IES LM-79-08

MEASUREMENT AND TEST REPORT

For

Maxlite Inc.

10 York Ave. West Caldwell, NJ 07006, USA.

Test Model: SDLS820CSWJ

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hexy He
Report Number:	RSZ190513503-10
Test Date:	2019-02-01 to 2019-02-14
Report Date:	2019-05-14
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 sample was received on 2019-01-30 and used for testing. All tests and evaluations were performed at the least efficient white light setting.

Model Tested:	SDLS820CSWJ
Manufacturer:	Maxlite Inc.
Product Designation:	LED Recessed Downlight
Burning Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120V AC 60Hz
Rated Power:	20W
Nominal CCT:	2700K, 3000K, 4000K, 5000K

Note:

1. The applicant Maxlite Inc. declare that their products with model SDLS820CSWJ are the same to the products in report # RSZ190130509-10-1-M1 and is authorized by original applicant to use their test data.

2. All the data in previous report (RSZ190130509-10-1-M1) is shared in this report.

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement 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	2018-03-18	2019-03-18
Digital power meter	EVERFINE	PF9811	G135717CN1361159	2018-12-13	2019-12-13
High-precision rapid spectral radiometer	EVERFINE	HAAS-2000	N/A	2018-03-18	2019-03-18
Precision frequency power supply	ALL Power	APW-105N	970663	2018-03-19	2019-03-19
Standard Light Source	EVERFINE	D204	G100283CJ6351178	2018-12-24	2019-12-24
thermometer	SENSING	NA	NA	2018-03-17	2019-03-17
Programmable Precision DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	2018-03-26	2019-03-26
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2018-03-19	2019-03-19
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2018-03-26	2019-03-26

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Digital power meter	YOKOGAWA	WT-210	91j926132	2018-03-26	2019-03-26
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2018-03-18	2019-03-18
Wireless Remote Sensor	N/A	433MHz	N/A	2018-03-17	2019-03-17
Standard Light Source	EVERFINE	D908	1012001	2018-12-24	2019-12-24

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 IES LM-79-08. 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°C during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

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=1.6% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=20K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=1.6(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. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

The uncertainty of the luminous intensity is U=2.82% (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: **Downward**

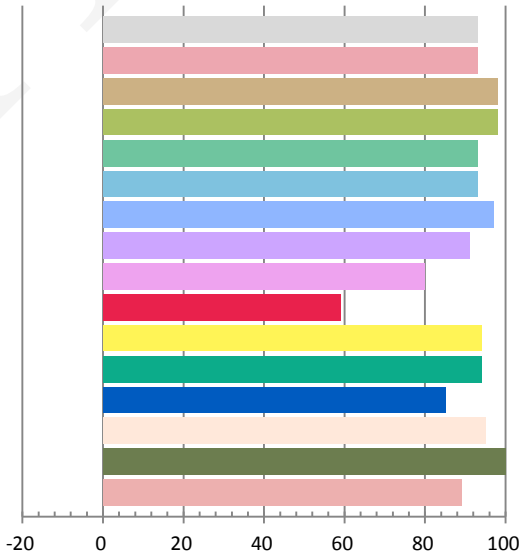
Photometric and Electrical Measurement Result

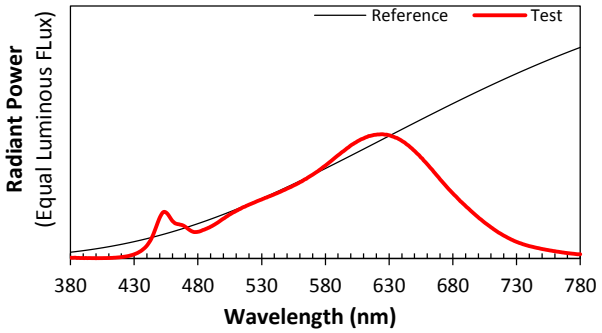
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.169	19.91	0.9815	1515.8	76.15

