

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: P827668

Luminaire Tested: **OHBL-15HE-A-UNV-L930-CD-UPL24**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P827668  
REPORT IS A COMBINATION OF REPORTS P826215 AND G3-2310-221-6  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-15HE-A-UNV-L930-CD-UPL24  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

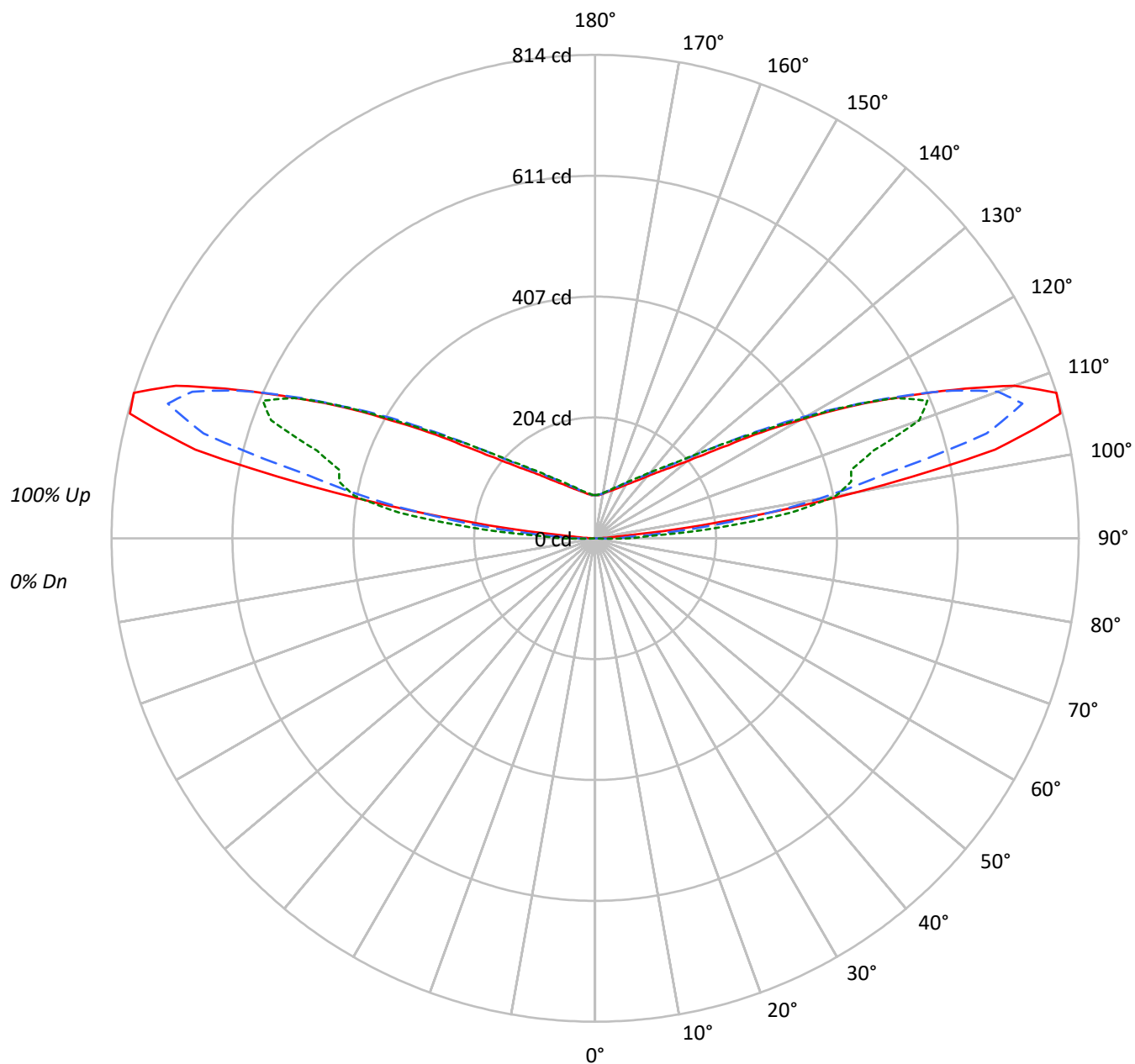
Lumens per Lamp: N/A  
Luminaire Lumens: 1956.4 lumens  
Efficiency: N/A  
Efficacy: 112.4 lumens/watt  
Spacing Criteria (0/90/45): - / - / -  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.67' x H: 0.17')  
CIE Type: Indirect

Input Watts (W): 17.4  
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: P827668

CATALOG NUMBER: OHBL-15HE-A-UNV-L930-CD-UPL24

### Luminous Intensity Polar Plot





TEST NUMBER: P827668

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

|     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| RF  | 20 |    |    |    | 20 |    |    |    |    | 20 |    |    |    |    | 20 |    |    |    |    | 20 |
| RC  | 80 |    |    |    | 70 |    |    |    |    | 50 |    |    |    |    | 30 |    |    |    |    | 10 |
| RW  | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 |
| RCR |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 0   | 95 | 95 | 95 | 95 | 81 | 81 | 81 | 81 | 56 | 56 | 56 | 32 | 32 | 32 | 10 | 10 | 10 | 10 | 10 | 10 |
| 1   | 87 | 83 | 79 | 76 | 74 | 71 | 68 | 65 | 48 | 47 | 45 | 28 | 27 | 26 | 9  | 9  | 9  | 9  | 9  | 9  |
| 2   | 79 | 72 | 66 | 62 | 67 | 62 | 57 | 53 | 42 | 40 | 37 | 24 | 23 | 22 | 8  | 7  | 7  | 7  | 7  | 7  |
| 3   | 72 | 63 | 56 | 51 | 61 | 54 | 49 | 44 | 37 | 34 | 31 | 21 | 20 | 18 | 7  | 6  | 6  | 6  | 6  | 6  |
| 4   | 65 | 56 | 48 | 43 | 56 | 48 | 42 | 37 | 33 | 29 | 26 | 19 | 17 | 16 | 6  | 6  | 5  | 5  | 5  | 5  |
| 5   | 60 | 49 | 42 | 36 | 51 | 42 | 36 | 32 | 29 | 25 | 22 | 17 | 15 | 13 | 5  | 5  | 4  | 4  | 4  | 4  |
| 6   | 55 | 44 | 36 | 31 | 47 | 38 | 31 | 27 | 26 | 22 | 19 | 15 | 13 | 11 | 5  | 4  | 4  | 4  | 4  | 4  |
| 7   | 50 | 39 | 32 | 27 | 43 | 34 | 28 | 23 | 23 | 19 | 17 | 14 | 11 | 10 | 4  | 4  | 3  | 3  | 3  | 3  |
| 8   | 47 | 35 | 28 | 23 | 40 | 30 | 24 | 20 | 21 | 17 | 14 | 12 | 10 | 9  | 4  | 3  | 3  | 3  | 3  | 3  |
| 9   | 43 | 32 | 25 | 20 | 37 | 27 | 22 | 18 | 19 | 15 | 13 | 11 | 9  | 8  | 4  | 3  | 2  | 2  | 2  | 2  |
| 10  | 40 | 29 | 22 | 18 | 34 | 25 | 19 | 16 | 17 | 14 | 11 | 10 | 8  | 7  | 3  | 3  | 2  | 2  | 2  | 2  |

