

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: P633191

Luminaire Tested: GWS-SA2E-730-U-SL2-W-HSS

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P633191  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-30)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA2E-730-U-SL2-W-HSS  
Description: GALLEON WALL SLIM LUMINAIRE. (2) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: (32) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

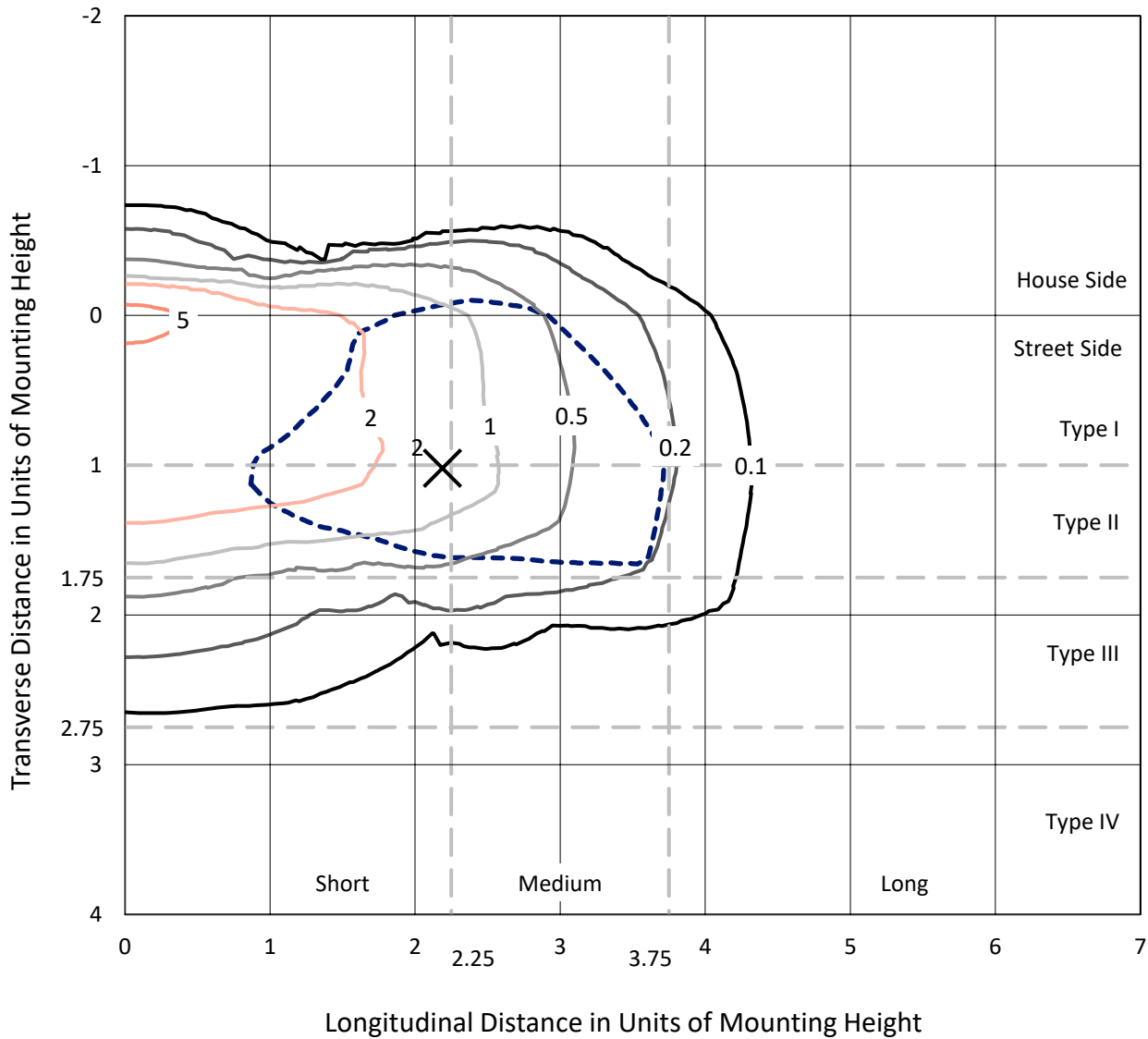
Lumens per Lamp: N/A  
Luminaire Lumens: 10532.7 lumens  
Efficiency: N/A  
Efficacy: 97.3 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G2  
  
