IES LM-79-08

MEASUREMENT AND TEST REPORT

For

LEDVANCE LLC

200 Ballardvale Street Wilmington, MA 01887

#Test Model: LEDMD6R2A1200ST9SC3

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hexy He
Report Number:	RSZ191009506-10
Test Date:	2019-09-02 to 2019-09-03
Report Date:	2019-10-11
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.

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1. Product Description

General Information:

One test sample was in good condition and received on 2019-08-29 and used for testing. All tests and evaluations were performed at the least efficient white light setting.

#Model Tested:	LEDMD6R2A1200ST9SC3
#Manufacturer:	LEDVANCE LLC
#Product Designation:	LED recessed downLight
Burning Time Before Test:	0hour(For New Products)

#Rated Values:

Rated Voltage/Frequency:	120V AC 60Hz
Rated Power:	16 W
Nominal CCT:	2700K/3000K/3500K/4000K/5000K
Nominal Lumen Output:	1200Im

Note:

1. The applicant LEDVANCE LLC declare that their products with model LEDMD6R2A1200ST9SC3

are the same to the products in report#RSZ190829503-10-1-M1 and is authorized by original applicant to use their test data.

2. All the data in previous report (RSZ190829503-10-1-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 temperature integrating sphere	SENSING	SPR-600	S09008	2019-06-28	2020-06-27
High-precision rapid spectral analysis system	EVERFINE	HAAS-2000	M112048CA1361125	2018-12-13	2019-12-13
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

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
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
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=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=22K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.1(K=2), at the 95% confidence level.

The uncertainty of power meter AC current U=0.39 % of rdg, AC Voltage U=0.25% of rdg, Power U=0.42%) (K=2), at the 95% confidence level.

Goniophotometer System

The 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. 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**

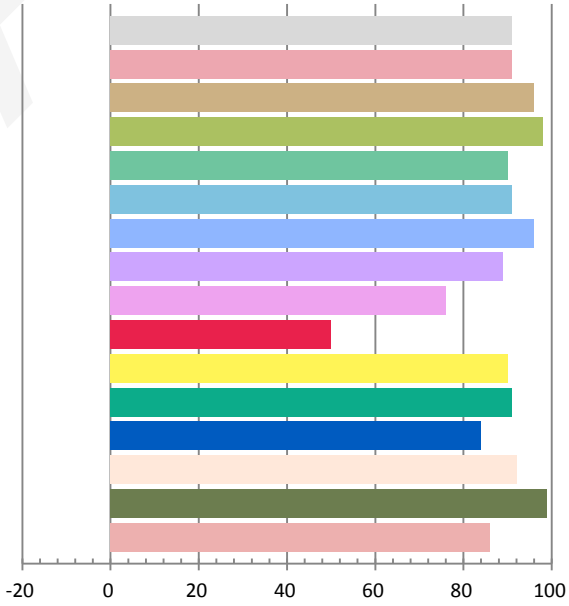
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.1358	15.94	0.9778	1212.5	76.07

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.1918	2679	-0.00141	0.4591	0.4066	0.2638	0.5257

