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/840

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
Reviewed By:	George Chen
Report Number:	KS2211206-62748E-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/840
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:	4000K
Nominal Lumen Output:	1700 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	0.1183	13.98	0.9849	1967.9	140.73

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
6.0557	3927	-0.00037	0.3834	0.3778	0.2267	0.5025

Color Rendering Index

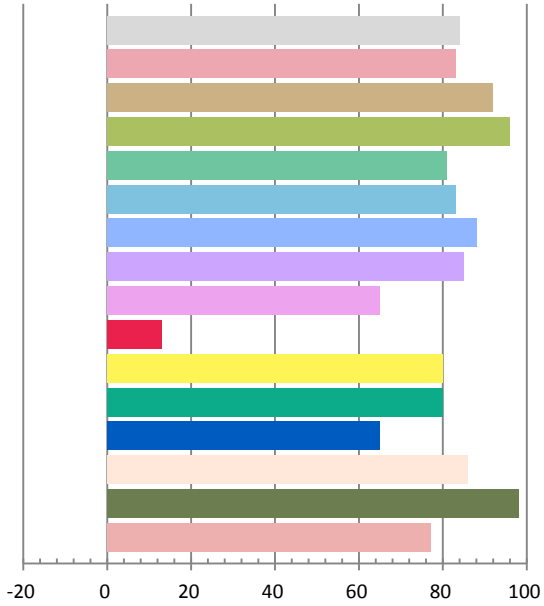
Ra
84.1

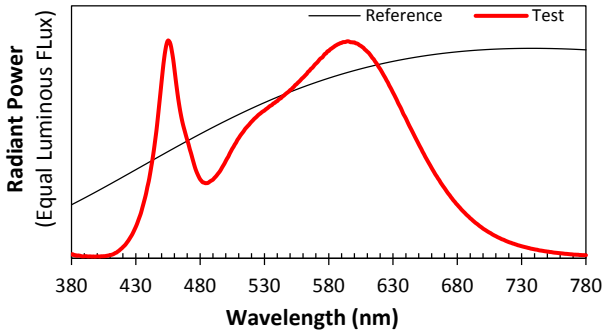
R1	R2	R3	R4
83	92	96	81

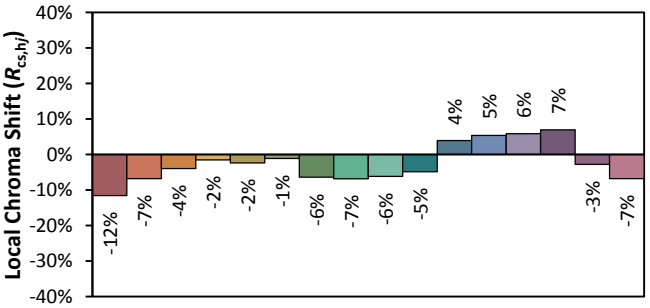
R5	R6	R7	R8
83	88	85	65

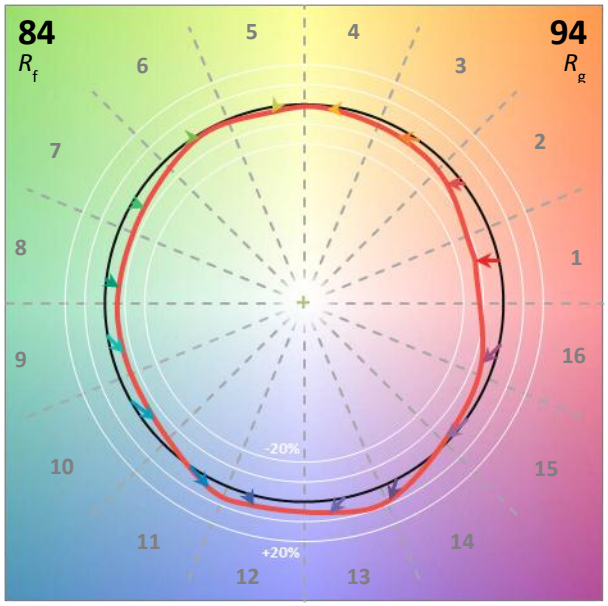
