

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: P671602

Luminaire Tested: **CCP-SA1C-840-U-SL4**

Issue Date: 04/16/2023

**Test Information**

Test Method: LM-79-08  
Report Number: P671602  
Test Lab: INNOVATION CENTER(G1)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA1C-840-U-SL4  
Description: INVUE CLEAR CURVE POLE MOUNT LIGHT SQUARE LUMINAIRE @615mA w/ SL4  
distribution lens  
Light Source: (16) 4000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3777.4 lumens  
Efficiency: N/A  
Efficacy: 118.0 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

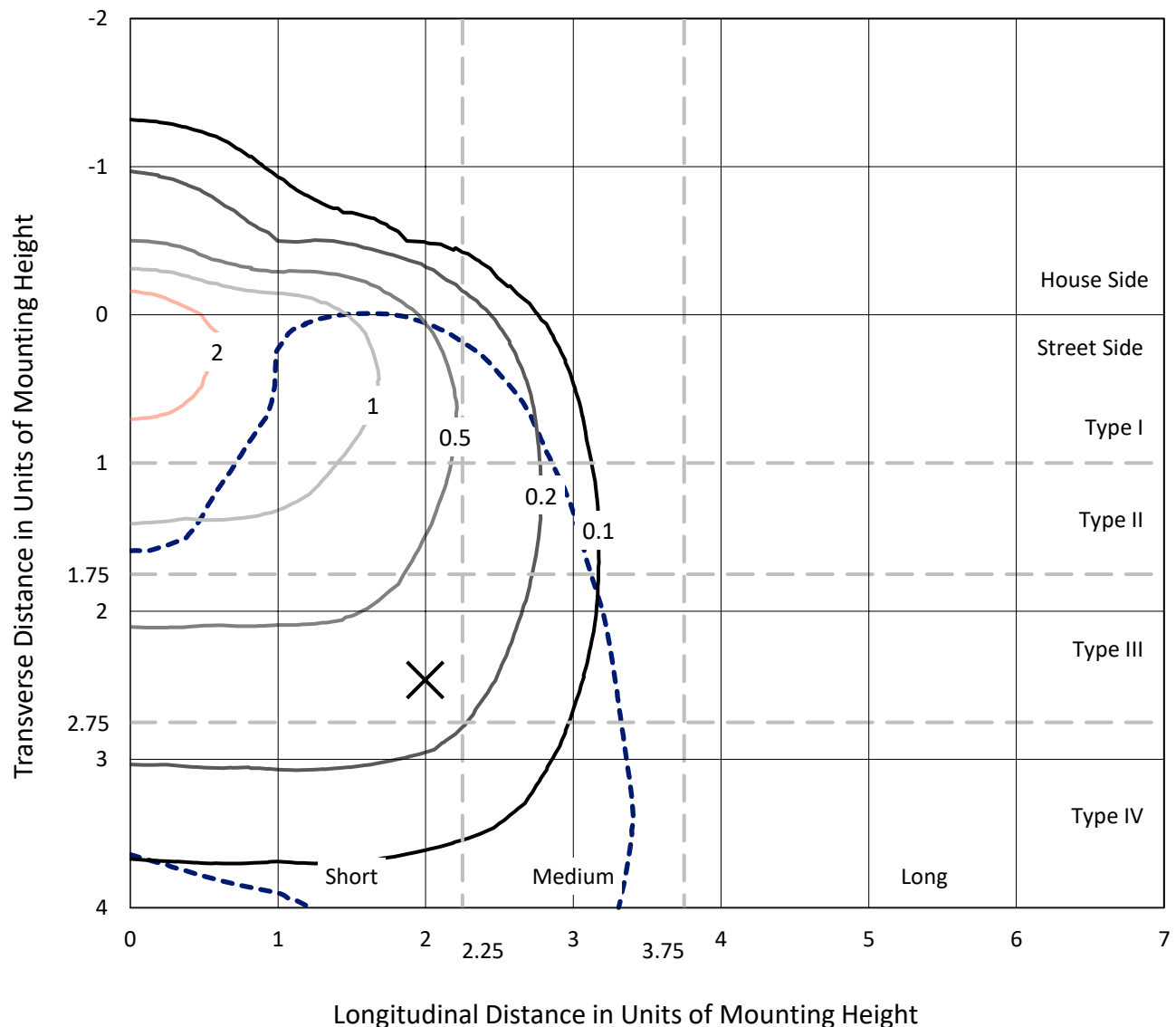
Input Watts (W): 32  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

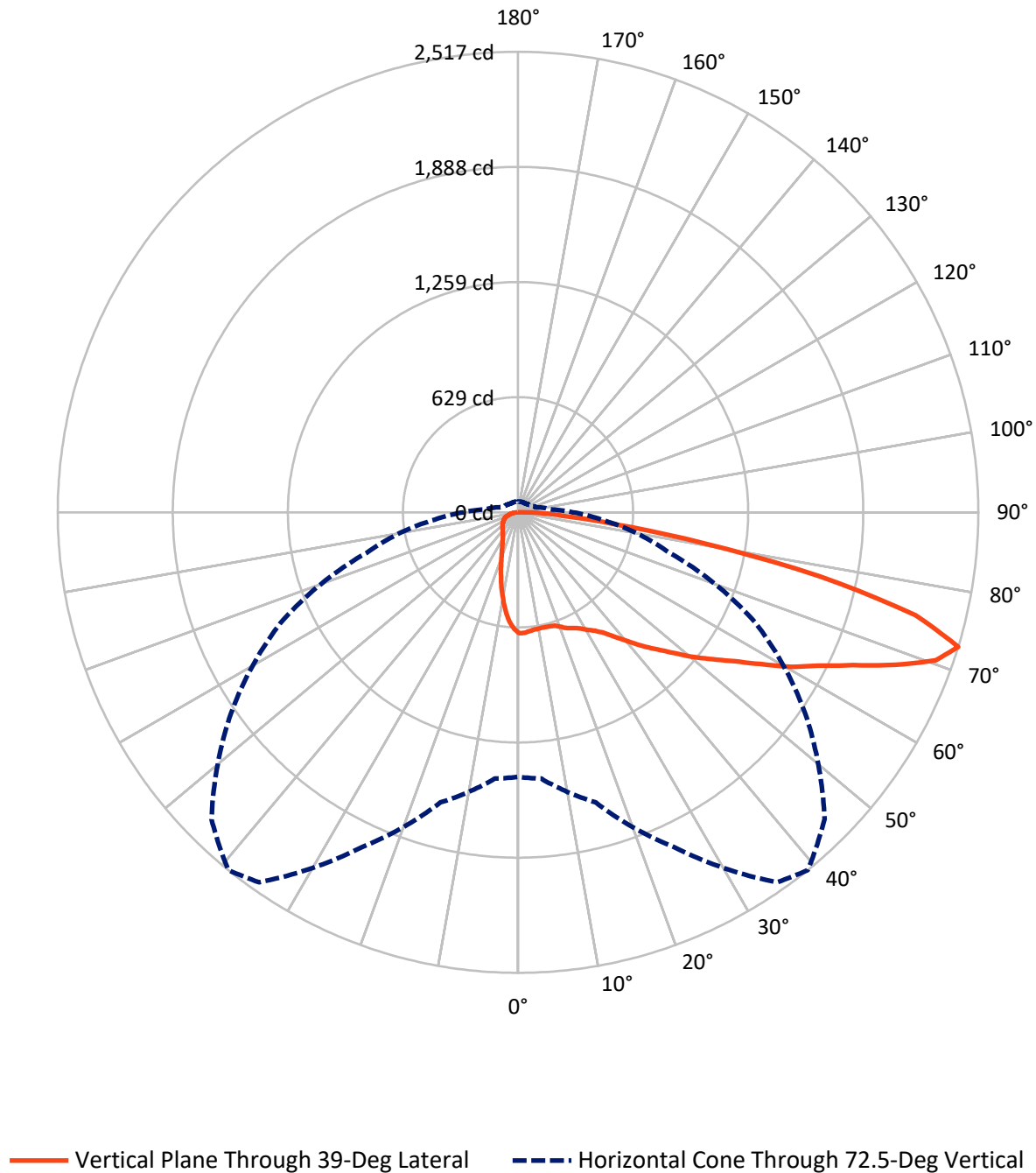
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 2.9 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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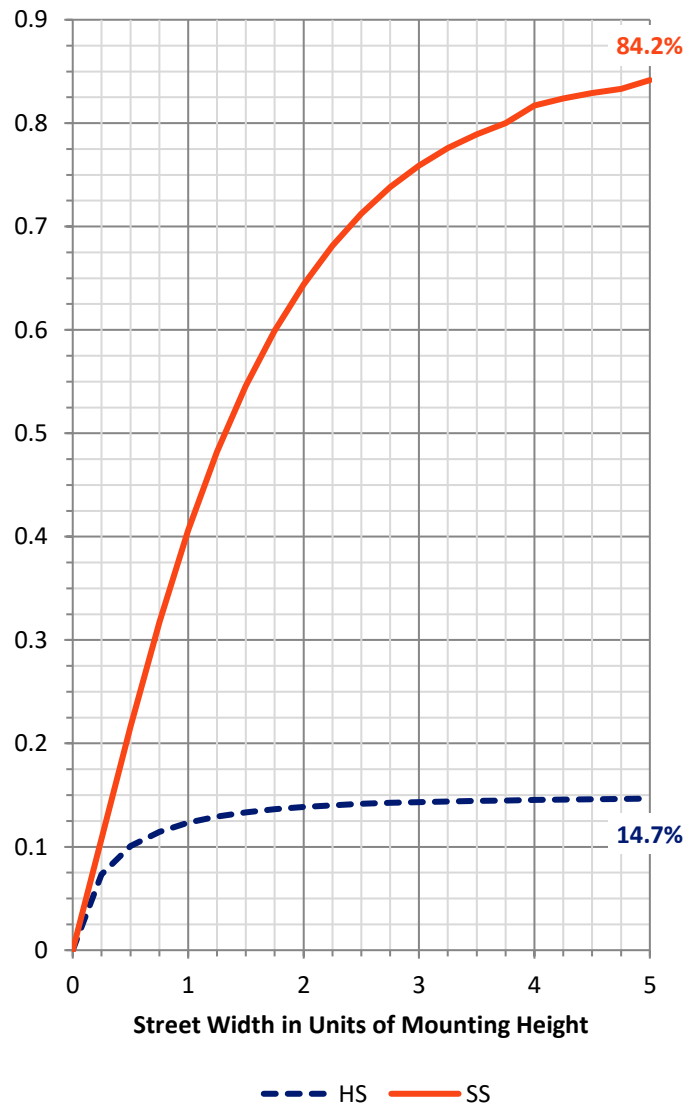
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 561.4    | 0.0    | 561.4  |
|                    | % Fixture | 14.9     | 0.0    | 14.9   |
| <b>Street Side</b> | Lumens    | 3216.0   | 0.0    | 3216.0 |
|                    | % Fixture | 85.1     | 0.0    | 85.1   |
| <b>Total</b>       | Lumens    | 3777.4   | 0.0    | 3777.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 58.4   | 1.5       |
| 10°-20°   | 149.1  | 3.9       |
| 20°-30°   | 227.2  | 6.0       |
| 30°-40°   | 332.3  | 8.8       |
| 40°-50°   | 508.8  | 13.5      |
| 50°-60°   | 746.2  | 19.8      |
| 60°-70°   | 951.7  | 25.2      |
| 70°-80°   | 687.6  | 18.2      |
| 80°-90°   | 116.0  | 3.1       |
| 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°    | 3777.4 | 100.0     |
| 0°-180°   | 3777.4 | 100.0     |