Color Rendering Index

Ra			
90.9			
R1	R2	R3	R4
91	96	98	90
R5	R6	R7	R8
91	96	89	76
R9	R10	R11	R12
50	90	91	84
R13	R14	R15	
92	99	86	



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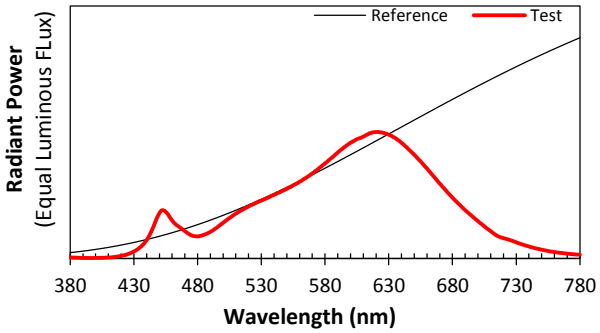
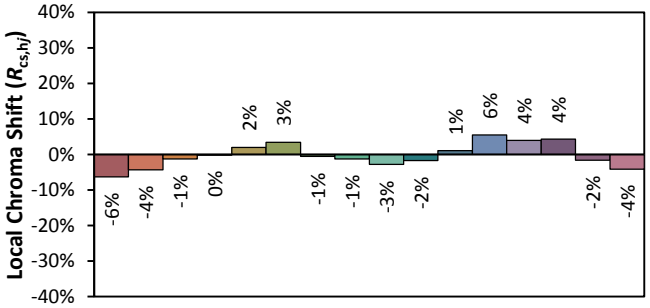
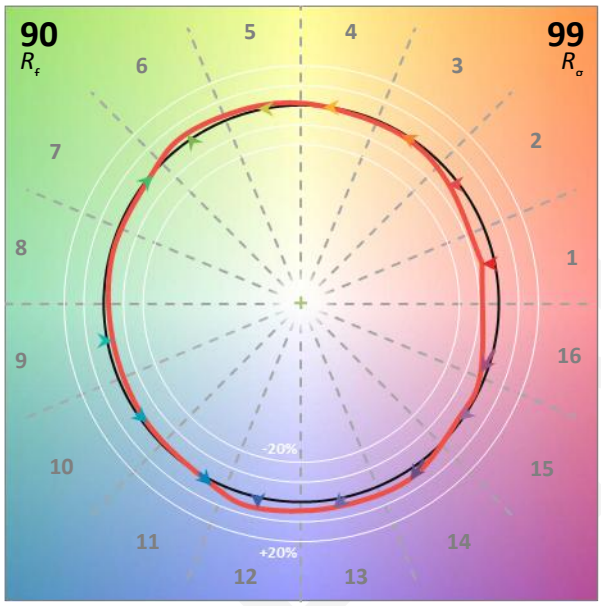
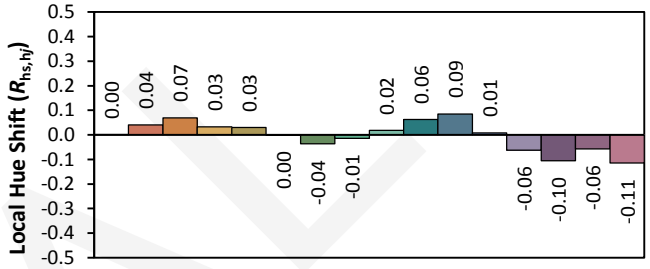
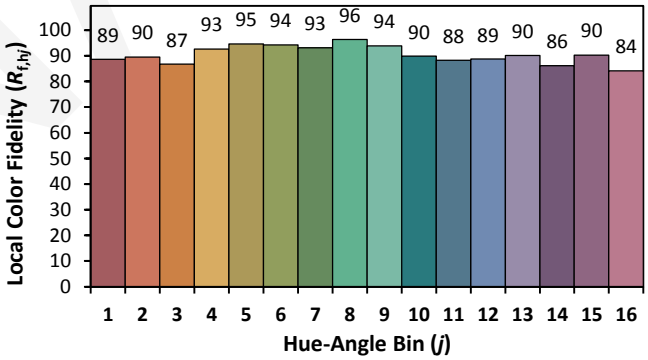
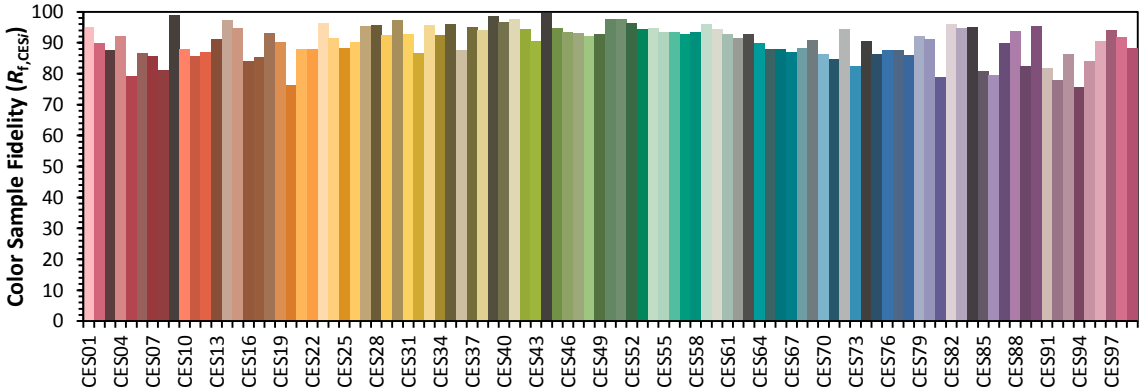

