



Shenzhen Belling Efficiency Testing Lab



Report No.:BL180517006-9

Date of issue 2018-05-18

Version 1.0

Total pages 15

## Test report of

**IES LM-79-08**

**Approved Method: Electrical and Photometric**

**Measurements of Solid-State Lighting Products**

**Applicant:**

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-L130-0100A-3000K / IK-SBSL2-L130-0100A-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

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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-L130-0100A-3000K / IK-SBSL2-L130-0100A-5700K
<b>Rated Inputs</b>	AC 120-277V 50/60Hz
<b>Rated Power</b>	100 W
<b>Nominal CCT</b>	3000K / 5700K
<b>Date of Receipt Samples</b>	2018-05-14
<b>Date of Test</b>	2018-05-14 to 2018-05-17

## 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-L130-0100A-3000K	120.04	60	0.872	104.09	0.994
IK-SBSL2-L130-0100A-5700K	120.05	60	0.854	101.91	0.994

#### 3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0100A-3000K	13573.34	130.4	3015	83.9	12
IK-SBSL2-L130-0100A-5700K	14756.57	144.8	5490	83.5	13

#### 3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0100A-3000K	0.00081	0.4371	0.4062	0.2497	0.5222
IK-SBSL2-L130-0100A-5700K	0.00224	0.3327	0.3457	0.2053	0.4799

### 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-L130-0100A-3000K	120.12	60	0.8724	104.12	0.9936

#### 3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
13552.05	130.16	99.836	0.878



### 3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0100A-3000K	Power Factor	277	60	0.925
	THD	277	60	13.8%



## 4 Test Data

### IK-SBSL2-L130-0100A-3000K

#### Test Condition

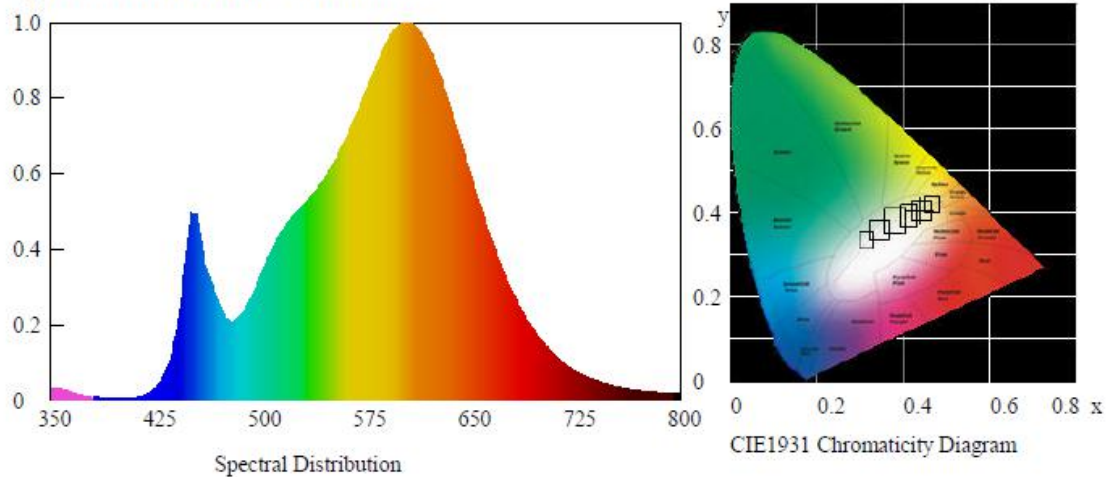
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

#### Spectroradiometric Parameters

Chromaticity Coordinates:  $x=0.4371$   $y=0.4062$   $u'=0.2497$   $v'=0.5222$ 

Correlated Color Temperature: 3015 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index:  $R_f=84$ Gamut Index:  $R_g=95$ 

