



Shenzhen Belling Efficiency Testing Lab



Report No.:BL170809003-9

Date of issue 2017-08-16

Version 1.1

Total pages 14

**Test report of**

**IES LM-79-08**

**Approved Method: Electrical and Photometric**

**Measurements of Solid-State Lighting Products**

**Applicant:**

P.Q.L., Inc.

**Address:**

2285 Ward Avenue  
Simi Valley, CA 93065

**For Product:**

High Bay Luminaires for Commercial and Industrial Buildings

**Model No.:**

90382\_30K, 9038X\_35K, 9038X\_40K, 9038X\_45K, 90383\_50K, 9038X\_57K  
90382 was selected as the representative model for all the measurements.  
9038X is all the same except CCT.

**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: 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 Federal Government.**





# 1 General

## 1.1 Product Information

<b>Manufacturer</b>	P.Q.L., Inc.
<b>Manufacturer Address</b>	2285 Ward Avenue Simi Valley, CA 93065
<b>Brand Name</b>	Superior Life®
<b>Luminaire Type</b>	High Bay Luminaires for Commercial and Industrial Buildings
<b>Model Number</b>	90382 9038X_57K
<b>Rated Inputs</b>	AC 100-277V 50/60Hz
<b>Rated Power</b>	300 W
<b>Nominal CCT</b>	3000K / 5700K
<b>Date of Receipt Samples</b>	2017-07-28

## 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
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  $\pm 0.2$  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.  $4\pi$  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
90382	120.0	60	2.569	307.4	0.997
9038X_57K	120.0	60	2.574	307.9	0.997

#### 3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
90382	40238.66	130.9	2995	82.1	8
9038X_57K	43259.95	140.5	5484	84.4	17

#### 3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
90382	0.000	0.4373	0.4041	0.2508	0.5214
9038X_57K	0.003	0.3329	0.3474	0.2048	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
90382	120.06	60	2.5885	309.95	0.9973

#### 3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 20-50°(%lm)
40545.82	130.81	53.677



### 3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
90382	Power Factor	277	60	0.947
	THDi	277	60	13.9%





## 4 Test Data

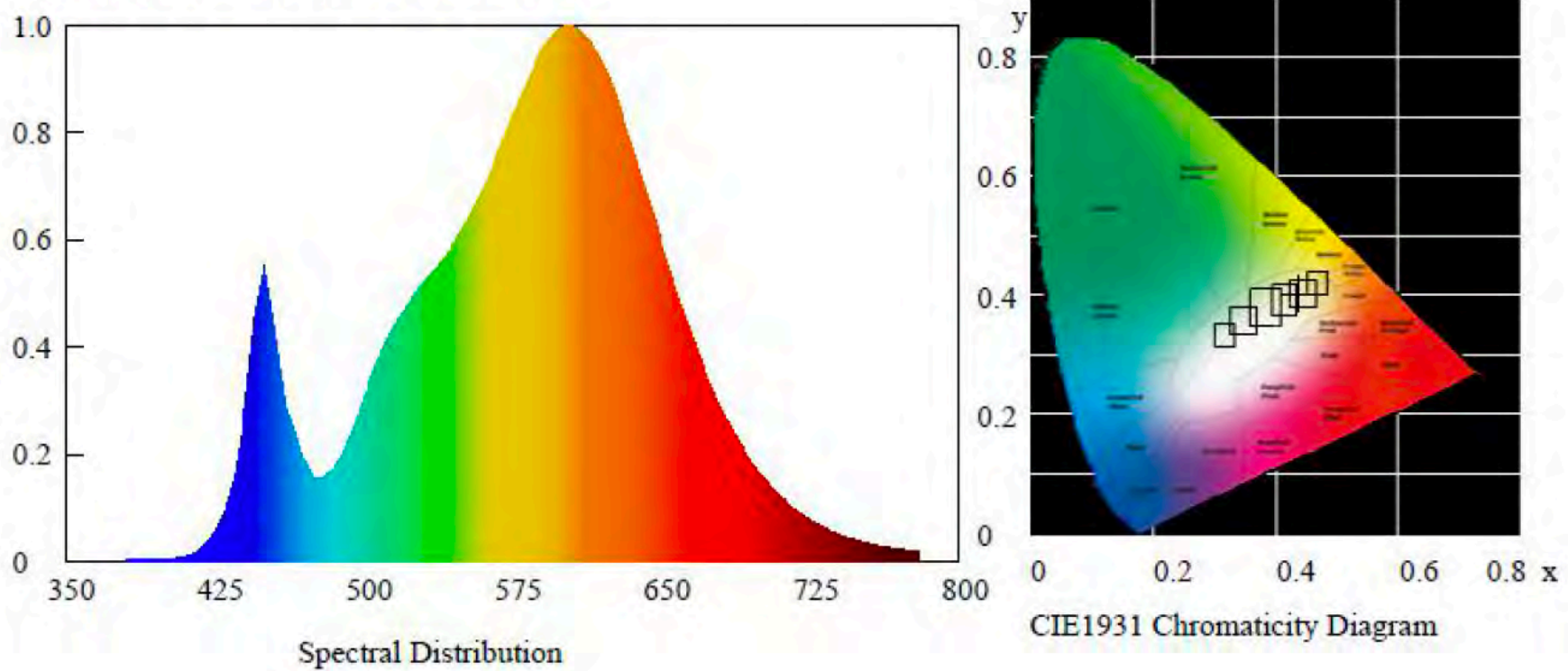
90382

### Test Condition

Temperature: 25°C  
Spectrum Range: 380-780 nm

RH: 58%  
Scan Step: 5 nm

### Spectroradiometric Parameters



Chromaticity Coordinates:  $x=0.4373$   $y=0.4041$   $u'=0.2508$   $v'=0.5214$

Correlated Color Temperature: 2995 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index:  $R_f=82$

