

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: P472258

Luminaire Tested: **CCP-VA-2-860-U-T2**

Issue Date: 01/27/2021



**Test Information**

Test Method: LM-79-08  
Report Number: P472258  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 01/27/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-VA-2-860-U-T2  
Description: INVUE CLEARCURVE POLE MOUNT Wave Stream LUMINAIRE WITH T2  
DISTRIBUTION LENS  
Light Source: 5700K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3630.4 lumens  
Efficiency: N/A  
Efficacy: 89.6 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.54' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2

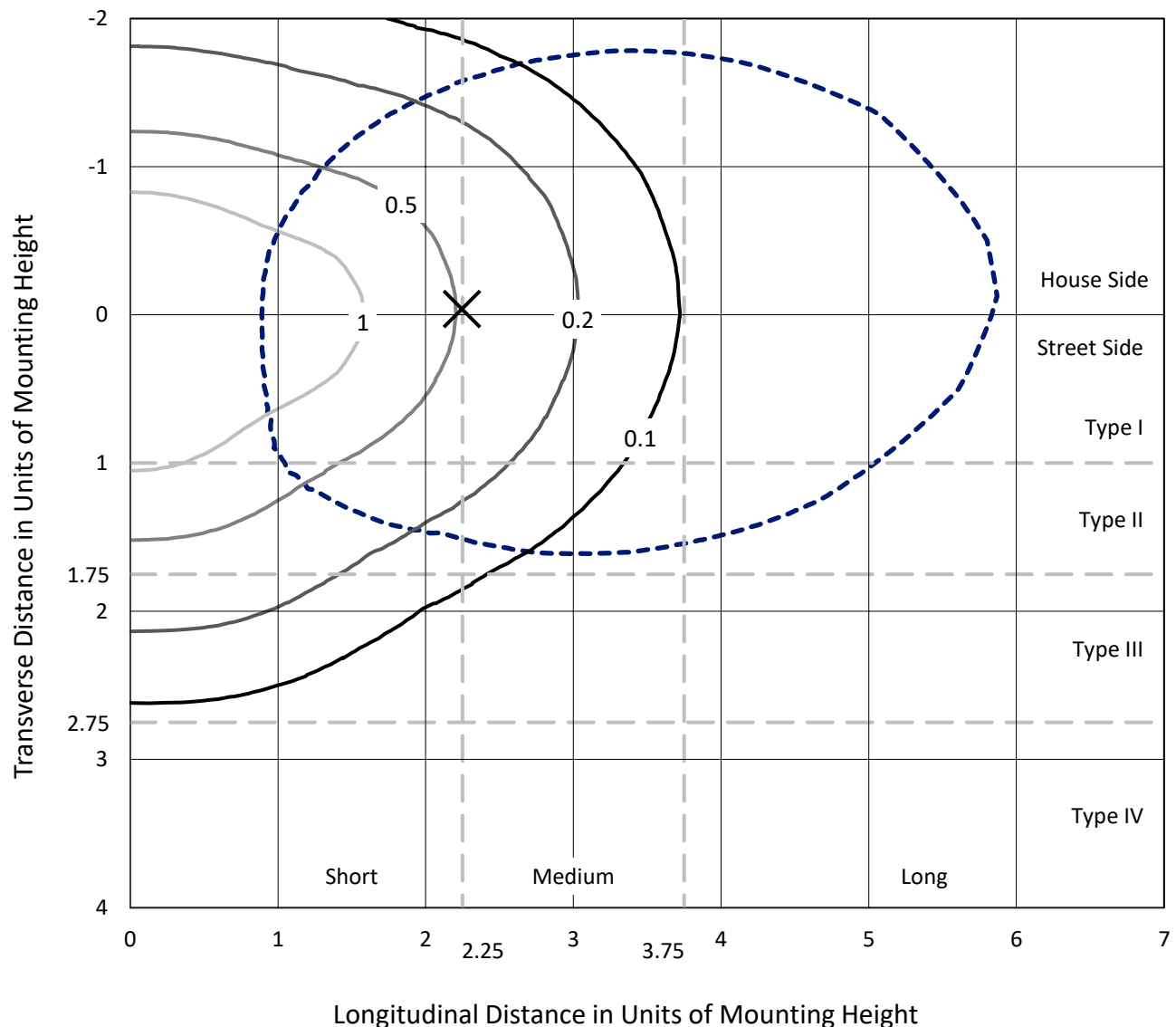
Input Watts (W): 40.5  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

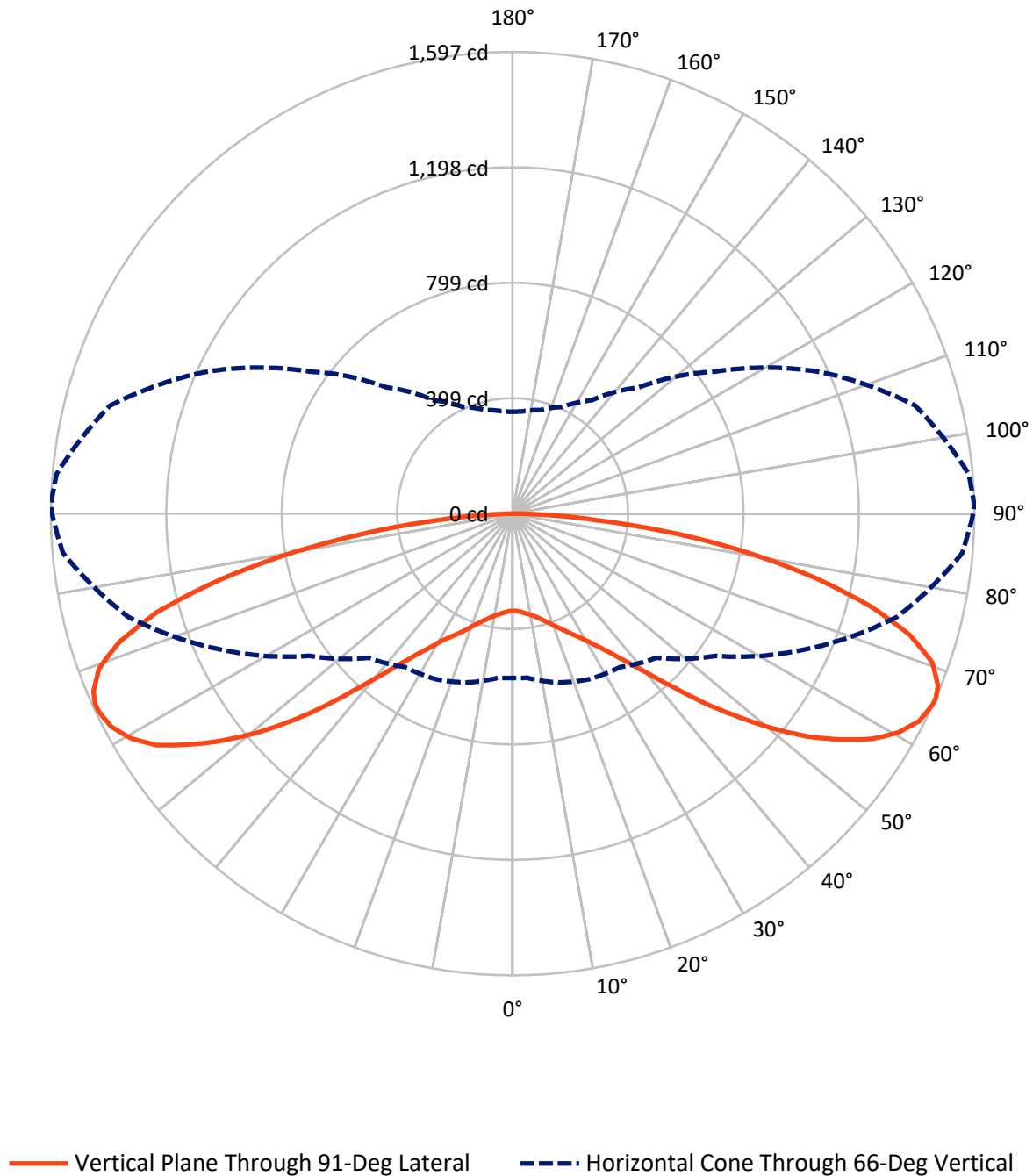
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 1.6 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1752.2   | 0.0    | 1752.2 |
|                    | % Fixture | 48.3     | 0.0    | 48.3   |
| <b>Street Side</b> | Lumens    | 1878.2   | 0.0    | 1878.2 |
|                    | % Fixture | 51.7     | 0.0    | 51.7   |
| <b>Total</b>       | Lumens    | 3630.4   | 0.0    | 3630.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 33.1   | 0.9       |
| 10°-20°   | 108.4  | 3.0       |
| 20°-30°   | 209.6  | 5.8       |
| 30°-40°   | 343.9  | 9.5       |
| 40°-50°   | 544.7  | 15.0      |
| 50°-60°   | 751.1  | 20.7      |
| 60°-70°   | 843.5  | 23.2      |
| 70°-80°   | 630.4  | 17.4      |
| 80°-90°   | 165.6  | 4.6       |
| 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       |
| 0°-90°    | 3630.4 | 100.0     |
| 0°-180°   | 3630.4 | 100.0     |

