

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: P674789

Luminaire Tested: **CCP-SA2E-850-U-T3R-HSS**

Issue Date: 04/16/2023



**Test Information**

Test Method: LM-79-08  
Report Number: P674789  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA2E-850-U-T3R-HSS  
Description: INVUE CLEAR CURVE POLE MOUNT Light Square Luminaire @1050mA w/ T3R  
distribution lens and House Side Shield  
Light Source: (32) 5000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 9462.5 lumens  
Efficiency: N/A  
Efficacy: 88.8 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B1 - U0 - G2

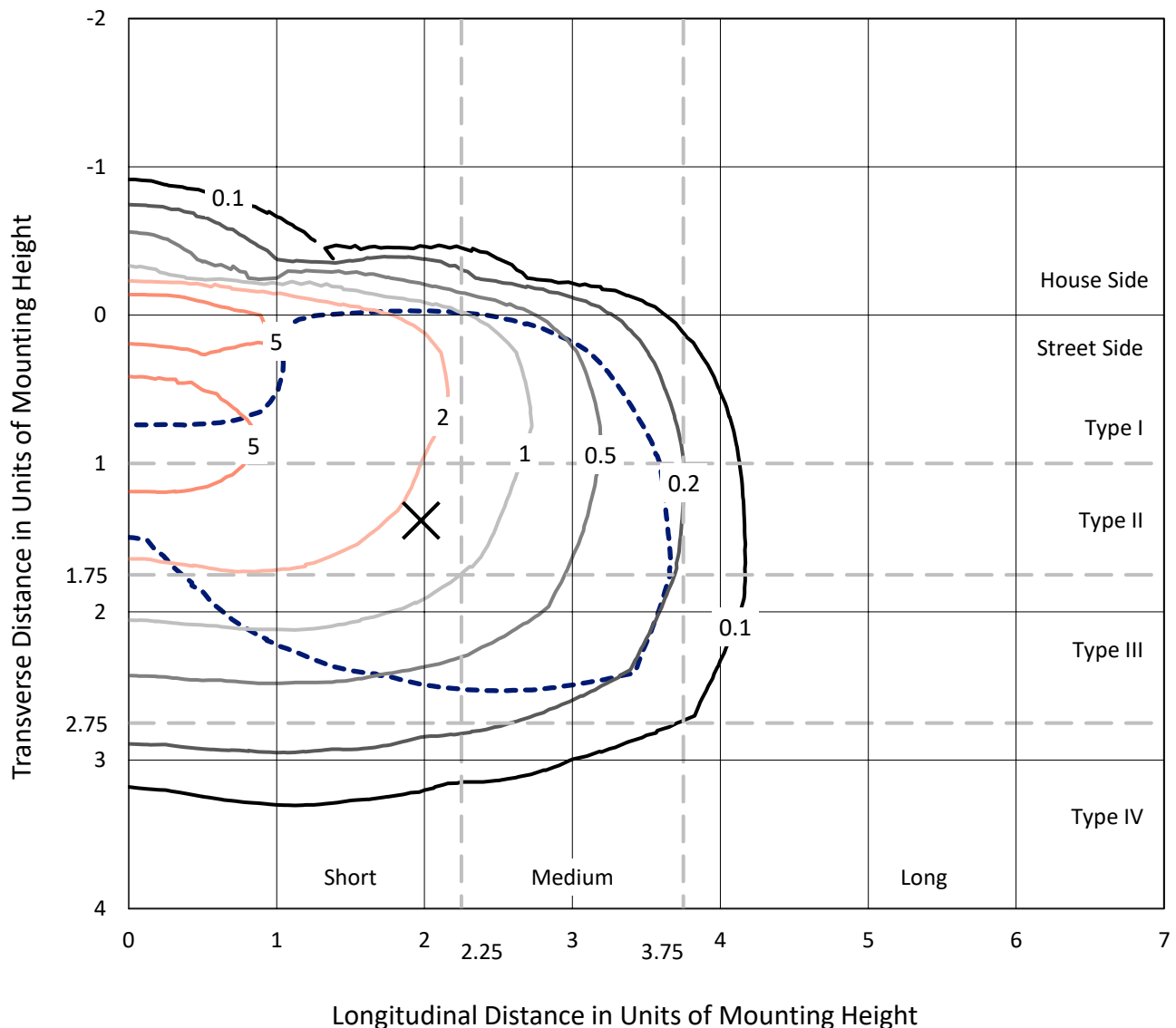
Input Watts (W): 106.6  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

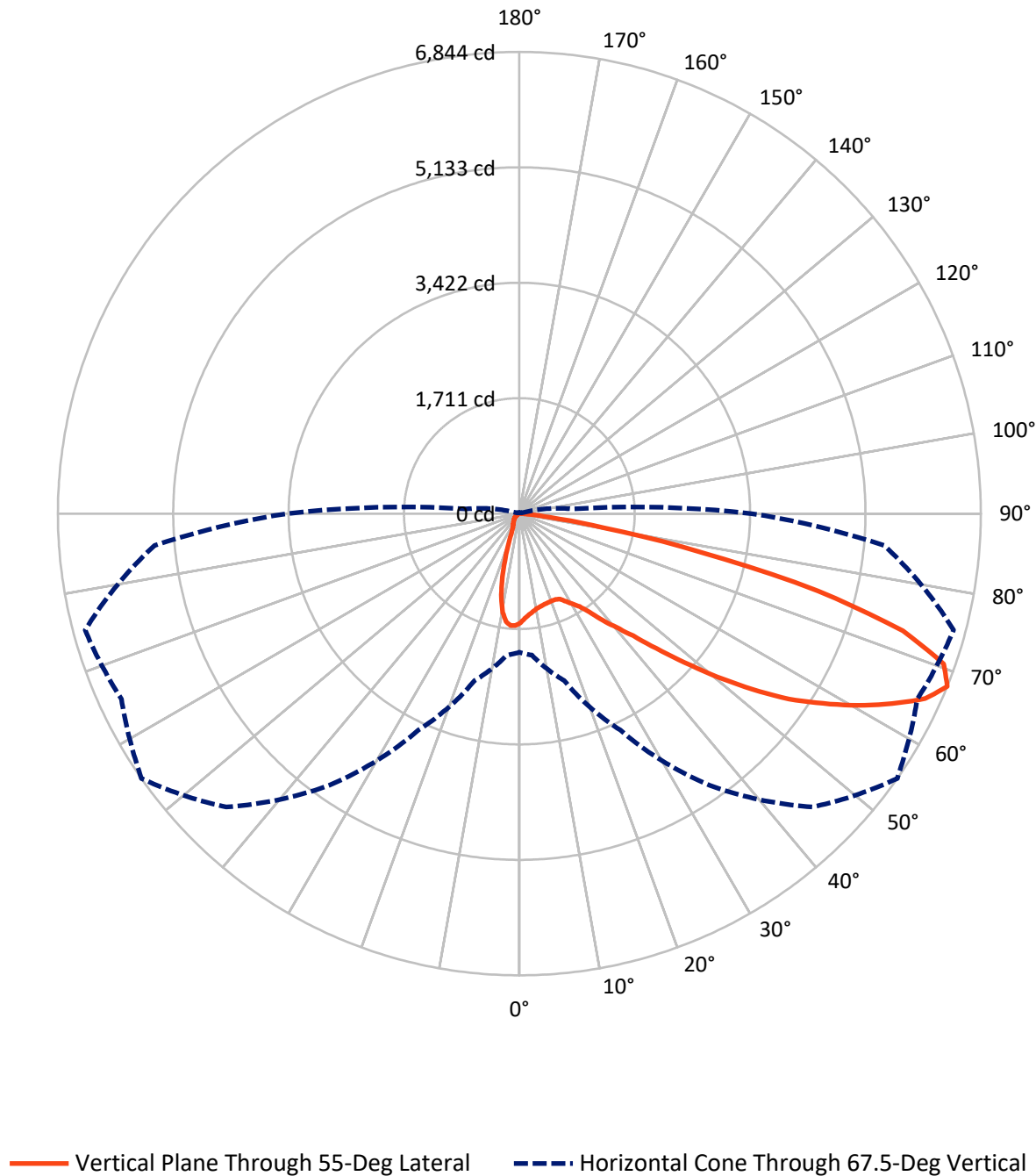
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 7.9 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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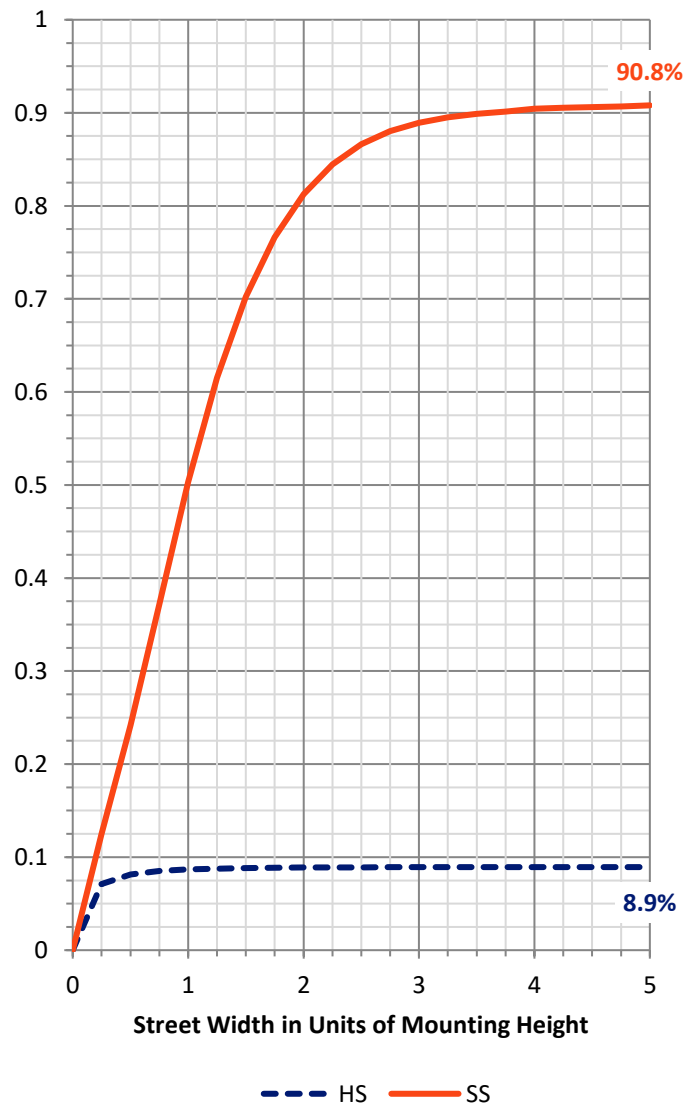
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 850.1    | 0.0    | 850.1  |
|                    | % Fixture | 9.0      | 0.0    | 9.0    |
| <b>Street Side</b> | Lumens    | 8612.4   | 0.0    | 8612.4 |
|                    | % Fixture | 91.0     | 0.0    | 91.0   |
| <b>Total</b>       | Lumens    | 9462.5   | 0.0    | 9462.5 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 142.3  | 1.5       |
| 10°-20°   | 324.0  | 3.4       |
| 20°-30°   | 519.9  | 5.5       |
| 30°-40°   | 901.7  | 9.5       |
| 40°-50°   | 1503.5 | 15.9      |
| 50°-60°   | 2198.5 | 23.2      |
| 60°-70°   | 2563.5 | 27.1      |
| 70°-80°   | 1244.1 | 13.1      |
| 80°-90°   | 65.0   | 0.7       |
| 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°    | 9462.5 | 100.0     |
| 0°-180°   | 9462.5 | 100.0     |

