Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23080353L00101

Client..... : IKIO LED LIGHTING

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

Test Model.....: IK-HBAX-0100-50-DY-RLV02BS

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:	**Checked by:**	**Approved by:**
Jarvis Zhang	Sandy Chen	Jessie Li
Jarvis Zhang/ Test Engineer	Sandy Chen/ Project Engineer	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.
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1. Product Description for Equipment under Test(EUT)

Representative (Tested) Model:	IK-HBAX-0100-50-DY-RLV02BS
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires (Commercial and Industrial)
Rated Voltage/Frequency:	100-277V AC, 50/60Hz
Rated Power:	100W
Rated luminous flux:	14000lm
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°C±1.2°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 paramters 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)
119.99	60	0.8377	99.87	0.9936	14715	147.34	5211

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
84.6	15	85	97	0.3396	0.3498	0.2084	0.483	1.32E-03

5.2 Color Rendering Index

Ra
84.6

R1	R2	R3	R4	R5
83	89	92	85	84

R6	R7	R8	R9	R10
85	88	70	15	73

R11	R12	R13	R14	R15
85	64	85	96	79

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

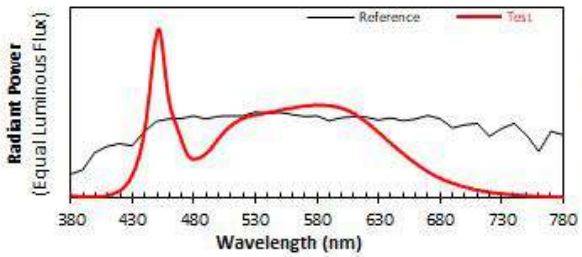
ANSI/IES TM-30-18 Color Rendition Report

