

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: P674462

Luminaire Tested: **CCP-SA-1E-830-U-AFL-HSS**

Issue Date: 04/16/2023

**Test Information**

Test Method: LM-79-08  
Report Number: P674462  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA-1E-830-U-AFL-HSS  
Description: INVUE CLEAR CURVE POLE MOUNT Light Square Luminaire @1050mA w/ AFL  
distribution lens and House Side Shield  
Light Source: (16) 3000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4505.1 lumens  
Efficiency: N/A  
Efficacy: 80.3 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G1

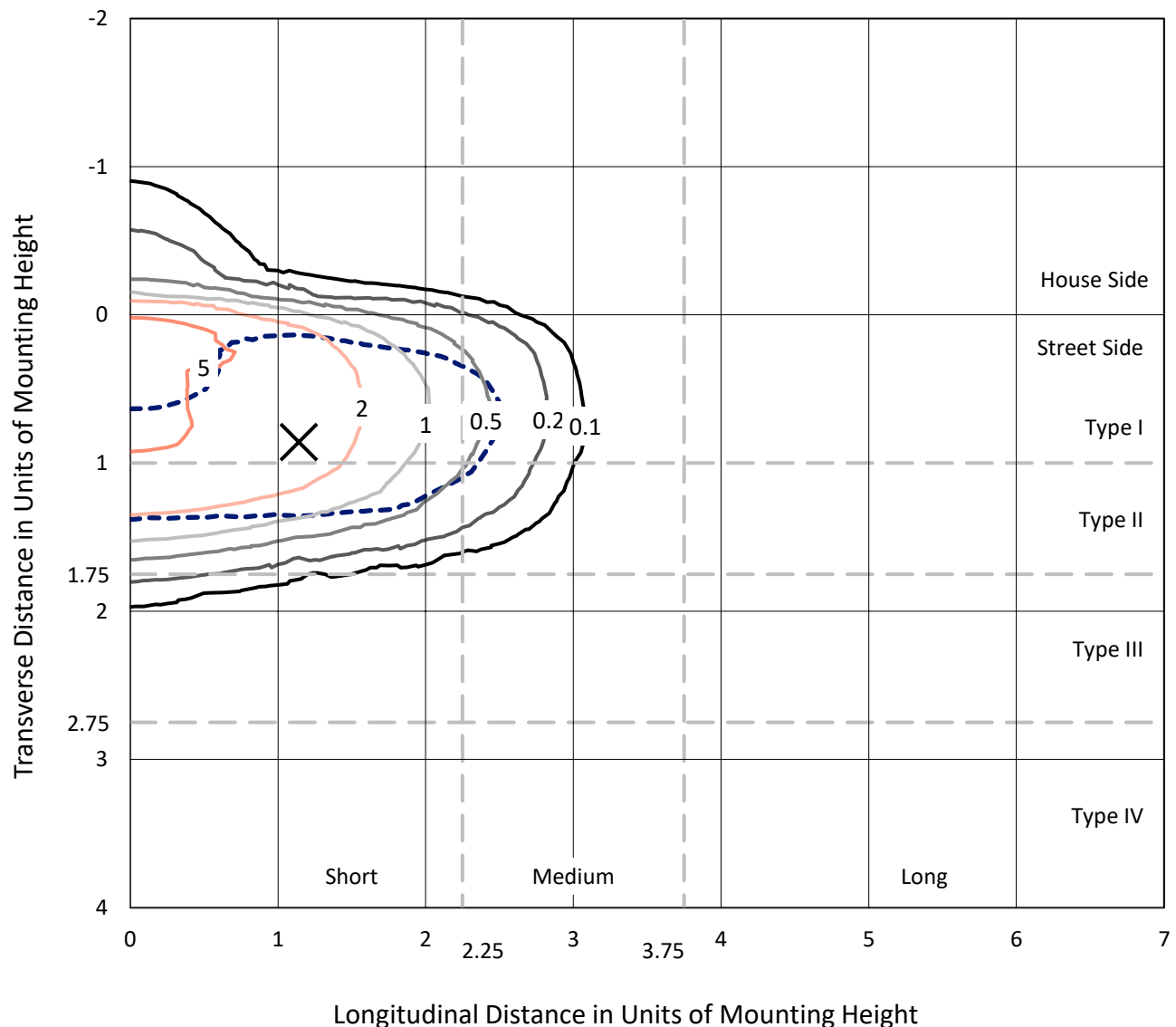
Input Watts (W): 56.1  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

