



Shenzhen Belling Efficiency Testing Lab



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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-L130-0300M-3000K / IK-SBSL2-L130-0300M-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-L130-0300M-3000K / IK-SBSL2-L130-0300M-5700K
<b>Rated Inputs</b>	AC 200-480V 50/60Hz
<b>Rated Power</b>	300 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-L130-0300M-3000K	277.07	60	1.109	305.30	0.994
IK-SBSL2-L130-0300M-5700K	277.08	60	1.109	305.37	0.994

#### 3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0300M-3000K	39017.34	127.8	3043	83.5	11
IK-SBSL2-L130-0300M-5700K	43515.23	142.5	5532	82.8	9

#### 3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0300M-3000K	0.00079	0.4350	0.4054	0.2488	0.5216
IK-SBSL2-L130-0300M-5700K	0.0026	0.3318	0.3456	0.2047	0.4797

### 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-L130-0300M-3000K	277.07	60	1.1057	304.50	0.9939

#### 3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
38875.06	127.67	99.828	0.933



### 3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0300M -3000K	Power Factor	480	60	0.933
	THD	480	60	12.9%



## 4 Test Data

IK-SBSL2-L130-0300M-3000K

### Test Condition

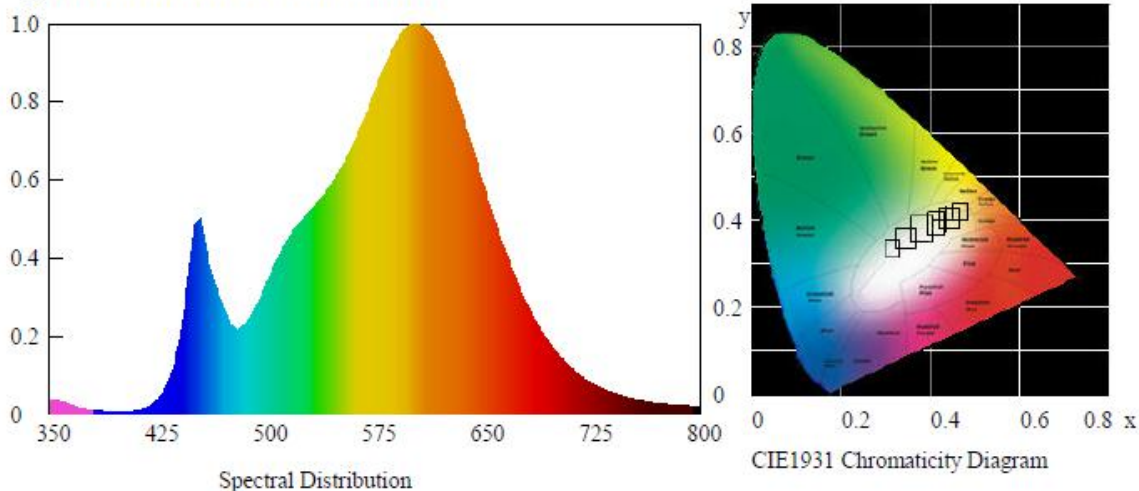
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

### Spectroradiometric Parameters



Chromaticity Coordinates:  $x=0.4350$   $y=0.4054$   $u'=0.2488$   $v'=0.5216$

Correlated Color Temperature: 3043 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index:  $R_f=83$

