



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-L130-0240M-3000K / IK-SBSL2-L130-0240M-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-L130-0240M-3000K / IK-SBSL2-L130-0240M-5700K
Rated Inputs	AC 120-277V 50/60Hz
Rated Power	240 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-L130-0240M-3000K	120.08	60	2.043	244.13	0.995
IK-SBSL2-L130-0240M-5700K	120.05	60	2.040	244.17	0.997

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0240M-3000K	31395.12	128.6	3020	83.8	12
IK-SBSL2-L130-0240M-5700K	35209.31	144.2	5704	84.1	15

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0240M-3000K	0.0011	0.4371	0.4069	0.2495	0.5225
IK-SBSL2-L130-0240M-5700K	0.00182	0.3279	0.3406	0.2039	0.4766

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-L130-0240M-3000K	120.14	60	2.0313	243.14	0.9963

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
31196.37	128.31	99.820	0.888



3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0240M -3000K	Power Factor	277	60	0.927
	THD	277	60	13.9%



4 Test Data

IK-SBSL2-L130-0240M-3000K

Test Condition

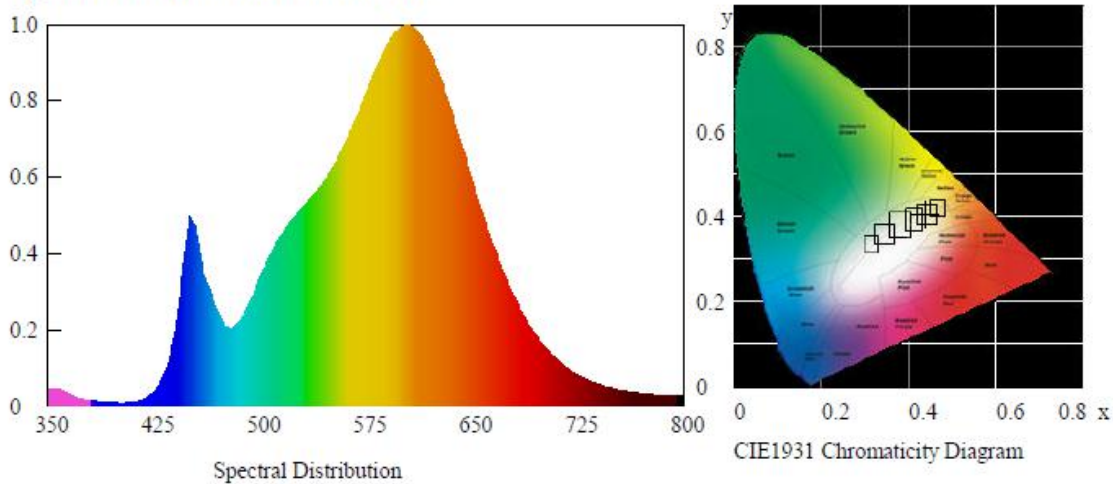
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4371$ $y=0.4069$ $u'=0.2495$ $v'=0.5225$

Correlated Color Temperature: 3020 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index: $R_f=84$

