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: 15A19DIM/827

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
Reviewed By:	George Chen
Report Number:	KS2211206-62745E-10
Test Date:	2021-12-16
Report Date:	2021-12-28
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588

1. Product Description

General Information:

One test sample was in good condition and received on 2021-12-06, and used for testing.

Model Tested:	15A19DIM/827
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	LED Lamp
Burning Time Before Test:	0hour(For New Products)

#Rated Values:

Rated Voltage/Frequency:	120 V AC 60Hz
Rated Power:	15W
Nominal CCT:	2700K
Nominal Lumen Output:	1600 lm

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 IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
1.5m integrating sphere	SENSING	1.5m	NA	2021-06-30	2022-06-29
Digital power meter	EVERFINE	PF9811	G135717CN1361159	2021-09-23	2022-09-22
High-precision rapid spectral radiometer	EVERFINE	HAAS-2000	N/A	2021-06-30	2022-06-29
Precision frequency power supply	ALL Power	APW-105N	970663	2021-01-04	2022-01-03
Standard Light Source	EVERFINE	D204	N/A	2021-10-15	2022-10-14
thermometer	SENSING	NA	NA	2021-04-27	2022-04-26
Programmable Precision DC Power Supply	EVERFINE	WY5015	11060010	2021-06-30	2022-06-29
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2021-01-04	2022-01-03
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2021-01-04	2022-01-03
Digital power meter	YOKOGAWA	WT-210	91j926132	2021-01-04	2022-01-03
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2021-03-12	2022-03-11

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
wireless remote thermohygrometer	N/A	433MHz	N/A	2021-04-27	2022-04-26
Standard Light Source	EVERFINE	D908	1012003	2021-10-15	2022-10-14

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) 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=21K (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=0.19 % of rdg, AC Voltage U=0.17% of rdg, Power U=0.48% (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]

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

Test orientation: **Base up**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1157	13.66	0.984	1705.9	124.87

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
5.3923	2707	-0.00182	0.4562	0.4049	0.2627	0.5246

