

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: STREETWORKS

Report Number: P348790

Luminaire Tested: **ARCH-N-PA1-50-827-24VDC-T2R-HSS**

Issue Date: 3/3/2020



**Test Information**

Test Method: LM-79-08  
Report Number: P348790  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-9)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: ARCH-N-PA1-50-827-24VDC-T2R-HSS  
Description: ARCHEON ROADWAY AND AREA LUMINAIRE  
(1) 80 CRI, 2700K, 980mA LIGHT ENGINE WITH 16 LEDS AND  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3953 lumens  
Efficiency: N/A  
Efficacy: 79.1 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.75' x H: 0')  
IES Classification: Type II - Medium  
BUG Rating: B0 - U0 - G1

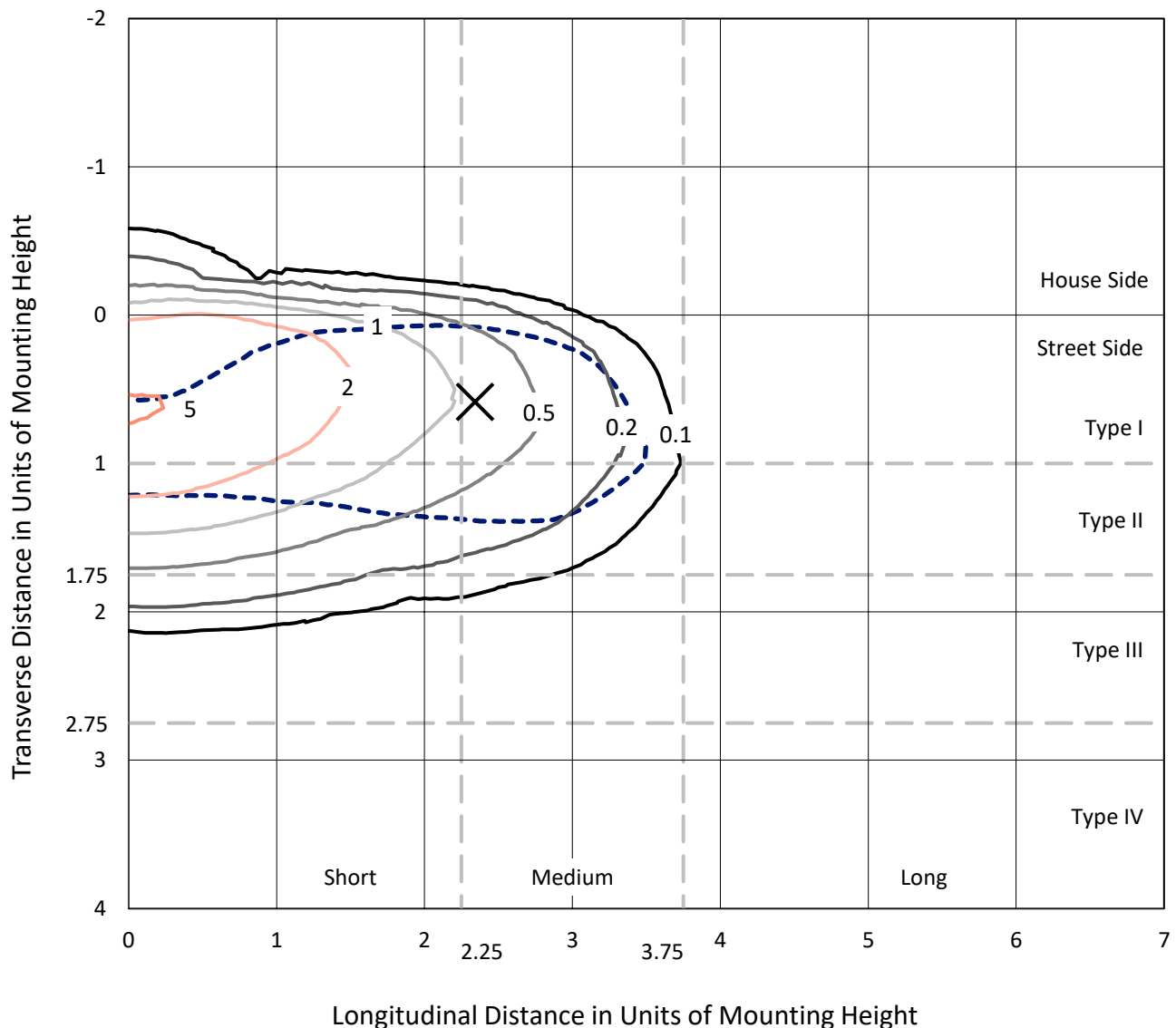
Input Watts (W): 50  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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CATALOG NUMBER: ARCH-N-PA1-50-827-24VDC-T2R-HSS

