

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: P633600

Luminaire Tested: GWS-SA2F-722-U-T2R-W

Issue Date: 1/10/2023

### Test Information

Test Method: LM-79-2019  
Report Number: P633600  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-11)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA2F-722-U-T2R-W  
Description: GALLEON WALL SLIM LUMINAIRE. (2) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE II ROADWAY OPTICS  
Light Source: (32) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: -

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 12184.6 lumens  
Efficiency: N/A  
Efficacy: 97.9 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



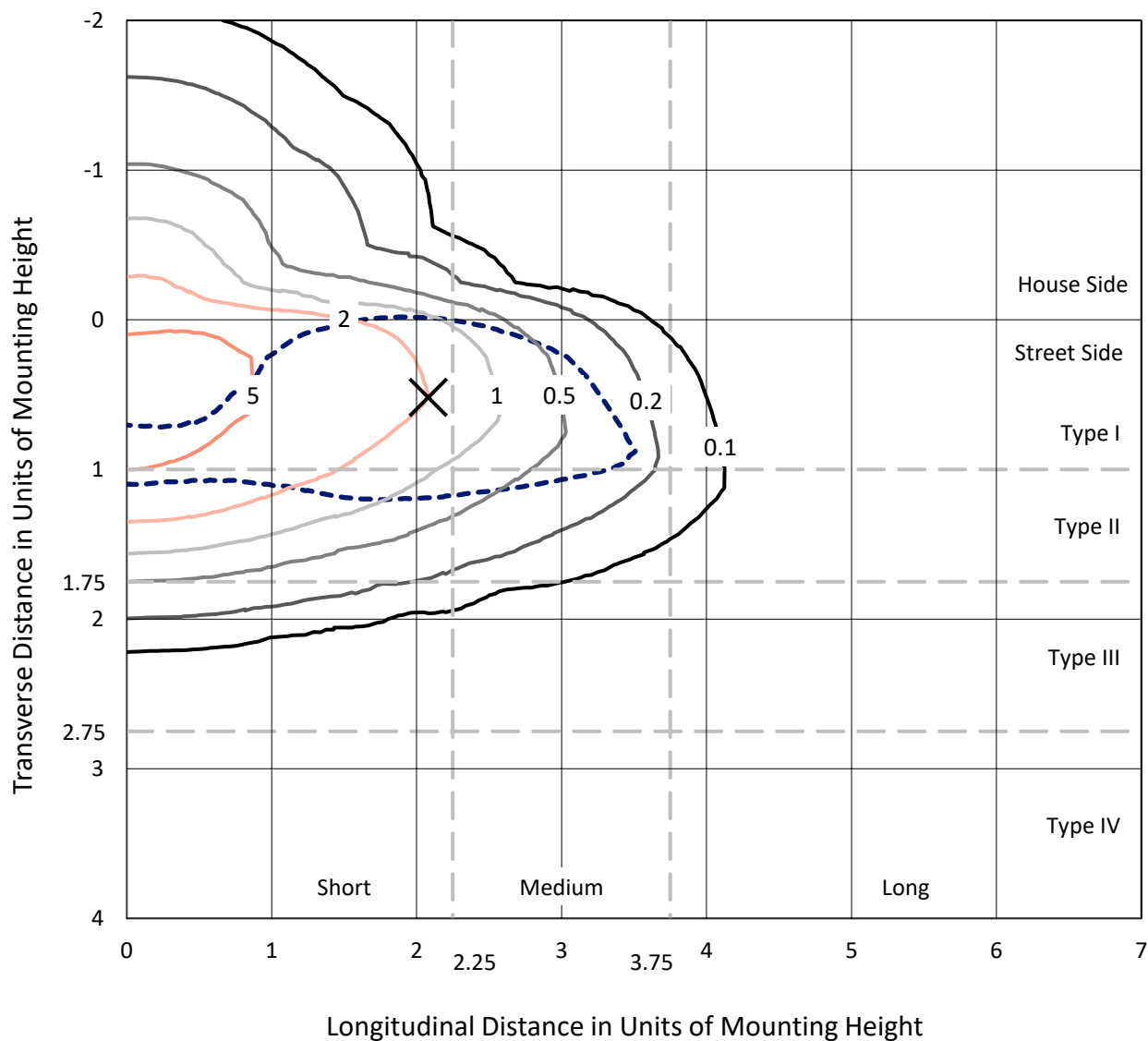
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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

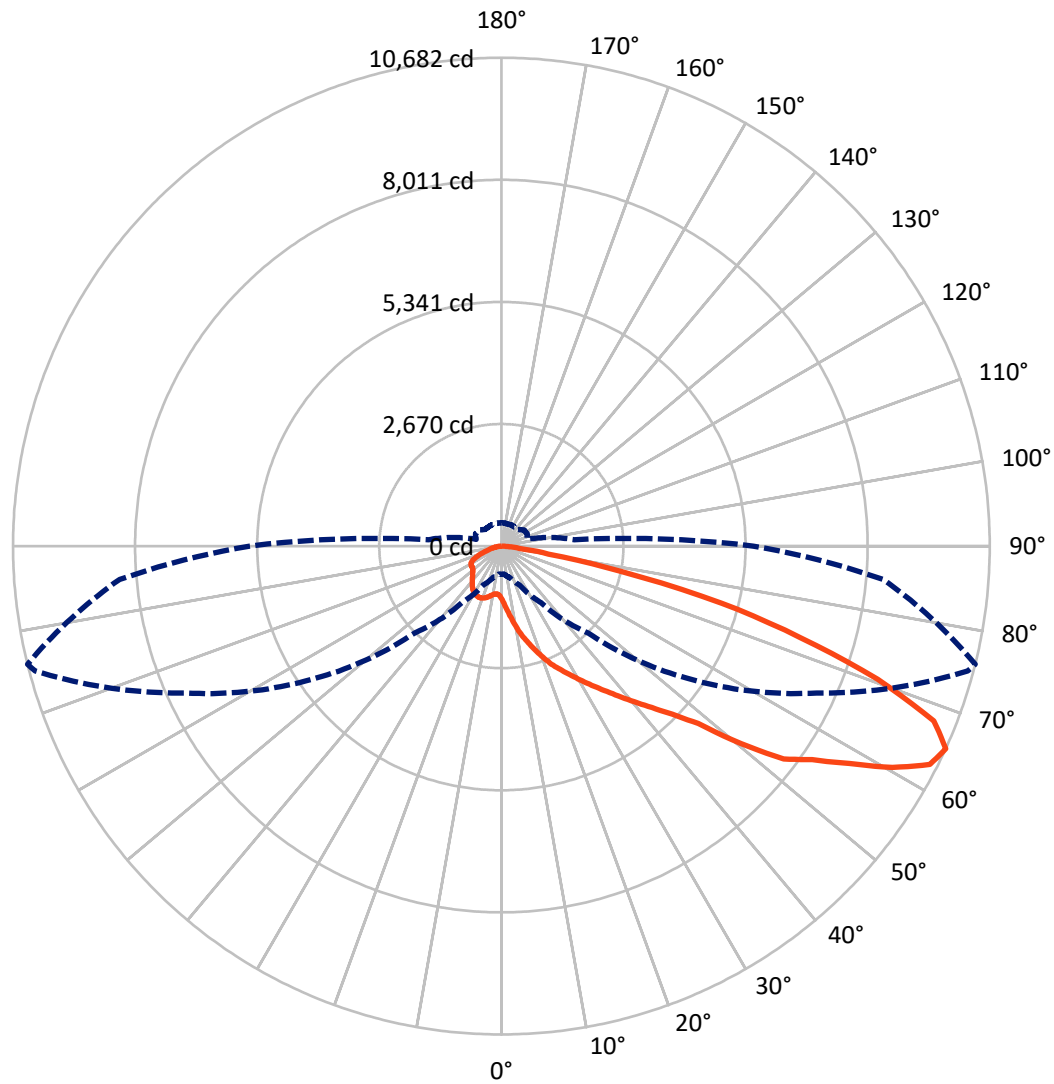


Based on 20 foot mounting height. Maximum calculated value = 7.5 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 76-Deg Lateral    - - - Horizontal Cone Through 65-Deg Vertical

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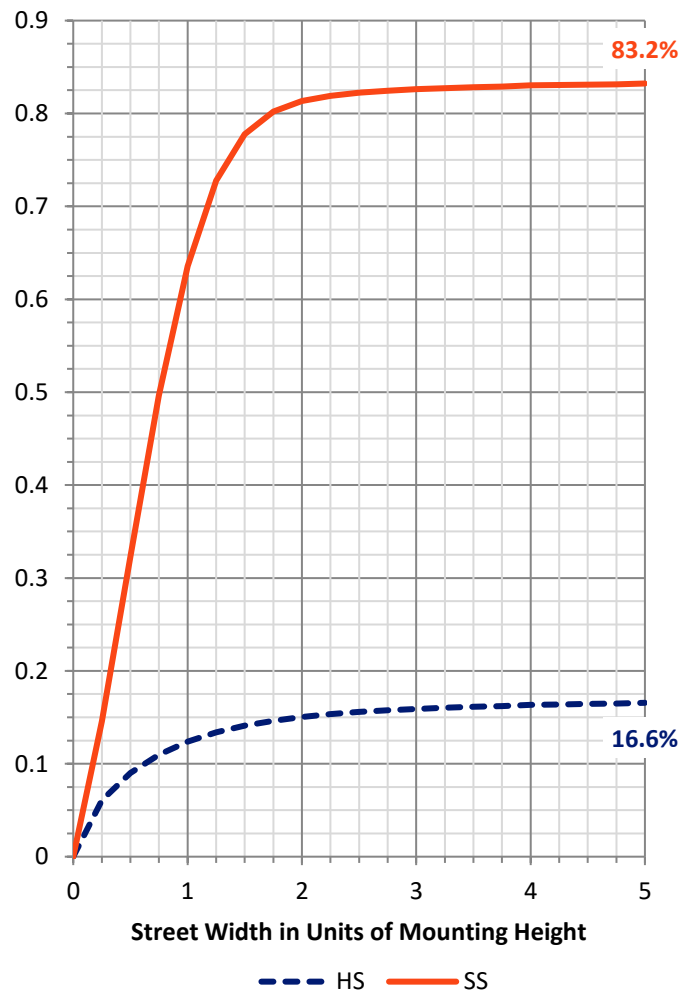
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2036.7   | 0.0    | 2036.7  |
|                    | % Fixture | 16.7     | 0.0    | 16.7    |
| <b>Street Side</b> | Lumens    | 10147.9  | 0.0    | 10147.9 |
|                    | % Fixture | 83.3     | 0.0    | 83.3    |
| <b>Total</b>       | Lumens    | 12184.6  | 0.0    | 12184.6 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 137.1   | 1.1       |
