

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: P826578

Luminaire Tested: **OHBL-30SE-MCL-UNV-L830-CD-UPL30**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P826578  
REPORT IS A COMBINATION OF REPORTS P826282 AND G3-2310-221-4  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-30SE-MCL-UNV-L830-CD-UPL30  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

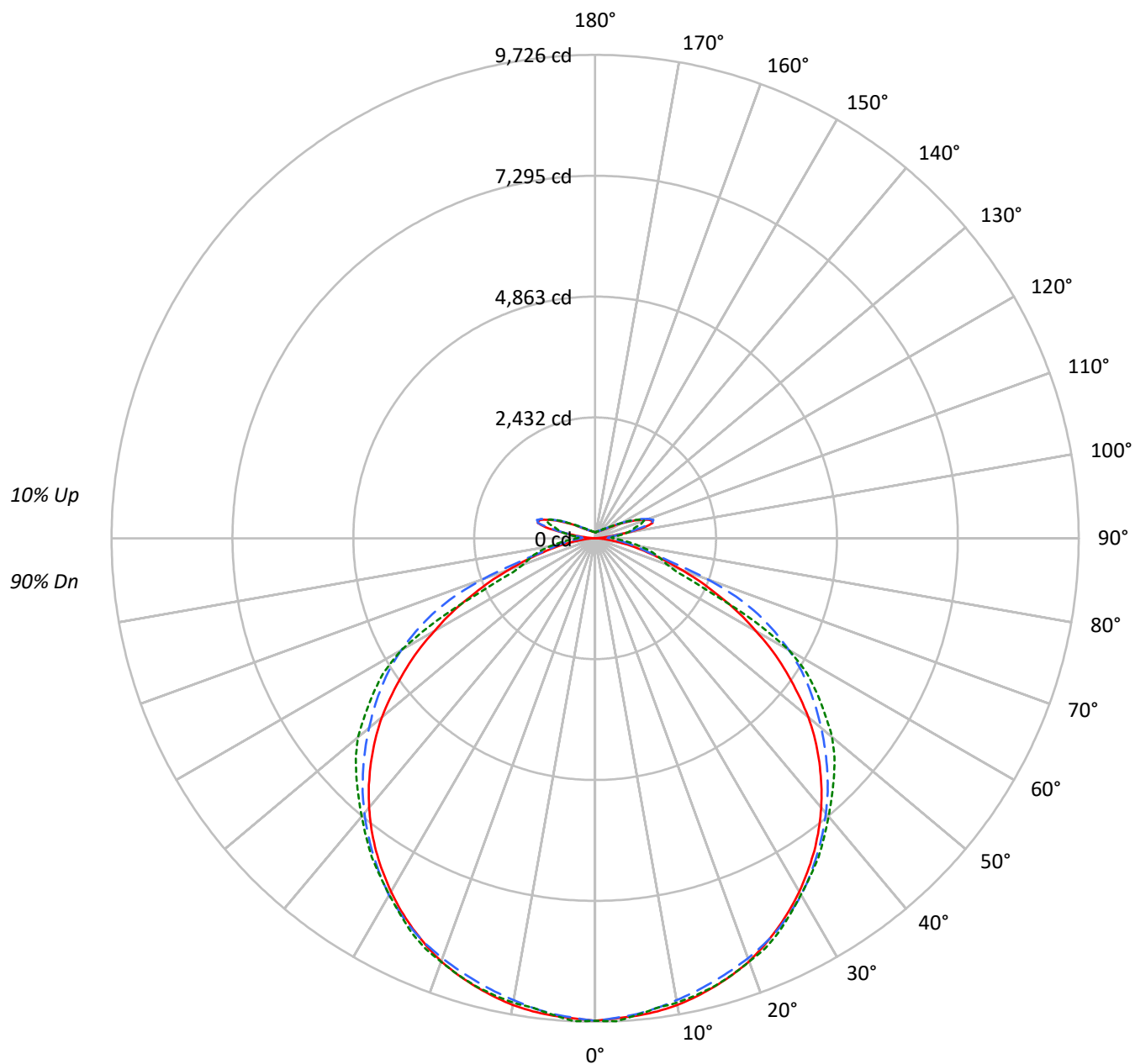
Lumens per Lamp: N/A  
Luminaire Lumens: 30285.8 lumens  
Efficiency: N/A  
Efficacy: 153.6 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.67' x H: 0.17')  
CIE Type: Semi-Direct

Input Watts (W): 197.2  
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: P826578