## Iso-Footcandle Lines of Horizontal Illumination

× Max cd  
 - - - 1/2 Max cd

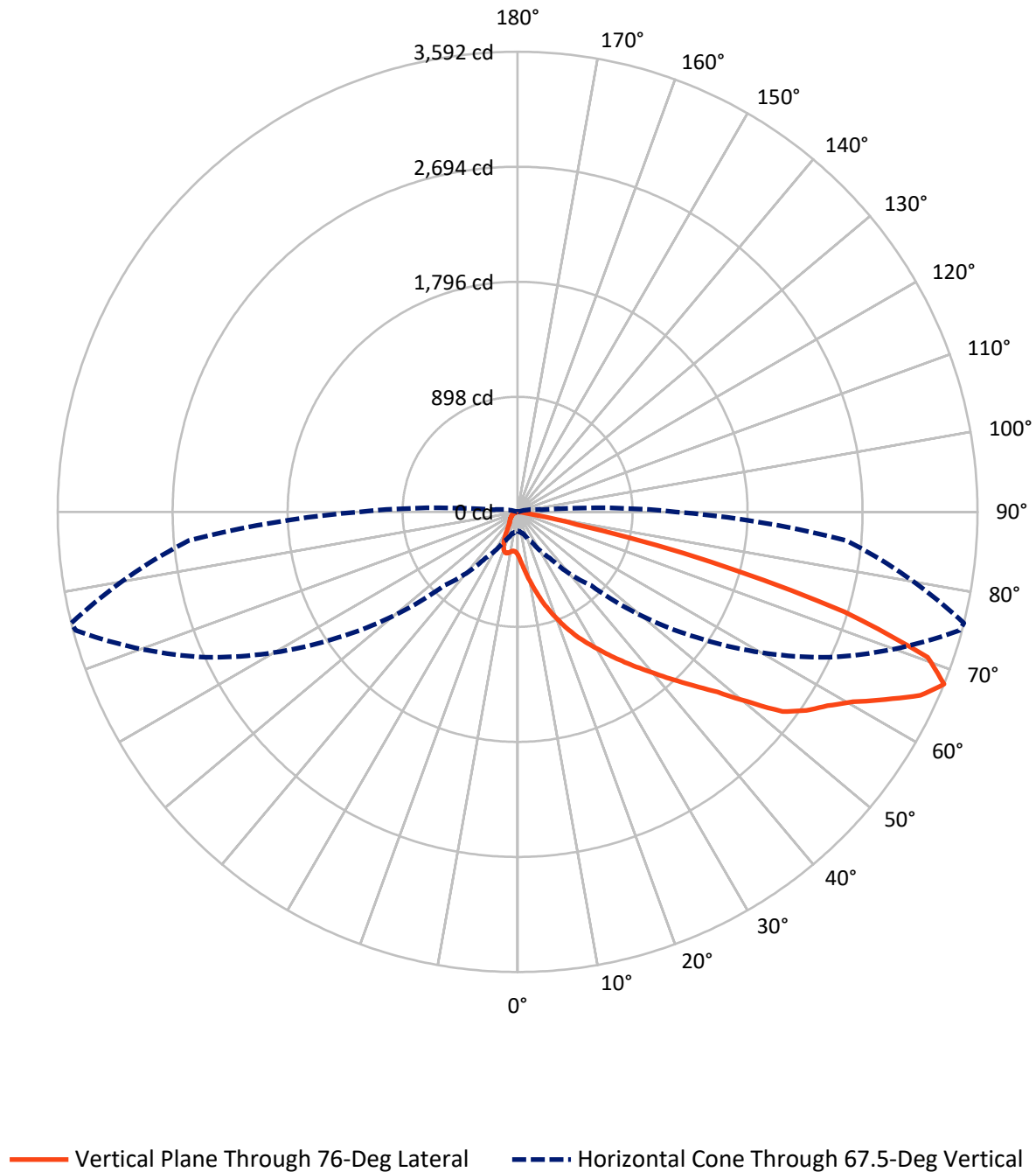


Based on 15 foot mounting height. Maximum calculated value = 5.2 fc  
 Type II - Medium - N/A

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CATALOG NUMBER: ARCH-N-PA1-50-827-24VDC-T2R-HSS

## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 196.3    | 0.0    | 196.3  |
|                    | % Fixture | 5.0      | 0.0    | 5.0    |
| <b>Street Side</b> | Lumens    | 3756.7   | 0.0    | 3756.7 |
|                    | % Fixture | 95.0     | 0.0    | 95.0   |
| <b>Total</b>       | Lumens    | 3953.0   | 0.0    | 3953.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 41.7   | 1.1       |
| 10°-20°   | 165.3  | 4.2       |
| 20°-30°   | 336.3  | 8.5       |
| 30°-40°   | 583.7  | 14.8      |
| 40°-50°   | 824.8  | 20.9      |
| 50°-60°   | 935.3  | 23.7      |
| 60°-70°   | 775.8  | 19.6      |
| 70°-80°   | 281.0  | 7.1       |
| 80°-90°   | 9.1    | 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°    | 3953.0 | 100.0     |
| 0°-180°   | 3953.0 | 100.0     |



