



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-L130-0150M-3000K / IK-SBSL2-L130-0150M-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-L130-0150M-3000K / IK-SBSL2-L130-0150M-5700K
Rated Inputs	AC 200-480V 50/60Hz
Rated Power	150 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-L130-0150M-3000K	277.01	60	0.547	150.53	0.993
IK-SBSL2-L130-0150M-5700K	277.02	60	0.553	151.94	0.992

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0150M-3000K	19358.16	128.6	3029	83.7	12
IK-SBSL2-L130-0150M-5700K	21818.58	143.6	5522	84.0	16

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0150M-3000K	0.00067	0.4359	0.4054	0.2493	0.5217
IK-SBSL2-L130-0150M-5700K	0.00212	0.3320	0.3448	0.2051	0.4794

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-L130-0150M-3000K	277.08	60	0.547	150.86	0.9953

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
19368.65	128.39	99.828	0.869



3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0150M-3000K	Power Factor	480	60	0.935
	THD	480	60	12.7%



4 Test Data

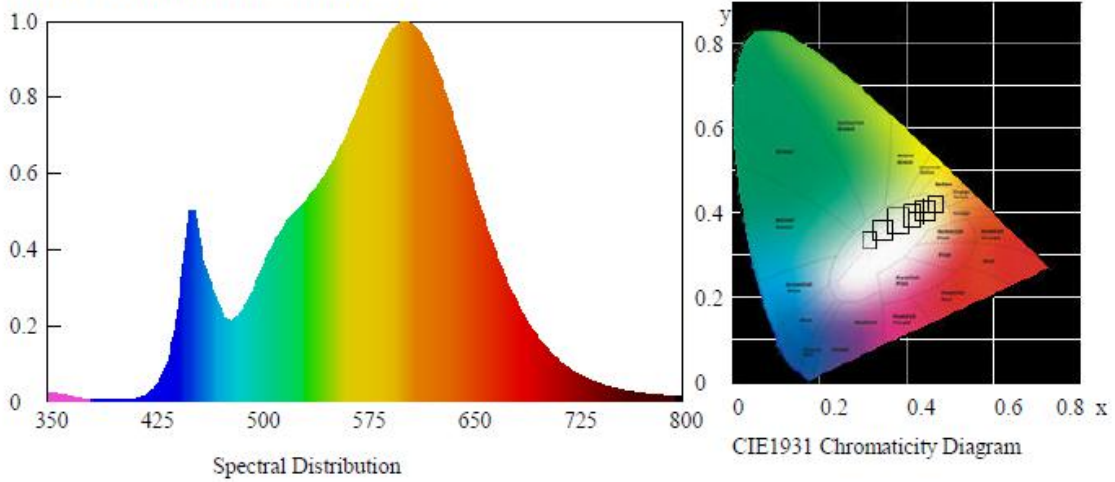
IK-SBSL2-L130-0150M-3000K

Test Condition

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4359$ $y=0.4054$ $u'=0.2493$ $v'=0.5217$

Correlated Color Temperature: 3029 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index: $R_f=83$

