

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: P324013

Luminaire Tested: **GLEON-SA9C-830-U-SL4-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P324013  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-25)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9C-830-U-SL4-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 3000K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 40781 lumens  
Efficiency: N/A  
Efficacy: 81.4 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

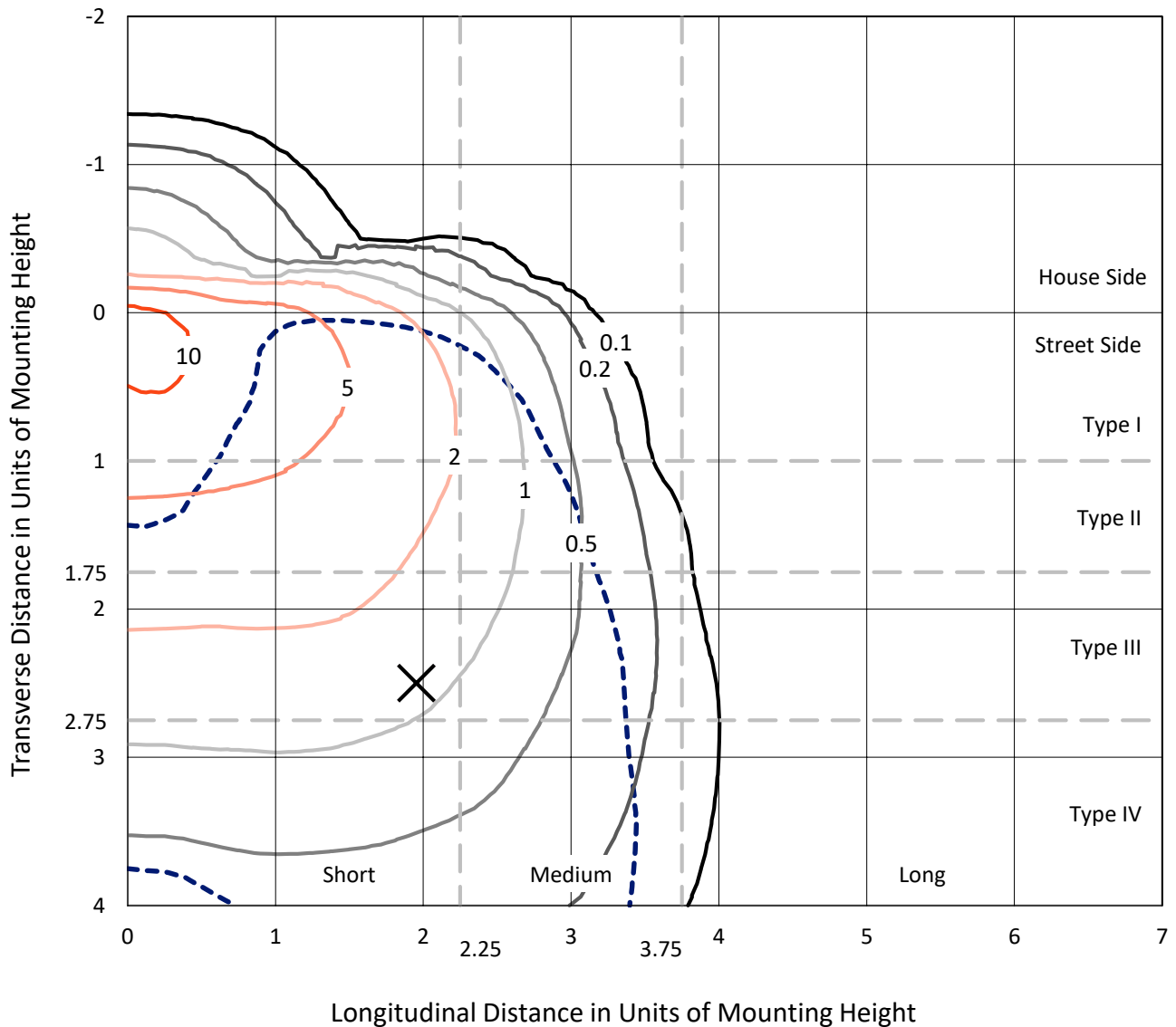
Input Watts (W): 501  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P324013  
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### Iso-Footcandle Lines of Horizontal Illumination

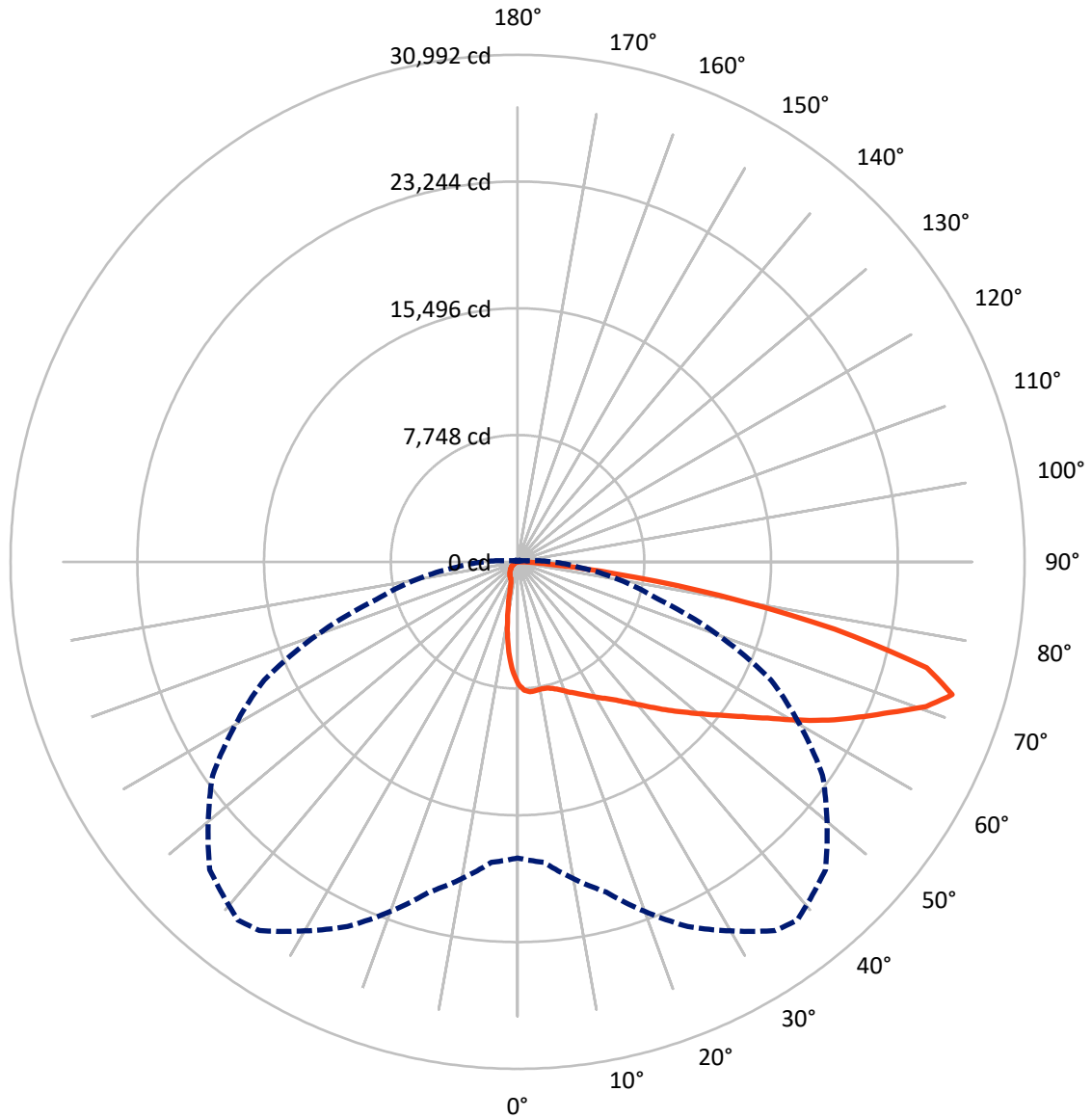
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 12.7 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 38-Deg Lateral    - - - Horizontal Cone Through 72.5-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3431.9   | 0.0    | 3431.9  |
|                    | % Fixture | 8.4      | 0.0    | 8.4     |
| <b>Street Side</b> | Lumens    | 37349.1  | 0.0    | 37349.1 |
|                    | % Fixture | 91.6     | 0.0    | 91.6    |
| <b>Total</b>       | Lumens    | 40781.0  | 0.0    | 40781.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 639.1   | 1.6       |
| 10°-20°   | 1562.7  | 3.8       |
| 20°-30°   | 2485.5  | 6.1       |
| 30°-40°   | 3736.7  | 9.2       |
| 40°-50°   | 5700.6  | 14.0      |
| 50°-60°   | 8056.9  | 19.8      |
| 60°-70°   | 10106.0 | 24.8      |
| 70°-80°   | 7556.5  | 18.5      |
| 80°-90°   | 937.0   | 2.3       |