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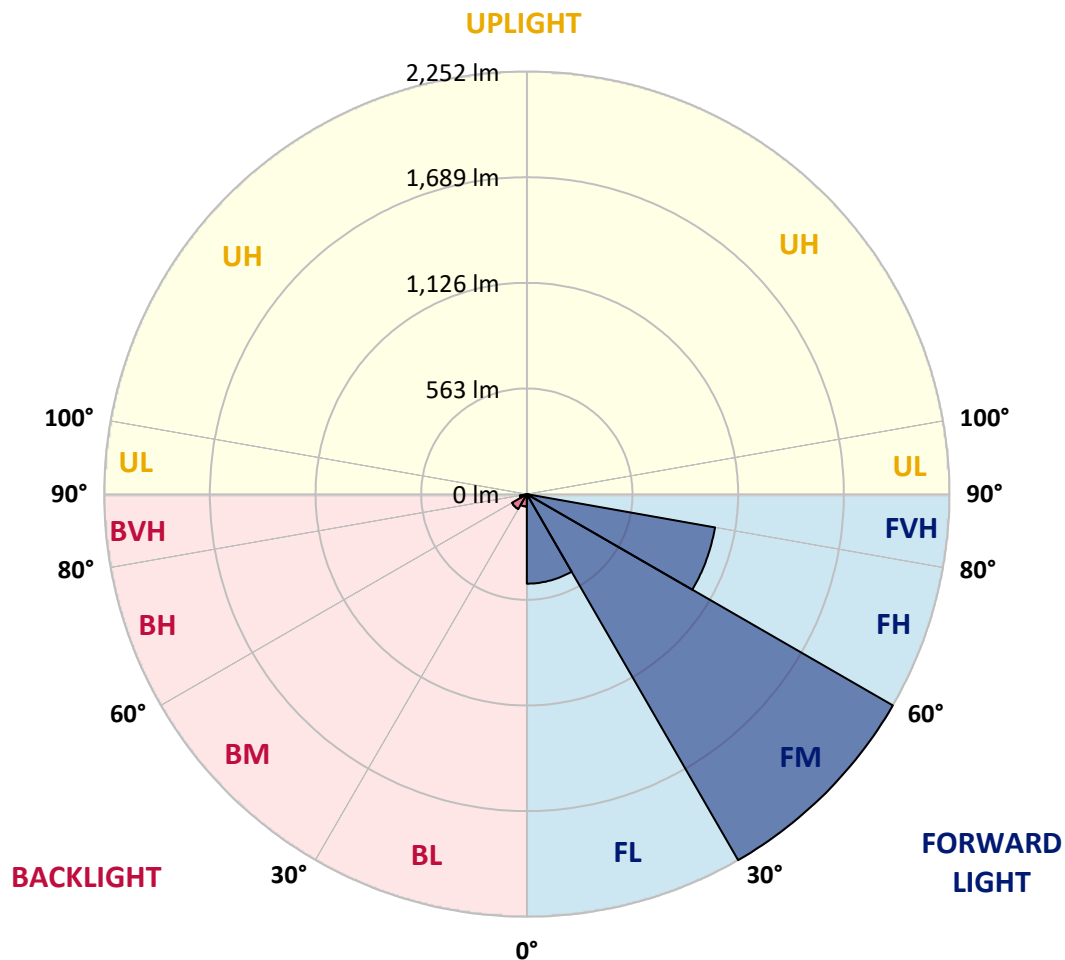
CATALOG NUMBER: ARCH-N-PA1-50-827-24VDC-T2R-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 477.1  | 12.1      |                         |      |         |
| FM   | (30°-60°)   | 2251.9 | 57.0      |                         |      |         |
| FH   | (60°-80°)   | 1018.8 | 25.8      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 8.8    | 0.2       |                         |      | G0/10   |
| BL   | (0°-30°)    | 66.2   | 1.7       | B0/110                  |      |         |
| BM   | (30°-60°)   | 91.9   | 2.3       | B0/220                  |      |         |
| BH   | (60°-80°)   | 37.9   | 1.0       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 0.3    | 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 Medium



