



Shenzhen Belling Efficiency Testing Lab Co.,Ltd



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**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.:**

90341, 9034X-240-35K, 9034X-240-40K, 9034X-240-45K, 90342, 9034X-240-57K

90341 was selected as the representative model.

All measurements are the same except CCT.

**Test laboratory: Shenzhen Belling Efficiency Testing Lab Co.,Ltd, 1Floor, No.1 Building, Meibaohe Industrial Park, Dalang Street, Longhua District, Shenzhen, Guangdong Prov.518101 China.**

*Jarvis Zhang*

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Complied by: Jarvis zhang

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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 Co.,Ltd. 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

|                                 |   |
|---------------------------------|---|
| <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>             | 90341, 9034X-240-57K  |
| <b>Rated Inputs</b>             | AC 120-277V 50/60Hz   |
| <b>Rated Power</b>              | 240 W   |
| <b>Nominal CCT</b>              | 3000K / 5700K   |
| <b>Date of Receipt Samples</b>  | 2019-08-27  |
| <b>Date of test</b>             | 2019-08-27 to 2019-09-02                                    |
| <b>Burning Time Before Test</b> | 0hour(For New Products)                                     |

## 1.2 Standards or methods

- ANSI C78.377-2015:Specifications for the Chromaticity of Solid State Lighting Products
- ANSI C82.77-10:2014:Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment - Solid State
- 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         | 2020-04-07           |
| AC Power Source                                 | ALL POWER   | APW-110N  | 992257      | 2020-04-08           |
| Total Luminous Flux Standard Lamp               | SENSING     | 110V/200W | S1520062    | 2020-04-15           |
| Total Spectral Radiant Flux Standard Lamp       | SENSING     | 12V/20W   | LSD12201731 | 2020-04-15           |
| Digital Power Meter                             | YOKOGAWA    | WT310     | C2QM02030V  | 2020-04-08           |
| Integral Sphere                                 | SENSING     | SPR-600M  | N.A         | 2020-04-07           |
| Digital Power Meter                             | YOKOGAWA    | WT210     | 91L929742   | 2020-04-08           |
| Optical Color and Electrical Measurement System | SENSING     | SPR-3000  | S1101108    | 2020-04-07           |
| Environment Measurer                            | KTJ         | HTC-1     | N/A         | 2020-05-12           |
| Environment Measurer                            | KTJ         | TA218B    | N/A         | 2020-05-12           |
| Stop watch                                      | KISLO       | K610      | N/A         | 2020-05-12           |
| Digital Anemometer                              | TECMAN      | TD8901    | 026141      | 2019-09-11           |

Statement of Traceability: Shenzhen Belling Efficiency Testing Lab Co.,Ltd 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 (Total operating time for integrating sphere test: 1.0 hour)

#### 3.1.1 Electrical data

| Model Number  | Input Voltage(V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|---------------|------------------|----------------|-------------------|-----------|--------------|
| 90341         | 119.92           | 60             | 2.031             | 242.95    | 0.998        |
| 9034X-240-57K | 119.98           | 60             | 2.017             | 241.38    | 0.997        |

#### 3.1.2 Photometric data

| Model Number  | Luminous Flux (lm) | Efficacy (lm/W) | CCT (K) | CRI  | R9 |
|---------------|--------------------|-----------------|---------|------|----|
| 90341         | 32166.58           | 132.4           | 2995    | 84.2 | 13 |
| 9034X-240-57K | 33986.30           | 140.8           | 5480    | 84.6 | 16 |

#### 3.1.3 Chromaticity Coordinate

| Model Number  | Duv      | x      | y      | u'     | v'     |
|---------------|----------|--------|--------|--------|--------|
| 90341         | +0.0008  | 0.4384 | 0.4066 | 0.2505 | 0.5226 |
| 9034X-240-57K | +0.00271 | 0.3330 | 0.3469 | 0.2050 | 0.4805 |

### 3.2 Goniophotometer System (Total operating time for luminous intensity distribution: 1.0 hour)

#### 3.2.1 Electrical data

| Model Number | Input Voltage(V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|--------------|------------------|----------------|-------------------|-----------|--------------|
| 90341        | 120.06           | 60             | 1.9764            | 236.680   | 0.9974       |

#### 3.2.2 Photometric data

| Luminous Flux (lm) | Efficacy (lm/W) | Zonal Lumen in 20-50°(%lm) |
|--------------------|-----------------|----------------------------|
| 31406.85           | 132.40          | 52.86                      |



### 3.3 Additional Test

| Model Number | Test Item    | Test Voltage (V) | Frequency(Hz) | Test Result |
|--------------|--------------|------------------|---------------|-------------|
| 90341        | Power Factor | 277              | 60            | 0.951       |
|              | THD          | 277              | 60            | 6.0%        |

