



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-L130-0190M-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.

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

Manufacturer	IKIO LED LIGHTING
Manufacturer Address	8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250
Brand Name	IKIO
Luminaire Type	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires
Model Number	IK-SBSL2-L130-0190M-3000K / IK-SBSL2-L130-0190M-5700K
Rated Inputs	AC 120-277V 50/60Hz
Rated Power	185 W
Nominal CCT	3000K / 5700K
Date of Receipt Samples	2018-05-14
Date of Test	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 ± 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. 4π 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	120.05	60	1.529	182.80	0.996
IK-SBSL2-L130-0190M-5700K	120.09	60	1.520	181.59	0.995

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0190M-3000K	23544.64	128.8	3021	83.6	11
IK-SBSL2-L130-0190M-5700K	25876.58	142.5	5794	84.2	17

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0190M-3000K	0.00096	0.4368	0.4065	0.2495	0.5223
IK-SBSL2-L130-0190M-5700K	0.00126	0.3260	0.3378	0.2037	0.4749

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	120.05	60	1.5214	181.82	0.9955

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
23346.12	128.40	99.824	0.973



3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0190M-3000K	Power Factor	277	60	0.928
	THD	277	60	13.2%



4 Test Data

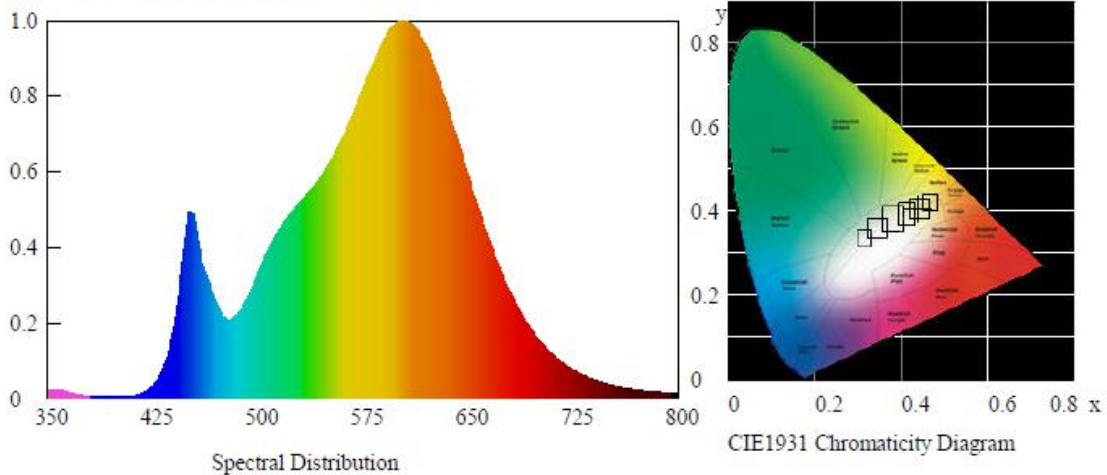
IK-SBSL2-L130-0190M-3000K

Test Condition

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4368$ $y=0.4065$ $u'=0.2495$ $v'=0.5223$

Correlated Color Temperature: 3021 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index: $R_f=83$

