

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: P323945

Luminaire Tested: **GLEON-SA1A-827-U-SL4-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P323945  
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-SA1A-827-U-SL4-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(1) 80 CRI, 2700K, 615mA 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: 2911 lumens  
Efficiency: N/A  
Efficacy: 85.6 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B0 - U0 - G1

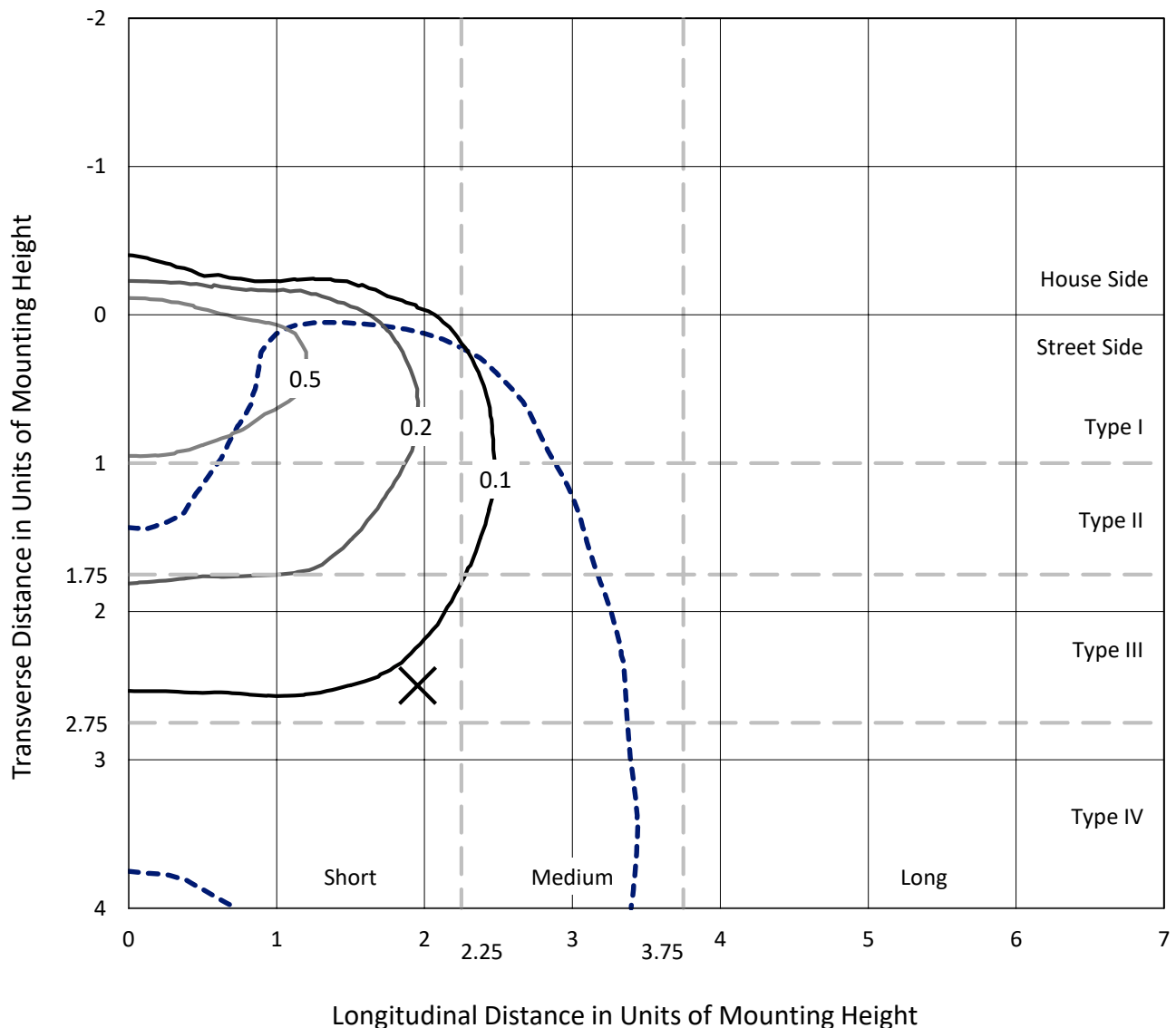
Input Watts (W): 34  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

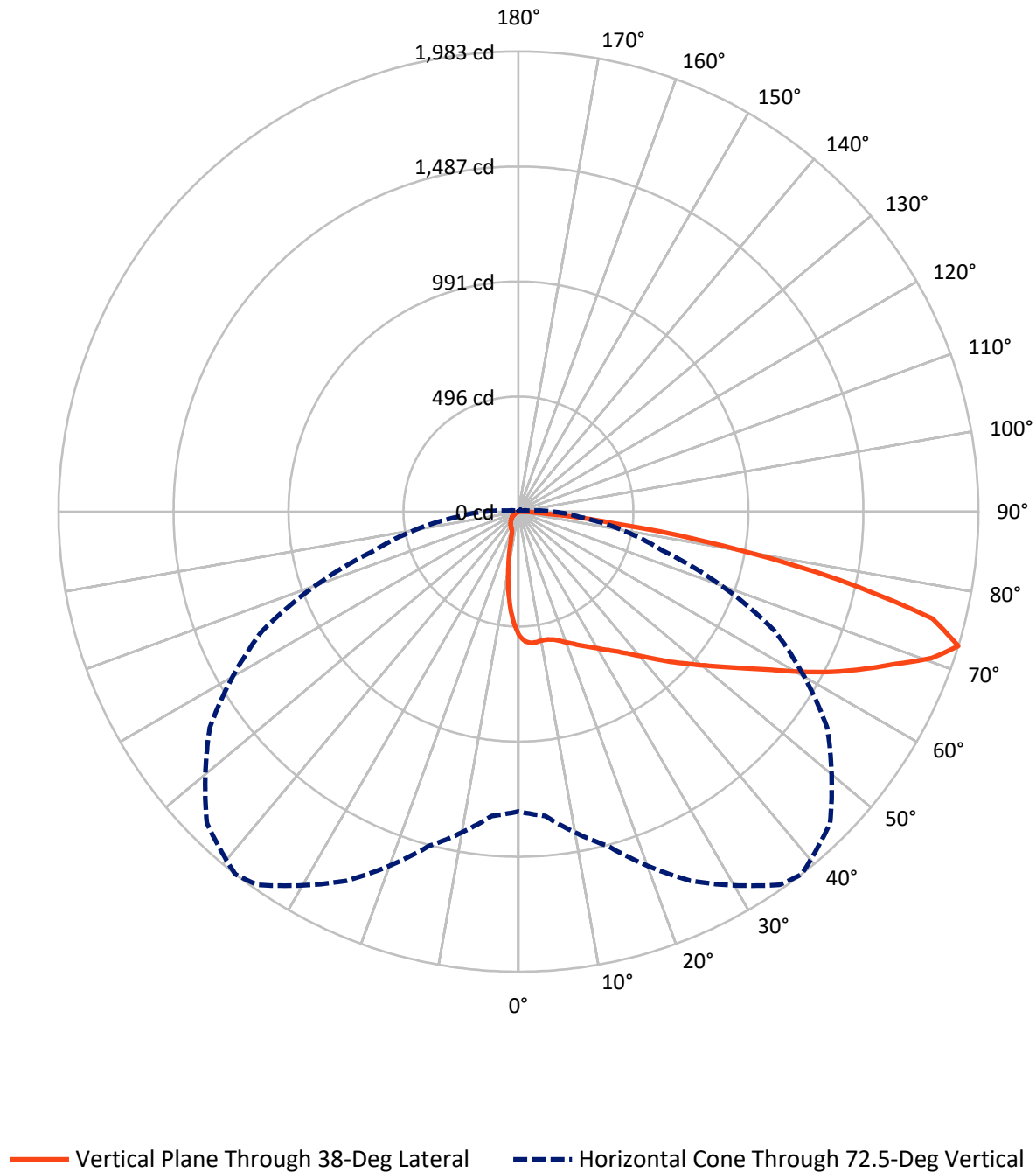
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 0.9 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    | 245.0    | 0.0    | 245.0  |
|                    | % Fixture | 8.4      | 0.0    | 8.4    |
| <b>Street Side</b> | Lumens    | 2666.0   | 0.0    | 2666.0 |
|                    | % Fixture | 91.6     | 0.0    | 91.6   |
| <b>Total</b>       | Lumens    | 2911.0   | 0.0    | 2911.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 45.6   | 1.6       |
| 10°-20°   | 111.6  | 3.8       |
| 20°-30°   | 177.4  | 6.1       |
| 30°-40°   | 266.7  | 9.2       |
| 40°-50°   | 406.9  | 14.0      |
| 50°-60°   | 575.1  | 19.8      |
| 60°-70°   | 721.4  | 24.8      |
| 70°-80°   | 539.4  | 18.5      |
| 80°-90°   | 66.9   | 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°    | 2911.0 | 100.0     |
| 0°-180°   | 2911.0 | 100.0     |

**Coefficient of Utilization**



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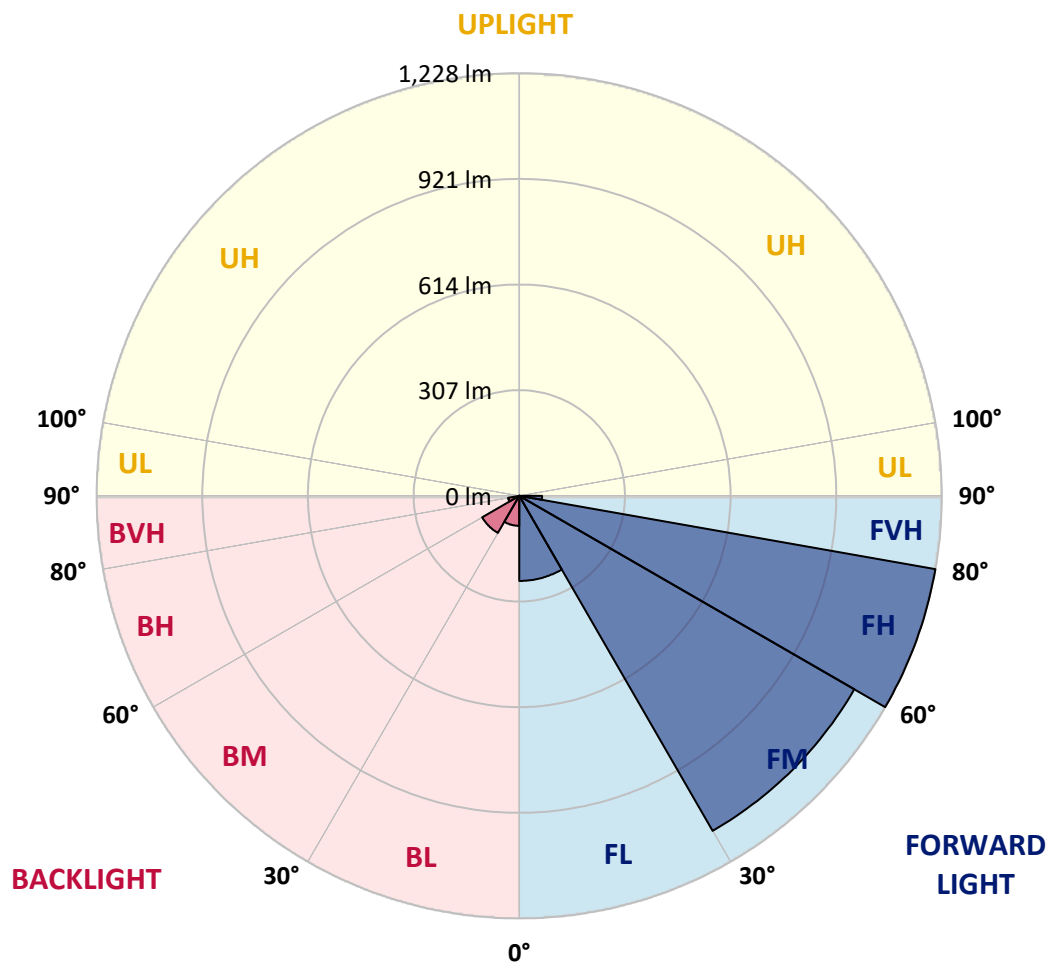