R9	R10	R11	R12
13	80	80	65

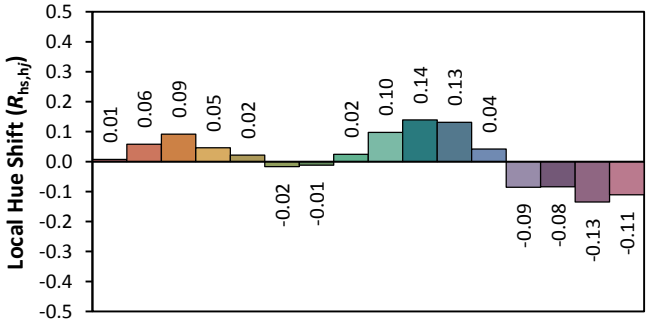
R13	R14	R15
86	98	77

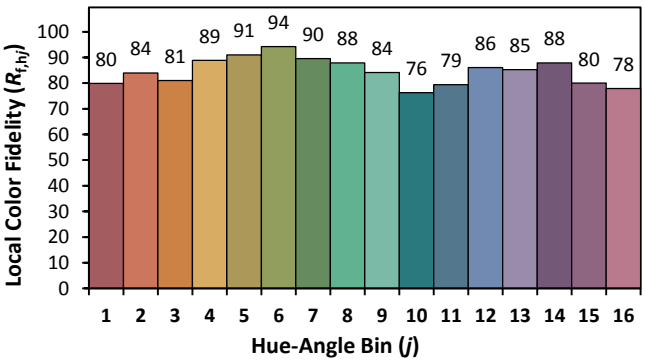


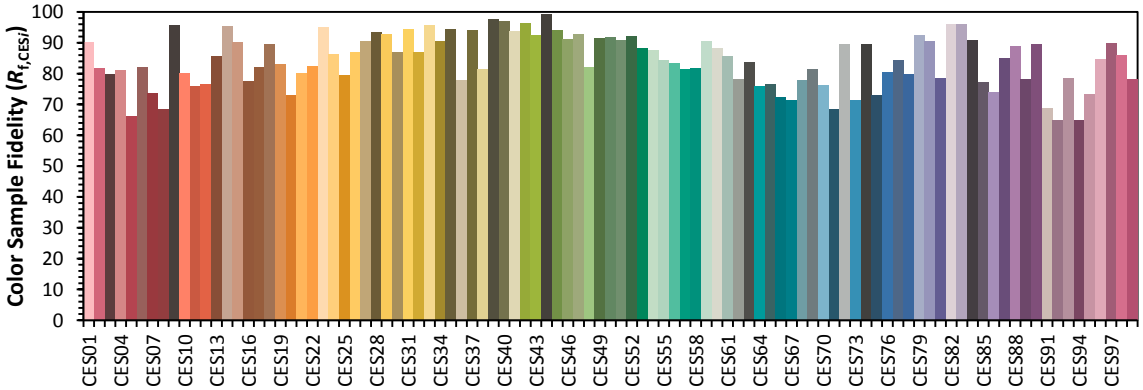

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


Local Chroma Shift ($R_{cs,hj}$)
40% 30% 20% 10% 0% -10% -20% -30% -40%
-12% -7% -4% -2% -2% -1% -6% -7% -6% -5% 4% 5% 6% 7% -3% -7%

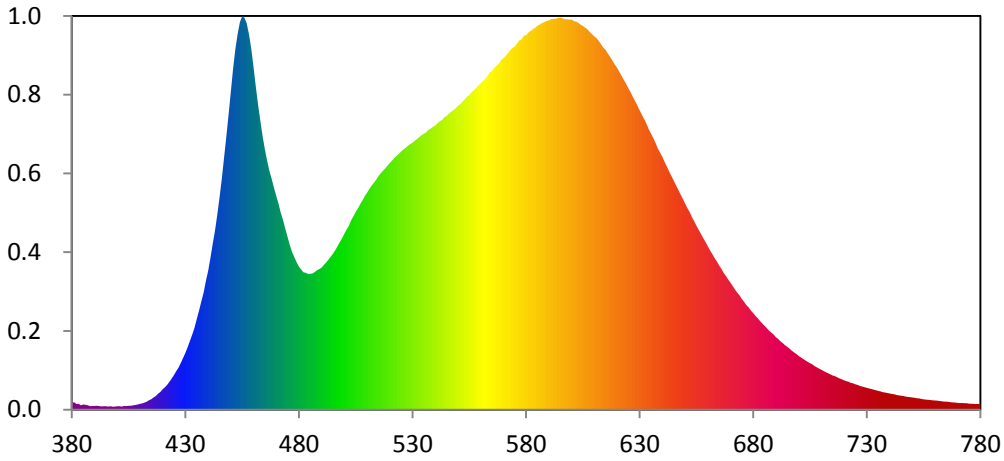

84
R_f
94
R_g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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 0.06 0.09 0.05 0.02 -0.02 -0.01 0.02 0.10 0.14 0.13 0.04 -0.09 -0.08 -0.13 -0.11


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
80 84 81 89 91 94 90 88 84 76 79 86 85 88 80 78
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

