TESTING
NVLAP LAB CODE:600177-0

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-830
All Models	:	PLU01R-1224T-830, 12FLPR-SPx-xxxxxx (x-xxxxxx in the model designation could be any numbers, letters or blank, which indicates customer code. PLU01R-1224T-830 and 12FLPR-SPx-xxxxxx are same except model name.)
Brand Name	:	artika
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	:	N02A22030775L00701
Date of receipt	:	Oct. 25, 2021
Date of test	:	Oct. 25, 2021 - Nov. 08, 2021
Date of report	:	Nov. 09, 2021

Tested by:	Checked by:	Approved by:
Brooke Zheng/ Test Engineer	Sandy Chen/ Project Engineer	Jessie Li/ Technical Manager

Guangdong Meide Testing Technology Co., Ltd. * CERTIFICATE *

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 use 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.

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1. Product Description for Equipment under Test(EUT)

Model Tested:	PLU01R-1224T-830
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:	3000K
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).

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°C±1.2°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 paramters 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° vertical intervals and 22.5°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 π 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

Test Ambient Temperature (Integrating sphere internal temperature)	25.1℃	Test orientation	Downward
Operate time(Min.)	60	stabilization time(Min.)	45

Optical and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.215	23.99	0.9299	1802.2	75.12

CCT (K)	Ra	R9	x	y	u'	v'
2991	83.5	10	0.4375	0.4040	0.2509	0.5215

Color Rendering Index

Ra
83.5

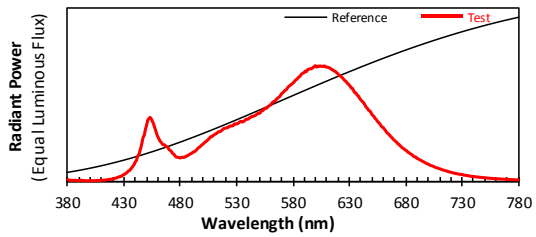
R1	R2	R3	R4	R5
82	92	96	81	83

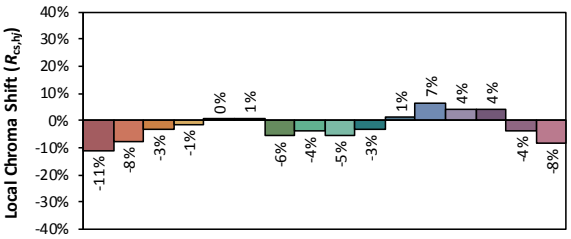
R6	R7	R8	R9	R10
91	83	60	10	83

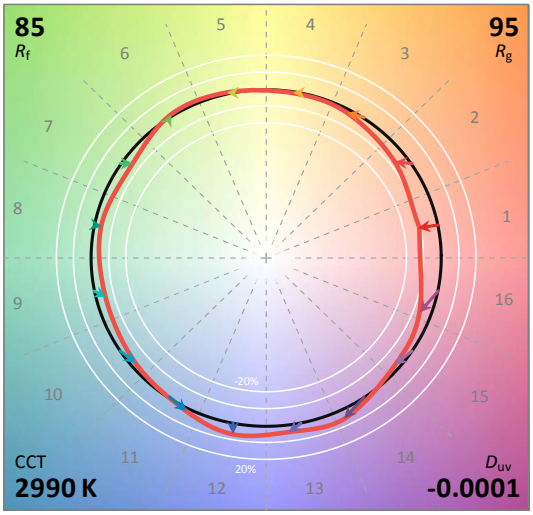
R11	R12	R13	R14	R15
81	73	85	98	75

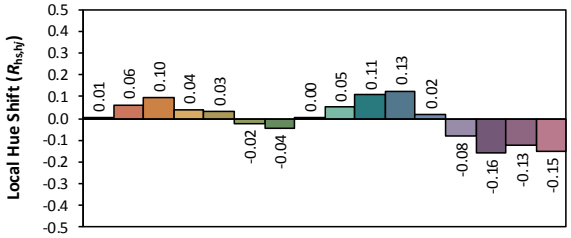
ANSI/IES TM-30-18 Color Rendition Report

