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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:
Architectural Flood and Spot Luminaires

Model No.:
IK-FLBO-L120-0050-DN-30-ML / IK-FLBO-L120-0050-DN-57-ML

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.

Sam Chen Jason zhou

Complied by: Sam Chen — **Review by: Jason zhou**

Project Engineer — **Technical Manager**

Note: This test report is perpared 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 Federal 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	Architectural Flood and Spot Luminaires
Model Number	IK-FLBO-L120-0050-DN-30-ML/ IK-FLBO-L120-0050-DN-57-ML
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	50 W
Nominal CCT	3000K / 5700K
Date of Receipt Samples	2016-12-07

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	2017-09-21
AC Power Source	ALL POWER	APW-110N	992257	2017-08-27
Total Luminous Flux Standard Lamp	SENSING	110V/100W	S13100234	2017-09-15
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2017-08-29
Integral Sphere	SENSING	SPR-600M	N.A	2017-08-27
Integral Sphere (2M)	SENSING	SD-20	N.A	2017-08-27
Digital Power Meter	YOKOGAWA	WT210	91L929742	2017-08-29
Optical Color and Electrical Measurement System	SENSING	SPR-3000	N.A	2017-08-27
Temperature/humidity/clock	VICTOR	VC230	57636	2017-09-13
Digital Anemometer	TECMAN	TD8901	026141	2017-09-13

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-FLBO-L120-0050-DN-30-ML	120.04	60	0.431	51.42	0.993
IK-FLBO-L120-0050-DN-57-ML	120.07	60	0.455	54.20	0.992

3.1.2 Additional Test

Test Item	Model	Test Voltage (V)	Frequency (Hz)	Test Result
Power factor	IK-FLBO-L120-0050-DN-30-ML	120	60	0.993
		277	60	0.921
	IK-FLBO-L120-0050-DN-57-ML	120	60	0.992
		277	60	0.927
Total harmonic distortion	IK-FLBO-L120-0050-DN-30-ML	120	60	13.8%
		277	60	17.7%
	IK-FLBO-L120-0050-DN-57-ML	120	60	14.5%
		277	60	19.2%
Off state power (W)	IK-FLBO-L120-0050-DN-30-ML	120	60	0
	IK-FLBO-L120-0050-DN-30-ML	277	60	0

3.1.3 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-FLBO-L120-0050-DN-30-ML	5459.056	106.166	2999	82.8	11
IK-FLBO-L120-0050-DN-57-ML	6046.877	111.566	5550	83.7	14

3.1.4 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-FLBO-L120-0050-DN-30-ML	0.0002	0.4373	0.4047	0.2505	0.5217
IK-FLBO-L120-0050-DN-57-ML	0.0020	0.3313	0.3441	0.2049	0.4789

3.2 Goniophotometer System

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
IK-FLBO-L120-0050-DN-30-ML	120.18	60	0.4247	50.685	0.9932

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
5463.38	107.79	99.842	0.084

