

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: P638058

Luminaire Tested: GWS-SA4E-722-U-T3-W-HSS

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P638058  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-26)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA4E-722-U-T3-W-HSS  
Description: GALLEON WALL SLIM LUMINAIRE. (4) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE III OPTICS WITH HOUSE SIDE SHIELD  
Light Source: (64) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 16549 lumens  
Efficiency: N/A  
Efficacy: 81.7 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B2 - U0 - G3

Input Watts (W): 202.6  
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



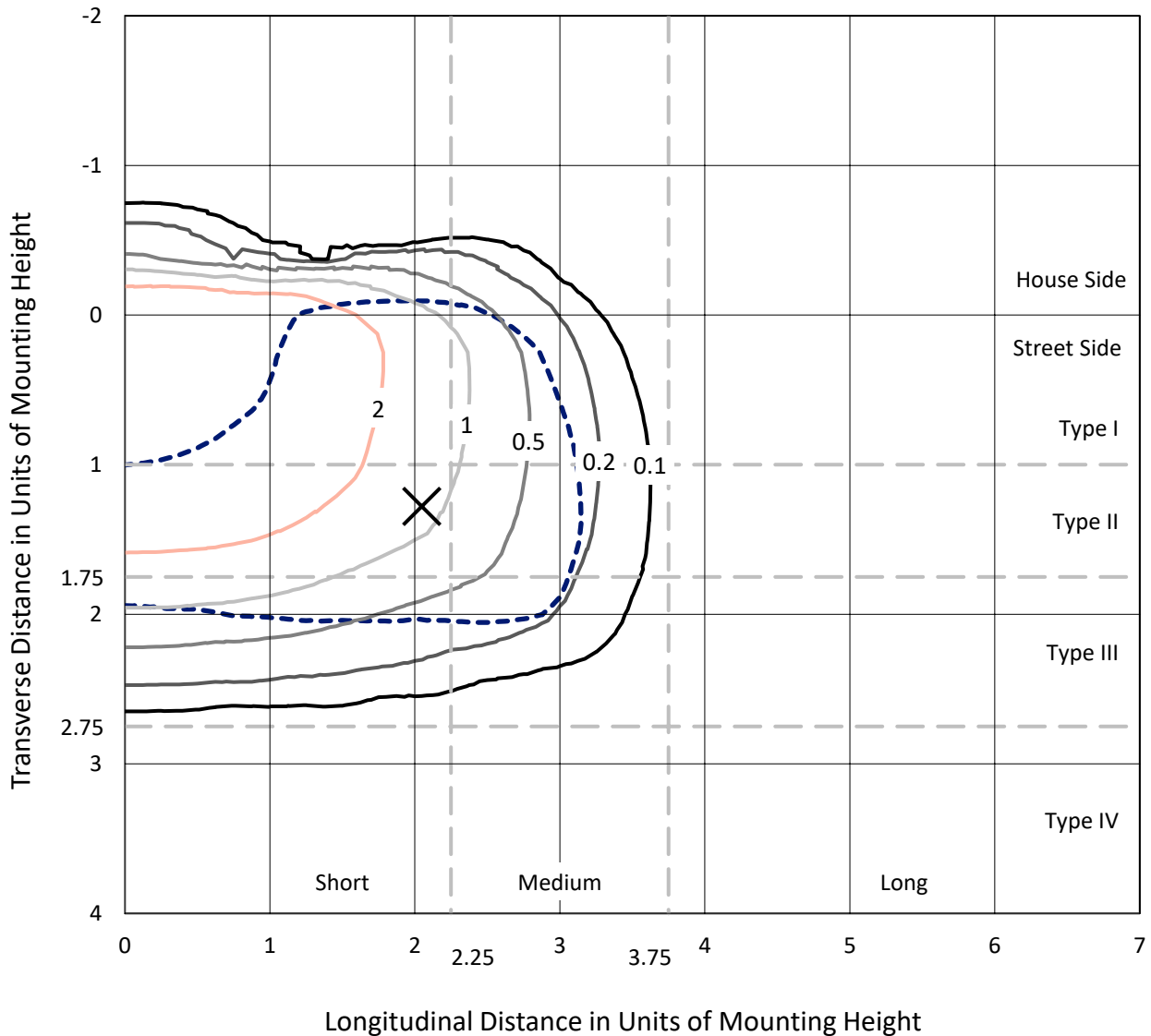
REPORT NUMBER: P638058

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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

