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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-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.

Zac.kuang

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-L130-0240M-3000K / IK-SBSL2-L130-0240M-5700K
Rated Inputs	AC 200-480V 50/60Hz
Rated Power	240 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
Goniophotometeric 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°C ±1°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	277.04	60	0.880	241.88	0.992
IK-SBSL2-L130-0240M-5700K	277.05	60	0.892	245.05	0.992

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-SBSL2-L130-0240M-3000K	30815.51	127.4	3052	83.4	11
IK-SBSL2-L130-0240M-5700K	35238.19	143.8	5676	83.7	13

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-SBSL2-L130-0240M-3000K	0.00062	0.4342	0.4047	0.2485	0.5212
IK-SBSL2-L130-0240M-5700K	0.00185	0.3285	0.3412	0.2041	0.4770

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	277.15	60	0.8763	240.99	0.9923

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
30653.43	127.20	99.815	0.957

3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
IK-SBSL2-L130-0240M-3000K	Power Factor	480	60	0.925
	THD	480	60	12.8%

4 Test Data

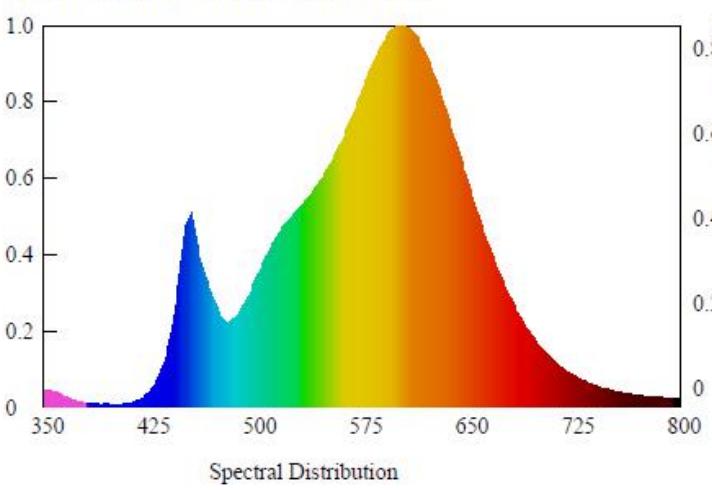
IK-SBSL2-L130-0240M-3000K

Test Condition

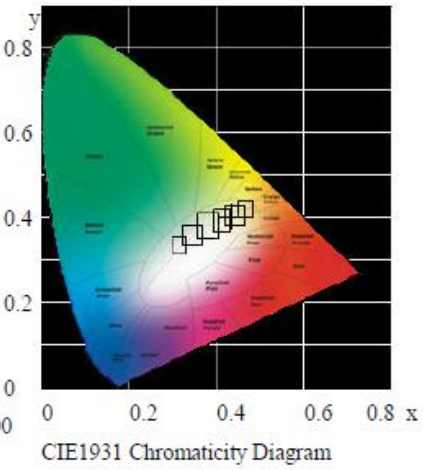
Temperature: 25°C RH: 58%

Spectrum Range: 350-800 nm Scan Step: 5 nm

Spectroradiometric Parameters



Spectral Distribution



CIE1931 Chromaticity Diagram

Chromaticity Coordinates: x=0.4342 y=0.4047 u'=0.2485 v'=0.5212

Correlated Color Temperature: 3052 K Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index: Rf=83 Gamut Index: Rg=94

Luminous Flux: 30815.51 lm Purity: 0.5194

Chromaticity Difference: +0.00062Duv Peak Wavelength: 600.0 nm

Color Ratio: Kr=44.5% Kg=47.9% Kb=7.6%

Bandwidth: 131.7nm Radiant Flux: 79.068 W

Photosynthetically Active Radiation(PAR): 75.51W Photosynthetic Photon Flux(PPF):366.57μmol/s

