S/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:	9W/13W/16W
Nominal CCT:	3000K, 3500K, 4000K
Nominal Lumen Output:	1900lm/2000lm/2000lm @16W

## 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**

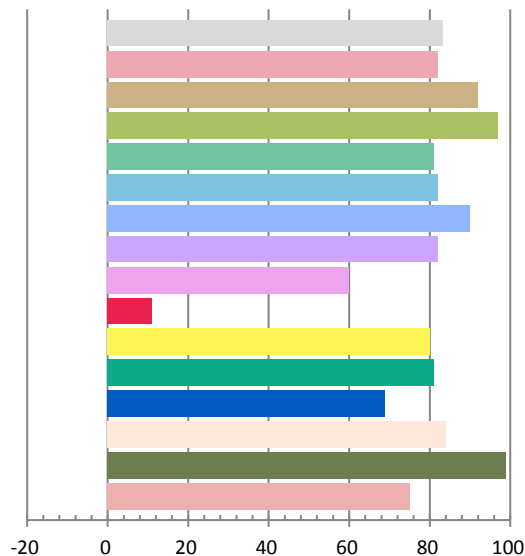
#### Photometric and Electrical Measurement Result

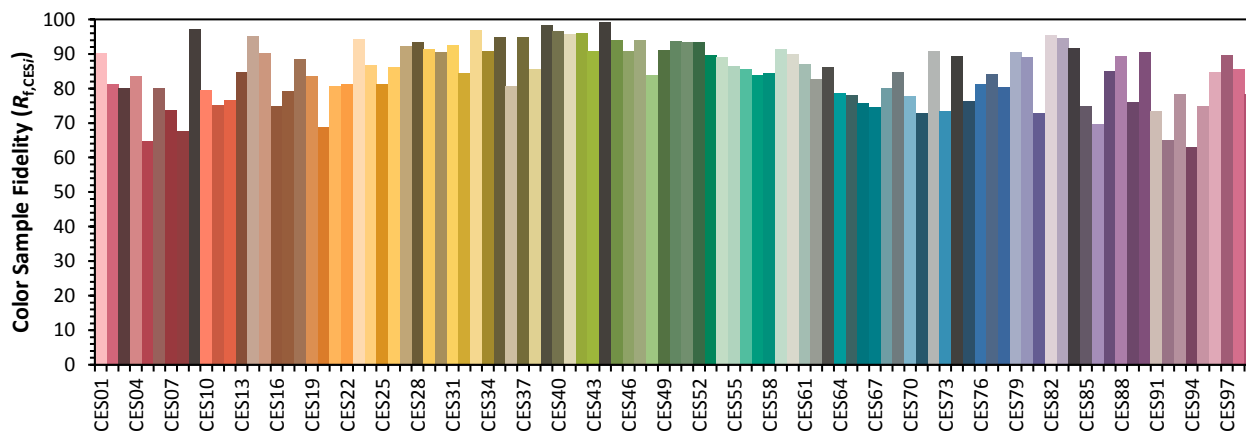
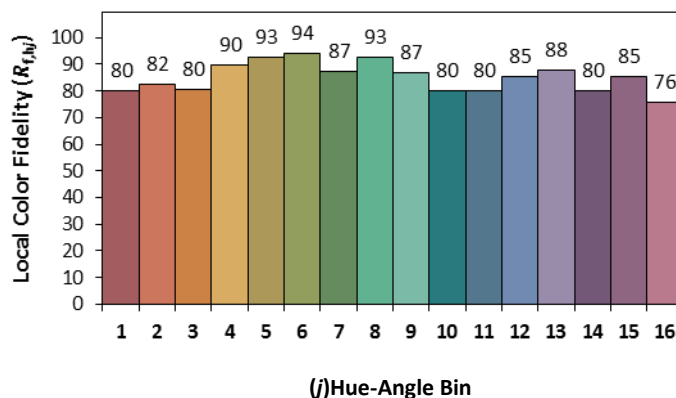
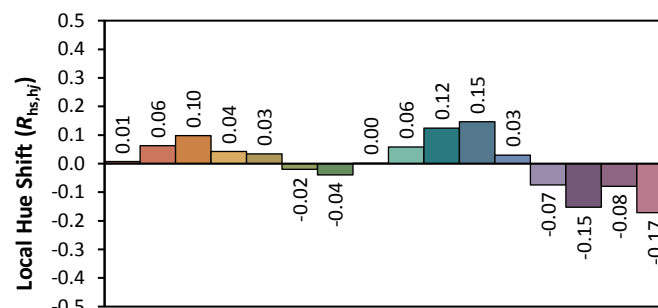
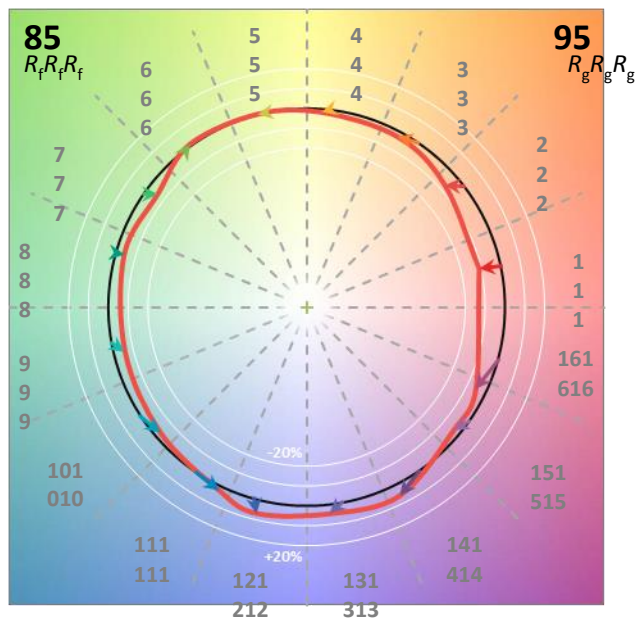
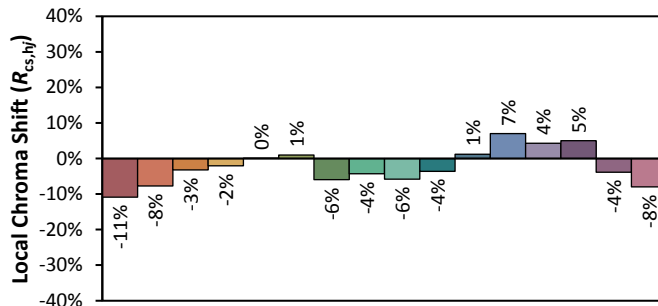
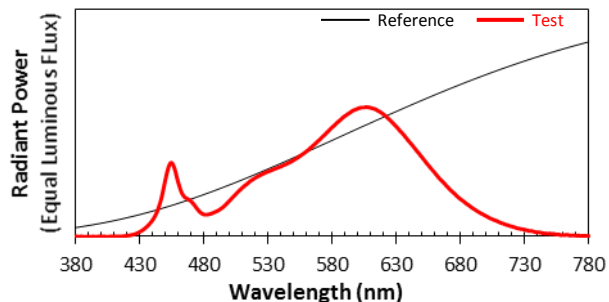
Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.1382	16.24	0.9793	2033.0	125.18

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
6.175	2912	0.00036	0.4439	0.4073	0.2537	0.5237

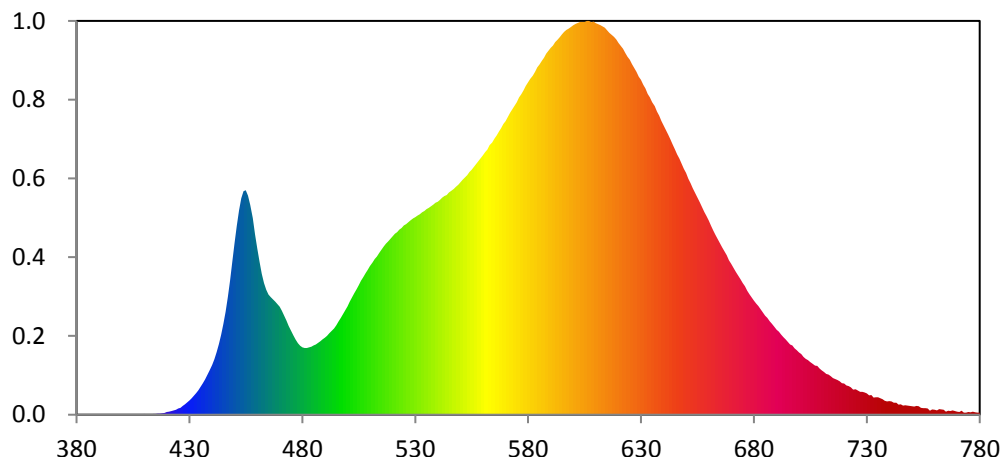
#### Color Rendering Index

<b>Ra</b>			
83.4			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
82	92	97	81
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
82	90	82	60
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
11	80	81	69
<b>R13</b>	<b>R14</b>	<b>R15</b>	
84	99	75	





