



Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23080353L00901

Client..... : IKIO LED LIGHTING

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

Test Model..... : IK-HBAX-0240-50-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-0240-50-DY-RLHV04BI
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires (Commercial and Industrial)
Rated Voltage/Frequency:	277-480V AC, 50/60Hz
Rated Power:	240W
Rated luminous flux:	33600lm
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	0.8693	239.8	0.996	35604	148.46	4872

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
85	24	85	98	0.3489	0.3561	0.2123	0.4874	7.03E-04

5.2 Color Rendering Index

<div>Ra</div> <div>85</div>									
<div>R1</div> <div>84</div>	<div>R2</div> <div>89</div>	<div>R3</div> <div>91</div>	<div>R4</div> <div>85</div>	<div>R5</div> <div>84</div>	<div>R6</div> <div>84</div>	<div>R7</div> <div>90</div>	<div>R8</div> <div>73</div>	<div>R9</div> <div>24</div>	<div>R10</div> <div>72</div>
<div>R11</div> <div>84</div>	<div>R12</div> <div>61</div>	<div>R13</div> <div>85</div>	<div>R14</div> <div>95</div>	<div>R15</div> <div>80</div>					

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

ANSI/IES TM-30-18 Color Rendition Report

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

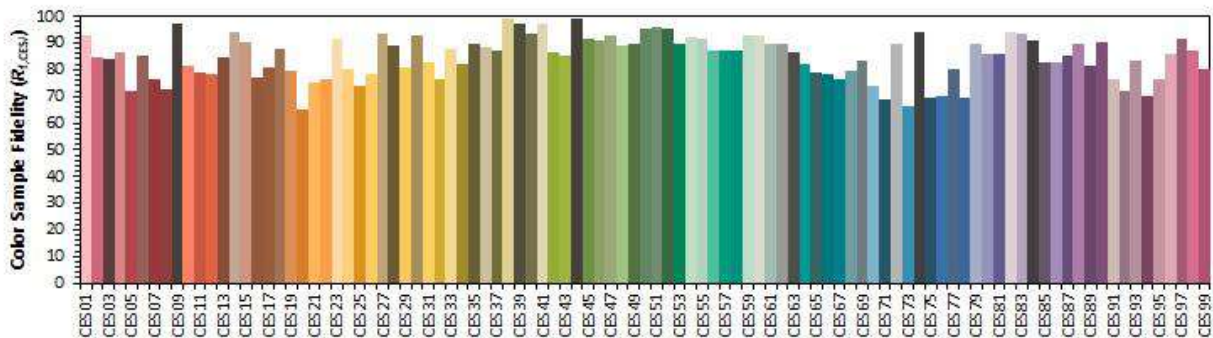
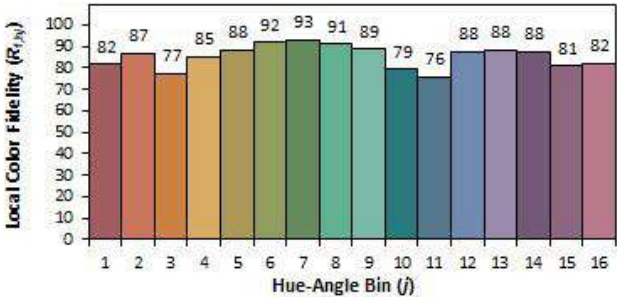
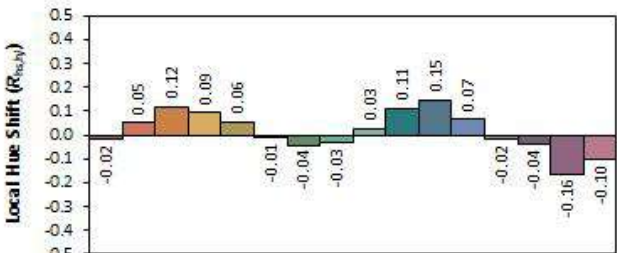
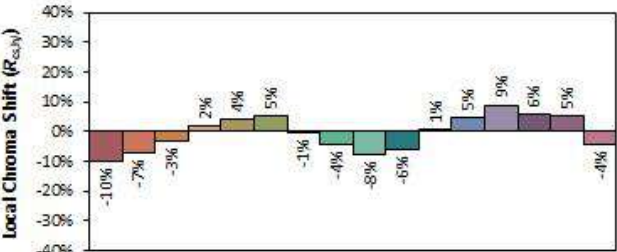
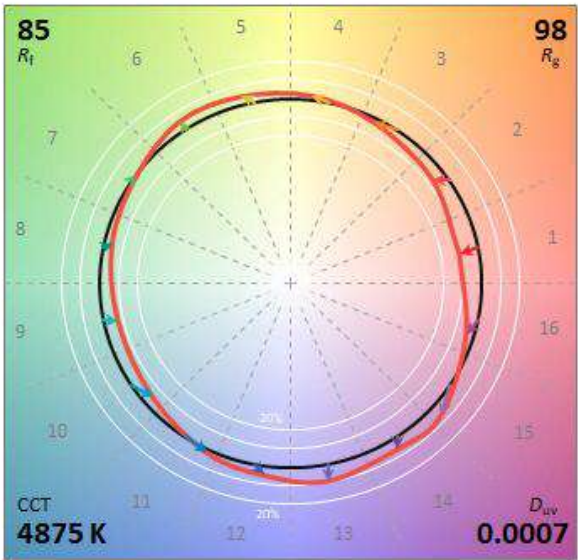
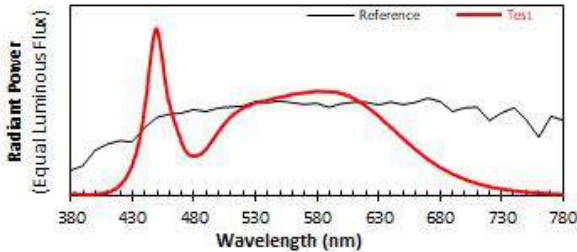
Date: 2023/9/7