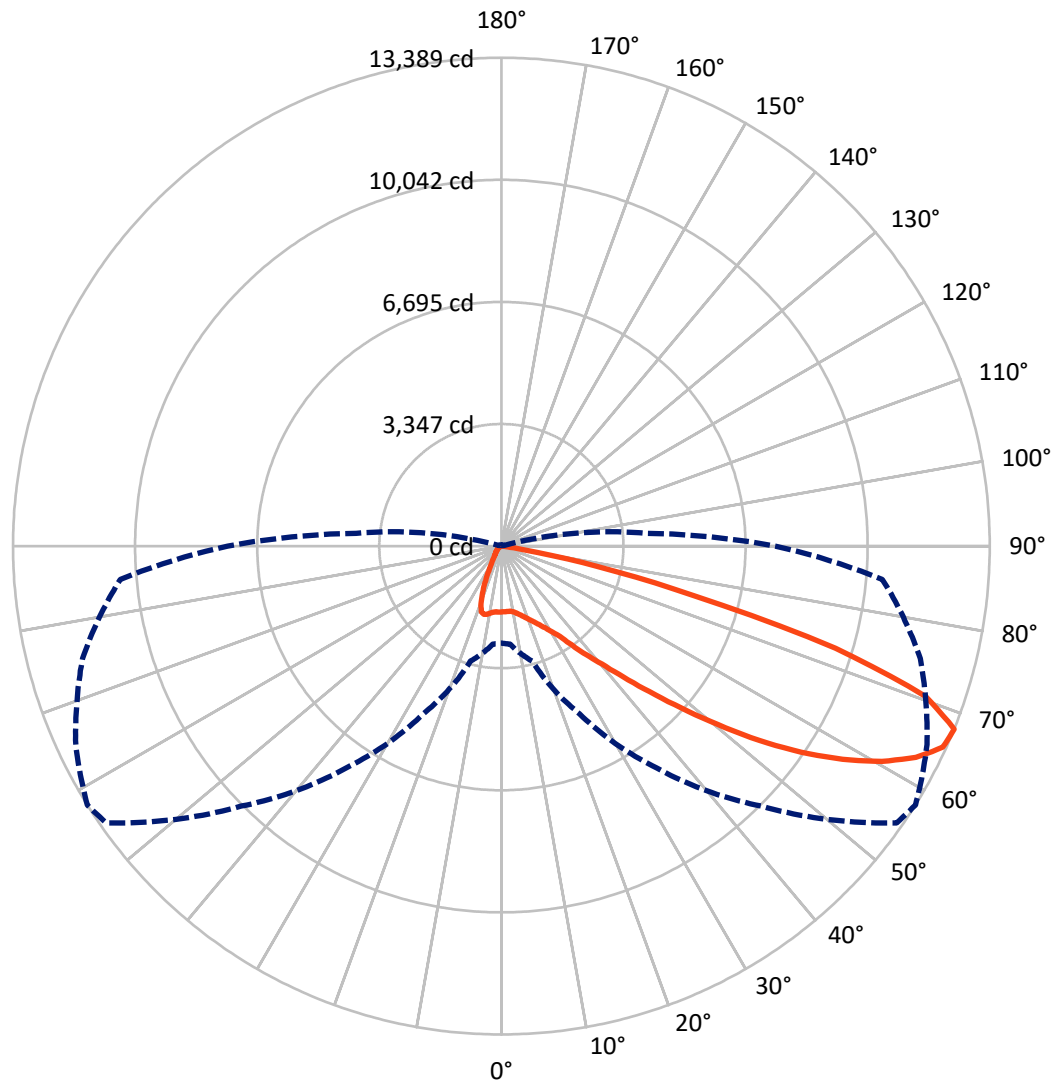
--- 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 4 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 58-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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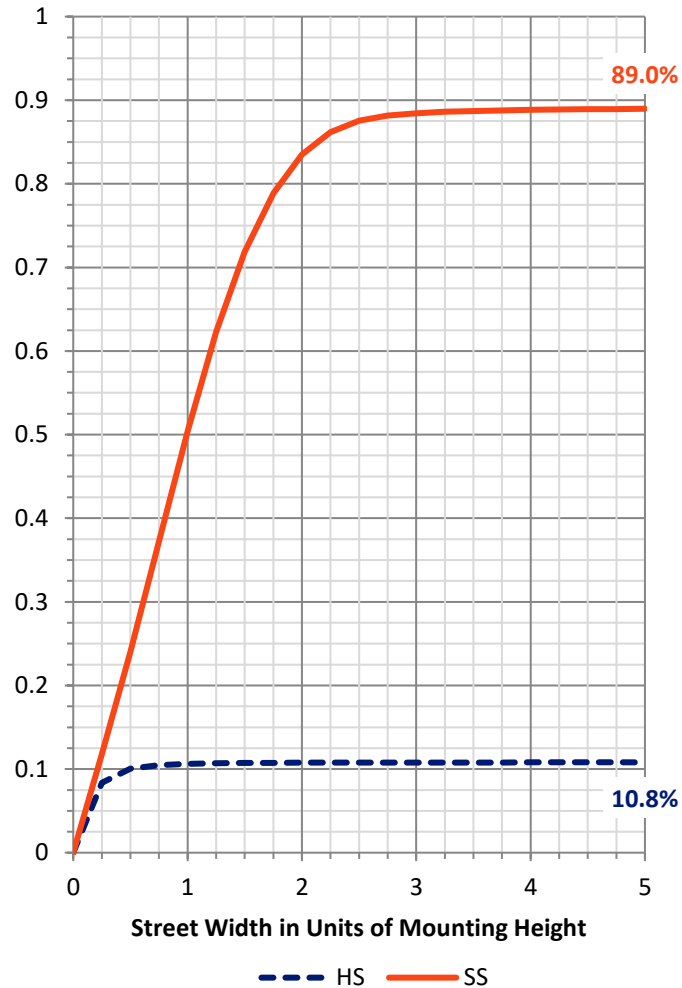
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1805.5   | 0.0    | 1805.5  |
|                    | % Fixture | 10.9     | 0.0    | 10.9    |
| <b>Street Side</b> | Lumens    | 14743.5  | 0.0    | 14743.5 |
|                    | % Fixture | 89.1     | 0.0    | 89.1    |
| <b>Total</b>       | Lumens    | 16549.0  | 0.0    | 16549.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 169.4   | 1.0       |
| 10°-20°   | 475.6   | 2.9       |
| 20°-30°   | 830.2   | 5.0       |
| 30°-40°   | 1482.7  | 9.0       |
| 40°-50°   | 2710.1  | 16.4      |
| 50°-60°   | 4507.1  | 27.2      |
| 60°-70°   | 4895.5  | 29.6      |
| 70°-80°   | 1437.4  | 8.7       |
| 80°-90°   | 40.9    | 0.2       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 16549.0 | 100.0     |
| 0°-180°   | 16549.0 | 100.0     |