## 4 Test Data

90341

### Test Condition

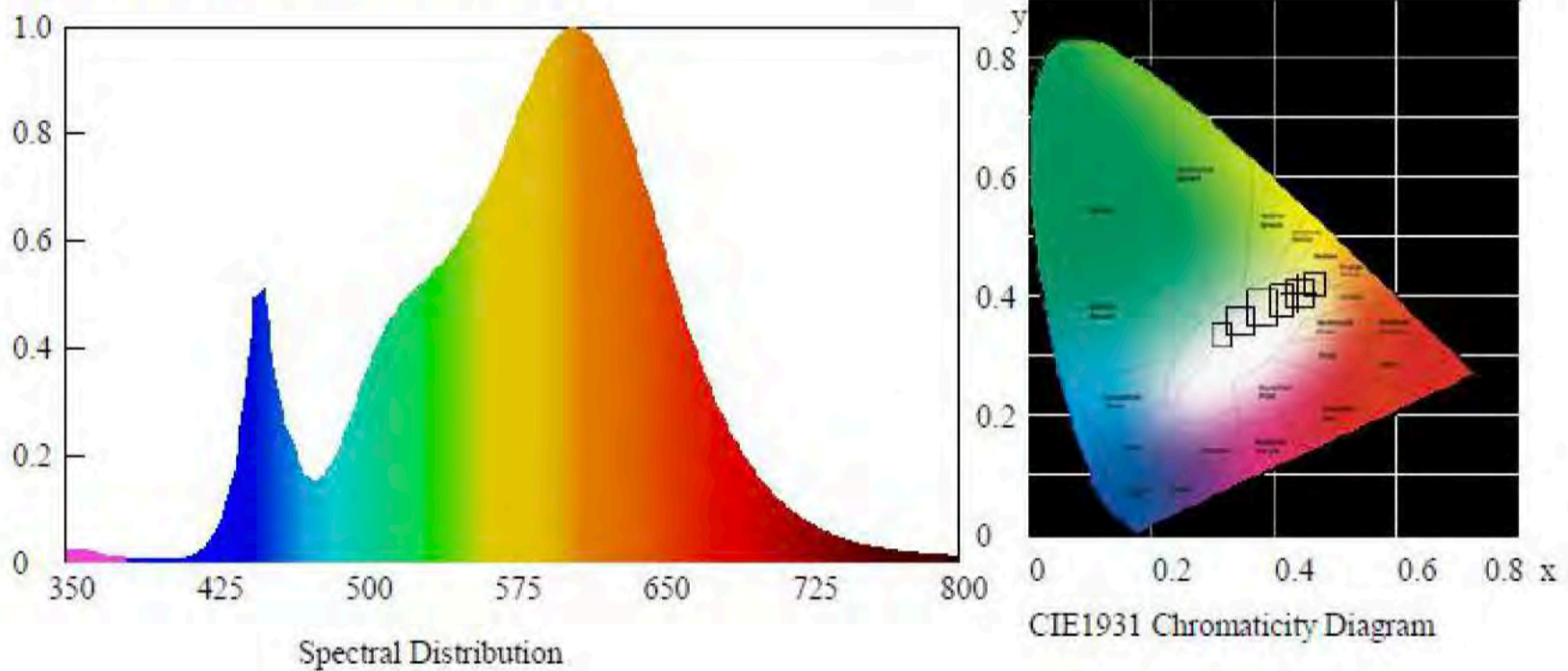
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

### Spectroradiometric Parameters

Chromaticity Coordinates:  $x=0.4384$   $y=0.4066$   $u'=0.2505$   $v'=0.5226$ 

Correlated Color Temperature: 2995 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index:  $R_f=84$ Gamut Index:  $R_g=97$ 

Luminous Flux: 32166.58 lm

Purity: 0.5384

Chromaticity Difference: +0.0008Duv

Peak Wavelength: 605.0 nm

Color Ratio:  $K_r=44.8\%$   $K_g=47.8\%$   $K_b=7.4\%$ 

Bandwidth: 133.1nm

Radiant Flux: 90.697 W

Rendering Index:  $R_a=84.2$  $R_1=83$   $R_2=91$   $R_3=97$   $R_4=84$   $R_5=83$   $R_6=89$   $R_7=85$   $R_8=62$  $R_9=13$   $R_{10}=79$   $R_{11}=85$   $R_{12}=74$   $R_{13}=85$   $R_{14}=99$   $R_{15}=75$   $R_e=79$ 

### Electric Parameters

Voltage: 119.92 V

Current: 2.031 A

Power Factor: 0.998

Power: 242.95 W

Luminous Efficacy: 132.4 lm/W

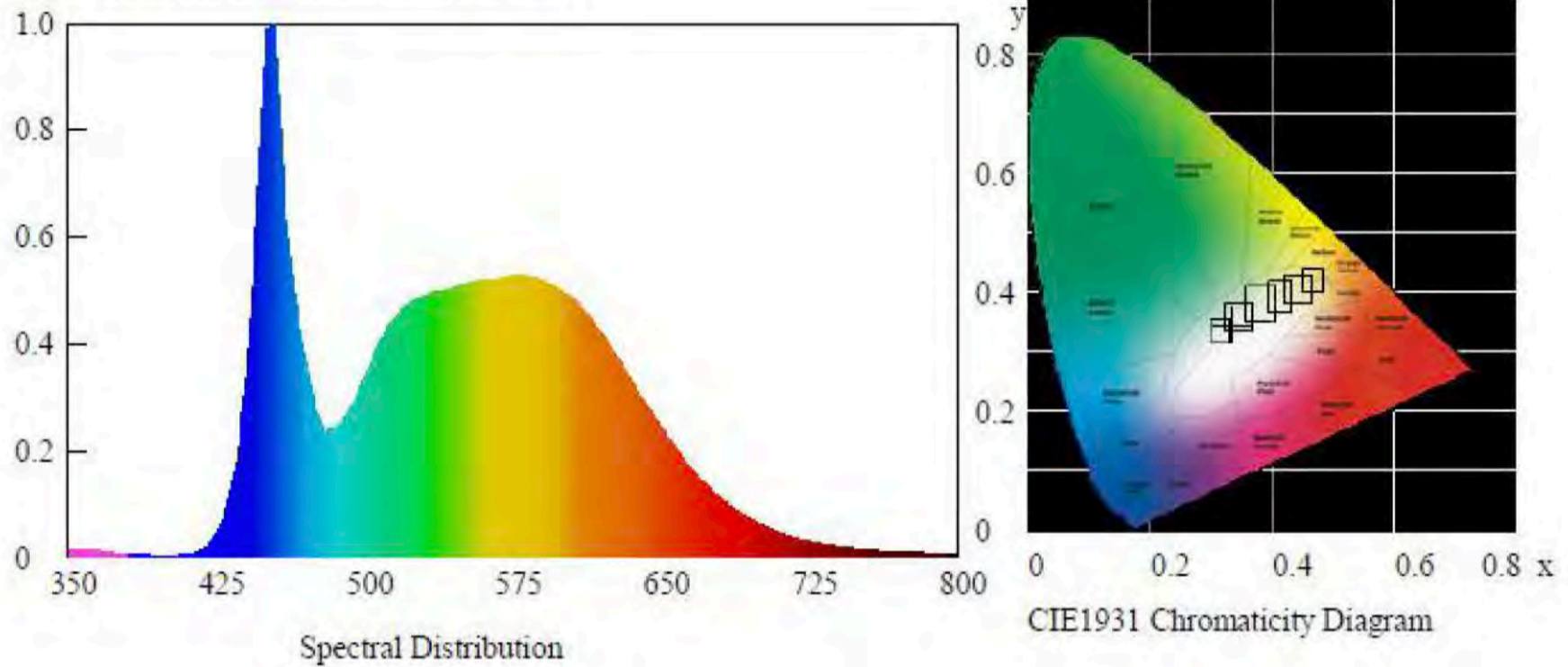
**9034X-240-57K****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