CATALOG NUMBER: GLEON-SA1A-827-U-SL4-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 247.4  | 8.5       |                         |      |         |
| FM   | (30°-60°)   | 1124.4 | 38.6      |                         |      |         |
| FH   | (60°-80°)   | 1228.0 | 42.2      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 66.3   | 2.3       |                         |      | G1/100  |
| BL   | (0°-30°)    | 87.2   | 3.0       | B0/110                  |      |         |
| BM   | (30°-60°)   | 124.4  | 4.3       | B0/220                  |      |         |
| BH   | (60°-80°)   | 32.7   | 1.1       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 0.6    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B0-U0-G1**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 38°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 535.3  | 535.3  | 535.3  | 535.3  | 535.3  | 535.3  | 535.3  | 535.3  | 535.3  | 535.3  | 535.3  |
| 2.5°  | 568.2  | 568.3  | 567.0  | 564.8  | 562.0  | 560.6  | 558.2  | 554.3  | 550.2  | 542.8  | 534.8  |
| 5°    | 579.8  | 579.8  | 578.1  | 575.2  | 570.7  | 569.4  | 564.8  | 558.7  | 550.2  | 538.2  | 524.8  |
| 7.5°  | 578.6  | 578.8  | 576.5  | 573.5  | 569.1  | 567.8  | 562.3  | 555.4  | 544.9  | 530.4  | 513.2  |
| 10°   | 572.3  | 572.9  | 571.1  | 569.7  | 565.5  | 564.2  | 559.0  | 552.1  | 541.6  | 526.1  | 506.4  |
| 12.5° | 565.9  | 566.5  | 567.1  | 568.4  | 565.9  | 565.4  | 561.3  | 555.5  | 545.5  | 529.4  | 507.2  |
| 15°   | 561.8  | 563.0  | 567.4  | 572.6  | 573.2  | 572.7  | 570.0  | 564.6  | 554.4  | 537.7  | 512.4  |
| 17.5° | 561.8  | 563.7  | 572.8  | 582.7  | 586.2  | 586.6  | 584.3  | 576.7  | 564.6  | 546.7  | 517.2  |
| 20°   | 566.5  | 569.2  | 583.3  | 597.3  | 603.1  | 603.1  | 598.7  | 588.0  | 573.9  | 554.8  | 520.5  |