| 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°    | 40781.0 | 100.0     |
| 0°-180°   | 40781.0 | 100.0     |

**Coefficient of Utilization**



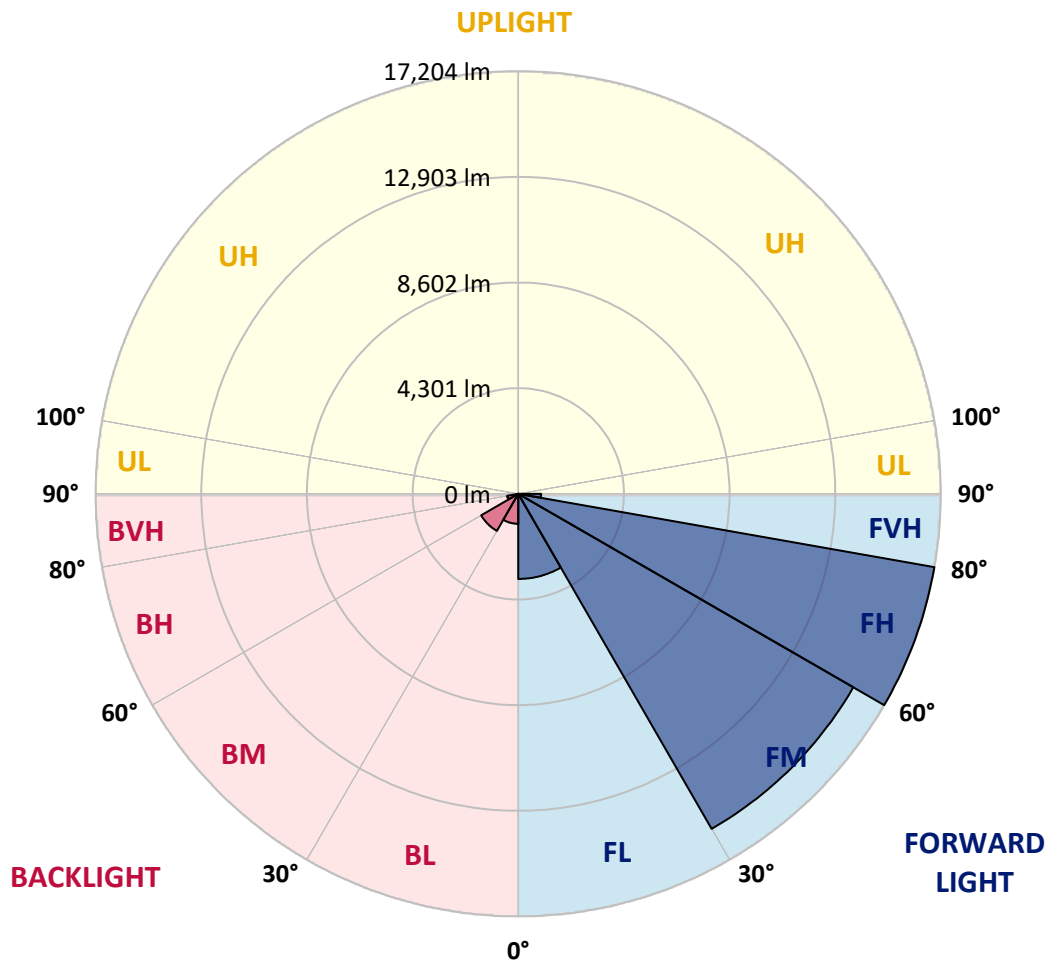
REPORT NUMBER: P324013  
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |        |
|----------------|---------|-----------|-------------------------|------|--------|
|                |         |           | B                       | U    | G      |
| FL (0°-30°)    | 3465.4  | 8.5       |                         |      |        |
| FM (30°-60°)   | 15751.4 | 38.6      |                         |      |        |
| FH (60°-80°)   | 17204.1 | 42.2      |                         |      | G5     |
| FVH (80°-90°)  | 928.2   | 2.3       |                         |      | G5     |
| BL (0°-30°)    | 1222.0  | 3.0       | B3/2500                 |      |        |
| BM (30°-60°)   | 1742.8  | 4.3       | B2/2500                 |      |        |
| BH (60°-80°)   | 458.4   | 1.1       | B1/500                  |      | G1/500 |
| BVH (80°-90°)  | 8.7     | 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-G5**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 38°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 7499.5  | 7499.5  | 7499.5  | 7499.5  | 7499.5  | 7499.5  | 7499.5  | 7499.5  | 7499.5  | 7499.5  | 7499.5  |
| 2.5°  | 7960.2  | 7961.9  | 7943.2  | 7912.7  | 7873.8  | 7853.5  | 7819.6  | 7765.4  | 7707.8  | 7604.5  | 7492.7  |
| 5°    | 8122.8  | 8122.8  | 8099.0  | 8058.4  | 7995.7  | 7977.1  | 7912.7  | 7826.4  | 7707.8  | 7540.1  | 7352.1  |
| 7.5°  | 8105.8  | 8109.2  | 8077.0  | 8034.7  | 7972.0  | 7955.1  | 7877.2  | 7780.6  | 7633.3  | 7430.1  | 7189.6  |
