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	:	ROYALUX EXPORTS
Address	:	150-B, NOIDA SPECIAL ECONOMIC ZONE, NOIDA, GAUTAM BUDHHA NAGAR, UTTAR PRADESH, 201305, INDIA
Test Model	:	304Y0300W50LBX
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
Report No.	:	N02A22060550L00501
Date of receipt	:	June 20, 2022
Date of test	:	June 20, 2022 – July 09, 2022
Date of report	:	July 09, 2022

Tested by:	**Checked by:**	**Approved by:**
Jarvis Zhang	Sandy Chen	
Jarvis Zhang/ 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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Add: 1st floor, B Area, Jinbaisheng Industrial Park, Headquarters 2 Road, Songshan Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.
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1. Product Description for Equipment under Test(EUT)

Representative (Tested) Model:	304Y0300W50LBX
Model No.:	304Y0300W50LBX
Manufacturer:	ROYALUX EXPORTS
Product Type:	High Bay Luminaires for Commercial and Industrial Buildings
Rated Voltage/Frequency:	100-277V AC, 50/60Hz
Rated Power:	300W
Rated luminous flux:	45000lm
Nominal CCT:	5000K
LED Manufacturer:	Bridgelux Inc.
LED Model No.:	BXEN-50E-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	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.

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

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)	CCT (K)
119.93	60	2.54	303.5	0.9961	44685	147.24	4902

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
83.8	12	84	96	0.3482	0.3565	0.2116	0.4875	1.20E-03

5.2 Color Rendering Index

Ra
83.8

R1	R2	R3	R4	R5
82	89	94	83	82

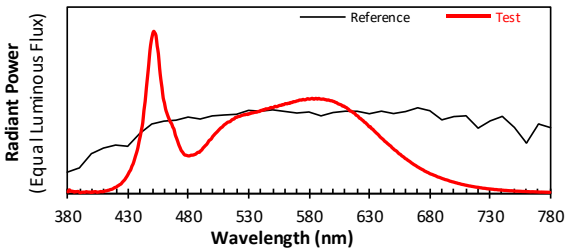
R6	R7	R8	R9	R10
84	88	68	12	74

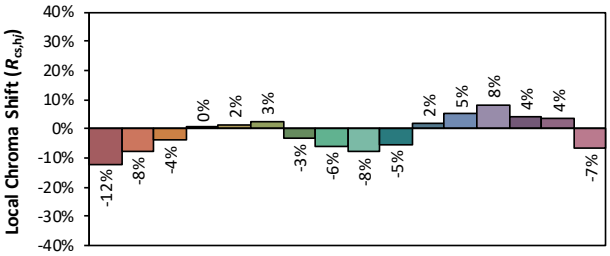
R11	R12	R13	R14	R15
82	58	84	97	77

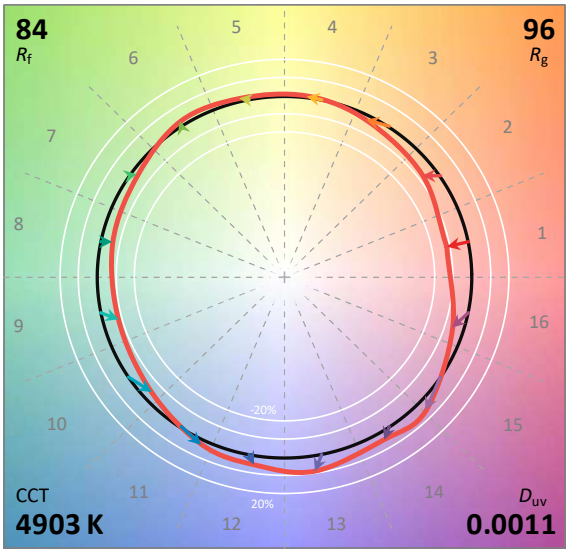
*5.3 ANSI/IES TM-30-18 Color Rendition Report