**Coefficient of Utilization**



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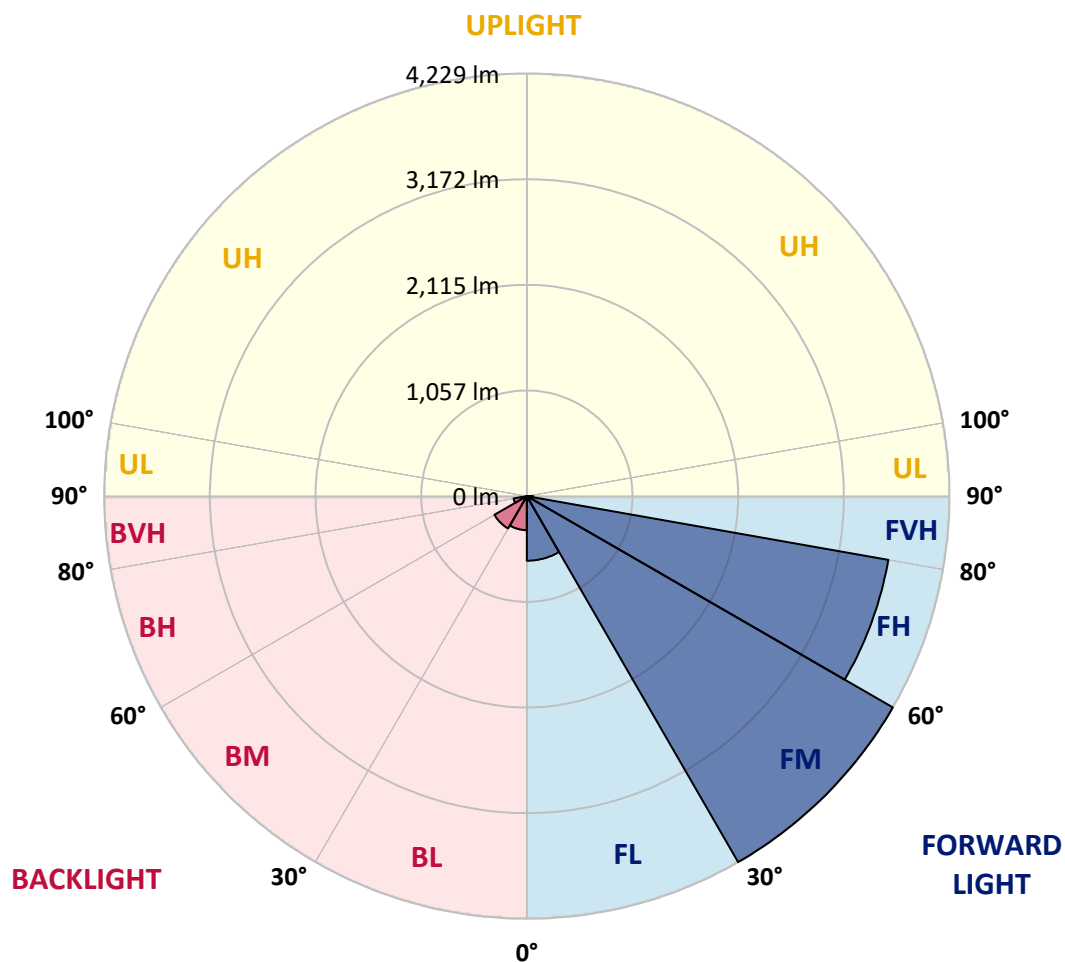
CATALOG NUMBER: CCP-SA2E-850-U-T3R-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 646.4  | 6.8       |                         |      |         |
| FM   | (30°-60°)   | 4229.4 | 44.7      |                         |      |         |
| FH   | (60°-80°)   | 3673.5 | 38.8      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 63.1   | 0.7       |                         |      | G1/100  |
| BL   | (0°-30°)    | 339.8  | 3.6       | B1/500                  |      |         |
| BM   | (30°-60°)   | 374.3  | 4.0       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 134.1  | 1.4       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 1.9    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

