



Shenzhen Belling Efficiency Testing Lab



Report No.:BL180416012-9

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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-L130-0500M-3000K / IK-SBSL2-L130-0500M-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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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

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-L130-0500M-3000K / IK-SBSL2-L130-0500M-5700K
Rated Inputs	AC 200-480V 50/60Hz
Rated Power	500 W
Nominal CCT	3000K / 5700K
Date of Receipt Samples	2018-03-30
Date of Test	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 ± 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-L130-0500M-3000K	277.02	60	1.830	502.48	0.991
IK-SBSL2-L130-0500M-5700K	277.07	60	1.831	502.64	0.991

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0500M-3000K	64015.95	127.4	3027	83.6	11
IK-SBSL2-L130-0500M-5700K	70972.77	141.2	5594	83.2	11

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0500M-3000K	0.00067	0.4360	0.4055	0.2494	0.5218
IK-SBSL2-L130-0500M-5700K	0.00238	0.3303	0.3439	0.2044	0.4786

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-L130-0500M-3000K	277.09	60	1.8261	501.54	0.9912

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
63733.41	127.08	99.848	0.928



3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0500M -3000K	Power Factor	480	60	0.940
	THD	480	60	13.6%



4 Test Data

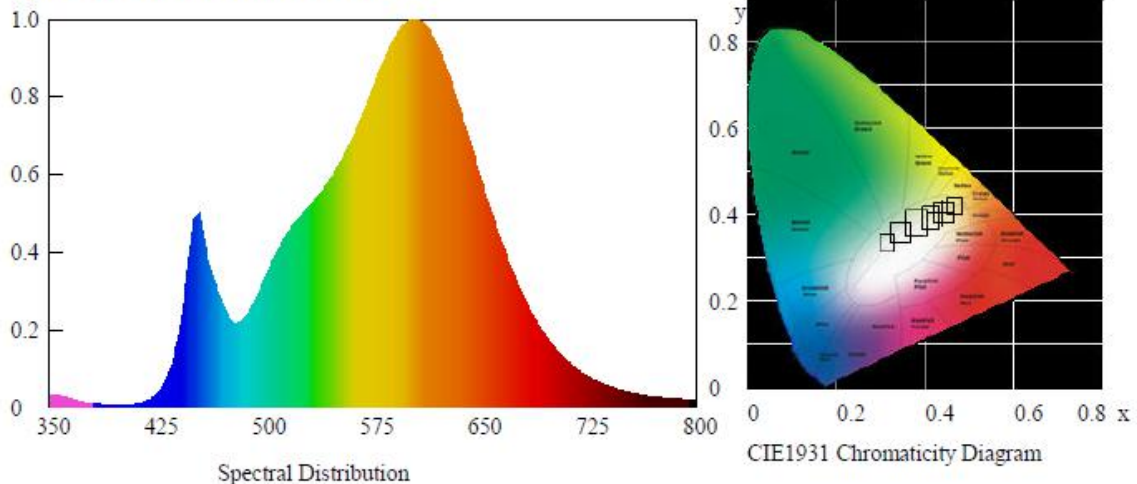
IK-SBSL2-L130-0500M-3000K

Test Condition

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4360$ $y=0.4055$ $u'=0.2494$ $v'=0.5218$

Correlated Color Temperature: 3027 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index: $R_f=83$

