

Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State  
Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

Brand: METALUX

Report Number: P827092

Luminaire Tested: **OHBL-18HE-A-UNV-L840-CD-UPL18**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P827092  
REPORT IS A COMBINATION OF REPORTS P826155 AND G3-2310-221-8  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-18HE-A-UNV-L840-CD-UPL18  
Description: 18000 LUMEN OHBL HE LED LUMINAIRE WITH 80CRI, 4000K LEDS AND AISLE  
LENSAND 1800 LUMEN UPLIGHT MODULE  
Light Source: -  
Ballast/Driver: -

**Summary**

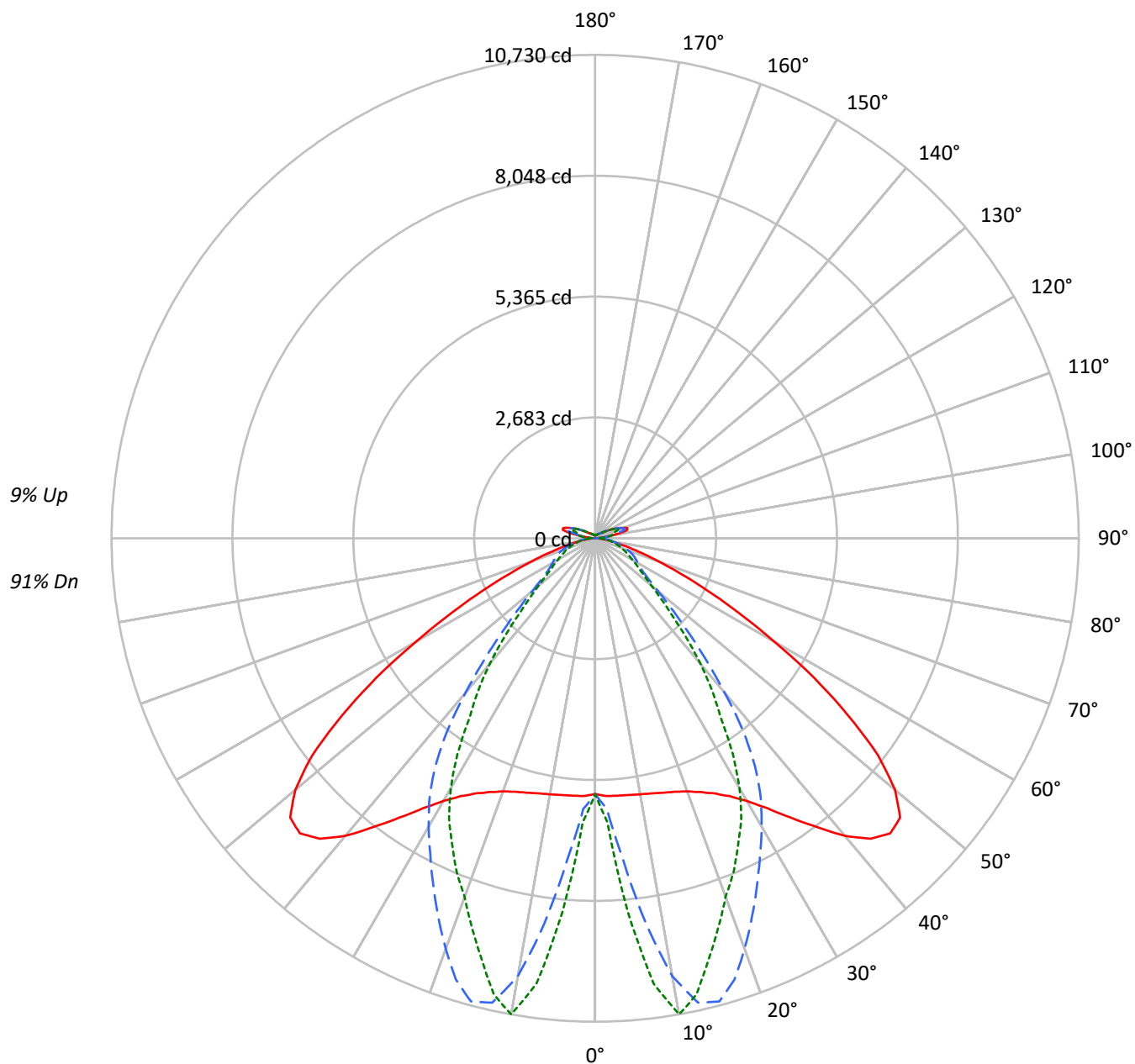
Lumens per Lamp: N/A  
Luminaire Lumens: 20009.9 lumens  
Efficiency: N/A  
Efficacy: 173.5 lumens/watt  
Spacing Criteria (0/90/45): 2.18 / 1.37 / 1.3  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.67' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 115.3  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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CATALOG NUMBER: OHBL-18HE-A-UNV-L840-CD-UPL18

