

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: P323975

Luminaire Tested: **GLEON-SA1D-827-U-SL4-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P323975  
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-SA1D-827-U-SL4-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(1) 80 CRI, 2700K, 1200mA LIGHTSQUARE WITH 16 LEDS 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: 4847 lumens  
Efficiency: N/A  
Efficacy: 72.3 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

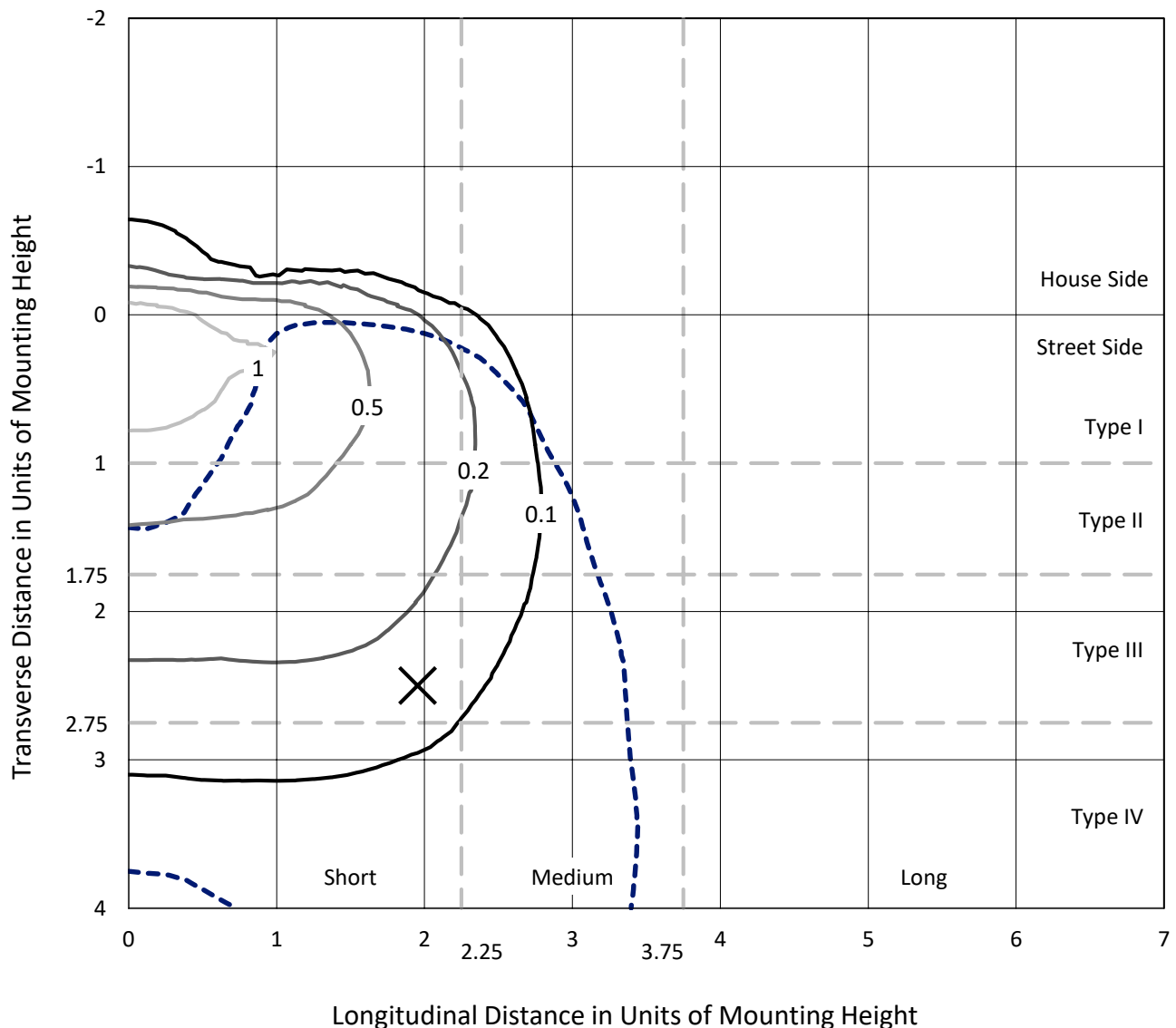
Input Watts (W): 67  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

