

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: P318835

Luminaire Tested: **GLEON-SA1B-827-U-T4FT**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P318835  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-16)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA1B-827-U-T4FT  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(1) 80 CRI, 2700K, 800mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV FORWARD  
THROW OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4425 lumens  
Efficiency: N/A  
Efficacy: 100.6 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

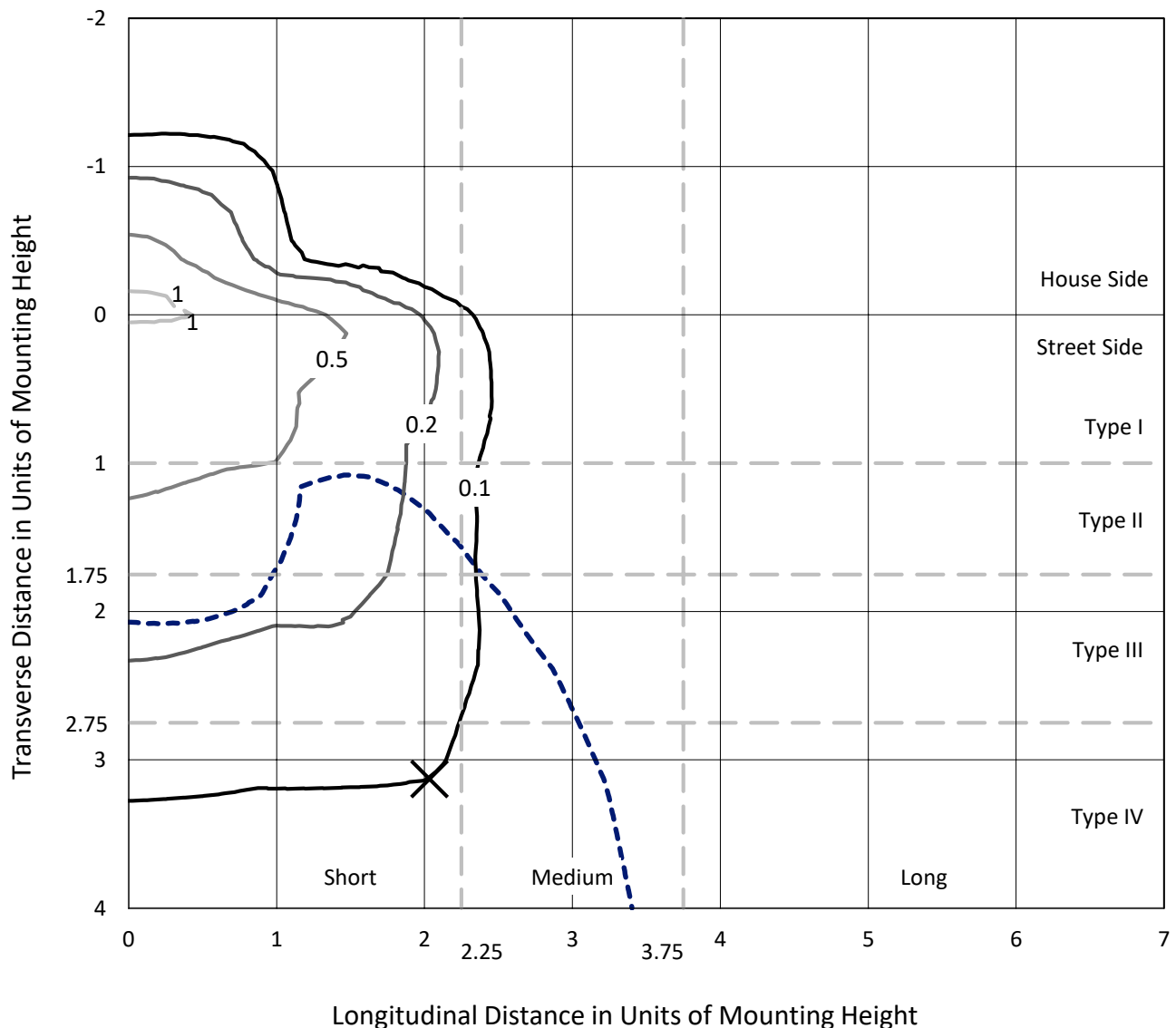
Input Watts (W): 44  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P318835  
 CATALOG NUMBER: GLEON-SA1B-827-U-T4FT

## Iso-Footcandle Lines of Horizontal Illumination

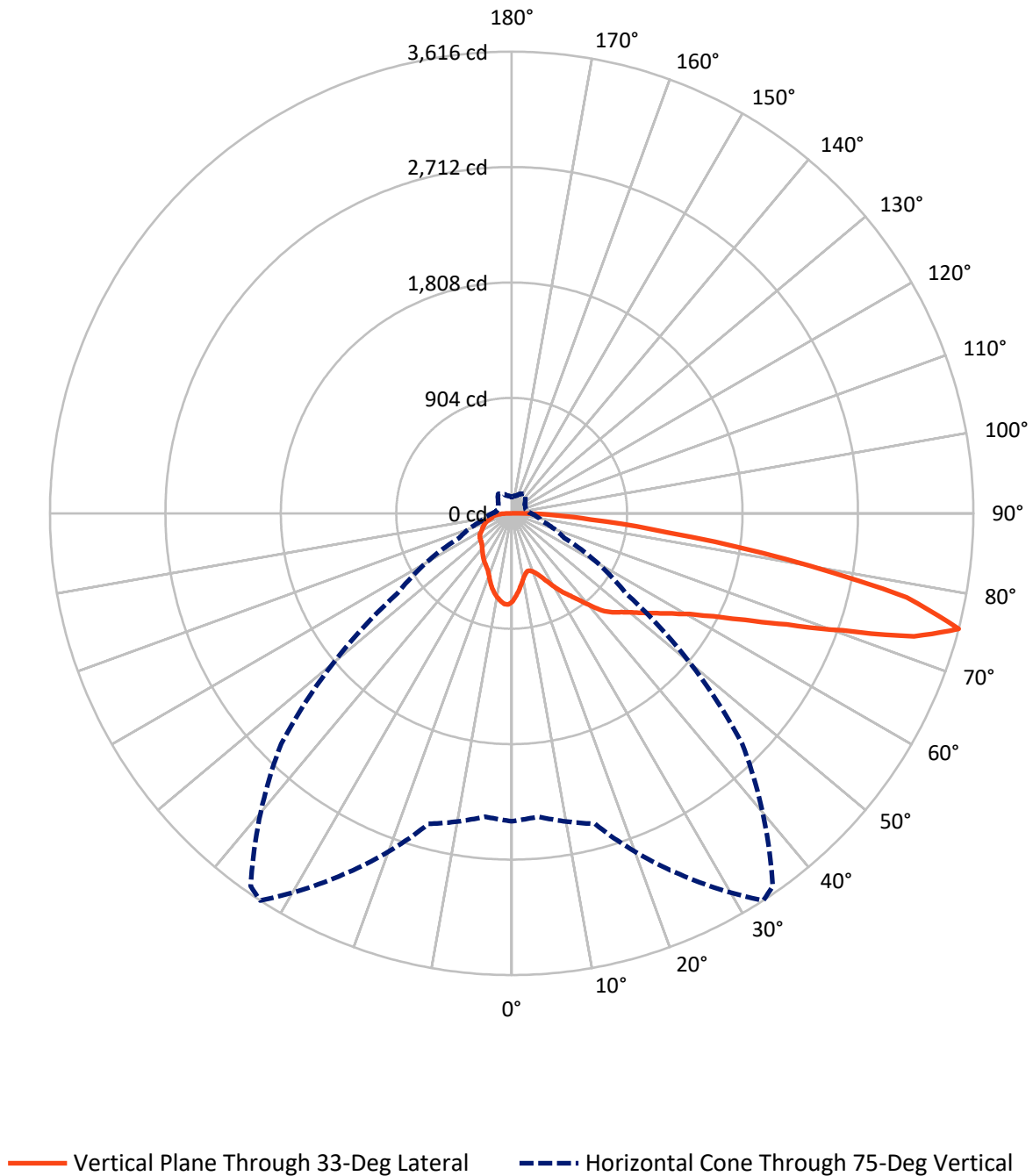
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 1.1 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA1B-827-U-T4FT

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 950.2    | 0.0    | 950.2  |
|                    | % Fixture | 21.5     | 0.0    | 21.5   |
| <b>Street Side</b> | Lumens    | 3474.8   | 0.0    | 3474.8 |
|                    | % Fixture | 78.5     | 0.0    | 78.5   |
| <b>Total</b>       | Lumens    | 4425.0   | 0.0    | 4425.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 62.6   | 1.4       |
| 10°-20°   | 169.4  | 3.8       |
| 20°-30°   | 276.7  | 6.3       |
| 30°-40°   | 412.0  | 9.3       |
| 40°-50°   | 591.0  | 13.4      |
