

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: STREETWORKS

Report Number: P362124

Luminaire Tested: NVN-SA2B-722-U-SL4

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P362124  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-24)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA2B-722-U-SL4  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(2) 70 CRI, 2200K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV SPILL  
LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 8200 lumens  
Efficiency: N/A  
Efficacy: 96.5 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G3

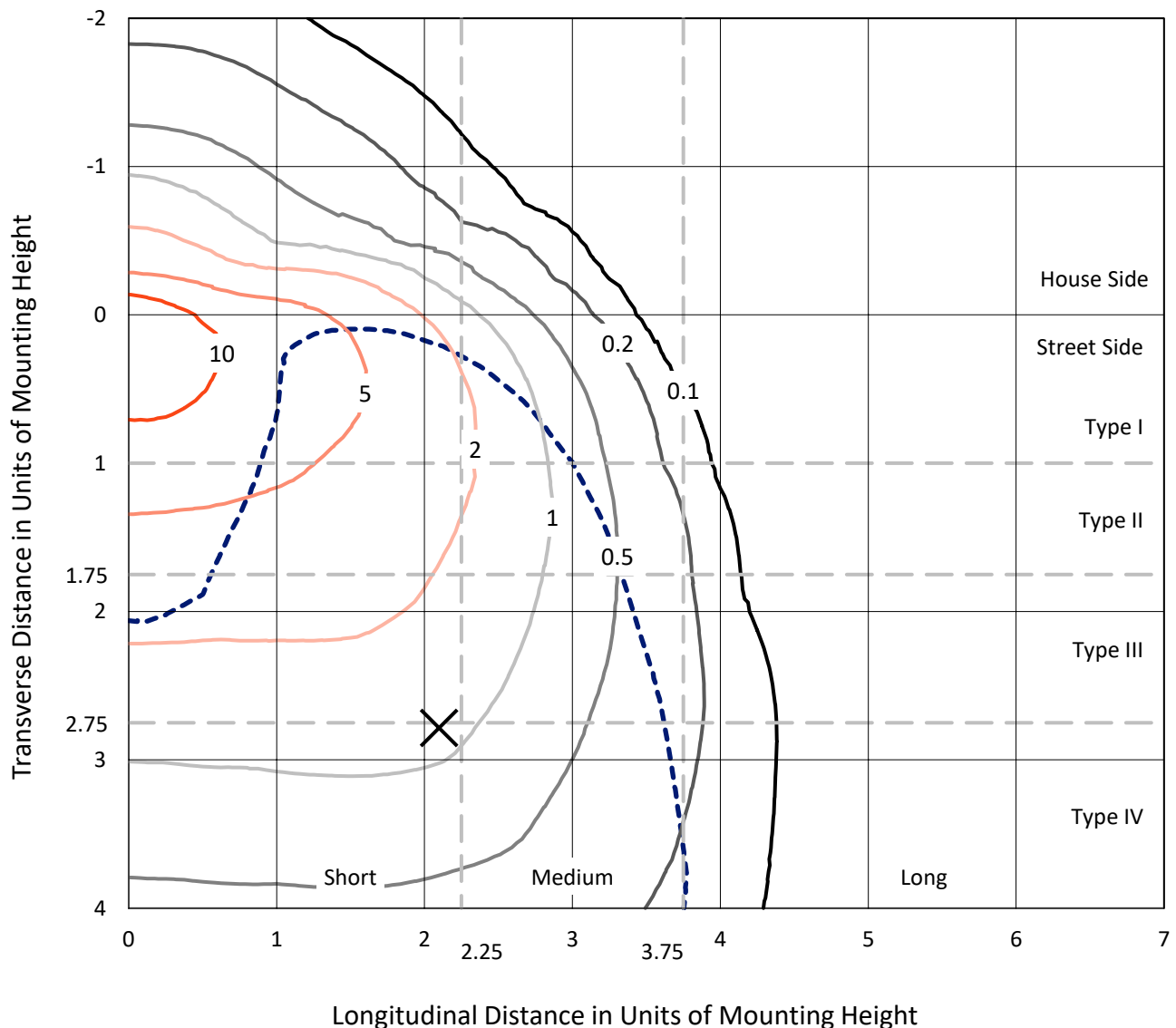
Input Watts (W): 85  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