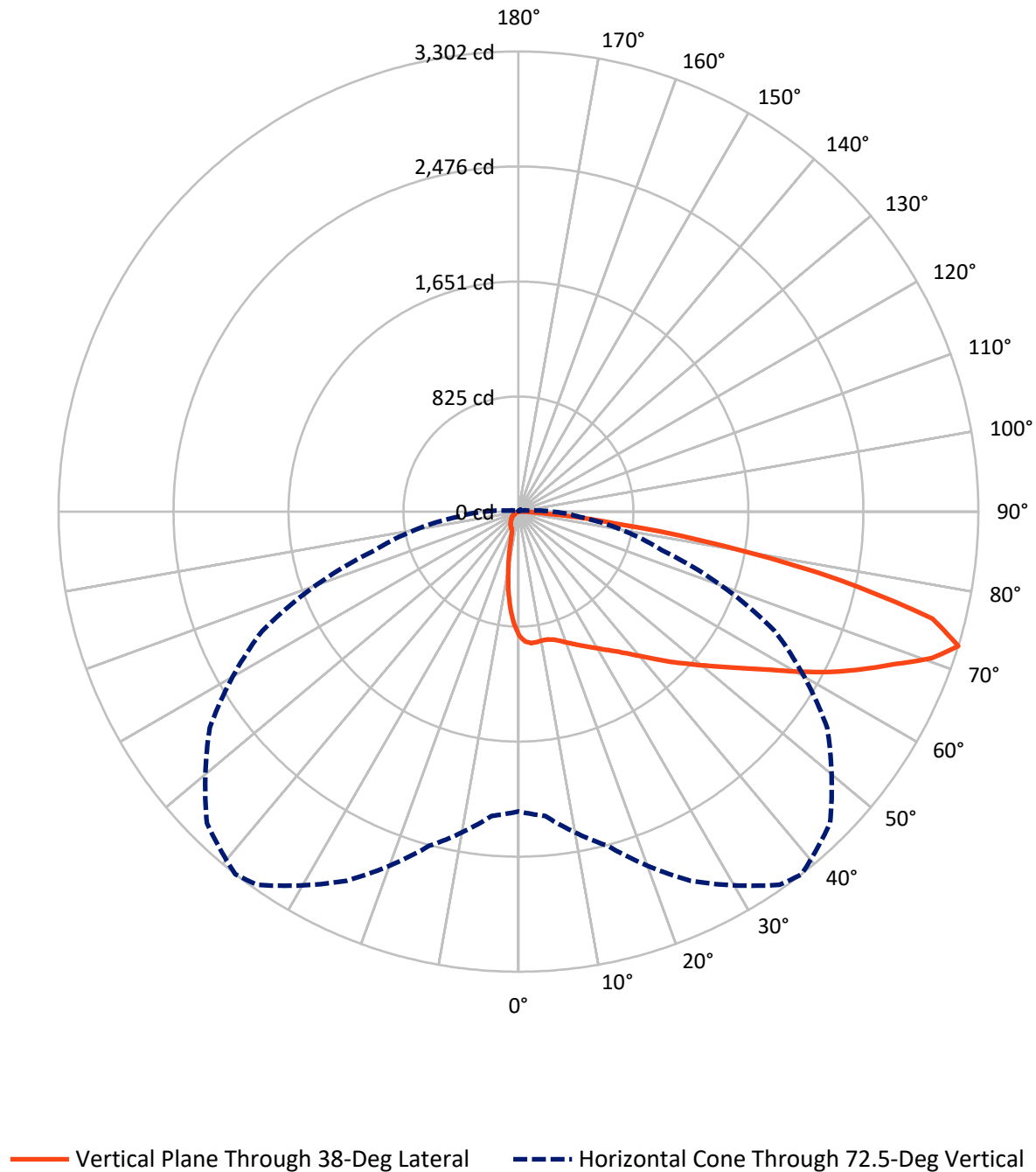
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 1.5 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 407.9    | 0.0    | 407.9  |
|                    | % Fixture | 8.4      | 0.0    | 8.4    |
| <b>Street Side</b> | Lumens    | 4439.1   | 0.0    | 4439.1 |
|                    | % Fixture | 91.6     | 0.0    | 91.6   |
| <b>Total</b>       | Lumens    | 4847.0   | 0.0    | 4847.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 76.0   | 1.6       |
| 10°-20°   | 185.7  | 3.8       |
| 20°-30°   | 295.4  | 6.1       |
| 30°-40°   | 444.1  | 9.2       |
| 40°-50°   | 677.5  | 14.0      |
| 50°-60°   | 957.6  | 19.8      |
| 60°-70°   | 1201.1 | 24.8      |
| 70°-80°   | 898.1  | 18.5      |
| 80°-90°   | 111.4  | 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°    | 4847.0 | 100.0     |
| 0°-180°   | 4847.0 | 100.0     |

