ANSI/IES LM-79-19

MEASUREMENT AND TEST REPORT

For

#Artika For Living Inc.

#1756, 50th Avenue Montréal (Lachine), Québec Canada H8T 2V5

#Test Model: PDT1-ROC-CRJ

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
Reviewed By:	Hexy He
Report Number:	SZ2220808-35948E-EE
Test Date:	2022-08-09 to 2022-08-10
Report Date:	2022-09-22
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China. Tel: +86-755-33320018 Fax: +86-755-33320008
Test Facility:	Test facility was located at No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

1. Product Description#

General Information:

One test sample was in good condition and received on 2022-08-08, and used for testing. All tests and evaluations were performed at the least efficient white light setting.

Model Tested:	PDT1-ROC-CRJ		
#Nominal CCT:	3000K	4000K	5000K
#Nominal Lumen Output:	700lm	740lm	720lm
Manufacturer:	Artika For Living Inc		
Brand Name:	Artika		
Product Designation:	LED Luminaires		
Burning Time Before Test:	0hour(For New Products)		

Rated Values:

Rated Voltage/Frequency:	120 V AC 60Hz
Rated Power:	12W

Family Declaration

Artika For Living Inc declares that there are some differences between multiple models and tested model. Details as below:

Tested Model	Multiple Models	Variations	Details
PDT1-ROC-CRJ	PDT1-ROC-XXXXXX	Model Name	The "X" is commercial code. Note:"X" can be A to Z and/ or 0 to 9 and /or blank.

2. Standards Used

- ANSI/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
- *IES TM-30-18: IES Method for Evaluating Light Source Color Rendition (This method is not in NVLAP accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
1.5m temperature integrating sphere	SENSING	SPR-600	S09008	2021-09-27	2022-09-26
High-precision rapid spectral analysis system	EVERFINE	HAAS-2000	M112048CA1361125	2021-09-27	2022-09-26
Digital power meter	YOKOGAWA	WT310	13398	2022-01-05	2023-01-04
Programmable Precision DC Power Supply	EVERFINE	WY5015	11060010	2022-01-05	2023-01-04
thermometer	SENSING	NA	NA	2022-01-10	2023-01-09
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2022-10-14
Precision frequency power supply	ALL Power	APW-105N	970613	2022-01-05	2023-01-04

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2022-01-06	2023-01-05
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2022-01-06	2023-01-05
Digital power meter	YOKOGAWA	WT-210	91j926132	2022-01-06	2023-01-05
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2021-10-26	2022-10-25
wireless remote thermohygrometer	N/A	433MHz	N/A	2022-01-10	2023-01-09
Standard Light Source	EVERFINE	D908	1012003	2021-10-15	2022-10-14

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) 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°C±1.2°C during measurement. And relative humidity is maintained between 10% and 65%.The air flow around the SSL product is less than 0.2m/s.

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.

4π 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=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=22K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.1(K=2), at the 95% confidence level.

The uncertainty of power meter AC current U=0.39 % of rdg, AC Voltage U=0.25% of rdg, Power U=0.42%) (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 luminous intensity distribution, The vertical angle (γ) test intervals were set no more than 2.5 degree ,The horizontal angle (C plane) test intervals were set no more than 22.5 degree. For color spatial uniformity, The vertical angle (γ) test intervals were set no more than 90 degree ,The horizontal angle (C plane) test intervals were set no more than 10 degree

The uncertainty of the luminous intensity is U=2.00% (K=2), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_f, 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]

The Stabilization time: **30 minutes**

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

Test orientation: **Downward**

The test CCT: 3000K

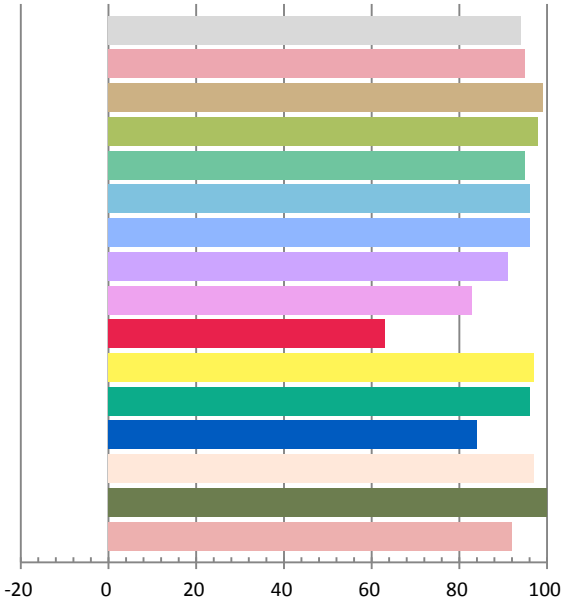
Photometric and Electrical Measurement Result

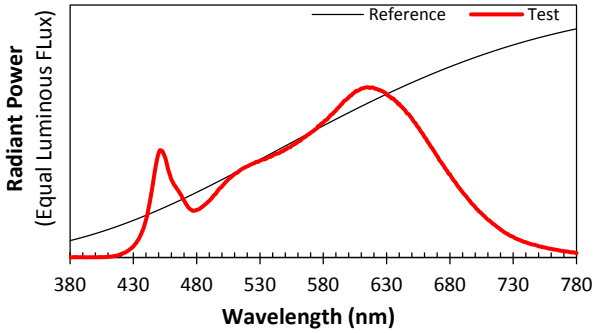
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.0956	11.14	0.9707	723.88	64.98

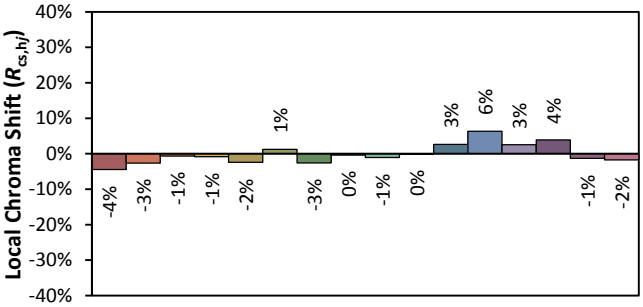
Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.5004	3134	-0.00254	0.4243	0.3933	0.2470	0.5152

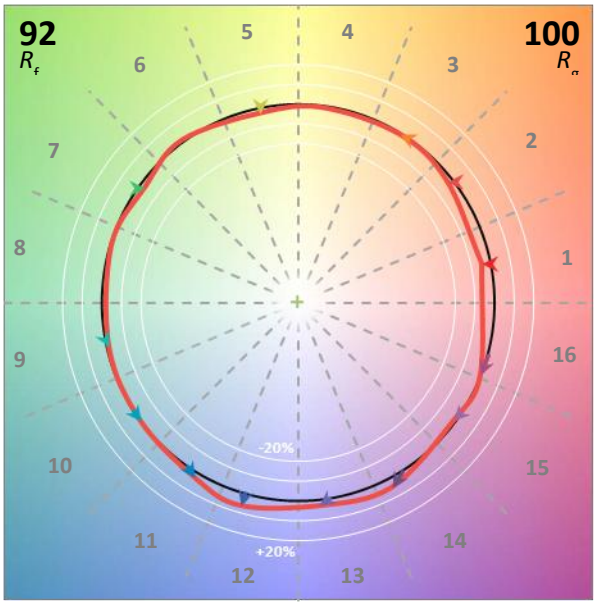
Color Rendering Index

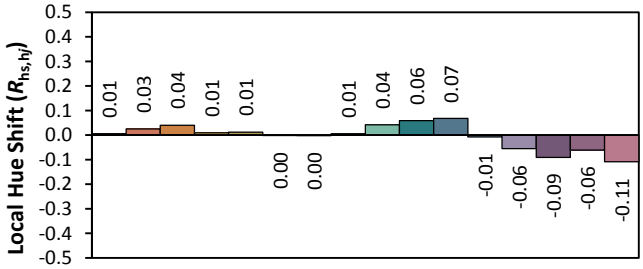
Ra			
94.1			
R1	R2	R3	R4
95	99	98	95
R5	R6	R7	R8
96	96	91	83
R9	R10	R11	R12
63	97	96	84
R13	R14	R15	
97	100	92	

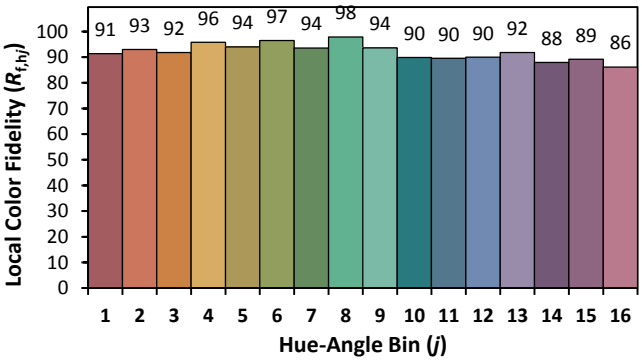


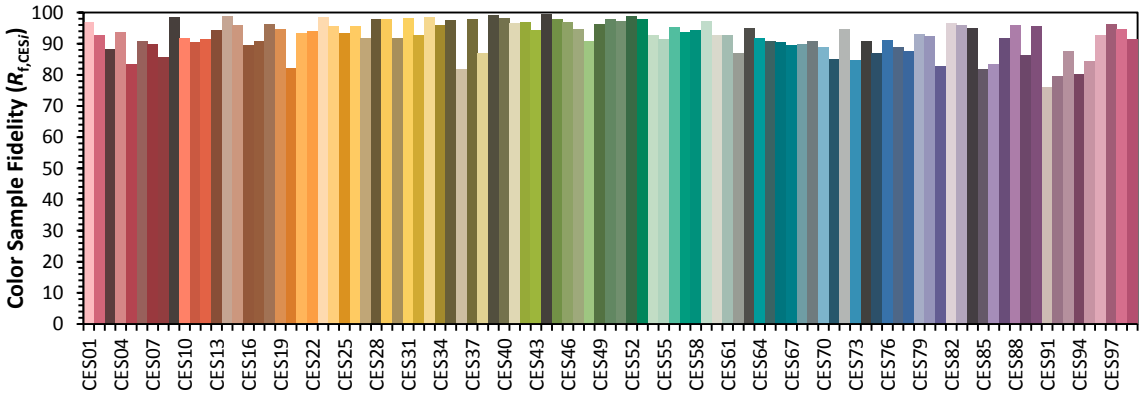

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-4% -3% -1% -1% -2% 1% -3% 0% -1% 0% 3% 6% 3% 4% -1% -2%

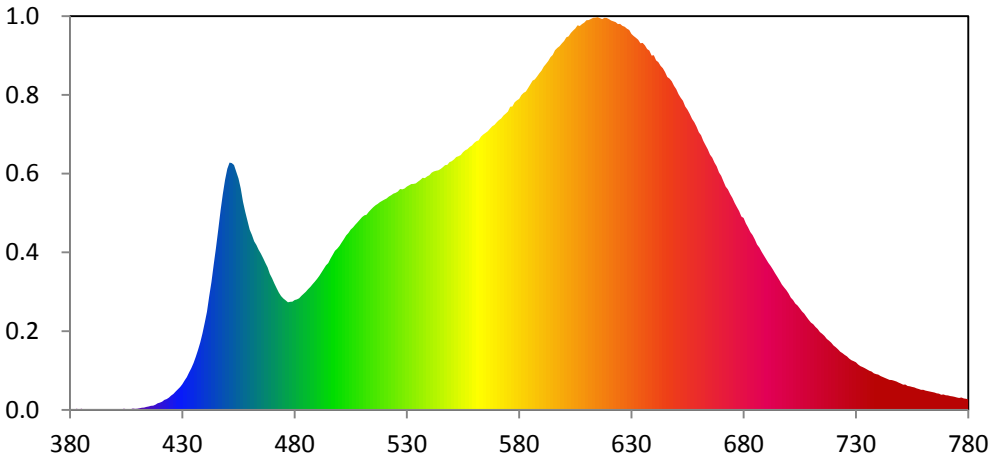

92
R_f
100
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


Local Hue Shift ($R_{hs,hj}$)
0.5 0.4 0.3 0.2 0.1 0.0 -0.1 -0.2 -0.3 -0.4 -0.5
0.01 0.03 0.04 0.01 0.01 0.00 0.00 0.01 0.04 0.06 0.07 -0.01 -0.06 -0.09 -0.06 -0.11