Gamut Index:  $R_g=94$

Luminous Flux: 39017.34 lm

Purity: 0.5238

Chromaticity Difference:  $+0.00079\text{Duv}$

Peak Wavelength: 600.0 nm

Color Ratio:  $K_r=44.5\%$   $K_g=47.9\%$   $K_b=7.6\%$

Bandwidth: 131.8nm

Radiant Flux: 110.041 W

Photosynthetically Active Radiation(PAR): 105.42W

Photosynthetic Photon Flux(PPF): 512.00 $\mu\text{mol/s}$

Rendering Index:  $R_a=83.5$

$R_1=82$   $R_2=92$   $R_3=96$   $R_4=81$   $R_5=82$   $R_6=90$   $R_7=83$   $R_8=60$

$R_9=11$   $R_{10}=81$   $R_{11}=81$   $R_{12}=72$   $R_{13}=85$   $R_{14}=99$   $R_{15}=75$   $R_e=78$

### Electric Parameters

Voltage: 277.07 V

Current: 1.109 A

Power Factor: 0.994

Power: 305.30 W

Luminous Efficacy: 127.8 lm/W

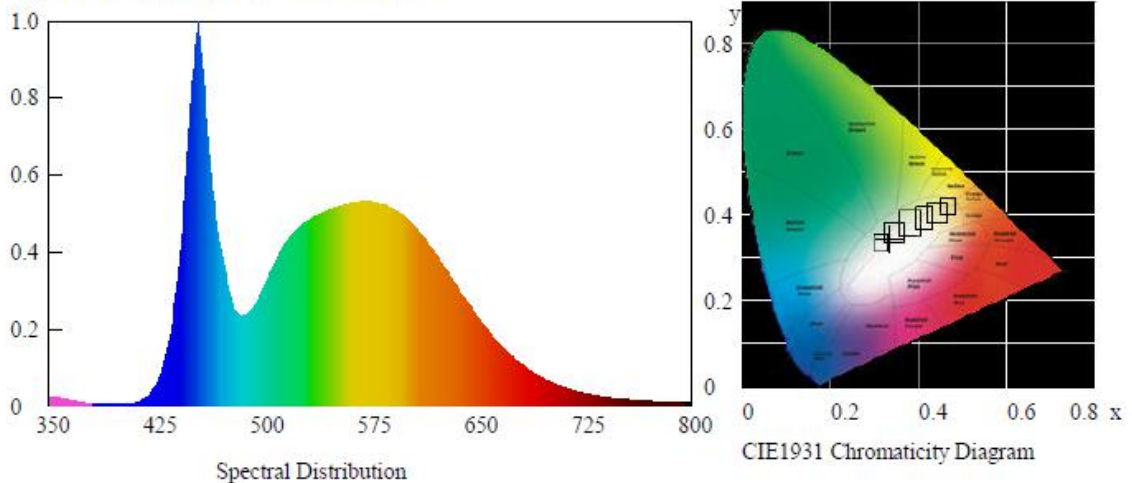
**IK-SBSL2-L130-0300M-5700K****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

**Spectroradiometric Parameters**Chromaticity Coordinates:  $x=0.3318$   $y=0.3456$   $u'=0.2047$   $v'=0.4797$ 

Correlated Color Temperature: 5532 K

Dominant Wavelength: 548.0 nm(E)

Colour Fidelity Index:  $R_f=80$ Gamut Index:  $R_g=93$ 

Luminous Flux: 43515.23 lm

Purity: 0.0331

Chromaticity Difference:  $+0.0026\text{Duv}$ 

Peak Wavelength: 455.0 nm

Color Ratio:  $K_r=32.3\%$   $K_g=56.1\%$   $K_b=11.6\%$ 

Bandwidth: 23.6nm

Radiant Flux: 140.583 W

Photosynthetically Active Radiation(PAR): 136.65W

Photosynthetic Photon Flux(PPF): 626.57 $\mu\text{mol/s}$ Rendering Index:  $R_a=82.8$  $R_1=81$   $R_2=89$   $R_3=92$   $R_4=81$   $R_5=81$   $R_6=83$   $R_7=87$   $R_8=68$  $R_9=9$   $R_{10}=72$   $R_{11}=79$   $R_{12}=56$   $R_{13}=84$   $R_{14}=96$   $R_{15}=77$   $R_e=76$ **Electric Parameters**

