

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: FAIL-SAFE

Report Number: P735652

Luminaire Tested: **22APR-22-B2750-W2D-CP125-5000K**

Issue Date: 1/5/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P735652  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (P708781)  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 1/5/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: FAIL-SAFE  
Catalog Number: 22APR-22-B2750-W2D-CP125-5000K  
Description: 2X2 2200 AMBIENT LUMEN OUTPUT APR TROFFER WITH BIO UP LEDS AT 5000K CCT, AND CP125 LENS

Light Source: -  
Ballast/Driver: -

**Summary**

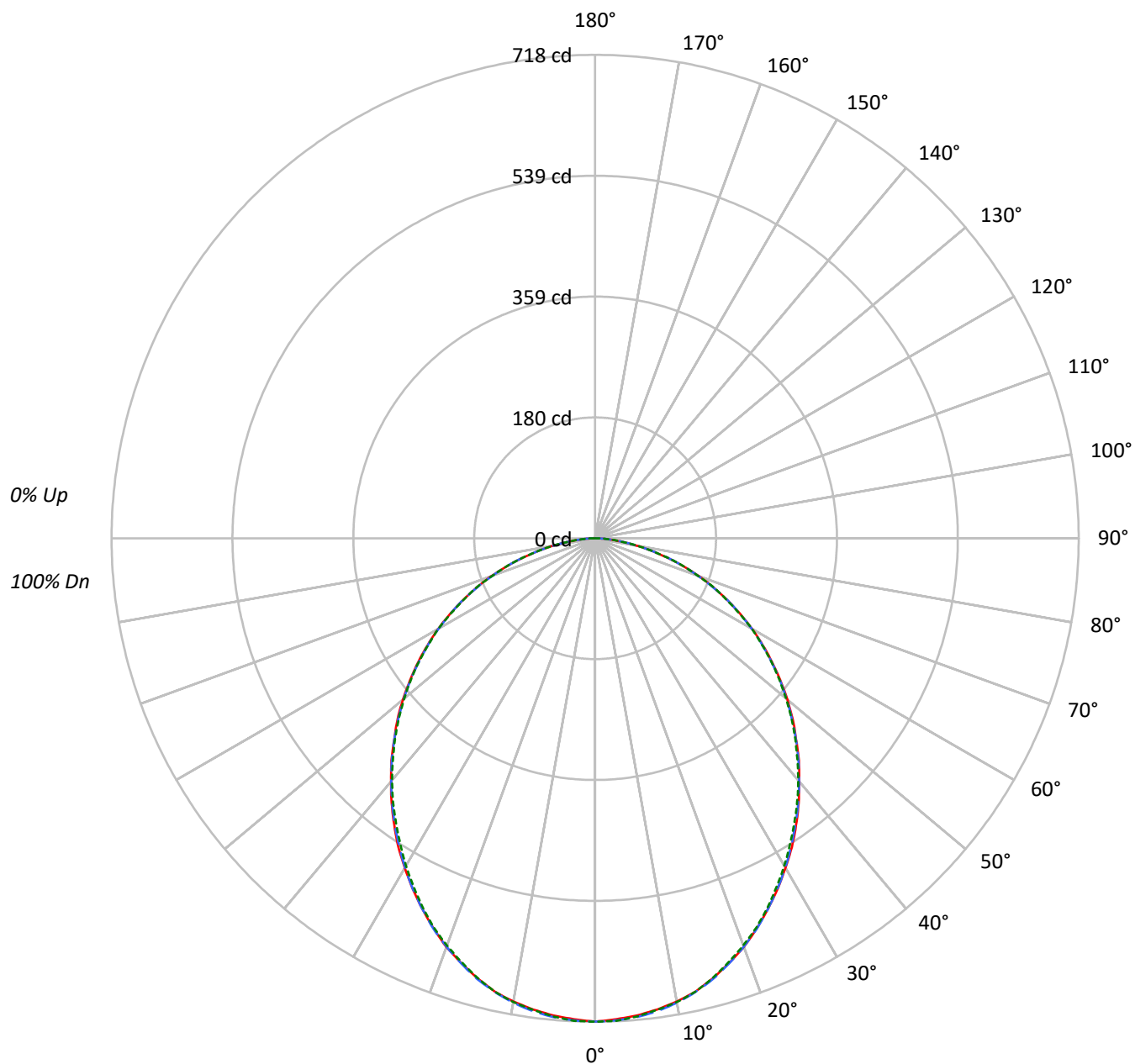
Lumens per Lamp: N/A  
Luminaire Lumens: 1834.0 lumens  
Efficiency: N/A  
Efficacy: 79.7 lumens/watt  
Spacing Criteria (0/90/45): 1.18 / 1.17 / 1.29  
Luminous Opening: Rectangular (W 2' x L: 2' x H: 0')  
CIE Type: Direct

Input Watts (W): 23  
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: P735652

CATALOG NUMBER: 22APR-22-B2750-W2D-CP125-5000K

### Luminous Intensity Polar Plot





TEST NUMBER: P735652

CATALOG NUMBER: 22APR-22-B2750-W2D-CP125-5000K

**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 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |    |    |
| 1   | 109 | 104 | 100 | 96  | 106 | 102 | 98  | 95  | 98  | 95  | 92  | 94  | 91  | 89  | 90  | 88  | 86  | 84  |    |    |
| 2   | 99  | 91  | 85  | 79  | 97  | 89  | 83  | 78  | 86  | 81  | 76  | 83  | 78  | 74  | 80  | 76  | 73  | 71  |    |    |
| 3   | 91  | 80  | 72  | 66  | 88  | 79  | 71  | 65  | 76  | 69  | 64  | 73  | 68  | 63  | 71  | 66  | 62  | 60  |    |    |
| 4   | 83  | 71  | 63  | 56  | 81  | 70  | 62  | 56  | 68  | 61  | 55  | 65  | 59  | 54  | 63  | 58  | 53  | 51  |    |    |
| 5   | 77  | 64  | 55  | 49  | 75  | 63  | 54  | 48  | 61  | 53  | 48  | 59  | 52  | 47  | 57  | 51  | 47  | 45  |    |    |
| 6   | 71  | 58  | 49  | 43  | 69  | 57  | 48  | 42  | 55  | 47  | 42  | 53  | 47  | 42  | 52  | 46  | 41  | 39  |    |    |
| 7   | 66  | 52  | 44  | 38  | 64  | 52  | 43  | 38  | 50  | 43  | 37  | 49  | 42  | 37  | 47  | 41  | 37  | 35  |    |    |
| 8   | 61  | 48  | 39  | 34  | 60  | 47  | 39  | 34  | 46  | 39  | 33  | 45  | 38  | 33  | 43  | 37  | 33  | 31  |    |    |
| 9   | 57  | 44  | 36  | 30  | 56  | 43  | 36  | 30  | 42  | 35  | 30  | 41  | 35  | 30  | 40  | 34  | 30  | 28  |    |    |
| 10  | 54  | 41  | 33  | 28  | 53  | 40  | 33  | 28  | 39  | 32  | 27  | 38  | 32  | 27  | 37  | 31  | 27  | 25  |    |    |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 1932 | 1932 | 1932 |
| 5°  | 1922 | 1928 | 1926 |
| 10° | 1909 | 1914 | 1911 |
| 15° | 1884 | 1888 | 1882 |
| 20° | 1850 | 1849 | 1843 |
| 25° | 1803 | 1803 | 1797 |
| 30° | 1756 | 1755 | 1745 |
| 35° | 1709 | 1704 | 1694 |
| 40° | 1656 | 1655 | 1648 |
| 45° | 1606 | 1604 | 1598 |
| 50° | 1559 | 1552 | 1549 |
| 55° | 1505 | 1498 | 1498 |
| 60° | 1449 | 1443 | 1446 |
| 65° | 1373 | 1377 | 1367 |
| 70° | 1283 | 1275 | 1275 |
| 75° | 1145 | 1150 | 1150 |
| 80° | 967  | 967  | 976  |
| 85° | 735  | 735  | 750  |