Gamut Index: $R_g=95$

Luminous Flux: 23544.64 lm

Purity: 0.5326

Chromaticity Difference: $+0.00096\Delta u v$

Peak Wavelength: 605.0 nm

Color Ratio: $K_r=44.6\%$ $K_g=47.9\%$ $K_b=7.5\%$

Bandwidth: 130.9nm

Radiant Flux: 58.465 W

Photosynthetically Active Radiation(PAR): 56.26W

Photosynthetic Photon Flux(PPF): 273.51 μ mol/s

Rendering Index: $R_a=83.6$

$R_1=82$ $R_2=92$ $R_3=97$ $R_4=82$ $R_5=82$ $R_6=90$ $R_7=84$ $R_8=61$

$R_9=11$ $R_{10}=81$ $R_{11}=81$ $R_{12}=71$ $R_{13}=85$ $R_{14}=99$ $R_{15}=75$ $R_e=78$

Electric Parameters

Voltage: 120.05 V

Current: 1.529 A

Power Factor: 0.996

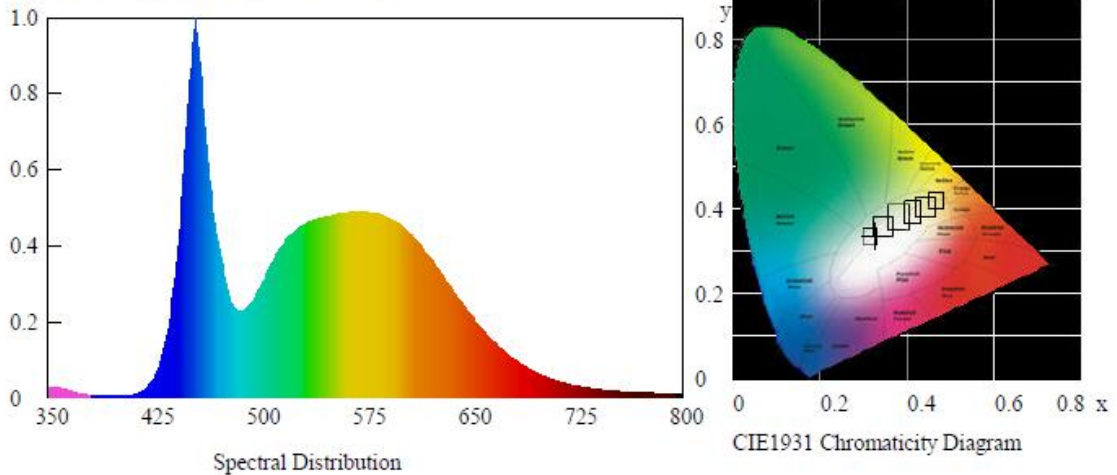
Power: 182.80 W

Luminous Efficacy: 128.8 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: $x=0.3260$ $y=0.3378$ $u'=0.2037$ $v'=0.4749$

Correlated Color Temperature: 5794 K

Dominant Wavelength: 499.0 nm(E)

