

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: P633390

Luminaire Tested: GWS-SA2E-750-U-T4FT-W

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P633390  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-54)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA2E-750-U-T4FT-W  
Description: GALLEON WALL SLIM LUMINAIRE. (2) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE IV FORWARD THROW OPTICS  
Light Source: (32) 5000K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 14416.6 lumens  
Efficiency: N/A  
Efficacy: 133.2 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G3

Input Watts (W): 108.2  
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



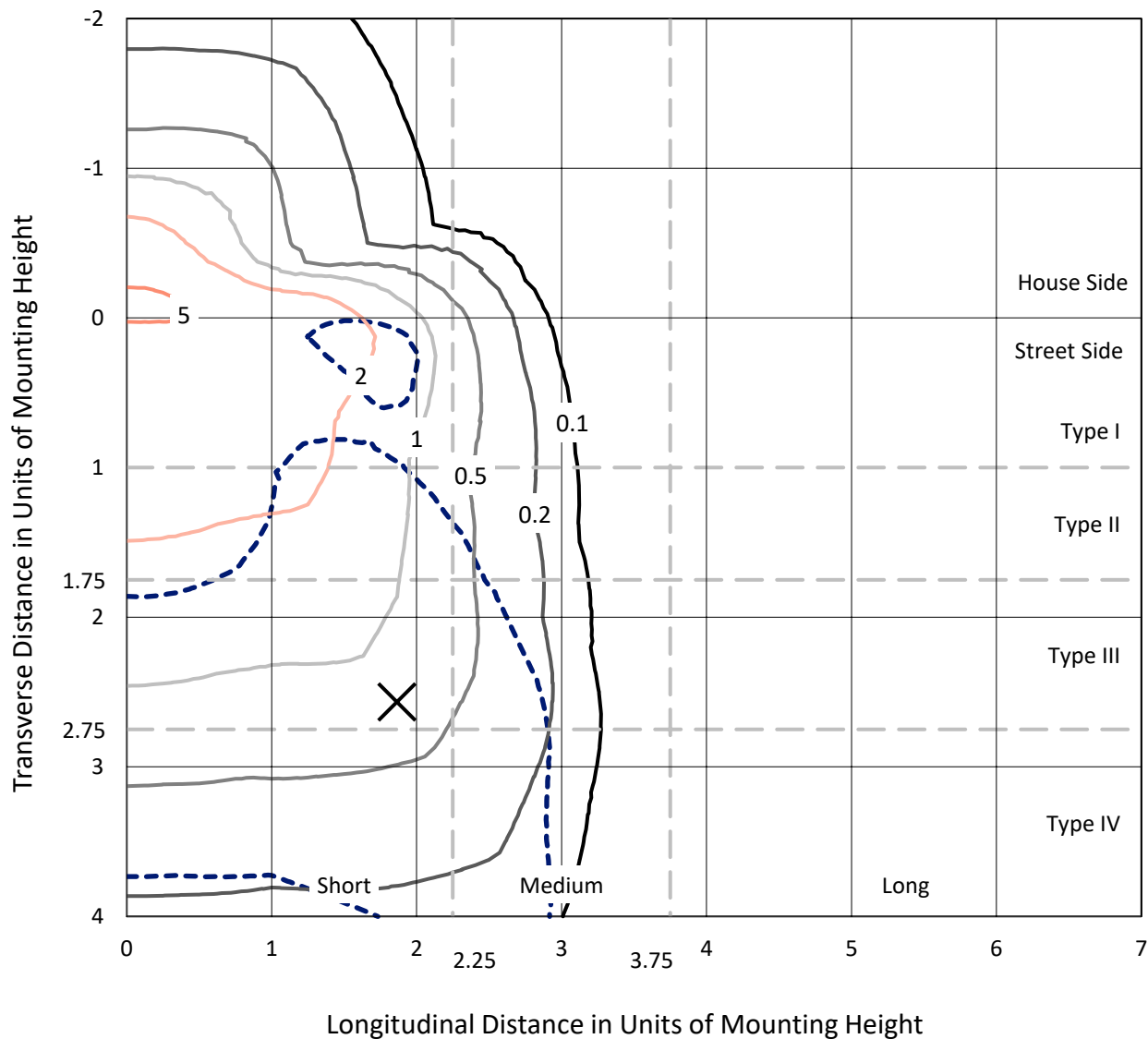
REPORT NUMBER: P633390

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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

