

## TEST REPORT OF ANSI/IES LM-79-19

### APPROVED METHOD FOR OPTICAL AND ELECTRICAL MEASUREMENTS OF SOLID-STATE LIGHTING PRODUCTS

**Client**: Artika for Living Inc.

**Address**: 1756, 50e Avenue Montréal (Lachine), Québec Canada H8T 2V5

**Test Model**: PLU01R-1224T-850

**All Models**: PLU01R-1224T-850, 12FLPR-SPx-xxxxxx (x-xxxxxx in the model designation could be any numbers, letters or blank, which indicates customer code. PLU01R-1224T-850 and 12FLPR-SPx-xxxxxx are same except model name.)

**Brand Name**: 

**Testing Laboratory**: Guangdong Meide Testing Technology Co., Ltd.

**Address**: 1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road, Songshan Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.

**Testing location**: As above

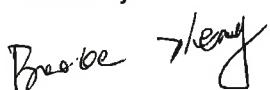
**Report No.**: N02A22030775L00801

**Date of receipt**: Nov. 22, 2021

**Date of test**: Nov. 22, 2021 - Nov. 25, 2021

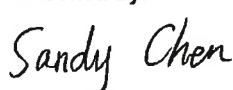
**Date of report**: Nov. 26, 2021

Tested by:



Brooke Zheng / Test Engineer

Checked by:



Sandy Chen / Project Engineer

Approved by:

  
Jessie Li / Technical Manager

Jessie Li / Technical Manager



Note 1: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Guangdong Meide Testing Technology Co., Ltd. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Note 2: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Note 3: This report contains data that are not covered by the NVLAP accreditation. It is marked \* in the title.



## 1. Product Description for Equipment under Test(EUT)

Model Tested:	PLU01R-1224T-850
Manufacturer:	ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO.,LTD
Product Type:	LED ceiling light
Rated Voltage/Frequency:	120V AC, 60Hz
Rated Power:	24W
Rated luminous flux:	1800lm
Nominal CCT:	5000K
LED Manufacturer:	MLS CO., LTD
LED Model No:	E2835UXXXX-3A

## 2. Standards Used

- ANSI/IES LM-79-19:APPROVED METHOD:OPTICAL AND ELECTRICAL MEASUREMENTS OF SOLID-STATE LIGHTING PRODUCTS
- IES TM-30-18 IES Method for Evaluating Light Source Color Rendition (This Method is not in Nvlap accreditation scope)

## 3. Test equipment list

Test Equipment	Serial No	Model No	Calibration due date
Full-field Speed Goniophotometer	MD-E028	GO-R5000	2022/09/17
Digital Power Meter	MD-E001	PF2010	2022/09/17
AC Testing Power Source	MD-E002	DPS1060	2022/09/17
Total Spectral Radiant Flux Standard Lamp	MD-E007	D908S	2022/10/13
Integrating Sphere System	MD-E029	2M	2022/09/17
High Accuracy Array Spectroradio Meter	MD-E011	HAAS-3000	2022/09/17
Digital Power Meter	MD-E008	PF310	2022/09/17
AC Testing Power Source	MD-E010	DPS1010	2022/09/17
Standard Lamp	MD-E036	D204	2022/10/13

Statement of Traceability: Guangdong Meide Testing Technology Co., Ltd.attested that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit(SI).



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## 4. Test Method

### Requirements of Ambient Condition

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 between 10% and 65%.

### Goniophotometer System

The sample was tested according to the ANSI/IES LM-79-19.

Photometric parameters were measured using a type C goniophotometer and software. The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, Luminous efficacy, zonal flux were calculated from the software taken at  $1^{\circ}$  vertical intervals and  $22.5^{\circ}$  horizontal intervals. Photometric distance was more than five times of the Largest dimension of the test SSL product.

### Integrating Sphere System

The sample was tested according to the ANSI/IES LM-79-19.

