

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: P826506

Luminaire Tested: **OHBL-18HE-W-UNV-L830-CD-UPL12**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P826506  
REPORT IS A COMBINATION OF REPORTS P826064 AND G3-2310-221-12  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-18HE-W-UNV-L830-CD-UPL12  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

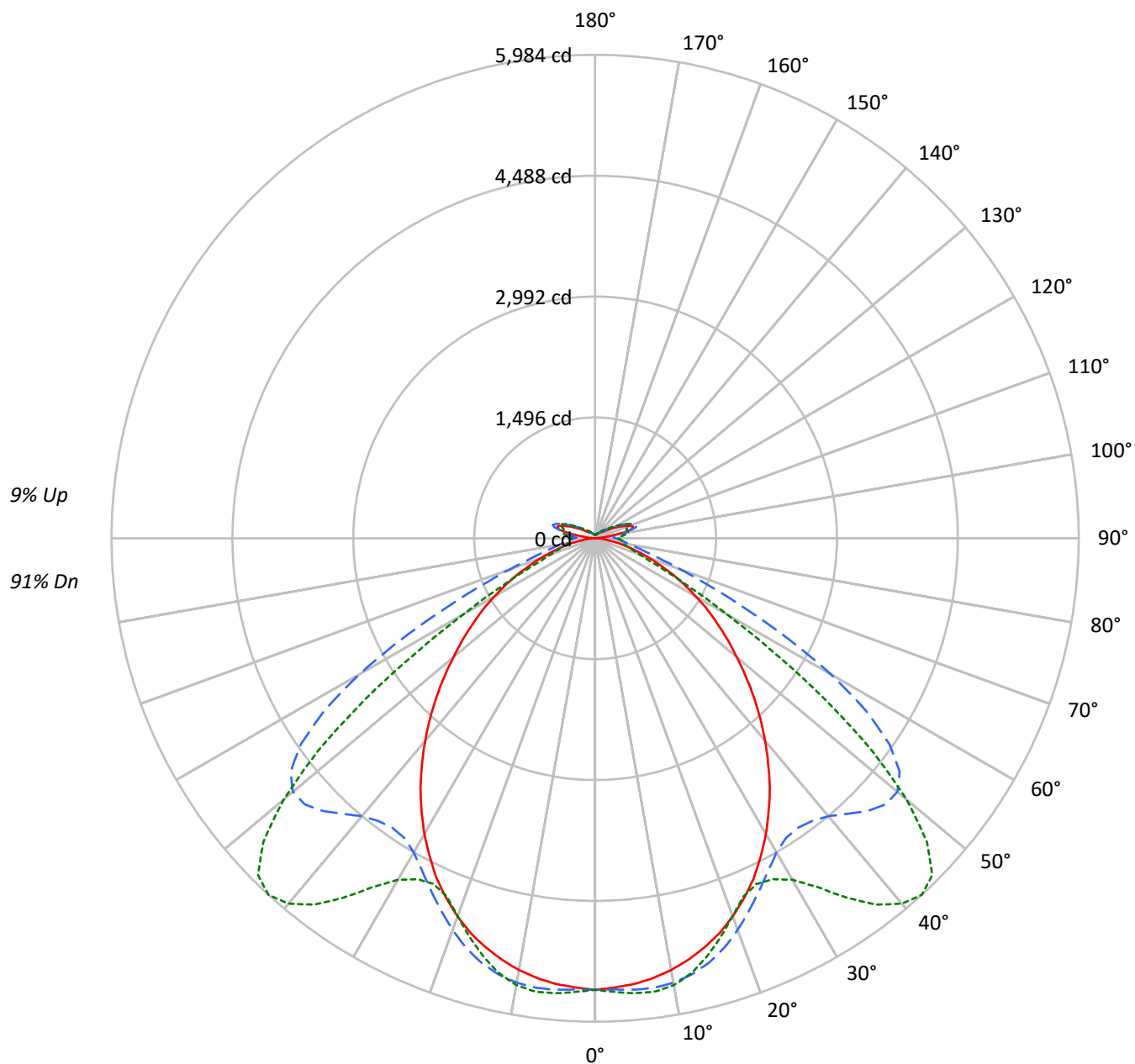
Lumens per Lamp: N/A  
Luminaire Lumens: 17894.0 lumens  
Efficiency: N/A  
Efficacy: 160.6 lumens/watt  
Spacing Criteria (0/90/45): 1.14 / 1.58 / 1.62  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.67' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 111.4  
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: P826506

