

Signify Classified - Internal  
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: INVUE

Report Number: P672907

Luminaire Tested: **CCP-SA1A-850-U-RW**

Issue Date: 04/16/2023



**Test Information**

Test Method: LM-79-08  
Report Number: P672907  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA1A-850-U-RW  
Description: INVUE CLEAR CURVE POLE MOUNT LIGHT SQUARE LUMINAIRE @350mA w/ RW  
distribution lens  
Light Source: (16) 5000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 2428.4 lumens  
Efficiency: N/A  
Efficacy: 134.9 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type II - Medium  
BUG Rating: B1 - U0 - G1

Input Watts (W): 18  
Input Voltage (V): 120  
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

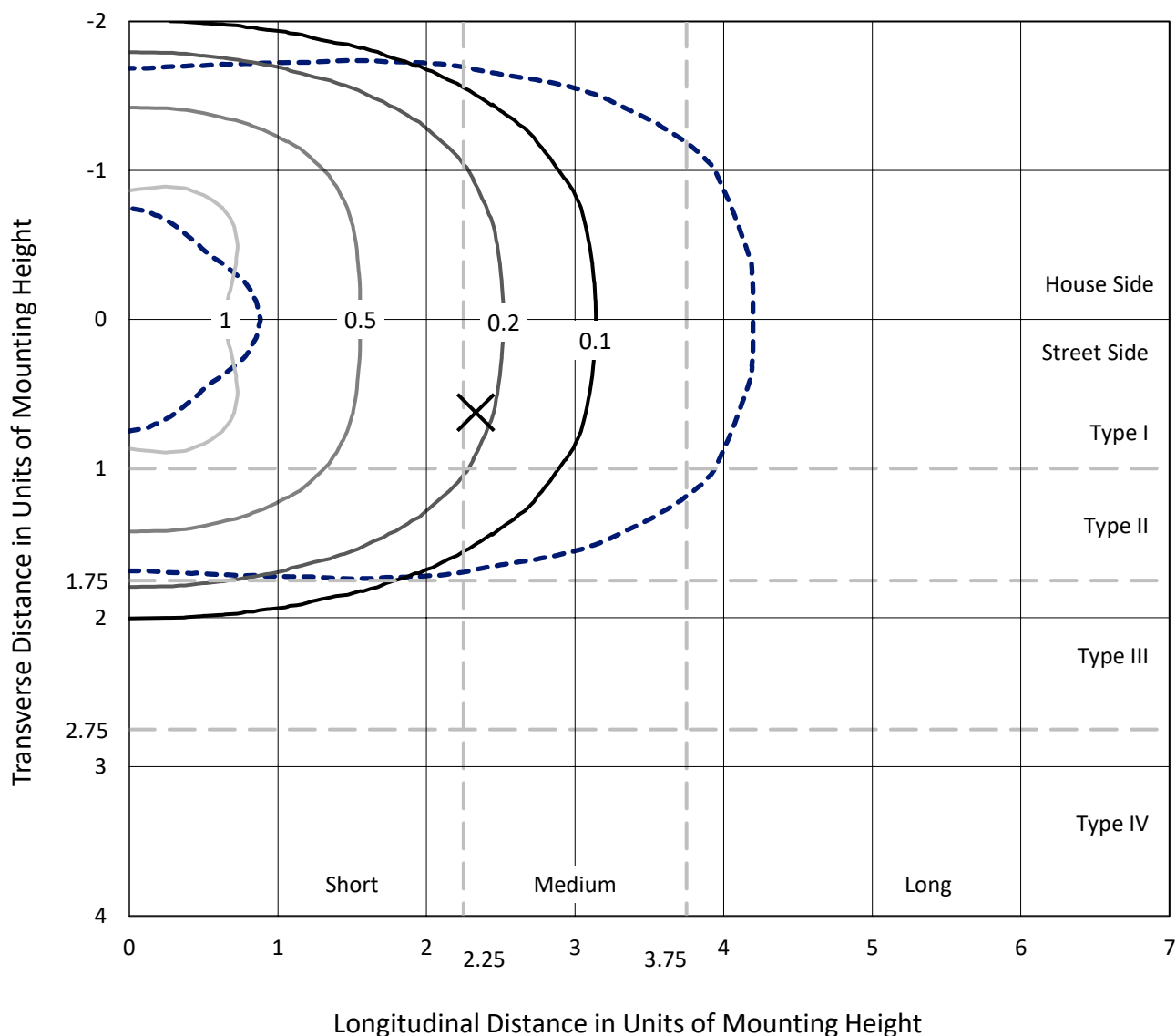
REPORT NUMBER: P672907

CATALOG NUMBER: CCP-SA1A-850-U-RW

## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

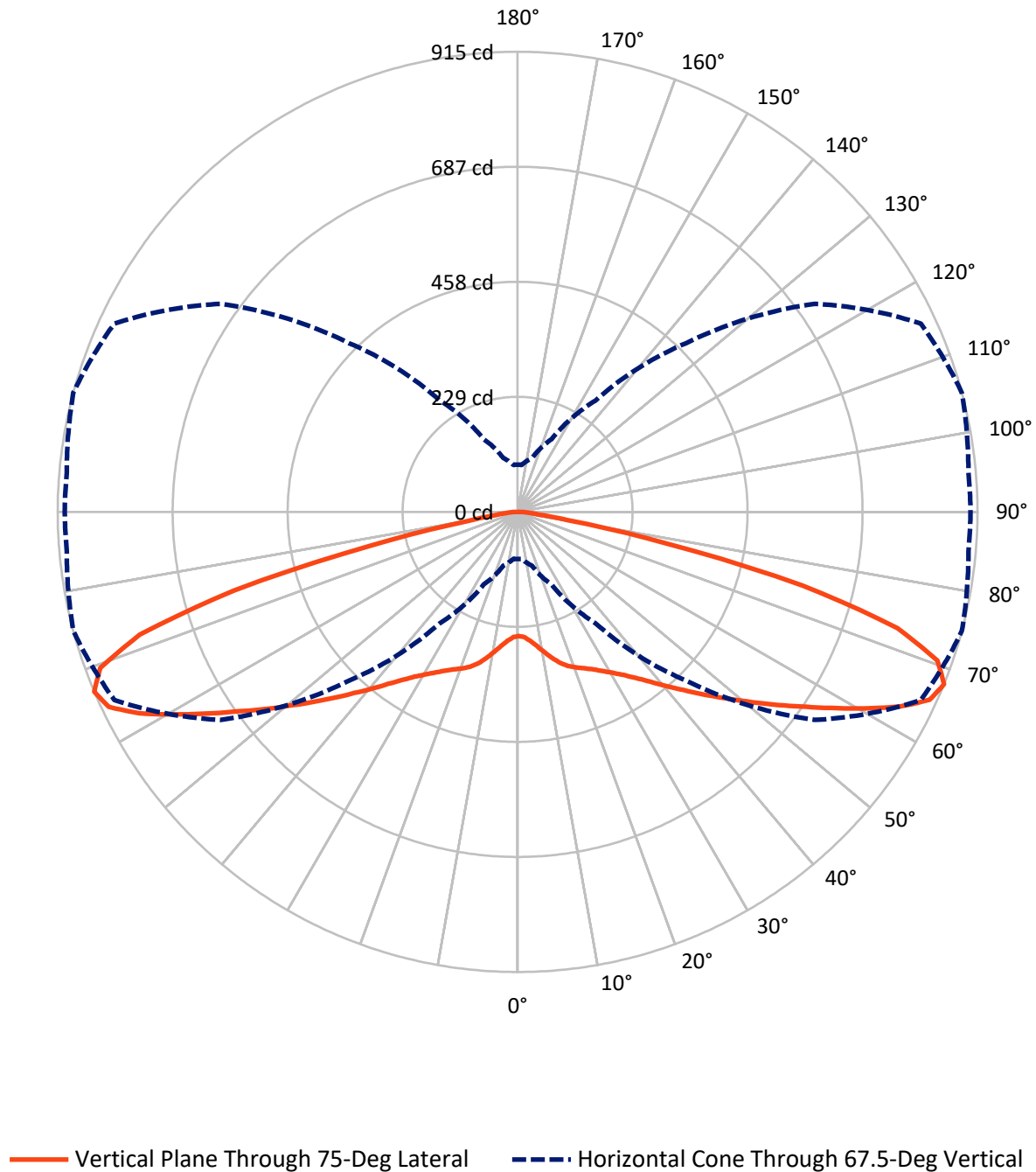
--- 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 1.3 fc  
 Type II - Medium - N/A

REPORT NUMBER: P672907  
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## Luminous Intensity Polar Plot



