



Shenzhen Belling Efficiency Testing Lab



Report No.:BL170913012-9

Date of issue 2017-09-18  
Version 1.0  
Total pages 15

**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.:**

90380\_30K, 9038X\_35K, 9038X\_40K, 9038X\_45K, 90381\_50K, 9038X\_57K

90380 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.**





Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
90380	3000K	31940.16	235.2	135.8
9038X_35K	3500K	32617.15 *1	236.3 *2	138.0 *3
9038X_40K	4000K	33294.14 *1	236.3 *2	140.9 *3
9038X_45K	4500K	33971.14 *1	236.3 *2	143.8 *3
90381	5000K	34648.13 *1	236.3 *2	146.6 *3
9038X_57K	5700K	35325.12	237.4	148.8

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

$$32617.15=(35325.12-31940.16) /5+31940.16$$

$$33294.14=(35325.12-31940.16) /5+32617.15$$

$$33971.14=(35325.12-31940.16) /5+33294.14$$

$$34648.13=(35325.12-31940.16) /5+33971.14$$

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

$$236.3=(235.2+237.4)/2$$

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

$$138.0 =32617.15 /236.3$$

$$140.9=33294.14 /236.3$$

$$143.8=33971.14 /236.3$$

$$146.6=34648.13 /236.3$$



# 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>	90380_30K 9038X_57K
<b>Rated Inputs</b>	AC 100-277V 50/60Hz
<b>Rated Power</b>	240 W
<b>Nominal CCT</b>	3000K / 5700K
<b>Date of Receipt Samples</b>	2017-08-24

## 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	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  $\pm 0.2$  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
90380	120.0	60	1.972	235.2	0.994
9038X_57K	120.1	60	1.989	237.4	0.994

#### 3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
90380	31940.16	135.8	2949	82.4	8
9038X_57K	35325.12	148.8	5452	84.0	14

#### 3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
90380	0.000	0.4410	0.4060	0.2524	0.5227
9038X_57K	0.003	0.3337	0.3485	0.2049	0.4815