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


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

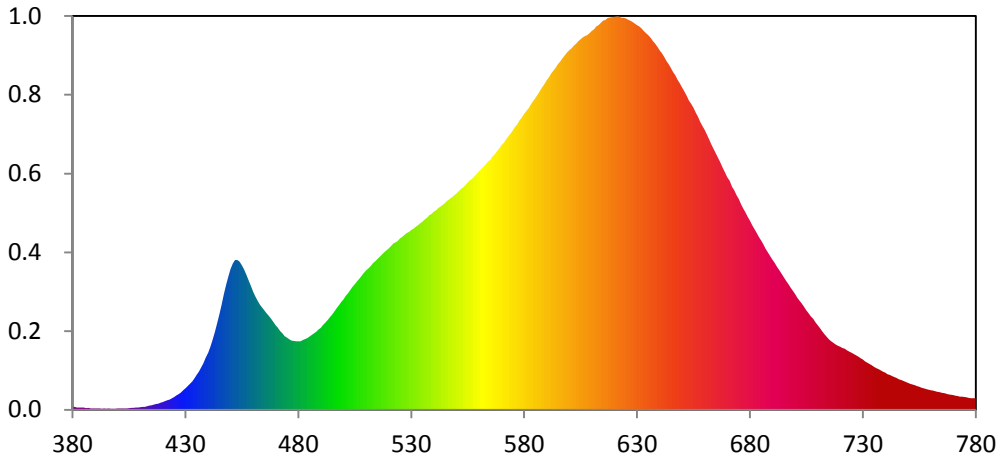

90
R_f
99
R_a
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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 0.04 0.07 0.03 0.03 0.00 -0.04 -0.01 0.02 0.06 0.09 0.01 -0.06 -0.10 -0.06 -0.11


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
89 90 87 93 95 94 93 96 94 90 88 89 90 86 90 84
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

