

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: McGRAW-EDISON

Report Number: P631101

Luminaire Tested: GWS-SA1F-722-U-SL2-W-HSS

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P631101  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-30)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA1F-722-U-SL2-W-HSS  
Description: GALLEON WALL SLIM LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE II SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: (16) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4919.4 lumens  
Efficiency: N/A  
Efficacy: 73.2 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G1

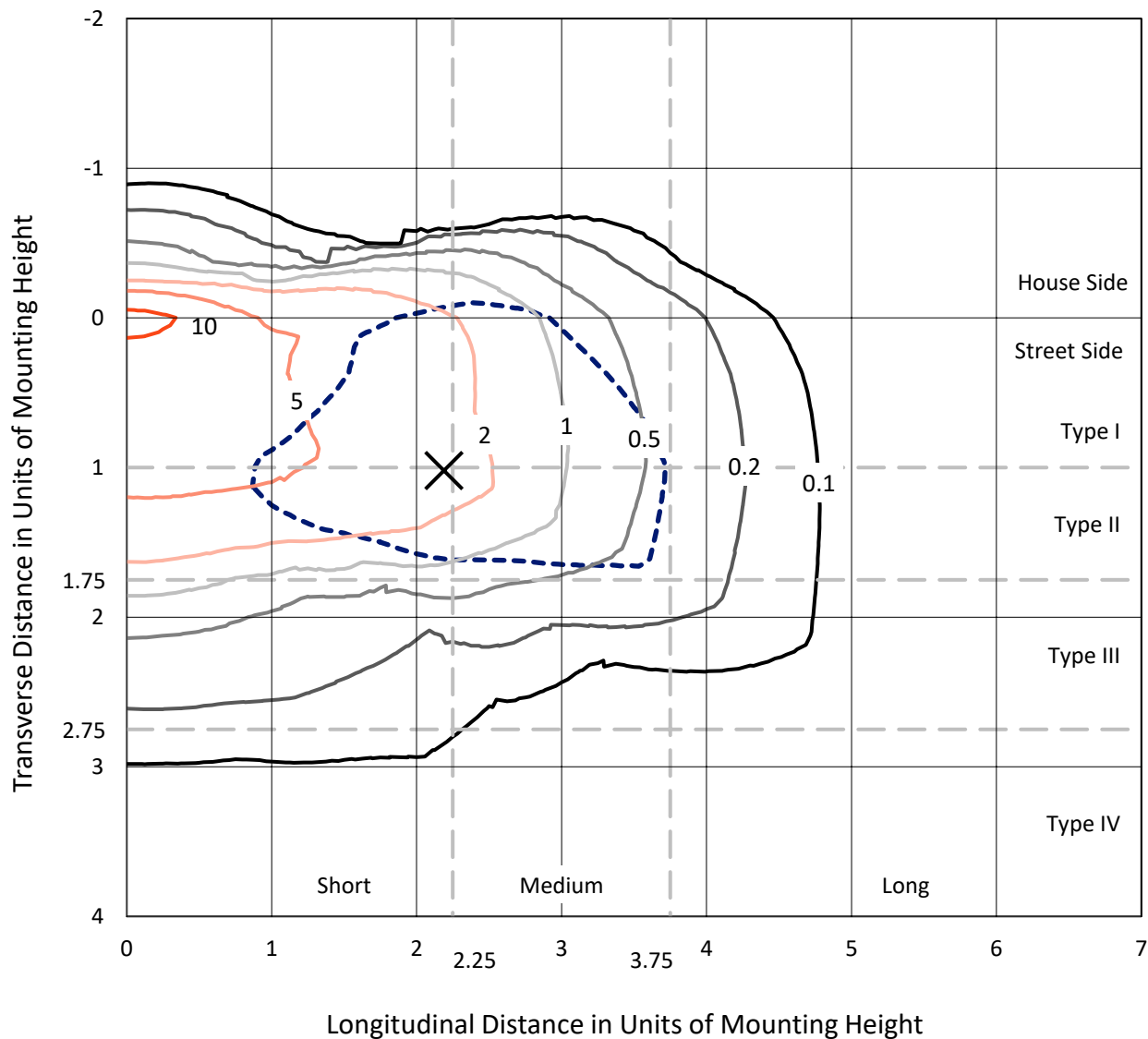
Input Watts (W): 67.2  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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 CATALOG NUMBER: GWS-SA1F-722-U-SL2-W-HSS

