IES LM-79-08

MEASUREMENT AND TEST REPORT

For

LEDVANCE LLC

200 Ballardvale Street Wilmington, MA 01887

#Test Model: LEDMD3R2A500ST9SC3

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hexy He
Report Number:	RSZ191009508-10
Test Date:	2019-09-10 to 2019-09-26
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.

1. Product Description

General Information:

One test sample was in good condition and received on 2019-09-05 and used for testing. All tests and evaluations were performed at the least efficient white light setting.

#Model Tested:	LEDMD3R2A500ST9SC3
#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:	8W
Nominal CCT:	2700K/3000K/3500K/4000K/5000K
Nominal Lumen Output:	500lm

Note:

1. The applicant LEDVANCE LLC declare that their products with model LEDMD3R2A500ST9SC3

are the same to the products in report# RSZ190905505-10-1-M2 and is authorized by original applicant to use their test data.

2. All the data in previous report (RSZ190905505-10-1-M2) 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
2.0m integrating sphere	EVERFINE	R98	11010018	2018-12-13	2019-12-13
spectroradiometer	EVERFINE	HAAS-2000	20140912	2018-12-13	2019-12-13
Digital Power Meter	EVERFINE	PF2010A	1011004	2019-07-28	2020-07-27
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	2019-07-23	2020-07-22
Rapid Recording Photometer	EVERFINE	PHOTO-2000F	1007010	2018-12-13	2019-12-13
Standard Light Source	EVERFINE	D204	N/A	2019-07-19	2020-07-18
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	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=0.19 % of rdg, AC Voltage U=0.18% of rdg, Power U=0.46%) (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	0.07021	7.91	0.9387	579.88	73.31

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.0623	2769	0.00243	0.4584	0.4168	0.2588	0.5295