Voltage: 277.08 V

Current: 1.109 A

Power Factor: 0.994

Power: 305.37 W

Luminous Efficacy: 142.5 lm/W



**Zonal Flux Diagram**

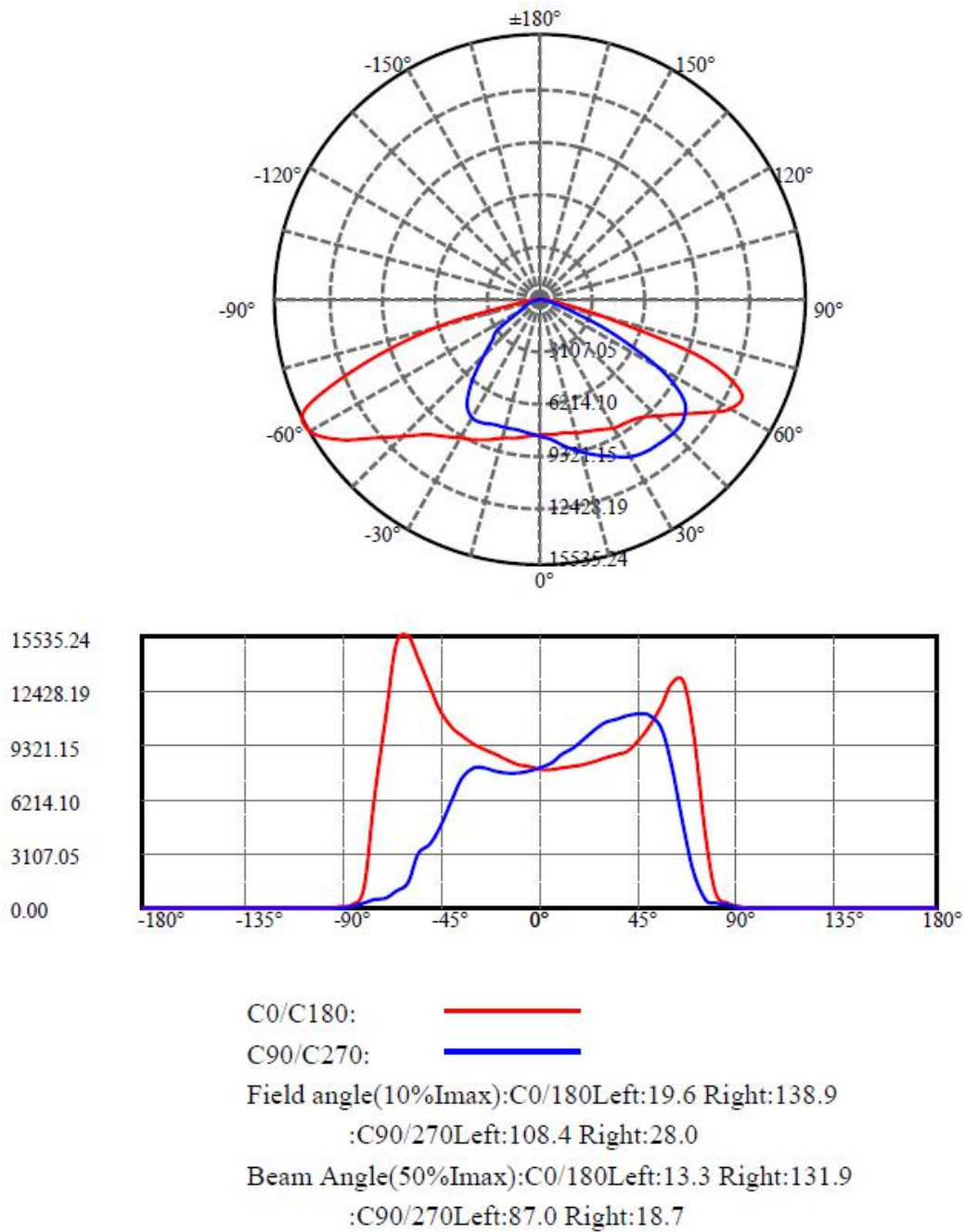
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	7945.988	.000	.000	.000%	.000%
5.0	8009.692	190.746	190.746	.491%	.491%
10.0	8174.248	578.950	769.696	1.489%	1.980%
15.0	8392.064	982.702	1752.398	2.528%	4.508%
20.0	8656.575	1405.047	3157.446	3.614%	8.122%
25.0	8973.155	1849.033	5006.479	4.756%	12.878%
30.0	9287.198	2310.863	7317.342	5.944%	18.823%
35.0	9500.985	2766.692	10084.030	7.117%	25.940%
40.0	9540.969	3177.006	13261.040	8.172%	34.112%
45.0	9402.670	3507.569	16768.610	9.023%	43.135%
50.0	9177.693	3754.434	20523.040	9.658%	52.792%
55.0	8920.939	3935.245	24458.290	10.123%	62.915%
60.0	8168.878	3950.263	28408.550	10.161%	73.077%
65.0	7110.589	3714.467	32123.020	9.555%	82.631%
70.0	5595.186	3217.184	35340.200	8.276%	90.907%
75.0	2690.446	2165.731	37505.930	5.571%	96.478%
80.0	820.988	939.562	38445.500	2.417%	98.895%
85.0	236.152	287.250	38732.750	.739%	99.634%
90.0	40.057	75.628	38808.380	.195%	99.828%
95.0	9.071	13.452	38821.830	.035%	99.863%
100.0	5.803	4.042	38825.870	.010%	99.873%
105.0	6.341	3.249	38829.120	.008%	99.882%
110.0	7.415	3.595	38832.710	.009%	99.891%
115.0	8.564	4.046	38836.760	.010%	99.901%
120.0	9.593	4.414	38841.180	.011%	99.913%
125.0	10.548	4.655	38845.830	.012%	99.925%
130.0	10.950	4.674	38850.510	.012%	99.937%
135.0	11.204	4.477	38854.980	.012%	99.948%
140.0	11.249	4.157	38859.140	.011%	99.959%
145.0	11.234	3.751	38862.890	.010%	99.969%
150.0	11.174	3.300	38866.190	.008%	99.977%
155.0	11.010	2.807	38869.000	.007%	99.984%
160.0	10.548	2.261	38871.260	.006%	99.990%
165.0	10.085	1.700	38872.960	.004%	99.995%
170.0	9.787	1.179	38874.140	.003%	99.998%
175.0	9.667	.696	38874.840	.002%	99.999%
180.0	9.966	.235	38875.070	.001%	100.000%