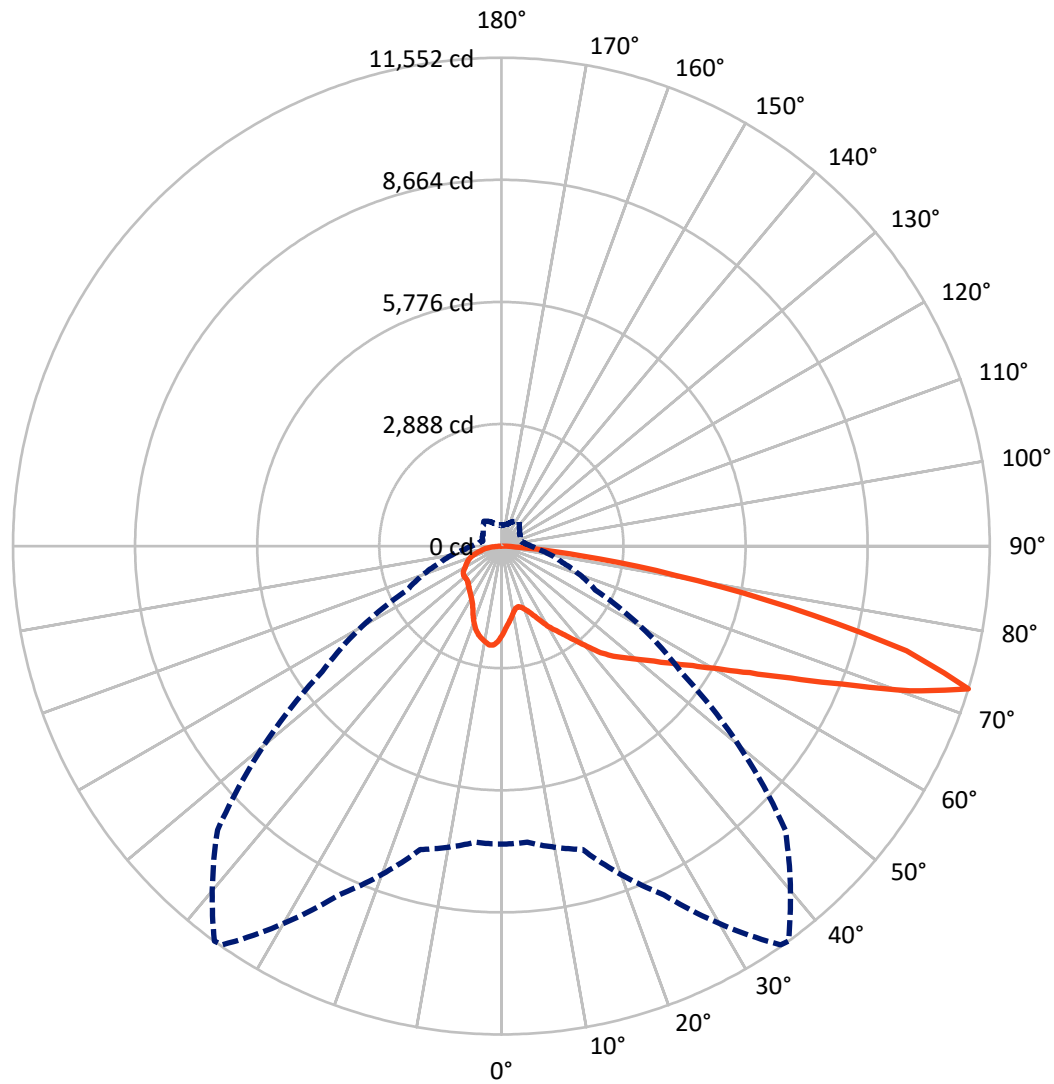


Based on 20 foot mounting height. Maximum calculated value = 5.6 fc  
 Type IV - Short - N/A

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CATALOG NUMBER: GWS-SA2E-750-U-T4FT-W

## Luminous Intensity Polar Plot



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

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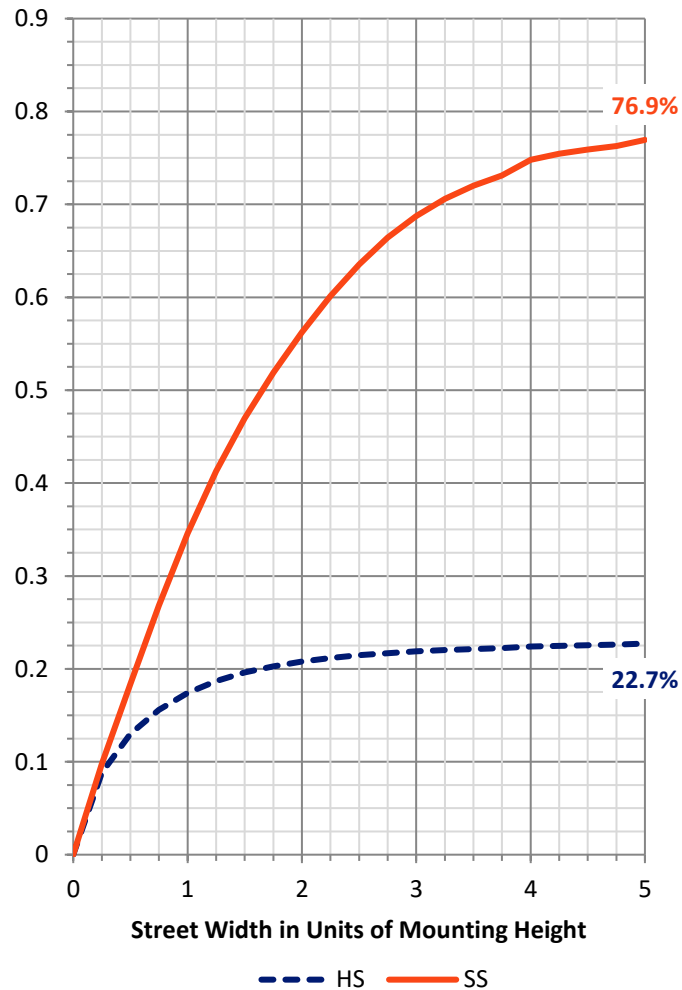
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3323.6   | 0.0    | 3323.6  |
|                    | % Fixture | 23.1     | 0.0    | 23.1    |
| <b>Street Side</b> | Lumens    | 11093.0  | 0.0    | 11093.0 |
|                    | % Fixture | 76.9     | 0.0    | 76.9    |
| <b>Total</b>       | Lumens    | 14416.6  | 0.0    | 14416.6 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 197.2   | 1.4       |
| 10°-20°   | 556.4   | 3.9       |
| 20°-30°   | 921.5   | 6.4       |
| 30°-40°   | 1380.1  | 9.6       |
| 40°-50°   | 2013.4  | 14.0      |
| 50°-60°   | 2865.7  | 19.9      |
| 60°-70°   | 3620.6  | 25.1      |
| 70°-80°   | 2580.0  | 17.9      |
| 80°-90°   | 281.6   | 2.0       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 14416.6 | 100.0     |
| 0°-180°   | 14416.6 | 100.0     |

