TESTING
NVLAP LAB CODE:600177-0

Global Testing Group

Test Report Of ANSI/IES LM-79-19

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

Report Number.....	:	N02A23040544L00401
Client.....	:	ROYALUX EXPORTS
Address.....	:	150-B, NOIDA SPECIAL ECONOMIC ZONE, NOIDA, GAUTAM BUDDHA NAGAR, UTTAR PRADESH, 201305, INDIA
Test Model.....	:	5804AP18WB1358F, 5804AP18WB1658F
Brand Name.....	:	Rlux
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:	**Checked by:**	**Approved by:**
Jarvis Zhang	Sandy Chen	Jessie Li
Jarvis Zhang/ Test Engineer	Sandy Chen/ Project Engineer	Jessie Li/ Technical Manager

Guangdong Meide Testing Technology Co., Ltd. GTG 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.

1. Product Description for Equipment under Test(EUT)

Representative (Tested) Model:	5804AP18WB1358F, 5804AP18WB1658F
Model No.:	5804AP18WB1358F, 5804AP18WB1408F, 5804AP18WB1508F, 5804AP18WB1658F (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:	18W
Rated luminous flux:	2700lm
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 Spectroradio Meter	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°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.

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)
5804AP18WB1358F	120.09	60	0.1541	17.77	0.96	2682.1	150.95	3528
5804AP18WB1658F	120.04	60	0.1571	18.08	0.9588	2827.3	156.41	6506

Model	Ra	R9	Rf	Rg	x	y	u'	v'	Duv
5804AP18WB1358F	83.9	10	85	95	0.4044	0.3917	0.2347	0.5115	6.11E-04
5804AP18WB1658F	82.5	9	83	98	0.3126	0.3296	0.1976	0.4686	3.54E-03

5.2 Color Rendering Index for Model # 5804AP18WB1358F

Ra
83.9

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	84	99	75

***5.3.1 ANSI/IES TM-30-18 Color Rendition Report for Model # 5804AP18WB1358F**

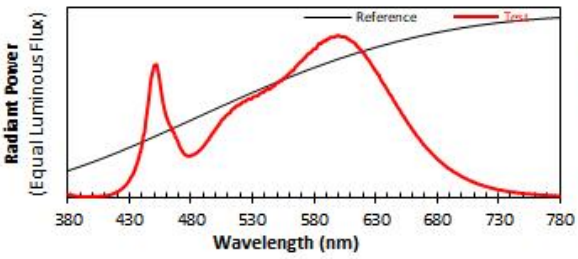
ANSI/IES TM-30-18 Color Rendition Report

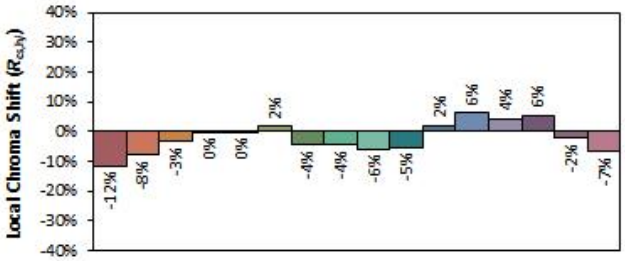
Source: BXEN-35E-11M-3CA

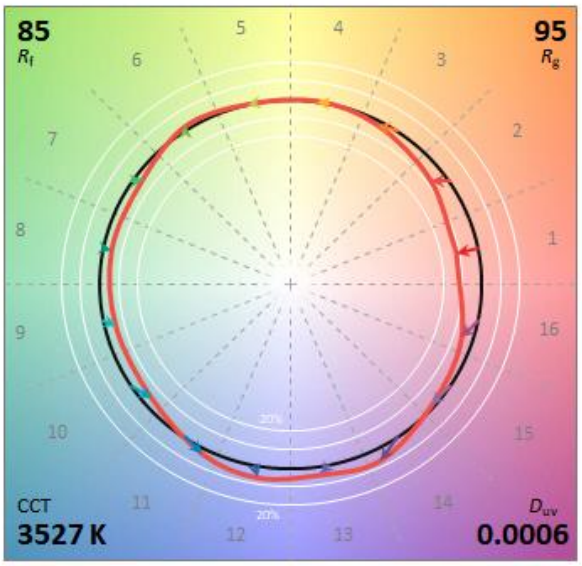
Manufacturer: ROYALUX EXPORTS PRIVATE LIMITED

