



Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23080353L00801

Client..... : IKIO LED LIGHTING

Address..... 8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

Test Model..... : IK-HBAX-0200-50-DY-RLHV04BI

Brand Name..... : IKIO

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..... : Aug. 14, 2023

Date of test : Aug. 30, 2023 – Sep. 08, 2023

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

Tested by:

Jarvis Zhang

Jarvis Zhang/ Test Engineer

Checked by:

Sandy Chen

Sandy Chen/ Project Engineer

Approved by:

Jessie Li

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 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:	IK-HBAX-0200-50-DY-RLHV04BI
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires (Commercial and Industrial)
Rated Voltage/Frequency:	277-480V AC, 50/60Hz
Rated Power:	200W
Rated luminous flux:	28000lm
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	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 $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ 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)	25.3℃	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)
276.99	60	0.7264	199.9	0.9936	28251	141.31	4942

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
86	23	86	98	0.3466	0.3521	0.2123	0.4851	-3.78E-04

5.2 Color Rendering Index

<div>Ra</div> <div>86</div>									
<div>R1</div> <div>85</div>	<div>R2</div> <div>91</div>	<div>R3</div> <div>94</div>	<div>R4</div> <div>86</div>	<div>R5</div> <div>85</div>					
<div>R6</div> <div>86</div>	<div>R7</div> <div>89</div>	<div>R8</div> <div>72</div>	<div>R9</div> <div>23</div>	<div>R10</div> <div>77</div>					
<div>R11</div> <div>85</div>	<div>R12</div> <div>64</div>	<div>R13</div> <div>87</div>	<div>R14</div> <div>97</div>	<div>R15</div> <div>81</div>					

