

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: P638382

Luminaire Tested: GWS-SA4E-760-U-T2R-W-GRSBK

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P638382  
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-SA4E-760-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) 5700K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 20696.9 lumens  
Efficiency: N/A  
Efficacy: 102.2 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G1

Input Watts (W): 202.6  
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

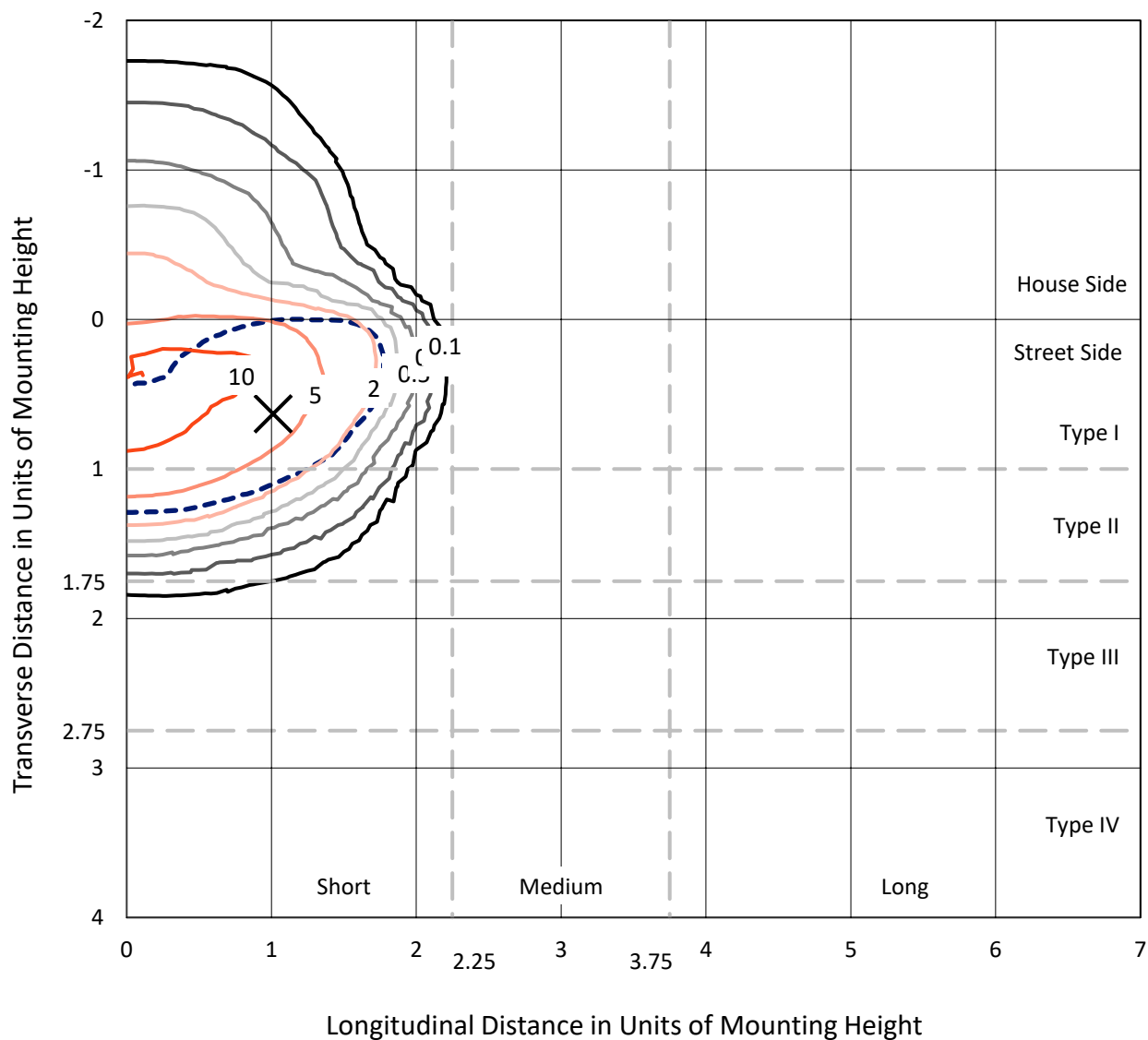


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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

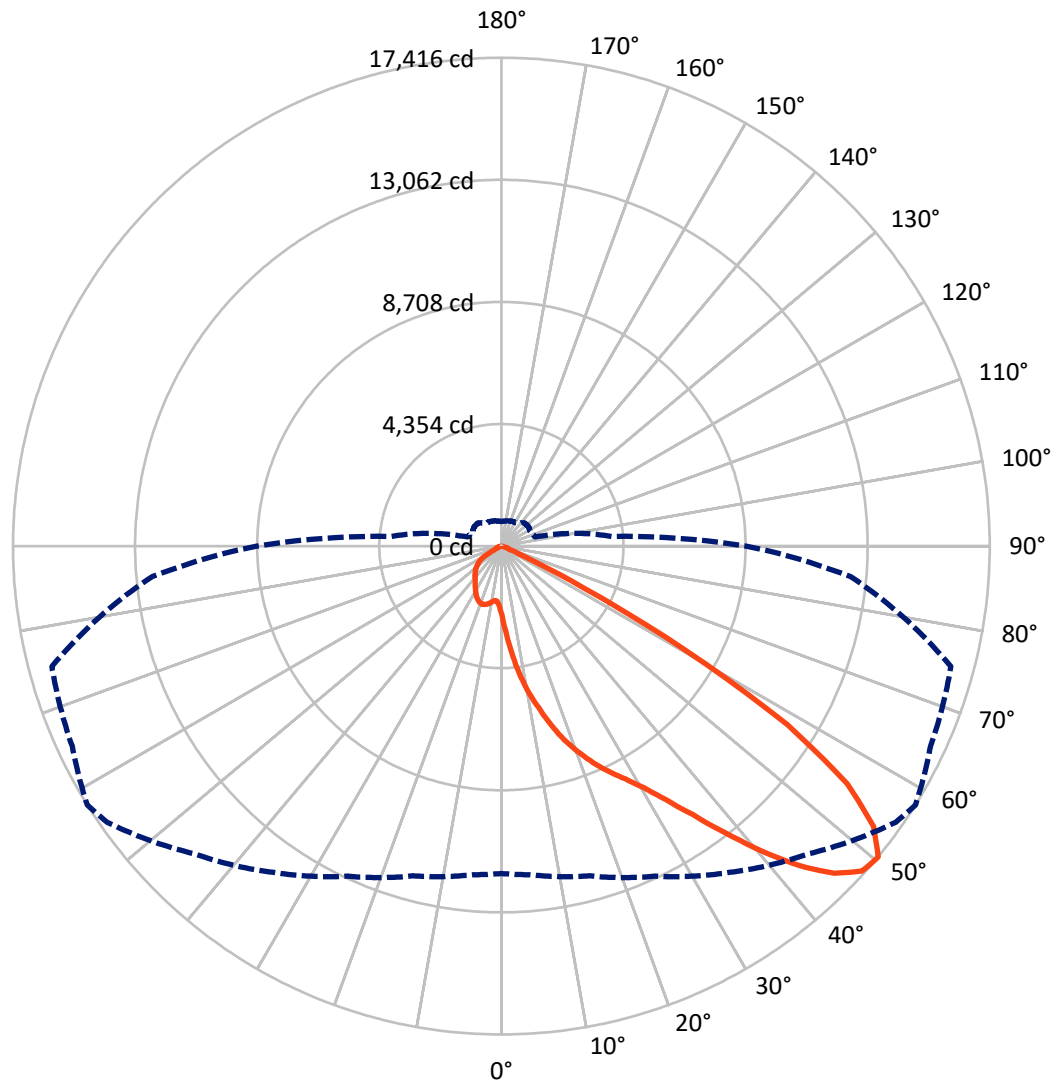


Based on 25 foot mounting height. Maximum calculated value = 12.1 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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

