

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: P674450

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

Issue Date: 04/16/2023

**Test Information**

Test Method: LM-79-08  
Report Number: P674450  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 04/16/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-SA-1D-827-U-AFL-HSS  
Description: INVUE CLEAR CURVE POLE MOUNT Light Square Luminaire @800mA w/ AFL  
distribution lens and House Side Shield  
Light Source: (16) 2700K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

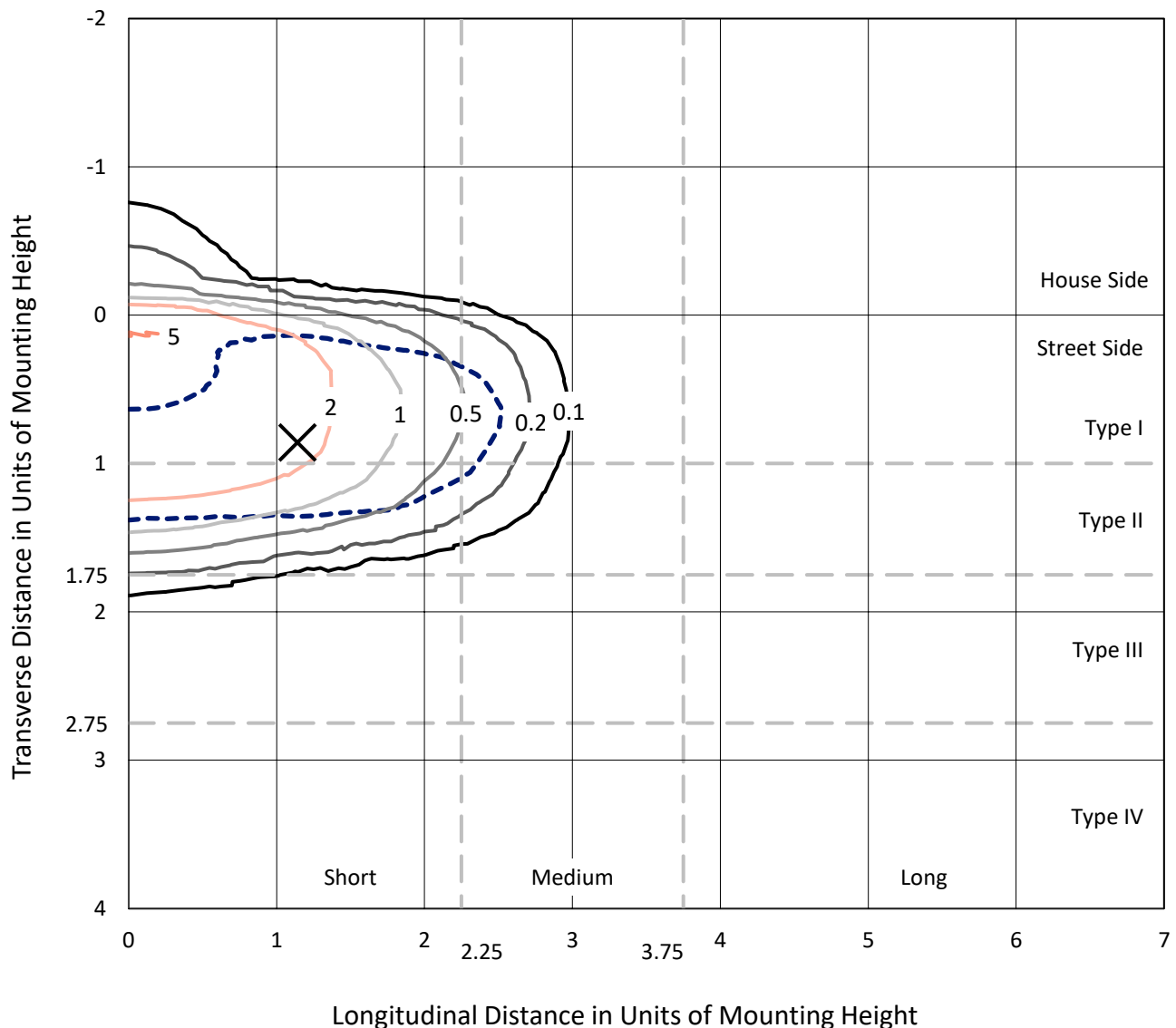
Lumens per Lamp: N/A  
Luminaire Lumens: 3399.6 lumens  
Efficiency: N/A  
Efficacy: 77.3 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B0 - U0 - G0