**Coefficient of Utilization**



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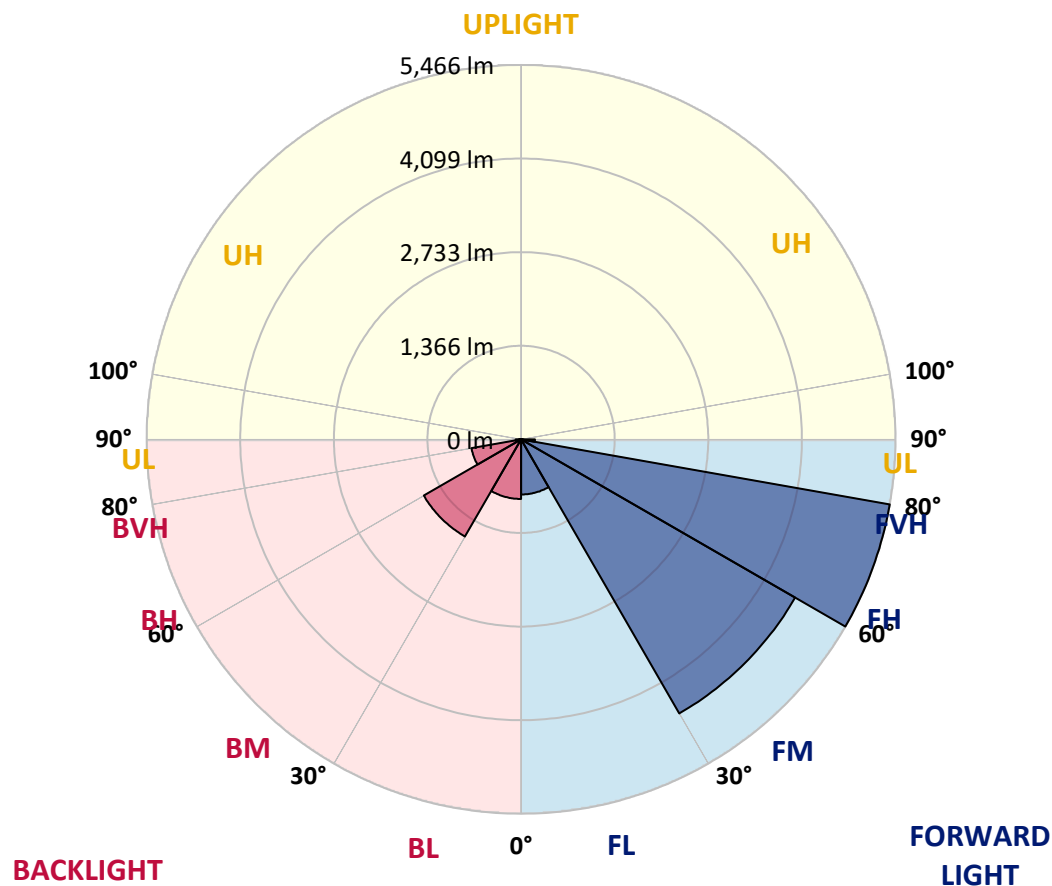
CATALOG NUMBER: GWS-SA2E-750-U-T4FT-W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 804.8  | 5.6       |                         |      |         |
| FM   | (30°-60°)   | 4620.2 | 32.0      |                         |      |         |
| FH   | (60°-80°)   | 5465.8 | 37.9      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 202.2  | 1.4       |                         |      | G2/225  |
| BL   | (0°-30°)    | 870.4  | 6.0       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1639.0 | 11.4      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 734.8  | 5.1       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 79.5   | 0.6       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 36°     | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|--------|
| 0°    | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9  | 2109.9  | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 |
| 2.5°  | 1924.8 | 1921.6 | 1915.2 | 1934.5 | 1953.7  | 1951.6  | 1978.3 | 2004.0 | 2031.8 | 2060.7 | 2099.2 |
| 5°    | 1770.8 | 1768.6 | 1763.3 | 1792.2 | 1821.0  | 1820.0  | 1863.8 | 1905.6 | 1962.3 | 2024.3 | 2101.4 |
| 7.5°  | 1616.7 | 1611.3 | 1618.8 | 1655.2 | 1695.9  | 1700.1  | 1760.1 | 1828.5 | 1910.9 | 2004.0 | 2113.1 |
| 10°   | 1480.8 | 1479.7 | 1482.9 | 1523.6 | 1584.6  | 1588.9  | 1665.9 | 1761.1 | 1870.3 | 1994.4 | 2139.9 |
| 12.5° | 1445.5 | 1443.4 | 1434.8 | 1455.1 | 1501.1  | 1507.6  | 1592.1 | 1708.7 | 1842.4 | 1999.7 | 2176.3 |
| 15°   | 1503.3 | 1497.9 | 1468.0 | 1458.3 | 1480.8  | 1486.2  | 1557.8 | 1677.7 | 1826.4 | 2009.4 | 2222.3 |
| 17.5° | 1602.8 | 1599.6 | 1542.9 | 1503.3 | 1518.3  | 1522.5  | 1576.0 | 1672.3 | 1822.1 | 2028.6 | 2279.0 |
| 20°   | 1748.3 | 1734.4 | 1645.6 | 1585.7 | 1585.7  | 1592.1  | 1624.2 | 1695.9 | 1827.5 | 2052.2 | 2343.2 |
| 22.5° | 1940.9 | 1913.1 | 1787.9 | 1706.6 | 1685.2  | 1693.7  | 1707.6 | 1754.7 | 1849.9 | 2091.7 | 2423.4 |
| 25°   | 2157.0 | 2131.3 | 1982.6 | 1868.1 | 1838.2  | 1841.4  | 1829.6 | 1838.2 | 1899.2 | 2146.3 | 2522.9 |
| 27.5° | 2387.1 | 2369.9 | 2211.6 | 2066.1 | 2019.0  | 2019.0  | 1977.3 | 1956.9 | 1967.6 | 2208.4 | 2634.2 |
