

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: P674454

Luminaire Tested: **CCP-SA-2B-827-U-AFL-HSS**

Issue Date: 04/16/2023

**Test Information**

Test Method: LM-79-08  
Report Number: P674454  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA-2B-827-U-AFL-HSS  
Description: INVUE CLEAR CURVE POLE MOUNT Light Square Luminaire @450mA w/ AFL  
distribution lens and House Side Shield  
Light Source: (32) 2700K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4209.9 lumens  
Efficiency: N/A  
Efficacy: 91.5 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B0 - U0 - G1

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

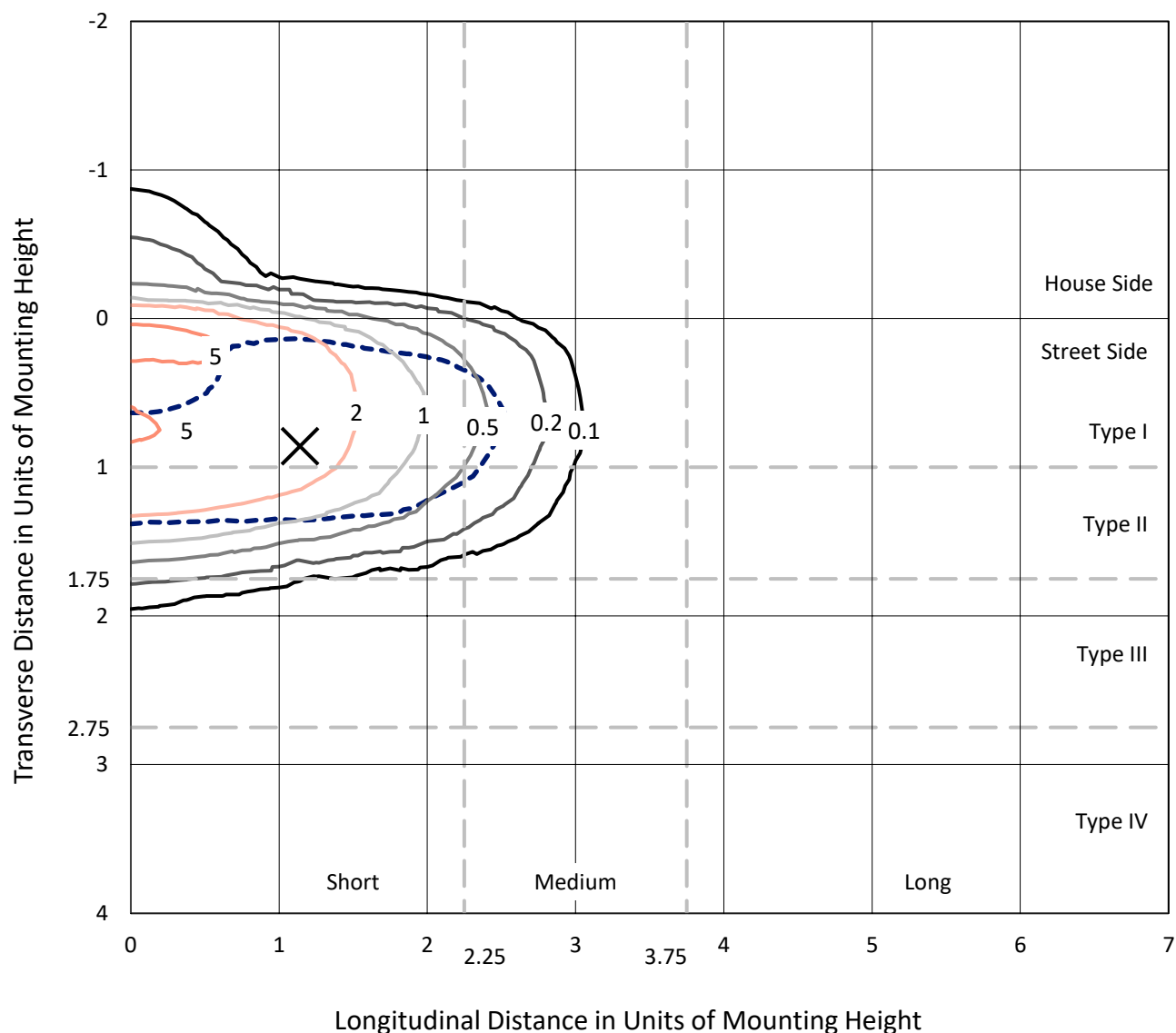
REPORT NUMBER: P674454

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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