Input Watts (W): 44  
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: P674450  
 CATALOG NUMBER: CCP-SA-1D-827-U-AFL-HSS

## Iso-Footcandle Lines of Horizontal Illumination

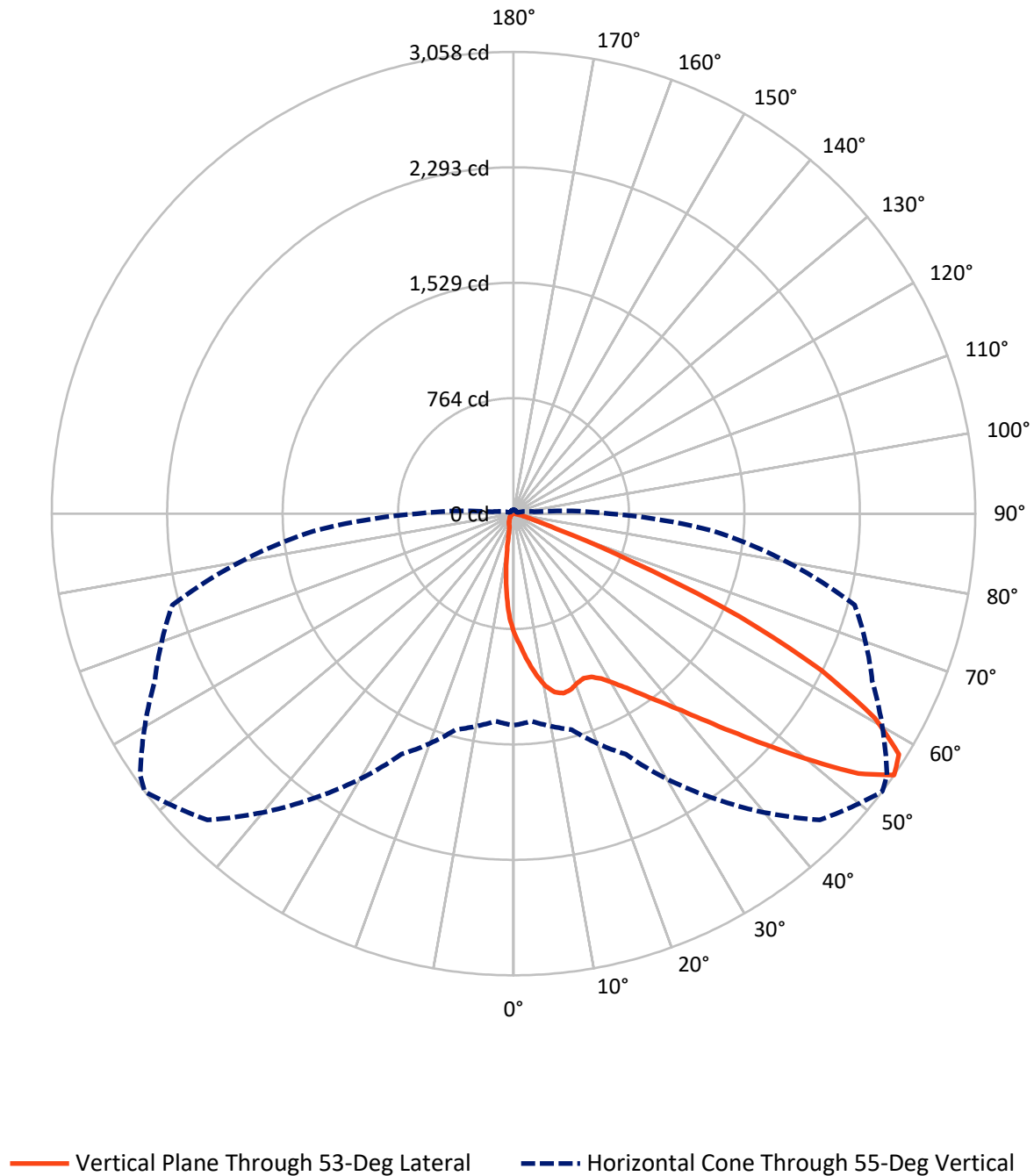
✕ Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 5.1 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 183.8    | 0.0    | 183.8  |
|                    | % Fixture | 5.4      | 0.0    | 5.4    |
| <b>Street Side</b> | Lumens    | 3215.8   | 0.0    | 3215.8 |
|                    | % Fixture | 94.6     | 0.0    | 94.6   |
| <b>Total</b>       | Lumens    | 3399.6   | 0.0    | 3399.6 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 71.1   | 2.1       |
| 10°-20°   | 185.9  | 5.5       |
| 20°-30°   | 311.1  | 9.2       |
| 30°-40°   | 508.9  | 15.0      |
| 40°-50°   | 818.1  | 24.1      |
| 50°-60°   | 923.6  | 27.2      |
| 60°-70°   | 492.7  | 14.5      |
| 70°-80°   | 81.0   | 2.4       |
| 80°-90°   | 7.2    | 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°    | 3399.6 | 100.0     |
| 0°-180°   | 3399.6 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P674450