Rendering Index: Ra=83.4

R1=82	R2=92	R3=96	R4=81	R5=82	R6=90	R7=83	R8=60
R9=11	R10=82	R11=81	R12=72	R13=85	R14=99	R15=75	Re=78

Electric Parameters

Voltage: 277.04 V Current: 0.880 A

Power Factor: 0.992 Power: 241.88 W

Luminous Efficacy: 127.4 lm/W

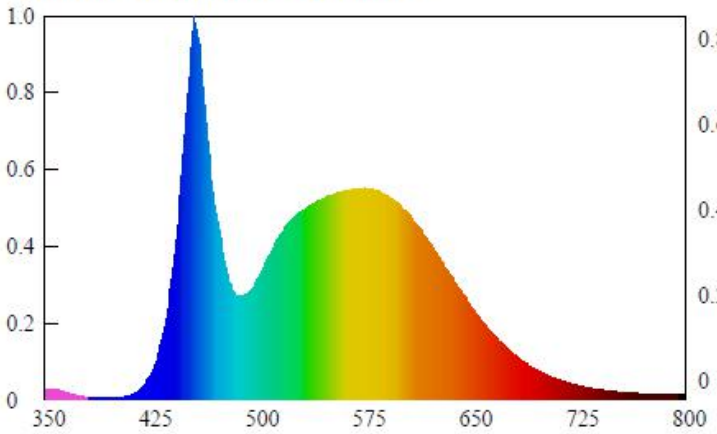
IK-SBSL2-L130-0240M-5700K

Test Condition

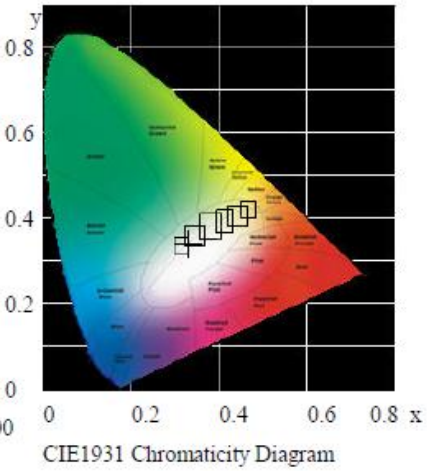
Temperature: 25°C RH: 58%

Spectrum Range: 350-800 nm Scan Step: 5 nm

Spectroradiometric Parameters



Spectral Distribution



CIE1931 Chromaticity Diagram

Chromaticity Coordinates: x=0.3285 y=0.3412 u'=0.2041 v'=0.477

Correlated Color Temperature: 5676 K Dominant Wavelength: 515.0 nm(E)

Colour Fidelity Index: Rf=80 Gamut Index: Rg=93

Luminous Flux: 35238.19 lm Purity: 0.0164

Chromaticity Difference: +0.00185Duv Peak Wavelength: 455.0 nm

Color Ratio: Kr=32.3% Kg=55.8% Kb=11.9%

Bandwidth: 30.5nm Radiant Flux: 97.172 W

Photosynthetically Active Radiation(PAR): 94.18W Photosynthetic Photon Flux(PPF):430.93μmol/s