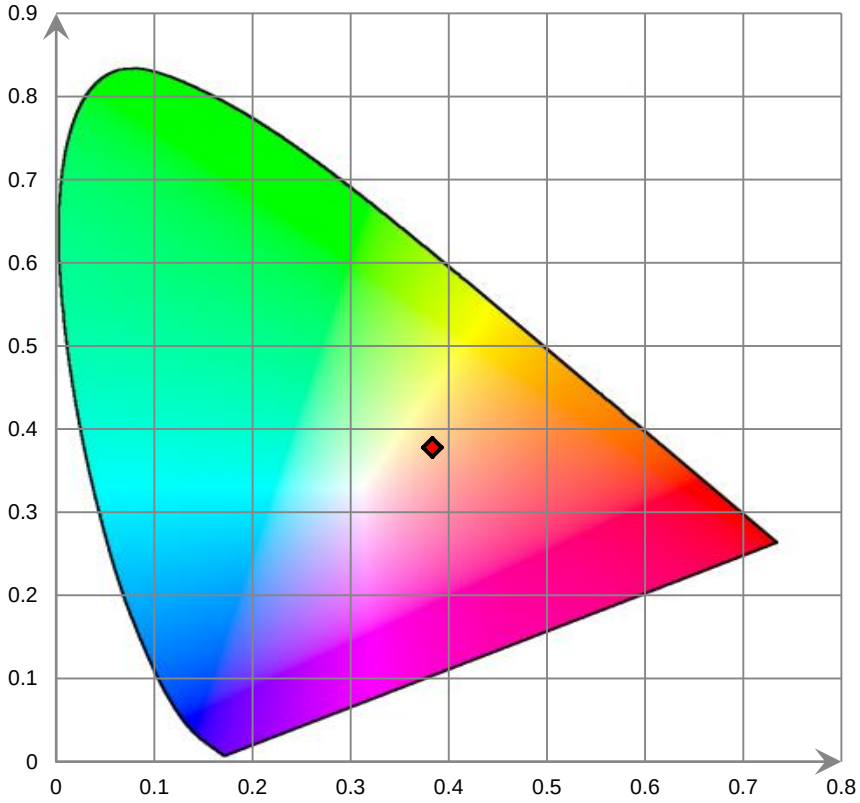
Relative Spectral Power Distribution



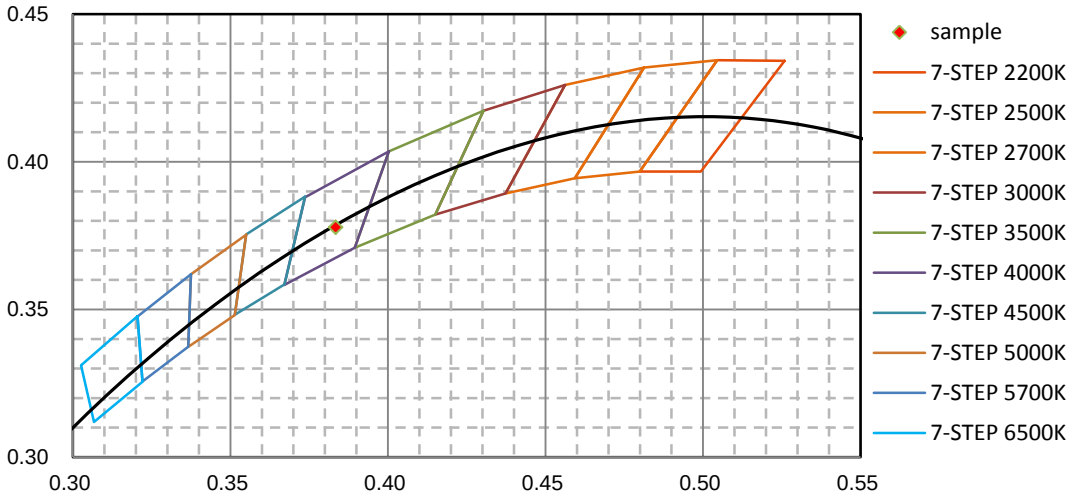
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.088E-01	421	1.994E+00	462	2.699E+01	503	1.674E+01	544	2.585E+01
381	6.605E-01	422	2.211E+00	463	2.548E+01	504	1.712E+01	545	2.598E+01
382	5.024E-01	423	2.492E+00	464	2.415E+01	505	1.751E+01	546	2.617E+01
383	5.152E-01	424	2.772E+00	465	2.300E+01	506	1.782E+01	547	2.635E+01
384	3.957E-01	425	3.087E+00	466	2.199E+01	507	1.820E+01	548	2.650E+01
385	4.587E-01	426	3.421E+00	467	2.113E+01	508	1.851E+01	549	2.666E+01
386	4.388E-01	427	3.749E+00	468	2.037E+01	509	1.892E+01	550	2.688E+01
387	3.935E-01	428	4.152E+00	469	1.961E+01	510	1.920E+01	551	2.702E+01
388	3.275E-01	429	4.596E+00	470	1.890E+01	511	1.953E+01	552	2.724E+01
389	3.176E-01	430	5.038E+00	471	1.822E+01	512	1.982E+01	553	2.743E+01
390	3.296E-01	431	5.527E+00	472	1.742E+01	513	2.008E+01	554	2.769E+01
391	3.551E-01	432	6.095E+00	473	1.674E+01	514	2.035E+01	555	2.783E+01
392	3.270E-01	433	6.662E+00	474	1.598E+01	515	2.067E+01	556	2.806E+01
393	2.975E-01	434	7.249E+00	475	1.525E+01	516	2.090E+01	557	2.824E+01
394	3.116E-01	435	8.011E+00	476	1.454E+01	517	2.113E+01	558	2.845E+01
395	3.053E-01	436	8.754E+00	477	1.394E+01	518	2.134E+01	559	2.869E+01
396	2.759E-01	437	9.544E+00	478	1.346E+01	519	2.160E+01	560	2.887E+01
397	3.023E-01	438	1.037E+01	479	1.302E+01	520	2.183E+01	561	2.907E+01
398	2.710E-01	439	1.139E+01	480	1.264E+01	521	2.204E+01	562	2.929E+01
399	2.872E-01	440	1.226E+01	481	1.239E+01	522	2.227E+01	563	2.950E+01
400	3.097E-01	441	1.337E+01	482	1.215E+01	523	2.245E+01	564	2.981E+01
401	3.096E-01	442	1.462E+01	483	1.211E+01	524	2.263E+01	565	2.996E+01
402	2.824E-01	443	1.584E+01	484	1.201E+01	525	2.285E+01	566	3.024E+01
403	3.330E-01	444	1.722E+01	485	1.202E+01	526	2.302E+01	567	3.040E+01
404	3.270E-01	445	1.875E+01	486	1.204E+01	527	2.317E+01	568	3.062E+01
405	3.459E-01	446	2.035E+01	487	1.218E+01	528	2.335E+01	569	3.090E+01
406	3.466E-01	447	2.221E+01	488	1.233E+01	529	2.349E+01	570	3.110E+01
407	3.907E-01	448	2.418E+01	489	1.245E+01	530	2.361E+01	571	3.129E+01
408	4.257E-01	449	2.613E+01	490	1.258E+01	531	2.380E+01	572	3.153E+01
409	4.693E-01	450	2.814E+01	491	1.282E+01	532	2.394E+01	573	3.180E+01
410	5.172E-01	451	3.015E+01	492	1.303E+01	533	2.410E+01	574	3.198E+01
411	5.577E-01	452	3.188E+01	493	1.327E+01	534	2.429E+01	575	3.210E+01
412	6.273E-01	453	3.327E+01	494	1.355E+01	535	2.441E+01	576	3.238E+01
413	7.186E-01	454	3.429E+01	495	1.380E+01	536	2.453E+01	577	3.266E+01
414	8.475E-01	455	3.479E+01	496	1.411E+01	537	2.475E+01	578	3.275E+01
415	9.268E-01	456	3.466E+01	497	1.448E+01	538	2.484E+01	579	3.307E+01
416	1.095E+00	457	3.418E+01	498	1.482E+01	539	2.503E+01	580	3.312E+01
417	1.232E+00	458	3.315E+01	499	1.517E+01	540	2.513E+01	581	3.336E+01
418	1.427E+00	459	3.188E+01	500	1.558E+01	541	2.535E+01	582	3.350E+01
419	1.588E+00	460	3.027E+01	501	1.595E+01	542	2.550E+01	583	3.365E+01