The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

### Fidelity Index ( $R_f$ ) and Gamut Index ( $R_g$ ) 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. Integrating Sphere Test Results

### 5.1 Test Data

<b>Test Ambient Temperature (Integrating sphere internal temperature)</b>	25.1°C	<b>Test orientation</b>	Downward
<b>Operate time(Min.)</b>	60	<b>stabilization time(Min.)</b>	45

#### Optical and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.2129	23.73	0.9283	1915.7	80.72

CCT (K)	Ra	R9	x	y	u'	v'
4759	82.6	9	0.3533	0.3655	0.2116	0.4925

#### Color Rendering Index



## \*ANSI/IES TM-30-18 Color Rendition Report

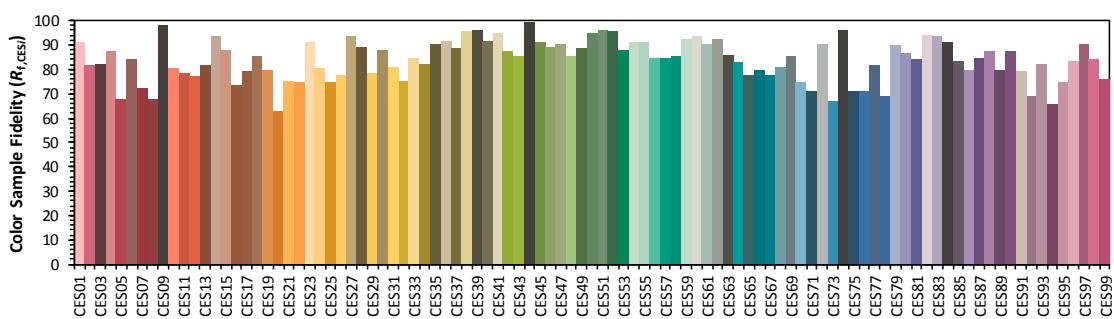
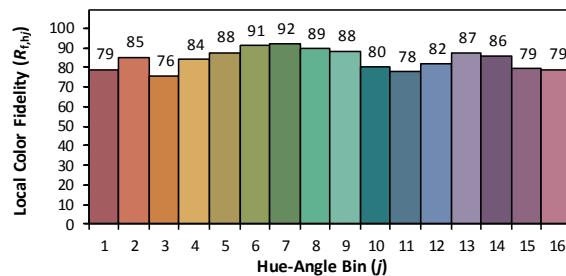
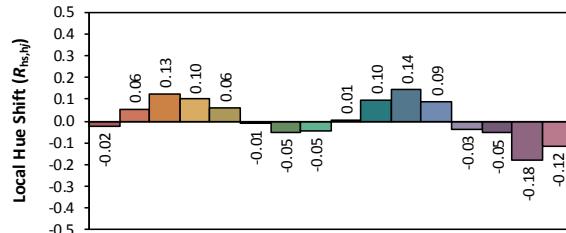
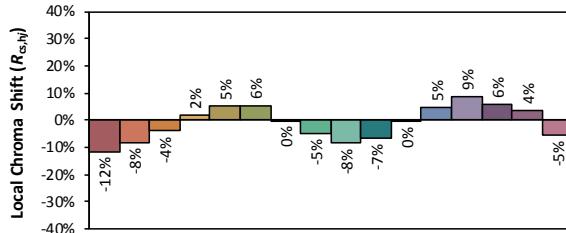
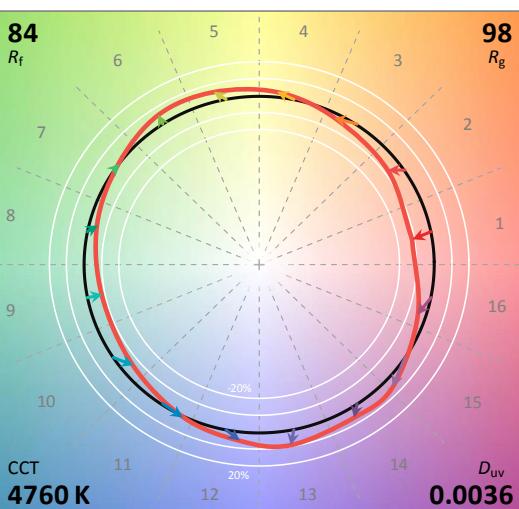
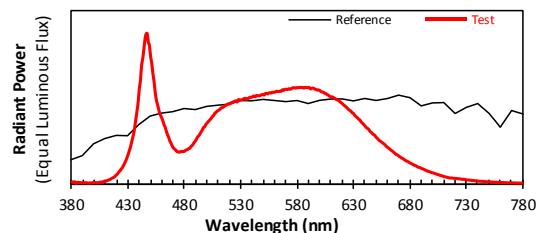
### ANSI/IES TM-30-18 Color Rendition Report

