



Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23080353L00401

Client..... : IKIO LED LIGHTING

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

Test Model..... : IK-HBAX-0240-50-DY-RLV04BS

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. 06, 2023

Date of report..... : Sep. 06, 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-RLV04BS
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires (Commercial and Industrial)
Rated Voltage/Frequency:	100-277V 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)
119.98	60	1.989	238.1	0.9979	35148	147.61	4863

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
84.9	24	85	98	0.3492	0.3565	0.2123	0.4876	7.74E-04

5.2 Color Rendering Index

Ra
84.9

R1
84

R2
89

R3
91

R4
85

R5
84

R6
84

R7
90

R8
73

R9
24

R10
72

R11
84

R12
61

R13
85

R14
95

R15
80

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

ANSI/IES TM-30-18 Color Rendition Report

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

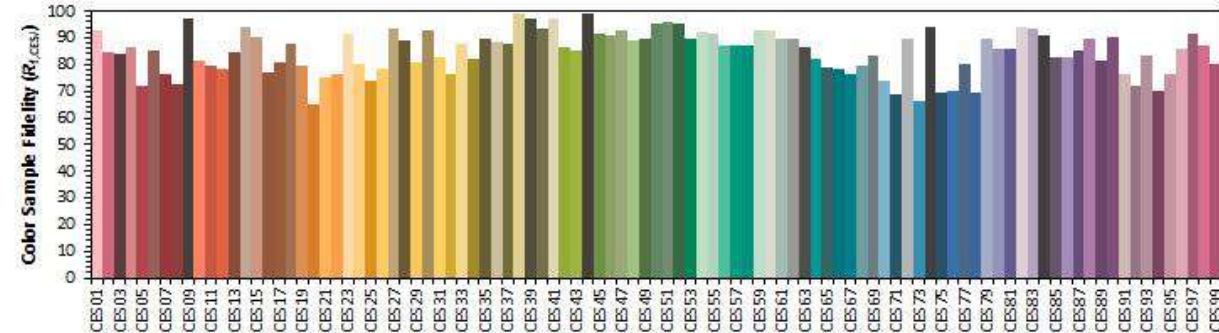
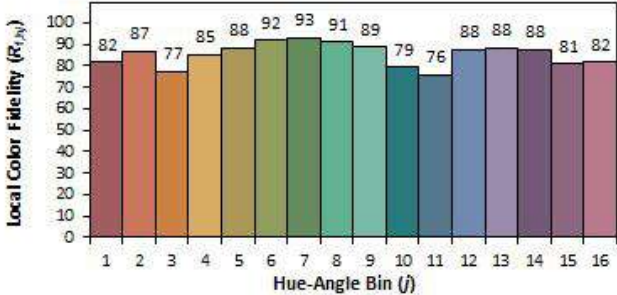
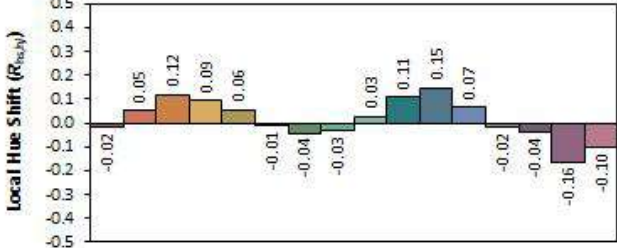
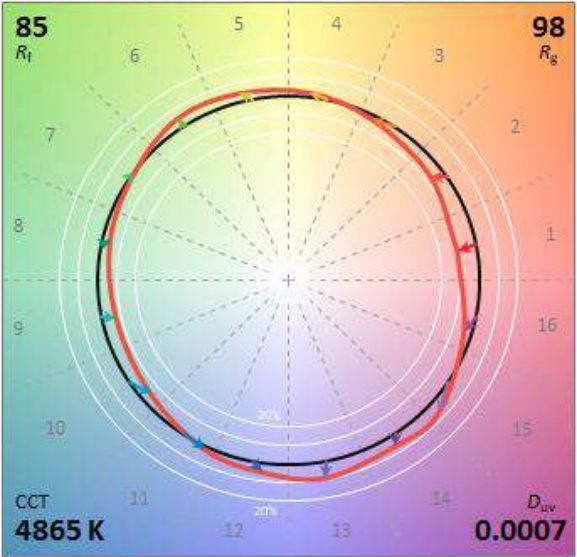
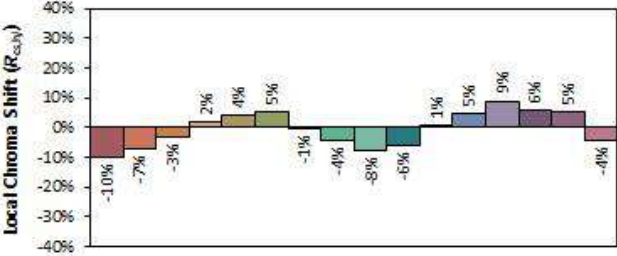
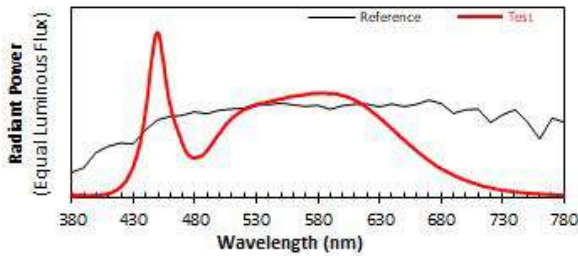
Manufacturer:

