

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: P361691

Luminaire Tested: NVN-SA1B-722-U-T4W

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P361691  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA1B-722-U-T4W  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 2200K, 800mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4261 lumens  
Efficiency: N/A  
Efficacy: 96.8 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G1

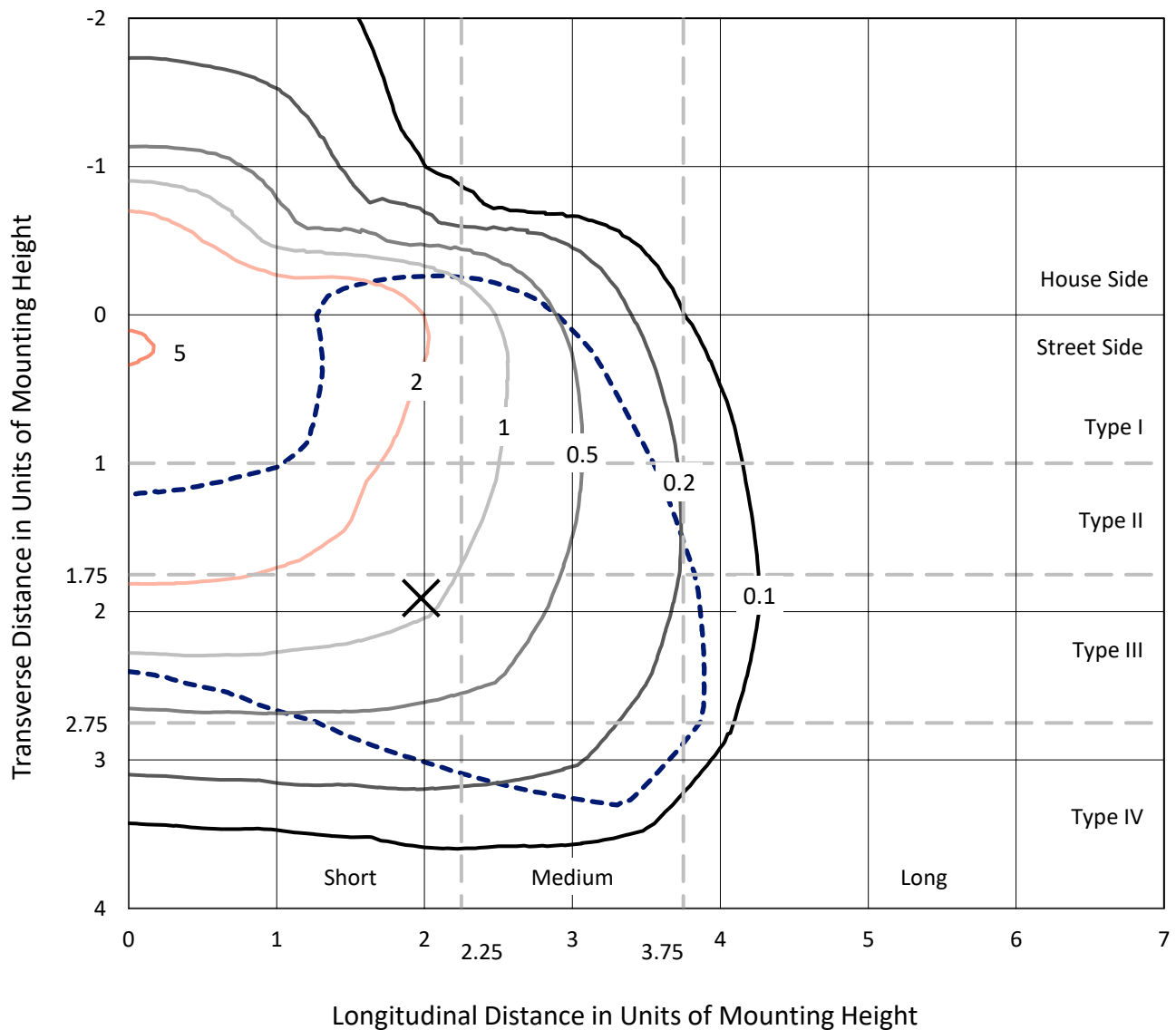
Input Watts (W): 44  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

