

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: P830899

Luminaire Tested: **OHBL-9HE-MCL-UNV-L830-CD**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830899  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2103-200-1)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-9HE-MCL-UNV-L830-CD  
Description: 9000 LUMEN OHBL HE LED LUMINAIRE WITH 80CRI, 3000K LEDS AND MEDIUM CLEAR LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

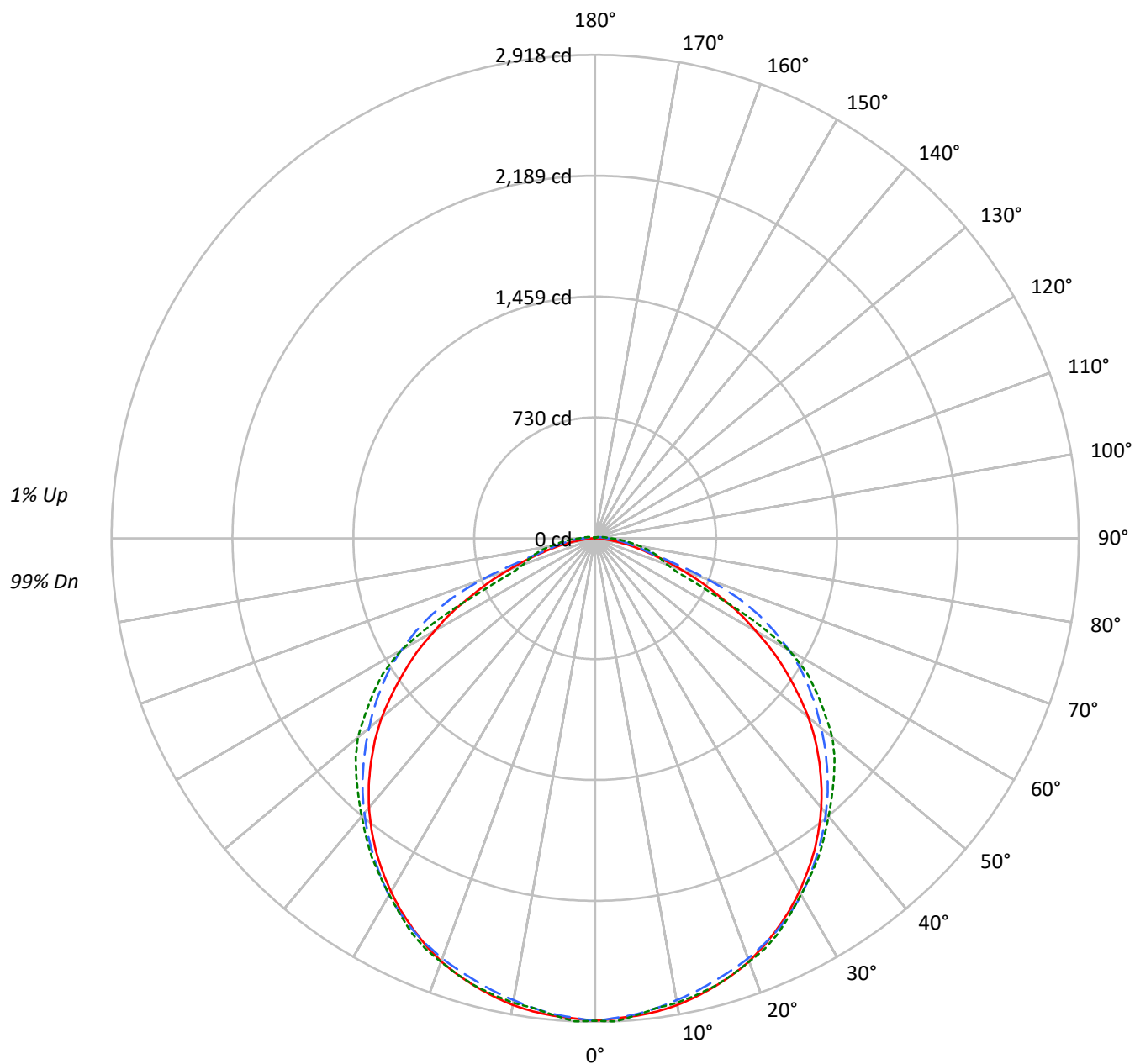
Lumens per Lamp: N/A  
Luminaire Lumens: 8232.0 lumens  
Efficiency: N/A  
Efficacy: 158.3 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 1.67' x L: 3.78' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 52  
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