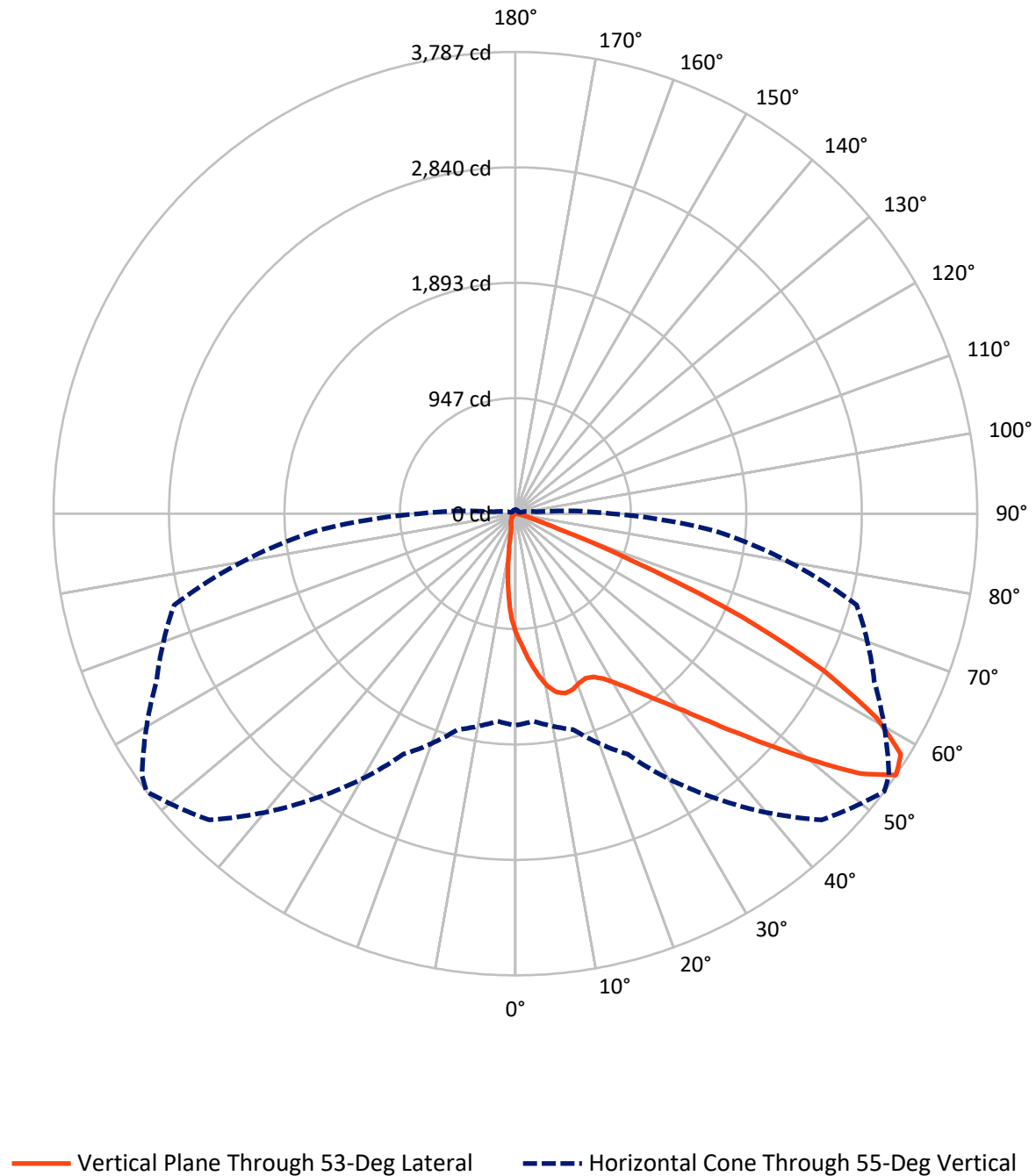


Based on 15 foot mounting height. Maximum calculated value = 6.4 fc

Type II - Short - N/A

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CATALOG NUMBER: CCP-SA-2B-827-U-AFL-HSS

