

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: P635587

Luminaire Tested: GWS-SA3E-722-U-T3R-W-HSS

Issue Date: 1/10/2023

### Test Information

Test Method: LM-79-2019  
Report Number: P635587  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-18)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA3E-722-U-T3R-W-HSS  
Description: GALLEON WALL SLIM LUMINAIRE. (3) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE III ROADWAY OPTICS WITH HOUSE SIDE SHIELD  
Light Source: (48) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: -

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 12680.9 lumens  
Efficiency: N/A  
Efficacy: 79.7 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 0.5' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B1 - U0 - G2

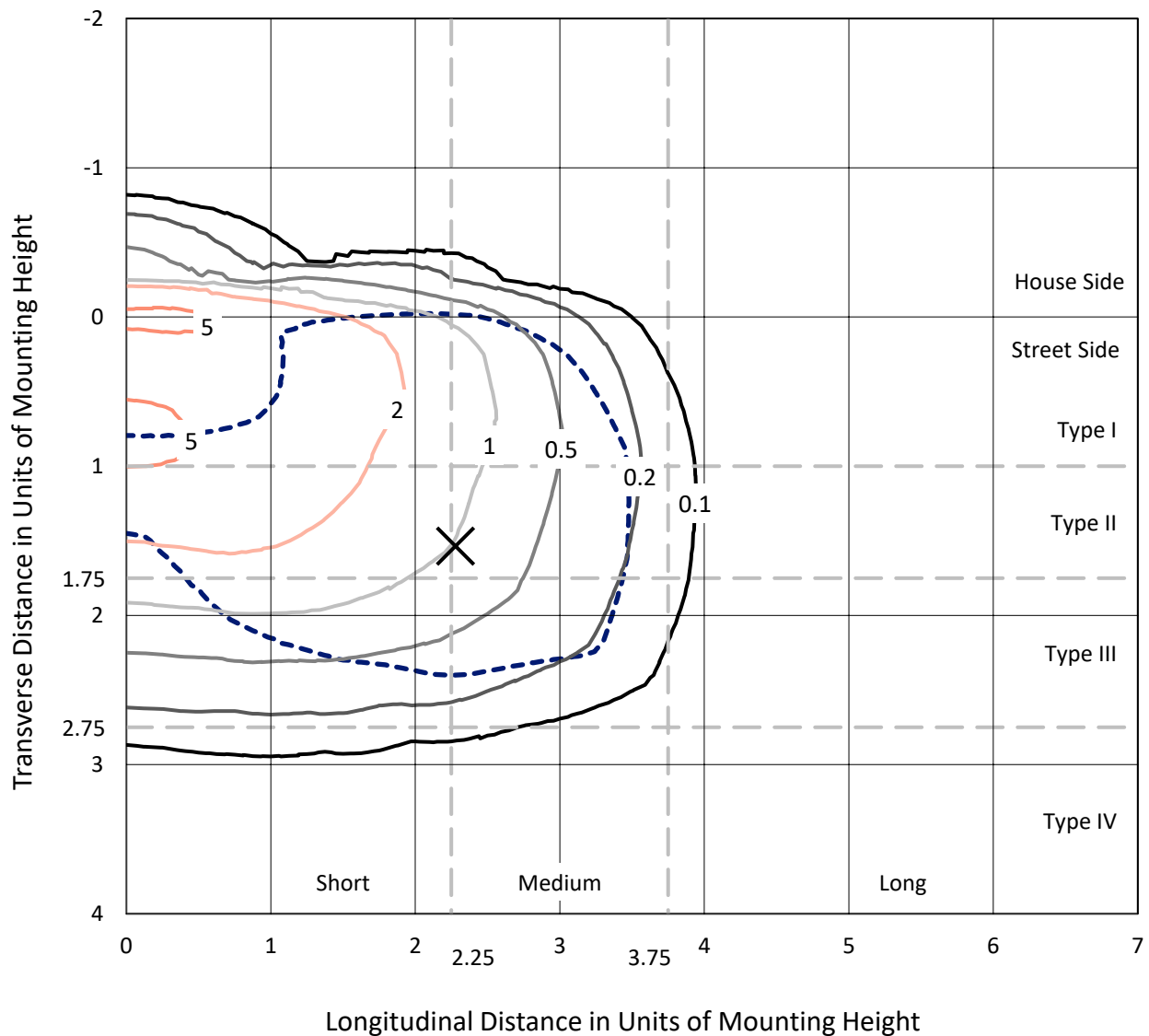
Input Watts (W): 159.2  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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 CATALOG NUMBER: GWS-SA3E-722-U-T3R-W-HSS

