

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: P361562

Luminaire Tested: NVN-SA4D-722-U-T4FT

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P361562  
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-SA4D-722-U-T4FT  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(4) 70 CRI, 2200K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
FORWARD THROW OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 23564 lumens  
Efficiency: N/A  
Efficacy: 91.3 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G4

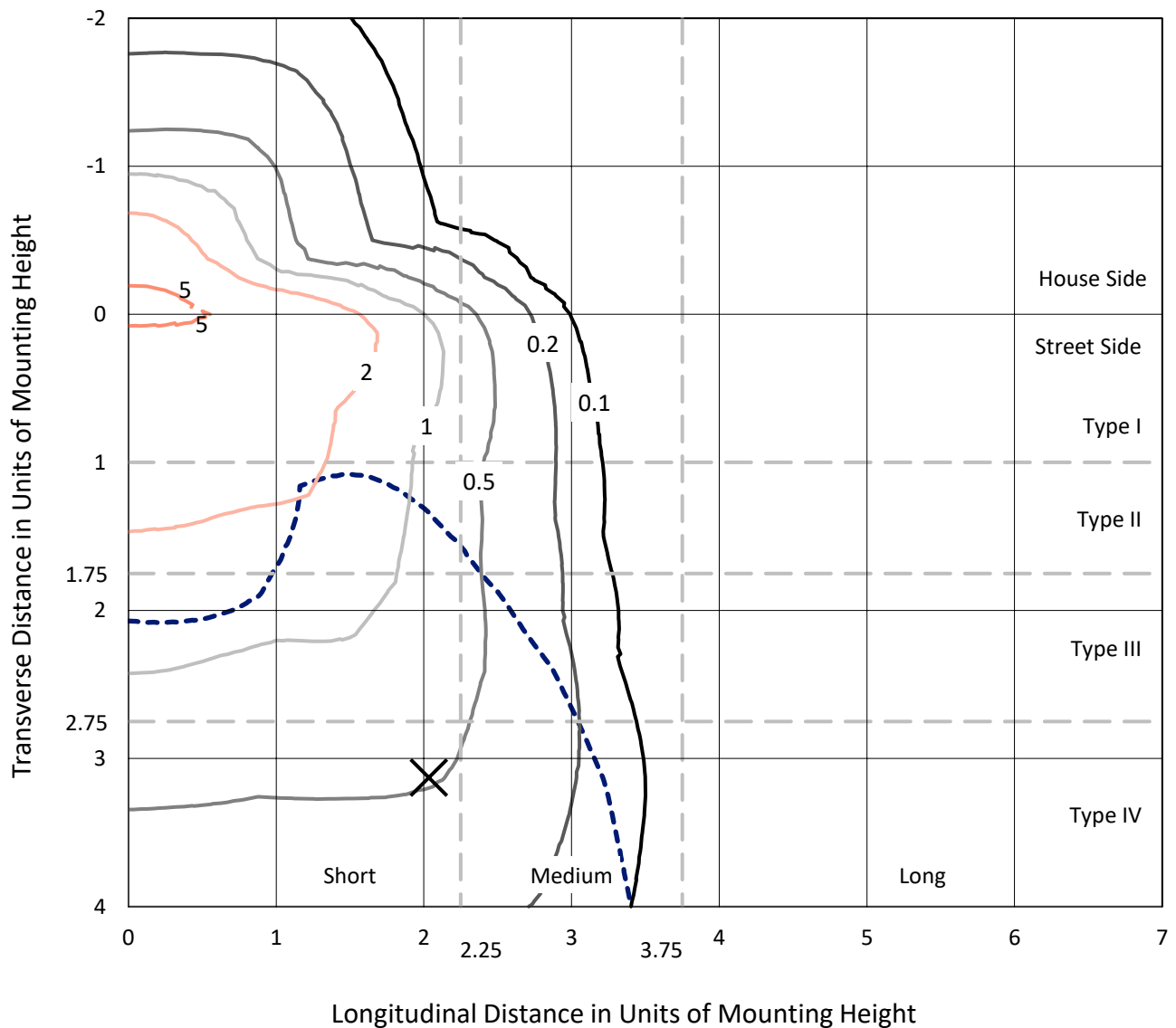
Input Watts (W): 258  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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### Iso-Footcandle Lines of Horizontal Illumination

