



Shenzhen Belling Efficiency Testing Lab



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## Test report of

**IES LM-79-08**

**Approved Method: Electrical and Photometric**

**Measurements of Solid-State Lighting Products**

IKIO LED LIGHTING

### Address:

8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

### For Product:

Outdoor Pole/Arm-Mounted Area and Roadway Luminaires

### Model No.:

IK-SBSL2-L130-0400A-3000K / IK-SBSL2-L130-0400A-5700K

Test laboratory: Shenzhen Belling Efficiency Testing Lab., 1/F., Building 1, 1F, No.1 building, Meibaohe industrial park, Dalang street, Shenzhen, Guangdong Prov.518101, China.

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Complied by: Zac Kuang

Review by: Jason Zhou

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Project Engineer

Technical Manager

Note: 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 Shenzhen Belling Efficiency Testing Lab. This report must not be used by the customer to claim product certification, approval, or endorsement By NVLAP, NIST, or any agency of the U.S. Government.



# 1 General

## 1.1 Product Information

<b>Manufacturer</b>	IKIO LED LIGHTING
<b>Manufacturer Address</b>	8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250
<b>Brand Name</b>	IKIO
<b>Luminaire Type</b>	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires
<b>Model Number</b>	IK-SBSL2-L130-0400A-3000K / IK-SBSL2-L130-0400A-5700K
<b>Rated Inputs</b>	AC 120-277V 50/60Hz
<b>Rated Power</b>	400 W
<b>Nominal CCT</b>	3000K / 5700K
<b>Date of Receipt Samples</b>	2018-03-30
<b>Date of Test</b>	2018-04-02 to 2018-04-13

## 1.2 Standards or methods

- ANSI C78.377-2015: Specifications for the Chromaticity of Solid State Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits-Related Power Quality Requirements for Lighting Equipment
- CIE Publication No.13.3-1995: Method of Measuring and Specifying Color Rendering of Light Sources
- IESNA LM-79-08 Approved Method: Electric & Photometric Measurement of Solid-state Lighting Products



### 1.3 Equipment list

Device	Manufacture	Model No.	Serial No.	Calibration due date
Goniophotometric System	SENSING	GMS-3000	N.A	2018-09-20
AC Power Source	ALL POWER	APW-110N	992257	2018-08-26
Total Luminous Flux Standard Lamp	SENSING	110V/100W	S13100234	2018-09-14
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2018-08-28
Integral Sphere	SENSING	SPR-600M	N.A	2018-08-26
Digital Power Meter	YOKOGAWA	WT210	91L929742	2018-08-28
Optical Color and Electrical Measurement System	SENSING	SPR-3000	N.A	2018-08-26
Temperature/humidity/clock	VICTOR	VC230	57636	2018-09-12
Digital Anemometer	TECMAN	TD8901	026141	2018-09-12

Statement of Traceability: Shenzhen Belling Efficiency Testing Lab attests that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit (SI).



## 2 Test conducted and method

### 2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , the air flow around the sample(s) being tested did not affect the performance.

### 2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within  $\pm 0.2$  percent under load.

### 2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

### 2.4 Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement. The system and standard light source has been calibrated regularly and traceable to the National Primary Standards.  $4\pi$  geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

### 2.5 Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement. The standard light source has been calibrated regularly and traceable to the National Primary Standards.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The method according to IESNA LM-79-08 following chapter.



## 3 Test Result Summary

### 3.1 Integrating Sphere System

#### 3.1.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
IK-SBSL2-L130-0400A-3000K	120.00	60	3.367	402.46	0.996
IK-SBSL2-L130-0400A-5700K	120.06	60	3.367	402.63	0.996

#### 3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0400A-3000K	51716.11	128.5	3013	84.1	13
IK-SBSL2-L130-0400A-5700K	57415.04	142.6	5704	83.8	14

#### 3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0400A-3000K	0.00085	0.4373	0.4063	0.2498	0.5223
IK-SBSL2-L130-0400A-5700K	0.00204	0.3279	0.3410	0.2038	0.4768