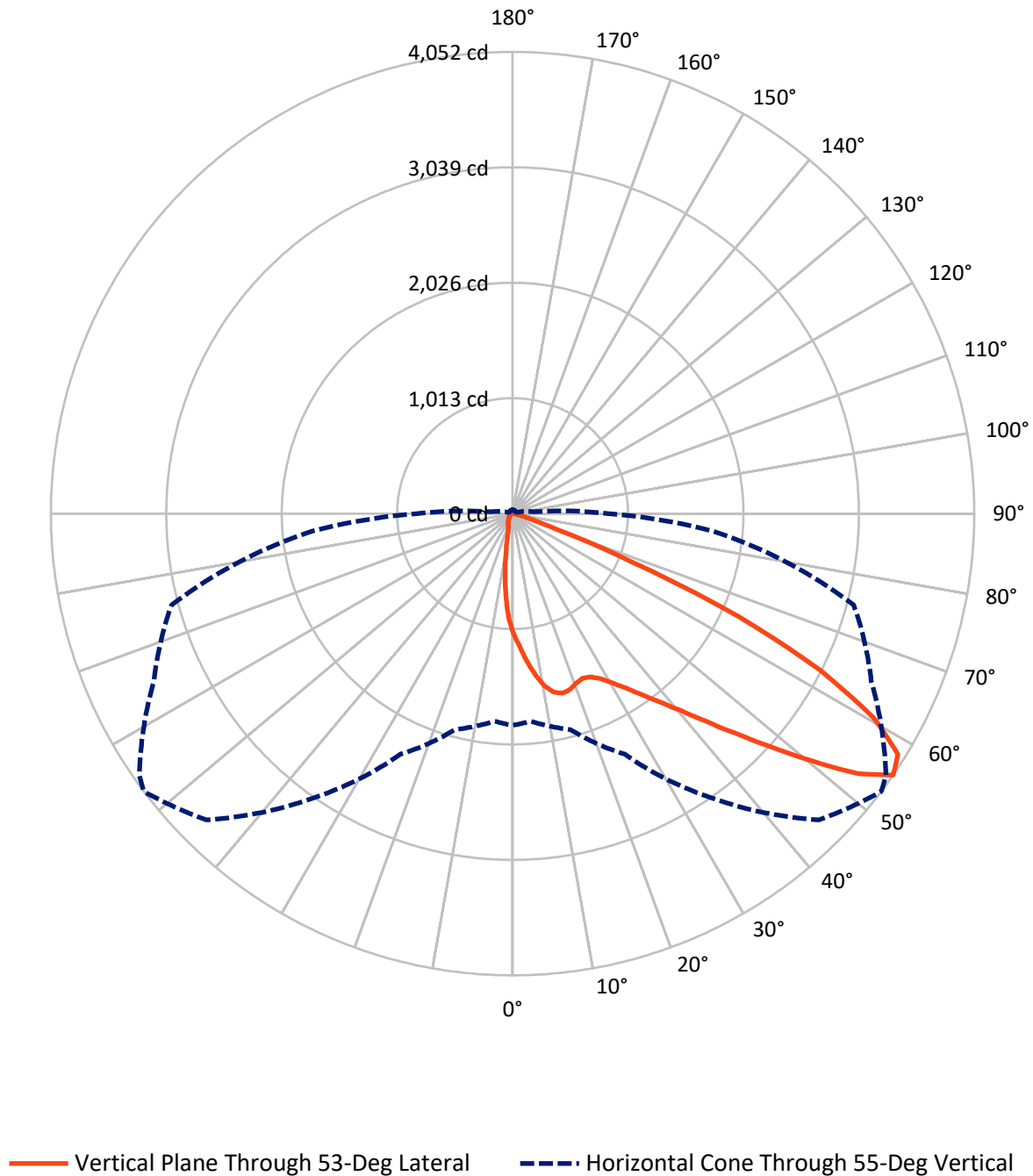
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 6.8 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    | 243.5    | 0.0    | 243.5  |
|                    | % Fixture | 5.4      | 0.0    | 5.4    |
| <b>Street Side</b> | Lumens    | 4261.6   | 0.0    | 4261.6 |
|                    | % Fixture | 94.6     | 0.0    | 94.6   |
| <b>Total</b>       | Lumens    | 4505.1   | 0.0    | 4505.1 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 94.3   | 2.1       |
| 10°-20°   | 246.3  | 5.5       |
| 20°-30°   | 412.2  | 9.2       |
| 30°-40°   | 674.4  | 15.0      |
| 40°-50°   | 1084.1 | 24.1      |
| 50°-60°   | 1224.0 | 27.2      |
| 60°-70°   | 652.9  | 14.5      |
| 70°-80°   | 107.3  | 2.4       |
| 80°-90°   | 9.6    | 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°    | 4505.1 | 100.0     |
| 0°-180°   | 4505.1 | 100.0     |