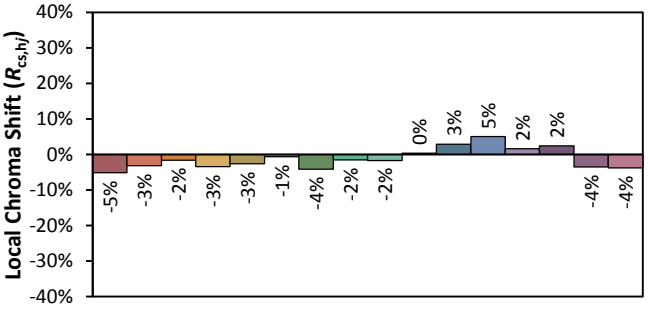
Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
5.3313	2727	0.000139	0.4579	0.4105	0.2613	0.5270

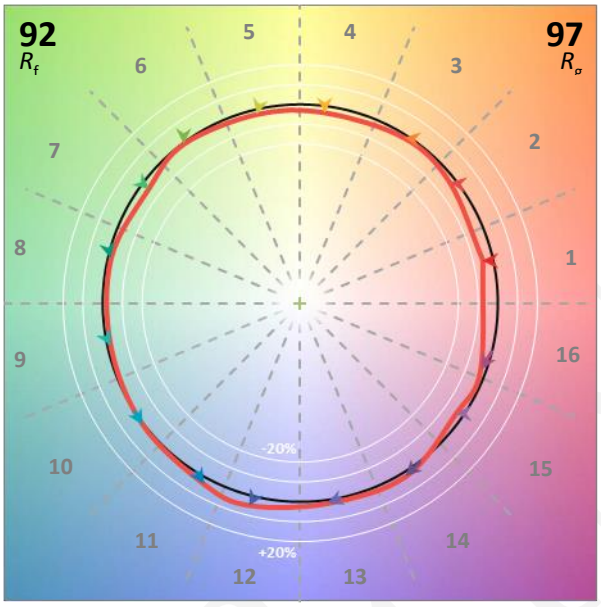
Color Rendering Index

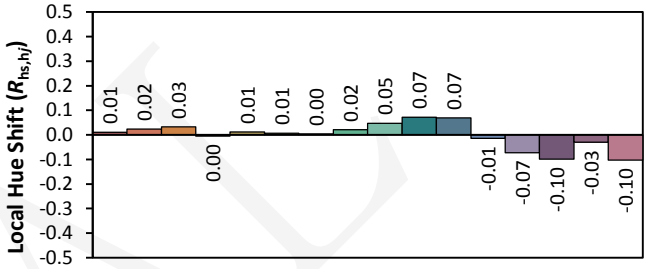
Ra			
93.0			
R1	R2	R3	R4
93	98	98	93
R5	R6	R7	R8
93	97	91	80
R9	R10	R11	R12
59	94	94	85
R13	R14	R15	
95	100	89	