| 22.5° | 578.6  | 582.1  | 599.9  | 616.1  | 622.2  | 620.9  | 614.9  | 599.4  | 583.6  | 564.0  | 524.6  |
| 25°   | 602.4  | 605.1  | 623.6  | 639.9  | 643.6  | 640.6  | 633.0  | 613.2  | 595.9  | 576.4  | 532.1  |
| 27.5° | 633.1  | 633.5  | 652.6  | 666.4  | 664.1  | 662.0  | 652.5  | 630.5  | 613.7  | 594.2  | 545.0  |
| 30°   | 666.9  | 666.9  | 683.7  | 694.2  | 687.2  | 685.5  | 675.9  | 651.4  | 636.4  | 618.4  | 563.4  |
| 32.5° | 699.5  | 700.9  | 714.6  | 721.3  | 713.4  | 711.7  | 702.4  | 677.9  | 666.6  | 655.3  | 592.0  |
| 35°   | 731.1  | 732.1  | 745.1  | 748.7  | 741.2  | 741.7  | 735.0  | 714.2  | 710.0  | 708.6  | 635.2  |
| 37.5° | 761.6  | 761.9  | 775.1  | 777.4  | 773.6  | 777.7  | 778.3  | 759.9  | 767.8  | 779.5  | 696.0  |
| 40°   | 789.6  | 789.8  | 802.9  | 808.8  | 815.2  | 820.5  | 825.2  | 815.4  | 841.4  | 868.6  | 768.4  |
| 42.5° | 811.9  | 814.5  | 831.0  | 842.3  | 859.2  | 869.4  | 882.2  | 881.7  | 929.1  | 969.9  | 855.9  |
| 45°   | 831.6  | 836.0  | 859.1  | 878.8  | 907.8  | 924.0  | 944.1  | 959.8  | 1027.7 | 1082.7 | 944.6  |
| 47.5° | 857.6  | 861.7  | 888.1  | 920.4  | 959.1  | 980.3  | 1013.6 | 1047.6 | 1136.2 | 1193.5 | 1031.1 |
| 50°   | 894.3  | 892.4  | 918.4  | 964.7  | 1014.4 | 1042.4 | 1089.7 | 1140.6 | 1243.8 | 1290.0 | 1082.0 |
| 52.5° | 933.3  | 932.6  | 951.8  | 1013.0 | 1079.7 | 1112.4 | 1175.0 | 1236.9 | 1346.7 | 1356.4 | 1105.3 |
| 55°   | 981.7  | 976.5  | 992.7  | 1068.0 | 1157.2 | 1192.3 | 1266.0 | 1332.1 | 1428.6 | 1393.9 | 1117.1 |
| 57.5° | 1032.3 | 1023.7 | 1039.2 | 1129.3 | 1244.6 | 1286.1 | 1366.8 | 1425.0 | 1483.1 | 1419.5 | 1116.9 |