| 10°-20°   | 522.1   | 4.3       |
| 20°-30°   | 1017.6  | 8.4       |
| 30°-40°   | 1701.8  | 14.0      |
| 40°-50°   | 2436.7  | 20.0      |
| 50°-60°   | 2884.7  | 23.7      |
| 60°-70°   | 2398.6  | 19.7      |
| 70°-80°   | 981.6   | 8.1       |
| 80°-90°   | 104.5   | 0.9       |
| 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°    | 12184.6 | 100.0     |
| 0°-180°   | 12184.6 | 100.0     |

**Coefficient of Utilization**



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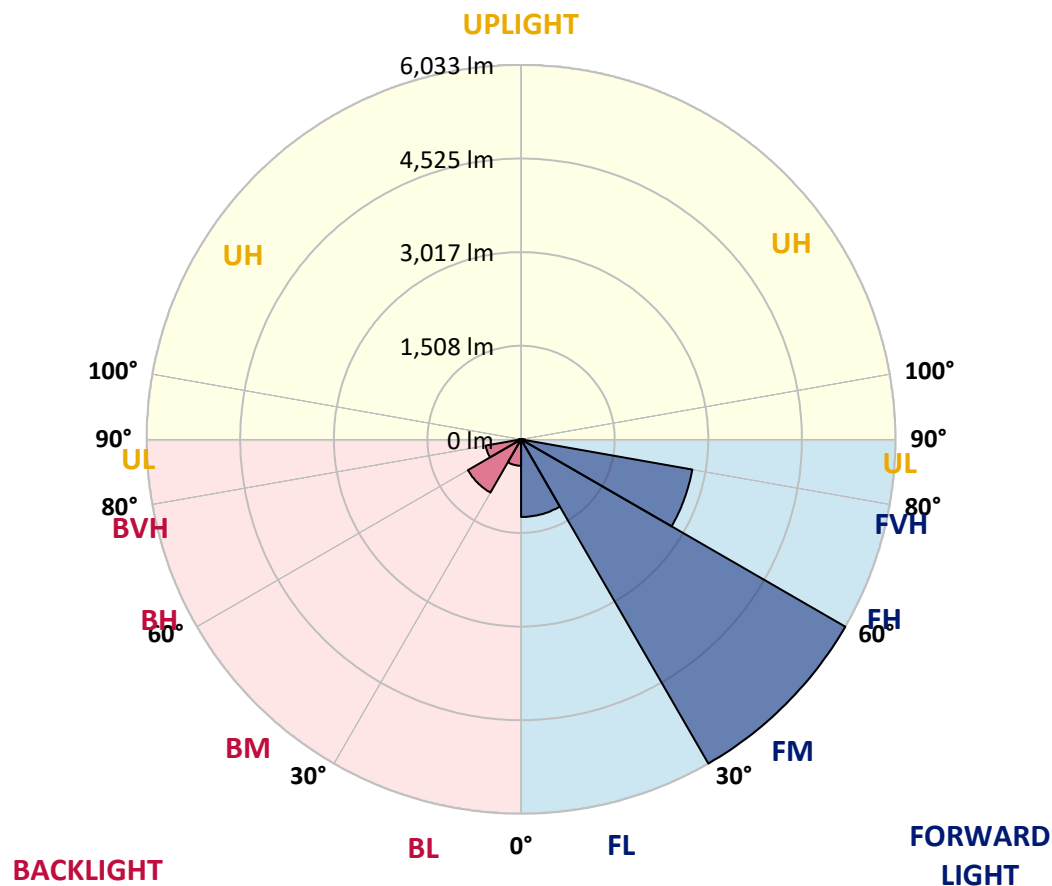
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1250.7 | 10.3      |                         |      |         |
| FM   | (30°-60°)   | 6033.3 | 49.5      |                         |      |         |
| FH   | (60°-80°)   | 2801.6 | 23.0      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 62.3   | 0.5       |                         |      | G1/100  |
| BL   | (0°-30°)    | 426.1  | 3.5       | B1/500                  |      |         |
| BM   | (30°-60°)   | 989.8  | 8.1       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 578.6  | 4.7       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 42.2   | 0.3       |                         |      | 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°    | 75°     | 76°     | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--------|
| 0°    | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8  | 1153.8  | 1153.8 |
| 2.5°  | 1617.3 | 1623.3 | 1603.6 | 1596.7 | 1550.4 | 1487.9 | 1435.7 | 1356.9 | 1284.0  | 1272.9  | 1207.8 |