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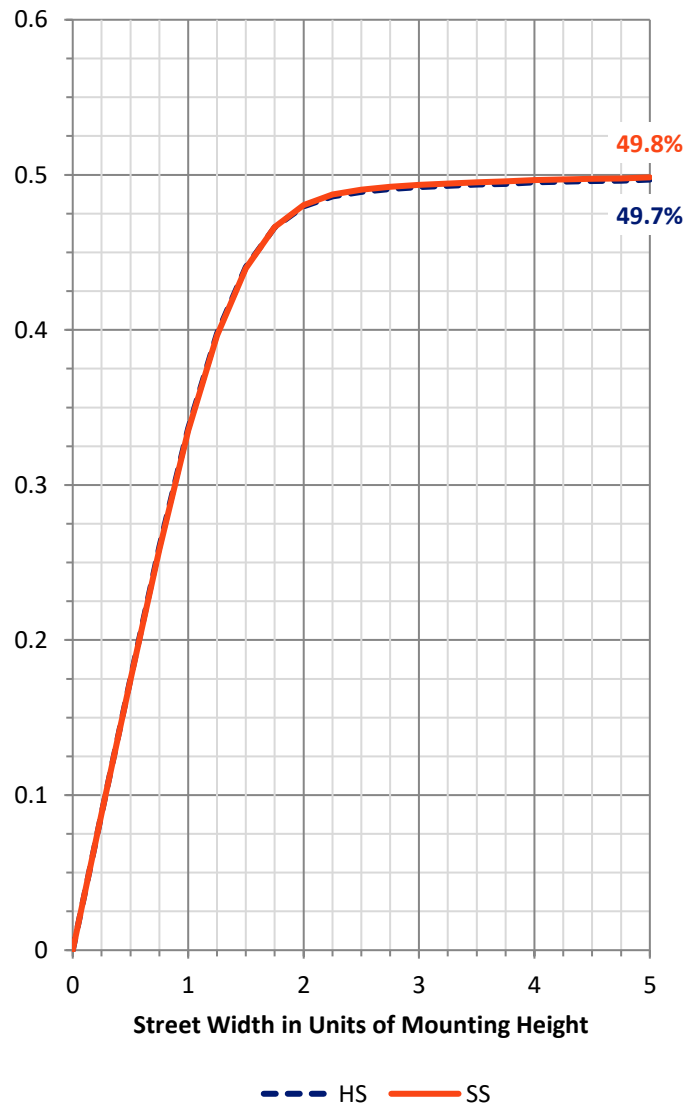
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1214.2   | 0.0    | 1214.2 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Street Side</b> | Lumens    | 1214.2   | 0.0    | 1214.2 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Total</b>       | Lumens    | 2428.4   | 0.0    | 2428.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 24.4   | 1.0       |
| 10°-20°   | 82.4   | 3.4       |
| 20°-30°   | 160.8  | 6.6       |
| 30°-40°   | 277.5  | 11.4      |
| 40°-50°   | 449.5  | 18.5      |
| 50°-60°   | 611.3  | 25.2      |
| 60°-70°   | 563.9  | 23.2      |
| 70°-80°   | 236.0  | 9.7       |
| 80°-90°   | 22.5   | 0.9       |
| 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       |
| 0°-90°    | 2428.4 | 100.0     |
| 0°-180°   | 2428.4 | 100.0     |



REPORT NUMBER: P672907

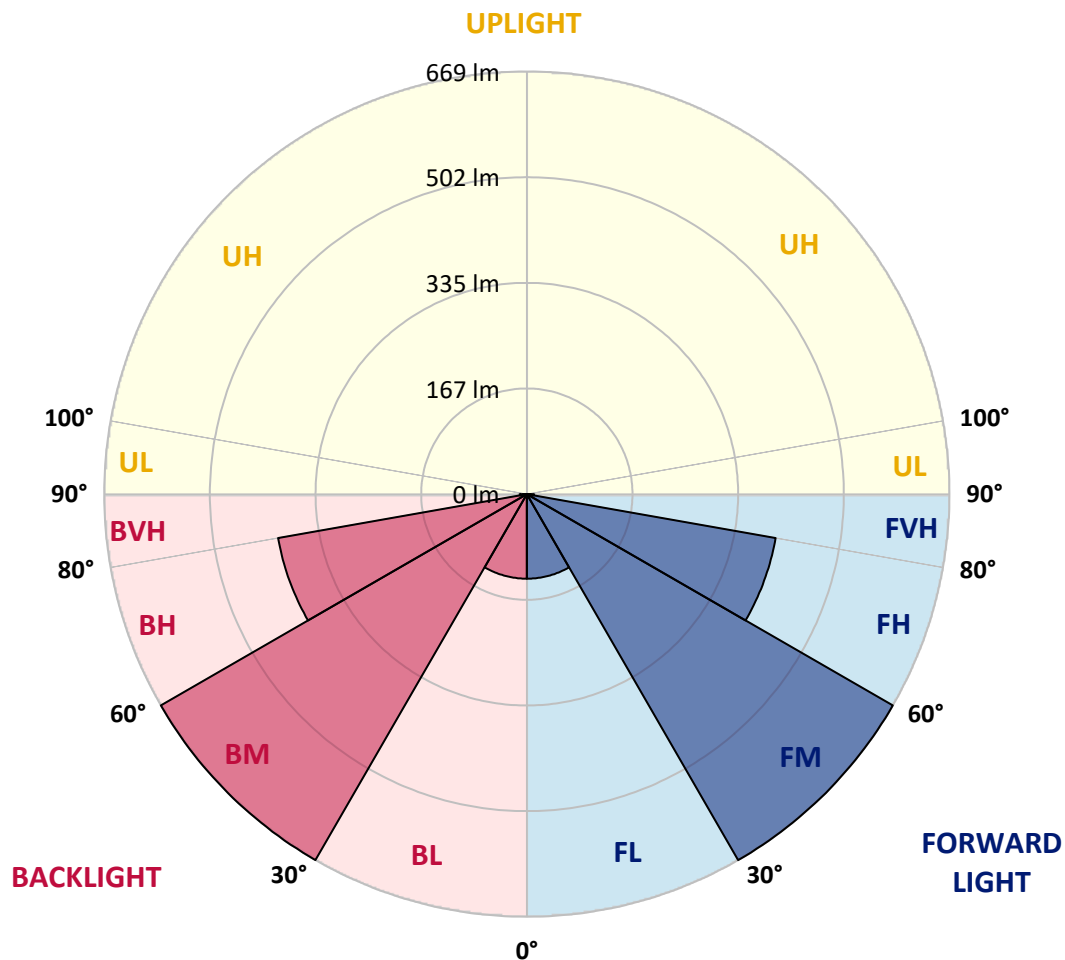
CATALOG NUMBER: CCP-SA1A-850-U-RW

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|--------|-----------|-------------------------|------|--------|
|      |             |        |           | B                       | U    | G      |
| FL   | (0°-30°)    | 133.8  | 5.5       |                         |      |        |
| FM   | (30°-60°)   | 669.1  | 27.6      |                         |      |        |
| FH   | (60°-80°)   | 400.0  | 16.5      |                         |      | G0/660 |
| FVH  | (80°-90°)   | 11.3   | 0.5       |                         |      | G1/100 |
| BL   | (0°-30°)    | 133.8  | 5.5       | B1/500                  |      |        |
| BM   | (30°-60°)   | 669.1  | 27.6      | B1/1000                 |      |        |
| BH   | (60°-80°)   | 400.0  | 16.5      | B1/500                  |      | G1/500 |
| BVH  | (80°-90°)   | 11.3   | 0.5       |                         |      | G1/100 |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |        |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |        |

**BUG Rating: B1-U0-G1**

Type II Medium



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CATALOG NUMBER: CCP-SA1A-850-U-RW

