

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: P472288

Luminaire Tested: **CCP-VA-4-827-U-T4FT**

Issue Date: 01/27/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P472288  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 01/27/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-VA-4-827-U-T4FT  
Description: INVUE CLEARCURVE POLE MOUNT Wave Stream LUMINAIRE WITH T4FT  
DISTRIBUTION LENS  
Light Source: 2700K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 5662.4 lumens  
Efficiency: N/A  
Efficacy: 87.7 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G2

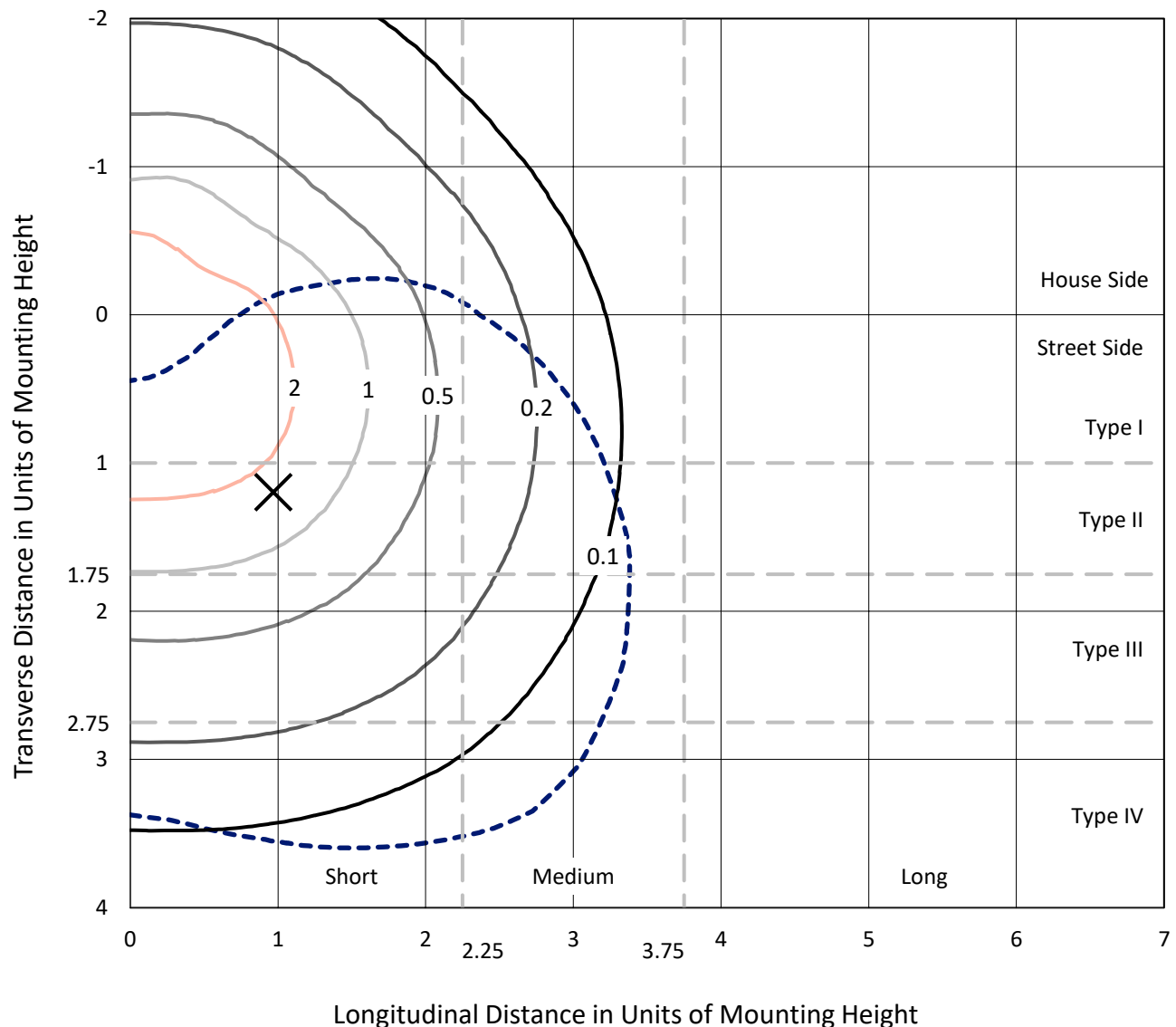
Input Watts (W): 64.6  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

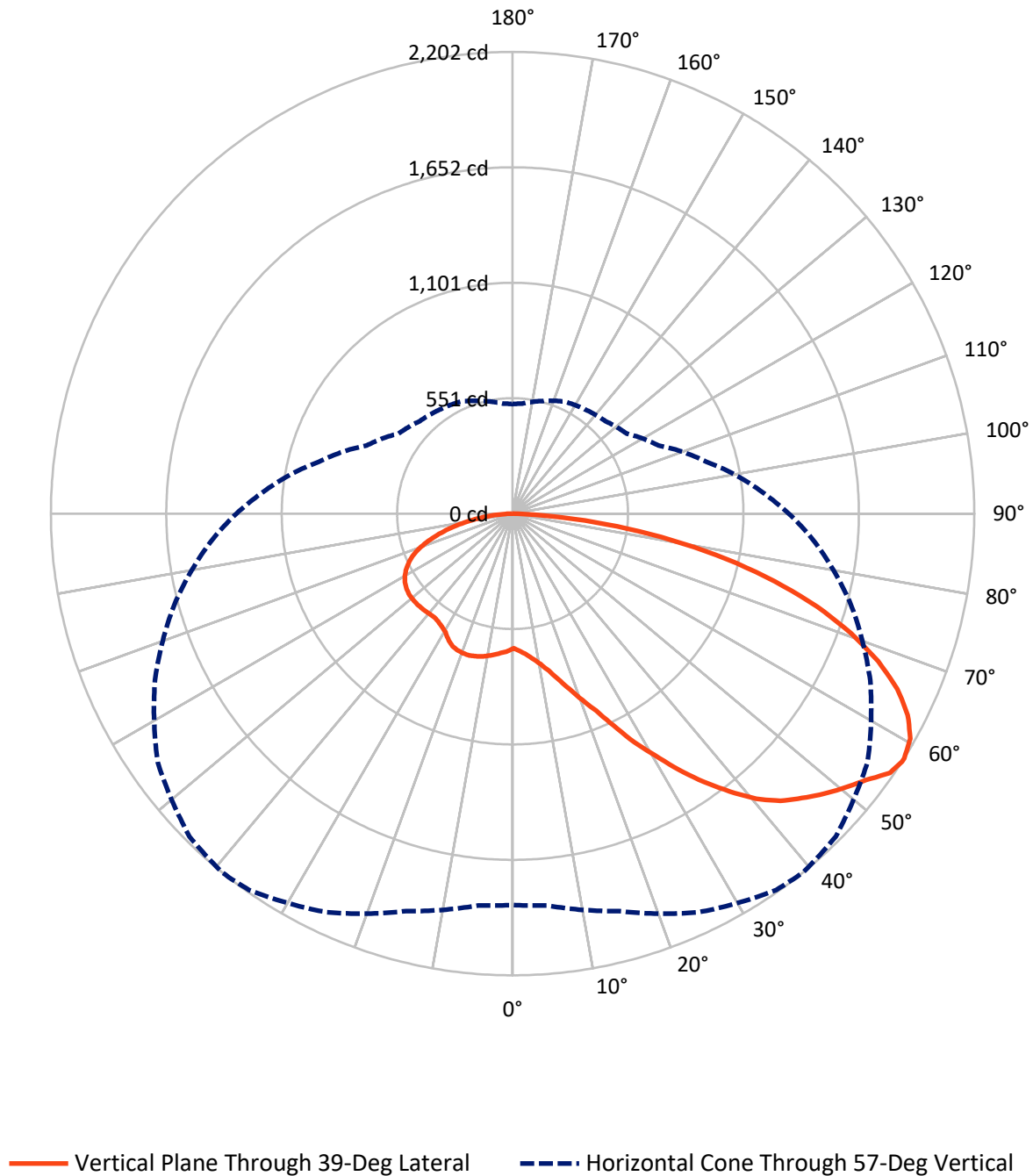
✕ Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 3.9 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: CCP-VA-4-827-U-T4FT

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1737.4   | 0.0    | 1737.4 |
|                    | % Fixture | 30.7     | 0.0    | 30.7   |
| <b>Street Side</b> | Lumens    | 3925.0   | 0.0    | 3925.0 |
|                    | % Fixture | 69.3     | 0.0    | 69.3   |
| <b>Total</b>       | Lumens    | 5662.4   | 0.0    | 5662.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 65.0   | 1.1       |
| 10°-20°   | 216.8  | 3.8       |
| 20°-30°   | 418.8  | 7.4       |
| 30°-40°   | 677.5  | 12.0      |
| 40°-50°   | 951.8  | 16.8      |
| 50°-60°   | 1175.8 | 20.8      |
| 60°-70°   | 1168.6 | 20.6      |
| 70°-80°   | 790.7  | 14.0      |
| 80°-90°   | 197.3  | 3.5       |
| 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°    | 5662.4 | 100.0     |
| 0°-180°   | 5662.4 | 100.0     |