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
91 93 92 96 94 97 94 98 94 90 90 90 92 88 89 86
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue-Angle Bin (j)


Color Sample Fidelity ($R_{f,CESi}$)
100 90 80 70 60 50 40 30 20 10 0
CES01 CES04 CES07 CES10 CES13 CES16 CES19 CES22 CES25 CES28 CES31 CES34 CES37 CES40 CES43 CES46 CES49 CES52 CES55 CES58 CES61 CES64 CES67 CES70 CES73 CES76 CES79 CES82 CES85 CES88 CES91 CES94 CES97

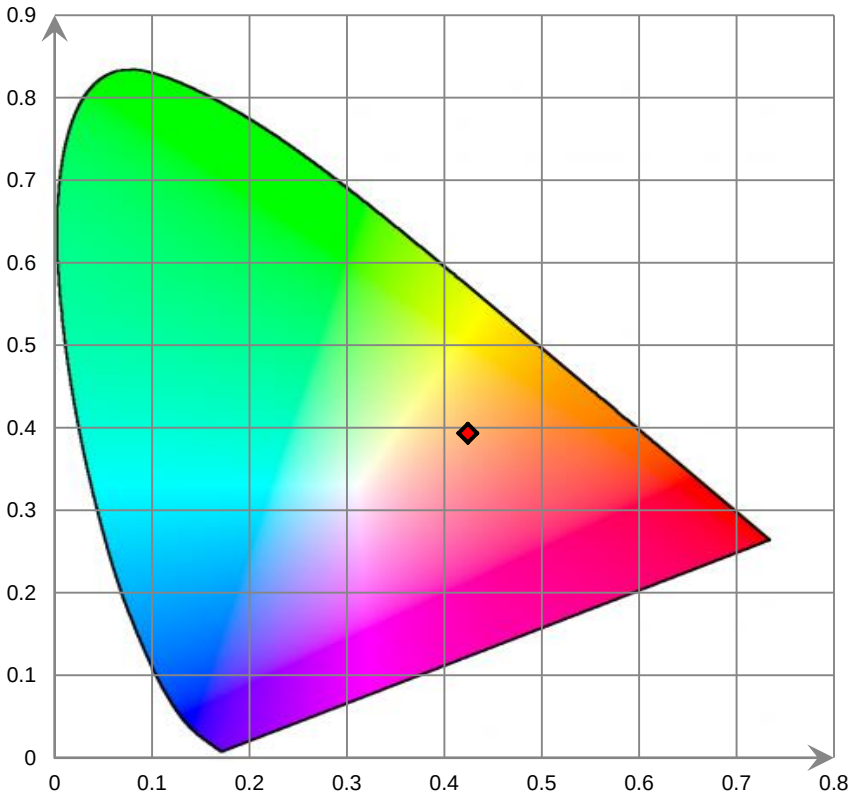
Relative Spectral Power Distribution



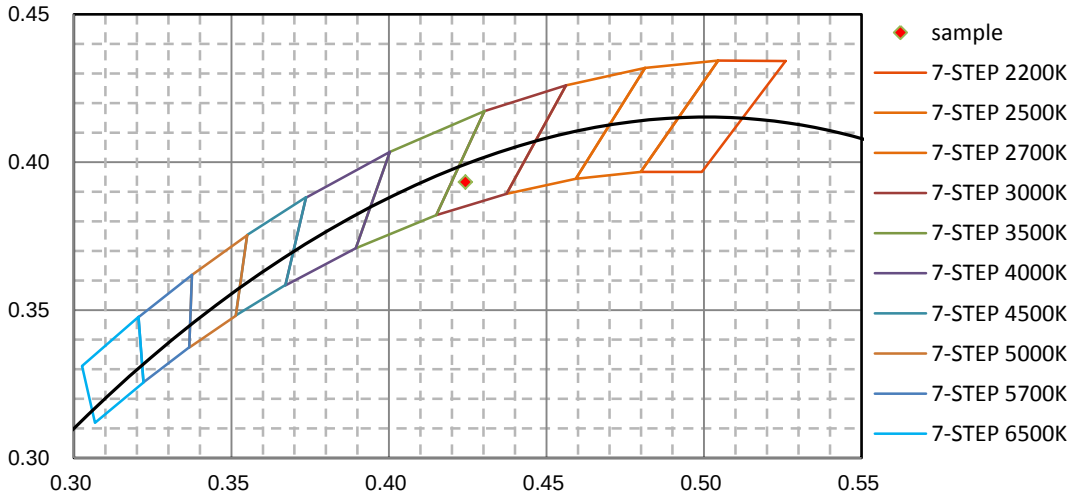
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.408E-02	421	3.039E-01	462	6.136E+00	503	6.350E+00	544	8.725E+00
381	1.784E-02	422	3.656E-01	463	6.007E+00	504	6.439E+00	545	8.770E+00
382	1.458E-02	423	3.964E-01	464	5.831E+00	505	6.562E+00	546	8.832E+00
383	4.602E-02	424	4.468E-01	465	5.687E+00	506	6.645E+00	547	8.911E+00
384	1.654E-02	425	5.231E-01	466	5.528E+00	507	6.742E+00	548	8.921E+00
385	4.449E-02	426	5.839E-01	467	5.353E+00	508	6.834E+00	549	9.023E+00
386	1.656E-02	427	6.666E-01	468	5.189E+00	509	6.922E+00	550	9.054E+00
387	2.655E-02	428	7.489E-01	469	4.950E+00	510	7.015E+00	551	9.122E+00
388	3.024E-02	429	8.340E-01	470	4.794E+00	511	7.084E+00	552	9.208E+00
389	2.672E-02	430	9.382E-01	471	4.604E+00	512	7.107E+00	553	9.236E+00
390	1.450E-02	431	1.072E+00	472	4.435E+00	513	7.211E+00	554	9.275E+00
391	2.604E-02	432	1.192E+00	473	4.276E+00	514	7.300E+00	555	9.380E+00
392	3.270E-02	433	1.360E+00	474	4.146E+00	515	7.380E+00	556	9.450E+00
393	1.106E-02	434	1.520E+00	475	4.055E+00	516	7.450E+00	557	9.493E+00
394	2.166E-02	435	1.704E+00	476	3.991E+00	517	7.498E+00	558	9.577E+00
395	2.062E-02	436	1.936E+00	477	3.919E+00	518	7.562E+00	559	9.627E+00
396	2.777E-02	437	2.185E+00	478	3.935E+00	519	7.611E+00	560	9.721E+00
397	2.608E-02	438	2.458E+00	479	3.944E+00	520	7.655E+00	561	9.782E+00
398	2.331E-02	439	2.792E+00	480	3.999E+00	521	7.702E+00	562	9.815E+00
399	2.743E-02	440	3.172E+00	481	4.021E+00	522	7.769E+00	563	9.944E+00
400	3.051E-02	441	3.572E+00	482	4.068E+00	523	7.814E+00	564	1.002E+01
401	1.730E-02	442	4.138E+00	483	4.149E+00	524	7.873E+00	565	1.008E+01
402	3.396E-02	443	4.658E+00	484	4.225E+00	525	7.904E+00	566	1.015E+01
403	2.464E-02	444	5.285E+00	485	4.304E+00	526	7.951E+00	567	1.024E+01
404	4.528E-02	445	5.887E+00	486	4.398E+00	527	8.041E+00	568	1.033E+01
405	2.519E-02	446	6.584E+00	487	4.480E+00	528	8.032E+00	569	1.038E+01
406	3.630E-02	447	7.262E+00	488	4.579E+00	529	8.058E+00	570	1.047E+01
407	2.635E-02	448	7.858E+00	489	4.672E+00	530	8.130E+00	571	1.055E+01
408	4.858E-02	449	8.375E+00	490	4.768E+00	531	8.174E+00	572	1.061E+01
409	3.912E-02	450	8.773E+00	491	4.878E+00	532	8.222E+00	573	1.071E+01
410	4.553E-02	451	9.002E+00	492	5.007E+00	533	8.228E+00	574	1.078E+01
411	6.475E-02	452	8.984E+00	493	5.134E+00	534	8.249E+00	575	1.086E+01
412	7.966E-02	453	8.915E+00	494	5.266E+00	535	8.312E+00	576	1.104E+01
413	8.749E-02	454	8.670E+00	495	5.346E+00	536	8.373E+00	577	1.105E+01
414	1.112E-01	455	8.428E+00	496	5.511E+00	537	8.451E+00	578	1.120E+01
415	1.261E-01	456	8.068E+00	497	5.650E+00	538	8.436E+00	579	1.127E+01
416	1.501E-01	457	7.581E+00	498	5.794E+00	539	8.502E+00	580	1.132E+01
417	1.563E-01	458	7.214E+00	499	5.871E+00	540	8.545E+00	581	1.146E+01
418	1.905E-01	459	6.892E+00	500	5.969E+00	541	8.639E+00	582	1.154E+01
419	2.439E-01	460	6.564E+00	501	6.098E+00	542	8.682E+00	583	1.159E+01
420	2.632E-01	461	6.368E+00	502	6.218E+00	543	8.709E+00	584	1.172E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.185E+01	626	1.399E+01	667	9.005E+00	708	3.388E+00	749	9.951E-01
586	1.198E+01	627	1.395E+01	668	8.861E+00	709	3.275E+00	750	9.605E-01
587	1.203E+01	628	1.388E+01	669	8.650E+00	710	3.180E+00	751	9.202E-01
588	1.214E+01	629	1.383E+01	670	8.520E+00	711	3.122E+00	752	9.247E-01
589	1.225E+01	630	1.369E+01	671	8.324E+00	712	3.019E+00	753	8.730E-01
590	1.235E+01	631	1.361E+01	672	8.128E+00	713	2.949E+00	754	8.619E-01
591	1.250E+01	632	1.354E+01	673	8.026E+00	714	2.833E+00	755	8.404E-01
592	1.260E+01	633	1.348E+01	674	7.856E+00	715	2.773E+00	756	8.201E-01
593	1.270E+01	634	1.335E+01	675	7.715E+00	716	2.696E+00	757	7.851E-01
594	1.284E+01	635	1.336E+01	676	7.538E+00	717	2.586E+00	758	7.604E-01
595	1.292E+01	636	1.327E+01	677	7.383E+00	718	2.520E+00	759	7.355E-01
596	1.309E+01	637	1.314E+01	678	7.237E+00	719	2.443E+00	760	7.330E-01
597	1.318E+01	638	1.308E+01	679	7.043E+00	720	2.348E+00	761	7.048E-01
598	1.324E+01	639	1.290E+01	680	6.989E+00	721	2.281E+00	762	6.841E-01
599	1.334E+01	640	1.291E+01	681	6.789E+00	722	2.204E+00	763	6.677E-01
600	1.343E+01	641	1.273E+01	682	6.641E+00	723	2.119E+00	764	6.525E-01
601	1.356E+01	642	1.266E+01	683	6.474E+00	724	2.066E+00	765	6.326E-01
602	1.360E+01	643	1.253E+01	684	6.362E+00	725	2.002E+00	766	6.034E-01
603	1.372E+01	644	1.244E+01	685	6.208E+00	726	1.948E+00	767	5.909E-01
604	1.381E+01	645	1.230E+01	686	6.021E+00	727	1.868E+00	768	5.537E-01
605	1.388E+01	646	1.212E+01	687	5.903E+00	728	1.810E+00	769	5.629E-01
606	1.400E+01	647	1.206E+01	688	5.756E+00	729	1.776E+00	770	5.354E-01
607	1.398E+01	648	1.197E+01	689	5.621E+00	730	1.735E+00	771	5.279E-01
608	1.405E+01	649	1.180E+01	690	5.486E+00	731	1.656E+00	772	5.072E-01
609	1.410E+01	650	1.168E+01	691	5.349E+00	732	1.593E+00	773	4.948E-01
610	1.419E+01	651	1.149E+01	692	5.241E+00	733	1.558E+00	774	4.751E-01
611	1.420E+01	652	1.136E+01	693	5.115E+00	734	1.516E+00	775	4.528E-01
612	1.423E+01	653	1.125E+01	694	4.972E+00	735	1.472E+00	776	4.355E-01
613	1.427E+01	654	1.105E+01	695	4.843E+00	736	1.428E+00	777	4.532E-01
614	1.428E+01	655	1.093E+01	696	4.714E+00	737	1.395E+00	778	4.155E-01
615	1.430E+01	656	1.078E+01	697	4.564E+00	738	1.334E+00	779	4.038E-01
616	1.427E+01	657	1.059E+01	698	4.462E+00	739	1.305E+00	780	3.830E-01
617	1.423E+01	658	1.047E+01	699	4.362E+00	740	1.288E+00		
618	1.428E+01	659	1.031E+01	700	4.236E+00	741	1.233E+00		
619	1.427E+01	660	1.011E+01	701	4.090E+00	742	1.197E+00		
620	1.423E+01	661	9.998E+00	702	4.003E+00	743	1.163E+00		
621	1.417E+01	662	9.794E+00	703	3.874E+00	744	1.131E+00		
622	1.415E+01	663	9.637E+00	704	3.802E+00	745	1.092E+00		
623	1.412E+01	664	9.487E+00	705	3.701E+00	746	1.087E+00		
624	1.405E+01	665	9.295E+00	706	3.587E+00	747	1.062E+00		
625	1.405E+01	666	9.185E+00	707	3.505E+00	748	1.038E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