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 247.1 | 247.1 | 247.1 | 247.1 | 247.1 | 247.1 | 247.1 | 247.1 | 247.1 | 247.1 | 247.1 |
| 2.5°  | 245.5 | 245.5 | 246.2 | 247.1 | 247.4 | 248.1 | 248.3 | 248.3 | 249.3 | 249.2 | 249.3 |
| 5°    | 244.8 | 244.8 | 246.0 | 247.6 | 249.3 | 251.4 | 253.5 | 254.7 | 257.4 | 257.9 | 258.1 |
| 7.5°  | 245.5 | 245.7 | 247.4 | 250.0 | 253.0 | 256.8 | 260.8 | 264.2 | 268.5 | 270.1 | 271.1 |
| 10°   | 248.1 | 248.3 | 250.5 | 254.2 | 258.8 | 264.3 | 270.1 | 275.3 | 282.3 | 285.5 | 286.0 |
| 12.5° | 252.1 | 252.3 | 255.6 | 261.5 | 268.0 | 275.0 | 281.5 | 288.1 | 296.8 | 301.5 | 302.6 |
| 15°   | 258.2 | 257.7 | 262.9 | 271.7 | 280.8 | 289.5 | 295.2 | 301.7 | 311.0 | 317.1 | 318.6 |
| 17.5° | 266.6 | 267.0 | 273.4 | 284.6 | 295.8 | 304.7 | 310.4 | 314.1 | 322.1 | 328.4 | 330.0 |
| 20°   | 277.1 | 278.7 | 286.9 | 299.8 | 312.9 | 322.3 | 326.3 | 325.8 | 330.3 | 335.8 | 337.0 |
| 22.5° | 291.9 | 293.0 | 302.9 | 317.4 | 332.4 | 342.2 | 343.8 | 338.0 | 337.8 | 341.3 | 342.9 |
| 25°   | 309.4 | 310.3 | 320.7 | 337.5 | 353.4 | 363.7 | 362.1 | 352.2 | 346.9 | 347.1 | 348.1 |
| 27.5° | 329.8 | 331.6 | 342.4 | 359.5 | 375.9 | 385.3 | 383.1 | 368.6 | 358.3 | 355.1 | 354.4 |
| 30°   | 356.4 | 358.3 | 369.3 | 385.7 | 400.2 | 408.6 | 405.1 | 386.7 | 371.4 | 366.1 | 365.1 |
| 32.5° | 390.9 | 390.7 | 402.1 | 418.0 | 428.1 | 433.5 | 426.7 | 405.9 | 386.6 | 379.6 | 378.2 |
| 35°   | 426.5 | 428.3 | 439.5 | 454.8 | 462.5 | 462.9 | 452.0 | 428.6 | 405.6 | 393.5 | 390.9 |
| 37.5° | 466.7 | 467.6 | 480.5 | 495.0 | 500.0 | 497.3 | 481.2 | 455.2 | 428.6 | 415.9 | 411.4 |
| 40°   | 507.9 | 508.8 | 523.8 | 537.8 | 543.3 | 536.7 | 515.6 | 484.5 | 455.9 | 441.9 | 439.3 |
| 42.5° | 546.1 | 548.4 | 565.2 | 581.6 | 587.0 | 579.3 | 553.8 | 516.6 | 484.7 | 471.2 | 467.7 |
| 45°   | 577.9 | 580.4 | 599.2 | 620.2 | 629.8 | 623.5 | 594.7 | 552.8 | 517.9 | 503.4 | 497.4 |
| 47.5° | 601.8 | 605.0 | 625.1 | 650.2 | 668.9 | 667.7 | 638.2 | 591.0 | 553.5 | 536.4 | 531.0 |
| 50°   | 618.2 | 621.6 | 643.2 | 670.3 | 698.4 | 707.8 | 682.3 | 633.3 | 593.1 | 573.9 | 570.2 |
| 52.5° | 619.5 | 622.4 | 647.2 | 680.9 | 718.5 | 739.2 | 725.8 | 677.8 | 636.8 | 616.9 | 614.2 |
| 55°   | 592.2 | 594.3 | 627.3 | 672.2 | 726.7 | 763.3 | 765.4 | 726.3 | 683.4 | 663.3 | 662.1 |
| 57.5° | 529.7 | 532.7 | 572.2 | 631.5 | 713.1 | 778.9 | 799.8 | 777.1 | 736.1 | 717.2 | 716.2 |
| 60°   | 427.9 | 431.8 | 476.8 | 555.7 | 663.8 | 774.9 | 829.0 | 824.8 | 793.7 | 775.4 | 774.7 |
| 62.5° | 301.9 | 303.3 | 350.2 | 437.2 | 567.4 | 732.3 | 843.1 | 871.2 | 853.4 | 834.9 | 836.0 |
| 65°   | 177.4 | 179.3 | 213.7 | 291.9 | 430.4 | 634.3 | 818.7 | 903.5 | 901.3 | 884.3 | 886.1 |
| 67.5° | 93.8  | 93.8  | 111.0 | 159.6 | 270.6 | 474.9 | 721.4 | 885.7 | 915.4 | 900.6 | 901.4 |
| 70°   | 64.8  | 64.6  | 67.7  | 80.1  | 130.8 | 294.4 | 539.7 | 792.5 | 886.6 | 881.0 | 883.3 |
| 72.5° | 54.8  | 54.5  | 54.6  | 56.4  | 66.5  | 133.0 | 327.7 | 610.4 | 790.4 | 799.0 | 800.9 |
| 75°   | 48.0  | 47.5  | 47.1  | 46.8  | 47.7  | 60.4  | 149.5 | 376.6 | 585.9 | 639.7 | 638.7 |
| 77.5° | 41.4  | 41.0  | 40.7  | 39.5  | 38.1  | 39.6  | 61.1  | 169.4 | 301.4 | 355.7 | 351.8 |
| 80°   | 34.0  | 34.0  | 34.6  | 32.8  | 30.2  | 29.2  | 36.5  | 63.2  | 100.0 | 104.4 | 96.0  |
| 82.5° | 26.7  | 26.7  | 29.3  | 26.9  | 23.7  | 21.1  | 25.3  | 33.7  | 40.7  | 33.0  | 26.9  |
| 85°   | 18.9  | 19.0  | 24.4  | 22.3  | 18.3  | 12.2  | 15.7  | 20.1  | 22.9  | 14.5  | 11.3  |
| 87.5° | 7.7   | 8.2   | 15.2  | 12.0  | 11.5  | 6.1   | 7.3   | 8.9   | 11.3  | 6.1   | 4.9   |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2104-224-9

Luminaire Tested: CCW-SA2A-850-U-SL4

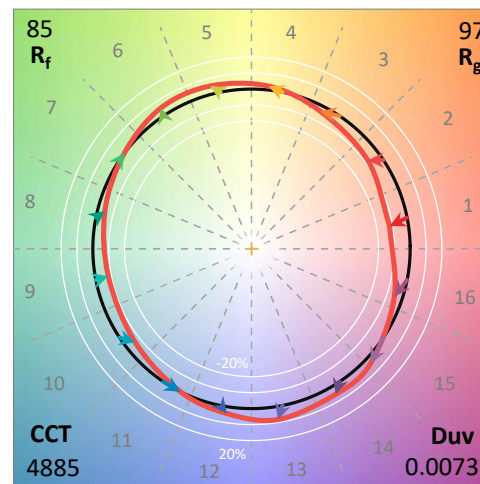
Test Date: 04/27/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-224-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/27/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **CCW-SA-2A-850-U-SL4**  
 Description: INVUE WALL PACK ClearCurve Light Square

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 4885   | CRI (Ra): | 82.2 |      |      |
| CIE u':                   | 0.2076 | R1:       | 79.1 | R9:  | 4.0  |
| CIE v':                   | 0.4943 | R2:       | 85.5 | R10: | 67.5 |
| Duv:                      | 0.0073 | R3:       | 92.5 | R11: | 82.5 |
| CIE x:                    | 0.3501 | R4:       | 82.9 | R12: | 63.4 |
| CIE y:                    | 0.3704 | R5:       | 80.2 | R13: | 80.2 |
| CIE z:                    | 0.2795 | R6:       | 81.6 | R14: | 96.0 |
| Peak Wavelength (nm):     | 446    | R7:       | 88.2 |      |      |
| Dominant Wavelength (nm): | 569    | R8:       | 67.2 |      |      |
| Purity:                   | 16.4   |           |      |      |      |
| Rf:                       | 84.6   |           |      |      |      |
| Rg:                       | 96.9   |           |      |      |      |