## Iso-Footcandle Lines of Horizontal Illumination

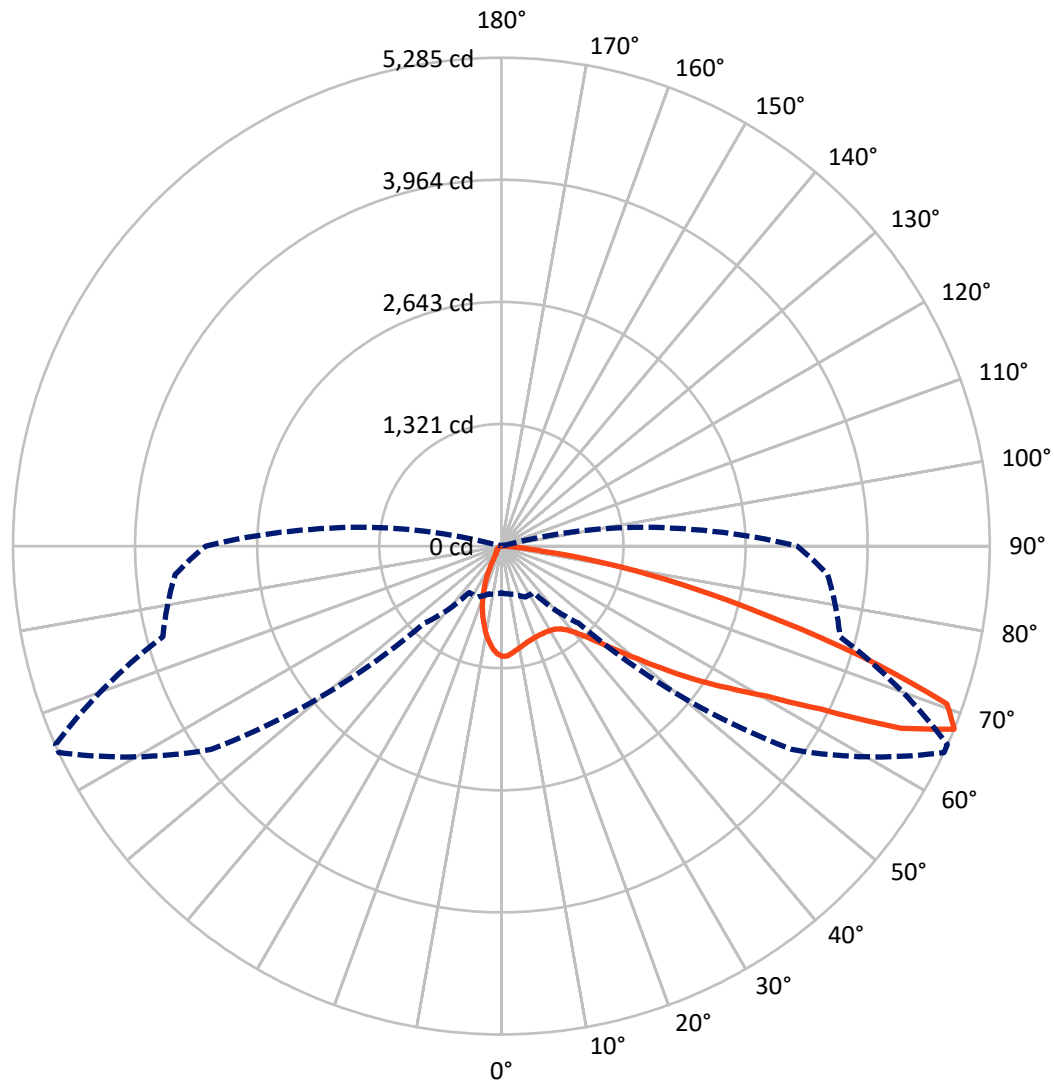
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 11.9 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 65-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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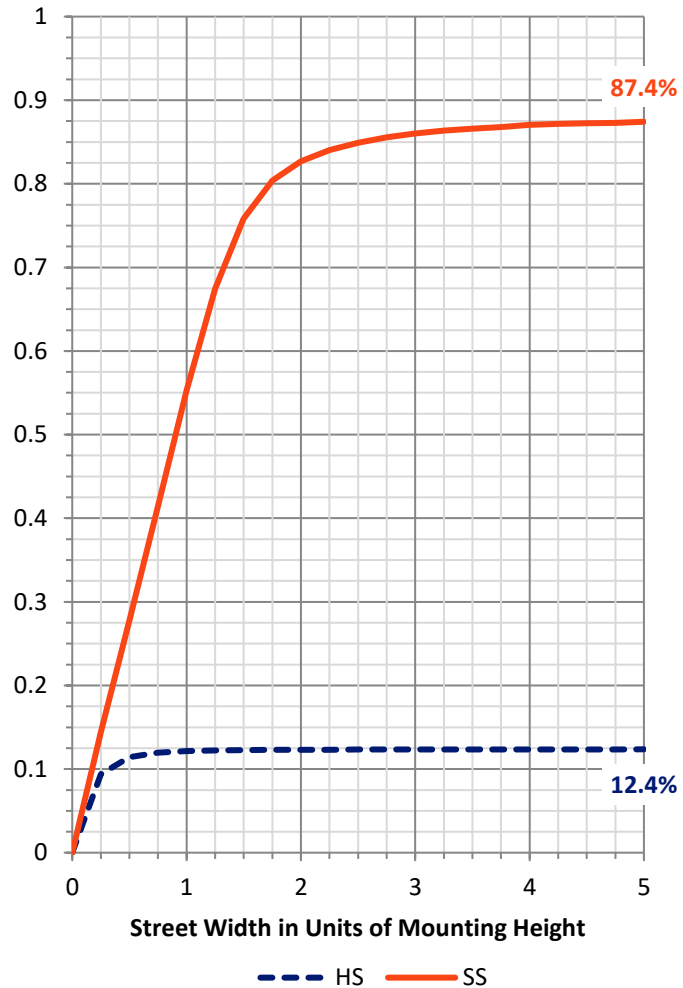
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 614.3    | 0.0    | 614.3  |
|                    | % Fixture | 12.5     | 0.0    | 12.5   |
| <b>Street Side</b> | Lumens    | 4305.1   | 0.0    | 4305.1 |
|                    | % Fixture | 87.5     | 0.0    | 87.5   |
| <b>Total</b>       | Lumens    | 4919.4   | 0.0    | 4919.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 99.1   | 2.0       |
| 10°-20°   | 222.8  | 4.5       |
| 20°-30°   | 318.3  | 6.5       |
| 30°-40°   | 463.1  | 9.4       |
| 40°-50°   | 725.3  | 14.7      |
| 50°-60°   | 1131.5 | 23.0      |
| 60°-70°   | 1242.9 | 25.3      |
| 70°-80°   | 661.4  | 13.4      |
| 80°-90°   | 55.1   | 1.1       |
| 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°    | 4919.4 | 100.0     |
| 0°-180°   | 4919.4 | 100.0     |