Gamut Index:  $R_g=97$

Luminous Flux: 40238.66 lm

Purity: 0.5286

Chromaticity Difference: 0.000Duv

Peak Wavelength: 605.0 nm

Color Ratio:  $K_r=44.8\%$   $K_g=48.2\%$   $K_b=7.0\%$

Bandwidth: 130.5nm

Radiant Flux: 112.648 W

Photosynthetically Active Radiation(PAR): 109.02W

Photosynthetic Photon Flux(PPF): 530.04 $\mu$ mol/s

Rendering Index:  $R_a=82.1$

$R_1=80$   $R_2=89$   $R_3=97$   $R_4=81$   $R_5=80$   $R_6=87$   $R_7=84$   $R_8=60$

$R_9=8$   $R_{10}=76$   $R_{11}=80$   $R_{12}=69$   $R_{13}=83$   $R_{14}=98$   $R_{15}=73$   $R_e=76$

### Electric Parameters

Voltage: 120.0 V

Current: 2.569 A

Power Factor: 0.997

Power: 307.4 W

Luminous Efficacy: 130.9 lm/W



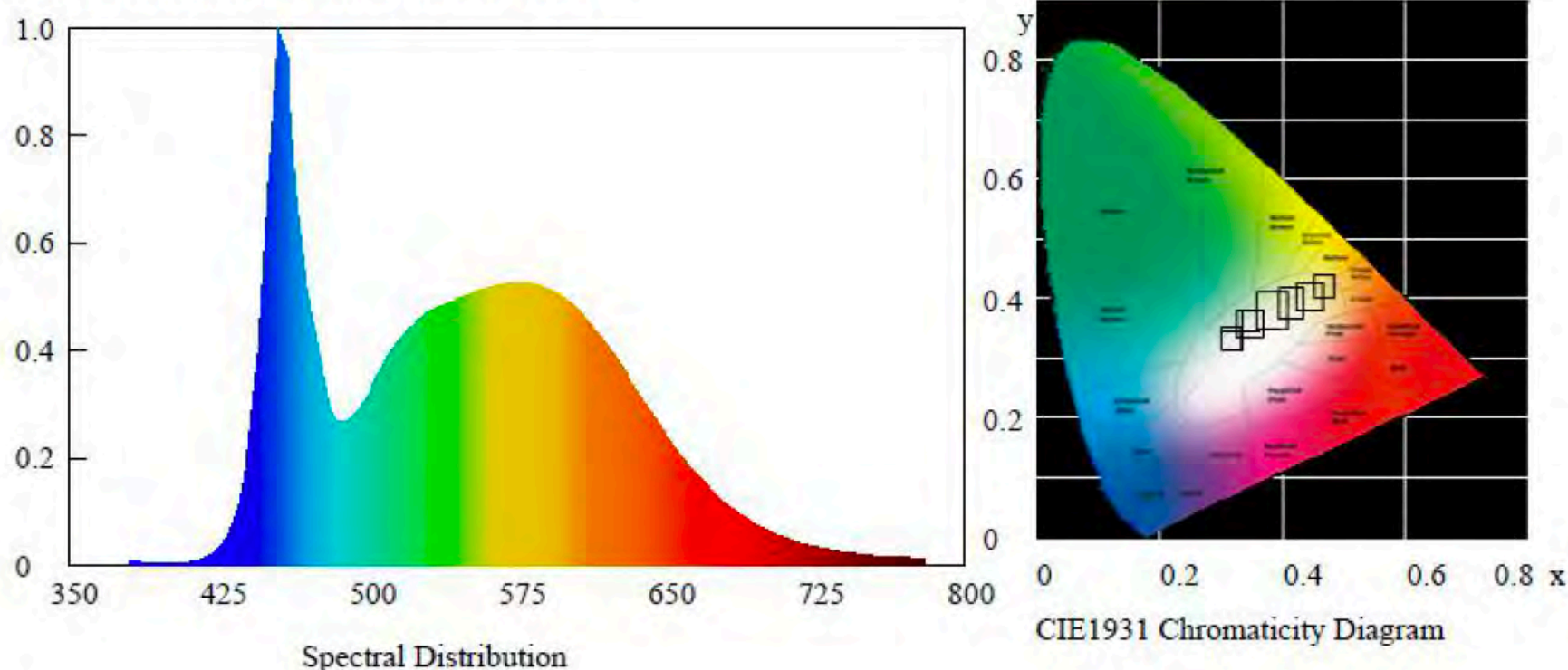
**9038X\_57K****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 380-780 nm

