

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P629102

Luminaire Tested: GWS-SA1A-830-U-T4FT-W

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P629102  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-54)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA1A-830-U-T4FT-W  
Description: GALLEON WALL SLIM LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV FORWARD THROW OPTICS  
Light Source: (16) 3000K CCT, 80 CRI LEDS  
Ballast/Driver: -

**Summary**

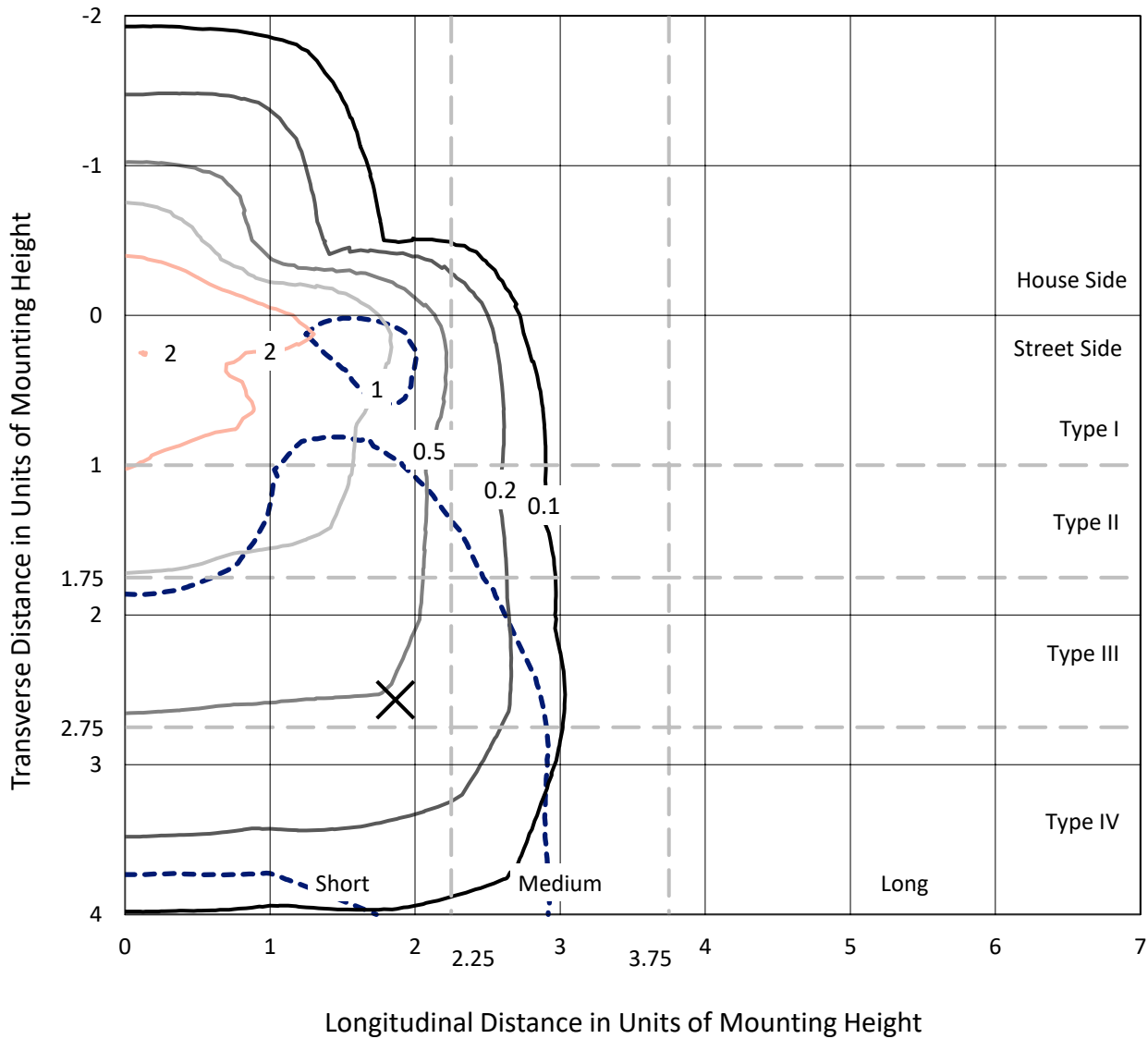
Lumens per Lamp: N/A  
Luminaire Lumens: 2182 lumens  
Efficiency: N/A  
Efficacy: 110.8 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G1  
  
Input Watts (W): 19.7  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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### Iso-Footcandle Lines of Horizontal Illumination

