

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: P640637

Luminaire Tested: GWS-SA5E-730-U-T2R-W-GRSBK

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P640637  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-12)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA5E-730-U-T2R-W-GRSBK  
Description: GALLEON WALL SLIM LUMINAIRE. (5) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II ROADWAY OPTICS W/ FACTORY INSTALLED GLARE SHIELD, BK  
Light Source: (80) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

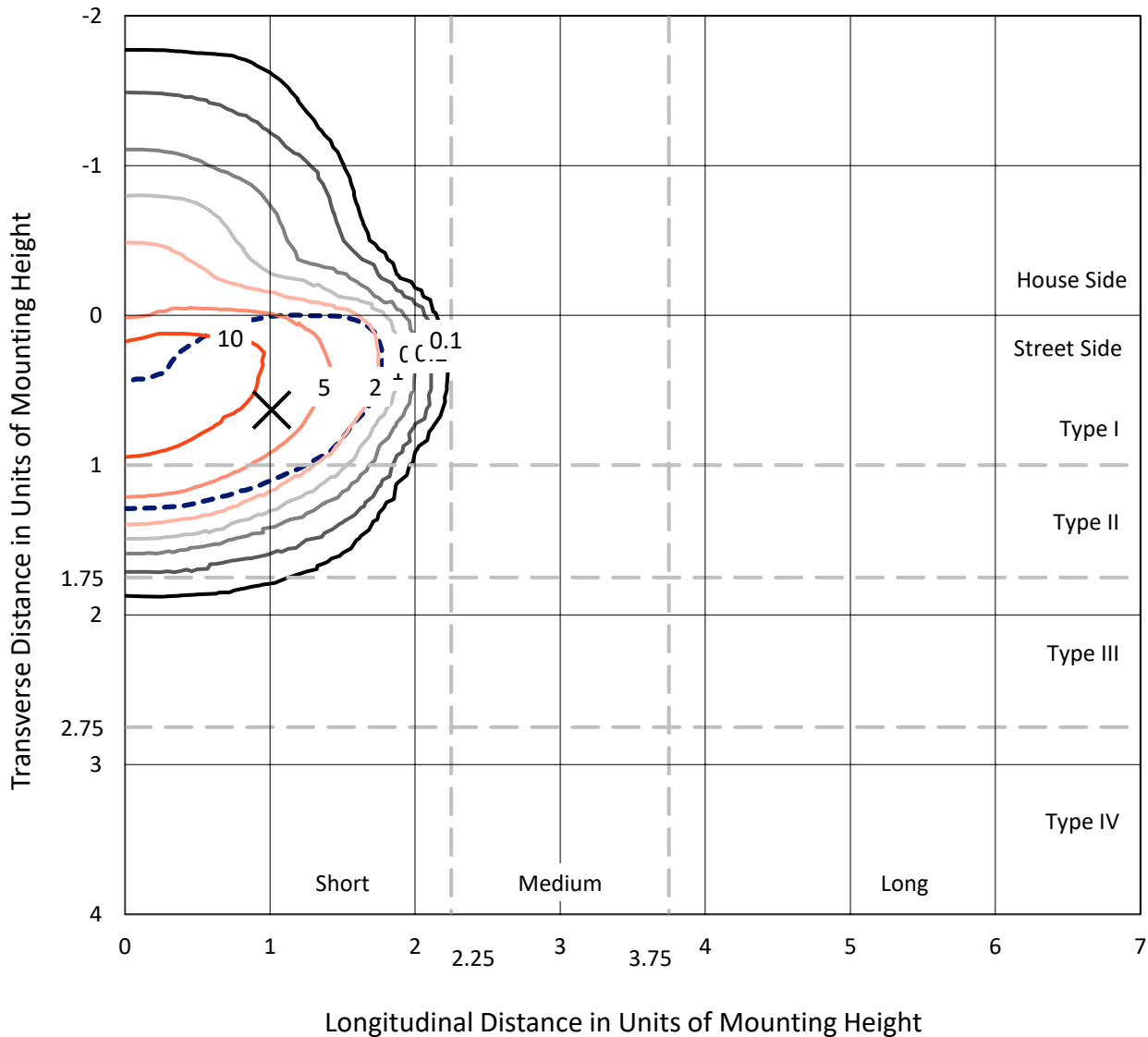
Lumens per Lamp: N/A  
Luminaire Lumens: 22915.9 lumens  
Efficiency: N/A  
Efficacy: 85.0 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G1  
  
