

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P633704

Luminaire Tested: GWS-SA2F-730-U-T2-W-GRSWH

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P633704  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-21)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA2F-730-U-T2-W-GRSWH  
Description: GALLEON WALL SLIM LUMINAIRE. (2) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II OPTICS W/ FACTORY INSALLED GLARE SHIELD, WH  
Light Source: (32) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

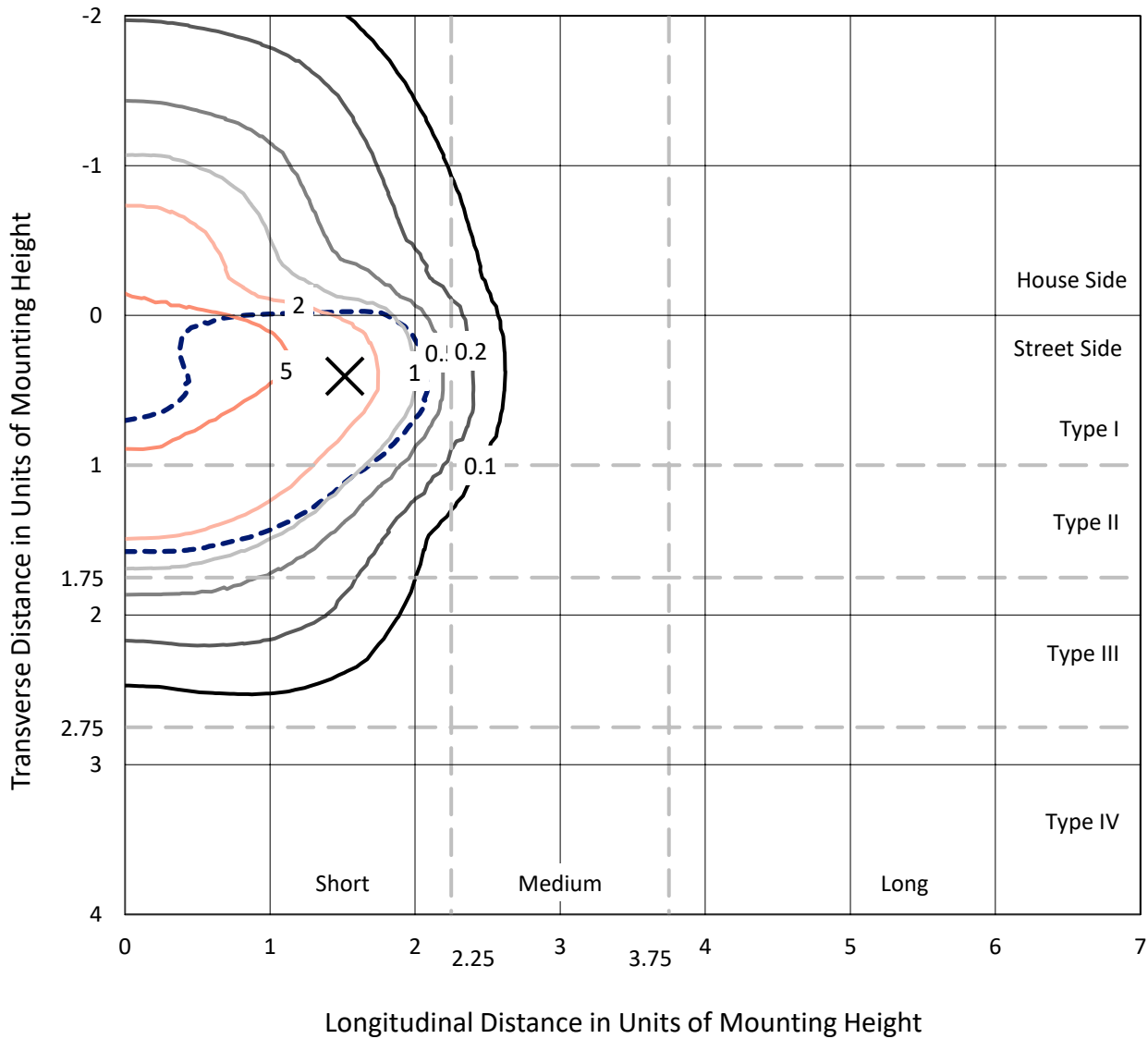
Lumens per Lamp: N/A  
Luminaire Lumens: 12316.2 lumens  
Efficiency: N/A  
Efficacy: 98.9 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2  
  
Input Watts (W): 124.5  
Input Voltage (V): 120  
Input Current (Ain): 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: P633704  
 CATALOG NUMBER: GWS-SA2F-730-U-T2-W-GRSWH