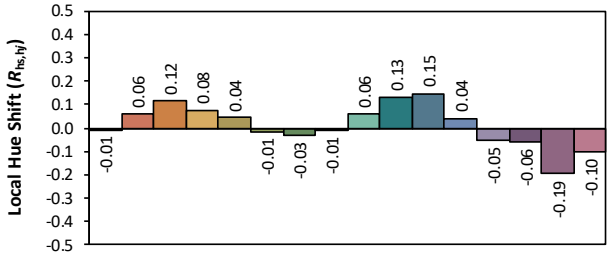
ANSI/IES TM-30-18 Color Rendition Report

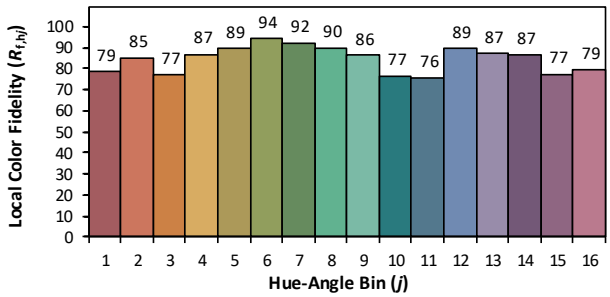
Source:	BXEN-50E-11M-3CA	Manufacturer:	ROYALUX EXPORTS
Date:	2022/7/8	Model:	304Y0300W50LBX