| 5°    | 2054.1 | 2028.4 | 2006.2 | 1991.6 | 1927.3 | 1856.2 | 1745.7 | 1597.6 | 1442.5  | 1423.7  | 1283.2 |
| 7.5°  | 2313.7 | 2309.4 | 2282.0 | 2273.4 | 2223.7 | 2152.6 | 2038.7 | 1854.5 | 1629.2  | 1598.4  | 1385.1 |
| 10°   | 2521.8 | 2519.3 | 2505.5 | 2513.3 | 2467.9 | 2398.5 | 2288.0 | 2097.8 | 1834.0  | 1803.1  | 1499.0 |
| 12.5° | 2703.4 | 2707.7 | 2705.1 | 2733.4 | 2710.3 | 2656.3 | 2541.5 | 2332.5 | 2038.7  | 2005.3  | 1637.8 |
| 15°   | 2836.2 | 2839.6 | 2852.5 | 2914.1 | 2927.0 | 2915.9 | 2799.4 | 2562.9 | 2240.9  | 2192.9  | 1780.9 |
| 17.5° | 2873.9 | 2880.7 | 2911.6 | 3010.9 | 3080.3 | 3126.6 | 3040.1 | 2797.6 | 2439.6  | 2387.3  | 1926.5 |
| 20°   | 2924.4 | 2932.1 | 2963.0 | 3066.6 | 3168.6 | 3273.9 | 3258.5 | 3035.8 | 2640.0  | 2597.2  | 2073.8 |
| 22.5° | 3158.3 | 3152.3 | 3138.6 | 3188.3 | 3261.1 | 3392.1 | 3430.7 | 3264.5 | 2847.3  | 2806.2  | 2236.6 |
| 25°   | 3608.8 | 3597.7 | 3510.3 | 3464.9 | 3441.0 | 3520.6 | 3589.1 | 3472.6 | 3049.5  | 2987.8  | 2388.2 |
| 27.5° | 4105.7 | 4099.7 | 3988.3 | 3880.4 | 3733.1 | 3698.8 | 3739.0 | 3654.2 | 3245.6  | 3183.1  | 2520.1 |
| 30°   | 4575.9 | 4558.0 | 4441.5 | 4306.1 | 4109.1 | 3961.8 | 3902.7 | 3832.4 | 3460.7  | 3395.6  | 2674.3 |
| 32.5° | 4996.5 | 4973.4 | 4836.3 | 4686.4 | 4480.0 | 4306.1 | 4129.7 | 4021.7 | 3703.9  | 3628.5  | 2831.9 |
| 35°   | 5341.7 | 5318.6 | 5178.1 | 5018.8 | 4791.8 | 4663.3 | 4421.8 | 4227.3 | 3951.5  | 3875.2  | 3017.8 |
| 37.5° | 5609.0 | 5587.6 | 5441.1 | 5284.3 | 5086.5 | 4984.5 | 4774.7 | 4458.6 | 4236.7  | 4157.1  | 3214.8 |