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

|     | 0° | 45° | 90° |
|-----|----|-----|-----|
| 0°  | 0  | 0   | 0   |
| 5°  | 0  | 0   | 0   |
| 10° | 0  | 0   | 0   |
| 15° | 0  | 0   | 0   |
| 20° | 0  | 0   | 0   |
| 25° | 0  | 0   | 0   |
| 30° | 0  | 0   | 0   |
| 35° | 0  | 0   | 0   |
| 40° | 0  | 0   | 0   |
| 45° | 0  | 0   | 0   |
| 50° | 0  | 0   | 0   |
| 55° | 0  | 0   | 0   |
| 60° | 0  | 0   | 0   |
| 65° | 0  | 0   | 0   |
| 70° | 0  | 0   | 0   |
| 75° | 0  | 0   | 0   |
| 80° | 0  | 0   | 0   |
| 85° | 0  | 0   | 0   |



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**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 0.0    | 0.0       |
| 10°-20°   | 0.0    | 0.0       |
| 20°-30°   | 0.0    | 0.0       |
| 30°-40°   | 0.0    | 0.0       |
| 40°-50°   | 0.0    | 0.0       |
| 50°-60°   | 0.0    | 0.0       |
| 60°-70°   | 0.0    | 0.0       |
| 70°-80°   | 0.0    | 0.0       |
| 80°-90°   | 5.0    | 0.3       |
| 90°-100°  | 187.4  | 9.6       |
| 100°-110° | 650.6  | 33.3      |
| 110°-120° | 558.1  | 28.5      |
| 120°-130° | 267.8  | 13.7      |
| 130°-140° | 134.0  | 6.8       |
| 140°-150° | 77.7   | 4.0       |
| 150°-160° | 45.3   | 2.3       |
| 160°-170° | 23.5   | 1.2       |
| 170°-180° | 7.1    | 0.4       |
| 0°-30°    | 0.0    | 0.0       |
| 0°-40°    | 0.0    | 0.0       |
| 0°-60°    | 0.0    | 0.0       |
| 0°-90°    | 5.0    | 0.3       |
| 90°-120°  | 1396.2 | 71.4      |
| 90°-150°  | 1875.5 | 95.9      |
| 90°-180°  | 1951.0 | 99.7      |
| 0°-180°   | 1956.4 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|------|-----|-------|-----|-------|-----|------|
| 0°   | 0   | 0     | 0   | 0     | 0   |      |
| 5°   | 0   | 0     | 0   | 0     | 0   | 0    |
| 15°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 25°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 35°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 45°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 55°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 65°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 75°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 85°  | 0   | 0     | 0   | 0     | 0   | 0    |
| 90°  | 4   | 28    | 38  | 50    | 56  | 3    |
| 95°  | 43  | 90    | 139 | 184   | 209 | 133  |
| 105° | 811 | 802   | 682 | 486   | 446 | 769  |
| 115° | 559 | 565   | 565 | 563   | 559 | 564  |
| 125° | 273 | 288   | 293 | 293   | 290 | 256  |
| 135° | 162 | 165   | 171 | 172   | 174 | 128  |
| 145° | 117 | 120   | 123 | 124   | 124 | 75   |
| 155° | 94  | 95    | 97  | 98    | 98  | 44   |
| 165° | 81  | 82    | 82  | 82    | 82  | 23   |
| 175° | 73  | 74    | 74  | 74    | 74  | 7    |
| 180° | 73  | 73    | 73  | 73    | 73  |      |



TEST NUMBER: P827668

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**CANDELA DISTRIBUTION (FULL):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 0°     | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 2.5°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 5°     | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 7.5°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 10°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 12.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 15°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 17.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 20°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 22.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 25°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 27.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 30°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 32.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 35°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 37.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 40°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 42.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 45°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 47.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 50°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 52.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 55°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 57.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 60°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 62.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 65°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 67.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 70°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 72.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 75°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 77.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 80°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 82.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5°  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 90°    | 4.0   | 27.5  | 38.0  | 50.1  | 55.8  |
| 92.5°  | 13.7  | 36.4  | 58.2  | 82.4  | 93.0  |
| 95°    | 42.8  | 89.7  | 139.0 | 184.3 | 208.6 |
| 97.5°  | 217.4 | 235.2 | 253.0 | 306.4 | 333.0 |
| 100°   | 446.2 | 473.7 | 382.3 | 404.2 | 411.4 |
| 102.5° | 689.5 | 685.5 | 499.6 | 447.8 | 441.4 |
| 105°   | 810.8 | 801.9 | 682.2 | 485.8 | 446.2 |



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**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 653.1 | 662.8 | 649.9 | 631.3 | 605.4 |
| 115°   | 559.4 | 565.0 | 565.0 | 563.4 | 558.6 |
| 117.5° | 478.5 | 479.3 | 482.6 | 481.8 | 482.6 |
| 120°   | 396.1 | 405.0 | 412.2 | 408.2 | 403.4 |
| 122.5° | 332.2 | 341.9 | 346.8 | 345.2 | 340.3 |
| 125°   | 273.2 | 287.8 | 293.4 | 292.6 | 290.2 |
| 127.5° | 231.2 | 241.7 | 249.8 | 250.6 | 249.8 |
| 130°   | 201.3 | 207.7 | 215.8 | 216.6 | 217.4 |
| 132.5° | 178.6 | 184.3 | 190.0 | 193.2 | 192.4 |
| 135°   | 161.7 | 164.9 | 170.6 | 172.2 | 173.8 |
| 137.5° | 147.9 | 150.4 | 155.2 | 157.6 | 157.6 |
| 140°   | 135.8 | 139.0 | 143.1 | 144.7 | 145.5 |
| 142.5° | 125.3 | 128.5 | 131.8 | 133.4 | 133.4 |
| 145°   | 117.2 | 120.4 | 122.9 | 123.7 | 124.5 |
| 147.5° | 109.9 | 113.2 | 114.8 | 116.4 | 116.4 |
| 150°   | 104.3 | 105.9 | 108.3 | 109.1 | 109.9 |
| 152.5° | 98.6  | 100.2 | 102.7 | 103.5 | 103.5 |
| 155°   | 93.8  | 95.4  | 97.0  | 97.8  | 97.8  |
| 157.5° | 89.7  | 91.3  | 93.0  | 93.8  | 93.8  |
| 160°   | 86.5  | 87.3  | 88.9  | 89.7  | 89.7  |
| 162.5° | 83.3  | 84.1  | 84.9  | 85.7  | 85.7  |
| 165°   | 80.8  | 81.6  | 82.4  | 82.4  | 82.4  |
| 167.5° | 78.4  | 78.4  | 79.2  | 80.0  | 80.0  |
| 170°   | 76.0  | 76.8  | 76.8  | 77.6  | 77.6  |
| 172.5° | 74.4  | 75.2  | 75.2  | 75.2  | 76.0  |
| 175°   | 72.8  | 73.6  | 73.6  | 74.4  | 74.4  |
| 177.5° | 72.8  | 72.8  | 72.8  | 72.8  | 72.8  |
| 180°   | 72.8  | 72.8  | 72.8  | 72.8  | 72.8  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 814.0 | 817.2 | 754.2 | 589.3 | 490.7 |
| 110°   | 750.9 | 758.2 | 721.8 | 659.6 | 580.4 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2304-001-2

