

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



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P324983

Luminaire Tested: **GLEON-SA9D-830-U-AFL-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P324983  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-30)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9D-830-U-AFL-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 3000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 45125 lumens  
Efficiency: N/A  
Efficacy: 78.5 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G3

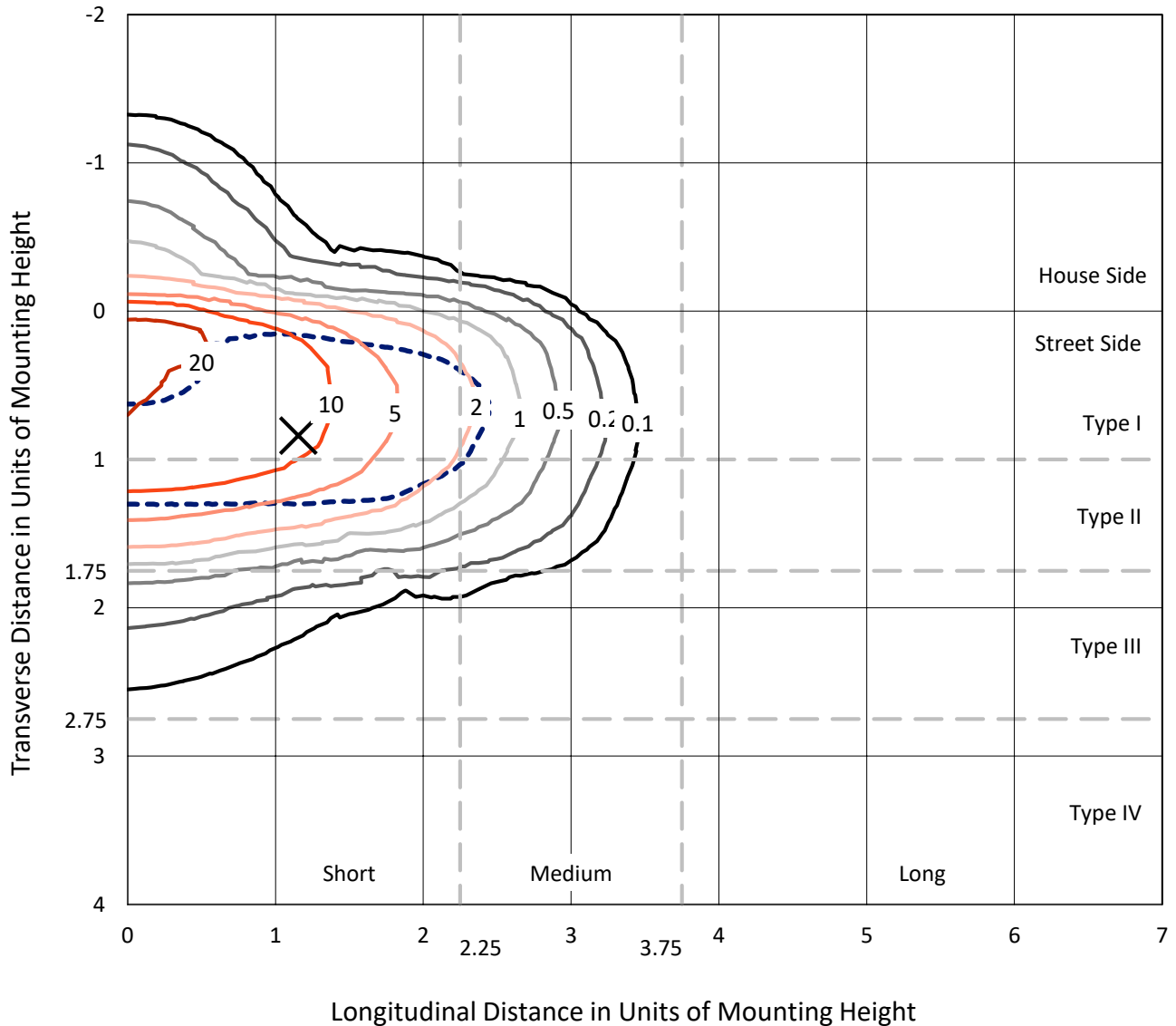
Input Watts (W): 575  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P324983  
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### Iso-Footcandle Lines of Horizontal Illumination