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

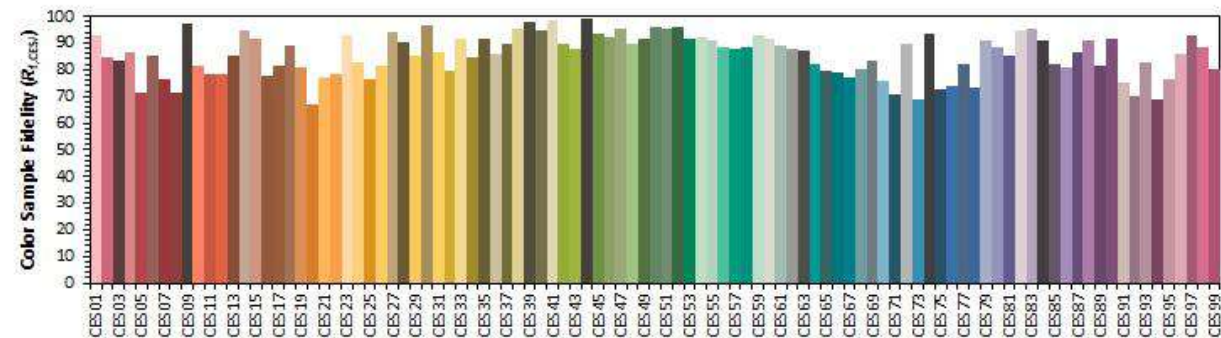
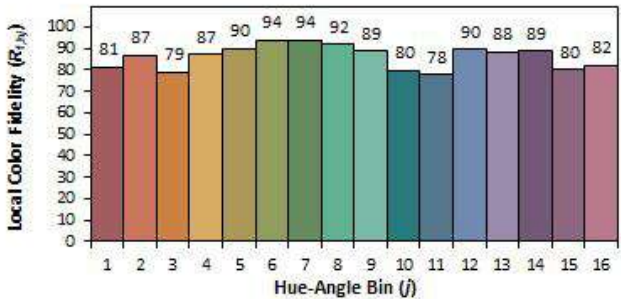
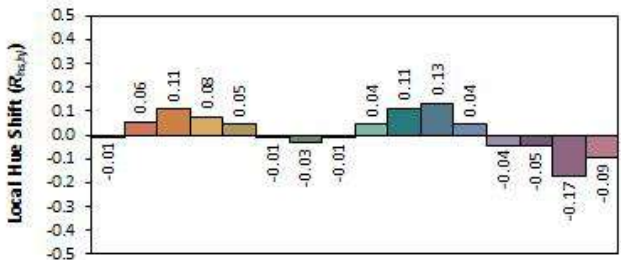
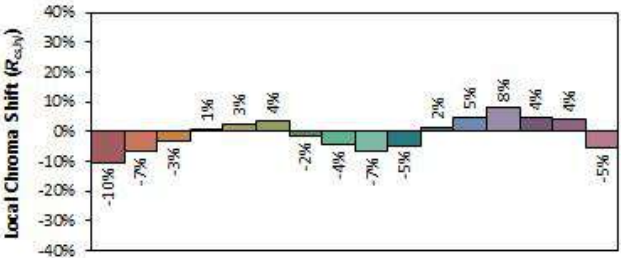
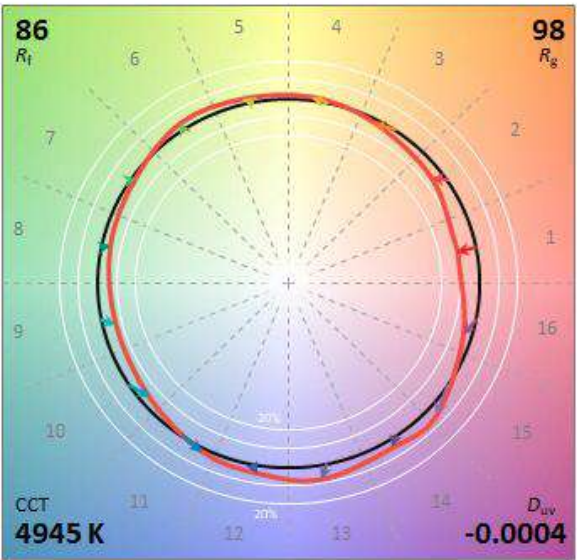
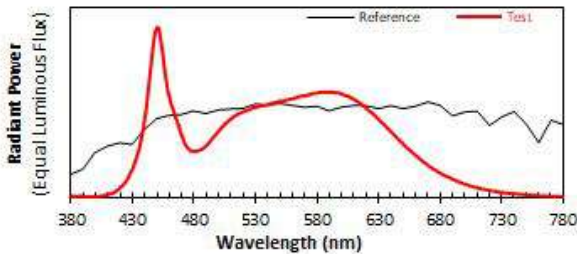
ANSI/IES TM-30-18 Color Rendition Report

Source: BXEN-50E-11M-3CA

Date: 2023/9/7

Manufacturer: IKIO LED LIGHTING

Model: IK-HBAX-0200-50-DY-RLHV04BI



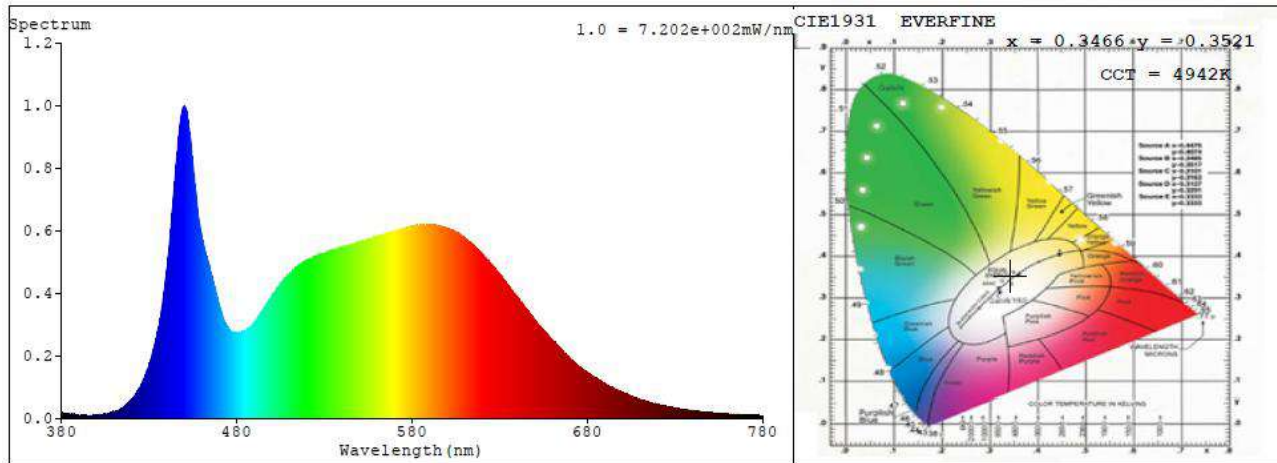
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3466
 y 0.3519
 u' 0.2123
 v' 0.4850

