

Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23040544L00301

Client..... : ROYALUX EXPORTS

Address..... : 150-B, NOIDA SPECIAL ECONOMIC ZONE, NOIDA, GAUTAM BUDDHA
NAGAR, UTTAR PRADESH, 201305, INDIA

Test Model..... : 5804AP15WB1358F, 5804AP15WB1658F

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

Date of receipt..... : Apr. 20, 2023

Date of test : May 27, 2023 – May 29, 2023

Date of report..... : June 08, 2023

Tested by:



Jarvis Zhang/ 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 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)

Representative (Tested) Model:	5804AP15WB1358F, 5804AP15WB1658F
Model No.:	5804AP15WB1358F, 5804AP15WB1408F, 5804AP15WB1508F, 5804AP15WB1658F (The models are same except CCT.)
Manufacturer:	ROYALUX EXPORTS PRIVATE LIMITED
Product Type:	Internal Driver/Line Voltage (UL Type B) Lamps
Rated Voltage/Frequency:	120-277V AC, 50/60Hz
Rated Power:	15W
Rated luminous flux:	2250lm
Nominal CCT:	3500K/ 4000K/ 5000K/ 6500K
LED Manufacturer:	Bridgelux Inc.
LED Model No.:	BXEN-35E-11M-3CA, BXEN-65E-11M-3CA

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)
- ANSI C82.77-10:2014 Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment-Solid State

3. Test equipment list

Test Equipment	Serial No.	Model No.	Calibration due date
Full-field Speed Goniophotometer	MD-E028	GO-R5000	2023/09/17
Digital Power Meter	MD-E001	PF2010	2023/09/17
AC Testing Power Source	MD-E002	DPS1060	2023/09/17
Total Spectral Radiant Flux Standard Lamp	MD-E007	D908S	2023/10/13
Integrating Sphere System	MD-E029	2M	2023/09/17
High Accuracy Array Spectroradiometer	MD-E011	HAAS-3000	2023/09/17
Digital Power Meter	MD-E008	PF310	2023/09/17
AC Testing Power Source	MD-E010	DPS1010	2023/09/17
Standard Lamp	MD-E036	D204	2023/10/13

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.

THD and PF Test

The sample was tested according to the ANSI C82.77-10:2014.

The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion were calculated from the digital power meter.

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.)	30

Optical and Electrical Measurement Result

Model	Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)	CCT (K)
5804AP15WB1358F	120.1	60	0.1194	13.86	0.9671	2110	152.2	3520
5804AP15WB1658F	120.07	60	0.122	14.16	0.9662	2226.5	157.28	6473

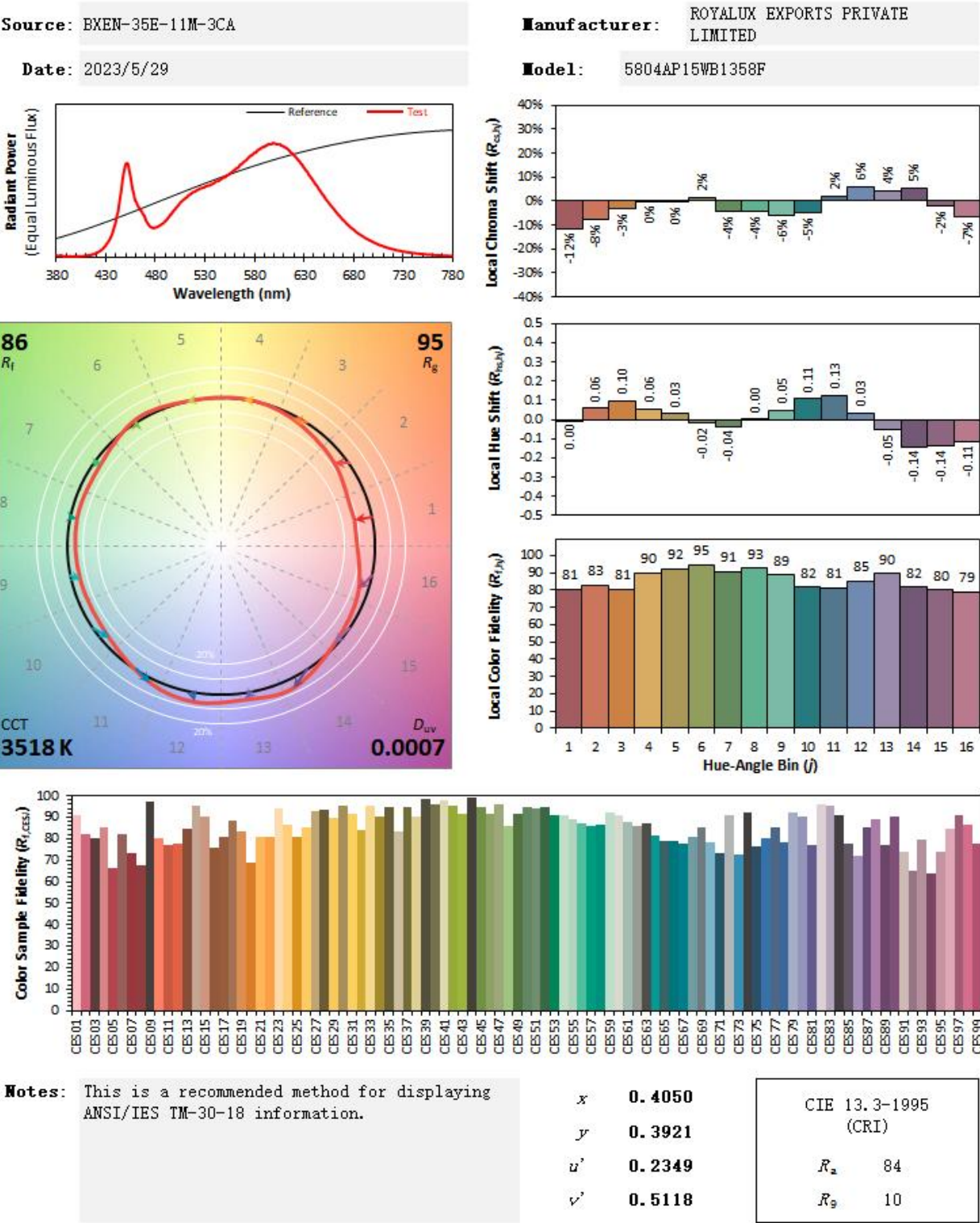
Model	Ra	R9	Rf	Rg	x	y	u'	v'	Duv
5804AP15WB1358F	84	10	86	95	0.405	0.3922	0.2349	0.5118	7.26E-04
5804AP15WB1658F	82.5	9	83	98	0.3131	0.3303	0.1976	0.4691	3.67E-03