**Coefficient of Utilization**



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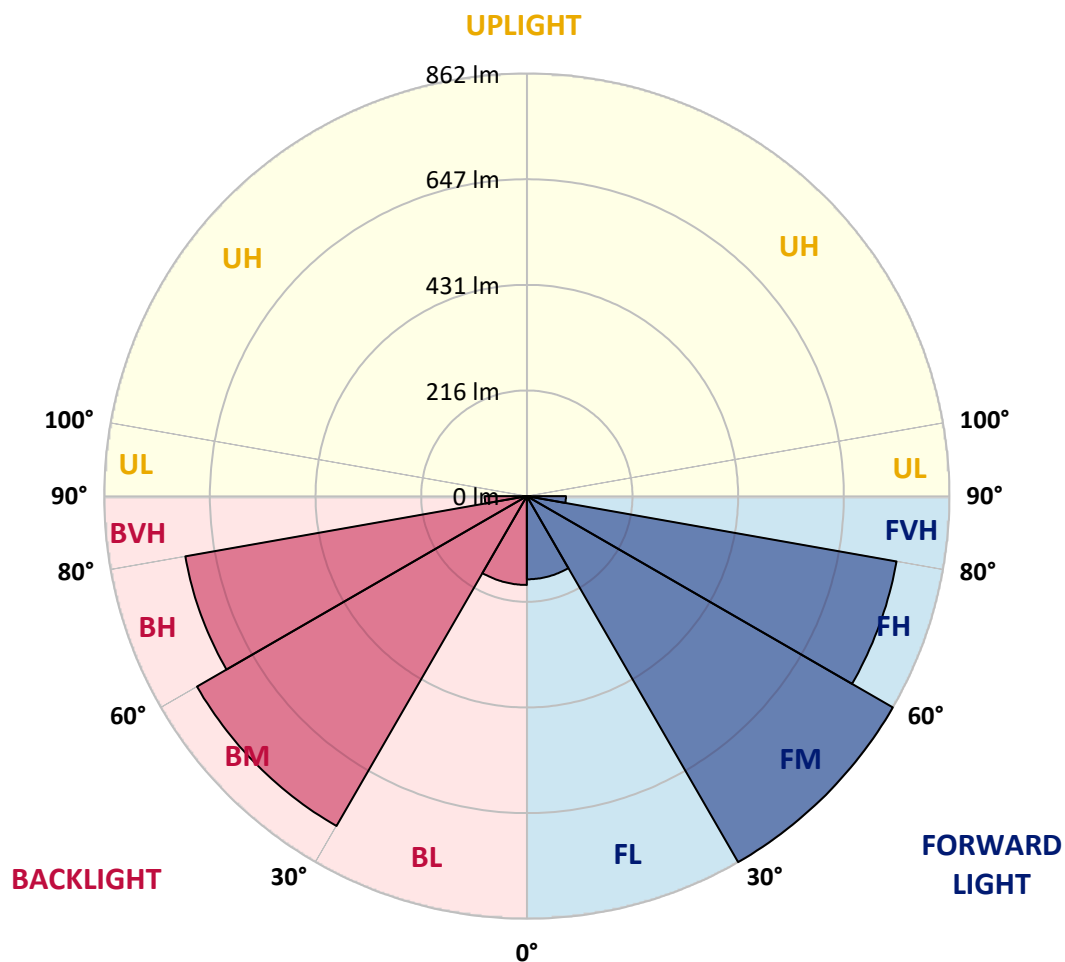
CATALOG NUMBER: CCP-VA-2-860-U-T2

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 169.7  | 4.7       |                         |      |         |
| FM   | (30°-60°)   | 862.5  | 23.8      |                         |      |         |
| FH   | (60°-80°)   | 766.2  | 21.1      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 79.8   | 2.2       |                         |      | G1/100  |
| BL   | (0°-30°)    | 181.3  | 5.0       | B1/500                  |      |         |
| BM   | (30°-60°)   | 777.3  | 21.4      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 707.7  | 19.5      | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 85.9   | 2.4       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°    | 75°    | 85°    | 90°    |
|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
| 0°    | 336.4 | 336.4 | 336.4 | 336.4 | 336.4 | 336.4 | 336.4 | 336.4  | 336.4  | 336.4  | 336.4  |
| 2.5°  | 337.7 | 337.7 | 337.7 | 337.7 | 339.0 | 339.0 | 339.0 | 339.0  | 339.0  | 337.7  | 337.7  |
| 5°    | 340.2 | 340.2 | 340.2 | 340.2 | 341.5 | 341.5 | 341.5 | 341.5  | 342.8  | 342.8  | 342.8  |
| 7.5°  | 342.8 | 342.8 | 344.1 | 344.1 | 345.4 | 345.4 | 346.7 | 346.7  | 348.0  | 349.2  | 349.2  |
| 10°   | 348.0 | 348.0 | 349.2 | 349.2 | 351.8 | 353.1 | 354.4 | 354.4  | 356.9  | 356.9  | 356.9  |
| 12.5° | 354.4 | 355.7 | 356.9 | 358.2 | 360.8 | 362.1 | 363.4 | 364.6  | 365.9  | 367.2  | 367.2  |
| 15°   | 364.6 | 363.4 | 365.9 | 368.5 | 369.8 | 372.3 | 373.6 | 374.9  | 377.5  | 380.0  | 380.0  |
| 17.5° | 372.3 | 373.6 | 374.9 | 377.5 | 380.0 | 383.9 | 386.5 | 389.0  | 391.6  | 394.2  | 394.2  |
| 20°   | 382.6 | 381.3 | 386.5 | 390.3 | 392.9 | 398.0 | 401.9 | 407.0  | 409.6  | 412.1  | 413.4  |
| 22.5° | 391.6 | 392.9 | 395.5 | 400.6 | 405.7 | 413.4 | 421.1 | 425.0  | 428.8  | 431.4  | 435.3  |
| 25°   | 403.2 | 404.4 | 408.3 | 413.4 | 421.1 | 430.1 | 439.1 | 444.2  | 448.1  | 453.2  | 457.1  |
| 27.5° | 414.7 | 414.7 | 421.1 | 428.8 | 437.8 | 449.4 | 459.7 | 464.8  | 471.2  | 477.6  | 480.2  |
| 30°   | 427.6 | 427.6 | 434.0 | 444.2 | 457.1 | 469.9 | 478.9 | 489.2  | 498.2  | 504.6  | 509.7  |
| 32.5° | 446.8 | 446.8 | 454.5 | 464.8 | 478.9 | 494.3 | 507.2 | 517.4  | 529.0  | 540.5  | 550.8  |
| 35°   | 468.6 | 469.9 | 480.2 | 493.0 | 509.7 | 529.0 | 540.5 | 554.7  | 567.5  | 586.8  | 597.0  |
| 37.5° | 503.3 | 504.6 | 516.1 | 532.8 | 549.5 | 570.1 | 589.3 | 606.0  | 625.3  | 647.1  | 654.8  |
| 40°   | 554.7 | 558.5 | 570.1 | 577.8 | 593.2 | 608.6 | 636.8 | 665.1  | 698.5  | 728.0  | 733.1  |
| 42.5° | 647.1 | 643.3 | 635.6 | 633.0 | 636.8 | 653.5 | 684.3 | 728.0  | 787.1  | 824.3  | 824.3  |
| 45°   | 683.1 | 683.1 | 684.3 | 681.8 | 679.2 | 690.8 | 726.7 | 796.0  | 879.5  | 930.9  | 941.1  |
| 47.5° | 689.5 | 690.8 | 702.3 | 712.6 | 715.2 | 728.0 | 771.7 | 862.8  | 974.5  | 1050.3 | 1056.7 |
| 50°   | 689.5 | 692.0 | 707.5 | 725.4 | 738.3 | 756.2 | 810.2 | 921.9  | 1068.2 | 1155.6 | 1172.2 |
| 52.5° | 686.9 | 689.5 | 706.2 | 728.0 | 748.5 | 774.2 | 843.6 | 983.5  | 1151.7 | 1269.8 | 1277.5 |
| 55°   | 680.5 | 683.1 | 703.6 | 726.7 | 749.8 | 784.5 | 870.5 | 1036.1 | 1232.6 | 1364.8 | 1379.0 |
| 57.5° | 672.8 | 676.6 | 698.5 | 722.9 | 744.7 | 787.1 | 888.5 | 1077.2 | 1298.1 | 1449.6 | 1475.3 |
| 60°   | 657.4 | 663.8 | 688.2 | 712.6 | 733.1 | 778.1 | 897.5 | 1109.3 | 1346.9 | 1511.2 | 1536.9 |
| 62.5° | 626.6 | 633.0 | 660.0 | 686.9 | 707.5 | 756.2 | 892.3 | 1124.7 | 1375.1 | 1549.7 | 1576.7 |
| 65°   | 588.0 | 590.6 | 620.1 | 648.4 | 668.9 | 720.3 | 870.5 | 1122.2 | 1381.5 | 1562.6 | 1593.4 |
| 66°   | 568.8 | 570.1 | 604.7 | 631.7 | 648.4 | 704.9 | 857.7 | 1113.2 | 1377.7 | 1561.3 | 1593.4 |
| 67.5° | 534.1 | 540.5 | 570.1 | 598.3 | 617.6 | 670.2 | 826.9 | 1092.6 | 1362.3 | 1548.4 | 1581.8 |
| 70°   | 473.8 | 478.9 | 503.3 | 531.6 | 552.1 | 602.2 | 760.1 | 1032.3 | 1305.8 | 1495.8 | 1534.3 |
| 72.5° | 408.3 | 412.1 | 437.8 | 458.4 | 471.2 | 525.1 | 679.2 | 933.4  | 1206.9 | 1396.9 | 1434.2 |
| 75°   | 339.0 | 341.5 | 364.6 | 378.8 | 390.3 | 437.8 | 571.4 | 806.3  | 1051.6 | 1236.4 | 1285.2 |
| 77.5° | 267.1 | 268.3 | 287.6 | 300.4 | 300.4 | 341.5 | 453.2 | 653.5  | 862.8  | 1033.6 | 1069.5 |
| 80°   | 196.4 | 195.2 | 206.7 | 213.1 | 217.0 | 244.0 | 326.1 | 480.2  | 657.4  | 790.9  | 825.6  |
| 82.5° | 128.4 | 127.1 | 134.8 | 137.4 | 137.4 | 154.1 | 205.4 | 304.3  | 431.4  | 536.7  | 557.2  |
| 85°   | 68.0  | 70.6  | 69.3  | 69.3  | 69.3  | 75.8  | 102.7 | 159.2  | 229.8  | 287.6  | 301.7  |
| 87.5° | 11.6  | 11.6  | 11.6  | 12.8  | 15.4  | 20.5  | 27.0  | 44.9   | 65.5   | 88.6   | 100.1  |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0    | 0.0    | 0.0    | 0.0    |

