

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: P640967

Luminaire Tested: GWS-SA5E-830-U-T2R-W-GRSBK

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P640967  
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-830-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, 80 CRI LEDS  
Ballast/Driver: -

**Summary**

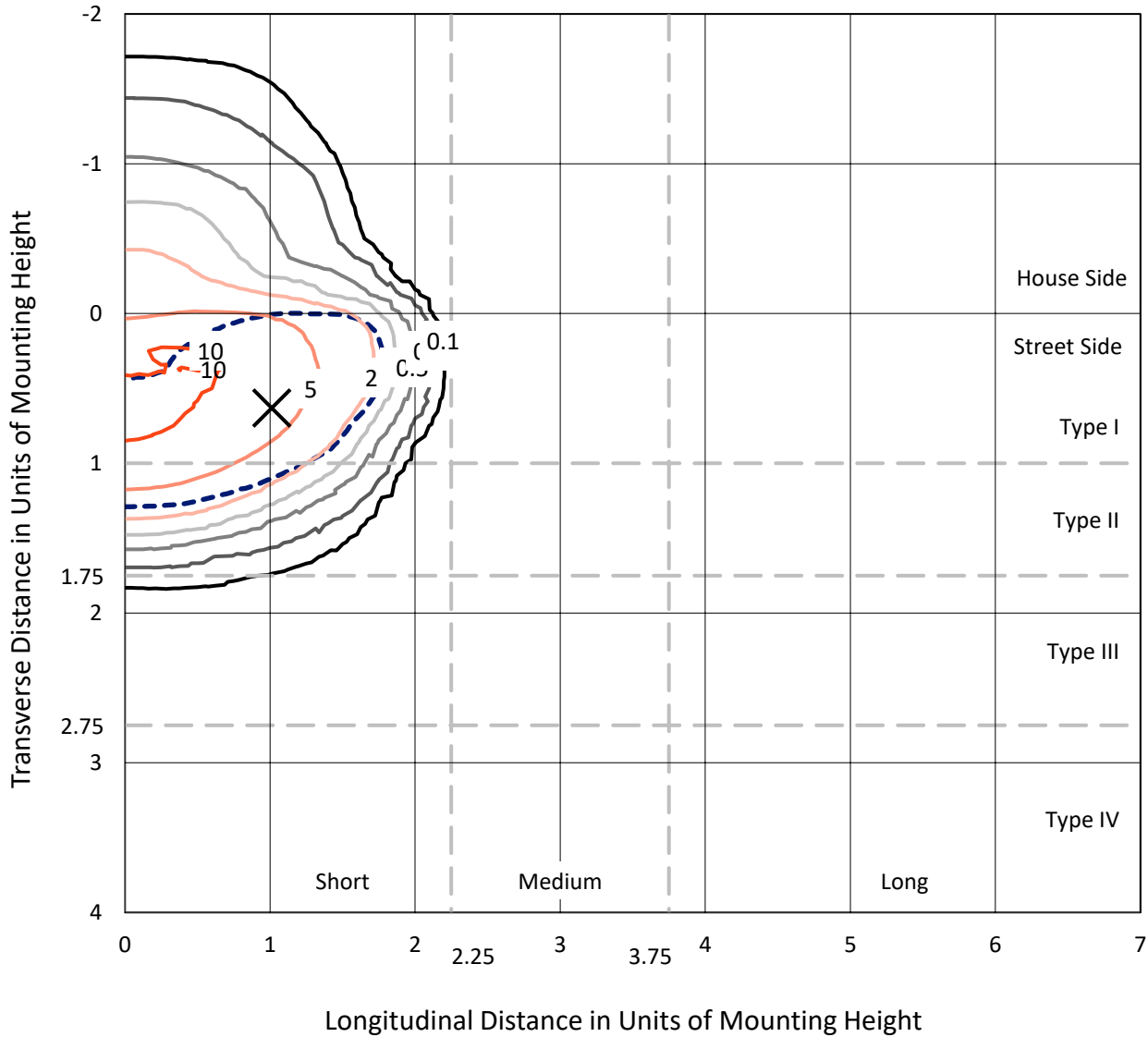
Lumens per Lamp: N/A  
Luminaire Lumens: 19991 lumens  
Efficiency: N/A  
Efficacy: 74.2 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G1  
  
Input Watts (W): 269.6  
Input Voltage (V): 120  
Input Current (Ain): NR  
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