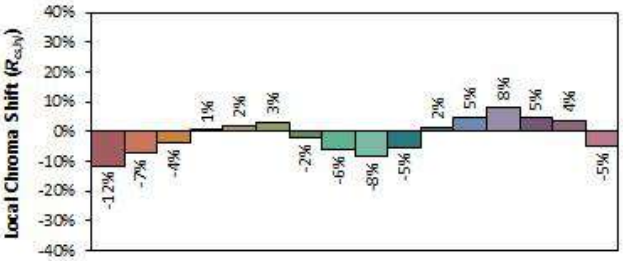
Source: BXEN-50E-11M-3CA

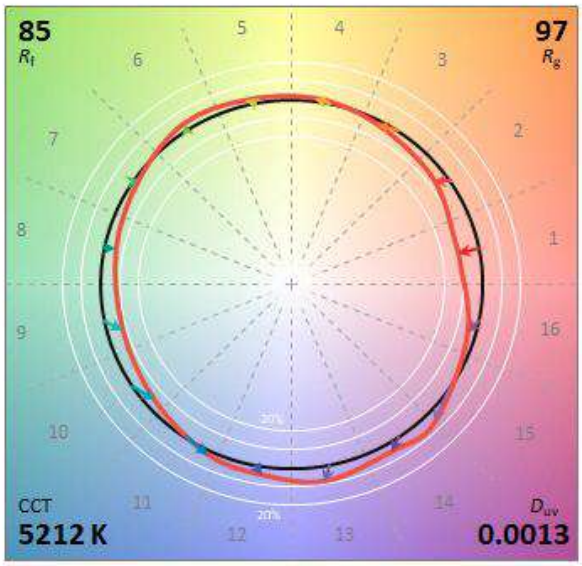
Manufacturer: IKIO LED LIGHTING

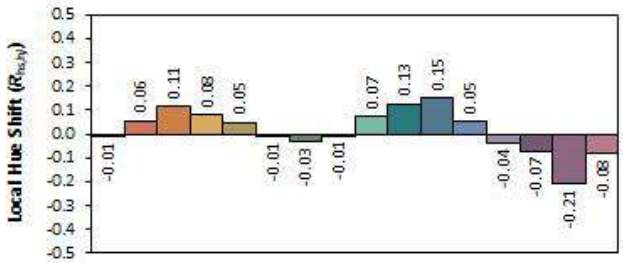
Date: 2023/9/6

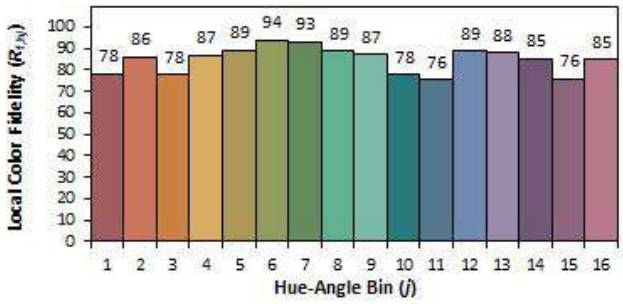