CATALOG NUMBER: OHBL-18HE-W-UNV-L830-CD-UPL12

### Luminous Intensity Polar Plot





TEST NUMBER: P826506

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

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     | 20  |     |     |     | 20  |     |    |    | 20 |
| RC  | 80  |     |     |     | 70  |     |     |     | 50  |     |     |     | 30  |     |    |    | 10 |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |
| 0   | 117 | 117 | 117 | 117 | 113 | 113 | 113 | 113 | 106 | 106 | 106 | 100 | 100 | 100 | 94 | 94 | 94 |
| 1   | 107 | 103 | 99  | 95  | 104 | 100 | 96  | 93  | 94  | 91  | 88  | 89  | 86  | 84  | 84 | 82 | 80 |
| 2   | 98  | 90  | 83  | 78  | 94  | 87  | 81  | 76  | 82  | 78  | 73  | 78  | 74  | 70  | 74 | 70 | 68 |
| 3   | 89  | 79  | 71  | 65  | 86  | 77  | 70  | 64  | 73  | 67  | 62  | 69  | 64  | 59  | 65 | 61 | 57 |
| 4   | 82  | 70  | 61  | 55  | 79  | 68  | 60  | 54  | 65  | 58  | 52  | 61  | 55  | 51  | 58 | 53 | 49 |
| 5   | 75  | 62  | 54  | 47  | 72  | 61  | 53  | 46  | 58  | 51  | 45  | 55  | 49  | 44  | 52 | 47 | 43 |
| 6   | 69  | 56  | 47  | 41  | 67  | 55  | 46  | 40  | 52  | 45  | 39  | 49  | 43  | 38  | 47 | 42 | 37 |
| 7   | 64  | 51  | 42  | 36  | 62  | 49  | 41  | 35  | 47  | 40  | 35  | 45  | 38  | 34  | 43 | 37 | 33 |
| 8   | 59  | 46  | 37  | 32  | 57  | 45  | 37  | 31  | 43  | 36  | 31  | 41  | 35  | 30  | 39 | 34 | 29 |
| 9   | 55  | 42  | 34  | 28  | 53  | 41  | 33  | 28  | 39  | 32  | 27  | 38  | 31  | 27  | 36 | 30 | 26 |
| 10  | 52  | 39  | 31  | 26  | 50  | 38  | 30  | 25  | 36  | 29  | 25  | 35  | 29  | 24  | 33 | 28 | 24 |

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

|     | 0°   | 45°   | 90°   |
|-----|------|-------|-------|
| 0°  | 9546 | 9546  | 9546  |
| 5°  | 9412 | 9533  | 9655  |
| 10° | 9248 | 9518  | 9666  |
| 15° | 9023 | 9361  | 9357  |
| 20° | 8732 | 9039  | 8898  |
| 25° | 8359 | 8650  | 8720  |
| 30° | 7881 | 8360  | 9384  |
| 35° | 7343 | 8514  | 10981 |
| 40° | 6730 | 9221  | 12694 |
| 45° | 6093 | 10460 | 13645 |
| 50° | 5434 | 11566 | 12698 |
| 55° | 4814 | 11551 | 9702  |
| 60° | 4185 | 9772  | 5932  |
| 65° | 3527 | 6747  | 3593  |
| 70° | 2797 | 4362  | 2594  |
| 75° | 2051 | 3125  | 2405  |
| 80° | 1384 | 2744  | 2714  |
| 85° | 827  | 3014  | 4290  |