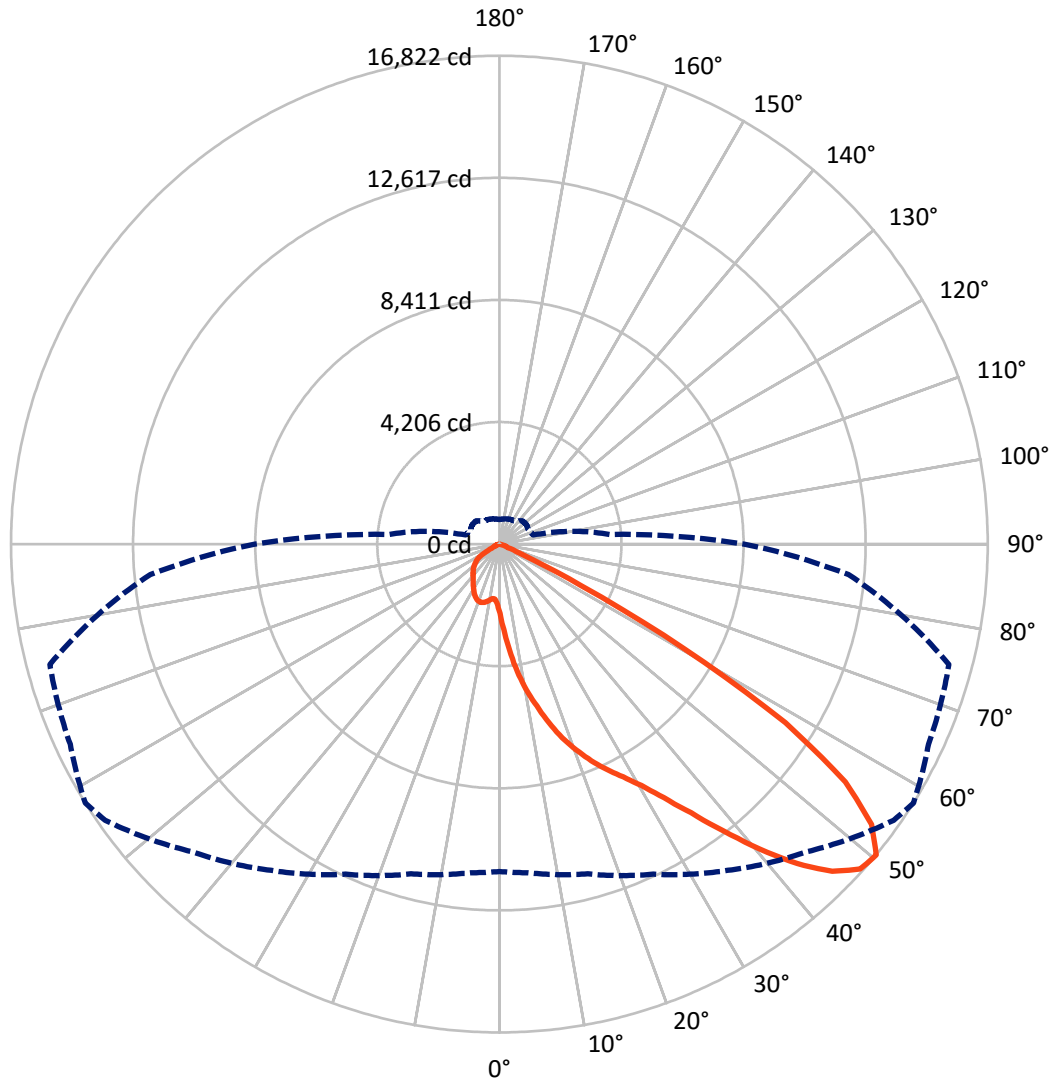
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 11.7 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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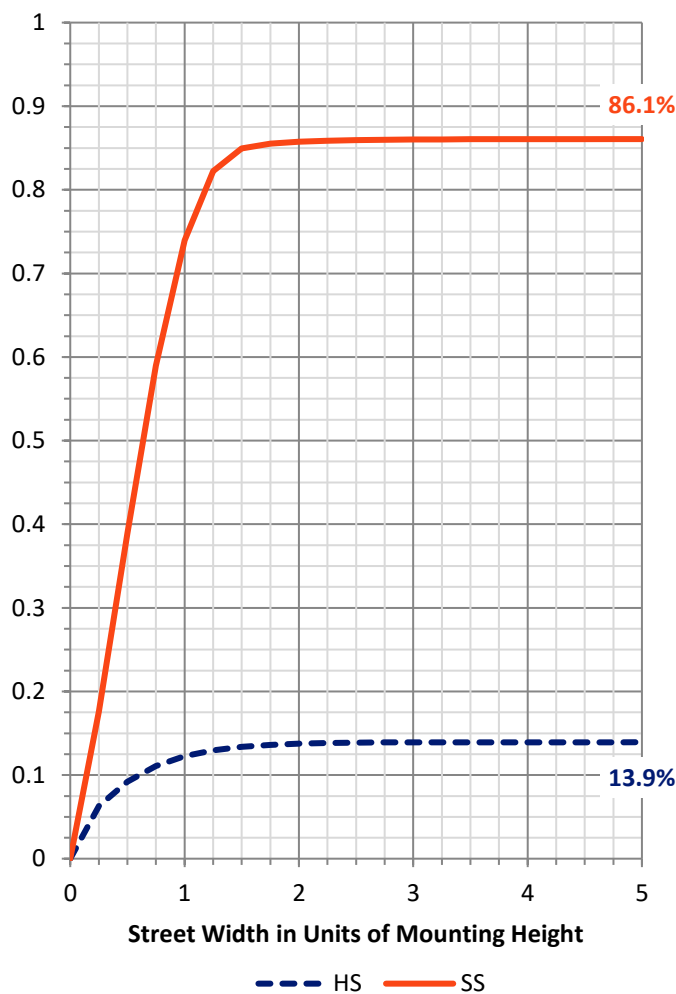
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2800.0   | 0.0    | 2800.0  |
|                    | % Fixture | 14.0     | 0.0    | 14.0    |
| <b>Street Side</b> | Lumens    | 17191.0  | 0.0    | 17191.0 |
|                    | % Fixture | 86.0     | 0.0    | 86.0    |
| <b>Total</b>       | Lumens    | 19991.0  | 0.0    | 19991.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 295.8   | 1.5       |
| 10°-20°   | 1171.1  | 5.9       |
| 20°-30°   | 2369.7  | 11.9      |
| 30°-40°   | 4192.3  | 21.0      |
| 40°-50°   | 6111.5  | 30.6      |
| 50°-60°   | 4898.5  | 24.5      |
| 60°-70°   | 882.5   | 4.4       |
| 70°-80°   | 69.6    | 0.3       |
| 80°-90°   | 0.0     | 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°    | 19991.0 | 100.0     |
| 0°-180°   | 19991.0 | 100.0     |