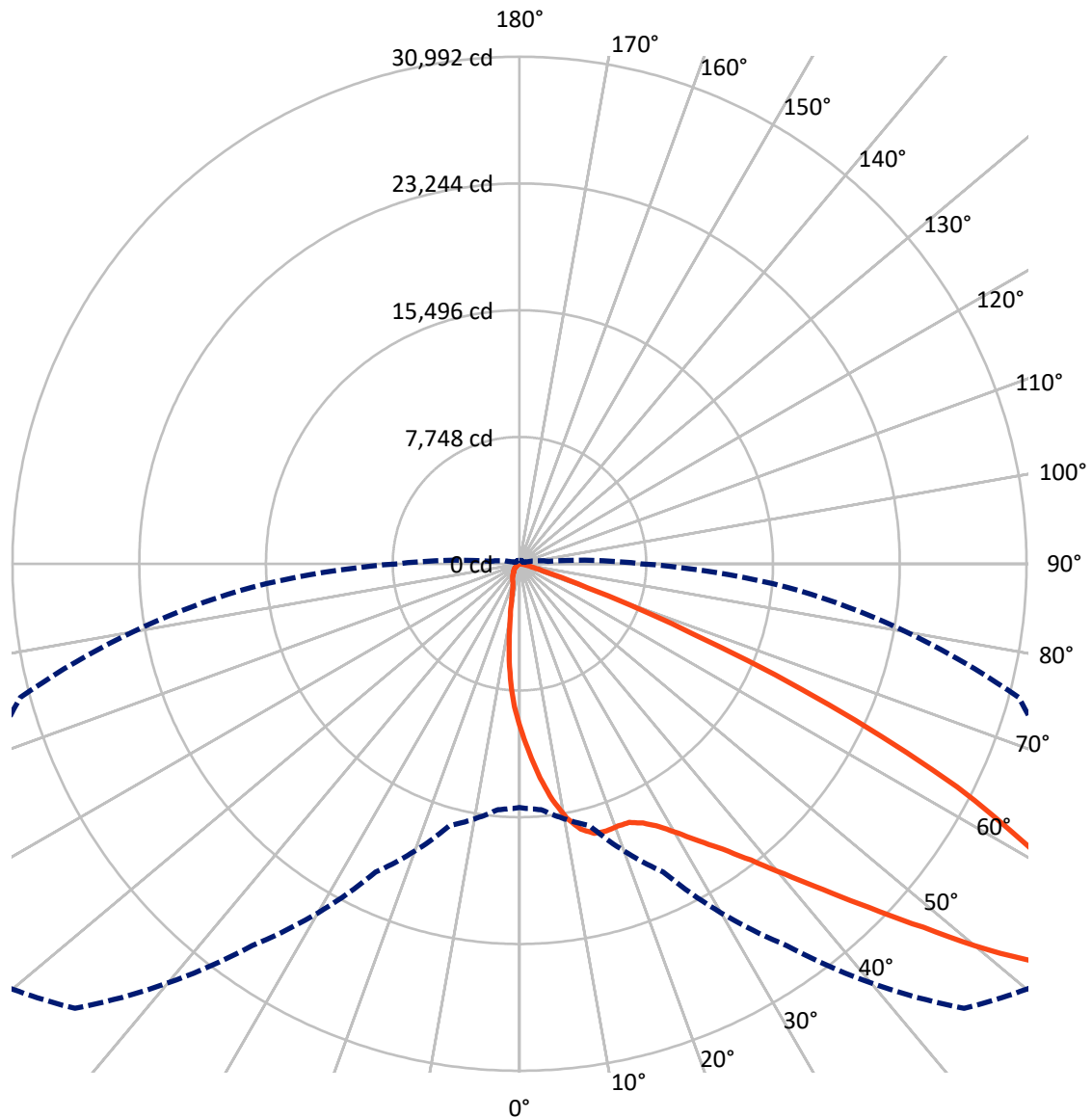
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 24.8 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 54-Deg Lateral    - - - Horizontal Cone Through 55-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2251.4   | 0.0    | 2251.4  |
|                    | % Fixture | 5.0      | 0.0    | 5.0     |
| <b>Street Side</b> | Lumens    | 42873.6  | 0.0    | 42873.6 |
|                    | % Fixture | 95.0     | 0.0    | 95.0    |
| <b>Total</b>       | Lumens    | 45125.0  | 0.0    | 45125.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 930.7   | 2.1       |
| 10°-20°   | 2552.4  | 5.7       |
| 20°-30°   | 4357.8  | 9.7       |
| 30°-40°   | 6993.5  | 15.5      |
| 40°-50°   | 11175.6 | 24.8      |
| 50°-60°   | 11974.9 | 26.5      |
| 60°-70°   | 6148.3  | 13.6      |
| 70°-80°   | 931.3   | 2.1       |
| 80°-90°   | 60.6    | 0.1       |
| 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°    | 45125.0 | 100.0     |
| 0°-180°   | 45125.0 | 100.0     |