Luminous Flux: 13573.34 lm

Purity: 0.5330

Chromaticity Difference: +0.00081Duv

Peak Wavelength: 605.0 nm

Color Ratio:  $K_r=44.7\%$   $K_g=47.8\%$   $K_b=7.5\%$ 

Bandwidth: 130.4nm

Radiant Flux: 34.102 W

Photosynthetically Active Radiation(PAR): 32.72W

Photosynthetic Photon Flux(PPF): 159.15 $\mu$ mol/sRendering Index:  $R_a=83.9$  $R_1=83$   $R_2=92$   $R_3=97$   $R_4=82$   $R_5=83$   $R_6=90$   $R_7=84$   $R_8=61$  $R_9=12$   $R_{10}=82$   $R_{11}=82$   $R_{12}=72$   $R_{13}=86$   $R_{14}=99$   $R_{15}=75$   $R_e=79$ 

#### Electric Parameters

Voltage: 120.04 V

Current: 0.872 A

Power Factor: 0.994

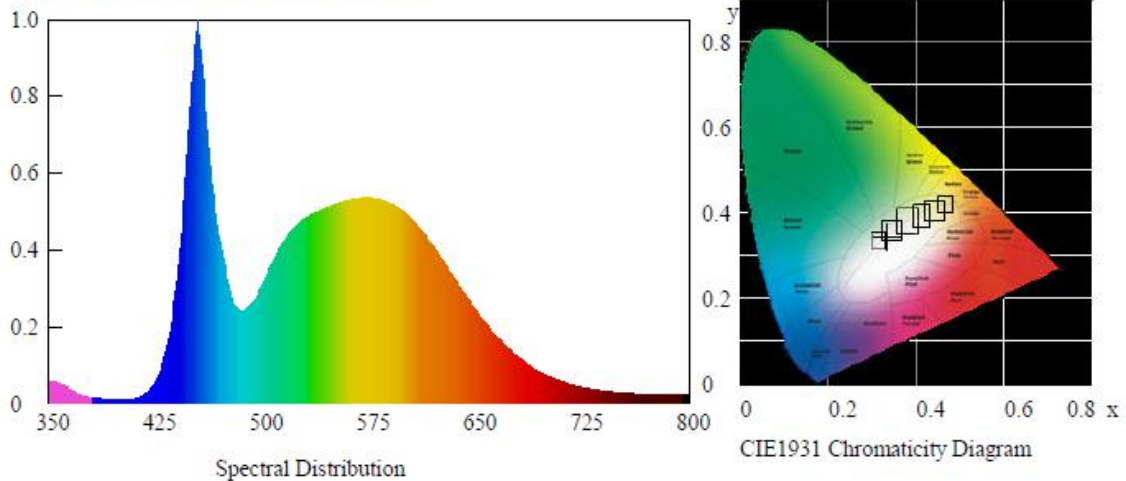
Power: 104.09 W

Luminous Efficacy: 130.4 lm/W

**IK-SBSL2-L130-0100A-5700K****Test Condition**

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

RH: 58%  
Scan Step: 5 nm

**Spectroradiometric Parameters**

Chromaticity Coordinates:  $x=0.3327$   $y=0.3457$   $u'=0.2053$   $v'=0.4799$

Correlated Color Temperature: 5490 K

Dominant Wavelength: 552.0 nm(E)