Model: IK-HBAX-0100-50-DY-RLV02BS

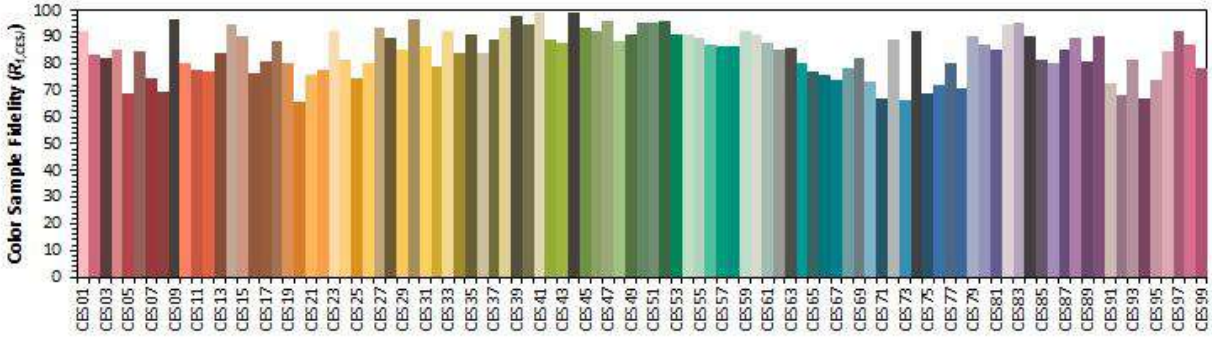












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

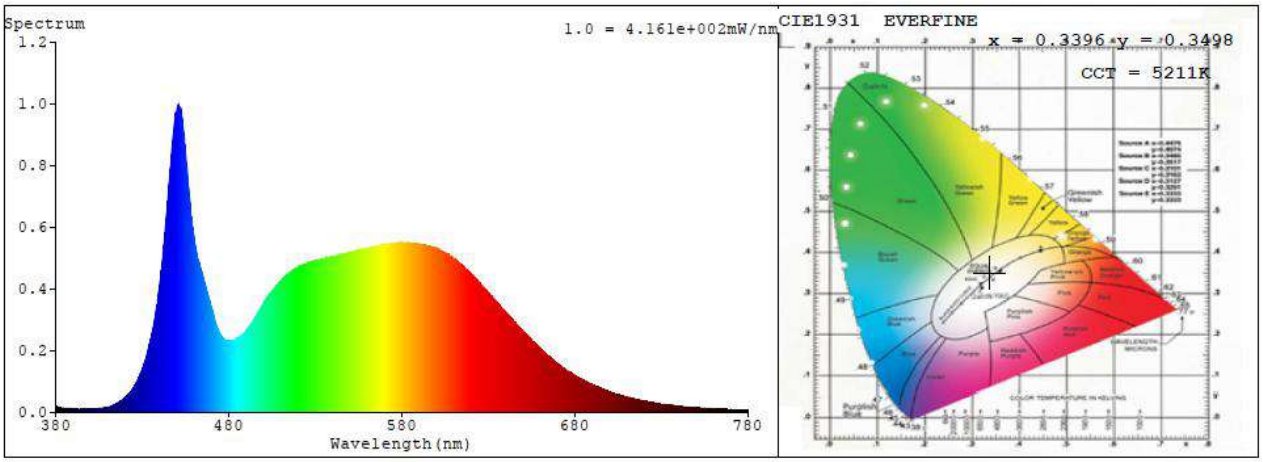
x	**0.3396**
y	**0.3496**
u'	**0.2084**
v'	**0.4829**

CIE 13.3-1995 (CRI)

