

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: P319216

Luminaire Tested: **GLEON-SA2D-830-U-T4W**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P319216  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA2D-830-U-T4W  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(2) 80 CRI, 3000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 12527 lumens  
Efficiency: N/A  
Efficacy: 97.1 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G3

Input Watts (W): 129  
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



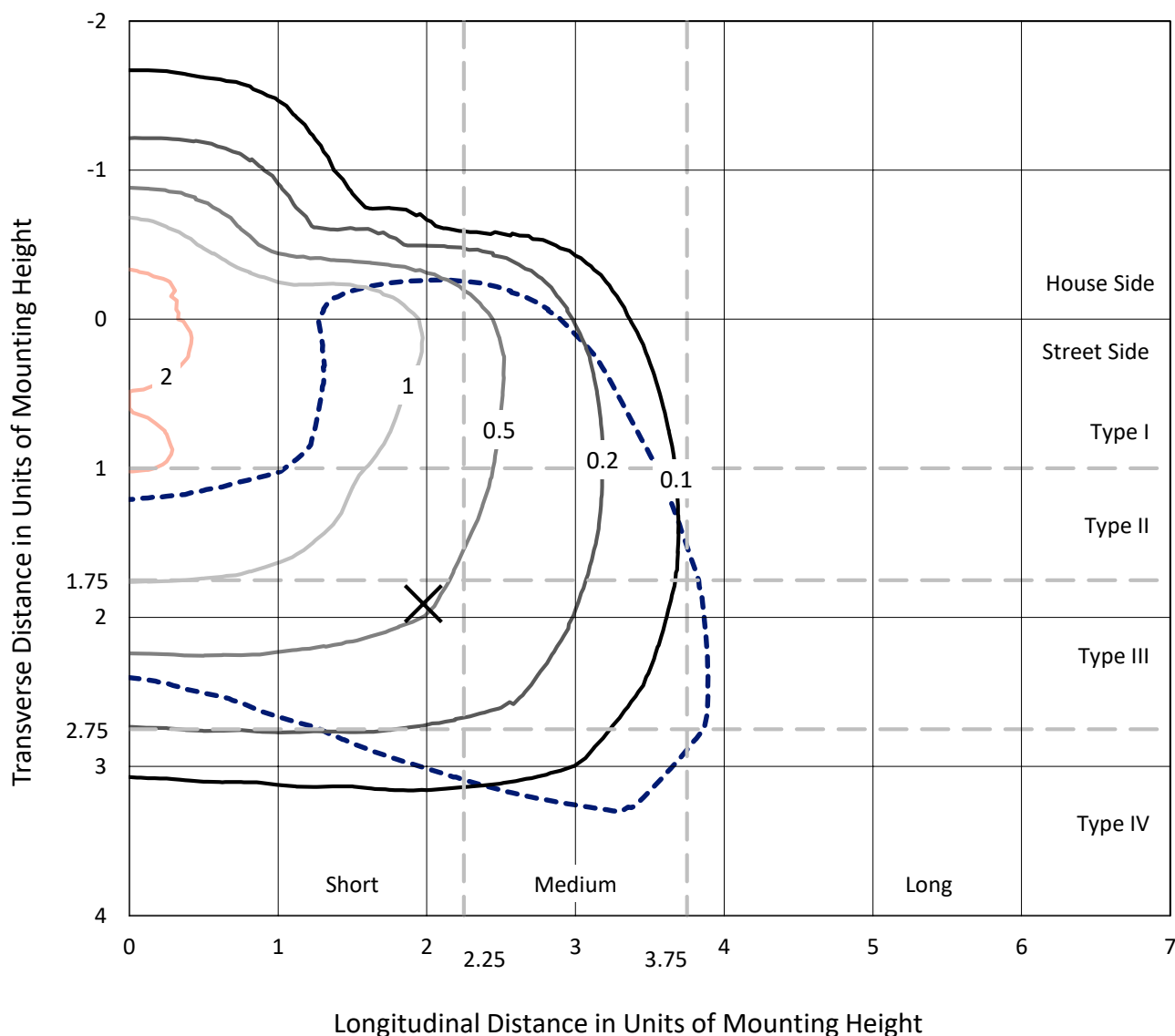
REPORT NUMBER: P319216

CATALOG NUMBER: GLEON-SA2D-830-U-T4W

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

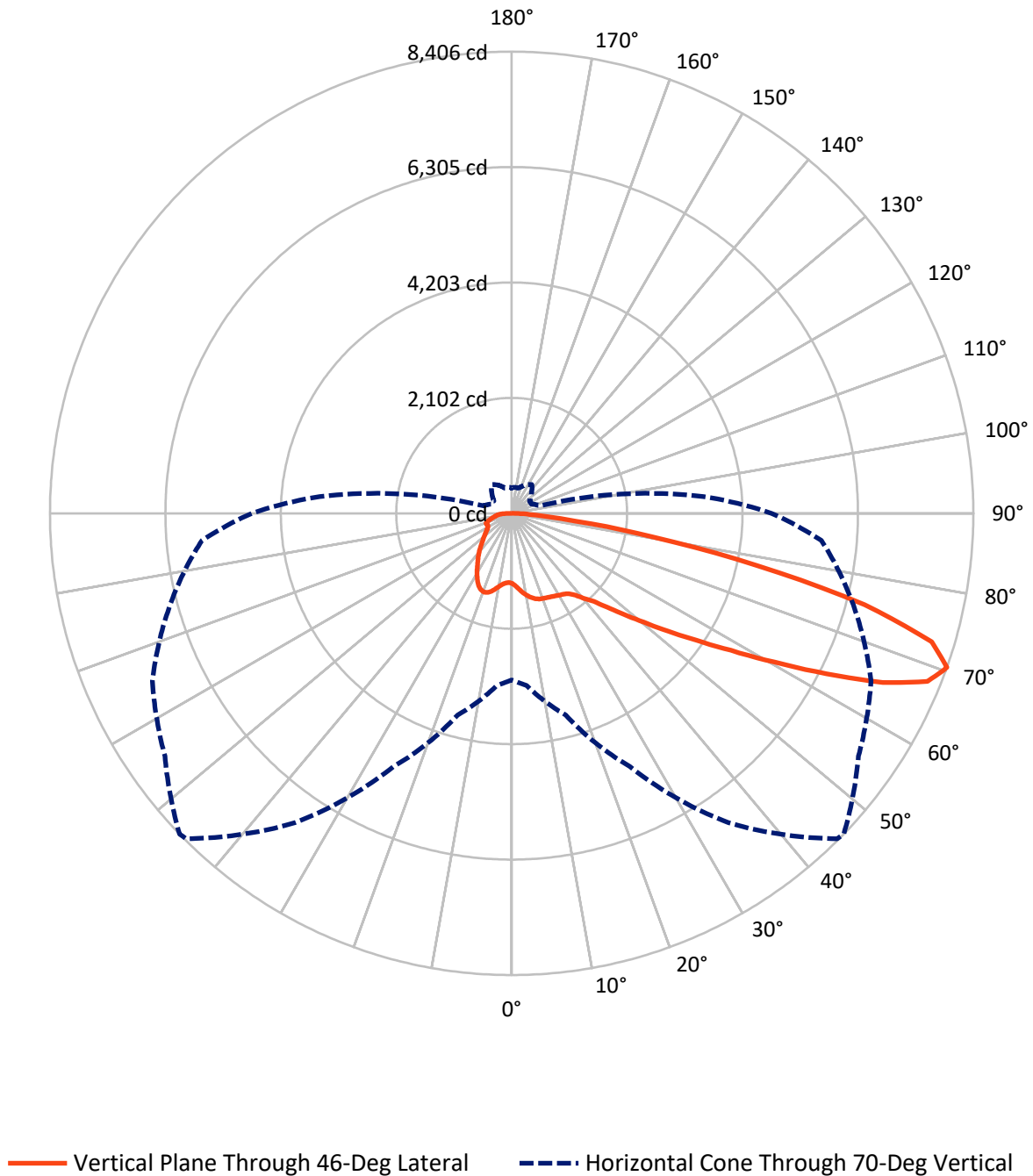


Based on 25 foot mounting height. Maximum calculated value = 2.6 fc

Type IV - Short - N/A

REPORT NUMBER: P319216  
CATALOG NUMBER: GLEON-SA2D-830-U-T4W

