



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

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

**Report Number..... :** N02A23080353L00301

**Client..... :** IKIO LED LIGHTING

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

**Test Model..... :** IK-HBAX-0200-50-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-0200-50-DY-RLV04BS
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires (Commercial and Industrial)
Rated Voltage/Frequency:	100-277V AC, 50/60Hz
Rated Power:	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  $1^{\circ}$  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)
120.01	60	1.668	199.8	0.9981	28034	140.32	4915

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
85.8	22	86	98	0.3475	0.3533	0.2124	0.4859	-1.18E-04

### 5.2 Color Rendering Index

<b>Ra</b> 85.8									
<b>R1</b> 85	<b>R2</b> 91	<b>R3</b> 94	<b>R4</b> 86	<b>R5</b> 85					
<b>R6</b> 86	<b>R7</b> 89	<b>R8</b> 72	<b>R9</b> 22	<b>R10</b> 77					
<b>R11</b> 85	<b>R12</b> 63	<b>R13</b> 86	<b>R14</b> 97	<b>R15</b> 80					

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

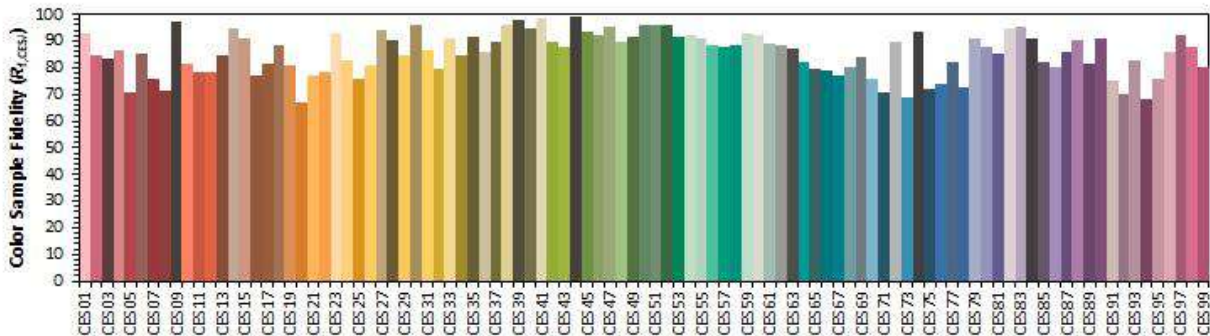
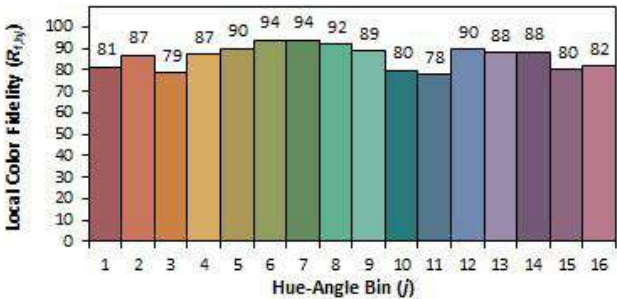
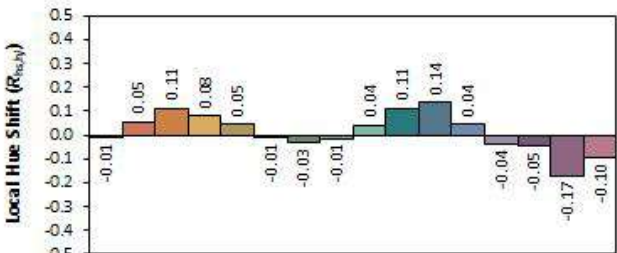
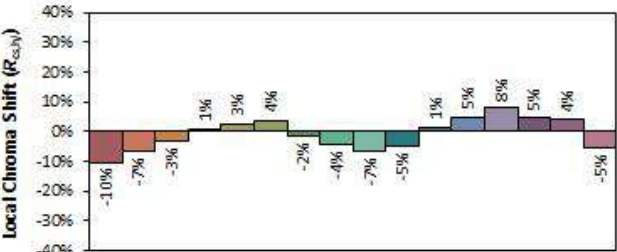
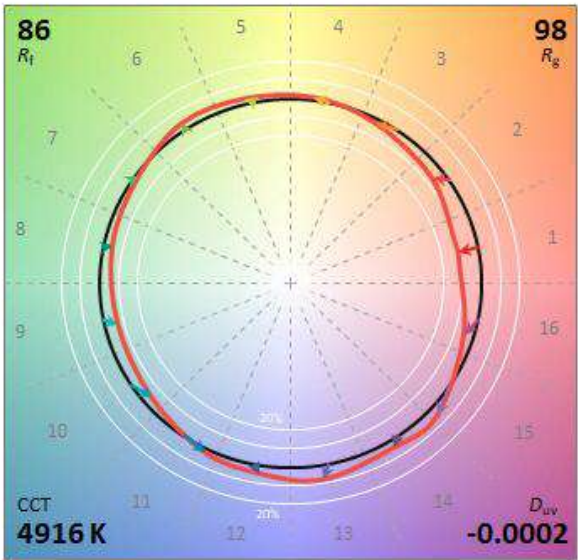
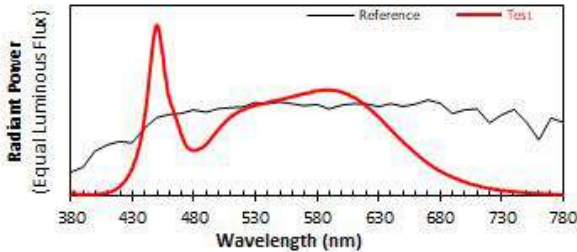
ANSI/IES TM-30-18 Color Rendition Report