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**CANDELA DISTRIBUTION (continued):**

|       | 91°    | 95°    | 105°   | 115°   | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 336.4  | 336.4  | 336.4  | 336.4  | 336.4 | 336.4 | 336.4 | 336.4 | 336.4 | 336.4 | 336.4 |
| 2.5°  | 337.7  | 339.0  | 339.0  | 339.0  | 339.0 | 339.0 | 339.0 | 339.0 | 339.0 | 339.0 | 339.0 |
| 5°    | 342.8  | 342.8  | 342.8  | 344.1  | 344.1 | 344.1 | 344.1 | 344.1 | 344.1 | 344.1 | 344.1 |
| 7.5°  | 349.2  | 349.2  | 350.5  | 350.5  | 350.5 | 351.8 | 351.8 | 350.5 | 350.5 | 350.5 | 350.5 |
| 10°   | 356.9  | 356.9  | 358.2  | 359.5  | 359.5 | 360.8 | 360.8 | 359.5 | 359.5 | 358.2 | 358.2 |
| 12.5° | 367.2  | 368.5  | 369.8  | 371.1  | 372.3 | 372.3 | 371.1 | 369.8 | 368.5 | 367.2 | 367.2 |
| 15°   | 380.0  | 381.3  | 382.6  | 385.2  | 385.2 | 385.2 | 383.9 | 382.6 | 380.0 | 378.8 | 380.0 |
| 17.5° | 395.5  | 396.7  | 399.3  | 400.6  | 401.9 | 400.6 | 400.6 | 399.3 | 399.3 | 398.0 | 398.0 |
| 20°   | 414.7  | 416.0  | 419.9  | 421.1  | 421.1 | 422.4 | 426.3 | 428.8 | 432.7 | 434.0 | 434.0 |
| 22.5° | 434.0  | 436.5  | 440.4  | 445.5  | 448.1 | 453.2 | 454.5 | 457.1 | 455.8 | 452.0 | 452.0 |
| 25°   | 457.1  | 459.7  | 467.4  | 473.8  | 478.9 | 481.5 | 478.9 | 475.1 | 468.6 | 463.5 | 462.2 |
| 27.5° | 481.5  | 485.3  | 496.9  | 505.9  | 508.4 | 505.9 | 495.6 | 486.6 | 478.9 | 472.5 | 469.9 |
| 30°   | 512.3  | 518.7  | 531.6  | 536.7  | 535.4 | 525.1 | 509.7 | 498.2 | 486.6 | 478.9 | 477.6 |
| 32.5° | 550.8  | 557.2  | 568.8  | 570.1  | 562.4 | 543.1 | 522.6 | 507.2 | 493.0 | 484.0 | 482.8 |
| 35°   | 597.0  | 603.5  | 609.9  | 606.0  | 584.2 | 559.8 | 534.1 | 512.3 | 498.2 | 487.9 | 487.9 |
| 37.5° | 656.1  | 660.0  | 660.0  | 640.7  | 607.3 | 575.2 | 543.1 | 517.4 | 502.0 | 491.8 | 490.5 |
| 40°   | 733.1  | 731.9  | 713.9  | 676.6  | 633.0 | 589.3 | 549.5 | 522.6 | 503.3 | 493.0 | 491.8 |
| 42.5° | 825.6  | 816.6  | 778.1  | 717.7  | 657.4 | 602.2 | 557.2 | 523.9 | 502.0 | 491.8 | 490.5 |
| 45°   | 938.6  | 923.2  | 853.8  | 765.2  | 683.1 | 613.7 | 561.1 | 522.6 | 498.2 | 486.6 | 485.3 |
| 47.5° | 1050.3 | 1041.3 | 946.3  | 815.3  | 708.7 | 626.6 | 563.7 | 518.7 | 490.5 | 473.8 | 473.8 |
| 50°   | 1168.4 | 1146.6 | 1038.7 | 875.7  | 735.7 | 635.6 | 563.7 | 512.3 | 477.6 | 459.7 | 457.1 |
| 52.5° | 1282.7 | 1260.8 | 1132.4 | 936.0  | 765.2 | 644.5 | 561.1 | 503.3 | 466.1 | 446.8 | 444.2 |
| 55°   | 1380.2 | 1362.3 | 1223.6 | 1004.1 | 796.0 | 651.0 | 557.2 | 493.0 | 454.5 | 436.5 | 434.0 |
| 57.5° | 1470.1 | 1452.1 | 1303.2 | 1061.8 | 825.6 | 654.8 | 548.2 | 480.2 | 440.4 | 422.4 | 421.1 |
| 60°   | 1535.6 | 1521.5 | 1371.3 | 1115.8 | 850.0 | 654.8 | 535.4 | 464.8 | 425.0 | 407.0 | 405.7 |
| 62.5° | 1579.3 | 1565.1 | 1420.1 | 1151.7 | 865.4 | 645.8 | 516.1 | 444.2 | 405.7 | 389.0 | 385.2 |
| 65°   | 1596.0 | 1583.1 | 1441.9 | 1165.8 | 862.8 | 627.9 | 490.5 | 418.6 | 381.3 | 364.6 | 362.1 |
| 66°   | 1597.2 | 1583.1 | 1441.9 | 1163.3 | 856.4 | 617.6 | 478.9 | 407.0 | 371.1 | 354.4 | 351.8 |
| 67.5° | 1587.0 | 1574.1 | 1432.9 | 1150.4 | 838.4 | 598.3 | 455.8 | 387.8 | 351.8 | 335.1 | 333.8 |
| 70°   | 1539.5 | 1529.2 | 1384.1 | 1101.6 | 796.0 | 556.0 | 417.3 | 350.5 | 315.9 | 304.3 | 300.4 |
| 72.5° | 1436.7 | 1425.2 | 1286.5 | 1010.5 | 726.7 | 498.2 | 368.5 | 306.9 | 278.6 | 264.5 | 263.2 |
| 75°   | 1277.5 | 1272.4 | 1137.6 | 889.8  | 626.6 | 428.8 | 312.0 | 259.4 | 236.2 | 226.0 | 226.0 |
| 77.5° | 1069.5 | 1059.3 | 945.0  | 735.7  | 514.9 | 346.7 | 250.4 | 210.6 | 192.6 | 183.6 | 184.9 |
| 80°   | 832.0  | 824.3  | 728.0  | 552.1  | 389.0 | 260.6 | 187.5 | 160.5 | 147.7 | 142.5 | 140.0 |
| 82.5° | 570.1  | 549.5  | 485.3  | 365.9  | 252.9 | 175.9 | 129.7 | 111.7 | 105.3 | 104.0 | 102.7 |
| 85°   | 296.6  | 304.3  | 255.5  | 193.9  | 137.4 | 97.6  | 78.3  | 71.9  | 69.3  | 70.6  | 70.6  |
| 87.5° | 97.6   | 100.1  | 77.0   | 59.1   | 44.9  | 34.7  | 29.5  | 28.2  | 24.4  | 27.0  | 28.2  |
| 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: SP1-2005-785-20

Luminaire Tested: WIS-VA-3-857-U-T4FT

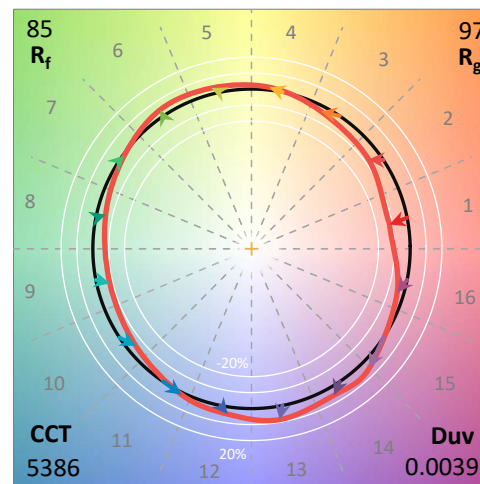
Test Date: 09/11/2020

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2005-785-20  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/11/2020  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-VA-3-857-U-T4FT**  
 Description: INVUE WALL PACK VA

