

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P361475

Luminaire Tested: NVN-SA1B-760-U-T4FT

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P361475  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-16)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA1B-760-U-T4FT  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 5700K, 800mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV FORWARD  
THROW OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 5912 lumens  
Efficiency: N/A  
Efficacy: 134.4 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

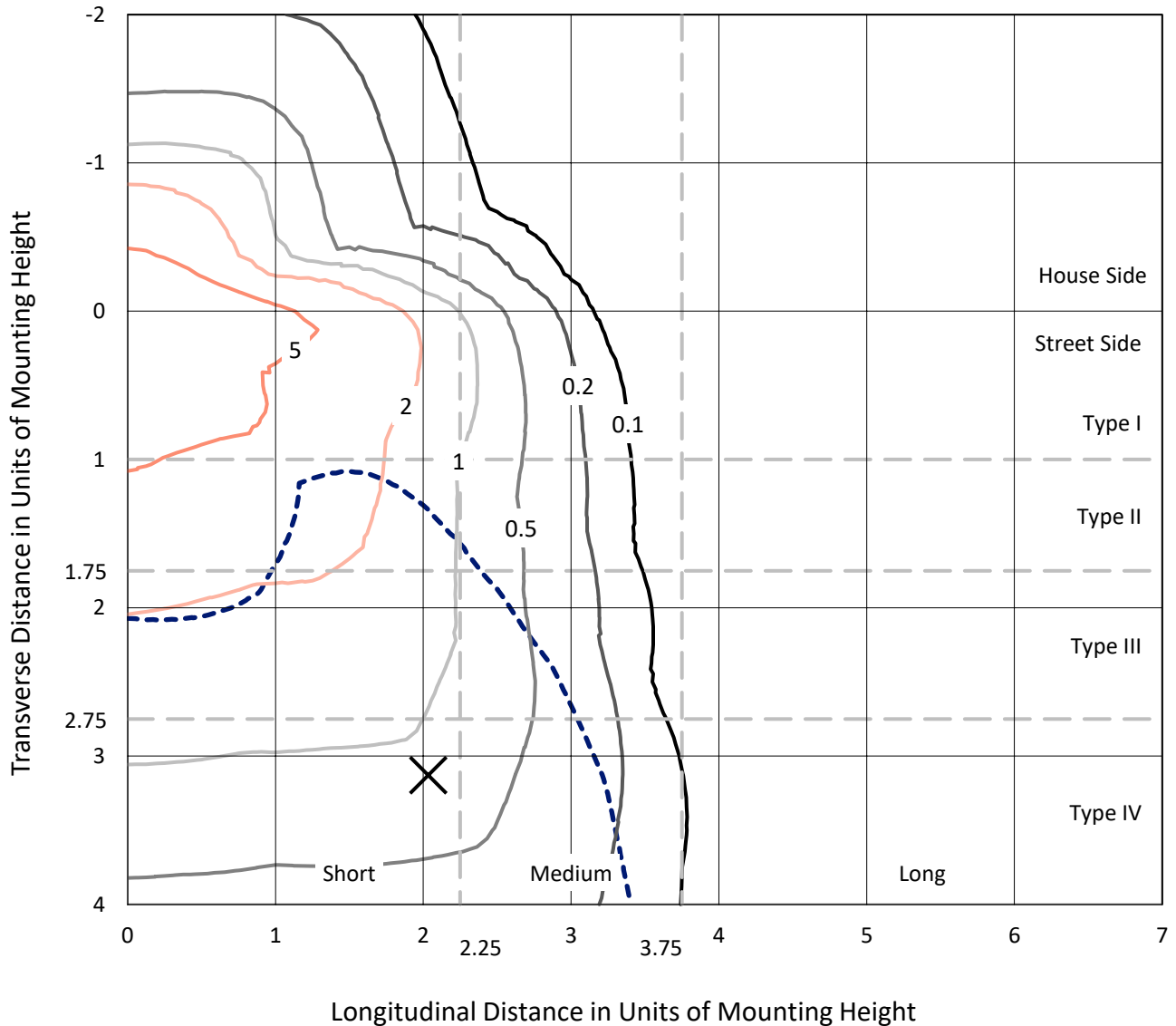
Input Watts (W): 44  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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### Iso-Footcandle Lines of Horizontal Illumination

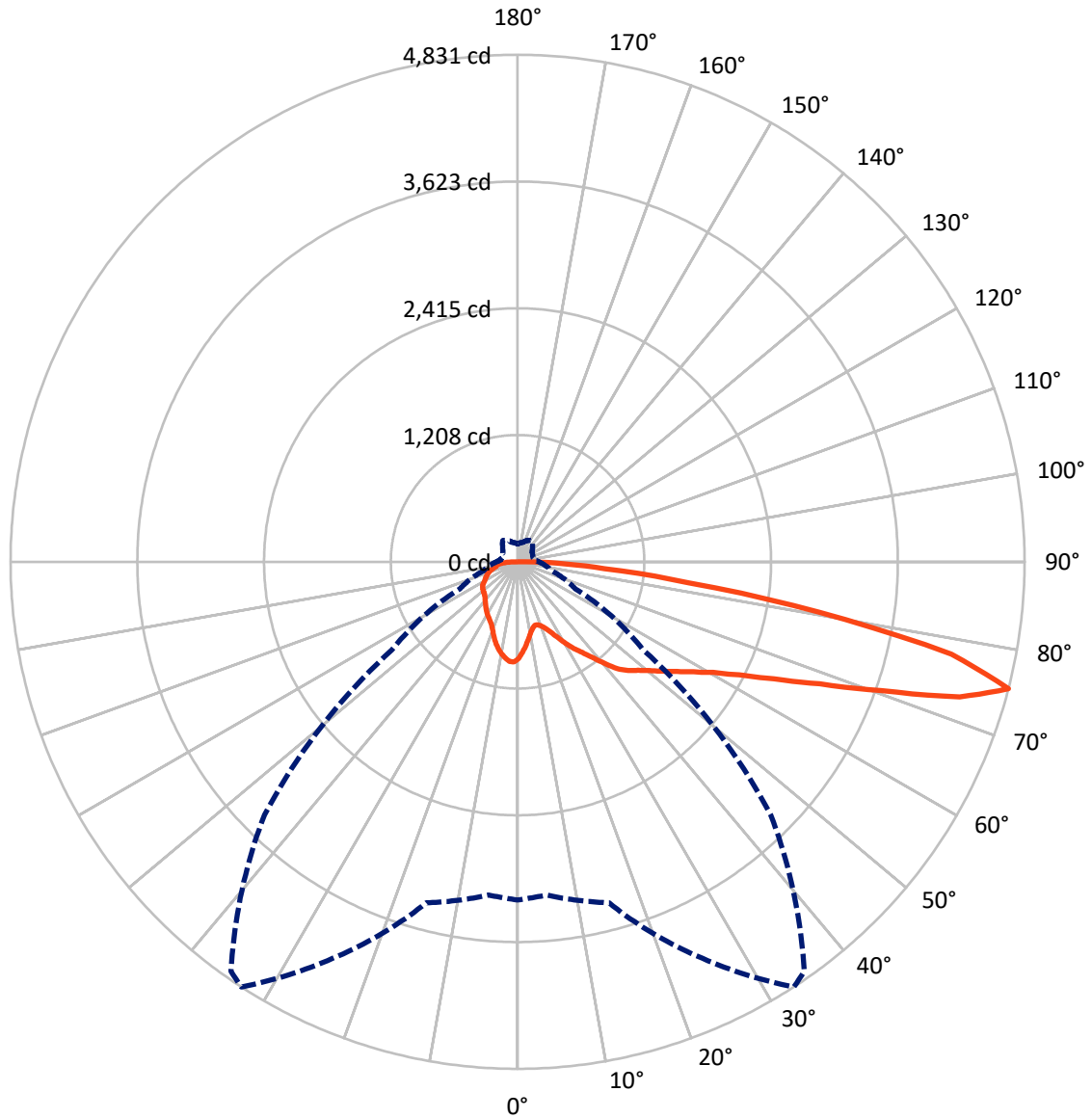
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 9.2 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 33-Deg Lateral      - - - Horizontal Cone Through 75-Deg Vertical

