

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: P827085

Luminaire Tested: **OHBL-15SE-N-UNV-L840-CD-UPL15**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P827085  
REPORT IS A COMBINATION OF REPORTS P826116 AND G3-2310-221-10  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-15SE-N-UNV-L840-CD-UPL15  
Description: 15000 LUMEN OHBL SE LED LUMINAIRE WITH 80CRI, 4000K LEDS AND NARROW LENS AND 1500 LUMEN UPLIGHT MODULE  
Light Source: -  
Ballast/Driver: -

**Summary**

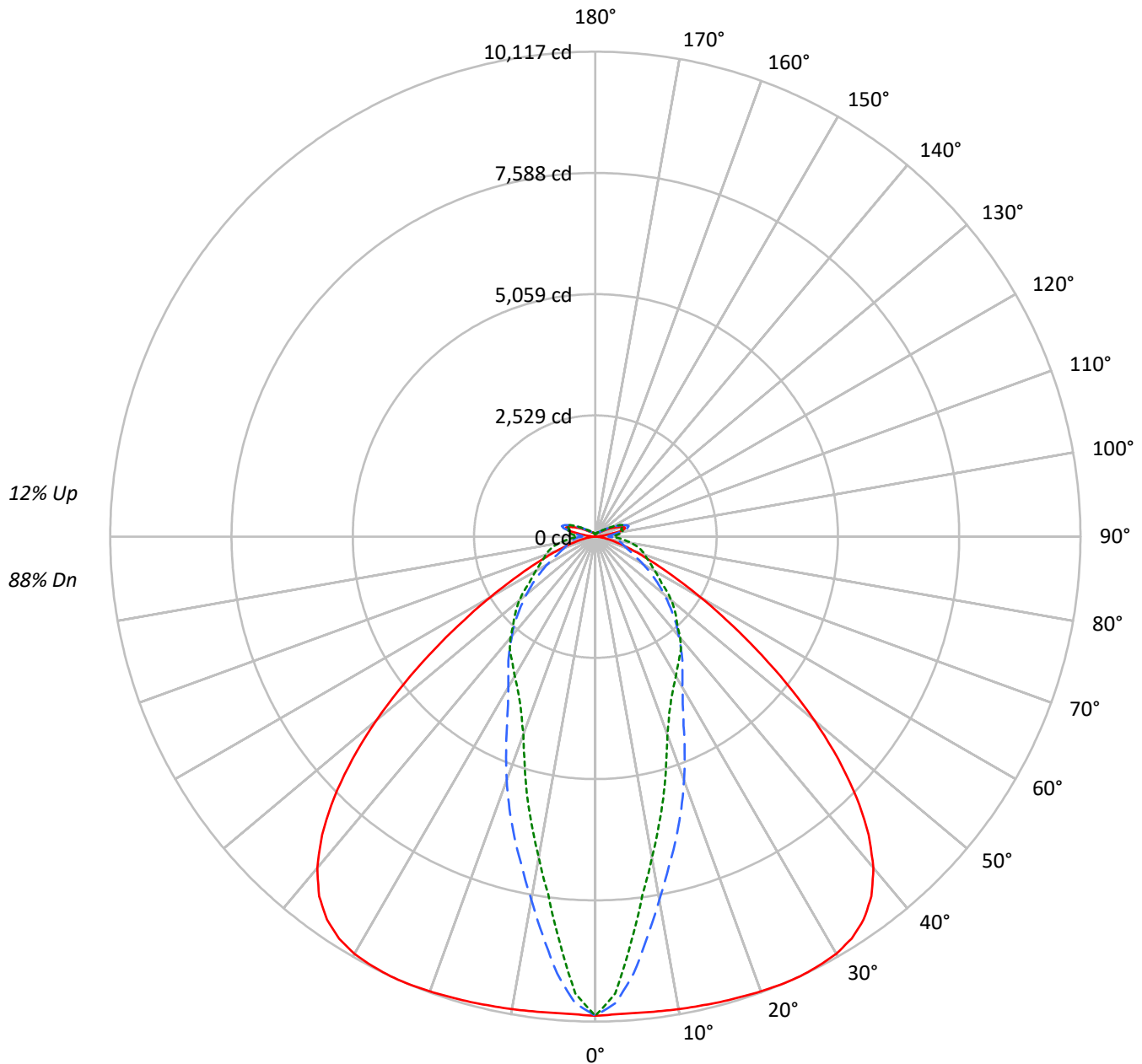
Lumens per Lamp: N/A  
Luminaire Lumens: 16270.2 lumens  
Efficiency: N/A  
Efficacy: 167.2 lumens/watt  
Spacing Criteria (0/90/45): 1.47 / 0.53 / 0.78  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 0.88' x H: 0.17')  
CIE Type: Semi-Direct