Input Watts (W): 269.6  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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### Iso-Footcandle Lines of Horizontal Illumination

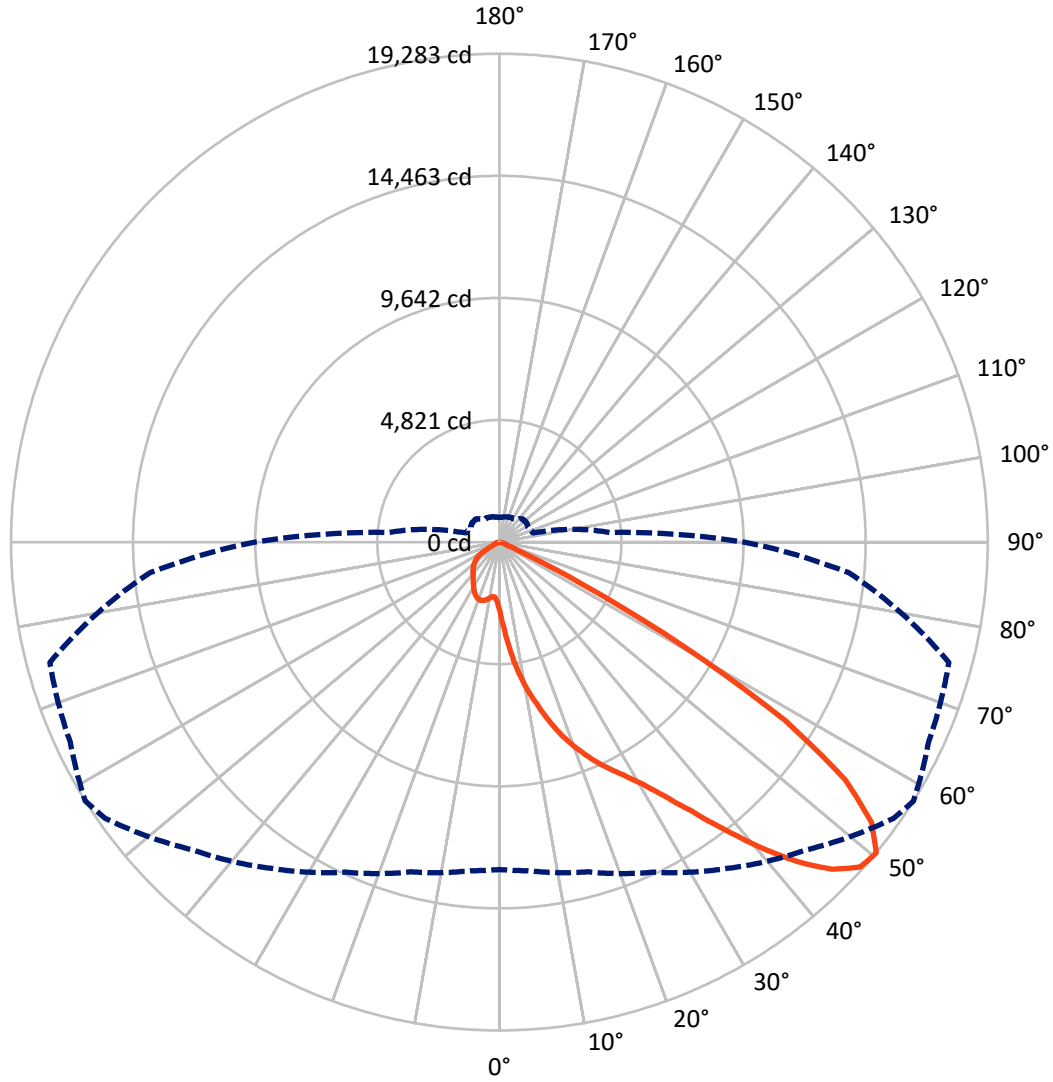
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 13.5 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 58-Deg Lateral    - - - Horizontal Cone Through 50-Deg Vertical

