

IES LM-79-19



MEASUREMENT AND TEST REPORT

For

Beyond LED Technology

1939 Parker Ct, Stone Mountain, GA 30087

#Test Model: DLX1-27CS144-S470W-02A8

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hexy He 
Report Number:	RSZ200110506-10-1
Test Date:	2020-01-15 to 2020-01-16
Report Date:	2020-01-21
Reviewed By:	Bill Xiong / EE Engineer 
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.



1. Product Description

General Information:

One test sample was in good condition and received on 2020-01-10, and used for testing.

#Model Tested: DLX1-27CS144-S470W-02A8

#Manufacturer: Sundopt Led Lighting Co., Ltd.

#Product Designation: LED Recessed Downlight

Burning Time Before Test: 0hour(For New Products)

#Rated Values:

Rated Voltage/Frequency: 120-277V AC 50/60HZ

Rated Power: 27W

Nominal CCT: 3000K/4000K/5000K

Nominal Lumen Output: 2700lm

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 temperature integrating sphere	SENSING	SPR-600	S09008	2019-06-28	2020-06-27
High-precision rapid spectral analysis system	EVERFINE	HAAS-2000	M112048CA1361125	2019-10-24	2020-10-23
Digital power meter	YOKOGAWA	WT310	13398	2019-07-12	2020-07-11
Programmable Precision DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	2019-03-08	2020-03-07
thermometer	SENSING	NA	NA	2019-03-08	2020-03-07
Standard Light Source	EVERFINE	D204	N/A	2019-07-19	2020-07-18
Precision frequency power supply	ALL Power	APW-105N	970613	2019-03-08	2020-03-07
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2019-03-08	2020-03-07
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2019-04-10	2020-04-09
Digital power meter	YOKOGAWA	WT-210	91j926132	2019-03-08	2020-03-07
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2019-03-08	2020-03-07
Wireless Remote Sensor	N/A	433MHz	N/A	2019-03-08	2020-03-07

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012003	2019-11-27	2020-11-26

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 $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ 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 $U=22\text{K}$ ($K=2$), 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 luminaire was tested in a can.

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_i , 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: **Downward**

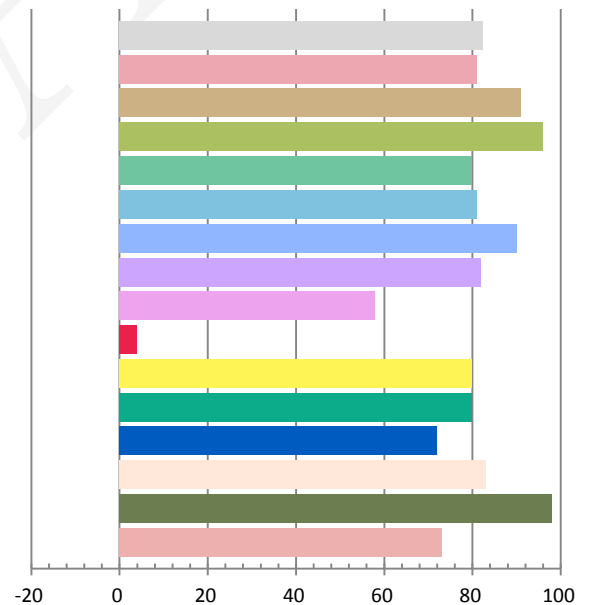
Photometric and Electrical Measurement Result