## Iso-Footcandle Lines of Horizontal Illumination

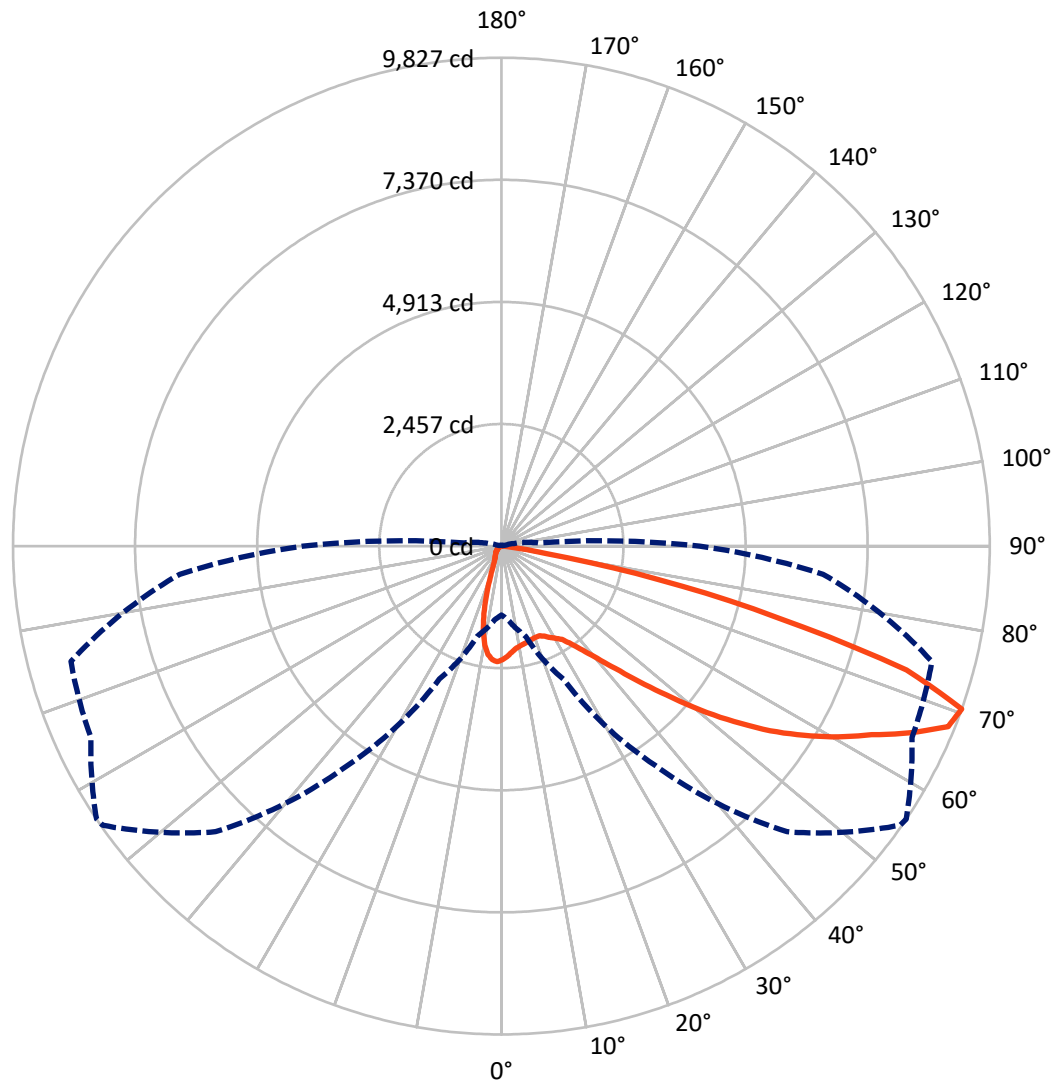
✕ Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 6 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 56-Deg Lateral    - - - Horizontal Cone Through 70-Deg Vertical

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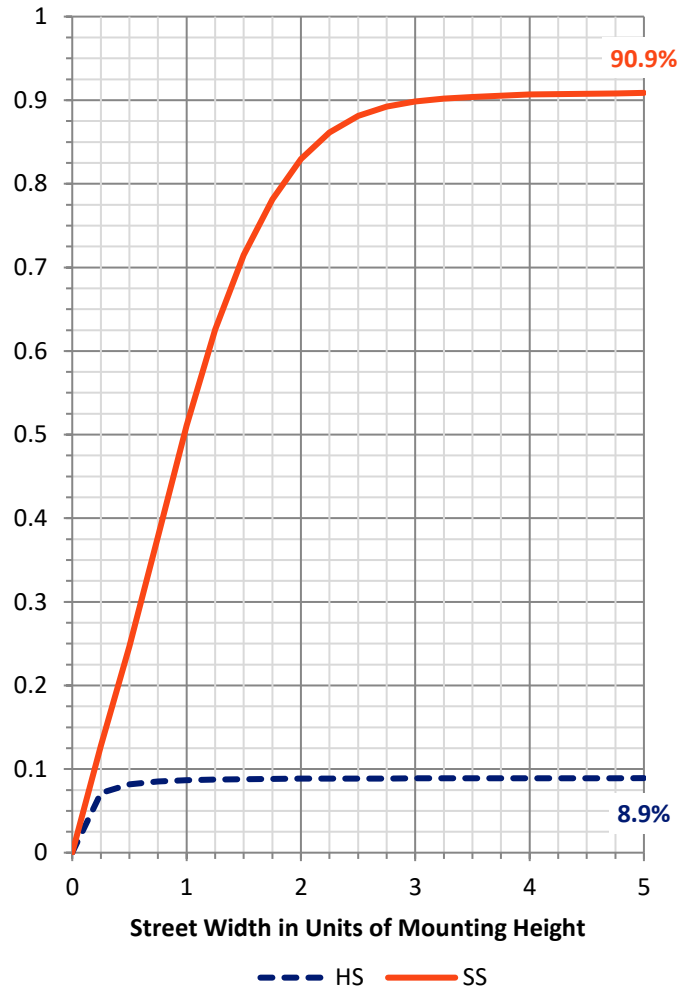
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1139.0   | 0.0    | 1139.0  |
|                    | % Fixture | 9.0      | 0.0    | 9.0     |
| <b>Street Side</b> | Lumens    | 11541.9  | 0.0    | 11541.9 |
|                    | % Fixture | 91.0     | 0.0    | 91.0    |
| <b>Total</b>       | Lumens    | 12680.9  | 0.0    | 12680.9 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 196.3   | 1.5       |
| 10°-20°   | 441.5   | 3.5       |
| 20°-30°   | 699.4   | 5.5       |
| 30°-40°   | 1206.1  | 9.5       |
| 40°-50°   | 2036.7  | 16.1      |
| 50°-60°   | 2992.6  | 23.6      |
| 60°-70°   | 3547.8  | 28.0      |
| 70°-80°   | 1512.9  | 11.9      |
| 80°-90°   | 47.5    | 0.4       |
| 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°    | 12680.9 | 100.0     |
| 0°-180°   | 12680.9 | 100.0     |