Color Rendering Index

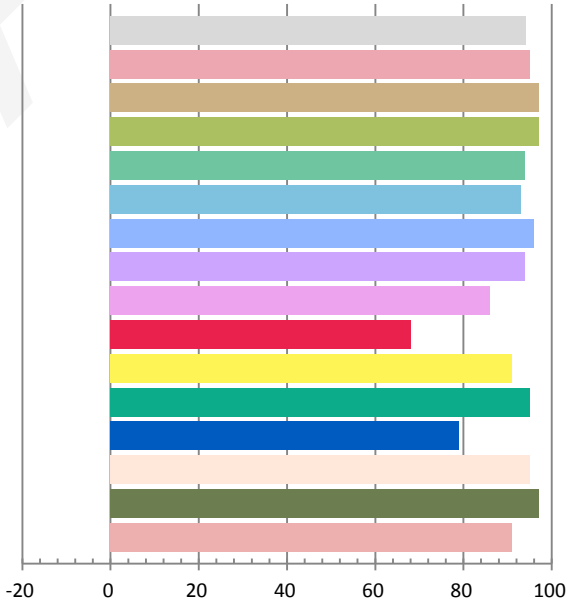
Ra
94.1

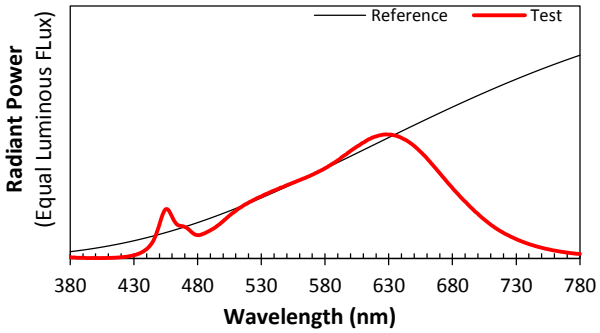
R1	R2	R3	R4
95	97	97	94

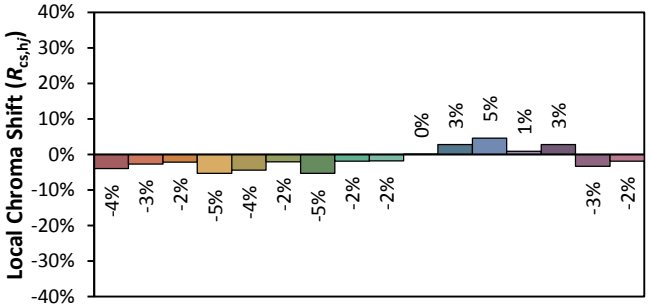
R5	R6	R7	R8
93	96	94	86

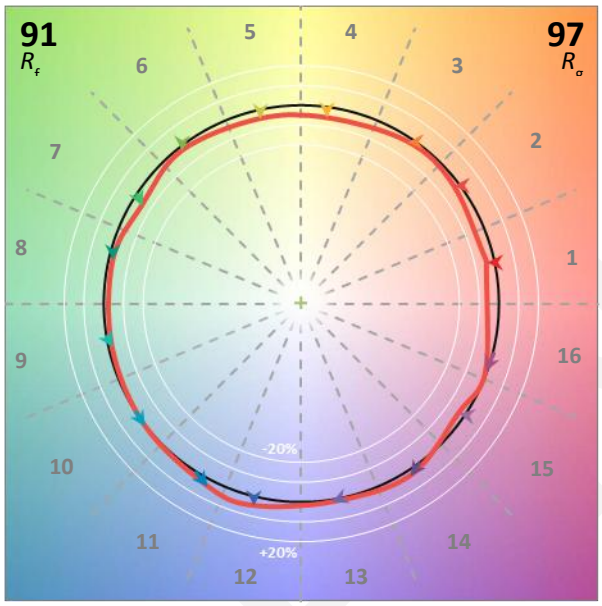
R9	R10	R11	R12
68	91	95	79

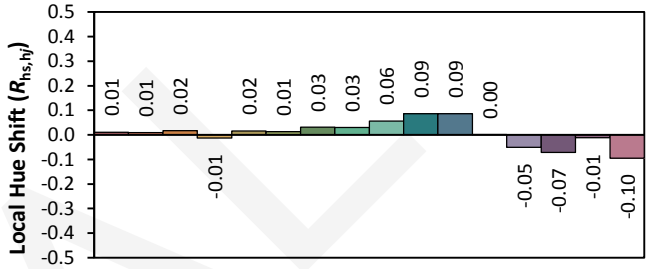
R13	R14	R15
95	97	91

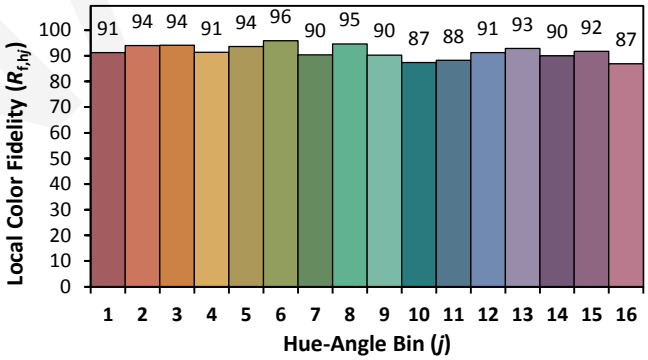


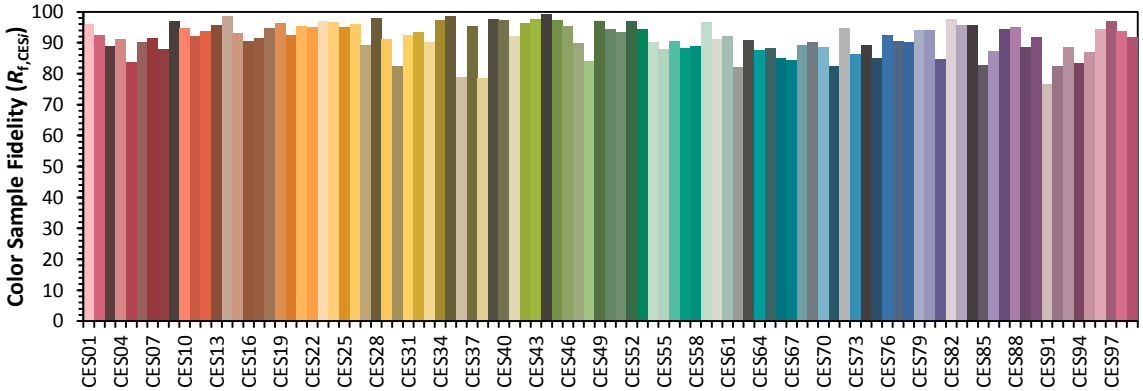

Reference
Test
Radiant Power
(Equal Luminous FLux)
380 430 480 530 580 630 680 730 780
Wavelength (nm)