### 3.2 Goniophotometer System

#### 3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
IK-SBSL2-L130-0400A-3000K	120.09	60	3.3479	400.28	0.9956

#### 3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
51244.47	128.02	99.847	0.863



### 3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0400A -3000K	Power Factor	277	60	0.942
	THD	277	60	14.5%



## 4 Test Data

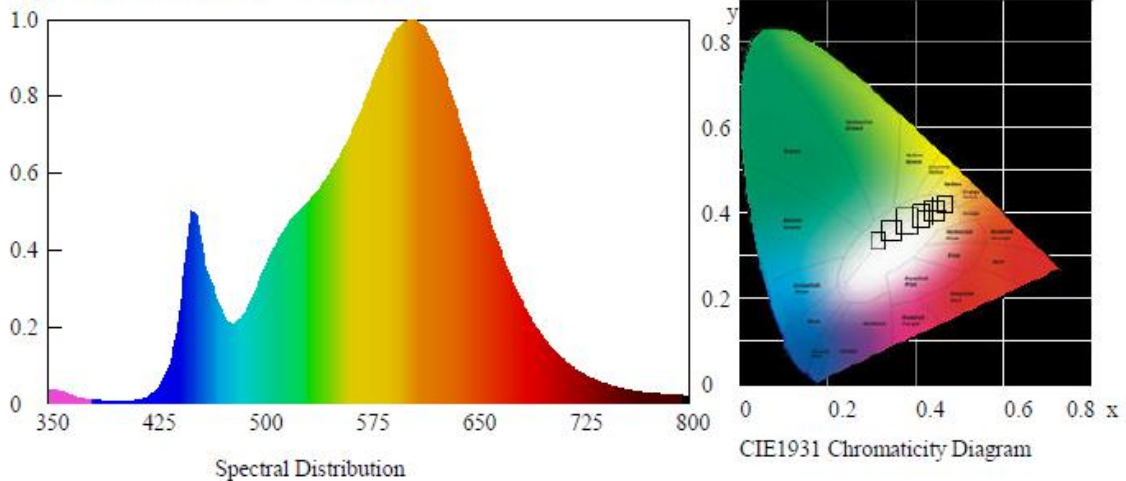
### IK-SBSL2-L130-0400A-3000K

#### Test Condition

Temperature: 25°C  
Spectrum Range: 350-800 nm

RH: 58%  
Scan Step: 5 nm

#### Spectroradiometric Parameters



Chromaticity Coordinates:  $x=0.4373$   $y=0.4063$   $u'=0.2498$   $v'=0.5223$

Correlated Color Temperature: 3013 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index:  $R_f=84$