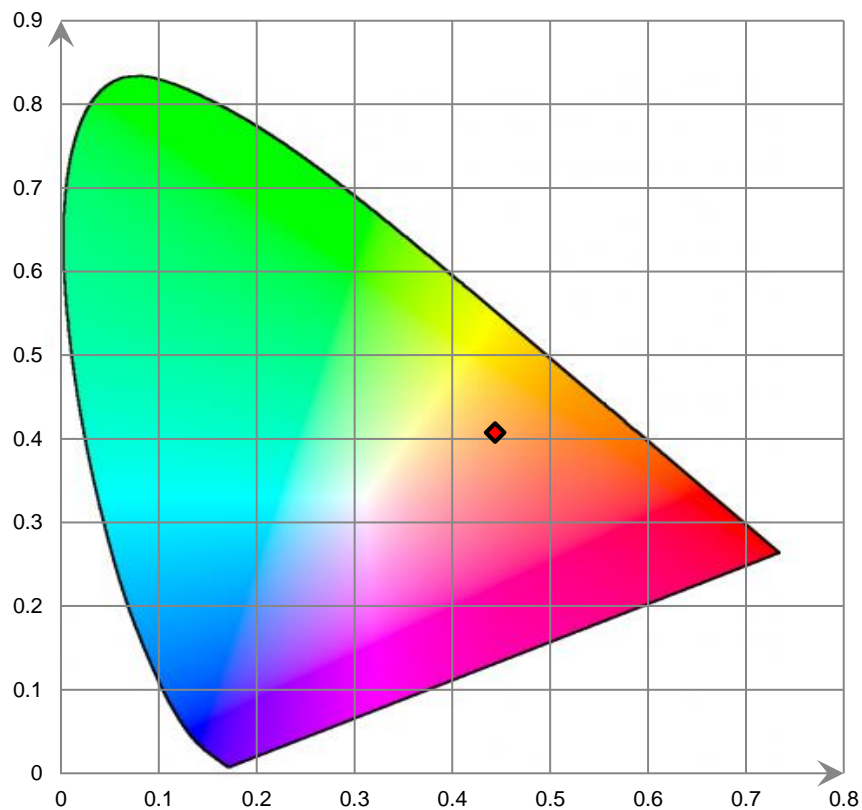
### Relative Spectral Power Distribution



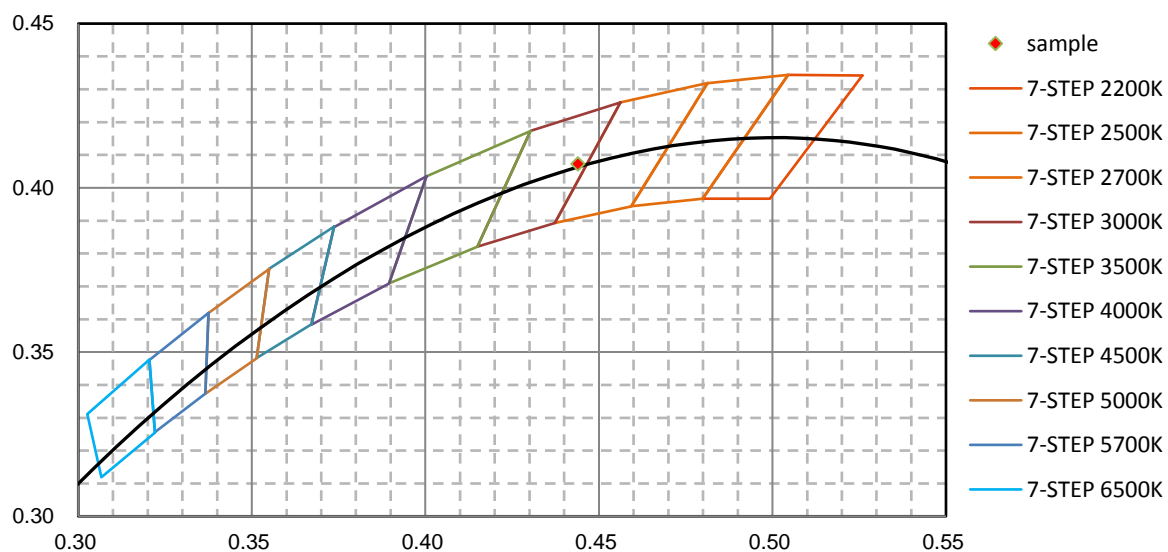
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.070E-02	421	3.358E-01	462	1.516E+01	503	1.306E+01	544	2.363E+01
381	4.950E-02	422	3.827E-01	463	1.416E+01	504	1.345E+01	545	2.390E+01
382	2.640E-02	423	4.784E-01	464	1.345E+01	505	1.393E+01	546	2.408E+01
383	1.900E-03	424	5.470E-01	465	1.293E+01	506	1.441E+01	547	2.426E+01
384	4.400E-02	425	6.833E-01	466	1.263E+01	507	1.478E+01	548	2.451E+01
385	5.670E-02	426	7.525E-01	467	1.242E+01	508	1.520E+01	549	2.471E+01
386	4.400E-03	427	9.329E-01	468	1.216E+01	509	1.556E+01	550	2.500E+01
387	3.820E-02	428	1.113E+00	469	1.189E+01	510	1.597E+01	551	2.526E+01
388	1.180E-02	429	1.319E+00	470	1.161E+01	511	1.635E+01	552	2.549E+01
389	2.090E-02	430	1.525E+00	471	1.116E+01	512	1.673E+01	553	2.575E+01
390	5.070E-02	431	1.758E+00	472	1.065E+01	513	1.701E+01	554	2.608E+01
391	2.060E-02	432	2.053E+00	473	1.014E+01	514	1.738E+01	555	2.635E+01
392	5.100E-03	433	2.318E+00	474	9.563E+00	515	1.772E+01	556	2.666E+01
393	1.550E-02	434	2.648E+00	475	9.010E+00	516	1.809E+01	557	2.695E+01
394	1.320E-02	435	3.025E+00	476	8.500E+00	517	1.837E+01	558	2.726E+01
395	4.110E-02	436	3.377E+00	477	8.054E+00	518	1.864E+01	559	2.757E+01
396	1.090E-02	437	3.813E+00	478	7.703E+00	519	1.892E+01	560	2.789E+01
397	1.170E-02	438	4.292E+00	479	7.417E+00	520	1.917E+01	561	2.821E+01
398	1.600E-03	439	4.782E+00	480	7.240E+00	521	1.947E+01	562	2.851E+01
399	1.000E-04	440	5.357E+00	481	7.183E+00	522	1.964E+01	563	2.899E+01
400	0.000E+00	441	5.977E+00	482	7.165E+00	523	1.990E+01	564	2.926E+01
401	1.730E-02	442	6.710E+00	483	7.243E+00	524	2.009E+01	565	2.968E+01
402	3.060E-02	443	7.577E+00	484	7.297E+00	525	2.034E+01	566	3.003E+01
403	2.070E-02	444	8.576E+00	485	7.433E+00	526	2.050E+01	567	3.044E+01
404	1.530E-02	445	9.767E+00	486	7.555E+00	527	2.068E+01	568	3.081E+01
405	3.120E-02	446	1.108E+01	487	7.723E+00	528	2.089E+01	569	3.126E+01
406	5.300E-03	447	1.264E+01	488	7.887E+00	529	2.111E+01	570	3.155E+01
407	6.270E-02	448	1.443E+01	489	8.090E+00	530	2.126E+01	571	3.201E+01
408	1.710E-02	449	1.645E+01	490	8.284E+00	531	2.141E+01	572	3.246E+01
409	5.830E-02	450	1.847E+01	491	8.484E+00	532	2.155E+01	573	3.285E+01
410	7.590E-02	451	2.031E+01	492	8.752E+00	533	2.175E+01	574	3.322E+01
411	5.660E-02	452	2.195E+01	493	9.027E+00	534	2.191E+01	575	3.361E+01
412	6.420E-02	453	2.326E+01	494	9.287E+00	535	2.210E+01	576	3.412E+01
413	2.430E-02	454	2.403E+01	495	9.632E+00	536	2.224E+01	577	3.446E+01
414	7.020E-02	455	2.413E+01	496	1.003E+01	537	2.242E+01	578	3.486E+01
415	7.060E-02	456	2.356E+01	497	1.039E+01	538	2.257E+01	579	3.534E+01
416	1.107E-01	457	2.255E+01	498	1.083E+01	539	2.278E+01	580	3.573E+01
417	1.253E-01	458	2.116E+01	499	1.125E+01	540	2.289E+01	581	3.611E+01
418	1.602E-01	459	1.938E+01	500	1.165E+01	541	2.310E+01	582	3.647E+01
419	2.031E-01	460	1.786E+01	501	1.215E+01	542	2.334E+01	583	3.687E+01
420	2.902E-01	461	1.645E+01	502	1.262E+01	543	2.351E+01	584	3.735E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.766E+01	626	3.768E+01	667	1.758E+01	708	5.243E+00	749	9.604E-01
586	3.802E+01	627	3.728E+01	668	1.714E+01	709	4.986E+00	750	9.155E-01
587	3.838E+01	628	3.687E+01	669	1.660E+01	710	4.763E+00	751	8.890E-01
588	3.882E+01	629	3.634E+01	670	1.623E+01	711	4.576E+00	752	9.318E-01
589	3.913E+01	630	3.599E+01	671	1.573E+01	712	4.403E+00	753	9.044E-01
590	3.944E+01	631	3.550E+01	672	1.533E+01	713	4.330E+00	754	7.372E-01
591	3.969E+01	632	3.508E+01	673	1.493E+01	714	4.146E+00	755	6.886E-01
592	4.005E+01	633	3.448E+01	674	1.456E+01	715	3.955E+00	756	7.173E-01
593	4.029E+01	634	3.412E+01	675	1.417E+01	716	3.850E+00	757	6.768E-01
594	4.058E+01	635	3.360E+01	676	1.381E+01	717	3.720E+00	758	4.234E-01
595	4.089E+01	636	3.318E+01	677	1.333E+01	718	3.580E+00	759	5.678E-01
596	4.116E+01	637	3.261E+01	678	1.297E+01	719	3.403E+00	760	5.252E-01
597	4.136E+01	638	3.214E+01	679	1.261E+01	720	3.363E+00	761	4.665E-01
598	4.151E+01	639	3.157E+01	680	1.227E+01	721	3.163E+00	762	5.936E-01
599	4.167E+01	640	3.108E+01	681	1.196E+01	722	3.087E+00	763	5.713E-01
600	4.187E+01	641	3.059E+01	682	1.168E+01	723	2.945E+00	764	5.473E-01
601	4.202E+01	642	3.012E+01	683	1.134E+01	724	2.702E+00	765	3.391E-01
602	4.213E+01	643	2.959E+01	684	1.099E+01	725	2.734E+00	766	4.295E-01
603	4.221E+01	644	2.906E+01	685	1.066E+01	726	2.596E+00	767	3.913E-01
604	4.224E+01	645	2.854E+01	686	1.039E+01	727	2.470E+00	768	4.615E-01
605	4.222E+01	646	2.798E+01	687	1.008E+01	728	2.448E+00	769	3.804E-01
606	4.234E+01	647	2.753E+01	688	9.774E+00	729	2.384E+00	770	3.146E-01
607	4.233E+01	648	2.700E+01	689	9.434E+00	730	2.298E+00	771	2.861E-01
608	4.221E+01	649	2.643E+01	690	9.130E+00	731	2.092E+00	772	4.156E-01
609	4.226E+01	650	2.598E+01	691	8.925E+00	732	2.115E+00	773	2.229E-01
610	4.210E+01	651	2.538E+01	692	8.633E+00	733	1.838E+00	774	2.346E-01
611	4.199E+01	652	2.491E+01	693	8.350E+00	734	1.871E+00	775	3.067E-01
612	4.189E+01	653	2.435E+01	694	8.101E+00	735	1.874E+00	776	2.618E-01
613	4.175E+01	654	2.379E+01	695	7.834E+00	736	1.786E+00	777	3.281E-01
614	4.161E+01	655	2.331E+01	696	7.557E+00	737	1.665E+00	778	2.743E-01
615	4.133E+01	656	2.282E+01	697	7.434E+00	738	1.484E+00	779	2.168E-01
616	4.105E+01	657	2.230E+01	698	7.154E+00	739	1.434E+00	780	2.112E-01
617	4.087E+01	658	2.181E+01	699	6.947E+00	740	1.446E+00		
618	4.061E+01	659	2.134E+01	700	6.684E+00	741	1.430E+00		
619	4.033E+01	660	2.086E+01	701	6.511E+00	742	1.307E+00		
620	3.995E+01	661	2.033E+01	702	6.225E+00	743	1.306E+00		
621	3.967E+01	662	1.979E+01	703	6.002E+00	744	1.093E+00		
622	3.933E+01	663	1.930E+01	704	5.866E+00	745	1.124E+00		
623	3.890E+01	664	1.888E+01	705	5.660E+00	746	9.963E-01		
624	3.848E+01	665	1.841E+01	706	5.505E+00	747	1.022E+00		
625	3.815E+01	666	1.799E+01	707	5.295E+00	748	9.655E-01		