| 30°   | 2592.5 | 2568.9 | 2435.2 | 2275.8 | 2213.7  | 2213.7  | 2134.5 | 2090.7 | 2065.0 | 2284.3 | 2782.9 |
| 32.5° | 2700.5 | 2686.6 | 2597.8 | 2475.9 | 2399.9  | 2388.1  | 2319.6 | 2268.3 | 2208.4 | 2396.7 | 2984.1 |
| 35°   | 2841.8 | 2838.6 | 2785.1 | 2689.8 | 2593.5  | 2576.4  | 2529.4 | 2488.7 | 2384.9 | 2536.8 | 3251.6 |
| 37.5° | 3019.4 | 3014.0 | 3005.5 | 2948.8 | 2833.2  | 2830.0  | 2788.3 | 2739.1 | 2604.2 | 2739.1 | 3575.8 |
| 40°   | 3218.4 | 3208.8 | 3198.1 | 3197.0 | 3127.5  | 3115.7  | 3112.5 | 3056.8 | 2868.5 | 2983.0 | 3913.9 |
| 42.5° | 3492.3 | 3459.1 | 3358.6 | 3403.5 | 3454.9  | 3444.2  | 3484.8 | 3401.4 | 3198.1 | 3273.0 | 4233.8 |
| 45°   | 3829.3 | 3748.0 | 3549.0 | 3561.9 | 3691.3  | 3712.7  | 3853.9 | 3833.6 | 3560.8 | 3607.9 | 4570.8 |
| 47.5° | 4031.6 | 3960.9 | 3775.8 | 3765.1 | 3926.7  | 3953.5  | 4260.5 | 4299.0 | 3951.3 | 4011.2 | 4987.0 |
| 50°   | 4197.4 | 4148.2 | 3996.2 | 4011.2 | 4182.4  | 4209.2  | 4663.9 | 4746.3 | 4319.4 | 4424.2 | 5470.6 |
| 52.5° | 4397.5 | 4326.9 | 4209.2 | 4279.8 | 4489.5  | 4521.6  | 5112.2 | 5201.0 | 4651.1 | 4877.9 | 5971.4 |
| 55°   | 4509.8 | 4480.9 | 4483.1 | 4591.1 | 4854.3  | 4898.2  | 5581.9 | 5566.9 | 4954.9 | 5266.3 | 6348.0 |
| 57.5° | 4768.8 | 4758.1 | 4856.5 | 4897.1 | 5280.2  | 5336.9  | 6051.6 | 5923.2 | 5231.0 | 5566.9 | 6528.8 |
| 60°   | 5225.6 | 5198.9 | 5284.5 | 5346.5 | 5806.6  | 5886.8  | 6575.9 | 6272.0 | 5418.2 | 5790.5 | 6467.8 |
| 62.5° | 5867.6 | 5834.4 | 5837.6 | 5936.1 | 6511.7  | 6596.2  | 7159.0 | 6563.1 | 5476.0 | 5824.8 | 6081.6 |
| 65°   | 6665.8 | 6617.6 | 6563.1 | 6696.8 | 7447.9  | 7518.5  | 7793.5 | 6774.9 | 5338.0 | 5495.2 | 5274.8 |
| 67.5° | 7507.8 | 7468.2 | 7404.0 | 7684.4 | 8660.1  | 8702.9  | 8505.0 | 6756.7 | 4900.4 | 4613.6 | 3699.9 |
| 70°   | 7557.0 | 7566.7 | 7870.5 | 8884.8 | 10242.6 | 10253.3 | 9178.0 | 6390.8 | 3968.4 | 2990.5 | 1843.5 |
| 72.5° | 7049.9 | 7033.8 | 7429.7 | 9104.2 | 11515.8 | 11552.2 | 9495.8 | 5177.5 | 2452.3 | 1491.5 | 864.5  |
| 75°   | 5726.4 | 5754.2 | 6170.4 | 7965.7 | 9870.3  | 9902.4  | 7741.1 | 3052.6 | 1165.2 | 729.7  | 553.2  |
| 77.5° | 2465.2 | 2620.3 | 3440.9 | 5611.9 | 7069.1  | 6969.6  | 3989.8 | 1236.9 | 621.6  | 520.0  | 423.7  |
