



Test Report Of ANSI/IES LM-79-19

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

Report Number..... : N02A23080353L00201

Client..... : IKIO LED LIGHTING

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

Test Model.....: IK-HBAX-0150-50-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:

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 used 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-0150-50-DY-RLV02BS
Manufacturer:	IKIO LED LIGHTING
Product Type:	High Bay Luminaires (Commercial and Industrial)
Rated Voltage/Frequency:	100-277V AC, 50/60Hz
Rated Power:	150W
Rated luminous flux:	21000lm
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

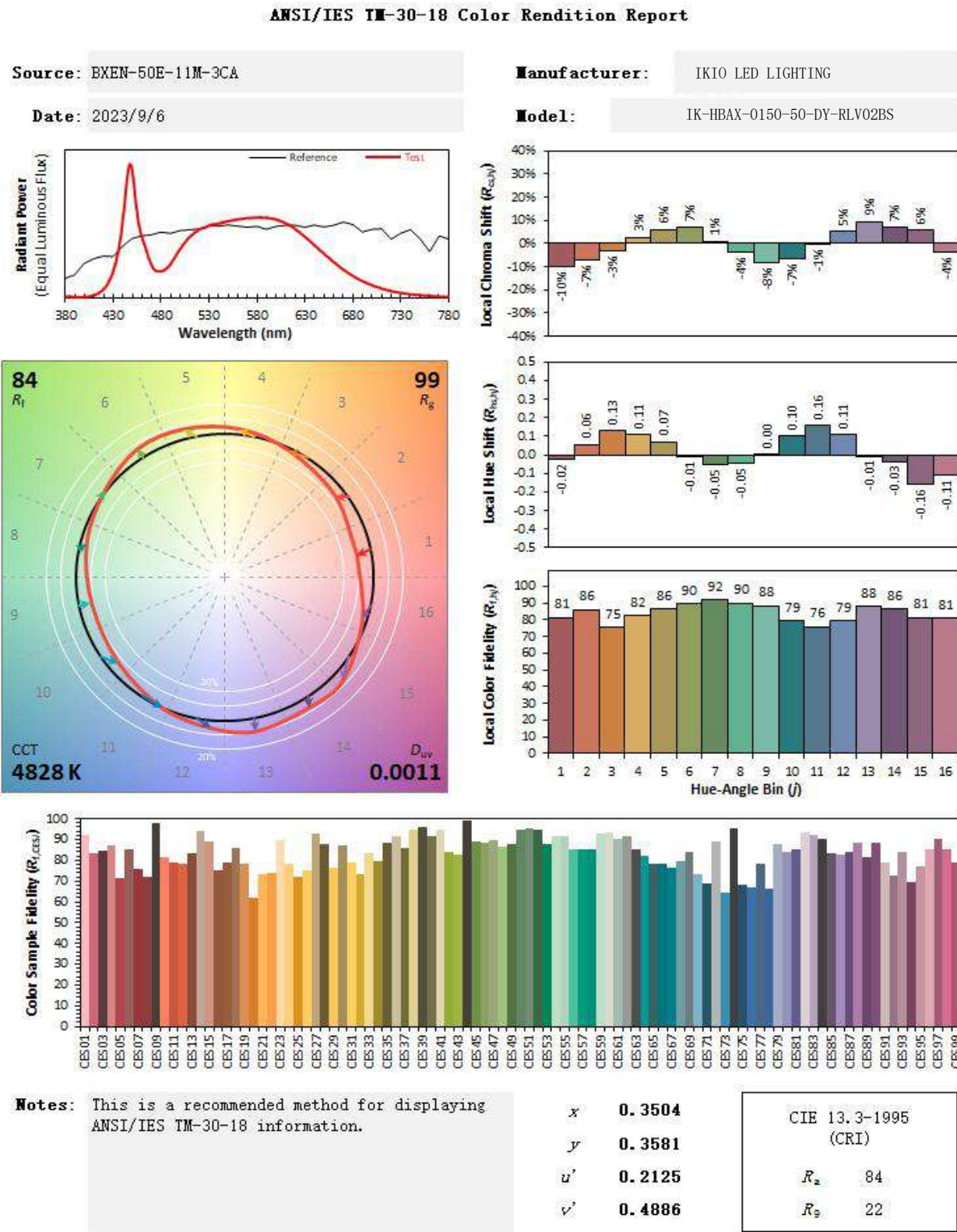
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)	CCT (K)
119.99	60	1.244	149	0.998	21498	144.32	4826