| 50°-60°   | 811.3  | 18.3      |
| 60°-70°   | 1015.7 | 23.0      |
| 70°-80°   | 918.9  | 20.8      |
| 80°-90°   | 167.4  | 3.8       |
| 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°    | 4425.0 | 100.0     |
| 0°-180°   | 4425.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P318835

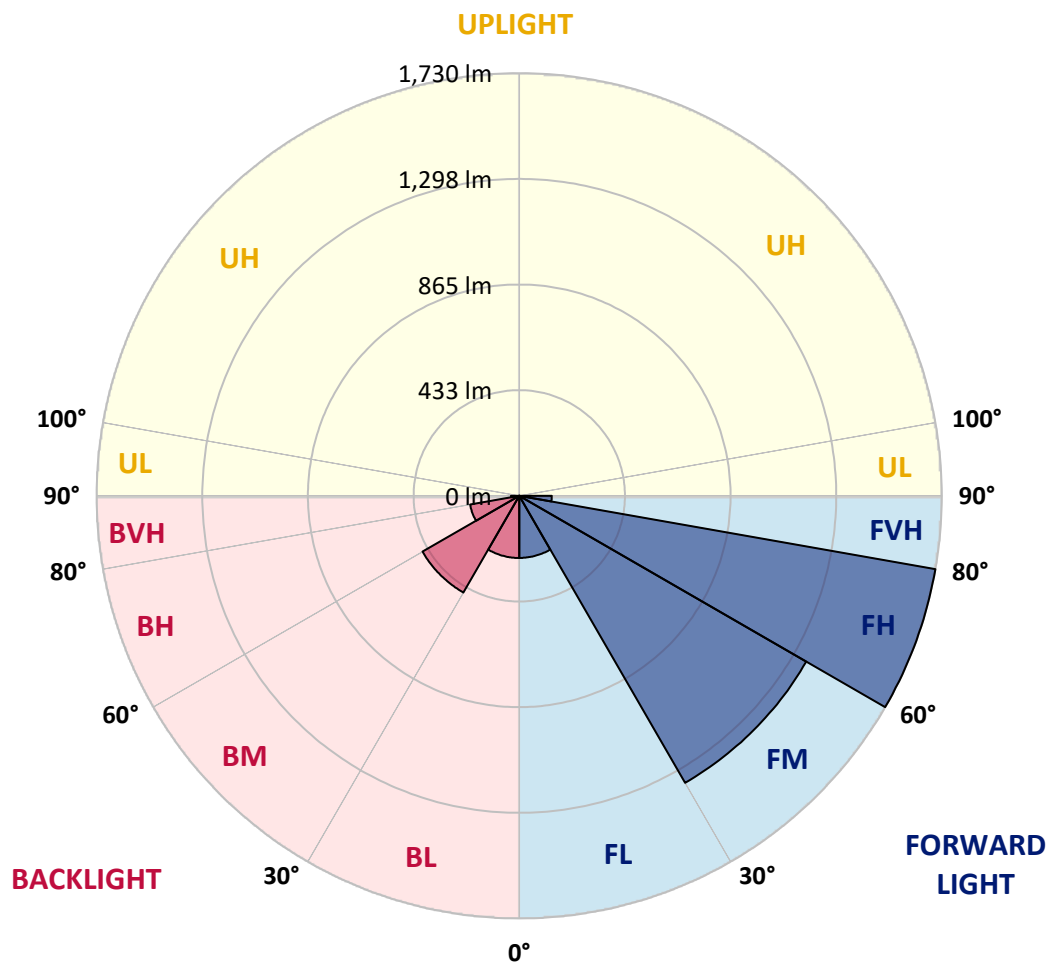
CATALOG NUMBER: GLEON-SA1B-827-U-T4FT

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 254.1  | 5.7       |                         |      |         |
| FM   | (30°-60°)   | 1357.1 | 30.7      |                         |      |         |
| FH   | (60°-80°)   | 1730.3 | 39.1      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 133.3  | 3.0       |                         |      | G2/225  |
| BL   | (0°-30°)    | 254.5  | 5.8       | B1/500                  |      |         |
| BM   | (30°-60°)   | 457.3  | 10.3      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 204.3  | 4.6       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 34.1   | 0.8       |                         |      | G1/100  |
| 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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CATALOG NUMBER: GLEON-SA1B-827-U-T4FT

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 33°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 691.7  | 691.7  | 691.7  | 691.7  | 691.7  | 691.7  | 691.7  | 691.7  | 691.7  | 691.7  | 691.7  |
| 2.5°  | 642.3  | 639.8  | 644.4  | 645.0  | 649.0  | 650.5  | 656.0  | 664.6  | 671.6  | 679.7  | 687.1  |