| 80°   | 711.5  | 772.5  | 1226.2 | 2668.4 | 4235.9  | 4161.0  | 1579.2 | 463.3  | 433.3  | 390.5  | 303.9  |
| 82.5° | 230.0  | 254.6  | 449.4  | 1062.5 | 1898.1  | 1895.9  | 599.2  | 273.9  | 283.5  | 265.3  | 195.8  |
| 85°   | 64.2   | 73.8   | 138.0  | 322.1  | 587.4   | 575.6   | 173.3  | 129.5  | 150.9  | 153.0  | 97.4   |
| 87.5° | 0.0    | 0.0    | 1.1    | 2.1    | 2.1     | 2.1     | 4.3    | 19.3   | 43.9   | 55.6   | 39.6   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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CATALOG NUMBER: GWS-SA2E-750-U-T4FT-W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 | 2109.9 |
| 2.5°  | 2122.8 | 2119.6 | 2163.4 | 2197.7 | 2229.8 | 2251.2 | 2257.6 | 2261.9 | 2270.4 | 2274.7 | 2270.4 |
| 5°    | 2137.8 | 2153.8 | 2226.6 | 2280.1 | 2322.9 | 2348.5 | 2349.6 | 2347.5 | 2353.9 | 2348.5 | 2345.3 |
| 7.5°  | 2169.9 | 2200.9 | 2292.9 | 2349.6 | 2377.4 | 2378.5 | 2352.8 | 2322.9 | 2307.9 | 2295.0 | 2290.8 |
| 10°   | 2212.6 | 2258.7 | 2359.2 | 2396.7 | 2388.1 | 2348.5 | 2291.8 | 2244.7 | 2218.0 | 2198.7 | 2194.5 |
| 12.5° | 2271.5 | 2322.9 | 2418.1 | 2417.0 | 2363.5 | 2292.9 | 2226.6 | 2169.9 | 2131.3 | 2108.9 | 2101.4 |
| 15°   | 2327.1 | 2392.4 | 2460.9 | 2410.6 | 2326.1 | 2240.5 | 2154.9 | 2078.9 | 2027.5 | 1992.2 | 1985.8 |
| 17.5° | 2395.6 | 2465.2 | 2491.9 | 2390.3 | 2279.0 | 2168.8 | 2054.3 | 1954.8 | 1885.2 | 1843.5 | 1840.3 |
| 20°   | 2474.8 | 2536.8 | 2506.9 | 2355.0 | 2218.0 | 2073.6 | 1918.4 | 1807.1 | 1732.2 | 1691.6 | 1694.8 |
| 22.5° | 2566.8 | 2611.7 | 2511.2 | 2306.8 | 2133.5 | 1938.7 | 1765.4 | 1658.4 | 1608.1 | 1586.7 | 1587.8 |
| 25°   | 2665.2 | 2694.1 | 2503.7 | 2241.5 | 2004.0 | 1774.0 | 1608.1 | 1558.9 | 1554.6 | 1549.3 | 1551.4 |
| 27.5° | 2781.9 | 2775.4 | 2481.2 | 2149.5 | 1829.6 | 1582.5 | 1497.9 | 1510.8 | 1527.9 | 1525.7 | 1527.9 |
| 30°   | 2938.1 | 2877.1 | 2452.3 | 2022.2 | 1622.0 | 1422.0 | 1432.7 | 1469.0 | 1491.5 | 1493.6 | 1500.1 |
| 32.5° | 3116.8 | 2989.4 | 2406.3 | 1848.9 | 1424.1 | 1332.1 | 1371.7 | 1415.5 | 1442.3 | 1447.6 | 1456.2 |
| 35°   | 3329.7 | 3117.8 | 2325.0 | 1632.7 | 1281.8 | 1278.6 | 1315.0 | 1344.9 | 1373.8 | 1376.0 | 1376.0 |
| 37.5° | 3574.7 | 3246.2 | 2195.5 | 1394.1 | 1194.1 | 1232.6 | 1266.8 | 1273.2 | 1280.7 | 1274.3 | 1277.5 |