### Luminous Intensity Polar Plot





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**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |     |     |     |     |  |     |     |     |  |     |     |     |  |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|-----|--|-----|-----|-----|--|----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     |  | 20  |     |     |  |     | 20  |     |  |    |    | 20 |
| RC  | 80  |     |     |     | 70  |     |     |     |  | 50  |     |     |  |     | 30  |     |  |    |    | 10 |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |  |     |     |     |  |     |     |     |  |    |    |    |
| 0   | 117 | 117 | 117 | 117 | 113 | 113 | 113 | 113 |  | 106 | 106 | 106 |  | 100 | 100 | 100 |  | 94 | 94 | 94 |
| 1   | 108 | 104 | 101 | 98  | 105 | 101 | 98  | 95  |  | 96  | 93  | 91  |  | 90  | 88  | 86  |  | 85 | 84 | 82 |
| 2   | 100 | 93  | 88  | 83  | 97  | 91  | 85  | 81  |  | 86  | 82  | 78  |  | 81  | 78  | 75  |  | 77 | 74 | 72 |
| 3   | 93  | 84  | 77  | 71  | 90  | 81  | 75  | 70  |  | 77  | 72  | 68  |  | 74  | 69  | 65  |  | 70 | 66 | 63 |
| 4   | 86  | 75  | 68  | 62  | 83  | 74  | 67  | 61  |  | 70  | 64  | 59  |  | 67  | 62  | 58  |  | 64 | 60 | 56 |
| 5   | 80  | 68  | 60  | 55  | 77  | 67  | 59  | 54  |  | 64  | 57  | 53  |  | 61  | 56  | 51  |  | 58 | 54 | 50 |
| 6   | 74  | 62  | 54  | 49  | 72  | 61  | 53  | 48  |  | 58  | 52  | 47  |  | 56  | 50  | 46  |  | 54 | 49 | 45 |
| 7   | 69  | 57  | 49  | 44  | 67  | 56  | 48  | 43  |  | 54  | 47  | 42  |  | 51  | 46  | 41  |  | 49 | 44 | 41 |
| 8   | 65  | 52  | 45  | 39  | 63  | 51  | 44  | 39  |  | 49  | 43  | 38  |  | 47  | 42  | 38  |  | 46 | 41 | 37 |
| 9   | 61  | 48  | 41  | 36  | 59  | 47  | 40  | 36  |  | 46  | 39  | 35  |  | 44  | 38  | 34  |  | 43 | 37 | 34 |
| 10  | 57  | 45  | 38  | 33  | 55  | 44  | 37  | 32  |  | 42  | 36  | 32  |  | 41  | 35  | 31  |  | 40 | 35 | 31 |

**AVERAGE LUMINANCE (cd/sqm):**

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 9698  | 9698  | 9698  |
| 5°  | 9747  | 12197 | 14216 |
| 10° | 9834  | 16816 | 18465 |
| 15° | 10068 | 18319 | 16947 |
| 20° | 10485 | 16997 | 15146 |
| 25° | 11249 | 15286 | 13854 |
| 30° | 12544 | 13764 | 12319 |
| 35° | 14746 | 12047 | 9817  |
| 40° | 17731 | 9174  | 7813  |
| 45° | 20339 | 6250  | 5561  |
| 50° | 20620 | 4287  | 4113  |
| 55° | 17848 | 3374  | 3360  |
| 60° | 13332 | 3157  | 3023  |
| 65° | 9138  | 3167  | 2863  |
| 70° | 5843  | 3055  | 2773  |
| 75° | 3514  | 2827  | 2653  |
| 80° | 2067  | 2485  | 2737  |
| 85° | 995   | 2134  | 2538  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 741.2   | 3.7       |
| 10°-20°   | 2616.2  | 13.1      |
| 20°-30°   | 3855.2  | 19.3      |
| 30°-40°   | 4051.2  | 20.2      |
| 40°-50°   | 3099.9  | 15.5      |
| 50°-60°   | 1871.8  | 9.4       |
| 60°-70°   | 1142.2  | 5.7       |
| 70°-80°   | 623.5   | 3.1       |
| 80°-90°   | 223.3   | 1.1       |
| 90°-100°  | 171.2   | 0.9       |
| 100°-110° | 594.6   | 3.0       |
| 110°-120° | 510.9   | 2.6       |
| 120°-130° | 245.3   | 1.2       |
| 130°-140° | 122.6   | 0.6       |
| 140°-150° | 71.2    | 0.4       |
| 150°-160° | 41.5    | 0.2       |
| 160°-170° | 21.5    | 0.1       |
| 170°-180° | 6.6     | 0.0       |
| 0°-30°    | 7212.6  | 36.0      |
| 0°-40°    | 11263.8 | 56.3      |
| 0°-60°    | 16235.5 | 81.1      |
| 0°-90°    | 18224.5 | 91.1      |
| 90°-120°  | 1276.7  | 6.4       |
| 90°-150°  | 1715.8  | 8.6       |
| 90°-180°  | 1785.0  | 8.9       |
| 0°-180°   | 20009.9 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°   | 67.5° | 90°  | Flux |
|------|------|-------|-------|-------|------|------|
| 0°   | 5678 | 5678  | 5678  | 5678  | 5678 |      |
| 5°   | 5735 | 6153  | 7177  | 8014  | 8324 | 548  |
| 15°  | 5847 | 9106  | 10643 | 9931  | 9698 | 1662 |
| 25°  | 6248 | 10568 | 8497  | 7692  | 7502 | 2920 |
| 35°  | 7568 | 8463  | 6190  | 5155  | 4853 | 4801 |
| 45°  | 9262 | 4829  | 2851  | 2509  | 2404 | 6998 |
| 55°  | 6850 | 1638  | 1298  | 1203  | 1199 | 6053 |
| 65°  | 2746 | 1037  | 955   | 817   | 776  | 2814 |
| 75°  | 731  | 645   | 591   | 488   | 468  | 841  |
| 85°  | 109  | 200   | 236   | 215   | 195  | 134  |
| 90°  | 4    | 25    | 34    | 45    | 50   | 9    |
| 95°  | 38   | 82    | 129   | 167   | 191  | 120  |
| 105° | 741  | 734   | 626   | 441   | 407  | 703  |
| 115° | 513  | 519   | 518   | 512   | 511  | 517  |
| 125° | 250  | 262   | 269   | 268   | 266  | 235  |
| 135° | 148  | 151   | 156   | 158   | 159  | 117  |
| 145° | 108  | 110   | 113   | 114   | 114  | 68   |
| 155° | 86   | 88    | 89    | 90    | 90   | 40   |
| 165° | 74   | 75    | 75    | 76    | 76   | 21   |
| 175° | 67   | 67    | 68    | 68    | 68   | 6    |
| 180° | 67   | 67    | 67    | 67    | 67   |      |