IKIO LED LIGHTING

Date: 2023/9/6

Model:

IK-HBAX-0240-50-DY-RLV04BS



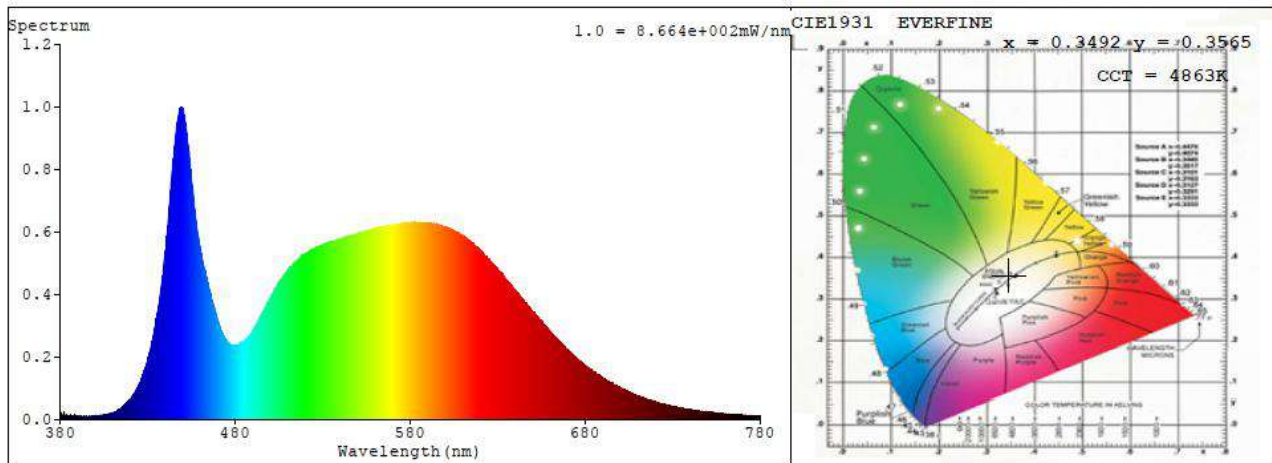
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3492
 y 0.3563
 u' 0.2124
 v' 0.4875