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

Date: 2023/9/6

Manufacturer: IKIO LEDLIGHTING

Model: IK-HBAX-0200-50-DY-RLV04BS



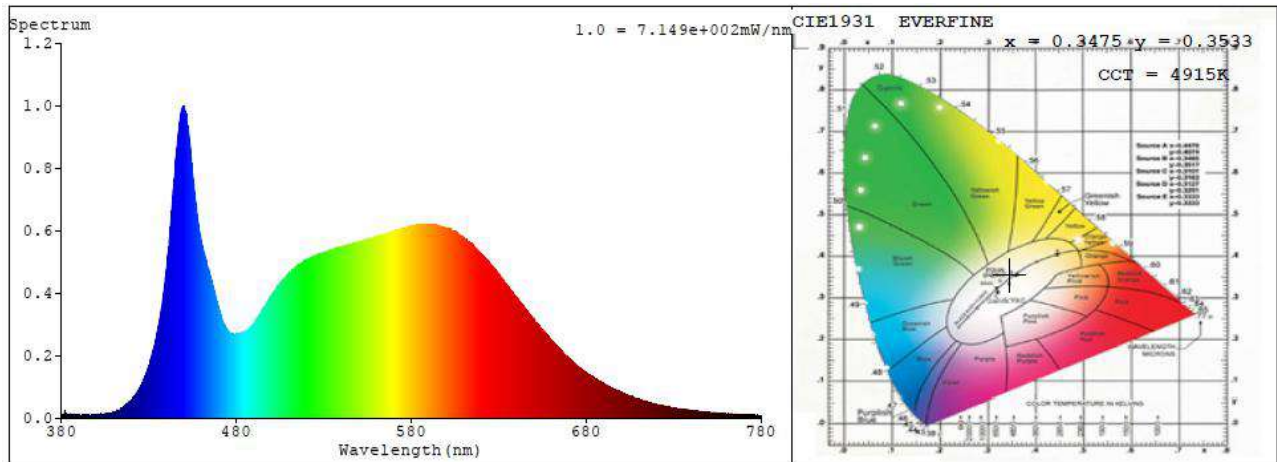
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3475  
y 0.3531  
u' 0.2124  
v' 0.4858