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

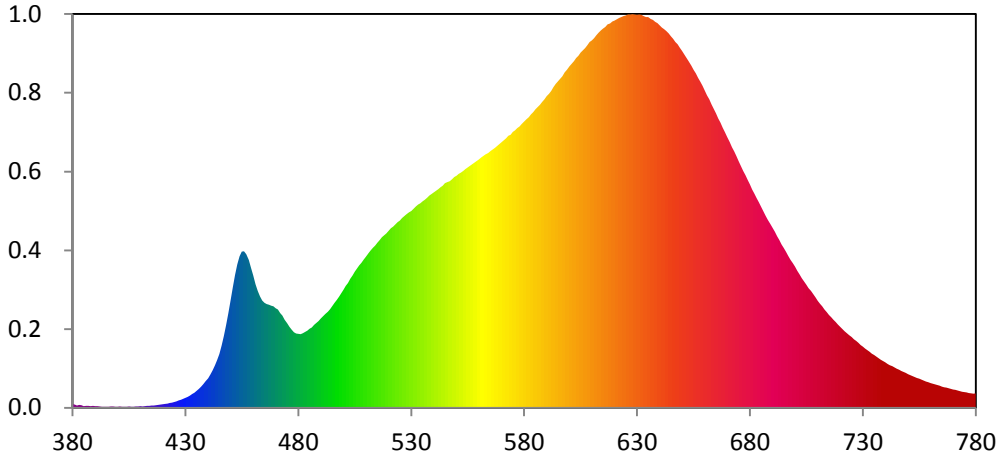

91
R_f
97
R_a
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
-20%
+20%


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
0.01 0.01 0.02 -0.01 0.02 0.01 0.03 0.03 0.06 0.09 0.09 0.00 -0.05 -0.07 -0.01 -0.10


Local Color Fidelity ($R_{f,hj}$)
100 90 80 70 60 50 40 30 20 10 0
91 94 94 91 94 96 90 95 90 87 88 91 93 90 92 87
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

