

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: P628658

Luminaire Tested: GWS-SA1A-722-U-T3R-W-GRSWH

Issue Date: 1/10/2023

### Test Information

Test Method: LM-79-2019  
Report Number: P628658  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-17)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA1A-722-U-T3R-W-GRSWH  
Description: GALLEON WALL SLIM LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE III ROADWAY OPTICS W/ FACTORY INSTALLED GLARE SHIELD, WH  
Light Source: (16) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: -

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 1836.5 lumens  
Efficiency: N/A  
Efficacy: 93.2 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G0

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



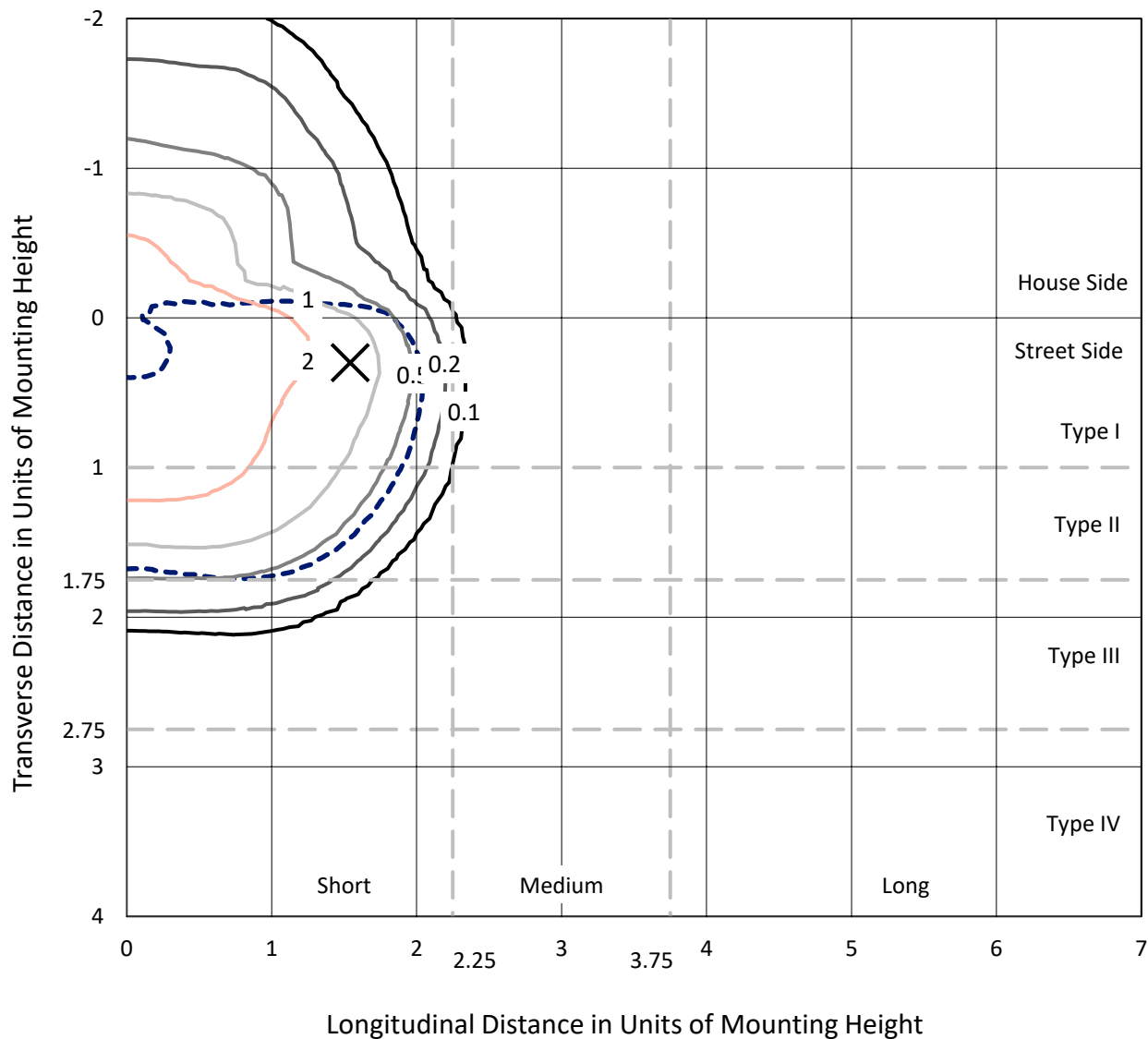
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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

