

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: P830395

Luminaire Tested: **OHBL-36SE-MCL-UNV-L830-CD**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830395  
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-36SE-MCL-UNV-L830-CD  
Description: 36000 LUMEN OHBL SE LED LUMINAIRE WITH 80CRI, 3000K LEDS AND MEDIUM CLEAR LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

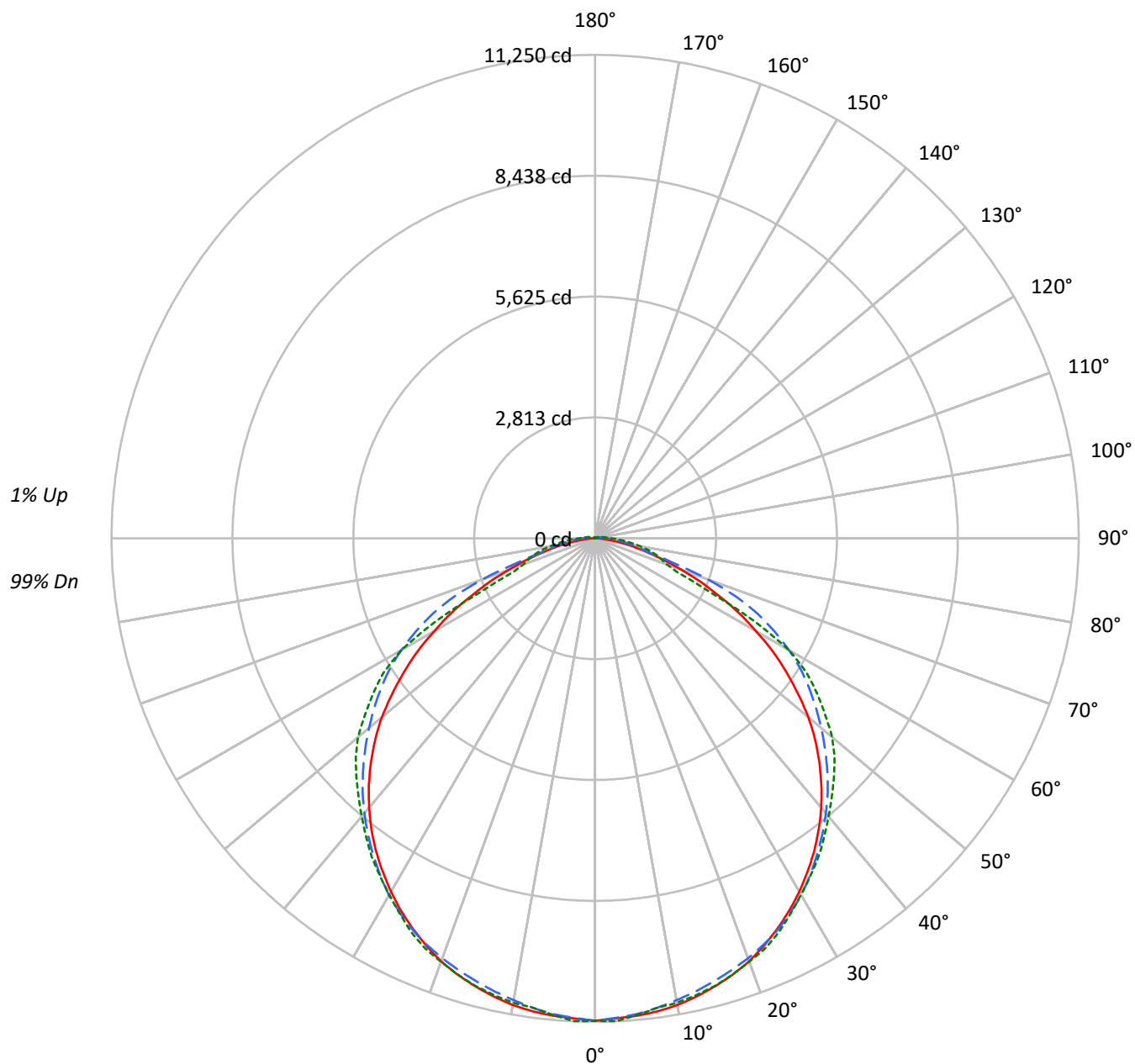
Lumens per Lamp: N/A  
Luminaire Lumens: 31734.0 lumens  
Efficiency: N/A  
Efficacy: 150.4 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 1.8' x L: 3.78' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 211  
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: P830395

CATALOG NUMBER: OHBL-36SE-MCL-UNV-L830-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P830395