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

Type III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 56°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 |
| 2.5°  | 1496.9 | 1506.5 | 1518.7 | 1523.1 | 1537.9 | 1558.8 | 1552.7 | 1548.4 | 1571.9 | 1604.2 | 1614.6 |
| 5°    | 1403.6 | 1404.5 | 1423.7 | 1437.6 | 1462.9 | 1483.0 | 1504.8 | 1503.0 | 1545.7 | 1600.7 | 1635.5 |
| 7.5°  | 1312.1 | 1313.8 | 1333.9 | 1355.7 | 1392.3 | 1431.5 | 1464.7 | 1462.9 | 1531.8 | 1605.0 | 1671.3 |
| 10°   | 1191.8 | 1200.5 | 1224.9 | 1263.3 | 1320.8 | 1382.7 | 1428.9 | 1433.3 | 1516.1 | 1621.6 | 1720.1 |
| 12.5° | 1095.0 | 1099.4 | 1126.4 | 1176.1 | 1244.1 | 1325.2 | 1411.5 | 1408.9 | 1519.6 | 1652.1 | 1783.8 |
| 15°   | 1054.0 | 1051.4 | 1068.0 | 1104.6 | 1182.2 | 1284.2 | 1394.0 | 1400.2 | 1531.8 | 1687.0 | 1850.0 |
| 17.5° | 1063.6 | 1061.0 | 1069.7 | 1082.8 | 1137.7 | 1250.2 | 1384.5 | 1394.9 | 1551.0 | 1723.6 | 1911.9 |
| 20°   | 1170.0 | 1151.7 | 1136.0 | 1122.0 | 1129.9 | 1222.3 | 1378.4 | 1389.7 | 1562.3 | 1751.5 | 1977.3 |
| 22.5° | 1374.9 | 1352.2 | 1310.4 | 1232.8 | 1181.3 | 1224.0 | 1380.1 | 1394.9 | 1587.6 | 1796.8 | 2056.6 |
| 25°   | 1708.8 | 1687.0 | 1597.2 | 1438.5 | 1302.5 | 1286.8 | 1403.6 | 1419.3 | 1646.0 | 1865.7 | 2141.2 |
| 27.5° | 2150.8 | 2102.0 | 1993.0 | 1765.4 | 1503.0 | 1387.1 | 1474.3 | 1491.7 | 1728.8 | 1918.9 | 2198.7 |
| 30°   | 2517.8 | 2506.5 | 2401.9 | 2122.9 | 1779.4 | 1534.4 | 1553.6 | 1563.2 | 1766.3 | 1951.1 | 2256.3 |
| 32.5° | 2898.8 | 2875.3 | 2779.4 | 2508.2 | 2100.2 | 1744.5 | 1642.5 | 1646.9 | 1815.1 | 1999.1 | 2340.0 |
| 35°   | 3230.1 | 3208.3 | 3128.1 | 2864.8 | 2475.1 | 2027.0 | 1789.9 | 1780.3 | 1916.3 | 2104.6 | 2453.3 |
| 37.5° | 3537.0 | 3534.4 | 3463.8 | 3195.2 | 2811.6 | 2319.9 | 2006.9 | 1999.1 | 2074.1 | 2220.5 | 2606.8 |
| 40°   | 3836.9 | 3829.9 | 3769.8 | 3524.8 | 3142.9 | 2612.0 | 2213.6 | 2193.5 | 2208.3 | 2382.7 | 2809.0 |
| 42.5° | 4020.9 | 4035.7 | 4056.6 | 3901.4 | 3536.1 | 2954.6 | 2475.1 | 2462.9 | 2460.3 | 2636.4 | 3074.9 |
| 45°   | 4120.2 | 4146.4 | 4269.3 | 4255.4 | 3952.9 | 3380.9 | 2847.4 | 2816.0 | 2805.5 | 2985.1 | 3379.2 |
| 47.5° | 4217.0 | 4228.4 | 4429.7 | 4514.3 | 4352.2 | 3825.6 | 3297.2 | 3253.7 | 3210.9 | 3410.6 | 3742.7 |
| 50°   | 4223.1 | 4241.4 | 4490.8 | 4696.5 | 4686.9 | 4263.2 | 3802.0 | 3763.7 | 3714.8 | 3928.4 | 4097.6 |
| 52.5° | 4137.7 | 4174.3 | 4482.9 | 4811.6 | 4894.4 | 4649.4 | 4326.0 | 4294.6 | 4254.5 | 4414.1 | 4396.6 |
| 55°   | 3547.5 | 3609.4 | 4329.5 | 4822.1 | 5040.0 | 4980.7 | 4852.6 | 4809.0 | 4769.8 | 4883.1 | 4689.6 |
| 57.5° | 3266.7 | 3301.6 | 3863.9 | 4814.2 | 5225.7 | 5287.6 | 5309.4 | 5289.4 | 5234.4 | 5375.7 | 4995.6 |
| 60°   | 3098.5 | 3149.0 | 3641.6 | 4727.0 | 5426.2 | 5634.6 | 5771.5 | 5731.4 | 5664.3 | 5858.7 | 5323.4 |
| 62.5° | 2897.1 | 2933.7 | 3420.2 | 4476.0 | 5545.7 | 5987.7 | 6204.8 | 6168.2 | 6029.5 | 6304.2 | 5588.4 |
| 65°   | 2525.7 | 2580.6 | 3068.0 | 4081.0 | 5385.3 | 6246.6 | 6612.8 | 6600.6 | 6360.0 | 6640.7 | 5660.8 |
| 67.5° | 2055.8 | 2105.5 | 2559.7 | 3539.6 | 4916.2 | 6149.9 | 6843.8 | 6805.5 | 6509.9 | 6666.0 | 5431.5 |
| 70°   | 1543.1 | 1570.2 | 1912.8 | 2704.4 | 4027.8 | 5632.9 | 6676.4 | 6668.6 | 6282.4 | 6291.1 | 4727.9 |
| 72.5° | 828.2  | 903.2  | 1272.0 | 1809.9 | 2832.6 | 4562.3 | 5950.2 | 5918.8 | 5605.0 | 5152.5 | 3400.1 |
| 75°   | 289.4  | 311.2  | 677.4  | 1016.5 | 1538.8 | 3039.2 | 4575.3 | 4502.1 | 4191.7 | 3351.3 | 1852.6 |
| 77.5° | 177.9  | 195.3  | 300.8  | 519.6  | 598.9  | 1319.1 | 2748.9 | 2653.8 | 2453.3 | 1449.0 | 632.9  |
| 80°   | 122.9  | 138.6  | 201.4  | 272.0  | 204.0  | 427.2  | 1265.0 | 1229.3 | 945.9  | 345.2  | 145.6  |
| 82.5° | 68.9   | 82.8   | 152.6  | 133.4  | 82.0   | 110.7  | 438.5  | 406.3  | 252.0  | 93.3   | 48.8   |
| 85°   | 40.1   | 48.0   | 107.2  | 94.2   | 41.8   | 39.2   | 114.2  | 102.0  | 65.4   | 34.9   | 23.5   |
| 87.5° | 20.9   | 27.0   | 78.5   | 62.8   | 25.3   | 13.9   | 26.2   | 25.3   | 16.6   | 12.2   | 15.7   |
| 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-SA2E-850-U-T3R-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 | 1621.6 |
| 2.5°  | 1633.8 | 1629.4 | 1652.1 | 1660.0 | 1658.2 | 1654.7 | 1663.4 | 1652.1 | 1651.2 | 1648.6 | 1646.0 |
| 5°    | 1663.4 | 1670.4 | 1688.7 | 1688.7 | 1664.3 | 1624.2 | 1599.8 | 1566.7 | 1538.8 | 1522.2 | 1519.6 |
| 7.5°  | 1707.9 | 1721.9 | 1734.1 | 1696.6 | 1612.9 | 1513.5 | 1408.0 | 1325.2 | 1252.8 | 1215.3 | 1211.8 |
| 10°   | 1770.7 | 1783.8 | 1774.2 | 1666.9 | 1487.3 | 1281.6 | 1109.8 | 937.2  | 850.9  | 803.8  | 803.8  |
| 12.5° | 1845.7 | 1856.1 | 1797.7 | 1592.8 | 1280.7 | 982.5  | 753.3  | 571.9  | 485.6  | 429.8  | 426.3  |
| 15°   | 1926.7 | 1929.4 | 1794.2 | 1463.8 | 1025.3 | 660.0  | 432.4  | 317.3  | 280.7  | 272.9  | 271.1  |
| 17.5° | 1997.4 | 1986.9 | 1757.6 | 1272.9 | 738.4  | 393.2  | 274.6  | 248.5  | 241.5  | 241.5  | 241.5  |
| 20°   | 2063.6 | 2028.7 | 1684.4 | 1050.5 | 473.4  | 267.7  | 236.3  | 229.3  | 229.3  | 230.2  | 230.2  |
| 22.5° | 2136.8 | 2068.0 | 1579.7 | 803.8  | 304.3  | 229.3  | 221.4  | 218.0  | 217.1  | 219.7  | 218.8  |
| 25°   | 2223.2 | 2106.3 | 1429.8 | 555.4  | 235.4  | 213.6  | 210.1  | 206.6  | 206.6  | 206.6  | 206.6  |
| 27.5° | 2271.1 | 2101.1 | 1258.9 | 350.5  | 205.8  | 197.9  | 194.4  | 190.9  | 188.3  | 187.4  | 188.3  |
| 30°   | 2313.0 | 2070.6 | 1035.7 | 245.0  | 185.7  | 177.0  | 174.4  | 170.0  | 164.8  | 163.0  | 163.0  |
| 32.5° | 2367.9 | 2045.3 | 802.1  | 197.0  | 168.3  | 158.7  | 150.8  | 143.9  | 135.1  | 131.6  | 130.8  |
| 35°   | 2428.9 | 1999.1 | 587.6  | 173.5  | 152.6  | 140.4  | 128.2  | 116.8  | 105.5  | 102.0  | 101.1  |
| 37.5° | 2504.8 | 1957.2 | 398.4  | 160.4  | 139.5  | 124.7  | 108.1  | 92.4   | 82.0   | 80.2   | 80.2   |
| 40°   | 2607.6 | 1922.4 | 275.5  | 149.1  | 127.3  | 109.9  | 89.8   | 73.2   | 66.3   | 64.5   | 64.5   |
| 42.5° | 2748.0 | 1893.6 | 208.4  | 139.5  | 116.8  | 95.0   | 72.4   | 60.2   | 54.9   | 53.2   | 53.2   |
| 45°   | 2913.6 | 1849.1 | 176.1  | 130.8  | 106.4  | 80.2   | 60.2   | 50.6   | 48.0   | 48.0   | 48.0   |
| 47.5° | 3103.7 | 1793.3 | 160.4  | 122.1  | 95.0   | 65.4   | 50.6   | 46.2   | 45.3   | 45.3   | 46.2   |
| 50°   | 3295.5 | 1727.1 | 149.1  | 111.6  | 82.0   | 55.8   | 46.2   | 43.6   | 43.6   | 44.5   | 44.5   |
| 52.5° | 3425.4 | 1623.3 | 137.7  | 100.3  | 68.9   | 48.8   | 43.6   | 42.7   | 41.8   | 41.8   | 41.8   |
| 55°   | 3551.8 | 1532.7 | 122.1  | 88.1   | 57.5   | 45.3   | 41.8   | 41.0   | 41.0   | 40.1   | 40.1   |
| 57.5° | 3683.5 | 1461.2 | 102.0  | 73.2   | 48.8   | 42.7   | 40.1   | 40.1   | 38.4   | 37.5   | 37.5   |
| 60°   | 3836.0 | 1398.4 | 78.5   | 57.5   | 42.7   | 40.1   | 37.5   | 36.6   | 34.9   | 33.1   | 33.1   |
| 62.5° | 3880.5 | 1265.9 | 59.3   | 46.2   | 36.6   | 34.9   | 34.0   | 32.3   | 27.9   | 24.4   | 25.3   |
| 65°   | 3764.5 | 1057.5 | 47.1   | 36.6   | 29.6   | 29.6   | 27.0   | 22.7   | 18.3   | 15.7   | 15.7   |
| 67.5° | 3444.6 | 789.9  | 38.4   | 28.8   | 23.5   | 22.7   | 19.2   | 16.6   | 11.3   | 9.6    | 9.6    |
| 70°   | 2838.7 | 522.2  | 31.4   | 22.7   | 19.2   | 15.7   | 13.1   | 12.2   | 8.7    | 7.0    | 7.0    |
| 72.5° | 1989.5 | 283.3  | 26.2   | 18.3   | 13.9   | 10.5   | 8.7    | 7.8    | 6.1    | 5.2    | 4.4    |
| 75°   | 1050.5 | 109.0  | 20.9   | 13.9   | 8.7    | 7.0    | 5.2    | 5.2    | 4.4    | 3.5    | 3.5    |
| 77.5° | 360.1  | 46.2   | 14.8   | 7.8    | 6.1    | 4.4    | 3.5    | 2.6    | 3.5    | 2.6    | 2.6    |
| 80°   | 85.4   | 27.0   | 9.6    | 5.2    | 3.5    | 2.6    | 2.6    | 1.7    | 1.7    | 1.7    | 1.7    |
| 82.5° | 37.5   | 15.7   | 6.1    | 3.5    | 3.5    | 2.6    | 1.7    | 0.9    | 0.9    | 0.9    | 0.9    |
| 85°   | 25.3   | 9.6    | 4.4    | 3.5    | 2.6    | 1.7    | 0.9    | 0.9    | 0.0    | 0.0    | 0.0    |
| 87.5° | 20.1   | 6.1    | 3.5    | 3.5    | 2.6    | 1.7    | 0.9    | 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    |



Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2104-224-9

Luminaire Tested: CCW-SA2A-850-U-SL4

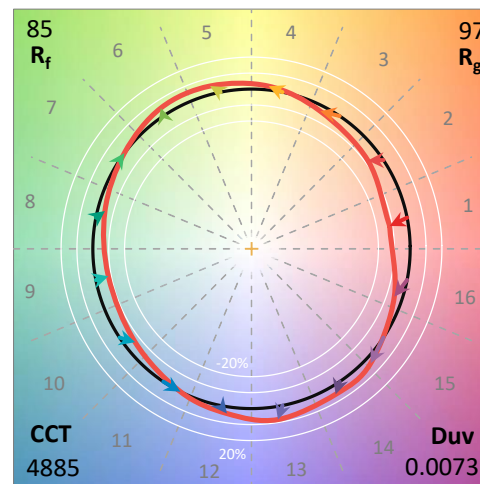
Test Date: 04/27/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-224-9  
 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-850-U-SL4**  
 Description: INVUE WALL PACK ClearCurve Light Square

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 4885   | CRI (Ra): | 82.2 |      |      |
| CIE u':                   | 0.2076 | R1:       | 79.1 | R9:  | 4.0  |
| CIE v':                   | 0.4943 | R2:       | 85.5 | R10: | 67.5 |
| Duv:                      | 0.0073 | R3:       | 92.5 | R11: | 82.5 |
| CIE x:                    | 0.3501 | R4:       | 82.9 | R12: | 63.4 |
| CIE y:                    | 0.3704 | R5:       | 80.2 | R13: | 80.2 |
| CIE z:                    | 0.2795 | R6:       | 81.6 | R14: | 96.0 |
| Peak Wavelength (nm):     | 446    | R7:       | 88.2 |      |      |
| Dominant Wavelength (nm): | 569    | R8:       | 67.2 |      |      |
| Purity:                   | 16.4   |           |      |      |      |
| Rf:                       | 84.6   |           |      |      |      |
| Rg:                       | 96.9   |           |      |      |      |



### Test Conditions

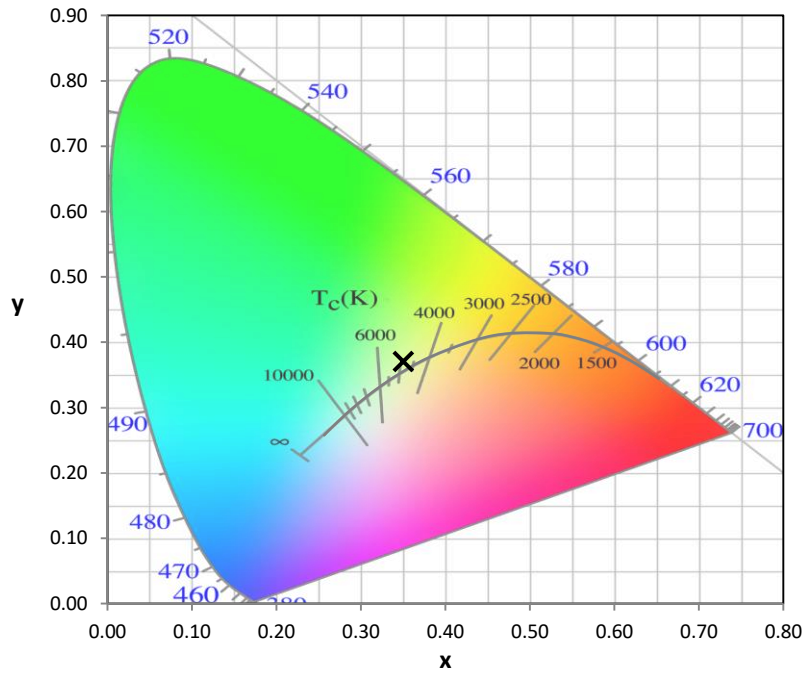
Stabilization Time: 76M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.9/41%  
 Sphere Temperature (°C): 24.2

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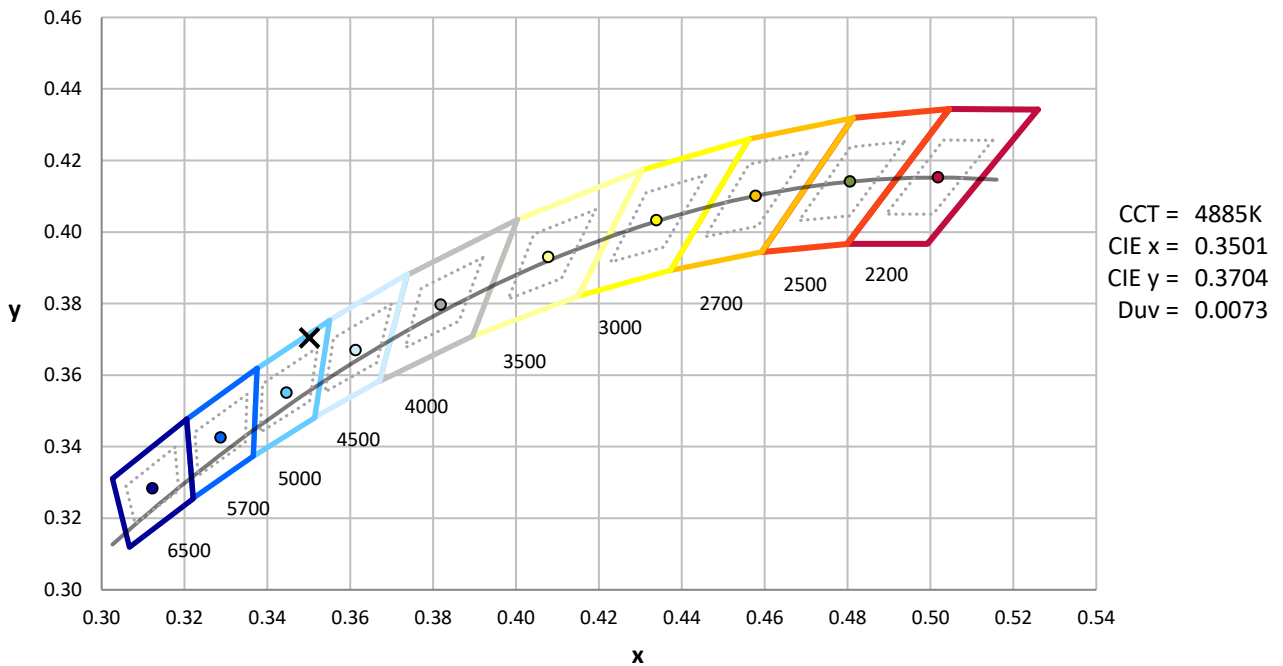
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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: SP1-2104-224-9

**CIE 1931 Chromaticity Diagram**



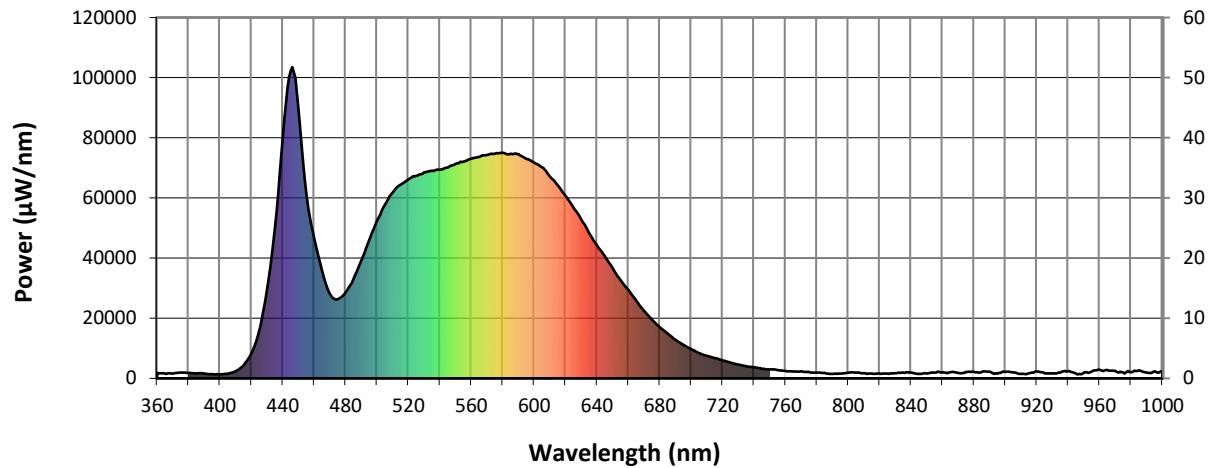
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 5000K 7-step quadrangle