TEST NUMBER: P735652

CATALOG NUMBER: 22APR-22-B2750-W2D-CP125-5000K

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 67.7   | 3.7       |
| 10°-20°   | 190.7  | 10.4      |
| 20°-30°   | 279.7  | 15.2      |
| 30°-40°   | 324.5  | 17.7      |
| 40°-50°   | 325.3  | 17.7      |
| 50°-60°   | 286.1  | 15.6      |
| 60°-70°   | 213.5  | 11.6      |
| 70°-80°   | 117.5  | 6.4       |
| 80°-90°   | 29.1   | 1.6       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| <hr/>     |        |           |
| 0°-30°    | 538.1  | 29.3      |
| 0°-40°    | 862.6  | 47.0      |
| 0°-60°    | 1474.0 | 80.4      |
| 0°-90°    | 1834.0 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 1834.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|-----|-----|-------|-----|-------|-----|------|
| 0°  | 718 | 718   | 718 | 718   | 718 |      |
| 5°  | 711 | 714   | 714 | 714   | 713 | 68   |
| 15° | 676 | 679   | 678 | 677   | 676 | 191  |
| 25° | 607 | 610   | 607 | 607   | 605 | 280  |
| 35° | 520 | 521   | 519 | 517   | 516 | 325  |
| 45° | 422 | 423   | 421 | 421   | 420 | 326  |
| 55° | 321 | 321   | 319 | 320   | 319 | 287  |
| 65° | 216 | 216   | 216 | 215   | 215 | 214  |
| 75° | 110 | 111   | 111 | 110   | 111 | 117  |
| 85° | 24  | 24    | 24  | 24    | 24  | 29   |
| 90° | 0   | 0     | 0   | 0     | 0   |      |



TEST NUMBER: P735652

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|-------|-------|-------|-------|-------|-------|
| 0°    | 717.9 | 717.9 | 717.9 | 717.9 | 717.9 |
| 2.5°  | 714.9 | 717.3 | 716.8 | 718.4 | 717.3 |
| 5°    | 711.4 | 713.9 | 713.9 | 713.9 | 712.9 |
| 7.5°  | 705.9 | 708.4 | 708.4 | 708.4 | 706.5 |
| 10°   | 698.6 | 701.1 | 700.5 | 700.5 | 699.5 |
| 12.5° | 689.6 | 691.1 | 690.1 | 690.1 | 689.6 |
| 15°   | 676.3 | 679.2 | 677.7 | 676.7 | 675.7 |
| 17.5° | 661.3 | 664.3 | 661.9 | 661.3 | 659.9 |
| 20°   | 646.0 | 648.0 | 645.5 | 645.5 | 643.5 |
| 22.5° | 627.1 | 629.1 | 627.6 | 626.7 | 625.7 |
| 25°   | 607.3 | 609.8 | 607.3 | 606.8 | 605.3 |
| 27.5° | 587.0 | 588.9 | 586.5 | 584.5 | 583.5 |
| 30°   | 565.2 | 566.6 | 564.7 | 563.2 | 561.7 |
| 32.5° | 543.8 | 543.8 | 541.9 | 540.4 | 538.4 |
| 35°   | 520.1 | 520.6 | 518.6 | 517.1 | 515.6 |
| 37.5° | 496.3 | 497.2 | 495.3 | 493.8 | 492.8 |
| 40°   | 471.5 | 472.5 | 471.0 | 469.5 | 469.0 |
| 42.5° | 447.7 | 447.7 | 446.7 | 445.2 | 444.2 |
| 45°   | 421.9 | 423.4 | 421.4 | 420.9 | 419.9 |
| 47.5° | 398.1 | 398.1 | 396.1 | 395.1 | 395.1 |
| 50°   | 372.4 | 373.3 | 370.8 | 370.3 | 369.9 |
| 52.5° | 346.5 | 346.0 | 345.5 | 345.1 | 344.6 |
| 55°   | 320.7 | 321.2 | 319.3 | 319.8 | 319.3 |
| 57.5° | 295.0 | 294.5 | 294.0 | 293.5 | 293.0 |
| 60°   | 269.2 | 268.7 | 268.2 | 267.7 | 268.7 |
| 62.5° | 242.4 | 242.9 | 241.5 | 242.9 | 240.9 |
| 65°   | 215.6 | 215.6 | 216.2 | 215.1 | 214.7 |
| 67.5° | 189.9 | 189.9 | 188.9 | 188.9 | 190.9 |
| 70°   | 163.1 | 163.6 | 162.1 | 164.1 | 162.1 |
| 72.5° | 136.8 | 137.3 | 136.8 | 136.3 | 137.3 |
| 75°   | 110.1 | 110.6 | 110.6 | 109.5 | 110.6 |
| 77.5° | 85.8  | 86.3  | 85.8  | 85.3  | 85.8  |
| 80°   | 62.4  | 63.0  | 62.4  | 61.9  | 63.0  |
| 82.5° | 41.6  | 42.1  | 41.6  | 41.6  | 42.1  |
| 85°   | 23.8  | 24.3  | 23.8  | 23.8  | 24.3  |
| 87.5° | 9.4   | 10.0  | 10.0  | 10.0  | 10.0  |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



Report Generated By 670246072 / DESKTOP-50001EG







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







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

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

METALUX

Report Number: SP1-2210-795-5

Test Date: 10/06/2022

Luminaire Tested: 9WP217084MDER4AM-5000K-315MA

Data in this report applies to families of products including 9WP217084MDER4AM-5000K.

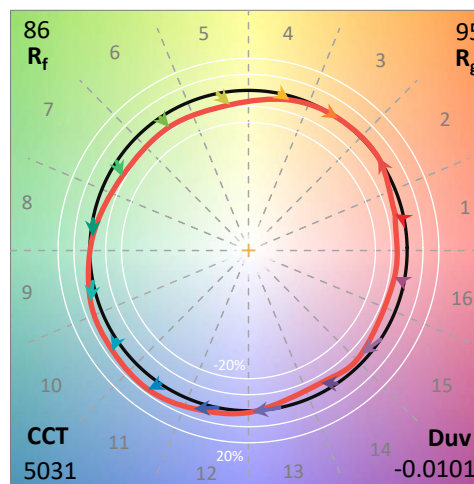
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2210-795-5  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/06/2022  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: METALUX  
 Catalog Number: **9WP217084MDER4AM-5000K-315MA**  
 Description: METALUX

TUNABLE BOARD, 5000K-315MA, PROGRAMMED @ 6.5Vdc.