TEST NUMBER: P826506

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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 534.1   | 3.0       |
| 10°-20°   | 1512.4  | 8.5       |
| 20°-30°   | 2213.2  | 12.4      |
| 30°-40°   | 2874.3  | 16.1      |
| 40°-50°   | 3509.9  | 19.6      |
| 50°-60°   | 3091.0  | 17.3      |
| 60°-70°   | 1610.8  | 9.0       |
| 70°-80°   | 690.7   | 3.9       |
| 80°-90°   | 334.7   | 1.9       |
| 90°-100°  | 266.6   | 1.5       |
| 100°-110° | 482.1   | 2.7       |
| 110°-120° | 388.1   | 2.2       |
| 120°-130° | 189.7   | 1.1       |
| 130°-140° | 95.0    | 0.5       |
| 140°-150° | 53.7    | 0.3       |
| 150°-160° | 29.5    | 0.2       |
| 160°-170° | 14.0    | 0.1       |
| 170°-180° | 4.2     | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 4259.8  | 23.8      |
| 0°-40°    | 7134.1  | 39.9      |
| 0°-60°    | 13735.0 | 76.8      |
| 0°-90°    | 16371.1 | 91.5      |
| 90°-120°  | 1136.7  | 6.4       |
| 90°-150°  | 1475.1  | 8.2       |
| 90°-180°  | 1523.0  | 8.5       |
| 0°-180°   | 17894.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 5589 | 5589  | 5589 | 5589  | 5589 |      |
| 5°   | 5537 | 5580  | 5610 | 5659  | 5653 | 525  |
| 15°  | 5240 | 5387  | 5438 | 5398  | 5354 | 1475 |
| 25°  | 4643 | 4891  | 4808 | 4717  | 4722 | 2131 |
| 35°  | 3768 | 4166  | 4375 | 5102  | 5429 | 2349 |
| 45°  | 2775 | 3491  | 4772 | 5777  | 5898 | 2139 |
| 55°  | 1847 | 3058  | 4444 | 3896  | 3463 | 1658 |
| 65°  | 1060 | 2119  | 2034 | 1131  | 973  | 1049 |
| 75°  | 427  | 991   | 654  | 447   | 424  | 465  |
| 85°  | 90   | 353   | 333  | 326   | 329  | 101  |
| 90°  | 4    | 145   | 242  | 280   | 289  | 8    |
| 95°  | 26   | 129   | 255  | 313   | 336  | 78   |
| 105° | 486  | 518   | 519  | 424   | 403  | 460  |
| 115° | 342  | 359   | 406  | 419   | 416  | 342  |
| 125° | 172  | 182   | 215  | 225   | 227  | 160  |
| 135° | 102  | 105   | 121  | 135   | 136  | 81   |
| 145° | 80   | 79    | 81   | 89    | 92   | 50   |
| 155° | 66   | 66    | 65   | 66    | 66   | 29   |
| 165° | 48   | 48    | 49   | 49    | 49   | 14   |
| 175° | 44   | 44    | 44   | 44    | 44   | 4    |
| 180° | 43   | 43    | 43   | 43    | 43   |      |



TEST NUMBER: P826506

CATALOG NUMBER: OHBL-18HE-W-UNV-L830-CD-UPL12

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 5589.2 | 5589.2 | 5589.2 | 5589.2 | 5589.2 |
| 2.5°   | 5565.1 | 5589.2 | 5590.4 | 5624.2 | 5620.6 |
| 5°     | 5537.4 | 5579.6 | 5609.8 | 5659.2 | 5653.1 |
| 7.5°   | 5491.6 | 5557.8 | 5611.0 | 5665.2 | 5660.4 |
| 10°    | 5426.4 | 5516.9 | 5586.8 | 5631.4 | 5616.9 |
| 12.5°  | 5342.0 | 5461.4 | 5530.1 | 5539.8 | 5512.1 |
| 15°    | 5239.5 | 5386.6 | 5438.4 | 5397.5 | 5354.0 |
| 17.5°  | 5123.7 | 5296.2 | 5314.3 | 5225.1 | 5170.8 |
| 20°    | 4979.0 | 5175.6 | 5157.5 | 5034.5 | 4974.2 |
| 22.5°  | 4818.7 | 5043.0 | 4985.1 | 4856.0 | 4798.1 |
| 25°    | 4642.6 | 4891.0 | 4807.8 | 4717.4 | 4722.2 |
| 27.5°  | 4436.4 | 4718.6 | 4637.8 | 4678.8 | 4756.0 |
| 30°    | 4226.6 | 4537.7 | 4488.3 | 4727.0 | 4879.0 |
| 32.5°  | 3996.3 | 4352.0 | 4396.6 | 4868.1 | 5116.5 |
| 35°    | 3768.4 | 4166.3 | 4374.9 | 5102.0 | 5428.9 |
| 37.5°  | 3516.3 | 3978.2 | 4409.9 | 5372.2 | 5714.6 |
| 40°    | 3271.6 | 3794.9 | 4489.5 | 5614.5 | 5903.9 |
| 42.5°  | 3021.9 | 3630.8 | 4623.3 | 5758.0 | 5983.6 |
| 45°    | 2774.7 | 3491.0 | 4771.6 | 5777.4 | 5898.0 |
| 47.5°  | 2527.5 | 3372.8 | 4874.2 | 5624.2 | 5568.7 |
| 50°    | 2288.7 | 3267.9 | 4881.4 | 5256.4 | 5029.7 |
| 52.5°  | 2065.6 | 3171.4 | 4748.7 | 4670.4 | 4318.2 |
| 55°    | 1847.4 | 3058.1 | 4443.7 | 3896.1 | 3463.2 |
| 57.5°  | 1648.4 | 2901.3 | 3973.4 | 3064.1 | 2591.4 |
| 60°    | 1437.4 | 2689.1 | 3365.6 | 2241.7 | 1869.1 |
| 62.5°  | 1243.2 | 2425.0 | 2684.3 | 1560.4 | 1343.4 |
| 65°    | 1060.0 | 2118.7 | 2034.3 | 1131.1 | 973.2  |
| 67.5°  | 865.8  | 1801.6 | 1501.4 | 824.8  | 723.5  |
| 70°    | 713.9  | 1507.3 | 1117.9 | 641.5  | 582.4  |
| 72.5°  | 558.3  | 1227.6 | 835.6  | 520.9  | 488.4  |
| 75°    | 426.8  | 991.2  | 653.6  | 447.4  | 424.4  |
| 77.5°  | 314.7  | 783.8  | 525.8  | 395.5  | 373.8  |
| 80°    | 220.6  | 617.4  | 440.2  | 353.3  | 344.9  |
| 82.5°  | 148.3  | 477.6  | 375.0  | 336.4  | 337.6  |
| 85°    | 90.4   | 353.3  | 332.9  | 325.6  | 329.2  |
| 87.5°  | 43.5   | 250.8  | 285.8  | 296.7  | 300.3  |
| 90°    | 4.0    | 144.6  | 241.8  | 279.6  | 289.4  |
| 92.5°  | 8.4    | 119.1  | 228.3  | 274.5  | 285.2  |
| 95°    | 25.7   | 128.7  | 254.9  | 312.9  | 335.7  |
| 97.5°  | 128.0  | 198.3  | 311.3  | 370.5  | 383.4  |
| 100°   | 260.5  | 329.4  | 369.7  | 410.1  | 418.4  |
| 102.5° | 412.1  | 449.9  | 419.5  | 418.1  | 415.9  |
| 105°   | 485.9  | 517.8  | 519.1  | 423.8  | 402.9  |