**Coefficient of Utilization**



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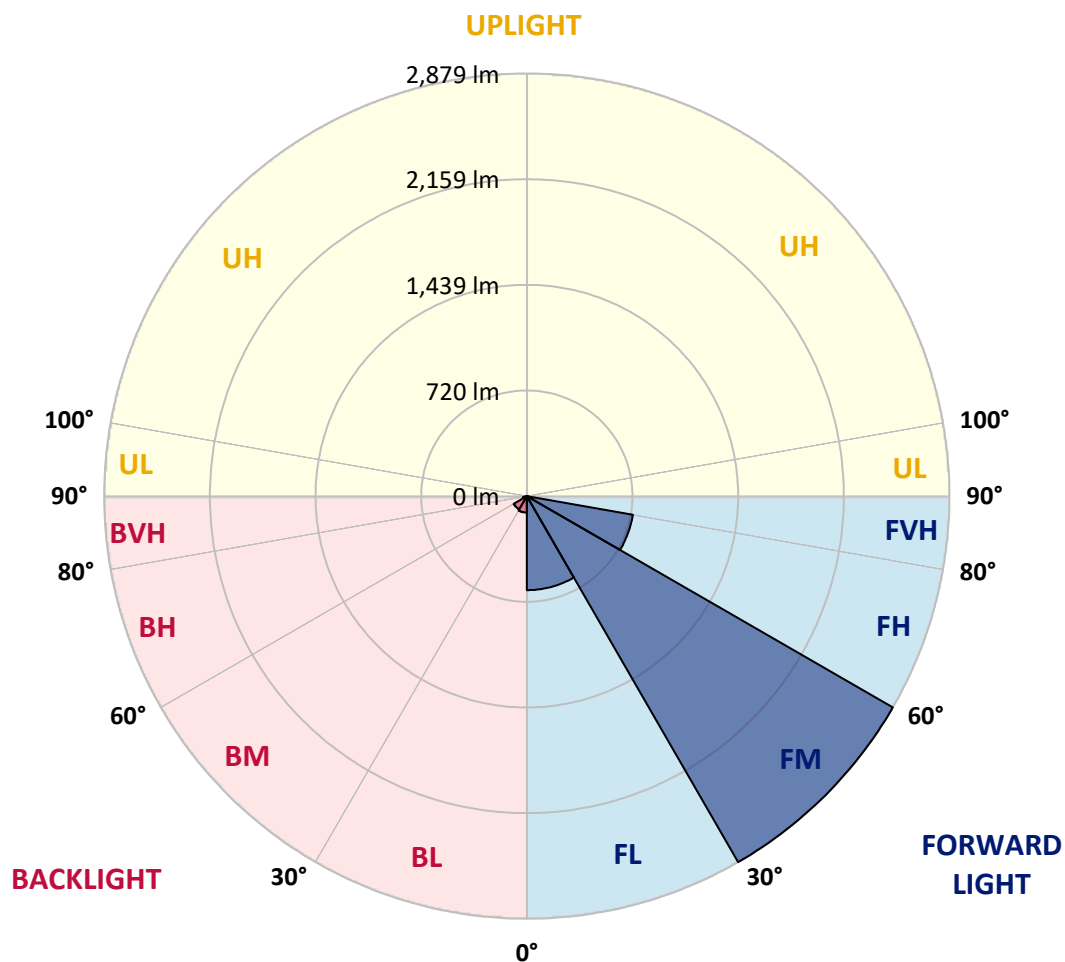
CATALOG NUMBER: CCP-SA-1E-830-U-AFL-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 640.4  | 14.2      |                         |      |         |
| FM   | (30°-60°)   | 2878.8 | 63.9      |                         |      |         |
| FH   | (60°-80°)   | 733.5  | 16.3      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 8.8    | 0.2       |                         |      | G0/10   |
| BL   | (0°-30°)    | 112.4  | 2.5       | B1/500                  |      |         |
| BM   | (30°-60°)   | 103.8  | 2.3       | B0/220                  |      |         |
| BH   | (60°-80°)   | 26.6   | 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