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 5031    | CRI (Ra): | 84.5 |      |      |
| CIE u':                   | 0.2182  | R1:       | 91.8 | R9:  | 77.5 |
| CIE v':                   | 0.4734  | R2:       | 85.4 | R10: | 70.0 |
| Duv:                      | -0.0101 | R3:       | 79.8 | R11: | 87.5 |
| CIE x:                    | 0.3424  | R4:       | 86.6 | R12: | 69.3 |
| CIE y:                    | 0.3302  | R5:       | 89.4 | R13: | 89.5 |
| CIE z:                    | 0.3273  | R6:       | 79.4 | R14: | 89.8 |
| Peak Wavelength (nm):     | 476     | R7:       | 81.5 |      |      |
| Dominant Wavelength (nm): | 495     | R8:       | 82.5 |      |      |
| Purity:                   | 3.1     |           |      |      |      |
| Rf:                       | 85.9    |           |      |      |      |
| Rg:                       | 94.8    |           |      |      |      |



### Test Conditions

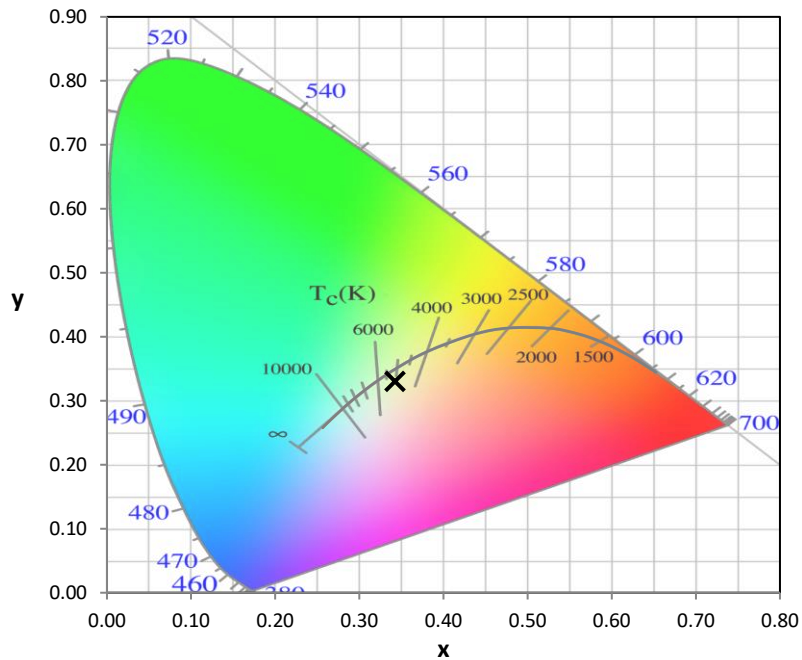
Stabilization Time: 58M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.0/38%  
 Sphere Temperature (°C): 24.4

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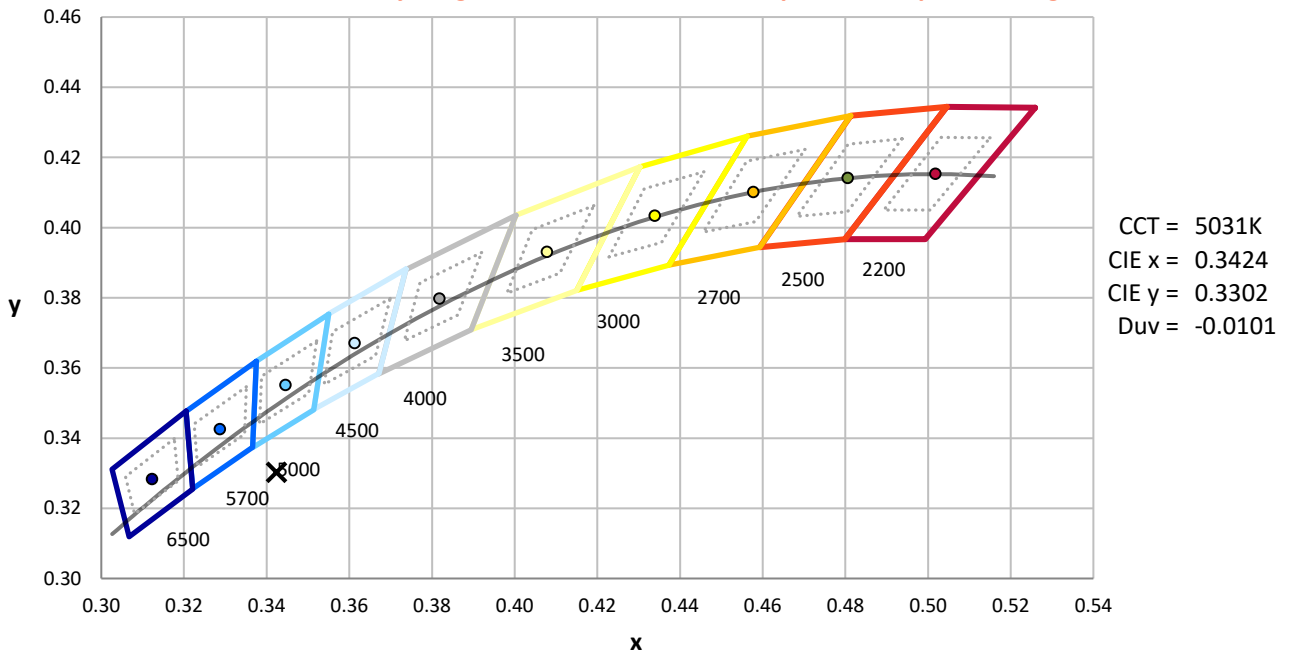
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 8/8/2022         | 2/8/2023             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2021       | 11/29/2022           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/29/2021       | 11/29/2022           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/29/2021       | 11/29/2022           |
| Sphere Thermometer             | ONSET IN0085          | 11/29/2021       | 11/29/2022           |
| Room Thermometer               | ONSET IN0046          | 11/29/2021       | 11/29/2022           |

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**CIE 1931 Chromaticity Diagram**



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

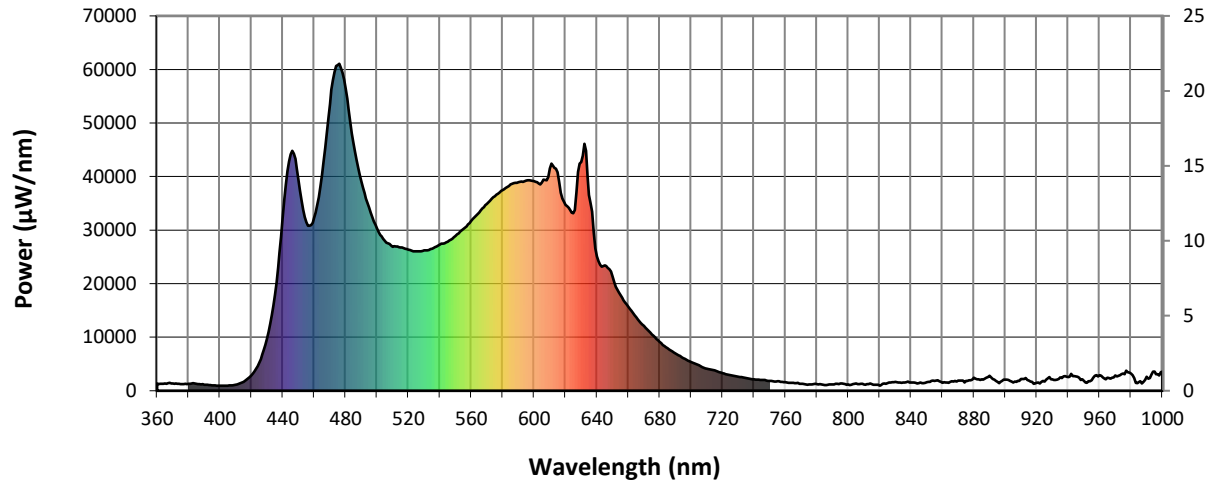


Point lies outside the range



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**Photopic Flux vs. Wavelength**