**Coefficient of Utilization**



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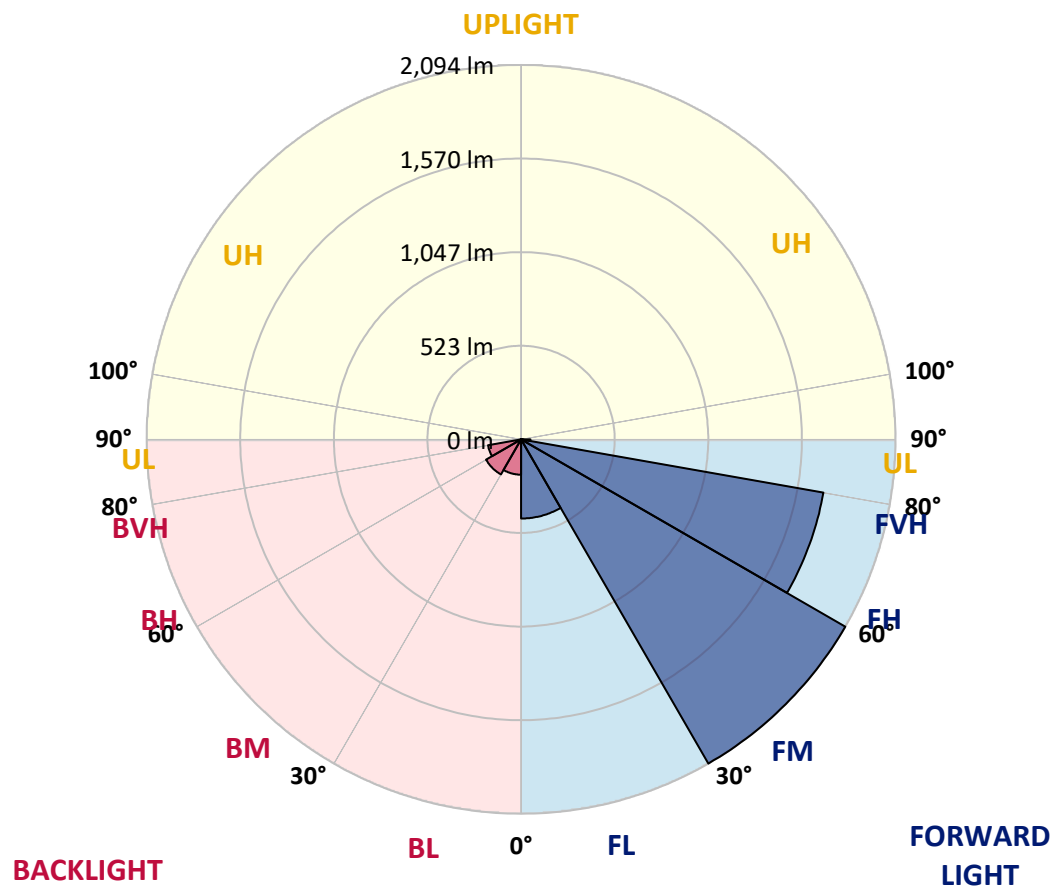
CATALOG NUMBER: GWS-SA1F-722-U-SL2-W-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 442.7  | 9.0       |                         |      |         |
| FM   | (30°-60°)   | 2093.6 | 42.6      |                         |      |         |
| FH   | (60°-80°)   | 1716.7 | 34.9      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 52.1   | 1.1       |                         |      | G1/100  |
| BL   | (0°-30°)    | 197.4  | 4.0       | B1/500                  |      |         |
| BM   | (30°-60°)   | 226.3  | 4.6       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 187.6  | 3.8       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 2.9    | 0.1       |                         |      | G0/10   |
| 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°    | 65°    | 66°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 |
| 2.5°  | 1151.7 | 1155.3 | 1150.4 | 1162.4 | 1164.6 | 1178.0 | 1185.5 | 1190.9 | 1190.4 | 1197.1 | 1197.1 |
| 5°    | 1084.1 | 1087.7 | 1085.0 | 1097.9 | 1108.1 | 1129.0 | 1146.4 | 1166.4 | 1167.3 | 1187.8 | 1195.3 |
| 7.5°  | 1026.7 | 1027.2 | 1027.2 | 1043.2 | 1056.5 | 1082.3 | 1108.1 | 1138.8 | 1142.4 | 1174.0 | 1194.0 |
| 10°   | 979.6  | 980.9  | 981.4  | 999.6  | 1014.3 | 1045.4 | 1078.3 | 1115.3 | 1119.3 | 1162.0 | 1193.1 |
| 12.5° | 947.1  | 947.5  | 949.3  | 968.5  | 984.5  | 1016.9 | 1050.3 | 1092.6 | 1097.9 | 1148.2 | 1189.1 |
| 15°   | 931.5  | 930.6  | 931.5  | 947.5  | 963.6  | 994.7  | 1029.0 | 1074.3 | 1080.1 | 1136.6 | 1189.6 |
| 17.5° | 930.6  | 929.3  | 928.4  | 940.4  | 950.7  | 978.2  | 1012.9 | 1062.3 | 1068.5 | 1131.3 | 1194.4 |
| 20°   | 943.5  | 942.7  | 938.2  | 943.5  | 945.8  | 968.5  | 1002.7 | 1053.0 | 1059.2 | 1130.4 | 1205.1 |
| 22.5° | 977.4  | 975.1  | 968.5  | 963.6  | 951.6  | 964.9  | 995.6  | 1046.3 | 1053.4 | 1132.6 | 1218.9 |
| 25°   | 1027.6 | 1026.7 | 1018.3 | 1006.3 | 975.6  | 970.2  | 996.0  | 1046.3 | 1053.0 | 1135.3 | 1233.6 |
| 27.5° | 1103.2 | 1097.9 | 1087.2 | 1066.3 | 1022.3 | 991.1  | 1004.9 | 1049.0 | 1055.6 | 1138.8 | 1245.6 |
| 30°   | 1180.2 | 1179.8 | 1176.2 | 1154.9 | 1089.5 | 1031.2 | 1023.6 | 1056.1 | 1062.3 | 1142.0 | 1256.7 |
| 32.5° | 1259.8 | 1261.2 | 1270.1 | 1253.6 | 1182.0 | 1090.8 | 1057.4 | 1070.8 | 1075.2 | 1148.2 | 1266.5 |
| 35°   | 1335.5 | 1338.1 | 1361.7 | 1367.5 | 1294.5 | 1181.1 | 1112.6 | 1100.1 | 1100.6 | 1162.0 | 1279.4 |
| 37.5° | 1408.0 | 1416.9 | 1454.7 | 1482.7 | 1434.7 | 1290.5 | 1192.2 | 1150.0 | 1146.4 | 1189.6 | 1299.0 |
| 40°   | 1490.3 | 1507.2 | 1554.8 | 1602.4 | 1587.3 | 1435.1 | 1300.8 | 1226.5 | 1218.9 | 1240.3 | 1334.1 |
