

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: P636567

Luminaire Tested: GWS-SA4B-722-U-T2R-W-GRSBK

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P636567  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-12)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA4B-722-U-T2R-W-GRSBK  
Description: GALLEON WALL SLIM LUMINAIRE. (4) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE II ROADWAY OPTICS W/ FACTORY INSTALLED GLARE SHIELD, BK  
Light Source: (64) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 7147 lumens  
Efficiency: N/A  
Efficacy: 75.7 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G0

Input Watts (W): 94.4  
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



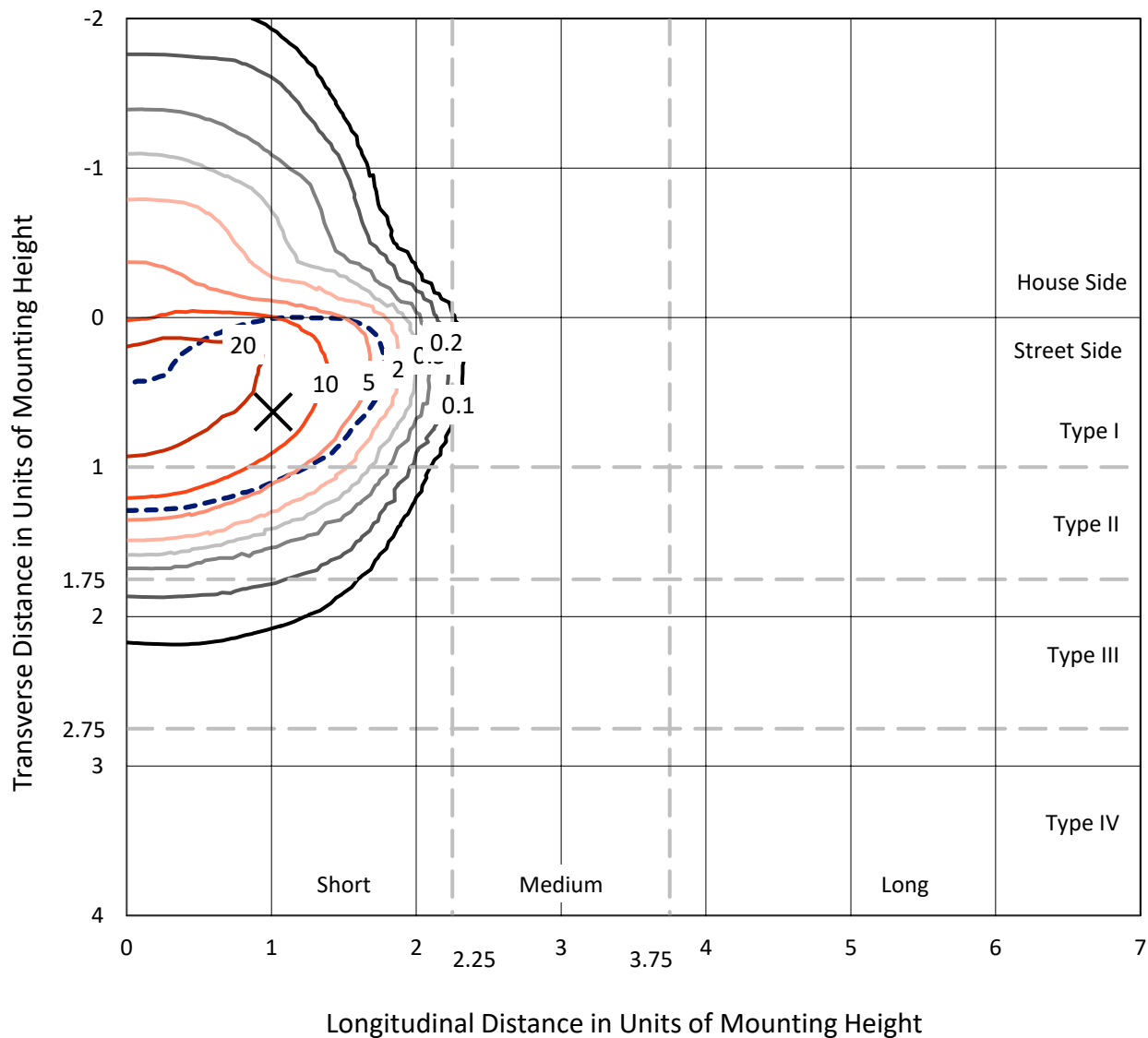
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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