REPORT NUMBER: P674462

CATALOG NUMBER: CCP-SA-1E-830-U-AFL-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 53°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 |
| 2.5°  | 1264.3 | 1256.8 | 1261.1 | 1249.7 | 1228.8 | 1202.7 | 1163.6 | 1165.6 | 1134.8 | 1108.0 | 1070.9 |
| 5°    | 1473.1 | 1465.2 | 1462.8 | 1433.6 | 1404.4 | 1357.4 | 1299.4 | 1290.0 | 1233.5 | 1165.2 | 1087.5 |
| 7.5°  | 1583.2 | 1576.5 | 1581.6 | 1571.0 | 1542.2 | 1499.5 | 1426.1 | 1419.0 | 1331.8 | 1228.4 | 1113.9 |
| 10°   | 1532.7 | 1530.3 | 1552.0 | 1577.3 | 1600.6 | 1595.5 | 1536.7 | 1525.6 | 1427.7 | 1297.8 | 1141.1 |
| 12.5° | 1396.9 | 1404.4 | 1432.0 | 1478.6 | 1550.5 | 1618.0 | 1608.5 | 1610.5 | 1525.6 | 1373.2 | 1171.1 |
| 15°   | 1317.2 | 1326.3 | 1342.1 | 1366.1 | 1454.5 | 1574.5 | 1635.7 | 1655.5 | 1619.5 | 1457.3 | 1206.7 |
| 17.5° | 1310.5 | 1318.0 | 1320.3 | 1329.4 | 1381.1 | 1504.7 | 1624.7 | 1662.2 | 1703.2 | 1536.7 | 1246.5 |
| 20°   | 1362.2 | 1365.3 | 1363.4 | 1356.7 | 1375.2 | 1466.8 | 1589.9 | 1643.6 | 1772.3 | 1621.1 | 1281.7 |
| 22.5° | 1459.7 | 1454.9 | 1449.0 | 1424.2 | 1423.0 | 1477.4 | 1571.0 | 1627.0 | 1813.4 | 1691.0 | 1304.9 |
| 25°   | 1580.5 | 1570.6 | 1562.3 | 1527.2 | 1510.6 | 1533.1 | 1588.0 | 1633.0 | 1850.5 | 1758.9 | 1321.5 |
| 27.5° | 1712.3 | 1715.5 | 1694.9 | 1647.6 | 1621.5 | 1616.8 | 1640.5 | 1674.0 | 1886.4 | 1819.7 | 1330.6 |
| 30°   | 1853.2 | 1854.8 | 1828.0 | 1779.0 | 1755.3 | 1724.9 | 1723.4 | 1743.5 | 1925.1 | 1889.5 | 1339.3 |
| 32.5° | 2013.9 | 2018.2 | 1974.4 | 1923.5 | 1882.0 | 1842.6 | 1823.2 | 1840.2 | 1994.5 | 1980.7 | 1357.1 |
| 35°   | 2246.0 | 2227.0 | 2167.8 | 2090.8 | 2032.0 | 1980.3 | 1950.7 | 1961.8 | 2086.9 | 2090.1 | 1392.6 |
| 37.5° | 2485.2 | 2483.2 | 2417.7 | 2306.8 | 2210.4 | 2146.1 | 2095.6 | 2113.7 | 2216.8 | 2236.5 | 1449.4 |
| 40°   | 2708.2 | 2713.3 | 2656.5 | 2559.8 | 2435.8 | 2325.3 | 2271.2 | 2283.5 | 2389.2 | 2414.1 | 1518.5 |
| 42.5° | 2853.8 | 2851.1 | 2855.4 | 2827.8 | 2703.4 | 2573.2 | 2491.9 | 2498.6 | 2589.8 | 2602.8 | 1604.9 |
| 45°   | 2920.9 | 2910.3 | 2947.4 | 3035.0 | 2985.7 | 2848.7 | 2755.9 | 2747.7 | 2797.8 | 2794.2 | 1683.5 |
| 47.5° | 2862.9 | 2843.2 | 2928.4 | 3139.6 | 3235.1 | 3193.7 | 3061.1 | 3046.1 | 3003.4 | 2975.0 | 1765.2 |
| 50°   | 2574.4 | 2565.7 | 2748.1 | 3089.9 | 3391.8 | 3512.6 | 3415.1 | 3359.5 | 3187.0 | 3108.4 | 1808.2 |
| 52.5° | 2300.0 | 2276.0 | 2399.1 | 2836.1 | 3322.0 | 3769.2 | 3789.3 | 3690.3 | 3339.3 | 3146.7 | 1793.6 |
| 55°   | 1858.0 | 1828.4 | 1962.6 | 2330.0 | 3045.3 | 3802.0 | 4052.2 | 4000.5 | 3472.8 | 3099.4 | 1764.0 |
| 57.5° | 1128.5 | 1099.3 | 1296.7 | 1668.9 | 2435.4 | 3529.6 | 3987.5 | 4040.0 | 3575.4 | 3047.3 | 1744.7 |