Input Watts (W): 97.3  
Input Voltage (V): NR  
Input Current (A<sub>in</sub>): 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

TEST NUMBER: P827085

CATALOG NUMBER: OHBL-15SE-N-UNV-L840-CD-UPL15

### 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 | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |
| 0   | 116 | 116 | 116 | 116 | 112 | 112 | 112 | 112 | 104 | 104 | 104 | 97 | 97 | 97 | 91 | 91 | 91 | 88 |    |    |
| 1   | 107 | 102 | 98  | 95  | 103 | 99  | 95  | 92  | 92  | 90  | 87  | 86 | 84 | 82 | 81 | 79 | 78 | 75 |    |    |
| 2   | 98  | 91  | 84  | 79  | 94  | 88  | 82  | 77  | 82  | 78  | 74  | 77 | 74 | 70 | 73 | 70 | 67 | 64 |    |    |
| 3   | 90  | 81  | 74  | 68  | 87  | 78  | 72  | 66  | 74  | 68  | 64  | 69 | 65 | 61 | 65 | 62 | 58 | 56 |    |    |
| 4   | 83  | 73  | 65  | 59  | 80  | 71  | 63  | 58  | 67  | 60  | 56  | 63 | 58 | 54 | 59 | 55 | 52 | 49 |    |    |
| 5   | 77  | 66  | 58  | 52  | 75  | 64  | 56  | 51  | 61  | 54  | 49  | 57 | 52 | 48 | 54 | 50 | 46 | 44 |    |    |
| 6   | 72  | 60  | 52  | 46  | 69  | 58  | 51  | 45  | 55  | 49  | 44  | 53 | 47 | 43 | 50 | 45 | 41 | 39 |    |    |
| 7   | 67  | 55  | 47  | 41  | 65  | 53  | 46  | 41  | 51  | 44  | 40  | 48 | 43 | 38 | 46 | 41 | 37 | 35 |    |    |
| 8   | 63  | 50  | 43  | 37  | 61  | 49  | 42  | 37  | 47  | 41  | 36  | 45 | 39 | 35 | 43 | 38 | 34 | 32 |    |    |
| 9   | 59  | 47  | 39  | 34  | 57  | 46  | 38  | 34  | 44  | 37  | 33  | 42 | 36 | 32 | 40 | 35 | 31 | 29 |    |    |
| 10  | 56  | 43  | 36  | 31  | 54  | 42  | 35  | 31  | 41  | 34  | 30  | 39 | 33 | 29 | 37 | 32 | 29 | 27 |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 32516 | 32516 | 32516 |
| 5°  | 32040 | 29448 | 27665 |
| 10° | 31996 | 24669 | 22292 |
| 15° | 32207 | 20981 | 18387 |
| 20° | 32682 | 17641 | 14949 |
| 25° | 33354 | 14516 | 13169 |
| 30° | 34012 | 12428 | 12305 |
| 35° | 34182 | 11251 | 11797 |
| 40° | 33026 | 10089 | 11270 |
| 45° | 29802 | 9043  | 10517 |
| 50° | 24593 | 7915  | 9963  |
| 55° | 18204 | 6857  | 8964  |
| 60° | 12355 | 5803  | 8700  |
| 65° | 7980  | 4915  | 8670  |
| 70° | 5161  | 4512  | 9322  |
| 75° | 3313  | 4512  | 10329 |
| 80° | 2013  | 4766  | 11305 |