| 10°   | 8017.7  | 8026.2  | 8000.8  | 7980.5  | 7922.9  | 7904.3  | 7831.4  | 7734.9  | 7587.6  | 7370.8  | 7094.7  |
| 12.5° | 7928.0  | 7936.5  | 7944.9  | 7963.6  | 7928.0  | 7921.2  | 7863.6  | 7782.3  | 7641.8  | 7416.5  | 7104.9  |
| 15°   | 7870.4  | 7887.3  | 7948.3  | 8021.1  | 8029.6  | 8022.8  | 7985.6  | 7909.4  | 7767.1  | 7533.4  | 7177.7  |
| 17.5° | 7870.4  | 7897.5  | 8024.5  | 8163.4  | 8212.5  | 8217.6  | 8185.4  | 8078.7  | 7909.4  | 7658.7  | 7245.4  |
| 20°   | 7936.5  | 7973.7  | 8171.9  | 8368.3  | 8449.6  | 8449.6  | 8387.0  | 8237.9  | 8039.8  | 7772.2  | 7291.2  |
| 22.5° | 8105.8  | 8154.9  | 8403.9  | 8630.9  | 8717.2  | 8698.6  | 8613.9  | 8397.1  | 8175.3  | 7900.9  | 7348.8  |
| 25°   | 8439.5  | 8476.7  | 8735.9  | 8964.5  | 9017.0  | 8974.7  | 8868.0  | 8590.2  | 8348.0  | 8075.3  | 7453.8  |
| 27.5° | 8869.7  | 8874.7  | 9142.3  | 9335.4  | 9303.2  | 9274.4  | 9140.6  | 8832.4  | 8597.0  | 8324.3  | 7635.0  |
| 30°   | 9342.2  | 9342.2  | 9577.6  | 9725.0  | 9626.7  | 9603.0  | 9469.2  | 9125.4  | 8915.4  | 8663.0  | 7892.4  |
| 32.5° | 9799.5  | 9819.8  | 10011.2 | 10104.3 | 9994.2  | 9970.5  | 9840.1  | 9496.3  | 9338.8  | 9179.6  | 8293.8  |
| 35°   | 10241.5 | 10256.8 | 10438.0 | 10488.8 | 10383.8 | 10390.6 | 10297.4 | 10006.1 | 9946.8  | 9926.5  | 8898.4  |
| 37.5° | 10670.0 | 10673.4 | 10858.0 | 10890.2 | 10837.7 | 10895.3 | 10903.7 | 10646.3 | 10756.4 | 10920.7 | 9750.4  |
| 40°   | 11061.2 | 11064.6 | 11247.5 | 11330.5 | 11420.3 | 11494.8 | 11560.9 | 11423.7 | 11787.8 | 12168.9 | 10764.9 |
| 42.5° | 11374.6 | 11410.1 | 11642.2 | 11799.7 | 12036.8 | 12179.1 | 12358.6 | 12351.8 | 13015.7 | 13588.2 | 11991.1 |
