



Shenzhen Belling Efficiency Testing Lab



Report No.:BL180416004-9

Date of issue 2018-04-16

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-L130-0190M-3000K / IK-SBSL2-L130-0190M-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.

*Zac.kuang*

*Jasonzhou*

---

Complied by: Zac Kuang

Review by: Jason Zhou

---

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-L130-0190M-3000K / IK-SBSL2-L130-0190M-5700K
<b>Rated Inputs</b>	AC 200-480V 50/60Hz
<b>Rated Power</b>	185 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-L130-0190M-3000K	276.99	60	0.690	189.14	0.989
IK-SBSL2-L130-0190M-5700K	277.06	60	0.691	189.18	0.988

#### 3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0190M-3000K	24096.44	127.4	3051	83.1	9
IK-SBSL2-L130-0190M-5700K	26825.72	141.8	5526	83.8	14

#### 3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0190M-3000K	0.00039	0.4339	0.4040	0.2487	0.5209
IK-SBSL2-L130-0190M-5700K	0.00214	0.3319	0.3448	0.2051	0.4793

### 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-L130-0190M-3000K	277.12	60	0.6915	189.55	0.9892

#### 3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
24092.36	127.10	99.834	0.784



### 3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0190M-3000K	Power Factor	480	60	0.926
	THD	480	60	14.1%



## 4 Test Data

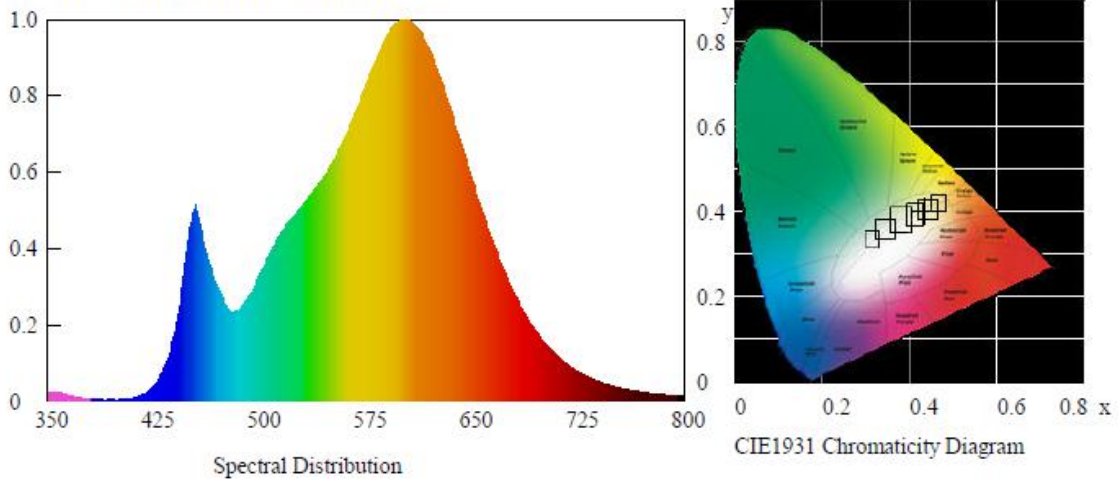
IK-SBSL2-L130-0190M-3000K

### Test Condition

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

RH: 58%  
Scan Step: 5 nm

### Spectroradiometric Parameters



Chromaticity Coordinates:  $x=0.4339$   $y=0.4040$   $u'=0.2487$   $v'=0.5209$

Correlated Color Temperature: 3051 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index:  $R_f=83$