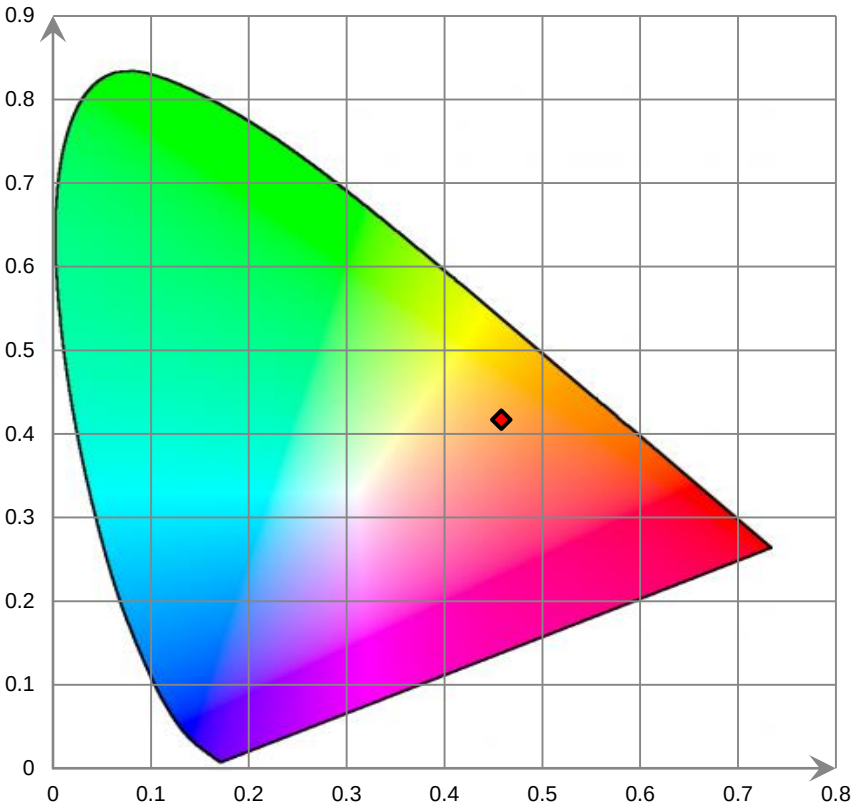
Relative Spectral Power Distribution



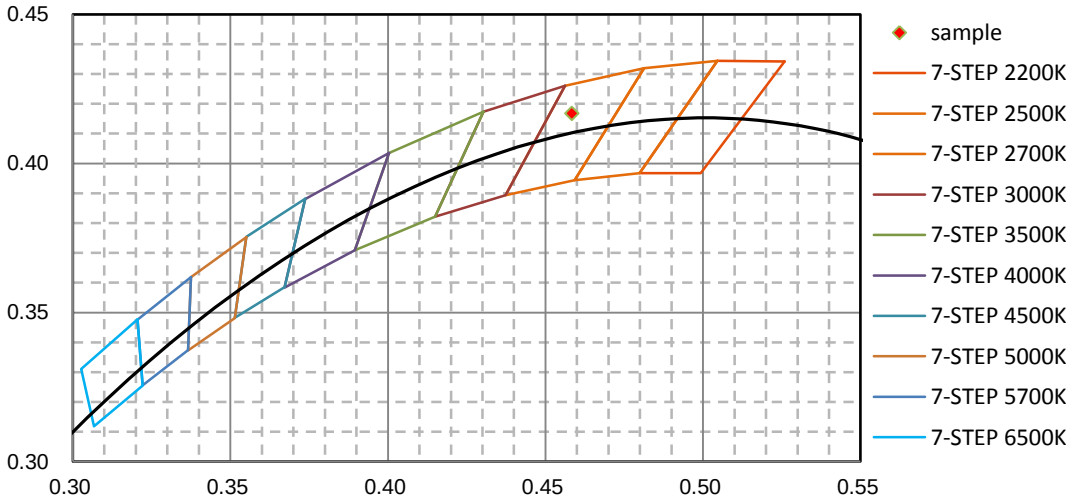
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.179E-01	421	1.183E-01	462	3.709E+00	503	4.091E+00	544	7.056E+00
381	1.042E-01	422	1.349E-01	463	3.534E+00	504	4.197E+00	545	7.131E+00
382	7.389E-02	423	1.470E-01	464	3.406E+00	505	4.320E+00	546	7.160E+00
383	9.305E-02	424	1.622E-01	465	3.330E+00	506	4.416E+00	547	7.199E+00
384	8.244E-02	425	1.823E-01	466	3.289E+00	507	4.525E+00	548	7.256E+00
385	5.438E-02	426	2.025E-01	467	3.269E+00	508	4.609E+00	549	7.327E+00
386	6.288E-02	427	2.276E-01	468	3.246E+00	509	4.707E+00	550	7.367E+00
387	5.462E-02	428	2.484E-01	469	3.225E+00	510	4.794E+00	551	7.431E+00
388	4.731E-02	429	2.816E-01	470	3.157E+00	511	4.911E+00	552	7.474E+00
389	6.122E-02	430	3.125E-01	471	3.115E+00	512	4.997E+00	553	7.525E+00
390	4.844E-02	431	3.403E-01	472	3.012E+00	513	5.083E+00	554	7.577E+00
391	5.233E-02	432	3.844E-01	473	2.922E+00	514	5.155E+00	555	7.631E+00
392	3.586E-02	433	4.352E-01	474	2.794E+00	515	5.244E+00	556	7.680E+00
393	2.661E-02	434	4.748E-01	475	2.680E+00	516	5.328E+00	557	7.729E+00
394	2.848E-02	435	5.359E-01	476	2.569E+00	517	5.414E+00	558	7.790E+00
395	2.702E-02	436	6.001E-01	477	2.476E+00	518	5.480E+00	559	7.841E+00
396	3.221E-02	437	6.668E-01	478	2.397E+00	519	5.542E+00	560	7.883E+00
397	3.575E-02	438	7.467E-01	479	2.361E+00	520	5.622E+00	561	7.943E+00
398	3.573E-02	439	8.404E-01	480	2.345E+00	521	5.702E+00	562	7.994E+00
399	3.310E-02	440	9.348E-01	481	2.334E+00	522	5.755E+00	563	8.051E+00
400	2.566E-02	441	1.053E+00	482	2.364E+00	523	5.822E+00	564	8.087E+00
401	3.724E-02	442	1.184E+00	483	2.409E+00	524	5.892E+00	565	8.148E+00
402	2.938E-02	443	1.337E+00	484	2.447E+00	525	5.946E+00	566	8.206E+00
403	2.798E-02	444	1.512E+00	485	2.507E+00	526	6.031E+00	567	8.257E+00
404	2.924E-02	445	1.711E+00	486	2.553E+00	527	6.092E+00	568	8.311E+00
405	3.469E-02	446	1.975E+00	487	2.627E+00	528	6.147E+00	569	8.376E+00
406	3.163E-02	447	2.271E+00	488	2.692E+00	529	6.204E+00	570	8.436E+00
407	3.308E-02	448	2.624E+00	489	2.754E+00	530	6.247E+00	571	8.494E+00
408	3.485E-02	449	2.995E+00	490	2.830E+00	531	6.321E+00	572	8.560E+00
409	4.000E-02	450	3.400E+00	491	2.902E+00	532	6.392E+00	573	8.637E+00
410	4.806E-02	451	3.818E+00	492	2.975E+00	533	6.456E+00	574	8.669E+00
411	4.431E-02	452	4.213E+00	493	3.049E+00	534	6.498E+00	575	8.757E+00
412	4.920E-02	453	4.549E+00	494	3.127E+00	535	6.558E+00	576	8.809E+00
413	5.569E-02	454	4.807E+00	495	3.236E+00	536	6.607E+00	577	8.882E+00
414	5.800E-02	455	4.956E+00	496	3.331E+00	537	6.669E+00	578	8.936E+00
415	6.603E-02	456	4.969E+00	497	3.421E+00	538	6.738E+00	579	9.010E+00
416	7.107E-02	457	4.877E+00	498	3.529E+00	539	6.792E+00	580	9.086E+00
417	7.989E-02	458	4.700E+00	499	3.641E+00	540	6.840E+00	581	9.158E+00
418	8.972E-02	459	4.440E+00	500	3.745E+00	541	6.892E+00	582	9.231E+00
419	1.010E-01	460	4.198E+00	501	3.872E+00	542	6.941E+00	583	9.323E+00
420	1.090E-01	461	3.923E+00	502	3.966E+00	543	6.997E+00	584	9.387E+00