Color Rendering Index

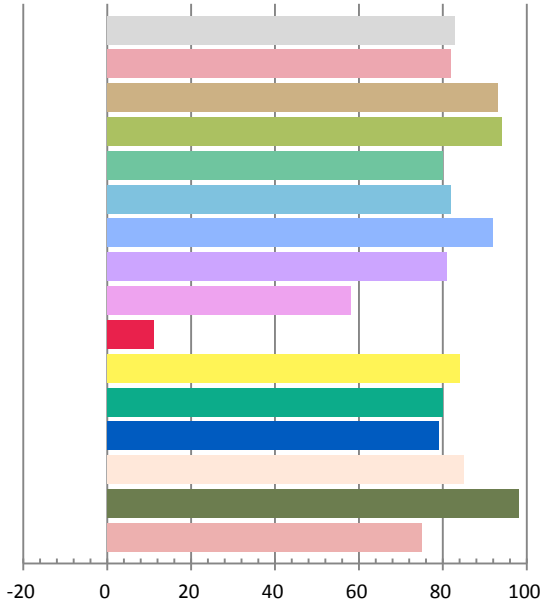
Ra
82.9

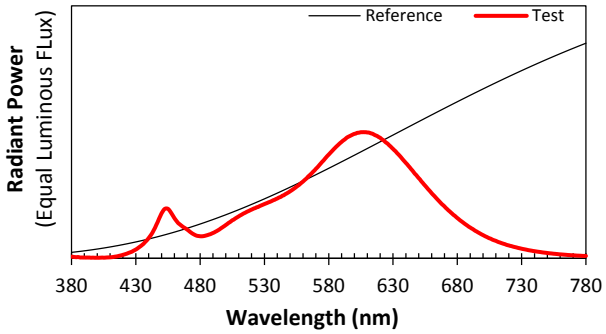
R1	R2	R3	R4
82	93	94	80

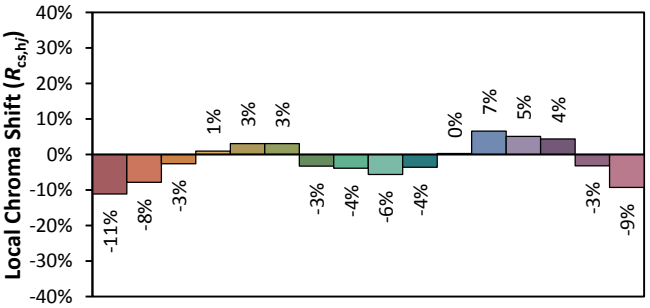
R5	R6	R7	R8
82	92	81	58

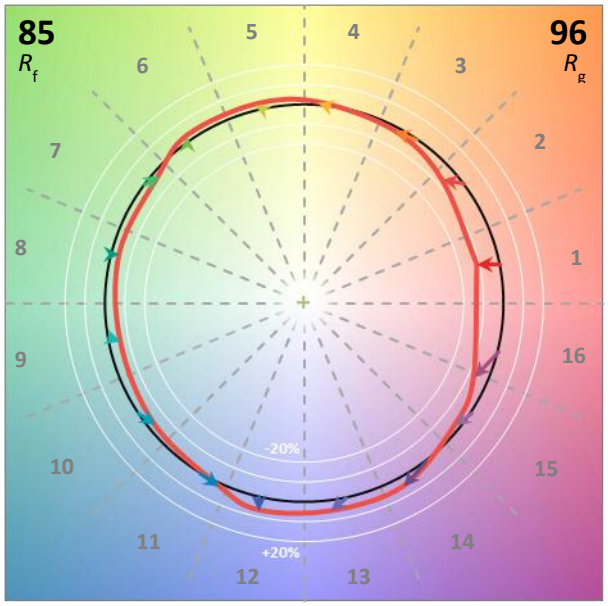
R9	R10	R11	R12
11	84	80	79

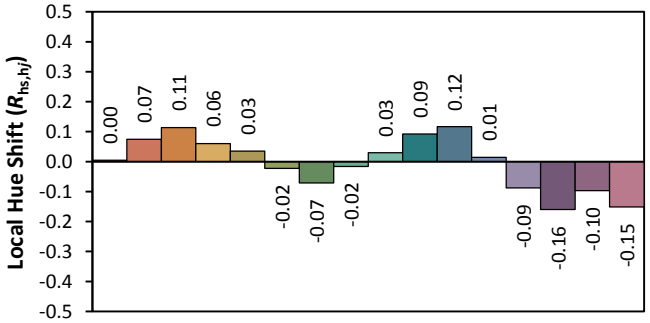
R13	R14	R15
85	98	75

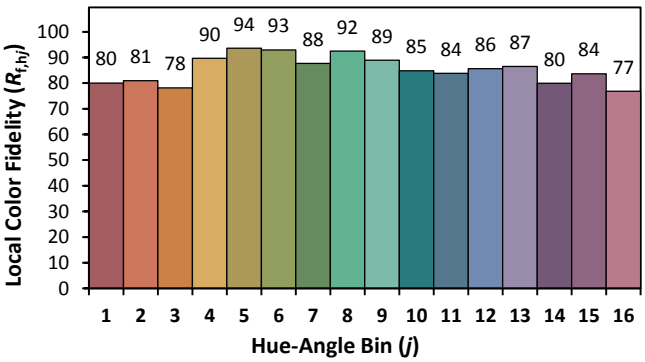


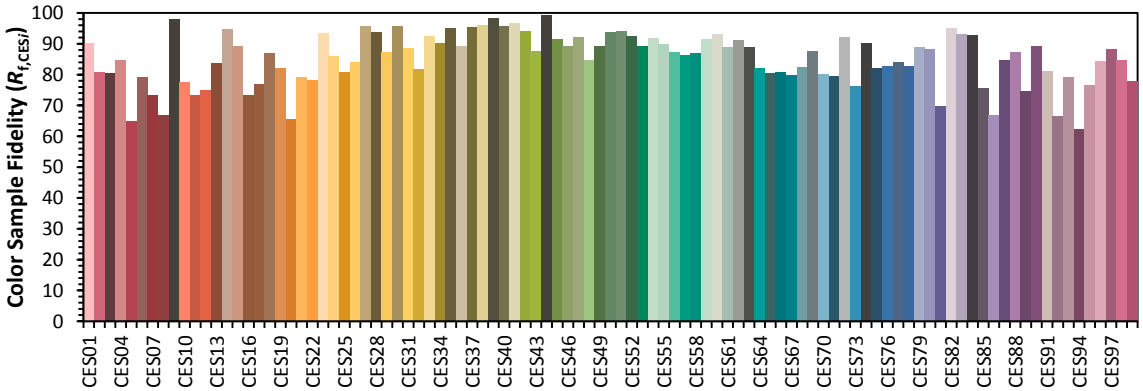

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-11% -8% -3% 1% 3% 3% -3% -4% -6% -4% 0% 7% 5% 4% -3% -9%

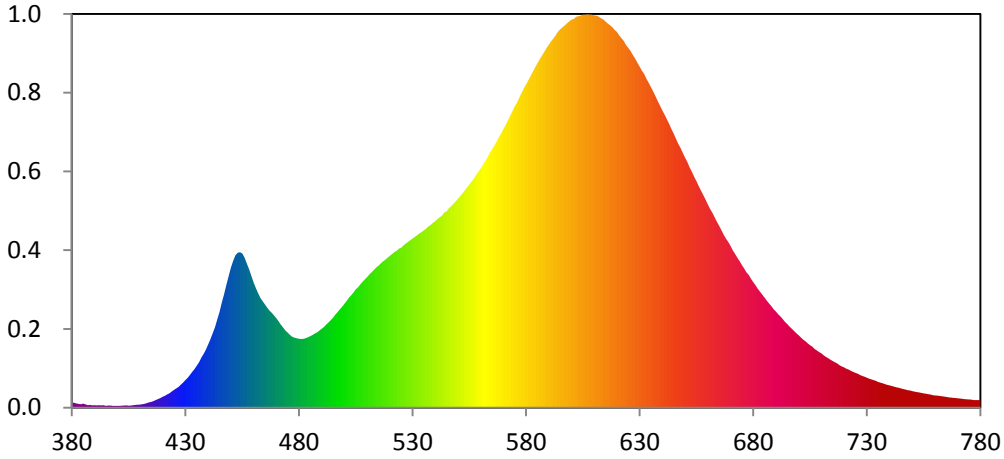

85
R_f
96
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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 0.07 0.11 0.06 0.03 -0.02 -0.07 -0.02 0.03 0.09 0.12 0.01 -0.09 -0.16 -0.10 -0.15


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
80 81 78 90 94 93 88 92 89 85 84 86 87 80 84 77
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