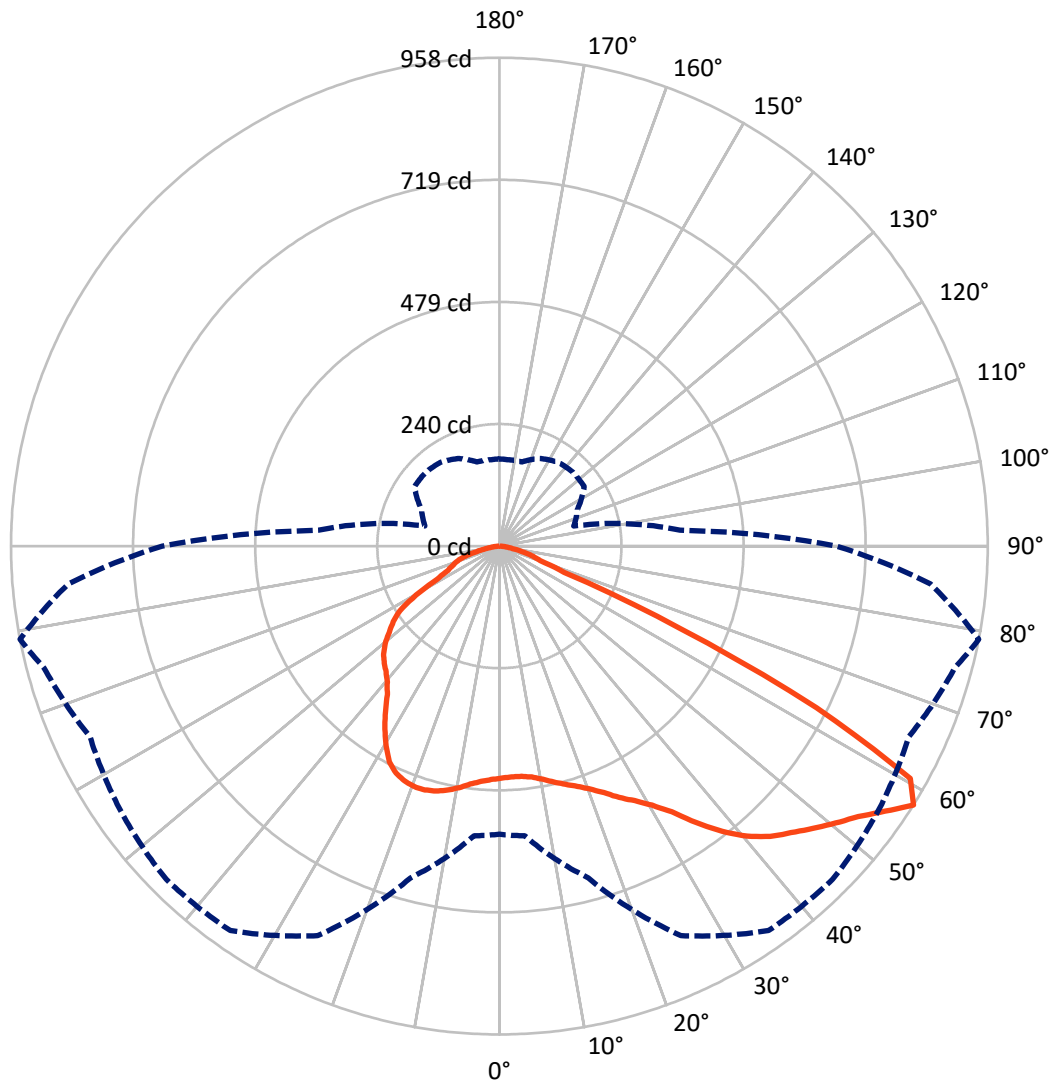


Based on 10 foot mounting height. Maximum calculated value = 4.6 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 79-Deg Lateral    - - - Horizontal Cone Through 57.5-Deg Vertical