Gamut Index: $R_g=94$

Luminous Flux: 64015.95 lm

Purity: 0.5275

Chromaticity Difference: $+0.00067\text{Duv}$

Peak Wavelength: 605.0 nm

Color Ratio: $K_r=44.7\%$ $K_g=47.8\%$ $K_b=7.6\%$

Bandwidth: 130.4nm

Radiant Flux: 134.82 W

Photosynthetically Active Radiation(PAR): 129.24W

Photosynthetic Photon Flux(PPF): 628.07 $\mu\text{mol/s}$

Rendering Index: $R_a=83.6$

$R_1=82$ $R_2=92$ $R_3=96$ $R_4=82$ $R_5=82$ $R_6=90$ $R_7=83$ $R_8=61$

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

Electric Parameters

Voltage: 277.02 V

Current: 1.830 A

Power Factor: 0.991

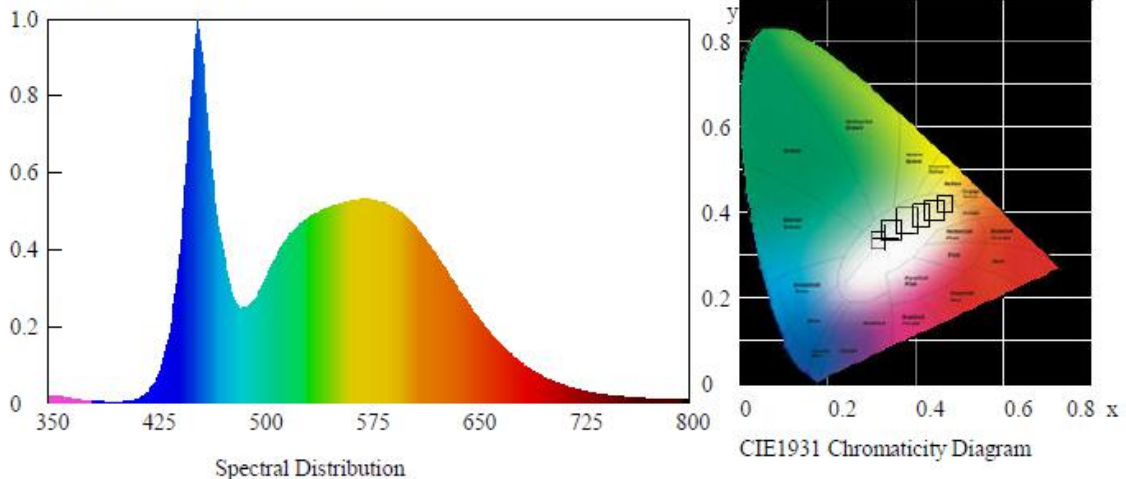
Power: 502.48 W

Luminous Efficacy: 127.4 lm/W

**IK-SBSL2-L130-0500M-5700K****Test Condition**

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.3303$ $y=0.3439$ $u'=0.2044$ $v'=0.4786$

Correlated Color Temperature: 5594 K

Dominant Wavelength: 537.0 nm(E)