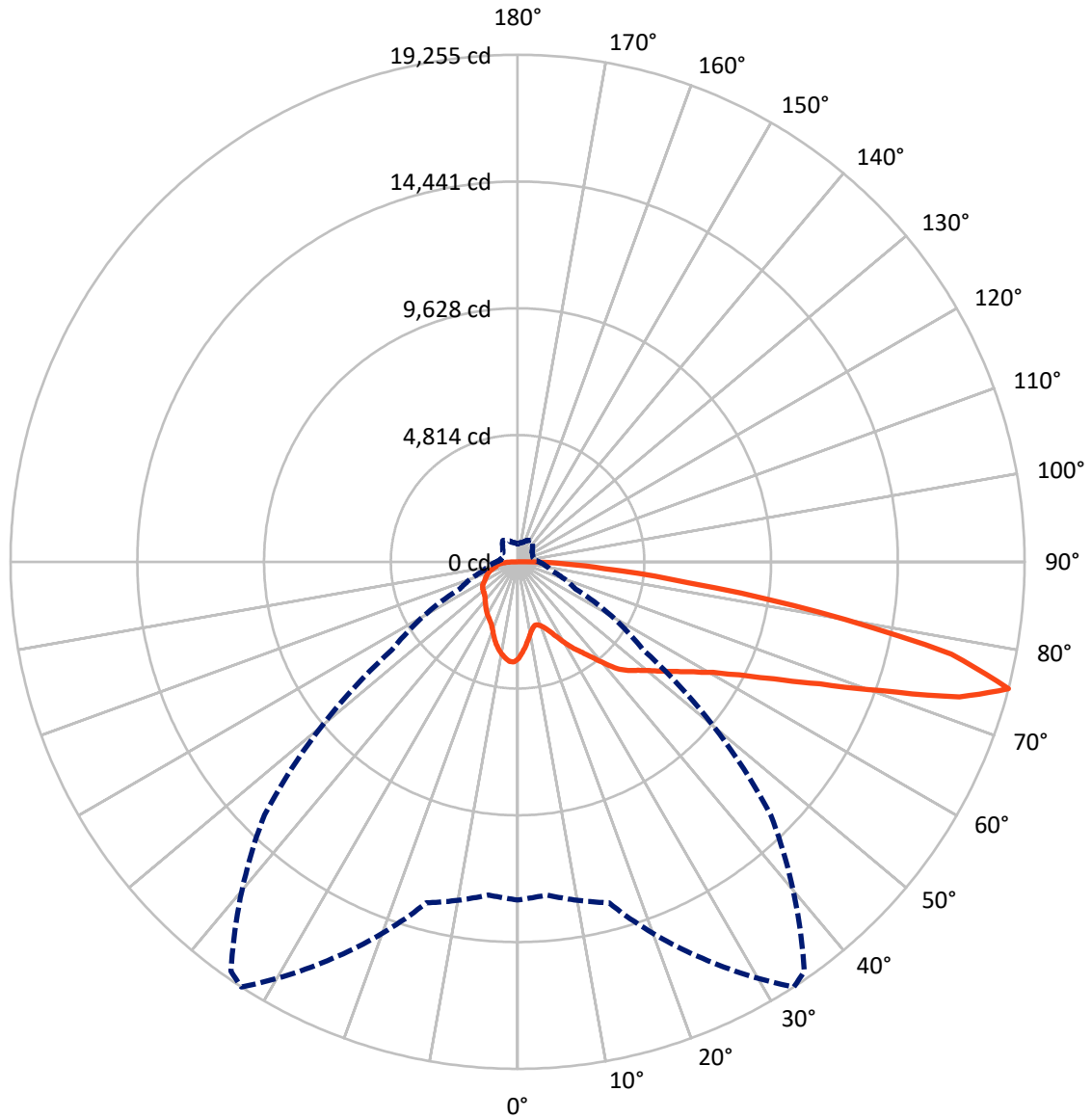
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 5.9 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    | 5059.8   | 0.0    | 5059.8  |
|                    | % Fixture | 21.5     | 0.0    | 21.5    |
| <b>Street Side</b> | Lumens    | 18504.2  | 0.0    | 18504.2 |
|                    | % Fixture | 78.5     | 0.0    | 78.5    |
| <b>Total</b>       | Lumens    | 23564.0  | 0.0    | 23564.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 333.1   | 1.4       |
| 10°-20°   | 902.2   | 3.8       |
| 20°-30°   | 1473.4  | 6.3       |
| 30°-40°   | 2194.2  | 9.3       |
| 40°-50°   | 3147.1  | 13.4      |
| 50°-60°   | 4320.4  | 18.3      |
| 60°-70°   | 5409.0  | 23.0      |
| 70°-80°   | 4893.3  | 20.8      |
| 80°-90°   | 891.3   | 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°    | 23564.0 | 100.0     |
| 0°-180°   | 23564.0 | 100.0     |

