

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: P472343

Luminaire Tested: **CCP-VA-3-835-U-T3**

Issue Date: 01/27/2021



**Test Information**

Test Method: LM-79-08  
Report Number: P472343  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 01/27/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-VA-3-835-U-T3  
Description: INVUE CLEARCURVE POLE MOUNT Wave Stream LUMINAIRE WITH T3  
DISTRIBUTION LENS  
Light Source: 3500K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4180.5 lumens  
Efficiency: N/A  
Efficacy: 85.5 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.54' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B2 - U0 - G2

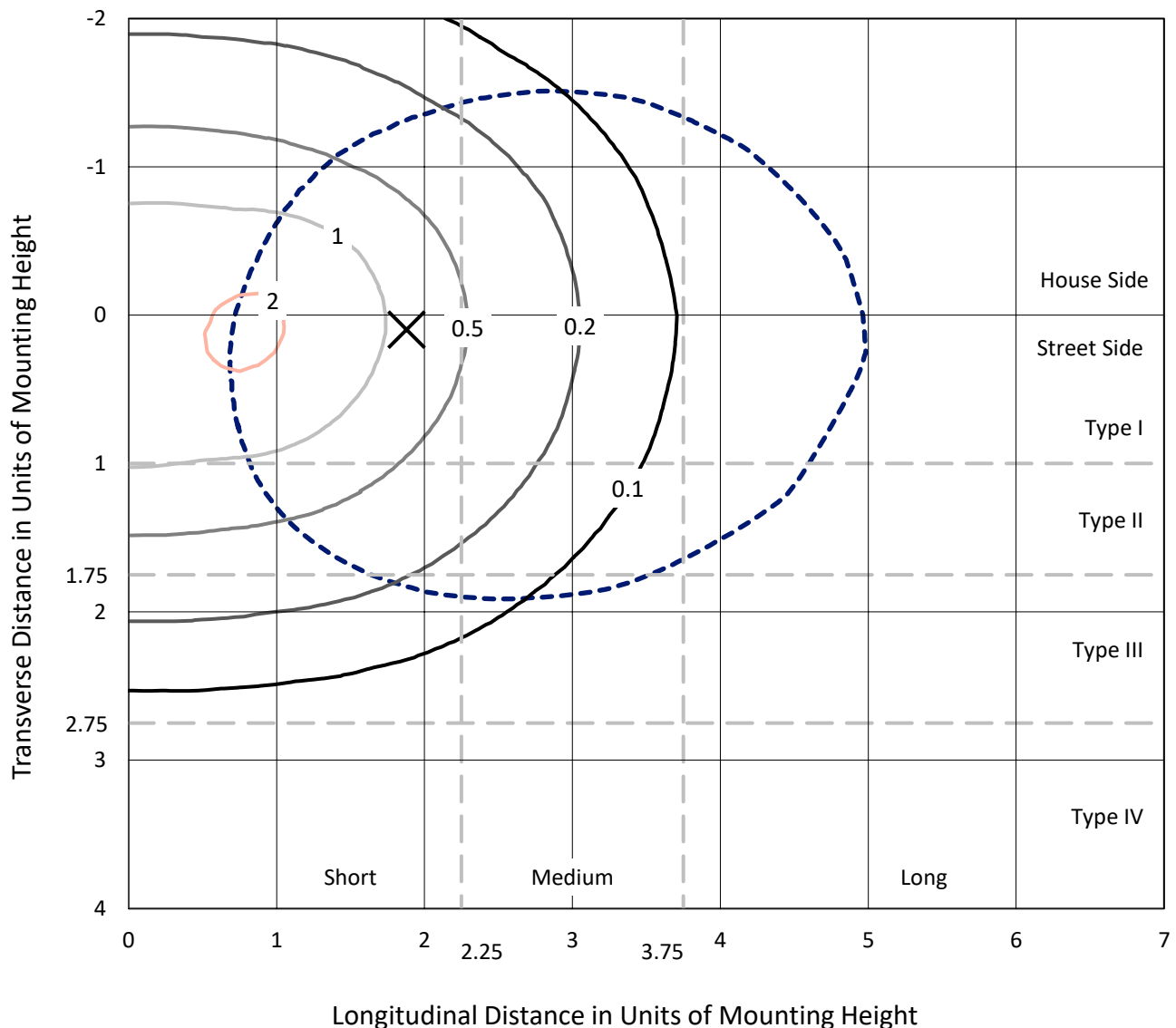
Input Watts (W): 48.9  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

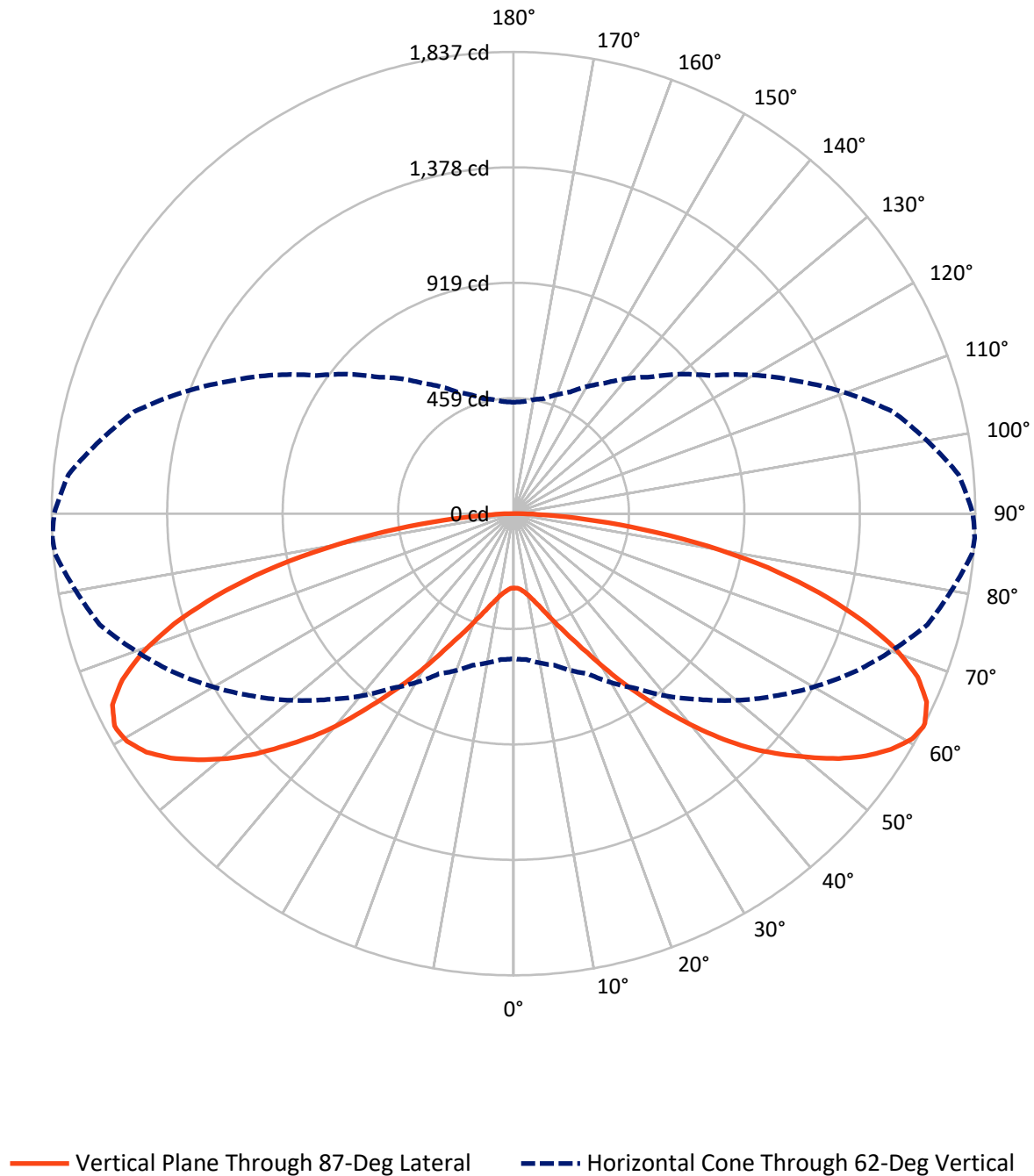
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 2.2 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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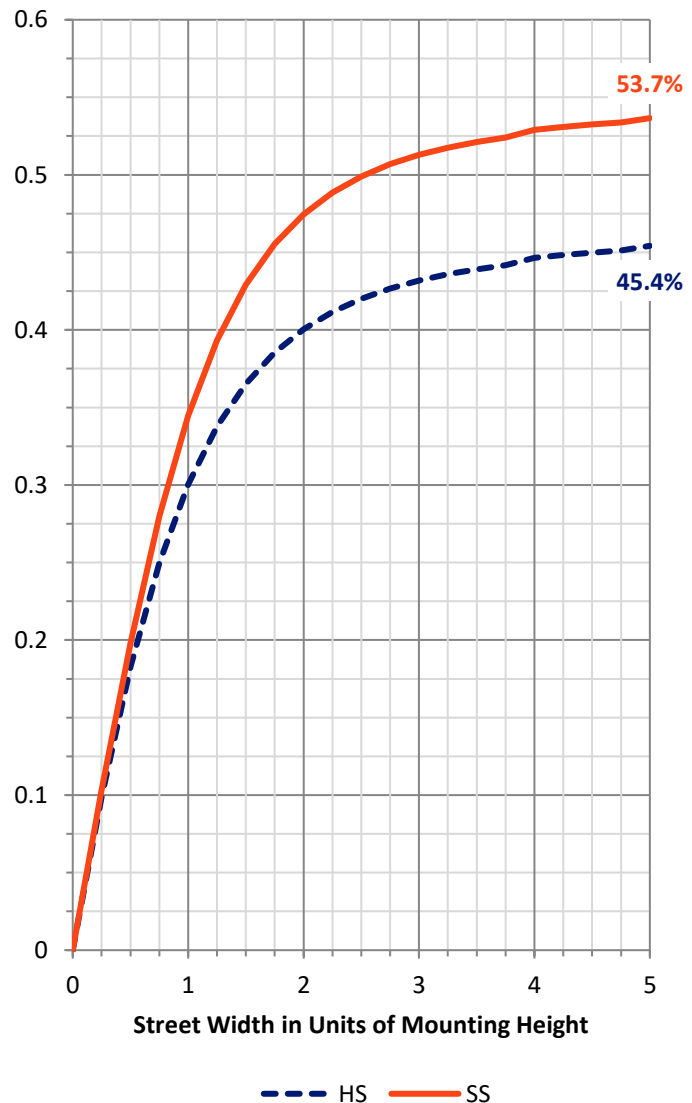
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1924.8   | 0.0    | 1924.8 |
|                    | % Fixture | 46.0     | 0.0    | 46.0   |
| <b>Street Side</b> | Lumens    | 2255.7   | 0.0    | 2255.7 |
|                    | % Fixture | 54.0     | 0.0    | 54.0   |
| <b>Total</b>       | Lumens    | 4180.5   | 0.0    | 4180.5 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 29.8   | 0.7       |
| 10°-20°   | 105.0  | 2.5       |
| 20°-30°   | 224.6  | 5.4       |
| 30°-40°   | 413.9  | 9.9       |
| 40°-50°   | 660.2  | 15.8      |
| 50°-60°   | 897.7  | 21.5      |
| 60°-70°   | 972.6  | 23.3      |
| 70°-80°   | 695.0  | 16.6      |
| 80°-90°   | 181.6  | 4.3       |
| 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°    | 4180.5 | 100.0     |
| 0°-180°   | 4180.5 | 100.0     |



