



Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23040544L00501

Client..... : ROYALUX EXPORTS

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

Test Model..... : 5804AP22WB1358F, 5804AP22WB1658F

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:	5804AP22WB1358F, 5804AP22WB1658F
Model No.:	5804AP22WB1358F, 5804AP22WB1408F, 5804AP22WB1508F, 5804AP22WB1658F (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:	22W
Rated luminous flux:	3300lm
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)
5804AP22WB1358F	120.08	60	0.1847	21.32	0.9612	3112.1	145.97	3527
5804AP22WB1658F	120.05	60	0.1894	21.82	0.9596	3299.6	151.24	6493

Model	Ra	R9	Rf	Rg	x	y	u'	v'	Duv
5804AP22WB1358F	83.8	10	85	95	0.4045	0.3918	0.2347	0.5116	6.43E-04
5804AP22WB1658F	82.2	8	83	98	0.3128	0.3301	0.1975	0.4689	3.72E-03

5.2 Color Rendering Index for Model # 5804AP22WB1358F

Ra 83.8				
R1 82	R2 91	R3 97	R4 82	R5 82
R6 88	R7 85	R8 63	R9 10	R10 79
R11 82	R12 68	R13 84	R14 99	R15 75

*5.3.1 ANSI/IES TM-30-18 Color Rendition Report for Model # 5804AP22WB1358F

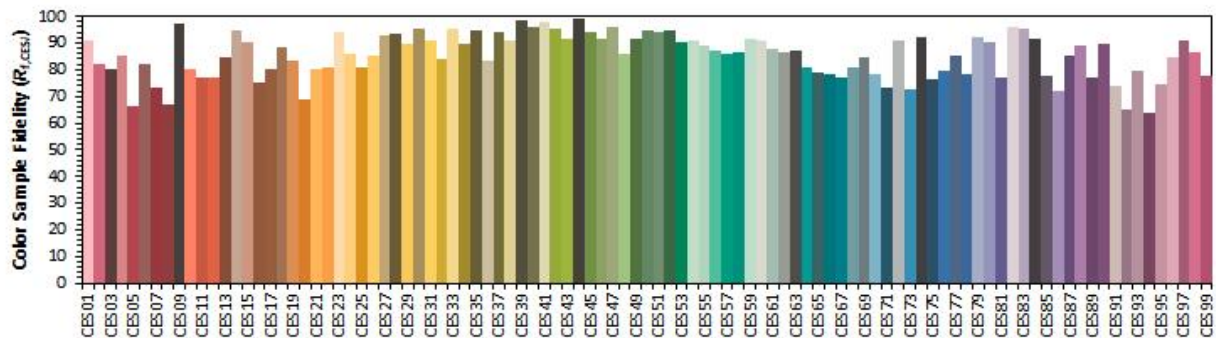
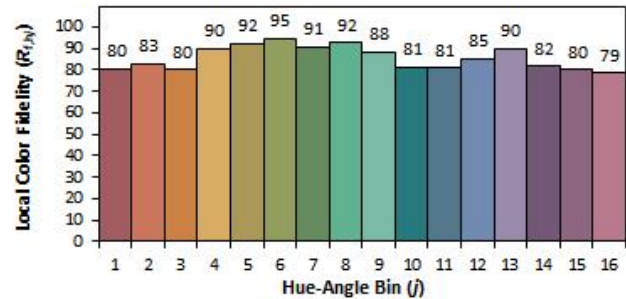
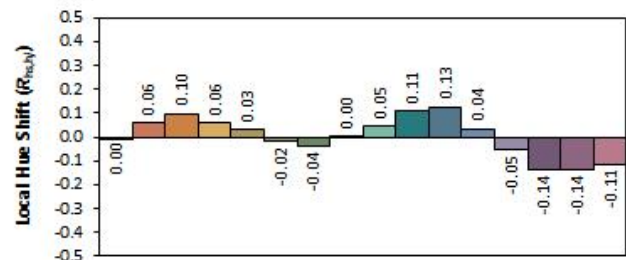
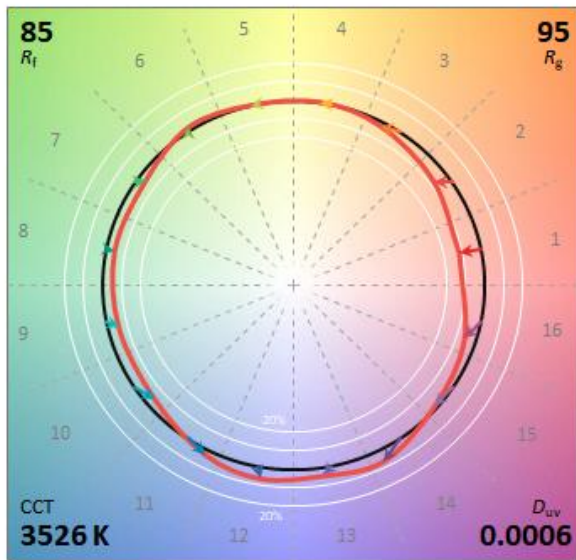
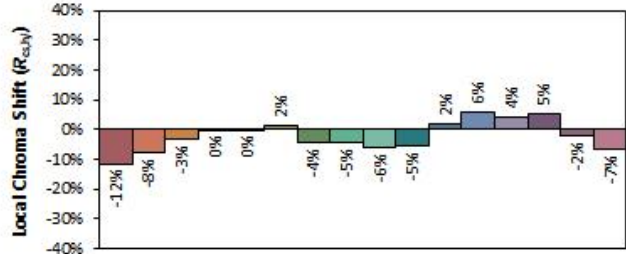
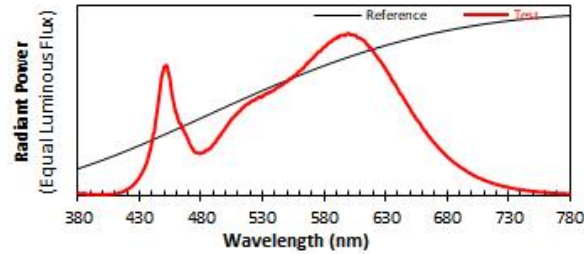
ANSI/IES TM-30-18 Color Rendition Report