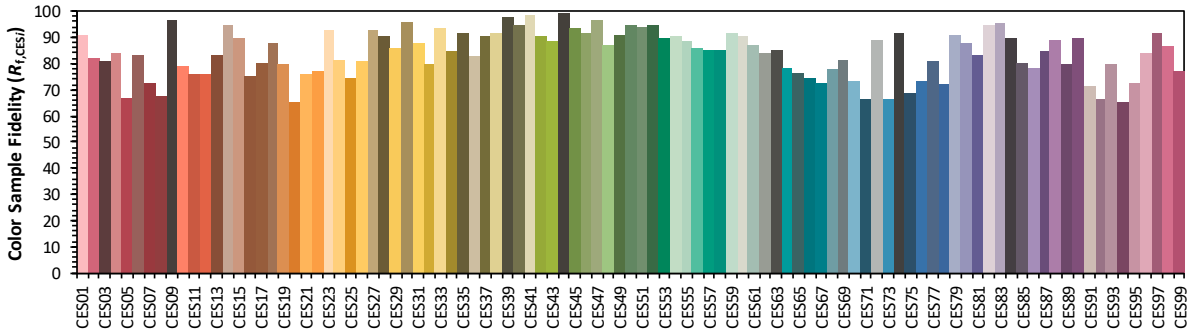












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

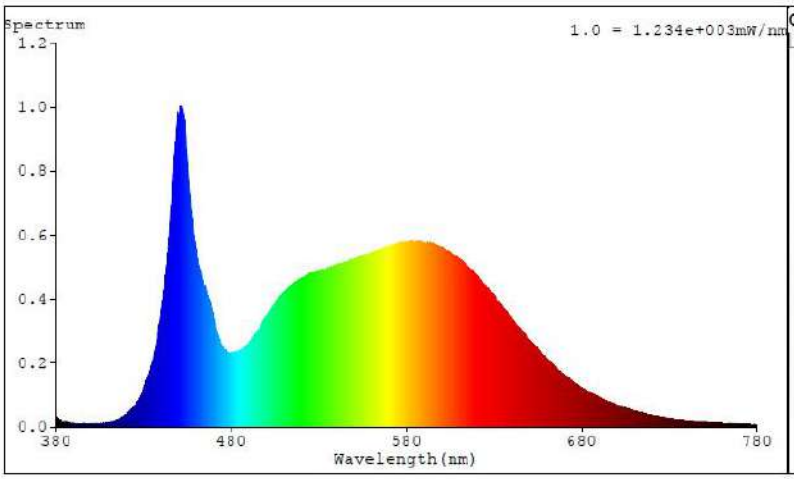
x	0.3482
y	0.3563
u'	0.2117
v'	0.4874

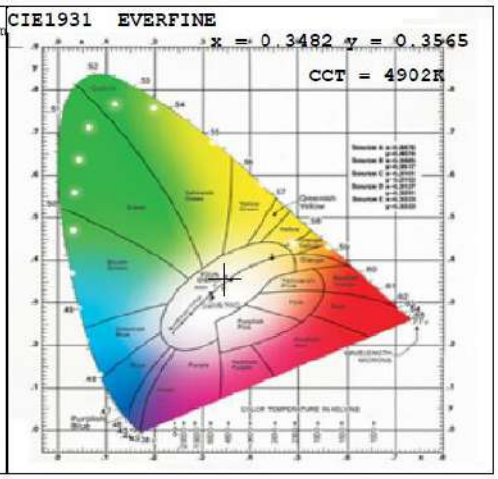
CIE 13.3-1995 (CRI)

R_a	84
R_9	12

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





nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0097	414	0.0201	448	0.8703	482	0.2329	516	0.4483
381	0.0222	415	0.0235	449	0.9251	483	0.2333	517	0.4519
382	0.0152	416	0.0249	450	0.9628	484	0.2342	518	0.4548
383	0.0125	417	0.0275	451	0.987	485	0.237	519	0.4632
384	0.0137	418	0.0325	452	0.9788	486	0.2399	520	0.4636
385	0.0079	419	0.0366	453	0.9622	487	0.2462	521	0.468
386	0.011	420	0.0385	454	0.8989	488	0.2512	522	0.4692
387	0.0103	421	0.0447	455	0.8516	489	0.2504	523	0.4711
388	0.0125	422	0.0489	456	0.7638	490	0.2592	524	0.4753
389	0.0099	423	0.0541	457	0.6967	491	0.265	525	0.4768
390	0.0045	424	0.0582	458	0.6447	492	0.2758	526	0.48
391	0.0069	425	0.0676	459	0.5816	493	0.2836	527	0.4792
392	0.0075	426	0.0756	460	0.553	494	0.2916	528	0.4837
393	0.008	427	0.0833	461	0.514	495	0.2983	529	0.4808
394	0.0068	428	0.0945	462	0.4909	496	0.3088	530	0.4862
395	0.0108	429	0.1057	463	0.4699	497	0.3211	531	0.4854
396	0.0092	430	0.1189	464	0.4516	498	0.327	532	0.4917
397	0.0084	431	0.1333	465	0.4352	499	0.3333	533	0.4903
398	0.0082	432	0.1443	466	0.4245	500	0.3457	534	0.4925
399	0.0057	433	0.1655	467	0.4039	501	0.3541	535	0.4942
400	0.0104	434	0.1799	468	0.3906	502	0.3627	536	0.4951
401	0.0072	435	0.2029	469	0.358	503	0.3698	537	0.4961
402	0.0105	436	0.2279	470	0.3384	504	0.3771	538	0.5002
403	0.011	437	0.2512	471	0.318	505	0.3854	539	0.4991
404	0.0072	438	0.279	472	0.2959	506	0.3931	540	0.506
405	0.0085	439	0.3179	473	0.2791	507	0.4003	541	0.505
406	0.0089	440	0.3504	474	0.2618	508	0.4046	542	0.5102
407	0.0118	441	0.3902	475	0.2527	509	0.4131	543	0.5092
408	0.0108	442	0.4292	476	0.2418	510	0.4199	544	0.5153
409	0.0109	443	0.5053	477	0.2342	511	0.4246	545	0.5151
410	0.013	444	0.56	478	0.233	512	0.431	546	0.5161
411	0.0155	445	0.6404	479	0.2306	513	0.4351	547	0.5174
412	0.0162	446	0.7118	480	0.2289	514	0.4363	548	0.5227
413	0.0189	447	0.7864	481	0.2296	515	0.4407	549	0.5235