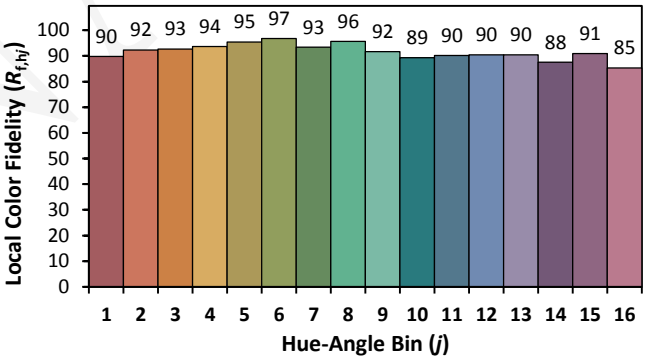


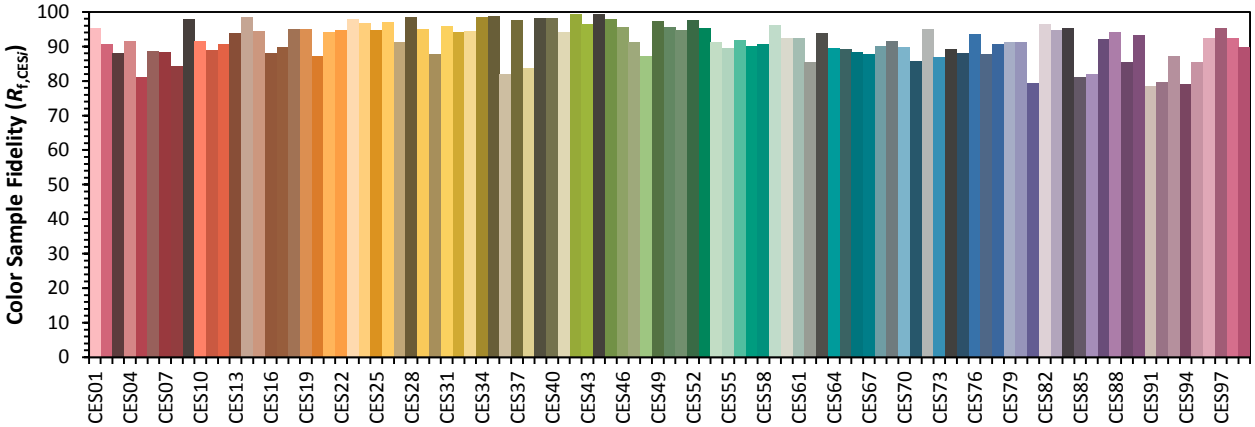

Reference
Test
Radiant Power
(Equal Luminous FLux)
380
430
480
530
580
630
680
730
780
Wavelength (nm)


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

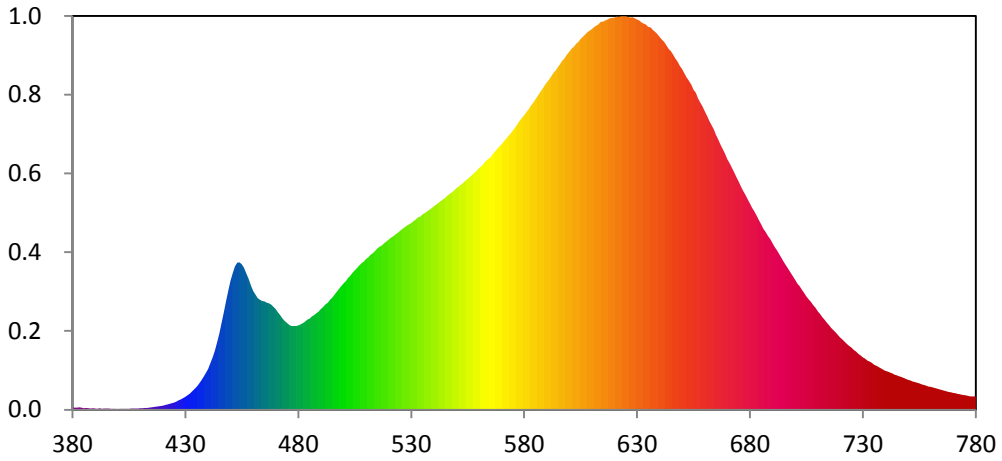

92
R_f
97
R_g
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
-20%
+20%


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
0.02
0.03
0.00
0.01
0.01
0.00
0.02
0.05
0.07
0.07
-0.01
-0.07
-0.10
-0.03
-0.10


Local Color Fidelity ($R_{f,hj}$)
100
90
80
70
60
50
40
30
20
10
0
90
92
93
94
95
97
93
96
92
89
90
90
90
88
91
85
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