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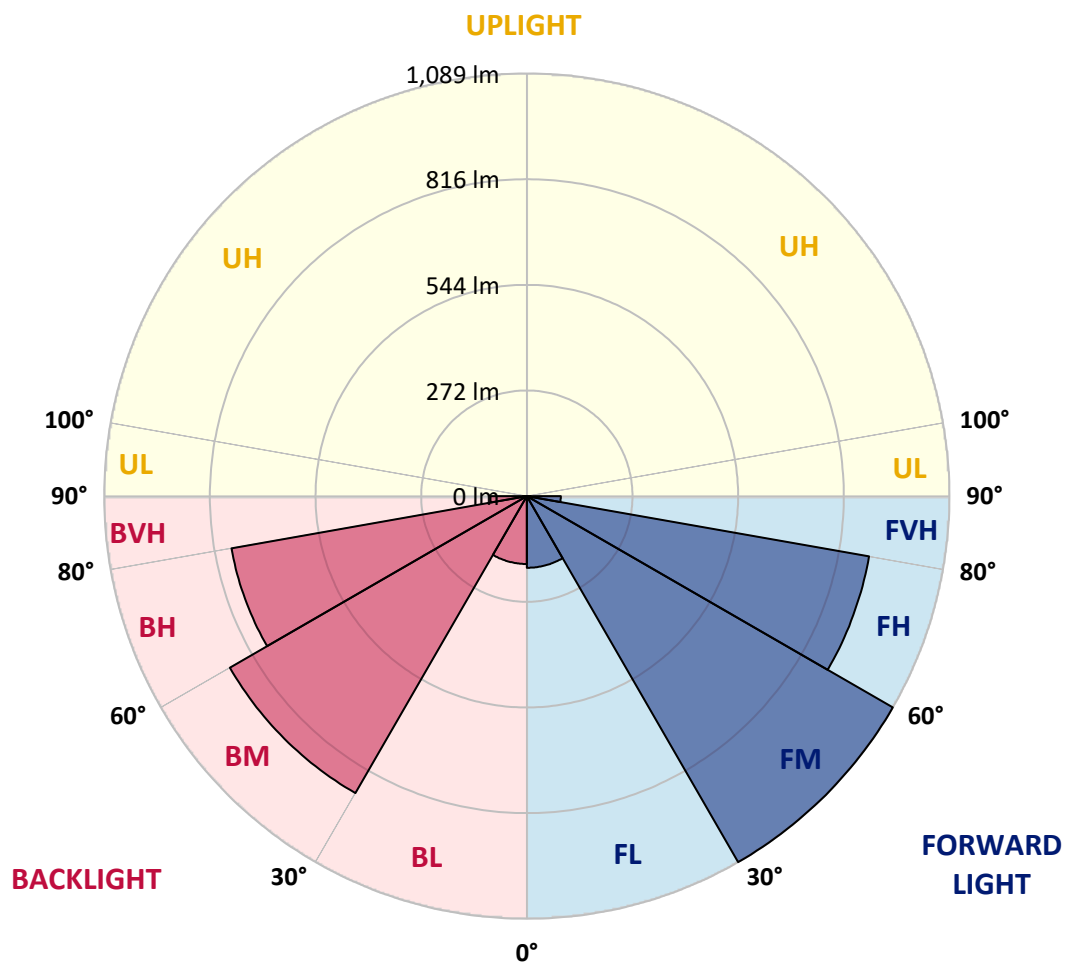
CATALOG NUMBER: CCP-VA-3-835-U-T3