| 42.5° | 1581.5 | 1599.7 | 1662.9 | 1729.6 | 1736.7 | 1609.9 | 1436.4 | 1338.1 | 1325.2 | 1325.7 | 1400.0 |
| 45°   | 1679.3 | 1703.8 | 1777.2 | 1873.3 | 1916.4 | 1804.8 | 1603.7 | 1488.9 | 1476.0 | 1456.9 | 1505.8 |
| 47.5° | 1807.9 | 1829.3 | 1900.0 | 2010.8 | 2093.5 | 2013.9 | 1823.0 | 1682.9 | 1659.3 | 1631.3 | 1670.4 |
| 50°   | 1918.7 | 1937.4 | 1998.3 | 2137.1 | 2309.3 | 2283.5 | 2071.7 | 1925.3 | 1902.7 | 1855.1 | 1887.5 |
| 52.5° | 1943.1 | 1957.8 | 2013.9 | 2170.0 | 2474.3 | 2623.8 | 2376.4 | 2218.5 | 2202.5 | 2114.4 | 2126.9 |
| 55°   | 1833.3 | 1855.5 | 1905.8 | 2079.3 | 2517.5 | 2956.5 | 2771.9 | 2549.0 | 2515.7 | 2375.1 | 2397.3 |
| 57.5° | 1555.7 | 1595.3 | 1642.4 | 1868.0 | 2400.5 | 3133.6 | 3324.4 | 2899.1 | 2868.9 | 2626.0 | 2626.4 |
| 60°   | 1140.2 | 1172.2 | 1203.8 | 1410.2 | 2122.9 | 3121.6 | 3825.8 | 3292.4 | 3237.2 | 2831.1 | 2823.5 |
| 62.5° | 829.2  | 845.7  | 845.2  | 918.6  | 1457.8 | 2916.0 | 4089.1 | 3884.9 | 3756.4 | 3050.4 | 3007.2 |
| 65°   | 652.2  | 651.7  | 670.8  | 694.9  | 814.1  | 2251.0 | 4121.6 | 4750.2 | 4611.4 | 3344.4 | 3254.6 |
| 67.5° | 507.6  | 517.4  | 536.5  | 607.2  | 611.7  | 1178.0 | 3836.0 | 5285.4 | 5282.7 | 3793.3 | 3544.2 |
| 70°   | 391.5  | 404.8  | 432.0  | 535.2  | 565.0  | 659.3  | 2870.2 | 5115.9 | 5159.0 | 3993.9 | 3339.1 |
| 72.5° | 251.3  | 250.5  | 290.5  | 432.4  | 542.7  | 549.4  | 1587.3 | 4063.8 | 4112.7 | 3617.6 | 2699.8 |
| 75°   | 140.6  | 141.5  | 164.2  | 264.7  | 505.8  | 516.9  | 786.1  | 2897.8 | 2936.5 | 2820.4 | 2074.4 |
| 77.5° | 55.2   | 56.9   | 77.0   | 139.2  | 333.6  | 461.8  | 467.1  | 1976.1 | 1981.8 | 1747.8 | 1272.3 |
| 80°   | 22.2   | 23.6   | 39.1   | 86.3   | 203.3  | 311.0  | 333.6  | 1164.2 | 1140.6 | 676.6  | 370.1  |
| 82.5° | 6.7    | 7.1    | 15.6   | 48.9   | 106.3  | 221.1  | 225.1  | 446.6  | 421.7  | 145.5  | 94.3   |
| 85°   | 0.4    | 0.4    | 3.6    | 15.1   | 37.8   | 55.6   | 149.9  | 145.5  | 129.0  | 36.5   | 41.8   |
| 87.5° | 0.0    | 0.0    | 0.4    | 0.4    | 0.9    | 1.8    | 16.0   | 26.7   | 27.1   | 6.7    | 18.7   |
| 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°    | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 | 1193.1 |
| 2.5°  | 1197.1 | 1181.1 | 1179.8 | 1167.3 | 1154.9 | 1139.3 | 1121.0 | 1107.7 | 1098.4 | 1081.9 | 1078.8 |
| 5°    | 1195.3 | 1174.0 | 1154.0 | 1118.4 | 1078.8 | 1036.1 | 998.7  | 964.0  | 942.2  | 927.5  | 921.3  |
| 7.5°  | 1191.8 | 1164.6 | 1118.4 | 1051.2 | 984.9  | 910.2  | 851.9  | 798.5  | 762.0  | 740.7  | 731.3  |
| 10°   | 1189.1 | 1152.6 | 1077.4 | 975.6  | 872.8  | 769.6  | 681.1  | 601.9  | 557.9  | 523.2  | 517.4  |
| 12.5° | 1183.8 | 1135.3 | 1025.0 | 887.0  | 754.5  | 617.5  | 504.5  | 407.5  | 340.3  | 310.1  | 299.4  |