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

Manufacturer: ROYALUX EXPORTS PRIVATE LIMITED

Date: 2023/5/29

Model: 5804AP22WB1358F



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

 x 0.4045 y 0.3916 u' 0.2348 v' 0.5115CIE 13.3-1995
(CRI) R_a 84 R_g 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 # 5804AP22WB1658F

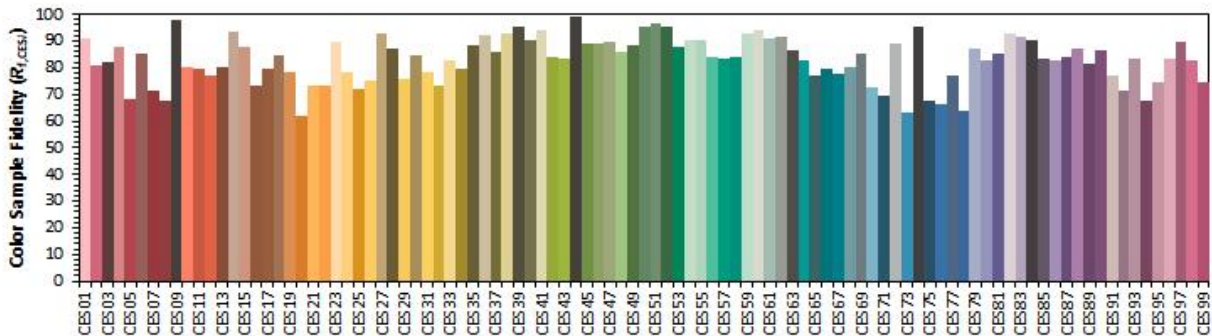
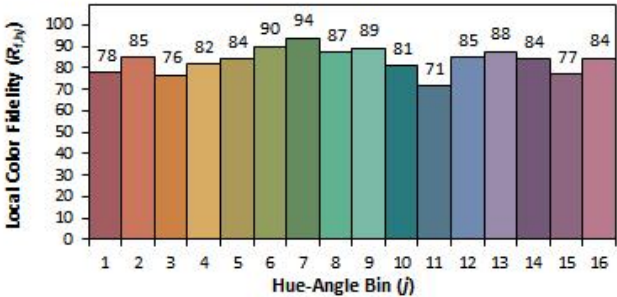
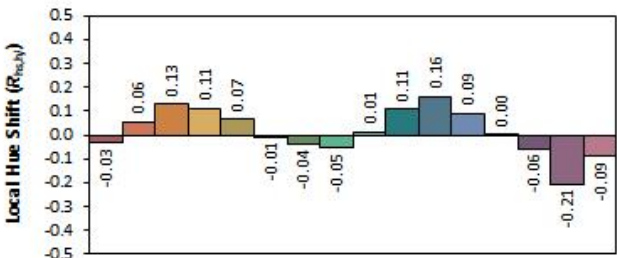
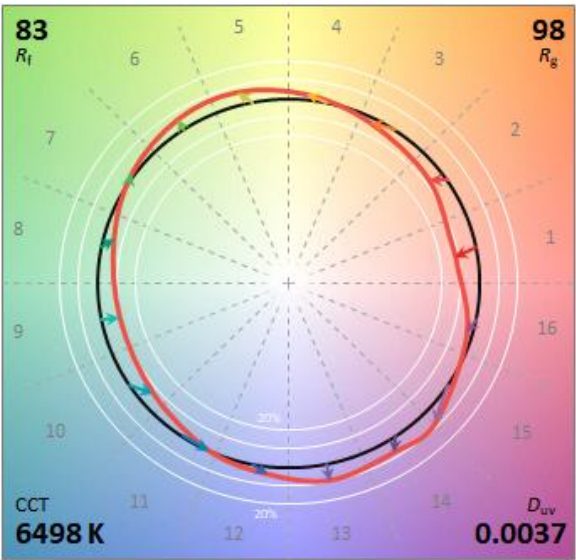
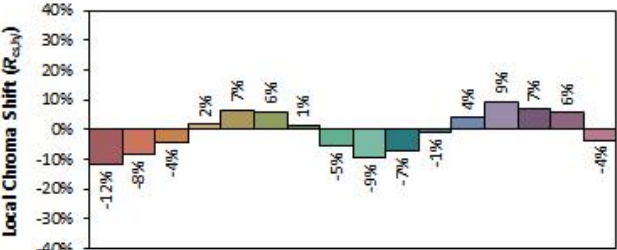
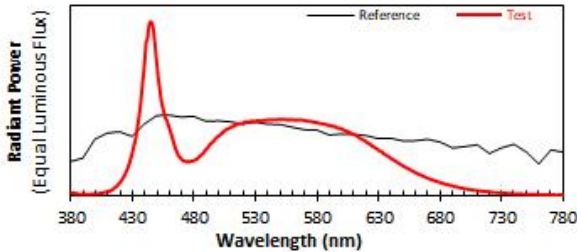
ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/5/29

