



# Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23080353L00501

Client..... : IKIO LED LIGHTING

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

Test Model..... : IK-HBAX-200240300-50-DY-RLV04BNH (300W)

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-200240300-50-DY-RLV04BNH (300W)
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires (Commercial and Industrial)
Rated Voltage/Frequency:	100-277V AC, 50/60Hz
Rated Power:	300W
Rated luminous flux:	42000lm
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  $1^{\circ}$  vertical intervals and  $22.5^{\circ}$  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  $4\pi$  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

<b>Test Ambient Temperature (Integrating sphere internal temperature)</b>	25.3℃	<b>Test orientation</b>	Downward
<b>Operate time(Min.)</b>	60	<b>stabilization time(Min.)</b>	30

### Optical and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)	CCT (K)
119.99	60	2.504	299.9	0.9979	43885	146.35	4874

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
84	16	84	97	0.3491	0.3576	0.2118	0.4881	1.40E-03

### 5.2 Color Rendering Index

<div>Ra</div> <div>84</div>									
<div>R1</div> <div>82</div>	<div>R2</div> <div>88</div>	<div>R3</div> <div>92</div>	<div>R4</div> <div>84</div>	<div>R5</div> <div>82</div>					
<div>R6</div> <div>83</div>	<div>R7</div> <div>89</div>	<div>R8</div> <div>70</div>	<div>R9</div> <div>16</div>	<div>R10</div> <div>72</div>					
<div>R11</div> <div>83</div>	<div>R12</div> <div>59</div>	<div>R13</div> <div>84</div>	<div>R14</div> <div>96</div>	<div>R15</div> <div>78</div>					

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

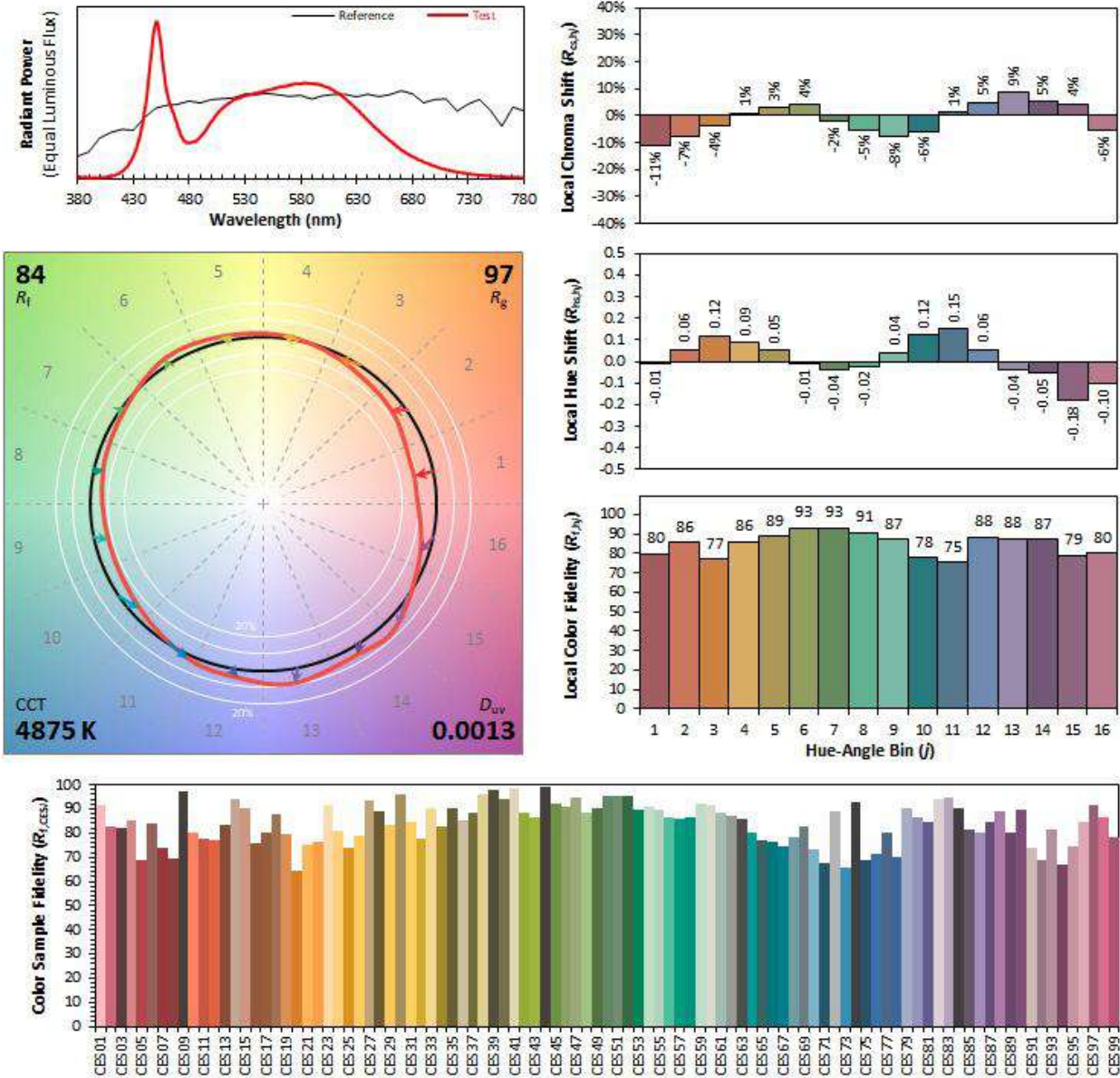
ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/9/6