| 40°   | 3799.4 | 3370.3 | 2011.5 | 1176.9 | 1122.4 | 1191.9 | 1220.8 | 1199.4 | 1175.9 | 1159.8 | 1163.0 |
| 42.5° | 3987.7 | 3454.9 | 1767.6 | 1025.0 | 1049.6 | 1155.5 | 1178.0 | 1134.1 | 1088.1 | 1058.2 | 1062.5 |
| 45°   | 4199.5 | 3533.0 | 1480.8 | 922.3  | 987.6  | 1129.9 | 1144.8 | 1088.1 | 1029.3 | 984.4  | 977.9  |
| 47.5° | 4491.6 | 3692.4 | 1226.2 | 850.6  | 943.7  | 1116.0 | 1140.6 | 1063.5 | 986.5  | 919.1  | 911.6  |
| 50°   | 4852.2 | 3918.1 | 1013.2 | 803.5  | 923.4  | 1108.5 | 1139.5 | 1036.8 | 944.8  | 865.6  | 860.2  |
| 52.5° | 5245.9 | 4138.6 | 856.0  | 767.2  | 903.0  | 1086.0 | 1134.1 | 1006.8 | 900.9  | 815.3  | 808.9  |
| 55°   | 5508.1 | 4225.2 | 750.0  | 732.9  | 869.9  | 1050.7 | 1112.7 | 977.9  | 834.6  | 756.5  | 746.8  |
| 57.5° | 5585.1 | 4113.9 | 676.2  | 701.9  | 827.1  | 1001.5 | 1072.1 | 916.9  | 793.9  | 731.8  | 724.4  |
| 60°   | 5452.4 | 3833.6 | 630.2  | 676.2  | 780.0  | 938.3  | 1001.5 | 881.6  | 761.8  | 706.2  | 700.8  |
| 62.5° | 5078.0 | 3401.4 | 594.9  | 649.5  | 731.8  | 872.0  | 956.5  | 838.8  | 726.5  | 682.6  | 675.1  |
| 65°   | 4324.7 | 2789.3 | 566.0  | 621.6  | 685.8  | 808.9  | 907.3  | 796.0  | 688.0  | 654.8  | 646.2  |
| 67.5° | 3024.7 | 1959.1 | 535.0  | 588.5  | 639.8  | 747.9  | 856.0  | 756.5  | 648.4  | 623.8  | 615.2  |
| 70°   | 1478.7 | 1038.9 | 497.5  | 550.0  | 590.6  | 685.8  | 804.6  | 708.3  | 596.0  | 582.1  | 570.3  |
| 72.5° | 704.0  | 581.0  | 453.7  | 497.5  | 523.2  | 603.4  | 719.0  | 638.8  | 533.9  | 503.9  | 483.6  |
| 75°   | 471.8  | 413.0  | 395.9  | 435.5  | 441.9  | 506.1  | 616.3  | 551.0  | 470.8  | 436.5  | 419.4  |
| 77.5° | 357.4  | 315.6  | 332.8  | 368.1  | 355.2  | 416.2  | 507.2  | 491.1  | 424.8  | 393.7  | 385.2  |
| 80°   | 251.4  | 230.0  | 264.3  | 285.7  | 276.0  | 354.2  | 456.9  | 420.5  | 349.9  | 315.6  | 309.2  |
| 82.5° | 158.4  | 154.1  | 194.7  | 197.9  | 201.1  | 280.3  | 375.6  | 330.6  | 271.8  | 223.6  | 207.6  |
| 85°   | 79.2   | 87.7   | 116.6  | 116.6  | 115.6  | 144.4  | 214.0  | 186.2  | 146.6  | 116.6  | 113.4  |
| 87.5° | 26.7   | 37.4   | 50.3   | 40.7   | 31.0   | 24.6   | 27.8   | 34.2   | 36.4   | 35.3   | 35.3   |
| 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: SP1-1908-441-4-R4