CATALOG NUMBER: OHBL-36SE-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  | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 110 | 110 | 110 | 106 | 106 | 106 | 101 | 101 | 101 |    |    | 99 |
| 1   | 109 | 104 | 100 | 96  | 106 | 102 | 98  | 95  | 97  | 94  | 91  | 93  | 91  | 88  | 90  | 87  | 86  |    |    | 83 |
| 2   | 99  | 91  | 84  | 79  | 96  | 89  | 83  | 78  | 85  | 80  | 76  | 82  | 78  | 74  | 79  | 75  | 72  |    |    | 70 |
| 3   | 91  | 80  | 72  | 66  | 88  | 79  | 71  | 65  | 75  | 69  | 64  | 72  | 67  | 63  | 70  | 65  | 61  |    |    | 59 |
| 4   | 83  | 71  | 62  | 56  | 81  | 70  | 62  | 55  | 67  | 60  | 54  | 65  | 59  | 54  | 62  | 57  | 53  |    |    | 51 |
| 5   | 76  | 64  | 55  | 48  | 74  | 62  | 54  | 48  | 60  | 53  | 47  | 58  | 52  | 46  | 56  | 50  | 46  |    |    | 44 |
| 6   | 70  | 57  | 48  | 42  | 68  | 56  | 48  | 42  | 54  | 47  | 41  | 52  | 46  | 41  | 51  | 45  | 40  |    |    | 38 |
| 7   | 65  | 52  | 43  | 37  | 63  | 51  | 43  | 37  | 49  | 42  | 36  | 48  | 41  | 36  | 46  | 40  | 36  |    |    | 34 |
| 8   | 61  | 47  | 39  | 33  | 59  | 46  | 38  | 33  | 45  | 38  | 33  | 44  | 37  | 32  | 42  | 36  | 32  |    |    | 30 |
| 9   | 57  | 43  | 35  | 30  | 55  | 43  | 35  | 29  | 41  | 34  | 29  | 40  | 34  | 29  | 39  | 33  | 29  |    |    | 27 |
| 10  | 53  | 40  | 32  | 27  | 52  | 39  | 32  | 27  | 38  | 31  | 27  | 37  | 31  | 26  | 36  | 30  | 26  |    |    | 24 |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 17756 | 17756 | 17756 |
| 5°  | 17640 | 17498 | 17535 |
| 10° | 17575 | 17233 | 17340 |
| 15° | 17464 | 17035 | 17224 |
| 20° | 17352 | 16910 | 17072 |
| 25° | 17143 | 16784 | 16920 |
| 30° | 16915 | 16586 | 16600 |
| 35° | 16643 | 16272 | 16424 |
| 40° | 16289 | 15947 | 16183 |
| 45° | 15798 | 15571 | 16077 |
| 50° | 15134 | 15143 | 15950 |
| 55° | 14077 | 14722 | 15354 |
| 60° | 12694 | 14106 | 14195 |
| 65° | 10889 | 12962 | 8996  |
| 70° | 8771  | 10119 | 6522  |
| 75° | 6576  | 6007  | 6620  |
| 80° | 4578  | 4994  | 6320  |
| 85° | 2605  | 4577  | 5924  |



TEST NUMBER: P830395

CATALOG NUMBER: OHBL-36SE-MCL-UNV-L830-CD

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1058.7  | 3.3       |
| 10°-20°   | 3035.7  | 9.6       |
| 20°-30°   | 4636.5  | 14.6      |
| 30°-40°   | 5625.7  | 17.7      |
| 40°-50°   | 5896.2  | 18.6      |
| 50°-60°   | 5342.9  | 16.8      |
| 60°-70°   | 3582.2  | 11.3      |
| 70°-80°   | 1608.6  | 5.1       |
| 80°-90°   | 583.7   | 1.8       |
| 90°-100°  | 175.7   | 0.6       |
| 100°-110° | 82.9    | 0.3       |
| 110°-120° | 41.6    | 0.1       |
| 120°-130° | 22.9    | 0.1       |
| 130°-140° | 15.8    | 0.0       |
| 140°-150° | 10.6    | 0.0       |
| 150°-160° | 7.9     | 0.0       |
| 160°-170° | 5.1     | 0.0       |
| 170°-180° | 1.6     | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 8730.9  | 27.5      |
| 0°-40°    | 14356.5 | 45.2      |
| 0°-60°    | 25595.6 | 80.7      |
| 0°-90°    | 31370.0 | 98.9      |
| 90°-120°  | 300.1   | 0.9       |
| 90°-150°  | 349.4   | 1.1       |
| 90°-180°  | 364.0   | 1.1       |
| 0°-180°   | 31734.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux |
|------|-------|-------|-------|-------|-------|------|
| 0°   | 11228 | 11228 | 11228 | 11228 | 11228 |      |
| 5°   | 11154 | 11193 | 11116 | 11150 | 11135 | ###  |
| 15°  | 10792 | 10750 | 10674 | 10768 | 10781 | 3047 |
| 25°  | 10026 | 9982  | 10052 | 10145 | 10116 | 4622 |
| 35°  | 8887  | 8908  | 8999  | 9094  | 9059  | 5554 |
| 45°  | 7375  | 7495  | 7635  | 7830  | 7854  | 5681 |
| 55°  | 5427  | 5688  | 6076  | 6320  | 6305  | 4844 |
| 65°  | 3185  | 3684  | 4182  | 3529  | 2882  | 3174 |
| 75°  | 1253  | 1818  | 1338  | 1368  | 1458  | 1370 |
| 85°  | 216   | 414   | 531   | 641   | 672   | 263  |
| 90°  | 2     | 138   | 274   | 344   | 360   | 13   |
| 95°  | 2     | 86    | 188   | 229   | 235   | 2    |
| 105° | 6     | 37    | 92    | 112   | 117   | 7    |
| 115° | 13    | 20    | 47    | 60    | 63    | 12   |
| 125° | 11    | 13    | 29    | 34    | 36    | 11   |
| 135° | 15    | 16    | 18    | 26    | 28    | 12   |
| 145° | 15    | 16    | 16    | 18    | 20    | 10   |
| 155° | 16    | 18    | 18    | 18    | 16    | 7    |
| 165° | 18    | 18    | 18    | 18    | 18    | 5    |
| 175° | 18    | 18    | 16    | 15    | 15    | 2    |
| 180° | 16    | 16    | 16    | 16    | 16    |      |