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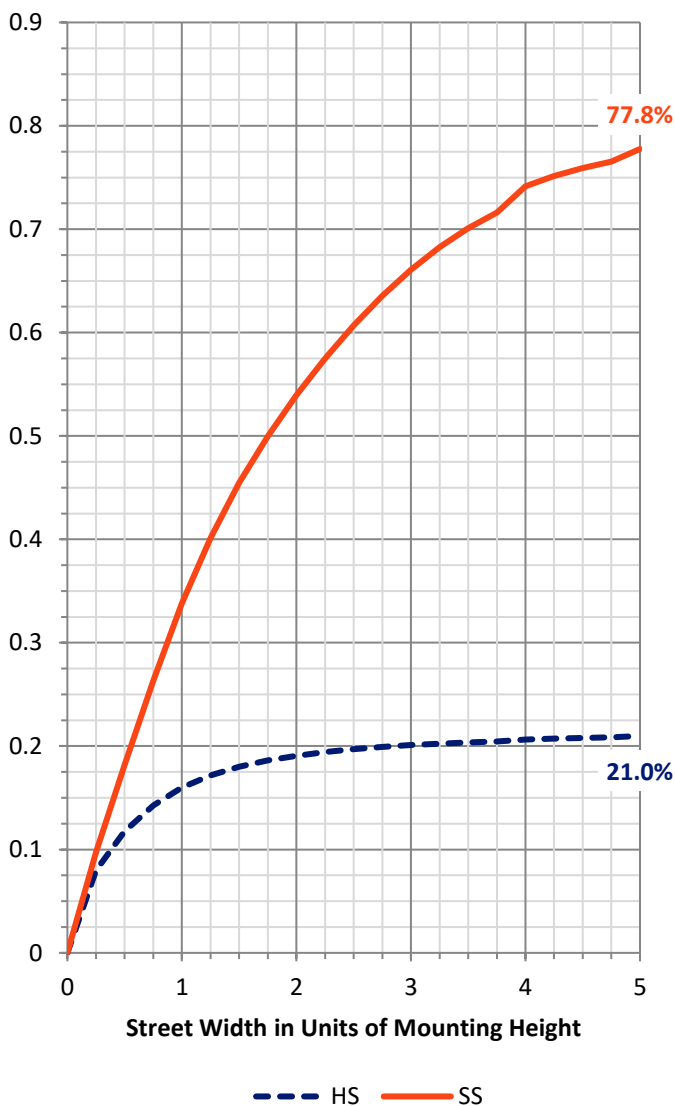
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1269.5   | 0.0    | 1269.5 |
|                    | % Fixture | 21.5     | 0.0    | 21.5   |
| <b>Street Side</b> | Lumens    | 4642.5   | 0.0    | 4642.5 |
|                    | % Fixture | 78.5     | 0.0    | 78.5   |
| <b>Total</b>       | Lumens    | 5912.0   | 0.0    | 5912.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 83.6   | 1.4       |
| 10°-20°   | 226.3  | 3.8       |
| 20°-30°   | 369.7  | 6.3       |
| 30°-40°   | 550.5  | 9.3       |
| 40°-50°   | 789.6  | 13.4      |
| 50°-60°   | 1084.0 | 18.3      |
| 60°-70°   | 1357.1 | 23.0      |
| 70°-80°   | 1227.7 | 20.8      |
| 80°-90°   | 223.6  | 3.8       |
| 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°    | 5912.0 | 100.0     |
| 0°-180°   | 5912.0 | 100.0     |