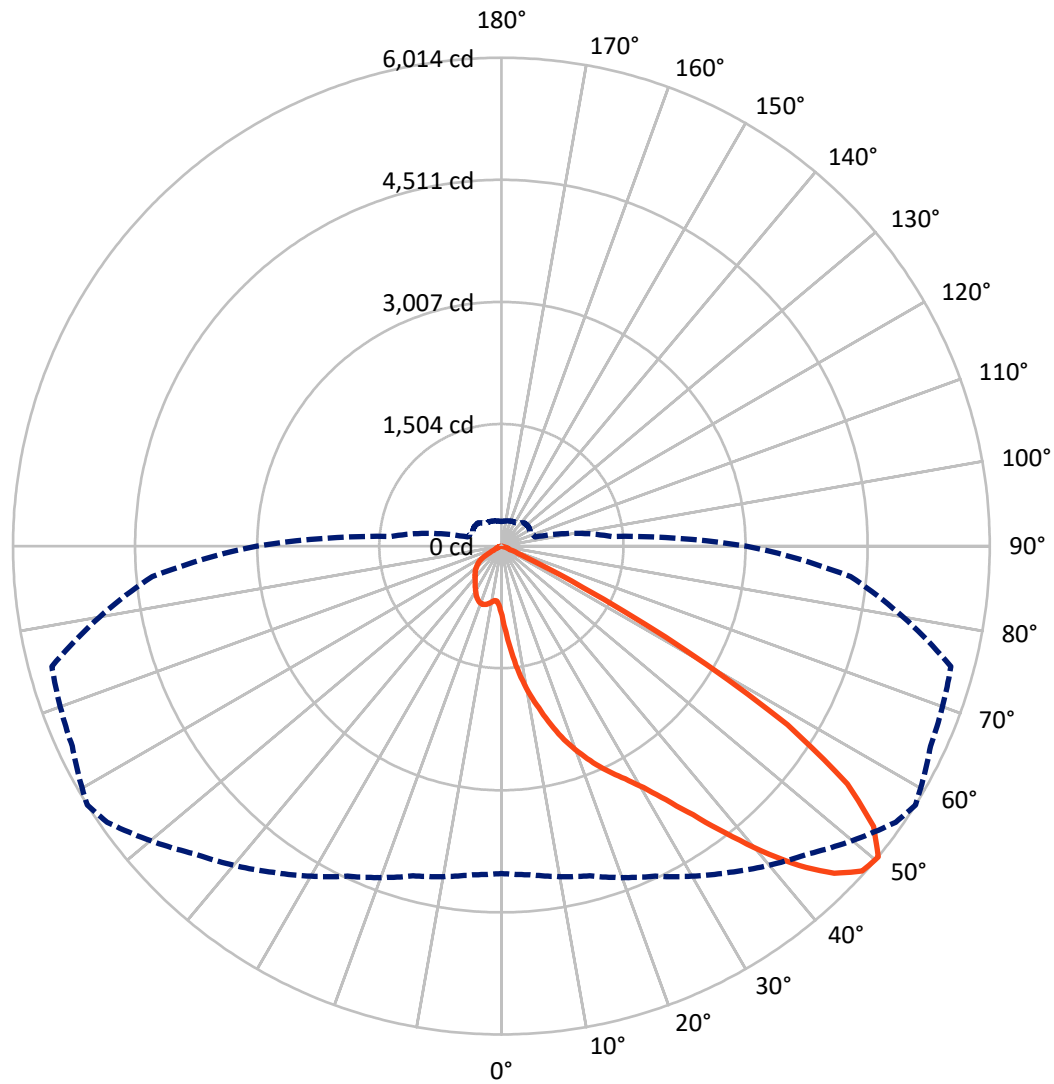


Based on 10 foot mounting height. Maximum calculated value = 26.2 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 58-Deg Lateral    - - - Horizontal Cone Through 50-Deg Vertical