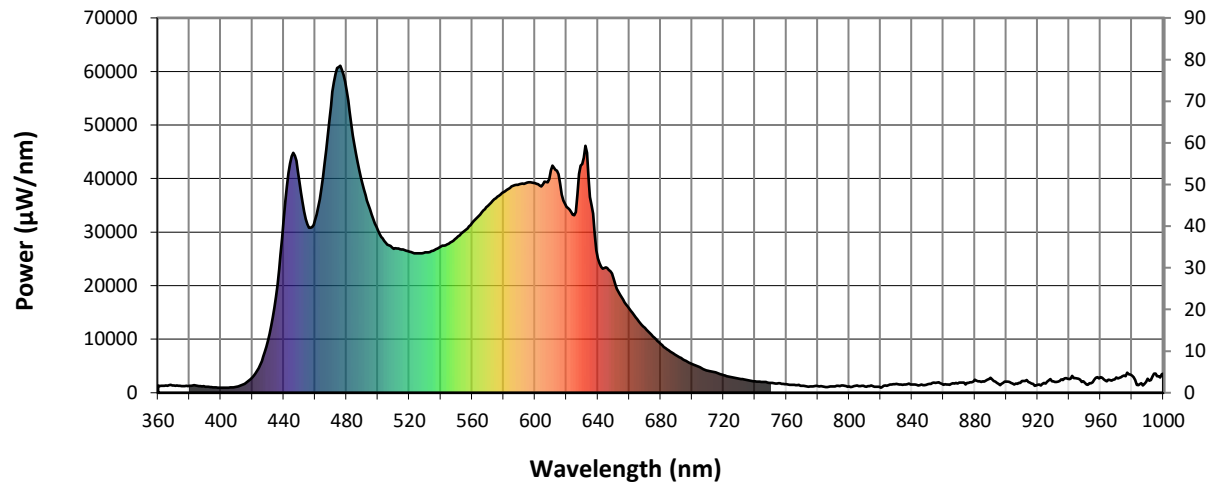


#####

| 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       | 1378             | NR               | 490       | 39050            | NR               | 620       | 34698            | NR               | 750       | 1822             | NR               | 880       | 2439             | NR               |
| 365       | 1331             | NR               | 495       | 34202            | NR               | 625       | 33140            | NR               | 755       | 1777             | NR               | 885       | 2149             | NR               |
| 370       | 1335             | NR               | 500       | 30309            | NR               | 630       | 42721            | NR               | 760       | 1599             | NR               | 890       | 2769             | NR               |
| 375       | 1253             | NR               | 505       | 28003            | NR               | 635       | 36567            | NR               | 765       | 1448             | NR               | 895       | 1685             | NR               |
| 380       | 1292             | NR               | 510       | 26874            | NR               | 640       | 25112            | NR               | 770       | 1318             | NR               | 900       | 2065             | NR               |
| 385       | 1298             | NR               | 515       | 26736            | NR               | 645       | 23382            | NR               | 775       | 1208             | NR               | 905       | 1550             | NR               |
| 390       | 1143             | NR               | 520       | 26353            | NR               | 650       | 21346            | NR               | 780       | 1268             | NR               | 910       | 2207             | NR               |
| 395       | 1012             | NR               | 525       | 26016            | NR               | 655       | 17849            | NR               | 785       | 1072             | NR               | 915       | 1905             | NR               |
| 400       | 913              | NR               | 530       | 26219            | NR               | 660       | 15701            | NR               | 790       | 1151             | NR               | 920       | 1492             | NR               |
| 405       | 948              | NR               | 535       | 26516            | NR               | 665       | 13709            | NR               | 795       | 1361             | NR               | 925       | 1709             | NR               |
| 410       | 1112             | NR               | 540       | 27283            | NR               | 670       | 12105            | NR               | 800       | 1152             | NR               | 930       | 2138             | NR               |
| 415       | 1681             | NR               | 545       | 27836            | NR               | 675       | 10522            | NR               | 805       | 1330             | NR               | 935       | 2497             | NR               |
| 420       | 2833             | NR               | 550       | 28917            | NR               | 680       | 9121             | NR               | 810       | 1205             | NR               | 940       | 2581             | NR               |
| 425       | 5230             | NR               | 555       | 30224            | NR               | 685       | 7915             | NR               | 815       | 1233             | NR               | 945       | 2662             | NR               |
| 430       | 9705             | NR               | 560       | 31691            | NR               | 690       | 6967             | NR               | 820       | 960              | NR               | 950       | 1809             | NR               |
| 435       | 17926            | NR               | 565       | 33290            | NR               | 695       | 6106             | NR               | 825       | 1423             | NR               | 955       | 1977             | NR               |
| 440       | 32347            | NR               | 570       | 34911            | NR               | 700       | 5390             | NR               | 830       | 1655             | NR               | 960       | 2906             | NR               |
| 445       | 44160            | NR               | 575       | 36327            | NR               | 705       | 4734             | NR               | 835       | 1541             | NR               | 965       | 2456             | NR               |
| 450       | 39460            | NR               | 580       | 37455            | NR               | 710       | 4108             | NR               | 840       | 1555             | NR               | 970       | 2874             | NR               |
| 455       | 31448            | NR               | 585       | 38519            | NR               | 715       | 3797             | NR               | 845       | 1414             | NR               | 975       | 3194             | NR               |
| 460       | 32233            | NR               | 590       | 38974            | NR               | 720       | 3287             | NR               | 850       | 1598             | NR               | 980       | 3237             | NR               |
| 465       | 40342            | NR               | 595       | 39274            | NR               | 725       | 2926             | NR               | 855       | 1852             | NR               | 985       | 1591             | NR               |
| 470       | 53556            | NR               | 600       | 39138            | NR               | 730       | 2611             | NR               | 860       | 1463             | NR               | 990       | 2611             | NR               |
| 475       | 60829            | NR               | 605       | 38865            | NR               | 735       | 2376             | NR               | 865       | 1656             | NR               | 995       | 3556             | NR               |
| 480       | 56377            | NR               | 610       | 41532            | NR               | 740       | 2107             | NR               | 870       | 1883             | NR               | 1000      | 3556             | NR               |
| 485       | 46320            | NR               | 615       | 40776            | NR               | 745       | 2023             | NR               | 875       | 1818             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2210-795-5