Colour Fidelity Index: $R_f=80$

Gamut Index: $R_g=94$

Luminous Flux: 25876.58 lm

Purity: 0.0232

Chromaticity Difference: +0.00126Duv

Peak Wavelength: 455.0 nm

Color Ratio: $K_r=32.1\%$ $K_g=56.0\%$ $K_b=12.0\%$

Bandwidth: 23.1nm

Radiant Flux: 94.054 W

Photosynthetically Active Radiation(PAR): 91.26W

Photosynthetic Photon Flux(PPF): 417.01 μ mol/s

Rendering Index: $R_a=84.2$

$R_1=83$ $R_2=90$ $R_3=92$ $R_4=82$ $R_5=82$ $R_6=84$ $R_7=88$ $R_8=71$

$R_9=17$ $R_{10}=74$ $R_{11}=81$ $R_{12}=57$ $R_{13}=86$ $R_{14}=96$ $R_{15}=80$ $R_e=78$

Electric Parameters

Voltage: 120.09 V

Current: 1.520 A

Power Factor: 0.995

Power: 181.59 W

Luminous Efficacy: 142.5 lm/W

**Zonal Flux Diagram**

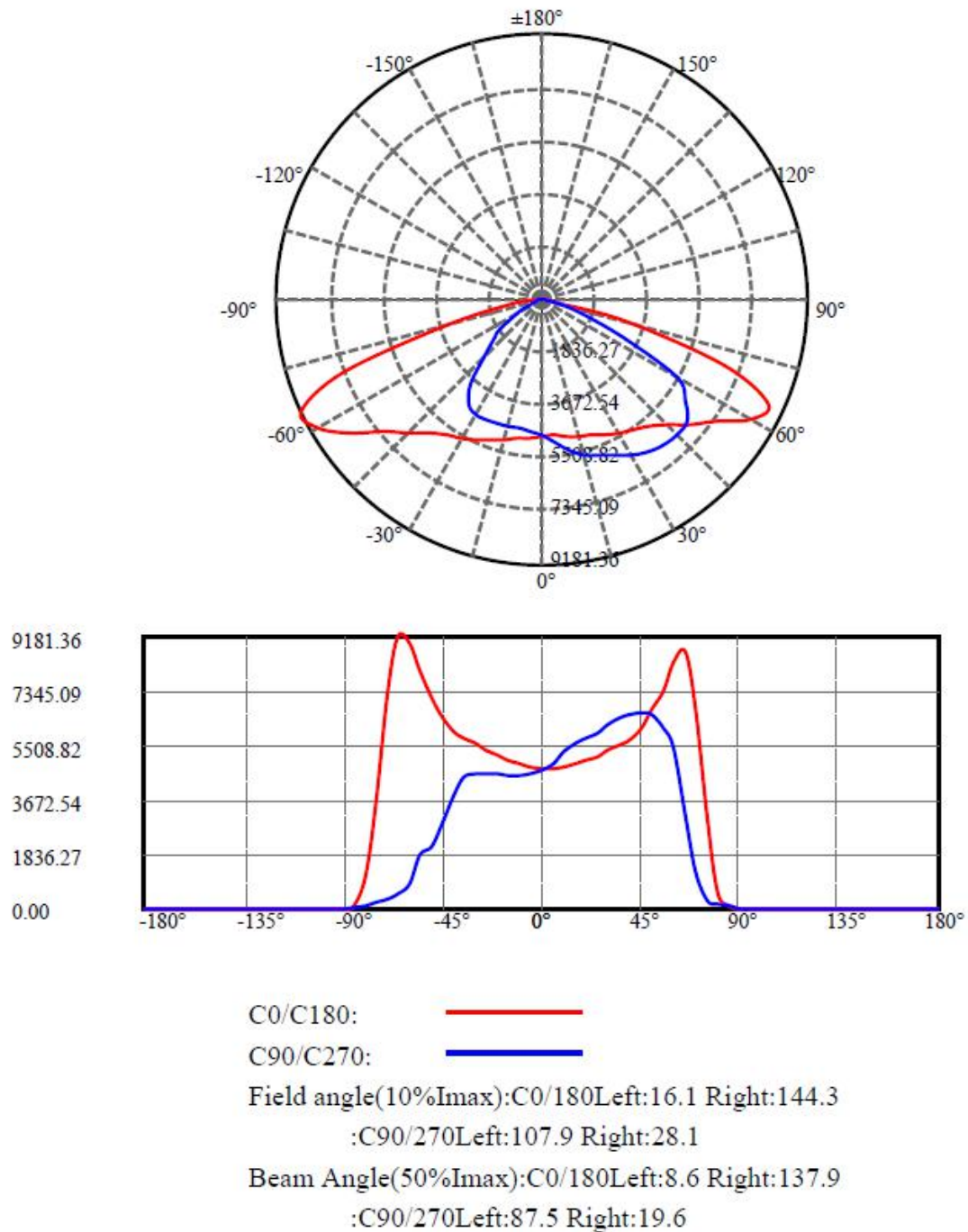
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	4713.417	.000	.000	.000%	.000%
5.0	4756.595	113.211	113.211	.485%	.485%
10.0	4857.298	343.919	457.131	1.473%	1.958%
15.0	4970.625	582.986	1040.116	2.497%	4.455%
20.0	5109.772	830.767	1870.883	3.558%	8.014%
25.0	5269.005	1088.542	2959.425	4.663%	12.676%
30.0	5449.610	1356.450	4315.875	5.810%	18.486%
35.0	5607.120	1628.181	5944.056	6.974%	25.461%
40.0	5678.415	1882.906	7826.962	8.065%	33.526%
45.0	5634.950	2094.761	9921.723	8.973%	42.498%
50.0	5487.625	2247.479	12169.200	9.627%	52.125%
55.0	5312.040	2348.207	14517.410	10.058%	62.183%
60.0	4948.348	2371.659	16889.070	10.159%	72.342%
65.0	4291.396	2246.199	19135.270	9.621%	81.963%
70.0	3486.131	1969.320	21104.590	8.435%	90.399%
75.0	1737.127	1365.276	22469.860	5.848%	96.247%
80.0	535.089	607.982	23077.850	2.604%	98.851%
85.0	140.296	183.518	23261.360	.786%	99.637%
90.0	19.438	43.736	23305.100	.187%	99.824%
95.0	4.232	6.481	23311.580	.028%	99.852%
100.0	4.002	2.237	23313.820	.010%	99.862%
105.0	4.304	2.222	23316.040	.010%	99.871%
110.0	4.863	2.396	23318.440	.010%	99.881%
115.0	5.595	2.648	23321.090	.011%	99.893%
120.0	6.240	2.877	23323.960	.012%	99.905%
125.0	6.886	3.034	23327.000	.013%	99.918%
130.0	7.173	3.057	23330.050	.013%	99.931%
135.0	7.345	2.933	23332.990	.013%	99.944%
140.0	7.345	2.720	23335.710	.012%	99.955%
145.0	7.259	2.436	23338.140	.010%	99.966%
150.0	7.302	2.144	23340.290	.009%	99.975%
155.0	7.259	1.843	23342.130	.008%	99.983%
160.0	6.915	1.486	23343.620	.006%	99.989%
165.0	6.685	1.121	23344.740	.005%	99.994%
170.0	6.412	.777	23345.510	.003%	99.997%
175.0	6.369	.457	23345.970	.002%	99.999%
180.0	6.542	.154	23346.130	.001%	100.000%