CIE 13.3-1995 (CRI)	
R_a	86
R_g	23

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	0.0102	414	0.0283	448	0.9537	482	0.2738	516	0.4906
381	0.0146	415	0.0297	449	0.9835	483	0.2744	517	0.4935
382	0.0063	416	0.0396	450	0.9973	484	0.2762	518	0.4958
383	0.0121	417	0.0412	451	0.9918	485	0.2817	519	0.5018
384	0.0071	418	0.048	452	0.962	486	0.283	520	0.5046
385	0.0062	419	0.0536	453	0.9154	487	0.2888	521	0.5067
386	0.0097	420	0.0629	454	0.8679	488	0.293	522	0.5096
387	0.0134	421	0.066	455	0.8135	489	0.2984	523	0.5115
388	0.0113	422	0.0739	456	0.7521	490	0.3055	524	0.5148
389	0.0117	423	0.0823	457	0.7006	491	0.312	525	0.5139
390	0.0091	424	0.091	458	0.6521	492	0.3201	526	0.5188
391	0.0058	425	0.0993	459	0.6144	493	0.331	527	0.525
392	0.0081	426	0.1119	460	0.5881	494	0.3376	528	0.5278
393	0.0089	427	0.1272	461	0.5546	495	0.3489	529	0.5275
394	0.0068	428	0.1404	462	0.5356	496	0.3577	530	0.5272
395	0.0077	429	0.1564	463	0.5155	497	0.3626	531	0.5314
396	0.0069	430	0.1704	464	0.494	498	0.3738	532	0.5326
397	0.0079	431	0.188	465	0.4684	499	0.3824	533	0.5345
398	0.0079	432	0.2114	466	0.4541	500	0.3913	534	0.5361
399	0.0093	433	0.2337	467	0.4293	501	0.4003	535	0.5386
400	0.0072	434	0.2519	468	0.4094	502	0.4071	536	0.539
401	0.0087	435	0.282	469	0.3831	503	0.4154	537	0.5409
402	0.0099	436	0.3102	470	0.366	504	0.4212	538	0.5412
403	0.0101	437	0.3396	471	0.3451	505	0.4348	539	0.5436
404	0.0115	438	0.381	472	0.3269	506	0.4345	540	0.5456
405	0.012	439	0.4187	473	0.3095	507	0.4427	541	0.5448
406	0.0133	440	0.4702	474	0.3001	508	0.4487	542	0.5468
407	0.0162	441	0.5187	475	0.291	509	0.4564	543	0.5525
408	0.0154	442	0.5802	476	0.2825	510	0.4611	544	0.554
409	0.0195	443	0.6468	477	0.2763	511	0.4655	545	0.5541
410	0.019	444	0.7169	478	0.2745	512	0.4745	546	0.5582
411	0.0234	445	0.7781	479	0.2721	513	0.4773	547	0.5577
412	0.0253	446	0.8445	480	0.2715	514	0.4826	548	0.5603
413	0.0282	447	0.9041	481	0.2731	515	0.4889	549	0.5635

