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	:	Blackjack Lighting LLC
Address	:	1547 Barclay Blvd Buffalo Grove, IL 60089
Test Model	:	VEC-24V-XX-12T-XXK
Brand Name	:	Blackjack Lighting
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.	:	N02A21120889L00101
Date of receipt	:	Jan. 04, 2022
Date of test	:	Jan. 10, 2022
Date of report	:	Jan. 12, 2022

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 No.:	VEC-24V-XX-12T-XXK
Manufacturer:	Blackjack Lighting LLC
Product Type:	Vector Vanity
Rated Voltage/Frequency:	120V AC, 60Hz
Rated Power:	18W
Rated luminous flux:	1089lm
Nominal CCT:	2700K, 3000K, 3500K, 4000K
LED Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
LED Model No.:	HL-AM-2835DW-S1-08-HR5

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 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)	25.3℃	Test orientation	Downward
Operate time(Min.)	75	stabilization time(Min.)	30

Optical and Electrical Measurement Result

Mode	Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux (lm)	Efficacy (lm/W)
2700K	120.01	60	0.1504	17.68	0.9795	1030.4	58.28
3000K	119.99	60	0.1516	17.41	0.9575	1116	64.09
3500K	120.07	60	0.1524	17.57	0.9603	1151.6	65.55
4000K	120.03	60	0.1573	18.17	0.9624	1148.8	63.23

Mode	CCT (K)	Ra	R9	x	y	u'	v'
2700K	2763	93.4	51	0.455	0.4098	0.2597	0.5263
3000K	2925	94.5	55	0.4423	0.4056	0.2533	0.5228
3500K	3340	95	62	0.4136	0.3928	0.2403	0.5134
4000K	3784	94	63	0.3908	0.3838	0.2291	0.5062

Color Rendering Index (Mode: 2700K)

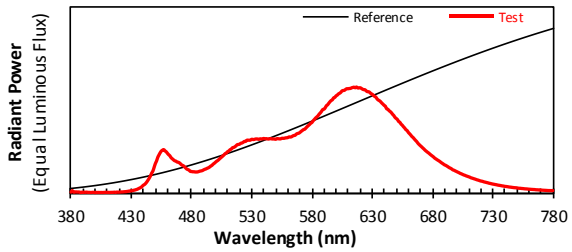
Ra
93.4

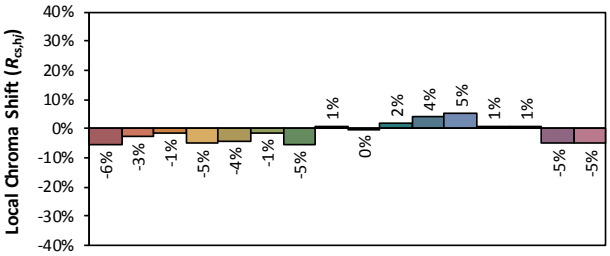
R1	R2	R3	R4	R5
97	100	97	97	97
R6	R7	R8	R9	R10
94	89	77	51	99
R11	R12	R13	R14	R15
98	84	99	99	89

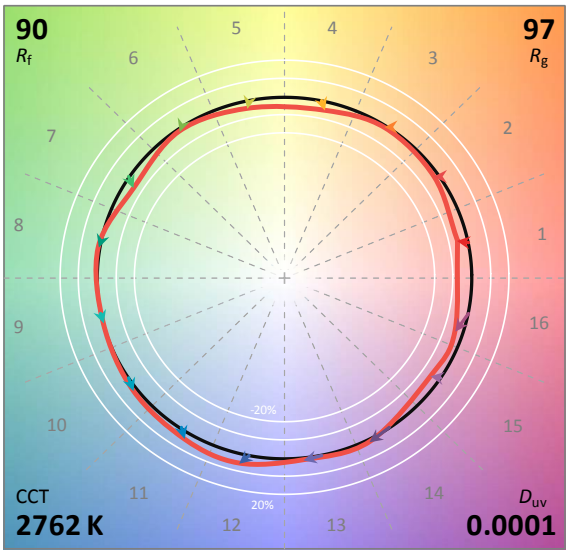
*ANSI/IES TM-30-18 Color Rendition Report (Mode: 2700K)