**Coefficient of Utilization**



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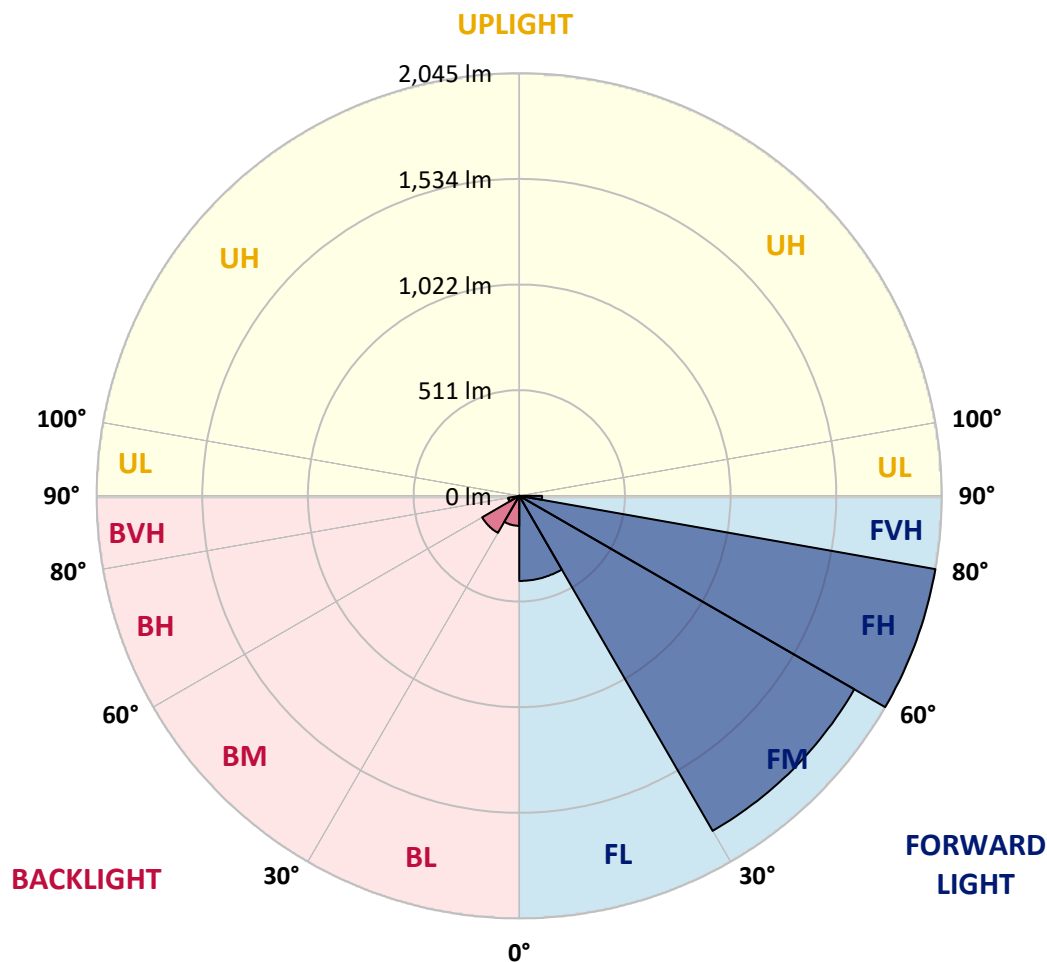
CATALOG NUMBER: GLEON-SA1D-827-U-SL4-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 411.9  | 8.5       |                         |      |         |
| FM   | (30°-60°)   | 1872.1 | 38.6      |                         |      |         |
| FH   | (60°-80°)   | 2044.8 | 42.2      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 110.3  | 2.3       |                         |      | G2/225  |
| BL   | (0°-30°)    | 145.2  | 3.0       | B1/500                  |      |         |
| BM   | (30°-60°)   | 207.1  | 4.3       | B0/220                  |      |         |
| BH   | (60°-80°)   | 54.5   | 1.1       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 1.0    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 38°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 891.3  | 891.3  | 891.3  | 891.3  | 891.3  | 891.3  | 891.3  | 891.3  | 891.3  | 891.3  | 891.3  |
| 2.5°  | 946.1  | 946.3  | 944.1  | 940.5  | 935.8  | 933.4  | 929.4  | 923.0  | 916.1  | 903.8  | 890.5  |
| 5°    | 965.4  | 965.4  | 962.6  | 957.8  | 950.3  | 948.1  | 940.5  | 930.2  | 916.1  | 896.2  | 873.8  |
| 7.5°  | 963.4  | 963.8  | 960.0  | 955.0  | 947.5  | 945.5  | 936.2  | 924.8  | 907.2  | 883.1  | 854.5  |
| 10°   | 952.9  | 954.0  | 950.9  | 948.5  | 941.7  | 939.5  | 930.8  | 919.3  | 901.8  | 876.0  | 843.2  |
| 12.5° | 942.3  | 943.3  | 944.3  | 946.5  | 942.3  | 941.5  | 934.6  | 925.0  | 908.3  | 881.5  | 844.4  |
| 15°   | 935.4  | 937.4  | 944.7  | 953.3  | 954.4  | 953.5  | 949.1  | 940.1  | 923.2  | 895.4  | 853.1  |
| 17.5° | 935.4  | 938.7  | 953.7  | 970.3  | 976.1  | 976.7  | 972.9  | 960.2  | 940.1  | 910.3  | 861.2  |
| 20°   | 943.3  | 947.7  | 971.3  | 994.6  | 1004.3 | 1004.3 | 996.8  | 979.1  | 955.6  | 923.8  | 866.6  |
| 22.5° | 963.4  | 969.2  | 998.8  | 1025.8 | 1036.1 | 1033.9 | 1023.8 | 998.0  | 971.7  | 939.1  | 873.4  |
| 25°   | 1003.1 | 1007.5 | 1038.3 | 1065.5 | 1071.7 | 1066.7 | 1054.0 | 1021.0 | 992.2  | 959.8  | 885.9  |
| 27.5° | 1054.2 | 1054.8 | 1086.6 | 1109.6 | 1105.7 | 1102.3 | 1086.4 | 1049.8 | 1021.8 | 989.4  | 907.5  |