**Spectroradiometric Parameters**Chromaticity Coordinates:  $x=0.3330$   $y=0.3469$   $u'=0.205$   $v'=0.4805$ 

Correlated Color Temperature: 5480 K

Dominant Wavelength: 553.0 nm(E)

Colour Fidelity Index:  $R_f=82$ Gamut Index:  $R_g=95$ 

Luminous Flux: 33986.30 lm

Purity: 0.0401

Chromaticity Difference: +0.00271Duv

Peak Wavelength: 455.0 nm

Color Ratio:  $K_r=32.5\%$   $K_g=55.4\%$   $K_b=12.0\%$ 

Bandwidth: 17.3nm

Radiant Flux: 95.662 W

Rendering Index:  $R_a=84.6$  $R_1=83$   $R_2=90$   $R_3=93$   $R_4=84$   $R_5=83$   $R_6=84$   $R_7=88$   $R_8=71$  $R_9=16$   $R_{10}=74$   $R_{11}=83$   $R_{12}=59$   $R_{13}=86$   $R_{14}=96$   $R_{15}=79$   $R_e=78$ **Electric Parameters**

Voltage: 119.98 V

Current: 2.017 A

Power Factor: 0.997

Power: 241.38 W

Luminous Efficacy: 140.8 lm/W



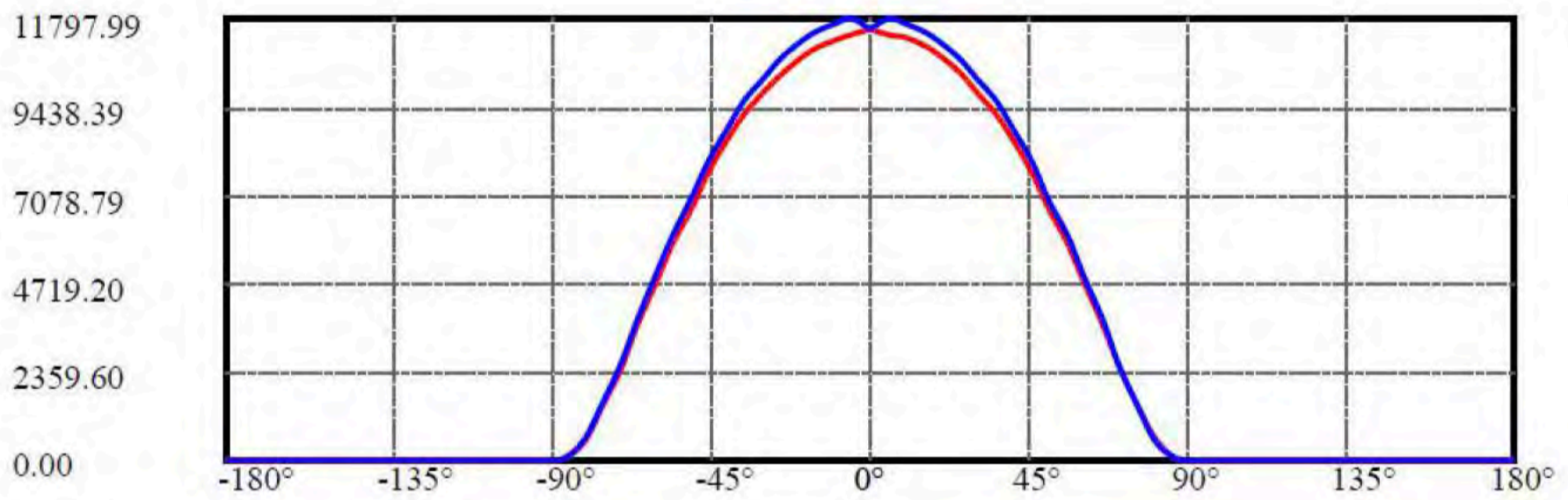
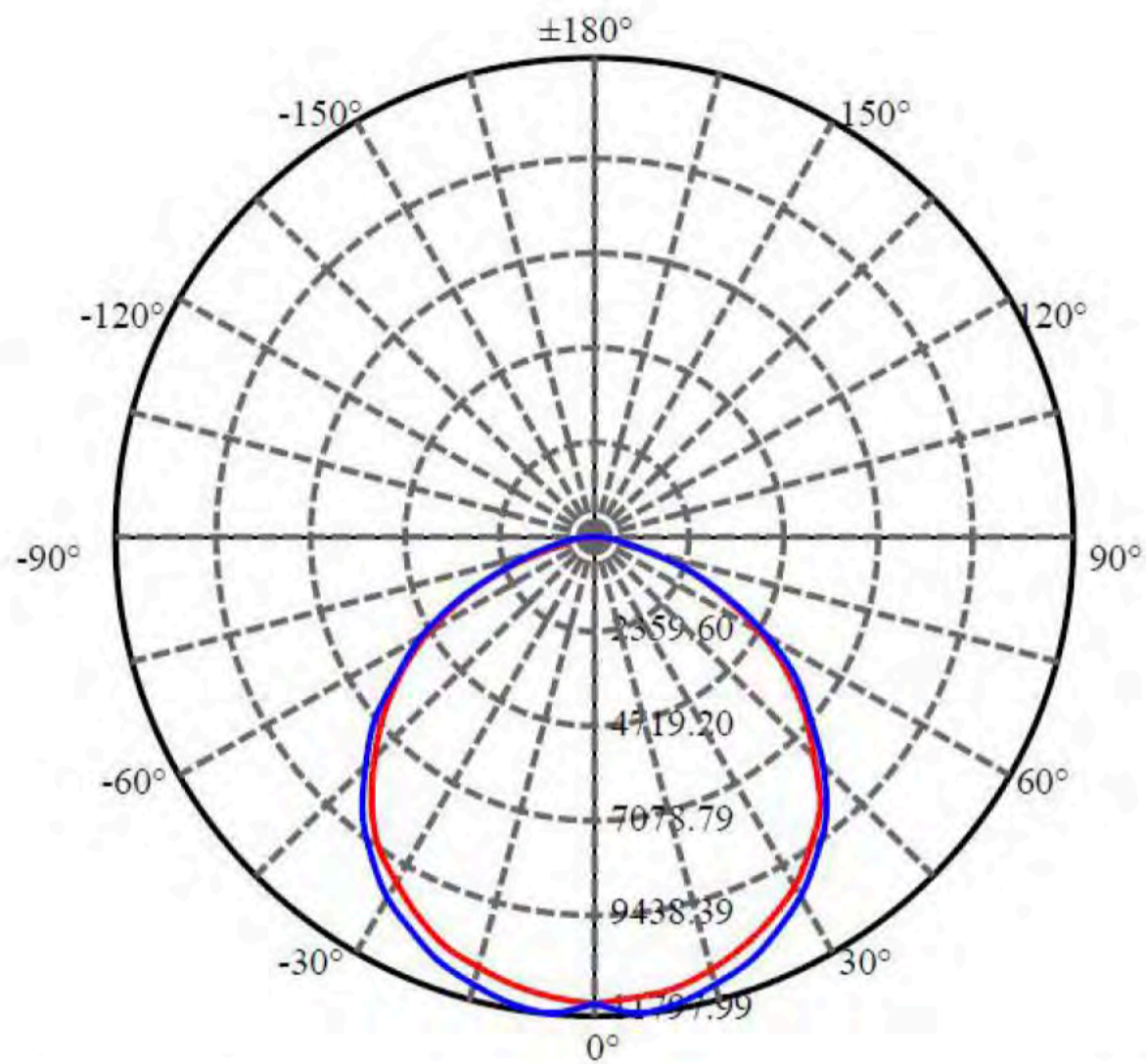
**Zonal Flux Diagram**