TEST NUMBER: P830899

CATALOG NUMBER: OHBL-9HE-MCL-UNV-L830-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P830899

CATALOG NUMBER: OHBL-9HE-MCL-UNV-L830-CD

**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   | 119 | 119 | 119 | 119 |  | 116 | 116 | 116 | 116 |  | 110 | 110 | 110 |  | 106 | 106 | 106 |  | 101 | 101 | 101 |
| 1   | 109 | 104 | 100 | 96  |  | 106 | 102 | 98  | 95  |  | 97  | 94  | 91  |  | 93  | 91  | 88  |  | 90  | 87  | 86  |
| 2   | 99  | 91  | 84  | 79  |  | 96  | 89  | 83  | 78  |  | 85  | 80  | 76  |  | 82  | 78  | 74  |  | 79  | 75  | 72  |
| 3   | 91  | 80  | 72  | 66  |  | 88  | 79  | 71  | 65  |  | 75  | 69  | 64  |  | 72  | 67  | 63  |  | 70  | 65  | 61  |
| 4   | 83  | 71  | 62  | 56  |  | 81  | 70  | 62  | 55  |  | 67  | 60  | 54  |  | 65  | 59  | 54  |  | 62  | 57  | 53  |
| 5   | 76  | 64  | 55  | 48  |  | 74  | 62  | 54  | 48  |  | 60  | 53  | 47  |  | 58  | 52  | 46  |  | 56  | 50  | 46  |
| 6   | 70  | 57  | 48  | 42  |  | 68  | 56  | 48  | 42  |  | 54  | 47  | 41  |  | 52  | 46  | 41  |  | 51  | 45  | 40  |
| 7   | 65  | 52  | 43  | 37  |  | 63  | 51  | 43  | 37  |  | 49  | 42  | 36  |  | 48  | 41  | 36  |  | 46  | 40  | 36  |
| 8   | 61  | 47  | 39  | 33  |  | 59  | 46  | 38  | 33  |  | 45  | 38  | 33  |  | 44  | 37  | 32  |  | 42  | 36  | 32  |
| 9   | 57  | 43  | 35  | 30  |  | 55  | 43  | 35  | 29  |  | 41  | 34  | 29  |  | 40  | 34  | 29  |  | 39  | 33  | 29  |
| 10  | 53  | 40  | 32  | 27  |  | 52  | 39  | 32  | 27  |  | 38  | 31  | 27  |  | 37  | 31  | 26  |  | 36  | 30  | 26  |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 4975 | 4975 | 4975 |
| 5°  | 4942 | 4900 | 4909 |
| 10° | 4924 | 4824 | 4852 |
| 15° | 4893 | 4766 | 4816 |
| 20° | 4861 | 4729 | 4770 |
| 25° | 4803 | 4691 | 4725 |
| 30° | 4739 | 4633 | 4632 |
| 35° | 4663 | 4543 | 4579 |
| 40° | 4564 | 4450 | 4508 |
| 45° | 4426 | 4341 | 4474 |
| 50° | 4240 | 4219 | 4433 |
| 55° | 3944 | 4098 | 4262 |
| 60° | 3556 | 3921 | 3934 |
| 65° | 3051 | 3598 | 2487 |
| 70° | 2457 | 2803 | 1798 |
| 75° | 1842 | 1659 | 1817 |
| 80° | 1283 | 1373 | 1723 |
| 85° | 730  | 1247 | 1594 |



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CATALOG NUMBER: OHBL-9HE-MCL-UNV-L830-CD

