

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: P674452

Luminaire Tested: **CCP-SA-1F-827-U-AFL-HSS**

Issue Date: 04/16/2023



**Test Information**

Test Method: LM-79-08  
Report Number: P674452  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA-1F-827-U-AFL-HSS  
Description: INVUE CLEAR CURVE POLE MOUNT Light Square Luminaire @1200mA w/ AFL  
distribution lens and House Side Shield  
Light Source: (16) 2700K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4570.5 lumens  
Efficiency: N/A  
Efficacy: 68.2 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G1

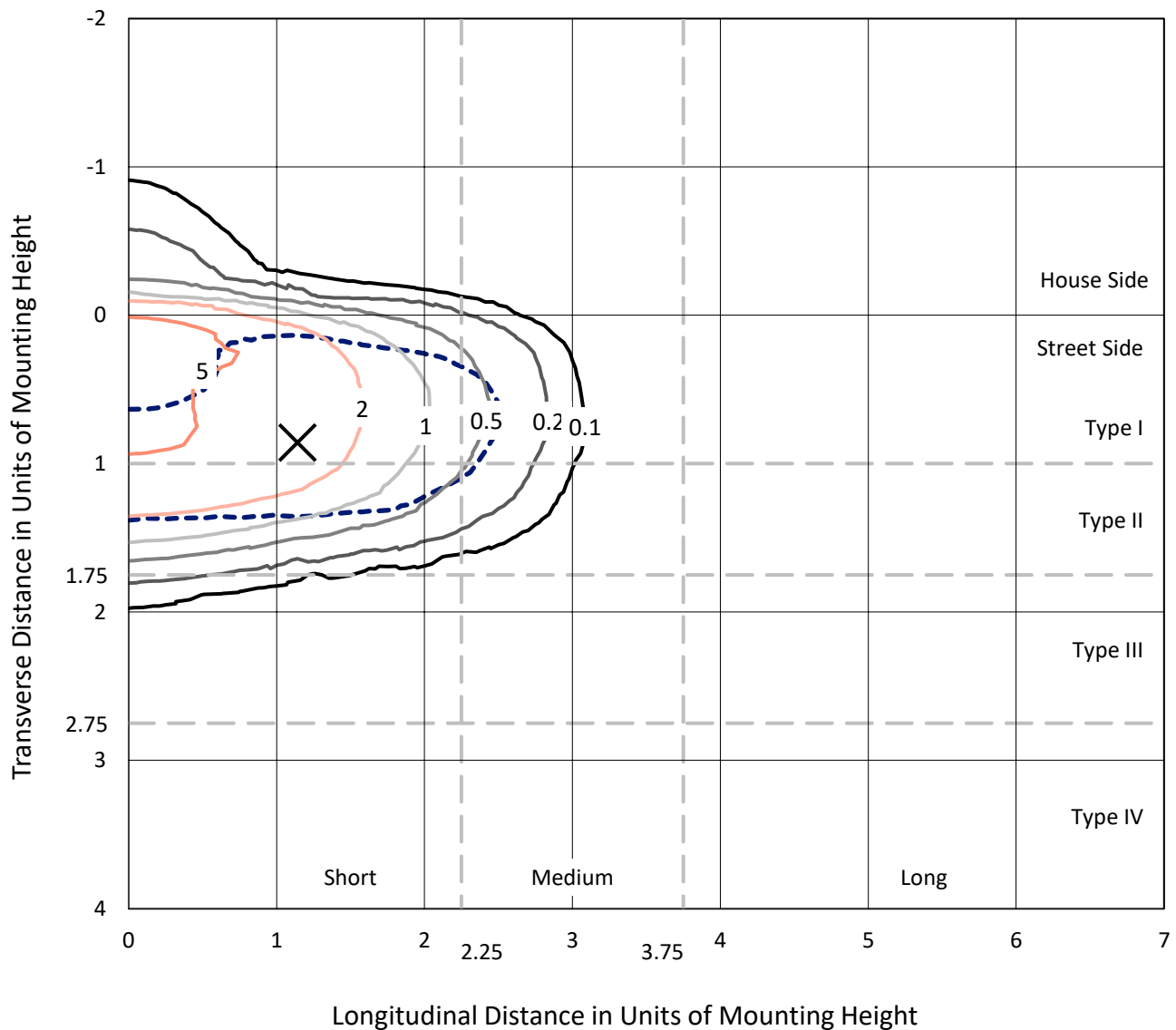
Input Watts (W): 67  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