CIE 1931xy Chromaticity Diagram



7-Step Chromaticity Quadrangles





## Control Setting: 3500K

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

Test orientation: **Downward**

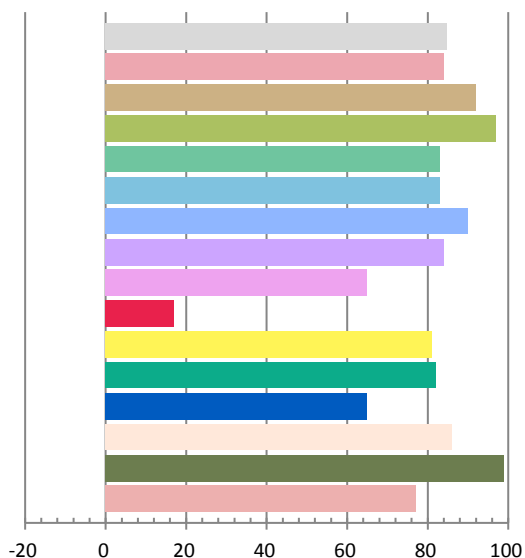
## Photometric and Electrical Measurement Result

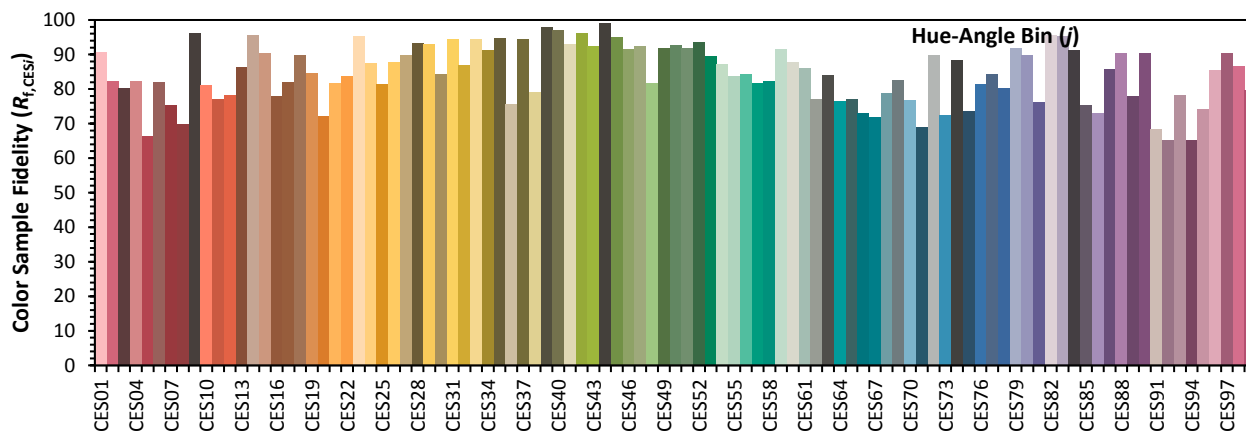
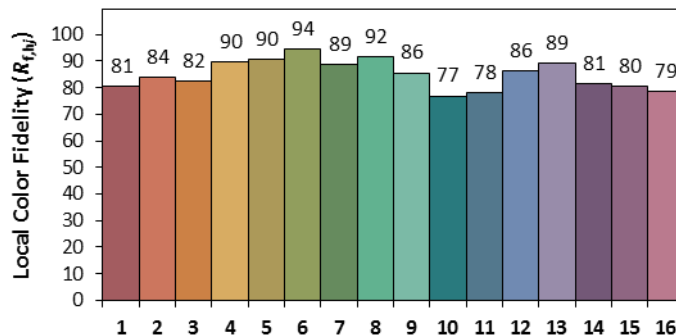
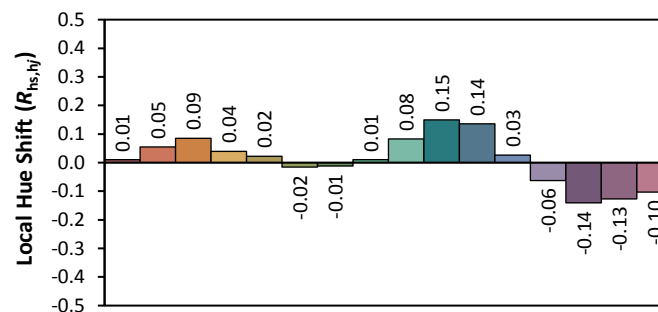
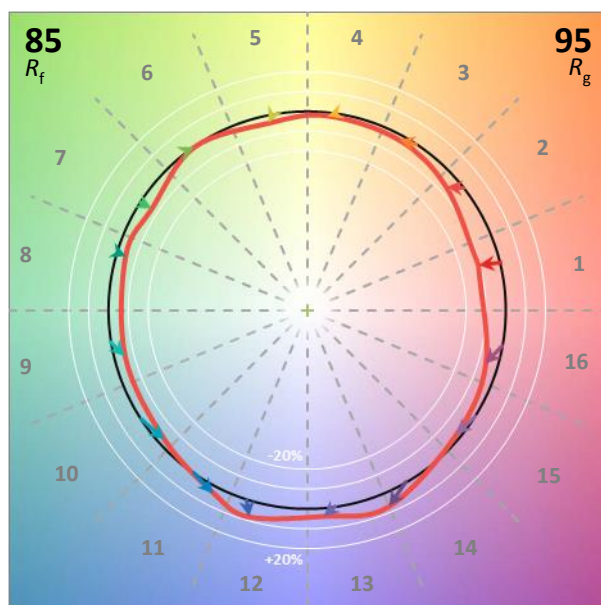
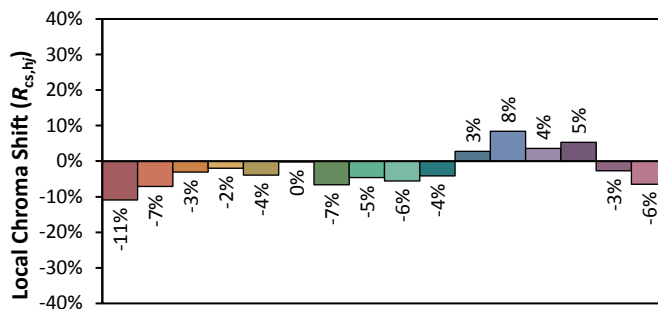
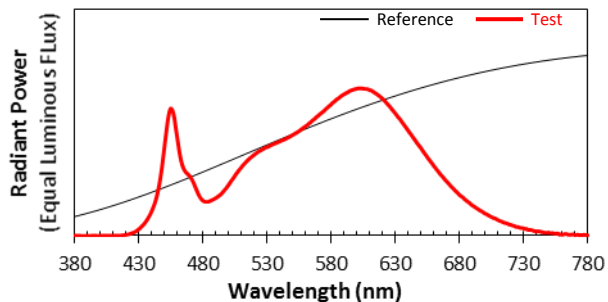
Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.1334	15.67	0.9788	2122.8	135.47