TEST NUMBER: P830395

CATALOG NUMBER: OHBL-36SE-MCL-UNV-L830-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 11227.5 | 11227.5 | 11227.5 | 11227.5 | 11227.5 |
| 2.5°   | 11182.1 | 11229.1 | 11170.7 | 11234.0 | 11250.2 |
| 5°     | 11154.5 | 11193.4 | 11115.5 | 11149.6 | 11135.0 |
| 7.5°   | 11104.1 | 11117.1 | 11024.6 | 11052.2 | 11023.0 |
| 10°    | 11029.5 | 11023.0 | 10914.2 | 10967.8 | 10974.3 |
| 12.5°  | 10919.1 | 10899.6 | 10802.2 | 10883.4 | 10885.0 |
| 15°    | 10792.4 | 10750.2 | 10673.9 | 10768.1 | 10781.1 |
| 17.5°  | 10646.3 | 10591.1 | 10540.8 | 10662.6 | 10643.1 |
| 20°    | 10475.9 | 10410.9 | 10401.2 | 10534.3 | 10485.6 |
| 22.5°  | 10264.8 | 10214.5 | 10237.2 | 10363.9 | 10333.0 |
| 25°    | 10026.2 | 9982.4  | 10052.2 | 10144.7 | 10115.5 |
| 27.5°  | 9774.6  | 9748.6  | 9828.1  | 9899.6  | 9842.7  |
| 30°    | 9498.6  | 9484.0  | 9589.5  | 9647.9  | 9576.5  |
| 32.5°  | 9198.3  | 9203.1  | 9303.8  | 9383.3  | 9316.8  |
| 35°    | 8886.6  | 8907.7  | 8998.6  | 9094.4  | 9058.6  |
| 37.5°  | 8544.0  | 8591.1  | 8682.0  | 8790.8  | 8753.4  |
| 40°    | 8182.0  | 8250.2  | 8350.8  | 8482.3  | 8448.2  |
| 42.5°  | 7790.8  | 7876.8  | 8006.7  | 8152.8  | 8149.5  |
| 45°    | 7375.2  | 7495.3  | 7634.9  | 7829.7  | 7854.1  |
| 47.5°  | 6943.3  | 7078.1  | 7255.0  | 7514.8  | 7552.1  |
| 50°    | 6474.2  | 6643.0  | 6863.8  | 7175.5  | 7198.2  |
| 52.5°  | 5951.4  | 6182.0  | 6474.2  | 6772.9  | 6745.3  |
| 55°    | 5427.1  | 5688.4  | 6076.4  | 6319.9  | 6305.3  |
| 57.5°  | 4904.3  | 5198.2  | 5669.0  | 5842.7  | 5841.0  |
| 60°    | 4319.9  | 4691.7  | 5206.3  | 5337.8  | 5207.9  |
| 62.5°  | 3779.3  | 4178.7  | 4712.8  | 4617.0  | 4172.2  |
| 65°    | 3185.1  | 3683.5  | 4181.9  | 3529.3  | 2881.6  |
| 67.5°  | 2657.5  | 3177.0  | 3552.0  | 2417.3  | 2069.9  |
| 70°    | 2126.7  | 2699.7  | 2769.5  | 1793.9  | 1769.5  |
| 72.5°  | 1655.9  | 2266.3  | 1910.8  | 1535.7  | 1613.7  |
| 75°    | 1253.3  | 1818.2  | 1337.7  | 1368.5  | 1457.8  |
| 77.5°  | 914.0   | 1396.1  | 1040.6  | 1199.7  | 1272.8  |
| 80°    | 628.3   | 988.7   | 849.0   | 1008.1  | 1058.5  |
| 82.5°  | 394.5   | 652.6   | 680.2   | 811.7   | 863.7   |
| 85°    | 215.9   | 414.0   | 530.9   | 641.2   | 672.1   |
| 87.5°  | 89.3    | 250.0   | 405.9   | 495.1   | 521.1   |
| 90°    | 1.6     | 138.0   | 274.4   | 344.2   | 360.4   |
| 92.5°  | 1.6     | 105.5   | 224.0   | 277.6   | 289.0   |
| 95°    | 1.6     | 86.0    | 188.3   | 228.9   | 235.4   |
| 97.5°  | 3.2     | 68.2    | 157.5   | 189.9   | 196.4   |
| 100°   | 4.9     | 56.8    | 131.5   | 159.1   | 164.0   |
| 102.5° | 6.5     | 45.5    | 110.4   | 133.1   | 138.0   |
| 105°   | 6.5     | 37.3    | 92.5    | 112.0   | 116.9   |



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CATALOG NUMBER: OHBL-36SE-MCL-UNV-L830-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°   | 22.5° | 45°  | 67.5° | 90°  |
|--------|------|-------|------|-------|------|
| 112.5° | 11.4 | 22.7  | 55.2 | 69.8  | 73.1 |
| 115°   | 13.0 | 19.5  | 47.1 | 60.1  | 63.3 |
| 117.5° | 13.0 | 16.2  | 40.6 | 50.3  | 53.6 |
| 120°   | 13.0 | 14.6  | 35.7 | 43.8  | 45.5 |
| 122.5° | 13.0 | 13.0  | 30.8 | 39.0  | 40.6 |
| 125°   | 11.4 | 13.0  | 29.2 | 34.1  | 35.7 |
| 127.5° | 13.0 | 13.0  | 26.0 | 30.8  | 32.5 |
| 130°   | 13.0 | 14.6  | 22.7 | 29.2  | 29.2 |
| 132.5° | 14.6 | 16.2  | 21.1 | 27.6  | 27.6 |
| 135°   | 14.6 | 16.2  | 17.9 | 26.0  | 27.6 |
| 137.5° | 16.2 | 16.2  | 16.2 | 24.4  | 26.0 |
| 140°   | 16.2 | 16.2  | 14.6 | 21.1  | 22.7 |
| 142.5° | 14.6 | 16.2  | 14.6 | 19.5  | 21.1 |
| 145°   | 14.6 | 16.2  | 16.2 | 17.9  | 19.5 |
| 147.5° | 16.2 | 16.2  | 16.2 | 16.2  | 17.9 |
| 150°   | 16.2 | 16.2  | 16.2 | 16.2  | 16.2 |
| 152.5° | 16.2 | 16.2  | 16.2 | 16.2  | 16.2 |
| 155°   | 16.2 | 17.9  | 17.9 | 17.9  | 16.2 |
| 157.5° | 16.2 | 17.9  | 17.9 | 17.9  | 17.9 |
| 160°   | 16.2 | 17.9  | 17.9 | 17.9  | 17.9 |
| 162.5° | 17.9 | 17.9  | 17.9 | 17.9  | 17.9 |
| 165°   | 17.9 | 17.9  | 17.9 | 17.9  | 17.9 |
| 167.5° | 17.9 | 19.5  | 17.9 | 17.9  | 17.9 |
| 170°   | 17.9 | 17.9  | 17.9 | 16.2  | 16.2 |
| 172.5° | 17.9 | 17.9  | 17.9 | 16.2  | 16.2 |
| 175°   | 17.9 | 17.9  | 16.2 | 14.6  | 14.6 |
| 177.5° | 19.5 | 17.9  | 16.2 | 14.6  | 13.0 |
| 180°   | 16.2 | 16.2  | 16.2 | 16.2  | 16.2 |