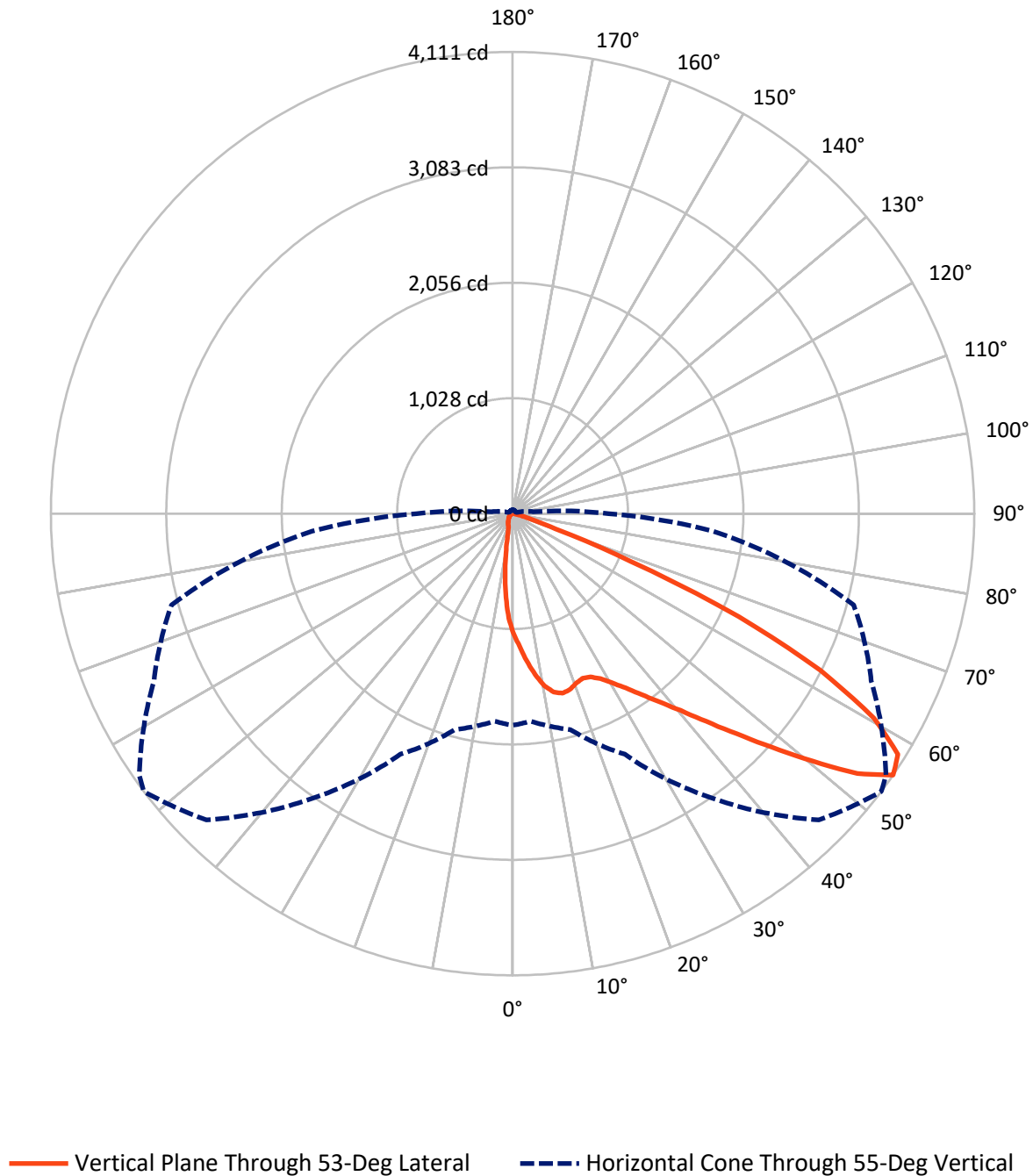
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 6.9 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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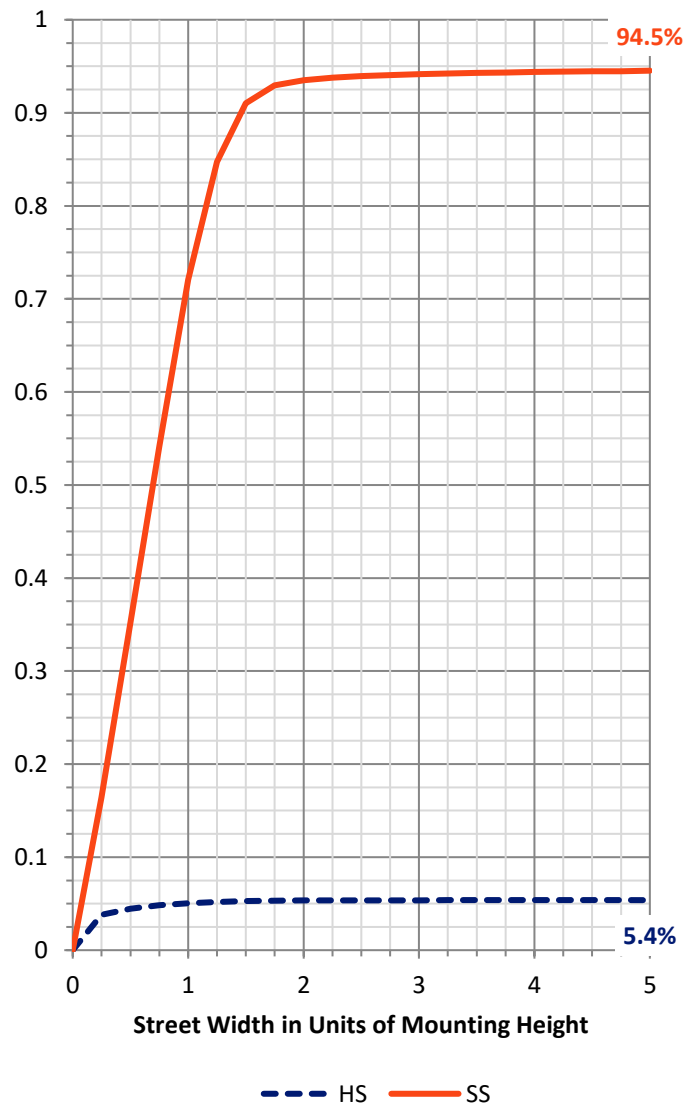
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 247.0    | 0.0    | 247.0  |
|                    | % Fixture | 5.4      | 0.0    | 5.4    |
| <b>Street Side</b> | Lumens    | 4323.4   | 0.0    | 4323.4 |
|                    | % Fixture | 94.6     | 0.0    | 94.6   |
| <b>Total</b>       | Lumens    | 4570.5   | 0.0    | 4570.5 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 95.6   | 2.1       |
| 10°-20°   | 249.9  | 5.5       |
| 20°-30°   | 418.2  | 9.2       |
| 30°-40°   | 684.2  | 15.0      |
| 40°-50°   | 1099.9 | 24.1      |
| 50°-60°   | 1241.7 | 27.2      |
| 60°-70°   | 662.4  | 14.5      |
| 70°-80°   | 108.8  | 2.4       |
| 80°-90°   | 9.7    | 0.2       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 4570.5 | 100.0     |
| 0°-180°   | 4570.5 | 100.0     |