**Coefficient of Utilization**



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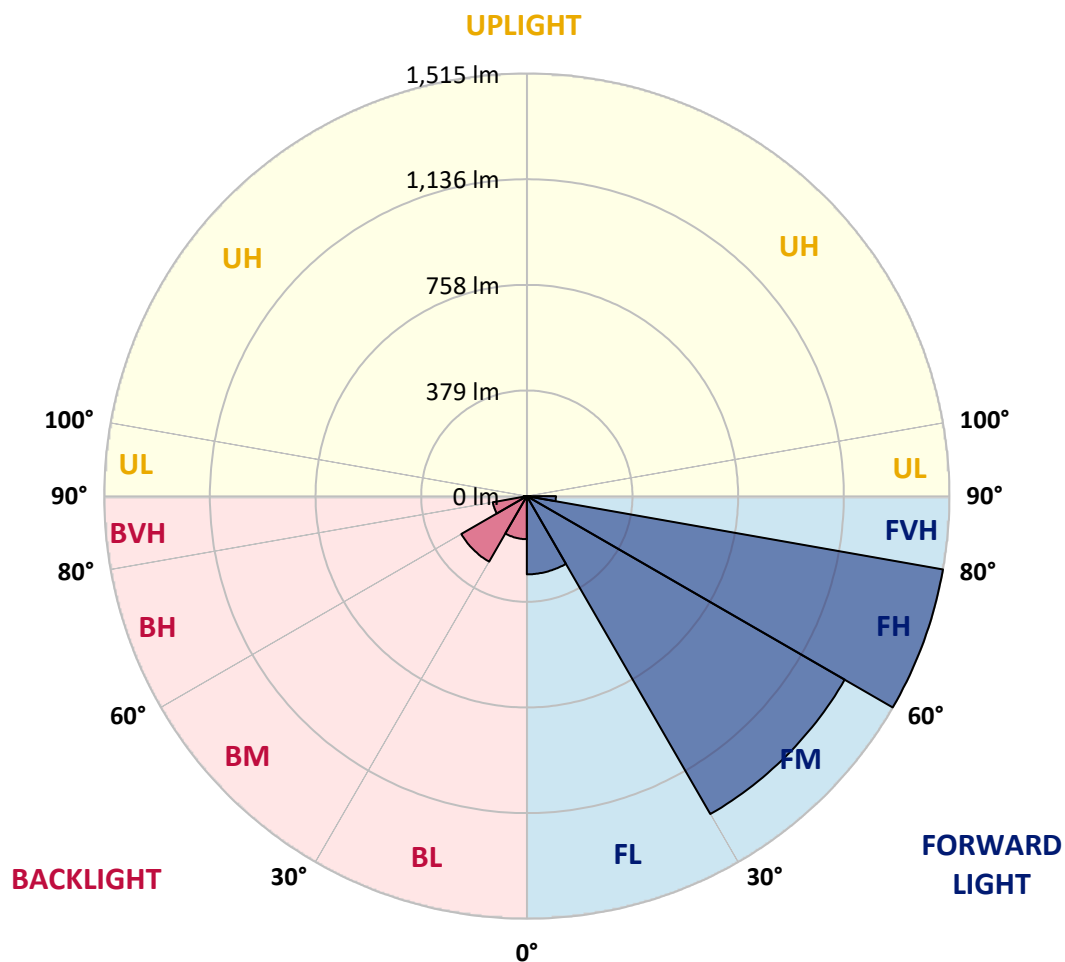
CATALOG NUMBER: CCP-SA1C-840-U-SL4