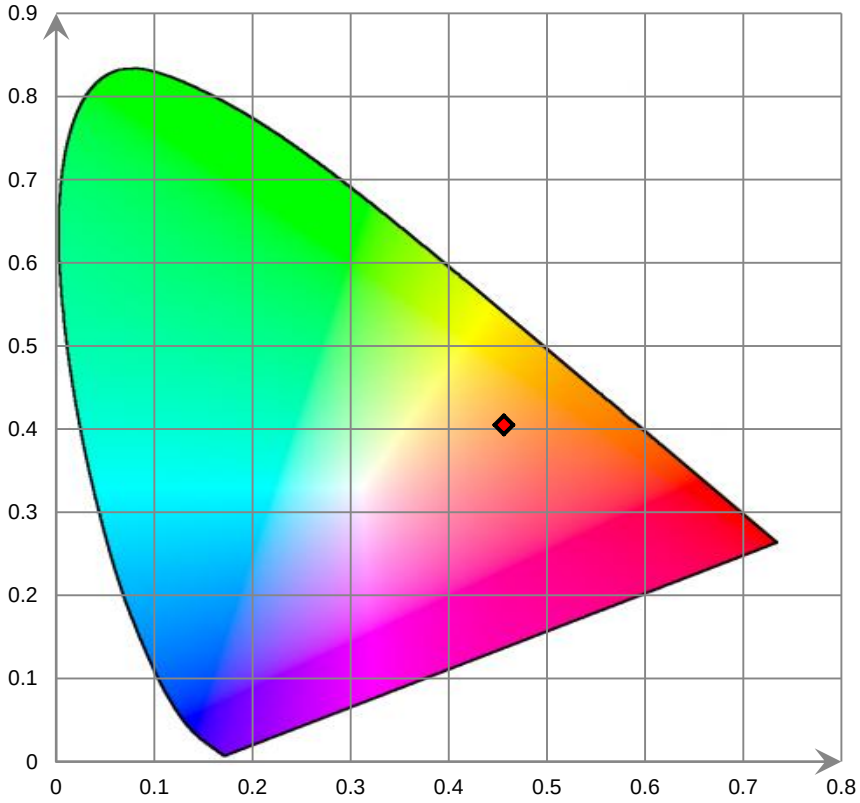
Relative Spectral Power Distribution



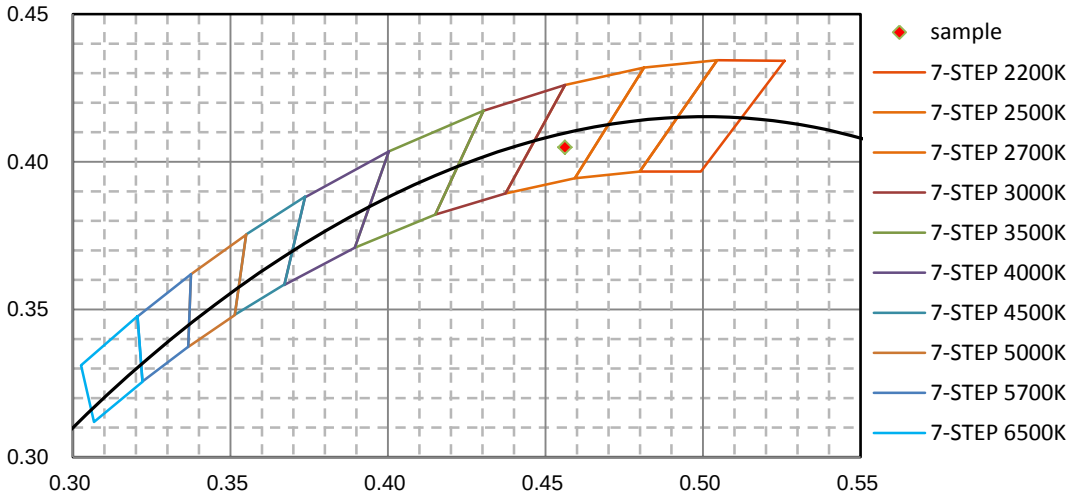
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.050E-01	421	1.145E+00	462	1.092E+01	503	1.071E+01	544	1.860E+01
381	4.684E-01	422	1.271E+00	463	1.045E+01	504	1.098E+01	545	1.870E+01
382	4.063E-01	423	1.389E+00	464	1.015E+01	505	1.129E+01	546	1.899E+01
383	3.620E-01	424	1.554E+00	465	9.841E+00	506	1.146E+01	547	1.919E+01
384	3.387E-01	425	1.701E+00	466	9.539E+00	507	1.174E+01	548	1.942E+01
385	3.957E-01	426	1.834E+00	467	9.261E+00	508	1.199E+01	549	1.964E+01
386	3.169E-01	427	1.989E+00	468	9.028E+00	509	1.222E+01	550	1.990E+01
387	2.345E-01	428	2.210E+00	469	8.782E+00	510	1.245E+01	551	2.015E+01
388	2.653E-01	429	2.411E+00	470	8.523E+00	511	1.270E+01	552	2.041E+01
389	2.336E-01	430	2.623E+00	471	8.238E+00	512	1.290E+01	553	2.069E+01
390	2.443E-01	431	2.850E+00	472	7.913E+00	513	1.313E+01	554	2.096E+01
391	2.217E-01	432	3.134E+00	473	7.630E+00	514	1.335E+01	555	2.126E+01
392	2.422E-01	433	3.418E+00	474	7.359E+00	515	1.352E+01	556	2.155E+01
393	2.305E-01	434	3.688E+00	475	7.149E+00	516	1.374E+01	557	2.181E+01
394	2.348E-01	435	4.005E+00	476	6.944E+00	517	1.393E+01	558	2.217E+01
395	1.821E-01	436	4.317E+00	477	6.767E+00	518	1.409E+01	559	2.248E+01
396	2.007E-01	437	4.751E+00	478	6.663E+00	519	1.429E+01	560	2.279E+01
397	2.077E-01	438	5.131E+00	479	6.613E+00	520	1.446E+01	561	2.315E+01
398	1.715E-01	439	5.534E+00	480	6.564E+00	521	1.464E+01	562	2.348E+01
399	1.759E-01	440	6.009E+00	481	6.547E+00	522	1.482E+01	563	2.382E+01
400	1.844E-01	441	6.520E+00	482	6.566E+00	523	1.493E+01	564	2.427E+01
401	1.751E-01	442	7.061E+00	483	6.625E+00	524	1.516E+01	565	2.461E+01
402	1.898E-01	443	7.672E+00	484	6.715E+00	525	1.523E+01	566	2.497E+01
403	2.058E-01	444	8.400E+00	485	6.821E+00	526	1.545E+01	567	2.533E+01
404	2.278E-01	445	9.103E+00	486	6.933E+00	527	1.562E+01	568	2.576E+01
405	1.929E-01	446	9.986E+00	487	7.068E+00	528	1.578E+01	569	2.611E+01
406	2.095E-01	447	1.077E+01	488	7.178E+00	529	1.595E+01	570	2.656E+01
407	2.419E-01	448	1.170E+01	489	7.356E+00	530	1.611E+01	571	2.693E+01
408	2.679E-01	449	1.251E+01	490	7.527E+00	531	1.627E+01	572	2.735E+01
409	2.841E-01	450	1.333E+01	491	7.695E+00	532	1.641E+01	573	2.781E+01
410	3.022E-01	451	1.396E+01	492	7.919E+00	533	1.659E+01	574	2.824E+01
411	3.378E-01	452	1.451E+01	493	8.110E+00	534	1.673E+01	575	2.868E+01
412	3.780E-01	453	1.476E+01	494	8.348E+00	535	1.689E+01	576	2.906E+01
413	4.430E-01	454	1.480E+01	495	8.572E+00	536	1.707E+01	577	2.953E+01
414	5.123E-01	455	1.469E+01	496	8.864E+00	537	1.727E+01	578	2.998E+01
415	5.622E-01	456	1.432E+01	497	9.106E+00	538	1.739E+01	579	3.041E+01
416	6.392E-01	457	1.378E+01	498	9.370E+00	539	1.761E+01	580	3.079E+01
417	7.438E-01	458	1.319E+01	499	9.624E+00	540	1.775E+01	581	3.120E+01
418	8.353E-01	459	1.257E+01	500	9.905E+00	541	1.798E+01	582	3.161E+01
419	9.208E-01	460	1.194E+01	501	1.017E+01	542	1.814E+01	583	3.201E+01