Gamut Index: $R_g=95$

Luminous Flux: 31395.12 lm

Purity: 0.5346

Chromaticity Difference: $+0.0011$ Duv

Peak Wavelength: 605.0 nm

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

Bandwidth: 130.8nm

Radiant Flux: 78.147 W

Photosynthetically Active Radiation(PAR): 74.53W

Photosynthetic Photon Flux(PPF): 362.41 μ mol/s

Rendering Index: $R_a=83.8$

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

$R_9=12$ $R_{10}=81$ $R_{11}=82$ $R_{12}=72$ $R_{13}=85$ $R_{14}=99$ $R_{15}=75$ $R_e=78$

Electric Parameters

Voltage: 120.08 V

Current: 2.043 A

Power Factor: 0.995

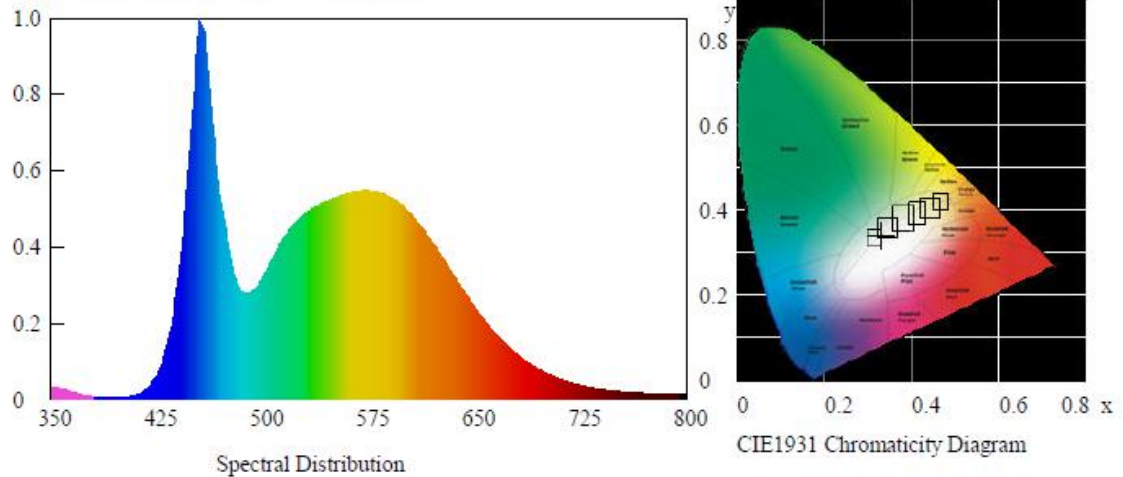
Power: 244.13 W

Luminous Efficacy: 128.6 lm/W

**IK-SBSL2-L130-0240M-5700K****Test Condition**

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.3279$ $y=0.3406$ $u'=0.2039$ $v'=0.4766$

Correlated Color Temperature: 5704 K

Dominant Wavelength: 510.0 nm(E)