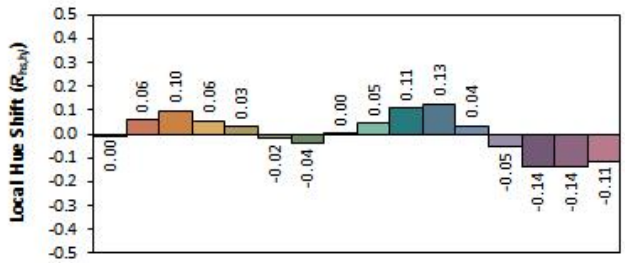
Date: 2023/5/29

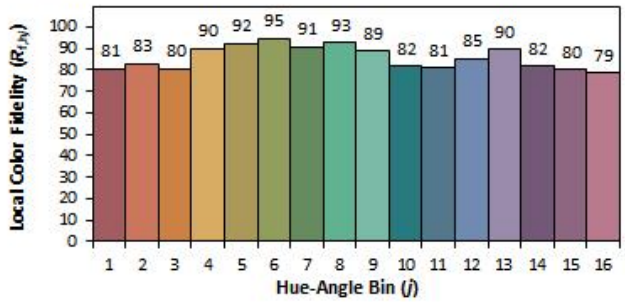
Model: 5804AP18WB1358F

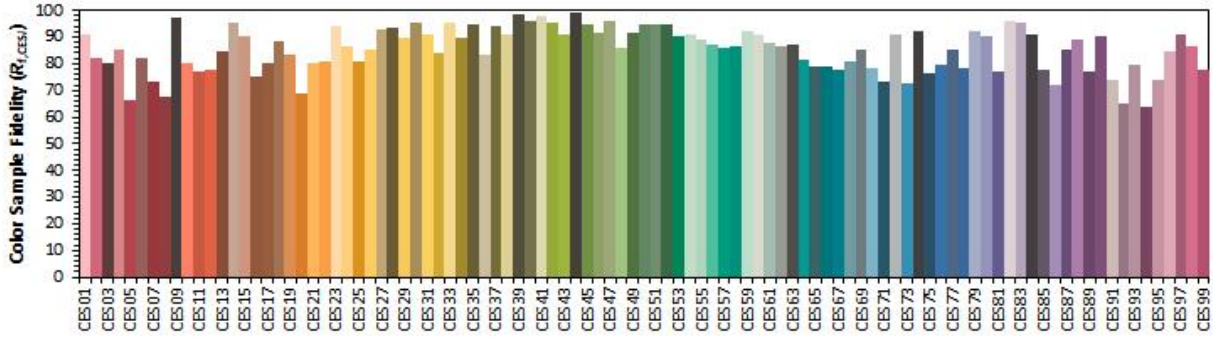












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4044
y	0.3915
u'	0.2348
v'	0.5115

CIE 13.3-1995 (CRI)

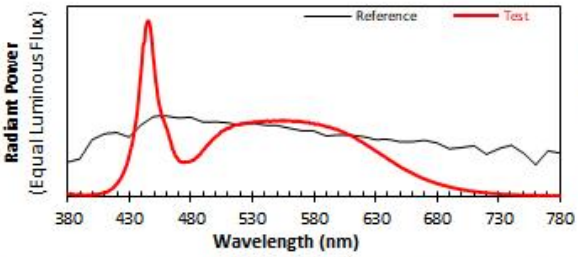
R_a	84
R_9	10

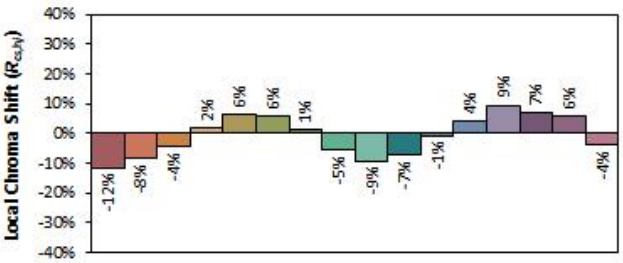
Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

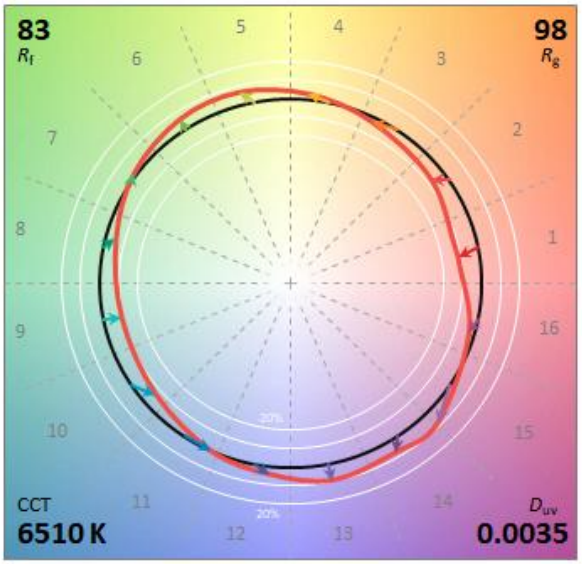
***5.3.2 ANSI/IES TM-30-18 Color Rendition Report for Model # 5804AP18WB1658F**