| 40°   | 5758.9 | 5743.5 | 5626.1 | 5501.9 | 5335.7 | 5247.5 | 5153.3 | 4750.7 | 4556.2  | 4476.6  | 3446.9 |
| 42.5° | 5804.3 | 5794.0 | 5711.8 | 5647.5 | 5535.3 | 5468.5 | 5522.5 | 5094.2 | 4897.2  | 4827.8  | 3708.2 |
| 45°   | 5690.4 | 5690.4 | 5666.4 | 5698.9 | 5704.1 | 5703.2 | 5892.5 | 5482.2 | 5316.0  | 5239.8  | 4076.5 |
| 47.5° | 5399.1 | 5418.0 | 5453.1 | 5613.3 | 5782.0 | 5923.4 | 6325.1 | 5999.6 | 5854.8  | 5792.3  | 4598.2 |
| 50°   | 4866.3 | 4917.7 | 5037.6 | 5350.3 | 5709.2 | 6069.0 | 6734.6 | 6764.5 | 6902.5  | 6792.0  | 5365.7 |
| 52.5° | 4086.0 | 4078.3 | 4384.1 | 4829.5 | 5376.9 | 6075.0 | 6959.9 | 7439.5 | 7810.5  | 7734.2  | 5936.2 |
| 55°   | 3247.4 | 3234.5 | 3519.8 | 4133.9 | 4867.2 | 5845.4 | 7095.2 | 7748.8 | 8314.1  | 8245.6  | 6449.3 |
| 57.5° | 2486.7 | 2470.4 | 2724.0 | 3278.2 | 4147.6 | 5358.0 | 7069.5 | 8117.1 | 9007.1  | 8972.0  | 7146.6 |
| 60°   | 1711.5 | 1691.8 | 1929.1 | 2413.9 | 3296.2 | 4612.8 | 6785.1 | 8306.4 | 9818.3  | 9830.3  | 7892.7 |
| 62.5° | 1027.9 | 1016.8 | 1189.0 | 1565.0 | 2371.1 | 3689.4 | 6119.5 | 8191.6 | 10464.2 | 10518.2 | 8372.4 |
| 65°   | 620.2  | 612.5  | 713.5  | 933.7  | 1504.2 | 2692.3 | 5093.3 | 7604.9 | 10557.6 | 10681.8 | 8383.5 |
| 67.5° | 451.4  | 452.3  | 481.4  | 568.8  | 877.2  | 1738.9 | 3822.1 | 6553.0 | 10071.0 | 10199.5 | 7855.0 |
| 70°   | 392.3  | 394.0  | 409.5  | 429.2  | 530.2  | 995.4  | 2485.0 | 5173.0 | 8632.8  | 8732.2  | 6588.1 |
| 72.5° | 348.6  | 348.6  | 358.9  | 369.2  | 414.6  | 606.5  | 1331.2 | 3615.7 | 6813.4  | 6839.9  | 5028.2 |