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	9.483E+00	626	1.249E+01	667	9.057E+00	708	3.602E+00	749	1.102E+00
586	9.558E+00	627	1.249E+01	668	8.888E+00	709	3.502E+00	750	1.071E+00
587	9.628E+00	628	1.251E+01	669	8.748E+00	710	3.398E+00	751	1.035E+00
588	9.712E+00	629	1.249E+01	670	8.593E+00	711	3.301E+00	752	1.006E+00
589	9.795E+00	630	1.248E+01	671	8.440E+00	712	3.226E+00	753	9.706E-01
590	9.898E+00	631	1.249E+01	672	8.275E+00	713	3.121E+00	754	9.435E-01
591	9.965E+00	632	1.248E+01	673	8.137E+00	714	3.039E+00	755	9.206E-01
592	1.007E+01	633	1.245E+01	674	7.985E+00	715	2.950E+00	756	8.896E-01
593	1.019E+01	634	1.241E+01	675	7.829E+00	716	2.876E+00	757	8.645E-01
594	1.028E+01	635	1.240E+01	676	7.672E+00	717	2.793E+00	758	8.331E-01
595	1.037E+01	636	1.235E+01	677	7.525E+00	718	2.722E+00	759	8.075E-01
596	1.045E+01	637	1.232E+01	678	7.386E+00	719	2.643E+00	760	7.857E-01
597	1.053E+01	638	1.226E+01	679	7.240E+00	720	2.570E+00	761	7.652E-01
598	1.065E+01	639	1.222E+01	680	7.090E+00	721	2.497E+00	762	7.417E-01
599	1.073E+01	640	1.215E+01	681	6.927E+00	722	2.427E+00	763	7.219E-01
600	1.084E+01	641	1.208E+01	682	6.798E+00	723	2.370E+00	764	6.973E-01
601	1.093E+01	642	1.202E+01	683	6.659E+00	724	2.302E+00	765	6.731E-01
602	1.101E+01	643	1.196E+01	684	6.529E+00	725	2.240E+00	766	6.505E-01
603	1.110E+01	644	1.189E+01	685	6.382E+00	726	2.172E+00	767	6.383E-01
604	1.118E+01	645	1.180E+01	686	6.236E+00	727	2.119E+00	768	6.150E-01
605	1.128E+01	646	1.172E+01	687	6.098E+00	728	2.059E+00	769	5.985E-01
606	1.135E+01	647	1.162E+01	688	5.965E+00	729	1.995E+00	770	5.773E-01
607	1.142E+01	648	1.154E+01	689	5.832E+00	730	1.939E+00	771	5.641E-01
608	1.152E+01	649	1.143E+01	690	5.716E+00	731	1.877E+00	772	5.445E-01
609	1.161E+01	650	1.133E+01	691	5.593E+00	732	1.824E+00	773	5.286E-01
610	1.167E+01	651	1.122E+01	692	5.451E+00	733	1.779E+00	774	5.101E-01
611	1.174E+01	652	1.110E+01	693	5.323E+00	734	1.719E+00	775	4.961E-01
612	1.183E+01	653	1.099E+01	694	5.181E+00	735	1.675E+00	776	4.842E-01
613	1.191E+01	654	1.086E+01	695	5.071E+00	736	1.626E+00	777	4.643E-01
614	1.199E+01	655	1.074E+01	696	4.947E+00	737	1.575E+00	778	4.579E-01
615	1.205E+01	656	1.062E+01	697	4.813E+00	738	1.528E+00	779	4.507E-01
616	1.210E+01	657	1.048E+01	698	4.694E+00	739	1.488E+00	780	4.515E-01
617	1.218E+01	658	1.036E+01	699	4.593E+00	740	1.440E+00		
618	1.221E+01	659	1.023E+01	700	4.481E+00	741	1.394E+00		
619	1.227E+01	660	1.008E+01	701	4.351E+00	742	1.355E+00		
620	1.230E+01	661	9.924E+00	702	4.240E+00	743	1.322E+00		
621	1.234E+01	662	9.793E+00	703	4.120E+00	744	1.281E+00		
622	1.238E+01	663	9.636E+00	704	4.014E+00	745	1.241E+00		
623	1.241E+01	664	9.493E+00	705	3.912E+00	746	1.205E+00		
624	1.244E+01	665	9.347E+00	706	3.805E+00	747	1.166E+00		
625	1.246E+01	666	9.189E+00	707	3.707E+00	748	1.136E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