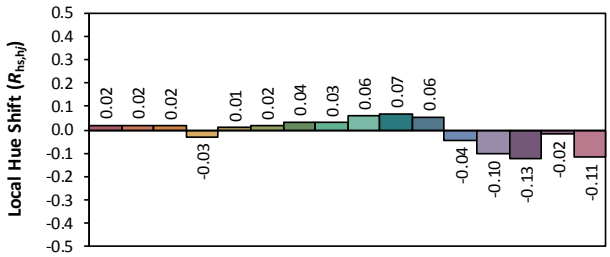
ANSI/IES TM-30-18 Color Rendition Report

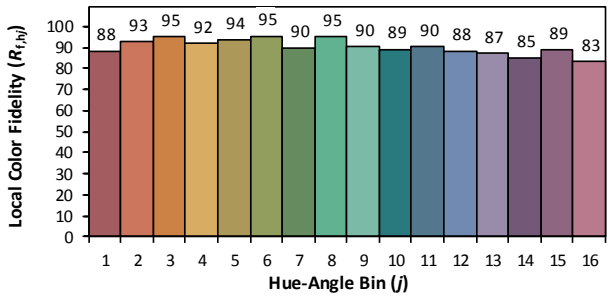
Source:	HL-AM-2835DW-S1-08-HR5	**Manufacturer:**	Blackjack Lighting LLC
Date:	2022/1/10	**Model:**	VEC-24V-XX-12T-XXK

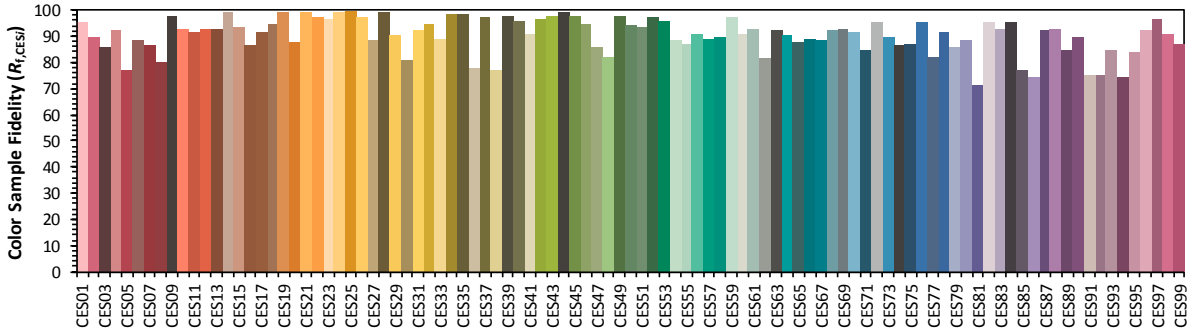












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

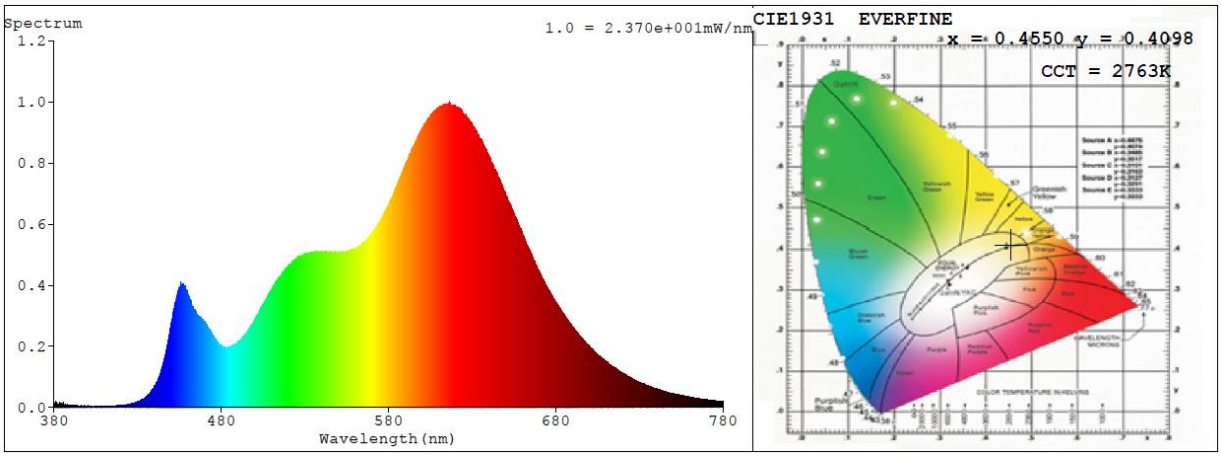
x	0.4551
y	0.4098
u'	0.2598
v'	0.5263

CIE 13.3-1995 (CRI)