Colour Fidelity Index: $R_f=80$

Gamut Index: $R_g=92$

Luminous Flux: 35209.31 lm

Purity: 0.0173

Chromaticity Difference: +0.00182Duv

Peak Wavelength: 455.0 nm

Color Ratio: $K_r=32.3\%$ $K_g=55.6\%$ $K_b=12.1\%$

Bandwidth: 28.1nm

Radiant Flux: 92.129 W

Photosynthetically Active Radiation(PAR): 89.24W

Photosynthetic Photon Flux(PPF): 408.34 μ mol/s

Rendering Index: $R_a=84.1$

$R_1=83$ $R_2=92$ $R_3=94$ $R_4=80$ $R_5=82$ $R_6=85$ $R_7=87$ $R_8=69$

$R_9=15$ $R_{10}=78$ $R_{11}=79$ $R_{12}=59$ $R_{13}=87$ $R_{14}=97$ $R_{15}=79$ $R_e=78$

Electric Parameters

Voltage: 120.05 V

Current: 2.040 A

Power Factor: 0.997

Power: 244.17 W

Luminous Efficacy: 144.2 lm/W

**Zonal Flux Diagram**

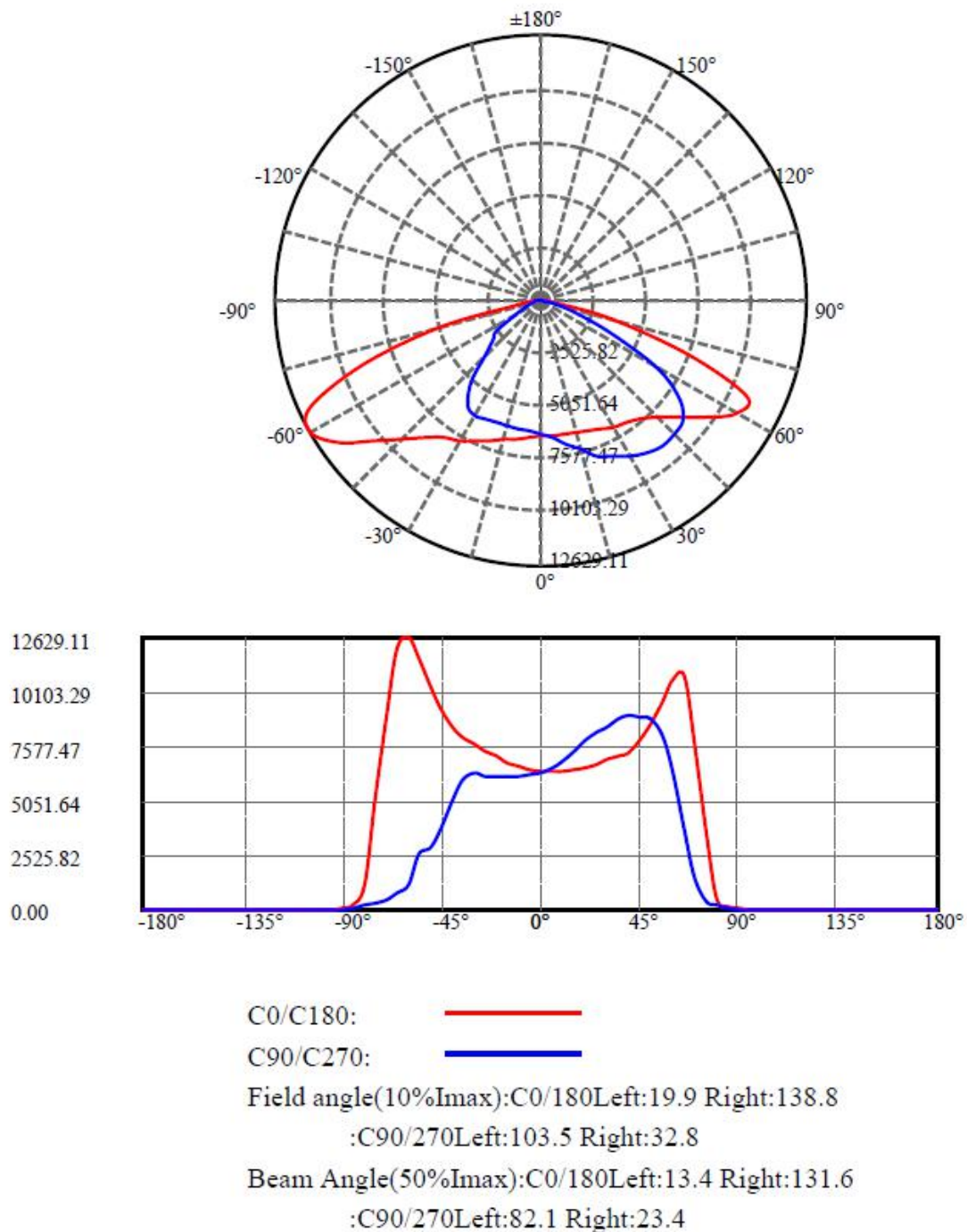
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	6336.445	.000	.000	.000%	.000%
5.0	6376.443	151.979	151.979	.487%	.487%
10.0	6497.018	460.524	612.503	1.476%	1.963%
15.0	6660.189	780.477	1392.980	2.502%	4.465%
20.0	6884.297	1116.256	2509.236	3.578%	8.043%
25.0	7139.309	1470.818	3980.054	4.715%	12.758%
30.0	7410.781	1841.326	5821.379	5.902%	18.660%
35.0	7639.800	2216.303	8037.683	7.104%	25.765%
40.0	7734.382	2565.066	10602.750	8.222%	33.987%
45.0	7646.297	2847.857	13450.610	9.129%	43.116%
50.0	7445.292	3049.476	16500.080	9.775%	52.891%
55.0	7221.040	3188.949	19689.030	10.222%	63.113%
60.0	6609.939	3196.991	22886.020	10.248%	73.361%
65.0	5691.122	2990.411	25876.430	9.586%	82.947%
70.0	4399.594	2555.034	28431.470	8.190%	91.137%
75.0	2125.553	1705.568	30137.040	5.467%	96.604%
80.0	588.430	726.186	30863.220	2.328%	98.932%
85.0	197.583	213.579	31076.800	.685%	99.617%
90.0	33.573	63.292	31140.090	.203%	99.820%
95.0	8.722	11.581	31151.670	.037%	99.857%
100.0	4.939	3.712	31155.380	.012%	99.869%
105.0	5.285	2.736	31158.120	.009%	99.877%
110.0	6.166	2.993	31161.110	.010%	99.887%
115.0	7.105	3.360	31164.470	.011%	99.898%
120.0	7.957	3.661	31168.130	.012%	99.910%
125.0	8.765	3.865	31172.000	.012%	99.922%
130.0	9.155	3.896	31175.900	.012%	99.934%
135.0	9.299	3.729	31179.630	.012%	99.946%
140.0	9.372	3.457	31183.080	.011%	99.957%
145.0	9.328	3.120	31186.200	.010%	99.967%
150.0	9.328	2.747	31188.950	.009%	99.976%
155.0	9.198	2.345	31191.290	.008%	99.984%
160.0	8.779	1.886	31193.180	.006%	99.990%
165.0	8.390	1.415	31194.590	.005%	99.994%
170.0	8.144	.981	31195.570	.003%	99.997%
175.0	8.072	.580	31196.150	.002%	99.999%
180.0	8.288	.196	31196.350	.001%	100.000%