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### Photopic Flux vs. Wavelength

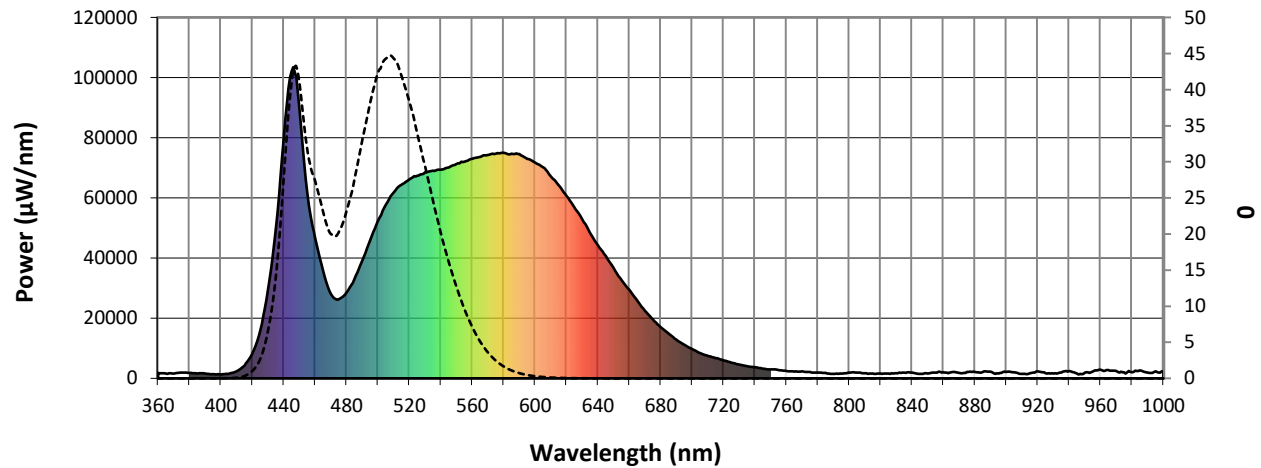


#####

| 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       | 1830             | 0.0              | 490       | 39290            | 5.6              | 620       | 60661            | 15.8             | 750       | 3022             | 0.0              | 880       | 2170             | 0.0              |
| 365       | 1565             | 0.0              | 495       | 45895            | 8.3              | 625       | 56965            | 12.6             | 755       | 2799             | 0.0              | 885       | 2095             | 0.0              |
| 370       | 1615             | 0.0              | 500       | 52484            | 11.6             | 630       | 52840            | 9.6              | 760       | 2426             | 0.0              | 890       | 2221             | 0.0              |
| 375       | 1925             | 0.0              | 505       | 57658            | 16.1             | 635       | 48454            | 7.3              | 765       | 2265             | 0.0              | 895       | 1631             | 0.0              |
| 380       | 1770             | 0.0              | 510       | 61833            | 21.2             | 640       | 44251            | 5.3              | 770       | 2313             | 0.0              | 900       | 2168             | 0.0              |
| 385       | 1631             | 0.0              | 515       | 64361            | 26.7             | 645       | 40632            | 3.9              | 775       | 2117             | 0.0              | 905       | 1986             | 0.0              |
| 390       | 1587             | 0.0              | 520       | 66173            | 32.1             | 650       | 36678            | 2.7              | 780       | 1949             | 0.0              | 910       | 1497             | 0.0              |
| 395       | 1387             | 0.0              | 525       | 67346            | 36.2             | 655       | 32622            | 1.9              | 785       | 1850             | 0.0              | 915       | 1688             | 0.0              |
| 400       | 1314             | 0.0              | 530       | 68548            | 40.4             | 660       | 29433            | 1.2              | 790       | 1537             | 0.0              | 920       | 2309             | 0.0              |
| 405       | 1545             | 0.0              | 535       | 69083            | 42.8             | 665       | 25904            | 0.8              | 795       | 1606             | 0.0              | 925       | 1676             | 0.0              |
| 410       | 2352             | 0.0              | 540       | 69434            | 45.2             | 670       | 22450            | 0.5              | 800       | 1879             | 0.0              | 930       | 1643             | 0.0              |
| 415       | 4302             | 0.0              | 545       | 70161            | 46.7             | 675       | 19540            | 0.3              | 805       | 1874             | 0.0              | 935       | 1938             | 0.0              |
| 420       | 8202             | 0.0              | 550       | 71259            | 48.4             | 680       | 17063            | 0.2              | 810       | 1689             | 0.0              | 940       | 2503             | 0.0              |
| 425       | 15931            | 0.1              | 555       | 72093            | 49.2             | 685       | 14938            | 0.1              | 815       | 1603             | 0.0              | 945       | 1604             | 0.0              |
| 430       | 29451            | 0.2              | 560       | 73055            | 49.6             | 690       | 12839            | 0.1              | 820       | 1615             | 0.0              | 950       | 1939             | 0.0              |
| 435       | 50263            | 0.6              | 565       | 73632            | 49.0             | 695       | 11135            | 0.0              | 825       | 1580             | 0.0              | 955       | 2280             | 0.0              |
| 440       | 79646            | 1.3              | 570       | 74262            | 48.3             | 700       | 9751             | 0.0              | 830       | 1691             | 0.0              | 960       | 2909             | 0.0              |
| 445       | 102126           | 2.1              | 575       | 74754            | 46.5             | 705       | 8425             | 0.0              | 835       | 1874             | 0.0              | 965       | 2727             | 0.0              |
| 450       | 89946            | 2.3              | 580       | 74999            | 44.6             | 710       | 7445             | 0.0              | 840       | 1897             | 0.0              | 970       | 2407             | 0.0              |
| 455       | 61475            | 2.1              | 585       | 74696            | 41.5             | 715       | 6743             | 0.0              | 845       | 1518             | 0.0              | 975       | 2033             | 0.0              |
| 460       | 46830            | 1.9              | 590       | 74627            | 38.6             | 720       | 5983             | 0.0              | 850       | 1637             | 0.0              | 980       | 1993             | 0.0              |
| 465       | 35832            | 1.8              | 595       | 73026            | 34.6             | 725       | 5259             | 0.0              | 855       | 1867             | 0.0              | 985       | 2615             | 0.0              |
| 470       | 28041            | 1.7              | 600       | 71687            | 30.9             | 730       | 4564             | 0.0              | 860       | 2075             | 0.0              | 990       | 1918             | 0.0              |
| 475       | 26334            | 2.1              | 605       | 70271            | 27.2             | 735       | 4065             | 0.0              | 865       | 2074             | 0.0              | 995       | 2319             | 0.0              |
| 480       | 28580            | 2.7              | 610       | 67123            | 23.1             | 740       | 3702             | 0.0              | 870       | 1793             | 0.0              | 1000      | 2272             | 0.0              |
| 485       | 33016            | 3.9              | 615       | 64247            | 19.4             | 745       | 3231             | 0.0              | 875       | 2156             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