**Coefficient of Utilization**



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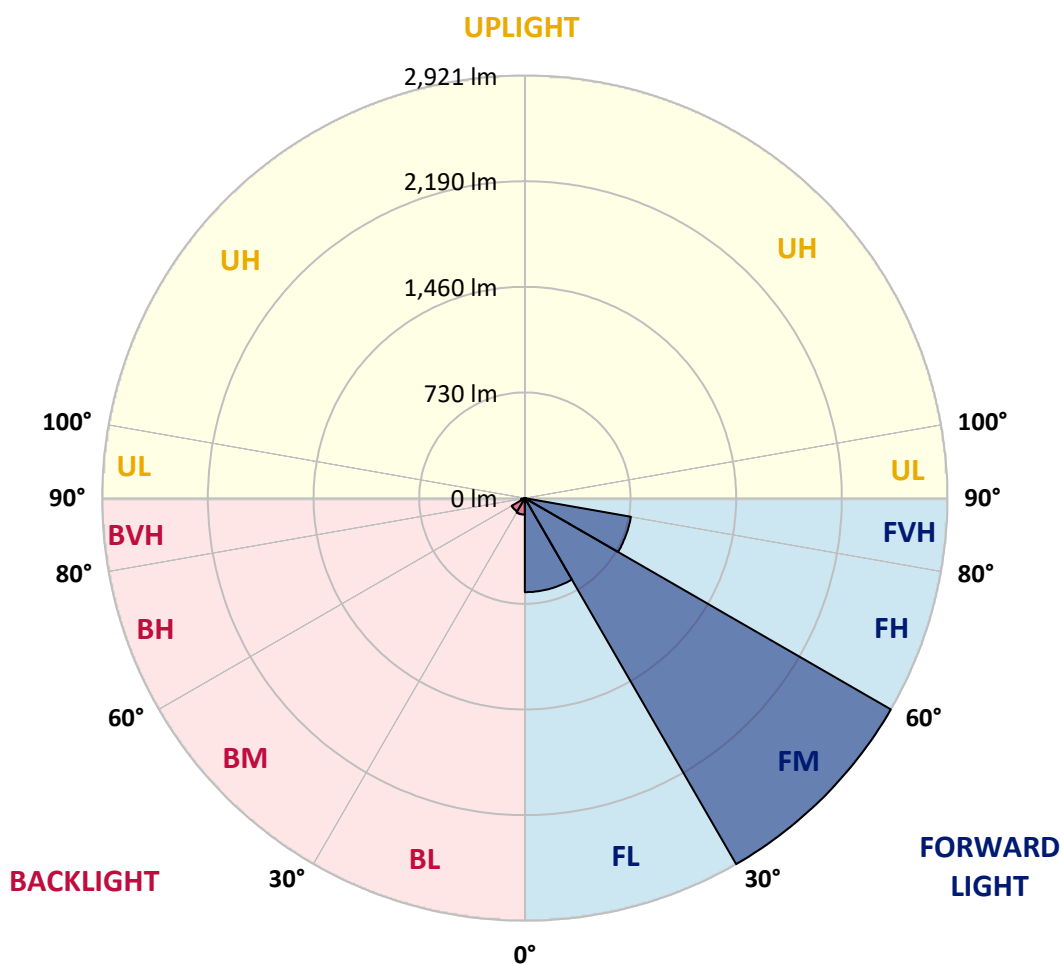
CATALOG NUMBER: CCP-SA-1F-827-U-AFL-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 649.7  | 14.2      |                         |      |         |
| FM   | (30°-60°)   | 2920.6 | 63.9      |                         |      |         |
| FH   | (60°-80°)   | 744.2  | 16.3      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 8.9    | 0.2       |                         |      | G0/10   |
| BL   | (0°-30°)    | 114.0  | 2.5       | B1/500                  |      |         |
| BM   | (30°-60°)   | 105.3  | 2.3       | B0/220                  |      |         |
| BH   | (60°-80°)   | 27.0   | 0.6       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 0.8    | 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-G1**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 53°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 |
| 2.5°  | 1282.6 | 1275.0 | 1279.4 | 1267.8 | 1246.6 | 1220.2 | 1180.5 | 1182.5 | 1151.3 | 1124.1 | 1086.4 |
| 5°    | 1494.5 | 1486.5 | 1484.1 | 1454.4 | 1424.8 | 1377.1 | 1318.3 | 1308.7 | 1251.4 | 1182.1 | 1103.2 |
| 7.5°  | 1606.2 | 1599.4 | 1604.6 | 1593.8 | 1564.6 | 1521.3 | 1446.8 | 1439.6 | 1351.1 | 1246.2 | 1130.1 |
| 10°   | 1554.9 | 1552.5 | 1574.6 | 1600.2 | 1623.8 | 1618.6 | 1559.0 | 1547.7 | 1448.4 | 1316.7 | 1157.7 |
| 12.5° | 1417.2 | 1424.8 | 1452.8 | 1500.1 | 1573.0 | 1641.4 | 1631.8 | 1633.8 | 1547.7 | 1393.2 | 1188.1 |
| 15°   | 1336.3 | 1345.5 | 1361.5 | 1386.0 | 1475.7 | 1597.4 | 1659.5 | 1679.5 | 1643.0 | 1478.5 | 1224.2 |
| 17.5° | 1329.5 | 1337.1 | 1339.5 | 1348.7 | 1401.2 | 1526.5 | 1648.3 | 1686.3 | 1727.9 | 1559.0 | 1264.6 |
| 20°   | 1382.0 | 1385.2 | 1383.2 | 1376.3 | 1395.2 | 1488.1 | 1613.0 | 1667.5 | 1798.0 | 1644.6 | 1300.3 |
| 22.5° | 1480.9 | 1476.1 | 1470.1 | 1444.8 | 1443.6 | 1498.9 | 1593.8 | 1650.7 | 1839.7 | 1715.5 | 1323.9 |
| 25°   | 1603.4 | 1593.4 | 1585.0 | 1549.3 | 1532.5 | 1555.3 | 1611.0 | 1656.7 | 1877.3 | 1784.4 | 1340.7 |
| 27.5° | 1737.2 | 1740.4 | 1719.5 | 1671.5 | 1645.0 | 1640.2 | 1664.3 | 1698.3 | 1913.7 | 1846.1 | 1349.9 |
| 30°   | 1880.1 | 1881.7 | 1854.5 | 1804.8 | 1780.8 | 1750.0 | 1748.4 | 1768.8 | 1953.0 | 1917.0 | 1358.7 |
| 32.5° | 2043.1 | 2047.5 | 2003.0 | 1951.4 | 1909.3 | 1869.3 | 1849.7 | 1866.9 | 2023.5 | 2009.5 | 1376.7 |
| 35°   | 2278.6 | 2259.3 | 2199.3 | 2121.2 | 2061.5 | 2009.1 | 1979.0 | 1990.2 | 2117.2 | 2120.4 | 1412.8 |
| 37.5° | 2521.2 | 2519.2 | 2452.8 | 2340.2 | 2242.5 | 2177.2 | 2126.0 | 2144.4 | 2248.9 | 2268.9 | 1470.5 |
| 40°   | 2747.5 | 2752.7 | 2695.0 | 2596.9 | 2471.2 | 2359.0 | 2304.2 | 2316.6 | 2423.9 | 2449.2 | 1540.5 |
| 42.5° | 2895.3 | 2892.4 | 2896.9 | 2868.8 | 2742.7 | 2610.5 | 2528.0 | 2534.8 | 2627.4 | 2640.6 | 1628.2 |
| 45°   | 2963.3 | 2952.5 | 2990.2 | 3079.1 | 3029.0 | 2890.0 | 2795.9 | 2787.5 | 2838.4 | 2834.8 | 1707.9 |
| 47.5° | 2904.5 | 2884.4 | 2970.9 | 3185.2 | 3282.1 | 3240.0 | 3105.5 | 3090.3 | 3047.0 | 3018.2 | 1790.8 |
| 50°   | 2611.7 | 2602.9 | 2787.9 | 3134.7 | 3441.1 | 3563.6 | 3464.7 | 3408.2 | 3233.2 | 3153.5 | 1834.5 |
| 52.5° | 2333.4 | 2309.0 | 2433.9 | 2877.2 | 3370.2 | 3823.9 | 3844.3 | 3743.8 | 3387.8 | 3192.4 | 1819.6 |
| 55°   | 1884.9 | 1854.9 | 1991.0 | 2363.9 | 3089.5 | 3857.1 | 4111.0 | 4058.6 | 3523.2 | 3144.3 | 1789.6 |
| 57.5° | 1144.9 | 1115.3 | 1315.5 | 1693.1 | 2470.8 | 3580.8 | 4045.3 | 4098.6 | 3627.3 | 3091.5 | 1770.0 |
| 60°   | 481.3  | 462.5  | 541.0  | 808.1  | 1577.8 | 2942.9 | 3697.0 | 3829.9 | 3646.9 | 3019.0 | 1778.0 |
| 62.5° | 250.3  | 241.9  | 246.3  | 323.6  | 637.9  | 1937.8 | 3077.1 | 3308.5 | 3449.1 | 2987.0 | 1786.0 |
| 65°   | 187.8  | 181.4  | 167.4  | 177.8  | 247.9  | 837.7  | 2211.3 | 2521.2 | 3020.2 | 2905.7 | 1731.9 |
| 67.5° | 154.2  | 148.2  | 138.2  | 135.0  | 146.2  | 290.7  | 1128.9 | 1531.7 | 2366.7 | 2559.3 | 1538.1 |
| 70°   | 122.9  | 120.9  | 117.7  | 111.7  | 109.7  | 141.0  | 404.9  | 624.3  | 1565.0 | 1804.8 | 1114.9 |
| 72.5° | 102.5  | 102.9  | 99.3   | 94.1   | 86.9   | 90.9   | 161.4  | 213.4  | 757.3  | 865.4  | 466.9  |
| 75°   | 85.7   | 85.7   | 86.9   | 79.7   | 72.5   | 62.5   | 89.7   | 104.1  | 243.1  | 199.8  | 99.7   |
| 77.5° | 67.3   | 68.1   | 73.3   | 67.3   | 58.1   | 39.2   | 48.9   | 55.7   | 72.1   | 57.7   | 36.4   |