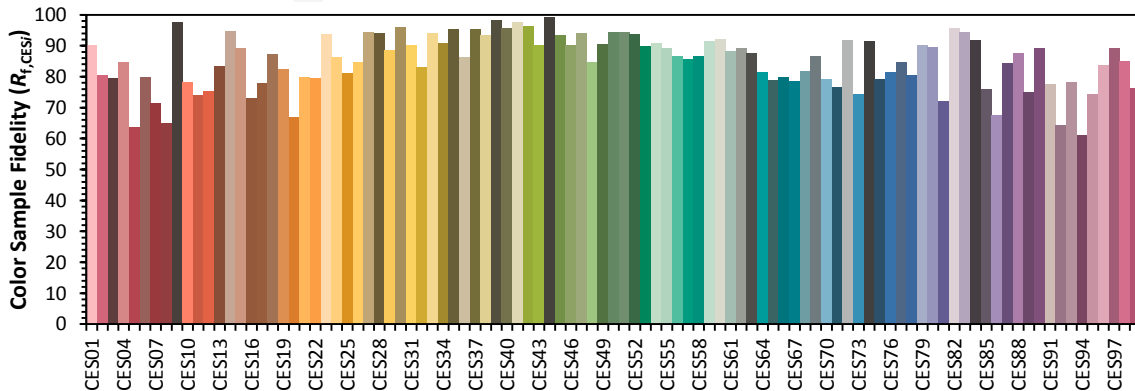
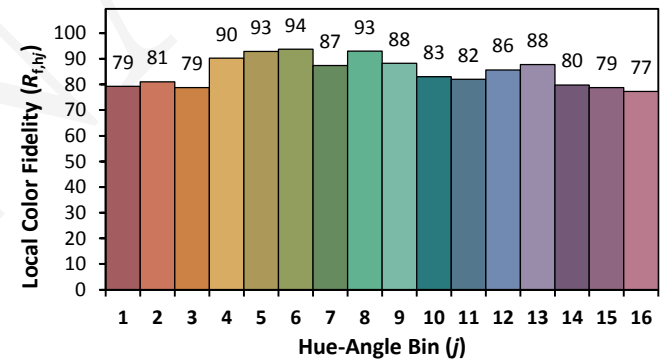
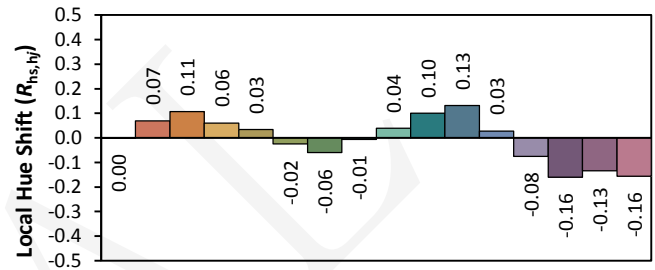
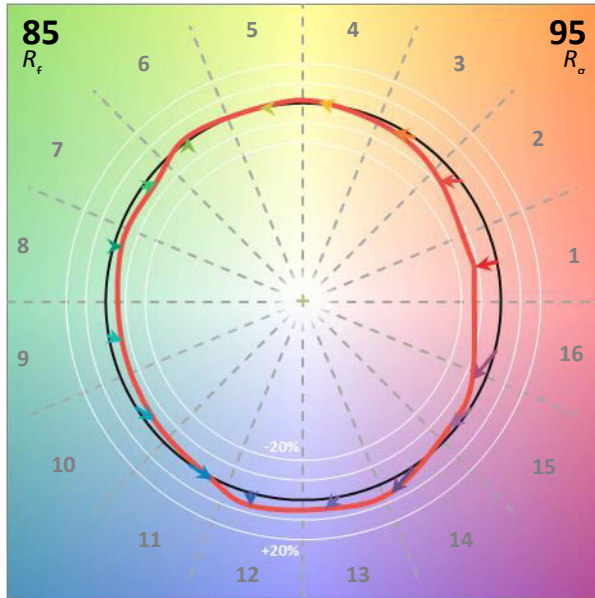
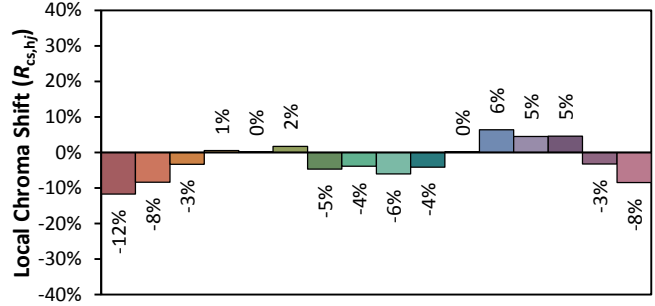
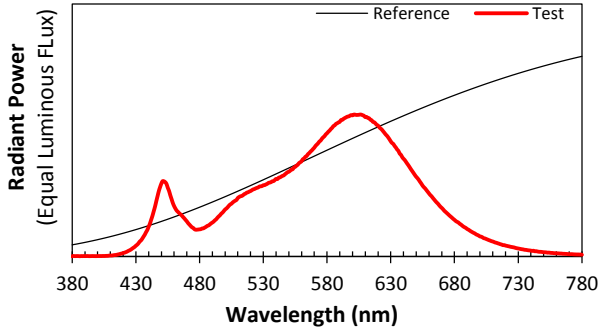
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.2206	25.99	0.9817	2708.9	104.23

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.1618	3012	0.00024	0.4364	0.4045	0.2501	0.5215