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
6.437	3329	0.00026	0.4156	0.3962	0.2401	0.5151

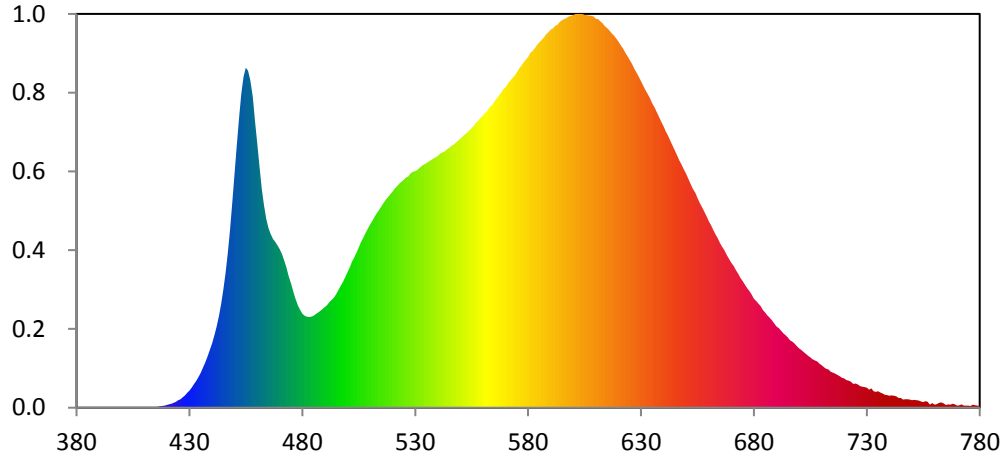
## Color Rendering Index

<b>Ra</b>			
84.7			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
84	92	97	83
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
83	90	84	65
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
17	81	82	65
<b>R13</b>	<b>R14</b>	<b>R15</b>	
86	99	77	





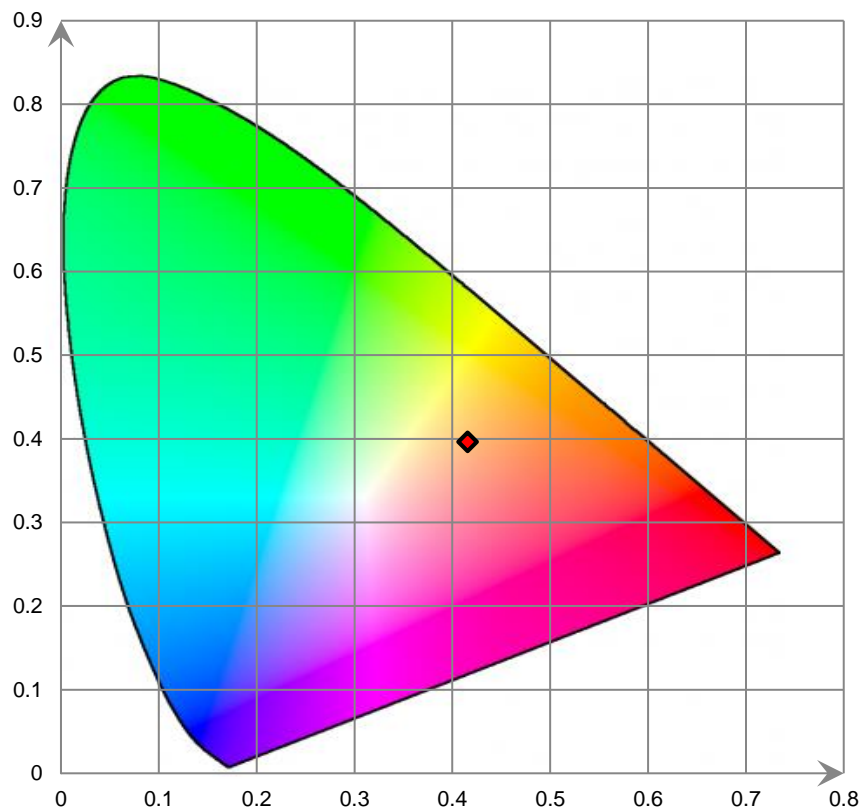
### Relative Spectral Power Distribution