**Coefficient of Utilization**



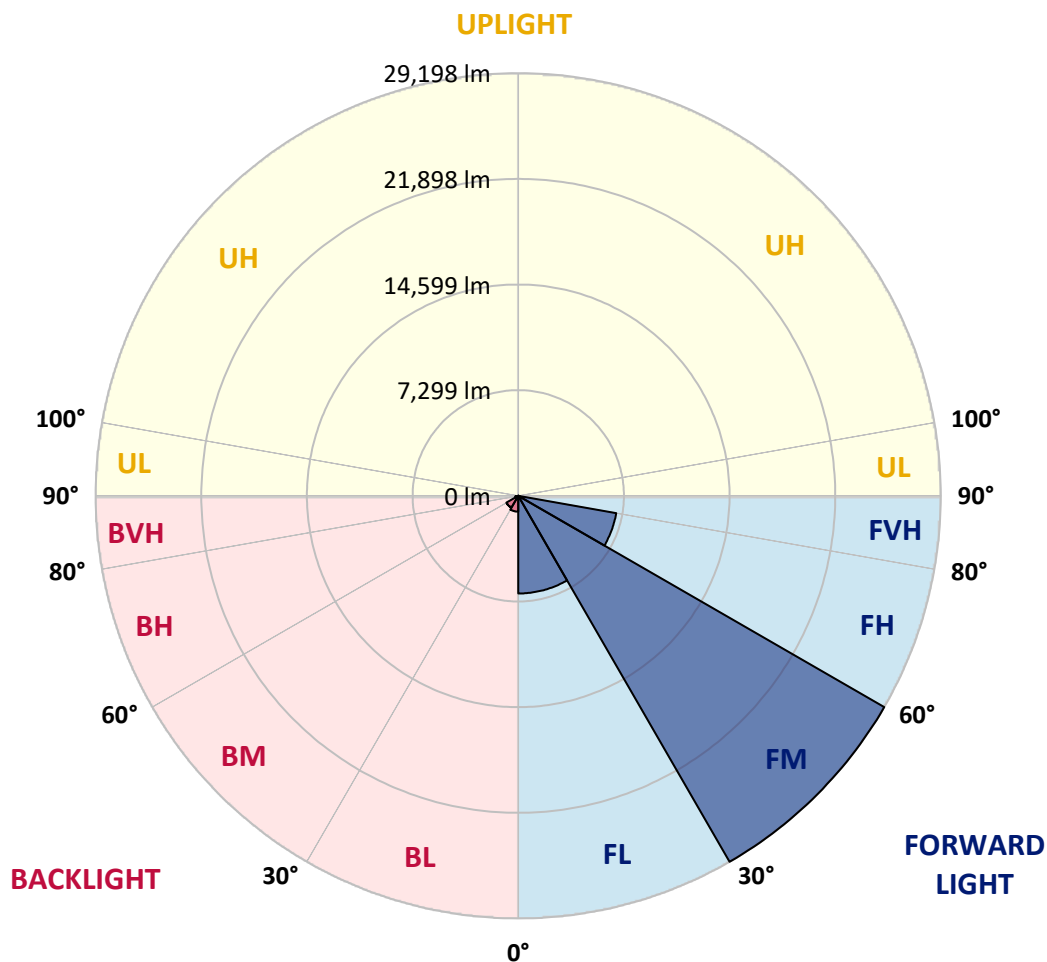
REPORT NUMBER: P324983  
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|---------|-----------|-------------------------|------|---------|
|                |         |           | B                       | U    | G       |
| FL (0°-30°)    | 6745.4  | 14.9      |                         |      |         |
| FM (30°-60°)   | 29197.9 | 64.7      |                         |      |         |
| FH (60°-80°)   | 6872.1  | 15.2      |                         |      | G3/7500 |
| FVH (80°-90°)  | 58.2    | 0.1       |                         |      | G1/100  |
| BL (0°-30°)    | 1095.4  | 2.4       | B3/2500                 |      |         |
| BM (30°-60°)   | 946.1   | 2.1       | B1/1000                 |      |         |
| BH (60°-80°)   | 207.5   | 0.5       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 2.4     | 0.0       |                         |      | G0/10   |
| UL (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G3**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 |
| 2.5°  | 12682.4 | 12493.4 | 12499.2 | 12413.5 | 12099.8 | 11854.2 | 11598.9 | 11538.5 | 11141.0 | 10723.9 | 10322.5 |
| 5°    | 14874.8 | 14736.4 | 14703.3 | 14537.6 | 14101.1 | 13639.3 | 13144.3 | 13029.3 | 12251.8 | 11398.2 | 10558.3 |
| 7.5°  | 16001.1 | 16003.1 | 15975.8 | 15915.4 | 15642.6 | 15194.4 | 14590.3 | 14469.4 | 13411.3 | 12130.9 | 10803.8 |
| 10°   | 15673.8 | 15747.8 | 15899.8 | 16100.5 | 16309.0 | 16252.5 | 15798.5 | 15689.3 | 14539.6 | 12906.5 | 11076.7 |
| 12.5° | 14909.8 | 14919.6 | 15089.1 | 15418.5 | 16018.7 | 16634.5 | 16642.3 | 16605.3 | 15617.2 | 13717.2 | 11376.8 |
| 15°   | 14529.8 | 14566.9 | 14629.2 | 14841.6 | 15410.7 | 16396.7 | 17102.2 | 17154.8 | 16605.3 | 14578.6 | 11696.4 |