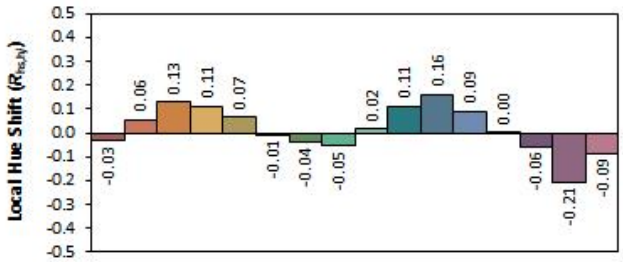
ANSI/IES TM-30-18 Color Rendition Report

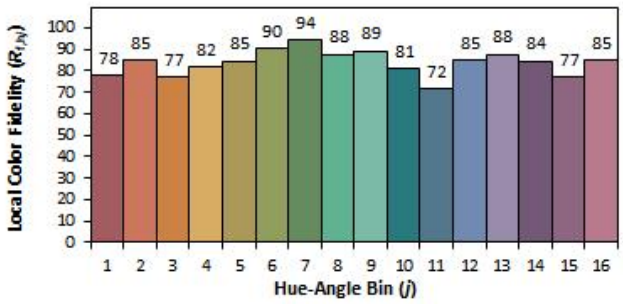
Source:	BXEN-65E-11M-3CA	**Manufacturer:**	ROYALUX EXPORTS PRIVATE LIMITED
Date:	2023/5/29	**Model:**	5804AP18WB1658F

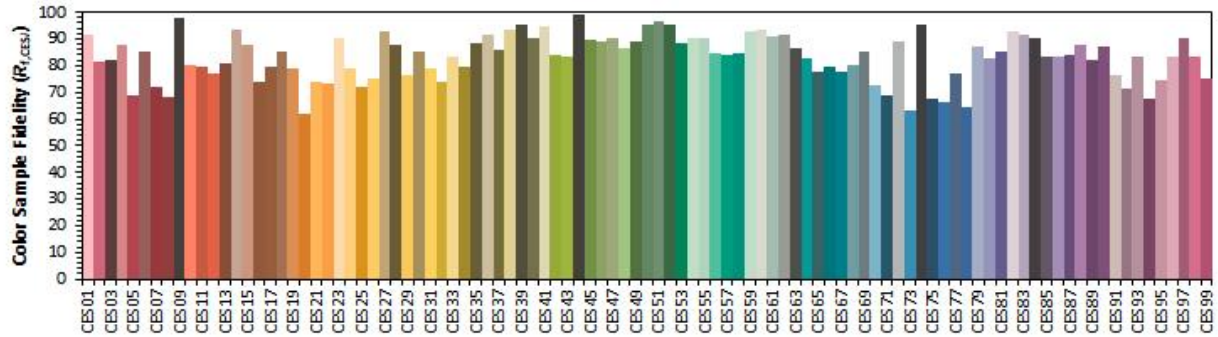












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

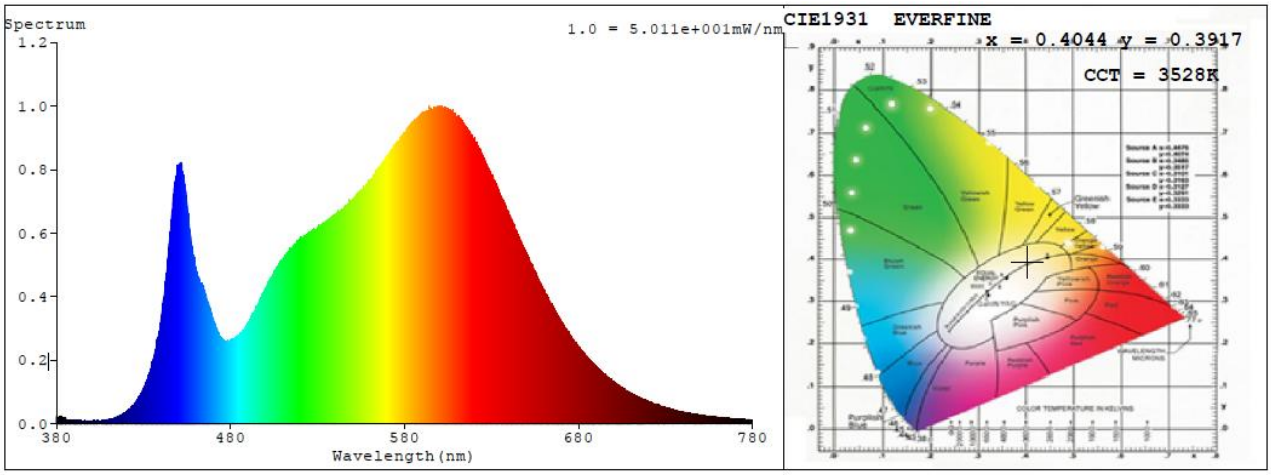
x	0.3125
y	0.3294
u'	0.1976
v'	0.4685

CIE 13.3-1995 (CRI)