420	1.803E+00	461	2.858E+01	502	1.628E+01	543	2.562E+01	584	3.379E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.395E+01	626	2.809E+01	667	1.211E+01	708	3.747E+00	749	1.112E+00
586	3.406E+01	627	2.764E+01	668	1.181E+01	709	3.630E+00	750	1.078E+00
587	3.419E+01	628	2.728E+01	669	1.151E+01	710	3.536E+00	751	1.061E+00
588	3.427E+01	629	2.689E+01	670	1.123E+01	711	3.419E+00	752	1.013E+00
589	3.438E+01	630	2.647E+01	671	1.093E+01	712	3.320E+00	753	1.000E+00
590	3.442E+01	631	2.609E+01	672	1.062E+01	713	3.229E+00	754	9.601E-01
591	3.454E+01	632	2.568E+01	673	1.034E+01	714	3.119E+00	755	9.231E-01
592	3.455E+01	633	2.527E+01	674	1.009E+01	715	3.028E+00	756	9.014E-01
593	3.457E+01	634	2.480E+01	675	9.791E+00	716	2.967E+00	757	8.827E-01
594	3.465E+01	635	2.441E+01	676	9.537E+00	717	2.864E+00	758	8.598E-01
595	3.468E+01	636	2.403E+01	677	9.252E+00	718	2.765E+00	759	8.369E-01
596	3.462E+01	637	2.357E+01	678	9.036E+00	719	2.683E+00	760	8.180E-01
597	3.453E+01	638	2.309E+01	679	8.757E+00	720	2.600E+00	761	7.958E-01
598	3.453E+01	639	2.273E+01	680	8.550E+00	721	2.527E+00	762	7.774E-01
599	3.449E+01	640	2.235E+01	681	8.309E+00	722	2.467E+00	763	7.455E-01
600	3.450E+01	641	2.191E+01	682	8.091E+00	723	2.377E+00	764	7.215E-01
601	3.436E+01	642	2.147E+01	683	7.837E+00	724	2.327E+00	765	7.146E-01
602	3.432E+01	643	2.105E+01	684	7.623E+00	725	2.246E+00	766	6.925E-01
603	3.421E+01	644	2.066E+01	685	7.419E+00	726	2.187E+00	767	6.701E-01
604	3.404E+01	645	2.026E+01	686	7.219E+00	727	2.101E+00	768	6.496E-01
605	3.394E+01	646	1.985E+01	687	6.993E+00	728	2.052E+00	769	6.387E-01
606	3.378E+01	647	1.944E+01	688	6.810E+00	729	1.994E+00	770	6.097E-01
607	3.364E+01	648	1.903E+01	689	6.628E+00	730	1.933E+00	771	5.903E-01
608	3.339E+01	649	1.864E+01	690	6.410E+00	731	1.881E+00	772	5.865E-01
609	3.322E+01	650	1.823E+01	691	6.249E+00	732	1.829E+00	773	5.741E-01
610	3.302E+01	651	1.784E+01	692	6.051E+00	733	1.775E+00	774	5.737E-01
611	3.285E+01	652	1.746E+01	693	5.877E+00	734	1.728E+00	775	5.388E-01
612	3.259E+01	653	1.703E+01	694	5.696E+00	735	1.671E+00	776	5.324E-01
613	3.231E+01	654	1.667E+01	695	5.550E+00	736	1.629E+00	777	5.149E-01
614	3.201E+01	655	1.626E+01	696	5.396E+00	737	1.560E+00	778	5.122E-01
615	3.181E+01	656	1.590E+01	697	5.217E+00	738	1.525E+00	779	5.025E-01
616	3.147E+01	657	1.553E+01	698	5.064E+00	739	1.482E+00	780	5.035E-01
617	3.120E+01	658	1.517E+01	699	4.921E+00	740	1.441E+00		
618	3.087E+01	659	1.482E+01	700	4.752E+00	741	1.400E+00		
619	3.054E+01	660	1.445E+01	701	4.620E+00	742	1.377E+00		
620	3.025E+01	661	1.409E+01	702	4.493E+00	743	1.317E+00		
621	2.990E+01	662	1.375E+01	703	4.360E+00	744	1.267E+00		
622	2.953E+01	663	1.339E+01	704	4.230E+00	745	1.243E+00		
623	2.917E+01	664	1.310E+01	705	4.112E+00	746	1.211E+00		
624	2.883E+01	665	1.276E+01	706	4.009E+00	747	1.176E+00		
625	2.843E+01	666	1.247E+01	707	3.859E+00	748	1.136E+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**