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.522	599	0.5646	648	0.2882	697	0.0752	746	0.0171
551	0.5264	600	0.5614	649	0.279	698	0.0735	747	0.0164
552	0.5309	601	0.5596	650	0.2731	699	0.0711	748	0.0166
553	0.5283	602	0.5548	651	0.2659	700	0.0697	749	0.0161
554	0.5307	603	0.5533	652	0.2616	701	0.0673	750	0.0153
555	0.5345	604	0.5472	653	0.2562	702	0.0652	751	0.0145
556	0.5368	605	0.5443	654	0.248	703	0.0635	752	0.0139
557	0.5368	606	0.5418	655	0.2412	704	0.0609	753	0.014
558	0.5417	607	0.5388	656	0.2378	705	0.0599	754	0.0137
559	0.5404	608	0.5319	657	0.2298	706	0.0573	755	0.0134
560	0.546	609	0.5326	658	0.2252	707	0.0554	756	0.0131
561	0.5472	610	0.5261	659	0.2197	708	0.0542	757	0.0123
562	0.5461	611	0.5236	660	0.2126	709	0.0525	758	0.0123
563	0.5505	612	0.5172	661	0.2092	710	0.0506	759	0.0121
564	0.5484	613	0.5123	662	0.2029	711	0.0494	760	0.012
565	0.5548	614	0.5031	663	0.1982	712	0.0477	761	0.0114
566	0.5536	615	0.5015	664	0.1934	713	0.0459	762	0.011
567	0.559	616	0.4971	665	0.1871	714	0.0452	763	0.0107
568	0.559	617	0.4911	666	0.1821	715	0.0434	764	0.01
569	0.5606	618	0.4888	667	0.1768	716	0.0423	765	0.0104
570	0.5638	619	0.4781	668	0.1726	717	0.041	766	0.0104
571	0.565	620	0.4743	669	0.1683	718	0.0395	767	0.01
572	0.5687	621	0.4685	670	0.1627	719	0.0383	768	0.0097
573	0.5694	622	0.4587	671	0.159	720	0.0377	769	0.0095
574	0.569	623	0.456	672	0.1542	721	0.0367	770	0.0089
575	0.5731	624	0.4484	673	0.1502	722	0.0348	771	0.0087
576	0.5709	625	0.4438	674	0.1462	723	0.0344	772	0.0081
577	0.5707	626	0.435	675	0.1427	724	0.0325	773	0.0085
578	0.5743	627	0.4311	676	0.1369	725	0.0318	774	0.0082
579	0.5776	628	0.4232	677	0.1338	726	0.0313	775	0.008
580	0.5748	629	0.4162	678	0.1298	727	0.0301	776	0.0077
581	0.5753	630	0.4065	679	0.1271	728	0.0288	777	0.0075
582	0.5781	631	0.4064	680	0.1224	729	0.0283	778	0.0074
583	0.5791	632	0.3949	681	0.1188	730	0.0274	779	0.0071
584	0.574	633	0.3915	682	0.1167	731	0.027	780	0.007
585	0.5769	634	0.3827	683	0.1137	732	0.0259		
586	0.5796	635	0.3756	684	0.1106	733	0.0256		
587	0.5747	636	0.3682	685	0.108	734	0.0239		
588	0.5797	637	0.362	686	0.1043	735	0.0239		
589	0.5762	638	0.3546	687	0.1005	736	0.0234		
590	0.5746	639	0.3454	688	0.0988	737	0.0221		
591	0.5745	640	0.3387	689	0.0961	738	0.0219		
592	0.5756	641	0.3328	690	0.0931	739	0.021		
593	0.5726	642	0.3262	691	0.0901	740	0.0202		
594	0.5717	643	0.3176	692	0.0879	741	0.02		
595	0.5685	644	0.3129	693	0.0847	742	0.0189		
596	0.5701	645	0.3056	694	0.0833	743	0.0187		
597	0.5674	646	0.2997	695	0.0812	744	0.0183		
598	0.5651	647	0.2933	696	0.0786	745	0.0175		

