

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: P321129

Luminaire Tested: **GLEON-SA5C-830-U-AFL**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P321129  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-29)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA5C-830-U-AFL  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(5) 80 CRI, 3000K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 28819 lumens  
Efficiency: N/A  
Efficacy: 103.3 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G3

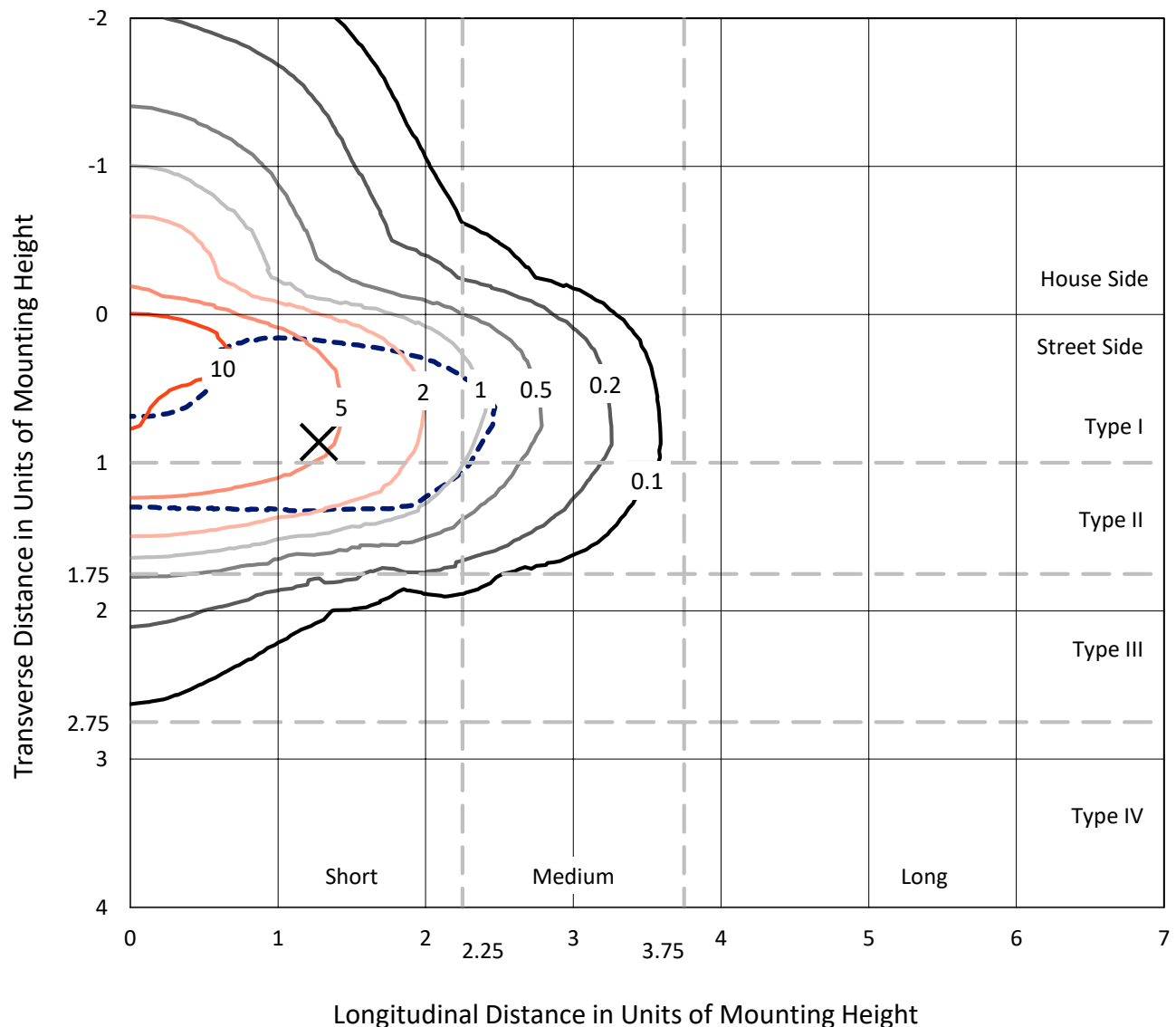
Input Watts (W): 279  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P321129  
 CATALOG NUMBER: GLEON-SA5C-830-U-AFL