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 5386   | CRI (Ra): | 83.7 |      |      |
| CIE u':                   | 0.2049 | R1:       | 81.8 | R9:  | 10.3 |
| CIE v':                   | 0.4830 | R2:       | 87.3 | R10: | 70.9 |
| Duv:                      | 0.0039 | R3:       | 92.0 | R11: | 85.0 |
| CIE x:                    | 0.3352 | R4:       | 84.6 | R12: | 66.4 |
| CIE y:                    | 0.3511 | R5:       | 83.2 | R13: | 83.0 |
| CIE z:                    | 0.3137 | R6:       | 83.3 | R14: | 95.8 |
| Peak Wavelength (nm):     | 450    | R7:       | 87.5 |      |      |
| Dominant Wavelength (nm): | 559    | R8:       | 69.6 |      |      |
| Purity:                   | 6.1    |           |      |      |      |
| Rf:                       | 84.9   |           |      |      |      |
| Rg:                       | 97     |           |      |      |      |



### Test Conditions

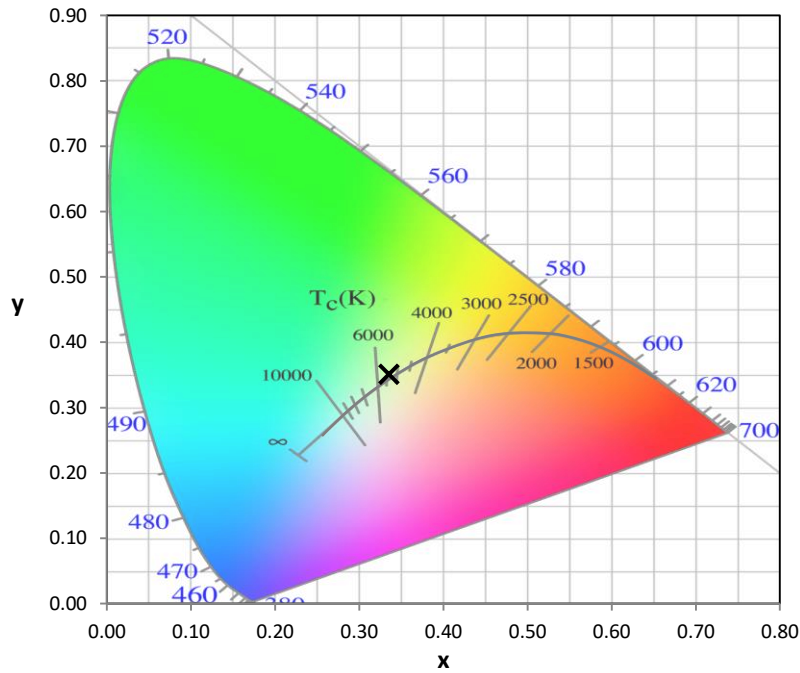
Stabilization Time: 53M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.1/46%  
 Sphere Temperature (°C): 24.8

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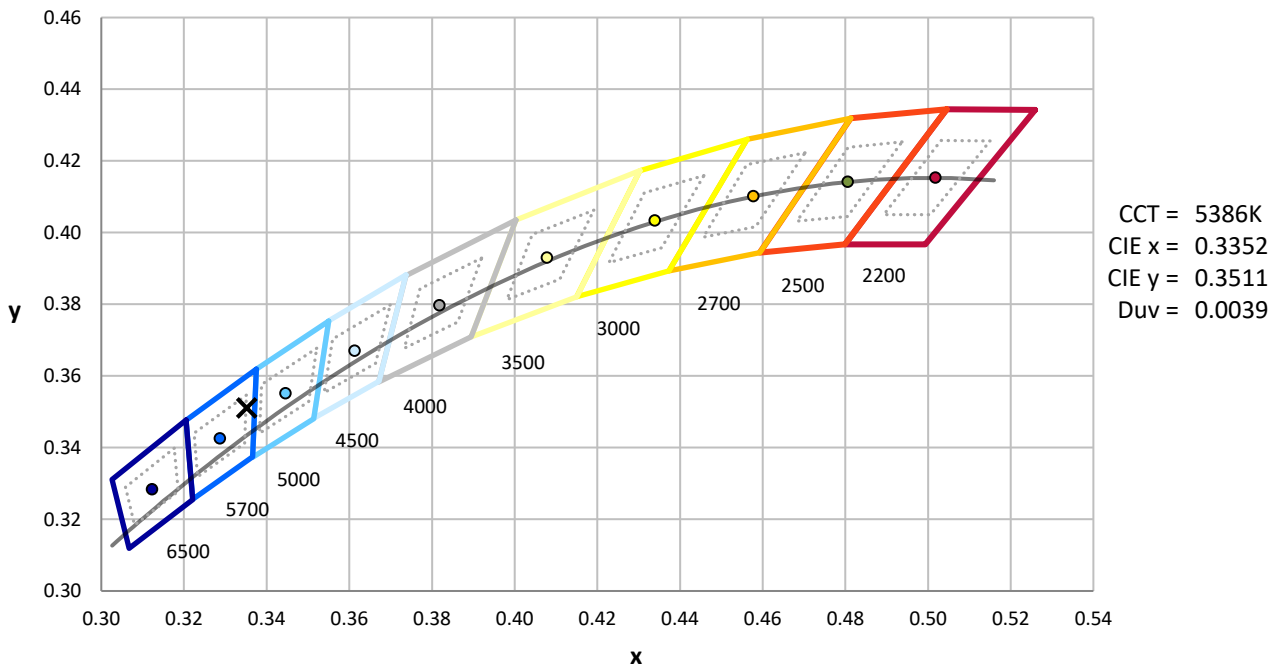
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| Power Meter                    | IN0071                | 12/3/2020        | 12/3/2020            |
| AC Power Source                | IN0063                | 12/3/2020        | 12/3/2020            |
| DC Power Source                | IN0208                | 12/3/2020        | 12/3/2020            |
| Sphere Thermometer             | IN0085                | 12/3/2020        | 12/3/2020            |
| Room Thermometer               | IN0046                | 12/3/2020        | 12/3/2020            |

REPORT NUMBER: SP1-2005-785-20

**CIE 1931 Chromaticity Diagram**



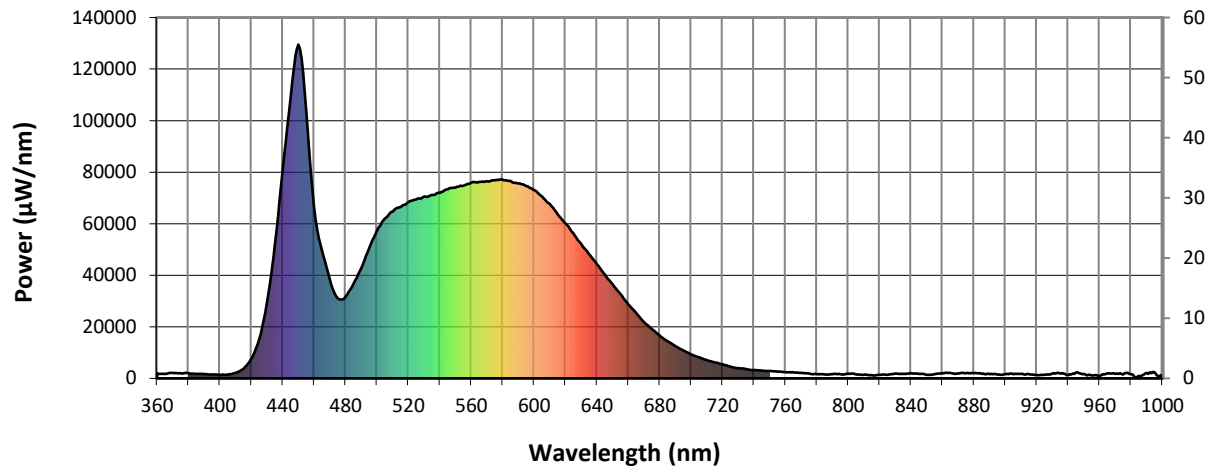
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 5700K 7-step quadrangle

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### Photopic Flux vs. Wavelength

