

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: P472193

Luminaire Tested: **CCP-VA-5-835-U-T4W**

Issue Date: 01/27/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P472193  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 01/27/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-VA-5-835-U-T4W  
Description: INVUE CLEARCURVE POLE MOUNT Wave Stream LUMINAIRE WITH T4W  
DISTRIBUTION LENS  
Light Source: 3500K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 7372.4 lumens  
Efficiency: N/A  
Efficacy: 99.2 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.54' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G2

Input Watts (W): 74.3  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

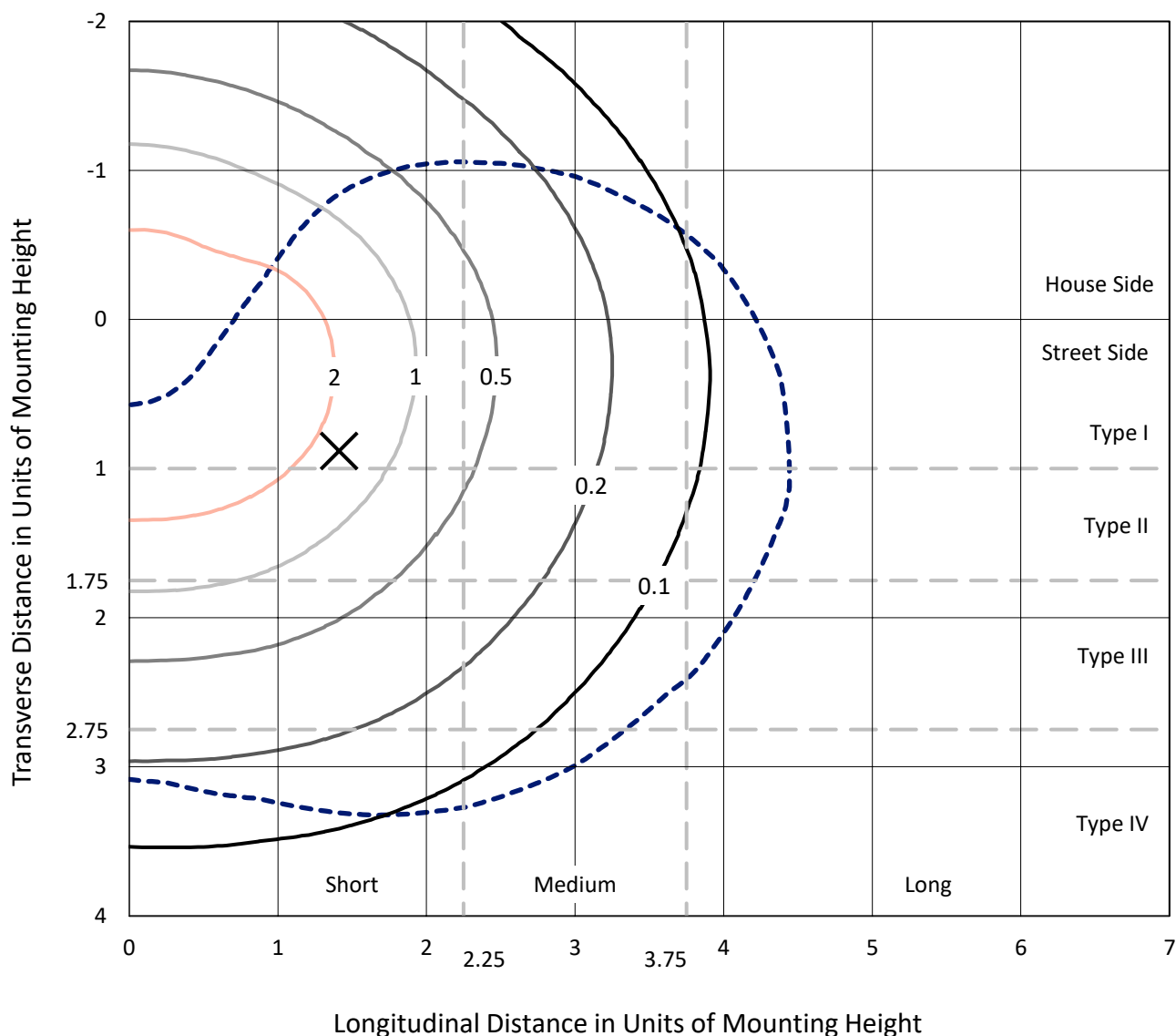
REPORT NUMBER: P472193

CATALOG NUMBER: CCP-VA-5-835-U-T4W

## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

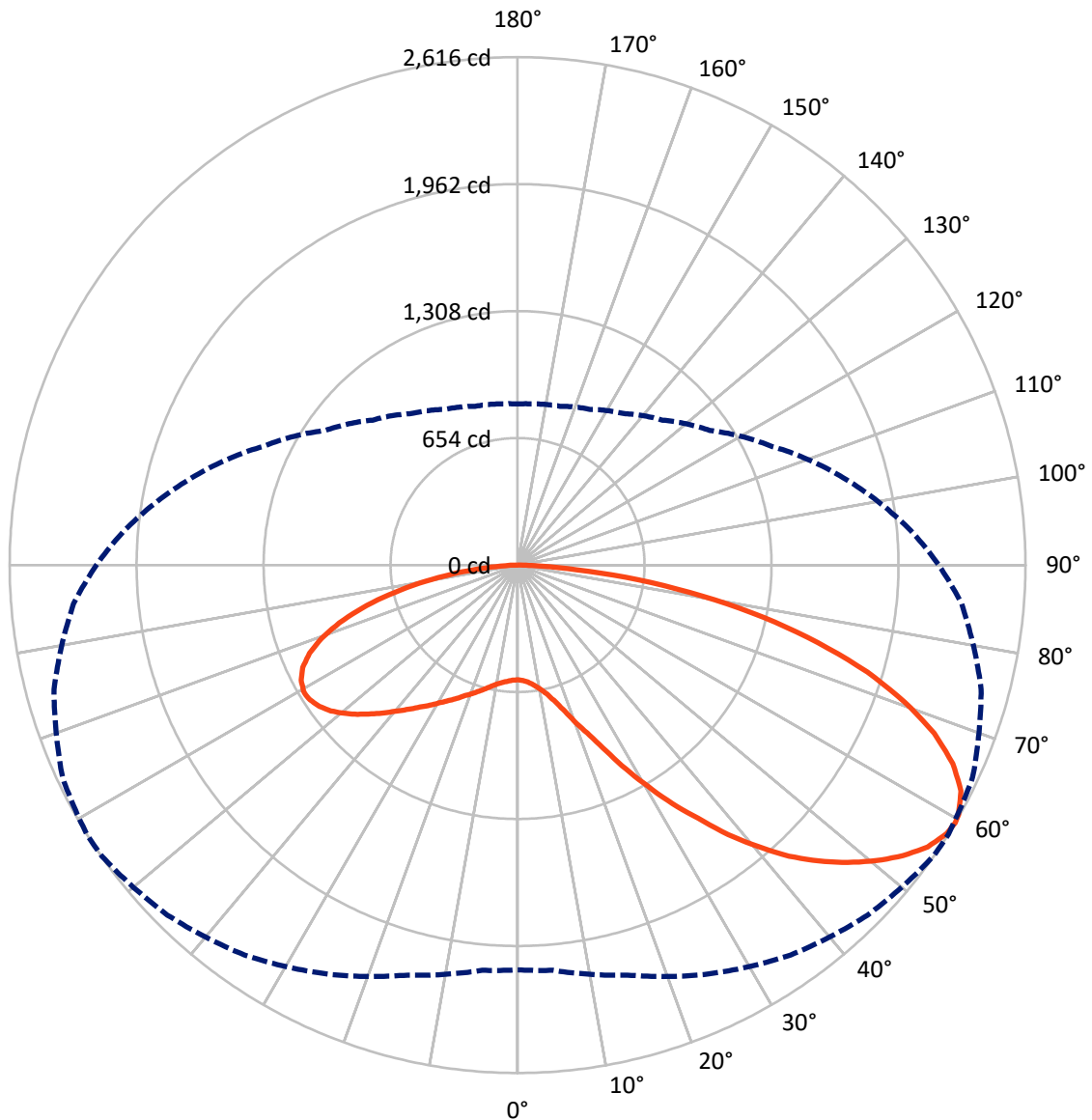


Based on 15 foot mounting height. Maximum calculated value = 4 fc

Type IV - Short - N/A

REPORT NUMBER: P472193  
CATALOG NUMBER: CCP-VA-5-835-U-T4W

## Luminous Intensity Polar Plot



— Vertical Plane Through 58-Deg Lateral      - - - Horizontal Cone Through 59-Deg Vertical

REPORT NUMBER: P472193

CATALOG NUMBER: CCP-VA-5-835-U-T4W

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2629.3   | 0.0    | 2629.3 |
|                    | % Fixture | 35.7     | 0.0    | 35.7   |
| <b>Street Side</b> | Lumens    | 4743.1   | 0.0    | 4743.1 |