### 3.2 Goniophotometer System

#### 3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
90380	120.16	60	1.9671	234.98	0.9941

#### 3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 20-50°(%lm)
31748.58	135.11	53.162



### 3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
90380	Power Factor	277	60	0.953
	THDi	277	60	14.1%





## 4 Test Data

90380

### Test Condition

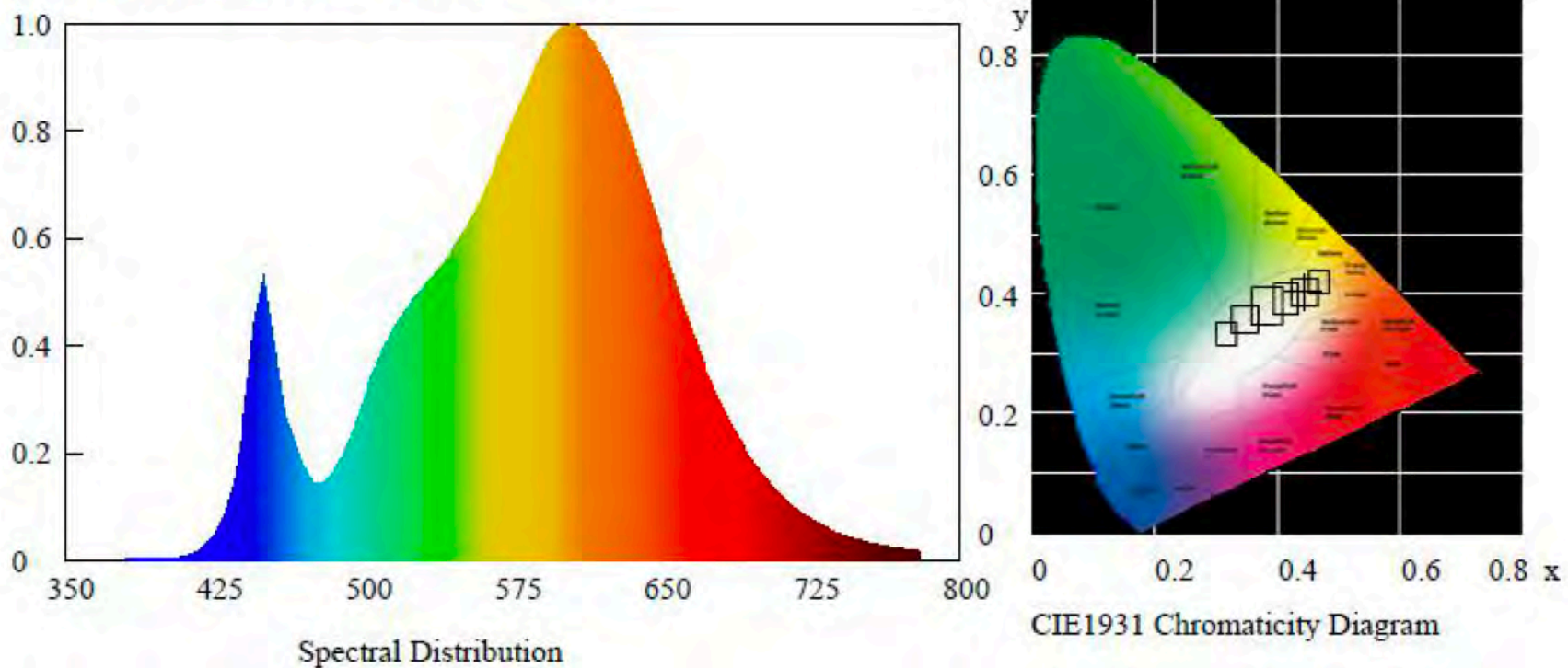
Temperature: 25°C

RH: 58%

Spectrum Range: 380-780 nm

Scan Step: 5 nm

### Spectroradiometric Parameters



Chromaticity Coordinates:  $x=0.4410$   $y=0.4060$   $u'=0.2524$   $v'=0.5227$

Correlated Color Temperature: 2949 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index:  $R_f=82$

Gamut Index:  $R_g=97$

Luminous Flux: 31940.16 lm

Purity: 0.5460

Chromaticity Difference: 0.000Duv

Peak Wavelength: 605.0 nm

Color Ratio:  $K_r=45.1\%$   $K_g=48.0\%$   $K_b=6.9\%$

Bandwidth: 128nm

Radiant Flux: 78.743 W

Photosynthetically Active Radiation(PAR): 76.19W

Photosynthetic Photon Flux(PPF):371.21 $\mu$ mol/s

Rendering Index:  $R_a=82.4$

$R_1=81$   $R_2=90$   $R_3=97$   $R_4=81$   $R_5=80$   $R_6=87$   $R_7=84$   $R_8=60$

$R_9=8$   $R_{10}=76$   $R_{11}=81$   $R_{12}=69$   $R_{13}=83$   $R_{14}=98$   $R_{15}=73$   $R_e=77$

### Electric Parameters

Voltage: 120.0 V

Current: 1.972 A

Power Factor: 0.994

Power: 235.2 W

Luminous Efficacy: 135.8 lm/W



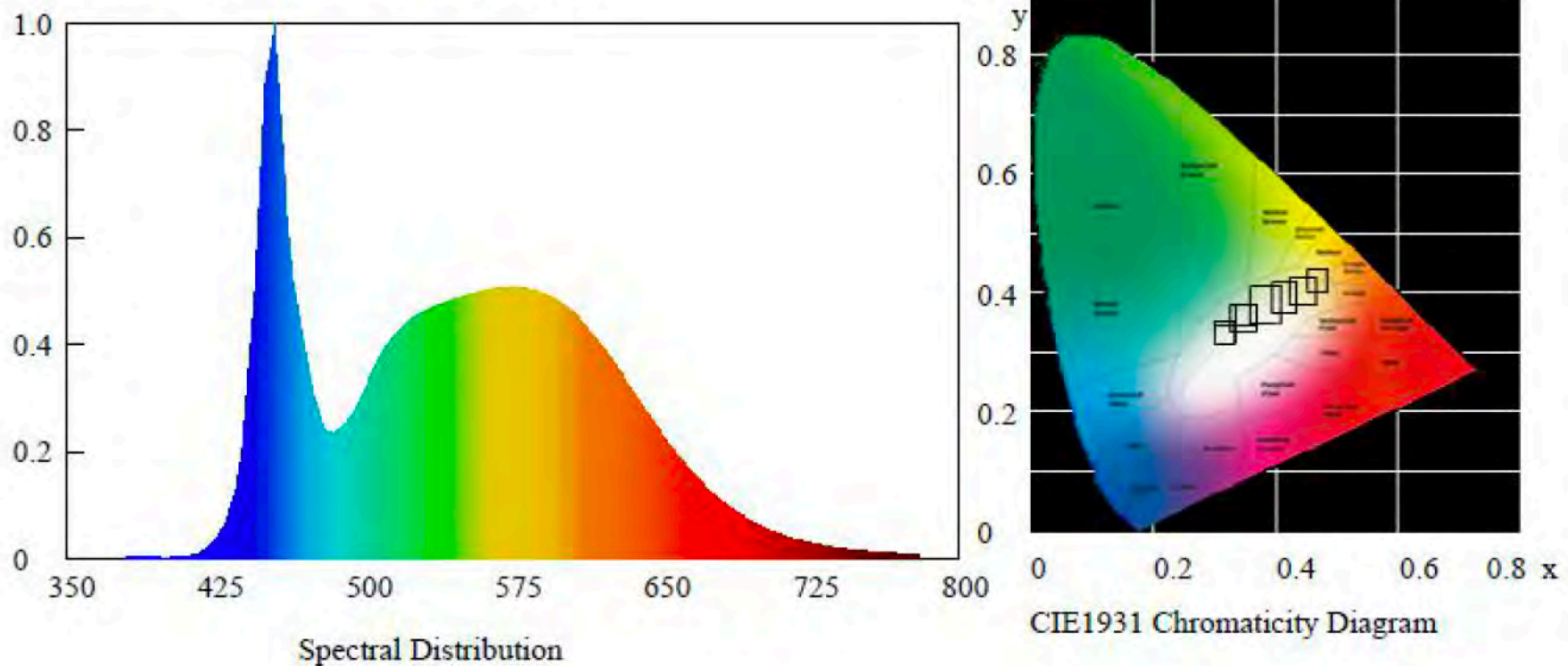
**9038X\_57K****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 380-780 nm