Source: E2835UXXXX-3A

Date: 2021/11/25

Manufacturer: ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO., LTD

Model: PLU01R-1224T-850



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  **0.3533**

$y$  **0.3654**

$u'$  **0.2116**

$v'$  **0.4924**

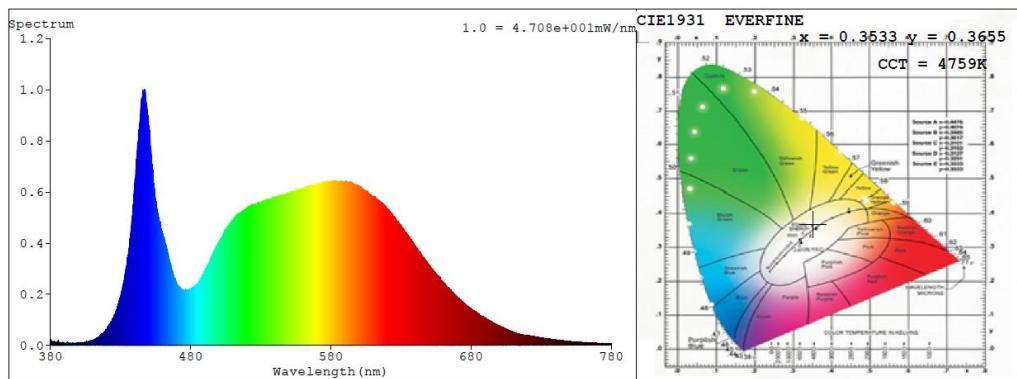
CIE 13.3-1995  
(CRI)

$R_a$  83

$R_g$  9

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

### Relative Spectral Power Distribution



nm	mW								
380	0.0143	414	0.0317	448	0.9418	482	0.2281	516	0.5206
381	0.0158	415	0.0366	449	0.9204	483	0.2314	517	0.5239
382	0.015	416	0.0411	450	0.8475	484	0.2368	518	0.5288
383	0.0154	417	0.0447	451	0.8038	485	0.2401	519	0.5334
384	0.0056	418	0.0502	452	0.7373	486	0.2512	520	0.5314
385	0.0115	419	0.0571	453	0.6862	487	0.2575	521	0.5392
386	0.0127	420	0.0644	454	0.6171	488	0.2689	522	0.5387
387	0.0112	421	0.0731	455	0.5641	489	0.28	523	0.5452
388	0.0107	422	0.0833	456	0.5326	490	0.2894	524	0.5468
389	0.0095	423	0.0911	457	0.5024	491	0.3026	525	0.5522
390	0.0091	424	0.1017	458	0.4743	492	0.3166	526	0.5523
391	0.0091	425	0.1113	459	0.4561	493	0.3228	527	0.5455
392	0.0105	426	0.1252	460	0.4385	494	0.3364	528	0.5614
393	0.0103	427	0.1398	461	0.4182	495	0.3488	529	0.5569
394	0.0083	428	0.1555	462	0.394	496	0.3597	530	0.5598
395	0.0073	429	0.1761	463	0.3782	497	0.3759	531	0.5591
396	0.0097	430	0.1959	464	0.3525	498	0.3815	532	0.5635
397	0.0077	431	0.22	465	0.3291	499	0.3954	533	0.5681
398	0.0101	432	0.2435	466	0.3128	500	0.4051	534	0.5704
399	0.0104	433	0.2742	467	0.289	501	0.4131	535	0.562
400	0.0092	434	0.3047	468	0.2752	502	0.4224	536	0.5676
401	0.0106	435	0.3372	469	0.257	503	0.4297	537	0.5696
402	0.0103	436	0.3817	470	0.2441	504	0.4391	538	0.5764
403	0.0102	437	0.4361	471	0.235	505	0.451	539	0.5767
404	0.0112	438	0.4887	472	0.2294	506	0.4562	540	0.5773
405	0.0139	439	0.5477	473	0.2203	507	0.4709	541	0.5826
406	0.0141	440	0.6349	474	0.2146	508	0.475	542	0.5856
407	0.0141	441	0.688	475	0.2148	509	0.4842	543	0.5802
408	0.0182	442	0.7894	476	0.2127	510	0.4893	544	0.5883
409	0.0179	443	0.8314	477	0.217	511	0.4929	545	0.5877
410	0.0208	444	0.893	478	0.2178	512	0.5017	546	0.5869
411	0.023	445	0.959	479	0.2177	513	0.507	547	0.5877
412	0.0259	446	0.9965	480	0.2181	514	0.5097	548	0.5914
413	0.0293	447	1	481	0.225	515	0.514	549	0.5947



