



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 Non-Cutoff and Semi-Cutoff Wall-mounted Area Luminaires

Model No.:

IK-WPBO-L110-0018-DN-30-ML /

IK-WPBO-L110-0018-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.

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Complied by: Sam Chen

Review by: Jason Zhou

Project Engineer

Technical Manager

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used 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	3470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250
Brand Name	IKIO
Luminaire Type	Outdoor Non-Cutoff and Semi-Cutoff Wall-mounted Area Luminaires
Model Number	IK-WPBO-L110-0018-DN-30-ML/ IK-WPBO-L110-0018-DN-57-ML
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	18 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
Goniophotometric 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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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-WPBO-L110-0018-DN-30-ML	120.10	60	0.138	16.41	0.990
IK-WPBO-L110-0018-DN-57-ML	120.03	60	0.143	16.50	0.962

3.1.2 Additional Test

Test Item	Model	Test Voltage (V)	Frequency (Hz)	Test Result
Power factor	IK-WPBO-L110-0018-DN-30-ML	120	60	0.990
		277	60	0.916
	IK-WPBO-L110-0018-DN-57-ML	120	60	0.962
		277	60	0.918
Total harmonic distortion	IK-WPBO-L110-0018-DN-30-ML	120	60	12.8%
		277	60	17.3%
	IK-WPBO-L110-0018-DN-57-ML	120	60	13.3%
		277	60	18.5%
Off state power (W)	IK-WPBO-L110-0018-DN-30-ML	120	60	0
	IK-WPBO-L110-0018-DN-30-ML	277	60	0

3.1.3 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-WPBO-L110-0018-DN-30-ML	1637.636	99.795	2978	84.0	17
IK-WPBO-L110-0018-DN-57-ML	1694.687	102.708	5526	84.4	18

3.1.4 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-WPBO-L110-0018-DN-30-ML	0.0006	0.4394	0.4064	0.2512	0.5227
IK-WPBO-L110-0018-DN-57-ML	0.0018	0.3319	0.3440	0.2054	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-WPBO-L110-0018-DN-30-ML	120.09	60	0.1483	16.42	0.9217

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 80-90°(%lm)
1623.84	98.89	4.67



4 Test Data

IK-WPBO-L110-0018-DN-30-ML

Test Condition

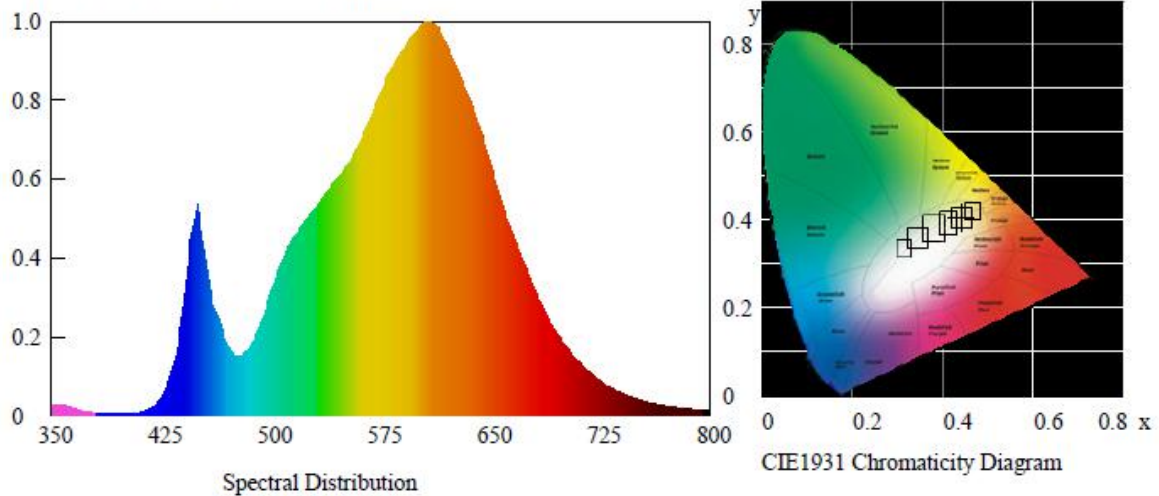
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4394$ $y=0.4064$ $u'=0.2512$ $v'=0.5227$