Scan Step: 5 nm

**Spectroradiometric Parameters**Chromaticity Coordinates:  $x=0.3337$   $y=0.3485$   $u'=0.2049$   $v'=0.4815$ 

Correlated Color Temperature: 5452 K

Dominant Wavelength: 554.0 nm(E)

Colour Fidelity Index:  $R_f=81$ Gamut Index:  $R_g=93$ 

Luminous Flux: 35325.12 lm

Purity: 0.0467

Chromaticity Difference: 0.003Duv

Peak Wavelength: 455.0 nm

Color Ratio:  $K_r=32.5\%$   $K_g=55.5\%$   $K_b=12.0\%$ 

Bandwidth: 24.1nm

Radiant Flux: 86.55 W

Photosynthetically Active Radiation(PAR): 84.94W

Photosynthetic Photon Flux(PPF):390.28 $\mu$ mol/sRendering Index:  $R_a=84.0$  $R_1=83$   $R_2=90$   $R_3=94$   $R_4=82$   $R_5=82$   $R_6=84$   $R_7=88$   $R_8=69$  $R_9=14$   $R_{10}=75$   $R_{11}=81$   $R_{12}=57$   $R_{13}=86$   $R_{14}=96$   $R_{15}=78$   $R_e=77$ **Electric Parameters**