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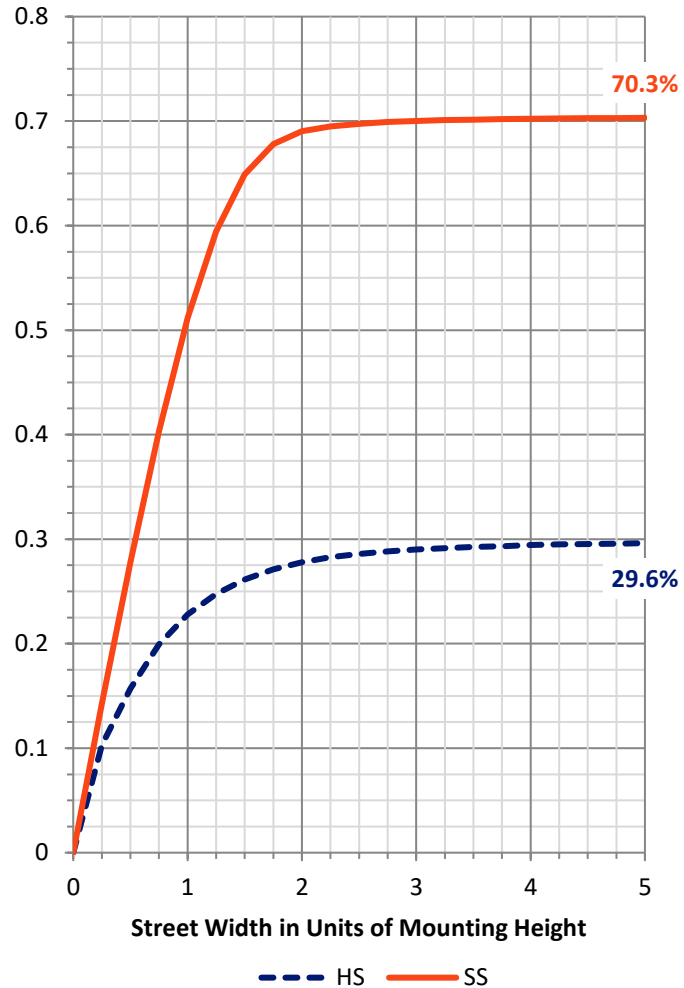
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 545.9    | 0.0    | 545.9  |
|                    | % Fixture | 29.7     | 0.0    | 29.7   |
| <b>Street Side</b> | Lumens    | 1290.6   | 0.0    | 1290.6 |
|                    | % Fixture | 70.3     | 0.0    | 70.3   |
| <b>Total</b>       | Lumens    | 1836.5   | 0.0    | 1836.5 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 42.1   | 2.3       |
| 10°-20°   | 117.1  | 6.4       |
| 20°-30°   | 198.5  | 10.8      |
| 30°-40°   | 303.9  | 16.5      |
| 40°-50°   | 405.2  | 22.1      |
| 50°-60°   | 468.0  | 25.5      |
| 60°-70°   | 243.2  | 13.2      |
| 70°-80°   | 51.7   | 2.8       |
| 80°-90°   | 6.7    | 0.4       |
| 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°    | 1836.5 | 100.0     |
| 0°-180°   | 1836.5 | 100.0     |

**Coefficient of Utilization**



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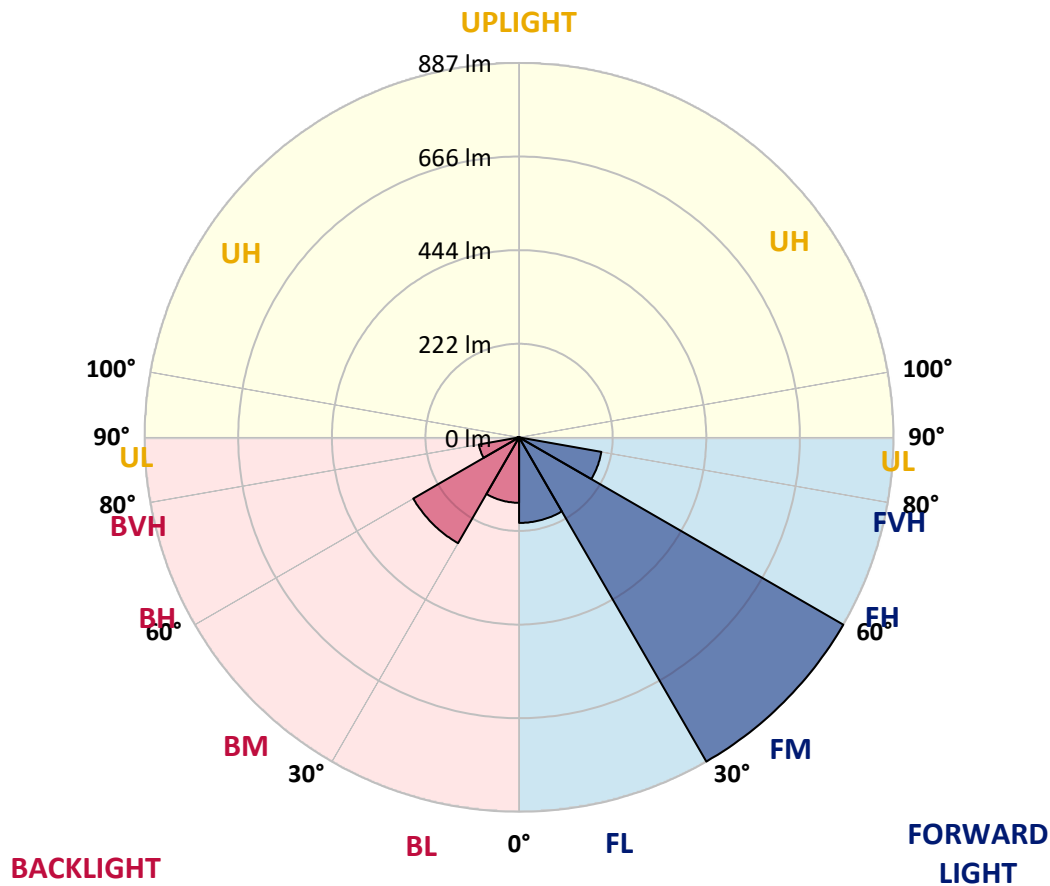
CATALOG NUMBER: GWS-SA1A-722-U-T3R-W-GRSWH