**Coefficient of Utilization**

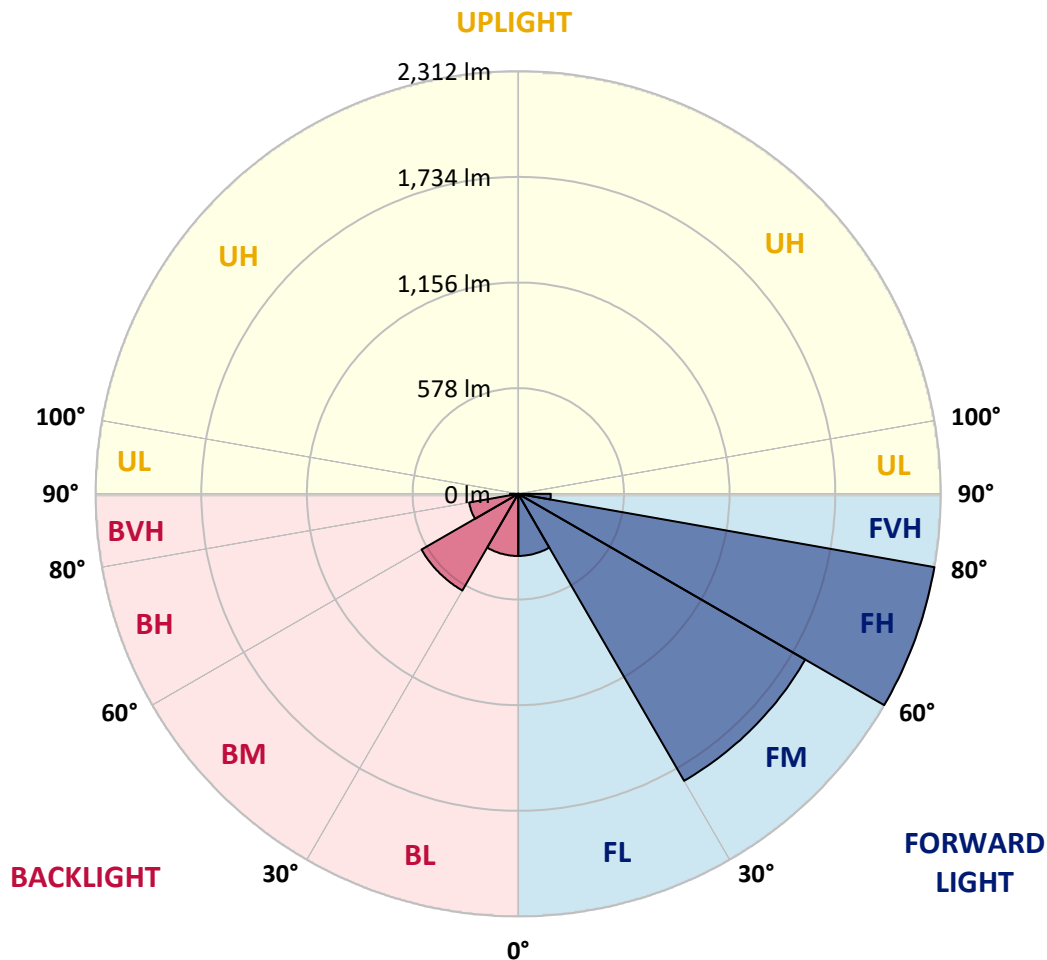


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 339.6  | 5.7       |                         |      |         |
| FM (30°-60°)   | 1813.1 | 30.7      |                         |      |         |
| FH (60°-80°)   | 2311.8 | 39.1      |                         |      | G2/5000 |
| FVH (80°-90°)  | 178.1  | 3.0       |                         |      | G2/225  |
| BL (0°-30°)    | 340.0  | 5.8       | B1/500                  |      |         |
| BM (30°-60°)   | 611.0  | 10.3      | B1/1000                 |      |         |
| BH (60°-80°)   | 273.0  | 4.6       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 45.5   | 0.8       |                         |      | G1/100  |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**  
 Type IV Short





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CATALOG NUMBER: NVN-SA1B-760-U-T4FT

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 33°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 924.1  | 924.1  | 924.1  | 924.1  | 924.1  | 924.1  | 924.1  | 924.1  | 924.1  | 924.1  | 924.1  |
| 2.5°  | 858.1  | 854.8  | 861.0  | 861.8  | 867.1  | 869.1  | 876.5  | 887.9  | 897.3  | 908.1  | 918.0  |
| 5°    | 780.3  | 778.1  | 786.6  | 792.8  | 804.4  | 809.3  | 826.7  | 851.0  | 872.6  | 897.1  | 919.4  |
| 7.5°  | 706.4  | 705.2  | 714.8  | 728.6  | 742.1  | 748.9  | 778.9  | 814.2  | 850.4  | 890.0  | 924.1  |
| 10°   | 644.1  | 643.7  | 652.9  | 666.6  | 686.4  | 693.9  | 732.7  | 779.3  | 829.9  | 884.5  | 932.0  |
| 12.5° | 609.2  | 610.6  | 614.9  | 626.3  | 644.7  | 652.3  | 695.4  | 750.1  | 812.8  | 882.6  | 943.7  |
| 15°   | 617.8  | 620.0  | 612.6  | 612.2  | 625.3  | 631.2  | 671.7  | 729.3  | 800.5  | 885.7  | 960.6  |
| 17.5° | 654.3  | 654.7  | 635.3  | 623.1  | 631.0  | 634.1  | 664.3  | 717.4  | 793.4  | 892.6  | 981.9  |
| 20°   | 705.8  | 704.8  | 670.4  | 650.0  | 654.3  | 655.1  | 674.7  | 717.6  | 792.8  | 904.7  | 1009.4 |
| 22.5° | 774.0  | 766.4  | 720.3  | 692.5  | 691.5  | 690.3  | 701.5  | 732.7  | 801.8  | 924.3  | 1042.3 |
| 25°   | 863.0  | 855.9  | 792.4  | 754.4  | 746.2  | 743.1  | 744.8  | 765.0  | 819.5  | 945.3  | 1079.1 |
| 27.5° | 962.1  | 949.6  | 888.3  | 834.6  | 817.7  | 813.4  | 803.6  | 810.5  | 838.9  | 965.5  | 1122.8 |
| 30°   | 1045.0 | 1038.2 | 984.7  | 921.0  | 901.0  | 894.9  | 869.1  | 861.6  | 866.9  | 993.1  | 1177.9 |
| 32.5° | 1091.3 | 1086.8 | 1054.4 | 1002.9 | 984.3  | 975.7  | 939.4  | 924.3  | 911.8  | 1036.6 | 1252.7 |
| 35°   | 1147.5 | 1144.6 | 1125.0 | 1087.7 | 1060.1 | 1051.1 | 1022.9 | 1007.2 | 975.1  | 1096.4 | 1349.3 |
| 37.5° | 1219.0 | 1215.9 | 1216.3 | 1186.1 | 1153.2 | 1144.8 | 1126.3 | 1109.7 | 1057.2 | 1175.1 | 1454.2 |
| 40°   | 1299.8 | 1293.9 | 1291.7 | 1290.2 | 1269.4 | 1264.7 | 1254.9 | 1232.4 | 1160.2 | 1269.0 | 1557.8 |
| 42.5° | 1421.5 | 1400.5 | 1355.6 | 1372.5 | 1393.2 | 1390.7 | 1398.7 | 1366.4 | 1274.5 | 1380.1 | 1658.8 |
| 45°   | 1539.0 | 1504.5 | 1426.9 | 1430.5 | 1475.7 | 1489.3 | 1549.0 | 1526.1 | 1398.5 | 1501.8 | 1763.4 |
| 47.5° | 1592.5 | 1566.3 | 1500.4 | 1500.6 | 1545.3 | 1573.7 | 1704.4 | 1688.1 | 1528.8 | 1640.1 | 1891.0 |
| 50°   | 1652.3 | 1626.2 | 1567.0 | 1589.2 | 1628.2 | 1658.4 | 1854.5 | 1846.1 | 1652.7 | 1791.4 | 2044.0 |
| 52.5° | 1717.7 | 1673.3 | 1635.8 | 1675.6 | 1730.3 | 1765.4 | 2004.8 | 1981.9 | 1766.5 | 1943.7 | 2219.8 |
| 55°   | 1718.5 | 1706.4 | 1735.0 | 1764.2 | 1846.1 | 1889.2 | 2162.2 | 2101.8 | 1859.2 | 2093.4 | 2363.0 |
| 57.5° | 1816.3 | 1796.7 | 1857.3 | 1870.8 | 1977.8 | 2026.4 | 2318.9 | 2206.1 | 1953.5 | 2208.2 | 2440.2 |
| 60°   | 1945.8 | 1929.0 | 1978.7 | 2014.2 | 2140.8 | 2205.7 | 2486.1 | 2313.4 | 2027.7 | 2294.8 | 2436.5 |
| 62.5° | 2169.4 | 2150.4 | 2149.8 | 2199.6 | 2370.1 | 2445.7 | 2673.8 | 2418.5 | 2057.1 | 2311.9 | 2332.6 |
| 65°   | 2496.7 | 2466.5 | 2409.5 | 2433.2 | 2686.9 | 2762.2 | 2883.5 | 2494.7 | 2018.3 | 2220.0 | 2064.8 |
| 67.5° | 2815.3 | 2814.3 | 2744.3 | 2792.9 | 3105.1 | 3165.6 | 3122.5 | 2502.3 | 1897.2 | 1900.0 | 1589.8 |
| 70°   | 3132.9 | 3137.0 | 3125.1 | 3294.2 | 3670.2 | 3733.1 | 3376.9 | 2400.8 | 1624.9 | 1372.1 | 952.5  |
| 72.5° | 3384.5 | 3383.5 | 3443.1 | 3879.1 | 4403.5 | 4389.4 | 3591.3 | 2093.2 | 1166.7 | 740.7  | 455.2  |
| 75°   | 3221.5 | 3186.0 | 3363.6 | 4168.7 | 4830.9 | 4762.1 | 3409.0 | 1460.1 | 605.5  | 337.2  | 245.1  |
| 77.5° | 2101.2 | 2134.9 | 2395.7 | 3443.7 | 4225.6 | 4141.9 | 2501.0 | 681.3  | 285.3  | 221.2  | 177.7  |
| 80°   | 760.9  | 796.4  | 1121.8 | 1950.7 | 2911.3 | 2897.6 | 1231.6 | 280.0  | 193.0  | 167.0  | 129.5  |
| 82.5° | 261.8  | 274.9  | 442.5  | 866.3  | 1643.7 | 1705.0 | 463.4  | 159.1  | 140.3  | 118.4  | 88.6   |
| 85°   | 102.7  | 117.6  | 202.4  | 416.8  | 829.1  | 835.2  | 187.7  | 95.2   | 97.6   | 77.6   | 48.6   |
| 87.5° | 39.0   | 47.4   | 96.8   | 193.6  | 378.6  | 347.8  | 67.2   | 45.3   | 55.5   | 46.2   | 23.1   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P361475  
 CATALOG NUMBER: NVN-SA1B-760-U-T4FT