R_a	93
R_9	51

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

Relative Spectral Power Distribution (Mode: 2700K)



nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.006	414	0.0038	448	0.2057	482	0.1978	516	0.4327
381	0.0204	415	0.0041	449	0.2404	483	0.1957	517	0.4419
382	0.0065	416	0.0055	450	0.2749	484	0.1955	518	0.4523
383	0.0067	417	0.004	451	0.2996	485	0.1963	519	0.4544
384	0.0085	418	0.0063	452	0.3335	486	0.1995	520	0.4578
385	0.0073	419	0.0059	453	0.3558	487	0.2035	521	0.466
386	0.0074	420	0.0062	454	0.3765	488	0.2057	522	0.4686
387	0.0065	421	0.0067	455	0.3929	489	0.2088	523	0.4755
388	0.0014	422	0.0081	456	0.4012	490	0.215	524	0.4836
389	0.0062	423	0.0081	457	0.4062	491	0.2206	525	0.4828
390	0.003	424	0.0097	458	0.3937	492	0.2244	526	0.4943
391	0.006	425	0.0103	459	0.3858	493	0.2303	527	0.4946
392	0.0044	426	0.0116	460	0.3715	494	0.235	528	0.4944
393	0.0061	427	0.0133	461	0.3585	495	0.2419	529	0.4957
394	0.0037	428	0.0155	462	0.3484	496	0.2511	530	0.5035
395	0.0041	429	0.0172	463	0.331	497	0.258	531	0.5009
396	0.0028	430	0.0184	464	0.3206	498	0.2697	532	0.5017
397	0.0029	431	0.0205	465	0.3106	499	0.2779	533	0.5053
398	0.0044	432	0.0236	466	0.3015	500	0.2883	534	0.5064
399	0.0038	433	0.0261	467	0.2979	501	0.2976	535	0.5053
400	0.002	434	0.0298	468	0.2897	502	0.3053	536	0.503
401	0.0035	435	0.0333	469	0.2869	503	0.3158	537	0.5074
402	0.0029	436	0.0392	470	0.281	504	0.3263	538	0.5062
403	0.0032	437	0.0448	471	0.2709	505	0.336	539	0.5078
404	0.0025	438	0.0506	472	0.2605	506	0.3459	540	0.5107
405	0.003	439	0.0602	473	0.2558	507	0.3567	541	0.5078
406	0.0025	440	0.0712	474	0.2469	508	0.3683	542	0.5089
407	0.0031	441	0.078	475	0.2352	509	0.3751	543	0.5069
408	0.0039	442	0.0892	476	0.2241	510	0.3868	544	0.5054
409	0.0043	443	0.1037	477	0.2183	511	0.3931	545	0.5081
410	0.0037	444	0.121	478	0.2127	512	0.405	546	0.5086
411	0.0038	445	0.1394	479	0.2013	513	0.4103	547	0.506
412	0.0029	446	0.1607	480	0.2004	514	0.423	548	0.5064
413	0.0036	447	0.1859	481	0.1977	515	0.4265	549	0.5052