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|--------|-----------|-------------------------|------|--------|
|      |             |        |           | B                       | U    | G      |
| FL   | (0°-30°)    | 202.8  | 11.0      |                         |      |        |
| FM   | (30°-60°)   | 887.4  | 48.3      |                         |      |        |
| FH   | (60°-80°)   | 198.0  | 10.8      |                         |      | G0/660 |
| FVH  | (80°-90°)   | 2.3    | 0.1       |                         |      | G0/10  |
| BL   | (0°-30°)    | 155.0  | 8.4       | B1/500                  |      |        |
| BM   | (30°-60°)   | 289.7  | 15.8      | B1/1000                 |      |        |
| BH   | (60°-80°)   | 96.9   | 5.3       | B0/110                  |      | G0/110 |
| BVH  | (80°-90°)   | 4.4    | 0.2       |                         |      | G0/10  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |        |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |        |

**BUG Rating: B1-U0-G0**

Type II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 79°   | 85°   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 |
| 2.5°  | 434.4 | 433.5 | 433.8 | 435.0 | 439.5 | 442.8 | 446.3 | 449.4 | 452.4 | 453.3 | 454.1 |
| 5°    | 418.9 | 417.3 | 417.7 | 419.7 | 424.9 | 430.5 | 436.7 | 444.2 | 451.4 | 453.8 | 456.9 |
| 7.5°  | 408.0 | 407.7 | 408.4 | 411.4 | 417.0 | 422.2 | 430.2 | 440.9 | 453.3 | 457.4 | 462.9 |
| 10°   | 393.4 | 392.8 | 395.8 | 402.0 | 411.1 | 419.5 | 429.0 | 441.6 | 459.0 | 465.0 | 473.6 |
| 12.5° | 381.9 | 381.6 | 384.7 | 393.3 | 405.0 | 418.3 | 431.4 | 445.5 | 466.7 | 474.9 | 485.5 |
| 15°   | 388.6 | 387.3 | 387.4 | 393.4 | 403.9 | 419.7 | 437.4 | 452.6 | 474.3 | 484.9 | 498.4 |
| 17.5° | 408.3 | 405.9 | 404.1 | 405.1 | 411.1 | 427.5 | 446.6 | 462.0 | 483.2 | 495.5 | 512.0 |
| 20°   | 435.5 | 434.1 | 429.1 | 425.8 | 427.2 | 441.6 | 461.0 | 475.4 | 494.8 | 508.6 | 526.3 |
| 22.5° | 471.9 | 468.6 | 461.9 | 456.6 | 452.6 | 463.8 | 481.7 | 494.2 | 510.8 | 525.3 | 543.7 |
| 25°   | 517.1 | 512.3 | 501.7 | 493.4 | 484.7 | 496.3 | 512.2 | 521.6 | 532.9 | 546.3 | 563.8 |
| 27.5° | 563.2 | 559.2 | 547.3 | 536.2 | 525.4 | 532.6 | 551.5 | 556.9 | 555.7 | 565.5 | 580.5 |
| 30°   | 612.3 | 607.2 | 596.0 | 584.0 | 570.0 | 574.7 | 591.6 | 594.3 | 581.6 | 589.7 | 599.9 |
| 32.5° | 664.1 | 659.2 | 649.4 | 635.5 | 619.7 | 621.5 | 626.2 | 628.7 | 616.5 | 621.2 | 629.0 |
| 35°   | 716.9 | 712.2 | 702.3 | 688.5 | 676.9 | 665.9 | 654.2 | 664.4 | 657.4 | 666.4 | 665.8 |
| 37.5° | 765.1 | 760.4 | 754.2 | 743.6 | 723.8 | 702.1 | 675.1 | 687.7 | 698.7 | 710.1 | 708.1 |
| 40°   | 797.6 | 794.5 | 796.0 | 794.3 | 768.8 | 726.0 | 685.3 | 699.1 | 729.0 | 748.5 | 747.5 |