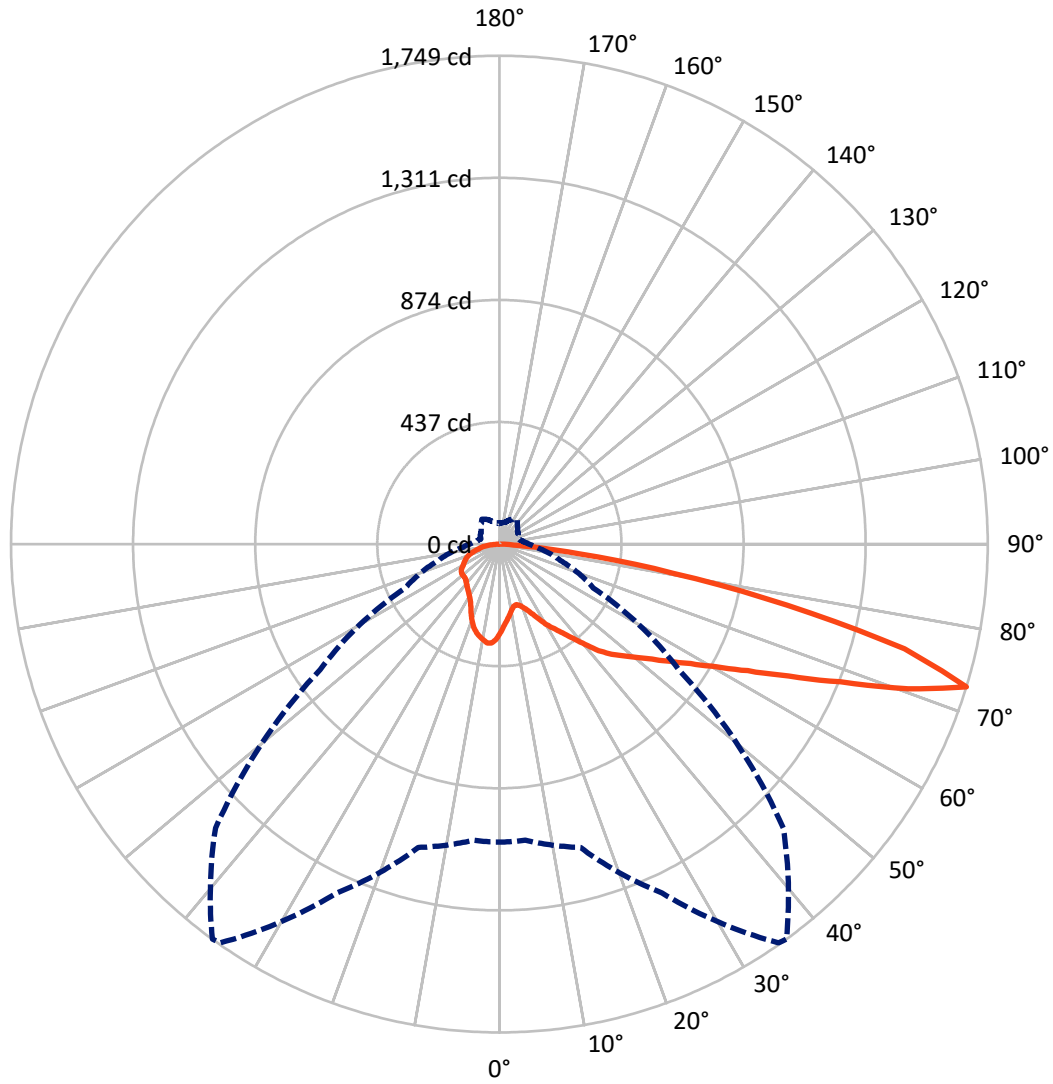
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 3.4 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 36-Deg Lateral    - - - Horizontal Cone Through 72.5-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 503.1    | 0.0    | 503.1  |
|                    | % Fixture | 23.1     | 0.0    | 23.1   |
| <b>Street Side</b> | Lumens    | 1678.9   | 0.0    | 1678.9 |
|                    | % Fixture | 76.9     | 0.0    | 76.9   |
| <b>Total</b>       | Lumens    | 2182.0   | 0.0    | 2182.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 29.8   | 1.4       |
| 10°-20°   | 84.2   | 3.9       |
| 20°-30°   | 139.5  | 6.4       |
| 30°-40°   | 208.9  | 9.6       |
| 40°-50°   | 304.7  | 14.0      |
| 50°-60°   | 433.7  | 19.9      |
| 60°-70°   | 548.0  | 25.1      |
| 70°-80°   | 390.5  | 17.9      |
| 80°-90°   | 42.6   | 2.0       |
| 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°    | 2182.0 | 100.0     |
| 0°-180°   | 2182.0 | 100.0     |