Colour Fidelity Index: $R_f=80$

Gamut Index: $R_g=93$

Luminous Flux: 70972.77 lm

Purity: 0.0242

Chromaticity Difference: $+0.00238\text{Duv}$

Peak Wavelength: 455.0 nm

Color Ratio: $K_r=32.3\%$ $K_g=56.0\%$ $K_b=11.8\%$

Bandwidth: 21.5nm

Radiant Flux: 195.113 W

Photosynthetically Active Radiation(PAR): 189.97W

Photosynthetic Photon Flux(PPF): 870.29 $\mu\text{mol/s}$

Rendering Index: $R_a=83.2$

$R_1=82$ $R_2=90$ $R_3=93$ $R_4=80$ $R_5=81$ $R_6=84$ $R_7=87$ $R_8=68$

$R_9=11$ $R_{10}=74$ $R_{11}=79$ $R_{12}=57$ $R_{13}=85$ $R_{14}=96$ $R_{15}=78$ $R_e=76$

Electric Parameters

Voltage: 277.07 V

Current: 1.831 A

Power Factor: 0.991

Power: 502.64 W

Luminous Efficacy: 141.2 lm/W

**Zonal Flux Diagram**

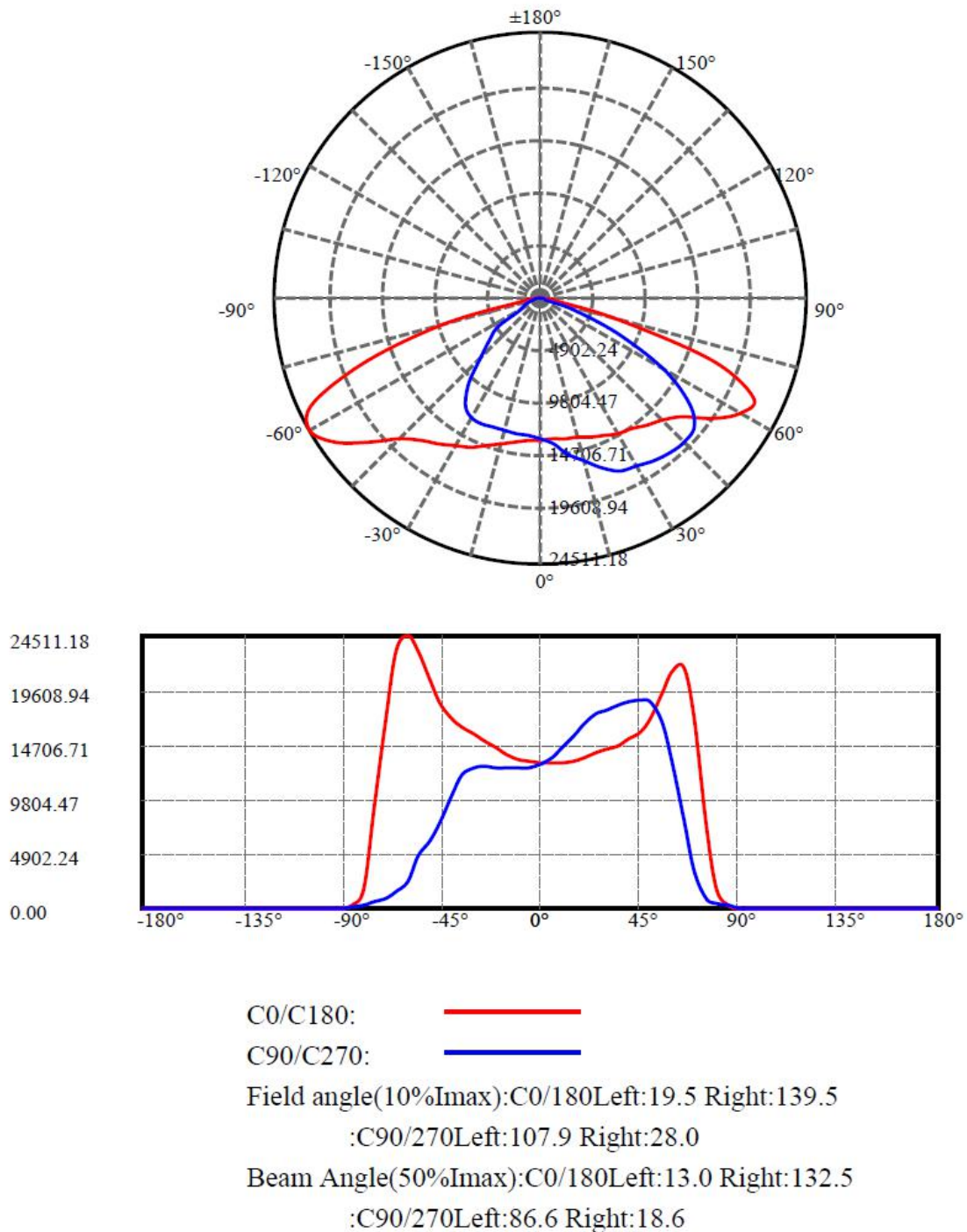
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	13020.840	.000	.000	.000%	.000%
5.0	13128.700	312.610	312.610	.490%	.490%
10.0	13429.560	950.072	1262.683	1.491%	1.981%
15.0	13847.540	1618.059	2880.741	2.539%	4.520%
20.0	14337.180	2322.817	5203.559	3.645%	8.165%
25.0	14909.500	3067.437	8270.996	4.813%	12.977%
30.0	15377.720	3832.873	12103.870	6.014%	18.991%
35.0	15725.770	4580.207	16684.080	7.187%	26.178%
40.0	15837.110	5266.028	21950.100	8.263%	34.441%