Manufacturer:

IKIO LED LIGHTING

Model:

IK-HBAX-0240-50-DY-RLHV04BI



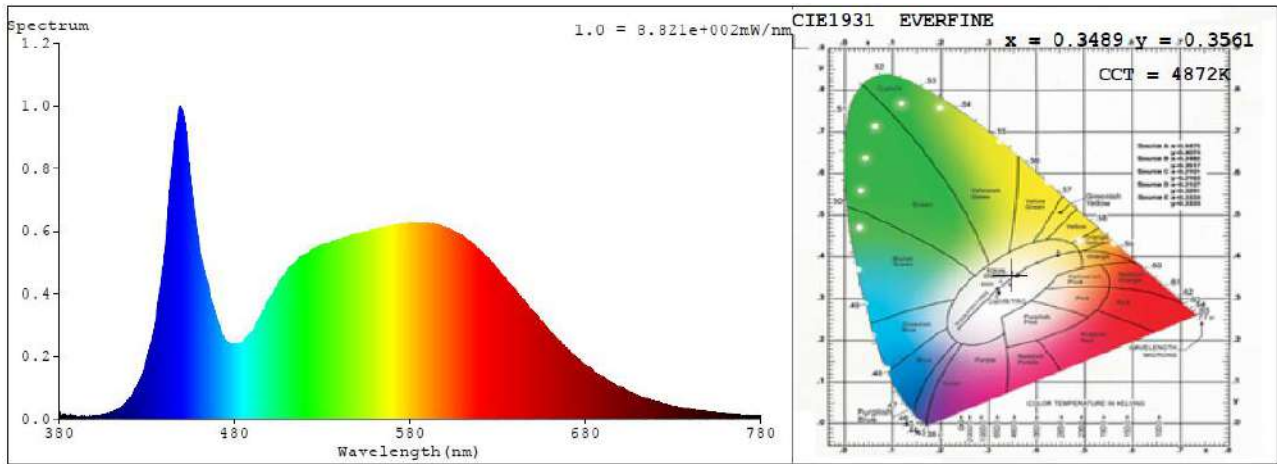
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3489
y 0.3559
u' 0.2123
v' 0.4873