Gamut Index:  $R_g=94$

Luminous Flux: 24096.44 lm

Purity: 0.5166

Chromaticity Difference: +0.00039Duv

Peak Wavelength: 605.0 nm

Color Ratio:  $K_r=44.6\%$   $K_g=47.8\%$   $K_b=7.6\%$

Bandwidth: 130.3nm

Radiant Flux: 61.629 W

Photosynthetically Active Radiation(PAR): 59.30W

Photosynthetic Photon Flux(PPF): 287.79 $\mu$ mol/s

Rendering Index:  $R_a=83.1$

$R_1=82$   $R_2=92$   $R_3=96$   $R_4=80$   $R_5=82$   $R_6=90$   $R_7=83$   $R_8=60$

$R_9=9$   $R_{10}=82$   $R_{11}=80$   $R_{12}=72$   $R_{13}=85$   $R_{14}=98$   $R_{15}=74$   $R_e=78$

### Electric Parameters

Voltage: 276.99 V

Current: 0.690 A

Power Factor: 0.989

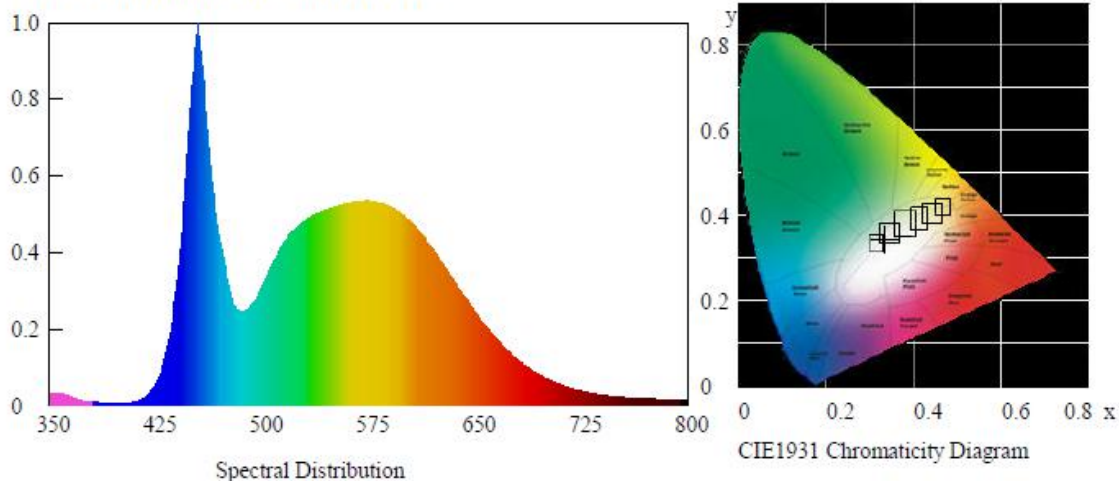
Power: 189.14 W

Luminous Efficacy: 127.4 lm/W

**IK-SBSL2-L130-0190M-5700K****Test Condition**

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

RH: 58%  
Scan Step: 5 nm

**Spectroradiometric Parameters**

Chromaticity Coordinates:  $x=0.3319$   $y=0.3448$   $u'=0.2051$   $v'=0.4793$

Correlated Color Temperature: 5526 K

Dominant Wavelength: 548.0 nm(E)