CIE 13.3-1995 (CRI)  
R<sub>a</sub> 86  
R<sub>g</sub> 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	0.0077	414	0.0307	448	0.9573	482	0.2675	516	0.4894
381	0.0118	415	0.0319	449	0.9926	483	0.2715	517	0.4935
382	0.0257	416	0.0373	450	0.9982	484	0.2736	518	0.4984
383	0.0155	417	0.0413	451	0.9811	485	0.276	519	0.5016
384	0.0117	418	0.0472	452	0.9445	486	0.2798	520	0.5033
385	0.0067	419	0.0536	453	0.9004	487	0.2837	521	0.5059
386	0.0088	420	0.0561	454	0.8447	488	0.2903	522	0.5101
387	0.0072	421	0.0668	455	0.8021	489	0.2948	523	0.5151
388	0.0121	422	0.0721	456	0.7288	490	0.3014	524	0.5148
389	0.0082	423	0.0801	457	0.6844	491	0.3097	525	0.5177
390	0.0055	424	0.089	458	0.6359	492	0.3172	526	0.5232
391	0.0056	425	0.0988	459	0.5947	493	0.3293	527	0.5222
392	0.0062	426	0.1102	460	0.569	494	0.3353	528	0.5261
393	0.0089	427	0.1238	461	0.5417	495	0.347	529	0.5287
394	0.0121	428	0.1351	462	0.5238	496	0.3552	530	0.5291
395	0.0084	429	0.1499	463	0.5018	497	0.3602	531	0.532
396	0.007	430	0.1649	464	0.4796	498	0.3761	532	0.5351
397	0.0066	431	0.1887	465	0.4592	499	0.382	533	0.5329
398	0.0076	432	0.2067	466	0.4416	500	0.3902	534	0.5349
399	0.0096	433	0.225	467	0.4156	501	0.3988	535	0.5377
400	0.009	434	0.2494	468	0.397	502	0.4075	536	0.5378
401	0.0118	435	0.2819	469	0.3713	503	0.4165	537	0.541
402	0.0079	436	0.3049	470	0.3521	504	0.4197	538	0.5441
403	0.0108	437	0.3397	471	0.332	505	0.4278	539	0.5424
404	0.0107	438	0.3784	472	0.3152	506	0.4366	540	0.5469
405	0.0116	439	0.4231	473	0.3009	507	0.4437	541	0.5448
406	0.0147	440	0.4722	474	0.2869	508	0.4498	542	0.5526
407	0.0151	441	0.526	475	0.2821	509	0.4567	543	0.551
408	0.0144	442	0.581	476	0.275	510	0.4646	544	0.5528
409	0.0172	443	0.6544	477	0.2698	511	0.4662	545	0.5555
410	0.0194	444	0.731	478	0.2688	512	0.4735	546	0.5562
411	0.02	445	0.7869	479	0.2655	513	0.4759	547	0.5591
412	0.0246	446	0.8599	480	0.2674	514	0.4822	548	0.5568
413	0.0263	447	0.9178	481	0.2668	515	0.4877	549	0.5619