| 45°   | 11650.6 | 11711.6 | 12035.1 | 12311.2 | 12717.6 | 12944.6 | 13225.7 | 13445.9 | 14397.7 | 15168.3 | 13232.5 |
| 47.5° | 12014.8 | 12072.4 | 12441.6 | 12893.8 | 13435.7 | 13733.8 | 14199.6 | 14675.5 | 15916.9 | 16719.7 | 14445.2 |
| 50°   | 12527.9 | 12502.5 | 12866.7 | 13515.3 | 14211.4 | 14602.7 | 15266.6 | 15979.6 | 17424.3 | 18071.3 | 15158.2 |
| 52.5° | 13075.0 | 13064.8 | 13334.1 | 14191.1 | 15126.0 | 15583.3 | 16460.6 | 17327.8 | 18865.6 | 19002.8 | 15485.1 |
| 55°   | 13752.5 | 13679.6 | 13906.6 | 14961.7 | 16211.6 | 16702.8 | 17735.9 | 18662.4 | 20013.9 | 19527.8 | 15649.3 |
| 57.5° | 14462.1 | 14341.8 | 14558.6 | 15820.4 | 17436.1 | 18017.1 | 19148.4 | 19963.1 | 20777.7 | 19886.9 | 15647.7 |
| 60°   | 15195.4 | 15053.2 | 15310.6 | 16894.2 | 18957.0 | 19629.4 | 20679.5 | 20842.1 | 21490.8 | 20068.1 | 15532.5 |
| 62.5° | 15808.5 | 15723.9 | 16106.6 | 18042.5 | 20655.8 | 21316.3 | 21836.3 | 21641.5 | 22092.0 | 20208.7 | 15263.2 |
| 65°   | 16457.2 | 16462.3 | 17080.5 | 19382.2 | 22461.2 | 22906.6 | 22950.7 | 22678.0 | 22595.0 | 20179.9 | 14352.0 |
| 67.5° | 17334.5 | 17415.8 | 18447.3 | 21201.1 | 24217.5 | 24561.3 | 24558.0 | 23800.9 | 22962.5 | 19035.0 | 12331.5 |
| 70°   | 18262.7 | 18454.0 | 20022.4 | 23282.6 | 26134.7 | 26483.6 | 26304.1 | 24515.6 | 21621.2 | 15391.9 | 8727.4  |
| 72.5° | 18106.8 | 18438.8 | 20898.0 | 24595.2 | 27511.7 | 27777.6 | 26610.7 | 22759.3 | 17088.9 | 8945.9  | 3715.9  |
| 75°   | 13969.2 | 14353.7 | 19162.0 | 23294.5 | 26067.0 | 25828.2 | 22864.3 | 17710.5 | 9338.8  | 2496.4  | 836.7   |