| 17.5° | 14779.3 | 14831.9 | 14779.3 | 14804.6 | 15133.9 | 16020.6 | 17182.1 | 17316.5 | 17468.5 | 15430.2 | 11998.4 |
| 20°   | 15455.5 | 15504.2 | 15410.7 | 15307.4 | 15371.7 | 15911.5 | 17125.6 | 17306.8 | 18144.8 | 16186.3 | 12251.8 |
| 22.5° | 16367.5 | 16387.0 | 16244.7 | 16075.2 | 16028.4 | 16281.8 | 17172.3 | 17359.4 | 18686.5 | 16870.3 | 12411.6 |
| 25°   | 17371.1 | 17388.6 | 17211.3 | 17016.4 | 16905.4 | 17008.6 | 17556.2 | 17696.5 | 19164.0 | 17523.1 | 12503.1 |
| 27.5° | 18464.4 | 18479.9 | 18257.8 | 18018.1 | 17889.5 | 17893.4 | 18189.6 | 18339.6 | 19672.6 | 18267.5 | 12577.2 |
| 30°   | 19620.0 | 19612.2 | 19407.5 | 19074.3 | 18910.6 | 18906.7 | 19101.6 | 19253.6 | 20409.2 | 19222.4 | 12678.5 |
| 32.5° | 20917.8 | 20902.2 | 20611.9 | 20198.7 | 20013.6 | 20040.9 | 20214.3 | 20302.0 | 21323.2 | 20239.7 | 12859.8 |
| 35°   | 22626.9 | 22582.1 | 22143.6 | 21631.1 | 21290.0 | 21280.3 | 21426.4 | 21496.6 | 22488.5 | 21471.3 | 13161.8 |
| 37.5° | 24844.5 | 24803.6 | 24209.3 | 23464.8 | 22985.4 | 22806.2 | 22979.6 | 23069.2 | 24150.8 | 23051.7 | 13647.1 |
| 40°   | 27031.0 | 26990.1 | 26637.4 | 25955.3 | 25216.8 | 24786.1 | 24922.5 | 25018.0 | 26226.2 | 24969.3 | 14259.0 |
| 42.5° | 28539.4 | 28574.4 | 28697.2 | 28753.7 | 28061.9 | 27157.7 | 27220.1 | 27319.4 | 28406.8 | 27019.3 | 14958.6 |
| 45°   | 28936.9 | 29012.9 | 29706.7 | 31068.8 | 31328.0 | 30622.6 | 29969.7 | 30024.3 | 30622.6 | 29069.4 | 15658.2 |
| 47.5° | 27742.3 | 27882.6 | 29221.4 | 31754.8 | 33949.1 | 34448.0 | 33212.5 | 33140.3 | 32748.7 | 30727.8 | 16155.1 |
| 50°   | 25027.7 | 25156.3 | 26890.7 | 30638.2 | 34744.2 | 38099.9 | 37098.2 | 36885.8 | 34613.6 | 31719.7 | 16330.5 |
| 52.5° | 21099.1 | 21255.0 | 22663.9 | 27122.6 | 33245.6 | 39729.1 | 40777.5 | 40600.1 | 35981.6 | 31797.7 | 16359.7 |