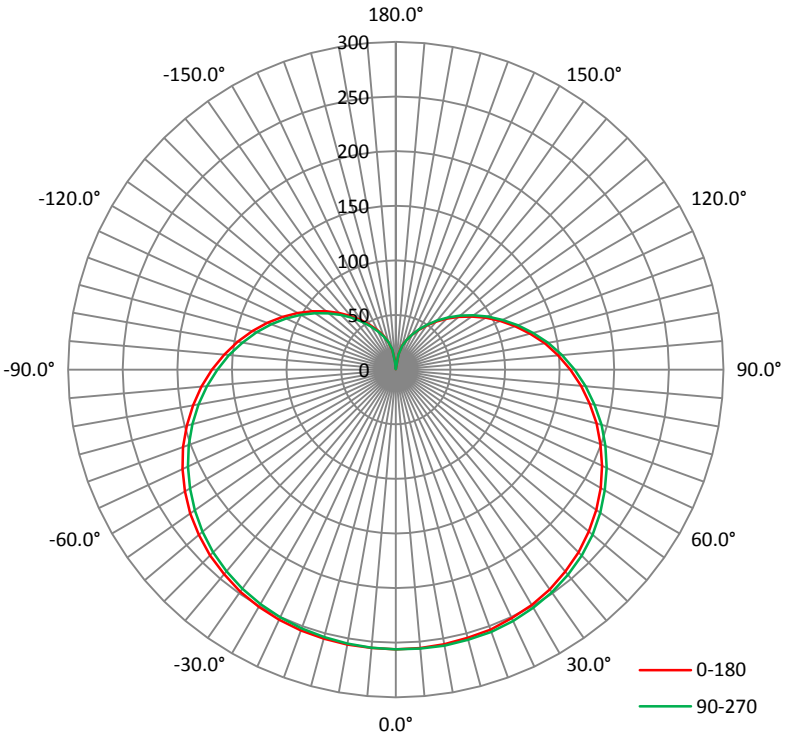
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.1183	13.99	0.9850

