



Shenzhen Belling Efficiency Testing Lab



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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-L140-0080M-3000K / HL-IK-SBSL2-L130-0080M-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-L130-0080M-3000K / IK-SBSL2-L130-0080M-5700K
Rated Inputs	AC 200-480V 50/60Hz
Rated Power	80 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-L130-0080M-3000K	277.05	60	0.304	83.42	0.991
IK-SBSL2-L130-0080M-5700K	277.08	60	0.303	83.51	0.996

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0080M-3000K	10902.99	130.7	3025	83.9	13
IK-SBSL2-L130-0080M-5700K	12142.35	145.4	5452	83.6	14

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0080M-3000K	0.00055	0.4360	0.4051	0.2495	0.5217
IK-SBSL2-L130-0080M-5700K	0.00256	0.3337	0.3471	0.2054	0.4808

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-L130-0080M-3000K	277.21	60	0.3035	83.36	0.9909

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
10893.74	130.68	99.874	0.731



3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-080M-3000K	Power Factor	480	60	0.929
	THD	480	60	13.6%



4 Test Data

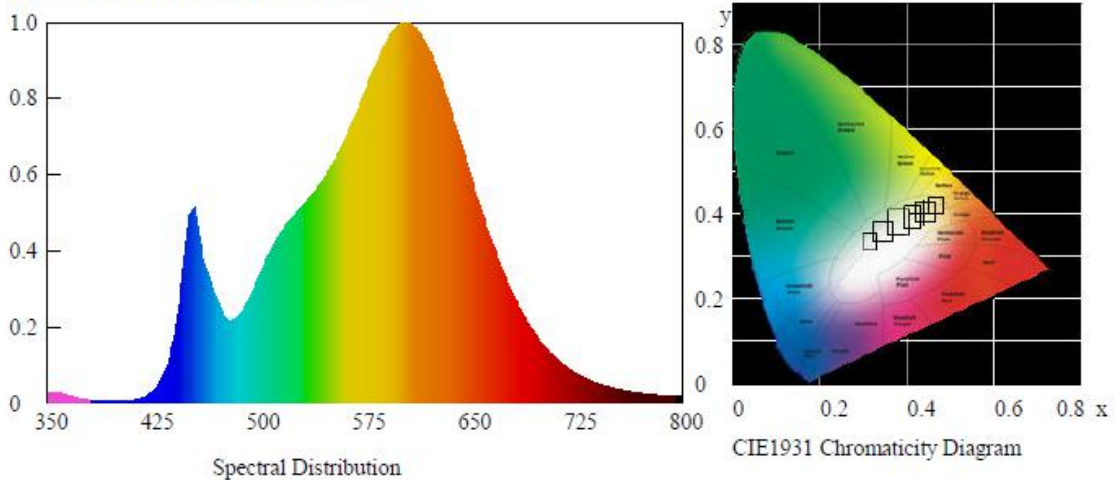
IK-SBSL2-L130-0080M-3000K

Test Condition

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4360$ $y=0.4051$ $u'=0.2495$ $v'=0.5217$

Correlated Color Temperature: 3025 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index: $R_f=84$