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 184.6  | 4.4       |                         |      |         |
| FM   | (30°-60°)   | 1088.5 | 26.0      |                         |      |         |
| FH   | (60°-80°)   | 895.1  | 21.4      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 87.5   | 2.1       |                         |      | G1/100  |
| BL   | (0°-30°)    | 174.8  | 4.2       | B1/500                  |      |         |
| BM   | (30°-60°)   | 883.3  | 21.1      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 772.6  | 18.5      | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 94.2   | 2.3       |                         |      | 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 III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°    | 55°    | 65°    | 75°    | 85°    | 87°    |
|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| 0°    | 295.9 | 295.9 | 295.9 | 295.9 | 295.9 | 295.9  | 295.9  | 295.9  | 295.9  | 295.9  | 295.9  |
| 2.5°  | 296.5 | 296.5 | 296.5 | 296.5 | 296.5 | 296.5  | 296.5  | 296.5  | 296.5  | 297.2  | 297.2  |
| 5°    | 298.6 | 297.9 | 297.9 | 298.6 | 299.2 | 299.9  | 301.2  | 301.9  | 303.3  | 304.6  | 303.9  |
| 7.5°  | 304.6 | 304.6 | 304.6 | 305.3 | 307.3 | 308.7  | 310.7  | 312.7  | 314.7  | 316.1  | 315.4  |
| 10°   | 314.1 | 314.1 | 314.1 | 315.4 | 317.4 | 321.5  | 324.8  | 328.2  | 330.2  | 331.6  | 332.2  |
| 12.5° | 324.2 | 324.2 | 325.5 | 328.2 | 332.2 | 337.6  | 343.7  | 348.4  | 351.8  | 353.1  | 353.8  |
| 15°   | 338.3 | 339.0 | 341.7 | 344.4 | 349.8 | 357.9  | 368.0  | 374.7  | 378.1  | 380.8  | 380.1  |
| 17.5° | 359.9 | 359.2 | 361.2 | 367.3 | 373.4 | 384.8  | 396.9  | 408.4  | 415.1  | 415.1  | 415.1  |
| 20°   | 384.1 | 383.5 | 384.8 | 389.5 | 399.6 | 415.1  | 434.0  | 449.5  | 456.9  | 455.6  | 456.9  |
| 22.5° | 411.1 | 411.1 | 412.4 | 416.5 | 426.6 | 448.8  | 475.1  | 498.0  | 508.1  | 504.8  | 503.4  |
| 25°   | 440.8 | 440.8 | 442.8 | 446.1 | 460.3 | 487.3  | 522.3  | 555.3  | 565.4  | 562.1  | 560.7  |
| 27.5° | 475.1 | 472.4 | 476.5 | 479.8 | 497.4 | 533.1  | 578.9  | 620.7  | 642.9  | 631.5  | 627.4  |
| 30°   | 511.5 | 509.5 | 510.2 | 516.9 | 537.1 | 583.0  | 637.5  | 693.5  | 724.5  | 717.1  | 711.0  |
| 32.5° | 543.2 | 544.5 | 546.6 | 558.0 | 580.9 | 636.2  | 699.5  | 773.0  | 808.0  | 806.0  | 804.7  |
| 35°   | 578.9 | 578.9 | 583.0 | 593.7 | 627.4 | 692.8  | 769.6  | 852.5  | 904.4  | 906.4  | 902.4  |
| 37.5° | 607.2 | 607.2 | 613.3 | 627.4 | 667.2 | 744.7  | 839.0  | 936.8  | 999.4  | 1010.2 | 1006.9 |
| 40°   | 632.2 | 630.8 | 637.5 | 658.4 | 704.9 | 800.0  | 907.1  | 1020.3 | 1104.6 | 1122.8 | 1118.1 |
| 42.5° | 647.0 | 648.3 | 657.8 | 684.0 | 741.3 | 848.5  | 973.8  | 1099.2 | 1197.6 | 1228.6 | 1228.6 |
| 45°   | 657.8 | 659.1 | 673.3 | 704.3 | 774.4 | 896.3  | 1034.5 | 1180.1 | 1288.6 | 1333.7 | 1335.7 |
| 47.5° | 662.5 | 664.5 | 682.0 | 719.8 | 802.0 | 940.1  | 1093.1 | 1252.8 | 1370.1 | 1434.1 | 1430.1 |
| 50°   | 662.5 | 665.2 | 686.1 | 731.2 | 826.9 | 977.2  | 1148.4 | 1322.3 | 1453.0 | 1524.4 | 1523.8 |
| 52.5° | 658.4 | 661.8 | 687.4 | 740.0 | 847.8 | 1012.9 | 1197.6 | 1381.6 | 1532.5 | 1616.8 | 1619.5 |
| 55°   | 650.3 | 654.4 | 684.0 | 745.4 | 864.0 | 1041.2 | 1237.3 | 1436.8 | 1601.3 | 1696.3 | 1702.4 |
| 57.5° | 634.2 | 638.2 | 671.9 | 740.7 | 870.0 | 1056.1 | 1266.3 | 1475.9 | 1657.2 | 1768.4 | 1769.8 |
| 60°   | 607.2 | 611.9 | 648.3 | 725.2 | 864.0 | 1056.7 | 1273.7 | 1493.4 | 1694.9 | 1816.9 | 1821.6 |
| 62°   | 577.6 | 583.0 | 624.1 | 703.6 | 848.5 | 1045.9 | 1265.6 | 1492.8 | 1705.1 | 1831.1 | 1837.1 |
| 62.5° | 570.1 | 574.9 | 616.7 | 696.2 | 842.4 | 1040.6 | 1260.9 | 1489.4 | 1703.7 | 1831.8 | 1836.5 |
| 65°   | 524.3 | 529.0 | 571.5 | 655.7 | 805.4 | 1007.5 | 1226.6 | 1459.7 | 1679.4 | 1804.8 | 1806.1 |
| 67.5° | 473.8 | 478.5 | 521.0 | 600.5 | 752.1 | 952.3  | 1168.6 | 1401.1 | 1614.7 | 1723.3 | 1733.4 |
| 70°   | 415.1 | 421.9 | 461.0 | 539.8 | 682.0 | 872.7  | 1076.9 | 1308.1 | 1511.6 | 1604.0 | 1613.4 |
| 72.5° | 357.2 | 361.9 | 392.9 | 462.3 | 591.0 | 768.3  | 958.3  | 1167.3 | 1352.6 | 1440.2 | 1448.3 |
| 75°   | 289.8 | 293.8 | 324.2 | 381.4 | 489.3 | 640.2  | 819.5  | 1002.1 | 1170.6 | 1249.5 | 1255.5 |
| 77.5° | 228.5 | 229.8 | 251.4 | 297.2 | 380.1 | 502.1  | 650.3  | 794.6  | 947.6  | 1019.0 | 1035.2 |
| 80°   | 161.1 | 167.8 | 182.6 | 214.3 | 266.9 | 359.9  | 467.0  | 590.4  | 697.5  | 777.7  | 783.1  |
| 82.5° | 104.5 | 105.8 | 115.2 | 126.7 | 164.4 | 227.1  | 297.2  | 373.4  | 469.1  | 521.0  | 516.9  |
| 85°   | 54.6  | 54.6  | 58.0  | 61.3  | 74.1  | 101.8  | 143.5  | 196.8  | 252.7  | 291.8  | 286.4  |
| 87.5° | 9.4   | 8.8   | 9.4   | 8.8   | 11.5  | 16.2   | 30.3   | 49.2   | 74.1   | 87.6   | 96.4   |
| 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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CATALOG NUMBER: CCP-VA-3-835-U-T3

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 295.9  | 295.9  | 295.9  | 295.9  | 295.9 | 295.9 | 295.9 | 295.9 | 295.9 | 295.9 | 295.9 |
| 2.5°  | 297.2  | 297.2  | 297.9  | 299.2  | 299.2 | 299.9 | 300.6 | 300.6 | 301.2 | 301.9 | 301.9 |
| 5°    | 305.3  | 305.3  | 306.0  | 307.3  | 308.0 | 308.0 | 308.7 | 309.3 | 309.3 | 309.3 | 310.0 |
| 7.5°  | 316.1  | 316.7  | 317.4  | 318.1  | 318.8 | 318.8 | 320.8 | 320.1 | 320.1 | 320.1 | 320.1 |
| 10°   | 331.6  | 332.9  | 332.9  | 332.9  | 332.9 | 332.2 | 332.9 | 332.2 | 330.9 | 330.9 | 330.2 |
| 12.5° | 354.5  | 354.5  | 353.1  | 351.8  | 349.8 | 349.1 | 348.4 | 346.4 | 343.7 | 342.4 | 342.4 |
| 15°   | 380.8  | 379.4  | 376.7  | 374.0  | 370.7 | 368.0 | 363.3 | 360.6 | 357.2 | 355.8 | 355.8 |
| 17.5° | 414.5  | 412.4  | 405.0  | 399.6  | 391.6 | 385.5 | 380.1 | 374.7 | 370.7 | 369.3 | 368.6 |
| 20°   | 452.9  | 448.2  | 437.4  | 425.3  | 414.5 | 405.0 | 394.9 | 388.2 | 384.1 | 380.8 | 380.1 |
| 22.5° | 501.4  | 494.7  | 475.8  | 456.9  | 437.4 | 423.9 | 411.1 | 401.7 | 394.3 | 390.9 | 389.5 |
| 25°   | 554.0  | 543.9  | 519.6  | 491.3  | 464.3 | 443.4 | 427.3 | 414.5 | 405.7 | 400.3 | 399.0 |
| 27.5° | 620.7  | 605.9  | 570.1  | 527.7  | 492.0 | 465.7 | 443.4 | 428.6 | 417.2 | 409.1 | 407.7 |
| 30°   | 698.9  | 683.4  | 624.1  | 568.1  | 523.0 | 485.9 | 461.6 | 442.1 | 427.9 | 418.5 | 416.5 |
| 32.5° | 791.9  | 763.6  | 695.5  | 616.7  | 554.6 | 509.5 | 478.5 | 455.6 | 438.1 | 427.3 | 424.6 |
| 35°   | 886.2  | 857.2  | 767.6  | 667.9  | 588.3 | 533.8 | 496.7 | 469.1 | 449.5 | 436.0 | 434.7 |
| 37.5° | 992.0  | 957.0  | 851.9  | 725.8  | 624.7 | 559.4 | 513.5 | 481.9 | 458.3 | 444.1 | 442.8 |
| 40°   | 1105.9 | 1070.2 | 942.2  | 792.5  | 667.9 | 584.3 | 529.7 | 494.0 | 467.7 | 452.2 | 450.2 |
| 42.5° | 1217.8 | 1175.3 | 1033.8 | 859.3  | 711.7 | 611.9 | 548.6 | 506.8 | 475.8 | 459.6 | 456.9 |
| 45°   | 1314.8 | 1277.8 | 1126.8 | 936.1  | 762.2 | 640.2 | 567.5 | 518.9 | 484.6 | 466.4 | 463.7 |
| 47.5° | 1424.7 | 1384.9 | 1228.6 | 1006.9 | 810.7 | 672.6 | 585.6 | 529.7 | 492.0 | 472.4 | 470.4 |
| 50°   | 1521.7 | 1486.0 | 1318.9 | 1072.2 | 857.2 | 702.9 | 602.5 | 539.8 | 498.0 | 477.1 | 474.4 |
| 52.5° | 1610.0 | 1578.4 | 1401.8 | 1133.6 | 897.0 | 731.2 | 618.0 | 547.2 | 502.1 | 479.2 | 475.8 |
| 55°   | 1699.0 | 1657.9 | 1473.9 | 1187.5 | 928.7 | 753.5 | 630.8 | 550.6 | 501.4 | 477.8 | 474.4 |
| 57.5° | 1765.7 | 1726.6 | 1526.5 | 1225.9 | 952.3 | 768.3 | 638.2 | 549.9 | 497.4 | 471.8 | 467.7 |
| 60°   | 1810.9 | 1767.7 | 1557.5 | 1244.8 | 960.4 | 773.0 | 638.2 | 543.9 | 487.3 | 459.6 | 455.6 |
| 62°   | 1827.7 | 1777.8 | 1563.5 | 1247.5 | 957.0 | 768.3 | 633.5 | 533.8 | 473.8 | 446.8 | 442.8 |
| 62.5° | 1828.4 | 1777.2 | 1561.5 | 1245.4 | 955.0 | 766.3 | 630.8 | 530.4 | 470.4 | 442.8 | 438.7 |
| 65°   | 1798.7 | 1747.5 | 1537.2 | 1224.5 | 932.1 | 748.1 | 611.9 | 510.8 | 446.8 | 419.9 | 415.8 |
| 67.5° | 1713.8 | 1674.7 | 1479.3 | 1176.0 | 893.0 | 714.4 | 584.3 | 482.5 | 419.2 | 390.9 | 388.9 |
| 70°   | 1595.9 | 1560.2 | 1384.9 | 1102.6 | 836.4 | 665.8 | 543.2 | 444.8 | 384.1 | 358.5 | 353.8 |
| 72.5° | 1447.6 | 1401.1 | 1250.8 | 1004.2 | 754.8 | 599.1 | 489.3 | 397.6 | 343.7 | 320.8 | 318.1 |
| 75°   | 1263.6 | 1207.7 | 1082.3 | 874.1  | 657.1 | 518.9 | 426.6 | 345.1 | 297.2 | 277.7 | 279.7 |
| 77.5° | 1029.1 | 1002.8 | 874.8  | 696.8  | 535.1 | 429.3 | 349.8 | 292.5 | 251.4 | 235.2 | 233.9 |
| 80°   | 777.0  | 752.1  | 662.5  | 529.0  | 404.4 | 324.8 | 270.9 | 230.5 | 202.2 | 188.0 | 187.4 |
| 82.5° | 527.0  | 503.4  | 435.4  | 355.2  | 275.6 | 229.8 | 196.1 | 169.8 | 152.3 | 145.6 | 145.6 |
| 85°   | 289.8  | 269.6  | 230.5  | 192.1  | 155.7 | 131.4 | 126.7 | 113.2 | 108.5 | 107.2 | 108.5 |
| 87.5° | 90.3   | 89.6   | 76.2   | 62.7   | 54.6  | 55.3  | 49.9  | 51.2  | 48.5  | 47.8  | 51.2  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2005-785-22