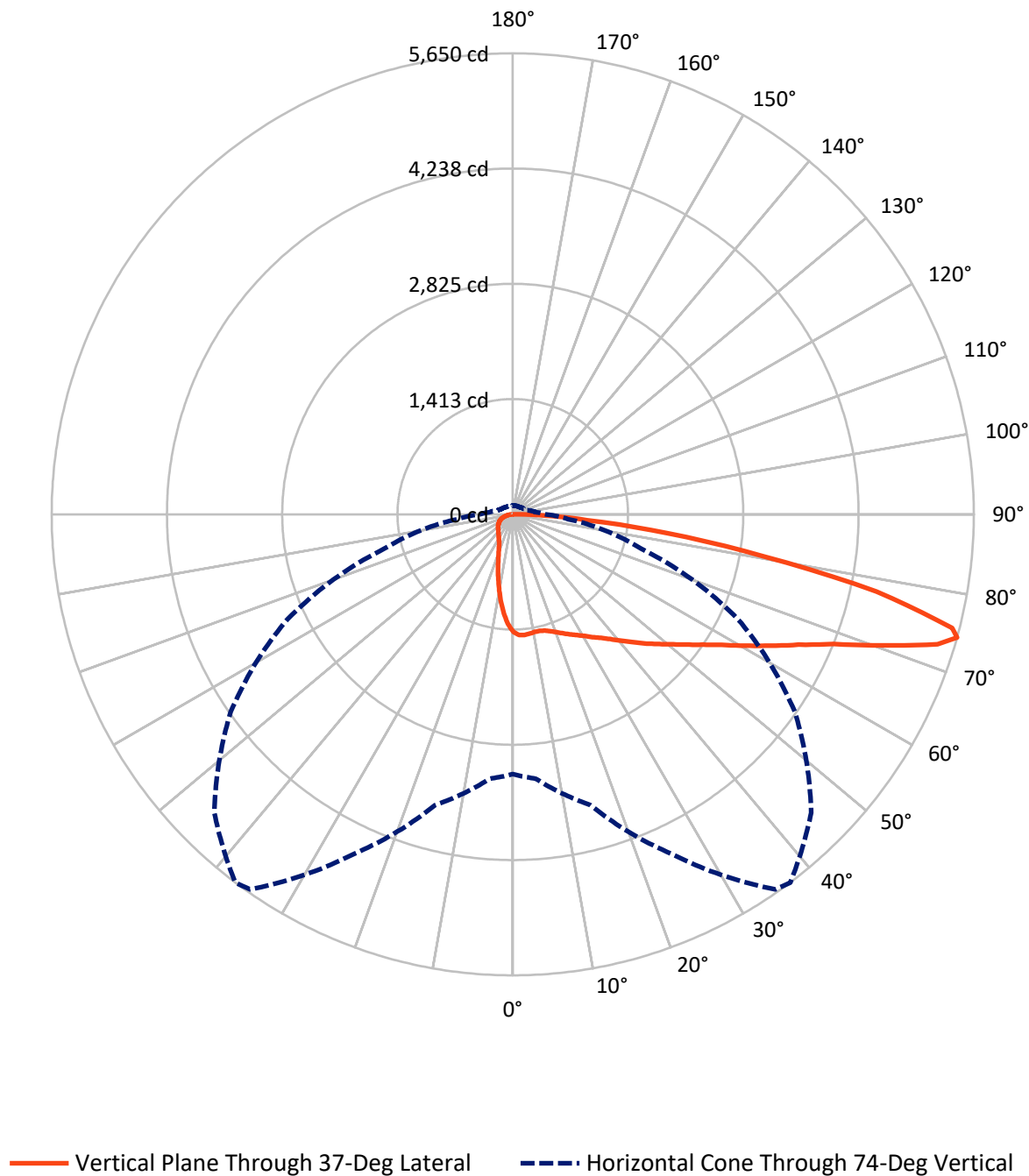


Based on 10 foot mounting height. Maximum calculated value = 14.7 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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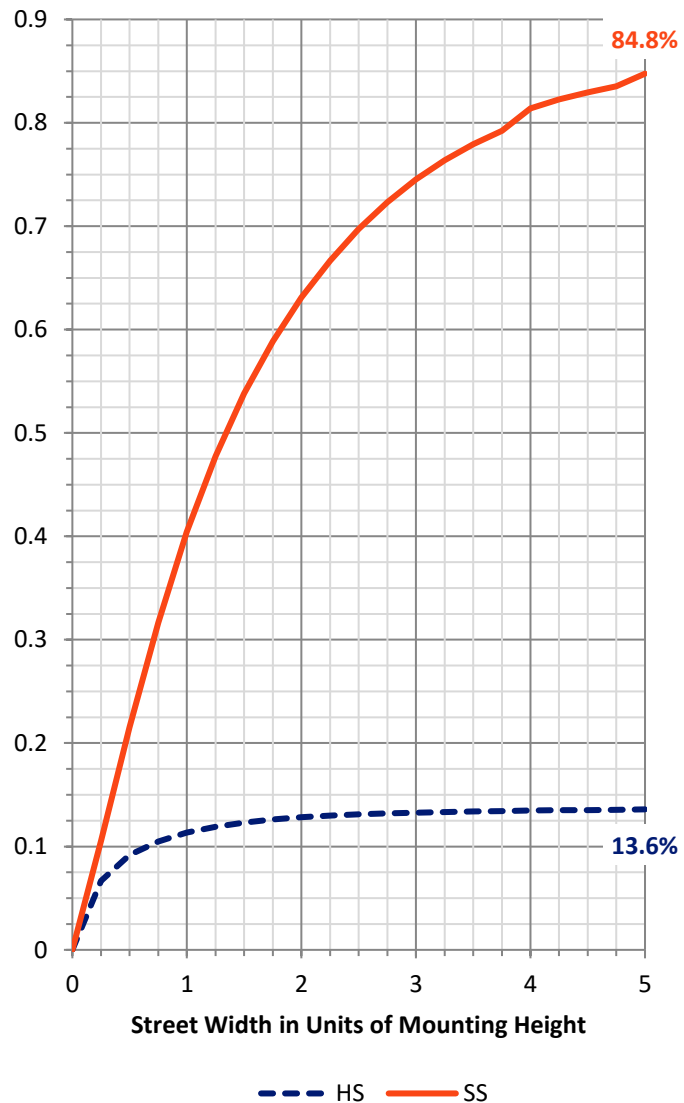
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1128.3   | 0.0    | 1128.3 |
|                    | % Fixture | 13.8     | 0.0    | 13.8   |
| <b>Street Side</b> | Lumens    | 7071.7   | 0.0    | 7071.7 |
|                    | % Fixture | 86.2     | 0.0    | 86.2   |
| <b>Total</b>       | Lumens    | 8200.0   | 0.0    | 8200.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 127.2  | 1.6       |
| 10°-20°   | 326.1  | 4.0       |
| 20°-30°   | 502.5  | 6.1       |
| 30°-40°   | 730.7  | 8.9       |
| 40°-50°   | 1075.5 | 13.1      |
| 50°-60°   | 1510.3 | 18.4      |
| 60°-70°   | 1911.6 | 23.3      |
| 70°-80°   | 1683.2 | 20.5      |
| 80°-90°   | 332.8  | 4.1       |
| 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°    | 8200.0 | 100.0     |
| 0°-180°   | 8200.0 | 100.0     |

**Coefficient of Utilization**



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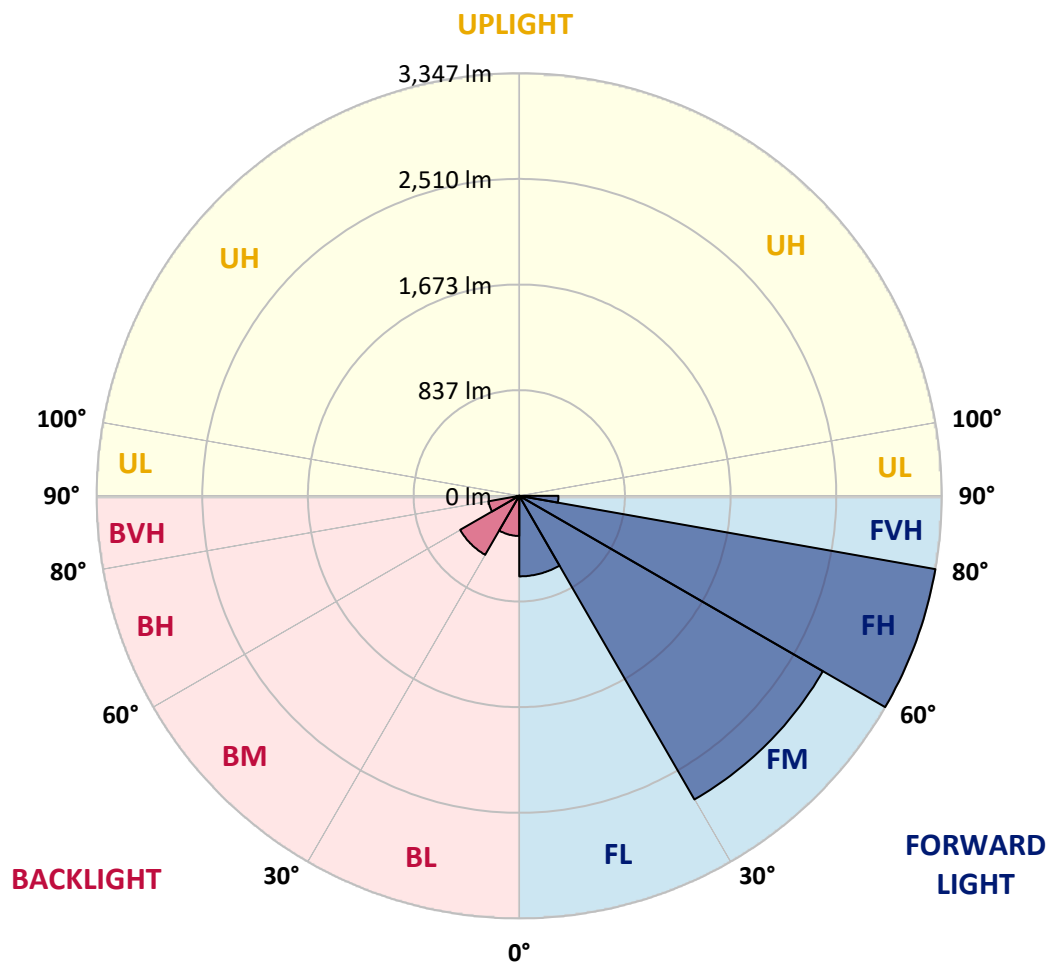
CATALOG NUMBER: NVN-SA2B-722-U-SL4