## Luminous Intensity Polar Plot



REPORT NUMBER: P319216

CATALOG NUMBER: GLEON-SA2D-830-U-T4W

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2871.1   | 0.0    | 2871.1  |
|                    | % Fixture | 22.9     | 0.0    | 22.9    |
| <b>Street Side</b> | Lumens    | 9655.9   | 0.0    | 9655.9  |
|                    | % Fixture | 77.1     | 0.0    | 77.1    |
| <b>Total</b>       | Lumens    | 12527.0  | 0.0    | 12527.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 130.1   | 1.0       |
| 10°-20°   | 433.5   | 3.5       |
| 20°-30°   | 722.8   | 5.8       |
| 30°-40°   | 1025.6  | 8.2       |
| 40°-50°   | 1508.7  | 12.0      |
| 50°-60°   | 2554.9  | 20.4      |
| 60°-70°   | 3626.7  | 29.0      |
| 70°-80°   | 2203.2  | 17.6      |
| 80°-90°   | 321.5   | 2.6       |
| 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°    | 12527.0 | 100.0     |
| 0°-180°   | 12527.0 | 100.0     |

**Coefficient of Utilization**



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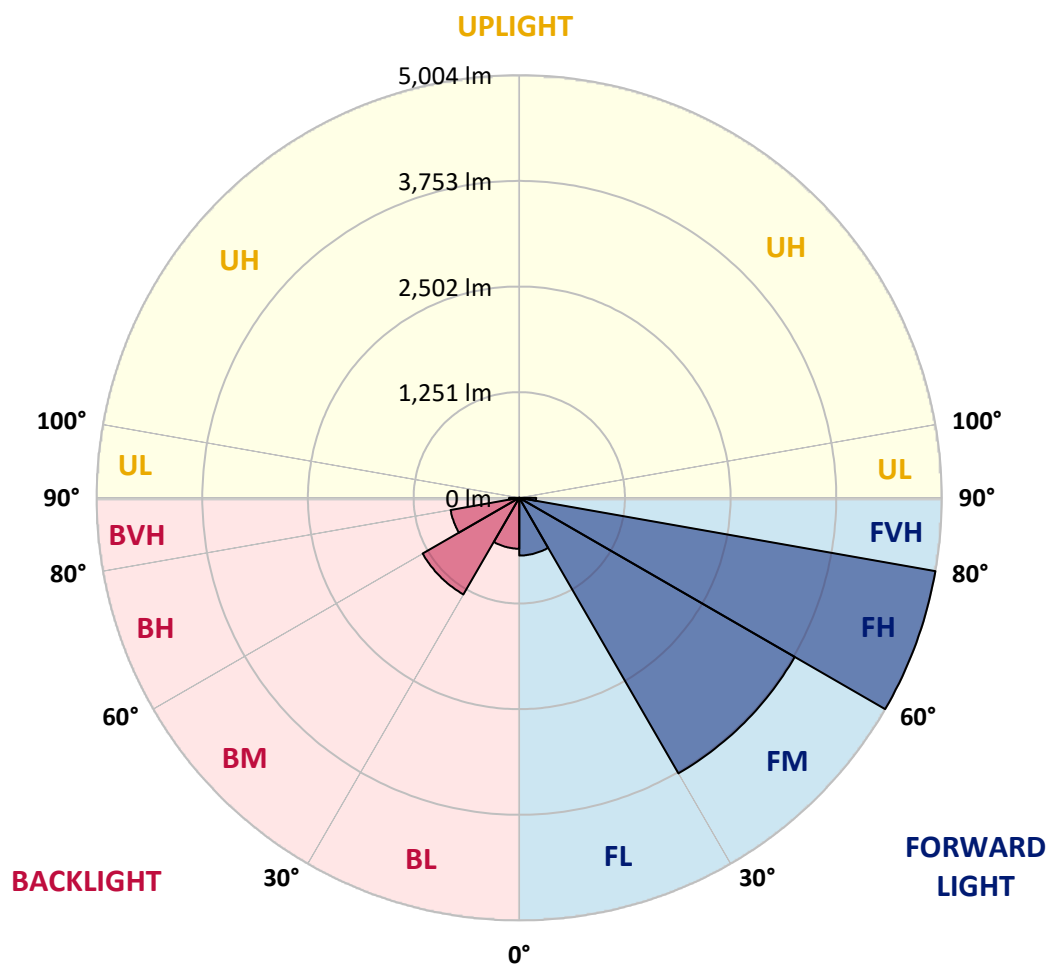
CATALOG NUMBER: GLEON-SA2D-830-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 683.5  | 5.5       |                         |      |         |
| FM   | (30°-60°)   | 3767.6 | 30.1      |                         |      |         |
| FH   | (60°-80°)   | 5004.5 | 39.9      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 200.3  | 1.6       |                         |      | G2/225  |
| BL   | (0°-30°)    | 602.8  | 4.8       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1321.7 | 10.6      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 825.4  | 6.6       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 121.2  | 1.0       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type IV Short