**Coefficient of Utilization**



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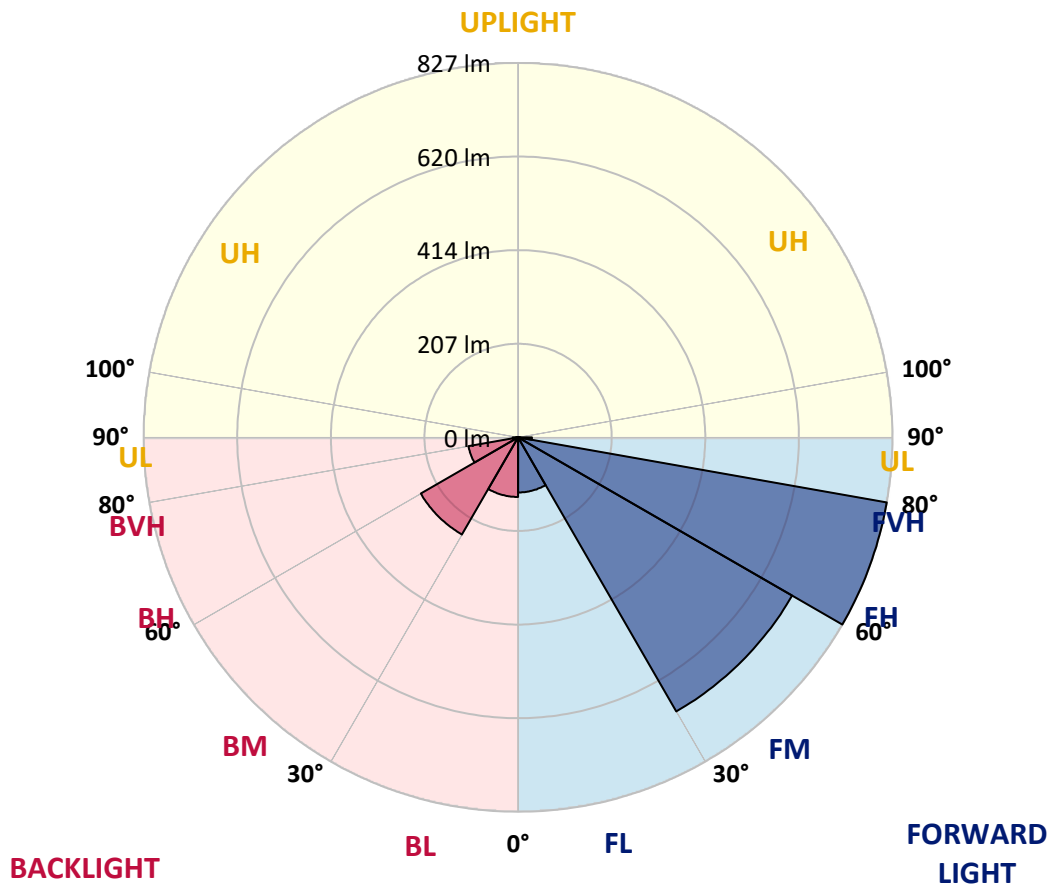
CATALOG NUMBER: GWS-SA1A-830-U-T4FT-W