Gamut Index:  $R_g=95$

Luminous Flux: 51716.11 lm

Purity: 0.5339

Chromaticity Difference:  $+0.00085\text{Duv}$

Peak Wavelength: 605.0 nm

Color Ratio:  $K_r=44.7\%$   $K_g=47.7\%$   $K_b=7.6\%$

Bandwidth: 130.5nm

Radiant Flux: 120.476 W

Photosynthetically Active Radiation(PAR): 115.40W

Photosynthetic Photon Flux(PPF): 561.25 $\mu\text{mol/s}$

Rendering Index:  $R_a=84.1$

$R_1=83$   $R_2=92$   $R_3=97$   $R_4=82$   $R_5=83$   $R_6=91$   $R_7=84$   $R_8=62$

$R_9=13$   $R_{10}=82$   $R_{11}=82$   $R_{12}=72$   $R_{13}=86$   $R_{14}=99$   $R_{15}=75$   $R_e=79$

#### Electric Parameters

Voltage: 120.00 V

Current: 3.367 A

Power Factor: 0.996

Power: 402.46 W

Luminous Efficacy: 128.5 lm/W

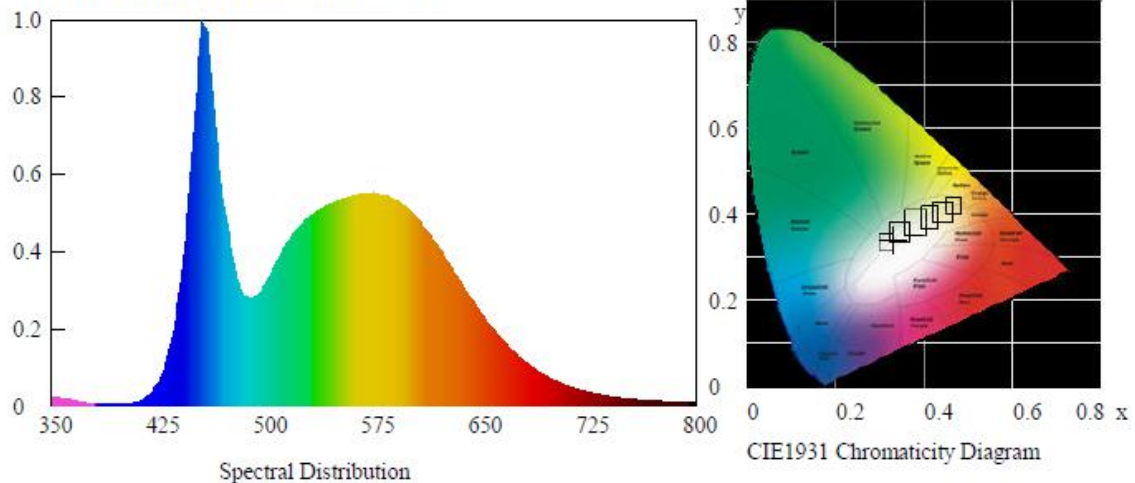
**IK-SBSL2-L130-0400A-5700K****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

**Spectroradiometric Parameters**Chromaticity Coordinates:  $x=0.3279$   $y=0.3410$   $u'=0.2038$   $v'=0.4768$ 

Correlated Color Temperature: 5704 K

Dominant Wavelength: 511.0 nm(E)

Colour Fidelity Index:  $R_f=80$ Gamut Index:  $R_g=92$ 

Luminous Flux: 57415.04 lm

Purity: 0.0176

Chromaticity Difference: +0.00204Duv

Peak Wavelength: 455.0 nm

Color Ratio:  $K_r=32.2\%$   $K_g=55.7\%$   $K_b=12.1\%$ 

Bandwidth: 28.2nm

Radiant Flux: 155.894 W

Photosynthetically Active Radiation(PAR): 151.61W

Photosynthetic Photon Flux(PPF): 693.57 $\mu$ mol/sRendering Index:  $R_a=83.8$  $R_1=83$   $R_2=91$   $R_3=94$   $R_4=80$   $R_5=82$   $R_6=85$   $R_7=87$   $R_8=69$  $R_9=14$   $R_{10}=77$   $R_{11}=78$   $R_{12}=59$   $R_{13}=86$   $R_{14}=97$   $R_{15}=79$   $R_e=77$ **Electric Parameters**