| 60°   | 1084.7 | 1074.5 | 1092.9 | 1205.9 | 1353.2 | 1401.2 | 1476.1 | 1487.7 | 1534.0 | 1432.5 | 1108.7 |
| 62.5° | 1128.4 | 1122.4 | 1149.7 | 1287.9 | 1474.4 | 1521.6 | 1558.7 | 1544.8 | 1577.0 | 1442.5 | 1089.5 |
| 65°   | 1174.7 | 1175.1 | 1219.2 | 1383.5 | 1603.3 | 1635.1 | 1638.2 | 1618.8 | 1612.9 | 1440.5 | 1024.5 |
| 67.5° | 1237.4 | 1243.2 | 1316.8 | 1513.4 | 1728.7 | 1753.2 | 1753.0 | 1698.9 | 1639.1 | 1358.7 | 880.2  |
| 70°   | 1303.6 | 1317.3 | 1429.2 | 1661.9 | 1865.5 | 1890.4 | 1877.6 | 1750.0 | 1543.3 | 1098.7 | 623.0  |
| 72.5° | 1292.5 | 1316.2 | 1491.7 | 1755.6 | 1963.8 | 1982.8 | 1899.5 | 1624.6 | 1219.8 | 638.6  | 265.2  |
| 75°   | 997.1  | 1024.6 | 1367.8 | 1662.8 | 1860.7 | 1843.6 | 1632.1 | 1264.2 | 666.6  | 178.2  | 59.7   |
| 77.5° | 526.7  | 541.4  | 903.6  | 1266.7 | 1450.9 | 1415.2 | 1149.7 | 701.3  | 203.2  | 44.1   | 26.8   |
| 80°   | 275.9  | 279.3  | 393.8  | 718.7  | 895.5  | 895.7  | 681.4  | 308.0  | 83.8   | 22.6   | 18.0   |
| 82.5° | 147.7  | 150.6  | 208.1  | 332.1  | 469.2  | 425.3  | 260.9  | 169.5  | 48.7   | 12.8   | 17.3   |
| 85°   | 35.5   | 36.1   | 118.0  | 151.7  | 184.5  | 131.8  | 77.5   | 142.3  | 13.2   | 7.5    | 14.0   |
| 87.5° | 13.7   | 13.9   | 43.8   | 65.6   | 47.0   | 30.5   | 36.3   | 53.1   | 1.7    | 2.9    | 2.2    |
| 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-SA1A-827-U-SL4-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 535.3 | 535.3 | 535.3 | 535.3 | 535.3 | 535.3 | 535.3 | 535.3 | 535.3 | 535.3 | 535.3 |
| 2.5°  | 530.0 | 526.9 | 519.1 | 509.3 | 500.6 | 494.3 | 484.9 | 478.7 | 474.6 | 474.5 | 472.9 |
| 5°    | 516.6 | 510.2 | 493.5 | 473.7 | 455.7 | 439.5 | 420.4 | 405.2 | 394.0 | 392.2 | 388.3 |
