

TEST REPORT OF ANSI/IES LM-79-19

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

Client : IKIO LED LIGHTING

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

Test Model IK-HBAX-0150-50-DY-RLV02BX

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

Report No. N02A22060550L00201

Date of receipt June 20,2022

Date of test June 20,2022- July 09, 2022

Date of report July 09, 2022

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.

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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-0150-50-DY-RLV02BX
Model No.:	IK-HBAX-0150-50-DY-RLV02BX
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires for Commercial and Industrial Buildings
Rated Voltage/Frequency:	100-277V AC, 50/60Hz
Rated Power:	150W
Rated luminous flux:	22500lm
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	2022/09/17
Digital Power Meter	MD-E001	PF2010	2022/09/17
AC Testing Power Source	MD-E002	DPS1060	2022/09/17
Total Spectral Radiant Flux Standard Lamp	MD-E007	D908S	2022/10/13
Integrating Sphere System	MD-E029	2M	2022/09/17
High Accuracy Array Spectroradio Meter	MD-E011	HAAS-3000	2022/09/17
Digital Power Meter	MD-E008	PF310	2022/09/17
AC Testing Power Source	MD-E010	DPS1010	2022/09/17
Standard Lamp	MD-E036	D204	2022/10/13

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)	25.1°C	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)
120.02	60	1.223	145.8	0.9933	21709	148.9	4893

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
82.6	4	83	92	0.3489	0.3603	0.2106	0.4894	2.82E-03

5.2 Color Rendering Index

Ra
82.6

R1
81

R2
92

R3
95

R4
77

R5
81

R6
88

R7
84

R8
63

R9
4

R10
81

R11
76

R12
58

R13
85

R14
98

R15
75

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

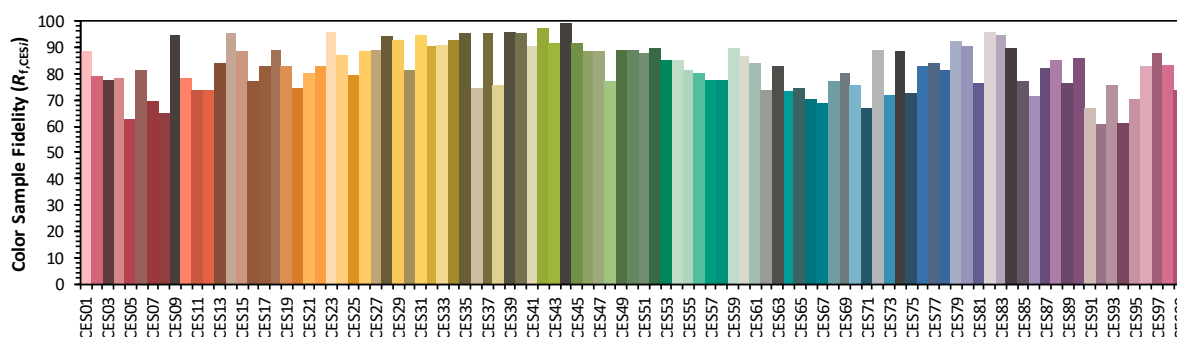
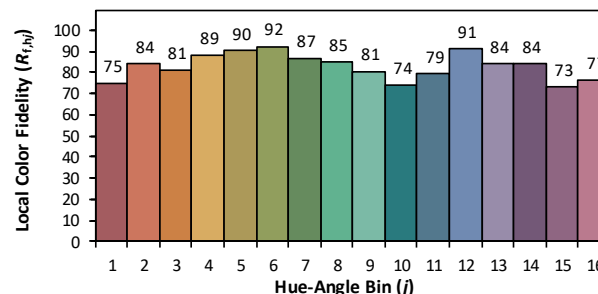
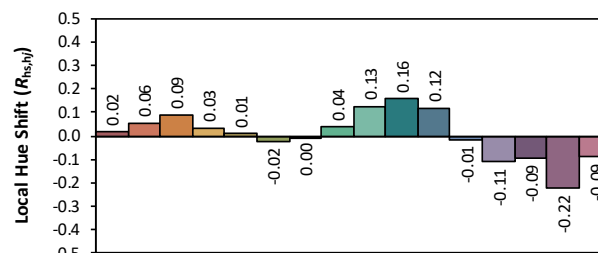
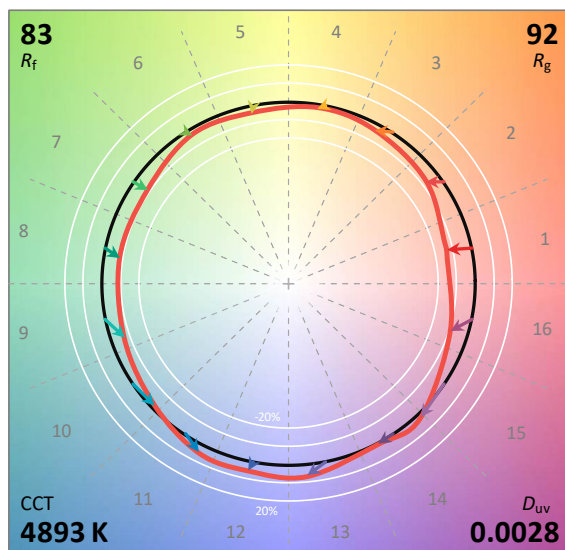
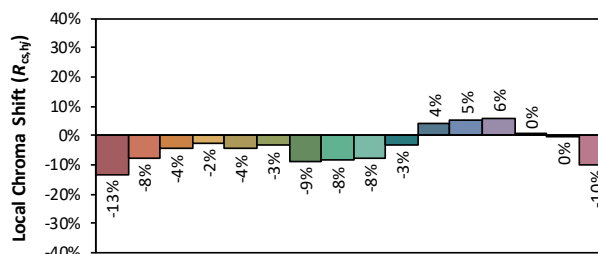
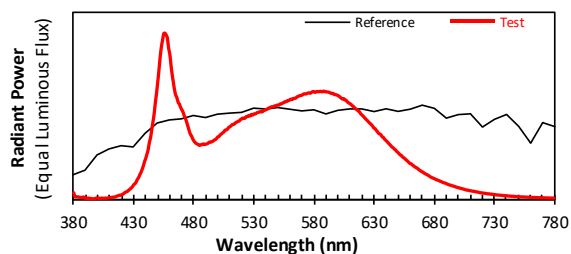
ANSI/IES TM-30-18 Color Rendition Report