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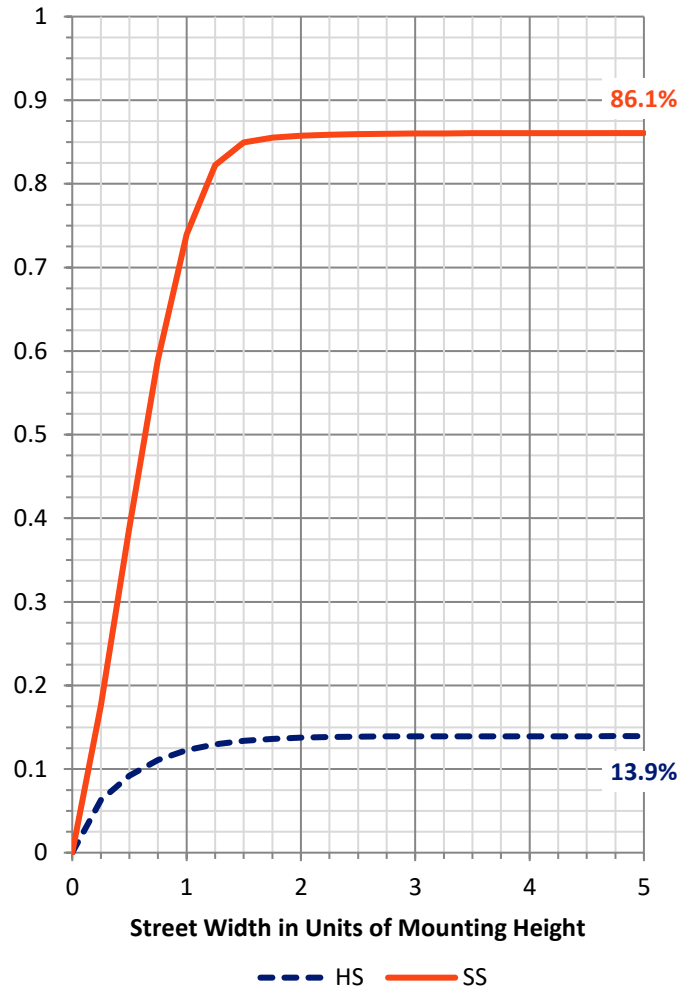
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3209.7   | 0.0    | 3209.7  |
|                    | % Fixture | 14.0     | 0.0    | 14.0    |
| <b>Street Side</b> | Lumens    | 19706.2  | 0.0    | 19706.2 |
|                    | % Fixture | 86.0     | 0.0    | 86.0    |
| <b>Total</b>       | Lumens    | 22915.9  | 0.0    | 22915.9 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 339.1   | 1.5       |
| 10°-20°   | 1342.4  | 5.9       |
| 20°-30°   | 2716.4  | 11.9      |
| 30°-40°   | 4805.7  | 21.0      |
| 40°-50°   | 7005.6  | 30.6      |
| 50°-60°   | 5615.2  | 24.5      |
| 60°-70°   | 1011.6  | 4.4       |
| 70°-80°   | 79.7    | 0.3       |
| 80°-90°   | 0.1     | 0.0       |
| 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°    | 22915.9 | 100.0     |
| 0°-180°   | 22915.9 | 100.0     |