Manufacturer: IKIO LED LIGHTING

Model: IK-HBAX-200240300-50-DY-RLV04BNH (300W)



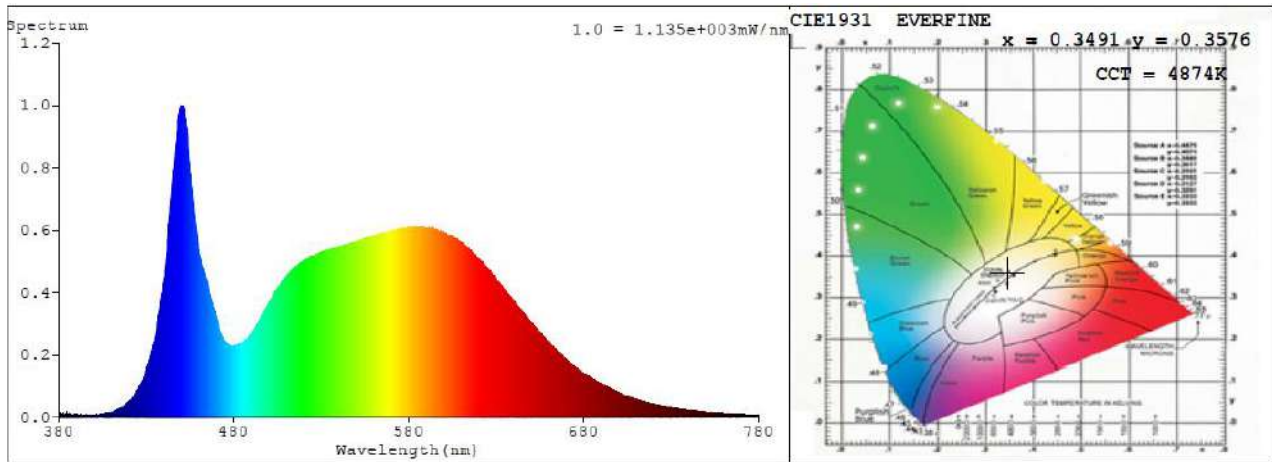
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.3490  
 $y$  0.3574  
 $u'$  0.2118  
 $v'$  0.4881