The Stabilization time: **30 minutes**

Total operating time for luminous intensity distribution: **1.5 hour**

Test orientation: **Downward**

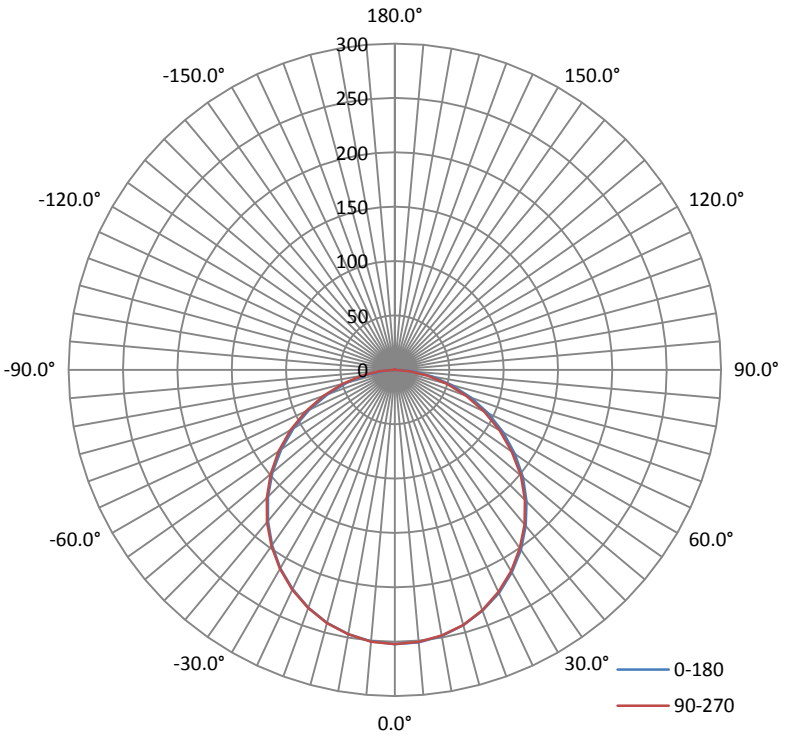
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0957	11.15	0.9709

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
725.395	65.06	252.6	1.27	1.26

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	112.5	112.4	112.4	112.4	112.4
Field Angle (10% I_{max}):	162.9	162.8	162.9	162.9	162.9

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	252	252	252	252	252	252	252	252
1°	252	252	252	252	252	252	252	252
2°	252	252	252	252	252	252	252	252
3°	252	251	251	252	252	252	252	252
4°	251	251	251	252	251	251	251	252
5°	251	250	251	251	251	251	251	252
6°	250	250	250	250	250	250	251	251
7°	250	249	249	250	250	250	250	251
8°	249	248	248	249	249	249	249	250
9°	248	248	248	248	248	248	249	249
10°	247	246	246	247	247	247	248	249
11°	245	245	245	246	246	247	247	248
12°	245	244	244	245	245	245	246	247
13°	244	243	243	244	244	244	245	246
14°	242	242	241	242	242	243	244	245
15°	241	240	240	241	241	242	242	243
16°	239	239	239	239	240	240	241	242
17°	238	237	237	238	238	239	239	241
18°	236	235	236	236	236	237	238	239
19°	235	234	234	234	235	235	236	238
20°	233	232	232	233	233	234	235	236
21°	230	230	230	231	231	232	233	234
22°	229	228	228	229	229	231	231	233
23°	227	226	226	227	227	228	229	231
24°	225	224	224	225	225	226	227	229
25°	222	222	222	223	223	224	225	227
26°	220	220	219	220	221	222	223	225
27°	218	217	217	218	218	220	221	222
28°	216	215	215	216	216	217	219	220
29°	213	212	212	213	214	214	216	218
30°	211	210	210	211	211	213	214	216
31°	208	207	207	208	209	210	211	213
32°	205	205	205	206	206	208	209	211
33°	203	202	202	203	203	205	206	208
34°	200	199	199	200	201	202	204	205
35°	197	196	196	197	198	199	201	203
36°	194	193	193	194	195	197	198	200
37°	191	190	191	191	192	194	195	197
38°	188	187	188	188	189	191	192	194
39°	185	184	184	185	186	187	189	191
40°	182	181	181	182	183	184	187	188
41°	178	177	178	179	180	181	183	185
42°	175	175	175	176	177	178	180	182
43°	172	171	171	172	173	175	177	179
44°	168	168	168	169	170	172	174	175
45°	165	164	165	166	167	168	170	172
46°	161	161	161	162	163	165	167	169
47°	158	157	157	159	160	162	163	165
48°	154	154	154	155	156	158	160	162
49°	151	150	150	151	153	154	156	158

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
50°	147	146	147	148	149	151	153	155
51°	143	142	143	144	145	147	149	151
52°	139	139	139	140	142	144	145	148
53°	135	135	135	136	138	140	142	144
54°	132	131	132	133	134	136	138	140
55°	128	127	128	129	130	132	134	136
56°	124	123	124	125	127	129	131	132
57°	120	119	120	121	123	125	127	128
58°	116	115	116	117	119	121	123	125
59°	112	111	112	113	115	117	119	121
60°	108	107	108	109	111	113	115	117
61°	103	103	104	105	107	109	111	113
62°	99	99	100	101	103	105	107	109
63°	95	95	96	97	99	101	103	105
64°	91	91	91	93	95	97	99	101
65°	87	87	87	89	90	93	95	97
66°	83	82	83	85	86	89	91	92
67°	78	78	79	80	82	84	86	88
68°	74	74	75	76	78	80	82	84
69°	70	70	71	72	74	76	78	80
70°	66	66	67	68	70	72	74	76
71°	62	62	63	64	66	68	70	72
72°	58	58	58	60	62	64	66	68
73°	53	53	54	56	58	60	62	63
74°	49	49	50	52	54	56	58	59
75°	45	45	46	48	50	52	54	55
76°	41	41	42	44	46	48	50	51
77°	37	38	38	40	42	44	46	47
78°	34	34	35	36	38	40	42	43
79°	30	30	31	33	34	36	38	39
80°	26	27	28	29	31	33	34	36
81°	23	23	24	26	27	29	31	32
82°	20	20	21	22	24	26	27	28
83°	16	16	17	19	20	22	24	25
84°	13	13	14	16	17	19	20	21
85°	10	10	11	12	14	16	17	18
86°	7	7	8	9	11	13	14	15
87°	4	5	6	7	8	10	11	12
88°	2	3	3	4	6	7	8	9
89°	0	0	0	1	3	4	6	6
90°	0	0	0	0	1	2	3	3
91°	0	0	0	0	0	0	0	1
92°	0	0	0	0	0	0	0	0
93°	0	0	0	0	0	0	0	0
94°	0	0	0	0	0	0	0	0
95°	0	0	0	0	0	0	0	0
96°	0	0	0	0	0	0	0	0
97°	0	0	0	0	0	0	0	0
98°	0	0	0	0	0	0	0	0
99°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
100°	0	0	0	0	0	0	0	0
101°	0	0	0	0	0	0	0	0
102°	0	0	0	0	0	0	0	0
103°	0	0	0	0	0	0	0	0
104°	0	0	0	0	0	0	0	0
105°	0	0	0	0	0	0	0	0
106°	0	0	0	0	0	0	0	0
107°	0	0	0	0	0	0	0	0
108°	0	0	0	0	0	0	0	0
109°	0	0	0	0	0	0	0	0
110°	0	0	0	0	0	0	0	0
111°	0	0	0	0	0	0	0	0
112°	0	0	0	0	0	0	0	0
113°	0	0	0	0	0	0	0	0
114°	0	0	0	0	0	0	0	0
115°	0	0	0	0	0	0	0	0
116°	0	0	0	0	0	0	0	0
117°	0	0	0	0	0	0	0	0
118°	0	0	0	0	0	0	0	0
119°	0	0	0	0	0	0	0	0
120°	0	0	0	0	0	0	0	0
121°	0	0	0	0	0	0	0	0
122°	0	0	0	0	0	0	0	0
123°	0	0	0	0	0	0	0	0
124°	0	0	0	0	0	0	0	0
125°	0	0	0	0	0	0	0	0
126°	0	0	0	0	0	0	0	0
127°	0	0	0	0	0	0	0	0
128°	0	0	0	0	0	0	0	0
129°	0	0	0	0	0	0	0	0
130°	0	0	0	0	0	0	0	0
131°	0	0	0	0	0	0	0	0
132°	0	0	0	0	0	0	0	0
133°	0	0	0	0	0	0	0	0
134°	0	0	0	0	0	0	0	0
135°	0	0	0	0	0	0	0	0
136°	0	0	0	0	0	0	0	0
137°	0	0	0	0	0	0	0	0
138°	0	0	0	0	0	0	0	0
139°	0	0	0	0	0	0	0	0
140°	0	0	0	0	0	0	0	0
141°	0	0	0	0	0	0	0	0
142°	0	0	0	0	0	0	0	0
143°	0	0	0	0	0	0	0	0
144°	0	0	0	0	0	0	0	0
145°	0	0	0	0	0	0	0	0
146°	0	0	0	0	0	0	0	0
147°	0	0	0	0	0	0	0	0
148°	0	0	0	0	0	0	0	0
149°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
150°	0	0	0	0	0	0	0	0
151°	0	0	0	0	0	0	0	0
152°	0	0	0	0	0	0	0	0
153°	0	0	0	0	0	0	0	0
154°	0	0	0	0	0	0	0	0
155°	0	0	0	0	0	0	0	0
156°	0	0	0	0	0	0	0	0
157°	0	0	0	0	0	0	0	0
158°	0	0	0	0	0	0	0	0
159°	1	1	1	1	1	0	1	0
160°	1	1	1	1	1	1	1	1
161°	1	1	1	1	1	1	1	1
162°	1	1	1	1	1	1	1	1
163°	1	1	1	1	1	1	1	1
164°	1	1	1	1	1	1	1	1
165°	1	1	1	1	1	1	1	1
166°	1	1	1	1	0	0	0	0
167°	0	0	0	0	0	0	0	0
168°	0	0	0	0	0	0	0	0
169°	0	0	0	0	0	0	0	0
170°	0	0	0	0	0	0	0	0
171°	0	0	0	0	0	0	0	0
172°	0	0	0	0	0	0	0	0
173°	0	0	0	0	0	0	0	0
174°	0	0	0	0	0	0	0	0
175°	0	0	0	0	0	0	0	0
176°	0	0	0	0	0	0	0	0
177°	0	0	0	0	0	0	0	0
178°	0	0	0	0	0	0	0	0
179°	0	0	0	0	0	0	0	0
180°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0°	252	252	252	252	252	252	252	252
1°	252	252	252	253	252	252	252	252
2°	252	252	252	253	252	252	252	252
3°	252	252	252	252	252	252	252	252
4°	252	251	252	252	252	251	251	251
5°	252	251	252	252	251	251	251	251
6°	251	251	251	251	251	251	250	250
7°	251	251	251	251	250	250	249	250
8°	250	250	250	251	250	250	249	248
9°	249	249	249	250	249	249	248	248
10°	248	249	249	249	248	248	247	247
11°	247	248	248	248	247	246	246	246
12°	247	247	247	247	246	246	245	245
13°	246	246	246	246	245	245	244	243
14°	244	245	245	245	244	243	243	242
15°	243	243	244	244	243	242	241	241
16°	242	242	242	242	241	241	240	239
17°	240	241	241	241	240	239	238	238
18°	239	240	239	239	238	238	237	236
19°	237	238	238	238	237	236	235	234
20°	236	236	236	236	235	234	233	232
21°	234	234	234	235	233	232	231	231
22°	232	233	233	233	231	231	229	229
23°	230	231	231	231	230	229	227	227
24°	228	229	229	229	228	227	225	225
25°	226	227	227	227	225	224	223	222
26°	224	224	225	225	223	222	221	220
27°	222	223	223	222	221	220	218	218
28°	220	220	220	220	219	218	216	215
29°	217	218	218	218	216	215	214	213
30°	215	215	216	215	214	213	211	210
31°	213	213	213	213	211	210	209	208
32°	210	210	211	210	209	208	206	205
33°	208	208	208	207	206	205	203	202
34°	205	205	205	205	203	202	200	199
35°	202	202	202	202	200	199	198	196
36°	199	199	199	199	197	196	195	193
37°	196	196	197	196	195	193	191	190
38°	193	194	194	193	192	190	188	187
39°	190	191	191	190	189	187	186	184
40°	187	188	188	187	186	184	183	181
41°	184	185	184	184	182	181	179	178
42°	181	181	181	181	179	178	176	174
43°	178	178	178	177	176	174	172	171
44°	174	175	175	174	173	171	169	168
45°	171	171	171	171	169	167	166	164
46°	168	168	168	167	165	164	162	161
47°	165	165	164	164	162	160	158	157
48°	161	161	161	160	158	157	155	153
49°	157	158	157	157	155	153	151	150