Input Watts (W): 108.2  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P633191  
 CATALOG NUMBER: GWS-SA2E-730-U-SL2-W-HSS

### Iso-Footcandle Lines of Horizontal Illumination

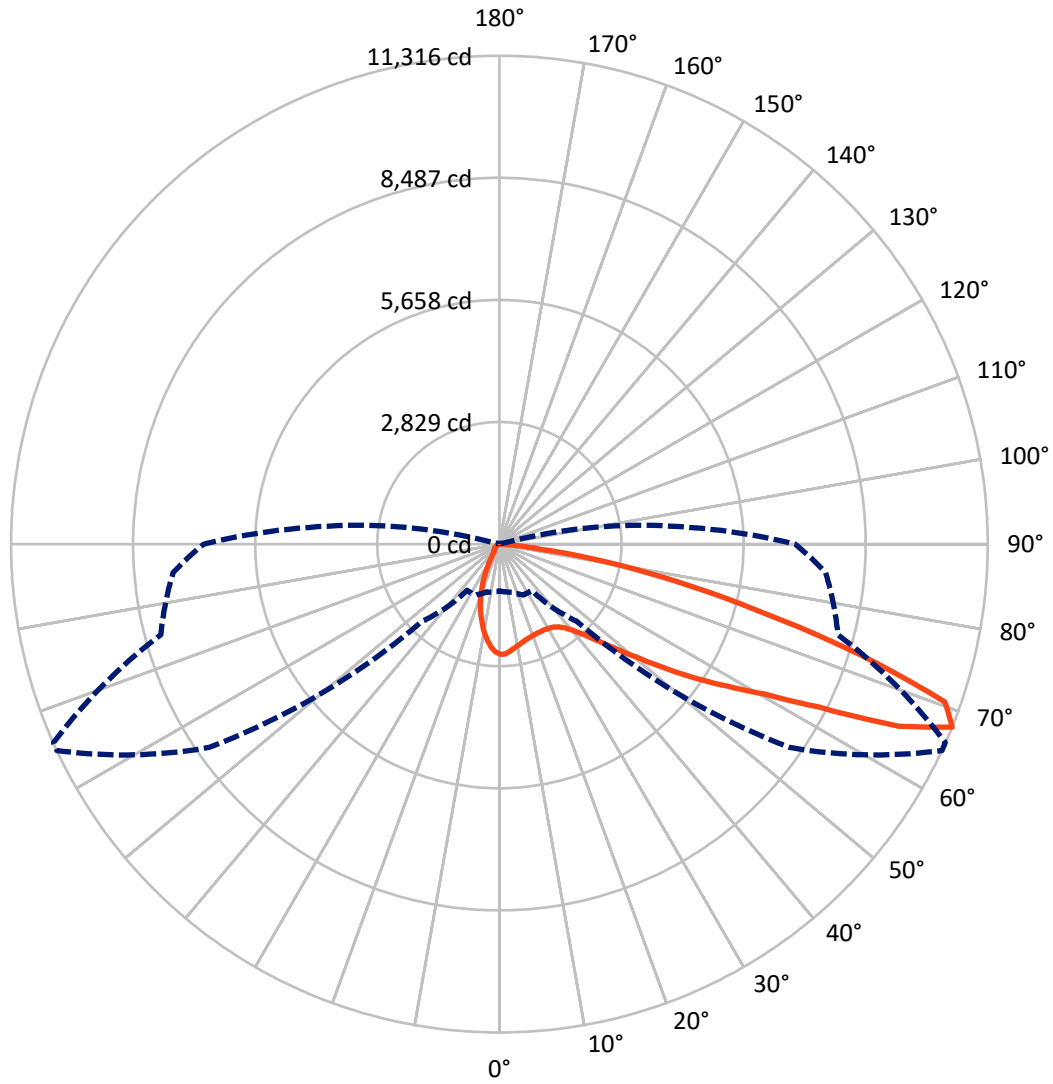
✕ Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 6.4 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 65-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1315.2   | 0.0    | 1315.2  |
|                    | % Fixture | 12.5     | 0.0    | 12.5    |
| <b>Street Side</b> | Lumens    | 9217.5   | 0.0    | 9217.5  |
|                    | % Fixture | 87.5     | 0.0    | 87.5    |
| <b>Total</b>       | Lumens    | 10532.7  | 0.0    | 10532.7 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 212.2   | 2.0       |
| 10°-20°   | 476.9   | 4.5       |
| 20°-30°   | 681.5   | 6.5       |
| 30°-40°   | 991.5   | 9.4       |
| 40°-50°   | 1552.9  | 14.7      |
| 50°-60°   | 2422.5  | 23.0      |
| 60°-70°   | 2661.0  | 25.3      |
| 70°-80°   | 1416.2  | 13.4      |
| 80°-90°   | 117.9   | 1.1       |
| 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°    | 10532.7 | 100.0     |
| 0°-180°   | 10532.7 | 100.0     |