420	1.044E+00	461	1.141E+01	502	1.048E+01	543	1.830E+01	584	3.242E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.280E+01	626	3.397E+01	667	1.649E+01	708	5.447E+00	749	1.638E+00
586	3.319E+01	627	3.356E+01	668	1.609E+01	709	5.307E+00	750	1.584E+00
587	3.354E+01	628	3.324E+01	669	1.577E+01	710	5.181E+00	751	1.532E+00
588	3.390E+01	629	3.284E+01	670	1.541E+01	711	4.999E+00	752	1.486E+00
589	3.425E+01	630	3.248E+01	671	1.499E+01	712	4.836E+00	753	1.460E+00
590	3.456E+01	631	3.209E+01	672	1.465E+01	713	4.714E+00	754	1.411E+00
591	3.490E+01	632	3.176E+01	673	1.427E+01	714	4.570E+00	755	1.362E+00
592	3.516E+01	633	3.130E+01	674	1.395E+01	715	4.440E+00	756	1.338E+00
593	3.546E+01	634	3.092E+01	675	1.359E+01	716	4.315E+00	757	1.294E+00
594	3.580E+01	635	3.051E+01	676	1.326E+01	717	4.209E+00	758	1.257E+00
595	3.603E+01	636	3.009E+01	677	1.290E+01	718	4.047E+00	759	1.208E+00
596	3.622E+01	637	2.962E+01	678	1.264E+01	719	3.923E+00	760	1.179E+00
597	3.641E+01	638	2.917E+01	679	1.228E+01	720	3.839E+00	761	1.154E+00
598	3.660E+01	639	2.874E+01	680	1.196E+01	721	3.714E+00	762	1.125E+00
599	3.679E+01	640	2.831E+01	681	1.166E+01	722	3.638E+00	763	1.092E+00
600	3.695E+01	641	2.791E+01	682	1.133E+01	723	3.518E+00	764	1.060E+00
601	3.702E+01	642	2.744E+01	683	1.105E+01	724	3.414E+00	765	1.033E+00
602	3.723E+01	643	2.701E+01	684	1.077E+01	725	3.322E+00	766	9.884E-01
603	3.727E+01	644	2.651E+01	685	1.048E+01	726	3.238E+00	767	9.748E-01
604	3.734E+01	645	2.609E+01	686	1.019E+01	727	3.117E+00	768	9.377E-01
605	3.743E+01	646	2.560E+01	687	9.927E+00	728	3.034E+00	769	9.178E-01
606	3.743E+01	647	2.510E+01	688	9.659E+00	729	2.953E+00	770	8.936E-01
607	3.745E+01	648	2.473E+01	689	9.366E+00	730	2.855E+00	771	8.759E-01
608	3.743E+01	649	2.425E+01	690	9.154E+00	731	2.773E+00	772	8.477E-01
609	3.743E+01	650	2.380E+01	691	8.898E+00	732	2.699E+00	773	8.168E-01
610	3.735E+01	651	2.340E+01	692	8.690E+00	733	2.625E+00	774	8.056E-01
611	3.734E+01	652	2.286E+01	693	8.420E+00	734	2.549E+00	775	7.877E-01
612	3.722E+01	653	2.245E+01	694	8.157E+00	735	2.451E+00	776	7.681E-01
613	3.708E+01	654	2.198E+01	695	7.967E+00	736	2.385E+00	777	7.334E-01
614	3.698E+01	655	2.156E+01	696	7.725E+00	737	2.323E+00	778	7.239E-01
615	3.678E+01	656	2.112E+01	697	7.518E+00	738	2.253E+00	779	7.226E-01
616	3.656E+01	657	2.065E+01	698	7.298E+00	739	2.179E+00	780	7.240E-01
617	3.641E+01	658	2.024E+01	699	7.084E+00	740	2.128E+00		
618	3.622E+01	659	1.982E+01	700	6.894E+00	741	2.065E+00		
619	3.596E+01	660	1.935E+01	701	6.684E+00	742	2.006E+00		
620	3.578E+01	661	1.893E+01	702	6.489E+00	743	1.945E+00		
621	3.544E+01	662	1.855E+01	703	6.324E+00	744	1.902E+00		
622	3.517E+01	663	1.813E+01	704	6.116E+00	745	1.841E+00		
623	3.492E+01	664	1.771E+01	705	5.945E+00	746	1.773E+00		
624	3.453E+01	665	1.731E+01	706	5.823E+00	747	1.729E+00		
625	3.425E+01	666	1.690E+01	707	5.606E+00	748	1.679E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Base up**