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
50°	154	154	154	153	151	150	148	146
51°	150	150	150	149	147	146	144	142
52°	147	147	147	146	144	142	140	138
53°	143	143	143	142	140	138	135	134
54°	139	139	139	138	135	134	131	130
55°	135	135	134	133	131	129	127	126
56°	131	131	130	129	127	125	123	122
57°	127	127	126	125	123	121	119	118
58°	123	123	123	121	119	118	115	114
59°	119	119	119	117	115	114	111	110
60°	115	115	115	113	111	109	107	106
61°	111	111	110	109	107	105	103	102
62°	107	107	106	105	103	101	99	98
63°	103	103	102	101	99	97	95	93
64°	99	99	98	97	95	93	91	89
65°	95	95	94	93	91	89	87	85
66°	90	90	90	89	87	84	82	81
67°	86	86	86	84	82	80	78	77
68°	82	82	82	80	78	76	74	73
69°	78	78	77	76	74	72	70	69
70°	74	74	73	72	70	68	66	64
71°	70	70	69	68	66	64	62	60
72°	66	66	65	64	61	59	58	56
73°	62	62	61	59	57	55	53	52
74°	58	58	57	55	53	51	49	48
75°	54	54	53	51	49	47	45	44
76°	50	50	49	47	45	43	42	40
77°	46	46	45	43	41	39	38	36
78°	42	42	41	39	37	36	34	33
79°	38	38	37	36	34	32	30	29
80°	34	34	33	32	30	28	27	25
81°	31	30	30	28	26	25	23	22
82°	27	27	26	25	23	21	20	19
83°	24	23	22	21	19	18	16	15
84°	20	20	19	18	16	15	13	12
85°	17	17	16	15	13	12	10	9
86°	14	14	13	12	10	8	7	6
87°	11	11	10	8	7	6	4	3
88°	8	8	7	6	4	3	2	1
89°	5	5	4	3	2	1	0	0
90°	2	2	2	1	0	0	0	0
91°	0	0	0	0	0	0	0	0
92°	0	0	0	0	0	0	0	0
93°	0	0	0	0	0	0	0	0
94°	0	0	0	0	0	0	0	0
95°	0	0	0	0	0	0	0	0
96°	0	0	0	0	0	0	0	0
97°	0	0	0	0	0	0	0	0
98°	0	0	0	0	0	0	0	0
99°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
100°	0	0	0	0	0	0	0	0
101°	0	0	0	0	0	0	0	0
102°	0	0	0	0	0	0	0	0
103°	0	0	0	0	0	0	0	0
104°	0	0	0	0	0	0	0	0
105°	0	0	0	0	0	0	0	0
106°	0	0	0	0	0	0	0	0
107°	0	0	0	0	0	0	0	0
108°	0	0	0	0	0	0	0	0
109°	0	0	0	0	0	0	0	0
110°	0	0	0	0	0	0	0	0
111°	0	0	0	0	0	0	0	0
112°	0	0	0	0	0	0	0	0
113°	0	0	0	0	0	0	0	0
114°	0	0	0	0	0	0	0	0
115°	0	0	0	0	0	0	0	0
116°	0	0	0	0	0	0	0	0
117°	0	0	0	0	0	0	0	0
118°	0	0	0	0	0	0	0	0
119°	0	0	0	0	0	0	0	0
120°	0	0	0	0	0	0	0	0
121°	0	0	0	0	0	0	0	0
122°	0	0	0	0	0	0	0	0
123°	0	0	0	0	0	0	0	0
124°	0	0	0	0	0	0	0	0
125°	0	0	0	0	0	0	0	0
126°	0	0	0	0	0	0	0	0
127°	0	0	0	0	0	0	0	0
128°	0	0	0	0	0	0	0	0
129°	0	0	0	0	0	0	0	0
130°	0	0	0	0	0	0	0	0
131°	0	0	0	0	0	0	0	0
132°	0	0	0	0	0	0	0	0
133°	0	0	0	0	0	0	0	0
134°	0	0	0	0	0	0	0	0
135°	0	0	0	0	0	0	0	0
136°	0	0	0	0	0	0	0	0
137°	0	0	0	0	0	0	0	0
138°	0	0	0	0	0	0	0	0
139°	0	0	0	0	0	0	0	0
140°	0	0	0	0	0	0	0	0
141°	0	0	0	0	0	0	0	0
142°	0	0	0	0	0	0	0	0
143°	0	0	0	0	0	0	0	0
144°	0	0	0	0	0	0	0	0
145°	0	0	0	0	0	0	0	0
146°	0	0	0	0	0	0	0	0
147°	0	0	0	0	0	0	0	0
148°	0	0	0	0	0	0	0	0
149°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
150°	0	0	0	0	0	0	0	0
151°	0	0	0	0	0	0	0	0
152°	0	0	0	0	0	0	0	0
153°	0	0	0	0	0	0	0	0
154°	0	0	0	0	0	0	0	0
155°	0	0	0	0	0	0	0	0
156°	0	0	0	0	0	0	0	0
157°	0	0	0	0	0	0	0	0
158°	0	0	0	0	0	0	0	0
159°	0	0	0	0	0	0	0	0
160°	0	0	0	0	0	0	0	0
161°	0	0	0	0	0	0	0	0
162°	0	0	0	0	0	0	0	0
163°	0	0	0	0	0	0	0	0
164°	0	0	0	0	0	0	0	0
165°	0	0	0	0	0	0	0	0
166°	0	0	0	0	0	0	0	0
167°	0	0	0	0	0	0	0	0
168°	0	0	0	0	0	0	0	0
169°	0	0	0	0	0	0	0	0
170°	0	0	0	0	0	0	0	0
171°	0	0	0	0	0	0	0	0
172°	0	0	0	0	0	0	0	0
173°	0	0	0	0	0	0	0	0
174°	0	0	0	0	0	0	0	0
175°	0	0	0	0	0	0	0	0
176°	0	0	0	0	0	0	0	0
177°	0	0	0	0	0	0	0	0
178°	0	0	0	0	0	0	0	0
179°	0	0	0	0	0	0	0	0
180°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	6.0	0.83
5-10	17.8	2.46
10-15	29.0	4.00
15-20	39.2	5.41
20-25	48.1	6.63
25-30	55.3	7.62
30-35	60.7	8.37
35-40	64.0	8.82
40-45	65.2	9.00
45-50	64.3	8.86
50-55	61.2	8.43
55-60	55.9	7.72
60-65	49.0	6.76
65-70	40.7	5.60
70-75	31.2	4.30
75-80	21.3	2.93
80-85	11.8	1.63
85-90	3.6	0.50
90-95	0.1	0.01
95-100	0.0	0.01
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.01
115-120	0.0	0.00
120-125	0.0	0.01
125-130	0.1	0.01
130-135	0.1	0.01
135-140	0.1	0.01
140-145	0.1	0.01
145-150	0.1	0.01
150-155	0.1	0.01
155-160	0.1	0.01
160-165	0.1	0.01
165-170	0.0	0.00
170-175	0.0	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	6.0	0.83
0-10	23.9	3.29
0-15	52.9	7.29
0-20	92.1	12.70
0-25	140.2	19.33
0-30	195.5	26.95
0-35	256.2	35.32
0-40	320.2	44.14
0-45	385.5	53.14
0-50	449.7	62.00
0-55	510.9	70.43
0-60	566.9	78.15
0-65	615.9	84.91
0-70	656.6	90.51
0-75	687.8	94.81
0-80	709.0	97.74
0-85	720.9	99.37
0-90	724.5	99.87
0-95	724.5	99.88
0-100	724.6	99.89
0-105	724.6	99.89
0-110	724.6	99.89
0-115	724.7	99.90
0-120	724.7	99.90
0-125	724.8	99.91
0-130	724.8	99.92
0-135	724.9	99.93
0-140	724.9	99.94
0-145	725.0	99.95
0-150	725.1	99.96
0-155	725.2	99.97
0-160	725.3	99.98
0-165	725.3	99.99
0-170	725.4	99.99
0-175	725.4	100.00
0-180	725.4	100.00