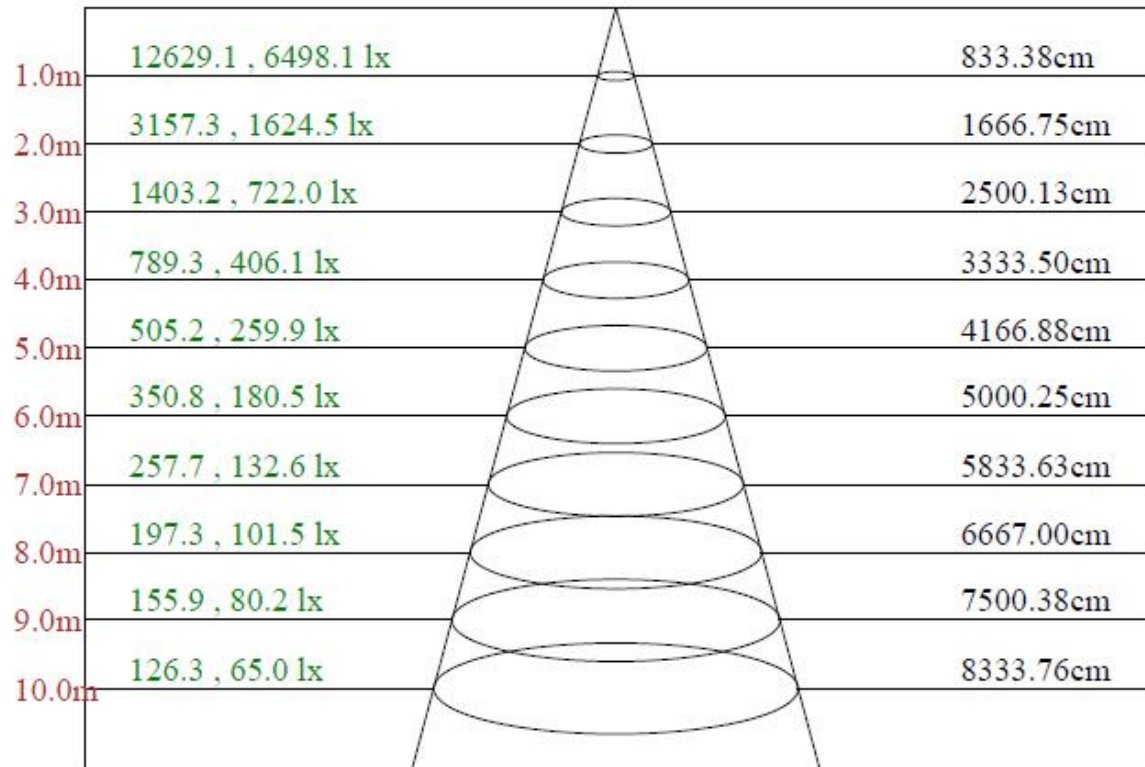
Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