## Luminous Intensity Polar Plot



REPORT NUMBER: P674454

CATALOG NUMBER: CCP-SA-2B-827-U-AFL-HSS

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 227.6    | 0.0    | 227.6  |
|                    | % Fixture | 5.4      | 0.0    | 5.4    |
| <b>Street Side</b> | Lumens    | 3982.4   | 0.0    | 3982.4 |
|                    | % Fixture | 94.6     | 0.0    | 94.6   |
| <b>Total</b>       | Lumens    | 4209.9   | 0.0    | 4209.9 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 88.1   | 2.1       |
| 10°-20°   | 230.2  | 5.5       |
| 20°-30°   | 385.2  | 9.2       |
| 30°-40°   | 630.2  | 15.0      |
| 40°-50°   | 1013.1 | 24.1      |
| 50°-60°   | 1143.8 | 27.2      |
| 60°-70°   | 610.1  | 14.5      |
| 70°-80°   | 100.3  | 2.4       |
| 80°-90°   | 9.0    | 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°    | 4209.9 | 100.0     |
| 0°-180°   | 4209.9 | 100.0     |

**Coefficient of Utilization**



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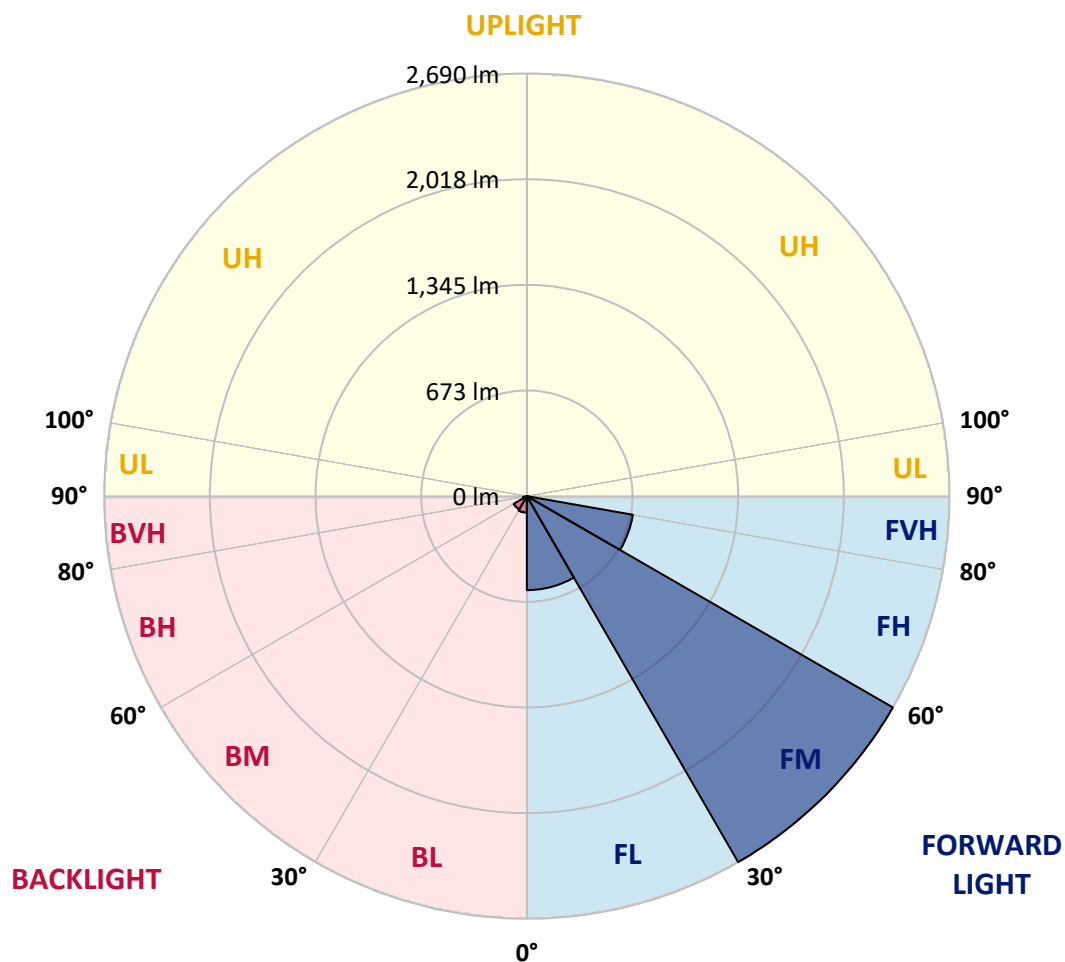
CATALOG NUMBER: CCP-SA-2B-827-U-AFL-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 598.5  | 14.2      |                         |      |         |
| FM   | (30°-60°)   | 2690.2 | 63.9      |                         |      |         |
| FH   | (60°-80°)   | 685.5  | 16.3      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 8.2    | 0.2       |                         |      | G0/10   |
| BL   | (0°-30°)    | 105.0  | 2.5       | B0/110                  |      |         |
| BM   | (30°-60°)   | 96.9   | 2.3       | B0/220                  |      |         |
| BH   | (60°-80°)   | 24.9   | 0.6       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 0.7    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B0-U0-G1**