CIE 13.3-1995 (CRI)  
 $R_a$  84  
 $R_g$  16

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	0.0122	414	0.026	448	0.9342	482	0.2309	516	0.4825
381	0.0147	415	0.0287	449	0.9699	483	0.2348	517	0.4895
382	0.0131	416	0.0318	450	0.9997	484	0.2347	518	0.4936
383	0.0067	417	0.0353	451	0.9978	485	0.2387	519	0.5005
384	0.0055	418	0.04	452	0.9695	486	0.2409	520	0.5041
385	0.0084	419	0.0467	453	0.9241	487	0.2483	521	0.5046
386	0.013	420	0.0501	454	0.8732	488	0.2542	522	0.5078
387	0.0114	421	0.0548	455	0.8106	489	0.2583	523	0.5113
388	0.0062	422	0.0629	456	0.7427	490	0.2705	524	0.5144
389	0.004	423	0.0705	457	0.6829	491	0.2755	525	0.5156
390	0.007	424	0.077	458	0.6284	492	0.2823	526	0.5182
391	0.0021	425	0.0844	459	0.5789	493	0.2952	527	0.5204
392	0.0089	426	0.098	460	0.5414	494	0.3027	528	0.526
393	0.0064	427	0.1086	461	0.5161	495	0.3132	529	0.5267
394	0.0072	428	0.1193	462	0.4839	496	0.3251	530	0.5285
395	0.0089	429	0.1335	463	0.4677	497	0.3323	531	0.53
396	0.0074	430	0.1504	464	0.4466	498	0.3475	532	0.5321
397	0.0059	431	0.1681	465	0.4283	499	0.3576	533	0.5342
398	0.0061	432	0.1855	466	0.413	500	0.3668	534	0.5341
399	0.0089	433	0.2119	467	0.3885	501	0.3766	535	0.5374
400	0.0074	434	0.2331	468	0.3674	502	0.3856	536	0.5368
401	0.008	435	0.2585	469	0.3457	503	0.395	537	0.5406
402	0.0065	436	0.2862	470	0.3218	504	0.4051	538	0.5423
403	0.0096	437	0.3204	471	0.3027	505	0.4148	539	0.5448
404	0.009	438	0.3551	472	0.2824	506	0.4216	540	0.5476
405	0.0111	439	0.3952	473	0.269	507	0.4306	541	0.5441
406	0.0125	440	0.4448	474	0.2553	508	0.4372	542	0.5471
407	0.0144	441	0.4877	475	0.2437	509	0.4436	543	0.554
408	0.0146	442	0.5452	476	0.2363	510	0.4521	544	0.5527
409	0.0141	443	0.6136	477	0.2324	511	0.4586	545	0.5541
410	0.0163	444	0.6838	478	0.2283	512	0.4626	546	0.5565
411	0.0179	445	0.7494	479	0.228	513	0.4691	547	0.5571
412	0.0209	446	0.8097	480	0.2289	514	0.4754	548	0.5621
413	0.0225	447	0.8818	481	0.2298	515	0.4804	549	0.5619