### Test Conditions

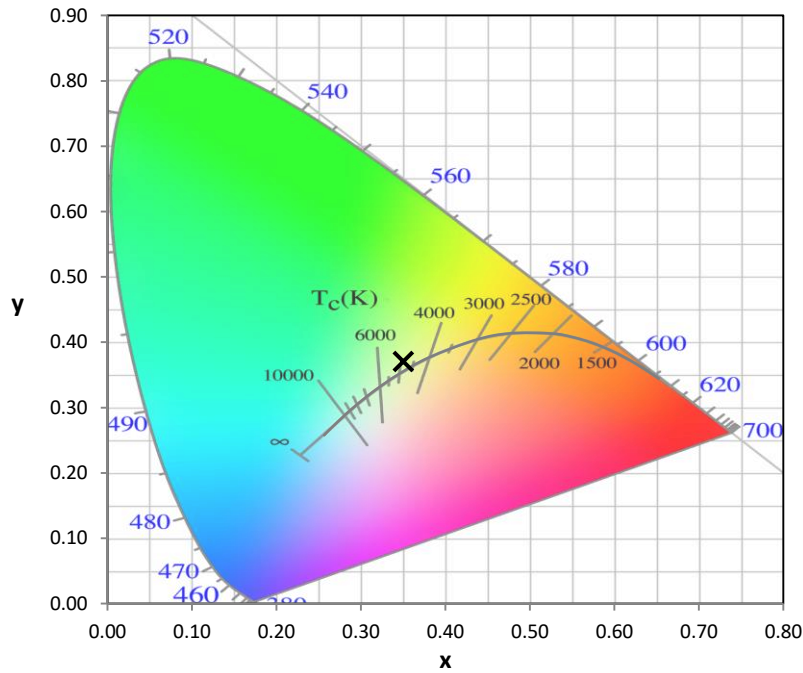
Stabilization Time: 76M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.9/41%  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2104-224-9

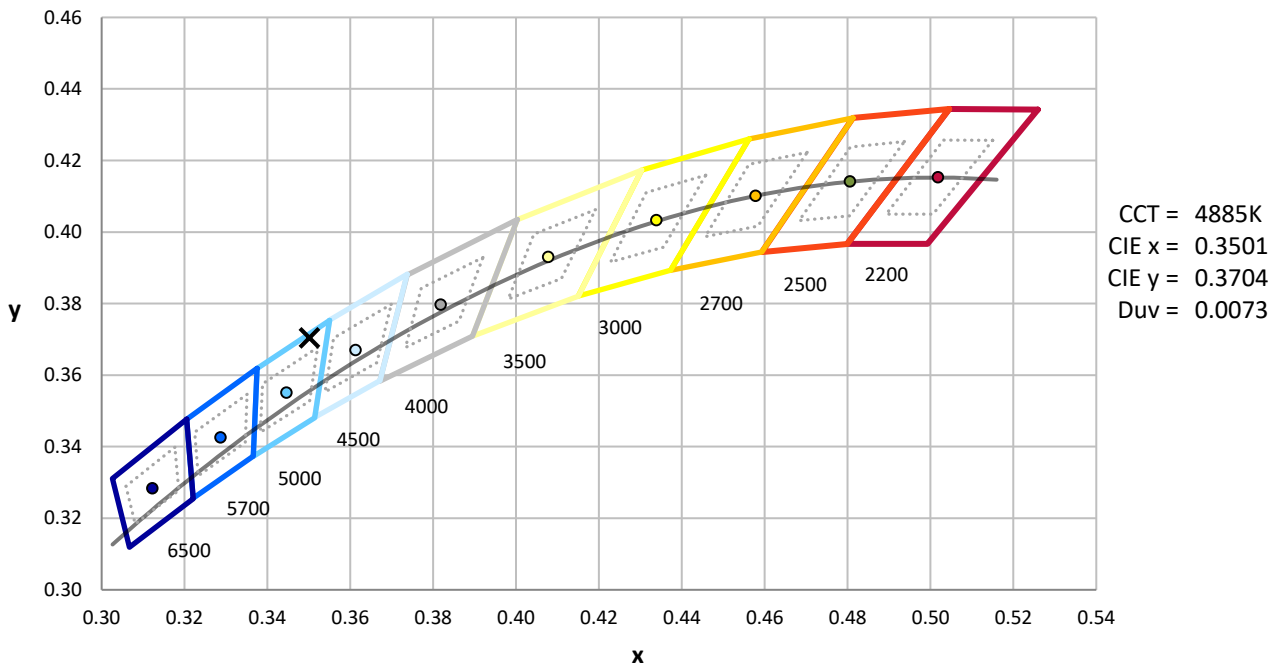
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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**CIE 1931 Chromaticity Diagram**



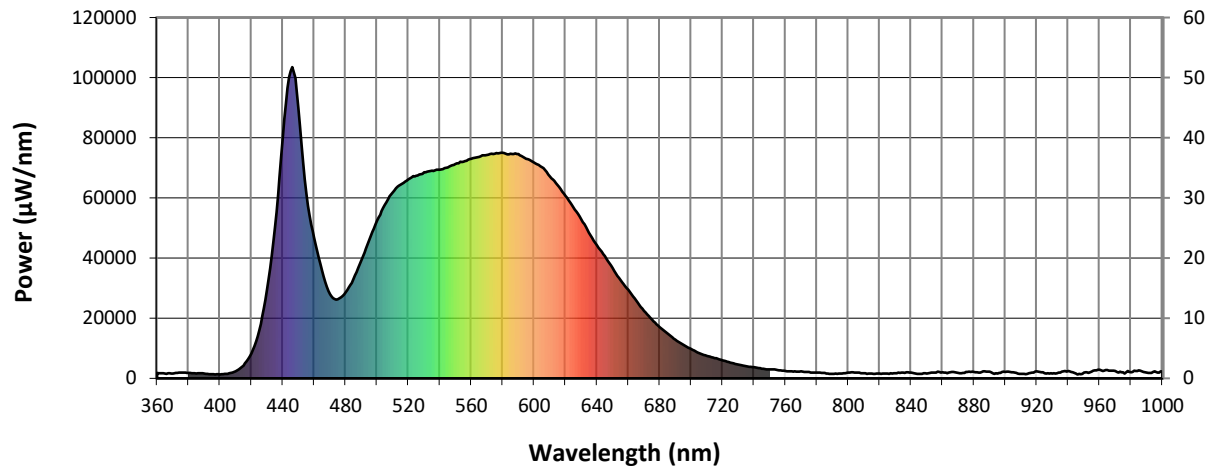
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 5000K 7-step quadrangle

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### Photopic Flux vs. Wavelength