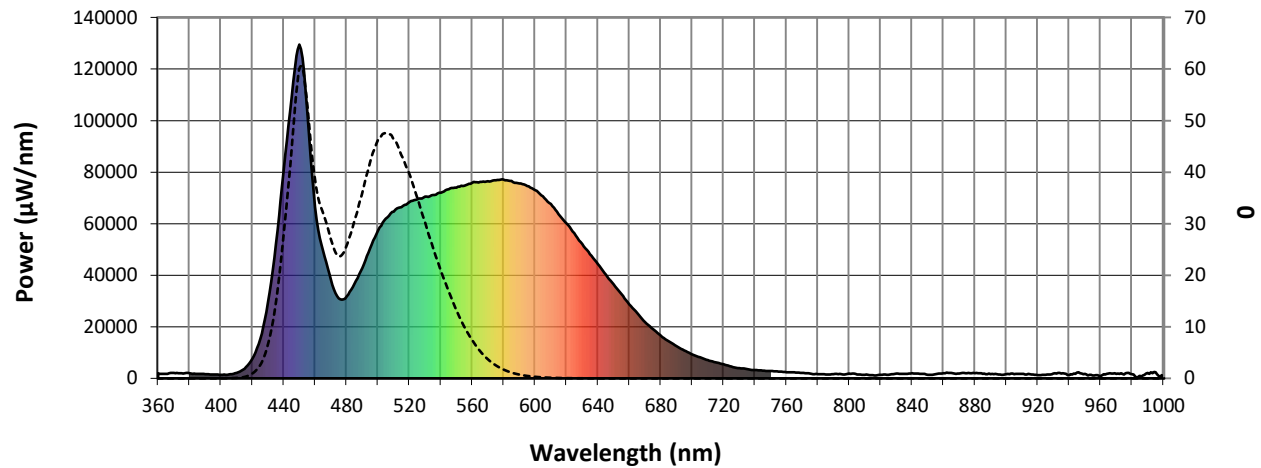


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| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1954             | 0.0              | 490       | 42831            | 6.1              | 620       | 60042            | 15.6             | 750       | 2873             | 0.0              | 880       | 2044             | 0.0              |
| 365       | 1724             | 0.0              | 495       | 50448            | 9.1              | 625       | 56351            | 12.4             | 755       | 2631             | 0.0              | 885       | 1734             | 0.0              |
| 370       | 2062             | 0.0              | 500       | 57301            | 12.6             | 630       | 52118            | 9.4              | 760       | 2425             | 0.0              | 890       | 1667             | 0.0              |
| 375       | 2008             | 0.0              | 505       | 61967            | 17.3             | 635       | 48230            | 7.2              | 765       | 2317             | 0.0              | 895       | 1441             | 0.0              |
| 380       | 1953             | 0.0              | 510       | 64719            | 22.2             | 640       | 44375            | 5.3              | 770       | 2102             | 0.0              | 900       | 1603             | 0.0              |
| 385       | 1682             | 0.0              | 515       | 66397            | 27.5             | 645       | 40217            | 3.9              | 775       | 1830             | 0.0              | 905       | 1642             | 0.0              |
| 390       | 1649             | 0.0              | 520       | 68407            | 33.2             | 650       | 36527            | 2.7              | 780       | 1607             | 0.0              | 910       | 1741             | 0.0              |
| 395       | 1482             | 0.0              | 525       | 69467            | 37.3             | 655       | 32673            | 1.9              | 785       | 1521             | 0.0              | 915       | 1565             | 0.0              |
| 400       | 1382             | 0.0              | 530       | 70500            | 41.5             | 660       | 28715            | 1.2              | 790       | 1655             | 0.0              | 920       | 1282             | 0.0              |
| 405       | 1525             | 0.0              | 535       | 71117            | 44.1             | 665       | 25303            | 0.8              | 795       | 1623             | 0.0              | 925       | 1374             | 0.0              |
| 410       | 2147             | 0.0              | 540       | 71985            | 46.9             | 670       | 21826            | 0.5              | 800       | 1833             | 0.0              | 930       | 1841             | 0.0              |
| 415       | 3759             | 0.0              | 545       | 73383            | 48.8             | 675       | 19145            | 0.3              | 805       | 1530             | 0.0              | 935       | 1813             | 0.0              |
| 420       | 7611             | 0.0              | 550       | 74010            | 50.3             | 680       | 16611            | 0.2              | 810       | 1397             | 0.0              | 940       | 1263             | 0.0              |
| 425       | 15319            | 0.1              | 555       | 74748            | 51.1             | 685       | 14392            | 0.1              | 815       | 1230             | 0.0              | 945       | 2229             | 0.0              |
| 430       | 29510            | 0.2              | 560       | 75851            | 51.5             | 690       | 12540            | 0.1              | 820       | 1409             | 0.0              | 950       | 1745             | 0.0              |
| 435       | 52212            | 0.6              | 565       | 76291            | 50.7             | 695       | 10850            | 0.0              | 825       | 1376             | 0.0              | 955       | 1081             | 0.0              |
| 440       | 80741            | 1.3              | 570       | 76525            | 49.8             | 700       | 9348             | 0.0              | 830       | 1909             | 0.0              | 960       | 876              | 0.0              |
| 445       | 108993           | 2.3              | 575       | 76882            | 47.8             | 705       | 8139             | 0.0              | 835       | 1697             | 0.0              | 965       | 1894             | 0.0              |
| 450       | 129500           | 3.4              | 580       | 77077            | 45.8             | 710       | 7042             | 0.0              | 840       | 1953             | 0.0              | 970       | 1743             | 0.0              |
| 455       | 103230           | 3.5              | 585       | 76634            | 42.6             | 715       | 6253             | 0.0              | 845       | 1765             | 0.0              | 975       | 1544             | 0.0              |
| 460       | 66471            | 2.7              | 590       | 75616            | 39.1             | 720       | 5450             | 0.0              | 850       | 1313             | 0.0              | 980       | 1583             | 0.0              |
| 465       | 49584            | 2.6              | 595       | 74612            | 35.4             | 725       | 4567             | 0.0              | 855       | 1616             | 0.0              | 985       | 953              | 0.0              |
| 470       | 38149            | 2.4              | 600       | 72977            | 31.5             | 730       | 3952             | 0.0              | 860       | 2001             | 0.0              | 990       | 2075             | 0.0              |
| 475       | 31044            | 2.4              | 605       | 70597            | 27.3             | 735       | 3632             | 0.0              | 865       | 2095             | 0.0              | 995       | 2336             | 0.0              |
| 480       | 31747            | 3.0              | 610       | 67624            | 23.2             | 740       | 3214             | 0.0              | 870       | 1923             | 0.0              | 1000      | 595              | 0.0              |
| 485       | 36675            | 4.3              | 615       | 63727            | 19.2             | 745       | 3034             | 0.0              | 875       | 2037             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