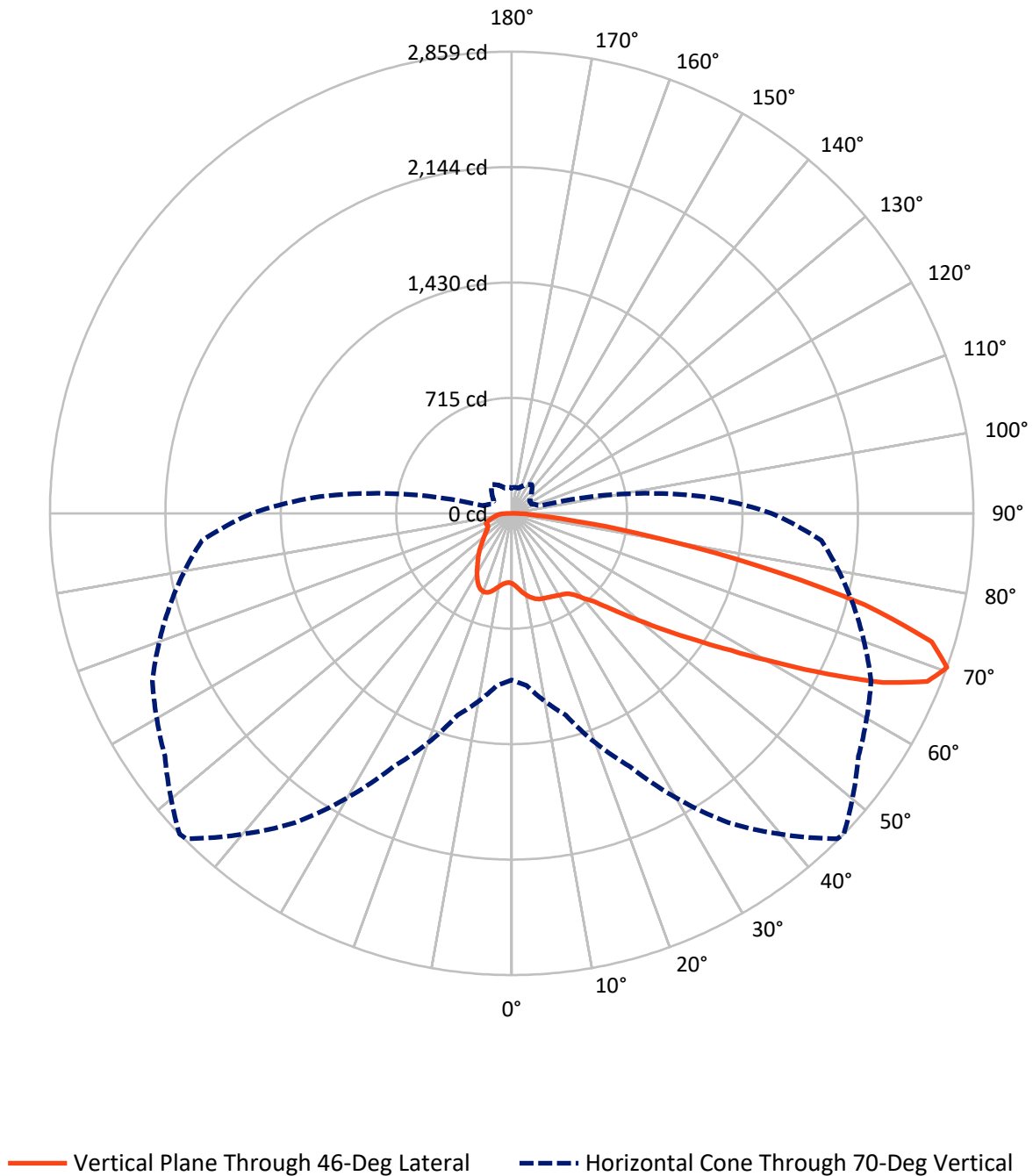
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 5.4 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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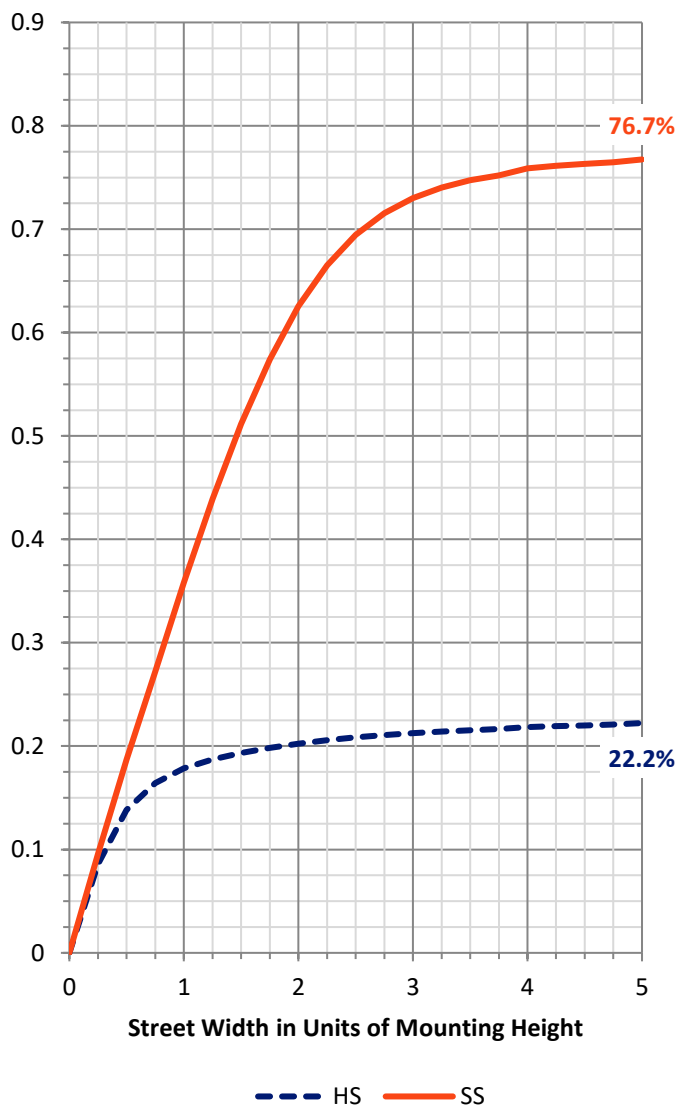
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 976.6    | 0.0    | 976.6  |
|                    | % Fixture | 22.9     | 0.0    | 22.9   |
| <b>Street Side</b> | Lumens    | 3284.4   | 0.0    | 3284.4 |
|                    | % Fixture | 77.1     | 0.0    | 77.1   |
| <b>Total</b>       | Lumens    | 4261.0   | 0.0    | 4261.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 44.3   | 1.0       |
| 10°-20°   | 147.4  | 3.5       |
| 20°-30°   | 245.8  | 5.8       |
| 30°-40°   | 348.9  | 8.2       |
| 40°-50°   | 513.2  | 12.0      |
| 50°-60°   | 869.0  | 20.4      |
| 60°-70°   | 1233.6 | 29.0      |
| 70°-80°   | 749.4  | 17.6      |
| 80°-90°   | 109.4  | 2.6       |
| 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°    | 4261.0 | 100.0     |
| 0°-180°   | 4261.0 | 100.0     |