Report Generated By 670246072 / DESKTOP-50001EG







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







|        |     |      |      |      |      |
|--------|-----|------|------|------|------|
| 107.5° | 8.1 | 30.8 | 79.5 | 95.8 | 99.0 |
| 110°   | 9.7 | 26.0 | 66.6 | 81.2 | 84.4 |



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.

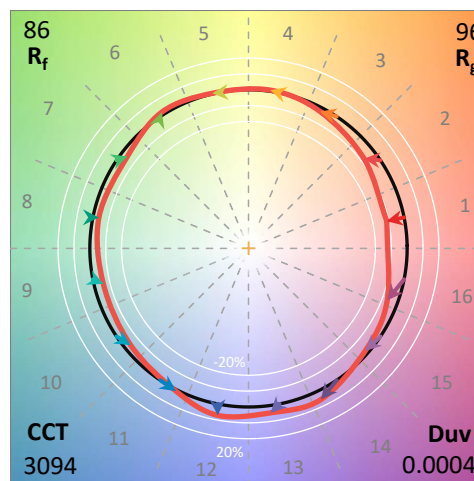
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 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

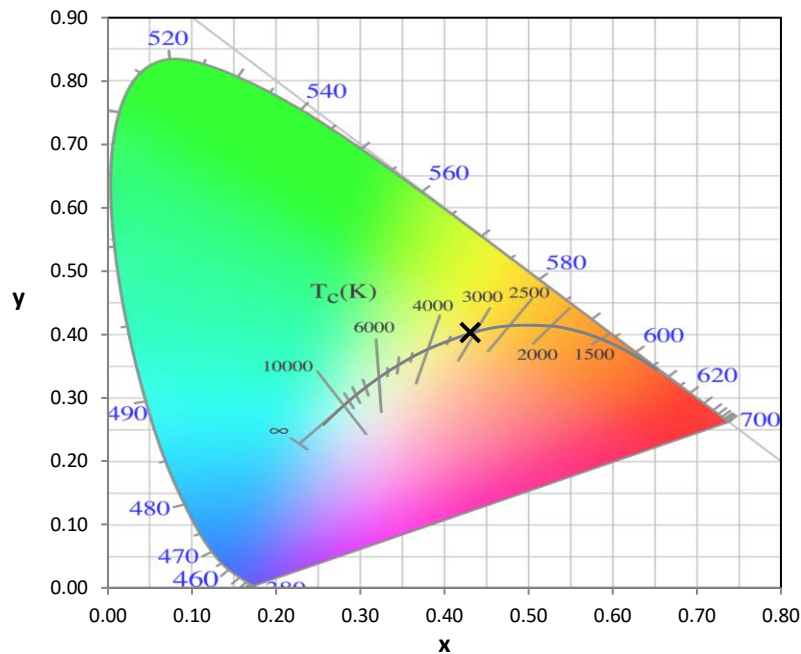


REPORT NUMBER: SP1-2307-100-4

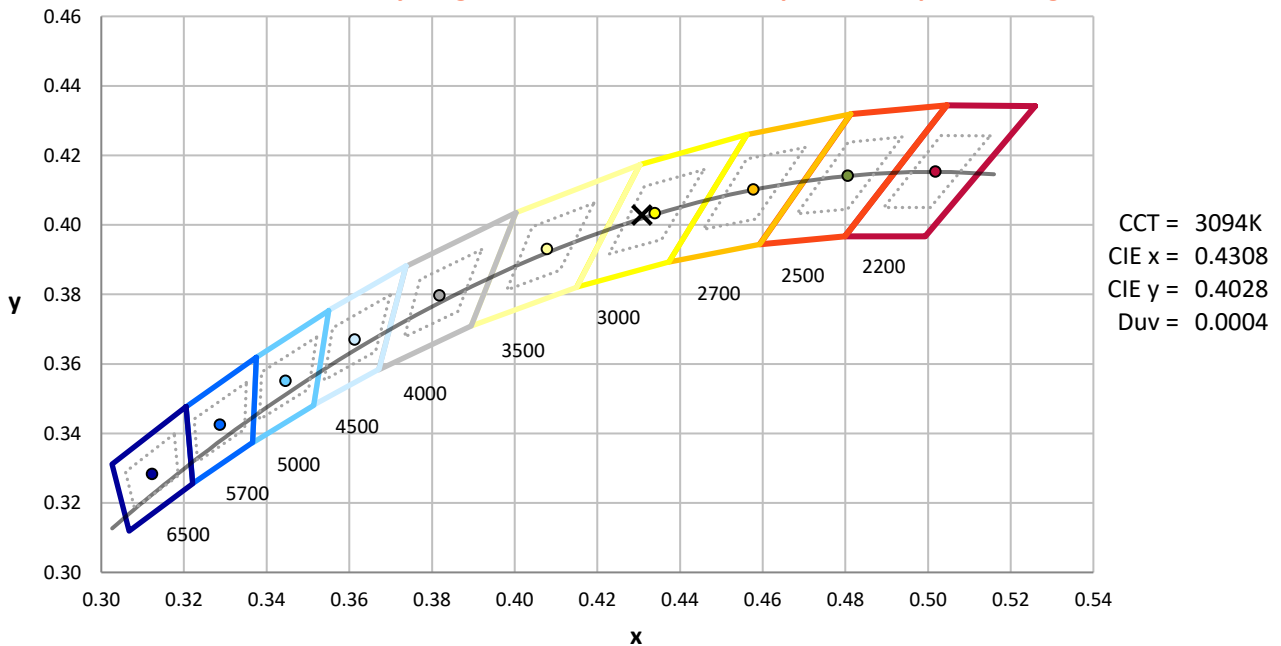
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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