Test Date: 05/31/2023

Luminaire Tested: OHB-15SE-N-UNV-L930

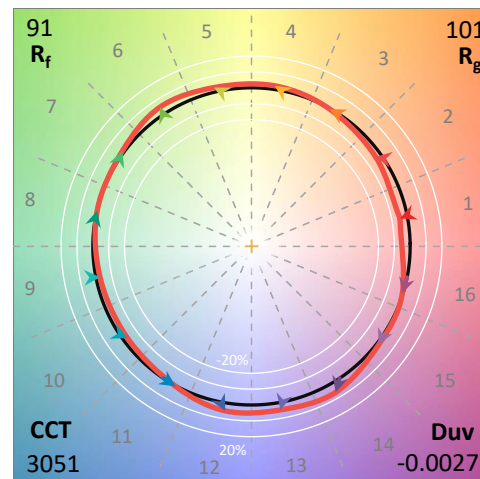
Data in this report applies to families of products including OHB-15SE-N-UNV-L930.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2304-001-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 05/31/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L930**  
 Description: 15SE OHB WITH APT LEDS, NARROW LENS, 90CRI 3000K

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 3051    | CRI (Ra): | 92.2 |      |      |
| CIE u':                   | 0.2497  | R1:       | 92.8 | R9:  | 60.2 |
| CIE v':                   | 0.5166  | R2:       | 95.6 | R10: | 88.6 |
| Duv:                      | -0.0027 | R3:       | 96.4 | R11: | 92.7 |
| CIE x:                    | 0.4295  | R4:       | 92.2 | R12: | 82.3 |
| CIE y:                    | 0.3950  | R5:       | 92.5 | R13: | 93.6 |
| CIE z:                    | 0.1755  | R6:       | 94.0 | R14: | 97.4 |
| Peak Wavelength (nm):     | 621     | R7:       | 91.7 |      |      |
| Dominant Wavelength (nm): | 583     | R8:       | 82.4 |      |      |
| Purity:                   | 47.8    |           |      |      |      |
| Rf:                       | 90.7    |           |      |      |      |
| Rg:                       | 101.5   |           |      |      |      |



### Test Conditions

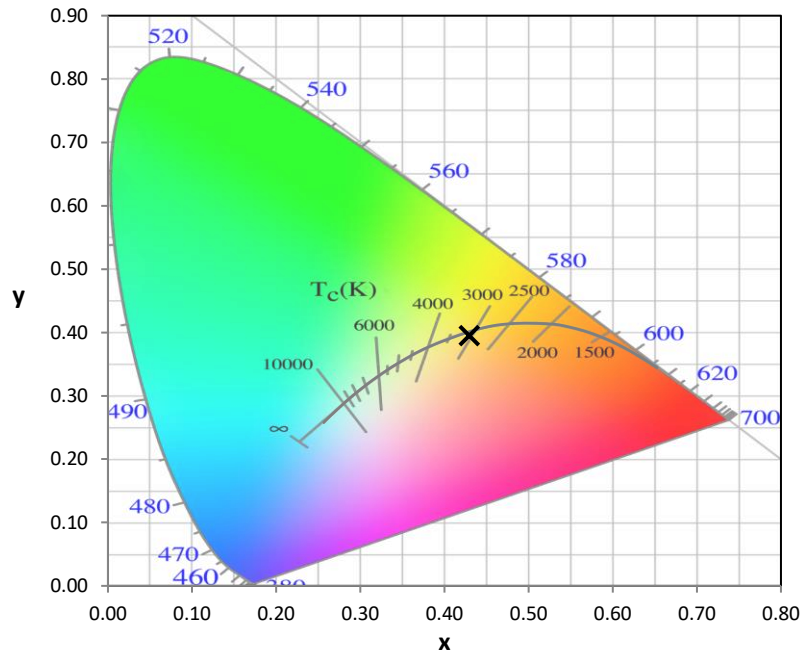
Stabilization Time: 22M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.2/44%  
 Sphere Temperature (°C): 25.3

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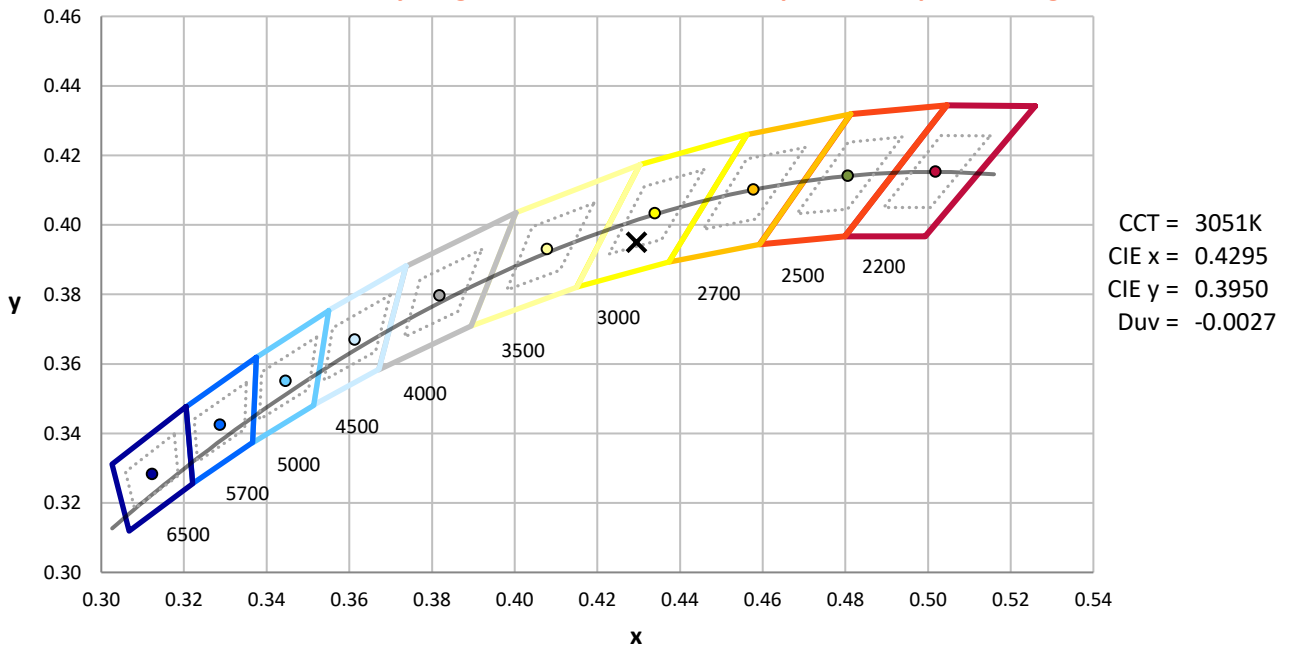
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