Luminaire Tested: WIS-VA-3-835-U-T4FT

Test Date: 09/08/2020

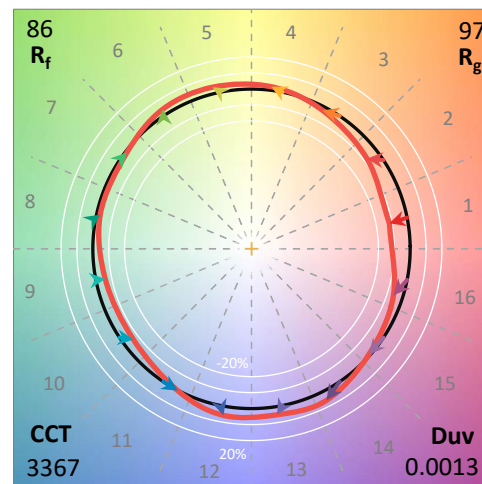
### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2005-785-22  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/08/2020  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-VA-3-835-U-T4FT**  
 Description: INVUE WALL PACK VA

### Spectral Parameters

CCT (K): 3367  
 CIE  $u'$ : 0.2385  
 CIE  $v'$ : 0.5156  
 Duv: 0.0013  
 CIE x: 0.4144  
 CIE y: 0.3981  
 CIE z: 0.1876  
 Peak Wavelength (nm): 601  
 Dominant Wavelength (nm): 580  
 Purity: 44.1  
 Rf: 85.9  
 Rg: 96.9

CRI (Ra): 83.4  
 R1: 81.2  
 R2: 89.8  
 R3: 97.0  
 R4: 83.1  
 R5: 82.1  
 R6: 87.8  
 R7: 84.7  
 R8: 61.6  
 R9: 7.1  
 R10: 77.4  
 R11: 83.4  
 R12: 73.6  
 R13: 83.1  
 R14: 98.6