| 80°   | 53.7   | 52.9   | 50.9   | 60.5   | 52.1   | 27.6   | 23.2   | 25.6   | 33.6   | 27.6   | 18.0   |
| 82.5° | 37.6   | 37.2   | 35.6   | 40.8   | 40.4   | 20.4   | 15.2   | 15.6   | 20.4   | 17.6   | 11.2   |
| 85°   | 9.2    | 10.8   | 22.8   | 19.2   | 16.8   | 12.0   | 9.2    | 10.0   | 13.2   | 11.6   | 6.0    |
| 87.5° | 4.0    | 4.0    | 10.4   | 12.4   | 8.0    | 5.2    | 4.0    | 4.4    | 6.8    | 6.8    | 3.6    |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 | 1069.6 |
| 2.5°  | 1073.2 | 1047.2 | 1014.3 | 979.5  | 943.9  | 901.0  | 873.8  | 851.4  | 833.7  | 820.1  | 815.3  |
| 5°    | 1077.2 | 1027.2 | 952.7  | 860.2  | 766.1  | 678.0  | 609.9  | 559.4  | 517.8  | 495.0  | 484.9  |
| 7.5°  | 1076.8 | 1010.3 | 875.8  | 720.8  | 567.8  | 440.9  | 350.8  | 295.1  | 257.9  | 242.7  | 233.5  |
| 10°   | 1076.4 | 988.3  | 788.1  | 566.2  | 379.6  | 255.5  | 188.2  | 157.0  | 143.4  | 138.2  | 137.4  |
| 12.5° | 1088.0 | 963.1  | 690.0  | 416.9  | 238.3  | 159.0  | 130.9  | 123.7  | 120.5  | 118.9  | 118.5  |
| 15°   | 1094.4 | 939.9  | 586.7  | 294.3  | 160.6  | 125.7  | 116.9  | 113.7  | 112.5  | 111.7  | 111.3  |
| 17.5° | 1101.2 | 903.8  | 488.5  | 213.0  | 128.5  | 114.1  | 108.9  | 106.9  | 106.1  | 106.1  | 106.1  |
| 20°   | 1102.4 | 865.0  | 391.2  | 157.0  | 114.1  | 106.5  | 101.3  | 99.3   | 98.1   | 97.3   | 97.3   |
| 22.5° | 1093.6 | 818.9  | 307.5  | 127.3  | 105.7  | 99.3   | 93.7   | 90.5   | 88.5   | 88.1   | 88.1   |
| 25°   | 1071.6 | 753.6  | 235.9  | 111.7  | 98.9   | 92.1   | 85.3   | 81.7   | 80.1   | 80.1   | 80.1   |
| 27.5° | 1040.0 | 676.8  | 182.2  | 99.3   | 90.1   | 83.3   | 77.3   | 74.1   | 73.7   | 73.3   | 73.7   |
| 30°   | 1003.9 | 602.7  | 139.4  | 88.1   | 79.7   | 74.1   | 69.3   | 67.7   | 68.5   | 68.5   | 68.9   |
| 32.5° | 967.9  | 528.6  | 108.9  | 79.3   | 70.5   | 65.7   | 63.3   | 63.3   | 64.5   | 64.5   | 64.5   |
| 35°   | 937.1  | 456.1  | 91.3   | 72.1   | 64.1   | 60.1   | 58.9   | 60.1   | 60.9   | 61.3   | 61.3   |
| 37.5° | 919.8  | 393.6  | 80.5   | 65.7   | 58.9   | 55.7   | 55.3   | 56.5   | 58.1   | 59.3   | 59.7   |
| 40°   | 913.4  | 345.6  | 74.1   | 60.9   | 54.1   | 52.1   | 51.7   | 53.3   | 56.1   | 58.1   | 58.5   |
| 42.5° | 913.8  | 303.1  | 68.5   | 56.1   | 50.9   | 48.1   | 48.1   | 50.5   | 53.3   | 55.3   | 55.3   |
| 45°   | 916.6  | 266.7  | 62.9   | 51.3   | 48.1   | 43.2   | 43.6   | 46.9   | 48.9   | 50.9   | 50.9   |
| 47.5° | 919.0  | 237.5  | 56.9   | 46.1   | 41.6   | 39.2   | 40.0   | 42.4   | 45.3   | 48.5   | 48.5   |
| 50°   | 905.0  | 216.6  | 50.9   | 40.4   | 36.4   | 35.6   | 37.2   | 39.2   | 43.2   | 46.5   | 46.9   |
| 52.5° | 871.4  | 197.8  | 45.7   | 36.0   | 32.8   | 33.2   | 35.2   | 36.4   | 39.6   | 40.0   | 40.4   |
| 55°   | 856.6  | 188.2  | 41.6   | 32.8   | 30.0   | 31.2   | 32.4   | 32.8   | 32.0   | 30.0   | 30.0   |
| 57.5° | 853.4  | 181.8  | 37.6   | 29.6   | 27.6   | 29.2   | 28.8   | 26.4   | 24.0   | 21.6   | 21.2   |
| 60°   | 856.6  | 173.0  | 34.4   | 25.6   | 25.2   | 25.6   | 24.4   | 20.0   | 16.8   | 15.2   | 14.4   |
| 62.5° | 838.1  | 160.2  | 31.6   | 22.0   | 22.0   | 21.6   | 18.4   | 13.6   | 10.8   | 9.6    | 9.2    |
| 65°   | 777.3  | 135.0  | 28.8   | 18.4   | 18.0   | 17.2   | 12.4   | 9.2    | 7.2    | 6.0    | 5.6    |
| 67.5° | 657.5  | 104.5  | 26.0   | 15.2   | 14.4   | 12.0   | 8.0    | 6.0    | 4.0    | 3.6    | 3.2    |
| 70°   | 448.5  | 64.9   | 22.0   | 12.0   | 10.8   | 7.6    | 4.8    | 3.6    | 2.4    | 2.0    | 1.6    |
| 72.5° | 162.6  | 37.6   | 18.4   | 9.2    | 7.2    | 4.8    | 2.8    | 1.6    | 1.2    | 1.2    | 0.8    |
| 75°   | 38.4   | 26.4   | 14.0   | 6.8    | 4.8    | 2.8    | 1.6    | 1.2    | 0.8    | 0.8    | 0.4    |
| 77.5° | 17.6   | 20.4   | 9.2    | 4.0    | 3.2    | 2.0    | 1.2    | 0.8    | 0.4    | 0.4    | 0.0    |
| 80°   | 10.0   | 14.4   | 4.4    | 2.8    | 2.4    | 1.6    | 0.8    | 0.4    | 0.4    | 0.0    | 0.0    |
| 82.5° | 5.2    | 8.0    | 3.2    | 2.4    | 2.0    | 1.2    | 0.8    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 3.6    | 4.0    | 2.4    | 2.0    | 1.6    | 1.2    | 0.8    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 2.8    | 2.8    | 2.4    | 2.0    | 1.6    | 1.2    | 0.4    | 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: SP1-2104-224-5