**Coefficient of Utilization**



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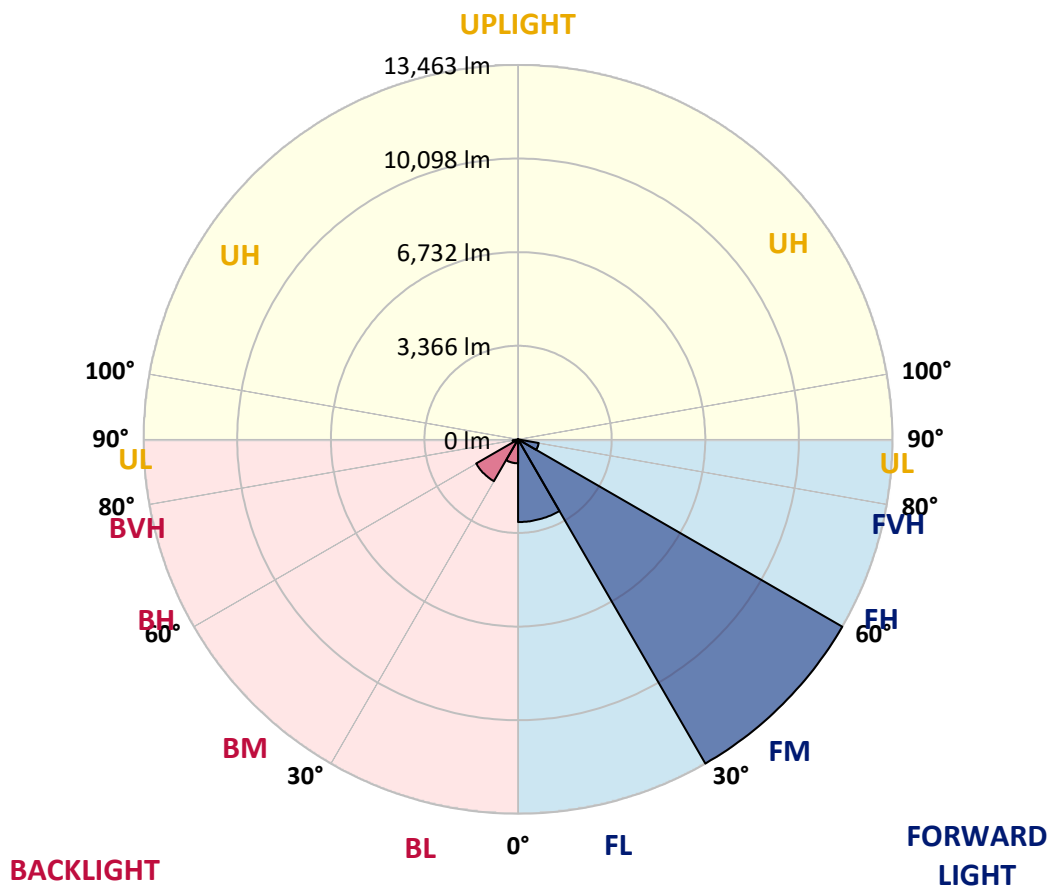
CATALOG NUMBER: GWS-SA5E-830-U-T2R-W-GRSBK