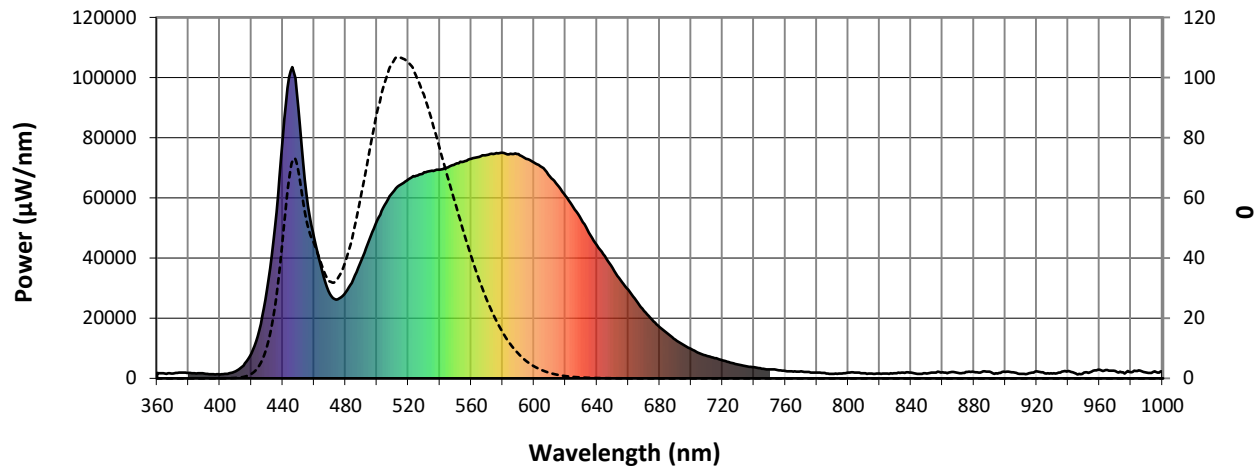
Scotopic Lumens: 9262.6

S/P: 1.91

| 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       | 1830             | 0.0              | 490       | 39290            | 60.5             | 620       | 60661            | 0.8              | 750       | 3022             | 0.0              | 880       | 2170             | 0.0              |
| 365       | 1565             | 0.0              | 495       | 45895            | 74.2             | 625       | 56965            | 0.5              | 755       | 2799             | 0.0              | 885       | 2095             | 0.0              |
| 370       | 1615             | 0.0              | 500       | 52484            | 87.8             | 630       | 52840            | 0.3              | 760       | 2426             | 0.0              | 890       | 2221             | 0.0              |
| 375       | 1925             | 0.0              | 505       | 57658            | 98.0             | 635       | 48454            | 0.2              | 765       | 2265             | 0.0              | 895       | 1631             | 0.0              |
| 380       | 1770             | 0.0              | 510       | 61833            | 104.8            | 640       | 44251            | 0.1              | 770       | 2313             | 0.0              | 900       | 2168             | 0.0              |
| 385       | 1631             | 0.0              | 515       | 64361            | 106.7            | 645       | 40632            | 0.1              | 775       | 2117             | 0.0              | 905       | 1986             | 0.0              |
| 390       | 1587             | 0.0              | 520       | 66173            | 105.2            | 650       | 36678            | 0.0              | 780       | 1949             | 0.0              | 910       | 1497             | 0.0              |
| 395       | 1387             | 0.0              | 525       | 67346            | 100.7            | 655       | 32622            | 0.0              | 785       | 1850             | 0.0              | 915       | 1688             | 0.0              |
| 400       | 1314             | 0.0              | 530       | 68548            | 94.5             | 660       | 29433            | 0.0              | 790       | 1537             | 0.0              | 920       | 2309             | 0.0              |
| 405       | 1545             | 0.0              | 535       | 69083            | 86.1             | 665       | 25904            | 0.0              | 795       | 1606             | 0.0              | 925       | 1676             | 0.0              |
| 410       | 2352             | 0.1              | 540       | 69434            | 76.7             | 670       | 22450            | 0.0              | 800       | 1879             | 0.0              | 930       | 1643             | 0.0              |
| 415       | 4302             | 0.4              | 545       | 70161            | 67.3             | 675       | 19540            | 0.0              | 805       | 1874             | 0.0              | 935       | 1938             | 0.0              |
| 420       | 8202             | 1.3              | 550       | 71259            | 58.3             | 680       | 17063            | 0.0              | 810       | 1689             | 0.0              | 940       | 2503             | 0.0              |
| 425       | 15931            | 3.9              | 555       | 72093            | 49.3             | 685       | 14938            | 0.0              | 815       | 1603             | 0.0              | 945       | 1604             | 0.0              |
| 430       | 29451            | 10.0             | 560       | 73055            | 40.8             | 690       | 12839            | 0.0              | 820       | 1615             | 0.0              | 950       | 1939             | 0.0              |
| 435       | 50263            | 22.5             | 565       | 73632            | 33.0             | 695       | 11135            | 0.0              | 825       | 1580             | 0.0              | 955       | 2280             | 0.0              |
| 440       | 79646            | 44.5             | 570       | 74262            | 26.2             | 700       | 9751             | 0.0              | 830       | 1691             | 0.0              | 960       | 2909             | 0.0              |
| 445       | 102126           | 68.4             | 575       | 74754            | 20.4             | 705       | 8425             | 0.0              | 835       | 1874             | 0.0              | 965       | 2727             | 0.0              |
| 450       | 89946            | 69.7             | 580       | 74999            | 15.5             | 710       | 7445             | 0.0              | 840       | 1897             | 0.0              | 970       | 2407             | 0.0              |
| 455       | 61475            | 53.7             | 585       | 74696            | 11.4             | 715       | 6743             | 0.0              | 845       | 1518             | 0.0              | 975       | 2033             | 0.0              |
| 460       | 46830            | 45.2             | 590       | 74627            | 8.3              | 720       | 5983             | 0.0              | 850       | 1637             | 0.0              | 980       | 1993             | 0.0              |
| 465       | 35832            | 37.8             | 595       | 73026            | 5.8              | 725       | 5259             | 0.0              | 855       | 1867             | 0.0              | 985       | 2615             | 0.0              |
| 470       | 28041            | 32.3             | 600       | 71687            | 4.0              | 730       | 4564             | 0.0              | 860       | 2075             | 0.0              | 990       | 1918             | 0.0              |
| 475       | 26334            | 32.9             | 605       | 70271            | 2.8              | 735       | 4065             | 0.0              | 865       | 2074             | 0.0              | 995       | 2319             | 0.0              |
| 480       | 28580            | 38.6             | 610       | 67123            | 1.8              | 740       | 3702             | 0.0              | 870       | 1793             | 0.0              | 1000      | 2272             | 0.0              |
| 485       | 33016            | 47.9             | 615       | 64247            | 1.2              | 745       | 3231             | 0.0              | 875       | 2156             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 3791.6**

**M/P: 0.78**

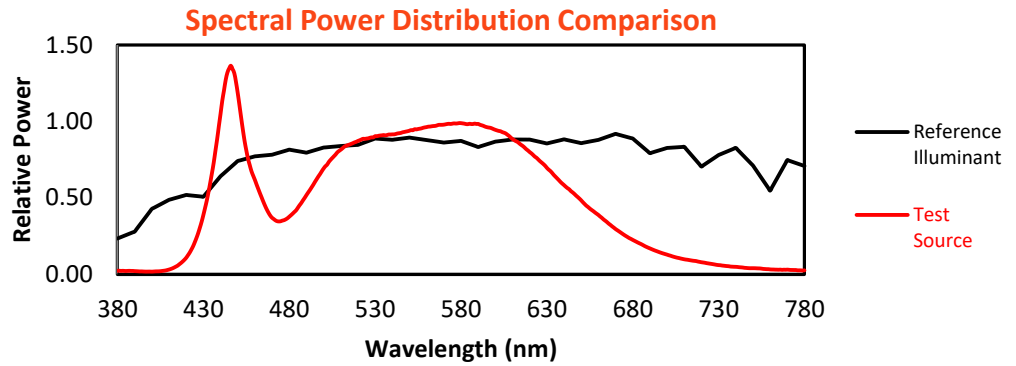
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1830             | 0.0              | 490       | 39290            | 32.7             | 620       | 60661            | 0.0              | 750       | 3022             | 0.0              | 880       | 2170             | 0.0              |
| 365       | 1565             | 0.0              | 495       | 45895            | 37.9             | 625       | 56965            | 0.0              | 755       | 2799             | 0.0              | 885       | 2095             | 0.0              |
| 370       | 1615             | 0.0              | 500       | 52484            | 42.2             | 630       | 52840            | 0.0              | 760       | 2426             | 0.0              | 890       | 2221             | 0.0              |
| 375       | 1925             | 0.0              | 505       | 57658            | 44.3             | 635       | 48454            | 0.0              | 765       | 2265             | 0.0              | 895       | 1631             | 0.0              |
| 380       | 1770             | 0.0              | 510       | 61833            | 44.4             | 640       | 44251            | 0.0              | 770       | 2313             | 0.0              | 900       | 2168             | 0.0              |
| 385       | 1631             | 0.0              | 515       | 64361            | 42.1             | 645       | 40632            | 0.0              | 775       | 2117             | 0.0              | 905       | 1986             | 0.0              |
| 390       | 1587             | 0.0              | 520       | 66173            | 38.5             | 650       | 36678            | 0.0              | 780       | 1949             | 0.0              | 910       | 1497             | 0.0              |
| 395       | 1387             | 0.0              | 525       | 67346            | 34.2             | 655       | 32622            | 0.0              | 785       | 1850             | 0.0              | 915       | 1688             | 0.0              |
| 400       | 1314             | 0.0              | 530       | 68548            | 29.6             | 660       | 29433            | 0.0              | 790       | 1537             | 0.0              | 920       | 2309             | 0.0              |
| 405       | 1545             | 0.0              | 535       | 69083            | 24.9             | 665       | 25904            | 0.0              | 795       | 1606             | 0.0              | 925       | 1676             | 0.0              |
| 410       | 2352             | 0.1              | 540       | 69434            | 20.3             | 670       | 22450            | 0.0              | 800       | 1879             | 0.0              | 930       | 1643             | 0.0              |
| 415       | 4302             | 0.3              | 545       | 70161            | 16.3             | 675       | 19540            | 0.0              | 805       | 1874             | 0.0              | 935       | 1938             | 0.0              |
| 420       | 8202             | 0.9              | 550       | 71259            | 12.8             | 680       | 17063            | 0.0              | 810       | 1689             | 0.0              | 940       | 2503             | 0.0              |
| 425       | 15931            | 2.5              | 555       | 72093            | 9.7              | 685       | 14938            | 0.0              | 815       | 1603             | 0.0              | 945       | 1604             | 0.0              |
| 430       | 29451            | 6.2              | 560       | 73055            | 7.2              | 690       | 12839            | 0.0              | 820       | 1615             | 0.0              | 950       | 1939             | 0.0              |
| 435       | 50263            | 13.4             | 565       | 73632            | 5.2              | 695       | 11135            | 0.0              | 825       | 1580             | 0.0              | 955       | 2280             | 0.0              |
| 440       | 79646            | 26.6             | 570       | 74262            | 3.6              | 700       | 9751             | 0.0              | 830       | 1691             | 0.0              | 960       | 2909             | 0.0              |
| 445       | 102126           | 40.3             | 575       | 74754            | 2.5              | 705       | 8425             | 0.0              | 835       | 1874             | 0.0              | 965       | 2727             | 0.0              |
| 450       | 89946            | 41.4             | 580       | 74999            | 1.7              | 710       | 7445             | 0.0              | 840       | 1897             | 0.0              | 970       | 2407             | 0.0              |
| 455       | 61475            | 32.2             | 585       | 74696            | 1.1              | 715       | 6743             | 0.0              | 845       | 1518             | 0.0              | 975       | 2033             | 0.0              |
| 460       | 46830            | 27.6             | 590       | 74627            | 0.7              | 720       | 5983             | 0.0              | 850       | 1637             | 0.0              | 980       | 1993             | 0.0              |
| 465       | 35832            | 23.4             | 595       | 73026            | 0.5              | 725       | 5259             | 0.0              | 855       | 1867             | 0.0              | 985       | 2615             | 0.0              |
| 470       | 28041            | 20.1             | 600       | 71687            | 0.3              | 730       | 4564             | 0.0              | 860       | 2075             | 0.0              | 990       | 1918             | 0.0              |
| 475       | 26334            | 20.1             | 605       | 70271            | 0.2              | 735       | 4065             | 0.0              | 865       | 2074             | 0.0              | 995       | 2319             | 0.0              |
| 480       | 28580            | 23.0             | 610       | 67123            | 0.1              | 740       | 3702             | 0.0              | 870       | 1793             | 0.0              | 1000      | 2272             | 0.0              |
| 485       | 33016            | 27.2             | 615       | 64247            | 0.1              | 745       | 3231             | 0.0              | 875       | 2156             | 0.0              |           |                  |                  |