**Coefficient of Utilization**



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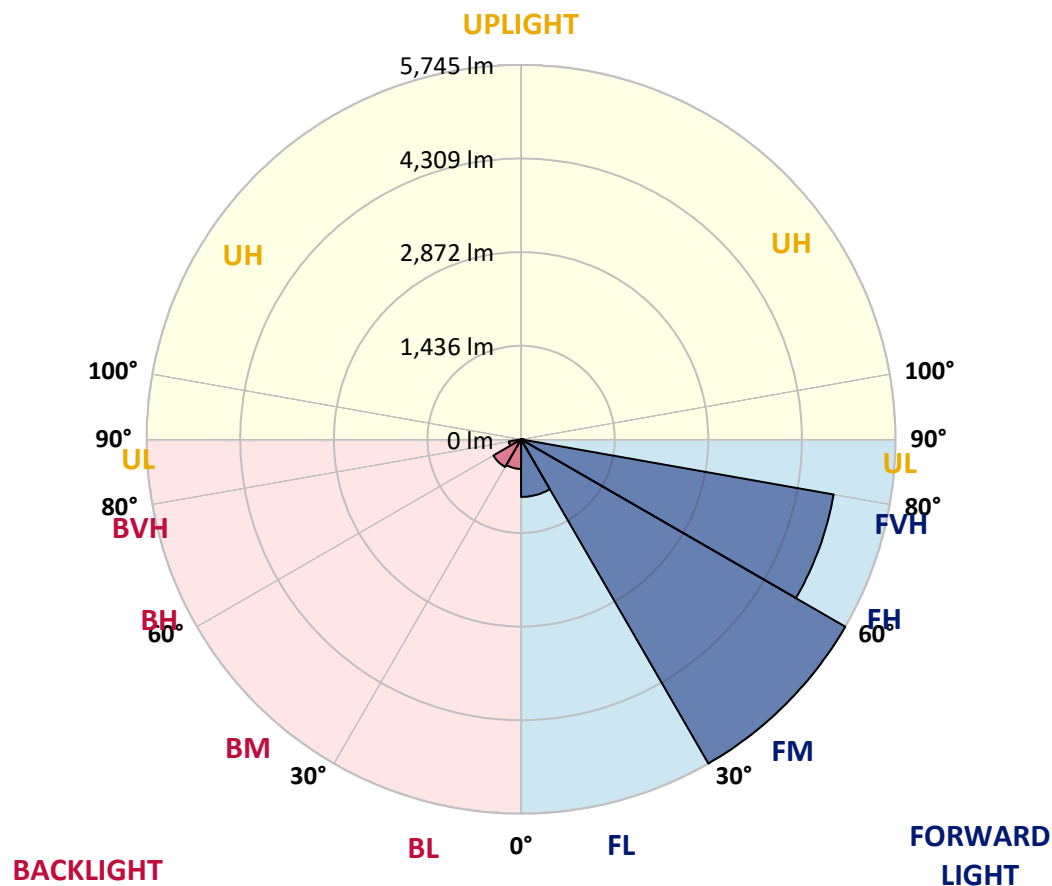
CATALOG NUMBER: GWS-SA3E-722-U-T3R-W-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 883.6  | 7.0       |                         |      |         |
| FM   | (30°-60°)   | 5744.8 | 45.3      |                         |      |         |
| FH   | (60°-80°)   | 4870.8 | 38.4      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 42.7   | 0.3       |                         |      | G1/100  |
| BL   | (0°-30°)    | 453.6  | 3.6       | B1/500                  |      |         |
| BM   | (30°-60°)   | 490.6  | 3.9       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 190.0  | 1.5       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 4.8    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