| 75°   | 306.7  | 304.1  | 309.2  | 314.4  | 359.8  | 424.0  | 647.6  | 2519.3 | 5032.5  | 4970.8  | 3249.9 |
| 77.5° | 244.1  | 241.6  | 242.4  | 247.6  | 288.7  | 303.2  | 328.1  | 1573.6 | 2836.2  | 2676.9  | 1435.7 |
| 80°   | 173.9  | 172.2  | 181.6  | 194.4  | 213.3  | 185.9  | 205.6  | 761.5  | 1124.7  | 1046.8  | 556.8  |
| 82.5° | 103.6  | 107.1  | 121.6  | 131.9  | 147.3  | 116.5  | 132.8  | 254.4  | 398.3   | 388.0   | 226.1  |
| 85°   | 14.6   | 15.4   | 43.7   | 50.5   | 63.4   | 45.4   | 70.2   | 114.8  | 159.3   | 170.5   | 79.7   |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 6.0    | 20.6   | 45.4    | 46.3    | 19.7   |
| 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-722-U-T2R-W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 | 1153.8 |
| 2.5°  | 1174.4 | 1134.1 | 1076.7 | 1028.8 | 988.5  | 956.0  | 928.6  | 908.0  | 902.0  | 893.4  | 893.4  |
| 5°    | 1217.2 | 1144.4 | 1041.6 | 968.8  | 926.8  | 902.0  | 884.9  | 876.3  | 872.0  | 866.9  | 864.3  |
| 7.5°  | 1276.3 | 1174.4 | 1035.6 | 962.0  | 929.4  | 914.0  | 902.9  | 897.7  | 894.3  | 889.1  | 889.1  |
| 10°   | 1357.7 | 1218.9 | 1054.5 | 985.9  | 960.2  | 944.8  | 932.0  | 923.4  | 915.7  | 908.0  | 906.3  |
| 12.5° | 1445.9 | 1277.2 | 1088.7 | 1018.5 | 991.1  | 972.2  | 954.2  | 941.4  | 932.0  | 922.6  | 920.0  |
| 15°   | 1543.6 | 1337.1 | 1125.6 | 1050.2 | 1015.9 | 990.2  | 968.8  | 949.1  | 936.3  | 922.6  | 920.8  |
| 17.5° | 1639.5 | 1398.0 | 1156.4 | 1071.6 | 1027.9 | 996.2  | 965.4  | 939.7  | 923.4  | 908.0  | 903.7  |