[Integrating Sphere System]

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

Test orientation: **Downward**

The test CCT: 4000K

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.093	10.83	0.97	762.9	70.44

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.7301	3990	-0.00491	0.3775	0.3647	0.2281	0.4957

Color Rendering Index

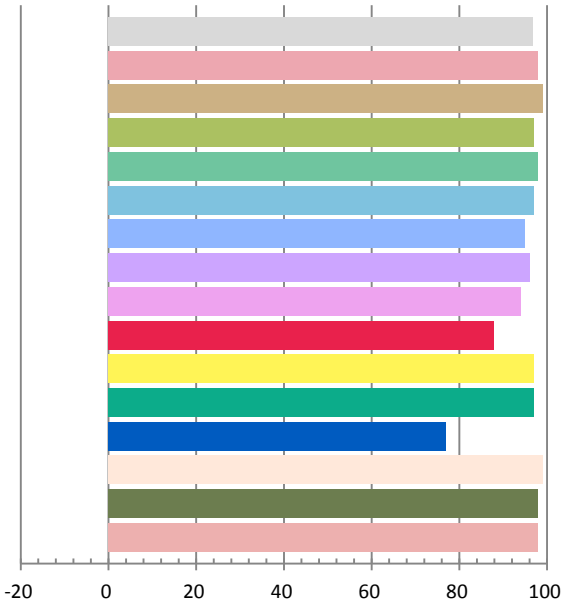
Ra
96.8

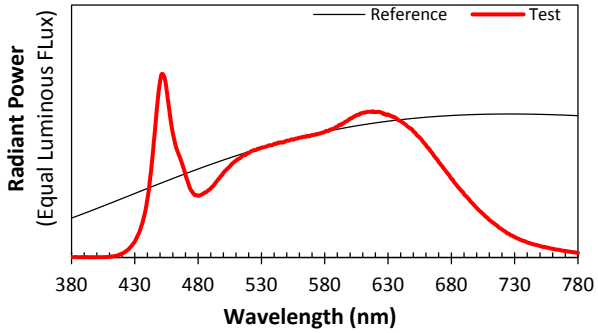
R1	R2	R3	R4
98	99	97	98

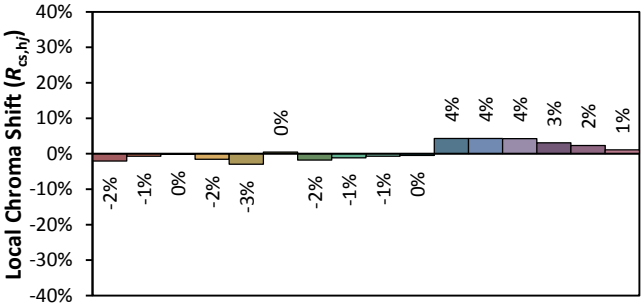
R5	R6	R7	R8
97	95	96	94

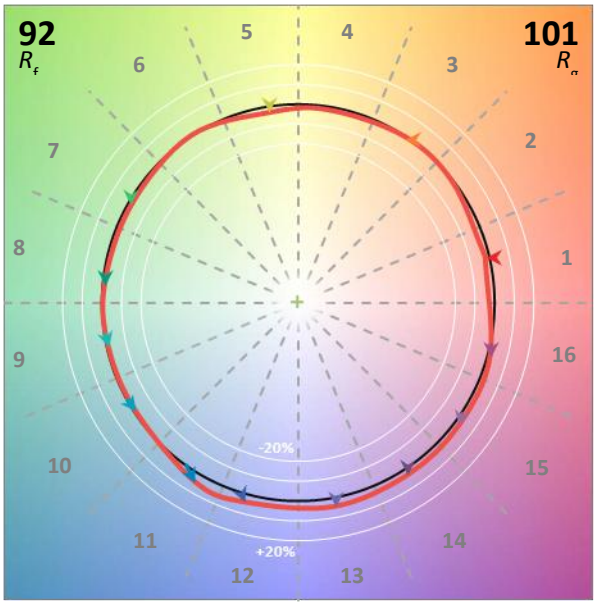
R9	R10	R11	R12
88	97	97	77

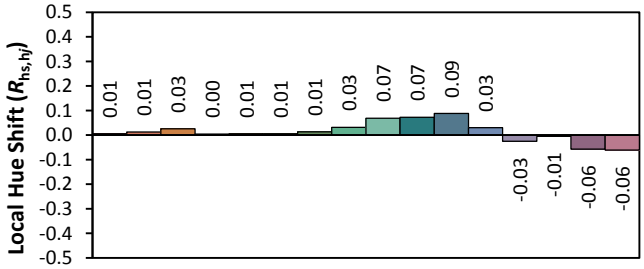
R13	R14	R15
99	98	98

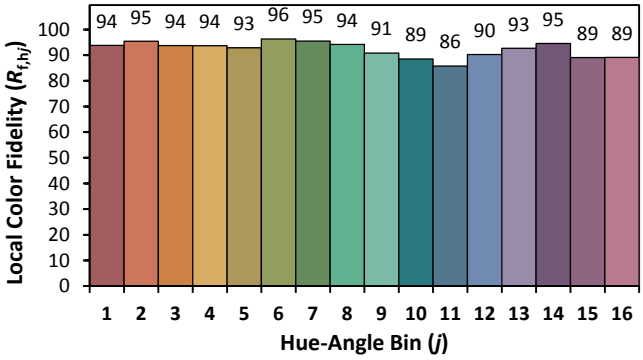


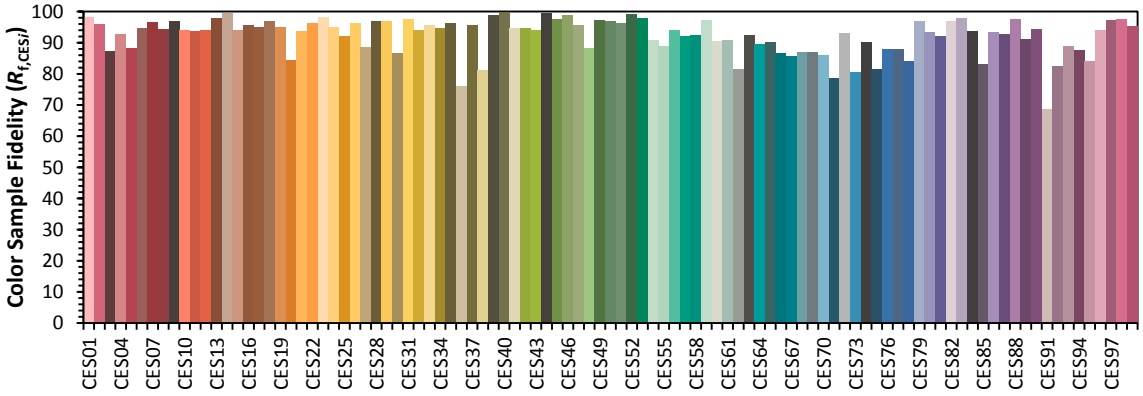

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-2% -1% 0% -2% -3% 0% -2% -1% -1% 0% 4% 4% 4% 3% 2% 1%

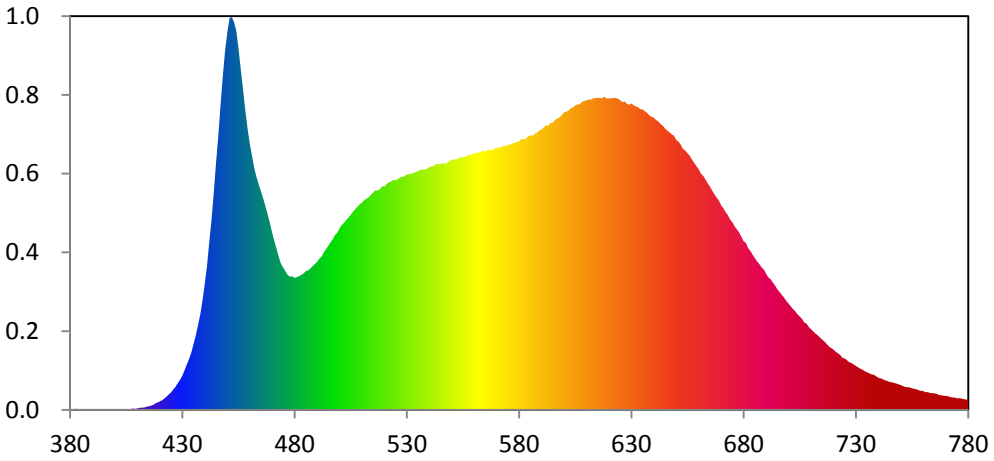

92
R_f
101
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


Local Hue Shift ($R_{hs,hj}$)
0.5 0.4 0.3 0.2 0.1 0.0 -0.1 -0.2 -0.3 -0.4 -0.5
0.01 0.01 0.03 0.00 0.01 0.01 0.01 0.03 0.07 0.07 0.09 0.03 -0.03 -0.01 -0.06 -0.06


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
94 95 94 94 93 96 95 94 91 89 86 90 93 95 89 89
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue-Angle Bin (j)


Color Sample Fidelity ($R_{f,CESi}$)
100 90 80 70 60 50 40 30 20 10 0
CES01 CES04 CES07 CES10 CES13 CES16 CES19 CES22 CES25 CES28 CES31 CES34 CES37 CES40 CES43 CES46 CES49 CES52 CES55 CES58 CES61 CES64 CES67 CES70 CES73 CES76 CES79 CES82 CES85 CES88 CES91 CES94 CES97