Correlated Color Temperature: 2978 K

Dominant Wavelength: 581.0 nm(E)

Luminous Flux: 1637.636 lm

Purity: 0.5414

Chromaticity Difference: 0.0006Duv

Peak Wavelength: 105.1 nm

Color Ratio: $K_r=44.7\%$ $K_g=48.2\%$ $K_b=7.1\%$

Bandwidth: 0nm

Radiant Flux: 5.239 W

Rendering Index: $R_a=84.0$

$R_1=83$ $R_2=90$ $R_3=97$ $R_4=83$ $R_5=82$ $R_6=88$ $R_7=86$ $R_8=64$

$R_9=17$ $R_{10}=77$ $R_{11}=83$ $R_{12}=70$ $R_{13}=85$ $R_{14}=98$ $R_{15}=76$

Electric Parameters

Voltage: 120.1 V

Current: 0.138 A

Power Factor: 0.990

Power: 16.41 W

Luminous Efficacy: 99.795 lm/W

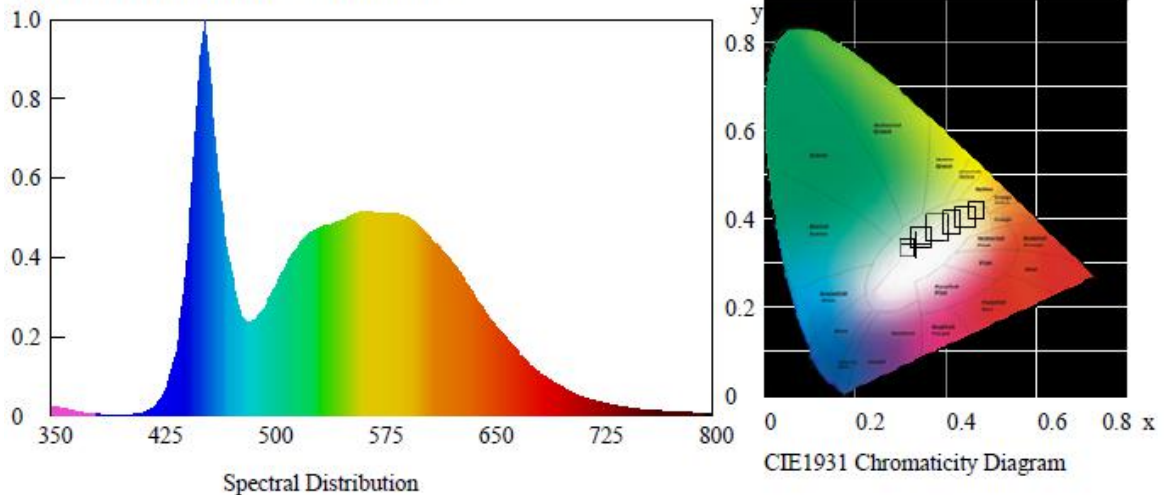
**IK-WPBO-L110-0018-DN-57-ML****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric ParametersChromaticity Coordinates: $x=0.3319$ $y=0.3440$ $u'=0.2054$ $v'=0.4789$

Correlated Color Temperature: 5526 K

Dominant Wavelength: 547.0 nm(E)

Luminous Flux: 1694.687 lm

Purity: 0.0282

Chromaticity Difference: 0.0018Duv

Peak Wavelength: 448.1 nm

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

Bandwidth: -444.4nm

Radiant Flux: 5.267 W

Rendering Index: $R_a=84.4$ $R_1=83$ $R_2=90$ $R_3=93$ $R_4=83$ $R_5=83$ $R_6=84$ $R_7=88$ $R_8=71$ $R_9=18$ $R_{10}=75$ $R_{11}=81$ $R_{12}=58$ $R_{13}=86$ $R_{14}=96$ $R_{15}=80$ **Electric Parameters**