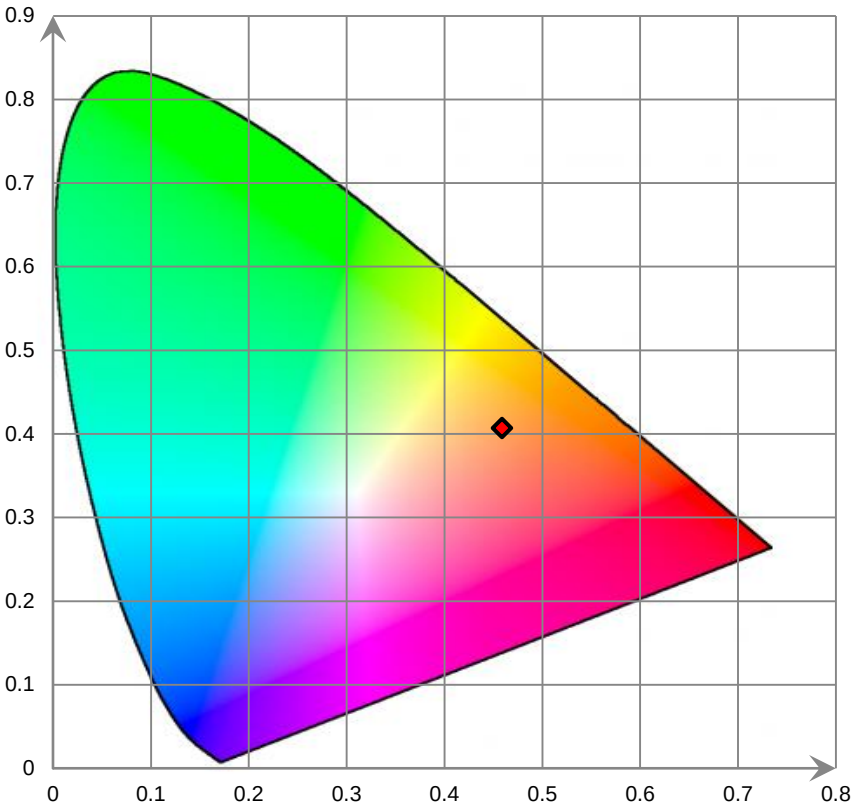
Relative Spectral Power Distribution



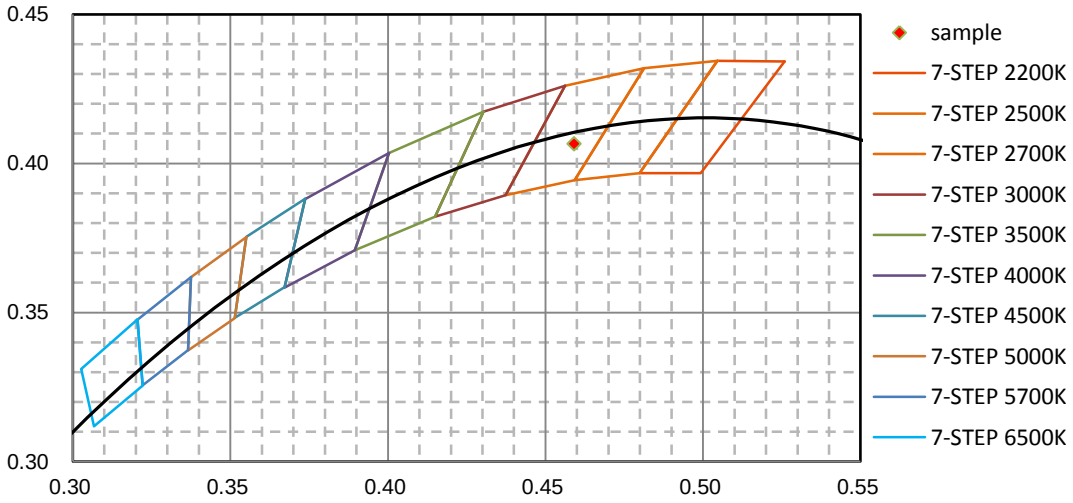
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.081E-01	421	5.736E-01	462	7.383E+00	503	8.121E+00	544	1.389E+01
381	1.899E-01	422	6.476E-01	463	7.124E+00	504	8.326E+00	545	1.400E+01
382	1.608E-01	423	7.032E-01	464	6.915E+00	505	8.508E+00	546	1.416E+01
383	1.577E-01	424	7.723E-01	465	6.733E+00	506	8.693E+00	547	1.429E+01
384	1.562E-01	425	8.638E-01	466	6.535E+00	507	8.869E+00	548	1.441E+01
385	1.384E-01	426	9.684E-01	467	6.343E+00	508	9.074E+00	549	1.453E+01
386	1.039E-01	427	1.063E+00	468	6.162E+00	509	9.255E+00	550	1.467E+01
387	1.176E-01	428	1.177E+00	469	5.949E+00	510	9.435E+00	551	1.482E+01
388	8.932E-02	429	1.312E+00	470	5.732E+00	511	9.589E+00	552	1.496E+01
389	7.865E-02	430	1.452E+00	471	5.561E+00	512	9.740E+00	553	1.507E+01
390	9.017E-02	431	1.595E+00	472	5.343E+00	513	9.933E+00	554	1.522E+01
391	8.383E-02	432	1.760E+00	473	5.180E+00	514	1.007E+01	555	1.540E+01
392	7.853E-02	433	1.918E+00	474	4.997E+00	515	1.021E+01	556	1.555E+01
393	7.086E-02	434	2.125E+00	475	4.873E+00	516	1.036E+01	557	1.567E+01
394	8.864E-02	435	2.364E+00	476	4.777E+00	517	1.052E+01	558	1.582E+01
395	6.250E-02	436	2.572E+00	477	4.691E+00	518	1.068E+01	559	1.598E+01
396	7.538E-02	437	2.869E+00	478	4.665E+00	519	1.080E+01	560	1.615E+01
397	6.306E-02	438	3.135E+00	479	4.646E+00	520	1.094E+01	561	1.630E+01
398	7.244E-02	439	3.503E+00	480	4.634E+00	521	1.109E+01	562	1.647E+01
399	7.257E-02	440	3.855E+00	481	4.649E+00	522	1.125E+01	563	1.664E+01
400	8.363E-02	441	4.275E+00	482	4.734E+00	523	1.133E+01	564	1.684E+01
401	9.143E-02	442	4.752E+00	483	4.780E+00	524	1.144E+01	565	1.695E+01
402	7.732E-02	443	5.277E+00	484	4.867E+00	525	1.160E+01	566	1.717E+01
403	8.994E-02	444	5.863E+00	485	4.971E+00	526	1.172E+01	567	1.733E+01
404	9.065E-02	445	6.463E+00	486	5.067E+00	527	1.184E+01	568	1.752E+01
405	1.014E-01	446	7.123E+00	487	5.180E+00	528	1.197E+01	569	1.772E+01
406	1.176E-01	447	7.820E+00	488	5.293E+00	529	1.206E+01	570	1.793E+01
407	1.254E-01	448	8.451E+00	489	5.451E+00	530	1.219E+01	571	1.808E+01
408	1.464E-01	449	9.024E+00	490	5.558E+00	531	1.228E+01	572	1.834E+01
409	1.582E-01	450	9.537E+00	491	5.747E+00	532	1.241E+01	573	1.852E+01
410	1.646E-01	451	9.909E+00	492	5.895E+00	533	1.252E+01	574	1.871E+01
411	1.888E-01	452	1.014E+01	493	6.103E+00	534	1.265E+01	575	1.894E+01
412	2.032E-01	453	1.014E+01	494	6.288E+00	535	1.276E+01	576	1.918E+01
413	2.367E-01	454	1.004E+01	495	6.472E+00	536	1.290E+01	577	1.935E+01
414	2.706E-01	455	9.799E+00	496	6.684E+00	537	1.302E+01	578	1.962E+01
415	2.937E-01	456	9.519E+00	497	6.890E+00	538	1.319E+01	579	1.980E+01
416	3.431E-01	457	9.182E+00	498	7.093E+00	539	1.327E+01	580	2.003E+01
417	3.806E-01	458	8.746E+00	499	7.301E+00	540	1.342E+01	581	2.024E+01
418	4.197E-01	459	8.374E+00	500	7.476E+00	541	1.352E+01	582	2.046E+01
419	4.705E-01	460	7.991E+00	501	7.726E+00	542	1.366E+01	583	2.072E+01