Voltage: 120.06 V

Current: 3.367 A

Power Factor: 0.996

Power: 402.63 W

Luminous Efficacy: 142.6 lm/W



**Zonal Flux Diagram**

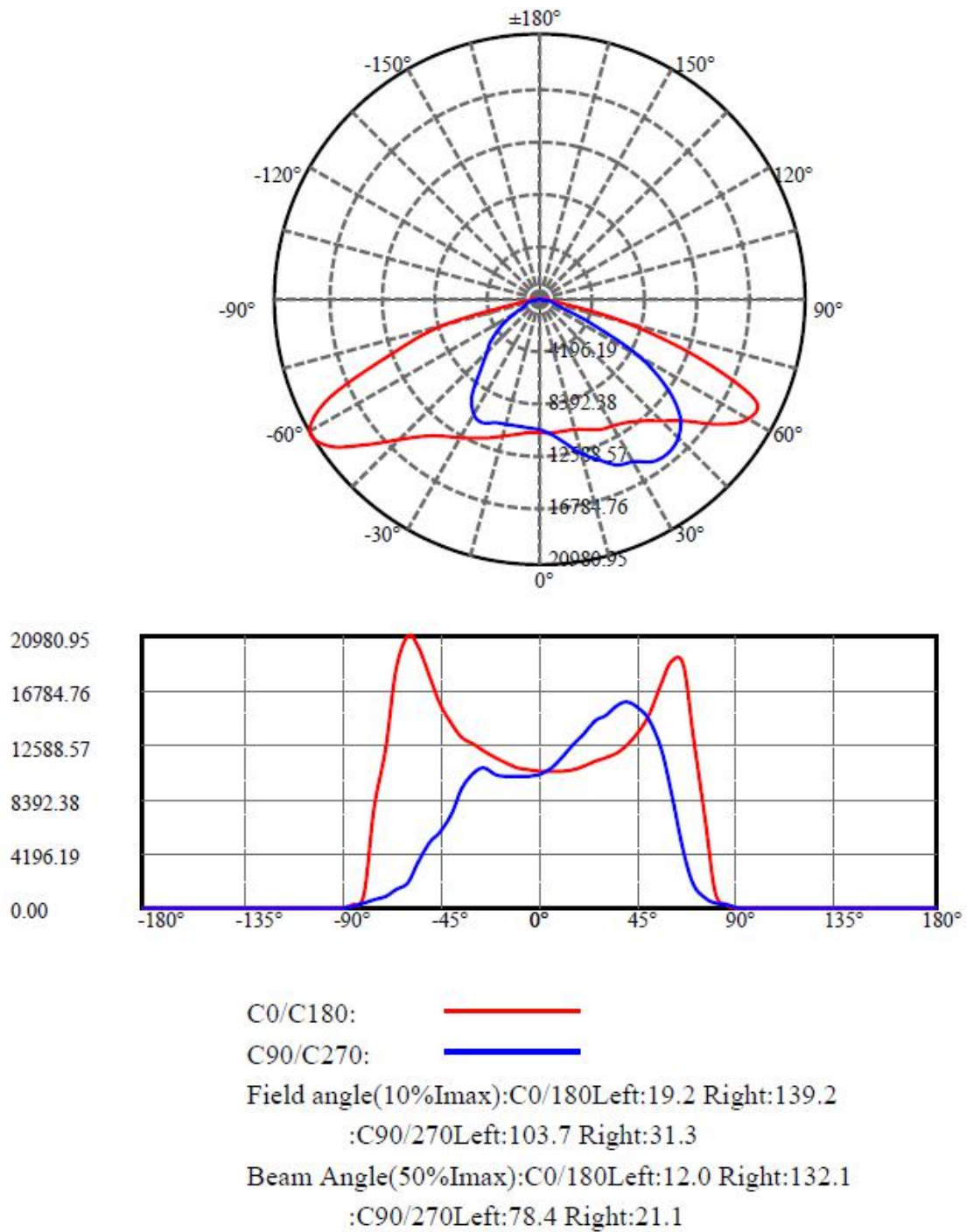
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	10421.510	.000	.000	.000%	.000%
5.0	10513.850	250.276	250.276	.488%	.488%
10.0	10777.650	761.664	1011.940	1.486%	1.975%
15.0	11161.910	1301.440	2313.380	2.540%	4.514%
20.0	11672.010	1881.836	4195.216	3.672%	8.187%
25.0	12279.130	2512.033	6707.249	4.902%	13.089%
30.0	12744.570	3166.771	9874.020	6.180%	19.268%
35.0	13049.450	3798.350	13672.370	7.412%	26.681%
40.0	13079.080	4359.347	18031.710	8.507%	35.188%
45.0	12846.980	4800.421	22832.140	9.368%	44.555%
50.0	12485.180	5118.733	27950.870	9.989%	54.544%
55.0	11813.280	5283.294	33234.160	10.310%	64.854%
60.0	10659.950	5194.623	38428.790	10.137%	74.991%
65.0	9167.259	4820.031	43248.820	9.406%	84.397%
70.0	6316.302	3920.537	47169.360	7.651%	92.048%
75.0	3141.550	2472.130	49641.480	4.824%	96.872%
80.0	904.377	1082.577	50724.060	2.113%	98.984%
85.0	340.046	338.139	51062.200	.660%	99.644%
90.0	39.157	103.829	51166.030	.203%	99.847%
95.0	6.988	12.635	51178.660	.025%	99.872%
100.0	6.960	3.790	51182.450	.007%	99.879%
105.0	7.636	3.905	51186.360	.008%	99.887%
110.0	8.973	4.341	51190.700	.008%	99.895%
115.0	10.489	4.928	51195.630	.010%	99.905%
120.0	11.936	5.451	51201.080	.011%	99.915%
125.0	13.218	5.814	51206.890	.011%	99.927%
130.0	14.113	5.943	51212.830	.012%	99.938%
135.0	14.444	5.770	51218.600	.011%	99.950%
140.0	14.458	5.351	51223.950	.010%	99.960%
145.0	14.361	4.808	51228.760	.009%	99.969%
150.0	14.431	4.240	51233.000	.008%	99.978%
155.0	14.196	3.623	51236.620	.007%	99.985%
160.0	13.631	2.919	51239.540	.006%	99.990%
165.0	12.969	2.192	51241.730	.004%	99.995%
170.0	12.570	1.515	51243.250	.003%	99.998%
175.0	12.335	.891	51244.140	.002%	99.999%
180.0	12.763	.300	51244.440	.001%	100.000%