Colour Fidelity Index:  $R_f=81$

Gamut Index:  $R_g=94$

Luminous Flux: 26825.72 lm

Purity: 0.0309

Chromaticity Difference: +0.00214Duv

Peak Wavelength: 455.0 nm

Color Ratio:  $K_r=32.4\%$   $K_g=55.8\%$   $K_b=11.7\%$

Bandwidth: 22.8nm

Radiant Flux: 68.286 W

Photosynthetically Active Radiation(PAR): 65.98W

Photosynthetic Photon Flux(PPF): 302.78  $\mu\text{mol/s}$

Rendering Index:  $R_a=83.8$

$R_1=82$   $R_2=90$   $R_3=93$   $R_4=82$   $R_5=82$   $R_6=84$   $R_7=88$   $R_8=70$

$R_9=14$   $R_{10}=74$   $R_{11}=80$   $R_{12}=58$   $R_{13}=85$   $R_{14}=96$   $R_{15}=79$   $R_e=77$

**Electric Parameters**

Voltage: 277.06 V

Current: 0.691 A

Power Factor: 0.988

Power: 189.18 W

Luminous Efficacy: 141.8 lm/W



**Zonal Flux Diagram**

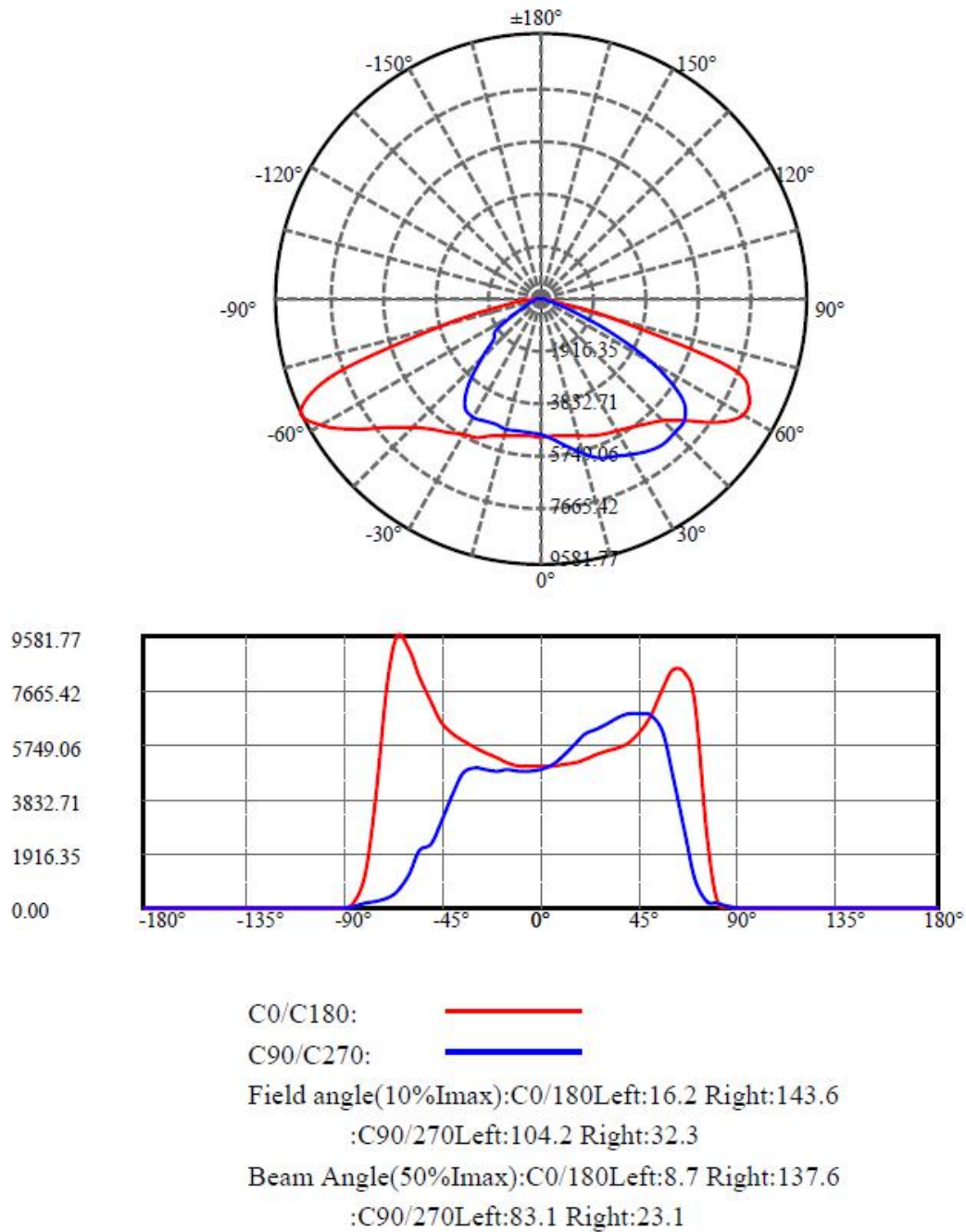
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	4926.014	.000	.000	.000%	.000%
5.0	4968.151	118.282	118.282	.491%	.491%
10.0	5073.198	359.211	477.493	1.491%	1.982%
15.0	5208.678	609.914	1087.407	2.532%	4.513%
20.0	5362.008	871.173	1958.580	3.616%	8.129%
25.0	5537.282	1143.134	3101.714	4.745%	12.874%
30.0	5721.043	1424.750	4526.464	5.914%	18.788%
35.0	5889.148	1709.682	6236.146	7.096%	25.884%
40.0	5967.129	1978.130	8214.277	8.211%	34.095%
45.0	5895.001	2196.370	10410.650	9.116%	43.211%
50.0	5724.993	2347.990	12758.640	9.746%	52.957%
55.0	5550.450	2451.656	15210.290	10.176%	63.133%
60.0	5102.709	2462.448	17672.740	10.221%	73.354%
65.0	4379.883	2305.236	19977.980	9.568%	82.922%
70.0	3509.170	1997.559	21975.540	8.291%	91.214%
75.0	1628.564	1342.921	23318.460	5.574%	96.788%
80.0	407.960	544.917	23863.380	2.262%	99.050%
85.0	135.246	147.602	24010.980	.613%	99.662%
90.0	15.904	41.386	24052.360	.172%	99.834%
95.0	3.731	5.376	24057.740	.022%	99.856%
100.0	3.731	2.028	24059.770	.008%	99.865%
105.0	4.184	2.118	24061.880	.009%	99.874%
110.0	4.916	2.379	24064.260	.010%	99.883%
115.0	5.633	2.671	24066.940	.011%	99.894%
120.0	6.277	2.895	24069.830	.012%	99.906%
125.0	6.906	3.047	24072.880	.013%	99.919%
130.0	7.330	3.095	24075.970	.013%	99.932%
135.0	7.506	2.998	24078.970	.012%	99.944%
140.0	7.476	2.774	24081.740	.012%	99.956%
145.0	7.359	2.475	24084.220	.010%	99.966%
150.0	7.476	2.185	24086.400	.009%	99.975%
155.0	7.403	1.883	24088.290	.008%	99.983%
160.0	7.125	1.524	24089.810	.006%	99.989%
165.0	6.789	1.147	24090.960	.005%	99.994%
170.0	6.569	.792	24091.750	.003%	99.997%
175.0	6.467	.466	24092.220	.002%	99.999%
180.0	6.672	.157	24092.370	.001%	100.000%