5.2 Color Rendering Index for Model # 5804AP15WB1358F

Ra					
84					
R1	R2	R3	R4	R5	
82	91	97	83	83	
R6	R7	R8	R9	R10	
88	85	63	10	79	
R11	R12	R13	R14	R15	
82	68	85	99	75	

*5.3.1 ANSI/IES TM-30-18 Color Rendition Report for Model # 5804AP15WB1358F

ANSI/IES TM-30-18 Color Rendition Report



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

***5.3.2 ANSI/IES TM-30-18 Color Rendition Report for Model # 5804AP15WB1658F**

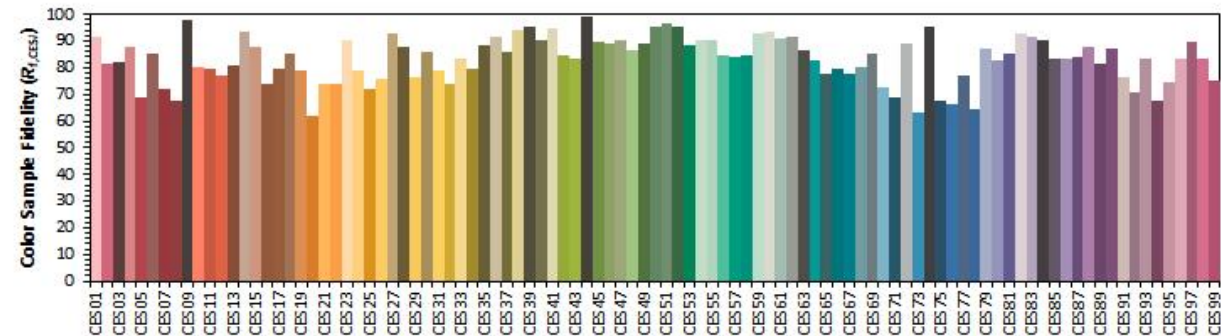
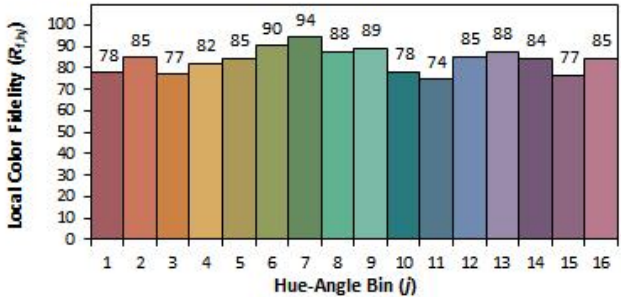