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5619	599	0.6088	648	0.33	697	0.0902	746	0.0209
551	0.5643	600	0.6071	649	0.3243	698	0.0883	747	0.0197
552	0.5655	601	0.6067	650	0.3165	699	0.0847	748	0.0198
553	0.5681	602	0.6012	651	0.3072	700	0.0824	749	0.0183
554	0.5663	603	0.6007	652	0.3024	701	0.0795	750	0.0175
555	0.5721	604	0.5952	653	0.2944	702	0.0775	751	0.0178
556	0.5739	605	0.5952	654	0.289	703	0.0745	752	0.0167
557	0.5746	606	0.5938	655	0.2836	704	0.0725	753	0.0169
558	0.5756	607	0.5857	656	0.2772	705	0.0703	754	0.0167
559	0.5783	608	0.5822	657	0.2694	706	0.068	755	0.0161
560	0.5809	609	0.5802	658	0.2641	707	0.067	756	0.0154
561	0.583	610	0.5785	659	0.2578	708	0.0642	757	0.0154
562	0.5827	611	0.5718	660	0.2508	709	0.0623	758	0.0144
563	0.586	612	0.5687	661	0.246	710	0.0615	759	0.0146
564	0.588	613	0.5646	662	0.2393	711	0.0582	760	0.0141
565	0.5904	614	0.5589	663	0.2321	712	0.0566	761	0.0138
566	0.5911	615	0.5557	664	0.227	713	0.0551	762	0.0132
567	0.5923	616	0.5465	665	0.221	714	0.053	763	0.0132
568	0.5949	617	0.5434	666	0.2157	715	0.0516	764	0.0126
569	0.5972	618	0.5375	667	0.2088	716	0.0498	765	0.0122
570	0.5968	619	0.5306	668	0.2025	717	0.0485	766	0.012
571	0.6008	620	0.5254	669	0.1989	718	0.0482	767	0.0116
572	0.6011	621	0.5215	670	0.1929	719	0.0455	768	0.0113
573	0.6036	622	0.514	671	0.1886	720	0.0447	769	0.0109
574	0.6026	623	0.5096	672	0.1827	721	0.0433	770	0.0107
575	0.6044	624	0.5033	673	0.1774	722	0.0413	771	0.0107
576	0.6104	625	0.4943	674	0.1733	723	0.0408	772	0.0101
577	0.6081	626	0.4895	675	0.1679	724	0.0391	773	0.0097
578	0.6117	627	0.4816	676	0.1627	725	0.0373	774	0.0101
579	0.6138	628	0.4734	677	0.1584	726	0.0368	775	0.0097
580	0.6132	629	0.4691	678	0.1547	727	0.0362	776	0.0097
581	0.6144	630	0.462	679	0.149	728	0.0352	777	0.009
582	0.6144	631	0.4553	680	0.1456	729	0.0336	778	0.0086
583	0.6154	632	0.4456	681	0.1429	730	0.0322	779	0.0089
584	0.617	633	0.4413	682	0.1385	731	0.0316	780	0.0089
585	0.6191	634	0.4329	683	0.1348	732	0.0307		
586	0.6174	635	0.4232	684	0.1312	733	0.0304		
587	0.6192	636	0.419	685	0.1276	734	0.0295		
588	0.6179	637	0.4088	686	0.1255	735	0.0284		
589	0.6181	638	0.4027	687	0.1195	736	0.0274		
590	0.6187	639	0.3949	688	0.1182	737	0.0263		
591	0.619	640	0.3901	689	0.1146	738	0.0256		
592	0.6173	641	0.381	690	0.1117	739	0.0249		
593	0.6181	642	0.3756	691	0.1082	740	0.0245		
594	0.6185	643	0.3653	692	0.1042	741	0.0235		
595	0.6139	644	0.3609	693	0.1024	742	0.0231		
596	0.6144	645	0.3503	694	0.0992	743	0.022		
597	0.6129	646	0.3436	695	0.0963	744	0.0218		
598	0.6133	647	0.3388	696	0.0918	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