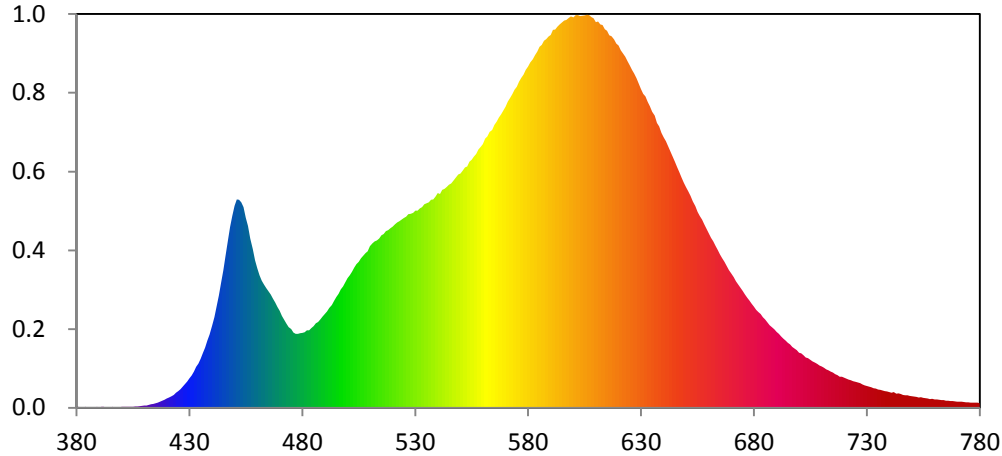
Color Rendering Index

Ra			
82.4			
R1	R2	R3	R4
81	91	96	80
R5	R6	R7	R8
81	90	82	58
R9	R10	R11	R12
4	80	80	72
R13	R14	R15	
83	98	73	





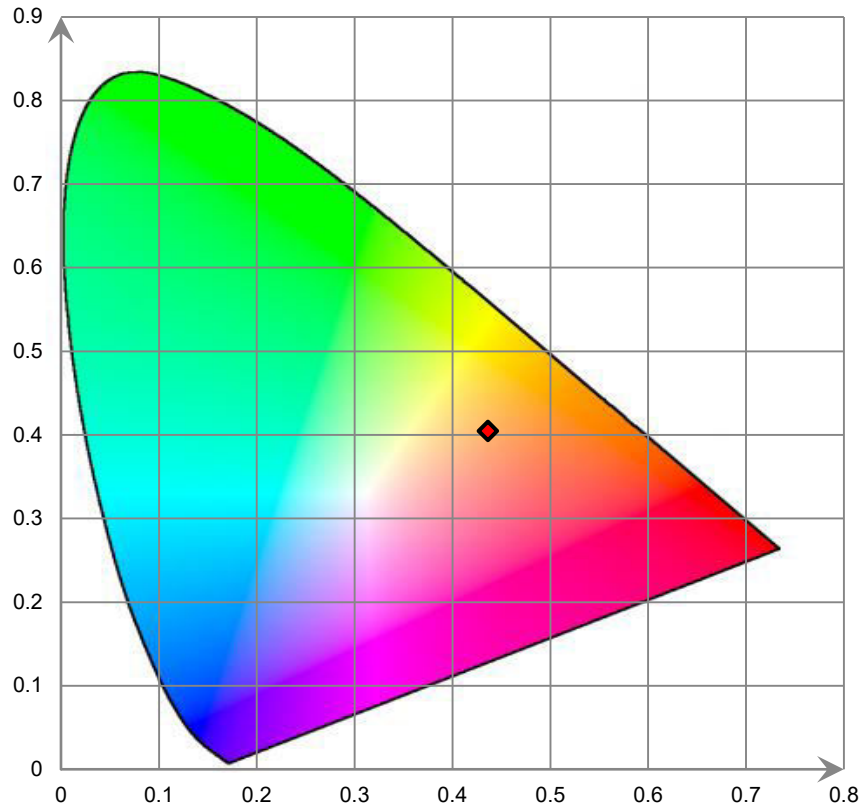
Relative Spectral Power Distribution



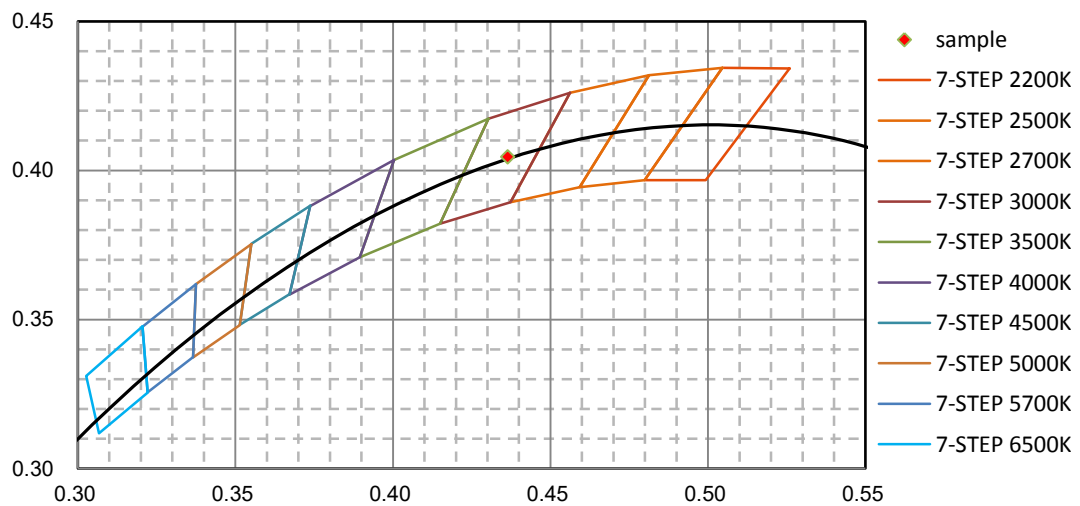
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.548E-02	421	1.435E+00	462	1.798E+01	503	1.988E+01	544	3.129E+01
381	1.436E-01	422	1.630E+00	463	1.748E+01	504	2.037E+01	545	3.160E+01
382	8.917E-02	423	1.830E+00	464	1.694E+01	505	2.067E+01	546	3.178E+01
383	9.817E-02	424	2.129E+00	465	1.650E+01	506	2.118E+01	547	3.224E+01
384	1.118E-01	425	2.357E+00	466	1.605E+01	507	2.155E+01	548	3.263E+01
385	1.000E-01	426	2.637E+00	467	1.545E+01	508	2.188E+01	549	3.306E+01
386	5.235E-02	427	2.999E+00	468	1.491E+01	509	2.218E+01	550	3.322E+01
387	1.050E-01	428	3.365E+00	469	1.430E+01	510	2.292E+01	551	3.361E+01
388	8.880E-02	429	3.701E+00	470	1.373E+01	511	2.330E+01	552	3.407E+01
389	1.130E-01	430	4.174E+00	471	1.303E+01	512	2.357E+01	553	3.418E+01
390	9.982E-02	431	4.574E+00	472	1.248E+01	513	2.370E+01	554	3.488E+01
391	1.103E-01	432	5.109E+00	473	1.192E+01	514	2.399E+01	555	3.515E+01
392	1.258E-01	433	5.804E+00	474	1.143E+01	515	2.442E+01	556	3.560E+01
393	8.798E-02	434	6.253E+00	475	1.114E+01	516	2.464E+01	557	3.597E+01
394	8.067E-02	435	6.945E+00	476	1.065E+01	517	2.501E+01	558	3.661E+01
395	9.757E-02	436	7.748E+00	477	1.046E+01	518	2.517E+01	559	3.696E+01
396	1.142E-01	437	8.517E+00	478	1.048E+01	519	2.545E+01	560	3.736E+01
397	9.766E-02	438	9.514E+00	479	1.054E+01	520	2.565E+01	561	3.813E+01
398	8.813E-02	439	1.038E+01	480	1.061E+01	521	2.597E+01	562	3.844E+01
399	8.411E-02	440	1.163E+01	481	1.068E+01	522	2.628E+01	563	3.910E+01
400	1.157E-01	441	1.282E+01	482	1.095E+01	523	2.643E+01	564	3.939E+01
401	1.169E-01	442	1.438E+01	483	1.099E+01	524	2.669E+01	565	4.011E+01
402	1.222E-01	443	1.591E+01	484	1.130E+01	525	2.689E+01	566	4.055E+01
403	1.113E-01	444	1.771E+01	485	1.158E+01	526	2.707E+01	567	4.112E+01
404	1.429E-01	445	1.951E+01	486	1.195E+01	527	2.743E+01	568	4.158E+01
405	1.393E-01	446	2.160E+01	487	1.214E+01	528	2.750E+01	569	4.214E+01
406	1.551E-01	447	2.362E+01	488	1.252E+01	529	2.762E+01	570	4.268E+01
407	1.942E-01	448	2.563E+01	489	1.293E+01	530	2.794E+01	571	4.339E+01
408	2.045E-01	449	2.721E+01	490	1.327E+01	531	2.796E+01	572	4.390E+01
409	2.844E-01	450	2.860E+01	491	1.365E+01	532	2.824E+01	573	4.443E+01
410	3.219E-01	451	2.953E+01	492	1.416E+01	533	2.845E+01	574	4.508E+01
411	3.267E-01	452	2.947E+01	493	1.456E+01	534	2.883E+01	575	4.549E+01
412	3.877E-01	453	2.913E+01	494	1.516E+01	535	2.897E+01	576	4.621E+01
413	4.787E-01	454	2.845E+01	495	1.569E+01	536	2.912E+01	577	4.675E+01
414	5.330E-01	455	2.696E+01	496	1.615E+01	537	2.947E+01	578	4.720E+01
415	6.161E-01	456	2.574E+01	497	1.677E+01	538	2.954E+01	579	4.788E+01
416	7.415E-01	457	2.400E+01	498	1.719E+01	539	2.996E+01	580	4.835E+01
417	8.527E-01	458	2.248E+01	499	1.778E+01	540	3.042E+01	581	4.893E+01