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

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|---------|-----------|-------------------------|------|---------|
|                |         |           | B                       | U    | G       |
| FL (0°-30°)    | 2974.6  | 14.9      |                         |      |         |
| FM (30°-60°)   | 13463.3 | 67.3      |                         |      |         |
| FH (60°-80°)   | 753.1   | 3.8       |                         |      | G1/1800 |
| FVH (80°-90°)  | 0.0     | 0.0       |                         |      | G0/10   |
| BL (0°-30°)    | 862.0   | 4.3       | B2/1000                 |      |         |
| BM (30°-60°)   | 1738.9  | 8.7       | B2/2500                 |      |         |
| BH (60°-80°)   | 199.0   | 1.0       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 0.0     | 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°    | 2387.9  | 2387.9  | 2387.9  | 2387.9  | 2387.9  | 2387.9  | 2387.9  | 2387.9  | 2387.9  | 2387.9  | 2387.9  |
| 2.5°  | 3533.7  | 3478.2  | 3446.1  | 3420.4  | 3307.1  | 3127.6  | 3010.0  | 2948.0  | 2845.4  | 2672.2  | 2522.6  |
| 5°    | 4611.2  | 4570.6  | 4495.7  | 4444.4  | 4299.1  | 4044.7  | 3781.7  | 3677.0  | 3443.9  | 3052.7  | 2702.1  |
| 7.5°  | 5325.2  | 5295.3  | 5267.5  | 5199.1  | 5062.2  | 4831.4  | 4540.6  | 4431.6  | 4072.5  | 3516.6  | 2941.6  |
| 10°   | 5874.6  | 5851.1  | 5819.0  | 5816.9  | 5710.0  | 5502.6  | 5218.3  | 5105.0  | 4715.9  | 4021.1  | 3223.8  |
| 12.5° | 6357.7  | 6338.5  | 6332.1  | 6391.9  | 6323.5  | 6169.6  | 5861.8  | 5720.7  | 5308.1  | 4536.4  | 3535.9  |
| 15°   | 6689.1  | 6684.8  | 6712.6  | 6830.2  | 6868.7  | 6798.1  | 6539.4  | 6387.7  | 5913.1  | 5053.7  | 3880.1  |
| 17.5° | 6840.9  | 6853.7  | 6907.1  | 7110.2  | 7281.2  | 7341.1  | 7142.3  | 7014.0  | 6513.8  | 5577.4  | 4247.8  |
| 20°   | 7099.5  | 7095.3  | 7127.3  | 7319.7  | 7529.2  | 7743.0  | 7683.2  | 7574.1  | 7120.9  | 6131.1  | 4656.1  |
| 22.5° | 7828.5  | 7766.5  | 7698.1  | 7728.0  | 7802.9  | 8053.0  | 8164.1  | 8108.6  | 7747.3  | 6699.8  | 5077.2  |
| 25°   | 8948.7  | 8884.6  | 8664.4  | 8450.6  | 8309.5  | 8422.8  | 8574.6  | 8602.4  | 8369.4  | 7283.4  | 5517.6  |
| 27.5° | 10137.3 | 10079.6 | 9831.6  | 9510.9  | 9106.9  | 8910.2  | 9023.5  | 9079.1  | 8980.8  | 7978.2  | 5985.8  |
| 30°   | 11251.1 | 11174.1 | 10902.6 | 10505.0 | 10036.8 | 9735.4  | 9607.1  | 9645.6  | 9703.3  | 8801.2  | 6535.2  |
| 32.5° | 12217.4 | 12159.6 | 11834.7 | 11415.7 | 10964.6 | 10650.4 | 10351.1 | 10415.2 | 10556.3 | 9808.1  | 7238.5  |
| 35°   | 13036.1 | 13006.2 | 12662.0 | 12245.2 | 11768.4 | 11608.1 | 11351.6 | 11364.4 | 11505.5 | 11024.5 | 8095.7  |
| 37.5° | 13748.0 | 13696.7 | 13384.6 | 12997.6 | 12619.3 | 12593.6 | 12523.1 | 12529.5 | 12602.2 | 12441.8 | 9081.3  |
| 40°   | 14196.9 | 14149.9 | 13927.6 | 13688.2 | 13418.8 | 13423.1 | 13788.6 | 13816.4 | 13733.0 | 13833.5 | 10122.3 |
| 42.5° | 14365.8 | 14331.6 | 14211.9 | 14214.0 | 14186.3 | 14312.4 | 14998.6 | 15049.9 | 14750.6 | 14925.9 | 11011.7 |
| 45°   | 14072.9 | 14058.0 | 14066.5 | 14374.4 | 14707.9 | 15096.9 | 15988.4 | 16078.2 | 15654.9 | 15650.6 | 11706.4 |
| 47.5° | 13128.1 | 13098.1 | 13348.2 | 13872.0 | 14643.7 | 15400.5 | 16587.0 | 16725.9 | 16287.7 | 16065.4 | 12142.5 |
| 50°   | 11276.7 | 11362.3 | 11757.7 | 12544.4 | 13718.1 | 14983.6 | 16580.6 | 16822.1 | 16311.2 | 16029.0 | 12069.9 |
| 52.5° | 8168.4  | 8151.3  | 9017.1  | 10098.8 | 11526.9 | 13649.7 | 15699.8 | 16052.5 | 15740.4 | 15672.0 | 11907.4 |
| 55°   | 4444.4  | 4600.5  | 5184.1  | 6616.4  | 8399.3  | 11125.0 | 13688.2 | 14457.7 | 14819.0 | 15541.6 | 12200.3 |
| 57.5° | 1633.3  | 1701.7  | 2067.2  | 3080.5  | 4446.6  | 6917.8  | 10455.8 | 11616.6 | 12732.6 | 15178.2 | 12151.1 |
| 60°   | 658.4   | 671.3   | 816.6   | 1133.0  | 1868.4  | 3520.9  | 6272.2  | 7302.6  | 8354.4  | 11618.8 | 9325.0  |
| 62.5° | 478.9   | 496.0   | 553.7   | 662.7   | 944.9   | 1539.2  | 2704.3  | 3144.7  | 3437.5  | 5754.9  | 4594.1  |
| 65°   | 386.9   | 399.8   | 446.8   | 496.0   | 624.2   | 827.3   | 872.2   | 840.1   | 835.9   | 1487.9  | 1053.9  |
| 67.5° | 320.7   | 333.5   | 367.7   | 401.9   | 448.9   | 412.6   | 299.3   | 314.3   | 256.5   | 254.4   | 207.4   |
| 70°   | 235.2   | 250.1   | 284.3   | 320.7   | 269.4   | 111.2   | 173.2   | 256.5   | 194.5   | 162.5   | 158.2   |
| 72.5° | 177.4   | 188.1   | 220.2   | 209.5   | 79.1    | 42.8    | 115.4   | 186.0   | 149.6   | 119.7   | 117.6   |
| 75°   | 132.5   | 139.0   | 111.2   | 34.2    | 8.6     | 10.7    | 42.8    | 77.0    | 83.4    | 68.4    | 68.4    |
| 77.5° | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 4.3     | 6.4     | 8.6     | 10.7    | 12.8    |
| 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: P640967