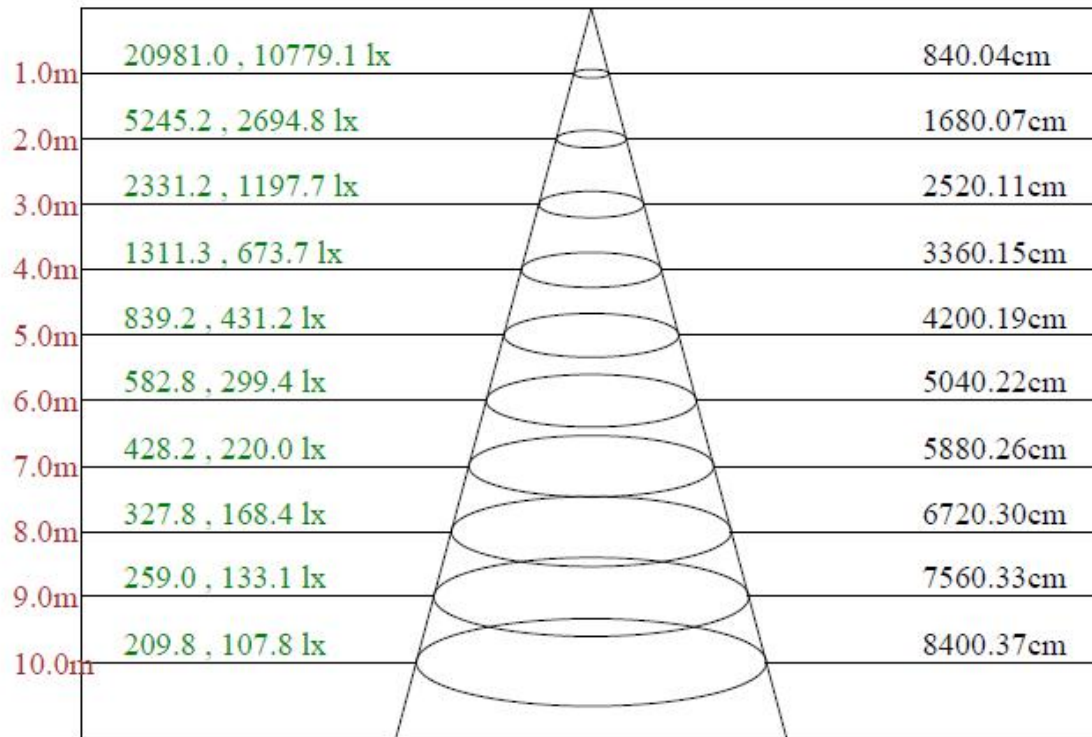
## Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