R_a	82
R_9	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 # 5804AP18WB1358F



nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0191	414	0.0175	448	0.7531	482	0.2671	516	0.5602
381	0.0173	415	0.0206	449	0.7801	483	0.2682	517	0.5631
382	0.0236	416	0.0238	450	0.8149	484	0.2764	518	0.5722
383	0.0127	417	0.0269	451	0.815	485	0.2785	519	0.57
384	0.0118	418	0.0297	452	0.819	486	0.2863	520	0.5753
385	0.0145	419	0.0342	453	0.7822	487	0.2933	521	0.5811
386	0.0104	420	0.0384	454	0.7401	488	0.299	522	0.5905
387	0.009	421	0.0407	455	0.692	489	0.3084	523	0.5906
388	0.0101	422	0.047	456	0.6383	490	0.3176	524	0.5912
389	0.0108	423	0.0529	457	0.5912	491	0.326	525	0.6015
390	0.0062	424	0.0581	458	0.5544	492	0.3386	526	0.6026
391	0.0055	425	0.0646	459	0.5227	493	0.3483	527	0.6102
392	0.0075	426	0.072	460	0.4954	494	0.3555	528	0.6112
393	0.0066	427	0.0776	461	0.477	495	0.3705	529	0.6066
394	0.0082	428	0.0887	462	0.4567	496	0.3781	530	0.6157
395	0.0076	429	0.0985	463	0.4428	497	0.3927	531	0.6237
396	0.0061	430	0.1105	464	0.4315	498	0.4008	532	0.6248
397	0.0062	431	0.1264	465	0.4094	499	0.4138	533	0.6274
398	0.0082	432	0.1364	466	0.4033	500	0.4214	534	0.6255
399	0.0079	433	0.1514	467	0.3773	501	0.4351	535	0.6346
400	0.007	434	0.1657	468	0.3679	502	0.4436	536	0.6416
401	0.0101	435	0.1934	469	0.3517	503	0.4543	537	0.6445
402	0.0055	436	0.2099	470	0.3311	504	0.4665	538	0.6484
403	0.0092	437	0.2336	471	0.3113	505	0.479	539	0.6482
404	0.0083	438	0.2644	472	0.2972	506	0.4853	540	0.6586
405	0.0083	439	0.2897	473	0.2864	507	0.4914	541	0.6609
406	0.0093	440	0.3249	474	0.272	508	0.5007	542	0.67
407	0.0123	441	0.3777	475	0.2664	509	0.5091	543	0.6685
408	0.0098	442	0.3984	476	0.2623	510	0.5158	544	0.6668
409	0.0104	443	0.4628	477	0.2579	511	0.5206	545	0.6753
410	0.0126	444	0.5195	478	0.259	512	0.5247	546	0.6815
411	0.0138	445	0.5749	479	0.2553	513	0.5413	547	0.687
412	0.0149	446	0.636	480	0.2609	514	0.5483	548	0.6906
413	0.0161	447	0.7089	481	0.2626	515	0.549	549	0.7019