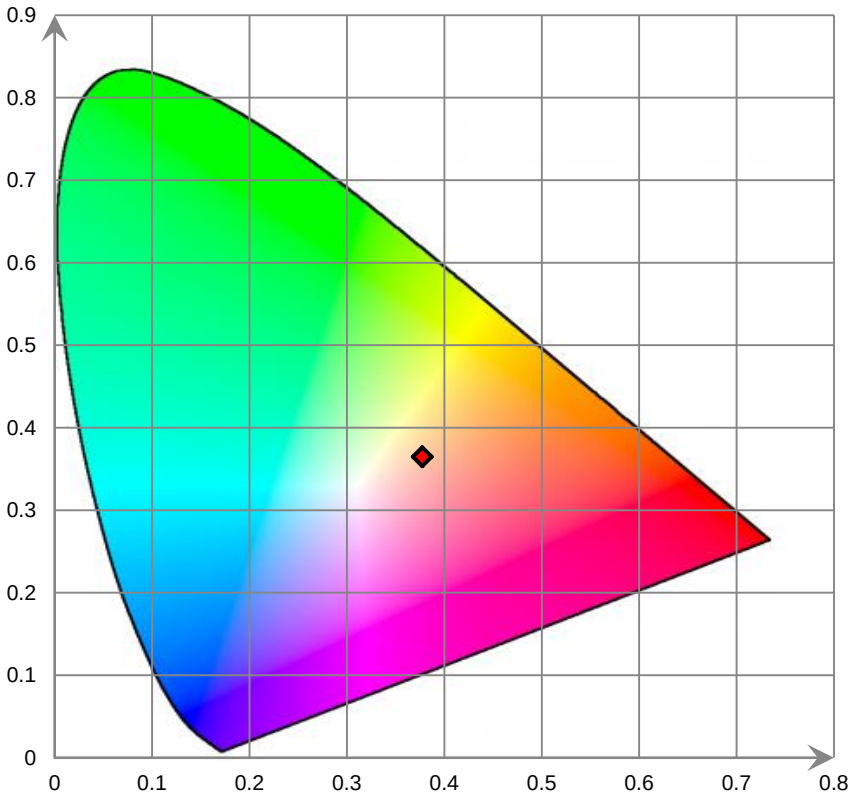
Relative Spectral Power Distribution



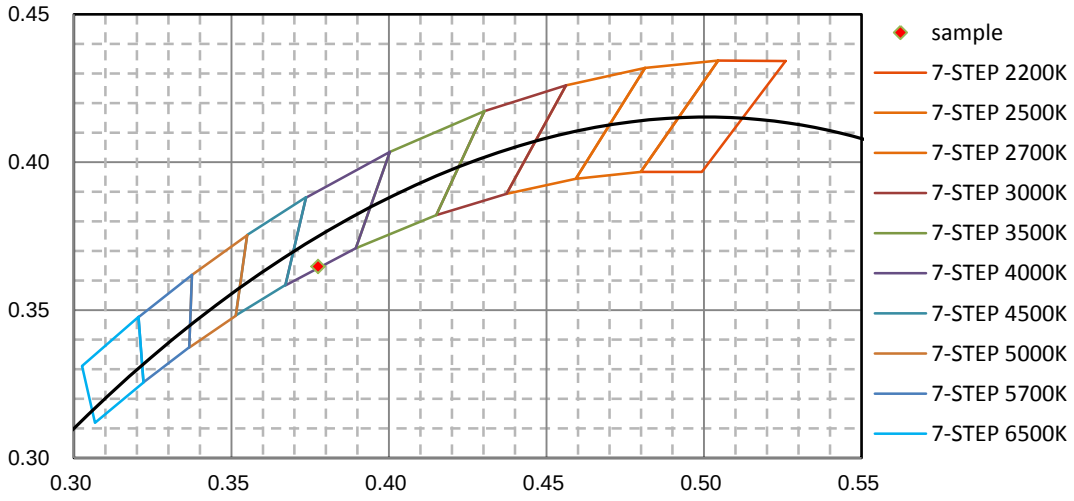
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.309E-02	421	4.037E-01	462	1.002E+01	503	7.846E+00	544	1.015E+01
381	2.081E-02	422	4.740E-01	463	9.632E+00	504	7.955E+00	545	1.018E+01
382	2.990E-02	423	5.532E-01	464	9.327E+00	505	8.058E+00	546	1.020E+01
383	5.275E-02	424	6.442E-01	465	9.042E+00	506	8.194E+00	547	1.017E+01
384	2.412E-02	425	7.253E-01	466	8.749E+00	507	8.308E+00	548	1.022E+01
385	3.831E-02	426	8.537E-01	467	8.429E+00	508	8.402E+00	549	1.029E+01
386	1.456E-02	427	9.666E-01	468	8.086E+00	509	8.501E+00	550	1.034E+01
387	3.544E-02	428	1.109E+00	469	7.729E+00	510	8.572E+00	551	1.035E+01
388	3.687E-02	429	1.252E+00	470	7.339E+00	511	8.677E+00	552	1.035E+01
389	3.218E-02	430	1.413E+00	471	6.978E+00	512	8.737E+00	553	1.041E+01
390	1.354E-02	431	1.640E+00	472	6.653E+00	513	8.794E+00	554	1.046E+01
391	3.667E-02	432	1.874E+00	473	6.321E+00	514	8.898E+00	555	1.044E+01
392	3.949E-02	433	2.104E+00	474	6.027E+00	515	8.979E+00	556	1.046E+01
393	3.035E-02	434	2.368E+00	475	5.883E+00	516	9.081E+00	557	1.052E+01
394	2.388E-02	435	2.726E+00	476	5.706E+00	517	9.071E+00	558	1.053E+01
395	2.062E-02	436	3.070E+00	477	5.569E+00	518	9.119E+00	559	1.057E+01
396	3.733E-02	437	3.505E+00	478	5.508E+00	519	9.251E+00	560	1.059E+01
397	3.107E-02	438	3.939E+00	479	5.524E+00	520	9.239E+00	561	1.063E+01
398	2.399E-02	439	4.520E+00	480	5.456E+00	521	9.339E+00	562	1.063E+01
399	2.610E-02	440	5.201E+00	481	5.493E+00	522	9.408E+00	563	1.068E+01
400	3.133E-02	441	5.930E+00	482	5.529E+00	523	9.444E+00	564	1.070E+01
401	2.786E-02	442	6.906E+00	483	5.587E+00	524	9.505E+00	565	1.068E+01
402	3.597E-02	443	7.834E+00	484	5.642E+00	525	9.503E+00	566	1.076E+01
403	2.934E-02	444	8.939E+00	485	5.739E+00	526	9.534E+00	567	1.074E+01
404	3.590E-02	445	1.016E+01	486	5.763E+00	527	9.620E+00	568	1.072E+01
405	3.154E-02	446	1.134E+01	487	5.847E+00	528	9.628E+00	569	1.081E+01
406	3.780E-02	447	1.261E+01	488	5.935E+00	529	9.671E+00	570	1.083E+01
407	3.940E-02	448	1.380E+01	489	6.028E+00	530	9.727E+00	571	1.084E+01
408	5.460E-02	449	1.483E+01	490	6.118E+00	531	9.745E+00	572	1.086E+01
409	4.701E-02	450	1.559E+01	491	6.254E+00	532	9.762E+00	573	1.092E+01
410	6.260E-02	451	1.620E+01	492	6.337E+00	533	9.795E+00	574	1.089E+01
411	8.421E-02	452	1.624E+01	493	6.504E+00	534	9.831E+00	575	1.095E+01
412	9.665E-02	453	1.604E+01	494	6.644E+00	535	9.870E+00	576	1.097E+01
413	1.014E-01	454	1.568E+01	495	6.786E+00	536	9.928E+00	577	1.101E+01
414	1.310E-01	455	1.495E+01	496	6.924E+00	537	9.933E+00	578	1.104E+01
415	1.497E-01	456	1.409E+01	497	7.049E+00	538	9.940E+00	579	1.108E+01
416	1.775E-01	457	1.327E+01	498	7.225E+00	539	9.963E+00	580	1.110E+01
417	2.131E-01	458	1.243E+01	499	7.318E+00	540	1.005E+01	581	1.120E+01
418	2.724E-01	459	1.166E+01	500	7.498E+00	541	1.007E+01	582	1.119E+01
419	3.090E-01	460	1.102E+01	501	7.633E+00	542	1.007E+01	583	1.121E+01
420	3.572E-01	461	1.053E+01	502	7.728E+00	543	1.017E+01	584	1.130E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.135E+01	626	1.272E+01	667	8.906E+00	708	3.568E+00	749	1.059E+00
586	1.134E+01	627	1.275E+01	668	8.768E+00	709	3.433E+00	750	1.022E+00
587	1.141E+01	628	1.265E+01	669	8.651E+00	710	3.335E+00	751	9.858E-01
588	1.146E+01	629	1.262E+01	670	8.455E+00	711	3.244E+00	752	9.495E-01
589	1.155E+01	630	1.267E+01	671	8.329E+00	712	3.154E+00	753	9.382E-01
590	1.159E+01	631	1.259E+01	672	8.173E+00	713	3.087E+00	754	9.336E-01
591	1.168E+01	632	1.254E+01	673	8.049E+00	714	2.992E+00	755	8.907E-01
592	1.177E+01	633	1.251E+01	674	7.866E+00	715	2.907E+00	756	8.731E-01
593	1.174E+01	634	1.243E+01	675	7.756E+00	716	2.828E+00	757	8.538E-01
594	1.185E+01	635	1.243E+01	676	7.585E+00	717	2.725E+00	758	8.145E-01
595	1.188E+01	636	1.235E+01	677	7.465E+00	718	2.620E+00	759	7.872E-01
596	1.199E+01	637	1.228E+01	678	7.333E+00	719	2.559E+00	760	7.811E-01
597	1.205E+01	638	1.217E+01	679	7.163E+00	720	2.491E+00	761	7.317E-01
598	1.210E+01	639	1.211E+01	680	6.968E+00	721	2.405E+00	762	7.405E-01
599	1.219E+01	640	1.208E+01	681	6.907E+00	722	2.338E+00	763	7.008E-01
600	1.230E+01	641	1.198E+01	682	6.690E+00	723	2.266E+00	764	6.906E-01
601	1.232E+01	642	1.192E+01	683	6.571E+00	724	2.146E+00	765	6.869E-01
602	1.238E+01	643	1.182E+01	684	6.423E+00	725	2.127E+00	766	6.614E-01
603	1.247E+01	644	1.175E+01	685	6.281E+00	726	2.052E+00	767	6.233E-01
604	1.251E+01	645	1.163E+01	686	6.142E+00	727	1.971E+00	768	6.081E-01
605	1.259E+01	646	1.155E+01	687	6.026E+00	728	1.943E+00	769	5.887E-01
606	1.263E+01	647	1.147E+01	688	5.886E+00	729	1.875E+00	770	5.826E-01
607	1.263E+01	648	1.139E+01	689	5.807E+00	730	1.817E+00	771	5.664E-01
608	1.274E+01	649	1.134E+01	690	5.619E+00	731	1.758E+00	772	5.374E-01
609	1.276E+01	650	1.115E+01	691	5.474E+00	732	1.702E+00	773	5.175E-01
610	1.280E+01	651	1.109E+01	692	5.402E+00	733	1.660E+00	774	5.181E-01
611	1.283E+01	652	1.096E+01	693	5.262E+00	734	1.597E+00	775	4.804E-01
612	1.283E+01	653	1.079E+01	694	5.137E+00	735	1.553E+00	776	4.845E-01
613	1.288E+01	654	1.072E+01	695	4.987E+00	736	1.510E+00	777	4.678E-01
614	1.289E+01	655	1.061E+01	696	4.870E+00	737	1.466E+00	778	4.492E-01
615	1.290E+01	656	1.050E+01	697	4.757E+00	738	1.450E+00	779	4.277E-01
616	1.290E+01	657	1.034E+01	698	4.639E+00	739	1.396E+00	780	4.223E-01
617	1.288E+01	658	1.020E+01	699	4.500E+00	740	1.326E+00		
618	1.295E+01	659	1.007E+01	700	4.397E+00	741	1.307E+00		
619	1.287E+01	660	9.940E+00	701	4.275E+00	742	1.278E+00		
620	1.288E+01	661	9.757E+00	702	4.162E+00	743	1.221E+00		
621	1.288E+01	662	9.677E+00	703	4.069E+00	744	1.205E+00		
622	1.289E+01	663	9.519E+00	704	3.956E+00	745	1.155E+00		
623	1.289E+01	664	9.366E+00	705	3.863E+00	746	1.141E+00		
624	1.286E+01	665	9.231E+00	706	3.764E+00	747	1.115E+00		
625	1.281E+01	666	9.056E+00	707	3.616E+00	748	1.087E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Integrating Sphere System]

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

Test orientation: **Downward**

The test CCT: 5000K

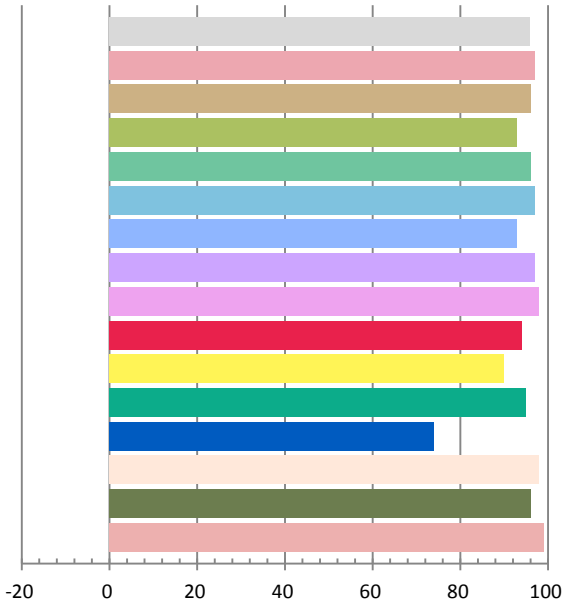
Photometric and Electrical Measurement Result