45.0	15605.170	5821.792	27771.890	9.135%	43.575%
50.0	15202.970	6225.235	33997.130	9.768%	53.343%
55.0	14583.600	6476.592	40473.720	10.162%	63.505%
60.0	13256.830	6435.237	46908.960	10.097%	73.602%
65.0	11428.980	6001.168	52910.130	9.416%	83.018%
70.0	8783.224	5117.861	58027.980	8.030%	91.048%
75.0	4465.371	3462.969	61490.950	5.434%	96.482%
80.0	1343.763	1554.362	63045.320	2.439%	98.920%
85.0	389.546	470.982	63516.300	.739%	99.659%
90.0	48.907	120.052	63636.350	.188%	99.848%
95.0	9.005	15.857	63652.200	.025%	99.873%
100.0	9.107	4.922	63657.130	.008%	99.880%
105.0	9.903	5.086	63662.210	.008%	99.888%
110.0	11.423	5.574	63667.790	.009%	99.897%
115.0	13.233	6.243	63674.030	.010%	99.907%
120.0	14.927	6.846	63680.880	.011%	99.918%
125.0	16.360	7.232	63688.110	.011%	99.929%
130.0	17.214	7.300	63695.410	.011%	99.940%
135.0	17.518	7.018	63702.430	.011%	99.951%
140.0	17.432	6.471	63708.900	.010%	99.962%
145.0	17.287	5.792	63714.690	.009%	99.971%
150.0	17.214	5.081	63719.770	.008%	99.979%
155.0	16.954	4.324	63724.100	.007%	99.985%
160.0	16.172	3.474	63727.570	.005%	99.991%
165.0	15.492	2.610	63730.180	.004%	99.995%
170.0	14.869	1.801	63731.980	.003%	99.998%
175.0	14.739	1.059	63733.040	.002%	99.999%
180.0	15.231	.358	63733.400	.001%	100.000%