Gamut Index: $R_g=94$

Luminous Flux: 10902.99 lm

Purity: 0.5265

Chromaticity Difference: $+0.00055Duv$

Peak Wavelength: 605.0 nm

Color Ratio: $K_r=44.7\%$ $K_g=47.7\%$ $K_b=7.6\%$

Bandwidth: 130.2nm

Radiant Flux: 28.69 W

Photosynthetically Active Radiation(PAR): 27.55W

Photosynthetic Photon Flux(PPF): 133.93 μ mol/s

Rendering Index: $R_a=83.9$

$R_1=83$ $R_2=92$ $R_3=96$ $R_4=82$ $R_5=83$ $R_6=91$ $R_7=84$ $R_8=61$

$R_9=13$ $R_{10}=82$ $R_{11}=81$ $R_{12}=72$ $R_{13}=86$ $R_{14}=99$ $R_{15}=75$ $R_e=79$

Electric Parameters

Voltage: 277.05 V

Current: 0.304 A

Power Factor: 0.991

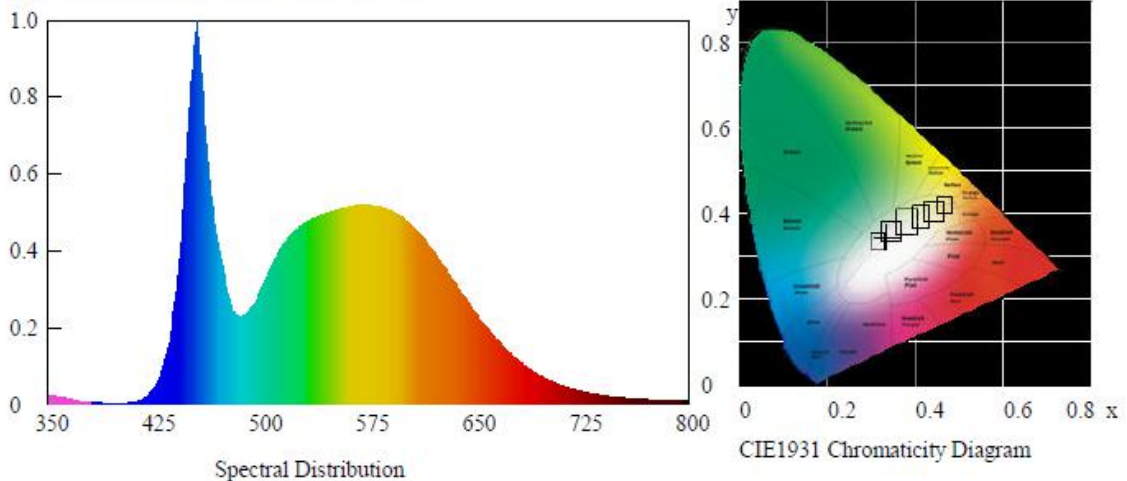
Power: 83.42 W

Luminous Efficacy: 130.7 lm/W

**IK-SBSL2-L130-0080M-5700K****Test Condition**

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.3337$ $y=0.3471$ $u'=0.2054$ $v'=0.4808$

Correlated Color Temperature: 5452 K

Dominant Wavelength: 554.0 nm(E)