|                    | % Fixture | 64.3     | 0.0    | 64.3   |
| <b>Total</b>       | Lumens    | 7372.4   | 0.0    | 7372.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 58.6   | 0.8       |
| 10°-20°   | 200.0  | 2.7       |
| 20°-30°   | 422.1  | 5.7       |
| 30°-40°   | 776.8  | 10.5      |
| 40°-50°   | 1210.8 | 16.4      |
| 50°-60°   | 1591.0 | 21.6      |
| 60°-70°   | 1667.1 | 22.6      |
| 70°-80°   | 1155.8 | 15.7      |
| 80°-90°   | 290.2  | 3.9       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 7372.4 | 100.0     |
| 0°-180°   | 7372.4 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P472193

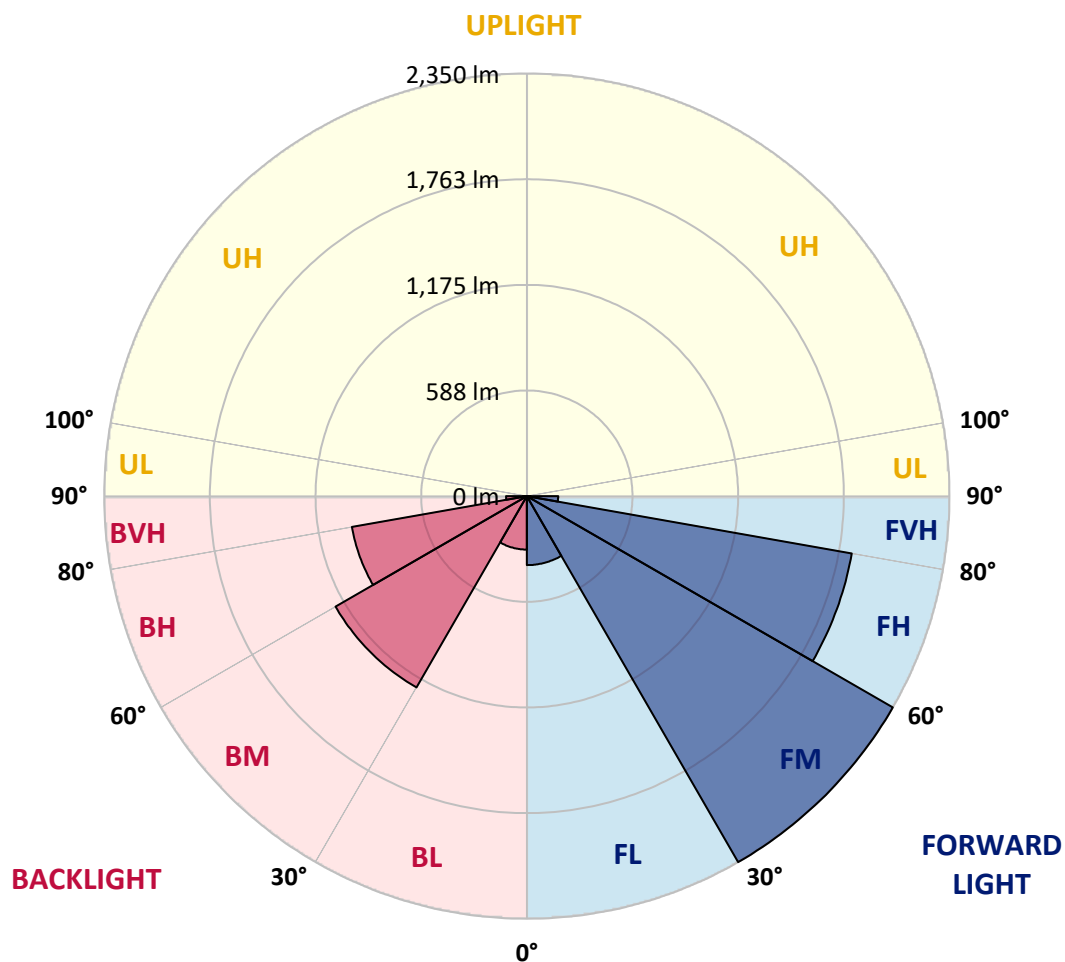
CATALOG NUMBER: CCP-VA-5-835-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 383.5  | 5.2       |                         |      |         |
| FM   | (30°-60°)   | 2350.2 | 31.9      |                         |      |         |
| FH   | (60°-80°)   | 1835.0 | 24.9      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 174.4  | 2.4       |                         |      | G2/225  |
| BL   | (0°-30°)    | 297.2  | 4.0       | B1/500                  |      |         |
| BM   | (30°-60°)   | 1228.4 | 16.7      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 987.9  | 13.4      | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 115.8  | 1.6       |                         |      | G2/225  |
| 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



