

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: P362556

Luminaire Tested: NVN-SA2B-722-U-AFL

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P362556  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-29)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA2B-722-U-AFL  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(2) 70 CRI, 2200K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 8807 lumens  
Efficiency: N/A  
Efficacy: 103.6 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G1

Input Watts (W): 85  
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

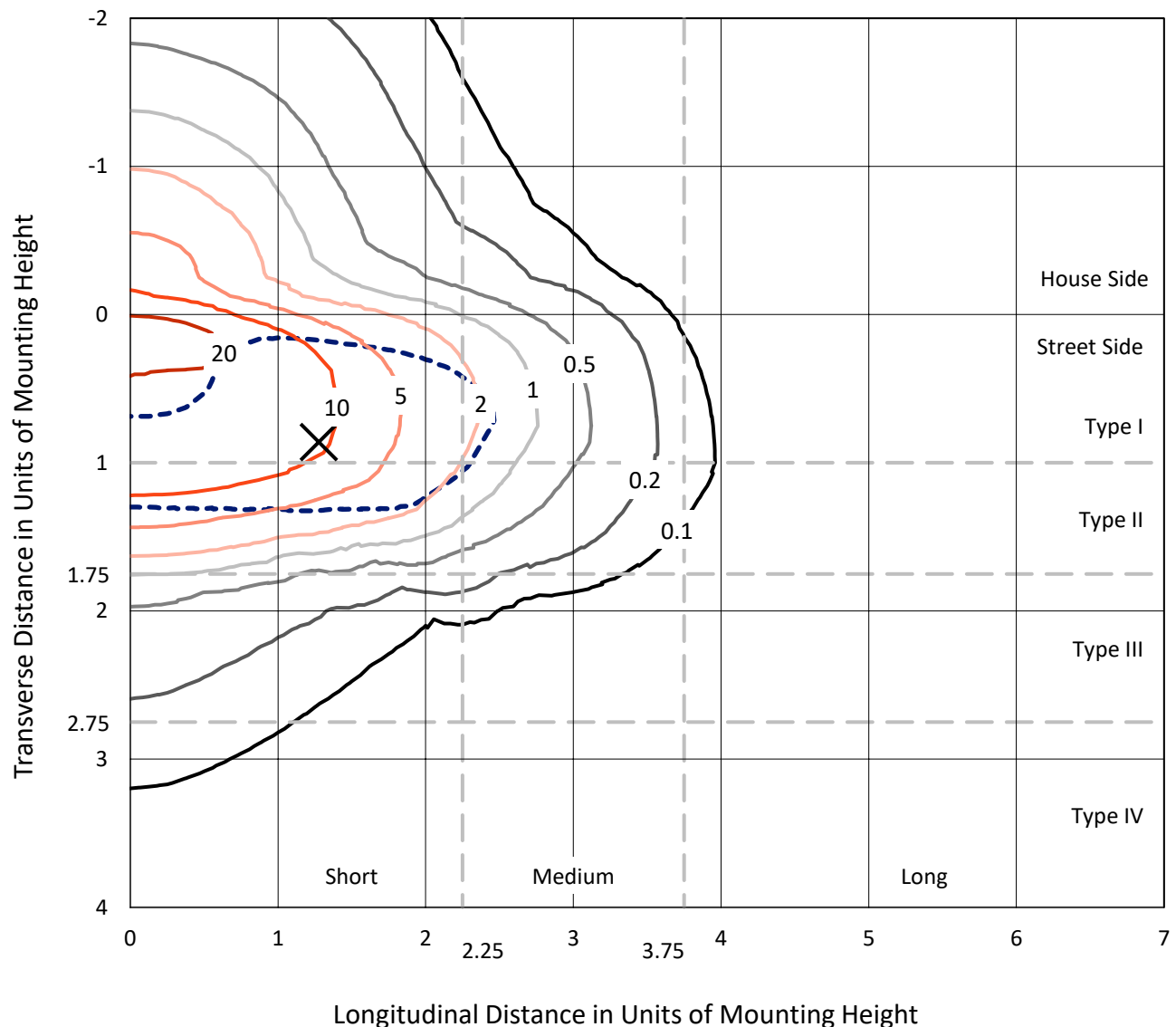


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## Iso-Footcandle Lines of Horizontal Illumination

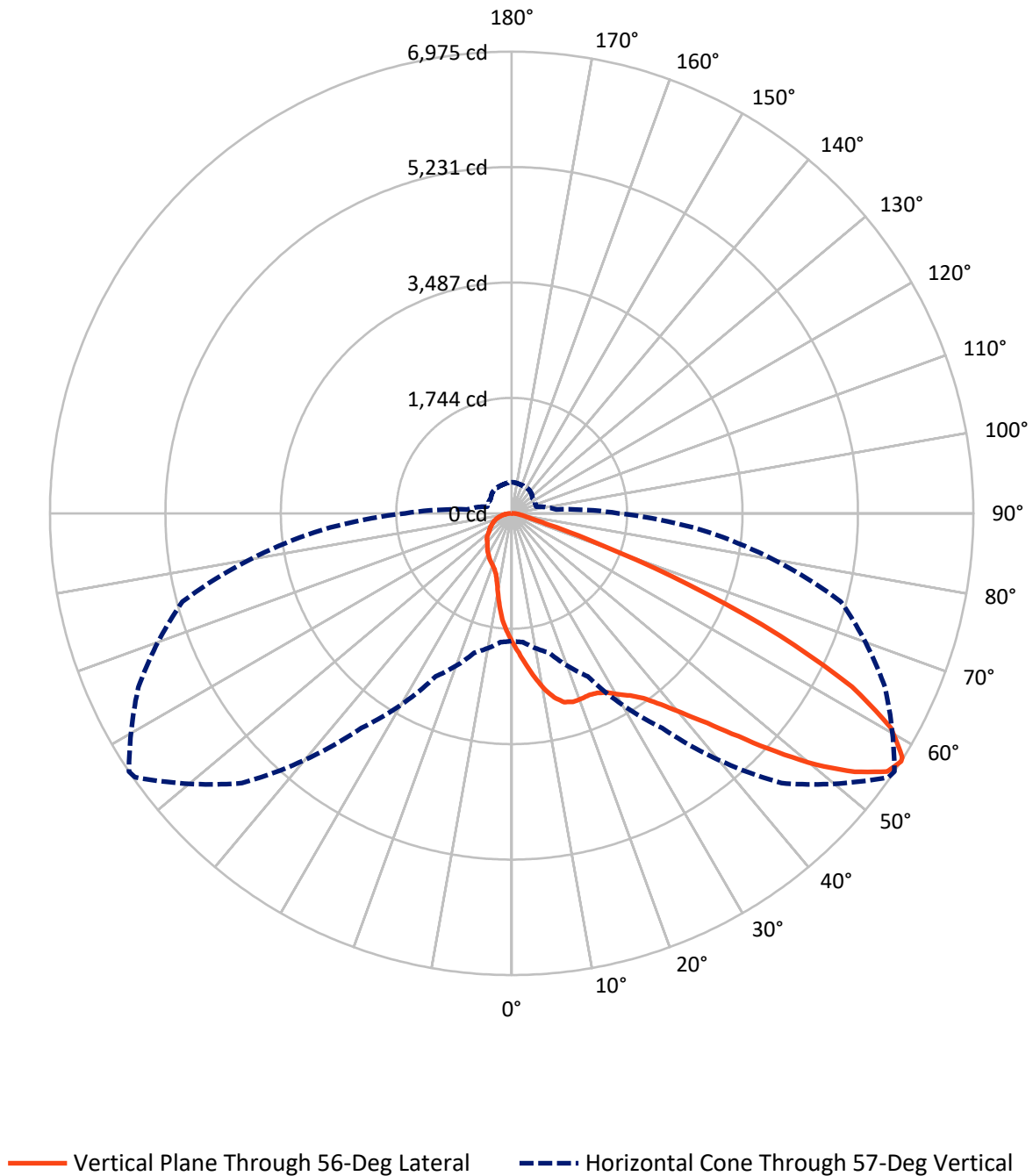
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 27.1 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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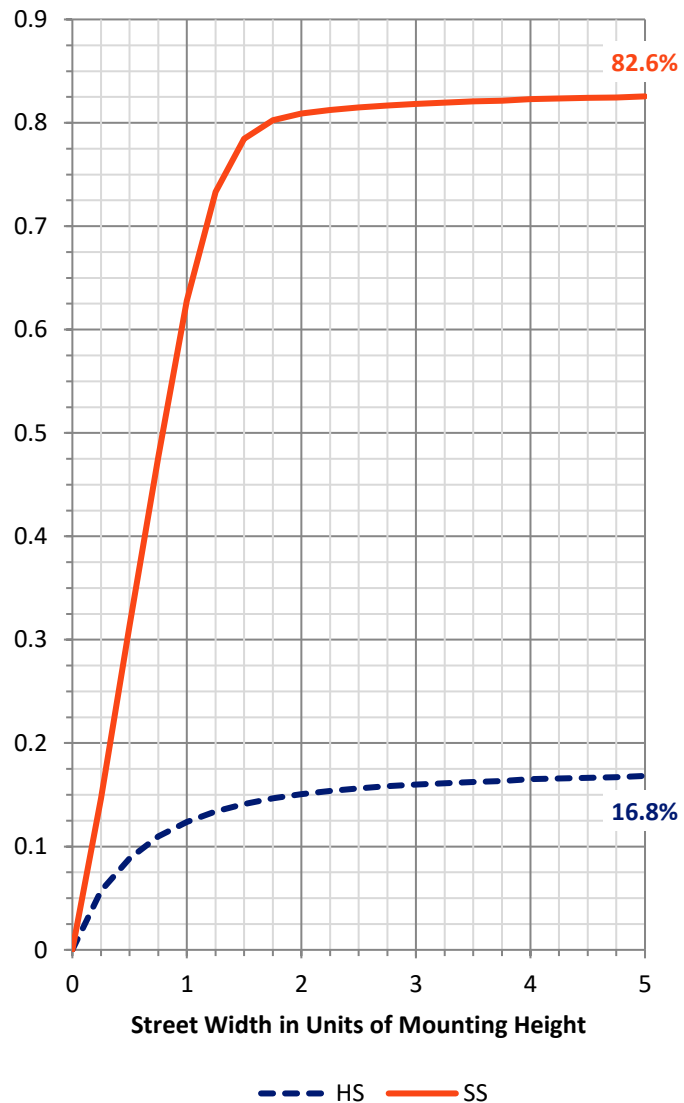
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1518.1   | 0.0    | 1518.1 |
|                    | % Fixture | 17.2     | 0.0    | 17.2   |
| <b>Street Side</b> | Lumens    | 7288.9   | 0.0    | 7288.9 |
|                    | % Fixture | 82.8     | 0.0    | 82.8   |
| <b>Total</b>       | Lumens    | 8807.0   | 0.0    | 8807.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 186.6  | 2.1       |
