

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: P674464

Luminaire Tested: **CCP-SA2A-830-U-AFL-HSS**

Issue Date: 04/16/2023

**Test Information**

Test Method: LM-79-08  
Report Number: P674464  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA2A-830-U-AFL-HSS  
Description: INVUE CLEAR CURVE POLE MOUNT Light Square Luminaire @350mA w/ AFL  
distribution lens and House Side Shield  
Light Source: (32) 3000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3605.4 lumens  
Efficiency: N/A  
Efficacy: 99.6 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B0 - U0 - G0

Input Watts (W): 36.2  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

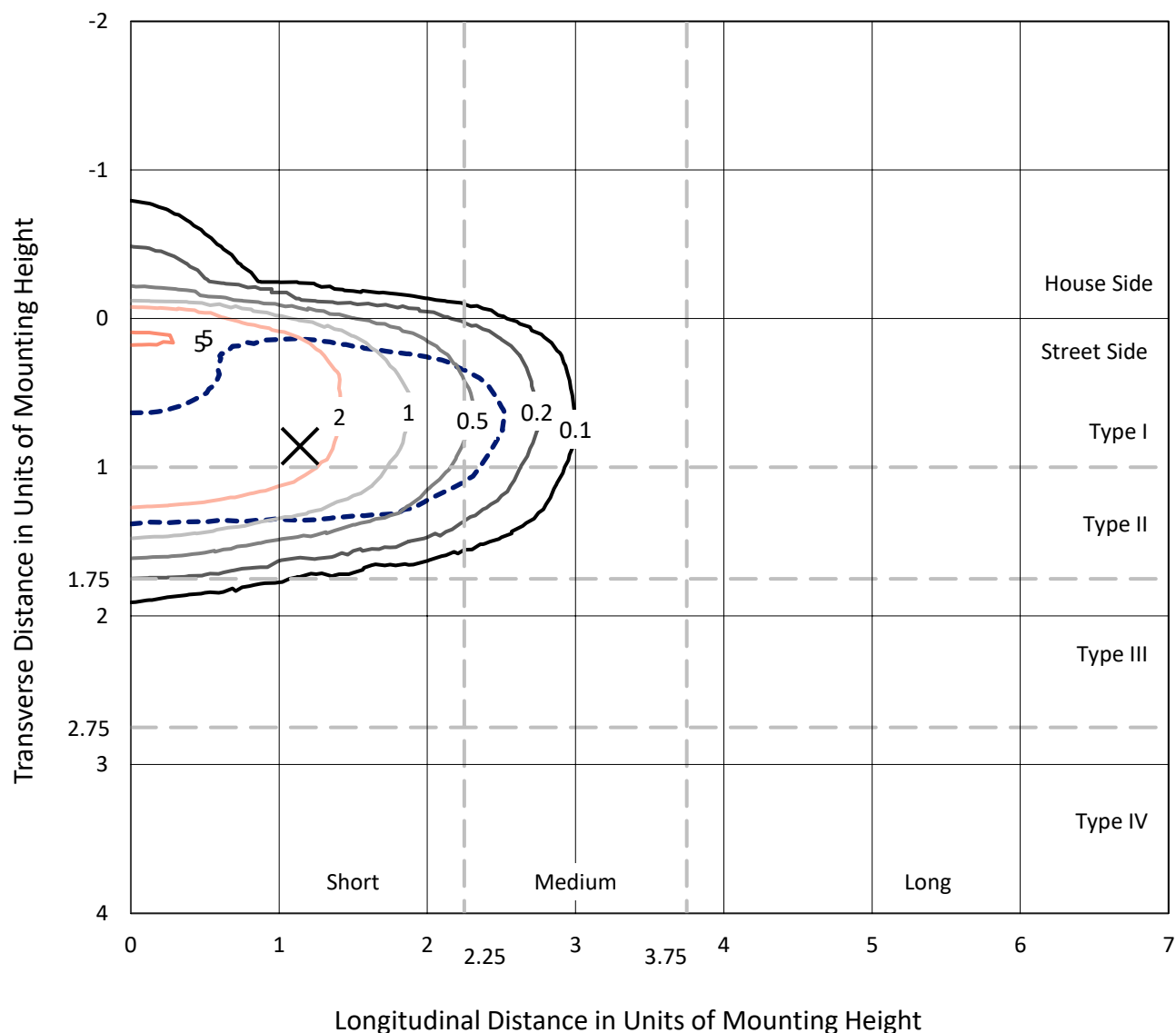
REPORT NUMBER: P674464

CATALOG NUMBER: CCP-SA2A-830-U-AFL-HSS

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

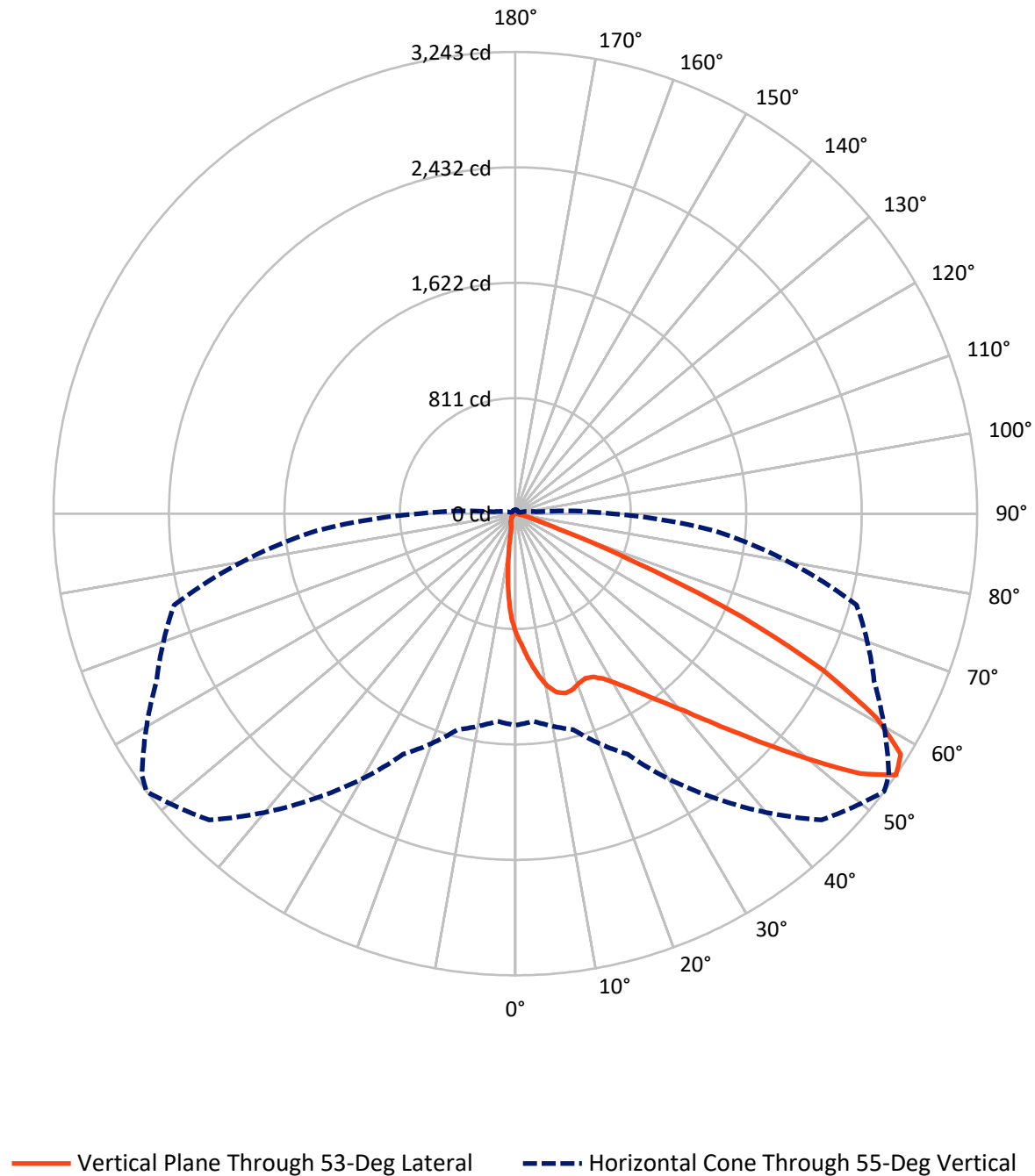


Based on 15 foot mounting height. Maximum calculated value = 5.4 fc

Type II - Short - N/A

REPORT NUMBER: P674464  
CATALOG NUMBER: CCP-SA2A-830-U-AFL-HSS

## Luminous Intensity Polar Plot



REPORT NUMBER: P674464

CATALOG NUMBER: CCP-SA2A-830-U-AFL-HSS

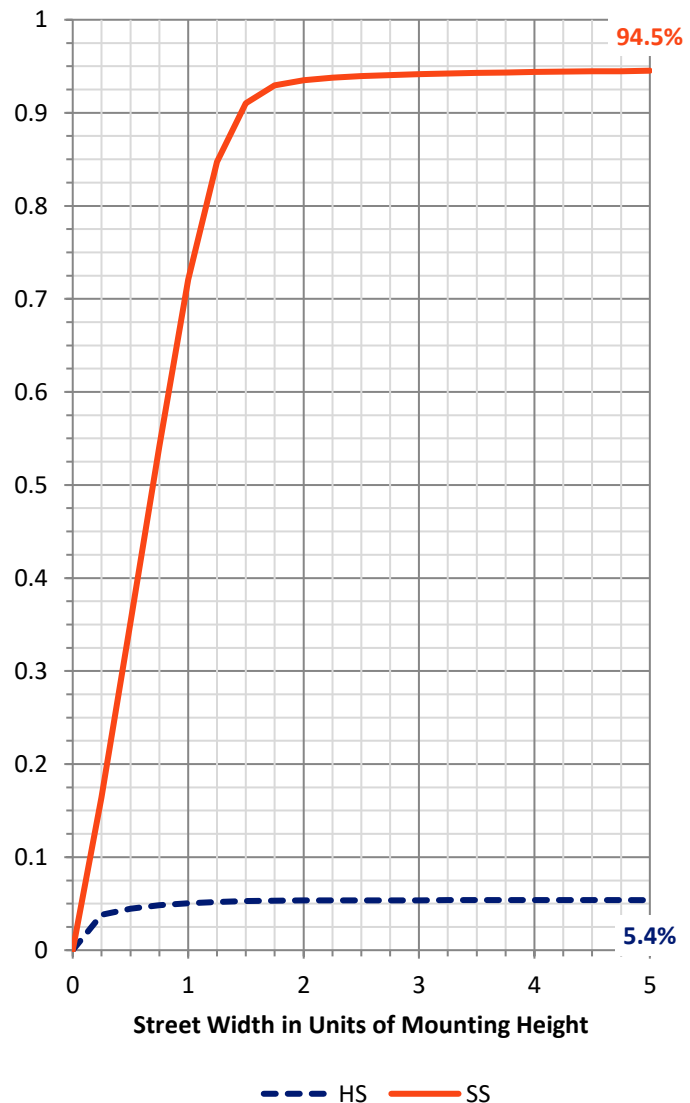
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 194.9    | 0.0    | 194.9  |
|                    | % Fixture | 5.4      | 0.0    | 5.4    |
| <b>Street Side</b> | Lumens    | 3410.5   | 0.0    | 3410.5 |
|                    | % Fixture | 94.6     | 0.0    | 94.6   |
| <b>Total</b>       | Lumens    | 3605.4   | 0.0    | 3605.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 75.4   | 2.1       |