REPORT NUMBER: P472193

CATALOG NUMBER: CCP-VA-5-835-U-T4W

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 58°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  |
| 2.5°  | 599.3  | 599.3  | 599.3  | 597.7  | 597.7  | 597.7  | 596.0  | 596.0  | 596.0  | 594.3  | 592.7  |
| 5°    | 612.6  | 612.6  | 610.9  | 612.6  | 610.9  | 609.3  | 607.6  | 607.6  | 607.6  | 606.0  | 604.3  |
| 7.5°  | 630.9  | 632.5  | 630.9  | 632.5  | 630.9  | 629.2  | 625.9  | 625.9  | 624.2  | 620.9  | 617.6  |
| 10°   | 659.1  | 659.1  | 659.1  | 657.4  | 655.8  | 654.1  | 652.4  | 650.8  | 649.1  | 644.1  | 639.2  |
| 12.5° | 693.9  | 693.9  | 693.9  | 690.6  | 690.6  | 687.3  | 685.6  | 684.0  | 680.7  | 674.0  | 667.4  |
| 15°   | 737.1  | 735.4  | 740.4  | 740.4  | 738.8  | 738.8  | 733.8  | 730.5  | 727.1  | 717.2  | 702.2  |
| 17.5° | 795.2  | 793.5  | 798.5  | 801.8  | 801.8  | 803.5  | 795.2  | 791.9  | 780.3  | 767.0  | 747.1  |
| 20°   | 873.2  | 869.9  | 874.9  | 878.2  | 874.9  | 878.2  | 869.9  | 871.6  | 855.0  | 831.7  | 800.2  |
| 22.5° | 957.9  | 957.9  | 962.9  | 962.9  | 964.5  | 967.9  | 957.9  | 952.9  | 939.6  | 906.4  | 866.6  |
| 25°   | 1062.5 | 1070.8 | 1070.8 | 1070.8 | 1077.4 | 1079.1 | 1069.1 | 1060.8 | 1042.6 | 997.7  | 943.0  |
| 27.5° | 1190.3 | 1188.7 | 1187.0 | 1197.0 | 1197.0 | 1200.3 | 1193.6 | 1190.3 | 1168.7 | 1114.0 | 1030.9 |
| 30°   | 1326.5 | 1316.5 | 1323.1 | 1326.5 | 1333.1 | 1338.1 | 1331.4 | 1321.5 | 1294.9 | 1235.1 | 1132.2 |
| 32.5° | 1451.0 | 1457.6 | 1467.6 | 1470.9 | 1480.8 | 1482.5 | 1465.9 | 1465.9 | 1439.3 | 1363.0 | 1256.7 |
| 35°   | 1592.1 | 1592.1 | 1618.6 | 1630.3 | 1630.3 | 1640.2 | 1615.3 | 1602.0 | 1583.8 | 1504.1 | 1369.6 |
| 37.5° | 1714.9 | 1718.2 | 1739.8 | 1766.4 | 1769.7 | 1784.7 | 1766.4 | 1761.4 | 1728.2 | 1646.9 | 1497.4 |
| 40°   | 1829.5 | 1832.8 | 1859.4 | 1890.9 | 1909.2 | 1932.4 | 1914.1 | 1905.8 | 1871.0 | 1778.0 | 1625.3 |
| 42.5° | 1919.1 | 1925.8 | 1959.0 | 2005.4 | 2035.3 | 2063.6 | 2055.3 | 2050.3 | 2002.1 | 1904.2 | 1743.1 |
| 45°   | 1987.2 | 1998.8 | 2045.3 | 2100.1 | 2141.6 | 2183.1 | 2184.7 | 2174.8 | 2130.0 | 2020.4 | 1857.7 |
| 47.5° | 2042.0 | 2055.3 | 2106.7 | 2176.4 | 2239.5 | 2291.0 | 2301.0 | 2289.3 | 2247.8 | 2133.3 | 1960.6 |
| 50°   | 2086.8 | 2093.4 | 2151.5 | 2241.2 | 2319.2 | 2384.0 | 2403.9 | 2393.9 | 2357.4 | 2227.9 | 2050.3 |
| 52.5° | 2110.0 | 2120.0 | 2186.4 | 2289.3 | 2384.0 | 2462.0 | 2491.9 | 2486.9 | 2443.7 | 2314.2 | 2130.0 |
| 55°   | 2121.7 | 2131.6 | 2209.6 | 2327.5 | 2433.8 | 2525.1 | 2561.6 | 2563.3 | 2521.8 | 2392.3 | 2204.7 |
| 57.5° | 2108.4 | 2121.7 | 2206.3 | 2337.5 | 2455.3 | 2553.3 | 2609.7 | 2608.1 | 2574.9 | 2452.0 | 2267.8 |
| 59°   | 2085.1 | 2095.1 | 2186.4 | 2324.2 | 2452.0 | 2550.0 | 2614.7 | 2616.4 | 2586.5 | 2471.9 | 2296.0 |
| 60°   | 2058.6 | 2070.2 | 2163.2 | 2307.6 | 2438.7 | 2538.4 | 2606.4 | 2609.7 | 2584.8 | 2476.9 | 2307.6 |
| 62.5° | 1967.3 | 1982.2 | 2085.1 | 2239.5 | 2382.3 | 2476.9 | 2558.3 | 2563.3 | 2550.0 | 2463.6 | 2315.9 |
| 65°   | 1839.4 | 1852.7 | 1963.9 | 2128.3 | 2277.7 | 2375.7 | 2452.0 | 2463.6 | 2462.0 | 2403.9 | 2282.7 |
| 67.5° | 1683.4 | 1685.0 | 1789.6 | 1968.9 | 2125.0 | 2221.3 | 2294.3 | 2314.2 | 2329.2 | 2291.0 | 2184.7 |
| 70°   | 1495.8 | 1494.1 | 1595.4 | 1773.0 | 1929.1 | 2030.4 | 2103.4 | 2116.7 | 2154.9 | 2125.0 | 2038.7 |
| 72.5° | 1263.4 | 1283.3 | 1377.9 | 1527.3 | 1681.7 | 1794.6 | 1859.4 | 1884.3 | 1905.8 | 1912.5 | 1841.1 |
| 75°   | 1044.2 | 1065.8 | 1140.5 | 1280.0 | 1412.8 | 1517.4 | 1587.1 | 1598.7 | 1638.6 | 1648.5 | 1582.1 |
| 77.5° | 835.1  | 836.7  | 891.5  | 1002.7 | 1123.9 | 1210.2 | 1266.7 | 1296.6 | 1318.2 | 1338.1 | 1268.3 |
| 80°   | 586.0  | 594.3  | 632.5  | 712.2  | 806.8  | 898.1  | 944.6  | 964.5  | 979.5  | 992.8  | 969.5  |
| 82.5° | 366.9  | 370.2  | 395.1  | 443.3  | 508.0  | 559.5  | 607.6  | 624.2  | 627.5  | 657.4  | 654.1  |
| 85°   | 174.3  | 176.0  | 192.6  | 215.8  | 244.0  | 285.5  | 303.8  | 303.8  | 327.0  | 348.6  | 348.6  |
| 87.5° | 23.2   | 23.2   | 28.2   | 31.5   | 39.8   | 51.5   | 71.4   | 73.0   | 86.3   | 96.3   | 104.6  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