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 280.3  | 7.4       |                         |      |         |
| FM   | (30°-60°)   | 1316.1 | 34.8      |                         |      |         |
| FH   | (60°-80°)   | 1515.3 | 40.1      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 104.2  | 2.8       |                         |      | G2/225  |
| BL   | (0°-30°)    | 154.4  | 4.1       | B1/500                  |      |         |
| BM   | (30°-60°)   | 271.2  | 7.2       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 124.0  | 3.3       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 11.8   | 0.3       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 39°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 661.2  | 661.2  | 661.2  | 661.2  | 661.2  | 661.2  | 661.2  | 661.2  | 661.2  | 661.2  | 661.2  |
| 2.5°  | 671.1  | 672.6  | 669.7  | 666.9  | 665.5  | 659.8  | 665.5  | 662.6  | 659.8  | 659.8  | 659.8  |
| 5°    | 662.6  | 664.1  | 664.1  | 661.2  | 662.6  | 652.7  | 651.3  | 652.7  | 648.4  | 645.6  | 644.2  |
| 7.5°  | 649.9  | 652.7  | 658.4  | 657.0  | 651.3  | 647.0  | 648.4  | 647.0  | 639.9  | 635.7  | 624.3  |
| 10°   | 639.9  | 642.8  | 645.6  | 648.4  | 647.0  | 645.6  | 644.2  | 638.5  | 637.1  | 627.2  | 615.8  |
| 12.5° | 630.0  | 630.0  | 631.4  | 642.8  | 644.2  | 644.2  | 635.7  | 635.7  | 631.4  | 630.0  | 613.0  |
| 15°   | 620.1  | 624.3  | 635.7  | 638.5  | 644.2  | 647.0  | 642.8  | 642.8  | 635.7  | 625.7  | 613.0  |
| 17.5° | 622.9  | 630.0  | 641.4  | 648.4  | 651.3  | 651.3  | 657.0  | 652.7  | 642.8  | 637.1  | 624.3  |
| 20°   | 637.1  | 638.5  | 652.7  | 665.5  | 668.3  | 668.3  | 662.6  | 658.4  | 651.3  | 641.4  | 624.3  |
| 22.5° | 645.6  | 655.5  | 672.6  | 679.7  | 688.2  | 688.2  | 681.1  | 671.1  | 661.2  | 651.3  | 632.8  |
| 25°   | 682.5  | 683.9  | 691.0  | 702.4  | 706.6  | 700.9  | 693.9  | 682.5  | 669.7  | 659.8  | 642.8  |
| 27.5° | 708.0  | 715.1  | 723.6  | 729.3  | 722.2  | 718.0  | 712.3  | 699.5  | 689.6  | 681.1  | 657.0  |
| 30°   | 754.9  | 746.4  | 752.0  | 754.9  | 742.1  | 744.9  | 729.3  | 718.0  | 706.6  | 706.6  | 679.7  |
| 32.5° | 783.2  | 790.3  | 784.7  | 783.2  | 773.3  | 771.9  | 762.0  | 749.2  | 742.1  | 750.6  | 713.7  |
| 35°   | 832.9  | 828.6  | 828.6  | 827.2  | 815.9  | 808.8  | 808.8  | 786.1  | 793.2  | 811.6  | 766.2  |
| 37.5° | 858.4  | 857.0  | 865.5  | 872.6  | 861.3  | 865.5  | 861.3  | 851.4  | 854.2  | 886.8  | 831.5  |
| 40°   | 884.0  | 893.9  | 910.9  | 913.8  | 920.9  | 926.6  | 923.7  | 922.3  | 933.6  | 986.1  | 919.5  |
| 42.5° | 908.1  | 916.6  | 942.2  | 964.9  | 981.9  | 1000.3 | 1001.8 | 1001.8 | 1038.6 | 1113.9 | 1025.9 |
| 45°   | 939.3  | 946.4  | 981.9  | 1027.3 | 1055.7 | 1068.4 | 1079.8 | 1092.6 | 1142.2 | 1231.6 | 1139.4 |
| 47.5° | 981.9  | 987.6  | 1030.1 | 1086.9 | 1142.2 | 1149.3 | 1172.0 | 1186.2 | 1261.4 | 1352.2 | 1255.7 |
| 50°   | 1042.9 | 1038.6 | 1072.7 | 1155.0 | 1208.9 | 1243.0 | 1275.6 | 1301.1 | 1374.9 | 1474.3 | 1346.6 |
| 52.5° | 1092.6 | 1092.6 | 1118.1 | 1227.4 | 1301.1 | 1333.8 | 1367.8 | 1403.3 | 1488.4 | 1596.3 | 1420.3 |
| 55°   | 1177.7 | 1169.2 | 1184.8 | 1298.3 | 1404.7 | 1435.9 | 1501.2 | 1531.0 | 1613.3 | 1687.1 | 1482.8 |
| 57.5° | 1235.9 | 1240.1 | 1258.6 | 1392.0 | 1526.8 | 1565.1 | 1630.3 | 1651.6 | 1724.0 | 1782.2 | 1528.2 |
| 60°   | 1312.5 | 1298.3 | 1338.0 | 1495.5 | 1661.6 | 1715.5 | 1769.4 | 1782.2 | 1836.1 | 1843.2 | 1549.5 |
| 62.5° | 1386.3 | 1383.4 | 1417.5 | 1599.1 | 1806.3 | 1844.6 | 1899.9 | 1914.1 | 1936.8 | 1891.4 | 1519.7 |
| 65°   | 1431.7 | 1450.1 | 1514.0 | 1712.6 | 1970.9 | 2013.4 | 2068.8 | 2040.4 | 2014.9 | 1848.9 | 1373.5 |
| 67.5° | 1494.1 | 1502.6 | 1600.5 | 1836.1 | 2161.0 | 2224.9 | 2273.1 | 2161.0 | 1970.9 | 1674.3 | 1156.4 |
| 70°   | 1508.3 | 1531.0 | 1658.7 | 1965.2 | 2356.8 | 2422.1 | 2424.9 | 2119.9 | 1810.5 | 1362.2 | 838.6  |
| 72.5° | 1445.9 | 1461.5 | 1641.7 | 2019.1 | 2468.9 | 2517.2 | 2371.0 | 1917.0 | 1434.5 | 858.4  | 456.9  |
| 75°   | 1216.0 | 1260.0 | 1428.9 | 1853.1 | 2263.2 | 2244.7 | 2009.2 | 1462.9 | 861.3  | 380.3  | 193.0  |
| 77.5° | 847.1  | 848.5  | 1024.5 | 1348.0 | 1694.2 | 1689.9 | 1433.1 | 848.5  | 368.9  | 153.2  | 113.5  |
| 80°   | 376.0  | 403.0  | 509.4  | 726.5  | 1028.7 | 1028.7 | 835.7  | 421.4  | 184.5  | 99.3   | 78.0   |
| 82.5° | 221.4  | 229.9  | 272.4  | 339.1  | 500.9  | 527.8  | 400.1  | 280.9  | 126.3  | 62.4   | 48.2   |
| 85°   | 163.2  | 177.4  | 202.9  | 204.3  | 237.0  | 241.2  | 221.4  | 244.1  | 86.6   | 34.1   | 39.7   |
| 87.5° | 122.0  | 130.5  | 161.8  | 134.8  | 126.3  | 119.2  | 136.2  | 249.7  | 32.6   | 17.0   | 12.8   |
| 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-SA1C-840-U-SL4

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 661.2  | 661.2 | 661.2 | 661.2 | 661.2 | 661.2 | 661.2 | 661.2 | 661.2 | 661.2 | 661.2 |
| 2.5°  | 654.1  | 654.1 | 651.3 | 645.6 | 645.6 | 634.3 | 637.1 | 639.9 | 632.8 | 632.8 | 634.3 |
| 5°    | 644.2  | 638.5 | 631.4 | 622.9 | 617.2 | 601.6 | 598.8 | 588.9 | 587.4 | 584.6 | 580.3 |
| 7.5°  | 624.3  | 615.8 | 603.0 | 590.3 | 571.8 | 557.6 | 540.6 | 526.4 | 520.7 | 516.5 | 515.1 |
| 10°   | 605.9  | 604.5 | 583.2 | 557.6 | 529.3 | 502.3 | 476.8 | 458.3 | 447.0 | 439.9 | 438.4 |
| 12.5° | 605.9  | 594.5 | 564.7 | 529.3 | 488.1 | 448.4 | 415.7 | 390.2 | 374.6 | 363.2 | 359.0 |
| 15°   | 603.0  | 591.7 | 552.0 | 498.0 | 451.2 | 397.3 | 351.9 | 324.9 | 302.2 | 290.9 | 292.3 |
| 17.5° | 605.9  | 588.9 | 533.5 | 475.3 | 410.1 | 351.9 | 298.0 | 265.3 | 242.6 | 234.1 | 232.7 |
| 20°   | 607.3  | 586.0 | 519.3 | 444.1 | 367.5 | 302.2 | 251.1 | 219.9 | 202.9 | 197.2 | 197.2 |
| 22.5° | 604.5  | 577.5 | 498.0 | 407.2 | 330.6 | 261.1 | 218.5 | 191.6 | 180.2 | 173.1 | 175.9 |
| 25°   | 617.2  | 576.1 | 478.2 | 376.0 | 288.0 | 227.0 | 194.4 | 174.5 | 167.4 | 163.2 | 164.6 |
| 27.5° | 620.1  | 576.1 | 462.6 | 340.5 | 251.1 | 201.5 | 175.9 | 163.2 | 157.5 | 154.7 | 153.2 |
| 30°   | 631.4  | 578.9 | 444.1 | 305.1 | 221.4 | 181.6 | 161.8 | 154.7 | 150.4 | 149.0 | 149.0 |
| 32.5° | 662.6  | 587.4 | 424.3 | 275.3 | 195.8 | 164.6 | 151.8 | 146.1 | 143.3 | 141.9 | 143.3 |
| 35°   | 699.5  | 610.1 | 403.0 | 244.1 | 177.4 | 153.2 | 143.3 | 139.1 | 137.6 | 137.6 | 137.6 |
| 37.5° | 756.3  | 644.2 | 384.5 | 218.5 | 161.8 | 141.9 | 134.8 | 133.4 | 132.0 | 133.4 | 133.4 |
| 40°   | 821.6  | 681.1 | 367.5 | 198.6 | 150.4 | 134.8 | 127.7 | 127.7 | 126.3 | 127.7 | 129.1 |
| 42.5° | 896.8  | 726.5 | 350.5 | 178.8 | 140.5 | 129.1 | 123.4 | 122.0 | 120.6 | 123.4 | 124.9 |
| 45°   | 1000.3 | 788.9 | 339.1 | 167.4 | 133.4 | 123.4 | 117.8 | 117.8 | 116.4 | 116.4 | 119.2 |
| 47.5° | 1086.9 | 848.5 | 339.1 | 156.1 | 129.1 | 119.2 | 113.5 | 113.5 | 110.7 | 112.1 | 112.1 |
| 50°   | 1159.3 | 899.6 | 346.2 | 153.2 | 123.4 | 114.9 | 110.7 | 107.8 | 106.4 | 106.4 | 106.4 |
| 52.5° | 1207.5 | 930.8 | 351.9 | 150.4 | 120.6 | 109.3 | 106.4 | 105.0 | 102.2 | 100.7 | 102.2 |
| 55°   | 1255.7 | 952.1 | 353.3 | 150.4 | 116.4 | 103.6 | 100.7 | 100.7 | 97.9  | 96.5  | 96.5  |
| 57.5° | 1274.2 | 943.6 | 333.4 | 147.6 | 113.5 | 99.3  | 96.5  | 95.1  | 93.6  | 92.2  | 92.2  |
| 60°   | 1265.7 | 912.4 | 289.5 | 140.5 | 110.7 | 96.5  | 90.8  | 90.8  | 90.8  | 88.0  | 89.4  |
| 62.5° | 1207.5 | 805.9 | 232.7 | 129.1 | 106.4 | 90.8  | 85.1  | 88.0  | 88.0  | 86.6  | 86.6  |
| 65°   | 1054.3 | 665.5 | 188.7 | 119.2 | 100.7 | 86.6  | 80.9  | 85.1  | 86.6  | 85.1  | 83.7  |
| 67.5° | 842.8  | 512.2 | 156.1 | 107.8 | 93.6  | 79.5  | 75.2  | 79.5  | 80.9  | 79.5  | 79.5  |
| 70°   | 578.9  | 330.6 | 126.3 | 96.5  | 83.7  | 72.4  | 68.1  | 70.9  | 70.9  | 72.4  | 72.4  |
| 72.5° | 299.4  | 178.8 | 103.6 | 82.3  | 72.4  | 65.3  | 61.0  | 61.0  | 59.6  | 59.6  | 59.6  |
| 75°   | 149.0  | 122.0 | 86.6  | 69.5  | 61.0  | 55.3  | 52.5  | 49.7  | 49.7  | 49.7  | 49.7  |
| 77.5° | 103.6  | 93.6  | 70.9  | 55.3  | 49.7  | 45.4  | 45.4  | 41.1  | 41.1  | 41.1  | 41.1  |
| 80°   | 78.0   | 73.8  | 53.9  | 42.6  | 38.3  | 35.5  | 35.5  | 34.1  | 34.1  | 32.6  | 32.6  |
| 82.5° | 55.3   | 59.6  | 41.1  | 31.2  | 28.4  | 27.0  | 27.0  | 25.5  | 25.5  | 22.7  | 22.7  |
| 85°   | 44.0   | 49.7  | 31.2  | 22.7  | 21.3  | 18.4  | 18.4  | 17.0  | 17.0  | 15.6  | 14.2  |
| 87.5° | 12.8   | 27.0  | 12.8  | 8.5   | 8.5   | 8.5   | 8.5   | 7.1   | 7.1   | 5.7   | 5.7   |
| 90°   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2104-224-8