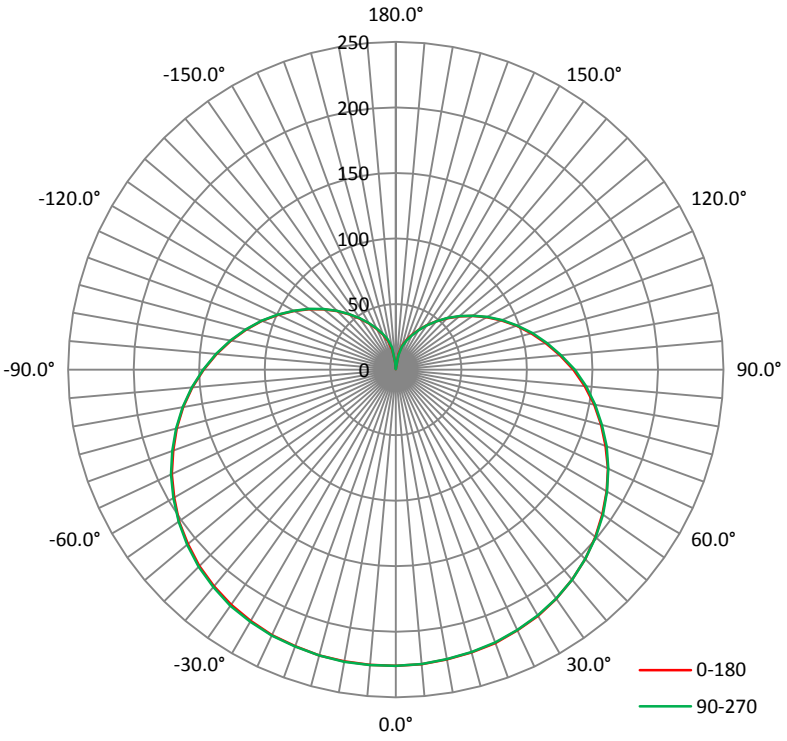
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1157	13.67	0.9843

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1707.22	124.92	226.8	1.45	1.45

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	209.2	209.1	209.7	210.0	209.5
Field Angle (10% I_{max}):	326.5	326.9	326.7	326.8	326.7

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	226	226	226	226	226	226	226	226
1°	226	226	226	226	226	226	226	226
2°	226	226	226	226	226	226	226	226
3°	226	226	226	226	226	226	226	226
4°	226	226	226	226	226	226	226	226
5°	226	226	226	227	226	226	226	226
6°	226	226	227	226	226	226	226	226
7°	226	226	227	227	226	226	226	225
8°	226	226	226	227	226	226	226	225
9°	226	226	227	227	226	226	226	225
10°	226	226	226	227	226	226	225	225
11°	226	226	226	227	227	226	225	225
12°	226	226	226	227	226	226	225	225
13°	226	226	226	227	226	225	225	225
14°	226	226	226	226	226	226	225	224
15°	226	226	226	226	226	225	225	224
16°	225	226	226	226	226	225	224	224
17°	225	226	226	226	225	225	224	224
18°	225	225	226	226	226	225	224	224
19°	225	225	226	226	225	225	224	223
20°	225	225	225	226	225	225	224	223
21°	225	225	225	226	225	224	223	222
22°	224	225	225	225	225	224	223	222
23°	224	225	225	225	224	224	223	222
24°	224	224	225	225	224	224	222	221
25°	224	224	225	225	224	223	222	221
26°	223	224	224	224	223	223	222	220
27°	223	224	224	224	223	222	221	220
28°	222	223	224	224	223	222	221	220
29°	222	223	223	223	223	222	220	219
30°	221	222	223	223	222	221	220	218
31°	221	222	222	223	222	221	219	218
32°	221	222	222	222	221	220	219	217
33°	220	221	221	222	221	220	218	217
34°	220	220	221	221	220	219	218	216
35°	219	220	221	221	220	219	217	215
36°	218	219	220	220	219	218	216	215
37°	218	219	219	220	219	217	216	214
38°	217	218	218	219	218	217	215	213
39°	217	217	218	218	217	216	214	212
40°	216	217	217	218	217	215	213	211
41°	215	216	217	217	216	215	213	211
42°	215	215	216	216	215	214	212	210
43°	214	215	215	215	214	213	211	209
44°	213	214	214	214	213	212	210	208
45°	212	213	214	214	213	211	209	207
46°	211	212	213	213	212	210	208	206
47°	210	211	212	212	211	209	207	205
48°	209	210	211	211	210	208	206	204
49°	208	209	210	210	209	207	205	202