| 10°-20°   | 527.6  | 6.0       |
| 20°-30°   | 859.3  | 9.8       |
| 30°-40°   | 1284.5 | 14.6      |
| 40°-50°   | 1948.4 | 22.1      |
| 50°-60°   | 2183.8 | 24.8      |
| 60°-70°   | 1289.8 | 14.6      |
| 70°-80°   | 422.6  | 4.8       |
| 80°-90°   | 104.4  | 1.2       |
| 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°    | 8807.0 | 100.0     |
| 0°-180°   | 8807.0 | 100.0     |

**Coefficient of Utilization**



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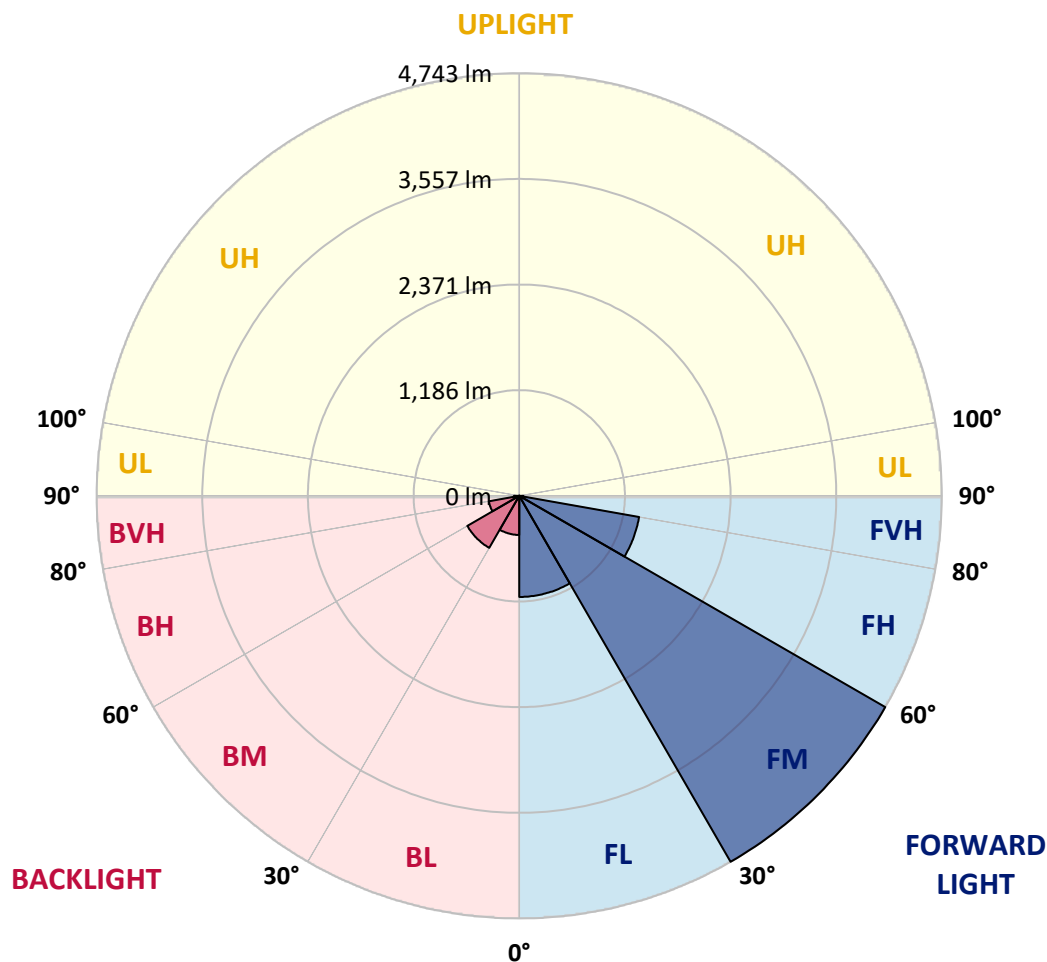
CATALOG NUMBER: NVN-SA2B-722-U-AFL

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1134.5 | 12.9      |                         |      |         |
| FM   | (30°-60°)   | 4742.9 | 53.9      |                         |      |         |
| FH   | (60°-80°)   | 1365.6 | 15.5      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 46.0   | 0.5       |                         |      | G1/100  |
| BL   | (0°-30°)    | 439.0  | 5.0       | B1/500                  |      |         |
| BM   | (30°-60°)   | 673.9  | 7.7       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 346.9  | 3.9       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 58.4   | 0.7       |                         |      | 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 II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 56°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 |