Rendering Index: Ra=83.7

R1=82	R2=91	R3=93	R4=81	R5=82	R6=84	R7=87	R8=69
R9=13	R10=75	R11=79	R12=59	R13=86	R14=96	R15=79	Re=77

Electric Parameters

Voltage: 277.05 V Current: 0.892 A

Power Factor: 0.992 Power: 245.05 W

Luminous Efficacy: 143.8 lm/W

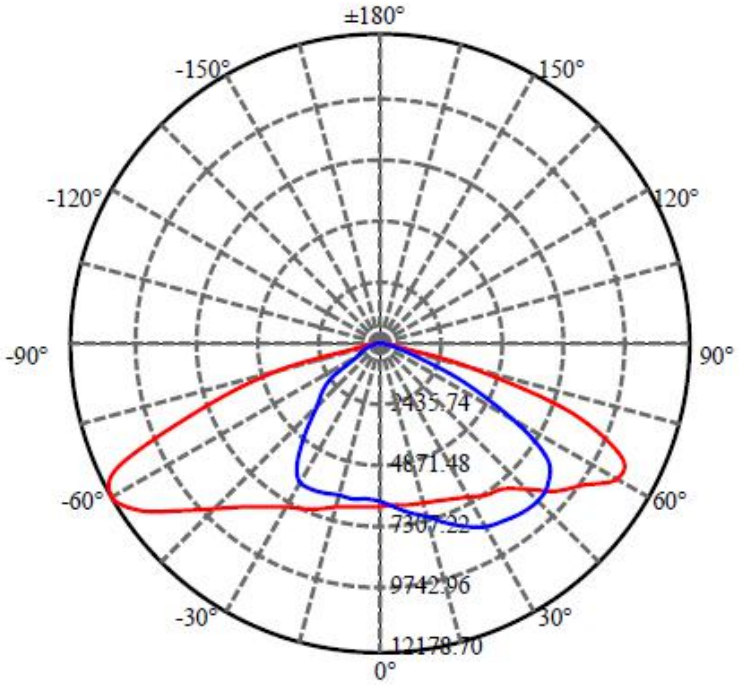
Zonal Flux Diagram

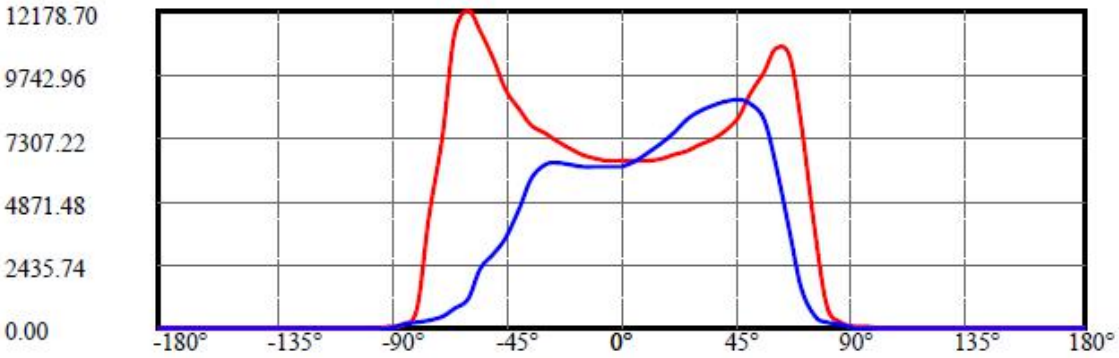
Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	6227.336	.000	.000	.000%	.000%
5.0	6275.637	149.470	149.470	.488%	.488%
10.0	6397.920	453.373	602.843	1.479%	1.967%
15.0	6571.716	769.350	1372.193	2.510%	4.476%
20.0	6796.001	1101.688	2473.880	3.594%	8.070%
25.0	7068.879	1454.170	3928.051	4.744%	12.814%
30.0	7327.311	1821.850	5749.900	5.943%	18.758%
35.0	7491.622	2182.191	7932.092	7.119%	25.877%
40.0	7521.974	2504.905	10437.000	8.172%	34.048%
45.0	7429.895	2768.460	13205.460	9.031%	43.080%
50.0	7308.925	2978.194	16183.650	9.716%	52.796%
55.0	7072.965	3127.102	19310.750	10.201%	62.997%
60.0	6481.097	3132.983	22443.730	10.221%	73.218%
65.0	5675.948	2955.400	25399.130	9.641%	82.859%
70.0	4227.476	2507.610	27906.750	8.181%	91.040%
75.0	2124.551	1660.318	29567.060	5.416%	96.456%
80.0	627.313	736.322	30303.390	2.402%	98.858%
85.0	205.768	226.368	30529.750	.738%	99.597%
90.0	39.239	67.085	30596.840	.219%	99.815%
95.0	13.031	14.312	30611.150	.047%	99.862%
100.0	4.305	4.711	30615.860	.015%	99.877%
105.0	4.786	2.432	30618.290	.008%	99.885%
110.0	5.574	2.708	30621.000	.009%	99.894%
115.0	6.508	3.059	30624.060	.010%	99.904%
120.0	7.311	3.359	30627.420	.011%	99.915%
125.0	7.982	3.535	30630.960	.012%	99.927%
130.0	8.478	3.579	30634.530	.012%	99.938%
135.0	8.580	3.447	30637.980	.011%	99.950%
140.0	8.624	3.186	30641.170	.010%	99.960%
145.0	8.595	2.873	30644.040	.009%	99.969%
150.0	8.624	2.536	30646.570	.008%	99.978%
155.0	8.522	2.170	30648.740	.007%	99.985%
160.0	8.143	1.748	30650.490	.006%	99.990%
165.0	7.807	1.314	30651.810	.004%	99.995%
170.0	7.515	.909	30652.710	.003%	99.998%
175.0	7.398	.533	30653.250	.002%	99.999%
180.0	7.646	.180	30653.430	.001%	100.000%

Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





C0/C180:

C90/C270:

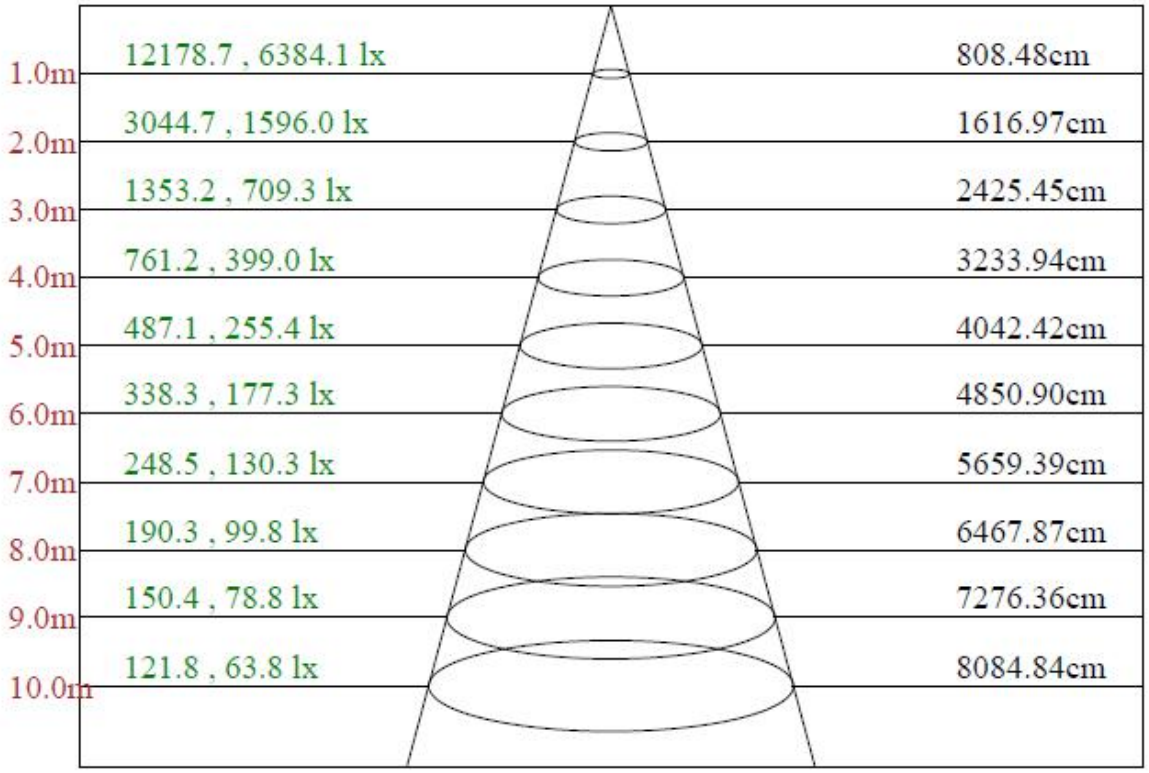
Field angle(10%Imax):C0/180Left:19.4 Right:139.3

:C90/270Left:108.7 Right:28.0

Beam Angle(50%Imax):C0/180Left:12.1 Right:132.0

:C90/270Left:86.1 Right:18.6

Lux distance Curve



Max , Ave Beam angle of C180plane152.19

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	6402.45	6414.12	6451.48	6526.19	6638.26	6776.01	7023.50	7252.31	7539.48
22.5	6341.74	6383.77	6486.50	6647.60	6909.09	7207.95	7623.54	8153.53	8737.23
45.0	6257.69	6369.76	6579.89	6869.40	7179.93	7597.85	8071.81	8494.41	8991.72
67.5	6203.99	6386.10	6673.28	7039.84	7404.07	7770.63	8137.19	8419.70	8662.52
90.0	6232.01	6428.13	6747.99	7095.88	7523.14	7990.10	8305.29	8534.10	8706.88
112.5	6180.64	6376.76	6694.29	7074.86	7499.79	7948.07	8361.33	8713.88	9050.09
135.0	6098.92	6278.70	6565.88	6911.43	7270.98	7761.29	8342.65	8998.73	9610.44
157.5	6101.26	6213.33	6367.42	6642.93	6981.47	7408.74	7931.73	8569.12	9393.30
180.0	6402.45	6439.80	6530.86	6684.95	6897.42	7151.91	7471.78	7824.33	8382.34
202.5	6341.74	6355.75	6395.44	6495.84	6668.61	6841.38	7065.52	7392.39	7700.58
225.0	6257.69	6234.34	6271.70	6355.75	6521.52	6680.28	6785.35	6689.62	6159.63
247.5	6203.99	6159.63	6192.31	6241.35	6367.42	6537.86	6516.85	6080.24	5062.28
270.0	6232.01	6173.64	6189.98	6203.99	6243.68	6355.75	6288.04	5741.70	4642.02
292.5	6180.64	6103.59	6089.58	6105.93	6161.96	6318.39	6330.07	5905.14	4950.21
315.0	6098.92	6045.22	6061.57	6115.27	6227.34	6381.43	6493.50	6407.11	5867.78
337.5	6101.26	6047.56	6068.57	6136.28	6241.35	6374.43	6488.83	6689.62	6895.08
360.0	6402.45	6414.12	6451.48	6526.19	6638.26	6776.01	7023.50	7252.31	7539.48