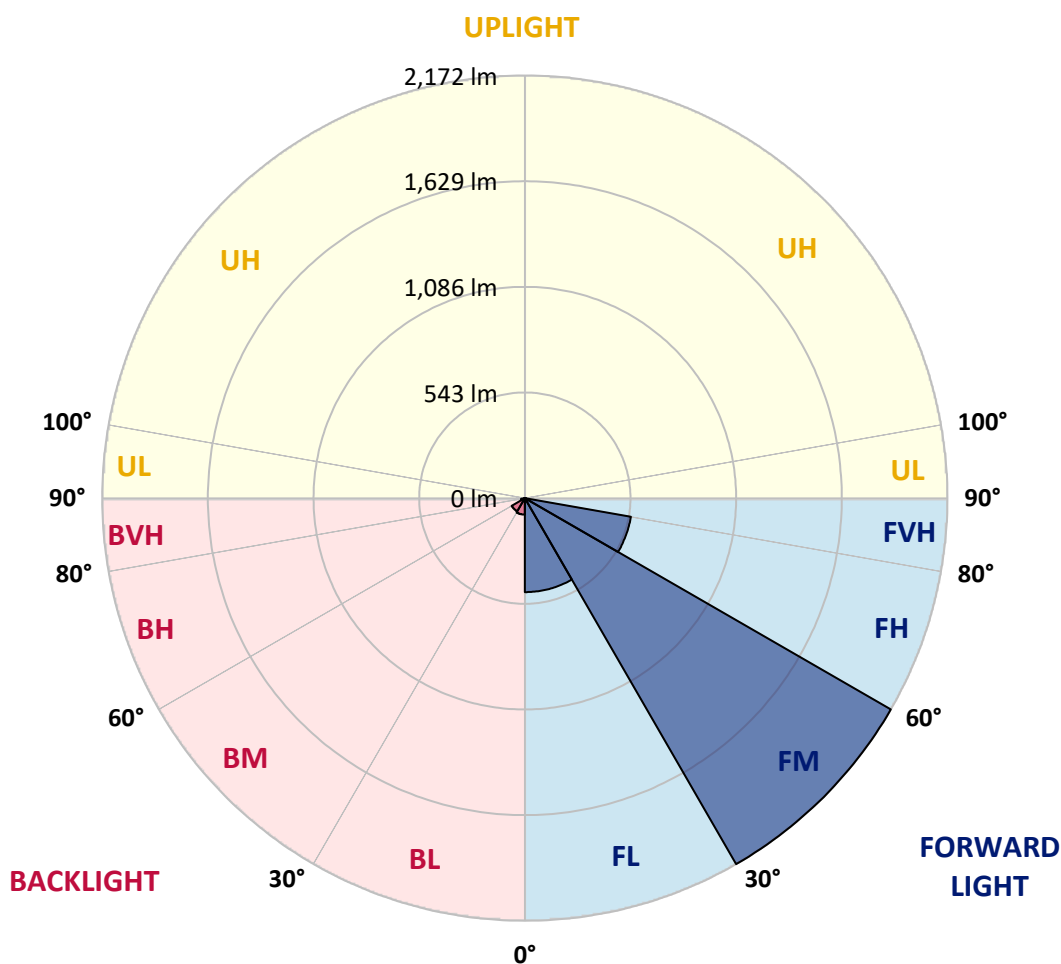
CATALOG NUMBER: CCP-SA-1D-827-U-AFL-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|--------|-----------|-------------------------|------|--------|
|      |             |        |           | B                       | U    | G      |
| FL   | (0°-30°)    | 483.3  | 14.2      |                         |      |        |
| FM   | (30°-60°)   | 2172.4 | 63.9      |                         |      |        |
| FH   | (60°-80°)   | 553.5  | 16.3      |                         |      | G0/660 |
| FVH  | (80°-90°)   | 6.7    | 0.2       |                         |      | G0/10  |
| BL   | (0°-30°)    | 84.8   | 2.5       | B0/110                  |      |        |
| BM   | (30°-60°)   | 78.3   | 2.3       | B0/220                  |      |        |
| BH   | (60°-80°)   | 20.1   | 0.6       | B0/110                  |      | G0/110 |
| BVH  | (80°-90°)   | 0.6    | 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-G0**