Luminaire Tested: CCW-SA2A-840-U-SL4

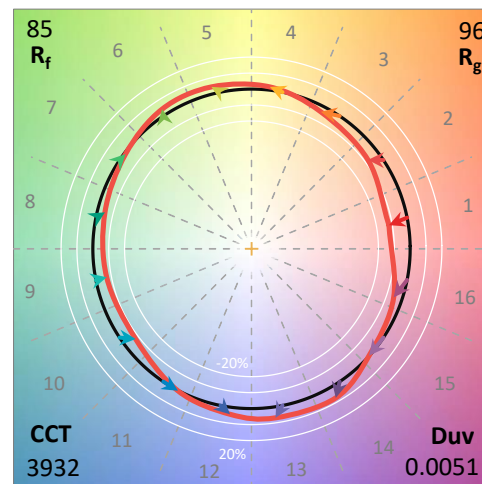
Test Date: 04/27/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-224-8  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/27/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **CCW-SA-2A-840-U-SL4**  
 Description: INVUE WALL PACK ClearCurve Light Square

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3932   | CRI (Ra): | 81.8 |      |      |
| CIE u':                   | 0.2235 | R1:       | 78.9 | R9:  | 0.1  |
| CIE v':                   | 0.5092 | R2:       | 86.4 | R10: | 69.8 |
| Duv:                      | 0.0051 | R3:       | 94.7 | R11: | 82.4 |
| CIE x:                    | 0.3873 | R4:       | 82.5 | R12: | 67.7 |
| CIE y:                    | 0.3923 | R5:       | 79.9 | R13: | 80.2 |
| CIE z:                    | 0.2205 | R6:       | 83.2 | R14: | 97.1 |
| Peak Wavelength (nm):     | 590    | R7:       | 86.3 |      |      |
| Dominant Wavelength (nm): | 576    | R8:       | 62.5 |      |      |
| Purity:                   | 34     |           |      |      |      |
| Rf:                       | 85.2   |           |      |      |      |
| Rg:                       | 96.1   |           |      |      |      |



### Test Conditions

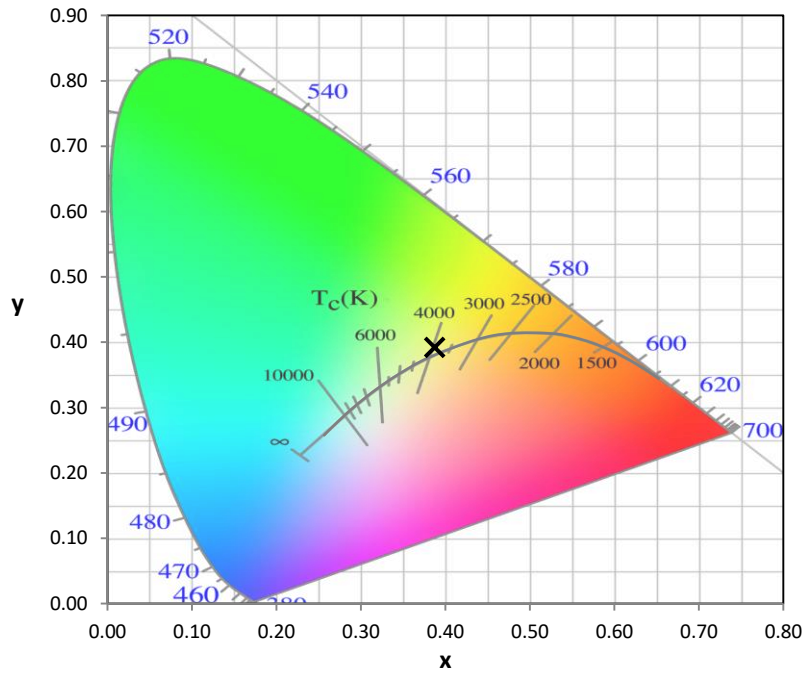
Stabilization Time: 123M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.9/41%  
 Sphere Temperature (°C): 24.2

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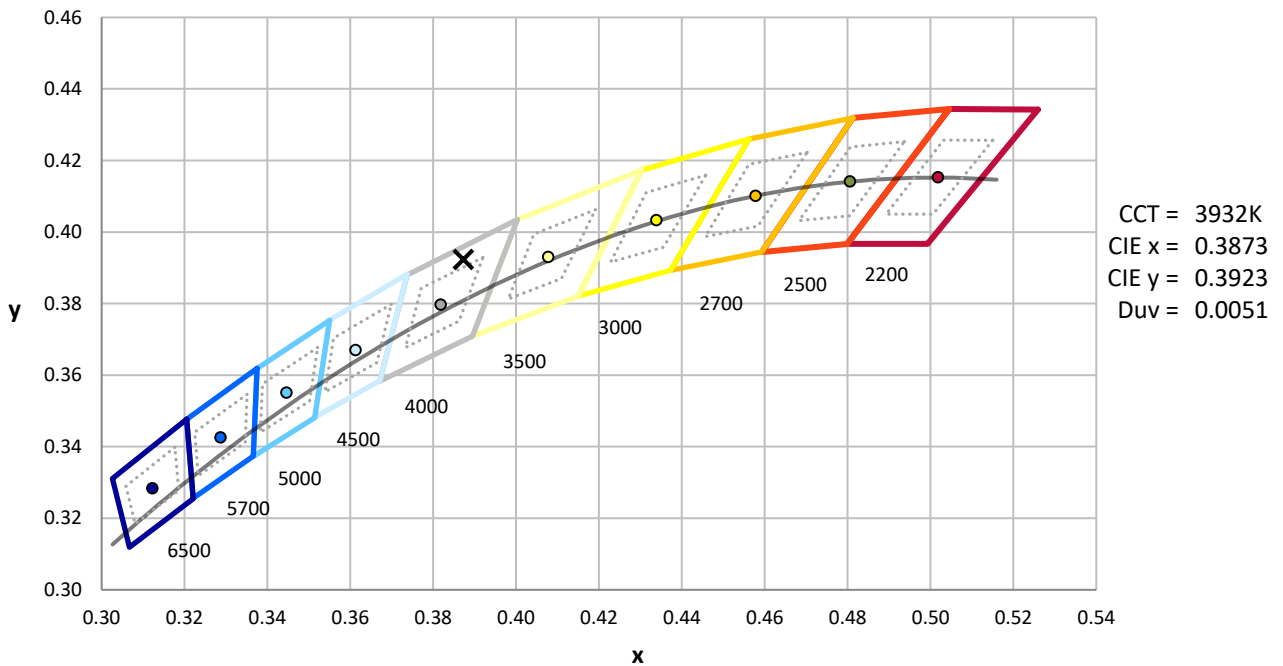
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| 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: SP1-2104-224-8

**CIE 1931 Chromaticity Diagram**



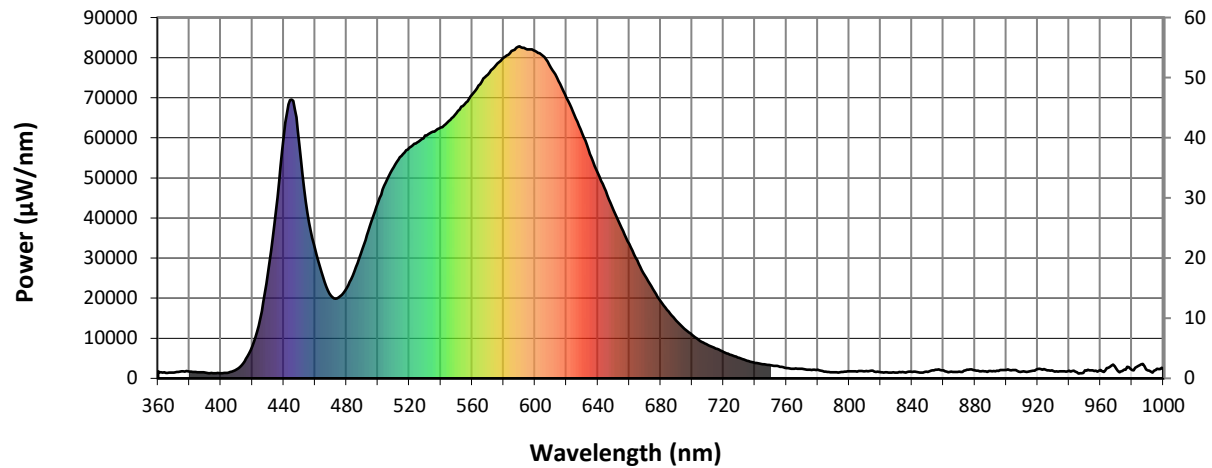
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 4000K 7-step quadrangle