Ra	R9	Rf	Rg	x	y	u'	v'	Duv
83.8	22	84	99	0.3505	0.3582	0.2125	0.4887	1.19E-03

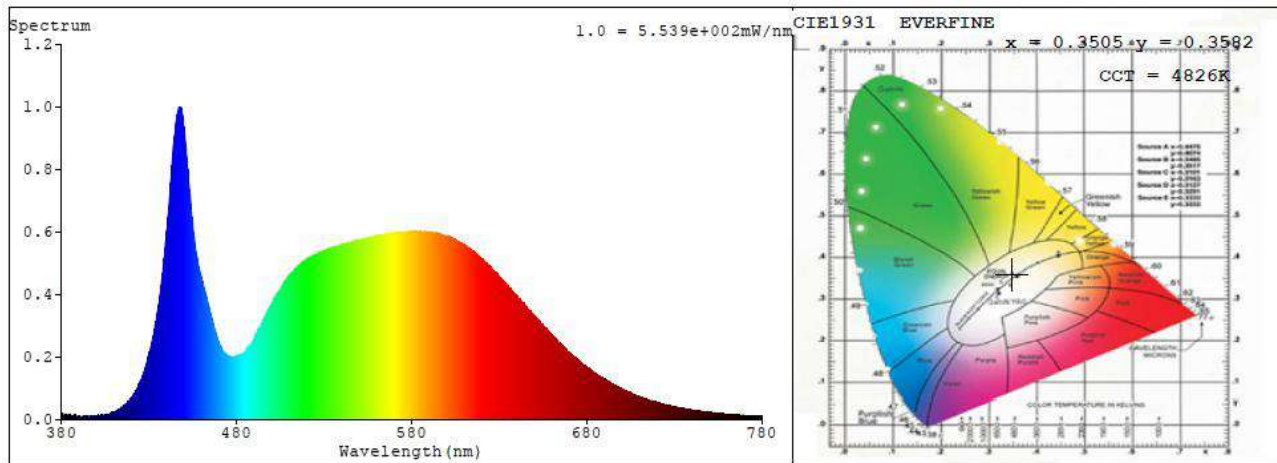
5.2 Color Rendering Index

<div>Ra</div> <div>83.8</div>									
<div>R1</div> <div>83</div>	<div>R2</div> <div>87</div>	<div>R3</div> <div>90</div>	<div>R4</div> <div>85</div>	<div>R5</div> <div>83</div>					
<div>R6</div> <div>82</div>	<div>R7</div> <div>89</div>	<div>R8</div> <div>73</div>	<div>R9</div> <div>22</div>	<div>R10</div> <div>69</div>					
<div>R11</div> <div>84</div>	<div>R12</div> <div>61</div>	<div>R13</div> <div>83</div>	<div>R14</div> <div>94</div>	<div>R15</div> <div>79</div>					