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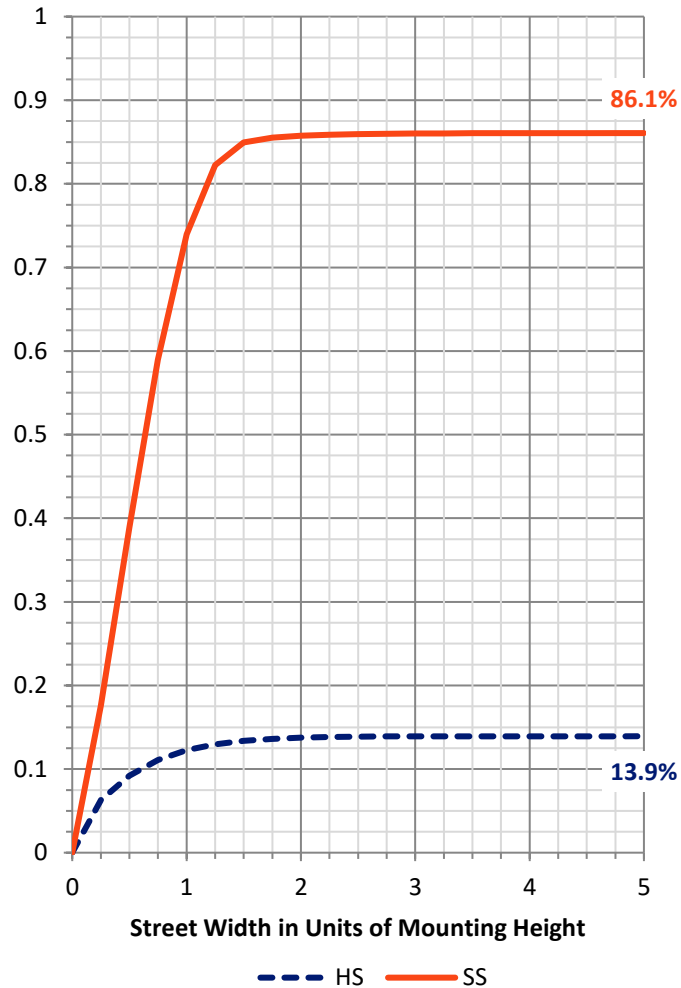
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2898.9   | 0.0    | 2898.9  |
|                    | % Fixture | 14.0     | 0.0    | 14.0    |
| <b>Street Side</b> | Lumens    | 17798.0  | 0.0    | 17798.0 |
|                    | % Fixture | 86.0     | 0.0    | 86.0    |
| <b>Total</b>       | Lumens    | 20696.9  | 0.0    | 20696.9 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 306.3   | 1.5       |
| 10°-20°   | 1212.4  | 5.9       |
| 20°-30°   | 2453.4  | 11.9      |
| 30°-40°   | 4340.3  | 21.0      |
| 40°-50°   | 6327.3  | 30.6      |
| 50°-60°   | 5071.5  | 24.5      |
| 60°-70°   | 913.7   | 4.4       |
| 70°-80°   | 72.0    | 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°    | 20696.9 | 100.0     |
| 0°-180°   | 20696.9 | 100.0     |

**Coefficient of Utilization**



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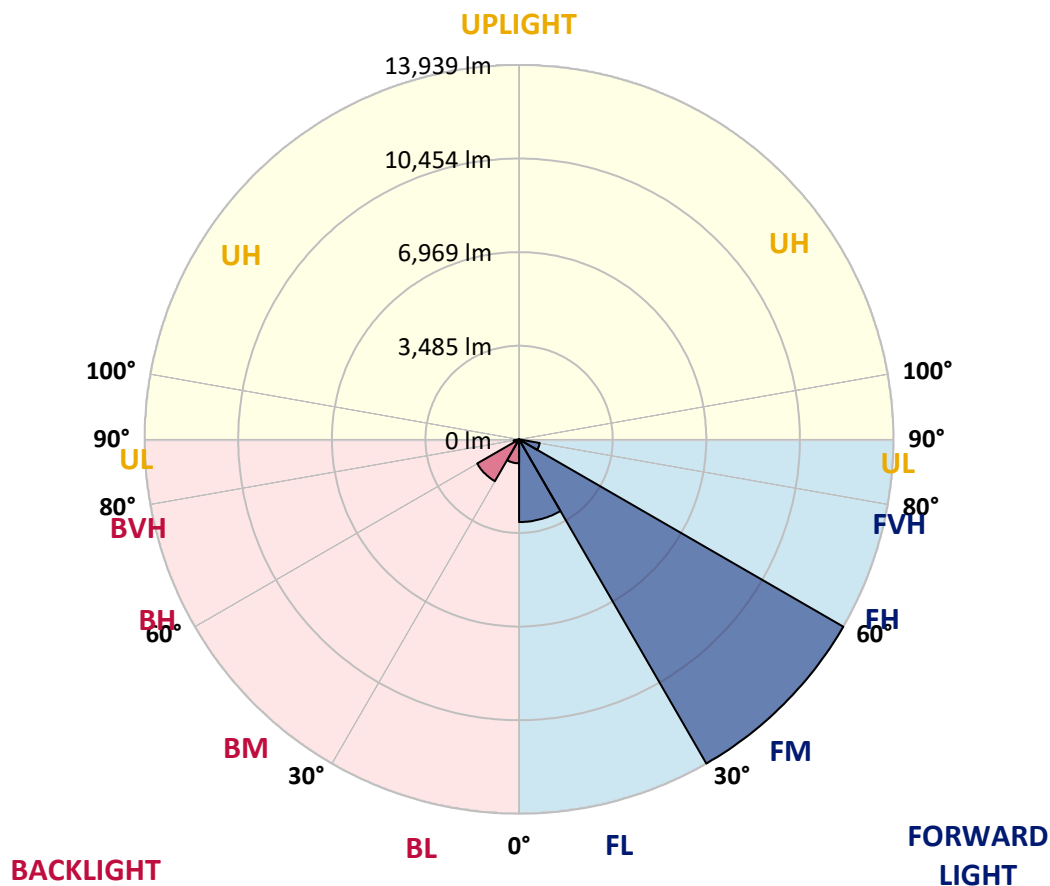
CATALOG NUMBER: GWS-SA4E-760-U-T2R-W-GRSBK

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3079.6  | 14.9      |                         |      |         |
| FM   | (30°-60°)   | 13938.7 | 67.3      |                         |      |         |
| FH   | (60°-80°)   | 779.6   | 3.8       |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 0.0     | 0.0       |                         |      | G0/10   |
| BL   | (0°-30°)    | 892.5   | 4.3       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1800.3  | 8.7       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 206.0   | 1.0       | B1/500                  |      | G1/500  |
| 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: B2-U0-G1**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 58°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2472.2  | 2472.2  | 2472.2  | 2472.2  | 2472.2  | 2472.2  | 2472.2  | 2472.2  | 2472.2  | 2472.2  | 2472.2  |
| 2.5°  | 3658.5  | 3601.0  | 3567.8  | 3541.2  | 3423.9  | 3238.0  | 3116.3  | 3052.1  | 2945.8  | 2766.6  | 2611.6  |
| 5°    | 4774.0  | 4731.9  | 4654.5  | 4601.4  | 4450.9  | 4187.5  | 3915.3  | 3806.8  | 3565.6  | 3160.5  | 2797.6  |
| 7.5°  | 5513.2  | 5482.2  | 5453.5  | 5382.6  | 5241.0  | 5002.0  | 4701.0  | 4588.1  | 4216.3  | 3640.8  | 3045.4  |
| 10°   | 6082.0  | 6057.7  | 6024.5  | 6022.3  | 5911.6  | 5696.9  | 5402.6  | 5285.3  | 4882.4  | 4163.1  | 3337.6  |
| 12.5° | 6582.2  | 6562.3  | 6555.7  | 6617.6  | 6546.8  | 6387.5  | 6068.8  | 5922.7  | 5495.5  | 4696.5  | 3660.7  |
| 15°   | 6925.3  | 6920.9  | 6949.6  | 7071.4  | 7111.2  | 7038.2  | 6770.4  | 6613.2  | 6121.9  | 5232.1  | 4017.1  |
| 17.5° | 7082.4  | 7095.7  | 7151.0  | 7361.3  | 7538.4  | 7600.3  | 7394.5  | 7261.7  | 6743.8  | 5774.4  | 4397.7  |
| 20°   | 7350.2  | 7345.8  | 7379.0  | 7578.2  | 7795.1  | 8016.4  | 7954.4  | 7841.6  | 7372.4  | 6347.6  | 4820.5  |
| 22.5° | 8105.0  | 8040.8  | 7969.9  | 8000.9  | 8078.4  | 8337.3  | 8452.4  | 8394.9  | 8020.8  | 6936.4  | 5256.5  |
| 25°   | 9264.7  | 9198.3  | 8970.3  | 8749.0  | 8602.9  | 8720.2  | 8877.4  | 8906.2  | 8664.9  | 7540.6  | 5712.4  |
| 27.5° | 10495.3 | 10435.5 | 10178.8 | 9846.8  | 9428.5  | 9224.9  | 9342.2  | 9399.7  | 9297.9  | 8259.9  | 6197.1  |
| 30°   | 11648.4 | 11568.7 | 11287.6 | 10875.9 | 10391.2 | 10079.2 | 9946.4  | 9986.2  | 10046.0 | 9112.0  | 6765.9  |
| 32.5° | 12648.8 | 12589.0 | 12252.6 | 11818.8 | 11351.8 | 11026.5 | 10716.6 | 10783.0 | 10929.1 | 10154.4 | 7494.1  |
| 35°   | 13496.4 | 13465.5 | 13109.1 | 12677.5 | 12184.0 | 12018.0 | 11752.4 | 11765.7 | 11911.8 | 11413.8 | 8381.6  |
| 37.5° | 14233.5 | 14180.3 | 13857.2 | 13456.6 | 13064.9 | 13038.3 | 12965.3 | 12971.9 | 13047.2 | 12881.2 | 9401.9  |
| 40°   | 14698.2 | 14649.6 | 14419.4 | 14171.5 | 13892.6 | 13897.0 | 14275.5 | 14304.3 | 14218.0 | 14322.0 | 10479.8 |
| 42.5° | 14873.1 | 14837.7 | 14713.7 | 14716.0 | 14687.2 | 14817.8 | 15528.2 | 15581.3 | 15271.5 | 15453.0 | 11400.5 |
| 45°   | 14569.9 | 14554.4 | 14563.2 | 14881.9 | 15227.2 | 15630.0 | 16553.0 | 16645.9 | 16207.7 | 16203.3 | 12119.8 |
| 47.5° | 13591.6 | 13560.6 | 13819.6 | 14361.8 | 15160.8 | 15944.3 | 17172.7 | 17316.5 | 16862.8 | 16632.6 | 12571.3 |
| 50°   | 11674.9 | 11763.5 | 12172.9 | 12987.4 | 14202.5 | 15512.7 | 17166.0 | 17416.1 | 16887.2 | 16595.0 | 12496.1 |
| 52.5° | 8456.9  | 8439.2  | 9335.5  | 10455.4 | 11933.9 | 14131.7 | 16254.2 | 16619.4 | 16296.2 | 16225.4 | 12327.8 |
| 55°   | 4601.4  | 4762.9  | 5367.2  | 6850.0  | 8695.9  | 11517.8 | 14171.5 | 14968.3 | 15342.3 | 16090.4 | 12631.1 |
| 57.5° | 1690.9  | 1761.8  | 2140.2  | 3189.3  | 4603.6  | 7162.1  | 10825.0 | 12026.8 | 13182.2 | 15714.1 | 12580.2 |
| 60°   | 681.7   | 695.0   | 845.5   | 1173.0  | 1934.4  | 3645.2  | 6493.7  | 7560.5  | 8649.4  | 12029.1 | 9654.2  |
| 62.5° | 495.8   | 513.5   | 573.2   | 686.1   | 978.3   | 1593.5  | 2799.8  | 3255.7  | 3558.9  | 5958.1  | 4756.3  |
| 65°   | 400.6   | 413.9   | 462.6   | 513.5   | 646.3   | 856.5   | 903.0   | 869.8   | 865.4   | 1540.4  | 1091.1  |
| 67.5° | 332.0   | 345.3   | 380.7   | 416.1   | 464.8   | 427.2   | 309.9   | 325.3   | 265.6   | 263.4   | 214.7   |
| 70°   | 243.5   | 259.0   | 294.4   | 332.0   | 278.9   | 115.1   | 179.3   | 265.6   | 201.4   | 168.2   | 163.8   |
| 72.5° | 183.7   | 194.8   | 228.0   | 216.9   | 81.9    | 44.3    | 119.5   | 192.6   | 154.9   | 123.9   | 121.7   |
| 75°   | 137.2   | 143.9   | 115.1   | 35.4    | 8.9     | 11.1    | 44.3    | 79.7    | 86.3    | 70.8    | 70.8    |
| 77.5° | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 4.4     | 6.6     | 8.9     | 11.1    | 13.3    |
| 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     |