### Iso-Footcandle Lines of Horizontal Illumination

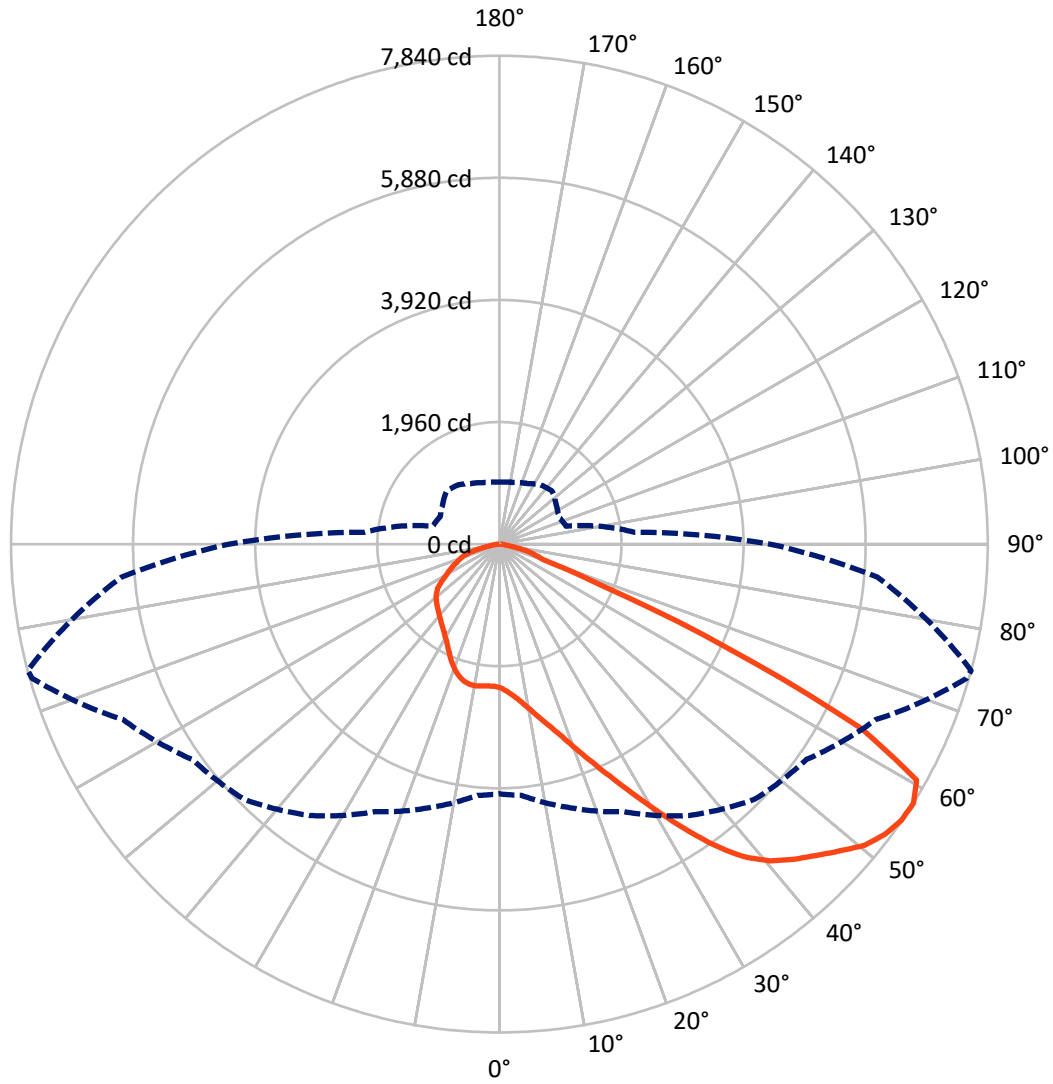
✕ Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 8.2 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 75-Deg Lateral    - - - Horizontal Cone Through 57.5-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3331.8   | 0.0    | 3331.8  |
|                    | % Fixture | 27.1     | 0.0    | 27.1    |
| <b>Street Side</b> | Lumens    | 8984.4   | 0.0    | 8984.4  |
|                    | % Fixture | 72.9     | 0.0    | 72.9    |
| <b>Total</b>       | Lumens    | 12316.2  | 0.0    | 12316.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 230.8   | 1.9       |
| 10°-20°   | 734.9   | 6.0       |
| 20°-30°   | 1303.3  | 10.6      |
| 30°-40°   | 1995.1  | 16.2      |
| 40°-50°   | 2778.0  | 22.6      |
| 50°-60°   | 3183.0  | 25.8      |
| 60°-70°   | 1635.5  | 13.3      |
| 70°-80°   | 411.7   | 3.3       |
| 80°-90°   | 44.0    | 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°    | 12316.2 | 100.0     |
| 0°-180°   | 12316.2 | 100.0     |

