

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: P673911

Luminaire Tested: **CCP-SA2B-840-U-SL3-HSS**

Issue Date: 04/16/2023

**Test Information**

Test Method: LM-79-08  
Report Number: P673911  
Test Lab: INNOVATION CENTER(G1)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA2B-840-U-SL3-HSS  
Description: INVUE CLEAR CURVE POLE MOUNT Light Square Luminaire @450mA w/ SL3  
distribution lens and House Side Shield  
Light Source: (32) 4000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4865.7 lumens  
Efficiency: N/A  
Efficacy: 105.8 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B1 - U0 - G2

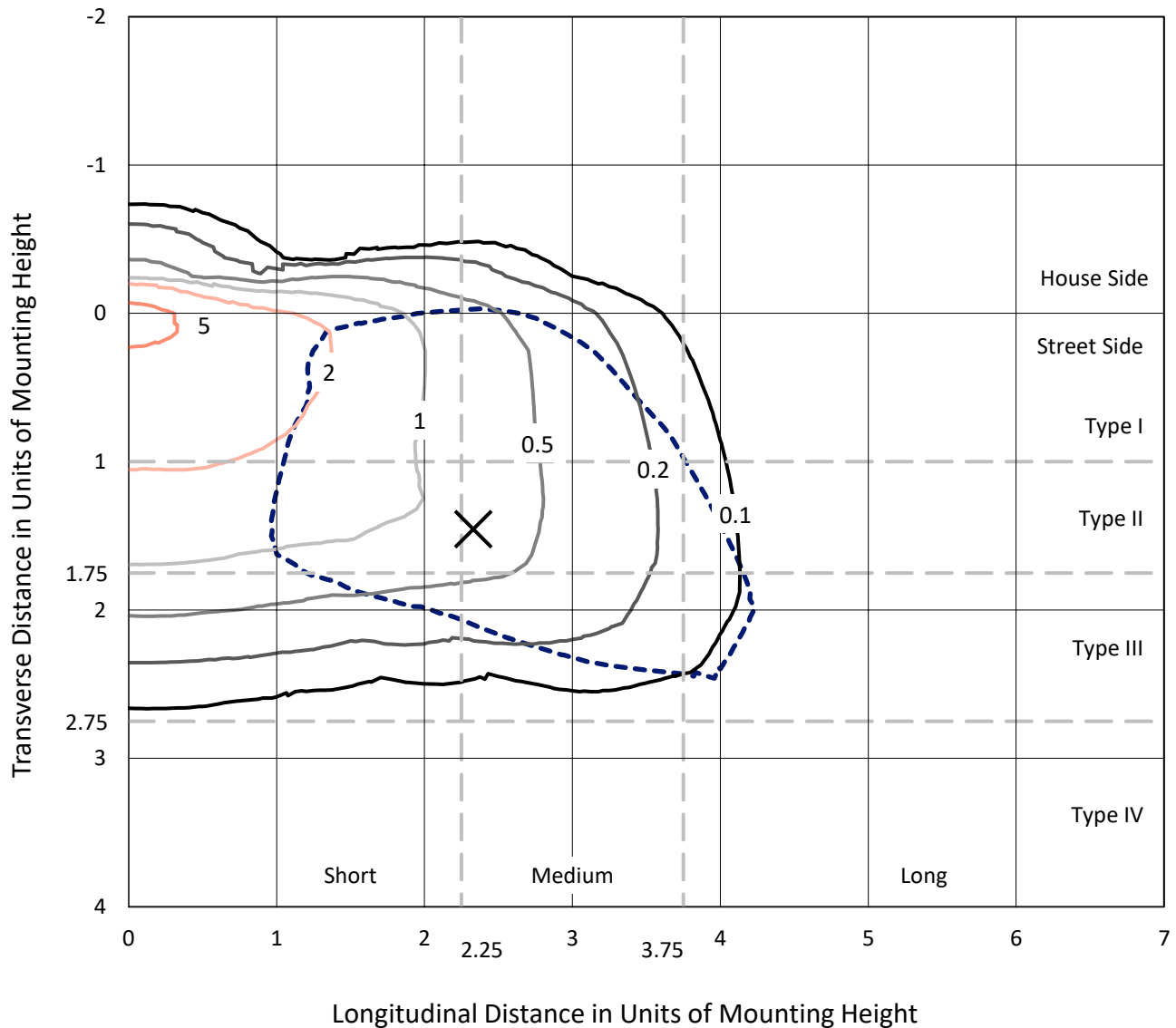
Input Watts (W): 46  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