| 15°   | 1178.4 | 1117.0 | 972.5  | 793.6  | 625.5  | 456.4  | 319.4  | 226.0  | 179.7  | 165.5  | 164.6  |
| 17.5° | 1177.5 | 1100.6 | 915.5  | 705.1  | 490.2  | 298.9  | 181.9  | 146.4  | 136.6  | 133.0  | 133.0  |
| 20°   | 1180.2 | 1086.8 | 859.5  | 603.2  | 357.2  | 181.9  | 135.7  | 126.8  | 121.0  | 117.9  | 117.9  |
| 22.5° | 1182.9 | 1072.6 | 805.6  | 500.5  | 237.1  | 133.0  | 119.7  | 112.1  | 105.4  | 101.9  | 100.1  |
| 25°   | 1184.7 | 1057.0 | 746.0  | 397.3  | 154.8  | 115.7  | 105.0  | 95.2   | 87.2   | 82.7   | 82.7   |
| 27.5° | 1184.2 | 1038.3 | 686.0  | 296.3  | 120.1  | 102.8  | 89.9   | 79.6   | 71.6   | 66.7   | 67.2   |
| 30°   | 1180.7 | 1017.8 | 623.7  | 206.9  | 105.0  | 89.9   | 77.0   | 66.3   | 58.3   | 54.3   | 53.8   |
| 32.5° | 1178.0 | 996.0  | 551.6  | 145.5  | 94.3   | 78.7   | 65.4   | 55.2   | 48.5   | 45.4   | 44.9   |
| 35°   | 1174.9 | 974.7  | 483.1  | 110.8  | 85.0   | 68.1   | 55.2   | 46.7   | 41.4   | 38.7   | 38.7   |
| 37.5° | 1175.8 | 952.4  | 408.8  | 95.2   | 75.6   | 59.2   | 47.2   | 40.0   | 35.6   | 32.9   | 32.5   |
| 40°   | 1189.6 | 939.1  | 335.9  | 86.3   | 67.2   | 51.2   | 40.9   | 34.7   | 30.3   | 27.6   | 27.1   |
| 42.5° | 1223.8 | 939.5  | 266.0  | 79.6   | 59.6   | 43.6   | 35.6   | 29.8   | 25.8   | 22.7   | 22.2   |
| 45°   | 1292.3 | 958.2  | 204.2  | 72.5   | 51.6   | 37.8   | 30.7   | 25.4   | 21.4   | 18.7   | 18.2   |
| 47.5° | 1404.4 | 1013.8 | 154.8  | 66.3   | 44.9   | 32.9   | 26.2   | 21.4   | 17.8   | 15.6   | 15.1   |
| 50°   | 1582.8 | 1114.4 | 121.9  | 58.7   | 37.8   | 28.5   | 22.2   | 17.8   | 14.7   | 12.5   | 12.0   |
| 52.5° | 1797.2 | 1265.2 | 104.5  | 52.0   | 32.5   | 24.9   | 19.1   | 14.7   | 12.0   | 10.2   | 9.8    |
| 55°   | 2043.7 | 1445.3 | 96.5   | 45.4   | 27.6   | 21.4   | 15.6   | 12.0   | 9.8    | 8.5    | 7.6    |
| 57.5° | 2269.7 | 1607.7 | 96.1   | 38.7   | 23.6   | 18.2   | 12.9   | 10.2   | 8.5    | 6.7    | 6.2    |
| 60°   | 2489.9 | 1743.4 | 90.3   | 32.0   | 20.5   | 15.1   | 11.1   | 8.5    | 7.1    | 5.8    | 5.3    |
| 62.5° | 2689.6 | 1853.7 | 75.6   | 25.8   | 17.3   | 12.5   | 9.3    | 7.6    | 6.2    | 4.9    | 4.9    |
| 65°   | 2940.5 | 1994.3 | 57.8   | 20.9   | 14.2   | 10.2   | 8.0    | 6.7    | 5.8    | 4.4    | 4.4    |
| 67.5° | 3199.9 | 2068.6 | 41.4   | 17.3   | 11.6   | 8.9    | 7.1    | 6.2    | 4.9    | 4.0    | 4.0    |
| 70°   | 2898.3 | 1747.8 | 29.8   | 14.2   | 9.8    | 7.6    | 6.2    | 5.8    | 4.9    | 4.0    | 3.6    |
| 72.5° | 2263.4 | 1260.3 | 22.2   | 11.1   | 8.5    | 7.1    | 5.8    | 5.3    | 4.4    | 3.6    | 3.6    |
| 75°   | 1678.4 | 734.9  | 16.9   | 8.9    | 6.7    | 5.8    | 5.8    | 5.3    | 4.4    | 3.6    | 3.1    |
| 77.5° | 912.4  | 256.2  | 12.9   | 7.1    | 5.3    | 4.4    | 4.9    | 4.9    | 4.0    | 3.1    | 2.7    |