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

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 56°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 |
| 2.5°  | 2128.6 | 2125.1 | 2127.4 | 2144.8 | 2177.3 | 2192.4 | 2218.0 | 2222.6 | 2243.5 | 2270.2 | 2280.7 |
| 5°    | 1990.4 | 1978.8 | 1984.6 | 2009.0 | 2046.1 | 2087.9 | 2135.5 | 2148.3 | 2200.6 | 2259.8 | 2303.9 |
| 7.5°  | 1863.8 | 1851.0 | 1865.0 | 1903.3 | 1955.5 | 2000.8 | 2071.7 | 2079.8 | 2163.4 | 2267.9 | 2348.0 |
| 10°   | 1665.2 | 1668.7 | 1696.6 | 1763.9 | 1844.1 | 1938.1 | 2033.3 | 2045.0 | 2148.3 | 2294.6 | 2418.9 |
| 12.5° | 1513.1 | 1505.0 | 1535.2 | 1611.8 | 1724.5 | 1861.5 | 2004.3 | 2019.4 | 2149.5 | 2335.3 | 2509.5 |
| 15°   | 1442.3 | 1439.9 | 1452.7 | 1508.5 | 1617.6 | 1779.0 | 1977.6 | 1997.3 | 2164.6 | 2372.4 | 2595.4 |
| 17.5° | 1444.6 | 1441.1 | 1439.9 | 1472.5 | 1553.7 | 1717.5 | 1948.6 | 1974.1 | 2177.3 | 2413.1 | 2686.0 |
| 20°   | 1545.6 | 1529.4 | 1500.3 | 1485.2 | 1534.0 | 1678.0 | 1928.8 | 1957.9 | 2195.9 | 2456.0 | 2782.3 |
| 22.5° | 1757.0 | 1762.8 | 1685.0 | 1603.7 | 1580.5 | 1682.6 | 1926.5 | 1960.2 | 2236.6 | 2523.4 | 2900.8 |
| 25°   | 2179.7 | 2170.4 | 2026.4 | 1844.1 | 1717.5 | 1736.1 | 1967.2 | 2007.8 | 2316.7 | 2619.8 | 3012.3 |
| 27.5° | 2709.2 | 2717.3 | 2519.9 | 2229.6 | 1964.8 | 1846.4 | 2041.5 | 2082.1 | 2409.6 | 2680.2 | 3086.6 |
| 30°   | 3286.3 | 3278.2 | 3066.9 | 2745.2 | 2315.5 | 2029.9 | 2115.8 | 2151.8 | 2456.0 | 2712.7 | 3163.2 |
| 32.5° | 3832.1 | 3813.5 | 3604.5 | 3267.7 | 2762.6 | 2319.0 | 2218.0 | 2238.9 | 2517.6 | 2783.5 | 3266.6 |
| 35°   | 4297.8 | 4296.6 | 4114.3 | 3755.5 | 3222.5 | 2681.3 | 2393.3 | 2410.7 | 2632.5 | 2896.1 | 3418.7 |
| 37.5° | 4778.5 | 4762.3 | 4557.9 | 4230.4 | 3695.1 | 3078.5 | 2661.6 | 2654.6 | 2813.7 | 3062.2 | 3605.7 |
| 40°   | 5173.4 | 5162.9 | 5006.1 | 4691.4 | 4186.3 | 3517.4 | 2986.7 | 2965.8 | 3028.5 | 3292.1 | 3865.8 |
| 42.5° | 5466.0 | 5467.1 | 5418.4 | 5226.8 | 4706.5 | 4024.9 | 3395.5 | 3363.0 | 3361.8 | 3639.3 | 4209.5 |
| 45°   | 5687.8 | 5702.9 | 5776.0 | 5747.0 | 5320.8 | 4616.0 | 3919.2 | 3885.5 | 3828.6 | 4089.9 | 4603.2 |
| 47.5° | 5791.1 | 5810.9 | 6031.5 | 6147.6 | 5858.5 | 5202.4 | 4542.8 | 4472.0 | 4360.5 | 4689.1 | 5043.3 |
| 50°   | 5780.7 | 5815.5 | 6123.3 | 6476.3 | 6346.2 | 5796.9 | 5222.1 | 5188.4 | 5006.1 | 5323.2 | 5478.8 |
| 52.5° | 5543.8 | 5618.1 | 6129.1 | 6676.0 | 6721.3 | 6345.0 | 5924.7 | 5862.0 | 5773.7 | 5985.1 | 5887.5 |
| 55°   | 4900.5 | 4991.0 | 5884.0 | 6739.9 | 7013.9 | 6823.5 | 6612.1 | 6561.0 | 6414.7 | 6609.8 | 6244.0 |
| 57.5° | 4550.9 | 4628.7 | 5368.4 | 6708.5 | 7262.4 | 7265.9 | 7224.1 | 7182.3 | 7061.5 | 7227.6 | 6662.1 |