**Scotopic Flux vs. Wavelength**



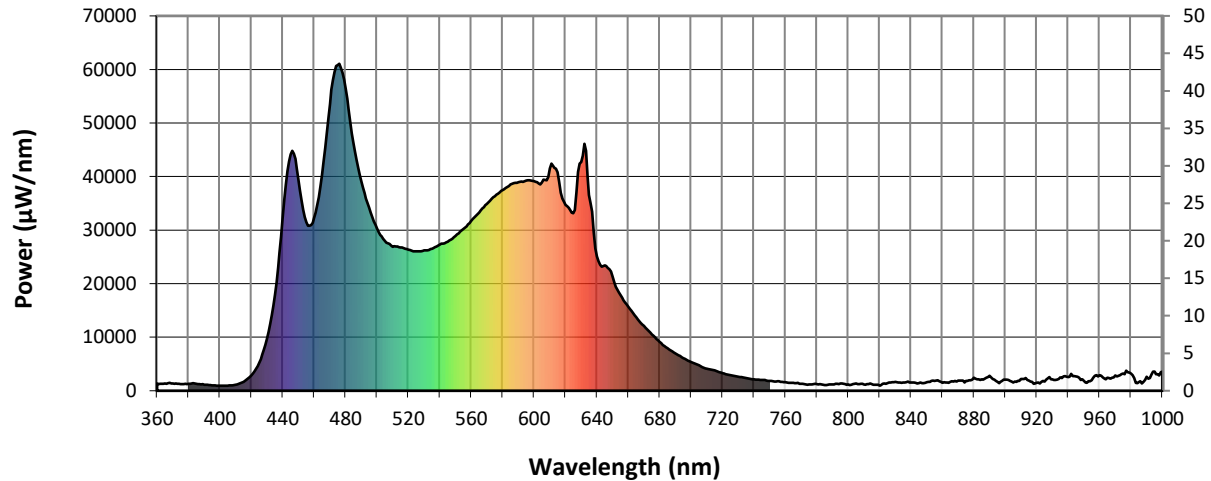
**Scotopic Lumens: 5560**

**S/P: 2.33**

| 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       | 1378             | NR               | 490       | 39050            | NR               | 620       | 34698            | NR               | 750       | 1822             | NR               | 880       | 2439             | NR               |
| 365       | 1331             | NR               | 495       | 34202            | NR               | 625       | 33140            | NR               | 755       | 1777             | NR               | 885       | 2149             | NR               |
| 370       | 1335             | NR               | 500       | 30309            | NR               | 630       | 42721            | NR               | 760       | 1599             | NR               | 890       | 2769             | NR               |
| 375       | 1253             | NR               | 505       | 28003            | NR               | 635       | 36567            | NR               | 765       | 1448             | NR               | 895       | 1685             | NR               |
| 380       | 1292             | NR               | 510       | 26874            | NR               | 640       | 25112            | NR               | 770       | 1318             | NR               | 900       | 2065             | NR               |
| 385       | 1298             | NR               | 515       | 26736            | NR               | 645       | 23382            | NR               | 775       | 1208             | NR               | 905       | 1550             | NR               |
| 390       | 1143             | NR               | 520       | 26353            | NR               | 650       | 21346            | NR               | 780       | 1268             | NR               | 910       | 2207             | NR               |
| 395       | 1012             | NR               | 525       | 26016            | NR               | 655       | 17849            | NR               | 785       | 1072             | NR               | 915       | 1905             | NR               |
| 400       | 913              | NR               | 530       | 26219            | NR               | 660       | 15701            | NR               | 790       | 1151             | NR               | 920       | 1492             | NR               |
| 405       | 948              | NR               | 535       | 26516            | NR               | 665       | 13709            | NR               | 795       | 1361             | NR               | 925       | 1709             | NR               |
| 410       | 1112             | NR               | 540       | 27283            | NR               | 670       | 12105            | NR               | 800       | 1152             | NR               | 930       | 2138             | NR               |
| 415       | 1681             | NR               | 545       | 27836            | NR               | 675       | 10522            | NR               | 805       | 1330             | NR               | 935       | 2497             | NR               |
| 420       | 2833             | NR               | 550       | 28917            | NR               | 680       | 9121             | NR               | 810       | 1205             | NR               | 940       | 2581             | NR               |
| 425       | 5230             | NR               | 555       | 30224            | NR               | 685       | 7915             | NR               | 815       | 1233             | NR               | 945       | 2662             | NR               |
| 430       | 9705             | NR               | 560       | 31691            | NR               | 690       | 6967             | NR               | 820       | 960              | NR               | 950       | 1809             | NR               |
| 435       | 17926            | NR               | 565       | 33290            | NR               | 695       | 6106             | NR               | 825       | 1423             | NR               | 955       | 1977             | NR               |
| 440       | 32347            | NR               | 570       | 34911            | NR               | 700       | 5390             | NR               | 830       | 1655             | NR               | 960       | 2906             | NR               |
| 445       | 44160            | NR               | 575       | 36327            | NR               | 705       | 4734             | NR               | 835       | 1541             | NR               | 965       | 2456             | NR               |
| 450       | 39460            | NR               | 580       | 37455            | NR               | 710       | 4108             | NR               | 840       | 1555             | NR               | 970       | 2874             | NR               |
| 455       | 31448            | NR               | 585       | 38519            | NR               | 715       | 3797             | NR               | 845       | 1414             | NR               | 975       | 3194             | NR               |
| 460       | 32233            | NR               | 590       | 38974            | NR               | 720       | 3287             | NR               | 850       | 1598             | NR               | 980       | 3237             | NR               |
| 465       | 40342            | NR               | 595       | 39274            | NR               | 725       | 2926             | NR               | 855       | 1852             | NR               | 985       | 1591             | NR               |
| 470       | 53556            | NR               | 600       | 39138            | NR               | 730       | 2611             | NR               | 860       | 1463             | NR               | 990       | 2611             | NR               |
| 475       | 60829            | NR               | 605       | 38865            | NR               | 735       | 2376             | NR               | 865       | 1656             | NR               | 995       | 3556             | NR               |
| 480       | 56377            | NR               | 610       | 41532            | NR               | 740       | 2107             | NR               | 870       | 1883             | NR               | 1000      | 3556             | NR               |
| 485       | 46320            | NR               | 615       | 40776            | NR               | 745       | 2023             | NR               | 875       | 1818             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 2561.9 S/P: 1.07**