Scan Step: 5 nm

**Spectroradiometric Parameters**Chromaticity Coordinates:  $x=0.3329$   $y=0.3474$   $u'=0.2048$   $v'=0.4808$ 

Correlated Color Temperature: 5484 K

Dominant Wavelength: 553.0 nm(E)

Colour Fidelity Index:  $R_f=80$ Gamut Index:  $R_g=92$ 

Luminous Flux: 43259.95 lm

Purity: 0.0416

Chromaticity Difference: 0.003Duv

Peak Wavelength: 455.0 nm

Color Ratio:  $K_r=32.7\%$   $K_g=55.1\%$   $K_b=12.2\%$ 

Bandwidth: 27.7nm

Radiant Flux: 123.085 W

Photosynthetically Active Radiation(PAR): 120.41W

Photosynthetic Photon Flux(PPF):553.26 $\mu$ mol/sRendering Index:  $R_a=84.4$  $R_1=84$   $R_2=93$   $R_3=95$   $R_4=80$   $R_5=82$   $R_6=87$   $R_7=86$   $R_8=69$  $R_9=17$   $R_{10}=80$   $R_{11}=79$   $R_{12}=58$   $R_{13}=87$   $R_{14}=97$   $R_{15}=79$   $R_e=78$ **Electric Parameters**