## Lux distance Curve



Max , Ave Beam angle of C180plane153.21



**Luminous Intensity Distribution Data**

C/γ(°)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	10545.83	10552.44	10578.91	10678.14	10933.95	11282.37	11593.31	11939.53	12625.35
22.5	10466.44	10534.80	10750.91	11088.31	11553.62	12250.47	13061.99	14036.70	15150.34
45.0	10437.77	10667.12	11079.49	11672.70	12387.19	13306.77	14175.63	15093.00	15990.53
67.5	10387.05	10757.53	11394.84	12182.10	13044.35	13882.33	14599.03	15225.31	15575.95
90.0	10349.56	10786.20	11580.08	12620.94	13480.98	14422.61	14868.07	15584.77	15849.39
112.5	10362.79	10812.66	11591.10	12515.09	13516.27	14433.64	15090.80	15805.29	16255.15
135.0	10411.31	10821.48	11480.84	12369.55	13335.44	14349.84	15342.19	16541.83	17613.57
157.5	10411.31	10713.42	11174.32	11816.04	12665.05	13584.63	14535.08	15730.31	17329.10
180.0	10545.83	10647.27	10878.82	11207.39	11655.06	12126.97	12693.72	13207.53	14146.96
202.5	10466.44	10497.31	10596.55	10783.99	11092.72	11372.79	11789.57	12437.91	13117.12
225.0	10437.77	10376.02	10402.49	10556.85	10799.43	11134.62	11445.56	11438.94	10435.57
247.5	10387.05	10237.10	10250.33	10283.41	10556.85	10993.49	11028.77	10047.45	8230.34
270.0	10349.56	10195.20	10204.02	10173.14	10331.92	10755.32	10468.64	9222.69	7326.20
292.5	10362.79	10148.89	10073.91	10067.29	10347.36	10797.22	10761.94	9670.35	7740.78
315.0	10411.31	10215.04	10166.53	10234.89	10481.88	10929.54	11251.50	10986.87	9621.84
337.5	10411.31	10259.15	10239.30	10340.74	10570.08	10843.53	11207.39	11822.65	12257.08
360.0	10545.83	10552.44	10578.91	10678.14	10933.95	11282.37	11593.31	11939.53	12625.35

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	13626.53	15046.69	17353.36	18974.20	18786.75	13172.25	6830.02	1147.16	295.72
22.5	16327.93	17291.61	17838.51	17756.91	17000.52	13441.29	8309.73	2256.83	516.91
45.0	16636.66	16755.74	16279.41	15198.85	13734.58	10640.65	4273.07	698.40	305.42
67.5	15518.61	14890.12	13635.35	11293.40	7784.89	3731.02	1154.66	536.09	238.39
90.0	15425.99	14438.05	12195.33	8909.55	4395.01	1868.49	766.76	429.58	197.59
112.5	16204.44	15443.63	13957.31	11637.41	8439.84	4107.01	1348.50	646.35	289.55
135.0	17909.07	17461.41	16731.48	15937.60	14063.16	9884.26	4121.35	788.37	307.41
157.5	18588.28	19007.28	18958.76	18206.78	15741.34	12254.88	7299.74	1647.08	452.07
180.0	15778.83	17875.99	20240.00	20980.95	18350.12	12316.62	7714.32	1092.03	294.84
202.5	13342.05	12446.73	10287.82	8942.63	10417.92	7650.37	1956.48	1147.16	761.91
225.0	8393.53	6538.93	5883.98	4108.78	2113.05	1663.18	1259.63	791.24	276.76
247.5	6329.44	5436.32	4093.34	2335.77	1707.29	1334.60	925.09	551.31	227.36
270.0	5875.16	5129.79	3553.06	1987.35	1449.27	937.00	636.87	425.61	172.89
292.5	6168.46	5416.47	3921.33	2249.77	1649.95	1268.45	875.92	527.49	216.55
315.0	7522.46	6106.71	5491.45	3486.90	1956.48	1557.33	1138.34	695.53	252.50
337.5	11904.25	10477.47	8592.00	8552.30	9085.97	5233.44	1654.36	1089.82	634.88
360.0	13626.53	15046.69	17353.36	18974.20	18786.75	13172.25	6830.02	1147.16	295.72