**Coefficient of Utilization**

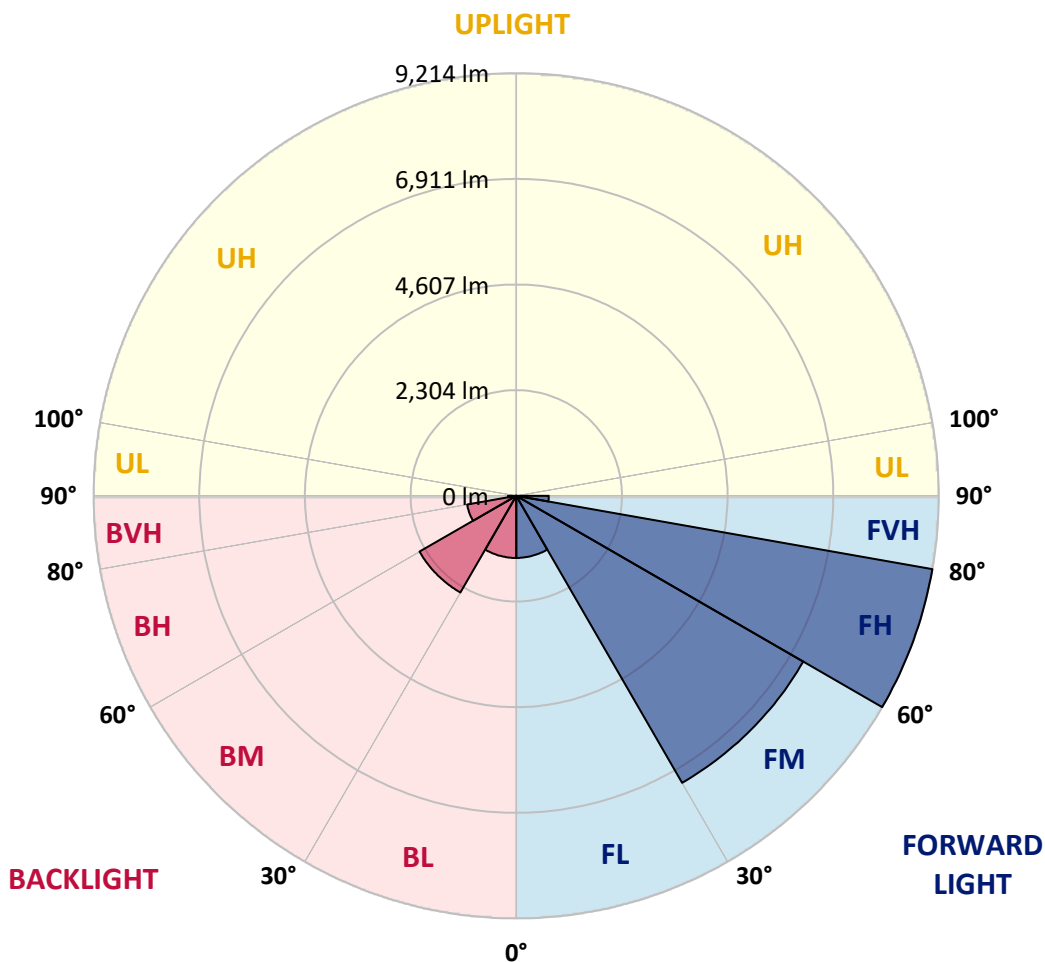


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|----------------|--------|-----------|-------------------------|------|----------|
|                |        |           | B                       | U    | G        |
| FL (0°-30°)    | 1353.4 | 5.7       |                         |      |          |
| FM (30°-60°)   | 7226.6 | 30.7      |                         |      |          |
| FH (60°-80°)   | 9214.3 | 39.1      |                         |      | G4/12000 |
| FVH (80°-90°)  | 709.9  | 3.0       |                         |      | G4/750   |
| BL (0°-30°)    | 1355.3 | 5.8       | B3/2500                 |      |          |
| BM (30°-60°)   | 2435.1 | 10.3      | B2/2500                 |      |          |
| BH (60°-80°)   | 1088.0 | 4.6       | B3/2500                 |      | G3/2500  |
| BVH (80°-90°)  | 181.5  | 0.8       |                         |      | G2/225   |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |          |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**  
 Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 33°     | 35°     | 45°     | 55°    | 65°    | 75°    | 85°    |
|-------|---------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|
| 0°    | 3683.2  | 3683.2  | 3683.2  | 3683.2  | 3683.2  | 3683.2  | 3683.2  | 3683.2 | 3683.2 | 3683.2 | 3683.2 |
| 2.5°  | 3420.3  | 3407.3  | 3431.7  | 3434.9  | 3456.1  | 3464.2  | 3493.5  | 3539.1 | 3576.6 | 3619.7 | 3658.8 |
| 5°    | 3110.2  | 3101.2  | 3135.4  | 3159.8  | 3206.2  | 3225.7  | 3294.9  | 3391.8 | 3478.1 | 3575.7 | 3664.5 |
| 7.5°  | 2815.5  | 2810.6  | 2848.9  | 2904.2  | 2957.9  | 2984.8  | 3104.5  | 3245.3 | 3389.3 | 3547.3 | 3683.2 |
| 10°   | 2567.2  | 2565.6  | 2602.2  | 2656.8  | 2735.7  | 2765.8  | 2920.5  | 3106.1 | 3307.9 | 3525.3 | 3714.9 |