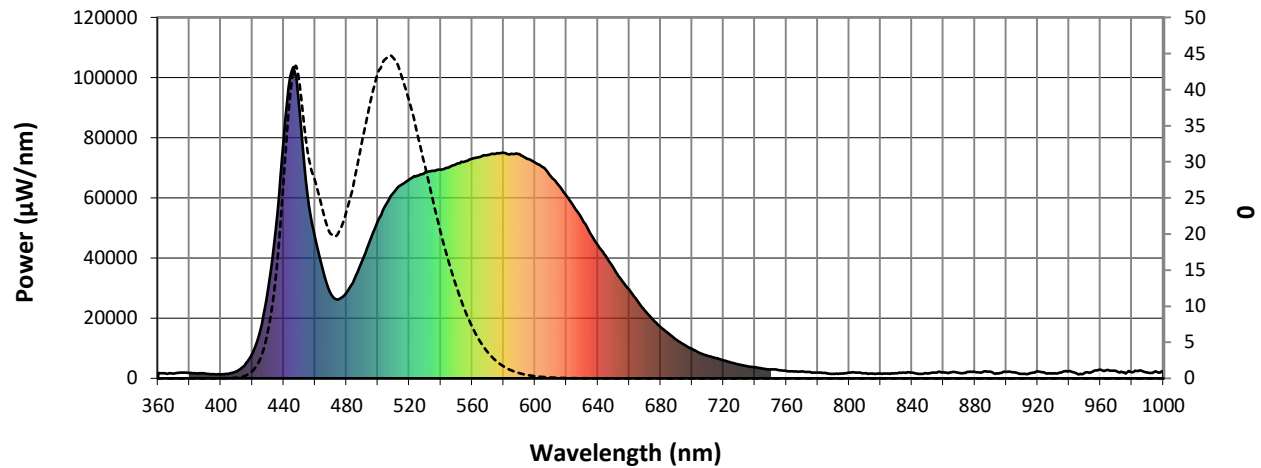


#####

| 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       | 1830             | 0.0              | 490       | 39290            | 5.6              | 620       | 60661            | 15.8             | 750       | 3022             | 0.0              | 880       | 2170             | 0.0              |
| 365       | 1565             | 0.0              | 495       | 45895            | 8.3              | 625       | 56965            | 12.6             | 755       | 2799             | 0.0              | 885       | 2095             | 0.0              |
| 370       | 1615             | 0.0              | 500       | 52484            | 11.6             | 630       | 52840            | 9.6              | 760       | 2426             | 0.0              | 890       | 2221             | 0.0              |
| 375       | 1925             | 0.0              | 505       | 57658            | 16.1             | 635       | 48454            | 7.3              | 765       | 2265             | 0.0              | 895       | 1631             | 0.0              |
| 380       | 1770             | 0.0              | 510       | 61833            | 21.2             | 640       | 44251            | 5.3              | 770       | 2313             | 0.0              | 900       | 2168             | 0.0              |
| 385       | 1631             | 0.0              | 515       | 64361            | 26.7             | 645       | 40632            | 3.9              | 775       | 2117             | 0.0              | 905       | 1986             | 0.0              |
| 390       | 1587             | 0.0              | 520       | 66173            | 32.1             | 650       | 36678            | 2.7              | 780       | 1949             | 0.0              | 910       | 1497             | 0.0              |
| 395       | 1387             | 0.0              | 525       | 67346            | 36.2             | 655       | 32622            | 1.9              | 785       | 1850             | 0.0              | 915       | 1688             | 0.0              |
| 400       | 1314             | 0.0              | 530       | 68548            | 40.4             | 660       | 29433            | 1.2              | 790       | 1537             | 0.0              | 920       | 2309             | 0.0              |
| 405       | 1545             | 0.0              | 535       | 69083            | 42.8             | 665       | 25904            | 0.8              | 795       | 1606             | 0.0              | 925       | 1676             | 0.0              |
| 410       | 2352             | 0.0              | 540       | 69434            | 45.2             | 670       | 22450            | 0.5              | 800       | 1879             | 0.0              | 930       | 1643             | 0.0              |
| 415       | 4302             | 0.0              | 545       | 70161            | 46.7             | 675       | 19540            | 0.3              | 805       | 1874             | 0.0              | 935       | 1938             | 0.0              |
| 420       | 8202             | 0.0              | 550       | 71259            | 48.4             | 680       | 17063            | 0.2              | 810       | 1689             | 0.0              | 940       | 2503             | 0.0              |
| 425       | 15931            | 0.1              | 555       | 72093            | 49.2             | 685       | 14938            | 0.1              | 815       | 1603             | 0.0              | 945       | 1604             | 0.0              |
| 430       | 29451            | 0.2              | 560       | 73055            | 49.6             | 690       | 12839            | 0.1              | 820       | 1615             | 0.0              | 950       | 1939             | 0.0              |
| 435       | 50263            | 0.6              | 565       | 73632            | 49.0             | 695       | 11135            | 0.0              | 825       | 1580             | 0.0              | 955       | 2280             | 0.0              |
| 440       | 79646            | 1.3              | 570       | 74262            | 48.3             | 700       | 9751             | 0.0              | 830       | 1691             | 0.0              | 960       | 2909             | 0.0              |
| 445       | 102126           | 2.1              | 575       | 74754            | 46.5             | 705       | 8425             | 0.0              | 835       | 1874             | 0.0              | 965       | 2727             | 0.0              |
| 450       | 89946            | 2.3              | 580       | 74999            | 44.6             | 710       | 7445             | 0.0              | 840       | 1897             | 0.0              | 970       | 2407             | 0.0              |
| 455       | 61475            | 2.1              | 585       | 74696            | 41.5             | 715       | 6743             | 0.0              | 845       | 1518             | 0.0              | 975       | 2033             | 0.0              |
| 460       | 46830            | 1.9              | 590       | 74627            | 38.6             | 720       | 5983             | 0.0              | 850       | 1637             | 0.0              | 980       | 1993             | 0.0              |
| 465       | 35832            | 1.8              | 595       | 73026            | 34.6             | 725       | 5259             | 0.0              | 855       | 1867             | 0.0              | 985       | 2615             | 0.0              |
| 470       | 28041            | 1.7              | 600       | 71687            | 30.9             | 730       | 4564             | 0.0              | 860       | 2075             | 0.0              | 990       | 1918             | 0.0              |
| 475       | 26334            | 2.1              | 605       | 70271            | 27.2             | 735       | 4065             | 0.0              | 865       | 2074             | 0.0              | 995       | 2319             | 0.0              |
| 480       | 28580            | 2.7              | 610       | 67123            | 23.1             | 740       | 3702             | 0.0              | 870       | 1793             | 0.0              | 1000      | 2272             | 0.0              |
| 485       | 33016            | 3.9              | 615       | 64247            | 19.4             | 745       | 3231             | 0.0              | 875       | 2156             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



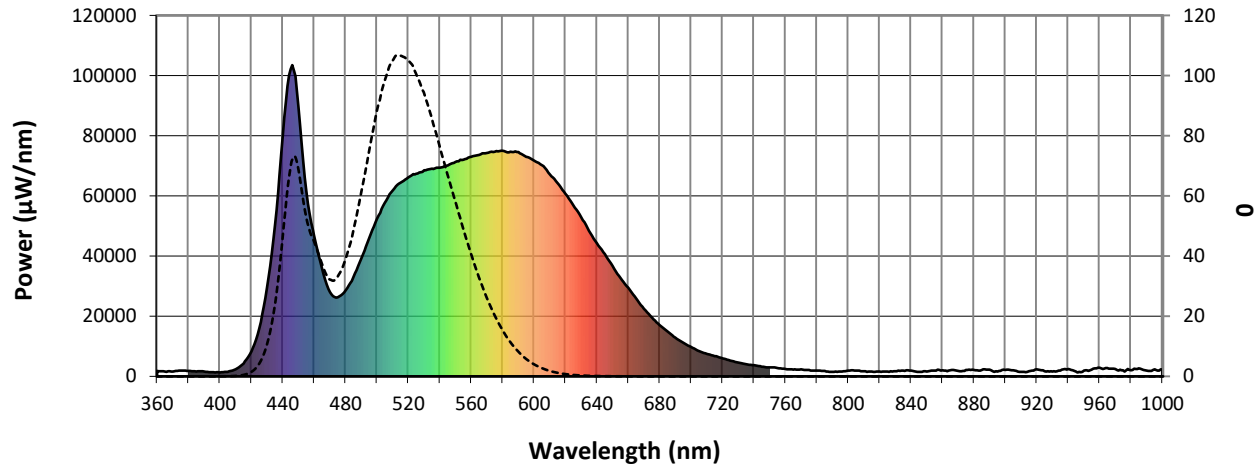
Scotopic Lumens: 9262.6

S/P: 1.91

| 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       | 1830             | 0.0              | 490       | 39290            | 60.5             | 620       | 60661            | 0.8              | 750       | 3022             | 0.0              | 880       | 2170             | 0.0              |
| 365       | 1565             | 0.0              | 495       | 45895            | 74.2             | 625       | 56965            | 0.5              | 755       | 2799             | 0.0              | 885       | 2095             | 0.0              |
| 370       | 1615             | 0.0              | 500       | 52484            | 87.8             | 630       | 52840            | 0.3              | 760       | 2426             | 0.0              | 890       | 2221             | 0.0              |
| 375       | 1925             | 0.0              | 505       | 57658            | 98.0             | 635       | 48454            | 0.2              | 765       | 2265             | 0.0              | 895       | 1631             | 0.0              |
| 380       | 1770             | 0.0              | 510       | 61833            | 104.8            | 640       | 44251            | 0.1              | 770       | 2313             | 0.0              | 900       | 2168             | 0.0              |
| 385       | 1631             | 0.0              | 515       | 64361            | 106.7            | 645       | 40632            | 0.1              | 775       | 2117             | 0.0              | 905       | 1986             | 0.0              |
| 390       | 1587             | 0.0              | 520       | 66173            | 105.2            | 650       | 36678            | 0.0              | 780       | 1949             | 0.0              | 910       | 1497             | 0.0              |
| 395       | 1387             | 0.0              | 525       | 67346            | 100.7            | 655       | 32622            | 0.0              | 785       | 1850             | 0.0              | 915       | 1688             | 0.0              |
| 400       | 1314             | 0.0              | 530       | 68548            | 94.5             | 660       | 29433            | 0.0              | 790       | 1537             | 0.0              | 920       | 2309             | 0.0              |
| 405       | 1545             | 0.0              | 535       | 69083            | 86.1             | 665       | 25904            | 0.0              | 795       | 1606             | 0.0              | 925       | 1676             | 0.0              |
| 410       | 2352             | 0.1              | 540       | 69434            | 76.7             | 670       | 22450            | 0.0              | 800       | 1879             | 0.0              | 930       | 1643             | 0.0              |
| 415       | 4302             | 0.4              | 545       | 70161            | 67.3             | 675       | 19540            | 0.0              | 805       | 1874             | 0.0              | 935       | 1938             | 0.0              |
| 420       | 8202             | 1.3              | 550       | 71259            | 58.3             | 680       | 17063            | 0.0              | 810       | 1689             | 0.0              | 940       | 2503             | 0.0              |
| 425       | 15931            | 3.9              | 555       | 72093            | 49.3             | 685       | 14938            | 0.0              | 815       | 1603             | 0.0              | 945       | 1604             | 0.0              |
| 430       | 29451            | 10.0             | 560       | 73055            | 40.8             | 690       | 12839            | 0.0              | 820       | 1615             | 0.0              | 950       | 1939             | 0.0              |
| 435       | 50263            | 22.5             | 565       | 73632            | 33.0             | 695       | 11135            | 0.0              | 825       | 1580             | 0.0              | 955       | 2280             | 0.0              |
| 440       | 79646            | 44.5             | 570       | 74262            | 26.2             | 700       | 9751             | 0.0              | 830       | 1691             | 0.0              | 960       | 2909             | 0.0              |
| 445       | 102126           | 68.4             | 575       | 74754            | 20.4             | 705       | 8425             | 0.0              | 835       | 1874             | 0.0              | 965       | 2727             | 0.0              |
| 450       | 89946            | 69.7             | 580       | 74999            | 15.5             | 710       | 7445             | 0.0              | 840       | 1897             | 0.0              | 970       | 2407             | 0.0              |
| 455       | 61475            | 53.7             | 585       | 74696            | 11.4             | 715       | 6743             | 0.0              | 845       | 1518             | 0.0              | 975       | 2033             | 0.0              |
| 460       | 46830            | 45.2             | 590       | 74627            | 8.3              | 720       | 5983             | 0.0              | 850       | 1637             | 0.0              | 980       | 1993             | 0.0              |
| 465       | 35832            | 37.8             | 595       | 73026            | 5.8              | 725       | 5259             | 0.0              | 855       | 1867             | 0.0              | 985       | 2615             | 0.0              |
| 470       | 28041            | 32.3             | 600       | 71687            | 4.0              | 730       | 4564             | 0.0              | 860       | 2075             | 0.0              | 990       | 1918             | 0.0              |
| 475       | 26334            | 32.9             | 605       | 70271            | 2.8              | 735       | 4065             | 0.0              | 865       | 2074             | 0.0              | 995       | 2319             | 0.0              |
| 480       | 28580            | 38.6             | 610       | 67123            | 1.8              | 740       | 3702             | 0.0              | 870       | 1793             | 0.0              | 1000      | 2272             | 0.0              |
| 485       | 33016            | 47.9             | 615       | 64247            | 1.2              | 745       | 3231             | 0.0              | 875       | 2156             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 3791.6**