Test Date: 10/02/2019

Luminaire Tested: SA1C-750-U-5WQ

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

### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-4-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-750-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):                  | 4884   | CRI (Ra): | 73.5 |      |       |
| CIE u':                   | 0.2101 | R1:       | 70.5 | R9:  | -28.4 |
| CIE v':                   | 0.4904 | R2:       | 77.7 | R10: | 48.6  |
| Duv:                      | 0.0037 | R3:       | 84.6 | R11: | 73.2  |
| CIE x:                    | 0.3493 | R4:       | 74.7 | R12: | 50.7  |
| CIE y:                    | 0.3624 | R5:       | 71.9 | R13: | 71.2  |
| CIE z:                    | 0.2884 | R6:       | 70.7 | R14: | 91.4  |
| Peak Wavelength (nm):     | 444    | R7:       | 81.2 |      |       |
| Dominant Wavelength (nm): | 571    | R8:       | 56.9 |      |       |
| Purity:                   | 13.7   |           |      |      |       |
| Rf:                       | 74.9   |           |      |      |       |
| Rg:                       | 96.3   |           |      |      |       |



### Test Conditions

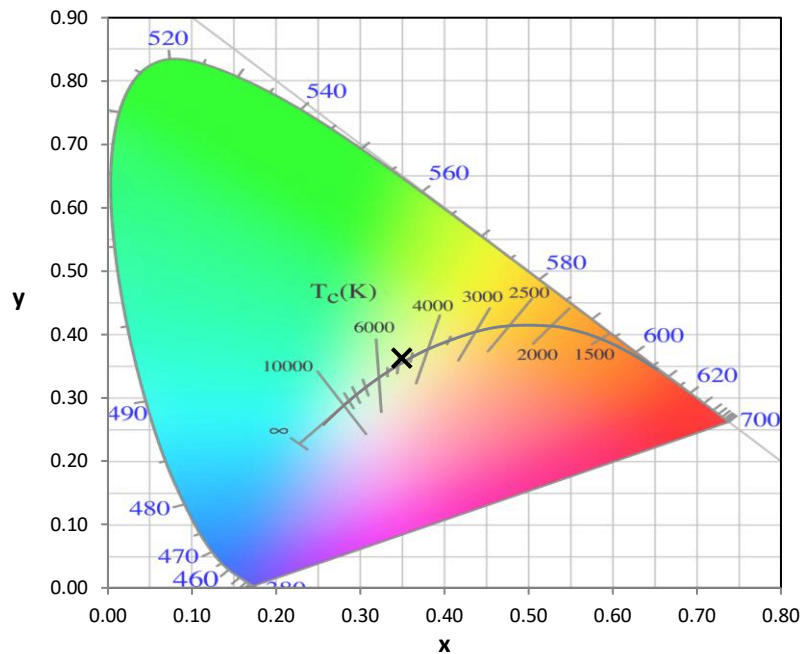
Stabilization Time: 240M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0./44%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-4-R4

| 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 5000K 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