**Coefficient of Utilization**



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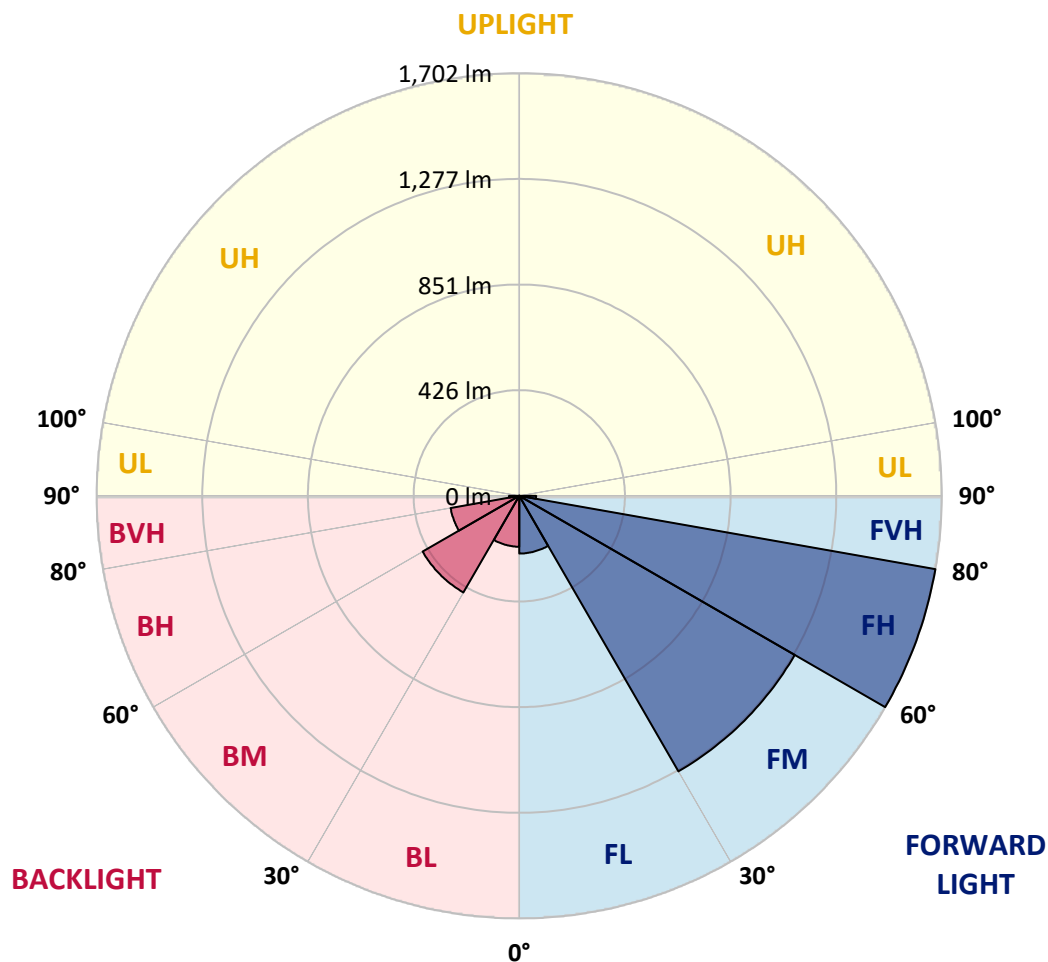
CATALOG NUMBER: NVN-SA1B-722-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 232.5  | 5.5       |                         |      |         |
| FM   | (30°-60°)   | 1281.5 | 30.1      |                         |      |         |
| FH   | (60°-80°)   | 1702.2 | 39.9      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 68.1   | 1.6       |                         |      | G1/100  |
| BL   | (0°-30°)    | 205.0  | 4.8       | B1/500                  |      |         |
| BM   | (30°-60°)   | 449.6  | 10.6      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 280.8  | 6.6       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 41.2   | 1.0       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 46°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 434.1  | 434.1  | 434.1  | 434.1  | 434.1  | 434.1  | 434.1  | 434.1  | 434.1  | 434.1  | 434.1  |
| 2.5°  | 455.8  | 456.1  | 456.7  | 455.3  | 451.2  | 450.0  | 449.6  | 445.3  | 442.6  | 438.5  | 435.0  |
| 5°    | 492.3  | 492.6  | 491.7  | 487.6  | 478.6  | 471.9  | 471.3  | 461.7  | 452.9  | 443.6  | 436.6  |
| 7.5°  | 530.4  | 530.8  | 528.0  | 520.3  | 507.6  | 495.9  | 495.2  | 482.1  | 468.8  | 454.7  | 444.2  |
| 10°   | 564.0  | 562.3  | 557.8  | 547.0  | 532.0  | 517.7  | 517.1  | 503.4  | 488.1  | 471.0  | 457.0  |
| 12.5° | 586.5  | 585.0  | 579.2  | 566.1  | 549.6  | 536.5  | 535.3  | 522.6  | 507.8  | 489.1  | 472.3  |
| 15°   | 598.9  | 599.9  | 592.0  | 577.2  | 561.1  | 550.0  | 549.0  | 540.0  | 526.7  | 507.9  | 488.6  |
| 17.5° | 600.5  | 601.4  | 593.8  | 579.1  | 565.9  | 558.4  | 557.9  | 551.9  | 542.3  | 524.2  | 504.1  |
| 20°   | 591.2  | 591.7  | 585.5  | 573.4  | 564.8  | 562.4  | 562.3  | 559.7  | 552.5  | 536.5  | 516.9  |
| 22.5° | 577.6  | 578.0  | 573.5  | 564.8  | 561.9  | 565.5  | 566.5  | 565.5  | 560.4  | 545.4  | 527.0  |
| 25°   | 574.2  | 574.0  | 569.3  | 560.4  | 562.9  | 570.6  | 571.9  | 572.4  | 568.9  | 555.7  | 539.8  |