Manufacturer: ROYALUX EXPORTS PRIVATE LIMITED

Model: 5804AP22WB1658F



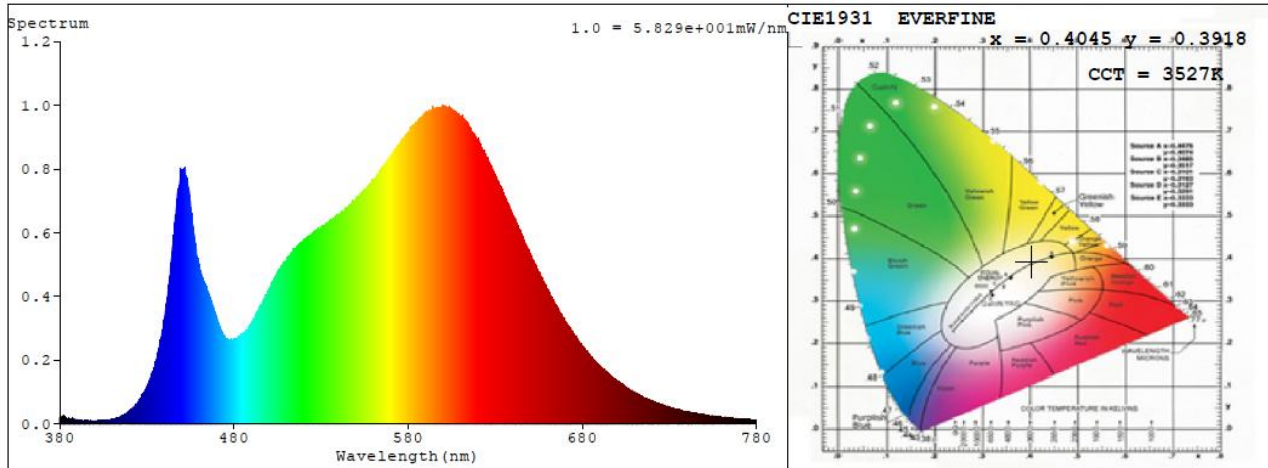
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3127
y 0.3299
u' 0.1975
v' 0.4688