nm	mW								
550	0.5935	599	0.6259	648	0.3293	697	0.0846	746	0.0185
551	0.5923	600	0.6228	649	0.3255	698	0.0828	747	0.0181
552	0.6022	601	0.6172	650	0.3141	699	0.0792	748	0.0167
553	0.6022	602	0.6125	651	0.3067	700	0.0769	749	0.0165
554	0.5998	603	0.6108	652	0.2998	701	0.0752	750	0.0167
555	0.6051	604	0.6077	653	0.2907	702	0.0723	751	0.0157
556	0.6068	605	0.6016	654	0.2864	703	0.0698	752	0.0151
557	0.6045	606	0.5999	655	0.2805	704	0.0668	753	0.0147
558	0.6096	607	0.5936	656	0.2754	705	0.0649	754	0.0141
559	0.6104	608	0.5909	657	0.2682	706	0.0628	755	0.0137
560	0.6101	609	0.5832	658	0.2639	707	0.0593	756	0.0137
561	0.6134	610	0.5802	659	0.2542	708	0.0572	757	0.0132
562	0.617	611	0.5793	660	0.2479	709	0.0551	758	0.0131
563	0.6152	612	0.5777	661	0.2422	710	0.0526	759	0.0129
564	0.6156	613	0.571	662	0.2353	711	0.05	760	0.0124
565	0.6166	614	0.5681	663	0.2301	712	0.0487	761	0.0119
566	0.6165	615	0.5613	664	0.2236	713	0.047	762	0.0111
567	0.6268	616	0.5589	665	0.2185	714	0.0447	763	0.0114
568	0.6224	617	0.5562	666	0.2114	715	0.0433	764	0.0109
569	0.6273	618	0.5486	667	0.2054	716	0.0411	765	0.0103
570	0.6307	619	0.542	668	0.1982	717	0.0419	766	0.0101
571	0.6284	620	0.5368	669	0.195	718	0.0404	767	0.0098
572	0.6299	621	0.5299	670	0.1903	719	0.0396	768	0.0096
573	0.634	622	0.5226	671	0.1842	720	0.0393	769	0.0099
574	0.6306	623	0.5167	672	0.179	721	0.0385	770	0.0094
575	0.6329	624	0.51	673	0.1742	722	0.0377	771	0.009
576	0.6387	625	0.5023	674	0.171	723	0.0365	772	0.0092
577	0.6401	626	0.4949	675	0.1648	724	0.0361	773	0.0088
578	0.6399	627	0.4894	676	0.1601	725	0.0353	774	0.0084
579	0.6374	628	0.4841	677	0.1545	726	0.0338	775	0.0084
580	0.6411	629	0.4737	678	0.1525	727	0.0328	776	0.008
581	0.6402	630	0.4715	679	0.1477	728	0.0328	777	0.0078
582	0.6412	631	0.4603	680	0.1433	729	0.0316	778	0.008
583	0.6426	632	0.4518	681	0.1388	730	0.0299	779	0.0076
584	0.6412	633	0.4449	682	0.1356	731	0.0287	780	0.0077
585	0.6422	634	0.4388	683	0.1311	732	0.0283		
586	0.6378	635	0.4308	684	0.1277	733	0.0275		
587	0.6413	636	0.4255	685	0.1237	734	0.0268		
588	0.6415	637	0.4133	686	0.1213	735	0.0256		
589	0.6409	638	0.4065	687	0.1157	736	0.0251		
590	0.6407	639	0.3994	688	0.1125	737	0.0244		
591	0.6419	640	0.3898	689	0.1112	738	0.0229		
592	0.6317	641	0.3814	690	0.1075	739	0.0226		
593	0.636	642	0.3732	691	0.1038	740	0.0214		
594	0.6379	643	0.3691	692	0.1015	741	0.0209		
595	0.6361	644	0.3608	693	0.0978	742	0.0202		
596	0.6307	645	0.3496	694	0.0937	743	0.02		
597	0.6285	646	0.3444	695	0.0901	744	0.0192		
598	0.6241	647	0.3361	696	0.0878	745	0.019		