REPORT NUMBER: P638382

CATALOG NUMBER: GWS-SA4E-760-U-T2R-W-GRSBK

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2472.2 | 2472.2 | 2472.2 | 2472.2 | 2472.2 | 2472.2 | 2472.2 | 2472.2 | 2472.2 | 2472.2 | 2472.2 |
| 2.5°  | 2523.1 | 2430.2 | 2297.4 | 2186.7 | 2102.6 | 2020.7 | 1958.7 | 1896.8 | 1894.5 | 1863.6 | 1856.9 |
| 5°    | 2629.4 | 2461.1 | 2217.7 | 2042.8 | 1936.6 | 1872.4 | 1828.2 | 1806.0 | 1795.0 | 1783.9 | 1779.5 |
| 7.5°  | 2782.1 | 2540.8 | 2204.4 | 2018.5 | 1930.0 | 1887.9 | 1856.9 | 1843.6 | 1837.0 | 1828.2 | 1825.9 |
| 10°   | 2970.2 | 2655.9 | 2253.1 | 2065.0 | 1987.5 | 1947.7 | 1914.5 | 1894.5 | 1883.5 | 1868.0 | 1863.6 |
| 12.5° | 3195.9 | 2797.6 | 2330.6 | 2142.4 | 2060.5 | 2007.4 | 1963.2 | 1934.4 | 1918.9 | 1899.0 | 1894.5 |
| 15°   | 3439.4 | 2950.3 | 2416.9 | 2213.3 | 2115.9 | 2047.3 | 1991.9 | 1947.7 | 1918.9 | 1894.5 | 1887.9 |
| 17.5° | 3691.7 | 3105.2 | 2494.3 | 2261.9 | 2142.4 | 2060.5 | 1980.9 | 1921.1 | 1885.7 | 1854.7 | 1845.9 |
| 20°   | 3975.0 | 3264.6 | 2545.2 | 2270.8 | 2133.6 | 2025.1 | 1932.2 | 1856.9 | 1821.5 | 1779.5 | 1770.6 |
| 22.5° | 4271.6 | 3412.8 | 2567.4 | 2250.9 | 2084.9 | 1958.7 | 1859.1 | 1781.7 | 1730.8 | 1686.5 | 1673.2 |
| 25°   | 4559.3 | 3545.6 | 2556.3 | 2195.6 | 2011.9 | 1865.8 | 1764.0 | 1684.3 | 1629.0 | 1584.7 | 1573.6 |
| 27.5° | 4864.7 | 3656.3 | 2516.5 | 2113.7 | 1912.3 | 1764.0 | 1666.6 | 1598.0 | 1547.1 | 1498.4 | 1487.3 |
| 30°   | 5207.8 | 3758.1 | 2452.3 | 2014.1 | 1795.0 | 1659.9 | 1584.7 | 1538.2 | 1482.9 | 1432.0 | 1416.5 |
| 32.5° | 5621.7 | 3848.9 | 2359.3 | 1894.5 | 1690.9 | 1569.2 | 1527.1 | 1491.7 | 1427.6 | 1374.4 | 1363.4 |
| 35°   | 6095.3 | 3924.1 | 2242.0 | 1770.6 | 1589.1 | 1511.7 | 1502.8 | 1456.3 | 1372.2 | 1310.2 | 1297.0 |
| 37.5° | 6644.2 | 3997.1 | 2102.6 | 1648.9 | 1513.9 | 1485.1 | 1487.3 | 1407.6 | 1305.8 | 1230.6 | 1221.7 |
| 40°   | 7235.1 | 4070.2 | 1947.7 | 1542.6 | 1445.3 | 1469.6 | 1449.7 | 1336.8 | 1170.8 | 1097.8 | 1088.9 |
| 42.5° | 7850.4 | 4149.9 | 1790.5 | 1443.0 | 1387.7 | 1409.8 | 1381.1 | 1195.2 | 1075.6 | 1038.0 | 1033.6 |
| 45°   | 8406.0 | 4245.0 | 1620.1 | 1343.4 | 1330.2 | 1323.5 | 1274.8 | 1082.3 | 1031.4 | 1004.8 | 1002.6 |
| 47.5° | 8806.6 | 4229.5 | 1438.6 | 1248.3 | 1268.2 | 1246.1 | 1097.8 | 1029.2 | 987.1  | 951.7  | 942.8  |
| 50°   | 8733.5 | 3959.5 | 1250.5 | 1142.0 | 1188.5 | 1168.6 | 987.1  | 967.2  | 929.6  | 891.9  | 878.7  |
| 52.5° | 8547.6 | 3592.1 | 1086.7 | 1029.2 | 1102.2 | 1055.7 | 911.9  | 891.9  | 858.7  | 810.1  | 794.6  |
| 55°   | 8647.2 | 3246.8 | 958.3  | 938.4  | 1013.7 | 874.2  | 827.8  | 796.8  | 761.4  | 708.2  | 701.6  |
| 57.5° | 8326.3 | 2649.3 | 770.2  | 783.5  | 896.4  | 745.9  | 725.9  | 677.3  | 617.5  | 582.1  | 577.7  |
| 60°   | 5763.3 | 1423.1 | 482.5  | 498.0  | 648.5  | 626.4  | 650.7  | 606.4  | 533.4  | 500.2  | 493.6  |
| 62.5° | 2647.1 | 571.0  | 263.4  | 252.3  | 340.8  | 424.9  | 557.7  | 553.3  | 462.6  | 409.5  | 405.0  |
| 65°   | 641.8  | 261.2  | 188.1  | 177.1  | 192.6  | 254.5  | 363.0  | 436.0  | 374.0  | 312.1  | 305.4  |
| 67.5° | 208.0  | 212.5  | 172.6  | 161.6  | 170.4  | 190.3  | 216.9  | 241.2  | 239.0  | 219.1  | 214.7  |
| 70°   | 166.0  | 192.6  | 159.4  | 146.1  | 146.1  | 152.7  | 146.1  | 117.3  | 101.8  | 110.7  | 115.1  |
| 72.5° | 123.9  | 146.1  | 126.2  | 112.9  | 108.4  | 106.2  | 90.7   | 66.4   | 46.5   | 42.1   | 39.8   |
| 75°   | 73.0   | 81.9   | 77.5   | 66.4   | 62.0   | 55.3   | 44.3   | 28.8   | 15.5   | 11.1   | 6.6    |
| 77.5° | 13.3   | 15.5   | 17.7   | 13.3   | 11.1   | 8.9    | 6.6    | 2.2    | 0.0    | 0.0    | 0.0    |
| 80°   | 0.0    | 2.2    | 2.2    | 2.2    | 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: SP1-1908-441-9-R4

Test Date: 10/23/2019

Luminaire Tested: SA1C-760-U-5WQ

Data in this report applies to families of products SA1C-760-U-5WQ .