## Iso-Footcandle Lines of Horizontal Illumination

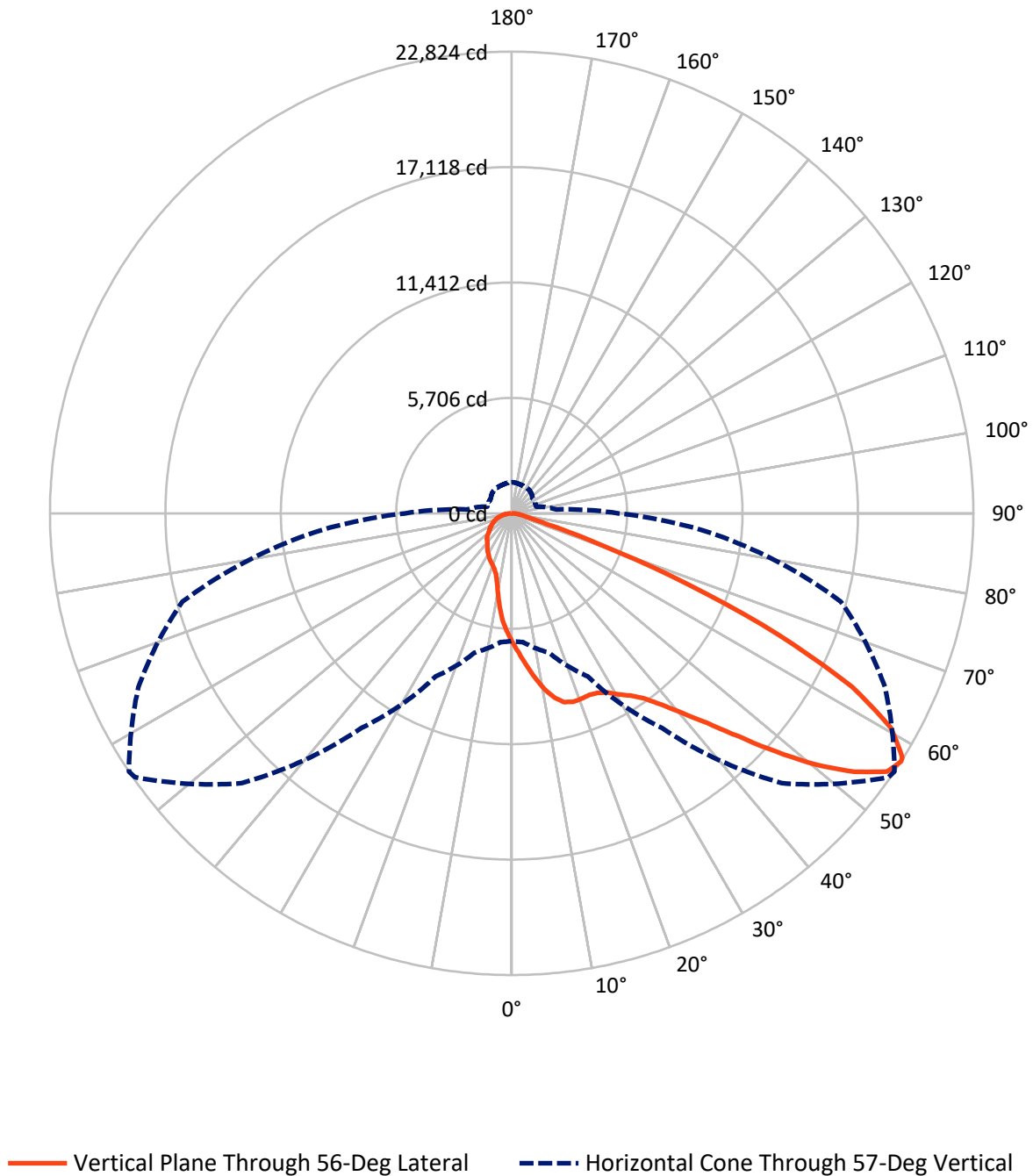
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 14.2 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA5C-830-U-AFL