Luminaire Tested: CCW-SA-2A-827-U-SL4

Test Date: 04/27/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-224-5  
 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-827-U-SL4**  
 Description: INVUE WALL PACK ClearCurve Light Square

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 2661   | CRI (Ra): | 82.2 |      |      |
| CIE u':                   | 0.2642 | R1:       | 80.7 | R9:  | 5.2  |
| CIE v':                   | 0.5282 | R2:       | 91.5 | R10: | 82.2 |
| Duv:                      | 0.0001 | R3:       | 94.9 | R11: | 81.4 |
| CIE x:                    | 0.4631 | R4:       | 80.7 | R12: | 80.4 |
| CIE y:                    | 0.4115 | R5:       | 81.5 | R13: | 83.2 |
| CIE z:                    | 0.1254 | R6:       | 91.6 | R14: | 97.8 |
| Peak Wavelength (nm):     | 606    | R7:       | 81.0 |      |      |
| Dominant Wavelength (nm): | 584    | R8:       | 56.0 |      |      |
| Purity:                   | 62.8   |           |      |      |      |
| Rf:                       | 85.3   |           |      |      |      |
| Rg:                       | 96.5   |           |      |      |      |



### Test Conditions

Stabilization Time: 163M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0/47%  
 Sphere Temperature (°C): 24.1

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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            |

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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 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



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| 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       | 1379             | 0.0              | 490       | 19477            | 2.8              | 620       | 90616            | 23.6             | 750       | 4384             | 0.0              | 880       | 1655             | 0.0              |
| 365       | 1114             | 0.0              | 495       | 23200            | 4.2              | 625       | 87050            | 19.2             | 755       | 4013             | 0.0              | 885       | 1597             | 0.0              |
| 370       | 1169             | 0.0              | 500       | 26999            | 6.0              | 630       | 81805            | 14.8             | 760       | 3486             | 0.0              | 890       | 1696             | 0.0              |
| 375       | 1418             | 0.0              | 505       | 30185            | 8.4              | 635       | 76273            | 11.5             | 765       | 3111             | 0.0              | 895       | 1694             | 0.0              |
| 380       | 1358             | 0.0              | 510       | 33025            | 11.3             | 640       | 70276            | 8.4              | 770       | 2922             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1234             | 0.0              | 515       | 35307            | 14.6             | 645       | 65174            | 6.3              | 775       | 2649             | 0.0              | 905       | 1631             | 0.0              |
| 390       | 1133             | 0.0              | 520       | 37140            | 18.0             | 650       | 59417            | 4.3              | 780       | 2399             | 0.0              | 910       | 1506             | 0.0              |
| 395       | 1066             | 0.0              | 525       | 38834            | 20.8             | 655       | 53417            | 3.1              | 785       | 2386             | 0.0              | 915       | 1763             | 0.0              |
| 400       | 982              | 0.0              | 530       | 40401            | 23.8             | 660       | 48038            | 2.0              | 790       | 1912             | 0.0              | 920       | 1860             | 0.0              |
| 405       | 996              | 0.0              | 535       | 42121            | 26.1             | 665       | 42350            | 1.3              | 795       | 1902             | 0.0              | 925       | 1612             | 0.0              |
| 410       | 1276             | 0.0              | 540       | 43918            | 28.6             | 670       | 36925            | 0.8              | 800       | 2023             | 0.0              | 930       | 976              | 0.0              |
| 415       | 1798             | 0.0              | 545       | 46244            | 30.8             | 675       | 32385            | 0.5              | 805       | 1813             | 0.0              | 935       | 1702             | 0.0              |
| 420       | 2943             | 0.0              | 550       | 49225            | 33.5             | 680       | 28089            | 0.3              | 810       | 1888             | 0.0              | 940       | 1083             | 0.0              |
| 425       | 4989             | 0.0              | 555       | 52758            | 36.0             | 685       | 24306            | 0.2              | 815       | 1669             | 0.0              | 945       | 1672             | 0.0              |
| 430       | 8360             | 0.1              | 560       | 56904            | 38.7             | 690       | 20941            | 0.1              | 820       | 1558             | 0.0              | 950       | 2462             | 0.0              |
| 435       | 13537            | 0.2              | 565       | 61643            | 41.0             | 695       | 18065            | 0.1              | 825       | 1689             | 0.0              | 955       | 1958             | 0.0              |
| 440       | 21265            | 0.3              | 570       | 66872            | 43.5             | 700       | 15715            | 0.0              | 830       | 1632             | 0.0              | 960       | 2236             | 0.0              |
| 445       | 29496            | 0.6              | 575       | 72519            | 45.1             | 705       | 13502            | 0.0              | 835       | 1615             | 0.0              | 965       | 2541             | 0.0              |
| 450       | 30225            | 0.8              | 580       | 78030            | 46.4             | 710       | 11899            | 0.0              | 840       | 1583             | 0.0              | 970       | 1960             | 0.0              |
| 455       | 23120            | 0.8              | 585       | 83595            | 46.4             | 715       | 10427            | 0.0              | 845       | 1541             | 0.0              | 975       | 1763             | 0.0              |
| 460       | 18596            | 0.8              | 590       | 88814            | 45.9             | 720       | 9351             | 0.0              | 850       | 1350             | 0.0              | 980       | 1627             | 0.0              |
| 465       | 15865            | 0.8              | 595       | 91588            | 43.4             | 725       | 8139             | 0.0              | 855       | 1689             | 0.0              | 985       | 1556             | 0.0              |
| 470       | 13251            | 0.8              | 600       | 94210            | 40.6             | 730       | 7143             | 0.0              | 860       | 1763             | 0.0              | 990       | 1638             | 0.0              |
| 475       | 12609            | 1.0              | 605       | 96240            | 37.3             | 735       | 6273             | 0.0              | 865       | 1765             | 0.0              | 995       | 2124             | 0.0              |
| 480       | 14016            | 1.3              | 610       | 95474            | 32.8             | 740       | 5462             | 0.0              | 870       | 942              | 0.0              | 1000      | 1228             | 0.0              |
| 485       | 16368            | 1.9              | 615       | 93812            | 28.3             | 745       | 4946             | 0.0              | 875       | 1844             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-224-5