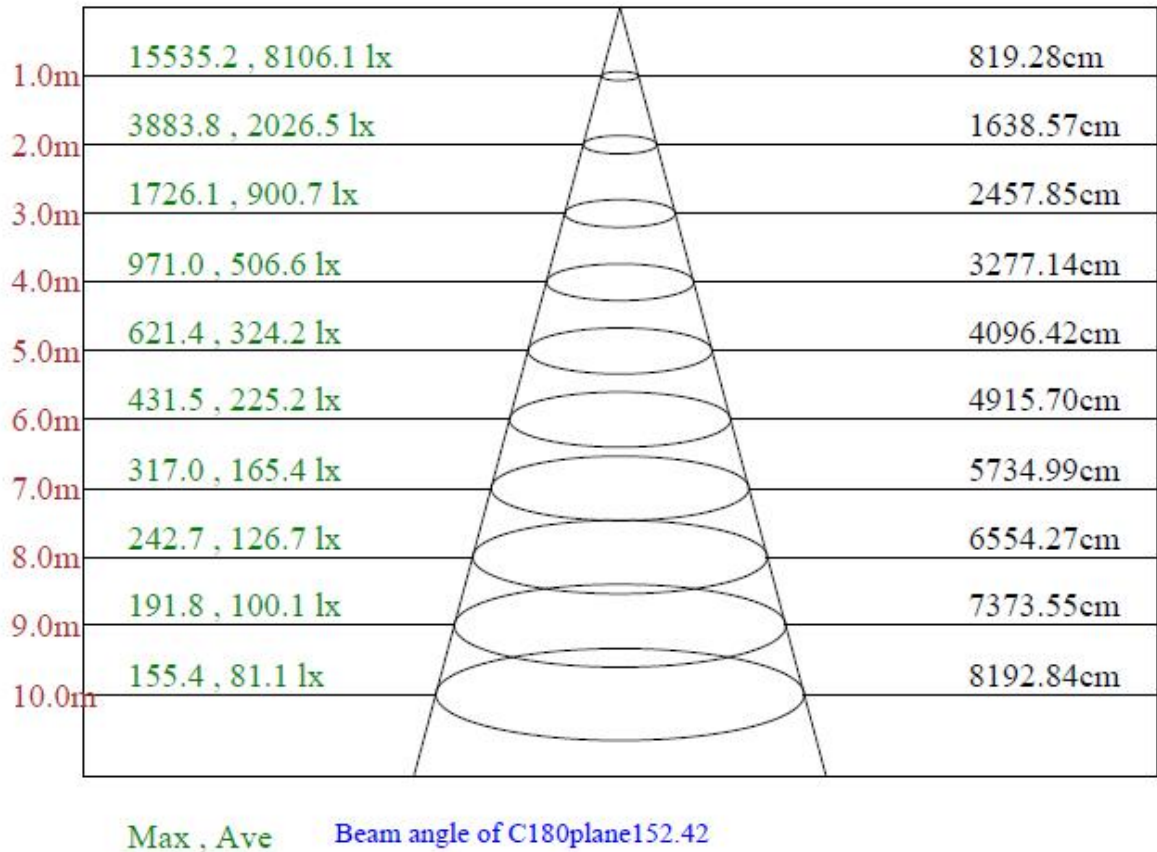
## Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