420	5.223E-01	461	7.653E+00	502	7.902E+00	543	1.378E+01	584	2.094E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.115E+01	626	2.644E+01	667	1.674E+01	708	6.147E+00	749	1.892E+00
586	2.137E+01	627	2.638E+01	668	1.640E+01	709	5.926E+00	750	1.826E+00
587	2.162E+01	628	2.630E+01	669	1.609E+01	710	5.731E+00	751	1.761E+00
588	2.186E+01	629	2.619E+01	670	1.577E+01	711	5.527E+00	752	1.710E+00
589	2.209E+01	630	2.607E+01	671	1.551E+01	712	5.316E+00	753	1.663E+00
590	2.233E+01	631	2.598E+01	672	1.512E+01	713	5.115E+00	754	1.606E+00
591	2.255E+01	632	2.587E+01	673	1.489E+01	714	4.944E+00	755	1.551E+00
592	2.279E+01	633	2.567E+01	674	1.456E+01	715	4.766E+00	756	1.498E+00
593	2.299E+01	634	2.553E+01	675	1.429E+01	716	4.635E+00	757	1.452E+00
594	2.320E+01	635	2.540E+01	676	1.394E+01	717	4.531E+00	758	1.407E+00
595	2.344E+01	636	2.521E+01	677	1.365E+01	718	4.424E+00	759	1.371E+00
596	2.361E+01	637	2.500E+01	678	1.339E+01	719	4.335E+00	760	1.326E+00
597	2.382E+01	638	2.482E+01	679	1.308E+01	720	4.261E+00	761	1.292E+00
598	2.401E+01	639	2.460E+01	680	1.281E+01	721	4.177E+00	762	1.247E+00
599	2.421E+01	640	2.436E+01	681	1.251E+01	722	4.132E+00	763	1.212E+00
600	2.439E+01	641	2.417E+01	682	1.225E+01	723	4.037E+00	764	1.189E+00
601	2.452E+01	642	2.392E+01	683	1.199E+01	724	3.955E+00	765	1.146E+00
602	2.469E+01	643	2.364E+01	684	1.171E+01	725	3.863E+00	766	1.126E+00
603	2.481E+01	644	2.344E+01	685	1.146E+01	726	3.784E+00	767	1.087E+00
604	2.498E+01	645	2.317E+01	686	1.122E+01	727	3.689E+00	768	1.048E+00
605	2.513E+01	646	2.289E+01	687	1.092E+01	728	3.598E+00	769	1.026E+00
606	2.524E+01	647	2.266E+01	688	1.066E+01	729	3.481E+00	770	9.902E-01
607	2.534E+01	648	2.236E+01	689	1.040E+01	730	3.393E+00	771	9.616E-01
608	2.540E+01	649	2.213E+01	690	1.016E+01	731	3.282E+00	772	9.371E-01
609	2.554E+01	650	2.185E+01	691	9.923E+00	732	3.185E+00	773	8.972E-01
610	2.569E+01	651	2.158E+01	692	9.682E+00	733	3.091E+00	774	8.783E-01
611	2.579E+01	652	2.130E+01	693	9.447E+00	734	3.004E+00	775	8.628E-01
612	2.598E+01	653	2.099E+01	694	9.226E+00	735	2.910E+00	776	8.334E-01
613	2.608E+01	654	2.071E+01	695	8.990E+00	736	2.822E+00	777	8.043E-01
614	2.623E+01	655	2.046E+01	696	8.735E+00	737	2.758E+00	778	7.877E-01
615	2.639E+01	656	2.013E+01	697	8.523E+00	738	2.662E+00	779	7.852E-01
616	2.642E+01	657	1.984E+01	698	8.292E+00	739	2.589E+00	780	7.867E-01
617	2.656E+01	658	1.951E+01	699	8.061E+00	740	2.508E+00		
618	2.658E+01	659	1.922E+01	700	7.840E+00	741	2.410E+00		
619	2.662E+01	660	1.897E+01	701	7.602E+00	742	2.351E+00		
620	2.664E+01	661	1.862E+01	702	7.395E+00	743	2.279E+00		
621	2.666E+01	662	1.830E+01	703	7.195E+00	744	2.203E+00		
622	2.666E+01	663	1.797E+01	704	6.979E+00	745	2.135E+00		
623	2.658E+01	664	1.767E+01	705	6.754E+00	746	2.065E+00		
624	2.657E+01	665	1.736E+01	706	6.543E+00	747	2.007E+00		
625	2.653E+01	666	1.704E+01	707	6.300E+00	748	1.958E+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**