Voltage: 120.0 V

Current: 2.574 A

Power Factor: 0.997

Power: 307.9 W

Luminous Efficacy: 140.5 lm/W





## Zonal Flux Diagram

Zonal flux distribution table

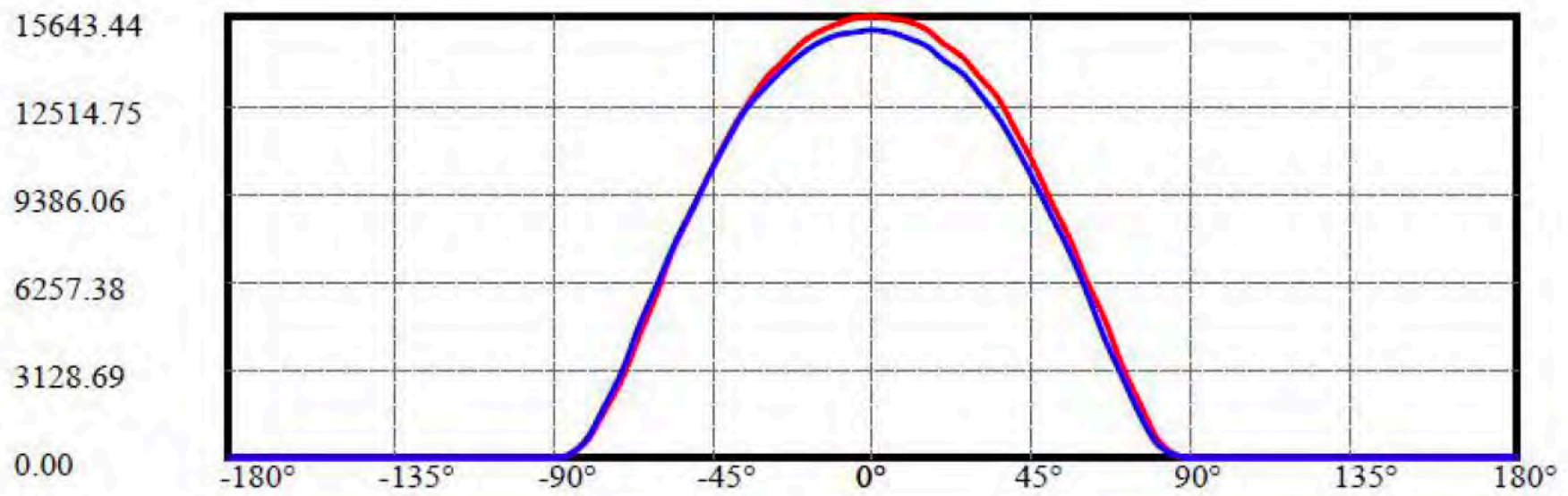
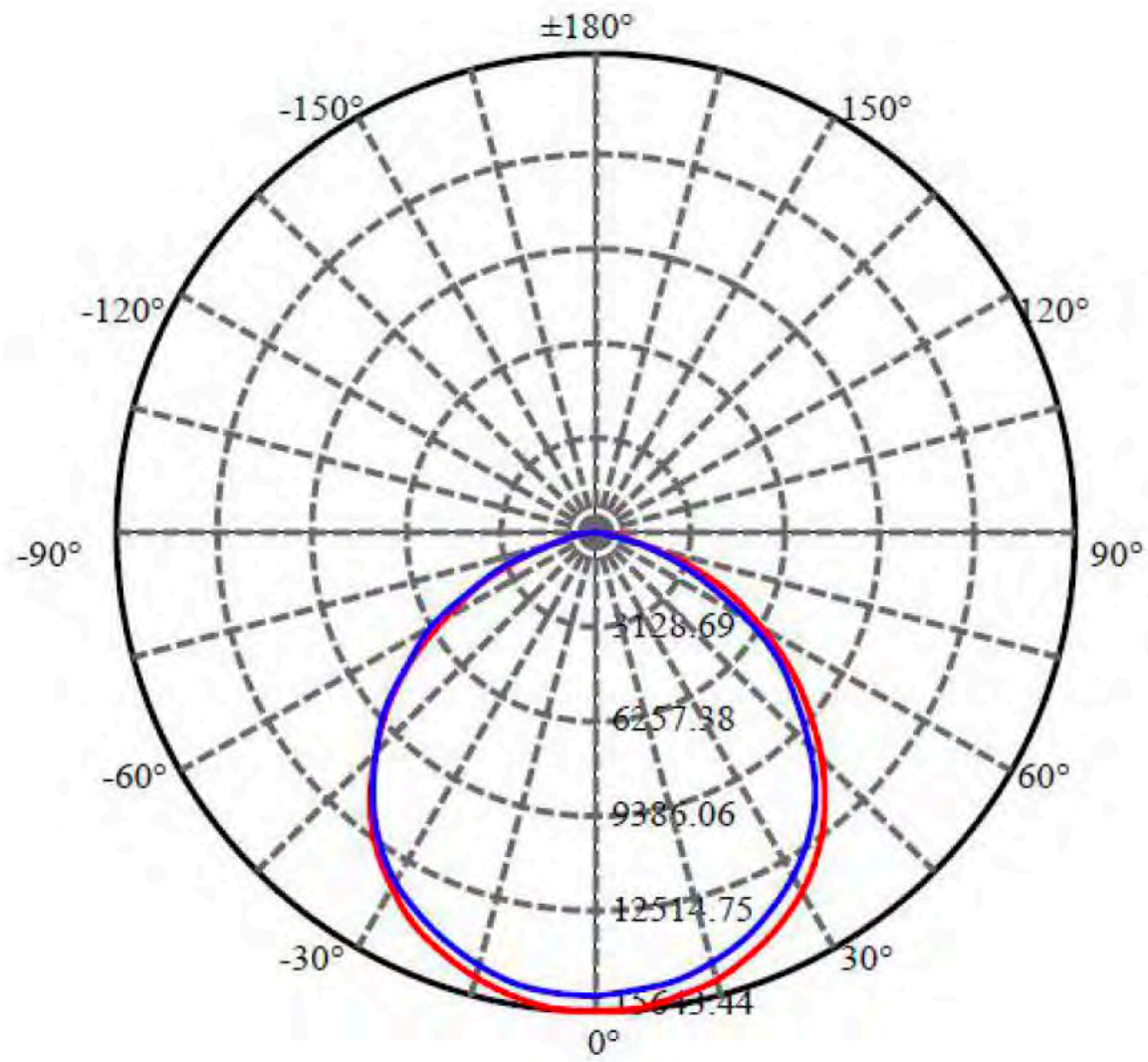
$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	15251.320	.000	.000	.000%	.000%
5.0	15181.810	363.820	363.820	.897%	.897%
10.0	15011.900	1080.124	1443.943	2.664%	3.561%
15.0	14710.850	1763.134	3207.077	4.348%	7.910%
20.0	14294.420	2390.442	5597.520	5.896%	13.805%
25.0	13756.320	2942.005	8539.524	7.256%	21.061%
30.0	13083.120	3396.554	11936.080	8.377%	29.438%
35.0	12276.020	3734.312	15670.390	9.210%	38.649%
40.0	11290.740	3931.937	19602.330	9.698%	48.346%
45.0	10045.400	3950.561	23552.890	9.743%	58.090%
50.0	8801.380	3808.268	27361.160	9.393%	67.482%
55.0	7471.417	3538.248	30899.400	8.727%	76.209%
60.0	6038.039	3122.673	34022.080	7.702%	83.910%
65.0	4413.411	2540.767	36562.840	6.266%	90.177%
70.0	2995.498	1875.983	38438.830	4.627%	94.803%
75.0	1649.687	1214.177	39653.000	2.995%	97.798%
80.0	642.301	613.272	40266.280	1.513%	99.311%
85.0	107.044	203.615	40469.890	.502%	99.813%
90.0	2.116	29.889	40499.780	.074%	99.886%
95.0	1.564	1.008	40500.790	.002%	99.889%
100.0	1.840	.925	40501.710	.002%	99.891%
105.0	2.523	1.167	40502.880	.003%	99.894%
110.0	3.574	1.594	40504.480	.004%	99.898%
115.0	5.033	2.179	40506.660	.005%	99.903%
120.0	6.531	2.811	40509.470	.007%	99.910%
125.0	8.108	3.384	40512.850	.008%	99.919%
130.0	9.685	3.869	40516.720	.010%	99.928%
135.0	10.999	4.179	40520.900	.010%	99.939%
140.0	12.195	4.294	40525.190	.011%	99.949%
145.0	13.154	4.229	40529.420	.010%	99.960%
150.0	14.153	4.021	40533.440	.010%	99.969%
155.0	14.757	3.659	40537.100	.009%	99.978%
160.0	14.981	3.119	40540.220	.008%	99.986%
165.0	14.889	2.462	40542.680	.006%	99.992%
170.0	14.613	1.750	40544.430	.004%	99.997%
175.0	14.691	1.048	40545.480	.003%	99.999%
180.0	15.401	.360	40545.840	.001%	100.000%





### Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]



C0/C180: ———

C90/C270: ———

Field angle(10%Imax):C0/180Left:75.0 Right:76.2

:C90/270Left:76.1 Right:75.0

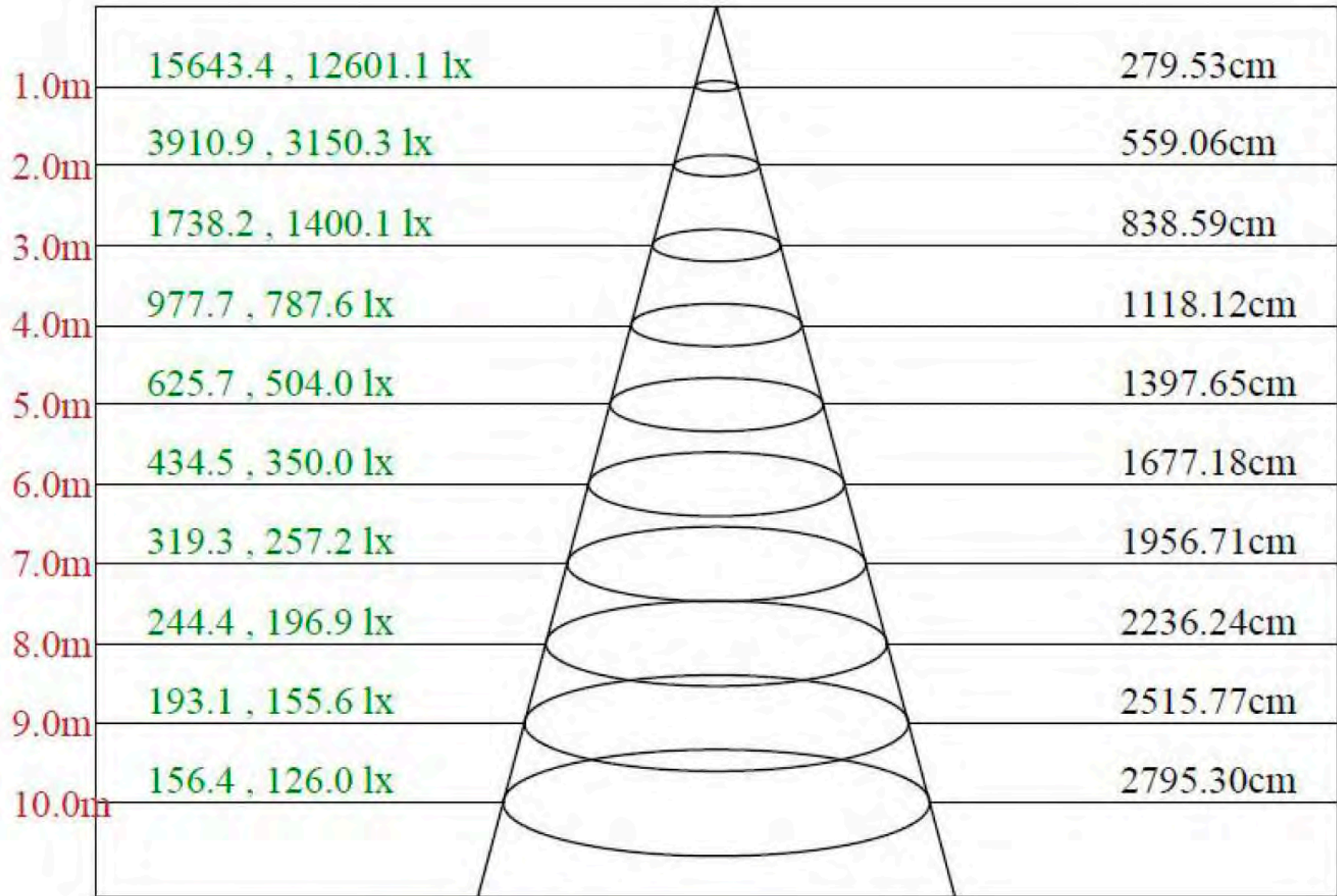
Beam Angle(50%Imax):C0/180Left:53.6 Right:54.9