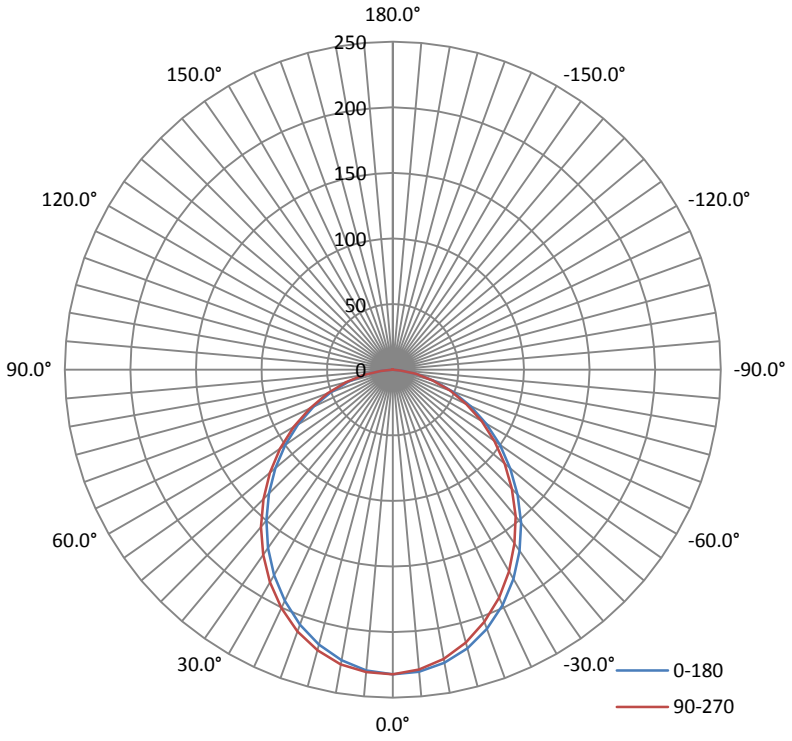
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.0705	7.900	0.9326