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5624	599	0.5955	648	0.3195	697	0.0881	746	0.0202
551	0.5649	600	0.5922	649	0.312	698	0.0863	747	0.0192
552	0.5689	601	0.5902	650	0.3069	699	0.0827	748	0.019
553	0.5684	602	0.5857	651	0.2994	700	0.0809	749	0.0179
554	0.5692	603	0.5844	652	0.2926	701	0.0786	750	0.0179
555	0.5737	604	0.583	653	0.285	702	0.076	751	0.0169
556	0.5748	605	0.5812	654	0.2789	703	0.0734	752	0.0166
557	0.5772	606	0.5764	655	0.2746	704	0.0706	753	0.017
558	0.5781	607	0.5717	656	0.2676	705	0.0689	754	0.0163
559	0.5795	608	0.5696	657	0.2609	706	0.0661	755	0.0157
560	0.5822	609	0.5648	658	0.2553	707	0.0653	756	0.0153
561	0.5843	610	0.5608	659	0.2482	708	0.0626	757	0.0148
562	0.5854	611	0.5562	660	0.2423	709	0.0616	758	0.0144
563	0.5879	612	0.552	661	0.2372	710	0.0588	759	0.0141
564	0.59	613	0.5486	662	0.2332	711	0.0569	760	0.0139
565	0.5904	614	0.5445	663	0.2276	712	0.0554	761	0.0132
566	0.5872	615	0.537	664	0.2197	713	0.0542	762	0.0133
567	0.593	616	0.5358	665	0.2154	714	0.052	763	0.013
568	0.5916	617	0.5263	666	0.2068	715	0.0505	764	0.0123
569	0.5946	618	0.521	667	0.2034	716	0.0499	765	0.012
570	0.5951	619	0.5152	668	0.198	717	0.0474	766	0.0115
571	0.601	620	0.5098	669	0.1909	718	0.0468	767	0.0107
572	0.5964	621	0.5037	670	0.1865	719	0.0446	768	0.0114
573	0.6013	622	0.4984	671	0.1808	720	0.0441	769	0.0104
574	0.6037	623	0.4901	672	0.1772	721	0.0428	770	0.0102
575	0.6044	624	0.4842	673	0.1724	722	0.0408	771	0.0102
576	0.6045	625	0.4783	674	0.1675	723	0.0399	772	0.0097
577	0.6054	626	0.4731	675	0.1636	724	0.0387	773	0.0096
578	0.6046	627	0.4654	676	0.1591	725	0.0377	774	0.0096
579	0.603	628	0.4576	677	0.153	726	0.0364	775	0.0094
580	0.608	629	0.4523	678	0.1504	727	0.0354	776	0.0091
581	0.6053	630	0.4446	679	0.1456	728	0.0336	777	0.0087
582	0.6083	631	0.439	680	0.143	729	0.0334	778	0.0086
583	0.611	632	0.4331	681	0.1401	730	0.0322	779	0.0082
584	0.6102	633	0.424	682	0.1349	731	0.0312	780	0.0082
585	0.6084	634	0.4158	683	0.1326	732	0.0298		
586	0.6081	635	0.4087	684	0.1287	733	0.0297		
587	0.6066	636	0.4037	685	0.1235	734	0.0283		
588	0.6076	637	0.3954	686	0.1217	735	0.0274		
589	0.6076	638	0.3867	687	0.1174	736	0.027		
590	0.6063	639	0.3813	688	0.1155	737	0.0261		
591	0.6032	640	0.3736	689	0.1117	738	0.025		
592	0.6064	641	0.3657	690	0.1082	739	0.0244		
593	0.6034	642	0.3624	691	0.1057	740	0.0235		
594	0.6049	643	0.3539	692	0.1015	741	0.0234		
595	0.6011	644	0.347	693	0.0996	742	0.0222		
596	0.6021	645	0.3384	694	0.097	743	0.022		
597	0.601	646	0.3308	695	0.0945	744	0.021		
598	0.5961	647	0.3253	696	0.0911	745	0.0205		

## 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

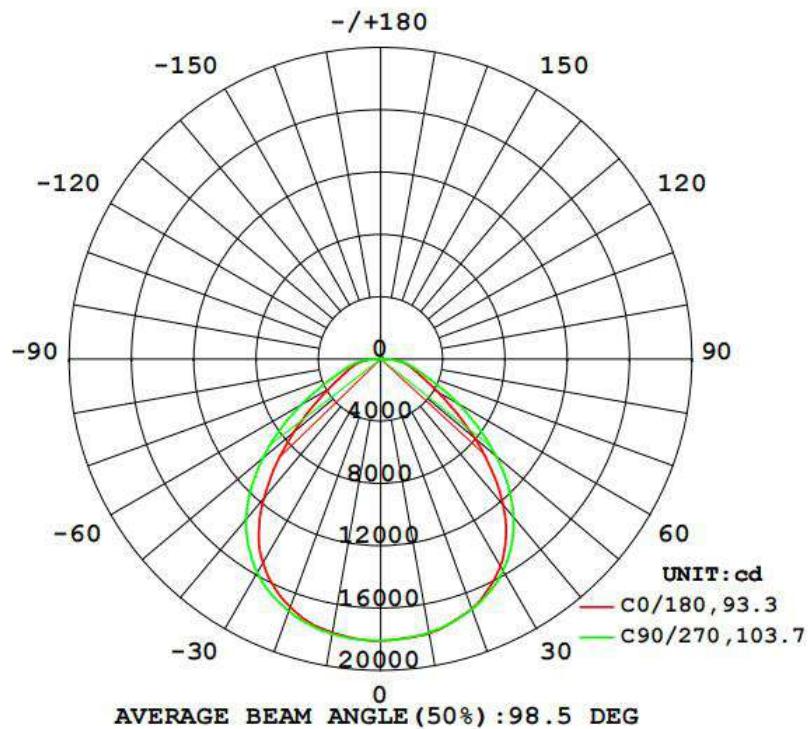
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120	60	2.5076	0.997	299.9

### Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
43809.8	146.08	18088	56.4%

### 6.2 Luminous Intensity Distribution

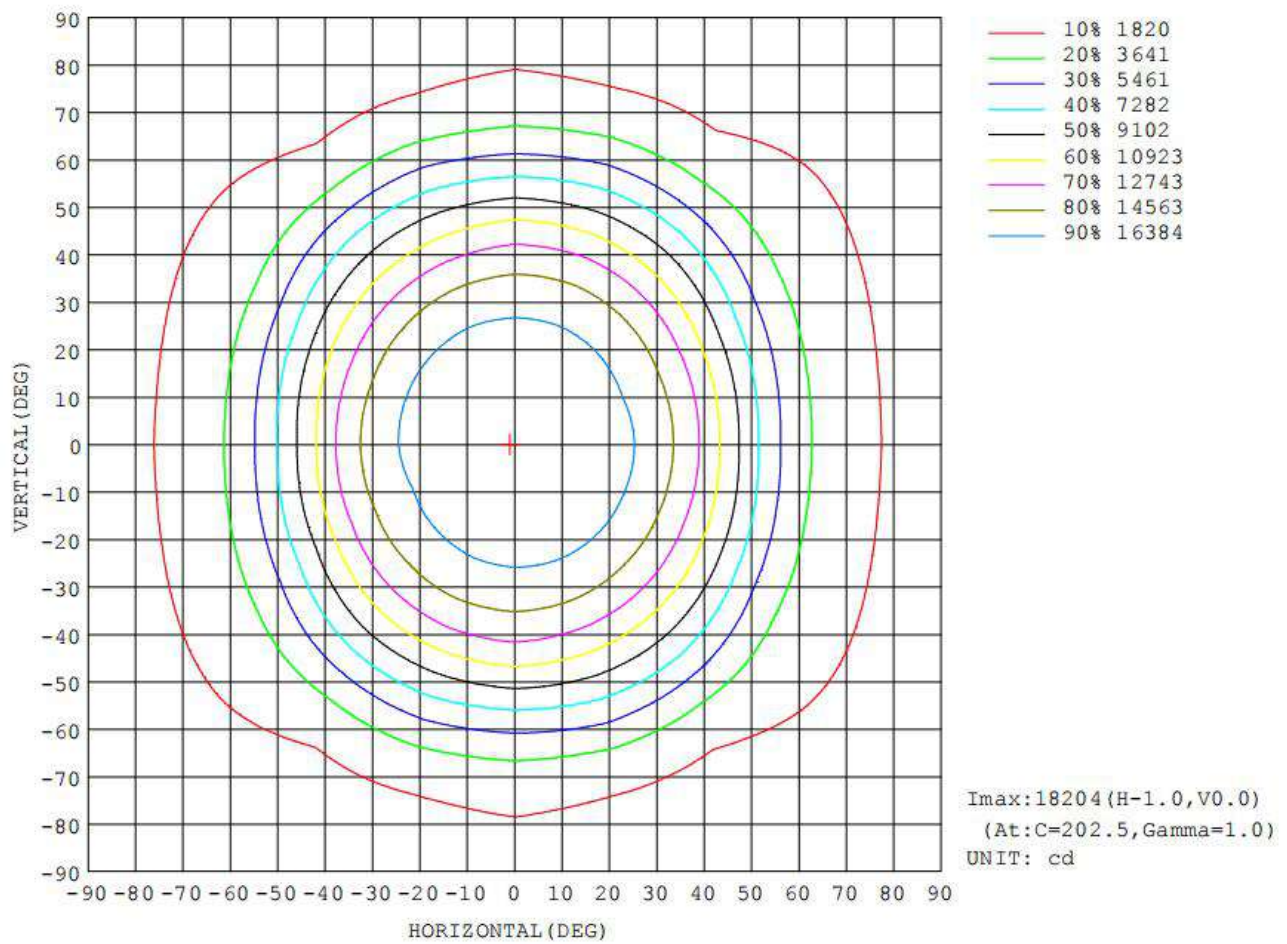




### 6.3 Zonal Flux Diagram

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315	$\gamma$	$\Phi$ zone	$\Phi$ total	$\Phi$ lum, lamp
10	1790	1782	1783	1781	1783	1789	1791	1790	0- 10	1715	1715	3.91, 3.91
20	1708	1708	1711	1707	1696	1713	1724	1718	10- 20	4960	6675	15.2, 15.2
30	1538	1549	1571	1538	1513	1544	1564	1567	20- 30	7562	14238	32.5, 32.5
40	1223	1262	1328	1243	1168	1241	1345	1292	30- 40	8874	23112	52.8, 52.8
50	787.7	890.3	969.3	849.7	726.4	859.2	990.3	906.3	40- 50	8238	31350	71.6, 71.6
60	425.7	484.2	576.5	452.3	391.4	451.5	592.1	502.8	50- 60	6001	37351	85.3, 85.3
70	245.2	198.2	291.0	193.9	232.0	187.7	299.1	219.9	60- 70	3428	40779	93.1, 93.1
80	157.2	125.6	163.2	123.3	142.9	121.7	169.8	136.7	70- 80	1940	42719	97.5, 97.5
90	8.006	4.887	11.38	3.387	0.3143	0.2545	14.40	14.23	80- 90	834.2	43553	99.4, 99.4
100	11.05	5.316	0.5502	4.761	8.463	4.964	0.6859	5.899	90-100	30.32	43583	99.5, 99.5
110	8.073	4.816	1.010	5.154	7.390	4.814	1.076	5.319	100-110	52.37	43636	99.6, 99.6
120	7.461	4.560	1.467	5.483	7.895	5.130	1.251	4.560	110-120	48.14	43684	99.7, 99.7
130	5.825	4.033	1.840	5.043	7.039	5.132	1.433	4.214	120-130	41.56	43726	99.8, 99.8
140	4.776	3.602	1.822	4.494	6.460	4.831	2.468	3.857	130-140	32.89	43758	99.9, 99.9
150	3.798	3.615	2.552	3.879	5.627	4.846	2.799	3.972	140-150	24.57	43783	99.9, 99.9
160	3.519	2.888	2.425	2.869	4.353	3.931	2.984	2.401	150-160	16.29	43799	100, 100
170	2.330	2.141	2.482	2.562	2.738	2.502	2.763	2.948	160-170	7.927	43807	100, 100