| 12.5° | 2428.1  | 2433.8  | 2450.8  | 2496.4  | 2569.7  | 2599.8  | 2771.5  | 2989.7 | 3239.6 | 3518.0 | 3761.3 |
| 15°   | 2462.2  | 2471.2  | 2441.9  | 2440.3  | 2492.4  | 2516.0  | 2677.1  | 2906.7 | 3190.7 | 3530.2 | 3828.9 |
| 17.5° | 2607.9  | 2609.6  | 2532.2  | 2483.4  | 2515.1  | 2527.4  | 2647.8  | 2859.5 | 3162.2 | 3557.8 | 3913.5 |
| 20°   | 2813.1  | 2809.0  | 2672.2  | 2590.8  | 2607.9  | 2611.2  | 2689.3  | 2860.3 | 3159.8 | 3605.9 | 4023.4 |
| 22.5° | 3084.9  | 3054.8  | 2870.8  | 2760.2  | 2756.1  | 2751.2  | 2796.0  | 2920.5 | 3195.6 | 3684.0 | 4154.5 |
| 25°   | 3439.8  | 3411.3  | 3158.2  | 3006.8  | 2974.2  | 2962.0  | 2968.5  | 3049.1 | 3266.4 | 3767.8 | 4301.0 |
| 27.5° | 3834.6  | 3784.9  | 3540.7  | 3326.7  | 3259.1  | 3242.0  | 3202.9  | 3230.6 | 3343.8 | 3848.4 | 4475.2 |
| 30°   | 4165.1  | 4138.2  | 3924.9  | 3671.0  | 3591.2  | 3566.8  | 3464.2  | 3434.1 | 3455.3 | 3958.3 | 4694.9 |
| 32.5° | 4349.8  | 4331.9  | 4202.5  | 3997.4  | 3923.3  | 3889.1  | 3744.2  | 3684.0 | 3634.3 | 4131.7 | 4992.9 |
| 35°   | 4573.7  | 4562.3  | 4484.1  | 4335.2  | 4225.3  | 4189.5  | 4077.1  | 4014.5 | 3886.7 | 4370.2 | 5377.9 |
| 37.5° | 4858.5  | 4846.3  | 4848.0  | 4727.5  | 4596.5  | 4563.1  | 4489.0  | 4423.1 | 4213.9 | 4683.5 | 5796.2 |
| 40°   | 5180.9  | 5157.3  | 5148.3  | 5142.6  | 5059.6  | 5040.9  | 5001.8  | 4912.3 | 4624.1 | 5058.0 | 6208.9 |
| 42.5° | 5666.0  | 5582.2  | 5403.1  | 5470.6  | 5552.9  | 5543.1  | 5574.8  | 5446.2 | 5079.9 | 5500.8 | 6611.8 |
| 45°   | 6134.0  | 5996.5  | 5687.2  | 5701.8  | 5881.7  | 5936.2  | 6173.9  | 6082.8 | 5574.0 | 5985.9 | 7028.6 |
| 47.5° | 6347.3  | 6243.1  | 5980.2  | 5981.0  | 6159.3  | 6272.4  | 6793.3  | 6728.2 | 6093.3 | 6536.9 | 7537.3 |
| 50°   | 6585.8  | 6481.6  | 6245.5  | 6334.3  | 6489.7  | 6610.2  | 7391.6  | 7358.2 | 6587.4 | 7140.1 | 8147.0 |