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
50°	207	208	209	209	208	206	204	202
51°	206	207	208	208	207	205	203	200
52°	205	206	207	207	206	204	202	199
53°	204	205	206	206	204	203	200	198
54°	203	204	205	205	203	202	199	197
55°	202	203	204	203	202	201	198	196
56°	200	202	202	202	201	199	197	194
57°	199	201	201	201	200	198	196	193
58°	198	199	200	200	199	197	194	192
59°	196	198	199	199	197	196	193	190
60°	195	197	197	197	196	194	192	189
61°	194	196	196	196	195	193	190	187
62°	193	194	195	195	193	192	189	186
63°	191	193	193	193	192	190	187	184
64°	190	191	192	192	191	189	186	183
65°	188	190	191	190	189	187	184	182
66°	187	188	189	189	188	186	183	180
67°	186	187	187	187	186	184	182	179
68°	184	185	186	186	184	183	180	177
69°	182	184	185	184	183	181	178	175
70°	181	182	183	183	181	180	177	174
71°	179	181	182	182	180	178	175	172
72°	178	179	180	180	179	177	174	171
73°	176	178	178	178	177	175	172	169
74°	175	176	177	177	175	173	170	167
75°	173	174	175	175	173	172	169	166
76°	171	173	173	173	172	170	167	164
77°	170	171	172	172	170	168	165	162
78°	168	169	170	170	168	167	164	161
79°	166	168	168	168	167	165	162	159
80°	165	166	167	166	165	163	160	157
81°	163	164	165	165	163	161	159	155
82°	161	163	163	163	161	160	157	154
83°	159	161	161	161	160	158	155	152
84°	158	159	160	159	158	156	153	150
85°	156	157	158	158	156	154	151	148
86°	154	155	156	156	154	152	150	147
87°	152	154	154	154	152	151	148	145
88°	150	152	152	152	151	149	146	143
89°	149	150	151	150	149	147	144	141
90°	147	148	149	148	147	145	142	139
91°	145	146	147	147	145	143	140	137
92°	143	144	145	145	143	142	138	135
93°	141	142	143	143	141	139	137	134
94°	139	141	141	141	140	138	135	132
95°	137	139	139	139	138	136	133	130
96°	135	137	137	137	136	134	131	128
97°	134	135	135	135	134	132	129	126
98°	131	133	134	133	132	130	127	124
99°	130	131	132	131	130	128	125	122

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
100°	128	129	130	130	128	126	123	120
101°	126	127	128	128	126	124	122	119
102°	124	125	126	126	124	122	120	117
103°	122	123	124	124	122	121	118	115
104°	120	121	122	122	120	118	116	113
105°	118	120	120	120	118	117	114	111
106°	116	118	118	118	116	115	112	109
107°	114	116	116	116	115	113	110	107
108°	112	114	114	114	113	111	108	106
109°	110	112	112	112	111	109	106	104
110°	109	110	110	110	109	107	104	102
111°	107	108	108	108	107	105	102	100
112°	105	106	106	106	105	103	101	98
113°	103	104	105	104	103	101	99	96
114°	101	102	103	102	101	99	97	94
115°	99	100	101	101	99	97	95	93
116°	97	98	99	99	97	96	93	91
117°	95	96	97	97	96	94	91	89
118°	93	95	95	95	94	92	90	87
119°	91	93	93	93	92	90	88	85
120°	89	91	91	91	90	88	86	83
121°	88	89	89	89	88	86	84	82
122°	86	87	88	87	86	85	82	80
123°	84	85	86	85	84	83	80	78
124°	82	83	84	84	83	81	79	76
125°	80	82	82	82	81	79	77	75
126°	79	80	80	80	79	77	75	73
127°	77	78	78	78	77	76	74	71
128°	75	76	77	76	75	74	72	70
129°	73	74	75	75	74	72	70	68
130°	72	73	73	73	72	70	68	67
131°	70	71	71	71	70	69	67	65
132°	68	69	70	70	69	67	65	63
133°	66	68	68	68	67	65	63	62
134°	65	66	66	66	65	64	62	60
135°	63	64	64	65	63	62	60	58
136°	62	63	63	63	62	61	59	57
137°	60	61	61	61	60	59	57	55
138°	58	59	60	60	59	57	55	54
139°	57	58	58	58	57	56	54	52
140°	55	56	56	56	55	54	52	51
141°	53	54	55	55	54	52	51	49
142°	52	53	53	53	52	51	49	48
143°	50	51	52	51	51	50	48	46
144°	49	50	50	50	49	48	47	45
145°	47	48	49	48	48	47	45	44
146°	46	47	47	47	46	45	44	42
147°	45	45	46	46	45	44	43	41
148°	43	44	44	44	44	43	41	40
149°	42	43	43	43	42	41	40	39