Colour Fidelity Index:  $R_f=80$

Gamut Index:  $R_g=93$

Luminous Flux: 14756.57 lm

Purity: 0.0359

Chromaticity Difference: +0.00224Duv

Peak Wavelength: 455.0 nm

Color Ratio:  $K_r=32.5\%$   $K_g=55.8\%$   $K_b=11.7\%$

Bandwidth: 22.9nm

Radiant Flux: 38.445 W

Photosynthetically Active Radiation(PAR): 36.78W

Photosynthetic Photon Flux(PPF): 168.84  $\mu\text{mol/s}$

Rendering Index:  $R_a=83.5$

$R_1=82$   $R_2=90$   $R_3=93$   $R_4=81$   $R_5=82$   $R_6=84$   $R_7=88$   $R_8=69$

$R_9=13$   $R_{10}=73$   $R_{11}=80$   $R_{12}=57$   $R_{13}=85$   $R_{14}=96$   $R_{15}=78$   $R_e=77$

**Electric Parameters**

Voltage: 120.05 V

Current: 0.854 A

Power Factor: 0.994

Power: 101.91 W

Luminous Efficacy: 144.8 lm/W



**Zonal Flux Diagram**

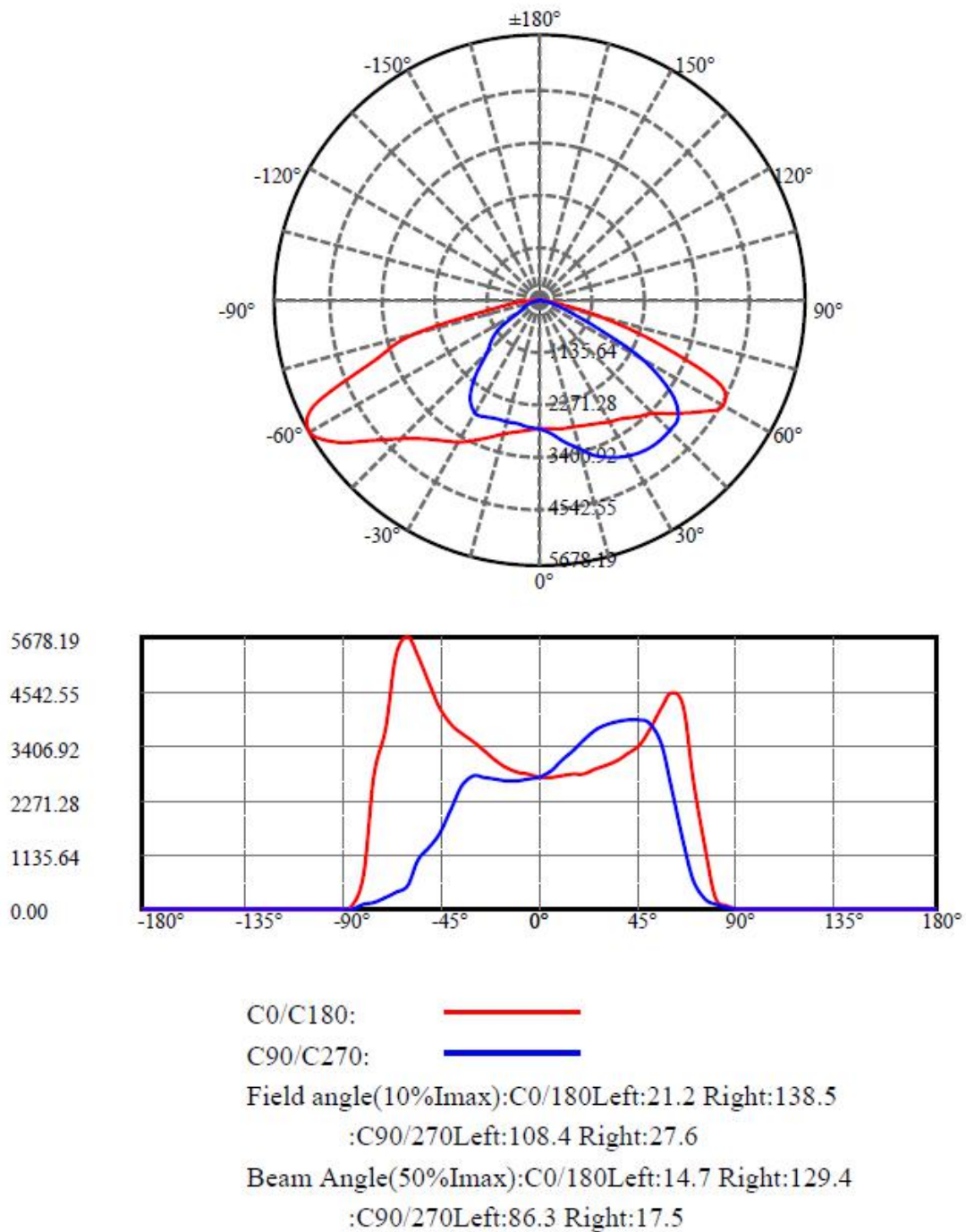
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	2765.096	.000	.000	.000%	.000%
5.0	2790.619	66.417	66.417	.490%	.490%
10.0	2859.202	202.112	268.529	1.491%	1.981%
15.0	2953.946	344.832	613.361	2.545%	4.526%
20.0	3068.366	496.323	1109.684	3.662%	8.188%
25.0	3209.795	658.463	1768.147	4.859%	13.047%
30.0	3328.633	827.444	2595.591	6.106%	19.153%
35.0	3404.426	991.490	3587.081	7.316%	26.469%
40.0	3420.613	1138.706	4725.787	8.402%	34.871%
45.0	3361.423	1255.749	5981.536	9.266%	44.138%
50.0	3274.932	1340.973	7322.509	9.895%	54.032%
55.0	3137.726	1394.325	8716.834	10.289%	64.321%
60.0	2809.905	1374.778	10091.610	10.144%	74.466%
65.0	2390.521	1264.233	11355.850	9.329%	83.794%
70.0	1736.518	1044.993	12400.840	7.711%	91.505%
75.0	922.301	694.972	13095.810	5.128%	96.633%
80.0	255.168	315.058	13410.870	2.325%	98.958%
85.0	86.158	92.747	13503.610	.684%	99.643%
90.0	9.809	26.277	13529.890	.194%	99.836%
95.0	1.904	3.207	13533.100	.024%	99.860%
100.0	2.001	1.061	13534.160	.008%	99.868%
105.0	2.209	1.126	13535.290	.008%	99.876%
110.0	2.515	1.235	13536.520	.009%	99.885%
115.0	2.946	1.383	13537.900	.010%	99.896%
120.0	3.432	1.550	13539.450	.011%	99.907%
125.0	3.793	1.670	13541.120	.012%	99.919%
130.0	4.029	1.701	13542.820	.013%	99.932%
135.0	4.182	1.659	13544.480	.012%	99.944%
140.0	4.168	1.546	13546.030	.011%	99.956%
145.0	4.210	1.398	13547.430	.010%	99.966%
150.0	4.210	1.240	13548.670	.009%	99.975%
155.0	4.182	1.062	13549.730	.008%	99.983%
160.0	4.043	.863	13550.590	.006%	99.989%
165.0	3.821	.648	13551.240	.005%	99.994%
170.0	3.779	.451	13551.690	.003%	99.997%
175.0	3.710	.268	13551.960	.002%	99.999%
180.0	3.890	.091	13552.050	.001%	100.000%