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 121.8  | 5.6       |                         |      |         |
| FM (30°-60°)   | 699.3  | 32.0      |                         |      |         |
| FH (60°-80°)   | 827.3  | 37.9      |                         |      | G1/1800 |
| FVH (80°-90°)  | 30.6   | 1.4       |                         |      | G1/100  |
| BL (0°-30°)    | 131.7  | 6.0       | B1/500                  |      |         |
| BM (30°-60°)   | 248.1  | 11.4      | B1/1000                 |      |         |
| BH (60°-80°)   | 111.2  | 5.1       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 12.0   | 0.6       |                         |      | G1/100  |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 36°    | 45°    | 55°    | 65°   | 75°   | 85°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| 0°    | 319.3  | 319.3  | 319.3  | 319.3  | 319.3  | 319.3  | 319.3  | 319.3  | 319.3 | 319.3 | 319.3 |
| 2.5°  | 291.3  | 290.8  | 289.9  | 292.8  | 295.7  | 295.4  | 299.4  | 303.3  | 307.5 | 311.9 | 317.7 |
| 5°    | 268.0  | 267.7  | 266.9  | 271.2  | 275.6  | 275.5  | 282.1  | 288.4  | 297.0 | 306.4 | 318.0 |
| 7.5°  | 244.7  | 243.9  | 245.0  | 250.5  | 256.7  | 257.3  | 266.4  | 276.8  | 289.2 | 303.3 | 319.8 |
| 10°   | 224.1  | 224.0  | 224.4  | 230.6  | 239.8  | 240.5  | 252.1  | 266.6  | 283.1 | 301.9 | 323.9 |
| 12.5° | 218.8  | 218.5  | 217.2  | 220.2  | 227.2  | 228.2  | 241.0  | 258.6  | 278.9 | 302.7 | 329.4 |
| 15°   | 227.5  | 226.7  | 222.2  | 220.7  | 224.1  | 224.9  | 235.8  | 253.9  | 276.4 | 304.1 | 336.3 |
| 17.5° | 242.6  | 242.1  | 233.5  | 227.5  | 229.8  | 230.4  | 238.5  | 253.1  | 275.8 | 307.0 | 344.9 |
| 20°   | 264.6  | 262.5  | 249.1  | 240.0  | 240.0  | 241.0  | 245.8  | 256.7  | 276.6 | 310.6 | 354.6 |
| 22.5° | 293.8  | 289.5  | 270.6  | 258.3  | 255.1  | 256.4  | 258.5  | 265.6  | 280.0 | 316.6 | 366.8 |
| 25°   | 326.5  | 322.6  | 300.1  | 282.7  | 278.2  | 278.7  | 276.9  | 278.2  | 287.4 | 324.9 | 381.9 |
| 27.5° | 361.3  | 358.7  | 334.7  | 312.7  | 305.6  | 305.6  | 299.3  | 296.2  | 297.8 | 334.2 | 398.7 |
| 30°   | 392.4  | 388.8  | 368.6  | 344.4  | 335.1  | 335.1  | 323.1  | 316.4  | 312.5 | 345.7 | 421.2 |
| 32.5° | 408.7  | 406.6  | 393.2  | 374.7  | 363.2  | 361.4  | 351.1  | 343.3  | 334.2 | 362.7 | 451.7 |
| 35°   | 430.1  | 429.6  | 421.5  | 407.1  | 392.5  | 390.0  | 382.8  | 376.7  | 361.0 | 384.0 | 492.1 |
| 37.5° | 457.0  | 456.2  | 454.9  | 446.3  | 428.8  | 428.3  | 422.0  | 414.6  | 394.2 | 414.6 | 541.2 |
| 40°   | 487.1  | 485.7  | 484.0  | 483.9  | 473.4  | 471.6  | 471.1  | 462.7  | 434.2 | 451.5 | 592.4 |
| 42.5° | 528.6  | 523.6  | 508.3  | 515.1  | 522.9  | 521.3  | 527.4  | 514.8  | 484.0 | 495.4 | 640.8 |
| 45°   | 579.6  | 567.3  | 537.2  | 539.1  | 558.7  | 561.9  | 583.3  | 580.2  | 538.9 | 546.1 | 691.8 |
| 47.5° | 610.2  | 599.5  | 571.5  | 569.9  | 594.3  | 598.4  | 644.8  | 650.7  | 598.0 | 607.1 | 754.8 |
| 50°   | 635.3  | 627.8  | 604.8  | 607.1  | 633.0  | 637.1  | 705.9  | 718.4  | 653.8 | 669.6 | 828.0 |
| 52.5° | 665.6  | 654.9  | 637.1  | 647.8  | 679.5  | 684.4  | 773.7  | 787.2  | 704.0 | 738.3 | 903.8 |
| 55°   | 682.6  | 678.2  | 678.5  | 694.9  | 734.7  | 741.4  | 844.8  | 842.6  | 749.9 | 797.1 | 960.8 |
| 57.5° | 721.8  | 720.1  | 735.0  | 741.2  | 799.2  | 807.8  | 915.9  | 896.5  | 791.7 | 842.6 | 988.2 |
| 60°   | 790.9  | 786.9  | 799.8  | 809.2  | 878.8  | 891.0  | 995.3  | 949.3  | 820.1 | 876.4 | 978.9 |
| 62.5° | 888.1  | 883.1  | 883.5  | 898.4  | 985.6  | 998.4  | 1083.5 | 993.3  | 828.8 | 881.6 | 920.5 |
| 65°   | 1008.9 | 1001.6 | 993.3  | 1013.6 | 1127.3 | 1138.0 | 1179.6 | 1025.4 | 807.9 | 831.7 | 798.4 |
| 67.5° | 1136.3 | 1130.3 | 1120.6 | 1163.1 | 1310.7 | 1317.2 | 1287.3 | 1022.7 | 741.7 | 698.3 | 560.0 |
| 70°   | 1143.8 | 1145.2 | 1191.2 | 1344.7 | 1550.3 | 1551.9 | 1389.1 | 967.3  | 600.6 | 452.6 | 279.0 |
| 72.5° | 1067.0 | 1064.6 | 1124.5 | 1377.9 | 1743.0 | 1748.5 | 1437.2 | 783.6  | 371.2 | 225.7 | 130.8 |
| 75°   | 866.7  | 870.9  | 933.9  | 1205.6 | 1493.9 | 1498.8 | 1171.6 | 462.0  | 176.4 | 110.4 | 83.7  |
| 77.5° | 373.1  | 396.6  | 520.8  | 849.4  | 1069.9 | 1054.9 | 603.9  | 187.2  | 94.1  | 78.7  | 64.1  |
| 80°   | 107.7  | 116.9  | 185.6  | 403.9  | 641.1  | 629.8  | 239.0  | 70.1   | 65.6  | 59.1  | 46.0  |
| 82.5° | 34.8   | 38.5   | 68.0   | 160.8  | 287.3  | 287.0  | 90.7   | 41.5   | 42.9  | 40.2  | 29.6  |
| 85°   | 9.7    | 11.2   | 20.9   | 48.7   | 88.9   | 87.1   | 26.2   | 19.6   | 22.8  | 23.2  | 14.7  |
| 87.5° | 0.0    | 0.0    | 0.2    | 0.3    | 0.3    | 0.3    | 0.6    | 2.9    | 6.6   | 8.4   | 6.0   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   |