| 10°-20°   | 197.1  | 5.5       |
| 20°-30°   | 329.9  | 9.2       |
| 30°-40°   | 539.7  | 15.0      |
| 40°-50°   | 867.6  | 24.1      |
| 50°-60°   | 979.6  | 27.2      |
| 60°-70°   | 522.5  | 14.5      |
| 70°-80°   | 85.9   | 2.4       |
| 80°-90°   | 7.7    | 0.2       |
| 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°    | 3605.4 | 100.0     |
| 0°-180°   | 3605.4 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P674464

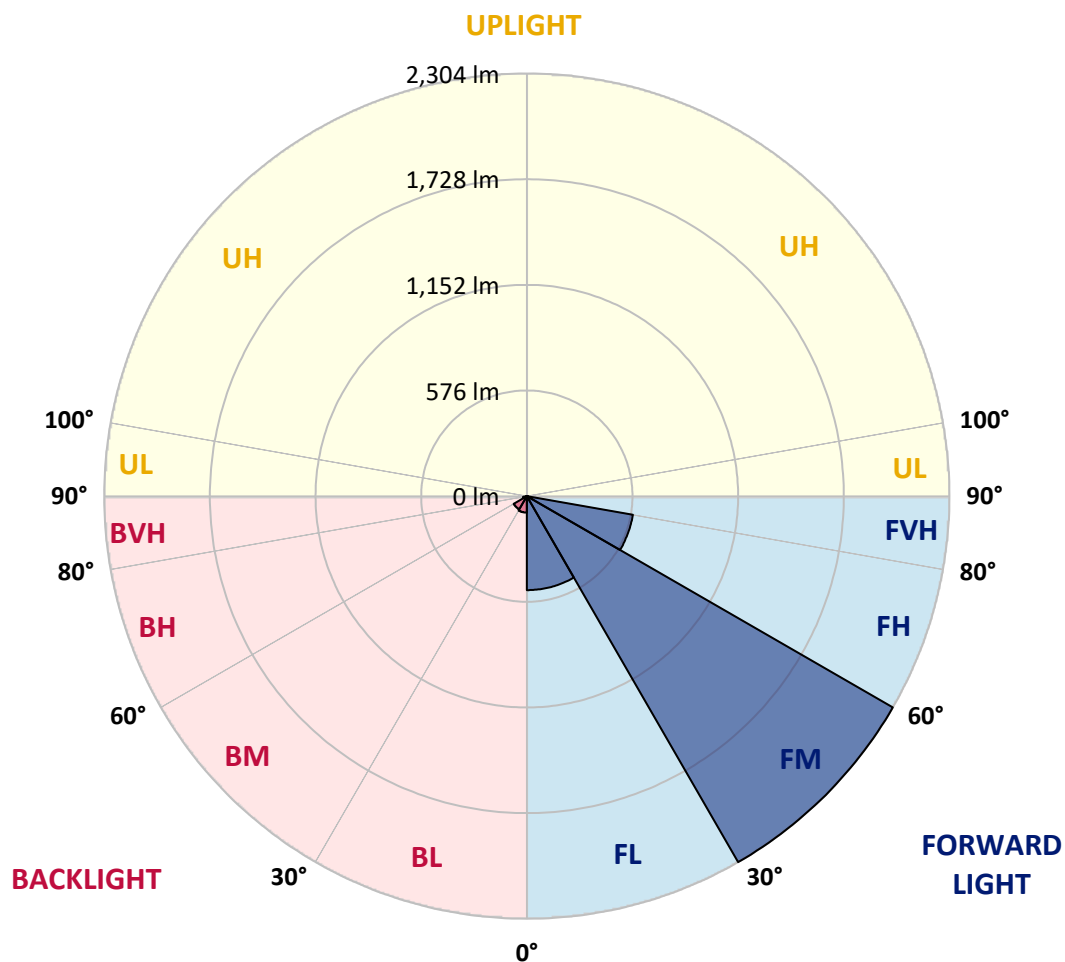
CATALOG NUMBER: CCP-SA2A-830-U-AFL-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|--------|-----------|-------------------------|------|--------|
|      |             |        |           | B                       | U    | G      |
| FL   | (0°-30°)    | 512.5  | 14.2      |                         |      |        |
| FM   | (30°-60°)   | 2303.9 | 63.9      |                         |      |        |
| FH   | (60°-80°)   | 587.0  | 16.3      |                         |      | G0/660 |
| FVH  | (80°-90°)   | 7.1    | 0.2       |                         |      | G0/10  |
| BL   | (0°-30°)    | 89.9   | 2.5       | B0/110                  |      |        |
| BM   | (30°-60°)   | 83.0   | 2.3       | B0/220                  |      |        |
| BH   | (60°-80°)   | 21.3   | 0.6       | B0/110                  |      | G0/110 |
| BVH  | (80°-90°)   | 0.6    | 0.0       |                         |      | G0/10  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |        |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |        |