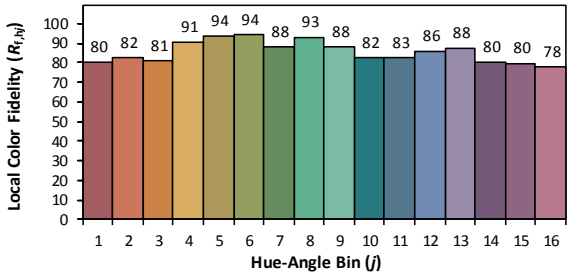
Source:	E2835UXXXX-3A	**Manufacturer:**	ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO.,LTD
Date:	2021/10/28	**Model:**	PLU01R-1224T-830

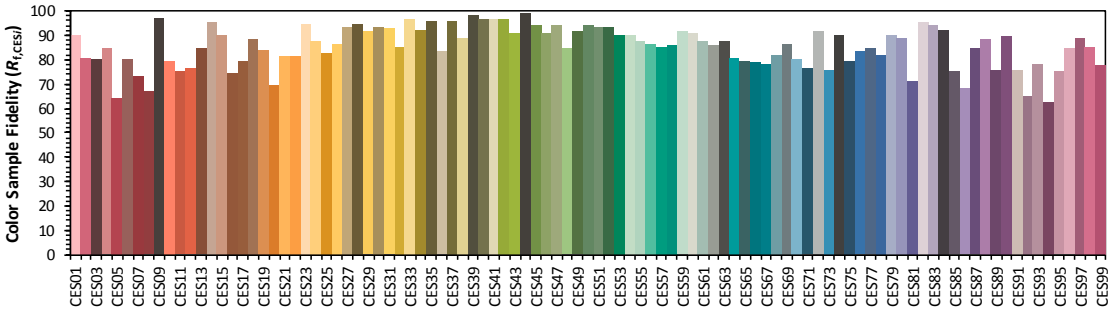












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

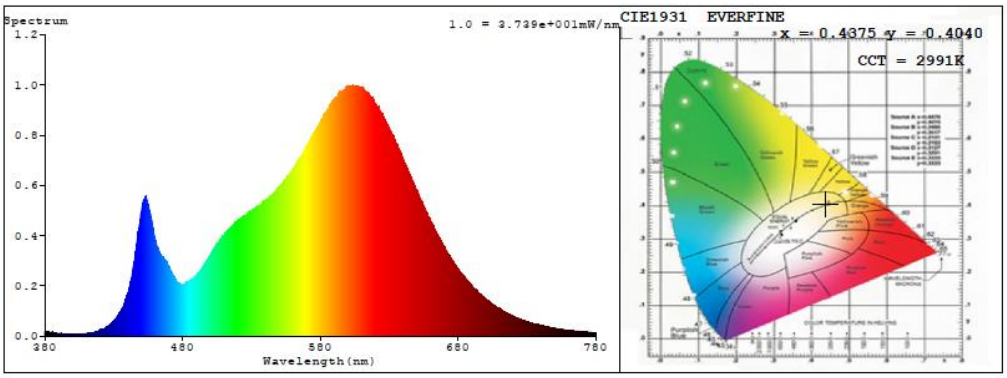
x	0.4375
y	0.4039
u'	0.2510
v'	0.5214

CIE 13.3-1995 (CRI)