**Coefficient of Utilization**



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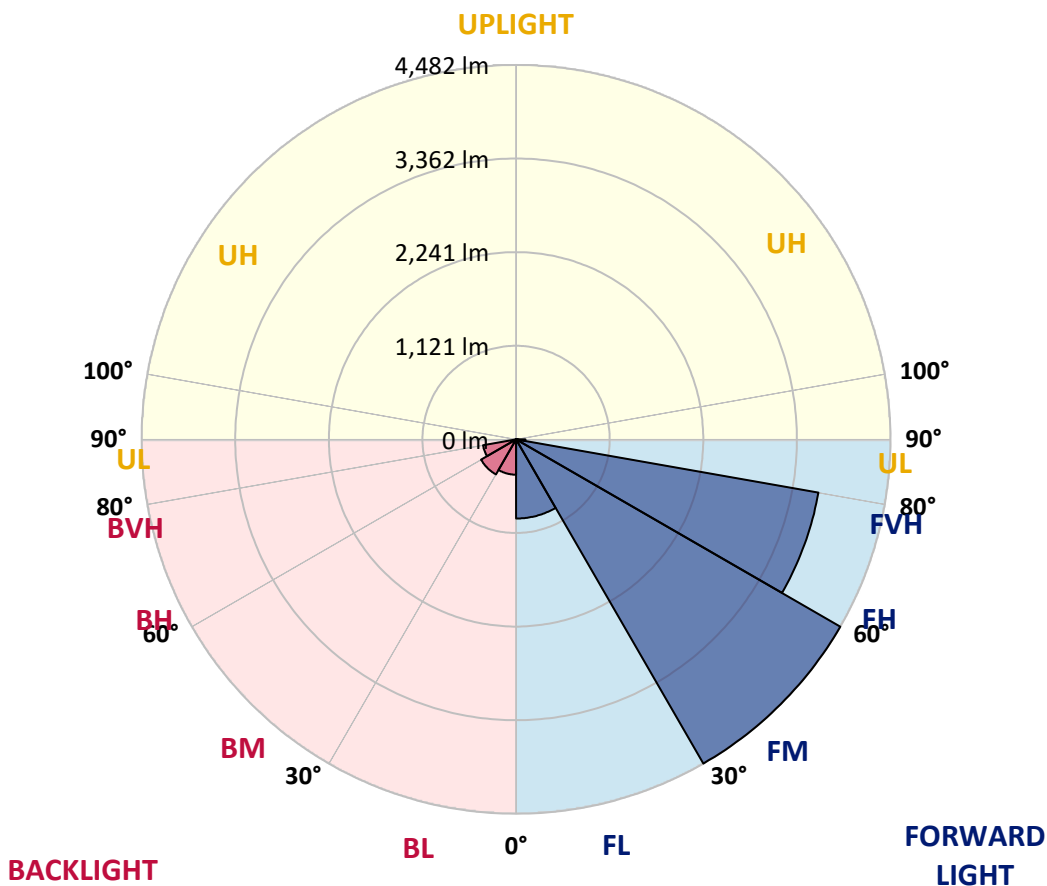
CATALOG NUMBER: GWS-SA2E-730-U-SL2-W-HSS