| 27.5° | 590.4  | 589.4  | 580.5  | 566.2  | 567.8  | 577.2  | 578.9  | 583.1  | 581.0  | 569.4  | 554.4  |
| 30°   | 637.2  | 635.5  | 617.3  | 588.4  | 580.5  | 585.3  | 587.5  | 594.2  | 594.7  | 585.0  | 573.8  |
| 32.5° | 716.3  | 714.1  | 681.4  | 629.8  | 602.0  | 593.6  | 595.7  | 605.7  | 611.1  | 603.7  | 591.6  |
| 35°   | 816.2  | 813.7  | 770.8  | 700.2  | 637.8  | 609.5  | 611.0  | 619.0  | 629.8  | 619.3  | 603.3  |
| 37.5° | 920.3  | 914.3  | 873.0  | 783.1  | 694.8  | 643.5  | 643.5  | 644.5  | 649.6  | 627.8  | 617.0  |
| 40°   | 1023.8 | 1017.8 | 980.5  | 880.5  | 768.6  | 697.0  | 693.7  | 671.1  | 667.0  | 648.2  | 644.5  |
| 42.5° | 1120.1 | 1118.3 | 1096.3 | 990.6  | 855.2  | 749.7  | 745.0  | 706.7  | 707.5  | 695.9  | 696.0  |
| 45°   | 1222.4 | 1222.4 | 1204.5 | 1101.7 | 956.2  | 834.2  | 829.6  | 773.1  | 781.9  | 776.5  | 789.5  |
| 47.5° | 1306.0 | 1308.6 | 1306.1 | 1217.5 | 1073.5 | 941.7  | 933.3  | 865.3  | 889.8  | 908.3  | 946.1  |
| 50°   | 1391.3 | 1395.4 | 1395.8 | 1344.5 | 1215.4 | 1069.5 | 1059.8 | 987.7  | 1042.3 | 1095.4 | 1169.6 |
| 52.5° | 1515.1 | 1524.3 | 1487.7 | 1471.2 | 1389.2 | 1221.1 | 1211.6 | 1145.0 | 1236.3 | 1310.8 | 1438.7 |
| 55°   | 1629.9 | 1621.8 | 1595.7 | 1605.9 | 1575.3 | 1393.8 | 1386.6 | 1328.1 | 1452.4 | 1549.2 | 1715.3 |
| 57.5° | 1692.0 | 1691.4 | 1717.6 | 1761.4 | 1776.0 | 1606.7 | 1600.7 | 1543.8 | 1696.1 | 1768.8 | 1975.0 |
| 60°   | 1764.9 | 1765.9 | 1830.9 | 1930.2 | 1990.3 | 1871.8 | 1869.1 | 1826.0 | 1932.7 | 1973.8 | 2178.7 |
| 62.5° | 1775.1 | 1793.5 | 1905.5 | 2076.4 | 2191.0 | 2181.5 | 2187.3 | 2080.2 | 2144.5 | 2137.5 | 2330.8 |
| 65°   | 1657.7 | 1681.9 | 1884.6 | 2120.5 | 2390.5 | 2520.2 | 2525.6 | 2335.8 | 2311.4 | 2277.3 | 2385.2 |
| 67.5° | 1417.1 | 1453.0 | 1673.2 | 2024.4 | 2456.2 | 2770.6 | 2778.2 | 2534.0 | 2450.0 | 2324.7 | 2254.3 |
| 70°   | 1031.3 | 1071.1 | 1292.7 | 1729.0 | 2339.0 | 2850.7 | 2859.3 | 2621.6 | 2455.2 | 2189.8 | 1924.4 |
| 72.5° | 623.0  | 654.2  | 836.9  | 1272.9 | 1974.1 | 2704.9 | 2720.2 | 2510.5 | 2241.6 | 1854.9 | 1421.0 |
| 75°   | 273.6  | 294.0  | 404.7  | 733.5  | 1413.3 | 2237.9 | 2257.0 | 2148.8 | 1821.3 | 1348.0 | 839.9  |