REPORT NUMBER: P472193

CATALOG NUMBER: CCP-VA-5-835-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|
| 0°    | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0  | 591.0 | 591.0 | 591.0 | 591.0 | 591.0 |
| 2.5°  | 592.7  | 592.7  | 592.7  | 592.7  | 592.7  | 591.0  | 592.7 | 592.7 | 592.7 | 592.7 | 592.7 |
| 5°    | 604.3  | 602.6  | 601.0  | 599.3  | 599.3  | 597.7  | 597.7 | 597.7 | 597.7 | 597.7 | 597.7 |
| 7.5°  | 615.9  | 614.3  | 612.6  | 609.3  | 607.6  | 606.0  | 606.0 | 604.3 | 604.3 | 604.3 | 604.3 |
| 10°   | 635.8  | 634.2  | 627.5  | 622.6  | 619.2  | 617.6  | 615.9 | 614.3 | 612.6 | 612.6 | 612.6 |
| 12.5° | 662.4  | 659.1  | 647.5  | 640.8  | 635.8  | 632.5  | 629.2 | 627.5 | 625.9 | 624.2 | 624.2 |
| 15°   | 695.6  | 687.3  | 672.4  | 662.4  | 655.8  | 650.8  | 645.8 | 642.5 | 640.8 | 639.2 | 639.2 |
| 17.5° | 735.4  | 725.5  | 705.6  | 687.3  | 675.7  | 667.4  | 660.7 | 655.8 | 654.1 | 654.1 | 654.1 |
| 20°   | 785.2  | 768.6  | 740.4  | 715.5  | 697.3  | 685.6  | 675.7 | 670.7 | 669.0 | 667.4 | 665.7 |
| 22.5° | 843.4  | 821.8  | 780.3  | 742.1  | 718.8  | 702.2  | 690.6 | 684.0 | 679.0 | 677.3 | 677.3 |
| 25°   | 909.8  | 878.2  | 823.4  | 776.9  | 745.4  | 722.2  | 707.2 | 698.9 | 690.6 | 687.3 | 687.3 |
| 27.5° | 989.4  | 947.9  | 874.9  | 813.5  | 770.3  | 742.1  | 725.5 | 713.9 | 705.6 | 698.9 | 695.6 |
| 30°   | 1075.8 | 1029.3 | 931.3  | 853.3  | 798.5  | 767.0  | 747.1 | 733.8 | 722.2 | 710.5 | 708.9 |
| 32.5° | 1185.3 | 1118.9 | 999.4  | 898.1  | 831.7  | 791.9  | 768.6 | 752.0 | 737.1 | 725.5 | 722.2 |
| 35°   | 1296.6 | 1216.9 | 1070.8 | 944.6  | 863.3  | 815.1  | 786.9 | 768.6 | 753.7 | 740.4 | 738.8 |
| 37.5° | 1411.1 | 1326.5 | 1148.8 | 999.4  | 899.8  | 841.7  | 806.8 | 786.9 | 768.6 | 755.4 | 753.7 |
| 40°   | 1530.6 | 1431.0 | 1228.5 | 1055.8 | 938.0  | 868.3  | 828.4 | 803.5 | 783.6 | 772.0 | 770.3 |
| 42.5° | 1643.5 | 1535.6 | 1314.8 | 1122.3 | 982.8  | 896.5  | 850.0 | 823.4 | 798.5 | 786.9 | 785.2 |
| 45°   | 1751.4 | 1635.2 | 1401.2 | 1183.7 | 1027.6 | 926.4  | 871.6 | 840.0 | 813.5 | 801.8 | 800.2 |
| 47.5° | 1849.4 | 1733.2 | 1480.8 | 1250.1 | 1074.1 | 959.6  | 894.8 | 856.6 | 826.7 | 815.1 | 815.1 |
| 50°   | 1937.4 | 1816.2 | 1558.9 | 1311.5 | 1117.3 | 992.8  | 914.7 | 871.6 | 841.7 | 830.1 | 828.4 |
| 52.5° | 2020.4 | 1889.2 | 1626.9 | 1364.6 | 1158.8 | 1022.6 | 934.7 | 883.2 | 851.7 | 838.4 | 836.7 |
| 55°   | 2086.8 | 1955.6 | 1683.4 | 1407.8 | 1187.0 | 1042.6 | 947.9 | 889.8 | 855.0 | 843.4 | 841.7 |
| 57.5° | 2144.9 | 2010.4 | 1723.2 | 1437.7 | 1205.3 | 1054.2 | 954.6 | 889.8 | 853.3 | 840.0 | 838.4 |
| 59°   | 2169.8 | 2033.7 | 1736.5 | 1446.0 | 1208.6 | 1055.8 | 952.9 | 884.9 | 846.7 | 833.4 | 830.1 |
| 60°   | 2183.1 | 2043.6 | 1741.5 | 1447.6 | 1206.9 | 1052.5 | 951.3 | 879.9 | 840.0 | 825.1 | 825.1 |
| 62.5° | 2196.4 | 2051.9 | 1734.8 | 1434.4 | 1188.7 | 1034.3 | 934.7 | 860.0 | 815.1 | 798.5 | 798.5 |
| 65°   | 2168.1 | 2022.1 | 1696.7 | 1397.8 | 1152.1 | 1002.7 | 903.1 | 826.7 | 776.9 | 760.3 | 760.3 |
| 67.5° | 2085.1 | 1949.0 | 1626.9 | 1329.8 | 1092.4 | 947.9  | 851.7 | 773.6 | 727.1 | 708.9 | 703.9 |
| 70°   | 1944.0 | 1829.5 | 1517.4 | 1231.8 | 1011.0 | 878.2  | 786.9 | 712.2 | 664.1 | 645.8 | 639.2 |
| 72.5° | 1754.8 | 1641.9 | 1371.3 | 1112.3 | 903.1  | 786.9  | 707.2 | 635.8 | 582.7 | 564.4 | 566.1 |
| 75°   | 1494.1 | 1414.4 | 1182.0 | 961.2  | 778.6  | 670.7  | 604.3 | 544.5 | 499.7 | 484.8 | 486.4 |
| 77.5° | 1211.9 | 1145.5 | 957.9  | 783.6  | 635.8  | 552.8  | 496.4 | 448.2 | 418.4 | 410.1 | 405.1 |
| 80°   | 928.0  | 863.3  | 718.8  | 584.4  | 483.1  | 425.0  | 386.8 | 353.6 | 330.4 | 318.7 | 322.1 |
| 82.5° | 622.6  | 582.7  | 476.5  | 386.8  | 328.7  | 287.2  | 273.9 | 252.3 | 244.0 | 237.4 | 242.4 |
| 85°   | 335.3  | 300.5  | 249.0  | 207.5  | 181.0  | 169.3  | 172.7 | 171.0 | 164.4 | 162.7 | 167.7 |
| 87.5° | 109.6  | 94.6   | 73.0   | 61.4   | 63.1   | 56.4   | 56.4  | 53.1  | 48.1  | 46.5  | 49.8  |
| 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