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 947.9  | 9.0       |                         |      |         |
| FM (30°-60°)   | 4482.5 | 42.6      |                         |      |         |
| FH (60°-80°)   | 3675.5 | 34.9      |                         |      | G2/5000 |
| FVH (80°-90°)  | 111.6  | 1.1       |                         |      | G2/225  |
| BL (0°-30°)    | 422.7  | 4.0       | B1/500                  |      |         |
| BM (30°-60°)   | 484.5  | 4.6       | B1/1000                 |      |         |
| BH (60°-80°)   | 401.7  | 3.8       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 6.3    | 0.1       |                         |      | G0/10   |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

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

Type II Short





REPORT NUMBER: P633191

CATALOG NUMBER: GWS-SA2E-730-U-SL2-W-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°     | 66°     | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|
| 0°    | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5  | 2554.5  | 2554.5 | 2554.5 |
| 2.5°  | 2465.9 | 2473.6 | 2463.1 | 2488.8 | 2493.6 | 2522.1 | 2538.3 | 2549.7  | 2548.8  | 2563.1 | 2563.1 |
| 5°    | 2321.2 | 2328.8 | 2323.1 | 2350.7 | 2372.6 | 2417.4 | 2454.5 | 2497.4  | 2499.3  | 2543.1 | 2559.3 |
| 7.5°  | 2198.3 | 2199.2 | 2199.2 | 2233.5 | 2262.1 | 2317.3 | 2372.6 | 2438.3  | 2445.9  | 2513.6 | 2556.4 |
| 10°   | 2097.3 | 2100.2 | 2101.1 | 2140.2 | 2171.6 | 2238.3 | 2308.8 | 2387.8  | 2396.4  | 2487.8 | 2554.5 |
| 12.5° | 2027.8 | 2028.8 | 2032.6 | 2073.5 | 2107.8 | 2177.3 | 2248.8 | 2339.3  | 2350.7  | 2458.3 | 2545.9 |
| 15°   | 1994.5 | 1992.6 | 1994.5 | 2028.8 | 2063.0 | 2129.7 | 2203.1 | 2300.2  | 2312.6  | 2433.5 | 2546.9 |
| 17.5° | 1992.6 | 1989.7 | 1987.8 | 2013.5 | 2035.4 | 2094.5 | 2168.8 | 2274.5  | 2287.8  | 2422.1 | 2557.4 |
| 20°   | 2020.2 | 2018.3 | 2008.7 | 2020.2 | 2024.9 | 2073.5 | 2146.9 | 2254.5  | 2267.8  | 2420.2 | 2580.2 |
| 22.5° | 2092.6 | 2087.8 | 2073.5 | 2063.0 | 2037.3 | 2065.9 | 2131.6 | 2240.2  | 2255.4  | 2425.0 | 2609.8 |
| 25°   | 2200.2 | 2198.3 | 2180.2 | 2154.5 | 2088.8 | 2077.3 | 2132.6 | 2240.2  | 2254.5  | 2430.7 | 2641.2 |
| 27.5° | 2362.1 | 2350.7 | 2327.8 | 2283.1 | 2188.8 | 2122.1 | 2151.6 | 2245.9  | 2260.2  | 2438.3 | 2666.9 |
| 30°   | 2526.9 | 2525.9 | 2518.3 | 2472.6 | 2332.6 | 2207.8 | 2191.6 | 2261.2  | 2274.5  | 2445.0 | 2690.7 |