| 2.5°  | 2243.1 | 2263.6 | 2254.6 | 2223.1 | 2198.9 | 2164.7 | 2126.5 | 2115.0 | 2074.8 | 2029.7 | 1975.5 |
| 5°    | 2598.1 | 2587.8 | 2573.0 | 2523.9 | 2472.2 | 2411.9 | 2316.3 | 2301.2 | 2211.6 | 2109.6 | 2001.8 |
| 7.5°  | 2800.3 | 2799.3 | 2790.6 | 2761.8 | 2714.6 | 2635.9 | 2520.6 | 2502.7 | 2367.4 | 2203.4 | 2036.3 |
| 10°   | 2770.9 | 2768.8 | 2783.3 | 2813.3 | 2827.5 | 2811.2 | 2714.0 | 2696.1 | 2530.0 | 2307.2 | 2076.3 |
| 12.5° | 2604.1 | 2605.3 | 2628.6 | 2691.6 | 2777.3 | 2880.2 | 2864.4 | 2855.6 | 2698.6 | 2424.7 | 2124.7 |
| 15°   | 2474.3 | 2477.0 | 2495.5 | 2550.3 | 2651.3 | 2838.1 | 2955.8 | 2958.9 | 2861.7 | 2554.2 | 2181.3 |
| 17.5° | 2417.4 | 2423.1 | 2431.6 | 2470.0 | 2562.7 | 2754.3 | 2977.6 | 2994.0 | 3004.6 | 2688.6 | 2235.8 |
| 20°   | 2435.5 | 2441.0 | 2443.4 | 2467.9 | 2543.9 | 2703.4 | 2962.5 | 2991.8 | 3114.1 | 2815.1 | 2290.3 |
| 22.5° | 2517.0 | 2520.3 | 2521.8 | 2528.2 | 2587.2 | 2717.9 | 2952.5 | 2983.4 | 3193.4 | 2928.6 | 2331.4 |
| 25°   | 2652.0 | 2649.5 | 2639.8 | 2631.7 | 2671.3 | 2775.4 | 2975.5 | 3004.9 | 3257.9 | 3031.5 | 2358.4 |
| 27.5° | 2813.6 | 2810.5 | 2791.8 | 2769.4 | 2792.1 | 2865.0 | 3041.8 | 3065.1 | 3315.7 | 3127.7 | 2372.0 |
| 30°   | 3007.6 | 2999.7 | 2964.3 | 2937.7 | 2946.4 | 2999.4 | 3151.0 | 3172.2 | 3405.0 | 3237.0 | 2385.3 |
| 32.5° | 3231.9 | 3223.4 | 3172.2 | 3128.0 | 3128.0 | 3172.2 | 3263.6 | 3281.2 | 3480.6 | 3360.5 | 2406.8 |