CIE 13.3-1995 (CRI)
Ra 82
Rg 8

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 # 5804AP22WB1358F



nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0188	414	0.0196	448	0.7361	482	0.2683	516	0.5559
381	0.0154	415	0.0212	449	0.7593	483	0.2697	517	0.5611
382	0.0122	416	0.0257	450	0.7942	484	0.2818	518	0.5652
383	0.012	417	0.0273	451	0.792	485	0.2802	519	0.5685
384	0.017	418	0.0315	452	0.8023	486	0.2843	520	0.5747
385	0.0151	419	0.0368	453	0.7702	487	0.2925	521	0.5815
386	0.0154	420	0.0391	454	0.7378	488	0.2953	522	0.5859
387	0.0093	421	0.0447	455	0.6981	489	0.3082	523	0.5875
388	0.0079	422	0.0516	456	0.6387	490	0.3171	524	0.5877
389	0.006	423	0.0528	457	0.5936	491	0.3238	525	0.5989
390	0.0129	424	0.0597	458	0.5617	492	0.3316	526	0.6013
391	0.0118	425	0.0689	459	0.5231	493	0.3483	527	0.6054
392	0.0084	426	0.0751	460	0.5032	494	0.3541	528	0.61
393	0.0083	427	0.0835	461	0.4799	495	0.3689	529	0.6043
394	0.0091	428	0.0949	462	0.4536	496	0.373	530	0.613
395	0.0054	429	0.1049	463	0.4471	497	0.39	531	0.6191
396	0.0103	430	0.1158	464	0.4323	498	0.3972	532	0.6203
397	0.006	431	0.1294	465	0.4107	499	0.4067	533	0.6302
398	0.0097	432	0.1403	466	0.4024	500	0.4206	534	0.6272
399	0.0079	433	0.1588	467	0.3809	501	0.4314	535	0.6377
400	0.0063	434	0.1719	468	0.37	502	0.4404	536	0.6352
401	0.0079	435	0.1925	469	0.3535	503	0.4514	537	0.6412
402	0.0099	436	0.2073	470	0.3345	504	0.4617	538	0.6428
403	0.0077	437	0.2365	471	0.3166	505	0.474	539	0.6475
404	0.0096	438	0.2652	472	0.3013	506	0.4777	540	0.6534
405	0.0095	439	0.2934	473	0.2915	507	0.4894	541	0.6603
406	0.0096	440	0.3276	474	0.2747	508	0.4936	542	0.6668
407	0.0112	441	0.3767	475	0.2711	509	0.5046	543	0.6683
408	0.0107	442	0.3954	476	0.2641	510	0.511	544	0.6733
409	0.0109	443	0.4578	477	0.2647	511	0.518	545	0.6775
410	0.0151	444	0.5072	478	0.2637	512	0.5222	546	0.6815
411	0.0135	445	0.5632	479	0.2586	513	0.5371	547	0.6869
412	0.0159	446	0.6206	480	0.264	514	0.5408	548	0.6966
413	0.018	447	0.6799	481	0.2646	515	0.5478	549	0.6992

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.701	599	0.9946	648	0.558	697	0.1465	746	0.0326
551	0.7093	600	0.9977	649	0.5498	698	0.1433	747	0.0308
552	0.719	601	0.9951	650	0.5361	699	0.1387	748	0.0305
553	0.7183	602	0.9879	651	0.5215	700	0.1352	749	0.0297
554	0.7229	603	0.9891	652	0.5066	701	0.1291	750	0.0279
555	0.7366	604	0.9875	653	0.5012	702	0.1261	751	0.0266
556	0.7363	605	0.9873	654	0.4859	703	0.1216	752	0.027
557	0.7434	606	0.9857	655	0.4748	704	0.1185	753	0.0249
558	0.7509	607	0.9729	656	0.4651	705	0.1146	754	0.0254
559	0.7607	608	0.972	657	0.4565	706	0.1101	755	0.0243
560	0.7656	609	0.9706	658	0.4458	707	0.1087	756	0.0238
561	0.7706	610	0.9647	659	0.4367	708	0.1051	757	0.0231
562	0.7795	611	0.9627	660	0.4188	709	0.101	758	0.0227
563	0.7811	612	0.9569	661	0.4126	710	0.0984	759	0.023
564	0.7931	613	0.951	662	0.3975	711	0.0933	760	0.0214
565	0.802	614	0.9411	663	0.3951	712	0.093	761	0.0207
566	0.8129	615	0.9279	664	0.3802	713	0.0895	762	0.0206
567	0.8155	616	0.9271	665	0.3694	714	0.0864	763	0.0199
568	0.8254	617	0.9076	666	0.3626	715	0.084	764	0.0193
569	0.8318	618	0.9108	667	0.3493	716	0.0819	765	0.0178
570	0.8402	619	0.895	668	0.3435	717	0.0785	766	0.0176
571	0.8437	620	0.8906	669	0.3309	718	0.0762	767	0.0175
572	0.8552	621	0.8772	670	0.3256	719	0.0742	768	0.0167
573	0.8605	622	0.8654	671	0.3149	720	0.0726	769	0.017
574	0.8729	623	0.8569	672	0.3074	721	0.0692	770	0.0163
575	0.8787	624	0.8452	673	0.2983	722	0.0676	771	0.016
576	0.8879	625	0.8358	674	0.2889	723	0.0655	772	0.0148
577	0.8872	626	0.8275	675	0.2827	724	0.0633	773	0.0146
578	0.8959	627	0.8165	676	0.2732	725	0.0609	774	0.0151
579	0.9068	628	0.8052	677	0.2671	726	0.0593	775	0.0141
580	0.914	629	0.7943	678	0.2599	727	0.057	776	0.0136
581	0.9161	630	0.781	679	0.2502	728	0.0548	777	0.0134
582	0.9239	631	0.7696	680	0.2439	729	0.0561	778	0.0129
583	0.935	632	0.7592	681	0.2359	730	0.0534	779	0.0131
584	0.9397	633	0.7443	682	0.2302	731	0.051	780	0.0131
585	0.9439	634	0.7371	683	0.2238	732	0.0486		
586	0.9498	635	0.7139	684	0.2166	733	0.0471		
587	0.9523	636	0.7085	685	0.2112	734	0.0464		
588	0.9626	637	0.6933	686	0.203	735	0.0451		
589	0.9659	638	0.686	687	0.1993	736	0.0439		
590	0.9659	639	0.6698	688	0.1933	737	0.0414		
591	0.9786	640	0.6573	689	0.1882	738	0.0402		
592	0.9727	641	0.6436	690	0.1835	739	0.0398		
593	0.9836	642	0.6278	691	0.1764	740	0.0395		
594	0.986	643	0.623	692	0.1717	741	0.0361		
595	0.9868	644	0.6111	693	0.1678	742	0.0359		
596	0.9866	645	0.5952	694	0.1629	743	0.035		
597	0.9848	646	0.5845	695	0.1587	744	0.0345		
598	0.9912	647	0.5731	696	0.152	745	0.033		