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CATALOG NUMBER: ARCH-N-PA1-50-827-24VDC-T2R-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 76°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 335.3  | 335.3  | 335.3  | 335.3  | 335.3  | 335.3  | 335.3  | 335.3  | 335.3  | 335.3  | 335.3  |
| 2.5°  | 500.6  | 489.3  | 491.9  | 484.6  | 471.5  | 444.4  | 421.4  | 399.6  | 374.1  | 373.3  | 352.3  |
| 5°    | 675.0  | 665.5  | 664.2  | 649.5  | 625.6  | 579.7  | 535.0  | 484.1  | 427.3  | 423.1  | 378.6  |
| 7.5°  | 833.3  | 825.7  | 822.9  | 805.4  | 760.9  | 716.2  | 658.0  | 583.2  | 494.3  | 486.7  | 414.1  |
| 10°   | 954.9  | 951.3  | 951.9  | 939.5  | 901.4  | 859.8  | 783.4  | 688.0  | 570.4  | 558.6  | 456.7  |
| 12.5° | 1047.0 | 1047.9 | 1054.1 | 1046.5 | 1025.2 | 994.4  | 912.8  | 799.7  | 654.5  | 638.4  | 505.4  |
| 15°   | 1114.8 | 1119.1 | 1130.5 | 1140.0 | 1138.5 | 1111.8 | 1037.0 | 913.1  | 743.9  | 726.1  | 559.6  |
| 17.5° | 1158.6 | 1163.4 | 1180.1 | 1201.2 | 1220.6 | 1214.4 | 1156.9 | 1022.6 | 834.3  | 813.7  | 617.7  |
| 20°   | 1197.0 | 1202.7 | 1220.6 | 1248.5 | 1284.7 | 1292.5 | 1254.7 | 1128.8 | 924.6  | 899.5  | 677.6  |
| 22.5° | 1280.3 | 1280.2 | 1291.1 | 1307.4 | 1341.8 | 1361.9 | 1338.0 | 1227.3 | 1013.8 | 987.6  | 738.7  |
| 25°   | 1431.0 | 1425.3 | 1421.5 | 1408.7 | 1416.3 | 1428.8 | 1415.4 | 1319.5 | 1103.5 | 1077.0 | 800.7  |
| 27.5° | 1610.1 | 1613.6 | 1582.8 | 1548.3 | 1521.6 | 1508.8 | 1487.0 | 1404.9 | 1189.8 | 1160.7 | 861.4  |
| 30°   | 1799.1 | 1800.1 | 1763.8 | 1719.8 | 1661.1 | 1612.4 | 1574.6 | 1486.5 | 1278.4 | 1246.7 | 920.2  |
| 32.5° | 1969.5 | 1962.8 | 1926.8 | 1866.8 | 1792.7 | 1738.0 | 1659.5 | 1577.6 | 1372.3 | 1341.7 | 985.7  |
| 35°   | 2104.6 | 2096.7 | 2052.9 | 1998.3 | 1921.4 | 1866.3 | 1771.9 | 1668.5 | 1471.0 | 1441.1 | 1051.4 |
| 37.5° | 2203.4 | 2194.0 | 2149.0 | 2092.9 | 2026.5 | 1994.5 | 1902.3 | 1767.4 | 1578.8 | 1546.6 | 1120.5 |
| 40°   | 2237.7 | 2229.5 | 2201.3 | 2160.2 | 2106.9 | 2099.6 | 2040.7 | 1881.2 | 1696.0 | 1661.7 | 1198.8 |
| 42.5° | 2217.2 | 2209.3 | 2199.2 | 2185.4 | 2163.2 | 2170.1 | 2171.3 | 2010.9 | 1826.3 | 1792.5 | 1285.2 |
| 45°   | 2136.2 | 2129.1 | 2139.5 | 2159.7 | 2187.3 | 2221.6 | 2290.5 | 2150.4 | 1971.8 | 1935.8 | 1385.1 |
| 47.5° | 2016.8 | 2011.6 | 2040.4 | 2091.0 | 2171.5 | 2266.1 | 2399.4 | 2296.9 | 2135.1 | 2101.7 | 1509.8 |
| 50°   | 1847.1 | 1846.2 | 1903.7 | 1996.0 | 2119.9 | 2287.5 | 2512.0 | 2463.5 | 2362.0 | 2326.9 | 1683.2 |
| 52.5° | 1582.8 | 1584.5 | 1697.6 | 1845.3 | 2029.3 | 2273.0 | 2584.4 | 2677.6 | 2626.0 | 2589.4 | 1833.4 |
| 55°   | 1331.1 | 1341.5 | 1421.7 | 1634.7 | 1890.4 | 2219.0 | 2609.4 | 2777.5 | 2771.7 | 2737.0 | 1916.9 |
| 57.5° | 1084.6 | 1103.5 | 1180.8 | 1379.8 | 1687.6 | 2094.4 | 2595.7 | 2820.9 | 2880.1 | 2853.6 | 2027.0 |
| 60°   | 817.5  | 826.2  | 915.2  | 1101.3 | 1427.2 | 1867.2 | 2496.4 | 2844.4 | 3028.4 | 3010.0 | 2186.9 |
| 62.5° | 520.1  | 541.8  | 620.8  | 800.2  | 1111.3 | 1551.6 | 2329.1 | 2844.1 | 3213.9 | 3223.9 | 2393.2 |
| 65°   | 274.0  | 299.3  | 341.2  | 495.9  | 763.7  | 1199.1 | 2077.4 | 2817.4 | 3441.5 | 3455.5 | 2554.5 |
| 67.5° | 147.7  | 155.0  | 177.2  | 257.4  | 442.9  | 812.3  | 1707.6 | 2685.7 | 3573.3 | 3591.8 | 2577.0 |
| 70°   | 108.1  | 112.1  | 120.4  | 142.4  | 222.9  | 471.8  | 1246.1 | 2387.3 | 3403.3 | 3396.4 | 2289.6 |
| 72.5° | 83.0   | 89.2   | 95.4   | 104.3  | 128.2  | 251.8  | 775.8  | 1869.4 | 2715.5 | 2669.8 | 1711.5 |
| 75°   | 65.5   | 66.5   | 75.3   | 83.3   | 96.1   | 143.4  | 344.5  | 1088.8 | 1657.4 | 1549.2 | 887.5  |
| 77.5° | 52.3   | 53.0   | 58.2   | 65.1   | 77.3   | 94.2   | 106.7  | 428.3  | 529.1  | 472.2  | 192.6  |
| 80°   | 31.0   | 32.7   | 43.3   | 50.2   | 64.1   | 59.4   | 39.0   | 93.0   | 82.6   | 74.8   | 32.4   |
| 82.5° | 17.3   | 18.7   | 24.4   | 39.7   | 44.7   | 28.4   | 19.4   | 25.1   | 19.4   | 18.9   | 9.2    |