| 52.5° | 6846.2  | 6669.6  | 6519.8  | 6678.6  | 6896.7  | 7036.7  | 7990.7  | 7899.5 | 7040.8 | 7747.3 | 8847.8 |
| 55°   | 6849.5  | 6801.5  | 6915.4  | 7031.8  | 7358.2  | 7530.0  | 8618.2  | 8377.3 | 7410.3 | 8343.9 | 9418.4 |
| 57.5° | 7239.4  | 7161.3  | 7403.0  | 7456.7  | 7883.2  | 8077.0  | 9242.6  | 8793.2 | 7786.4 | 8801.4 | 9726.1 |
| 60°   | 7755.4  | 7688.7  | 7886.5  | 8028.1  | 8532.8  | 8791.6  | 9909.2  | 9220.6 | 8081.8 | 9146.5 | 9711.4 |
| 62.5° | 8646.7  | 8571.0  | 8568.6  | 8767.2  | 9446.9  | 9748.0  | 10657.2 | 9639.8 | 8199.1 | 9214.9 | 9297.1 |
| 65°   | 9951.5  | 9831.1  | 9604.0  | 9698.4  | 10709.3 | 11009.7 | 11493.2 | 9943.4 | 8044.4 | 8848.6 | 8230.0 |
| 67.5° | 11221.3 | 11217.2 | 10938.0 | 11131.8 | 12376.3 | 12617.2 | 12445.5 | 9973.5 | 7561.7 | 7573.1 | 6336.7 |
| 70°   | 12487.0 | 12503.3 | 12456.1 | 13130.0 | 14628.6 | 14879.3 | 13459.7 | 9569.0 | 6476.7 | 5469.0 | 3796.3 |
| 72.5° | 13489.8 | 13485.7 | 13723.4 | 15461.2 | 17551.5 | 17495.3 | 14314.4 | 8343.1 | 4650.2 | 2952.2 | 1814.3 |
| 75°   | 12840.3 | 12698.6 | 13406.8 | 16615.4 | 19255.1 | 18980.8 | 13587.5 | 5819.8 | 2413.4 | 1343.9 | 976.8  |
| 77.5° | 8374.9  | 8509.2  | 9548.6  | 13725.9 | 16842.5 | 16508.8 | 9968.6  | 2715.4 | 1137.1 | 881.5  | 708.1  |
| 80°   | 3032.8  | 3174.5  | 4471.1  | 7775.0  | 11603.9 | 11549.3 | 4909.0  | 1115.9 | 769.2  | 665.8  | 516.1  |
| 82.5° | 1043.5  | 1095.6  | 1763.9  | 3452.8  | 6551.6  | 6795.8  | 1846.9  | 634.1  | 559.2  | 472.1  | 353.3  |
| 85°   | 409.4   | 468.8   | 806.6   | 1661.3  | 3304.7  | 3329.1  | 748.0   | 379.3  | 389.1  | 309.3  | 193.7  |
| 87.5° | 155.5   | 188.8   | 385.8   | 771.6   | 1509.1  | 1386.2  | 267.8   | 180.7  | 221.4  | 184.0  | 92.0   |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P361562  
 CATALOG NUMBER: NVN-SA4D-722-U-T4FT