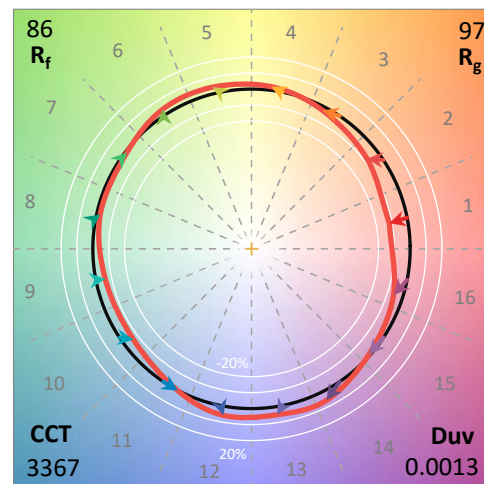
Test Date: 09/08/2020

### 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   | CRI (Ra): | 83.4 |      |      |
| CIE u':                   | 0.2385 | R1:       | 81.2 | R9:  | 7.1  |
| CIE v':                   | 0.5156 | R2:       | 89.8 | R10: | 77.4 |
| Duv:                      | 0.0013 | R3:       | 97.0 | R11: | 83.4 |
| CIE x:                    | 0.4144 | R4:       | 83.1 | R12: | 73.6 |
| CIE y:                    | 0.3981 | R5:       | 82.1 | R13: | 83.1 |
| CIE z:                    | 0.1876 | R6:       | 87.8 | R14: | 98.6 |
| Peak Wavelength (nm):     | 601    | R7:       | 84.7 |      |      |
| Dominant Wavelength (nm): | 580    | R8:       | 61.6 |      |      |
| Purity:                   | 44.1   |           |      |      |      |
| Rf:                       | 85.9   |           |      |      |      |
| Rg:                       | 96.9   |           |      |      |      |



### Test Conditions

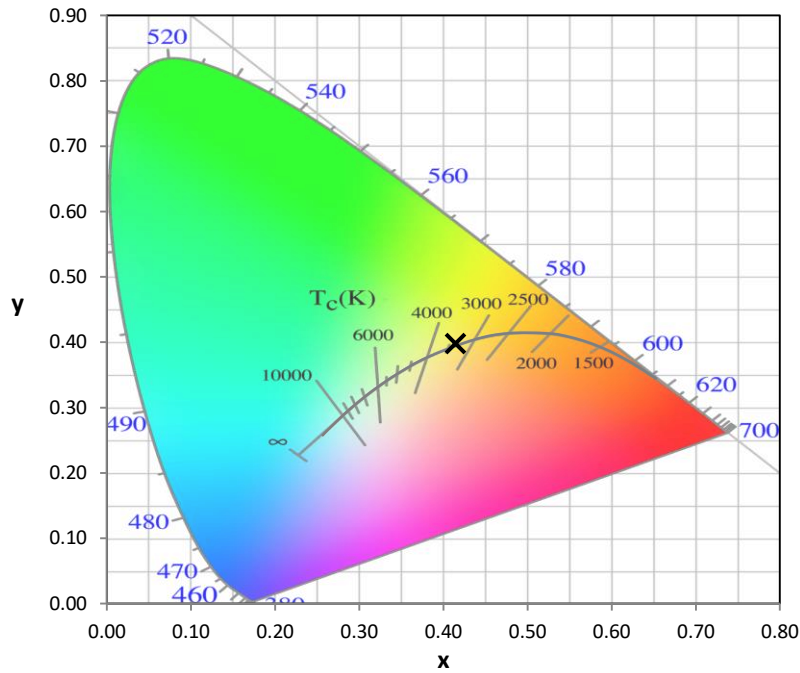
Stabilization Time: 67M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.0/46%  
 Sphere Temperature (°C): 24.0

REPORT NUMBER: SP1-2005-785-22

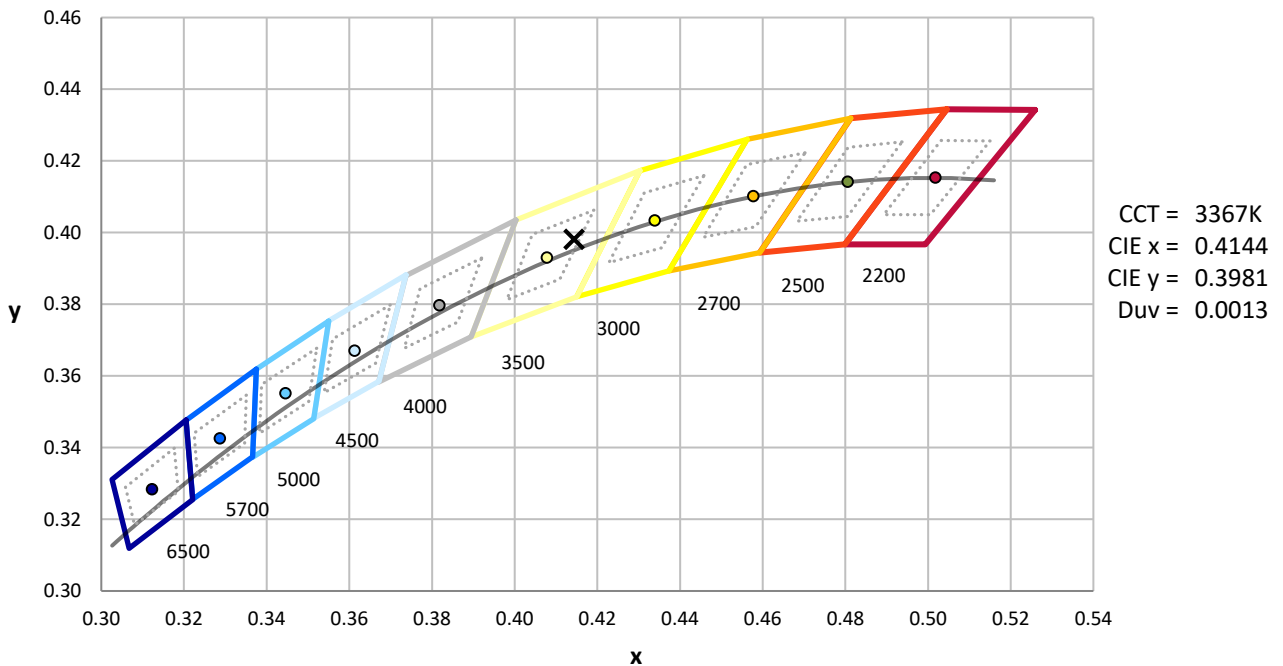
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

**CIE 1931 Chromaticity Diagram**



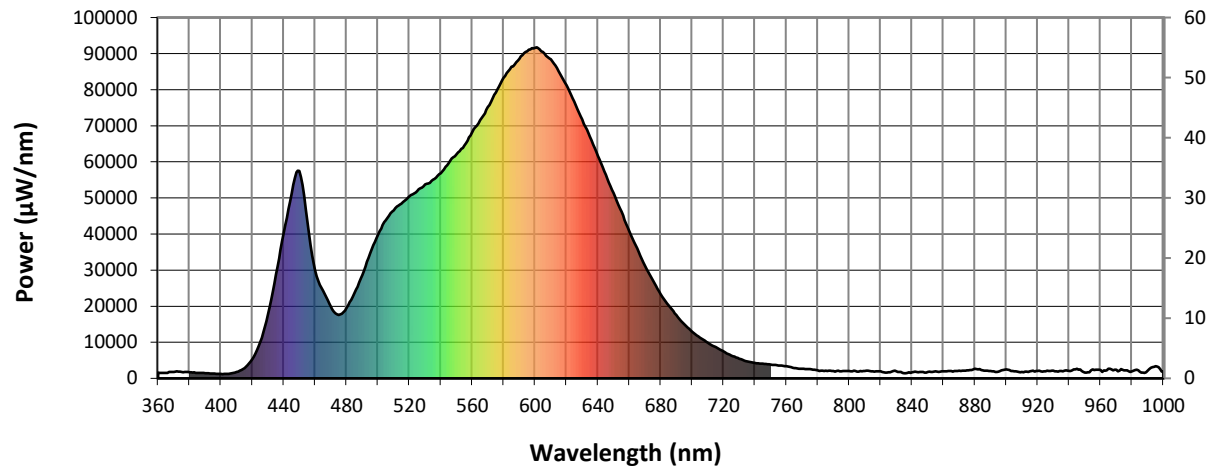
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3500K 4-step quadrangle