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 274.6  | 3.3       |
| 10°-20°   | 787.5  | 9.6       |
| 20°-30°   | 1202.7 | 14.6      |
| 30°-40°   | 1459.3 | 17.7      |
| 40°-50°   | 1529.5 | 18.6      |
| 50°-60°   | 1386.0 | 16.8      |
| 60°-70°   | 929.2  | 11.3      |
| 70°-80°   | 417.3  | 5.1       |
| 80°-90°   | 151.4  | 1.8       |
| 90°-100°  | 45.6   | 0.6       |
| 100°-110° | 21.5   | 0.3       |
| 110°-120° | 10.8   | 0.1       |
| 120°-130° | 6.0    | 0.1       |
| 130°-140° | 4.1    | 0.0       |
| 140°-150° | 2.7    | 0.0       |
| 150°-160° | 2.0    | 0.0       |
| 160°-170° | 1.3    | 0.0       |
| 170°-180° | 0.4    | 0.0       |
| <hr/>     |        |           |
| 0°-30°    | 2264.8 | 27.5      |
| 0°-40°    | 3724.2 | 45.2      |
| 0°-60°    | 6639.6 | 80.7      |
| 0°-90°    | 8137.6 | 98.9      |
| 90°-120°  | 77.9   | 0.9       |
| 90°-150°  | 90.7   | 1.1       |
| 90°-180°  | 94.0   | 1.1       |
| 0°-180°   | 8232.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 2912 | 2912  | 2912 | 2912  | 2912 |      |
| 5°   | 2894 | 2904  | 2883 | 2892  | 2888 | 275  |
| 15°  | 2800 | 2789  | 2769 | 2793  | 2797 | 790  |
| 25°  | 2601 | 2590  | 2608 | 2632  | 2624 | 1199 |
| 35°  | 2305 | 2311  | 2334 | 2359  | 2350 | 1441 |
| 45°  | 1913 | 1944  | 1980 | 2031  | 2037 | 1474 |
| 55°  | 1408 | 1476  | 1576 | 1639  | 1636 | 1257 |
| 65°  | 826  | 956   | 1085 | 916   | 748  | 823  |
| 75°  | 325  | 472   | 347  | 355   | 378  | 355  |
| 85°  | 56   | 107   | 138  | 166   | 174  | 68   |
| 90°  | 0    | 36    | 71   | 89    | 94   | 3    |
| 95°  | 0    | 22    | 49   | 59    | 61   | 1    |
| 105° | 2    | 10    | 24   | 29    | 30   | 2    |
| 115° | 3    | 5     | 12   | 16    | 16   | 3    |
| 125° | 3    | 3     | 8    | 9     | 9    | 3    |
| 135° | 4    | 4     | 5    | 7     | 7    | 3    |
| 145° | 4    | 4     | 4    | 5     | 5    | 3    |
| 155° | 4    | 5     | 5    | 5     | 4    | 2    |
| 165° | 5    | 5     | 5    | 5     | 5    | 1    |
| 175° | 5    | 5     | 4    | 4     | 4    | 0    |
| 180° | 4    | 4     | 4    | 4     | 4    |      |