| 60°   | 4340.7 | 4418.5 | 5093.2 | 6593.6 | 7487.7 | 7732.7 | 7798.9 | 7794.3 | 7620.1 | 7930.2 | 7152.1 |
| 62.5° | 4033.0 | 4139.8 | 4806.4 | 6295.1 | 7648.0 | 8192.6 | 8392.3 | 8361.0 | 8167.0 | 8661.7 | 7637.5 |
| 65°   | 3411.7 | 3504.6 | 4218.8 | 5802.7 | 7553.9 | 8573.5 | 9035.7 | 9051.9 | 8827.8 | 9350.4 | 8020.7 |
| 67.5° | 2392.2 | 2460.7 | 3170.2 | 4769.2 | 6915.2 | 8698.9 | 9694.1 | 9692.9 | 9310.9 | 9703.4 | 7851.2 |
| 70°   | 1386.5 | 1480.6 | 1873.1 | 2948.4 | 5380.1 | 8128.7 | 9792.8 | 9826.5 | 9114.6 | 8966.0 | 6497.2 |
| 72.5° | 536.5  | 614.3  | 1061.4 | 1566.5 | 2805.6 | 6226.6 | 8423.7 | 8522.4 | 7628.2 | 6916.4 | 4521.9 |
| 75°   | 160.3  | 178.8  | 499.3  | 833.8  | 1126.4 | 3007.6 | 5702.9 | 5730.8 | 5232.6 | 4314.0 | 2317.8 |
| 77.5° | 119.6  | 132.4  | 218.3  | 421.5  | 394.8  | 911.6  | 2950.7 | 3222.5 | 2777.7 | 1541.0 | 638.7  |
| 80°   | 81.3   | 96.4   | 155.6  | 205.5  | 146.3  | 242.7  | 829.1  | 910.4  | 847.7  | 346.1  | 160.3  |
| 82.5° | 36.0   | 46.4   | 110.3  | 103.4  | 53.4   | 69.7   | 255.5  | 271.7  | 175.3  | 104.5  | 55.7   |
| 85°   | 3.5    | 4.6    | 41.8   | 45.3   | 19.7   | 16.3   | 53.4   | 53.4   | 38.3   | 36.0   | 23.2   |
| 87.5° | 0.0    | 0.0    | 1.2    | 2.3    | 2.3    | 3.5    | 4.6    | 5.8    | 7.0    | 9.3    | 11.6   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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CATALOG NUMBER: GWS-SA3E-722-U-T3R-W-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 | 2286.5 |
| 2.5°  | 2307.4 | 2293.5 | 2310.9 | 2324.8 | 2328.3 | 2302.8 | 2287.7 | 2265.6 | 2260.9 | 2262.1 | 2256.3 |
| 5°    | 2338.7 | 2331.8 | 2344.6 | 2329.5 | 2290.0 | 2215.7 | 2151.8 | 2081.0 | 2042.6 | 2020.6 | 2018.2 |
| 7.5°  | 2396.8 | 2393.3 | 2379.4 | 2310.9 | 2187.8 | 2022.9 | 1863.8 | 1708.2 | 1611.8 | 1577.0 | 1571.2 |
| 10°   | 2482.7 | 2475.8 | 2418.9 | 2256.3 | 1993.9 | 1676.8 | 1409.8 | 1186.8 | 1050.9 | 1011.4 | 962.7  |
| 12.5° | 2581.5 | 2567.5 | 2443.3 | 2139.0 | 1701.2 | 1262.3 | 929.0  | 679.3  | 562.0  | 527.2  | 527.2  |
| 15°   | 2676.7 | 2646.5 | 2429.3 | 1945.1 | 1341.2 | 821.0  | 519.1  | 392.5  | 356.5  | 347.2  | 347.2  |
| 17.5° | 2774.2 | 2716.2 | 2374.7 | 1680.3 | 926.7  | 485.4  | 346.1  | 321.7  | 317.0  | 318.2  | 319.3  |
| 20°   | 2866.0 | 2775.4 | 2278.4 | 1362.1 | 591.1  | 339.1  | 310.1  | 304.2  | 301.9  | 304.2  | 303.1  |
| 22.5° | 2965.8 | 2830.0 | 2132.0 | 1014.9 | 384.4  | 305.4  | 295.0  | 290.3  | 288.0  | 291.5  | 291.5  |
| 25°   | 3064.5 | 2869.4 | 1938.1 | 682.8  | 305.4  | 284.5  | 278.7  | 274.1  | 271.7  | 272.9  | 272.9  |
| 27.5° | 3115.6 | 2854.3 | 1683.8 | 435.5  | 274.1  | 263.6  | 257.8  | 252.0  | 248.5  | 247.3  | 248.5  |