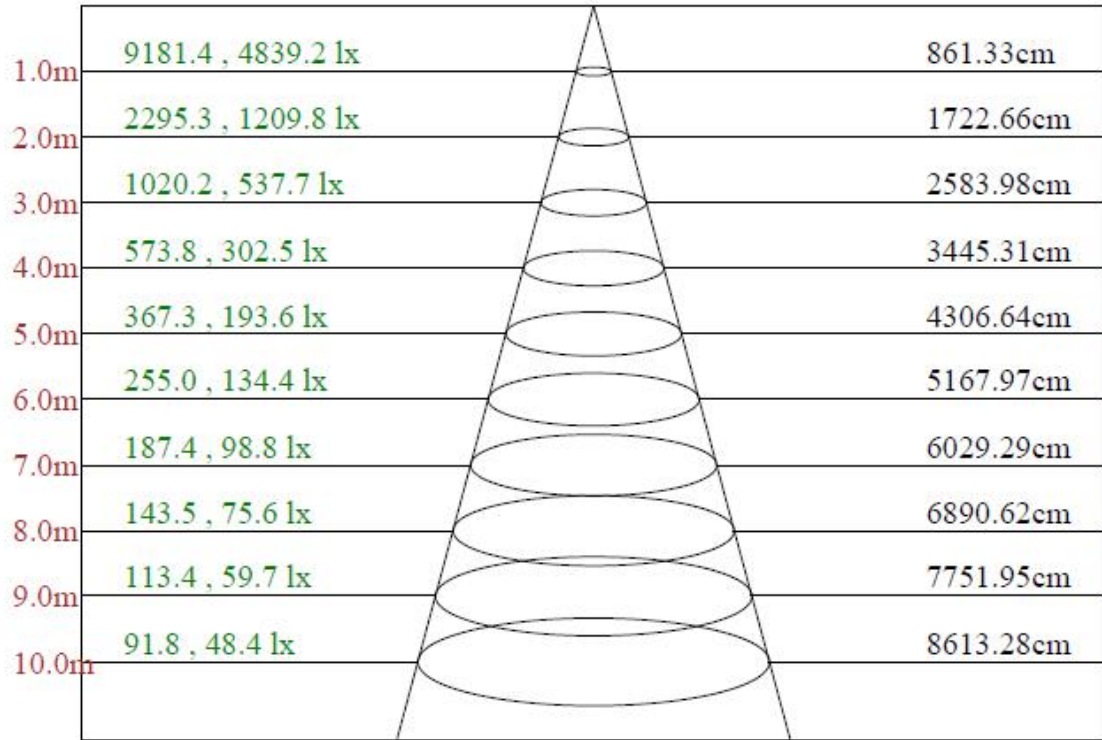
Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