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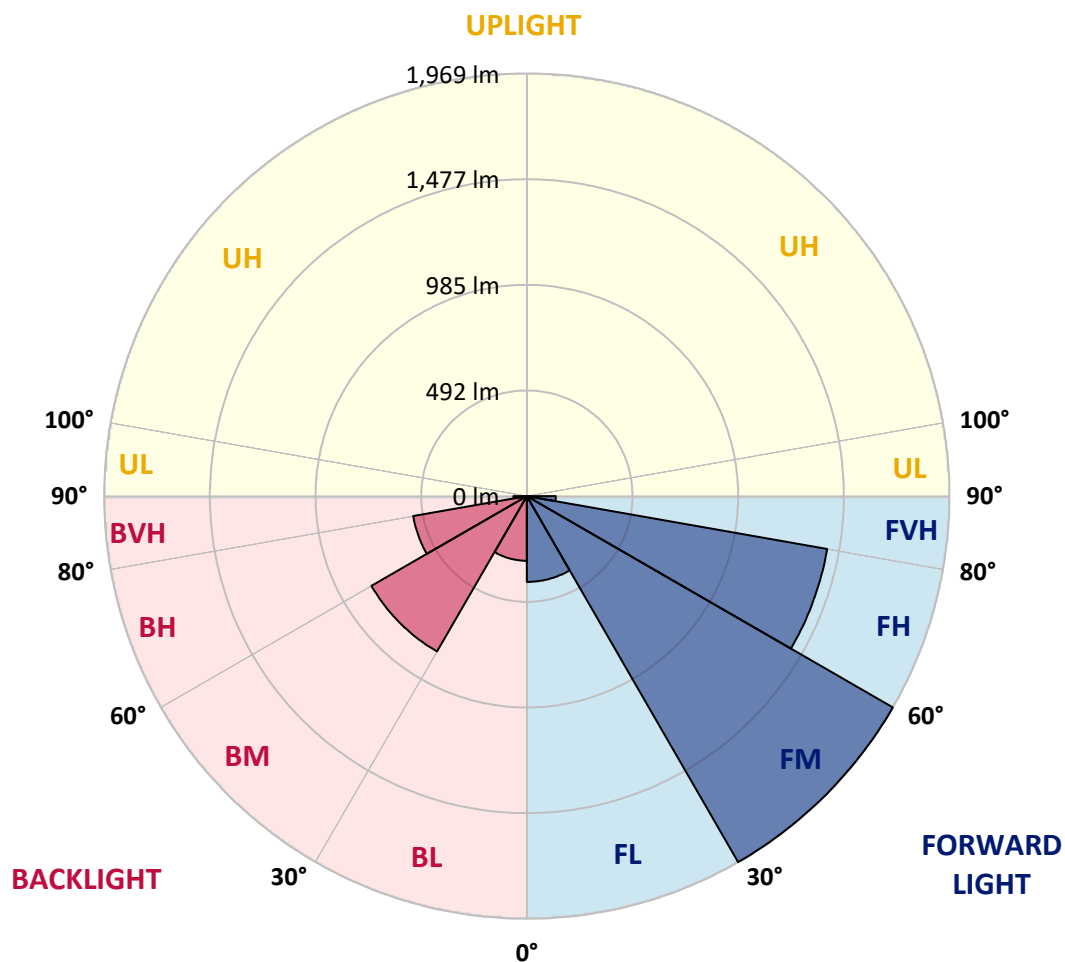
CATALOG NUMBER: CCP-VA-4-827-U-T4FT

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 399.5  | 7.1       |                         |      |         |
| FM   | (30°-60°)   | 1969.1 | 34.8      |                         |      |         |
| FH   | (60°-80°)   | 1421.3 | 25.1      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 135.0  | 2.4       |                         |      | G2/225  |
| BL   | (0°-30°)    | 301.1  | 5.3       | B1/500                  |      |         |
| BM   | (30°-60°)   | 835.9  | 14.8      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 538.1  | 9.5       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 62.3   | 1.1       |                         |      | 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 IV Short





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CATALOG NUMBER: CCP-VA-4-827-U-T4FT

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 39°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 642.1  | 642.1  | 642.1  | 642.1  | 642.1  | 642.1  | 642.1  | 642.1  | 642.1  | 642.1  | 642.1  |
| 2.5°  | 661.2  | 660.3  | 659.4  | 659.4  | 657.7  | 656.0  | 655.1  | 653.4  | 654.2  | 656.0  | 656.8  |
| 5°    | 680.3  | 678.5  | 678.5  | 676.8  | 674.2  | 674.2  | 671.6  | 668.1  | 667.2  | 666.4  | 666.4  |
| 7.5°  | 709.8  | 707.2  | 708.0  | 705.4  | 702.8  | 699.4  | 695.0  | 690.7  | 688.9  | 682.9  | 677.7  |
| 10°   | 743.6  | 742.7  | 740.1  | 735.8  | 733.2  | 729.7  | 725.4  | 717.6  | 711.5  | 704.6  | 700.2  |
| 12.5° | 783.5  | 781.8  | 782.7  | 779.2  | 774.8  | 768.8  | 761.8  | 754.0  | 742.7  | 729.7  | 721.0  |
| 15°   | 835.6  | 832.1  | 832.1  | 831.2  | 822.6  | 820.8  | 813.9  | 796.5  | 780.9  | 763.6  | 743.6  |
| 17.5° | 898.9  | 898.1  | 894.6  | 891.1  | 885.9  | 879.8  | 872.9  | 853.8  | 830.4  | 803.5  | 776.6  |
| 20°   | 966.6  | 964.9  | 967.5  | 962.3  | 951.8  | 949.2  | 938.0  | 916.3  | 887.6  | 856.4  | 815.6  |
| 22.5° | 1040.4 | 1042.1 | 1042.1 | 1040.4 | 1031.7 | 1021.3 | 1011.7 | 983.1  | 950.1  | 911.9  | 864.2  |
| 25°   | 1129.7 | 1130.6 | 1135.8 | 1141.0 | 1135.8 | 1119.3 | 1106.3 | 1062.0 | 1017.8 | 969.2  | 912.8  |
| 27.5° | 1230.4 | 1224.3 | 1239.1 | 1248.6 | 1239.1 | 1234.7 | 1206.1 | 1157.5 | 1096.8 | 1036.0 | 965.7  |
| 30°   | 1327.6 | 1327.6 | 1339.7 | 1353.6 | 1347.5 | 1337.1 | 1313.7 | 1251.2 | 1181.8 | 1104.6 | 1019.5 |
| 32.5° | 1417.8 | 1428.2 | 1433.4 | 1465.5 | 1462.0 | 1456.8 | 1429.9 | 1347.5 | 1260.7 | 1173.1 | 1071.6 |
| 35°   | 1524.5 | 1521.1 | 1542.7 | 1562.7 | 1578.3 | 1571.4 | 1551.4 | 1468.1 | 1354.5 | 1245.1 | 1128.9 |
| 37.5° | 1605.2 | 1612.2 | 1631.2 | 1666.8 | 1678.1 | 1681.6 | 1656.4 | 1570.5 | 1441.2 | 1322.4 | 1192.2 |
| 40°   | 1666.8 | 1672.0 | 1708.5 | 1753.6 | 1777.0 | 1789.2 | 1764.0 | 1659.9 | 1522.8 | 1384.0 | 1241.7 |
| 42.5° | 1716.3 | 1719.8 | 1757.9 | 1822.1 | 1861.2 | 1873.3 | 1850.8 | 1740.6 | 1592.2 | 1433.4 | 1282.4 |
| 45°   | 1749.3 | 1755.3 | 1800.4 | 1866.4 | 1927.1 | 1935.8 | 1924.5 | 1811.7 | 1653.8 | 1480.3 | 1311.9 |
| 47.5° | 1777.9 | 1784.8 | 1835.2 | 1918.4 | 1986.1 | 1997.4 | 1987.0 | 1874.2 | 1712.8 | 1522.8 | 1337.1 |
| 50°   | 1816.1 | 1823.9 | 1874.2 | 1967.0 | 2041.7 | 2054.7 | 2051.2 | 1940.1 | 1768.3 | 1570.5 | 1363.1 |
| 52.5° | 1852.5 | 1858.6 | 1918.4 | 2021.7 | 2102.4 | 2111.1 | 2108.5 | 2001.7 | 1824.7 | 1621.7 | 1396.1 |
| 55°   | 1881.1 | 1888.1 | 1959.2 | 2086.8 | 2173.5 | 2183.1 | 2164.9 | 2049.5 | 1869.0 | 1659.0 | 1427.3 |
| 57°   | 1866.4 | 1875.9 | 1962.7 | 2098.1 | 2191.8 | 2202.2 | 2178.8 | 2066.8 | 1882.0 | 1669.4 | 1438.6 |
| 57.5° | 1862.1 | 1869.0 | 1959.2 | 2097.2 | 2192.6 | 2202.2 | 2178.8 | 2066.0 | 1881.1 | 1668.6 | 1438.6 |
| 60°   | 1798.7 | 1815.2 | 1916.7 | 2066.0 | 2167.5 | 2179.6 | 2157.1 | 2031.2 | 1859.4 | 1644.3 | 1415.2 |
| 62.5° | 1713.7 | 1736.2 | 1843.0 | 1992.2 | 2106.7 | 2115.4 | 2092.9 | 1973.1 | 1810.9 | 1593.1 | 1366.6 |
| 65°   | 1591.3 | 1626.0 | 1738.0 | 1882.0 | 2006.1 | 2016.5 | 1993.9 | 1875.9 | 1730.2 | 1515.0 | 1293.7 |
| 67.5° | 1471.6 | 1492.4 | 1612.2 | 1749.3 | 1864.7 | 1880.3 | 1861.2 | 1756.2 | 1619.1 | 1410.9 | 1196.5 |
| 70°   | 1335.4 | 1350.1 | 1449.0 | 1583.5 | 1699.8 | 1712.8 | 1696.3 | 1598.3 | 1469.0 | 1281.6 | 1082.9 |
| 72.5° | 1171.4 | 1187.0 | 1271.2 | 1395.2 | 1498.5 | 1519.3 | 1508.0 | 1406.5 | 1289.4 | 1127.1 | 956.2  |
| 75°   | 986.6  | 1003.9 | 1079.4 | 1178.3 | 1279.0 | 1291.1 | 1278.1 | 1203.5 | 1097.6 | 951.0  | 801.7  |
| 77.5° | 800.0  | 811.3  | 865.9  | 940.6  | 1018.7 | 1044.7 | 1041.2 | 988.3  | 881.6  | 765.3  | 643.8  |
| 80°   | 598.7  | 600.4  | 629.1  | 690.7  | 753.1  | 772.2  | 776.6  | 728.9  | 658.6  | 570.9  | 482.4  |
| 82.5° | 378.3  | 384.4  | 400.0  | 446.0  | 476.4  | 502.4  | 508.5  | 480.7  | 436.4  | 381.8  | 327.1  |
| 85°   | 176.1  | 170.9  | 183.1  | 198.7  | 242.1  | 242.1  | 249.9  | 235.1  | 222.1  | 203.9  | 169.2  |
| 87.5° | 14.8   | 13.9   | 13.9   | 14.8   | 23.4   | 25.2   | 39.9   | 44.3   | 47.7   | 47.7   | 50.3   |
| 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-4-827-U-T4FT