418	1.011E+00	459	2.092E+01	500	1.839E+01	541	3.032E+01	582	4.940E+01
419	1.121E+00	460	1.975E+01	501	1.878E+01	542	3.087E+01	583	5.000E+01
420	1.299E+00	461	1.880E+01	502	1.929E+01	543	3.101E+01	584	5.048E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	5.115E+01	626	4.788E+01	667	2.068E+01	708	6.189E+00	749	1.687E+00
586	5.145E+01	627	4.736E+01	668	2.007E+01	709	5.965E+00	750	1.618E+00
587	5.202E+01	628	4.670E+01	669	1.949E+01	710	5.830E+00	751	1.589E+00
588	5.227E+01	629	4.595E+01	670	1.903E+01	711	5.641E+00	752	1.552E+00
589	5.261E+01	630	4.516E+01	671	1.851E+01	712	5.427E+00	753	1.450E+00
590	5.283E+01	631	4.451E+01	672	1.790E+01	713	5.309E+00	754	1.482E+00
591	5.357E+01	632	4.414E+01	673	1.746E+01	714	5.116E+00	755	1.398E+00
592	5.361E+01	633	4.335E+01	674	1.700E+01	715	4.964E+00	756	1.346E+00
593	5.402E+01	634	4.273E+01	675	1.654E+01	716	4.761E+00	757	1.328E+00
594	5.433E+01	635	4.196E+01	676	1.606E+01	717	4.641E+00	758	1.238E+00
595	5.460E+01	636	4.141E+01	677	1.562E+01	718	4.400E+00	759	1.242E+00
596	5.487E+01	637	4.036E+01	678	1.520E+01	719	4.413E+00	760	1.173E+00
597	5.496E+01	638	3.986E+01	679	1.473E+01	720	4.235E+00	761	1.183E+00
598	5.524E+01	639	3.896E+01	680	1.433E+01	721	4.123E+00	762	1.144E+00
599	5.548E+01	640	3.833E+01	681	1.388E+01	722	3.997E+00	763	1.101E+00
600	5.535E+01	641	3.780E+01	682	1.356E+01	723	3.893E+00	764	1.090E+00
601	5.567E+01	642	3.706E+01	683	1.331E+01	724	3.755E+00	765	1.008E+00
602	5.564E+01	643	3.633E+01	684	1.284E+01	725	3.668E+00	766	1.003E+00
603	5.553E+01	644	3.563E+01	685	1.251E+01	726	3.570E+00	767	9.684E-01
604	5.555E+01	645	3.486E+01	686	1.210E+01	727	3.465E+00	768	9.463E-01
605	5.559E+01	646	3.409E+01	687	1.170E+01	728	3.298E+00	769	8.929E-01
606	5.569E+01	647	3.337E+01	688	1.141E+01	729	3.182E+00	770	8.573E-01
607	5.563E+01	648	3.263E+01	689	1.112E+01	730	3.081E+00	771	8.488E-01
608	5.540E+01	649	3.189E+01	690	1.072E+01	731	2.985E+00	772	8.618E-01
609	5.521E+01	650	3.123E+01	691	1.046E+01	732	2.882E+00	773	8.140E-01
610	5.466E+01	651	3.067E+01	692	1.012E+01	733	2.782E+00	774	7.776E-01
611	5.476E+01	652	3.001E+01	693	9.783E+00	734	2.718E+00	775	7.594E-01
612	5.434E+01	653	2.924E+01	694	9.504E+00	735	2.574E+00	776	7.287E-01
613	5.425E+01	654	2.855E+01	695	9.214E+00	736	2.545E+00	777	7.438E-01
614	5.365E+01	655	2.776E+01	696	8.981E+00	737	2.450E+00	778	7.025E-01
615	5.345E+01	656	2.716E+01	697	8.618E+00	738	2.363E+00	779	7.140E-01
616	5.281E+01	657	2.665E+01	698	8.400E+00	739	2.317E+00	780	6.147E-01
617	5.266E+01	658	2.599E+01	699	8.147E+00	740	2.237E+00		
618	5.218E+01	659	2.537E+01	700	7.815E+00	741	2.123E+00		
619	5.163E+01	660	2.472E+01	701	7.718E+00	742	2.220E+00		
620	5.136E+01	661	2.409E+01	702	7.452E+00	743	1.993E+00		
621	5.068E+01	662	2.360E+01	703	7.133E+00	744	2.035E+00		
622	5.022E+01	663	2.295E+01	704	7.012E+00	745	1.927E+00		
623	4.977E+01	664	2.236E+01	705	6.790E+00	746	1.818E+00		
624	4.914E+01	665	2.174E+01	706	6.584E+00	747	1.776E+00		
625	4.852E+01	666	2.118E+01	707	6.369E+00	748	1.759E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