| 5°    | 584.0  | 582.4  | 588.8  | 593.4  | 602.1  | 605.7  | 618.7  | 636.9  | 653.1  | 671.5  | 688.1  |
| 7.5°  | 528.7  | 527.8  | 535.0  | 545.4  | 555.5  | 560.5  | 583.0  | 609.4  | 636.5  | 666.1  | 691.7  |
| 10°   | 482.1  | 481.8  | 488.7  | 498.9  | 513.7  | 519.4  | 548.4  | 583.3  | 621.2  | 662.0  | 697.6  |
| 12.5° | 456.0  | 457.0  | 460.2  | 468.8  | 482.6  | 488.2  | 520.5  | 561.4  | 608.3  | 660.6  | 706.3  |
| 15°   | 462.4  | 464.1  | 458.6  | 458.2  | 468.0  | 472.5  | 502.7  | 545.8  | 599.2  | 662.9  | 719.0  |
| 17.5° | 489.7  | 490.0  | 475.5  | 466.3  | 472.3  | 474.6  | 497.2  | 537.0  | 593.8  | 668.1  | 734.9  |
| 20°   | 528.3  | 527.5  | 501.8  | 486.5  | 489.7  | 490.3  | 505.0  | 537.1  | 593.4  | 677.1  | 755.5  |
| 22.5° | 579.3  | 573.7  | 539.1  | 518.3  | 517.6  | 516.6  | 525.0  | 548.4  | 600.1  | 691.8  | 780.2  |
| 25°   | 645.9  | 640.6  | 593.1  | 564.6  | 558.5  | 556.2  | 557.4  | 572.6  | 613.4  | 707.5  | 807.7  |
| 27.5° | 720.1  | 710.8  | 664.9  | 624.7  | 612.0  | 608.8  | 601.5  | 606.7  | 627.9  | 722.7  | 840.4  |
| 30°   | 782.1  | 777.1  | 737.0  | 689.4  | 674.4  | 669.8  | 650.5  | 644.9  | 648.9  | 743.3  | 881.6  |
| 32.5° | 816.8  | 813.5  | 789.2  | 750.7  | 736.7  | 730.3  | 703.1  | 691.8  | 682.5  | 775.9  | 937.6  |
| 35°   | 858.9  | 856.7  | 842.1  | 814.1  | 793.5  | 786.7  | 765.6  | 753.9  | 729.9  | 820.7  | 1009.9 |
| 37.5° | 912.4  | 910.1  | 910.4  | 887.8  | 863.2  | 856.9  | 843.0  | 830.6  | 791.3  | 879.5  | 1088.5 |