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.7062	599	0.998	648	0.5595	697	0.1472	746	0.0313
551	0.7081	600	0.9979	649	0.55	698	0.1405	747	0.0301
552	0.7187	601	0.9951	650	0.5384	699	0.1371	748	0.0293
553	0.7185	602	0.99	651	0.5242	700	0.1322	749	0.0285
554	0.7229	603	0.9899	652	0.5115	701	0.129	750	0.0276
555	0.737	604	0.9892	653	0.5034	702	0.1242	751	0.0274
556	0.7351	605	0.9922	654	0.4896	703	0.1204	752	0.0264
557	0.7447	606	0.9876	655	0.4779	704	0.1179	753	0.0253
558	0.7516	607	0.9815	656	0.4668	705	0.1148	754	0.0247
559	0.7594	608	0.973	657	0.4535	706	0.11	755	0.0234
560	0.7658	609	0.9732	658	0.444	707	0.1061	756	0.0236
561	0.7721	610	0.9656	659	0.433	708	0.1028	757	0.023
562	0.7825	611	0.962	660	0.4217	709	0.1012	758	0.022
563	0.7806	612	0.9577	661	0.4102	710	0.0976	759	0.0208
564	0.7914	613	0.9538	662	0.4029	711	0.0929	760	0.0213
565	0.8048	614	0.9444	663	0.3883	712	0.0906	761	0.0202
566	0.8124	615	0.9323	664	0.3788	713	0.0874	762	0.0199
567	0.8203	616	0.9288	665	0.3709	714	0.0852	763	0.0194
568	0.8282	617	0.9159	666	0.3627	715	0.0818	764	0.0188
569	0.8364	618	0.9122	667	0.3512	716	0.08	765	0.0181
570	0.8417	619	0.8997	668	0.342	717	0.0779	766	0.0175
571	0.8474	620	0.895	669	0.3287	718	0.0741	767	0.0173
572	0.8579	621	0.8821	670	0.3234	719	0.0728	768	0.0161
573	0.8619	622	0.875	671	0.3136	720	0.0711	769	0.0159
574	0.8763	623	0.8599	672	0.3038	721	0.0683	770	0.0157
575	0.8828	624	0.8541	673	0.2975	722	0.0668	771	0.0153
576	0.8896	625	0.8419	674	0.2897	723	0.0636	772	0.0146
577	0.8904	626	0.8305	675	0.2805	724	0.0621	773	0.0142
578	0.899	627	0.8171	676	0.2733	725	0.06	774	0.0138
579	0.9083	628	0.8049	677	0.2658	726	0.0587	775	0.0136
580	0.9159	629	0.795	678	0.2577	727	0.0559	776	0.0134
581	0.9166	630	0.7793	679	0.2504	728	0.0547	777	0.0133
582	0.9209	631	0.7769	680	0.2422	729	0.0522	778	0.0127
583	0.9358	632	0.7588	681	0.2349	730	0.0511	779	0.0125
584	0.9491	633	0.7544	682	0.2283	731	0.0487	780	0.0125
585	0.9483	634	0.7353	683	0.2231	732	0.0488		
586	0.949	635	0.7194	684	0.2163	733	0.0469		
587	0.9593	636	0.7072	685	0.2101	734	0.0449		
588	0.9637	637	0.6972	686	0.2023	735	0.0435		
589	0.9692	638	0.6882	687	0.1969	736	0.0427		
590	0.964	639	0.6725	688	0.1912	737	0.0411		
591	0.9761	640	0.6626	689	0.1824	738	0.0391		
592	0.9776	641	0.6447	690	0.1815	739	0.0386		
593	0.9857	642	0.6343	691	0.1747	740	0.0371		
594	0.9863	643	0.6278	692	0.1708	741	0.0362		
595	0.9886	644	0.611	693	0.1632	742	0.0358		
596	0.9868	645	0.5975	694	0.1597	743	0.0347		
597	0.9878	646	0.586	695	0.1556	744	0.0322		
598	0.9935	647	0.5752	696	0.1508	745	0.0325		

6. Goniophotometer Test results for Model # 5804AP18WB1358F

6.1 Test Data

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

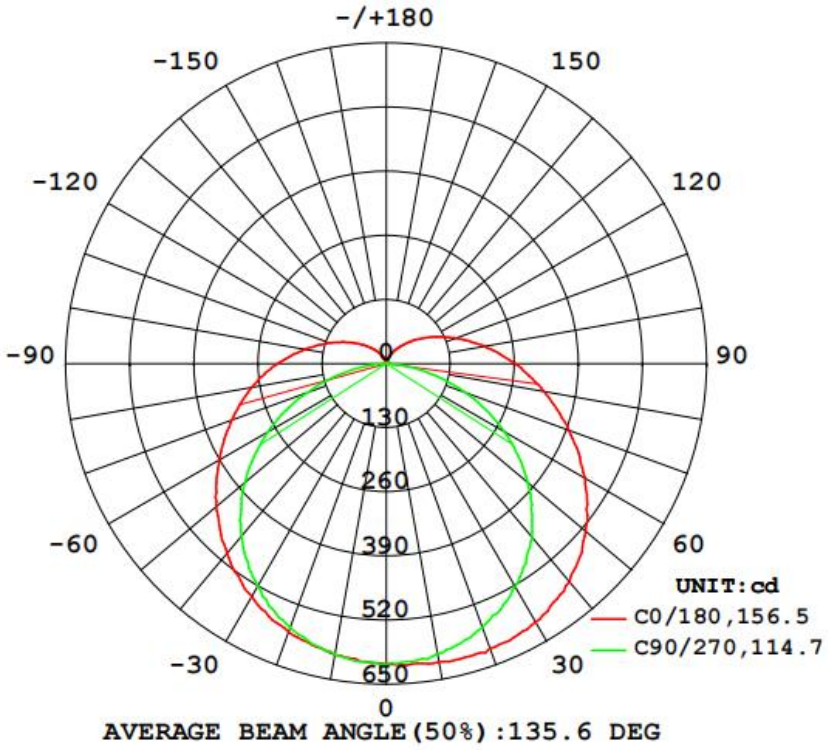
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120	60	0.1549	0.9567	17.78

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Spacing Criteria (C0/180°)	Spacing Criteria (C90/270°)	Beam Angle
2684.79	151.04	1.34	1.27	135.6°