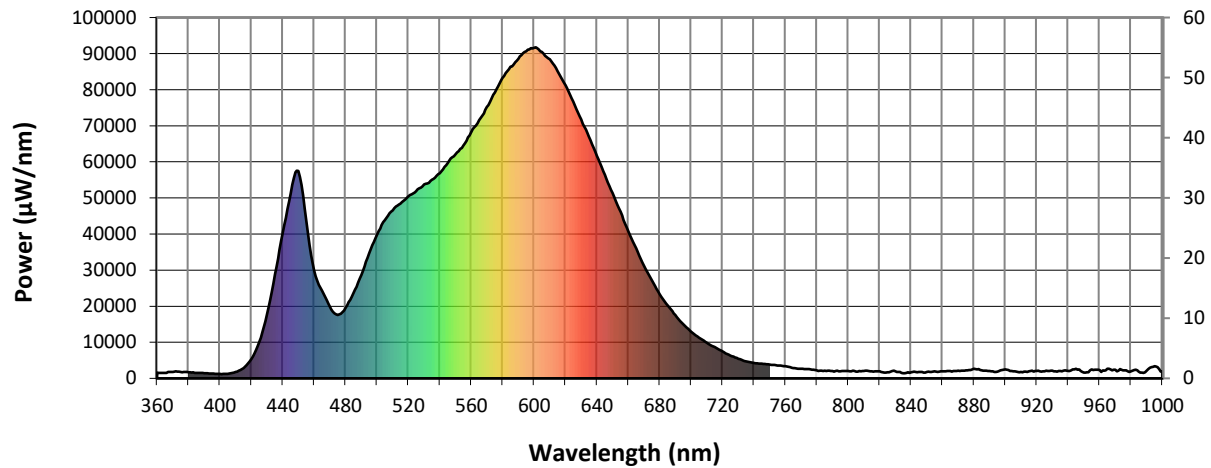
REPORT NUMBER: SP1-2005-785-22

| 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: SP1-2005-785-22

### Photopic Flux vs. Wavelength

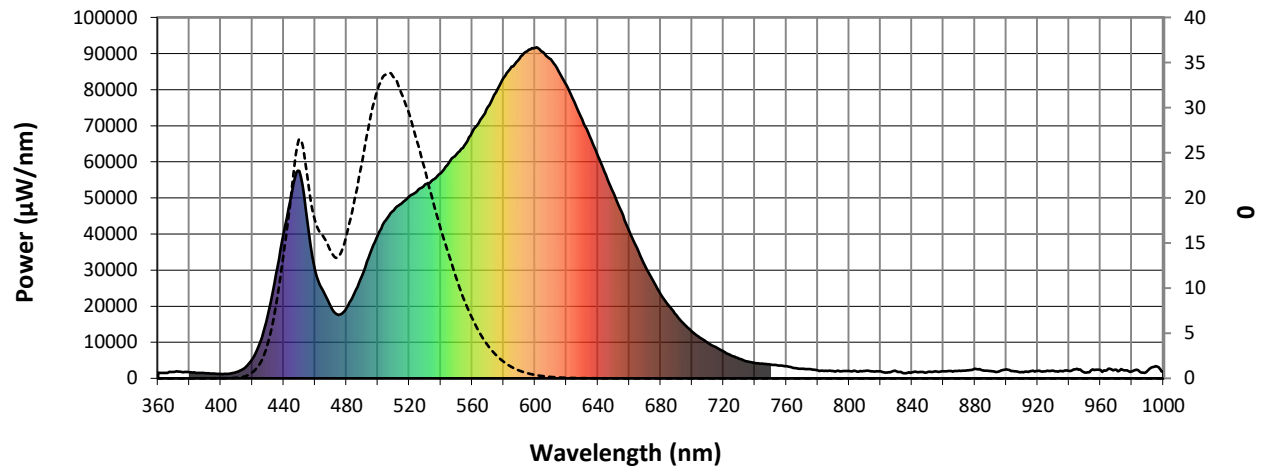


#####

| 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       | 1643             | 0.0              | 490       | 28622            | 4.1              | 620       | 81207            | 21.1             | 750       | 3846             | 0.0              | 880       | 2622             | 0.0              |
| 365       | 1520             | 0.0              | 495       | 34557            | 6.3              | 625       | 76716            | 16.9             | 755       | 3519             | 0.0              | 885       | 2243             | 0.0              |
| 370       | 1802             | 0.0              | 500       | 39800            | 8.8              | 630       | 71708            | 13.0             | 760       | 3368             | 0.0              | 890       | 2081             | 0.0              |
| 375       | 1769             | 0.0              | 505       | 43851            | 12.3             | 635       | 66921            | 10.1             | 765       | 2855             | 0.0              | 895       | 1881             | 0.0              |
| 380       | 1679             | 0.0              | 510       | 46532            | 16.0             | 640       | 61633            | 7.4              | 770       | 2693             | 0.0              | 900       | 2480             | 0.0              |
| 385       | 1485             | 0.0              | 515       | 48456            | 20.1             | 645       | 56361            | 5.4              | 775       | 2536             | 0.0              | 905       | 1958             | 0.0              |
| 390       | 1455             | 0.0              | 520       | 50477            | 24.5             | 650       | 51385            | 3.8              | 780       | 2227             | 0.0              | 910       | 1735             | 0.0              |
| 395       | 1324             | 0.0              | 525       | 51864            | 27.8             | 655       | 46205            | 2.7              | 785       | 2107             | 0.0              | 915       | 1963             | 0.0              |
| 400       | 1202             | 0.0              | 530       | 53736            | 31.6             | 660       | 40823            | 1.7              | 790       | 2005             | 0.0              | 920       | 2064             | 0.0              |
| 405       | 1271             | 0.0              | 535       | 55031            | 34.1             | 665       | 35968            | 1.1              | 795       | 1994             | 0.0              | 925       | 1969             | 0.0              |
| 410       | 1753             | 0.0              | 540       | 56881            | 37.1             | 670       | 31229            | 0.7              | 800       | 2045             | 0.0              | 930       | 2173             | 0.0              |
| 415       | 2819             | 0.0              | 545       | 59674            | 39.7             | 675       | 27129            | 0.5              | 805       | 1910             | 0.0              | 935       | 2053             | 0.0              |
| 420       | 5364             | 0.0              | 550       | 62076            | 42.2             | 680       | 23366            | 0.3              | 810       | 2060             | 0.0              | 940       | 2078             | 0.0              |
| 425       | 10089            | 0.1              | 555       | 64554            | 44.1             | 685       | 20236            | 0.2              | 815       | 1930             | 0.0              | 945       | 2656             | 0.0              |
| 430       | 17744            | 0.1              | 560       | 68182            | 46.3             | 690       | 17552            | 0.1              | 820       | 1947             | 0.0              | 950       | 1571             | 0.0              |
| 435       | 28789            | 0.3              | 565       | 71544            | 47.6             | 695       | 14991            | 0.1              | 825       | 1656             | 0.0              | 955       | 2480             | 0.0              |
| 440       | 40235            | 0.6              | 570       | 75176            | 48.9             | 700       | 12957            | 0.0              | 830       | 1993             | 0.0              | 960       | 2276             | 0.0              |
| 445       | 51214            | 1.1              | 575       | 79236            | 49.3             | 705       | 11301            | 0.0              | 835       | 1455             | 0.0              | 965       | 2688             | 0.0              |
| 450       | 57466            | 1.5              | 580       | 83316            | 49.5             | 710       | 9834             | 0.0              | 840       | 1654             | 0.0              | 970       | 2355             | 0.0              |
| 455       | 43576            | 1.5              | 585       | 86387            | 48.0             | 715       | 8691             | 0.0              | 845       | 1789             | 0.0              | 975       | 2216             | 0.0              |
| 460       | 29961            | 1.2              | 590       | 88571            | 45.8             | 720       | 7415             | 0.0              | 850       | 1806             | 0.0              | 980       | 1965             | 0.0              |
| 465       | 24272            | 1.3              | 595       | 90667            | 43.0             | 725       | 6340             | 0.0              | 855       | 1940             | 0.0              | 985       | 1873             | 0.0              |
| 470       | 19791            | 1.2              | 600       | 91594            | 39.5             | 730       | 5448             | 0.0              | 860       | 1986             | 0.0              | 990       | 2127             | 0.0              |
| 475       | 17585            | 1.4              | 605       | 90498            | 35.0             | 735       | 4721             | 0.0              | 865       | 2055             | 0.0              | 995       | 3367             | 0.0              |
| 480       | 19565            | 1.9              | 610       | 88416            | 30.4             | 740       | 4296             | 0.0              | 870       | 2122             | 0.0              | 1000      | 1864             | 0.0              |
| 485       | 23624            | 2.8              | 615       | 85127            | 25.7             | 745       | 4067             | 0.0              | 875       | 2183             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