CIE 13.3-1995 (CRI)
R_a 85
R_g 24

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	0.0087	414	0.0346	448	0.9737	482	0.2411	516	0.5065
381	0.0118	415	0.0372	449	1	483	0.2421	517	0.5128
382	0.0145	416	0.0397	450	0.9934	484	0.2453	518	0.5179
383	0.0157	417	0.0461	451	0.9653	485	0.2472	519	0.5206
384	0.0125	418	0.0521	452	0.9253	486	0.2533	520	0.5246
385	0.0115	419	0.0593	453	0.8769	487	0.26	521	0.5304
386	0.0098	420	0.0683	454	0.8216	488	0.2667	522	0.5334
387	0.0095	421	0.0743	455	0.7741	489	0.2754	523	0.5368
388	0.0094	422	0.0848	456	0.7141	490	0.2802	524	0.537
389	0.0083	423	0.0908	457	0.6623	491	0.2903	525	0.5427
390	0.0093	424	0.1006	458	0.6198	492	0.3002	526	0.5415
391	0.0098	425	0.1126	459	0.5769	493	0.3111	527	0.5481
392	0.008	426	0.1241	460	0.5484	494	0.3231	528	0.5516
393	0.0076	427	0.1402	461	0.5197	495	0.3313	529	0.5533
394	0.0055	428	0.1558	462	0.4921	496	0.3443	530	0.5563
395	0.0076	429	0.1741	463	0.4697	497	0.3515	531	0.5578
396	0.0062	430	0.1898	464	0.4456	498	0.3677	532	0.561
397	0.0098	431	0.2156	465	0.4226	499	0.3771	533	0.5626
398	0.0069	432	0.2349	466	0.4028	500	0.3878	534	0.5624
399	0.0109	433	0.2575	467	0.3788	501	0.3952	535	0.5669
400	0.0085	434	0.2892	468	0.3588	502	0.4053	536	0.5633
401	0.0089	435	0.3174	469	0.3415	503	0.4161	537	0.5663
402	0.0127	436	0.352	470	0.3156	504	0.4251	538	0.5665
403	0.0117	437	0.3873	471	0.3001	505	0.4354	539	0.5707
404	0.0135	438	0.433	472	0.2827	506	0.4394	540	0.574
405	0.0132	439	0.4834	473	0.2716	507	0.4512	541	0.5754
406	0.0137	440	0.5388	474	0.2618	508	0.4581	542	0.577
407	0.0164	441	0.5884	475	0.2509	509	0.4675	543	0.5787
408	0.0165	442	0.6439	476	0.2447	510	0.4736	544	0.5804
409	0.0216	443	0.7241	477	0.2417	511	0.4797	545	0.5812
410	0.021	444	0.7836	478	0.2392	512	0.4875	546	0.5858
411	0.0238	445	0.8456	479	0.2388	513	0.4941	547	0.5863
412	0.026	446	0.9044	480	0.2377	514	0.4957	548	0.5895
413	0.0303	447	0.9492	481	0.2374	515	0.5029	549	0.5901