**M/P: 0.78**

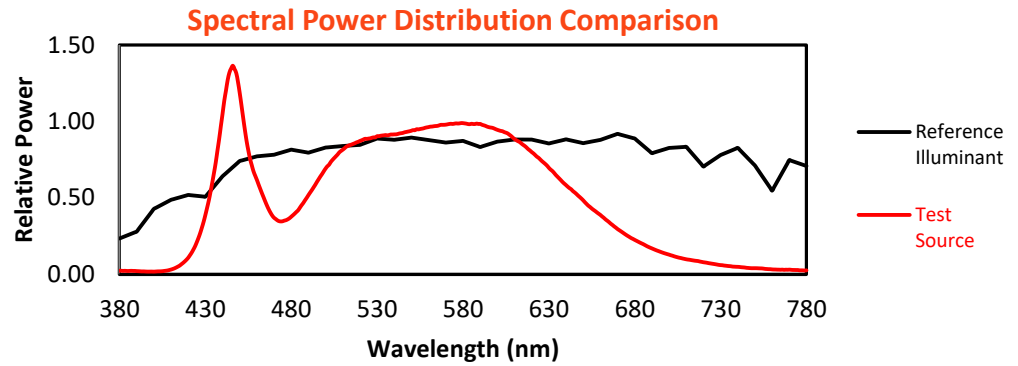
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1830             | 0.0              | 490       | 39290            | 32.7             | 620       | 60661            | 0.0              | 750       | 3022             | 0.0              | 880       | 2170             | 0.0              |
| 365       | 1565             | 0.0              | 495       | 45895            | 37.9             | 625       | 56965            | 0.0              | 755       | 2799             | 0.0              | 885       | 2095             | 0.0              |
| 370       | 1615             | 0.0              | 500       | 52484            | 42.2             | 630       | 52840            | 0.0              | 760       | 2426             | 0.0              | 890       | 2221             | 0.0              |
| 375       | 1925             | 0.0              | 505       | 57658            | 44.3             | 635       | 48454            | 0.0              | 765       | 2265             | 0.0              | 895       | 1631             | 0.0              |
| 380       | 1770             | 0.0              | 510       | 61833            | 44.4             | 640       | 44251            | 0.0              | 770       | 2313             | 0.0              | 900       | 2168             | 0.0              |
| 385       | 1631             | 0.0              | 515       | 64361            | 42.1             | 645       | 40632            | 0.0              | 775       | 2117             | 0.0              | 905       | 1986             | 0.0              |
| 390       | 1587             | 0.0              | 520       | 66173            | 38.5             | 650       | 36678            | 0.0              | 780       | 1949             | 0.0              | 910       | 1497             | 0.0              |
| 395       | 1387             | 0.0              | 525       | 67346            | 34.2             | 655       | 32622            | 0.0              | 785       | 1850             | 0.0              | 915       | 1688             | 0.0              |
| 400       | 1314             | 0.0              | 530       | 68548            | 29.6             | 660       | 29433            | 0.0              | 790       | 1537             | 0.0              | 920       | 2309             | 0.0              |
| 405       | 1545             | 0.0              | 535       | 69083            | 24.9             | 665       | 25904            | 0.0              | 795       | 1606             | 0.0              | 925       | 1676             | 0.0              |
| 410       | 2352             | 0.1              | 540       | 69434            | 20.3             | 670       | 22450            | 0.0              | 800       | 1879             | 0.0              | 930       | 1643             | 0.0              |
| 415       | 4302             | 0.3              | 545       | 70161            | 16.3             | 675       | 19540            | 0.0              | 805       | 1874             | 0.0              | 935       | 1938             | 0.0              |
| 420       | 8202             | 0.9              | 550       | 71259            | 12.8             | 680       | 17063            | 0.0              | 810       | 1689             | 0.0              | 940       | 2503             | 0.0              |
| 425       | 15931            | 2.5              | 555       | 72093            | 9.7              | 685       | 14938            | 0.0              | 815       | 1603             | 0.0              | 945       | 1604             | 0.0              |
| 430       | 29451            | 6.2              | 560       | 73055            | 7.2              | 690       | 12839            | 0.0              | 820       | 1615             | 0.0              | 950       | 1939             | 0.0              |
| 435       | 50263            | 13.4             | 565       | 73632            | 5.2              | 695       | 11135            | 0.0              | 825       | 1580             | 0.0              | 955       | 2280             | 0.0              |
| 440       | 79646            | 26.6             | 570       | 74262            | 3.6              | 700       | 9751             | 0.0              | 830       | 1691             | 0.0              | 960       | 2909             | 0.0              |
| 445       | 102126           | 40.3             | 575       | 74754            | 2.5              | 705       | 8425             | 0.0              | 835       | 1874             | 0.0              | 965       | 2727             | 0.0              |
| 450       | 89946            | 41.4             | 580       | 74999            | 1.7              | 710       | 7445             | 0.0              | 840       | 1897             | 0.0              | 970       | 2407             | 0.0              |
| 455       | 61475            | 32.2             | 585       | 74696            | 1.1              | 715       | 6743             | 0.0              | 845       | 1518             | 0.0              | 975       | 2033             | 0.0              |
| 460       | 46830            | 27.6             | 590       | 74627            | 0.7              | 720       | 5983             | 0.0              | 850       | 1637             | 0.0              | 980       | 1993             | 0.0              |
| 465       | 35832            | 23.4             | 595       | 73026            | 0.5              | 725       | 5259             | 0.0              | 855       | 1867             | 0.0              | 985       | 2615             | 0.0              |
| 470       | 28041            | 20.1             | 600       | 71687            | 0.3              | 730       | 4564             | 0.0              | 860       | 2075             | 0.0              | 990       | 1918             | 0.0              |
| 475       | 26334            | 20.1             | 605       | 70271            | 0.2              | 735       | 4065             | 0.0              | 865       | 2074             | 0.0              | 995       | 2319             | 0.0              |
| 480       | 28580            | 23.0             | 610       | 67123            | 0.1              | 740       | 3702             | 0.0              | 870       | 1793             | 0.0              | 1000      | 2272             | 0.0              |
| 485       | 33016            | 27.2             | 615       | 64247            | 0.1              | 745       | 3231             | 0.0              | 875       | 2156             | 0.0              |           |                  |                  |