Type II Short





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

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 53°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 795.6  | 795.6  | 795.6  | 795.6  | 795.6  | 795.6  | 795.6  | 795.6  | 795.6  | 795.6  | 795.6  |
| 2.5°  | 954.0  | 948.4  | 951.7  | 943.0  | 927.2  | 907.6  | 878.1  | 879.6  | 856.3  | 836.1  | 808.1  |
| 5°    | 1111.6 | 1105.7 | 1103.9 | 1081.8 | 1059.8 | 1024.3 | 980.6  | 973.4  | 930.8  | 879.3  | 820.6  |
| 7.5°  | 1194.7 | 1189.7 | 1193.5 | 1185.5 | 1163.7 | 1131.6 | 1076.2 | 1070.8 | 1005.0 | 926.9  | 840.6  |
| 10°   | 1156.6 | 1154.8 | 1171.2 | 1190.3 | 1207.8 | 1204.0 | 1159.6 | 1151.2 | 1077.4 | 979.4  | 861.1  |
| 12.5° | 1054.1 | 1059.8 | 1080.6 | 1115.8 | 1170.0 | 1220.9 | 1213.8 | 1215.3 | 1151.2 | 1036.3 | 883.8  |
| 15°   | 994.0  | 1000.8 | 1012.7 | 1030.9 | 1097.6 | 1188.2 | 1234.3 | 1249.2 | 1222.1 | 1099.7 | 910.6  |
| 17.5° | 988.9  | 994.6  | 996.3  | 1003.2 | 1042.2 | 1135.4 | 1226.0 | 1254.3 | 1285.3 | 1159.6 | 940.6  |
| 20°   | 1027.9 | 1030.3 | 1028.8 | 1023.7 | 1037.7 | 1106.9 | 1199.8 | 1240.3 | 1337.4 | 1223.3 | 967.2  |
| 22.5° | 1101.5 | 1097.9 | 1093.4 | 1074.7 | 1073.8 | 1114.9 | 1185.5 | 1227.8 | 1368.4 | 1276.0 | 984.7  |
| 25°   | 1192.6 | 1185.2 | 1178.9 | 1152.4 | 1139.9 | 1156.9 | 1198.3 | 1232.3 | 1396.4 | 1327.3 | 997.2  |
| 27.5° | 1292.1 | 1294.5 | 1279.0 | 1243.3 | 1223.6 | 1220.0 | 1237.9 | 1263.2 | 1423.5 | 1373.1 | 1004.1 |
| 30°   | 1398.5 | 1399.6 | 1379.4 | 1342.5 | 1324.6 | 1301.7 | 1300.5 | 1315.7 | 1452.7 | 1425.9 | 1010.6 |
| 32.5° | 1519.7 | 1523.0 | 1489.9 | 1451.5 | 1420.2 | 1390.4 | 1375.8 | 1388.6 | 1505.1 | 1494.7 | 1024.0 |
| 35°   | 1694.8 | 1680.5 | 1635.9 | 1577.8 | 1533.4 | 1494.4 | 1472.0 | 1480.4 | 1574.8 | 1577.2 | 1050.9 |
| 37.5° | 1875.3 | 1873.8 | 1824.4 | 1740.7 | 1668.0 | 1619.5 | 1581.3 | 1595.0 | 1672.8 | 1687.7 | 1093.7 |
| 40°   | 2043.6 | 2047.5 | 2004.6 | 1931.6 | 1838.1 | 1754.7 | 1713.9 | 1723.1 | 1803.0 | 1821.7 | 1145.9 |
| 42.5° | 2153.5 | 2151.4 | 2154.7 | 2133.9 | 2040.0 | 1941.8 | 1880.4 | 1885.5 | 1954.3 | 1964.1 | 1211.1 |
| 45°   | 2204.2 | 2196.1 | 2224.1 | 2290.3 | 2253.0 | 2149.7 | 2079.7 | 2073.4 | 2111.2 | 2108.6 | 1270.4 |
| 47.5° | 2160.4 | 2145.5 | 2209.8 | 2369.2 | 2441.3 | 2410.0 | 2309.9 | 2298.6 | 2266.4 | 2245.0 | 1332.0 |
| 50°   | 1942.6 | 1936.1 | 2073.7 | 2331.7 | 2559.5 | 2650.7 | 2577.1 | 2535.1 | 2404.9 | 2345.7 | 1364.5 |
| 52.5° | 1735.6 | 1717.5 | 1810.4 | 2140.1 | 2506.8 | 2844.3 | 2859.5 | 2784.7 | 2519.9 | 2374.5 | 1353.5 |