180	3.198	3.005	3.039	3.072	3.186	3.044	2.999	3.050	170-180	2.600	43810	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	1808	1808	1808	1808	1808	1808	1808	1808	1808	1808	1808	1808	1808	1808	1808	1808			
5	1800	1800	1800	1799	1801	1802	1802	1802	1803	1804	1805	1806	1805	1803	1801	1800			
10	1790	1787	1782	1780	1783	1784	1781	1782	1783	1786	1789	1790	1791	1788	1790	1792			
15	1753	1754	1756	1751	1754	1753	1752	1753	1754	1757	1759	1762	1766	1762	1767	1760			
20	1708	1704	1708	1710	1711	1706	1707	1696	1696	1702	1713	1720	1724	1725	1718	1713			
25	1633	1634	1641	1650	1653	1646	1631	1620	1618	1628	1642	1658	1665	1666	1656	1644			
30	1538	1536	1549	1564	1571	1562	1538	1520	1513	1520	1544	1571	1584	1583	1567	1550			
35	1404	1400	1419	1447	1464	1445	1409	1381	1367	1375	1409	1450	1479	1475	1449	1423			
40	1223	1230	1262	1300	1328	1297	1243	1190	1168	1194	1241	1296	1345	1334	1292	1250			
45	1008	1036	1079	1128	1161	1118	1049	972	946	989	1053	1120	1179	1159	1105	1040			
50	788	824	890	943	969	921	850	757	726	771	859	934	990	964	906	822			
55	583	608	691	755	768	732	645	560	535	562	656	746	788	770	703	617			
60	426	428	484	570	576	545	452	404	391	395	451	559	592	581	503	447			
65	317	301	312	391	411	378	296	289	293	281	290	381	424	406	335	320			
70	245	221	198	255	291	255	194	220	232	212	188	251	299	278	220	241			
75	201	177	151	182	220	181	153	173	190	170	151	180	227	196	164	191			
80	157	139	126	131	163	129	123	129	143	131	122	128	170	141	137	147			
85	105	93.8	77.8	80.3	86.3	74.6	65.6	75.8	86.6	79.9	67.9	76.9	91.5	87.0	83.8	98.0			
90	8.01	0.20	4.89	10.5	11.4	3.81	3.39	0.21	0.31	0.29	0.25	5.23	14.4	23.9	14.2	6.00			
95	0.27	0.27	2.00	1.77	0.36	1.60	2.81	0.31	2.54	0.57	3.13	1.74	0.51	1.89	4.17	0.40			