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 642.1  | 642.1  | 642.1 | 642.1 | 642.1 | 642.1 | 642.1 | 642.1 | 642.1 | 642.1 | 642.1 |
| 2.5°  | 655.1  | 654.2  | 651.6 | 651.6 | 653.4 | 656.0 | 656.8 | 657.7 | 658.6 | 659.4 | 659.4 |
| 5°    | 665.5  | 664.6  | 662.9 | 661.2 | 662.9 | 663.8 | 666.4 | 668.1 | 668.1 | 669.9 | 669.0 |
| 7.5°  | 675.1  | 675.9  | 674.2 | 673.3 | 673.3 | 675.1 | 678.5 | 681.1 | 682.9 | 683.7 | 685.5 |
| 10°   | 696.8  | 691.5  | 684.6 | 681.1 | 681.1 | 684.6 | 688.1 | 691.5 | 695.0 | 696.8 | 696.8 |
| 12.5° | 715.8  | 709.8  | 696.8 | 691.5 | 690.7 | 694.1 | 698.5 | 703.7 | 706.3 | 708.9 | 708.9 |
| 15°   | 733.2  | 728.0  | 712.4 | 700.2 | 696.8 | 699.4 | 704.6 | 710.6 | 715.0 | 717.6 | 717.6 |
| 17.5° | 766.2  | 750.5  | 729.7 | 709.8 | 702.8 | 703.7 | 709.8 | 715.8 | 721.0 | 722.8 | 721.9 |
| 20°   | 797.4  | 777.4  | 746.2 | 717.6 | 706.3 | 702.8 | 708.9 | 716.7 | 721.0 | 723.6 | 723.6 |
| 22.5° | 833.0  | 811.3  | 762.7 | 725.4 | 704.6 | 699.4 | 704.6 | 711.5 | 716.7 | 718.4 | 720.2 |
| 25°   | 883.3  | 845.1  | 780.9 | 731.5 | 702.0 | 691.5 | 695.0 | 702.0 | 708.0 | 708.9 | 708.0 |
| 27.5° | 928.4  | 885.0  | 805.2 | 737.5 | 695.9 | 676.8 | 673.3 | 678.5 | 688.1 | 694.1 | 695.9 |
| 30°   | 967.5  | 927.6  | 830.4 | 742.7 | 684.6 | 652.5 | 648.2 | 649.9 | 656.0 | 672.5 | 673.3 |
| 32.5° | 1025.6 | 964.0  | 855.5 | 747.1 | 671.6 | 639.5 | 633.4 | 631.7 | 633.4 | 642.1 | 642.1 |
| 35°   | 1065.5 | 1004.8 | 880.7 | 754.9 | 662.0 | 629.1 | 623.0 | 620.4 | 618.7 | 610.0 | 607.4 |
| 37.5° | 1117.6 | 1049.9 | 905.0 | 761.8 | 657.7 | 624.7 | 616.1 | 617.8 | 609.1 | 584.8 | 577.9 |
| 40°   | 1174.8 | 1090.7 | 929.3 | 768.8 | 659.4 | 625.6 | 617.8 | 616.9 | 602.2 | 568.3 | 561.4 |
| 42.5° | 1202.6 | 1125.4 | 954.5 | 778.3 | 666.4 | 628.2 | 621.3 | 618.7 | 600.4 | 562.3 | 552.7 |
| 45°   | 1229.5 | 1150.5 | 972.7 | 786.1 | 673.3 | 631.7 | 623.0 | 620.4 | 599.6 | 557.1 | 550.1 |
| 47.5° | 1253.8 | 1166.2 | 981.4 | 790.5 | 678.5 | 634.3 | 623.9 | 619.5 | 595.2 | 554.5 | 547.5 |
| 50°   | 1265.1 | 1174.8 | 981.4 | 790.5 | 680.3 | 636.9 | 622.1 | 616.1 | 588.3 | 550.1 | 544.0 |
| 52.5° | 1282.4 | 1180.1 | 973.5 | 785.3 | 677.7 | 636.9 | 618.7 | 609.1 | 579.6 | 544.0 | 538.8 |
| 55°   | 1308.5 | 1189.6 | 963.1 | 777.4 | 671.6 | 631.7 | 612.6 | 599.6 | 567.5 | 535.4 | 531.0 |
| 57°   | 1317.1 | 1193.1 | 956.2 | 767.9 | 664.6 | 624.7 | 605.6 | 589.2 | 556.2 | 526.7 | 522.3 |
| 57.5° | 1315.4 | 1191.3 | 953.6 | 765.3 | 662.0 | 622.1 | 603.9 | 586.6 | 553.6 | 524.9 | 520.6 |
| 60°   | 1292.0 | 1174.8 | 937.1 | 748.8 | 648.2 | 608.2 | 588.3 | 569.2 | 535.4 | 510.2 | 506.7 |
| 62.5° | 1253.8 | 1137.5 | 907.6 | 727.1 | 629.1 | 589.2 | 568.3 | 546.6 | 512.8 | 491.1 | 489.4 |
| 65°   | 1188.7 | 1075.1 | 865.1 | 695.9 | 604.8 | 564.0 | 541.4 | 518.0 | 488.5 | 469.4 | 464.2 |
| 67.5° | 1080.3 | 991.8  | 805.2 | 652.5 | 567.5 | 532.8 | 508.5 | 484.2 | 457.3 | 440.8 | 437.3 |
| 70°   | 990.0  | 900.7  | 728.9 | 597.8 | 522.3 | 489.4 | 466.8 | 443.4 | 420.0 | 405.2 | 404.3 |
| 72.5° | 875.5  | 789.6  | 633.4 | 530.2 | 465.1 | 433.0 | 415.6 | 394.8 | 376.6 | 363.6 | 363.6 |
| 75°   | 736.7  | 669.0  | 534.5 | 449.5 | 396.5 | 373.1 | 358.4 | 341.9 | 326.2 | 317.6 | 319.3 |
| 77.5° | 585.7  | 534.5  | 436.4 | 363.6 | 324.5 | 308.9 | 295.0 | 285.5 | 275.9 | 268.1 | 269.0 |
| 80°   | 432.1  | 393.9  | 321.0 | 267.2 | 248.2 | 234.3 | 231.7 | 225.6 | 220.4 | 217.8 | 213.5 |
| 82.5° | 295.9  | 262.0  | 213.5 | 183.1 | 169.2 | 164.9 | 165.7 | 165.7 | 166.6 | 166.6 | 164.9 |
| 85°   | 153.6  | 140.6  | 108.5 | 98.0  | 96.3  | 100.7 | 105.9 | 109.3 | 108.5 | 108.5 | 105.9 |
| 87.5° | 44.3   | 39.9   | 34.7  | 31.2  | 33.0  | 35.6  | 31.2  | 30.4  | 29.5  | 28.6  | 28.6  |
| 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: SP1-2005-785-16