| 60°   | 474.5  | 455.9  | 533.3  | 796.5  | 1555.2 | 2900.8 | 3644.1 | 3775.1 | 3594.7 | 2975.8 | 1752.6 |
| 62.5° | 246.7  | 238.4  | 242.8  | 318.9  | 628.8  | 1910.1 | 3033.0 | 3261.2 | 3399.7 | 2944.2 | 1760.5 |
| 65°   | 185.1  | 178.8  | 165.0  | 175.3  | 244.3  | 825.8  | 2179.7 | 2485.2 | 2977.0 | 2864.1 | 1707.2 |
| 67.5° | 152.0  | 146.0  | 136.2  | 133.0  | 144.1  | 286.6  | 1112.7 | 1509.8 | 2332.8 | 2522.7 | 1516.1 |
| 70°   | 121.2  | 119.2  | 116.0  | 110.1  | 108.2  | 138.9  | 399.1  | 615.4  | 1542.6 | 1779.0 | 1098.9 |
| 72.5° | 101.0  | 101.4  | 97.9   | 92.8   | 85.7   | 89.6   | 159.1  | 210.4  | 746.4  | 853.0  | 460.2  |
| 75°   | 84.5   | 84.5   | 85.7   | 78.5   | 71.4   | 61.6   | 88.4   | 102.6  | 239.6  | 197.0  | 98.3   |
| 77.5° | 66.3   | 67.1   | 72.2   | 66.3   | 57.2   | 38.7   | 48.2   | 54.9   | 71.0   | 56.8   | 35.9   |
| 80°   | 52.9   | 52.1   | 50.1   | 59.6   | 51.3   | 27.2   | 22.9   | 25.3   | 33.2   | 27.2   | 17.8   |
| 82.5° | 37.1   | 36.7   | 35.1   | 40.3   | 39.9   | 20.1   | 15.0   | 15.4   | 20.1   | 17.4   | 11.1   |
| 85°   | 9.1    | 10.7   | 22.5   | 18.9   | 16.6   | 11.8   | 9.1    | 9.9    | 13.0   | 11.4   | 5.9    |
| 87.5° | 3.9    | 3.9    | 10.3   | 12.2   | 7.9    | 5.1    | 3.9    | 4.3    | 6.7    | 6.7    | 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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CATALOG NUMBER: CCP-SA-1E-830-U-AFL-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 | 1054.3 |
| 2.5°  | 1057.9 | 1032.2 | 999.8  | 965.5  | 930.4  | 888.1  | 861.3  | 839.2  | 821.8  | 808.4  | 803.7  |
| 5°    | 1061.8 | 1012.5 | 939.0  | 847.9  | 755.1  | 668.3  | 601.2  | 551.4  | 510.4  | 487.9  | 478.0  |
| 7.5°  | 1061.4 | 995.9  | 863.3  | 710.5  | 559.7  | 434.6  | 345.8  | 290.9  | 254.2  | 239.2  | 230.1  |
| 10°   | 1061.0 | 974.2  | 776.8  | 558.1  | 374.2  | 251.8  | 185.5  | 154.7  | 141.3  | 136.2  | 135.4  |
| 12.5° | 1072.5 | 949.3  | 680.1  | 410.9  | 234.9  | 156.7  | 129.1  | 122.0  | 118.8  | 117.2  | 116.8  |
| 15°   | 1078.8 | 926.4  | 578.3  | 290.1  | 158.3  | 123.9  | 115.3  | 112.1  | 110.9  | 110.1  | 109.7  |
| 17.5° | 1085.5 | 890.9  | 481.6  | 210.0  | 126.7  | 112.5  | 107.4  | 105.4  | 104.6  | 104.6  | 104.6  |
| 20°   | 1086.7 | 852.6  | 385.6  | 154.7  | 112.5  | 105.0  | 99.9   | 97.9   | 96.7   | 95.9   | 95.9   |
| 22.5° | 1078.0 | 807.2  | 303.1  | 125.5  | 104.2  | 97.9   | 92.4   | 89.2   | 87.2   | 86.8   | 86.8   |
| 25°   | 1056.3 | 742.9  | 232.5  | 110.1  | 97.5   | 90.8   | 84.1   | 80.5   | 78.9   | 78.9   | 78.9   |