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	8118.51	9001.06	9799.56	10740.47	10476.64	7807.99	3612.61	825.35	247.72
22.5	9351.28	10012.02	10539.68	10784.83	10539.68	9199.52	5608.62	2211.51	378.94
45.0	9437.66	9734.18	9794.89	9458.68	8765.25	7224.29	4106.89	654.44	224.14
67.5	8774.59	8746.57	8496.75	7637.55	5601.61	3068.37	1068.86	364.93	159.93
90.0	8797.93	8653.18	8013.45	6304.38	3669.81	1540.26	431.70	251.22	118.84
112.5	9257.89	9232.20	8879.65	7807.99	5620.29	3113.67	1017.27	369.83	148.96
135.0	10082.06	10296.86	10061.05	9570.75	8895.99	7130.90	3443.34	535.13	192.15
157.5	10196.47	10724.13	10957.61	10875.89	10348.23	8326.31	5529.24	1218.52	251.46
180.0	9166.83	10317.88	11445.58	12178.70	11296.15	7404.07	4207.75	790.09	176.98
202.5	7770.63	7289.66	6175.97	5193.03	5886.46	5221.04	1186.54	625.02	361.89
225.0	5108.97	3913.57	3339.21	2587.41	1158.52	868.77	657.71	409.29	143.36
247.5	3850.53	3091.72	2543.05	1347.64	889.79	706.74	481.20	285.31	135.18
270.0	3514.32	2909.61	2283.89	1165.52	774.21	488.44	337.38	230.91	122.81
292.5	3745.46	3021.68	2547.72	1340.63	870.17	667.98	445.48	271.07	144.29
315.0	4789.11	3603.04	3061.37	2442.65	1165.52	847.99	632.03	407.19	176.98
337.5	6916.10	6395.44	5228.05	4261.45	4856.82	4023.30	1226.23	587.20	308.66
360.0	8118.51	9001.06	9799.56	10740.47	10476.64	7807.99	3612.61	825.35	247.72

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	51.60	41.79	5.60	5.37	5.84	6.77	7.24	7.71	7.94
22.5	81.72	33.62	4.44	4.20	4.20	4.67	4.90	5.84	6.77
45.0	47.16	8.17	3.50	2.80	2.80	3.27	3.97	4.67	5.14
67.5	35.49	3.74	2.80	2.10	2.10	2.80	3.50	3.97	4.67
90.0	13.31	2.57	1.87	2.10	2.34	2.57	3.27	3.97	4.67
112.5	32.69	2.34	2.10	2.10	2.34	3.04	3.74	4.20	5.60
135.0	38.29	5.14	3.04	3.27	3.97	5.14	6.07	6.54	7.24
157.5	68.18	22.88	5.37	5.84	7.24	8.41	9.11	9.34	9.34
180.0	60.00	37.12	5.84	5.60	5.84	6.54	7.24	7.71	7.94
202.5	43.89	15.88	6.30	7.71	8.87	9.34	10.04	10.74	10.51
225.0	22.41	4.90	5.60	7.47	9.34	10.51	11.21	11.44	11.44
247.5	20.08	3.27	4.20	6.07	7.47	9.11	9.81	10.74	10.97
270.0	7.94	2.34	3.04	4.20	5.84	7.24	8.64	9.57	10.27
292.5	26.62	2.80	3.27	4.44	5.37	6.77	7.94	9.34	10.27
315.0	32.22	6.07	4.90	5.60	6.77	7.94	9.34	10.27	10.97
337.5	46.23	15.88	7.00	7.71	8.87	10.04	10.97	11.67	11.91
360.0	51.60	41.79	5.60	5.37	5.84	6.77	7.24	7.71	7.94