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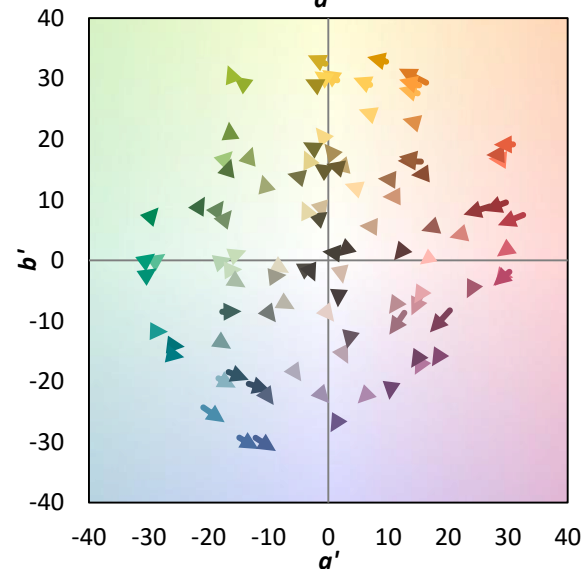
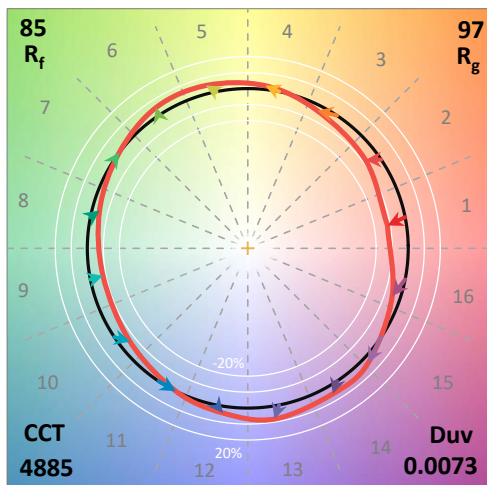
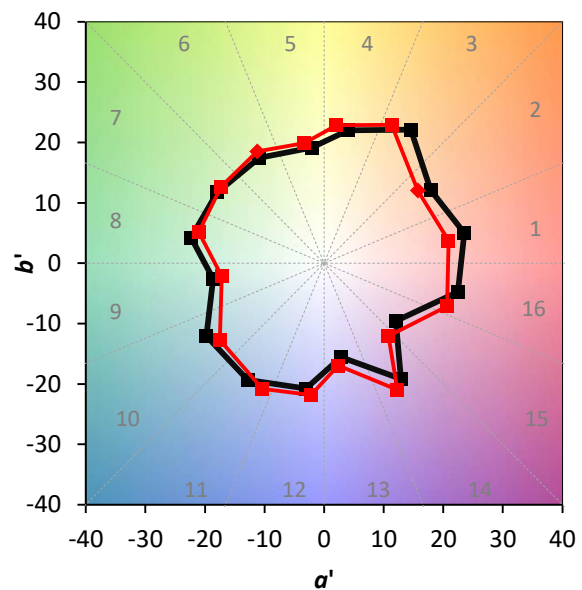
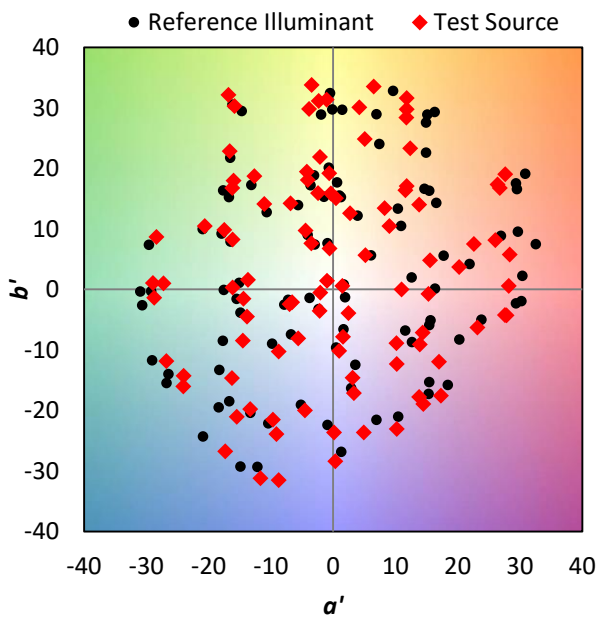
TM-30-18