| 85°   | 0.0    | 0.9    | 15.8   | 24.6   | 18.2   | 6.2    | 8.1    | 8.3    | 5.7    | 5.4    | 3.6    |
| 87.5° | 0.0    | 0.0    | 4.8    | 4.7    | 0.7    | 1.0    | 1.9    | 2.8    | 2.3    | 2.3    | 1.9    |
| 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°    | 335.3  | 335.3 | 335.3 | 335.3 | 335.3 | 335.3 | 335.3 | 335.3 | 335.3 | 335.3 | 335.3 |
| 2.5°  | 341.9  | 332.6 | 314.9 | 297.6 | 283.0 | 271.1 | 260.3 | 256.0 | 252.5 | 252.0 | 249.2 |
| 5°    | 357.2  | 338.3 | 304.5 | 276.8 | 258.3 | 245.1 | 233.8 | 226.9 | 221.5 | 219.5 | 217.5 |
| 7.5°  | 380.2  | 351.6 | 303.1 | 271.2 | 249.1 | 226.9 | 206.1 | 183.6 | 169.6 | 164.2 | 161.1 |
| 10°   | 408.2  | 369.3 | 308.3 | 269.7 | 230.9 | 184.1 | 149.7 | 121.1 | 109.5 | 105.7 | 104.6 |
| 12.5° | 441.0  | 391.3 | 317.3 | 260.0 | 192.1 | 130.8 | 103.2 | 93.5  | 90.9  | 89.7  | 89.7  |
| 15°   | 478.6  | 415.4 | 323.7 | 231.9 | 142.0 | 98.9  | 89.4  | 84.9  | 82.1  | 80.5  | 80.7  |
| 17.5° | 517.0  | 438.9 | 320.6 | 191.2 | 104.8 | 88.0  | 80.9  | 76.0  | 72.2  | 70.7  | 70.3  |
| 20°   | 555.8  | 460.7 | 303.3 | 142.4 | 88.7  | 79.8  | 71.9  | 66.5  | 62.7  | 61.1  | 60.8  |
| 22.5° | 596.0  | 479.3 | 272.8 | 104.4 | 79.7  | 70.8  | 63.0  | 57.7  | 54.0  | 52.7  | 52.0  |
| 25°   | 635.2  | 494.3 | 230.2 | 84.5  | 71.2  | 62.4  | 54.9  | 49.9  | 46.6  | 45.2  | 45.0  |
| 27.5° | 671.7  | 503.9 | 180.8 | 74.7  | 63.7  | 54.7  | 48.0  | 43.5  | 40.7  | 39.7  | 39.5  |
| 30°   | 704.6  | 504.7 | 133.7 | 67.4  | 57.2  | 48.2  | 41.9  | 37.9  | 35.5  | 34.5  | 34.1  |
| 32.5° | 737.9  | 497.5 | 97.3  | 60.8  | 51.1  | 42.4  | 36.4  | 33.3  | 31.5  | 30.7  | 30.7  |
| 35°   | 769.2  | 480.6 | 75.9  | 55.1  | 45.2  | 36.9  | 32.0  | 29.8  | 28.8  | 27.9  | 27.9  |
| 37.5° | 799.9  | 456.6 | 64.4  | 50.1  | 39.7  | 32.2  | 28.2  | 26.8  | 26.0  | 25.1  | 25.1  |
| 40°   | 831.0  | 426.3 | 58.5  | 45.4  | 35.2  | 28.6  | 25.1  | 23.9  | 23.0  | 22.3  | 22.2  |
| 42.5° | 869.3  | 391.3 | 54.7  | 41.1  | 31.2  | 25.3  | 22.2  | 20.8  | 20.1  | 19.4  | 19.1  |
| 45°   | 913.7  | 361.1 | 51.6  | 36.7  | 27.9  | 22.5  | 19.2  | 17.8  | 16.8  | 15.9  | 15.8  |
| 47.5° | 977.6  | 339.3 | 47.5  | 32.0  | 24.8  | 19.6  | 16.6  | 15.1  | 13.5  | 12.6  | 12.5  |
| 50°   | 1059.2 | 321.3 | 42.1  | 27.9  | 21.7  | 16.6  | 13.9  | 12.0  | 10.6  | 9.7   | 9.7   |
| 52.5° | 1099.7 | 297.7 | 37.2  | 24.2  | 18.2  | 14.0  | 11.3  | 9.0   | 8.3   | 7.4   | 7.4   |
| 55°   | 1116.0 | 279.7 | 32.4  | 20.6  | 15.1  | 11.6  | 8.8   | 6.9   | 6.4   | 5.9   | 5.7   |
| 57.5° | 1161.7 | 274.5 | 28.2  | 17.5  | 12.5  | 9.2   | 6.8   | 5.2   | 4.8   | 4.2   | 4.2   |
| 60°   | 1235.3 | 277.1 | 24.4  | 14.9  | 10.0  | 7.1   | 5.0   | 4.0   | 3.6   | 2.9   | 2.9   |
| 62.5° | 1314.8 | 273.8 | 20.6  | 12.8  | 7.8   | 5.2   | 3.5   | 2.9   | 2.9   | 1.7   | 1.6   |
| 65°   | 1330.1 | 243.9 | 17.7  | 10.6  | 6.1   | 3.8   | 2.3   | 1.9   | 2.6   | 0.3   | 0.0   |
| 67.5° | 1234.4 | 189.1 | 15.2  | 8.1   | 4.5   | 2.9   | 1.7   | 0.9   | 2.3   | 0.0   | 0.0   |
| 70°   | 987.1  | 120.2 | 12.3  | 5.9   | 3.5   | 2.4   | 1.4   | 0.3   | 1.7   | 0.0   | 0.0   |
| 72.5° | 698.0  | 69.8  | 9.7   | 4.2   | 2.9   | 1.9   | 1.0   | 0.0   | 1.0   | 0.0   | 0.0   |
| 75°   | 353.0  | 37.2  | 6.1   | 3.1   | 2.3   | 1.4   | 0.7   | 0.0   | 0.2   | 0.0   | 0.0   |
| 77.5° | 76.4   | 17.3  | 3.8   | 2.3   | 1.6   | 0.9   | 0.3   | 0.0   | 0.0   | 0.0   | 0.0   |
| 80°   | 16.6   | 7.6   | 2.4   | 1.4   | 0.9   | 0.5   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 82.5° | 6.1    | 4.0   | 1.2   | 0.7   | 0.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 3.3    | 2.1   | 0.7   | 0.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 1.7    | 0.7   | 0.2   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 90°   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2101-121-9