**Coefficient of Utilization**



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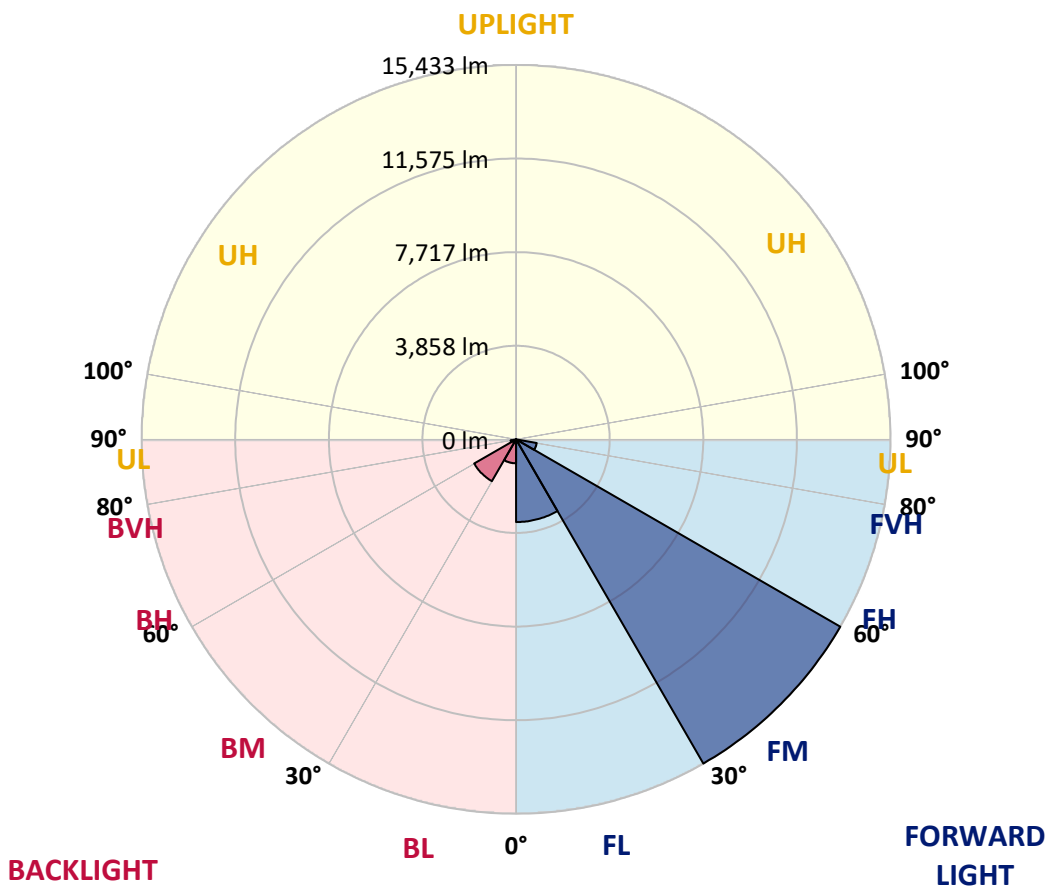
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|---------|-----------|-------------------------|------|---------|
|                |         |           | B                       | U    | G       |
| FL (0°-30°)    | 3409.8  | 14.9      |                         |      |         |
| FM (30°-60°)   | 15433.2 | 67.3      |                         |      |         |
| FH (60°-80°)   | 863.2   | 3.8       |                         |      | G1/1800 |
| FVH (80°-90°)  | 0.0     | 0.0       |                         |      | G0/10   |
| BL (0°-30°)    | 988.1   | 4.3       | B2/1000                 |      |         |
| BM (30°-60°)   | 1993.4  | 8.7       | B2/2500                 |      |         |
| BH (60°-80°)   | 228.1   | 1.0       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 0.1     | 0.0       |                         |      | G0/10   |
| UL (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G1**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 58°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2737.3  | 2737.3  | 2737.3  | 2737.3  | 2737.3  | 2737.3  | 2737.3  | 2737.3  | 2737.3  | 2737.3  | 2737.3  |
| 2.5°  | 4050.8  | 3987.0  | 3950.3  | 3920.9  | 3791.0  | 3585.2  | 3450.4  | 3379.3  | 3261.7  | 3063.2  | 2891.6  |
| 5°    | 5285.8  | 5239.3  | 5153.5  | 5094.7  | 4928.1  | 4636.4  | 4335.0  | 4214.9  | 3947.8  | 3499.4  | 3097.5  |
| 7.5°  | 6104.3  | 6070.0  | 6038.2  | 5959.7  | 5802.9  | 5538.2  | 5205.0  | 5080.0  | 4668.3  | 4031.2  | 3372.0  |
| 10°   | 6734.1  | 6707.2  | 6670.4  | 6667.9  | 6545.4  | 6307.7  | 5981.8  | 5851.9  | 5405.9  | 4609.5  | 3695.4  |
| 12.5° | 7287.9  | 7265.9  | 7258.5  | 7327.1  | 7248.7  | 7072.3  | 6719.4  | 6557.7  | 6084.7  | 5200.1  | 4053.2  |
| 15°   | 7667.8  | 7662.9  | 7694.7  | 7829.5  | 7873.6  | 7792.8  | 7496.2  | 7322.2  | 6778.2  | 5793.1  | 4447.7  |
| 17.5° | 7841.8  | 7856.5  | 7917.7  | 8150.5  | 8346.6  | 8415.2  | 8187.3  | 8040.3  | 7466.8  | 6393.5  | 4869.2  |
| 20°   | 8138.3  | 8133.4  | 8170.1  | 8390.7  | 8630.8  | 8875.9  | 8807.3  | 8682.3  | 8162.8  | 7028.2  | 5337.3  |
| 22.5° | 8973.9  | 8902.8  | 8824.4  | 8858.7  | 8944.5  | 9231.2  | 9358.7  | 9294.9  | 8880.8  | 7680.0  | 5820.1  |
| 25°   | 10258.0 | 10184.5 | 9932.1  | 9687.0  | 9525.3  | 9655.2  | 9829.2  | 9861.0  | 9593.9  | 8349.0  | 6324.9  |
| 27.5° | 11620.5 | 11554.3 | 11270.1 | 10902.5 | 10439.3 | 10213.9 | 10343.8 | 10407.5 | 10294.8 | 9145.5  | 6861.5  |