Luminaire Tested: WIS-VA-3-827-U-T4FT

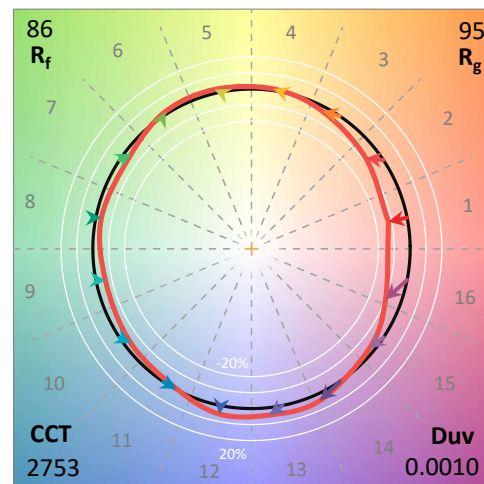
Test Date: 08/13/2020

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2005-785-16  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/13/2020  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-VA-3-827-U-T4FT**  
 Description: INVUE WALL PACK VA

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 2753   | CRI (Ra): | 81.6 |      |      |
| CIE u':                   | 0.2598 | R1:       | 79.8 | R9:  | 0.8  |
| CIE v':                   | 0.5277 | R2:       | 91.4 | R10: | 82.1 |
| Duv:                      | 0.0010 | R3:       | 94.2 | R11: | 80.3 |
| CIE x:                    | 0.4571 | R4:       | 79.8 | R12: | 79.0 |
| CIE y:                    | 0.4127 | R5:       | 80.8 | R13: | 82.5 |
| CIE z:                    | 0.1302 | R6:       | 91.4 | R14: | 97.2 |
| Peak Wavelength (nm):     | 601    | R7:       | 80.6 |      |      |
| Dominant Wavelength (nm): | 583    | R8:       | 54.5 |      |      |
| Purity:                   | 61.5   |           |      |      |      |
| Rf:                       | 85.7   |           |      |      |      |
| Rg:                       | 94.8   |           |      |      |      |



### Test Conditions

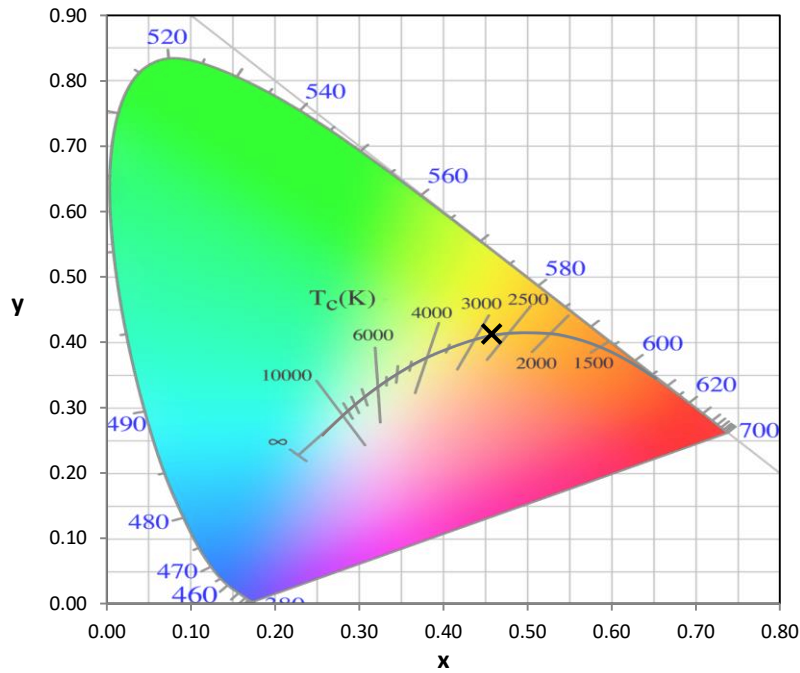
Stabilization Time: 81M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.1/43%  
 Sphere Temperature (°C): 24.3

REPORT NUMBER: SP1-2005-785-16

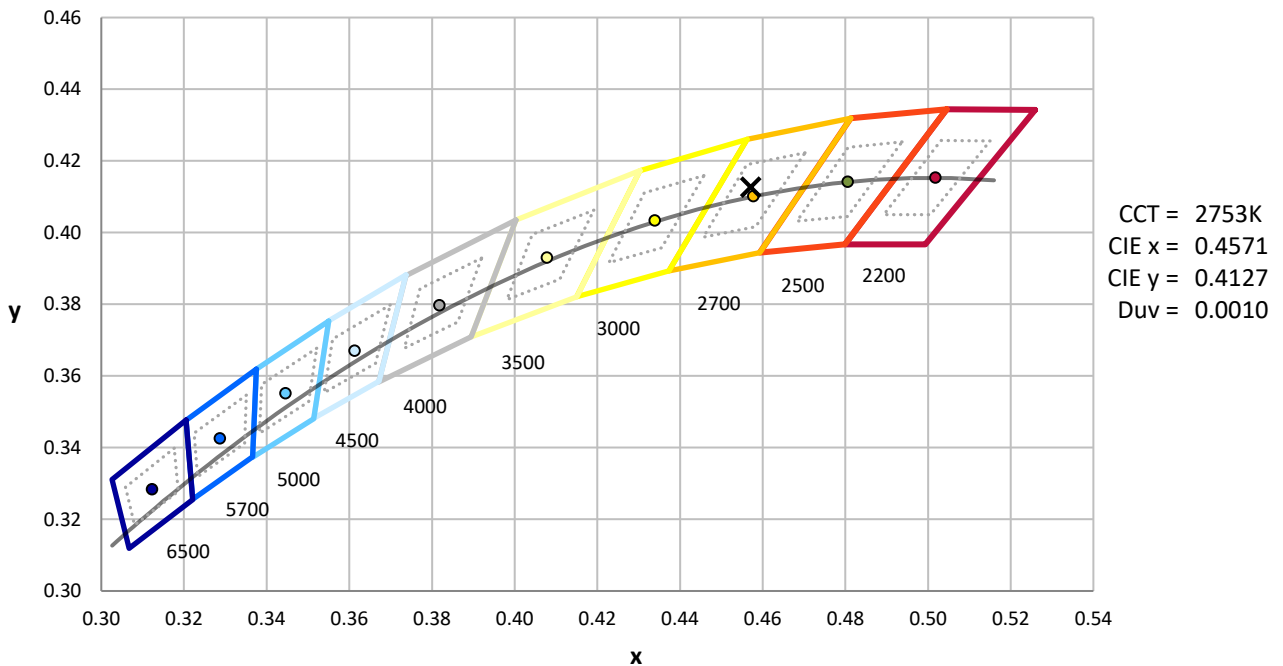
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

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**CIE 1931 Chromaticity Diagram**



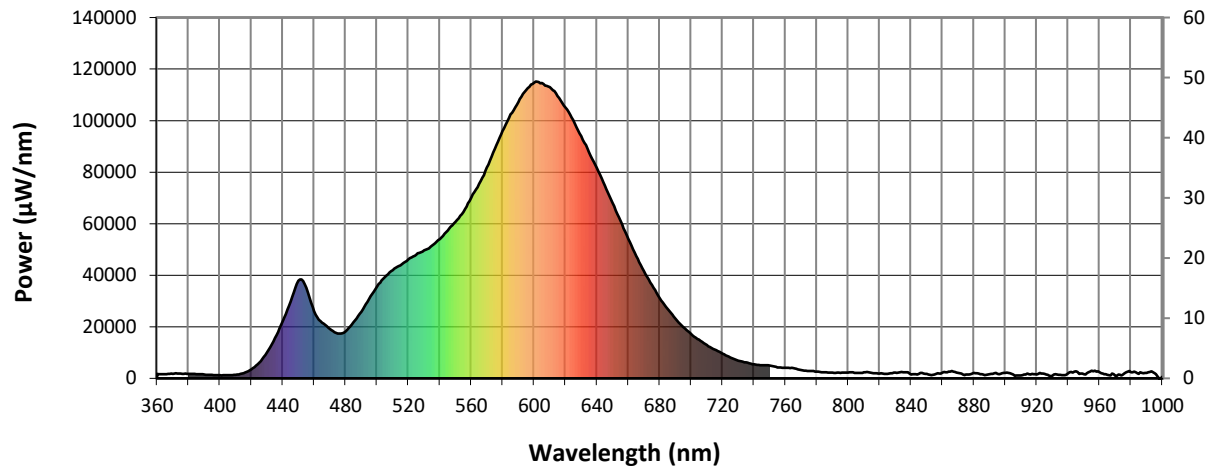
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength

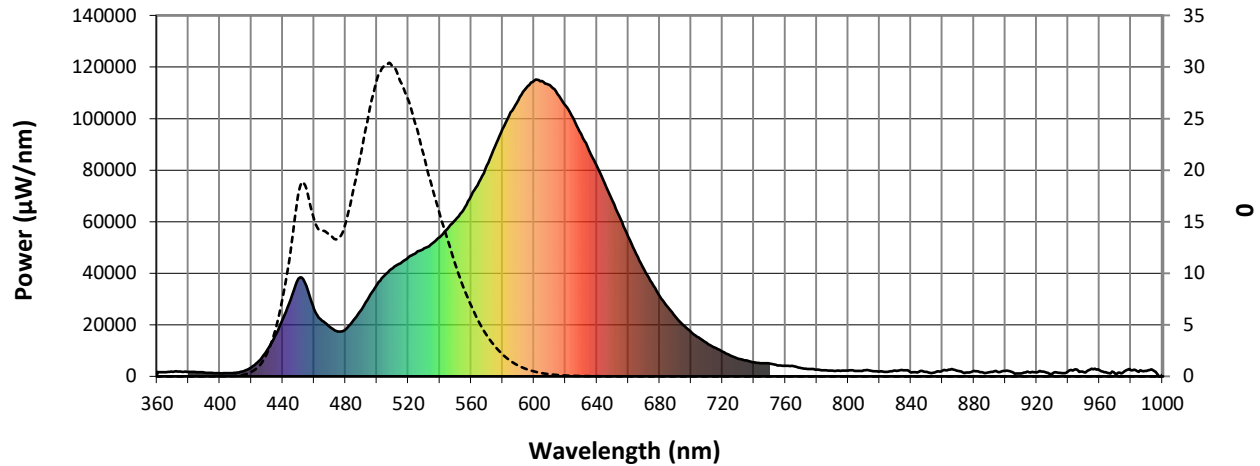


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1795             | 0.0              | 490       | 25874            | 3.7              | 620       | 105030           | 27.3             | 750       | 4991             | 0.0              | 880       | 2071             | 0.0              |
| 365       | 1611             | 0.0              | 495       | 30796            | 5.6              | 625       | 100202           | 22.1             | 755       | 4287             | 0.0              | 885       | 1578             | 0.0              |
| 370       | 1776             | 0.0              | 500       | 35638            | 7.9              | 630       | 94026            | 17.0             | 760       | 4129             | 0.0              | 890       | 1633             | 0.0              |
| 375       | 1813             | 0.0              | 505       | 39281            | 11.0             | 635       | 87734            | 13.2             | 765       | 3942             | 0.0              | 895       | 1779             | 0.0              |
| 380       | 1756             | 0.0              | 510       | 41915            | 14.4             | 640       | 81563            | 9.7              | 770       | 3235             | 0.0              | 900       | 2147             | 0.0              |
| 385       | 1668             | 0.0              | 515       | 43836            | 18.2             | 645       | 74752            | 7.2              | 775       | 2898             | 0.0              | 905       | 1526             | 0.0              |
| 390       | 1473             | 0.0              | 520       | 46153            | 22.4             | 650       | 68076            | 5.0              | 780       | 2609             | 0.0              | 910       | 1117             | 0.0              |
| 395       | 1330             | 0.0              | 525       | 47948            | 25.7             | 655       | 61086            | 3.5              | 785       | 2416             | 0.0              | 915       | 1611             | 0.0              |
| 400       | 1199             | 0.0              | 530       | 49667            | 29.2             | 660       | 54155            | 2.3              | 790       | 2217             | 0.0              | 920       | 1532             | 0.0              |
| 405       | 1244             | 0.0              | 535       | 51509            | 31.9             | 665       | 47463            | 1.5              | 795       | 2175             | 0.0              | 925       | 1719             | 0.0              |
| 410       | 1390             | 0.0              | 540       | 54052            | 35.2             | 670       | 41564            | 0.9              | 800       | 2276             | 0.0              | 930       | 1059             | 0.0              |
| 415       | 2019             | 0.0              | 545       | 57395            | 38.2             | 675       | 36235            | 0.6              | 805       | 2163             | 0.0              | 935       | 1344             | 0.0              |
| 420       | 3533             | 0.0              | 550       | 60674            | 41.2             | 680       | 31220            | 0.4              | 810       | 2360             | 0.0              | 940       | 1936             | 0.0              |
| 425       | 6120             | 0.0              | 555       | 64616            | 44.1             | 685       | 27007            | 0.2              | 815       | 2081             | 0.0              | 945       | 2748             | 0.0              |
| 430       | 10047            | 0.1              | 560       | 69984            | 47.6             | 690       | 23223            | 0.1              | 820       | 1877             | 0.0              | 950       | 1655             | 0.0              |
| 435       | 15593            | 0.2              | 565       | 75433            | 50.2             | 695       | 19912            | 0.1              | 825       | 1692             | 0.0              | 955       | 2936             | 0.0              |
| 440       | 22108            | 0.3              | 570       | 81800            | 53.2             | 700       | 17238            | 0.0              | 830       | 2247             | 0.0              | 960       | 2317             | 0.0              |
| 445       | 29752            | 0.6              | 575       | 89003            | 55.4             | 705       | 14973            | 0.0              | 835       | 2348             | 0.0              | 965       | 1395             | 0.0              |
| 450       | 37921            | 1.0              | 580       | 95982            | 57.0             | 710       | 12860            | 0.0              | 840       | 1547             | 0.0              | 970       | 972              | 0.0              |
| 455       | 35084            | 1.2              | 585       | 102371           | 56.9             | 715       | 11188            | 0.0              | 845       | 1767             | 0.0              | 975       | 1501             | 0.0              |
| 460       | 26102            | 1.1              | 590       | 107222           | 55.4             | 720       | 9613             | 0.0              | 850       | 1731             | 0.0              | 980       | 2417             | 0.0              |
| 465       | 21642            | 1.1              | 595       | 111829           | 53.0             | 725       | 8124             | 0.0              | 855       | 1548             | 0.0              | 985       | 1775             | 0.0              |
| 470       | 19153            | 1.2              | 600       | 114731           | 49.4             | 730       | 6861             | 0.0              | 860       | 2199             | 0.0              | 990       | 2177             | 0.0              |
| 475       | 17436            | 1.4              | 605       | 114580           | 44.4             | 735       | 6153             | 0.0              | 865       | 2652             | 0.0              | 995       | 1983             | 0.0              |
| 480       | 18301            | 1.7              | 610       | 113006           | 38.8             | 740       | 5483             | 0.0              | 870       | 2084             | 0.0              | 1000      | 568              | 0.0              |
| 485       | 21736            | 2.6              | 615       | 109545           | 33.1             | 745       | 5110             | 0.0              | 875       | 1539             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