4 Test Data

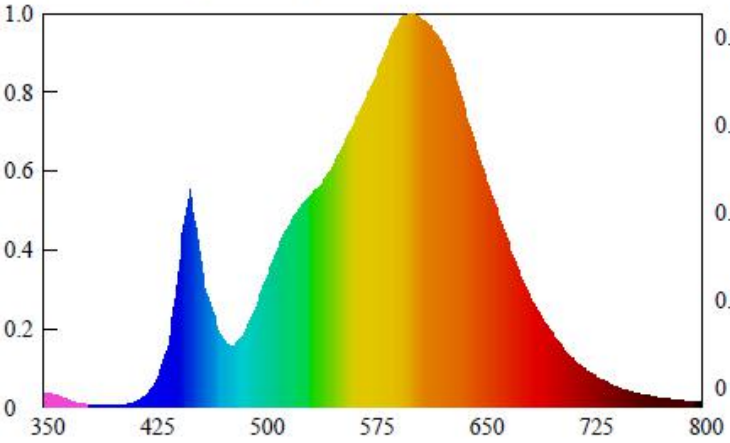
IK-FLBO-L120-0050-DN-30-ML

Test Condition

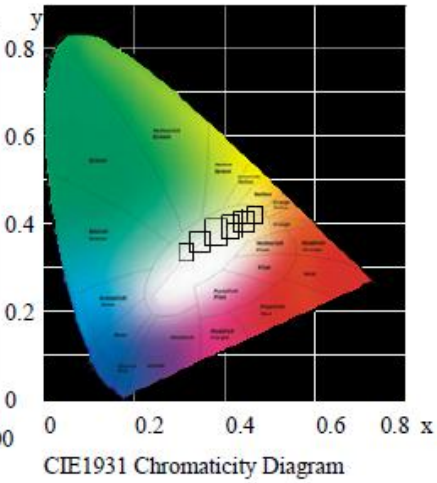
Temperature: 25°C RH: 58%

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

Spectroradiometric Parameters



Spectral Distribution



CIE1931 Chromaticity Diagram

Chromaticity Coordinates: x=0.4373 y=0.4047 u'=0.2505 v'=0.5217

Correlated Color Temperature: 2999 K Dominant Wavelength: 581.0 nm(E)

Luminous Flux: 5459.056 lm Purity: 0.5300

Chromaticity Difference: 0.0002Duv Peak Wavelength: 691.6 nm

Color Ratio: Kr=44.6% Kg=48.4% Kb=7.0%

Bandwidth: 112.8nm Radiant Flux: 16.06 W

Rendering Index: Ra=82.8

R1=81	R2=90	R3=97	R4=82	R5=81	R6=87	R7=84	R8=61
R9=11	R10=76	R11=81	R12=69	R13=84	R14=98	R15=74	

Electric Parameters

Voltage: 120.04 V Current: 0.431 A

Power Factor: 0.993 Power: 51.42 W

Luminous Efficacy: 106.166 lm/W

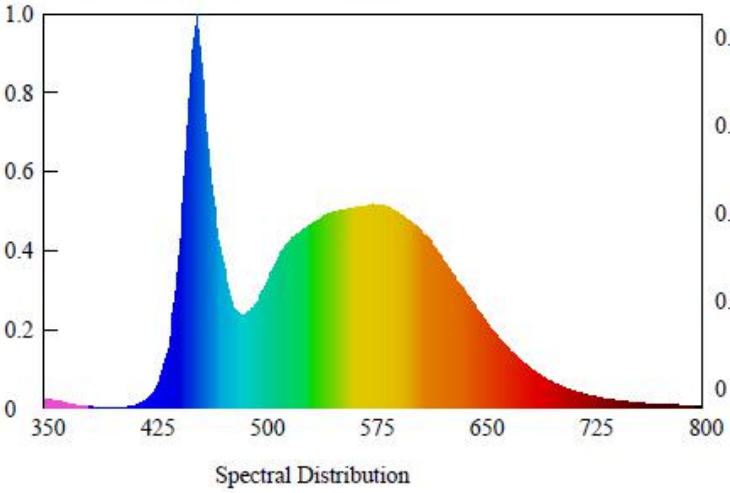
IK-FLBO-L120-0050-DN-57-ML

Test Condition

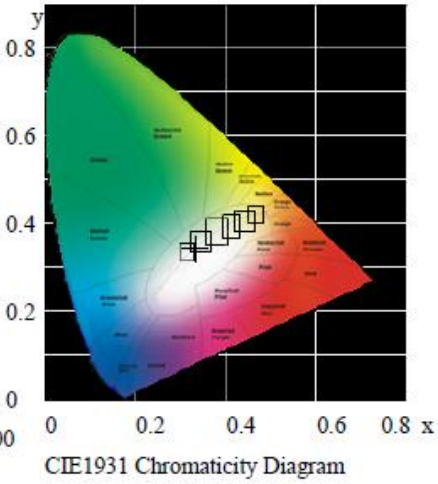
Temperature: 25°C RH: 58%

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

Spectroradiometric Parameters



Spectral Distribution



CIE1931 Chromaticity Diagram

Chromaticity Coordinates: x=0.3313 y=0.3441 u'=0.2049 v'=0.4789

Correlated Color Temperature: 5550 K Dominant Wavelength: 544.0 nm(E)