| 27.5° | 1025.1 | 667.1  | 179.6  | 97.9   | 88.8   | 82.1   | 76.2   | 73.0   | 72.6   | 72.2   | 72.6   |
| 30°   | 989.6  | 594.1  | 137.4  | 86.8   | 78.5   | 73.0   | 68.3   | 66.7   | 67.5   | 67.5   | 67.9   |
| 32.5° | 954.0  | 521.0  | 107.4  | 78.2   | 69.5   | 64.7   | 62.4   | 62.4   | 63.6   | 63.6   | 63.6   |
| 35°   | 923.6  | 449.6  | 90.0   | 71.0   | 63.2   | 59.2   | 58.0   | 59.2   | 60.0   | 60.4   | 60.4   |
| 37.5° | 906.7  | 388.0  | 79.3   | 64.7   | 58.0   | 54.9   | 54.5   | 55.7   | 57.2   | 58.4   | 58.8   |
| 40°   | 900.4  | 340.6  | 73.0   | 60.0   | 53.3   | 51.3   | 50.9   | 52.5   | 55.3   | 57.2   | 57.6   |
| 42.5° | 900.8  | 298.8  | 67.5   | 55.3   | 50.1   | 47.4   | 47.4   | 49.7   | 52.5   | 54.5   | 54.5   |
| 45°   | 903.5  | 262.9  | 62.0   | 50.5   | 47.4   | 42.6   | 43.0   | 46.2   | 48.2   | 50.1   | 50.1   |
| 47.5° | 905.9  | 234.1  | 56.1   | 45.4   | 41.1   | 38.7   | 39.5   | 41.8   | 44.6   | 47.8   | 47.8   |
| 50°   | 892.1  | 213.5  | 50.1   | 39.9   | 35.9   | 35.1   | 36.7   | 38.7   | 42.6   | 45.8   | 46.2   |
| 52.5° | 858.9  | 195.0  | 45.0   | 35.5   | 32.4   | 32.8   | 34.7   | 35.9   | 39.1   | 39.5   | 39.9   |
| 55°   | 844.3  | 185.5  | 41.1   | 32.4   | 29.6   | 30.8   | 32.0   | 32.4   | 31.6   | 29.6   | 29.6   |
| 57.5° | 841.2  | 179.2  | 37.1   | 29.2   | 27.2   | 28.8   | 28.4   | 26.1   | 23.7   | 21.3   | 20.9   |
| 60°   | 844.3  | 170.5  | 33.9   | 25.3   | 24.9   | 25.3   | 24.1   | 19.7   | 16.6   | 15.0   | 14.2   |
| 62.5° | 826.2  | 157.9  | 31.2   | 21.7   | 21.7   | 21.3   | 18.2   | 13.4   | 10.7   | 9.5    | 9.1    |
| 65°   | 766.2  | 133.0  | 28.4   | 18.2   | 17.8   | 17.0   | 12.2   | 9.1    | 7.1    | 5.9    | 5.5    |
| 67.5° | 648.1  | 103.0  | 25.7   | 15.0   | 14.2   | 11.8   | 7.9    | 5.9    | 3.9    | 3.6    | 3.2    |
| 70°   | 442.1  | 63.9   | 21.7   | 11.8   | 10.7   | 7.5    | 4.7    | 3.6    | 2.4    | 2.0    | 1.6    |
| 72.5° | 160.3  | 37.1   | 18.2   | 9.1    | 7.1    | 4.7    | 2.8    | 1.6    | 1.2    | 1.2    | 0.8    |
| 75°   | 37.9   | 26.1   | 13.8   | 6.7    | 4.7    | 2.8    | 1.6    | 1.2    | 0.8    | 0.8    | 0.4    |
| 77.5° | 17.4   | 20.1   | 9.1    | 3.9    | 3.2    | 2.0    | 1.2    | 0.8    | 0.4    | 0.4    | 0.0    |
| 80°   | 9.9    | 14.2   | 4.3    | 2.8    | 2.4    | 1.6    | 0.8    | 0.4    | 0.4    | 0.0    | 0.0    |
| 82.5° | 5.1    | 7.9    | 3.2    | 2.4    | 2.0    | 1.2    | 0.8    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 3.6    | 3.9    | 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    |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2012-088-3