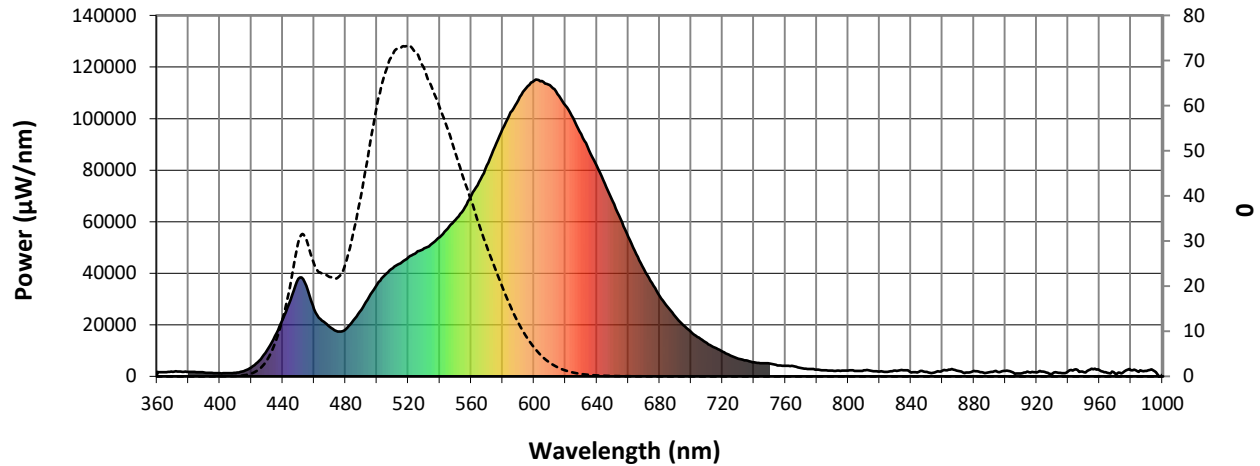
Scotopic Lumens: 2412.3

S/P: 0.46

| λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 1795          | 0.0           | 490    | 25874         | 39.8          | 620    | 105030        | 1.3           | 750    | 4991          | 0.0           | 880    | 2071          | 0.0           |
| 365    | 1611          | 0.0           | 495    | 30796         | 49.8          | 625    | 100202        | 0.8           | 755    | 4287          | 0.0           | 885    | 1578          | 0.0           |
| 370    | 1776          | 0.0           | 500    | 35638         | 59.6          | 630    | 94026         | 0.5           | 760    | 4129          | 0.0           | 890    | 1633          | 0.0           |
| 375    | 1813          | 0.0           | 505    | 39281         | 66.8          | 635    | 87734         | 0.3           | 765    | 3942          | 0.0           | 895    | 1779          | 0.0           |
| 380    | 1756          | 0.0           | 510    | 41915         | 71.0          | 640    | 81563         | 0.2           | 770    | 3235          | 0.0           | 900    | 2147          | 0.0           |
| 385    | 1668          | 0.0           | 515    | 43836         | 72.7          | 645    | 74752         | 0.1           | 775    | 2898          | 0.0           | 905    | 1526          | 0.0           |
| 390    | 1473          | 0.0           | 520    | 46153         | 73.4          | 650    | 68076         | 0.1           | 780    | 2609          | 0.0           | 910    | 1117          | 0.0           |
| 395    | 1330          | 0.0           | 525    | 47948         | 71.7          | 655    | 61086         | 0.0           | 785    | 2416          | 0.0           | 915    | 1611          | 0.0           |
| 400    | 1199          | 0.0           | 530    | 49667         | 68.5          | 660    | 54155         | 0.0           | 790    | 2217          | 0.0           | 920    | 1532          | 0.0           |
| 405    | 1244          | 0.0           | 535    | 51509         | 64.2          | 665    | 47463         | 0.0           | 795    | 2175          | 0.0           | 925    | 1719          | 0.0           |
| 410    | 1390          | 0.1           | 540    | 54052         | 59.7          | 670    | 41564         | 0.0           | 800    | 2276          | 0.0           | 930    | 1059          | 0.0           |
| 415    | 2019          | 0.2           | 545    | 57395         | 55.0          | 675    | 36235         | 0.0           | 805    | 2163          | 0.0           | 935    | 1344          | 0.0           |
| 420    | 3533          | 0.6           | 550    | 60674         | 49.6          | 680    | 31220         | 0.0           | 810    | 2360          | 0.0           | 940    | 1936          | 0.0           |
| 425    | 6120          | 1.5           | 555    | 64616         | 44.2          | 685    | 27007         | 0.0           | 815    | 2081          | 0.0           | 945    | 2748          | 0.0           |
| 430    | 10047         | 3.4           | 560    | 69984         | 39.1          | 690    | 23223         | 0.0           | 820    | 1877          | 0.0           | 950    | 1655          | 0.0           |
| 435    | 15593         | 7.0           | 565    | 75433         | 33.8          | 695    | 19912         | 0.0           | 825    | 1692          | 0.0           | 955    | 2936          | 0.0           |
| 440    | 22108         | 12.4          | 570    | 81800         | 28.9          | 700    | 17238         | 0.0           | 830    | 2247          | 0.0           | 960    | 2317          | 0.0           |
| 445    | 29752         | 19.9          | 575    | 89003         | 24.2          | 705    | 14973         | 0.0           | 835    | 2348          | 0.0           | 965    | 1395          | 0.0           |
| 450    | 37921         | 29.4          | 580    | 95982         | 19.8          | 710    | 12860         | 0.0           | 840    | 1547          | 0.0           | 970    | 972           | 0.0           |
| 455    | 35084         | 30.7          | 585    | 102371        | 15.6          | 715    | 11188         | 0.0           | 845    | 1767          | 0.0           | 975    | 1501          | 0.0           |
| 460    | 26102         | 25.2          | 590    | 107222        | 11.9          | 720    | 9613          | 0.0           | 850    | 1731          | 0.0           | 980    | 2417          | 0.0           |
| 465    | 21642         | 22.9          | 595    | 111829        | 8.9           | 725    | 8124          | 0.0           | 855    | 1548          | 0.0           | 985    | 1775          | 0.0           |
| 470    | 19153         | 22.1          | 600    | 114731        | 6.5           | 730    | 6861          | 0.0           | 860    | 2199          | 0.0           | 990    | 2177          | 0.0           |
| 475    | 17436         | 21.8          | 605    | 114580        | 4.5           | 735    | 6153          | 0.0           | 865    | 2652          | 0.0           | 995    | 1983          | 0.0           |
| 480    | 18301         | 24.7          | 610    | 113006        | 3.1           | 740    | 5483          | 0.0           | 870    | 2084          | 0.0           | 1000   | 568           | 0.0           |
| 485    | 21736         | 31.5          | 615    | 109545        | 2.0           | 745    | 5110          | 0.0           | 875    | 1539          | 0.0           |        |               |               |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 6507.1**
**S/P: 1.24**

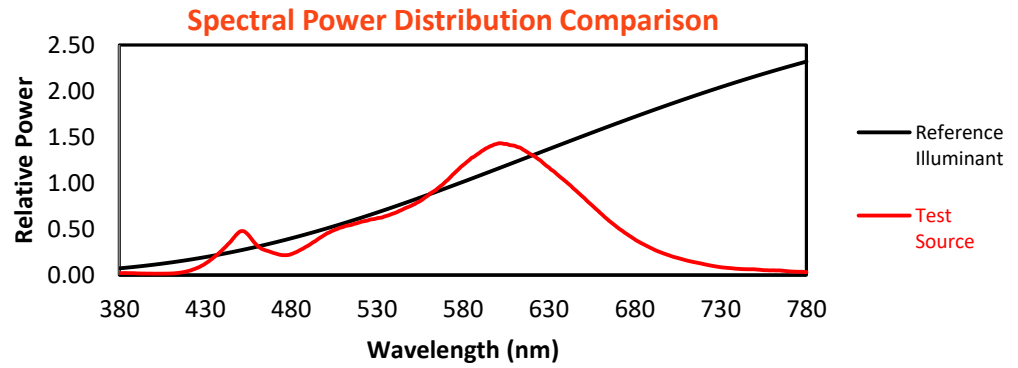
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1795             | 0.0              | 490       | 25874            | 21.5             | 620       | 105030           | 0.1              | 750       | 4991             | 0.0              | 880       | 2071             | 0.0              |
| 365       | 1611             | 0.0              | 495       | 30796            | 25.4             | 625       | 100202           | 0.1              | 755       | 4287             | 0.0              | 885       | 1578             | 0.0              |
| 370       | 1776             | 0.0              | 500       | 35638            | 28.6             | 630       | 94026            | 0.0              | 760       | 4129             | 0.0              | 890       | 1633             | 0.0              |
| 375       | 1813             | 0.0              | 505       | 39281            | 30.1             | 635       | 87734            | 0.0              | 765       | 3942             | 0.0              | 895       | 1779             | 0.0              |
| 380       | 1756             | 0.0              | 510       | 41915            | 30.1             | 640       | 81563            | 0.0              | 770       | 3235             | 0.0              | 900       | 2147             | 0.0              |
| 385       | 1668             | 0.0              | 515       | 43836            | 28.6             | 645       | 74752            | 0.0              | 775       | 2898             | 0.0              | 905       | 1526             | 0.0              |
| 390       | 1473             | 0.0              | 520       | 46153            | 26.9             | 650       | 68076            | 0.0              | 780       | 2609             | 0.0              | 910       | 1117             | 0.0              |
| 395       | 1330             | 0.0              | 525       | 47948            | 24.3             | 655       | 61086            | 0.0              | 785       | 2416             | 0.0              | 915       | 1611             | 0.0              |
| 400       | 1199             | 0.0              | 530       | 49667            | 21.5             | 660       | 54155            | 0.0              | 790       | 2217             | 0.0              | 920       | 1532             | 0.0              |
| 405       | 1244             | 0.0              | 535       | 51509            | 18.5             | 665       | 47463            | 0.0              | 795       | 2175             | 0.0              | 925       | 1719             | 0.0              |
| 410       | 1390             | 0.1              | 540       | 54052            | 15.8             | 670       | 41564            | 0.0              | 800       | 2276             | 0.0              | 930       | 1059             | 0.0              |
| 415       | 2019             | 0.1              | 545       | 57395            | 13.3             | 675       | 36235            | 0.0              | 805       | 2163             | 0.0              | 935       | 1344             | 0.0              |
| 420       | 3533             | 0.4              | 550       | 60674            | 10.9             | 680       | 31220            | 0.0              | 810       | 2360             | 0.0              | 940       | 1936             | 0.0              |
| 425       | 6120             | 1.0              | 555       | 64616            | 8.7              | 685       | 27007            | 0.0              | 815       | 2081             | 0.0              | 945       | 2748             | 0.0              |
| 430       | 10047            | 2.1              | 560       | 69984            | 6.9              | 690       | 23223            | 0.0              | 820       | 1877             | 0.0              | 950       | 1655             | 0.0              |
| 435       | 15593            | 4.2              | 565       | 75433            | 5.3              | 695       | 19912            | 0.0              | 825       | 1692             | 0.0              | 955       | 2936             | 0.0              |
| 440       | 22108            | 7.4              | 570       | 81800            | 4.0              | 700       | 17238            | 0.0              | 830       | 2247             | 0.0              | 960       | 2317             | 0.0              |
| 445       | 29752            | 11.7             | 575       | 89003            | 3.0              | 705       | 14973            | 0.0              | 835       | 2348             | 0.0              | 965       | 1395             | 0.0              |
| 450       | 37921            | 17.5             | 580       | 95982            | 2.1              | 710       | 12860            | 0.0              | 840       | 1547             | 0.0              | 970       | 972              | 0.0              |
| 455       | 35084            | 18.4             | 585       | 102371           | 1.5              | 715       | 11188            | 0.0              | 845       | 1767             | 0.0              | 975       | 1501             | 0.0              |
| 460       | 26102            | 15.4             | 590       | 107222           | 1.1              | 720       | 9613             | 0.0              | 850       | 1731             | 0.0              | 980       | 2417             | 0.0              |
| 465       | 21642            | 14.1             | 595       | 111829           | 0.7              | 725       | 8124             | 0.0              | 855       | 1548             | 0.0              | 985       | 1775             | 0.0              |
| 470       | 19153            | 13.7             | 600       | 114731           | 0.5              | 730       | 6861             | 0.0              | 860       | 2199             | 0.0              | 990       | 2177             | 0.0              |
| 475       | 17436            | 13.3             | 605       | 114580           | 0.3              | 735       | 6153             | 0.0              | 865       | 2652             | 0.0              | 995       | 1983             | 0.0              |
| 480       | 18301            | 14.7             | 610       | 113006           | 0.2              | 740       | 5483             | 0.0              | 870       | 2084             | 0.0              | 1000      | 568              | 0.0              |
| 485       | 21736            | 17.9             | 615       | 109545           | 0.1              | 745       | 5110             | 0.0              | 875       | 1539             | 0.0              |           |                  |                  |