Type II Short





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CATALOG NUMBER: CCP-SA-2B-827-U-AFL-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 53°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 985.2  | 985.2  | 985.2  | 985.2  | 985.2  | 985.2  | 985.2  | 985.2  | 985.2  | 985.2  | 985.2  |
| 2.5°  | 1181.5 | 1174.4 | 1178.5 | 1167.8 | 1148.3 | 1123.9 | 1087.4 | 1089.2 | 1060.5 | 1035.4 | 1000.7 |
| 5°    | 1376.6 | 1369.2 | 1367.0 | 1339.7 | 1312.4 | 1268.5 | 1214.3 | 1205.4 | 1152.7 | 1088.9 | 1016.2 |
| 7.5°  | 1479.5 | 1473.2 | 1478.0 | 1468.1 | 1441.1 | 1401.3 | 1332.7 | 1326.0 | 1244.5 | 1147.9 | 1040.9 |
| 10°   | 1432.3 | 1430.1 | 1450.4 | 1474.0 | 1495.7 | 1490.9 | 1436.0 | 1425.6 | 1334.2 | 1212.8 | 1066.4 |
| 12.5° | 1305.4 | 1312.4 | 1338.2 | 1381.7 | 1448.9 | 1512.0 | 1503.1 | 1504.9 | 1425.6 | 1283.3 | 1094.4 |
| 15°   | 1230.9 | 1239.4 | 1254.1 | 1276.6 | 1359.2 | 1471.4 | 1528.6 | 1547.0 | 1513.4 | 1361.8 | 1127.6 |
| 17.5° | 1224.6 | 1231.6 | 1233.8 | 1242.3 | 1290.6 | 1406.1 | 1518.2 | 1553.3 | 1591.6 | 1436.0 | 1164.9 |
| 20°   | 1272.9 | 1275.9 | 1274.0 | 1267.8 | 1285.1 | 1370.7 | 1485.8 | 1535.9 | 1656.2 | 1514.9 | 1197.7 |
| 22.5° | 1364.0 | 1359.6 | 1354.1 | 1330.8 | 1329.7 | 1380.6 | 1468.1 | 1520.4 | 1694.5 | 1580.2 | 1219.4 |
| 25°   | 1476.9 | 1467.7 | 1459.9 | 1427.1 | 1411.6 | 1432.6 | 1483.9 | 1526.0 | 1729.2 | 1643.6 | 1234.9 |
| 27.5° | 1600.1 | 1603.1 | 1583.9 | 1539.6 | 1515.3 | 1510.8 | 1533.0 | 1564.3 | 1762.8 | 1700.4 | 1243.4 |
| 30°   | 1731.8 | 1733.3 | 1708.2 | 1662.4 | 1640.3 | 1611.9 | 1610.4 | 1629.3 | 1798.9 | 1765.7 | 1251.5 |
| 32.5° | 1881.9 | 1886.0 | 1845.0 | 1797.5 | 1758.7 | 1721.8 | 1703.8 | 1719.6 | 1863.8 | 1850.9 | 1268.1 |
| 35°   | 2098.8 | 2081.1 | 2025.8 | 1953.8 | 1898.9 | 1850.6 | 1822.9 | 1833.2 | 1950.2 | 1953.1 | 1301.3 |
| 37.5° | 2322.3 | 2320.5 | 2259.3 | 2155.6 | 2065.6 | 2005.5 | 1958.3 | 1975.2 | 2071.5 | 2090.0 | 1354.5 |
| 40°   | 2530.7 | 2535.5 | 2482.4 | 2392.1 | 2276.2 | 2172.9 | 2122.4 | 2133.9 | 2232.7 | 2255.9 | 1419.0 |
| 42.5° | 2666.9 | 2664.3 | 2668.3 | 2642.5 | 2526.3 | 2404.6 | 2328.6 | 2334.9 | 2420.1 | 2432.3 | 1499.8 |
| 45°   | 2729.6 | 2719.6 | 2754.3 | 2836.2 | 2790.1 | 2662.1 | 2575.4 | 2567.6 | 2614.5 | 2611.2 | 1573.2 |
| 47.5° | 2675.3 | 2656.9 | 2736.6 | 2933.9 | 3023.2 | 2984.4 | 2860.5 | 2846.5 | 2806.6 | 2780.1 | 1649.5 |
| 50°   | 2405.7 | 2397.6 | 2568.0 | 2887.4 | 3169.6 | 3282.5 | 3191.4 | 3139.4 | 2978.2 | 2904.8 | 1689.7 |
| 52.5° | 2149.3 | 2126.8 | 2241.9 | 2650.3 | 3104.3 | 3522.2 | 3541.0 | 3448.5 | 3120.5 | 2940.5 | 1676.1 |