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5035	599	0.897	648	0.7261	697	0.2156	746	0.0512
551	0.5092	600	0.9112	649	0.7088	698	0.2118	747	0.0496
552	0.5084	601	0.9182	650	0.6987	699	0.2056	748	0.0481
553	0.5071	602	0.9297	651	0.6886	700	0.2004	749	0.0473
554	0.5072	603	0.9363	652	0.6707	701	0.1945	750	0.0465
555	0.5124	604	0.9449	653	0.6633	702	0.1896	751	0.0441
556	0.5123	605	0.9583	654	0.646	703	0.183	752	0.0425
557	0.5127	606	0.9619	655	0.6357	704	0.1787	753	0.0421
558	0.516	607	0.9638	656	0.6211	705	0.1733	754	0.0406
559	0.5172	608	0.9727	657	0.6092	706	0.168	755	0.0398
560	0.5192	609	0.9786	658	0.5936	707	0.1643	756	0.0383
561	0.5252	610	0.9784	659	0.5856	708	0.1592	757	0.037
562	0.5244	611	0.9808	660	0.5686	709	0.1553	758	0.0364
563	0.5266	612	0.9815	661	0.5562	710	0.1511	759	0.0354
564	0.5336	613	0.9873	662	0.5436	711	0.1471	760	0.0339
565	0.5387	614	0.9903	663	0.5293	712	0.1411	761	0.0332
566	0.5407	615	0.9932	664	0.5196	713	0.1379	762	0.0322
567	0.5513	616	0.9873	665	0.506	714	0.1338	763	0.0314
568	0.5574	617	0.9948	666	0.4931	715	0.1303	764	0.0307
569	0.5601	618	0.9862	667	0.4817	716	0.1265	765	0.0301
570	0.5673	619	0.9862	668	0.4661	717	0.1221	766	0.0283
571	0.5772	620	0.9878	669	0.4541	718	0.1191	767	0.0282
572	0.5853	621	0.9821	670	0.4431	719	0.1151	768	0.0271
573	0.5943	622	0.9746	671	0.4331	720	0.1112	769	0.0265
574	0.5979	623	0.9701	672	0.4219	721	0.1091	770	0.0259
575	0.6093	624	0.969	673	0.4117	722	0.1061	771	0.0248
576	0.6213	625	0.9594	674	0.3999	723	0.102	772	0.024
577	0.632	626	0.9511	675	0.3906	724	0.0997	773	0.0233
578	0.6422	627	0.9505	676	0.3812	725	0.0966	774	0.0228
579	0.654	628	0.9439	677	0.3733	726	0.0939	775	0.0219
580	0.6612	629	0.9329	678	0.3631	727	0.0903	776	0.0211
581	0.6771	630	0.927	679	0.3538	728	0.088	777	0.0208
582	0.689	631	0.9172	680	0.3452	729	0.085	778	0.0207
583	0.7026	632	0.9067	681	0.3364	730	0.0823	779	0.0204
584	0.7128	633	0.9006	682	0.3254	731	0.0802	780	0.0204
585	0.7238	634	0.8843	683	0.3181	732	0.0779		
586	0.7394	635	0.8731	684	0.3103	733	0.076		
587	0.7517	636	0.8665	685	0.3032	734	0.0732		
588	0.7663	637	0.8569	686	0.296	735	0.0709		
589	0.7832	638	0.8439	687	0.2871	736	0.0693		
590	0.7861	639	0.8336	688	0.279	737	0.0672		
591	0.7988	640	0.8218	689	0.2716	738	0.0648		
592	0.8186	641	0.8132	690	0.2632	739	0.0633		
593	0.8271	642	0.7906	691	0.2583	740	0.0606		
594	0.8423	643	0.786	692	0.2515	741	0.0593		
595	0.8564	644	0.773	693	0.2445	742	0.058		
596	0.868	645	0.7638	694	0.2365	743	0.056		
597	0.8749	646	0.7528	695	0.2312	744	0.0539		
598	0.8927	647	0.7379	696	0.2243	745	0.0529		

6. Goniophotometer Test results (Mode: 2700K)

6.1 Test Data

Test Ambient Temperature	25.1℃	Test orientation	Downward
Operate time(Min.)	90	stabilization time(Min.)	30