Gamut Index: $R_g=95$

Luminous Flux: 19358.16 lm

Purity: 0.5269

Chromaticity Difference: +0.00067Duv

Peak Wavelength: 605.0 nm

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

Bandwidth: 130.8nm

Radiant Flux: 50.905 W

Photosynthetically Active Radiation(PAR): 49.03W

Photosynthetic Photon Flux(PPF): 238.25 μ mol/s

Rendering Index: $R_a=83.7$

$R_1=82$ $R_2=92$ $R_3=96$ $R_4=82$ $R_5=82$ $R_6=90$ $R_7=84$ $R_8=61$

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

Electric Parameters

Voltage: 277.01 V

Current: 0.547 A

Power Factor: 0.993

Power: 150.53 W

Luminous Efficacy: 128.6 lm/W

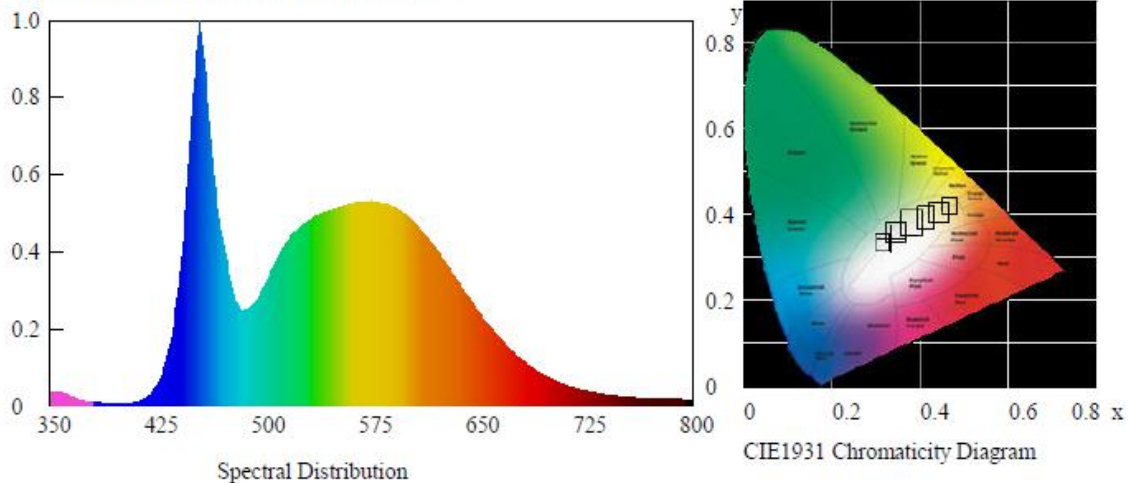
**IK-SBSL2-L130-0150M-5700K****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric ParametersChromaticity Coordinates: $x=0.3320$ $y=0.3448$ $u'=0.2051$ $v'=0.4794$

Correlated Color Temperature: 5522 K

Dominant Wavelength: 548.0 nm(E)

Colour Fidelity Index: $R_f=81$ Gamut Index: $R_g=93$

Luminous Flux: 21818.58 lm

Purity: 0.0309

Chromaticity Difference: $+0.00212Duv$

Peak Wavelength: 455.0 nm

Color Ratio: $K_r=32.5\%$ $K_g=55.7\%$ $K_b=11.8\%$

Bandwidth: 21.7nm

Radiant Flux: 57.912 W

Photosynthetically Active Radiation(PAR): 55.84W

Photosynthetic Photon Flux(PPF): 256.33 $\mu\text{mol/s}$ Rendering Index: $R_a=84.0$ $R_1=83$ $R_2=90$ $R_3=93$ $R_4=82$ $R_5=82$ $R_6=84$ $R_7=88$ $R_8=70$ $R_9=16$ $R_{10}=75$ $R_{11}=80$ $R_{12}=58$ $R_{13}=86$ $R_{14}=96$ $R_{15}=79$ $R_e=77$ **Electric Parameters**