TEST NUMBER: P827092

CATALOG NUMBER: OHBL-18HE-A-UNV-L840-CD-UPL18

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|--------|---------|---------|---------|---------|
| 0°     | 5677.8 | 5677.8  | 5677.8  | 5677.8  | 5677.8  |
| 2.5°   | 5724.4 | 5782.8  | 6013.1  | 6252.2  | 6310.4  |
| 5°     | 5734.8 | 6152.6  | 7177.4  | 8014.2  | 8323.5  |
| 7.5°   | 5747.0 | 6751.8  | 8620.0  | 9644.5  | 9972.5  |
| 10°    | 5770.1 | 7509.5  | 9870.0  | 10605.5 | 10729.5 |
| 12.5°  | 5798.9 | 8312.3  | 10557.8 | 10531.0 | 10374.7 |
| 15°    | 5846.6 | 9106.2  | 10642.6 | 9931.1  | 9697.6  |
| 17.5°  | 5896.7 | 9778.0  | 10273.0 | 9278.1  | 9074.8  |
| 20°    | 5978.3 | 10276.6 | 9698.1  | 8697.7  | 8466.6  |
| 22.5°  | 6095.9 | 10550.8 | 9095.3  | 8172.7  | 8022.0  |
| 25°    | 6247.6 | 10568.5 | 8496.6  | 7692.4  | 7502.5  |
| 27.5°  | 6450.9 | 10323.4 | 7922.7  | 7221.7  | 7021.1  |
| 30°    | 6727.5 | 9853.9  | 7389.5  | 6654.2  | 6405.4  |
| 32.5°  | 7103.2 | 9178.3  | 6839.7  | 5969.0  | 5690.0  |
| 35°    | 7567.7 | 8463.4  | 6189.9  | 5154.9  | 4853.4  |
| 37.5°  | 8074.6 | 7669.7  | 5401.3  | 4433.9  | 4258.4  |
| 40°    | 8620.0 | 6851.9  | 4466.6  | 3759.3  | 3633.6  |
| 42.5°  | 9045.6 | 5962.7  | 3598.3  | 3124.0  | 2990.4  |
| 45°    | 9262.5 | 4829.3  | 2851.3  | 2509.0  | 2403.6  |
| 47.5°  | 9178.0 | 3748.8  | 2260.4  | 1993.6  | 1961.9  |
| 50°    | 8685.0 | 2768.1  | 1809.5  | 1642.2  | 1629.1  |
| 52.5°  | 7914.2 | 2063.2  | 1494.7  | 1391.2  | 1368.6  |
| 55°    | 6849.9 | 1637.6  | 1298.0  | 1203.0  | 1199.4  |
| 57.5°  | 5751.1 | 1391.2  | 1178.2  | 1104.6  | 1079.1  |
| 60°    | 4579.0 | 1240.5  | 1087.4  | 1004.3  | 952.5   |
| 62.5°  | 3589.3 | 1135.1  | 1020.6  | 907.9   | 859.5   |
| 65°    | 2746.2 | 1036.7  | 954.9   | 817.1   | 775.5   |
| 67.5°  | 2047.1 | 943.0   | 874.6   | 721.7   | 697.3   |
| 70°    | 1491.5 | 846.8   | 783.0   | 641.8   | 622.6   |
| 72.5°  | 1063.0 | 750.9   | 691.5   | 566.8   | 545.6   |
| 75°    | 731.2  | 644.7   | 591.4   | 487.9   | 468.2   |
| 77.5°  | 493.3  | 536.4   | 492.8   | 416.6   | 408.3   |
| 80°    | 329.4  | 425.4   | 398.6   | 353.0   | 347.9   |
| 82.5°  | 199.9  | 308.7   | 314.6   | 287.1   | 273.2   |
| 85°    | 108.8  | 199.9   | 235.7   | 214.7   | 194.8   |
| 87.5°  | 42.6   | 110.8   | 162.4   | 145.8   | 137.3   |
| 90°    | 4.0    | 25.0    | 34.0    | 45.0    | 50.0    |
| 92.5°  | 13.0   | 33.0    | 55.0    | 76.0    | 84.0    |
| 95°    | 38.0   | 82.0    | 129.0   | 167.0   | 191.0   |
| 97.5°  | 195.0  | 213.0   | 238.0   | 282.0   | 298.0   |
| 100°   | 402.0  | 422.0   | 354.0   | 371.0   | 377.0   |
| 102.5° | 629.0  | 628.0   | 454.0   | 410.0   | 404.0   |
| 105°   | 741.0  | 734.0   | 626.0   | 441.0   | 407.0   |