Luminaire Tested: IFLD-S-SA2A-827-U-T2

Test Date: 03/05/2021

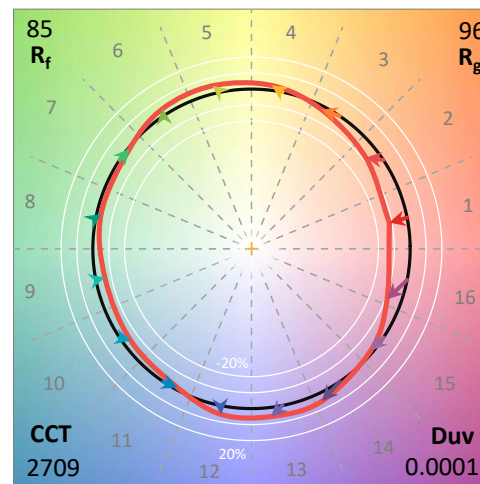
### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/05/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-827-U-T2**  
 Description: STREETWORKS INF FLOOD

PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 2709   | CRI (Ra): | 82.1 |      |      |
| CIE u':                   | 0.2620 | R1:       | 80.4 | R9:  | 4.5  |
| CIE v':                   | 0.5273 | R2:       | 91.2 | R10: | 81.3 |
| Duv:                      | 0.0001 | R3:       | 95.2 | R11: | 81.0 |
| CIE x:                    | 0.4591 | R4:       | 80.5 | R12: | 79.0 |
| CIE y:                    | 0.4107 | R5:       | 81.2 | R13: | 82.9 |
| CIE z:                    | 0.1301 | R6:       | 90.9 | R14: | 97.9 |
| Peak Wavelength (nm):     | 606    | R7:       | 81.1 |      |      |
| Dominant Wavelength (nm): | 584    | R8:       | 56.0 |      |      |
| Purity:                   | 61.2   |           |      |      |      |
| Rf:                       | 85.2   |           |      |      |      |
| Rg:                       | 96.4   |           |      |      |      |



### Test Conditions

Stabilization Time: 60M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.9/31%  
 Sphere Temperature (°C): 24.4

REPORT NUMBER: SP1-2101-121-9

| 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            |

REPORT NUMBER: SP1-2101-121-9

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



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| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2013             | 0.0              | 490       | 33356            | 4.7              | 620       | 150993           | 39.3             | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 7.3              | 625       | 145077           | 32.0             | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 10.2             | 630       | 136072           | 24.6             | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 14.5             | 635       | 126417           | 19.0             | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 19.4             | 640       | 116412           | 13.9             | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 25.2             | 645       | 107525           | 10.4             | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 31.0             | 650       | 97857            | 7.2              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 35.8             | 655       | 88582            | 5.1              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 41.1             | 660       | 79462            | 3.3              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.0              | 535       | 72510            | 45.0             | 665       | 70606            | 2.2              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.0              | 540       | 75299            | 49.1             | 670       | 61774            | 1.4              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.0              | 545       | 79297            | 52.8             | 675       | 53771            | 0.9              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.0              | 550       | 84946            | 57.7             | 680       | 46786            | 0.5              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 0.0              | 555       | 90790            | 62.0             | 685       | 40747            | 0.4              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 0.1              | 560       | 98231            | 66.8             | 690       | 35400            | 0.2              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 0.3              | 565       | 105738           | 70.3             | 695       | 30445            | 0.1              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 0.6              | 570       | 114034           | 74.1             | 700       | 26278            | 0.1              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 1.1              | 575       | 123632           | 76.9             | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 1.4              | 580       | 132443           | 78.7             | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 1.4              | 585       | 141502           | 78.6             | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 1.4              | 590       | 148917           | 77.0             | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 1.4              | 595       | 154326           | 73.2             | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 1.5              | 600       | 159208           | 68.6             | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 1.7              | 605       | 161290           | 62.5             | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 2.3              | 610       | 159549           | 54.8             | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 3.3              | 615       | 156663           | 47.3             | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