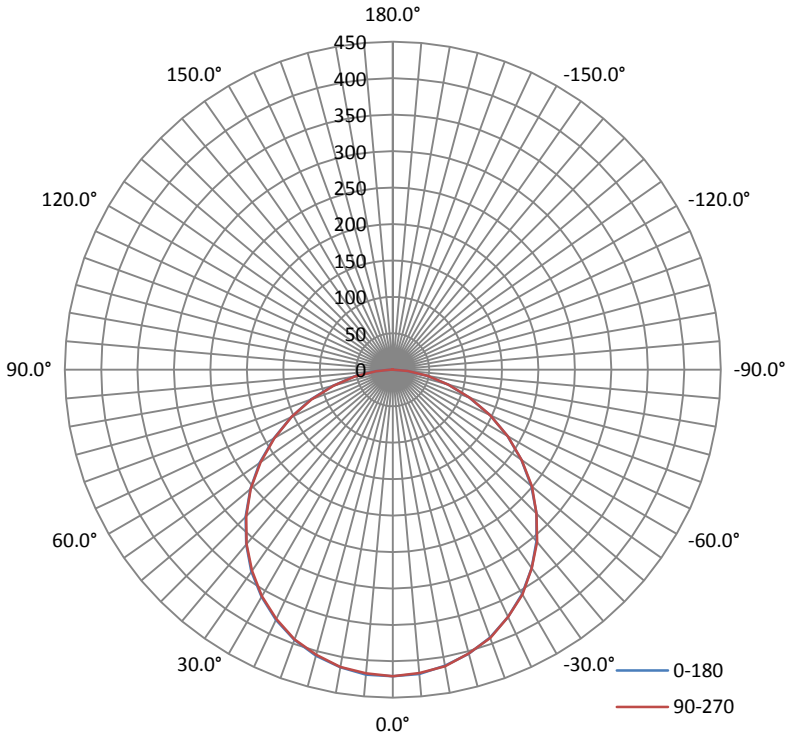
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.1356	15.91	0.9771