Voltage: 120.1 V

Current: 1.989 A

Power Factor: 0.994

Power: 237.4 W

Luminous Efficacy: 148.8 lm/W



**Zonal Flux Diagram**

Zonal flux distribution table

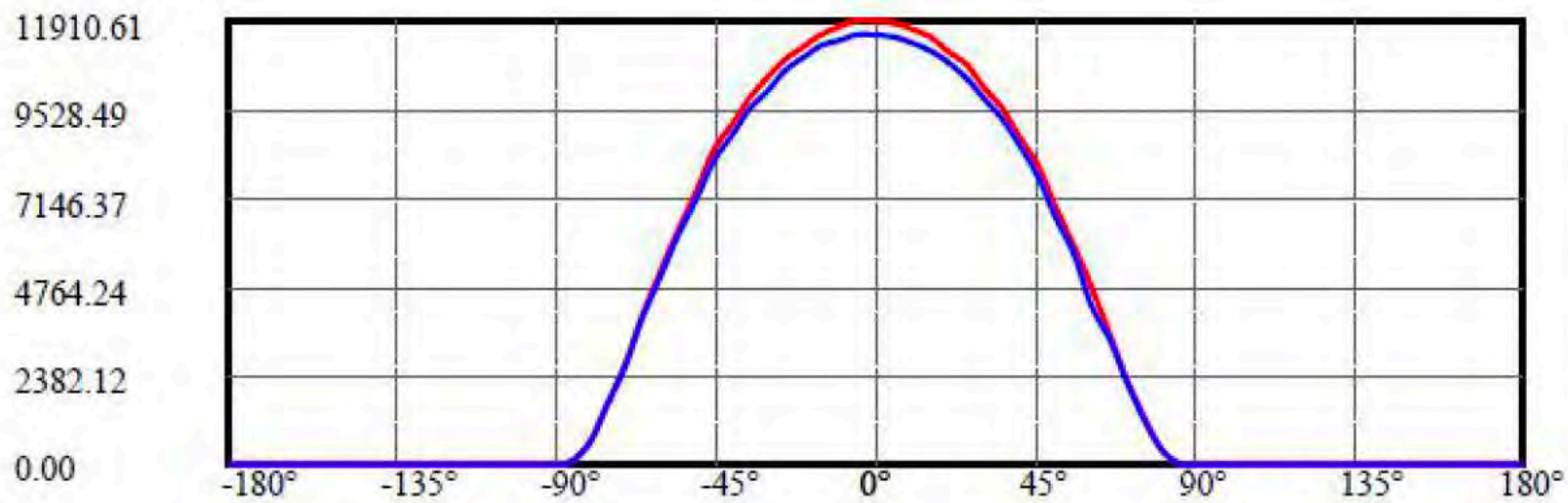
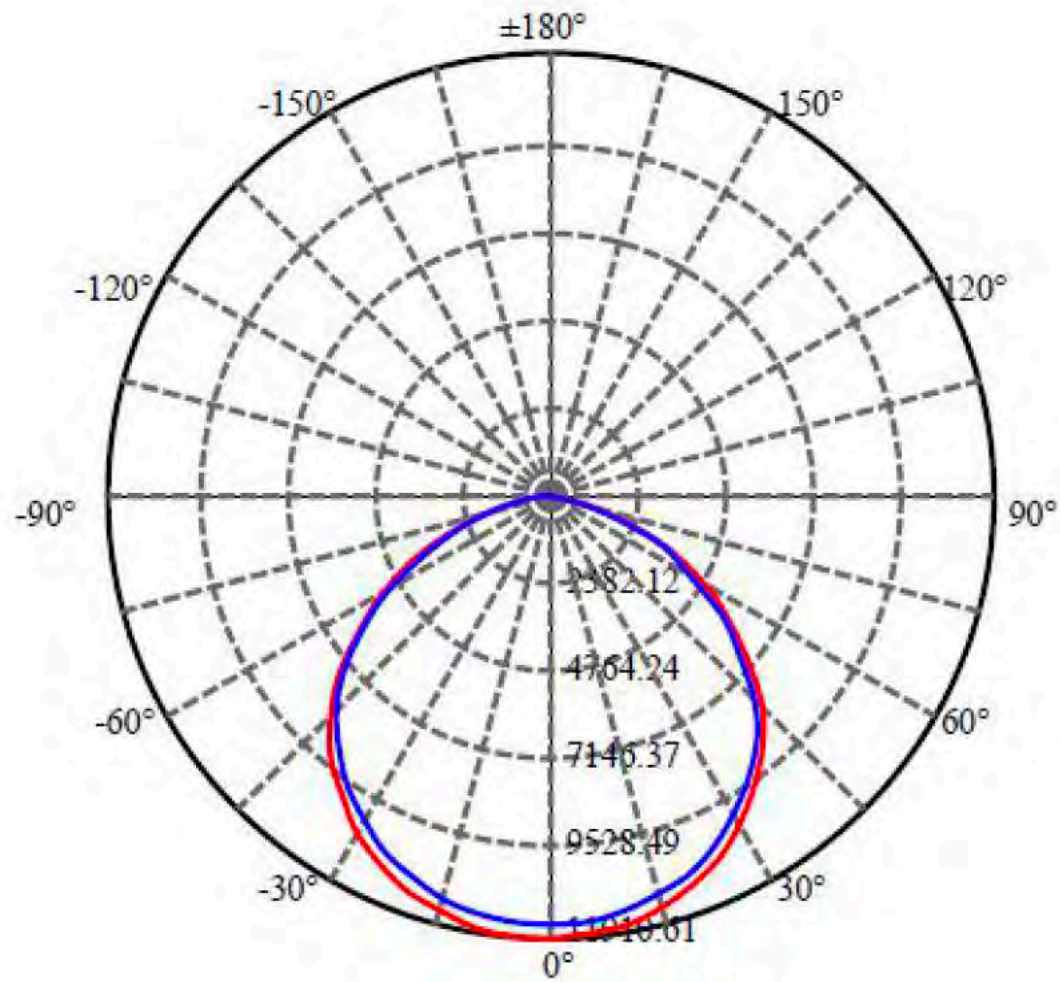
$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	11614.310	.000	.000	.000%	.000%
5.0	11574.660	277.218	277.218	.873%	.873%
10.0	11443.350	823.427	1100.644	2.594%	3.467%
15.0	11223.360	1344.574	2445.218	4.235%	7.702%
20.0	10911.990	1824.264	4269.482	5.746%	13.448%
25.0	10519.010	2247.717	6517.199	7.080%	20.528%
30.0	10026.220	2600.016	9117.216	8.189%	28.717%
35.0	9434.980	2865.798	11983.010	9.027%	37.743%
40.0	8767.292	3036.911	15019.920	9.566%	47.309%
45.0	7986.620	3102.123	18122.050	9.771%	57.080%
50.0	6987.868	3025.815	21147.860	9.531%	66.610%
55.0	5927.060	2808.135	23956.000	8.845%	75.455%
60.0	4863.834	2494.285	26450.280	7.856%	83.312%
65.0	3642.083	2067.805	28518.090	6.513%	89.825%