CATALOG NUMBER: OHBL-30SE-MCL-UNV-L830-CD-UPL30

### Luminous Intensity Polar Plot





TEST NUMBER: P826578

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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 |  | 105 | 105 | 105 |  | 99 | 99 | 99 |  | 92 | 92 | 92 |
| 1   | 107 | 102 | 98  | 94  |  | 103 | 99  | 95  | 92  |  | 93  | 90  | 87  |  | 87 | 85 | 83 |  | 82 | 80 | 78 |
| 2   | 97  | 89  | 83  | 77  |  | 94  | 87  | 81  | 76  |  | 81  | 76  | 72  |  | 77 | 73 | 69 |  | 72 | 69 | 66 |
| 3   | 89  | 79  | 71  | 64  |  | 85  | 76  | 69  | 63  |  | 72  | 66  | 61  |  | 68 | 63 | 58 |  | 64 | 60 | 56 |
| 4   | 81  | 70  | 61  | 55  |  | 78  | 68  | 60  | 54  |  | 64  | 57  | 52  |  | 60 | 55 | 50 |  | 57 | 52 | 48 |
| 5   | 75  | 62  | 53  | 47  |  | 72  | 60  | 52  | 46  |  | 57  | 50  | 45  |  | 54 | 48 | 43 |  | 51 | 46 | 42 |
| 6   | 69  | 56  | 47  | 41  |  | 66  | 54  | 46  | 40  |  | 52  | 44  | 39  |  | 49 | 43 | 38 |  | 46 | 41 | 37 |
| 7   | 64  | 51  | 42  | 36  |  | 61  | 49  | 41  | 36  |  | 47  | 40  | 35  |  | 45 | 38 | 34 |  | 42 | 37 | 33 |
| 8   | 59  | 46  | 38  | 32  |  | 57  | 45  | 37  | 32  |  | 43  | 36  | 31  |  | 41 | 35 | 30 |  | 39 | 33 | 29 |
| 9   | 55  | 42  | 34  | 29  |  | 53  | 41  | 34  | 28  |  | 39  | 32  | 28  |  | 38 | 31 | 27 |  | 36 | 30 | 26 |
| 10  | 52  | 39  | 31  | 26  |  | 50  | 38  | 31  | 26  |  | 36  | 30  | 25  |  | 35 | 29 | 24 |  | 33 | 28 | 24 |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 16579 | 16579 | 16579 |
| 5°  | 16390 | 16331 | 16442 |
| 10° | 16251 | 16076 | 16328 |
| 15° | 16068 | 15884 | 16289 |
| 20° | 15884 | 15760 | 16217 |
| 25° | 15608 | 15635 | 16149 |
| 30° | 15312 | 15442 | 15923 |
| 35° | 14971 | 15141 | 15840 |
| 40° | 14551 | 14829 | 15704 |
| 45° | 14001 | 14469 | 15709 |
| 50° | 13289 | 14060 | 15711 |
| 55° | 12225 | 13656 | 15271 |
| 60° | 10874 | 13069 | 14289 |
| 65° | 9163  | 11991 | 9199  |
| 70° | 7202  | 9342  | 6814  |
| 75° | 5207  | 5529  | 7142  |
| 80° | 3409  | 4575  | 7201  |
| 85° | 1707  | 4155  | 7571  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 915.3   | 3.0       |
| 10°-20°   | 2624.5  | 8.7       |
| 20°-30°   | 4008.5  | 13.2      |
| 30°-40°   | 4863.6  | 16.1      |
| 40°-50°   | 5097.6  | 16.8      |
| 50°-60°   | 4619.1  | 15.3      |
| 60°-70°   | 3097.0  | 10.2      |
| 70°-80°   | 1390.7  | 4.6       |
| 80°-90°   | 510.7   | 1.7       |
| 90°-100°  | 372.2   | 1.2       |
| 100°-110° | 1067.6  | 3.5       |
| 110°-120° | 855.8   | 2.8       |
| 120°-130° | 406.7   | 1.3       |
| 130°-140° | 208.7   | 0.7       |
| 140°-150° | 123.2   | 0.4       |
| 150°-160° | 73.6    | 0.2       |
| 160°-170° | 39.1    | 0.1       |
| 170°-180° | 12.0    | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 7548.2  | 24.9      |
| 0°-40°    | 12411.9 | 41.0      |
| 0°-60°    | 22128.6 | 73.1      |
| 0°-90°    | 27126.9 | 89.6      |
| 90°-120°  | 2295.6  | 7.6       |
| 90°-150°  | 3034.2  | 10.0      |
| 90°-180°  | 3159.0  | 10.4      |
| 0°-180°   | 30285.8 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 9707 | 9707  | 9707 | 9707  | 9707 |      |
| 5°   | 9644 | 9677  | 9610 | 9639  | 9627 | 917  |
| 15°  | 9331 | 9294  | 9228 | 9310  | 9321 | 2634 |
| 25°  | 8668 | 8630  | 8691 | 8771  | 8745 | 3996 |
| 35°  | 7683 | 7701  | 7780 | 7862  | 7832 | 4802 |
| 45°  | 6376 | 6480  | 6601 | 6769  | 6790 | 4912 |
| 55°  | 4692 | 4918  | 5253 | 5464  | 5451 | 4188 |
| 65°  | 2754 | 3184  | 3616 | 3051  | 2491 | 2744 |
| 75°  | 1084 | 1572  | 1156 | 1183  | 1260 | 1184 |
| 85°  | 187  | 358   | 459  | 554   | 581  | 228  |
| 90°  | 8    | 157   | 287  | 354   | 368  | 16   |
| 95°  | 54   | 181   | 293  | 363   | 380  | 194  |
| 105° | 1194 | 1230  | 1186 | 927   | 832  | 1129 |
| 115° | 832  | 838   | 860  | 876   | 862  | 833  |
| 125° | 414  | 427   | 452  | 446   | 441  | 387  |
| 135° | 250  | 256   | 263  | 275   | 276  | 197  |
| 145° | 186  | 190   | 195  | 198   | 199  | 118  |
| 155° | 153  | 157   | 159  | 161   | 159  | 72   |
| 165° | 135  | 136   | 136  | 138   | 138  | 38   |
| 175° | 123  | 124   | 123  | 122   | 122  | 12   |
| 180° | 121  | 121   | 121  | 121   | 121  |      |



