

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-1528T-850

All Models..... : PLU01R-1528T-850, 15FLPR-SPx-xxxxxx (x-xxxxxx in the model designation could be any numbers, letters or blank, which indicates customer code.
PLU01R-1528T-850 and 15FLPR-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...... : N02A22030775L01001

Date of receipt..... : Nov. 29, 2021

Date of test..... : Nov. 29, 2021

Date of report..... : Apr. 02, 2022

Tested by:

Brooke Zheng/ Test Engineer

Checked by:

Sandy Chen/ Project Engineer

Approved by:

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 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.



1. Product Description for Equipment under Test(EUT)

Model No.:	PLU01R-1528T-850
Manufacturer:	ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO.,LTD
Product Type:	LED ceiling light
Rated Voltage/Frequency:	120V AC, 60Hz
Rated Power:	28W
Rated luminous flux:	2000lm
Nominal CCT:	5000K
LED Manufacturer:	MLS CO., LTD
LED Model No.:	E2835X1X2X3X4-P

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 $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ 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° 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 4π 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°C	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)
120.14	60	0.2534	26.5	0.8704	2055.6	77.56

CCT (K)	Ra	R9	x	y	u'	v'
4863	81.8	2	0.3505	0.3680	0.2088	0.4932

Color Rendering Index

Ra 81.8				
R1 79	R2 87	R3 93	R4 80	R5 79
R6 82	R7 88	R8 66	R9 2	R10 69
R11 79	R12 54	R13 81	R14 97	R15 73



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

ANSI/IES TM-30-18 Color Rendition Report

Source: E2835X1X2X3X4-P

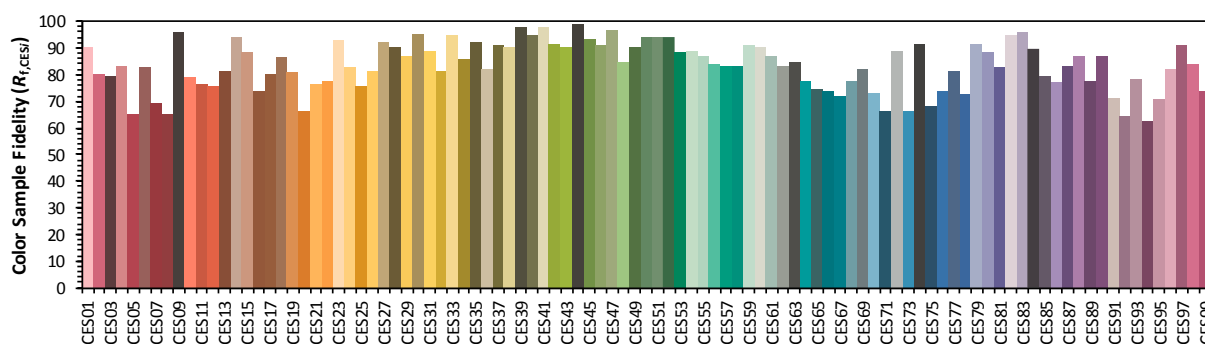
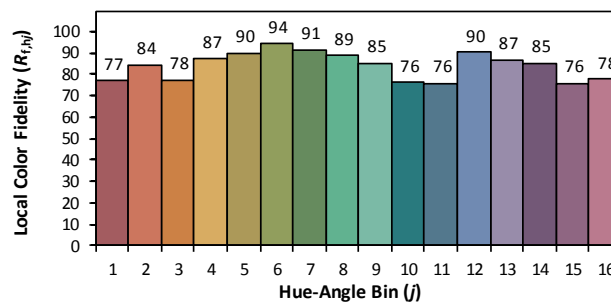
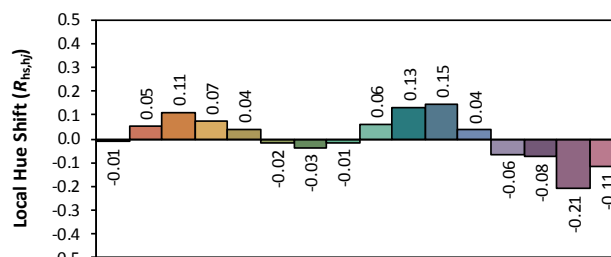
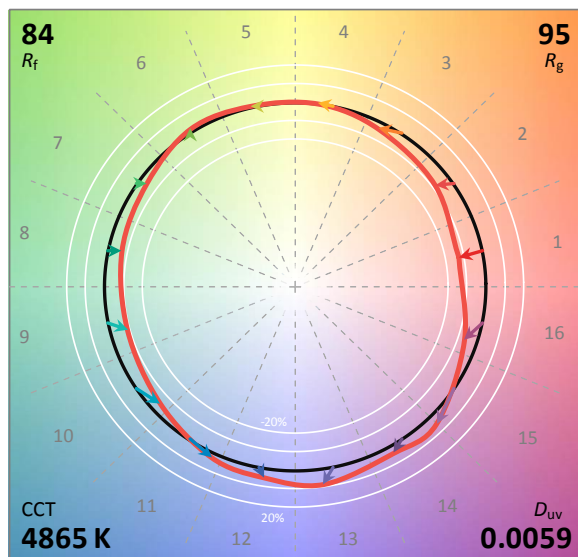
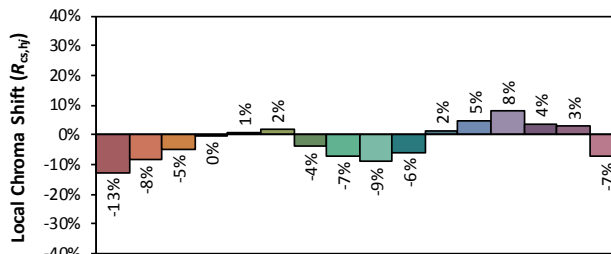
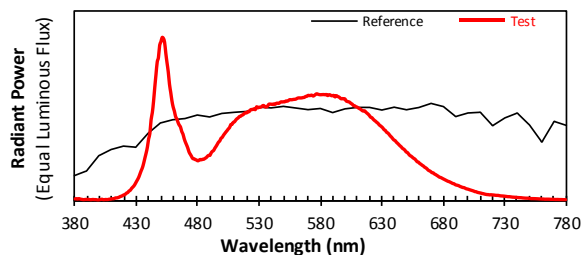
Date: 2021/11/29