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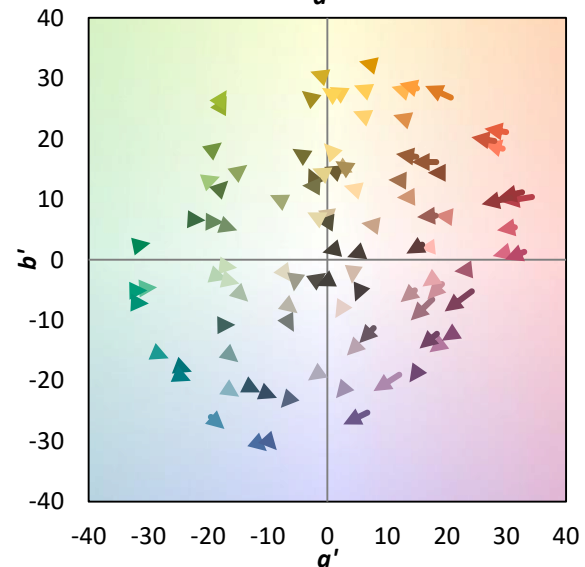
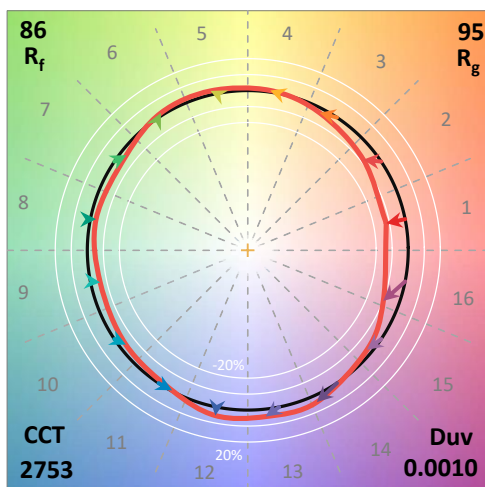
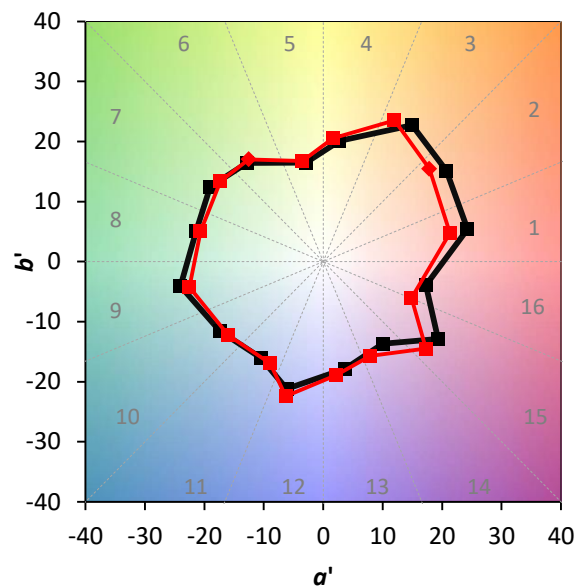
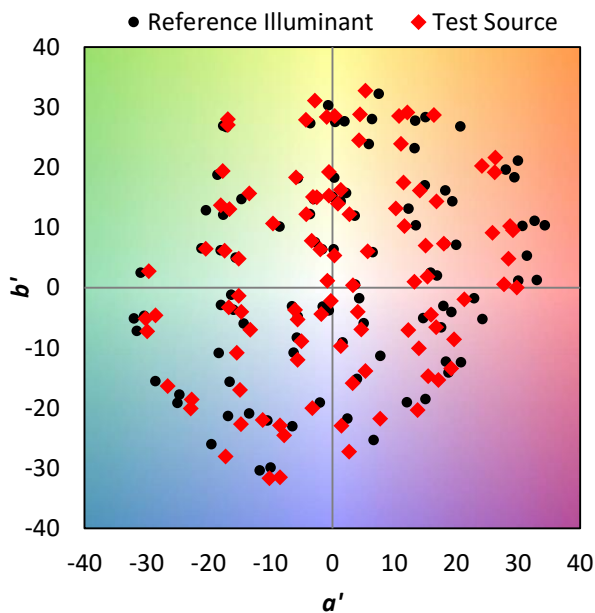
TM-30-18