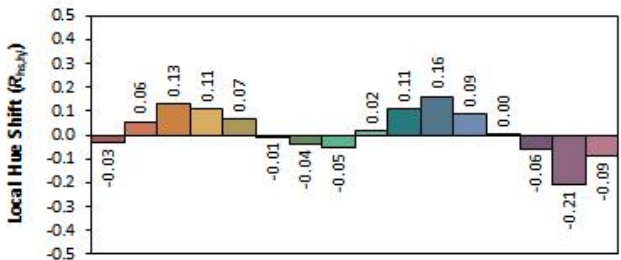
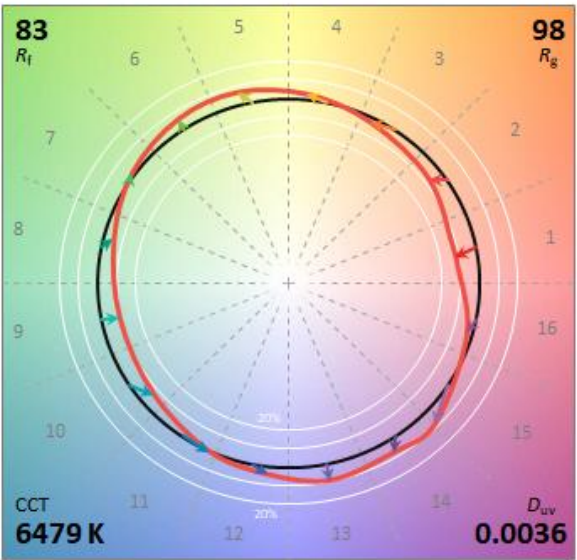
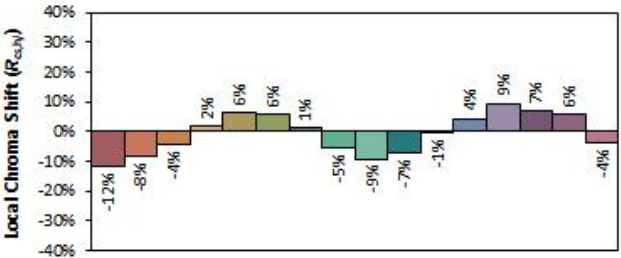
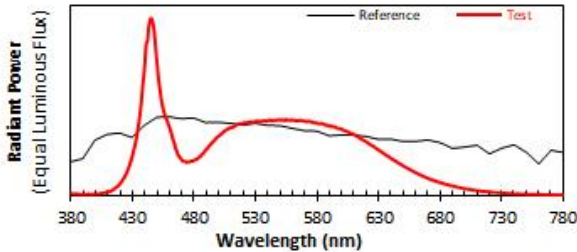
ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-65E-11M-3CA

Date: 2023/5/29

Manufacturer: ROYALUX EXPORTS PRIVATE LIMITED

Model: 5804AP15WB1658F



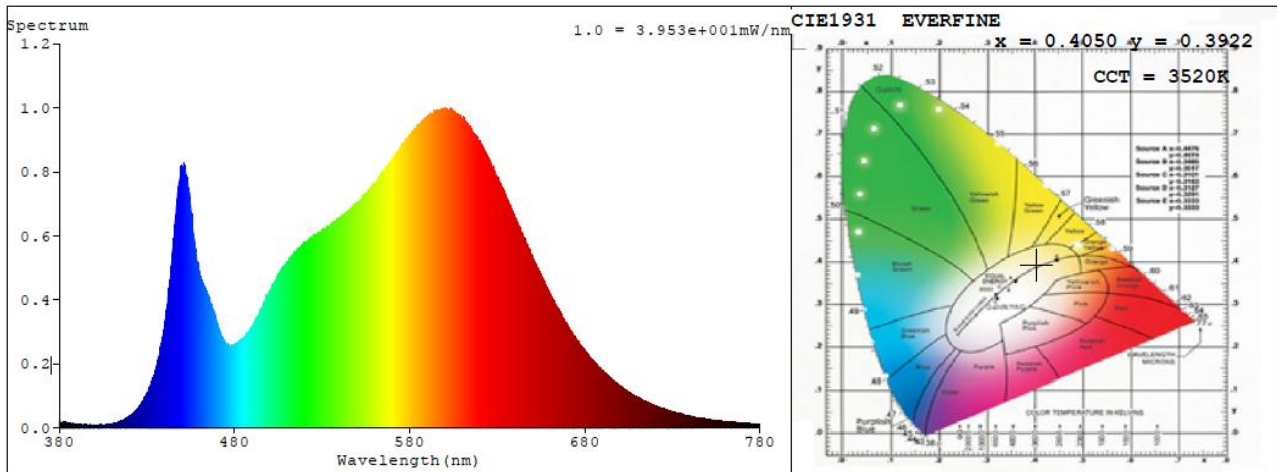
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x **0.3130**
 y **0.3301**
 u' **0.1976**
 v' **0.4690**