| 32.5° | 2697.4 | 2700.2 | 2719.3 | 2684.0 | 2530.7 | 2335.4 | 2264.0 | 2292.6  | 2302.1  | 2458.3 | 2711.7 |
| 35°   | 2859.3 | 2865.0 | 2915.5 | 2927.9 | 2771.7 | 2528.8 | 2382.1 | 2355.4  | 2356.4  | 2487.8 | 2739.3 |
| 37.5° | 3014.6 | 3033.6 | 3114.6 | 3174.6 | 3071.7 | 2763.1 | 2552.6 | 2462.1  | 2454.5  | 2546.9 | 2781.2 |
| 40°   | 3190.8 | 3227.0 | 3328.9 | 3430.8 | 3398.4 | 3072.7 | 2785.0 | 2625.9  | 2609.8  | 2655.5 | 2856.4 |
| 42.5° | 3386.0 | 3425.1 | 3560.3 | 3703.2 | 3718.4 | 3447.0 | 3075.5 | 2865.0  | 2837.4  | 2838.3 | 2997.4 |
| 45°   | 3595.6 | 3647.9 | 3805.1 | 4010.8 | 4103.2 | 3864.2 | 3433.6 | 3187.9  | 3160.3  | 3119.3 | 3224.1 |
| 47.5° | 3870.8 | 3916.5 | 4068.0 | 4305.1 | 4482.3 | 4311.8 | 3903.2 | 3603.2  | 3552.7  | 3492.7 | 3576.5 |
| 50°   | 4108.0 | 4148.0 | 4278.5 | 4575.6 | 4944.2 | 4889.0 | 4435.6 | 4122.3  | 4073.7  | 3971.8 | 4041.3 |
| 52.5° | 4160.4 | 4191.8 | 4311.8 | 4646.1 | 5297.6 | 5617.6 | 5088.1 | 4749.9  | 4715.7  | 4527.1 | 4553.7 |
| 55°   | 3925.1 | 3972.7 | 4080.4 | 4451.8 | 5390.0 | 6330.1 | 5934.8 | 5457.6  | 5386.2  | 5085.2 | 5132.8 |
| 57.5° | 3330.8 | 3415.5 | 3516.5 | 3999.4 | 5139.5 | 6709.2 | 7117.8 | 6207.2  | 6142.4  | 5622.4 | 5623.4 |
| 60°   | 2441.2 | 2509.7 | 2577.4 | 3019.3 | 4545.2 | 6683.4 | 8191.2 | 7049.2  | 6931.1  | 6061.5 | 6045.3 |
| 62.5° | 1775.4 | 1810.6 | 1809.7 | 1966.8 | 3121.2 | 6243.4 | 8755.1 | 8317.9  | 8042.6  | 6531.1 | 6438.7 |
| 65°   | 1396.3 | 1395.4 | 1436.3 | 1487.8 | 1743.0 | 4819.5 | 8824.6 | 10170.4 | 9873.3  | 7160.6 | 6968.2 |
| 67.5° | 1086.8 | 1107.7 | 1148.7 | 1300.1 | 1309.6 | 2522.1 | 8213.1 | 11316.2 | 11310.5 | 8121.7 | 7588.3 |
| 70°   | 838.2  | 866.7  | 924.8  | 1145.8 | 1209.6 | 1411.6 | 6145.3 | 10953.3 | 11045.7 | 8551.2 | 7149.2 |
| 72.5° | 538.1  | 536.2  | 622.0  | 925.8  | 1162.0 | 1176.3 | 3398.4 | 8700.8  | 8805.5  | 7745.4 | 5780.5 |
| 75°   | 301.0  | 302.9  | 351.5  | 566.7  | 1083.0 | 1106.8 | 1683.0 | 6204.4  | 6287.2  | 6038.6 | 4441.3 |
| 77.5° | 118.1  | 121.9  | 164.8  | 298.1  | 714.3  | 988.7  | 1000.1 | 4230.9  | 4243.2  | 3742.2 | 2724.1 |
| 80°   | 47.6   | 50.5   | 83.8   | 184.8  | 435.3  | 665.8  | 714.3  | 2492.6  | 2442.1  | 1448.7 | 792.5  |
| 82.5° | 14.3   | 15.2   | 33.3   | 104.8  | 227.6  | 473.4  | 481.9  | 956.3   | 902.9   | 311.5  | 201.9  |