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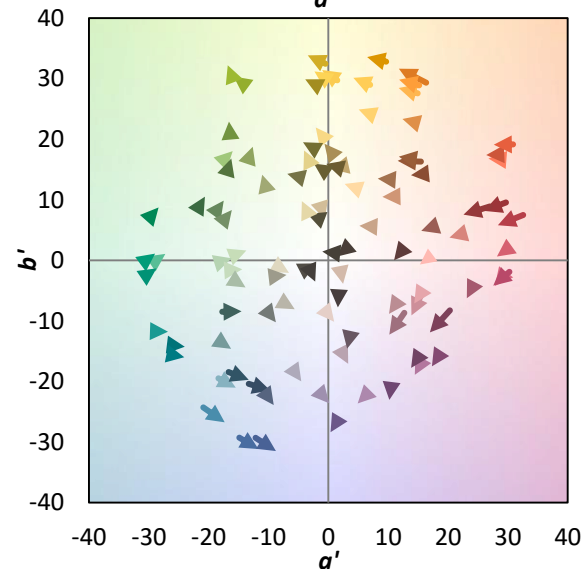
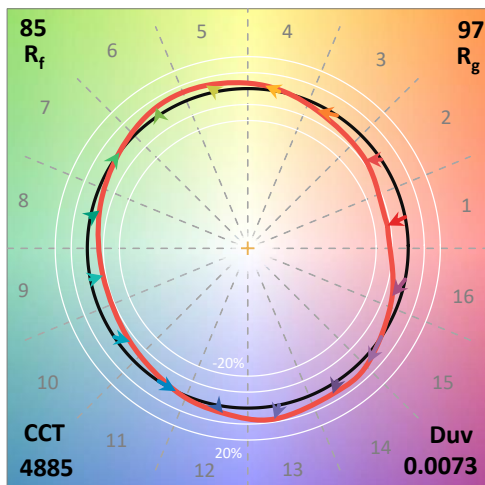
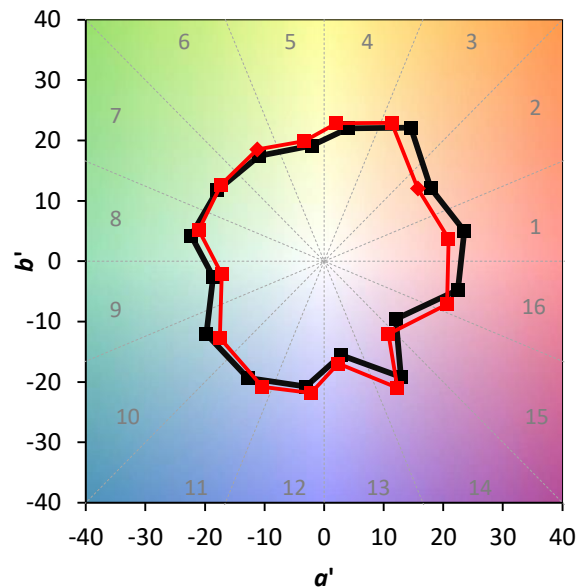
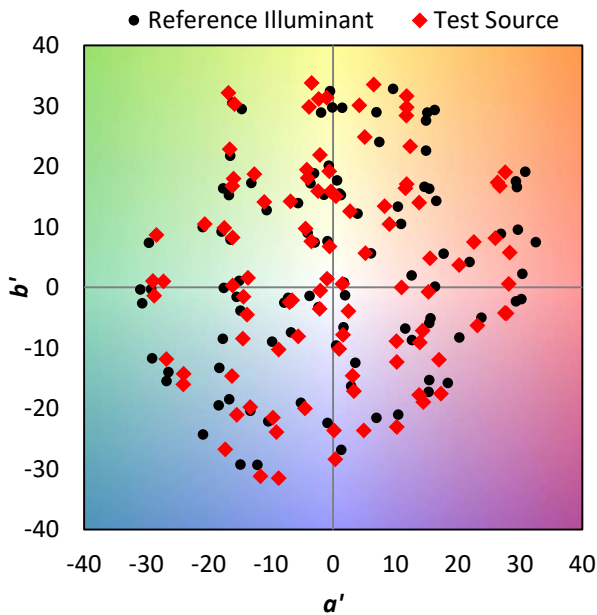
TM-30-18