Manufacturer:

ZHEJIANG TWINSEL ELECTRONIC
TECHNOLOGY CO., LTD

Model:

PLU01R-1528T-850



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

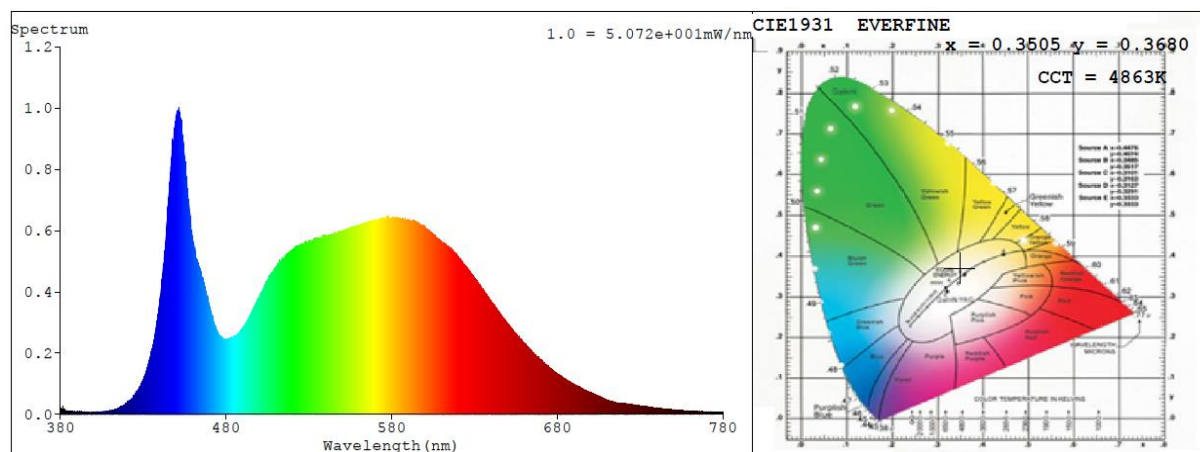
x 0.3505
 y 0.3679
 u' 0.2088
 v' 0.4932