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
150°	41	41	42	42	41	40	39	37
151°	39	40	40	40	40	39	37	36
152°	38	39	39	39	38	37	36	35
153°	37	37	38	38	37	36	35	34
154°	35	36	37	36	36	35	34	33
155°	34	35	35	35	35	34	33	32
156°	33	34	34	34	33	33	32	31
157°	32	32	33	33	32	32	31	29
158°	31	31	32	32	31	30	29	28
159°	29	30	30	30	30	29	28	27
160°	28	29	29	29	29	28	27	26
161°	27	28	28	28	28	27	26	25
162°	26	27	27	27	27	26	25	24
163°	25	26	26	26	26	25	24	23
164°	24	25	25	25	25	24	23	22
165°	22	23	24	24	24	23	22	21
166°	21	22	23	23	23	22	21	20
167°	20	21	22	22	21	21	20	19
168°	18	20	20	20	20	19	19	18
169°	17	18	19	19	19	18	17	16
170°	15	17	18	17	17	17	16	15
171°	14	15	16	15	15	15	14	13
172°	12	12	14	13	13	13	13	11
173°	11	10	11	10	11	10	11	9
174°	9	8	8	8	8	8	8	7
175°	7	5	6	5	6	6	6	3
176°	4	3	3	3	3	3	3	0
177°	0	0	0	0	0	1	1	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°	226	226	226	226	226	226	226	226
1°	226	226	226	226	226	226	226	226
2°	226	225	225	226	226	226	226	226
3°	226	225	225	226	225	226	226	226
4°	226	225	226	225	226	226	226	226
5°	226	225	226	225	226	226	226	226
6°	225	225	225	225	225	225	226	226
7°	225	225	225	225	225	225	226	226
8°	225	225	225	225	225	225	226	226
9°	225	224	224	225	225	225	225	226
10°	225	224	224	224	224	225	225	226
11°	224	224	224	224	224	225	225	226
12°	224	224	224	224	224	224	225	226
13°	224	224	223	224	224	224	225	225
14°	224	223	223	223	223	224	224	225
15°	223	223	223	223	223	224	224	225
16°	223	222	222	222	223	223	224	225
17°	223	222	222	222	222	223	224	225
18°	222	222	222	222	222	223	223	224
19°	222	221	221	222	222	222	223	224
20°	222	221	221	221	221	222	223	224
21°	222	221	221	221	221	222	223	223
22°	221	220	220	221	221	221	222	223
23°	221	220	220	220	221	221	222	223
24°	220	219	219	219	220	221	222	223
25°	219	219	219	219	219	220	221	222
26°	219	218	218	218	219	220	221	222
27°	219	218	218	218	218	220	221	222
28°	218	218	217	217	218	219	220	221
29°	218	217	216	217	217	219	220	221
30°	217	216	216	216	217	218	219	220
31°	216	215	215	216	216	217	219	220
32°	215	215	214	215	216	217	218	219
33°	215	214	214	214	215	216	217	219
34°	214	213	213	214	214	215	217	218
35°	213	212	212	213	213	215	216	217
36°	213	212	211	212	213	214	215	217
37°	212	211	211	211	212	213	215	216
38°	211	210	210	210	211	213	214	216
39°	210	209	209	209	210	212	213	215
40°	209	208	208	208	209	211	212	214
41°	209	207	207	208	208	210	212	213
42°	208	206	206	207	208	209	211	212
43°	207	205	205	206	206	208	210	212
44°	205	204	204	205	206	207	209	211
45°	204	203	203	204	204	206	208	209
46°	203	202	202	202	203	205	207	209
47°	202	201	201	202	202	204	206	208
48°	201	200	200	200	201	203	205	207
49°	200	199	198	199	200	202	204	206

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
50°	199	198	197	198	199	201	203	205
51°	198	196	196	197	198	200	202	203
52°	196	195	195	196	197	199	201	202
53°	195	194	194	194	196	197	199	201
54°	194	192	192	193	194	196	198	200
55°	192	191	191	192	193	195	197	199
56°	191	190	190	191	192	194	196	198
57°	190	189	188	189	190	192	195	197
58°	189	187	187	188	189	191	193	195
59°	187	186	186	186	187	190	192	194
60°	186	184	184	185	186	188	191	192
61°	184	183	183	184	185	187	189	191
62°	183	181	181	182	184	186	188	190
63°	182	180	180	181	182	184	186	188
64°	180	178	178	179	181	183	185	187
65°	179	177	177	178	179	181	183	185
66°	177	175	175	176	178	180	182	184
67°	175	174	173	174	176	178	180	182
68°	173	172	172	173	175	177	179	181
69°	172	171	170	171	173	175	178	179
70°	170	169	169	170	171	174	176	178
71°	169	167	167	168	170	172	174	176
72°	167	166	166	167	168	170	173	175
73°	166	164	164	165	166	169	171	173
74°	164	162	162	163	165	167	170	172
75°	162	161	160	161	163	166	168	170
76°	160	159	159	160	161	164	166	168
77°	159	157	157	158	160	162	164	166
78°	157	156	155	156	158	160	163	165
79°	155	154	153	155	156	159	161	163
80°	154	152	152	153	154	157	159	161
81°	152	150	150	151	153	155	158	159
82°	150	149	149	149	151	154	156	158
83°	148	147	147	148	149	152	154	156
84°	147	145	145	146	148	150	152	154
85°	145	143	143	144	146	148	150	152
86°	143	141	141	142	144	146	149	151
87°	141	140	139	140	142	145	147	149
88°	139	138	138	139	140	143	145	147
89°	138	136	136	137	138	141	143	145
90°	136	134	134	135	137	139	141	143
91°	134	133	132	133	135	137	140	142
92°	132	131	130	131	133	135	138	140
93°	130	128	128	129	131	134	136	138
94°	128	126	126	127	129	132	134	136
95°	126	124	124	125	126	130	132	134
96°	124	122	122	123	125	127	130	132
97°	122	121	120	121	123	125	128	130
98°	120	119	118	119	121	123	126	127
99°	118	117	117	117	119	121	124	125