Colour Fidelity Index: $R_f=80$

Gamut Index: $R_g=94$

Luminous Flux: 12142.35 lm

Purity: 0.0424

Chromaticity Difference: +0.00256Duv

Peak Wavelength: 455.0 nm

Color Ratio: $K_r=32.5\%$ $K_g=55.8\%$ $K_b=11.7\%$

Bandwidth: 23.5nm

Radiant Flux: 31.389 W

Photosynthetically Active Radiation(PAR): 30.52W

Photosynthetic Photon Flux(PPF): 140.24 μ mol/s

Rendering Index: $R_a=83.6$

$R_1=82$ $R_2=90$ $R_3=93$ $R_4=82$ $R_5=82$ $R_6=84$ $R_7=88$ $R_8=70$

$R_9=14$ $R_{10}=73$ $R_{11}=80$ $R_{12}=57$ $R_{13}=85$ $R_{14}=96$ $R_{15}=78$ $R_e=77$

Electric Parameters

Voltage: 277.08 V

Current: 0.303 A

Power Factor: 0.996

Power: 83.51 W

Luminous Efficacy: 145.4 lm/W

**Zonal Flux Diagram**

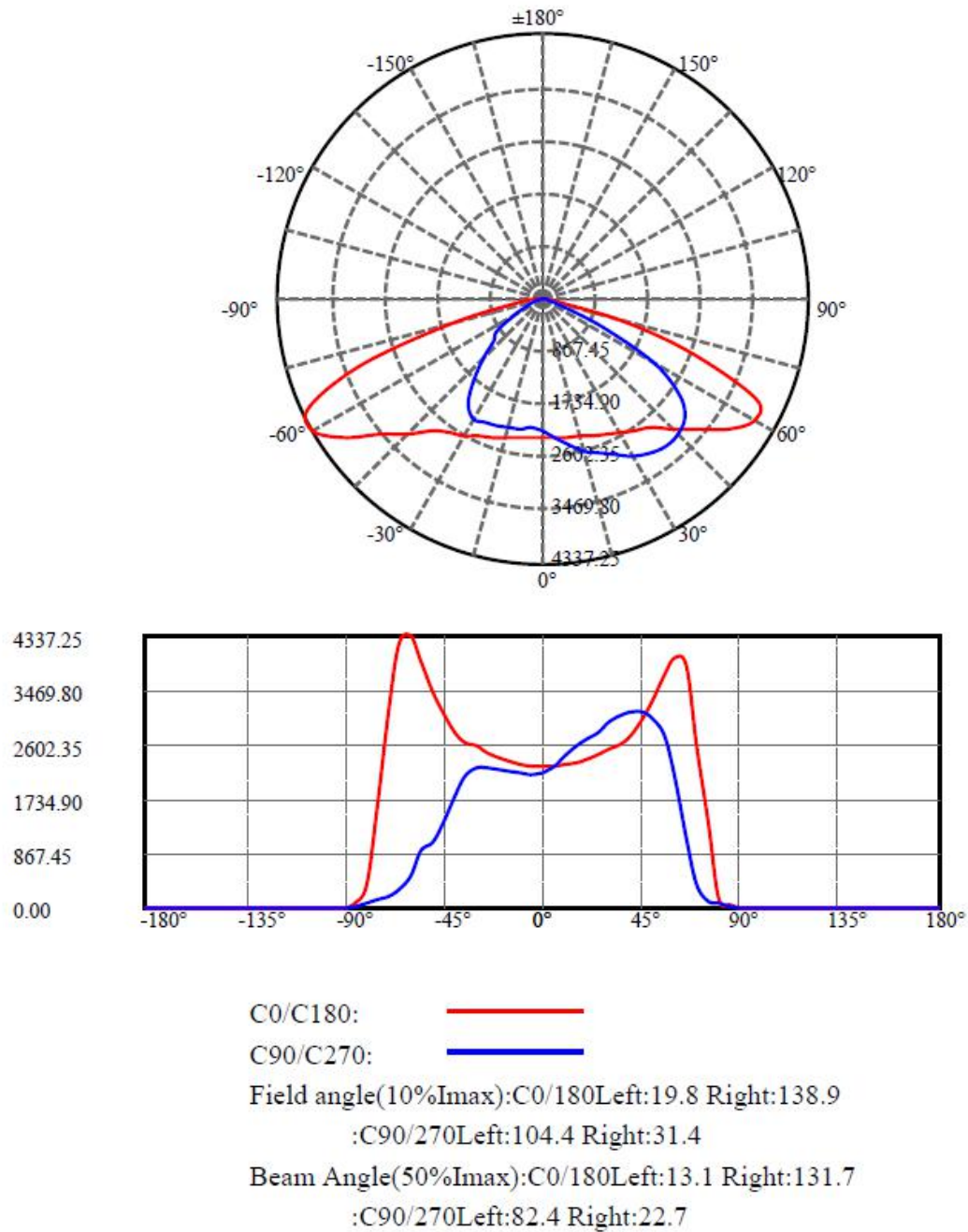
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	2198.821	.000	.000	.000%	.000%
5.0	2220.145	52.827	52.827	.485%	.485%
10.0	2269.631	160.613	213.441	1.474%	1.959%
15.0	2329.727	272.831	486.272	2.504%	4.464%
20.0	2404.034	390.128	876.400	3.581%	8.045%
25.0	2498.700	514.206	1390.606	4.720%	12.765%
30.0	2600.909	645.360	2035.966	5.924%	18.689%
35.0	2684.639	778.334	2814.300	7.145%	25.834%
40.0	2721.884	902.038	3716.338	8.280%	34.114%