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5639	599	0.6103	648	0.3309	697	0.0908	746	0.0213
551	0.5636	600	0.6062	649	0.3258	698	0.0876	747	0.0197
552	0.5658	601	0.6058	650	0.316	699	0.0841	748	0.019
553	0.5657	602	0.6026	651	0.3102	700	0.0817	749	0.0192
554	0.5702	603	0.5997	652	0.3008	701	0.0793	750	0.0191
555	0.5705	604	0.5974	653	0.2938	702	0.078	751	0.0174
556	0.5717	605	0.5956	654	0.2881	703	0.0758	752	0.0177
557	0.5748	606	0.5935	655	0.2826	704	0.0728	753	0.0173
558	0.5753	607	0.5873	656	0.2768	705	0.0706	754	0.0169
559	0.5792	608	0.5856	657	0.2698	706	0.0693	755	0.0165
560	0.5784	609	0.5803	658	0.2643	707	0.0664	756	0.0157
561	0.5803	610	0.5769	659	0.2568	708	0.0644	757	0.0153
562	0.5854	611	0.5711	660	0.2517	709	0.063	758	0.0154
563	0.5855	612	0.5674	661	0.2438	710	0.0611	759	0.0143
564	0.5873	613	0.5641	662	0.2404	711	0.0585	760	0.0141
565	0.591	614	0.5586	663	0.2329	712	0.057	761	0.0134
566	0.5926	615	0.555	664	0.2279	713	0.0558	762	0.0138
567	0.5938	616	0.5474	665	0.2205	714	0.0533	763	0.0129
568	0.5937	617	0.5419	666	0.2145	715	0.0527	764	0.0128
569	0.5961	618	0.5383	667	0.2092	716	0.0513	765	0.0124
570	0.5949	619	0.5314	668	0.2046	717	0.049	766	0.0123
571	0.6	620	0.525	669	0.1991	718	0.0482	767	0.0119
572	0.5992	621	0.5212	670	0.193	719	0.0473	768	0.0113
573	0.6047	622	0.5108	671	0.187	720	0.0456	769	0.0109
574	0.6012	623	0.5053	672	0.1815	721	0.0435	770	0.0113
575	0.6046	624	0.5016	673	0.1775	722	0.0424	771	0.0106
576	0.6086	625	0.4951	674	0.1732	723	0.0408	772	0.0108
577	0.6104	626	0.4882	675	0.1669	724	0.0402	773	0.0102
578	0.6104	627	0.4812	676	0.1642	725	0.0389	774	0.0101
579	0.6113	628	0.4756	677	0.1592	726	0.0373	775	0.0101
580	0.6117	629	0.4671	678	0.1549	727	0.036	776	0.0095
581	0.6149	630	0.4615	679	0.1494	728	0.0355	777	0.009
582	0.6163	631	0.4541	680	0.1471	729	0.0341	778	0.0093
583	0.6152	632	0.4445	681	0.1425	730	0.0335	779	0.009
584	0.6175	633	0.4382	682	0.1386	731	0.0319	780	0.009
585	0.6179	634	0.4308	683	0.135	732	0.031		
586	0.619	635	0.4265	684	0.1317	733	0.03		
587	0.6168	636	0.4174	685	0.1283	734	0.0294		
588	0.617	637	0.4109	686	0.1238	735	0.0289		
589	0.6172	638	0.4013	687	0.1219	736	0.0274		
590	0.6175	639	0.3966	688	0.1194	737	0.0266		
591	0.6209	640	0.3886	689	0.1144	738	0.0261		
592	0.6164	641	0.3819	690	0.1121	739	0.0246		
593	0.6163	642	0.374	691	0.1084	740	0.0241		
594	0.6162	643	0.3656	692	0.1057	741	0.0244		
595	0.6143	644	0.3603	693	0.1027	742	0.0234		
596	0.6136	645	0.3525	694	0.0993	743	0.0233		
597	0.6141	646	0.3447	695	0.0959	744	0.0221		
598	0.6128	647	0.3382	696	0.0931	745	0.0214		