Lux distance Curve



Max , Ave

Beam angle of C180plane153.81

**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	4717.15	4719.44	4804.37	4896.17	5004.05	5146.35	5336.86	5525.07	5710.98
22.5	4786.00	4857.16	4953.56	5095.86	5279.48	5515.88	5855.58	6252.65	6681.86
45.0	4742.39	4877.81	5061.43	5277.18	5511.29	5828.04	6158.55	6505.13	6833.34
67.5	4703.38	4893.88	5180.78	5444.73	5701.80	5938.21	6195.27	6415.61	6583.16
90.0	4668.95	4930.60	5286.36	5568.67	5754.59	5954.27	6215.93	6436.27	6573.98
112.5	4689.60	4891.58	5157.83	5430.96	5708.68	5949.68	6206.75	6450.04	6672.68
135.0	4696.49	4850.27	5070.61	5286.36	5557.20	5885.42	6259.54	6693.34	7062.87
157.5	4703.38	4795.18	4928.31	5111.93	5348.33	5621.47	5958.86	6394.96	6938.92
180.0	4717.15	4790.59	4896.17	5017.82	5185.37	5366.70	5568.67	5743.11	6013.95
202.5	4786.00	4749.28	4733.21	4749.28	4854.86	4962.74	5082.09	5247.34	5465.39
225.0	4742.39	4675.83	4671.24	4691.90	4744.69	4802.07	4838.79	4829.61	4680.42
247.5	4703.38	4639.11	4620.75	4593.20	4618.45	4657.47	4696.49	4588.61	4090.55
270.0	4668.95	4561.07	4524.35	4517.46	4561.07	4586.32	4579.43	4432.54	3799.06
292.5	4689.60	4595.50	4570.25	4558.78	4535.82	4577.14	4627.63	4535.82	4053.83
315.0	4696.49	4620.75	4602.39	4623.04	4648.29	4703.38	4769.94	4758.46	4613.86
337.5	4703.38	4657.47	4655.18	4666.65	4742.39	4808.96	4843.38	4905.35	5079.79
360.0	4717.15	4719.44	4804.37	4896.17	5004.05	5146.35	5336.86	5525.07	5710.98

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	6117.23	6725.47	7354.36	8306.88	8644.28	6711.70	3043.93	551.77	120.73
22.5	7182.22	7581.59	7845.54	7905.21	7703.23	6881.54	4070.12	1801.06	210.24
45.0	7161.56	7287.80	7301.57	7092.70	6567.10	5433.26	3293.19	508.85	149.19
67.5	6670.38	6674.97	6484.47	5846.40	4469.26	2409.30	990.85	239.62	113.38
90.0	6624.48	6569.39	6096.58	5421.78	3146.75	1275.92	297.46	175.13	92.27
112.5	6826.46	6835.64	6631.36	5940.50	4433.00	2481.60	989.24	245.59	109.25
135.0	7414.04	7528.80	7423.22	7166.15	6619.89	5492.93	3192.66	461.80	140.70
157.5	7471.42	7831.77	8008.50	7958.00	7733.07	6833.34	3996.45	1498.32	168.01
180.0	6516.60	7122.54	8052.11	8933.48	9181.36	7303.87	3512.15	1150.37	136.11
202.5	5669.67	5626.06	4987.98	3810.53	3532.81	4533.53	1359.23	486.36	294.48
225.0	4108.91	3133.44	2346.18	2132.72	953.67	607.32	448.72	270.15	91.58
247.5	3160.98	2291.09	1935.33	1145.78	611.22	465.70	285.99	156.76	83.32
270.0	2825.88	2109.77	1813.69	849.00	528.13	322.48	207.72	132.21	72.30
292.5	3163.28	2265.85	1939.92	1152.66	609.38	451.01	282.77	165.72	86.76
315.0	4007.92	3027.86	2210.76	2109.77	804.94	594.23	425.31	255.92	109.02
337.5	5238.16	5189.96	4561.07	3401.98	3124.26	3980.38	1398.25	461.80	267.39
360.0	6117.23	6725.47	7354.36	8306.88	8644.28	6711.70	3043.93	551.77	120.73