Voltage: 277.02 V

Current: 0.553 A

Power Factor: 0.992

Power: 151.94 W

Luminous Efficacy: 143.6 lm/W

**Zonal Flux Diagram**

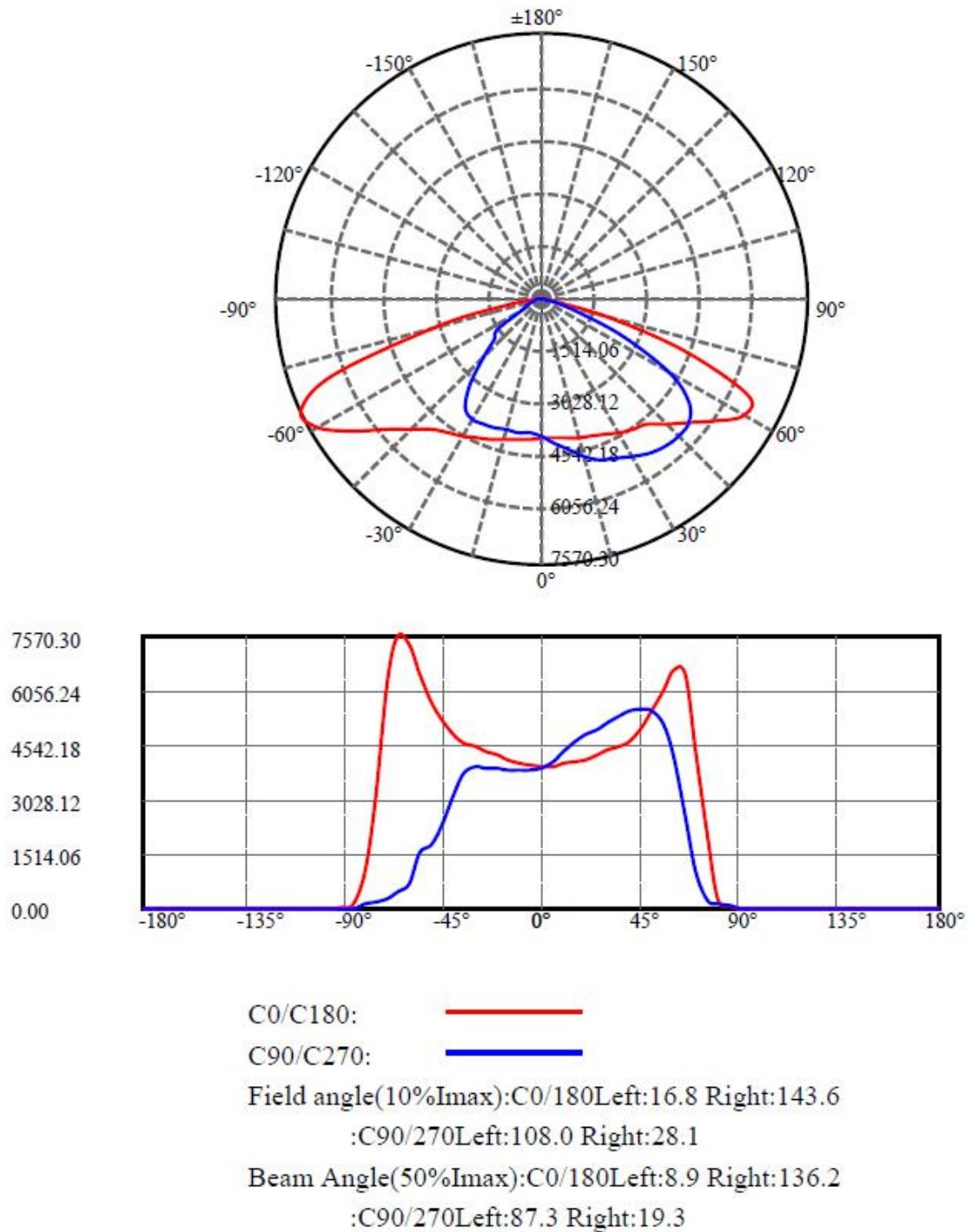
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	3948.370	.000	.000	.000%	.000%
5.0	3985.010	94.841	94.841	.490%	.490%
10.0	4069.018	288.118	382.959	1.488%	1.977%
15.0	4167.932	488.610	871.570	2.523%	4.500%
20.0	4290.668	697.107	1568.677	3.599%	8.099%
25.0	4426.501	914.270	2482.947	4.720%	12.819%
30.0	4578.773	1139.625	3622.572	5.884%	18.703%
35.0	4698.306	1366.115	4988.687	7.053%	25.757%
40.0	4735.643	1573.983	6562.670	8.126%	33.883%
45.0	4682.006	1743.754	8306.424	9.003%	42.886%
50.0	4559.966	1867.475	10173.900	9.642%	52.528%
55.0	4438.204	1956.502	12130.400	10.101%	62.629%
60.0	4112.721	1976.522	14106.920	10.205%	72.834%
65.0	3553.438	1863.658	15970.580	9.622%	82.456%
70.0	2811.012	1611.520	17582.100	8.320%	90.776%
75.0	1408.745	1102.977	18685.080	5.695%	96.471%
80.0	392.410	481.939	19167.020	2.488%	98.959%
85.0	106.089	135.454	19302.470	.699%	99.658%
90.0	13.820	32.832	19335.300	.170%	99.828%
95.0	3.162	4.650	19339.950	.024%	99.852%
100.0	3.246	1.741	19341.700	.009%	99.861%
105.0	3.553	1.819	19343.510	.009%	99.870%
110.0	4.138	2.010	19345.520	.010%	99.881%
115.0	4.667	2.229	19347.750	.012%	99.892%
120.0	5.224	2.405	19350.160	.012%	99.905%
125.0	5.698	2.525	19352.680	.013%	99.918%
130.0	5.949	2.532	19355.210	.013%	99.931%
135.0	6.102	2.435	19357.650	.013%	99.943%
140.0	6.102	2.260	19359.910	.012%	99.955%
145.0	6.088	2.034	19361.940	.011%	99.965%
150.0	6.130	1.799	19363.740	.009%	99.975%
155.0	6.046	1.541	19365.280	.008%	99.983%
160.0	5.837	1.246	19366.530	.006%	99.989%
165.0	5.587	.942	19367.470	.005%	99.994%
170.0	5.489	.657	19368.130	.003%	99.997%
175.0	5.447	.391	19368.520	.002%	99.999%
180.0	5.573	.132	19368.650	.001%	100.000%