Luminous Flux: 6046.877 lm Purity: 0.0272

Chromaticity Difference: 0.0020Duv Peak Wavelength: 448.3 nm

Color Ratio: Kr=32.5% Kg=55.7% Kb=11.8%

Bandwidth: -444.6nm Radiant Flux: 16.427 W

Rendering Index: Ra=83.7

R1=82	R2=90	R3=93	R4=82	R5=82	R6=84	R7=88	R8=69
R9=14	R10=74	R11=80	R12=57	R13=85	R14=96	R15=79	

Electric Parameters

Voltage: 120.07 V Current: 0.455 A

Power Factor: 0.992 Power: 54.2 W

Luminous Efficacy: 111.566 lm/W

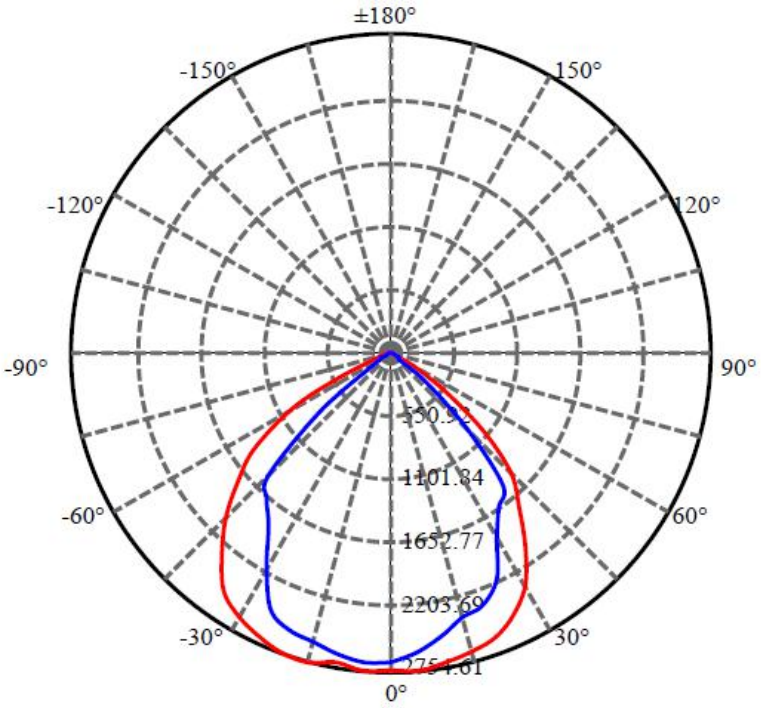
Zonal Flux Diagram

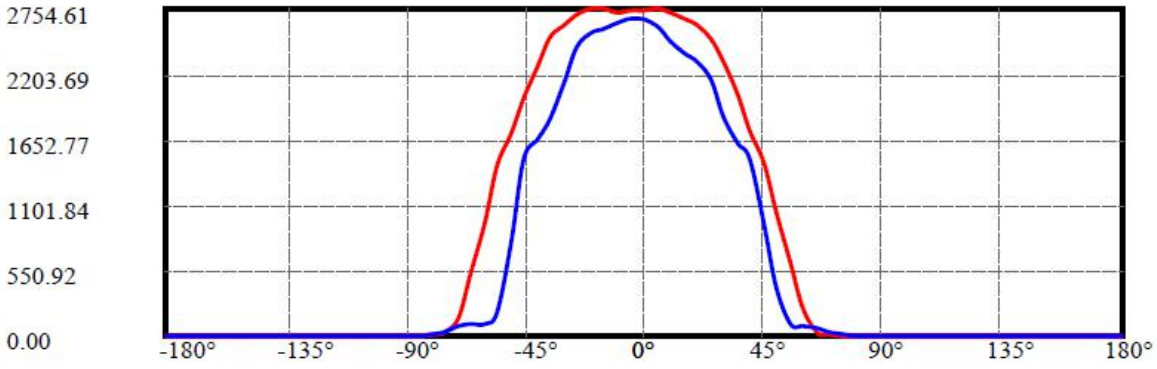
Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	2663.724	0.000	0	.000%	.000%
5.0	2650.336	63.523	63.523	1.163%	1.163%
10.0	2619.422	188.504	252.027	3.450%	4.613%
15.0	2581.814	308.709	560.736	5.651%	10.264%
20.0	2517.980	420.870	981.606	7.703%	17.967%
25.0	2417.390	518.724	1500.33	9.495%	27.462%
30.0	2256.443	593.529	2093.859	10.864%	38.325%
35.0	2036.418	635.822	2729.681	11.638%	49.963%
40.0	1802.070	645.790	3375.471	11.820%	61.784%
45.0	1524.904	622.412	3997.883	11.392%	73.176%
50.0	1145.995	547.384	4545.267	10.019%	83.195%
55.0	709.656	413.606	4958.873	7.571%	90.766%
60.0	366.539	259.931	5218.804	4.758%	95.523%
65.0	160.961	137.489	5356.293	2.517%	98.040%
70.0	64.123	62.088	5418.381	1.136%	99.176%
75.0	21.099	23.621	5442.002	.432%	99.609%
80.0	8.536	8.172	5450.174	.150%	99.758%
85.0	3.244	3.311	5453.485	.061%	99.819%
90.0	1.127	1.261	5454.746	.023%	99.842%
95.0	0.248	0.395	5455.141	.007%	99.849%
100.0	0.275	0.140	5455.282	.003%	99.852%
105.0	0.344	0.160	5455.442	.003%	99.855%
110.0	0.495	0.212	5455.654	.004%	99.859%
115.0	0.770	0.313	5455.967	.006%	99.864%
120.0	1.004	0.423	5456.39	.008%	99.872%
125.0	1.347	0.534	5456.924	.010%	99.882%
130.0	1.718	0.658	5457.581	.012%	99.894%
135.0	2.034	0.750	5458.331	.014%	99.908%
140.0	2.392	0.812	5459.143	.015%	99.922%
145.0	2.667	0.839	5459.982	.015%	99.938%
150.0	2.859	0.812	5460.794	.015%	99.953%
155.0	3.038	0.745	5461.539	.014%	99.966%
160.0	3.107	0.644	5462.184	.012%	99.978%
165.0	3.120	0.513	5462.697	.009%	99.988%
170.0	3.203	0.375	5463.072	.007%	99.994%
175.0	3.217	0.229	5463.301	.004%	99.999%
180.0	3.244	0.077	5463.378	.001%	100.000%

Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





C0/C180:

C90/C270:

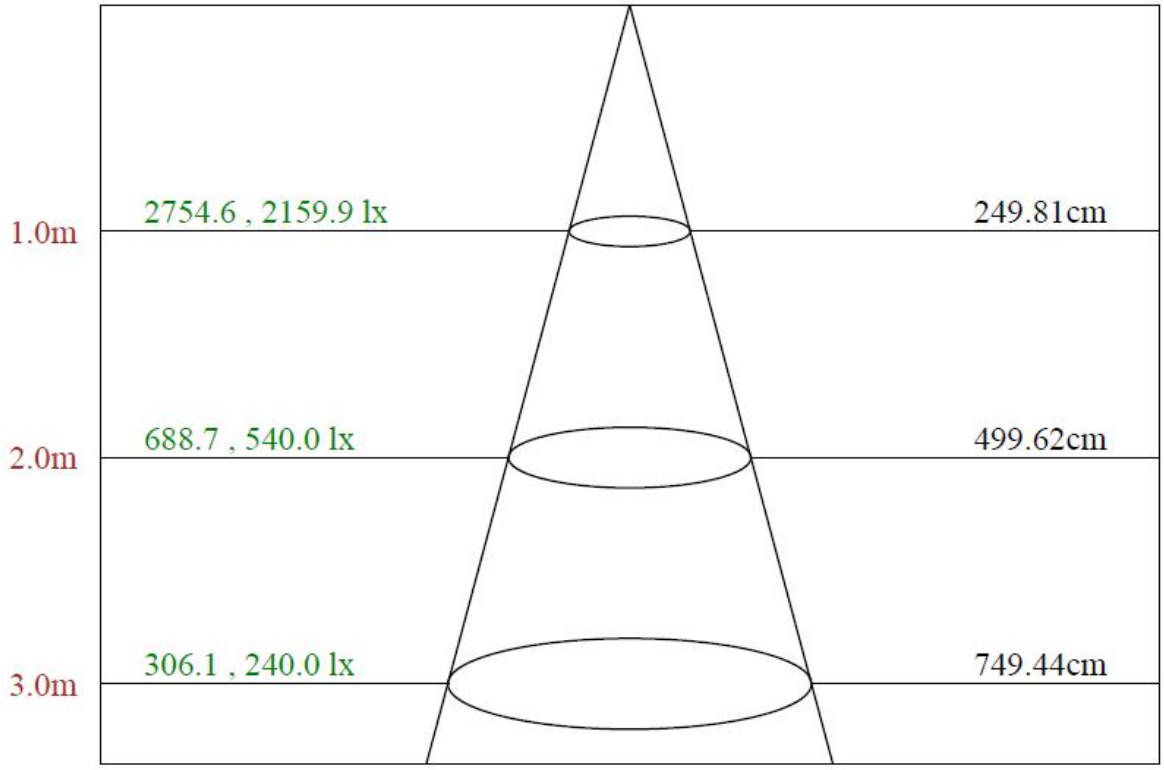
Field angle(10%Imax):C0/180Left:53.4 Right:74.6