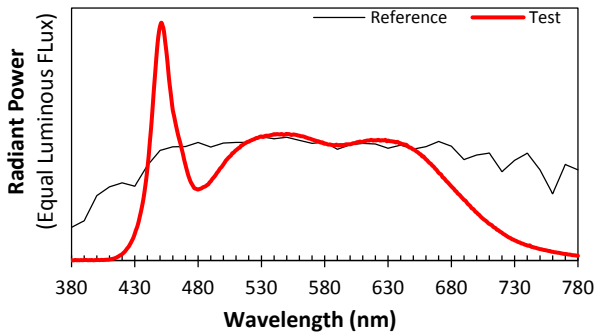
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.0959	11.18	0.9717	735.95	65.81

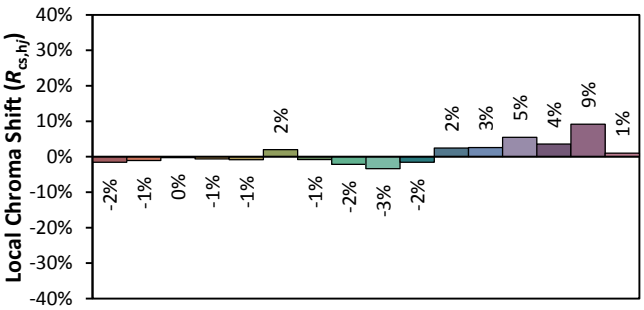
Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.6849	5198	-0.000923	0.3397	0.3454	0.2101	0.4808

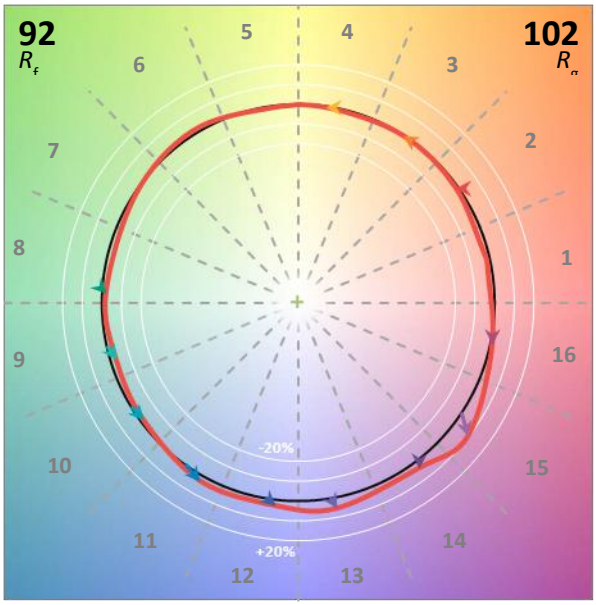
Color Rendering Index

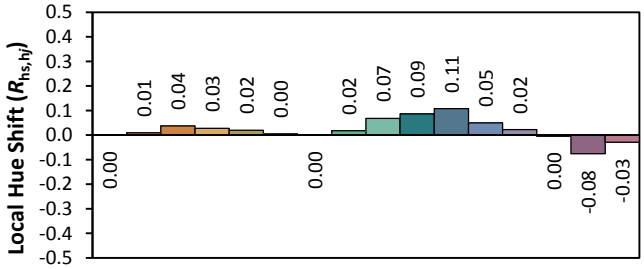
Ra			
95.9			
R1	R2	R3	R4
97	96	93	96
R5	R6	R7	R8
97	93	97	98
R9	R10	R11	R12
94	90	95	74
R13	R14	R15	
98	96	99	

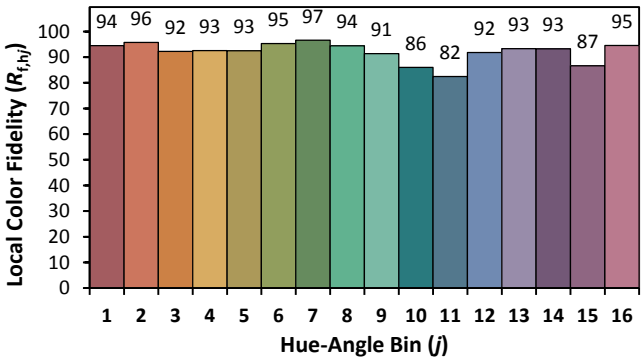


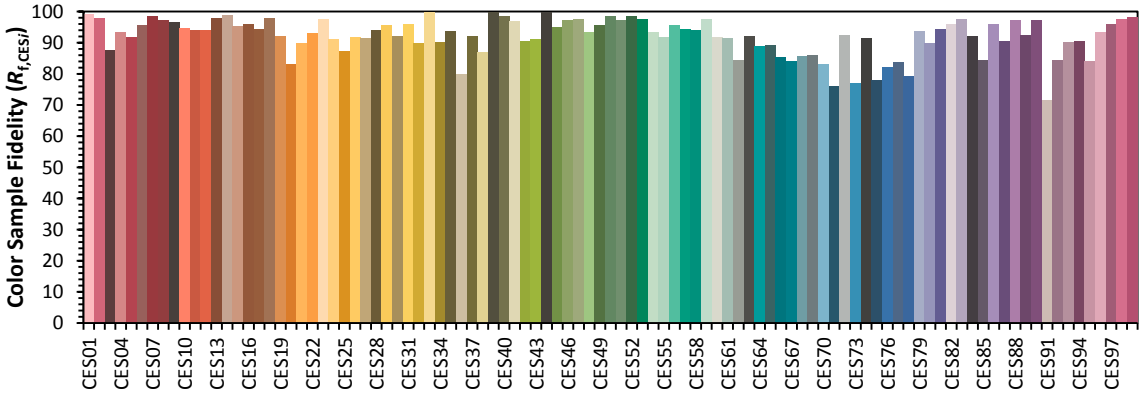

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-2% -1% 0% -1% -1% 2% -1% -2% -3% -2% 2% 3% 5% 4% 9% 1%

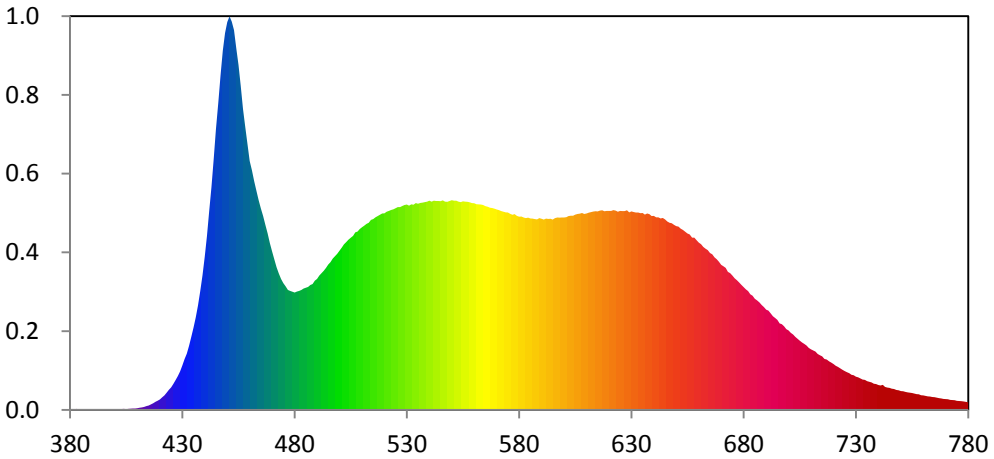

92
R_f
102
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


Local Hue Shift ($R_{hs,hj}$)
0.5 0.4 0.3 0.2 0.1 0.0 -0.1 -0.2 -0.3 -0.4 -0.5
0.00 0.01 0.04 0.03 0.02 0.00 0.00 0.02 0.07 0.09 0.11 0.05 0.02 0.00 -0.08 -0.03


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
94 96 92 93 93 95 97 94 91 86 82 92 93 93 87 95
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue-Angle Bin (j)


Color Sample Fidelity ($R_{f,CESi}$)
100 90 80 70 60 50 40 30 20 10 0
CES01 CES04 CES07 CES10 CES13 CES16 CES19 CES22 CES25 CES28 CES31 CES34 CES37 CES40 CES43 CES46 CES49 CES52 CES55 CES58 CES61 CES64 CES67 CES70 CES73 CES76 CES79 CES82 CES85 CES88 CES91 CES94 CES97