| 30°   | 12897.2 | 12809.0 | 12497.8 | 12042.0 | 11505.3 | 11159.8 | 11012.8 | 11056.9 | 11123.0 | 10088.9 | 7491.3  |
| 32.5° | 14004.9 | 13938.7 | 13566.2 | 13085.9 | 12568.9 | 12208.6 | 11865.6 | 11939.1 | 12100.8 | 11243.1 | 8297.6  |
| 35°   | 14943.5 | 14909.1 | 14514.6 | 14036.8 | 13490.3 | 13306.5 | 13012.4 | 13027.1 | 13188.9 | 12637.5 | 9280.2  |
| 37.5° | 15759.5 | 15700.7 | 15342.9 | 14899.3 | 14465.6 | 14436.2 | 14355.3 | 14362.7 | 14446.0 | 14262.2 | 10409.9 |
| 40°   | 16274.1 | 16220.2 | 15965.3 | 15690.9 | 15382.1 | 15387.0 | 15806.1 | 15837.9 | 15742.3 | 15857.5 | 11603.4 |
| 42.5° | 16467.7 | 16428.5 | 16291.3 | 16293.7 | 16261.9 | 16406.4 | 17193.1 | 17251.9 | 16908.8 | 17109.7 | 12622.8 |
| 45°   | 16132.0 | 16114.8 | 16124.6 | 16477.5 | 16859.8 | 17305.8 | 18327.7 | 18430.6 | 17945.4 | 17940.5 | 13419.2 |
| 47.5° | 15048.8 | 15014.5 | 15301.2 | 15901.6 | 16786.3 | 17653.8 | 19013.8 | 19173.1 | 18670.7 | 18415.9 | 13919.1 |
| 50°   | 12926.7 | 13024.7 | 13478.0 | 14379.8 | 15725.2 | 17175.9 | 19006.5 | 19283.4 | 18697.7 | 18374.2 | 13835.8 |
| 52.5° | 9363.6  | 9343.9  | 10336.4 | 11576.4 | 13213.4 | 15646.8 | 17996.8 | 18401.2 | 18043.4 | 17965.0 | 13649.6 |
| 55°   | 5094.7  | 5273.6  | 5942.6  | 7584.5  | 9628.2  | 12752.7 | 15690.9 | 16573.1 | 16987.2 | 17815.5 | 13985.3 |
| 57.5° | 1872.2  | 1950.6  | 2369.7  | 3531.2  | 5097.1  | 7930.0  | 11985.6 | 13316.3 | 14595.5 | 17398.9 | 13928.9 |
| 60°   | 754.8   | 769.5   | 936.1   | 1298.8  | 2141.8  | 4036.1  | 7189.9  | 8371.1  | 9576.8  | 13318.7 | 10689.3 |
| 62.5° | 548.9   | 568.5   | 634.7   | 759.7   | 1083.1  | 1764.4  | 3099.9  | 3604.8  | 3940.5  | 6596.9  | 5266.2  |
| 65°   | 443.5   | 458.3   | 512.2   | 568.5   | 715.6   | 948.4   | 999.8   | 963.1   | 958.2   | 1705.6  | 1208.1  |
| 67.5° | 367.6   | 382.3   | 421.5   | 460.7   | 514.6   | 473.0   | 343.1   | 360.2   | 294.1   | 291.6   | 237.7   |
| 70°   | 269.6   | 286.7   | 325.9   | 367.6   | 308.8   | 127.4   | 198.5   | 294.1   | 223.0   | 186.2   | 181.3   |
| 72.5° | 203.4   | 215.6   | 252.4   | 240.2   | 90.7    | 49.0    | 132.3   | 213.2   | 171.5   | 137.2   | 134.8   |
| 75°   | 151.9   | 159.3   | 127.4   | 39.2    | 9.8     | 12.3    | 49.0    | 88.2    | 95.6    | 78.4    | 78.4    |
| 77.5° | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 4.9     | 7.4     | 9.8     | 12.3    | 14.7    |
| 80°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 82.5° | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 85°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 87.5° | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 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     |