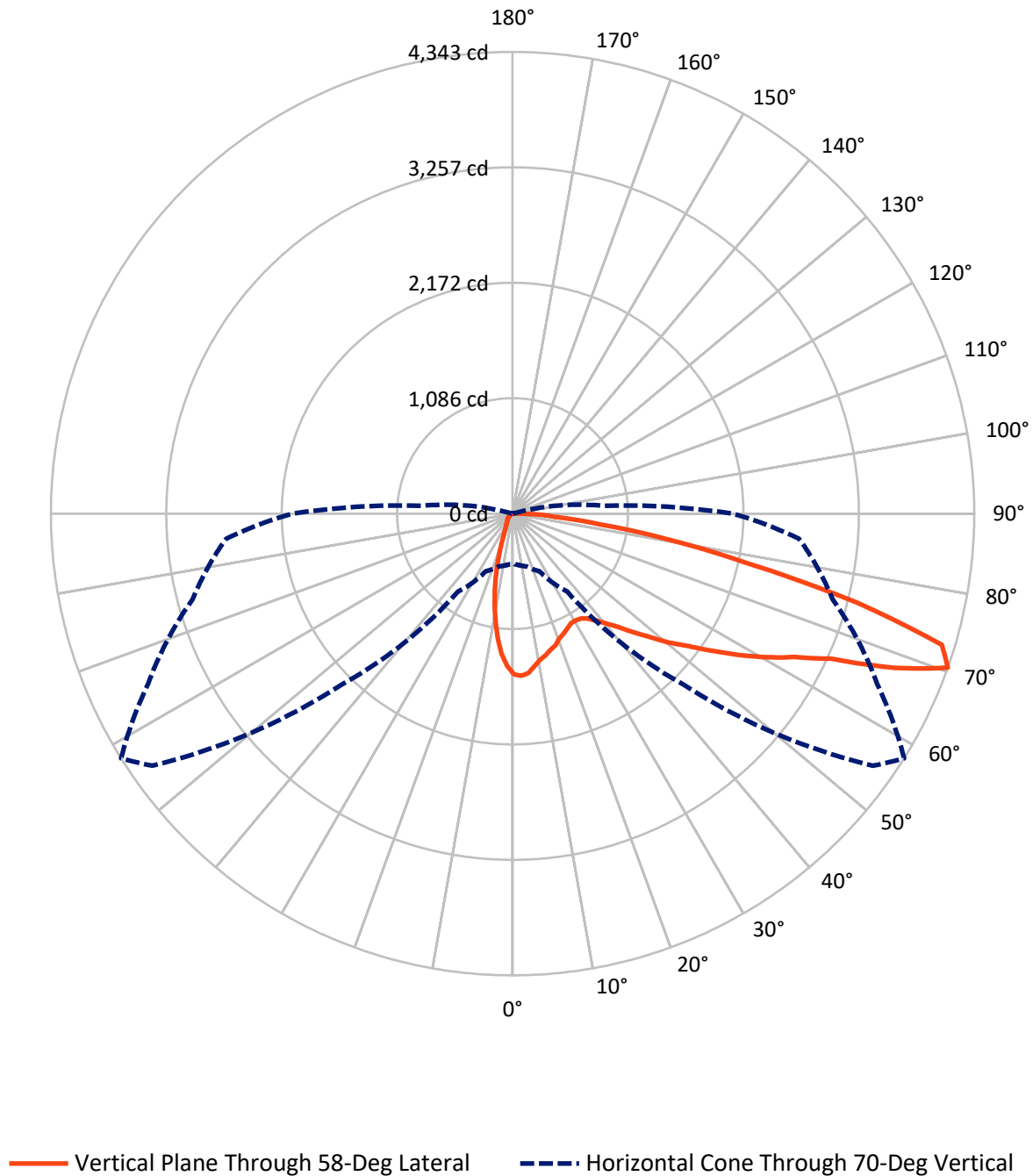
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 6.7 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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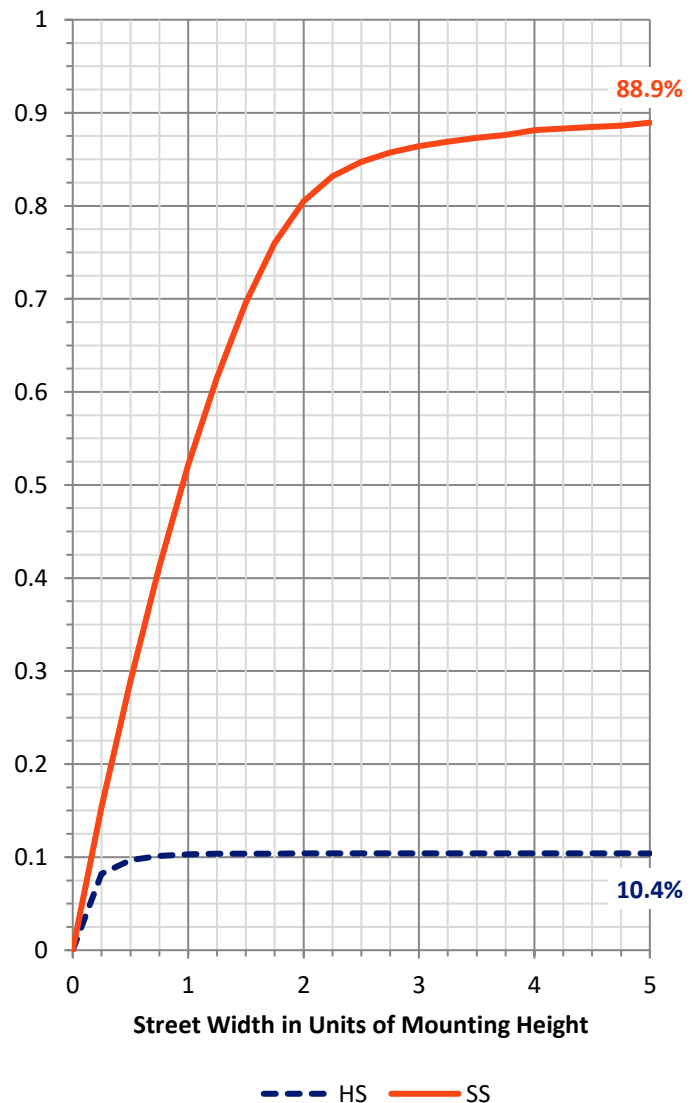
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 509.5    | 0.0    | 509.5  |
|                    | % Fixture | 10.5     | 0.0    | 10.5   |
| <b>Street Side</b> | Lumens    | 4356.2   | 0.0    | 4356.2 |
|                    | % Fixture | 89.5     | 0.0    | 89.5   |
| <b>Total</b>       | Lumens    | 4865.7   | 0.0    | 4865.7 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 123.3  | 2.5       |
| 10°-20°   | 256.6  | 5.3       |
| 20°-30°   | 343.6  | 7.1       |
| 30°-40°   | 464.4  | 9.5       |
| 40°-50°   | 666.5  | 13.7      |
| 50°-60°   | 982.3  | 20.2      |
| 60°-70°   | 1198.1 | 24.6      |
| 70°-80°   | 731.6  | 15.0      |
| 80°-90°   | 99.4   | 2.0       |
| 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°    | 4865.7 | 100.0     |
| 0°-180°   | 4865.7 | 100.0     |