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5904	599	0.6113	648	0.3574	697	0.1104	746	0.0256
551	0.5914	600	0.6105	649	0.3512	698	0.1069	747	0.0256
552	0.5959	601	0.6112	650	0.3457	699	0.104	748	0.0246
553	0.594	602	0.6082	651	0.3368	700	0.1017	749	0.0242
554	0.5969	603	0.6027	652	0.3322	701	0.0986	750	0.0239
555	0.5983	604	0.6042	653	0.325	702	0.0958	751	0.0225
556	0.5989	605	0.5996	654	0.3168	703	0.0922	752	0.0222
557	0.6033	606	0.5989	655	0.3123	704	0.0902	753	0.0214
558	0.6021	607	0.5974	656	0.3049	705	0.0875	754	0.0213
559	0.6057	608	0.5896	657	0.2993	706	0.0844	755	0.0201
560	0.6073	609	0.5837	658	0.2942	707	0.0826	756	0.0195
561	0.6073	610	0.5846	659	0.285	708	0.0806	757	0.0194
562	0.6073	611	0.5794	660	0.2799	709	0.0785	758	0.0189
563	0.6099	612	0.5765	661	0.2746	710	0.0757	759	0.0176
564	0.6116	613	0.5704	662	0.2696	711	0.0744	760	0.0176
565	0.6142	614	0.5674	663	0.2621	712	0.0704	761	0.0173
566	0.6147	615	0.5644	664	0.2562	713	0.0693	762	0.0168
567	0.6159	616	0.5565	665	0.2501	714	0.0675	763	0.0164
568	0.6139	617	0.5537	666	0.2434	715	0.0658	764	0.0164
569	0.616	618	0.546	667	0.24	716	0.0626	765	0.0162
570	0.6165	619	0.5432	668	0.2329	717	0.0618	766	0.0152
571	0.6193	620	0.537	669	0.2271	718	0.0599	767	0.0146
572	0.6201	621	0.531	670	0.2198	719	0.0582	768	0.0145
573	0.6182	622	0.5253	671	0.2155	720	0.0563	769	0.0138
574	0.6203	623	0.5205	672	0.2101	721	0.0548	770	0.0138
575	0.6212	624	0.5156	673	0.2066	722	0.0525	771	0.0132
576	0.6226	625	0.5079	674	0.2005	723	0.0518	772	0.0133
577	0.6264	626	0.5027	675	0.1955	724	0.0502	773	0.013
578	0.622	627	0.4974	676	0.1906	725	0.0484	774	0.0122
579	0.6234	628	0.4909	677	0.185	726	0.0471	775	0.0118
580	0.6263	629	0.4829	678	0.181	727	0.0456	776	0.0115
581	0.6261	630	0.4795	679	0.1765	728	0.0437	777	0.0117
582	0.6263	631	0.4719	680	0.172	729	0.0435	778	0.0107
583	0.6239	632	0.4646	681	0.1675	730	0.0418	779	0.0106
584	0.6255	633	0.4594	682	0.1646	731	0.0405	780	0.0106
585	0.6246	634	0.4476	683	0.1616	732	0.0395		
586	0.6251	635	0.4421	684	0.157	733	0.0379		
587	0.6234	636	0.4371	685	0.1518	734	0.0379		
588	0.624	637	0.4309	686	0.1482	735	0.0365		
589	0.6243	638	0.4251	687	0.144	736	0.0352		
590	0.6236	639	0.4186	688	0.1409	737	0.0337		
591	0.6216	640	0.4112	689	0.1364	738	0.0337		
592	0.6212	641	0.4057	690	0.1324	739	0.0325		
593	0.6231	642	0.4016	691	0.1293	740	0.0315		
594	0.6217	643	0.3928	692	0.1265	741	0.0311		
595	0.62	644	0.385	693	0.1227	742	0.0296		
596	0.6195	645	0.3785	694	0.1205	743	0.0285		
597	0.6186	646	0.3711	695	0.1164	744	0.0285		
598	0.6163	647	0.3643	696	0.113	745	0.027		