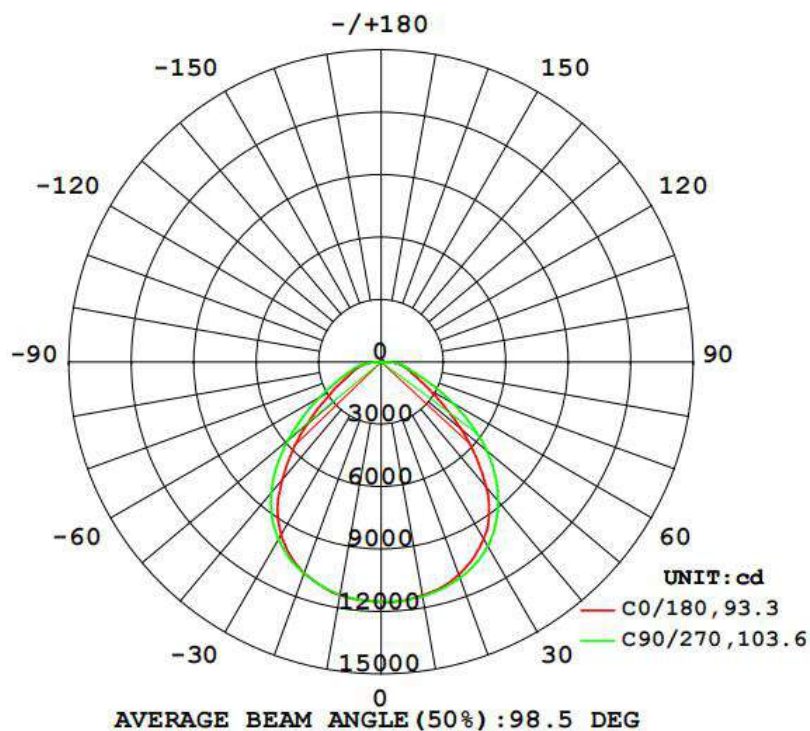
### Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120	60	1.6703	0.9975	199.9

### Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
27995.8	140.02	11542	56.2%