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



5.4 Relative Spectral Power Distribution



nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0146	414	0.0345	448	0.9901	482	0.2053	516	0.4935
381	0.013	415	0.0383	449	0.9795	483	0.2084	517	0.496
382	0.0066	416	0.0458	450	0.9321	484	0.2125	518	0.5001
383	0.0157	417	0.0498	451	0.8778	485	0.2193	519	0.5054
384	0.0156	418	0.0561	452	0.809	486	0.2228	520	0.5121
385	0.0103	419	0.0622	453	0.738	487	0.2341	521	0.5168
386	0.0087	420	0.0723	454	0.6743	488	0.2392	522	0.5161
387	0.0128	421	0.0772	455	0.6305	489	0.2451	523	0.5219
388	0.0107	422	0.0852	456	0.5712	490	0.2578	524	0.5241
389	0.0071	423	0.0948	457	0.5331	491	0.266	525	0.5245
390	0.0071	424	0.1073	458	0.5003	492	0.279	526	0.5258
391	0.0088	425	0.1206	459	0.476	493	0.2898	527	0.5283
392	0.0082	426	0.135	460	0.4513	494	0.2995	528	0.535
393	0.0114	427	0.1494	461	0.429	495	0.3116	529	0.5353
394	0.0062	428	0.1654	462	0.4085	496	0.3265	530	0.5406
395	0.0081	429	0.1838	463	0.3835	497	0.3358	531	0.5398
396	0.0058	430	0.2072	464	0.3676	498	0.3477	532	0.5451
397	0.0091	431	0.2284	465	0.3414	499	0.36	533	0.547
398	0.0104	432	0.2542	466	0.3235	500	0.3675	534	0.5447
399	0.0109	433	0.2809	467	0.2974	501	0.3769	535	0.5528
400	0.0113	434	0.3146	468	0.2813	502	0.3887	536	0.5453
401	0.0143	435	0.3473	469	0.2632	503	0.3996	537	0.5495
402	0.0079	436	0.3835	470	0.2446	504	0.4078	538	0.5518
403	0.0117	437	0.4293	471	0.2304	505	0.414	539	0.5555
404	0.0128	438	0.473	472	0.2194	506	0.424	540	0.5579
405	0.0144	439	0.5299	473	0.2112	507	0.4358	541	0.5574
406	0.0146	440	0.6008	474	0.2058	508	0.4429	542	0.5565
407	0.0174	441	0.6514	475	0.2035	509	0.4509	543	0.562
408	0.0182	442	0.7209	476	0.2009	510	0.4576	544	0.5646
409	0.0223	443	0.8025	477	0.1989	511	0.4614	545	0.5637
410	0.0225	444	0.8736	478	0.1998	512	0.4711	546	0.5673
411	0.0255	445	0.9234	479	0.2005	513	0.4736	547	0.5673
412	0.0304	446	0.9697	480	0.1995	514	0.4827	548	0.5703
413	0.0313	447	0.9966	481	0.2044	515	0.4895	549	0.573