TEST NUMBER: P827092

CATALOG NUMBER: OHBL-18HE-A-UNV-L840-CD-UPL18

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 602.0 | 606.0 | 594.0 | 578.0 | 553.0 |
| 115°   | 513.0 | 519.0 | 518.0 | 512.0 | 511.0 |
| 117.5° | 437.0 | 440.0 | 442.0 | 440.0 | 441.0 |
| 120°   | 365.0 | 372.0 | 376.0 | 373.0 | 371.0 |
| 122.5° | 305.0 | 314.0 | 319.0 | 316.0 | 314.0 |
| 125°   | 250.0 | 262.0 | 269.0 | 268.0 | 266.0 |
| 127.5° | 212.0 | 221.0 | 230.0 | 229.0 | 227.0 |
| 130°   | 184.0 | 191.0 | 197.0 | 198.0 | 199.0 |
| 132.5° | 165.0 | 168.0 | 174.0 | 175.0 | 177.0 |
| 135°   | 148.0 | 151.0 | 156.0 | 158.0 | 159.0 |
| 137.5° | 135.0 | 138.0 | 142.0 | 144.0 | 145.0 |
| 140°   | 124.0 | 127.0 | 130.0 | 132.0 | 133.0 |
| 142.5° | 115.0 | 118.0 | 121.0 | 122.0 | 123.0 |
| 145°   | 108.0 | 110.0 | 113.0 | 114.0 | 114.0 |
| 147.5° | 101.0 | 103.0 | 105.0 | 107.0 | 107.0 |
| 150°   | 95.0  | 97.0  | 99.0  | 100.0 | 101.0 |
| 152.5° | 91.0  | 92.0  | 94.0  | 95.0  | 95.0  |
| 155°   | 86.0  | 88.0  | 89.0  | 90.0  | 90.0  |
| 157.5° | 83.0  | 84.0  | 85.0  | 86.0  | 86.0  |
| 160°   | 80.0  | 80.0  | 81.0  | 82.0  | 82.0  |
| 162.5° | 77.0  | 77.0  | 78.0  | 79.0  | 79.0  |
| 165°   | 74.0  | 75.0  | 75.0  | 76.0  | 76.0  |
| 167.5° | 72.0  | 72.0  | 73.0  | 73.0  | 74.0  |
| 170°   | 70.0  | 70.0  | 71.0  | 71.0  | 71.0  |
| 172.5° | 68.0  | 69.0  | 69.0  | 69.0  | 69.0  |
| 175°   | 67.0  | 67.0  | 68.0  | 68.0  | 68.0  |
| 177.5° | 66.0  | 67.0  | 67.0  | 67.0  | 67.0  |
| 180°   | 67.0  | 67.0  | 67.0  | 67.0  | 67.0  |



Report Generated By 670246072 / DESKTOP-50001EG





— 0°-180°    - - 45°-225°    - - - 90°-270°







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 748.0 | 748.0 | 690.0 | 536.0 | 449.0 |
| 110°   | 685.0 | 693.0 | 663.0 | 603.0 | 534.0 |



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2304-001-1

Test Date: 05/31/2023

Luminaire Tested: OHB-15SE-N-UNV-L840

Data in this report applies to families of products including OHB-15SE-N-UNV-L840.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2304-001-1  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 05/31/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L840**  
 Description: 15SE OHB WITH APT LEDS, NARROW LENS, 80CRI 4000K