| 30°   | 1110.4 | 1110.4 | 1138.3 | 1155.9 | 1144.2 | 1141.4 | 1125.5 | 1084.6 | 1059.6 | 1029.6 | 938.0  |
| 32.5° | 1164.7 | 1167.1 | 1189.9 | 1200.9 | 1187.9 | 1185.0 | 1169.5 | 1128.7 | 1110.0 | 1091.0 | 985.8  |
| 35°   | 1217.2 | 1219.1 | 1240.6 | 1246.6 | 1234.2 | 1235.0 | 1223.9 | 1189.3 | 1182.2 | 1179.8 | 1057.6 |
| 37.5° | 1268.2 | 1268.6 | 1290.5 | 1294.3 | 1288.1 | 1294.9 | 1296.0 | 1265.4 | 1278.4 | 1298.0 | 1158.9 |
| 40°   | 1314.7 | 1315.1 | 1336.8 | 1346.7 | 1357.4 | 1366.2 | 1374.1 | 1357.8 | 1401.0 | 1446.3 | 1279.4 |
| 42.5° | 1351.9 | 1356.1 | 1383.7 | 1402.4 | 1430.6 | 1447.5 | 1468.9 | 1468.1 | 1547.0 | 1615.0 | 1425.2 |
| 45°   | 1384.7 | 1392.0 | 1430.4 | 1463.2 | 1511.5 | 1538.5 | 1571.9 | 1598.1 | 1711.2 | 1802.8 | 1572.7 |
| 47.5° | 1428.0 | 1434.9 | 1478.7 | 1532.5 | 1596.9 | 1632.3 | 1687.7 | 1744.2 | 1891.8 | 1987.2 | 1716.9 |
| 50°   | 1489.0 | 1486.0 | 1529.3 | 1606.4 | 1689.1 | 1735.6 | 1814.5 | 1899.2 | 2071.0 | 2147.8 | 1801.6 |
| 52.5° | 1554.0 | 1552.8 | 1584.8 | 1686.7 | 1797.8 | 1852.1 | 1956.4 | 2059.5 | 2242.3 | 2258.6 | 1840.5 |
| 55°   | 1634.5 | 1625.9 | 1652.9 | 1778.3 | 1926.8 | 1985.2 | 2108.0 | 2218.1 | 2378.7 | 2321.0 | 1860.0 |
| 57.5° | 1718.9 | 1704.6 | 1730.4 | 1880.3 | 2072.4 | 2141.4 | 2275.9 | 2372.7 | 2469.5 | 2363.6 | 1859.8 |
| 60°   | 1806.0 | 1789.1 | 1819.7 | 2007.9 | 2253.1 | 2333.0 | 2457.8 | 2477.2 | 2554.3 | 2385.2 | 1846.1 |
| 62.5° | 1878.9 | 1868.9 | 1914.3 | 2144.4 | 2455.0 | 2533.5 | 2595.3 | 2572.2 | 2625.7 | 2401.9 | 1814.1 |
| 65°   | 1956.0 | 1956.6 | 2030.1 | 2303.7 | 2669.6 | 2722.6 | 2727.8 | 2695.4 | 2685.5 | 2398.5 | 1705.8 |
| 67.5° | 2060.3 | 2069.9 | 2192.5 | 2519.8 | 2878.4 | 2919.2 | 2918.8 | 2828.8 | 2729.2 | 2262.4 | 1465.7 |
| 70°   | 2170.6 | 2193.3 | 2379.7 | 2767.2 | 3106.2 | 3147.7 | 3126.4 | 2913.8 | 2569.8 | 1829.4 | 1037.3 |
| 72.5° | 2152.1 | 2191.5 | 2483.8 | 2923.2 | 3269.9 | 3301.5 | 3162.8 | 2705.0 | 2031.1 | 1063.3 | 441.6  |
| 75°   | 1660.3 | 1706.0 | 2277.5 | 2768.7 | 3098.2 | 3069.8 | 2717.5 | 2105.0 | 1110.0 | 296.7  | 99.4   |
| 77.5° | 877.1  | 901.4  | 1504.5 | 2109.2 | 2415.8 | 2356.4 | 1914.3 | 1167.7 | 338.4  | 73.5   | 44.7   |