| 35°   | 3512.7 | 3502.1 | 3435.6 | 3361.4 | 3340.5 | 3362.9 | 3417.1 | 3429.5 | 3616.8 | 3516.1 | 2445.8 |
| 37.5° | 3843.8 | 3829.6 | 3743.4 | 3644.1 | 3598.4 | 3597.2 | 3636.2 | 3661.6 | 3834.5 | 3720.4 | 2512.1 |
| 40°   | 4175.9 | 4165.9 | 4090.5 | 4012.4 | 3922.8 | 3894.1 | 3954.3 | 3962.2 | 4119.0 | 3974.0 | 2596.9 |
| 42.5° | 4432.5 | 4430.7 | 4416.8 | 4427.1 | 4335.4 | 4277.3 | 4324.5 | 4330.8 | 4466.4 | 4248.5 | 2687.1 |
| 45°   | 4568.1 | 4571.2 | 4638.6 | 4788.2 | 4822.1 | 4779.7 | 4803.0 | 4804.8 | 4863.5 | 4525.4 | 2769.7 |
| 47.5° | 4459.5 | 4475.2 | 4645.9 | 4980.4 | 5257.9 | 5398.6 | 5359.9 | 5382.3 | 5248.5 | 4763.3 | 2834.5 |
| 50°   | 4036.0 | 4055.4 | 4346.0 | 4894.7 | 5461.3 | 5997.6 | 5977.3 | 5972.2 | 5559.1 | 4937.7 | 2869.6 |
| 52.5° | 3511.5 | 3526.7 | 3766.4 | 4449.5 | 5312.1 | 6328.7 | 6514.9 | 6488.2 | 5835.1 | 5068.1 | 2876.2 |
| 55°   | 2712.8 | 2736.4 | 2966.1 | 3560.9 | 4708.6 | 6202.2 | 6910.1 | 6886.2 | 6086.6 | 5136.5 | 2868.4 |
| 57°   | 1928.6 | 1953.4 | 2181.6 | 2717.6 | 3961.0 | 5764.3 | 6949.5 | 6974.9 | 6222.5 | 5148.0 | 2877.1 |
| 57.5° | 1721.0 | 1746.4 | 1972.5 | 2493.1 | 3727.9 | 5606.0 | 6915.6 | 6958.0 | 6247.0 | 5146.2 | 2882.0 |
| 60°   | 866.5  | 876.2  | 1020.3 | 1391.7 | 2356.6 | 4532.1 | 6473.4 | 6582.7 | 6269.1 | 5057.2 | 2902.9 |
| 62.5° | 538.7  | 531.8  | 527.2  | 641.0  | 1146.5 | 3005.5 | 5560.9 | 5771.2 | 5846.3 | 4841.7 | 2852.3 |