**Coefficient of Utilization**



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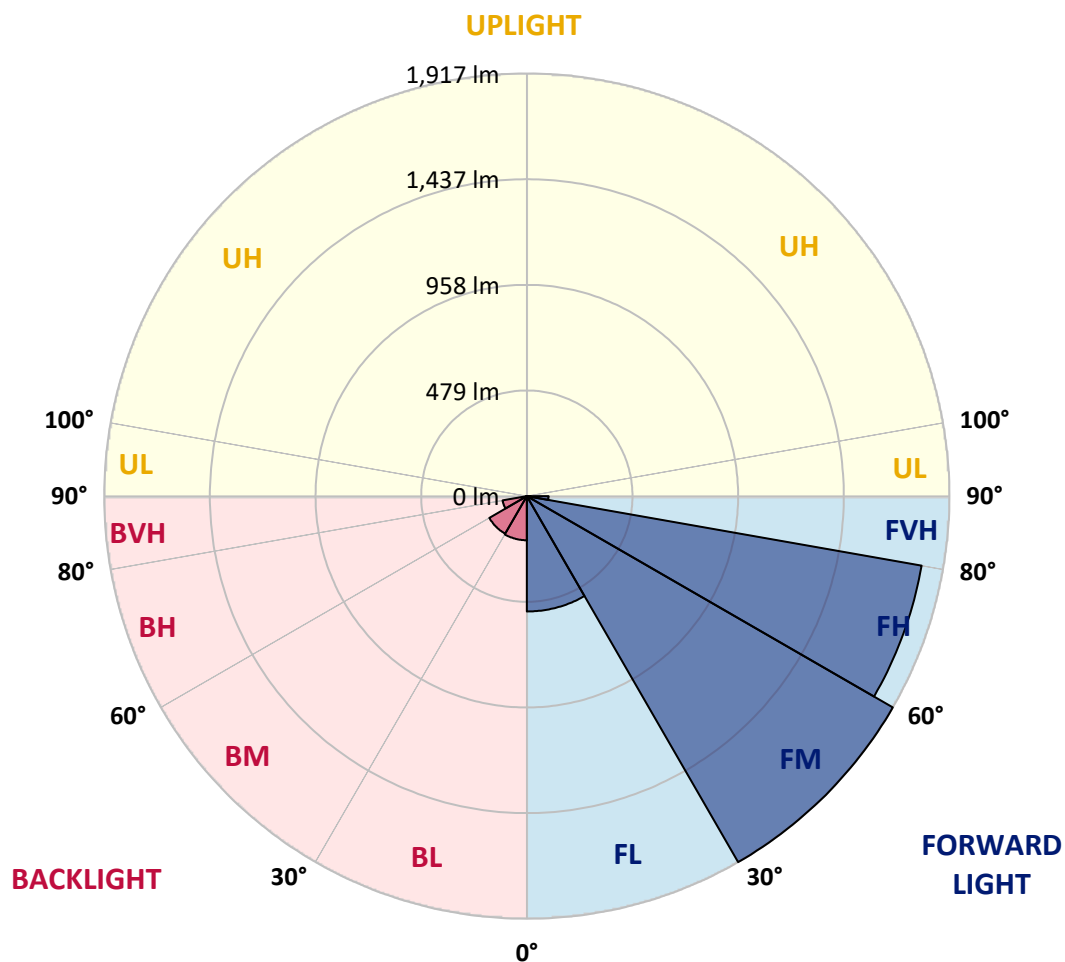
CATALOG NUMBER: CCP-SA2B-840-U-SL3-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 523.1  | 10.8      |                         |      |         |
| FM   | (30°-60°)   | 1916.6 | 39.4      |                         |      |         |
| FH   | (60°-80°)   | 1818.1 | 37.4      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 98.4   | 2.0       |                         |      | G1/100  |
| BL   | (0°-30°)    | 200.2  | 4.1       | B1/500                  |      |         |
| BM   | (30°-60°)   | 196.6  | 4.0       | B0/220                  |      |         |
| BH   | (60°-80°)   | 111.7  | 2.3       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 1.0    | 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 Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 58°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 |
| 2.5°  | 1537.8 | 1543.5 | 1529.9 | 1545.8 | 1531.0 | 1537.8 | 1529.9 | 1527.6 | 1528.7 | 1529.9 | 1520.7 |
| 5°    | 1466.0 | 1479.7 | 1485.4 | 1476.2 | 1497.9 | 1494.5 | 1508.2 | 1509.3 | 1503.6 | 1497.9 | 1499.1 |
| 7.5°  | 1371.3 | 1385.0 | 1390.7 | 1396.4 | 1418.1 | 1446.6 | 1464.8 | 1453.4 | 1462.5 | 1483.1 | 1452.3 |
| 10°   | 1302.8 | 1299.4 | 1298.3 | 1309.7 | 1350.7 | 1374.7 | 1405.5 | 1402.1 | 1424.9 | 1444.3 | 1419.2 |
| 12.5° | 1218.4 | 1211.6 | 1232.1 | 1241.2 | 1277.7 | 1319.9 | 1343.9 | 1369.0 | 1391.8 | 1412.4 | 1383.8 |
| 15°   | 1155.7 | 1161.4 | 1169.4 | 1188.7 | 1215.0 | 1270.9 | 1306.3 | 1330.2 | 1371.3 | 1381.6 | 1370.1 |
| 17.5° | 1105.5 | 1110.0 | 1121.4 | 1131.7 | 1164.8 | 1218.4 | 1274.3 | 1302.8 | 1346.2 | 1373.6 | 1338.2 |
| 20°   | 1106.6 | 1092.9 | 1092.9 | 1103.2 | 1121.4 | 1185.3 | 1244.7 | 1253.8 | 1313.1 | 1359.9 | 1335.9 |
| 22.5° | 1107.8 | 1103.2 | 1092.9 | 1091.8 | 1099.8 | 1145.4 | 1205.9 | 1226.4 | 1290.3 | 1345.0 | 1316.5 |
| 25°   | 1123.7 | 1106.6 | 1107.8 | 1091.8 | 1095.2 | 1118.0 | 1165.9 | 1196.7 | 1269.7 | 1353.0 | 1306.3 |
| 27.5° | 1137.4 | 1145.4 | 1129.4 | 1122.6 | 1103.2 | 1102.0 | 1142.0 | 1168.2 | 1259.5 | 1371.3 | 1313.1 |
| 30°   | 1168.2 | 1173.9 | 1173.9 | 1169.4 | 1151.1 | 1124.9 | 1134.0 | 1167.1 | 1238.9 | 1367.9 | 1301.7 |
| 32.5° | 1219.6 | 1209.3 | 1223.0 | 1216.1 | 1192.2 | 1151.1 | 1159.1 | 1176.2 | 1251.5 | 1411.2 | 1319.9 |
| 35°   | 1236.7 | 1244.7 | 1262.9 | 1248.1 | 1240.1 | 1216.1 | 1200.2 | 1212.7 | 1269.7 | 1454.6 | 1347.3 |
| 37.5° | 1289.1 | 1277.7 | 1290.3 | 1323.4 | 1331.4 | 1288.0 | 1257.2 | 1275.5 | 1338.2 | 1505.9 | 1372.4 |
| 40°   | 1293.7 | 1302.8 | 1325.6 | 1390.7 | 1398.7 | 1380.4 | 1355.3 | 1359.9 | 1406.6 | 1572.1 | 1435.2 |
| 42.5° | 1316.5 | 1326.8 | 1373.6 | 1428.3 | 1471.7 | 1475.1 | 1456.8 | 1456.8 | 1496.8 | 1678.2 | 1504.8 |
| 45°   | 1361.0 | 1343.9 | 1404.4 | 1496.8 | 1559.5 | 1572.1 | 1596.0 | 1590.3 | 1622.3 | 1790.0 | 1634.8 |
| 47.5° | 1378.1 | 1383.8 | 1450.0 | 1561.8 | 1633.7 | 1691.9 | 1731.8 | 1732.9 | 1748.9 | 1932.6 | 1803.7 |
| 50°   | 1434.0 | 1432.9 | 1512.7 | 1616.6 | 1722.7 | 1828.8 | 1906.3 | 1906.3 | 1905.2 | 2071.8 | 1948.5 |
| 52.5° | 1508.2 | 1505.9 | 1567.5 | 1690.7 | 1828.8 | 1962.2 | 2064.9 | 2068.3 | 2094.6 | 2242.9 | 2115.1 |
| 55°   | 1629.1 | 1618.8 | 1678.2 | 1769.4 | 1934.9 | 2096.9 | 2274.8 | 2276.0 | 2255.4 | 2364.9 | 2234.9 |
| 57.5° | 1730.6 | 1729.5 | 1778.6 | 1866.4 | 2053.5 | 2270.3 | 2476.8 | 2507.6 | 2442.5 | 2490.4 | 2330.7 |
| 60°   | 1704.4 | 1719.2 | 1820.8 | 1950.8 | 2179.0 | 2487.0 | 2694.7 | 2742.6 | 2638.7 | 2576.0 | 2402.6 |
| 62.5° | 1541.3 | 1575.5 | 1686.2 | 1893.8 | 2285.1 | 2801.9 | 2994.7 | 2973.0 | 2741.4 | 2649.0 | 2490.4 |
| 65°   | 1108.9 | 1143.1 | 1280.0 | 1591.5 | 2161.9 | 3024.4 | 3389.4 | 3291.3 | 2924.0 | 2757.4 | 2607.9 |
| 67.5° | 652.6  | 666.2  | 751.8  | 1015.3 | 1616.6 | 2903.4 | 3868.6 | 3876.6 | 3283.3 | 2924.0 | 2811.0 |
| 70°   | 471.2  | 481.4  | 514.5  | 598.9  | 895.6  | 2276.0 | 4135.5 | 4343.2 | 3781.9 | 3115.6 | 2703.8 |
| 72.5° | 361.6  | 361.6  | 417.5  | 498.5  | 570.4  | 1363.3 | 3805.8 | 4222.2 | 3890.2 | 2931.9 | 2179.0 |
| 75°   | 260.1  | 267.0  | 327.4  | 429.0  | 525.9  | 684.5  | 2804.2 | 3350.6 | 3297.0 | 2376.4 | 1521.9 |
| 77.5° | 149.4  | 152.9  | 230.4  | 359.4  | 494.0  | 470.0  | 1732.9 | 2271.4 | 2335.3 | 1487.6 | 659.4  |