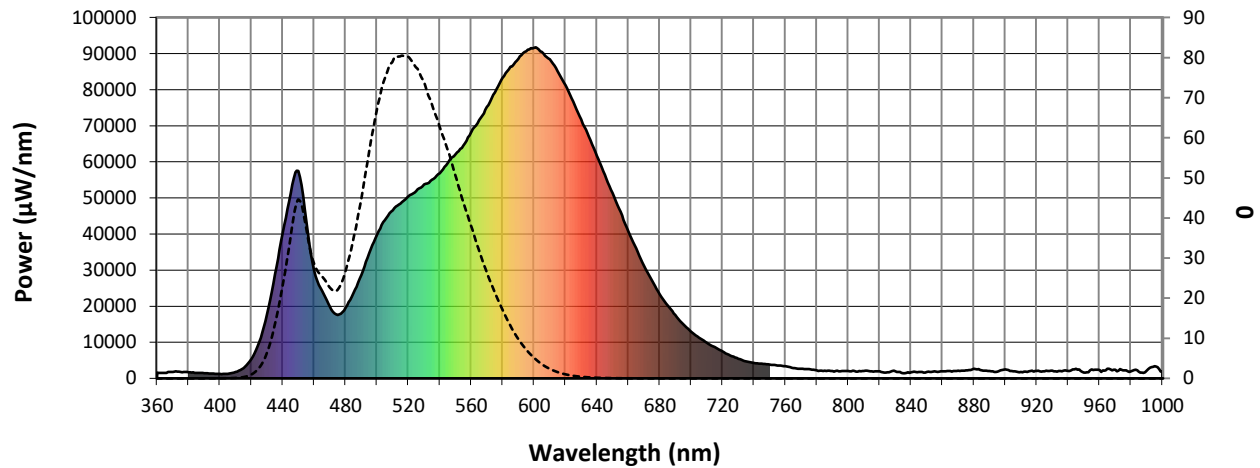
Scotopic Lumens: 2745.1

S/P: 0.57

| 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       | 1643             | 0.0              | 490       | 28622            | 44.1             | 620       | 81207            | 1.0              | 750       | 3846             | 0.0              | 880       | 2622             | 0.0              |
| 365       | 1520             | 0.0              | 495       | 34557            | 55.9             | 625       | 76716            | 0.6              | 755       | 3519             | 0.0              | 885       | 2243             | 0.0              |
| 370       | 1802             | 0.0              | 500       | 39800            | 66.6             | 630       | 71708            | 0.4              | 760       | 3368             | 0.0              | 890       | 2081             | 0.0              |
| 375       | 1769             | 0.0              | 505       | 43851            | 74.5             | 635       | 66921            | 0.3              | 765       | 2855             | 0.0              | 895       | 1881             | 0.0              |
| 380       | 1679             | 0.0              | 510       | 46532            | 78.9             | 640       | 61633            | 0.2              | 770       | 2693             | 0.0              | 900       | 2480             | 0.0              |
| 385       | 1485             | 0.0              | 515       | 48456            | 80.3             | 645       | 56361            | 0.1              | 775       | 2536             | 0.0              | 905       | 1958             | 0.0              |
| 390       | 1455             | 0.0              | 520       | 50477            | 80.2             | 650       | 51385            | 0.1              | 780       | 2227             | 0.0              | 910       | 1735             | 0.0              |
| 395       | 1324             | 0.0              | 525       | 51864            | 77.6             | 655       | 46205            | 0.0              | 785       | 2107             | 0.0              | 915       | 1963             | 0.0              |
| 400       | 1202             | 0.0              | 530       | 53736            | 74.1             | 660       | 40823            | 0.0              | 790       | 2005             | 0.0              | 920       | 2064             | 0.0              |
| 405       | 1271             | 0.0              | 535       | 55031            | 68.6             | 665       | 35968            | 0.0              | 795       | 1994             | 0.0              | 925       | 1969             | 0.0              |
| 410       | 1753             | 0.1              | 540       | 56881            | 62.9             | 670       | 31229            | 0.0              | 800       | 2045             | 0.0              | 930       | 2173             | 0.0              |
| 415       | 2819             | 0.3              | 545       | 59674            | 57.2             | 675       | 27129            | 0.0              | 805       | 1910             | 0.0              | 935       | 2053             | 0.0              |
| 420       | 5364             | 0.9              | 550       | 62076            | 50.8             | 680       | 23366            | 0.0              | 810       | 2060             | 0.0              | 940       | 2078             | 0.0              |
| 425       | 10089            | 2.5              | 555       | 64554            | 44.1             | 685       | 20236            | 0.0              | 815       | 1930             | 0.0              | 945       | 2656             | 0.0              |
| 430       | 17744            | 6.0              | 560       | 68182            | 38.1             | 690       | 17552            | 0.0              | 820       | 1947             | 0.0              | 950       | 1571             | 0.0              |
| 435       | 28789            | 12.9             | 565       | 71544            | 32.1             | 695       | 14991            | 0.0              | 825       | 1656             | 0.0              | 955       | 2480             | 0.0              |
| 440       | 40235            | 22.5             | 570       | 75176            | 26.5             | 700       | 12957            | 0.0              | 830       | 1993             | 0.0              | 960       | 2276             | 0.0              |
| 445       | 51214            | 34.3             | 575       | 79236            | 21.6             | 705       | 11301            | 0.0              | 835       | 1455             | 0.0              | 965       | 2688             | 0.0              |
| 450       | 57466            | 44.5             | 580       | 83316            | 17.2             | 710       | 9834             | 0.0              | 840       | 1654             | 0.0              | 970       | 2355             | 0.0              |
| 455       | 43576            | 38.1             | 585       | 86387            | 13.2             | 715       | 8691             | 0.0              | 845       | 1789             | 0.0              | 975       | 2216             | 0.0              |
| 460       | 29961            | 28.9             | 590       | 88571            | 9.9              | 720       | 7415             | 0.0              | 850       | 1806             | 0.0              | 980       | 1965             | 0.0              |
| 465       | 24272            | 25.6             | 595       | 90667            | 7.2              | 725       | 6340             | 0.0              | 855       | 1940             | 0.0              | 985       | 1873             | 0.0              |
| 470       | 19791            | 22.8             | 600       | 91594            | 5.2              | 730       | 5448             | 0.0              | 860       | 1986             | 0.0              | 990       | 2127             | 0.0              |
| 475       | 17585            | 22.0             | 605       | 90498            | 3.6              | 735       | 4721             | 0.0              | 865       | 2055             | 0.0              | 995       | 3367             | 0.0              |
| 480       | 19565            | 26.4             | 610       | 88416            | 2.4              | 740       | 4296             | 0.0              | 870       | 2122             | 0.0              | 1000      | 1864             | 0.0              |
| 485       | 23624            | 34.2             | 615       | 85127            | 1.6              | 745       | 4067             | 0.0              | 875       | 2183             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 7094.9**
**S/P: 1.48**

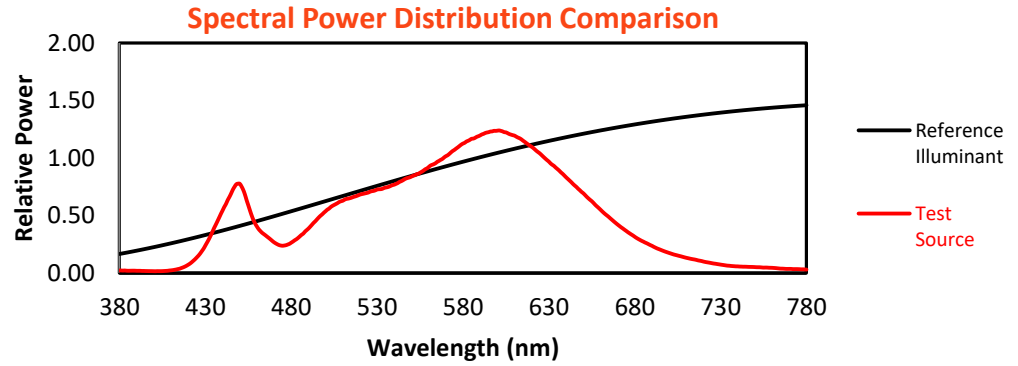
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1643             | 0.0              | 490       | 28622            | 23.8             | 620       | 81207            | 0.1              | 750       | 3846             | 0.0              | 880       | 2622             | 0.0              |
| 365       | 1520             | 0.0              | 495       | 34557            | 28.5             | 625       | 76716            | 0.0              | 755       | 3519             | 0.0              | 885       | 2243             | 0.0              |
| 370       | 1802             | 0.0              | 500       | 39800            | 32.0             | 630       | 71708            | 0.0              | 760       | 3368             | 0.0              | 890       | 2081             | 0.0              |
| 375       | 1769             | 0.0              | 505       | 43851            | 33.7             | 635       | 66921            | 0.0              | 765       | 2855             | 0.0              | 895       | 1881             | 0.0              |
| 380       | 1679             | 0.0              | 510       | 46532            | 33.4             | 640       | 61633            | 0.0              | 770       | 2693             | 0.0              | 900       | 2480             | 0.0              |
| 385       | 1485             | 0.0              | 515       | 48456            | 31.7             | 645       | 56361            | 0.0              | 775       | 2536             | 0.0              | 905       | 1958             | 0.0              |
| 390       | 1455             | 0.0              | 520       | 50477            | 29.4             | 650       | 51385            | 0.0              | 780       | 2227             | 0.0              | 910       | 1735             | 0.0              |
| 395       | 1324             | 0.0              | 525       | 51864            | 26.3             | 655       | 46205            | 0.0              | 785       | 2107             | 0.0              | 915       | 1963             | 0.0              |
| 400       | 1202             | 0.0              | 530       | 53736            | 23.2             | 660       | 40823            | 0.0              | 790       | 2005             | 0.0              | 920       | 2064             | 0.0              |
| 405       | 1271             | 0.0              | 535       | 55031            | 19.8             | 665       | 35968            | 0.0              | 795       | 1994             | 0.0              | 925       | 1969             | 0.0              |
| 410       | 1753             | 0.1              | 540       | 56881            | 16.6             | 670       | 31229            | 0.0              | 800       | 2045             | 0.0              | 930       | 2173             | 0.0              |
| 415       | 2819             | 0.2              | 545       | 59674            | 13.9             | 675       | 27129            | 0.0              | 805       | 1910             | 0.0              | 935       | 2053             | 0.0              |
| 420       | 5364             | 0.6              | 550       | 62076            | 11.1             | 680       | 23366            | 0.0              | 810       | 2060             | 0.0              | 940       | 2078             | 0.0              |
| 425       | 10089            | 1.6              | 555       | 64554            | 8.7              | 685       | 20236            | 0.0              | 815       | 1930             | 0.0              | 945       | 2656             | 0.0              |
| 430       | 17744            | 3.7              | 560       | 68182            | 6.7              | 690       | 17552            | 0.0              | 820       | 1947             | 0.0              | 950       | 1571             | 0.0              |
| 435       | 28789            | 7.7              | 565       | 71544            | 5.0              | 695       | 14991            | 0.0              | 825       | 1656             | 0.0              | 955       | 2480             | 0.0              |
| 440       | 40235            | 13.4             | 570       | 75176            | 3.7              | 700       | 12957            | 0.0              | 830       | 1993             | 0.0              | 960       | 2276             | 0.0              |
| 445       | 51214            | 20.2             | 575       | 79236            | 2.6              | 705       | 11301            | 0.0              | 835       | 1455             | 0.0              | 965       | 2688             | 0.0              |
| 450       | 57466            | 26.5             | 580       | 83316            | 1.9              | 710       | 9834             | 0.0              | 840       | 1654             | 0.0              | 970       | 2355             | 0.0              |
| 455       | 43576            | 22.8             | 585       | 86387            | 1.3              | 715       | 8691             | 0.0              | 845       | 1789             | 0.0              | 975       | 2216             | 0.0              |
| 460       | 29961            | 17.7             | 590       | 88571            | 0.9              | 720       | 7415             | 0.0              | 850       | 1806             | 0.0              | 980       | 1965             | 0.0              |
| 465       | 24272            | 15.9             | 595       | 90667            | 0.6              | 725       | 6340             | 0.0              | 855       | 1940             | 0.0              | 985       | 1873             | 0.0              |
| 470       | 19791            | 14.2             | 600       | 91594            | 0.4              | 730       | 5448             | 0.0              | 860       | 1986             | 0.0              | 990       | 2127             | 0.0              |
| 475       | 17585            | 13.4             | 605       | 90498            | 0.2              | 735       | 4721             | 0.0              | 865       | 2055             | 0.0              | 995       | 3367             | 0.0              |
| 480       | 19565            | 15.7             | 610       | 88416            | 0.2              | 740       | 4296             | 0.0              | 870       | 2122             | 0.0              | 1000      | 1864             | 0.0              |
| 485       | 23624            | 19.5             | 615       | 85127            | 0.1              | 745       | 4067             | 0.0              | 875       | 2183             | 0.0              |           |                  |                  |