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
581.956	73.67	232.3	1.19	1.15

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	100.5	1006.0	100.4	100.2	326.8
Field Angle (10% I_{max}):	157.6	157.6	157.5	157.4	157.5

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	232	232	232	232	232	232	232	232
5.0°	230	230	231	231	231	231	231	231
10.0°	225	226	227	228	228	228	228	227
15.0°	217	219	220	221	221	221	221	221
20.0°	207	209	210	212	212	212	212	211
25.0°	194	197	199	200	200	200	200	199
30.0°	181	183	185	186	187	187	186	185
35.0°	166	168	170	171	172	172	171	170
40.0°	150	152	154	155	156	156	155	154
45.0°	133	136	138	139	139	139	138	136
50.0°	117	119	121	122	122	121	120	119
55.0°	100	102	103	104	105	104	103	101
60.0°	83	85	86	87	87	86	85	84
65.0°	67	68	69	70	70	69	68	67
70.0°	50	52	52	53	53	52	51	50
75.0°	35	36	37	37	37	36	35	34
80.0°	21	22	22	22	22	21	21	20
85.0°	9	9	9	9	9	9	8	7
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

Luminous Intensity (cd) Distribution Data (cont.)

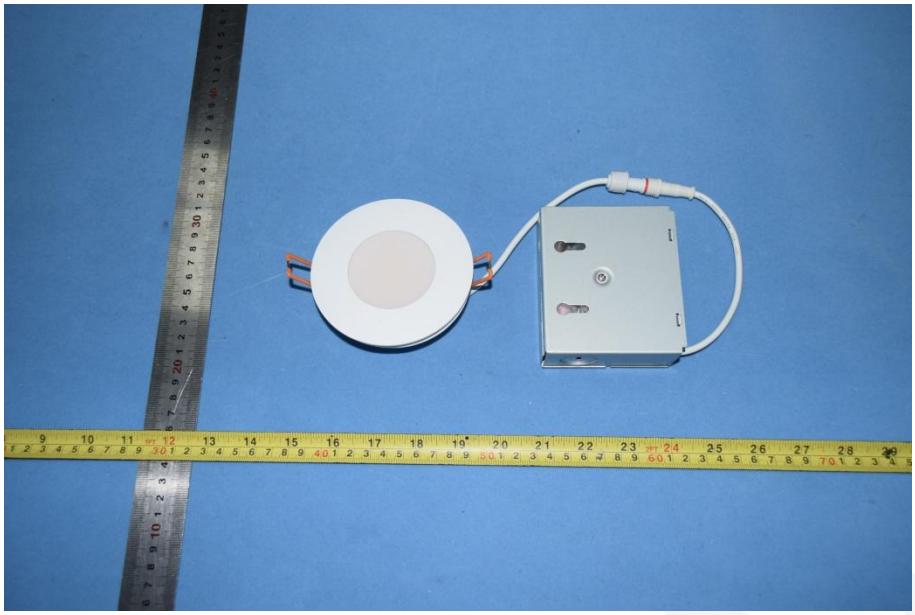
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	232	232	232	232	232	232	232	232
5.0°	231	231	230	230	229	229	229	230
10.0°	227	226	225	224	224	224	224	224
15.0°	220	219	217	216	215	215	215	216
20.0°	210	209	207	206	205	204	205	205
25.0°	198	196	195	193	192	192	192	193
30.0°	184	182	180	179	177	177	178	179
35.0°	169	167	165	163	162	162	162	164
40.0°	152	150	149	147	146	146	146	148
45.0°	135	133	131	129	128	128	129	131
50.0°	117	115	114	112	112	112	113	115
55.0°	100	98	97	96	95	95	96	98
60.0°	82	81	80	79	78	79	80	81
65.0°	65	64	63	62	62	63	63	65
70.0°	49	48	47	47	46	47	48	49
75.0°	33	32	32	32	32	32	33	34
80.0°	19	18	18	18	18	18	19	20
85.0°	7	7	6	6	6	7	7	8
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