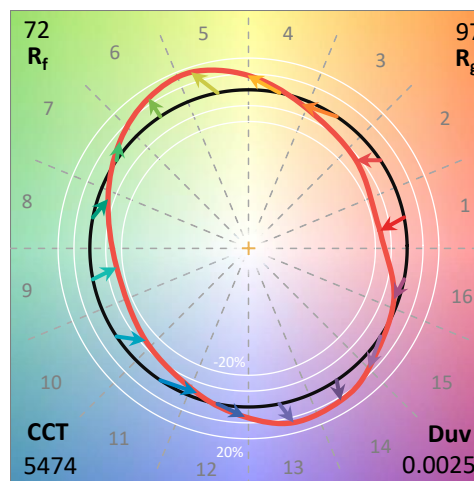
### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-9-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-760-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):                  | 5474   | CRI (Ra): | 71.7 |      |       |
| CIE u':                   | 0.2052 | R1:       | 70.6 | R9:  | -27.1 |
| CIE v':                   | 0.4804 | R2:       | 74.6 | R10: | 40.8  |
| Duv:                      | 0.0025 | R3:       | 78.3 | R11: | 74.6  |
| CIE x:                    | 0.3330 | R4:       | 73.8 | R12: | 50.4  |
| CIE y:                    | 0.3466 | R5:       | 72.4 | R13: | 70.0  |
| CIE z:                    | 0.3204 | R6:       | 67.5 | R14: | 87.8  |
| Peak Wavelength (nm):     | 442    | R7:       | 77.5 |      |       |
| Dominant Wavelength (nm): | 554    | R8:       | 58.9 |      |       |
| Purity:                   | 4.1    |           |      |      |       |
| Rf:                       | 72.1   |           |      |      |       |
| Rg:                       | 97.2   |           |      |      |       |



### Test Conditions

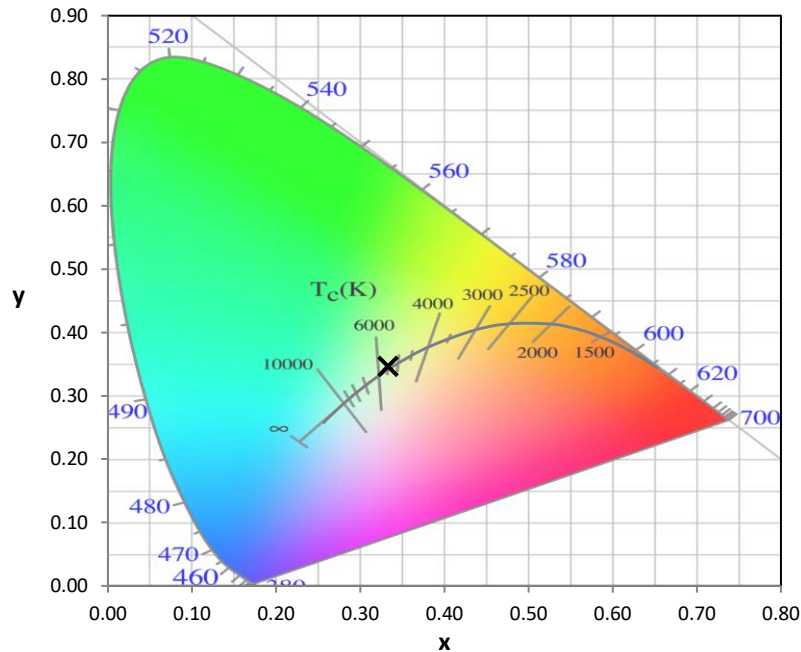
Stabilization Time: 240M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.6/31%  
 Sphere Temperature (°C): 25.9

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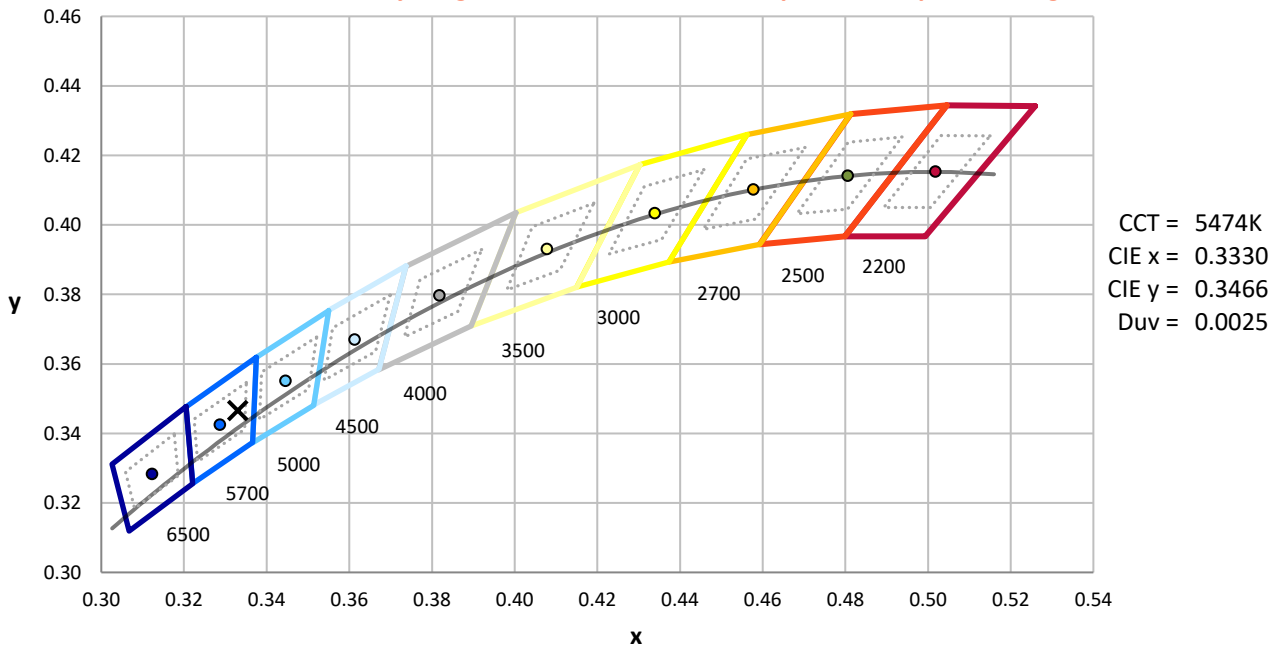
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



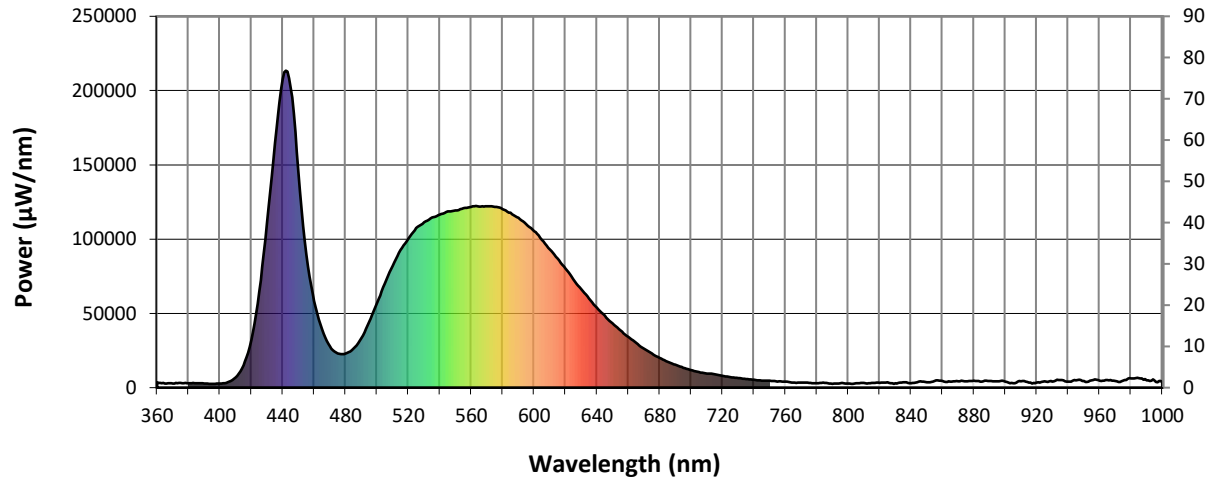
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 5700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