:C90/270Left:55.0 Right:54.0





Lux distance Curve



Max , Ave      Beam angle of C0plane108.81



**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	15643.44	15569.85	15410.06	15130.43	14705.73	14188.51	13503.10	12697.84	11663.41
22.5	15456.32	15416.37	15222.94	14926.49	14518.60	13992.98	13309.67	12453.95	11444.75
45.0	15296.53	15220.84	15073.66	14760.39	14354.61	13835.29	13141.47	12323.59	11257.63
67.5	15197.71	15111.51	14941.21	14627.93	14222.15	13679.71	13009.01	12216.37	11186.14
90.0	15140.94	15023.20	14882.33	14558.55	14131.74	13574.58	12914.40	12081.81	11108.35
112.5	15086.28	15012.69	14804.54	14478.66	14043.44	13524.12	12830.30	12037.65	11024.25
135.0	15098.89	14997.97	14760.39	14487.07	14028.72	13498.89	12788.25	11978.78	10959.07
157.5	15090.48	14995.87	14777.21	14445.02	14024.52	13446.33	12796.66	11968.27	10956.97
180.0	15643.44	15559.34	15384.83	15037.92	14627.93	14030.82	13366.43	12479.18	11451.06
202.5	15456.32	15397.45	15222.94	14892.85	14478.66	13892.06	13168.80	12321.49	11327.01
225.0	15296.53	15243.97	15079.97	14787.72	14333.58	13774.32	13091.01	12275.24	11287.06
247.5	15197.71	15134.64	14981.15	14684.70	14281.02	13736.47	13036.34	12256.31	11327.01
270.0	15140.94	15090.48	14937.00	14644.75	14245.28	13719.65	13074.19	12313.08	11354.34
292.5	15086.28	15031.61	14886.54	14611.11	14232.66	13721.76	13082.60	12296.26	11400.60
315.0	15098.89	15058.95	14918.08	14640.55	14230.56	13736.47	13099.42	12340.41	11444.75
337.5	15090.48	15044.23	14907.57	14659.47	14251.58	13749.09	13118.34	12376.16	11459.47
360.0	15643.44	15569.85	15410.06	15130.43	14705.73	14188.51	13503.10	12697.84	11663.41
$C/\gamma(^{\circ})$	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	10397.70	9140.41	7792.71	6337.78	4826.08	3258.88	1826.65	709.59	123.63
22.5	10197.97	8900.72	7523.59	6066.55	4344.61	3023.61	1730.99	731.04	148.65
45.0	10048.69	8825.03	7477.33	5992.97	4153.28	2975.88	1641.84	658.50	134.56
67.5	9970.90	8705.19	7372.21	5957.22	4146.76	2909.23	1585.92	556.95	91.46
90.0	9855.26	8623.19	7321.75	5913.07	4160.01	2877.69	1502.03	512.17	63.92
112.5	9790.08	8536.99	7252.36	5793.23	4181.45	2804.53	1440.84	458.98	49.20
135.0	9781.67	8513.86	7180.88	5753.28	4177.25	2709.49	1360.74	417.35	48.36
157.5	9697.57	8454.99	7174.57	5719.64	4167.37	2653.36	1359.69	407.04	41.63
180.0	10107.56	8808.21	7443.69	5917.28	4281.53	2851.83	1560.90	603.42	109.12
202.5	10004.54	8713.60	7336.46	5883.64	4273.12	2820.29	1560.90	621.71	114.17
225.0	10000.33	8782.98	7391.13	5942.51	4329.89	2906.50	1621.87	605.94	117.74
247.5	10086.53	8804.01	7460.51	6079.17	4504.40	3005.31	1676.53	646.73	114.17
270.0	10124.38	8921.75	7578.25	6184.29	4649.47	3156.69	1754.33	672.59	126.36
292.5	10191.66	8989.03	7746.45	6304.14	4739.88	3249.20	1869.96	745.76	129.94
315.0	10218.99	9028.98	7721.22	6360.90	4840.80	3360.64	1922.53	900.08	147.39
337.5	10252.63	9073.13	7769.58	6402.95	4838.69	3364.84	1979.29	1028.96	152.43
360.0	10397.70	9140.41	7792.71	6337.78	4826.08	3258.88	1826.65	709.59	123.63
$C/\gamma(^{\circ})$	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	1.05	0.63	0.84	1.26	3.15	4.84	6.10	7.99	9.25
22.5	1.05	0.84	1.26	2.10	3.57	4.63	6.10	7.78	9.46
45.0	1.26	1.05	1.26	2.10	3.36	4.84	6.31	7.78	9.46
67.5	1.26	1.05	1.47	2.31	3.15	4.84	6.31	7.99	9.46
90.0	1.47	1.05	1.47	2.31	3.36	4.84	6.52	7.99	9.46
112.5	1.26	1.05	1.47	2.52	3.36	5.05	6.73	8.20	9.67
135.0	1.26	1.26	1.68	2.73	3.36	5.26	6.73	8.41	10.09
157.5	1.26	0.84	1.47	2.52	3.79	5.47	6.94	8.41	10.09
180.0	2.31	1.89	2.10	2.73	3.79	5.47	6.73	8.41	10.09
202.5	2.31	1.89	2.52	2.73	4.00	5.26	6.94	8.41	10.09
225.0	2.52	2.10	2.31	2.94	3.79	5.26	6.73	8.41	10.09
247.5	2.52	2.31	2.52	2.94	3.79	5.26	6.52	7.99	9.46
270.0	2.94	2.10	2.31	2.94	3.79	4.84	6.52	7.99	9.67
292.5	3.36	2.31	2.31	2.73	3.79	4.84	6.52	7.99	9.46
315.0	3.57	2.31	2.10	2.73	3.57	5.05	6.52	7.99	9.67
337.5	4.42	2.31	2.31	2.73	3.57	4.84	6.31	7.99	9.46
360.0	1.05	0.63	0.84	1.26	3.15	4.84	6.10	7.99	9.25