CIE 13.3-1995
(CRI)

R_a 82
 R_g 2

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	0.0111	414	0.0176	448	0.8643	482	0.2493	516	0.516
381	0.013	415	0.0194	449	0.9383	483	0.247	517	0.5188
382	0.01	416	0.0222	450	0.9578	484	0.2506	518	0.5263
383	0.0133	417	0.0262	451	0.9843	485	0.2506	519	0.5308
384	0.0112	418	0.0284	452	0.9796	486	0.2562	520	0.53
385	0.0093	419	0.0327	453	0.9562	487	0.2605	521	0.5381
386	0.0081	420	0.0362	454	0.8894	488	0.2688	522	0.5378
387	0.0066	421	0.0398	455	0.8316	489	0.2739	523	0.5479
388	0.0078	422	0.0467	456	0.777	490	0.2741	524	0.5504
389	0.0084	423	0.0502	457	0.7025	491	0.2892	525	0.5505
390	0.0079	424	0.0592	458	0.6541	492	0.2982	526	0.5549
391	0.0082	425	0.0634	459	0.6025	493	0.3037	527	0.5498
392	0.0073	426	0.0739	460	0.5652	494	0.3173	528	0.5665
393	0.0063	427	0.0819	461	0.5402	495	0.3284	529	0.5605
394	0.0078	428	0.0899	462	0.5073	496	0.341	530	0.5645
395	0.0078	429	0.1016	463	0.4937	497	0.3538	531	0.5636
396	0.007	430	0.1153	464	0.4719	498	0.361	532	0.5673
397	0.0071	431	0.1284	465	0.4559	499	0.3766	533	0.5733
398	0.0054	432	0.1433	466	0.4446	500	0.3825	534	0.5737
399	0.0048	433	0.1632	467	0.4176	501	0.395	535	0.5655
400	0.0065	434	0.1829	468	0.402	502	0.4049	536	0.5663
401	0.008	435	0.2011	469	0.3743	503	0.4148	537	0.5712
402	0.0095	436	0.2281	470	0.3532	504	0.4236	538	0.582
403	0.0065	437	0.2593	471	0.3359	505	0.4337	539	0.5828
404	0.007	438	0.2893	472	0.3166	506	0.4417	540	0.5823
405	0.008	439	0.3245	473	0.2932	507	0.4596	541	0.5812
406	0.0073	440	0.3739	474	0.2804	508	0.4609	542	0.584
407	0.0081	441	0.406	475	0.2673	509	0.473	543	0.5813
408	0.0101	442	0.4886	476	0.2545	510	0.4761	544	0.587
409	0.0098	443	0.5314	477	0.2537	511	0.4865	545	0.5887
410	0.0119	444	0.5991	478	0.2485	512	0.4944	546	0.5872
411	0.0125	445	0.6842	479	0.2463	513	0.4995	547	0.5918
412	0.0138	446	0.7619	480	0.2411	514	0.5078	548	0.5964
413	0.0174	447	0.8369	481	0.2441	515	0.5099	549	0.5958