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 4018   | CRI (Ra): | 84.0 |      |      |
| CIE u':                   | 0.2242 | R1:       | 82.5 | R9:  | 11.5 |
| CIE v':                   | 0.5025 | R2:       | 91.6 | R10: | 79.8 |
| Duv:                      | 0.0010 | R3:       | 96.1 | R11: | 80.5 |
| CIE x:                    | 0.3803 | R4:       | 81.4 | R12: | 64.0 |
| CIE y:                    | 0.3788 | R5:       | 82.4 | R13: | 85.1 |
| CIE z:                    | 0.2410 | R6:       | 88.0 | R14: | 98.4 |
| Peak Wavelength (nm):     | 454    | R7:       | 85.5 |      |      |
| Dominant Wavelength (nm): | 578    | R8:       | 64.7 |      |      |
| Purity:                   | 27.9   |           |      |      |      |
| Rf:                       | 84.5   |           |      |      |      |
| Rg:                       | 93.7   |           |      |      |      |



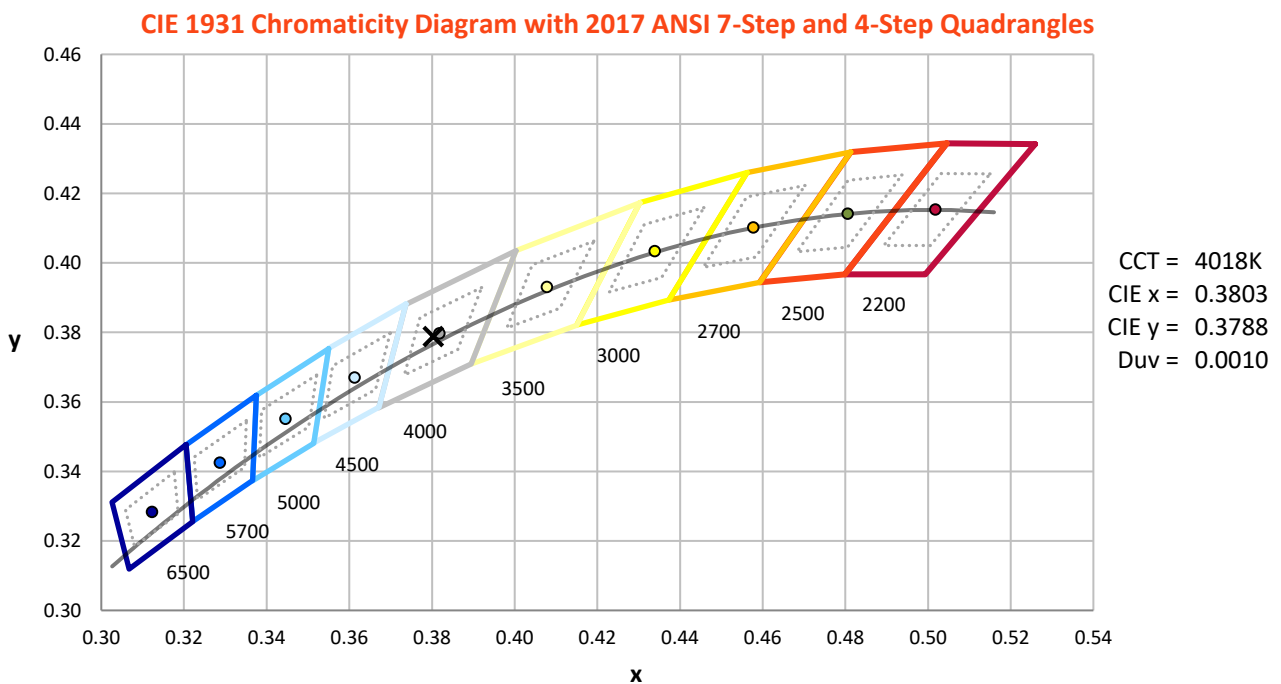
### Test Conditions

Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/44%  
 Sphere Temperature (°C): 25.3

REPORT NUMBER: SP1-2304-001-1

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 2/9/2023         | 8/9/2023             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2022       | 11/29/2023           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/28/2022       | 11/28/2023           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/28/2022       | 11/28/2023           |
| Sphere Thermometer             | ONSET IN0085          | 11/28/2022       | 11/28/2023           |
| Room Thermometer               | ONSET IN0046          | 11/28/2022       | 11/28/2023           |