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1969.42	140.78	256.8	1.47	1.49

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	213.2	213.4	212.2	212.6	212.9
Field Angle (10% I_{max}):	328.1	328.8	328.3	328.2	328.4

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	256	256	256	256	256	256	256	256
1°	256	256	256	256	256	256	256	256
2°	256	256	256	256	256	256	256	256
3°	256	256	256	256	256	256	256	256
4°	256	256	256	256	256	256	256	256
5°	256	256	256	256	256	256	256	256
6°	256	256	256	256	255	256	256	256
7°	256	256	256	255	255	256	255	256
8°	256	256	255	255	255	255	255	256
9°	256	255	255	255	255	255	255	256
10°	256	255	255	255	255	255	255	255
11°	255	255	255	255	254	255	255	255
12°	255	255	255	255	254	254	254	255
13°	255	255	254	254	254	254	254	254
14°	255	255	254	254	254	254	254	254
15°	255	255	254	254	253	254	253	254
16°	255	254	254	253	253	254	253	254
17°	255	254	254	253	253	253	253	254
18°	254	254	253	253	253	253	253	253
19°	254	253	253	253	252	253	252	253
20°	254	253	253	252	252	252	252	253
21°	254	253	253	252	252	252	252	253
22°	254	253	252	252	251	252	251	252
23°	253	253	252	252	251	251	251	252
24°	253	253	252	251	251	251	251	252
25°	253	252	251	251	250	250	250	251
26°	252	252	251	250	250	250	250	251
27°	252	251	251	250	250	250	249	250
28°	252	251	250	250	249	249	249	250
29°	251	251	250	249	248	248	248	249
30°	251	250	249	248	248	248	248	249
31°	250	249	249	248	247	247	247	248
32°	250	249	249	248	247	247	246	247
33°	249	248	248	247	246	246	246	247
34°	249	248	247	246	246	245	245	246
35°	248	247	247	246	245	245	244	245
36°	248	247	246	245	244	244	244	245
37°	247	246	246	244	244	243	243	244
38°	246	245	245	244	243	242	242	243
39°	245	245	244	243	242	242	241	242
40°	245	244	243	242	241	241	240	241
41°	244	243	242	241	240	240	240	240
42°	243	243	242	241	239	239	239	239
43°	242	242	241	240	238	238	238	239
44°	241	241	240	239	237	237	237	238
45°	241	240	239	238	236	236	235	237
46°	240	239	238	237	235	235	235	235
47°	239	238	237	235	234	234	233	234
48°	238	237	236	235	233	233	232	233
49°	236	236	234	233	232	232	231	232

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
50°	235	235	234	232	231	230	230	231
51°	234	234	233	231	230	229	229	230
52°	233	233	232	230	229	228	227	228
53°	232	232	231	229	227	227	226	227
54°	231	230	229	227	226	225	225	225
55°	230	229	228	226	225	224	223	224
56°	228	227	227	225	223	223	222	223
57°	227	226	225	223	222	221	221	221
58°	226	225	224	222	221	220	219	220
59°	224	224	222	220	219	219	218	218
60°	223	222	221	219	217	217	216	217
61°	221	221	220	218	216	216	215	215
62°	220	219	218	216	215	214	213	214
63°	218	218	217	215	213	212	212	212
64°	217	217	215	213	211	211	210	210
65°	215	215	214	211	210	209	208	209
66°	214	213	212	210	208	207	207	207
67°	212	212	210	208	207	206	205	205
68°	210	210	209	207	205	204	203	204
69°	209	209	207	205	203	203	202	202
70°	207	207	205	203	202	201	200	200
71°	205	205	204	202	200	199	198	198
72°	203	203	202	200	198	197	196	197
73°	202	202	200	198	196	195	194	195
74°	200	200	199	196	195	194	193	193
75°	198	198	197	194	193	192	191	191
76°	196	196	195	193	191	190	189	189
77°	194	195	193	191	189	188	187	187
78°	192	193	191	189	187	186	185	185
79°	190	191	189	187	185	184	183	183
80°	188	189	188	185	183	182	181	181
81°	187	187	186	183	181	180	179	179
82°	185	185	184	181	180	178	177	177
83°	183	183	182	179	178	177	175	175
84°	181	181	180	177	176	174	173	173
85°	179	179	178	175	173	172	171	171
86°	177	177	176	173	172	170	170	169
87°	175	175	174	171	170	168	167	167
88°	172	173	172	169	168	166	165	165
89°	170	171	170	167	165	164	163	163
90°	168	169	167	165	163	162	161	161
91°	166	167	166	163	161	160	159	159
92°	164	164	163	161	159	158	157	157
93°	162	162	161	159	157	156	155	155
94°	160	160	159	157	155	154	153	153
95°	158	158	157	155	153	152	151	151
96°	156	156	155	153	151	150	149	149
97°	153	154	153	151	149	148	147	146
98°	151	152	151	149	147	146	144	144
99°	149	150	148	146	145	144	142	142