Zonal flux distribution table

| $\gamma(^{\circ})$ | Average I(cd) | Zonal F(lm) | Sum F(lm) | Eff Flux(%) | Eff Sum(%) |
|--------------------|---------------|-------------|-----------|-------------|------------|
| 0.0                | 11502.510     | 0.000       | 0         | 0.00%       | 0.00%      |
| 5.0                | 11460.659     | 274.518     | 274.518   | 0.87%       | 0.87%      |
| 10.0               | 11323.945     | 815.077     | 1089.595  | 2.60%       | 3.47%      |
| 15.0               | 11110.174     | 1330.777    | 2420.372  | 4.24%       | 7.71%      |
| 20.0               | 10805.258     | 1806.139    | 4226.511  | 5.75%       | 13.46%     |
| 25.0               | 10400.833     | 2224.127    | 6450.639  | 7.08%       | 20.54%     |
| 30.0               | 9910.578      | 2570.426    | 9021.065  | 8.18%       | 28.72%     |
| 35.0               | 9331.440      | 2833.522    | 11854.587 | 9.02%       | 37.75%     |
| 40.0               | 8639.371      | 2998.294    | 14852.881 | 9.55%       | 47.29%     |
| 45.0               | 7752.263      | 3035.044    | 17887.924 | 9.66%       | 56.96%     |
| 50.0               | 6807.361      | 2941.985    | 20829.909 | 9.37%       | 66.32%     |
| 55.0               | 5825.125      | 2746.723    | 23576.632 | 8.75%       | 75.07%     |
| 60.0               | 4823.492      | 2461.398    | 26038.03  | 7.84%       | 82.91%     |
| 65.0               | 3618.755      | 2052.326    | 28090.356 | 6.53%       | 89.44%     |
| 70.0               | 2479.863      | 1544.209    | 29634.565 | 4.92%       | 94.36%     |
| 75.0               | 1395.205      | 1012.881    | 30647.446 | 3.23%       | 97.58%     |
| 80.0               | 537.765       | 517.209     | 31164.655 | 1.65%       | 99.23%     |
| 85.0               | 96.005        | 172.210     | 31336.865 | 0.55%       | 99.78%     |
| 90.0               | 3.494         | 27.244      | 31364.109 | 0.09%       | 99.86%     |
| 95.0               | 2.684         | 1.692       | 31365.8   | 0.01%       | 99.87%     |
| 100.0              | 2.750         | 1.476       | 31367.277 | 0.00%       | 99.87%     |
| 105.0              | 3.255         | 1.607       | 31368.883 | 0.01%       | 99.88%     |
| 110.0              | 4.185         | 1.945       | 31370.828 | 0.01%       | 99.89%     |
| 115.0              | 5.208         | 2.378       | 31373.207 | 0.01%       | 99.89%     |
| 120.0              | 6.417         | 2.826       | 31376.033 | 0.01%       | 99.90%     |
| 125.0              | 7.547         | 3.228       | 31379.261 | 0.01%       | 99.91%     |
| 130.0              | 8.569         | 3.504       | 31382.765 | 0.01%       | 99.92%     |
| 135.0              | 9.553         | 3.662       | 31386.426 | 0.01%       | 99.93%     |
| 140.0              | 10.217        | 3.661       | 31390.087 | 0.01%       | 99.95%     |
| 145.0              | 10.881        | 3.520       | 31393.607 | 0.01%       | 99.96%     |
| 150.0              | 11.519        | 3.299       | 31396.906 | 0.01%       | 99.97%     |
| 155.0              | 11.944        | 2.969       | 31399.875 | 0.01%       | 99.98%     |
| 160.0              | 12.050        | 2.517       | 31402.392 | 0.01%       | 99.99%     |
| 165.0              | 11.785        | 1.964       | 31404.356 | 0.01%       | 99.99%     |
| 170.0              | 11.572        | 1.386       | 31405.741 | 0.00%       | 100.00%    |
| 175.0              | 11.599        | 0.829       | 31406.57  | 0.00%       | 100.00%    |
| 180.0              | 12.129        | 0.284       | 31406.854 | 0.00%       | 100.00%    |