Lux distance Curve



Max , Ave

Beam angle of C180plane152.89

**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	6441.86	6423.37	6469.58	6513.48	6608.21	6742.21	6964.01	7104.94	7329.05
22.5	6423.37	6455.72	6557.38	6705.24	6970.94	7255.12	7689.47	8170.04	8671.39
45.0	6354.06	6478.82	6702.93	6961.70	7255.12	7682.54	8151.55	8572.05	8974.06
67.5	6328.65	6525.03	6860.04	7227.39	7606.30	7948.24	8294.80	8546.63	8726.84
90.0	6363.30	6580.48	6917.80	7361.40	7851.20	8207.00	8505.04	8828.50	9054.92
112.5	6324.03	6545.83	6910.87	7312.88	7777.27	8239.35	8634.43	9024.89	9392.24
135.0	6236.23	6462.65	6767.62	7088.77	7550.85	8153.86	8777.67	9484.65	10120.01
157.5	6220.06	6360.99	6580.48	6857.73	7250.50	7726.44	8285.56	9015.64	9902.84
180.0	6441.86	6541.21	6670.59	6846.18	7132.67	7409.92	7666.37	7975.96	8470.39
202.5	6423.37	6437.24	6462.65	6585.10	6746.83	6908.56	7123.43	7416.85	7763.41
225.0	6354.06	6312.48	6340.20	6395.65	6515.79	6612.83	6714.48	6765.31	6545.83
247.5	6328.65	6229.30	6226.99	6240.85	6298.61	6421.06	6515.79	6344.82	5559.28
270.0	6363.30	6247.78	6203.89	6185.40	6164.61	6222.37	6314.79	6056.02	5076.41
292.5	6324.03	6187.71	6132.26	6086.06	6090.68	6159.99	6277.82	6123.02	5365.21
315.0	6236.23	6106.85	6067.57	6076.81	6143.82	6243.16	6319.41	6365.61	6116.09
337.5	6220.06	6127.64	6081.44	6118.40	6185.40	6296.30	6337.89	6441.86	6682.14
360.0	6441.86	6423.37	6469.58	6513.48	6608.21	6742.21	6964.01	7104.94	7329.05

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	7902.03	8632.12	9660.24	10699.92	10852.41	7654.82	3515.04	569.51	169.35
22.5	9288.27	9895.91	10334.88	10558.99	10300.23	8793.85	4568.59	1062.09	337.78
45.0	9403.79	9676.42	9683.35	9327.55	8521.22	6679.83	3427.71	415.87	185.99
67.5	8819.26	8770.74	8451.91	7456.12	5413.73	2732.51	883.96	327.62	139.55
90.0	8964.81	8860.85	8068.38	6428.00	3654.82	1508.46	417.49	246.29	112.52
112.5	9614.04	9574.76	9168.13	8056.83	5829.60	3206.60	1149.66	364.12	152.72
135.0	10542.82	10572.85	10364.92	9872.80	9172.75	7402.98	3780.74	611.33	198.69
157.5	10625.99	11046.48	11173.56	11051.11	10413.43	8595.15	5434.52	1684.51	246.06
180.0	9302.13	10348.74	11725.74	12629.11	12056.13	9001.78	5023.27	1201.87	233.12
202.5	8049.90	7911.27	6954.77	5453.01	5293.59	6372.55	1888.06	667.01	466.01
225.0	5658.63	4316.29	3352.85	3061.74	1335.87	908.91	722.23	480.79	190.84
247.5	4246.98	3147.23	2752.15	1590.02	910.30	742.56	526.54	319.53	120.37
270.0	3782.59	2904.64	2551.14	1199.56	781.15	495.12	346.56	230.35	75.09
292.5	4064.46	2999.36	2722.11	1449.08	872.87	657.08	445.21	277.48	97.04
315.0	5191.93	3808.00	2934.67	2789.12	1171.84	832.90	619.65	380.52	143.94
337.5	6883.14	6659.04	5637.84	4136.08	4478.02	4808.40	1259.63	575.98	292.27
360.0	7902.03	8632.12	9660.24	10699.92	10852.41	7654.82	3515.04	569.51	169.35