6. Goniophotometer Test results

6.1 Test Data

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

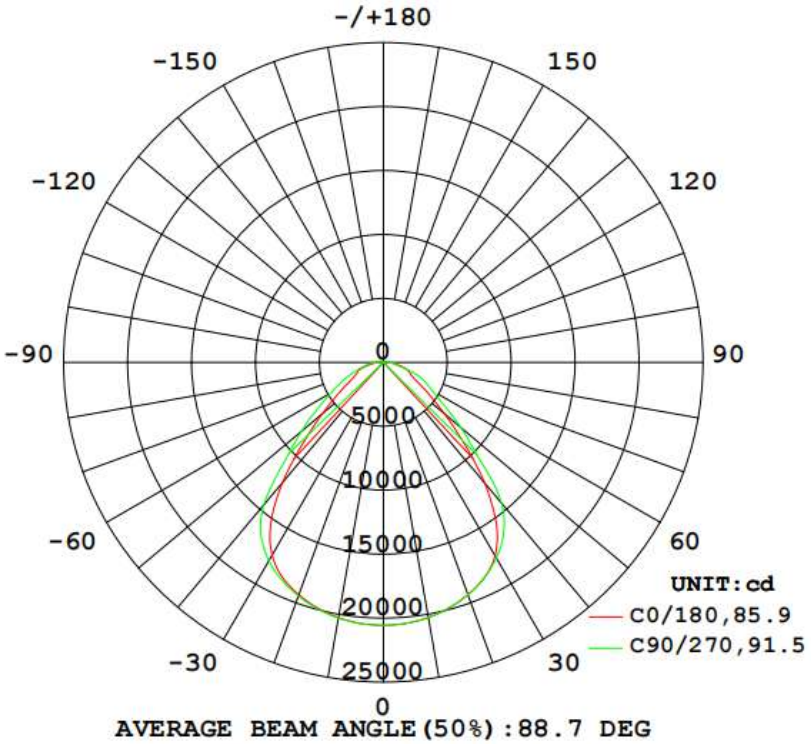
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
119.9	60	2.5384	0.9962	303.2