**BUG Rating: B0-U0-G0**

Type II Short



REPORT NUMBER: P674464

CATALOG NUMBER: CCP-SA2A-830-U-AFL-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 53°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 843.8  | 843.8  | 843.8  | 843.8  | 843.8  | 843.8  | 843.8  | 843.8  | 843.8  | 843.8  | 843.8  |
| 2.5°  | 1011.8 | 1005.8 | 1009.3 | 1000.1 | 983.4  | 962.5  | 931.3  | 932.8  | 908.2  | 886.7  | 857.0  |
| 5°    | 1178.9 | 1172.6 | 1170.7 | 1147.3 | 1123.9 | 1086.4 | 1039.9 | 1032.3 | 987.2  | 932.5  | 870.3  |
| 7.5°  | 1267.0 | 1261.7 | 1265.8 | 1257.3 | 1234.2 | 1200.1 | 1141.3 | 1135.6 | 1065.8 | 983.1  | 891.5  |
| 10°   | 1226.6 | 1224.7 | 1242.1 | 1262.3 | 1280.9 | 1276.8 | 1229.8 | 1220.9 | 1142.6 | 1038.7 | 913.2  |
| 12.5° | 1117.9 | 1123.9 | 1146.1 | 1183.3 | 1240.8 | 1294.8 | 1287.3 | 1288.8 | 1220.9 | 1099.0 | 937.3  |
| 15°   | 1054.1 | 1061.4 | 1074.0 | 1093.3 | 1164.1 | 1260.1 | 1309.1 | 1324.9 | 1296.1 | 1166.3 | 965.7  |
| 17.5° | 1048.8 | 1054.8 | 1056.7 | 1063.9 | 1105.3 | 1204.2 | 1300.2 | 1330.2 | 1363.1 | 1229.8 | 997.6  |
| 20°   | 1090.1 | 1092.7 | 1091.1 | 1085.7 | 1100.6 | 1173.9 | 1272.4 | 1315.4 | 1418.4 | 1297.4 | 1025.7 |
| 22.5° | 1168.2 | 1164.4 | 1159.6 | 1139.7 | 1138.8 | 1182.4 | 1257.3 | 1302.1 | 1451.2 | 1353.3 | 1044.3 |
| 25°   | 1264.8 | 1256.9 | 1250.3 | 1222.2 | 1208.9 | 1226.9 | 1270.8 | 1306.8 | 1480.9 | 1407.6 | 1057.6 |
| 27.5° | 1370.3 | 1372.9 | 1356.4 | 1318.5 | 1297.7 | 1293.9 | 1312.9 | 1339.7 | 1509.7 | 1456.3 | 1064.9 |
| 30°   | 1483.1 | 1484.4 | 1462.9 | 1423.7 | 1404.8 | 1380.5 | 1379.2 | 1395.3 | 1540.6 | 1512.2 | 1071.8 |
| 32.5° | 1611.7 | 1615.2 | 1580.1 | 1539.3 | 1506.2 | 1474.6 | 1459.1 | 1472.7 | 1596.2 | 1585.2 | 1086.0 |
| 35°   | 1797.4 | 1782.3 | 1734.9 | 1673.3 | 1626.2 | 1584.8 | 1561.1 | 1570.0 | 1670.1 | 1672.7 | 1114.5 |
| 37.5° | 1988.9 | 1987.3 | 1934.8 | 1846.1 | 1769.0 | 1717.5 | 1677.1 | 1691.6 | 1774.1 | 1789.8 | 1160.0 |
| 40°   | 2167.3 | 2171.4 | 2126.0 | 2048.6 | 1949.4 | 1860.9 | 1817.6 | 1827.4 | 1912.1 | 1932.0 | 1215.2 |
| 42.5° | 2283.9 | 2281.7 | 2285.2 | 2263.1 | 2163.6 | 2059.3 | 1994.2 | 1999.6 | 2072.6 | 2083.0 | 1284.4 |
| 45°   | 2337.6 | 2329.1 | 2358.8 | 2428.9 | 2389.4 | 2279.8 | 2205.6 | 2198.9 | 2239.0 | 2236.2 | 1347.3 |
| 47.5° | 2291.2 | 2275.4 | 2343.6 | 2512.6 | 2589.1 | 2555.9 | 2449.8 | 2437.7 | 2403.6 | 2380.9 | 1412.7 |
| 50°   | 2060.3 | 2053.3 | 2199.2 | 2472.8 | 2714.5 | 2811.1 | 2733.1 | 2688.6 | 2550.5 | 2487.7 | 1447.1 |
| 52.5° | 1840.7 | 1821.4 | 1920.0 | 2269.7 | 2658.6 | 3016.5 | 3032.6 | 2953.3 | 2672.5 | 2518.3 | 1435.4 |
| 55°   | 1486.9 | 1463.2 | 1570.6 | 1864.7 | 2437.1 | 3042.7 | 3243.0 | 3201.6 | 2779.2 | 2480.4 | 1411.7 |
| 57.5° | 903.1  | 879.8  | 1037.7 | 1335.6 | 1949.1 | 2824.7 | 3191.2 | 3233.2 | 2861.4 | 2438.7 | 1396.2 |
| 60°   | 379.7  | 364.9  | 426.8  | 637.5  | 1244.6 | 2321.5 | 2916.3 | 3021.2 | 2876.8 | 2381.5 | 1402.6 |
| 62.5° | 197.4  | 190.8  | 194.3  | 255.2  | 503.2  | 1528.6 | 2427.3 | 2609.9 | 2720.8 | 2356.2 | 1408.9 |
| 65°   | 148.2  | 143.1  | 132.0  | 140.3  | 195.5  | 660.8  | 1744.4 | 1988.9 | 2382.5 | 2292.1 | 1366.2 |
| 67.5° | 121.6  | 116.9  | 109.0  | 106.5  | 115.3  | 229.3  | 890.5  | 1208.3 | 1866.9 | 2018.9 | 1213.3 |
| 70°   | 97.0   | 95.4   | 92.9   | 88.1   | 86.6   | 111.2  | 319.4  | 492.5  | 1234.5 | 1423.7 | 879.4  |
| 72.5° | 80.9   | 81.2   | 78.3   | 74.2   | 68.5   | 71.7   | 127.3  | 168.4  | 597.4  | 682.6  | 368.3  |
| 75°   | 67.6   | 67.6   | 68.5   | 62.9   | 57.2   | 49.3   | 70.8   | 82.1   | 191.7  | 157.6  | 78.7   |
| 77.5° | 53.1   | 53.7   | 57.8   | 53.1   | 45.8   | 31.0   | 38.5   | 43.9   | 56.9   | 45.5   | 28.7   |
| 80°   | 42.3   | 41.7   | 40.1   | 47.7   | 41.1   | 21.8   | 18.3   | 20.2   | 26.5   | 21.8   | 14.2   |
| 82.5° | 29.7   | 29.4   | 28.1   | 32.2   | 31.9   | 16.1   | 12.0   | 12.3   | 16.1   | 13.9   | 8.8    |
| 85°   | 7.3    | 8.5    | 18.0   | 15.2   | 13.3   | 9.5    | 7.3    | 7.9    | 10.4   | 9.2    | 4.7    |
| 87.5° | 3.2    | 3.2    | 8.2    | 9.8    | 6.3    | 4.1    | 3.2    | 3.5    | 5.4    | 5.4    | 2.8    |
| 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: P674464