REPORT NUMBER: P319216

CATALOG NUMBER: GLEON-SA2D-830-U-T4W

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 46°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 |
| 2.5°  | 1340.1 | 1341.0 | 1342.7 | 1338.4 | 1326.4 | 1323.0 | 1321.7 | 1309.3 | 1301.1 | 1289.1 | 1278.8 |
| 5°    | 1447.3 | 1448.2 | 1445.6 | 1433.6 | 1407.0 | 1387.3 | 1385.6 | 1357.3 | 1331.6 | 1304.1 | 1283.5 |
| 7.5°  | 1559.2 | 1560.5 | 1552.3 | 1529.6 | 1492.3 | 1458.0 | 1455.9 | 1417.3 | 1378.3 | 1336.7 | 1305.8 |
| 10°   | 1658.2 | 1653.1 | 1639.8 | 1608.1 | 1563.9 | 1521.9 | 1520.2 | 1479.9 | 1434.9 | 1384.7 | 1343.6 |
| 12.5° | 1724.3 | 1720.0 | 1702.8 | 1664.2 | 1615.8 | 1577.2 | 1573.8 | 1536.5 | 1492.8 | 1437.9 | 1388.6 |
| 15°   | 1760.7 | 1763.7 | 1740.5 | 1696.8 | 1649.7 | 1617.1 | 1614.1 | 1587.5 | 1548.5 | 1493.2 | 1436.6 |
| 17.5° | 1765.4 | 1768.0 | 1745.7 | 1702.4 | 1663.8 | 1641.5 | 1640.2 | 1622.7 | 1594.4 | 1541.2 | 1482.0 |
| 20°   | 1738.0 | 1739.7 | 1721.3 | 1685.7 | 1660.4 | 1653.5 | 1653.1 | 1645.4 | 1624.4 | 1577.2 | 1519.8 |
| 22.5° | 1698.1 | 1699.4 | 1686.1 | 1660.4 | 1651.8 | 1662.5 | 1665.5 | 1662.5 | 1647.5 | 1603.4 | 1549.3 |
| 25°   | 1688.2 | 1687.4 | 1673.7 | 1647.5 | 1654.8 | 1677.5 | 1681.4 | 1682.7 | 1672.4 | 1633.8 | 1587.1 |
| 27.5° | 1735.8 | 1732.8 | 1706.7 | 1664.7 | 1669.4 | 1696.8 | 1702.0 | 1714.4 | 1708.0 | 1674.1 | 1629.9 |
| 30°   | 1873.4 | 1868.3 | 1814.7 | 1729.8 | 1706.7 | 1720.8 | 1727.3 | 1747.0 | 1748.3 | 1720.0 | 1687.0 |
| 32.5° | 2105.8 | 2099.4 | 2003.3 | 1851.6 | 1769.7 | 1745.3 | 1751.3 | 1780.8 | 1796.7 | 1774.8 | 1739.3 |
| 35°   | 2399.5 | 2392.2 | 2266.1 | 2058.6 | 1875.2 | 1792.0 | 1796.3 | 1819.9 | 1851.6 | 1820.7 | 1773.6 |
| 37.5° | 2705.6 | 2688.0 | 2566.7 | 2302.1 | 2042.8 | 1891.9 | 1891.9 | 1894.9 | 1909.9 | 1845.6 | 1813.9 |
| 40°   | 3009.9 | 2992.4 | 2882.6 | 2588.5 | 2259.7 | 2049.2 | 2039.4 | 1972.9 | 1960.9 | 1905.6 | 1894.9 |
| 42.5° | 3292.9 | 3287.7 | 3223.0 | 2912.2 | 2514.4 | 2204.0 | 2190.3 | 2077.5 | 2080.1 | 2045.8 | 2046.2 |
| 45°   | 3593.8 | 3593.8 | 3541.1 | 3238.9 | 2811.0 | 2452.6 | 2438.9 | 2273.0 | 2298.7 | 2282.9 | 2321.0 |