| 55°   | 1736.2 | 1708.6 | 1834.0 | 2177.4 | 2845.7 | 3552.9 | 3786.7 | 3738.4 | 3245.2 | 2896.3 | 1648.4 |
| 57.5° | 1054.6 | 1027.3 | 1211.7 | 1559.5 | 2275.9 | 3298.3 | 3726.2 | 3775.3 | 3341.1 | 2847.6 | 1630.4 |
| 60°   | 443.4  | 426.0  | 498.3  | 744.4  | 1453.3 | 2710.7 | 3405.3 | 3527.8 | 3359.2 | 2780.8 | 1637.7 |
| 62.5° | 230.5  | 222.8  | 226.8  | 298.0  | 587.6  | 1784.9 | 2834.3 | 3047.5 | 3177.0 | 2751.3 | 1645.1 |
| 65°   | 173.0  | 167.1  | 154.2  | 163.8  | 228.3  | 771.7  | 2036.8 | 2322.3 | 2781.9 | 2676.4 | 1595.3 |
| 67.5° | 142.0  | 136.5  | 127.3  | 124.3  | 134.6  | 267.8  | 1039.8 | 1410.9 | 2180.0 | 2357.4 | 1416.8 |
| 70°   | 113.2  | 111.4  | 108.4  | 102.9  | 101.1  | 129.8  | 372.9  | 575.1  | 1441.5 | 1662.4 | 1026.9 |
| 72.5° | 94.4   | 94.8   | 91.5   | 86.7   | 80.0   | 83.7   | 148.7  | 196.6  | 697.5  | 797.1  | 430.1  |
| 75°   | 78.9   | 78.9   | 80.0   | 73.4   | 66.8   | 57.5   | 82.6   | 95.9   | 223.9  | 184.1  | 91.8   |
| 77.5° | 62.0   | 62.7   | 67.5   | 62.0   | 53.5   | 36.1   | 45.0   | 51.3   | 66.4   | 53.1   | 33.6   |
| 80°   | 49.4   | 48.7   | 46.8   | 55.7   | 48.0   | 25.5   | 21.4   | 23.6   | 31.0   | 25.5   | 16.6   |
| 82.5° | 34.7   | 34.3   | 32.8   | 37.6   | 37.3   | 18.8   | 14.0   | 14.4   | 18.8   | 16.2   | 10.3   |
| 85°   | 8.5    | 10.0   | 21.0   | 17.7   | 15.5   | 11.1   | 8.5    | 9.2    | 12.2   | 10.7   | 5.5    |
| 87.5° | 3.7    | 3.7    | 9.6    | 11.4   | 7.4    | 4.8    | 3.7    | 4.1    | 6.3    | 6.3    | 3.3    |
| 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°    | 985.2  | 985.2 | 985.2 | 985.2 | 985.2 | 985.2 | 985.2 | 985.2 | 985.2 | 985.2 | 985.2 |
| 2.5°  | 988.5  | 964.6 | 934.3 | 902.2 | 869.4 | 829.9 | 804.9 | 784.2 | 768.0 | 755.4 | 751.0 |
| 5°    | 992.2  | 946.1 | 877.5 | 792.3 | 705.6 | 624.5 | 561.8 | 515.3 | 476.9 | 455.9 | 446.7 |
| 7.5°  | 991.9  | 930.6 | 806.7 | 663.9 | 523.0 | 406.1 | 323.1 | 271.8 | 237.5 | 223.5 | 215.0 |
| 10°   | 991.5  | 910.3 | 725.9 | 521.6 | 349.7 | 235.3 | 173.4 | 144.6 | 132.1 | 127.3 | 126.5 |
| 12.5° | 1002.2 | 887.1 | 635.5 | 384.0 | 219.5 | 146.4 | 120.6 | 114.0 | 111.0 | 109.6 | 109.2 |
| 15°   | 1008.1 | 865.7 | 540.4 | 271.1 | 147.9 | 115.8 | 107.7 | 104.8 | 103.6 | 102.9 | 102.5 |
| 17.5° | 1014.4 | 832.5 | 450.0 | 196.2 | 118.4 | 105.1 | 100.3 | 98.5  | 97.7  | 97.7  | 97.7  |
| 20°   | 1015.5 | 796.7 | 360.4 | 144.6 | 105.1 | 98.1  | 93.3  | 91.5  | 90.4  | 89.6  | 89.6  |
| 22.5° | 1007.4 | 754.3 | 283.3 | 117.3 | 97.4  | 91.5  | 86.3  | 83.4  | 81.5  | 81.1  | 81.1  |