| 55°   | 14900.1 | 15089.1 | 16579.9 | 20787.3 | 28496.5 | 38433.1 | 42081.2 | 42028.6 | 37117.7 | 31591.1 | 16422.1 |
| 57.5° | 8373.8  | 8510.2  | 10117.9 | 13325.5 | 20871.1 | 33475.5 | 40719.0 | 41067.8 | 37803.7 | 31232.5 | 16515.6 |
| 60°   | 3718.2  | 3755.2  | 4587.3  | 6633.5  | 12218.6 | 25583.1 | 36819.6 | 37408.1 | 37215.2 | 30753.1 | 16673.5 |
| 62.5° | 2061.8  | 2030.6  | 2030.6  | 2757.5  | 5310.3  | 15837.4 | 30024.3 | 30996.7 | 34703.2 | 30186.1 | 16681.3 |
| 65°   | 1615.5  | 1586.3  | 1502.5  | 1514.2  | 2022.8  | 7029.1  | 20791.2 | 22519.7 | 29932.7 | 28523.8 | 16120.0 |
| 67.5° | 1370.0  | 1344.6  | 1260.8  | 1227.7  | 1256.9  | 2319.0  | 11423.5 | 13218.3 | 22712.6 | 24203.4 | 13962.8 |
| 70°   | 1157.6  | 1140.0  | 1097.1  | 1056.2  | 982.2   | 1145.9  | 4371.0  | 5590.9  | 13995.9 | 16100.5 | 9531.3  |
| 72.5° | 931.5   | 923.7   | 939.3   | 904.2   | 814.6   | 763.9   | 1494.7  | 1810.4  | 6286.6  | 7185.0  | 3926.7  |
| 75°   | 802.9   | 799.0   | 806.8   | 771.7   | 670.4   | 532.0   | 760.0   | 830.2   | 1773.4  | 1757.8  | 795.1   |
| 77.5° | 522.3   | 528.1   | 668.4   | 652.8   | 576.8   | 354.7   | 393.6   | 424.8   | 537.9   | 403.4   | 241.6   |
| 80°   | 333.2   | 329.3   | 339.1   | 541.8   | 518.4   | 270.9   | 196.8   | 206.6   | 259.2   | 198.8   | 116.9   |
| 82.5° | 202.7   | 198.8   | 222.2   | 253.3   | 261.1   | 189.0   | 120.8   | 122.8   | 161.7   | 128.6   | 62.4    |
| 85°   | 17.5    | 23.4    | 134.5   | 124.7   | 89.6    | 58.5    | 58.5    | 62.4    | 85.7    | 76.0    | 35.1    |
| 87.5° | 0.0     | 0.0     | 23.4    | 35.1    | 19.5    | 21.4    | 21.4    | 23.4    | 33.1    | 33.1    | 17.5    |
| 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: P324983