CATALOG NUMBER: CCP-SA2A-830-U-AFL-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 843.8 | 843.8 | 843.8 | 843.8 | 843.8 | 843.8 | 843.8 | 843.8 | 843.8 | 843.8 | 843.8 |
| 2.5°  | 846.6 | 826.1 | 800.2 | 772.7 | 744.6 | 710.8 | 689.3 | 671.6 | 657.7 | 646.9 | 643.2 |
| 5°    | 849.8 | 810.3 | 751.5 | 678.5 | 604.3 | 534.8 | 481.1 | 441.3 | 408.4 | 390.4 | 382.5 |
| 7.5°  | 849.4 | 797.0 | 690.9 | 568.6 | 447.9 | 347.8 | 276.7 | 232.8 | 203.4 | 191.4 | 184.2 |
| 10°   | 849.1 | 779.6 | 621.7 | 446.7 | 299.5 | 201.5 | 148.5 | 123.8 | 113.1 | 109.0 | 108.4 |
| 12.5° | 858.3 | 759.7 | 544.3 | 328.8 | 188.0 | 125.4 | 103.3 | 97.6  | 95.1  | 93.8  | 93.5  |
| 15°   | 863.3 | 741.4 | 462.8 | 232.2 | 126.7 | 99.2  | 92.2  | 89.7  | 88.8  | 88.1  | 87.8  |
| 17.5° | 868.7 | 713.0 | 385.4 | 168.1 | 101.4 | 90.0  | 85.9  | 84.3  | 83.7  | 83.7  | 83.7  |
| 20°   | 869.7 | 682.3 | 308.6 | 123.8 | 90.0  | 84.0  | 79.9  | 78.3  | 77.4  | 76.8  | 76.8  |
| 22.5° | 862.7 | 646.0 | 242.6 | 100.5 | 83.4  | 78.3  | 73.9  | 71.4  | 69.8  | 69.5  | 69.5  |
| 25°   | 845.3 | 594.5 | 186.1 | 88.1  | 78.0  | 72.7  | 67.3  | 64.4  | 63.2  | 63.2  | 63.2  |
| 27.5° | 820.4 | 533.9 | 143.7 | 78.3  | 71.1  | 65.7  | 61.0  | 58.4  | 58.1  | 57.8  | 58.1  |
| 30°   | 791.9 | 475.4 | 109.9 | 69.5  | 62.9  | 58.4  | 54.6  | 53.4  | 54.0  | 54.0  | 54.3  |
| 32.5° | 763.5 | 417.0 | 85.9  | 62.5  | 55.6  | 51.8  | 49.9  | 49.9  | 50.9  | 50.9  | 50.9  |
| 35°   | 739.2 | 359.8 | 72.0  | 56.9  | 50.5  | 47.4  | 46.4  | 47.4  | 48.0  | 48.3  | 48.3  |
| 37.5° | 725.6 | 310.5 | 63.5  | 51.8  | 46.4  | 43.9  | 43.6  | 44.5  | 45.8  | 46.8  | 47.1  |
| 40°   | 720.6 | 272.6 | 58.4  | 48.0  | 42.6  | 41.1  | 40.8  | 42.0  | 44.2  | 45.8  | 46.1  |
| 42.5° | 720.9 | 239.1 | 54.0  | 44.2  | 40.1  | 37.9  | 37.9  | 39.8  | 42.0  | 43.6  | 43.6  |
| 45°   | 723.1 | 210.4 | 49.6  | 40.4  | 37.9  | 34.1  | 34.4  | 37.0  | 38.5  | 40.1  | 40.1  |
| 47.5° | 725.0 | 187.3 | 44.9  | 36.3  | 32.9  | 31.0  | 31.6  | 33.5  | 35.7  | 38.2  | 38.2  |
| 50°   | 713.9 | 170.9 | 40.1  | 31.9  | 28.7  | 28.1  | 29.4  | 31.0  | 34.1  | 36.6  | 37.0  |
| 52.5° | 687.4 | 156.1 | 36.0  | 28.4  | 25.9  | 26.2  | 27.8  | 28.7  | 31.3  | 31.6  | 31.9  |
| 55°   | 675.7 | 148.5 | 32.9  | 25.9  | 23.7  | 24.6  | 25.6  | 25.9  | 25.3  | 23.7  | 23.7  |
| 57.5° | 673.2 | 143.4 | 29.7  | 23.4  | 21.8  | 23.1  | 22.7  | 20.8  | 19.0  | 17.1  | 16.7  |
| 60°   | 675.7 | 136.5 | 27.2  | 20.2  | 19.9  | 20.2  | 19.3  | 15.8  | 13.3  | 12.0  | 11.4  |
| 62.5° | 661.2 | 126.4 | 25.0  | 17.4  | 17.4  | 17.1  | 14.5  | 10.7  | 8.5   | 7.6   | 7.3   |
| 65°   | 613.1 | 106.5 | 22.7  | 14.5  | 14.2  | 13.6  | 9.8   | 7.3   | 5.7   | 4.7   | 4.4   |
| 67.5° | 518.7 | 82.4  | 20.5  | 12.0  | 11.4  | 9.5   | 6.3   | 4.7   | 3.2   | 2.8   | 2.5   |
| 70°   | 353.8 | 51.2  | 17.4  | 9.5   | 8.5   | 6.0   | 3.8   | 2.8   | 1.9   | 1.6   | 1.3   |
| 72.5° | 128.3 | 29.7  | 14.5  | 7.3   | 5.7   | 3.8   | 2.2   | 1.3   | 0.9   | 0.9   | 0.6   |
| 75°   | 30.3  | 20.8  | 11.1  | 5.4   | 3.8   | 2.2   | 1.3   | 0.9   | 0.6   | 0.6   | 0.3   |
| 77.5° | 13.9  | 16.1  | 7.3   | 3.2   | 2.5   | 1.6   | 0.9   | 0.6   | 0.3   | 0.3   | 0.0   |
| 80°   | 7.9   | 11.4  | 3.5   | 2.2   | 1.9   | 1.3   | 0.6   | 0.3   | 0.3   | 0.0   | 0.0   |
| 82.5° | 4.1   | 6.3   | 2.5   | 1.9   | 1.6   | 0.9   | 0.6   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 2.8   | 3.2   | 1.9   | 1.6   | 1.3   | 0.9   | 0.6   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 2.2   | 2.2   | 1.9   | 1.6   | 1.3   | 0.9   | 0.3   | 0.0   | 0.0   | 0.0   | 0.0   |
| 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: SP1-2012-088-3

Luminaire Tested: WIS-SA830-2D-U-SL4

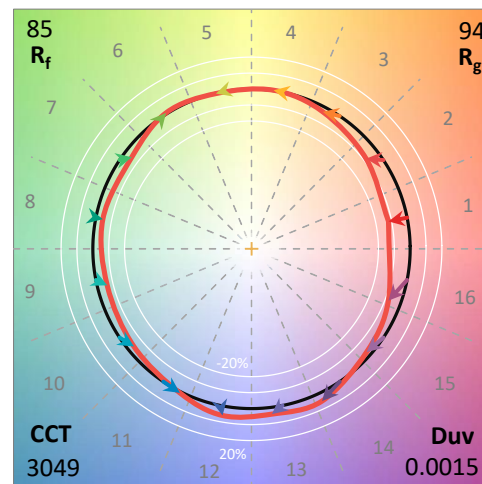
Test Date: 01/11/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2012-088-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 01/11/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-SA-830-2D-U-SL4**  
 Description: INVUE. WALL PACK LIGHT SQUARE SL4 OPTICS 2-SQUARE.

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3049   | CRI (Ra): | 81.7 |      |      |
| CIE u':                   | 0.2482 | R1:       | 79.6 | R9:  | 1.9  |
| CIE v':                   | 0.5224 | R2:       | 90.6 | R10: | 79.3 |
| Duv:                      | 0.0015 | R3:       | 95.7 | R11: | 78.7 |
| CIE x:                    | 0.4354 | R4:       | 79.4 | R12: | 72.2 |
| CIE y:                    | 0.4072 | R5:       | 80.2 | R13: | 82.2 |
| CIE z:                    | 0.1574 | R6:       | 89.0 | R14: | 98.1 |
| Peak Wavelength (nm):     | 601    | R7:       | 82.2 |      |      |
| Dominant Wavelength (nm): | 582    | R8:       | 57.0 |      |      |
| Purity:                   | 53     |           |      |      |      |
| Rf:                       | 85.1   |           |      |      |      |
| Rg:                       | 94.3   |           |      |      |      |