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 924.1  | 924.1  | 924.1 | 924.1 | 924.1 | 924.1 | 924.1 | 924.1 | 924.1 | 924.1 | 924.1 |
| 2.5°  | 925.5  | 929.8  | 938.8 | 944.9 | 951.4 | 953.3 | 954.1 | 955.7 | 957.4 | 956.8 | 957.0 |
| 5°    | 931.2  | 939.6  | 954.1 | 960.2 | 963.1 | 959.8 | 953.5 | 948.4 | 944.7 | 942.7 | 942.0 |
| 7.5°  | 940.6  | 952.5  | 968.0 | 967.0 | 960.4 | 945.9 | 929.6 | 917.3 | 907.1 | 903.5 | 901.4 |
| 10°   | 953.1  | 967.0  | 977.8 | 966.1 | 947.2 | 922.0 | 897.5 | 878.5 | 863.2 | 857.3 | 856.3 |
| 12.5° | 969.0  | 983.1  | 985.1 | 960.4 | 929.0 | 894.7 | 861.4 | 836.3 | 813.4 | 806.0 | 804.4 |
| 15°   | 989.6  | 1002.9 | 990.2 | 950.4 | 906.5 | 860.4 | 817.3 | 783.2 | 759.1 | 750.1 | 746.8 |
| 17.5° | 1011.3 | 1023.9 | 991.3 | 933.9 | 877.1 | 819.7 | 765.6 | 730.7 | 703.1 | 692.7 | 691.5 |
| 20°   | 1037.2 | 1042.9 | 987.0 | 910.2 | 836.7 | 767.0 | 710.1 | 677.2 | 662.5 | 655.1 | 654.3 |
| 22.5° | 1069.3 | 1063.2 | 977.2 | 878.1 | 785.4 | 706.2 | 659.8 | 644.5 | 640.8 | 639.2 | 639.8 |
| 25°   | 1103.2 | 1084.4 | 962.7 | 836.3 | 720.7 | 645.3 | 623.1 | 627.4 | 632.3 | 631.6 | 631.6 |
| 27.5° | 1140.5 | 1106.0 | 940.4 | 780.7 | 649.0 | 595.5 | 598.1 | 613.9 | 621.2 | 621.0 | 620.8 |
| 30°   | 1188.5 | 1130.5 | 912.0 | 713.9 | 582.0 | 560.4 | 576.5 | 595.7 | 605.7 | 605.3 | 605.5 |
| 32.5° | 1247.6 | 1157.5 | 873.4 | 639.4 | 533.6 | 534.4 | 553.0 | 572.0 | 583.7 | 582.6 | 582.8 |
| 35°   | 1316.6 | 1187.7 | 821.2 | 565.9 | 501.6 | 513.8 | 528.5 | 541.8 | 552.8 | 551.4 | 550.0 |
| 37.5° | 1391.7 | 1217.3 | 751.7 | 500.1 | 475.4 | 494.6 | 506.9 | 509.1 | 514.2 | 510.5 | 507.9 |
| 40°   | 1463.2 | 1240.0 | 662.3 | 446.2 | 449.1 | 478.3 | 486.2 | 477.3 | 468.1 | 466.8 | 463.2 |
| 42.5° | 1525.5 | 1247.6 | 571.8 | 403.1 | 421.3 | 461.1 | 466.0 | 447.2 | 430.7 | 422.9 | 419.7 |
| 45°   | 1591.3 | 1250.2 | 487.5 | 367.0 | 394.5 | 445.8 | 451.1 | 426.0 | 402.7 | 386.0 | 380.5 |
| 47.5° | 1677.2 | 1269.4 | 421.9 | 340.2 | 374.1 | 435.6 | 443.1 | 409.0 | 378.8 | 354.9 | 349.8 |
| 50°   | 1789.8 | 1307.4 | 368.6 | 319.8 | 360.9 | 428.9 | 437.4 | 392.5 | 359.2 | 330.4 | 325.3 |
| 52.5° | 1914.7 | 1342.3 | 325.5 | 303.3 | 348.0 | 417.0 | 430.1 | 380.7 | 340.8 | 307.8 | 302.2 |
| 55°   | 2002.1 | 1315.6 | 290.8 | 286.1 | 331.2 | 400.1 | 419.9 | 370.7 | 314.5 | 285.7 | 280.8 |
| 57.5° | 2018.9 | 1224.1 | 264.5 | 268.3 | 311.0 | 378.8 | 404.1 | 348.4 | 300.2 | 276.1 | 271.0 |
| 60°   | 1973.1 | 1096.6 | 244.9 | 252.0 | 289.4 | 352.1 | 374.7 | 332.7 | 286.5 | 265.9 | 261.6 |
| 62.5° | 1858.2 | 966.1  | 230.4 | 237.3 | 269.2 | 324.9 | 356.4 | 316.1 | 272.6 | 254.2 | 250.0 |
| 65°   | 1626.0 | 811.1  | 216.5 | 224.2 | 250.4 | 301.4 | 339.8 | 300.8 | 258.9 | 244.9 | 240.8 |
| 67.5° | 1227.3 | 607.5  | 203.4 | 210.3 | 233.6 | 281.0 | 321.8 | 285.7 | 245.7 | 236.7 | 231.8 |
| 70°   | 722.7  | 380.5  | 188.5 | 195.8 | 216.1 | 259.8 | 302.6 | 269.2 | 229.1 | 225.0 | 218.7 |
| 72.5° | 336.3  | 228.9  | 171.5 | 178.7 | 194.0 | 231.4 | 277.9 | 247.5 | 209.5 | 200.5 | 192.0 |
| 75°   | 200.7  | 167.5  | 151.5 | 157.9 | 168.7 | 201.2 | 246.9 | 225.5 | 190.9 | 179.1 | 170.1 |
| 77.5° | 150.1  | 128.0  | 129.5 | 136.2 | 145.0 | 176.0 | 218.7 | 208.1 | 176.6 | 167.5 | 161.3 |
| 80°   | 108.0  | 97.2   | 105.6 | 112.9 | 122.1 | 160.1 | 209.5 | 192.4 | 159.7 | 147.4 | 141.7 |
| 82.5° | 72.1   | 69.8   | 79.4  | 87.0  | 96.0  | 140.1 | 196.9 | 168.5 | 136.4 | 120.9 | 108.2 |
| 85°   | 39.8   | 42.1   | 53.5  | 56.8  | 64.5  | 98.6  | 161.3 | 135.4 | 102.7 | 82.7  | 79.0  |
| 87.5° | 16.5   | 19.4   | 28.8  | 27.8  | 34.3  | 58.8  | 106.2 | 81.7  | 65.3  | 48.8  | 38.0  |
| 90°   | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-9-R4