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1212.92	76.24	421.1	1.26	1.25

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	112.6	112.7	112.5	112.8	112.7
Field Angle (10% I_{max}):	162.8	162.9	162.7	162.7	162.8

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	421	421	421	421	421	421	421	421
5.0°	420	420	420	419	418	419	418	419
10.0°	414	415	415	414	414	414	413	412
15.0°	406	407	407	407	405	405	404	404
20.0°	394	395	395	394	394	393	392	391
25.0°	379	379	379	379	377	378	376	376
30.0°	360	360	361	360	359	359	357	356
35.0°	338	338	339	338	337	337	335	334
40.0°	313	313	314	313	312	312	310	308
45.0°	285	286	286	285	284	284	281	280
50.0°	255	255	256	255	254	253	251	250
55.0°	223	223	224	223	221	221	219	218
60.0°	188	189	190	189	188	187	185	183
65.0°	154	155	155	154	153	152	150	149
70.0°	119	120	121	120	118	117	115	114
75.0°	85	86	87	86	84	83	81	80
80.0°	53	55	54	54	52	51	50	48
85.0°	24	25	25	24	23	22	21	20
90.0°	3	3	2	3	3	3	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°	0	0	0	0	0	0	0	0
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°	0	0	0	0	0	0	0	0

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Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	421	421	421	421	421	421	421	421
5.0°	419	418	419	418	418	419	418	420
10.0°	412	412	413	412	413	414	414	414
15.0°	403	404	403	403	403	404	405	406
20.0°	391	390	390	391	392	392	393	394
25.0°	374	374	374	375	374	376	377	378
30.0°	355	354	355	355	356	357	359	359
35.0°	332	332	332	333	333	335	336	338
40.0°	307	306	306	306	308	310	311	312
45.0°	279	279	278	279	279	281	283	284
50.0°	248	247	247	248	249	251	253	254
55.0°	216	215	215	216	216	218	220	221
60.0°	182	181	181	182	183	184	186	187
65.0°	148	147	147	147	148	150	151	153
70.0°	112	112	112	112	113	114	116	117
75.0°	79	79	79	79	79	81	82	84
80.0°	48	48	47	48	48	49	51	52
85.0°	20	19	19	20	20	21	22	23
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°	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°	0	0	0	0	0	0	0	0

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Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	10.0	0.83
5-10	29.8	2.45
10-15	48.5	4.00
15-20	65.7	5.42
20-25	80.6	6.64
25-30	92.9	7.66
30-35	102.0	8.41
35-40	107.7	8.88
40-45	109.6	9.04
45-50	107.8	8.89
50-55	102.3	8.43
55-60	93.5	7.71
60-65	81.7	6.73
65-70	67.4	5.56
70-75	51.6	4.26
75-80	35.4	2.92
80-85	19.5	1.60
85-90	5.5	0.46
90-95	0.1	0.01
95-100	0.0	0.00
100-105	0.1	0.01
105-110	0.1	0.00
110-115	0.1	0.01
115-120	0.1	0.00
120-125	0.1	0.01
125-130	0.1	0.01
130-135	0.1	0.00
135-140	0.1	0.01
140-145	0.1	0.01
145-150	0.1	0.01
150-155	0.1	0.01
155-160	0.1	0.01
160-165	0.1	0.00
165-170	0.1	0.01
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	10.0	0.83
0-10	39.8	3.28
0-15	88.3	7.28
0-20	154.0	12.70
0-25	234.6	19.34
0-30	327.5	27.00
0-35	429.5	35.41
0-40	537.2	44.29
0-45	646.8	53.33
0-50	754.6	62.22
0-55	857.0	70.65
0-60	950.5	78.36
0-65	1032.1	85.09
0-70	1099.6	90.65
0-75	1151.2	94.91
0-80	1186.6	97.83
0-85	1206.0	99.43
0-90	1211.6	99.89
0-95	1211.7	99.90
0-100	1211.7	99.90
0-105	1211.8	99.91
0-110	1211.8	99.91
0-115	1211.9	99.92
0-120	1212.0	99.92
0-125	1212.0	99.93
0-130	1212.1	99.94
0-135	1212.2	99.94
0-140	1212.3	99.95
0-145	1212.4	99.96
0-150	1212.5	99.97
0-155	1212.6	99.98
0-160	1212.7	99.99
0-165	1212.8	99.99
0-170	1212.9	100.00
0-175	1212.9	100.00
0-180	1212.9	100.00