45.0	2698.642	1003.654	4719.992	9.213%	43.328%
50.0	2631.708	1077.075	5797.067	9.887%	53.215%
55.0	2550.444	1126.772	6923.840	10.343%	63.558%
60.0	2340.872	1130.614	8054.454	10.379%	73.937%
65.0	1984.615	1051.534	9105.988	9.653%	83.589%
70.0	1504.996	883.592	9989.580	8.111%	91.700%
75.0	704.343	577.486	10567.070	5.301%	97.001%
80.0	167.812	233.364	10800.430	2.142%	99.143%
85.0	59.848	61.861	10862.290	.568%	99.711%
90.0	5.024	17.763	10880.050	.163%	99.874%
95.0	.940	1.633	10881.690	.015%	99.889%
100.0	.992	.525	10882.210	.005%	99.894%
105.0	1.253	.601	10882.810	.006%	99.900%
110.0	1.462	.709	10883.520	.007%	99.906%
115.0	1.931	.859	10884.380	.008%	99.914%
120.0	2.245	1.015	10885.400	.009%	99.923%
125.0	2.532	1.104	10886.500	.010%	99.934%
130.0	2.701	1.138	10887.640	.010%	99.944%
135.0	2.767	1.105	10888.740	.010%	99.954%
140.0	2.793	1.029	10889.770	.009%	99.964%
145.0	2.819	.936	10890.710	.009%	99.972%
150.0	2.845	.834	10891.540	.008%	99.980%
155.0	2.701	.702	10892.240	.006%	99.986%
160.0	2.623	.558	10892.800	.005%	99.991%
165.0	2.480	.421	10893.220	.004%	99.995%
170.0	2.401	.290	10893.510	.003%	99.998%
175.0	2.401	.172	10893.680	.002%	99.999%
180.0	2.401	.057	10893.740	.001%	100.000%