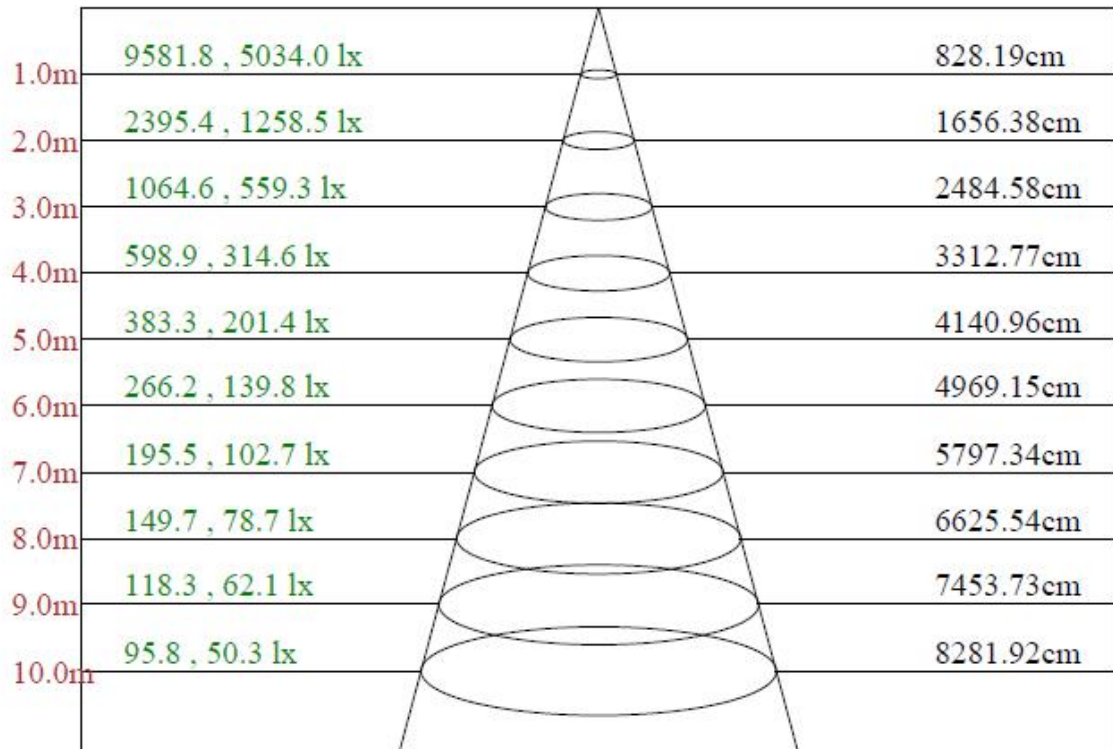
## Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