### Summary

$R_f = 85.7$   
 $R_g = 94.8$   
 CIE  $R_a = 81.6$   
 $R_g = 0.8$

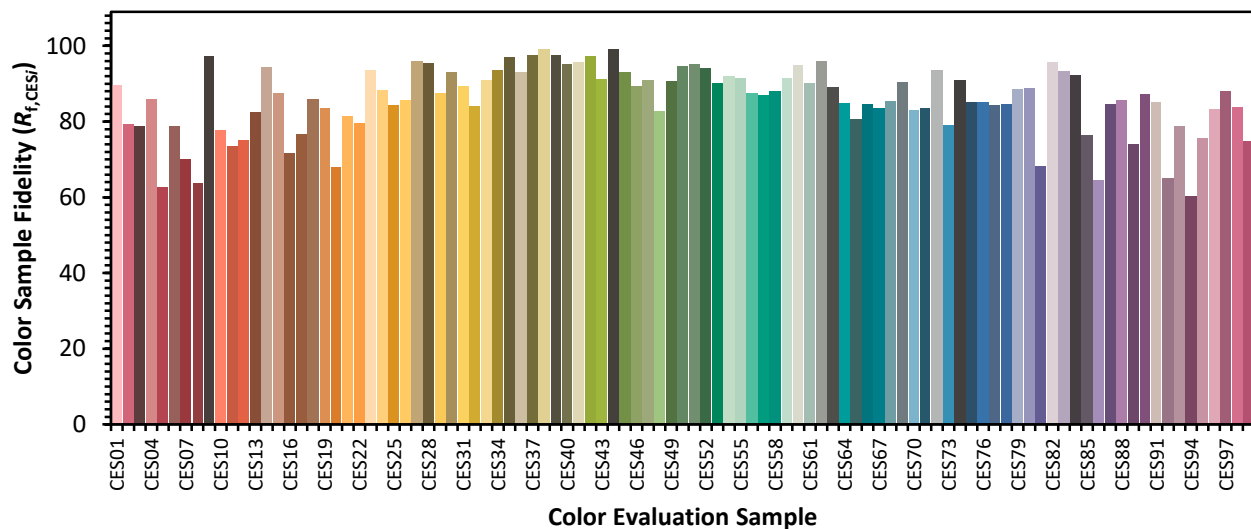


### Color Vector Graphics

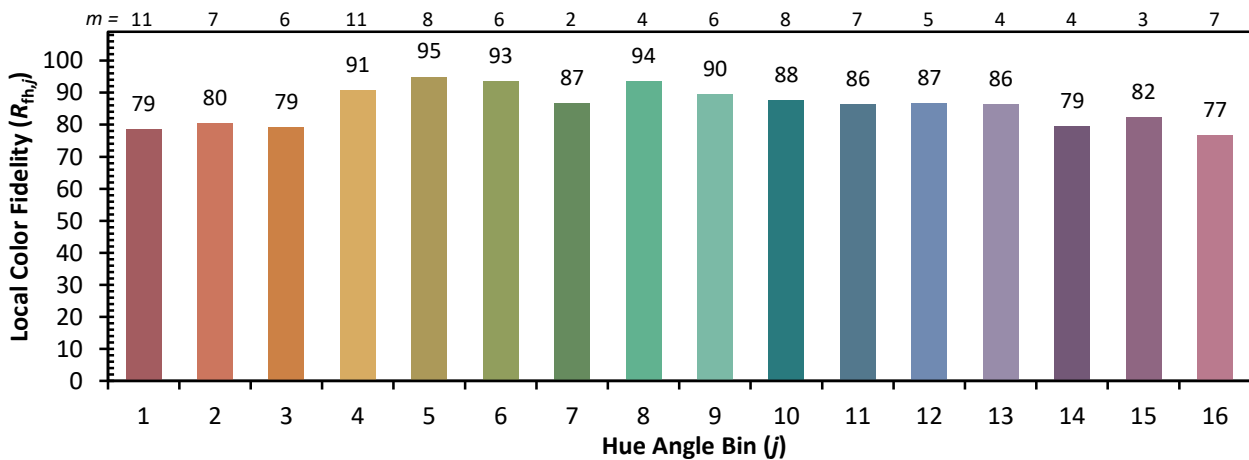
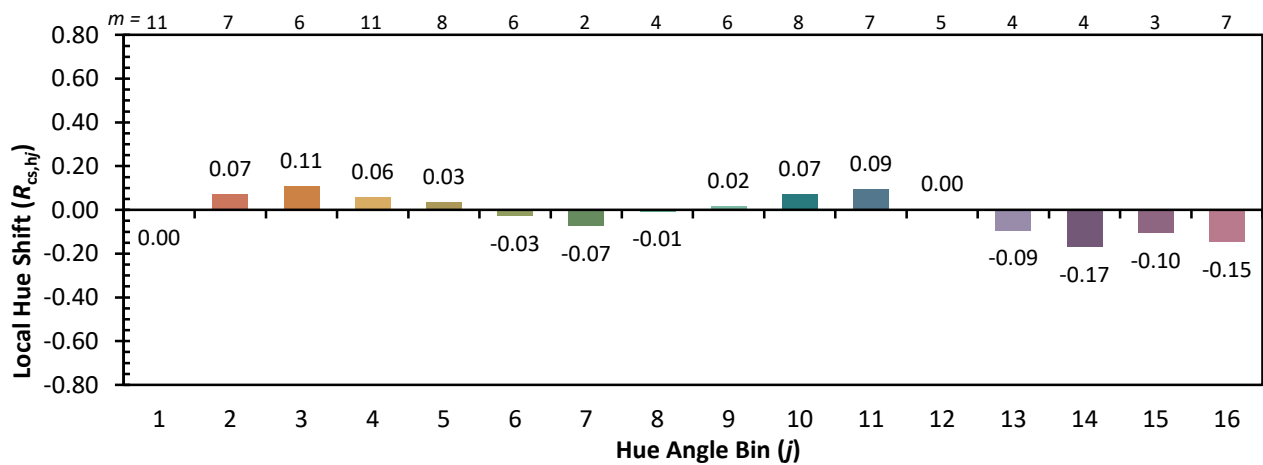
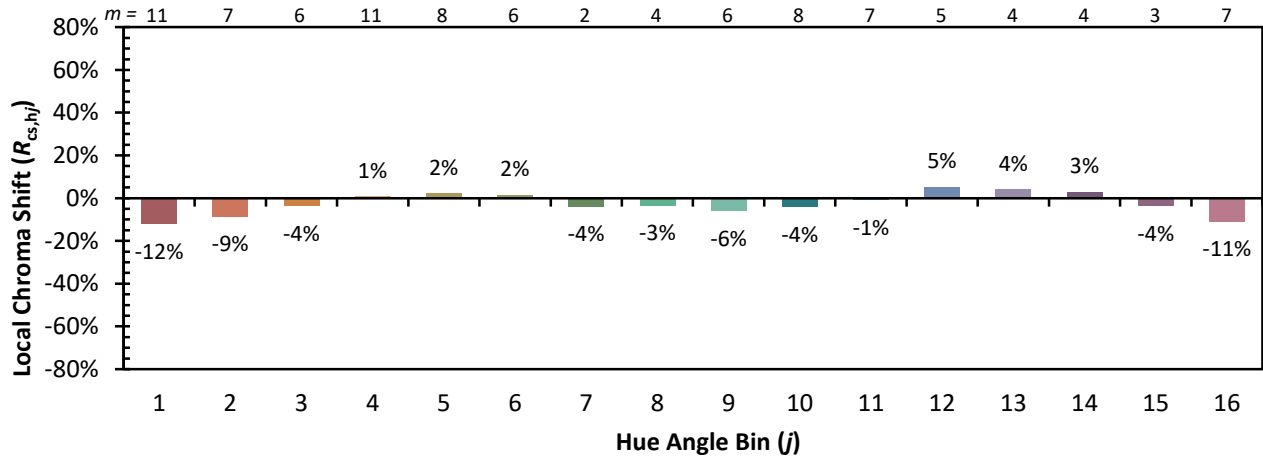


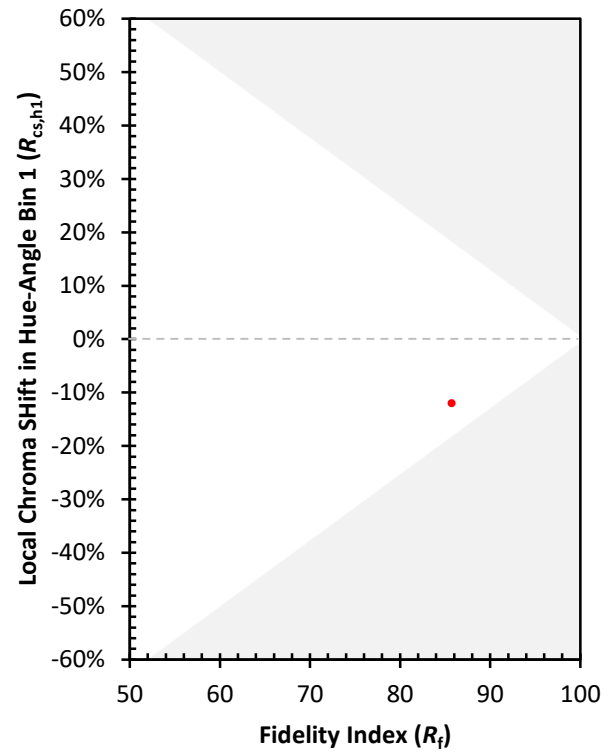
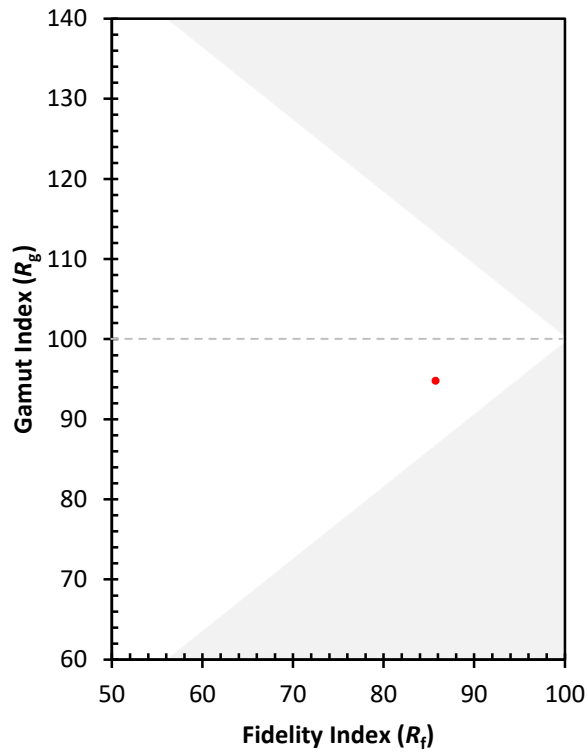
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 86 | CES51 = 95 | CES76 = 85 |
| CES02 = 63 | CES27 = 96 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 96 | CES53 = 90 | CES78 = 85 |
| CES04 = 71 | CES29 = 87 | CES54 = 92 | CES79 = 89 |
| CES05 = 50 | CES30 = 93 | CES55 = 91 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 87 | CES81 = 68 |
| CES07 = 43 | CES32 = 84 | CES57 = 87 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 88 | CES83 = 93 |
| CES09 = 29 | CES34 = 94 | CES59 = 92 | CES84 = 92 |
| CES10 = 77 | CES35 = 97 | CES60 = 95 | CES85 = 76 |
| CES11 = 60 | CES36 = 93 | CES61 = 90 | CES86 = 65 |
| CES12 = 66 | CES37 = 98 | CES62 = 96 | CES87 = 85 |
| CES13 = 44 | CES38 = 99 | CES63 = 89 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 85 | CES89 = 74 |
| CES15 = 72 | CES40 = 95 | CES65 = 81 | CES90 = 87 |
| CES16 = 48 | CES41 = 96 | CES66 = 85 | CES91 = 85 |
| CES17 = 50 | CES42 = 97 | CES67 = 84 | CES92 = 65 |
| CES18 = 57 | CES43 = 91 | CES68 = 85 | CES93 = 79 |
| CES19 = 73 | CES44 = 99 | CES69 = 90 | CES94 = 60 |
| CES20 = 67 | CES45 = 93 | CES70 = 83 | CES95 = 76 |
| CES21 = 87 | CES46 = 89 | CES71 = 83 | CES96 = 83 |
| CES22 = 79 | CES47 = 91 | CES72 = 94 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 79 | CES98 = 84 |
| CES24 = 91 | CES49 = 91 | CES74 = 91 | CES99 = 75 |
| CES25 = 72 | CES50 = 95 | CES75 = 85 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**


(END OF REPORT)