### Test Conditions

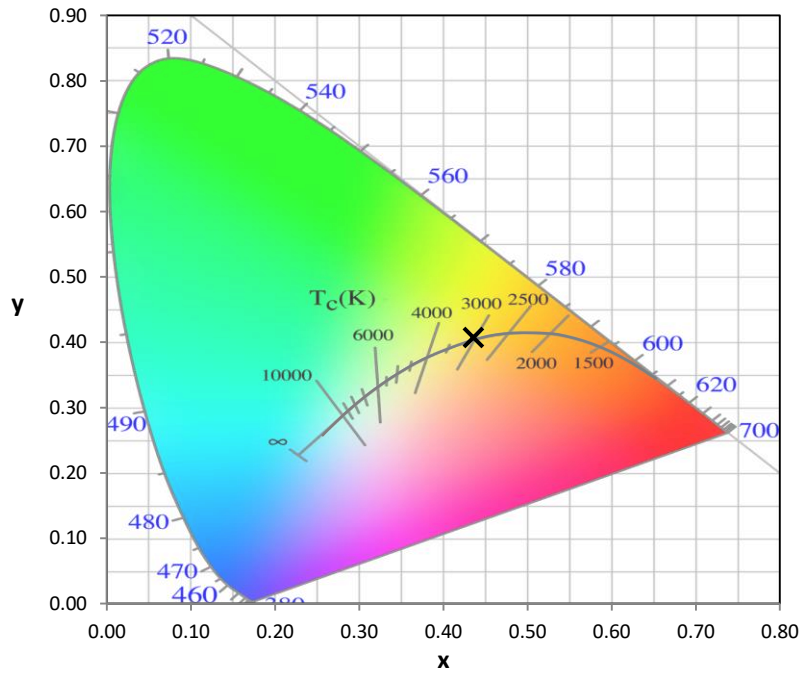
Stabilization Time: 83M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.6/29%  
 Sphere Temperature (°C): 25.6

REPORT NUMBER: SP1-2012-088-3

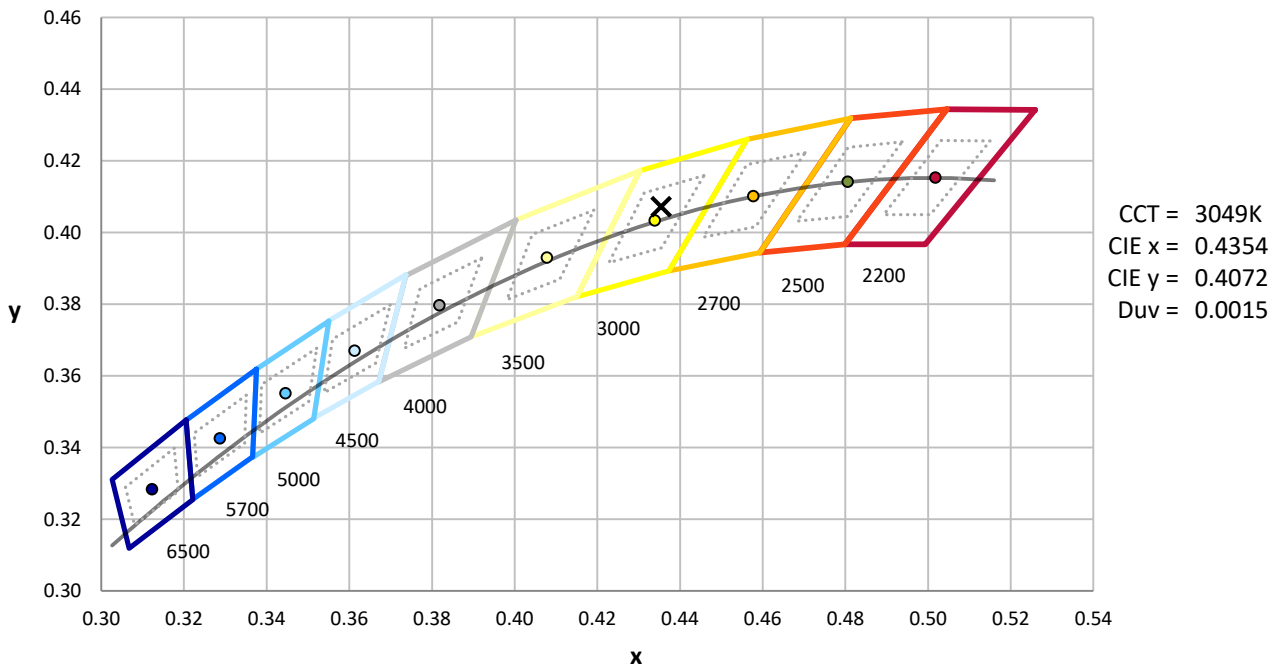
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

REPORT NUMBER: SP1-2012-088-3

**CIE 1931 Chromaticity Diagram**



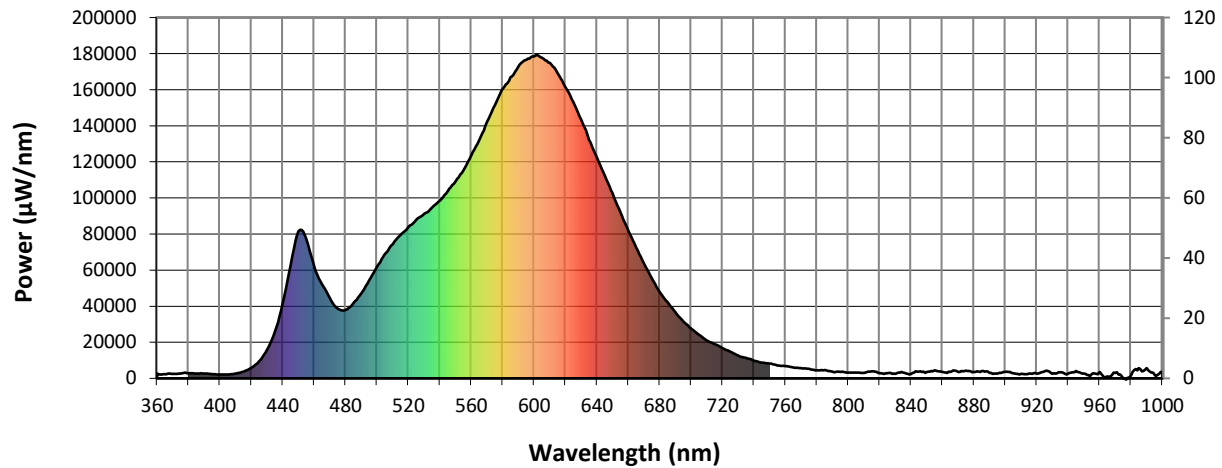
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

REPORT NUMBER: SP1-2012-088-3

### Photopic Flux vs. Wavelength

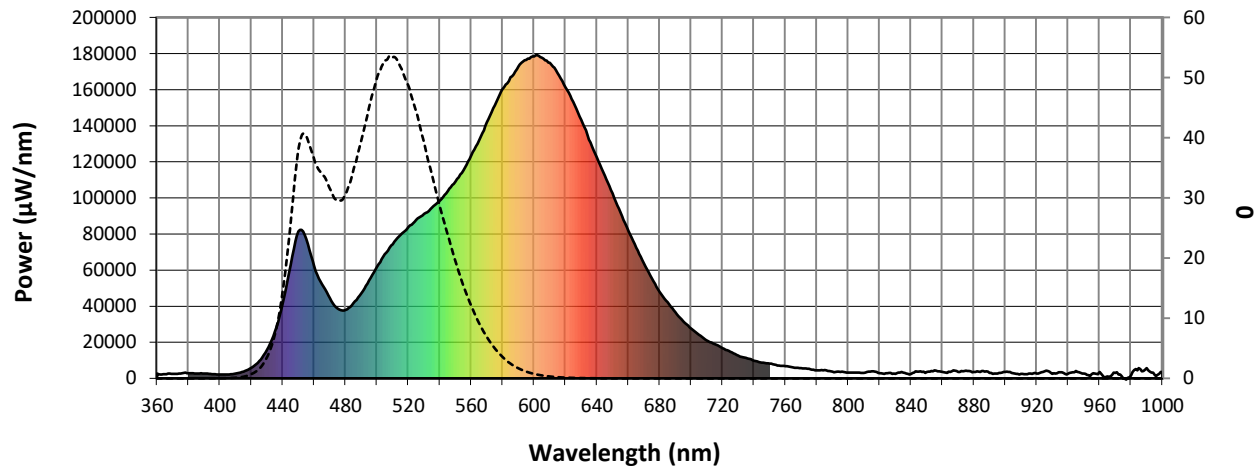


#####

| 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       | 2750             | 0.0              | 490       | 47173            | 6.7              | 620       | 161309           | 42.0             | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 9.8              | 625       | 153301           | 33.8             | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 13.6             | 630       | 143292           | 25.9             | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 19.3             | 635       | 132368           | 19.9             | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 25.5             | 640       | 122334           | 14.6             | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 32.9             | 645       | 112200           | 10.8             | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 40.6             | 650       | 102448           | 7.5              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 47.1             | 655       | 91886            | 5.3              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 53.7             | 660       | 81865            | 3.4              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.0              | 535       | 94694            | 58.7             | 665       | 72448            | 2.3              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.0              | 540       | 98431            | 64.1             | 670       | 63654            | 1.4              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.0              | 545       | 103765           | 69.1             | 675       | 55284            | 0.9              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 0.0              | 550       | 109130           | 74.2             | 680       | 47949            | 0.6              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 0.1              | 555       | 115271           | 78.7             | 685       | 42173            | 0.4              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 0.1              | 560       | 123390           | 83.9             | 690       | 36755            | 0.2              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 0.3              | 565       | 131926           | 87.7             | 695       | 31630            | 0.1              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 0.7              | 570       | 141815           | 92.2             | 700       | 27642            | 0.1              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 1.3              | 575       | 151359           | 94.2             | 705       | 24213            | 0.1              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 2.1              | 580       | 160364           | 95.3             | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 2.6              | 585       | 166836           | 92.7             | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 2.6              | 590       | 172885           | 89.4             | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 2.7              | 595       | 176548           | 83.7             | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 2.8              | 600       | 178427           | 76.9             | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 3.0              | 605       | 177729           | 68.8             | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 3.6              | 610       | 174846           | 60.1             | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 4.9              | 615       | 169274           | 51.1             | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-3