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### Photopic Flux vs. Wavelength

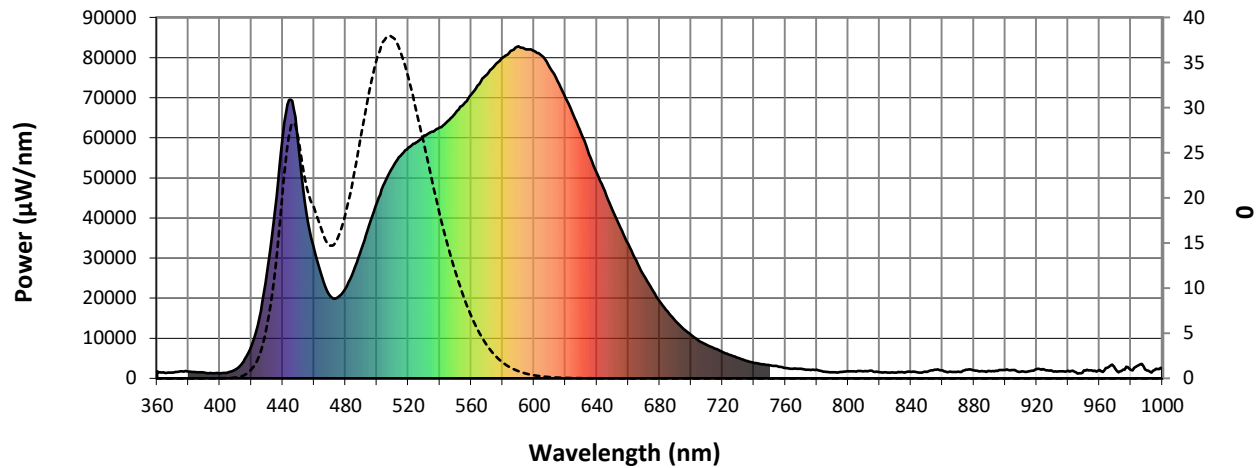


#####

| 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       | 1725             | 0.0              | 490       | 32247            | 4.6              | 620       | 69956            | 18.2             | 750       | 3261             | 0.0              | 880       | 1960             | 0.0              |
| 365       | 1400             | 0.0              | 495       | 38143            | 6.9              | 625       | 65781            | 14.5             | 755       | 3018             | 0.0              | 885       | 1828             | 0.0              |
| 370       | 1447             | 0.0              | 500       | 43918            | 9.7              | 630       | 61092            | 11.1             | 760       | 2521             | 0.0              | 890       | 1806             | 0.0              |
| 375       | 1728             | 0.0              | 505       | 48833            | 13.7             | 635       | 55954            | 8.4              | 765       | 2437             | 0.0              | 895       | 1814             | 0.0              |
| 380       | 1669             | 0.0              | 510       | 52659            | 18.1             | 640       | 51151            | 6.1              | 770       | 2407             | 0.0              | 900       | 2078             | 0.0              |
| 385       | 1495             | 0.0              | 515       | 55510            | 23.0             | 645       | 46656            | 4.5              | 775       | 2143             | 0.0              | 905       | 2072             | 0.0              |
| 390       | 1437             | 0.0              | 520       | 57534            | 27.9             | 650       | 41933            | 3.1              | 780       | 2156             | 0.0              | 910       | 1650             | 0.0              |
| 395       | 1307             | 0.0              | 525       | 58806            | 31.6             | 655       | 37478            | 2.2              | 785       | 1708             | 0.0              | 915       | 1725             | 0.0              |
| 400       | 1277             | 0.0              | 530       | 60565            | 35.7             | 660       | 33501            | 1.4              | 790       | 1555             | 0.0              | 920       | 2324             | 0.0              |
| 405       | 1471             | 0.0              | 535       | 61554            | 38.2             | 665       | 29439            | 0.9              | 795       | 1560             | 0.0              | 925       | 2173             | 0.0              |
| 410       | 2252             | 0.0              | 540       | 62542            | 40.8             | 670       | 25594            | 0.6              | 800       | 1752             | 0.0              | 930       | 1833             | 0.0              |
| 415       | 4196             | 0.0              | 545       | 64150            | 42.7             | 675       | 22306            | 0.4              | 805       | 1696             | 0.0              | 935       | 1740             | 0.0              |
| 420       | 7969             | 0.0              | 550       | 66171            | 45.0             | 680       | 19204            | 0.2              | 810       | 1762             | 0.0              | 940       | 1956             | 0.0              |
| 425       | 14965            | 0.1              | 555       | 68352            | 46.7             | 685       | 16645            | 0.1              | 815       | 1884             | 0.0              | 945       | 1549             | 0.0              |
| 430       | 26348            | 0.2              | 560       | 70775            | 48.1             | 690       | 14365            | 0.1              | 820       | 1502             | 0.0              | 950       | 2026             | 0.0              |
| 435       | 41840            | 0.5              | 565       | 73374            | 48.8             | 695       | 12367            | 0.1              | 825       | 1454             | 0.0              | 955       | 1971             | 0.0              |
| 440       | 60229            | 0.9              | 570       | 75776            | 49.3             | 700       | 10847            | 0.0              | 830       | 1466             | 0.0              | 960       | 2048             | 0.0              |
| 445       | 69537            | 1.4              | 575       | 78035            | 48.6             | 705       | 9369             | 0.0              | 835       | 1541             | 0.0              | 965       | 2608             | 0.0              |
| 450       | 58253            | 1.5              | 580       | 79996            | 47.5             | 710       | 8303             | 0.0              | 840       | 1616             | 0.0              | 970       | 2403             | 0.0              |
| 455       | 41363            | 1.4              | 585       | 81672            | 45.4             | 715       | 7458             | 0.0              | 845       | 1445             | 0.0              | 975       | 2154             | 0.0              |
| 460       | 32336            | 1.3              | 590       | 82819            | 42.8             | 720       | 6565             | 0.0              | 850       | 1636             | 0.0              | 980       | 2109             | 0.0              |
| 465       | 25279            | 1.3              | 595       | 82030            | 38.9             | 725       | 5799             | 0.0              | 855       | 2149             | 0.0              | 985       | 3271             | 0.0              |
| 470       | 20560            | 1.3              | 600       | 81639            | 35.2             | 730       | 5071             | 0.0              | 860       | 2002             | 0.0              | 990       | 1987             | 0.0              |
| 475       | 20192            | 1.6              | 605       | 80430            | 31.1             | 735       | 4394             | 0.0              | 865       | 1653             | 0.0              | 995       | 2115             | 0.0              |
| 480       | 22473            | 2.1              | 610       | 77509            | 26.6             | 740       | 3856             | 0.0              | 870       | 1669             | 0.0              | 1000      | 2424             | 0.0              |
| 485       | 26686            | 3.2              | 615       | 74116            | 22.4             | 745       | 3544             | 0.0              | 875       | 2164             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