### Scotopic Flux vs. Wavelength



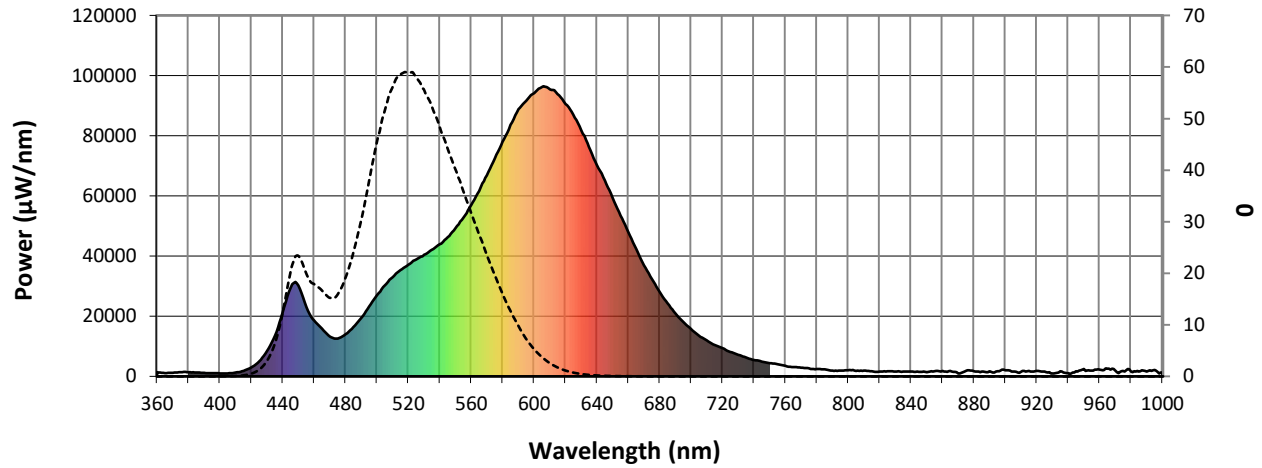
Scotopic Lumens: 5165.4

S/P: 1.2

| 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       | 1379             | 0.0              | 490       | 19477            | 30.0             | 620       | 90616            | 1.1              | 750       | 4384             | 0.0              | 880       | 1655             | 0.0              |
| 365       | 1114             | 0.0              | 495       | 23200            | 37.5             | 625       | 87050            | 0.7              | 755       | 4013             | 0.0              | 885       | 1597             | 0.0              |
| 370       | 1169             | 0.0              | 500       | 26999            | 45.2             | 630       | 81805            | 0.5              | 760       | 3486             | 0.0              | 890       | 1696             | 0.0              |
| 375       | 1418             | 0.0              | 505       | 30185            | 51.3             | 635       | 76273            | 0.3              | 765       | 3111             | 0.0              | 895       | 1694             | 0.0              |
| 380       | 1358             | 0.0              | 510       | 33025            | 56.0             | 640       | 70276            | 0.2              | 770       | 2922             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1234             | 0.0              | 515       | 35307            | 58.5             | 645       | 65174            | 0.1              | 775       | 2649             | 0.0              | 905       | 1631             | 0.0              |
| 390       | 1133             | 0.0              | 520       | 37140            | 59.0             | 650       | 59417            | 0.1              | 780       | 2399             | 0.0              | 910       | 1506             | 0.0              |
| 395       | 1066             | 0.0              | 525       | 38834            | 58.1             | 655       | 53417            | 0.0              | 785       | 2386             | 0.0              | 915       | 1763             | 0.0              |
| 400       | 982              | 0.0              | 530       | 40401            | 55.7             | 660       | 48038            | 0.0              | 790       | 1912             | 0.0              | 920       | 1860             | 0.0              |
| 405       | 996              | 0.0              | 535       | 42121            | 52.5             | 665       | 42350            | 0.0              | 795       | 1902             | 0.0              | 925       | 1612             | 0.0              |
| 410       | 1276             | 0.1              | 540       | 43918            | 48.5             | 670       | 36925            | 0.0              | 800       | 2023             | 0.0              | 930       | 976              | 0.0              |
| 415       | 1798             | 0.2              | 545       | 46244            | 44.3             | 675       | 32385            | 0.0              | 805       | 1813             | 0.0              | 935       | 1702             | 0.0              |
| 420       | 2943             | 0.5              | 550       | 49225            | 40.3             | 680       | 28089            | 0.0              | 810       | 1888             | 0.0              | 940       | 1083             | 0.0              |
| 425       | 4989             | 1.2              | 555       | 52758            | 36.1             | 685       | 24306            | 0.0              | 815       | 1669             | 0.0              | 945       | 1672             | 0.0              |
| 430       | 8360             | 2.8              | 560       | 56904            | 31.8             | 690       | 20941            | 0.0              | 820       | 1558             | 0.0              | 950       | 2462             | 0.0              |
| 435       | 13537            | 6.1              | 565       | 61643            | 27.7             | 695       | 18065            | 0.0              | 825       | 1689             | 0.0              | 955       | 1958             | 0.0              |
| 440       | 21265            | 11.9             | 570       | 66872            | 23.6             | 700       | 15715            | 0.0              | 830       | 1632             | 0.0              | 960       | 2236             | 0.0              |
| 445       | 29496            | 19.8             | 575       | 72519            | 19.7             | 705       | 13502            | 0.0              | 835       | 1615             | 0.0              | 965       | 2541             | 0.0              |
| 450       | 30225            | 23.4             | 580       | 78030            | 16.1             | 710       | 11899            | 0.0              | 840       | 1583             | 0.0              | 970       | 1960             | 0.0              |
| 455       | 23120            | 20.2             | 585       | 83595            | 12.8             | 715       | 10427            | 0.0              | 845       | 1541             | 0.0              | 975       | 1763             | 0.0              |
| 460       | 18596            | 18.0             | 590       | 88814            | 9.9              | 720       | 9351             | 0.0              | 850       | 1350             | 0.0              | 980       | 1627             | 0.0              |
| 465       | 15865            | 16.8             | 595       | 91588            | 7.3              | 725       | 8139             | 0.0              | 855       | 1689             | 0.0              | 985       | 1556             | 0.0              |
| 470       | 13251            | 15.3             | 600       | 94210            | 5.3              | 730       | 7143             | 0.0              | 860       | 1763             | 0.0              | 990       | 1638             | 0.0              |
| 475       | 12609            | 15.8             | 605       | 96240            | 3.8              | 735       | 6273             | 0.0              | 865       | 1765             | 0.0              | 995       | 2124             | 0.0              |
| 480       | 14016            | 18.9             | 610       | 95474            | 2.6              | 740       | 5462             | 0.0              | 870       | 942              | 0.0              | 1000      | 1228             | 0.0              |
| 485       | 16368            | 23.7             | 615       | 93812            | 1.7              | 745       | 4946             | 0.0              | 875       | 1844             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 1892.1      M/P: 0.44**