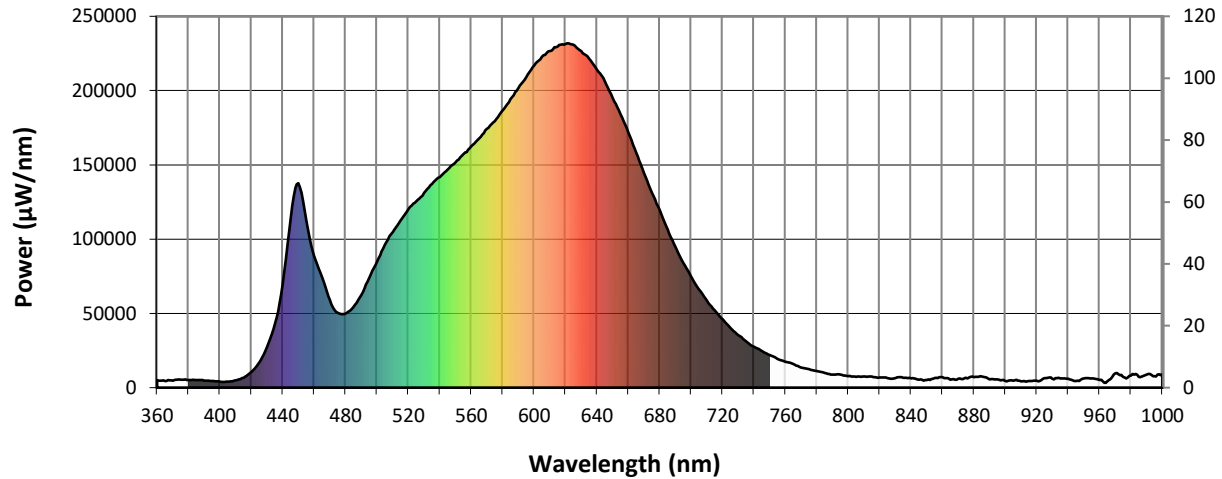
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

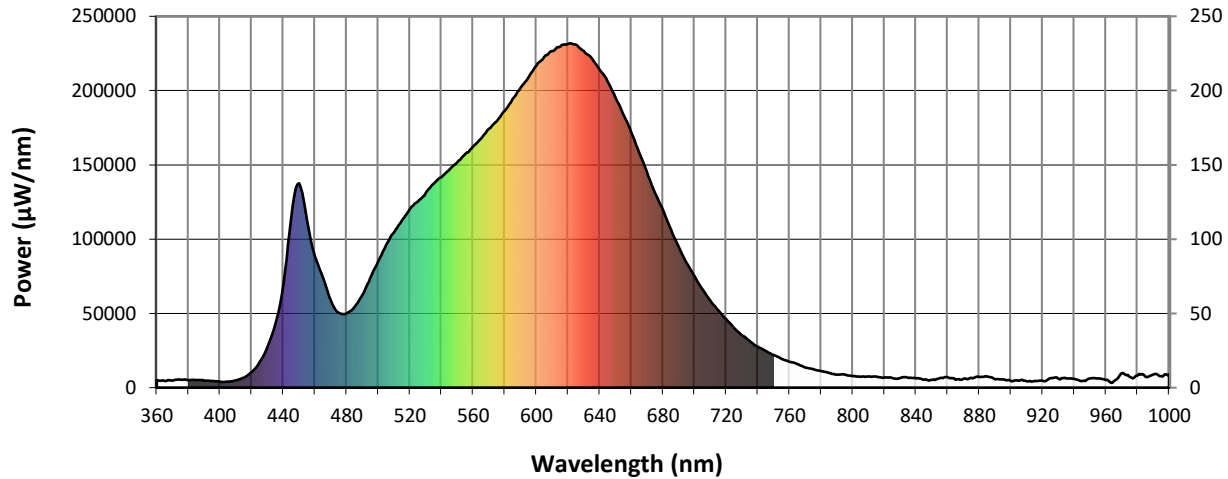


#####

| 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       | 5142             | NR               | 490       | 62439            | NR               | 620       | 231386           | NR               | 750       | 21976            | NR               | 880       | 7157             | NR               |
| 365       | 4540             | NR               | 495       | 73651            | NR               | 625       | 230941           | NR               | 755       | 19435            | NR               | 885       | 7445             | NR               |
| 370       | 4803             | NR               | 500       | 84837            | NR               | 630       | 226625           | NR               | 760       | 17457            | NR               | 890       | 5651             | NR               |
| 375       | 5429             | NR               | 505       | 96138            | NR               | 635       | 221573           | NR               | 765       | 15928            | NR               | 895       | 5663             | NR               |
| 380       | 5059             | NR               | 510       | 104675           | NR               | 640       | 214183           | NR               | 770       | 13612            | NR               | 900       | 4391             | NR               |
| 385       | 5164             | NR               | 515       | 112374           | NR               | 645       | 206197           | NR               | 775       | 12383            | NR               | 905       | 4718             | NR               |
| 390       | 4787             | NR               | 520       | 120074           | NR               | 650       | 195149           | NR               | 780       | 11099            | NR               | 910       | 4205             | NR               |
| 395       | 4429             | NR               | 525       | 125393           | NR               | 655       | 184048           | NR               | 785       | 9818             | NR               | 915       | 4466             | NR               |
| 400       | 3966             | NR               | 530       | 131080           | NR               | 660       | 171890           | NR               | 790       | 8853             | NR               | 920       | 4608             | NR               |
| 405       | 4026             | NR               | 535       | 137166           | NR               | 665       | 158117           | NR               | 795       | 8815             | NR               | 925       | 6506             | NR               |
| 410       | 4947             | NR               | 540       | 141770           | NR               | 670       | 144601           | NR               | 800       | 7747             | NR               | 930       | 6091             | NR               |
| 415       | 6735             | NR               | 545       | 146789           | NR               | 675       | 131155           | NR               | 805       | 7317             | NR               | 935       | 6242             | NR               |
| 420       | 10542            | NR               | 550       | 151664           | NR               | 680       | 119765           | NR               | 810       | 7417             | NR               | 940       | 5908             | NR               |
| 425       | 16995            | NR               | 555       | 157152           | NR               | 685       | 106544           | NR               | 815       | 7400             | NR               | 945       | 4377             | NR               |
| 430       | 27239            | NR               | 560       | 162379           | NR               | 690       | 94952            | NR               | 820       | 6832             | NR               | 950       | 6170             | NR               |
| 435       | 43016            | NR               | 565       | 167867           | NR               | 695       | 83928            | NR               | 825       | 6514             | NR               | 955       | 6143             | NR               |
| 440       | 69527            | NR               | 570       | 174214           | NR               | 700       | 74959            | NR               | 830       | 6419             | NR               | 960       | 5227             | NR               |
| 445       | 113795           | NR               | 575       | 179459           | NR               | 705       | 66186            | NR               | 835       | 6702             | NR               | 965       | 4363             | NR               |
| 450       | 137556           | NR               | 580       | 186493           | NR               | 710       | 58632            | NR               | 840       | 6224             | NR               | 970       | 9654             | NR               |
| 455       | 112457           | NR               | 585       | 194218           | NR               | 715       | 52023            | NR               | 845       | 5410             | NR               | 975       | 7378             | NR               |
| 460       | 88709            | NR               | 590       | 201759           | NR               | 720       | 46022            | NR               | 850       | 5183             | NR               | 980       | 8170             | NR               |
| 465       | 74548            | NR               | 595       | 208902           | NR               | 725       | 40235            | NR               | 855       | 6469             | NR               | 985       | 7350             | NR               |
| 470       | 58681            | NR               | 600       | 217002           | NR               | 730       | 35330            | NR               | 860       | 7161             | NR               | 990       | 8712             | NR               |
| 475       | 50369            | NR               | 605       | 222691           | NR               | 735       | 31141            | NR               | 865       | 5351             | NR               | 995       | 7670             | NR               |
| 480       | 50005            | NR               | 610       | 226497           | NR               | 740       | 27444            | NR               | 870       | 5943             | NR               | 1000      | 8916             | NR               |
| 485       | 54326            | NR               | 615       | 229506           | NR               | 745       | 24768            | NR               | 875       | 6650             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