REPORT NUMBER: P640637  
 CATALOG NUMBER: GWS-SA5E-730-U-T2R-W-GRSBK

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2737.3 | 2737.3 | 2737.3 | 2737.3 | 2737.3 | 2737.3 | 2737.3 | 2737.3 | 2737.3 | 2737.3 | 2737.3 |
| 2.5°  | 2793.6 | 2690.7 | 2543.7 | 2421.1 | 2328.0 | 2237.4 | 2168.7 | 2100.1 | 2097.7 | 2063.4 | 2056.0 |
| 5°    | 2911.3 | 2725.0 | 2455.5 | 2261.9 | 2144.2 | 2073.2 | 2024.2 | 1999.6 | 1987.4 | 1975.1 | 1970.2 |
| 7.5°  | 3080.3 | 2813.2 | 2440.7 | 2234.9 | 2136.9 | 2090.3 | 2056.0 | 2041.3 | 2034.0 | 2024.2 | 2021.7 |
| 10°   | 3288.6 | 2940.7 | 2494.7 | 2286.4 | 2200.6 | 2156.5 | 2119.7 | 2097.7 | 2085.4 | 2068.3 | 2063.4 |
| 12.5° | 3538.6 | 3097.5 | 2580.4 | 2372.1 | 2281.5 | 2222.6 | 2173.6 | 2141.8 | 2124.6 | 2102.6 | 2097.7 |
| 15°   | 3808.2 | 3266.6 | 2676.0 | 2450.6 | 2342.7 | 2266.8 | 2205.5 | 2156.5 | 2124.6 | 2097.7 | 2090.3 |
| 17.5° | 4087.5 | 3438.1 | 2761.8 | 2504.5 | 2372.1 | 2281.5 | 2193.2 | 2127.1 | 2087.9 | 2053.6 | 2043.8 |
| 20°   | 4401.2 | 3614.6 | 2818.1 | 2514.3 | 2362.3 | 2242.3 | 2139.3 | 2056.0 | 2016.8 | 1970.2 | 1960.4 |
| 22.5° | 4729.6 | 3778.7 | 2842.6 | 2492.2 | 2308.4 | 2168.7 | 2058.5 | 1972.7 | 1916.3 | 1867.3 | 1852.6 |
| 25°   | 5048.1 | 3925.8 | 2830.4 | 2430.9 | 2227.6 | 2065.8 | 1953.1 | 1864.9 | 1803.6 | 1754.6 | 1742.3 |
| 27.5° | 5386.3 | 4048.3 | 2786.3 | 2340.3 | 2117.3 | 1953.1 | 1845.3 | 1769.3 | 1712.9 | 1659.0 | 1646.8 |
| 30°   | 5766.1 | 4161.0 | 2715.2 | 2230.0 | 1987.4 | 1837.9 | 1754.6 | 1703.1 | 1641.9 | 1585.5 | 1568.4 |
| 32.5° | 6224.4 | 4261.5 | 2612.3 | 2097.7 | 1872.2 | 1737.4 | 1690.9 | 1651.7 | 1580.6 | 1521.8 | 1509.5 |
| 35°   | 6748.8 | 4344.8 | 2482.4 | 1960.4 | 1759.5 | 1673.7 | 1663.9 | 1612.5 | 1519.3 | 1450.7 | 1436.0 |
| 37.5° | 7356.6 | 4425.7 | 2328.0 | 1825.7 | 1676.2 | 1644.3 | 1646.8 | 1558.6 | 1445.8 | 1362.5 | 1352.7 |
| 40°   | 8010.8 | 4506.6 | 2156.5 | 1708.0 | 1600.2 | 1627.2 | 1605.1 | 1480.1 | 1296.3 | 1215.5 | 1205.7 |
| 42.5° | 8692.1 | 4594.8 | 1982.5 | 1597.8 | 1536.5 | 1561.0 | 1529.1 | 1323.3 | 1191.0 | 1149.3 | 1144.4 |
| 45°   | 9307.2 | 4700.2 | 1793.8 | 1487.5 | 1472.8 | 1465.4 | 1411.5 | 1198.3 | 1142.0 | 1112.5 | 1110.1 |
| 47.5° | 9750.7 | 4683.0 | 1592.9 | 1382.1 | 1404.2 | 1379.7 | 1215.5 | 1139.5 | 1092.9 | 1053.7 | 1043.9 |
| 50°   | 9669.9 | 4384.0 | 1384.6 | 1264.5 | 1315.9 | 1293.9 | 1092.9 | 1070.9 | 1029.2 | 987.6  | 972.9  |