R_a	84
R_9	10

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	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0166	414	0.0118	448	0.3995	482	0.2087	516	0.4339
381	0.0115	415	0.014	449	0.4491	483	0.2048	517	0.4399
382	0.0089	416	0.0157	450	0.4825	484	0.2119	518	0.4524
383	0.0087	417	0.0173	451	0.5246	485	0.2138	519	0.4558
384	0.0085	418	0.0181	452	0.5397	486	0.2208	520	0.4584
385	0.0093	419	0.0193	453	0.5505	487	0.2254	521	0.4617
386	0.0081	420	0.0213	454	0.541	488	0.2309	522	0.4629
387	0.0097	421	0.0233	455	0.5193	489	0.2379	523	0.4702
388	0.0073	422	0.0272	456	0.5006	490	0.2413	524	0.4758
389	0.0067	423	0.0289	457	0.4695	491	0.2503	525	0.4761
390	0.006	424	0.0335	458	0.4398	492	0.2537	526	0.4803
391	0.0091	425	0.0369	459	0.4099	493	0.2594	527	0.4804
392	0.0102	426	0.0406	460	0.3839	494	0.2676	528	0.4959
393	0.0067	427	0.0436	461	0.3653	495	0.2791	529	0.4946
394	0.0086	428	0.0452	462	0.3462	496	0.2889	530	0.4946
395	0.0052	429	0.055	463	0.3362	497	0.2955	531	0.4982
396	0.0049	430	0.0591	464	0.3208	498	0.3035	532	0.5061
397	0.0053	431	0.0655	465	0.3163	499	0.3132	533	0.5135
398	0.0047	432	0.0719	466	0.3144	500	0.3209	534	0.5164
399	0.006	433	0.0811	467	0.3033	501	0.3295	535	0.5106
400	0.0069	434	0.0902	468	0.2989	502	0.3388	536	0.5171
401	0.0071	435	0.0943	469	0.2907	503	0.3454	537	0.521
402	0.0045	436	0.1074	470	0.273	504	0.3535	538	0.5335
403	0.0062	437	0.1191	471	0.267	505	0.3642	539	0.5358
404	0.0059	438	0.1333	472	0.2573	506	0.3725	540	0.5355
405	0.006	439	0.1462	473	0.2427	507	0.3853	541	0.5441
406	0.0085	440	0.1693	474	0.2344	508	0.3851	542	0.5496
407	0.0071	441	0.1807	475	0.2245	509	0.395	543	0.5566
408	0.008	442	0.2153	476	0.2121	510	0.4003	544	0.5589
409	0.0081	443	0.2303	477	0.2089	511	0.4081	545	0.5627
410	0.0091	444	0.2585	478	0.2065	512	0.4121	546	0.5655
411	0.0106	445	0.2942	479	0.2047	513	0.4207	547	0.571
412	0.0107	446	0.3361	480	0.202	514	0.4277	548	0.5792
413	0.0104	447	0.382	481	0.2066	515	0.4278	549	0.587