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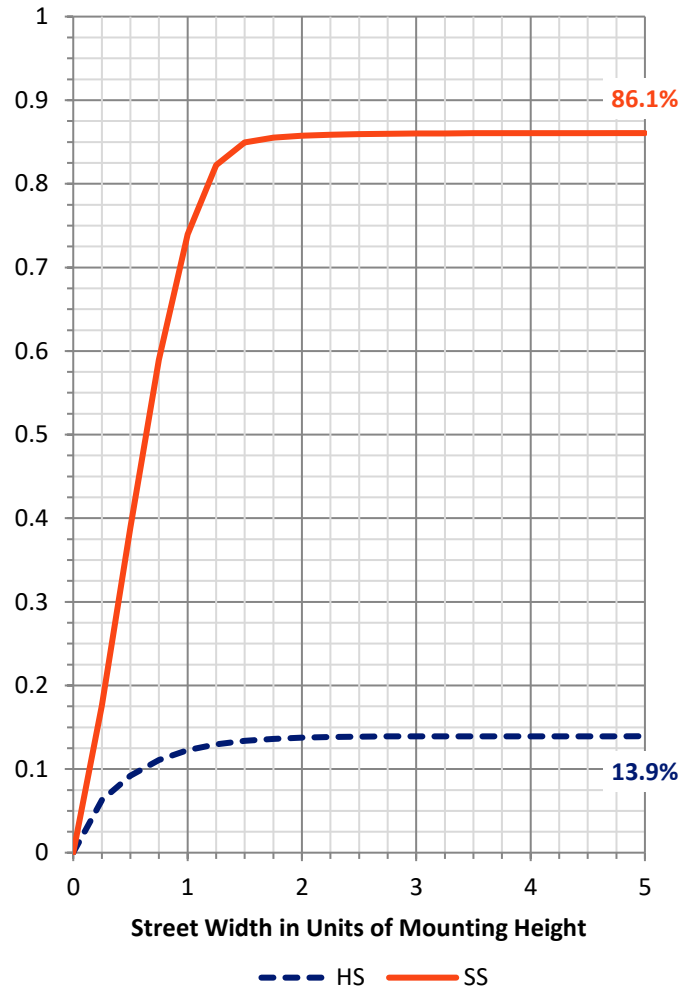
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1001.0   | 0.0    | 1001.0 |
|                    | % Fixture | 14.0     | 0.0    | 14.0   |
| <b>Street Side</b> | Lumens    | 6146.0   | 0.0    | 6146.0 |
|                    | % Fixture | 86.0     | 0.0    | 86.0   |
| <b>Total</b>       | Lumens    | 7147.0   | 0.0    | 7147.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 105.8  | 1.5       |
| 10°-20°   | 418.7  | 5.9       |
| 20°-30°   | 847.2  | 11.9      |
| 30°-40°   | 1498.8 | 21.0      |
| 40°-50°   | 2184.9 | 30.6      |
| 50°-60°   | 1751.3 | 24.5      |
| 60°-70°   | 315.5  | 4.4       |
| 70°-80°   | 24.9   | 0.3       |
| 80°-90°   | 0.0    | 0.0       |
| 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°    | 7147.0 | 100.0     |
| 0°-180°   | 7147.0 | 100.0     |

**Coefficient of Utilization**



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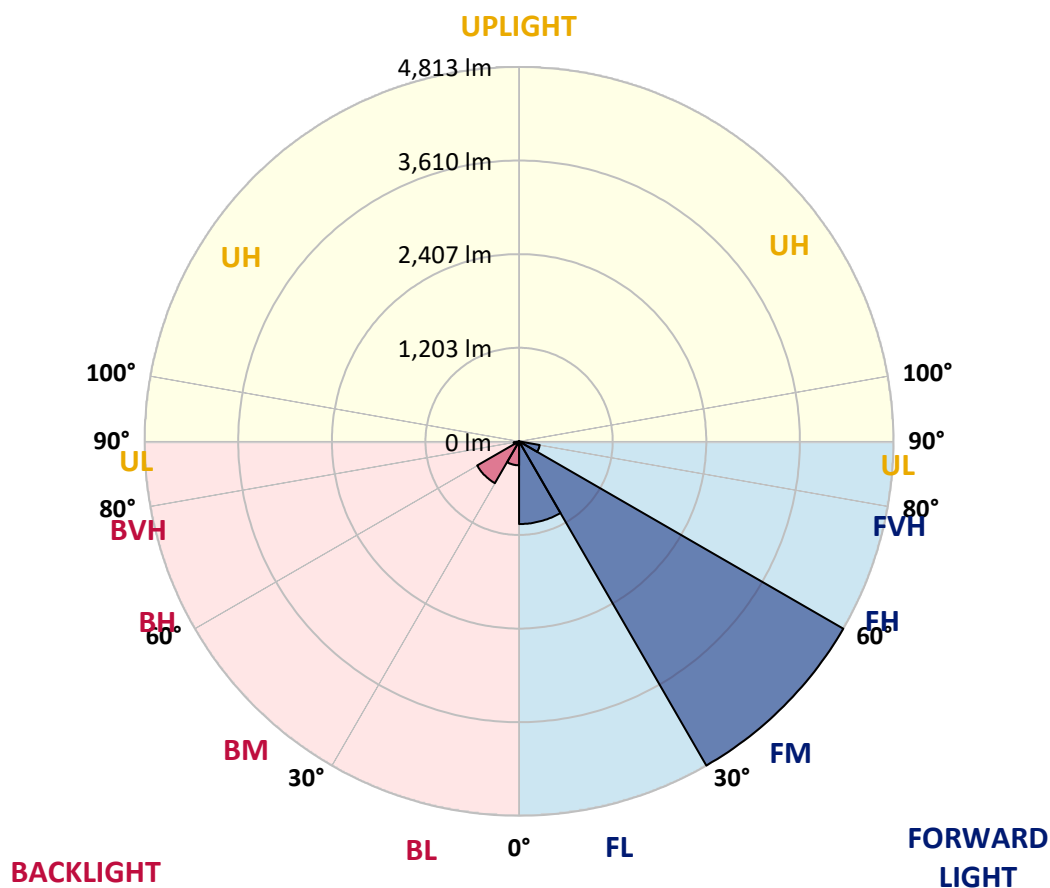
CATALOG NUMBER: GWS-SA4B-722-U-T2R-W-GRSBK