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 638.1  | 7.8       |                         |      |         |
| FM   | (30°-60°)   | 2776.6 | 33.9      |                         |      |         |
| FH   | (60°-80°)   | 3346.8 | 40.8      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 310.3  | 3.8       |                         |      | G3/500  |
| BL   | (0°-30°)    | 317.8  | 3.9       | B1/500                  |      |         |
| BM   | (30°-60°)   | 539.9  | 6.6       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 248.0  | 3.0       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 22.5   | 0.3       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G3**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 37°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 |
| 2.5°  | 1494.2 | 1494.5 | 1494.2 | 1491.9 | 1486.4 | 1481.8 | 1478.0 | 1472.5 | 1460.4 | 1451.2 | 1437.3 |
| 5°    | 1508.4 | 1506.6 | 1505.5 | 1501.1 | 1492.5 | 1487.3 | 1480.0 | 1469.6 | 1449.7 | 1431.2 | 1408.7 |
| 7.5°  | 1501.7 | 1499.7 | 1497.1 | 1491.9 | 1482.1 | 1477.7 | 1467.6 | 1454.1 | 1430.1 | 1405.8 | 1373.5 |
| 10°   | 1481.2 | 1480.6 | 1479.5 | 1478.3 | 1469.9 | 1466.5 | 1457.2 | 1442.8 | 1419.1 | 1389.6 | 1351.8 |
| 12.5° | 1458.4 | 1459.8 | 1464.4 | 1470.5 | 1466.8 | 1465.0 | 1459.3 | 1449.4 | 1425.2 | 1393.4 | 1347.8 |
| 15°   | 1443.9 | 1448.0 | 1460.4 | 1476.3 | 1479.5 | 1478.9 | 1477.4 | 1471.1 | 1445.4 | 1410.1 | 1357.0 |
| 17.5° | 1439.0 | 1445.7 | 1469.4 | 1495.6 | 1504.9 | 1506.9 | 1507.5 | 1496.5 | 1467.9 | 1430.7 | 1366.5 |
| 20°   | 1448.0 | 1456.4 | 1491.0 | 1527.1 | 1541.9 | 1543.0 | 1540.4 | 1521.4 | 1489.3 | 1448.3 | 1371.7 |
| 22.5° | 1475.1 | 1482.6 | 1526.0 | 1566.7 | 1583.5 | 1585.2 | 1577.4 | 1548.5 | 1511.8 | 1469.1 | 1379.0 |
| 25°   | 1527.4 | 1536.7 | 1580.0 | 1620.7 | 1629.4 | 1629.7 | 1618.4 | 1582.6 | 1541.3 | 1498.2 | 1394.5 |
| 27.5° | 1595.6 | 1604.8 | 1643.8 | 1683.7 | 1679.1 | 1676.5 | 1661.2 | 1625.3 | 1579.7 | 1538.4 | 1422.3 |
| 30°   | 1671.6 | 1681.7 | 1718.6 | 1746.9 | 1736.0 | 1730.8 | 1718.3 | 1672.1 | 1633.1 | 1593.3 | 1464.7 |
| 32.5° | 1750.1 | 1759.4 | 1791.7 | 1811.1 | 1797.2 | 1794.9 | 1776.1 | 1733.9 | 1702.7 | 1677.0 | 1533.5 |
| 35°   | 1830.7 | 1837.4 | 1869.1 | 1880.1 | 1861.6 | 1861.0 | 1855.8 | 1817.1 | 1797.5 | 1809.6 | 1633.4 |
| 37.5° | 1913.0 | 1914.8 | 1941.9 | 1942.5 | 1937.0 | 1939.3 | 1944.8 | 1920.5 | 1926.0 | 1963.9 | 1763.4 |
| 40°   | 1986.4 | 1991.0 | 2010.7 | 2016.7 | 2026.3 | 2034.3 | 2061.8 | 2045.9 | 2088.4 | 2155.4 | 1925.2 |
| 42.5° | 2040.7 | 2049.7 | 2081.1 | 2096.7 | 2127.6 | 2140.3 | 2179.1 | 2193.8 | 2279.3 | 2379.8 | 2117.5 |
| 45°   | 2086.6 | 2100.5 | 2151.0 | 2183.1 | 2235.4 | 2257.6 | 2313.1 | 2362.5 | 2495.1 | 2623.3 | 2320.0 |
| 47.5° | 2136.3 | 2153.9 | 2217.2 | 2278.4 | 2349.5 | 2374.6 | 2475.4 | 2549.4 | 2725.3 | 2868.2 | 2510.9 |
| 50°   | 2209.4 | 2223.0 | 2284.8 | 2381.0 | 2469.6 | 2502.0 | 2641.5 | 2747.5 | 2959.2 | 3101.6 | 2676.4 |
| 52.5° | 2311.3 | 2306.1 | 2358.4 | 2493.3 | 2612.3 | 2652.2 | 2818.8 | 2958.4 | 3196.4 | 3312.8 | 2816.2 |
| 55°   | 2413.9 | 2405.2 | 2441.9 | 2610.9 | 2778.7 | 2820.6 | 3014.1 | 3170.1 | 3422.0 | 3502.8 | 2923.4 |
| 57.5° | 2528.0 | 2511.5 | 2542.4 | 2743.5 | 2968.2 | 3018.2 | 3232.8 | 3395.1 | 3643.8 | 3656.5 | 2991.6 |
| 60°   | 2645.5 | 2623.3 | 2658.0 | 2907.8 | 3208.8 | 3267.7 | 3488.7 | 3614.6 | 3852.9 | 3779.6 | 3013.5 |
| 62.5° | 2748.4 | 2732.8 | 2786.2 | 3091.2 | 3480.0 | 3544.7 | 3740.0 | 3848.0 | 4059.2 | 3830.7 | 2934.4 |
| 65°   | 2838.2 | 2840.8 | 2933.2 | 3297.5 | 3782.4 | 3851.5 | 4028.2 | 4135.7 | 4221.5 | 3800.3 | 2749.2 |
| 67.5° | 2945.4 | 2960.1 | 3117.8 | 3569.0 | 4163.1 | 4238.8 | 4447.7 | 4449.4 | 4312.2 | 3622.4 | 2384.7 |
| 70°   | 3101.6 | 3132.0 | 3371.7 | 3945.6 | 4704.4 | 4808.4 | 4969.6 | 4633.7 | 4184.8 | 3140.0 | 1876.3 |
| 72.5° | 3240.3 | 3296.9 | 3641.8 | 4376.6 | 5364.2 | 5443.0 | 5274.9 | 4527.4 | 3652.5 | 2353.2 | 1169.0 |
| 74°   | 3184.0 | 3254.1 | 3690.9 | 4588.9 | 5612.6 | 5650.4 | 5171.8 | 4217.2 | 3045.3 | 1629.7 | 679.4  |
| 75°   | 3062.6 | 3138.9 | 3619.2 | 4586.9 | 5581.1 | 5560.0 | 4922.8 | 3862.7 | 2508.1 | 1111.5 | 452.0  |
| 77.5° | 2471.7 | 2552.2 | 3049.6 | 3931.2 | 4576.2 | 4556.3 | 3781.6 | 2591.2 | 1098.5 | 364.5  | 229.6  |
| 80°   | 1437.0 | 1498.5 | 1893.1 | 2496.5 | 3085.7 | 3121.8 | 2487.0 | 1282.2 | 432.1  | 204.8  | 155.7  |