70.0	2460.664	1545.255	30063.340	4.867%	94.692%
75.0	1354.609	997.251	31060.590	3.141%	97.833%
80.0	485.186	492.278	31552.870	1.551%	99.384%
85.0	57.739	147.526	31700.400	.465%	99.848%
90.0	1.100	16.111	31716.510	.051%	99.899%
95.0	.829	.528	31717.040	.002%	99.901%
100.0	1.100	.524	31717.560	.002%	99.902%
105.0	1.752	.763	31718.320	.002%	99.905%
110.0	2.716	1.168	31719.490	.004%	99.908%
115.0	3.667	1.616	31721.110	.005%	99.913%
120.0	4.780	2.053	31723.160	.006%	99.920%
125.0	5.907	2.470	31725.630	.008%	99.928%
130.0	6.912	2.787	31728.420	.009%	99.936%
135.0	7.822	2.977	31731.390	.009%	99.946%
140.0	8.473	3.017	31734.410	.010%	99.955%
145.0	9.180	2.945	31737.360	.009%	99.965%
150.0	9.723	2.784	31740.140	.009%	99.973%
155.0	10.089	2.507	31742.650	.008%	99.981%
160.0	10.103	2.118	31744.760	.007%	99.988%
165.0	9.981	1.655	31746.420	.005%	99.993%
170.0	9.886	1.178	31747.600	.004%	99.997%
175.0	10.062	.714	31748.310	.002%	99.999%
180.0	10.592	.247	31748.550	.001%	100.000%





### Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]



C0/C180: 

C90/C270: 

Field angle(10%Imax):C0/180Left:77.0 Right:75.0

:C90/270Left:77.2 Right:74.9

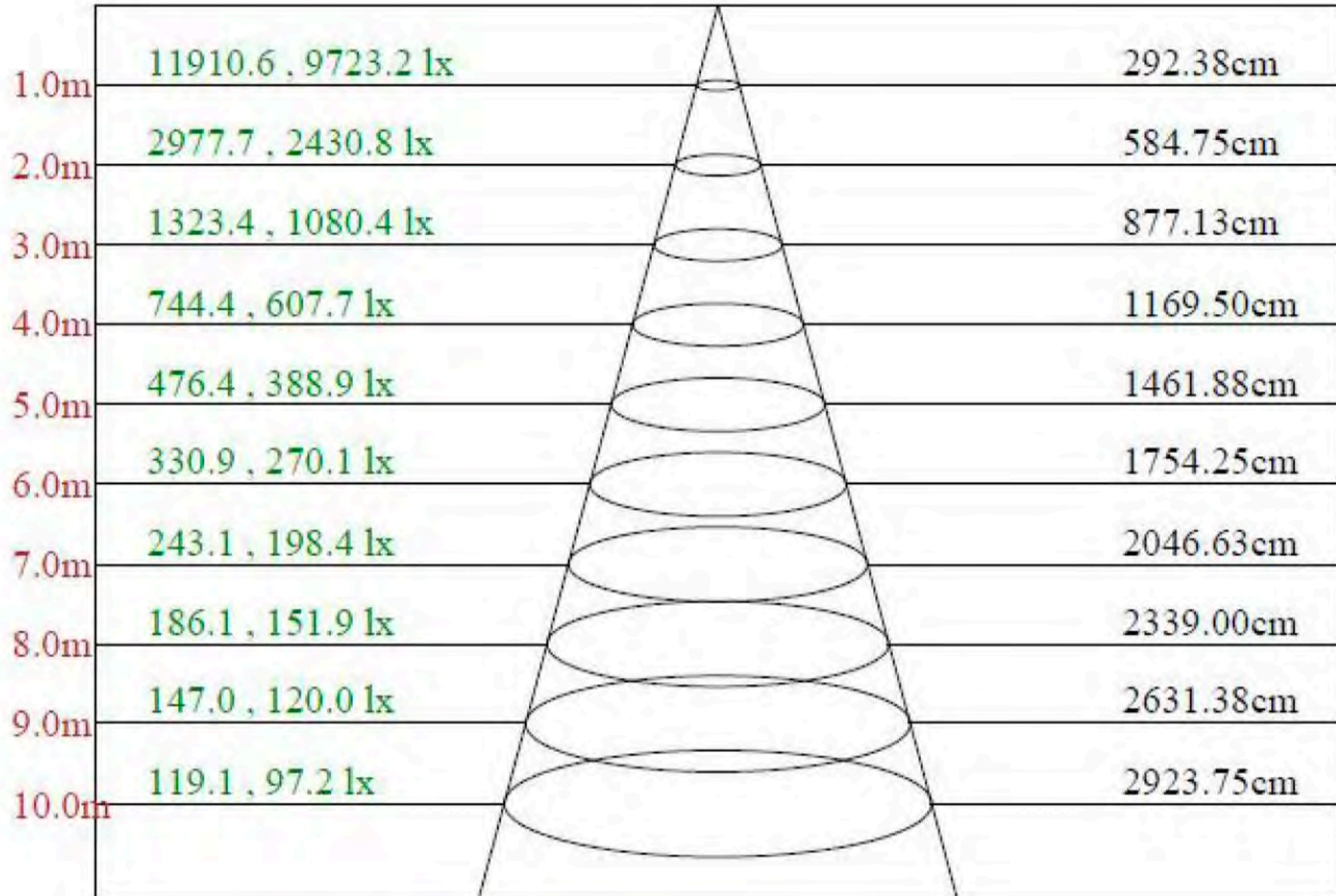
Beam Angle(50%Imax):C0/180Left:56.7 Right:54.4