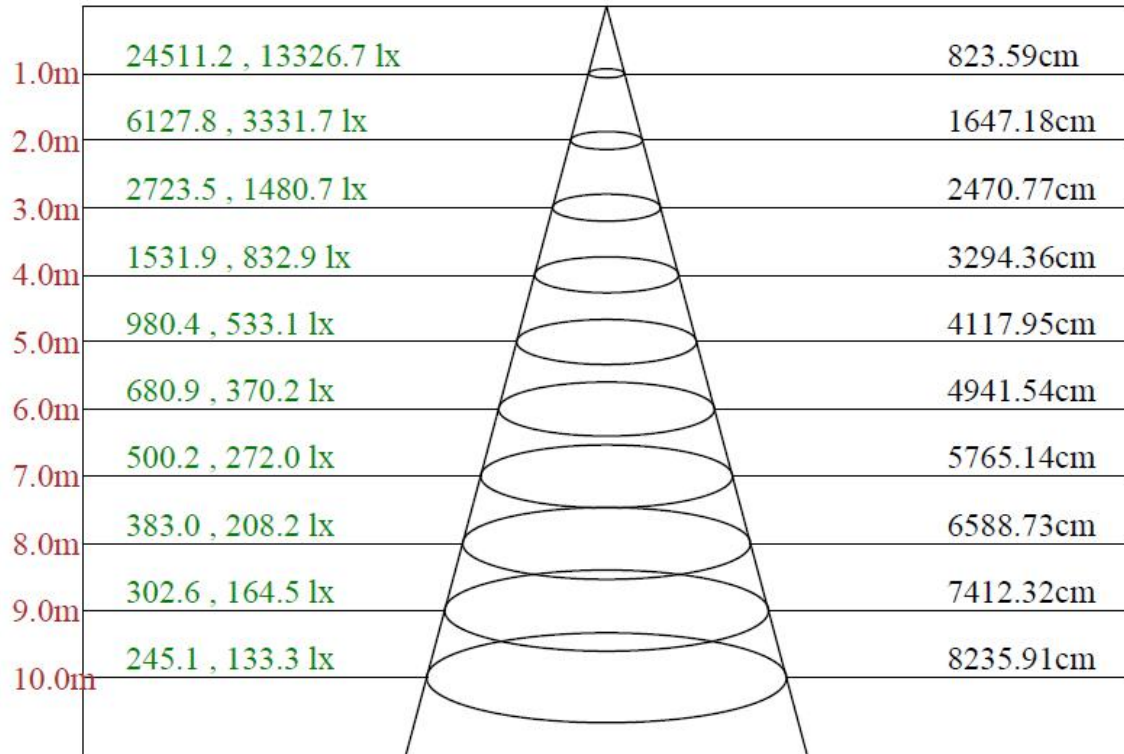
Luminous Intensity Distribution Diagram

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	13107.13	13044.58	13097.86	13266.97	13568.11	13978.13	14341.82	14624.43	15205.86
22.5	13028.37	13160.41	13463.87	13880.84	14406.68	15122.47	15882.28	16718.53	17668.29
45.0	13042.27	13373.53	13924.85	14605.89	15349.49	16280.71	17100.75	17788.74	18532.34
67.5	13012.15	13503.25	14267.69	15196.60	16097.71	16871.42	17485.29	17874.46	18203.39
90.0	12921.81	13512.51	14520.19	15592.72	16542.48	17492.23	17821.18	18289.11	18618.05
112.5	12968.14	13558.84	14471.54	15435.20	16440.55	17390.31	18034.29	18652.79	19340.79
135.0	13063.12	13549.58	14288.54	15189.65	16183.42	17302.28	18402.61	19679.00	20918.31
157.5	13023.74	13354.99	13885.47	14568.83	15465.31	16433.60	17559.41	18810.31	20529.14
180.0	13107.13	13209.06	13447.65	13859.99	14390.46	15073.83	15673.79	16327.04	17054.42
202.5	13028.37	13023.74	13100.18	13327.20	13667.72	13998.98	14478.49	15078.46	15701.59
225.0	13042.27	12933.39	12942.66	13063.12	13287.82	13535.68	13730.26	13707.10	12982.04
247.5	13012.15	12794.40	12738.81	12810.62	12942.66	13188.21	13248.44	12616.04	10966.70
270.0	12921.81	12669.32	12662.37	12662.37	12590.55	12803.67	12708.69	12069.35	10158.25
292.5	12968.14	12713.33	12569.71	12530.33	12565.07	12773.56	12877.80	12358.91	10772.11
315.0	13063.12	12782.82	12685.53	12697.11	12829.15	13056.17	13280.87	13273.92	12523.38
337.5	13023.74	12875.48	12805.99	12873.17	13067.75	13250.75	13417.54	13744.16	14219.04
360.0	13107.13	13044.58	13097.86	13266.97	13568.11	13978.13	14341.82	14624.43	15205.86