CATALOG NUMBER: GWS-SA5E-830-U-T2R-W-GRSBK

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2387.9 | 2387.9 | 2387.9 | 2387.9 | 2387.9 | 2387.9 | 2387.9 | 2387.9 | 2387.9 | 2387.9 | 2387.9 |
| 2.5°  | 2437.1 | 2347.3 | 2219.0 | 2112.1 | 2030.9 | 1951.8 | 1891.9 | 1832.1 | 1829.9 | 1800.0 | 1793.6 |
| 5°    | 2539.7 | 2377.2 | 2142.0 | 1973.2 | 1870.5 | 1808.6 | 1765.8 | 1744.4 | 1733.7 | 1723.0 | 1718.8 |
| 7.5°  | 2687.2 | 2454.2 | 2129.2 | 1949.6 | 1864.1 | 1823.5 | 1793.6 | 1780.8 | 1774.4 | 1765.8 | 1763.7 |
| 10°   | 2868.9 | 2565.3 | 2176.3 | 1994.5 | 1919.7 | 1881.2 | 1849.2 | 1829.9 | 1819.2 | 1804.3 | 1800.0 |
| 12.5° | 3086.9 | 2702.1 | 2251.1 | 2069.4 | 1990.3 | 1939.0 | 1896.2 | 1868.4 | 1853.4 | 1834.2 | 1829.9 |
| 15°   | 3322.1 | 2849.6 | 2334.4 | 2137.8 | 2043.7 | 1977.4 | 1924.0 | 1881.2 | 1853.4 | 1829.9 | 1823.5 |
| 17.5° | 3565.8 | 2999.3 | 2409.3 | 2184.8 | 2069.4 | 1990.3 | 1913.3 | 1855.6 | 1821.4 | 1791.5 | 1782.9 |
| 20°   | 3839.4 | 3153.2 | 2458.4 | 2193.4 | 2060.8 | 1956.1 | 1866.3 | 1793.6 | 1759.4 | 1718.8 | 1710.2 |
| 22.5° | 4125.9 | 3296.4 | 2479.8 | 2174.1 | 2013.8 | 1891.9 | 1795.7 | 1720.9 | 1671.7 | 1629.0 | 1616.2 |
| 25°   | 4403.8 | 3424.7 | 2469.1 | 2120.7 | 1943.2 | 1802.1 | 1703.8 | 1626.8 | 1573.4 | 1530.6 | 1520.0 |
| 27.5° | 4698.8 | 3531.6 | 2430.6 | 2041.6 | 1847.0 | 1703.8 | 1609.7 | 1543.5 | 1494.3 | 1447.3 | 1436.6 |
| 30°   | 5030.2 | 3629.9 | 2368.7 | 1945.4 | 1733.7 | 1603.3 | 1530.6 | 1485.8 | 1432.3 | 1383.1 | 1368.2 |
| 32.5° | 5429.9 | 3717.6 | 2278.9 | 1829.9 | 1633.3 | 1515.7 | 1475.1 | 1440.9 | 1378.9 | 1327.6 | 1316.9 |
| 35°   | 5887.4 | 3790.3 | 2165.6 | 1710.2 | 1534.9 | 1460.1 | 1451.5 | 1406.7 | 1325.4 | 1265.6 | 1252.7 |
| 37.5° | 6417.6 | 3860.8 | 2030.9 | 1592.6 | 1462.2 | 1434.4 | 1436.6 | 1359.6 | 1261.3 | 1188.6 | 1180.0 |
| 40°   | 6988.4 | 3931.4 | 1881.2 | 1490.0 | 1396.0 | 1419.5 | 1400.2 | 1291.2 | 1130.9 | 1060.3 | 1051.8 |
| 42.5° | 7582.7 | 4008.3 | 1729.5 | 1393.8 | 1340.4 | 1361.8 | 1334.0 | 1154.4 | 1039.0 | 1002.6 | 998.3  |
| 45°   | 8119.3 | 4100.2 | 1564.8 | 1297.6 | 1284.8 | 1278.4 | 1231.4 | 1045.4 | 996.2  | 970.5  | 968.4  |
| 47.5° | 8506.2 | 4085.3 | 1389.6 | 1205.7 | 1224.9 | 1203.6 | 1060.3 | 994.1  | 953.4  | 919.2  | 910.7  |
| 50°   | 8435.6 | 3824.5 | 1207.8 | 1103.1 | 1148.0 | 1128.7 | 953.4  | 934.2  | 897.9  | 861.5  | 848.7  |
| 52.5° | 8256.1 | 3469.6 | 1049.6 | 994.1  | 1064.6 | 1019.7 | 880.8  | 861.5  | 829.5  | 782.4  | 767.5  |
| 55°   | 8352.3 | 3136.1 | 925.7  | 906.4  | 979.1  | 844.4  | 799.5  | 769.6  | 735.4  | 684.1  | 677.7  |
| 57.5° | 8042.3 | 2558.9 | 743.9  | 756.8  | 865.8  | 720.4  | 701.2  | 654.2  | 596.4  | 562.2  | 558.0  |
| 60°   | 5566.8 | 1374.6 | 466.0  | 481.0  | 626.4  | 605.0  | 628.5  | 585.7  | 515.2  | 483.1  | 476.7  |
| 62.5° | 2556.8 | 551.5  | 254.4  | 243.7  | 329.2  | 410.5  | 538.7  | 534.4  | 446.8  | 395.5  | 391.2  |
| 65°   | 620.0  | 252.3  | 181.7  | 171.0  | 186.0  | 245.8  | 350.6  | 421.1  | 361.3  | 301.4  | 295.0  |
| 67.5° | 201.0  | 205.2  | 166.7  | 156.1  | 164.6  | 183.8  | 209.5  | 233.0  | 230.9  | 211.6  | 207.4  |
| 70°   | 160.3  | 186.0  | 153.9  | 141.1  | 141.1  | 147.5  | 141.1  | 113.3  | 98.3   | 106.9  | 111.2  |
| 72.5° | 119.7  | 141.1  | 121.9  | 109.0  | 104.8  | 102.6  | 87.6   | 64.1   | 44.9   | 40.6   | 38.5   |
| 75°   | 70.5   | 79.1   | 74.8   | 64.1   | 59.9   | 53.4   | 42.8   | 27.8   | 15.0   | 10.7   | 6.4    |
| 77.5° | 12.8   | 15.0   | 17.1   | 12.8   | 10.7   | 8.6    | 6.4    | 2.1    | 0.0    | 0.0    | 0.0    |
| 80°   | 0.0    | 2.1    | 2.1    | 2.1    | 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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Peachtree City, GA 30269