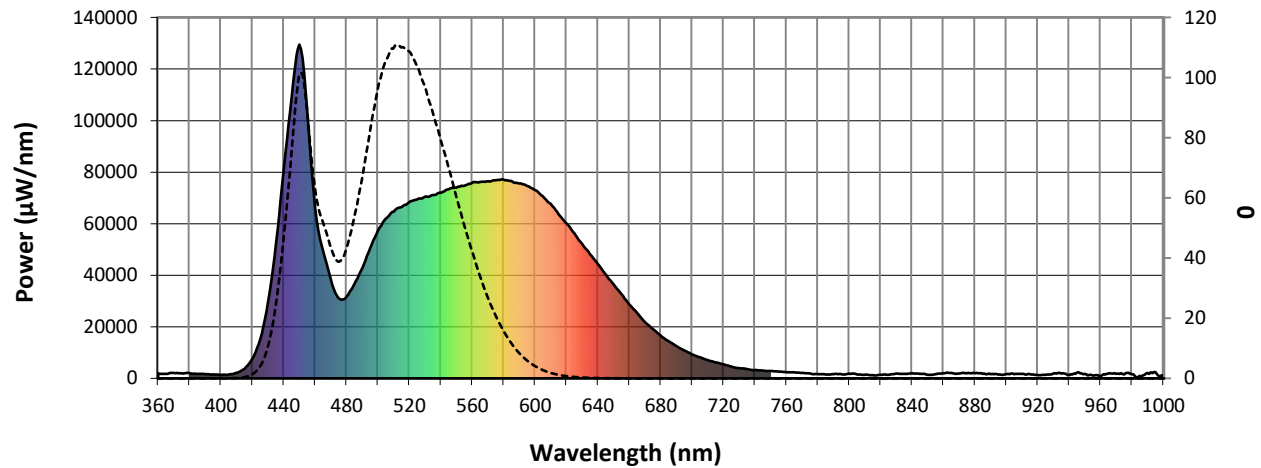
Scotopic Lumens: 4315.3

S/P: 0.86

| 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       | 1954             | 0.0              | 490       | 42831            | 66.0             | 620       | 60042            | 0.8              | 750       | 2873             | 0.0              | 880       | 2044             | 0.0              |
| 365       | 1724             | 0.0              | 495       | 50448            | 81.6             | 625       | 56351            | 0.5              | 755       | 2631             | 0.0              | 885       | 1734             | 0.0              |
| 370       | 2062             | 0.0              | 500       | 57301            | 95.8             | 630       | 52118            | 0.3              | 760       | 2425             | 0.0              | 890       | 1667             | 0.0              |
| 375       | 2008             | 0.0              | 505       | 61967            | 105.3            | 635       | 48230            | 0.2              | 765       | 2317             | 0.0              | 895       | 1441             | 0.0              |
| 380       | 1953             | 0.0              | 510       | 64719            | 109.7            | 640       | 44375            | 0.1              | 770       | 2102             | 0.0              | 900       | 1603             | 0.0              |
| 385       | 1682             | 0.0              | 515       | 66397            | 110.1            | 645       | 40217            | 0.1              | 775       | 1830             | 0.0              | 905       | 1642             | 0.0              |
| 390       | 1649             | 0.0              | 520       | 68407            | 108.7            | 650       | 36527            | 0.0              | 780       | 1607             | 0.0              | 910       | 1741             | 0.0              |
| 395       | 1482             | 0.0              | 525       | 69467            | 103.9            | 655       | 32673            | 0.0              | 785       | 1521             | 0.0              | 915       | 1565             | 0.0              |
| 400       | 1382             | 0.0              | 530       | 70500            | 97.2             | 660       | 28715            | 0.0              | 790       | 1655             | 0.0              | 920       | 1282             | 0.0              |
| 405       | 1525             | 0.0              | 535       | 71117            | 88.6             | 665       | 25303            | 0.0              | 795       | 1623             | 0.0              | 925       | 1374             | 0.0              |
| 410       | 2147             | 0.1              | 540       | 71985            | 79.5             | 670       | 21826            | 0.0              | 800       | 1833             | 0.0              | 930       | 1841             | 0.0              |
| 415       | 3759             | 0.4              | 545       | 73383            | 70.4             | 675       | 19145            | 0.0              | 805       | 1530             | 0.0              | 935       | 1813             | 0.0              |
| 420       | 7611             | 1.3              | 550       | 74010            | 60.5             | 680       | 16611            | 0.0              | 810       | 1397             | 0.0              | 940       | 1263             | 0.0              |
| 425       | 15319            | 3.7              | 555       | 74748            | 51.1             | 685       | 14392            | 0.0              | 815       | 1230             | 0.0              | 945       | 2229             | 0.0              |
| 430       | 29510            | 10.0             | 560       | 75851            | 42.4             | 690       | 12540            | 0.0              | 820       | 1409             | 0.0              | 950       | 1745             | 0.0              |
| 435       | 52212            | 23.3             | 565       | 76291            | 34.2             | 695       | 10850            | 0.0              | 825       | 1376             | 0.0              | 955       | 1081             | 0.0              |
| 440       | 80741            | 45.1             | 570       | 76525            | 27.0             | 700       | 9348             | 0.0              | 830       | 1909             | 0.0              | 960       | 876              | 0.0              |
| 445       | 108993           | 73.0             | 575       | 76882            | 20.9             | 705       | 8139             | 0.0              | 835       | 1697             | 0.0              | 965       | 1894             | 0.0              |
| 450       | 129500           | 100.4            | 580       | 77077            | 15.9             | 710       | 7042             | 0.0              | 840       | 1953             | 0.0              | 970       | 1743             | 0.0              |
| 455       | 103230           | 90.2             | 585       | 76634            | 11.7             | 715       | 6253             | 0.0              | 845       | 1765             | 0.0              | 975       | 1544             | 0.0              |
| 460       | 66471            | 64.2             | 590       | 75616            | 8.4              | 720       | 5450             | 0.0              | 850       | 1313             | 0.0              | 980       | 1583             | 0.0              |
| 465       | 49584            | 52.4             | 595       | 74612            | 5.9              | 725       | 4567             | 0.0              | 855       | 1616             | 0.0              | 985       | 953              | 0.0              |
| 470       | 38149            | 43.9             | 600       | 72977            | 4.1              | 730       | 3952             | 0.0              | 860       | 2001             | 0.0              | 990       | 2075             | 0.0              |
| 475       | 31044            | 38.8             | 605       | 70597            | 2.8              | 735       | 3632             | 0.0              | 865       | 2095             | 0.0              | 995       | 2336             | 0.0              |
| 480       | 31747            | 42.9             | 610       | 67624            | 1.8              | 740       | 3214             | 0.0              | 870       | 1923             | 0.0              | 1000      | 595              | 0.0              |
| 485       | 36675            | 53.2             | 615       | 63727            | 1.2              | 745       | 3034             | 0.0              | 875       | 2037             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 10248.4      S/P: 2.05**

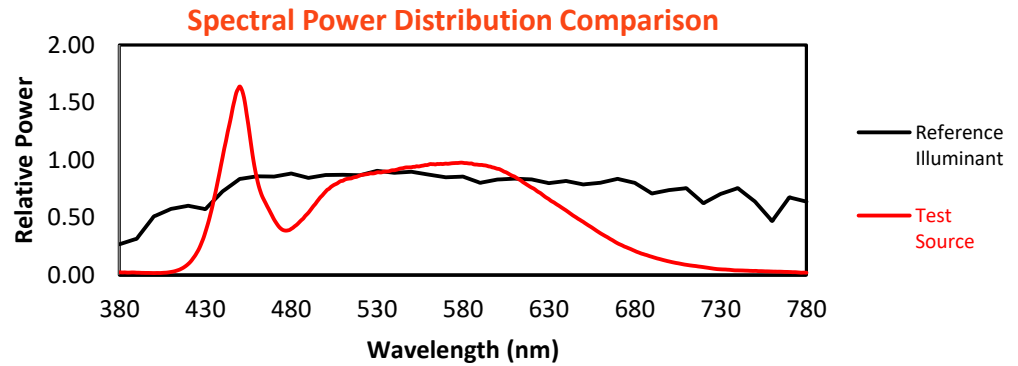
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1954             | 0.0              | 490       | 42831            | 35.6             | 620       | 60042            | 0.0              | 750       | 2873             | 0.0              | 880       | 2044             | 0.0              |
| 365       | 1724             | 0.0              | 495       | 50448            | 41.6             | 625       | 56351            | 0.0              | 755       | 2631             | 0.0              | 885       | 1734             | 0.0              |
| 370       | 2062             | 0.0              | 500       | 57301            | 46.1             | 630       | 52118            | 0.0              | 760       | 2425             | 0.0              | 890       | 1667             | 0.0              |
| 375       | 2008             | 0.0              | 505       | 61967            | 47.6             | 635       | 48230            | 0.0              | 765       | 2317             | 0.0              | 895       | 1441             | 0.0              |
| 380       | 1953             | 0.0              | 510       | 64719            | 46.5             | 640       | 44375            | 0.0              | 770       | 2102             | 0.0              | 900       | 1603             | 0.0              |
| 385       | 1682             | 0.0              | 515       | 66397            | 43.4             | 645       | 40217            | 0.0              | 775       | 1830             | 0.0              | 905       | 1642             | 0.0              |
| 390       | 1649             | 0.0              | 520       | 68407            | 39.8             | 650       | 36527            | 0.0              | 780       | 1607             | 0.0              | 910       | 1741             | 0.0              |
| 395       | 1482             | 0.0              | 525       | 69467            | 35.2             | 655       | 32673            | 0.0              | 785       | 1521             | 0.0              | 915       | 1565             | 0.0              |
| 400       | 1382             | 0.0              | 530       | 70500            | 30.5             | 660       | 28715            | 0.0              | 790       | 1655             | 0.0              | 920       | 1282             | 0.0              |
| 405       | 1525             | 0.0              | 535       | 71117            | 25.6             | 665       | 25303            | 0.0              | 795       | 1623             | 0.0              | 925       | 1374             | 0.0              |
| 410       | 2147             | 0.1              | 540       | 71985            | 21.1             | 670       | 21826            | 0.0              | 800       | 1833             | 0.0              | 930       | 1841             | 0.0              |
| 415       | 3759             | 0.2              | 545       | 73383            | 17.0             | 675       | 19145            | 0.0              | 805       | 1530             | 0.0              | 935       | 1813             | 0.0              |
| 420       | 7611             | 0.9              | 550       | 74010            | 13.3             | 680       | 16611            | 0.0              | 810       | 1397             | 0.0              | 940       | 1263             | 0.0              |
| 425       | 15319            | 2.4              | 555       | 74748            | 10.1             | 685       | 14392            | 0.0              | 815       | 1230             | 0.0              | 945       | 2229             | 0.0              |
| 430       | 29510            | 6.2              | 560       | 75851            | 7.5              | 690       | 12540            | 0.0              | 820       | 1409             | 0.0              | 950       | 1745             | 0.0              |
| 435       | 52212            | 13.9             | 565       | 76291            | 5.4              | 695       | 10850            | 0.0              | 825       | 1376             | 0.0              | 955       | 1081             | 0.0              |
| 440       | 80741            | 27.0             | 570       | 76525            | 3.7              | 700       | 9348             | 0.0              | 830       | 1909             | 0.0              | 960       | 876              | 0.0              |
| 445       | 108993           | 43.0             | 575       | 76882            | 2.6              | 705       | 8139             | 0.0              | 835       | 1697             | 0.0              | 965       | 1894             | 0.0              |
| 450       | 129500           | 59.7             | 580       | 77077            | 1.7              | 710       | 7042             | 0.0              | 840       | 1953             | 0.0              | 970       | 1743             | 0.0              |
| 455       | 103230           | 54.1             | 585       | 76634            | 1.1              | 715       | 6253             | 0.0              | 845       | 1765             | 0.0              | 975       | 1544             | 0.0              |
| 460       | 66471            | 39.2             | 590       | 75616            | 0.7              | 720       | 5450             | 0.0              | 850       | 1313             | 0.0              | 980       | 1583             | 0.0              |
| 465       | 49584            | 32.4             | 595       | 74612            | 0.5              | 725       | 4567             | 0.0              | 855       | 1616             | 0.0              | 985       | 953              | 0.0              |
| 470       | 38149            | 27.3             | 600       | 72977            | 0.3              | 730       | 3952             | 0.0              | 860       | 2001             | 0.0              | 990       | 2075             | 0.0              |
| 475       | 31044            | 23.7             | 605       | 70597            | 0.2              | 735       | 3632             | 0.0              | 865       | 2095             | 0.0              | 995       | 2336             | 0.0              |
| 480       | 31747            | 25.5             | 610       | 67624            | 0.1              | 740       | 3214             | 0.0              | 870       | 1923             | 0.0              | 1000      | 595              | 0.0              |
| 485       | 36675            | 30.2             | 615       | 63727            | 0.1              | 745       | 3034             | 0.0              | 875       | 2037             | 0.0              |           |                  |                  |