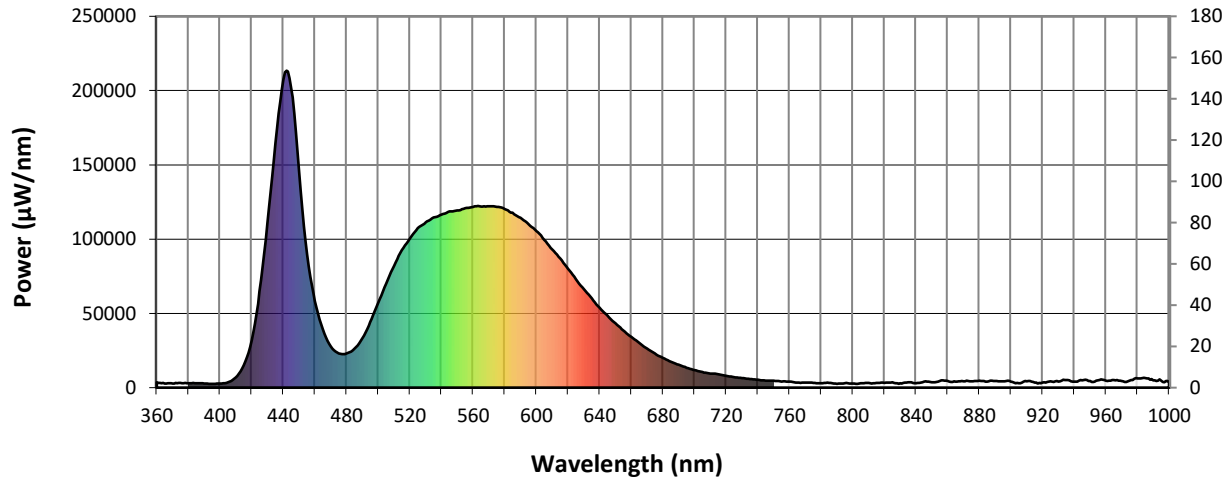


#####

| 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       | 3540             | NR               | 490       | 33363            | NR               | 620       | 80193            | NR               | 750       | 4663             | NR               | 880       | 4678             | NR               |
| 365       | 2862             | NR               | 495       | 44177            | NR               | 625       | 73091            | NR               | 755       | 4147             | NR               | 885       | 4128             | NR               |
| 370       | 2865             | NR               | 500       | 57019            | NR               | 630       | 66269            | NR               | 760       | 4040             | NR               | 890       | 4504             | NR               |
| 375       | 3254             | NR               | 505       | 70030            | NR               | 635       | 60012            | NR               | 765       | 3474             | NR               | 895       | 4371             | NR               |
| 380       | 3076             | NR               | 510       | 81972            | NR               | 640       | 53914            | NR               | 770       | 3469             | NR               | 900       | 4082             | NR               |
| 385       | 2904             | NR               | 515       | 92590            | NR               | 645       | 48385            | NR               | 775       | 3181             | NR               | 905       | 2982             | NR               |
| 390       | 2689             | NR               | 520       | 100305           | NR               | 650       | 43219            | NR               | 780       | 2969             | NR               | 910       | 4351             | NR               |
| 395       | 2619             | NR               | 525       | 107452           | NR               | 655       | 38562            | NR               | 785       | 3132             | NR               | 915       | 3365             | NR               |
| 400       | 2679             | NR               | 530       | 111373           | NR               | 660       | 34110            | NR               | 790       | 2507             | NR               | 920       | 3430             | NR               |
| 405       | 3515             | NR               | 535       | 114505           | NR               | 665       | 30085            | NR               | 795       | 2968             | NR               | 925       | 4264             | NR               |
| 410       | 6934             | NR               | 540       | 116408           | NR               | 670       | 26205            | NR               | 800       | 2758             | NR               | 930       | 4095             | NR               |
| 415       | 14943            | NR               | 545       | 118700           | NR               | 675       | 22906            | NR               | 805       | 2872             | NR               | 935       | 5048             | NR               |
| 420       | 31939            | NR               | 550       | 119209           | NR               | 680       | 20058            | NR               | 810       | 3094             | NR               | 940       | 4074             | NR               |
| 425       | 64701            | NR               | 555       | 120742           | NR               | 685       | 17413            | NR               | 815       | 3222             | NR               | 945       | 4949             | NR               |
| 430       | 110939           | NR               | 560       | 121594           | NR               | 690       | 15447            | NR               | 820       | 3238             | NR               | 950       | 4387             | NR               |
| 435       | 164597           | NR               | 565       | 121913           | NR               | 695       | 13398            | NR               | 825       | 3524             | NR               | 955       | 4978             | NR               |
| 440       | 207696           | NR               | 570       | 122147           | NR               | 700       | 11777            | NR               | 830       | 2921             | NR               | 960       | 4706             | NR               |
| 445       | 201830           | NR               | 575       | 121605           | NR               | 705       | 10412            | NR               | 835       | 3595             | NR               | 965       | 5083             | NR               |
| 450       | 145410           | NR               | 580       | 120248           | NR               | 710       | 9544             | NR               | 840       | 3016             | NR               | 970       | 4522             | NR               |
| 455       | 89594            | NR               | 585       | 117717           | NR               | 715       | 8940             | NR               | 845       | 4032             | NR               | 975       | 4740             | NR               |
| 460       | 58321            | NR               | 590       | 114359           | NR               | 720       | 7897             | NR               | 850       | 3579             | NR               | 980       | 6122             | NR               |
| 465       | 39318            | NR               | 595       | 109974           | NR               | 725       | 7045             | NR               | 855       | 4571             | NR               | 985       | 6450             | NR               |
| 470       | 27693            | NR               | 600       | 105269           | NR               | 730       | 6483             | NR               | 860       | 4485             | NR               | 990       | 4875             | NR               |
| 475       | 23081            | NR               | 605       | 99453            | NR               | 735       | 5838             | NR               | 865       | 3978             | NR               | 995       | 4764             | NR               |
| 480       | 23002            | NR               | 610       | 92921            | NR               | 740       | 5261             | NR               | 870       | 4298             | NR               | 1000      | 3640             | NR               |
| 485       | 26201            | NR               | 615       | 86989            | NR               | 745       | 4760             | NR               | 875       | 4356             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