:C90/270Left:56.7 Right:54.3





Lux distance Curve



Max , Ave      Beam angle of C0plane111.18



**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	11910.61	11825.88	11678.13	11445.66	11113.24	10704.77	10165.95	9542.39	8818.89
22.5	11754.18	11717.24	11554.29	11310.95	10978.53	10574.41	10070.35	9433.76	8745.02
45.0	11680.31	11621.64	11467.38	11213.18	10872.07	10498.37	9972.58	9344.68	8682.01
67.5	11608.61	11549.95	11384.82	11184.94	10835.13	10417.98	9911.75	9292.54	8579.90
90.0	11539.08	11495.63	11352.23	11113.24	10791.68	10357.15	9846.57	9220.84	8562.52
112.5	11510.84	11456.52	11278.36	11050.23	10696.08	10298.48	9766.18	9149.14	8464.75
135.0	11465.21	11391.34	11265.32	10998.08	10672.18	10235.48	9735.76	9114.38	8427.81
157.5	11445.66	11389.17	11219.70	10972.01	10626.56	10215.92	9664.06	9070.92	8382.19
180.0	11910.61	11893.23	11788.94	11549.95	11271.84	10895.97	10407.12	9827.01	9168.69
202.5	11754.18	11741.14	11645.54	11443.48	11117.58	10741.71	10268.07	9731.42	9047.02
225.0	11680.31	11654.23	11541.25	11343.54	11041.54	10685.22	10196.37	9614.09	8962.29
247.5	11608.61	11549.95	11471.73	11263.15	11008.95	10607.00	10135.53	9559.77	8879.73
270.0	11539.08	11532.56	11402.20	11217.53	10924.21	10570.07	10081.22	9531.53	8894.94
292.5	11510.84	11478.25	11393.51	11174.07	10909.01	10526.62	10063.83	9511.98	8881.90
315.0	11465.21	11450.00	11326.16	11145.83	10872.07	10465.78	10063.83	9505.46	8886.25
337.5	11445.66	11447.83	11323.99	11148.00	10861.21	10509.23	10070.35	9509.80	8892.76
360.0	11910.61	11825.88	11678.13	11445.66	11113.24	10704.77	10165.95	9542.39	8818.89
$C/\gamma(^{\circ})$	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	8012.83	6919.97	5820.60	4797.27	3495.84	2274.79	1181.28	353.93	24.12
22.5	7919.40	6839.58	5779.32	4849.41	3444.56	2292.39	1204.53	376.31	23.90
45.0	7882.47	6796.13	5716.31	4936.32	3435.87	2256.76	1176.50	386.95	25.86
67.5	7797.73	6722.26	5679.38	4782.06	3367.87	2225.91	1166.29	369.36	23.90
90.0	7719.52	6670.12	5631.58	4317.76	3320.50	2191.58	1127.62	335.90	20.21
112.5	7667.37	6652.73	5585.95	4329.49	3308.55	2142.26	1086.99	322.64	17.16
135.0	7626.09	6604.94	5549.02	4307.77	3242.94	2103.59	1053.75	287.23	12.60
157.5	7606.54	6531.06	5462.11	4329.06	3177.32	2006.68	1012.25	269.85	10.65
180.0	8399.57	7415.34	6318.14	5260.05	3978.17	2746.26	1583.88	615.52	86.26
202.5	8273.55	7280.64	6237.75	5162.28	3886.92	2702.81	1523.05	599.66	83.43
225.0	8199.68	7243.70	6168.23	5127.52	3882.57	2659.36	1529.56	583.58	76.91
247.5	8154.05	7191.56	6139.98	5075.37	3889.09	2681.08	1514.36	580.32	83.65
270.0	8117.12	7189.39	6124.77	5097.10	3884.74	2689.77	1568.67	618.34	85.39
292.5	8123.64	7232.84	6174.75	5110.13	3926.03	2757.13	1590.40	651.59	102.99
315.0	8141.02	7258.91	6229.06	5166.62	3999.90	2787.54	1668.62	695.26	113.63
337.5	8145.36	7256.74	6216.03	5173.14	4032.49	2852.72	1686.00	716.55	133.19
360.0	8012.83	6919.97	5820.60	4797.27	3495.84	2274.79	1181.28	353.93	24.12
$C/\gamma(^{\circ})$	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	0.00	0.00	0.00	0.22	1.74	2.61	3.91	5.00	5.87
22.5	0.22	0.44	0.44	1.52	2.17	3.48	4.78	6.08	7.17
45.0	0.44	0.44	0.65	1.52	2.82	3.69	5.00	6.08	7.17
67.5	0.44	0.65	1.09	1.74	2.82	3.69	4.78	5.87	6.74
90.0	0.65	0.22	1.09	1.74	2.82	3.91	4.78	5.87	6.95
112.5	0.65	0.44	1.09	1.74	2.82	3.91	5.00	6.08	6.74
135.0	0.65	0.65	1.09	1.96	2.82	3.91	5.00	6.08	7.17
157.5	0.65	0.44	1.09	1.96	2.82	3.91	5.00	6.30	7.39
180.0	1.09	0.65	0.87	1.52	2.39	3.48	4.56	5.65	6.74
202.5	1.52	1.30	1.30	1.96	2.61	3.69	5.00	6.08	6.95
225.0	1.52	1.52	1.30	1.96	3.04	3.69	4.78	6.08	6.95
247.5	1.74	1.30	1.52	1.96	2.82	3.69	4.78	5.87	6.95
270.0	1.52	1.09	1.52	2.17	3.04	3.69	4.78	5.87	6.95
292.5	1.74	1.30	1.30	1.96	2.82	3.69	4.78	5.65	6.74
315.0	1.96	1.30	1.74	2.17	2.82	3.91	4.78	6.08	6.95
337.5	2.82	1.52	1.52	1.96	3.04	3.69	4.78	5.87	7.17
360.0	0.00	0.00	0.00	0.22	1.74	2.61	3.91	5.00	5.87