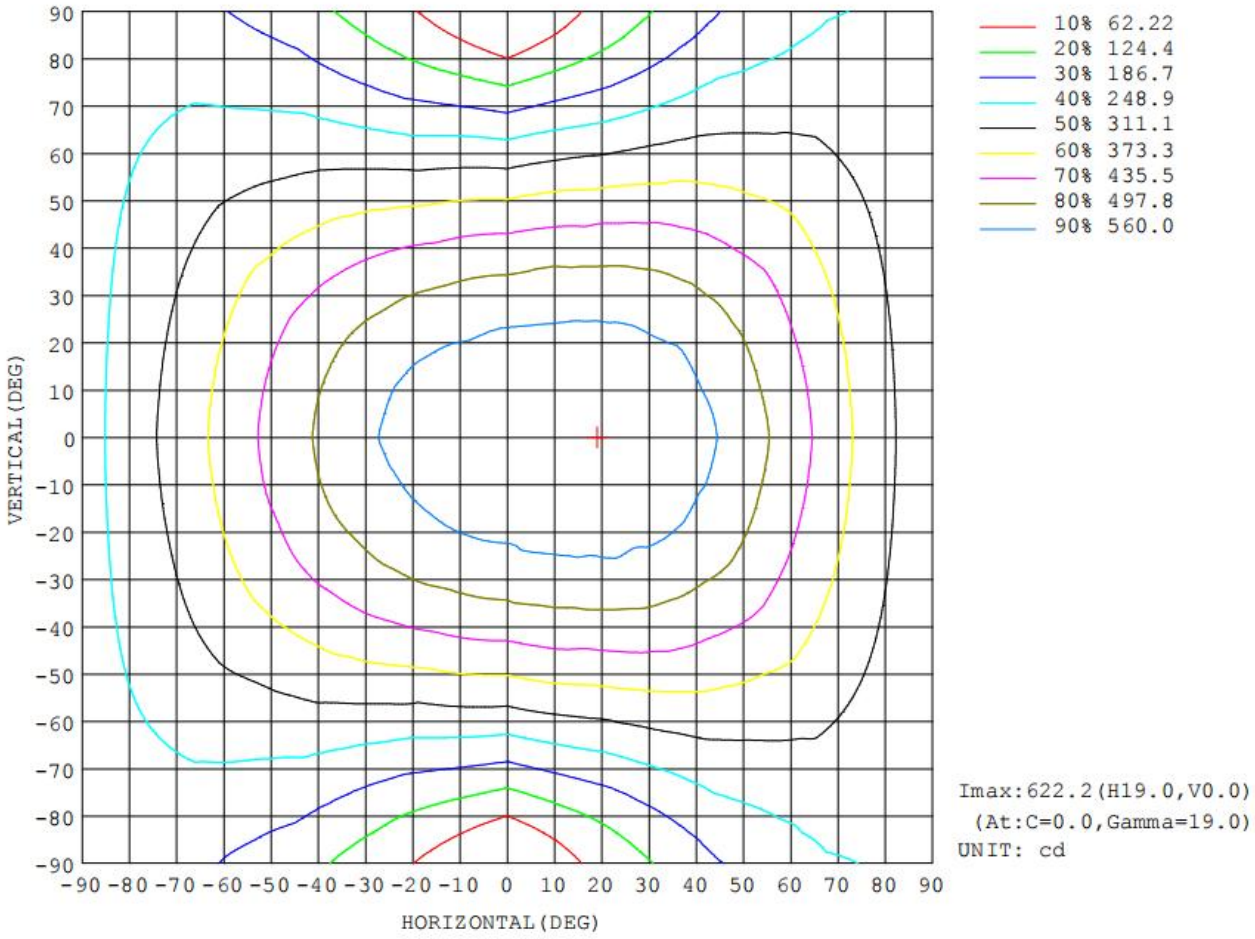
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum,lamp
10	614.1	608.9	597.3	599.4	599.5	598.0	598.9	611.7	0- 10	57.90	57.90	2.16,2.16
20	614.3	599.1	569.6	571.9	579.6	573.1	570.0	597.6	10- 20	168.5	226.4	8.43,8.43
30	604.9	569.8	522.5	532.8	545.0	532.6	521.4	571.7	20- 30	262.9	489.2	18.2,18.2
40	578.5	529.0	460.5	477.4	503.2	478.7	457.1	527.2	30- 40	330.8	820.0	30.5,30.5
50	527.5	469.0	375.3	413.6	451.2	414.5	374.4	469.2	40- 50	363.5	1184	44.1,44.1
60	465.8	394.3	276.9	343.6	392.0	345.2	277.8	394.8	50- 60	358.1	1542	57.4,57.4
70	393.6	317.3	169.1	275.0	333.2	277.2	169.9	320.0	60- 70	319.6	1861	69.3,69.3
80	324.8	245.1	61.89	211.5	276.9	213.7	62.88	248.3	70- 80	259.0	2120	79,79
90	261.6	184.6	0.4525	151.8	220.6	154.8	0.4412	187.2	80- 90	192.9	2313	86.2,86.2
100	203.5	132.0	0.3285	104.4	167.3	106.3	0.3423	133.7	90-100	137.8	2451	91.3,91.3
110	151.5	91.51	0.4063	69.45	123.2	70.76	0.3785	91.96	100-110	94.70	2546	94.8,94.8
120	109.7	61.30	0.5454	45.91	86.99	46.90	0.4253	61.46	110-120	62.00	2608	97.1,97.1
130	74.26	40.13	0.6814	30.03	58.67	30.77	0.5394	40.15	120-130	38.27	2646	98.5,98.5
140	47.08	25.47	0.7642	18.99	37.62	20.11	0.7282	24.88	130-140	21.77	2668	99.4,99.4
150	27.19	15.36	0.8228	11.43	21.87	13.71	0.9824	12.28	140-150	11.02	2679	99.8,99.8
160	13.85	7.630	0.9300	6.187	11.17	8.816	1.541	4.759	150-160	4.624	2683	99.9,99.9
170	5.480	3.240	1.001	2.212	4.095	3.461	1.176	2.223	160-170	1.381	2685	100,100
180	1.084	1.089	1.100	1.102	1.126	1.142	1.086	1.108	170-180	0.1912	2685	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