Test Date: 10/23/2019

Luminaire Tested: SA1C-760-U-5WQ

Data in this report applies to families of products SA1C-760-U-5WQ .

**Test Information**

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-9-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-760-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

**Spectral Parameters**

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 5474   | CRI (Ra): | 71.7 | R9:  | -27.1 |
| CIE u':                   | 0.2052 | R1:       | 70.6 | R10: | 40.8  |
| CIE v':                   | 0.4804 | R2:       | 74.6 | R11: | 74.6  |
| Duv:                      | 0.0025 | R3:       | 78.3 | R12: | 50.4  |
| CIE x:                    | 0.3330 | R4:       | 73.8 | R13: | 70.0  |
| CIE y:                    | 0.3466 | R5:       | 72.4 | R14: | 87.8  |
| CIE z:                    | 0.3204 | R6:       | 67.5 |      |       |
| Peak Wavelength (nm):     | 442    | R7:       | 77.5 |      |       |
| Dominant Wavelength (nm): | 554    | R8:       | 58.9 |      |       |
| Purity:                   | 4.1    |           |      |      |       |
| Rf:                       | 72.1   |           |      |      |       |
| Rg:                       | 97.2   |           |      |      |       |



**Test Conditions**

Stabilization Time: 240M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.6/31%  
 Sphere Temperature (°C): 25.9

REPORT NUMBER: SP1-1908-441-9-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