| 80°   | 76.4   | 78.7   | 128.9  | 284.1  | 447.2  | 409.6  | 1033.6 | 1495.6 | 1268.6 | 432.4  | 152.9  |
| 82.5° | 37.6   | 37.6   | 58.2   | 181.4  | 379.9  | 362.8  | 608.1  | 826.0  | 449.5  | 99.3   | 63.9   |
| 85°   | 12.5   | 13.7   | 26.2   | 102.7  | 274.9  | 219.0  | 371.9  | 392.4  | 150.6  | 37.6   | 35.4   |
| 87.5° | 3.4    | 4.6    | 6.8    | 37.6   | 119.8  | 143.7  | 221.3  | 251.0  | 61.6   | 14.8   | 17.1   |
| 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-SA2B-840-U-SL3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 | 1510.5 |
| 2.5°  | 1486.5 | 1478.5 | 1469.4 | 1446.6 | 1428.3 | 1404.4 | 1388.4 | 1375.8 | 1351.9 | 1356.5 | 1346.2 |
| 5°    | 1471.7 | 1456.8 | 1404.4 | 1354.2 | 1308.5 | 1238.9 | 1191.0 | 1160.2 | 1135.1 | 1110.0 | 1128.3 |
| 7.5°  | 1445.4 | 1410.1 | 1327.9 | 1234.4 | 1137.4 | 1046.1 | 954.9  | 900.1  | 860.2  | 823.7  | 822.5  |
| 10°   | 1400.9 | 1343.9 | 1215.0 | 1092.9 | 943.5  | 823.7  | 707.3  | 616.1  | 556.7  | 513.4  | 512.2  |
| 12.5° | 1350.7 | 1291.4 | 1129.4 | 930.9  | 758.7  | 589.8  | 450.6  | 353.7  | 297.8  | 263.5  | 259.0  |
| 15°   | 1318.8 | 1232.1 | 1022.2 | 787.2  | 573.8  | 384.5  | 249.8  | 189.4  | 167.7  | 159.7  | 159.7  |
| 17.5° | 1277.7 | 1178.5 | 916.1  | 637.7  | 398.2  | 222.5  | 162.0  | 146.0  | 144.9  | 142.6  | 140.3  |
| 20°   | 1260.6 | 1137.4 | 821.4  | 508.8  | 252.1  | 157.4  | 139.2  | 135.8  | 135.8  | 133.5  | 131.2  |
| 22.5° | 1215.0 | 1078.1 | 721.0  | 373.1  | 167.7  | 138.0  | 131.2  | 126.6  | 124.4  | 122.1  | 124.4  |
| 25°   | 1194.5 | 1035.9 | 626.3  | 257.8  | 136.9  | 123.2  | 119.8  | 115.2  | 111.8  | 110.7  | 110.7  |
| 27.5° | 1180.8 | 993.7  | 533.9  | 179.1  | 120.9  | 112.9  | 106.1  | 102.7  | 98.1   | 93.5   | 93.5   |
| 30°   | 1170.5 | 960.6  | 444.9  | 132.3  | 108.4  | 100.4  | 94.7   | 86.7   | 81.0   | 76.4   | 76.4   |
| 32.5° | 1156.8 | 921.8  | 355.9  | 112.9  | 98.1   | 90.1   | 79.9   | 73.0   | 65.0   | 61.6   | 61.6   |
| 35°   | 1161.4 | 895.6  | 279.5  | 100.4  | 87.8   | 77.6   | 68.5   | 59.3   | 51.3   | 47.9   | 46.8   |
| 37.5° | 1170.5 | 876.2  | 212.2  | 90.1   | 78.7   | 67.3   | 57.0   | 46.8   | 42.2   | 37.6   | 37.6   |
| 40°   | 1209.3 | 870.5  | 156.3  | 83.3   | 71.9   | 59.3   | 47.9   | 38.8   | 34.2   | 30.8   | 29.7   |
| 42.5° | 1274.3 | 878.4  | 120.9  | 75.3   | 65.0   | 50.2   | 39.9   | 31.9   | 27.4   | 24.0   | 22.8   |
| 45°   | 1357.6 | 909.2  | 99.3   | 70.7   | 57.0   | 42.2   | 31.9   | 26.2   | 20.5   | 18.3   | 18.3   |
| 47.5° | 1478.5 | 957.2  | 86.7   | 65.0   | 50.2   | 35.4   | 27.4   | 20.5   | 16.0   | 13.7   | 13.7   |
| 50°   | 1615.4 | 1011.9 | 76.4   | 58.2   | 43.4   | 29.7   | 21.7   | 16.0   | 11.4   | 10.3   | 10.3   |
| 52.5° | 1752.3 | 1081.5 | 70.7   | 53.6   | 37.6   | 24.0   | 17.1   | 11.4   | 8.0    | 6.8    | 6.8    |
| 55°   | 1896.1 | 1143.1 | 63.9   | 50.2   | 30.8   | 19.4   | 12.5   | 6.8    | 4.6    | 3.4    | 3.4    |
| 57.5° | 1996.5 | 1167.1 | 55.9   | 43.4   | 24.0   | 14.8   | 9.1    | 4.6    | 2.3    | 1.1    | 1.1    |
| 60°   | 2068.3 | 1170.5 | 47.9   | 35.4   | 18.3   | 11.4   | 5.7    | 2.3    | 1.1    | 0.0    | 0.0    |
| 62.5° | 2128.8 | 1177.3 | 41.1   | 27.4   | 13.7   | 8.0    | 3.4    | 1.1    | 0.0    | 0.0    | 0.0    |
| 65°   | 2248.6 | 1171.6 | 33.1   | 21.7   | 9.1    | 4.6    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    |
| 67.5° | 2343.3 | 1114.6 | 26.2   | 14.8   | 5.7    | 2.3    | 1.1    | 0.0    | 0.0    | 0.0    | 0.0    |
| 70°   | 2072.9 | 849.9  | 20.5   | 10.3   | 3.4    | 1.1    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 72.5° | 1628.0 | 567.0  | 13.7   | 5.7    | 2.3    | 1.1    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 75°   | 1067.8 | 281.8  | 10.3   | 3.4    | 1.1    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 77.5° | 415.3  | 74.2   | 6.8    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 80°   | 100.4  | 25.1   | 3.4    | 1.1    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 43.4   | 9.1    | 2.3    | 1.1    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 26.2   | 4.6    | 1.1    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 13.7   | 2.3    | 1.1    | 1.1    | 0.0    | 0.0    | 0.0    | 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: SP1-2104-224-8