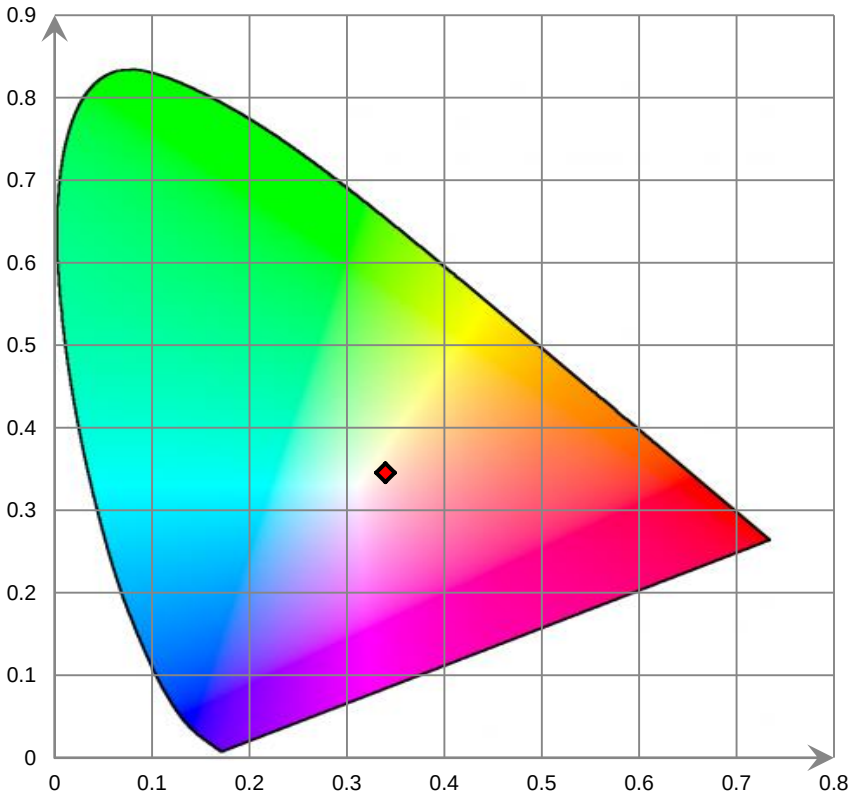
Relative Spectral Power Distribution



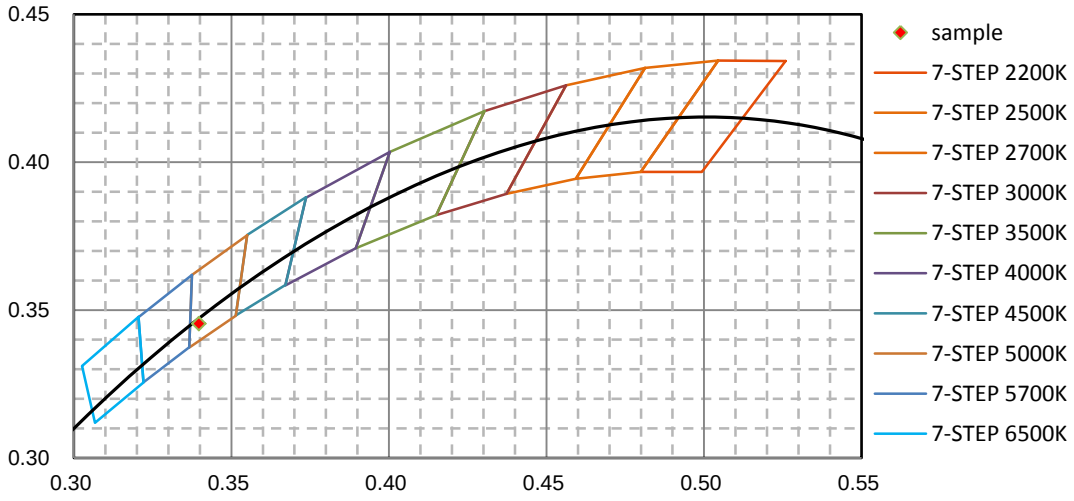
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.092E-02	421	6.487E-01	462	1.180E+01	503	8.654E+00	544	1.077E+01
381	1.450E-02	422	7.476E-01	463	1.130E+01	504	8.782E+00	545	1.076E+01
382	1.959E-02	423	8.854E-01	464	1.081E+01	505	8.878E+00	546	1.081E+01
383	5.306E-02	424	1.035E+00	465	1.039E+01	506	8.977E+00	547	1.074E+01
384	1.825E-02	425	1.163E+00	466	9.997E+00	507	9.154E+00	548	1.073E+01
385	3.879E-02	426	1.340E+00	467	9.542E+00	508	9.202E+00	549	1.078E+01
386	2.116E-02	427	1.541E+00	468	9.112E+00	509	9.329E+00	550	1.081E+01
387	3.677E-02	428	1.750E+00	469	8.607E+00	510	9.421E+00	551	1.079E+01
388	3.519E-02	429	1.984E+00	470	8.175E+00	511	9.503E+00	552	1.079E+01
389	2.885E-02	430	2.290E+00	471	7.765E+00	512	9.600E+00	553	1.074E+01
390	4.428E-02	431	2.622E+00	472	7.362E+00	513	9.650E+00	554	1.072E+01
391	4.664E-02	432	2.904E+00	473	7.037E+00	514	9.805E+00	555	1.076E+01
392	4.468E-02	433	3.306E+00	474	6.753E+00	515	9.844E+00	556	1.075E+01
393	2.309E-02	434	3.770E+00	475	6.544E+00	516	9.935E+00	557	1.073E+01
394	3.901E-02	435	4.249E+00	476	6.367E+00	517	9.996E+00	558	1.071E+01
395	3.059E-02	436	4.774E+00	477	6.184E+00	518	1.006E+01	559	1.067E+01
396	4.630E-02	437	5.392E+00	478	6.137E+00	519	1.013E+01	560	1.066E+01
397	2.192E-02	438	6.128E+00	479	6.095E+00	520	1.014E+01	561	1.061E+01
398	2.649E-02	439	6.937E+00	480	6.059E+00	521	1.022E+01	562	1.061E+01
399	4.413E-02	440	7.897E+00	481	6.103E+00	522	1.026E+01	563	1.059E+01
400	4.194E-02	441	8.974E+00	482	6.134E+00	523	1.031E+01	564	1.056E+01
401	4.896E-02	442	1.027E+01	483	6.187E+00	524	1.035E+01	565	1.051E+01
402	3.528E-02	443	1.149E+01	484	6.260E+00	525	1.040E+01	566	1.048E+01
403	4.862E-02	444	1.293E+01	485	6.300E+00	526	1.046E+01	567	1.043E+01
404	5.866E-02	445	1.447E+01	486	6.345E+00	527	1.046E+01	568	1.041E+01
405	4.165E-02	446	1.586E+01	487	6.447E+00	528	1.052E+01	569	1.038E+01
406	5.311E-02	447	1.727E+01	488	6.495E+00	529	1.057E+01	570	1.033E+01
407	6.536E-02	448	1.854E+01	489	6.665E+00	530	1.059E+01	571	1.030E+01
408	7.357E-02	449	1.944E+01	490	6.759E+00	531	1.054E+01	572	1.026E+01
409	6.945E-02	450	2.001E+01	491	6.929E+00	532	1.061E+01	573	1.023E+01
410	9.228E-02	451	2.030E+01	492	7.052E+00	533	1.059E+01	574	1.019E+01
411	1.172E-01	452	2.003E+01	493	7.178E+00	534	1.067E+01	575	1.018E+01
412	1.327E-01	453	1.959E+01	494	7.325E+00	535	1.063E+01	576	1.012E+01
413	1.580E-01	454	1.866E+01	495	7.499E+00	536	1.067E+01	577	1.006E+01
414	1.922E-01	455	1.780E+01	496	7.620E+00	537	1.069E+01	578	1.010E+01
415	2.284E-01	456	1.672E+01	497	7.807E+00	538	1.072E+01	579	1.001E+01
416	2.898E-01	457	1.554E+01	498	7.925E+00	539	1.074E+01	580	9.964E+00
417	3.424E-01	458	1.461E+01	499	8.049E+00	540	1.079E+01	581	9.973E+00
418	4.191E-01	459	1.372E+01	500	8.211E+00	541	1.075E+01	582	9.923E+00
419	4.758E-01	460	1.284E+01	501	8.366E+00	542	1.079E+01	583	9.891E+00
420	5.470E-01	461	1.236E+01	502	8.543E+00	543	1.078E+01	584	9.915E+00

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	9.878E+00	626	1.026E+01	667	7.873E+00	708	3.325E+00	749	1.012E+00
586	9.864E+00	627	1.026E+01	668	7.775E+00	709	3.203E+00	750	9.737E-01
587	9.845E+00	628	1.030E+01	669	7.639E+00	710	3.129E+00	751	9.662E-01
588	9.823E+00	629	1.018E+01	670	7.484E+00	711	3.066E+00	752	9.311E-01
589	9.893E+00	630	1.024E+01	671	7.406E+00	712	3.014E+00	753	9.089E-01
590	9.860E+00	631	1.021E+01	672	7.329E+00	713	2.887E+00	754	8.906E-01
591	9.821E+00	632	1.018E+01	673	7.121E+00	714	2.819E+00	755	8.691E-01
592	9.866E+00	633	1.018E+01	674	7.050E+00	715	2.759E+00	756	8.432E-01
593	9.851E+00	634	1.015E+01	675	6.930E+00	716	2.629E+00	757	8.156E-01
594	9.860E+00	635	1.015E+01	676	6.789E+00	717	2.594E+00	758	8.088E-01
595	9.821E+00	636	1.008E+01	677	6.695E+00	718	2.506E+00	759	7.544E-01
596	9.888E+00	637	1.013E+01	678	6.576E+00	719	2.438E+00	760	7.484E-01
597	9.921E+00	638	1.010E+01	679	6.450E+00	720	2.369E+00	761	7.216E-01
598	9.918E+00	639	9.999E+00	680	6.334E+00	721	2.274E+00	762	7.015E-01
599	9.926E+00	640	1.001E+01	681	6.216E+00	722	2.219E+00	763	6.921E-01
600	9.921E+00	641	9.937E+00	682	6.126E+00	723	2.145E+00	764	6.670E-01
601	9.945E+00	642	9.931E+00	683	5.964E+00	724	2.072E+00	765	6.601E-01
602	9.997E+00	643	9.874E+00	684	5.890E+00	725	2.001E+00	766	6.351E-01
603	1.002E+01	644	9.897E+00	685	5.730E+00	726	1.946E+00	767	6.120E-01
604	1.002E+01	645	9.824E+00	686	5.649E+00	727	1.899E+00	768	5.885E-01
605	1.008E+01	646	9.720E+00	687	5.543E+00	728	1.809E+00	769	5.665E-01
606	1.011E+01	647	9.651E+00	688	5.409E+00	729	1.791E+00	770	5.575E-01
607	1.012E+01	648	9.631E+00	689	5.303E+00	730	1.718E+00	771	5.531E-01
608	1.016E+01	649	9.546E+00	690	5.175E+00	731	1.685E+00	772	5.211E-01
609	1.011E+01	650	9.478E+00	691	5.121E+00	732	1.627E+00	773	5.120E-01
610	1.013E+01	651	9.453E+00	692	4.982E+00	733	1.570E+00	774	5.035E-01
611	1.018E+01	652	9.346E+00	693	4.835E+00	734	1.548E+00	775	4.696E-01
612	1.020E+01	653	9.279E+00	694	4.741E+00	735	1.480E+00	776	4.571E-01
613	1.023E+01	654	9.194E+00	695	4.641E+00	736	1.452E+00	777	4.498E-01
614	1.025E+01	655	9.100E+00	696	4.467E+00	737	1.414E+00	778	4.396E-01
615	1.024E+01	656	9.047E+00	697	4.420E+00	738	1.350E+00	779	4.191E-01
616	1.028E+01	657	8.886E+00	698	4.316E+00	739	1.334E+00	780	3.987E-01
617	1.030E+01	658	8.886E+00	699	4.164E+00	740	1.285E+00		
618	1.024E+01	659	8.750E+00	700	4.097E+00	741	1.263E+00		
619	1.026E+01	660	8.634E+00	701	3.975E+00	742	1.294E+00		
620	1.026E+01	661	8.544E+00	702	3.896E+00	743	1.184E+00		
621	1.026E+01	662	8.411E+00	703	3.770E+00	744	1.155E+00		
622	1.030E+01	663	8.314E+00	704	3.667E+00	745	1.133E+00		
623	1.028E+01	664	8.241E+00	705	3.570E+00	746	1.094E+00		
624	1.023E+01	665	8.093E+00	706	3.484E+00	747	1.081E+00		
625	1.027E+01	666	8.025E+00	707	3.407E+00	748	1.034E+00		

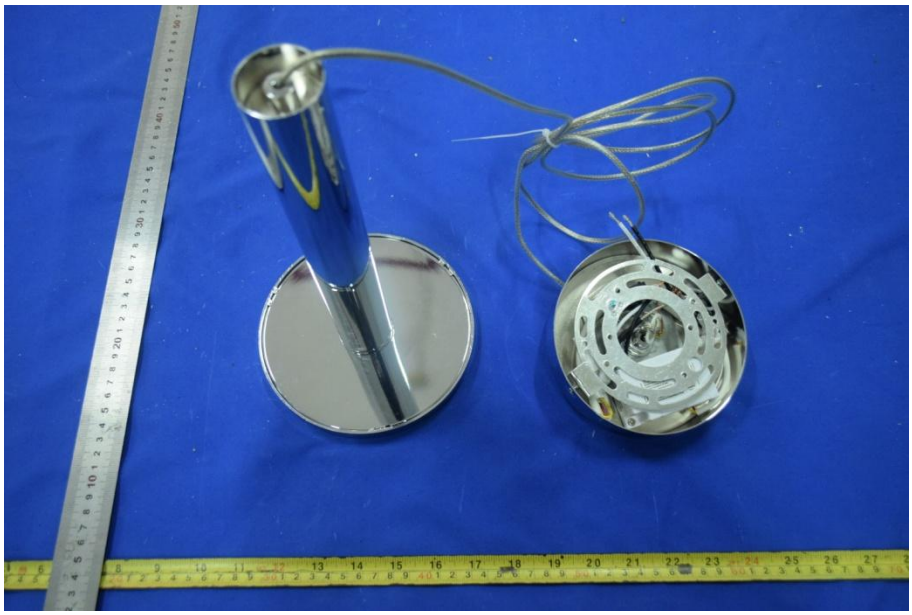
CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



6. Product Photo



Directions

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2. This report includes some test methods are not in NVLAP accreditation scope marked *.
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**********