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	49.44	13.63	6.24	6.47	7.16	8.09	8.55	9.01	9.24
22.5	62.84	10.63	5.31	5.08	4.85	5.55	6.24	7.16	7.39
45.0	31.19	6.01	3.93	3.47	3.47	4.16	4.62	5.08	6.24
67.5	28.42	4.39	3.24	2.54	2.77	3.24	3.70	4.62	5.31
90.0	9.94	3.24	2.54	2.31	2.31	3.24	3.70	4.62	5.31
112.5	25.41	3.24	2.31	2.31	2.77	3.47	4.39	5.31	6.01
135.0	34.19	4.85	4.16	3.70	4.85	5.55	6.24	7.16	7.86
157.5	62.61	13.63	6.47	6.70	7.86	8.78	9.47	9.70	9.47
180.0	67.70	33.50	6.47	6.01	6.47	6.93	7.62	8.32	8.78
202.5	60.30	15.48	7.16	8.09	9.24	10.17	10.86	11.32	10.86
225.0	26.80	5.55	6.01	7.62	9.70	10.86	11.78	12.01	12.01
247.5	14.32	3.47	4.39	6.24	7.86	9.24	10.40	11.32	11.55
270.0	2.31	2.54	3.47	4.62	6.47	7.62	9.24	10.17	11.09
292.5	9.47	3.24	4.16	4.85	6.01	7.16	8.55	10.17	11.09
315.0	20.33	5.31	5.55	6.24	7.16	8.78	10.17	11.32	11.55
337.5	31.88	10.86	7.62	8.32	9.70	10.86	11.78	12.94	12.71
360.0	49.44	13.63	6.24	6.47	7.16	8.09	8.55	9.01	9.24



C/ γ (°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	9.01	9.01	8.78	8.09	8.32	7.62	7.16	6.93	6.93
22.5	7.86	8.09	8.09	8.78	8.55	8.55	7.86	8.09	8.32
45.0	6.70	7.16	7.62	8.32	8.32	8.32	8.09	8.32	8.09
67.5	6.01	6.47	7.39	7.86	8.55	8.32	8.32	7.86	8.09
90.0	6.24	6.93	7.39	8.09	8.09	8.32	8.09	7.86	8.09
112.5	6.47	7.62	7.86	8.32	8.32	8.09	8.09	8.09	8.09
135.0	8.09	8.32	8.32	8.32	8.32	8.32	8.32	7.86	8.32
157.5	9.47	9.24	9.01	9.24	9.01	8.55	8.32	8.32	8.55
180.0	8.78	8.55	8.55	8.32	8.32	7.86	7.86	7.39	7.39
202.5	10.40	9.94	9.70	9.24	9.01	8.55	8.32	7.86	8.09
225.0	11.32	10.86	10.40	9.94	9.70	8.78	8.78	8.32	7.86
247.5	11.55	10.86	11.09	10.63	9.94	9.47	8.55	8.32	8.09
270.0	11.32	11.32	11.09	10.86	10.63	9.70	9.24	8.55	8.09
292.5	11.55	11.55	11.32	11.09	10.63	10.17	9.24	8.78	8.32
315.0	11.78	11.78	11.32	11.09	10.86	9.94	9.01	8.78	8.32
337.5	12.25	12.25	11.32	11.09	10.63	9.94	9.01	9.01	8.55
360.0	9.01	9.01	8.78	8.09	8.32	7.62	7.16	6.93	6.93