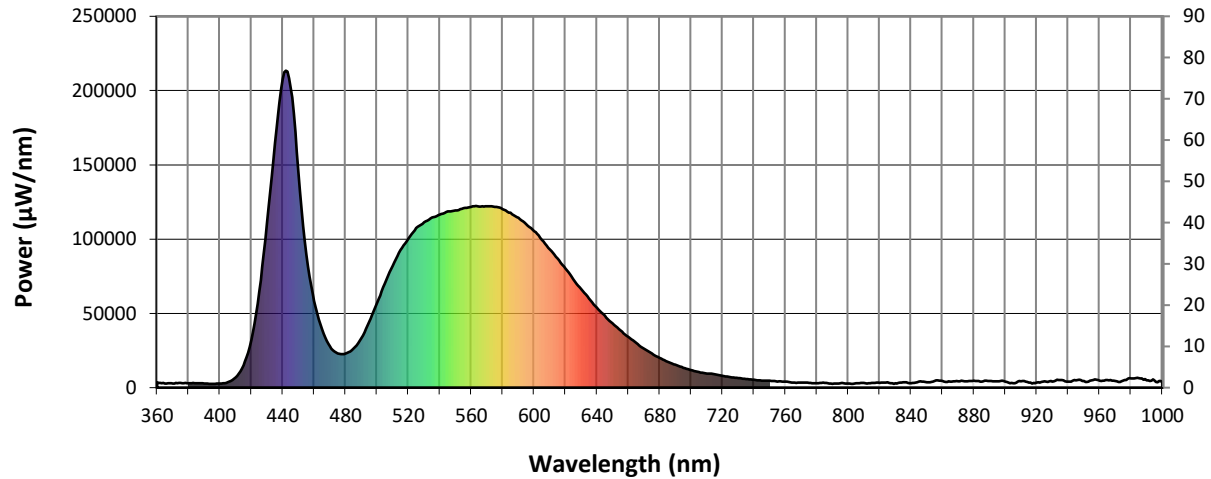
Scotopic Lumens: 13759.3

S/P: 1.85

| 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       | 3540             | NR               | 490       | 33363            | NR               | 620       | 80193            | NR               | 750       | 4663             | NR               | 880       | 4678             | NR               |
| 365       | 2862             | NR               | 495       | 44177            | NR               | 625       | 73091            | NR               | 755       | 4147             | NR               | 885       | 4128             | NR               |
| 370       | 2865             | NR               | 500       | 57019            | NR               | 630       | 66269            | NR               | 760       | 4040             | NR               | 890       | 4504             | NR               |
| 375       | 3254             | NR               | 505       | 70030            | NR               | 635       | 60012            | NR               | 765       | 3474             | NR               | 895       | 4371             | NR               |
| 380       | 3076             | NR               | 510       | 81972            | NR               | 640       | 53914            | NR               | 770       | 3469             | NR               | 900       | 4082             | NR               |
| 385       | 2904             | NR               | 515       | 92590            | NR               | 645       | 48385            | NR               | 775       | 3181             | NR               | 905       | 2982             | NR               |
| 390       | 2689             | NR               | 520       | 100305           | NR               | 650       | 43219            | NR               | 780       | 2969             | NR               | 910       | 4351             | NR               |
| 395       | 2619             | NR               | 525       | 107452           | NR               | 655       | 38562            | NR               | 785       | 3132             | NR               | 915       | 3365             | NR               |
| 400       | 2679             | NR               | 530       | 111373           | NR               | 660       | 34110            | NR               | 790       | 2507             | NR               | 920       | 3430             | NR               |
| 405       | 3515             | NR               | 535       | 114505           | NR               | 665       | 30085            | NR               | 795       | 2968             | NR               | 925       | 4264             | NR               |
| 410       | 6934             | NR               | 540       | 116408           | NR               | 670       | 26205            | NR               | 800       | 2758             | NR               | 930       | 4095             | NR               |
| 415       | 14943            | NR               | 545       | 118700           | NR               | 675       | 22906            | NR               | 805       | 2872             | NR               | 935       | 5048             | NR               |
| 420       | 31939            | NR               | 550       | 119209           | NR               | 680       | 20058            | NR               | 810       | 3094             | NR               | 940       | 4074             | NR               |
| 425       | 64701            | NR               | 555       | 120742           | NR               | 685       | 17413            | NR               | 815       | 3222             | NR               | 945       | 4949             | NR               |
| 430       | 110939           | NR               | 560       | 121594           | NR               | 690       | 15447            | NR               | 820       | 3238             | NR               | 950       | 4387             | NR               |
| 435       | 164597           | NR               | 565       | 121913           | NR               | 695       | 13398            | NR               | 825       | 3524             | NR               | 955       | 4978             | NR               |
| 440       | 207696           | NR               | 570       | 122147           | NR               | 700       | 11777            | NR               | 830       | 2921             | NR               | 960       | 4706             | NR               |
| 445       | 201830           | NR               | 575       | 121605           | NR               | 705       | 10412            | NR               | 835       | 3595             | NR               | 965       | 5083             | NR               |
| 450       | 145410           | NR               | 580       | 120248           | NR               | 710       | 9544             | NR               | 840       | 3016             | NR               | 970       | 4522             | NR               |
| 455       | 89594            | NR               | 585       | 117717           | NR               | 715       | 8940             | NR               | 845       | 4032             | NR               | 975       | 4740             | NR               |
| 460       | 58321            | NR               | 590       | 114359           | NR               | 720       | 7897             | NR               | 850       | 3579             | NR               | 980       | 6122             | NR               |
| 465       | 39318            | NR               | 595       | 109974           | NR               | 725       | 7045             | NR               | 855       | 4571             | NR               | 985       | 6450             | NR               |
| 470       | 27693            | NR               | 600       | 105269           | NR               | 730       | 6483             | NR               | 860       | 4485             | NR               | 990       | 4875             | NR               |
| 475       | 23081            | NR               | 605       | 99453            | NR               | 735       | 5838             | NR               | 865       | 3978             | NR               | 995       | 4764             | NR               |
| 480       | 23002            | NR               | 610       | 92921            | NR               | 740       | 5261             | NR               | 870       | 4298             | NR               | 1000      | 3640             | NR               |
| 485       | 26201            | NR               | 615       | 86989            | NR               | 745       | 4760             | NR               | 875       | 4356             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5527.6 M/P: 0.74**

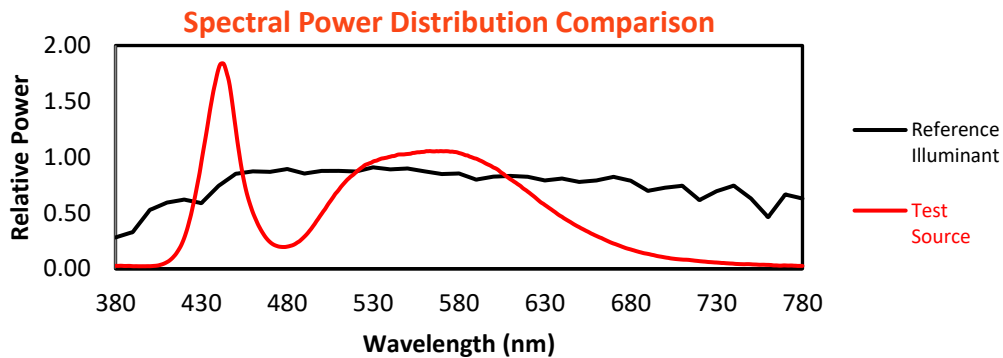
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 3540             | NR               | 490       | 33363            | NR               | 620       | 80193            | NR               | 750       | 4663             | NR               | 880       | 4678             | NR               |
| 365       | 2862             | NR               | 495       | 44177            | NR               | 625       | 73091            | NR               | 755       | 4147             | NR               | 885       | 4128             | NR               |
| 370       | 2865             | NR               | 500       | 57019            | NR               | 630       | 66269            | NR               | 760       | 4040             | NR               | 890       | 4504             | NR               |
| 375       | 3254             | NR               | 505       | 70030            | NR               | 635       | 60012            | NR               | 765       | 3474             | NR               | 895       | 4371             | NR               |
| 380       | 3076             | NR               | 510       | 81972            | NR               | 640       | 53914            | NR               | 770       | 3469             | NR               | 900       | 4082             | NR               |
| 385       | 2904             | NR               | 515       | 92590            | NR               | 645       | 48385            | NR               | 775       | 3181             | NR               | 905       | 2982             | NR               |
| 390       | 2689             | NR               | 520       | 100305           | NR               | 650       | 43219            | NR               | 780       | 2969             | NR               | 910       | 4351             | NR               |
| 395       | 2619             | NR               | 525       | 107452           | NR               | 655       | 38562            | NR               | 785       | 3132             | NR               | 915       | 3365             | NR               |
| 400       | 2679             | NR               | 530       | 111373           | NR               | 660       | 34110            | NR               | 790       | 2507             | NR               | 920       | 3430             | NR               |
| 405       | 3515             | NR               | 535       | 114505           | NR               | 665       | 30085            | NR               | 795       | 2968             | NR               | 925       | 4264             | NR               |
| 410       | 6934             | NR               | 540       | 116408           | NR               | 670       | 26205            | NR               | 800       | 2758             | NR               | 930       | 4095             | NR               |
| 415       | 14943            | NR               | 545       | 118700           | NR               | 675       | 22906            | NR               | 805       | 2872             | NR               | 935       | 5048             | NR               |
| 420       | 31939            | NR               | 550       | 119209           | NR               | 680       | 20058            | NR               | 810       | 3094             | NR               | 940       | 4074             | NR               |
| 425       | 64701            | NR               | 555       | 120742           | NR               | 685       | 17413            | NR               | 815       | 3222             | NR               | 945       | 4949             | NR               |
| 430       | 110939           | NR               | 560       | 121594           | NR               | 690       | 15447            | NR               | 820       | 3238             | NR               | 950       | 4387             | NR               |
| 435       | 164597           | NR               | 565       | 121913           | NR               | 695       | 13398            | NR               | 825       | 3524             | NR               | 955       | 4978             | NR               |
| 440       | 207696           | NR               | 570       | 122147           | NR               | 700       | 11777            | NR               | 830       | 2921             | NR               | 960       | 4706             | NR               |
| 445       | 201830           | NR               | 575       | 121605           | NR               | 705       | 10412            | NR               | 835       | 3595             | NR               | 965       | 5083             | NR               |
| 450       | 145410           | NR               | 580       | 120248           | NR               | 710       | 9544             | NR               | 840       | 3016             | NR               | 970       | 4522             | NR               |
| 455       | 89594            | NR               | 585       | 117717           | NR               | 715       | 8940             | NR               | 845       | 4032             | NR               | 975       | 4740             | NR               |
| 460       | 58321            | NR               | 590       | 114359           | NR               | 720       | 7897             | NR               | 850       | 3579             | NR               | 980       | 6122             | NR               |
| 465       | 39318            | NR               | 595       | 109974           | NR               | 725       | 7045             | NR               | 855       | 4571             | NR               | 985       | 6450             | NR               |
| 470       | 27693            | NR               | 600       | 105269           | NR               | 730       | 6483             | NR               | 860       | 4485             | NR               | 990       | 4875             | NR               |
| 475       | 23081            | NR               | 605       | 99453            | NR               | 735       | 5838             | NR               | 865       | 3978             | NR               | 995       | 4764             | NR               |
| 480       | 23002            | NR               | 610       | 92921            | NR               | 740       | 5261             | NR               | 870       | 4298             | NR               | 1000      | 3640             | NR               |
| 485       | 26201            | NR               | 615       | 86989            | NR               | 745       | 4760             | NR               | 875       | 4356             | NR               |           |                  |                  |