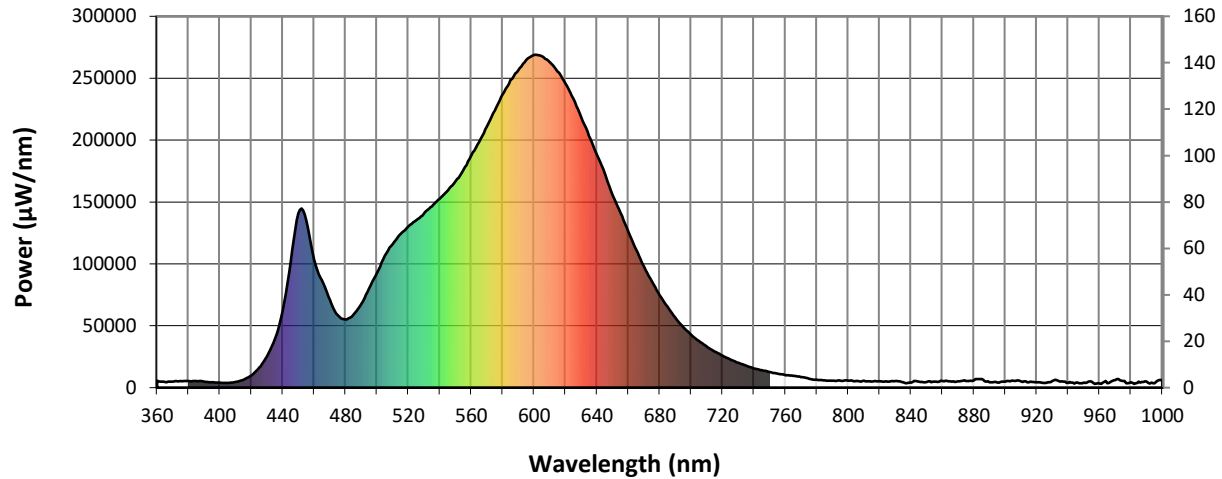
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