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3683.2 | 3683.2 | 3683.2 | 3683.2 | 3683.2 | 3683.2 | 3683.2 | 3683.2 | 3683.2 | 3683.2 | 3683.2 |
| 2.5°  | 3688.9 | 3706.0 | 3741.8 | 3766.2 | 3792.3 | 3799.6 | 3802.8 | 3809.3 | 3815.9 | 3813.4 | 3814.2 |
| 5°    | 3711.7 | 3745.0 | 3802.8 | 3827.3 | 3838.7 | 3825.6 | 3800.4 | 3780.0 | 3765.4 | 3757.3 | 3754.8 |
| 7.5°  | 3749.1 | 3796.3 | 3858.2 | 3854.1 | 3828.1 | 3770.3 | 3705.2 | 3656.3 | 3615.6 | 3601.0 | 3592.8 |
| 10°   | 3798.8 | 3854.1 | 3897.3 | 3850.9 | 3775.2 | 3675.0 | 3577.4 | 3501.7 | 3440.6 | 3417.0 | 3412.9 |
| 12.5° | 3862.3 | 3918.4 | 3926.6 | 3828.1 | 3702.7 | 3566.0 | 3433.3 | 3333.2 | 3242.0 | 3212.7 | 3206.2 |
| 15°   | 3944.5 | 3997.4 | 3946.9 | 3788.2 | 3613.2 | 3429.2 | 3257.5 | 3121.6 | 3025.5 | 2989.7 | 2976.7 |
| 17.5° | 4030.7 | 4081.2 | 3951.0 | 3722.3 | 3496.0 | 3267.2 | 3051.5 | 2912.4 | 2802.5 | 2761.0 | 2756.1 |
| 20°   | 4134.1 | 4156.9 | 3933.9 | 3627.8 | 3334.8 | 3057.2 | 2830.2 | 2699.1 | 2640.5 | 2611.2 | 2607.9 |
| 22.5° | 4261.9 | 4237.5 | 3894.8 | 3500.0 | 3130.5 | 2814.7 | 2629.9 | 2568.9 | 2554.2 | 2547.7 | 2550.1 |
| 25°   | 4397.0 | 4322.1 | 3837.0 | 3333.2 | 2872.5 | 2572.1 | 2483.4 | 2500.5 | 2520.0 | 2517.6 | 2517.6 |
| 27.5° | 4546.0 | 4408.4 | 3748.3 | 3111.8 | 2586.8 | 2373.5 | 2384.1 | 2446.8 | 2476.1 | 2475.3 | 2474.4 |
| 30°   | 4737.3 | 4506.1 | 3635.2 | 2845.6 | 2319.8 | 2233.5 | 2297.8 | 2374.3 | 2414.2 | 2412.6 | 2413.4 |
| 32.5° | 4972.5 | 4613.5 | 3481.3 | 2548.5 | 2126.9 | 2130.1 | 2204.2 | 2279.9 | 2326.3 | 2322.2 | 2323.1 |
| 35°   | 5247.6 | 4734.0 | 3272.9 | 2255.5 | 1999.1 | 2047.9 | 2106.5 | 2159.4 | 2203.4 | 2197.7 | 2192.0 |
| 37.5° | 5547.2 | 4852.0 | 2996.2 | 1993.4 | 1894.9 | 1971.4 | 2020.3 | 2029.2 | 2049.6 | 2034.9 | 2024.3 |
| 40°   | 5832.0 | 4942.4 | 2639.7 | 1778.5 | 1789.9 | 1906.3 | 1938.0 | 1902.2 | 1865.6 | 1860.7 | 1846.1 |
| 42.5° | 6080.3 | 4972.5 | 2279.1 | 1606.8 | 1679.2 | 1837.9 | 1857.5 | 1782.6 | 1716.6 | 1685.7 | 1672.7 |
| 45°   | 6342.4 | 4983.1 | 1942.9 | 1462.7 | 1572.6 | 1776.9 | 1798.0 | 1697.9 | 1605.1 | 1538.4 | 1516.4 |
| 47.5° | 6685.1 | 5059.6 | 1681.6 | 1356.1 | 1491.2 | 1736.2 | 1766.3 | 1630.4 | 1509.9 | 1414.7 | 1394.3 |
| 50°   | 7133.6 | 5211.0 | 1469.2 | 1274.7 | 1438.3 | 1709.3 | 1743.5 | 1564.4 | 1431.8 | 1317.0 | 1296.6 |
| 52.5° | 7631.7 | 5350.2 | 1297.5 | 1208.7 | 1387.0 | 1662.1 | 1714.2 | 1517.2 | 1358.5 | 1226.6 | 1204.7 |
| 55°   | 7980.1 | 5243.6 | 1159.1 | 1140.4 | 1320.2 | 1594.6 | 1673.5 | 1477.3 | 1253.5 | 1138.7 | 1119.2 |
| 57.5° | 8046.8 | 4878.9 | 1054.1 | 1069.5 | 1239.7 | 1509.9 | 1610.8 | 1388.6 | 1196.5 | 1100.5 | 1080.1 |
