

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: P362135

Luminaire Tested: NVN-SA1D-722-U-SL4

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P362135  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-24)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA1D-722-U-SL4  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 2200K, 1200mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV SPILL  
LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 5585 lumens  
Efficiency: N/A  
Efficacy: 83.4 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

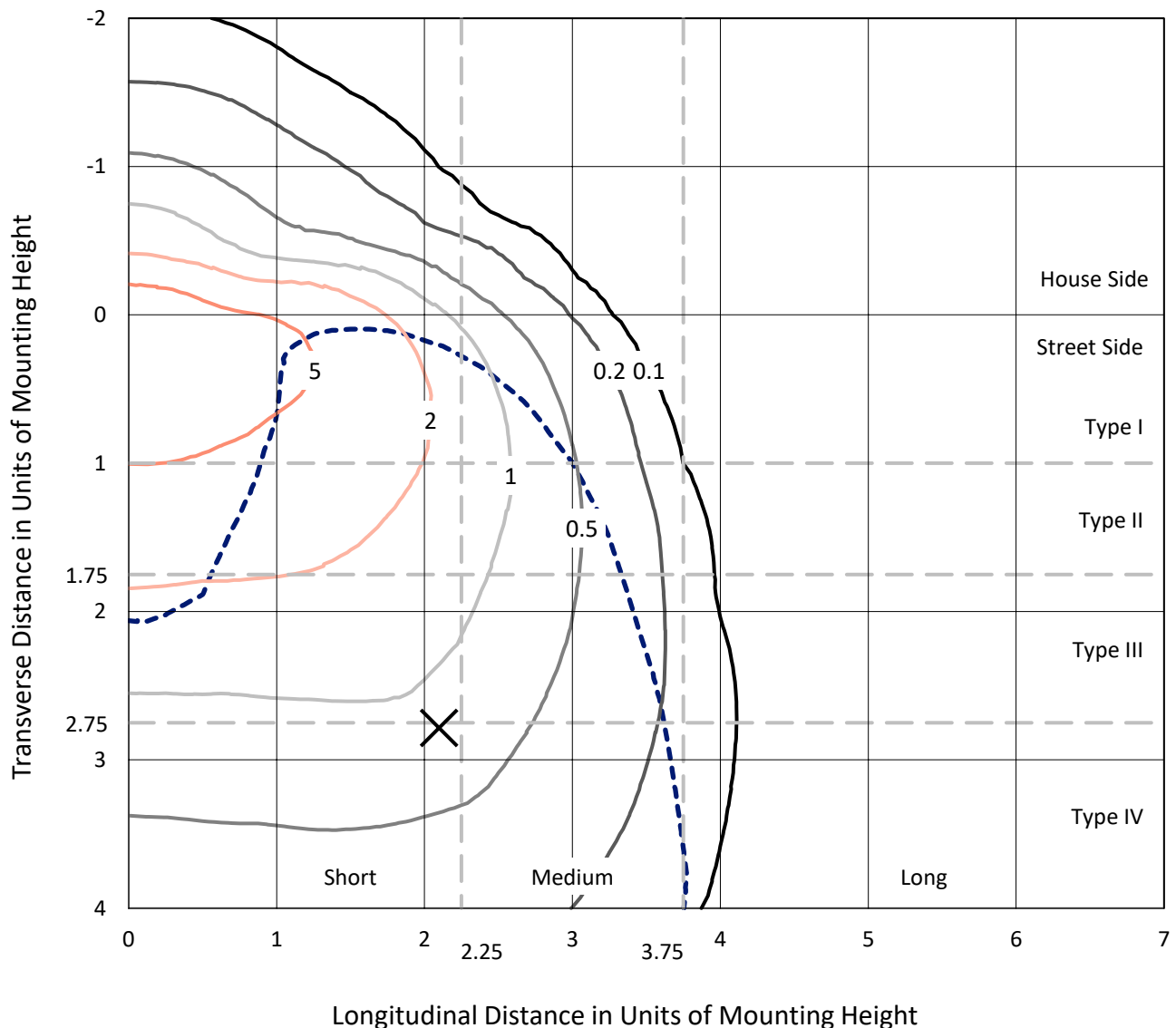
Input Watts (W): 67  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

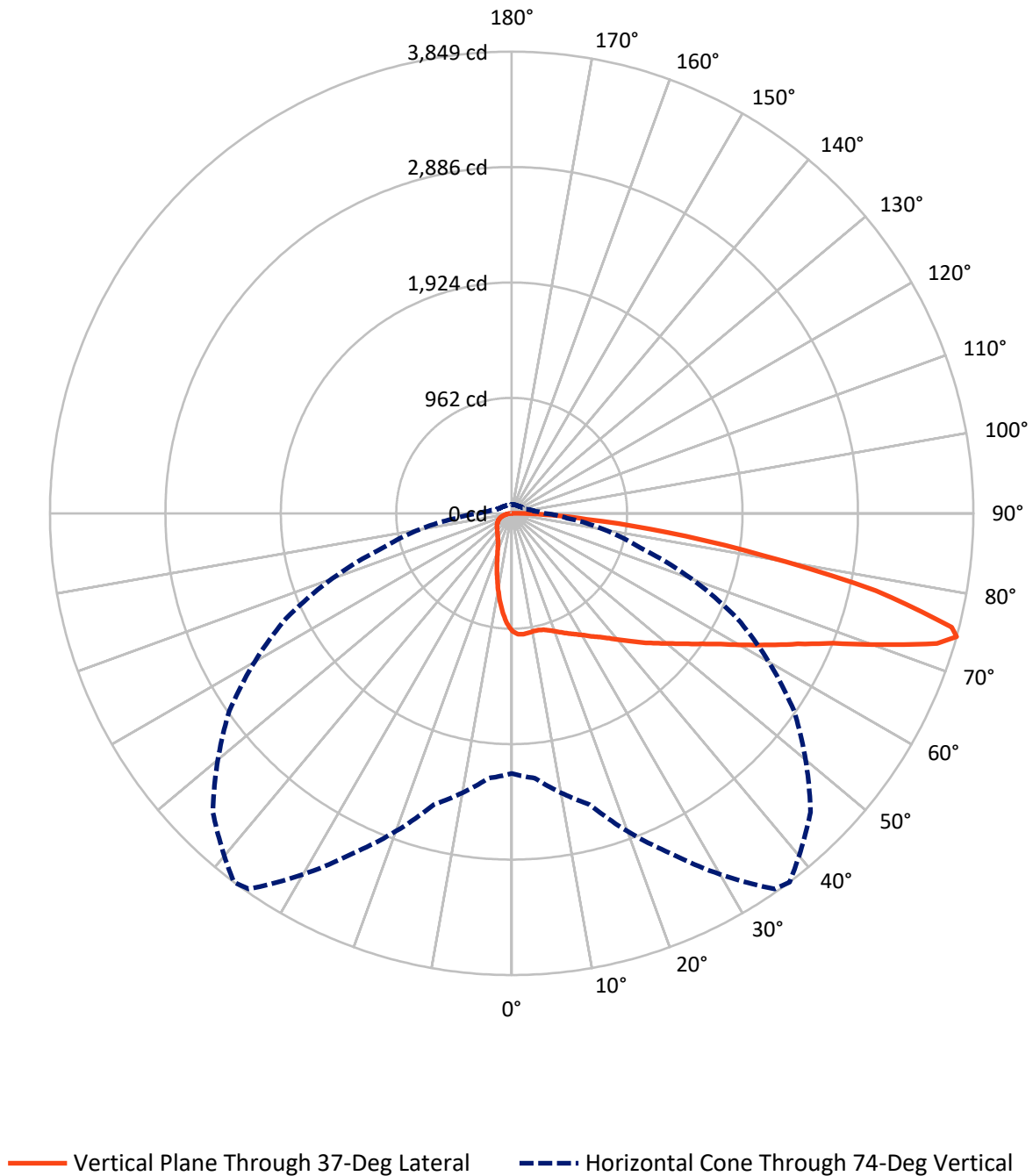
× Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 10 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    | 768.4    | 0.0    | 768.4  |
|                    | % Fixture | 13.8     | 0.0    | 13.8   |
| <b>Street Side</b> | Lumens    | 4816.5   | 0.0    | 4816.5 |
|                    | % Fixture | 86.2     | 0.0    | 86.2   |
| <b>Total</b>       | Lumens    | 5585.0   | 0.0    | 5585.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 86.7   | 1.6       |
| 10°-20°   | 222.1  | 4.0       |
| 20°-30°   | 342.3  | 6.1       |
| 30°-40°   | 497.7  | 8.9       |
| 40°-50°   | 732.5  | 13.1      |
| 50°-60°   | 1028.7 | 18.4      |
| 60°-70°   | 1302.0 | 23.3      |
| 70°-80°   | 1146.4 | 20.5      |
| 80°-90°   | 226.7  | 4.1       |