REPORT NUMBER: SP1-2304-001-1



Point lies inside the ANSI 4000K 4-step quadrangle

REPORT NUMBER: SP1-2304-001-1

**Photopic Flux vs. Wavelength**



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 6853             | NR               | 490       | 98921            | NR               | 620       | 217813           | NR               | 750       | 11077            | NR               | 880       | 7212             | NR               |
| 365       | 5941             | NR               | 495       | 111249           | NR               | 625       | 204757           | NR               | 755       | 10374            | NR               | 885       | 8336             | NR               |
| 370       | 6345             | NR               | 500       | 125186           | NR               | 630       | 189812           | NR               | 760       | 9527             | NR               | 890       | 8299             | NR               |
| 375       | 7044             | NR               | 505       | 139782           | NR               | 635       | 174714           | NR               | 765       | 9227             | NR               | 895       | 8295             | NR               |
| 380       | 6587             | NR               | 510       | 150374           | NR               | 640       | 160641           | NR               | 770       | 8071             | NR               | 900       | 5725             | NR               |
| 385       | 6443             | NR               | 515       | 158837           | NR               | 645       | 146146           | NR               | 775       | 7303             | NR               | 905       | 5085             | NR               |
| 390       | 5977             | NR               | 520       | 167163           | NR               | 650       | 132087           | NR               | 780       | 6839             | NR               | 910       | 6133             | NR               |
| 395       | 5473             | NR               | 525       | 171514           | NR               | 655       | 118817           | NR               | 785       | 5988             | NR               | 915       | 6429             | NR               |
| 400       | 4874             | NR               | 530       | 176783           | NR               | 660       | 105411           | NR               | 790       | 5761             | NR               | 920       | 7354             | NR               |
| 405       | 4470             | NR               | 535       | 182412           | NR               | 665       | 92911            | NR               | 795       | 6396             | NR               | 925       | 6889             | NR               |
| 410       | 5232             | NR               | 540       | 187578           | NR               | 670       | 81240            | NR               | 800       | 6049             | NR               | 930       | 7465             | NR               |
| 415       | 7030             | NR               | 545       | 192635           | NR               | 675       | 70762            | NR               | 805       | 5748             | NR               | 935       | 9430             | NR               |
| 420       | 11074            | NR               | 550       | 198282           | NR               | 680       | 61913            | NR               | 810       | 5571             | NR               | 940       | 6867             | NR               |
| 425       | 19121            | NR               | 555       | 206255           | NR               | 685       | 53742            | NR               | 815       | 5977             | NR               | 945       | 7026             | NR               |
| 430       | 32148            | NR               | 560       | 213621           | NR               | 690       | 46348            | NR               | 820       | 6580             | NR               | 950       | 9476             | NR               |
| 435       | 54073            | NR               | 565       | 222021           | NR               | 695       | 40313            | NR               | 825       | 6610             | NR               | 955       | 8237             | NR               |
| 440       | 89242            | NR               | 570       | 230974           | NR               | 700       | 35240            | NR               | 830       | 6652             | NR               | 960       | 7127             | NR               |
| 445       | 153497           | NR               | 575       | 237268           | NR               | 705       | 30635            | NR               | 835       | 5919             | NR               | 965       | 5614             | NR               |
| 450       | 236793           | NR               | 580       | 244317           | NR               | 710       | 27359            | NR               | 840       | 5707             | NR               | 970       | 9396             | NR               |
| 455       | 259282           | NR               | 585       | 250340           | NR               | 715       | 24401            | NR               | 845       | 5548             | NR               | 975       | 9700             | NR               |
| 460       | 209272           | NR               | 590       | 252316           | NR               | 720       | 21810            | NR               | 850       | 5560             | NR               | 980       | 8916             | NR               |
| 465       | 162456           | NR               | 595       | 253019           | NR               | 725       | 19005            | NR               | 855       | 6972             | NR               | 985       | 9548             | NR               |
| 470       | 132627           | NR               | 600       | 252244           | NR               | 730       | 17009            | NR               | 860       | 8311             | NR               | 990       | 10271            | NR               |
| 475       | 106283           | NR               | 605       | 246798           | NR               | 735       | 14940            | NR               | 865       | 6330             | NR               | 995       | 7323             | NR               |
| 480       | 91347            | NR               | 610       | 238764           | NR               | 740       | 13159            | NR               | 870       | 8019             | NR               | 1000      | 8719             | NR               |
| 485       | 91575            | NR               | 615       | 229100           | NR               | 745       | 12000            | NR               | 875       | 7419             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 25258.1