## 6. Goniophotometer Test results

### 6.1 Test Data

Test Ambient Temperature	25.1°C	Test orientation	Downward
Operate time(Min.)	90	stabilization time(Min.)	60

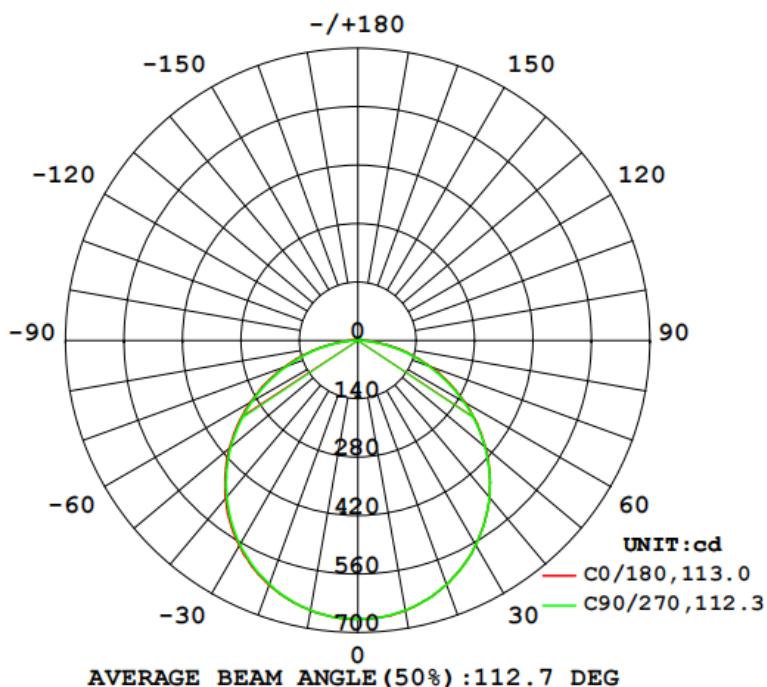
#### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120	60	0.2140	0.9338	23.98

#### Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	I <sub>max</sub> (cd)	Spacing Criteria (C0/180°)	Spacing Criteria (C90/270°)
1804.7	75.26	622.6	1.27	1.26

### 6.2 Luminous Intensity Distribution





### 6.3 Zonal Flux Diagram

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315	$\gamma$	$\Phi$ zone	$\Phi$ total	#lum,lamp
10	656.8	656.4	656.8	657.0	656.4	656.5	656.4	656.2	0- 10	63.24	63.24	3.3,3.3
20	621.9	621.8	621.9	623.1	623.3	622.6	621.4	621.5	10- 20	181.3	244.5	12.7,12.7
30	565.2	565.6	565.6	567.4	567.8	566.9	565.2	565.6	20- 30	275.1	519.6	27.1,27.1
40	490.4	490.6	490.5	491.5	493.4	491.8	489.5	490.4	30- 40	332.1	851.7	44.4,44.4
50	399.0	398.7	398.0	399.4	401.8	399.4	397.2	399.1	40- 50	344.7	1196	62.4,62.4
60	295.4	294.3	292.7	294.5	298.0	295.0	293.2	295.8	50- 60	311.2	1508	78.6,78.6
70	185.6	183.0	180.9	183.2	187.9	184.3	182.4	186.5	60- 70	237.4	1745	91,91
80	80.81	77.40	74.35	76.78	81.09	77.54	75.49	80.27	70- 80	137.3	1882	98.1,98.1
90	0.0267	0.0004	0.0091	0.0028	0	0	0	0	80- 90	35.59	1918	100,100
100	0	0.0035	0	0	0	0.0043	0	0	90-100	0.0010	1918	100,100
110	0	0.0026	0	0	0	0.0056	0	0	100-110	0.0010	1918	100,100
120	0	0.0022	0	0	0	0.0047	0	0	110-120	0.0008	1918	100,100
130	0	0.0013	0	0	0	0.0013	0	0	120-130	0.0005	1918	100,100
140	0	0.0004	0	0	0	0	0	0	130-140	0.0002	1918	100,100
150	0	0	0	0	0	0	0	0	140-150	0.0000	1918	100,100
160	0	0	0	0	0	0	0	0	150-160	0.0000	1918	100,100
170	0	0	0	0	0	0	0	0	160-170	0	1918	100,100
180	0	0	0	0	0	0	0	0	170-180	0	1918	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		