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	15886.91	17077.58	19401.02	21277.37	21631.79	16984.92	7649.49	1816.36	358.13
22.5	18819.58	19917.59	20619.49	20763.11	20153.88	17564.04	11057.04	4342.71	722.28
45.0	19257.40	19716.06	19625.72	18828.85	17269.85	13748.80	7491.97	1274.76	416.50
67.5	18388.71	18347.02	17610.38	15242.93	10985.23	6007.11	2262.05	687.30	311.34
90.0	18743.14	18513.80	16808.87	13146.51	7904.31	3296.82	909.22	509.63	248.56
112.5	19778.61	19672.04	18745.45	16206.58	11816.85	6792.40	2528.21	770.46	314.58
135.0	21594.73	21601.68	21103.63	20190.94	18687.54	14698.55	7760.69	1410.28	393.57
157.5	21993.16	22803.93	22924.39	22461.09	21145.33	17503.82	10957.43	3534.03	510.09
180.0	18395.66	20589.38	23086.54	24511.18	23070.33	17015.04	8993.05	1788.79	319.44
202.5	15993.47	15402.76	13338.78	10975.96	10952.80	10792.96	3479.82	1337.08	838.10
225.0	11096.42	8564.51	6868.84	5522.96	2532.38	1754.04	1311.59	767.68	248.33
247.5	8545.97	6551.48	5205.60	3023.48	1756.36	1367.19	879.57	474.88	220.53
270.0	7723.62	6018.69	4689.03	2409.61	1483.01	928.68	595.57	378.75	162.85
292.5	8418.57	6454.19	5163.91	3035.06	1754.04	1290.75	808.92	463.99	195.28
315.0	10598.38	8149.85	6363.85	5224.14	2384.13	1693.81	1251.37	719.96	275.89
337.5	14448.38	13866.94	11782.10	9289.56	9335.89	9092.66	3509.94	1223.57	697.26
360.0	15886.91	17077.58	19401.02	21277.37	21631.79	16984.92	7649.49	1816.36	358.13

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	31.97	11.81	11.81	12.28	13.20	14.36	15.52	16.68	16.68
22.5	116.98	11.35	9.50	9.03	8.57	9.50	10.66	12.05	12.97
45.0	73.90	9.27	6.95	6.02	6.02	6.72	7.64	9.27	10.42
67.5	62.08	7.41	5.56	4.17	4.17	5.10	6.26	7.88	9.27
90.0	25.25	5.56	4.17	3.71	4.17	4.87	6.49	7.88	9.27
112.5	57.91	5.79	4.17	4.17	4.87	6.02	7.88	9.27	10.89
135.0	58.84	8.11	7.18	7.18	8.57	10.19	11.81	13.20	14.36
157.5	101.93	12.97	12.05	12.74	14.36	16.45	17.61	18.07	18.53
180.0	41.93	12.51	12.05	11.81	12.51	13.44	14.36	15.52	16.22
202.5	47.26	11.12	13.20	14.83	17.14	19.00	20.39	21.08	20.62
225.0	28.96	8.34	11.58	14.83	18.07	20.62	22.47	23.40	22.93
247.5	16.22	6.26	8.57	11.81	15.52	18.30	20.62	21.78	22.70
270.0	6.95	4.63	6.49	9.03	11.81	15.29	17.61	19.92	21.54
292.5	16.22	6.26	7.64	9.27	11.58	14.36	17.37	19.92	21.54
315.0	31.74	9.27	10.66	11.81	14.13	16.91	19.69	21.78	23.17
337.5	64.40	13.44	14.13	15.75	18.07	20.62	22.47	24.09	24.32
360.0	31.97	11.81	11.81	12.28	13.20	14.36	15.52	16.68	16.68



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	16.68	16.45	15.75	15.06	14.59	13.90	13.44	12.74	13.20
22.5	13.90	14.13	14.59	14.83	14.83	14.59	14.59	14.13	14.13
45.0	11.81	12.51	13.67	14.36	14.83	14.83	15.06	14.36	14.13
67.5	10.89	11.81	12.97	14.13	14.83	15.06	14.83	14.36	14.13
90.0	10.89	12.05	13.44	14.36	15.06	15.06	15.06	14.83	15.06
112.5	12.28	13.67	14.59	14.83	15.52	15.52	15.06	15.06	15.29
135.0	15.06	15.29	15.52	15.52	15.75	15.75	15.29	15.06	15.29
157.5	17.84	17.37	17.14	16.91	16.91	16.22	15.29	15.06	15.52
180.0	15.98	15.98	15.06	15.29	14.83	14.13	13.67	13.44	13.67
202.5	19.46	18.30	17.37	16.91	16.45	15.52	14.36	14.13	14.13
225.0	21.78	20.15	19.23	18.53	17.61	16.45	15.29	14.59	14.36
247.5	22.47	21.78	21.08	20.15	19.23	17.37	16.45	15.29	14.83
270.0	22.01	22.01	21.54	21.31	20.15	18.53	17.37	15.98	15.29
292.5	22.24	22.24	21.54	21.54	20.85	18.53	17.84	16.45	15.52
315.0	23.17	22.47	21.54	21.08	20.15	19.00	17.37	16.45	15.75
337.5	23.86	22.70	21.54	20.62	19.69	18.30	16.91	15.98	15.52
360.0	16.68	16.45	15.75	15.06	14.59	13.90	13.44	12.74	13.20
C/γ(°)	180.0								
0.0	13.44								
22.5	14.83								
45.0	14.83								
67.5	15.29								
90.0	15.29								
112.5	15.75								
135.0	15.98								
157.5	16.45								
180.0	13.44								
202.5	14.83								
225.0	14.83								
247.5	15.29								
270.0	15.29								
292.5	15.75								
315.0	15.98								
337.5	16.45								
360.0	13.44								