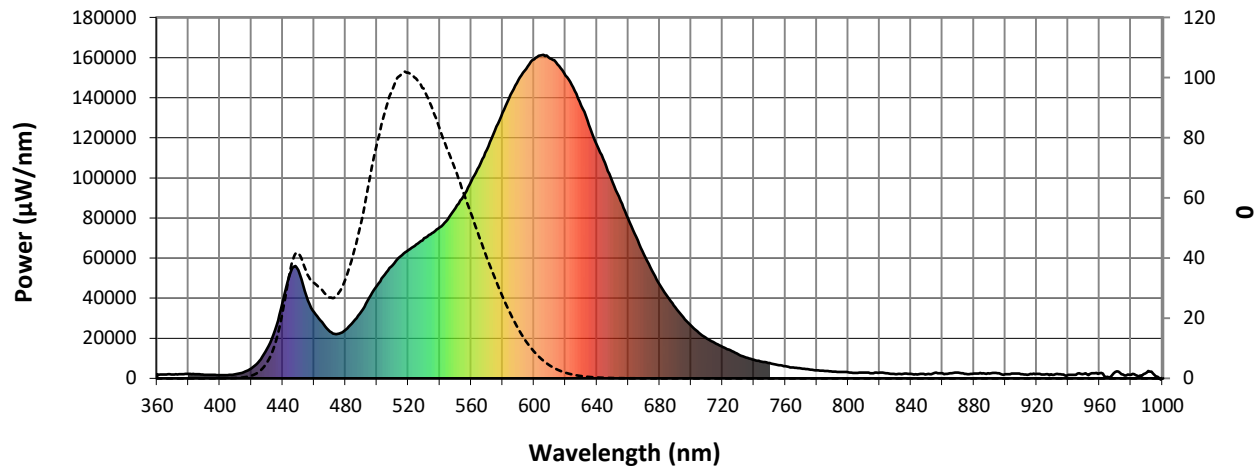
Scotopic Lumens: 8911.3

S/P: 1.22

| 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       | 2013             | 0.0              | 490       | 33356            | 51.4             | 620       | 150993           | 1.9              | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 64.7             | 625       | 145077           | 1.2              | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 77.4             | 630       | 136072           | 0.8              | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 88.0             | 635       | 126417           | 0.5              | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 95.9             | 640       | 116412           | 0.3              | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 100.7            | 645       | 107525           | 0.2              | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 101.7            | 650       | 97857            | 0.1              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 99.8             | 655       | 88582            | 0.1              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 96.3             | 660       | 79462            | 0.0              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.1              | 535       | 72510            | 90.4             | 665       | 70606            | 0.0              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.1              | 540       | 75299            | 83.2             | 670       | 61774            | 0.0              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.3              | 545       | 79297            | 76.0             | 675       | 53771            | 0.0              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.8              | 550       | 84946            | 69.5             | 680       | 46786            | 0.0              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 2.1              | 555       | 90790            | 62.0             | 685       | 40747            | 0.0              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 5.0              | 560       | 98231            | 54.9             | 690       | 35400            | 0.0              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 10.7             | 565       | 105738           | 47.4             | 695       | 30445            | 0.0              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 21.3             | 570       | 114034           | 40.2             | 700       | 26278            | 0.0              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 35.5             | 575       | 123632           | 33.7             | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 41.8             | 580       | 132443           | 27.3             | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 36.0             | 585       | 141502           | 21.6             | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 31.8             | 590       | 148917           | 16.6             | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 29.6             | 595       | 154326           | 12.3             | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 26.9             | 600       | 159208           | 9.0              | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 27.7             | 605       | 161290           | 6.3              | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 32.7             | 610       | 159549           | 4.3              | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 40.9             | 615       | 156663           | 2.9              | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 3277.6**
**M/P: 0.45**

| 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       | 2013             | 0.0              | 490       | 33356            | 27.8             | 620       | 150993           | 0.1              | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 33.0             | 625       | 145077           | 0.1              | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 37.2             | 630       | 136072           | 0.0              | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 39.7             | 635       | 126417           | 0.0              | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 40.6             | 640       | 116412           | 0.0              | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 39.7             | 645       | 107525           | 0.0              | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 37.2             | 650       | 97857            | 0.0              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 33.8             | 655       | 88582            | 0.0              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 30.2             | 660       | 79462            | 0.0              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.0              | 535       | 72510            | 26.1             | 665       | 70606            | 0.0              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.1              | 540       | 75299            | 22.0             | 670       | 61774            | 0.0              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.2              | 545       | 79297            | 18.4             | 675       | 53771            | 0.0              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.6              | 550       | 84946            | 15.2             | 680       | 46786            | 0.0              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 1.3              | 555       | 90790            | 12.2             | 685       | 40747            | 0.0              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 3.1              | 560       | 98231            | 9.7              | 690       | 35400            | 0.0              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 6.4              | 565       | 105738           | 7.4              | 695       | 30445            | 0.0              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 12.8             | 570       | 114034           | 5.6              | 700       | 26278            | 0.0              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 20.9             | 575       | 123632           | 4.1              | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 24.8             | 580       | 132443           | 3.0              | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 21.6             | 585       | 141502           | 2.1              | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 19.4             | 590       | 148917           | 1.5              | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 18.3             | 595       | 154326           | 1.0              | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 16.7             | 600       | 159208           | 0.7              | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 16.9             | 605       | 161290           | 0.4              | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 19.4             | 610       | 159549           | 0.3              | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 23.3             | 615       | 156663           | 0.2              | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