| 40°   | 972.9  | 968.5  | 966.8  | 965.7  | 950.1  | 946.6  | 939.3  | 922.5  | 868.3  | 949.8  | 1166.0 |
| 42.5° | 1064.0 | 1048.3 | 1014.6 | 1027.3 | 1042.8 | 1040.9 | 1046.9 | 1022.7 | 953.9  | 1033.0 | 1241.6 |
| 45°   | 1151.9 | 1126.1 | 1068.0 | 1070.7 | 1104.5 | 1114.7 | 1159.4 | 1142.3 | 1046.7 | 1124.1 | 1319.9 |
| 47.5° | 1191.9 | 1172.4 | 1123.0 | 1123.2 | 1156.6 | 1177.9 | 1275.7 | 1263.5 | 1144.2 | 1227.5 | 1415.4 |
| 50°   | 1236.7 | 1217.2 | 1172.8 | 1189.5 | 1218.7 | 1241.3 | 1388.0 | 1381.8 | 1237.0 | 1340.8 | 1529.9 |
| 52.5° | 1285.6 | 1252.5 | 1224.3 | 1254.1 | 1295.1 | 1321.4 | 1500.5 | 1483.4 | 1322.2 | 1454.8 | 1661.5 |
| 55°   | 1286.2 | 1277.2 | 1298.6 | 1320.5 | 1381.8 | 1414.0 | 1618.4 | 1573.1 | 1391.6 | 1566.9 | 1768.6 |
| 57.5° | 1359.5 | 1344.8 | 1390.2 | 1400.3 | 1480.4 | 1516.7 | 1735.6 | 1651.3 | 1462.2 | 1652.8 | 1826.4 |
| 60°   | 1456.4 | 1443.8 | 1481.0 | 1507.6 | 1602.3 | 1650.9 | 1860.8 | 1731.5 | 1517.7 | 1717.6 | 1823.7 |
| 62.5° | 1623.7 | 1609.5 | 1609.1 | 1646.4 | 1774.0 | 1830.5 | 2001.3 | 1810.2 | 1539.7 | 1730.4 | 1745.9 |
| 65°   | 1868.8 | 1846.1 | 1803.5 | 1821.2 | 2011.1 | 2067.5 | 2158.3 | 1867.2 | 1510.6 | 1661.6 | 1545.5 |
| 67.5° | 2107.2 | 2106.4 | 2054.0 | 2090.4 | 2324.1 | 2369.3 | 2337.1 | 1872.9 | 1420.0 | 1422.1 | 1189.9 |
| 70°   | 2344.9 | 2347.9 | 2339.1 | 2465.6 | 2747.0 | 2794.1 | 2527.5 | 1796.9 | 1216.2 | 1027.0 | 712.9  |
| 72.5° | 2533.2 | 2532.4 | 2577.1 | 2903.4 | 3295.9 | 3285.4 | 2688.0 | 1566.7 | 873.2  | 554.4  | 340.7  |