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|--------|-----------|-------------------------|------|--------|
|      |             |        |           | B                       | U    | G      |
| FL   | (0°-30°)    | 1063.5 | 14.9      |                         |      |        |
| FM   | (30°-60°)   | 4813.3 | 67.3      |                         |      |        |
| FH   | (60°-80°)   | 269.2  | 3.8       |                         |      | G0/660 |
| FVH  | (80°-90°)   | 0.0    | 0.0       |                         |      | G0/10  |
| BL   | (0°-30°)    | 308.2  | 4.3       | B1/500                  |      |        |
| BM   | (30°-60°)   | 621.7  | 8.7       | B1/1000                 |      |        |
| BH   | (60°-80°)   | 71.1   | 1.0       | B0/110                  |      | G0/110 |
| BVH  | (80°-90°)   | 0.0    | 0.0       |                         |      | G0/10  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |        |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |        |

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

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 58°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 853.7  | 853.7  | 853.7  | 853.7  | 853.7  | 853.7  | 853.7  | 853.7  | 853.7  | 853.7  | 853.7  |
| 2.5°  | 1263.3 | 1243.5 | 1232.0 | 1222.8 | 1182.3 | 1118.1 | 1076.1 | 1053.9 | 1017.3 | 955.3  | 901.8  |
| 5°    | 1648.5 | 1634.0 | 1607.3 | 1588.9 | 1537.0 | 1446.0 | 1352.0 | 1314.6 | 1231.2 | 1091.4 | 966.0  |
| 7.5°  | 1903.8 | 1893.1 | 1883.2 | 1858.7 | 1809.8 | 1727.3 | 1623.3 | 1584.3 | 1455.9 | 1257.2 | 1051.6 |
| 10°   | 2100.2 | 2091.8 | 2080.4 | 2079.6 | 2041.4 | 1967.2 | 1865.6 | 1825.1 | 1686.0 | 1437.6 | 1152.5 |
| 12.5° | 2273.0 | 2266.1 | 2263.8 | 2285.2 | 2260.7 | 2205.7 | 2095.6 | 2045.2 | 1897.7 | 1621.8 | 1264.1 |
| 15°   | 2391.4 | 2389.9 | 2399.8 | 2441.9 | 2455.6 | 2430.4 | 2337.9 | 2283.7 | 2114.0 | 1806.7 | 1387.2 |
| 17.5° | 2445.7 | 2450.3 | 2469.4 | 2542.0 | 2603.1 | 2624.5 | 2553.4 | 2507.6 | 2328.8 | 1994.0 | 1518.6 |
| 20°   | 2538.2 | 2536.6 | 2548.1 | 2616.9 | 2691.8 | 2768.2 | 2746.8 | 2707.8 | 2545.8 | 2191.9 | 1664.6 |
| 22.5° | 2798.8 | 2776.6 | 2752.2 | 2762.9 | 2789.6 | 2879.0 | 2918.8 | 2898.9 | 2769.7 | 2395.2 | 1815.2 |
| 25°   | 3199.3 | 3176.3 | 3097.6 | 3021.2 | 2970.7 | 3011.2 | 3065.5 | 3075.4 | 2992.1 | 2603.9 | 1972.6 |
| 27.5° | 3624.2 | 3603.6 | 3514.9 | 3400.3 | 3255.8 | 3185.5 | 3226.0 | 3245.9 | 3210.7 | 2852.3 | 2140.0 |
| 30°   | 4022.4 | 3994.9 | 3897.8 | 3755.7 | 3588.3 | 3480.5 | 3434.7 | 3448.4 | 3469.1 | 3146.5 | 2336.4 |
| 32.5° | 4367.8 | 4347.2 | 4231.0 | 4081.2 | 3920.0 | 3807.6 | 3700.6 | 3723.6 | 3774.0 | 3506.5 | 2587.8 |