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

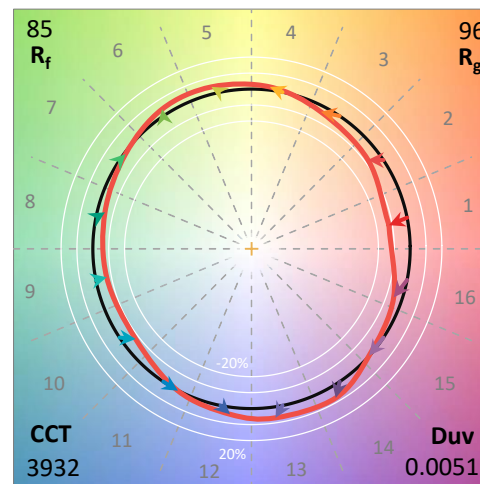
Test Date: 04/27/2021

### 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

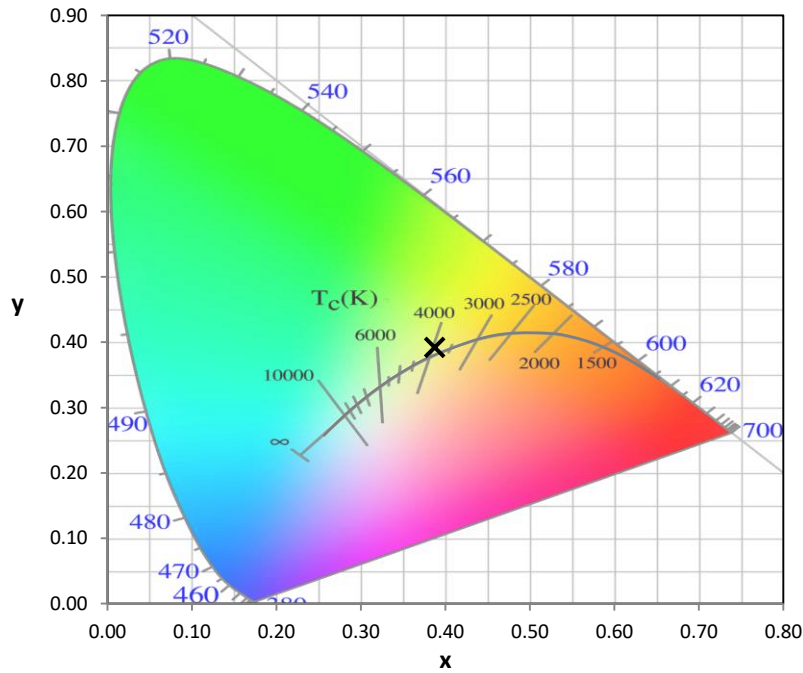
Stabilization Time: 123M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.9/41%  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2104-224-8

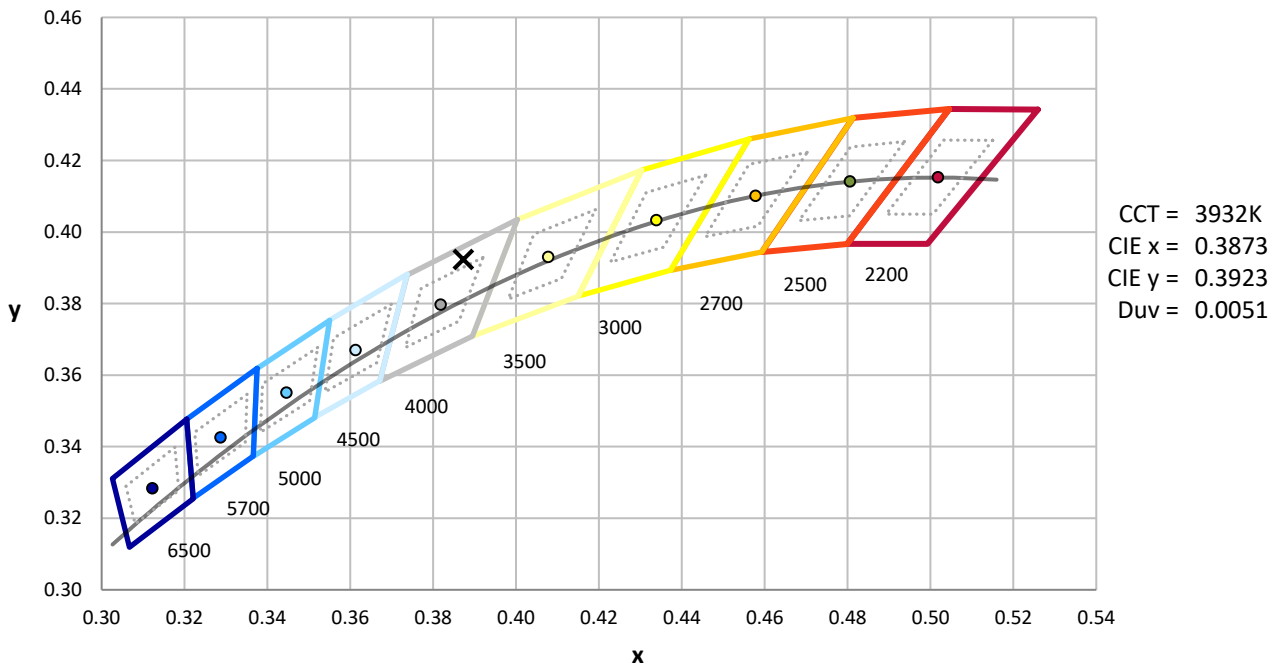
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

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**CIE 1931 Chromaticity Diagram**



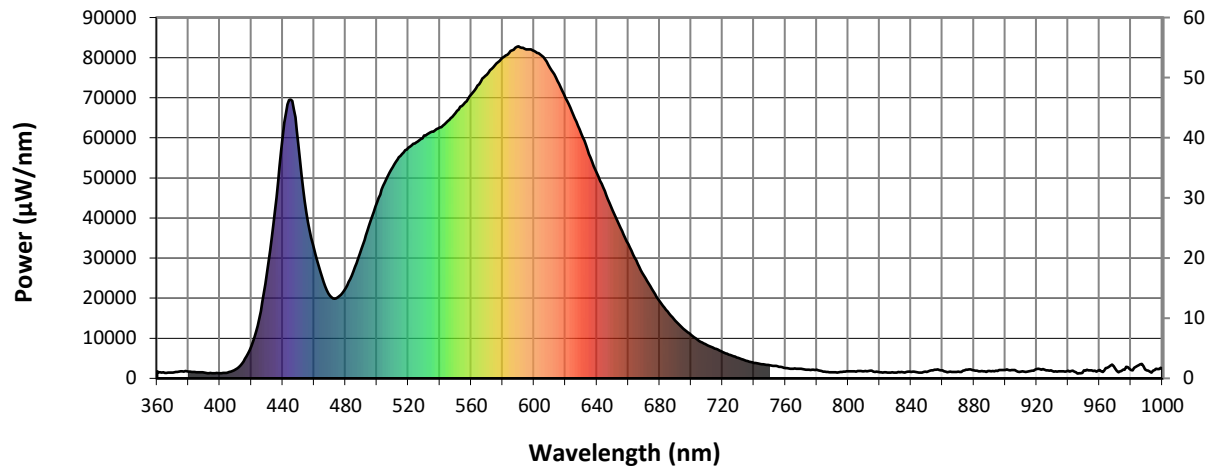
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 4000K 7-step quadrangle