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 4967.8   | 0.0    | 4967.8  |
|                    | % Fixture | 17.2     | 0.0    | 17.2    |
| <b>Street Side</b> | Lumens    | 23851.2  | 0.0    | 23851.2 |
|                    | % Fixture | 82.8     | 0.0    | 82.8    |
| <b>Total</b>       | Lumens    | 28819.0  | 0.0    | 28819.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 610.6   | 2.1       |
| 10°-20°   | 1726.3  | 6.0       |
| 20°-30°   | 2811.8  | 9.8       |
| 30°-40°   | 4203.4  | 14.6      |
| 40°-50°   | 6375.6  | 22.1      |
| 50°-60°   | 7146.0  | 24.8      |
| 60°-70°   | 4220.7  | 14.6      |
| 70°-80°   | 1382.9  | 4.8       |
| 80°-90°   | 341.7   | 1.2       |
| 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°    | 28819.0 | 100.0     |
| 0°-180°   | 28819.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P321129

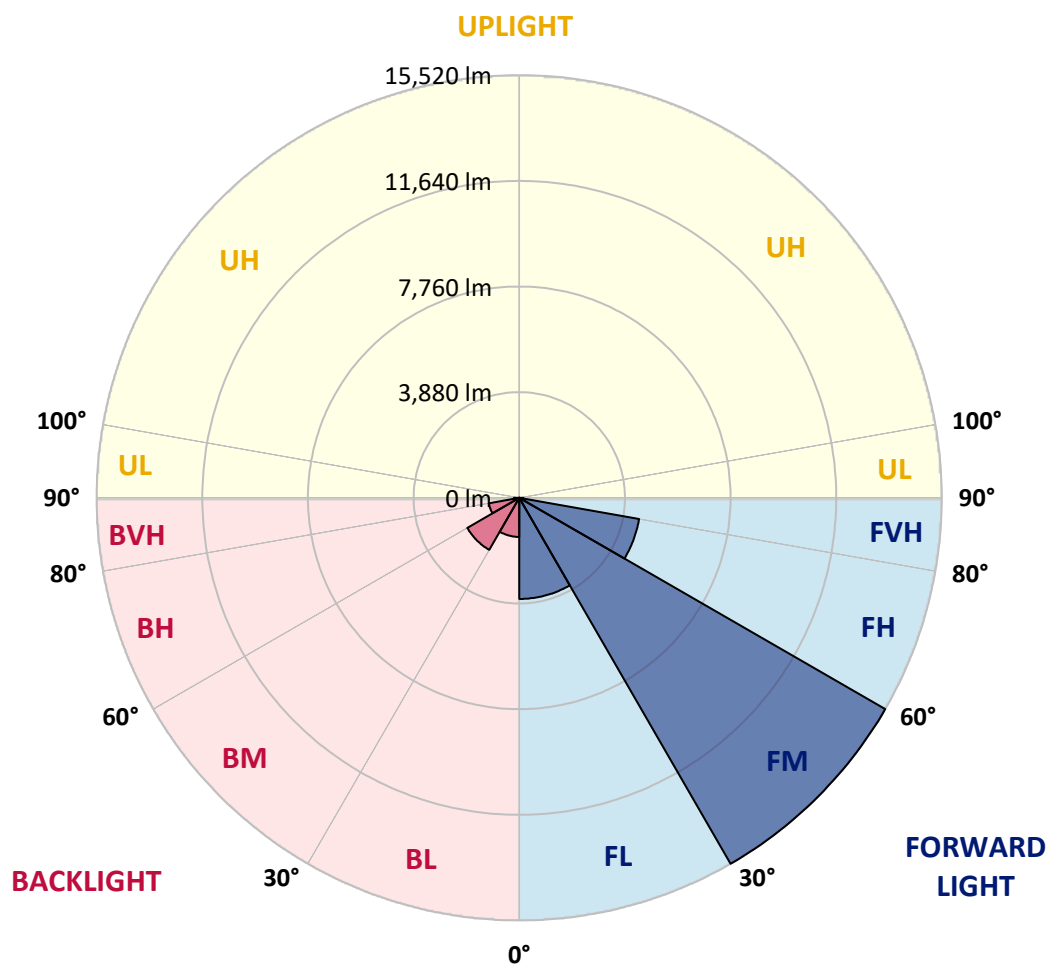
CATALOG NUMBER: GLEON-SA5C-830-U-AFL

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3712.3  | 12.9      |                         |      |         |
| FM   | (30°-60°)   | 15520.0 | 53.9      |                         |      |         |
| FH   | (60°-80°)   | 4468.5  | 15.5      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 150.4   | 0.5       |                         |      | G2/225  |
| BL   | (0°-30°)    | 1436.5  | 5.0       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 2205.0  | 7.7       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1135.1  | 3.9       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 191.2   | 0.7       |                         |      | G2/225  |
| 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°     | 55°     | 56°     | 65°     | 75°     | 85°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 6392.1  | 6392.1  | 6392.1  | 6392.1  | 6392.1  | 6392.1  | 6392.1  | 6392.1  | 6392.1  | 6392.1  | 6392.1 |
| 2.5°  | 7339.9  | 7407.2  | 7377.5  | 7274.5  | 7195.3  | 7083.4  | 6958.6  | 6921.0  | 6789.2  | 6641.7  | 6464.4 |
| 5°    | 8501.6  | 8468.0  | 8419.4  | 8259.0  | 8089.6  | 7892.5  | 7579.6  | 7530.1  | 7236.9  | 6903.1  | 6550.5 |