| 7.5°  | 502.2 | 491.7 | 466.1 | 435.1 | 404.9 | 374.2 | 338.5 | 316.4 | 297.4 | 288.3 | 287.4 |
| 10°   | 493.4 | 478.6 | 442.2 | 397.5 | 350.1 | 300.2 | 253.5 | 221.2 | 197.9 | 191.3 | 186.3 |
| 12.5° | 491.6 | 472.1 | 423.9 | 362.2 | 294.5 | 228.5 | 176.9 | 142.5 | 123.9 | 118.0 | 116.4 |
| 15°   | 493.4 | 469.1 | 408.4 | 327.3 | 238.2 | 162.1 | 118.7 | 98.8  | 91.8  | 90.1  | 89.9  |
| 17.5° | 494.5 | 465.4 | 390.9 | 288.5 | 183.5 | 115.8 | 90.9  | 85.1  | 84.0  | 83.9  | 84.1  |
| 20°   | 494.3 | 459.9 | 369.9 | 245.2 | 136.5 | 91.0  | 82.2  | 81.0  | 80.8  | 80.9  | 80.8  |
| 22.5° | 493.5 | 453.4 | 347.0 | 200.6 | 103.1 | 81.4  | 78.5  | 77.7  | 77.6  | 77.6  | 77.6  |
| 25°   | 495.1 | 448.2 | 321.7 | 157.9 | 85.0  | 76.9  | 75.1  | 74.5  | 74.4  | 74.4  | 74.1  |
| 27.5° | 500.7 | 445.3 | 294.0 | 121.5 | 76.8  | 72.9  | 71.4  | 71.3  | 71.0  | 70.8  | 71.1  |
| 30°   | 509.9 | 445.3 | 263.7 | 94.5  | 71.8  | 68.8  | 67.7  | 67.5  | 67.3  | 67.2  | 67.3  |
| 32.5° | 526.1 | 448.6 | 230.5 | 78.6  | 67.1  | 64.2  | 63.5  | 63.8  | 63.5  | 63.5  | 63.5  |
| 35°   | 555.4 | 458.8 | 195.8 | 68.5  | 62.1  | 59.7  | 59.0  | 59.5  | 59.2  | 59.2  | 59.1  |
| 37.5° | 598.1 | 477.7 | 160.9 | 62.5  | 57.8  | 55.2  | 54.3  | 55.0  | 54.8  | 54.8  | 54.6  |
| 40°   | 650.1 | 505.1 | 127.7 | 57.9  | 53.6  | 50.9  | 50.1  | 50.4  | 49.8  | 49.8  | 50.1  |
| 42.5° | 714.2 | 539.9 | 98.7  | 53.4  | 49.3  | 46.8  | 46.3  | 45.9  | 44.9  | 44.2  | 44.4  |
| 45°   | 785.6 | 576.2 | 76.9  | 49.1  | 45.3  | 43.3  | 42.6  | 41.6  | 39.8  | 38.6  | 38.7  |
| 47.5° | 849.3 | 604.1 | 62.5  | 44.9  | 41.7  | 40.1  | 39.0  | 37.2  | 34.6  | 33.1  | 33.2  |