| 85° | 928   | 5480  | 13482 |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 841.3   | 5.2       |
| 10°-20°   | 1979.2  | 12.2      |
| 20°-30°   | 2480.9  | 15.2      |
| 30°-40°   | 2632.5  | 16.2      |
| 40°-50°   | 2380.2  | 14.6      |
| 50°-60°   | 1725.8  | 10.6      |
| 60°-70°   | 1083.0  | 6.7       |
| 70°-80°   | 716.7   | 4.4       |
| 80°-90°   | 416.7   | 2.6       |
| 90°-100°  | 345.7   | 2.1       |
| 100°-110° | 642.7   | 4.0       |
| 110°-120° | 518.8   | 3.2       |
| 120°-130° | 249.4   | 1.5       |
| 130°-140° | 123.0   | 0.8       |
| 140°-150° | 70.8    | 0.4       |
| 150°-160° | 39.7    | 0.2       |
| 160°-170° | 18.3    | 0.1       |
| 170°-180° | 5.6     | 0.0       |
| 0°-30°    | 5301.4  | 32.6      |
| 0°-40°    | 7933.9  | 48.8      |
| 0°-60°    | 12039.9 | 74.0      |
| 0°-90°    | 14256.4 | 87.6      |
| 90°-120°  | 1507.1  | 9.3       |
| 90°-150°  | 1950.3  | 12.0      |
| 90°-180°  | 2014.0  | 12.4      |
| 0°-180°   | 16270.2 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|-------|-------|------|-------|------|------|
| 0°   | 9995  | 9995  | 9995 | 9995  | 9995 |      |
| 5°   | 9975  | 9719  | 9148 | 8724  | 8504 | 953  |
| 15°  | 10051 | 8192  | 6506 | 5786  | 5524 | 2850 |
| 25°  | 10117 | 6334  | 4357 | 3867  | 3744 | 4674 |
| 35°  | 9755  | 4211  | 3162 | 3063  | 3062 | 6064 |
| 45°  | 7712  | 2667  | 2292 | 2347  | 2387 | 5875 |
| 55°  | 4083  | 1653  | 1495 | 1622  | 1680 | 3689 |
| 65°  | 1460  | 959   | 866  | 1109  | 1233 | 1519 |
| 75°  | 451   | 516   | 581  | 903   | 957  | 503  |
| 85°  | 79    | 214   | 425  | 592   | 543  | 95   |
| 90°  | 3     | 111   | 275  | 385   | 393  | 7    |
| 95°  | 32    | 135   | 324  | 437   | 473  | 103  |
| 105° | 641   | 666   | 690  | 585   | 560  | 607  |
| 115° | 446   | 466   | 546  | 571   | 565  | 450  |
| 125° | 222   | 238   | 283  | 296   | 294  | 209  |
| 135° | 134   | 140   | 156  | 171   | 172  | 107  |
| 145° | 102   | 105   | 109  | 119   | 118  | 65   |
| 155° | 84    | 88    | 91   | 92    | 91   | 38   |
| 165° | 63    | 63    | 64   | 64    | 64   | 18   |
| 175° | 57    | 57    | 57   | 58    | 58   | 6    |
| 180° | 57    | 57    | 57   | 57    | 57   |      |