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	0.0197	414	0.0331	448	0.9803	482	0.2433	516	0.5086
381	0.0043	415	0.0376	449	0.9928	483	0.2411	517	0.5165
382	0.0014	416	0.0417	450	0.9957	484	0.2443	518	0.5234
383	0.0128	417	0.0457	451	0.9692	485	0.2497	519	0.5233
384	0.0082	418	0.0529	452	0.9299	486	0.2522	520	0.5289
385	0.0034	419	0.0596	453	0.8772	487	0.2597	521	0.5327
386	0.0125	420	0.063	454	0.829	488	0.2661	522	0.5352
387	0.0132	421	0.0742	455	0.7792	489	0.2739	523	0.5395
388	0.0107	422	0.0816	456	0.72	490	0.2832	524	0.5416
389	0.0097	423	0.0891	457	0.6677	491	0.2933	525	0.5432
390	0.0096	424	0.0998	458	0.6171	492	0.3028	526	0.5467
391	0.008	425	0.1119	459	0.581	493	0.3126	527	0.5508
392	0.0094	426	0.122	460	0.5472	494	0.3235	528	0.5518
393	0.0061	427	0.1421	461	0.5145	495	0.3361	529	0.5532
394	0.0064	428	0.1547	462	0.4899	496	0.345	530	0.5593
395	0.0104	429	0.1717	463	0.465	497	0.3568	531	0.5609
396	0.0093	430	0.1902	464	0.4442	498	0.3714	532	0.561
397	0.0086	431	0.2132	465	0.4202	499	0.3789	533	0.5623
398	0.0088	432	0.2365	466	0.4032	500	0.3844	534	0.569
399	0.0099	433	0.2614	467	0.3777	501	0.3951	535	0.5675
400	0.0097	434	0.2893	468	0.3602	502	0.4074	536	0.567
401	0.0087	435	0.3203	469	0.3368	503	0.4174	537	0.569
402	0.01	436	0.3527	470	0.3184	504	0.4271	538	0.5726
403	0.0127	437	0.3916	471	0.3004	505	0.4373	539	0.5753
404	0.0137	438	0.4332	472	0.2831	506	0.4464	540	0.5776
405	0.0145	439	0.4821	473	0.2692	507	0.455	541	0.5779
406	0.0138	440	0.5367	474	0.2578	508	0.4606	542	0.5804
407	0.0169	441	0.5877	475	0.2529	509	0.4686	543	0.5825
408	0.0168	442	0.6517	476	0.2461	510	0.4761	544	0.5819
409	0.0198	443	0.7245	477	0.2399	511	0.4833	545	0.5822
410	0.0215	444	0.7945	478	0.2386	512	0.4889	546	0.5875
411	0.0223	445	0.8469	479	0.2364	513	0.4948	547	0.5881
412	0.0264	446	0.9034	480	0.2364	514	0.4998	548	0.5918
413	0.031	447	0.9503	481	0.2375	515	0.506	549	0.5908

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5964	599	0.6162	648	0.3595	697	0.1108	746	0.0258
551	0.5921	600	0.6143	649	0.3545	698	0.1077	747	0.0262
552	0.5975	601	0.6142	650	0.3442	699	0.105	748	0.0246
553	0.5983	602	0.6109	651	0.3426	700	0.1011	749	0.0239
554	0.6006	603	0.6058	652	0.3339	701	0.0994	750	0.0238
555	0.6036	604	0.6054	653	0.3267	702	0.0955	751	0.0229
556	0.6024	605	0.605	654	0.3198	703	0.0949	752	0.0217
557	0.6071	606	0.6013	655	0.3149	704	0.0918	753	0.0218
558	0.6071	607	0.5974	656	0.3061	705	0.0877	754	0.0211
559	0.6078	608	0.5941	657	0.3022	706	0.0849	755	0.0202
560	0.6082	609	0.5913	658	0.2947	707	0.0831	756	0.0197
561	0.6123	610	0.5865	659	0.29	708	0.081	757	0.0196
562	0.6109	611	0.58	660	0.2794	709	0.0782	758	0.0186
563	0.6125	612	0.5812	661	0.2773	710	0.0765	759	0.0184
564	0.6142	613	0.5752	662	0.2688	711	0.0726	760	0.0178
565	0.6156	614	0.571	663	0.2626	712	0.0714	761	0.0175
566	0.614	615	0.5654	664	0.2589	713	0.0691	762	0.0175
567	0.6183	616	0.5605	665	0.2515	714	0.0662	763	0.0166
568	0.6157	617	0.557	666	0.2464	715	0.0657	764	0.0155
569	0.6195	618	0.5516	667	0.2396	716	0.063	765	0.0157
570	0.6207	619	0.5455	668	0.2346	717	0.0615	766	0.0148
571	0.6214	620	0.5404	669	0.228	718	0.0605	767	0.0149
572	0.6225	621	0.5353	670	0.2232	719	0.0574	768	0.0144
573	0.6258	622	0.53	671	0.2175	720	0.0565	769	0.0135
574	0.625	623	0.5226	672	0.2136	721	0.0549	770	0.0132
575	0.6254	624	0.518	673	0.2065	722	0.0537	771	0.0132
576	0.6276	625	0.5107	674	0.2019	723	0.0515	772	0.0131
577	0.6275	626	0.5048	675	0.197	724	0.0501	773	0.0127
578	0.6266	627	0.4991	676	0.1897	725	0.0486	774	0.0125
579	0.6281	628	0.4934	677	0.1864	726	0.0469	775	0.0119
580	0.6281	629	0.4881	678	0.1813	727	0.0461	776	0.0113
581	0.6285	630	0.4797	679	0.1777	728	0.0451	777	0.0114
582	0.6284	631	0.4731	680	0.1728	729	0.0437	778	0.0113
583	0.6301	632	0.4704	681	0.1686	730	0.0415	779	0.0105
584	0.6278	633	0.4618	682	0.165	731	0.0402	780	0.0106
585	0.6289	634	0.4555	683	0.1609	732	0.0396		
586	0.6276	635	0.446	684	0.1565	733	0.0385		
587	0.6276	636	0.4403	685	0.1537	734	0.0377		
588	0.6261	637	0.4361	686	0.1491	735	0.0367		
589	0.6279	638	0.4272	687	0.145	736	0.0347		
590	0.624	639	0.4212	688	0.1428	737	0.0344		
591	0.6269	640	0.4144	689	0.1382	738	0.0336		
592	0.6247	641	0.4085	690	0.1344	739	0.0318		
593	0.6256	642	0.4016	691	0.1317	740	0.0313		
594	0.6253	643	0.3934	692	0.1266	741	0.03		
595	0.622	644	0.3863	693	0.1227	742	0.0292		
596	0.6228	645	0.3805	694	0.1197	743	0.0286		
597	0.621	646	0.3721	695	0.1165	744	0.0281		
598	0.6184	647	0.3637	696	0.1142	745	0.0274		