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
550	0.5714	599	0.5861	648	0.3455	697	0.1061	746	0.0251
551	0.5741	600	0.5834	649	0.3396	698	0.1038	747	0.025
552	0.5771	601	0.5857	650	0.3333	699	0.1011	748	0.0235
553	0.577	602	0.5817	651	0.3252	700	0.0977	749	0.0235
554	0.5771	603	0.5785	652	0.3175	701	0.0951	750	0.0229
555	0.58	604	0.575	653	0.3123	702	0.0924	751	0.0221
556	0.5831	605	0.5753	654	0.3074	703	0.0898	752	0.0215
557	0.5836	606	0.5708	655	0.302	704	0.0861	753	0.0209
558	0.5839	607	0.5662	656	0.2966	705	0.0855	754	0.0204
559	0.5847	608	0.5656	657	0.2902	706	0.0826	755	0.02
560	0.5878	609	0.5605	658	0.283	707	0.0803	756	0.019
561	0.5877	610	0.5599	659	0.2767	708	0.0774	757	0.0188
562	0.5893	611	0.5536	660	0.2708	709	0.0757	758	0.0185
563	0.5866	612	0.55	661	0.2657	710	0.073	759	0.0173
564	0.5893	613	0.5488	662	0.2626	711	0.0713	760	0.0178
565	0.5919	614	0.5456	663	0.2532	712	0.0685	761	0.0167
566	0.5926	615	0.5386	664	0.2477	713	0.0675	762	0.0161
567	0.593	616	0.5354	665	0.2422	714	0.0646	763	0.0161
568	0.5935	617	0.5303	666	0.2372	715	0.0626	764	0.0153
569	0.5967	618	0.526	667	0.2309	716	0.0606	765	0.0149
570	0.596	619	0.5205	668	0.2251	717	0.0585	766	0.0144
571	0.597	620	0.5129	669	0.2181	718	0.0579	767	0.0143
572	0.5942	621	0.5102	670	0.2158	719	0.0562	768	0.0138
573	0.5987	622	0.503	671	0.2109	720	0.054	769	0.0132
574	0.5964	623	0.4992	672	0.2043	721	0.0529	770	0.0137
575	0.5972	624	0.494	673	0.1996	722	0.0518	771	0.0125
576	0.5995	625	0.488	674	0.1956	723	0.05	772	0.0125
577	0.5979	626	0.4813	675	0.1898	724	0.049	773	0.0124
578	0.5997	627	0.475	676	0.1857	725	0.0467	774	0.012
579	0.5998	628	0.4707	677	0.1813	726	0.0465	775	0.0116
580	0.5995	629	0.4642	678	0.1768	727	0.0437	776	0.0111
581	0.5984	630	0.4574	679	0.1718	728	0.0421	777	0.0108
582	0.6016	631	0.4527	680	0.1693	729	0.0421	778	0.0106
583	0.6041	632	0.4456	681	0.1641	730	0.0403	779	0.0108
584	0.5993	633	0.4407	682	0.159	731	0.0392	780	0.0108
585	0.6011	634	0.435	683	0.1552	732	0.0387		
586	0.599	635	0.4268	684	0.1516	733	0.0374		
587	0.596	636	0.4207	685	0.1475	734	0.0358		
588	0.5988	637	0.4156	686	0.143	735	0.0353		
589	0.5995	638	0.4072	687	0.1392	736	0.0336		
590	0.5982	639	0.4001	688	0.1358	737	0.0329		
591	0.6003	640	0.3945	689	0.1306	738	0.0326		
592	0.5955	641	0.3879	690	0.13	739	0.0312		
593	0.5932	642	0.3844	691	0.1266	740	0.0303		
594	0.5942	643	0.3772	692	0.1212	741	0.0296		
595	0.5926	644	0.3707	693	0.1192	742	0.0277		
596	0.5934	645	0.3633	694	0.115	743	0.0279		
597	0.5894	646	0.3567	695	0.1123	744	0.0271		
598	0.5907	647	0.3504	696	0.1105	745	0.0263		

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

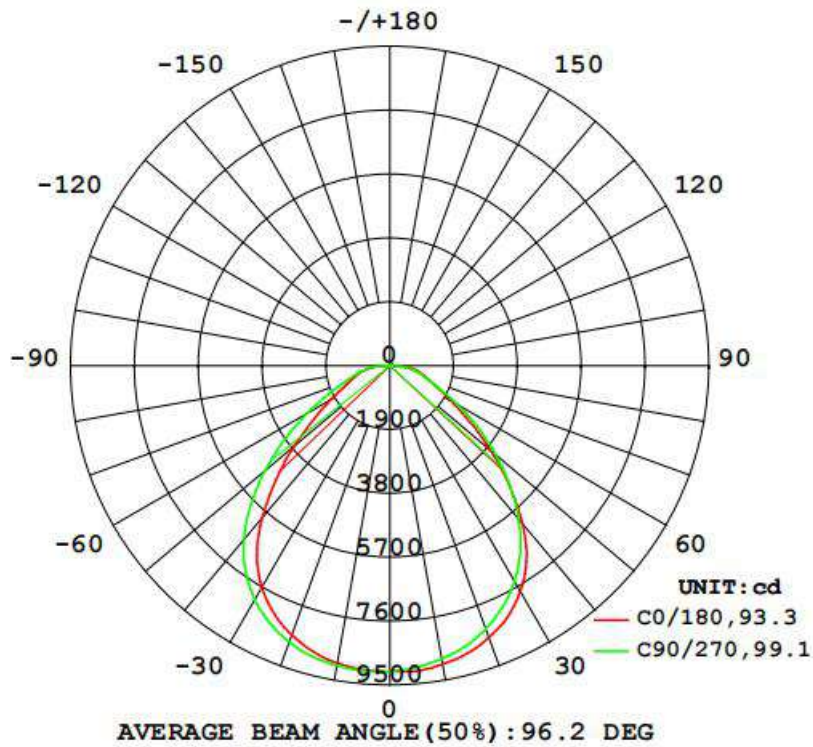
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current(A)	Power Factor	Power(W)
120.1	60	1.2425	0.9975	148.8