TEST NUMBER: P830899

CATALOG NUMBER: OHBL-9HE-MCL-UNV-L830-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 2912.5 | 2912.5 | 2912.5 | 2912.5 | 2912.5 |
| 2.5°   | 2900.7 | 2912.9 | 2897.7 | 2914.2 | 2918.4 |
| 5°     | 2893.5 | 2903.6 | 2883.4 | 2892.3 | 2888.5 |
| 7.5°   | 2880.5 | 2883.9 | 2859.8 | 2867.0 | 2859.4 |
| 10°    | 2861.1 | 2859.4 | 2831.2 | 2845.1 | 2846.8 |
| 12.5°  | 2832.5 | 2827.4 | 2802.2 | 2823.2 | 2823.6 |
| 15°    | 2799.6 | 2788.7 | 2768.9 | 2793.3 | 2796.7 |
| 17.5°  | 2761.7 | 2747.4 | 2734.4 | 2765.9 | 2760.9 |
| 20°    | 2717.5 | 2700.7 | 2698.1 | 2732.7 | 2720.0 |
| 22.5°  | 2662.8 | 2649.7 | 2655.6 | 2688.5 | 2680.4 |
| 25°    | 2600.9 | 2589.5 | 2607.6 | 2631.6 | 2624.0 |
| 27.5°  | 2535.6 | 2528.8 | 2549.5 | 2568.0 | 2553.3 |
| 30°    | 2464.0 | 2460.2 | 2487.6 | 2502.7 | 2484.2 |
| 32.5°  | 2386.1 | 2387.3 | 2413.5 | 2434.1 | 2416.8 |
| 35°    | 2305.2 | 2310.7 | 2334.3 | 2359.1 | 2349.9 |
| 37.5°  | 2216.4 | 2228.6 | 2252.2 | 2280.4 | 2270.7 |
| 40°    | 2122.5 | 2140.1 | 2166.3 | 2200.4 | 2191.5 |
| 42.5°  | 2021.0 | 2043.3 | 2077.0 | 2114.9 | 2114.0 |
| 45°    | 1913.2 | 1944.3 | 1980.5 | 2031.1 | 2037.4 |
| 47.5°  | 1801.1 | 1836.1 | 1882.0 | 1949.4 | 1959.1 |
| 50°    | 1679.4 | 1723.2 | 1780.5 | 1861.4 | 1867.3 |
| 52.5°  | 1543.8 | 1603.6 | 1679.4 | 1756.9 | 1749.8 |
| 55°    | 1407.8 | 1475.6 | 1576.3 | 1639.4 | 1635.6 |
| 57.5°  | 1272.2 | 1348.4 | 1470.6 | 1515.6 | 1515.2 |
| 60°    | 1120.6 | 1217.0 | 1350.5 | 1384.7 | 1351.0 |
| 62.5°  | 980.4  | 1084.0 | 1222.5 | 1197.7 | 1082.3 |
| 65°    | 826.2  | 955.5  | 1084.8 | 915.5  | 747.5  |
| 67.5°  | 689.4  | 824.1  | 921.4  | 627.1  | 536.9  |
| 70°    | 551.7  | 700.3  | 718.4  | 465.3  | 459.0  |
| 72.5°  | 429.5  | 587.9  | 495.7  | 398.4  | 418.6  |
| 75°    | 325.1  | 471.7  | 347.0  | 355.0  | 378.2  |
| 77.5°  | 237.1  | 362.2  | 269.9  | 311.2  | 330.2  |
| 80°    | 163.0  | 256.5  | 220.2  | 261.5  | 274.6  |
| 82.5°  | 102.3  | 169.3  | 176.5  | 210.6  | 224.0  |
| 85°    | 56.0   | 107.4  | 137.7  | 166.3  | 174.3  |
| 87.5°  | 23.2   | 64.9   | 105.3  | 128.4  | 135.2  |
| 90°    | 0.4    | 35.8   | 71.2   | 89.3   | 93.5   |
| 92.5°  | 0.4    | 27.4   | 58.1   | 72.0   | 75.0   |
| 95°    | 0.4    | 22.3   | 48.9   | 59.4   | 61.1   |
| 97.5°  | 0.8    | 17.7   | 40.8   | 49.3   | 51.0   |
| 100°   | 1.3    | 14.7   | 34.1   | 41.3   | 42.5   |
| 102.5° | 1.7    | 11.8   | 28.6   | 34.5   | 35.8   |
| 105°   | 1.7    | 9.7    | 24.0   | 29.1   | 30.3   |



TEST NUMBER: P830899

CATALOG NUMBER: OHBL-9HE-MCL-UNV-L830-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°  | 22.5° | 45°  | 67.5° | 90°  |
|--------|-----|-------|------|-------|------|
| 112.5° | 2.9 | 5.9   | 14.3 | 18.1  | 19.0 |
| 115°   | 3.4 | 5.1   | 12.2 | 15.6  | 16.4 |
| 117.5° | 3.4 | 4.2   | 10.5 | 13.1  | 13.9 |
| 120°   | 3.4 | 3.8   | 9.3  | 11.4  | 11.8 |
| 122.5° | 3.4 | 3.4   | 8.0  | 10.1  | 10.5 |
| 125°   | 2.9 | 3.4   | 7.6  | 8.8   | 9.3  |
| 127.5° | 3.4 | 3.4   | 6.7  | 8.0   | 8.4  |
| 130°   | 3.4 | 3.8   | 5.9  | 7.6   | 7.6  |
| 132.5° | 3.8 | 4.2   | 5.5  | 7.2   | 7.2  |
| 135°   | 3.8 | 4.2   | 4.6  | 6.7   | 7.2  |
| 137.5° | 4.2 | 4.2   | 4.2  | 6.3   | 6.7  |
| 140°   | 4.2 | 4.2   | 3.8  | 5.5   | 5.9  |
| 142.5° | 3.8 | 4.2   | 3.8  | 5.1   | 5.5  |
| 145°   | 3.8 | 4.2   | 4.2  | 4.6   | 5.1  |
| 147.5° | 4.2 | 4.2   | 4.2  | 4.2   | 4.6  |
| 150°   | 4.2 | 4.2   | 4.2  | 4.2   | 4.2  |
| 152.5° | 4.2 | 4.2   | 4.2  | 4.2   | 4.2  |
| 155°   | 4.2 | 4.6   | 4.6  | 4.6   | 4.2  |
| 157.5° | 4.2 | 4.6   | 4.6  | 4.6   | 4.6  |
| 160°   | 4.2 | 4.6   | 4.6  | 4.6   | 4.6  |
| 162.5° | 4.6 | 4.6   | 4.6  | 4.6   | 4.6  |
| 165°   | 4.6 | 4.6   | 4.6  | 4.6   | 4.6  |
| 167.5° | 4.6 | 5.1   | 4.6  | 4.6   | 4.6  |
| 170°   | 4.6 | 4.6   | 4.6  | 4.2   | 4.2  |
| 172.5° | 4.6 | 4.6   | 4.6  | 4.2   | 4.2  |
| 175°   | 4.6 | 4.6   | 4.2  | 3.8   | 3.8  |
| 177.5° | 5.1 | 4.6   | 4.2  | 3.8   | 3.4  |
| 180°   | 4.2 | 4.2   | 4.2  | 4.2   | 4.2  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |     |     |      |      |      |
|--------|-----|-----|------|------|------|
| 107.5° | 2.1 | 8.0 | 20.6 | 24.8 | 25.7 |
| 110°   | 2.5 | 6.7 | 17.3 | 21.1 | 21.9 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-4