R_a	85
R_9	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	0.0177	414	0.0256	448	0.9131	482	0.2335	516	0.4549
381	0.0109	415	0.0296	449	0.9397	483	0.2344	517	0.4599
382	0.0129	416	0.0328	450	0.9768	484	0.2354	518	0.4642
383	0.0136	417	0.0348	451	0.9965	485	0.2394	519	0.4678
384	0.0129	418	0.0378	452	0.988	486	0.2435	520	0.4696
385	0.0109	419	0.0421	453	0.9541	487	0.2467	521	0.4719
386	0.011	420	0.0466	454	0.899	488	0.2524	522	0.4752
387	0.0103	421	0.0525	455	0.8387	489	0.2581	523	0.4792
388	0.0083	422	0.0586	456	0.7772	490	0.2654	524	0.4777
389	0.0122	423	0.0645	457	0.7052	491	0.2712	525	0.4819
390	0.009	424	0.0732	458	0.654	492	0.2778	526	0.4802
391	0.0088	425	0.081	459	0.6005	493	0.2867	527	0.486
392	0.0097	426	0.0916	460	0.5582	494	0.2924	528	0.4879
393	0.0101	427	0.0986	461	0.5262	495	0.3048	529	0.4897
394	0.0082	428	0.113	462	0.5026	496	0.3136	530	0.4877
395	0.0092	429	0.1275	463	0.4799	497	0.3239	531	0.49
396	0.009	430	0.1415	464	0.4572	498	0.3328	532	0.4935
397	0.0096	431	0.1579	465	0.4398	499	0.3437	533	0.4944
398	0.0088	432	0.173	466	0.4189	500	0.3509	534	0.4958
399	0.0086	433	0.1949	467	0.4007	501	0.3607	535	0.4948
400	0.0093	434	0.216	468	0.3793	502	0.3699	536	0.4988
401	0.0096	435	0.2397	469	0.3588	503	0.3772	537	0.5003
402	0.0111	436	0.2676	470	0.3374	504	0.3844	538	0.502
403	0.01	437	0.2968	471	0.3156	505	0.395	539	0.503
404	0.011	438	0.3327	472	0.298	506	0.3999	540	0.5025
405	0.0117	439	0.3714	473	0.2795	507	0.4072	541	0.5063
406	0.0122	440	0.4113	474	0.2633	508	0.4128	542	0.5071
407	0.0114	441	0.4598	475	0.2517	509	0.4209	543	0.5098
408	0.0138	442	0.5184	476	0.2425	510	0.4254	544	0.5097
409	0.0163	443	0.5749	477	0.2383	511	0.4315	545	0.5097
410	0.016	444	0.6396	478	0.2314	512	0.438	546	0.5096
411	0.0176	445	0.7088	479	0.232	513	0.4444	547	0.5121
412	0.02	446	0.7791	480	0.2285	514	0.4482	548	0.5132
413	0.0228	447	0.8476	481	0.2298	515	0.451	549	0.5178