REPORT NUMBER: P629102  
 CATALOG NUMBER: GWS-SA1A-830-U-T4FT-W

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 319.3 | 319.3 | 319.3 | 319.3 | 319.3 | 319.3 | 319.3 | 319.3 | 319.3 | 319.3 | 319.3 |
| 2.5°  | 321.3 | 320.8 | 327.4 | 332.6 | 337.5 | 340.7 | 341.7 | 342.3 | 343.6 | 344.3 | 343.6 |
| 5°    | 323.6 | 326.0 | 337.0 | 345.1 | 351.6 | 355.5 | 355.6 | 355.3 | 356.3 | 355.5 | 355.0 |
| 7.5°  | 328.4 | 333.1 | 347.0 | 355.6 | 359.8 | 360.0 | 356.1 | 351.6 | 349.3 | 347.4 | 346.7 |
| 10°   | 334.9 | 341.9 | 357.1 | 362.7 | 361.4 | 355.5 | 346.9 | 339.7 | 335.7 | 332.8 | 332.1 |
| 12.5° | 343.8 | 351.6 | 366.0 | 365.8 | 357.7 | 347.0 | 337.0 | 328.4 | 322.6 | 319.2 | 318.0 |
| 15°   | 352.2 | 362.1 | 372.5 | 364.9 | 352.1 | 339.1 | 326.1 | 314.6 | 306.9 | 301.5 | 300.6 |
| 17.5° | 362.6 | 373.1 | 377.2 | 361.8 | 344.9 | 328.3 | 310.9 | 295.9 | 285.3 | 279.0 | 278.5 |
| 20°   | 374.6 | 384.0 | 379.4 | 356.4 | 335.7 | 313.8 | 290.4 | 273.5 | 262.2 | 256.0 | 256.5 |
| 22.5° | 388.5 | 395.3 | 380.1 | 349.1 | 322.9 | 293.4 | 267.2 | 251.0 | 243.4 | 240.2 | 240.3 |
| 25°   | 403.4 | 407.8 | 378.9 | 339.3 | 303.3 | 268.5 | 243.4 | 235.9 | 235.3 | 234.5 | 234.8 |
| 27.5° | 421.0 | 420.1 | 375.5 | 325.3 | 276.9 | 239.5 | 226.7 | 228.7 | 231.3 | 230.9 | 231.3 |
| 30°   | 444.7 | 435.5 | 371.2 | 306.1 | 245.5 | 215.2 | 216.8 | 222.3 | 225.7 | 226.1 | 227.0 |
| 32.5° | 471.7 | 452.5 | 364.2 | 279.8 | 215.5 | 201.6 | 207.6 | 214.2 | 218.3 | 219.1 | 220.4 |
| 35°   | 504.0 | 471.9 | 351.9 | 247.1 | 194.0 | 193.5 | 199.0 | 203.6 | 207.9 | 208.3 | 208.3 |
| 37.5° | 541.0 | 491.3 | 332.3 | 211.0 | 180.7 | 186.6 | 191.7 | 192.7 | 193.8 | 192.9 | 193.4 |
| 40°   | 575.0 | 510.1 | 304.4 | 178.1 | 169.9 | 180.4 | 184.8 | 181.5 | 178.0 | 175.5 | 176.0 |
| 42.5° | 603.5 | 522.9 | 267.5 | 155.1 | 158.9 | 174.9 | 178.3 | 171.7 | 164.7 | 160.2 | 160.8 |
| 45°   | 635.6 | 534.7 | 224.1 | 139.6 | 149.5 | 171.0 | 173.3 | 164.7 | 155.8 | 149.0 | 148.0 |
| 47.5° | 679.8 | 558.9 | 185.6 | 128.7 | 142.8 | 168.9 | 172.6 | 161.0 | 149.3 | 139.1 | 138.0 |
| 50°   | 734.4 | 593.0 | 153.4 | 121.6 | 139.8 | 167.8 | 172.5 | 156.9 | 143.0 | 131.0 | 130.2 |
| 52.5° | 794.0 | 626.4 | 129.6 | 116.1 | 136.7 | 164.4 | 171.7 | 152.4 | 136.4 | 123.4 | 122.4 |
| 55°   | 833.7 | 639.5 | 113.5 | 110.9 | 131.7 | 159.0 | 168.4 | 148.0 | 126.3 | 114.5 | 113.0 |
| 57.5° | 845.3 | 622.7 | 102.3 | 106.2 | 125.2 | 151.6 | 162.3 | 138.8 | 120.2 | 110.8 | 109.6 |
| 60°   | 825.2 | 580.2 | 95.4  | 102.3 | 118.1 | 142.0 | 151.6 | 133.4 | 115.3 | 106.9 | 106.1 |
| 62.5° | 768.6 | 514.8 | 90.0  | 98.3  | 110.8 | 132.0 | 144.8 | 127.0 | 110.0 | 103.3 | 102.2 |
| 65°   | 654.6 | 422.2 | 85.7  | 94.1  | 103.8 | 122.4 | 137.3 | 120.5 | 104.1 | 99.1  | 97.8  |
| 67.5° | 457.8 | 296.5 | 81.0  | 89.1  | 96.8  | 113.2 | 129.6 | 114.5 | 98.1  | 94.4  | 93.1  |
| 70°   | 223.8 | 157.2 | 75.3  | 83.2  | 89.4  | 103.8 | 121.8 | 107.2 | 90.2  | 88.1  | 86.3  |
| 72.5° | 106.6 | 87.9  | 68.7  | 75.3  | 79.2  | 91.3  | 108.8 | 96.7  | 80.8  | 76.3  | 73.2  |
| 75°   | 71.4  | 62.5  | 59.9  | 65.9  | 66.9  | 76.6  | 93.3  | 83.4  | 71.3  | 66.1  | 63.5  |
| 77.5° | 54.1  | 47.8  | 50.4  | 55.7  | 53.8  | 63.0  | 76.8  | 74.3  | 64.3  | 59.6  | 58.3  |
| 80°   | 38.1  | 34.8  | 40.0  | 43.2  | 41.8  | 53.6  | 69.1  | 63.6  | 53.0  | 47.8  | 46.8  |
| 82.5° | 24.0  | 23.3  | 29.5  | 30.0  | 30.4  | 42.4  | 56.8  | 50.0  | 41.1  | 33.8  | 31.4  |
| 85°   | 12.0  | 13.3  | 17.7  | 17.7  | 17.5  | 21.9  | 32.4  | 28.2  | 22.2  | 17.7  | 17.2  |
| 87.5° | 4.0   | 5.7   | 7.6   | 6.2   | 4.7   | 3.7   | 4.2   | 5.2   | 5.5   | 5.3   | 5.3   |
| 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