| 42.5° | 825.7 | 822.6 | 831.3 | 837.6 | 807.5 | 748.1 | 690.3 | 703.5 | 748.4 | 778.9 | 777.4 |
| 45°   | 838.2 | 837.3 | 851.7 | 871.7 | 843.0 | 771.5 | 703.0 | 712.5 | 763.1 | 802.1 | 796.4 |
| 47.5° | 823.3 | 826.5 | 854.8 | 888.6 | 872.4 | 799.3 | 729.2 | 731.6 | 782.3 | 827.4 | 811.3 |
| 50°   | 793.7 | 800.6 | 838.9 | 889.1 | 893.9 | 830.7 | 765.4 | 759.3 | 808.1 | 854.2 | 819.1 |
| 52.5° | 750.6 | 757.8 | 820.3 | 885.6 | 906.2 | 867.0 | 813.6 | 805.0 | 840.7 | 881.1 | 820.5 |
| 55°   | 651.7 | 661.4 | 777.7 | 877.8 | 918.2 | 900.0 | 867.9 | 850.5 | 882.8 | 918.1 | 833.8 |
| 57.5° | 565.3 | 570.4 | 673.8 | 843.1 | 920.6 | 924.4 | 906.7 | 885.9 | 924.5 | 958.0 | 848.8 |
| 60°   | 414.9 | 416.1 | 509.0 | 697.6 | 846.9 | 910.3 | 903.5 | 872.7 | 904.7 | 926.0 | 780.1 |
| 62.5° | 234.4 | 234.5 | 308.7 | 465.6 | 632.6 | 741.9 | 746.1 | 719.0 | 692.1 | 698.4 | 543.0 |
| 65°   | 88.0  | 96.3  | 141.0 | 228.8 | 364.7 | 438.0 | 455.4 | 461.7 | 417.0 | 389.2 | 291.2 |
| 67.5° | 58.9  | 60.8  | 82.3  | 117.7 | 162.3 | 187.4 | 209.6 | 210.2 | 153.8 | 137.1 | 114.7 |
| 70°   | 44.9  | 46.8  | 64.7  | 84.2  | 82.3  | 76.0  | 82.1  | 79.9  | 82.6  | 84.8  | 87.2  |
| 72.5° | 33.5  | 35.4  | 50.2  | 59.5  | 49.4  | 48.7  | 55.1  | 61.3  | 67.0  | 69.4  | 73.1  |
| 75°   | 22.2  | 23.7  | 33.8  | 31.8  | 27.3  | 32.3  | 40.2  | 46.4  | 49.7  | 52.6  | 55.4  |
| 77.5° | 14.1  | 15.2  | 18.0  | 14.6  | 15.2  | 18.9  | 23.4  | 29.0  | 32.1  | 35.0  | 36.5  |
| 80°   | 6.5   | 6.3   | 6.2   | 6.9   | 8.6   | 11.1  | 14.1  | 17.4  | 19.8  | 21.0  | 21.9  |
| 82.5° | 2.6   | 2.9   | 3.2   | 3.8   | 4.7   | 6.0   | 8.0   | 10.2  | 12.2  | 12.5  | 13.2  |
| 85°   | 1.1   | 1.2   | 1.4   | 1.7   | 2.1   | 2.7   | 3.3   | 4.7   | 5.9   | 6.3   | 6.8   |
| 87.5° | 0.0   | 0.0   | 0.0   | 0.0   | 0.2   | 0.3   | 0.5   | 0.8   | 1.4   | 1.5   | 1.7   |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 | 455.1 |
| 2.5°  | 458.1 | 456.2 | 459.5 | 461.7 | 463.8 | 461.6 | 460.8 | 458.9 | 458.6 | 458.6 | 459.6 |
| 5°    | 462.3 | 461.0 | 464.4 | 465.8 | 465.6 | 460.7 | 457.7 | 453.8 | 451.8 | 451.8 | 452.1 |
| 7.5°  | 469.8 | 469.1 | 471.0 | 468.9 | 464.1 | 454.1 | 444.2 | 435.9 | 430.4 | 427.5 | 428.4 |
| 10°   | 482.3 | 481.4 | 479.8 | 471.9 | 458.1 | 437.3 | 417.0 | 402.0 | 393.0 | 387.9 | 388.2 |
| 12.5° | 494.5 | 493.0 | 487.1 | 469.8 | 441.5 | 408.3 | 381.7 | 364.9 | 355.0 | 349.0 | 347.6 |
| 15°   | 507.8 | 503.9 | 491.3 | 459.0 | 414.3 | 372.8 | 345.1 | 326.9 | 316.2 | 312.6 | 312.5 |
| 17.5° | 520.6 | 513.7 | 490.9 | 439.8 | 381.7 | 335.8 | 307.8 | 296.6 | 294.8 | 296.4 | 296.9 |
| 20°   | 533.5 | 522.4 | 485.9 | 413.2 | 343.0 | 298.8 | 284.4 | 289.1 | 295.8 | 300.3 | 301.4 |