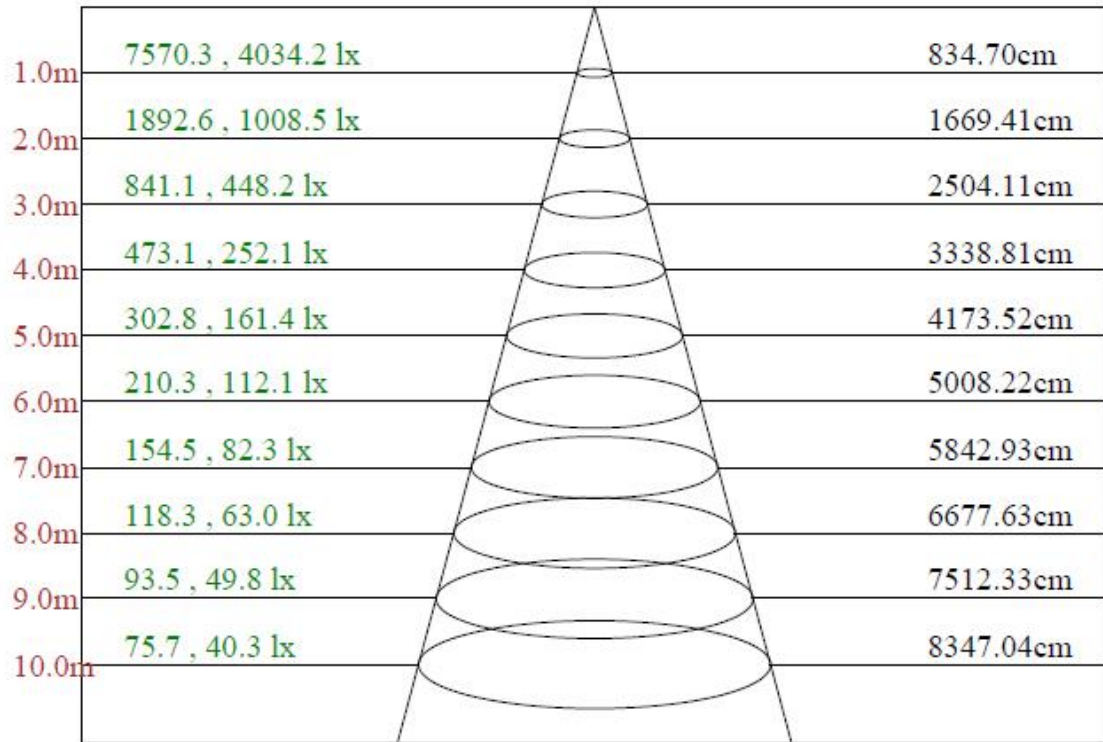
Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