| 25°   | 987.1  | 694.2 | 217.3 | 102.9 | 91.1  | 84.8  | 78.6  | 75.2  | 73.8  | 73.8  | 73.8  |
| 27.5° | 957.9  | 623.4 | 167.8 | 91.5  | 83.0  | 76.7  | 71.2  | 68.2  | 67.9  | 67.5  | 67.9  |
| 30°   | 924.7  | 555.1 | 128.4 | 81.1  | 73.4  | 68.2  | 63.8  | 62.3  | 63.1  | 63.1  | 63.4  |
| 32.5° | 891.5  | 486.9 | 100.3 | 73.0  | 64.9  | 60.5  | 58.3  | 58.3  | 59.4  | 59.4  | 59.4  |
| 35°   | 863.1  | 420.1 | 84.1  | 66.4  | 59.0  | 55.3  | 54.2  | 55.3  | 56.1  | 56.4  | 56.4  |
| 37.5° | 847.3  | 362.6 | 74.1  | 60.5  | 54.2  | 51.3  | 50.9  | 52.0  | 53.5  | 54.6  | 55.0  |
| 40°   | 841.4  | 318.3 | 68.2  | 56.1  | 49.8  | 48.0  | 47.6  | 49.1  | 51.6  | 53.5  | 53.9  |
| 42.5° | 841.7  | 279.2 | 63.1  | 51.6  | 46.8  | 44.3  | 44.3  | 46.5  | 49.1  | 50.9  | 50.9  |
| 45°   | 844.3  | 245.7 | 57.9  | 47.2  | 44.3  | 39.8  | 40.2  | 43.2  | 45.0  | 46.8  | 46.8  |
| 47.5° | 846.5  | 218.7 | 52.4  | 42.4  | 38.4  | 36.1  | 36.9  | 39.1  | 41.7  | 44.6  | 44.6  |
| 50°   | 833.6  | 199.6 | 46.8  | 37.3  | 33.6  | 32.8  | 34.3  | 36.1  | 39.8  | 42.8  | 43.2  |
| 52.5° | 802.6  | 182.2 | 42.0  | 33.2  | 30.2  | 30.6  | 32.5  | 33.6  | 36.5  | 36.9  | 37.3  |
| 55°   | 789.0  | 173.4 | 38.4  | 30.2  | 27.7  | 28.8  | 29.9  | 30.2  | 29.5  | 27.7  | 27.7  |
| 57.5° | 786.0  | 167.5 | 34.7  | 27.3  | 25.5  | 26.9  | 26.6  | 24.3  | 22.1  | 19.9  | 19.5  |
| 60°   | 789.0  | 159.3 | 31.7  | 23.6  | 23.2  | 23.6  | 22.5  | 18.4  | 15.5  | 14.0  | 13.3  |
| 62.5° | 772.0  | 147.5 | 29.1  | 20.3  | 20.3  | 19.9  | 17.0  | 12.5  | 10.0  | 8.9   | 8.5   |
| 65°   | 716.0  | 124.3 | 26.6  | 17.0  | 16.6  | 15.9  | 11.4  | 8.5   | 6.6   | 5.5   | 5.2   |
| 67.5° | 605.7  | 96.3  | 24.0  | 14.0  | 13.3  | 11.1  | 7.4   | 5.5   | 3.7   | 3.3   | 3.0   |
| 70°   | 413.1  | 59.8  | 20.3  | 11.1  | 10.0  | 7.0   | 4.4   | 3.3   | 2.2   | 1.8   | 1.5   |
| 72.5° | 149.8  | 34.7  | 17.0  | 8.5   | 6.6   | 4.4   | 2.6   | 1.5   | 1.1   | 1.1   | 0.7   |
| 75°   | 35.4   | 24.3  | 12.9  | 6.3   | 4.4   | 2.6   | 1.5   | 1.1   | 0.7   | 0.7   | 0.4   |
| 77.5° | 16.2   | 18.8  | 8.5   | 3.7   | 3.0   | 1.8   | 1.1   | 0.7   | 0.4   | 0.4   | 0.0   |
| 80°   | 9.2    | 13.3  | 4.1   | 2.6   | 2.2   | 1.5   | 0.7   | 0.4   | 0.4   | 0.0   | 0.0   |
| 82.5° | 4.8    | 7.4   | 3.0   | 2.2   | 1.8   | 1.1   | 0.7   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 3.3    | 3.7   | 2.2   | 1.8   | 1.5   | 1.1   | 0.7   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 2.6    | 2.6   | 2.2   | 1.8   | 1.5   | 1.1   | 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