| 22.5° | 546.9 | 529.6 | 474.6 | 379.0 | 302.1 | 273.9 | 279.9 | 290.1 | 298.5 | 304.5 | 305.1 |
| 25°   | 561.9 | 536.4 | 457.8 | 337.1 | 269.4 | 267.0 | 278.8 | 289.7 | 298.7 | 305.6 | 306.8 |
| 27.5° | 570.4 | 536.5 | 434.3 | 294.0 | 254.4 | 264.3 | 276.3 | 286.5 | 295.5 | 303.0 | 304.4 |
| 30°   | 578.9 | 532.5 | 396.9 | 259.0 | 250.0 | 261.1 | 271.9 | 281.4 | 290.0 | 297.3 | 299.0 |
| 32.5° | 590.7 | 528.7 | 353.8 | 238.9 | 247.5 | 258.1 | 267.0 | 275.4 | 282.0 | 285.3 | 286.2 |
| 35°   | 605.4 | 523.9 | 308.0 | 230.2 | 245.8 | 255.7 | 263.5 | 268.0 | 259.5 | 257.7 | 259.6 |
| 37.5° | 626.0 | 519.4 | 262.3 | 226.4 | 244.8 | 254.8 | 261.7 | 250.2 | 239.7 | 235.4 | 236.9 |
| 40°   | 648.2 | 516.8 | 231.4 | 223.4 | 245.2 | 255.7 | 254.2 | 237.1 | 221.9 | 213.1 | 212.8 |
| 42.5° | 667.1 | 512.9 | 211.6 | 221.5 | 246.4 | 259.2 | 244.0 | 225.5 | 203.0 | 197.8 | 197.9 |
| 45°   | 679.9 | 503.0 | 201.1 | 219.4 | 247.5 | 259.9 | 239.2 | 209.6 | 193.6 | 190.2 | 190.1 |
| 47.5° | 685.2 | 485.0 | 194.3 | 216.1 | 247.3 | 253.8 | 229.4 | 203.0 | 186.9 | 186.0 | 186.6 |
| 50°   | 681.7 | 455.4 | 187.4 | 209.6 | 243.7 | 247.3 | 218.2 | 197.2 | 182.4 | 187.4 | 191.0 |
| 52.5° | 669.0 | 417.1 | 179.1 | 200.8 | 237.2 | 240.0 | 212.5 | 193.6 | 179.1 | 185.7 | 188.6 |
| 55°   | 665.6 | 386.1 | 168.6 | 189.2 | 227.6 | 226.9 | 206.5 | 191.8 | 176.9 | 174.3 | 174.8 |
| 57.5° | 661.3 | 355.7 | 151.2 | 168.5 | 203.3 | 204.5 | 200.8 | 189.6 | 171.0 | 170.3 | 171.0 |
| 60°   | 574.5 | 272.7 | 134.8 | 145.4 | 167.0 | 173.4 | 194.3 | 185.7 | 161.6 | 158.4 | 158.3 |
| 62.5° | 375.2 | 165.2 | 120.0 | 126.7 | 136.0 | 143.6 | 177.2 | 174.5 | 151.2 | 149.3 | 150.6 |
| 65°   | 201.8 | 117.7 | 109.2 | 113.2 | 118.3 | 124.0 | 146.9 | 155.4 | 136.6 | 129.7 | 129.9 |
| 67.5° | 103.2 | 100.2 | 101.1 | 103.9 | 107.8 | 110.7 | 118.5 | 126.0 | 116.5 | 110.7 | 110.5 |
| 70°   | 88.3  | 90.7  | 92.0  | 93.7  | 96.3  | 95.8  | 96.6  | 97.9  | 97.2  | 94.3  | 94.1  |
| 72.5° | 75.2  | 79.0  | 79.3  | 79.6  | 80.5  | 78.4  | 77.0  | 74.8  | 74.9  | 75.4  | 75.5  |
| 75°   | 57.2  | 60.8  | 61.7  | 61.3  | 62.2  | 59.5  | 57.7  | 55.4  | 52.7  | 52.3  | 52.6  |
| 77.5° | 37.2  | 40.1  | 41.4  | 41.1  | 41.6  | 39.5  | 38.6  | 36.2  | 33.0  | 31.8  | 31.8  |
| 80°   | 22.5  | 24.2  | 25.2  | 25.5  | 26.0  | 24.5  | 23.0  | 20.9  | 19.5  | 18.2  | 18.2  |
| 82.5° | 13.7  | 14.7  | 15.5  | 15.5  | 15.9  | 14.3  | 13.1  | 11.6  | 11.0  | 9.8   | 9.8   |
| 85°   | 6.9   | 7.7   | 8.0   | 7.8   | 7.5   | 6.2   | 5.7   | 5.0   | 4.7   | 4.1   | 4.1   |
| 87.5° | 1.7   | 2.1   | 2.1   | 1.5   | 1.5   | 0.8   | 0.5   | 0.2   | 0.0   | 0.0   | 0.0   |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-10-R4