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

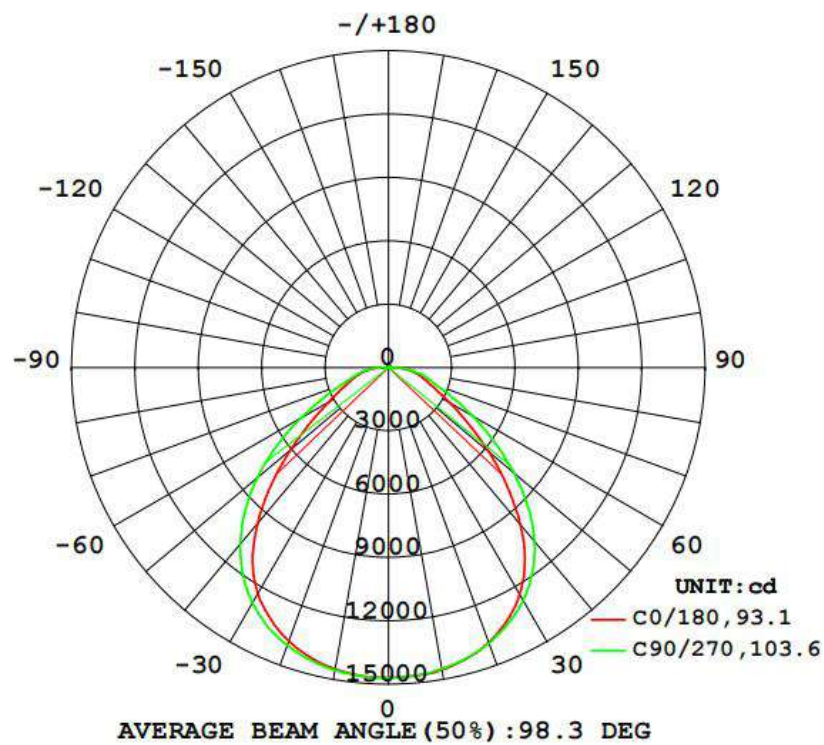
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
277.1	60	0.8685	0.9968	239.9