| 80°   | 459.4  | 465.0  | 655.6  | 1196.7 | 1491.0 | 1491.4 | 1134.5 | 512.9  | 139.5  | 37.6   | 30.0   |
| 82.5° | 246.0  | 250.8  | 346.4  | 553.0  | 781.2  | 708.2  | 434.4  | 282.2  | 81.1   | 21.3   | 28.8   |
| 85°   | 59.2   | 60.2   | 196.5  | 252.6  | 307.2  | 219.4  | 129.0  | 236.9  | 21.9   | 12.5   | 23.4   |
| 87.5° | 22.7   | 23.1   | 72.9   | 109.3  | 78.3   | 50.7   | 60.4   | 88.4   | 2.8    | 4.8    | 3.6    |
| 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-SA1D-827-U-SL4-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 891.3  | 891.3  | 891.3 | 891.3 | 891.3 | 891.3 | 891.3 | 891.3 | 891.3 | 891.3 | 891.3 |
| 2.5°  | 882.5  | 877.3  | 864.4 | 848.1 | 833.6 | 823.1 | 807.4 | 797.1 | 790.3 | 790.1 | 787.5 |
| 5°    | 860.1  | 849.5  | 821.7 | 788.7 | 758.7 | 731.7 | 699.9 | 674.8 | 656.0 | 653.0 | 646.6 |
| 7.5°  | 836.2  | 818.7  | 776.0 | 724.5 | 674.1 | 623.0 | 563.6 | 526.8 | 495.2 | 480.1 | 478.5 |
| 10°   | 821.5  | 796.9  | 736.3 | 661.9 | 583.0 | 499.8 | 422.1 | 368.4 | 329.5 | 318.5 | 310.2 |
| 12.5° | 818.5  | 786.1  | 705.8 | 603.1 | 490.4 | 380.5 | 294.5 | 237.3 | 206.3 | 196.5 | 193.8 |
| 15°   | 821.5  | 781.0  | 680.0 | 544.9 | 396.6 | 269.9 | 197.7 | 164.5 | 152.8 | 150.0 | 149.8 |
| 17.5° | 823.3  | 775.0  | 650.8 | 480.3 | 305.6 | 192.8 | 151.4 | 141.7 | 139.9 | 139.7 | 140.1 |
| 20°   | 823.1  | 765.7  | 616.0 | 408.2 | 227.3 | 151.6 | 136.9 | 134.9 | 134.5 | 134.7 | 134.5 |
| 22.5° | 821.7  | 754.9  | 577.7 | 334.0 | 171.7 | 135.5 | 130.6 | 129.4 | 129.2 | 129.2 | 129.2 |
| 25°   | 824.3  | 746.2  | 535.7 | 262.9 | 141.5 | 128.0 | 125.0 | 124.0 | 123.8 | 123.8 | 123.4 |
| 27.5° | 833.8  | 741.4  | 489.6 | 202.3 | 127.8 | 121.4 | 119.0 | 118.8 | 118.2 | 118.0 | 118.4 |
| 30°   | 849.1  | 741.4  | 439.0 | 157.4 | 119.6 | 114.5 | 112.7 | 112.3 | 112.1 | 111.9 | 112.1 |
| 32.5° | 876.0  | 747.0  | 383.9 | 130.8 | 111.7 | 106.9 | 105.7 | 106.3 | 105.7 | 105.7 | 105.7 |
| 35°   | 924.8  | 763.9  | 326.1 | 114.1 | 103.5 | 99.4  | 98.2  | 99.0  | 98.6  | 98.6  | 98.4  |
| 37.5° | 995.8  | 795.3  | 267.9 | 104.1 | 96.2  | 92.0  | 90.4  | 91.6  | 91.2  | 91.2  | 91.0  |