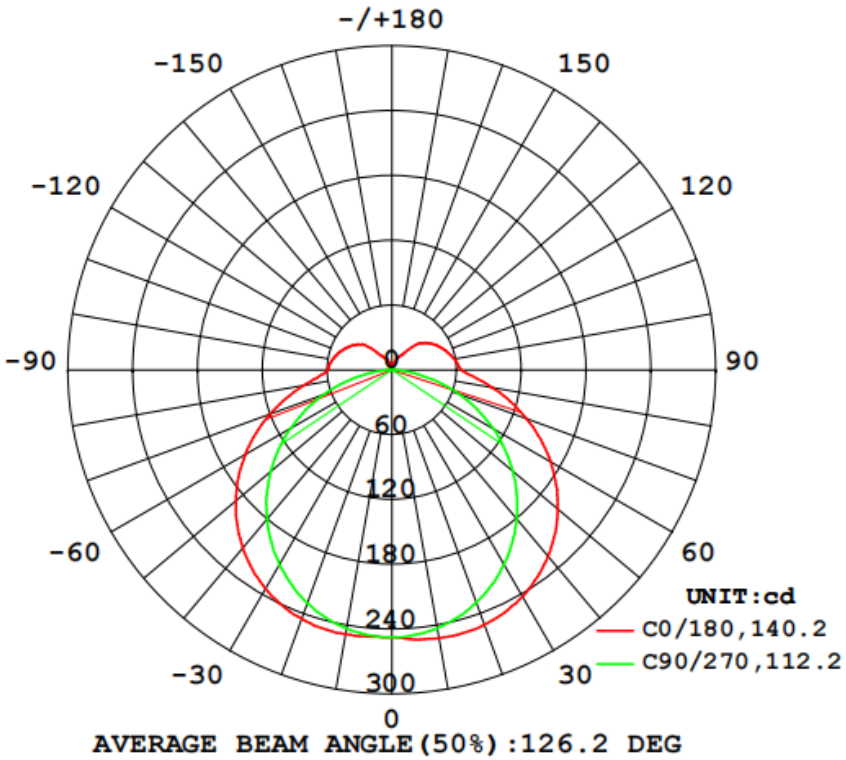
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120.2	60	0.1495	0.9792	17.59

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax(cd)	Spacing Criteria (C0/180°)	Spacing Criteria (C90/270°)
1027.5	58.42	252.7	1.41	1.25