Optical Measurement

Luminous Flux (lm)	Efficacy(lm/W)	Imax (cd)	ZL (20-50°)
21426.8	144.01	9128	56.7%

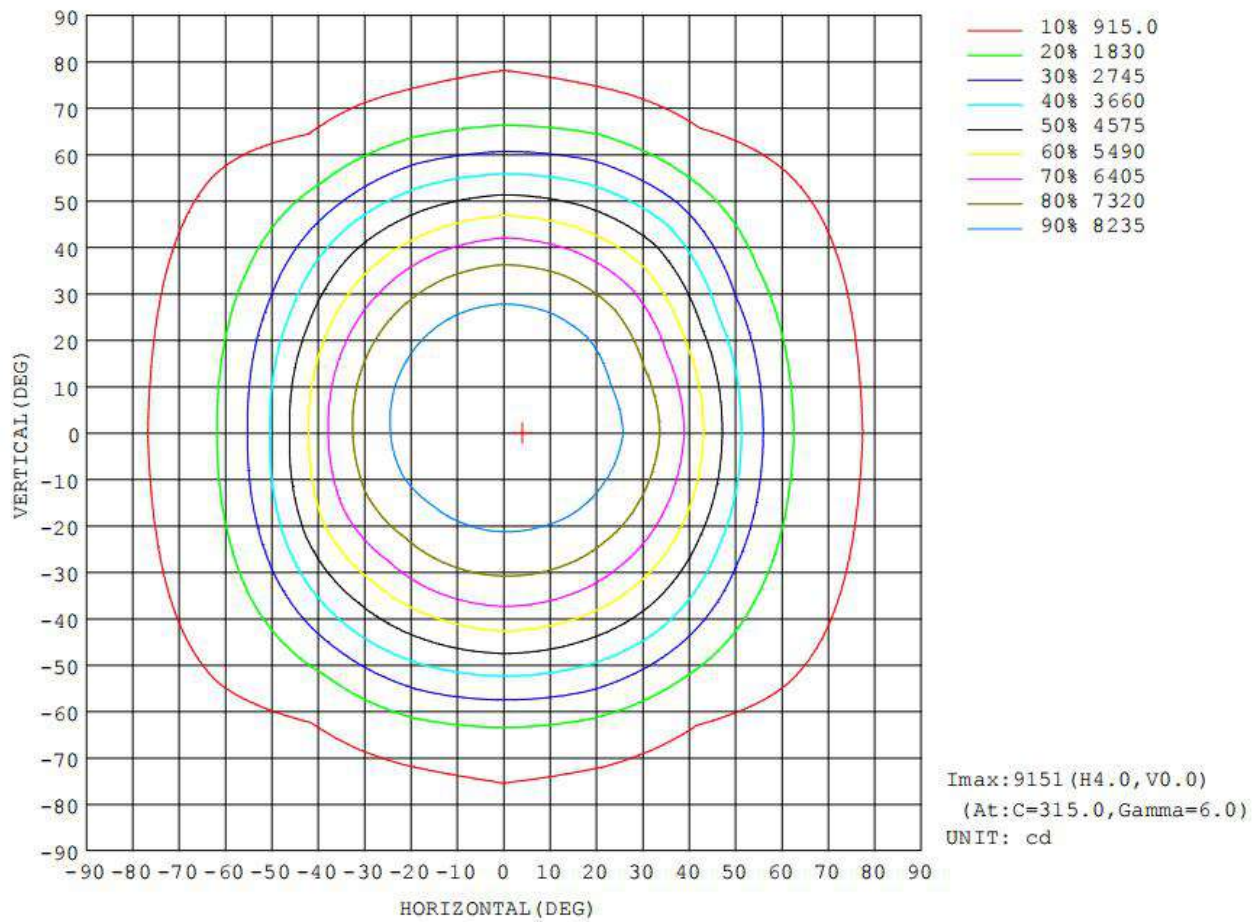
6.2 Luminous Intensity Distribution



6.3 Zonal Flux Diagram

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	Φ lum, lamp
10	9015	8928	8864	8913	8981	9052	9062	9090	0- 10	863.8	863.8	4.03, 4.03
20	8608	8453	8337	8388	8529	8683	8754	8746	10- 20	2489	3353	15.6, 15.6
30	7763	7515	7417	7414	7625	7864	8040	7974	20- 30	3771	7124	33.2, 33.2
40	6151	5920	5975	5807	5912	6309	6761	6528	30- 40	4378	11502	53.7, 53.7
50	3922	4047	4113	3965	3726	4361	4846	4615	40- 50	3993	15495	72.3, 72.3
60	2128	2125	2338	2054	2038	2322	2858	2557	50- 60	2863	18358	85.7, 85.7
70	1231	924.8	1202	899.5	1196	998.7	1418	1086	60- 70	1629	19988	93.3, 93.3
80	786.8	575.6	681.9	545.9	739.3	607.2	797.4	649.2	70- 80	932.3	20920	97.6, 97.6