| 65°   | 473.7  | 460.7  | 410.7  | 401.6  | 506.4  | 1459.8 | 4187.7 | 4449.5 | 4942.8 | 4502.1 | 2731.9 |
| 67.5° | 444.9  | 432.2  | 375.9  | 342.0  | 342.3  | 578.7  | 2599.9 | 2894.7 | 3850.5 | 3928.0 | 2447.7 |
| 70°   | 415.3  | 403.8  | 351.1  | 311.1  | 291.5  | 320.5  | 1196.1 | 1419.8 | 2510.0 | 3087.5 | 2045.7 |
| 72.5° | 377.1  | 369.3  | 319.3  | 278.1  | 257.3  | 240.0  | 457.9  | 540.9  | 1453.1 | 2073.6 | 1420.7 |
| 75°   | 337.2  | 329.9  | 287.2  | 247.9  | 222.5  | 188.9  | 257.9  | 277.8  | 738.2  | 1060.8 | 699.5  |
| 77.5° | 293.3  | 289.0  | 255.4  | 219.1  | 198.9  | 156.5  | 182.5  | 192.2  | 316.6  | 454.9  | 350.8  |
| 80°   | 233.4  | 241.5  | 223.4  | 195.2  | 176.5  | 125.3  | 129.2  | 135.6  | 184.3  | 222.2  | 199.2  |
| 82.5° | 151.9  | 166.2  | 174.9  | 158.6  | 145.3  | 98.7   | 92.9   | 95.6   | 120.2  | 135.6  | 86.6   |
| 85°   | 63.3   | 71.1   | 115.0  | 103.8  | 96.6   | 72.0   | 62.3   | 63.6   | 74.5   | 77.2   | 35.4   |
| 87.5° | 28.1   | 30.0   | 50.5   | 47.5   | 40.9   | 24.8   | 26.6   | 29.1   | 39.6   | 37.5   | 13.6   |
| 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-SA2B-722-U-AFL

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 | 1953.4 |
| 2.5°  | 1955.2 | 1929.8 | 1886.2 | 1838.1 | 1798.7 | 1767.3 | 1735.5 | 1713.7 | 1688.3 | 1674.6 | 1667.7 |