Test Date: 07/27/2023

Luminaire Tested: OHB-15SE-N-UNV-L830-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L830-CD.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L830-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 80CRI, 3000K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3094   | CRI (Ra): | 83.1 |      |      |
| CIE u':                   | 0.2471 | R1:       | 81.4 | R9:  | 8.0  |
| CIE v':                   | 0.5200 | R2:       | 91.2 | R10: | 80.2 |
| Duv:                      | 0.0004 | R3:       | 96.3 | R11: | 80.9 |
| CIE x:                    | 0.4308 | R4:       | 81.2 | R12: | 72.3 |
| CIE y:                    | 0.4028 | R5:       | 81.8 | R13: | 83.8 |
| CIE z:                    | 0.1664 | R6:       | 89.5 | R14: | 98.6 |
| Peak Wavelength (nm):     | 601    | R7:       | 83.2 |      |      |
| Dominant Wavelength (nm): | 582    | R8:       | 59.8 |      |      |
| Purity:                   | 50.4   |           |      |      |      |
| Rf:                       | 85.5   |           |      |      |      |
| Rg:                       | 95.7   |           |      |      |      |



### Test Conditions

Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-4

| 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           |

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**CIE 1931 Chromaticity Diagram**



**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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**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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 18580

S/P: 1.39

| 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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 7125.5**

**M/P: 0.53**

| 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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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**TM-30-18**

**Summary**

$R_f = 85.5$   
 $R_g = 95.7$   
 $CIE R_a = 83.1$   
 $R_9 = 8.0$



**Color Vector Graphics**



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 94 | CES76 = 81 |
| CES02 = 63 | CES27 = 94 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 90 | CES78 = 81 |
| CES04 = 70 | CES29 = 89 | CES54 = 91 | CES79 = 91 |
| CES05 = 49 | CES30 = 96 | CES55 = 90 | CES80 = 90 |
| CES06 = 51 | CES31 = 90 | CES56 = 87 | CES81 = 74 |
| CES07 = 42 | CES32 = 83 | CES57 = 86 | CES82 = 96 |
| CES08 = 41 | CES33 = 94 | CES58 = 87 | CES83 = 95 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 92 |
| CES10 = 76 | CES35 = 95 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 87 | CES61 = 89 | CES86 = 70 |
| CES12 = 65 | CES37 = 95 | CES62 = 90 | CES87 = 85 |
| CES13 = 43 | CES38 = 94 | CES63 = 88 | CES88 = 88 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 76 |
| CES15 = 71 | CES40 = 96 | CES65 = 80 | CES90 = 89 |
| CES16 = 47 | CES41 = 98 | CES66 = 80 | CES91 = 79 |
| CES17 = 50 | CES42 = 96 | CES67 = 79 | CES92 = 66 |
| CES18 = 56 | CES43 = 91 | CES68 = 82 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 87 | CES94 = 63 |
| CES20 = 66 | CES45 = 94 | CES70 = 79 | CES95 = 75 |
| CES21 = 87 | CES46 = 91 | CES71 = 77 | CES96 = 84 |
| CES22 = 79 | CES47 = 94 | CES72 = 92 | CES97 = 90 |
| CES23 = 92 | CES48 = 85 | CES73 = 75 | CES98 = 86 |
| CES24 = 91 | CES49 = 91 | CES74 = 92 | CES99 = 77 |
| CES25 = 72 | CES50 = 95 | CES75 = 79 |            |



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**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)