CATALOG NUMBER: GLEON-SA9D-830-U-AFL-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°    | 125°    | 135°    | 145°    | 155°    | 165°    | 175°    | 180°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 | 10106.2 |
| 2.5°  | 10114.0 | 9911.3  | 9502.1  | 9108.4  | 8775.2  | 8453.7  | 8087.3  | 7724.8  | 7555.3  | 7487.1  | 7416.9  |
| 5°    | 10131.5 | 9714.5  | 8870.7  | 8021.0  | 7140.2  | 6347.1  | 5670.8  | 4977.1  | 4630.2  | 4478.2  | 4408.1  |
| 7.5°  | 10154.9 | 9519.6  | 8155.5  | 6729.0  | 5310.3  | 4234.6  | 3295.3  | 2691.2  | 2430.1  | 2389.2  | 2287.8  |
| 10°   | 10158.8 | 9283.8  | 7325.3  | 5302.5  | 3560.4  | 2552.9  | 1964.3  | 1652.5  | 1537.6  | 1518.1  | 1484.9  |
| 12.5° | 10166.6 | 9005.1  | 6403.6  | 3926.7  | 2373.6  | 1707.1  | 1420.6  | 1317.4  | 1286.2  | 1284.2  | 1284.2  |
| 15°   | 10190.0 | 8712.8  | 5446.7  | 2829.6  | 1705.2  | 1352.4  | 1247.2  | 1206.3  | 1194.6  | 1200.4  | 1198.5  |
| 17.5° | 10190.0 | 8367.9  | 4507.4  | 2108.5  | 1377.8  | 1216.0  | 1157.6  | 1130.3  | 1126.4  | 1132.2  | 1134.2  |
| 20°   | 10115.9 | 7948.9  | 3646.1  | 1640.8  | 1221.9  | 1128.3  | 1075.7  | 1050.4  | 1040.6  | 1044.5  | 1046.5  |
| 22.5° | 9938.6  | 7434.5  | 2944.6  | 1358.3  | 1118.6  | 1048.4  | 991.9   | 952.9   | 937.3   | 939.3   | 939.3   |
| 25°   | 9661.9  | 6824.5  | 2303.4  | 1175.1  | 1034.8  | 962.7   | 896.4   | 851.6   | 841.9   | 839.9   | 843.8   |
| 27.5° | 9307.2  | 6150.2  | 1833.8  | 1034.8  | 935.4   | 867.2   | 800.9   | 763.9   | 756.1   | 758.1   | 760.0   |
| 30°   | 8958.4  | 5450.6  | 1446.0  | 915.9   | 824.3   | 760.0   | 709.3   | 691.8   | 691.8   | 697.7   | 699.6   |
| 32.5° | 8638.8  | 4778.3  | 1143.9  | 812.6   | 724.9   | 666.5   | 637.2   | 635.3   | 645.0   | 648.9   | 650.9   |
| 35°   | 8364.0  | 4156.7  | 947.1   | 732.7   | 647.0   | 596.3   | 586.6   | 594.4   | 606.1   | 613.9   | 615.8   |
| 37.5° | 8169.1  | 3601.3  | 828.2   | 666.5   | 586.6   | 545.6   | 543.7   | 559.3   | 574.9   | 592.4   | 596.3   |
| 40°   | 8087.3  | 3131.6  | 746.4   | 608.0   | 537.9   | 506.7   | 500.8   | 522.3   | 551.5   | 576.8   | 580.7   |
| 42.5° | 8019.1  | 2747.7  | 676.2   | 551.5   | 498.9   | 454.1   | 452.1   | 479.4   | 514.5   | 539.8   | 545.6   |
| 45°   | 7960.6  | 2439.8  | 611.9   | 491.1   | 448.2   | 389.7   | 395.6   | 430.7   | 458.0   | 485.2   | 491.1   |
| 47.5° | 7839.8  | 2186.5  | 541.8   | 426.8   | 370.3   | 333.2   | 344.9   | 376.1   | 397.5   | 438.5   | 444.3   |