6. Goniophotometer Test results

6.1 Test Data

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

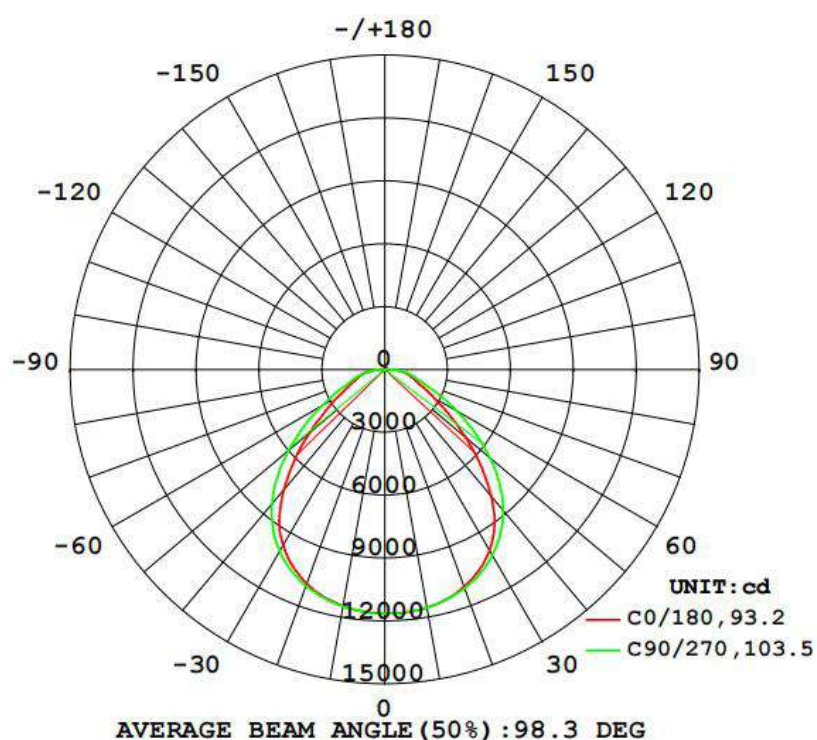
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
277.1	60	0.7251	0.9952	199.9

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	I _{max} (cd)	ZL (20-50°)
28192.6	141.02	11659	56.3%