| 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       | 1378             | NR               | 490       | 39050            | NR               | 620       | 34698            | NR               | 750       | 1822             | NR               | 880       | 2439             | NR               |
| 365       | 1331             | NR               | 495       | 34202            | NR               | 625       | 33140            | NR               | 755       | 1777             | NR               | 885       | 2149             | NR               |
| 370       | 1335             | NR               | 500       | 30309            | NR               | 630       | 42721            | NR               | 760       | 1599             | NR               | 890       | 2769             | NR               |
| 375       | 1253             | NR               | 505       | 28003            | NR               | 635       | 36567            | NR               | 765       | 1448             | NR               | 895       | 1685             | NR               |
| 380       | 1292             | NR               | 510       | 26874            | NR               | 640       | 25112            | NR               | 770       | 1318             | NR               | 900       | 2065             | NR               |
| 385       | 1298             | NR               | 515       | 26736            | NR               | 645       | 23382            | NR               | 775       | 1208             | NR               | 905       | 1550             | NR               |
| 390       | 1143             | NR               | 520       | 26353            | NR               | 650       | 21346            | NR               | 780       | 1268             | NR               | 910       | 2207             | NR               |
| 395       | 1012             | NR               | 525       | 26016            | NR               | 655       | 17849            | NR               | 785       | 1072             | NR               | 915       | 1905             | NR               |
| 400       | 913              | NR               | 530       | 26219            | NR               | 660       | 15701            | NR               | 790       | 1151             | NR               | 920       | 1492             | NR               |
| 405       | 948              | NR               | 535       | 26516            | NR               | 665       | 13709            | NR               | 795       | 1361             | NR               | 925       | 1709             | NR               |
| 410       | 1112             | NR               | 540       | 27283            | NR               | 670       | 12105            | NR               | 800       | 1152             | NR               | 930       | 2138             | NR               |
| 415       | 1681             | NR               | 545       | 27836            | NR               | 675       | 10522            | NR               | 805       | 1330             | NR               | 935       | 2497             | NR               |
| 420       | 2833             | NR               | 550       | 28917            | NR               | 680       | 9121             | NR               | 810       | 1205             | NR               | 940       | 2581             | NR               |
| 425       | 5230             | NR               | 555       | 30224            | NR               | 685       | 7915             | NR               | 815       | 1233             | NR               | 945       | 2662             | NR               |
| 430       | 9705             | NR               | 560       | 31691            | NR               | 690       | 6967             | NR               | 820       | 960              | NR               | 950       | 1809             | NR               |
| 435       | 17926            | NR               | 565       | 33290            | NR               | 695       | 6106             | NR               | 825       | 1423             | NR               | 955       | 1977             | NR               |
| 440       | 32347            | NR               | 570       | 34911            | NR               | 700       | 5390             | NR               | 830       | 1655             | NR               | 960       | 2906             | NR               |
| 445       | 44160            | NR               | 575       | 36327            | NR               | 705       | 4734             | NR               | 835       | 1541             | NR               | 965       | 2456             | NR               |
| 450       | 39460            | NR               | 580       | 37455            | NR               | 710       | 4108             | NR               | 840       | 1555             | NR               | 970       | 2874             | NR               |
| 455       | 31448            | NR               | 585       | 38519            | NR               | 715       | 3797             | NR               | 845       | 1414             | NR               | 975       | 3194             | NR               |
| 460       | 32233            | NR               | 590       | 38974            | NR               | 720       | 3287             | NR               | 850       | 1598             | NR               | 980       | 3237             | NR               |
| 465       | 40342            | NR               | 595       | 39274            | NR               | 725       | 2926             | NR               | 855       | 1852             | NR               | 985       | 1591             | NR               |
| 470       | 53556            | NR               | 600       | 39138            | NR               | 730       | 2611             | NR               | 860       | 1463             | NR               | 990       | 2611             | NR               |
| 475       | 60829            | NR               | 605       | 38865            | NR               | 735       | 2376             | NR               | 865       | 1656             | NR               | 995       | 3556             | NR               |
| 480       | 56377            | NR               | 610       | 41532            | NR               | 740       | 2107             | NR               | 870       | 1883             | NR               | 1000      | 3556             | NR               |
| 485       | 46320            | NR               | 615       | 40776            | NR               | 745       | 2023             | NR               | 875       | 1818             | NR               |           |                  |                  |

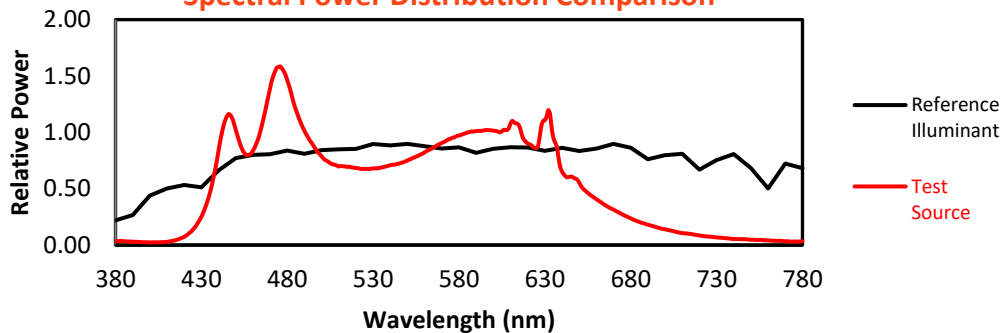
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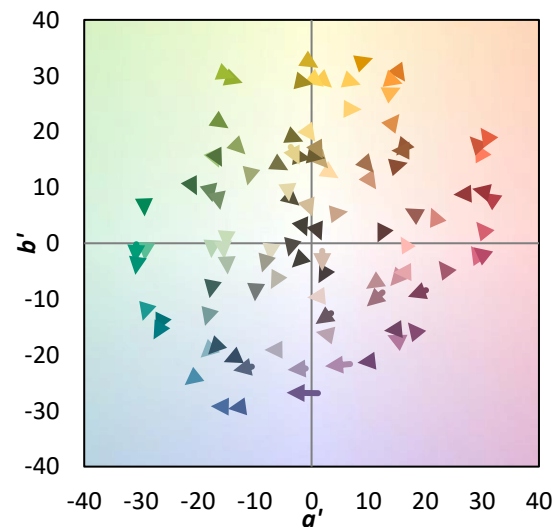
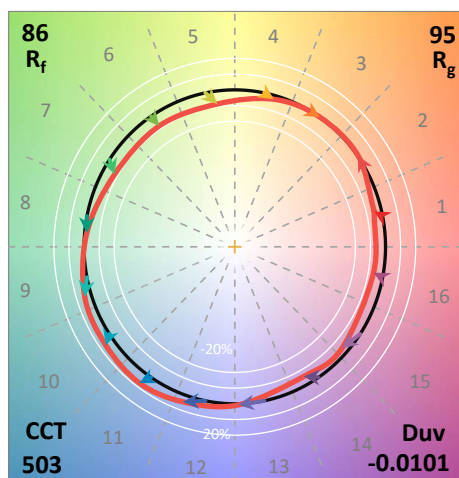
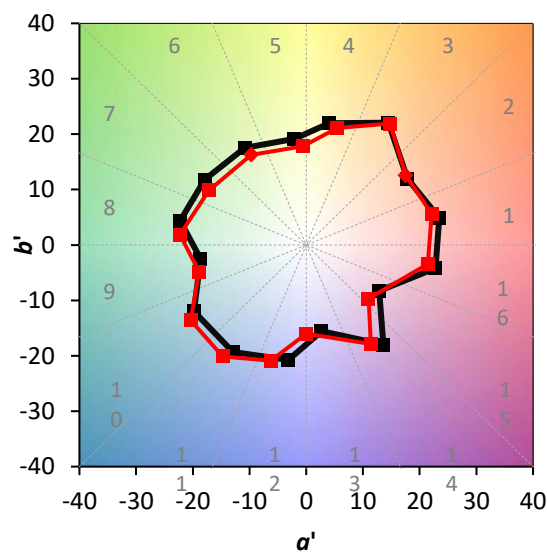
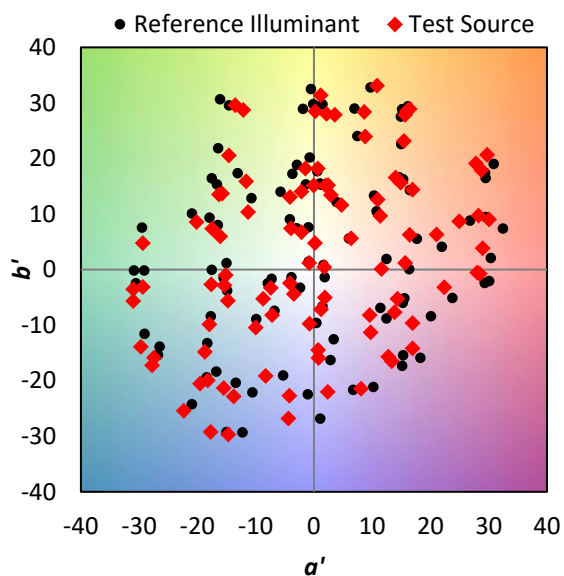
### Summary