## Lux distance Curve





**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	7949.27	7918.24	7973.14	8087.72	8214.23	8383.71	8627.19	8820.54	9013.88
22.5	7968.37	8032.82	8164.10	8388.48	8655.83	9023.43	9474.58	10030.76	10596.48
45.0	7934.95	8104.43	8417.13	8763.25	9147.56	9603.48	10116.69	10572.61	11050.02
67.5	7956.43	8195.14	8588.99	9056.85	9527.09	9937.66	10317.20	10579.77	10820.86
90.0	7970.75	8281.07	8741.76	9207.23	9651.22	10185.91	10606.03	10816.09	10999.89
112.5	7961.21	8264.36	8722.67	9245.43	9734.77	10271.85	10730.15	11109.69	11489.23
135.0	7908.69	8154.56	8548.41	9030.59	9553.35	10162.04	10816.09	11599.03	12365.27
157.5	7918.24	8078.17	8343.13	8715.51	9159.49	9701.35	10393.58	11174.14	12200.56
180.0	7949.27	8078.17	8242.88	8445.77	8756.09	9097.43	9379.10	9832.63	10367.33
202.5	7968.37	7987.46	8047.14	8149.78	8350.29	8567.51	8837.24	9245.43	9684.64
225.0	7934.95	7889.60	7939.72	8051.91	8202.30	8352.68	8498.29	8515.00	8111.59
247.5	7956.43	7868.11	7877.66	7923.01	8032.82	8219.00	8281.07	7925.40	6779.63
270.0	7970.75	7844.24	7763.08	7755.92	7798.89	7973.14	8006.56	7450.38	6185.26
292.5	7961.21	7832.31	7808.44	7772.63	7815.60	7954.04	8068.62	7727.28	6571.96
315.0	7908.69	7815.60	7803.66	7827.53	7908.69	8037.59	8233.33	8221.39	7703.41
337.5	7918.24	7810.82	7806.05	7851.40	7997.01	8099.65	8209.46	8395.65	8715.51
360.0	7949.27	7918.24	7973.14	8087.72	8214.23	8383.71	8627.19	8820.54	9013.88
C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	9605.87	10424.62	11589.48	12816.42	12976.34	9973.47	4102.82	843.81	248.49
22.5	11293.49	12016.76	12582.49	12938.15	12725.71	11398.52	6607.76	2524.52	414.15
45.0	11546.52	11904.57	12033.47	11692.13	10806.54	8787.12	4685.73	771.73	243.48
67.5	10968.86	10980.79	10670.48	9562.90	6968.20	3845.98	1369.91	407.23	178.31
90.0	11124.01	10990.34	10224.11	8140.23	4658.04	1999.37	505.10	291.93	149.43
112.5	11801.93	11821.03	11412.84	10006.89	7214.07	3938.59	1367.29	411.28	178.07
135.0	12897.57	13157.76	12962.02	12379.59	11439.10	9328.97	4719.63	675.05	231.30
157.5	13155.37	13785.55	14005.15	13842.84	13293.82	11229.04	6815.43	2446.46	293.37
180.0	11288.72	12658.87	14272.50	15535.24	15055.44	10980.79	6142.29	1186.83	210.54
202.5	10011.66	9710.90	8433.84	6622.09	6750.98	8111.59	2062.87	818.75	571.22
225.0	6901.37	5180.32	4182.55	3817.33	1492.37	1097.32	857.42	533.74	171.87
247.5	5115.87	3908.04	3394.83	1776.42	1122.14	911.84	630.89	386.22	144.65
270.0	4638.47	3664.56	3077.35	1415.98	965.79	613.23	438.97	297.90	90.95
292.5	4920.14	3779.14	3373.34	1647.53	1076.79	825.43	553.55	343.97	129.62
315.0	6345.19	4578.79	3781.53	3344.70	1265.60	1038.83	781.04	479.79	181.65
337.5	8827.70	8281.07	6739.05	5163.61	5958.49	5442.90	1406.44	716.59	341.35
360.0	9605.87	10424.62	11589.48	12816.42	12976.34	9973.47	4102.82	843.81	248.49
C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	49.17	24.11	8.12	8.36	9.31	10.26	10.98	11.46	11.46
22.5	90.95	17.19	6.21	5.73	5.97	6.45	6.92	8.36	9.07
45.0	48.22	6.68	4.77	3.82	3.82	4.54	5.25	6.45	6.92
67.5	44.40	4.77	3.34	3.10	3.10	3.58	4.54	5.49	6.45
90.0	26.26	3.58	2.63	2.39	2.86	3.58	4.30	5.25	6.21
112.5	46.55	3.10	2.63	2.63	3.10	3.82	5.01	6.21	6.92
135.0	47.74	5.25	4.54	4.54	5.49	6.45	7.40	8.36	9.31
157.5	82.35	10.98	7.40	7.64	9.07	10.74	11.22	11.70	11.46
180.0	57.05	21.48	7.64	7.88	8.36	8.83	9.55	10.50	10.50
202.5	48.70	11.70	8.12	9.55	10.98	12.17	12.89	13.37	13.37
225.0	21.72	6.21	7.16	9.55	11.70	13.37	14.32	14.56	14.08
247.5	12.41	4.06	5.73	7.40	9.79	11.46	12.89	13.85	13.85
270.0	2.39	3.10	4.06	5.73	7.64	9.55	11.22	12.41	13.13
292.5	9.55	4.06	4.77	5.73	7.16	8.83	10.74	12.17	13.13
315.0	20.53	6.68	6.45	7.40	8.83	10.26	11.94	13.61	14.32
337.5	32.94	12.17	9.31	10.03	11.46	13.13	14.32	15.04	15.04
360.0	49.17	24.11	8.12	8.36	9.31	10.26	10.98	11.46	11.46