## Lux distance Curve



Max , Ave

Beam angle of C180plane152.68



**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	4988.93	4991.27	5038.09	5110.65	5244.08	5410.29	5532.02	5630.33	5857.40
22.5	4937.43	4991.27	5117.68	5274.52	5466.47	5726.31	6025.95	6430.92	6847.60
45.0	4918.70	5063.84	5272.18	5508.61	5749.72	6065.74	6374.74	6711.83	7034.87
67.5	4918.70	5084.90	5375.18	5670.13	5918.26	6168.74	6416.88	6634.58	6784.40
90.0	4857.84	5068.52	5377.52	5770.79	6103.20	6285.79	6477.74	6704.81	6856.96
112.5	4925.72	5108.31	5405.61	5716.95	6004.88	6276.42	6526.90	6775.03	7013.81
135.0	4937.43	5089.59	5326.02	5595.22	5878.47	6224.92	6620.53	7081.69	7538.17
157.5	4923.38	5033.40	5183.22	5375.18	5644.38	5939.33	6346.65	6828.87	7430.49
180.0	4988.93	4986.59	5019.36	5124.70	5281.54	5499.24	5639.70	5873.79	6152.35
202.5	4937.43	4930.40	4946.79	4993.61	5084.90	5197.27	5307.29	5464.13	5716.95
225.0	4918.70	4862.52	4869.54	4916.36	4988.93	5077.88	5141.09	5159.81	5017.02
247.5	4918.70	4857.84	4827.40	4834.43	4876.56	4937.43	5035.74	4949.13	4415.41
270.0	4857.84	4813.36	4836.77	4876.56	4832.09	4853.15	4918.70	4736.11	4066.61
292.5	4925.72	4853.15	4820.38	4804.00	4808.68	4864.86	4974.88	4897.63	4354.54
315.0	4937.43	4876.56	4855.50	4864.86	4930.40	5005.31	5070.86	5124.70	4963.18
337.5	4923.38	4878.90	4899.97	4902.31	4979.56	5063.84	5127.04	5223.02	5424.33
360.0	4988.93	4991.27	5038.09	5110.65	5244.08	5410.29	5532.02	5630.33	5857.40
C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	6243.65	6812.49	7723.10	8399.62	8298.96	7187.03	2607.53	320.47	75.61
22.5	7292.37	7706.71	8011.03	8095.30	7875.26	6576.06	3535.70	689.86	154.97
45.0	7350.90	7493.69	7507.73	7268.96	6632.24	4645.98	2513.43	242.05	105.11
67.5	6868.67	6842.92	6597.13	5815.26	4078.32	2018.56	580.31	188.91	80.06
90.0	6847.60	6775.03	6203.85	4618.36	2685.25	1036.55	258.44	152.86	76.78
112.5	7177.67	7194.05	6941.24	6091.49	4398.55	2242.58	685.65	211.38	85.21
135.0	7875.26	7999.32	7933.78	7592.01	6978.69	5609.27	2952.58	296.83	118.68
157.5	8004.01	8411.32	8589.23	8514.32	8245.12	6971.67	3985.62	1022.04	148.41
180.0	6562.01	7245.55	8146.80	9104.23	9581.77	7856.53	3722.50	1199.01	161.52
202.5	5946.35	5934.65	5304.95	4068.95	3633.55	4932.75	1920.01	503.06	334.75
225.0	4410.72	3380.73	2491.19	2385.85	1201.35	664.11	523.66	330.77	137.41
247.5	3411.16	2465.44	2111.96	1344.15	664.82	540.05	366.12	218.17	112.13
270.0	3041.30	2257.10	2011.30	1194.33	581.71	373.61	255.63	170.65	86.61
292.5	3366.68	2411.60	2128.35	1283.28	666.22	512.19	342.01	206.00	93.64
315.0	4300.70	3153.66	2324.98	2343.71	1180.28	653.35	489.48	300.34	123.13
337.5	5620.97	5515.63	4780.59	3523.52	3376.05	4326.45	1318.40	474.97	269.91
360.0	6243.65	6812.49	7723.10	8399.62	8298.96	7187.03	2607.53	320.47	75.61
C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	6.56	4.45	4.68	4.92	5.38	6.09	6.56	6.56	6.79
22.5	15.68	4.45	3.98	3.75	3.75	4.21	4.92	5.38	5.85
45.0	9.60	4.21	3.28	2.81	3.04	3.28	3.75	4.45	4.92
67.5	11.71	3.28	2.34	2.11	2.11	2.58	3.28	3.75	4.45
90.0	8.19	2.58	1.87	2.11	2.34	2.81	3.04	3.75	4.45
112.5	13.81	2.58	1.87	2.11	2.81	3.28	3.75	4.21	4.92
135.0	13.11	3.28	3.04	3.28	3.98	4.45	5.15	6.09	6.56
157.5	24.11	4.92	4.92	5.62	6.32	7.49	7.49	7.96	7.73
180.0	27.62	5.15	4.92	4.68	5.38	5.62	6.09	6.56	7.26
202.5	33.01	4.68	5.38	6.09	7.49	7.96	8.66	9.13	8.90
225.0	18.73	3.28	4.45	6.32	7.26	8.66	9.36	9.36	9.60
247.5	16.39	2.58	3.28	4.68	6.09	7.26	8.19	8.90	9.36
270.0	7.02	2.11	2.58	3.75	4.92	6.09	6.79	7.96	8.66
292.5	11.71	2.81	3.04	3.51	4.68	5.62	6.56	7.96	8.66
315.0	14.98	4.21	4.21	4.92	5.85	6.56	7.73	8.66	9.36
337.5	22.24	5.15	5.85	6.32	7.26	8.19	9.13	9.83	9.83
360.0	6.56	4.45	4.68	4.92	5.38	6.09	6.56	6.56	6.79