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
44600	147.1	20560	58.6%

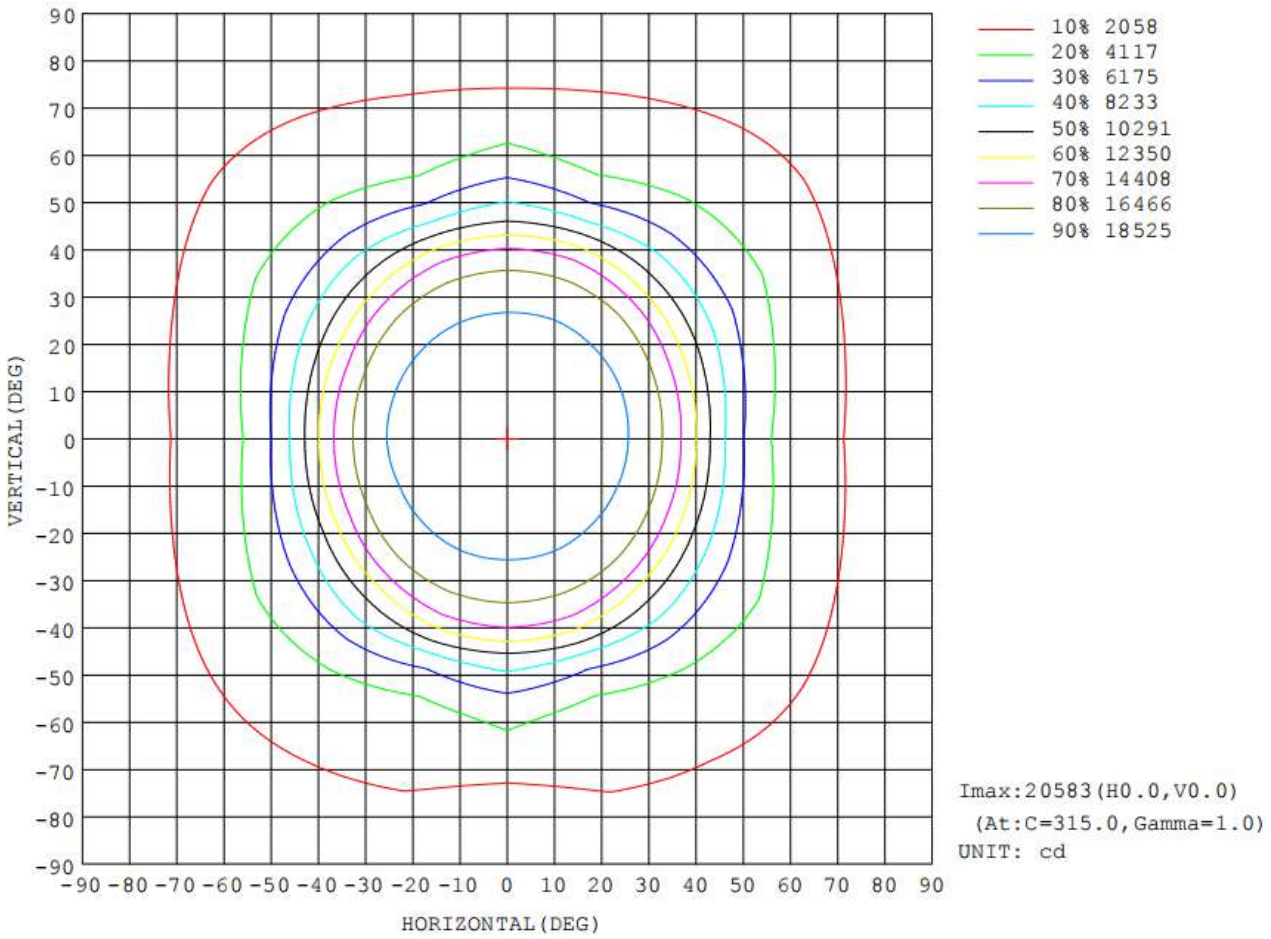
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	ŋlum,lamp
10	2026	2025	2024	2024	2026	2029	2029	2029	0- 10	1949	1949	4.37,4.37
20	1934	1930	1933	1928	1934	1938	1944	1946	10- 20	5619	7568	17,17
30	1747	1758	1767	1751	1741	1770	1792	1784	20- 30	8587	16155	36.2,36.2
40	1234	1294	1440	1274	1229	1306	1458	1343	30- 40	9878	26033	58.4,58.4
50	620.2	731.5	787.9	727.6	617.3	748.8	833.1	770.3	40- 50	7692	33725	75.6,75.6
60	310.4	376.2	441.2	380.5	312.0	401.4	469.7	413.9	50- 60	4699	38423	86.2,86.2
70	214.5	255.6	270.3	256.1	213.5	252.0	268.2	255.7	60- 70	3037	41460	93,93
80	115.9	138.5	101.5	135.7	115.9	139.0	144.2	141.6	70- 80	2024	43484	97.5,97.5
90	6.673	5.934	2.088	5.167	5.459	6.956	3.051	8.728	80- 90	778.9	44263	99.2,99.2
100	4.879	0.7890	2.085	0.9041	4.685	1.054	2.038	0.8619	90-100	41.32	44304	99.3,99.3
110	0.6199	4.459	3.016	3.883	0.9913	3.822	3.001	3.779	100-110	19.71	44324	99.4,99.4
120	7.254	5.861	4.592	5.908	7.335	5.990	4.454	5.495	110-120	48.65	44372	99.5,99.5
130	8.573	7.120	5.109	7.383	9.253	7.272	5.037	6.530	120-130	58.33	44431	99.6,99.6
140	9.024	7.816	5.702	8.339	10.00	8.043	5.374	7.023	130-140	59.18	44490	99.8,99.8
150	9.070	8.695	5.745	8.467	10.09	8.772	5.769	8.042	140-150	50.71	44540	99.9,99.9
160	8.236	6.970	5.209	7.203	8.910	7.280	4.462	6.949	150-160	36.43	44577	99.9,99.9
170	6.624	6.015	4.568	5.225	6.664	6.448	5.891	5.159	160-170	18.27	44595	100,100
180	5.856	6.534	4.494	6.211	5.880	5.917	5.661	5.504	170-180	5.185	44600	100,100
DEG	LUMINOUS INTENSITY:X10cd									UNIT:lm		