**Coefficient of Utilization**



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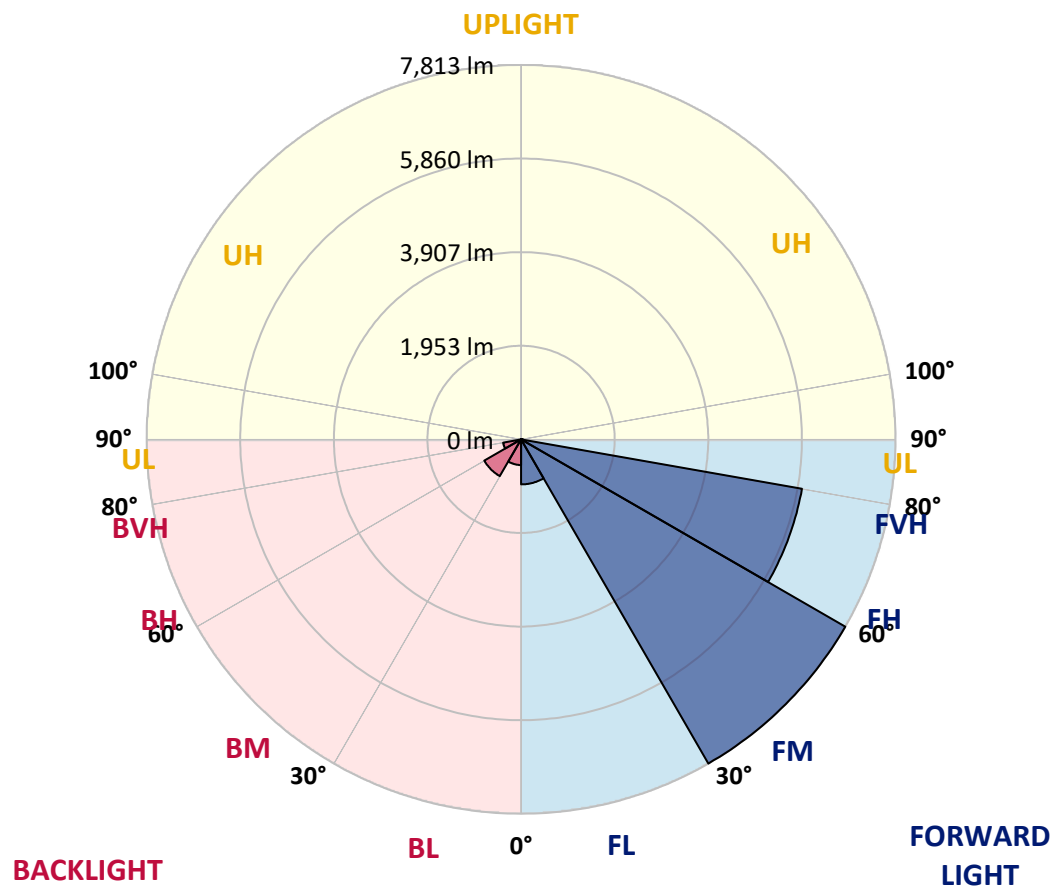
CATALOG NUMBER: GWS-SA4E-722-U-T3-W-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 939.7  | 5.7       |                         |      |         |
| FM   | (30°-60°)   | 7813.1 | 47.2      |                         |      |         |
| FH   | (60°-80°)   | 5951.8 | 36.0      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 38.9   | 0.2       |                         |      | G1/100  |
| BL   | (0°-30°)    | 535.5  | 3.2       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 886.8  | 5.4       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 381.1  | 2.3       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 2.0    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 55°     | 58°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3  | 1803.3  | 1803.3  | 1803.3  | 1803.3  | 1803.3  | 1803.3  |
| 2.5°  | 1769.4 | 1766.2 | 1766.2 | 1779.1 | 1780.7  | 1787.2  | 1801.7  | 1803.3  | 1811.4  | 1808.2  | 1796.9  |
| 5°    | 1677.3 | 1678.9 | 1688.6 | 1711.2 | 1730.6  | 1754.9  | 1790.4  | 1798.5  | 1816.3  | 1826.0  | 1819.5  |
| 7.5°  | 1591.7 | 1593.3 | 1607.8 | 1643.4 | 1680.5  | 1729.0  | 1787.2  | 1803.3  | 1838.9  | 1864.8  | 1866.4  |
| 10°   | 1559.3 | 1557.7 | 1572.3 | 1612.7 | 1661.1  | 1729.0  | 1813.0  | 1834.0  | 1887.4  | 1932.6  | 1940.7  |
| 12.5° | 1569.0 | 1567.4 | 1582.0 | 1619.1 | 1672.5  | 1758.1  | 1858.3  | 1887.4  | 1955.2  | 2024.7  | 2039.3  |
| 15°   | 1607.8 | 1606.2 | 1615.9 | 1646.6 | 1704.8  | 1793.7  | 1916.5  | 1960.1  | 2045.7  | 2129.8  | 2152.4  |
| 17.5° | 1724.2 | 1716.1 | 1706.4 | 1709.6 | 1743.6  | 1835.7  | 1990.8  | 2044.1  | 2150.8  | 2251.0  | 2270.3  |
| 20°   | 1931.0 | 1910.0 | 1884.1 | 1850.2 | 1834.0  | 1897.1  | 2076.4  | 2137.8  | 2267.1  | 2381.8  | 2385.1  |
| 22.5° | 2242.9 | 2234.8 | 2175.0 | 2076.4 | 2007.0  | 2008.6  | 2176.6  | 2247.7  | 2406.1  | 2532.1  | 2514.3  |
| 25°   | 2677.5 | 2672.7 | 2580.6 | 2419.0 | 2238.0  | 2176.6  | 2304.3  | 2377.0  | 2570.9  | 2705.0  | 2648.5  |
| 27.5° | 3217.3 | 3183.3 | 3075.1 | 2856.9 | 2587.1  | 2394.8  | 2465.9  | 2530.5  | 2745.4  | 2871.5  | 2764.8  |
| 30°   | 3687.5 | 3689.1 | 3587.3 | 3359.5 | 3055.7  | 2722.8  | 2663.0  | 2719.6  | 2905.4  | 3037.9  | 2908.6  |
| 32.5° | 4139.9 | 4154.5 | 4043.0 | 3837.8 | 3504.9  | 3151.0  | 2945.8  | 2955.5  | 3110.6  | 3254.4  | 3097.7  |
| 35°   | 4560.1 | 4571.4 | 4493.8 | 4319.3 | 4009.1  | 3598.6  | 3340.1  | 3335.2  | 3419.2  | 3566.3  | 3361.1  |