### Summary

$R_f = 84.6$   
 $R_g = 96.9$   
 CIE  $R_a = 82.2$   
 $R_9 = 4.0$



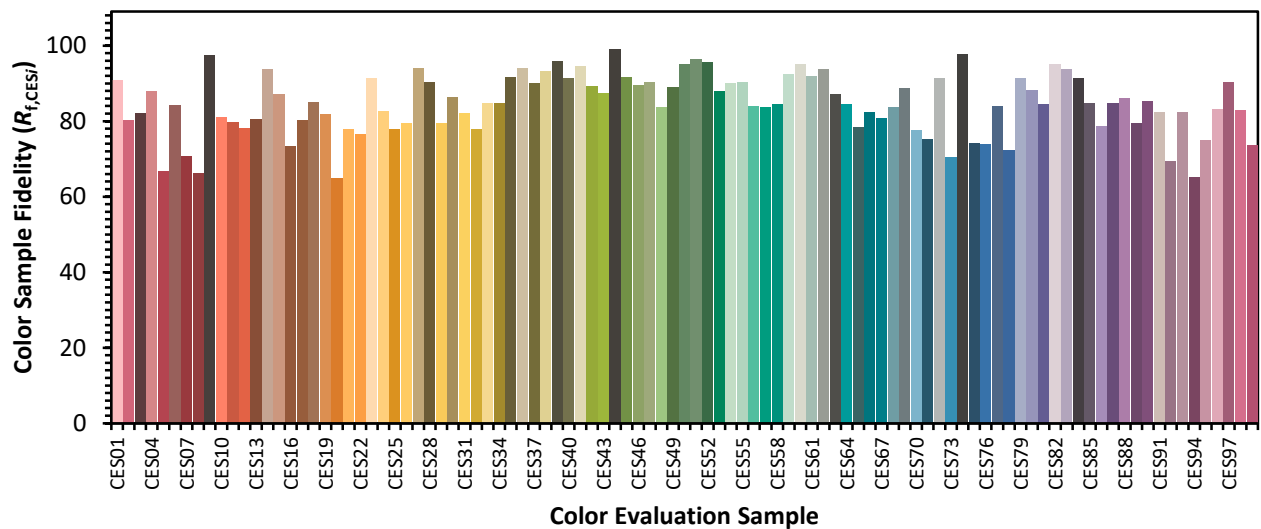
### Color Vector Graphics



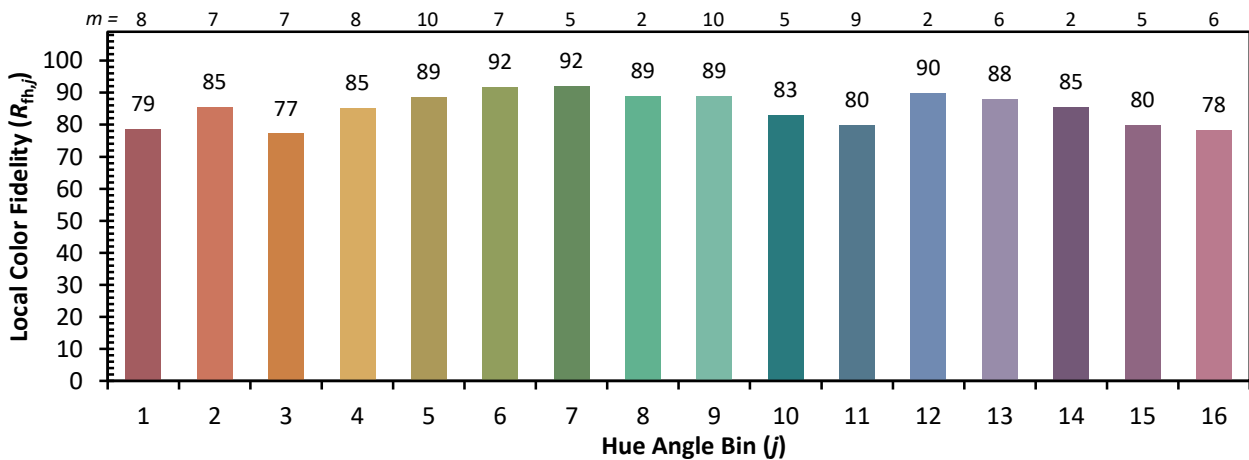
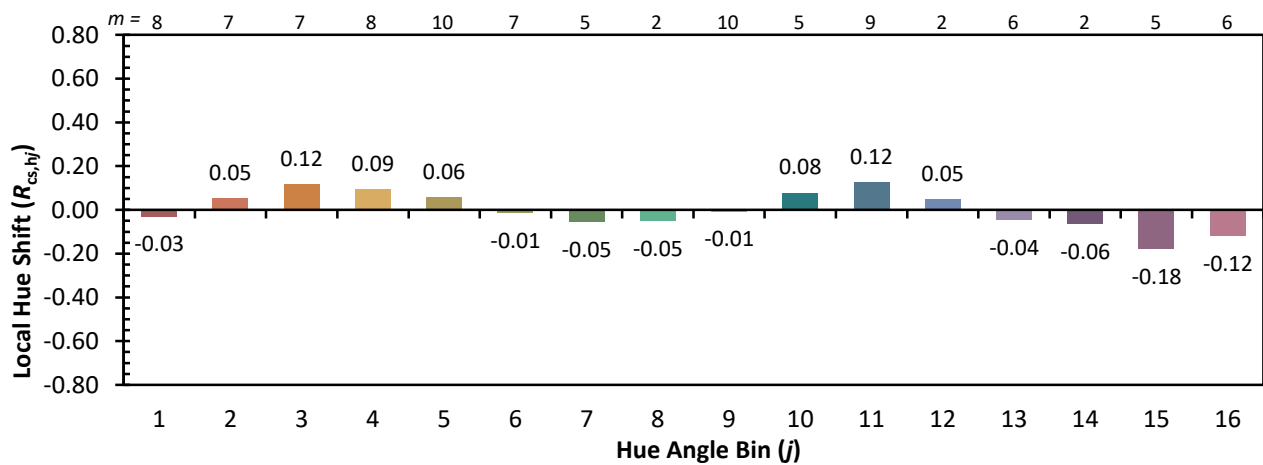
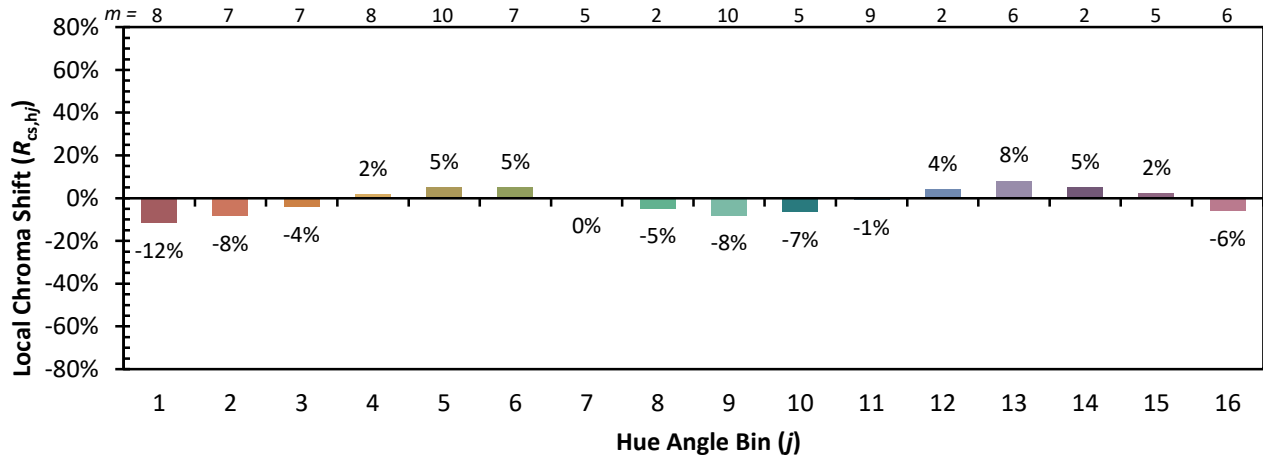


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

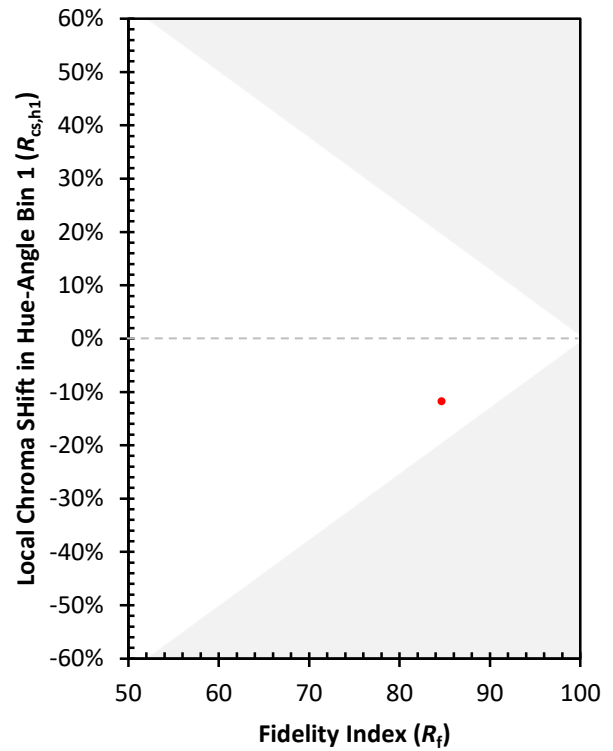
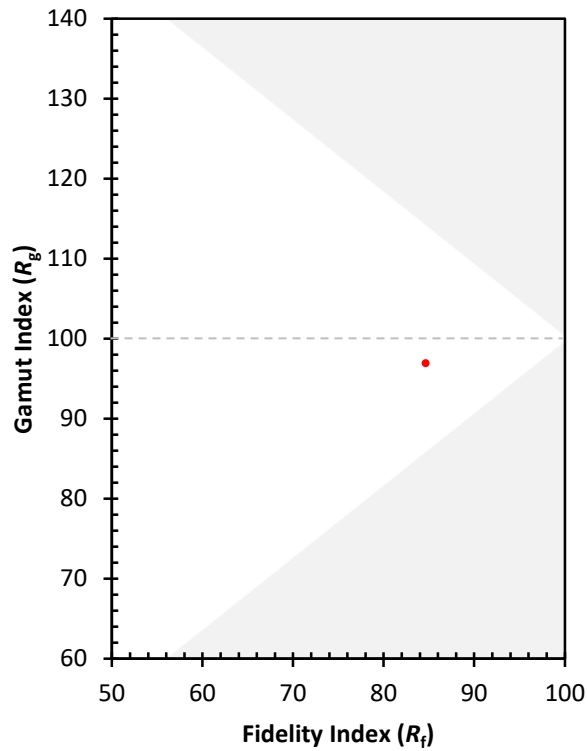
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 79 | CES51 = 96 | CES76 = 74 |
| CES02 = 60 | CES27 = 94 | CES52 = 96 | CES77 = 84 |
| CES03 = 30 | CES28 = 90 | CES53 = 88 | CES78 = 72 |
| CES04 = 69 | CES29 = 80 | CES54 = 90 | CES79 = 91 |
| CES05 = 47 | CES30 = 86 | CES55 = 90 | CES80 = 88 |
| CES06 = 50 | CES31 = 82 | CES56 = 84 | CES81 = 85 |
| CES07 = 39 | CES32 = 78 | CES57 = 84 | CES82 = 95 |
| CES08 = 39 | CES33 = 85 | CES58 = 84 | CES83 = 94 |
| CES09 = 29 | CES34 = 85 | CES59 = 92 | CES84 = 91 |
| CES10 = 73 | CES35 = 92 | CES60 = 95 | CES85 = 85 |
| CES11 = 56 | CES36 = 94 | CES61 = 92 | CES86 = 79 |
| CES12 = 61 | CES37 = 90 | CES62 = 94 | CES87 = 85 |
| CES13 = 42 | CES38 = 93 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 96 | CES64 = 84 | CES89 = 79 |
| CES15 = 70 | CES40 = 91 | CES65 = 78 | CES90 = 85 |
| CES16 = 46 | CES41 = 94 | CES66 = 82 | CES91 = 82 |
| CES17 = 48 | CES42 = 89 | CES67 = 81 | CES92 = 69 |
| CES18 = 55 | CES43 = 87 | CES68 = 84 | CES93 = 82 |
| CES19 = 70 | CES44 = 99 | CES69 = 89 | CES94 = 65 |
| CES20 = 64 | CES45 = 92 | CES70 = 78 | CES95 = 75 |
| CES21 = 85 | CES46 = 89 | CES71 = 75 | CES96 = 83 |
| CES22 = 77 | CES47 = 90 | CES72 = 91 | CES97 = 90 |
| CES23 = 91 | CES48 = 84 | CES73 = 71 | CES98 = 83 |
| CES24 = 90 | CES49 = 89 | CES74 = 98 | CES99 = 74 |
| CES25 = 70 | CES50 = 95 | CES75 = 74 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)