6.4 Isocandela Diagram



6.5 Luminous Distribution Intensity 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	609	609	609	609	609	609	609	609	609	609	609	609	609	609	609	609			
5	610	611	612	609	606	603	606	604	606	604	605	608	606	607	613	612			
10	614	616	609	603	597	598	599	599	599	598	598	599	599	605	612	616			
15	616	614	606	595	586	587	587	589	590	590	587	584	587	595	607	614			
20	614	611	599	584	570	570	572	576	580	576	573	571	570	581	598	610			
25	613	604	588	566	549	548	553	559	565	561	557	548	549	564	588	603			
30	605	595	570	544	523	524	533	541	545	542	533	522	521	542	572	595			
35	591	580	550	516	494	494	510	521	524	520	508	492	490	515	553	584			
40	578	561	529	487	461	460	477	498	503	494	479	459	457	486	527	567			
45	554	539	502	453	416	423	446	470	476	470	449	422	417	451	501	541			
50	528	509	469	411	375	382	414	441	451	441	415	382	374	412	469	513			
55	498	481	433	369	327	340	378	410	421	409	379	340	327	371	433	483			
60	466	448	394	324	277	296	344	379	392	379	345	298	278	326	395	449			
65	430	410	356	278	224	251	310	348	363	349	310	253	225	280	359	414			
70	394	375	317	232	169	208	275	318	333	319	277	211	170	233	320	378			
75	359	340	280	188	114	166	240	289	305	290	245	169	115	189	283	341			
80	325	305	245	149	61.9	130	212	259	277	261	214	133	62.9	149	248	307			
85	292	273	214	116	20.0	98.3	180	230	249	233	183	101	20.8	115	216	276			
90	262	242	185	88.8	0.45	70.5	152	201	221	204	155	73.1	0.44	89.0	187	246			
95	232	213	157	66.4	0.41	49.1	126	175	193	178	129	51.6	0.29	65.9	160	216			
100	203	185	132	49.0	0.33	35.4	104	150	167	153	106	37.3	0.34	48.7	134	189			
105	177	159	111	37.2	0.37	26.5	85.1	127	145	130	86.9	28.0	0.37	36.7	111	162			
110	151	136	91.5	29.0	0.41	20.3	69.5	108	123	110	70.8	21.4	0.38	28.5	92.0	138			
115	129	115	75.3	23.0	0.48	16.2	56.6	90.6	104	91.9	58.0	16.9	0.42	22.6	75.1	117			
120	110	96.7	61.3	18.7	0.55	13.3	45.9	75.2	87.0	76.3	46.9	13.8	0.43	18.3	61.5	97.6			
125	90.4	79.8	49.7	15.4	0.62	11.1	37.2	61.9	71.7	62.7	38.0	11.2	0.49	15.1	49.9	80.4			
130	74.3	65.1	40.1	12.9	0.68	9.28	30.0	50.0	58.7	50.7	30.8	9.38	0.54	12.0	40.2	65.8			
135	60.0	52.3	32.3	10.8	0.73	7.75	24.1	40.1	47.2	40.9	24.7	8.01	0.62	10.3	32.0	52.6			
140	47.1	41.3	25.5	9.08	0.76	6.47	19.0	31.6	37.6	32.6	20.1	7.08	0.73	8.31	24.9	41.2			
145	36.4	31.8	19.9	7.48	0.80	5.33	14.7	24.5	29.1	25.8	16.5	6.57	0.86	6.19	18.2	31.3			
150	27.2	24.0	15.4	6.13	0.82	4.20	11.4	18.3	21.9	20.1	13.7	6.25	0.98	4.32	12.3	22.7			
155	19.8	17.6	11.1	4.71	0.88	3.20	8.58	13.4	15.9	15.2	11.2	5.86	1.26	2.75	8.19	15.0			
160	13.9	12.4	7.63	3.57	0.93	2.37	6.19	9.39	11.2	11.0	8.82	5.07	1.54	1.71	4.76	9.29			
165	8.92	8.07	4.95	2.69	0.98	1.55	3.92	6.20	7.03	7.23	6.12	3.79	1.43	1.26	3.26	5.49			
170	5.48	4.36	3.24	2.07	1.00	1.02	2.21	3.35	4.09	4.11	3.46	2.33	1.18	1.13	2.22	3.46			
175	2.83	2.12	2.01	1.53	1.05	1.03	1.10	1.42	1.80	1.82	1.58	1.22	1.10	1.13	1.58	2.09			
180	1.08	1.09	1.09	1.08	1.10	1.08	1.10	1.12	1.13	1.13	1.14	1.11	1.09	1.09	1.11	1.14			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
5804AP18WB1358F	120.0	60	0.959	24.2
	277.0	60	0.954	13.7
5804AP18WB1658F	120.0	60	0.962	24
	277.0	60	0.957	13.4