CIE 13.3-1995
(CRI)
 R_a 82
 R_g 9

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

5.4 Relative Spectral Power Distribution for Model # 5804AP15WB1358F



nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0177	414	0.0196	448	0.7433	482	0.267	516	0.5583
381	0.0106	415	0.0178	449	0.7812	483	0.2688	517	0.5614
382	0.0118	416	0.0225	450	0.8172	484	0.2761	518	0.5698
383	0.0103	417	0.0246	451	0.8193	485	0.2811	519	0.5716
384	0.0186	418	0.0283	452	0.8196	486	0.2867	520	0.5732
385	0.0125	419	0.0335	453	0.7818	487	0.2941	521	0.5809
386	0.0125	420	0.0359	454	0.7384	488	0.2971	522	0.5878
387	0.0072	421	0.0405	455	0.694	489	0.3061	523	0.5899
388	0.0037	422	0.0444	456	0.6342	490	0.3176	524	0.5923
389	0.0103	423	0.0494	457	0.588	491	0.3227	525	0.6017
390	0.0118	424	0.0542	458	0.5568	492	0.3367	526	0.6033
391	0.0083	425	0.0613	459	0.5122	493	0.3471	527	0.6032
392	0.0053	426	0.0676	460	0.4895	494	0.3545	528	0.6103
393	0.0088	427	0.0759	461	0.4748	495	0.3718	529	0.6075
394	0.0083	428	0.0862	462	0.4538	496	0.3744	530	0.6162
395	0.0053	429	0.0934	463	0.4373	497	0.3931	531	0.6201
396	0.0059	430	0.1075	464	0.4279	498	0.3997	532	0.6234
397	0.0076	431	0.1207	465	0.41	499	0.4131	533	0.6261
398	0.0071	432	0.1312	466	0.4028	500	0.4209	534	0.6253
399	0.0074	433	0.1463	467	0.3802	501	0.4336	535	0.6289
400	0.006	434	0.1592	468	0.3699	502	0.4423	536	0.637
401	0.0081	435	0.1799	469	0.3559	503	0.452	537	0.6386
402	0.0076	436	0.1986	470	0.3296	504	0.4655	538	0.642
403	0.0087	437	0.2227	471	0.3118	505	0.4759	539	0.6454
404	0.0081	438	0.2562	472	0.2973	506	0.4849	540	0.6547
405	0.0087	439	0.2811	473	0.2866	507	0.4925	541	0.6622
406	0.0094	440	0.3128	474	0.2722	508	0.5001	542	0.6642
407	0.0104	441	0.3675	475	0.2646	509	0.5073	543	0.6638
408	0.0102	442	0.3898	476	0.2622	510	0.5144	544	0.6666
409	0.0122	443	0.4479	477	0.2572	511	0.5199	545	0.6752
410	0.0128	444	0.5055	478	0.2546	512	0.525	546	0.6788
411	0.0135	445	0.5643	479	0.2573	513	0.5397	547	0.6868
412	0.0159	446	0.6231	480	0.259	514	0.544	548	0.6934
413	0.0163	447	0.6925	481	0.2608	515	0.5463	549	0.6983