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	6.56	6.56	6.09	6.32	6.09	5.85	5.62	5.62	5.38
22.5	6.32	6.32	6.56	7.02	7.02	6.79	6.56	6.32	6.32
45.0	5.62	6.09	6.09	6.32	6.56	6.79	6.79	6.56	6.56
67.5	4.92	5.62	5.85	6.32	6.79	6.79	6.56	6.79	6.56
90.0	5.15	5.62	6.09	6.56	6.79	6.79	6.56	6.56	6.56
112.5	5.85	6.32	6.32	6.56	6.79	6.79	6.79	6.56	6.56
135.0	6.56	6.79	6.79	6.79	7.02	6.79	6.79	6.56	6.79
157.5	7.73	7.49	7.49	7.73	7.26	7.02	6.79	6.79	6.79
180.0	7.02	6.79	6.79	7.02	6.79	6.79	6.32	6.09	6.09
202.5	8.43	8.19	7.73	7.73	7.49	6.79	7.02	6.56	6.56
225.0	9.36	8.66	8.19	8.19	7.96	7.26	6.79	6.56	6.32
247.5	9.36	9.13	8.66	8.19	8.19	7.73	7.02	6.79	6.56
270.0	9.36	8.90	8.90	8.66	8.43	7.96	7.26	6.79	6.32
292.5	8.90	8.90	8.90	8.90	8.66	7.96	7.26	7.02	6.79
315.0	9.36	9.13	8.66	8.66	8.43	7.96	7.26	6.79	6.56
337.5	9.60	9.13	8.66	8.66	8.19	7.96	7.26	6.79	6.79
360.0	6.56	6.56	6.09	6.32	6.09	5.85	5.62	5.62	5.38