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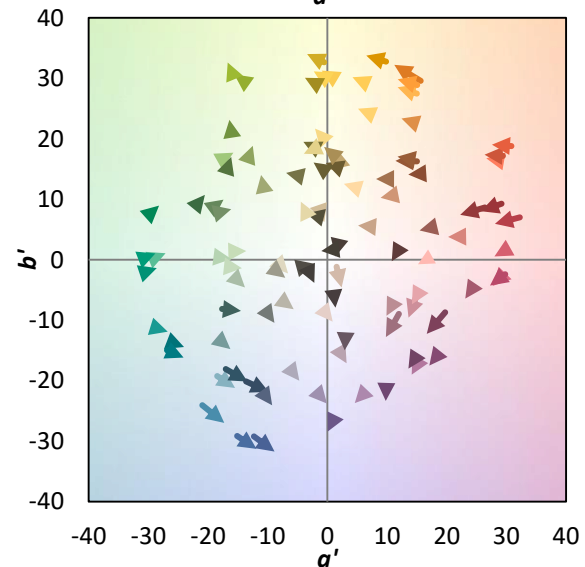
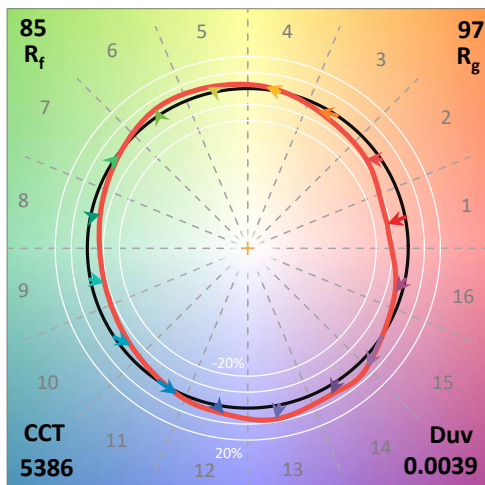
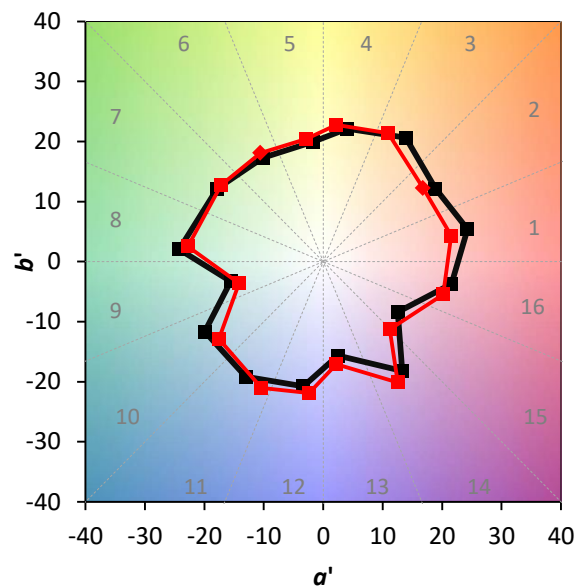
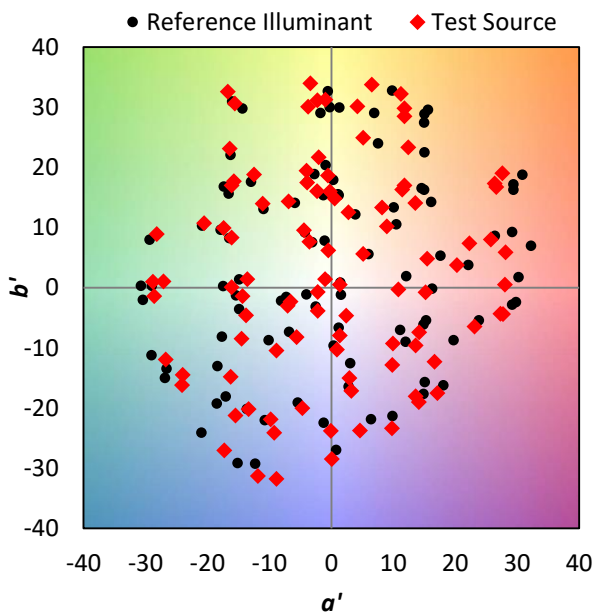
TM-30-18