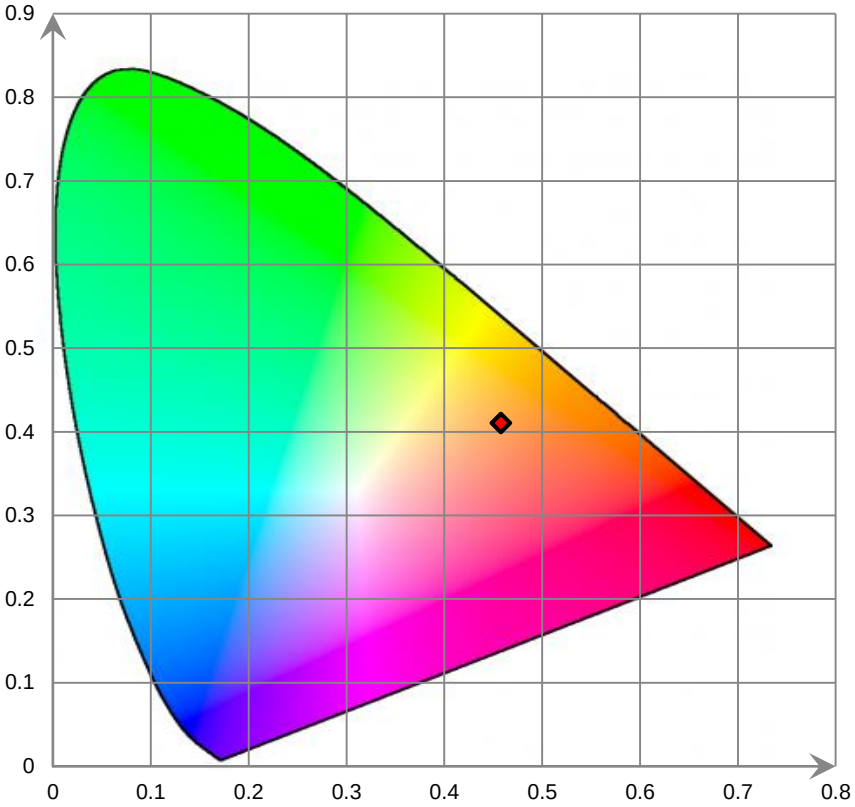
Relative Spectral Power Distribution



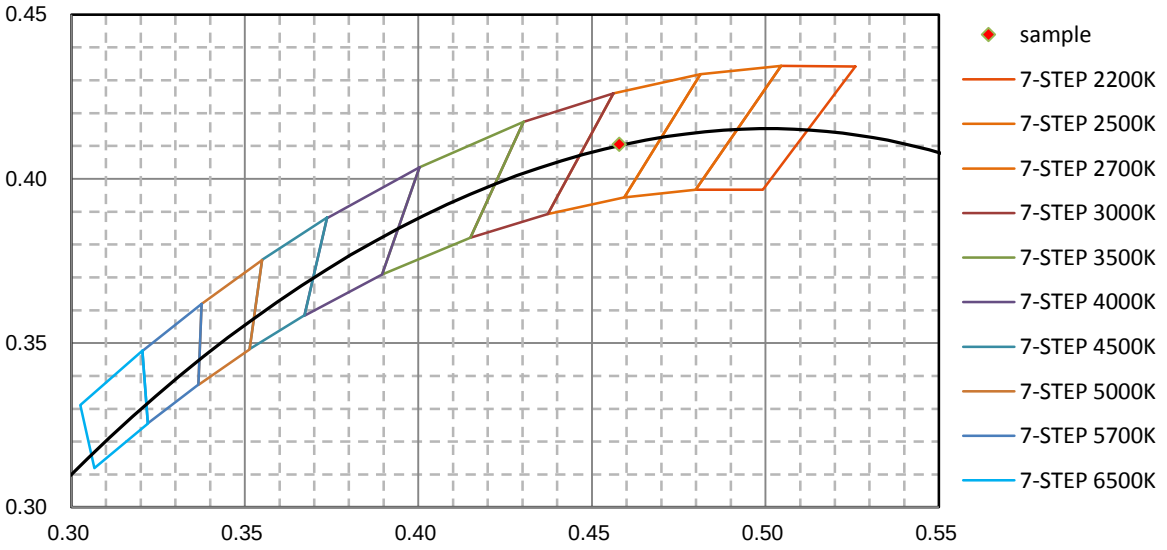
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.126E-01	421	3.996E-01	462	9.274E+00	503	1.114E+01	544	1.748E+01
381	1.654E-01	422	4.382E-01	463	9.155E+00	504	1.138E+01	545	1.762E+01
382	1.616E-01	423	4.883E-01	464	9.052E+00	505	1.160E+01	546	1.779E+01
383	1.898E-01	424	5.442E-01	465	9.010E+00	506	1.178E+01	547	1.795E+01
384	1.861E-01	425	6.081E-01	466	8.906E+00	507	1.200E+01	548	1.808E+01
385	1.137E-01	426	6.813E-01	467	8.847E+00	508	1.217E+01	549	1.825E+01
386	1.479E-01	427	7.821E-01	468	8.732E+00	509	1.232E+01	550	1.842E+01
387	1.153E-01	428	8.686E-01	469	8.570E+00	510	1.253E+01	551	1.856E+01
388	9.883E-02	429	9.703E-01	470	8.359E+00	511	1.268E+01	552	1.872E+01
389	1.103E-01	430	1.086E+00	471	8.117E+00	512	1.289E+01	553	1.885E+01
390	9.263E-02	431	1.222E+00	472	7.858E+00	513	1.303E+01	554	1.904E+01
391	7.305E-02	432	1.357E+00	473	7.609E+00	514	1.321E+01	555	1.921E+01
392	1.186E-01	433	1.519E+00	474	7.385E+00	515	1.343E+01	556	1.937E+01
393	7.724E-02	434	1.714E+00	475	7.193E+00	516	1.356E+01	557	1.952E+01
394	8.761E-02	435	1.903E+00	476	7.052E+00	517	1.367E+01	558	1.971E+01
395	9.111E-02	436	2.144E+00	477	6.951E+00	518	1.387E+01	559	1.987E+01
396	8.092E-02	437	2.419E+00	478	6.954E+00	519	1.400E+01	560	2.009E+01
397	7.263E-02	438	2.693E+00	479	6.965E+00	520	1.416E+01	561	2.024E+01
398	7.658E-02	439	3.022E+00	480	7.020E+00	521	1.430E+01	562	2.042E+01
399	7.339E-02	440	3.399E+00	481	7.087E+00	522	1.443E+01	563	2.066E+01
400	5.084E-02	441	3.863E+00	482	7.197E+00	523	1.458E+01	564	2.087E+01
401	7.545E-02	442	4.363E+00	483	7.337E+00	524	1.471E+01	565	2.098E+01
402	7.013E-02	443	4.913E+00	484	7.502E+00	525	1.486E+01	566	2.126E+01
403	7.310E-02	444	5.603E+00	485	7.587E+00	526	1.502E+01	567	2.147E+01
404	7.390E-02	445	6.362E+00	486	7.749E+00	527	1.516E+01	568	2.168E+01
405	7.874E-02	446	7.223E+00	487	7.875E+00	528	1.529E+01	569	2.188E+01