S/P: 1.73

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 6853             | NR               | 490       | 98921            | NR               | 620       | 217813           | NR               | 750       | 11077            | NR               | 880       | 7212             | NR               |
| 365       | 5941             | NR               | 495       | 111249           | NR               | 625       | 204757           | NR               | 755       | 10374            | NR               | 885       | 8336             | NR               |
| 370       | 6345             | NR               | 500       | 125186           | NR               | 630       | 189812           | NR               | 760       | 9527             | NR               | 890       | 8299             | NR               |
| 375       | 7044             | NR               | 505       | 139782           | NR               | 635       | 174714           | NR               | 765       | 9227             | NR               | 895       | 8295             | NR               |
| 380       | 6587             | NR               | 510       | 150374           | NR               | 640       | 160641           | NR               | 770       | 8071             | NR               | 900       | 5725             | NR               |
| 385       | 6443             | NR               | 515       | 158837           | NR               | 645       | 146146           | NR               | 775       | 7303             | NR               | 905       | 5085             | NR               |
| 390       | 5977             | NR               | 520       | 167163           | NR               | 650       | 132087           | NR               | 780       | 6839             | NR               | 910       | 6133             | NR               |
| 395       | 5473             | NR               | 525       | 171514           | NR               | 655       | 118817           | NR               | 785       | 5988             | NR               | 915       | 6429             | NR               |
| 400       | 4874             | NR               | 530       | 176783           | NR               | 660       | 105411           | NR               | 790       | 5761             | NR               | 920       | 7354             | NR               |
| 405       | 4470             | NR               | 535       | 182412           | NR               | 665       | 92911            | NR               | 795       | 6396             | NR               | 925       | 6889             | NR               |
| 410       | 5232             | NR               | 540       | 187578           | NR               | 670       | 81240            | NR               | 800       | 6049             | NR               | 930       | 7465             | NR               |
| 415       | 7030             | NR               | 545       | 192635           | NR               | 675       | 70762            | NR               | 805       | 5748             | NR               | 935       | 9430             | NR               |
| 420       | 11074            | NR               | 550       | 198282           | NR               | 680       | 61913            | NR               | 810       | 5571             | NR               | 940       | 6867             | NR               |
| 425       | 19121            | NR               | 555       | 206255           | NR               | 685       | 53742            | NR               | 815       | 5977             | NR               | 945       | 7026             | NR               |
| 430       | 32148            | NR               | 560       | 213621           | NR               | 690       | 46348            | NR               | 820       | 6580             | NR               | 950       | 9476             | NR               |
| 435       | 54073            | NR               | 565       | 222021           | NR               | 695       | 40313            | NR               | 825       | 6610             | NR               | 955       | 8237             | NR               |
| 440       | 89242            | NR               | 570       | 230974           | NR               | 700       | 35240            | NR               | 830       | 6652             | NR               | 960       | 7127             | NR               |
| 445       | 153497           | NR               | 575       | 237268           | NR               | 705       | 30635            | NR               | 835       | 5919             | NR               | 965       | 5614             | NR               |
| 450       | 236793           | NR               | 580       | 244317           | NR               | 710       | 27359            | NR               | 840       | 5707             | NR               | 970       | 9396             | NR               |
| 455       | 259282           | NR               | 585       | 250340           | NR               | 715       | 24401            | NR               | 845       | 5548             | NR               | 975       | 9700             | NR               |
| 460       | 209272           | NR               | 590       | 252316           | NR               | 720       | 21810            | NR               | 850       | 5560             | NR               | 980       | 8916             | NR               |
| 465       | 162456           | NR               | 595       | 253019           | NR               | 725       | 19005            | NR               | 855       | 6972             | NR               | 985       | 9548             | NR               |
| 470       | 132627           | NR               | 600       | 252244           | NR               | 730       | 17009            | NR               | 860       | 8311             | NR               | 990       | 10271            | NR               |
| 475       | 106283           | NR               | 605       | 246798           | NR               | 735       | 14940            | NR               | 865       | 6330             | NR               | 995       | 7323             | NR               |
| 480       | 91347            | NR               | 610       | 238764           | NR               | 740       | 13159            | NR               | 870       | 8019             | NR               | 1000      | 8719             | NR               |
| 485       | 91575            | NR               | 615       | 229100           | NR               | 745       | 12000            | NR               | 875       | 7419             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2304-001-1