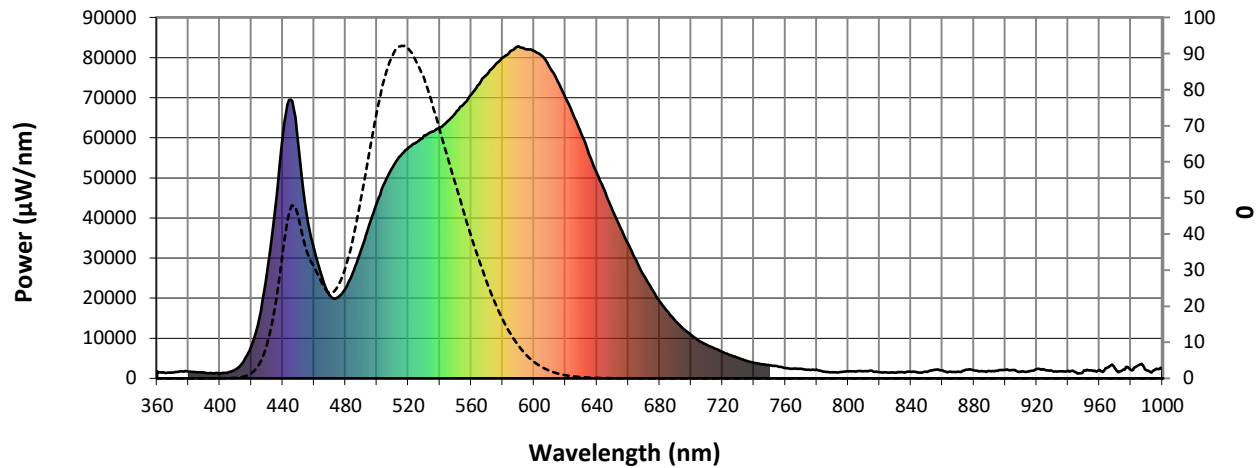
Scotopic Lumens: 7846

S/P: 1.64

| 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       | 1725             | 0.0              | 490       | 32247            | 49.7             | 620       | 69956            | 0.9              | 750       | 3261             | 0.0              | 880       | 1960             | 0.0              |
| 365       | 1400             | 0.0              | 495       | 38143            | 61.7             | 625       | 65781            | 0.6              | 755       | 3018             | 0.0              | 885       | 1828             | 0.0              |
| 370       | 1447             | 0.0              | 500       | 43918            | 73.5             | 630       | 61092            | 0.3              | 760       | 2521             | 0.0              | 890       | 1806             | 0.0              |
| 375       | 1728             | 0.0              | 505       | 48833            | 83.0             | 635       | 55954            | 0.2              | 765       | 2437             | 0.0              | 895       | 1814             | 0.0              |
| 380       | 1669             | 0.0              | 510       | 52659            | 89.3             | 640       | 51151            | 0.1              | 770       | 2407             | 0.0              | 900       | 2078             | 0.0              |
| 385       | 1495             | 0.0              | 515       | 55510            | 92.0             | 645       | 46656            | 0.1              | 775       | 2143             | 0.0              | 905       | 2072             | 0.0              |
| 390       | 1437             | 0.0              | 520       | 57534            | 91.5             | 650       | 41933            | 0.0              | 780       | 2156             | 0.0              | 910       | 1650             | 0.0              |
| 395       | 1307             | 0.0              | 525       | 58806            | 88.0             | 655       | 37478            | 0.0              | 785       | 1708             | 0.0              | 915       | 1725             | 0.0              |
| 400       | 1277             | 0.0              | 530       | 60565            | 83.5             | 660       | 33501            | 0.0              | 790       | 1555             | 0.0              | 920       | 2324             | 0.0              |
| 405       | 1471             | 0.0              | 535       | 61554            | 76.7             | 665       | 29439            | 0.0              | 795       | 1560             | 0.0              | 925       | 2173             | 0.0              |
| 410       | 2252             | 0.1              | 540       | 62542            | 69.1             | 670       | 25594            | 0.0              | 800       | 1752             | 0.0              | 930       | 1833             | 0.0              |
| 415       | 4196             | 0.4              | 545       | 64150            | 61.5             | 675       | 22306            | 0.0              | 805       | 1696             | 0.0              | 935       | 1740             | 0.0              |
| 420       | 7969             | 1.3              | 550       | 66171            | 54.1             | 680       | 19204            | 0.0              | 810       | 1762             | 0.0              | 940       | 1956             | 0.0              |
| 425       | 14965            | 3.7              | 555       | 68352            | 46.7             | 685       | 16645            | 0.0              | 815       | 1884             | 0.0              | 945       | 1549             | 0.0              |
| 430       | 26348            | 9.0              | 560       | 70775            | 39.6             | 690       | 14365            | 0.0              | 820       | 1502             | 0.0              | 950       | 2026             | 0.0              |
| 435       | 41840            | 18.7             | 565       | 73374            | 32.9             | 695       | 12367            | 0.0              | 825       | 1454             | 0.0              | 955       | 1971             | 0.0              |
| 440       | 60229            | 33.7             | 570       | 75776            | 26.7             | 700       | 10847            | 0.0              | 830       | 1466             | 0.0              | 960       | 2048             | 0.0              |
| 445       | 69537            | 46.6             | 575       | 78035            | 21.3             | 705       | 9369             | 0.0              | 835       | 1541             | 0.0              | 965       | 2608             | 0.0              |
| 450       | 58253            | 45.1             | 580       | 79996            | 16.5             | 710       | 8303             | 0.0              | 840       | 1616             | 0.0              | 970       | 2403             | 0.0              |
| 455       | 41363            | 36.1             | 585       | 81672            | 12.5             | 715       | 7458             | 0.0              | 845       | 1445             | 0.0              | 975       | 2154             | 0.0              |
| 460       | 32336            | 31.2             | 590       | 82819            | 9.2              | 720       | 6565             | 0.0              | 850       | 1636             | 0.0              | 980       | 2109             | 0.0              |
| 465       | 25279            | 26.7             | 595       | 82030            | 6.5              | 725       | 5799             | 0.0              | 855       | 2149             | 0.0              | 985       | 3271             | 0.0              |
| 470       | 20560            | 23.7             | 600       | 81639            | 4.6              | 730       | 5071             | 0.0              | 860       | 2002             | 0.0              | 990       | 1987             | 0.0              |
| 475       | 20192            | 25.2             | 605       | 80430            | 3.2              | 735       | 4394             | 0.0              | 865       | 1653             | 0.0              | 995       | 2115             | 0.0              |
| 480       | 22473            | 30.4             | 610       | 77509            | 2.1              | 740       | 3856             | 0.0              | 870       | 1669             | 0.0              | 1000      | 2424             | 0.0              |
| 485       | 26686            | 38.7             | 615       | 74116            | 1.4              | 745       | 3544             | 0.0              | 875       | 2164             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 3084.4**

**M/P: 0.64**

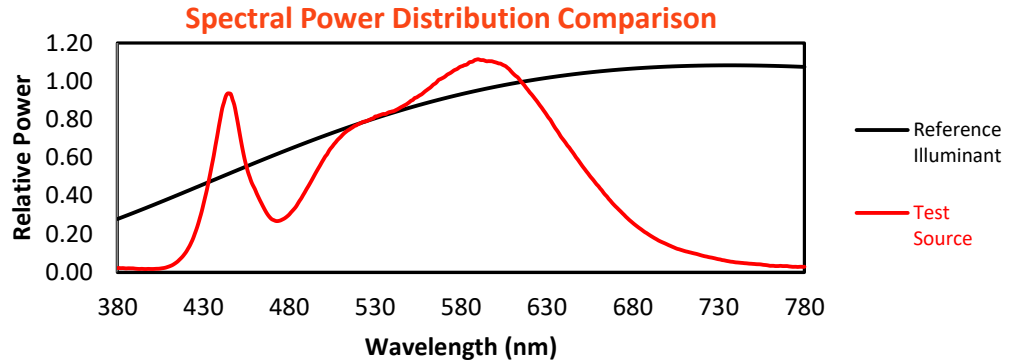
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1725             | 0.0              | 490       | 32247            | 26.8             | 620       | 69956            | 0.1              | 750       | 3261             | 0.0              | 880       | 1960             | 0.0              |
| 365       | 1400             | 0.0              | 495       | 38143            | 31.5             | 625       | 65781            | 0.0              | 755       | 3018             | 0.0              | 885       | 1828             | 0.0              |
| 370       | 1447             | 0.0              | 500       | 43918            | 35.3             | 630       | 61092            | 0.0              | 760       | 2521             | 0.0              | 890       | 1806             | 0.0              |
| 375       | 1728             | 0.0              | 505       | 48833            | 37.5             | 635       | 55954            | 0.0              | 765       | 2437             | 0.0              | 895       | 1814             | 0.0              |
| 380       | 1669             | 0.0              | 510       | 52659            | 37.8             | 640       | 51151            | 0.0              | 770       | 2407             | 0.0              | 900       | 2078             | 0.0              |
| 385       | 1495             | 0.0              | 515       | 55510            | 36.3             | 645       | 46656            | 0.0              | 775       | 2143             | 0.0              | 905       | 2072             | 0.0              |
| 390       | 1437             | 0.0              | 520       | 57534            | 33.5             | 650       | 41933            | 0.0              | 780       | 2156             | 0.0              | 910       | 1650             | 0.0              |
| 395       | 1307             | 0.0              | 525       | 58806            | 29.8             | 655       | 37478            | 0.0              | 785       | 1708             | 0.0              | 915       | 1725             | 0.0              |
| 400       | 1277             | 0.0              | 530       | 60565            | 26.2             | 660       | 33501            | 0.0              | 790       | 1555             | 0.0              | 920       | 2324             | 0.0              |
| 405       | 1471             | 0.0              | 535       | 61554            | 22.2             | 665       | 29439            | 0.0              | 795       | 1560             | 0.0              | 925       | 2173             | 0.0              |
| 410       | 2252             | 0.1              | 540       | 62542            | 18.3             | 670       | 25594            | 0.0              | 800       | 1752             | 0.0              | 930       | 1833             | 0.0              |
| 415       | 4196             | 0.3              | 545       | 64150            | 14.9             | 675       | 22306            | 0.0              | 805       | 1696             | 0.0              | 935       | 1740             | 0.0              |
| 420       | 7969             | 0.9              | 550       | 66171            | 11.9             | 680       | 19204            | 0.0              | 810       | 1762             | 0.0              | 940       | 1956             | 0.0              |
| 425       | 14965            | 2.3              | 555       | 68352            | 9.2              | 685       | 16645            | 0.0              | 815       | 1884             | 0.0              | 945       | 1549             | 0.0              |
| 430       | 26348            | 5.6              | 560       | 70775            | 7.0              | 690       | 14365            | 0.0              | 820       | 1502             | 0.0              | 950       | 2026             | 0.0              |
| 435       | 41840            | 11.2             | 565       | 73374            | 5.1              | 695       | 12367            | 0.0              | 825       | 1454             | 0.0              | 955       | 1971             | 0.0              |
| 440       | 60229            | 20.1             | 570       | 75776            | 3.7              | 700       | 10847            | 0.0              | 830       | 1466             | 0.0              | 960       | 2048             | 0.0              |
| 445       | 69537            | 27.4             | 575       | 78035            | 2.6              | 705       | 9369             | 0.0              | 835       | 1541             | 0.0              | 965       | 2608             | 0.0              |
| 450       | 58253            | 26.8             | 580       | 79996            | 1.8              | 710       | 8303             | 0.0              | 840       | 1616             | 0.0              | 970       | 2403             | 0.0              |
| 455       | 41363            | 21.7             | 585       | 81672            | 1.2              | 715       | 7458             | 0.0              | 845       | 1445             | 0.0              | 975       | 2154             | 0.0              |
| 460       | 32336            | 19.1             | 590       | 82819            | 0.8              | 720       | 6565             | 0.0              | 850       | 1636             | 0.0              | 980       | 2109             | 0.0              |
| 465       | 25279            | 16.5             | 595       | 82030            | 0.5              | 725       | 5799             | 0.0              | 855       | 2149             | 0.0              | 985       | 3271             | 0.0              |
| 470       | 20560            | 14.7             | 600       | 81639            | 0.3              | 730       | 5071             | 0.0              | 860       | 2002             | 0.0              | 990       | 1987             | 0.0              |
| 475       | 20192            | 15.4             | 605       | 80430            | 0.2              | 735       | 4394             | 0.0              | 865       | 1653             | 0.0              | 995       | 2115             | 0.0              |
| 480       | 22473            | 18.1             | 610       | 77509            | 0.1              | 740       | 3856             | 0.0              | 870       | 1669             | 0.0              | 1000      | 2424             | 0.0              |
| 485       | 26686            | 22.0             | 615       | 74116            | 0.1              | 745       | 3544             | 0.0              | 875       | 2164             | 0.0              |           |                  |                  |