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.6972	599	0.9981	648	0.5605	697	0.1469	746	0.0313
551	0.7046	600	0.9952	649	0.547	698	0.1407	747	0.0299
552	0.7146	601	0.9943	650	0.5406	699	0.1381	748	0.029
553	0.7187	602	0.9881	651	0.524	700	0.1315	749	0.0285
554	0.7206	603	0.9879	652	0.5093	701	0.1292	750	0.0275
555	0.7325	604	0.9866	653	0.5005	702	0.1231	751	0.0265
556	0.7339	605	0.9866	654	0.4887	703	0.1203	752	0.0256
557	0.743	606	0.9875	655	0.4785	704	0.1163	753	0.0254
558	0.7511	607	0.9751	656	0.4658	705	0.1126	754	0.0246
559	0.7574	608	0.9754	657	0.454	706	0.1085	755	0.0232
560	0.7617	609	0.9701	658	0.4443	707	0.1049	756	0.0226
561	0.7708	610	0.9645	659	0.4337	708	0.1029	757	0.0218
562	0.7806	611	0.9629	660	0.4244	709	0.0996	758	0.0221
563	0.7789	612	0.9552	661	0.4134	710	0.0963	759	0.0209
564	0.788	613	0.9503	662	0.4004	711	0.0919	760	0.0208
565	0.8019	614	0.9427	663	0.3918	712	0.0908	761	0.0197
566	0.811	615	0.9353	664	0.379	713	0.087	762	0.0194
567	0.8138	616	0.9233	665	0.3701	714	0.0846	763	0.0187
568	0.822	617	0.9142	666	0.3613	715	0.0814	764	0.0176
569	0.8316	618	0.9112	667	0.3502	716	0.0791	765	0.0182
570	0.8378	619	0.899	668	0.3415	717	0.076	766	0.0177
571	0.8436	620	0.8923	669	0.3289	718	0.0748	767	0.017
572	0.8517	621	0.8824	670	0.3246	719	0.0728	768	0.0167
573	0.8599	622	0.8729	671	0.3137	720	0.0693	769	0.0159
574	0.8707	623	0.8637	672	0.3055	721	0.068	770	0.0157
575	0.8784	624	0.8528	673	0.2956	722	0.0657	771	0.0147
576	0.8889	625	0.8425	674	0.2872	723	0.0628	772	0.0148
577	0.8873	626	0.8361	675	0.2798	724	0.0604	773	0.0139
578	0.8959	627	0.8172	676	0.2699	725	0.0598	774	0.0143
579	0.9035	628	0.8129	677	0.2629	726	0.0583	775	0.0135
580	0.9154	629	0.796	678	0.2569	727	0.0559	776	0.0124
581	0.9148	630	0.7819	679	0.2477	728	0.0551	777	0.0131
582	0.9172	631	0.7749	680	0.2452	729	0.0516	778	0.0119
583	0.9358	632	0.7584	681	0.2364	730	0.0509	779	0.0124
584	0.9362	633	0.7511	682	0.2279	731	0.0492	780	0.0124
585	0.9437	634	0.7402	683	0.2204	732	0.0481		
586	0.9485	635	0.7204	684	0.2143	733	0.0454		
587	0.9554	636	0.7116	685	0.207	734	0.0442		
588	0.9593	637	0.697	686	0.2015	735	0.0433		
589	0.9661	638	0.6887	687	0.1978	736	0.0426		
590	0.9636	639	0.6726	688	0.1898	737	0.0398		
591	0.9746	640	0.6619	689	0.1862	738	0.0396		
592	0.973	641	0.6477	690	0.1805	739	0.0377		
593	0.9822	642	0.6334	691	0.1741	740	0.0372		
594	0.988	643	0.628	692	0.168	741	0.0355		
595	0.9901	644	0.6115	693	0.1649	742	0.035		
596	0.9875	645	0.5961	694	0.1592	743	0.0338		
597	0.9869	646	0.5865	695	0.156	744	0.0323		
598	0.9934	647	0.572	696	0.1489	745	0.0311		

6. Goniophotometer Test results for Model # 5804AP15WB1358F

6.1 Test Data

Test Ambient Temperature	25.2°C	Test orientation	Downward
Operate time(Min.)	90	stabilization time(Min.)	30

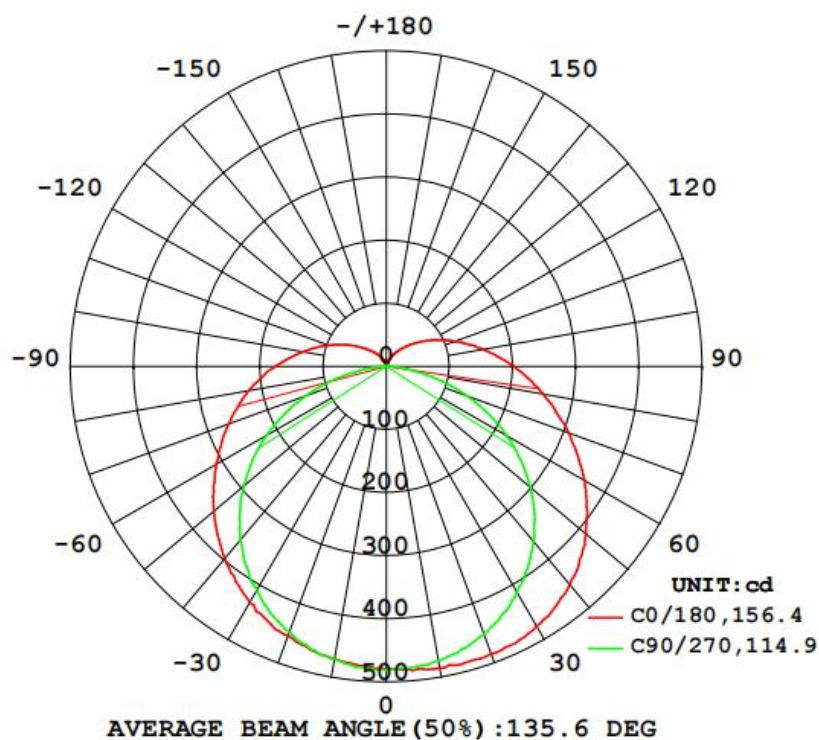
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120	60	0.1198	0.9651	13.87

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Spacing Criteria (C0/180°)	Spacing Criteria (C90/270°)	Beam Angle
2112.99	152.3	1.34	1.27	135.6°