| 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       | 1379             | 0.0              | 490       | 19477            | 16.2             | 620       | 90616            | 0.1              | 750       | 4384             | 0.0              | 880       | 1655             | 0.0              |
| 365       | 1114             | 0.0              | 495       | 23200            | 19.2             | 625       | 87050            | 0.0              | 755       | 4013             | 0.0              | 885       | 1597             | 0.0              |
| 370       | 1169             | 0.0              | 500       | 26999            | 21.7             | 630       | 81805            | 0.0              | 760       | 3486             | 0.0              | 890       | 1696             | 0.0              |
| 375       | 1418             | 0.0              | 505       | 30185            | 23.2             | 635       | 76273            | 0.0              | 765       | 3111             | 0.0              | 895       | 1694             | 0.0              |
| 380       | 1358             | 0.0              | 510       | 33025            | 23.7             | 640       | 70276            | 0.0              | 770       | 2922             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1234             | 0.0              | 515       | 35307            | 23.1             | 645       | 65174            | 0.0              | 775       | 2649             | 0.0              | 905       | 1631             | 0.0              |
| 390       | 1133             | 0.0              | 520       | 37140            | 21.6             | 650       | 59417            | 0.0              | 780       | 2399             | 0.0              | 910       | 1506             | 0.0              |
| 395       | 1066             | 0.0              | 525       | 38834            | 19.7             | 655       | 53417            | 0.0              | 785       | 2386             | 0.0              | 915       | 1763             | 0.0              |
| 400       | 982              | 0.0              | 530       | 40401            | 17.5             | 660       | 48038            | 0.0              | 790       | 1912             | 0.0              | 920       | 1860             | 0.0              |
| 405       | 996              | 0.0              | 535       | 42121            | 15.2             | 665       | 42350            | 0.0              | 795       | 1902             | 0.0              | 925       | 1612             | 0.0              |
| 410       | 1276             | 0.0              | 540       | 43918            | 12.9             | 670       | 36925            | 0.0              | 800       | 2023             | 0.0              | 930       | 976              | 0.0              |
| 415       | 1798             | 0.1              | 545       | 46244            | 10.7             | 675       | 32385            | 0.0              | 805       | 1813             | 0.0              | 935       | 1702             | 0.0              |
| 420       | 2943             | 0.3              | 550       | 49225            | 8.8              | 680       | 28089            | 0.0              | 810       | 1888             | 0.0              | 940       | 1083             | 0.0              |
| 425       | 4989             | 0.8              | 555       | 52758            | 7.1              | 685       | 24306            | 0.0              | 815       | 1669             | 0.0              | 945       | 1672             | 0.0              |
| 430       | 8360             | 1.8              | 560       | 56904            | 5.6              | 690       | 20941            | 0.0              | 820       | 1558             | 0.0              | 950       | 2462             | 0.0              |
| 435       | 13537            | 3.6              | 565       | 61643            | 4.3              | 695       | 18065            | 0.0              | 825       | 1689             | 0.0              | 955       | 1958             | 0.0              |
| 440       | 21265            | 7.1              | 570       | 66872            | 3.3              | 700       | 15715            | 0.0              | 830       | 1632             | 0.0              | 960       | 2236             | 0.0              |
| 445       | 29496            | 11.6             | 575       | 72519            | 2.4              | 705       | 13502            | 0.0              | 835       | 1615             | 0.0              | 965       | 2541             | 0.0              |
| 450       | 30225            | 13.9             | 580       | 78030            | 1.7              | 710       | 11899            | 0.0              | 840       | 1583             | 0.0              | 970       | 1960             | 0.0              |
| 455       | 23120            | 12.1             | 585       | 83595            | 1.2              | 715       | 10427            | 0.0              | 845       | 1541             | 0.0              | 975       | 1763             | 0.0              |
| 460       | 18596            | 11.0             | 590       | 88814            | 0.9              | 720       | 9351             | 0.0              | 850       | 1350             | 0.0              | 980       | 1627             | 0.0              |
| 465       | 15865            | 10.4             | 595       | 91588            | 0.6              | 725       | 8139             | 0.0              | 855       | 1689             | 0.0              | 985       | 1556             | 0.0              |
| 470       | 13251            | 9.5              | 600       | 94210            | 0.4              | 730       | 7143             | 0.0              | 860       | 1763             | 0.0              | 990       | 1638             | 0.0              |
| 475       | 12609            | 9.6              | 605       | 96240            | 0.3              | 735       | 6273             | 0.0              | 865       | 1765             | 0.0              | 995       | 2124             | 0.0              |
| 480       | 14016            | 11.3             | 610       | 95474            | 0.2              | 740       | 5462             | 0.0              | 870       | 942              | 0.0              | 1000      | 1228             | 0.0              |
| 485       | 16368            | 13.5             | 615       | 93812            | 0.1              | 745       | 4946             | 0.0              | 875       | 1844             | 0.0              |           |                  |                  |

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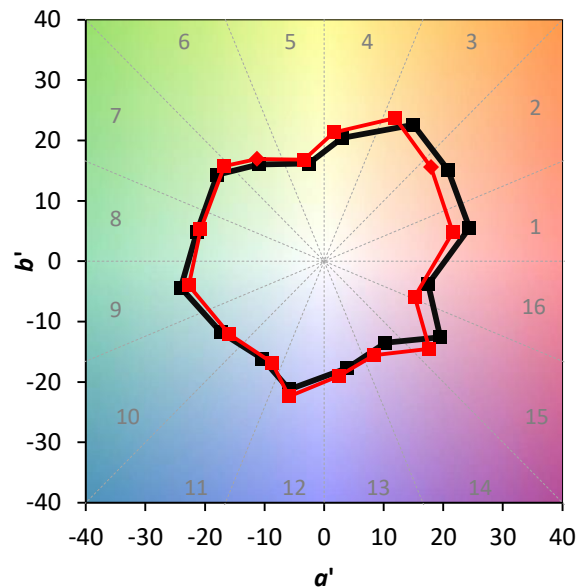
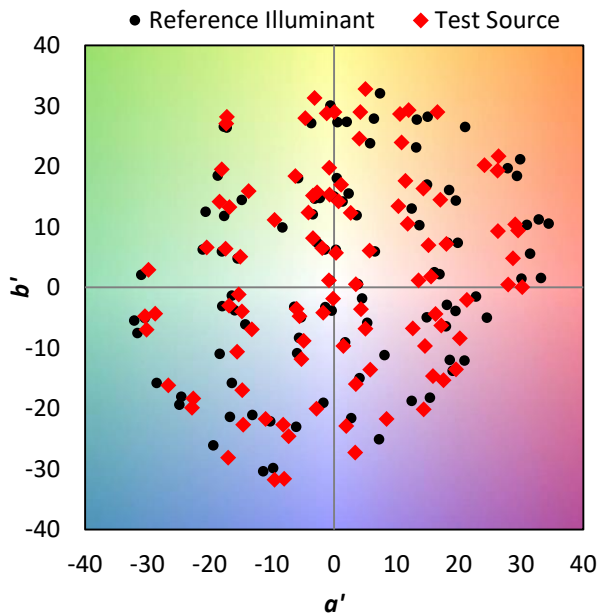
TM-30-18