| 85°   | 1.0    | 1.0    | 7.6    | 32.4   | 81.0   | 119.1  | 321.0  | 311.5   | 276.2   | 78.1   | 89.5   |
| 87.5° | 0.0    | 0.0    | 1.0    | 1.0    | 1.9    | 3.8    | 34.3   | 57.1    | 58.1    | 14.3   | 40.0   |
| 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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 CATALOG NUMBER: GWS-SA2E-730-U-SL2-W-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 | 2554.5 |
| 2.5°  | 2563.1 | 2528.8 | 2525.9 | 2499.3 | 2472.6 | 2439.3 | 2400.2 | 2371.6 | 2351.6 | 2316.4 | 2309.7 |
| 5°    | 2559.3 | 2513.6 | 2470.7 | 2394.5 | 2309.7 | 2218.3 | 2138.3 | 2064.0 | 2017.3 | 1985.9 | 1972.6 |
| 7.5°  | 2551.7 | 2493.6 | 2394.5 | 2250.7 | 2108.8 | 1948.7 | 1824.0 | 1709.7 | 1631.6 | 1585.9 | 1565.9 |
| 10°   | 2545.9 | 2467.8 | 2306.9 | 2088.8 | 1868.7 | 1647.8 | 1458.2 | 1288.7 | 1194.4 | 1120.1 | 1107.7 |
| 12.5° | 2534.5 | 2430.7 | 2194.5 | 1899.2 | 1615.4 | 1322.0 | 1080.1 | 872.5  | 728.6  | 663.9  | 641.0  |
| 15°   | 2523.1 | 2391.6 | 2082.1 | 1699.2 | 1339.2 | 977.2  | 683.9  | 483.9  | 384.8  | 354.3  | 352.4  |
| 17.5° | 2521.2 | 2356.4 | 1960.2 | 1509.7 | 1049.6 | 640.1  | 389.6  | 313.4  | 292.4  | 284.8  | 284.8  |
| 20°   | 2526.9 | 2326.9 | 1840.2 | 1291.5 | 764.8  | 389.6  | 290.5  | 271.5  | 259.1  | 252.4  | 252.4  |
| 22.5° | 2532.6 | 2296.4 | 1724.9 | 1071.5 | 507.7  | 284.8  | 256.2  | 240.0  | 225.7  | 218.1  | 214.3  |
| 25°   | 2536.4 | 2263.1 | 1597.3 | 850.6  | 331.5  | 247.6  | 224.8  | 203.8  | 186.7  | 177.2  | 177.2  |
| 27.5° | 2535.5 | 2223.1 | 1468.7 | 634.3  | 257.2  | 220.0  | 192.4  | 170.5  | 153.3  | 142.9  | 143.8  |
| 30°   | 2527.8 | 2179.2 | 1335.4 | 442.9  | 224.8  | 192.4  | 164.8  | 141.9  | 124.8  | 116.2  | 115.2  |
| 32.5° | 2522.1 | 2132.6 | 1181.1 | 311.5  | 201.9  | 168.6  | 140.0  | 118.1  | 103.8  | 97.2   | 96.2   |
| 35°   | 2515.5 | 2086.9 | 1034.4 | 237.2  | 181.9  | 145.7  | 118.1  | 100.0  | 88.6   | 82.9   | 82.9   |
| 37.5° | 2517.4 | 2039.2 | 875.3  | 203.8  | 161.9  | 126.7  | 101.0  | 85.7   | 76.2   | 70.5   | 69.5   |
| 40°   | 2546.9 | 2010.7 | 719.1  | 184.8  | 143.8  | 109.5  | 87.6   | 74.3   | 64.8   | 59.1   | 58.1   |
| 42.5° | 2620.2 | 2011.6 | 569.6  | 170.5  | 127.6  | 93.3   | 76.2   | 63.8   | 55.2   | 48.6   | 47.6   |
| 45°   | 2766.9 | 2051.6 | 437.2  | 155.3  | 110.5  | 81.0   | 65.7   | 54.3   | 45.7   | 40.0   | 39.1   |