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### Photopic Flux vs. Wavelength

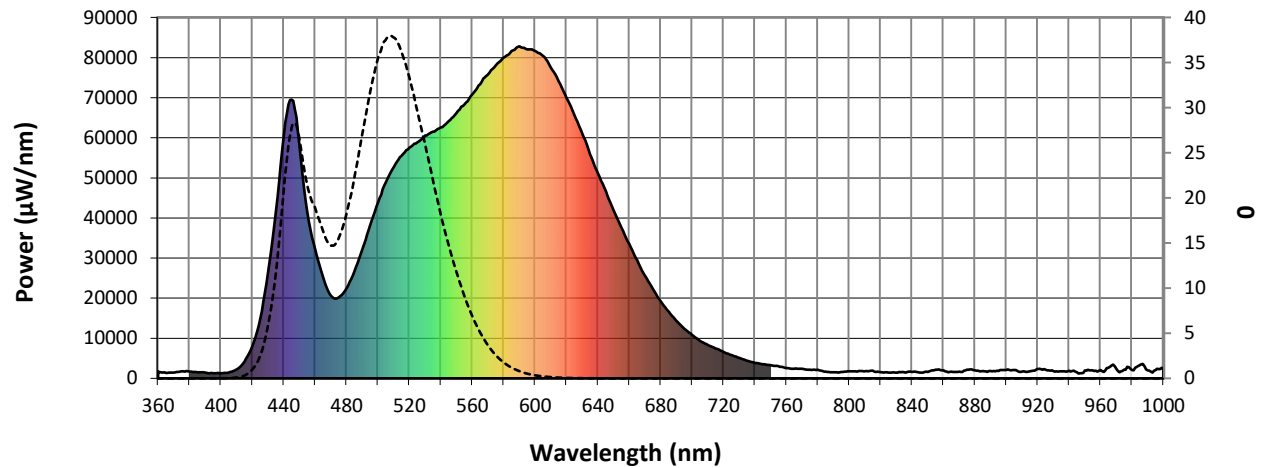


#####

| 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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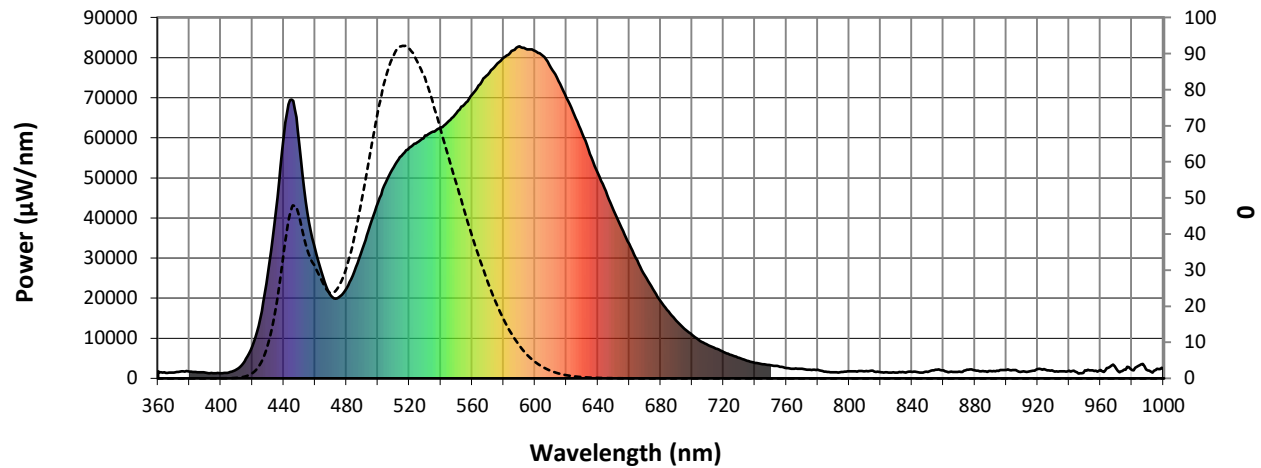
### Scotopic Flux vs. Wavelength