REPORT NUMBER: SP1-1908-441-9-R4

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 5700K 4-step quadrangle

REPORT NUMBER: SP1-1908-441-9-R4

**Photopic Flux vs. Wavelength**



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| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 3540                                 | NR                             | 490               | 33363                                | NR                             | 620               | 80193                                | NR                             | 750               | 4663                                 | NR                             | 880               | 4678                                 | NR                             |
| 365               | 2862                                 | NR                             | 495               | 44177                                | NR                             | 625               | 73091                                | NR                             | 755               | 4147                                 | NR                             | 885               | 4128                                 | NR                             |
| 370               | 2865                                 | NR                             | 500               | 57019                                | NR                             | 630               | 66269                                | NR                             | 760               | 4040                                 | NR                             | 890               | 4504                                 | NR                             |
| 375               | 3254                                 | NR                             | 505               | 70030                                | NR                             | 635               | 60012                                | NR                             | 765               | 3474                                 | NR                             | 895               | 4371                                 | NR                             |
| 380               | 3076                                 | NR                             | 510               | 81972                                | NR                             | 640               | 53914                                | NR                             | 770               | 3469                                 | NR                             | 900               | 4082                                 | NR                             |
| 385               | 2904                                 | NR                             | 515               | 92590                                | NR                             | 645               | 48385                                | NR                             | 775               | 3181                                 | NR                             | 905               | 2982                                 | NR                             |
| 390               | 2689                                 | NR                             | 520               | 100305                               | NR                             | 650               | 43219                                | NR                             | 780               | 2969                                 | NR                             | 910               | 4351                                 | NR                             |
| 395               | 2619                                 | NR                             | 525               | 107452                               | NR                             | 655               | 38562                                | NR                             | 785               | 3132                                 | NR                             | 915               | 3365                                 | NR                             |
| 400               | 2679                                 | NR                             | 530               | 111373                               | NR                             | 660               | 34110                                | NR                             | 790               | 2507                                 | NR                             | 920               | 3430                                 | NR                             |
| 405               | 3515                                 | NR                             | 535               | 114505                               | NR                             | 665               | 30085                                | NR                             | 795               | 2968                                 | NR                             | 925               | 4264                                 | NR                             |
| 410               | 6934                                 | NR                             | 540               | 116408                               | NR                             | 670               | 26205                                | NR                             | 800               | 2758                                 | NR                             | 930               | 4095                                 | NR                             |
| 415               | 14943                                | NR                             | 545               | 118700                               | NR                             | 675               | 22906                                | NR                             | 805               | 2872                                 | NR                             | 935               | 5048                                 | NR                             |
| 420               | 31939                                | NR                             | 550               | 119209                               | NR                             | 680               | 20058                                | NR                             | 810               | 3094                                 | NR                             | 940               | 4074                                 | NR                             |
| 425               | 64701                                | NR                             | 555               | 120742                               | NR                             | 685               | 17413                                | NR                             | 815               | 3222                                 | NR                             | 945               | 4949                                 | NR                             |
| 430               | 110939                               | NR                             | 560               | 121594                               | NR                             | 690               | 15447                                | NR                             | 820               | 3238                                 | NR                             | 950               | 4387                                 | NR                             |
| 435               | 164597                               | NR                             | 565               | 121913                               | NR                             | 695               | 13398                                | NR                             | 825               | 3524                                 | NR                             | 955               | 4978                                 | NR                             |
| 440               | 207696                               | NR                             | 570               | 122147                               | NR                             | 700               | 11777                                | NR                             | 830               | 2921                                 | NR                             | 960               | 4706                                 | NR                             |
| 445               | 201830                               | NR                             | 575               | 121605                               | NR                             | 705               | 10412                                | NR                             | 835               | 3595                                 | NR                             | 965               | 5083                                 | NR                             |
| 450               | 145410                               | NR                             | 580               | 120248                               | NR                             | 710               | 9544                                 | NR                             | 840               | 3016                                 | NR                             | 970               | 4522                                 | NR                             |
| 455               | 89594                                | NR                             | 585               | 117717                               | NR                             | 715               | 8940                                 | NR                             | 845               | 4032                                 | NR                             | 975               | 4740                                 | NR                             |
| 460               | 58321                                | NR                             | 590               | 114359                               | NR                             | 720               | 7897                                 | NR                             | 850               | 3579                                 | NR                             | 980               | 6122                                 | NR                             |
| 465               | 39318                                | NR                             | 595               | 109974                               | NR                             | 725               | 7045                                 | NR                             | 855               | 4571                                 | NR                             | 985               | 6450                                 | NR                             |
| 470               | 27693                                | NR                             | 600               | 105269                               | NR                             | 730               | 6483                                 | NR                             | 860               | 4485                                 | NR                             | 990               | 4875                                 | NR                             |
| 475               | 23081                                | NR                             | 605               | 99453                                | NR                             | 735               | 5838                                 | NR                             | 865               | 3978                                 | NR                             | 995               | 4764                                 | NR                             |
| 480               | 23002                                | NR                             | 610               | 92921                                | NR                             | 740               | 5261                                 | NR                             | 870               | 4298                                 | NR                             | 1000              | 3640                                 | NR                             |
| 485               | 26201                                | NR                             | 615               | 86989                                | NR                             | 745               | 4760                                 | NR                             | 875               | 4356                                 | NR                             |                   |                                      |                                |

REPORT NUMBER: SP1-1908-441-9-R4

Scotopic Flux vs. Wavelength



Scotopic Lumens: 13759.3 S/P: 1.85

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 3540          | NR            | 490    | 33363         | NR            | 620    | 80193         | NR            | 750    | 4663          | NR            | 880    | 4678          | NR            |
| 365    | 2862          | NR            | 495    | 44177         | NR            | 625    | 73091         | NR            | 755    | 4147          | NR            | 885    | 4128          | NR            |
| 370    | 2865          | NR            | 500    | 57019         | NR            | 630    | 66269         | NR            | 760    | 4040          | NR            | 890    | 4504          | NR            |
| 375    | 3254          | NR            | 505    | 70030         | NR            | 635    | 60012         | NR            | 765    | 3474          | NR            | 895    | 4371          | NR            |
| 380    | 3076          | NR            | 510    | 81972         | NR            | 640    | 53914         | NR            | 770    | 3469          | NR            | 900    | 4082          | NR            |
| 385    | 2904          | NR            | 515    | 92590         | NR            | 645    | 48385         | NR            | 775    | 3181          | NR            | 905    | 2982          | NR            |
| 390    | 2689          | NR            | 520    | 100305        | NR            | 650    | 43219         | NR            | 780    | 2969          | NR            | 910    | 4351          | NR            |
| 395    | 2619          | NR            | 525    | 107452        | NR            | 655    | 38562         | NR            | 785    | 3132          | NR            | 915    | 3365          | NR            |
| 400    | 2679          | NR            | 530    | 111373        | NR            | 660    | 34110         | NR            | 790    | 2507          | NR            | 920    | 3430          | NR            |
| 405    | 3515          | NR            | 535    | 114505        | NR            | 665    | 30085         | NR            | 795    | 2968          | NR            | 925    | 4264          | NR            |
| 410    | 6934          | NR            | 540    | 116408        | NR            | 670    | 26205         | NR            | 800    | 2758          | NR            | 930    | 4095          | NR            |
| 415    | 14943         | NR            | 545    | 118700        | NR            | 675    | 22906         | NR            | 805    | 2872          | NR            | 935    | 5048          | NR            |
| 420    | 31939         | NR            | 550    | 119209        | NR            | 680    | 20058         | NR            | 810    | 3094          | NR            | 940    | 4074          | NR            |
| 425    | 64701         | NR            | 555    | 120742        | NR            | 685    | 17413         | NR            | 815    | 3222          | NR            | 945    | 4949          | NR            |
| 430    | 110939        | NR            | 560    | 121594        | NR            | 690    | 15447         | NR            | 820    | 3238          | NR            | 950    | 4387          | NR            |
| 435    | 164597        | NR            | 565    | 121913        | NR            | 695    | 13398         | NR            | 825    | 3524          | NR            | 955    | 4978          | NR            |
| 440    | 207696        | NR            | 570    | 122147        | NR            | 700    | 11777         | NR            | 830    | 2921          | NR            | 960    | 4706          | NR            |
| 445    | 201830        | NR            | 575    | 121605        | NR            | 705    | 10412         | NR            | 835    | 3595          | NR            | 965    | 5083          | NR            |
| 450    | 145410        | NR            | 580    | 120248        | NR            | 710    | 9544          | NR            | 840    | 3016          | NR            | 970    | 4522          | NR            |
| 455    | 89594         | NR            | 585    | 117717        | NR            | 715    | 8940          | NR            | 845    | 4032          | NR            | 975    | 4740          | NR            |
| 460    | 58321         | NR            | 590    | 114359        | NR            | 720    | 7897          | NR            | 850    | 3579          | NR            | 980    | 6122          | NR            |
| 465    | 39318         | NR            | 595    | 109974        | NR            | 725    | 7045          | NR            | 855    | 4571          | NR            | 985    | 6450          | NR            |
| 470    | 27693         | NR            | 600    | 105269        | NR            | 730    | 6483          | NR            | 860    | 4485          | NR            | 990    | 4875          | NR            |
| 475    | 23081         | NR            | 605    | 99453         | NR            | 735    | 5838          | NR            | 865    | 3978          | NR            | 995    | 4764          | NR            |
| 480    | 23002         | NR            | 610    | 92921         | NR            | 740    | 5261          | NR            | 870    | 4298          | NR            | 1000   | 3640          | NR            |
| 485    | 26201         | NR            | 615    | 86989         | NR            | 745    | 4760          | NR            | 875    | 4356          | NR            |        |               |               |