| 80°   | 241.6  | 70.3   | 8.9    | 5.3    | 4.4    | 3.6    | 3.6    | 4.4    | 3.6    | 2.7    | 2.7    |
| 82.5° | 70.3   | 20.5   | 6.2    | 4.4    | 3.6    | 3.1    | 3.1    | 3.1    | 2.7    | 2.2    | 1.8    |
| 85°   | 34.3   | 7.6    | 4.4    | 3.6    | 3.1    | 2.7    | 2.2    | 2.2    | 1.8    | 1.3    | 1.3    |
| 87.5° | 15.1   | 3.1    | 3.6    | 3.1    | 3.1    | 2.2    | 1.8    | 1.3    | 1.3    | 0.9    | 0.4    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

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

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

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

### Test Information

Test Method: LM-79-2008 Report  
 Number: SP1-1908-441-10-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-722-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

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

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2237    | CRI (Ra): | 72.0 |      |       |
| CIE u':                   | 0.2876  | R1:       | 68.9 | R9:  | -17.4 |
| CIE v':                   | 0.5346  | R2:       | 83.0 | R10: | 61.3  |
| Duv:                      | -0.0006 | R3:       | 95.2 | R11: | 59.8  |
| CIE x:                    | 0.5005  | R4:       | 66.2 | R12: | 50.5  |
| CIE y:                    | 0.4134  | R5:       | 65.9 | R13: | 71.1  |
| CIE z:                    | 0.0860  | R6:       | 76.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 603     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.8 |      |       |
| Purity:                   | 74.5    |           |      |      |       |
| Rf:                       | 69.8    |           |      |      |       |
| Rg:                       | 99.2    |           |      |      |       |



### Test Conditions

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

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

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CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

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

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 4696.9

S/P: 0.85

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

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**Melanopic Flux vs. Wavelength**



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

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

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### Summary

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



### Color Vector Graphics



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

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



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)