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

Manufacturer: IKIO LED LIGHTING

Date: 2022/7/9

Model: IK-HBAX-0150-50-DY-RLV02BX



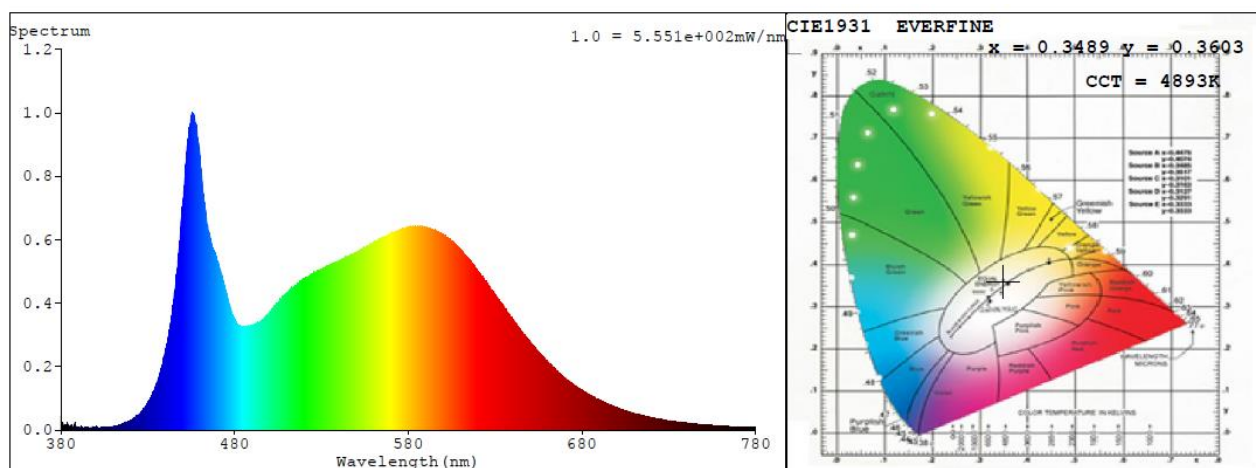
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3488
 y 0.3601
 u' 0.2106
 v' 0.4893