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	11.46	10.98	10.98	10.74	10.50	9.79	9.31	9.07	9.31
22.5	9.31	9.79	9.79	10.03	10.03	10.03	9.79	9.55	9.55
45.0	7.64	8.59	9.07	9.55	9.79	10.03	9.55	9.55	9.55
67.5	7.16	7.88	8.83	9.31	9.79	9.79	9.55	9.55	9.55
90.0	7.40	8.12	9.07	9.55	9.79	10.03	9.79	10.03	9.55
112.5	8.12	9.07	9.55	9.79	10.03	9.79	9.79	9.79	9.79
135.0	9.79	10.03	10.26	9.79	10.03	10.26	10.03	9.55	9.79
157.5	11.46	10.98	10.74	10.74	10.74	10.50	9.79	9.79	9.79
180.0	10.74	10.26	10.74	10.26	10.26	9.55	9.55	9.31	9.31
202.5	12.41	11.94	11.46	11.22	10.74	10.03	10.03	9.55	9.31
225.0	13.61	12.89	12.17	11.94	11.46	10.74	10.03	9.55	9.55
247.5	13.85	13.61	12.89	12.65	11.94	11.22	10.03	10.03	9.55
270.0	13.61	13.61	13.37	13.37	12.65	11.70	10.98	10.03	9.79
292.5	13.85	13.85	13.61	13.37	12.89	11.94	10.98	10.26	10.03
315.0	14.08	14.08	13.61	13.37	12.89	11.94	11.22	10.50	10.03
337.5	14.80	14.32	13.61	13.13	12.65	11.46	10.98	10.50	10.26
360.0	11.46	10.98	10.98	10.74	10.50	9.79	9.31	9.07	9.31
C/γ(°)	180.0								
0.0	9.31								
22.5	9.79								
45.0	9.79								
67.5	9.79								
90.0	10.03								
112.5	10.26								
135.0	10.26								
157.5	10.50								
180.0	9.31								
202.5	9.79								
225.0	9.79								
247.5	9.79								
270.0	10.03								
292.5	10.26								
315.0	10.26								
337.5	10.50								
360.0	9.31								



## 5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0300M-3000K	3000K	39017.34	305.30	127.8
IK-SBSL2-L130-0300M-3500K	3500K	39916.92 <sup>*1</sup>	305.34 <sup>*2</sup>	130.7 <sup>*3</sup>
IK-SBSL2-L130-0300M-4000K	4000K	40816.50 <sup>*1</sup>	305.34 <sup>*2</sup>	133.7 <sup>*3</sup>
IK-SBSL2-L130-0300M-4500K	4500K	41716.07 <sup>*1</sup>	305.34 <sup>*2</sup>	136.6 <sup>*3</sup>
IK-SBSL2-L130-0300M-5000K	5000K	42615.65 <sup>*1</sup>	305.34 <sup>*2</sup>	139.6 <sup>*3</sup>
IK-SBSL2-L130-0300M-5700K	5700K	43515.23	305.37	142.5