100	11.0	9.12	5.32	2.20	0.55	2.16	4.76	7.58	8.46	7.26	4.96	2.38	0.69	2.49	5.90	10.1			
105	8.91	7.91	4.98	2.27	0.77	2.36	4.90	7.12	7.35	6.72	4.77	2.57	0.92	2.49	5.52	8.53			
110	8.07	7.28	4.82	2.38	1.01	2.61	5.15	7.27	7.39	6.71	4.81	2.72	1.08	2.54	5.32	7.89			
115	7.75	7.09	4.68	2.49	1.26	2.85	5.39	7.56	7.81	7.08	5.02	2.89	1.12	2.59	4.95	7.46			
120	7.46	6.75	4.56	2.59	1.47	2.95	5.48	7.60	7.90	7.21	5.13	2.98	1.25	2.62	4.56	6.91			
125	6.67	6.12	4.31	2.66	1.43	2.97	5.25	7.29	7.57	7.00	5.15	2.96	1.46	2.63	4.37	6.20			
130	5.83	5.53	4.03	2.84	1.84	2.90	5.04	6.80	7.04	6.58	5.13	2.91	1.43	2.71	4.21	5.56			
135	5.23	5.03	3.88	2.82	1.99	2.61	4.88	6.36	6.67	6.34	5.10	3.12	1.86	3.04	4.11	5.10			
140	4.78	4.59	3.60	2.65	1.82	2.39	4.49	5.96	6.46	6.20	4.83	3.10	2.47	3.01	3.86	4.78			
145	4.27	4.06	3.61	2.69	2.17	2.48	4.30	5.37	6.16	5.86	4.91	2.79	2.74	2.73	4.06	4.39			
150	3.80	3.76	3.62	2.63	2.55	1.81	3.88	4.87	5.63	5.60	4.85	3.24	2.80	2.28	3.97	4.31			
155	3.72	3.73	3.39	1.89	2.34	2.10	3.26	4.30	5.24	5.16	4.44	3.31	2.84	2.93	3.58	4.30			
160	3.52	3.28	2.89	2.01	2.43	2.69	2.87	3.35	4.35	4.14	3.93	2.75	2.98	2.81	2.40	3.80			
165	3.01	2.69	1.88	2.46	2.40	2.79	2.19	2.60	3.55	3.41	3.35	2.72	2.92	2.58	2.45	2.96			
170	2.33	2.01	2.14	2.70	2.48	2.77	2.56	2.05	2.74	2.71	2.50	2.95	2.76	2.55	2.95	2.51			
175	2.72	2.78	2.63	2.60	2.61	2.70	2.69	2.81	3.03	3.02	2.89	2.75	2.68	2.63	2.73	2.78			
180	3.20	3.09	3.01	3.01	3.04	3.07	3.07	2.98	3.19	3.18	3.04	3.02	3.00	3.01	3.05	3.07			

## 7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-200240300-50-DY-RLV04BNH (300W)	100.0	60	0.997	4.74
	120.0	60	0.998	3.57
	277.0	60	0.933	7.39