CIE 13.3-1995
 (CRI)
 R_a 83
 R_g 4

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	0.0396	414	0.0141	448	0.5735	482	0.3319	516	0.459
381	0.0172	415	0.0166	449	0.6299	483	0.3284	517	0.463
382	0.016	416	0.0196	450	0.697	484	0.3239	518	0.4656
383	0.015	417	0.0225	451	0.7661	485	0.3202	519	0.4747
384	0.0152	418	0.025	452	0.8433	486	0.3245	520	0.4777
385	0.0122	419	0.025	453	0.9029	487	0.3251	521	0.4827
386	0.0124	420	0.0283	454	0.944	488	0.3295	522	0.4794
387	0.0101	421	0.0314	455	0.9824	489	0.3254	523	0.4846
388	0.0151	422	0.0377	456	0.9852	490	0.3278	524	0.4915
389	0.0084	423	0.0421	457	0.9738	491	0.3295	525	0.4915
390	0.0076	424	0.0459	458	0.9582	492	0.3333	526	0.4976
391	0.0046	425	0.0489	459	0.8978	493	0.3402	527	0.4949
392	0.0085	426	0.0566	460	0.8632	494	0.3388	528	0.5037
393	0.0063	427	0.062	461	0.7978	495	0.3428	529	0.4998
394	0.0063	428	0.0686	462	0.74	496	0.3454	530	0.5067
395	0.0046	429	0.0765	463	0.6938	497	0.352	531	0.5067
396	0.0042	430	0.0873	464	0.6483	498	0.355	532	0.5102
397	0.0041	431	0.0934	465	0.6175	499	0.3616	533	0.5149
398	0.0063	432	0.1029	466	0.6018	500	0.3707	534	0.5165
399	0.0083	433	0.1189	467	0.5751	501	0.3732	535	0.5189
400	0.0069	434	0.1287	468	0.5654	502	0.3829	536	0.5208
401	0.0078	435	0.146	469	0.546	503	0.3878	537	0.5186
402	0.0058	436	0.1596	470	0.5322	504	0.3945	538	0.5277
403	0.0081	437	0.178	471	0.5187	505	0.3993	539	0.5271
404	0.0071	438	0.199	472	0.4969	506	0.4104	540	0.533
405	0.0071	439	0.2243	473	0.4811	507	0.4116	541	0.534
406	0.0074	440	0.2436	474	0.4603	508	0.4163	542	0.5398
407	0.0083	441	0.269	475	0.4361	509	0.426	543	0.5418
408	0.0071	442	0.2941	476	0.4119	510	0.4308	544	0.5471
409	0.01	443	0.3381	477	0.3894	511	0.4356	545	0.5484
410	0.0115	444	0.3654	478	0.3773	512	0.4433	546	0.5483
411	0.0117	445	0.4133	479	0.3614	513	0.4444	547	0.5535
412	0.0126	446	0.4593	480	0.3479	514	0.4487	548	0.5538
413	0.014	447	0.5074	481	0.3389	515	0.4552	549	0.5579