| 55°   | 1402.0 | 1379.7 | 1481.0 | 1758.3 | 2298.0 | 2869.0 | 3057.8 | 3018.8 | 2620.6 | 2338.8 | 1331.1 |
| 57.5° | 851.6  | 829.5  | 978.5  | 1259.4 | 1837.8 | 2663.5 | 3009.0 | 3048.6 | 2698.0 | 2299.5 | 1316.5 |
| 60°   | 358.0  | 344.0  | 402.4  | 601.1  | 1173.6 | 2189.0 | 2749.9 | 2848.7 | 2712.6 | 2245.6 | 1322.5 |
| 62.5° | 186.2  | 179.9  | 183.2  | 240.7  | 474.5  | 1441.3 | 2288.8 | 2460.9 | 2565.5 | 2221.7 | 1328.5 |
| 65°   | 139.7  | 134.9  | 124.5  | 132.3  | 184.4  | 623.1  | 1644.8 | 1875.3 | 2246.5 | 2161.3 | 1288.2 |
| 67.5° | 114.7  | 110.2  | 102.8  | 100.4  | 108.7  | 216.2  | 839.7  | 1139.3 | 1760.4 | 1903.6 | 1144.1 |
| 70°   | 91.4   | 90.0   | 87.6   | 83.1   | 81.6   | 104.8  | 301.1  | 464.4  | 1164.0 | 1342.5 | 829.2  |
| 72.5° | 76.3   | 76.6   | 73.9   | 70.0   | 64.6   | 67.6   | 120.0  | 158.8  | 563.3  | 643.7  | 347.3  |
| 75°   | 63.7   | 63.7   | 64.6   | 59.3   | 53.9   | 46.5   | 66.7   | 77.4   | 180.8  | 148.6  | 74.2   |
| 77.5° | 50.0   | 50.6   | 54.5   | 50.0   | 43.2   | 29.2   | 36.3   | 41.4   | 53.6   | 42.9   | 27.1   |
| 80°   | 39.9   | 39.3   | 37.8   | 45.0   | 38.7   | 20.6   | 17.3   | 19.1   | 25.0   | 20.6   | 13.4   |
| 82.5° | 28.0   | 27.7   | 26.5   | 30.4   | 30.1   | 15.2   | 11.3   | 11.6   | 15.2   | 13.1   | 8.3    |
| 85°   | 6.9    | 8.0    | 17.0   | 14.3   | 12.5   | 8.9    | 6.9    | 7.4    | 9.8    | 8.6    | 4.5    |
| 87.5° | 3.0    | 3.0    | 7.7    | 9.2    | 6.0    | 3.9    | 3.0    | 3.3    | 5.1    | 5.1    | 2.7    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 795.6 | 795.6 | 795.6 | 795.6 | 795.6 | 795.6 | 795.6 | 795.6 | 795.6 | 795.6 | 795.6 |
| 2.5°  | 798.3 | 778.9 | 754.5 | 728.6 | 702.1 | 670.2 | 649.9 | 633.3 | 620.1 | 610.0 | 606.4 |
| 5°    | 801.2 | 764.0 | 708.6 | 639.8 | 569.8 | 504.3 | 453.6 | 416.1 | 385.1 | 368.2 | 360.7 |
| 7.5°  | 800.9 | 751.5 | 651.4 | 536.1 | 422.4 | 327.9 | 260.9 | 219.5 | 191.8 | 180.5 | 173.7 |
| 10°   | 800.7 | 735.1 | 586.2 | 421.2 | 282.4 | 190.0 | 140.0 | 116.8 | 106.6 | 102.8 | 102.2 |
| 12.5° | 809.3 | 716.4 | 513.2 | 310.1 | 177.2 | 118.3 | 97.4  | 92.0  | 89.7  | 88.5  | 88.2  |
| 15°   | 814.1 | 699.1 | 436.4 | 218.9 | 119.4 | 93.5  | 87.0  | 84.6  | 83.7  | 83.1  | 82.8  |
| 17.5° | 819.1 | 672.3 | 363.4 | 158.5 | 95.6  | 84.9  | 81.0  | 79.5  | 78.9  | 78.9  | 78.9  |
| 20°   | 820.0 | 643.4 | 291.0 | 116.8 | 84.9  | 79.2  | 75.4  | 73.9  | 73.0  | 72.4  | 72.4  |
| 22.5° | 813.5 | 609.1 | 228.8 | 94.7  | 78.6  | 73.9  | 69.7  | 67.3  | 65.8  | 65.5  | 65.5  |