Voltage: 120.03 V

Current: 0.143 A

Power Factor: 0.962

Power: 16.5 W

Luminous Efficacy: 102.708 lm/W

**Zonal Flux Diagram**

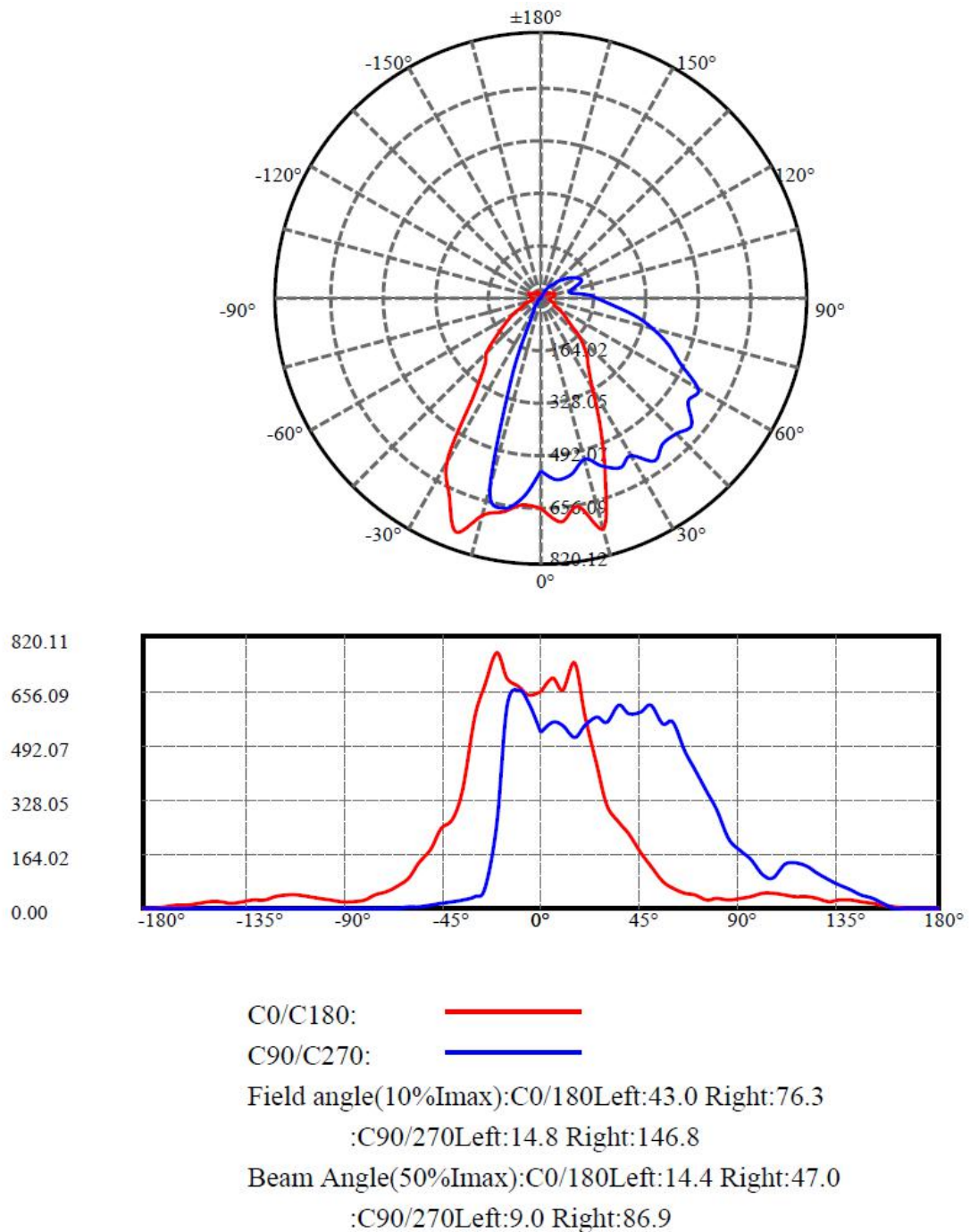
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	556.695	0.000	0	.000%	.000%
5.0	605.272	13.872	13.872	.854%	.854%
10.0	615.100	43.614	57.486	2.686%	3.540%
15.0	638.674	74.310	131.796	4.576%	8.116%
20.0	618.454	103.970	235.766	6.403%	14.519%
25.0	513.397	120.109	355.875	7.397%	21.916%
30.0	432.201	121.657	477.532	7.492%	29.407%
35.0	352.065	117.172	594.703	7.216%	36.623%
40.0	296.299	108.941	703.644	6.709%	43.332%
45.0	273.784	106.210	809.854	6.541%	49.873%
50.0	242.719	105.128	914.982	6.474%	56.347%
55.0	220.905	101.529	1016.511	6.252%	62.599%
60.0	191.036	95.848	1112.359	5.903%	68.502%
65.0	154.019	84.268	1196.626	5.189%	73.691%
70.0	125.181	70.878	1267.504	4.365%	78.056%
75.0	97.992	58.478	1325.982	3.601%	81.657%
80.0	78.501	47.298	1373.28	2.913%	84.570%
85.0	58.501	37.163	1410.443	2.289%	86.858%
90.0	51.725	30.047	1440.49	1.850%	88.709%
95.0	48.384	27.211	1467.701	1.676%	90.384%
100.0	40.330	23.891	1491.592	1.471%	91.856%
105.0	36.907	20.492	1512.084	1.262%	93.118%
110.0	40.522	20.154	1532.238	1.241%	94.359%
115.0	37.471	19.753	1551.992	1.216%	95.575%
120.0	32.632	17.062	1569.054	1.051%	96.626%
125.0	27.271	13.837	1582.891	.852%	97.478%
130.0	23.409	11.057	1593.948	.681%	98.159%
135.0	20.921	8.984	1602.931	.553%	98.712%
140.0	17.622	7.063	1609.994	.435%	99.147%
145.0	15.588	5.489	1615.483	.338%	99.485%
150.0	12.000	4.092	1619.575	.252%	99.737%
155.0	6.887	2.441	1622.016	.150%	99.887%
160.0	3.134	1.103	1623.119	.068%	99.955%
165.0	1.732	0.442	1623.562	.027%	99.983%
170.0	1.114	0.188	1623.749	.012%	99.994%
175.0	0.866	0.074	1623.824	.005%	99.999%
180.0	0.825	0.020	1623.844	.001%	100.000%