TEST NUMBER: P826506

CATALOG NUMBER: OHBL-18HE-W-UNV-L830-CD-UPL12

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 396.2 | 420.7 | 468.5 | 470.6 | 457.2 |
| 115°   | 342.3 | 359.1 | 405.9 | 418.8 | 415.6 |
| 117.5° | 289.5 | 306.4 | 349.1 | 360.7 | 360.0 |
| 120°   | 243.9 | 259.1 | 295.9 | 306.7 | 307.9 |
| 122.5° | 206.7 | 217.4 | 252.6 | 263.2 | 265.3 |
| 125°   | 172.2 | 182.4 | 215.1 | 225.2 | 227.3 |
| 127.5° | 144.0 | 150.8 | 183.9 | 195.0 | 196.2 |
| 130°   | 126.4 | 130.1 | 156.4 | 169.5 | 171.9 |
| 132.5° | 113.3 | 116.1 | 136.7 | 149.7 | 153.1 |
| 135°   | 102.2 | 105.0 | 120.7 | 134.9 | 136.1 |
| 137.5° | 94.7  | 96.6  | 107.8 | 120.8 | 124.1 |
| 140°   | 87.3  | 90.1  | 96.8  | 109.7 | 110.9 |
| 142.5° | 82.9  | 83.6  | 89.1  | 99.6  | 101.7 |
| 145°   | 79.5  | 78.9  | 81.1  | 89.1  | 92.5  |
| 147.5° | 74.8  | 75.5  | 77.3  | 82.2  | 84.3  |
| 150°   | 72.0  | 73.0  | 71.5  | 74.8  | 77.2  |
| 152.5° | 68.3  | 69.2  | 67.7  | 68.7  | 71.1  |
| 155°   | 65.5  | 66.4  | 65.0  | 65.9  | 65.9  |
| 157.5° | 53.0  | 54.9  | 54.9  | 55.8  | 55.8  |
| 160°   | 51.2  | 52.1  | 53.0  | 53.0  | 53.0  |
| 162.5° | 49.3  | 50.2  | 50.2  | 51.2  | 51.2  |
| 165°   | 48.4  | 48.4  | 49.3  | 49.3  | 49.3  |
| 167.5° | 46.5  | 46.5  | 47.5  | 47.5  | 47.5  |
| 170°   | 45.6  | 45.6  | 45.6  | 46.5  | 46.5  |
| 172.5° | 44.7  | 44.7  | 44.7  | 44.7  | 44.7  |
| 175°   | 43.7  | 43.7  | 43.7  | 43.7  | 43.7  |
| 177.5° | 42.8  | 43.7  | 43.7  | 43.7  | 43.7  |
| 180°   | 42.8  | 42.8  | 42.8  | 42.8  | 42.8  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 489.9 | 523.2 | 548.9 | 468.9 | 411.8 |
| 110°   | 449.0 | 482.0 | 518.2 | 499.3 | 454.3 |



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

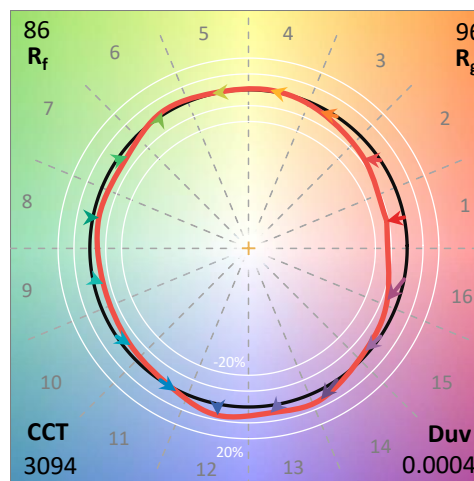
Test Method: LM-79-2019  
 Report Number: SP1-2307-100-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L830-CD**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