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5591	599	0.6193	648	0.2939	697	0.0781	746	0.0191
551	0.5599	600	0.616	649	0.2846	698	0.0746	747	0.0181
552	0.566	601	0.6118	650	0.2786	699	0.0727	748	0.0174
553	0.566	602	0.6056	651	0.2709	700	0.0704	749	0.0167
554	0.5716	603	0.5998	652	0.2641	701	0.0685	750	0.0164
555	0.5734	604	0.5946	653	0.2597	702	0.0663	751	0.0162
556	0.5796	605	0.5973	654	0.251	703	0.0642	752	0.0153
557	0.5794	606	0.5898	655	0.2468	704	0.0629	753	0.0148
558	0.586	607	0.5867	656	0.2405	705	0.0606	754	0.0153
559	0.5852	608	0.5778	657	0.2337	706	0.0585	755	0.0148
560	0.5908	609	0.5723	658	0.2275	707	0.0562	756	0.014
561	0.5945	610	0.5681	659	0.2205	708	0.0553	757	0.0138
562	0.592	611	0.5631	660	0.2137	709	0.0537	758	0.0136
563	0.5985	612	0.5557	661	0.2116	710	0.0521	759	0.013
564	0.5987	613	0.55	662	0.2048	711	0.0509	760	0.0129
565	0.6017	614	0.5435	663	0.1998	712	0.0493	761	0.0126
566	0.6072	615	0.5359	664	0.1938	713	0.0486	762	0.012
567	0.6115	616	0.5313	665	0.1896	714	0.0474	763	0.0119
568	0.6142	617	0.5241	666	0.1856	715	0.0456	764	0.0118
569	0.6161	618	0.5193	667	0.1799	716	0.0441	765	0.011
570	0.6175	619	0.5076	668	0.1739	717	0.0433	766	0.0113
571	0.6224	620	0.5014	669	0.1692	718	0.0405	767	0.0107
572	0.626	621	0.4944	670	0.1642	719	0.0397	768	0.0105
573	0.6248	622	0.4864	671	0.1614	720	0.039	769	0.0103
574	0.627	623	0.4785	672	0.1554	721	0.0376	770	0.0098
575	0.6303	624	0.4711	673	0.1519	722	0.0368	771	0.0099
576	0.6314	625	0.464	674	0.1476	723	0.036	772	0.0099
577	0.6293	626	0.456	675	0.1445	724	0.0344	773	0.0087
578	0.634	627	0.4497	676	0.1392	725	0.0333	774	0.0091
579	0.6384	628	0.4426	677	0.1343	726	0.0331	775	0.0088
580	0.6384	629	0.4342	678	0.1306	727	0.0319	776	0.0086
581	0.6346	630	0.4238	679	0.1272	728	0.0312	777	0.0084
582	0.6381	631	0.4192	680	0.1248	729	0.0301	778	0.0086
583	0.6395	632	0.4098	681	0.1209	730	0.0294	779	0.008
584	0.6385	633	0.4011	682	0.1175	731	0.0281	780	0.0082
585	0.6403	634	0.3912	683	0.115	732	0.0271		
586	0.6399	635	0.388	684	0.1121	733	0.0267		
587	0.6372	636	0.382	685	0.1087	734	0.0257		
588	0.6423	637	0.3706	686	0.1065	735	0.0254		
589	0.6388	638	0.367	687	0.1024	736	0.0244		
590	0.6385	639	0.3566	688	0.0992	737	0.0238		
591	0.6368	640	0.3498	689	0.098	738	0.0231		
592	0.6362	641	0.3428	690	0.0951	739	0.0219		
593	0.6339	642	0.335	691	0.0918	740	0.0217		
594	0.6306	643	0.3272	692	0.0887	741	0.0217		
595	0.6275	644	0.3202	693	0.086	742	0.0207		
596	0.6289	645	0.3112	694	0.0842	743	0.0199		
597	0.6215	646	0.3069	695	0.0821	744	0.0195		
598	0.621	647	0.2987	696	0.0792	745	0.0189		

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

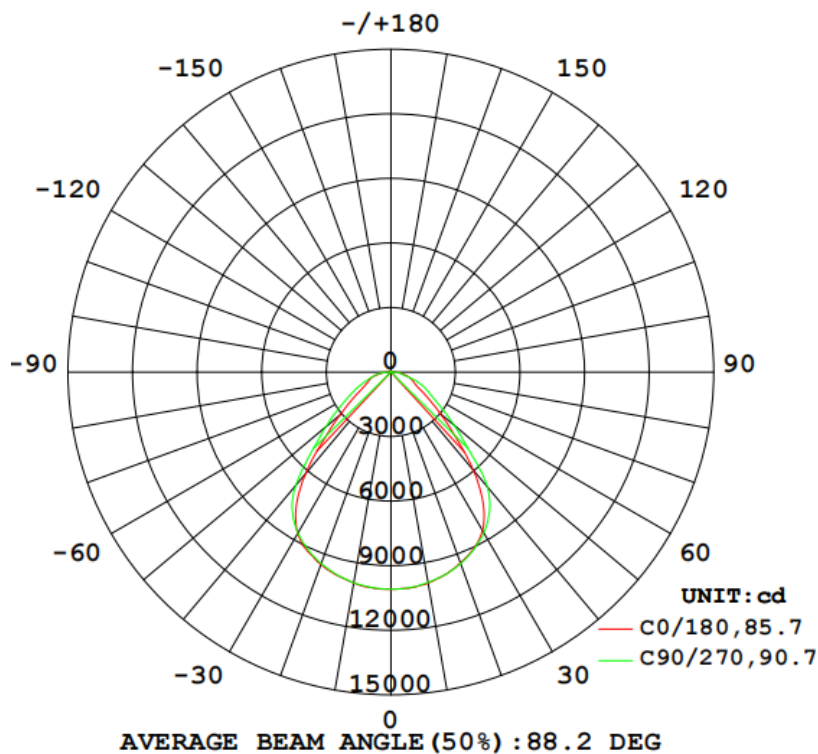
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120.1	60	1.2279	0.9962	146.9