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

$$39916.92 = (43515.23 - 39017.34) / 5 + 39017.34$$

$$40816.50 = (43515.23 - 39017.34) / 5 + 39916.92$$

$$41716.07 = (43515.23 - 39017.34) / 5 + 40816.50$$

$$42615.65 = (43515.23 - 39017.34) / 5 + 41716.07$$

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

$$305.34 = (305.30 + 305.37) / 2$$

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

$$130.7 = 39916.92 / 305.34$$

$$133.7 = 40816.50 / 305.34$$

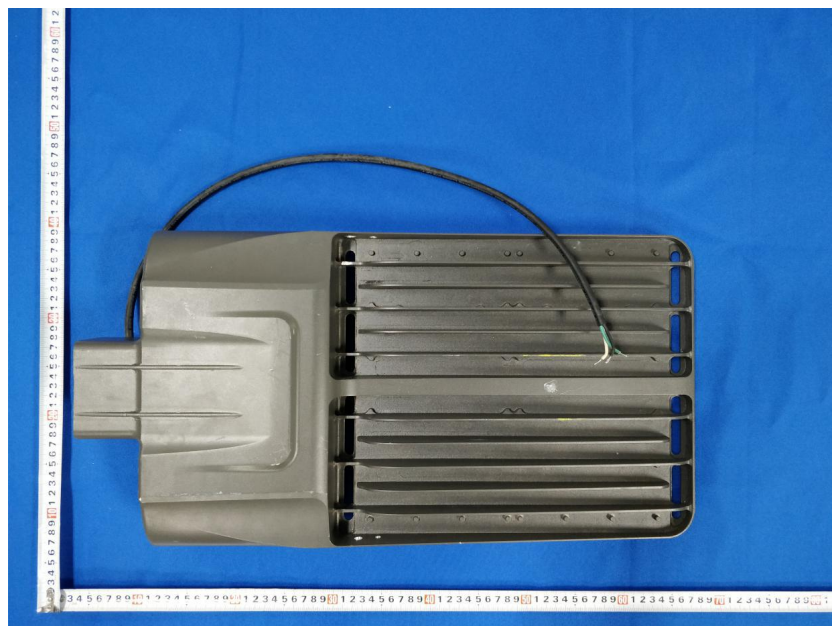
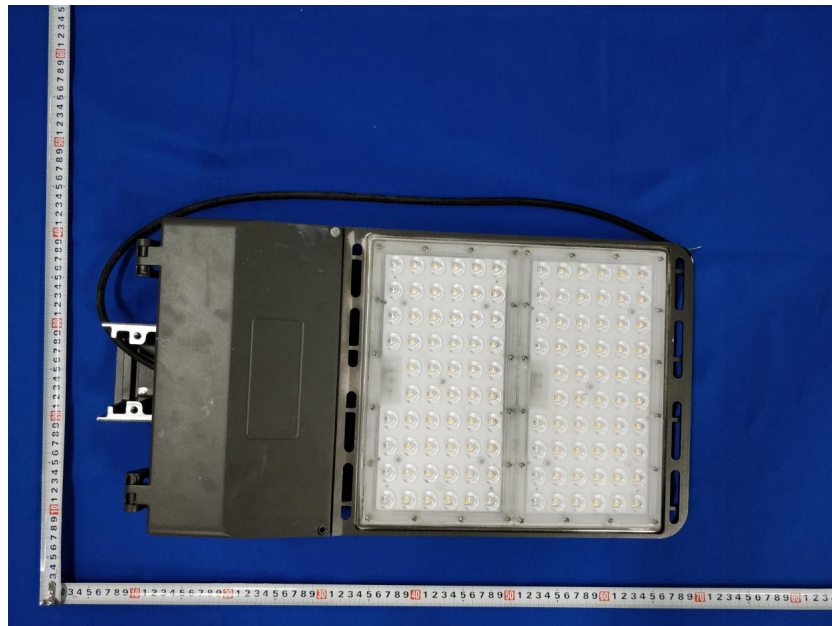
$$136.6 = 41716.07 / 305.34$$

$$139.6 = 42615.65 / 305.34$$





## Photo Document



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