406	8.862E-02	447	8.114E+00	488	8.040E+00	529	1.542E+01	570	2.208E+01
407	8.887E-02	448	9.028E+00	489	8.169E+00	530	1.554E+01	571	2.231E+01
408	9.044E-02	449	9.922E+00	490	8.368E+00	531	1.570E+01	572	2.253E+01
409	1.015E-01	450	1.074E+01	491	8.525E+00	532	1.582E+01	573	2.277E+01
410	1.105E-01	451	1.138E+01	492	8.734E+00	533	1.600E+01	574	2.296E+01
411	1.174E-01	452	1.193E+01	493	8.918E+00	534	1.606E+01	575	2.324E+01
412	1.359E-01	453	1.224E+01	494	9.136E+00	535	1.625E+01	576	2.348E+01
413	1.465E-01	454	1.226E+01	495	9.338E+00	536	1.636E+01	577	2.373E+01
414	1.822E-01	455	1.209E+01	496	9.560E+00	537	1.649E+01	578	2.401E+01
415	1.915E-01	456	1.180E+01	497	9.799E+00	538	1.663E+01	579	2.425E+01
416	2.219E-01	457	1.136E+01	498	1.004E+01	539	1.676E+01	580	2.448E+01
417	2.495E-01	458	1.084E+01	499	1.028E+01	540	1.692E+01	581	2.475E+01
418	2.766E-01	459	1.032E+01	500	1.049E+01	541	1.706E+01	582	2.502E+01
419	3.077E-01	460	9.870E+00	501	1.069E+01	542	1.718E+01	583	2.529E+01
420	3.456E-01	461	9.575E+00	502	1.095E+01	543	1.734E+01	584	2.555E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.583E+01	626	3.268E+01	667	2.207E+01	708	8.700E+00	749	2.557E+00
586	2.611E+01	627	3.263E+01	668	2.169E+01	709	8.468E+00	750	2.494E+00
587	2.640E+01	628	3.264E+01	669	2.131E+01	710	8.193E+00	751	2.428E+00
588	2.667E+01	629	3.256E+01	670	2.086E+01	711	7.979E+00	752	2.369E+00
589	2.695E+01	630	3.247E+01	671	2.049E+01	712	7.715E+00	753	2.299E+00
590	2.721E+01	631	3.239E+01	672	2.010E+01	713	7.489E+00	754	2.244E+00
591	2.746E+01	632	3.223E+01	673	1.973E+01	714	7.257E+00	755	2.186E+00
592	2.773E+01	633	3.213E+01	674	1.935E+01	715	7.031E+00	756	2.113E+00
593	2.802E+01	634	3.202E+01	675	1.896E+01	716	6.801E+00	757	2.068E+00
594	2.823E+01	635	3.184E+01	676	1.858E+01	717	6.621E+00	758	2.008E+00
595	2.849E+01	636	3.179E+01	677	1.820E+01	718	6.426E+00	759	1.942E+00
596	2.876E+01	637	3.159E+01	678	1.787E+01	719	6.212E+00	760	1.908E+00