### Luminous Intensity Distribution Diagram Light Distribution Curve [Unit:cd]



C0/C180: —

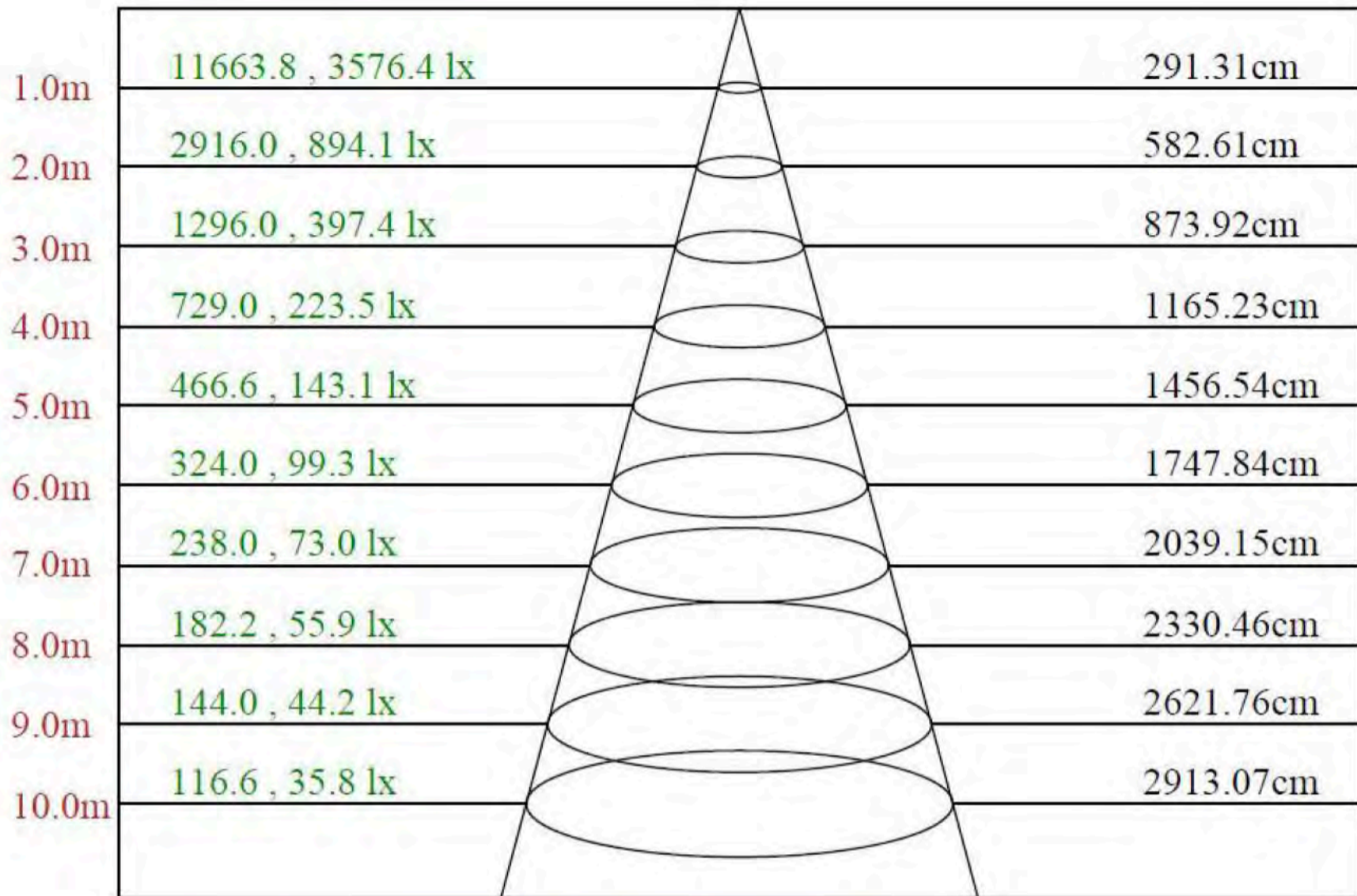
C90/C270: —

Field angle(10%Imax):C0/180Left:76.2 Right:76.5  
:C90/270Left:76.8 Right:76.5

Beam Angle(50%Imax):C0/180Left:55.1 Right:55.2  
:C90/270Left:56.1 Right:56.2



Lux distance Curve



Max , Ave

Beam angle of C270 plane 111.06

**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                        | 11502.51 | 11385.59 | 11260.17 | 11036.97 | 10741.49 | 10329.09 | 9852.92  | 9247.07 | 8609.34 |
| 22.5                       | 11502.51 | 11343.08 | 11162.39 | 10964.69 | 10647.95 | 10261.06 | 9776.39  | 9208.81 | 8515.81 |
| 45.0                       | 11502.51 | 11296.31 | 11149.63 | 10941.31 | 10616.07 | 10227.05 | 9733.87  | 9157.79 | 8456.29 |
| 67.5                       | 11502.51 | 11255.92 | 11098.61 | 10890.29 | 10584.18 | 10154.78 | 9653.09  | 9089.77 | 8371.26 |
| 90.0                       | 11502.51 | 11772.48 | 11642.81 | 11413.23 | 11113.49 | 10709.60 | 10180.28 | 9582.95 | 8892.07 |
| 112.5                      | 11502.51 | 11615.17 | 11498.26 | 11258.05 | 10958.31 | 10543.79 | 10029.36 | 9455.40 | 8730.51 |
| 135.0                      | 11502.51 | 11523.77 | 11385.59 | 11164.51 | 10856.28 | 10443.88 | 9942.20  | 9349.11 | 8636.98 |
| 157.5                      | 11502.51 | 11442.99 | 11298.44 | 11073.11 | 10775.50 | 10356.72 | 9863.55  | 9289.59 | 8588.09 |
| 180.0                      | 11502.51 | 11377.09 | 11236.79 | 11002.95 | 10694.72 | 10288.70 | 9810.40  | 9255.58 | 8575.33 |
| 202.5                      | 11502.51 | 11336.70 | 11202.78 | 10996.58 | 10673.46 | 10275.94 | 9801.90  | 9251.33 | 8577.46 |
| 225.0                      | 11502.51 | 11311.19 | 11179.39 | 10975.32 | 10667.08 | 10275.94 | 9814.65  | 9244.95 | 8592.34 |
| 247.5                      | 11502.51 | 11272.93 | 11139.00 | 10956.19 | 10650.08 | 10295.08 | 9821.03  | 9253.45 | 8585.96 |
| 270.0                      | 11502.51 | 11797.99 | 11657.69 | 11436.61 | 11143.25 | 10715.98 | 10218.55 | 9604.20 | 8894.20 |
| 292.5                      | 11502.51 | 11647.06 | 11525.89 | 11313.32 | 11015.71 | 10594.81 | 10118.64 | 9523.42 | 8809.17 |
| 315.0                      | 11502.51 | 11538.65 | 11423.86 | 11217.66 | 10928.55 | 10518.28 | 10025.10 | 9436.27 | 8741.14 |
| 337.5                      | 11502.51 | 11453.62 | 11321.82 | 11122.00 | 10818.01 | 10422.62 | 9927.32  | 9353.36 | 8653.99 |
| 360.0                      | 11502.51 | 11385.59 | 11260.17 | 11036.97 | 10741.49 | 10329.09 | 9852.92  | 9247.07 | 8609.34 |
| C/ $\gamma$ ( $^{\circ}$ ) | 45.0     | 50.0     | 55.0     | 60.0     | 65.0     | 70.0     | 75.0     | 80.0    | 85.0    |
| 0.0                        | 7701.64  | 6747.18  | 5786.33  | 4755.33  | 3600.62  | 2478.64  | 1411.72  | 554.61  | 107.99  |
| 22.5                       | 7635.74  | 6689.78  | 5724.68  | 4712.82  | 3534.08  | 2489.48  | 1347.31  | 532.50  | 86.09   |
| 45.0                       | 7599.61  | 6653.64  | 5656.66  | 4721.32  | 3495.18  | 2377.03  | 1312.66  | 490.41  | 84.39   |
| 67.5                       | 7478.44  | 6557.98  | 5586.51  | 4857.37  | 3391.87  | 2236.30  | 1253.56  | 455.55  | 70.15   |
| 90.0                       | 7954.61  | 6981.01  | 6013.79  | 4940.28  | 3713.71  | 2510.53  | 1411.51  | 533.78  | 91.83   |
| 112.5                      | 7803.68  | 6855.59  | 5890.49  | 4827.61  | 3603.17  | 2463.76  | 1375.37  | 495.30  | 86.73   |
| 135.0                      | 7759.04  | 6825.83  | 5816.09  | 4789.35  | 3577.66  | 2399.99  | 1334.98  | 489.78  | 79.50   |