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

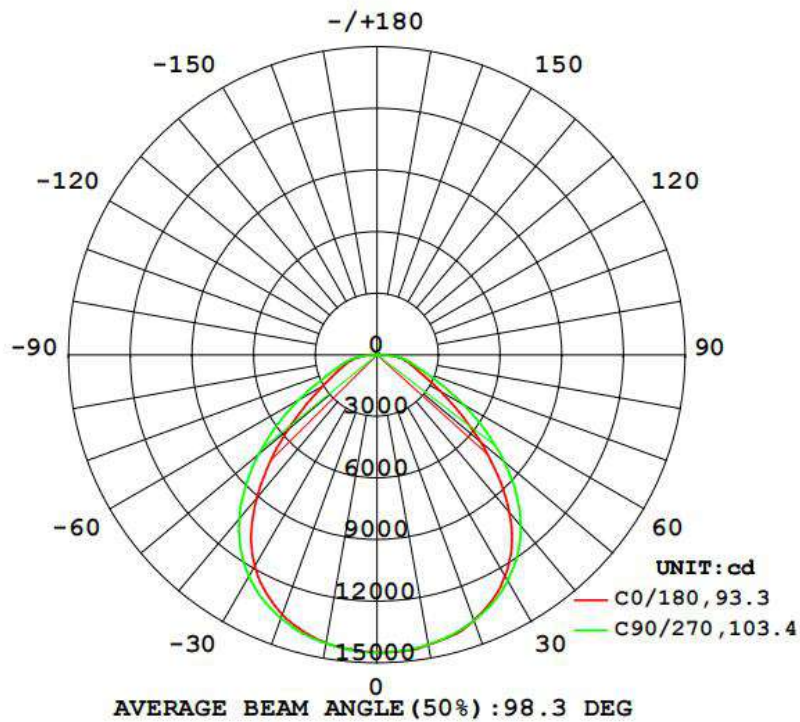
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120	60	1.9903	0.9977	238.3