| 50°   | 882.8 | 608.3 | 53.2  | 40.6  | 38.3  | 36.8  | 35.2  | 32.4  | 29.3  | 27.7  | 27.6  |
| 52.5° | 891.4 | 588.5 | 46.3  | 36.8  | 34.9  | 33.1  | 31.1  | 27.3  | 23.8  | 22.1  | 21.9  |
| 55°   | 894.5 | 558.3 | 40.1  | 33.1  | 31.3  | 29.3  | 26.6  | 22.4  | 19.1  | 17.4  | 17.3  |
| 57.5° | 884.1 | 513.2 | 35.3  | 29.9  | 27.7  | 25.1  | 21.9  | 17.9  | 14.7  | 13.4  | 13.4  |
| 60°   | 861.0 | 452.1 | 31.6  | 26.4  | 23.9  | 21.0  | 17.7  | 13.9  | 11.0  | 9.9   | 9.9   |
| 62.5° | 815.0 | 373.1 | 28.0  | 22.7  | 20.4  | 17.4  | 14.3  | 10.5  | 7.7   | 7.1   | 7.3   |
| 65°   | 728.0 | 283.0 | 24.5  | 19.5  | 17.4  | 14.4  | 11.1  | 7.5   | 5.2   | 5.2   | 5.4   |
| 67.5° | 593.7 | 196.6 | 20.9  | 16.6  | 15.0  | 11.7  | 8.5   | 5.2   | 3.6   | 4.1   | 4.6   |
| 70°   | 393.0 | 110.3 | 17.9  | 13.7  | 12.8  | 9.3   | 6.3   | 3.5   | 2.9   | 3.9   | 4.7   |
| 72.5° | 148.3 | 42.9  | 15.0  | 11.0  | 11.1  | 7.1   | 4.5   | 2.7   | 2.7   | 4.2   | 5.6   |
| 75°   | 41.3  | 21.0  | 10.8  | 8.1   | 8.7   | 5.2   | 3.3   | 2.3   | 2.5   | 4.8   | 6.5   |
| 77.5° | 24.3  | 15.5  | 7.0   | 4.7   | 5.9   | 3.6   | 2.2   | 1.8   | 2.2   | 4.1   | 6.3   |
| 80°   | 19.6  | 8.2   | 4.1   | 2.4   | 3.3   | 2.1   | 1.5   | 1.1   | 0.6   | 1.6   | 3.3   |
| 82.5° | 19.6  | 5.0   | 1.9   | 1.7   | 1.7   | 1.1   | 0.7   | 0.5   | 0.1   | 0.0   | 0.8   |
| 85°   | 13.2  | 2.1   | 1.2   | 1.1   | 0.8   | 0.4   | 0.2   | 0.1   | 0.0   | 0.0   | 0.0   |
| 87.5° | 2.2   | 0.8   | 0.5   | 0.2   | 0.1   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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

Report Prepared for

Cooper Lighting Solutions

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)