| 77.5° | 116.5  | 122.3  | 165.9  | 318.6  | 799.0  | 1529.2 | 1555.5 | 1570.1 | 1235.7 | 733.5  | 354.9  |
| 80°   | 72.6   | 75.0   | 93.9   | 144.2  | 373.9  | 858.9  | 887.2  | 923.8  | 613.6  | 269.6  | 123.9  |
| 82.5° | 44.2   | 46.8   | 62.4   | 87.2   | 194.7  | 389.3  | 402.9  | 428.7  | 238.1  | 116.5  | 64.2   |
| 85°   | 26.5   | 28.4   | 38.2   | 55.1   | 110.8  | 153.1  | 153.0  | 169.2  | 112.1  | 75.0   | 33.8   |
| 87.5° | 12.7   | 14.1   | 20.4   | 28.6   | 55.8   | 57.5   | 53.8   | 61.0   | 68.1   | 49.1   | 17.1   |
| 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: NVN-SA1B-722-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 434.1  | 434.1  | 434.1 | 434.1 | 434.1 | 434.1 | 434.1 | 434.1 | 434.1 | 434.1 | 434.1 |
| 2.5°  | 433.8  | 433.2  | 431.3 | 429.9 | 429.6 | 428.7 | 428.0 | 428.4 | 429.0 | 429.2 | 429.2 |
| 5°    | 433.7  | 432.1  | 429.6 | 428.6 | 429.9 | 431.6 | 433.8 | 436.7 | 438.5 | 439.8 | 440.7 |
| 7.5°  | 440.7  | 437.6  | 434.8 | 434.3 | 436.9 | 441.5 | 446.5 | 452.6 | 456.9 | 459.8 | 460.4 |
| 10°   | 452.3  | 448.5  | 445.8 | 446.4 | 451.0 | 457.7 | 464.7 | 472.6 | 479.0 | 483.0 | 483.3 |
| 12.5° | 465.8  | 462.1  | 459.5 | 462.0 | 469.7 | 477.9 | 485.2 | 492.0 | 497.8 | 501.8 | 501.8 |
| 15°   | 481.2  | 478.6  | 475.5 | 481.2 | 491.7 | 499.0 | 502.1 | 505.4 | 508.6 | 511.5 | 511.0 |
| 17.5° | 496.1  | 493.6  | 492.0 | 498.7 | 509.6 | 513.0 | 511.0 | 508.5 | 508.5 | 510.1 | 510.4 |
| 20°   | 508.9  | 506.7  | 507.8 | 514.3 | 520.0 | 516.5 | 508.9 | 501.0 | 497.8 | 498.7 | 499.6 |
| 22.5° | 520.1  | 519.1  | 522.2 | 525.3 | 521.2 | 508.9 | 494.9 | 484.3 | 480.3 | 480.0 | 480.3 |
| 25°   | 533.3  | 533.1  | 536.9 | 531.4 | 513.3 | 490.7 | 471.9 | 461.5 | 459.3 | 461.1 | 464.0 |
| 27.5° | 549.6  | 551.2  | 553.1 | 532.8 | 497.3 | 463.1 | 444.0 | 436.9 | 439.1 | 443.3 | 446.1 |
| 30°   | 570.5  | 574.8  | 570.7 | 529.2 | 474.2 | 431.6 | 413.4 | 411.4 | 417.3 | 423.3 | 426.2 |
| 32.5° | 590.7  | 597.6  | 587.7 | 519.7 | 444.5 | 398.2 | 384.1 | 383.5 | 390.8 | 396.6 | 400.7 |
| 35°   | 607.1  | 620.6  | 600.3 | 500.9 | 410.1 | 367.5 | 357.1 | 353.2 | 355.8 | 362.7 | 367.3 |