C/ γ (°)	180.0
0.0	6.93
22.5	8.32
45.0	8.32
67.5	8.32
90.0	8.55
112.5	8.55
135.0	8.55
157.5	8.78
180.0	6.93
202.5	8.32
225.0	8.32
247.5	8.32
270.0	8.55
292.5	8.55
315.0	8.55
337.5	8.78
360.0	6.93



5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0240M-3000K	3000K	31395.12	244.13	128.6
IK-SBSL2-L130-0240M-3500K	3500K	32157.96 ^{*1}	244.15 ^{*2}	131.7 ^{*3}
IK-SBSL2-L130-0240M-4000K	4000K	32920.80 ^{*1}	244.15 ^{*2}	134.8 ^{*3}
IK-SBSL2-L130-0240M-4500K	4500K	33683.63 ^{*1}	244.15 ^{*2}	138.0 ^{*3}
IK-SBSL2-L130-0240M-5000K	5000K	34446.47 ^{*1}	244.15 ^{*2}	141.1 ^{*3}
IK-SBSL2-L130-0240M-5700K	5700K	35209.31	244.17	144.2

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

$$32157.96 = (35209.31 - 31395.12) / 5 + 31395.12$$

$$32920.80 = (35209.31 - 31395.12) / 5 + 32157.96$$

$$33683.63 = (35209.31 - 31395.12) / 5 + 32920.80$$

$$34446.47 = (35209.31 - 31395.12) / 5 + 33683.63$$

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

$$244.15 = (244.13 + 244.17) / 2$$

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

$$131.7 = 32157.96 / 244.15$$

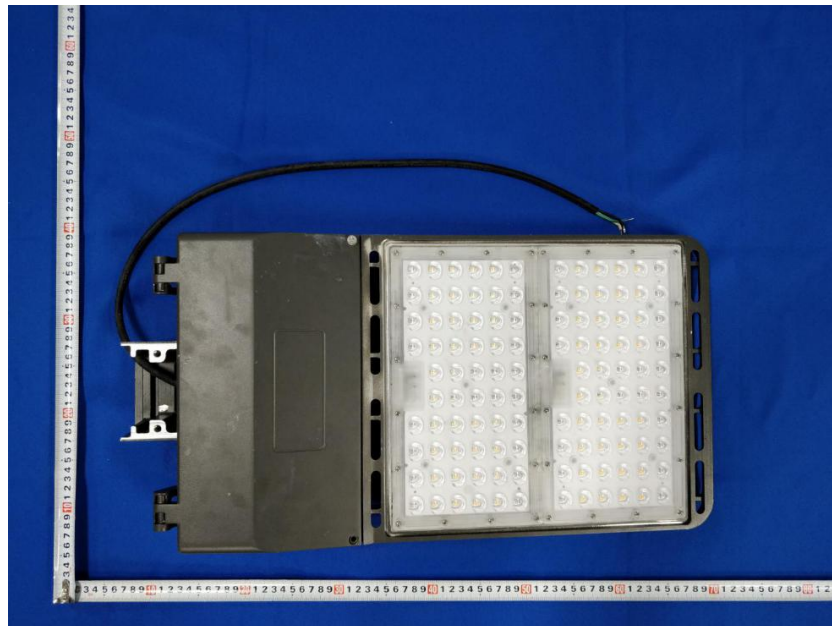
$$134.8 = 32920.80 / 244.15$$

$$138.0 = 33683.63 / 244.15$$

$$141.1 = 34446.47 / 244.15$$



Photo Document



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