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5845	599	0.9901	648	0.6078	697	0.163	746	0.0348
551	0.5933	600	0.9963	649	0.5981	698	0.158	747	0.0343
552	0.6067	601	0.9842	650	0.5779	699	0.1523	748	0.0325
553	0.6088	602	0.9929	651	0.5683	700	0.1496	749	0.0328
554	0.6172	603	0.9897	652	0.5579	701	0.1434	750	0.0316
555	0.6286	604	0.9945	653	0.5421	702	0.1383	751	0.0303
556	0.628	605	0.9912	654	0.5338	703	0.1357	752	0.0296
557	0.6357	606	0.9922	655	0.5175	704	0.1318	753	0.0281
558	0.645	607	0.9889	656	0.5076	705	0.1282	754	0.0279
559	0.6519	608	0.9947	657	0.4972	706	0.1226	755	0.0263
560	0.6592	609	0.9866	658	0.4833	707	0.1194	756	0.026
561	0.6693	610	0.9848	659	0.4694	708	0.1165	757	0.0255
562	0.6813	611	0.983	660	0.4653	709	0.1127	758	0.0247
563	0.6873	612	0.9783	661	0.4523	710	0.1092	759	0.0238
564	0.6904	613	0.9759	662	0.4407	711	0.1068	760	0.0228
565	0.7046	614	0.9661	663	0.4252	712	0.1021	761	0.0228
566	0.7133	615	0.963	664	0.4153	713	0.0988	762	0.022
567	0.7215	616	0.9534	665	0.4067	714	0.0966	763	0.0219
568	0.7286	617	0.9505	666	0.397	715	0.0927	764	0.0206
569	0.7416	618	0.9442	667	0.3842	716	0.091	765	0.0201
570	0.7564	619	0.9338	668	0.3763	717	0.0875	766	0.0192
571	0.7633	620	0.9266	669	0.3636	718	0.0844	767	0.0192
572	0.7742	621	0.9129	670	0.3551	719	0.0817	768	0.0184
573	0.7844	622	0.9087	671	0.3449	720	0.0789	769	0.0181
574	0.7887	623	0.8991	672	0.3385	721	0.0768	770	0.0172
575	0.8023	624	0.8923	673	0.325	722	0.0736	771	0.0177
576	0.8158	625	0.8797	674	0.3197	723	0.072	772	0.0161
577	0.8227	626	0.8693	675	0.3085	724	0.0691	773	0.0158
578	0.831	627	0.8618	676	0.2998	725	0.0675	774	0.0154
579	0.8385	628	0.85	677	0.2891	726	0.0654	775	0.0146
580	0.8471	629	0.8388	678	0.2852	727	0.0629	776	0.0147
581	0.8565	630	0.8296	679	0.2761	728	0.0622	777	0.0136
582	0.8689	631	0.8167	680	0.2684	729	0.0602	778	0.0138
583	0.8778	632	0.8026	681	0.2643	730	0.0589	779	0.0136
584	0.8848	633	0.7999	682	0.2514	731	0.0573	780	0.0136
585	0.8979	634	0.7785	683	0.248	732	0.0533		
586	0.9026	635	0.7637	684	0.2399	733	0.0537		
587	0.9169	636	0.761	685	0.234	734	0.0509		
588	0.9271	637	0.7429	686	0.2276	735	0.0499		
589	0.9332	638	0.737	687	0.2167	736	0.0481		
590	0.9367	639	0.7191	688	0.2117	737	0.0454		
591	0.9508	640	0.7058	689	0.2104	738	0.044		
592	0.9454	641	0.6942	690	0.1997	739	0.0429		
593	0.9613	642	0.6849	691	0.1952	740	0.0422		
594	0.9661	643	0.6733	692	0.189	741	0.0416		
595	0.9695	644	0.6569	693	0.1842	742	0.0392		
596	0.9697	645	0.6401	694	0.179	743	0.0388		
597	0.9752	646	0.6305	695	0.1732	744	0.0371		
598	0.9813	647	0.6158	696	0.1688	745	0.0362		

6. Goniophotometer Test results

6.1 Test Data

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

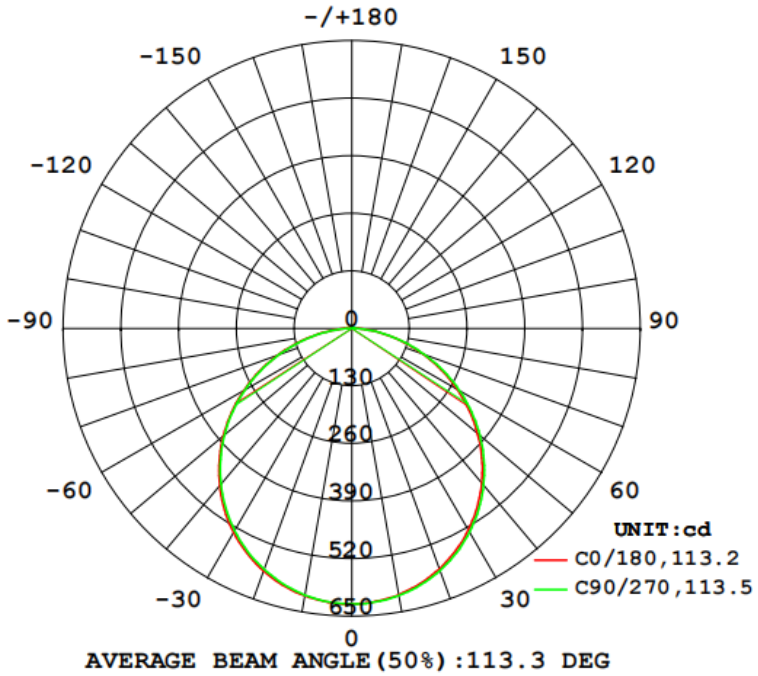
Electrical Measurement

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)	Imax(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