| 37.5° | 5030.3 | 5041.6 | 4965.7 | 4808.9 | 4518.1  | 4110.9  | 3787.7  | 3781.2  | 3815.1  | 3934.7  | 3700.4  |
| 40°   | 5531.2 | 5552.2 | 5468.2 | 5335.7 | 5057.8  | 4713.6  | 4308.0  | 4249.8  | 4215.9  | 4356.5  | 4139.9  |
| 42.5° | 6038.6 | 6070.9 | 6041.9 | 5909.4 | 5671.8  | 5387.4  | 4983.4  | 4893.0  | 4820.2  | 4996.4  | 4766.9  |
| 45°   | 6668.8 | 6707.6 | 6694.7 | 6592.9 | 6408.7  | 6177.6  | 5796.2  | 5691.2  | 5657.3  | 5820.5  | 5547.4  |
| 47.5° | 7274.8 | 7316.8 | 7363.7 | 7341.0 | 7210.2  | 7103.5  | 6680.1  | 6620.4  | 6610.7  | 6785.2  | 6361.8  |
| 50°   | 7725.6 | 7764.4 | 7943.8 | 8073.0 | 8161.9  | 8139.3  | 7772.5  | 7683.6  | 7669.1  | 7780.6  | 7221.5  |
| 52.5° | 8048.8 | 8086.0 | 8333.2 | 8737.2 | 9063.6  | 9241.3  | 8871.3  | 8851.9  | 8772.7  | 8734.0  | 8026.2  |
| 55°   | 8299.3 | 8351.0 | 8611.1 | 9222.0 | 9879.6  | 10273.9 | 10042.8 | 9973.3  | 9769.7  | 9546.7  | 8772.7  |
| 57.5° | 8349.4 | 8370.4 | 8737.2 | 9561.3 | 10513.1 | 11151.3 | 11151.3 | 11030.1 | 10637.5 | 10328.8 | 9635.6  |
| 60°   | 7900.1 | 7964.8 | 8460.9 | 9533.8 | 10784.5 | 11725.0 | 12070.8 | 11986.8 | 11456.7 | 11077.0 | 10466.2 |
| 62.5° | 6903.1 | 6975.8 | 7580.2 | 8876.1 | 10513.1 | 11842.9 | 12767.2 | 12754.3 | 12156.4 | 11695.9 | 11154.6 |
| 65°   | 5293.7 | 5347.0 | 5873.8 | 7425.1 | 9365.8  | 11388.9 | 13264.9 | 13300.5 | 12709.1 | 12104.7 | 11392.1 |
| 67.5° | 2659.8 | 2696.9 | 3265.7 | 5072.3 | 7423.5  | 10081.6 | 13231.0 | 13389.4 | 12877.1 | 11888.2 | 10485.6 |
| 70°   | 929.1  | 966.3  | 1234.5 | 2176.6 | 4518.1  | 7698.2  | 12086.9 | 12345.5 | 11889.8 | 10147.9 | 7735.3  |
| 72.5° | 318.3  | 336.1  | 512.2  | 808.0  | 1758.1  | 4563.3  | 9191.3  | 9580.7  | 8764.7  | 6812.6  | 4445.3  |
| 75°   | 181.0  | 192.3  | 274.7  | 437.9  | 736.9   | 1501.2  | 5214.5  | 5453.7  | 5109.5  | 3713.3  | 1829.2  |
| 77.5° | 122.8  | 132.5  | 171.3  | 248.8  | 407.2   | 483.2   | 2126.5  | 2677.5  | 2335.0  | 1211.9  | 467.0   |
| 80°   | 72.7   | 79.2   | 105.0  | 147.0  | 208.5   | 187.4   | 455.7   | 606.0   | 780.5   | 362.0   | 140.6   |
| 82.5° | 33.9   | 38.8   | 67.9   | 97.0   | 105.0   | 79.2    | 134.1   | 163.2   | 219.8   | 177.7   | 58.2    |
| 85°   | 0.0    | 0.0    | 22.6   | 40.4   | 38.8    | 22.6    | 37.2    | 40.4    | 59.8    | 88.9    | 22.6    |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 1.6     | 3.2     | 4.8     | 9.7     | 17.8    | 9.7     |
| 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: P638058