| 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°    | 5585.0 | 100.0     |
| 0°-180°   | 5585.0 | 100.0     |

**Coefficient of Utilization**



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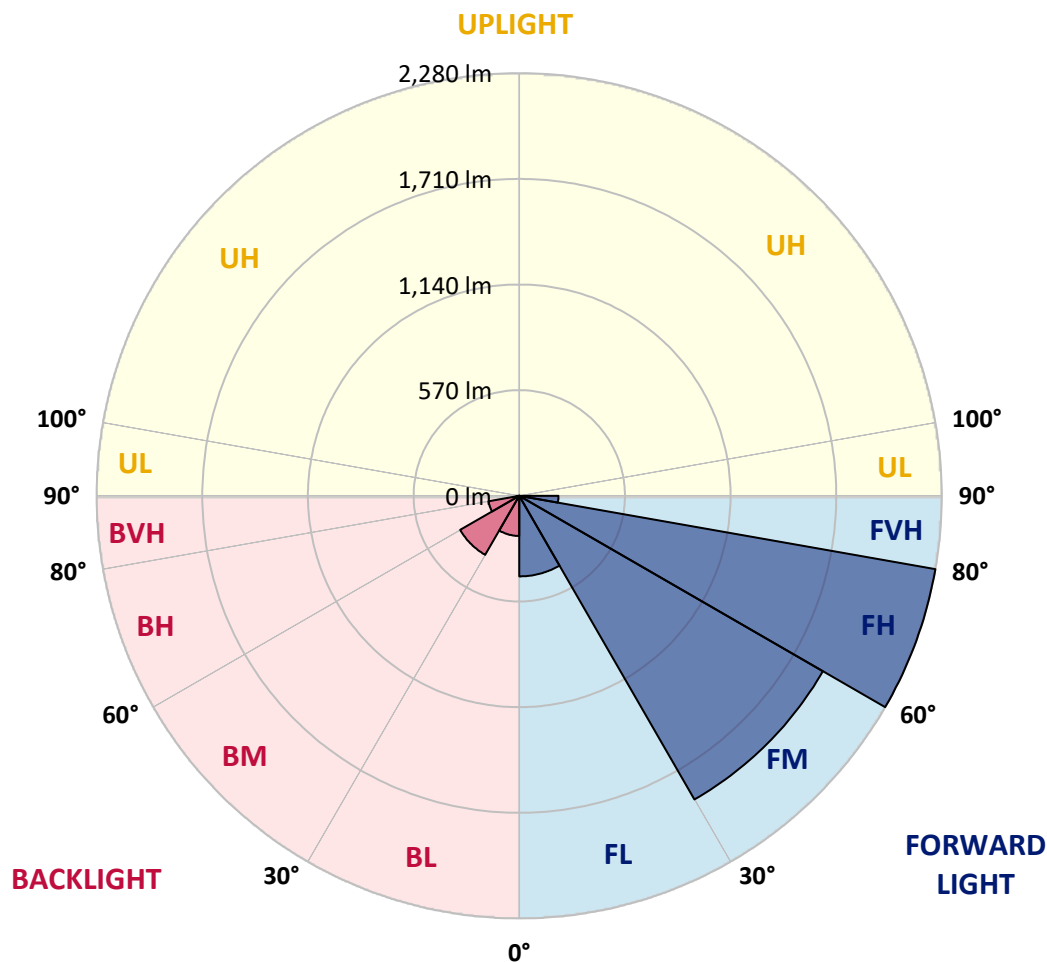
CATALOG NUMBER: NVN-SA1D-722-U-SL4

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 434.6  | 7.8       |                         |      |         |
| FM   | (30°-60°)   | 1891.1 | 33.9      |                         |      |         |
| FH   | (60°-80°)   | 2279.5 | 40.8      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 211.3  | 3.8       |                         |      | G2/225  |
| BL   | (0°-30°)    | 216.5  | 3.9       | B1/500                  |      |         |
| BM   | (30°-60°)   | 367.7  | 6.6       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 168.9  | 3.0       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 15.3   | 0.3       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 37°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 984.1  | 984.1  | 984.1  | 984.1  | 984.1  | 984.1  | 984.1  | 984.1  | 984.1  | 984.1  | 984.1  |
| 2.5°  | 1017.7 | 1017.9 | 1017.7 | 1016.1 | 1012.4 | 1009.2 | 1006.7 | 1002.9 | 994.7  | 988.4  | 978.9  |
| 5°    | 1027.3 | 1026.2 | 1025.4 | 1022.4 | 1016.5 | 1013.0 | 1008.1 | 1001.0 | 987.4  | 974.8  | 959.5  |
| 7.5°  | 1022.8 | 1021.4 | 1019.7 | 1016.1 | 1009.4 | 1006.5 | 999.6  | 990.4  | 974.0  | 957.5  | 935.5  |
| 10°   | 1008.8 | 1008.5 | 1007.7 | 1006.9 | 1001.2 | 998.8  | 992.5  | 982.7  | 966.5  | 946.5  | 920.7  |