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2408-195-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/07/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **GALN-SB1A-830-U-5WQ**  
 Description: GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS

**Spectral Parameters**

CCT (K): 3050  
 CIE u': 0.2476  
 CIE v': 0.5251  
 Duv: 0.0034  
 CIE x: 0.4383  
 CIE y: 0.4131  
 CIE z: 0.1487  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 581  
 Purity: 55.55201  
 Rf: 81.5  
 Rg: 99.2

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



**Test Conditions**

Stabilization Time: 20M  
 Operation Time: 1H 20M  
 Sphere Temperature (°C): 24.2

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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CIE 1931 Chromaticity Diagram



CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



CCT = 3050K  
 CIE x = 0.4383  
 CIE y = 0.4131  
 Duv = 0.0034

Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360               | 0                           | NR                      | 490               | 168                         | NR                      | 620               | 940                         | NR                      | 750               | 35                          | NR                      | 880               | 1                           | NR                      |
| 365               | 0                           | NR                      | 495               | 233                         | NR                      | 625               | 897                         | NR                      | 755               | 30                          | NR                      | 885               | 1                           | NR                      |
| 370               | 0                           | NR                      | 500               | 300                         | NR                      | 630               | 847                         | NR                      | 760               | 26                          | NR                      | 890               | 1                           | NR                      |
| 375               | 0                           | NR                      | 505               | 372                         | NR                      | 635               | 790                         | NR                      | 765               | 22                          | NR                      | 895               | 1                           | NR                      |
| 380               | 0                           | NR                      | 510               | 430                         | NR                      | 640               | 730                         | NR                      | 770               | 19                          | NR                      | 900               | 1                           | NR                      |
| 385               | 0                           | NR                      | 515               | 483                         | NR                      | 645               | 668                         | NR                      | 775               | 16                          | NR                      | 905               | 1                           | NR                      |
| 390               | 0                           | NR                      | 520               | 524                         | NR                      | 650               | 605                         | NR                      | 780               | 14                          | NR                      | 910               | 0                           | NR                      |
| 395               | 2                           | NR                      | 525               | 555                         | NR                      | 655               | 545                         | NR                      | 785               | 12                          | NR                      | 915               | 0                           | NR                      |
| 400               | 4                           | NR                      | 530               | 581                         | NR                      | 660               | 485                         | NR                      | 790               | 10                          | NR                      | 920               | 0                           | NR                      |
| 405               | 7                           | NR                      | 535               | 604                         | NR                      | 665               | 430                         | NR                      | 795               | 9                           | NR                      | 925               | 0                           | NR                      |
| 410               | 17                          | NR                      | 540               | 623                         | NR                      | 670               | 378                         | NR                      | 800               | 8                           | NR                      | 930               | 0                           | NR                      |
| 415               | 34                          | NR                      | 545               | 645                         | NR                      | 675               | 331                         | NR                      | 805               | 7                           | NR                      | 935               | 0                           | NR                      |
| 420               | 68                          | NR                      | 550               | 667                         | NR                      | 680               | 290                         | NR                      | 810               | 6                           | NR                      | 940               | 0                           | NR                      |
| 425               | 128                         | NR                      | 555               | 693                         | NR                      | 685               | 251                         | NR                      | 815               | 5                           | NR                      | 945               | 0                           | NR                      |
| 430               | 214                         | NR                      | 560               | 719                         | NR                      | 690               | 218                         | NR                      | 820               | 4                           | NR                      | 950               | 0                           | NR                      |
| 435               | 339                         | NR                      | 565               | 754                         | NR                      | 695               | 188                         | NR                      | 825               | 4                           | NR                      | 955               | 0                           | NR                      |
| 440               | 507                         | NR                      | 570               | 791                         | NR                      | 700               | 162                         | NR                      | 830               | 3                           | NR                      | 960               | 0                           | NR                      |
| 445               | 573                         | NR                      | 575               | 830                         | NR                      | 705               | 139                         | NR                      | 835               | 3                           | NR                      | 965               | 0                           | NR                      |
| 450               | 356                         | NR                      | 580               | 873                         | NR                      | 710               | 119                         | NR                      | 840               | 3                           | NR                      | 970               | 0                           | NR                      |