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
35062	147.11	14499	56.2%

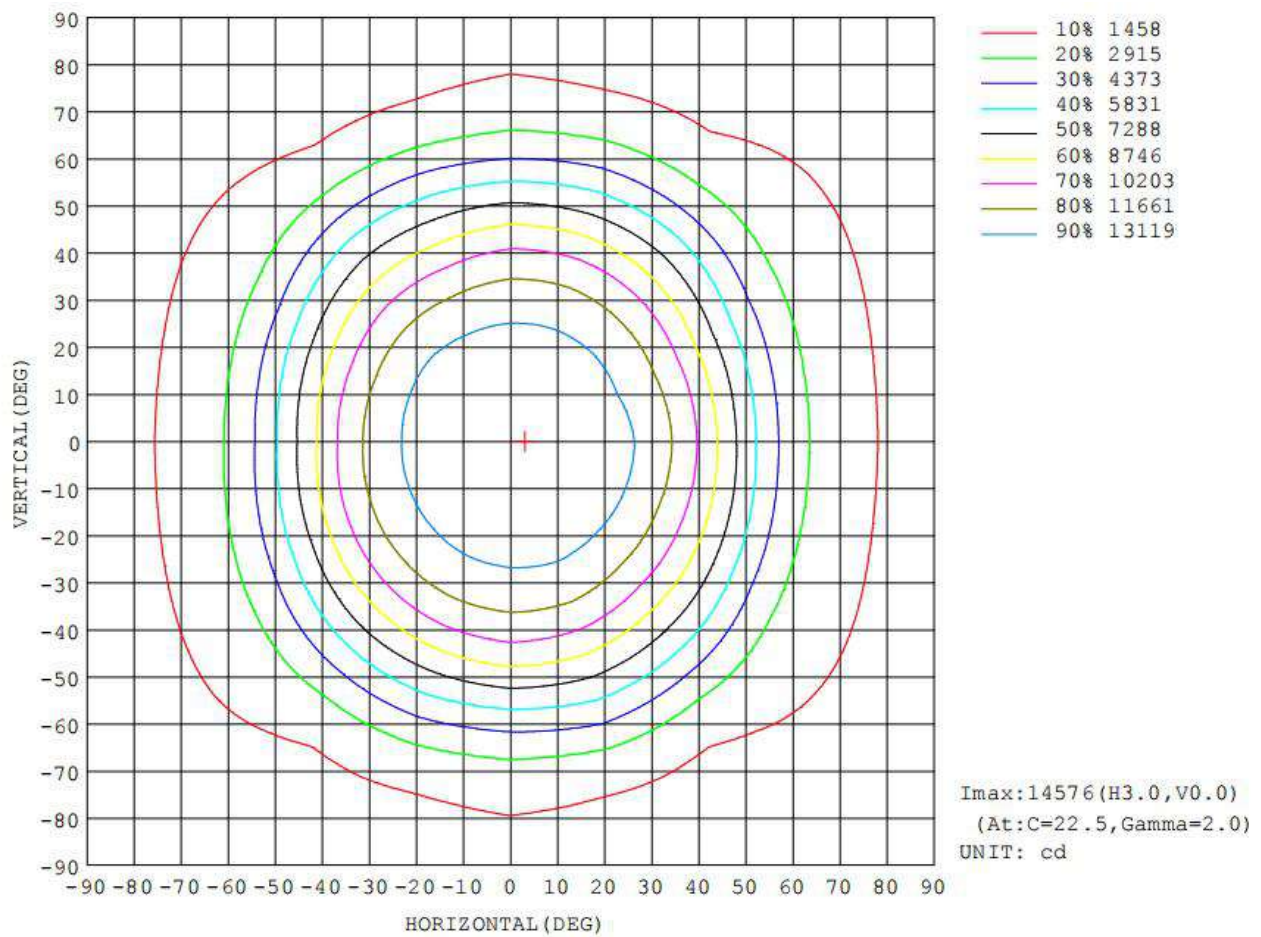
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	lum, lamp
10	1435	1438	1433	1431	1425	1430	1427	1435	0- 10	1375	1375	3.92, 3.92
20	1377	1378	1378	1364	1348	1359	1365	1375	10- 20	3972	5346	15.2, 15.2
30	1246	1254	1271	1233	1190	1213	1247	1245	20- 30	6044	11390	32.5, 32.5
40	1003	1026	1088	1002	911.4	958.7	1044	1022	30- 40	7080	18470	52.7, 52.7
50	654.1	729.9	808.6	690.3	565.5	667.8	750.4	709.1	40- 50	6579	25049	71.4, 71.4
60	359.4	403.3	487.0	375.2	305.3	346.4	439.3	387.7	50- 60	4798	29848	85.1, 85.1
70	204.4	164.4	246.3	162.8	183.8	146.0	224.2	170.5	60- 70	2751	32599	93, 93
80	130.2	103.2	140.5	102.5	110.6	94.39	123.7	105.8	70- 80	1557	34156	97.4, 97.4
90	0.3162	2.544	8.223	0.1519	0.2542	0.2077	0.2364	0.2058	80- 90	658.4	34814	99.3, 99.3
100	9.257	4.495	0.5203	4.277	7.513	4.295	0.7283	4.674	90-100	27.85	34842	99.4, 99.4
110	7.095	4.777	1.174	4.618	6.796	4.631	1.391	5.049	100-110	46.86	34889	99.5, 99.5
120	7.233	4.765	1.611	4.776	7.305	4.660	1.772	4.836	110-120	45.91	34935	99.6, 99.6
130	6.255	4.706	1.993	4.507	6.426	4.611	2.077	4.745	120-130	41.31	34976	99.8, 99.8
140	5.539	4.331	2.202	4.132	5.757	4.391	2.733	4.392	130-140	33.97	35010	99.9, 99.9
150	4.630	4.159	2.531	4.043	5.095	4.540	3.007	4.136	140-150	25.49	35036	99.9, 99.9
160	3.872	2.906	2.397	3.059	4.478	4.191	2.968	1.995	150-160	16.58	35052	100, 100
170	1.918	1.747	2.157	2.567	2.358	2.164	2.668	2.634	160-170	7.585	35060	100, 100
180	2.913	2.709	2.803	2.774	2.853	2.583	2.652	2.692	170-180	2.309	35062	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	1449	1449	1449	1449	1449	1449	1449	1449	1449	1449	1449	1449	1449	1449	1449	1449			
5	1449	1448	1448	1448	1446	1443	1441	1441	1440	1441	1442	1441	1443	1445	1446	1447			
10	1435	1436	1438	1438	1433	1430	1431	1430	1425	1428	1430	1425	1427	1432	1435	1432			
15	1415	1413	1412	1417	1410	1410	1406	1399	1393	1395	1403	1400	1403	1411	1407	1411			
20	1377	1381	1378	1386	1378	1376	1364	1360	1348	1351	1359	1360	1365	1371	1375	1372			
25	1322	1322	1329	1338	1333	1325	1309	1297	1278	1283	1301	1304	1314	1320	1320	1313			
30	1246	1247	1254	1275	1271	1256	1233	1215	1190	1194	1213	1224	1247	1253	1245	1237			
35	1143	1140	1154	1190	1192	1170	1135	1105	1069	1072	1103	1120	1157	1162	1147	1135			
40	1003	1006	1026	1076	1088	1052	1002	955	911	929	969	993	1044	1044	1022	993			