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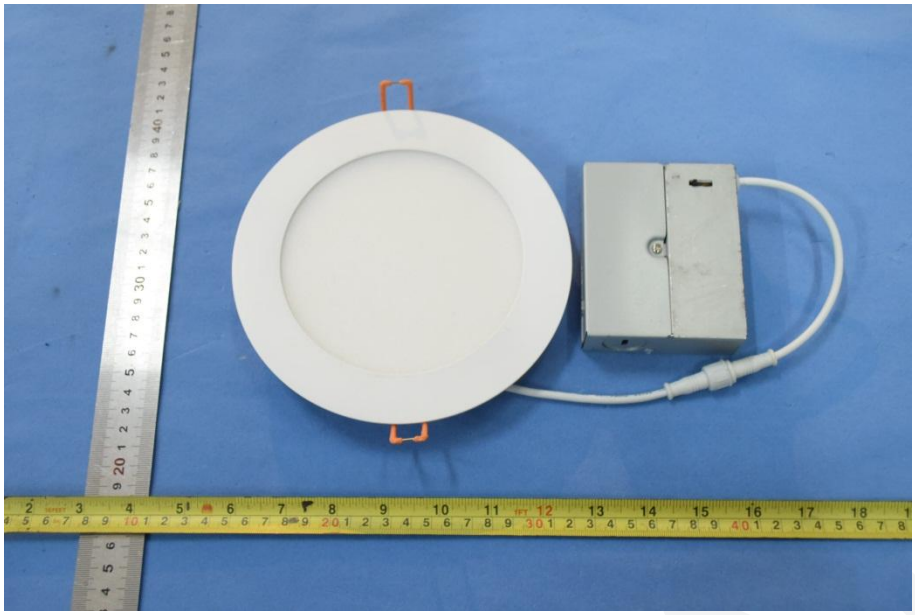
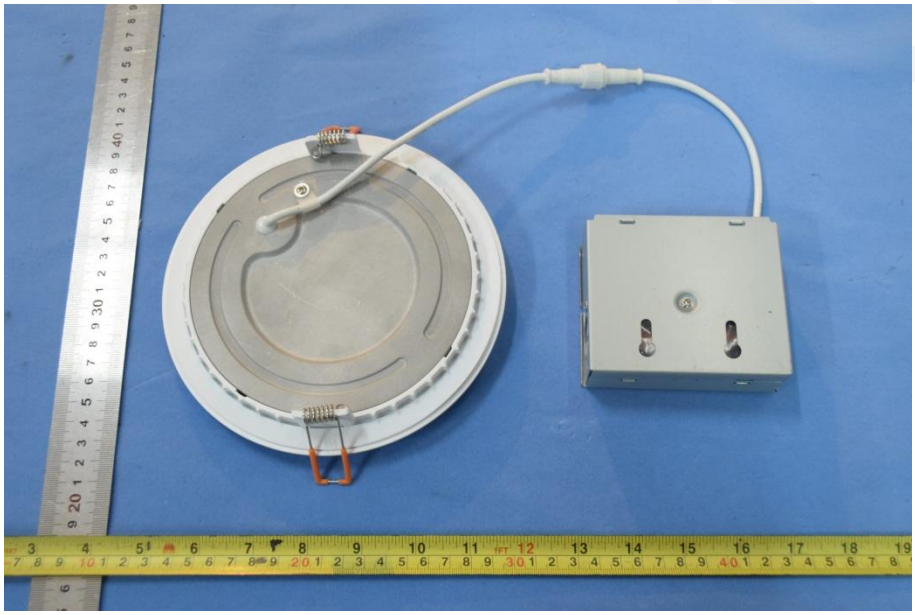
6. Product Photo





Directions

1. The information marked # 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**********

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