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	10.56	4.82	4.82	4.59	5.28	5.74	6.20	6.66	6.89
22.5	38.10	5.05	4.36	3.90	3.90	4.13	4.82	5.28	5.74
45.0	34.89	4.82	3.44	2.75	2.75	2.98	3.44	4.13	4.59
67.5	37.41	3.90	2.53	2.07	2.07	2.30	2.98	3.67	4.13
90.0	17.21	3.21	2.07	1.84	2.07	2.30	2.98	3.90	4.13
112.5	32.82	3.21	2.07	2.07	2.30	2.98	3.44	4.36	4.82
135.0	25.48	4.13	3.21	3.21	3.67	4.36	5.28	5.74	6.20
157.5	33.05	5.74	5.51	5.74	6.20	7.12	7.57	7.35	7.80
180.0	14.92	5.51	5.05	5.05	5.51	5.74	6.20	6.66	6.89
202.5	15.84	5.05	5.74	6.20	7.35	8.26	8.72	9.41	8.95
225.0	7.35	4.13	5.05	6.43	7.35	8.72	9.18	9.64	9.41
247.5	4.13	2.98	3.67	5.51	6.66	7.57	8.26	8.72	8.95
270.0	2.98	2.07	2.75	4.13	5.05	6.43	7.12	8.03	8.72
292.5	5.51	2.75	3.21	3.90	4.59	5.97	6.89	8.03	8.72
315.0	10.79	4.13	4.36	4.82	5.51	6.66	7.57	8.95	9.18
337.5	19.97	6.20	6.20	6.66	7.57	8.26	9.18	9.64	9.64
360.0	10.56	4.82	4.82	4.59	5.28	5.74	6.20	6.66	6.89



C/ γ (°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	6.66	6.43	6.20	6.20	6.20	5.51	5.51	5.51	5.05
22.5	6.20	5.97	6.43	6.66	6.89	6.43	6.43	6.43	6.43
45.0	5.28	5.74	5.97	6.20	6.43	6.66	6.66	6.43	6.43
67.5	4.59	5.28	5.74	6.43	6.43	6.43	6.66	6.43	6.66
90.0	4.82	5.74	5.97	6.20	6.66	6.43	6.43	6.43	6.43
112.5	5.51	6.20	6.20	6.43	6.66	6.66	6.43	6.20	6.20
135.0	6.66	6.66	6.43	6.66	6.66	6.66	6.43	6.43	6.66
157.5	7.35	7.35	7.35	7.12	7.12	7.12	6.89	6.43	6.66
180.0	6.89	6.66	6.89	6.66	6.43	6.43	6.43	6.20	5.97
202.5	8.26	8.26	7.80	7.57	7.57	6.66	6.43	6.43	6.43
225.0	9.18	8.72	8.26	8.03	7.57	7.12	6.66	6.43	6.43
247.5	9.41	8.95	8.49	8.49	8.03	7.35	6.89	6.66	6.43
270.0	8.95	8.95	8.72	8.72	8.49	7.80	7.12	6.66	6.43
292.5	8.95	8.72	8.72	8.49	8.49	7.80	7.35	6.66	6.43
315.0	9.18	8.95	8.49	8.49	8.49	7.80	7.35	6.66	6.66
337.5	9.64	8.95	8.49	8.49	8.03	7.80	7.35	6.66	6.66
360.0	6.66	6.43	6.20	6.20	6.20	5.51	5.51	5.51	5.05