597	2.905E+01	638	3.141E+01	679	1.750E+01	720	6.015E+00	761	1.837E+00
598	2.925E+01	639	3.123E+01	680	1.716E+01	721	5.850E+00	762	1.787E+00
599	2.954E+01	640	3.100E+01	681	1.679E+01	722	5.663E+00	763	1.748E+00
600	2.980E+01	641	3.078E+01	682	1.649E+01	723	5.471E+00	764	1.686E+00
601	3.003E+01	642	3.060E+01	683	1.616E+01	724	5.303E+00	765	1.635E+00
602	3.021E+01	643	3.032E+01	684	1.578E+01	725	5.142E+00	766	1.574E+00
603	3.044E+01	644	3.003E+01	685	1.544E+01	726	4.957E+00	767	1.542E+00
604	3.061E+01	645	2.983E+01	686	1.506E+01	727	4.823E+00	768	1.474E+00
605	3.085E+01	646	2.953E+01	687	1.480E+01	728	4.640E+00	769	1.448E+00
606	3.103E+01	647	2.922E+01	688	1.446E+01	729	4.507E+00	770	1.398E+00
607	3.121E+01	648	2.896E+01	689	1.417E+01	730	4.362E+00	771	1.364E+00
608	3.140E+01	649	2.861E+01	690	1.383E+01	731	4.245E+00	772	1.318E+00
609	3.152E+01	650	2.834E+01	691	1.350E+01	732	4.099E+00	773	1.283E+00
610	3.165E+01	651	2.800E+01	692	1.324E+01	733	3.997E+00	774	1.250E+00
611	3.183E+01	652	2.765E+01	693	1.292E+01	734	3.887E+00	775	1.220E+00
612	3.197E+01	653	2.737E+01	694	1.259E+01	735	3.747E+00	776	1.174E+00
613	3.207E+01	654	2.703E+01	695	1.229E+01	736	3.655E+00	777	1.131E+00
614	3.227E+01	655	2.660E+01	696	1.199E+01	737	3.542E+00	778	1.093E+00
615	3.229E+01	656	2.636E+01	697	1.170E+01	738	3.445E+00	779	1.099E+00
616	3.238E+01	657	2.589E+01	698	1.140E+01	739	3.353E+00	780	1.101E+00
617	3.245E+01	658	2.555E+01	699	1.111E+01	740	3.247E+00		
618	3.256E+01	659	2.521E+01	700	1.082E+01	741	3.175E+00		
619	3.259E+01	660	2.482E+01	701	1.051E+01	742	3.097E+00		
620	3.263E+01	661	2.445E+01	702	1.029E+01	743	3.021E+00		
621	3.269E+01	662	2.403E+01	703	9.999E+00	744	2.928E+00		
622	3.268E+01	663	2.367E+01	704	9.719E+00	745	2.856E+00		
623	3.272E+01	664	2.332E+01	705	9.441E+00	746	2.773E+00		
624	3.274E+01	665	2.286E+01	706	9.195E+00	747	2.723E+00		
625	3.274E+01	666	2.248E+01	707	8.959E+00	748	2.646E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