| 30°   | 3150.5 | 2807.9 | 1372.6 | 310.1  | 248.5  | 235.7  | 229.9  | 225.3  | 216.0  | 210.2  | 212.5  |
| 32.5° | 3205.0 | 2761.4 | 1034.7 | 260.1  | 227.6  | 207.9  | 198.6  | 187.0  | 174.2  | 168.4  | 168.4  |
| 35°   | 3270.1 | 2697.6 | 725.8  | 234.6  | 205.5  | 184.6  | 167.2  | 147.5  | 132.4  | 127.7  | 127.7  |
| 37.5° | 3356.0 | 2637.2 | 483.1  | 217.2  | 187.0  | 164.9  | 140.5  | 117.3  | 101.0  | 98.7   | 97.5   |
| 40°   | 3484.9 | 2586.1 | 340.2  | 204.4  | 170.7  | 144.0  | 115.0  | 90.6   | 79.0   | 75.5   | 75.5   |
| 42.5° | 3652.1 | 2533.8 | 269.4  | 191.6  | 156.8  | 124.3  | 91.7   | 72.0   | 62.7   | 60.4   | 59.2   |
| 45°   | 3858.8 | 2472.3 | 234.6  | 180.0  | 142.8  | 103.4  | 73.2   | 60.4   | 53.4   | 51.1   | 51.1   |
| 47.5° | 4082.9 | 2388.7 | 218.3  | 164.9  | 126.6  | 83.6   | 61.5   | 52.3   | 48.8   | 47.6   | 46.4   |
| 50°   | 4303.6 | 2276.0 | 204.4  | 151.0  | 108.0  | 68.5   | 53.4   | 47.6   | 45.3   | 44.1   | 44.1   |
| 52.5° | 4496.3 | 2144.8 | 187.0  | 134.7  | 88.3   | 59.2   | 47.6   | 44.1   | 41.8   | 39.5   | 38.3   |
| 55°   | 4661.2 | 2002.0 | 164.9  | 116.1  | 72.0   | 52.3   | 44.1   | 40.6   | 38.3   | 36.0   | 34.8   |
| 57.5° | 4873.8 | 1920.7 | 132.4  | 94.1   | 59.2   | 46.4   | 40.6   | 37.2   | 34.8   | 31.4   | 31.4   |
| 60°   | 5109.5 | 1861.5 | 98.7   | 74.3   | 51.1   | 43.0   | 37.2   | 33.7   | 31.4   | 27.9   | 27.9   |
| 62.5° | 5298.8 | 1773.2 | 77.8   | 60.4   | 44.1   | 38.3   | 33.7   | 30.2   | 27.9   | 24.4   | 24.4   |
| 65°   | 5370.8 | 1590.9 | 63.9   | 47.6   | 36.0   | 33.7   | 30.2   | 27.9   | 24.4   | 20.9   | 20.9   |
| 67.5° | 5045.6 | 1226.3 | 53.4   | 38.3   | 30.2   | 29.0   | 26.7   | 25.5   | 20.9   | 18.6   | 17.4   |
| 70°   | 3995.8 | 747.8  | 44.1   | 31.4   | 25.5   | 24.4   | 24.4   | 22.1   | 18.6   | 17.4   | 16.3   |
| 72.5° | 2738.2 | 385.5  | 36.0   | 25.5   | 22.1   | 22.1   | 20.9   | 19.7   | 17.4   | 16.3   | 16.3   |
| 75°   | 1422.5 | 128.9  | 27.9   | 19.7   | 17.4   | 18.6   | 18.6   | 17.4   | 16.3   | 16.3   | 15.1   |
| 77.5° | 407.6  | 58.1   | 20.9   | 15.1   | 13.9   | 13.9   | 15.1   | 15.1   | 15.1   | 13.9   | 13.9   |
| 80°   | 105.7  | 33.7   | 15.1   | 11.6   | 11.6   | 11.6   | 11.6   | 12.8   | 13.9   | 12.8   | 12.8   |
| 82.5° | 43.0   | 18.6   | 10.5   | 9.3    | 9.3    | 9.3    | 9.3    | 10.5   | 11.6   | 11.6   | 11.6   |
| 85°   | 26.7   | 9.3    | 8.1    | 8.1    | 8.1    | 7.0    | 7.0    | 8.1    | 8.1    | 9.3    | 9.3    |
| 87.5° | 16.3   | 7.0    | 7.0    | 7.0    | 7.0    | 5.8    | 5.8    | 5.8    | 5.8    | 5.8    | 5.8    |
| 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.