| 47.5° | 3839.5 | 3847.2 | 3839.9 | 3579.3 | 3156.1 | 2768.6 | 2743.7 | 2543.9 | 2616.0 | 2670.4 | 2781.4 |
| 50°   | 4090.3 | 4102.3 | 4103.6 | 3952.7 | 3573.3 | 3144.1 | 3115.8 | 2903.6 | 3064.4 | 3220.4 | 3438.6 |
| 52.5° | 4454.2 | 4481.3 | 4373.7 | 4325.2 | 4084.3 | 3590.0 | 3562.1 | 3366.2 | 3634.6 | 3853.6 | 4229.6 |
| 55°   | 4791.6 | 4768.1 | 4691.3 | 4721.3 | 4631.3 | 4097.6 | 4076.6 | 3904.6 | 4269.9 | 4554.6 | 5042.9 |
| 57.5° | 4974.3 | 4972.6 | 5049.7 | 5178.3 | 5221.2 | 4723.5 | 4705.9 | 4538.7 | 4986.3 | 5200.2 | 5806.4 |
| 60°   | 5188.6 | 5191.6 | 5382.8 | 5674.8 | 5851.4 | 5502.9 | 5495.1 | 5368.2 | 5682.1 | 5803.0 | 6405.3 |
| 62.5° | 5218.6 | 5272.6 | 5601.9 | 6104.3 | 6441.3 | 6413.4 | 6430.6 | 6115.5 | 6304.5 | 6284.0 | 6852.4 |
| 65°   | 4873.5 | 4944.7 | 5540.6 | 6234.2 | 7027.8 | 7409.3 | 7425.2 | 6867.0 | 6795.4 | 6695.1 | 7012.3 |
| 67.5° | 4166.2 | 4271.6 | 4919.0 | 5951.7 | 7221.1 | 8145.4 | 8167.7 | 7449.6 | 7202.7 | 6834.4 | 6627.4 |
| 70°   | 3031.8 | 3148.8 | 3800.5 | 5083.2 | 6876.4 | 8380.8 | 8406.1 | 7707.3 | 7218.1 | 6437.9 | 5657.6 |
| 72.5° | 1831.4 | 1923.2 | 2460.3 | 3742.2 | 5803.8 | 7952.1 | 7997.1 | 7380.6 | 6590.1 | 5453.1 | 4177.7 |
| 75°   | 804.3  | 864.3  | 1189.7 | 2156.4 | 4155.0 | 6579.3 | 6635.5 | 6317.4 | 5354.5 | 3963.0 | 2469.3 |
| 77.5° | 342.5  | 359.7  | 487.9  | 936.7  | 2348.9 | 4495.8 | 4573.0 | 4615.9 | 3632.8 | 2156.4 | 1043.5 |
| 80°   | 213.5  | 220.4  | 276.1  | 424.0  | 1099.2 | 2525.1 | 2608.2 | 2715.8 | 1804.0 | 792.7  | 364.4  |
| 82.5° | 129.9  | 137.6  | 183.5  | 256.4  | 572.3  | 1144.6 | 1184.5 | 1260.4 | 700.1  | 342.5  | 188.6  |
| 85°   | 78.0   | 83.6   | 112.3  | 162.1  | 325.8  | 450.1  | 449.7  | 497.3  | 329.7  | 220.4  | 99.5   |
| 87.5° | 37.3   | 41.6   | 60.0   | 84.0   | 164.2  | 168.9  | 158.2  | 179.2  | 200.2  | 144.5  | 50.2   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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CATALOG NUMBER: GLEON-SA2D-830-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 | 1276.3 |