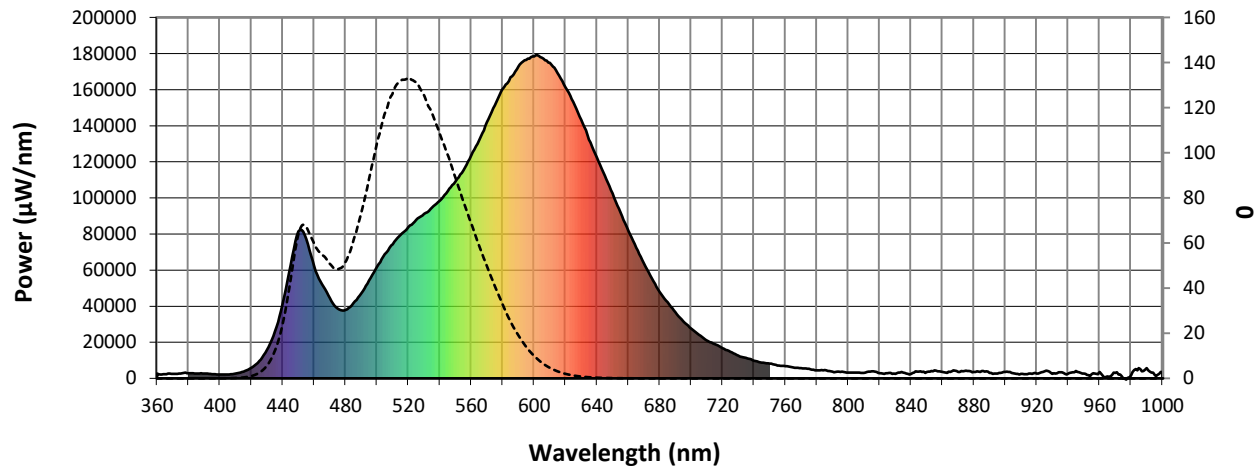
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 4584.8**
**S/P: 0.52**

| 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       | 2750             | 0.0              | 490       | 47173            | 72.6             | 620       | 161309           | 2.0              | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 87.7             | 625       | 153301           | 1.3              | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 103.4            | 630       | 143292           | 0.8              | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 117.0            | 635       | 132368           | 0.5              | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 126.0            | 640       | 122334           | 0.3              | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 131.6            | 645       | 112200           | 0.2              | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 133.2            | 650       | 102448           | 0.1              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 131.3            | 655       | 91886            | 0.1              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 125.8            | 660       | 81865            | 0.0              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.1              | 535       | 94694            | 118.0            | 665       | 72448            | 0.0              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.2              | 540       | 98431            | 108.8            | 670       | 63654            | 0.0              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.4              | 545       | 103765           | 99.5             | 675       | 55284            | 0.0              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 1.0              | 550       | 109130           | 89.2             | 680       | 47949            | 0.0              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 2.3              | 555       | 115271           | 78.8             | 685       | 42173            | 0.0              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 5.4              | 560       | 123390           | 69.0             | 690       | 36755            | 0.0              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 11.6             | 565       | 131926           | 59.2             | 695       | 31630            | 0.0              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 23.2             | 570       | 141815           | 50.0             | 700       | 27642            | 0.0              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 42.1             | 575       | 151359           | 41.2             | 705       | 24213            | 0.0              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 63.1             | 580       | 160364           | 33.0             | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 67.4             | 585       | 166836           | 25.5             | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 60.3             | 590       | 172885           | 19.3             | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 55.1             | 595       | 176548           | 14.1             | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 51.0             | 600       | 178427           | 10.1             | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 48.4             | 605       | 177729           | 7.0              | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 51.4             | 610       | 174846           | 4.7              | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 60.4             | 615       | 169274           | 3.1              | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-3

### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 12033.4    S/P: 1.36**

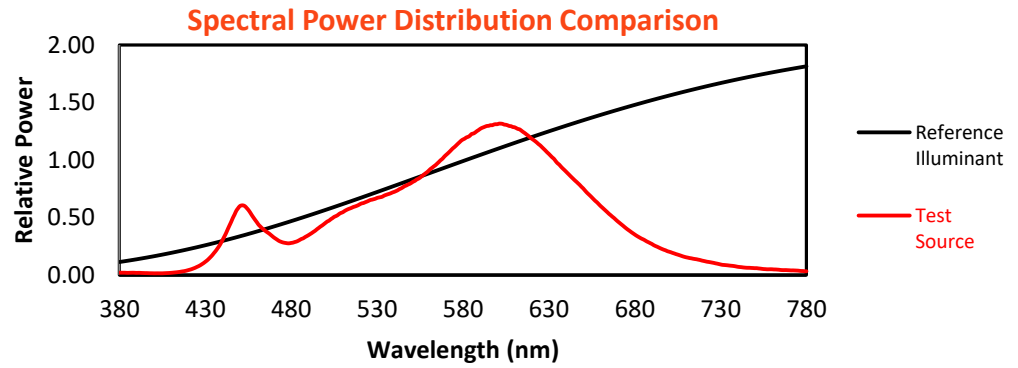
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2750             | 0.0              | 490       | 47173            | 39.3             | 620       | 161309           | 0.1              | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 44.8             | 625       | 153301           | 0.1              | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 49.7             | 630       | 143292           | 0.0              | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 52.8             | 635       | 132368           | 0.0              | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 53.4             | 640       | 122334           | 0.0              | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 51.9             | 645       | 112200           | 0.0              | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 48.8             | 650       | 102448           | 0.0              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 44.5             | 655       | 91886            | 0.0              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 39.4             | 660       | 81865            | 0.0              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.0              | 535       | 94694            | 34.1             | 665       | 72448            | 0.0              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.1              | 540       | 98431            | 28.8             | 670       | 63654            | 0.0              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.2              | 545       | 103765           | 24.1             | 675       | 55284            | 0.0              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 0.7              | 550       | 109130           | 19.6             | 680       | 47949            | 0.0              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 1.5              | 555       | 115271           | 15.5             | 685       | 42173            | 0.0              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 3.3              | 560       | 123390           | 12.2             | 690       | 36755            | 0.0              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 6.9              | 565       | 131926           | 9.3              | 695       | 31630            | 0.0              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 13.9             | 570       | 141815           | 6.9              | 700       | 27642            | 0.0              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 24.8             | 575       | 151359           | 5.0              | 705       | 24213            | 0.0              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 37.5             | 580       | 160364           | 3.6              | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 40.4             | 585       | 166836           | 2.5              | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 36.8             | 590       | 172885           | 1.7              | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 34.1             | 595       | 176548           | 1.1              | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 31.7             | 600       | 178427           | 0.8              | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 29.5             | 605       | 177729           | 0.5              | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 30.6             | 610       | 174846           | 0.3              | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 34.3             | 615       | 169274           | 0.2              | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-3