Luminous Intensity (cd) Distribution Data

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

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
150°	47	47	47	46	46	45	44	44
151°	46	46	46	45	44	43	43	42
152°	44	44	44	43	43	42	41	41
153°	43	43	43	42	41	41	40	39
154°	41	41	41	41	40	39	39	38
155°	40	40	40	39	39	38	37	37
156°	38	39	39	38	37	37	36	36
157°	37	37	37	37	36	35	35	34
158°	36	36	36	35	35	34	33	33
159°	34	35	35	34	34	33	32	32
160°	33	33	33	33	32	32	31	31
161°	32	32	32	31	31	31	30	29
162°	30	31	31	30	30	29	29	28
163°	29	30	30	29	29	28	28	27
164°	27	28	28	28	28	27	26	26
165°	26	27	27	27	26	26	25	25
166°	25	26	26	26	25	24	24	23
167°	23	24	24	24	24	23	23	22
168°	21	23	23	23	22	22	21	20
169°	20	21	22	21	21	20	20	19
170°	18	19	20	19	19	18	18	17
171°	16	17	18	17	17	16	16	15
172°	14	14	16	14	14	14	14	13
173°	12	11	13	11	12	11	11	11
174°	10	9	9	9	9	9	9	8
175°	8	6	6	5	6	6	6	3
176°	5	3	3	3	3	3	3	1
177°	3	1	1	1	1	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°	256	256	256	256	256	256	256	256
1°	256	256	256	256	256	257	256	256
2°	256	256	256	256	256	256	256	257
3°	256	256	256	257	256	257	256	257
4°	256	256	256	256	256	257	256	256
5°	256	256	256	256	256	256	256	256
6°	256	256	256	257	257	256	256	256
7°	256	256	256	257	257	256	256	256
8°	256	256	256	257	256	257	256	256
9°	255	256	256	257	256	257	256	256
10°	255	256	256	257	257	257	256	256
11°	255	256	256	256	257	257	256	256
12°	255	256	256	256	256	256	256	256
13°	255	256	256	256	256	257	256	256
14°	255	256	256	256	256	256	256	256
15°	254	255	256	256	256	256	256	255
16°	254	255	256	255	256	256	255	256
17°	254	255	255	256	256	256	255	255
18°	254	255	255	256	256	256	255	255
19°	254	254	255	256	256	256	255	255
20°	253	254	255	255	256	255	255	254
21°	253	253	254	255	255	255	254	254
22°	253	253	254	255	255	255	254	254
23°	252	253	254	254	254	255	254	254
24°	252	253	253	254	254	254	254	253
25°	251	252	253	254	254	254	253	253
26°	251	252	253	254	254	254	253	253
27°	250	251	253	253	253	253	253	252
28°	250	251	252	253	253	253	252	252
29°	250	251	252	252	252	252	252	252
30°	249	250	251	252	252	252	251	251
31°	248	250	251	251	251	252	251	251
32°	248	249	250	251	251	251	250	250
33°	247	248	249	250	250	251	250	250
34°	247	248	249	250	250	250	249	249
35°	246	247	248	249	249	249	249	248
36°	245	246	247	248	248	249	248	248
37°	244	246	247	247	248	248	247	247
38°	243	245	246	247	247	247	246	246
39°	242	244	245	246	246	246	246	246
40°	241	243	244	245	245	246	245	245
41°	241	242	243	244	244	245	244	244
42°	240	241	242	243	243	244	243	243
43°	239	240	241	242	243	243	243	242
44°	238	239	240	241	241	242	241	242
45°	237	238	239	240	241	241	240	241
46°	236	237	238	239	239	240	240	240
47°	235	236	237	238	238	239	239	239
48°	233	235	236	237	237	238	237	238
49°	232	233	235	236	236	237	236	237