| 157.5                      | 7708.02  | 6751.43  | 5784.20  | 4727.70  | 3535.15  | 2421.25  | 1313.72  | 482.34  | 81.20   |
| 180.0                      | 7697.39  | 6751.43  | 5765.07  | 4757.46  | 3577.66  | 2419.12  | 1356.24  | 508.70  | 83.75   |
| 202.5                      | 7693.14  | 6742.92  | 5803.34  | 4768.09  | 3601.04  | 2487.14  | 1386.00  | 525.70  | 96.30   |
| 225.0                      | 7731.40  | 6793.94  | 5824.59  | 4842.49  | 3683.95  | 2527.53  | 1456.15  | 569.92  | 103.74  |
| 247.5                      | 7756.91  | 6840.71  | 5884.12  | 4895.64  | 3713.71  | 2621.07  | 1500.79  | 603.29  | 121.59  |
| 270.0                      | 7975.87  | 7015.02  | 5981.90  | 4946.65  | 3730.50  | 2555.17  | 1466.78  | 577.57  | 102.67  |
| 292.5                      | 7914.22  | 6970.38  | 5933.01  | 4908.39  | 3745.60  | 2585.99  | 1442.54  | 587.99  | 115.64  |
| 315.0                      | 7831.32  | 6895.98  | 5903.25  | 4897.76  | 3705.63  | 2559.21  | 1493.99  | 604.14  | 113.52  |
| 337.5                      | 7795.18  | 6844.96  | 5847.98  | 4827.61  | 3690.54  | 2545.60  | 1459.98  | 592.66  | 110.97  |
| 360.0                      | 7701.64  | 6747.18  | 5786.33  | 4755.33  | 3600.62  | 2478.64  | 1411.72  | 554.61  | 107.99  |
| C/ $\gamma$ ( $^{\circ}$ ) | 90.0     | 95.0     | 100.0    | 105.0    | 110.0    | 115.0    | 120.0    | 125.0   | 130.0   |
| 0.0                        | 3.61     | 2.76     | 2.76     | 3.40     | 4.04     | 5.10     | 6.17     | 7.23    | 8.50    |
| 22.5                       | 3.61     | 2.76     | 2.76     | 3.19     | 4.04     | 5.10     | 6.38     | 7.23    | 8.08    |
| 45.0                       | 3.61     | 2.76     | 2.76     | 3.40     | 4.25     | 5.10     | 6.59     | 7.65    | 8.50    |
| 67.5                       | 3.61     | 2.55     | 2.98     | 3.19     | 4.25     | 5.31     | 6.38     | 7.87    | 8.72    |
| 90.0                       | 3.19     | 2.76     | 2.76     | 3.19     | 4.46     | 5.10     | 6.59     | 7.87    | 8.93    |
| 112.5                      | 3.19     | 2.55     | 2.76     | 3.19     | 4.25     | 5.31     | 6.59     | 7.87    | 8.72    |
| 135.0                      | 3.19     | 2.55     | 2.76     | 3.19     | 4.25     | 5.10     | 6.38     | 7.65    | 8.50    |
| 157.5                      | 3.19     | 2.76     | 2.76     | 3.40     | 4.25     | 5.53     | 6.59     | 7.65    | 8.50    |
| 180.0                      | 2.98     | 2.55     | 2.76     | 3.40     | 4.46     | 5.10     | 6.17     | 7.23    | 8.72    |
| 202.5                      | 3.40     | 2.55     | 2.76     | 3.19     | 4.04     | 5.31     | 6.38     | 7.44    | 8.29    |
| 225.0                      | 3.40     | 2.76     | 2.76     | 3.19     | 3.83     | 5.10     | 6.38     | 7.23    | 8.29    |
| 247.5                      | 3.83     | 2.55     | 2.76     | 3.19     | 3.83     | 5.10     | 6.38     | 7.44    | 8.72    |
| 270.0                      | 3.61     | 2.98     | 2.55     | 3.19     | 4.25     | 5.31     | 6.59     | 7.87    | 8.93    |
| 292.5                      | 4.04     | 2.55     | 2.55     | 3.19     | 4.25     | 5.31     | 6.59     | 7.65    | 8.93    |
| 315.0                      | 3.83     | 2.55     | 2.76     | 3.19     | 4.25     | 5.31     | 6.17     | 7.65    | 8.50    |
| 337.5                      | 3.61     | 2.98     | 2.76     | 3.40     | 4.25     | 5.10     | 6.38     | 7.23    | 8.29    |
| 360.0                      | 3.61     | 2.76     | 2.76     | 3.40     | 4.04     | 5.10     | 6.17     | 7.23    | 8.50    |