**Coefficient of Utilization**



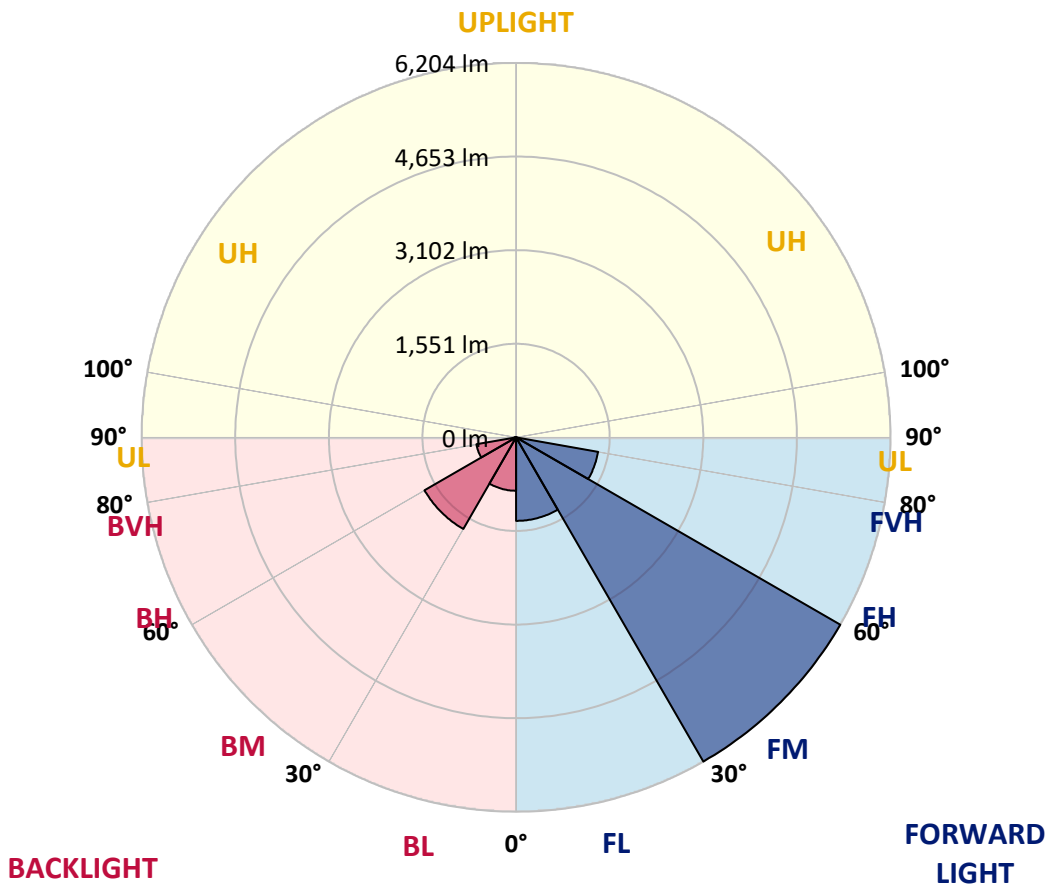
REPORT NUMBER: P633704

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 1383.8 | 11.2      |                         |      |         |
| FM (30°-60°)   | 6203.8 | 50.4      |                         |      |         |
| FH (60°-80°)   | 1380.5 | 11.2      |                         |      | G1/1800 |
| FVH (80°-90°)  | 16.3   | 0.1       |                         |      | G1/100  |
| BL (0°-30°)    | 885.1  | 7.2       | B2/1000                 |      |         |
| BM (30°-60°)   | 1752.2 | 14.2      | B2/2500                 |      |         |
| BH (60°-80°)   | 666.7  | 5.4       | B2/1000                 |      | G2/1000 |
| BVH (80°-90°)  | 27.7   | 0.2       |                         |      | G1/100  |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**  
 Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 74°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 |
| 2.5°  | 2478.1 | 2484.4 | 2478.1 | 2488.7 | 2467.5 | 2458.0 | 2434.7 | 2399.7 | 2372.2 | 2368.0 | 2337.2 |
| 5°    | 2670.8 | 2684.6 | 2676.1 | 2671.9 | 2643.3 | 2622.1 | 2587.2 | 2517.3 | 2460.1 | 2451.6 | 2391.2 |
| 7.5°  | 2794.7 | 2804.3 | 2804.3 | 2807.4 | 2796.9 | 2772.5 | 2735.4 | 2652.8 | 2572.3 | 2559.6 | 2468.6 |
| 10°   | 2836.0 | 2843.4 | 2857.2 | 2883.7 | 2904.9 | 2912.3 | 2887.9 | 2808.5 | 2710.0 | 2697.3 | 2570.2 |
| 12.5° | 2845.6 | 2854.0 | 2875.2 | 2923.9 | 2982.2 | 3035.1 | 3039.4 | 2981.1 | 2871.0 | 2857.2 | 2687.8 |
| 15°   | 2863.6 | 2872.0 | 2900.6 | 2961.0 | 3046.8 | 3148.4 | 3210.9 | 3170.7 | 3048.9 | 3034.1 | 2821.2 |
| 17.5° | 2861.5 | 2871.0 | 2913.3 | 2993.8 | 3109.3 | 3256.5 | 3377.2 | 3394.1 | 3268.1 | 3242.7 | 2972.6 |
| 20°   | 2856.2 | 2864.6 | 2910.2 | 3008.7 | 3151.6 | 3353.9 | 3572.0 | 3659.9 | 3524.4 | 3501.1 | 3149.5 |
| 22.5° | 2898.5 | 2908.0 | 2943.0 | 3024.5 | 3173.9 | 3429.1 | 3752.1 | 3963.9 | 3828.3 | 3795.5 | 3352.8 |
| 25°   | 2993.8 | 3007.6 | 3028.8 | 3084.9 | 3214.1 | 3495.8 | 3936.3 | 4308.1 | 4169.3 | 4130.1 | 3574.2 |
| 27.5° | 3141.0 | 3158.0 | 3187.6 | 3214.1 | 3304.1 | 3580.5 | 4119.6 | 4693.5 | 4554.8 | 4513.5 | 3808.2 |
| 30°   | 3321.1 | 3343.3 | 3381.4 | 3399.4 | 3460.9 | 3705.5 | 4318.7 | 5090.7 | 5010.2 | 4953.0 | 4071.9 |
| 32.5° | 3569.9 | 3600.6 | 3636.6 | 3641.9 | 3679.0 | 3895.0 | 4515.6 | 5484.6 | 5483.6 | 5443.3 | 4371.6 |
| 35°   | 3894.0 | 3926.8 | 3934.2 | 3941.6 | 3959.6 | 4155.6 | 4753.9 | 5843.6 | 5982.4 | 5935.8 | 4697.8 |