6.4 Isocandela Diagram



6.5 Luminous Distribution Intensity Data

Table--1 UNIT: X10cd

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	2056	2056	2056	2056	2056	2056	2056	2056	2056	2056	2056	2056	2056	2056	2056	2056			
5	2047	2047	2048	2047	2048	2047	2047	2047	2049	2048	2049	2050	2050	2050	2051	2051			
10	2026	2025	2025	2024	2024	2024	2024	2024	2026	2027	2029	2030	2029	2031	2029	2030			
15	1987	1988	1986	1986	1987	1987	1985	1984	1989	1991	1992	1993	1994	1998	1996	1995			
20	1934	1932	1930	1935	1933	1936	1928	1929	1934	1936	1938	1941	1944	1950	1946	1942			
25	1862	1858	1857	1864	1863	1862	1854	1851	1860	1862	1867	1876	1879	1884	1877	1873			
30	1747	1749	1758	1765	1767	1764	1751	1735	1741	1752	1770	1783	1792	1794	1784	1771			
35	1542	1558	1602	1630	1638	1626	1589	1538	1537	1549	1609	1650	1666	1663	1637	1579			
40	1234	1247	1294	1408	1440	1395	1274	1223	1229	1243	1306	1411	1458	1440	1343	1275			
45	890	936	984	1046	1055	1035	971	916	886	954	1002	1043	1096	1075	1024	982			
50	620	693	732	663	788	658	728	677	617	712	749	706	833	720	770	743			
55	438	527	502	458	575	461	507	519	438	540	536	499	627	509	552	565			
60	310	418	376	321	441	325	381	410	312	418	401	351	470	357	414	437			
65	244	334	308	252	362	255	311	328	245	324	311	271	365	274	318	336			
70	215	265	256	239	270	242	256	253	214	258	252	231	268	234	256	264			
75	175	187	197	219	158	217	196	177	176	199	199	197	196	201	201	203			
80	116	128	139	126	102	124	136	126	116	143	139	134	144	137	142	145			
85	69.1	78.0	76.8	63.2	71.6	61.9	73.9	76.1	69.2	82.9	79.9	71.7	86.1	72.2	83.2	84.9			
90	6.67	15.0	5.93	3.72	2.09	3.48	5.17	5.56	5.46	7.19	6.96	4.95	3.05	5.71	8.73	9.71			
95	5.37	5.17	4.20	1.57	1.94	1.99	4.13	5.05	5.39	5.08	4.09	1.82	1.66	1.82	4.14	5.21			
100	4.88	1.47	0.79	2.26	2.09	2.06	0.90	2.98	4.68	3.32	1.05	2.42	2.04	2.14	0.86	2.90			
105	0.48	0.66	1.40	2.30	2.60	2.20	2.02	0.61	0.53	0.73	1.26	2.70	2.86	2.49	0.95	0.71			
110	0.62	3.93	4.46	3.06	3.02	2.96	3.88	5.00	0.99	4.77	3.82	3.13	3.00	2.75	3.78	3.14			
115	6.57	6.15	5.13	4.01	3.51	3.91	4.93	5.90	6.32	6.16	5.01	4.10	3.75	3.51	4.69	5.93			
120	7.25	6.70	5.86	5.05	4.59	4.84	5.91	6.54	7.34	6.87	5.99	5.08	4.45	4.47	5.50	6.59			
125	7.94	7.47	6.45	5.49	4.49	5.46	6.65	7.46	8.23	7.79	6.64	6.16	5.25	5.45	6.03	7.39			
130	8.57	8.19	7.12	6.37	5.11	6.55	7.38	8.16	9.25	8.55	7.27	6.99	5.04	6.13	6.53	7.98			
135	8.83	8.82	7.75	7.00	5.47	6.83	7.62	8.83	9.91	9.18	7.61	7.62	5.21	7.06	6.95	8.51			
140	9.02	9.20	7.82	7.64	5.70	6.26	8.34	9.26	10.0	9.60	8.04	7.44	5.37	7.69	7.02	8.79			
145	9.07	8.83	8.67	6.96	5.73	6.66	8.45	8.83	9.60	9.21	8.67	7.46	5.57	7.91	7.72	8.22			
150	9.07	9.18	8.69	7.15	5.74	7.97	8.47	9.17	10.1	9.68	8.77	7.80	5.77	9.47	8.04	8.25			
155	8.97	9.07	8.56	7.76	5.79	7.58	7.57	8.67	9.67	9.21	8.75	8.42	5.38	5.44	6.91	8.14			
160	8.24	8.42	6.97	7.37	5.21	5.60	7.20	7.62	8.91	8.58	7.28	8.37	4.46	4.44	6.95	7.10			
165	6.36	6.83	7.49	4.91	5.39	4.83	7.40	6.84	6.63	6.56	6.92	7.59	5.29	5.15	5.45	6.63			
170	6.62	6.95	6.02	5.00	4.57	5.97	5.22	6.05	6.66	6.72	6.45	5.89	5.89	4.79	5.16	6.22			
175	4.37	4.89	5.67	5.60	4.34	5.45	6.29	4.75	4.85	4.88	5.47	6.74	5.72	4.49	5.97	5.40			
180	5.86	5.93	6.53	5.65	4.49	5.44	6.21	5.21	5.88	5.88	5.92	6.50	5.66	4.46	5.50	6.17			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
304Y0300W50LBX	120.0	60	0.996	5.98
	277.0	60	0.957	8.98