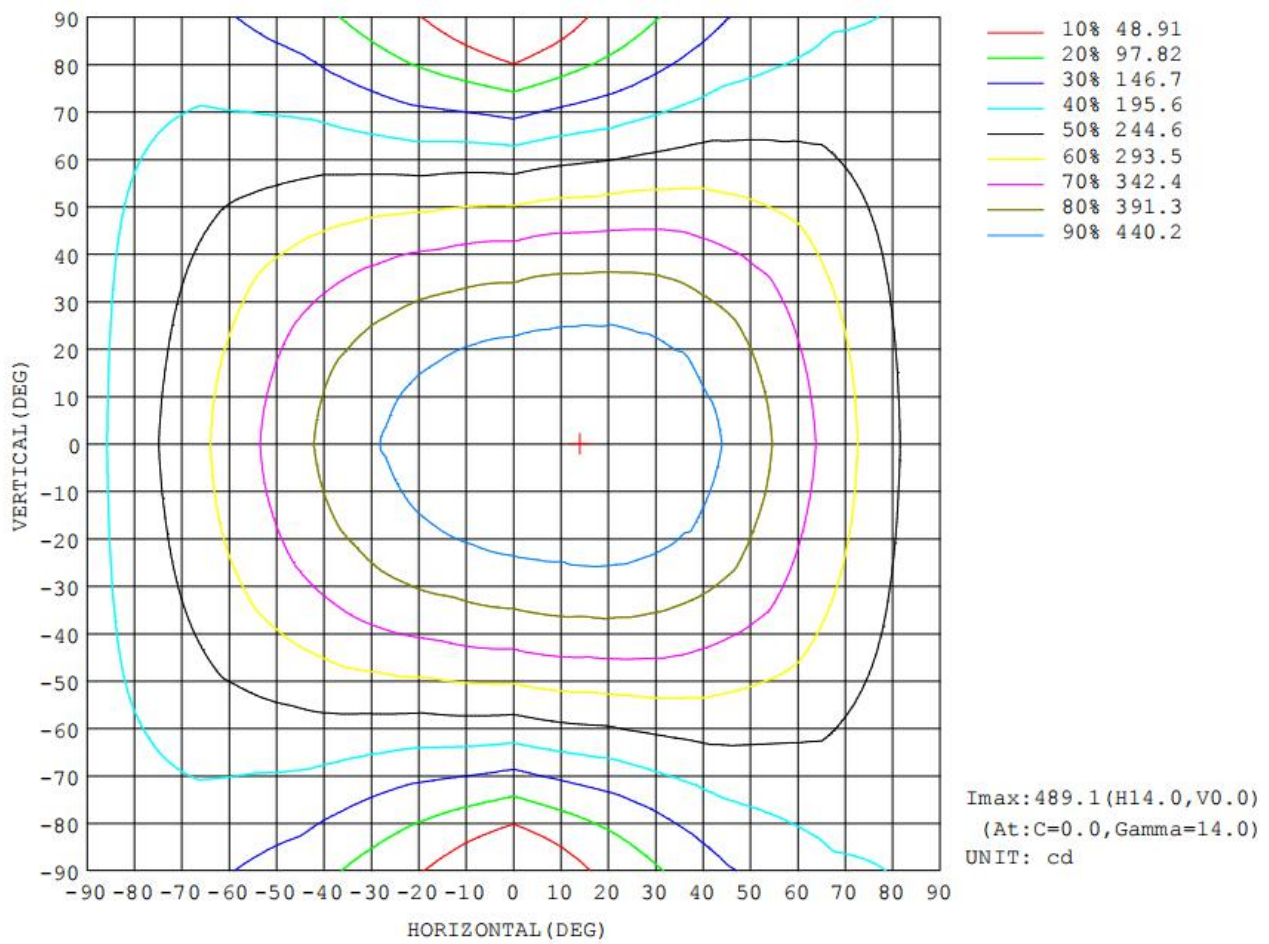
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum, lamp
10	485.6	480.3	473.5	472.3	470.2	470.3	471.2	480.7	0- 10	45.65	45.65	2.16,2.16
20	485.2	472.2	451.0	451.9	454.3	450.7	448.5	473.2	10- 20	132.8	178.5	8.45,8.45
30	475.2	451.5	413.7	423.3	432.2	418.4	409.8	449.5	20- 30	207.3	385.8	18.3,18.3
40	451.6	416.6	362.4	379.7	397.5	376.4	359.6	416.1	30- 40	260.7	646.5	30.6,30.6
50	412.7	367.7	298.0	330.3	356.7	326.1	295.1	368.5	40- 50	286.5	932.9	44.2,44.2
60	362.2	309.6	220.4	273.6	310.8	273.1	218.8	310.1	50- 60	282.3	1215	57.5,57.5
70	307.1	247.7	135.1	219.4	265.5	217.7	134.3	250.8	60- 70	251.8	1467	69.4,69.4
80	252.2	190.6	50.35	169.5	220.8	168.3	49.76	193.9	70- 80	204.0	1671	79.1,79.1
90	202.6	142.5	0.2674	123.1	175.5	121.9	0.4743	145.6	80- 90	151.9	1823	86.3,86.3
100	156.4	101.7	0.2184	85.10	134.5	83.59	0.2955	104.1	90-100	108.3	1931	91.4,91.4
110	116.8	69.38	0.2877	56.50	98.68	54.88	0.3312	70.91	100-110	74.20	2005	94.9,94.9
120	83.77	46.02	0.3748	36.15	68.14	33.68	0.3774	47.29	110-120	48.16	2054	97.2,97.2
130	56.56	30.19	0.4842	24.17	44.09	23.10	0.4767	30.86	120-130	29.27	2083	98.6,98.6
140	35.76	19.20	0.5444	15.82	29.01	16.17	0.6337	19.09	130-140	16.66	2100	99.4,99.4
150	20.62	11.41	0.5790	9.444	17.90	11.06	0.8729	8.894	140-150	8.589	2108	99.8,99.8
160	10.25	5.692	0.6704	5.348	8.841	6.893	1.359	3.581	150-160	3.607	2112	99.9,99.9
170	3.998	2.285	0.7840	2.165	3.716	3.174	1.100	1.642	160-170	1.096	2113	100,100
180	0.8320	0.8929	0.8743	0.9054	0.8784	0.9308	0.8761	0.8785	170-180	0.1560	2113	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