| 37.5° | 628.3  | 651.0  | 609.1 | 472.2 | 372.7 | 342.1 | 330.0 | 321.0 | 318.6 | 321.4 | 323.7 |
| 40°   | 667.3  | 697.2  | 613.2 | 432.1 | 336.3 | 316.7 | 304.5 | 291.2 | 282.0 | 275.3 | 275.5 |
| 42.5° | 730.9  | 757.4  | 610.6 | 383.4 | 302.6 | 291.9 | 278.1 | 262.8 | 247.9 | 232.7 | 231.6 |
| 45°   | 834.1  | 846.9  | 602.7 | 331.7 | 273.0 | 266.0 | 253.0 | 237.7 | 217.9 | 200.7 | 199.0 |
| 47.5° | 999.3  | 970.9  | 590.4 | 286.7 | 246.9 | 244.0 | 232.0 | 214.4 | 193.4 | 179.5 | 178.3 |
| 50°   | 1224.6 | 1149.8 | 584.5 | 250.8 | 223.8 | 224.7 | 214.9 | 196.3 | 176.4 | 166.2 | 165.1 |
| 52.5° | 1494.1 | 1358.2 | 596.0 | 223.1 | 205.3 | 208.4 | 201.1 | 183.6 | 167.0 | 158.9 | 157.8 |
| 55°   | 1773.6 | 1574.0 | 608.4 | 203.0 | 187.8 | 193.8 | 191.3 | 176.9 | 161.9 | 154.4 | 153.4 |
| 57.5° | 2012.9 | 1735.1 | 583.6 | 186.7 | 172.2 | 181.5 | 183.7 | 172.7 | 159.2 | 152.5 | 151.4 |
| 60°   | 2163.6 | 1800.0 | 518.5 | 171.3 | 159.8 | 171.8 | 179.4 | 171.5 | 160.3 | 159.7 | 158.8 |
| 62.5° | 2235.0 | 1794.3 | 421.0 | 159.2 | 152.1 | 167.5 | 182.6 | 178.0 | 171.9 | 177.2 | 177.6 |
| 65°   | 2202.9 | 1708.6 | 313.5 | 151.2 | 146.6 | 169.2 | 192.2 | 190.4 | 175.3 | 180.5 | 181.3 |
| 67.5° | 1991.8 | 1504.0 | 232.1 | 144.2 | 140.4 | 173.7 | 209.7 | 194.5 | 168.7 | 172.5 | 170.2 |
| 70°   | 1609.9 | 1192.4 | 179.1 | 136.3 | 134.2 | 173.1 | 217.6 | 192.0 | 161.6 | 162.4 | 156.2 |
| 72.5° | 1110.1 | 813.1  | 145.7 | 129.1 | 125.1 | 157.8 | 212.0 | 185.9 | 155.6 | 148.9 | 140.6 |
| 75°   | 603.7  | 436.4  | 123.8 | 121.5 | 109.2 | 138.5 | 201.8 | 181.5 | 150.2 | 141.3 | 136.6 |
| 77.5° | 237.5  | 181.1  | 107.5 | 111.1 | 95.5  | 122.3 | 190.4 | 173.2 | 142.8 | 131.1 | 128.8 |
| 80°   | 97.0   | 92.5   | 89.1  | 96.1  | 82.1  | 107.0 | 176.7 | 163.5 | 133.9 | 121.6 | 116.9 |
| 82.5° | 55.0   | 57.5   | 69.3  | 75.8  | 66.6  | 98.6  | 170.2 | 155.6 | 123.2 | 108.9 | 103.4 |
| 85°   | 28.1   | 33.7   | 48.3  | 54.4  | 49.0  | 83.8  | 156.8 | 136.2 | 98.9  | 83.4  | 83.8  |
| 87.5° | 13.6   | 18.8   | 30.5  | 34.1  | 31.8  | 60.7  | 117.1 | 98.7  | 77.0  | 61.0  | 59.1  |
| 90°   | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