### Summary

$R_f = 84.6$   
 $R_g = 96.9$   
 CIE  $R_a = 82.2$   
 $R_g = 4.0$

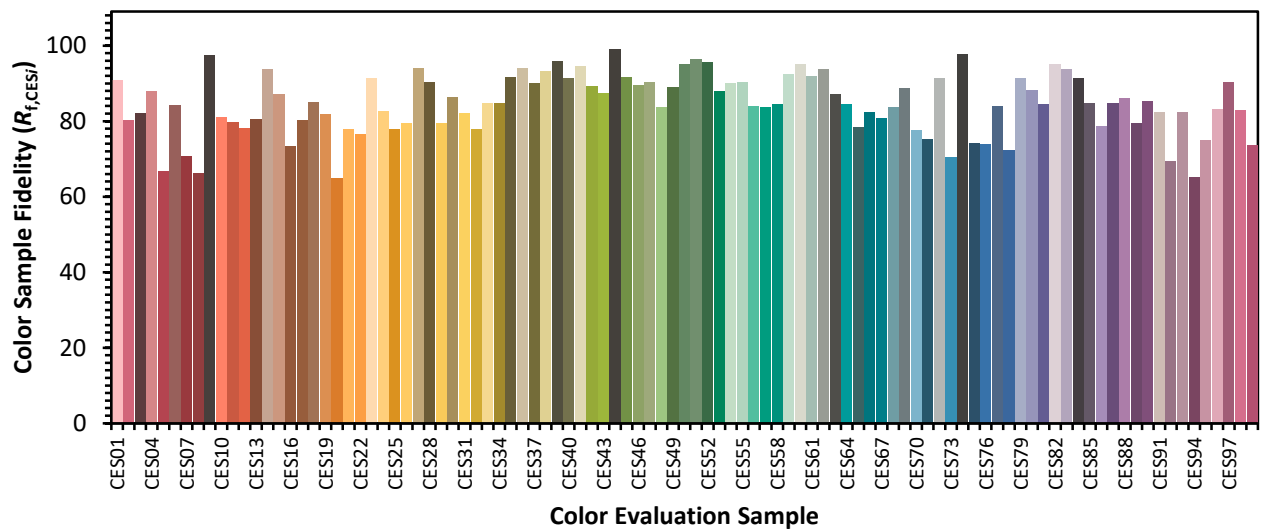


### Color Vector Graphics

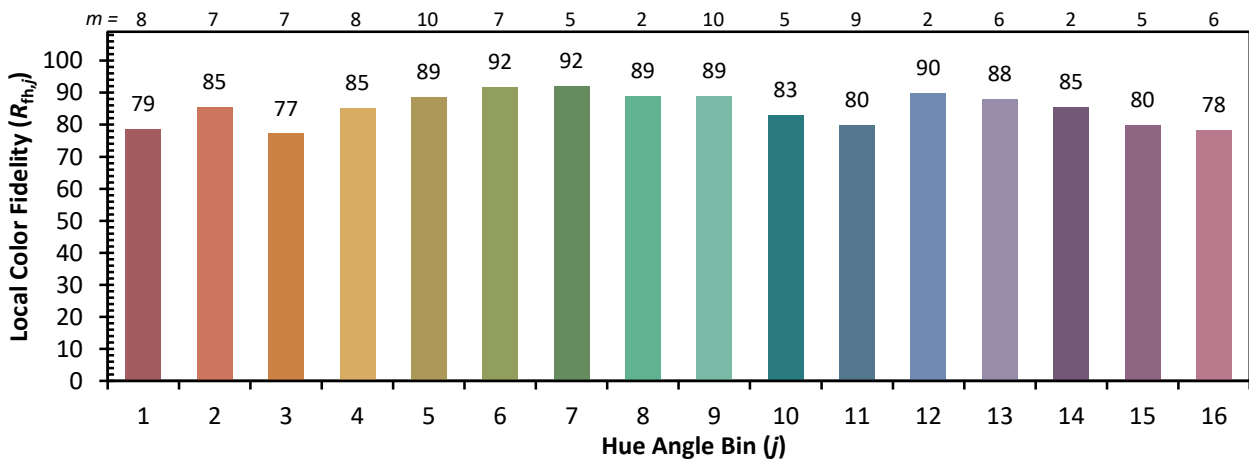
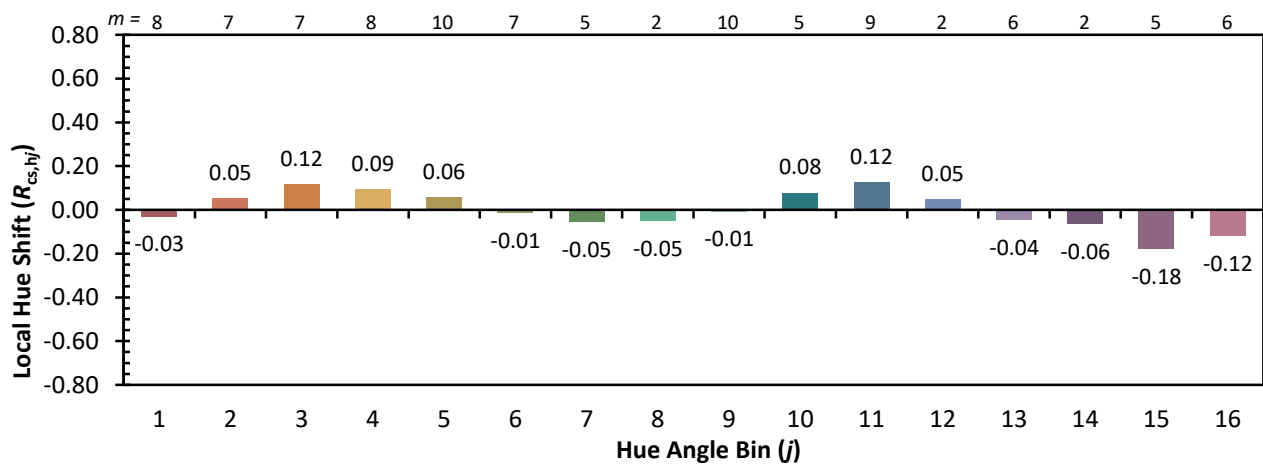
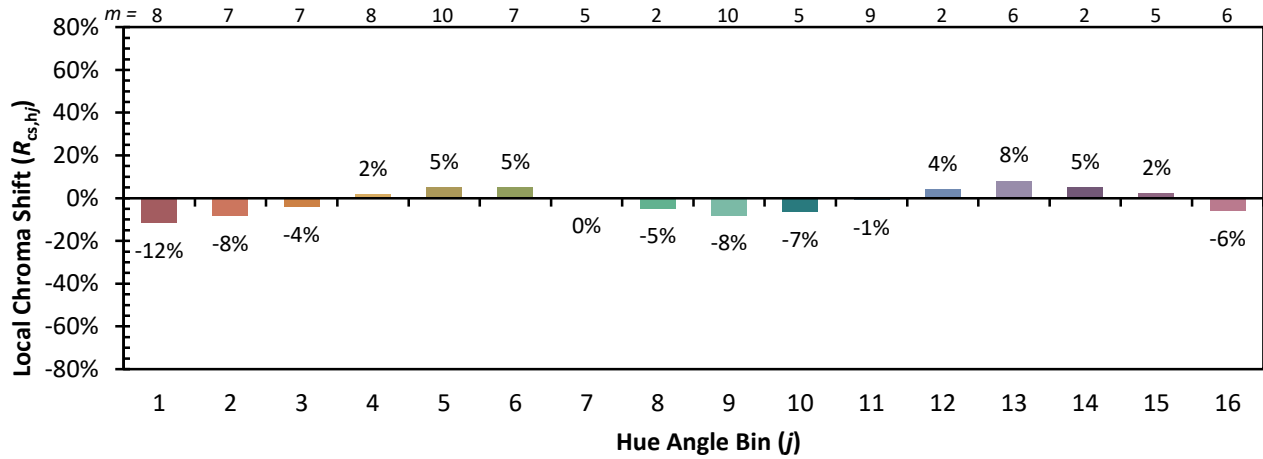


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

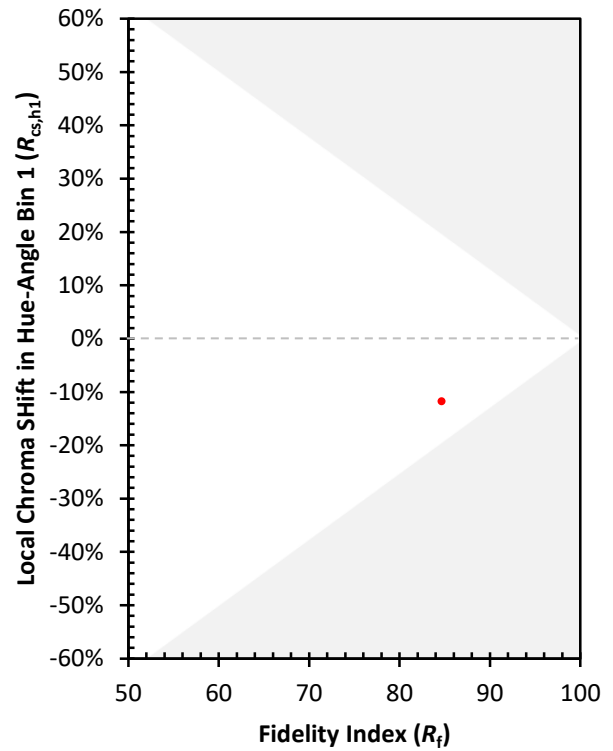
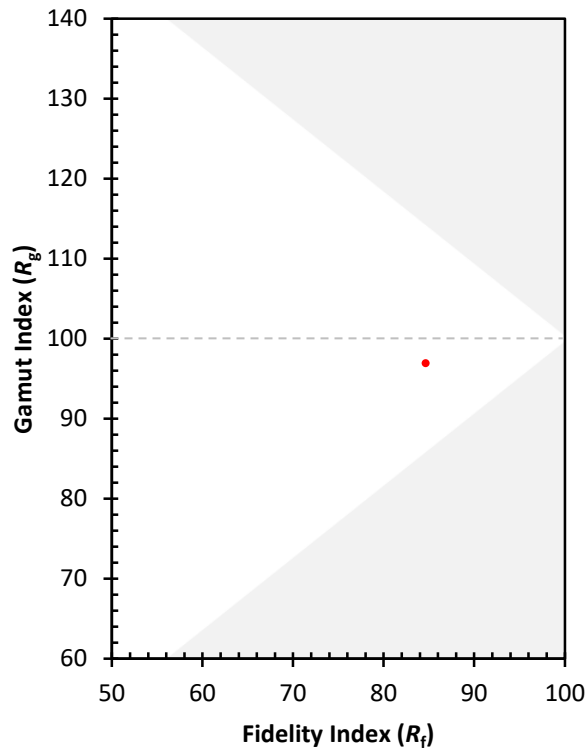
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 79 | CES51 = 96 | CES76 = 74 |
| CES02 = 60 | CES27 = 94 | CES52 = 96 | CES77 = 84 |
| CES03 = 30 | CES28 = 90 | CES53 = 88 | CES78 = 72 |
| CES04 = 69 | CES29 = 80 | CES54 = 90 | CES79 = 91 |
| CES05 = 47 | CES30 = 86 | CES55 = 90 | CES80 = 88 |
| CES06 = 50 | CES31 = 82 | CES56 = 84 | CES81 = 85 |
| CES07 = 39 | CES32 = 78 | CES57 = 84 | CES82 = 95 |
| CES08 = 39 | CES33 = 85 | CES58 = 84 | CES83 = 94 |
| CES09 = 29 | CES34 = 85 | CES59 = 92 | CES84 = 91 |
| CES10 = 73 | CES35 = 92 | CES60 = 95 | CES85 = 85 |
| CES11 = 56 | CES36 = 94 | CES61 = 92 | CES86 = 79 |
| CES12 = 61 | CES37 = 90 | CES62 = 94 | CES87 = 85 |
| CES13 = 42 | CES38 = 93 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 96 | CES64 = 84 | CES89 = 79 |
| CES15 = 70 | CES40 = 91 | CES65 = 78 | CES90 = 85 |
| CES16 = 46 | CES41 = 94 | CES66 = 82 | CES91 = 82 |
| CES17 = 48 | CES42 = 89 | CES67 = 81 | CES92 = 69 |
| CES18 = 55 | CES43 = 87 | CES68 = 84 | CES93 = 82 |
| CES19 = 70 | CES44 = 99 | CES69 = 89 | CES94 = 65 |
| CES20 = 64 | CES45 = 92 | CES70 = 78 | CES95 = 75 |
| CES21 = 85 | CES46 = 89 | CES71 = 75 | CES96 = 83 |
| CES22 = 77 | CES47 = 90 | CES72 = 91 | CES97 = 90 |
| CES23 = 91 | CES48 = 84 | CES73 = 71 | CES98 = 83 |
| CES24 = 90 | CES49 = 89 | CES74 = 98 | CES99 = 74 |
| CES25 = 70 | CES50 = 95 | CES75 = 74 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)