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
21733	147.94	10101	58.5%

6.2 Luminous Intensity Distribution

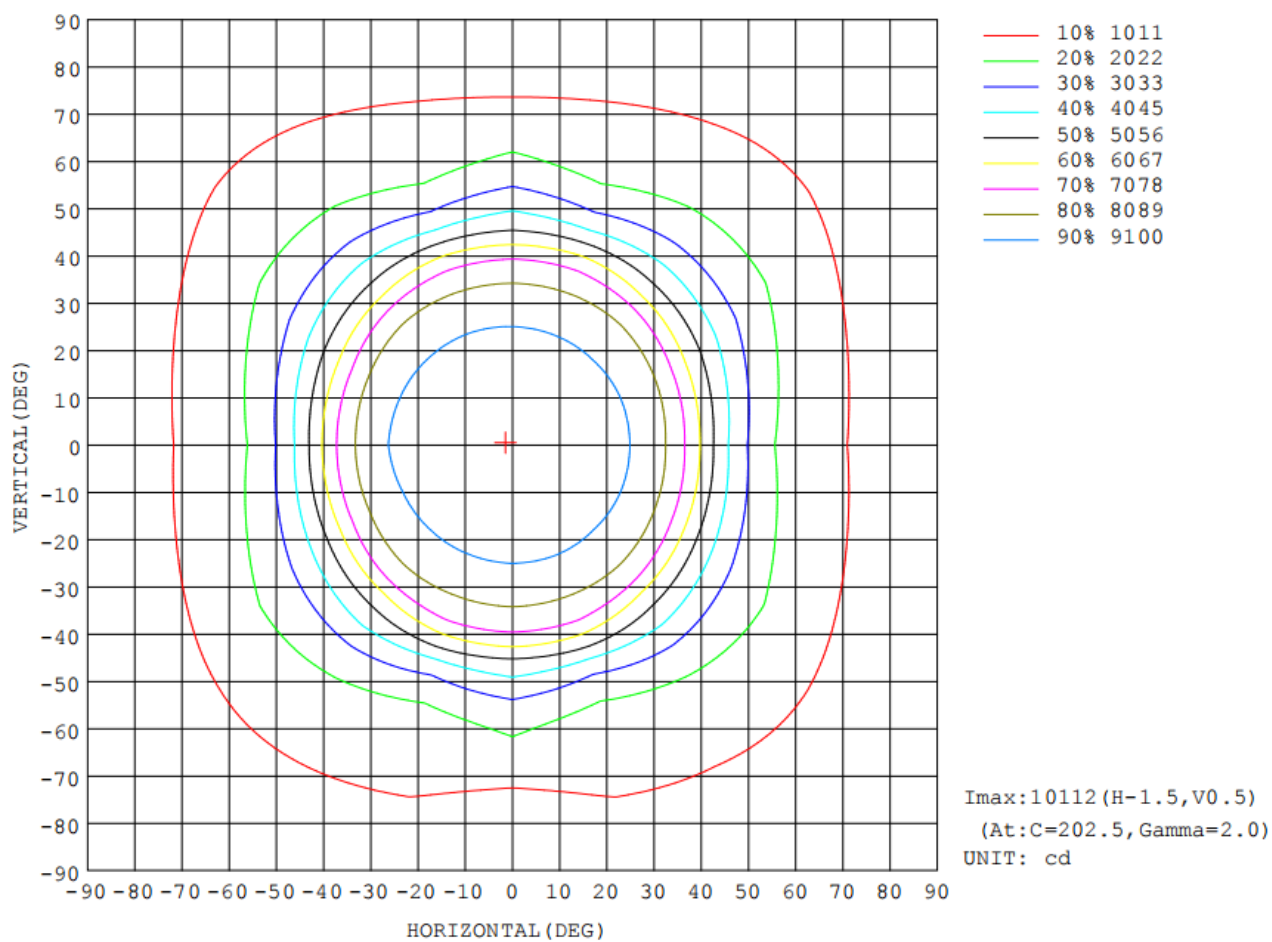




6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	Φ lum, lamp
10	995.6	992.5	992.2	995.4	995.3	995.9	993.7	993.5	0- 10	956.6	956.6	4.4, 4.4
20	944.4	944.2	947.0	946.4	951.2	948.8	946.5	945.4	10- 20	2752	3708	17.1, 17.1
30	850.6	856.3	862.8	860.7	865.7	863.3	863.8	859.8	20- 30	4191	7900	36.3, 36.3
40	595.7	624.3	697.7	629.7	618.4	639.2	689.5	636.0	30- 40	4813	12713	58.5, 58.5
50	297.4	355.2	384.1	361.2	305.8	364.7	395.4	362.0	40- 50	3724	16437	75.6, 75.6
60	150.2	184.9	216.8	189.2	156.7	199.6	224.5	197.7	50- 60	2287	18724	86.2, 86.2
70	104.5	124.0	129.0	126.6	106.7	123.8	126.7	121.6	60- 70	1486	20210	93, 93
80	55.68	68.26	50.93	68.49	58.22	68.85	68.86	67.83	70- 80	984.7	21194	97.5, 97.5
90	3.921	3.963	0.2506	3.747	3.919	4.440	0.6160	4.967	80- 90	383.9	21578	99.3, 99.3
100	0.6968	0.3326	0.4203	1.354	3.106	0.4406	0.5636	0.4125	90-100	24.11	21602	99.4, 99.4
110	2.480	2.464	1.422	2.240	0.3574	2.400	1.699	2.320	100-110	12.23	21614	99.5, 99.5
120	2.865	2.661	2.021	2.541	3.133	2.967	2.263	2.635	110-120	24.10	21638	99.6, 99.6
130	2.971	2.985	2.353	3.050	3.624	3.517	2.298	2.968	120-130	25.65	21664	99.7, 99.7
140	3.204	3.168	1.702	3.286	3.728	3.638	2.363	2.905	130-140	24.53	21689	99.8, 99.8
150	3.195	3.269	2.532	3.309	3.717	3.684	2.157	3.029	140-150	20.36	21709	99.9, 99.9
160	2.928	2.375	2.491	2.715	3.532	3.452	1.879	2.717	150-160	14.28	21723	100, 100
170	2.593	2.399	1.923	2.446	3.008	3.219	2.317	2.582	160-170	7.553	21731	100, 100