| 75°   | 2411.2 | 2384.6 | 2517.6 | 3120.2 | 3615.9 | 3564.3 | 2551.5 | 1092.9 | 453.2  | 252.4  | 183.4  |
| 77.5° | 1572.7 | 1597.9 | 1793.1 | 2577.5 | 3162.8 | 3100.1 | 1872.0 | 509.9  | 213.5  | 165.5  | 133.0  |
| 80°   | 569.5  | 596.1  | 839.6  | 1460.0 | 2179.0 | 2168.8 | 921.8  | 209.6  | 144.4  | 125.0  | 96.9   |
| 82.5° | 196.0  | 205.7  | 331.2  | 648.4  | 1230.3 | 1276.2 | 346.8  | 119.1  | 105.0  | 88.7   | 66.3   |
| 85°   | 76.9   | 88.0   | 151.5  | 312.0  | 620.6  | 625.2  | 140.5  | 71.2   | 73.1   | 58.1   | 36.4   |
| 87.5° | 29.2   | 35.5   | 72.5   | 144.9  | 283.4  | 260.3  | 50.3   | 33.9   | 41.6   | 34.5   | 17.3   |
| 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-SA1B-827-U-T4FT

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 691.7  | 691.7  | 691.7 | 691.7 | 691.7 | 691.7 | 691.7 | 691.7 | 691.7 | 691.7 | 691.7 |
| 2.5°  | 692.7  | 695.9  | 702.7 | 707.2 | 712.1 | 713.5 | 714.1 | 715.3 | 716.6 | 716.1 | 716.3 |
| 5°    | 697.0  | 703.3  | 714.1 | 718.7 | 720.8 | 718.4 | 713.7 | 709.8 | 707.1 | 705.6 | 705.1 |
| 7.5°  | 704.0  | 712.9  | 724.5 | 723.8 | 718.9 | 708.0 | 695.8 | 686.6 | 679.0 | 676.2 | 674.7 |
| 10°   | 713.4  | 723.8  | 731.9 | 723.1 | 708.9 | 690.1 | 671.8 | 657.6 | 646.1 | 641.7 | 640.9 |
| 12.5° | 725.3  | 735.8  | 737.4 | 718.9 | 695.3 | 669.6 | 644.7 | 625.9 | 608.8 | 603.3 | 602.1 |
| 15°   | 740.7  | 750.7  | 741.2 | 711.4 | 678.5 | 644.0 | 611.7 | 586.2 | 568.1 | 561.4 | 559.0 |