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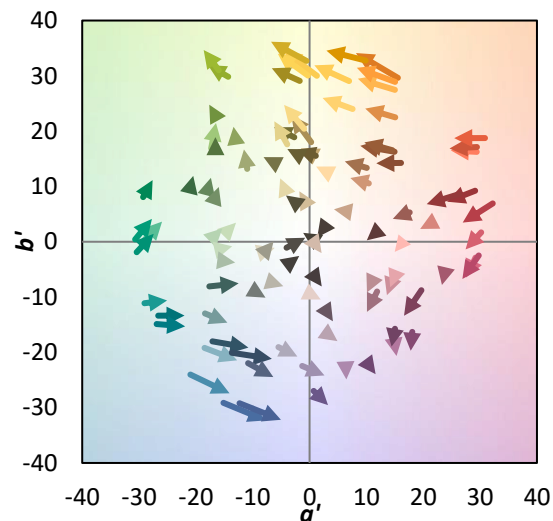
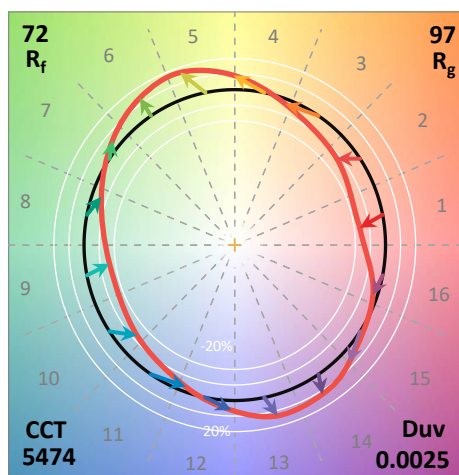
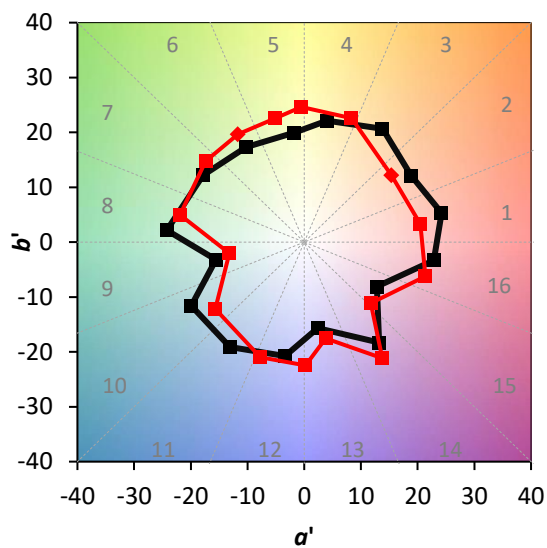
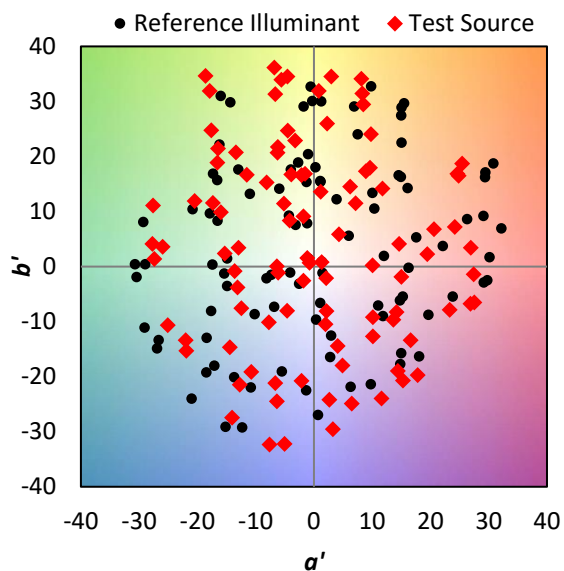
**TM-30-18**