45	832	853	883	940	959	912	851	785	737	768	822	851	905	902	868	821			
50	654	684	730	794	809	757	690	617	565	597	668	703	750	743	709	647			
55	490	511	569	642	645	604	528	460	417	434	506	553	590	589	544	485			
60	359	362	403	492	487	454	375	334	305	305	346	406	439	439	388	354			
65	266	254	259	345	350	317	249	240	232	218	222	273	312	305	261	256			
70	204	184	164	223	246	215	163	182	184	165	146	181	224	210	171	192			
75	166	145	125	155	185	151	126	143	150	133	119	133	172	150	129	152			
80	130	116	103	113	140	110	102	107	111	101	94.4	92.6	124	107	106	115			
85	88.3	79.1	64.7	73.4	80.4	66.3	56.8	64.0	64.1	59.4	51.0	49.5	59.6	61.3	60.2	72.7			
90	0.32	6.69	2.54	9.50	8.22	9.09	0.15	14.6	0.25	0.23	0.21	0.48	0.24	0.22	0.21	0.26			
95	0.20	0.23	1.70	1.52	0.28	1.28	1.53	0.22	2.65	0.54	3.41	1.71	0.43	1.72	4.76	3.63			
100	9.26	7.91	4.49	1.94	0.52	1.86	4.28	6.90	7.51	6.61	4.30	2.08	0.73	2.15	4.67	8.05			
105	7.56	6.91	4.62	2.16	0.85	2.04	4.44	6.37	6.56	6.25	4.54	2.24	1.09	2.30	4.85	7.23			
110	7.09	6.64	4.78	2.47	1.17	2.29	4.62	6.56	6.80	6.40	4.63	2.44	1.39	2.52	5.05	6.98			
115	7.12	6.64	4.76	2.74	1.42	2.56	4.73	6.85	7.24	6.70	4.69	2.64	1.56	2.70	4.97	7.00			
120	7.23	6.64	4.76	2.94	1.61	2.75	4.78	6.88	7.30	6.68	4.66	2.75	1.77	2.83	4.84	6.83			
125	6.84	6.29	4.72	3.06	1.74	2.85	4.62	6.58	6.96	6.40	4.61	2.83	2.00	2.96	4.79	6.37			
130	6.26	5.95	4.71	3.29	1.99	3.04	4.51	6.09	6.43	6.00	4.61	2.99	2.08	3.10	4.75	5.97			
135	5.85	5.62	4.60	3.33	2.20	3.13	4.38	5.68	6.00	5.72	4.58	3.31	2.30	3.34	4.59	5.70			
140	5.54	5.30	4.33	3.22	2.20	3.12	4.13	5.32	5.76	5.53	4.39	3.50	2.73	3.36	4.39	5.44			
145	5.08	4.82	4.32	2.96	2.54	2.76	4.13	4.87	5.47	5.25	4.49	3.55	2.58	2.73	4.46	4.96			
150	4.63	4.54	4.16	2.74	2.53	1.74	4.04	4.48	5.10	5.06	4.54	3.33	3.01	1.97	4.14	4.88			
155	4.39	4.28	3.70	1.62	2.62	1.86	3.79	4.24	4.89	4.83	4.50	3.29	3.00	2.84	3.37	4.49			
160	3.87	3.70	2.91	1.74	2.40	2.19	3.06	3.84	4.48	4.40	4.19	2.24	2.97	2.67	2.00	3.54			
165	2.97	2.74	1.57	2.19	2.20	2.61	1.85	2.84	3.51	3.48	3.26	2.33	2.73	2.40	2.37	2.00			
170	1.92	1.62	1.75	2.34	2.16	2.47	2.57	1.80	2.36	2.34	2.16	2.75	2.67	2.57	2.63	2.08			
175	2.45	2.48	2.35	2.37	2.34	2.47	2.44	2.43	2.61	2.61	2.64	2.56	2.48	2.41	2.49	2.53			
180	2.91	2.60	2.71	2.79	2.80	2.83	2.77	2.53	2.85	2.85	2.58	2.64	2.65	2.67	2.69	2.67			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-0240-50-DY-RLV04BS	100.0	60	0.997	6.78
	120.0	60	0.998	4.45
	277.0	60	0.958	6.23