## 8. Photo of sample

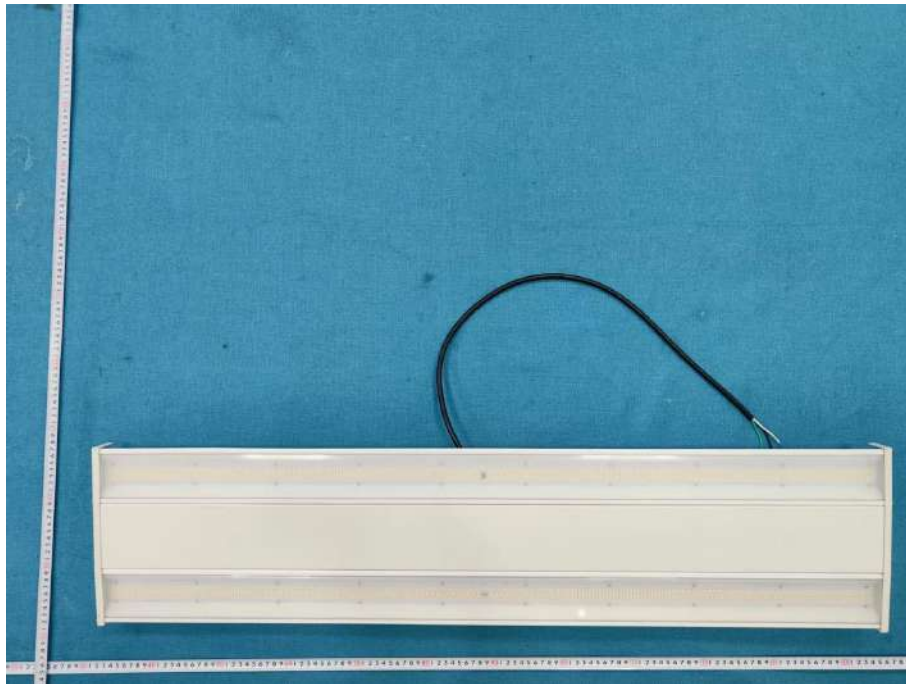


Figure 1

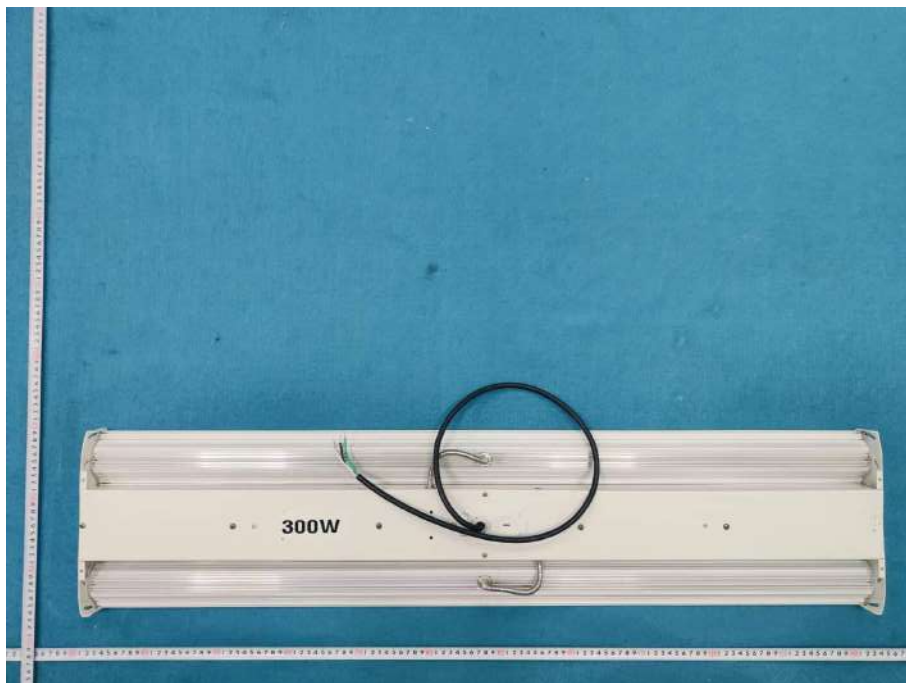


Figure 2

---End of Report---