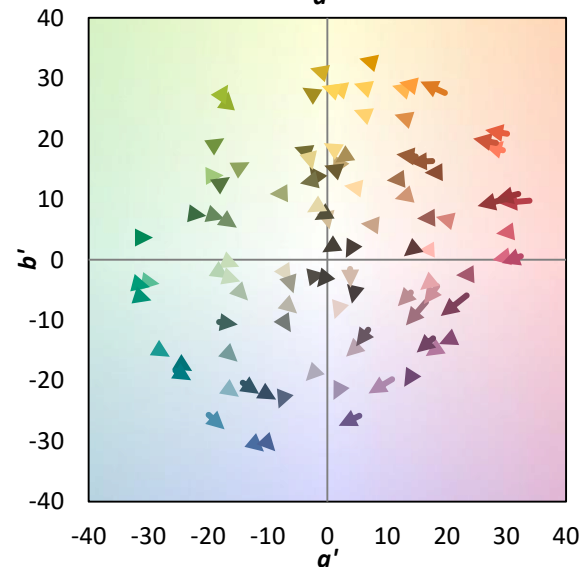
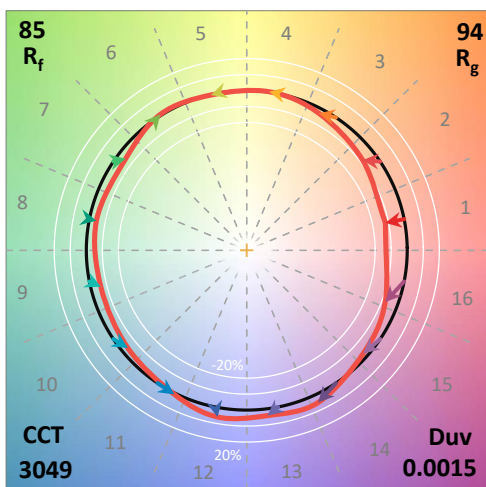
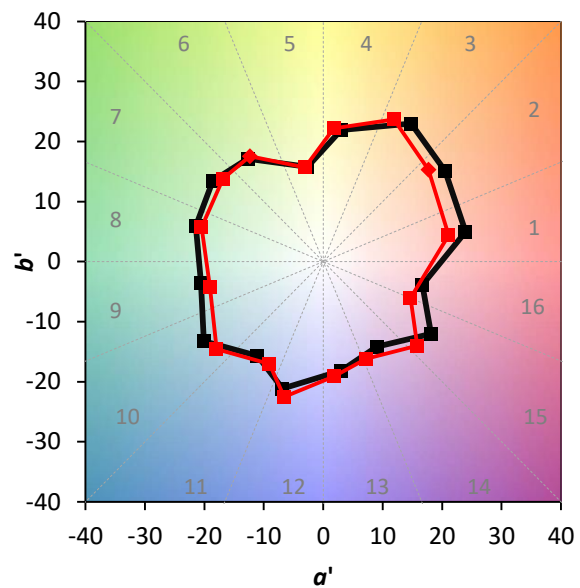
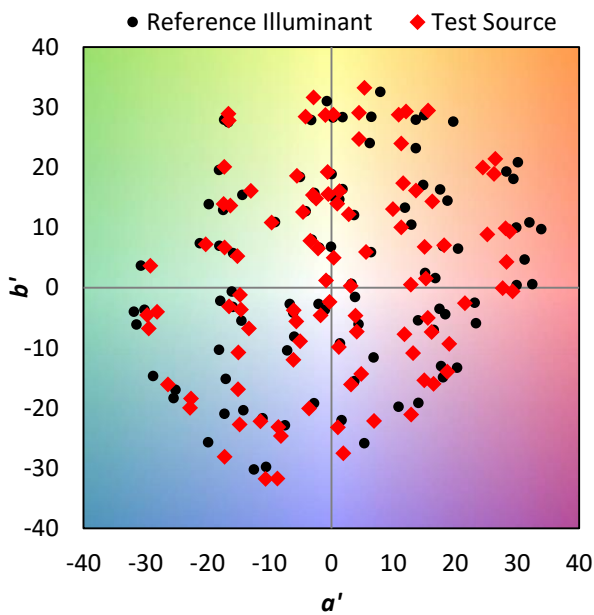
TM-30-18