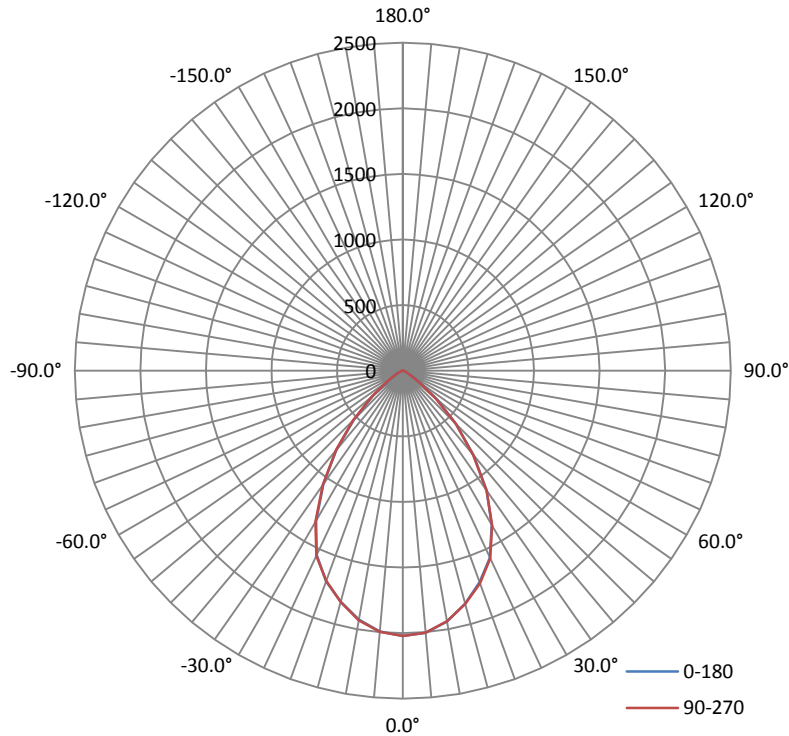
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.2227	26.13	0.9770

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2728.01	104.40	2023	1.05	1.06

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	72.6	72.8	72.8	72.6	72.7
Field Angle (10% I _{max}):	106.2	106.0	105.8	105.9	106.0