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
35531.6	148.11	14699	56.3%

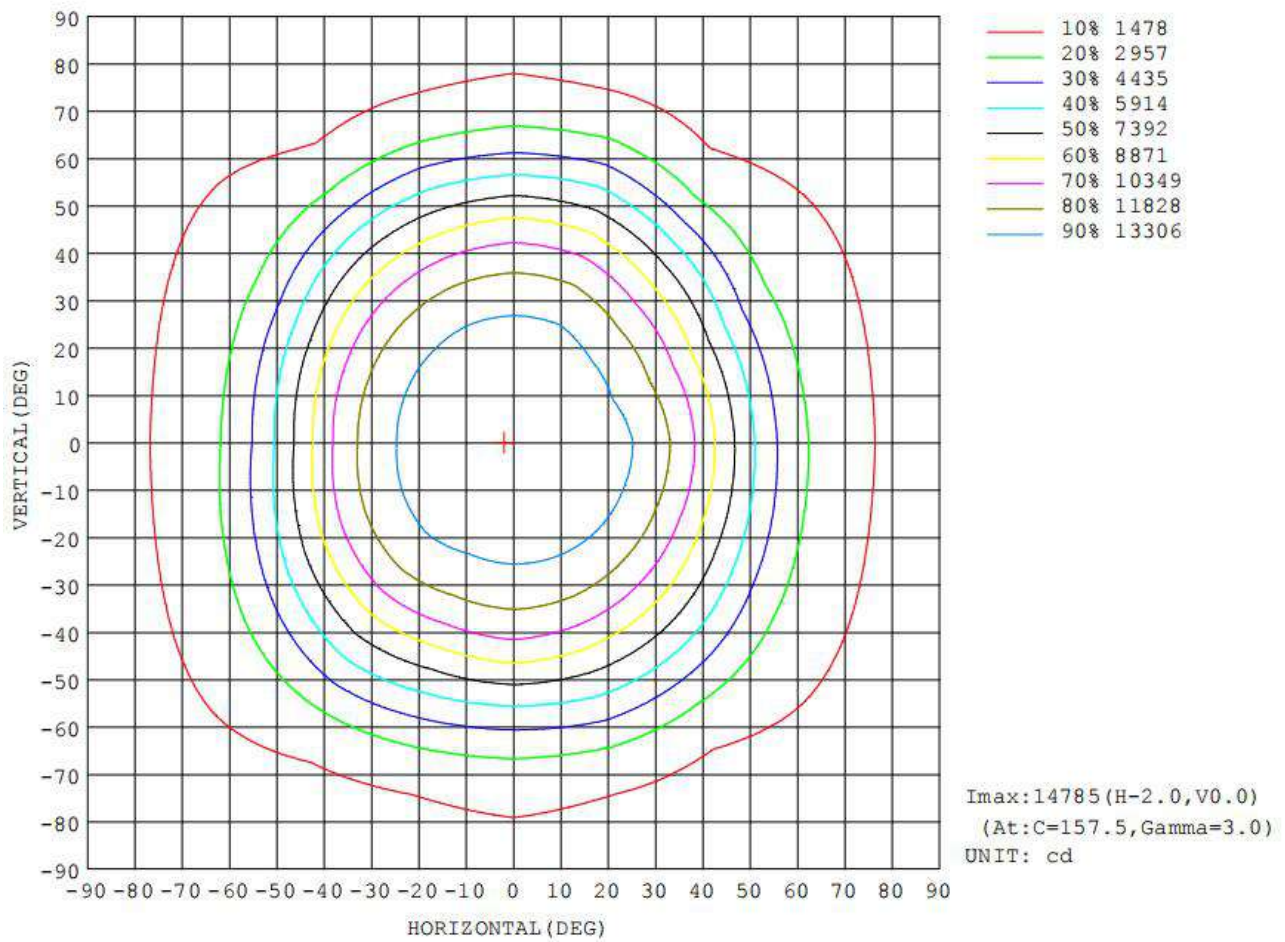
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	Φ lum, lamp
10	1454	1450	1449	1456	1450	1451	1455	1450	0- 10	1395	1395	3.92, 3.92
20	1387	1388	1390	1401	1379	1390	1401	1379	10- 20	4030	5424	15.3, 15.3
30	1242	1251	1275	1284	1238	1258	1289	1236	20- 30	6141	11565	32.5, 32.5
40	972.8	1004	1077	1064	956.7	1027	1091	988.9	30- 40	7201	18766	52.8, 52.8
50	620.0	702.6	775.3	756.9	605.3	706.2	810.8	666.1	40- 50	6668	25435	71.6, 71.6
60	338.0	391.9	461.3	447.6	328.2	359.5	480.4	326.4	50- 60	4853	30288	85.2, 85.2
70	193.8	165.7	241.4	196.6	195.6	150.8	235.3	144.1	60- 70	2785	33073	93.1, 93.1
80	119.6	96.81	138.0	110.7	121.0	105.5	129.6	97.30	70- 80	1575	34648	97.5, 97.5
90	7.420	0.1444	8.128	13.36	0.2398	0.2127	8.313	0.2389	80- 90	660.9	35309	99.4, 99.4
100	7.376	3.979	0.4244	4.367	8.344	4.385	0.5865	3.976	90-100	27.01	35336	99.4, 99.4
110	5.664	3.994	0.8120	4.549	6.905	4.596	0.8673	3.952	100-110	42.84	35379	99.6, 99.6
120	5.896	4.193	1.156	4.766	7.180	4.562	1.028	4.036	110-120	41.00	35420	99.7, 99.7
130	5.492	4.067	1.474	4.436	6.237	4.558	1.233	4.186	120-130	37.02	35457	99.8, 99.8
140	4.843	3.683	1.558	4.067	5.613	4.283	1.998	3.716	130-140	30.01	35487	99.9, 99.9
150	3.955	3.252	2.192	3.523	4.921	4.183	2.310	3.183	140-150	22.25	35509	99.9, 99.9
160	3.063	2.459	2.056	2.618	3.816	3.473	2.439	1.919	150-160	14.05	35523	100, 100
170	1.819	1.702	2.075	1.831	2.196	2.022	2.260	2.349	160-170	6.632	35530	100, 100
180	2.584	2.399	2.471	2.286	2.551	2.405	2.378	2.375	170-180	2.078	35532	100, 100
DEG	LUMINOUS INTENSITY: X10cd									UNIT: lm		