| 20°   | 1754.3 | 1458.8 | 1177.8 | 1077.6 | 1025.3 | 983.4  | 946.5  | 914.0  | 896.0  | 878.0  | 875.4  |
| 22.5° | 1859.7 | 1515.3 | 1188.1 | 1069.0 | 1005.6 | 956.0  | 913.1  | 878.0  | 858.3  | 840.3  | 836.9  |
| 25°   | 1961.6 | 1565.0 | 1183.8 | 1048.5 | 975.7  | 918.3  | 873.7  | 838.6  | 819.8  | 800.9  | 795.8  |
| 27.5° | 2060.1 | 1598.4 | 1166.7 | 1016.8 | 938.0  | 876.3  | 833.5  | 801.8  | 785.5  | 769.2  | 762.4  |
| 30°   | 2156.9 | 1629.2 | 1140.1 | 975.7  | 890.0  | 832.6  | 797.5  | 775.2  | 758.9  | 741.8  | 736.7  |
| 32.5° | 2254.6 | 1651.5 | 1099.9 | 927.7  | 841.2  | 794.1  | 772.7  | 756.4  | 739.2  | 722.1  | 717.0  |
| 35°   | 2353.1 | 1660.9 | 1051.0 | 872.9  | 800.1  | 769.2  | 761.5  | 742.7  | 719.5  | 699.0  | 692.1  |
| 37.5° | 2470.4 | 1669.5 | 990.2  | 818.9  | 764.1  | 757.2  | 755.5  | 727.3  | 699.8  | 671.6  | 663.9  |
| 40°   | 2611.8 | 1680.6 | 927.7  | 770.1  | 735.0  | 752.9  | 746.1  | 707.5  | 652.7  | 625.3  | 616.8  |
| 42.5° | 2784.8 | 1701.2 | 862.6  | 725.5  | 713.5  | 736.7  | 729.0  | 659.6  | 622.7  | 607.3  | 603.0  |
| 45°   | 3039.2 | 1776.6 | 797.5  | 690.4  | 697.3  | 713.5  | 701.6  | 631.3  | 616.8  | 606.5  | 601.3  |
| 47.5° | 3492.3 | 1892.2 | 741.0  | 663.9  | 684.4  | 693.0  | 646.7  | 623.6  | 612.5  | 598.8  | 592.8  |
| 50°   | 3963.5 | 1942.8 | 695.6  | 647.6  | 669.9  | 674.1  | 616.8  | 613.3  | 605.6  | 591.1  | 585.1  |
| 52.5° | 4282.1 | 1935.9 | 668.1  | 641.6  | 657.9  | 641.6  | 603.0  | 602.2  | 597.0  | 579.9  | 573.1  |