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum,lamp
10	610.4	611.1	612.7	613.2	613.3	612.2	611.4	610.6	0- 10	58.91	58.91	3.26,3.26
20	577.5	579.2	581.8	582.8	582.6	581.0	578.9	578.3	10- 20	169.0	227.9	12.6,12.6
30	525.2	528.0	530.5	532.0	532.0	530.4	528.0	525.8	20- 30	256.8	484.6	26.9,26.9
40	455.5	458.7	461.7	462.3	463.5	461.4	459.0	456.6	30- 40	310.7	795.3	44.1,44.1
50	370.0	373.7	377.0	377.1	378.2	377.0	374.4	371.9	40- 50	323.2	1119	62,62
60	273.7	276.8	279.7	279.9	281.5	280.4	278.4	276.1	50- 60	292.8	1411	78.2,78.2
70	171.1	173.6	175.7	175.7	178.2	177.6	175.9	174.1	60- 70	224.7	1636	90.7,90.7
80	73.84	74.61	75.17	73.82	77.86	77.43	75.57	75.12	70- 80	131.3	1767	97.9,97.9
90	0.1709	0.1067	0.1200	0.1377	0.1912	0.1625	0.2068	0.1566	80- 90	35.38	1803	99.9,99.9
100	0.1168	0.1354	0.1164	0.1365	0.2483	0.2280	0.2172	0.2191	90-100	0.1695	1803	99.9,99.9
110	0.1744	0.1812	0.1772	0.1838	0.2474	0.2518	0.2450	0.2409	100-110	0.2104	1803	99.9,99.9
120	0.2463	0.2444	0.2751	0.2745	0.2509	0.2565	0.2551	0.2380	110-120	0.2320	1803	99.9,99.9
130	0.3355	0.3441	0.3809	0.3674	0.3347	0.3259	0.3277	0.3185	120-130	0.2676	1804	99.9,99.9
140	0.4056	0.4125	0.4347	0.4261	0.4781	0.4765	0.4650	0.4762	130-140	0.3066	1804	100,100
150	0.4261	0.4353	0.4424	0.4570	0.6165	0.6345	0.6137	0.6214	140-150	0.3101	1804	100,100
160	0.4537	0.5224	0.5178	0.5212	0.6863	0.7089	0.7205	0.7309	150-160	0.2648	1804	100,100
170	0.5463	0.5609	0.5736	0.5856	0.6875	0.6720	0.7145	0.7262	160-170	0.1751	1805	100,100
180	0.6299	0.6229	0.6505	0.6615	0.6330	0.6044	0.6377	0.6593	170-180	0.0611	1805	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