| 82.5° | 638.3  | 680.8  | 914.5  | 1274.4 | 1862.2 | 1908.7 | 1302.4 | 671.9  | 266.9  | 124.5  | 93.6   |
| 85°   | 418.8  | 450.3  | 555.2  | 606.9  | 886.8  | 918.5  | 637.5  | 523.1  | 176.2  | 68.5   | 68.7   |
| 87.5° | 301.3  | 331.6  | 412.5  | 360.2  | 407.0  | 385.3  | 346.9  | 484.1  | 70.8   | 39.0   | 23.1   |
| 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°    | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 | 1444.8 |
| 2.5°  | 1431.2 | 1426.6 | 1416.2 | 1396.6 | 1385.6 | 1376.4 | 1361.0 | 1352.1 | 1348.0 | 1347.8 | 1349.5 |
| 5°    | 1395.7 | 1385.0 | 1358.2 | 1325.2 | 1298.9 | 1275.0 | 1245.2 | 1227.3 | 1214.6 | 1207.1 | 1209.1 |
| 7.5°  | 1354.4 | 1337.6 | 1295.5 | 1242.9 | 1200.7 | 1154.2 | 1108.3 | 1080.9 | 1059.5 | 1043.6 | 1046.5 |
| 10°   | 1326.1 | 1303.0 | 1241.5 | 1165.8 | 1095.6 | 1028.0 | 964.7  | 926.9  | 896.9  | 873.8  | 875.5  |
| 12.5° | 1316.6 | 1285.4 | 1200.2 | 1099.1 | 1000.6 | 908.1  | 825.5  | 767.5  | 736.6  | 710.3  | 712.3  |
| 15°   | 1318.0 | 1276.1 | 1165.5 | 1039.0 | 915.1  | 798.7  | 698.4  | 630.6  | 588.7  | 570.5  | 570.8  |
| 17.5° | 1319.2 | 1265.4 | 1129.1 | 974.6  | 830.4  | 696.4  | 587.5  | 518.8  | 479.2  | 462.4  | 462.7  |
| 20°   | 1315.4 | 1248.1 | 1084.0 | 900.6  | 742.0  | 602.5  | 497.1  | 438.8  | 408.7  | 395.7  | 395.7  |
| 22.5° | 1310.5 | 1227.6 | 1033.2 | 826.4  | 654.8  | 521.1  | 432.4  | 387.9  | 370.6  | 361.9  | 361.6  |
| 25°   | 1312.8 | 1212.3 | 981.2  | 750.1  | 574.5  | 456.1  | 389.4  | 359.9  | 348.3  | 342.9  | 342.6  |
| 27.5° | 1325.2 | 1205.1 | 933.3  | 674.2  | 504.3  | 407.3  | 360.5  | 339.7  | 332.2  | 328.7  | 328.7  |
| 30°   | 1347.8 | 1205.1 | 883.3  | 609.5  | 446.0  | 371.2  | 338.2  | 324.1  | 318.9  | 316.6  | 316.6  |
| 32.5° | 1387.0 | 1211.7 | 835.1  | 545.3  | 399.5  | 342.9  | 319.8  | 310.2  | 306.2  | 305.0  | 305.0  |
| 35°   | 1454.6 | 1234.2 | 788.0  | 484.7  | 361.9  | 319.8  | 302.1  | 296.6  | 293.8  | 293.5  | 294.3  |
| 37.5° | 1549.7 | 1280.2 | 743.8  | 439.9  | 335.4  | 301.0  | 287.4  | 283.1  | 281.3  | 282.8  | 283.9  |
| 40°   | 1669.2 | 1342.6 | 703.6  | 399.5  | 315.1  | 286.0  | 273.8  | 270.9  | 270.1  | 272.1  | 273.8  |
| 42.5° | 1813.7 | 1426.9 | 670.7  | 370.3  | 299.5  | 273.2  | 262.3  | 258.8  | 257.9  | 260.3  | 262.6  |
| 45°   | 1969.9 | 1517.6 | 647.6  | 348.6  | 287.4  | 263.7  | 252.2  | 248.4  | 246.7  | 247.8  | 250.4  |
| 47.5° | 2112.0 | 1603.4 | 638.3  | 333.3  | 275.8  | 255.6  | 243.2  | 238.6  | 235.7  | 235.1  | 237.1  |
| 50°   | 2231.9 | 1667.2 | 642.7  | 324.1  | 266.6  | 246.7  | 234.5  | 229.3  | 225.0  | 222.4  | 223.9  |
| 52.5° | 2319.1 | 1707.4 | 646.7  | 320.0  | 259.4  | 236.9  | 225.0  | 220.1  | 214.3  | 210.0  | 210.0  |
| 55°   | 2382.4 | 1716.6 | 637.8  | 316.9  | 253.9  | 226.2  | 214.3  | 209.7  | 203.9  | 199.0  | 198.4  |
| 57.5° | 2407.2 | 1690.6 | 604.6  | 312.2  | 250.1  | 216.1  | 203.1  | 199.6  | 194.7  | 188.9  | 188.6  |
| 60°   | 2373.7 | 1610.3 | 540.4  | 302.4  | 245.2  | 207.7  | 191.8  | 189.5  | 187.2  | 181.7  | 181.4  |
| 62.5° | 2239.1 | 1434.1 | 457.5  | 282.5  | 235.4  | 198.7  | 181.4  | 182.6  | 182.8  | 179.1  | 178.5  |
| 65°   | 1995.1 | 1192.1 | 376.7  | 256.5  | 220.7  | 188.0  | 170.7  | 176.2  | 179.4  | 178.8  | 177.9  |
| 67.5° | 1640.4 | 927.8  | 319.2  | 229.1  | 201.3  | 173.3  | 159.2  | 165.5  | 168.1  | 170.1  | 169.6  |
| 70°   | 1217.5 | 654.2  | 264.0  | 200.2  | 177.9  | 156.0  | 144.1  | 147.3  | 145.6  | 147.9  | 148.8  |
| 72.5° | 678.8  | 392.5  | 215.2  | 171.3  | 153.7  | 135.8  | 127.4  | 126.8  | 123.0  | 123.0  | 123.0  |
| 74°   | 407.3  | 288.0  | 189.2  | 153.4  | 138.9  | 122.5  | 115.2  | 112.6  | 109.2  | 109.5  | 109.2  |
| 75°   | 327.6  | 247.5  | 173.6  | 141.5  | 128.5  | 114.7  | 107.5  | 104.0  | 101.4  | 101.4  | 101.1  |
| 77.5° | 206.8  | 188.0  | 139.8  | 112.6  | 102.8  | 94.5   | 89.5   | 84.9   | 84.9   | 84.6   | 84.3   |
| 80°   | 156.3  | 149.6  | 108.9  | 85.2   | 78.9   | 72.5   | 69.3   | 67.3   | 67.3   | 68.2   | 67.9   |
| 82.5° | 107.2  | 112.6  | 76.5   | 59.5   | 56.3   | 51.7   | 51.1   | 51.4   | 50.5   | 49.4   | 49.1   |
| 85°   | 78.3   | 84.6   | 51.7   | 37.5   | 34.4   | 31.5   | 33.8   | 35.0   | 33.5   | 30.9   | 29.8   |
| 87.5° | 30.0   | 55.5   | 27.7   | 15.6   | 14.4   | 12.4   | 14.4   | 15.0   | 16.2   | 12.7   | 13.0   |
| 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.