### 6.2 Luminous Intensity Distribution

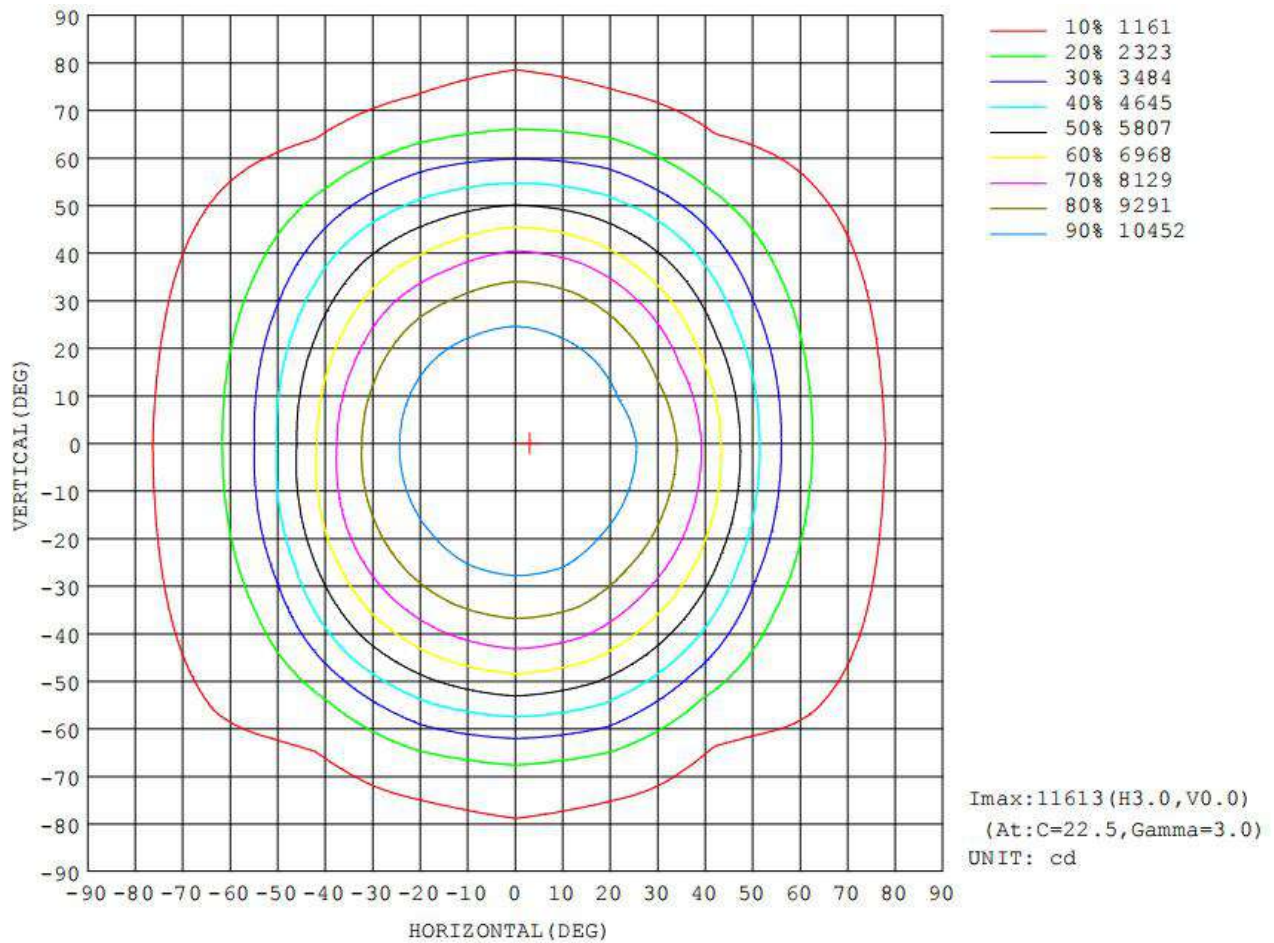




### 6.3 Zonal Flux Diagram

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315	$\gamma$	$\Phi$ zone	$\Phi$ total	$\Phi$ lum, lamp
10	1140	1143	1145	1143	1139	1136	1136	1135	0- 10	1095	1095	3.91,3.91
20	1089	1098	1106	1098	1081	1083	1083	1084	10- 20	3163	4257	15.2,15.2
30	984.3	998.3	1024	999.7	961.2	972.8	986.0	977.2	20- 30	4819	9076	32.4,32.4
40	786.1	824.8	876.1	826.8	740.3	770.3	823.3	786.2	30- 40	5656	14732	52.6,52.6
50	502.1	576.2	661.4	583.1	467.7	536.0	583.7	544.3	40- 50	5251	19983	71.4,71.4
60	270.0	299.1	400.5	307.7	254.6	295.0	343.8	305.2	50- 60	3831	23814	85.1,85.1
70	158.0	123.4	195.2	130.5	149.4	124.8	182.7	131.4	60- 70	2191	26004	92.9,92.9
80	102.0	86.18	108.5	88.66	92.55	74.15	102.1	76.84	70- 80	1243	27247	97.3,97.3
90	0.1833	0.1097	9.990	0.1346	0.2019	0.1616	0.1858	0.2151	80- 90	541.8	27789	99.3,99.3
100	7.082	4.046	0.3616	4.118	7.070	3.814	0.4976	4.134	90-100	20.93	27816	99.3,99.3
110	6.372	4.728	0.7655	4.740	6.431	4.138	0.8189	4.175	100-110	42.00	27852	99.5,99.5
120	6.637	4.377	1.111	4.212	6.281	3.857	1.064	4.021	110-120	40.76	27893	99.6,99.6
130	5.544	4.065	1.402	3.983	5.317	3.770	1.301	3.863	120-130	34.75	27927	99.8,99.8
140	4.684	3.618	1.474	3.617	4.736	3.549	1.907	3.369	130-140	27.74	27955	99.9,99.9
150	3.755	3.056	1.699	3.381	4.119	3.650	2.147	3.014	140-150	20.30	27975	99.9,99.9
160	2.872	2.247	1.734	2.362	3.524	3.305	2.197	1.528	150-160	12.77	27988	100,100
170	1.656	1.331	1.634	1.826	1.876	1.766	2.008	1.977	160-170	5.875	27994	100,100
180	2.187	2.147	1.887	1.923	2.149	1.966	1.986	2.002	170-180	1.759	27996	100,100
DEG	LUMINOUS INTENSITY:K10cd									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	1153	1153	1153	1153	1153	1153	1153	1153	1153	1153	1153	1153	1153	1153	1153	1153			
5	1152	1153	1153	1153	1152	1152	1151	1151	1149	1149	1148	1147	1148	1150	1150	1150			
10	1140	1141	1143	1146	1145	1144	1143	1142	1139	1138	1136	1133	1136	1138	1135	1135			
15	1123	1124	1124	1130	1129	1128	1126	1124	1115	1115	1118	1111	1114	1114	1114	1118			
20	1089	1092	1098	1106	1106	1104	1098	1091	1081	1079	1083	1079	1083	1081	1084	1082			
25	1044	1049	1055	1071	1072	1068	1056	1048	1031	1033	1035	1036	1043	1040	1038	1035			
30	984	988	998	1021	1024	1016	1000	985	961	963	973	973	986	986	977	972			
35	904	910	923	955	959	947	925	902	870	865	882	890	915	910	893	884			