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	23.38	9.92	9.70	9.92	10.81	11.91	12.57	13.23	13.45
22.5	66.16	9.26	7.72	7.28	7.06	7.94	8.82	9.92	10.81
45.0	53.81	7.50	5.51	4.85	4.85	5.51	6.40	7.72	8.60
67.5	47.85	5.73	4.19	3.75	3.97	4.19	5.51	6.62	7.72
90.0	25.80	3.97	3.53	3.31	3.75	4.41	5.51	6.18	7.72
112.5	47.85	3.75	3.53	3.75	3.97	5.07	6.18	7.50	8.82
135.0	56.90	6.40	5.29	5.51	6.62	8.60	9.48	11.25	12.35
157.5	89.09	9.04	8.60	9.26	11.25	13.23	14.55	15.66	15.88
180.0	35.73	10.59	10.14	9.92	10.59	11.03	12.13	13.01	13.67
202.5	49.62	9.26	10.59	12.13	14.11	15.66	17.20	17.64	17.42
225.0	30.87	6.62	8.82	11.47	14.33	16.54	18.30	19.41	19.41
247.5	13.01	4.41	6.18	8.60	11.47	13.89	16.10	17.64	18.74
270.0	3.31	3.31	4.63	5.95	8.82	11.25	13.45	15.44	16.98
292.5	13.01	4.63	5.07	6.62	8.38	10.37	12.57	14.55	16.76
315.0	28.45	7.50	7.50	8.60	10.37	12.57	14.78	16.76	18.08
337.5	41.68	9.92	10.37	11.25	13.23	15.66	17.42	18.97	19.41
360.0	23.38	9.92	9.70	9.92	10.81	11.91	12.57	13.23	13.45



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	13.67	13.01	12.57	12.35	11.91	11.47	10.81	10.59	10.59
22.5	11.69	11.69	12.13	12.35	12.35	12.13	12.13	12.35	12.13
45.0	9.48	10.37	11.03	11.91	12.35	12.79	12.57	12.57	12.35
67.5	8.60	9.70	10.59	11.69	12.57	12.79	12.79	12.35	12.13
90.0	9.04	9.92	11.25	12.13	12.79	13.23	13.01	12.57	12.57
112.5	10.14	11.03	11.91	12.57	13.01	12.79	12.57	12.79	12.35
135.0	12.79	12.79	13.23	13.45	13.23	13.01	13.01	12.79	13.01
157.5	15.44	15.22	14.33	14.33	14.11	13.89	13.01	12.79	13.01
180.0	13.23	13.01	12.79	12.57	12.35	11.69	11.47	11.03	11.47
202.5	16.76	15.44	14.55	14.33	13.89	12.79	11.91	11.91	11.47
225.0	18.52	17.20	16.32	15.88	14.55	13.67	12.57	12.35	11.91
247.5	18.52	18.52	17.42	16.76	15.88	14.78	13.67	12.79	12.35
270.0	17.64	18.30	17.86	17.64	16.98	15.66	14.33	13.23	12.79
292.5	17.64	18.08	17.86	17.86	17.42	15.88	14.55	13.67	13.23
315.0	18.30	18.30	18.08	17.64	17.20	16.10	14.55	13.67	13.01
337.5	19.63	18.74	17.86	17.42	16.54	15.44	14.55	13.67	13.01
360.0	13.67	13.01	12.57	12.35	11.91	11.47	10.81	10.59	10.59
C/γ(°)	180.0								
0.0	11.03								
22.5	12.13								
45.0	12.57								
67.5	12.79								
90.0	13.23								
112.5	13.23								
135.0	13.45								
157.5	13.67								
180.0	11.03								
202.5	12.13								
225.0	12.57								
247.5	12.79								
270.0	13.23								
292.5	13.23								
315.0	13.45								
337.5	13.67								
360.0	11.03								