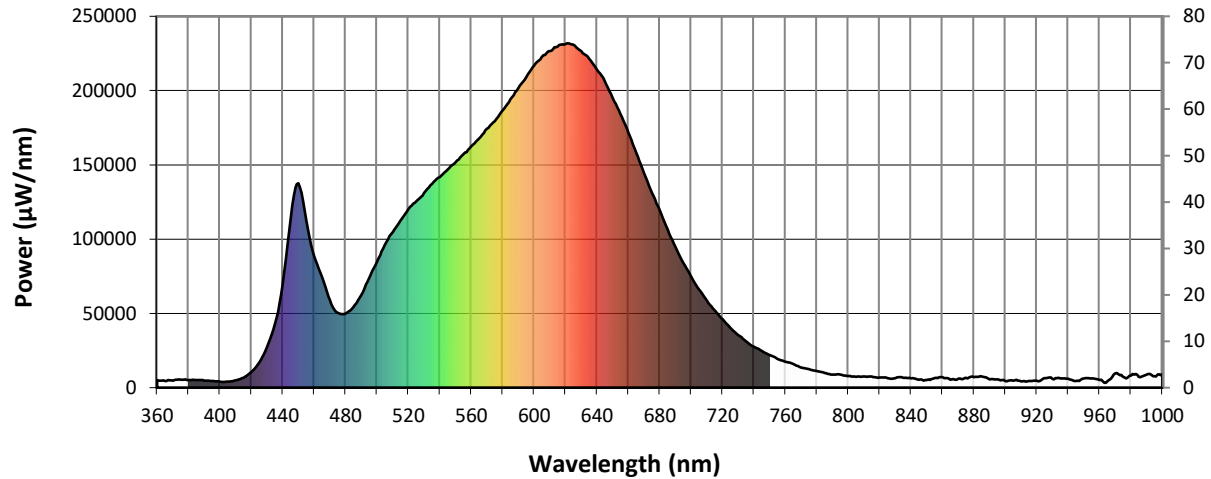
Scotopic Lumens: 16819.9

S/P: 1.43

| 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       | 5142             | NR               | 490       | 62439            | NR               | 620       | 231386           | NR               | 750       | 21976            | NR               | 880       | 7157             | NR               |
| 365       | 4540             | NR               | 495       | 73651            | NR               | 625       | 230941           | NR               | 755       | 19435            | NR               | 885       | 7445             | NR               |
| 370       | 4803             | NR               | 500       | 84837            | NR               | 630       | 226625           | NR               | 760       | 17457            | NR               | 890       | 5651             | NR               |
| 375       | 5429             | NR               | 505       | 96138            | NR               | 635       | 221573           | NR               | 765       | 15928            | NR               | 895       | 5663             | NR               |
| 380       | 5059             | NR               | 510       | 104675           | NR               | 640       | 214183           | NR               | 770       | 13612            | NR               | 900       | 4391             | NR               |
| 385       | 5164             | NR               | 515       | 112374           | NR               | 645       | 206197           | NR               | 775       | 12383            | NR               | 905       | 4718             | NR               |
| 390       | 4787             | NR               | 520       | 120074           | NR               | 650       | 195149           | NR               | 780       | 11099            | NR               | 910       | 4205             | NR               |
| 395       | 4429             | NR               | 525       | 125393           | NR               | 655       | 184048           | NR               | 785       | 9818             | NR               | 915       | 4466             | NR               |
| 400       | 3966             | NR               | 530       | 131080           | NR               | 660       | 171890           | NR               | 790       | 8853             | NR               | 920       | 4608             | NR               |
| 405       | 4026             | NR               | 535       | 137166           | NR               | 665       | 158117           | NR               | 795       | 8815             | NR               | 925       | 6506             | NR               |
| 410       | 4947             | NR               | 540       | 141770           | NR               | 670       | 144601           | NR               | 800       | 7747             | NR               | 930       | 6091             | NR               |
| 415       | 6735             | NR               | 545       | 146789           | NR               | 675       | 131155           | NR               | 805       | 7317             | NR               | 935       | 6242             | NR               |
| 420       | 10542            | NR               | 550       | 151664           | NR               | 680       | 119765           | NR               | 810       | 7417             | NR               | 940       | 5908             | NR               |
| 425       | 16995            | NR               | 555       | 157152           | NR               | 685       | 106544           | NR               | 815       | 7400             | NR               | 945       | 4377             | NR               |
| 430       | 27239            | NR               | 560       | 162379           | NR               | 690       | 94952            | NR               | 820       | 6832             | NR               | 950       | 6170             | NR               |
| 435       | 43016            | NR               | 565       | 167867           | NR               | 695       | 83928            | NR               | 825       | 6514             | NR               | 955       | 6143             | NR               |
| 440       | 69527            | NR               | 570       | 174214           | NR               | 700       | 74959            | NR               | 830       | 6419             | NR               | 960       | 5227             | NR               |
| 445       | 113795           | NR               | 575       | 179459           | NR               | 705       | 66186            | NR               | 835       | 6702             | NR               | 965       | 4363             | NR               |
| 450       | 137556           | NR               | 580       | 186493           | NR               | 710       | 58632            | NR               | 840       | 6224             | NR               | 970       | 9654             | NR               |
| 455       | 112457           | NR               | 585       | 194218           | NR               | 715       | 52023            | NR               | 845       | 5410             | NR               | 975       | 7378             | NR               |
| 460       | 88709            | NR               | 590       | 201759           | NR               | 720       | 46022            | NR               | 850       | 5183             | NR               | 980       | 8170             | NR               |
| 465       | 74548            | NR               | 595       | 208902           | NR               | 725       | 40235            | NR               | 855       | 6469             | NR               | 985       | 7350             | NR               |
| 470       | 58681            | NR               | 600       | 217002           | NR               | 730       | 35330            | NR               | 860       | 7161             | NR               | 990       | 8712             | NR               |
| 475       | 50369            | NR               | 605       | 222691           | NR               | 735       | 31141            | NR               | 865       | 5351             | NR               | 995       | 7670             | NR               |
| 480       | 50005            | NR               | 610       | 226497           | NR               | 740       | 27444            | NR               | 870       | 5943             | NR               | 1000      | 8916             | NR               |
| 485       | 54326            | NR               | 615       | 229506           | NR               | 745       | 24768            | NR               | 875       | 6650             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 6505.3 M/P: 0.55**