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2408-195-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/07/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **GALN-SB1A-830-U-5WQ**  
 Description: GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS

**Spectral Parameters**

CCT (K): 3050  
 CIE u': 0.2476  
 CIE v': 0.5251  
 Duv: 0.0034  
 CIE x: 0.4383  
 CIE y: 0.4131  
 CIE z: 0.1487  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 581  
 Purity: 55.55201  
 Rf: 81.5  
 Rg: 99.2

|           |      |      |      |
|-----------|------|------|------|
| CRI (Ra): | 81.0 |      |      |
| R1:       | 79.6 | R9:  | 7.1  |
| R2:       | 85.6 | R10: | 67.0 |
| R3:       | 92.0 | R11: | 82.7 |
| R4:       | 82.6 | R12: | 63.2 |
| R5:       | 78.9 | R13: | 80.3 |
| R6:       | 81.7 | R14: | 95.0 |
| R7:       | 85.2 | R15: | 71.7 |
| R8:       | 62.0 |      |      |



**Test Conditions**

Stabilization Time: 20M  
 Operation Time: 1H 20M  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2408-195-9

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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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

REPORT NUMBER: SP1-2408-195-9

**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360               | 0                           | NR                      | 490               | 168                         | NR                      | 620               | 940                         | NR                      | 750               | 35                          | NR                      | 880               | 1                           | NR                      |
| 365               | 0                           | NR                      | 495               | 233                         | NR                      | 625               | 897                         | NR                      | 755               | 30                          | NR                      | 885               | 1                           | NR                      |
| 370               | 0                           | NR                      | 500               | 300                         | NR                      | 630               | 847                         | NR                      | 760               | 26                          | NR                      | 890               | 1                           | NR                      |
| 375               | 0                           | NR                      | 505               | 372                         | NR                      | 635               | 790                         | NR                      | 765               | 22                          | NR                      | 895               | 1                           | NR                      |
| 380               | 0                           | NR                      | 510               | 430                         | NR                      | 640               | 730                         | NR                      | 770               | 19                          | NR                      | 900               | 1                           | NR                      |
| 385               | 0                           | NR                      | 515               | 483                         | NR                      | 645               | 668                         | NR                      | 775               | 16                          | NR                      | 905               | 1                           | NR                      |
| 390               | 0                           | NR                      | 520               | 524                         | NR                      | 650               | 605                         | NR                      | 780               | 14                          | NR                      | 910               | 0                           | NR                      |
| 395               | 2                           | NR                      | 525               | 555                         | NR                      | 655               | 545                         | NR                      | 785               | 12                          | NR                      | 915               | 0                           | NR                      |
| 400               | 4                           | NR                      | 530               | 581                         | NR                      | 660               | 485                         | NR                      | 790               | 10                          | NR                      | 920               | 0                           | NR                      |
| 405               | 7                           | NR                      | 535               | 604                         | NR                      | 665               | 430                         | NR                      | 795               | 9                           | NR                      | 925               | 0                           | NR                      |
| 410               | 17                          | NR                      | 540               | 623                         | NR                      | 670               | 378                         | NR                      | 800               | 8                           | NR                      | 930               | 0                           | NR                      |
| 415               | 34                          | NR                      | 545               | 645                         | NR                      | 675               | 331                         | NR                      | 805               | 7                           | NR                      | 935               | 0                           | NR                      |
| 420               | 68                          | NR                      | 550               | 667                         | NR                      | 680               | 290                         | NR                      | 810               | 6                           | NR                      | 940               | 0                           | NR                      |
| 425               | 128                         | NR                      | 555               | 693                         | NR                      | 685               | 251                         | NR                      | 815               | 5                           | NR                      | 945               | 0                           | NR                      |
| 430               | 214                         | NR                      | 560               | 719                         | NR                      | 690               | 218                         | NR                      | 820               | 4                           | NR                      | 950               | 0                           | NR                      |
| 435               | 339                         | NR                      | 565               | 754                         | NR                      | 695               | 188                         | NR                      | 825               | 4                           | NR                      | 955               | 0                           | NR                      |
| 440               | 507                         | NR                      | 570               | 791                         | NR                      | 700               | 162                         | NR                      | 830               | 3                           | NR                      | 960               | 0                           | NR                      |
| 445               | 573                         | NR                      | 575               | 830                         | NR                      | 705               | 139                         | NR                      | 835               | 3                           | NR                      | 965               | 0                           | NR                      |