C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	7.71	7.71	7.24	7.00	6.77	6.77	6.30	6.30	6.07
22.5	6.77	7.24	7.24	7.71	7.94	7.71	7.24	7.24	7.24
45.0	6.07	6.54	6.77	7.24	7.71	7.47	7.71	7.47	7.24
67.5	5.37	6.30	6.54	7.24	7.71	7.94	7.71	7.47	7.47
90.0	5.60	6.30	7.24	7.47	7.94	7.71	7.71	7.47	7.47
112.5	6.07	6.77	7.47	7.47	7.71	7.47	7.47	7.47	7.71
135.0	7.47	7.94	7.94	8.41	7.94	7.94	7.71	7.71	7.94
157.5	8.87	8.87	8.64	8.64	8.41	8.41	8.17	7.47	7.71
180.0	7.94	7.94	7.71	7.94	7.71	7.47	7.00	6.77	6.77
202.5	9.81	9.11	9.11	8.87	8.64	7.94	7.71	7.24	7.00
225.0	10.74	10.27	9.81	9.34	9.11	8.17	7.94	7.47	7.24
247.5	11.21	10.51	10.27	9.81	9.57	8.64	7.94	7.71	7.47
270.0	10.51	10.51	10.27	10.04	9.81	9.11	8.41	7.94	7.47
292.5	10.51	10.51	10.51	10.27	9.81	9.34	8.64	7.94	7.94
315.0	10.74	10.51	10.51	10.27	9.81	9.11	8.64	8.17	7.71
337.5	11.91	10.97	10.27	10.27	9.81	9.11	8.64	8.41	7.94
360.0	7.71	7.71	7.24	7.00	6.77	6.77	6.30	6.30	6.07

C/γ(°)	180.0
0.0	6.54
22.5	7.47
45.0	7.71
67.5	7.71
90.0	7.71
112.5	7.94
135.0	7.94
157.5	8.17
180.0	6.54
202.5	7.47
225.0	7.71
247.5	7.71
270.0	7.71
292.5	7.94
315.0	7.94
337.5	8.17
360.0	6.54

5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
IK-SBSL2-L130-0240M-3000K	3000K	30815.51	241.88	127.4
IK-SBSL2-L130-0240M-3500K	3500K	31700.05 *1	243.47 *2	130.2 *3
IK-SBSL2-L130-0240M-4000K	4000K	32584.58 *1	243.47 *2	133.8 *3
IK-SBSL2-L130-0240M-4500K	4500K	33469.12 *1	243.47 *2	137.5 *3
IK-SBSL2-L130-0240M-5000K	5000K	34353.65 *1	243.47 *2	141.1 *3
IK-SBSL2-L130-0240M-5700K	5700K	35238.19	245.05	143.8

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

31700.05=(35238.19-30815.51) /5+30815.51

32584.58=(35238.19-30815.51) /5+31700.05

33469.12=(35238.19-30815.51) /5+32584.58

34353.65=(35238.19-30815.51) /5+33469.12

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

243.47=(241.88+245.05)/2

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

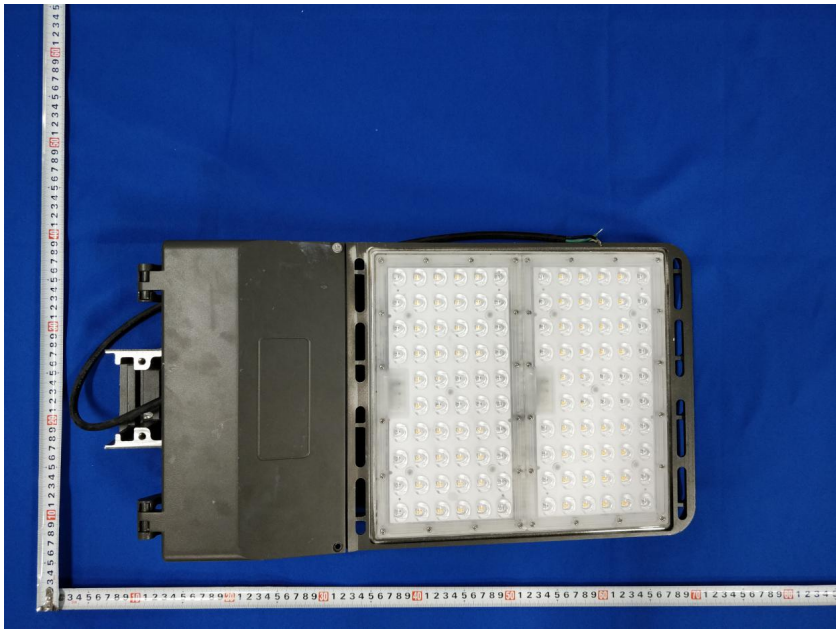
130.2=31700.05 /243.47

133.8=32584.58 /243.47

137.5=33469.12 /243.47

141.1=34353.65 /243.47

Photo Document



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