| 25°   | 797.1 | 560.6 | 175.4 | 83.1  | 73.6  | 68.5  | 63.4  | 60.8  | 59.6  | 59.6  | 59.6  |
| 27.5° | 773.5 | 503.4 | 135.5 | 73.9  | 67.0  | 62.0  | 57.5  | 55.1  | 54.8  | 54.5  | 54.8  |
| 30°   | 746.7 | 448.3 | 103.7 | 65.5  | 59.3  | 55.1  | 51.5  | 50.3  | 50.9  | 50.9  | 51.2  |
| 32.5° | 719.9 | 393.2 | 81.0  | 59.0  | 52.4  | 48.8  | 47.1  | 47.1  | 48.0  | 48.0  | 48.0  |
| 35°   | 697.0 | 339.3 | 67.9  | 53.6  | 47.7  | 44.7  | 43.8  | 44.7  | 45.3  | 45.6  | 45.6  |
| 37.5° | 684.2 | 292.8 | 59.9  | 48.8  | 43.8  | 41.4  | 41.1  | 42.0  | 43.2  | 44.1  | 44.4  |
| 40°   | 679.4 | 257.1 | 55.1  | 45.3  | 40.2  | 38.7  | 38.4  | 39.6  | 41.7  | 43.2  | 43.5  |
| 42.5° | 679.7 | 225.5 | 50.9  | 41.7  | 37.8  | 35.7  | 35.7  | 37.5  | 39.6  | 41.1  | 41.1  |
| 45°   | 681.8 | 198.4 | 46.8  | 38.1  | 35.7  | 32.2  | 32.5  | 34.8  | 36.3  | 37.8  | 37.8  |
| 47.5° | 683.6 | 176.6 | 42.3  | 34.3  | 31.0  | 29.2  | 29.8  | 31.6  | 33.7  | 36.0  | 36.0  |
| 50°   | 673.2 | 161.1 | 37.8  | 30.1  | 27.1  | 26.5  | 27.7  | 29.2  | 32.2  | 34.6  | 34.8  |
| 52.5° | 648.1 | 147.1 | 34.0  | 26.8  | 24.4  | 24.7  | 26.2  | 27.1  | 29.5  | 29.8  | 30.1  |
| 55°   | 637.1 | 140.0 | 31.0  | 24.4  | 22.3  | 23.2  | 24.1  | 24.4  | 23.8  | 22.3  | 22.3  |
| 57.5° | 634.7 | 135.2 | 28.0  | 22.0  | 20.6  | 21.7  | 21.4  | 19.7  | 17.9  | 16.1  | 15.8  |
| 60°   | 637.1 | 128.7 | 25.6  | 19.1  | 18.8  | 19.1  | 18.2  | 14.9  | 12.5  | 11.3  | 10.7  |
| 62.5° | 623.4 | 119.1 | 23.5  | 16.4  | 16.4  | 16.1  | 13.7  | 10.1  | 8.0   | 7.1   | 6.9   |
| 65°   | 578.1 | 100.4 | 21.4  | 13.7  | 13.4  | 12.8  | 9.2   | 6.9   | 5.4   | 4.5   | 4.2   |
| 67.5° | 489.1 | 77.7  | 19.4  | 11.3  | 10.7  | 8.9   | 6.0   | 4.5   | 3.0   | 2.7   | 2.4   |
| 70°   | 333.6 | 48.3  | 16.4  | 8.9   | 8.0   | 5.7   | 3.6   | 2.7   | 1.8   | 1.5   | 1.2   |
| 72.5° | 120.9 | 28.0  | 13.7  | 6.9   | 5.4   | 3.6   | 2.1   | 1.2   | 0.9   | 0.9   | 0.6   |
| 75°   | 28.6  | 19.7  | 10.4  | 5.1   | 3.6   | 2.1   | 1.2   | 0.9   | 0.6   | 0.6   | 0.3   |
| 77.5° | 13.1  | 15.2  | 6.9   | 3.0   | 2.4   | 1.5   | 0.9   | 0.6   | 0.3   | 0.3   | 0.0   |
| 80°   | 7.4   | 10.7  | 3.3   | 2.1   | 1.8   | 1.2   | 0.6   | 0.3   | 0.3   | 0.0   | 0.0   |
| 82.5° | 3.9   | 6.0   | 2.4   | 1.8   | 1.5   | 0.9   | 0.6   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 2.7   | 3.0   | 1.8   | 1.5   | 1.2   | 0.9   | 0.6   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 2.1   | 2.1   | 1.8   | 1.5   | 1.2   | 0.9   | 0.3   | 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