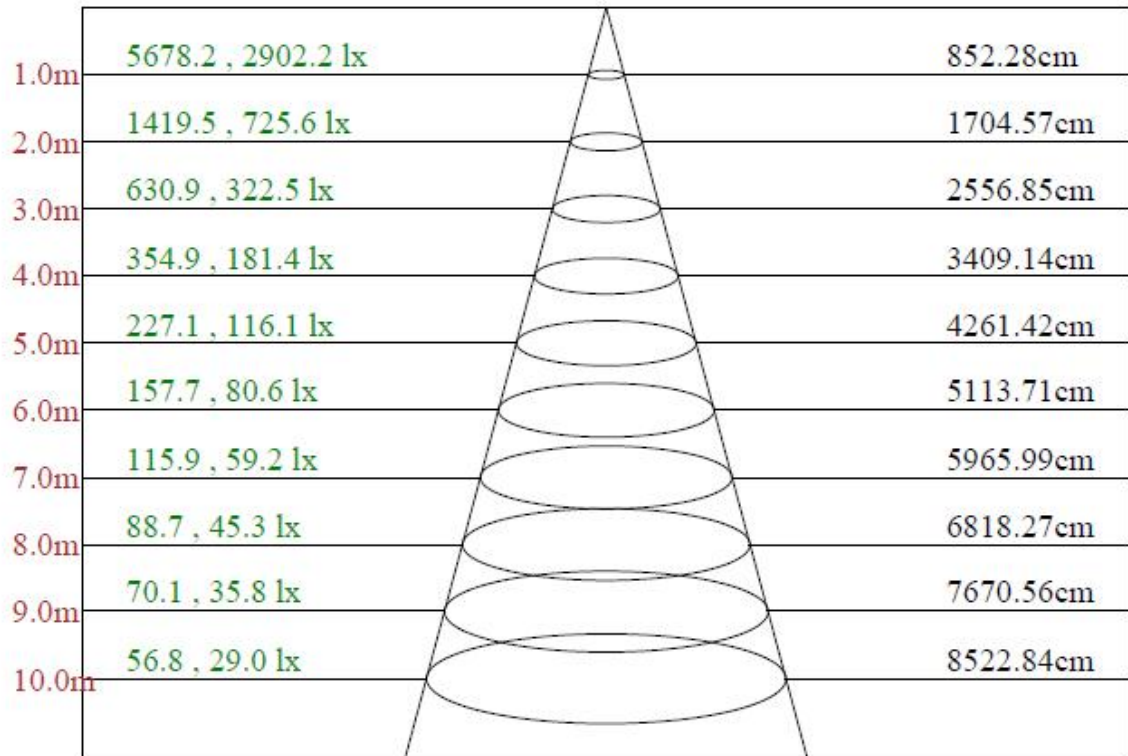
## Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