8. Photo of sample

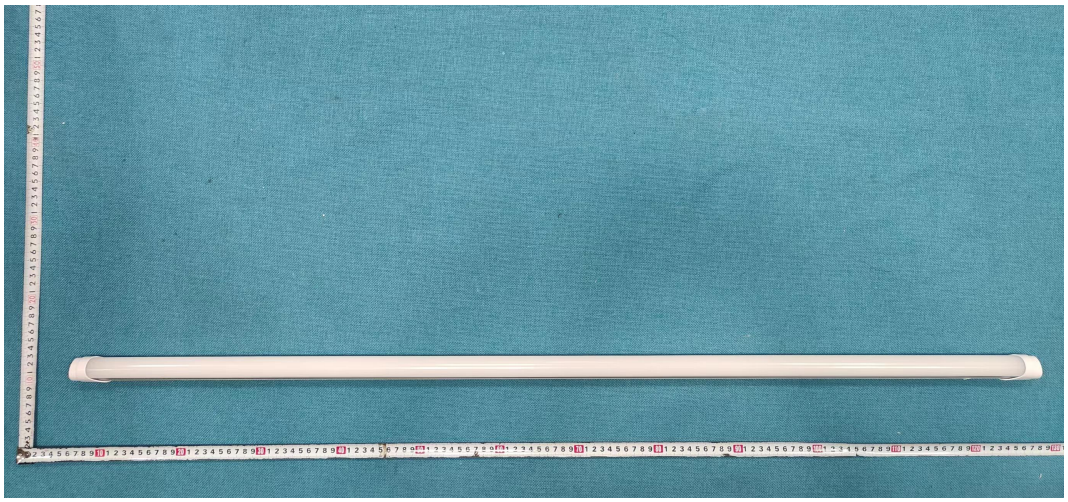


Figure 1

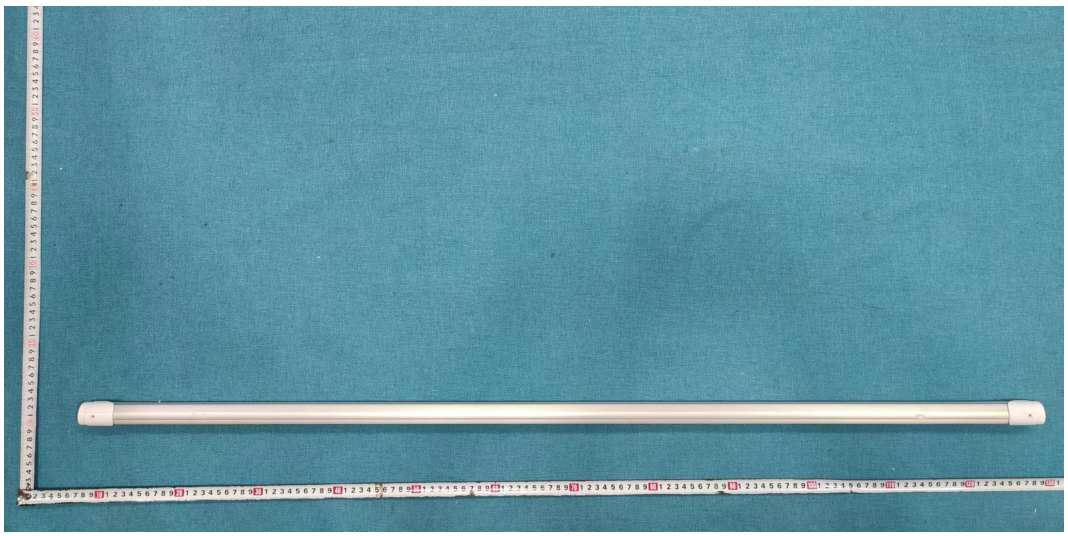


Figure 2

---End of Report---