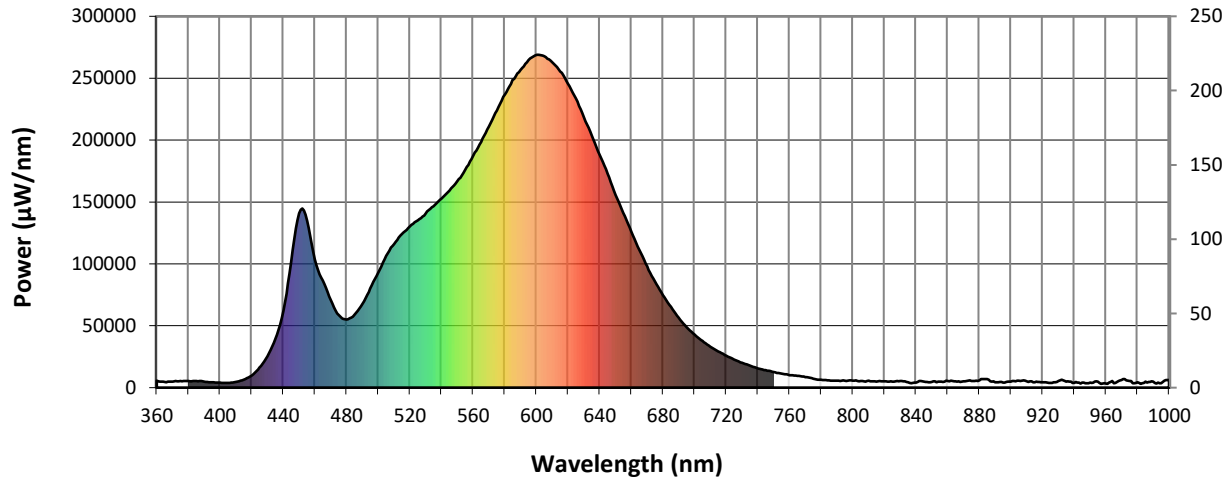


#####

| 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



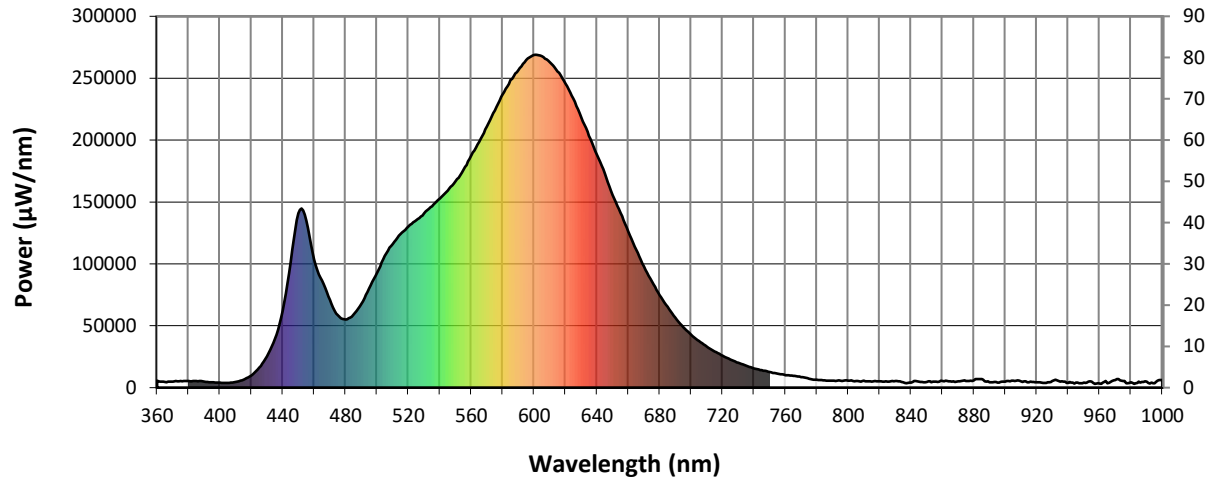
Scotopic Lumens: 18580

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**

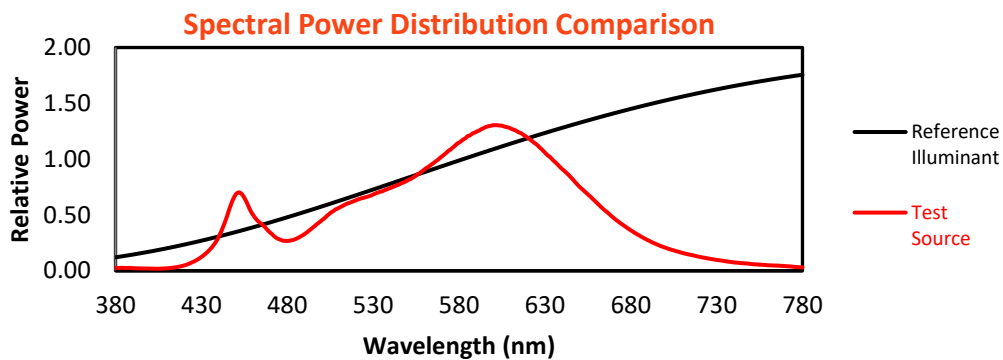
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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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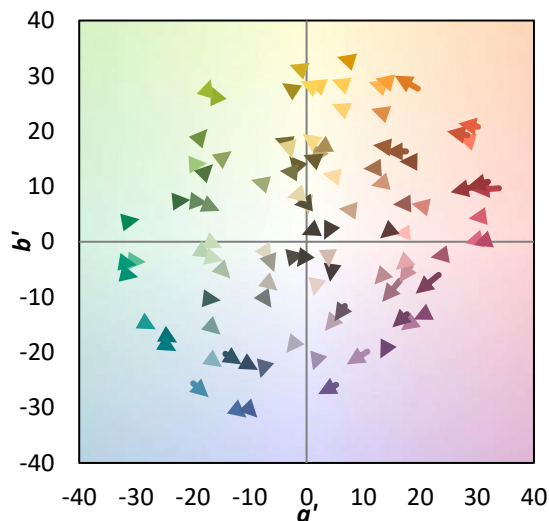
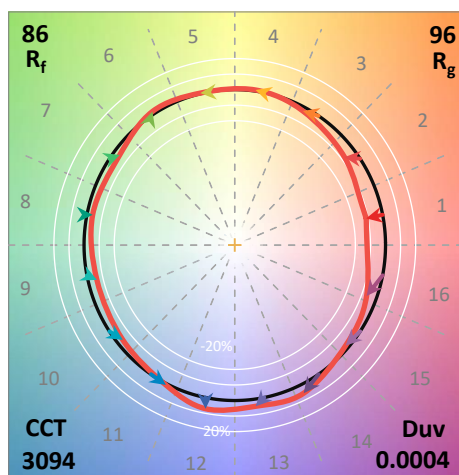
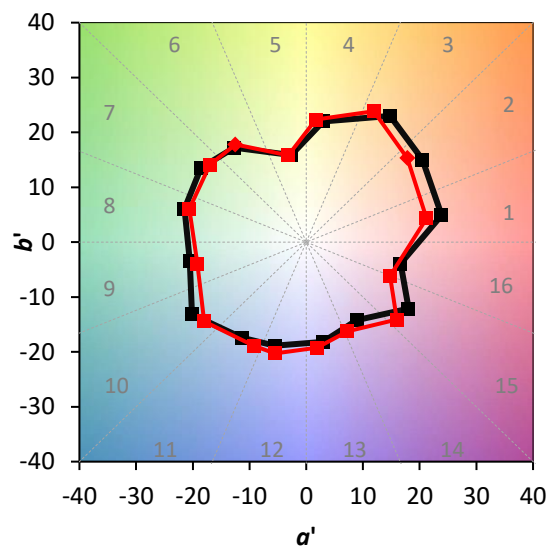
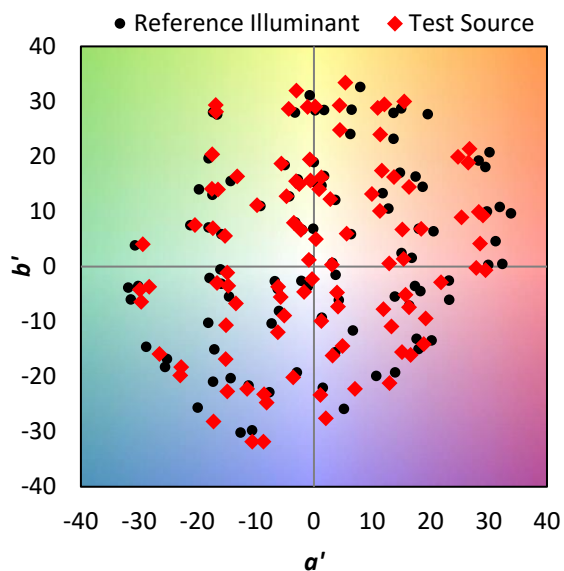
**TM-30-18**