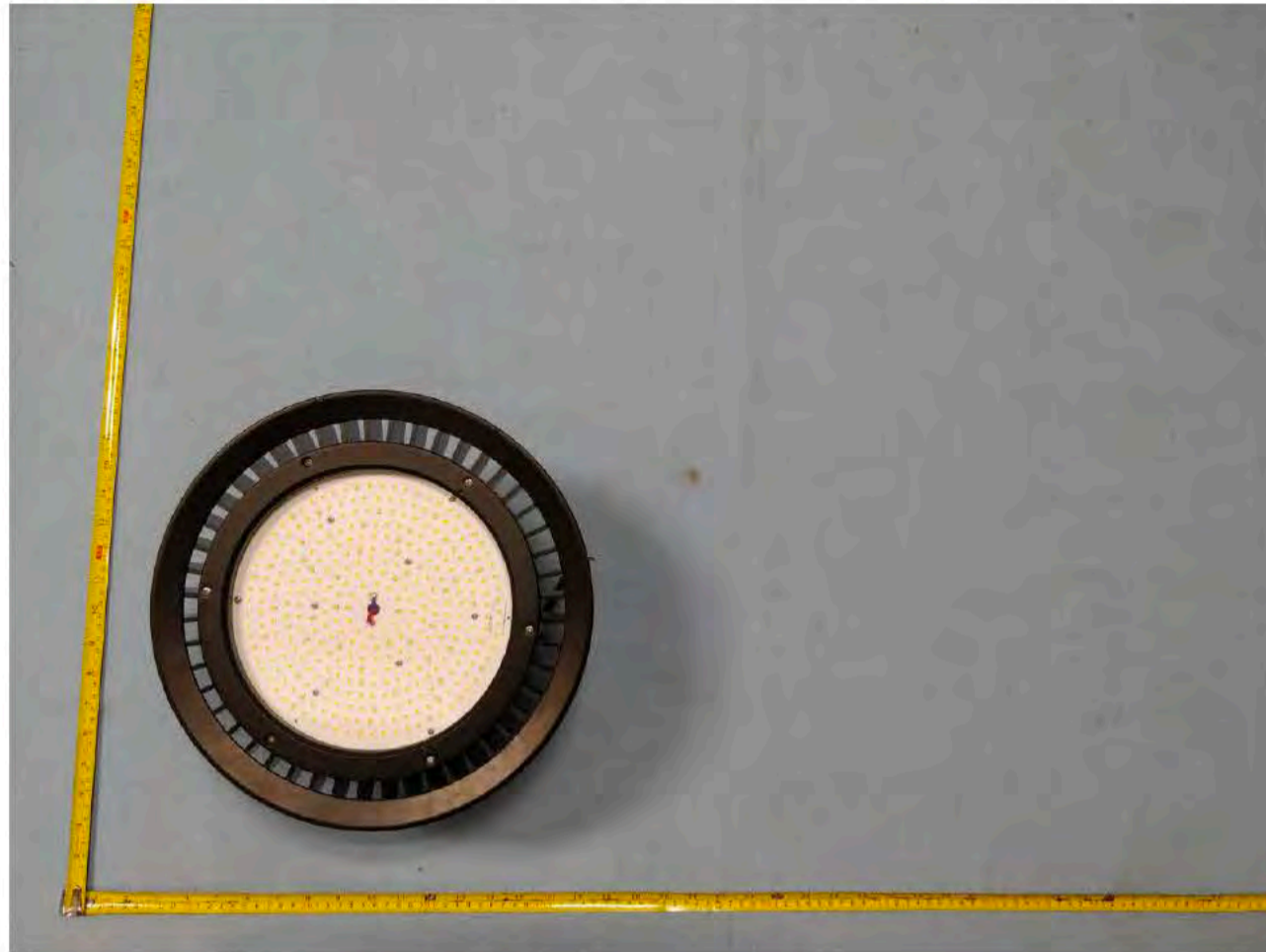


$C/\gamma(^{\circ})$	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	7.17	7.82	8.47	8.69	9.34	9.13	8.69	8.91	9.34
22.5	8.04	8.69	9.34	9.99	10.43	10.21	10.43	10.21	10.43
45.0	7.82	8.69	9.34	9.99	10.21	10.43	9.99	10.21	10.43
67.5	7.82	8.69	9.13	9.56	9.99	9.99	9.99	9.99	10.21
90.0	7.82	8.47	8.91	9.56	9.78	9.78	9.78	9.78	9.99
112.5	7.60	8.26	9.13	9.78	9.99	9.99	9.99	9.56	10.21
135.0	7.82	8.47	9.56	9.78	10.21	9.99	9.99	9.99	10.43
157.5	8.04	8.69	9.34	9.99	9.99	9.99	9.99	9.99	10.43
180.0	7.60	8.26	9.34	9.56	10.21	10.43	10.21	9.99	9.78
202.5	8.04	8.69	9.34	9.99	10.65	10.43	10.21	9.99	9.99
225.0	8.04	8.69	9.13	9.99	10.21	10.21	10.21	9.99	10.21
247.5	7.82	8.47	9.13	9.56	9.99	10.21	9.99	9.78	9.99
270.0	7.82	8.26	9.13	9.78	9.99	10.21	9.99	9.99	9.78
292.5	7.82	8.47	9.13	9.56	9.99	9.99	9.99	9.78	9.78
315.0	7.82	8.26	9.13	9.56	9.99	10.21	9.99	9.78	9.99
337.5	8.04	8.69	9.34	10.21	10.43	10.43	10.21	10.21	9.99
360.0	7.17	7.82	8.47	8.69	9.34	9.13	8.69	8.91	9.34
$C/\gamma(^{\circ})$	180.0								
0.0	9.78								
22.5	10.65								
45.0	10.86								
67.5	10.65								
90.0	10.65								
112.5	10.65								
135.0	10.65								
157.5	10.86								
180.0	9.78								
202.5	10.65								
225.0	10.86								
247.5	10.65								
270.0	10.65								
292.5	10.65								
315.0	10.65								
337.5	10.86								
360.0	9.78								





## Photo Document



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