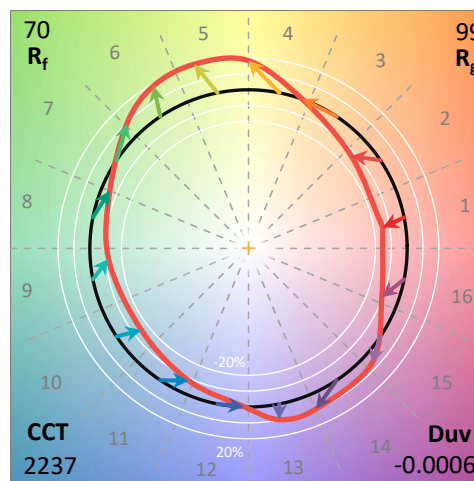
### Test Information

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

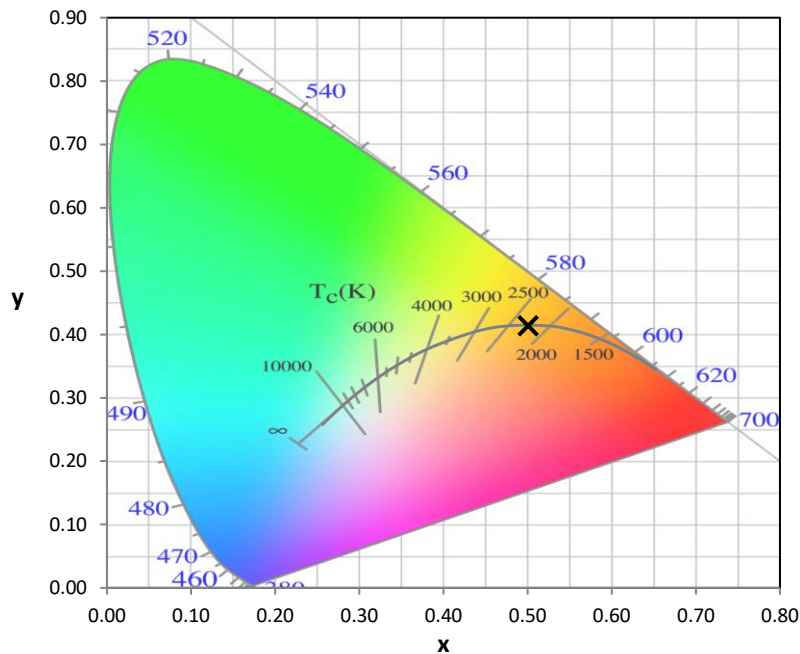
Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