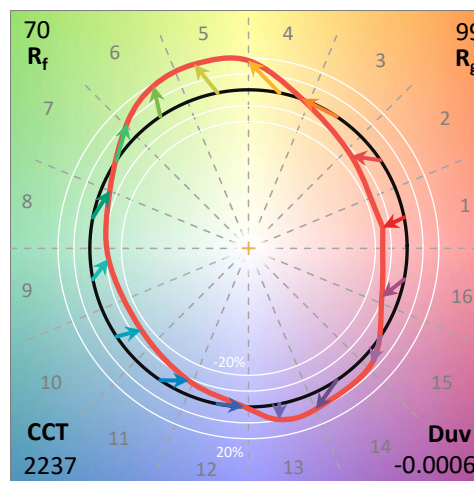
### Test Information

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    |           |      |      |       |



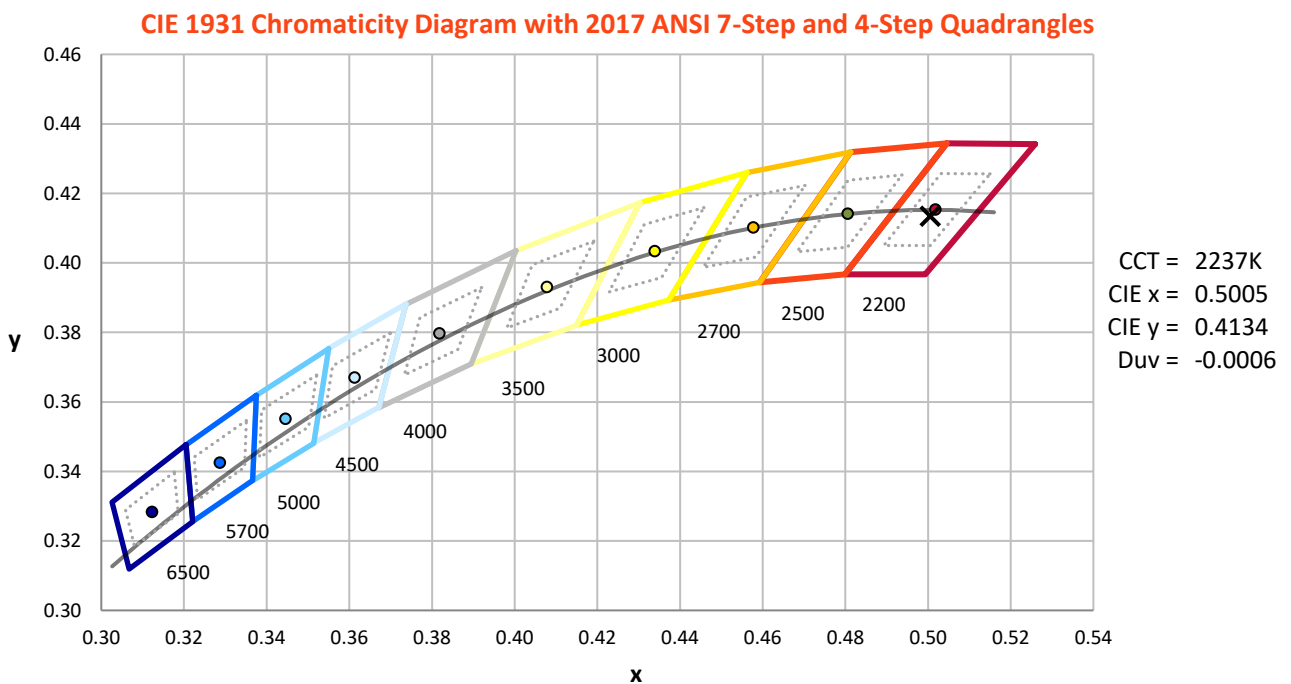
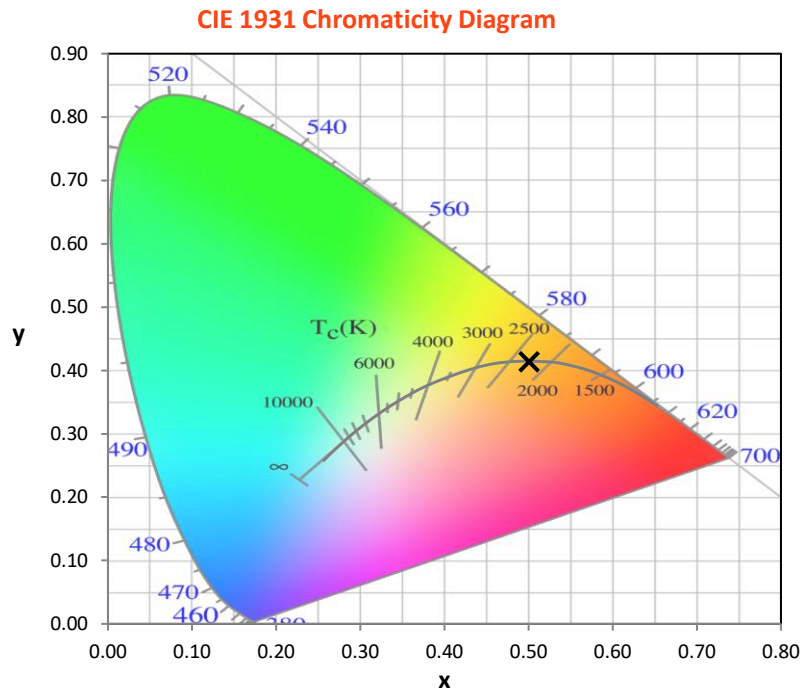
### Test Conditions

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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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 ( $R_{f,i}$ )**