| 17.5° | 756.9  | 766.4  | 741.9 | 699.0 | 656.5 | 613.5 | 573.0 | 546.9 | 526.3 | 518.5 | 517.6 |
| 20°   | 776.3  | 780.6  | 738.7 | 681.3 | 626.2 | 574.1 | 531.5 | 506.9 | 495.8 | 490.3 | 489.7 |
| 22.5° | 800.3  | 795.7  | 731.4 | 657.3 | 587.9 | 528.6 | 493.9 | 482.4 | 479.6 | 478.4 | 478.9 |
| 25°   | 825.7  | 811.6  | 720.5 | 625.9 | 539.4 | 483.0 | 466.3 | 469.6 | 473.2 | 472.8 | 472.8 |
| 27.5° | 853.7  | 827.8  | 703.9 | 584.4 | 485.8 | 445.7 | 447.7 | 459.5 | 465.0 | 464.8 | 464.7 |
| 30°   | 889.6  | 846.2  | 682.6 | 534.4 | 435.6 | 419.4 | 431.5 | 445.9 | 453.4 | 453.1 | 453.2 |
| 32.5° | 933.8  | 866.4  | 653.7 | 478.6 | 399.4 | 400.0 | 413.9 | 428.1 | 436.8 | 436.1 | 436.2 |
| 35°   | 985.4  | 889.0  | 614.6 | 423.6 | 375.4 | 384.6 | 395.6 | 405.5 | 413.8 | 412.7 | 411.6 |
| 37.5° | 1041.7 | 911.1  | 562.6 | 374.3 | 355.8 | 370.2 | 379.4 | 381.1 | 384.9 | 382.1 | 380.1 |
| 40°   | 1095.2 | 928.1  | 495.7 | 334.0 | 336.1 | 358.0 | 363.9 | 357.2 | 350.3 | 349.4 | 346.7 |
| 42.5° | 1141.8 | 933.8  | 428.0 | 301.7 | 315.3 | 345.1 | 348.8 | 334.7 | 322.4 | 316.6 | 314.1 |
| 45°   | 1191.0 | 935.8  | 364.9 | 274.7 | 295.3 | 333.7 | 337.6 | 318.8 | 301.4 | 288.9 | 284.8 |
| 47.5° | 1255.4 | 950.1  | 315.8 | 254.7 | 280.0 | 326.0 | 331.7 | 306.2 | 283.5 | 265.7 | 261.8 |
| 50°   | 1339.6 | 978.6  | 275.9 | 239.4 | 270.1 | 321.0 | 327.4 | 293.8 | 268.9 | 247.3 | 243.5 |
| 52.5° | 1433.1 | 1004.7 | 243.6 | 227.0 | 260.5 | 312.1 | 321.9 | 284.9 | 255.1 | 230.3 | 226.2 |