|                 |       |       |       |       |       |       |       |       |       |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| C/ $\gamma$ (°) | 135.0 | 140.0 | 145.0 | 150.0 | 155.0 | 160.0 | 165.0 | 170.0 | 175.0 |
| 0.0             | 9.35  | 9.78  | 10.63 | 10.84 | 11.90 | 11.69 | 11.48 | 11.48 | 11.48 |
| 22.5            | 9.35  | 9.99  | 10.84 | 11.27 | 11.90 | 11.69 | 11.48 | 11.48 | 11.69 |
| 45.0            | 9.78  | 10.20 | 10.84 | 11.48 | 11.90 | 12.12 | 11.90 | 11.90 | 11.69 |
| 67.5            | 9.35  | 10.63 | 11.05 | 11.69 | 12.12 | 12.33 | 12.12 | 11.69 | 11.69 |
| 90.0            | 9.99  | 10.63 | 11.48 | 12.12 | 12.33 | 12.76 | 12.33 | 12.12 | 11.90 |
| 112.5           | 9.78  | 10.42 | 11.05 | 11.90 | 12.12 | 12.33 | 11.90 | 11.69 | 11.69 |
| 135.0           | 9.78  | 10.42 | 11.05 | 11.69 | 12.12 | 12.33 | 12.12 | 11.90 | 11.69 |
| 157.5           | 9.35  | 10.20 | 10.84 | 11.48 | 11.90 | 11.90 | 11.69 | 11.27 | 11.48 |
| 180.0           | 9.35  | 9.99  | 10.63 | 11.27 | 11.69 | 11.90 | 11.27 | 11.05 | 11.48 |
| 202.5           | 9.14  | 9.78  | 10.63 | 11.27 | 11.48 | 11.90 | 11.27 | 11.05 | 11.27 |
| 225.0           | 9.57  | 9.99  | 10.63 | 11.27 | 11.90 | 11.48 | 11.48 | 11.48 | 11.27 |
| 247.5           | 9.57  | 10.20 | 10.84 | 11.48 | 11.69 | 11.90 | 11.69 | 11.27 | 11.27 |
| 270.0           | 9.99  | 10.84 | 11.48 | 12.12 | 12.54 | 12.54 | 12.33 | 11.90 | 11.90 |
| 292.5           | 9.99  | 10.42 | 11.05 | 11.90 | 12.33 | 12.33 | 12.12 | 11.69 | 11.90 |
| 315.0           | 9.35  | 10.20 | 10.63 | 11.48 | 11.69 | 11.90 | 11.90 | 11.69 | 11.69 |
| 337.5           | 9.14  | 9.78  | 10.42 | 11.05 | 11.48 | 11.69 | 11.48 | 11.48 | 11.48 |
| 360.0           | 9.35  | 9.78  | 10.63 | 10.84 | 11.90 | 11.69 | 11.48 | 11.48 | 11.48 |
| C/ $\gamma$ (°) | 180.0 |       |       |       |       |       |       |       |       |
| 0.0             | 12.13 |       |       |       |       |       |       |       |       |
| 22.5            | 12.13 |       |       |       |       |       |       |       |       |
| 45.0            | 12.13 |       |       |       |       |       |       |       |       |
| 67.5            | 12.13 |       |       |       |       |       |       |       |       |
| 90.0            | 12.13 |       |       |       |       |       |       |       |       |
| 112.5           | 12.13 |       |       |       |       |       |       |       |       |
| 135.0           | 12.13 |       |       |       |       |       |       |       |       |
| 157.5           | 12.13 |       |       |       |       |       |       |       |       |
| 180.0           | 12.13 |       |       |       |       |       |       |       |       |
| 202.5           | 12.13 |       |       |       |       |       |       |       |       |
| 225.0           | 12.13 |       |       |       |       |       |       |       |       |
| 247.5           | 12.13 |       |       |       |       |       |       |       |       |
| 270.0           | 12.13 |       |       |       |       |       |       |       |       |
| 292.5           | 12.13 |       |       |       |       |       |       |       |       |
| 315.0           | 12.13 |       |       |       |       |       |       |       |       |
| 337.5           | 12.13 |       |       |       |       |       |       |       |       |
| 360.0           | 12.13 |       |       |       |       |       |       |       |       |