| 77.5° | 7379.2  | 7584.2  | 12658.4 | 17746.1 | 20325.5 | 19825.9 | 16106.6 | 9824.9  | 2847.0  | 618.2   | 376.0   |
| 80°   | 3864.9  | 3912.3  | 5516.2  | 10068.8 | 12544.9 | 12548.3 | 9545.4  | 4315.4  | 1173.7  | 316.7   | 252.4   |
| 82.5° | 2069.6  | 2110.3  | 2914.8  | 4652.5  | 6573.1  | 5958.3  | 3654.9  | 2374.5  | 682.5   | 179.5   | 242.2   |
| 85°   | 497.9   | 506.4   | 1653.0  | 2125.5  | 2584.5  | 1846.1  | 1085.6  | 1993.4  | 184.6   | 105.0   | 196.5   |
| 87.5° | 191.4   | 194.8   | 613.1   | 919.7   | 658.8   | 426.8   | 508.1   | 743.5   | 23.7    | 40.6    | 30.5    |
| 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: P324013

CATALOG NUMBER: GLEON-SA9C-830-U-SL4-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 7499.5  | 7499.5 | 7499.5 | 7499.5 | 7499.5 | 7499.5 | 7499.5 | 7499.5 | 7499.5 | 7499.5 | 7499.5 |
| 2.5°  | 7425.0  | 7380.9 | 7272.5 | 7135.4 | 7013.4 | 6925.3 | 6793.2 | 6706.9 | 6649.3 | 6647.6 | 6625.6 |
| 5°    | 7237.0  | 7147.2 | 6913.5 | 6635.7 | 6383.4 | 6156.4 | 5888.8 | 5677.1 | 5519.6 | 5494.2 | 5440.0 |
| 7.5°  | 7035.4  | 6888.1 | 6529.0 | 6095.5 | 5672.0 | 5241.9 | 4742.2 | 4432.3 | 4166.4 | 4039.4 | 4025.8 |
| 10°   | 6911.8  | 6705.2 | 6195.4 | 5568.7 | 4904.8 | 4205.3 | 3551.6 | 3099.4 | 2772.5 | 2679.4 | 2609.9 |
| 12.5° | 6886.4  | 6613.7 | 5937.9 | 5074.2 | 4125.7 | 3201.0 | 2477.8 | 1996.8 | 1736.0 | 1653.0 | 1631.0 |
| 15°   | 6911.8  | 6571.4 | 5721.2 | 4584.7 | 3336.5 | 2271.2 | 1663.2 | 1383.7 | 1285.5 | 1261.8 | 1260.1 |
| 17.5° | 6927.0  | 6520.6 | 5475.6 | 4041.1 | 2571.0 | 1622.5 | 1273.6 | 1192.3 | 1177.1 | 1175.4 | 1178.8 |
| 20°   | 6925.3  | 6442.7 | 5182.6 | 3434.7 | 1912.1 | 1275.3 | 1151.7 | 1134.7 | 1131.4 | 1133.1 | 1131.4 |