| 40°   | 1082.4 | 841.0  | 212.6 | 96.4  | 89.2  | 84.7  | 83.3  | 83.9  | 82.9  | 82.9  | 83.3  |
| 42.5° | 1189.3 | 899.0  | 164.3 | 89.0  | 82.1  | 77.9  | 77.1  | 76.5  | 74.7  | 73.7  | 73.9  |
| 45°   | 1308.0 | 959.4  | 128.0 | 81.7  | 75.5  | 72.1  | 70.9  | 69.2  | 66.2  | 64.2  | 64.4  |
| 47.5° | 1414.1 | 1005.9 | 104.1 | 74.7  | 69.4  | 66.8  | 65.0  | 62.0  | 57.6  | 55.2  | 55.4  |
| 50°   | 1469.9 | 1012.9 | 88.6  | 67.6  | 63.8  | 61.2  | 58.6  | 53.9  | 48.7  | 46.1  | 45.9  |
| 52.5° | 1484.2 | 979.9  | 77.1  | 61.2  | 58.2  | 55.2  | 51.7  | 45.5  | 39.7  | 36.8  | 36.4  |
| 55°   | 1489.4 | 929.6  | 66.8  | 55.2  | 52.1  | 48.7  | 44.3  | 37.2  | 31.8  | 29.0  | 28.8  |
| 57.5° | 1472.1 | 854.5  | 58.8  | 49.7  | 46.1  | 41.9  | 36.4  | 29.8  | 24.6  | 22.3  | 22.3  |
| 60°   | 1433.6 | 752.9  | 52.5  | 43.9  | 39.9  | 35.0  | 29.4  | 23.1  | 18.3  | 16.5  | 16.5  |
| 62.5° | 1356.9 | 621.2  | 46.7  | 37.8  | 34.0  | 29.0  | 23.8  | 17.5  | 12.9  | 11.9  | 12.1  |
| 65°   | 1212.2 | 471.2  | 40.9  | 32.4  | 29.0  | 24.0  | 18.5  | 12.5  | 8.7   | 8.7   | 9.1   |
| 67.5° | 988.6  | 327.3  | 34.8  | 27.6  | 25.0  | 19.5  | 14.1  | 8.7   | 6.0   | 6.8   | 7.6   |
| 70°   | 654.4  | 183.6  | 29.8  | 22.7  | 21.3  | 15.5  | 10.5  | 5.8   | 4.8   | 6.4   | 7.9   |
| 72.5° | 247.0  | 71.5   | 25.0  | 18.3  | 18.5  | 11.9  | 7.4   | 4.4   | 4.4   | 7.0   | 9.3   |
| 75°   | 68.8   | 35.0   | 17.9  | 13.5  | 14.5  | 8.7   | 5.4   | 3.8   | 4.2   | 8.1   | 10.9  |
| 77.5° | 40.5   | 25.8   | 11.7  | 7.9   | 9.9   | 6.0   | 3.6   | 3.0   | 3.6   | 6.8   | 10.5  |
| 80°   | 32.6   | 13.7   | 6.8   | 4.0   | 5.4   | 3.4   | 2.4   | 1.8   | 1.0   | 2.6   | 5.4   |
| 82.5° | 32.6   | 8.3    | 3.2   | 2.8   | 2.8   | 1.8   | 1.2   | 0.8   | 0.2   | 0.0   | 1.4   |
| 85°   | 21.9   | 3.4    | 2.0   | 1.8   | 1.4   | 0.6   | 0.4   | 0.2   | 0.0   | 0.0   | 0.0   |
| 87.5° | 3.6    | 1.4    | 0.8   | 0.4   | 0.2   | 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   |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/03/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Invue  
 Catalog Number: **EMM2-HTN-SA1A-827-U-5WQ**  
 Description: Epic Modern Light Square 40W 5WQ Optic