6. Goniophotometer Test results for Model # 5804AP22WB1358F

6.1 Test Data

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

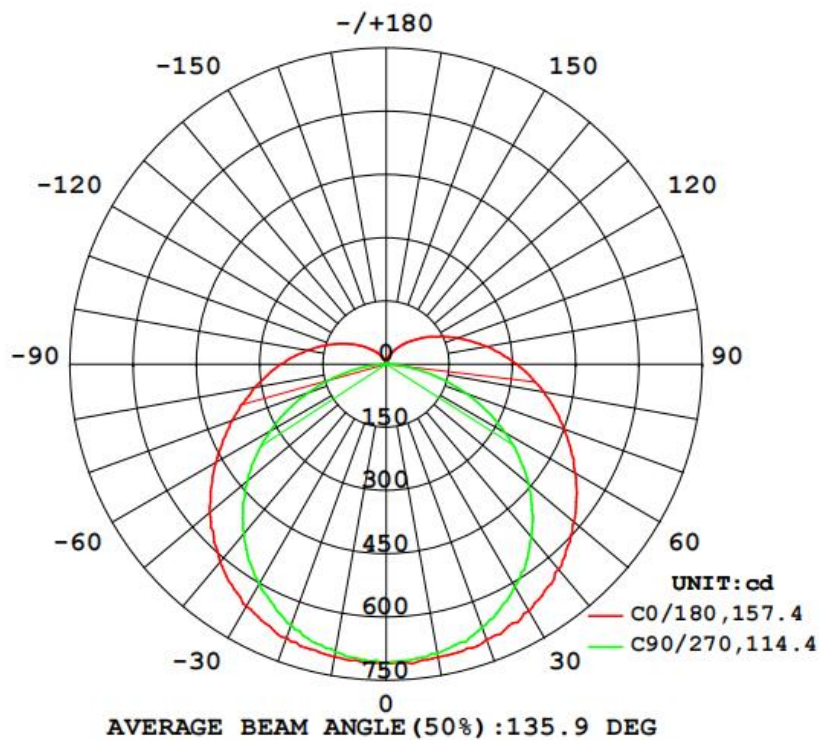
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
119.9	60	0.1854	0.9579	21.31

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Spacing Criteria (C0/180°)	Spacing Criteria (C90/270°)	Beam Angle
3108.46	145.89	1.40	1.27	135.9°