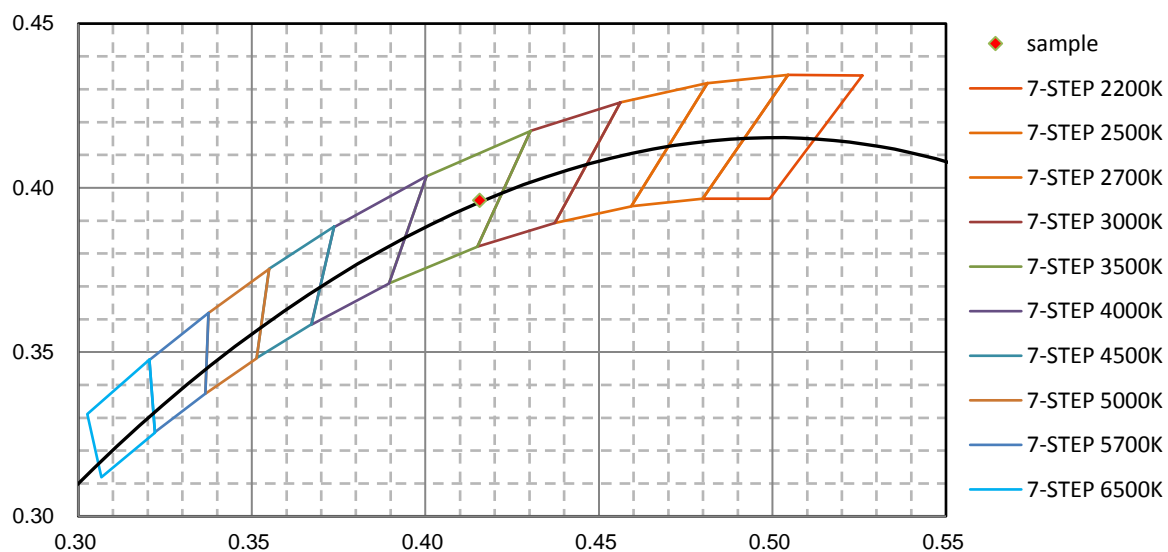
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.840E-02	421	3.493E-01	462	2.250E+01	503	1.544E+01	544	2.649E+01
381	5.230E-02	422	4.042E-01	463	2.079E+01	504	1.591E+01	545	2.665E+01
382	4.190E-02	423	5.128E-01	464	1.940E+01	505	1.646E+01	546	2.686E+01
383	1.700E-03	424	6.099E-01	465	1.844E+01	506	1.699E+01	547	2.703E+01
384	5.290E-02	425	7.677E-01	466	1.783E+01	507	1.742E+01	548	2.721E+01
385	3.500E-02	426	8.607E-01	467	1.735E+01	508	1.793E+01	549	2.742E+01
386	4.400E-03	427	1.061E+00	468	1.705E+01	509	1.834E+01	550	2.765E+01
387	3.210E-02	428	1.263E+00	469	1.669E+01	510	1.878E+01	551	2.783E+01
388	7.300E-03	429	1.523E+00	470	1.630E+01	511	1.921E+01	552	2.807E+01
389	7.100E-03	430	1.774E+00	471	1.577E+01	512	1.962E+01	553	2.823E+01
390	5.480E-02	431	2.050E+00	472	1.514E+01	513	1.999E+01	554	2.849E+01
391	1.750E-02	432	2.406E+00	473	1.440E+01	514	2.034E+01	555	2.870E+01
392	5.500E-03	433	2.756E+00	474	1.352E+01	515	2.069E+01	556	2.898E+01
393	5.000E-03	434	3.150E+00	475	1.270E+01	516	2.104E+01	557	2.926E+01
394	1.020E-02	435	3.577E+00	476	1.187E+01	517	2.139E+01	558	2.948E+01
395	3.630E-02	436	4.101E+00	477	1.111E+01	518	2.163E+01	559	2.979E+01
396	2.680E-02	437	4.627E+00	478	1.049E+01	519	2.194E+01	560	2.998E+01
397	1.770E-02	438	5.224E+00	479	1.003E+01	520	2.220E+01	561	3.028E+01
398	9.800E-03	439	5.851E+00	480	9.642E+00	521	2.252E+01	562	3.048E+01
399	5.800E-03	440	6.608E+00	481	9.447E+00	522	2.274E+01	563	3.088E+01
400	2.000E-04	441	7.435E+00	482	9.341E+00	523	2.301E+01	564	3.108E+01
401	2.000E-02	442	8.342E+00	483	9.326E+00	524	2.321E+01	565	3.143E+01
402	1.750E-02	443	9.379E+00	484	9.336E+00	525	2.340E+01	566	3.176E+01
403	3.190E-02	444	1.063E+01	485	9.440E+00	526	2.365E+01	567	3.201E+01
404	2.460E-02	445	1.213E+01	486	9.609E+00	527	2.375E+01	568	3.234E+01
405	2.620E-02	446	1.385E+01	487	9.766E+00	528	2.405E+01	569	3.270E+01
406	5.500E-03	447	1.592E+01	488	9.937E+00	529	2.423E+01	570	3.292E+01
407	8.850E-02	448	1.833E+01	489	1.013E+01	530	2.428E+01	571	3.327E+01
408	1.610E-02	449	2.111E+01	490	1.033E+01	531	2.443E+01	572	3.357E+01
409	4.550E-02	450	2.403E+01	491	1.054E+01	532	2.465E+01	573	3.382E+01
410	5.130E-02	451	2.695E+01	492	1.082E+01	533	2.486E+01	574	3.409E+01
411	4.220E-02	452	2.971E+01	493	1.108E+01	534	2.498E+01	575	3.443E+01
412	6.460E-02	453	3.222E+01	494	1.133E+01	535	2.512E+01	576	3.481E+01
413	2.440E-02	454	3.396E+01	495	1.168E+01	536	2.527E+01	577	3.511E+01
414	5.670E-02	455	3.490E+01	496	1.212E+01	537	2.540E+01	578	3.544E+01
415	6.950E-02	456	3.461E+01	497	1.254E+01	538	2.557E+01	579	3.572E+01
416	7.940E-02	457	3.366E+01	498	1.294E+01	539	2.572E+01	580	3.601E+01
417	1.474E-01	458	3.191E+01	499	1.344E+01	540	2.585E+01	581	3.642E+01
418	1.746E-01	459	2.938E+01	500	1.392E+01	541	2.607E+01	582	3.666E+01
419	2.256E-01	460	2.713E+01	501	1.440E+01	542	2.621E+01	583	3.694E+01
420	2.971E-01	461	2.475E+01	502	1.498E+01	543	2.632E+01	584	3.729E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.754E+01	626	3.531E+01	667	1.615E+01	708	4.764E+00	749	8.291E-01
586	3.777E+01	627	3.482E+01	668	1.569E+01	709	4.528E+00	750	7.899E-01
587	3.805E+01	628	3.441E+01	669	1.528E+01	710	4.341E+00	751	7.913E-01
588	3.837E+01	629	3.397E+01	670	1.490E+01	711	4.153E+00	752	7.768E-01
589	3.857E+01	630	3.353E+01	671	1.455E+01	712	4.004E+00	753	7.317E-01
590	3.881E+01	631	3.308E+01	672	1.411E+01	713	3.938E+00	754	6.297E-01
591	3.895E+01	632	3.260E+01	673	1.375E+01	714	3.685E+00	755	5.691E-01
592	3.921E+01	633	3.223E+01	674	1.333E+01	715	3.581E+00	756	6.679E-01
593	3.931E+01	634	3.179E+01	675	1.301E+01	716	3.499E+00	757	5.951E-01
594	3.961E+01	635	3.124E+01	676	1.264E+01	717	3.381E+00	758	3.077E-01
595	3.976E+01	636	3.079E+01	677	1.227E+01	718	3.251E+00	759	4.898E-01
596	3.992E+01	637	3.032E+01	678	1.197E+01	719	3.070E+00	760	3.097E-01
597	4.000E+01	638	2.981E+01	679	1.162E+01	720	3.004E+00	761	3.833E-01
598	4.017E+01	639	2.934E+01	680	1.120E+01	721	2.855E+00	762	5.209E-01
599	4.024E+01	640	2.886E+01	681	1.096E+01	722	2.784E+00	763	5.600E-01
600	4.033E+01	641	2.833E+01	682	1.068E+01	723	2.670E+00	764	4.278E-01
601	4.043E+01	642	2.790E+01	683	1.044E+01	724	2.451E+00	765	2.970E-01
602	4.043E+01	643	2.740E+01	684	1.003E+01	725	2.489E+00	766	3.529E-01
603	4.043E+01	644	2.690E+01	685	9.775E+00	726	2.378E+00	767	3.164E-01
604	4.042E+01	645	2.641E+01	686	9.481E+00	727	2.224E+00	768	4.130E-01
605	4.034E+01	646	2.591E+01	687	9.242E+00	728	2.168E+00	769	3.391E-01
606	4.030E+01	647	2.538E+01	688	8.984E+00	729	2.132E+00	770	2.050E-01
607	4.027E+01	648	2.496E+01	689	8.616E+00	730	2.068E+00	771	2.397E-01
608	4.023E+01	649	2.447E+01	690	8.338E+00	731	1.865E+00	772	3.458E-01
609	4.016E+01	650	2.405E+01	691	8.167E+00	732	1.985E+00	773	2.284E-01
610	3.993E+01	651	2.352E+01	692	7.893E+00	733	1.699E+00	774	2.190E-01
611	3.991E+01	652	2.300E+01	693	7.655E+00	734	1.616E+00	775	2.219E-01
612	3.967E+01	653	2.248E+01	694	7.434E+00	735	1.677E+00	776	1.954E-01
613	3.947E+01	654	2.206E+01	695	7.217E+00	736	1.577E+00	777	3.146E-01
614	3.918E+01	655	2.151E+01	696	6.922E+00	737	1.470E+00	778	2.496E-01
615	3.898E+01	656	2.101E+01	697	6.778E+00	738	1.341E+00	779	1.969E-01
616	3.874E+01	657	2.060E+01	698	6.579E+00	739	1.285E+00	780	1.459E-01
617	3.845E+01	658	2.011E+01	699	6.321E+00	740	1.218E+00		
618	3.820E+01	659	1.968E+01	700	6.089E+00	741	1.277E+00		
619	3.789E+01	660	1.915E+01	701	5.949E+00	742	1.240E+00		
620	3.758E+01	661	1.874E+01	702	5.732E+00	743	1.175E+00		
621	3.721E+01	662	1.824E+01	703	5.529E+00	744	1.006E+00		
622	3.689E+01	663	1.780E+01	704	5.349E+00	745	9.860E-01		
623	3.646E+01	664	1.739E+01	705	5.160E+00	746	8.526E-01		
624	3.608E+01	665	1.692E+01	706	4.977E+00	747	8.829E-01		
625	3.568E+01	666	1.652E+01	707	4.831E+00	748	8.779E-01		

CIE 1931xy Chromaticity Diagram



7-StepChromaticity Quadrangles



**Control Setting: 4000K**

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

Test orientation: **Downward**

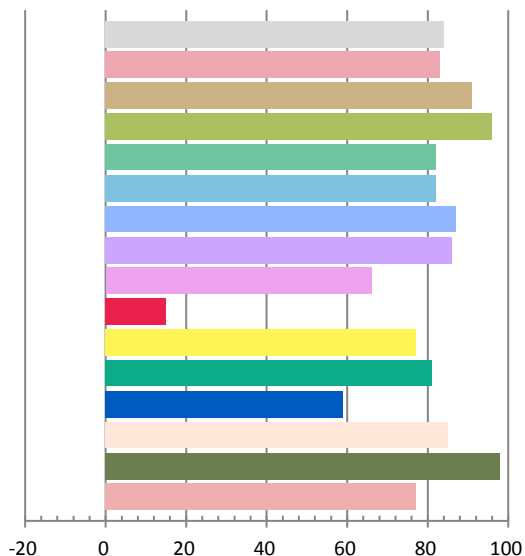
**Photometric and Electrical Measurement Result**