#####

| 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              |           |                  |                  |

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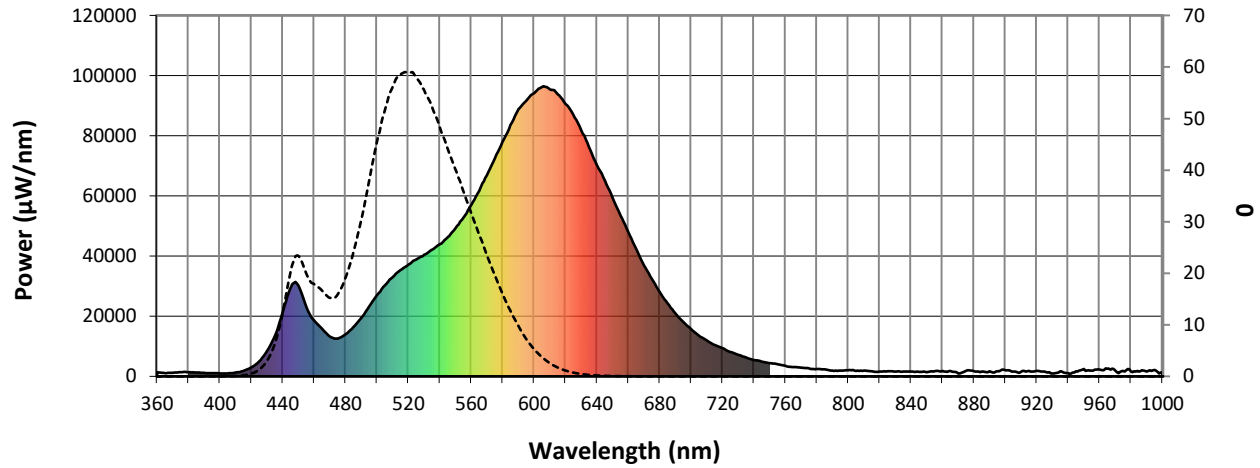
### Scotopic Flux vs. Wavelength