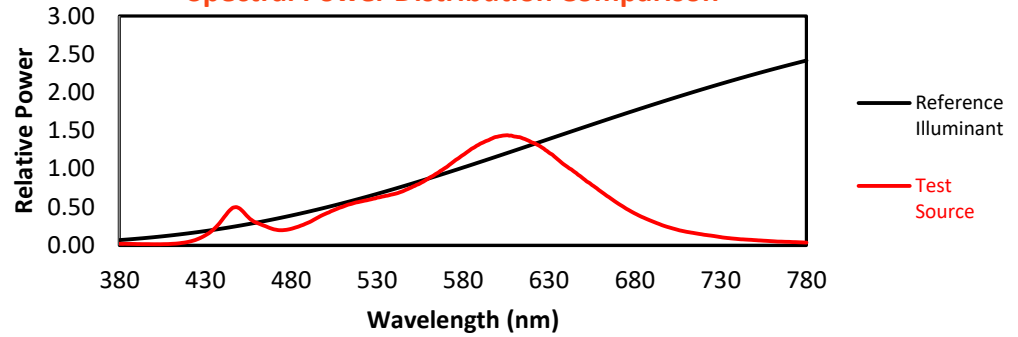
REPORT NUMBER: SP1-2101-121-9

TM-30-18

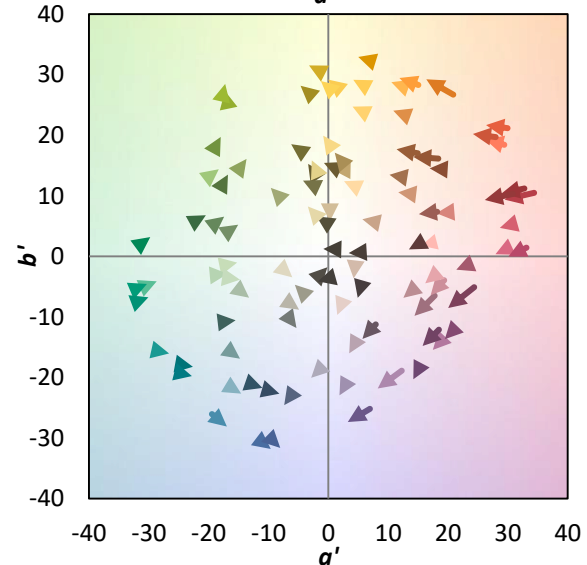
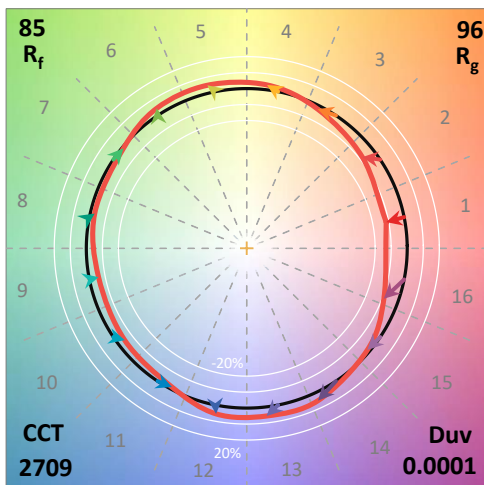
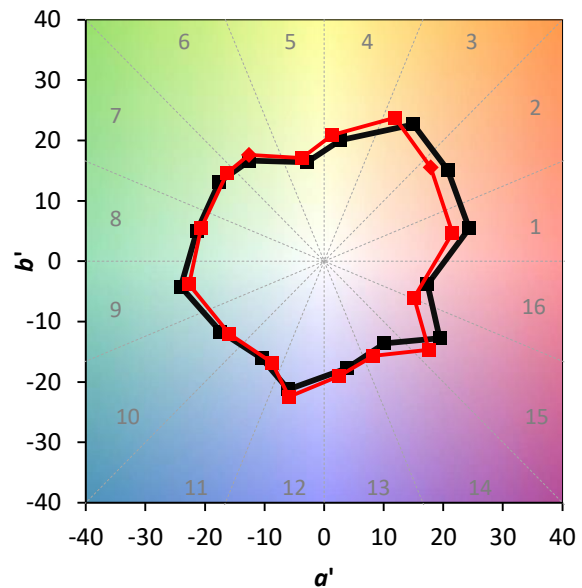
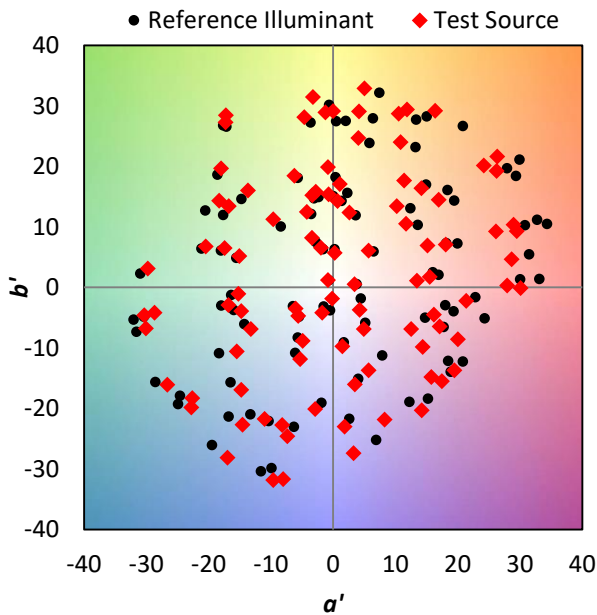
### Summary

$R_f = 85.2$   
 $R_g = 96.4$   
 CIE  $R_a = 82.1$   
 $R_9 = 4.5$

### Spectral Power Distribution Comparison



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 83 | CES51 = 95 | CES76 = 83 |
| CES02 = 64 | CES27 = 95 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 82 |
| CES04 = 71 | CES29 = 82 | CES54 = 92 | CES79 = 89 |
| CES05 = 50 | CES30 = 87 | CES55 = 92 | CES80 = 89 |
| CES06 = 52 | CES31 = 85 | CES56 = 87 | CES81 = 69 |
| CES07 = 43 | CES32 = 80 | CES57 = 87 | CES82 = 96 |
| CES08 = 42 | CES33 = 86 | CES58 = 88 | CES83 = 93 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 93 |
| CES10 = 77 | CES35 = 96 | CES60 = 96 | CES85 = 78 |
| CES11 = 60 | CES36 = 96 | CES61 = 91 | CES86 = 65 |
| CES12 = 66 | CES37 = 95 | CES62 = 97 | CES87 = 85 |
| CES13 = 44 | CES38 = 93 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 97 | CES64 = 86 | CES89 = 74 |
| CES15 = 72 | CES40 = 94 | CES65 = 81 | CES90 = 86 |
| CES16 = 48 | CES41 = 93 | CES66 = 85 | CES91 = 87 |
| CES17 = 50 | CES42 = 95 | CES67 = 84 | CES92 = 67 |
| CES18 = 57 | CES43 = 88 | CES68 = 85 | CES93 = 80 |
| CES19 = 73 | CES44 = 99 | CES69 = 91 | CES94 = 61 |
| CES20 = 67 | CES45 = 92 | CES70 = 82 | CES95 = 77 |
| CES21 = 87 | CES46 = 88 | CES71 = 83 | CES96 = 84 |
| CES22 = 79 | CES47 = 88 | CES72 = 93 | CES97 = 88 |
| CES23 = 92 | CES48 = 81 | CES73 = 78 | CES98 = 84 |
| CES24 = 91 | CES49 = 88 | CES74 = 91 | CES99 = 76 |
| CES25 = 72 | CES50 = 94 | CES75 = 85 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)