5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0500M-3000K	3000K	64015.95	502.48	127.4
IK-SBSL2-L130-0500M-3500K	3500K	65407.31 * ¹	502.56 * ²	130.1 * ³
IK-SBSL2-L130-0500M-4000K	4000K	66798.68 * ¹	502.56 * ²	132.9 * ³
IK-SBSL2-L130-0500M-4500K	4500K	68190.04 * ¹	502.56 * ²	135.7 * ³
IK-SBSL2-L130-0500M-5000K	5000K	69581.41 * ¹	502.56 * ²	138.5 * ³
IK-SBSL2-L130-0500M-5700K	5700K	70972.77	502.64	141.2

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

$$65407.31 = (70972.77 - 64015.95) / 5 + 64015.95$$

$$66798.68 = (70972.77 - 64015.95) / 5 + 65407.31$$

$$68190.04 = (70972.77 - 64015.95) / 5 + 66798.68$$

$$69581.41 = (70972.77 - 64015.95) / 5 + 68190.04$$

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

$$502.56 = (502.48 + 502.64) / 2$$

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

$$130.1 = 65407.31 / 502.56$$

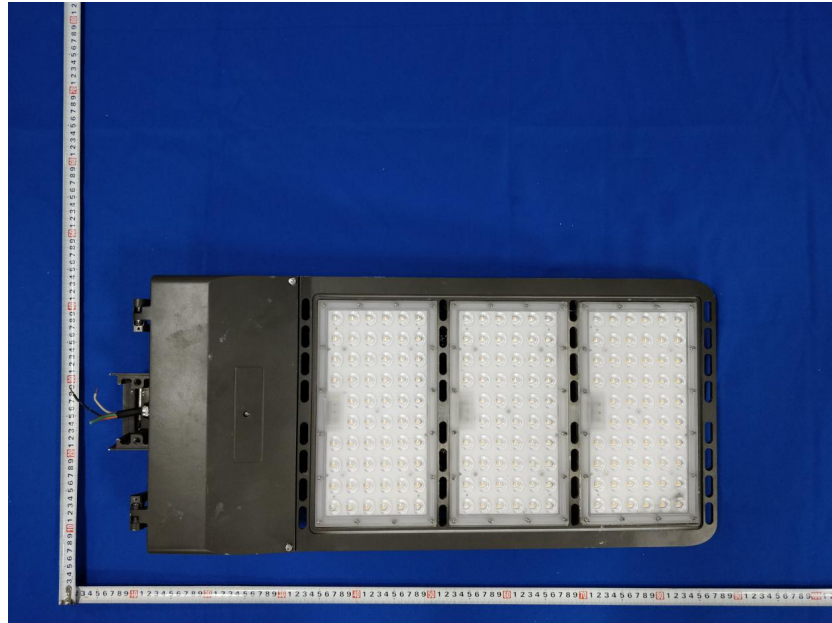
$$132.9 = 66798.68 / 502.56$$

$$135.7 = 68190.04 / 502.56$$

$$138.5 = 69581.41 / 502.56$$



Photo Document



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