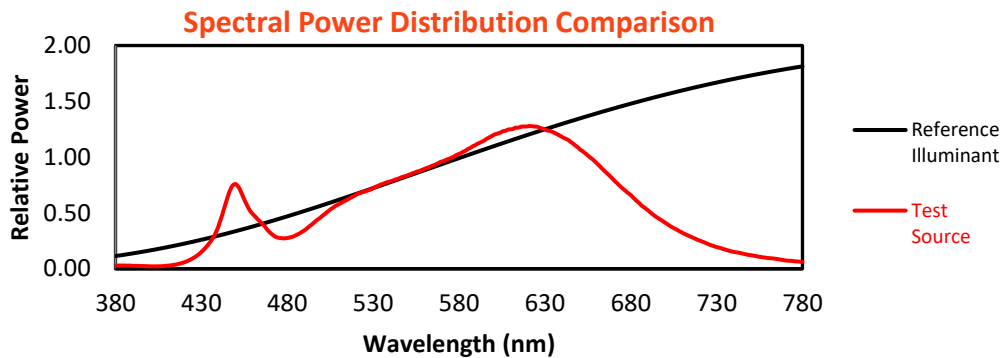
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 5142             | NR               | 490       | 62439            | NR               | 620       | 231386           | NR               | 750       | 21976            | NR               | 880       | 7157             | NR               |
| 365       | 4540             | NR               | 495       | 73651            | NR               | 625       | 230941           | NR               | 755       | 19435            | NR               | 885       | 7445             | NR               |
| 370       | 4803             | NR               | 500       | 84837            | NR               | 630       | 226625           | NR               | 760       | 17457            | NR               | 890       | 5651             | NR               |
| 375       | 5429             | NR               | 505       | 96138            | NR               | 635       | 221573           | NR               | 765       | 15928            | NR               | 895       | 5663             | NR               |
| 380       | 5059             | NR               | 510       | 104675           | NR               | 640       | 214183           | NR               | 770       | 13612            | NR               | 900       | 4391             | NR               |
| 385       | 5164             | NR               | 515       | 112374           | NR               | 645       | 206197           | NR               | 775       | 12383            | NR               | 905       | 4718             | NR               |
| 390       | 4787             | NR               | 520       | 120074           | NR               | 650       | 195149           | NR               | 780       | 11099            | NR               | 910       | 4205             | NR               |
| 395       | 4429             | NR               | 525       | 125393           | NR               | 655       | 184048           | NR               | 785       | 9818             | NR               | 915       | 4466             | NR               |
| 400       | 3966             | NR               | 530       | 131080           | NR               | 660       | 171890           | NR               | 790       | 8853             | NR               | 920       | 4608             | NR               |
| 405       | 4026             | NR               | 535       | 137166           | NR               | 665       | 158117           | NR               | 795       | 8815             | NR               | 925       | 6506             | NR               |
| 410       | 4947             | NR               | 540       | 141770           | NR               | 670       | 144601           | NR               | 800       | 7747             | NR               | 930       | 6091             | NR               |
| 415       | 6735             | NR               | 545       | 146789           | NR               | 675       | 131155           | NR               | 805       | 7317             | NR               | 935       | 6242             | NR               |
| 420       | 10542            | NR               | 550       | 151664           | NR               | 680       | 119765           | NR               | 810       | 7417             | NR               | 940       | 5908             | NR               |
| 425       | 16995            | NR               | 555       | 157152           | NR               | 685       | 106544           | NR               | 815       | 7400             | NR               | 945       | 4377             | NR               |
| 430       | 27239            | NR               | 560       | 162379           | NR               | 690       | 94952            | NR               | 820       | 6832             | NR               | 950       | 6170             | NR               |
| 435       | 43016            | NR               | 565       | 167867           | NR               | 695       | 83928            | NR               | 825       | 6514             | NR               | 955       | 6143             | NR               |
| 440       | 69527            | NR               | 570       | 174214           | NR               | 700       | 74959            | NR               | 830       | 6419             | NR               | 960       | 5227             | NR               |
| 445       | 113795           | NR               | 575       | 179459           | NR               | 705       | 66186            | NR               | 835       | 6702             | NR               | 965       | 4363             | NR               |
| 450       | 137556           | NR               | 580       | 186493           | NR               | 710       | 58632            | NR               | 840       | 6224             | NR               | 970       | 9654             | NR               |
| 455       | 112457           | NR               | 585       | 194218           | NR               | 715       | 52023            | NR               | 845       | 5410             | NR               | 975       | 7378             | NR               |
| 460       | 88709            | NR               | 590       | 201759           | NR               | 720       | 46022            | NR               | 850       | 5183             | NR               | 980       | 8170             | NR               |
| 465       | 74548            | NR               | 595       | 208902           | NR               | 725       | 40235            | NR               | 855       | 6469             | NR               | 985       | 7350             | NR               |
| 470       | 58681            | NR               | 600       | 217002           | NR               | 730       | 35330            | NR               | 860       | 7161             | NR               | 990       | 8712             | NR               |
| 475       | 50369            | NR               | 605       | 222691           | NR               | 735       | 31141            | NR               | 865       | 5351             | NR               | 995       | 7670             | NR               |
| 480       | 50005            | NR               | 610       | 226497           | NR               | 740       | 27444            | NR               | 870       | 5943             | NR               | 1000      | 8916             | NR               |
| 485       | 54326            | NR               | 615       | 229506           | NR               | 745       | 24768            | NR               | 875       | 6650             | NR               |           |                  |                  |

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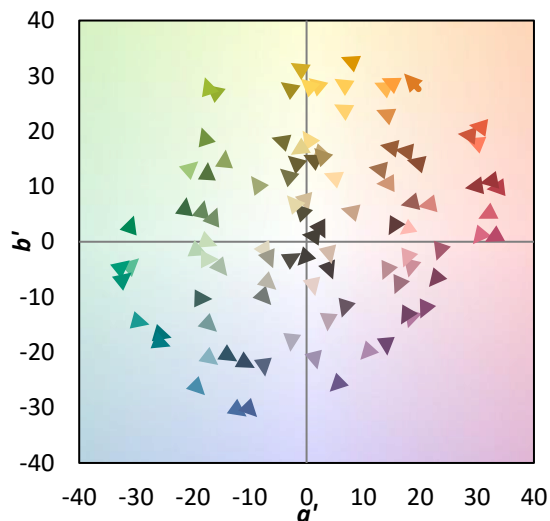
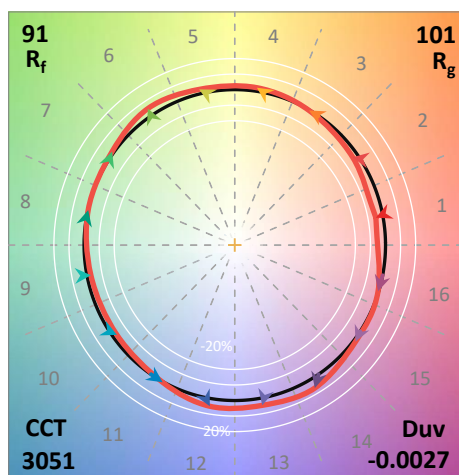
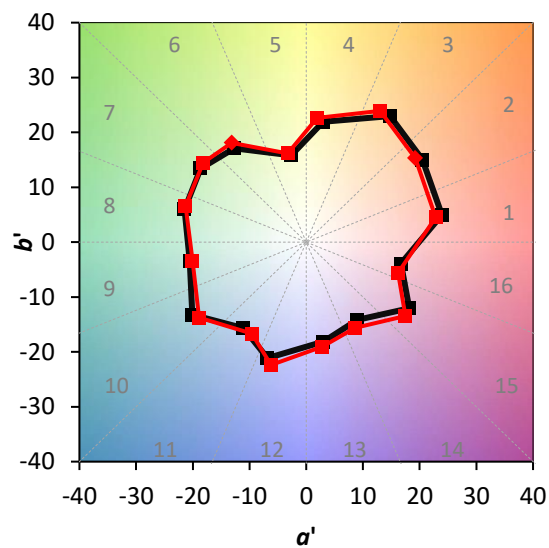
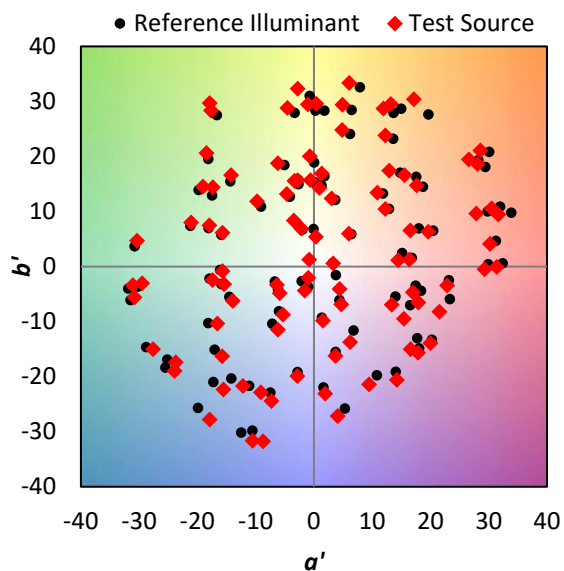
**TM-30-18**