**Summary**

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



**Color Vector Graphics**

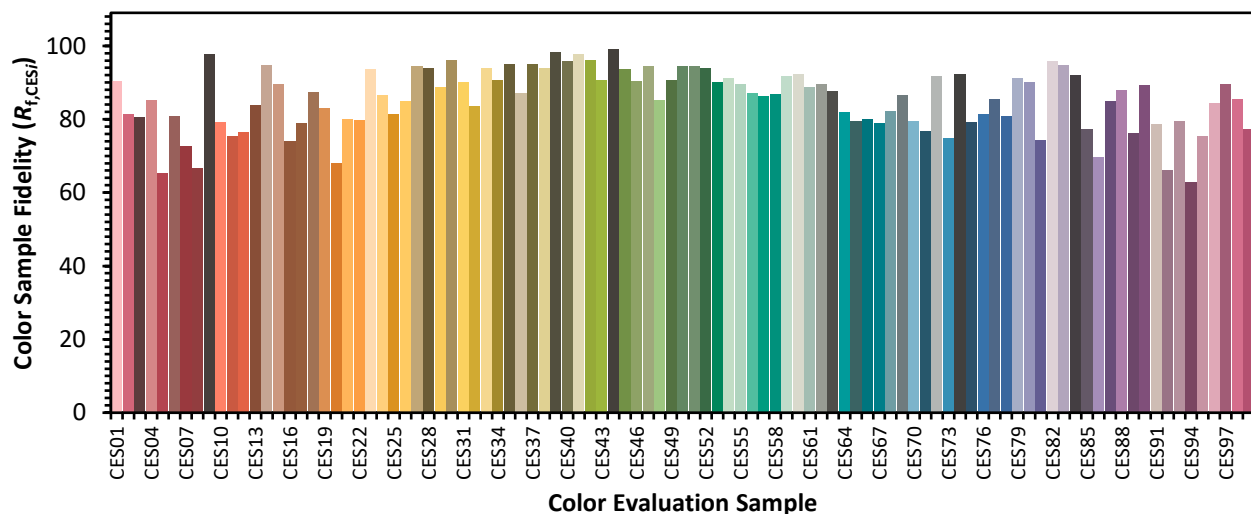


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

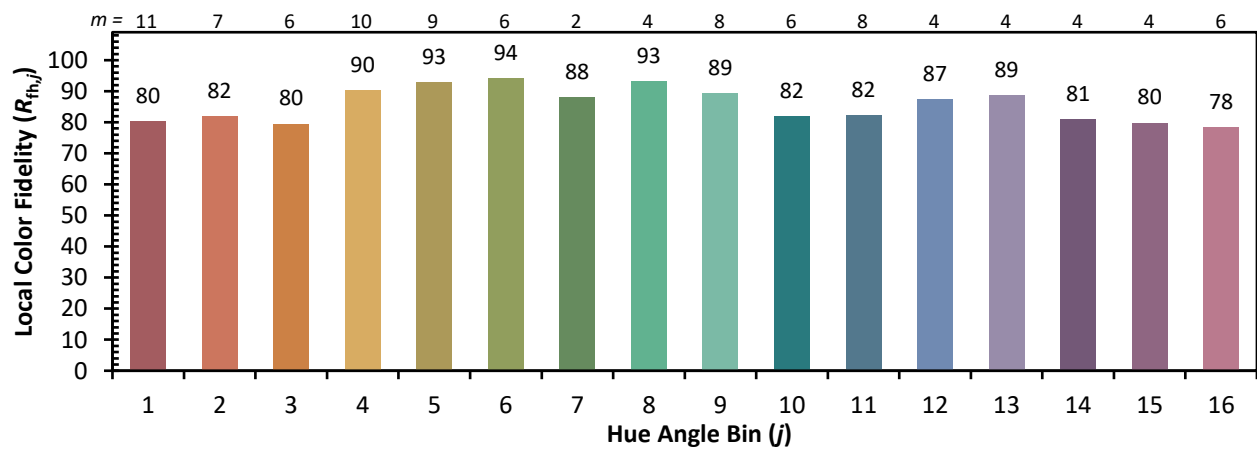
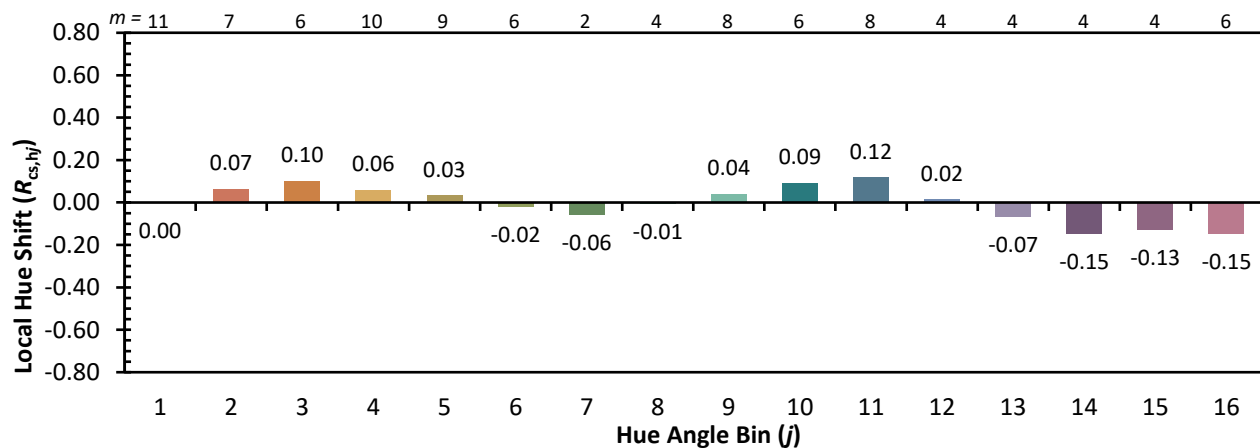
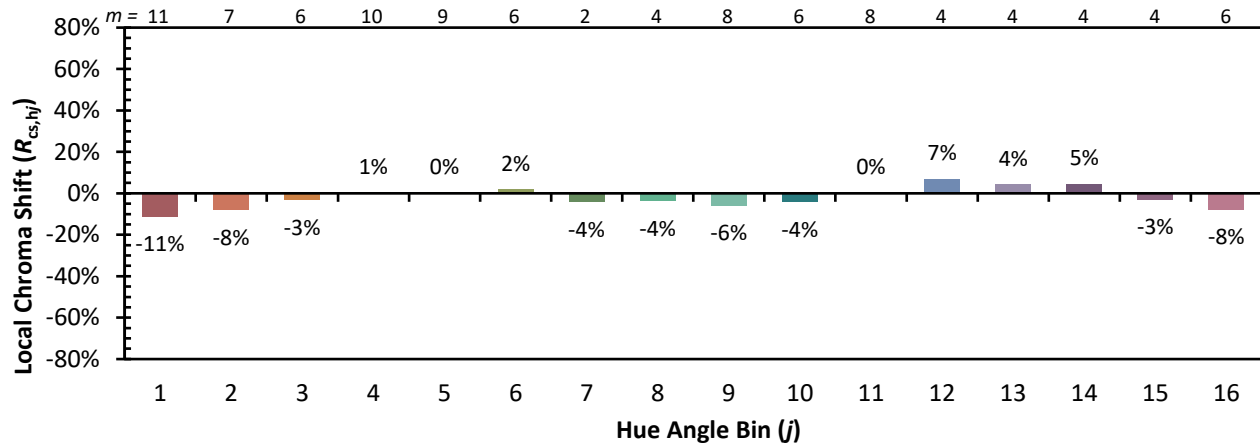
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 94 | CES76 = 81 |
| CES02 = 63 | CES27 = 94 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 90 | CES78 = 81 |
| CES04 = 70 | CES29 = 89 | CES54 = 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**