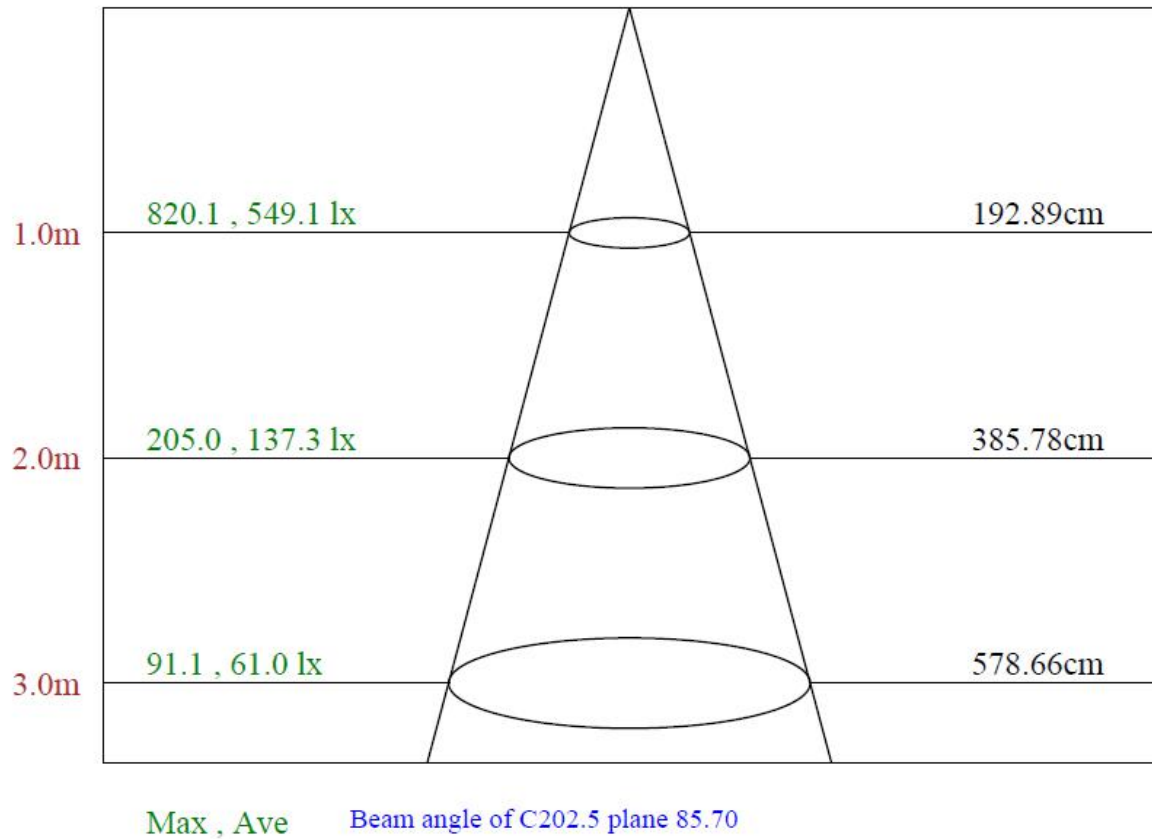
Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