REPORT NUMBER: SP1-2104-224-5

| 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**



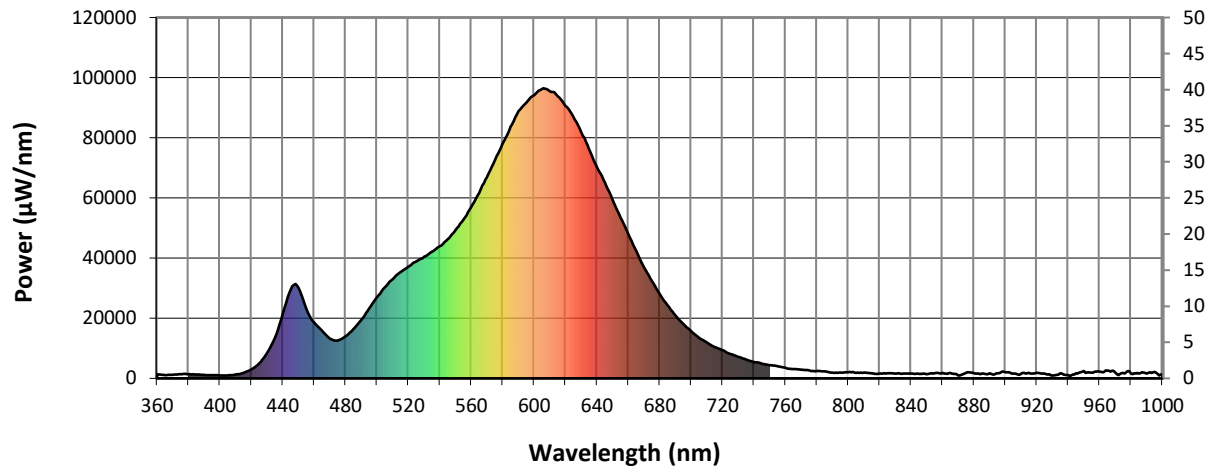
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