#### 6.4 Luminous Distribution Intensity (cd) Data

Table--1

UNIT: cd

C (DEG)\ γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5		
0	668	668	668	668	668	668	668	668	668	668	668	668	668	668	668	668		
5	665	665	665	665	666	665	666	665	665	665	665	666	665	665	665	666		
10	657	657	656	656	657	657	657	658	656	657	656	656	656	656	656	657		
15	642	642	642	641	642	643	643	644	643	643	642	642	642	641	641	644		
20	622	623	622	621	622	623	623	624	623	623	623	622	621	622	622	623		
25	596	597	597	596	596	597	598	599	598	597	597	596	596	596	596	598		
30	565	566	566	565	566	566	567	568	568	567	567	566	565	565	566	568		
35	530	531	530	530	530	531	532	533	533	532	531	530	530	529	530	532		
40	490	491	491	490	490	491	491	493	493	493	492	490	490	490	490	493		
45	447	447	447	446	446	447	447	449	450	449	447	446	445	445	447	449		
50	399	399	399	398	398	399	399	401	402	401	399	398	397	397	399	401		
55	348	349	348	347	347	348	348	350	351	350	349	347	346	347	349	351		
60	295	295	294	293	293	294	294	296	298	297	295	294	293	294	296	298		
65	241	240	239	237	237	238	239	241	243	242	240	239	238	240	242	244		
70	186	185	183	181	181	182	183	185	188	187	184	183	182	184	186	189		
75	132	131	128	126	126	127	128	130	133	132	130	128	128	129	132	135		
80	80.8	80.0	77.4	75.2	74.4	75.0	76.8	78.5	81.1	80.0	77.5	75.7	75.5	77.4	80.3	83.0		
85	33.7	33.1	30.1	27.6	26.5	27.2	28.9	30.7	33.8	33.0	30.6	28.7	28.4	29.7	32.5	35.7		
90	0.03	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00		
100	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
105	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

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## 7. Photo of sample



Figure 1

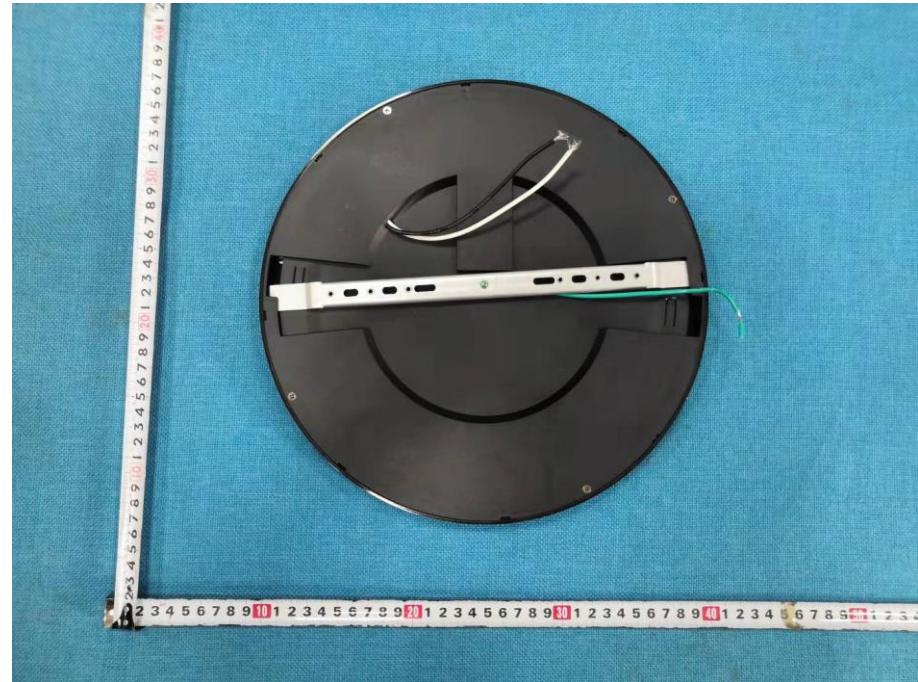


Figure 2

\*\*\*\*\* END OF THE TEST REPORT\*\*\*\*\*