REPORT NUMBER: SP1-1908-441-10-R4

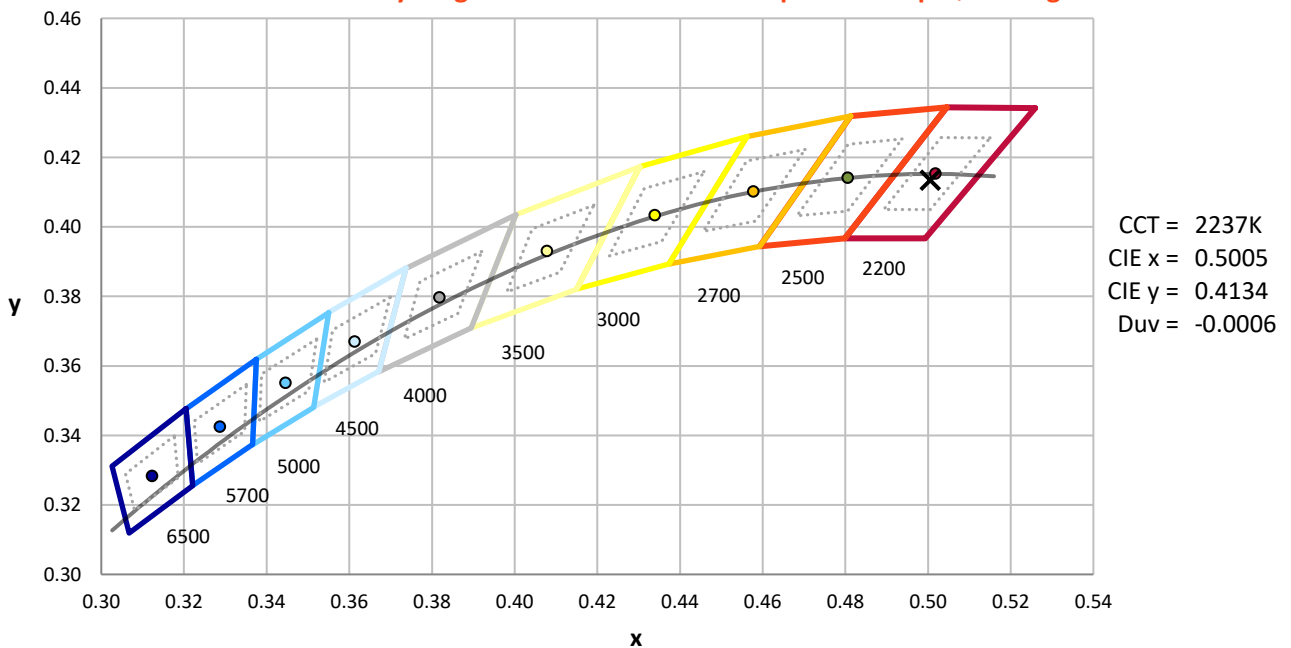
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



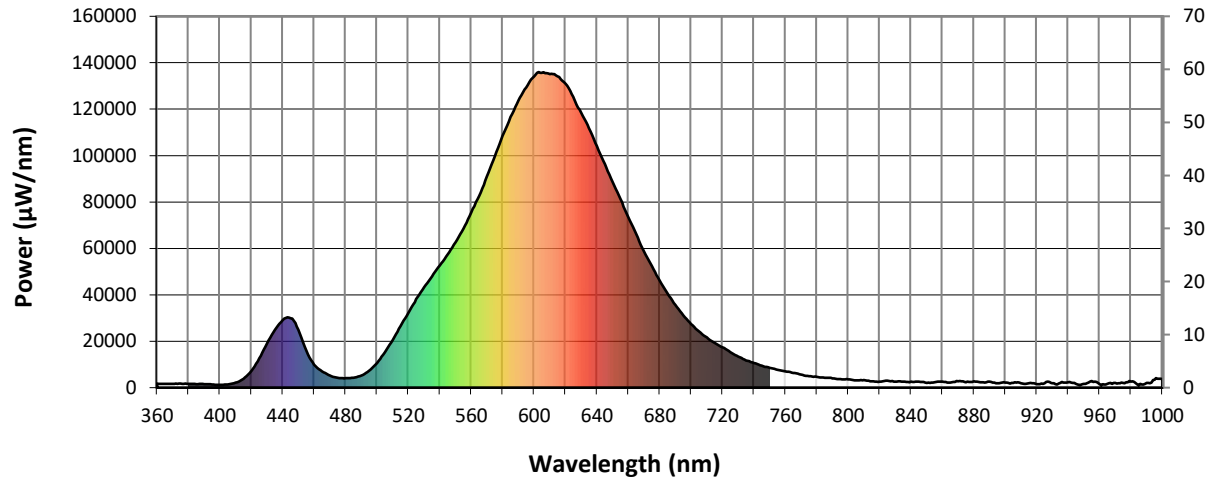
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