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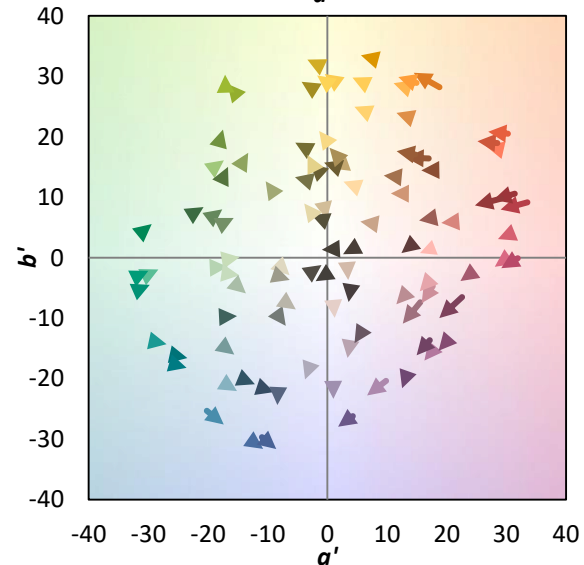
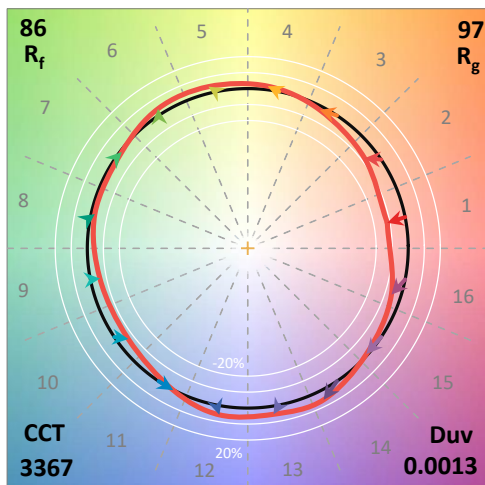
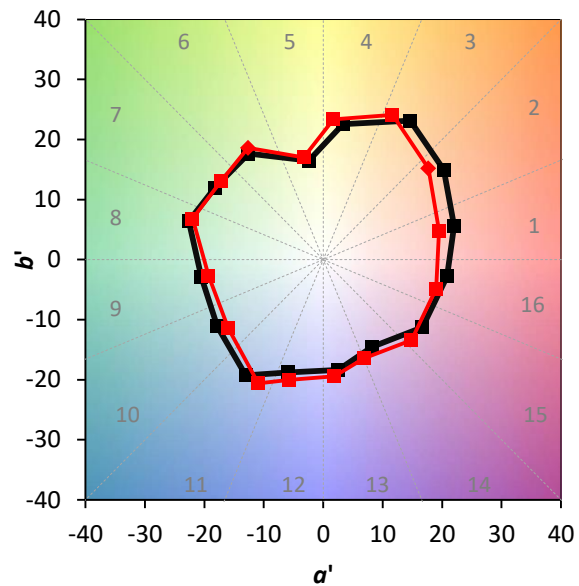
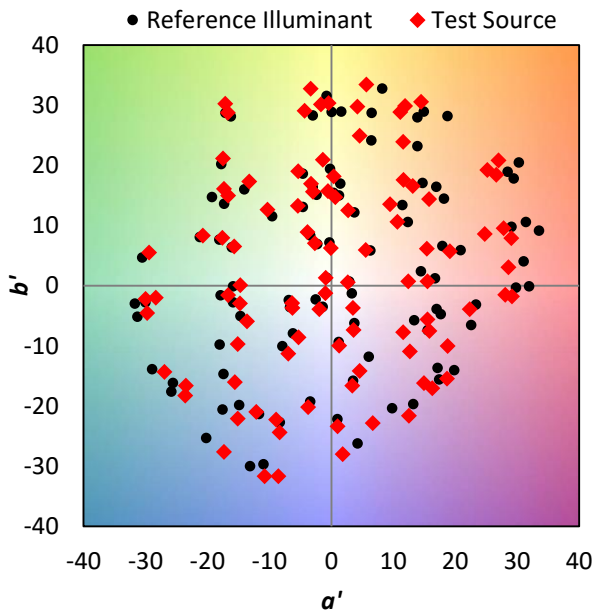
TM-30-18