**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**

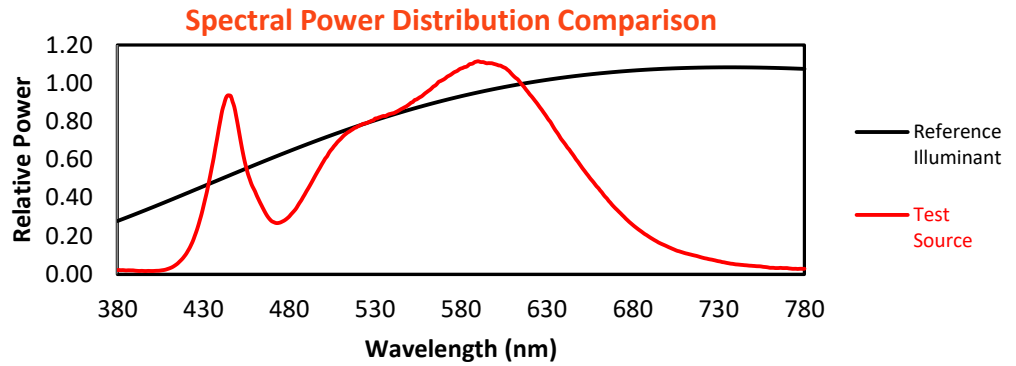
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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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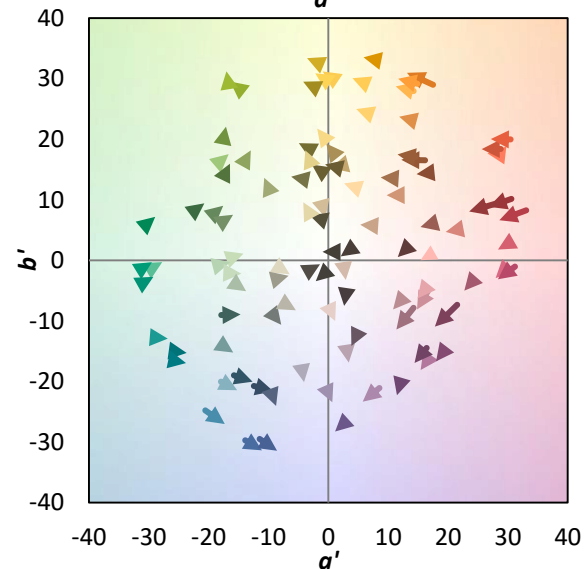
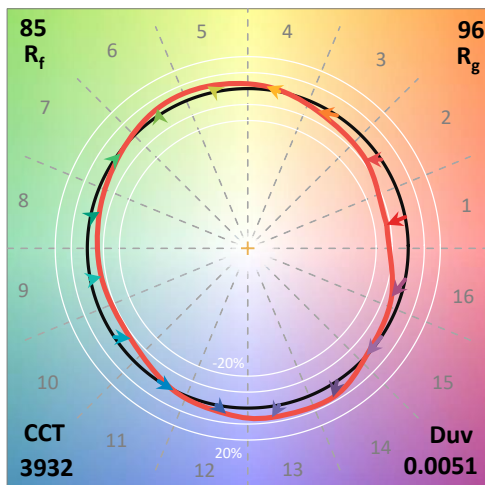
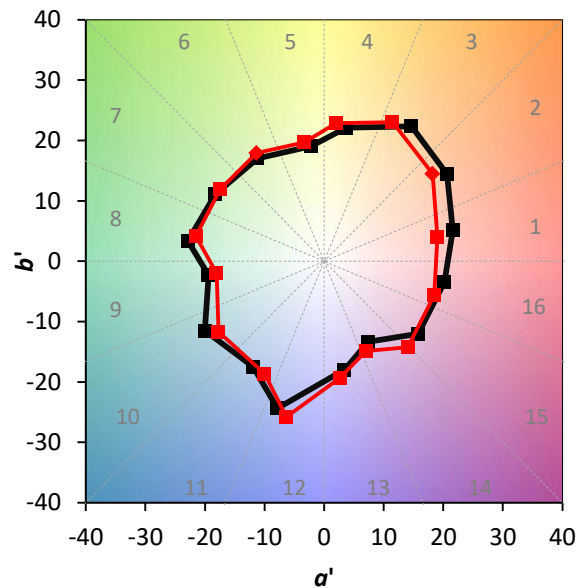
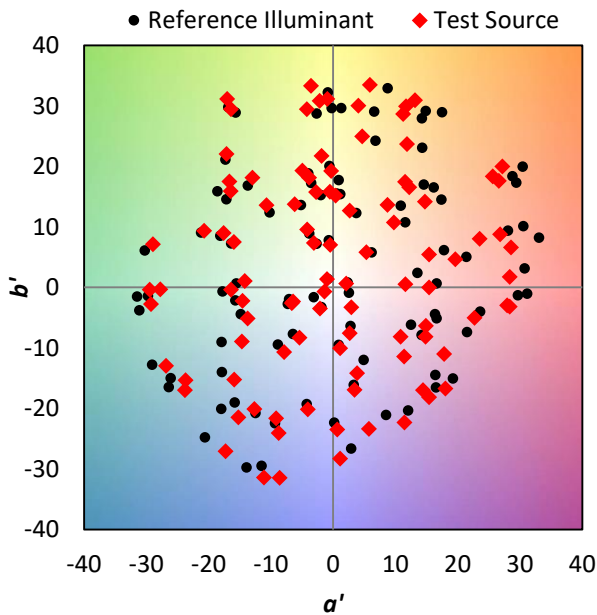
TM-30-18