Lux distance Curve



Max , Ave

Beam angle of C180plane152.79

**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	3954.78	3970.38	4026.11	4079.61	4157.62	4264.62	4400.59	4505.35	4661.39
22.5	3963.70	4008.28	4077.38	4202.20	4347.09	4543.25	4812.96	5113.88	5443.78
45.0	3945.86	4043.94	4191.06	4369.38	4570.00	4826.34	5096.05	5365.77	5628.80
67.5	3939.18	4070.69	4298.05	4523.19	4721.57	4922.19	5120.57	5307.81	5443.78
90.0	3907.97	4092.98	4373.84	4656.93	4853.09	4991.29	5189.67	5383.60	5503.97
112.5	3941.40	4099.67	4329.26	4552.16	4781.76	5002.43	5207.50	5412.58	5597.59
135.0	3961.47	4079.61	4262.39	4456.32	4683.68	4980.14	5287.75	5668.92	6005.50
157.5	3972.61	4039.48	4148.71	4282.45	4494.21	4728.26	5038.10	5441.56	5907.43
180.0	3954.78	3999.36	4061.77	4144.25	4262.39	4367.15	4523.19	4630.18	4855.31
202.5	3963.70	3959.24	3965.92	3997.13	4077.38	4153.16	4237.87	4373.84	4570.00
225.0	3945.86	3912.43	3925.80	3954.78	4019.42	4086.29	4139.79	4128.65	3972.61
247.5	3939.18	3903.51	3878.99	3874.53	3921.34	3983.76	4046.17	3916.89	3426.49
270.0	3907.97	3845.56	3854.47	3856.70	3905.74	3925.80	3961.47	3765.31	3143.41
292.5	3941.40	3883.45	3876.76	3856.70	3870.08	3934.72	3999.36	3878.99	3364.08
315.0	3961.47	3912.43	3905.74	3925.80	3961.47	4026.11	4095.21	4088.52	3905.74
337.5	3972.61	3939.18	3928.03	3954.78	4023.88	4088.52	4104.13	4191.06	4340.40
360.0	3954.78	3970.38	4026.11	4079.61	4157.62	4264.62	4400.59	4505.35	4661.39
C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	5020.26	5499.51	6072.38	6640.78	6493.67	4368.49	2003.92	271.50	71.55
22.5	5811.58	6152.62	6402.28	6500.35	6317.57	5430.41	3087.46	836.56	142.44
45.0	5900.74	6023.34	6052.31	5878.45	5448.24	4423.77	2451.06	300.70	111.90
67.5	5530.72	5550.78	5421.49	4933.33	3681.05	1941.73	719.98	203.07	89.83
90.0	5539.63	5503.97	5142.86	4238.31	2549.81	1047.43	258.57	153.14	79.13
112.5	5726.87	5769.23	5626.57	5075.99	3819.03	2064.10	781.73	210.42	95.85
135.0	6313.11	6422.34	6362.15	6141.48	5706.81	4393.01	2718.99	372.47	118.81
157.5	6373.30	6725.49	6888.21	6865.92	6654.16	5740.25	3370.77	1080.42	141.32
180.0	5263.23	5749.16	6558.31	7325.10	7570.30	6308.66	3054.24	1101.60	138.20
202.5	4741.63	4674.76	4117.50	3165.70	2953.94	3905.74	1389.14	415.05	262.14
225.0	3448.79	2592.83	1975.38	1834.95	745.39	540.77	413.93	250.77	81.58
247.5	2606.20	1921.89	1661.09	1099.37	542.55	429.32	282.20	169.85	34.10
270.0	2314.20	1785.91	1551.86	692.12	458.96	296.24	201.95	130.85	13.60
292.5	2552.71	1879.53	1663.32	952.70	536.98	407.69	265.03	157.15	29.87
315.0	3301.67	2394.44	1855.02	1752.48	632.16	530.74	394.77	236.73	80.25
337.5	4467.46	4313.66	3660.55	2706.51	2744.41	3147.86	1146.18	388.30	206.86
360.0	5020.26	5499.51	6072.38	6640.78	6493.67	4368.49	2003.92	271.50	71.55
C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	5.80	3.57	3.79	3.79	4.46	4.68	5.13	5.35	5.35
22.5	15.38	3.79	3.57	3.34	3.12	3.57	3.79	4.46	4.68
45.0	16.72	3.34	2.45	2.23	2.68	2.68	3.12	3.57	4.01
67.5	23.18	2.90	2.23	2.01	1.78	2.23	2.68	3.12	3.57
90.0	12.48	2.23	1.78	1.78	2.01	2.23	2.68	3.34	4.01
112.5	23.85	2.01	2.01	1.78	2.23	2.45	2.90	3.79	4.01
135.0	17.39	2.90	2.45	2.68	3.34	3.79	4.24	4.90	5.35
157.5	22.29	4.24	4.46	4.46	5.35	5.80	6.46	6.46	6.46
180.0	23.85	4.24	4.01	3.79	4.24	4.46	4.90	5.57	5.57
202.5	22.07	4.01	4.46	5.13	6.02	6.46	6.91	6.91	6.91
225.0	6.46	3.12	4.01	5.13	6.02	7.13	7.58	8.03	7.80
247.5	3.57	2.23	3.12	4.46	5.57	6.24	6.69	7.36	7.58
270.0	1.56	1.78	2.23	3.12	4.24	5.35	6.24	6.46	7.13
292.5	3.34	2.23	2.68	3.34	4.01	4.90	6.02	6.46	7.13
315.0	7.13	3.57	3.79	4.24	4.90	6.02	6.46	7.36	7.58
337.5	16.05	4.46	4.90	5.57	6.24	6.69	7.80	8.03	8.03
360.0	5.80	3.57	3.79	3.79	4.46	4.68	5.13	5.35	5.35