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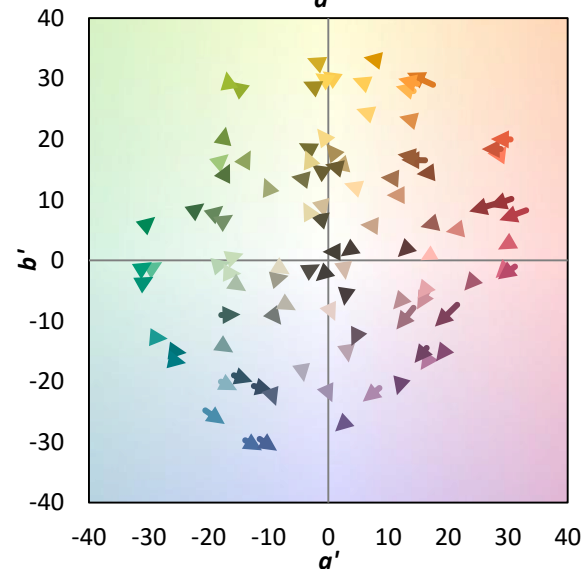
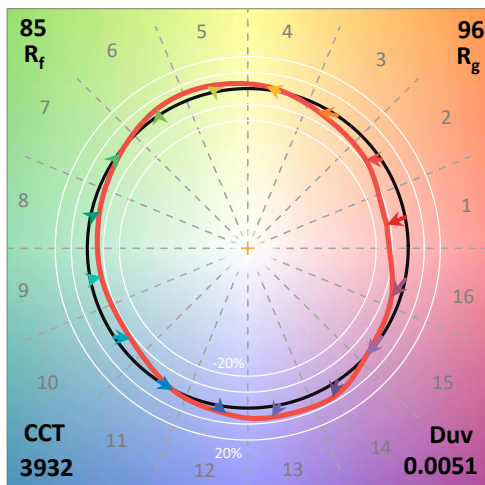
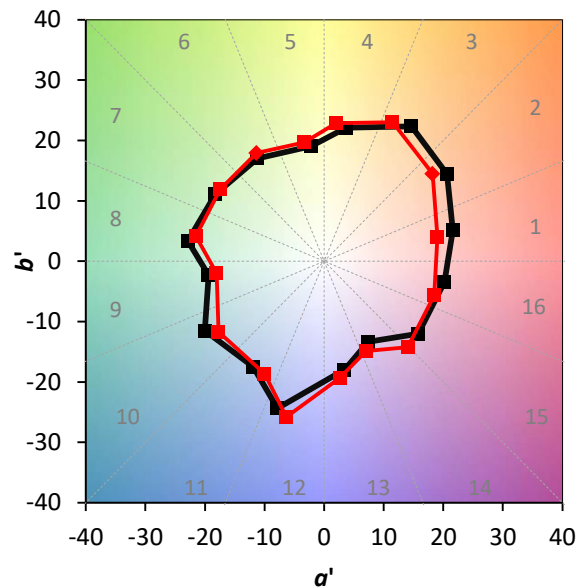
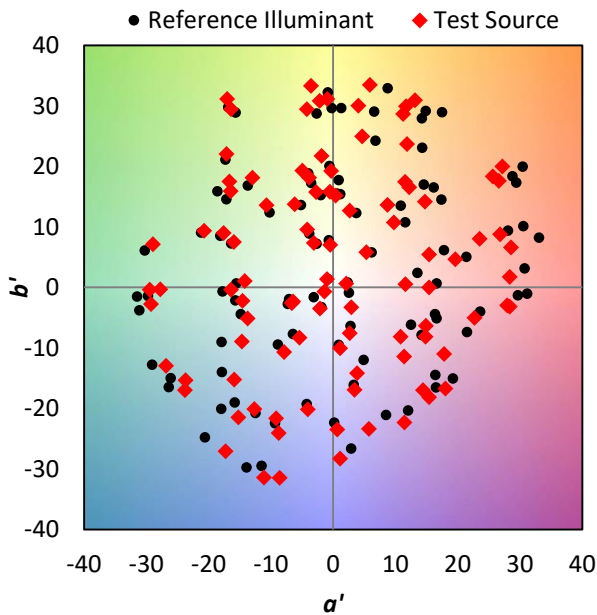
TM-30-18