| 37.5° | 4247.7 | 4295.4 | 4307.0 | 4274.2 | 4299.6 | 4469.0 | 5021.8 | 6131.7 | 6416.6 | 6366.8 | 5013.4 |
| 40°   | 4625.8 | 4644.8 | 4676.6 | 4624.7 | 4656.5 | 4828.0 | 5284.5 | 6315.9 | 6740.6 | 6687.7 | 5262.2 |
| 42.5° | 4896.9 | 4931.8 | 4979.5 | 4960.4 | 4978.4 | 5135.2 | 5468.7 | 6404.9 | 6971.5 | 6918.5 | 5441.2 |
| 45°   | 5191.3 | 5201.9 | 5232.6 | 5228.3 | 5238.9 | 5385.1 | 5601.1 | 6444.1 | 7178.0 | 7130.3 | 5593.7 |
| 47.5° | 5447.6 | 5463.4 | 5483.6 | 5460.3 | 5437.0 | 5532.3 | 5709.1 | 6478.0 | 7416.3 | 7359.1 | 5753.6 |
| 50°   | 5694.3 | 5708.1 | 5732.4 | 5664.7 | 5577.8 | 5602.2 | 5762.1 | 6524.6 | 7639.7 | 7599.5 | 5879.6 |
| 52.5° | 5739.8 | 5754.7 | 5869.0 | 5882.8 | 5771.6 | 5685.8 | 5855.3 | 6627.3 | 7771.0 | 7745.6 | 5925.2 |
| 55°   | 5166.9 | 5193.4 | 5421.1 | 5682.7 | 5956.9 | 5929.4 | 6004.6 | 6681.3 | 7822.9 | 7829.3 | 6006.7 |
| 57.5° | 4010.5 | 4048.6 | 4381.1 | 4740.1 | 5317.3 | 5794.9 | 6023.7 | 6667.5 | 7804.9 | 7839.9 | 6090.4 |
| 60°   | 2630.6 | 2652.8 | 3046.8 | 3449.2 | 4047.5 | 4708.4 | 5391.4 | 6419.7 | 7645.0 | 7694.8 | 6069.2 |
| 62.5° | 1588.5 | 1613.9 | 1930.6 | 2235.6 | 2588.2 | 3029.8 | 3656.8 | 5159.5 | 6408.1 | 6519.3 | 4860.9 |
| 65°   | 1108.8 | 1142.7 | 1420.1 | 1671.1 | 1792.9 | 1701.8 | 1852.2 | 2881.6 | 3992.5 | 4039.1 | 2970.5 |
| 67.5° | 803.8  | 827.1  | 1054.8 | 1353.4 | 1487.9 | 1202.0 | 916.0  | 1276.1 | 1738.9 | 1755.8 | 1225.3 |
| 70°   | 526.3  | 552.8  | 759.3  | 1030.4 | 1214.7 | 974.3  | 685.2  | 690.5  | 731.8  | 740.2  | 711.7  |
| 72.5° | 289.1  | 305.0  | 469.1  | 684.1  | 718.0  | 582.5  | 534.8  | 574.0  | 602.6  | 602.6  | 610.0  |
| 75°   | 149.3  | 163.1  | 191.7  | 225.6  | 272.2  | 318.8  | 385.5  | 443.7  | 474.4  | 476.6  | 473.4  |
| 77.5° | 76.2   | 81.5   | 102.7  | 111.2  | 121.8  | 141.9  | 184.3  | 236.2  | 263.7  | 274.3  | 272.2  |
| 80°   | 36.0   | 38.1   | 43.4   | 50.8   | 62.5   | 79.4   | 99.5   | 118.6  | 135.6  | 137.7  | 149.3  |
| 82.5° | 19.1   | 21.2   | 23.3   | 27.5   | 33.9   | 42.4   | 58.2   | 69.9   | 80.5   | 82.6   | 92.1   |
| 85°   | 7.4    | 8.5    | 9.5    | 10.6   | 14.8   | 18.0   | 24.4   | 32.8   | 40.2   | 40.2   | 47.7   |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 1.1    | 2.1    | 4.2    | 5.3    | 7.4    | 7.4    | 12.7   |
| 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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CATALOG NUMBER: GWS-SA2F-730-U-T2-W-GRSWH