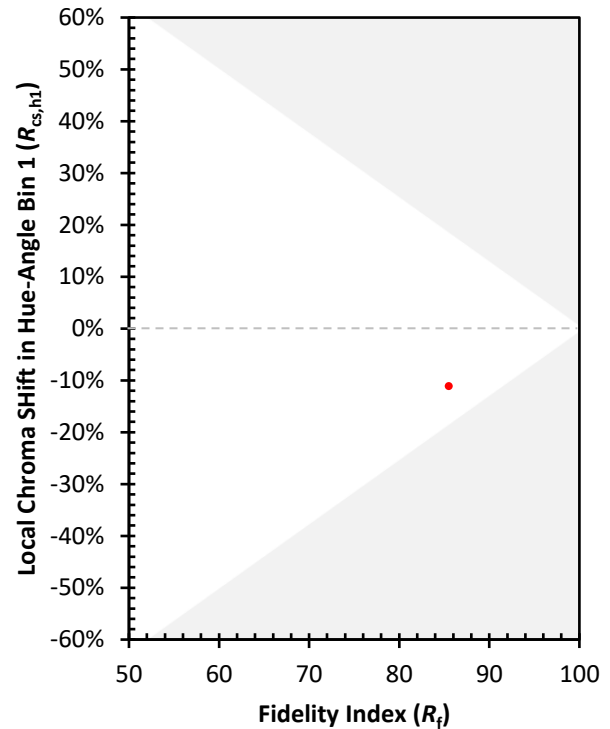
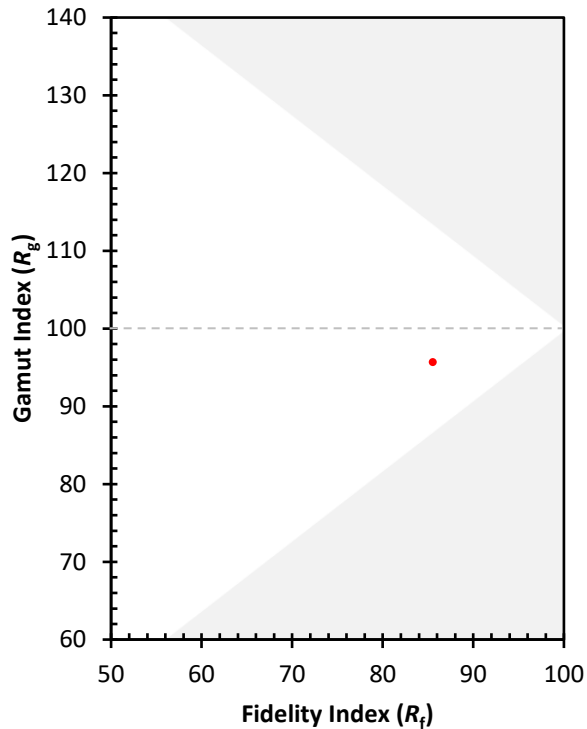




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**Measure Comparisons**



(END OF REPORT)