REPORT NUMBER: SP1-1908-441-9-R4

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5527.6 M/P: 0.74**

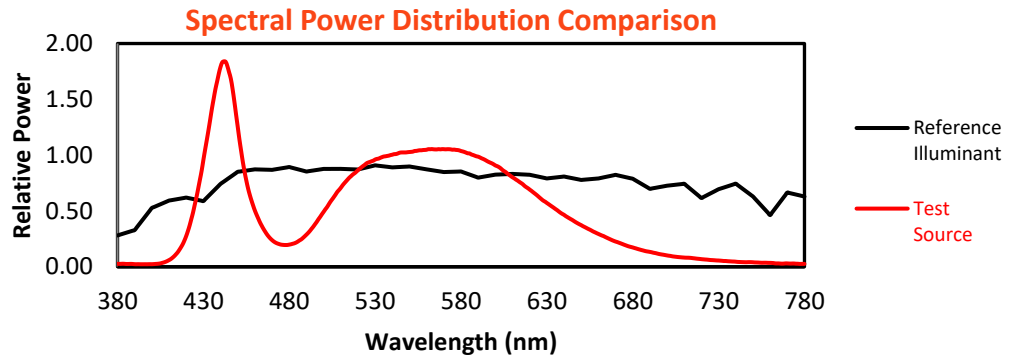
| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 3540          | NR            | 490    | 33363         | NR            | 620    | 80193         | NR            | 750    | 4663          | NR            | 880    | 4678          | NR            |
| 365    | 2862          | NR            | 495    | 44177         | NR            | 625    | 73091         | NR            | 755    | 4147          | NR            | 885    | 4128          | NR            |
| 370    | 2865          | NR            | 500    | 57019         | NR            | 630    | 66269         | NR            | 760    | 4040          | NR            | 890    | 4504          | NR            |
| 375    | 3254          | NR            | 505    | 70030         | NR            | 635    | 60012         | NR            | 765    | 3474          | NR            | 895    | 4371          | NR            |
| 380    | 3076          | NR            | 510    | 81972         | NR            | 640    | 53914         | NR            | 770    | 3469          | NR            | 900    | 4082          | NR            |
| 385    | 2904          | NR            | 515    | 92590         | NR            | 645    | 48385         | NR            | 775    | 3181          | NR            | 905    | 2982          | NR            |
| 390    | 2689          | NR            | 520    | 100305        | NR            | 650    | 43219         | NR            | 780    | 2969          | NR            | 910    | 4351          | NR            |
| 395    | 2619          | NR            | 525    | 107452        | NR            | 655    | 38562         | NR            | 785    | 3132          | NR            | 915    | 3365          | NR            |
| 400    | 2679          | NR            | 530    | 111373        | NR            | 660    | 34110         | NR            | 790    | 2507          | NR            | 920    | 3430          | NR            |
| 405    | 3515          | NR            | 535    | 114505        | NR            | 665    | 30085         | NR            | 795    | 2968          | NR            | 925    | 4264          | NR            |
| 410    | 6934          | NR            | 540    | 116408        | NR            | 670    | 26205         | NR            | 800    | 2758          | NR            | 930    | 4095          | NR            |
| 415    | 14943         | NR            | 545    | 118700        | NR            | 675    | 22906         | NR            | 805    | 2872          | NR            | 935    | 5048          | NR            |
| 420    | 31939         | NR            | 550    | 119209        | NR            | 680    | 20058         | NR            | 810    | 3094          | NR            | 940    | 4074          | NR            |
| 425    | 64701         | NR            | 555    | 120742        | NR            | 685    | 17413         | NR            | 815    | 3222          | NR            | 945    | 4949          | NR            |
| 430    | 110939        | NR            | 560    | 121594        | NR            | 690    | 15447         | NR            | 820    | 3238          | NR            | 950    | 4387          | NR            |
| 435    | 164597        | NR            | 565    | 121913        | NR            | 695    | 13398         | NR            | 825    | 3524          | NR            | 955    | 4978          | NR            |
| 440    | 207696        | NR            | 570    | 122147        | NR            | 700    | 11777         | NR            | 830    | 2921          | NR            | 960    | 4706          | NR            |
| 445    | 201830        | NR            | 575    | 121605        | NR            | 705    | 10412         | NR            | 835    | 3595          | NR            | 965    | 5083          | NR            |
| 450    | 145410        | NR            | 580    | 120248        | NR            | 710    | 9544          | NR            | 840    | 3016          | NR            | 970    | 4522          | NR            |
| 455    | 89594         | NR            | 585    | 117717        | NR            | 715    | 8940          | NR            | 845    | 4032          | NR            | 975    | 4740          | NR            |
| 460    | 58321         | NR            | 590    | 114359        | NR            | 720    | 7897          | NR            | 850    | 3579          | NR            | 980    | 6122          | NR            |
| 465    | 39318         | NR            | 595    | 109974        | NR            | 725    | 7045          | NR            | 855    | 4571          | NR            | 985    | 6450          | NR            |
| 470    | 27693         | NR            | 600    | 105269        | NR            | 730    | 6483          | NR            | 860    | 4485          | NR            | 990    | 4875          | NR            |
| 475    | 23081         | NR            | 605    | 99453         | NR            | 735    | 5838          | NR            | 865    | 3978          | NR            | 995    | 4764          | NR            |
| 480    | 23002         | NR            | 610    | 92921         | NR            | 740    | 5261          | NR            | 870    | 4298          | NR            | 1000   | 3640          | NR            |
| 485    | 26201         | NR            | 615    | 86989         | NR            | 745    | 4760          | NR            | 875    | 4356          | NR            |        |               |               |