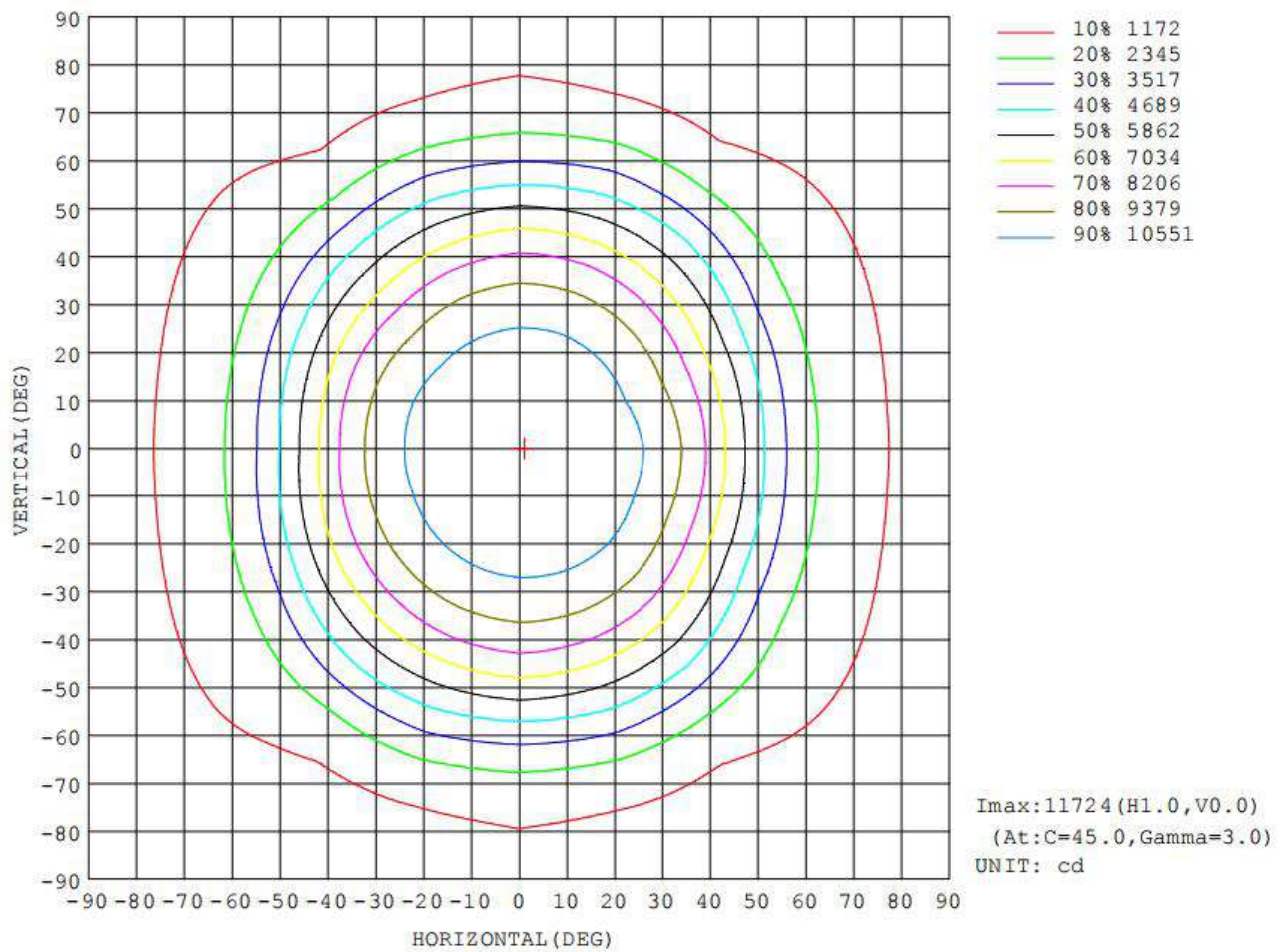
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum, lamp
10	1154	1156	1153	1150	1146	1146	1147	1149	0- 10	1105	1105	3.92, 3.92
20	1104	1113	1111	1103	1087	1087	1098	1100	10- 20	3193	4298	15.2, 15.2
30	997.9	1018	1026	1002	969.7	969.6	1002	994.6	20- 30	4866	9164	32.5, 32.5
40	790.9	844.0	879.5	820.9	749.7	767.5	837.5	804.9	30- 40	5710	14875	52.8, 52.8
50	505.3	597.3	655.5	579.3	470.1	518.3	600.5	559.9	40- 50	5293	20168	71.5, 71.5
60	272.7	332.9	397.3	319.7	255.8	265.0	347.5	298.7	50- 60	3851	24019	85.2, 85.2
70	158.3	140.0	200.3	134.2	152.1	114.0	177.9	126.2	60- 70	2205	26225	93, 93
80	100.1	87.44	113.7	84.30	93.47	71.25	97.66	79.71	70- 80	1249	27474	97.5, 97.5
90	0.4124	9.995	10.26	0.1230	0.1959	0.1790	0.2930	0.3895	80- 90	536.5	28010	99.4, 99.4
100	6.172	3.242	0.3841	3.063	5.335	3.127	0.5649	3.303	90-100	19.00	28029	99.4, 99.4
110	4.976	3.509	0.8959	3.310	5.184	3.590	0.9220	3.574	100-110	33.82	28063	99.5, 99.5
120	5.162	3.641	1.289	3.575	5.438	3.551	1.156	3.445	110-120	33.75	28097	99.7, 99.7
130	4.709	3.686	1.568	3.559	4.833	3.532	1.415	3.402	120-130	30.70	28128	99.8, 99.8
140	4.166	3.131	1.788	3.402	4.459	3.403	1.868	3.087	130-140	25.61	28153	99.9, 99.9
150	3.367	3.003	2.078	3.262	4.009	3.621	2.169	2.876	140-150	19.24	28172	99.9, 99.9
160	2.735	2.055	1.874	2.518	3.467	3.228	2.257	1.648	150-160	12.50	28185	100, 100
170	1.606	1.461	1.763	1.867	1.732	1.603	2.094	1.936	160-170	5.817	28191	100, 100
180	2.162	1.995	2.124	2.096	2.180	2.011	2.010	2.064	170-180	1.784	28193	100, 100
DEG	LUMINOUS INTENSITY: X10cd									UNIT: lm		