LENS

### Spectral Parameters

CCT (K): 3094  
 CIE u': 0.2471  
 CIE v': 0.5200  
 Duv: 0.0004  
 CIE x: 0.4308  
 CIE y: 0.4028  
 CIE z: 0.1664  
 Peak Wavelength (nm): 601  
 Dominant Wavelength (nm): 582  
 Purity: 50.4  
 Rf: 85.5  
 Rg: 95.7

CRI (Ra): 83.1  
 R1: 81.4  
 R2: 91.2  
 R3: 96.3  
 R4: 81.2  
 R5: 81.8  
 R6: 89.5  
 R7: 83.2  
 R8: 59.8  
 R9: 8.0  
 R10: 80.2  
 R11: 80.9  
 R12: 72.3  
 R13: 83.8  
 R14: 98.6



### Test Conditions

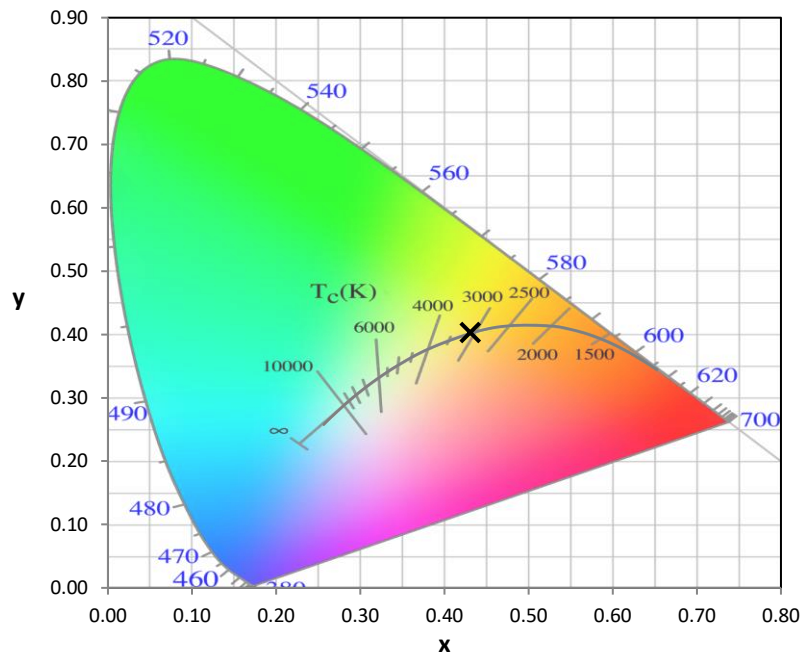
Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-4