## Lux distance Curve



Max , Ave

Beam angle of C180plane153.07



**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	2761.51	2752.62	2788.19	2821.53	2830.43	2926.02	3001.60	3094.97	3241.70
22.5	2748.17	2777.07	2841.54	2919.35	3030.50	3181.67	3355.07	3532.92	3739.67
45.0	2768.63	2827.98	2932.69	3058.74	3222.58	3442.22	3640.74	3812.36	4003.99
67.5	2761.96	2852.44	3025.61	3227.25	3407.98	3618.73	3758.56	3831.70	3895.06
90.0	2753.73	2884.67	3093.86	3308.83	3532.92	3728.55	3837.04	3920.40	3952.19
112.5	2774.85	2892.23	3077.41	3307.94	3548.93	3782.13	3901.29	3996.66	4115.81
135.0	2770.40	2881.56	3052.74	3263.93	3510.69	3775.24	3997.54	4262.09	4491.07
157.5	2781.52	2879.33	3003.83	3175.00	3395.09	3650.74	3913.07	4215.41	4582.21
180.0	2761.51	2812.64	2866.00	2966.03	3119.43	3310.61	3488.46	3652.97	3855.27
202.5	2748.17	2770.40	2803.75	2861.55	2957.14	3061.63	3183.90	3339.51	3530.70
225.0	2768.63	2742.84	2746.62	2787.08	2849.10	2910.01	2979.15	3011.83	2881.78
247.5	2761.96	2710.16	2707.27	2739.73	2775.74	2838.43	2859.77	2727.72	2339.57
270.0	2753.73	2706.16	2689.48	2682.81	2709.05	2765.29	2778.41	2580.11	2122.82
292.5	2774.85	2710.16	2695.26	2687.04	2690.15	2762.40	2799.08	2663.92	2246.42
315.0	2770.40	2717.05	2701.49	2703.71	2723.72	2772.63	2889.56	2868.89	2667.70
337.5	2781.52	2732.61	2721.50	2752.62	2790.41	2830.43	2874.89	2959.37	3063.85
360.0	2761.51	2752.62	2788.19	2821.53	2830.43	2926.02	3001.60	3094.97	3241.70