:C90/270Left:49.5 Right:57.3

Beam Angle(50%Imax):C0/180Left:40.6 Right:60.9

:C90/270Left:41.1 Right:46.4

Lux distance Curve



Max , Ave Beam angle of C180 plane 101.63

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	2730.64	2751.75	2713.04	2662.68	2619.35	2494.43	2307.05	2033.46	1730.40
22.5	2731.30	2706.67	2658.28	2610.34	2551.18	2460.13	2337.62	2127.15	1859.50
45.0	2720.96	2662.24	2645.53	2579.77	2471.12	2380.95	2265.49	2029.72	1704.45
67.5	2675.00	2630.13	2536.66	2429.56	2376.77	2236.46	1990.58	1689.49	1509.59
90.0	2674.12	2592.74	2482.56	2369.73	2317.39	2150.69	1840.37	1617.80	1490.24
112.5	2623.09	2566.13	2498.61	2406.02	2324.43	2189.83	1963.09	1662.22	1479.02
135.0	2590.76	2552.28	2500.37	2460.35	2386.45	2265.71	2154.86	1961.77	1662.44
157.5	2563.93	2542.38	2498.39	2433.73	2377.21	2291.22	2137.93	1924.38	1644.19
180.0	2730.64	2738.78	2715.46	2754.61	2750.87	2696.99	2623.31	2514.23	2279.12
202.5	2731.30	2713.48	2673.68	2738.34	2665.98	2629.69	2572.51	2428.68	2261.09
225.0	2720.96	2705.13	2691.27	2665.54	2602.86	2534.90	2424.94	2240.42	1949.23
247.5	2675.00	2690.61	2727.78	2717.66	2547.44	2431.09	2212.71	1907.88	1681.58
270.0	2674.12	2674.78	2630.79	2583.73	2545.24	2431.97	2131.55	1828.71	1659.58
292.5	2623.09	2653.44	2643.33	2663.78	2578.23	2431.75	2222.82	1937.13	1701.37
315.0	2590.76	2621.77	2647.28	2600.22	2562.61	2516.21	2429.34	2265.27	1990.36
337.5	2563.93	2603.08	2647.72	2632.99	2610.56	2536.22	2488.94	2414.38	2230.96
360.0	2730.64	2751.75	2713.04	2662.68	2619.35	2494.43	2307.05	2033.46	1730.40