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
50°	231	232	234	234	235	235	235	236
51°	229	231	232	233	234	234	234	234
52°	228	230	231	232	232	233	233	233
53°	227	228	230	230	231	232	231	232
54°	226	227	228	229	230	231	230	231
55°	224	225	227	227	228	229	229	229
56°	222	224	226	226	227	228	227	228
57°	221	223	224	225	226	226	226	227
58°	219	221	223	223	224	225	225	225
59°	218	220	221	222	223	223	223	224
60°	217	218	220	220	221	222	222	222
61°	215	217	218	219	219	220	220	221
62°	213	215	216	217	218	219	219	220
63°	211	213	215	215	216	217	217	218
64°	210	212	213	214	215	216	215	216
65°	208	210	211	212	213	214	214	215
66°	207	208	210	210	211	212	212	213
67°	205	207	208	208	210	210	211	211
68°	203	205	206	207	208	209	209	210
69°	201	203	205	205	206	207	207	208
70°	199	201	203	203	204	205	205	206
71°	198	199	201	201	202	203	204	204
72°	196	198	199	199	201	201	202	203
73°	194	196	197	197	199	200	200	201
74°	192	194	195	196	197	198	198	199
75°	190	192	193	194	195	196	196	197
76°	188	190	192	192	193	194	194	195
77°	186	188	189	190	191	192	192	193
78°	184	186	187	188	189	190	190	191
79°	182	184	185	186	187	188	188	189
80°	180	182	183	184	185	186	186	187
81°	178	180	182	182	183	184	184	185
82°	177	178	179	179	181	182	182	183
83°	174	176	177	177	178	180	180	181
84°	172	174	175	175	176	178	178	179
85°	170	172	173	173	174	176	176	177
86°	168	170	171	171	172	174	174	175
87°	166	168	169	169	170	171	172	173
88°	164	166	167	167	168	169	170	171
89°	162	164	165	165	166	167	168	169
90°	160	161	163	163	164	165	166	167
91°	158	159	160	160	162	163	164	165
92°	156	157	158	158	159	161	161	163
93°	154	155	156	156	157	158	159	161
94°	151	153	154	154	155	156	157	158
95°	149	151	151	152	153	154	155	156
96°	147	148	149	150	151	152	153	154
97°	145	146	147	147	148	150	150	152
98°	143	144	145	145	146	148	148	150
99°	141	142	142	143	144	145	146	147

Luminous Intensity (cd) Distribution Data (cont.)

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

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
150°	42	42	42	42	42	43	44	45
151°	40	40	40	40	41	42	43	44
152°	39	39	39	39	40	40	41	42
153°	38	38	38	38	38	39	40	41
154°	36	36	36	36	37	38	38	39
155°	35	35	35	35	35	36	37	38
156°	34	34	34	34	34	35	35	36
157°	33	32	32	32	33	33	34	35
158°	31	31	31	31	31	32	33	34
159°	30	30	30	30	30	31	31	32
160°	29	29	29	29	29	29	30	31
161°	28	28	28	27	28	28	29	30
162°	27	27	26	26	27	27	28	28
163°	25	25	25	25	25	26	26	27
164°	24	24	24	24	24	24	25	26
165°	23	23	23	22	23	23	24	24
166°	21	21	21	21	21	22	22	23
167°	20	20	19	19	19	20	21	22
168°	18	18	18	17	18	18	19	20
169°	17	17	16	15	16	17	17	18
170°	15	15	14	13	14	14	16	17
171°	12	12	11	11	11	11	13	14
172°	10	9	9	9	9	8	10	11
173°	5	5	4	4	5	6	8	8
174°	1	1	1	0	1	1	2	5
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	6.1	0.31
5-10	18.3	0.93
10-15	30.3	1.54
15-20	41.9	2.13
20-25	53.1	2.69
25-30	63.5	3.23
30-35	73.2	3.71
35-40	81.8	4.16
40-45	89.2	4.53
45-50	95.3	4.84
50-55	100.0	5.08
55-60	103.2	5.24
60-65	104.9	5.33
65-70	105.1	5.33
70-75	103.9	5.28
75-80	101.3	5.15
80-85	97.6	4.95
85-90	92.7	4.71
90-95	87.0	4.41
95-100	80.5	4.09
100-105	73.4	3.72
105-110	65.8	3.35
110-115	58.2	2.95
115-120	50.7	2.58
120-125	43.4	2.20
125-130	36.5	1.85
130-135	30.0	1.53
135-140	24.1	1.22
140-145	18.8	0.95
145-150	14.2	0.72
150-155	10.3	0.53
155-160	7.2	0.36
160-165	4.6	0.23
165-170	2.5	0.13
170-175	0.8	0.04
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	6.1	0.31
0-10	24.4	1.24
0-15	54.7	2.78
0-20	96.6	4.91
0-25	149.7	7.60
0-30	213.2	10.83
0-35	286.4	14.54
0-40	368.2	18.70
0-45	457.4	23.23
0-50	552.8	28.07
0-55	652.8	33.15
0-60	756.0	38.39
0-65	861.0	43.72
0-70	966.1	49.05
0-75	1070.0	54.33
0-80	1171.3	59.48
0-85	1268.9	64.43
0-90	1361.6	69.14
0-95	1448.6	73.55
0-100	1529.0	77.64
0-105	1602.4	81.36
0-110	1668.2	84.71
0-115	1726.5	87.66
0-120	1777.2	90.24
0-125	1820.6	92.44
0-130	1857.1	94.29
0-135	1887.0	95.82
0-140	1911.1	97.04
0-145	1929.9	97.99
0-150	1944.1	98.71
0-155	1954.4	99.24
0-160	1961.5	99.60
0-165	1966.1	99.83
0-170	1968.6	99.96
0-175	1969.4	100.00
0-180	1969.4	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**********