Luminous Intensity (cd) Distribution Data

C Y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	2022	2022	2022	2022	2022	2022	2022	2022
1°	2019	2020	2023	2019	2021	2020	2017	2020
2°	2014	2014	2015	2019	2019	2018	2017	2021
3°	2007	2010	2011	2013	2014	2013	2015	2014
4°	2002	2004	2004	2005	2006	2010	2008	2009
5°	1995	1990	1999	1998	1997	1998	2001	2004
6°	1984	1982	1990	1989	1987	1989	1989	1994
7°	1972	1972	1976	1978	1972	1977	1977	1984
8°	1958	1956	1963	1960	1962	1964	1965	1971
9°	1943	1940	1944	1947	1945	1948	1950	1956
10°	1925	1921	1923	1927	1931	1930	1931	1937
11°	1906	1901	1905	1909	1910	1913	1915	1917
12°	1886	1882	1884	1888	1891	1893	1894	1902
13°	1862	1862	1861	1866	1869	1872	1877	1877
14°	1840	1837	1840	1845	1846	1850	1852	1858
15°	1822	1816	1820	1823	1825	1828	1830	1834
16°	1798	1791	1797	1798	1800	1806	1806	1810
17°	1772	1767	1769	1775	1777	1781	1780	1787
18°	1748	1740	1745	1748	1752	1757	1753	1760
19°	1727	1719	1720	1725	1729	1730	1729	1732
20°	1707	1695	1698	1703	1704	1709	1704	1708
21°	1684	1673	1676	1679	1682	1686	1683	1688
22°	1658	1646	1652	1655	1660	1663	1661	1665
23°	1625	1616	1617	1624	1629	1634	1636	1638
24°	1588	1579	1583	1589	1596	1598	1601	1602
25°	1549	1537	1541	1551	1557	1558	1561	1566
26°	1508	1499	1501	1510	1516	1519	1519	1526
27°	1462	1452	1456	1464	1468	1477	1477	1483
28°	1418	1407	1412	1418	1423	1432	1434	1439
29°	1369	1361	1362	1368	1376	1382	1386	1397
30°	1322	1313	1315	1320	1328	1334	1340	1348
31°	1271	1261	1265	1270	1275	1284	1288	1298
32°	1216	1210	1212	1216	1225	1231	1238	1250
33°	1162	1158	1160	1164	1172	1177	1187	1198
34°	1107	1104	1107	1111	1115	1125	1135	1150
35°	1054	1049	1054	1058	1062	1073	1083	1096
36°	998	997	1000	1003	1008	1017	1027	1043
37°	944	942	946	949	952	962	975	990
38°	890	889	893	895	896	909	920	937
39°	836	835	837	839	845	855	867	881
40°	783	780	783	787	791	801	816	830
41°	728	728	730	732	738	748	761	776
42°	675	675	677	680	687	698	710	724
43°	622	621	625	628	635	646	658	671
44°	573	572	575	578	585	595	607	620
45°	524	522	525	529	536	546	558	571
46°	474	472	475	479	487	497	510	522
47°	426	423	427	431	439	450	462	474
48°	380	378	380	385	391	403	413	426

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
49°	334	332	334	339	346	356	368	379
50°	293	291	292	297	304	314	325	337
51°	252	251	253	257	263	273	283	295
52°	217	215	217	221	226	235	246	256
53°	184	184	184	188	193	201	211	220
54°	158	157	158	160	164	171	179	188
55°	137	137	137	138	141	146	153	161
56°	121	121	121	122	124	128	133	139
57°	107	107	107	108	110	113	118	123
58°	94	94	94	95	96	100	104	109
59°	83	83	83	83	85	88	91	96
60°	73	73	73	73	75	77	80	84
61°	64	64	64	64	65	68	70	74
62°	58	57	57	57	58	59	62	65
63°	51	51	50	50	51	53	55	58
64°	44	44	44	44	44	46	49	51
65°	40	39	39	39	39	41	42	45
66°	35	35	34	34	35	36	38	40
67°	32	31	31	31	31	32	33	36
68°	29	28	28	28	28	29	30	32
69°	26	26	25	25	25	26	27	29
70°	23	23	22	22	23	23	24	26
71°	21	21	20	20	20	21	22	23
72°	19	19	18	18	18	19	20	21
73°	17	17	16	16	17	17	18	19
74°	15	15	15	15	15	15	16	17
75°	14	14	13	13	13	14	14	15
76°	12	12	12	12	12	12	13	14
77°	11	11	11	11	11	11	11	12
78°	10	10	9	9	9	10	10	11
79°	9	8	8	8	8	9	9	10
80°	8	7	7	7	7	8	8	9
81°	7	6	6	6	6	7	7	7
82°	5	5	5	5	5	6	6	6
83°	4	4	4	4	4	5	5	5
84°	3	3	3	3	3	4	4	4
85°	3	3	2	3	3	3	3	3
86°	2	2	2	2	2	2	2	2
87°	1	1	1	1	1	1	1	2
88°	0	0	0	0	0	1	1	1
89°	0	0	0	0	0	0	0	0
90°	0	0	0	0	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

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
98°	0	0	0	0	0	0	0	0
99°	0	0	0	0	0	0	0	0
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	1	1	0	0	0
127°	1	1	1	1	1	1	1	0
128°	1	1	1	1	1	1	1	1
129°	1	1	1	1	1	1	1	1
130°	1	1	1	1	1	1	1	1
131°	1	1	1	1	1	1	1	1
132°	1	1	1	1	1	1	1	1
133°	1	1	1	1	1	1	1	1
134°	1	1	1	1	1	1	1	1
135°	1	1	1	1	1	1	1	1
136°	1	1	1	1	1	1	1	1
137°	1	1	1	1	1	1	1	1
138°	1	1	1	1	1	1	1	1
139°	1	1	1	1	1	1	1	1
140°	1	1	1	1	1	1	1	1
141°	1	1	2	2	2	2	1	1
142°	1	2	2	2	2	2	2	1
143°	2	2	2	2	2	2	2	2
144°	2	2	2	2	2	2	2	2
145°	2	2	2	2	2	2	2	2
146°	2	2	2	2	2	2	2	2