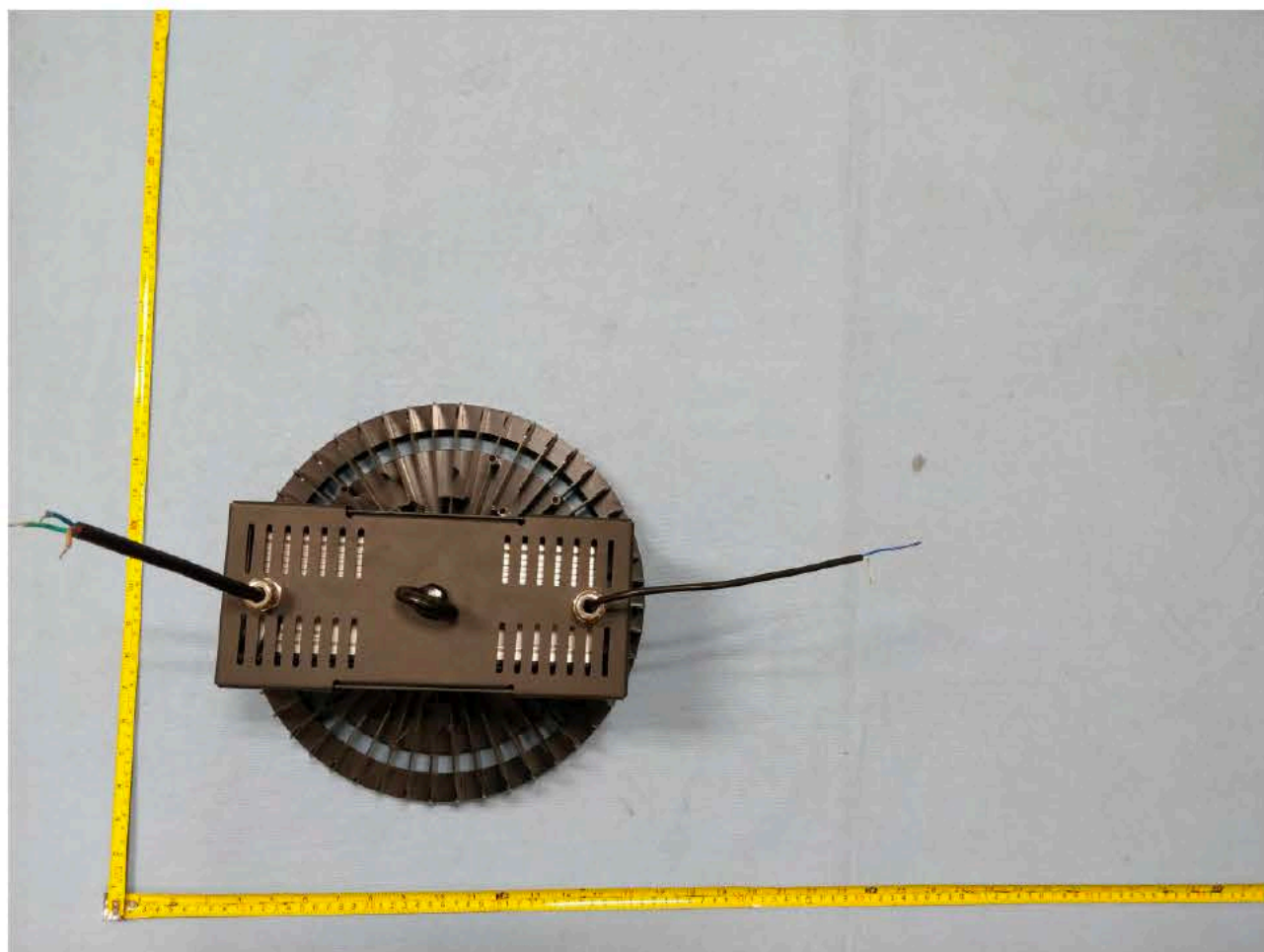
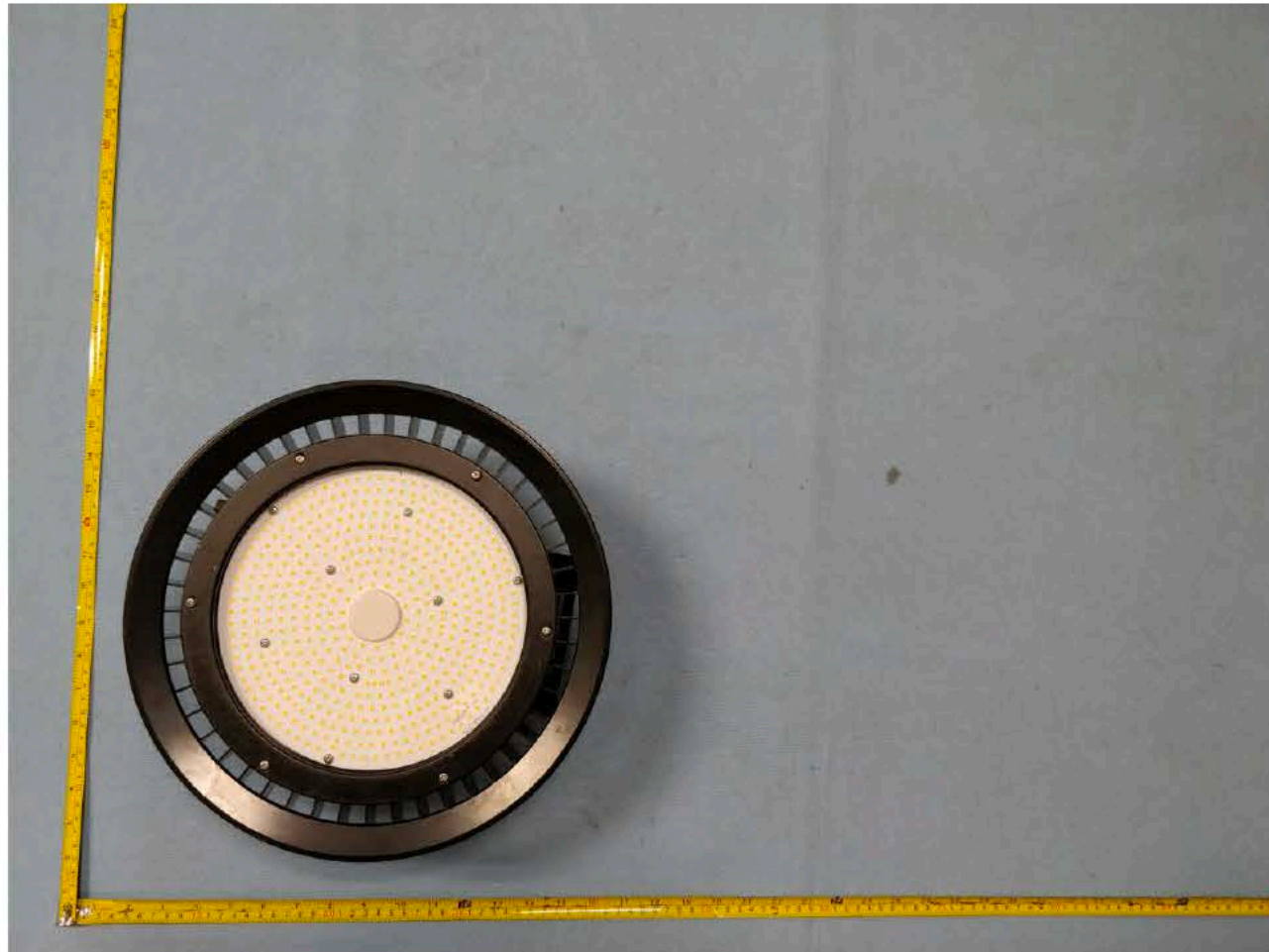