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
100°	116	115	115	115	117	120	122	124
101°	114	113	113	114	115	117	120	122
102°	112	111	111	112	113	116	118	120
103°	111	109	109	110	112	114	116	118
104°	109	107	107	108	110	112	114	116
105°	107	106	105	106	108	110	112	114
106°	105	104	103	104	106	108	110	112
107°	103	102	102	103	104	106	108	110
108°	102	100	100	101	102	104	106	108
109°	100	98	98	99	100	103	105	107
110°	98	97	96	97	98	101	103	105
111°	96	95	94	95	97	99	101	103
112°	94	93	93	93	95	97	99	101
113°	92	91	91	92	93	95	97	99
114°	91	89	89	90	91	93	95	97
115°	89	88	87	88	89	91	93	95
116°	87	86	85	86	88	90	92	93
117°	85	84	84	84	86	88	90	91
118°	83	82	82	83	84	86	88	90
119°	82	81	80	81	82	84	86	88
120°	80	79	78	79	81	82	84	86
121°	78	77	77	77	79	81	82	84
122°	76	75	75	76	77	79	81	82
123°	75	74	73	74	75	77	79	81
124°	73	72	72	72	73	75	77	79
125°	71	70	70	71	72	74	75	77
126°	70	69	68	69	70	72	74	75
127°	68	67	67	67	68	70	72	74
128°	66	65	65	66	67	68	70	72
129°	65	64	63	64	65	67	69	70
130°	63	62	62	62	64	65	67	68
131°	62	61	60	61	62	64	65	67
132°	60	59	59	59	60	62	63	65
133°	58	57	57	58	59	60	62	63
134°	57	56	56	56	57	59	60	62
135°	55	54	54	55	56	57	59	60
136°	54	53	53	53	54	56	57	58
137°	52	52	51	52	53	54	55	57
138°	51	50	50	50	51	53	54	55
139°	49	49	48	49	50	51	52	54
140°	48	47	47	47	48	50	51	52
141°	47	46	46	46	47	48	49	51
142°	45	45	44	45	45	47	48	49
143°	44	43	43	43	44	45	47	48
144°	43	42	41	42	43	44	45	46
145°	41	41	40	40	41	42	44	45
146°	40	39	39	39	40	41	42	43
147°	39	38	38	38	39	40	41	42
148°	37	37	36	37	37	38	40	41
149°	36	36	35	35	36	37	38	39

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
150°	35	34	34	34	35	36	37	38
151°	34	33	33	33	34	35	36	37
152°	33	32	32	32	32	33	34	35
153°	32	31	31	31	31	32	33	34
154°	31	30	29	30	30	31	32	33
155°	29	29	28	28	29	30	31	32
156°	28	28	27	27	28	28	29	31
157°	27	27	26	26	27	27	28	29
158°	26	26	25	25	26	26	27	28
159°	25	25	24	24	25	25	26	27
160°	24	24	23	23	23	24	25	26
161°	23	23	22	22	22	23	24	25
162°	22	22	22	21	21	22	23	24
163°	21	21	21	20	20	21	22	23
164°	20	20	19	19	19	20	21	22
165°	19	19	18	18	18	19	19	20
166°	18	18	17	17	17	17	18	19
167°	17	17	16	15	16	16	17	18
168°	15	15	15	14	14	15	16	17
169°	14	14	13	12	13	13	14	15
170°	12	12	11	11	11	11	12	13
171°	11	10	10	9	9	10	11	12
172°	8	8	7	7	7	7	9	10
173°	5	5	3	3	4	4	6	7
174°	1	1	1	0	0	1	2	4
175°	0	0	0	0	0	0	0	1
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	5.4	0.32
5-10	16.1	0.94
10-15	26.7	1.56
15-20	36.9	2.17
20-25	46.7	2.73
25-30	55.8	3.27
30-35	64.2	3.76
35-40	71.6	4.19
40-45	78.0	4.57
45-50	83.2	4.88
50-55	87.1	5.10
55-60	89.8	5.26
60-65	91.1	5.33
65-70	91.1	5.34
70-75	90.0	5.27
75-80	87.6	5.14
80-85	84.3	4.93
85-90	80.0	4.69
90-95	74.9	4.39
95-100	69.1	4.04
100-105	62.9	3.69
105-110	56.6	3.31
110-115	50.0	2.93
115-120	43.5	2.55
120-125	37.2	2.18
125-130	31.2	1.83
130-135	25.7	1.51
135-140	20.6	1.20
140-145	16.0	0.94
145-150	12.1	0.71
150-155	8.8	0.52
155-160	6.1	0.35
160-165	3.9	0.23
165-170	2.1	0.13
170-175	0.7	0.04
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	5.4	0.32
0-10	21.5	1.26
0-15	48.2	2.82
0-20	85.1	4.99
0-25	131.8	7.72
0-30	187.6	10.99
0-35	251.8	14.75
0-40	323.4	18.94
0-45	401.4	23.51
0-50	484.6	28.39
0-55	571.7	33.49
0-60	661.5	38.75
0-65	752.6	44.08
0-70	843.7	49.42
0-75	933.7	54.69
0-80	1021.3	59.83
0-85	1105.6	64.76
0-90	1185.6	69.45
0-95	1260.6	73.84
0-100	1329.6	77.88
0-105	1392.6	81.57
0-110	1449.1	84.88
0-115	1499.2	87.81
0-120	1542.7	90.36
0-125	1579.9	92.54
0-130	1611.2	94.37
0-135	1636.8	95.88
0-140	1657.4	97.08
0-145	1673.4	98.02
0-150	1685.6	98.73
0-155	1694.4	99.25
0-160	1700.5	99.60
0-165	1704.4	99.83
0-170	1706.5	99.96
0-175	1707.2	100.00
0-180	1707.2	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. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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