| 52.5° | 9464.0 | 3977.2 | 1203.2 | 1139.5 | 1220.4 | 1168.9 | 1009.6 | 987.6  | 950.8  | 896.9  | 879.7  |
| 55°   | 9574.3 | 3595.0 | 1061.1 | 1039.0 | 1122.4 | 968.0  | 916.5  | 882.2  | 843.0  | 784.2  | 776.8  |
| 57.5° | 9219.0 | 2933.3 | 852.8  | 867.5  | 992.5  | 825.8  | 803.8  | 749.9  | 683.7  | 644.5  | 639.6  |
| 60°   | 6381.2 | 1575.7 | 534.2  | 551.4  | 718.0  | 693.5  | 720.5  | 671.5  | 590.6  | 553.8  | 546.5  |
| 62.5° | 2930.9 | 632.2  | 291.6  | 279.4  | 377.4  | 470.5  | 617.5  | 612.6  | 512.2  | 453.4  | 448.5  |
| 65°   | 710.7  | 289.2  | 208.3  | 196.0  | 213.2  | 281.8  | 401.9  | 482.8  | 414.1  | 345.5  | 338.2  |
| 67.5° | 230.4  | 235.3  | 191.1  | 178.9  | 188.7  | 210.7  | 240.2  | 267.1  | 264.7  | 242.6  | 237.7  |
| 70°   | 183.8  | 213.2  | 176.4  | 161.7  | 161.7  | 169.1  | 161.7  | 129.9  | 112.7  | 122.5  | 127.4  |
| 72.5° | 137.2  | 161.7  | 139.7  | 125.0  | 120.1  | 117.6  | 100.5  | 73.5   | 51.5   | 46.6   | 44.1   |
| 75°   | 80.9   | 90.7   | 85.8   | 73.5   | 68.6   | 61.3   | 49.0   | 31.9   | 17.2   | 12.3   | 7.4    |
| 77.5° | 14.7   | 17.2   | 19.6   | 14.7   | 12.3   | 9.8    | 7.4    | 2.5    | 0.0    | 0.0    | 0.0    |
| 80°   | 0.0    | 2.5    | 2.5    | 2.5    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 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    |



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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  
 CIE u': 0.2508  
 CIE v': 0.5215  
 Duv: 0.0000  
 CIE x: 0.4374  
 CIE y: 0.4043  
 CIE z: 0.1583  
 Peak Wavelength (nm): 593  
 Dominant Wavelength (nm): 582  
 Purity: 53

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.8 |      |       |
| R1:       | 67.5 | R9:  | -38.3 |
| R2:       | 82.9 | R10: | 62.5  |
| R3:       | 94.7 | R11: | 63.7  |
| R4:       | 67.7 | R12: | 57.8  |
| R5:       | 67.9 | R13: | 70.4  |
| R6:       | 77.6 | R14: | 97.3  |
| R7:       | 76.0 |      |       |
| R8:       | 40.5 |      |       |

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            |

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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 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| $\lambda$<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**

| 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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**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)