| 2.5°  | 1275.4 | 1273.7 | 1268.1 | 1263.8 | 1263.0 | 1260.4 | 1258.3 | 1259.5 | 1261.3 | 1261.7 | 1261.7 |
| 5°    | 1275.0 | 1270.3 | 1263.0 | 1260.0 | 1263.8 | 1269.0 | 1275.4 | 1284.0 | 1289.1 | 1293.0 | 1295.5 |
| 7.5°  | 1295.5 | 1286.5 | 1278.4 | 1276.7 | 1284.4 | 1298.1 | 1312.7 | 1330.7 | 1343.1 | 1351.7 | 1353.4 |
| 10°   | 1329.8 | 1318.7 | 1310.6 | 1312.3 | 1326.0 | 1345.7 | 1366.3 | 1389.4 | 1408.3 | 1419.9 | 1420.7 |
| 12.5° | 1369.3 | 1358.6 | 1350.9 | 1358.1 | 1380.9 | 1404.9 | 1426.3 | 1446.5 | 1463.6 | 1475.2 | 1475.2 |
| 15°   | 1414.7 | 1407.0 | 1398.0 | 1414.7 | 1445.6 | 1467.0 | 1476.0 | 1485.9 | 1495.3 | 1503.9 | 1502.2 |
| 17.5° | 1458.5 | 1451.2 | 1446.5 | 1466.2 | 1498.3 | 1508.2 | 1502.2 | 1494.9 | 1494.9 | 1499.6 | 1500.5 |
| 20°   | 1496.2 | 1489.8 | 1492.8 | 1512.0 | 1528.8 | 1518.5 | 1496.2 | 1473.0 | 1463.6 | 1466.2 | 1468.7 |
| 22.5° | 1529.2 | 1526.2 | 1535.2 | 1544.2 | 1532.2 | 1496.2 | 1455.0 | 1423.7 | 1412.2 | 1411.3 | 1412.2 |
| 25°   | 1567.8 | 1567.3 | 1578.5 | 1562.2 | 1509.0 | 1442.6 | 1387.3 | 1356.9 | 1350.4 | 1355.6 | 1364.1 |
| 27.5° | 1615.8 | 1620.5 | 1626.1 | 1566.5 | 1461.9 | 1361.6 | 1305.4 | 1284.4 | 1290.8 | 1303.3 | 1311.4 |
| 30°   | 1677.1 | 1690.0 | 1678.0 | 1555.8 | 1394.2 | 1269.0 | 1215.4 | 1209.4 | 1227.0 | 1244.5 | 1253.1 |
| 32.5° | 1736.7 | 1756.8 | 1727.7 | 1527.9 | 1306.7 | 1170.8 | 1129.2 | 1127.5 | 1148.9 | 1166.1 | 1178.1 |
| 35°   | 1784.7 | 1824.6 | 1765.0 | 1472.6 | 1205.5 | 1080.3 | 1049.9 | 1038.3 | 1046.0 | 1066.2 | 1079.9 |
| 37.5° | 1847.3 | 1913.7 | 1790.7 | 1388.1 | 1095.8 | 1005.7 | 970.2  | 943.6  | 936.7  | 944.9  | 951.7  |
| 40°   | 1961.8 | 2049.6 | 1802.7 | 1270.3 | 988.6  | 931.1  | 895.1  | 856.1  | 829.1  | 809.4  | 809.8  |
| 42.5° | 2148.7 | 2226.7 | 1795.0 | 1127.1 | 889.6  | 858.3  | 817.5  | 772.5  | 728.8  | 684.2  | 680.8  |
| 45°   | 2452.2 | 2489.9 | 1771.8 | 975.3  | 802.5  | 782.0  | 743.8  | 698.8  | 640.5  | 589.9  | 585.2  |
| 47.5° | 2937.9 | 2854.3 | 1735.8 | 842.8  | 725.8  | 717.2  | 682.1  | 630.2  | 568.5  | 527.7  | 524.3  |