6.4 Isocandela Diagram



6.5 Luminous Distribution Intensity 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	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481			
5	483	481	481	480	479	480	477	477	476	477	476	478	478	483	484	481			
10	486	485	480	478	474	472	472	473	470	469	470	470	471	477	481	486			
15	486	484	478	470	463	462	464	464	465	461	462	462	463	470	478	485			
20	485	480	472	459	451	451	452	454	454	453	451	447	448	459	473	481			
25	484	477	463	445	434	433	438	443	445	440	436	431	432	445	460	476			
30	475	468	452	429	414	414	423	429	432	427	418	411	410	428	450	469			
35	466	457	435	407	390	390	402	412	416	410	399	387	387	408	434	458			
40	452	440	417	384	362	365	380	393	398	391	376	362	360	383	416	445			
45	433	423	392	356	332	336	356	373	378	370	353	334	329	355	394	424			
50	413	401	368	325	298	305	330	350	357	347	326	302	295	324	368	402			
55	387	374	338	292	261	273	302	326	334	324	298	269	259	292	341	378			
60	362	348	310	256	220	237	274	301	311	300	273	235	219	257	310	350			
65	334	320	278	219	178	202	246	277	288	276	245	199	178	221	280	323			
70	307	291	248	182	135	167	219	254	266	253	218	165	134	184	251	294			
75	278	263	218	147	92.0	135	194	231	243	229	192	133	90.9	150	221	268			
80	252	236	191	116	50.3	107	170	208	221	206	168	104	49.8	118	194	240			
85	227	211	166	89.7	16.4	80.7	146	185	198	185	144	78.4	16.6	92.1	169	214			
90	203	187	142	67.7	0.27	58.4	123	162	175	162	122	56.2	0.47	70.3	146	191			
95	178	164	120	50.1	0.26	41.6	103	141	155	141	102	39.8	0.38	52.5	124	168			
100	156	143	102	36.8	0.22	29.9	85.1	121	134	121	83.6	28.3	0.30	38.8	104	146			
105	135	122	84.3	27.6	0.25	22.0	69.7	104	116	103	68.3	19.6	0.32	29.3	86.2	125			
110	117	105	69.4	21.2	0.29	17.0	56.5	87.5	98.7	86.6	54.9	14.8	0.33	22.5	70.9	107			
115	99.7	88.3	56.7	16.9	0.33	13.7	45.3	72.9	83.0	71.9	42.8	12.3	0.35	17.8	58.2	90.0			
120	83.8	73.8	46.0	13.7	0.37	11.4	36.2	59.1	68.1	58.0	33.7	10.6	0.38	14.4	47.3	75.1			
125	69.4	60.8	37.4	11.4	0.43	9.50	29.7	47.8	55.0	46.3	27.4	8.88	0.42	11.8	38.4	61.7			
130	56.6	49.4	30.2	9.50	0.48	7.96	24.2	38.9	44.1	37.4	23.1	7.37	0.48	8.90	30.9	50.2			
135	45.3	39.3	24.1	7.88	0.52	6.57	19.7	31.6	36.0	30.6	19.5	5.98	0.55	7.59	24.5	40.0			
140	35.8	31.0	19.2	6.63	0.54	5.54	15.8	25.3	29.0	25.3	16.2	5.28	0.63	6.27	19.1	31.5			
145	27.5	23.9	14.7	5.50	0.55	4.72	12.5	20.0	23.4	20.7	13.5	5.17	0.73	4.68	13.8	23.8			
150	20.6	17.9	11.4	4.42	0.58	3.89	9.44	15.2	17.9	16.4	11.1	5.04	0.87	3.19	8.89	17.0			
155	14.6	13.0	8.16	3.33	0.63	3.10	7.05	11.0	13.1	12.4	8.70	4.83	1.17	2.05	6.16	11.6			
160	10.2	9.18	5.69	2.49	0.67	2.33	5.35	7.60	8.84	8.63	6.89	4.41	1.36	1.26	3.58	6.78			
165	6.71	6.00	3.55	1.88	0.72	1.57	3.63	5.31	5.87	5.73	5.00	3.40	1.29	0.90	2.44	4.09			
170	4.00	3.14	2.29	1.44	0.78	1.03	2.16	3.13	3.72	3.72	3.17	2.18	1.10	0.92	1.64	2.53			
175	1.95	1.55	1.40	0.99	0.84	0.85	1.07	1.42	1.75	1.76	1.52	1.15	0.91	0.90	1.07	1.50			
180	0.83	0.89	0.89	0.88	0.87	0.88	0.91	0.92	0.88	0.88	0.93	0.90	0.88	0.87	0.88	0.90			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
5804AP15WB1358F	120.0	60	0.966	24.8
	277.0	60	0.976	9.8
5804AP15WB1658F	120.0	60	0.968	24.3
	277.0	60	0.976	9.6