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.597	599	0.6144	648	0.3115	697	0.0796	746	0.0168
551	0.5968	600	0.6149	649	0.3045	698	0.0763	747	0.0162
552	0.6021	601	0.6025	650	0.2945	699	0.0725	748	0.0159
553	0.6007	602	0.599	651	0.291	700	0.071	749	0.0159
554	0.6046	603	0.5969	652	0.2818	701	0.0687	750	0.0149
555	0.6096	604	0.5937	653	0.2734	702	0.066	751	0.0141
556	0.6091	605	0.5869	654	0.2692	703	0.0637	752	0.0132
557	0.6096	606	0.5826	655	0.2629	704	0.0614	753	0.0133
558	0.6111	607	0.5742	656	0.2567	705	0.0589	754	0.0131
559	0.6118	608	0.5725	657	0.2521	706	0.0556	755	0.0129
560	0.613	609	0.5672	658	0.2442	707	0.0547	756	0.0125
561	0.6172	610	0.5646	659	0.2353	708	0.0513	757	0.0122
562	0.6199	611	0.5597	660	0.2332	709	0.0495	758	0.0117
563	0.6202	612	0.5554	661	0.2249	710	0.0479	759	0.0112
564	0.6201	613	0.5509	662	0.2207	711	0.0462	760	0.0111
565	0.6208	614	0.5448	663	0.2143	712	0.0441	761	0.0104
566	0.6226	615	0.541	664	0.2099	713	0.0426	762	0.0106
567	0.6237	616	0.543	665	0.2028	714	0.0405	763	0.0097
568	0.629	617	0.5353	666	0.1985	715	0.0388	764	0.0098
569	0.6299	618	0.5285	667	0.1926	716	0.0376	765	0.0098
570	0.6355	619	0.5223	668	0.1847	717	0.0373	766	0.0098
571	0.6344	620	0.514	669	0.1808	718	0.0359	767	0.0095
572	0.635	621	0.5041	670	0.1764	719	0.0365	768	0.009
573	0.6372	622	0.5013	671	0.1697	720	0.0357	769	0.0091
574	0.6316	623	0.4927	672	0.1686	721	0.0351	770	0.0086
575	0.6348	624	0.4854	673	0.1619	722	0.0342	771	0.0084
576	0.6406	625	0.4798	674	0.1582	723	0.0331	772	0.0077
577	0.6449	626	0.4729	675	0.1532	724	0.0328	773	0.0082
578	0.6426	627	0.4672	676	0.1486	725	0.0326	774	0.0079
579	0.6405	628	0.4579	677	0.1431	726	0.0312	775	0.0075
580	0.6395	629	0.4521	678	0.1408	727	0.0298	776	0.0075
581	0.6398	630	0.446	679	0.1372	728	0.0293	777	0.0074
582	0.6404	631	0.4386	680	0.133	729	0.0288	778	0.0069
583	0.6403	632	0.4286	681	0.1294	730	0.028	779	0.007
584	0.6396	633	0.4242	682	0.1254	731	0.027	780	0.007
585	0.6406	634	0.4133	683	0.1217	732	0.026		
586	0.6344	635	0.4091	684	0.1179	733	0.0249		
587	0.639	636	0.401	685	0.1155	734	0.0249		
588	0.6385	637	0.3913	686	0.112	735	0.024		
589	0.6338	638	0.3841	687	0.1082	736	0.0229		
590	0.634	639	0.3749	688	0.1043	737	0.022		
591	0.6351	640	0.3667	689	0.1027	738	0.0218		
592	0.6263	641	0.3627	690	0.0974	739	0.0204		
593	0.634	642	0.3533	691	0.0949	740	0.0205		
594	0.629	643	0.3466	692	0.0932	741	0.0197		
595	0.6263	644	0.3388	693	0.0904	742	0.0191		
596	0.6208	645	0.3313	694	0.0863	743	0.0189		
597	0.6148	646	0.3249	695	0.0837	744	0.0185		
598	0.6164	647	0.316	696	0.0805	745	0.0174		

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

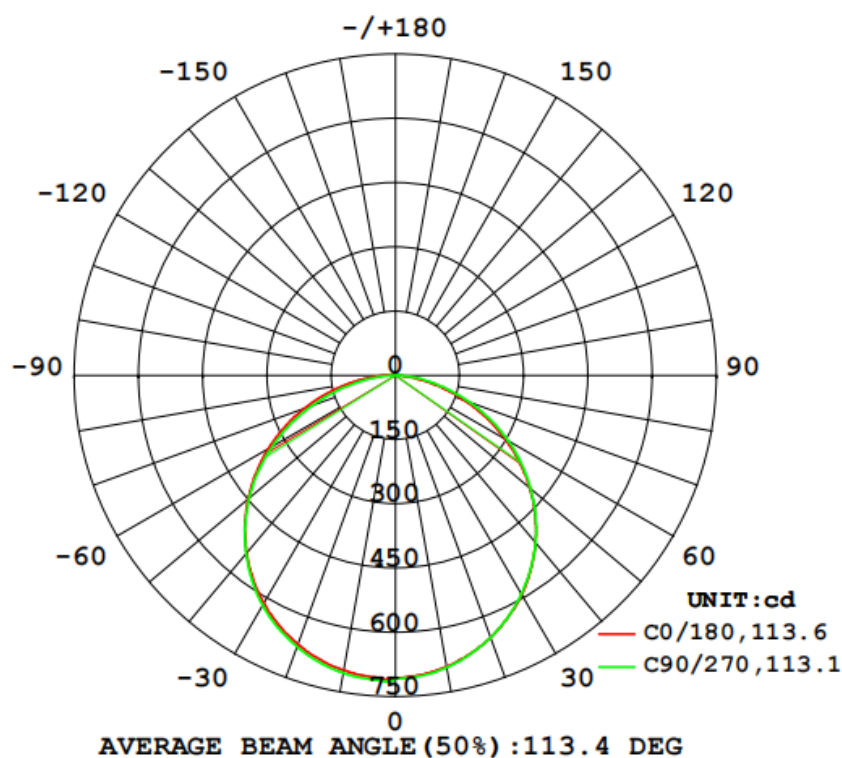
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120.2	60	0.2531	0.8732	26.56