TEST NUMBER: P827085

CATALOG NUMBER: OHBL-15SE-N-UNV-L840-CD-UPL15

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|---------|--------|--------|--------|--------|
| 0°     | 9994.6  | 9994.6 | 9994.6 | 9994.6 | 9994.6 |
| 2.5°   | 9973.7  | 9916.6 | 9738.7 | 9630.3 | 9538.9 |
| 5°     | 9974.6  | 9718.7 | 9148.0 | 8723.7 | 8504.0 |
| 7.5°   | 9988.9  | 9420.0 | 8391.8 | 7772.5 | 7530.9 |
| 10°    | 10010.8 | 9050.0 | 7686.0 | 7025.8 | 6800.4 |
| 12.5°  | 10026.9 | 8633.4 | 7064.8 | 6386.6 | 6139.2 |
| 15°    | 10050.7 | 8192.0 | 6506.4 | 5786.3 | 5523.8 |
| 17.5°  | 10072.6 | 7776.3 | 5954.7 | 5202.3 | 4910.3 |
| 20°    | 10094.5 | 7328.3 | 5403.0 | 4627.7 | 4387.1 |
| 22.5°  | 10115.4 | 6855.5 | 4864.6 | 4181.6 | 4017.1 |
| 25°    | 10117.3 | 6334.3 | 4356.6 | 3866.8 | 3744.0 |
| 27.5°  | 10092.6 | 5794.0 | 3944.8 | 3603.3 | 3527.2 |
| 30°    | 10049.8 | 5269.8 | 3625.1 | 3413.0 | 3358.8 |
| 32.5°  | 9943.2  | 4735.2 | 3377.8 | 3229.4 | 3198.0 |
| 35°    | 9754.9  | 4211.1 | 3161.9 | 3063.0 | 3062.0 |
| 37.5°  | 9458.1  | 3745.9 | 2927.9 | 2910.8 | 2931.7 |
| 40°    | 9019.6  | 3338.8 | 2706.3 | 2751.9 | 2751.9 |
| 42.5°  | 8434.6  | 2985.0 | 2505.5 | 2552.2 | 2539.8 |
| 45°    | 7711.6  | 2667.3 | 2291.5 | 2346.7 | 2386.6 |
| 47.5°  | 6873.6  | 2387.6 | 2072.7 | 2179.3 | 2234.4 |
| 50°    | 5962.3  | 2121.2 | 1873.0 | 2009.0 | 2071.8 |
| 52.5°  | 5007.3  | 1874.9 | 1678.0 | 1834.0 | 1884.4 |
| 55°    | 4082.7  | 1653.2 | 1495.3 | 1621.8 | 1679.9 |
| 57.5°  | 3245.6  | 1442.1 | 1316.5 | 1436.4 | 1556.2 |
| 60°    | 2525.5  | 1260.4 | 1148.1 | 1319.4 | 1439.2 |
| 62.5°  | 1929.1  | 1098.7 | 990.2  | 1210.0 | 1329.8 |
| 65°    | 1460.1  | 958.8  | 865.6  | 1109.1 | 1232.8 |
| 67.5°  | 1100.6  | 838.0  | 768.6  | 1035.9 | 1156.7 |
| 70°    | 826.6   | 721.0  | 690.6  | 990.2  | 1098.7 |
| 72.5°  | 610.7   | 613.5  | 628.8  | 950.3  | 1033.0 |
| 75°    | 450.9   | 516.5  | 581.2  | 902.7  | 956.9  |
| 77.5°  | 322.5   | 428.1  | 538.4  | 845.6  | 864.7  |
| 80°    | 223.5   | 349.1  | 493.7  | 770.5  | 754.3  |
| 82.5°  | 139.8   | 279.7  | 453.7  | 687.7  | 643.0  |
| 85°    | 79.0    | 214.0  | 425.2  | 591.7  | 543.2  |
| 87.5°  | 35.2    | 159.8  | 371.9  | 461.3  | 430.9  |
| 90°    | 3.0     | 111.4  | 275.4  | 385.2  | 393.1  |
| 92.5°  | 11.9    | 102.2  | 273.3  | 381.7  | 401.2  |
| 95°    | 31.8    | 134.8  | 323.9  | 436.9  | 473.2  |
| 97.5°  | 170.8   | 242.2  | 407.6  | 509.0  | 538.4  |
| 100°   | 342.7   | 413.5  | 486.4  | 566.1  | 582.6  |
| 102.5° | 548.7   | 569.7  | 559.2  | 577.2  | 578.9  |
| 105°   | 640.6   | 665.9  | 689.9  | 585.3  | 560.0  |