$R_f = 85.9$   
 $R_g = 94.8$   
 CIE  $R_a = 84.5$   
 $R_g = 77.5$

### Spectral Power Distribution Comparison



### Color Vector Graphics

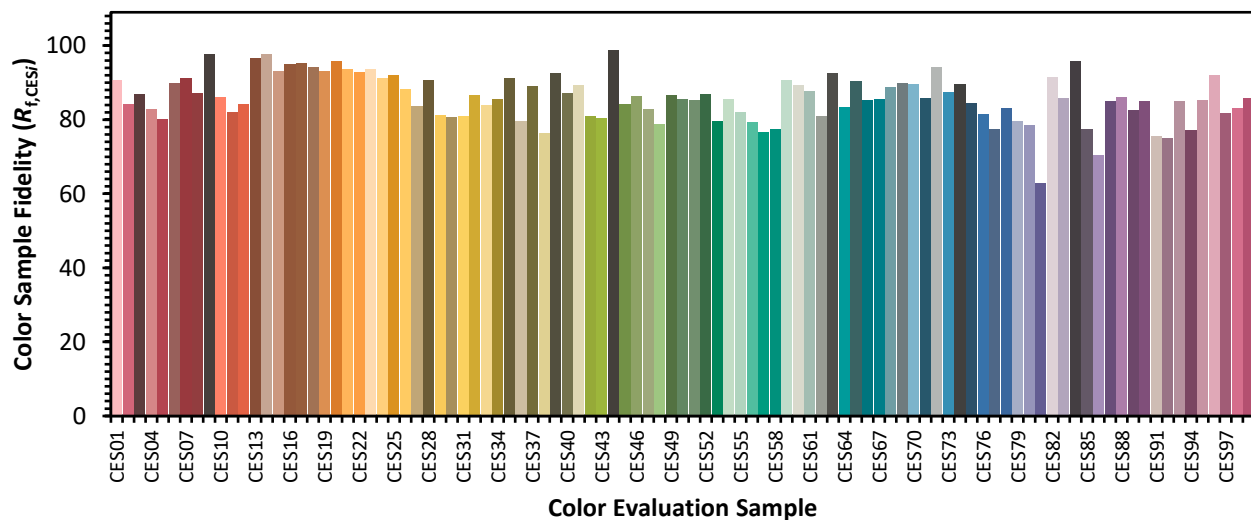


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

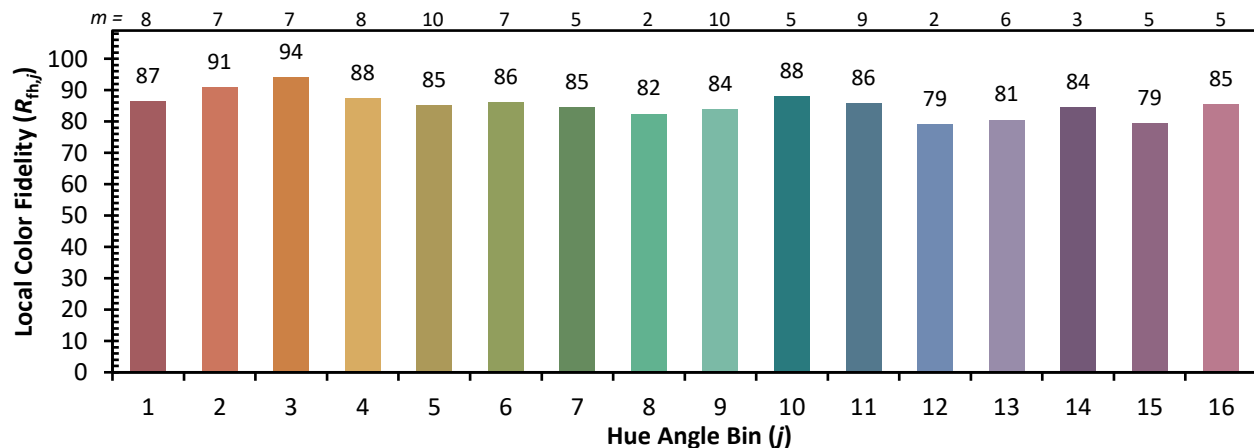
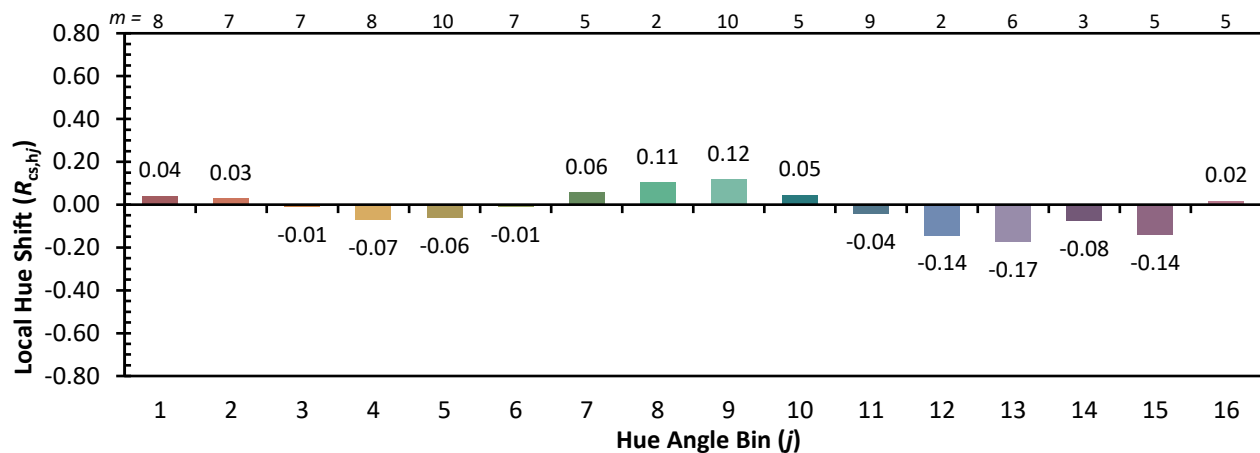
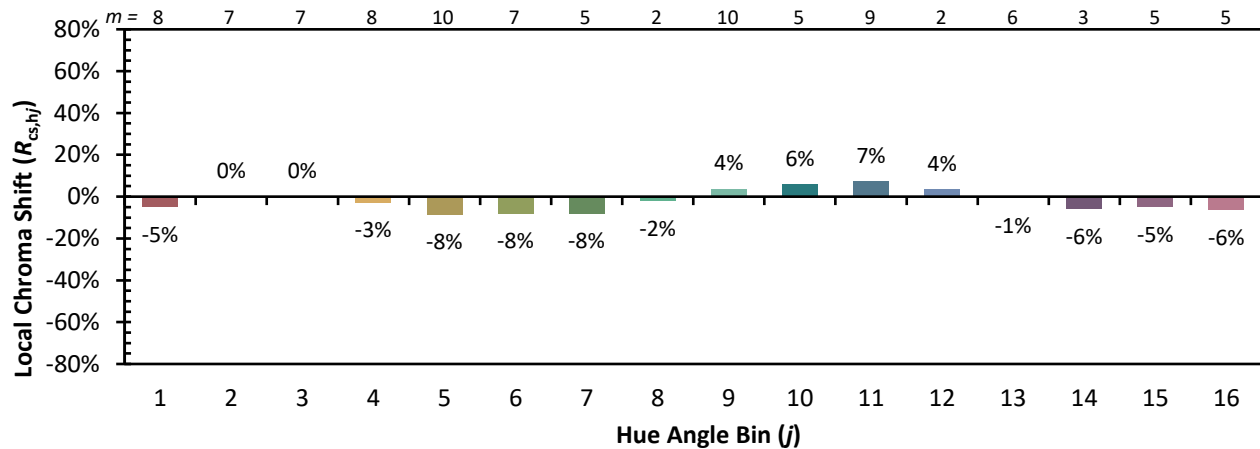
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|------------|------------|------------|------------|
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| CES02 = 61 | CES27 = 83 | CES52 = 87 | CES77 = 77 |
| CES03 = 31 | CES28 = 90 | CES53 = 79 | CES78 = 83 |
| CES04 = 69 | CES29 = 81 | CES54 = 85 | CES79 = 80 |
| CES05 = 48 | CES30 = 81 | CES55 = 82 | CES80 = 78 |
| CES06 = 50 | CES31 = 81 | CES56 = 79 | CES81 = 63 |
| CES07 = 41 | CES32 = 87 | CES57 = 77 | CES82 = 92 |
| CES08 = 40 | CES33 = 84 | CES58 = 77 | CES83 = 86 |
| CES09 = 29 | CES34 = 85 | CES59 = 91 | CES84 = 96 |
| CES10 = 74 | CES35 = 91 | CES60 = 89 | CES85 = 77 |