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	I _{max} (cd)	Spacing Criteria (C0/180°)	Spacing Criteria (C90/270°)
2058.9	77.51	715.1	1.29	1.30

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	690.6	689.7	692.3	699.0	698.7	704.1	705.2	703.0	0- 10	67.24	67.24	3.27, 3.27
20	650.7	647.3	650.8	661.7	668.0	674.0	674.0	667.4	10- 20	192.8	260.0	12.6, 12.6
30	590.3	584.5	588.7	603.6	614.5	621.6	620.3	610.3	20- 30	293.1	553.1	26.9, 26.9
40	509.7	502.6	509.0	526.7	541.4	547.7	543.0	530.2	30- 40	355.1	908.3	44.1, 44.1
50	409.8	403.9	412.4	432.7	449.9	455.2	446.4	430.4	40- 50	370.4	1279	62.1, 62.1
60	295.2	291.5	303.3	325.5	343.1	345.9	333.2	314.0	50- 60	336.0	1615	78.4, 78.4
70	172.3	171.9	186.0	209.0	226.8	224.6	207.1	188.1	60- 70	256.4	1871	90.9, 90.9
80	59.72	61.59	74.40	95.89	109.8	102.5	82.77	68.16	70- 80	146.3	2017	98, 98
90	0.0874	0.0857	0.1180	8.062	13.08	5.711	0.2200	0.1734	80- 90	39.15	2056	99.9, 99.9
100	0.1408	0.1372	0.1250	0.1200	0.2209	0.2343	0.2380	0.2538	90-100	0.4038	2057	99.9, 99.9
110	0.2058	0.2002	0.1928	0.1810	0.2697	0.2735	0.2656	0.2730	100-110	0.2235	2057	99.9, 99.9
120	0.2899	0.2846	0.3032	0.2619	0.2610	0.2681	0.2826	0.2761	110-120	0.2513	2057	99.9, 99.9
130	0.3979	0.3988	0.4191	0.3723	0.3209	0.3278	0.3693	0.3816	120-130	0.2891	2058	99.9, 99.9
140	0.4761	0.4741	0.4946	0.4622	0.4773	0.4952	0.5288	0.5673	130-140	0.3376	2058	100, 100
150	0.4772	0.5014	0.5120	0.4986	0.6745	0.6740	0.6833	0.7237	140-150	0.3445	2058	100, 100
160	0.5212	0.5881	0.5981	0.5623	0.7465	0.7710	0.8062	0.8095	150-160	0.2963	2059	100, 100
170	0.6244	0.6340	0.6663	0.6329	0.7592	0.7524	0.7892	0.8052	160-170	0.1963	2059	100, 100
180	0.7301	0.7301	0.7279	0.7279	0.7279	0.7279	0.7301	0.7301	170-180	0.0692	2059	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