TEST NUMBER: P827085

CATALOG NUMBER: OHBL-15SE-N-UNV-L840-CD-UPL15

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 518.5 | 548.3 | 625.9 | 639.3 | 626.1 |
| 115°   | 446.5 | 465.5 | 546.5 | 571.2 | 565.0 |
| 117.5° | 385.4 | 397.7 | 469.2 | 491.0 | 490.0 |
| 120°   | 323.4 | 338.8 | 396.9 | 414.9 | 413.9 |
| 122.5° | 269.4 | 285.0 | 337.6 | 350.8 | 348.8 |
| 125°   | 222.4 | 238.2 | 283.2 | 295.5 | 293.5 |
| 127.5° | 190.5 | 199.4 | 238.8 | 252.1 | 249.1 |
| 130°   | 166.5 | 173.4 | 202.2 | 216.5 | 216.5 |
| 132.5° | 148.5 | 154.4 | 176.5 | 190.9 | 191.9 |
| 135°   | 134.5 | 140.4 | 155.8 | 171.1 | 172.1 |
| 137.5° | 124.5 | 129.4 | 141.0 | 154.3 | 155.3 |
| 140°   | 114.5 | 119.4 | 128.1 | 140.5 | 141.5 |
| 142.5° | 108.5 | 111.4 | 117.2 | 128.7 | 128.7 |
| 145°   | 102.4 | 105.4 | 109.3 | 118.9 | 117.9 |
| 147.5° | 97.4  | 101.3 | 104.3 | 109.0 | 109.1 |
| 150°   | 92.4  | 97.3  | 98.3  | 102.1 | 101.2 |
| 152.5° | 88.4  | 92.3  | 94.3  | 96.2  | 96.2  |
| 155°   | 84.4  | 88.3  | 91.2  | 92.2  | 91.3  |
| 157.5° | 70.0  | 71.0  | 72.0  | 73.0  | 73.0  |
| 160°   | 67.0  | 68.0  | 69.0  | 69.0  | 70.0  |
| 162.5° | 65.0  | 66.0  | 66.0  | 67.0  | 67.0  |
| 165°   | 63.0  | 63.0  | 64.0  | 64.0  | 64.0  |
| 167.5° | 61.0  | 61.0  | 62.0  | 62.0  | 63.0  |
| 170°   | 59.0  | 60.0  | 60.0  | 60.0  | 61.0  |
| 172.5° | 58.0  | 58.0  | 59.0  | 59.0  | 59.0  |
| 175°   | 57.0  | 57.0  | 57.0  | 58.0  | 58.0  |
| 177.5° | 56.0  | 57.0  | 57.0  | 57.0  | 57.0  |
| 180°   | 57.0  | 57.0  | 57.0  | 57.0  | 57.0  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 640.6 | 673.0 | 731.6 | 639.4 | 573.1 |
| 110°   | 592.6 | 624.2 | 695.2 | 679.4 | 624.1 |



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   |           |      |      |      |