| 35°   | 4660.6 | 4649.9 | 4526.8 | 4377.8 | 4207.3 | 4150.0 | 4058.3 | 4062.9 | 4113.3 | 3941.4 | 2894.3 |
| 37.5° | 4915.1 | 4896.7 | 4785.1 | 4646.8 | 4511.5 | 4502.4 | 4477.1 | 4479.4 | 4505.4 | 4448.1 | 3246.6 |
| 40°   | 5075.6 | 5058.7 | 4979.3 | 4893.7 | 4797.4 | 4798.9 | 4929.6 | 4939.5 | 4909.7 | 4945.6 | 3618.8 |
| 42.5° | 5135.9 | 5123.7 | 5080.9 | 5081.7 | 5071.7 | 5116.8 | 5362.2 | 5380.5 | 5273.5 | 5336.2 | 3936.8 |
| 45°   | 5031.2 | 5025.9 | 5028.9 | 5139.0 | 5258.2 | 5397.3 | 5716.0 | 5748.1 | 5596.8 | 5595.3 | 4185.2 |
| 47.5° | 4693.4 | 4682.7 | 4772.1 | 4959.4 | 5235.3 | 5505.8 | 5930.0 | 5979.7 | 5823.0 | 5743.5 | 4341.1 |
| 50°   | 4031.6 | 4062.1 | 4203.5 | 4484.8 | 4904.4 | 5356.8 | 5927.7 | 6014.1 | 5831.4 | 5730.5 | 4315.1 |
| 52.5° | 2920.3 | 2914.2 | 3223.7 | 3610.4 | 4121.0 | 4879.9 | 5612.8 | 5739.0 | 5627.4 | 5602.9 | 4257.0 |
| 55°   | 1588.9 | 1644.7 | 1853.4 | 2365.4 | 3002.8 | 3977.3 | 4893.7 | 5168.8 | 5298.0 | 5556.3 | 4361.7 |
| 57.5° | 583.9  | 608.4  | 739.1  | 1101.3 | 1589.7 | 2473.2 | 3738.1 | 4153.1 | 4552.0 | 5426.4 | 4344.1 |
| 60°   | 235.4  | 240.0  | 292.0  | 405.1  | 668.0  | 1258.8 | 2242.4 | 2610.8 | 2986.8 | 4153.8 | 3333.8 |
| 62.5° | 171.2  | 177.3  | 197.9  | 236.9  | 337.8  | 550.3  | 966.8  | 1124.3 | 1229.0 | 2057.4 | 1642.4 |
| 65°   | 138.3  | 142.9  | 159.7  | 177.3  | 223.2  | 295.8  | 311.8  | 300.4  | 298.8  | 531.9  | 376.8  |
| 67.5° | 114.6  | 119.2  | 131.5  | 143.7  | 160.5  | 147.5  | 107.0  | 112.3  | 91.7   | 90.9   | 74.1   |
| 70°   | 84.1   | 89.4   | 101.6  | 114.6  | 96.3   | 39.7   | 61.9   | 91.7   | 69.5   | 58.1   | 56.6   |
| 72.5° | 63.4   | 67.3   | 78.7   | 74.9   | 28.3   | 15.3   | 41.3   | 66.5   | 53.5   | 42.8   | 42.0   |
| 75°   | 47.4   | 49.7   | 39.7   | 12.2   | 3.1    | 3.8    | 15.3   | 27.5   | 29.8   | 24.5   | 24.5   |
| 77.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 1.5    | 2.3    | 3.1    | 3.8    | 4.6    |
| 80°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 853.7  | 853.7  | 853.7 | 853.7 | 853.7 | 853.7 | 853.7 | 853.7 | 853.7 | 853.7 | 853.7 |
| 2.5°  | 871.3  | 839.2  | 793.3 | 755.1 | 726.1 | 697.8 | 676.4 | 655.0 | 654.2 | 643.5 | 641.2 |
| 5°    | 908.0  | 849.9  | 765.8 | 705.4 | 668.7 | 646.6 | 631.3 | 623.6 | 619.8 | 616.0 | 614.5 |
| 7.5°  | 960.7  | 877.4  | 761.2 | 697.0 | 666.4 | 651.9 | 641.2 | 636.6 | 634.3 | 631.3 | 630.5 |
| 10°   | 1025.7 | 917.1  | 778.0 | 713.1 | 686.3 | 672.6 | 661.1 | 654.2 | 650.4 | 645.0 | 643.5 |
| 12.5° | 1103.6 | 966.0  | 804.8 | 739.8 | 711.5 | 693.2 | 677.9 | 668.0 | 662.6 | 655.7 | 654.2 |
| 15°   | 1187.7 | 1018.8 | 834.6 | 764.3 | 730.6 | 707.0 | 687.8 | 672.6 | 662.6 | 654.2 | 651.9 |