### Summary

$R_f = 85.9$   
 $R_g = 96.9$   
 CIE  $R_a = 83.4$   
 $R_9 = 7.1$

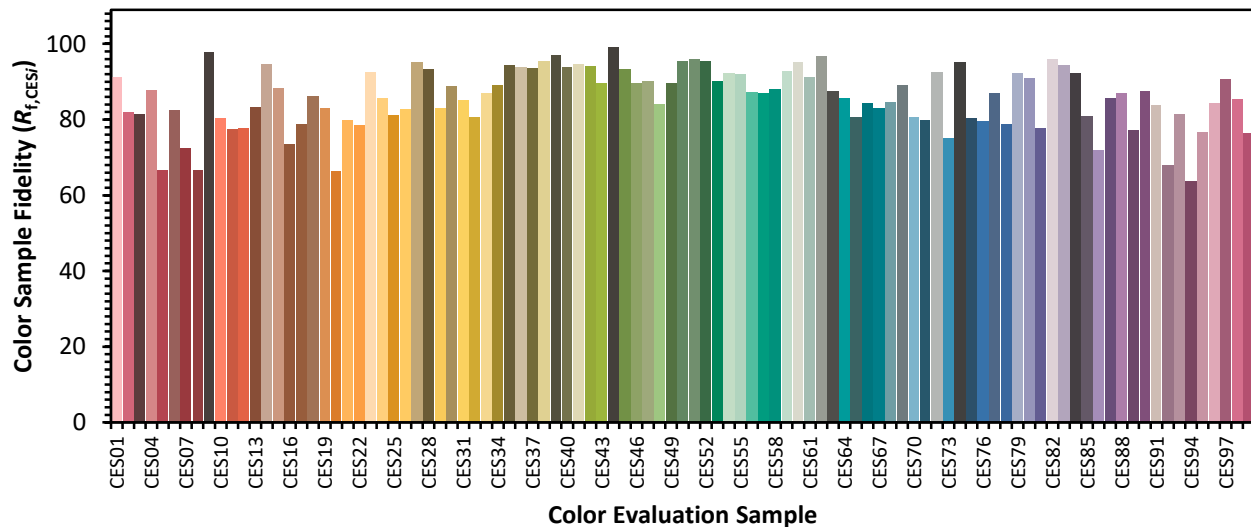


### Color Vector Graphics

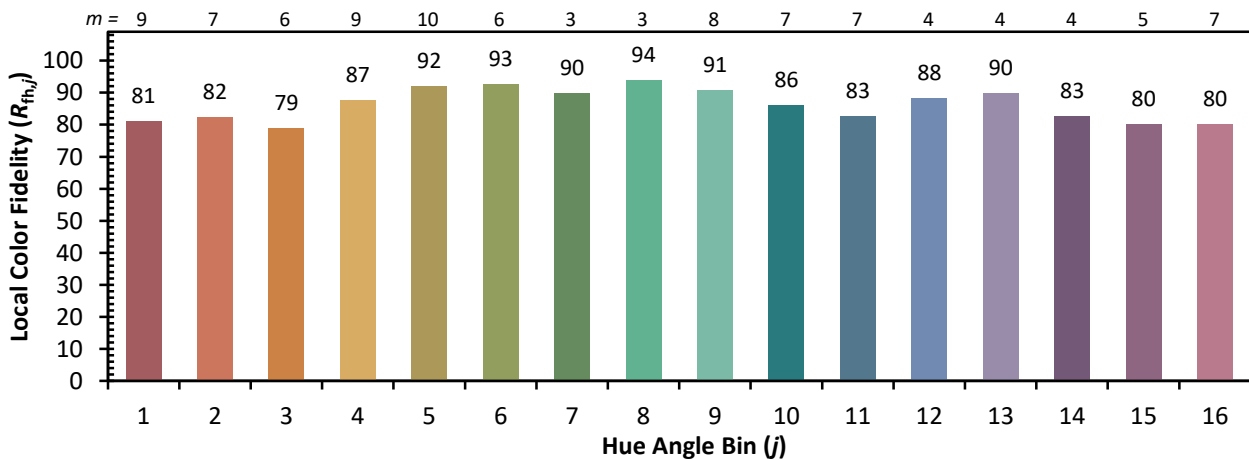
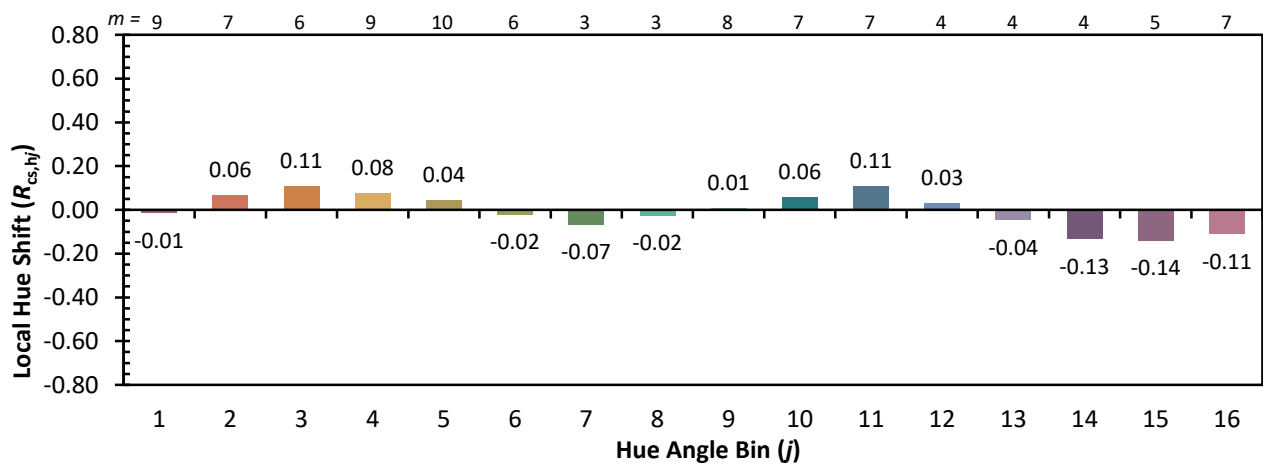
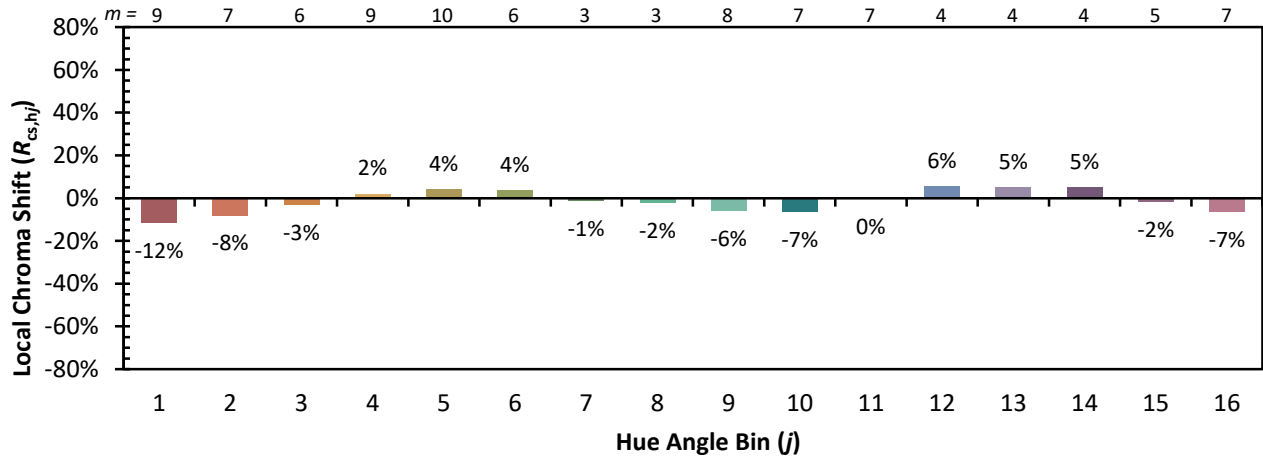


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

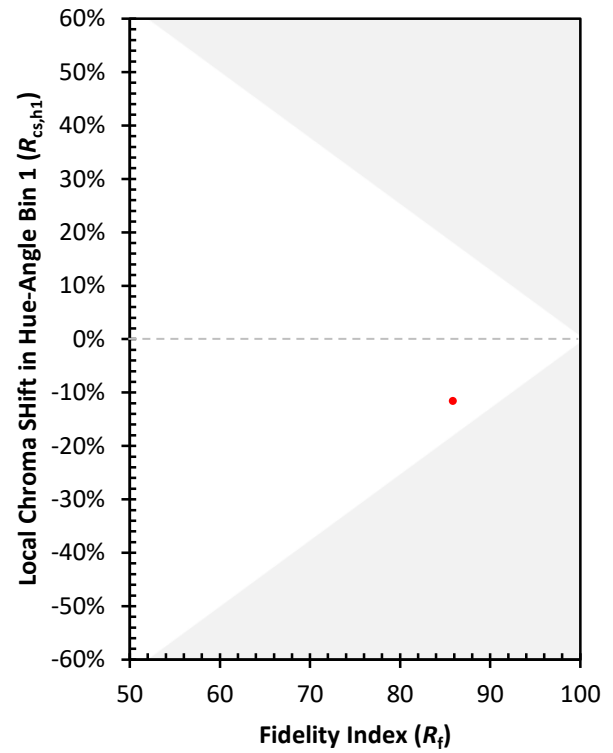
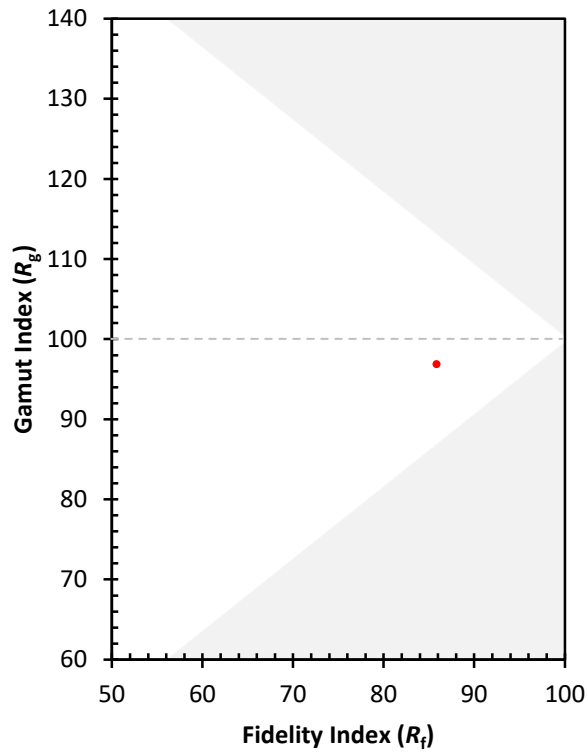
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 83 | CES51 = 96 | CES76 = 80 |
| CES02 = 62 | CES27 = 95 | CES52 = 96 | CES77 = 87 |
| CES03 = 31 | CES28 = 93 | CES53 = 90 | CES78 = 79 |
| CES04 = 70 | CES29 = 83 | CES54 = 92 | CES79 = 92 |
| CES05 = 49 | CES30 = 89 | CES55 = 92 | CES80 = 91 |
| CES06 = 51 | CES31 = 85 | CES56 = 87 | CES81 = 78 |
| CES07 = 41 | CES32 = 81 | CES57 = 87 | CES82 = 96 |
| CES08 = 40 | CES33 = 87 | CES58 = 88 | CES83 = 94 |
| CES09 = 29 | CES34 = 89 | CES59 = 93 | CES84 = 92 |
| CES10 = 75 | CES35 = 94 | CES60 = 95 | CES85 = 81 |
| CES11 = 58 | CES36 = 94 | CES61 = 91 | CES86 = 72 |
| CES12 = 64 | CES37 = 94 | CES62 = 97 | CES87 = 86 |
| CES13 = 43 | CES38 = 95 | CES63 = 88 | CES88 = 87 |
| CES14 = 74 | CES39 = 97 | CES64 = 86 | CES89 = 77 |
| CES15 = 71 | CES40 = 94 | CES65 = 81 | CES90 = 87 |
| CES16 = 47 | CES41 = 95 | CES66 = 84 | CES91 = 84 |
| CES17 = 50 | CES42 = 94 | CES67 = 83 | CES92 = 68 |
| CES18 = 56 | CES43 = 90 | CES68 = 85 | CES93 = 81 |
| CES19 = 72 | CES44 = 99 | CES69 = 89 | CES94 = 64 |
| CES20 = 66 | CES45 = 93 | CES70 = 81 | CES95 = 77 |
| CES21 = 86 | CES46 = 90 | CES71 = 80 | CES96 = 84 |
| CES22 = 78 | CES47 = 90 | CES72 = 93 | CES97 = 91 |
| CES23 = 92 | CES48 = 84 | CES73 = 75 | CES98 = 86 |
| CES24 = 91 | CES49 = 90 | CES74 = 95 | CES99 = 76 |
| CES25 = 72 | CES50 = 95 | CES75 = 80 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)