8. Photo of sample

Figure 1

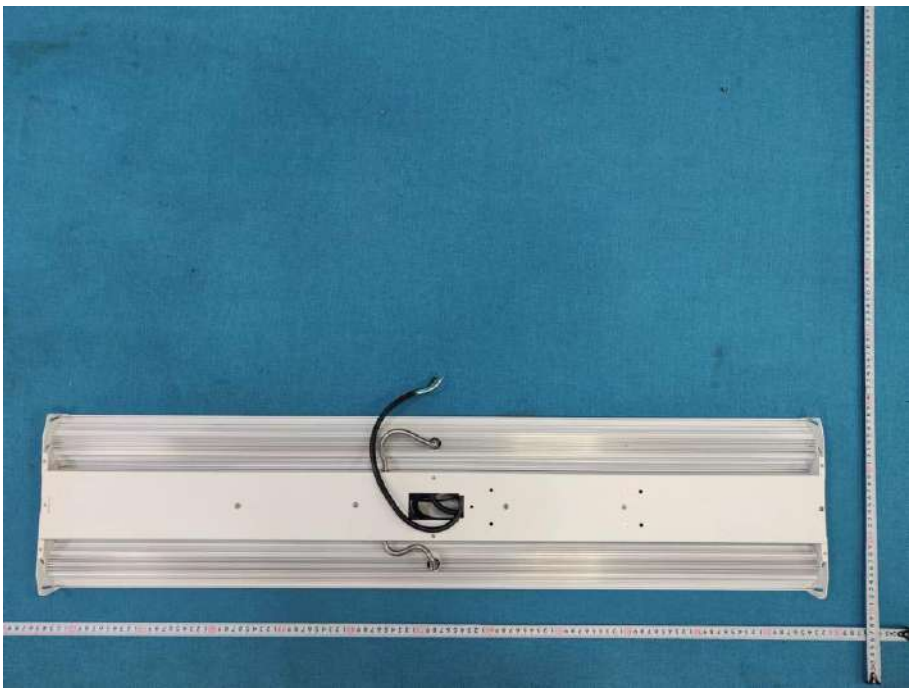


Figure 2

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