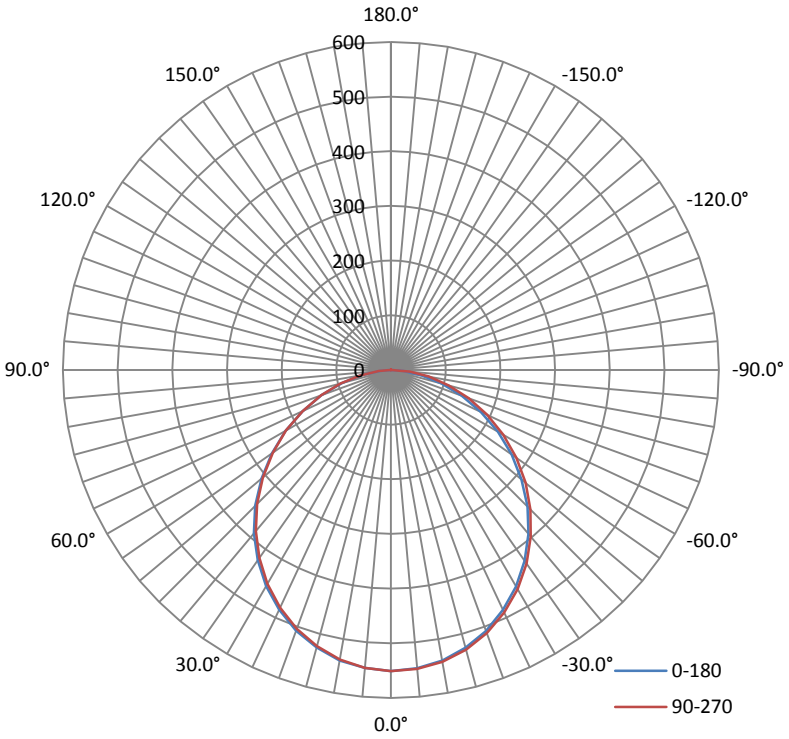
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.1690	19.89	0.9800