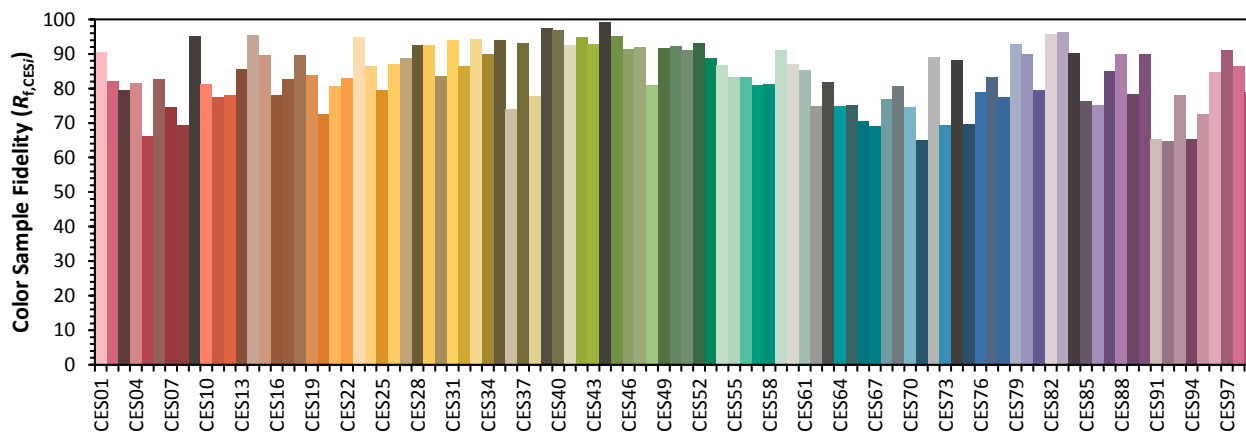
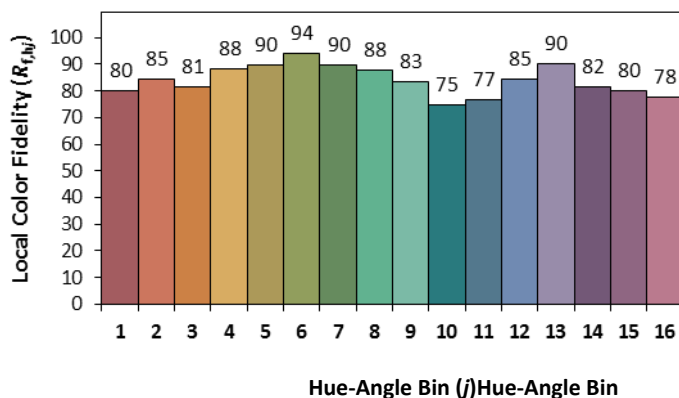
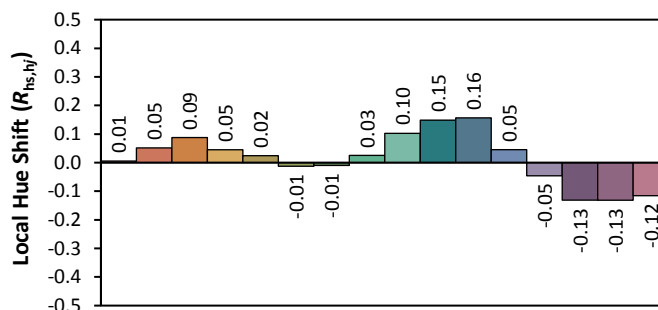
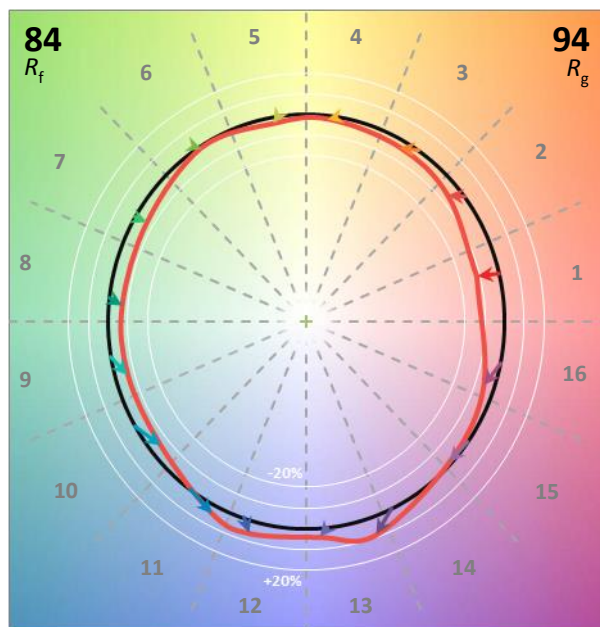
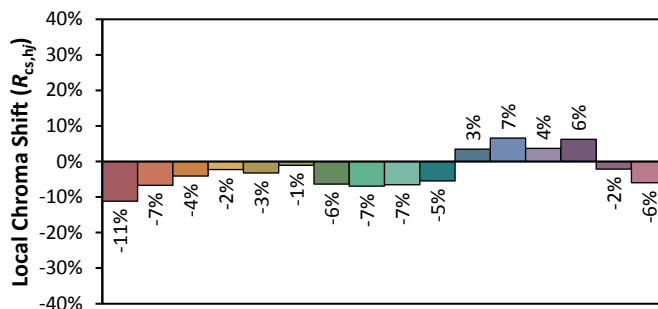
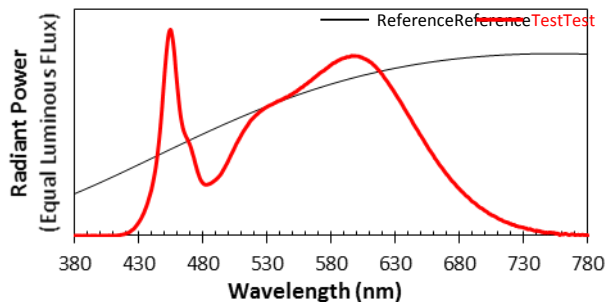
Voltage(V)	Frequency(Hz)	Current(A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy(lm/W)
120	60	0.1371	16.1	0.9786	2115.7	131.39

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
6.375	3844	0.00171	0.3890	0.3856	0.2271	0.5067

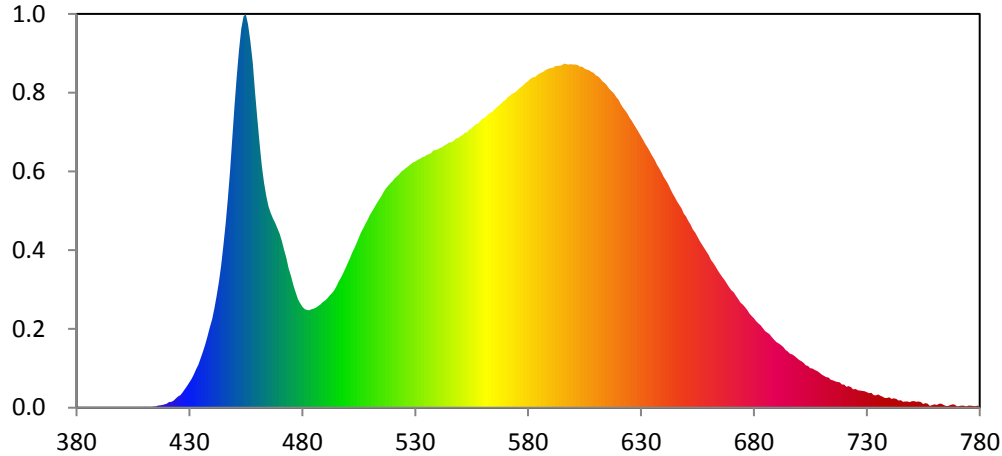
**Color Rendering Index**

<b>Ra</b>			
84.0			
<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
83	91	96	82
<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>
82	87	86	66
<b>R9</b>	<b>R10</b>	<b>R11</b>	<b>R12</b>
15	77	81	59
<b>R13</b>	<b>R14</b>	<b>R15</b>	
85	98	77	