6.4 Luminous Distribution Intensity (cd) Data

Table--1 UNIT: cd

C (DEG) y (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	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706			
5	701	702	702	702	703	707	707	712	706	709	710	712	712	712	712	709			
10	691	691	690	690	692	695	699	703	699	702	704	706	705	704	703	699			
15	673	673	671	671	674	678	683	689	686	689	692	693	693	690	688	684			
20	651	648	647	647	651	655	662	669	668	671	674	675	674	671	667	663			
25	623	620	619	619	623	627	635	643	644	649	651	651	650	645	641	636			
30	590	586	585	584	589	595	604	612	614	620	622	622	620	614	610	603			
35	552	548	546	546	551	557	567	577	580	585	587	586	585	577	573	565			
40	510	505	503	502	509	515	527	536	541	546	548	546	543	536	530	522			
45	462	457	455	456	463	470	482	492	498	503	503	502	497	490	482	474			
50	410	405	404	406	412	421	433	444	450	454	455	452	446	438	430	422			
55	354	349	349	352	359	369	381	392	398	402	402	398	391	383	374	365			
60	295	291	292	295	303	313	325	337	343	346	346	340	333	323	314	306			
65	234	231	232	236	245	256	268	279	286	289	286	280	272	261	252	244			
70	172	171	172	177	186	197	209	219	227	228	225	217	207	197	188	181			
75	114	114	114	119	128	138	151	160	167	168	162	153	143	133	125	120			
80	59.7	59.5	61.6	66.3	74.4	84.7	95.9	105	110	109	103	93.0	82.8	74.3	68.2	64.2			
85	13.0	14.1	17.0	21.2	27.9	36.6	46.2	53.6	58.1	56.3	49.5	40.6	31.9	25.0	20.0	16.9			
90	0.09	0.09	0.09	0.09	0.12	0.95	8.06	10.2	13.1	11.0	5.71	1.11	0.22	0.17	0.17	0.18			
95	0.11	0.11	0.11	0.10	0.10	0.10	0.09	0.10	0.18	0.18	0.18	0.19	0.20	0.21	0.22	0.22			
100	0.14	0.14	0.14	0.13	0.12	0.12	0.12	0.12	0.22	0.23	0.23	0.23	0.24	0.24	0.25	0.26			
105	0.17	0.18	0.17	0.16	0.16	0.15	0.15	0.16	0.25	0.26	0.26	0.26	0.26	0.26	0.27	0.28			
110	0.21	0.21	0.20	0.20	0.19	0.19	0.18	0.19	0.27	0.27	0.27	0.26	0.27	0.27	0.27	0.28			
115	0.24	0.25	0.24	0.24	0.24	0.23	0.22	0.22	0.27	0.27	0.27	0.26	0.27	0.27	0.26	0.27			
120	0.29	0.30	0.28	0.30	0.30	0.28	0.26	0.26	0.26	0.27	0.27	0.27	0.28	0.28	0.28	0.28			
125	0.34	0.35	0.35	0.36	0.37	0.34	0.32	0.31	0.27	0.28	0.28	0.30	0.32	0.32	0.32	0.32			
130	0.40	0.40	0.40	0.42	0.42	0.40	0.37	0.37	0.32	0.33	0.33	0.35	0.37	0.38	0.38	0.39			
135	0.43	0.43	0.44	0.46	0.46	0.45	0.42	0.43	0.40	0.40	0.40	0.43	0.45	0.46	0.47	0.48			
140	0.48	0.47	0.47	0.48	0.49	0.48	0.46	0.45	0.48	0.48	0.50	0.51	0.53	0.54	0.57	0.58			
145	0.49	0.49	0.48	0.49	0.51	0.50	0.48	0.49	0.58	0.57	0.59	0.59	0.61	0.63	0.65	0.66			
150	0.48	0.49	0.50	0.51	0.51	0.53	0.50	0.51	0.67	0.66	0.67	0.68	0.68	0.70	0.72	0.73			
155	0.51	0.53	0.55	0.56	0.56	0.56	0.53	0.51	0.72	0.72	0.74	0.77	0.75	0.74	0.79	0.78			
160	0.52	0.55	0.59	0.58	0.60	0.60	0.56	0.55	0.75	0.75	0.77	0.81	0.81	0.80	0.81	0.82			
165	0.58	0.60	0.62	0.61	0.62	0.63	0.60	0.57	0.75	0.75	0.76	0.79	0.80	0.79	0.80	0.82			
170	0.62	0.61	0.63	0.65	0.67	0.67	0.63	0.61	0.76	0.76	0.75	0.77	0.79	0.79	0.81	0.82			
175	0.69	0.69	0.72	0.74	0.74	0.72	0.68	0.67	0.74	0.74	0.74	0.76	0.79	0.79	0.79	0.80			
180	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73			