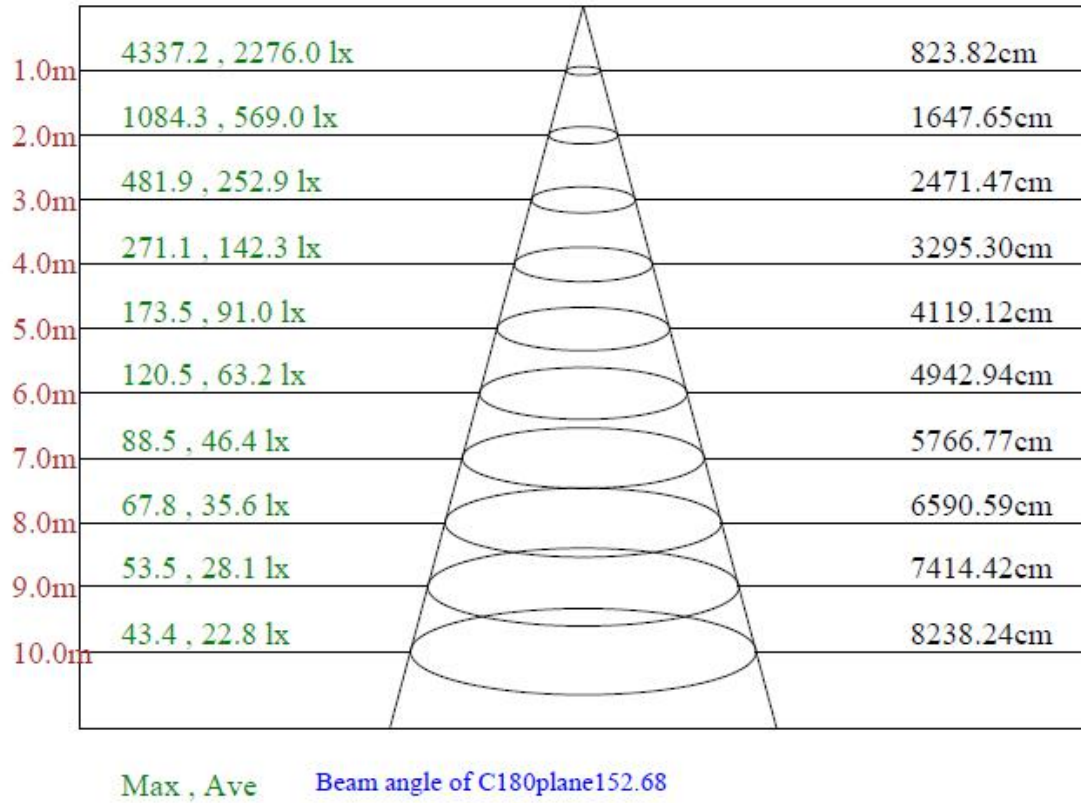
Luminous Intensity Distribution Diagram

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	2253.40	2273.44	2289.73	2324.39	2379.30	2451.55	2527.97	2613.79	2750.35
22.5	2238.99	2261.96	2307.48	2372.21	2467.84	2602.93	2770.39	2995.48	3227.88
45.0	2213.93	2262.17	2351.95	2455.73	2584.56	2746.38	2913.84	3105.52	3282.79
67.5	2194.10	2270.73	2403.73	2525.88	2660.14	2796.07	2934.30	3066.89	3150.62
90.0	2156.72	2260.91	2424.62	2583.72	2688.12	2803.80	2951.84	3068.35	3135.80
112.5	2177.81	2258.62	2365.11	2499.57	2634.67	2789.18	2932.21	3077.33	3198.65
135.0	2177.18	2237.11	2333.16	2452.39	2594.37	2775.82	2981.49	3221.61	3437.10
157.5	2178.44	2218.11	2272.82	2357.59	2464.91	2631.96	2837.21	3095.08	3387.61
180.0	2253.40	2261.33	2290.77	2333.16	2409.58	2474.94	2581.63	2648.24	2814.24
202.5	2238.99	2230.22	2244.84	2266.76	2311.65	2360.51	2411.25	2505.84	2621.31
225.0	2213.93	2195.35	2198.27	2225.63	2265.09	2313.95	2358.01	2356.96	2240.45
247.5	2194.10	2189.50	2186.16	2181.57	2213.72	2265.93	2300.17	2219.15	1925.99
270.0	2156.72	2119.76	2147.33	2173.22	2201.82	2239.62	2249.01	2101.60	1777.54
292.5	2177.81	2157.77	2166.33	2160.06	2175.51	2228.55	2268.64	2198.69	1923.28
315.0	2177.18	2164.24	2166.33	2173.84	2198.90	2249.43	2304.76	2315.41	2207.04
337.5	2178.44	2161.11	2165.49	2189.92	2214.35	2248.59	2291.82	2364.27	2469.51
360.0	2253.40	2273.44	2289.73	2324.39	2379.30	2451.55	2527.97	2613.79	2750.35

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	3013.02	3317.66	3710.84	3977.69	3843.01	2588.73	1341.14	170.59	41.97
22.5	3455.47	3658.01	3786.43	3825.26	3632.75	2963.12	1731.60	345.99	67.23
45.0	3438.14	3522.92	3484.08	3338.96	3048.93	2366.15	990.56	112.75	51.37
67.5	3159.81	3134.13	2998.20	2624.65	1769.18	875.51	224.05	93.96	34.45
90.0	3129.95	3021.16	2746.80	2102.02	1104.77	388.79	120.48	69.95	29.44
112.5	3250.22	3229.55	3100.51	2722.58	1859.60	989.93	259.33	102.73	34.45
135.0	3603.51	3648.62	3574.28	3397.63	3157.51	2437.56	1010.81	105.45	51.78
157.5	3660.31	3869.74	3945.32	3922.77	3712.93	2858.92	1832.24	233.02	61.39
180.0	3128.91	3450.88	3938.22	4337.25	4209.88	3140.81	1560.17	386.70	75.17
202.5	2696.89	2612.95	2264.67	1812.20	1860.22	2124.57	584.23	220.70	136.14
225.0	1920.36	1454.52	1169.50	1030.86	477.74	316.13	250.15	162.87	71.41
247.5	1477.07	1137.35	978.45	587.36	327.40	261.63	179.78	107.95	37.38
270.0	1349.07	1062.60	914.14	499.04	288.36	186.67	125.07	82.69	22.13
292.5	1464.75	1114.38	989.10	598.85	327.40	258.92	175.81	106.91	40.93
315.0	1894.05	1410.04	1103.94	1042.13	448.30	317.59	244.72	157.44	67.44
337.5	2536.74	2462.83	2102.64	1634.72	1685.87	2004.92	639.35	225.30	134.89
360.0	3013.02	3317.66	3710.84	3977.69	3843.01	2588.73	1341.14	170.59	41.97