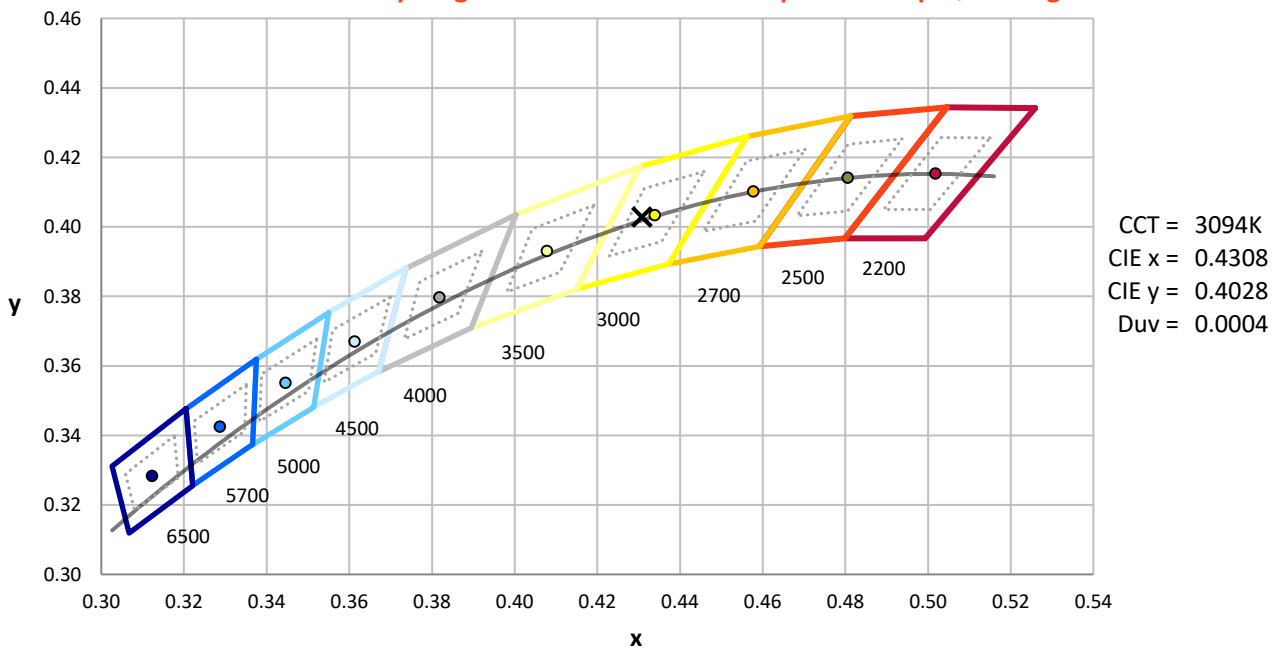
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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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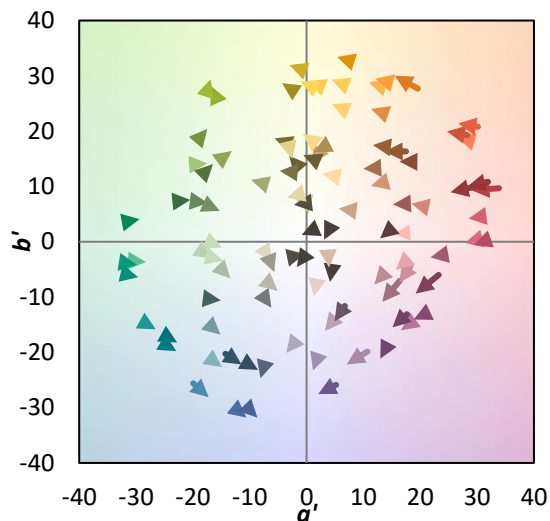
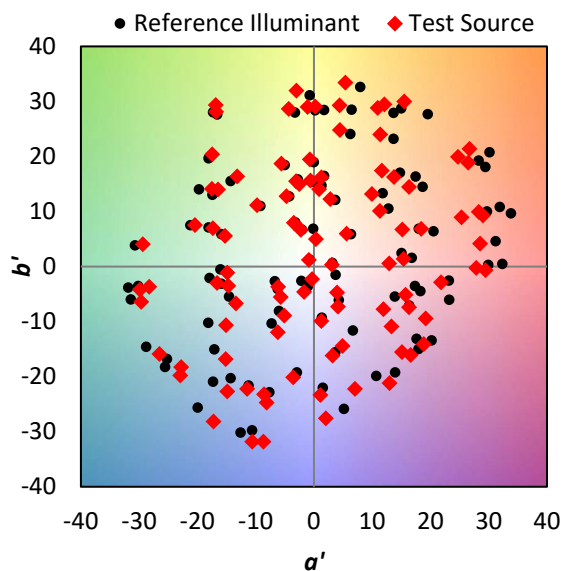
**TM-30-18**