6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	ŋlum,lamp
10	252.2	248.2	242.8	246.0	248.4	245.3	243.1	249.1	0- 10	23.62	23.62	2.3,2.3
20	251.0	242.5	229.2	239.3	245.3	238.4	229.8	244.1	10- 20	69.11	92.73	9.03,9.03
30	242.4	229.8	207.8	224.7	234.4	223.8	208.5	231.4	20- 30	107.9	200.6	19.5,19.5
40	225.2	209.4	180.1	202.8	214.9	201.9	180.3	211.5	30- 40	134.9	335.5	32.7,32.7
50	200.6	182.2	146.3	174.7	189.0	173.6	146.8	184.2	40- 50	146.8	482.3	46.9,46.9
60	169.9	148.8	108.1	140.7	157.1	139.3	108.6	150.9	50- 60	142.1	624.4	60.8,60.8
70	132.9	110.6	66.49	102.1	120.5	101.0	67.51	112.3	60- 70	121.0	745.4	72.5,72.5
80	94.32	70.57	24.77	63.70	82.87	62.08	25.64	72.61	70- 80	87.19	832.6	81,81
90	64.27	42.06	0.0149	40.75	60.09	38.63	0	43.64	80- 90	51.72	884.3	86.1,86.1
100	58.73	38.56	0	38.18	55.96	35.89	0	39.53	90-100	38.75	923.1	89.8,89.8
110	53.05	34.90	0	34.61	50.98	32.33	0	35.33	100-110	34.31	957.4	93.2,93.2
120	46.80	30.42	0	30.04	44.39	28.03	0	30.74	110-120	27.79	985.2	95.9,95.9
130	39.26	20.92	0	18.70	37.03	15.60	0	21.84	120-130	20.59	1006	97.9,97.9
140	25.76	13.34	0	12.36	20.55	11.69	0.0924	11.90	130-140	12.27	1018	99.1,99.1
150	15.08	8.047	0	8.330	13.13	8.217	0.1848	7.402	140-150	5.966	1024	99.7,99.7
160	8.737	4.750	0.1848	3.853	6.429	4.829	0.5515	1.828	150-160	2.682	1027	99.9,99.9
170	2.855	1.282	0.3695	1.009	1.746	1.265	0.6467	0.3661	160-170	0.7285	1027	100,100
180	0.1846	0.3653	0.4619	0.5474	0.1838	0.4567	0.6467	0.3633	170-180	0.0623	1027	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	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247			
5	251	250	248	247	246	246	247	247	248	247	247	246	246	247	249	250			
10	252	251	248	245	243	244	246	248	248	248	245	243	243	246	249	251			
15	253	251	246	241	237	239	244	246	248	246	243	239	237	242	247	251			
20	251	249	243	236	229	233	239	243	245	243	238	232	230	237	244	249			
25	248	245	237	227	219	225	233	238	241	238	232	224	220	229	239	246			
30	242	239	230	217	208	215	225	231	234	231	224	214	209	219	231	240			
35	234	231	220	206	195	204	215	222	226	222	214	203	195	208	222	232			
40	225	221	209	193	180	191	203	211	215	211	202	189	180	195	211	222			
45	214	209	197	178	164	176	190	198	203	199	189	174	164	181	199	210			
50	201	196	182	162	146	160	175	184	189	184	174	158	147	165	184	197			
55	186	181	167	145	128	143	158	169	174	169	157	141	128	148	168	181			
60	170	164	149	127	108	124	141	152	157	152	139	122	109	130	151	165			
65	152	146	130	108	87.5	105	122	134	139	134	120	102	88.4	110	132	147			
70	133	127	111	87.2	66.5	84.2	102	115	120	115	101	82.0	67.5	89.7	112	128			
75	114	107	90.4	66.2	45.3	63.3	82.6	95.5	101	95.4	81.4	61.1	46.4	68.9	92.4	108			
80	94.3	87.9	70.6	46.2	24.8	43.7	63.7	77.3	82.9	76.6	62.1	41.6	25.6	48.8	72.6	89.1			
85	76.4	69.9	53.1	28.9	7.90	27.6	47.8	61.5	67.1	61.2	46.2	25.0	8.02	31.4	55.0	71.3			
90	64.3	58.2	42.1	19.3	0.01	20.1	40.7	55.0	60.1	54.0	38.6	17.1	0.00	21.0	43.6	58.8			
95	61.3	55.5	40.4	18.2	0.00	19.2	39.6	53.2	58.3	52.0	37.4	16.3	0.00	19.5	41.1	56.0			
100	58.7	53.4	38.6	17.3	0.00	18.4	38.2	51.5	56.0	50.1	35.9	15.0	0.00	18.4	39.5	53.5			
105	55.9	51.0	36.8	16.3	0.00	17.3	36.4	49.3	53.4	48.3	34.6	14.4	0.00	17.3	37.3	50.7			
110	53.0	48.5	34.9	15.3	0.00	15.6	34.6	46.8	51.0	45.7	32.3	11.7	0.00	16.3	35.3	48.1			
115	49.8	45.4	32.8	11.1	0.00	11.1	32.4	44.2	48.0	42.9	30.7	7.42	0.00	13.1	33.1	45.2			
120	46.8	42.4	30.4	8.71	0.00	8.81	30.0	41.2	44.4	39.9	28.0	6.23	0.00	8.43	30.7	41.9			
125	43.2	39.0	27.5	7.70	0.00	7.90	25.4	37.8	40.9	36.6	22.3	5.87	0.00	7.43	28.1	38.4			
130	39.3	35.7	20.9	6.70	0.00	6.89	18.7	33.8	37.0	32.4	15.6	4.77	0.00	6.70	21.8	35.3			
135	34.7	29.2	15.4	5.96	0.00	6.06	14.5	25.5	29.6	23.8	13.0	4.49	0.00	5.87	14.6	28.8			
140	25.8	21.1	13.3	5.04	0.00	4.87	12.4	17.8	20.5	16.4	11.7	3.94	0.09	4.50	11.9	20.5			
145	18.1	16.3	11.3	4.04	0.00	3.68	10.3	14.9	15.7	14.4	9.77	3.11	0.09	3.03	9.78	15.1			
150	15.1	13.6	8.05	3.21	0.00	2.48	8.33	12.2	13.1	11.9	8.22	2.93	0.18	1.38	7.40	10.5			
155	11.9	10.6	6.22	2.48	0.00	2.11	6.04	9.57	10.1	9.17	6.57	3.02	0.46	0.28	4.48	8.27			
160	8.74	7.81	4.75	1.56	0.18	1.19	3.85	6.54	6.43	6.14	4.83	2.02	0.55	0.09	1.83	5.14			
165	5.53	5.05	3.11	1.01	0.37	0.74	2.48	4.05	4.21	3.76	2.92	1.56	0.74	0.28	0.37	2.47			
170	2.86	2.30	1.28	0.74	0.37	0.46	1.01	1.93	1.75	1.56	1.27	0.28	0.65	0.46	0.37	0.46			
175	0.74	0.65	0.64	0.64	0.46	0.46	0.28	0.46	0.18	0.28	0.46	0.28	0.65	0.46	0.37	0.46			
180	0.18	0.73	0.37	0.64	0.46	0.37	0.55	0.73	0.18	0.37	0.46	0.37	0.65	0.46	0.36	0.28			