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 | 2306.5 |
| 2.5°  | 2329.8 | 2299.1 | 2285.3 | 2263.1 | 2245.1 | 2225.0 | 2209.1 | 2197.5 | 2190.0 | 2185.8 | 2181.6 |
| 5°    | 2368.0 | 2321.4 | 2284.3 | 2239.8 | 2209.1 | 2179.4 | 2155.1 | 2138.1 | 2129.7 | 2123.3 | 2119.1 |
| 7.5°  | 2427.3 | 2364.8 | 2294.9 | 2226.0 | 2172.0 | 2124.4 | 2093.7 | 2075.7 | 2064.0 | 2059.8 | 2056.6 |
| 10°   | 2508.8 | 2422.0 | 2306.5 | 2197.5 | 2117.0 | 2065.1 | 2043.9 | 2035.4 | 2036.5 | 2034.4 | 2033.3 |
| 12.5° | 2600.9 | 2482.3 | 2303.4 | 2146.6 | 2057.7 | 2026.9 | 2028.0 | 2041.8 | 2057.7 | 2061.9 | 2063.0 |
| 15°   | 2700.5 | 2541.6 | 2272.6 | 2081.0 | 2011.1 | 2014.2 | 2041.8 | 2074.6 | 2104.3 | 2115.9 | 2118.0 |
| 17.5° | 2808.5 | 2591.4 | 2216.5 | 2008.9 | 1972.9 | 2006.8 | 2057.7 | 2111.7 | 2155.1 | 2174.2 | 2179.4 |
| 20°   | 2929.2 | 2633.8 | 2137.1 | 1938.0 | 1936.9 | 1993.1 | 2067.2 | 2138.1 | 2193.2 | 2218.6 | 2222.9 |
| 22.5° | 3057.4 | 2660.2 | 2039.7 | 1872.3 | 1899.9 | 1975.1 | 2059.8 | 2133.9 | 2192.2 | 2217.6 | 2222.9 |
| 25°   | 3186.6 | 2668.7 | 1932.7 | 1812.0 | 1861.7 | 1946.5 | 2023.8 | 2083.1 | 2138.1 | 2160.4 | 2164.6 |
| 27.5° | 3307.3 | 2644.4 | 1831.0 | 1760.1 | 1826.8 | 1904.1 | 1956.0 | 1987.8 | 2025.9 | 2042.8 | 2046.0 |
| 30°   | 3430.1 | 2595.6 | 1745.3 | 1718.8 | 1787.6 | 1845.9 | 1869.2 | 1871.3 | 1886.1 | 1886.1 | 1888.2 |
| 32.5° | 3554.0 | 2523.6 | 1670.1 | 1678.5 | 1738.9 | 1777.0 | 1780.2 | 1755.8 | 1737.8 | 1708.2 | 1707.1 |
| 35°   | 3697.0 | 2450.6 | 1608.6 | 1633.0 | 1681.7 | 1705.0 | 1695.5 | 1648.9 | 1605.5 | 1556.7 | 1554.6 |
| 37.5° | 3829.4 | 2375.4 | 1556.7 | 1586.4 | 1617.1 | 1634.1 | 1611.8 | 1555.7 | 1519.7 | 1469.9 | 1462.5 |
| 40°   | 3938.5 | 2307.6 | 1507.0 | 1537.7 | 1552.5 | 1567.3 | 1531.3 | 1485.8 | 1491.1 | 1463.6 | 1462.5 |
| 42.5° | 4002.0 | 2241.9 | 1460.4 | 1483.7 | 1493.2 | 1503.8 | 1472.0 | 1438.1 | 1466.7 | 1445.6 | 1446.6 |
| 45°   | 4048.6 | 2184.7 | 1418.0 | 1426.5 | 1449.8 | 1465.7 | 1436.0 | 1397.9 | 1404.3 | 1322.7 | 1303.6 |
| 47.5° | 4101.6 | 2153.0 | 1377.8 | 1369.3 | 1410.6 | 1438.1 | 1392.6 | 1337.5 | 1299.4 | 1218.9 | 1211.5 |
| 50°   | 4157.7 | 2141.3 | 1335.4 | 1312.1 | 1361.9 | 1388.4 | 1335.4 | 1266.6 | 1216.8 | 1173.4 | 1169.1 |
| 52.5° | 4176.7 | 2140.3 | 1282.5 | 1243.3 | 1293.1 | 1330.1 | 1285.6 | 1215.7 | 1156.4 | 1114.1 | 1112.0 |
| 55°   | 4251.9 | 2171.0 | 1214.7 | 1149.0 | 1195.6 | 1271.9 | 1239.0 | 1138.4 | 1090.8 | 1071.7 | 1069.6 |
| 57.5° | 4339.8 | 2176.3 | 1107.7 | 1046.3 | 1110.9 | 1200.9 | 1159.6 | 1072.8 | 1020.9 | 997.6  | 995.5  |
| 60°   | 4303.8 | 2046.0 | 993.4  | 967.9  | 1038.9 | 1134.2 | 1096.1 | 1020.9 | 960.5  | 938.3  | 936.2  |
| 62.5° | 3279.8 | 1444.5 | 909.7  | 900.2  | 961.6  | 1037.8 | 1030.4 | 952.1  | 894.9  | 879.0  | 876.9  |
| 65°   | 1972.9 | 1014.5 | 829.2  | 828.1  | 871.6  | 944.6  | 954.2  | 890.6  | 830.3  | 808.0  | 808.0  |
| 67.5° | 975.4  | 776.3  | 738.1  | 732.8  | 760.4  | 812.3  | 852.5  | 800.6  | 749.8  | 728.6  | 725.4  |
| 70°   | 689.4  | 684.1  | 671.4  | 656.6  | 661.9  | 683.1  | 700.0  | 656.6  | 602.6  | 581.4  | 577.2  |
| 72.5° | 596.2  | 597.3  | 588.8  | 577.2  | 572.9  | 558.1  | 543.3  | 511.5  | 478.7  | 456.4  | 458.6  |
| 75°   | 462.8  | 464.9  | 470.2  | 466.0  | 454.3  | 438.4  | 422.5  | 382.3  | 355.8  | 334.6  | 330.4  |
| 77.5° | 270.0  | 280.6  | 297.6  | 293.3  | 295.5  | 273.2  | 266.9  | 227.7  | 203.3  | 188.5  | 185.3  |
| 80°   | 152.5  | 158.9  | 166.3  | 171.6  | 165.2  | 155.7  | 141.9  | 120.7  | 113.3  | 102.7  | 100.6  |
| 82.5° | 92.1   | 98.5   | 101.7  | 105.9  | 103.8  | 91.1   | 80.5   | 66.7   | 60.4   | 55.1   | 54.0   |
| 85°   | 46.6   | 50.8   | 54.0   | 56.1   | 49.8   | 41.3   | 37.1   | 29.7   | 25.4   | 22.2   | 22.2   |
| 87.5° | 11.6   | 12.7   | 14.8   | 12.7   | 11.6   | 5.3    | 4.2    | 1.1    | 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    |



Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-2-R4

Test Date: 10/03/2019

Luminaire Tested: SA1C-730-U-5WQ

Data in this report applies to families of products SA1C-730-U-5WQ .

**Test Information**

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-2-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-730-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-2-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. (1) 70 CRI, 3000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

**Spectral Parameters**

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 2993   | CRI (Ra): | 71.8 | R9:  | -38.3 |
| CIE u':                   | 0.2508 | R1:       | 67.5 | R10: | 62.5  |
| CIE v':                   | 0.5215 | R2:       | 82.9 | R11: | 63.7  |
| Duv:                      | 0.0000 | R3:       | 94.7 | R12: | 57.8  |
| CIE x:                    | 0.4374 | R4:       | 67.7 | R13: | 70.4  |
| CIE y:                    | 0.4043 | R5:       | 67.9 | R14: | 97.3  |
| CIE z:                    | 0.1583 | R6:       | 77.6 |      |       |
| Peak Wavelength (nm):     | 593    | R7:       | 76.0 |      |       |
| Dominant Wavelength (nm): | 582    | R8:       | 40.5 |      |       |
| Purity:                   | 53     |           |      |      |       |
| Rf:                       | 75.7   |           |      |      |       |
| Rg:                       | 93.9   |           |      |      |       |



**Test Conditions**

Stabilization Time: 53M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0./44%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-2-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            |

REPORT NUMBER: SP1-1908-441-2-R4

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 3000K 4-step quadrangle

REPORT NUMBER: SP1-1908-441-2-R4

**Photopic Flux vs. Wavelength**



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| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 2397                                 | NR                             | 490               | 24908                                | NR                             | 620               | 118784                               | NR                             | 750               | 5037                                 | NR                             | 880               | 2677                                 | NR                             |
| 365               | 2084                                 | NR                             | 495               | 30998                                | NR                             | 625               | 108951                               | NR                             | 755               | 4413                                 | NR                             | 885               | 2940                                 | NR                             |
| 370               | 2143                                 | NR                             | 500               | 37103                                | NR                             | 630               | 99573                                | NR                             | 760               | 4189                                 | NR                             | 890               | 3116                                 | NR                             |
| 375               | 2413                                 | NR                             | 505               | 42987                                | NR                             | 635               | 90444                                | NR                             | 765               | 3677                                 | NR                             | 895               | 3345                                 | NR                             |
| 380               | 2172                                 | NR                             | 510               | 48702                                | NR                             | 640               | 80749                                | NR                             | 770               | 3366                                 | NR                             | 900               | 2312                                 | NR                             |
| 385               | 1997                                 | NR                             | 515               | 53741                                | NR                             | 645               | 71664                                | NR                             | 775               | 3211                                 | NR                             | 905               | 2829                                 | NR                             |
| 390               | 1830                                 | NR                             | 520               | 57283                                | NR                             | 650               | 63936                                | NR                             | 780               | 2682                                 | NR                             | 910               | 2783                                 | NR                             |
| 395               | 1861                                 | NR                             | 525               | 61876                                | NR                             | 655               | 56611                                | NR                             | 785               | 2804                                 | NR                             | 915               | 2662                                 | NR                             |
| 400               | 1717                                 | NR                             | 530               | 65398                                | NR                             | 660               | 49763                                | NR                             | 790               | 2581                                 | NR                             | 920               | 3047                                 | NR                             |
| 405               | 1761                                 | NR                             | 535               | 69597                                | NR                             | 665               | 42891                                | NR                             | 795               | 2711                                 | NR                             | 925               | 2256                                 | NR                             |
| 410               | 2680                                 | NR                             | 540               | 74214                                | NR                             | 670               | 36939                                | NR                             | 800               | 2609                                 | NR                             | 930               | 2976                                 | NR                             |
| 415               | 4374                                 | NR                             | 545               | 79911                                | NR                             | 675               | 31946                                | NR                             | 805               | 2581                                 | NR                             | 935               | 3503                                 | NR                             |
| 420               | 8071                                 | NR                             | 550               | 86153                                | NR                             | 680               | 27385                                | NR                             | 810               | 2404                                 | NR                             | 940               | 4226                                 | NR                             |
| 425               | 15169                                | NR                             | 555               | 93952                                | NR                             | 685               | 23504                                | NR                             | 815               | 2556                                 | NR                             | 945               | 2930                                 | NR                             |
| 430               | 26038                                | NR                             | 560               | 102904                               | NR                             | 690               | 20210                                | NR                             | 820               | 2742                                 | NR                             | 950               | 2115                                 | NR                             |
| 435               | 41316                                | NR                             | 565               | 112009                               | NR                             | 695               | 17459                                | NR                             | 825               | 2014                                 | NR                             | 955               | 2634                                 | NR                             |
| 440               | 59674                                | NR                             | 570               | 121662                               | NR                             | 700               | 15207                                | NR                             | 830               | 2488                                 | NR                             | 960               | 4200                                 | NR                             |
| 445               | 72751                                | NR                             | 575               | 130476                               | NR                             | 705               | 13322                                | NR                             | 835               | 2625                                 | NR                             | 965               | 1982                                 | NR                             |
| 450               | 65091                                | NR                             | 580               | 137926                               | NR                             | 710               | 11676                                | NR                             | 840               | 2754                                 | NR                             | 970               | 3613                                 | NR                             |
| 455               | 44894                                | NR                             | 585               | 143406                               | NR                             | 715               | 10626                                | NR                             | 845               | 2708                                 | NR                             | 975               | 4034                                 | NR                             |
| 460               | 32712                                | NR                             | 590               | 147039                               | NR                             | 720               | 9416                                 | NR                             | 850               | 2608                                 | NR                             | 980               | 3922                                 | NR                             |
| 465               | 25296                                | NR                             | 595               | 147365                               | NR                             | 725               | 8333                                 | NR                             | 855               | 2605                                 | NR                             | 985               | 1909                                 | NR                             |
| 470               | 19318                                | NR                             | 600               | 145800                               | NR                             | 730               | 7134                                 | NR                             | 860               | 1765                                 | NR                             | 990               | 3617                                 | NR                             |
| 475               | 17265                                | NR                             | 605               | 141363                               | NR                             | 735               | 6437                                 | NR                             | 865               | 2581                                 | NR                             | 995               | 4767                                 | NR                             |
| 480               | 18260                                | NR                             | 610               | 134199                               | NR                             | 740               | 5834                                 | NR                             | 870               | 3016                                 | NR                             | 1000              | 2528                                 | NR                             |
| 485               | 20845                                | NR                             | 615               | 127683                               | NR                             | 745               | 5500                                 | NR                             | 875               | 3952                                 | NR                             |                   |                                      |                                |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 8494.8