C/γ(°)	180.0
0.0	5.62
22.5	6.79
45.0	6.79
67.5	6.79
90.0	6.56
112.5	7.02
135.0	6.79
157.5	7.02
180.0	5.62
202.5	6.79
225.0	6.79
247.5	6.79
270.0	6.56
292.5	7.02
315.0	6.79
337.5	7.02
360.0	5.62



## 5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0190M-3000K	3000K	24096.44	189.14	127.4
IK-SBSL2-L130-0190M-3500K	3500K	24642.30 * <sup>1</sup>	189.16 * <sup>2</sup>	130.3 * <sup>3</sup>
IK-SBSL2-L130-0190M-4000K	4000K	25188.15 * <sup>1</sup>	189.16 * <sup>2</sup>	133.2 * <sup>3</sup>
IK-SBSL2-L130-0190M-4500K	4500K	25734.01 * <sup>1</sup>	189.16 * <sup>2</sup>	136.0 * <sup>3</sup>
IK-SBSL2-L130-0190M-5000K	5000K	26279.86 * <sup>1</sup>	189.16 * <sup>2</sup>	138.9 * <sup>3</sup>
IK-SBSL2-L130-0190M-5700K	5700K	26825.72	189.18	141.8

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

$$24642.30 = (26825.72 - 24096.44) / 5 + 24096.44$$

$$25188.15 = (26825.72 - 24096.44) / 5 + 24642.30$$

$$25734.01 = (26825.72 - 24096.44) / 5 + 25188.15$$

$$26279.86 = (26825.72 - 24096.44) / 5 + 25734.01$$

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

$$189.16 = (189.14 + 189.18) / 2$$

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

$$130.3 = 24642.30 / 189.16$$

$$133.2 = 25188.15 / 189.16$$

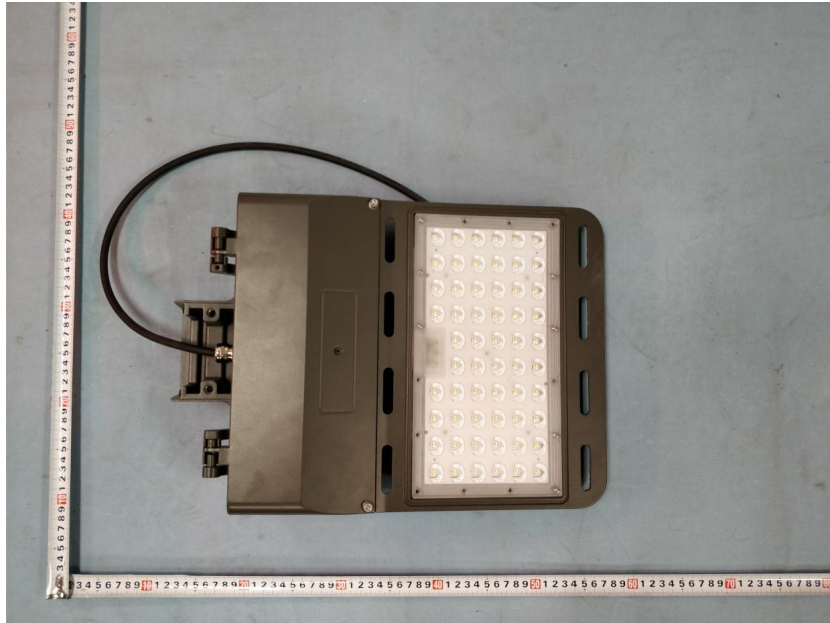
$$136.0 = 25734.01 / 189.16$$

$$138.9 = 26279.86 / 189.16$$





## Photo Document



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