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5145	599	0.5322	648	0.2752	697	0.0725	746	0.0168
551	0.518	600	0.5287	649	0.2696	698	0.0704	747	0.0158
552	0.5197	601	0.5293	650	0.2649	699	0.0694	748	0.0158
553	0.5216	602	0.5249	651	0.2579	700	0.0672	749	0.0154
554	0.5254	603	0.5235	652	0.2514	701	0.0651	750	0.0149
555	0.5265	604	0.5195	653	0.2457	702	0.0632	751	0.0142
556	0.5268	605	0.5155	654	0.2409	703	0.0617	752	0.0139
557	0.5286	606	0.5134	655	0.2349	704	0.0592	753	0.0135
558	0.5271	607	0.5126	656	0.2284	705	0.0569	754	0.0131
559	0.5301	608	0.5049	657	0.2241	706	0.0555	755	0.0134
560	0.5309	609	0.5027	658	0.2177	707	0.0538	756	0.0126
561	0.5304	610	0.4979	659	0.2131	708	0.0524	757	0.0119
562	0.5348	611	0.4975	660	0.208	709	0.0503	758	0.0119
563	0.5358	612	0.49	661	0.2028	710	0.0495	759	0.0117
564	0.5364	613	0.4832	662	0.1956	711	0.0474	760	0.0117
565	0.5373	614	0.4786	663	0.1924	712	0.0461	761	0.011
566	0.5379	615	0.4744	664	0.1858	713	0.0446	762	0.0109
567	0.5404	616	0.4706	665	0.1819	714	0.0438	763	0.0105
568	0.5418	617	0.464	666	0.177	715	0.0417	764	0.0102
569	0.5419	618	0.4592	667	0.1718	716	0.0415	765	0.0104
570	0.5421	619	0.4535	668	0.1671	717	0.0393	766	0.01
571	0.543	620	0.4502	669	0.1613	718	0.0389	767	0.0094
572	0.5441	621	0.4441	670	0.1577	719	0.0378	768	0.0093
573	0.5434	622	0.4379	671	0.1543	720	0.0353	769	0.0089
574	0.5453	623	0.4317	672	0.1495	721	0.0352	770	0.009
575	0.5433	624	0.4259	673	0.1453	722	0.0336	771	0.0091
576	0.5467	625	0.4202	674	0.141	723	0.0326	772	0.0085
577	0.5484	626	0.4124	675	0.1366	724	0.0318	773	0.008
578	0.5472	627	0.4067	676	0.1337	725	0.0309	774	0.0079
579	0.5489	628	0.4014	677	0.1295	726	0.0302	775	0.0077
580	0.5498	629	0.3954	678	0.1251	727	0.0294	776	0.0076
581	0.5465	630	0.3872	679	0.1226	728	0.0289	777	0.0074
582	0.5491	631	0.3821	680	0.1192	729	0.0276	778	0.0071
583	0.5472	632	0.3785	681	0.1165	730	0.0262	779	0.0071
584	0.5481	633	0.37	682	0.1138	731	0.0263	780	0.0072
585	0.5479	634	0.3659	683	0.1092	732	0.0252		
586	0.5476	635	0.3553	684	0.1067	733	0.0243		
587	0.5453	636	0.3502	685	0.1035	734	0.024		
588	0.5472	637	0.3443	686	0.1004	735	0.0227		
589	0.5456	638	0.3358	687	0.0984	736	0.0219		
590	0.5442	639	0.3318	688	0.095	737	0.0215		
591	0.5443	640	0.3266	689	0.0921	738	0.0211		
592	0.5443	641	0.3174	690	0.0902	739	0.0207		
593	0.5393	642	0.3118	691	0.0876	740	0.0194		
594	0.5412	643	0.3065	692	0.0849	741	0.0191		
595	0.5373	644	0.2993	693	0.0832	742	0.0182		
596	0.5383	645	0.2939	694	0.0802	743	0.0178		
597	0.5354	646	0.287	695	0.0783	744	0.0176		
598	0.5337	647	0.2804	696	0.0757	745	0.0173		

6. Goniophotometer Test results

6.1 Test Data

Test Ambient Temperature	25.2℃	Test orientation	Downward
Operate time(Min.)	90	stabilization time(Min.)	30

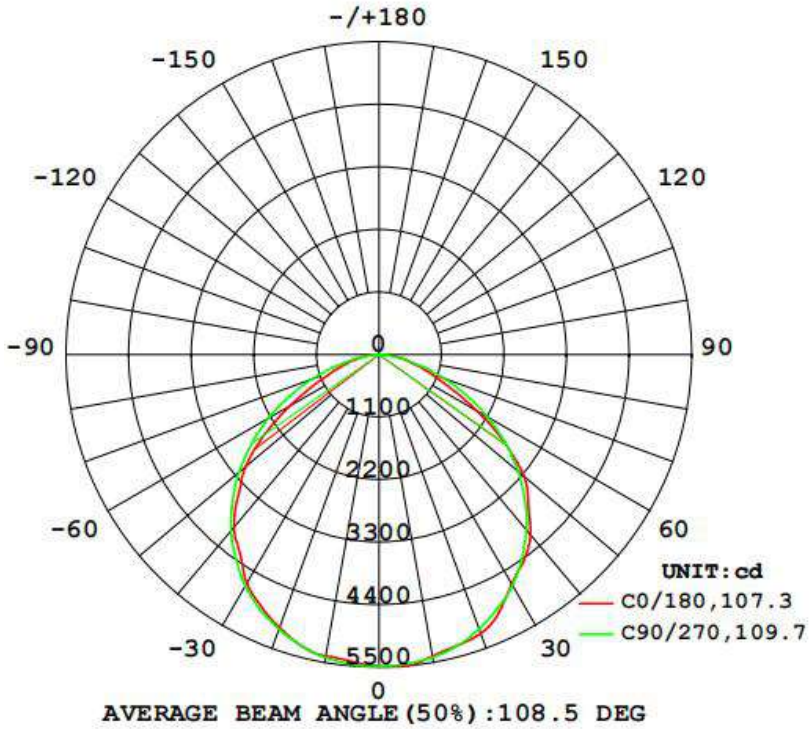
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120	60	0.8375	0.9933	99.81