S/P: 1.23

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 2397          | NR            | 490    | 24908         | NR            | 620    | 118784        | NR            | 750    | 5037          | NR            | 880    | 2677          | NR            |
| 365    | 2084          | NR            | 495    | 30998         | NR            | 625    | 108951        | NR            | 755    | 4413          | NR            | 885    | 2940          | NR            |
| 370    | 2143          | NR            | 500    | 37103         | NR            | 630    | 99573         | NR            | 760    | 4189          | NR            | 890    | 3116          | NR            |
| 375    | 2413          | NR            | 505    | 42987         | NR            | 635    | 90444         | NR            | 765    | 3677          | NR            | 895    | 3345          | NR            |
| 380    | 2172          | NR            | 510    | 48702         | NR            | 640    | 80749         | NR            | 770    | 3366          | NR            | 900    | 2312          | NR            |
| 385    | 1997          | NR            | 515    | 53741         | NR            | 645    | 71664         | NR            | 775    | 3211          | NR            | 905    | 2829          | NR            |
| 390    | 1830          | NR            | 520    | 57283         | NR            | 650    | 63936         | NR            | 780    | 2682          | NR            | 910    | 2783          | NR            |
| 395    | 1861          | NR            | 525    | 61876         | NR            | 655    | 56611         | NR            | 785    | 2804          | NR            | 915    | 2662          | NR            |
| 400    | 1717          | NR            | 530    | 65398         | NR            | 660    | 49763         | NR            | 790    | 2581          | NR            | 920    | 3047          | NR            |
| 405    | 1761          | NR            | 535    | 69597         | NR            | 665    | 42891         | NR            | 795    | 2711          | NR            | 925    | 2256          | NR            |
| 410    | 2680          | NR            | 540    | 74214         | NR            | 670    | 36939         | NR            | 800    | 2609          | NR            | 930    | 2976          | NR            |
| 415    | 4374          | NR            | 545    | 79911         | NR            | 675    | 31946         | NR            | 805    | 2581          | NR            | 935    | 3503          | NR            |
| 420    | 8071          | NR            | 550    | 86153         | NR            | 680    | 27385         | NR            | 810    | 2404          | NR            | 940    | 4226          | NR            |
| 425    | 15169         | NR            | 555    | 93952         | NR            | 685    | 23504         | NR            | 815    | 2556          | NR            | 945    | 2930          | NR            |
| 430    | 26038         | NR            | 560    | 102904        | NR            | 690    | 20210         | NR            | 820    | 2742          | NR            | 950    | 2115          | NR            |
| 435    | 41316         | NR            | 565    | 112009        | NR            | 695    | 17459         | NR            | 825    | 2014          | NR            | 955    | 2634          | NR            |
| 440    | 59674         | NR            | 570    | 121662        | NR            | 700    | 15207         | NR            | 830    | 2488          | NR            | 960    | 4200          | NR            |
| 445    | 72751         | NR            | 575    | 130476        | NR            | 705    | 13322         | NR            | 835    | 2625          | NR            | 965    | 1982          | NR            |
| 450    | 65091         | NR            | 580    | 137926        | NR            | 710    | 11676         | NR            | 840    | 2754          | NR            | 970    | 3613          | NR            |
| 455    | 44894         | NR            | 585    | 143406        | NR            | 715    | 10626         | NR            | 845    | 2708          | NR            | 975    | 4034          | NR            |
| 460    | 32712         | NR            | 590    | 147039        | NR            | 720    | 9416          | NR            | 850    | 2608          | NR            | 980    | 3922          | NR            |
| 465    | 25296         | NR            | 595    | 147365        | NR            | 725    | 8333          | NR            | 855    | 2605          | NR            | 985    | 1909          | NR            |
| 470    | 19318         | NR            | 600    | 145800        | NR            | 730    | 7134          | NR            | 860    | 1765          | NR            | 990    | 3617          | NR            |
| 475    | 17265         | NR            | 605    | 141363        | NR            | 735    | 6437          | NR            | 865    | 2581          | NR            | 995    | 4767          | NR            |
| 480    | 18260         | NR            | 610    | 134199        | NR            | 740    | 5834          | NR            | 870    | 3016          | NR            | 1000   | 2528          | NR            |
| 485    | 20845         | NR            | 615    | 127683        | NR            | 745    | 5500          | NR            | 875    | 3952          | NR            |        |               |               |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 3101.5 M/P: 0.45**