7. Photo of sample

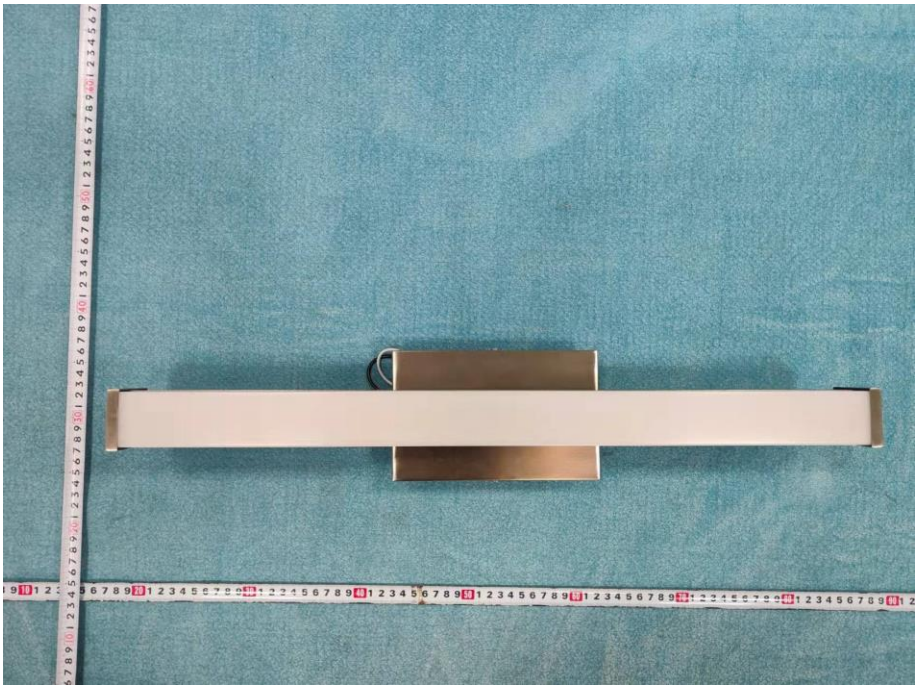


Figure 1 Overview

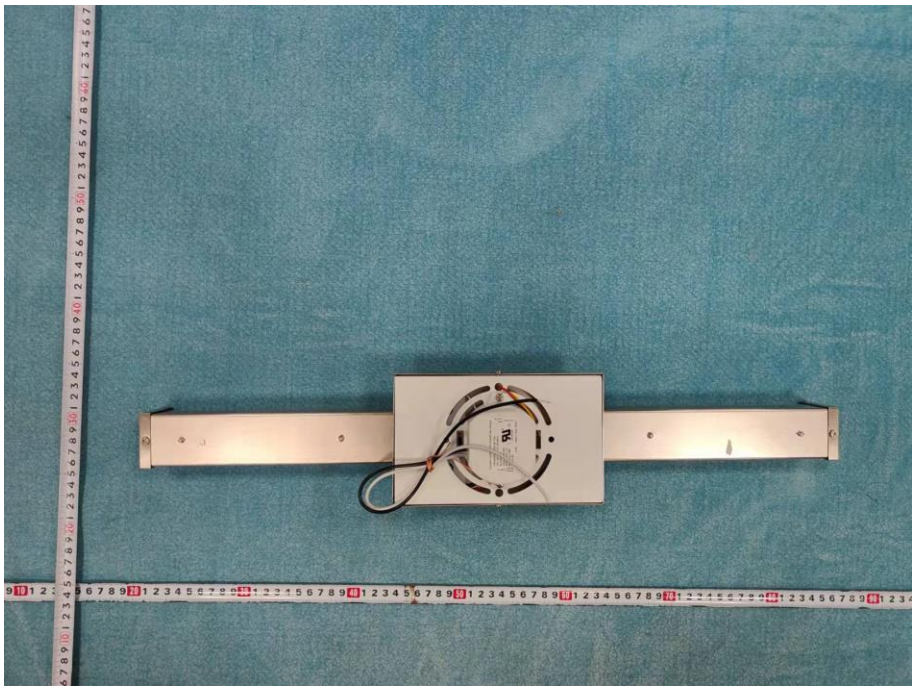


Figure 2 Overview

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