**Summary**

$R_f = 72.1$   
 $R_g = 97.2$   
 CIE  $R_a = 71.7$   
 $R_9 = -27.1$



**Color Vector Graphics**



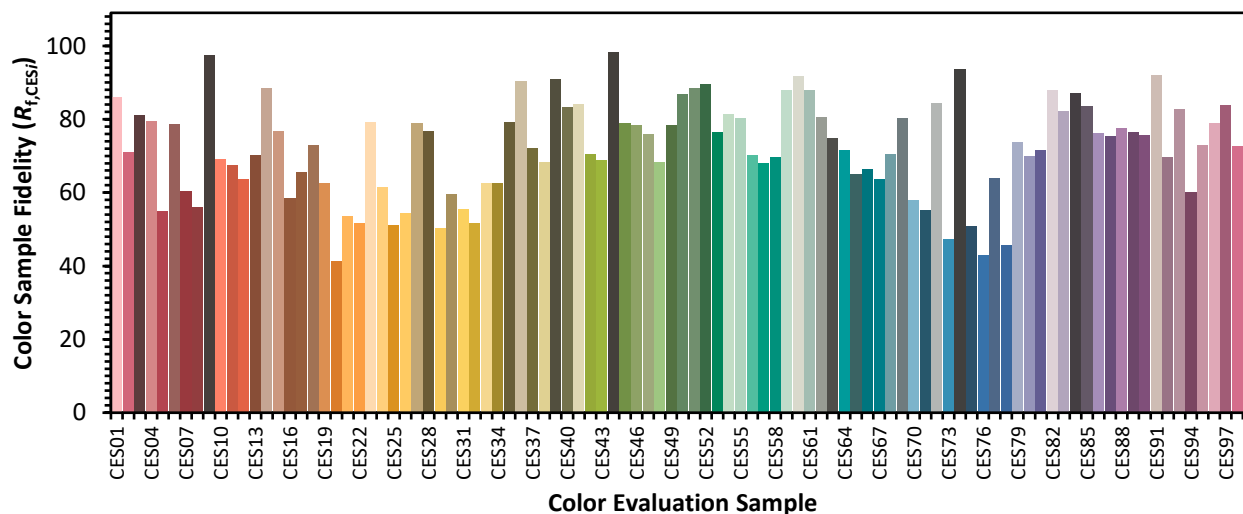


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

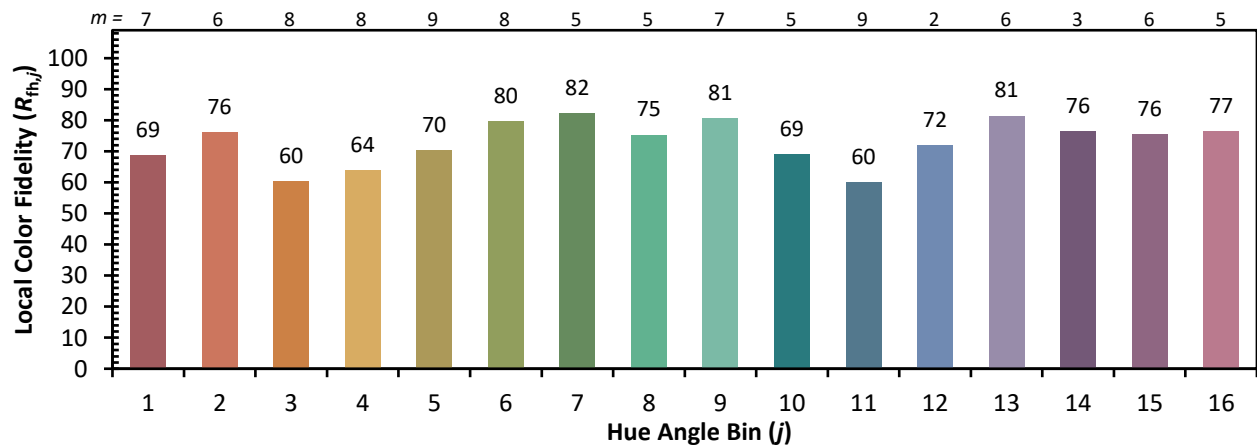
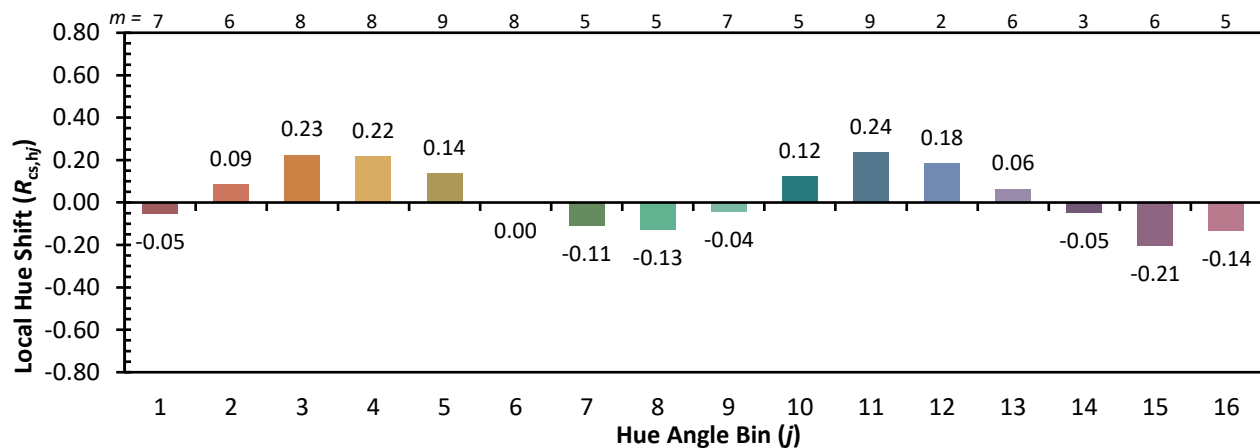
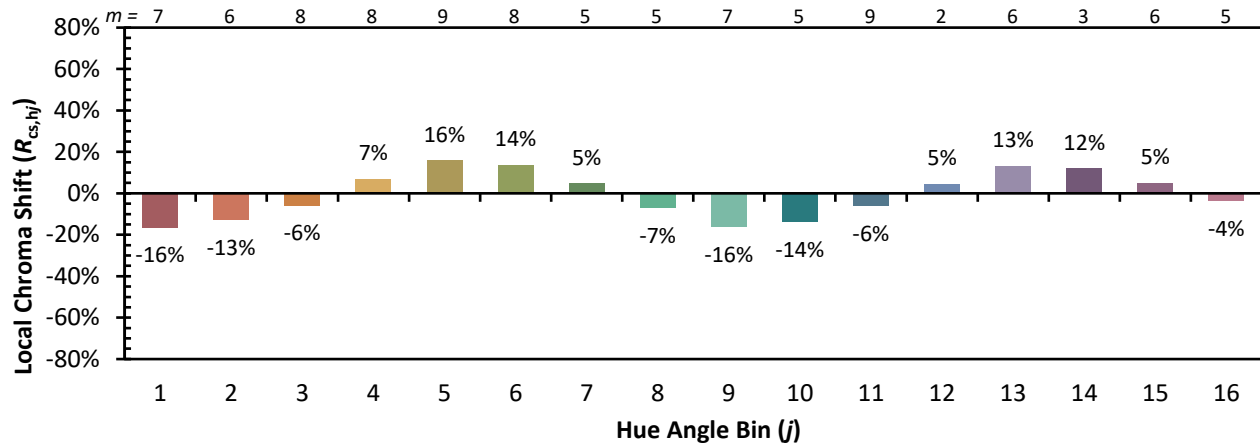
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 54 | CES51 = 88 | CES76 = 43 |
| CES02 = 59 | CES27 = 79 | CES52 = 90 | CES77 = 64 |
| CES03 = 30 | CES28 = 77 | CES53 = 77 | CES78 = 46 |
| CES04 = 69 | CES29 = 50 | CES54 = 81 | CES79 = 74 |
| CES05 = 46 | CES30 = 59 | CES55 = 80 | CES80 = 70 |
| CES06 = 50 | CES31 = 55 | CES56 = 70 | CES81 = 71 |
| CES07 = 38 | CES32 = 52 | CES57 = 68 | CES82 = 88 |
| CES08 = 38 | CES33 = 63 | CES58 = 70 | CES83 = 82 |
| CES09 = 29 | CES34 = 63 | CES59 = 88 | CES84 = 87 |
| CES10 = 72 | CES35 = 79 | CES60 = 92 | CES85 = 84 |
| CES11 = 55 | CES36 = 90 | CES61 = 88 | CES86 = 76 |
| CES12 = 61 | CES37 = 72 | CES62 = 81 | CES87 = 75 |
| CES13 = 41 | CES38 = 68 | CES63 = 75 | CES88 = 77 |
| CES14 = 74 | CES39 = 91 | CES64 = 72 | CES89 = 76 |
| CES15 = 70 | CES40 = 83 | CES65 = 65 | CES90 = 76 |
| CES16 = 46 | CES41 = 84 | CES66 = 66 | CES91 = 92 |
| CES17 = 48 | CES42 = 70 | CES67 = 64 | CES92 = 70 |
| CES18 = 55 | CES43 = 69 | CES68 = 71 | CES93 = 83 |
| CES19 = 70 | CES44 = 98 | CES69 = 80 | CES94 = 60 |
| CES20 = 64 | CES45 = 79 | CES70 = 58 | CES95 = 73 |
| CES21 = 85 | CES46 = 78 | CES71 = 55 | CES96 = 79 |
| CES22 = 77 | CES47 = 76 | CES72 = 84 | CES97 = 84 |
| CES23 = 91 | CES48 = 68 | CES73 = 47 | CES98 = 73 |
| CES24 = 90 | CES49 = 78 | CES74 = 94 | CES99 = 62 |
| CES25 = 71 | CES50 = 87 | CES75 = 51 |            |



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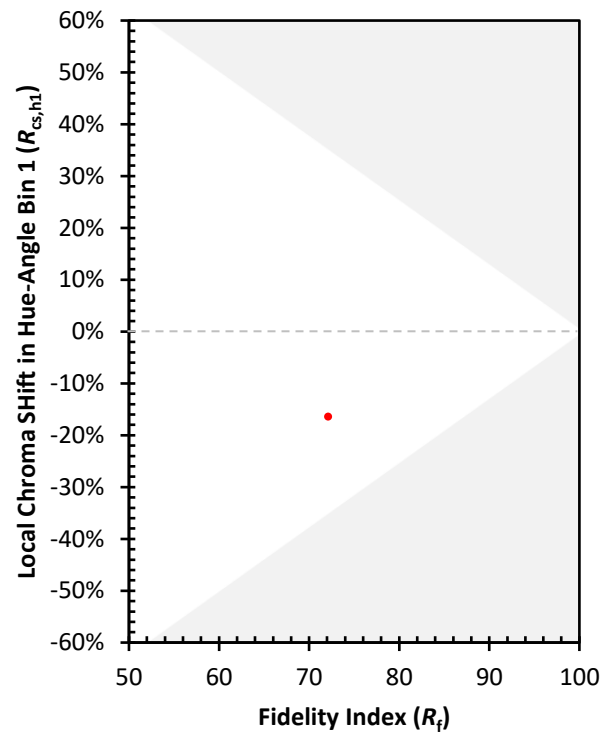
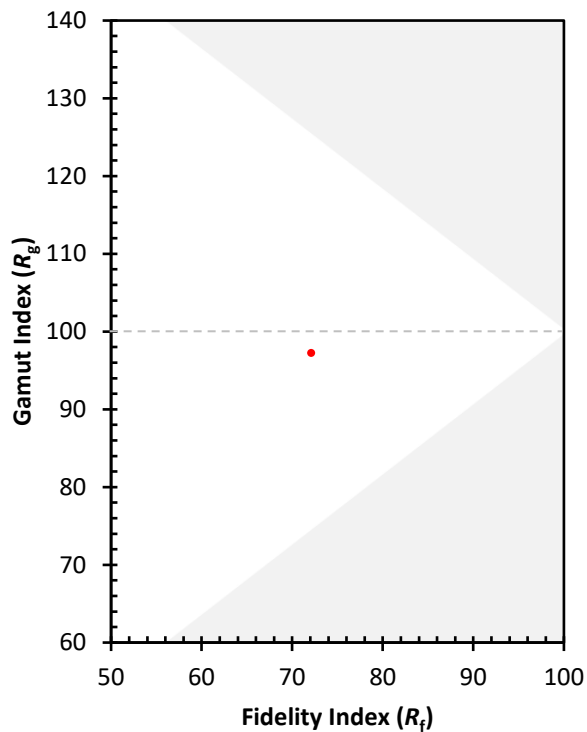
Color Rendition by Hue-Angle Bin



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)