| 55°   | 4641.9 | 1947.9 | 656.2  | 643.3  | 652.7  | 586.8  | 585.9  | 588.5  | 585.9  | 567.1  | 563.6  |
| 57.5° | 5127.6 | 1984.7 | 650.2  | 649.3  | 649.3  | 560.2  | 569.6  | 573.1  | 567.9  | 559.4  | 556.8  |
| 60°   | 5594.4 | 1987.3 | 639.0  | 656.2  | 646.7  | 543.9  | 550.8  | 554.2  | 548.2  | 546.5  | 545.7  |
| 62.5° | 5770.0 | 1864.0 | 614.2  | 651.0  | 636.5  | 526.0  | 531.1  | 532.8  | 526.8  | 531.1  | 530.2  |
| 65°   | 5508.8 | 1601.8 | 573.1  | 626.2  | 604.8  | 509.7  | 506.2  | 510.5  | 500.3  | 511.4  | 512.2  |
| 67.5° | 4891.2 | 1272.9 | 510.5  | 579.1  | 560.2  | 491.7  | 484.8  | 484.8  | 467.7  | 484.8  | 484.0  |
| 70°   | 3943.8 | 899.4  | 418.9  | 503.7  | 511.4  | 470.3  | 466.8  | 447.1  | 419.7  | 445.4  | 442.9  |
| 72.5° | 2989.5 | 645.9  | 329.8  | 398.3  | 440.3  | 440.3  | 441.1  | 407.7  | 376.0  | 388.0  | 377.8  |
| 75°   | 1893.9 | 454.9  | 263.8  | 304.9  | 345.2  | 386.3  | 406.0  | 344.4  | 316.1  | 310.9  | 305.8  |
| 77.5° | 853.2  | 299.0  | 205.6  | 233.9  | 245.0  | 304.9  | 370.9  | 296.4  | 257.8  | 246.7  | 243.3  |
| 80°   | 357.2  | 185.9  | 146.5  | 165.3  | 150.8  | 256.1  | 327.2  | 230.4  | 189.3  | 173.9  | 162.8  |
| 82.5° | 156.8  | 110.5  | 93.4   | 89.1   | 94.2   | 190.2  | 244.1  | 153.3  | 118.2  | 160.2  | 161.9  |
| 85°   | 66.0   | 58.2   | 48.0   | 43.7   | 38.5   | 72.8   | 114.8  | 60.0   | 73.7   | 42.0   | 34.3   |
| 87.5° | 15.4   | 17.1   | 12.8   | 8.6    | 5.1    | 0.9    | 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)