| 12.5° | 993.3  | 994.3  | 997.4  | 1001.6 | 999.0  | 997.8  | 993.9  | 987.2  | 970.7  | 949.0  | 918.0  |
| 15°   | 983.5  | 986.2  | 994.7  | 1005.5 | 1007.7 | 1007.3 | 1006.3 | 1002.0 | 984.4  | 960.4  | 924.2  |
| 17.5° | 980.1  | 984.6  | 1000.8 | 1018.7 | 1025.0 | 1026.4 | 1026.7 | 1019.3 | 999.8  | 974.4  | 930.7  |
| 20°   | 986.2  | 991.9  | 1015.5 | 1040.1 | 1050.2 | 1050.9 | 1049.2 | 1036.2 | 1014.4 | 986.4  | 934.3  |
| 22.5° | 1004.7 | 1009.8 | 1039.3 | 1067.1 | 1078.5 | 1079.7 | 1074.4 | 1054.7 | 1029.7 | 1000.6 | 939.2  |
| 25°   | 1040.3 | 1046.6 | 1076.1 | 1103.9 | 1109.8 | 1110.0 | 1102.3 | 1077.9 | 1049.8 | 1020.5 | 949.8  |
| 27.5° | 1086.7 | 1093.0 | 1119.6 | 1146.8 | 1143.6 | 1141.8 | 1131.4 | 1107.0 | 1075.9 | 1047.8 | 968.7  |
| 30°   | 1138.5 | 1145.4 | 1170.6 | 1189.8 | 1182.4 | 1178.8 | 1170.4 | 1138.9 | 1112.3 | 1085.2 | 997.6  |
| 32.5° | 1192.0 | 1198.3 | 1220.3 | 1233.5 | 1224.1 | 1222.5 | 1209.7 | 1181.0 | 1159.7 | 1142.2 | 1044.5 |
| 35°   | 1246.9 | 1251.4 | 1273.1 | 1280.5 | 1267.9 | 1267.5 | 1264.0 | 1237.6 | 1224.3 | 1232.5 | 1112.5 |
| 37.5° | 1303.0 | 1304.1 | 1322.6 | 1323.0 | 1319.3 | 1320.9 | 1324.6 | 1308.1 | 1311.8 | 1337.6 | 1201.1 |
| 40°   | 1352.9 | 1356.1 | 1369.5 | 1373.6 | 1380.1 | 1385.6 | 1404.3 | 1393.5 | 1422.4 | 1468.0 | 1311.2 |
| 42.5° | 1389.9 | 1396.0 | 1417.5 | 1428.1 | 1449.1 | 1457.8 | 1484.1 | 1494.2 | 1552.4 | 1620.9 | 1442.2 |