180	2.838	3.030	2.022	2.599	2.874	3.003	2.424	2.303	170-180	2.416	21733	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	1009	1009	1009	1009	1009	1009	1009	1009	1009	1009	1009	1009	1009	1009	1009	1009			
5	1007	1005	1004	1005	1006	1006	1007	1007	1006	1008	1006	1006	1005	1004	1004	1005			
10	996	993	992	993	992	994	995	996	995	997	996	996	994	992	993	994			
15	974	974	973	973	974	974	975	977	977	978	976	974	974	972	974	975			
20	944	945	944	945	947	946	946	949	951	951	949	947	947	945	945	947			
25	908	908	906	909	911	910	909	913	918	915	912	912	911	909	908	911			
30	851	855	856	859	863	861	861	861	866	866	863	863	864	861	860	861			
35	748	759	781	791	798	792	787	769	768	771	789	795	798	794	786	764			
40	596	603	624	684	698	685	630	611	618	616	639	679	690	680	636	609			
45	424	451	474	504	513	507	480	458	437	474	486	501	520	502	484	473			
50	297	332	355	320	384	323	361	339	306	352	365	339	395	338	362	355			
55	210	256	246	221	284	227	252	262	218	268	265	239	298	238	262	271			
60	150	204	185	156	217	162	189	207	157	208	200	170	225	170	198	210			
65	120	162	152	124	176	127	154	163	124	161	153	133	173	132	151	160			
70	104	127	124	119	129	121	127	125	107	128	124	114	127	113	122	125			
75	83.8	89.9	96.0	106	75.1	106	97.2	88.2	88.5	99.5	97.7	96.0	92.8	96.1	95.7	97.1			
80	55.7	62.9	68.3	60.0	50.9	60.7	68.5	64.4	58.2	71.8	68.9	64.6	68.9	64.1	67.8	69.9			
85	33.9	38.0	38.0	31.1	34.9	31.3	38.0	39.3	35.1	42.6	40.1	35.0	40.3	33.9	39.4	40.8			
90	3.92	4.50	3.96	2.25	0.25	2.21	3.75	4.29	3.92	5.15	4.44	2.81	0.62	3.02	4.97	5.66			
95	3.79	3.83	2.90	0.57	0.55	0.65	2.63	3.73	3.70	3.54	2.61	0.54	0.55	0.54	2.83	3.82			