TEST NUMBER: P826578

CATALOG NUMBER: OHBL-30SE-MCL-UNV-L830-CD-UPL30

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 9706.7 | 9706.7 | 9706.7 | 9706.7 | 9706.7 |
| 2.5°   | 9667.4 | 9708.1 | 9657.6 | 9712.3 | 9726.4 |
| 5°     | 9643.5 | 9677.2 | 9609.8 | 9639.3 | 9626.7 |
| 7.5°   | 9600.1 | 9611.2 | 9531.3 | 9555.1 | 9529.9 |
| 10°    | 9535.5 | 9529.9 | 9435.8 | 9482.2 | 9487.8 |
| 12.5°  | 9440.0 | 9423.2 | 9339.0 | 9409.2 | 9410.6 |
| 15°    | 9330.6 | 9294.1 | 9228.1 | 9309.6 | 9320.7 |
| 17.5°  | 9204.3 | 9156.6 | 9113.0 | 9218.3 | 9201.4 |
| 20°    | 9056.9 | 9000.8 | 8992.3 | 9107.4 | 9065.3 |
| 22.5°  | 8874.4 | 8831.0 | 8850.6 | 8960.0 | 8933.4 |
| 25°    | 8668.1 | 8630.3 | 8690.6 | 8770.6 | 8745.4 |
| 27.5°  | 8450.6 | 8428.1 | 8496.9 | 8558.7 | 8509.6 |
| 30°    | 8212.0 | 8199.3 | 8290.6 | 8341.1 | 8279.3 |
| 32.5°  | 7952.3 | 7956.5 | 8043.5 | 8112.3 | 8054.8 |
| 35°    | 7682.9 | 7701.1 | 7779.7 | 7862.5 | 7831.6 |
| 37.5°  | 7386.8 | 7427.4 | 7506.0 | 7600.0 | 7567.7 |
| 40°    | 7073.7 | 7132.7 | 7219.7 | 7333.3 | 7303.9 |
| 42.5°  | 6735.5 | 6809.9 | 6922.1 | 7048.5 | 7045.7 |
| 45°    | 6376.2 | 6480.0 | 6600.7 | 6769.1 | 6790.3 |
| 47.5°  | 6002.8 | 6119.3 | 6272.3 | 6496.9 | 6529.2 |
| 50°    | 5597.2 | 5743.2 | 5934.1 | 6203.5 | 6223.2 |
| 52.5°  | 5145.3 | 5344.6 | 5597.2 | 5855.5 | 5831.6 |
| 55°    | 4692.0 | 4917.9 | 5253.4 | 5463.8 | 5451.3 |
| 57.5°  | 4240.0 | 4494.0 | 4901.0 | 5051.2 | 5049.8 |
| 60°    | 3734.8 | 4056.2 | 4501.1 | 4614.8 | 4502.5 |
| 62.5°  | 3267.4 | 3612.7 | 4074.4 | 3991.6 | 3607.0 |
| 65°    | 2753.7 | 3184.5 | 3615.5 | 3051.3 | 2491.3 |
| 67.5°  | 2297.5 | 2746.7 | 3070.9 | 2089.8 | 1789.5 |
| 70°    | 1838.6 | 2334.0 | 2394.4 | 1550.9 | 1529.8 |
| 72.5°  | 1431.6 | 1959.3 | 1651.9 | 1327.7 | 1395.1 |
| 75°    | 1083.5 | 1571.9 | 1156.5 | 1183.2 | 1260.3 |
| 77.5°  | 790.1  | 1207.0 | 899.7  | 1037.2 | 1100.4 |
| 80°    | 543.2  | 854.7  | 734.0  | 871.6  | 915.1  |
| 82.5°  | 341.0  | 564.2  | 588.1  | 701.7  | 746.7  |
| 85°    | 186.7  | 357.9  | 459.0  | 554.4  | 581.0  |
| 87.5°  | 77.2   | 216.2  | 350.9  | 428.1  | 450.6  |
| 90°    | 7.9    | 157.4  | 287.4  | 354.4  | 368.3  |
| 92.5°  | 20.9   | 138.7  | 255.1  | 315.4  | 327.1  |
| 95°    | 54.4   | 181.4  | 293.1  | 362.6  | 380.3  |
| 97.5°  | 326.6  | 380.9  | 415.3  | 489.0  | 530.9  |
| 100°   | 643.5  | 724.7  | 617.1  | 649.3  | 658.2  |
| 102.5° | 1014.3 | 1066.6 | 897.6  | 779.5  | 755.8  |
| 105°   | 1193.9 | 1229.9 | 1185.5 | 926.9  | 831.5  |