Luminaire Tested: WIS-SA-830-2D-U-SL4

Test Date: 01/11/2021

### Test Information

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

### Spectral Parameters

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



### Test Conditions

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

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

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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 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

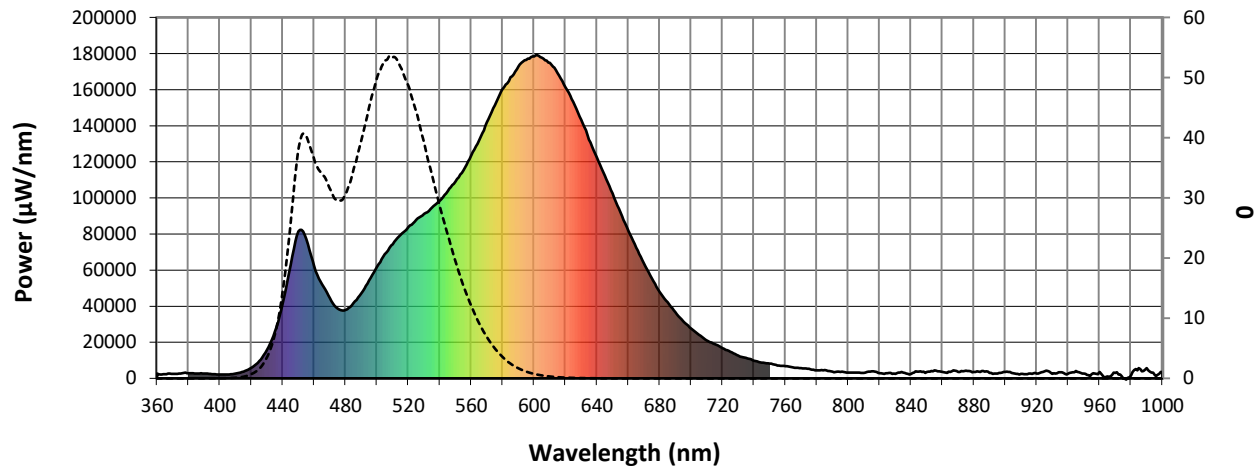


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| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2750             | 0.0              | 490       | 47173            | 6.7              | 620       | 161309           | 42.0             | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 9.8              | 625       | 153301           | 33.8             | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 13.6             | 630       | 143292           | 25.9             | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 19.3             | 635       | 132368           | 19.9             | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 25.5             | 640       | 122334           | 14.6             | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 32.9             | 645       | 112200           | 10.8             | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 40.6             | 650       | 102448           | 7.5              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 47.1             | 655       | 91886            | 5.3              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 53.7             | 660       | 81865            | 3.4              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.0              | 535       | 94694            | 58.7             | 665       | 72448            | 2.3              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.0              | 540       | 98431            | 64.1             | 670       | 63654            | 1.4              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.0              | 545       | 103765           | 69.1             | 675       | 55284            | 0.9              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 0.0              | 550       | 109130           | 74.2             | 680       | 47949            | 0.6              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 0.1              | 555       | 115271           | 78.7             | 685       | 42173            | 0.4              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 0.1              | 560       | 123390           | 83.9             | 690       | 36755            | 0.2              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 0.3              | 565       | 131926           | 87.7             | 695       | 31630            | 0.1              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 0.7              | 570       | 141815           | 92.2             | 700       | 27642            | 0.1              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 1.3              | 575       | 151359           | 94.2             | 705       | 24213            | 0.1              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 2.1              | 580       | 160364           | 95.3             | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 2.6              | 585       | 166836           | 92.7             | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 2.6              | 590       | 172885           | 89.4             | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 2.7              | 595       | 176548           | 83.7             | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 2.8              | 600       | 178427           | 76.9             | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 3.0              | 605       | 177729           | 68.8             | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 3.6              | 610       | 174846           | 60.1             | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 4.9              | 615       | 169274           | 51.1             | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-3