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
14684	147.13	5498	53.3%

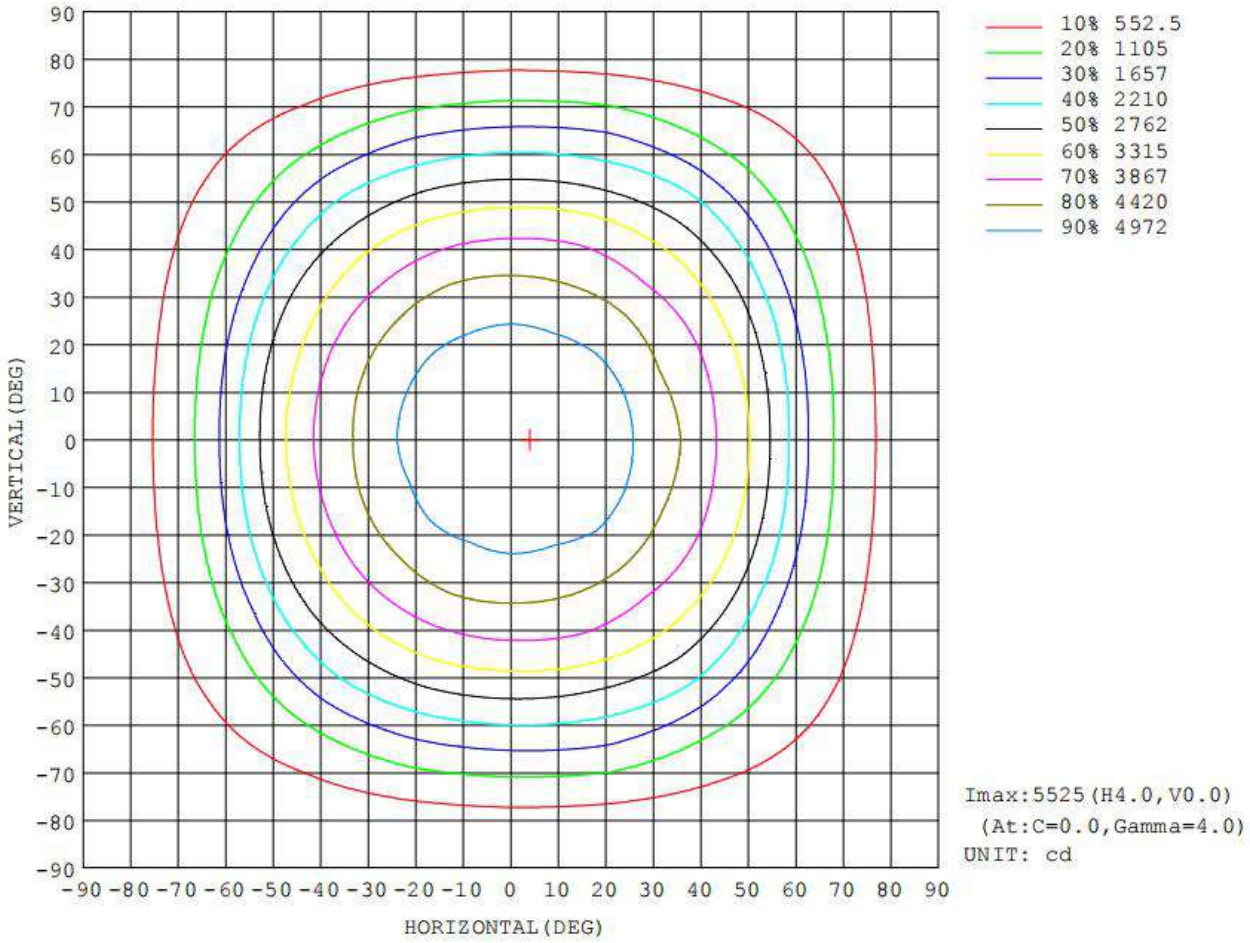
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum,lamp
10	5386	5429	5409	5354	5385	5354	5412	5436	0- 10	519.2	519.2	3.54,3.54
20	5222	5145	5138	5157	5113	5155	5142	5139	10- 20	1495	2014	13.7,13.7
30	4669	4770	4693	4649	4649	4659	4702	4777	20- 30	2279	4294	29.2,29.2
40	4141	4029	4033	4000	3970	4005	4051	4042	30- 40	2740	7033	47.9,47.9
50	3328	3292	3195	3124	3068	3139	3212	3307	40- 50	2803	9836	67,67
60	1997	2262	2208	2072	1817	2107	2253	2304	50- 60	2391	12227	83.3,83.3
70	947.4	1069	1194	969.9	842.7	984.4	1233	1096	60- 70	1538	13764	93.7,93.7
80	406.7	388.7	364.6	327.3	346.4	342.4	386.7	398.5	70- 80	716.5	14481	98.6,98.6
90	64.24	13.79	8.223	6.300	0.9596	1.001	2.406	1.703	80- 90	181.4	14662	99.8,99.9
100	1.389	1.770	1.668	1.455	1.829	2.457	2.530	2.164	90-100	2.743	14665	99.9,99.9
110	1.724	1.990	2.336	1.848	2.422	2.755	3.110	2.457	100-110	2.202	14667	99.9,99.9
120	2.447	2.604	3.153	2.644	2.699	2.956	3.416	2.709	110-120	2.476	14670	99.9,99.9
130	3.474	3.575	4.194	3.648	3.698	3.807	4.136	3.632	120-130	2.833	14672	99.9,99.9
140	4.639	4.309	4.790	4.263	5.426	5.011	4.342	5.004	130-140	3.295	14676	99.9,99.9
150	5.234	4.797	5.052	4.720	6.829	7.238	5.879	6.714	140-150	3.321	14679	100,100
160	5.694	5.286	5.019	5.572	7.993	8.153	7.585	7.399	150-160	2.890	14682	100,100
170	6.151	6.336	6.076	6.432	7.285	7.297	7.741	7.133	160-170	1.866	14684	100,100
180	8.116	7.839	7.838	7.946	7.836	7.045	7.724	7.872	170-180	0.6737	14684	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