### Summary

$R_f = 85.1$   
 $R_g = 94.3$   
 CIE  $R_a = 81.7$   
 $R_g = 1.9$

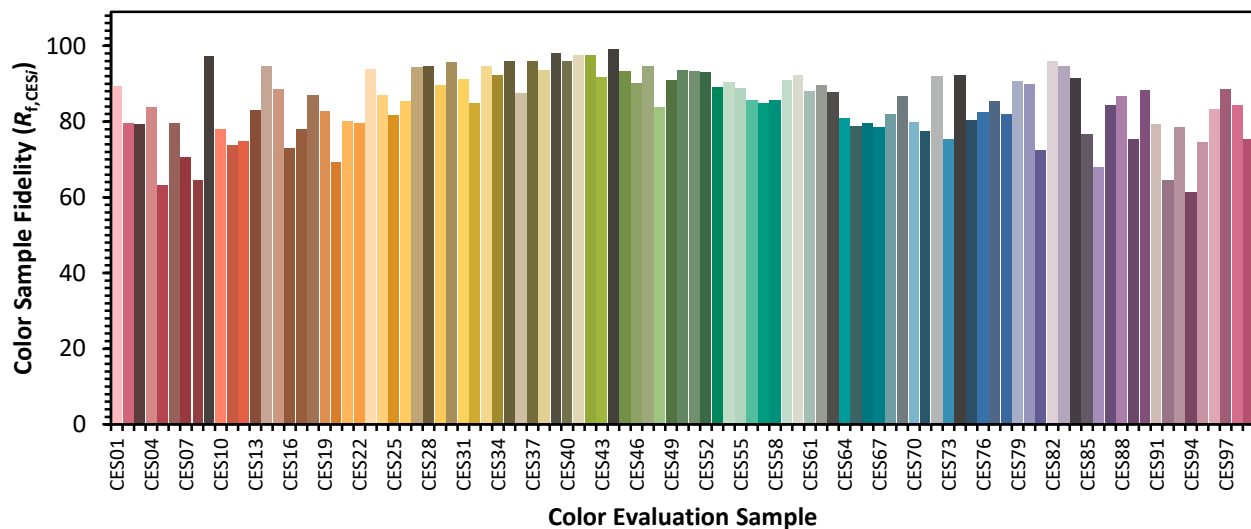


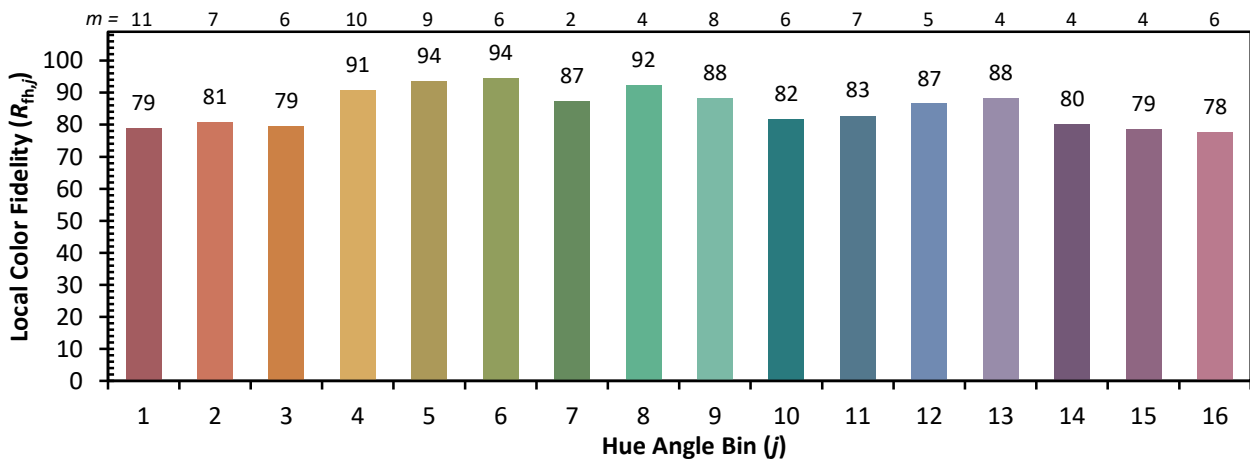
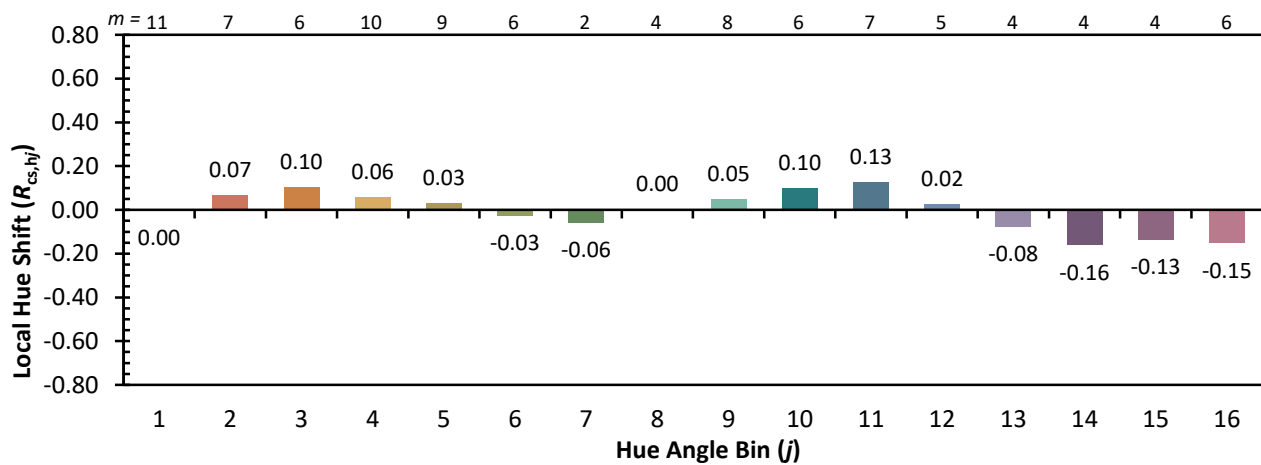
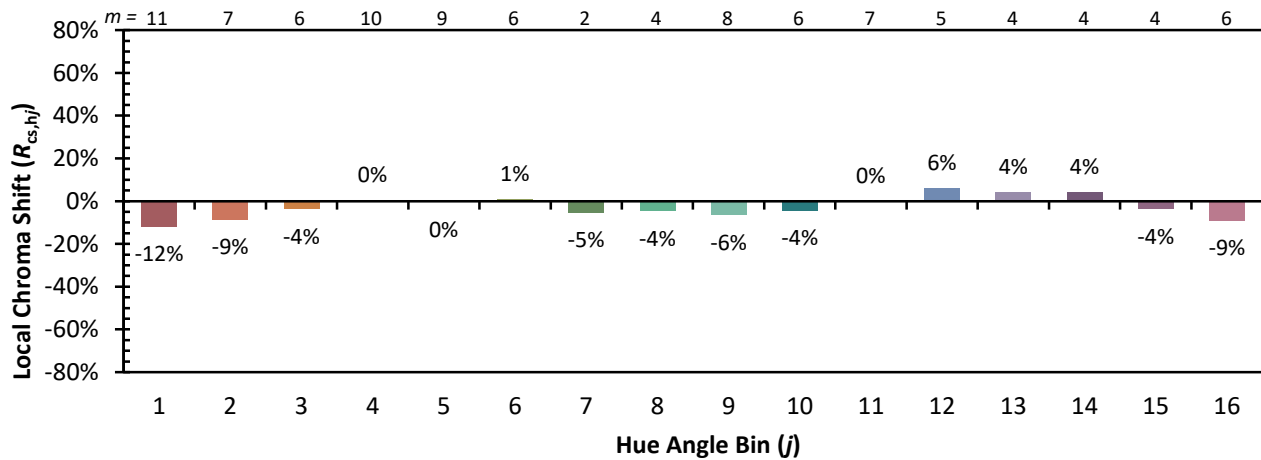
### Color Vector Graphics

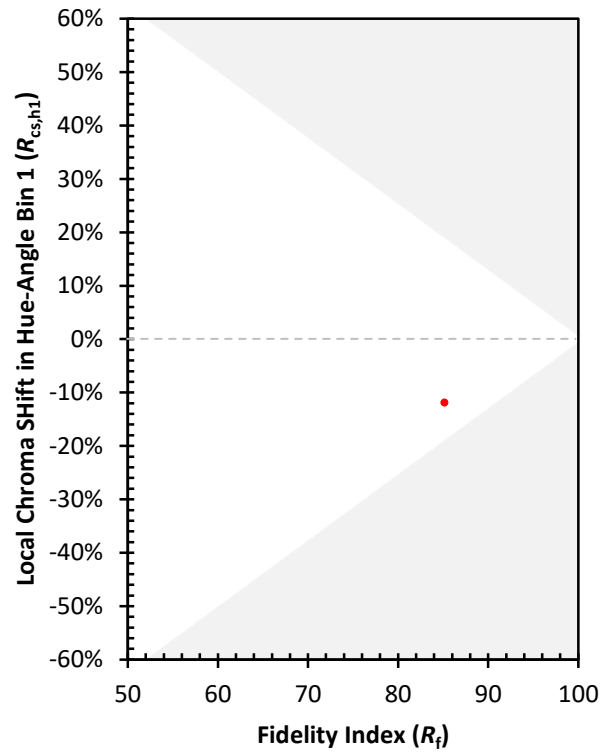
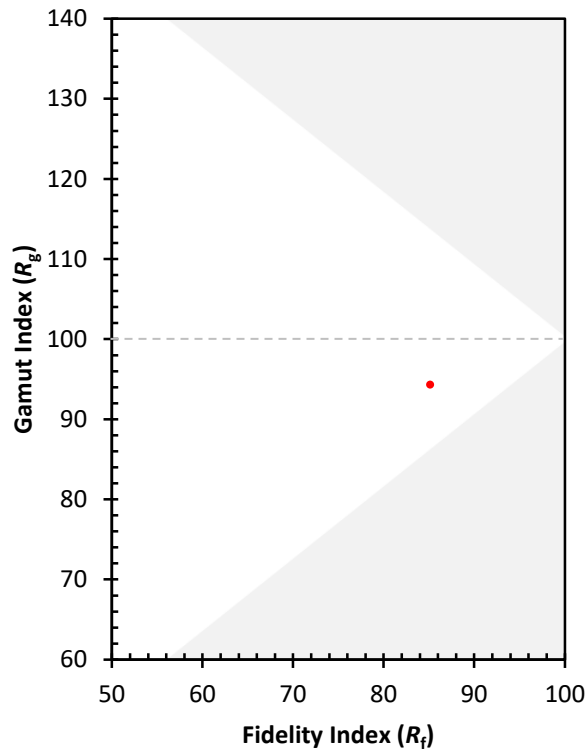


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 93 | CES76 = 82 |
| CES02 = 63 | CES27 = 94 | CES52 = 93 | CES77 = 85 |
| CES03 = 31 | CES28 = 95 | CES53 = 89 | CES78 = 82 |
| CES04 = 70 | CES29 = 90 | CES54 = 90 | CES79 = 91 |
| CES05 = 49 | CES30 = 96 | CES55 = 89 | CES80 = 90 |
| CES06 = 51 | CES31 = 91 | CES56 = 86 | CES81 = 72 |
| CES07 = 42 | CES32 = 85 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 95 | CES58 = 86 | CES83 = 95 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 76 | CES35 = 96 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 87 | CES61 = 88 | CES86 = 68 |
| CES12 = 65 | CES37 = 96 | CES62 = 90 | CES87 = 84 |
| CES13 = 43 | CES38 = 94 | CES63 = 88 | CES88 = 87 |
| CES14 = 74 | CES39 = 98 | CES64 = 81 | CES89 = 75 |
| CES15 = 71 | CES40 = 96 | CES65 = 79 | CES90 = 88 |
| CES16 = 47 | CES41 = 97 | CES66 = 80 | CES91 = 79 |
| CES17 = 50 | CES42 = 98 | CES67 = 78 | CES92 = 65 |
| CES18 = 56 | CES43 = 92 | CES68 = 82 | CES93 = 78 |
| CES19 = 72 | CES44 = 99 | CES69 = 87 | CES94 = 61 |
| CES20 = 66 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 90 | CES71 = 77 | CES96 = 83 |
| CES22 = 79 | CES47 = 95 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 84 | CES73 = 75 | CES98 = 84 |
| CES24 = 91 | CES49 = 91 | CES74 = 92 | CES99 = 75 |
| CES25 = 72 | CES50 = 94 | CES75 = 80 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**


(END OF REPORT)