| 60°   | 7864.5 | 4371.0 | 975.9  | 1004.4 | 1153.4 | 1403.3 | 1493.6 | 1325.9 | 1142.0 | 1059.8 | 1042.7 |
| 62.5° | 7406.3 | 3850.9 | 918.2  | 945.8  | 1072.8 | 1295.0 | 1420.4 | 1260.0 | 1086.6 | 1013.4 | 996.3  |
| 65°   | 6480.8 | 3233.1 | 862.8  | 893.7  | 997.9  | 1201.4 | 1354.4 | 1199.0 | 1032.1 | 975.9  | 959.7  |
| 67.5° | 4891.9 | 2421.5 | 810.7  | 838.4  | 931.2  | 1120.0 | 1282.8 | 1138.7 | 979.2  | 943.4  | 923.8  |
| 70°   | 2880.6 | 1516.4 | 751.3  | 780.6  | 861.2  | 1035.4 | 1206.3 | 1072.8 | 913.3  | 897.0  | 871.8  |
| 72.5° | 1340.6 | 912.5  | 683.7  | 712.2  | 773.3  | 922.2  | 1107.8 | 986.5  | 835.1  | 799.3  | 765.1  |
| 75°   | 800.1  | 667.5  | 604.0  | 629.2  | 672.3  | 801.8  | 984.1  | 898.6  | 761.1  | 713.8  | 678.0  |
| 77.5° | 598.3  | 510.4  | 516.1  | 542.9  | 577.9  | 701.6  | 871.8  | 829.4  | 704.1  | 667.5  | 643.0  |
| 80°   | 430.6  | 387.4  | 420.8  | 450.1  | 486.8  | 638.1  | 835.1  | 766.8  | 636.5  | 587.7  | 564.9  |
| 82.5° | 287.3  | 278.4  | 316.6  | 346.7  | 382.6  | 558.4  | 784.7  | 671.5  | 543.7  | 481.9  | 431.4  |
| 85°   | 158.7  | 167.7  | 213.3  | 226.3  | 257.2  | 393.1  | 643.0  | 539.7  | 409.4  | 329.7  | 315.0  |
| 87.5° | 65.9   | 77.3   | 114.8  | 110.7  | 136.7  | 234.4  | 423.3  | 325.6  | 260.5  | 194.5  | 151.4  |
| 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: SP1-1908-441-10-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: 4π  
 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  
 CIE u': 0.2876  
 CIE v': 0.5346  
 Duv: -0.0006  
 CIE x: 0.5005  
 CIE y: 0.4134  
 CIE z: 0.0860  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 587  
 Purity: 74.5  
 Rf: 69.8  
 Rg: 99.2

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 72.0 |      |       |
| R1:       | 68.9 | R9:  | -17.4 |
| R2:       | 83.0 | R10: | 61.3  |
| R3:       | 95.2 | R11: | 59.8  |
| R4:       | 66.2 | R12: | 50.5  |
| R5:       | 65.9 | R13: | 71.1  |
| R6:       | 76.3 | R14: | 96.9  |
| R7:       | 76.7 |      |       |
| R8:       | 43.8 |      |       |



**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 (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    | 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 (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    | 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 (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    | 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**

$R_f = 69.8$   
 $R_g = 99.2$   
 $CIE R_a = 72.0$   
 $R_9 = -17.4$



**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)