### Spectral Parameters

CCT (K): 2764  
 CIE  $u'$ : 0.2591  
 CIE  $v'$ : 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 R<sub>f</sub>: 84.7  
 R<sub>g</sub>: 94.6

CRI (Ra): 80.9  
 R1: 78.8  
 R2: 89.9  
 R3: 96.2  
 R4: 79.1  
 R5: 79.1  
 R6: 88.8  
 R7: 81.3  
 R8: 54.3  
 R9: -1.5  
 R10: 77.9  
 R11: 78.9  
 R12: 71.6  
 R13: 81.2  
 R14: 98.5  
 R15: 69.9



### Test Conditions

Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

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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 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



**Photopic Lumens: 4337.9**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 0                | 0.0              | 490       | 18018            | 2.6              | 620       | 87426            | 22.8             | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 3.9              | 625       | 83013            | 18.2             | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 5.8              | 630       | 78077            | 14.1             | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 8.5              | 635       | 72080            | 10.7             | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 11.5             | 640       | 66249            | 7.9              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 15.2             | 645       | 59973            | 5.7              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 18.7             | 650       | 53972            | 3.9              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 21.9             | 655       | 48369            | 2.7              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 24.9             | 660       | 42641            | 1.8              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 27.6             | 665       | 37602            | 1.1              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 30.0             | 670       | 32798            | 0.7              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.0              | 545       | 48553            | 32.5             | 675       | 28558            | 0.5              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.0              | 550       | 51408            | 34.9             | 680       | 24782            | 0.3              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.0              | 555       | 54711            | 37.4             | 685       | 21386            | 0.2              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 0.0              | 560       | 58847            | 40.0             | 690       | 18413            | 0.1              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 0.1              | 565       | 63386            | 42.4             | 695       | 15721            | 0.1              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 0.2              | 570       | 68196            | 44.3             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 0.6              | 575       | 73613            | 46.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 0.9              | 580       | 79207            | 47.1             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 0.9              | 585       | 84248            | 47.0             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 0.9              | 590       | 88397            | 45.7             | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 1.0              | 595       | 91428            | 43.4             | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 0.9              | 600       | 93452            | 40.3             | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 1.0              | 605       | 93959            | 36.4             | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 1.3              | 610       | 93079            | 32.0             | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 1.8              | 615       | 90707            | 27.3             | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 5286.7**
**S/P: 1.22**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | 0.0                            | 490               | 18018                                | 75.9                           | 620               | 87426                                | 0.4                            | 750               | 2680                                 | 0.0                            | 880               | 58                                   | 0.0                            |
| 365               | 0                                    | 0.0                            | 495               | 22295                                | 93.2                           | 625               | 83013                                | 0.2                            | 755               | 2287                                 | 0.0                            | 885               | 46                                   | 0.0                            |
| 370               | 0                                    | 0.0                            | 500               | 26478                                | 107.8                          | 630               | 78077                                | 0.1                            | 760               | 1944                                 | 0.0                            | 890               | 45                                   | 0.0                            |
| 375               | 0                                    | 0.0                            | 505               | 30524                                | 118.7                          | 635               | 72080                                | 0.1                            | 765               | 1653                                 | 0.0                            | 895               | 41                                   | 0.0                            |
| 380               | 0                                    | 0.0                            | 510               | 33611                                | 122.2                          | 640               | 66249                                | 0.1                            | 770               | 1413                                 | 0.0                            | 900               | 38                                   | 0.0                            |
| 385               | 0                                    | 0.0                            | 515               | 36490                                | 120.8                          | 645               | 59973                                | 0.0                            | 775               | 1198                                 | 0.0                            | 905               | 33                                   | 0.0                            |
| 390               | 0                                    | 0.0                            | 520               | 38610                                | 113.9                          | 650               | 53972                                | 0.0                            | 780               | 1025                                 | 0.0                            | 910               | 30                                   | 0.0                            |
| 395               | 0                                    | 0.0                            | 525               | 40511                                | 104.1                          | 655               | 48369                                | 0.0                            | 785               | 874                                  | 0.0                            | 915               | 23                                   | 0.0                            |
| 400               | 48                                   | 0.0                            | 530               | 42223                                | 92.4                           | 660               | 42641                                | 0.0                            | 790               | 747                                  | 0.0                            | 920               | 24                                   | 0.0                            |
| 405               | 201                                  | 0.0                            | 535               | 44137                                | 80.5                           | 665               | 37602                                | 0.0                            | 795               | 639                                  | 0.0                            | 925               | 22                                   | 0.0                            |
| 410               | 457                                  | 0.1                            | 540               | 46032                                | 68.2                           | 670               | 32798                                | 0.0                            | 800               | 547                                  | 0.0                            | 930               | 22                                   | 0.0                            |
| 415               | 925                                  | 0.3                            | 545               | 48553                                | 57.1                           | 675               | 28558                                | 0.0                            | 805               | 473                                  | 0.0                            | 935               | 17                                   | 0.0                            |