6.4 Isocandela Diagram



6.5 Luminous Distribution Intensity Data

Table--1 UNIT: X10cd

C (DEG) γ (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	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469			
5	1465	1463	1462	1463	1465	1466	1468	1469	1465	1465	1465	1466	1467	1467	1464	1466			
10	1454	1452	1450	1448	1449	1449	1456	1456	1450	1453	1451	1453	1455	1455	1450	1450			
15	1427	1426	1427	1426	1425	1423	1434	1434	1422	1426	1430	1431	1434	1434	1421	1418			
20	1387	1384	1388	1388	1390	1386	1401	1397	1379	1382	1390	1397	1401	1401	1379	1371			
25	1325	1326	1332	1337	1339	1336	1351	1345	1318	1324	1334	1349	1354	1354	1319	1307			
30	1242	1243	1251	1267	1275	1267	1284	1273	1238	1244	1258	1277	1289	1285	1236	1217			
35	1127	1123	1143	1172	1188	1173	1190	1172	1123	1134	1157	1185	1201	1194	1125	1099			
40	973	972	1004	1045	1077	1050	1064	1034	967	989	1027	1066	1091	1078	989	944			
45	795	811	853	900	936	902	913	869	785	816	873	923	961	939	833	765			
50	620	649	703	751	775	745	757	700	605	632	706	766	811	784	666	580			
55	461	490	548	605	611	595	602	538	448	457	530	605	645	624	489	417			
60	338	353	392	460	461	450	448	395	328	321	359	446	480	466	326	296			
65	252	250	259	321	333	320	304	284	248	228	229	298	339	317	212	214			
70	194	183	166	214	241	217	197	207	196	174	151	197	235	211	144	167			
75	157	140	124	150	188	152	138	157	160	145	125	145	173	151	121	137			
80	120	105	96.8	105	138	107	111	117	121	114	106	107	130	109	97.3	104			
85	76.2	66.3	55.8	63.6	72.9	61.8	70.7	80.9	75.6	70.9	60.4	65.1	70.4	67.9	39.3	46.7			
90	7.42	7.73	0.14	10.9	8.13	8.42	13.4	10.4	0.24	0.25	0.21	4.73	8.31	9.36	0.24	0.25			
95	0.22	0.22	1.48	1.40	0.28	1.42	0.17	0.18	0.40	2.77	4.48	1.61	0.40	1.42	4.13	0.60			
100	7.38	6.38	3.98	1.81	0.42	1.88	4.37	7.82	8.34	7.37	4.39	2.04	0.59	1.97	3.98	6.30			
105	6.02	5.50	3.94	1.96	0.61	2.07	4.38	6.73	6.95	6.55	4.52	2.20	0.74	2.10	3.88	5.54			
110	5.66	5.45	3.99	2.14	0.81	2.29	4.55	6.65	6.91	6.52	4.60	2.38	0.87	2.17	3.95	5.41			
115	5.77	5.59	4.13	2.33	1.00	2.49	4.68	6.77	7.18	6.58	4.56	2.56	0.92	2.27	3.98	5.54			
120	5.90	5.68	4.19	2.47	1.16	2.55	4.77	6.78	7.18	6.55	4.56	2.65	1.03	2.33	4.04	5.50			
125	5.78	5.57	4.10	2.51	1.18	2.54	4.66	6.51	6.79	6.22	4.56	2.65	1.21	2.28	4.15	5.37			
130	5.49	5.28	4.07	2.55	1.47	2.50	4.44	6.08	6.24	5.83	4.56	2.64	1.23	2.25	4.19	5.16			
135	5.13	4.95	3.98	2.48	1.62	2.34	4.35	5.65	5.84	5.55	4.51	2.76	1.48	2.44	4.02	4.96			
140	4.84	4.66	3.68	2.42	1.56	2.21	4.07	5.29	5.61	5.37	4.28	2.78	2.00	2.49	3.72	4.75			
145	4.47	4.22	3.47	2.25	1.98	2.09	3.83	4.88	5.34	5.10	4.30	2.57	2.05	2.14	3.55	4.35			
150	3.95	3.76	3.25	2.21	2.19	1.47	3.52	4.38	4.92	4.87	4.18	2.75	2.31	1.80	3.18	3.99			
155	3.54	3.39	2.93	1.51	2.05	1.71	3.11	3.92	4.54	4.45	3.87	2.77	2.37	2.29	2.50	3.50			
160	3.06	2.91	2.46	1.61	2.06	2.22	2.62	3.26	3.82	3.72	3.47	2.13	2.44	2.22	1.92	2.83			
165	2.46	2.27	1.47	2.00	2.01	2.25	1.68	2.49	3.05	3.04	2.80	2.15	2.38	2.09	2.14	1.93			
170	1.82	1.57	1.70	2.16	2.07	2.20	1.83	1.56	2.20	2.18	2.02	2.36	2.26	2.11	2.35	2.21			
175	2.20	2.16	2.12	2.12	2.14	2.22	2.14	2.09	2.37	2.36	2.41	2.28	2.22	2.15	2.26	2.39			
180	2.58	2.46	2.40	2.40	2.47	2.30	2.29	2.43	2.55	2.54	2.40	2.39	2.38	2.39	2.37	2.41			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-0240-50-DY-RLHV04BI	277.0	60	0.995	1.61
	480.0	60	0.967	6.38