| 450               | 356                         | NR                      | 580               | 873                         | NR                      | 710               | 119                         | NR                      | 840               | 3                           | NR                      | 970               | 0                           | NR                      |
| 455               | 217                         | NR                      | 585               | 913                         | NR                      | 715               | 102                         | NR                      | 845               | 2                           | NR                      | 975               | 0                           | NR                      |
| 460               | 168                         | NR                      | 590               | 948                         | NR                      | 720               | 88                          | NR                      | 850               | 2                           | NR                      | 980               | 0                           | NR                      |
| 465               | 113                         | NR                      | 595               | 974                         | NR                      | 725               | 76                          | NR                      | 855               | 2                           | NR                      | 985               | 0                           | NR                      |
| 470               | 85                          | NR                      | 600               | 994                         | NR                      | 730               | 65                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 85                          | NR                      | 605               | 998                         | NR                      | 735               | 55                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 94                          | NR                      | 610               | 994                         | NR                      | 740               | 47                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 120                         | NR                      | 615               | 973                         | NR                      | 745               | 41                          | NR                      | 875               | 1                           | NR                      |                   |                             |                         |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.27**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 940                      | NR            | 750    | 35                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 233                      | NR            | 625    | 897                      | NR            | 755    | 30                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 300                      | NR            | 630    | 847                      | NR            | 760    | 26                       | NR            | 890    | 1                        | NR            |
| 375    | 0                        | NR            | 505    | 372                      | NR            | 635    | 790                      | NR            | 765    | 22                       | NR            | 895    | 1                        | NR            |
| 380    | 0                        | NR            | 510    | 430                      | NR            | 640    | 730                      | NR            | 770    | 19                       | NR            | 900    | 1                        | NR            |
| 385    | 0                        | NR            | 515    | 483                      | NR            | 645    | 668                      | NR            | 775    | 16                       | NR            | 905    | 1                        | NR            |
| 390    | 0                        | NR            | 520    | 524                      | NR            | 650    | 605                      | NR            | 780    | 14                       | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 555                      | NR            | 655    | 545                      | NR            | 785    | 12                       | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 581                      | NR            | 660    | 485                      | NR            | 790    | 10                       | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 604                      | NR            | 665    | 430                      | NR            | 795    | 9                        | NR            | 925    | 0                        | NR            |
| 410    | 17                       | NR            | 540    | 623                      | NR            | 670    | 378                      | NR            | 800    | 8                        | NR            | 930    | 0                        | NR            |
| 415    | 34                       | NR            | 545    | 645                      | NR            | 675    | 331                      | NR            | 805    | 7                        | NR            | 935    | 0                        | NR            |
| 420    | 68                       | NR            | 550    | 667                      | NR            | 680    | 290                      | NR            | 810    | 6                        | NR            | 940    | 0                        | NR            |
| 425    | 128                      | NR            | 555    | 693                      | NR            | 685    | 251                      | NR            | 815    | 5                        | NR            | 945    | 0                        | NR            |
| 430    | 214                      | NR            | 560    | 719                      | NR            | 690    | 218                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 339                      | NR            | 565    | 754                      | NR            | 695    | 188                      | NR            | 825    | 4                        | NR            | 955    | 0                        | NR            |
| 440    | 507                      | NR            | 570    | 791                      | NR            | 700    | 162                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 573                      | NR            | 575    | 830                      | NR            | 705    | 139                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 356                      | NR            | 580    | 873                      | NR            | 710    | 119                      | NR            | 840    | 3                        | NR            | 970    | 0                        | NR            |
| 455    | 217                      | NR            | 585    | 913                      | NR            | 715    | 102                      | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 168                      | NR            | 590    | 948                      | NR            | 720    | 88                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 113                      | NR            | 595    | 974                      | NR            | 725    | 76                       | NR            | 855    | 2                        | NR            | 985    | 0                        | NR            |
| 470    | 85                       | NR            | 600    | 994                      | NR            | 730    | 65                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 998                      | NR            | 735    | 55                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 94                       | NR            | 610    | 994                      | NR            | 740    | 47                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 120                      | NR            | 615    | 973                      | NR            | 745    | 41                       | NR            | 875    | 1                        | NR            |        |                          |               |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: NR**