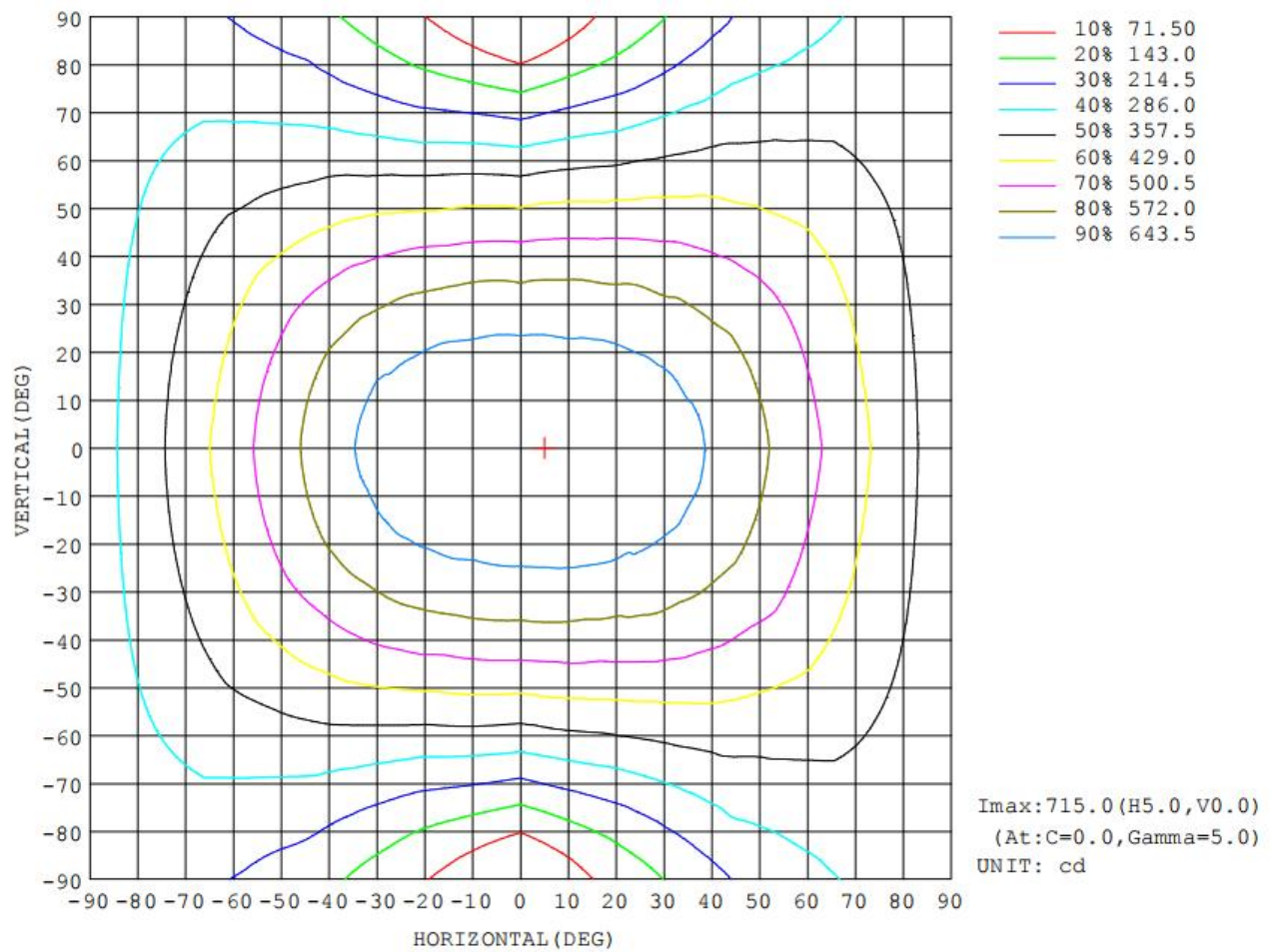
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	lum, lamp
10	706.5	695.1	696.9	703.7	705.2	695.2	692.6	700.8	0- 10	67.20	67.20	2.16,2.16
20	695.3	680.2	664.3	678.5	690.9	673.8	658.3	678.3	10- 20	195.6	262.8	8.45,8.45
30	677.6	645.3	609.5	639.6	663.9	630.7	600.7	641.9	20- 30	305.1	567.9	18.3,18.3
40	635.8	589.3	536.8	581.4	614.1	567.5	525.3	591.8	30- 40	383.4	951.3	30.6,30.6
50	581.6	524.5	443.3	501.3	547.7	492.4	429.1	519.5	40- 50	420.3	1372	44.1,44.1
60	518.6	444.6	326.3	413.8	466.9	400.0	318.1	443.0	50- 60	413.4	1785	57.4,57.4
70	448.3	363.9	200.0	323.8	387.4	314.0	196.5	362.1	60- 70	368.0	2153	69.3,69.3
80	380.4	290.4	74.13	244.3	315.8	237.3	73.19	287.1	70- 80	298.6	2452	78.9,78.9
90	310.6	218.8	0.5627	178.2	250.5	172.7	0.6086	219.4	80- 90	223.5	2675	86.1,86.1
100	243.7	156.6	0.4208	120.1	191.7	117.7	0.4533	155.9	90-100	160.2	2835	91.2,91.2
110	181.7	109.2	0.7053	79.50	138.5	77.31	0.5514	108.6	100-110	110.0	2945	94.7,94.7
120	131.5	76.09	1.106	50.59	96.57	49.26	0.8210	74.68	110-120	72.12	3017	97.1,97.1
130	91.82	51.73	1.544	31.28	63.12	30.86	1.149	51.16	120-130	44.74	3062	98.5,98.5
140	60.80	34.72	1.902	18.68	38.61	19.06	1.222	33.75	130-140	25.63	3088	99.3,99.3
150	37.31	22.60	2.127	10.24	21.19	12.34	1.115	19.79	140-150	13.17	3101	99.8,99.8
160	20.74	12.21	2.202	4.819	9.563	7.313	1.260	8.024	150-160	5.608	3106	99.9,99.9
170	9.622	5.752	2.212	1.210	3.001	2.474	1.333	4.110	160-170	1.687	3108	100,100
180	1.741	2.325	2.449	2.335	1.839	2.139	2.390	2.435	170-180	0.2701	3108	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	708	708	708	708	708	708	708	708	708	708	708	708	708	708	708	708			
5	713	707	704	705	703	703	709	712	708	706	702	704	703	703	707	703			
10	706	706	695	698	697	698	704	706	705	702	695	694	693	696	701	705			
15	705	703	690	687	683	685	694	697	700	696	688	680	681	682	693	702			
20	695	690	680	672	664	670	679	689	691	684	674	666	658	662	678	690			
25	687	680	668	647	641	645	661	676	679	674	656	639	631	641	661	680			
30	678	670	645	624	609	618	640	658	664	653	631	612	601	618	642	668			
35	656	648	625	593	578	589	614	634	639	632	601	582	569	584	616	646			
40	636	622	589	553	537	549	581	606	614	599	567	539	525	548	592	626			
45	610	599	559	514	489	506	543	572	580	566	531	496	482	507	557	596			