8. Photo of sample



Figure 1

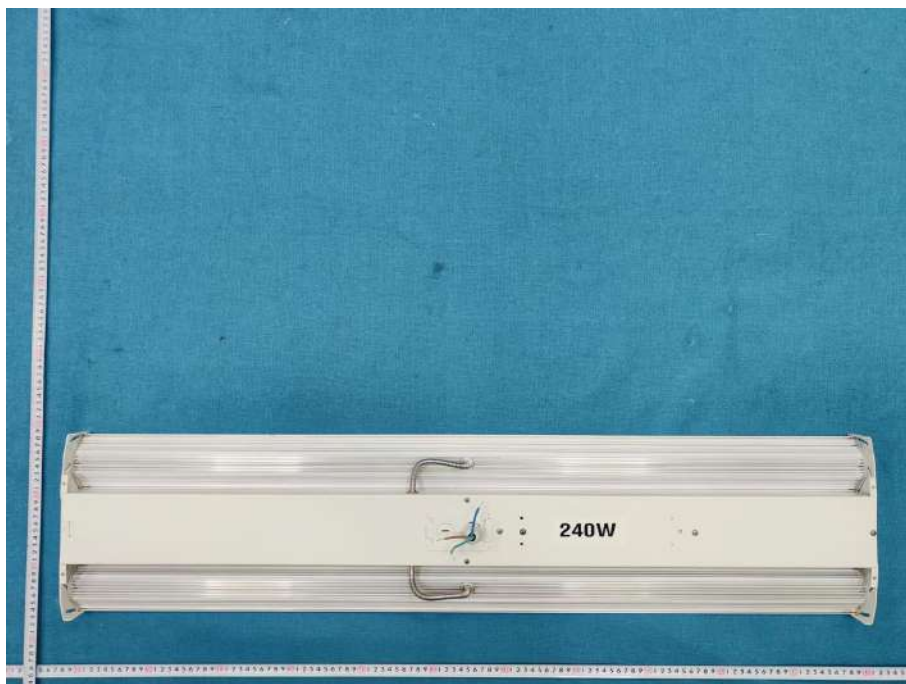


Figure 2

---End of Report---