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	3421.77	3746.34	4188.73	4531.08	4224.97	2664.59	1280.94	262.32	87.15
22.5	4004.21	4279.88	4497.74	4553.31	4392.14	3645.41	2203.07	447.28	190.30
45.0	4164.28	4270.98	4254.53	4057.79	3672.97	2903.79	1498.58	220.31	86.03
67.5	3960.64	3946.64	3775.01	3229.69	2212.63	1292.94	460.85	165.18	67.58
90.0	3961.53	3870.61	3451.56	2554.99	1412.77	614.24	196.30	110.93	51.80
112.5	4187.62	4123.15	3817.48	3078.75	2023.00	1153.33	365.48	144.95	63.58
135.0	4655.58	4586.66	4398.37	4105.36	3647.63	2735.06	1260.04	213.86	80.25
157.5	4866.77	4962.36	4871.22	4695.59	4419.71	3427.55	1989.66	500.86	102.04
180.0	4182.06	4686.70	5300.27	5678.19	5289.15	3786.35	2772.63	728.95	77.59
202.5	3675.20	3599.61	3192.79	2623.68	2614.79	2659.25	1145.33	312.12	279.22
225.0	2467.84	1918.30	1573.50	1351.19	616.24	415.72	312.57	194.96	56.91
247.5	1781.58	1389.43	1168.23	643.80	425.72	337.69	240.32	144.50	31.35
270.0	1596.39	1310.51	1019.51	495.53	349.02	229.64	158.28	105.37	11.78
292.5	1694.88	1359.19	1144.22	569.33	384.59	290.56	195.19	119.16	21.79
315.0	2107.48	1567.05	1360.30	1013.50	466.18	371.70	276.33	172.51	60.69
337.5	3054.96	2781.52	2190.18	1776.69	2096.81	1256.49	401.27	239.43	110.49
360.0	3421.77	3746.34	4188.73	4531.08	4224.97	2664.59	1280.94	262.32	87.15

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	6.23	2.67	2.89	3.11	3.56	3.78	4.00	4.22	4.22
22.5	16.23	3.11	2.89	2.89	2.45	3.11	3.56	3.78	3.78
45.0	11.34	2.45	2.22	2.00	2.00	1.78	2.22	2.22	2.67
67.5	14.23	1.56	1.33	1.11	0.89	1.33	1.56	2.22	2.22
90.0	6.45	1.11	0.89	0.89	1.11	1.11	1.56	1.78	2.45
112.5	16.45	1.11	0.89	0.89	1.11	1.11	1.56	2.22	2.45
135.0	11.34	1.56	1.56	1.33	1.78	2.22	2.67	2.89	3.11
157.5	17.34	2.89	2.67	2.89	3.34	3.78	4.22	4.45	4.45
180.0	13.78	2.67	2.67	2.67	3.11	3.11	3.56	4.00	4.22
202.5	18.67	2.89	3.56	3.56	4.22	4.67	5.34	5.56	5.34
225.0	4.89	1.78	2.22	3.34	3.78	4.45	5.11	5.11	5.11
247.5	2.89	0.89	1.33	2.22	2.89	3.56	4.22	4.22	4.89
270.0	0.22	0.67	0.89	1.56	2.00	2.67	3.34	4.00	4.45
292.5	1.56	0.89	1.11	1.33	2.00	2.45	3.11	3.78	4.45
315.0	5.34	1.33	1.78	2.00	2.22	3.11	3.56	4.45	4.67
337.5	10.00	2.89	3.11	3.56	3.78	4.89	5.34	5.78	6.00
360.0	6.23	2.67	2.89	3.11	3.56	3.78	4.00	4.22	4.22



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	4.45	4.00	4.22	4.22	4.00	3.56	3.56	3.34	3.34
22.5	4.00	4.00	4.00	4.22	4.45	4.45	4.00	4.22	4.22
45.0	3.11	3.34	3.56	3.56	3.78	4.00	3.78	3.78	3.78
67.5	2.45	2.89	2.89	3.34	3.78	3.56	3.56	3.34	3.56
90.0	2.45	2.89	3.34	3.34	3.56	3.11	3.34	3.34	3.56
112.5	3.11	3.11	3.56	3.56	3.56	3.78	3.56	3.78	3.34
135.0	3.78	3.56	3.78	3.56	3.56	3.78	3.56	3.56	3.78
157.5	4.67	4.45	4.45	4.45	4.22	3.78	4.00	4.00	4.22
180.0	4.00	4.22	4.22	4.00	4.00	4.22	3.78	4.00	4.00
202.5	5.34	4.89	4.89	4.67	4.67	4.67	4.22	4.22	4.00
225.0	4.89	4.89	4.45	4.45	4.00	4.00	3.78	3.56	3.56
247.5	4.67	4.67	4.67	4.45	4.45	4.00	3.56	3.56	3.56
270.0	4.67	4.67	4.67	4.67	4.45	4.22	3.78	3.56	3.34
292.5	4.67	4.67	4.45	4.67	4.89	4.22	4.22	4.00	3.56
315.0	4.89	4.89	4.67	4.67	4.45	4.45	4.00	4.00	3.34
337.5	5.78	5.56	5.56	5.56	5.11	4.89	4.45	4.22	4.22
360.0	4.45	4.00	4.22	4.22	4.00	3.56	3.56	3.34	3.34