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1518.13	76.33	551.0	1.24	1.25

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	108.2	108.9	109.2	108.9	108.8
Field Angle (10% I_{max}):	160.2	160.9	162.2	160.8	161.0

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	551	551	551	551	551	551	551	551
5.0°	547	548	547	547	547	547	547	547
10.0°	540	539	539	538	538	538	538	539
15.0°	526	525	524	524	523	524	524	525
20.0°	508	506	506	505	504	504	505	506
25.0°	484	483	482	481	480	480	481	482
30.0°	457	455	453	452	452	452	453	454
35.0°	425	423	421	420	419	420	420	422
40.0°	390	388	386	385	384	384	385	387
45.0°	351	349	348	347	346	346	347	348
50.0°	309	308	308	307	306	306	307	307
55.0°	266	265	265	265	264	264	264	264
60.0°	222	221	221	222	222	222	221	220
65.0°	178	177	177	179	179	179	176	176
70.0°	135	133	133	136	136	136	133	133
75.0°	93	91	92	94	95	94	92	91
80.0°	55	53	53	55	57	55	53	53
85.0°	20	19	19	20	22	20	19	19
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	1	1	1	1	1	1	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Luminous Intensity (cd) Distribution Data (cont.)

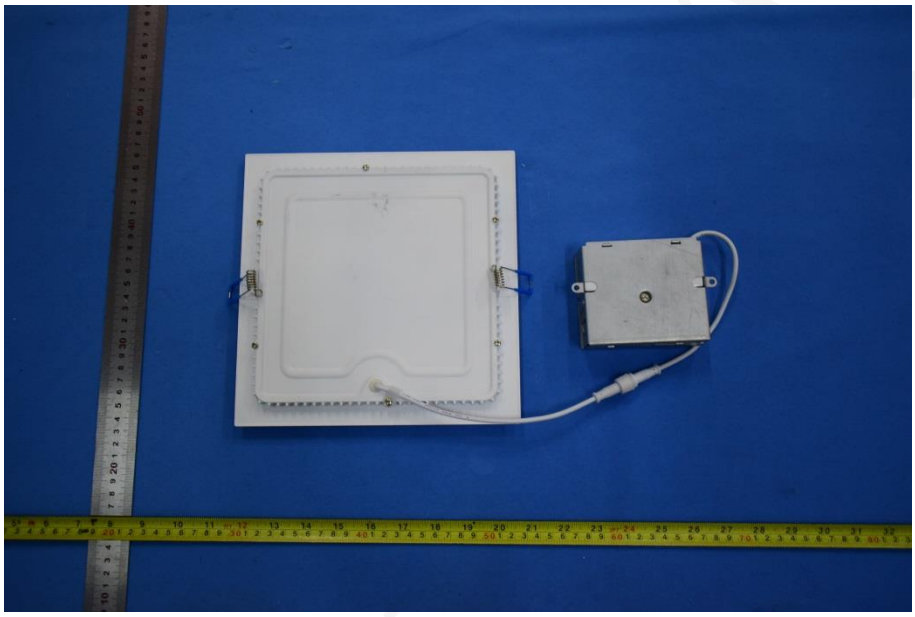
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	551	551	551	551	551	551	551	551
5.0°	548	548	549	549	549	549	549	548
10.0°	540	541	541	542	542	542	542	541
15.0°	526	528	529	529	530	530	529	528
20.0°	508	509	511	512	512	512	511	511
25.0°	485	487	488	489	490	490	489	488
30.0°	458	459	461	462	463	463	462	461
35.0°	426	428	430	431	432	432	431	429
40.0°	392	394	396	397	398	398	396	395
45.0°	353	356	358	360	361	361	359	357
50.0°	312	315	319	320	321	321	319	316
55.0°	269	272	277	279	280	280	277	273
60.0°	225	228	233	236	237	237	233	229
65.0°	181	184	189	193	194	194	189	185
70.0°	137	141	145	150	151	150	145	141
75.0°	95	98	102	107	109	107	102	98
80.0°	57	59	63	68	70	67	63	60
85.0°	23	25	28	32	34	32	28	25
90.0°	0	0	1	0	0	1	1	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	1	1	1	1	1	1	1	1

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	13.1	0.87
5-10	38.9	2.56
10-15	63.3	4.17
15-20	85.3	5.61
20-25	104.1	6.86
25-30	119.2	7.85
30-35	130.0	8.57
35-40	136.2	8.97
40-45	137.7	9.07
45-50	134.4	8.86
50-55	126.7	8.34
55-60	114.8	7.56
60-65	99.6	6.56
65-70	81.6	5.38
70-75	61.8	4.07
75-80	41.7	2.75
80-85	22.3	1.46
85-90	5.9	0.39
90-95	0.1	0.00
95-100	0.1	0.01
100-105	0.1	0.00
105-110	0.1	0.01
110-115	0.1	0.00
115-120	0.1	0.01
120-125	0.1	0.00
125-130	0.1	0.01
130-135	0.1	0.01
135-140	0.1	0.00
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	0.00
165-170	0.1	0.01
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	13.1	0.87
0-10	52.1	3.43
0-15	115.3	7.60
0-20	200.6	13.21
0-25	304.7	20.07
0-30	423.9	27.92
0-35	553.9	36.49
0-40	690.1	45.46
0-45	827.8	54.53
0-50	962.3	63.39
0-55	1088.9	71.73
0-60	1203.8	79.29
0-65	1303.4	85.85
0-70	1385.0	91.23
0-75	1446.8	95.30
0-80	1488.5	98.05
0-85	1510.8	99.51
0-90	1516.6	99.90
0-95	1516.7	99.90
0-100	1516.7	99.91
0-105	1516.8	99.91
0-110	1516.9	99.92
0-115	1516.9	99.92
0-120	1517.0	99.93
0-125	1517.1	99.93
0-130	1517.2	99.94
0-135	1517.3	99.95
0-140	1517.4	99.95
0-145	1517.5	99.96
0-150	1517.7	99.97
0-155	1517.8	99.98
0-160	1517.9	99.99
0-165	1518.0	99.99
0-170	1518.1	100.00
0-175	1518.1	100.00
0-180	1518.1	100.00

6. Product Photo



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