90	73.97	72.08	60.41	0.7383	1.412	1.563	56.32	64.79	80- 90	390.7	21311	99.5, 99.5
100	52.45	20.14	2.636	17.82	41.86	19.92	3.948	22.85	90-100	13.66	21324	99.5, 99.5
110	37.23	18.16	4.770	18.89	35.65	22.57	6.468	20.43	100-110	23.22	21347	99.6, 99.6
120	28.87	17.46	5.542	19.82	34.35	22.16	7.930	19.33	110-120	20.64	21368	99.7, 99.7
130	23.20	19.08	7.561	21.00	28.95	21.47	9.245	19.68	120-130	17.47	21386	99.8, 99.8
140	21.72	18.93	12.09	20.73	27.12	22.17	12.47	20.72	130-140	15.19	21401	99.9, 99.9
150	19.42	18.96	9.812	21.30	24.31	24.40	16.39	21.26	140-150	12.13	21413	99.9, 99.9
160	16.18	13.30	14.92	16.62	21.73	22.06	17.50	13.51	150-160	8.427	21421	100, 100
170	10.66	11.77	13.16	15.06	11.99	13.13	16.15	13.68	160-170	4.200	21426	100, 100
180	13.00	12.61	12.37	13.42	13.70	12.42	12.57	13.18	170-180	1.283	21427	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