8. Photo of sample



Figure 1

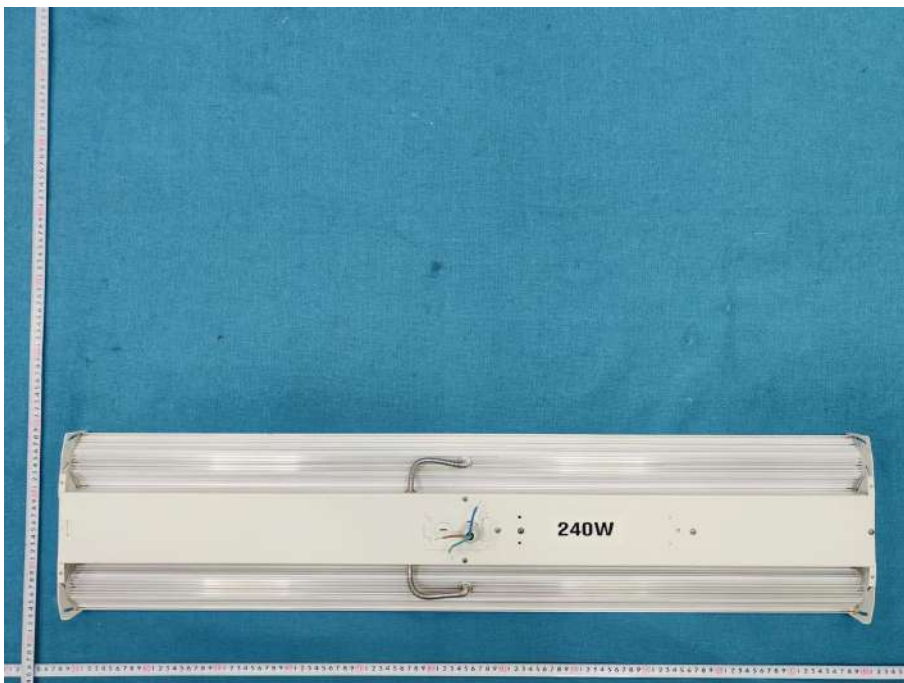


Figure 2

---End of Report---