6.4 Isocandela Diagram



6.5 Luminous Distribution Intensity Data

Table--1 UNIT: cd

γ (DEG) \ C(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	5483	5483	5483	5483	5483	5483	5483	5483	5483	5483	5483	5483	5483	5483	5483	5483			
5	5494	5493	5485	5471	5462	5448	5435	5426	5424	5430	5438	5452	5469	5477	5490	5496			
10	5386	5394	5429	5432	5409	5378	5354	5371	5385	5376	5354	5378	5412	5435	5436	5401			
15	5297	5283	5280	5338	5307	5260	5290	5306	5304	5309	5292	5255	5299	5334	5283	5283			
20	5222	5203	5145	5161	5138	5101	5157	5119	5113	5123	5155	5101	5142	5163	5139	5202			
25	4997	5021	5004	4918	4933	4912	4929	4903	4896	4906	4925	4930	4949	4935	4995	5026			
30	4669	4693	4770	4673	4693	4691	4649	4662	4649	4662	4659	4705	4702	4687	4777	4700			
35	4436	4401	4414	4403	4381	4394	4345	4303	4265	4297	4359	4404	4391	4400	4433	4395			
40	4141	4139	4029	4078	4033	4019	4000	3958	3970	3961	4005	4031	4051	4083	4042	4135			
45	3711	3711	3692	3708	3632	3610	3527	3544	3497	3550	3538	3622	3642	3713	3689	3714			
50	3328	3313	3292	3246	3195	3164	3124	3048	3068	3067	3139	3185	3212	3268	3307	3316			
55	2689	2746	2795	2736	2713	2684	2577	2526	2479	2557	2608	2709	2739	2766	2799	2775			
60	1997	2079	2262	2249	2208	2153	2072	1876	1817	1902	2107	2186	2253	2275	2304	2119			
65	1372	1433	1622	1756	1692	1632	1487	1285	1236	1310	1507	1677	1738	1789	1665	1465			
70	947	972	1069	1232	1194	1135	970	856	843	868	984	1160	1233	1266	1096	987			
75	642	649	672	744	737	692	591	563	566	574	604	712	768	771	686	658			
80	407	403	389	381	365	340	327	335	346	344	342	356	387	396	399	410			
85	223	212	178	138	115	115	129	149	165	159	140	123	122	146	185	219			
90	64.2	59.1	13.8	13.8	8.22	3.02	6.30	0.59	0.96	0.97	1.00	1.02	2.41	2.56	1.70	31.2			
95	0.74	0.84	0.90	1.73	1.13	1.13	1.12	0.89	1.32	1.46	1.64	2.11	1.95	1.90	1.47	1.32			
100	1.39	1.59	1.77	1.49	1.67	1.29	1.46	1.38	1.83	2.24	2.46	2.24	2.53	2.09	2.16	2.04			
105	1.42	1.79	1.82	1.68	2.05	1.53	1.62	1.64	2.22	2.52	2.63	2.55	3.00	2.37	2.36	2.27			
110	1.72	1.97	1.99	1.96	2.34	1.81	1.85	1.96	2.42	2.71	2.76	2.70	3.11	2.53	2.46	2.46			
115	2.04	2.22	2.26	2.29	1.82	2.20	2.19	2.25	2.56	2.80	2.82	2.82	2.09	2.68	2.54	2.55			
120	2.45	2.55	2.60	2.69	3.15	2.61	2.64	2.59	2.70	2.90	2.96	2.95	3.42	2.81	2.71	2.66			
125	2.95	2.97	3.09	3.17	3.63	3.10	3.11	3.13	3.06	3.23	3.24	3.12	3.36	3.06	3.07	3.02			
130	3.47	3.44	3.58	3.77	4.19	3.70	3.65	3.71	3.70	3.83	3.81	4.03	4.14	3.87	3.63	3.61			
135	4.05	3.93	3.97	4.27	3.62	4.37	3.98	4.18	4.48	4.64	4.52	4.69	4.75	4.48	4.31	4.43			
140	4.64	4.50	4.31	4.33	4.79	4.32	4.26	4.67	5.43	5.59	5.01	4.69	4.34	4.48	5.00	5.42			
145	4.99	4.83	4.79	4.31	4.94	4.71	4.91	4.83	6.31	6.26	6.17	5.32	5.87	5.35	6.16	6.11			
150	5.23	5.24	4.80	4.36	5.05	4.47	4.72	5.22	6.83	7.13	7.24	6.46	5.88	6.13	6.71	7.11			
155	5.65	5.79	4.97	4.94	4.56	5.04	4.96	5.82	7.76	7.56	7.97	7.50	6.95	6.55	6.88	7.73			
160	5.69	5.76	5.29	4.89	5.02	5.07	5.57	5.91	7.99	8.00	8.15	7.66	7.58	7.69	7.40	7.55			
165	5.25	5.45	5.87	5.85	5.39	6.01	5.79	5.60	7.71	7.63	7.01	7.71	7.66	6.90	7.54	7.47			
170	6.15	6.23	6.34	5.97	6.08	6.57	6.43	6.01	7.28	7.25	7.30	7.12	7.74	7.05	7.13	7.12			
175	6.89	6.97	6.68	6.68	6.81	7.18	7.17	6.89	7.45	7.44	7.80	7.72	7.33	7.14	7.24	7.29			
180	8.12	7.18	7.84	7.73	7.84	7.87	7.95	7.06	7.84	7.80	7.05	7.79	7.72	7.80	7.87	7.93			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-0100-50-DY-RLV02BS	100.0	60	0.996	4.51
	120.0	60	0.994	5.28
	277.0	60	0.901	8.65

8. Photo of sample

Figure 1

Figure 2

---End of Report---