### Summary

$R_f = 84.9$   
 $R_g = 97$   
 CIE  $R_a = 83.7$   
 $R_9 = 10.3$

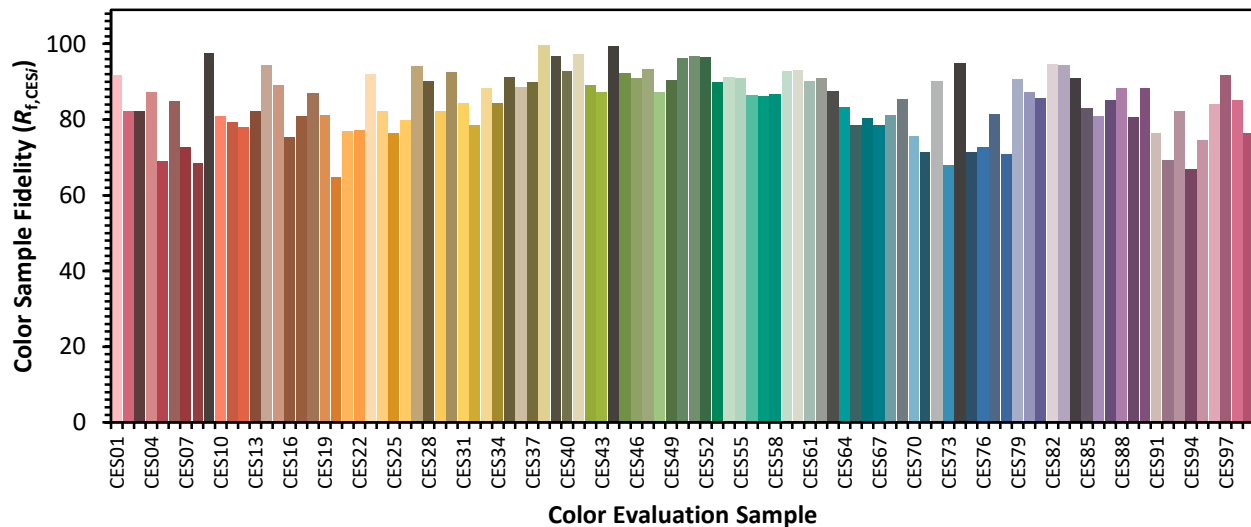


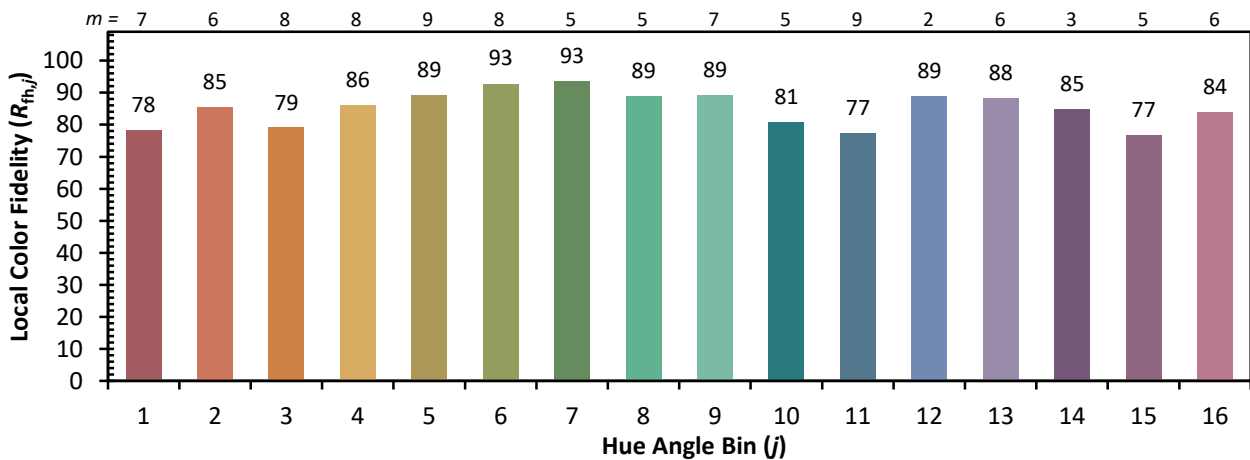
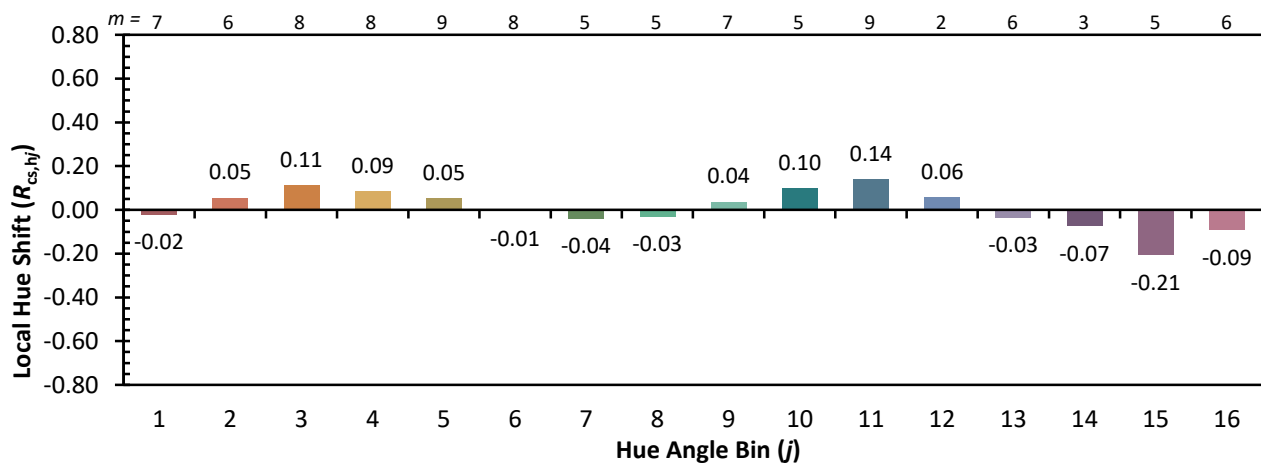
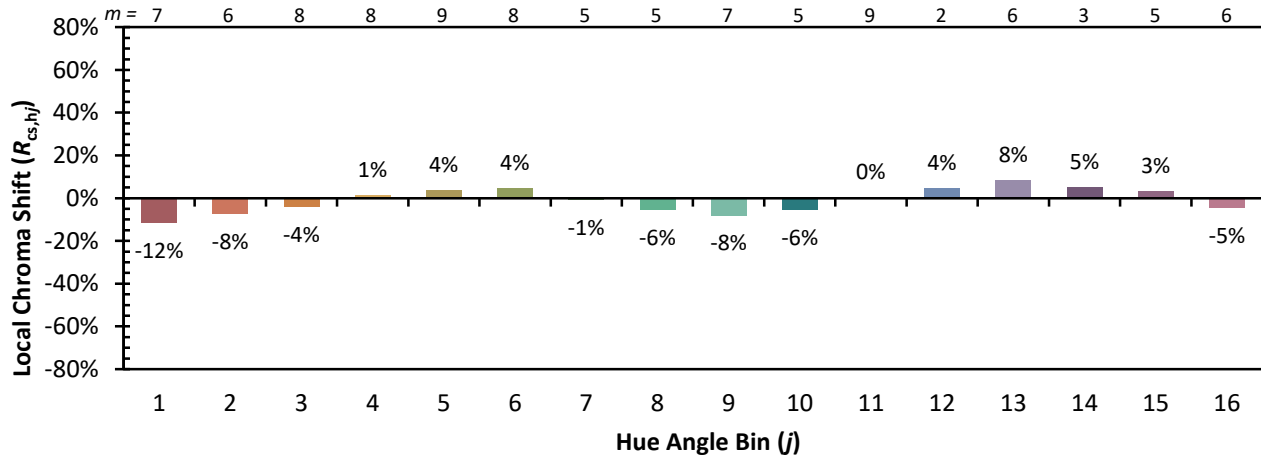
### Color Vector Graphics



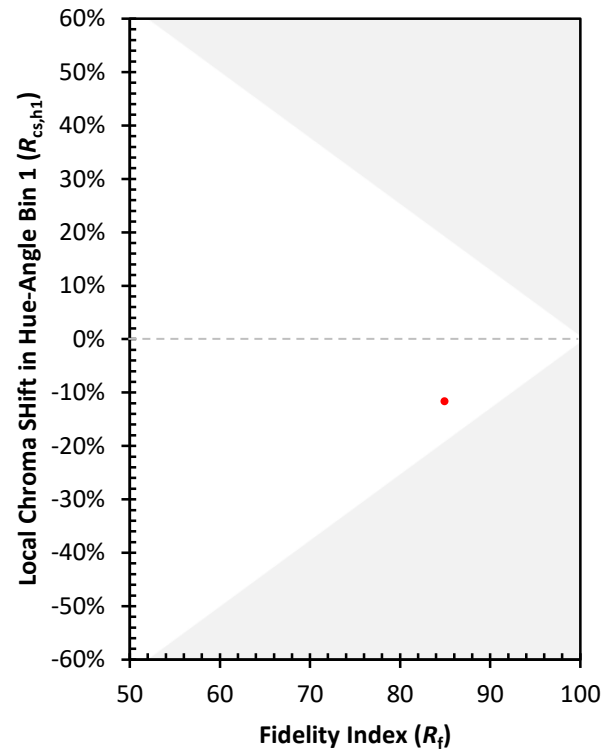
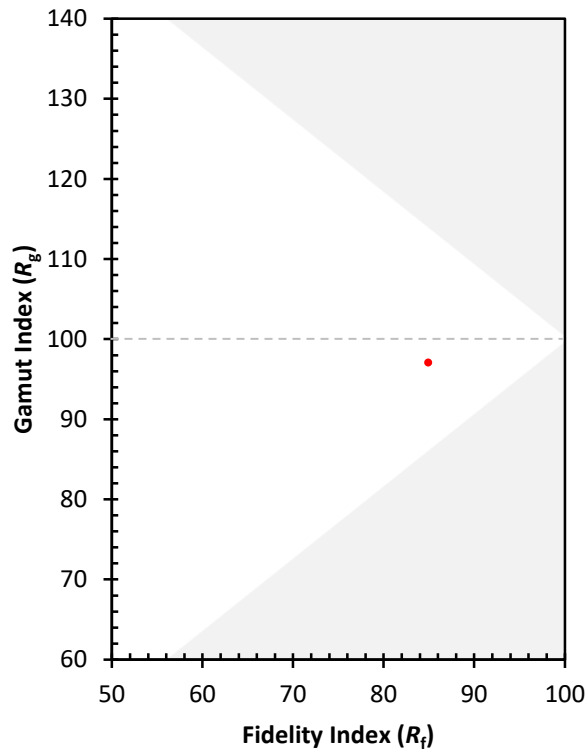
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |             |            |            |
|------------|-------------|------------|------------|
| CES01 = 85 | CES26 = 80  | CES51 = 97 | CES76 = 73 |
| CES02 = 60 | CES27 = 94  | CES52 = 96 | CES77 = 81 |
| CES03 = 30 | CES28 = 90  | CES53 = 90 | CES78 = 71 |
| CES04 = 68 | CES29 = 82  | CES54 = 91 | CES79 = 91 |
| CES05 = 46 | CES30 = 92  | CES55 = 91 | CES80 = 87 |
| CES06 = 50 | CES31 = 84  | CES56 = 86 | CES81 = 86 |
| CES07 = 39 | CES32 = 79  | CES57 = 86 | CES82 = 95 |
| CES08 = 38 | CES33 = 88  | CES58 = 87 | CES83 = 94 |
| CES09 = 29 | CES34 = 84  | CES59 = 93 | CES84 = 91 |
| CES10 = 72 | CES35 = 91  | CES60 = 93 | CES85 = 83 |
| CES11 = 55 | CES36 = 89  | CES61 = 90 | CES86 = 81 |
| CES12 = 61 | CES37 = 90  | CES62 = 91 | CES87 = 85 |
| CES13 = 42 | CES38 = 100 | CES63 = 88 | CES88 = 88 |
| CES14 = 74 | CES39 = 97  | CES64 = 83 | CES89 = 81 |
| CES15 = 70 | CES40 = 93  | CES65 = 79 | CES90 = 88 |
| CES16 = 46 | CES41 = 97  | CES66 = 80 | CES91 = 76 |
| CES17 = 48 | CES42 = 89  | CES67 = 79 | CES92 = 69 |
| CES18 = 55 | CES43 = 87  | CES68 = 81 | CES93 = 82 |
| CES19 = 70 | CES44 = 99  | CES69 = 85 | CES94 = 67 |
| CES20 = 64 | CES45 = 92  | CES70 = 76 | CES95 = 75 |
| CES21 = 85 | CES46 = 91  | CES71 = 71 | CES96 = 84 |
| CES22 = 77 | CES47 = 93  | CES72 = 90 | CES97 = 92 |
| CES23 = 91 | CES48 = 87  | CES73 = 68 | CES98 = 85 |
| CES24 = 90 | CES49 = 90  | CES74 = 95 | CES99 = 76 |
| CES25 = 70 | CES50 = 96  | CES75 = 71 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)