| 7.5°  | 9163.2  | 9160.3  | 9131.5  | 9037.5  | 8883.0  | 8625.4  | 8248.1  | 8189.7  | 7747.0  | 7210.2  | 6663.5 |
| 10°   | 9067.2  | 9060.2  | 9107.8  | 9205.8  | 9252.4  | 9198.9  | 8881.0  | 8822.5  | 8278.8  | 7549.9  | 6794.2 |
| 12.5° | 8521.5  | 8525.4  | 8601.7  | 8807.7  | 9088.0  | 9424.7  | 9373.2  | 9344.5  | 8830.5  | 7934.1  | 6952.7 |
| 15°   | 8096.6  | 8105.5  | 8165.9  | 8345.2  | 8676.0  | 9287.0  | 9672.3  | 9682.2  | 9364.3  | 8358.0  | 7137.9 |
| 17.5° | 7910.4  | 7929.2  | 7956.9  | 8082.7  | 8385.8  | 9012.7  | 9743.6  | 9797.1  | 9831.8  | 8797.8  | 7316.1 |
| 20°   | 7969.8  | 7987.6  | 7995.5  | 8075.8  | 8324.4  | 8846.3  | 9694.1  | 9790.2  | 10190.3 | 9211.8  | 7494.4 |
| 22.5° | 8236.2  | 8247.1  | 8252.1  | 8272.9  | 8466.0  | 8893.8  | 9661.4  | 9762.4  | 10449.8 | 9583.2  | 7629.1 |
| 25°   | 8677.9  | 8670.0  | 8638.3  | 8611.6  | 8741.3  | 9082.0  | 9736.7  | 9832.8  | 10660.7 | 9919.9  | 7717.2 |
| 27.5° | 9206.8  | 9196.9  | 9135.5  | 9062.2  | 9136.5  | 9375.2  | 9953.6  | 10029.8 | 10849.9 | 10234.9 | 7761.8 |
| 30°   | 9841.7  | 9815.9  | 9700.0  | 9612.9  | 9641.6  | 9814.9  | 10311.1 | 10380.4 | 11142.1 | 10592.4 | 7805.4 |
| 32.5° | 10575.6 | 10547.8 | 10380.4 | 10235.8 | 10235.8 | 10380.4 | 10679.5 | 10737.0 | 11389.7 | 10996.5 | 7875.7 |
| 35°   | 11494.7 | 11460.0 | 11242.1 | 10999.4 | 10931.1 | 11004.4 | 11181.7 | 11222.3 | 11835.4 | 11505.5 | 8003.5 |
| 37.5° | 12578.2 | 12531.6 | 12249.3 | 11924.5 | 11774.9 | 11771.0 | 11898.7 | 11981.9 | 12547.5 | 12174.1 | 8220.4 |
| 40°   | 13664.6 | 13631.9 | 13385.3 | 13129.8 | 12836.7 | 12742.6 | 12939.7 | 12965.4 | 13478.4 | 13004.0 | 8497.7 |
| 42.5° | 14504.5 | 14498.6 | 14453.0 | 14486.7 | 14186.6 | 13996.4 | 14150.9 | 14171.7 | 14615.4 | 13902.3 | 8792.8 |
| 45°   | 14948.2 | 14958.1 | 15179.0 | 15668.2 | 15779.1 | 15640.5 | 15716.8 | 15722.7 | 15914.8 | 14808.6 | 9063.2 |
| 47.5° | 14592.6 | 14644.1 | 15202.7 | 16297.1 | 17205.3 | 17665.9 | 17539.1 | 17612.4 | 17174.6 | 15587.0 | 9275.2 |