| 455               | 217                         | NR                      | 585               | 913                         | NR                      | 715               | 102                         | NR                      | 845               | 2                           | NR                      | 975               | 0                           | NR                      |
| 460               | 168                         | NR                      | 590               | 948                         | NR                      | 720               | 88                          | NR                      | 850               | 2                           | NR                      | 980               | 0                           | NR                      |
| 465               | 113                         | NR                      | 595               | 974                         | NR                      | 725               | 76                          | NR                      | 855               | 2                           | NR                      | 985               | 0                           | NR                      |
| 470               | 85                          | NR                      | 600               | 994                         | NR                      | 730               | 65                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 85                          | NR                      | 605               | 998                         | NR                      | 735               | 55                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 94                          | NR                      | 610               | 994                         | NR                      | 740               | 47                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 120                         | NR                      | 615               | 973                         | NR                      | 745               | 41                          | NR                      | 875               | 1                           | NR                      |                   |                             |                         |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.27**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 940                      | NR            | 750    | 35                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 233                      | NR            | 625    | 897                      | NR            | 755    | 30                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 300                      | NR            | 630    | 847                      | NR            | 760    | 26                       | NR            | 890    | 1                        | NR            |
| 375    | 0                        | NR            | 505    | 372                      | NR            | 635    | 790                      | NR            | 765    | 22                       | NR            | 895    | 1                        | NR            |
| 380    | 0                        | NR            | 510    | 430                      | NR            | 640    | 730                      | NR            | 770    | 19                       | NR            | 900    | 1                        | NR            |
| 385    | 0                        | NR            | 515    | 483                      | NR            | 645    | 668                      | NR            | 775    | 16                       | NR            | 905    | 1                        | NR            |
| 390    | 0                        | NR            | 520    | 524                      | NR            | 650    | 605                      | NR            | 780    | 14                       | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 555                      | NR            | 655    | 545                      | NR            | 785    | 12                       | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 581                      | NR            | 660    | 485                      | NR            | 790    | 10                       | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 604                      | NR            | 665    | 430                      | NR            | 795    | 9                        | NR            | 925    | 0                        | NR            |
| 410    | 17                       | NR            | 540    | 623                      | NR            | 670    | 378                      | NR            | 800    | 8                        | NR            | 930    | 0                        | NR            |
| 415    | 34                       | NR            | 545    | 645                      | NR            | 675    | 331                      | NR            | 805    | 7                        | NR            | 935    | 0                        | NR            |
| 420    | 68                       | NR            | 550    | 667                      | NR            | 680    | 290                      | NR            | 810    | 6                        | NR            | 940    | 0                        | NR            |
| 425    | 128                      | NR            | 555    | 693                      | NR            | 685    | 251                      | NR            | 815    | 5                        | NR            | 945    | 0                        | NR            |
| 430    | 214                      | NR            | 560    | 719                      | NR            | 690    | 218                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 339                      | NR            | 565    | 754                      | NR            | 695    | 188                      | NR            | 825    | 4                        | NR            | 955    | 0                        | NR            |
| 440    | 507                      | NR            | 570    | 791                      | NR            | 700    | 162                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 573                      | NR            | 575    | 830                      | NR            | 705    | 139                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 356                      | NR            | 580    | 873                      | NR            | 710    | 119                      | NR            | 840    | 3                        | NR            | 970    | 0                        | NR            |
| 455    | 217                      | NR            | 585    | 913                      | NR            | 715    | 102                      | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 168                      | NR            | 590    | 948                      | NR            | 720    | 88                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 113                      | NR            | 595    | 974                      | NR            | 725    | 76                       | NR            | 855    | 2                        | NR            | 985    | 0                        | NR            |
| 470    | 85                       | NR            | 600    | 994                      | NR            | 730    | 65                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 998                      | NR            | 735    | 55                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 94                       | NR            | 610    | 994                      | NR            | 740    | 47                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 120                      | NR            | 615    | 973                      | NR            | 745    | 41                       | NR            | 875    | 1                        | NR            |        |                          |               |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: NR**