| 45°   | 1421.2 | 1430.6 | 1465.1 | 1486.9 | 1522.5 | 1537.7 | 1575.4 | 1609.1 | 1699.4 | 1786.7 | 1580.2 |
| 47.5° | 1455.0 | 1467.0 | 1510.1 | 1551.8 | 1600.2 | 1617.3 | 1686.0 | 1736.4 | 1856.2 | 1953.6 | 1710.2 |
| 50°   | 1504.8 | 1514.1 | 1556.2 | 1621.7 | 1682.1 | 1704.1 | 1799.1 | 1871.3 | 2015.5 | 2112.5 | 1822.9 |
| 52.5° | 1574.3 | 1570.7 | 1606.3 | 1698.2 | 1779.2 | 1806.4 | 1919.9 | 2014.9 | 2177.0 | 2256.3 | 1918.1 |
| 55°   | 1644.1 | 1638.2 | 1663.2 | 1778.3 | 1892.6 | 1921.1 | 2052.9 | 2159.1 | 2330.7 | 2385.8 | 1991.1 |
| 57.5° | 1721.8 | 1710.6 | 1731.6 | 1868.6 | 2021.6 | 2055.7 | 2201.8 | 2312.4 | 2481.8 | 2490.4 | 2037.6 |
| 60°   | 1801.9 | 1786.7 | 1810.3 | 1980.5 | 2185.5 | 2225.6 | 2376.1 | 2461.9 | 2624.2 | 2574.2 | 2052.5 |
| 62.5° | 1871.9 | 1861.3 | 1897.7 | 2105.4 | 2370.2 | 2414.3 | 2547.3 | 2620.9 | 2764.7 | 2609.1 | 1998.6 |
| 65°   | 1933.1 | 1934.9 | 1997.8 | 2245.9 | 2576.2 | 2623.2 | 2743.6 | 2816.8 | 2875.2 | 2588.4 | 1872.5 |
| 67.5° | 2006.1 | 2016.1 | 2123.5 | 2430.8 | 2835.5 | 2887.0 | 3029.3 | 3030.5 | 2937.0 | 2467.2 | 1624.2 |
| 70°   | 2112.5 | 2133.2 | 2296.5 | 2687.4 | 3204.2 | 3275.0 | 3384.8 | 3156.0 | 2850.3 | 2138.7 | 1278.0 |
| 72.5° | 2206.9 | 2245.5 | 2480.4 | 2980.9 | 3653.5 | 3707.2 | 3592.7 | 3083.6 | 2487.7 | 1602.8 | 796.2  |
| 74°   | 2168.6 | 2216.4 | 2513.8 | 3125.5 | 3822.7 | 3848.5 | 3522.5 | 2872.3 | 2074.1 | 1110.0 | 462.7  |
| 75°   | 2086.0 | 2137.9 | 2465.1 | 3124.1 | 3801.3 | 3786.9 | 3352.9 | 2630.9 | 1708.2 | 757.0  | 307.9  |