6.4 Isocandela Diagram



6.5 Luminous Distribution Intensity Data

Table--1 UNIT: X10cd

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	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165			
5	1164	1164	1165	1164	1163	1162	1161	1161	1160	1161	1160	1159	1160	1161	1162	1162			
10	1154	1154	1156	1156	1153	1151	1150	1150	1146	1148	1146	1147	1147	1150	1149	1150			
15	1136	1136	1139	1139	1137	1134	1131	1129	1124	1125	1121	1125	1128	1130	1131	1132			
20	1104	1105	1113	1113	1111	1106	1103	1097	1087	1090	1087	1092	1098	1101	1100	1097			
25	1060	1061	1075	1077	1076	1069	1060	1051	1038	1040	1038	1049	1058	1060	1056	1051			
30	998	999	1018	1026	1026	1017	1002	988	970	974	970	989	1002	1003	995	987			
35	914	915	945	957	961	945	922	904	878	883	880	908	930	926	912	897			
40	791	798	844	867	880	854	821	792	750	761	767	806	837	829	805	781			
45	648	662	723	755	776	744	703	661	608	626	644	689	726	712	685	649			
50	505	524	597	633	656	623	579	522	470	490	518	567	601	590	560	508			
55	372	387	469	511	525	501	452	386	345	360	386	446	468	467	429	370			
60	273	276	333	389	397	382	320	275	256	259	265	327	348	349	299	266			
65	203	195	218	272	286	269	208	197	192	184	171	223	249	243	193	189			
70	158	146	140	181	200	178	134	147	152	139	114	150	178	161	126	144			
75	129	117	103	128	149	124	102	117	124	111	94.2	110	137	115	99.6	114			
80	100	89.8	87.4	93.2	114	88.7	84.3	90.3	93.5	84.1	71.2	78.2	97.7	80.3	79.7	86.9			
85	64.7	57.7	56.3	60.3	66.0	55.4	51.2	58.8	56.5	50.4	34.1	41.4	46.5	45.6	44.1	54.3			
90	0.41	3.83	10.00	11.3	10.3	9.19	0.12	6.70	0.20	0.18	0.18	0.33	0.29	0.18	0.39	0.18			
95	0.17	0.18	0.16	0.98	0.21	0.92	1.09	0.16	2.03	0.57	3.00	1.21	0.37	1.26	3.28	0.34			
100	6.17	5.30	3.24	1.44	0.38	1.33	3.06	4.64	5.33	4.93	3.13	1.47	0.56	1.63	3.30	5.67			
105	5.20	4.70	3.32	1.59	0.63	1.54	3.16	4.64	5.00	4.86	3.41	1.66	0.76	1.72	3.47	4.97			
110	4.98	4.77	3.51	1.77	0.90	1.75	3.31	4.77	5.18	5.03	3.59	1.88	0.92	1.78	3.57	4.88			
115	5.10	4.89	3.61	1.99	1.13	1.97	3.48	5.01	5.44	5.17	3.61	2.06	1.01	1.86	3.50	4.93			
120	5.16	4.93	3.64	2.17	1.29	2.14	3.58	5.06	5.44	5.08	3.55	2.15	1.16	1.82	3.45	4.82			
125	4.98	4.80	3.65	2.19	1.35	2.27	3.54	4.92	5.17	4.80	3.49	2.17	1.32	1.95	3.38	4.66			
130	4.71	4.54	3.69	2.35	1.57	2.46	3.56	4.68	4.83	4.53	3.53	2.33	1.41	2.04	3.40	4.43			
135	4.40	4.28	3.61	2.37	1.70	2.58	3.55	4.45	4.61	4.37	3.53	2.46	1.50	2.14	3.17	4.23			
140	4.17	4.05	3.13	2.35	1.79	2.60	3.40	4.22	4.46	4.25	3.40	2.62	1.87	2.21	3.09	4.05			
145	3.67	3.46	3.14	1.95	2.02	2.32	3.39	3.90	4.26	4.06	3.55	2.68	1.82	1.71	3.11	3.51			
150	3.37	3.26	3.00	1.85	2.08	1.27	3.26	3.61	4.01	3.94	3.62	2.76	2.17	1.61	2.88	3.48			
155	3.09	3.02	2.70	1.38	1.99	1.34	2.96	3.39	3.86	3.81	3.49	2.76	2.24	2.02	2.27	3.19			
160	2.73	2.58	2.05	1.51	1.87	1.68	2.52	2.97	3.47	3.39	3.23	1.62	2.26	1.94	1.65	2.41			
165	2.00	1.85	1.78	1.71	1.79	2.05	1.54	2.33	2.89	2.86	2.42	1.69	2.10	1.75	1.76	1.60			
170	1.61	1.38	1.46	1.86	1.76	1.97	1.87	1.29	1.73	1.72	1.60	2.18	2.09	1.92	1.94	1.72			
175	1.83	1.84	1.80	1.79	1.80	1.90	1.94	1.93	2.09	2.09	2.10	1.97	1.90	1.83	1.87	1.89			
180	2.16	2.08	2.00	2.07	2.12	2.16	2.10	1.99	2.18	2.17	2.01	2.00	2.01	2.03	2.06	2.06			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-0200-50-DY-RLHV04BI	277.0	60	0.993	2.61
	480.0	60	0.955	8.81