40	786	802	825	867	876	857	827	794	740	743	770	786	823	813	786	765			
45	645	668	707	761	777	750	711	657	603	618	652	671	710	696	665	635			
50	502	522	576	638	661	629	583	513	468	492	536	557	584	573	544	504			
55	370	378	439	510	532	504	447	374	344	367	415	445	458	457	424	378			
60	270	264	299	385	400	379	308	264	255	264	295	333	344	344	305	277			
65	202	185	188	264	284	260	198	189	190	187	194	230	249	247	202	198			
70	158	140	123	171	195	170	130	143	149	139	125	154	183	168	131	148			
75	131	118	99.4	123	141	122	101	119	122	108	95.6	110	144	118	100	113			
80	102	93.8	86.2	91.6	109	88.8	88.7	94.7	92.6	80.7	74.2	75.8	102	81.7	76.8	83.8			
85	67.1	62.1	51.8	60.8	62.8	57.0	55.7	61.4	56.7	49.0	42.0	41.9	49.6	46.5	42.1	53.4			
90	0.18	0.13	0.11	12.0	9.99	9.20	0.13	7.49	0.20	0.26	0.16	0.19	0.19	0.20	0.22	0.19			
95	0.17	0.18	1.29	0.97	0.20	1.03	1.30	0.17	2.28	0.44	2.90	1.43	0.33	1.49	3.83	0.32			
100	7.08	6.54	4.05	1.52	0.36	1.53	4.12	6.88	7.07	6.17	3.81	1.65	0.50	1.85	4.13	6.18			
105	6.16	6.13	4.68	1.89	0.55	1.92	4.73	6.29	6.32	5.82	4.07	1.84	0.68	1.93	4.14	5.90			
110	6.37	6.31	4.73	2.12	0.77	2.12	4.74	6.36	6.43	5.94	4.14	2.01	0.82	2.03	4.17	6.05			
115	6.72	6.55	4.56	2.32	0.96	2.29	4.46	6.39	6.56	5.93	4.00	2.15	0.93	2.13	4.13	6.16			
120	6.64	6.25	4.38	2.46	1.11	2.41	4.21	6.06	6.28	5.61	3.86	2.23	1.06	2.17	4.02	5.91			
125	6.14	5.80	4.16	2.49	1.18	2.47	4.07	5.62	5.76	5.24	3.78	2.29	1.22	2.15	3.92	5.50			
130	5.54	5.31	4.06	2.52	1.40	2.59	3.98	5.22	5.32	4.89	3.77	2.38	1.30	2.19	3.86	5.03			
135	5.06	4.89	3.94	2.47	1.56	2.62	3.83	4.86	4.97	4.66	3.70	2.54	1.43	2.34	3.70	4.72			
140	4.68	4.55	3.62	2.41	1.47	2.51	3.62	4.54	4.74	4.48	3.55	2.67	1.91	2.42	3.37	4.46			
145	4.28	4.09	3.34	2.22	1.77	2.18	3.53	4.13	4.45	4.24	3.60	2.71	1.73	2.16	3.24	4.04			
150	3.75	3.60	3.06	2.14	1.70	1.16	3.38	3.76	4.12	4.07	3.65	2.56	2.15	1.45	3.01	3.67			
155	3.31	3.18	2.74	1.20	1.88	1.49	3.02	3.48	3.91	3.84	3.57	2.54	2.17	2.09	2.61	3.31			
160	2.87	2.74	2.25	1.28	1.73	1.66	2.36	3.04	3.52	3.49	3.31	1.78	2.20	1.98	1.53	2.76			
165	2.31	2.09	1.56	1.61	1.64	1.90	1.61	2.26	2.77	2.80	2.55	1.86	2.02	1.82	1.87	1.55			
170	1.66	1.22	1.33	1.79	1.63	1.82	1.83	1.41	1.88	1.87	1.77	2.03	2.01	1.95	1.98	1.69			
175	1.87	1.79	1.74	1.73	1.73	1.80	1.80	1.79	1.97	1.98	2.11	2.05	1.92	1.88	1.94	2.05			
180	2.19	1.99	2.15	1.89	1.89	1.92	1.92	1.91	2.15	2.15	1.97	1.98	1.99	1.99	2.00	2.00			