| 420               | 1816                                 | 1.1                            | 550               | 51408                                | 46.7                           | 680               | 24782                                | 0.0                            | 810               | 401                                  | 0.0                            | 940               | 13                                   | 0.0                            |
| 425               | 3217                                 | 2.5                            | 555               | 54711                                | 37.4                           | 685               | 21386                                | 0.0                            | 815               | 351                                  | 0.0                            | 945               | 6                                    | 0.0                            |
| 430               | 5520                                 | 5.9                            | 560               | 58847                                | 29.4                           | 690               | 18413                                | 0.0                            | 820               | 307                                  | 0.0                            | 950               | 10                                   | 0.0                            |
| 435               | 9225                                 | 12.5                           | 565               | 63386                                | 22.5                           | 695               | 15721                                | 0.0                            | 825               | 261                                  | 0.0                            | 955               | 11                                   | 0.0                            |
| 440               | 15522                                | 26.3                           | 570               | 68196                                | 16.9                           | 700               | 13432                                | 0.0                            | 830               | 228                                  | 0.0                            | 960               | 8                                    | 0.0                            |
| 445               | 27642                                | 55.2                           | 575               | 73613                                | 12.4                           | 705               | 11513                                | 0.0                            | 835               | 193                                  | 0.0                            | 965               | 12                                   | 0.0                            |
| 450               | 36602                                | 85.4                           | 580               | 79207                                | 9.0                            | 710               | 9780                                 | 0.0                            | 840               | 174                                  | 0.0                            | 970               | 3                                    | 0.0                            |
| 455               | 28292                                | 75.1                           | 585               | 84248                                | 6.3                            | 715               | 8356                                 | 0.0                            | 845               | 151                                  | 0.0                            | 975               | 8                                    | 0.0                            |
| 460               | 21166                                | 63.2                           | 590               | 88397                                | 4.4                            | 720               | 7161                                 | 0.0                            | 850               | 123                                  | 0.0                            | 980               | 2                                    | 0.0                            |
| 465               | 19092                                | 63.2                           | 595               | 91428                                | 3.0                            | 725               | 6067                                 | 0.0                            | 855               | 106                                  | 0.0                            | 985               | 13                                   | 0.0                            |
| 470               | 14951                                | 54.2                           | 600               | 93452                                | 2.0                            | 730               | 5164                                 | 0.0                            | 860               | 95                                   | 0.0                            | 990               | 16                                   | 0.0                            |
| 475               | 12606                                | 48.8                           | 605               | 93959                                | 1.3                            | 735               | 4393                                 | 0.0                            | 865               | 82                                   | 0.0                            | 995               | 20                                   | 0.0                            |
| 480               | 13323                                | 54.2                           | 610               | 93079                                | 0.9                            | 740               | 3694                                 | 0.0                            | 870               | 77                                   | 0.0                            | 1000              | 0                                    | 0.0                            |
| 485               | 15164                                | 63.3                           | 615               | 90707                                | 0.5                            | 745               | 3157                                 | 0.0                            | 875               | 65                                   | 0.0                            |                   |                                      |                                |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 0                | 0.0              | 490       | 18018            | 27.7             | 620       | 87426            | 1.1              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 36.0             | 625       | 83013            | 0.7              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 44.2             | 630       | 78077            | 0.4              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 51.8             | 635       | 72080            | 0.3              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 57.0             | 640       | 66249            | 0.2              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 60.5             | 645       | 59973            | 0.1              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 61.4             | 650       | 53972            | 0.1              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 60.6             | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 58.2             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 55.0             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 50.9             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.1              | 545       | 48553            | 46.6             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.3              | 550       | 51408            | 42.0             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.8              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 1.9              | 560       | 58847            | 32.9             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 4.1              | 565       | 63386            | 28.4             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 8.7              | 570       | 68196            | 24.1             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 18.5             | 575       | 73613            | 20.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 28.3             | 580       | 79207            | 16.3             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 24.7             | 585       | 84248            | 12.9             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 20.4             | 590       | 88397            | 9.8              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 20.1             | 595       | 91428            | 7.3              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 17.2             | 600       | 93452            | 5.3              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 15.7             | 605       | 93959            | 3.7              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 18.0             | 610       | 93079            | 2.5              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 21.9             | 615       | 90707            | 1.7              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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TM-30-18

### Summary

$R_f = 84.7$   
 $R_g = 94.6$   
 $CIE R_a = 80.9$   
 $R_g = -1.5$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)