| 5°    | 1956.7 | 1906.8 | 1815.1 | 1721.0 | 1636.8 | 1559.9 | 1486.7 | 1430.4 | 1377.7 | 1349.3 | 1341.4 |
| 7.5°  | 1963.1 | 1888.0 | 1739.7 | 1584.8 | 1435.2 | 1298.7 | 1193.4 | 1127.4 | 1079.9 | 1058.7 | 1052.7 |
| 10°   | 1968.2 | 1865.9 | 1646.5 | 1417.1 | 1213.7 | 1075.4 | 993.6  | 956.7  | 940.4  | 937.7  | 934.9  |
| 12.5° | 1980.3 | 1843.2 | 1548.4 | 1242.1 | 1041.5 | 945.8  | 917.4  | 915.0  | 919.5  | 926.2  | 926.2  |
| 15°   | 1999.4 | 1820.8 | 1436.4 | 1092.0 | 931.9  | 898.3  | 904.1  | 917.4  | 929.8  | 940.1  | 941.6  |
| 17.5° | 2013.3 | 1793.3 | 1316.0 | 971.9  | 873.5  | 882.6  | 903.2  | 921.9  | 934.6  | 944.6  | 945.5  |
| 20°   | 2023.3 | 1750.6 | 1187.4 | 880.2  | 839.9  | 868.0  | 893.8  | 910.4  | 919.2  | 929.2  | 930.7  |
| 22.5° | 2018.2 | 1693.4 | 1073.3 | 814.5  | 812.7  | 846.9  | 871.4  | 891.3  | 884.7  | 875.0  | 881.4  |
| 25°   | 1993.4 | 1614.7 | 955.8  | 765.4  | 783.9  | 818.4  | 848.7  | 835.4  | 813.0  | 808.7  | 811.1  |
| 27.5° | 1949.2 | 1514.2 | 847.2  | 720.0  | 750.6  | 792.1  | 790.3  | 776.9  | 769.1  | 763.6  | 767.0  |
| 30°   | 1901.6 | 1405.3 | 752.1  | 680.4  | 713.7  | 747.9  | 740.9  | 740.6  | 732.8  | 724.0  | 728.2  |
| 32.5° | 1854.7 | 1295.7 | 676.8  | 647.7  | 685.8  | 690.4  | 705.5  | 710.1  | 694.6  | 676.2  | 674.9  |
| 35°   | 1813.9 | 1192.2 | 619.6  | 618.0  | 652.2  | 652.8  | 674.9  | 668.6  | 630.1  | 611.1  | 611.1  |