## 7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-0200-50-DY-RLV04BS	100.0	60	0.996	6.49
	120.0	60	0.997	4.2
	277.0	60	0.942	6.01



## 8. Photo of sample

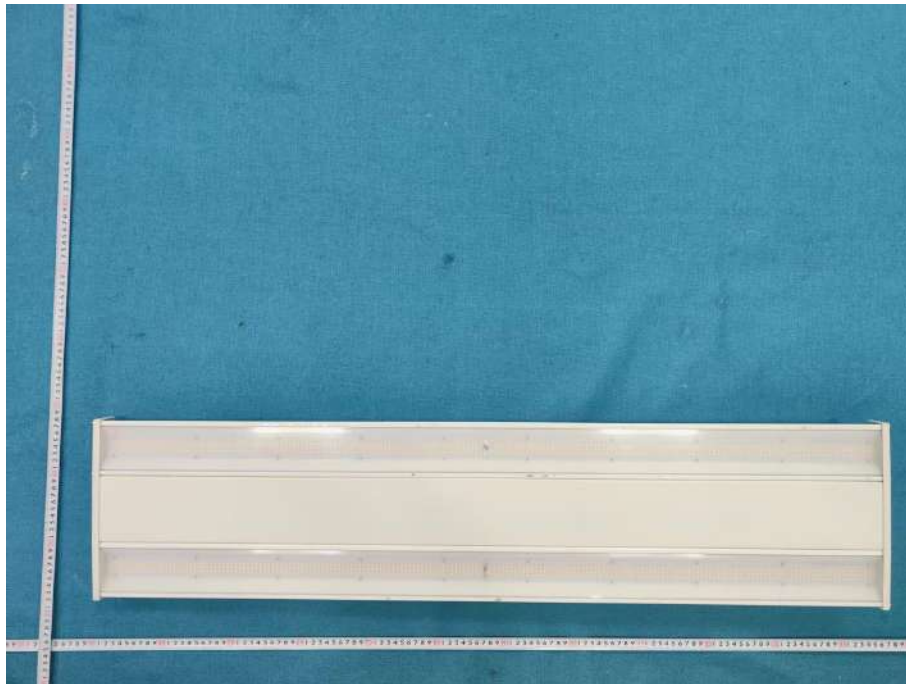


Figure 1



Figure 2

---End of Report---