| 47.5° | 3006.9 | 2170.7 | 331.5  | 141.9  | 96.2   | 70.5   | 56.2   | 45.7   | 38.1   | 33.3   | 32.4   |
| 50°   | 3388.9 | 2385.9 | 261.0  | 125.7  | 81.0   | 61.0   | 47.6   | 38.1   | 31.4   | 26.7   | 25.7   |
| 52.5° | 3848.0 | 2708.8 | 223.8  | 111.4  | 69.5   | 53.3   | 41.0   | 31.4   | 25.7   | 21.9   | 21.0   |
| 55°   | 4375.6 | 3094.6 | 206.7  | 97.2   | 59.1   | 45.7   | 33.3   | 25.7   | 21.0   | 18.1   | 16.2   |
| 57.5° | 4859.5 | 3442.2 | 205.7  | 82.9   | 50.5   | 39.1   | 27.6   | 21.9   | 18.1   | 14.3   | 13.3   |
| 60°   | 5330.9 | 3732.7 | 193.4  | 68.6   | 43.8   | 32.4   | 23.8   | 18.1   | 15.2   | 12.4   | 11.4   |
| 62.5° | 5758.6 | 3968.9 | 161.9  | 55.2   | 37.1   | 26.7   | 20.0   | 16.2   | 13.3   | 10.5   | 10.5   |
| 65°   | 6295.8 | 4269.9 | 123.8  | 44.8   | 30.5   | 21.9   | 17.1   | 14.3   | 12.4   | 9.5    | 9.5    |
| 67.5° | 6851.1 | 4429.0 | 88.6   | 37.1   | 24.8   | 19.0   | 15.2   | 13.3   | 10.5   | 8.6    | 8.6    |
| 70°   | 6205.3 | 3742.2 | 63.8   | 30.5   | 21.0   | 16.2   | 13.3   | 12.4   | 10.5   | 8.6    | 7.6    |
| 72.5° | 4846.1 | 2698.3 | 47.6   | 23.8   | 18.1   | 15.2   | 12.4   | 11.4   | 9.5    | 7.6    | 7.6    |
| 75°   | 3593.7 | 1573.5 | 36.2   | 19.0   | 14.3   | 12.4   | 12.4   | 11.4   | 9.5    | 7.6    | 6.7    |
| 77.5° | 1953.5 | 548.6  | 27.6   | 15.2   | 11.4   | 9.5    | 10.5   | 10.5   | 8.6    | 6.7    | 5.7    |
| 80°   | 517.2  | 150.5  | 19.0   | 11.4   | 9.5    | 7.6    | 7.6    | 9.5    | 7.6    | 5.7    | 5.7    |
| 82.5° | 150.5  | 43.8   | 13.3   | 9.5    | 7.6    | 6.7    | 6.7    | 6.7    | 5.7    | 4.8    | 3.8    |
| 85°   | 73.3   | 16.2   | 9.5    | 7.6    | 6.7    | 5.7    | 4.8    | 4.8    | 3.8    | 2.9    | 2.9    |
| 87.5° | 32.4   | 6.7    | 7.6    | 6.7    | 6.7    | 4.8    | 3.8    | 2.9    | 2.9    | 1.9    | 1.0    |
| 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  
 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

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| 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**



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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

| $\lambda$ (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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**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)