| CES11 = 57 | CES36 = 80 | CES61 = 87 | CES86 = 70 |
| CES12 = 63 | CES37 = 89 | CES62 = 81 | CES87 = 85 |
| CES13 = 43 | CES38 = 76 | CES63 = 92 | CES88 = 86 |
| CES14 = 74 | CES39 = 93 | CES64 = 83 | CES89 = 82 |
| CES15 = 71 | CES40 = 87 | CES65 = 90 | CES90 = 85 |
| CES16 = 47 | CES41 = 89 | CES66 = 85 | CES91 = 76 |
| CES17 = 49 | CES42 = 81 | CES67 = 86 | CES92 = 75 |
| CES18 = 56 | CES43 = 80 | CES68 = 89 | CES93 = 85 |
| CES19 = 71 | CES44 = 99 | CES69 = 90 | CES94 = 77 |
| CES20 = 66 | CES45 = 84 | CES70 = 89 | CES95 = 85 |
| CES21 = 85 | CES46 = 86 | CES71 = 86 | CES96 = 92 |
| CES22 = 77 | CES47 = 83 | CES72 = 94 | CES97 = 82 |
| CES23 = 91 | CES48 = 79 | CES73 = 87 | CES98 = 83 |
| CES24 = 89 | CES49 = 87 | CES74 = 89 | CES99 = 86 |
| CES25 = 70 | CES50 = 85 | CES75 = 84 |            |



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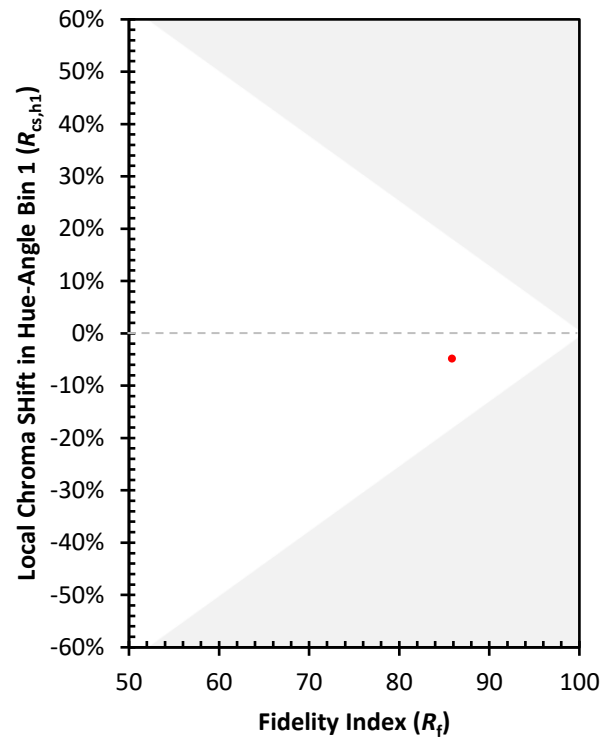
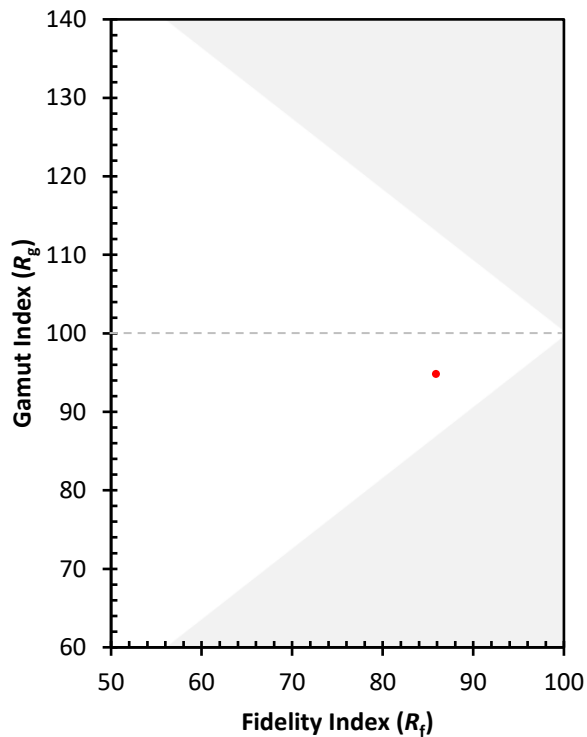
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



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