| 50°   | 13207.1 | 13270.5 | 14221.2 | 16016.8 | 17870.9 | 19625.9 | 19559.5 | 19542.7 | 18190.8 | 16157.5 | 9390.0 |
| 52.5° | 11490.7 | 11540.2 | 12324.6 | 14560.0 | 17382.6 | 20709.4 | 21318.5 | 21231.3 | 19094.0 | 16584.3 | 9411.8 |
| 55°   | 8877.0  | 8954.3  | 9706.0  | 11652.1 | 15407.7 | 20295.4 | 22612.0 | 22533.7 | 19917.1 | 16808.2 | 9386.1 |
| 57°   | 6310.9  | 6392.1  | 7138.8  | 8892.9  | 12961.4 | 18862.3 | 22740.7 | 22823.9 | 20361.8 | 16845.8 | 9414.8 |
| 57.5° | 5631.4  | 5714.6  | 6454.5  | 8158.0  | 12198.8 | 18344.3 | 22629.8 | 22768.4 | 20442.0 | 16839.9 | 9430.6 |
| 60°   | 2835.5  | 2867.2  | 3338.7  | 4553.9  | 7711.3  | 14830.3 | 21182.8 | 21540.3 | 20514.3 | 16548.7 | 9499.0 |
| 62.5° | 1762.9  | 1740.1  | 1725.3  | 2097.7  | 3751.7  | 9834.7  | 18196.7 | 18885.1 | 19130.7 | 15843.5 | 9333.6 |
| 65°   | 1550.0  | 1507.4  | 1344.0  | 1314.3  | 1656.9  | 4776.7  | 13703.3 | 14560.0 | 16174.3 | 14732.3 | 8939.4 |
| 67.5° | 1455.9  | 1414.3  | 1230.1  | 1119.2  | 1120.1  | 1893.7  | 8507.6  | 9472.2  | 12599.9 | 12853.5 | 8009.4 |
| 70°   | 1358.8  | 1321.2  | 1148.9  | 1018.1  | 953.8   | 1048.8  | 3914.1  | 4646.0  | 8213.4  | 10103.1 | 6694.2 |
| 72.5° | 1234.0  | 1208.3  | 1044.9  | 910.2   | 841.8   | 785.4   | 1498.5  | 1769.9  | 4754.9  | 6785.3  | 4649.0 |
| 75°   | 1103.3  | 1079.5  | 939.9   | 811.1   | 727.9   | 618.0   | 843.8   | 909.2   | 2415.6  | 3471.4  | 2288.8 |
| 77.5° | 959.7   | 945.8   | 835.9   | 717.1   | 650.7   | 512.0   | 597.2   | 628.9   | 1036.0  | 1488.6  | 1147.9 |
| 80°   | 763.6   | 790.3   | 730.9   | 638.8   | 577.4   | 410.0   | 422.9   | 443.7   | 603.2   | 727.0   | 651.7  |
| 82.5° | 497.2   | 543.7   | 572.5   | 519.0   | 475.4   | 322.9   | 304.1   | 313.0   | 393.2   | 443.7   | 283.3  |
| 85°   | 207.0   | 232.7   | 376.4   | 339.7   | 315.9   | 235.7   | 204.0   | 208.0   | 243.6   | 252.6   | 115.9  |
| 87.5° | 92.1    | 98.1    | 165.4   | 155.5   | 133.7   | 81.2    | 87.2    | 95.1    | 129.7   | 122.8   | 44.6   |
| 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: P321129