REPORT NUMBER: SP1-1908-441-9-R4

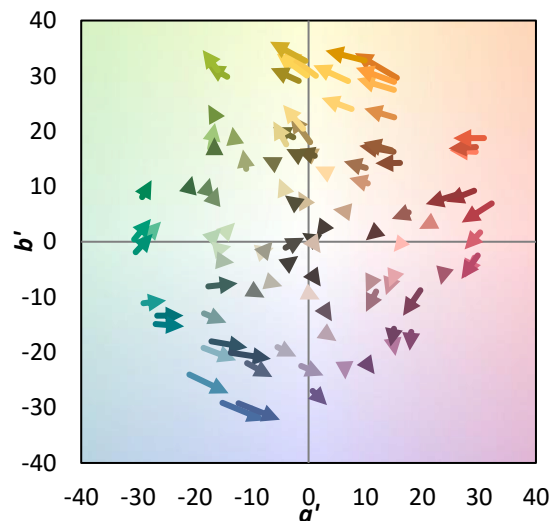
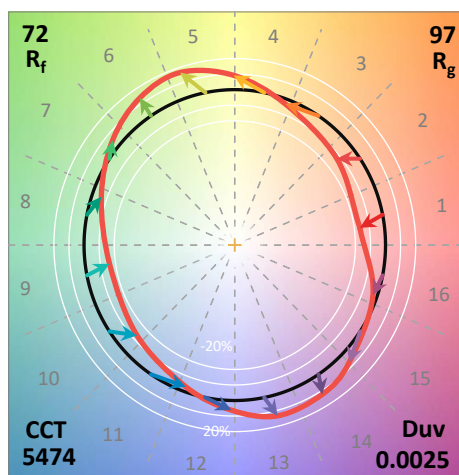
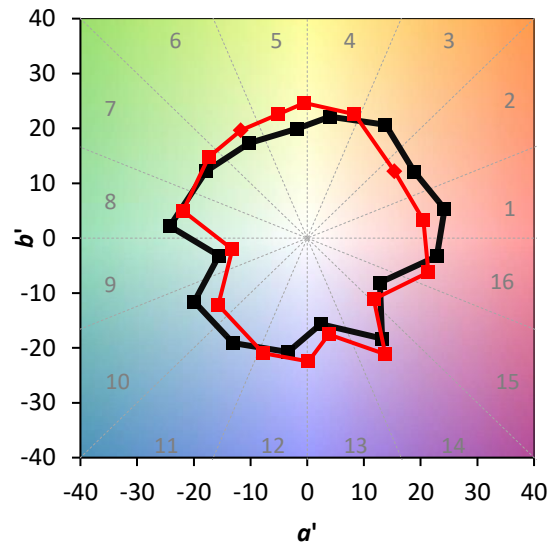
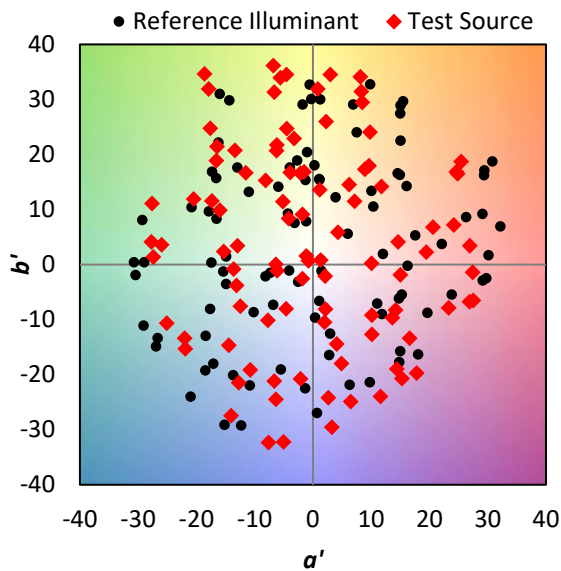
**TM-30-18**

**Summary**

$R_f = 72.1$   
 $R_g = 97.2$   
CIE  $R_a = 71.7$   
 $R_g = -27.1$



**Color Vector Graphics**





REPORT NUMBER: SP1-1908-441-9-R4

TM-30-18

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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 54 | CES51 = 88 | CES76 = 43 |
| CES02 = 59 | CES27 = 79 | CES52 = 90 | CES77 = 64 |
| CES03 = 30 | CES28 = 77 | CES53 = 77 | CES78 = 46 |
| CES04 = 69 | CES29 = 50 | CES54 = 81 | CES79 = 74 |
| CES05 = 46 | CES30 = 59 | CES55 = 80 | CES80 = 70 |
| CES06 = 50 | CES31 = 55 | CES56 = 70 | CES81 = 71 |
| CES07 = 38 | CES32 = 52 | CES57 = 68 | CES82 = 88 |
| CES08 = 38 | CES33 = 63 | CES58 = 70 | CES83 = 82 |
| CES09 = 29 | CES34 = 63 | CES59 = 88 | CES84 = 87 |
| CES10 = 72 | CES35 = 79 | CES60 = 92 | CES85 = 84 |
| CES11 = 55 | CES36 = 90 | CES61 = 88 | CES86 = 76 |
| CES12 = 61 | CES37 = 72 | CES62 = 81 | CES87 = 75 |
| CES13 = 41 | CES38 = 68 | CES63 = 75 | CES88 = 77 |
| CES14 = 74 | CES39 = 91 | CES64 = 72 | CES89 = 76 |
| CES15 = 70 | CES40 = 83 | CES65 = 65 | CES90 = 76 |
| CES16 = 46 | CES41 = 84 | CES66 = 66 | CES91 = 92 |
| CES17 = 48 | CES42 = 70 | CES67 = 64 | CES92 = 70 |
| CES18 = 55 | CES43 = 69 | CES68 = 71 | CES93 = 83 |
| CES19 = 70 | CES44 = 98 | CES69 = 80 | CES94 = 60 |
| CES20 = 64 | CES45 = 79 | CES70 = 58 | CES95 = 73 |
| CES21 = 85 | CES46 = 78 | CES71 = 55 | CES96 = 79 |
| CES22 = 77 | CES47 = 76 | CES72 = 84 | CES97 = 84 |
| CES23 = 91 | CES48 = 68 | CES73 = 47 | CES98 = 73 |
| CES24 = 90 | CES49 = 78 | CES74 = 94 | CES99 = 62 |
| CES25 = 71 | CES50 = 87 | CES75 = 51 |            |



REPORT NUMBER: SP1-1908-441-9-R4

TM-30-18

Color Rendition by Hue-Angle Bin



REPORT NUMBER: SP1-1908-441-9-R4

TM-30-18

Measure Comparisons



(END OF REPORT)