| 55°   | 1498.6 | 984.7  | 217.7 | 214.1 | 247.9 | 299.4 | 314.3 | 277.4 | 235.4 | 213.8 | 210.2 |
| 57.5° | 1511.1 | 916.2  | 197.9 | 200.8 | 232.8 | 283.5 | 302.5 | 260.8 | 224.7 | 206.7 | 202.8 |
| 60°   | 1476.8 | 820.8  | 183.3 | 188.6 | 216.6 | 263.5 | 280.5 | 249.0 | 214.5 | 199.0 | 195.8 |
| 62.5° | 1390.8 | 723.1  | 172.4 | 177.6 | 201.5 | 243.2 | 266.7 | 236.6 | 204.1 | 190.3 | 187.1 |
| 65°   | 1217.0 | 607.1  | 162.0 | 167.8 | 187.4 | 225.6 | 254.3 | 225.2 | 193.8 | 183.3 | 180.2 |
| 67.5° | 918.6  | 454.7  | 152.2 | 157.4 | 174.9 | 210.3 | 240.9 | 213.8 | 183.9 | 177.2 | 173.5 |
| 70°   | 540.9  | 284.8  | 141.1 | 146.6 | 161.7 | 194.4 | 226.5 | 201.5 | 171.5 | 168.4 | 163.7 |
| 72.5° | 251.7  | 171.3  | 128.4 | 133.7 | 145.2 | 173.2 | 208.0 | 185.3 | 156.8 | 150.1 | 143.7 |
| 75°   | 150.3  | 125.3  | 113.4 | 118.2 | 126.3 | 150.6 | 184.8 | 168.7 | 142.9 | 134.1 | 127.3 |
| 77.5° | 112.3  | 95.8   | 96.9  | 102.0 | 108.5 | 131.8 | 163.7 | 155.8 | 132.2 | 125.3 | 120.8 |
| 80°   | 80.9   | 72.8   | 79.0  | 84.5  | 91.4  | 119.8 | 156.8 | 144.0 | 119.5 | 110.4 | 106.1 |
| 82.5° | 54.0   | 52.3   | 59.5  | 65.1  | 71.8  | 104.9 | 147.3 | 126.1 | 102.1 | 90.5  | 81.0  |
| 85°   | 29.8   | 31.5   | 40.0  | 42.5  | 48.3  | 73.8  | 120.8 | 101.3 | 76.9  | 61.9  | 59.2  |
| 87.5° | 12.4   | 14.5   | 21.6  | 20.8  | 25.7  | 44.0  | 79.5  | 61.1  | 48.9  | 36.5  | 28.4  |
| 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 (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (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)