**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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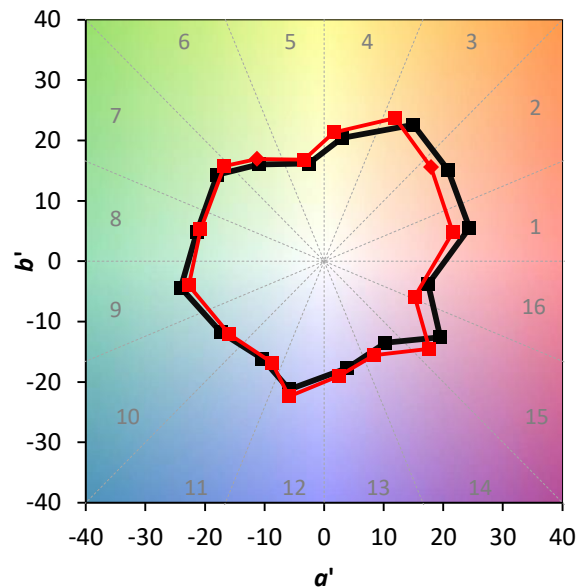
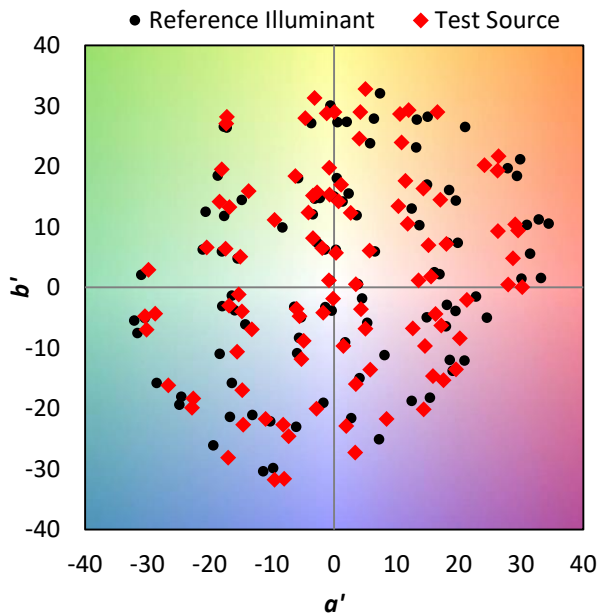
TM-30-18

### Summary

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

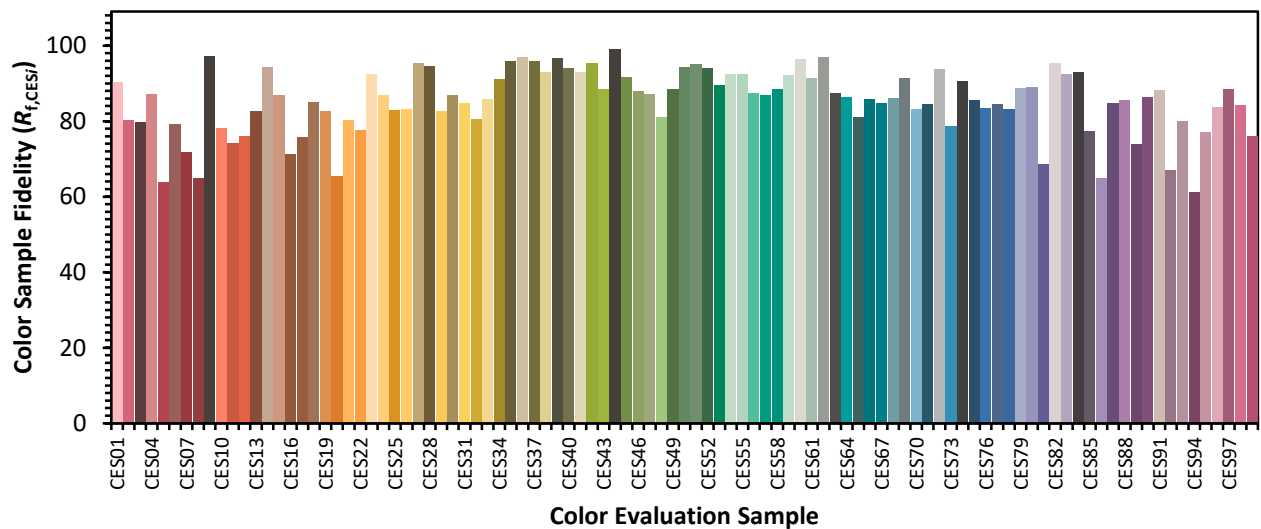


### Color Vector Graphics



**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)