| 17.5° | 1274.8 | 1072.3 | 861.3 | 781.1 | 739.8 | 711.5 | 684.0 | 663.4 | 651.2 | 640.5 | 637.4 |
| 20°   | 1372.6 | 1127.3 | 878.9 | 784.1 | 736.8 | 699.3 | 667.2 | 641.2 | 629.0 | 614.5 | 611.4 |
| 22.5° | 1475.1 | 1178.5 | 886.6 | 777.3 | 719.9 | 676.4 | 642.0 | 615.2 | 597.7 | 582.4 | 577.8 |
| 25°   | 1574.4 | 1224.4 | 882.7 | 758.2 | 694.7 | 644.3 | 609.1 | 581.6 | 562.5 | 547.2 | 543.4 |
| 27.5° | 1679.9 | 1262.6 | 869.0 | 729.9 | 660.3 | 609.1 | 575.5 | 551.8 | 534.2 | 517.4 | 513.6 |
| 30°   | 1798.3 | 1297.7 | 846.8 | 695.5 | 619.8 | 573.2 | 547.2 | 531.2 | 512.1 | 494.5 | 489.1 |
| 32.5° | 1941.3 | 1329.1 | 814.7 | 654.2 | 583.9 | 541.9 | 527.4 | 515.1 | 493.0 | 474.6 | 470.8 |
| 35°   | 2104.8 | 1355.1 | 774.2 | 611.4 | 548.8 | 522.0 | 518.9 | 502.9 | 473.9 | 452.5 | 447.9 |
| 37.5° | 2294.4 | 1380.3 | 726.1 | 569.4 | 522.8 | 512.8 | 513.6 | 486.1 | 450.9 | 424.9 | 421.9 |
| 40°   | 2498.4 | 1405.5 | 672.6 | 532.7 | 499.1 | 507.5 | 500.6 | 461.6 | 404.3 | 379.1 | 376.0 |
| 42.5° | 2710.9 | 1433.0 | 618.3 | 498.3 | 479.2 | 486.8 | 476.9 | 412.7 | 371.4 | 358.4 | 356.9 |
| 45°   | 2902.7 | 1465.9 | 559.5 | 463.9 | 459.3 | 457.0 | 440.2 | 373.7 | 356.2 | 347.0 | 346.2 |
| 47.5° | 3041.1 | 1460.5 | 496.8 | 431.1 | 437.9 | 430.3 | 379.1 | 355.4 | 340.9 | 328.6 | 325.6 |
| 50°   | 3015.8 | 1367.3 | 431.8 | 394.4 | 410.4 | 403.5 | 340.9 | 334.0 | 321.0 | 308.0 | 303.4 |
| 52.5° | 2951.6 | 1240.4 | 375.3 | 355.4 | 380.6 | 364.6 | 314.9 | 308.0 | 296.5 | 279.7 | 274.4 |
| 55°   | 2986.0 | 1121.2 | 330.9 | 324.1 | 350.0 | 301.9 | 285.8 | 275.1 | 262.9 | 244.6 | 242.3 |
| 57.5° | 2875.2 | 914.8  | 266.0 | 270.6 | 309.5 | 257.6 | 250.7 | 233.9 | 213.2 | 201.0 | 199.5 |
| 60°   | 1990.2 | 491.4  | 166.6 | 172.0 | 223.9 | 216.3 | 224.7 | 209.4 | 184.2 | 172.7 | 170.4 |
| 62.5° | 914.1  | 197.2  | 90.9  | 87.1  | 117.7 | 146.7 | 192.6 | 191.1 | 159.7 | 141.4 | 139.9 |
| 65°   | 221.6  | 90.2   | 65.0  | 61.1  | 66.5  | 87.9  | 125.3 | 150.6 | 129.2 | 107.8 | 105.5 |
| 67.5° | 71.8   | 73.4   | 59.6  | 55.8  | 58.8  | 65.7  | 74.9  | 83.3  | 82.5  | 75.7  | 74.1  |
| 70°   | 57.3   | 66.5   | 55.0  | 50.4  | 50.4  | 52.7  | 50.4  | 40.5  | 35.2  | 38.2  | 39.7  |
| 72.5° | 42.8   | 50.4   | 43.6  | 39.0  | 37.4  | 36.7  | 31.3  | 22.9  | 16.0  | 14.5  | 13.8  |
| 75°   | 25.2   | 28.3   | 26.7  | 22.9  | 21.4  | 19.1  | 15.3  | 9.9   | 5.3   | 3.8   | 2.3   |
| 77.5° | 4.6    | 5.3    | 6.1   | 4.6   | 3.8   | 3.1   | 2.3   | 0.8   | 0.0   | 0.0   | 0.0   |
| 80°   | 0.0    | 0.8    | 0.8   | 0.8   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 82.5° | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 90°   | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