CATALOG NUMBER: GWS-SA4E-722-U-T3-W-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3 | 1803.3 |
| 2.5°  | 1809.8 | 1798.5 | 1811.4 | 1805.0 | 1811.4 | 1809.8 | 1796.9 | 1788.8 | 1788.8 | 1774.3 | 1769.4 |
| 5°    | 1832.4 | 1821.1 | 1824.4 | 1809.8 | 1806.6 | 1798.5 | 1782.3 | 1775.9 | 1775.9 | 1761.3 | 1756.5 |
| 7.5°  | 1882.5 | 1864.8 | 1861.5 | 1832.4 | 1819.5 | 1796.9 | 1767.8 | 1756.5 | 1754.9 | 1740.3 | 1735.5 |
| 10°   | 1961.7 | 1940.7 | 1926.2 | 1889.0 | 1851.8 | 1806.6 | 1745.2 | 1693.5 | 1664.4 | 1625.6 | 1622.4 |
| 12.5° | 2058.7 | 2032.8 | 2010.2 | 1953.6 | 1892.2 | 1790.4 | 1609.4 | 1420.4 | 1304.0 | 1211.9 | 1218.4 |
| 15°   | 2166.9 | 2142.7 | 2107.1 | 2021.5 | 1895.5 | 1630.4 | 1252.3 | 961.5  | 819.3  | 743.3  | 740.1  |
| 17.5° | 2284.9 | 2249.3 | 2191.2 | 2074.8 | 1793.7 | 1245.9 | 814.4  | 575.3  | 500.9  | 475.1  | 468.6  |
| 20°   | 2394.8 | 2351.1 | 2278.4 | 2086.1 | 1499.6 | 843.5  | 509.0  | 446.0  | 433.1  | 425.0  | 425.0  |
| 22.5° | 2511.1 | 2456.2 | 2347.9 | 1998.9 | 1115.0 | 539.7  | 433.1  | 418.5  | 408.8  | 397.5  | 395.9  |
| 25°   | 2629.1 | 2558.0 | 2410.9 | 1771.0 | 730.4  | 425.0  | 405.6  | 389.4  | 371.7  | 353.9  | 349.0  |
| 27.5° | 2729.3 | 2637.2 | 2459.4 | 1431.7 | 468.6  | 383.0  | 370.0  | 342.6  | 318.3  | 298.9  | 295.7  |
| 30°   | 2848.8 | 2730.9 | 2480.4 | 1047.1 | 368.4  | 337.7  | 318.3  | 289.2  | 260.2  | 240.8  | 234.3  |
| 32.5° | 3008.8 | 2879.5 | 2448.1 | 681.9  | 326.4  | 297.3  | 266.6  | 232.7  | 203.6  | 182.6  | 179.4  |
| 35°   | 3257.7 | 3104.1 | 2299.4 | 434.7  | 295.7  | 256.9  | 219.8  | 184.2  | 160.0  | 143.8  | 140.6  |
| 37.5° | 3561.4 | 3419.2 | 2055.4 | 326.4  | 265.0  | 223.0  | 179.4  | 145.4  | 127.7  | 116.3  | 113.1  |
| 40°   | 4012.3 | 3813.5 | 1753.3 | 286.0  | 234.3  | 189.1  | 147.0  | 119.6  | 106.6  | 97.0   | 93.7   |
| 42.5° | 4597.2 | 4278.9 | 1405.8 | 260.2  | 205.2  | 158.4  | 119.6  | 98.6   | 87.3   | 80.8   | 79.2   |
| 45°   | 5280.8 | 4733.0 | 1039.0 | 234.3  | 177.7  | 130.9  | 98.6   | 80.8   | 72.7   | 67.9   | 66.3   |
| 47.5° | 5980.5 | 5130.5 | 717.5  | 206.8  | 151.9  | 108.3  | 82.4   | 69.5   | 63.0   | 56.6   | 54.9   |
| 50°   | 6727.0 | 5466.6 | 489.6  | 179.4  | 129.3  | 88.9   | 71.1   | 63.0   | 54.9   | 50.1   | 48.5   |
| 52.5° | 7274.8 | 5591.0 | 341.0  | 155.1  | 109.9  | 75.9   | 63.0   | 56.6   | 50.1   | 43.6   | 42.0   |
| 55°   | 7780.6 | 5587.8 | 258.5  | 130.9  | 93.7   | 66.3   | 56.6   | 50.1   | 43.6   | 38.8   | 37.2   |
| 57.5° | 8284.7 | 5544.2 | 203.6  | 111.5  | 80.8   | 59.8   | 50.1   | 43.6   | 40.4   | 33.9   | 32.3   |