Lux distance Curve



**Luminous Intensity Distribution Data**

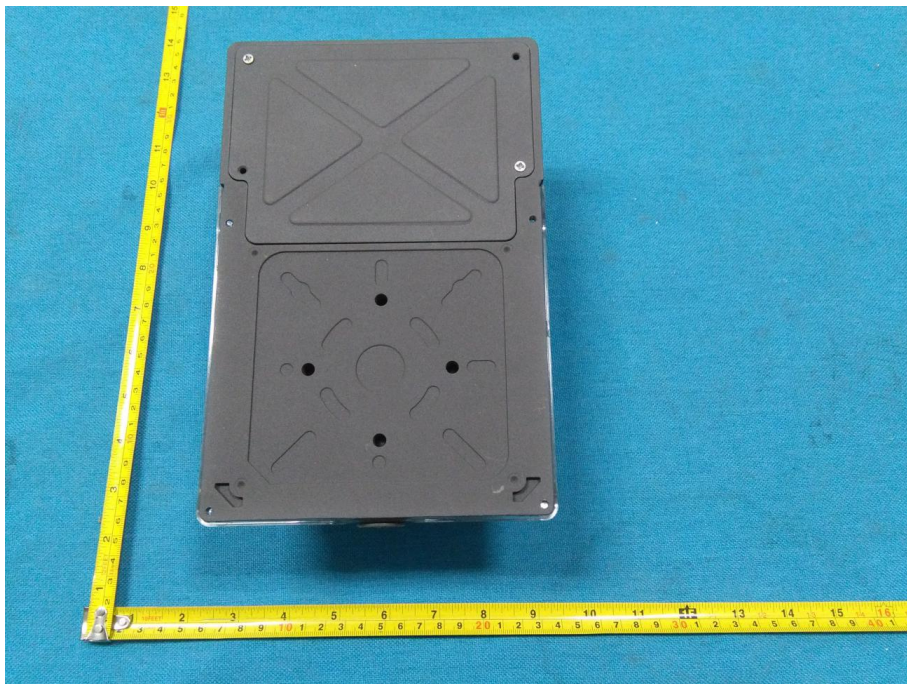
C/ $\gamma(^{\circ})$	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	649.89	690.80	654.95	737.42	579.51	433.92	309.66	257.76	223.23
22.5	597.11	641.75	685.96	727.75	776.79	627.02	564.56	481.64	437.44
45.0	548.06	550.04	531.35	660.45	641.09	658.91	630.98	607.44	609.86
67.5	561.26	561.26	502.98	523.65	579.29	556.42	557.52	609.86	581.93
90.0	530.69	561.04	551.36	515.51	552.46	575.11	558.40	612.72	585.67
112.5	578.85	522.55	547.18	527.61	608.32	545.64	602.17	635.16	632.30
135.0	477.03	598.87	568.74	654.95	684.64	651.87	548.94	582.81	587.21
157.5	510.68	563.90	618.22	593.81	650.55	514.41	512.43	411.93	337.81
180.0	649.89	640.87	666.39	691.90	766.89	673.20	573.80	359.36	268.53
202.5	597.11	638.45	671.88	638.45	820.12	687.50	686.18	289.43	126.46
225.0	548.06	626.14	679.14	665.73	720.93	507.16	203.65	67.96	38.27
247.5	561.26	621.96	579.07	708.39	383.78	126.90	64.66	56.08	33.87
270.0	530.69	614.04	656.05	607.00	255.56	58.72	36.73	24.41	18.25
292.5	578.85	620.86	590.29	662.87	384.22	180.34	57.62	66.20	45.31
315.0	477.03	612.72	685.74	617.34	704.65	625.92	311.86	116.56	49.92
337.5	510.68	619.10	652.31	685.96	786.47	791.30	696.08	453.71	164.73
360.0	649.89	690.80	654.95	737.42	579.51	433.92	309.66	257.76	223.23
C/ $\gamma(^{\circ})$	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	170.01	126.02	82.47	60.48	47.73	42.45	27.27	28.59	27.49
22.5	401.37	337.15	262.60	228.29	160.11	112.38	87.97	82.91	69.72
45.0	545.42	521.67	508.92	425.56	350.13	266.77	189.58	139.88	101.39
67.5	605.46	563.46	599.31	546.30	449.98	396.75	319.78	254.02	172.86
90.0	589.63	609.86	553.12	559.28	471.75	419.62	350.13	293.39	208.05