### Summary

$R_f = 85.2$   
 $R_g = 96.1$   
 $CIE R_a = 81.8$   
 $R_9 = 0.1$



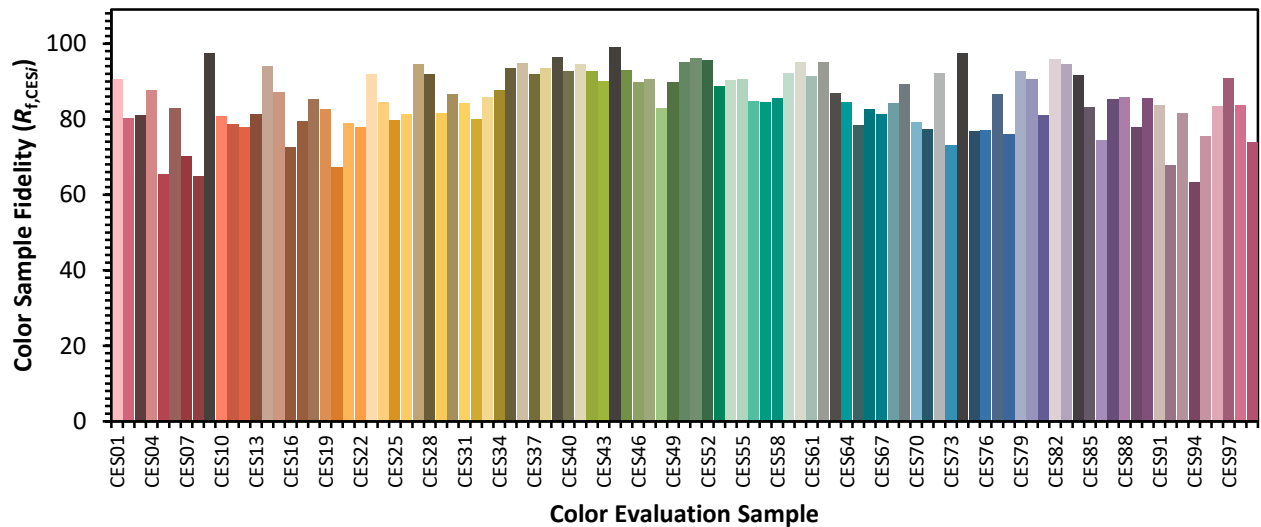
### Color Vector Graphics



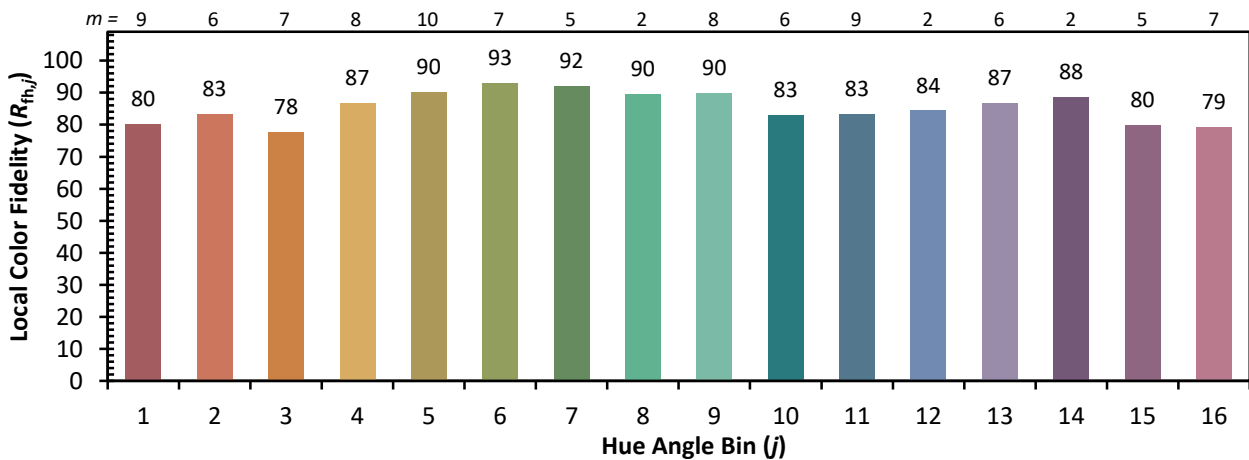
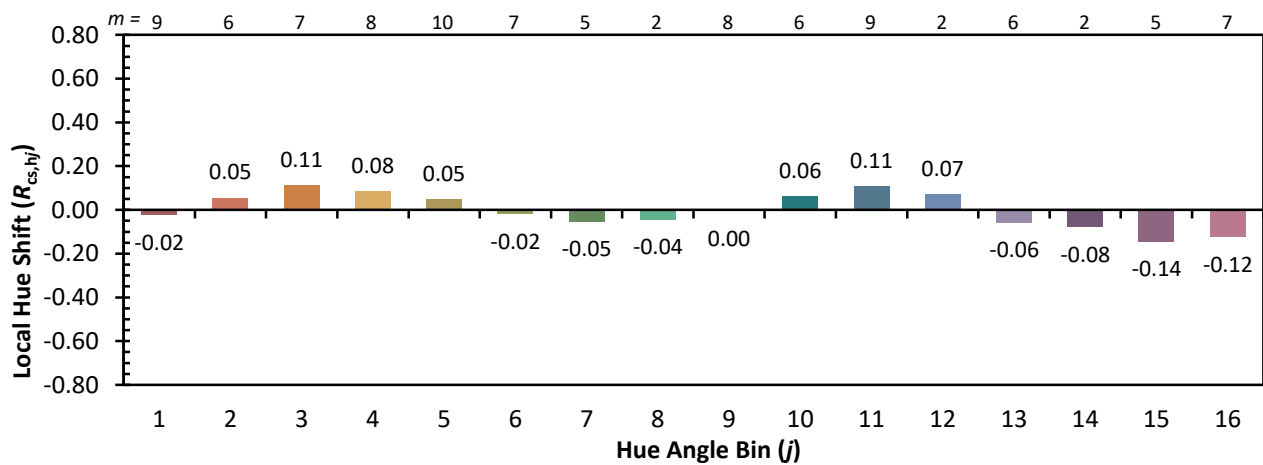
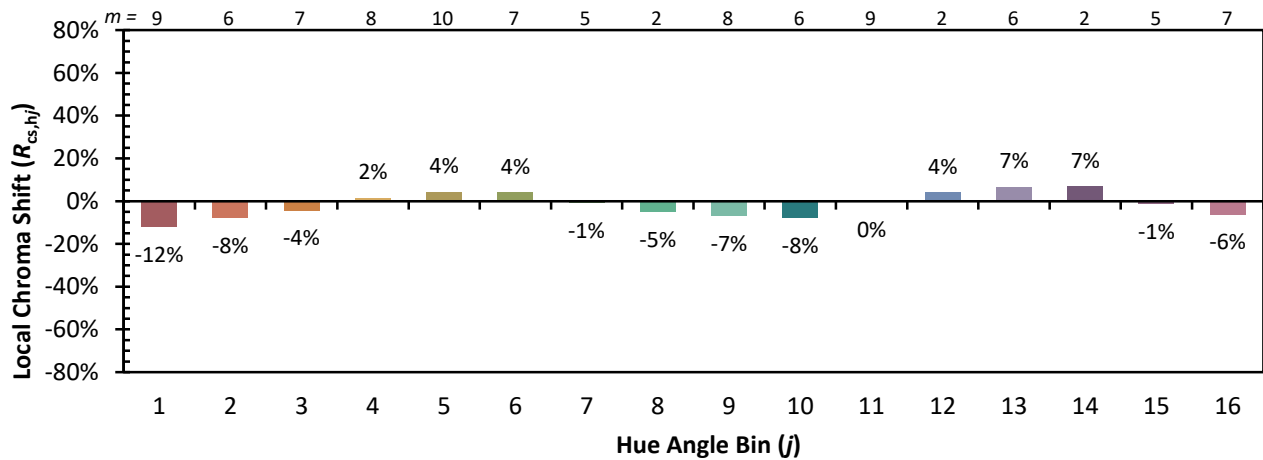


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| 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 |            |



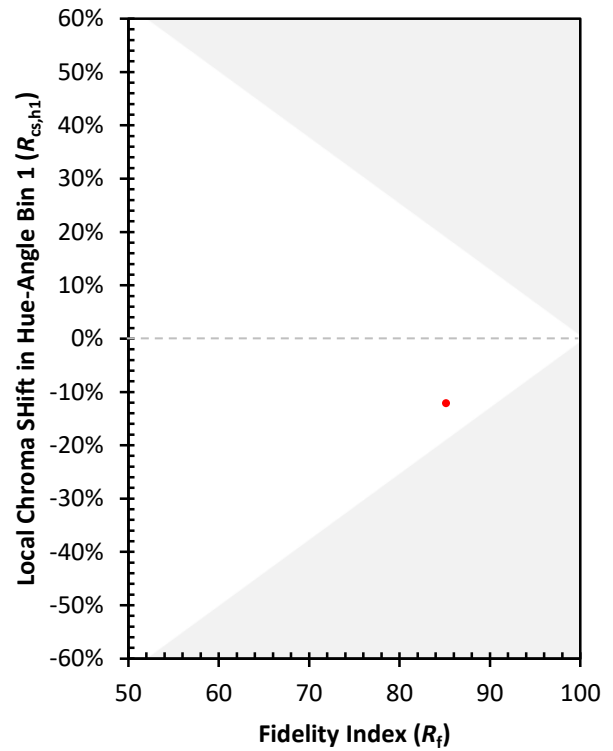
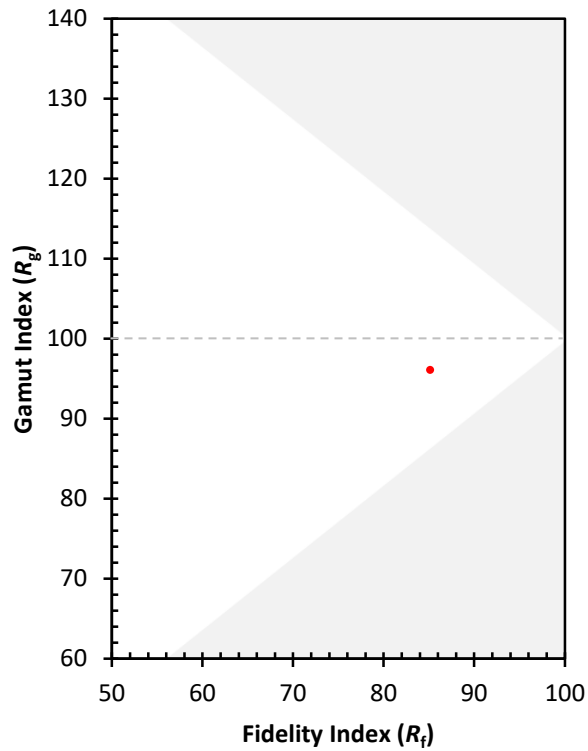
Color Rendition by Hue-Angle Bin



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)