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	5.35	5.35	5.13	5.13	4.90	4.68	4.24	4.24	4.46
22.5	4.90	5.35	5.13	5.57	5.80	5.57	5.35	5.35	5.57
45.0	4.46	4.68	5.13	5.57	5.57	5.80	5.35	5.57	5.57
67.5	4.01	4.46	4.68	5.35	5.57	5.35	5.35	5.35	5.35
90.0	4.24	4.68	4.90	5.35	5.57	5.80	5.57	5.57	5.57
112.5	4.68	5.13	5.57	5.35	5.57	5.57	5.35	5.35	5.57
135.0	5.57	5.57	5.80	5.57	5.80	5.57	5.57	5.35	5.57
157.5	6.24	6.24	6.24	6.24	6.24	5.80	5.57	5.80	5.80
180.0	5.57	5.57	5.80	5.57	5.57	5.35	5.35	5.13	4.90
202.5	6.91	6.46	6.24	6.46	5.80	5.80	5.35	5.35	5.35
225.0	7.58	7.13	6.69	6.69	6.46	6.02	5.57	5.80	5.35
247.5	7.58	7.36	7.13	6.91	6.69	6.24	6.02	5.80	5.35
270.0	7.36	7.36	7.13	7.13	6.91	6.46	6.02	5.57	5.35
292.5	7.58	7.36	7.36	7.13	6.69	6.46	6.24	5.80	5.57
315.0	7.58	7.36	7.13	7.13	6.91	6.46	6.24	6.02	5.80
337.5	8.03	7.58	7.36	6.91	6.69	6.46	6.24	5.80	6.02
360.0	5.35	5.35	5.13	5.13	4.90	4.68	4.24	4.24	4.46

C/γ(°)	180.0
0.0	4.68
22.5	5.80
45.0	5.57
67.5	5.35
90.0	5.80
112.5	5.80
135.0	5.80
157.5	5.80
180.0	4.68
202.5	5.80
225.0	5.57
247.5	5.35
270.0	5.80
292.5	5.80
315.0	5.80
337.5	5.80
360.0	4.68



5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2L130-015 0M-3000K	3000K	19358.16	150.53	128.6
IK-SBSL2L130-015 0M-3500K	3500K	19850.24 * ¹	151.24 * ²	131.3 * ³
IK-SBSL2L130-015 0M-4000K	4000K	20342.33 * ¹	151.24 * ²	134.5 * ³
IK-SBSL2L130-015 0M-4500K	4500K	20834.41 * ¹	151.24 * ²	137.8 * ³
IK-SBSL2L130-015 0M-5000K	5000K	21326.50 * ¹	151.24 * ²	141.0 * ³
IK-SBSL2L130-015 0M-5700K	5700K	21818.58	151.94	143.6

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

$$19850.24 = (21818.58 - 19358.16) / 5 + 19358.16$$

$$20342.33 = (21818.58 - 19358.16) / 5 + 19850.24$$

$$20834.41 = (21818.58 - 19358.16) / 5 + 20342.33$$

$$21326.50 = (21818.58 - 19358.16) / 5 + 20834.41$$

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

$$151.24 = (150.53 + 151.94) / 2$$

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

$$131.3 = 19850.24 / 151.24$$

$$134.5 = 20342.33 / 151.24$$

$$137.8 = 20834.41 / 151.24$$

$$141.0 = 21326.50 / 151.24$$



Photo Document



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