| 77.5° | 1683.4 | 1738.3 | 2077.1 | 2677.5 | 3116.8 | 3103.3 | 2575.6 | 1764.9 | 748.2  | 248.3  | 156.4  |
| 80°   | 978.7  | 1020.6 | 1289.4 | 1700.4 | 2101.7 | 2126.3 | 1693.9 | 873.3  | 294.3  | 139.5  | 106.0  |
| 82.5° | 434.8  | 463.7  | 622.9  | 868.0  | 1268.3 | 1300.0 | 887.1  | 457.6  | 181.8  | 84.8   | 63.7   |
| 85°   | 285.3  | 306.7  | 378.1  | 413.3  | 604.0  | 625.6  | 434.2  | 356.3  | 120.0  | 46.6   | 46.8   |
| 87.5° | 205.2  | 225.8  | 280.9  | 245.3  | 277.2  | 262.4  | 236.3  | 329.7  | 48.2   | 26.6   | 15.7   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 984.1  | 984.1  | 984.1 | 984.1 | 984.1 | 984.1 | 984.1 | 984.1 | 984.1 | 984.1 | 984.1 |
| 2.5°  | 974.8  | 971.7  | 964.6 | 951.2 | 943.7 | 937.4 | 927.0 | 920.9 | 918.2 | 918.0 | 919.1 |
| 5°    | 950.6  | 943.3  | 925.0 | 902.6 | 884.7 | 868.4 | 848.1 | 835.9 | 827.3 | 822.1 | 823.5 |
| 7.5°  | 922.5  | 911.1  | 882.3 | 846.5 | 817.8 | 786.1 | 754.9 | 736.2 | 721.6 | 710.8 | 712.8 |
| 10°   | 903.2  | 887.5  | 845.6 | 794.0 | 746.2 | 700.2 | 657.1 | 631.3 | 610.9 | 595.1 | 596.3 |
| 12.5° | 896.7  | 875.5  | 817.4 | 748.6 | 681.5 | 618.5 | 562.3 | 522.7 | 501.7 | 483.8 | 485.1 |
| 15°   | 897.7  | 869.2  | 793.8 | 707.6 | 623.2 | 544.0 | 475.7 | 429.5 | 400.9 | 388.5 | 388.7 |
| 17.5° | 898.5  | 861.9  | 769.0 | 663.8 | 565.6 | 474.3 | 400.2 | 353.3 | 326.4 | 315.0 | 315.2 |
| 20°   | 895.9  | 850.1  | 738.3 | 613.4 | 505.4 | 410.4 | 338.6 | 298.8 | 278.4 | 269.5 | 269.5 |