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

Data in this report applies to families of products SA1C-722-U-5WQ.

### Test Information

Test Method: LM-79-2008 Report  
 Number: SP1-1908-441-10-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-722-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2237    | CRI (Ra): | 72.0 |      |       |
| CIE u':                   | 0.2876  | R1:       | 68.9 | R9:  | -17.4 |
| CIE v':                   | 0.5346  | R2:       | 83.0 | R10: | 61.3  |
| Duv:                      | -0.0006 | R3:       | 95.2 | R11: | 59.8  |
| CIE x:                    | 0.5005  | R4:       | 66.2 | R12: | 50.5  |
| CIE y:                    | 0.4134  | R5:       | 65.9 | R13: | 71.1  |
| CIE z:                    | 0.0860  | R6:       | 76.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 603     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.8 |      |       |
| Purity:                   | 74.5    |           |      |      |       |
| Rf:                       | 69.8    |           |      |      |       |
| Rg:                       | 99.2    |           |      |      |       |



### Test Conditions

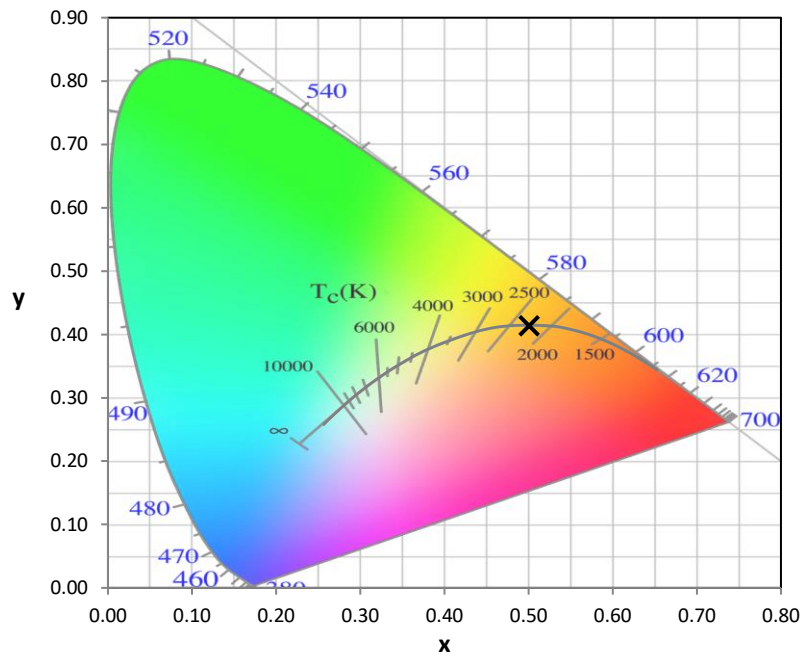
Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