REPORT NUMBER: SP1-2005-785-22

### Photopic Flux vs. Wavelength

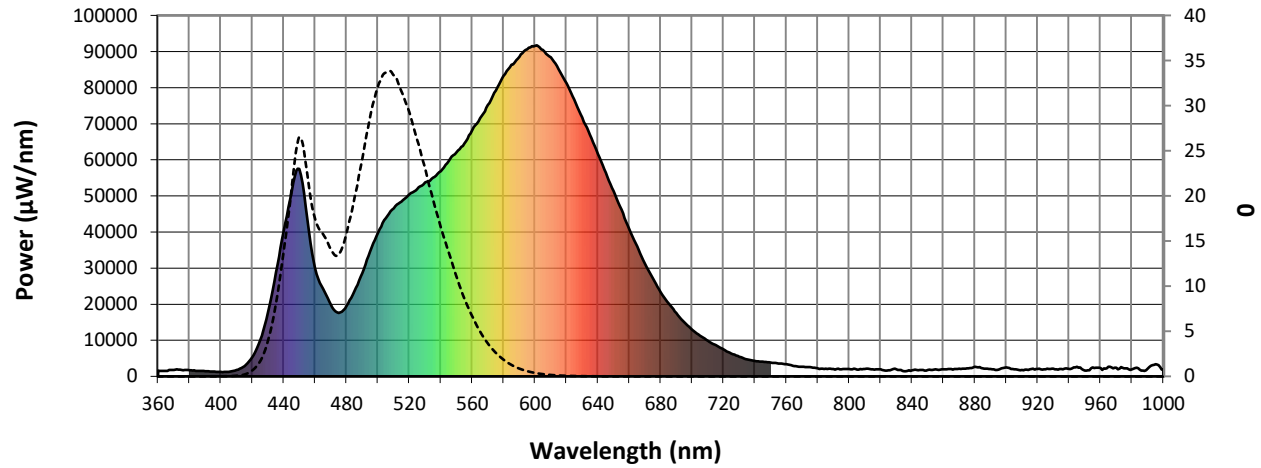


#####

| 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              |           |                  |                  |

REPORT NUMBER: SP1-2005-785-22

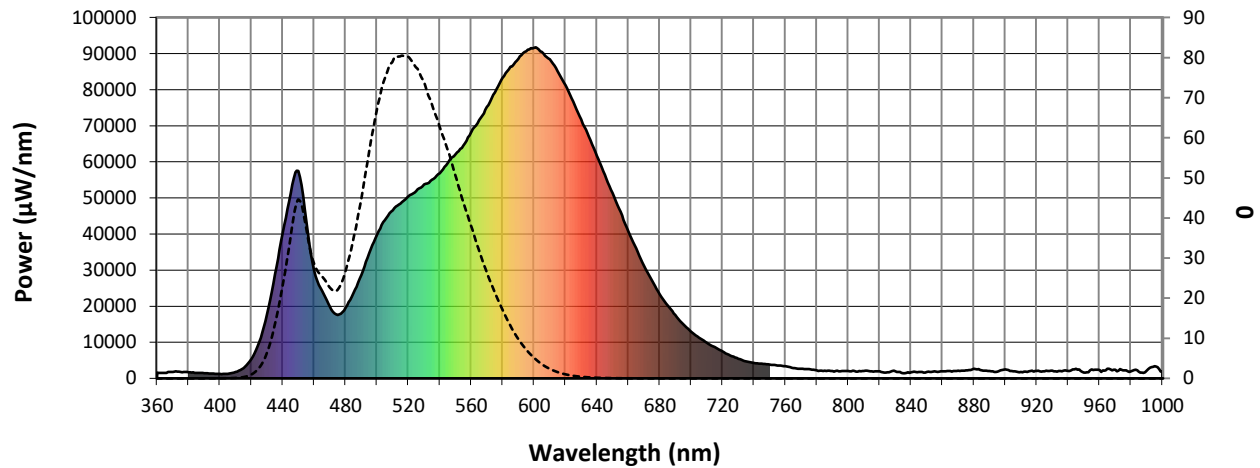
### Scotopic Flux vs. Wavelength


**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              |           |                  |                  |

REPORT NUMBER: SP1-2005-785-22

### Melanopic Flux vs. Wavelength


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

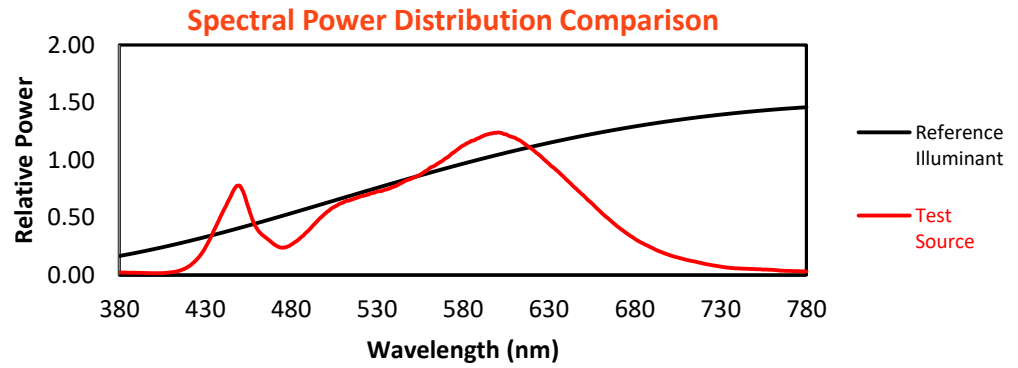
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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              |           |                  |                  |