8. Photo of sample

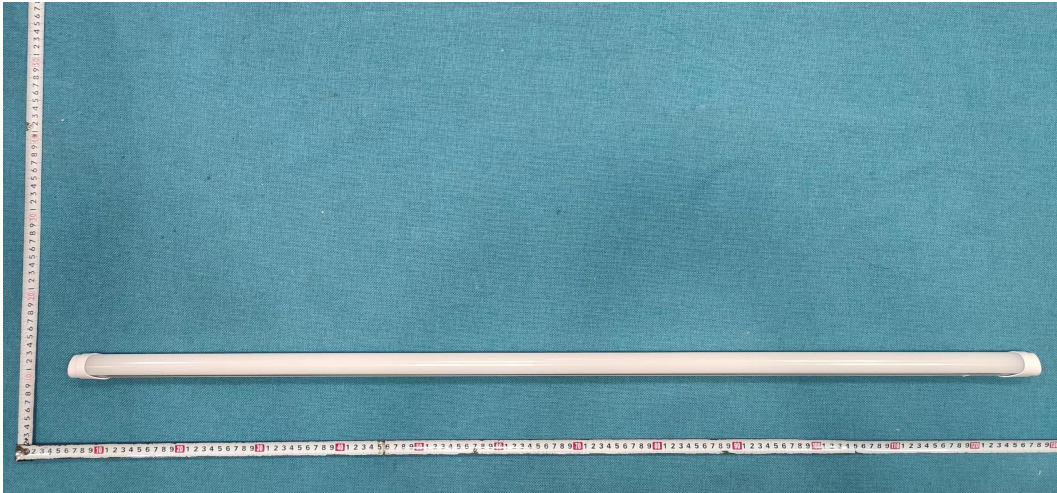


Figure 1

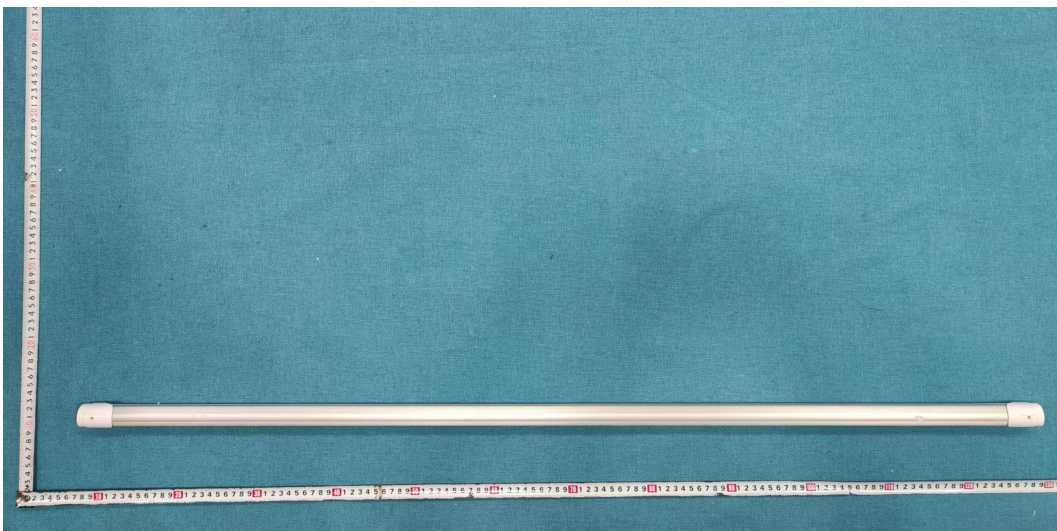


Figure 2

---End of Report---