| 22.5° | 6913.5  | 6351.2 | 4860.8 | 2809.8 | 1444.7 | 1139.8 | 1099.2 | 1089.0 | 1087.3 | 1087.3 | 1087.3 |
| 25°   | 6935.5  | 6278.4 | 4506.8 | 2211.9 | 1190.6 | 1077.2 | 1051.8 | 1043.3 | 1041.6 | 1041.6 | 1038.2 |
| 27.5° | 7015.1  | 6237.7 | 4119.0 | 1702.1 | 1075.5 | 1021.3 | 1000.9 | 999.3  | 994.2  | 992.5  | 995.9  |
| 30°   | 7143.8  | 6237.7 | 3693.9 | 1324.4 | 1006.0 | 963.7  | 948.4  | 945.1  | 943.4  | 941.7  | 943.4  |
| 32.5° | 7370.8  | 6285.1 | 3229.8 | 1100.9 | 940.0  | 899.3  | 889.2  | 894.2  | 889.2  | 889.2  | 889.2  |
| 35°   | 7780.6  | 6427.4 | 2743.7 | 960.3  | 870.5  | 836.7  | 826.5  | 833.3  | 829.9  | 829.9  | 828.2  |
| 37.5° | 8378.5  | 6691.6 | 2254.3 | 875.6  | 809.6  | 774.0  | 760.4  | 770.6  | 767.2  | 767.2  | 765.5  |
| 40°   | 9106.8  | 7076.1 | 1788.5 | 811.3  | 750.3  | 713.0  | 701.2  | 706.3  | 697.8  | 697.8  | 701.2  |
| 42.5° | 10006.1 | 7563.9 | 1382.0 | 748.6  | 691.0  | 655.4  | 648.7  | 643.6  | 628.3  | 619.9  | 621.6  |
| 45°   | 11005.4 | 8071.9 | 1077.2 | 687.6  | 635.1  | 606.3  | 596.2  | 582.6  | 557.2  | 540.3  | 542.0  |
| 47.5° | 11897.9 | 8463.2 | 875.6  | 628.3  | 584.3  | 562.3  | 547.0  | 521.6  | 484.4  | 464.1  | 465.8  |
| 50°   | 12367.0 | 8522.5 | 745.2  | 569.1  | 536.9  | 514.9  | 492.9  | 453.9  | 409.9  | 387.8  | 386.2  |
| 52.5° | 12487.3 | 8244.7 | 648.7  | 514.9  | 489.5  | 464.1  | 435.3  | 382.8  | 333.6  | 309.9  | 306.6  |
| 55°   | 12531.3 | 7821.3 | 562.3  | 464.1  | 438.7  | 409.9  | 372.6  | 313.3  | 267.6  | 243.9  | 242.2  |
| 57.5° | 12385.7 | 7189.6 | 494.5  | 418.3  | 387.8  | 352.3  | 306.6  | 250.7  | 206.6  | 188.0  | 188.0  |