CCT = 2661K  
 CIE  $x$  = 0.4631  
 CIE  $y$  = 0.4115  
 Duv = 0.0001

REPORT NUMBER: SP1-2104-224-5

### 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              |           |                  |                  |

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              |           |                  |                  |

REPORT NUMBER: SP1-2104-224-5

### 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              |           |                  |                  |

REPORT NUMBER: SP1-2104-224-5

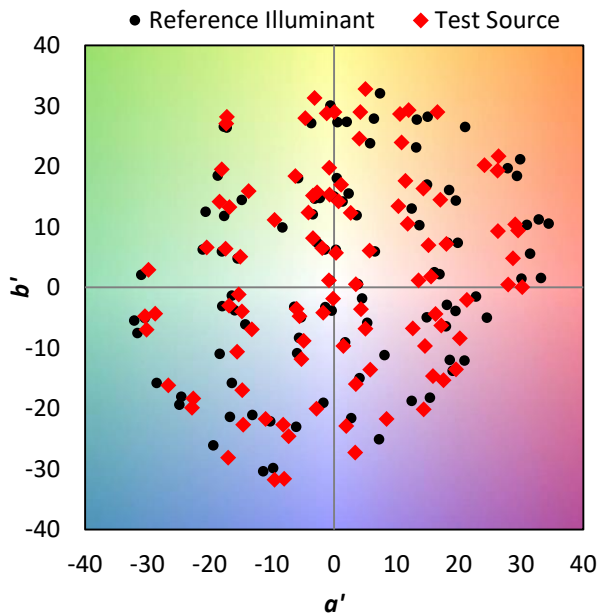
TM-30-18

### Summary

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

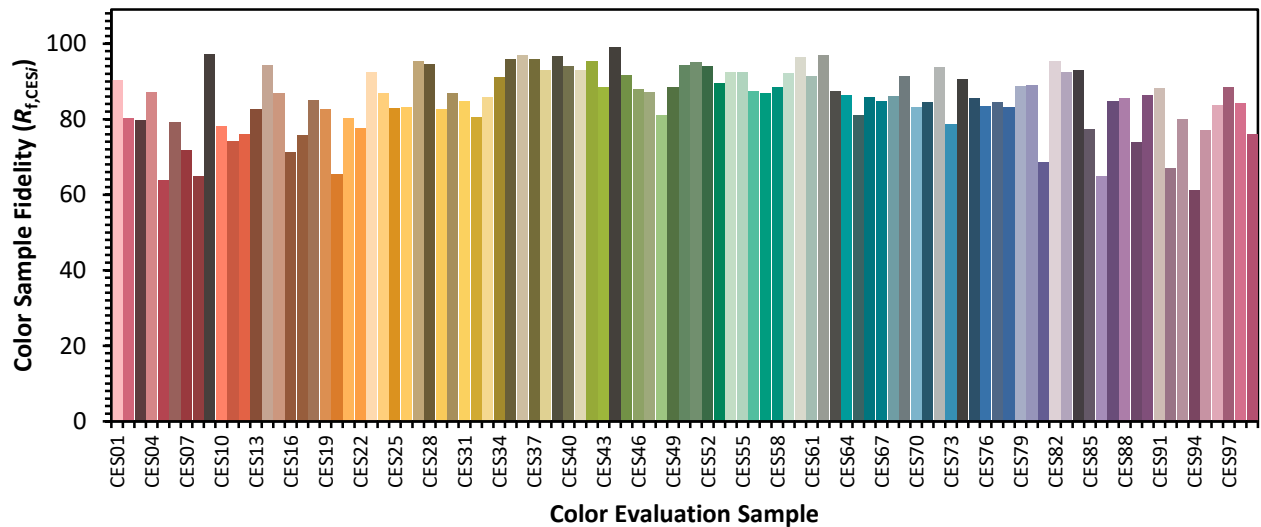


### Color Vector Graphics



**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)