| 37.5° | 1783.3 | 1089.0 | 576.0  | 591.4  | 608.1  | 623.8  | 635.0  | 608.7  | 602.3  | 591.7  | 591.4  |
| 40°   | 1770.0 | 998.2  | 548.7  | 571.1  | 576.9  | 596.9  | 568.1  | 578.4  | 581.4  | 576.0  | 576.0  |
| 42.5° | 1756.1 | 919.2  | 525.1  | 555.7  | 554.8  | 552.1  | 537.5  | 550.9  | 563.0  | 563.3  | 562.4  |
| 45°   | 1742.1 | 851.1  | 504.2  | 522.7  | 535.4  | 506.1  | 508.8  | 523.0  | 540.0  | 546.0  | 546.0  |
| 47.5° | 1726.7 | 797.2  | 485.2  | 487.9  | 507.6  | 487.9  | 485.8  | 496.7  | 516.6  | 526.3  | 528.5  |
| 50°   | 1692.8 | 748.8  | 463.4  | 457.3  | 462.8  | 469.4  | 471.2  | 476.4  | 498.5  | 513.9  | 517.6  |
| 52.5° | 1645.9 | 705.5  | 435.5  | 429.2  | 429.2  | 454.3  | 462.8  | 464.3  | 483.1  | 501.5  | 505.1  |
| 55°   | 1606.8 | 678.0  | 406.8  | 405.6  | 404.4  | 438.3  | 452.8  | 455.2  | 468.2  | 482.8  | 484.6  |
| 57°   | 1609.6 | 675.9  | 384.7  | 385.9  | 385.6  | 421.9  | 443.4  | 448.5  | 455.2  | 467.6  | 469.7  |
| 57.5° | 1611.1 | 677.4  | 379.8  | 380.5  | 380.1  | 417.4  | 440.7  | 446.4  | 451.6  | 464.6  | 466.7  |
| 60°   | 1633.8 | 681.3  | 360.2  | 353.5  | 355.0  | 393.2  | 425.2  | 432.5  | 435.8  | 453.1  | 455.8  |
| 62.5° | 1600.2 | 663.7  | 344.4  | 328.4  | 328.4  | 367.7  | 403.8  | 415.3  | 420.4  | 443.7  | 448.2  |
| 65°   | 1502.7 | 614.4  | 326.0  | 299.9  | 303.0  | 342.3  | 378.0  | 396.8  | 404.7  | 433.7  | 438.6  |