### Summary

$R_f = 85.2$   
 $R_g = 96.1$   
 $CIE R_a = 81.8$   
 $R_g = 0.1$

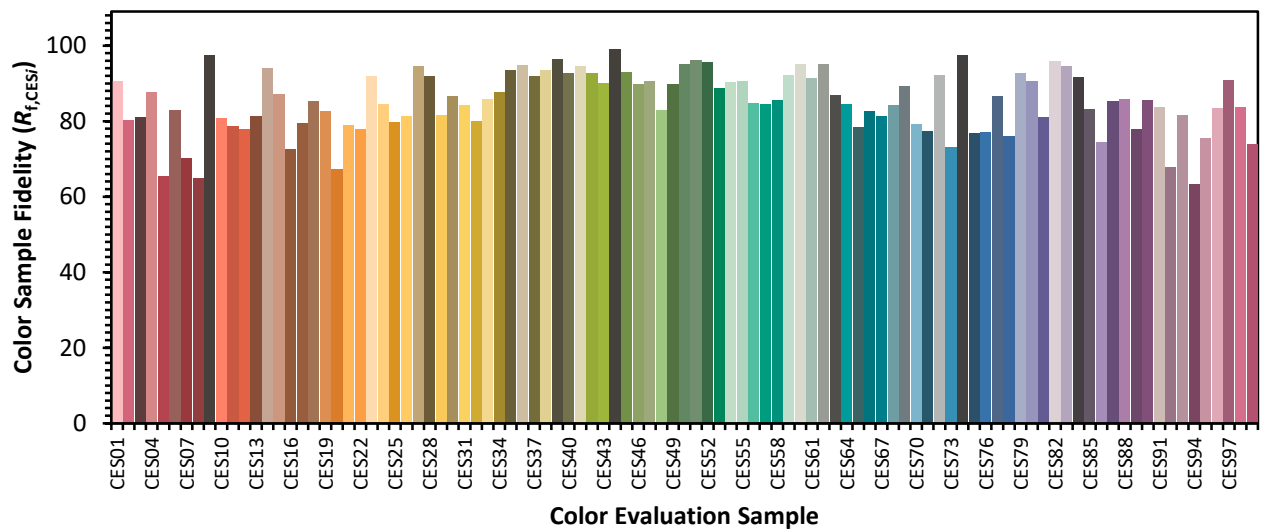


### Color Vector Graphics

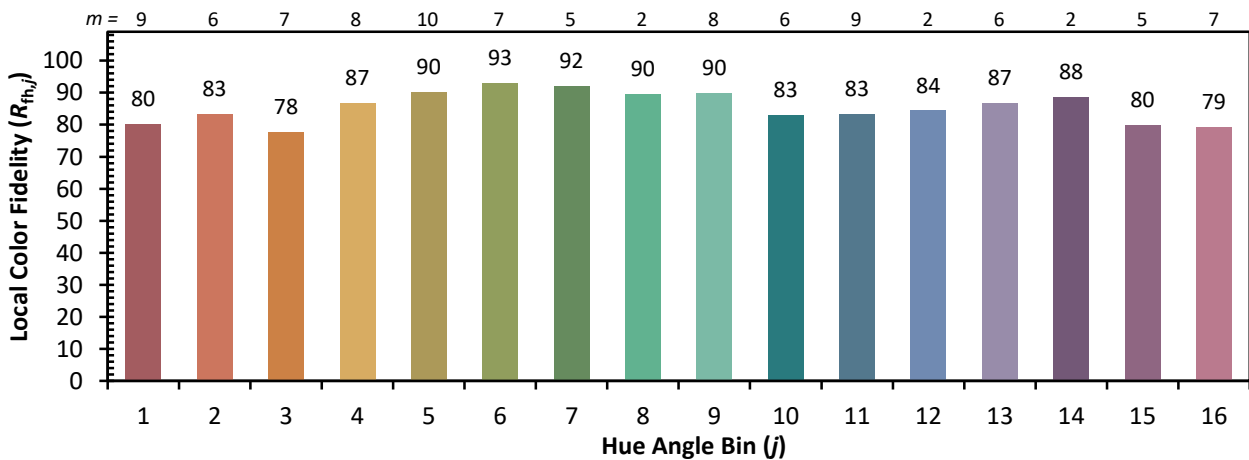
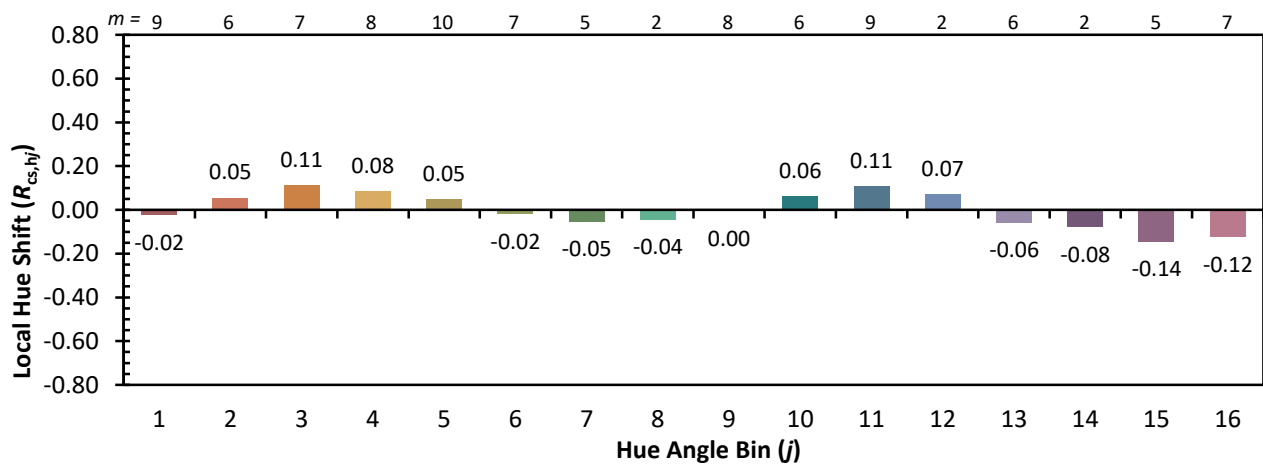
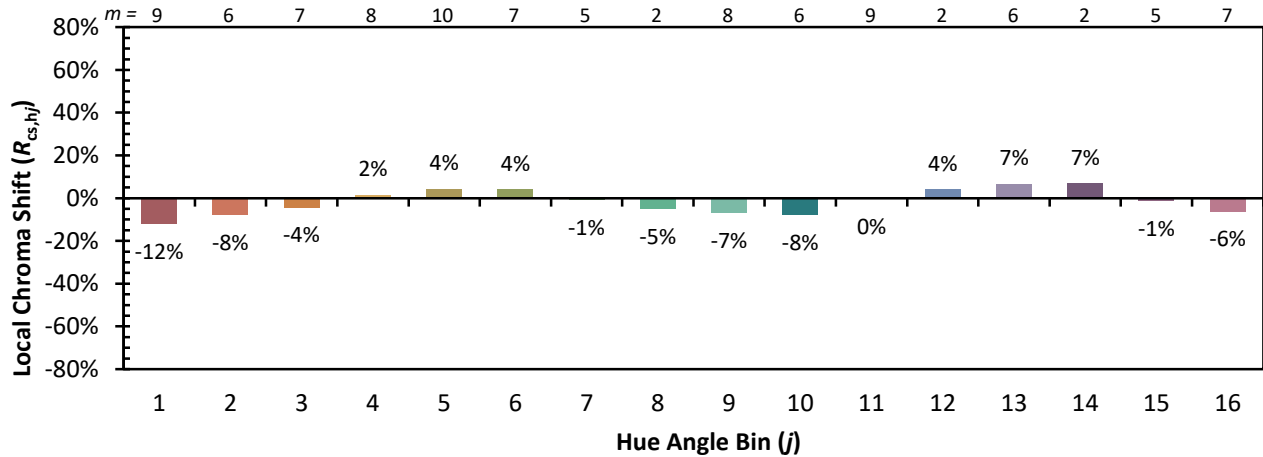


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

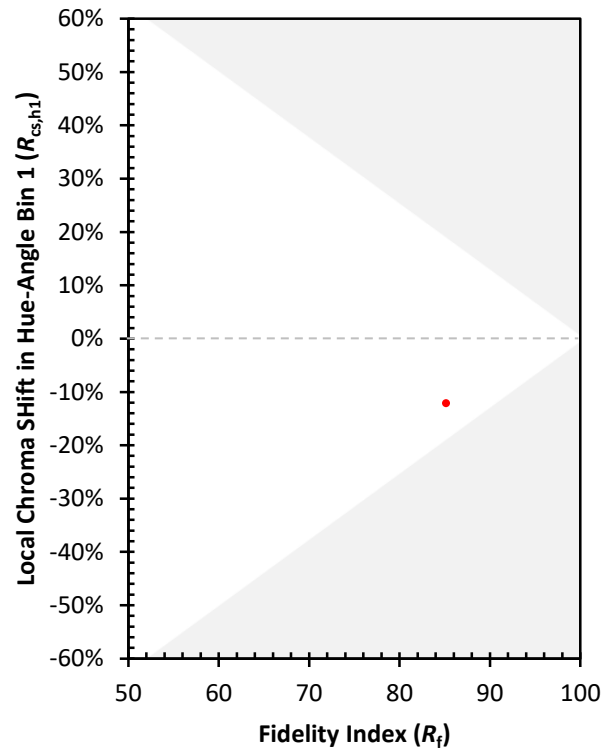
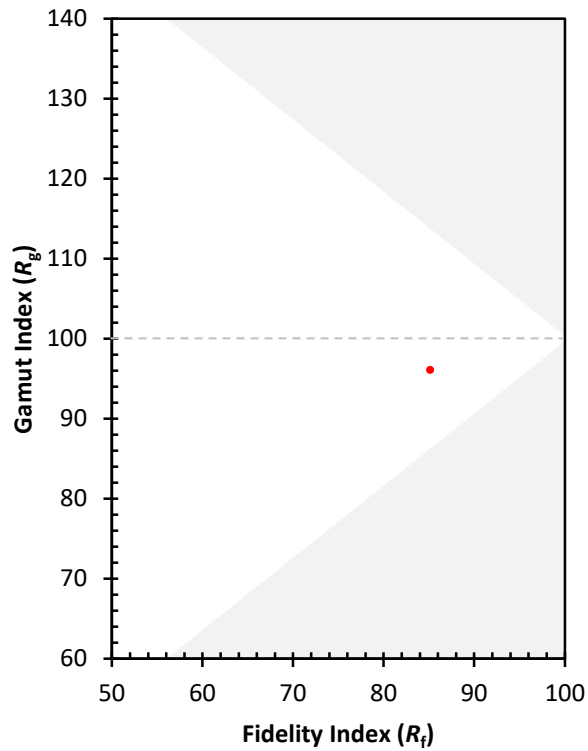
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 81 | CES51 = 96 | CES76 = 77 |
| CES02 = 61 | CES27 = 95 | CES52 = 96 | CES77 = 87 |
| CES03 = 31 | CES28 = 92 | CES53 = 89 | CES78 = 76 |
| CES04 = 69 | CES29 = 82 | CES54 = 90 | CES79 = 93 |
| CES05 = 48 | CES30 = 87 | CES55 = 91 | CES80 = 91 |
| CES06 = 50 | CES31 = 84 | CES56 = 85 | CES81 = 81 |
| CES07 = 40 | CES32 = 80 | CES57 = 84 | CES82 = 96 |
| CES08 = 39 | CES33 = 86 | CES58 = 85 | CES83 = 95 |
| CES09 = 29 | CES34 = 88 | CES59 = 92 | CES84 = 92 |
| CES10 = 74 | CES35 = 93 | CES60 = 95 | CES85 = 83 |
| CES11 = 57 | CES36 = 95 | CES61 = 91 | CES86 = 74 |
| CES12 = 63 | CES37 = 92 | CES62 = 95 | CES87 = 85 |
| CES13 = 42 | CES38 = 93 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 96 | CES64 = 84 | CES89 = 78 |
| CES15 = 71 | CES40 = 93 | CES65 = 78 | CES90 = 85 |
| CES16 = 47 | CES41 = 95 | CES66 = 83 | CES91 = 84 |
| CES17 = 49 | CES42 = 93 | CES67 = 81 | CES92 = 68 |
| CES18 = 56 | CES43 = 90 | CES68 = 84 | CES93 = 82 |
| CES19 = 71 | CES44 = 99 | CES69 = 89 | CES94 = 63 |
| CES20 = 65 | CES45 = 93 | CES70 = 79 | CES95 = 75 |
| CES21 = 86 | CES46 = 90 | CES71 = 77 | CES96 = 83 |
| CES22 = 78 | CES47 = 91 | CES72 = 92 | CES97 = 91 |
| CES23 = 91 | CES48 = 83 | CES73 = 73 | CES98 = 84 |
| CES24 = 90 | CES49 = 90 | CES74 = 98 | CES99 = 74 |
| CES25 = 71 | CES50 = 95 | CES75 = 77 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)