Luminous Intensity (cd) Distribution Data

C \ y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
147°	2	2	2	2	2	2	2	2
148°	2	2	2	2	2	2	2	2
149°	2	2	2	2	2	2	2	2
150°	2	2	2	2	2	2	2	2
151°	2	2	2	3	3	3	2	2
152°	2	2	3	3	3	3	2	2
153°	2	2	3	3	3	3	3	2
154°	2	3	3	3	3	3	3	2
155°	2	3	3	3	3	3	3	3
156°	3	3	3	3	3	3	3	3
157°	3	3	3	3	3	3	3	3
158°	3	3	3	3	3	3	3	3
159°	3	3	3	3	3	3	3	3
160°	3	3	3	3	3	3	3	3
161°	3	3	3	3	3	3	3	3
162°	3	3	3	3	3	3	3	3
163°	3	3	3	3	3	3	3	3
164°	3	3	3	3	3	3	3	3
165°	3	3	3	3	3	3	3	3
166°	3	3	3	3	3	3	3	3
167°	3	3	3	3	3	3	3	3
168°	3	3	3	3	3	3	3	3
169°	3	3	3	3	3	3	3	3
170°	3	3	3	3	3	3	3	3
171°	3	3	3	3	3	3	3	3
172°	2	2	3	3	3	3	3	3
173°	2	2	2	3	3	3	3	3
174°	2	2	2	2	2	2	2	2
175°	2	2	2	2	2	2	2	2
176°	2	2	2	2	2	2	2	2
177°	2	2	2	2	2	2	2	2
178°	2	2	2	2	2	2	2	2
179°	2	2	2	2	2	2	2	2
180°	2	2	2	2	2	2	2	2

Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0°	2022	2022	2022	2022	2022	2022	2022	2022
1°	2019	2018	2019	2022	2019	2019	2020	2021
2°	2019	2019	2019	2017	2016	2018	2017	2016
3°	2015	2012	2017	2020	2014	2016	2012	2011
4°	2008	2008	2016	2012	2010	2009	2005	2006
5°	2005	2000	2007	2005	2004	2000	1998	1998
6°	1995	1992	1999	1997	1997	1990	1987	1987
7°	1980	1984	1989	1985	1985	1982	1979	1978
8°	1971	1969	1978	1974	1971	1968	1962	1964
9°	1955	1959	1963	1961	1957	1955	1949	1945
10°	1941	1940	1946	1945	1939	1939	1933	1931
11°	1921	1923	1929	1928	1924	1920	1912	1909
12°	1902	1904	1909	1910	1904	1898	1890	1892
13°	1882	1881	1890	1890	1879	1878	1871	1869
14°	1859	1864	1869	1867	1862	1859	1850	1849
15°	1838	1843	1848	1846	1841	1834	1829	1826
16°	1815	1819	1827	1821	1817	1815	1808	1806
17°	1787	1797	1802	1800	1792	1790	1783	1778
18°	1766	1773	1777	1777	1770	1764	1755	1756
19°	1739	1746	1752	1750	1746	1742	1737	1731
20°	1714	1721	1729	1728	1725	1721	1713	1712
21°	1694	1700	1706	1708	1701	1697	1693	1689
22°	1670	1679	1688	1685	1680	1675	1669	1665
23°	1645	1651	1660	1658	1653	1647	1638	1633
24°	1611	1620	1629	1623	1618	1611	1604	1598
25°	1573	1585	1594	1590	1580	1575	1568	1560
26°	1534	1543	1552	1549	1544	1534	1524	1520
27°	1492	1503	1509	1508	1500	1490	1482	1476
28°	1449	1458	1464	1463	1456	1447	1437	1431
29°	1404	1414	1420	1416	1407	1399	1389	1381
30°	1357	1367	1372	1369	1360	1350	1342	1331
31°	1309	1318	1323	1323	1312	1303	1293	1282
32°	1261	1269	1273	1274	1264	1256	1244	1233
33°	1213	1220	1224	1225	1217	1209	1195	1184
34°	1165	1172	1174	1175	1169	1156	1142	1131
35°	1115	1116	1119	1120	1114	1099	1086	1075
36°	1058	1062	1064	1066	1058	1046	1030	1018
37°	1005	1009	1011	1011	1003	990	976	964
38°	951	954	954	955	947	934	920	909
39°	897	899	901	899	893	878	862	853
40°	845	845	845	846	838	824	810	797
41°	792	793	793	792	784	770	756	743
42°	737	740	739	738	729	716	702	689
43°	685	687	686	684	675	662	647	637
44°	634	636	635	632	622	609	596	585
45°	582	585	583	579	569	557	544	533
46°	533	535	533	527	517	505	494	483
47°	483	486	483	477	468	455	444	435
48°	436	438	434	427	418	406	395	388