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	2.92	1.25	1.67	1.88	1.67	2.30	2.30	2.51	2.71
22.5	6.47	1.25	1.04	1.25	0.84	1.25	1.67	2.09	1.88
45.0	3.34	1.25	0.84	0.63	0.63	0.84	1.04	1.25	1.67
67.5	2.71	1.04	0.42	0.63	0.42	0.63	1.04	1.25	1.67
90.0	1.46	0.84	0.42	0.21	0.63	0.63	0.84	1.67	1.67
112.5	1.88	0.84	0.42	0.63	0.63	1.04	1.46	1.67	2.09
135.0	2.51	0.84	0.84	1.25	1.67	1.88	2.09	2.51	2.71
157.5	6.89	2.09	1.88	2.30	2.51	3.13	3.34	3.34	3.34
180.0	10.02	1.25	1.46	1.46	1.25	1.88	2.09	2.30	2.09
202.5	11.28	1.04	1.46	1.67	2.09	2.71	3.13	3.13	3.34
225.0	4.80	0.21	1.04	1.88	2.51	2.92	3.34	3.34	3.13
247.5	1.67	0.21	0.63	1.04	1.88	2.51	2.71	2.92	3.34
270.0	0.00	0.00	0.21	0.84	1.25	1.88	2.51	2.71	3.13
292.5	2.51	0.21	0.42	0.84	1.25	1.88	2.09	2.71	3.13
315.0	6.68	1.04	1.25	1.25	1.67	2.30	2.71	3.34	3.34
337.5	15.24	1.67	1.88	2.30	2.51	3.13	3.55	3.76	3.97
360.0	2.92	1.25	1.67	1.88	1.67	2.30	2.30	2.51	2.71



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	2.71	2.51	2.30	2.51	2.30	2.09	2.09	2.09	2.09
22.5	2.09	2.30	2.51	2.30	2.30	2.51	2.30	2.09	2.09
45.0	1.67	1.88	2.30	2.09	2.30	2.30	2.30	2.09	2.30
67.5	1.88	1.88	2.09	2.51	2.51	2.30	2.51	2.30	2.51
90.0	1.88	2.30	2.30	2.30	2.51	2.51	2.51	2.51	2.30
112.5	2.30	2.30	2.71	2.92	2.71	2.51	2.30	2.51	2.51
135.0	2.71	2.92	2.92	3.13	2.51	2.71	2.71	2.71	2.71
157.5	3.13	3.13	3.13	3.13	2.71	3.13	2.71	2.51	2.71
180.0	2.30	2.30	2.30	2.30	2.30	2.09	2.09	2.30	2.09
202.5	2.92	2.92	2.51	2.51	2.30	2.51	2.30	2.09	2.09
225.0	3.13	2.92	3.13	2.92	2.71	2.51	2.09	2.30	2.09
247.5	3.34	3.34	3.13	3.34	2.92	2.71	2.71	2.51	2.51
270.0	3.34	3.13	3.34	3.13	3.13	2.71	2.51	2.30	2.30
292.5	3.34	3.55	3.55	3.55	3.34	3.13	2.71	2.71	2.51
315.0	3.76	3.55	3.34	3.55	3.34	3.13	2.92	2.71	2.71
337.5	3.76	3.76	3.55	3.34	3.34	3.13	2.92	2.71	2.92
360.0	2.71	2.51	2.30	2.51	2.30	2.09	2.09	2.09	2.09
C/γ(°)	180.0								
0.0	1.88								
22.5	2.30								
45.0	2.30								
67.5	2.51								
90.0	2.51								
112.5	2.51								
135.0	2.51								
157.5	2.71								
180.0	1.88								
202.5	2.30								
225.0	2.30								
247.5	2.51								
270.0	2.51								
292.5	2.51								
315.0	2.51								
337.5	2.71								
360.0	1.88								



5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
I K-SBSL2-L130-0080M-3000K	3000K	10902.99	83.42	130.7
I K-SBSL2-L130-0080M-3500K	3500K	11150.86 * ¹	83.47 * ²	133.6 * ³
I K-SBSL2-L130-0080M-4000K	4000K	11398.73 * ¹	83.47 * ²	136.6 * ³
I K-SBSL2-L130-0080M-4500K	4500K	11646.61 * ¹	83.47 * ²	139.5 * ³
I K-SBSL2-L130-0080M-5000K	5000K	11894.48 * ¹	83.47 * ²	142.5 * ³
I K-SBSL2-L130-0080M-5700K	5700K	12142.35	83.51	145.4

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

$$11150.86 = (12142.35 - 10902.99) / 5 + 10902.99$$

$$11398.73 = (12142.35 - 10902.99) / 5 + 11150.86$$

$$11646.61 = (12142.35 - 10902.99) / 5 + 11398.73$$

$$11894.48 = (12142.35 - 10902.99) / 5 + 11646.61$$

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

$$83.47 = (83.42 + 83.51) / 2$$

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

$$133.6 = 11150.86 / 83.47$$

$$136.6 = 11398.73 / 83.47$$

$$139.5 = 11646.61 / 83.47$$

$$142.5 = 11894.48 / 83.47$$



Photo Document



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