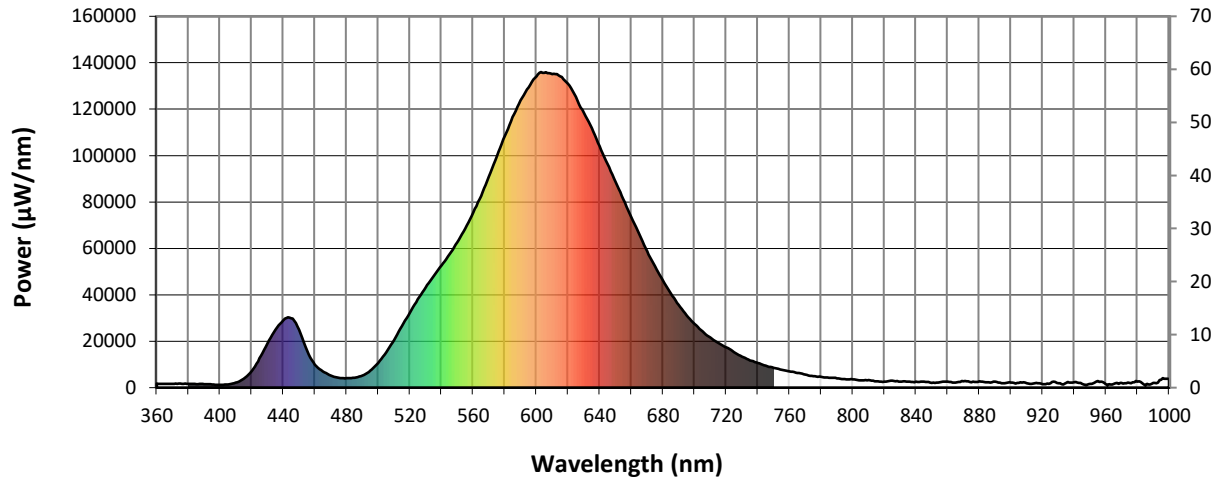


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



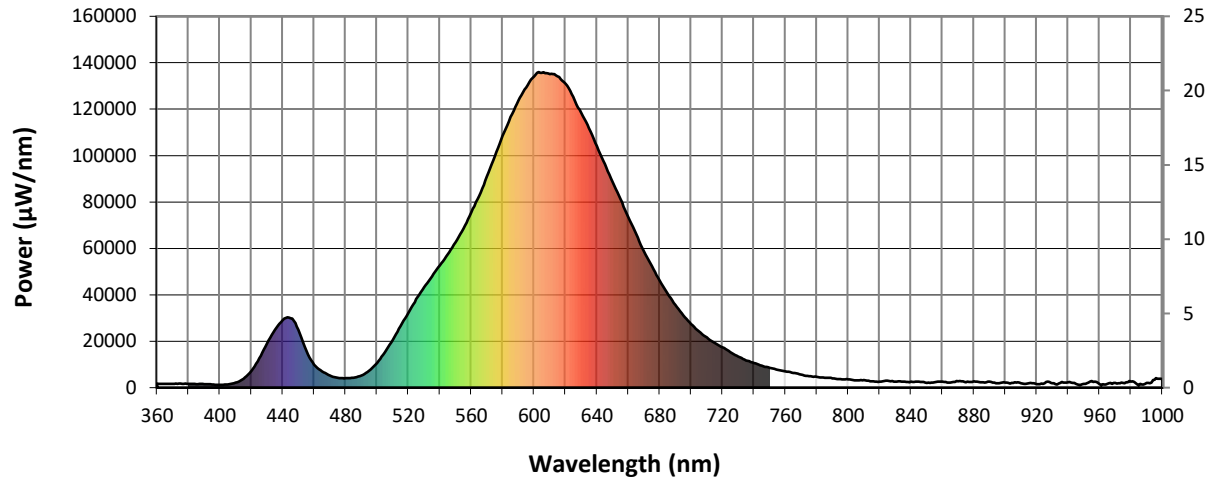
Scotopic Lumens: 4696.9

S/P: 0.85

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



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

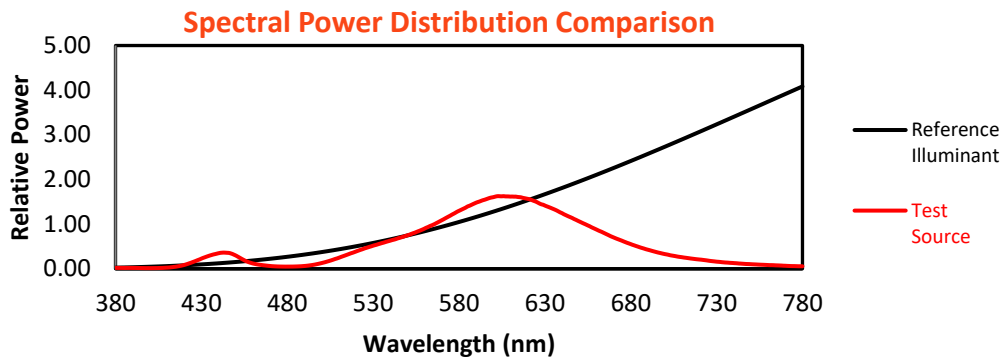
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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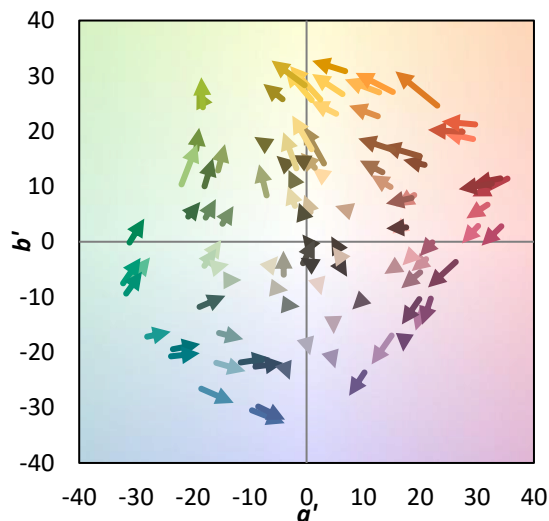
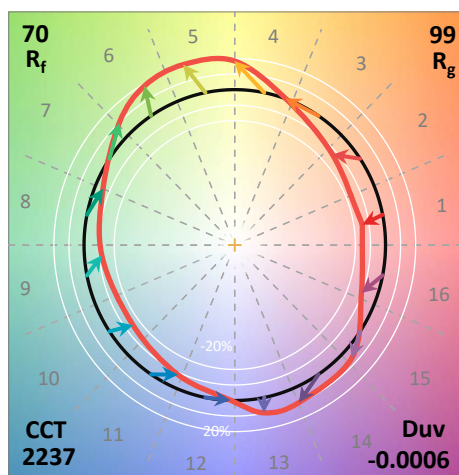
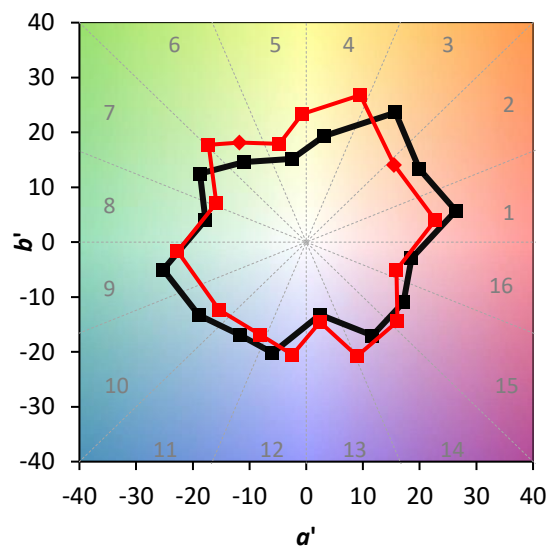
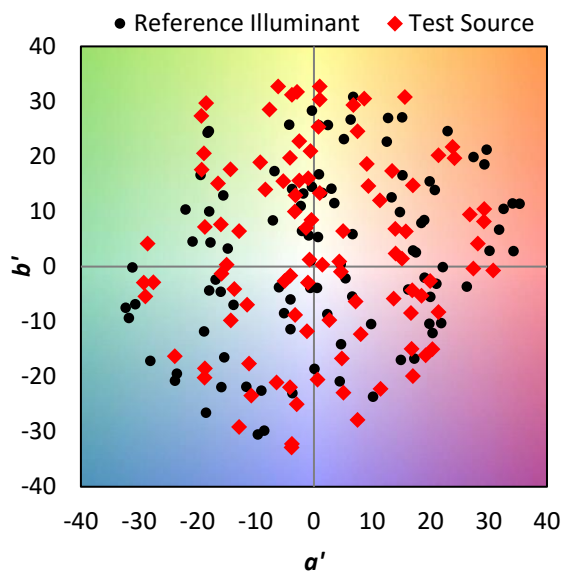
**TM-30-18**