| $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) |
|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|
| 360            | 2397                              | NR                          | 490            | 24908                             | NR                          | 620            | 118784                            | NR                          | 750            | 5037                              | NR                          | 880            | 2677                              | NR                          |
| 365            | 2084                              | NR                          | 495            | 30998                             | NR                          | 625            | 108951                            | NR                          | 755            | 4413                              | NR                          | 885            | 2940                              | NR                          |
| 370            | 2143                              | NR                          | 500            | 37103                             | NR                          | 630            | 99573                             | NR                          | 760            | 4189                              | NR                          | 890            | 3116                              | NR                          |
| 375            | 2413                              | NR                          | 505            | 42987                             | NR                          | 635            | 90444                             | NR                          | 765            | 3677                              | NR                          | 895            | 3345                              | NR                          |
| 380            | 2172                              | NR                          | 510            | 48702                             | NR                          | 640            | 80749                             | NR                          | 770            | 3366                              | NR                          | 900            | 2312                              | NR                          |
| 385            | 1997                              | NR                          | 515            | 53741                             | NR                          | 645            | 71664                             | NR                          | 775            | 3211                              | NR                          | 905            | 2829                              | NR                          |
| 390            | 1830                              | NR                          | 520            | 57283                             | NR                          | 650            | 63936                             | NR                          | 780            | 2682                              | NR                          | 910            | 2783                              | NR                          |
| 395            | 1861                              | NR                          | 525            | 61876                             | NR                          | 655            | 56611                             | NR                          | 785            | 2804                              | NR                          | 915            | 2662                              | NR                          |
| 400            | 1717                              | NR                          | 530            | 65398                             | NR                          | 660            | 49763                             | NR                          | 790            | 2581                              | NR                          | 920            | 3047                              | NR                          |
| 405            | 1761                              | NR                          | 535            | 69597                             | NR                          | 665            | 42891                             | NR                          | 795            | 2711                              | NR                          | 925            | 2256                              | NR                          |
| 410            | 2680                              | NR                          | 540            | 74214                             | NR                          | 670            | 36939                             | NR                          | 800            | 2609                              | NR                          | 930            | 2976                              | NR                          |
| 415            | 4374                              | NR                          | 545            | 79911                             | NR                          | 675            | 31946                             | NR                          | 805            | 2581                              | NR                          | 935            | 3503                              | NR                          |
| 420            | 8071                              | NR                          | 550            | 86153                             | NR                          | 680            | 27385                             | NR                          | 810            | 2404                              | NR                          | 940            | 4226                              | NR                          |
| 425            | 15169                             | NR                          | 555            | 93952                             | NR                          | 685            | 23504                             | NR                          | 815            | 2556                              | NR                          | 945            | 2930                              | NR                          |
| 430            | 26038                             | NR                          | 560            | 102904                            | NR                          | 690            | 20210                             | NR                          | 820            | 2742                              | NR                          | 950            | 2115                              | NR                          |
| 435            | 41316                             | NR                          | 565            | 112009                            | NR                          | 695            | 17459                             | NR                          | 825            | 2014                              | NR                          | 955            | 2634                              | NR                          |
| 440            | 59674                             | NR                          | 570            | 121662                            | NR                          | 700            | 15207                             | NR                          | 830            | 2488                              | NR                          | 960            | 4200                              | NR                          |
| 445            | 72751                             | NR                          | 575            | 130476                            | NR                          | 705            | 13322                             | NR                          | 835            | 2625                              | NR                          | 965            | 1982                              | NR                          |
| 450            | 65091                             | NR                          | 580            | 137926                            | NR                          | 710            | 11676                             | NR                          | 840            | 2754                              | NR                          | 970            | 3613                              | NR                          |
| 455            | 44894                             | NR                          | 585            | 143406                            | NR                          | 715            | 10626                             | NR                          | 845            | 2708                              | NR                          | 975            | 4034                              | NR                          |
| 460            | 32712                             | NR                          | 590            | 147039                            | NR                          | 720            | 9416                              | NR                          | 850            | 2608                              | NR                          | 980            | 3922                              | NR                          |
| 465            | 25296                             | NR                          | 595            | 147365                            | NR                          | 725            | 8333                              | NR                          | 855            | 2605                              | NR                          | 985            | 1909                              | NR                          |
| 470            | 19318                             | NR                          | 600            | 145800                            | NR                          | 730            | 7134                              | NR                          | 860            | 1765                              | NR                          | 990            | 3617                              | NR                          |
| 475            | 17265                             | NR                          | 605            | 141363                            | NR                          | 735            | 6437                              | NR                          | 865            | 2581                              | NR                          | 995            | 4767                              | NR                          |
| 480            | 18260                             | NR                          | 610            | 134199                            | NR                          | 740            | 5834                              | NR                          | 870            | 3016                              | NR                          | 1000           | 2528                              | NR                          |
| 485            | 20845                             | NR                          | 615            | 127683                            | NR                          | 745            | 5500                              | NR                          | 875            | 3952                              | NR                          |                |                                   |                             |

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**Summary**

$R_f = 75.7$   
 $R_g = 93.9$   
 CIE  $R_a = 71.8$   
 $R_9 = -38.3$



**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 67 | CES51 = 87 | CES76 = 63 |
| CES02 = 63 | CES27 = 88 | CES52 = 86 | CES77 = 80 |
| CES03 = 31 | CES28 = 87 | CES53 = 78 | CES78 = 67 |
| CES04 = 71 | CES29 = 66 | CES54 = 84 | CES79 = 87 |
| CES05 = 49 | CES30 = 73 | CES55 = 84 | CES80 = 86 |
| CES06 = 51 | CES31 = 70 | CES56 = 75 | CES81 = 71 |
| CES07 = 41 | CES32 = 65 | CES57 = 74 | CES82 = 94 |
| CES08 = 40 | CES33 = 73 | CES58 = 76 | CES83 = 90 |
| CES09 = 29 | CES34 = 79 | CES59 = 85 | CES84 = 89 |
| CES10 = 76 | CES35 = 89 | CES60 = 93 | CES85 = 77 |
| CES11 = 59 | CES36 = 97 | CES61 = 84 | CES86 = 61 |
| CES12 = 65 | CES37 = 87 | CES62 = 91 | CES87 = 78 |
| CES13 = 43 | CES38 = 81 | CES63 = 77 | CES88 = 77 |
| CES14 = 74 | CES39 = 95 | CES64 = 72 | CES89 = 67 |
| CES15 = 71 | CES40 = 92 | CES65 = 68 | CES90 = 76 |
| CES16 = 47 | CES41 = 88 | CES66 = 69 | CES91 = 89 |
| CES17 = 50 | CES42 = 89 | CES67 = 67 | CES92 = 58 |
| CES18 = 56 | CES43 = 79 | CES68 = 72 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 81 | CES94 = 49 |
| CES20 = 66 | CES45 = 85 | CES70 = 66 | CES95 = 68 |
| CES21 = 87 | CES46 = 80 | CES71 = 67 | CES96 = 76 |
| CES22 = 79 | CES47 = 82 | CES72 = 88 | CES97 = 82 |
| CES23 = 92 | CES48 = 69 | CES73 = 59 | CES98 = 75 |
| CES24 = 91 | CES49 = 80 | CES74 = 95 | CES99 = 62 |
| CES25 = 73 | CES50 = 87 | CES75 = 69 |            |



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Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)