C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	10.72	11.98	13.25	14.09	14.93	14.93	14.72	14.30	14.72
22.5	10.72	12.20	13.04	14.30	14.72	14.93	14.93	14.72	14.93
45.0	10.72	11.98	12.83	13.88	14.51	14.72	14.72	14.51	14.93
67.5	10.72	11.77	13.04	13.67	14.30	14.72	14.72	14.51	14.72
90.0	10.93	12.20	13.04	13.67	14.30	14.72	14.51	14.51	14.72
112.5	10.93	12.41	13.04	14.09	14.30	14.72	14.72	14.30	14.93
135.0	11.35	12.41	13.46	14.30	14.72	14.93	14.93	14.72	14.93
157.5	11.35	12.62	13.46	14.30	15.14	15.35	14.93	14.72	14.93
180.0	11.56	12.83	13.67	14.93	15.56	15.56	15.56	15.14	14.51
202.5	11.35	12.41	13.46	14.72	15.56	15.35	15.35	14.93	14.93
225.0	11.35	12.20	13.25	14.51	15.14	15.35	14.93	14.93	14.51
247.5	10.93	12.41	13.04	14.09	14.72	15.14	15.14	14.72	14.51
270.0	10.93	11.98	13.04	14.09	14.30	14.72	14.72	14.30	14.51
292.5	10.72	11.77	13.04	13.67	14.30	14.51	14.51	14.30	14.30
315.0	10.93	11.98	12.83	14.09	14.72	14.93	14.93	14.51	14.51
337.5	10.72	11.98	13.04	14.09	14.93	15.14	14.93	14.72	14.51
360.0	10.72	11.98	13.25	14.09	14.93	14.93	14.72	14.30	14.72
C/γ(°)	180.0								
0.0	15.35								
22.5	15.77								
45.0	15.35								
67.5	15.56								
90.0	15.35								
112.5	15.35								
135.0	15.14								
157.5	15.35								
180.0	15.35								
202.5	15.77								
225.0	15.35								
247.5	15.56								
270.0	15.35								
292.5	15.35								
315.0	15.14								
337.5	15.35								
360.0	15.35								





## Photo Document



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