C/ γ (°)	180.0
0.0	5.28
22.5	6.43
45.0	6.66
67.5	6.89
90.0	6.66
112.5	6.89
135.0	6.66
157.5	6.89
180.0	5.28
202.5	6.43
225.0	6.66
247.5	6.89
270.0	6.66
292.5	6.89
315.0	6.66
337.5	6.89
360.0	5.28



5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0190M-3000K	3000K	23544.64	182.80	128.8
IK-SBSL2-L130-0190M-3500K	3500K	24011.03 ^{*1}	182.20 ^{*2}	131.8 ^{*3}
IK-SBSL2-L130-0190M-4000K	4000K	24477.42 ^{*1}	182.20 ^{*2}	134.3 ^{*3}
IK-SBSL2-L130-0190M-4500K	4500K	24943.80 ^{*1}	182.20 ^{*2}	136.9 ^{*3}
IK-SBSL2-L130-0190M-5000K	5000K	25410.19 ^{*1}	182.20 ^{*2}	139.5 ^{*3}
IK-SBSL2-L130-0190M-5700K	5700K	25876.58	181.59	142.5

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

$$24011.03 = (25876.58 - 23544.64) / 5 + 23544.64$$

$$24477.42 = (25876.58 - 23544.64) / 5 + 24011.03$$

$$24943.80 = (25876.58 - 23544.64) / 5 + 24477.42$$

$$25410.19 = (25876.58 - 23544.64) / 5 + 24943.80$$

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

$$182.20 = (182.80 + 181.59) / 2$$

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

$$131.8 = 24011.03 / 182.20$$

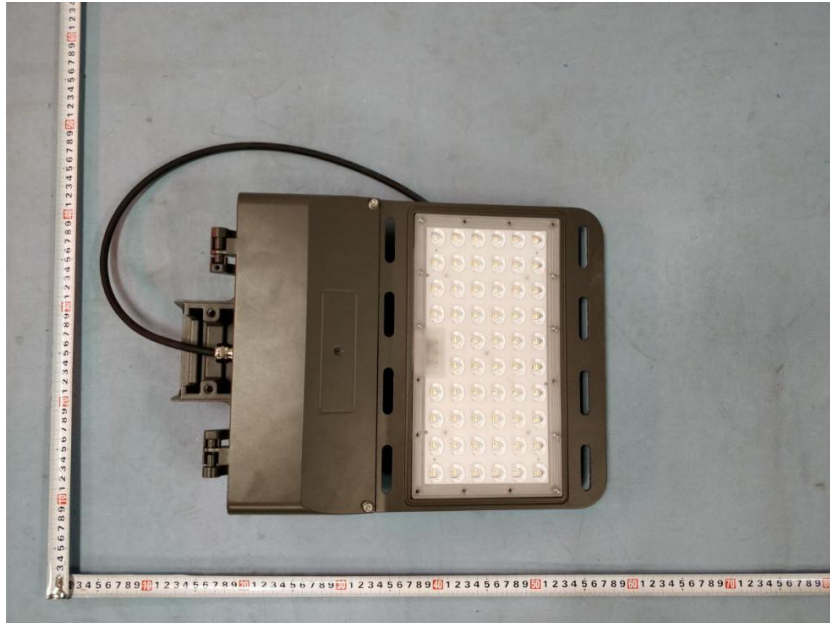
$$134.3 = 24477.42 / 182.20$$

$$136.9 = 24943.80 / 182.20$$

$$139.5 = 25410.19 / 182.20$$



Photo Document



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