LM-79-2008: 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

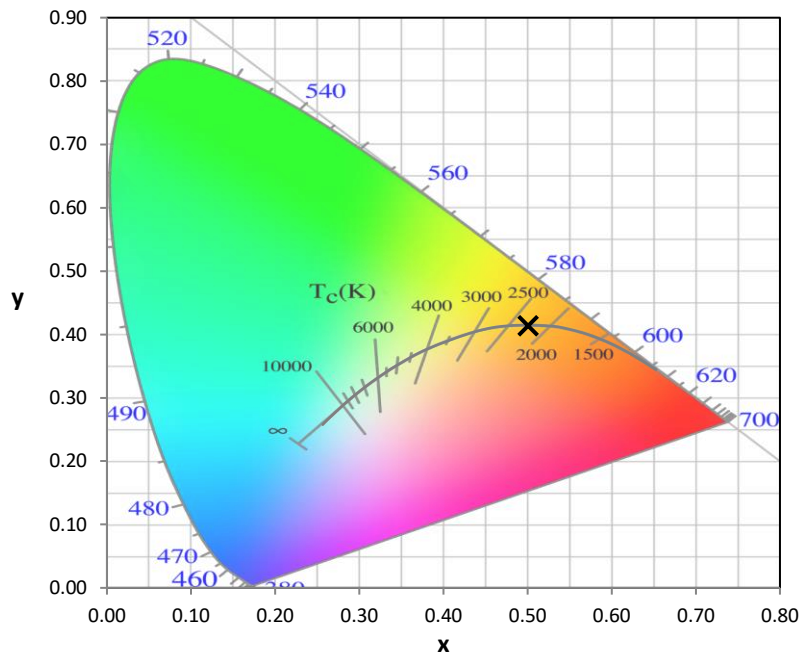
Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

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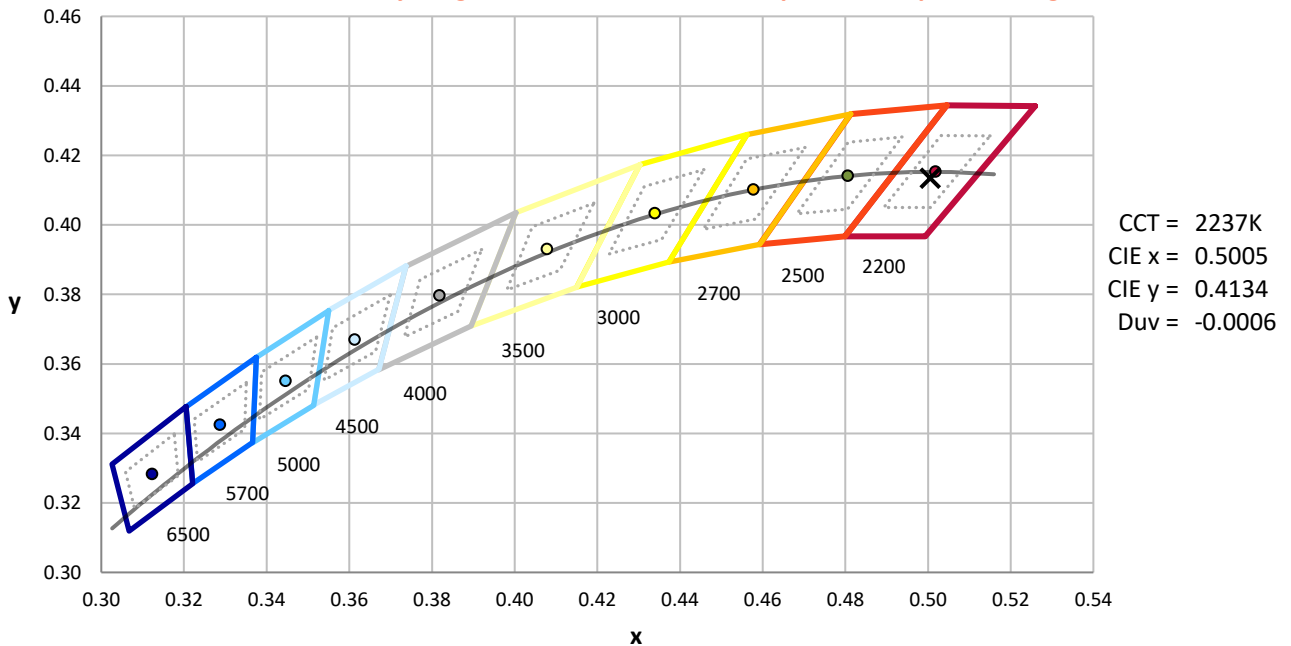
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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**