## 5 Performance Assessment

| Model name    | CCT(K) | Total Luminous(lm)      | Power(W)              | Luminous Efficacy(lm/W) |
|---------------|--------|-------------------------|-----------------------|-------------------------|
| 90341         | 3000K  | 32166.58                | 242.95                | 132.4                   |
| 9034X-240-35K | 3500K  | 32530.52 * <sup>1</sup> | 242.17 * <sup>2</sup> | 134.3 * <sup>3</sup>    |
| 9034X-240-40K | 4000K  | 32894.47 * <sup>1</sup> | 242.17 * <sup>2</sup> | 135.8 * <sup>3</sup>    |
| 9034X-240-45K | 4500K  | 33258.41 * <sup>1</sup> | 242.17 * <sup>2</sup> | 137.3 * <sup>3</sup>    |
| 90342         | 5000K  | 33622.36 * <sup>1</sup> | 242.17 * <sup>2</sup> | 138.8 * <sup>3</sup>    |
| 9034X-240-57K | 5700K  | 33986.30                | 241.38                | 140.8                   |

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

$$32530.52 = (33986.30 - 32166.58) / 5 + 32166.58$$

$$32894.47 = (33986.30 - 32166.58) / 5 + 32530.52$$

$$33258.41 = (33986.30 - 32166.58) / 5 + 32894.47$$

$$33622.36 = (33986.30 - 32166.58) / 5 + 33258.41$$

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

$$242.17 = (242.95 + 241.38) / 2$$

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

$$134.3 = 32530.52 / 242.17$$

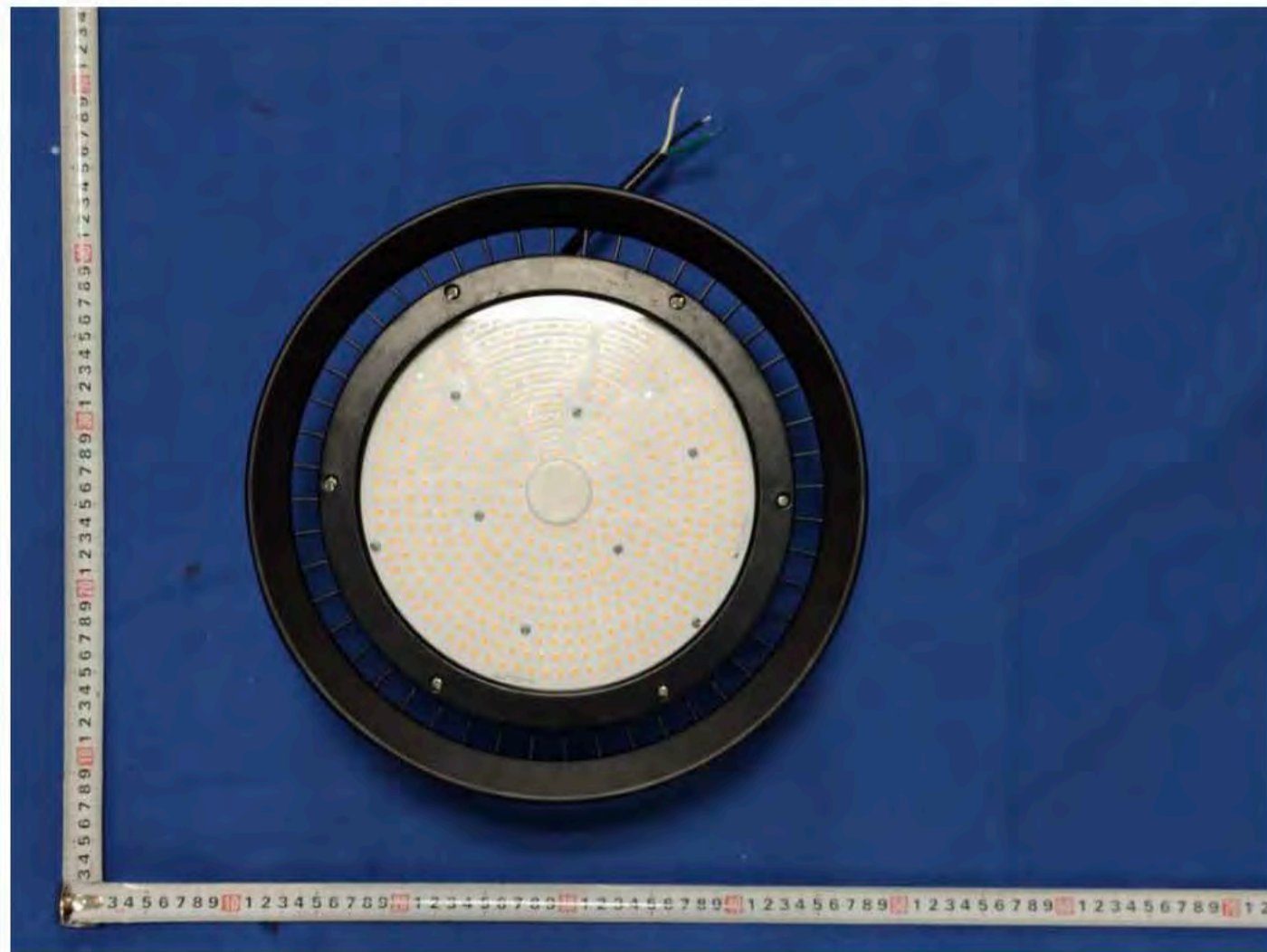
$$135.8 = 32894.47 / 242.17$$

$$137.3 = 33258.41 / 242.17$$

$$138.8 = 33622.36 / 242.17$$



## Photo Document



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