CATALOG NUMBER: GLEON-SA5C-830-U-AFL

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6392.1 | 6392.1 | 6392.1 | 6392.1 | 6392.1 | 6392.1 | 6392.1 | 6392.1 | 6392.1 | 6392.1 | 6392.1 |
| 2.5°  | 6398.0 | 6314.8 | 6172.2 | 6014.7 | 5886.0 | 5783.0 | 5679.0 | 5607.7 | 5524.5 | 5479.9 | 5457.1 |
| 5°    | 6403.0 | 6239.6 | 5939.5 | 5631.4 | 5356.1 | 5104.6 | 4864.9 | 4680.7 | 4508.3 | 4415.2 | 4389.5 |
| 7.5°  | 6423.8 | 6178.2 | 5692.9 | 5185.8 | 4696.5 | 4249.8 | 3905.2 | 3689.3 | 3533.8 | 3464.4 | 3444.6 |
| 10°   | 6440.6 | 6105.9 | 5387.8 | 4637.1 | 3971.5 | 3518.9 | 3251.5 | 3130.7 | 3077.2 | 3068.3 | 3059.4 |
| 12.5° | 6480.2 | 6031.6 | 5066.9 | 4064.6 | 3408.0 | 3095.0 | 3001.9 | 2994.0 | 3008.9 | 3030.6 | 3030.6 |
| 15°   | 6542.6 | 5958.3 | 4700.5 | 3573.4 | 3049.5 | 2939.5 | 2958.3 | 3001.9 | 3042.5 | 3076.2 | 3081.2 |
| 17.5° | 6588.2 | 5868.2 | 4306.3 | 3180.2 | 2858.3 | 2888.0 | 2955.4 | 3016.8 | 3058.4 | 3091.1 | 3094.0 |
| 20°   | 6620.9 | 5728.5 | 3885.4 | 2880.1 | 2748.4 | 2840.5 | 2924.7 | 2979.1 | 3007.9 | 3040.5 | 3045.5 |
| 22.5° | 6604.0 | 5541.3 | 3512.0 | 2665.2 | 2659.2 | 2771.2 | 2851.4 | 2916.7 | 2895.0 | 2863.3 | 2884.1 |
| 25°   | 6522.8 | 5283.8 | 3127.7 | 2504.7 | 2565.2 | 2678.1 | 2777.1 | 2733.5 | 2660.2 | 2646.4 | 2654.3 |
| 27.5° | 6378.2 | 4955.0 | 2772.1 | 2356.2 | 2456.2 | 2591.9 | 2586.0 | 2542.4 | 2516.6 | 2498.8 | 2509.7 |
| 30°   | 6222.7 | 4598.5 | 2461.2 | 2226.4 | 2335.4 | 2447.3 | 2424.5 | 2423.5 | 2397.8 | 2369.1 | 2382.9 |
| 32.5° | 6069.2 | 4239.9 | 2214.5 | 2119.5 | 2244.3 | 2259.1 | 2308.6 | 2323.5 | 2273.0 | 2212.6 | 2208.6 |
| 35°   | 5935.5 | 3901.2 | 2027.4 | 2022.4 | 2134.3 | 2136.3 | 2208.6 | 2187.8 | 2062.0 | 1999.6 | 1999.6 |
| 37.5° | 5835.5 | 3563.5 | 1884.7 | 1935.3 | 1989.7 | 2041.2 | 2077.9 | 1991.7 | 1970.9 | 1936.2 | 1935.3 |
| 40°   | 5791.9 | 3266.4 | 1795.6 | 1868.9 | 1887.7 | 1953.1 | 1859.0 | 1892.7 | 1902.6 | 1884.7 | 1884.7 |
| 42.5° | 5746.3 | 3007.9 | 1718.4 | 1818.4 | 1815.4 | 1806.5 | 1759.0 | 1802.5 | 1842.2 | 1843.1 | 1840.2 |
| 45°   | 5700.8 | 2785.0 | 1650.0 | 1710.4 | 1752.0 | 1656.0 | 1664.9 | 1711.4 | 1766.9 | 1786.7 | 1786.7 |
| 47.5° | 5650.3 | 2608.7 | 1587.6 | 1596.5 | 1660.9 | 1596.5 | 1589.6 | 1625.3 | 1690.6 | 1722.3 | 1729.2 |
| 50°   | 5539.3 | 2450.3 | 1516.3 | 1496.5 | 1514.3 | 1536.1 | 1542.1 | 1558.9 | 1631.2 | 1681.7 | 1693.6 |
| 52.5° | 5385.8 | 2308.6 | 1425.2 | 1404.4 | 1404.4 | 1486.6 | 1514.3 | 1519.3 | 1580.7 | 1641.1 | 1653.0 |