| 22.5° | 892.6  | 836.1  | 703.7 | 562.9 | 446.0 | 354.9 | 294.5 | 264.2 | 252.4 | 246.5 | 246.3 |
| 25°   | 894.1  | 825.7  | 668.3 | 510.9 | 391.3 | 310.6 | 265.2 | 245.1 | 237.3 | 233.5 | 233.3 |
| 27.5° | 902.6  | 820.8  | 635.6 | 459.2 | 343.5 | 277.4 | 245.5 | 231.4 | 226.2 | 223.9 | 223.9 |
| 30°   | 918.0  | 820.8  | 601.6 | 415.1 | 303.8 | 252.8 | 230.4 | 220.7 | 217.2 | 215.6 | 215.6 |
| 32.5° | 944.7  | 825.3  | 568.8 | 371.4 | 272.1 | 233.5 | 217.8 | 211.3 | 208.5 | 207.7 | 207.7 |
| 35°   | 990.7  | 840.6  | 536.7 | 330.1 | 246.5 | 217.8 | 205.8 | 202.0 | 200.1 | 199.9 | 200.5 |
| 37.5° | 1055.5 | 871.9  | 506.6 | 299.6 | 228.4 | 205.0 | 195.7 | 192.8 | 191.6 | 192.6 | 193.4 |
| 40°   | 1136.9 | 914.4  | 479.2 | 272.1 | 214.6 | 194.8 | 186.5 | 184.5 | 183.9 | 185.3 | 186.5 |
| 42.5° | 1235.3 | 971.9  | 456.8 | 252.2 | 204.0 | 186.1 | 178.6 | 176.3 | 175.7 | 177.3 | 178.8 |
| 45°   | 1341.7 | 1033.6 | 441.1 | 237.5 | 195.7 | 179.6 | 171.7 | 169.2 | 168.0 | 168.8 | 170.6 |
| 47.5° | 1438.5 | 1092.1 | 434.8 | 227.0 | 187.9 | 174.1 | 165.6 | 162.5 | 160.5 | 160.1 | 161.5 |
| 50°   | 1520.2 | 1135.5 | 437.7 | 220.7 | 181.6 | 168.0 | 159.7 | 156.2 | 153.3 | 151.5 | 152.5 |
| 52.5° | 1579.6 | 1162.9 | 440.5 | 218.0 | 176.7 | 161.3 | 153.3 | 149.9 | 146.0 | 143.0 | 143.0 |
| 55°   | 1622.6 | 1169.2 | 434.4 | 215.8 | 172.9 | 154.0 | 146.0 | 142.8 | 138.9 | 135.5 | 135.2 |
| 57.5° | 1639.6 | 1151.5 | 411.8 | 212.7 | 170.4 | 147.2 | 138.3 | 135.9 | 132.6 | 128.7 | 128.5 |