50	582	569	525	472	443	460	501	534	548	527	492	447	429	465	520	569			
55	552	535	486	425	386	407	458	495	506	488	446	398	376	416	483	534			
60	519	502	445	374	326	354	414	454	467	448	400	343	318	366	443	499			
65	484	467	406	322	264	300	367	413	428	406	357	291	258	316	402	467			
70	448	428	364	272	200	246	324	373	387	366	314	237	197	266	362	428			
75	414	394	327	223	135	196	282	336	350	330	273	190	133	218	326	393			
80	380	357	290	177	74.1	150	244	298	316	295	237	146	73.2	173	287	356			
85	344	322	254	139	24.2	115	210	265	281	262	204	110	25.4	135	251	322			
90	311	288	219	106	0.56	84.0	178	232	250	230	173	80.5	0.61	103	219	288			
95	276	254	187	78.7	0.33	58.7	148	201	220	201	144	57.0	0.51	75.5	186	256			
100	244	221	157	58.8	0.42	41.4	120	172	192	171	118	40.1	0.45	56.3	156	223			
105	211	192	131	45.6	0.56	29.9	98.6	146	163	146	95.9	29.2	0.47	43.6	131	192			
110	182	164	109	36.5	0.71	22.1	79.5	122	138	122	77.3	21.6	0.55	34.8	109	164			
115	156	139	91.2	30.1	0.90	16.9	63.7	103	116	101	61.8	16.0	0.69	28.8	90.1	140			
120	132	117	76.1	25.3	1.11	13.3	50.6	83.6	96.6	83.4	49.3	12.9	0.82	24.2	74.7	118			
125	111	98.2	62.4	21.7	1.33	10.7	39.9	68.1	78.7	67.4	38.9	9.99	0.97	20.7	62.0	97.8			
130	91.8	81.3	51.7	18.7	1.54	8.57	31.3	53.9	63.1	53.7	30.9	8.15	1.15	18.0	51.2	81.3			
135	75.6	66.7	42.4	16.2	1.73	6.84	24.2	42.2	50.1	42.2	24.1	6.74	1.25	14.8	41.6	66.3			
140	60.8	53.8	34.7	13.9	1.90	5.35	18.7	32.2	38.6	33.1	19.1	5.74	1.22	12.9	33.7	53.3			
145	48.2	42.7	28.2	12.3	2.04	4.17	13.8	24.2	29.1	25.4	15.1	5.18	1.14	10.2	26.4	41.6			
150	37.3	33.5	22.6	10.4	2.13	3.15	10.2	17.5	21.2	19.1	12.3	4.85	1.11	7.40	19.8	31.6			
155	28.2	25.5	16.9	8.35	2.19	2.25	7.23	12.3	14.8	14.0	9.82	4.49	1.18	5.00	13.0	23.0			
160	20.7	19.1	12.2	6.52	2.20	1.46	4.82	8.01	9.56	9.45	7.31	3.70	1.26	3.21	8.02	15.3			
165	14.5	13.1	8.57	4.99	2.20	1.11	2.82	4.80	5.80	5.76	4.63	2.63	1.30	2.47	5.81	8.99			
170	9.62	7.74	5.75	3.92	2.21	1.18	1.21	2.33	3.00	3.02	2.47	1.41	1.33	2.33	4.11	6.02			
175	5.47	3.74	3.75	3.03	2.33	1.65	1.29	1.27	1.37	1.37	1.40	1.36	1.67	2.37	3.10	3.86			
180	1.74	2.11	2.32	2.43	2.45	2.42	2.34	2.16	1.84	1.66	2.14	2.30	2.39	2.43	2.43	2.34			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
5804AP22WB1358F	120.0	60	0.959	24.1
	277.0	60	0.964	11.7
5804AP22WB1658F	120.0	60	0.956	23.8
	277.0	60	0.961	12.1