| 55°   | 5258.1 | 2218.5 | 1331.1 | 1327.1 | 1323.2 | 1434.1 | 1481.6 | 1489.6 | 1532.2 | 1579.7 | 1585.6 |
| 57°   | 5267.0 | 2211.6 | 1258.8 | 1262.8 | 1261.8 | 1380.6 | 1450.9 | 1467.8 | 1489.6 | 1530.2 | 1537.1 |
| 57.5° | 5271.9 | 2216.5 | 1243.0 | 1244.9 | 1243.9 | 1365.8 | 1442.0 | 1460.8 | 1477.7 | 1520.3 | 1527.2 |
| 60°   | 5346.2 | 2229.4 | 1178.6 | 1156.8 | 1161.7 | 1286.5 | 1391.5 | 1415.3 | 1426.2 | 1482.6 | 1491.6 |
| 62.5° | 5236.3 | 2172.0 | 1127.1 | 1074.6 | 1074.6 | 1203.3 | 1321.2 | 1358.8 | 1375.7 | 1451.9 | 1466.8 |
| 65°   | 4917.4 | 2010.5 | 1066.7 | 981.5  | 991.4  | 1120.1 | 1237.0 | 1298.4 | 1324.2 | 1419.3 | 1435.1 |
| 67.5° | 4425.1 | 1823.3 | 1002.3 | 898.3  | 908.2  | 1033.0 | 1149.9 | 1216.2 | 1256.8 | 1383.6 | 1396.5 |
| 70°   | 3784.3 | 1594.6 | 915.1  | 810.2  | 822.0  | 937.9  | 1046.9 | 1122.1 | 1182.5 | 1349.9 | 1353.9 |
| 72.5° | 2790.0 | 1307.3 | 793.3  | 713.1  | 726.0  | 827.0  | 942.9  | 1030.0 | 1111.2 | 1265.7 | 1263.8 |
| 75°   | 1658.9 | 1022.1 | 658.6  | 615.0  | 624.0  | 718.0  | 848.8  | 954.8  | 1076.6 | 1233.1 | 1251.9 |
| 77.5° | 1006.3 | 769.5  | 536.8  | 515.0  | 525.9  | 622.0  | 781.4  | 894.3  | 1061.7 | 1162.7 | 1156.8 |
| 80°   | 608.1  | 549.7  | 428.8  | 415.0  | 425.9  | 531.8  | 723.0  | 848.8  | 928.0  | 993.4  | 993.4  |
| 82.5° | 317.9  | 335.7  | 314.9  | 304.1  | 318.9  | 431.8  | 657.6  | 740.8  | 820.1  | 704.2  | 657.6  |
| 85°   | 129.7  | 175.3  | 191.1  | 190.2  | 199.1  | 299.1  | 567.5  | 633.9  | 528.9  | 502.1  | 514.0  |
| 87.5° | 43.6   | 74.3   | 93.1   | 80.2   | 84.2   | 188.2  | 393.2  | 306.0  | 363.5  | 253.5  | 240.7  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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:  $4\pi$   
 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  
 R<sub>f</sub>: 81.5  
 R<sub>g</sub>: 99.2

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



### 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

| λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</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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### 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<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(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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TM-30-18

### 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)