6.4 Luminous Distribution Intensity (cd) Data

Table--1 UNIT: cd

γ (DEG) \ C (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	622	622	622	622	622	622	622	622	622	622	622	622	622	622	622	622			
5	619	619	619	620	620	620	621	620	620	621	620	620	619	620	619	619			
10	610	611	611	612	613	613	613	613	613	613	612	612	611	611	611	611			
15	597	597	597	599	600	600	600	600	601	600	599	599	598	597	597	597			
20	578	579	579	581	582	583	583	582	583	583	581	581	579	578	578	578			
25	554	556	556	557	559	559	560	559	560	560	558	557	556	555	554	554			
30	525	527	528	530	531	531	532	531	532	532	530	530	528	527	526	526			
35	493	494	495	497	498	499	499	499	500	500	498	497	496	494	493	493			
40	456	457	459	460	462	462	462	462	463	463	461	461	459	457	457	456			
45	415	416	418	419	421	421	422	422	423	423	421	420	418	417	416	415			
50	370	372	374	375	377	377	377	377	378	379	377	376	374	373	372	371			
55	323	324	326	328	330	330	330	329	331	331	330	329	328	326	325	324			
60	274	275	277	278	280	280	280	279	282	282	280	280	278	277	276	276			
65	223	224	225	227	228	228	228	228	230	231	229	229	227	226	226	225			
70	171	172	174	175	176	176	176	176	178	179	178	177	176	175	174	174			
75	121	122	122	123	124	124	123	122	127	127	126	126	125	124	123	123			
80	73.8	74.3	74.6	74.8	75.2	75.7	73.8	74.3	77.9	78.2	77.4	76.4	75.6	75.1	75.1	75.6			
85	31.0	30.7	29.5	28.5	28.6	29.3	30.2	31.8	34.3	34.2	32.5	30.8	29.7	29.7	30.9	32.4			
90	0.17	0.18	0.11	0.10	0.12	0.14	0.14	0.32	0.19	0.17	0.16	0.20	0.21	0.18	0.16	0.16			
95	0.09	0.09	0.10	0.09	0.09	0.09	0.13	0.16	0.22	0.20	0.19	0.18	0.19	0.19	0.18	0.18			
100	0.12	0.14	0.14	0.13	0.12	0.13	0.14	0.18	0.25	0.24	0.23	0.22	0.22	0.22	0.22	0.22			
105	0.14	0.16	0.16	0.15	0.14	0.17	0.15	0.16	0.25	0.25	0.25	0.25	0.24	0.23	0.24	0.24			
110	0.17	0.19	0.18	0.18	0.18	0.20	0.18	0.19	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.25			
115	0.20	0.22	0.21	0.22	0.22	0.23	0.23	0.23	0.25	0.25	0.26	0.25	0.25	0.24	0.24	0.24			
120	0.25	0.26	0.24	0.26	0.28	0.28	0.27	0.27	0.25	0.25	0.26	0.26	0.26	0.25	0.24	0.24			
125	0.29	0.30	0.30	0.32	0.34	0.32	0.32	0.33	0.29	0.29	0.28	0.28	0.29	0.29	0.27	0.27			
130	0.34	0.35	0.34	0.37	0.38	0.38	0.37	0.38	0.33	0.34	0.33	0.33	0.33	0.33	0.32	0.32			
135	0.38	0.38	0.37	0.41	0.41	0.42	0.40	0.41	0.41	0.40	0.40	0.40	0.39	0.40	0.39	0.40			
140	0.41	0.40	0.41	0.42	0.43	0.44	0.43	0.43	0.48	0.48	0.48	0.47	0.46	0.47	0.48	0.47			
145	0.43	0.44	0.44	0.43	0.44	0.46	0.45	0.45	0.57	0.56	0.56	0.54	0.54	0.55	0.57	0.57			
150	0.43	0.43	0.44	0.45	0.44	0.48	0.46	0.44	0.62	0.63	0.63	0.63	0.61	0.62	0.62	0.63			
155	0.44	0.46	0.47	0.49	0.48	0.51	0.49	0.46	0.67	0.68	0.68	0.70	0.67	0.66	0.69	0.67			
160	0.45	0.48	0.52	0.51	0.52	0.54	0.52	0.48	0.69	0.69	0.71	0.73	0.72	0.72	0.73	0.71			
165	0.50	0.52	0.54	0.53	0.53	0.56	0.56	0.50	0.69	0.69	0.69	0.72	0.72	0.70	0.71	0.73			
170	0.55	0.53	0.56	0.57	0.57	0.60	0.59	0.53	0.69	0.69	0.67	0.70	0.71	0.70	0.73	0.72			
175	0.58	0.59	0.62	0.63	0.63	0.66	0.66	0.61	0.66	0.66	0.66	0.70	0.70	0.70	0.71	0.70			
180	0.63	0.60	0.62	0.64	0.65	0.66	0.66	0.62	0.63	0.64	0.60	0.62	0.64	0.65	0.66	0.66			