TEST NUMBER: P826578

CATALOG NUMBER: OHBL-30SE-MCL-UNV-L830-CD-UPL30

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°    | 67.5°  | 90°   |
|--------|-------|-------|--------|--------|-------|
| 112.5° | 962.8 | 980.0 | 1009.0 | 1009.6 | 990.0 |
| 115°   | 832.0 | 837.6 | 860.5  | 875.5  | 861.5 |
| 117.5° | 703.6 | 711.0 | 733.9  | 735.0  | 730.3 |
| 120°   | 593.8 | 603.6 | 619.9  | 621.3  | 615.3 |
| 122.5° | 497.9 | 511.9 | 532.0  | 528.7  | 521.8 |
| 125°   | 413.7 | 427.2 | 452.3  | 445.5  | 441.3 |
| 127.5° | 353.7 | 362.1 | 381.6  | 385.0  | 381.7 |
| 130°   | 306.2 | 315.1 | 331.4  | 338.8  | 337.9 |
| 132.5° | 275.1 | 283.0 | 293.7  | 302.1  | 301.1 |
| 135°   | 249.9 | 256.0 | 263.0  | 274.6  | 276.0 |
| 137.5° | 229.0 | 235.5 | 240.2  | 250.9  | 252.3 |
| 140°   | 213.2 | 217.8 | 221.1  | 228.5  | 230.9 |
| 142.5° | 197.8 | 203.0 | 206.2  | 212.3  | 214.6 |
| 145°   | 185.7 | 189.9 | 194.6  | 197.8  | 199.2 |
| 147.5° | 176.0 | 179.7 | 183.4  | 185.3  | 186.7 |
| 150°   | 167.6 | 170.4 | 174.1  | 175.0  | 176.0 |
| 152.5° | 160.1 | 162.0 | 164.8  | 166.7  | 166.7 |
| 155°   | 152.7 | 156.9 | 158.8  | 160.6  | 159.2 |
| 157.5° | 147.1 | 150.4 | 152.2  | 153.2  | 154.1 |
| 160°   | 142.5 | 144.8 | 146.7  | 147.6  | 148.5 |
| 162.5° | 138.3 | 140.1 | 141.1  | 142.0  | 142.9 |
| 165°   | 134.6 | 135.5 | 136.4  | 138.3  | 138.3 |
| 167.5° | 130.8 | 133.2 | 132.7  | 133.6  | 133.6 |
| 170°   | 128.0 | 129.0 | 129.9  | 128.5  | 128.5 |
| 172.5° | 125.3 | 126.2 | 127.1  | 125.7  | 125.7 |
| 175°   | 123.4 | 124.3 | 122.9  | 122.5  | 122.5 |
| 177.5° | 123.9 | 123.4 | 122.0  | 120.6  | 120.1 |
| 180°   | 121.1 | 121.1 | 121.1  | 121.1  | 121.1 |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 107.5° | 1194.4 | 1230.8 | 1229.2 | 1099.0 | 971.5  |
| 110°   | 1097.1 | 1130.7 | 1142.5 | 1107.7 | 1045.4 |



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           |

REPORT NUMBER: SP1-2307-100-4

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

REPORT NUMBER: SP1-2307-100-4

**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)