### Summary

$R_f = 85.3$   
 $R_g = 96.5$   
 CIE  $R_a = 82.2$   
 $R_9 = 5.2$

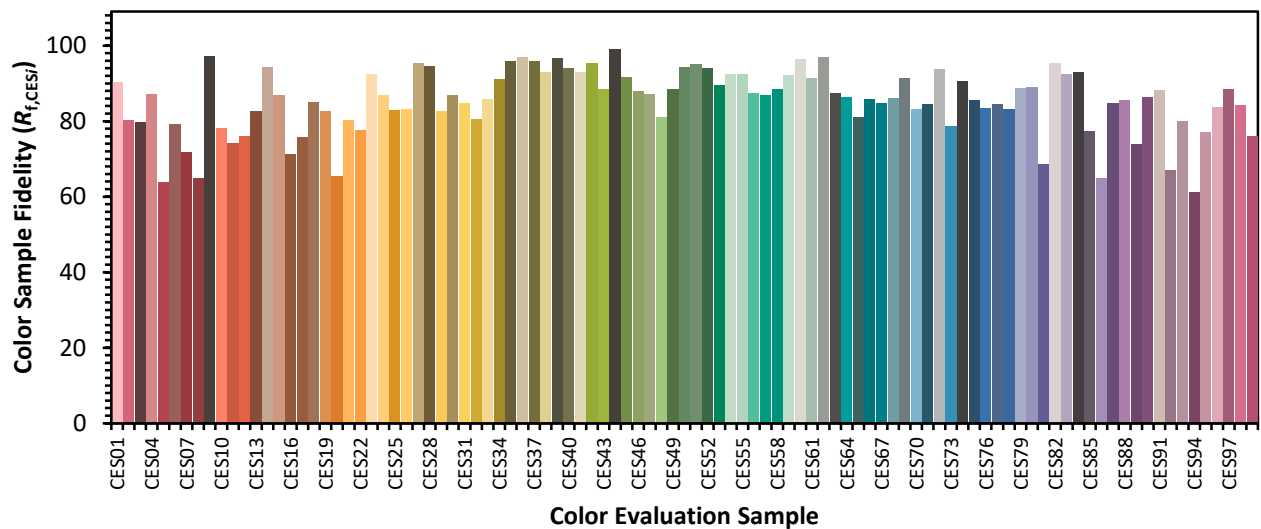


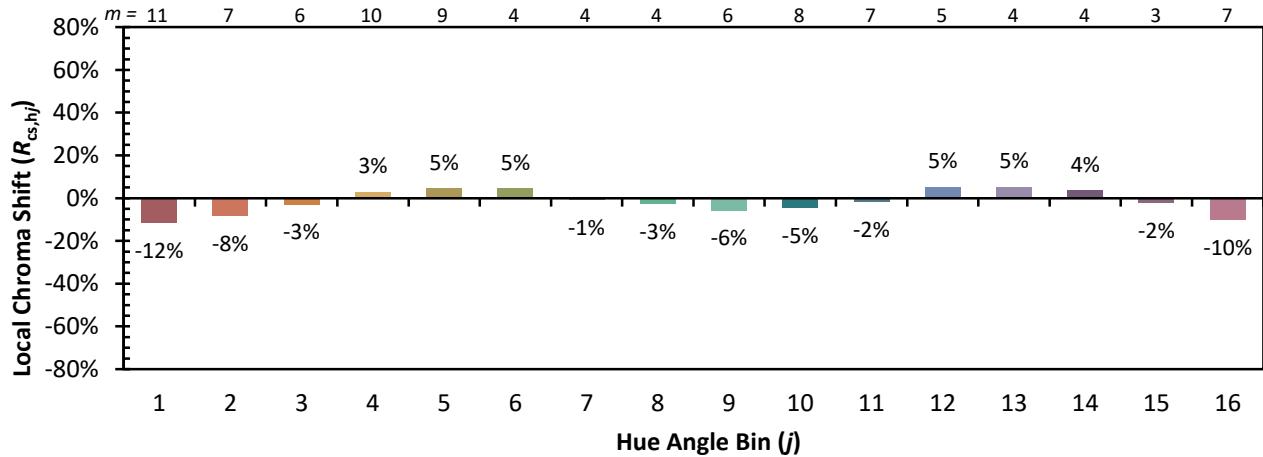
### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 83 | CES51 = 95 | CES76 = 83 |
| CES02 = 64 | CES27 = 95 | CES52 = 94 | CES77 = 85 |
| CES03 = 32 | CES28 = 95 | CES53 = 89 | CES78 = 83 |
| CES04 = 71 | CES29 = 83 | CES54 = 92 | CES79 = 89 |
| CES05 = 51 | CES30 = 87 | CES55 = 92 | CES80 = 89 |
| CES06 = 52 | CES31 = 85 | CES56 = 87 | CES81 = 69 |
| CES07 = 43 | CES32 = 81 | CES57 = 87 | CES82 = 95 |
| CES08 = 42 | CES33 = 86 | CES58 = 88 | CES83 = 92 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 93 |
| CES10 = 77 | CES35 = 96 | CES60 = 96 | CES85 = 77 |
| CES11 = 60 | CES36 = 97 | CES61 = 91 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 97 | CES87 = 85 |
| CES13 = 44 | CES38 = 93 | CES63 = 87 | CES88 = 85 |
| CES14 = 74 | CES39 = 97 | CES64 = 86 | CES89 = 74 |
| CES15 = 72 | CES40 = 94 | CES65 = 81 | CES90 = 86 |
| CES16 = 48 | CES41 = 93 | CES66 = 86 | CES91 = 88 |
| CES17 = 50 | CES42 = 95 | CES67 = 85 | CES92 = 67 |
| CES18 = 57 | CES43 = 88 | CES68 = 86 | CES93 = 80 |
| CES19 = 73 | CES44 = 99 | CES69 = 91 | CES94 = 61 |
| CES20 = 67 | CES45 = 92 | CES70 = 83 | CES95 = 77 |
| CES21 = 87 | CES46 = 88 | CES71 = 85 | CES96 = 84 |
| CES22 = 80 | CES47 = 87 | CES72 = 94 | CES97 = 88 |
| CES23 = 92 | CES48 = 81 | CES73 = 79 | CES98 = 84 |
| CES24 = 91 | CES49 = 88 | CES74 = 90 | CES99 = 76 |
| CES25 = 72 | CES50 = 94 | CES75 = 86 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)