100	0.70	0.29	0.33	0.83	0.42	0.64	1.35	2.77	3.11	2.70	0.44	0.97	0.56	0.98	0.41	0.31			
105	1.59	0.41	1.31	1.44	1.13	1.34	0.61	0.35	0.29	0.49	0.75	1.53	1.32	1.59	1.14	0.49			
110	2.48	2.91	2.46	1.75	1.42	1.69	2.24	0.81	0.36	0.76	2.40	1.84	1.70	1.83	2.32	2.93			
115	2.82	2.92	2.51	2.12	1.57	2.11	2.32	2.92	2.89	3.16	2.65	2.17	1.84	2.10	2.45	2.99			
120	2.86	2.93	2.66	2.43	2.02	2.42	2.54	2.96	3.13	3.32	2.97	2.58	2.26	2.38	2.64	3.06			
125	2.87	3.01	2.77	2.58	2.04	2.46	2.77	3.09	3.32	3.56	3.28	2.76	2.42	2.58	2.82	3.17			
130	2.97	3.16	2.99	2.90	2.35	3.04	3.05	3.21	3.62	3.79	3.52	3.05	2.30	2.89	2.97	3.32			
135	3.14	3.31	3.15	3.19	2.46	3.18	3.27	3.30	3.71	3.86	3.63	3.26	2.42	2.99	2.96	3.40			
140	3.20	3.44	3.17	3.14	1.70	3.17	3.29	3.41	3.73	3.79	3.64	3.70	2.36	3.13	2.91	3.31			
145	3.21	3.41	3.25	2.99	2.51	3.19	3.30	3.46	3.72	3.74	3.65	3.72	2.40	3.21	3.06	3.22			
150	3.19	3.31	3.27	3.04	2.53	3.07	3.31	3.31	3.72	3.65	3.68	3.72	2.16	3.15	3.03	3.12			
155	3.09	3.26	3.10	3.00	2.51	2.96	3.31	3.18	3.70	3.59	3.59	3.72	2.07	2.81	2.75	3.07			
160	2.93	2.96	2.37	2.44	2.49	2.90	2.71	3.09	3.53	3.45	3.45	3.50	1.88	2.35	2.72	2.60			
165	2.51	2.64	2.57	2.21	2.12	1.97	2.73	2.86	3.04	3.15	3.17	3.41	2.14	2.25	2.37	2.52			
170	2.59	2.52	2.40	2.43	1.92	2.16	2.45	2.84	3.01	3.06	3.22	3.33	2.32	2.02	2.58	2.27			
175	2.70	2.92	2.90	2.40	1.88	2.30	2.30	2.27	2.54	2.54	2.80	3.01	2.52	1.99	2.44	2.59			
180	2.84	3.02	3.03	2.44	2.02	2.29	2.60	2.62	2.87	2.87	3.00	3.02	2.42	2.01	2.30	2.61			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-0150-50-DY-RLV02BX	120.0	60	0.991	7.9
	277.0	60	0.921	9.8

8. Photo of sample



Figure 1



Figure 2

***** END OF REPORT*****