C/γ(°)	180.0
0.0	3.56
22.5	4.45
45.0	3.78
67.5	3.56
90.0	3.78
112.5	3.56
135.0	4.00
157.5	4.45
180.0	3.56
202.5	4.45
225.0	3.78
247.5	3.56
270.0	3.78
292.5	3.56
315.0	4.00
337.5	4.45
360.0	3.56



## 5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0100A-3000K	3000K	13573.34	104.09	130.4
IK-SBSL2-L130-0100A-3500K	3500K	13809.99 <sup>*1</sup>	103.00 <sup>*2</sup>	134.1 <sup>*3</sup>
IK-SBSL2-L130-0100A-4000K	4000K	14046.63 <sup>*1</sup>	103.00 <sup>*2</sup>	136.4 <sup>*3</sup>
IK-SBSL2-L130-0100A-4500K	4500K	14283.28 <sup>*1</sup>	103.00 <sup>*2</sup>	138.7 <sup>*3</sup>
IK-SBSL2-L130-0100A-5000K	5000K	14519.92 <sup>*1</sup>	103.00 <sup>*2</sup>	141.0 <sup>*3</sup>
IK-SBSL2-L130-0100A-5700K	5700K	14756.57	101.91	144.8

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

$$13809.99 = (14756.57 - 13573.34) / 5 + 13573.34$$

$$14046.63 = (14756.57 - 13573.34) / 5 + 13809.99$$

$$14283.28 = (14756.57 - 13573.34) / 5 + 14046.63$$

$$14519.92 = (14756.57 - 13573.34) / 5 + 14283.28$$

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

$$103.00 = (104.09 + 101.91) / 2$$

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

$$134.1 = 13809.99 / 103.00$$

$$136.4 = 14046.63 / 103.00$$

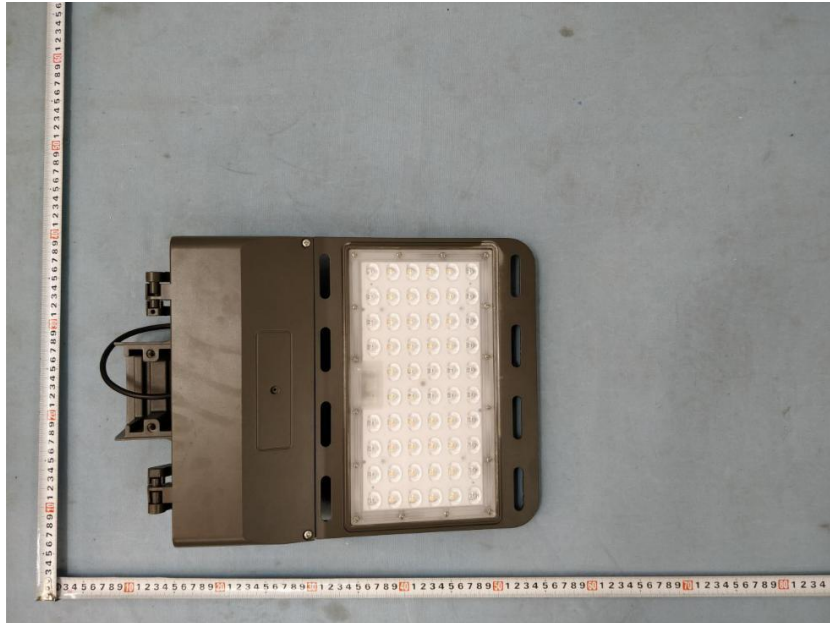
$$138.7 = 14283.28 / 103.00$$

$$141.0 = 14519.92 / 103.00$$





## Photo Document



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