112.5	617.12	565.66	586.11	520.79	430.62	359.80	285.03	219.93	148.01
135.0	555.32	488.02	439.20	356.95	310.98	229.61	157.03	109.96	95.01
157.5	334.95	287.01	218.39	160.55	107.11	82.25	75.44	68.18	57.18
180.0	237.74	178.80	135.92	94.13	64.66	48.60	38.71	25.95	22.65
202.5	85.33	48.82	34.97	27.49	18.03	9.90	10.34	7.04	7.04
225.0	26.61	22.43	16.72	10.78	7.48	5.50	4.84	7.26	7.92
247.5	23.75	16.72	12.10	7.92	4.18	1.76	1.54	1.54	1.32
270.0	13.86	9.24	6.16	3.52	1.98	1.32	1.32	1.10	0.88
292.5	28.59	18.25	14.52	8.80	4.84	2.42	2.20	1.54	1.54
315.0	30.13	27.27	20.89	12.54	8.36	6.16	4.84	5.50	6.60
337.5	115.24	63.12	43.11	33.21	26.39	17.59	11.88	9.24	8.36
360.0	170.01	126.02	82.47	60.48	47.73	42.45	27.27	28.59	27.49
C/ $\gamma(^{\circ})$	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	32.55	37.83	44.65	45.75	42.89	37.83	34.97	28.37	18.25
22.5	63.56	64.22	62.68	58.72	50.36	36.73	28.81	22.21	29.25
45.0	87.09	79.17	71.70	50.80	36.29	36.73	40.69	44.87	43.77
67.5	140.97	132.62	88.41	84.89	122.94	110.18	83.35	56.30	36.29
90.0	172.86	148.45	101.39	90.61	129.98	138.12	125.58	107.55	88.19
112.5	129.10	113.48	76.54	81.15	112.82	101.17	80.49	56.30	35.41
135.0	83.57	75.66	68.84	47.95	32.77	31.45	33.65	37.61	36.95
157.5	62.68	64.00	63.12	54.76	41.35	28.81	23.31	19.79	26.83
180.0	21.77	25.29	31.89	37.61	40.69	40.69	34.75	27.27	24.85
202.5	7.48	8.14	8.80	9.68	10.34	10.78	10.34	9.90	10.56
225.0	6.60	6.16	6.60	5.94	5.28	4.62	4.18	3.52	2.64
247.5	1.32	1.10	1.32	1.32	1.32	1.32	1.10	1.32	1.32
270.0	1.10	1.10	1.10	1.32	1.32	1.32	1.32	1.32	1.10
292.5	1.54	1.54	1.54	1.76	1.76	1.54	1.54	1.76	1.76
315.0	6.60	6.16	6.38	6.82	6.16	5.72	5.06	4.18	3.30
337.5	8.80	9.24	10.34	11.44	12.10	12.54	12.98	14.08	14.08
360.0	32.55	37.83	44.65	45.75	42.89	37.83	34.97	28.37	18.25