### Scotopic Flux vs. Wavelength



Scotopic Lumens: 4584.8

S/P: 0.52

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2750             | 0.0              | 490       | 47173            | 72.6             | 620       | 161309           | 2.0              | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 87.7             | 625       | 153301           | 1.3              | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 103.4            | 630       | 143292           | 0.8              | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 117.0            | 635       | 132368           | 0.5              | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 126.0            | 640       | 122334           | 0.3              | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 131.6            | 645       | 112200           | 0.2              | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 133.2            | 650       | 102448           | 0.1              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 131.3            | 655       | 91886            | 0.1              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 125.8            | 660       | 81865            | 0.0              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.1              | 535       | 94694            | 118.0            | 665       | 72448            | 0.0              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.2              | 540       | 98431            | 108.8            | 670       | 63654            | 0.0              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.4              | 545       | 103765           | 99.5             | 675       | 55284            | 0.0              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 1.0              | 550       | 109130           | 89.2             | 680       | 47949            | 0.0              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 2.3              | 555       | 115271           | 78.8             | 685       | 42173            | 0.0              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 5.4              | 560       | 123390           | 69.0             | 690       | 36755            | 0.0              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 11.6             | 565       | 131926           | 59.2             | 695       | 31630            | 0.0              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 23.2             | 570       | 141815           | 50.0             | 700       | 27642            | 0.0              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 42.1             | 575       | 151359           | 41.2             | 705       | 24213            | 0.0              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 63.1             | 580       | 160364           | 33.0             | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 67.4             | 585       | 166836           | 25.5             | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 60.3             | 590       | 172885           | 19.3             | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 55.1             | 595       | 176548           | 14.1             | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 51.0             | 600       | 178427           | 10.1             | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 48.4             | 605       | 177729           | 7.0              | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 51.4             | 610       | 174846           | 4.7              | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 60.4             | 615       | 169274           | 3.1              | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-3

### Melanopic Flux vs. Wavelength


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

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

REPORT NUMBER: SP1-2012-088-3

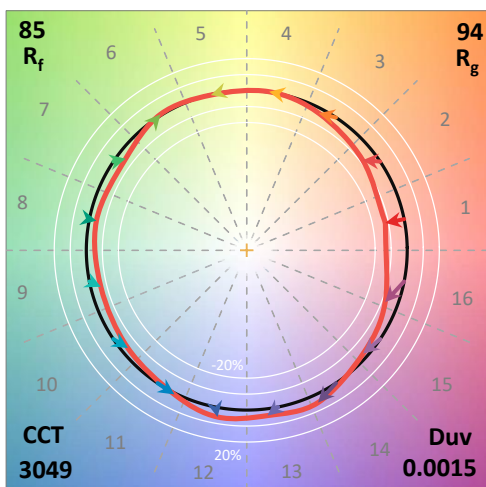
TM-30-18

### Summary

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



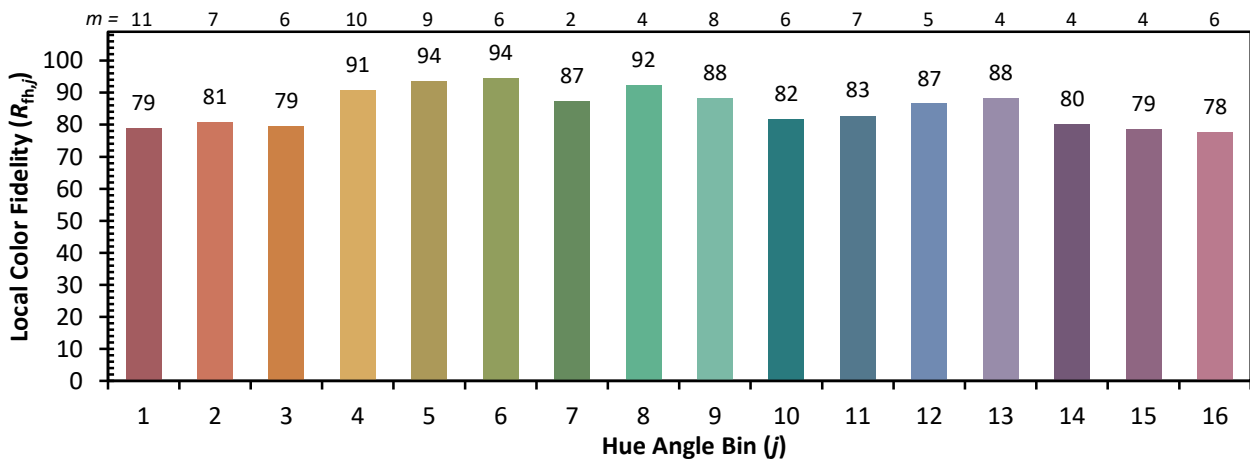
### Color Vector Graphics



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

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



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**


(END OF REPORT)