**Summary**

$R_f = 90.7$   
 $R_g = 101.5$   
 CIE  $R_a = 92.2$   
 $R_9 = 60.2$



**Color Vector Graphics**

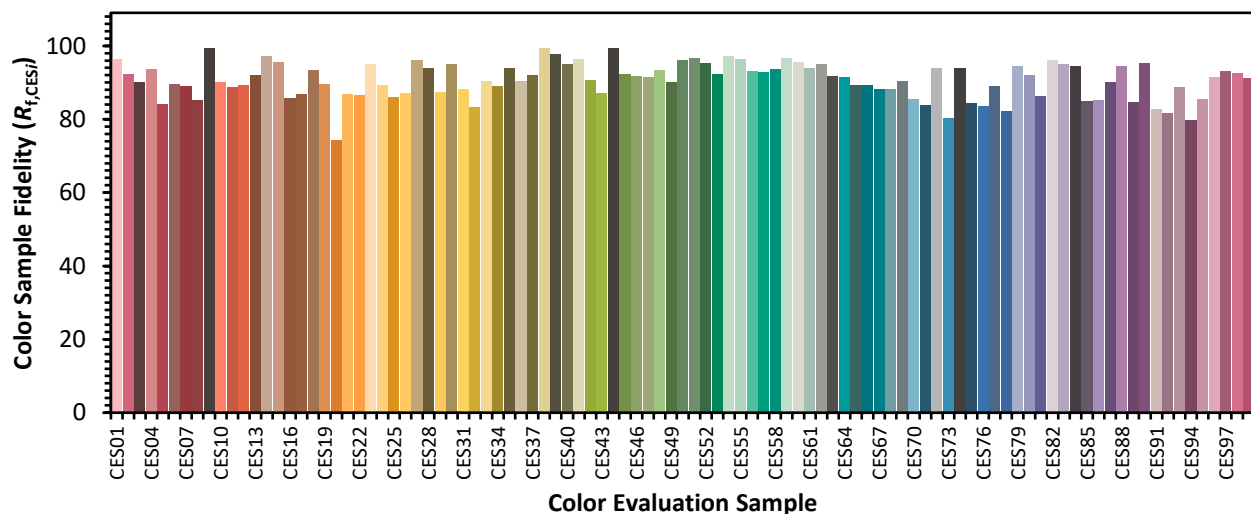


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

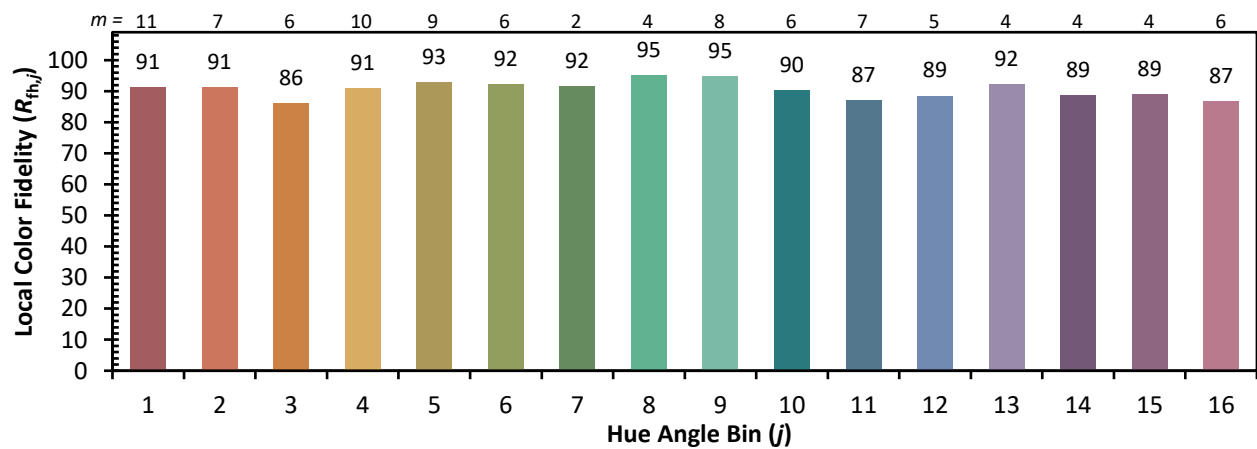
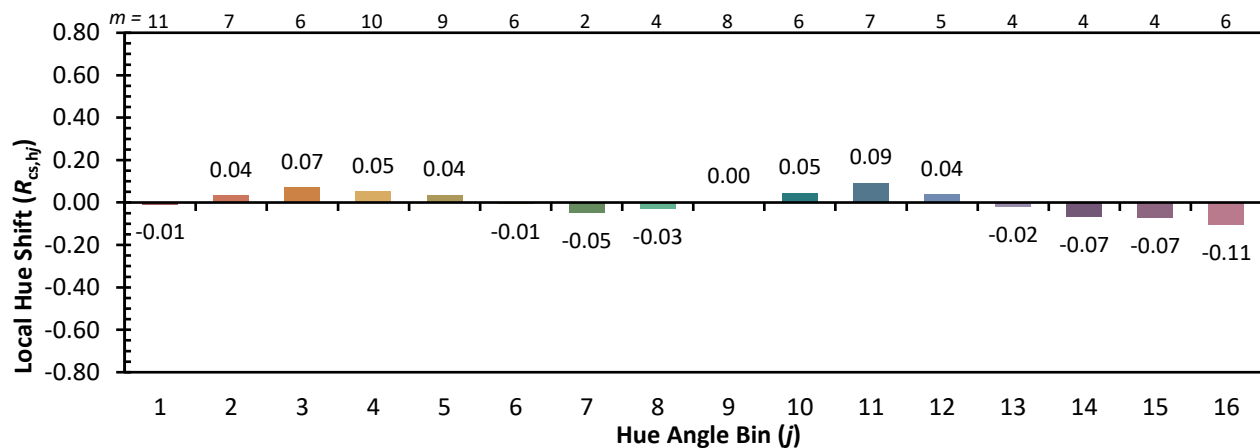
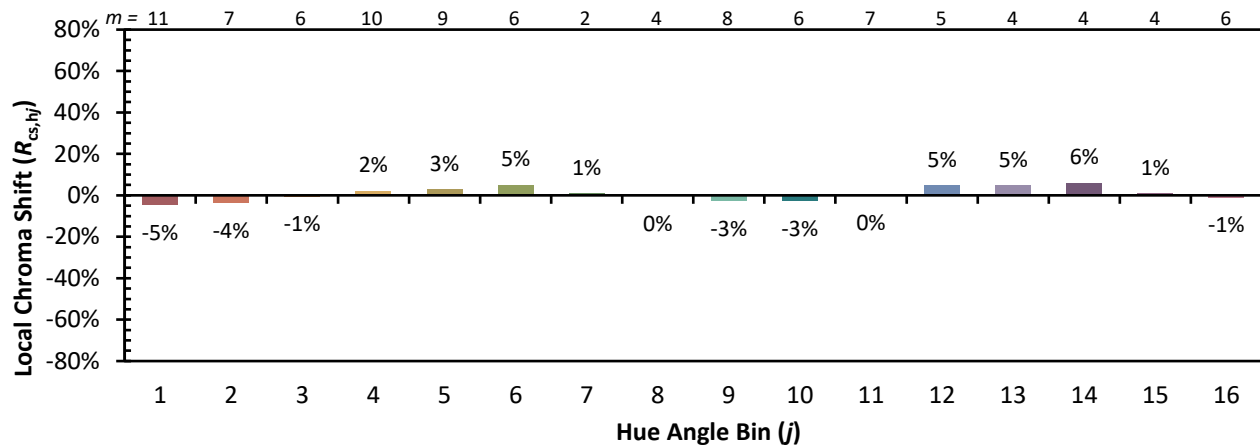
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 87 | CES51 = 97 | CES76 = 83 |
| CES02 = 63 | CES27 = 96 | CES52 = 95 | CES77 = 89 |
| CES03 = 32 | CES28 = 94 | CES53 = 92 | CES78 = 82 |
| CES04 = 70 | CES29 = 87 | CES54 = 97 | CES79 = 94 |
| CES05 = 51 | CES30 = 95 | CES55 = 96 | CES80 = 92 |
| CES06 = 51 | CES31 = 88 | CES56 = 93 | CES81 = 86 |
| CES07 = 43 | CES32 = 83 | CES57 = 93 | CES82 = 96 |
| CES08 = 42 | CES33 = 90 | CES58 = 94 | CES83 = 95 |
| CES09 = 29 | CES34 = 89 | CES59 = 97 | CES84 = 95 |
| CES10 = 76 | CES35 = 94 | CES60 = 96 | CES85 = 85 |
| CES11 = 59 | CES36 = 90 | CES61 = 94 | CES86 = 85 |