REPORT NUMBER: SP1-2005-785-22

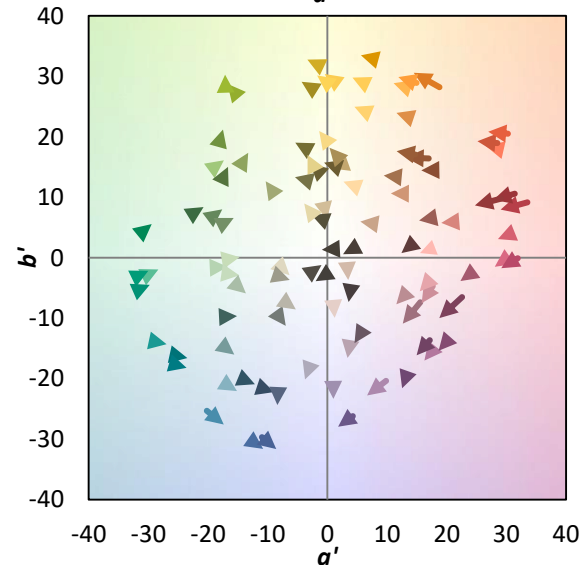
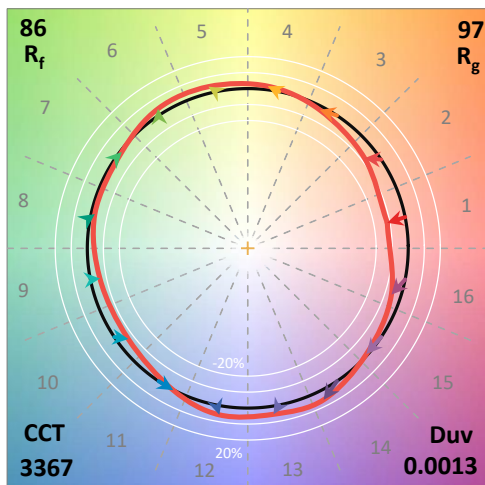
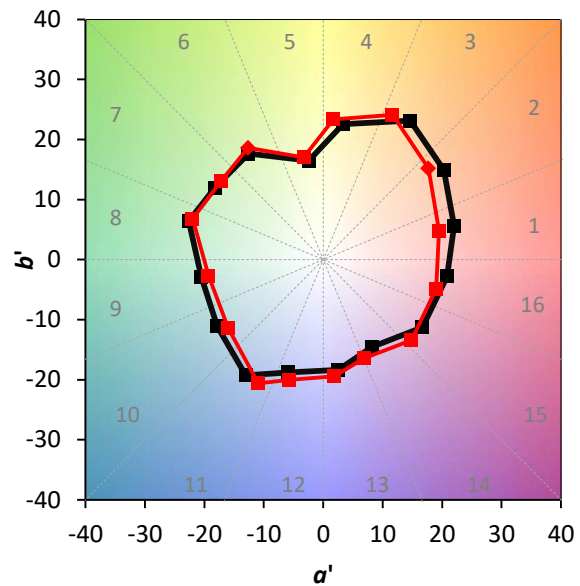
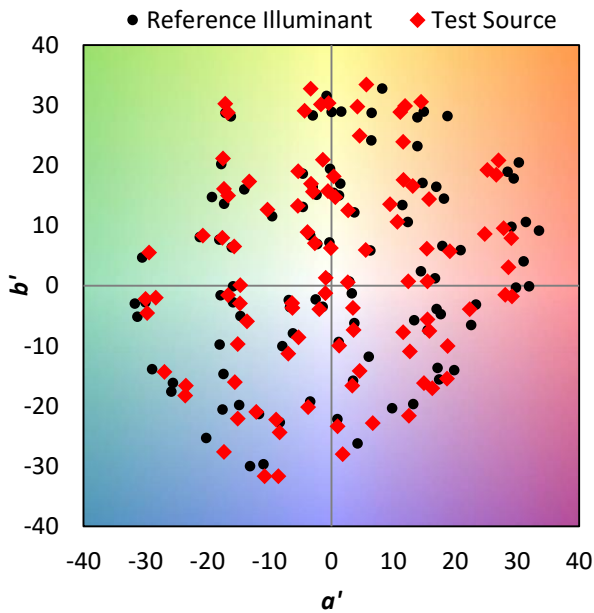
TM-30-18