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| 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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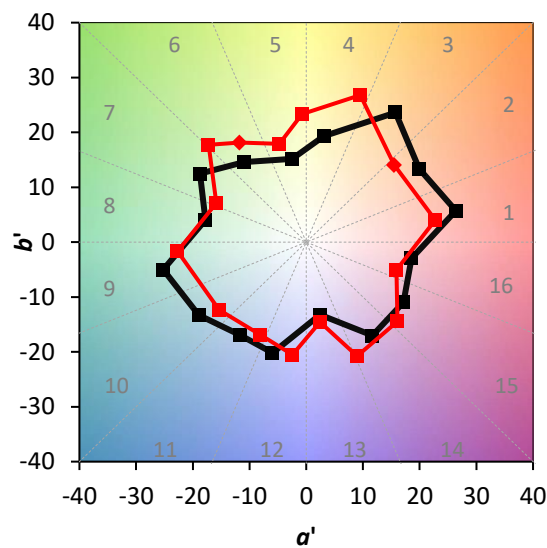
**TM-30-18**

### 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 ( $R_{f,i}$ )**

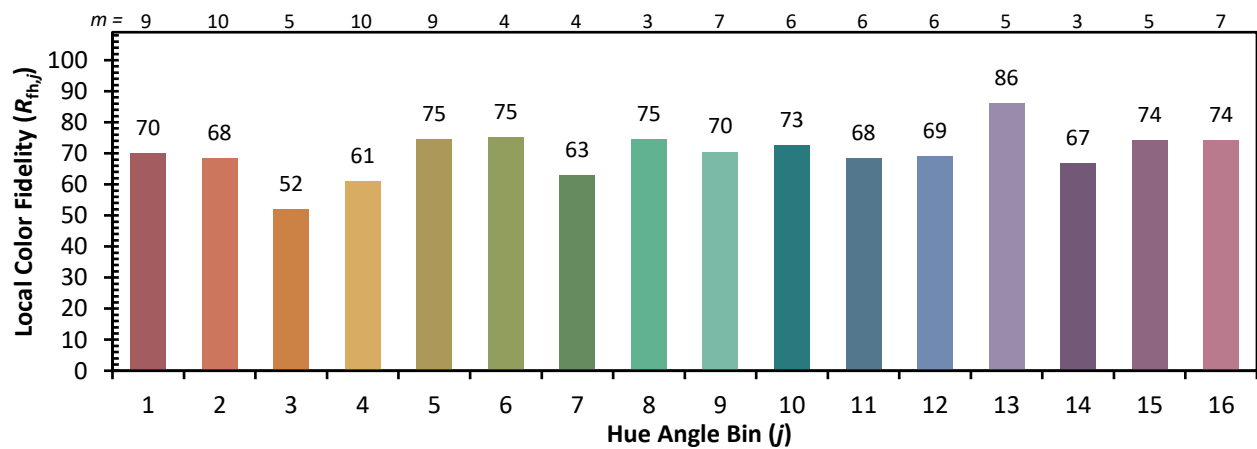
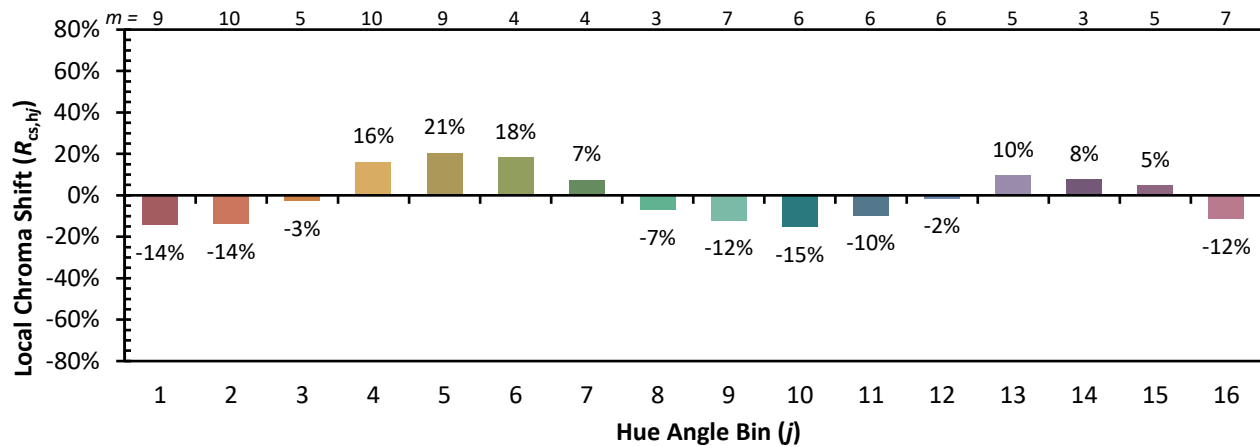
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 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)