6.4 Isocandela Diagram



6.5 Luminous Distribution Intensity Data

Table--1 UNIT: cd

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	9093	9093	9093	9093	9093	9093	9093	9093	9093	9093	9093	9093	9093	9093	9093	9093			
5	9112	9088	9057	9023	9010	9017	9037	9066	9083	9101	9113	9112	9109	9113	9125	9114			
10	9015	8973	8928	8899	8864	8875	8913	8969	8981	9015	9052	9073	9062	9083	9090	9019			
15	8872	8814	8725	8684	8647	8655	8696	8790	8816	8876	8915	8936	8952	8965	8951	8876			
20	8608	8511	8453	8358	8337	8344	8388	8504	8529	8599	8683	8720	8754	8760	8746	8611			
25	8270	8153	8041	7956	7930	7932	7968	8134	8149	8252	8333	8420	8453	8453	8424	8271			
30	7763	7629	7515	7447	7417	7403	7414	7616	7625	7741	7864	7970	8040	8043	7974	7756			
35	7093	6923	6805	6773	6773	6725	6675	6906	6907	7045	7192	7363	7487	7473	7356	7057			
40	6151	5992	5920	5938	5975	5862	5807	6029	5912	6083	6309	6573	6761	6698	6528	6156			
45	5041	4961	4993	5007	5061	4956	4901	5040	4810	5008	5348	5607	5857	5768	5592	5105			
50	3922	3890	4047	4085	4113	4046	3965	3957	3726	3925	4361	4632	4846	4789	4615	3974			
55	2901	2882	3052	3192	3188	3148	2986	2923	2767	2930	3306	3671	3821	3809	3584	2927			
60	2128	2064	2125	2322	2338	2310	2054	2084	2038	2123	2322	2722	2858	2855	2557	2096			
65	1577	1457	1398	1596	1640	1593	1344	1480	1520	1524	1526	1861	2014	1990	1679	1505			
70	1231	1091	925	1122	1202	1106	899	1102	1196	1161	999	1262	1418	1344	1086	1137			
75	1007	860	711	821	935	799	710	868	986	908	769	908	1074	944	793	898			
80	787	654	576	584	682	562	546	660	739	665	607	644	797	665	649	675			
85	507	421	330	338	351	310	285	424	440	395	320	362	426	396	389	423			
90	74.0	69.8	72.1	73.5	60.4	73.7	0.74	52.2	1.41	2.55	1.56	1.17	56.3	62.7	64.8	1.33			
95	1.16	1.20	1.37	5.44	1.49	4.77	14.8	1.29	12.9	2.55	10.1	5.90	2.64	5.73	2.06	2.25			
100	52.5	40.3	20.1	7.96	2.64	7.46	17.8	31.3	41.9	36.0	19.9	9.02	3.95	9.50	22.9	43.9			
105	43.3	36.8	18.9	9.07	3.77	8.78	18.2	31.1	37.0	35.4	21.2	10.5	5.31	10.7	21.3	38.9			
110	37.2	32.0	18.2	9.65	4.77	9.97	18.9	30.4	35.6	34.7	22.6	11.5	6.47	11.4	20.4	34.1			
115	33.1	28.6	17.7	10.5	5.53	11.1	19.6	31.5	35.9	34.7	22.8	12.6	6.56	12.2	19.9	30.9			
120	28.9	25.9	17.5	11.2	5.54	12.0	19.8	31.1	34.3	33.1	22.2	13.3	7.93	12.9	19.3	27.3			
125	25.0	24.2	17.4	11.2	7.33	13.1	19.5	29.4	31.0	30.6	21.3	13.8	6.73	13.0	19.1	25.1			
130	23.2	23.1	19.1	11.5	7.56	13.8	21.0	28.0	28.9	28.8	21.5	15.2	9.24	13.5	19.7	24.1			
135	22.1	22.4	20.2	12.4	9.34	14.5	21.8	26.8	27.8	27.7	23.0	16.2	11.0	13.9	21.5	23.9			
140	21.7	22.1	18.9	14.4	12.1	16.7	20.7	25.6	27.1	26.9	22.2	17.9	12.5	14.4	20.7	24.1			
145	20.9	20.9	18.5	9.97	14.0	14.1	21.5	23.8	26.1	25.5	23.6	18.6	13.8	11.7	21.8	22.9			
150	19.4	19.5	19.0	11.2	9.81	9.37	21.3	21.9	24.3	24.6	24.4	19.1	16.4	13.4	21.3	23.0			
155	18.6	19.7	17.0	11.1	14.4	10.6	19.2	21.5	23.4	24.4	23.0	19.9	16.8	15.2	16.6	21.9			
160	16.2	17.0	13.3	12.2	14.9	13.8	16.6	19.4	21.7	22.6	22.1	15.4	17.5	17.0	13.5	16.9			
165	11.9	12.6	10.6	12.4	13.2	15.0	11.1	16.1	18.6	18.9	18.8	13.8	16.5	15.6	14.7	14.0			
170	10.7	11.0	11.8	12.6	13.2	15.0	15.1	10.6	12.0	12.0	13.1	16.6	16.2	14.1	13.7	13.9			
175	10.4	11.4	13.0	14.2	14.8	15.7	15.2	14.0	14.1	14.1	15.7	15.6	14.6	13.2	13.1	13.0			
180	13.0	12.0	12.6	12.1	12.4	12.7	13.4	12.8	13.7	13.7	12.4	12.6	12.6	12.9	13.2	13.5			

7. THD and PF Test

Model Number	Voltage (V AC)	Frequency (Hz)	Power Factor	THD (%)
IK-HBAX-0150-50-DY-RLV02BS	100.0	60	0.998	3.96
	120.0	60	0.996	2.92
	277.0	60	0.934	7.23

8. Photo of sample



Figure 1



Figure 2

---End of Report---