7. Photo of sample

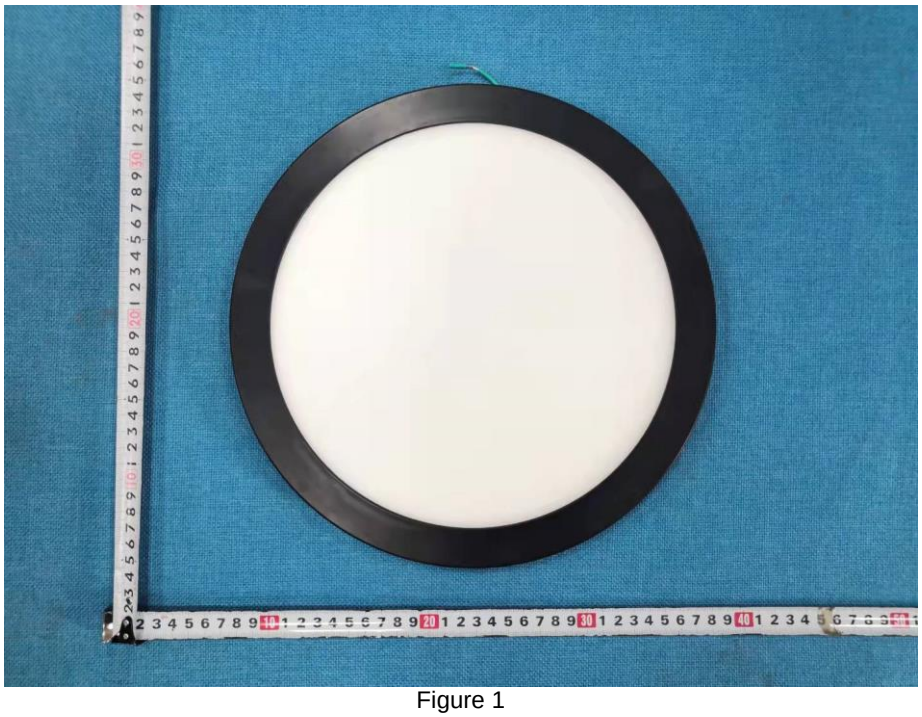


Figure 1

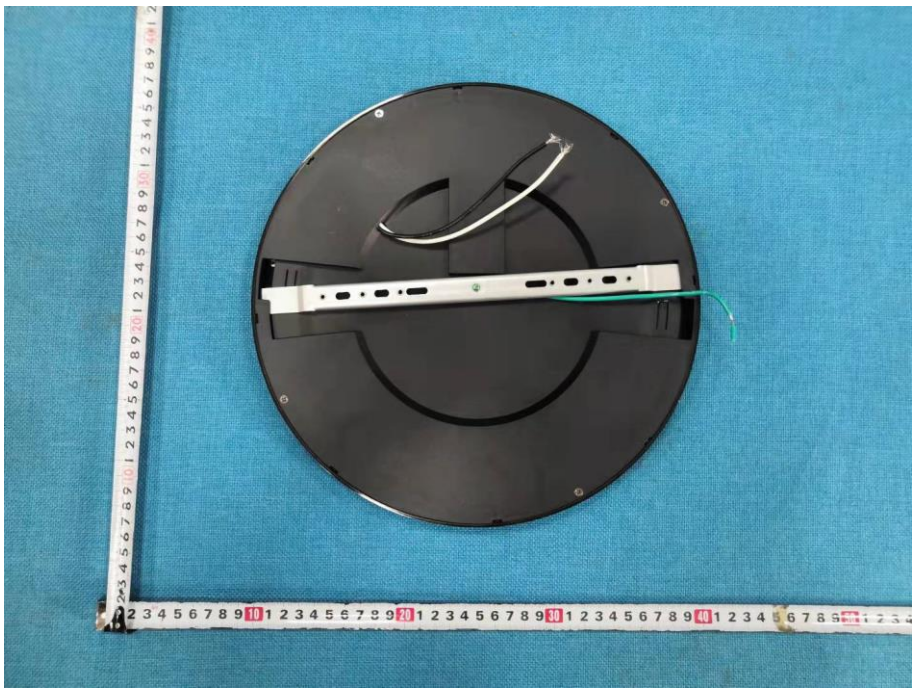


Figure 2

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