**M/P: 2.32**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 940                      | NR            | 750    | 35                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 233                      | NR            | 625    | 897                      | NR            | 755    | 30                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 300                      | NR            | 630    | 847                      | NR            | 760    | 26                       | NR            | 890    | 1                        | NR            |
| 375    | 0                        | NR            | 505    | 372                      | NR            | 635    | 790                      | NR            | 765    | 22                       | NR            | 895    | 1                        | NR            |
| 380    | 0                        | NR            | 510    | 430                      | NR            | 640    | 730                      | NR            | 770    | 19                       | NR            | 900    | 1                        | NR            |
| 385    | 0                        | NR            | 515    | 483                      | NR            | 645    | 668                      | NR            | 775    | 16                       | NR            | 905    | 1                        | NR            |
| 390    | 0                        | NR            | 520    | 524                      | NR            | 650    | 605                      | NR            | 780    | 14                       | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 555                      | NR            | 655    | 545                      | NR            | 785    | 12                       | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 581                      | NR            | 660    | 485                      | NR            | 790    | 10                       | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 604                      | NR            | 665    | 430                      | NR            | 795    | 9                        | NR            | 925    | 0                        | NR            |
| 410    | 17                       | NR            | 540    | 623                      | NR            | 670    | 378                      | NR            | 800    | 8                        | NR            | 930    | 0                        | NR            |
| 415    | 34                       | NR            | 545    | 645                      | NR            | 675    | 331                      | NR            | 805    | 7                        | NR            | 935    | 0                        | NR            |
| 420    | 68                       | NR            | 550    | 667                      | NR            | 680    | 290                      | NR            | 810    | 6                        | NR            | 940    | 0                        | NR            |
| 425    | 128                      | NR            | 555    | 693                      | NR            | 685    | 251                      | NR            | 815    | 5                        | NR            | 945    | 0                        | NR            |
| 430    | 214                      | NR            | 560    | 719                      | NR            | 690    | 218                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 339                      | NR            | 565    | 754                      | NR            | 695    | 188                      | NR            | 825    | 4                        | NR            | 955    | 0                        | NR            |
| 440    | 507                      | NR            | 570    | 791                      | NR            | 700    | 162                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 573                      | NR            | 575    | 830                      | NR            | 705    | 139                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 356                      | NR            | 580    | 873                      | NR            | 710    | 119                      | NR            | 840    | 3                        | NR            | 970    | 0                        | NR            |
| 455    | 217                      | NR            | 585    | 913                      | NR            | 715    | 102                      | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 168                      | NR            | 590    | 948                      | NR            | 720    | 88                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 113                      | NR            | 595    | 974                      | NR            | 725    | 76                       | NR            | 855    | 2                        | NR            | 985    | 0                        | NR            |
| 470    | 85                       | NR            | 600    | 994                      | NR            | 730    | 65                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 998                      | NR            | 735    | 55                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 94                       | NR            | 610    | 994                      | NR            | 740    | 47                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 120                      | NR            | 615    | 973                      | NR            | 745    | 41                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 81.5$   
 $R_g = 99.2$   
 $CIE R_a = 81.0$   
 $R_9 = 7.1$



**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)