| 50°   | 3600.3 | 3380.3 | 1718.3 | 737.4  | 658.1  | 660.6  | 631.9  | 577.0  | 518.7  | 488.7  | 485.3  |
| 52.5° | 4392.5 | 3993.0 | 1752.1 | 655.9  | 603.6  | 612.6  | 591.2  | 539.7  | 490.9  | 467.3  | 463.9  |
| 55°   | 5214.3 | 4627.4 | 1788.6 | 596.8  | 552.2  | 569.7  | 562.5  | 520.0  | 475.9  | 454.0  | 451.0  |
| 57.5° | 5917.8 | 5101.2 | 1715.7 | 548.7  | 506.3  | 533.7  | 540.2  | 507.6  | 468.1  | 448.4  | 445.0  |
| 60°   | 6360.7 | 5291.9 | 1524.5 | 503.7  | 469.9  | 505.0  | 527.3  | 504.2  | 471.1  | 469.4  | 466.9  |
| 62.5° | 6570.8 | 5275.2 | 1237.7 | 468.1  | 447.1  | 492.6  | 536.7  | 523.4  | 505.4  | 520.9  | 522.2  |
| 65°   | 6476.5 | 5023.1 | 921.7  | 444.6  | 430.8  | 497.3  | 565.0  | 559.9  | 515.3  | 530.7  | 532.9  |
| 67.5° | 5855.7 | 4421.7 | 682.5  | 424.0  | 412.8  | 510.6  | 616.5  | 571.9  | 496.0  | 507.2  | 500.3  |
| 70°   | 4732.9 | 3505.5 | 526.5  | 400.8  | 394.4  | 508.9  | 639.6  | 564.6  | 475.0  | 477.6  | 459.1  |
| 72.5° | 3263.7 | 2390.5 | 428.3  | 379.4  | 367.8  | 463.9  | 623.3  | 546.6  | 457.4  | 437.7  | 413.3  |
| 75°   | 1774.8 | 1283.1 | 364.0  | 357.1  | 321.1  | 407.3  | 593.3  | 533.7  | 441.6  | 415.4  | 401.7  |
| 77.5° | 698.4  | 532.5  | 316.0  | 326.7  | 280.8  | 359.7  | 559.9  | 509.3  | 419.7  | 385.4  | 378.5  |
| 80°   | 285.1  | 271.8  | 261.9  | 282.5  | 241.4  | 314.7  | 519.6  | 480.6  | 393.6  | 357.5  | 343.8  |
| 82.5° | 161.6  | 168.9  | 203.6  | 222.9  | 195.9  | 289.8  | 500.3  | 457.4  | 362.3  | 320.2  | 304.0  |
| 85°   | 82.7   | 99.0   | 141.9  | 159.9  | 144.0  | 246.5  | 460.9  | 400.4  | 290.7  | 245.2  | 246.5  |
| 87.5° | 39.9   | 55.3   | 89.6   | 100.3  | 93.5   | 178.3  | 344.3  | 290.2  | 226.4  | 179.2  | 173.6  |
| 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  
 Rf: 81.5  
 Rg: 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

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| 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**

| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 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)