7. Photo of sample

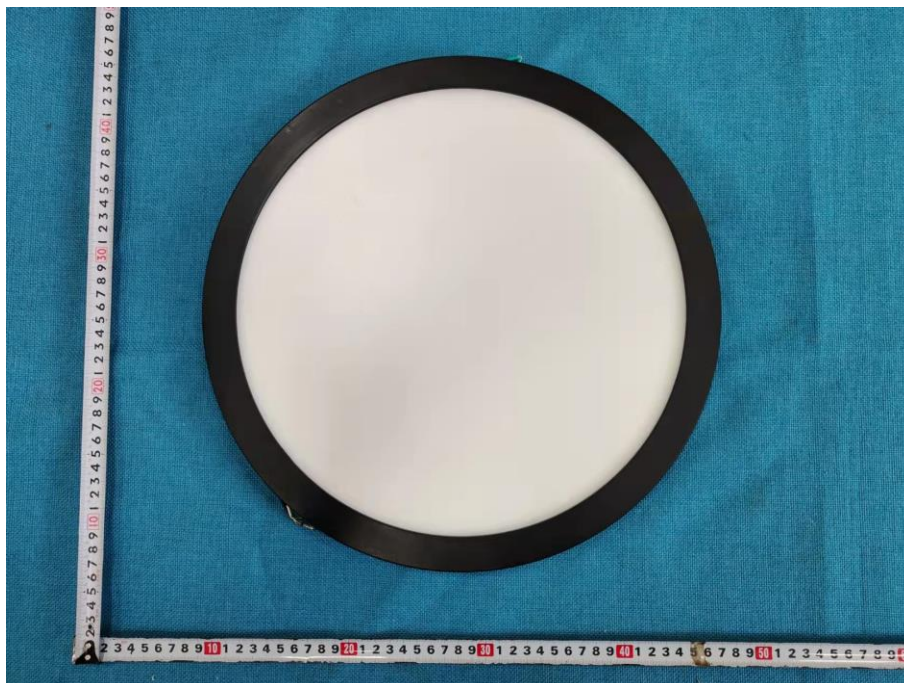


Figure 1

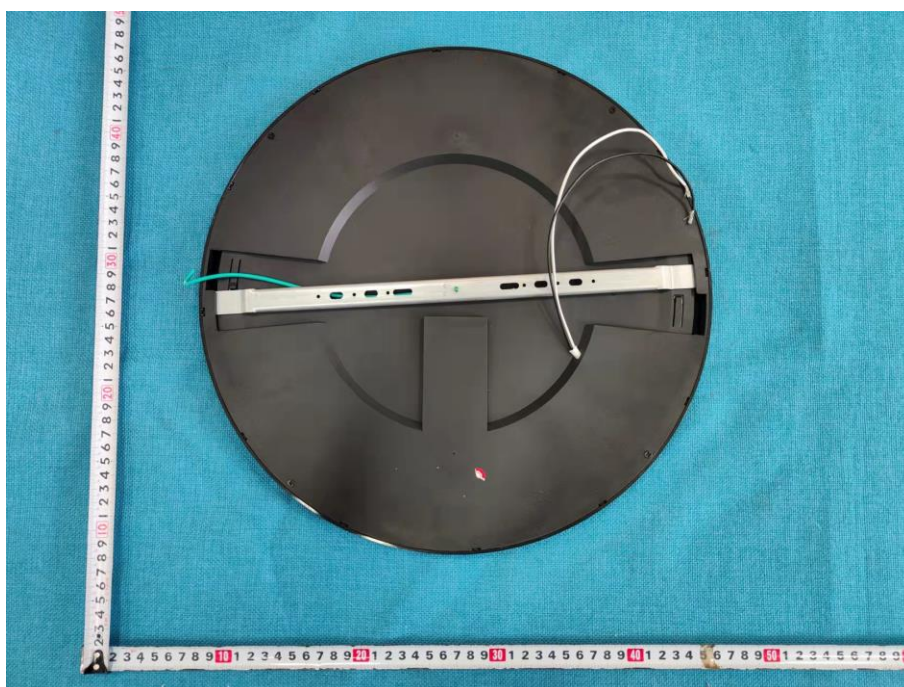


Figure 2

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