| 60°   | 8611.1 | 5379.3 | 158.4  | 93.7   | 69.5   | 51.7   | 43.6   | 38.8   | 33.9   | 29.1   | 27.5   |
| 62.5° | 8784.0 | 5149.9 | 121.2  | 74.3   | 56.6   | 45.2   | 38.8   | 33.9   | 29.1   | 24.2   | 22.6   |
| 65°   | 8549.7 | 4742.7 | 95.3   | 58.2   | 43.6   | 38.8   | 32.3   | 27.5   | 22.6   | 17.8   | 16.2   |
| 67.5° | 7510.7 | 3999.4 | 74.3   | 46.9   | 33.9   | 29.1   | 27.5   | 22.6   | 16.2   | 12.9   | 11.3   |
| 70°   | 5308.2 | 2739.0 | 58.2   | 35.5   | 25.9   | 22.6   | 21.0   | 17.8   | 12.9   | 9.7    | 8.1    |
| 72.5° | 2913.5 | 1381.6 | 42.0   | 25.9   | 19.4   | 17.8   | 16.2   | 14.5   | 11.3   | 8.1    | 8.1    |
| 75°   | 1121.4 | 379.7  | 30.7   | 17.8   | 12.9   | 12.9   | 11.3   | 11.3   | 9.7    | 6.5    | 6.5    |
| 77.5° | 292.5  | 113.1  | 19.4   | 11.3   | 8.1    | 8.1    | 8.1    | 6.5    | 6.5    | 4.8    | 4.8    |
| 80°   | 93.7   | 37.2   | 11.3   | 8.1    | 6.5    | 4.8    | 4.8    | 3.2    | 4.8    | 3.2    | 3.2    |
| 82.5° | 30.7   | 12.9   | 6.5    | 6.5    | 4.8    | 3.2    | 3.2    | 1.6    | 1.6    | 0.0    | 0.0    |
| 85°   | 11.3   | 6.5    | 4.8    | 3.2    | 3.2    | 3.2    | 1.6    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 6.5    | 3.2    | 3.2    | 3.2    | 3.2    | 1.6    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

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

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

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

### Test Information

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

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

### Spectral Parameters

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



### Test Conditions

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

REPORT NUMBER: SP1-1908-441-10-R4

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

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CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

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

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 4696.9**

**S/P: 0.85**

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

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**Melanopic Flux vs. Wavelength**



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

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

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### Summary

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



### Color Vector Graphics



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

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



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)