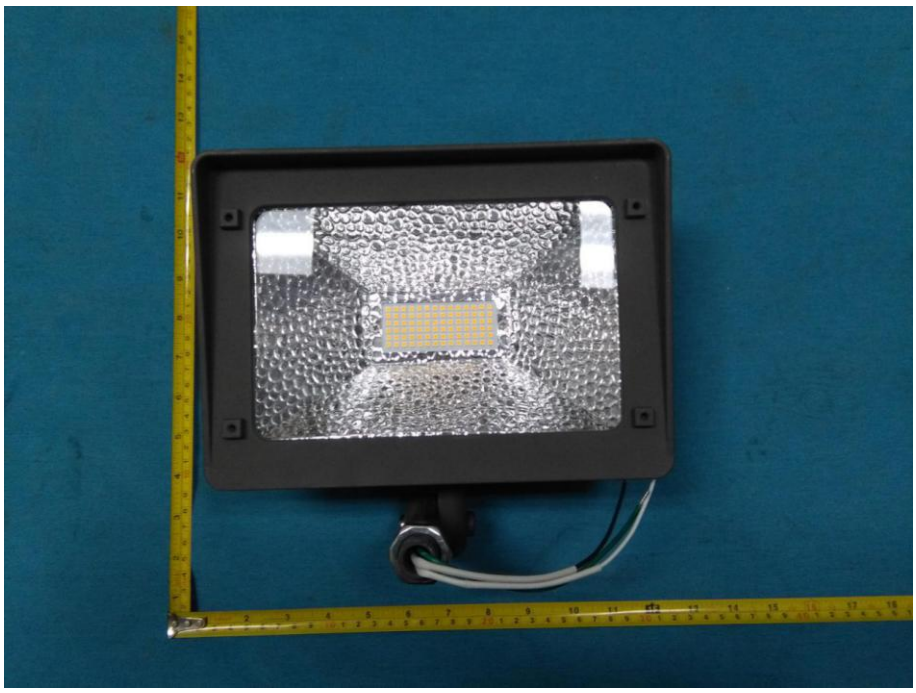
C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	1453.29	1051.04	609.86	246.10	29.25	12.98	6.16	3.30	0.22
22.5	1564.57	1292.08	830.01	405.11	27.27	14.74	7.48	3.30	0.22
45.0	1411.28	1211.37	662.87	120.08	50.36	28.37	12.10	3.74	0.22
67.5	1162.76	628.56	104.91	89.95	70.60	41.79	17.59	4.18	0.22
90.0	948.11	405.55	111.06	91.05	71.70	35.19	14.96	3.30	0.22
112.5	1143.85	651.21	102.93	86.87	72.58	40.47	15.40	3.08	0.22
135.0	1336.73	1130.44	651.43	142.29	37.83	20.23	7.92	2.64	0.22
157.5	1421.84	1042.90	635.60	244.56	25.51	12.76	6.16	2.42	0.22
180.0	2009.93	1712.15	1439.00	963.51	529.81	156.37	27.49	11.00	5.50
202.5	1997.61	1681.14	1373.02	943.94	520.35	121.62	17.59	9.46	5.28
225.0	1680.26	1445.15	1051.26	483.40	71.48	47.29	27.93	12.32	5.50
247.5	1547.42	984.84	409.51	107.11	96.11	79.39	41.79	18.25	7.48
270.0	1484.74	795.70	212.45	110.40	98.75	77.42	37.61	15.40	6.38
292.5	1541.04	1157.71	514.63	95.01	95.67	80.49	45.75	19.35	7.92
315.0	1706.43	1454.39	1244.36	727.53	190.02	49.26	28.37	13.86	6.16
337.5	1988.60	1691.69	1401.61	1007.71	588.09	207.61	23.31	11.00	5.94
360.0	1453.29	1051.04	609.86	246.10	29.25	12.98	6.16	3.30	0.22