| 50°   | 7623.5  | 1979.9  | 469.6   | 348.8   | 302.1   | 288.4   | 306.0   | 327.4   | 354.7   | 389.7   | 393.6   |
| 52.5° | 7477.3  | 1824.0  | 407.3   | 292.3   | 249.4   | 253.3   | 270.9   | 278.7   | 294.3   | 307.9   | 304.0   |
| 55°   | 7393.5  | 1738.3  | 356.6   | 253.3   | 212.4   | 224.1   | 228.0   | 218.3   | 210.5   | 196.8   | 191.0   |
| 57.5° | 7383.8  | 1660.3  | 317.6   | 220.2   | 187.1   | 192.9   | 179.3   | 146.2   | 118.9   | 103.3   | 99.4    |
| 60°   | 7368.2  | 1564.8  | 286.5   | 185.1   | 165.6   | 157.8   | 128.6   | 79.9    | 56.5    | 52.6    | 52.6    |
| 62.5° | 7198.7  | 1416.7  | 263.1   | 155.9   | 140.3   | 118.9   | 74.1    | 37.0    | 31.2    | 33.1    | 33.1    |
| 65°   | 6658.9  | 1210.2  | 239.7   | 126.7   | 111.1   | 85.7    | 37.0    | 21.4    | 11.7    | 13.6    | 13.6    |
| 67.5° | 5661.1  | 964.6   | 214.4   | 97.4    | 83.8    | 54.6    | 21.4    | 9.7     | 0.0     | 0.0     | 0.0     |
| 70°   | 3790.3  | 598.3   | 181.2   | 68.2    | 54.6    | 33.1    | 15.6    | 1.9     | 0.0     | 0.0     | 0.0     |
| 72.5° | 1453.8  | 323.5   | 146.2   | 40.9    | 35.1    | 23.4    | 9.7     | 0.0     | 0.0     | 0.0     | 0.0     |
| 75°   | 327.4   | 212.4   | 101.3   | 29.2    | 25.3    | 15.6    | 3.9     | 0.0     | 0.0     | 0.0     | 0.0     |
| 77.5° | 124.7   | 154.0   | 58.5    | 19.5    | 17.5    | 9.7     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 80°   | 60.4    | 91.6    | 27.3    | 11.7    | 9.7     | 3.9     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 82.5° | 31.2    | 35.1    | 11.7    | 5.8     | 3.9     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 85°   | 17.5    | 17.5    | 5.8     | 3.9     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 87.5° | 9.7     | 5.8     | 1.9     | 1.9     | 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     |



Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
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           |

REPORT NUMBER: SP1-2408-195-9

**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                      |                   |                             |                         |

REPORT NUMBER: SP1-2408-195-9

**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            |        |                          |               |

REPORT NUMBER: SP1-2408-195-9

**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)