| 60°   | 12062.2 | 6334.3 | 442.0  | 369.2  | 335.3  | 294.7  | 247.3  | 194.8  | 154.1  | 138.9  | 138.9  |
| 62.5° | 11416.9 | 5226.6 | 392.9  | 318.4  | 286.2  | 243.9  | 199.9  | 147.3  | 108.4  | 99.9   | 101.6  |
| 65°   | 10199.2 | 3964.8 | 343.8  | 272.7  | 243.9  | 201.5  | 155.8  | 105.0  | 72.8   | 72.8   | 76.2   |
| 67.5° | 8317.5  | 2753.9 | 293.0  | 232.0  | 210.0  | 164.3  | 118.6  | 72.8   | 50.8   | 57.6   | 64.4   |
| 70°   | 5506.1  | 1544.6 | 250.7  | 191.4  | 179.5  | 130.4  | 88.1   | 49.1   | 40.6   | 54.2   | 66.1   |
| 72.5° | 2078.1  | 601.2  | 210.0  | 154.1  | 155.8  | 99.9   | 62.7   | 37.3   | 37.3   | 59.3   | 77.9   |
| 75°   | 579.2   | 294.7  | 150.7  | 113.5  | 121.9  | 72.8   | 45.7   | 32.2   | 35.6   | 67.7   | 91.5   |
| 77.5° | 340.4   | 216.8  | 98.2   | 66.1   | 83.0   | 50.8   | 30.5   | 25.4   | 30.5   | 57.6   | 88.1   |
| 80°   | 274.4   | 115.2  | 57.6   | 33.9   | 45.7   | 28.8   | 20.3   | 15.2   | 8.5    | 22.0   | 45.7   |
| 82.5° | 274.4   | 69.4   | 27.1   | 23.7   | 23.7   | 15.2   | 10.2   | 6.8    | 1.7    | 0.0    | 11.9   |
| 85°   | 184.6   | 28.8   | 16.9   | 15.2   | 11.9   | 5.1    | 3.4    | 1.7    | 0.0    | 0.0    | 0.0    |
| 87.5° | 30.5    | 11.9   | 6.8    | 3.4    | 1.7    | 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           |

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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**



**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**



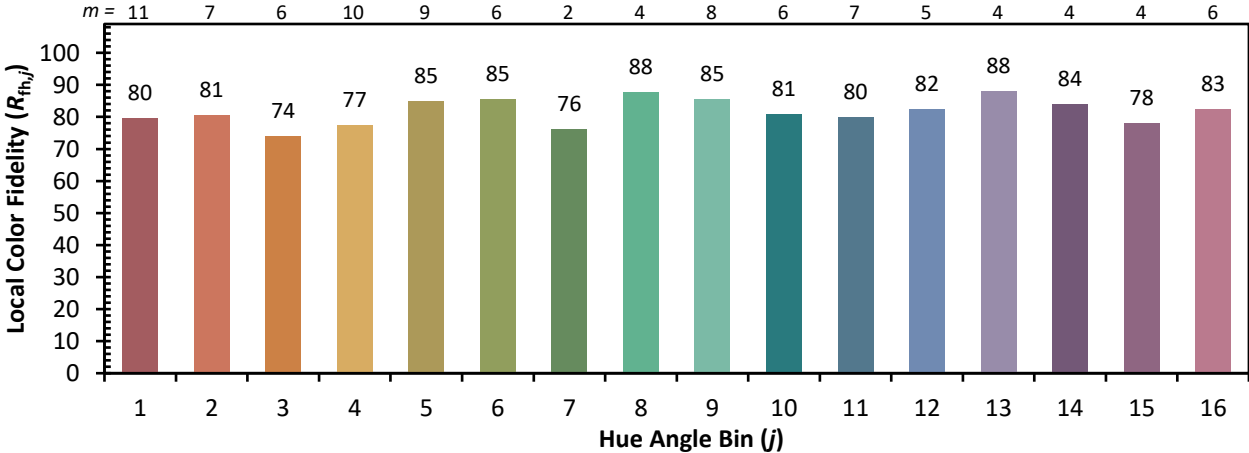


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| 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)