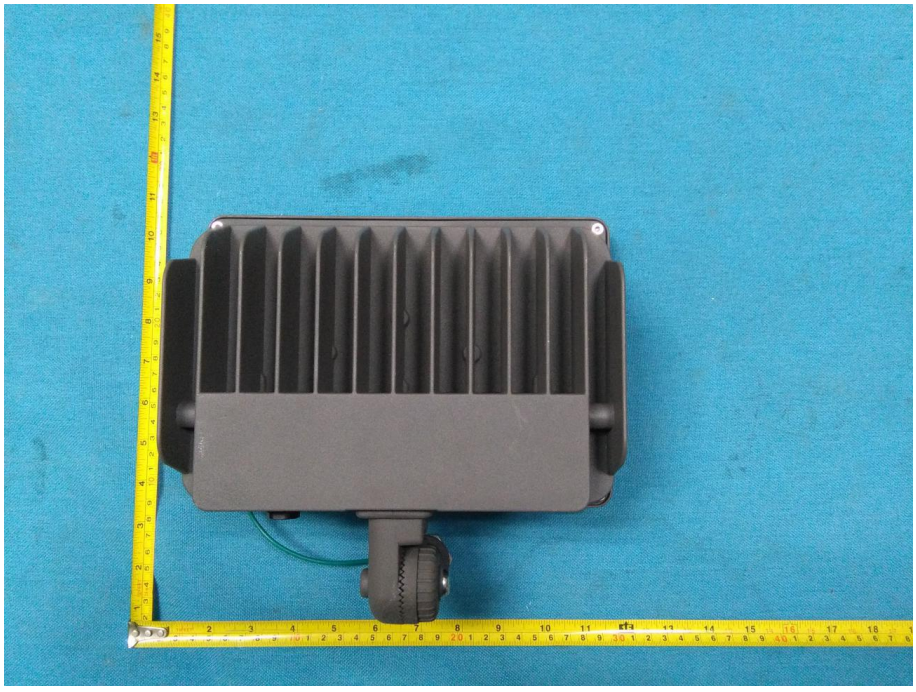
C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	0.22	0.22	0.44	0.66	0.88	1.10	1.54	1.98	2.20
22.5	0.22	0.22	0.44	0.44	0.66	1.10	1.32	1.54	1.98
45.0	0.22	0.22	0.22	0.44	0.66	0.88	1.10	1.32	1.54
67.5	0.22	0.22	0.22	0.22	0.44	0.66	0.88	1.10	1.54
90.0	0.22	0.22	0.22	0.22	0.44	0.66	0.88	1.32	1.76
112.5	0.22	0.22	0.22	0.44	0.44	0.88	1.10	1.54	1.98
135.0	0.22	0.22	0.44	0.44	0.66	1.10	1.32	1.76	2.20
157.5	0.22	0.22	0.44	0.66	0.88	1.32	1.54	1.98	2.42
180.0	2.42	0.22	0.22	0.22	0.44	0.66	0.88	1.32	1.54
202.5	1.98	0.22	0.22	0.44	0.44	0.66	0.88	1.32	1.76
225.0	1.54	0.22	0.22	0.22	0.44	0.66	0.88	1.32	1.76
247.5	1.32	0.22	0.22	0.22	0.22	0.44	0.66	1.10	1.54
270.0	1.32	0.22	0.22	0.22	0.22	0.44	0.66	0.88	1.32
292.5	2.20	0.22	0.22	0.22	0.22	0.44	0.66	0.88	1.10
315.0	2.64	0.44	0.22	0.22	0.44	0.66	0.88	1.10	1.32
337.5	2.86	0.44	0.22	0.22	0.44	0.66	0.88	1.10	1.54
360.0	0.22	0.22	0.44	0.66	0.88	1.10	1.54	1.98	2.20

C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	2.64	2.86	2.86	3.08	3.08	3.08	3.08	3.30	3.30
22.5	2.20	2.64	2.86	2.86	3.08	3.08	3.08	3.30	3.30
45.0	1.98	2.42	2.64	2.86	3.08	3.08	3.08	3.30	3.30
67.5	1.98	2.42	2.64	2.86	3.08	3.08	3.08	3.30	3.30
90.0	1.98	2.42	2.64	2.86	3.08	3.08	3.08	3.30	3.30
112.5	2.20	2.64	2.86	3.08	3.08	3.08	3.08	3.30	3.30
135.0	2.42	2.64	2.86	3.08	3.08	3.08	3.08	3.30	3.30
157.5	2.64	2.86	3.08	3.08	3.08	3.08	3.08	3.08	3.30
180.0	1.98	2.20	2.64	2.86	3.08	3.08	3.08	3.08	3.08
202.5	1.98	2.42	2.64	2.86	3.08	3.08	3.08	3.08	3.08
225.0	1.98	2.42	2.64	2.86	3.08	3.30	3.30	3.30	3.30
247.5	1.98	2.20	2.64	2.86	3.08	3.30	3.30	3.30	3.30
270.0	1.54	1.98	2.42	2.64	3.08	3.08	3.30	3.08	3.08
292.5	1.54	1.98	2.42	2.64	2.86	3.08	3.08	3.08	3.08
315.0	1.76	1.98	2.42	2.64	2.86	3.08	3.08	3.08	3.08
337.5	1.76	2.20	2.42	2.64	2.86	3.08	3.08	3.08	3.08
360.0	2.64	2.86	2.86	3.08	3.08	3.08	3.08	3.30	3.30

C/γ(°)	180.0
0.0	3.30
22.5	3.30
45.0	3.30
67.5	3.30
90.0	3.30
112.5	3.30
135.0	3.08
157.5	3.08
180.0	3.30
202.5	3.30
225.0	3.30
247.5	3.30
270.0	3.30
292.5	3.30
315.0	3.08
337.5	3.08
360.0	3.30

Photo Document





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