| CES12 = 65 | CES37 = 92 | CES62 = 95 | CES87 = 90 |
| CES13 = 44 | CES38 = 99 | CES63 = 92 | CES88 = 95 |
| CES14 = 74 | CES39 = 98 | CES64 = 91 | CES89 = 85 |
| CES15 = 72 | CES40 = 95 | CES65 = 89 | CES90 = 95 |
| CES16 = 48 | CES41 = 96 | CES66 = 89 | CES91 = 83 |
| CES17 = 50 | CES42 = 91 | CES67 = 88 | CES92 = 82 |
| CES18 = 57 | CES43 = 87 | CES68 = 88 | CES93 = 89 |
| CES19 = 72 | CES44 = 99 | CES69 = 90 | CES94 = 80 |
| CES20 = 67 | CES45 = 92 | CES70 = 85 | CES95 = 85 |
| CES21 = 86 | CES46 = 92 | CES71 = 84 | CES96 = 91 |
| CES22 = 79 | CES47 = 91 | CES72 = 94 | CES97 = 93 |
| CES23 = 92 | CES48 = 93 | CES73 = 80 | CES98 = 93 |
| CES24 = 91 | CES49 = 90 | CES74 = 94 | CES99 = 91 |
| CES25 = 72 | CES50 = 96 | CES75 = 84 |            |



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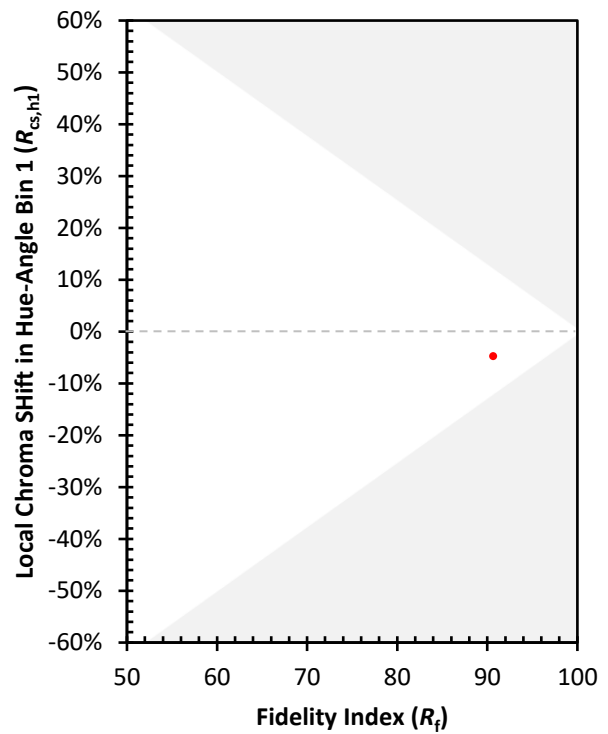
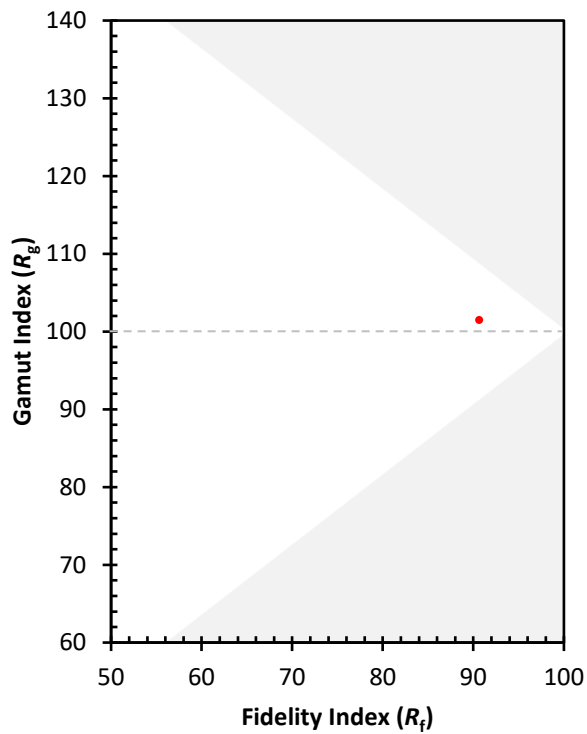
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)