| 60°   | 1616.7 | 1096.8 | 368.1 | 206.0 | 167.0 | 141.5 | 130.6 | 129.1 | 127.5 | 123.7 | 123.5 |
| 62.5° | 1525.1 | 976.8  | 311.6 | 192.4 | 160.3 | 135.4 | 123.5 | 124.3 | 124.5 | 122.0 | 121.6 |
| 65°   | 1358.8 | 811.9  | 256.5 | 174.7 | 150.3 | 128.1 | 116.3 | 120.0 | 122.2 | 121.8 | 121.2 |
| 67.5° | 1117.2 | 631.9  | 217.4 | 156.0 | 137.1 | 118.0 | 108.4 | 112.7 | 114.5 | 115.9 | 115.5 |
| 70°   | 829.2  | 445.6  | 179.8 | 136.3 | 121.2 | 106.2 | 98.2  | 100.3 | 99.2  | 100.7 | 101.3 |
| 72.5° | 462.3  | 267.4  | 146.6 | 116.7 | 104.7 | 92.5  | 86.8  | 86.4  | 83.8  | 83.8  | 83.8  |
| 74°   | 277.4  | 196.1  | 128.9 | 104.5 | 94.6  | 83.4  | 78.5  | 76.7  | 74.4  | 74.6  | 74.4  |
| 75°   | 223.1  | 168.6  | 118.2 | 96.4  | 87.5  | 78.1  | 73.2  | 70.8  | 69.1  | 69.1  | 68.9  |
| 77.5° | 140.9  | 128.1  | 95.2  | 76.7  | 70.0  | 64.3  | 61.0  | 57.8  | 57.8  | 57.6  | 57.4  |
| 80°   | 106.4  | 101.9  | 74.2  | 58.0  | 53.7  | 49.4  | 47.2  | 45.8  | 45.8  | 46.4  | 46.2  |
| 82.5° | 73.0   | 76.7   | 52.1  | 40.5  | 38.4  | 35.2  | 34.8  | 35.0  | 34.4  | 33.6  | 33.4  |
| 85°   | 53.3   | 57.6   | 35.2  | 25.6  | 23.4  | 21.4  | 23.0  | 23.8  | 22.8  | 21.1  | 20.3  |
| 87.5° | 20.5   | 37.8   | 18.9  | 10.6  | 9.8   | 8.5   | 9.8   | 10.2  | 11.0  | 8.7   | 8.9   |
| 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**



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| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 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)