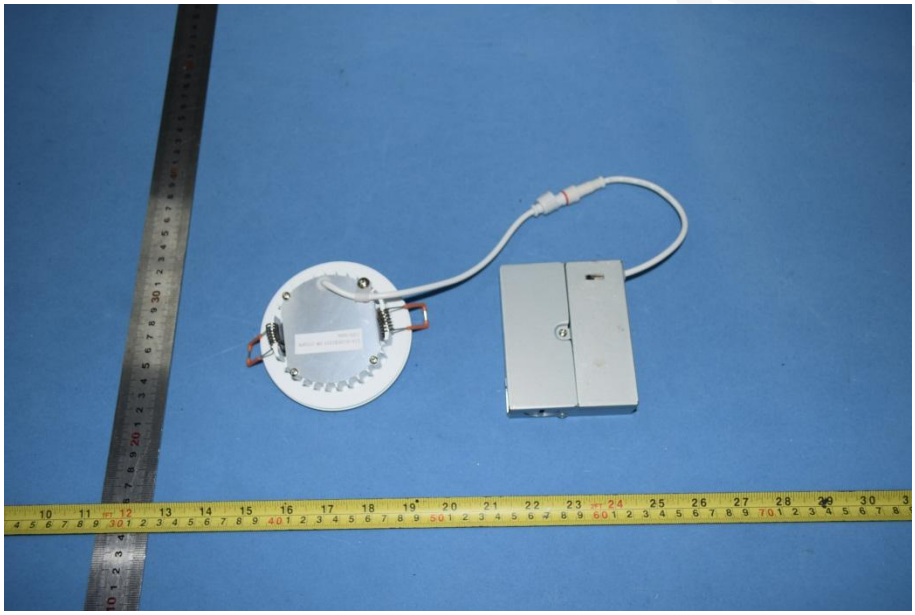
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	5.5	0.95
5-10	16.3	2.80
10-15	26.3	4.53
15-20	35.2	6.04
20-25	42.4	7.29
25-30	47.9	8.23
30-35	51.4	8.83
35-40	53.0	9.12
40-45	52.7	9.05
45-50	50.6	8.70
50-55	47.1	8.09
55-60	42.2	7.24
60-65	36.1	6.21
65-70	29.2	5.02
70-75	21.8	3.75
75-80	14.4	2.47
80-85	7.4	1.28
85-90	1.7	0.29
90-95	0.0	0.01
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.01
110-115	0.0	0.00
115-120	0.0	0.01
120-125	0.0	0.01
125-130	0.0	0.00
130-135	0.0	0.01
135-140	0.0	0.01
140-145	0.1	0.01
145-150	0.1	0.01
150-155	0.1	0.01
155-160	0.0	0.00
160-165	0.0	0.01
165-170	0.0	0.01
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	5.5	0.95
0-10	21.8	3.75
0-15	48.2	8.28
0-20	83.3	14.32
0-25	125.8	21.61
0-30	173.6	29.84
0-35	225.1	38.67
0-40	278.1	47.79
0-45	330.8	56.84
0-50	381.4	65.54
0-55	428.5	73.63
0-60	470.6	80.87
0-65	506.8	87.08
0-70	536.0	92.10
0-75	557.8	95.85
0-80	572.2	98.32
0-85	579.6	99.60
0-90	581.3	99.89
0-95	581.4	99.90
0-100	581.4	99.90
0-105	581.4	99.90
0-110	581.4	99.91
0-115	581.5	99.91
0-120	581.5	99.92
0-125	581.5	99.93
0-130	581.6	99.93
0-135	581.6	99.94
0-140	581.7	99.95
0-145	581.7	99.96
0-150	581.8	99.97
0-155	581.8	99.98
0-160	581.9	99.98
0-165	581.9	99.99
0-170	581.9	100.00
0-175	582.0	100.00
0-180	582.0	100.00

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**********