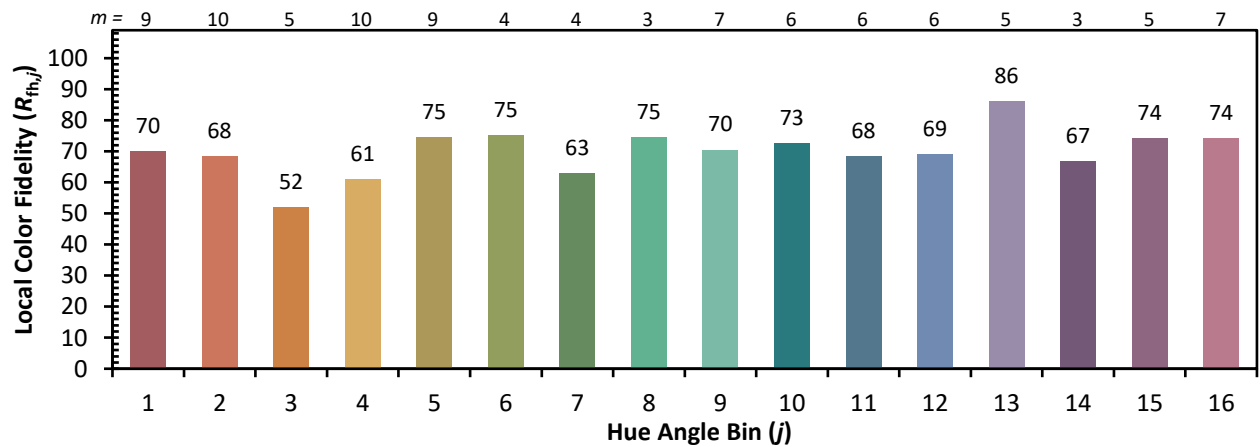
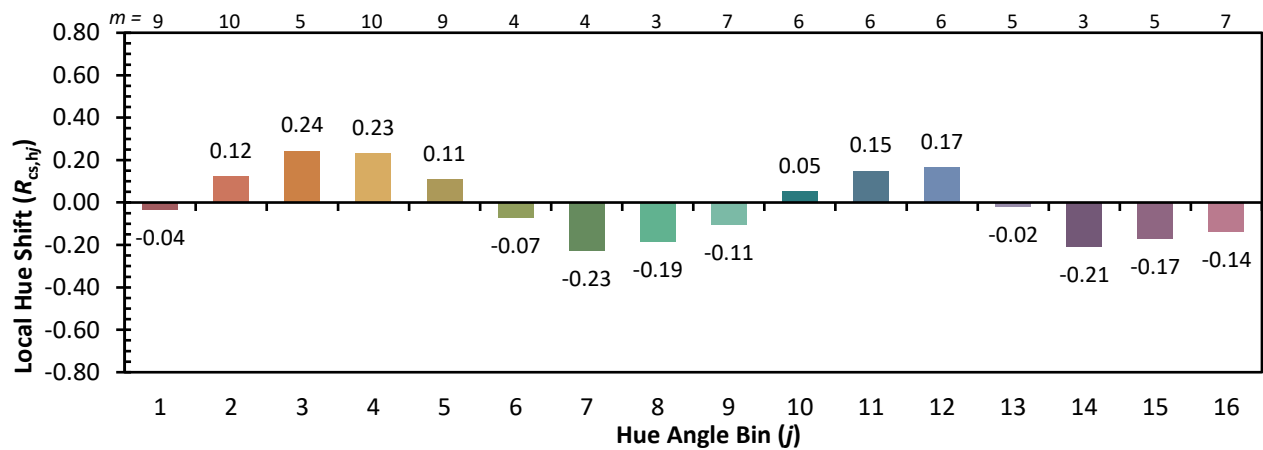
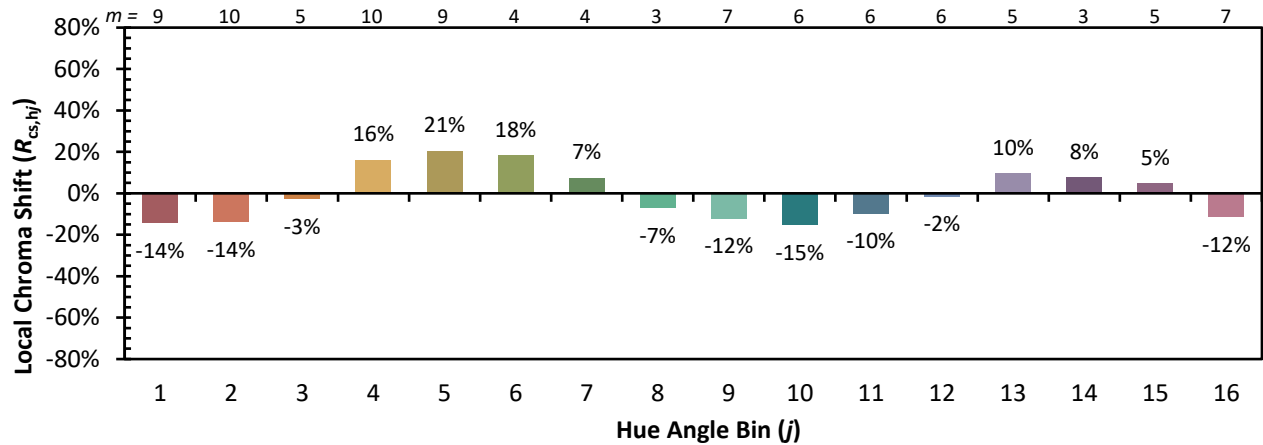
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 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)