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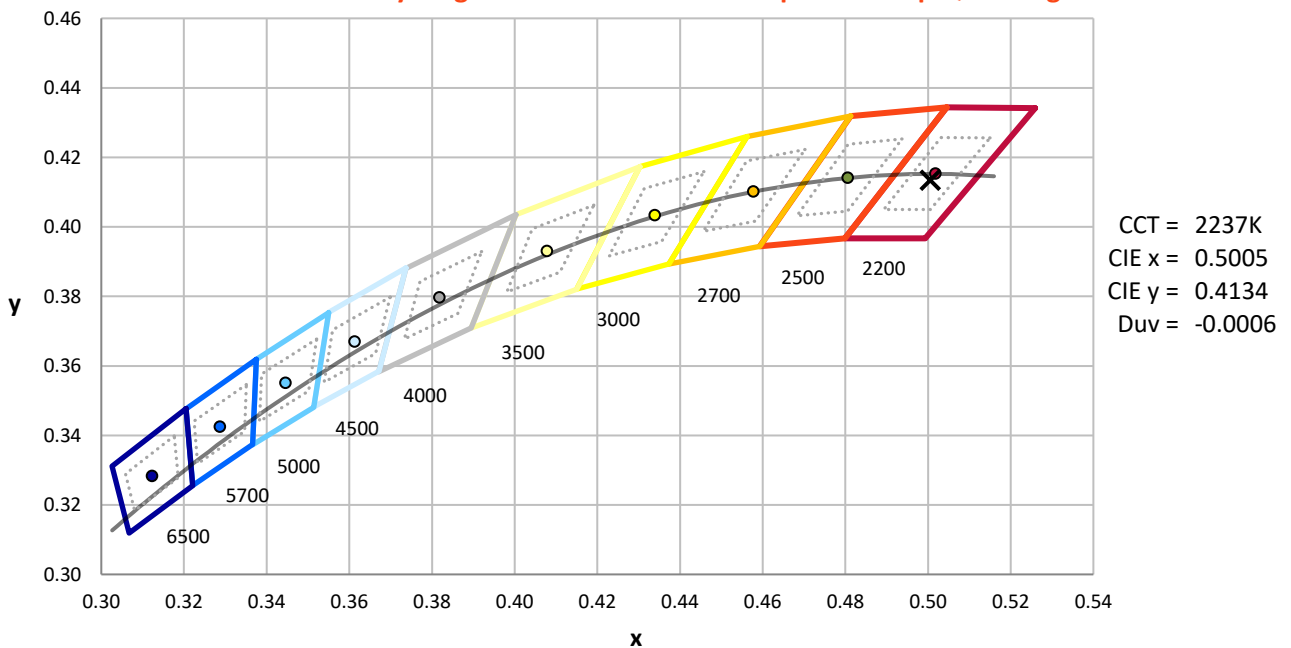
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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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 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 4696.9

S/P: 0.85

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1470.8 M/P: 0.27**

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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### Summary

$R_f = 69.8$   
 $R_g = 99.2$   
 CIE  $R_a = 72.0$   
 $R_g = -17.4$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 78 | CES79 = 84 |
| CES05 = 52 | CES30 = 48 | CES55 = 75 | CES80 = 84 |
| CES06 = 52 | CES31 = 51 | CES56 = 65 | CES81 = 63 |
| CES07 = 44 | CES32 = 51 | CES57 = 62 | CES82 = 92 |
| CES08 = 42 | CES33 = 53 | CES58 = 66 | CES83 = 83 |
| CES09 = 29 | CES34 = 70 | CES59 = 84 | CES84 = 92 |
| CES10 = 78 | CES35 = 85 | CES60 = 90 | CES85 = 81 |
| CES11 = 61 | CES36 = 78 | CES61 = 84 | CES86 = 56 |
| CES12 = 68 | CES37 = 80 | CES62 = 70 | CES87 = 78 |
| CES13 = 45 | CES38 = 53 | CES63 = 68 | CES88 = 72 |
| CES14 = 75 | CES39 = 90 | CES64 = 69 | CES89 = 62 |
| CES15 = 72 | CES40 = 84 | CES65 = 67 | CES90 = 67 |
| CES16 = 49 | CES41 = 75 | CES66 = 64 | CES91 = 90 |
| CES17 = 51 | CES42 = 79 | CES67 = 63 | CES92 = 67 |
| CES18 = 57 | CES43 = 64 | CES68 = 69 | CES93 = 79 |
| CES19 = 74 | CES44 = 98 | CES69 = 80 | CES94 = 52 |
| CES20 = 68 | CES45 = 73 | CES70 = 63 | CES95 = 76 |
| CES21 = 89 | CES46 = 67 | CES71 = 63 | CES96 = 78 |
| CES22 = 81 | CES47 = 60 | CES72 = 87 | CES97 = 77 |
| CES23 = 92 | CES48 = 48 | CES73 = 56 | CES98 = 71 |
| CES24 = 92 | CES49 = 64 | CES74 = 87 | CES99 = 65 |
| CES25 = 74 | CES50 = 74 | CES75 = 66 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)