### Relative Spectral Power Distribution

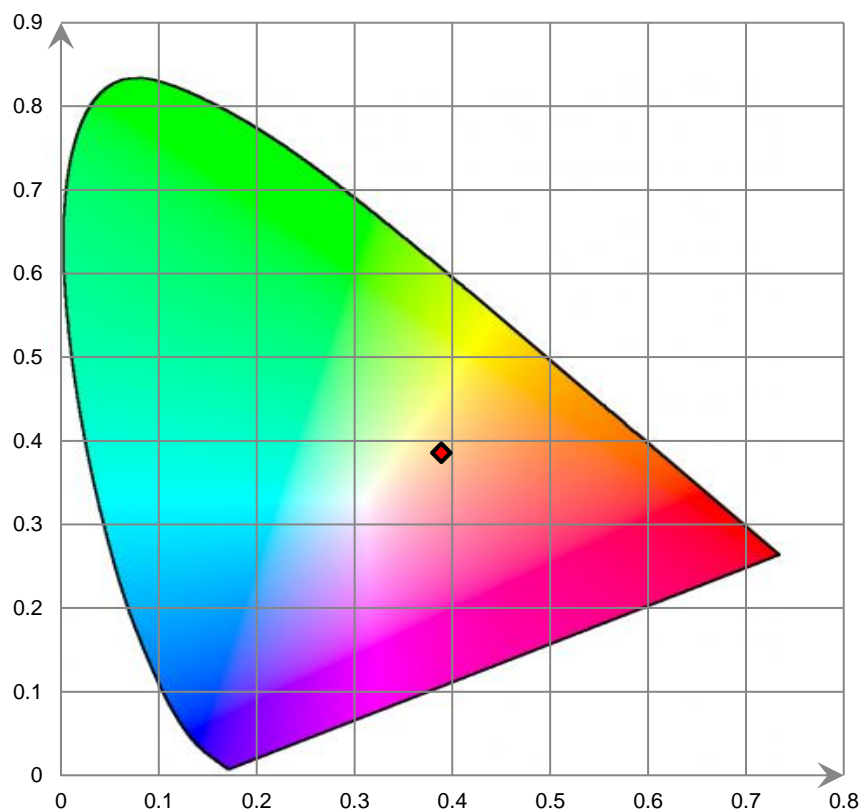


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.210E-02	421	5.947E-01	462	2.600E+01	503	1.708E+01	544	2.826E+01
381	3.460E-02	422	6.312E-01	463	2.414E+01	504	1.762E+01	545	2.843E+01
382	7.040E-02	423	7.837E-01	464	2.273E+01	505	1.820E+01	546	2.847E+01
383	8.100E-03	424	1.001E+00	465	2.162E+01	506	1.879E+01	547	2.860E+01
384	6.110E-02	425	1.218E+00	466	2.090E+01	507	1.923E+01	548	2.887E+01
385	5.120E-02	426	1.372E+00	467	2.031E+01	508	1.971E+01	549	2.892E+01
386	3.100E-03	427	1.672E+00	468	1.981E+01	509	2.018E+01	550	2.913E+01
387	3.380E-02	428	2.002E+00	469	1.924E+01	510	2.067E+01	551	2.927E+01
388	1.050E-02	429	2.356E+00	470	1.866E+01	511	2.113E+01	552	2.949E+01
389	1.450E-02	430	2.726E+00	471	1.788E+01	512	2.155E+01	553	2.955E+01
390	7.250E-02	431	3.123E+00	472	1.690E+01	513	2.194E+01	554	2.985E+01
391	1.510E-02	432	3.588E+00	473	1.605E+01	514	2.233E+01	555	2.999E+01
392	5.000E-04	433	4.122E+00	474	1.496E+01	515	2.269E+01	556	3.023E+01
393	3.330E-02	434	4.632E+00	475	1.406E+01	516	2.314E+01	557	3.043E+01
394	3.010E-02	435	5.318E+00	476	1.311E+01	517	2.353E+01	558	3.049E+01
395	3.500E-02	436	5.976E+00	477	1.236E+01	518	2.380E+01	559	3.081E+01
396	1.940E-02	437	6.743E+00	478	1.164E+01	519	2.408E+01	560	3.099E+01
397	1.090E-02	438	7.620E+00	479	1.119E+01	520	2.433E+01	561	3.115E+01
398	5.000E-04	439	8.522E+00	480	1.083E+01	521	2.463E+01	562	3.137E+01
399	0.000E+00	440	9.486E+00	481	1.058E+01	522	2.485E+01	563	3.161E+01
400	0.000E+00	441	1.067E+01	482	1.049E+01	523	2.507E+01	564	3.172E+01
401	4.480E-02	442	1.200E+01	483	1.046E+01	524	2.535E+01	565	3.199E+01
402	2.590E-02	443	1.347E+01	484	1.054E+01	525	2.552E+01	566	3.220E+01
403	2.690E-02	444	1.520E+01	485	1.062E+01	526	2.574E+01	567	3.243E+01
404	3.200E-02	445	1.737E+01	486	1.072E+01	527	2.591E+01	568	3.262E+01
405	4.810E-02	446	1.967E+01	487	1.090E+01	528	2.610E+01	569	3.284E+01
406	1.250E-02	447	2.241E+01	488	1.106E+01	529	2.629E+01	570	3.305E+01
407	8.370E-02	448	2.541E+01	489	1.129E+01	530	2.641E+01	571	3.331E+01
408	2.330E-02	449	2.895E+01	490	1.148E+01	531	2.659E+01	572	3.349E+01
409	5.900E-02	450	3.246E+01	491	1.169E+01	532	2.670E+01	573	3.368E+01
410	8.420E-02	451	3.560E+01	492	1.199E+01	533	2.685E+01	574	3.378E+01
411	7.300E-02	452	3.838E+01	493	1.228E+01	534	2.692E+01	575	3.396E+01
412	3.450E-02	453	4.067E+01	494	1.259E+01	535	2.710E+01	576	3.424E+01
413	3.350E-02	454	4.195E+01	495	1.300E+01	536	2.722E+01	577	3.441E+01
414	1.334E-01	455	4.224E+01	496	1.350E+01	537	2.732E+01	578	3.461E+01
415	1.101E-01	456	4.114E+01	497	1.393E+01	538	2.757E+01	579	3.485E+01
416	2.087E-01	457	3.942E+01	498	1.442E+01	539	2.764E+01	580	3.502E+01
417	2.489E-01	458	3.698E+01	499	1.493E+01	540	2.770E+01	581	3.527E+01
418	2.977E-01	459	3.385E+01	500	1.547E+01	541	2.787E+01	582	3.544E+01
419	3.615E-01	460	3.109E+01	501	1.599E+01	542	2.794E+01	583	3.548E+01
420	4.450E-01	461	2.842E+01	502	1.659E+01	543	2.813E+01	584	3.568E+01

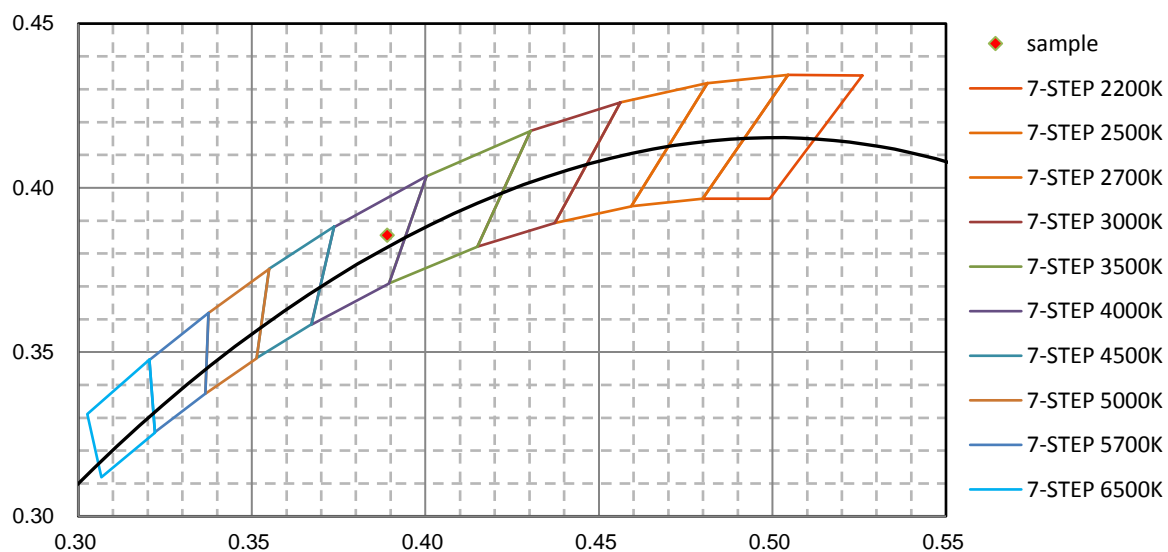


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.586E+01	626	3.073E+01	667	1.372E+01	708	3.942E+00	749	6.183E-01
586	3.597E+01	627	3.033E+01	668	1.333E+01	709	3.770E+00	750	6.942E-01
587	3.610E+01	628	2.995E+01	669	1.297E+01	710	3.569E+00	751	7.060E-01
588	3.627E+01	629	2.954E+01	670	1.260E+01	711	3.425E+00	752	6.460E-01
589	3.635E+01	630	2.911E+01	671	1.237E+01	712	3.296E+00	753	6.646E-01
590	3.642E+01	631	2.871E+01	672	1.198E+01	713	3.248E+00	754	6.028E-01
591	3.645E+01	632	2.827E+01	673	1.164E+01	714	3.006E+00	755	4.110E-01
592	3.664E+01	633	2.788E+01	674	1.127E+01	715	2.930E+00	756	5.032E-01
593	3.667E+01	634	2.747E+01	675	1.106E+01	716	2.837E+00	757	4.420E-01
594	3.666E+01	635	2.702E+01	676	1.078E+01	717	2.780E+00	758	1.715E-01
595	3.674E+01	636	2.660E+01	677	1.047E+01	718	2.717E+00	759	3.058E-01
596	3.690E+01	637	2.608E+01	678	1.012E+01	719	2.486E+00	760	3.547E-01
597	3.684E+01	638	2.568E+01	679	9.839E+00	720	2.495E+00	761	3.007E-01
598	3.682E+01	639	2.523E+01	680	9.607E+00	721	2.263E+00	762	4.210E-01
599	3.683E+01	640	2.478E+01	681	9.301E+00	722	2.300E+00	763	4.446E-01
600	3.681E+01	641	2.438E+01	682	9.060E+00	723	2.228E+00	764	2.996E-01
601	3.681E+01	642	2.397E+01	683	8.829E+00	724	1.973E+00	765	1.778E-01
602	3.674E+01	643	2.347E+01	684	8.527E+00	725	2.001E+00	766	1.999E-01
603	3.656E+01	644	2.299E+01	685	8.228E+00	726	1.868E+00	767	2.953E-01
604	3.658E+01	645	2.258E+01	686	8.063E+00	727	1.840E+00	768	3.486E-01
605	3.638E+01	646	2.213E+01	687	7.870E+00	728	1.795E+00	769	3.359E-01
606	3.628E+01	647	2.176E+01	688	7.586E+00	729	1.781E+00	770	1.141E-01
607	3.618E+01	648	2.135E+01	689	7.261E+00	730	1.670E+00	771	1.992E-01
608	3.601E+01	649	2.080E+01	690	7.020E+00	731	1.561E+00	772	2.212E-01
609	3.590E+01	650	2.050E+01	691	6.882E+00	732	1.589E+00	773	2.190E-01
610	3.563E+01	651	2.003E+01	692	6.707E+00	733	1.349E+00	774	1.254E-01
611	3.554E+01	652	1.966E+01	693	6.502E+00	734	1.333E+00	775	2.188E-01
612	3.530E+01	653	1.914E+01	694	6.193E+00	735	1.419E+00	776	2.317E-01
613	3.499E+01	654	1.874E+01	695	6.009E+00	736	1.273E+00	777	1.859E-01
614	3.481E+01	655	1.832E+01	696	5.788E+00	737	1.199E+00	778	1.432E-01
615	3.455E+01	656	1.785E+01	697	5.710E+00	738	1.066E+00	779	2.205E-01
616	3.421E+01	657	1.748E+01	698	5.538E+00	739	1.035E+00	780	8.140E-02
617	3.396E+01	658	1.711E+01	699	5.321E+00	740	1.112E+00		
618	3.367E+01	659	1.672E+01	700	5.113E+00	741	9.603E-01		
619	3.330E+01	660	1.635E+01	701	5.003E+00	742	1.024E+00		
620	3.302E+01	661	1.584E+01	702	4.812E+00	743	9.475E-01		
621	3.257E+01	662	1.552E+01	703	4.545E+00	744	7.617E-01		
622	3.219E+01	663	1.514E+01	704	4.478E+00	745	8.256E-01		
623	3.186E+01	664	1.473E+01	705	4.233E+00	746	6.239E-01		
624	3.153E+01	665	1.436E+01	706	4.189E+00	747	6.756E-01		
625	3.108E+01	666	1.403E+01	707	4.045E+00	748	6.769E-01		