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 10357.9 M/P: 0.71**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 6853             | NR               | 490       | 98921            | NR               | 620       | 217813           | NR               | 750       | 11077            | NR               | 880       | 7212             | NR               |
| 365       | 5941             | NR               | 495       | 111249           | NR               | 625       | 204757           | NR               | 755       | 10374            | NR               | 885       | 8336             | NR               |
| 370       | 6345             | NR               | 500       | 125186           | NR               | 630       | 189812           | NR               | 760       | 9527             | NR               | 890       | 8299             | NR               |
| 375       | 7044             | NR               | 505       | 139782           | NR               | 635       | 174714           | NR               | 765       | 9227             | NR               | 895       | 8295             | NR               |
| 380       | 6587             | NR               | 510       | 150374           | NR               | 640       | 160641           | NR               | 770       | 8071             | NR               | 900       | 5725             | NR               |
| 385       | 6443             | NR               | 515       | 158837           | NR               | 645       | 146146           | NR               | 775       | 7303             | NR               | 905       | 5085             | NR               |
| 390       | 5977             | NR               | 520       | 167163           | NR               | 650       | 132087           | NR               | 780       | 6839             | NR               | 910       | 6133             | NR               |
| 395       | 5473             | NR               | 525       | 171514           | NR               | 655       | 118817           | NR               | 785       | 5988             | NR               | 915       | 6429             | NR               |
| 400       | 4874             | NR               | 530       | 176783           | NR               | 660       | 105411           | NR               | 790       | 5761             | NR               | 920       | 7354             | NR               |
| 405       | 4470             | NR               | 535       | 182412           | NR               | 665       | 92911            | NR               | 795       | 6396             | NR               | 925       | 6889             | NR               |
| 410       | 5232             | NR               | 540       | 187578           | NR               | 670       | 81240            | NR               | 800       | 6049             | NR               | 930       | 7465             | NR               |
| 415       | 7030             | NR               | 545       | 192635           | NR               | 675       | 70762            | NR               | 805       | 5748             | NR               | 935       | 9430             | NR               |
| 420       | 11074            | NR               | 550       | 198282           | NR               | 680       | 61913            | NR               | 810       | 5571             | NR               | 940       | 6867             | NR               |
| 425       | 19121            | NR               | 555       | 206255           | NR               | 685       | 53742            | NR               | 815       | 5977             | NR               | 945       | 7026             | NR               |
| 430       | 32148            | NR               | 560       | 213621           | NR               | 690       | 46348            | NR               | 820       | 6580             | NR               | 950       | 9476             | NR               |
| 435       | 54073            | NR               | 565       | 222021           | NR               | 695       | 40313            | NR               | 825       | 6610             | NR               | 955       | 8237             | NR               |
| 440       | 89242            | NR               | 570       | 230974           | NR               | 700       | 35240            | NR               | 830       | 6652             | NR               | 960       | 7127             | NR               |
| 445       | 153497           | NR               | 575       | 237268           | NR               | 705       | 30635            | NR               | 835       | 5919             | NR               | 965       | 5614             | NR               |
| 450       | 236793           | NR               | 580       | 244317           | NR               | 710       | 27359            | NR               | 840       | 5707             | NR               | 970       | 9396             | NR               |
| 455       | 259282           | NR               | 585       | 250340           | NR               | 715       | 24401            | NR               | 845       | 5548             | NR               | 975       | 9700             | NR               |
| 460       | 209272           | NR               | 590       | 252316           | NR               | 720       | 21810            | NR               | 850       | 5560             | NR               | 980       | 8916             | NR               |
| 465       | 162456           | NR               | 595       | 253019           | NR               | 725       | 19005            | NR               | 855       | 6972             | NR               | 985       | 9548             | NR               |
| 470       | 132627           | NR               | 600       | 252244           | NR               | 730       | 17009            | NR               | 860       | 8311             | NR               | 990       | 10271            | NR               |
| 475       | 106283           | NR               | 605       | 246798           | NR               | 735       | 14940            | NR               | 865       | 6330             | NR               | 995       | 7323             | NR               |
| 480       | 91347            | NR               | 610       | 238764           | NR               | 740       | 13159            | NR               | 870       | 8019             | NR               | 1000      | 8719             | NR               |
| 485       | 91575            | NR               | 615       | 229100           | NR               | 745       | 12000            | NR               | 875       | 7419             | NR               |           |                  |                  |

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### Summary

$R_f = 84.5$   
 $R_g = 93.7$   
 CIE  $R_a = 84.0$   
 $R_9 = 11.5$



### Color Vector Graphics



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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 88 | CES51 = 91 | CES76 = 81 |
| CES02 = 61 | CES27 = 90 | CES52 = 93 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 80 |
| CES04 = 69 | CES29 = 93 | CES54 = 88 | CES79 = 93 |
| CES05 = 48 | CES30 = 87 | CES55 = 85 | CES80 = 91 |
| CES06 = 50 | CES31 = 95 | CES56 = 84 | CES81 = 78 |
| CES07 = 41 | CES32 = 88 | CES57 = 82 | CES82 = 96 |
| CES08 = 40 | CES33 = 96 | CES58 = 82 | CES83 = 96 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 91 |
| CES10 = 74 | CES35 = 95 | CES60 = 88 | CES85 = 77 |
| CES11 = 57 | CES36 = 77 | CES61 = 86 | CES86 = 74 |
| CES12 = 63 | CES37 = 95 | CES62 = 78 | CES87 = 84 |
| CES13 = 42 | CES38 = 81 | CES63 = 85 | CES88 = 88 |
| CES14 = 74 | CES39 = 98 | CES64 = 77 | CES89 = 78 |
| CES15 = 71 | CES40 = 97 | CES65 = 77 | CES90 = 89 |
| CES16 = 47 | CES41 = 94 | CES66 = 74 | CES91 = 68 |
| CES17 = 49 | CES42 = 97 | CES67 = 73 | CES92 = 64 |
| CES18 = 56 | CES43 = 93 | CES68 = 79 | CES93 = 78 |
| CES19 = 71 | CES44 = 99 | CES69 = 82 | CES94 = 65 |
| CES20 = 65 | CES45 = 94 | CES70 = 77 | CES95 = 73 |
| CES21 = 86 | CES46 = 91 | CES71 = 69 | CES96 = 84 |
| CES22 = 78 | CES47 = 93 | CES72 = 90 | CES97 = 90 |
| CES23 = 91 | CES48 = 82 | CES73 = 72 | CES98 = 86 |
| CES24 = 90 | CES49 = 92 | CES74 = 90 | CES99 = 77 |
| CES25 = 71 | CES50 = 92 | CES75 = 74 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)