**M/P: 2.32**

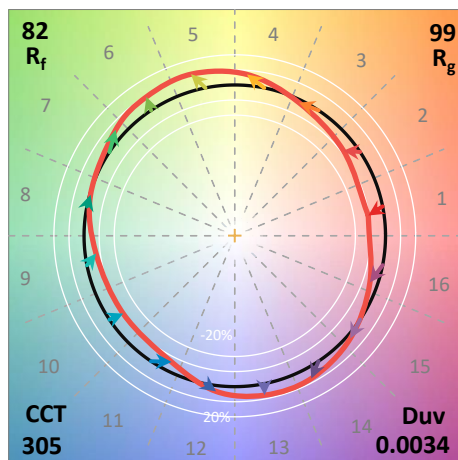
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 940                      | NR            | 750    | 35                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 233                      | NR            | 625    | 897                      | NR            | 755    | 30                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 300                      | NR            | 630    | 847                      | NR            | 760    | 26                       | NR            | 890    | 1                        | NR            |
| 375    | 0                        | NR            | 505    | 372                      | NR            | 635    | 790                      | NR            | 765    | 22                       | NR            | 895    | 1                        | NR            |
| 380    | 0                        | NR            | 510    | 430                      | NR            | 640    | 730                      | NR            | 770    | 19                       | NR            | 900    | 1                        | NR            |
| 385    | 0                        | NR            | 515    | 483                      | NR            | 645    | 668                      | NR            | 775    | 16                       | NR            | 905    | 1                        | NR            |
| 390    | 0                        | NR            | 520    | 524                      | NR            | 650    | 605                      | NR            | 780    | 14                       | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 555                      | NR            | 655    | 545                      | NR            | 785    | 12                       | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 581                      | NR            | 660    | 485                      | NR            | 790    | 10                       | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 604                      | NR            | 665    | 430                      | NR            | 795    | 9                        | NR            | 925    | 0                        | NR            |
| 410    | 17                       | NR            | 540    | 623                      | NR            | 670    | 378                      | NR            | 800    | 8                        | NR            | 930    | 0                        | NR            |
| 415    | 34                       | NR            | 545    | 645                      | NR            | 675    | 331                      | NR            | 805    | 7                        | NR            | 935    | 0                        | NR            |
| 420    | 68                       | NR            | 550    | 667                      | NR            | 680    | 290                      | NR            | 810    | 6                        | NR            | 940    | 0                        | NR            |
| 425    | 128                      | NR            | 555    | 693                      | NR            | 685    | 251                      | NR            | 815    | 5                        | NR            | 945    | 0                        | NR            |
| 430    | 214                      | NR            | 560    | 719                      | NR            | 690    | 218                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 339                      | NR            | 565    | 754                      | NR            | 695    | 188                      | NR            | 825    | 4                        | NR            | 955    | 0                        | NR            |
| 440    | 507                      | NR            | 570    | 791                      | NR            | 700    | 162                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 573                      | NR            | 575    | 830                      | NR            | 705    | 139                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 356                      | NR            | 580    | 873                      | NR            | 710    | 119                      | NR            | 840    | 3                        | NR            | 970    | 0                        | NR            |
| 455    | 217                      | NR            | 585    | 913                      | NR            | 715    | 102                      | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 168                      | NR            | 590    | 948                      | NR            | 720    | 88                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 113                      | NR            | 595    | 974                      | NR            | 725    | 76                       | NR            | 855    | 2                        | NR            | 985    | 0                        | NR            |
| 470    | 85                       | NR            | 600    | 994                      | NR            | 730    | 65                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 998                      | NR            | 735    | 55                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 94                       | NR            | 610    | 994                      | NR            | 740    | 47                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 120                      | NR            | 615    | 973                      | NR            | 745    | 41                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 81.5$   
 $R_g = 99.2$   
 $CIE R_a = 81.0$   
 $R_9 = 7.1$



**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)