C/ γ (°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	23.75	25.29	20.01	15.18	9.46	3.74	0.66	0.66	0.66
22.5	32.55	27.93	21.33	14.96	8.80	3.52	0.66	0.66	0.66
45.0	37.17	27.71	18.03	10.12	4.62	1.98	0.66	0.66	0.66
67.5	31.23	32.55	30.35	23.31	9.24	0.66	0.88	0.88	0.88
90.0	71.04	56.08	42.89	29.47	14.30	1.10	0.88	0.88	0.88
112.5	27.27	27.93	27.27	21.11	8.80	1.10	0.88	0.88	0.88
135.0	30.13	21.77	15.18	9.02	4.62	2.42	1.10	1.10	1.10
157.5	28.59	23.31	17.37	11.88	7.26	3.52	1.32	1.10	1.10
180.0	21.33	14.96	20.45	21.11	16.50	12.54	7.92	3.52	0.88
202.5	8.80	4.62	9.46	9.02	6.16	4.40	2.86	1.32	0.88
225.0	2.64	3.96	4.18	4.40	3.74	2.86	1.54	1.10	0.88
247.5	1.32	1.32	1.32	1.10	1.10	1.10	0.88	0.88	0.88
270.0	1.32	1.10	1.10	1.10	1.10	0.88	0.88	0.88	0.88
292.5	1.76	1.54	1.54	1.54	1.54	1.32	1.10	0.88	0.88
315.0	3.08	5.06	5.94	5.94	4.40	3.30	1.98	1.10	0.88
337.5	12.76	6.82	12.98	12.76	8.58	5.72	3.52	1.32	0.88
360.0	23.75	25.29	20.01	15.18	9.46	3.74	0.66	0.66	0.66
C/ γ (°)	180.0								
0.0	0.66								
22.5	0.66								
45.0	0.88								
67.5	0.88								
90.0	0.88								
112.5	0.88								
135.0	0.88								
157.5	0.88								
180.0	0.66								
202.5	0.66								
225.0	0.88								
247.5	0.88								
270.0	0.88								
292.5	0.88								
315.0	0.88								
337.5	0.88								
360.0	0.66								



Photo Document



End of test report