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

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-10-R4

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

Data in this report applies to families of products SA1C-722-U-5WQ.

### Test Information

Test Method: LM-79-2008 Report  
 Number: SP1-1908-441-10-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-722-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):                  | 2237    | CRI (Ra): | 72.0 |      |       |
| CIE u':                   | 0.2876  | R1:       | 68.9 | R9:  | -17.4 |
| CIE v':                   | 0.5346  | R2:       | 83.0 | R10: | 61.3  |
| Duv:                      | -0.0006 | R3:       | 95.2 | R11: | 59.8  |
| CIE x:                    | 0.5005  | R4:       | 66.2 | R12: | 50.5  |
| CIE y:                    | 0.4134  | R5:       | 65.9 | R13: | 71.1  |
| CIE z:                    | 0.0860  | R6:       | 76.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 603     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.8 |      |       |
| Purity:                   | 74.5    |           |      |      |       |
| Rf:                       | 69.8    |           |      |      |       |
| Rg:                       | 99.2    |           |      |      |       |



### Test Conditions

Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

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| 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            |

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CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 4696.9

S/P: 0.85

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1470.8 M/P: 0.27**

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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### Summary

$R_f = 69.8$   
 $R_g = 99.2$   
 CIE  $R_a = 72.0$   
 $R_g = -17.4$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 78 | CES79 = 84 |
| CES05 = 52 | CES30 = 48 | CES55 = 75 | CES80 = 84 |
| CES06 = 52 | CES31 = 51 | CES56 = 65 | CES81 = 63 |
| CES07 = 44 | CES32 = 51 | CES57 = 62 | CES82 = 92 |
| CES08 = 42 | CES33 = 53 | CES58 = 66 | CES83 = 83 |
| CES09 = 29 | CES34 = 70 | CES59 = 84 | CES84 = 92 |
| CES10 = 78 | CES35 = 85 | CES60 = 90 | CES85 = 81 |
| CES11 = 61 | CES36 = 78 | CES61 = 84 | CES86 = 56 |
| CES12 = 68 | CES37 = 80 | CES62 = 70 | CES87 = 78 |
| CES13 = 45 | CES38 = 53 | CES63 = 68 | CES88 = 72 |
| CES14 = 75 | CES39 = 90 | CES64 = 69 | CES89 = 62 |
| CES15 = 72 | CES40 = 84 | CES65 = 67 | CES90 = 67 |
| CES16 = 49 | CES41 = 75 | CES66 = 64 | CES91 = 90 |
| CES17 = 51 | CES42 = 79 | CES67 = 63 | CES92 = 67 |
| CES18 = 57 | CES43 = 64 | CES68 = 69 | CES93 = 79 |
| CES19 = 74 | CES44 = 98 | CES69 = 80 | CES94 = 52 |
| CES20 = 68 | CES45 = 73 | CES70 = 63 | CES95 = 76 |
| CES21 = 89 | CES46 = 67 | CES71 = 63 | CES96 = 78 |
| CES22 = 81 | CES47 = 60 | CES72 = 87 | CES97 = 77 |
| CES23 = 92 | CES48 = 48 | CES73 = 56 | CES98 = 71 |
| CES24 = 92 | CES49 = 64 | CES74 = 87 | CES99 = 65 |
| CES25 = 74 | CES50 = 74 | CES75 = 66 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)