## 5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0400A-3000K	3000K	51716.11	402.46	128.5
IK-SBSL2-L130-0400A-3500K	3500K	52855.90 * <sup>1</sup>	402.55 * <sup>2</sup>	131.3 * <sup>3</sup>
IK-SBSL2-L130-0400A-4000K	4000K	53995.68 * <sup>1</sup>	402.55 * <sup>2</sup>	134.1 * <sup>3</sup>
IK-SBSL2-L130-0400A-4500K	4500K	55135.47 * <sup>1</sup>	402.55 * <sup>2</sup>	137.0 * <sup>3</sup>
IK-SBSL2-L130-0400A-5000K	5000K	56275.25 * <sup>1</sup>	402.55 * <sup>2</sup>	139.8 * <sup>3</sup>
IK-SBSL2-L130-0400A-5700K	5700K	57415.04	402.63	142.6

\*1: This value is calculated and the calculation formula is as below:

$$52855.90 = (57415.04 - 51716.11) / 5 + 51716.11$$

$$53995.68 = (57415.04 - 51716.11) / 5 + 52855.90$$

$$55135.47 = (57415.04 - 51716.11) / 5 + 53995.68$$

$$56275.25 = (57415.04 - 51716.11) / 5 + 55135.47$$

\*2: This value is calculated and the calculation formula is as below:

$$402.55 = (402.46 + 402.63) / 2$$

\*3: This value is calculated and the calculation formula is as below:

$$131.3 = 52855.90 / 402.55$$

$$134.1 = 53995.68 / 402.55$$

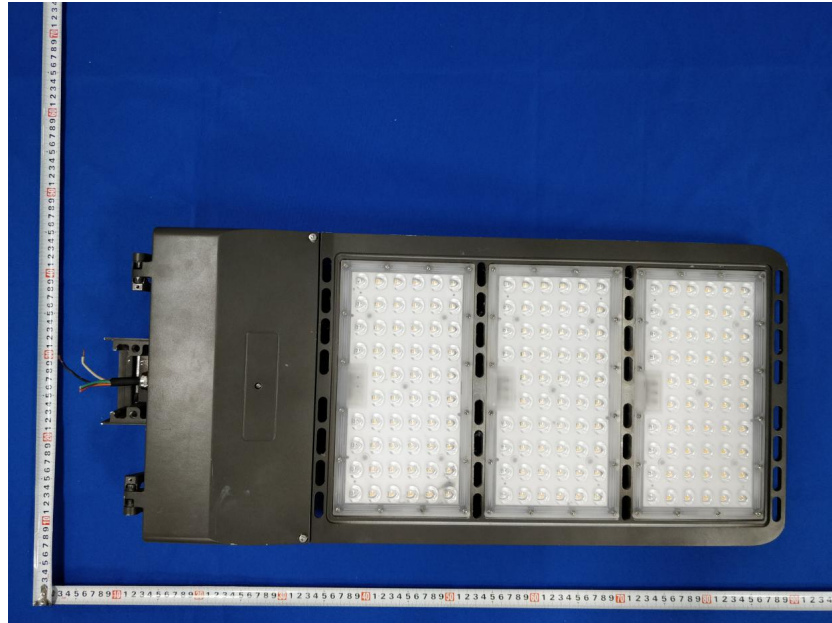
$$137.0 = 55135.47 / 402.55$$

$$139.8 = 56275.25 / 402.55$$





## Photo Document



\*\*\*\*End of test report\*\*\*\*