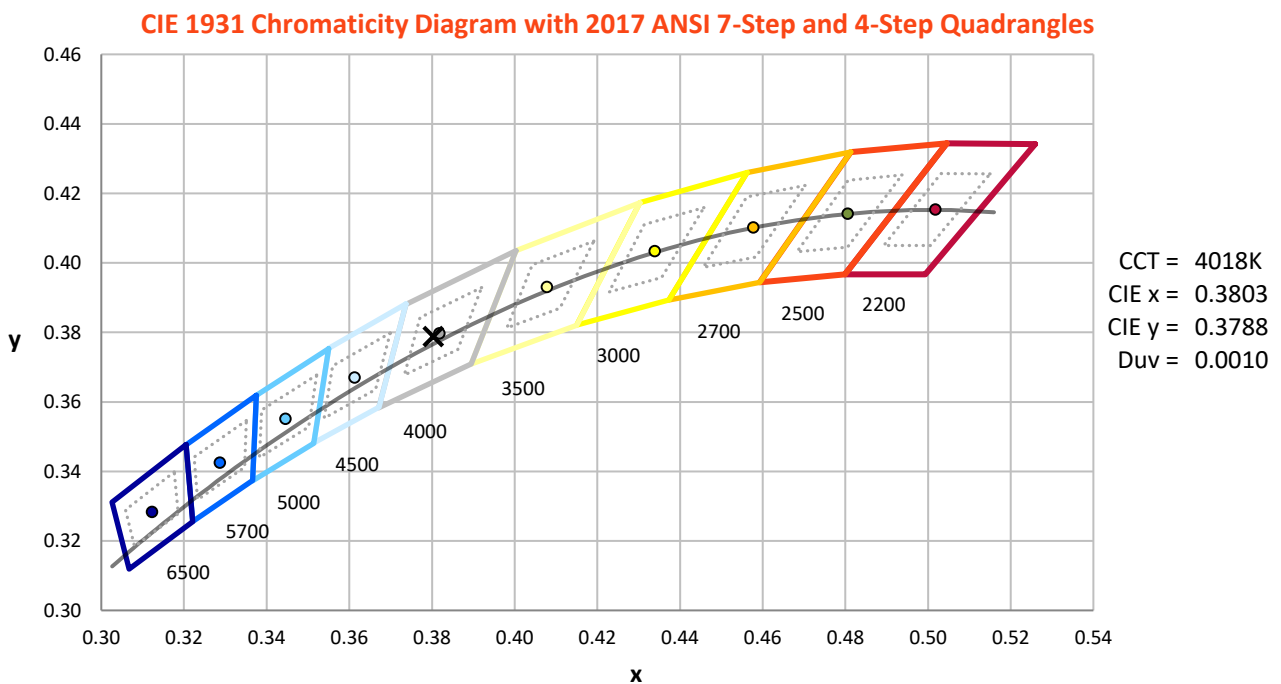
### Test Conditions

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               |           |                  |                  |

REPORT NUMBER: SP1-2304-001-1

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**

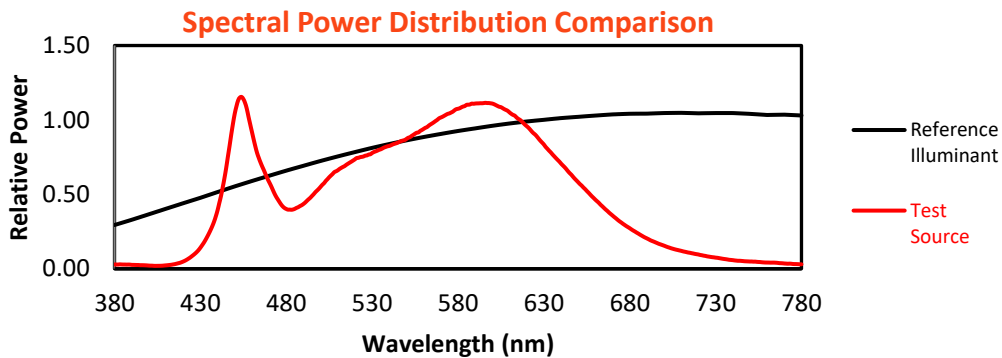
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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               |           |                  |                  |

REPORT NUMBER: SP1-2304-001-1

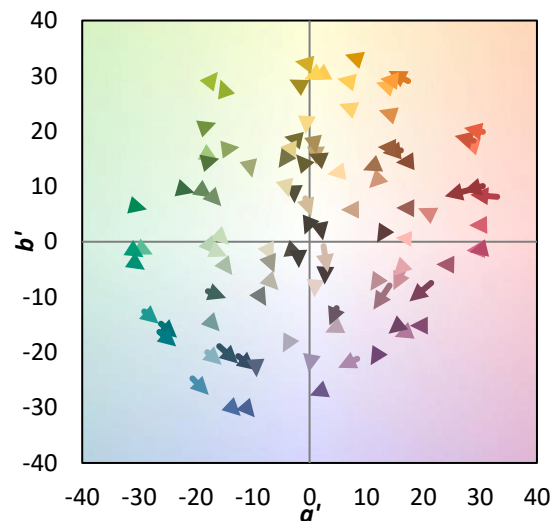
**TM-30-18**

**Summary**

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



**Color Vector Graphics**



REPORT NUMBER: SP1-2304-001-1

**TM-30-18**

**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 |            |



REPORT NUMBER: SP1-2304-001-1

**TM-30-18**

Color Rendition by Hue-Angle Bin



REPORT NUMBER: SP1-2304-001-1

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)