8. Photo of sample

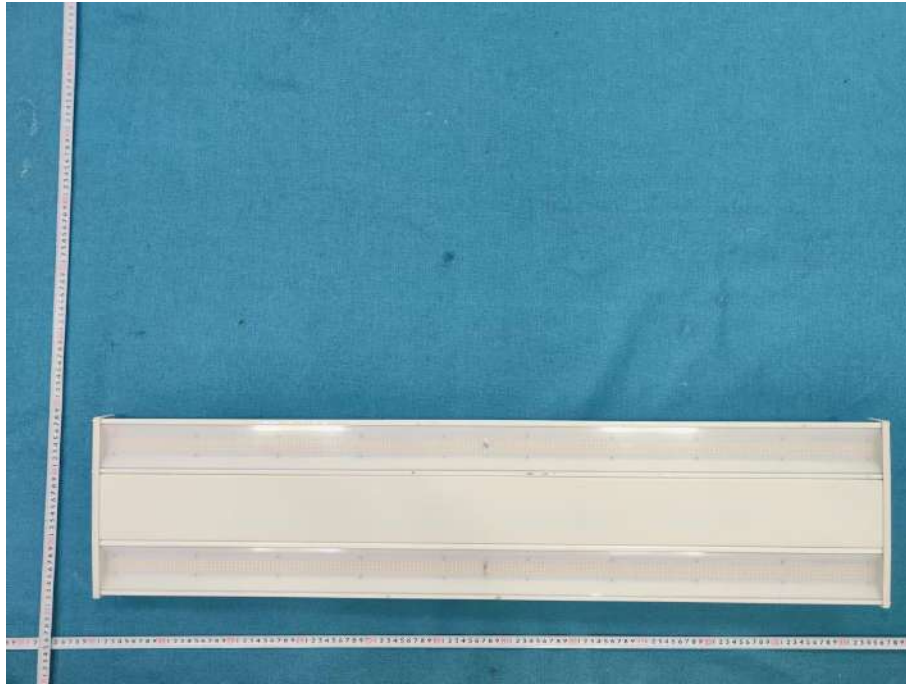


Figure 1



Figure 2

---End of Report---