| 67.5° | 1352.3 | 557.2  | 306.3  | 274.5  | 277.5  | 315.7  | 351.4  | 371.7  | 384.1  | 422.8  | 426.8  |
| 70°   | 1156.5 | 487.3  | 279.7  | 247.6  | 251.2  | 286.6  | 319.9  | 342.9  | 361.4  | 412.5  | 413.7  |
| 72.5° | 852.6  | 399.5  | 242.4  | 217.9  | 221.9  | 252.7  | 288.1  | 314.8  | 339.6  | 386.8  | 386.2  |
| 75°   | 507.0  | 312.4  | 201.3  | 188.0  | 190.7  | 219.4  | 259.4  | 291.8  | 329.0  | 376.8  | 382.6  |
| 77.5° | 307.5  | 235.2  | 164.0  | 157.4  | 160.7  | 190.1  | 238.8  | 273.3  | 324.5  | 355.3  | 353.5  |
| 80°   | 185.8  | 168.0  | 131.1  | 126.8  | 130.1  | 162.5  | 220.9  | 259.4  | 283.6  | 303.6  | 303.6  |
| 82.5° | 97.2   | 102.6  | 96.2   | 92.9   | 97.5   | 132.0  | 201.0  | 226.4  | 250.6  | 215.2  | 201.0  |
| 85°   | 39.6   | 53.6   | 58.4   | 58.1   | 60.8   | 91.4   | 173.4  | 193.7  | 161.6  | 153.5  | 157.1  |
| 87.5° | 13.3   | 22.7   | 28.5   | 24.5   | 25.7   | 57.5   | 120.2  | 93.5   | 111.1  | 77.5   | 73.5   |
| 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

REPORT NUMBER: SP1-1908-441-10-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            |

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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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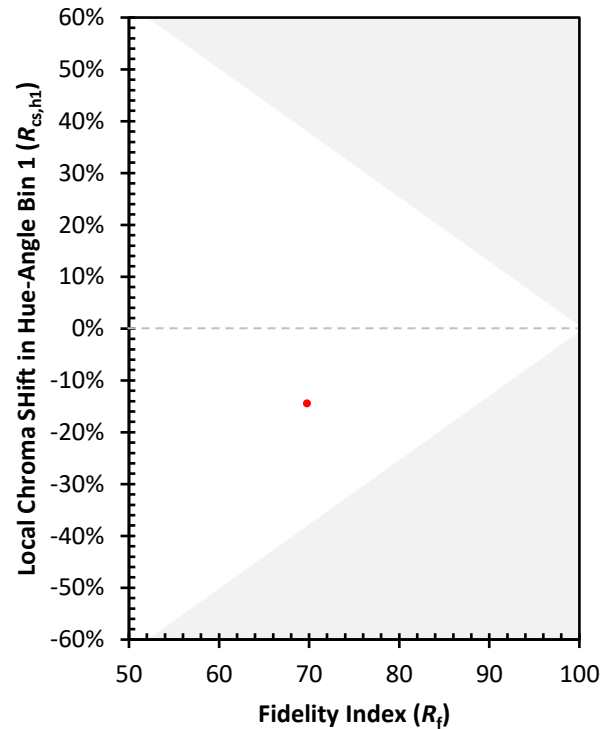
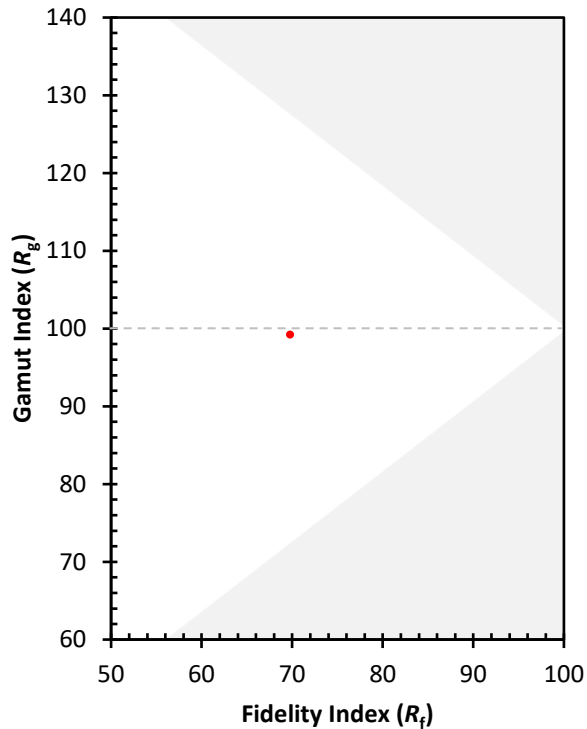
Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)