49°	390	391	387	380	370	359	349	341
50°	345	347	342	335	325	314	304	297
51°	303	304	299	292	283	272	263	258
52°	264	264	259	251	242	233	224	221
53°	228	228	221	215	206	197	191	187
54°	196	195	189	182	174	172	167	165
55°	167	166	167	159	153	147	143	143
56°	149	146	144	137	131	121	119	121
57°	131	126	121	115	110	106	105	106
58°	113	112	107	101	96	92	91	93
59°	100	98	94	88	83	80	80	81
60°	88	87	82	77	72	70	69	71
61°	78	76	72	67	63	60	61	63
62°	68	67	63	59	55	53	53	55
63°	60	59	56	52	48	46	47	49
64°	53	52	49	45	42	41	41	43
65°	47	47	44	40	37	36	37	38
66°	42	41	39	36	33	32	33	34
67°	38	37	35	32	30	29	29	31
68°	34	33	31	29	27	26	26	28
69°	30	30	28	26	24	23	24	25
70°	27	27	25	23	22	21	22	23
71°	25	24	23	21	20	19	20	21
72°	22	22	21	19	18	17	18	19
73°	20	20	19	17	16	16	16	17
74°	18	18	17	16	15	14	15	15
75°	16	16	15	14	14	13	13	14
76°	15	15	14	13	12	12	12	12
77°	13	13	12	12	11	11	11	11
78°	12	11	11	10	10	10	10	10
79°	10	10	10	9	9	9	9	9
80°	9	9	9	8	8	8	8	8
81°	8	8	7	7	7	7	7	7
82°	7	7	6	6	6	6	6	6
83°	6	6	5	5	5	5	5	5
84°	5	5	4	4	4	4	4	4
85°	4	4	4	3	3	3	3	3
86°	3	3	3	2	2	2	2	2
87°	2	2	2	2	2	1	1	1
88°	1	1	1	1	1	1	1	0
89°	0	0	0	0	0	0	0	0
90°	0	0	0	0	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
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	1	1	1	1	0
141°	1	0	1	1	1	1	1	1
142°	1	0	1	1	1	1	1	1
143°	1	1	1	1	1	1	1	1
144°	1	1	1	1	1	1	1	1
145°	1	1	1	1	1	1	1	1
146°	1	1	1	1	1	1	1	1
147°	1	1	1	1	1	1	1	1
148°	1	1	1	1	1	1	1	1
149°	1	1	1	1	1	1	1	1
150°	1	1	1	1	1	1	1	1
151°	1	1	1	1	1	1	1	1
152°	1	1	1	1	1	1	1	1
153°	1	1	1	1	1	1	1	1
154°	1	1	1	1	1	1	1	1
155°	1	1	1	1	1	1	1	1
156°	1	1	1	1	1	1	1	1

157°	1	1	1	1	1	1	1	1
158°	1	1	1	1	1	1	1	1
159°	1	1	1	1	1	1	1	1
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	1	1	1	1
167°	1	1	1	1	1	1	1	1
168°	1	1	1	1	1	1	1	1
169°	1	1	1	1	1	1	1	1
170°	1	1	1	1	1	1	1	2
171°	2	2	1	1	1	1	1	2
172°	2	2	1	1	1	1	1	2
173°	2	2	1	1	2	1	2	2
174°	2	2	2	2	2	2	2	2
175°	2	2	2	2	2	2	2	2
176°	2	2	2	2	2	2	2	2
177°	2	2	2	2	2	2	2	2
178°	2	2	2	2	2	2	2	2
179°	2	2	2	2	2	2	2	2
180°	2	2	2	2	2	2	2	2

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	48.1	1.76
5-10	140.8	5.16
10-15	223.1	8.18
15-20	291.5	10.69
20-25	345.0	12.64
25-30	368.0	13.50
30-35	357.3	13.09
35-40	316.0	11.58
40-45	251.7	9.23
45-50	173.7	6.37
50-55	97.1	3.56
55-60	50.0	1.83
60-65	27.5	1.01
65-70	15.7	0.58
70-75	9.7	0.35
75-80	5.8	0.21
80-85	2.9	0.11
85-90	0.6	0.02
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.01
105-110	0.0	0.00
110-115	0.1	0.00
115-120	0.1	0.00
120-125	0.1	0.01
125-130	0.2	0.00
130-135	0.2	0.01
135-140	0.3	0.01
140-145	0.4	0.01
145-150	0.4	0.02
150-155	0.4	0.02
155-160	0.4	0.01
160-165	0.3	0.01
165-170	0.2	0.01
170-175	0.1	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	48.1	1.76
0-10	188.8	6.92
0-15	412.0	15.10
0-20	703.5	25.79
0-25	1048.5	38.43
0-30	1416.5	51.93
0-35	1773.8	65.02
0-40	2089.8	76.60
0-45	2341.5	85.83
0-50	2515.2	92.20
0-55	2612.3	95.76
0-60	2662.4	97.59
0-65	2689.8	98.60
0-70	2705.5	99.18
0-75	2715.2	99.53
0-80	2721.0	99.74
0-85	2723.9	99.85
0-90	2724.6	99.87
0-95	2724.6	99.87
0-100	2724.6	99.87
0-105	2724.6	99.88
0-110	2724.6	99.88
0-115	2724.7	99.88
0-120	2724.8	99.88
0-125	2724.9	99.89
0-130	2725.1	99.89
0-135	2725.3	99.90
0-140	2725.6	99.91
0-145	2726.0	99.92
0-150	2726.4	99.94
0-155	2726.8	99.96
0-160	2727.2	99.97
0-165	2727.6	99.98
0-170	2727.8	99.99
0-175	2728.0	100.00
0-180	2728.0	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.
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*****END OF REPORT*****