### Summary

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

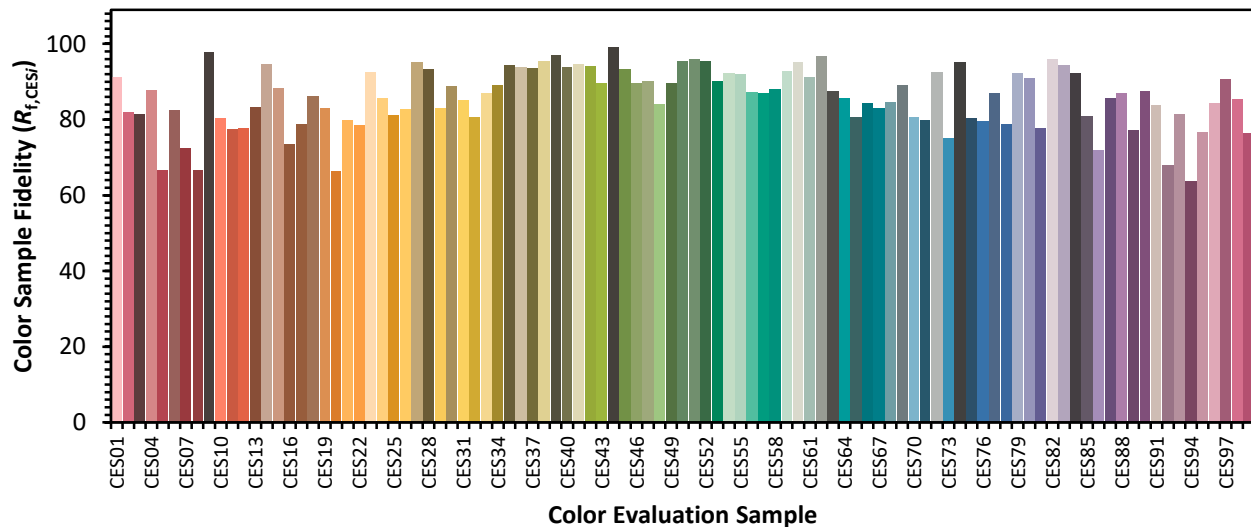


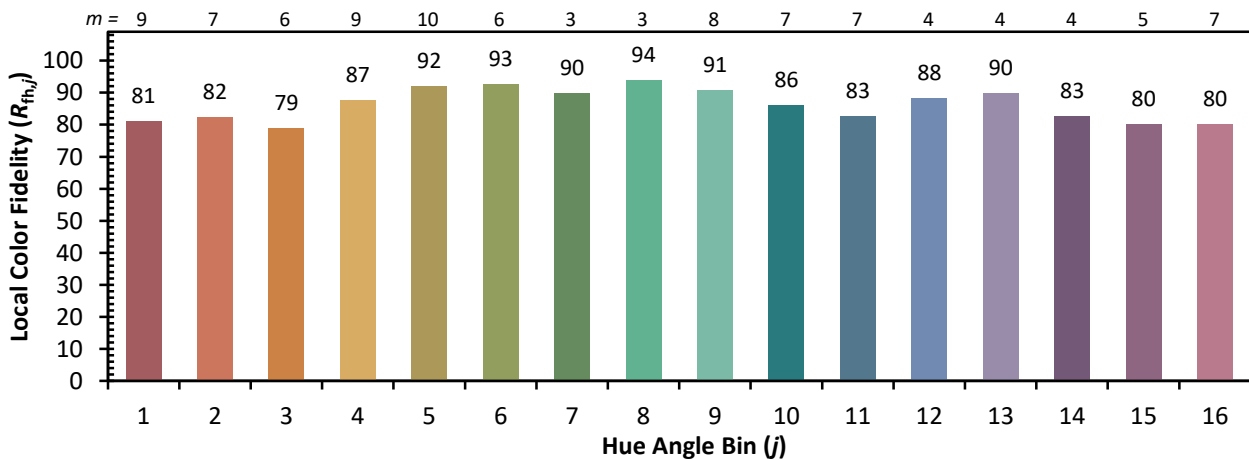
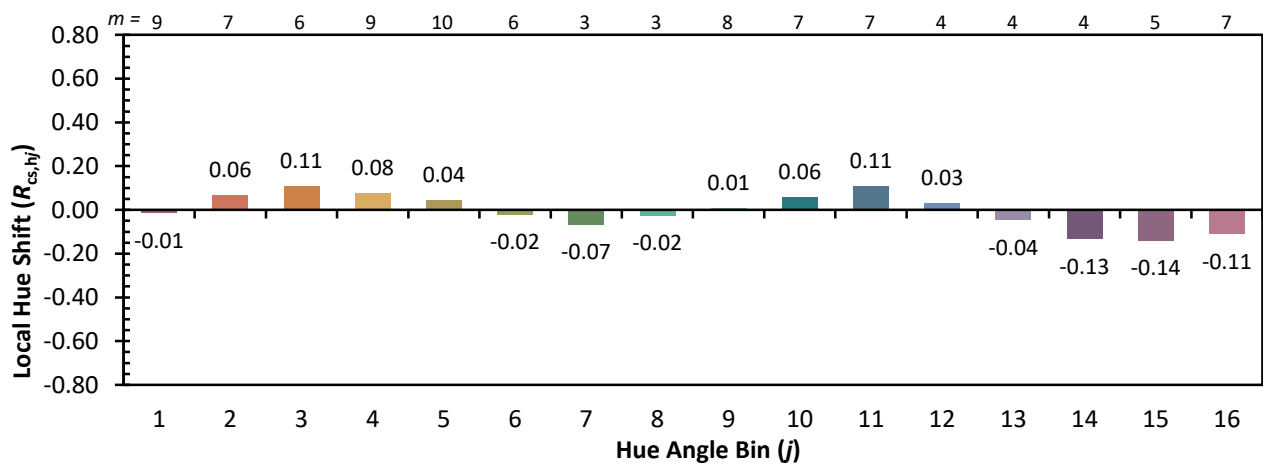
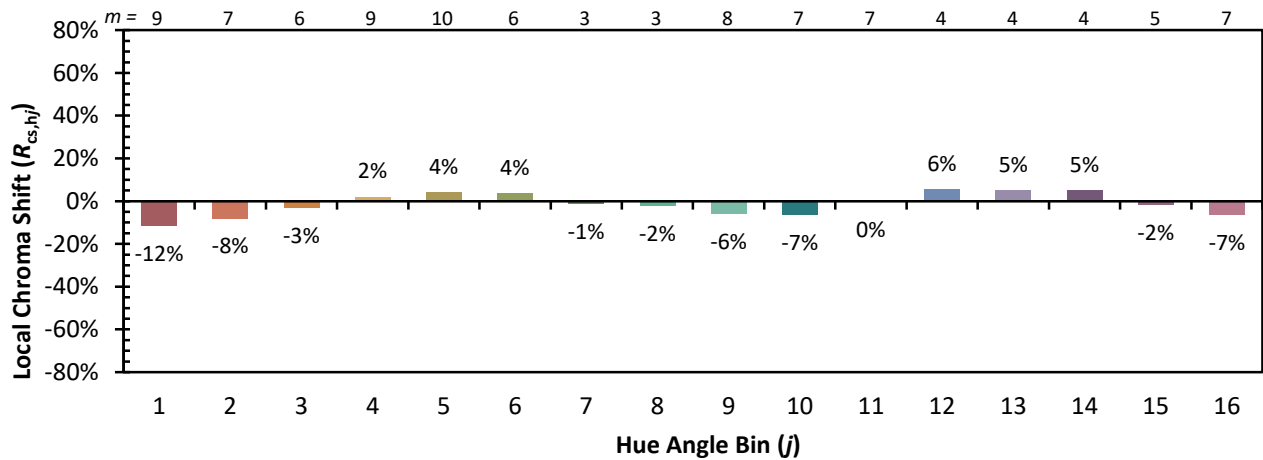
### Color Vector Graphics



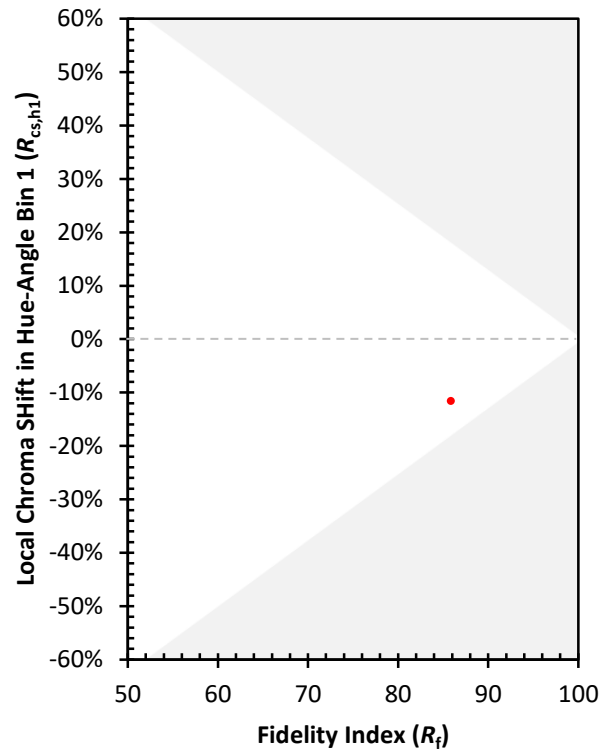
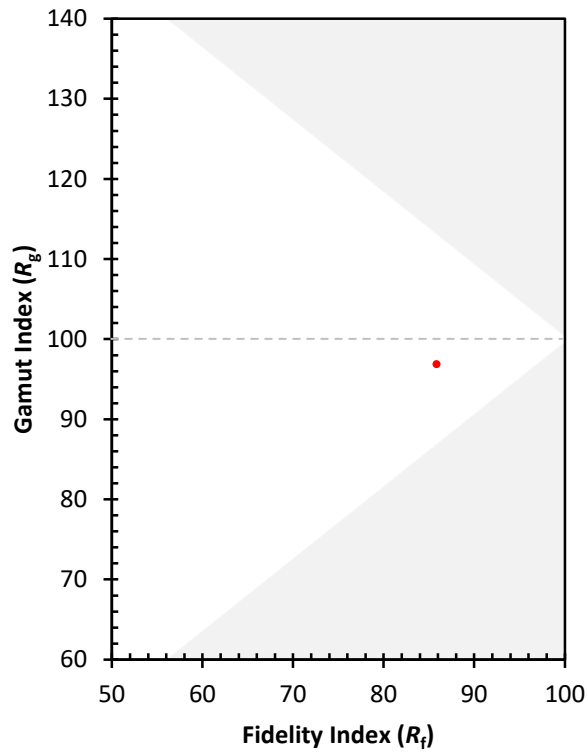
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| 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)