**Summary**

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



**Color Vector Graphics**

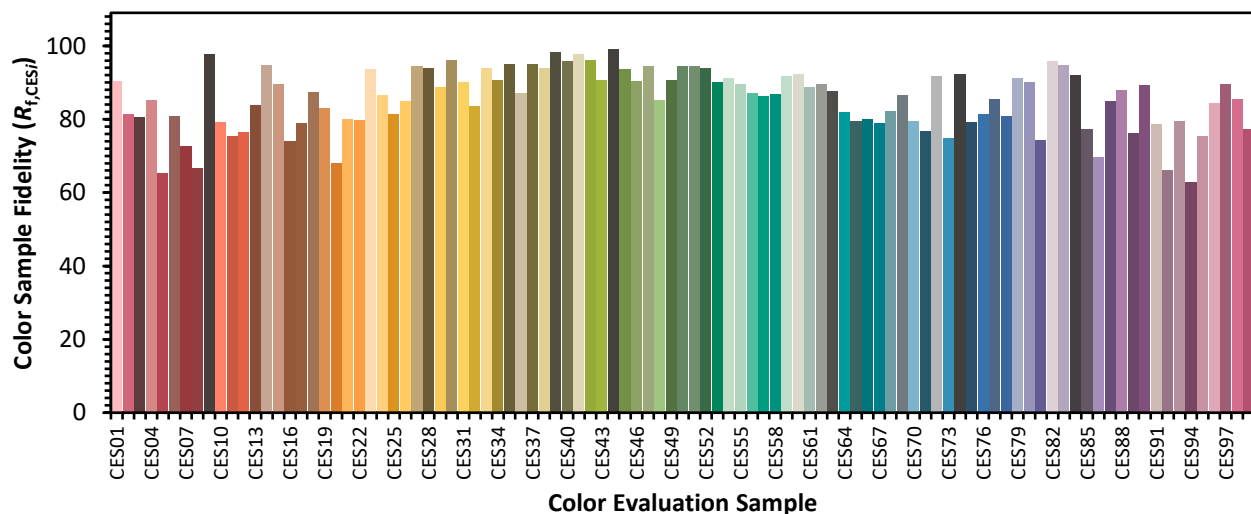


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

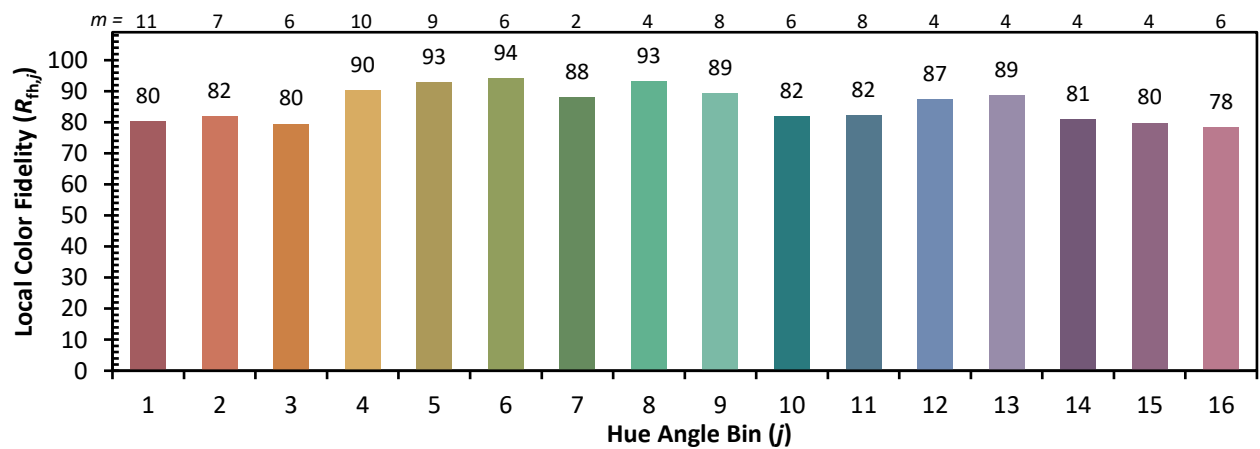
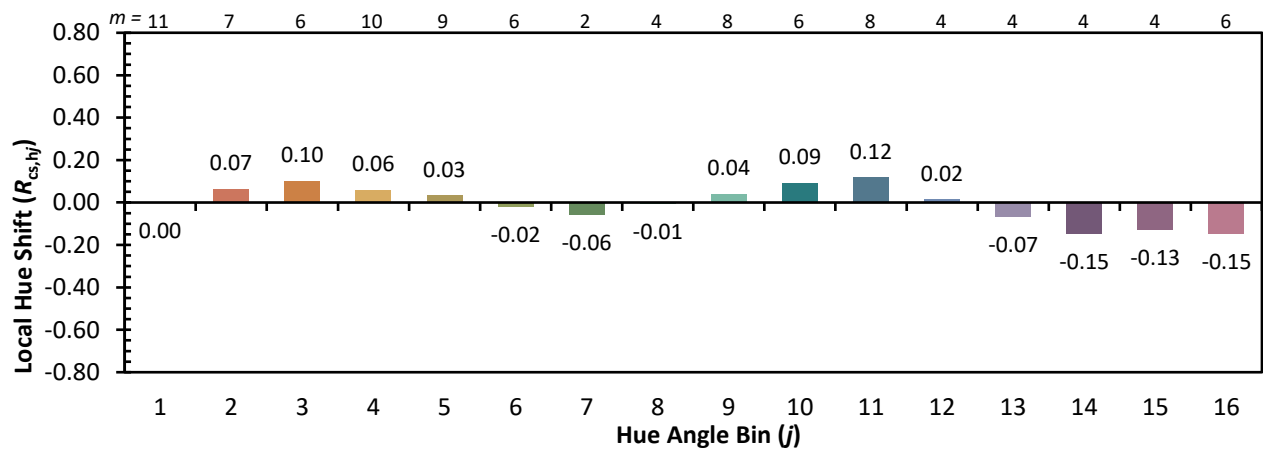
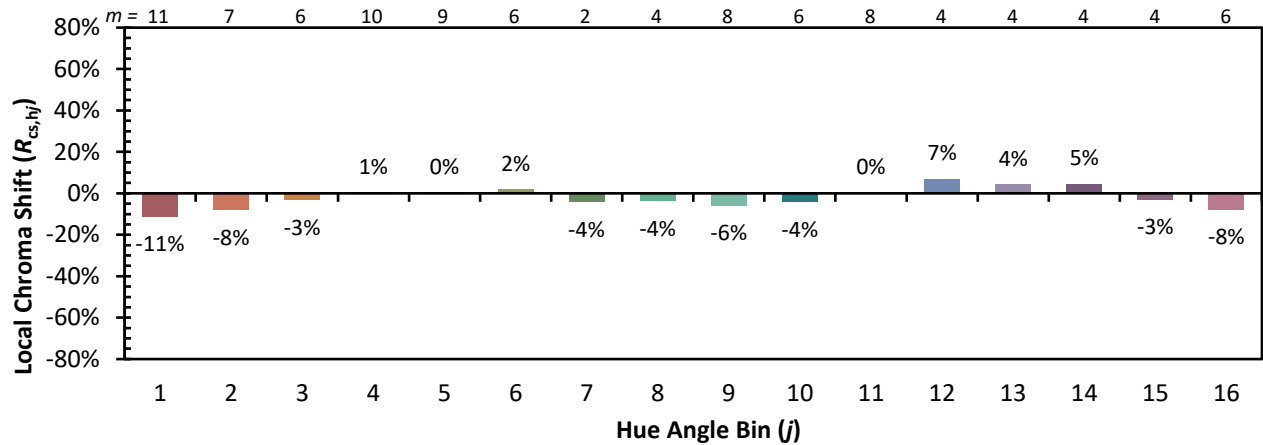
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 94 | CES76 = 81 |