CIE 1931xy Chromaticity Diagram



7-StepChromaticity Quadrangles



## [Goniophotometer System]

### Control Setting: 3000K

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

Test orientation: **Downward**

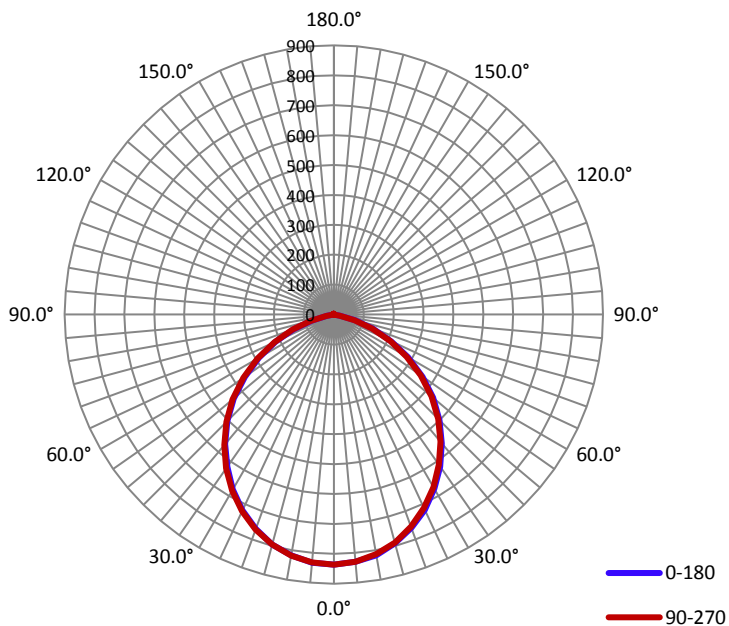
### Electrical Measurement

Input Voltage(V)	Frequency(Hz)	Input Current(A)	Power (W)	Power Factor
120.0	60	0.1380	16.25	0.9820

### Photometric Measurement

Luminous Flux(lm)	Efficacy(lm/W)	I <sub>max</sub> (cd)	S/MH(C0/180)	S/MH(C90/270)
2034.6	125.25	838.9	1.20	1.20

### Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle(50%I <sub>max</sub> ):	102.3	102.1	102.3	102.5	102.3
Field Angle(10%I <sub>max</sub> ):	148.5	148.7	148.7	148.8	148.7

**Luminous Intensity (cd) Distribution Data**

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	836	836	836	836	836	836	836	836
5.0°	830	831	832	831	829	830	831	831
10.0°	817	817	817	817	814	816	815	817
15.0°	791	792	789	790	790	791	792	793
20.0°	759	758	757	756	755	758	758	761
25.0°	721	719	715	715	713	716	720	721
30.0°	672	672	670	668	667	669	671	674
35.0°	621	618	615	613	612	616	618	621
40.0°	562	560	556	556	555	558	561	565
45.0°	501	497	496	494	495	497	500	504
50.0°	433	430	428	427	426	429	433	438
55.0°	362	358	356	355	354	358	361	366
60.0°	287	284	281	281	281	283	288	291
65.0°	213	210	208	206	208	210	213	219
70.0°	141	137	137	137	137	139	142	147
75.0°	74	72	71	71	72	73	77	80
80.0°	21	20	20	20	20	22	24	26
85.0°	4	4	4	4	4	4	5	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	1	0	1	1	1	1	1
150.0°	0	1	1	2	1	1	1	1
155.0°	1	1	1	2	2	2	2	2
160.0°	2	2	2	2	2	2	2	2
165.0°	2	2	2	3	3	2	2	2
170.0°	2	2	3	3	3	3	3	3
175.0°	2	3	3	3	3	3	3	3
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

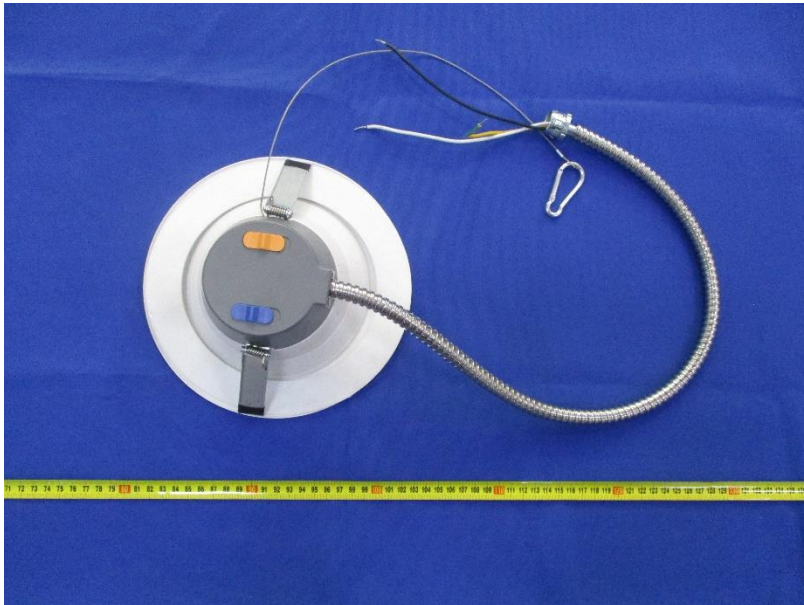
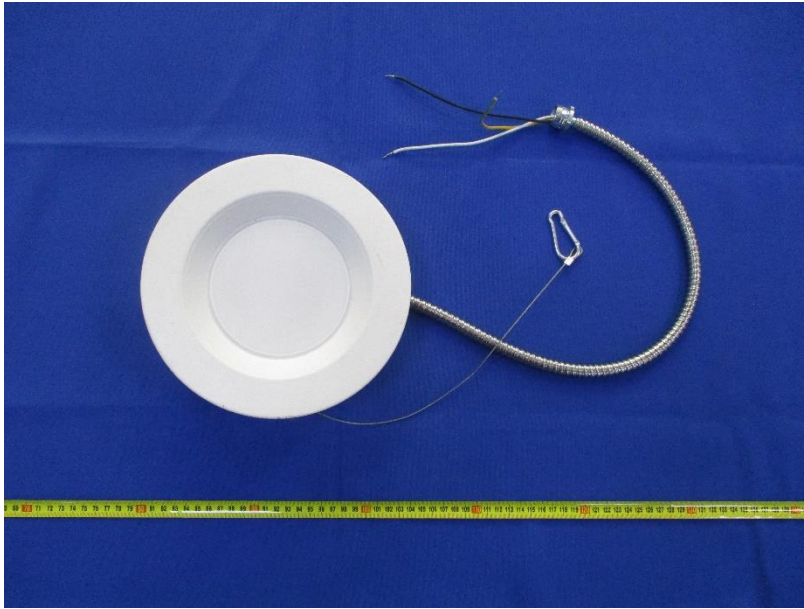
C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	836	836	836	836	836	836	836	836
5.0°	833	833	834	833	831	832	832	831
10.0°	817	820	818	820	819	820	818	817
15.0°	796	796	798	798	796	796	795	794
20.0°	762	764	765	767	765	765	762	761
25.0°	722	725	728	728	725	726	723	720
30.0°	675	680	681	682	680	679	676	674
35.0°	621	627	627	628	627	627	623	621
40.0°	565	570	569	570	569	569	566	563
45.0°	504	508	509	509	508	507	505	501
50.0°	437	441	443	445	443	440	438	435
55.0°	363	368	370	372	369	368	366	361
60.0°	289	293	293	295	294	293	289	286
65.0°	214	218	218	219	219	218	214	210
70.0°	142	144	146	147	146	145	142	138
75.0°	75	79	80	80	80	79	76	72
80.0°	22	25	26	27	27	25	22	20
85.0°	4	5	6	6	5	5	5	5
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	1	1	1
155.0°	0	0	1	1	1	1	1	1
160.0°	1	1	1	2	2	1	2	2
165.0°	1	2	2	2	2	2	2	2
170.0°	2	2	2	3	3	3	3	3
175.0°	2	2	3	3	3	3	3	3
180.0°	0	0	0	0	0	0	0	0

**Zonal Lumen Density Measurement**

Deg	Flux (lm)	%
0-5	20.0	0.98
5-10	58.9	2.91
10-15	95.5	4.69
15-20	128.1	6.30
20-25	155.4	7.64
25-30	176.5	8.67
30-35	190.6	9.37
35-40	197.6	9.71
40-45	197.2	9.69
45-50	189.6	9.32
50-55	173.4	8.53
55-60	150.2	7.39
60-65	121.7	5.98
65-70	89.7	4.41
70-75	56.5	2.78
75-80	25.4	1.24
80-85	6.0	0.29
85-90	0.7	0.03
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.0	0.00
145-150	0.0	0.00
150-155	0.3	0.00
155-160	0.5	0.00
160-165	0.5	0.00
165-170	0.3	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	19.9	0.98
0-10	78.9	3.88
0-15	174.5	8.58
0-20	302.6	14.87
0-25	458.0	22.51
0-30	634.5	31.19
0-35	825.1	40.55
0-40	1022.6	50.26
0-45	1219.8	59.95
0-50	1409.3	69.27
0-55	1582.9	77.80
0-60	1733.1	85.18
0-65	1854.8	91.16
0-70	1944.4	95.57
0-75	2000.9	98.34
0-80	2026.2	99.59
0-85	2032.3	99.89
0-90	2033.0	99.92
0-95	2033.0	99.92
0-100	2033.0	99.92
0-105	2033.0	99.92
0-110	2033.0	99.92
0-115	2033.0	99.92
0-120	2033.0	99.92
0-125	2033.0	99.92
0-130	2033.0	99.92
0-135	2033.0	99.92
0-140	2033.0	99.92
0-145	2033.1	99.93
0-150	2033.2	99.93
0-155	2033.5	99.95
0-160	2033.8	99.96
0-165	2034.1	99.98
0-170	2034.3	99.99
0-175	2034.5	100.00
0-180	2034.6	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 "★".
3. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
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\*\*\*\*\*END OF REPORT\*\*\*\*\*