8. Photo of sample

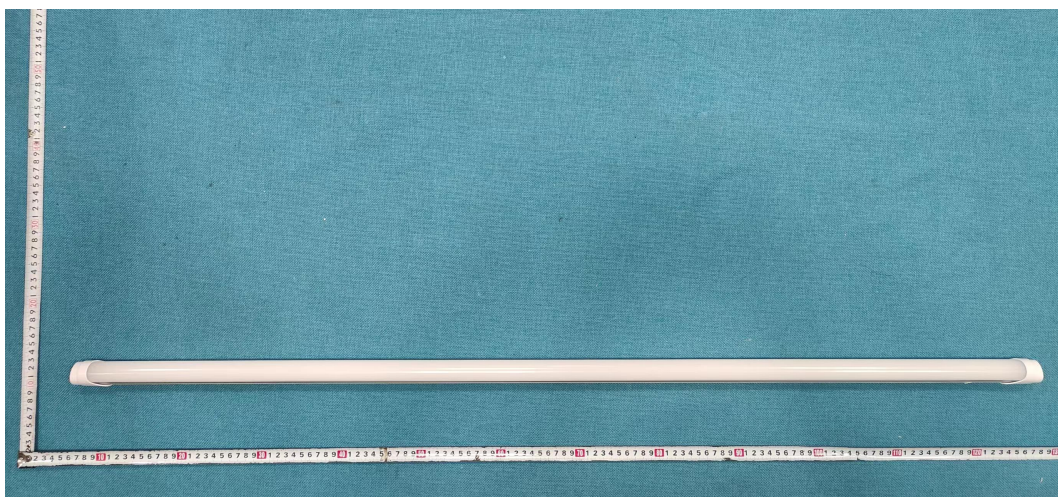


Figure 1

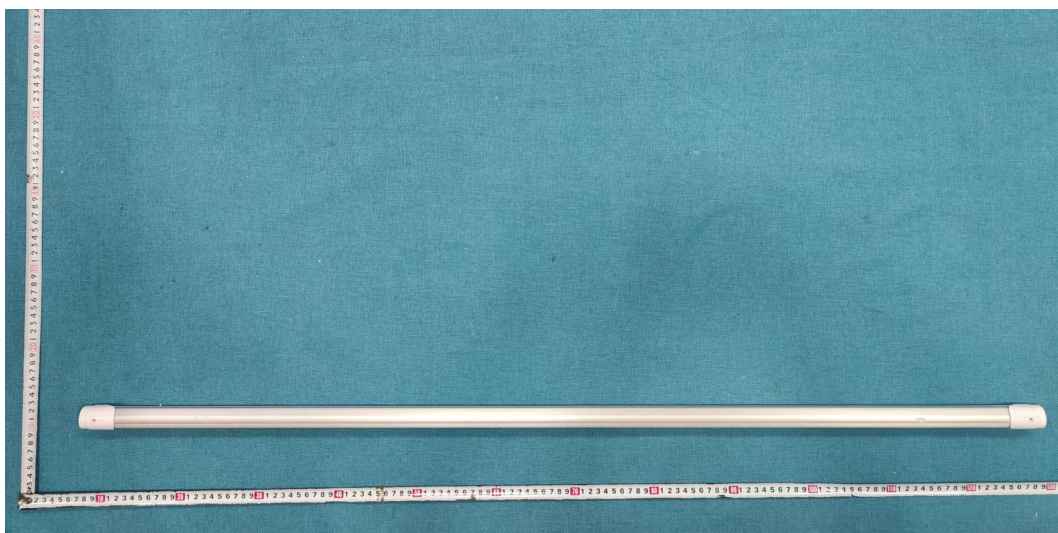


Figure 2

---End of Report---