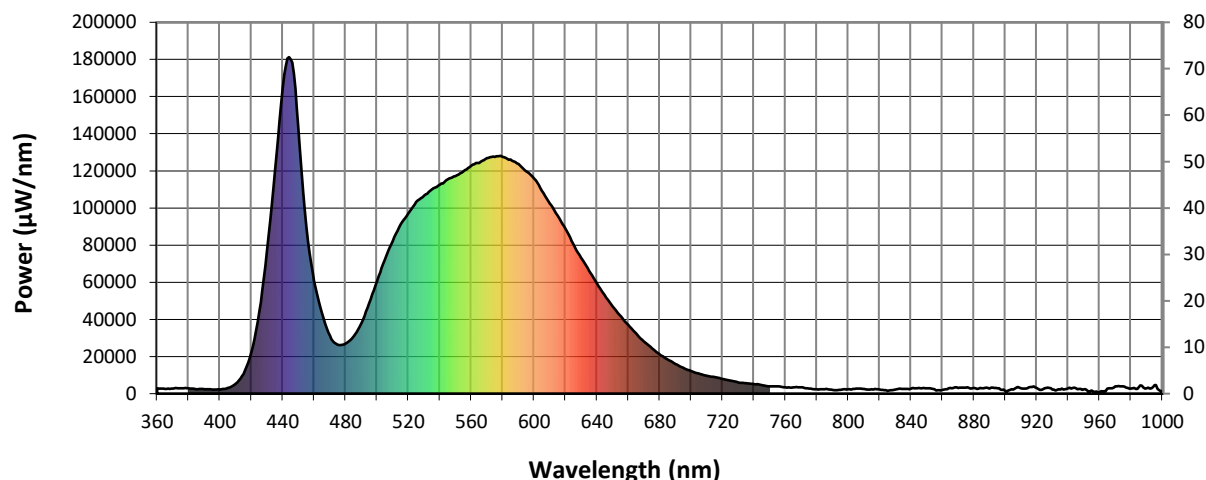
Scotopic Lumens: 13493.5

S/P: 1.77

| 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5378.9**

**M/P: 0.71**

| 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

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**TM-30-18**

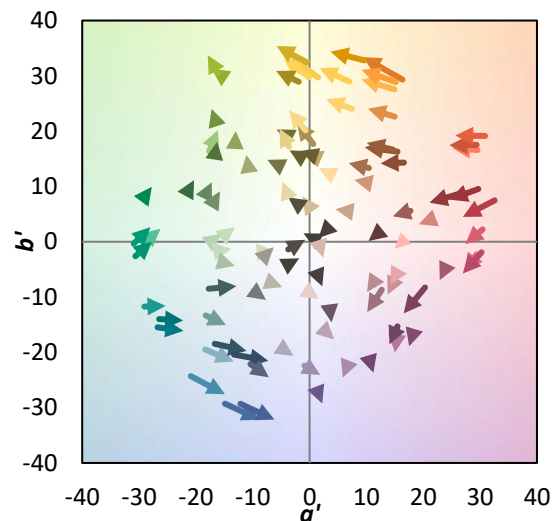
**Summary**

$R_f = 74.9$   
 $R_g = 96.3$   
 CIE  $R_a = 73.5$   
 $R_g = -28.4$

**Spectral Power Distribution Comparison**



**Color Vector Graphics**



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**TM-30-18**

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

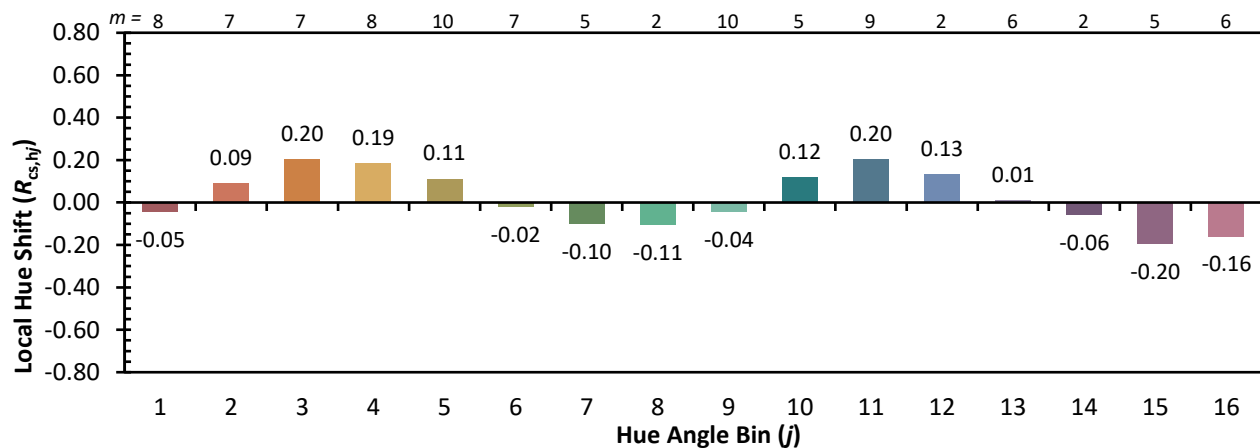
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 61 | CES51 = 90 | CES76 = 52 |
| CES02 = 60 | CES27 = 84 | CES52 = 91 | CES77 = 71 |
| CES03 = 30 | CES28 = 81 | CES53 = 79 | CES78 = 54 |
| CES04 = 69 | CES29 = 58 | CES54 = 83 | CES79 = 80 |
| CES05 = 46 | CES30 = 67 | CES55 = 83 | CES80 = 77 |
| CES06 = 50 | CES31 = 63 | CES56 = 73 | CES81 = 77 |
| CES07 = 39 | CES32 = 59 | CES57 = 72 | CES82 = 90 |
| CES08 = 38 | CES33 = 69 | CES58 = 73 | CES83 = 86 |
| CES09 = 29 | CES34 = 69 | CES59 = 88 | CES84 = 88 |
| CES10 = 73 | CES35 = 83 | CES60 = 93 | CES85 = 84 |
| CES11 = 56 | CES36 = 95 | CES61 = 88 | CES86 = 75 |
| CES12 = 61 | CES37 = 78 | CES62 = 85 | CES87 = 78 |
| CES13 = 41 | CES38 = 76 | CES63 = 77 | CES88 = 79 |
| CES14 = 74 | CES39 = 93 | CES64 = 74 | CES89 = 75 |
| CES15 = 70 | CES40 = 86 | CES65 = 67 | CES90 = 77 |
| CES16 = 46 | CES41 = 87 | CES66 = 69 | CES91 = 89 |
| CES17 = 49 | CES42 = 78 | CES67 = 67 | CES92 = 66 |
| CES18 = 55 | CES43 = 75 | CES68 = 73 | CES93 = 80 |
| CES19 = 71 | CES44 = 99 | CES69 = 81 | CES94 = 57 |
| CES20 = 64 | CES45 = 83 | CES70 = 63 | CES95 = 71 |
| CES21 = 85 | CES46 = 81 | CES71 = 60 | CES96 = 78 |
| CES22 = 77 | CES47 = 80 | CES72 = 86 | CES97 = 85 |
| CES23 = 91 | CES48 = 72 | CES73 = 53 | CES98 = 75 |
| CES24 = 90 | CES49 = 81 | CES74 = 96 | CES99 = 62 |
| CES25 = 71 | CES50 = 89 | CES75 = 58 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)