| CES02 = 63 | CES27 = 94 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 90 | CES78 = 81 |
| CES04 = 70 | CES29 = 89 | CES54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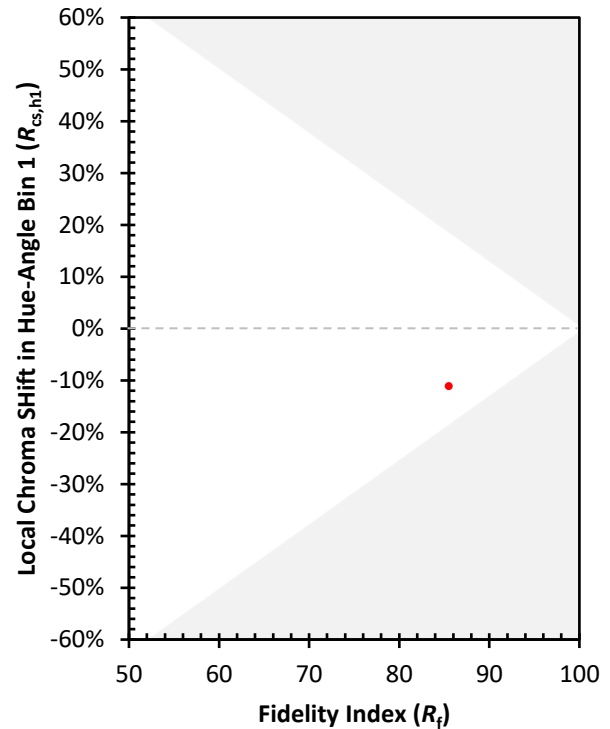
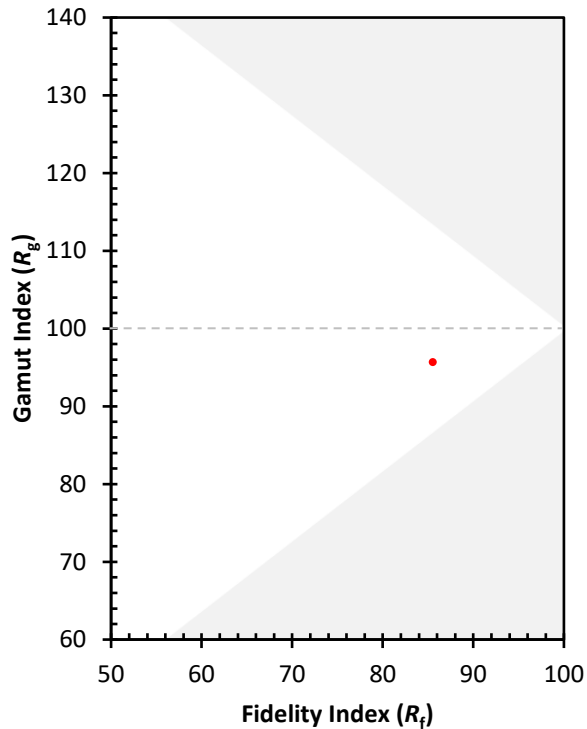
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)