### Summary

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



### Color Vector Graphics



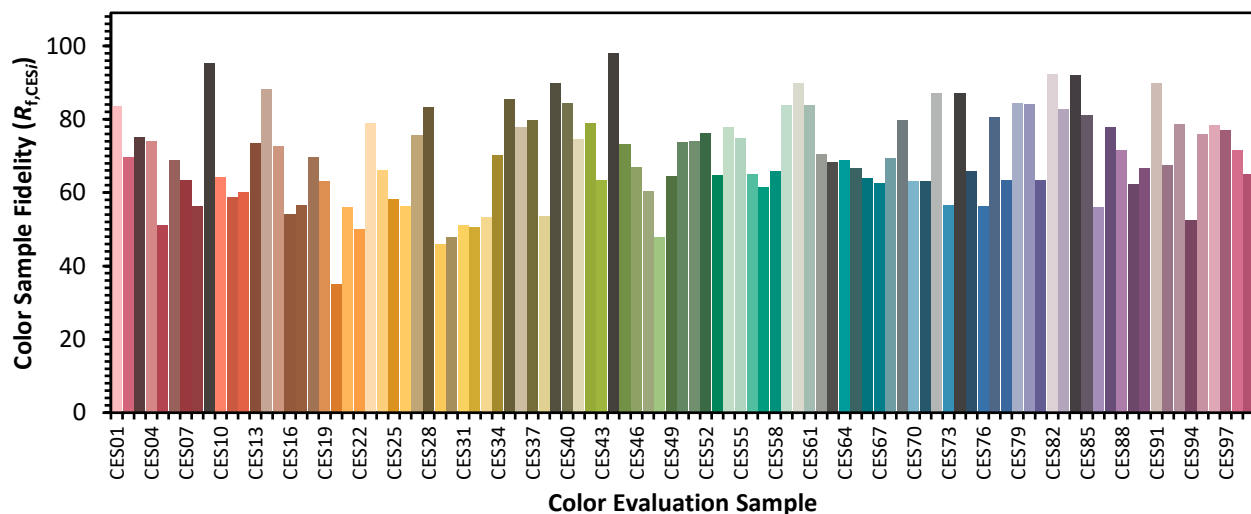


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

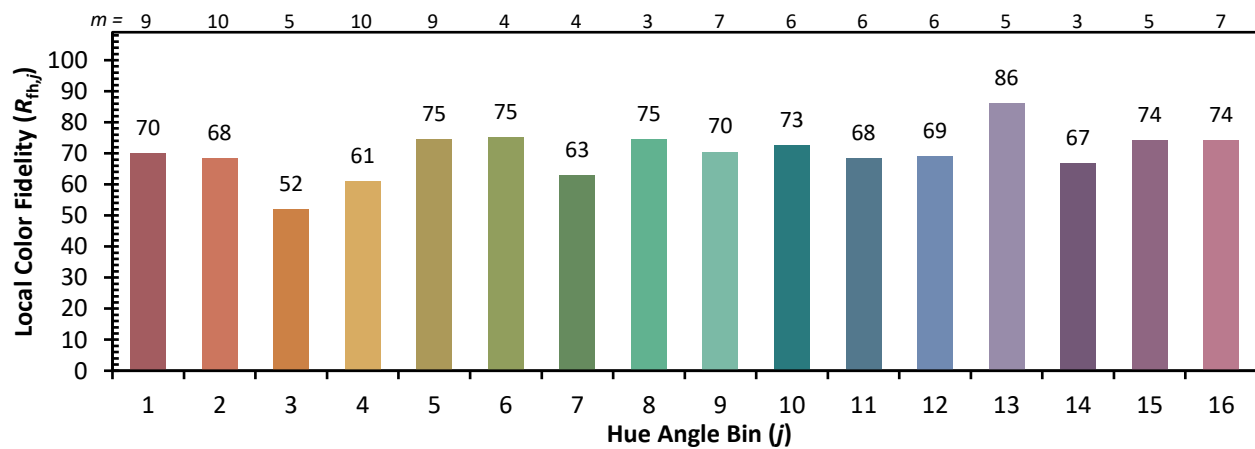
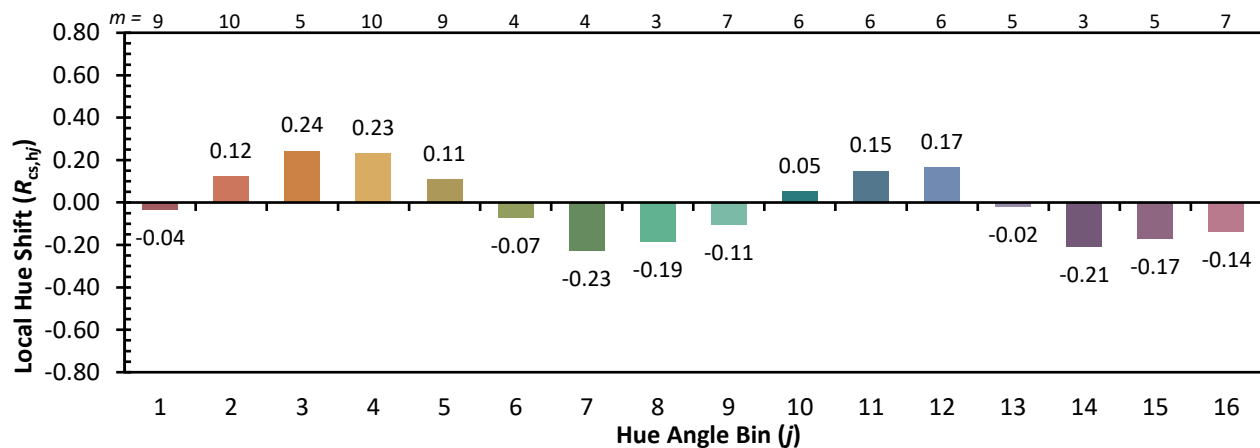
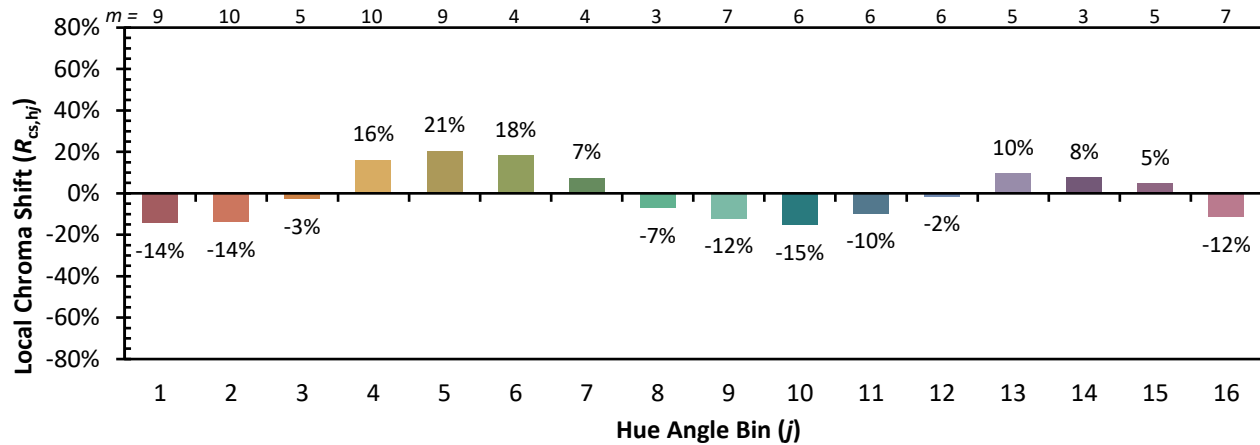
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54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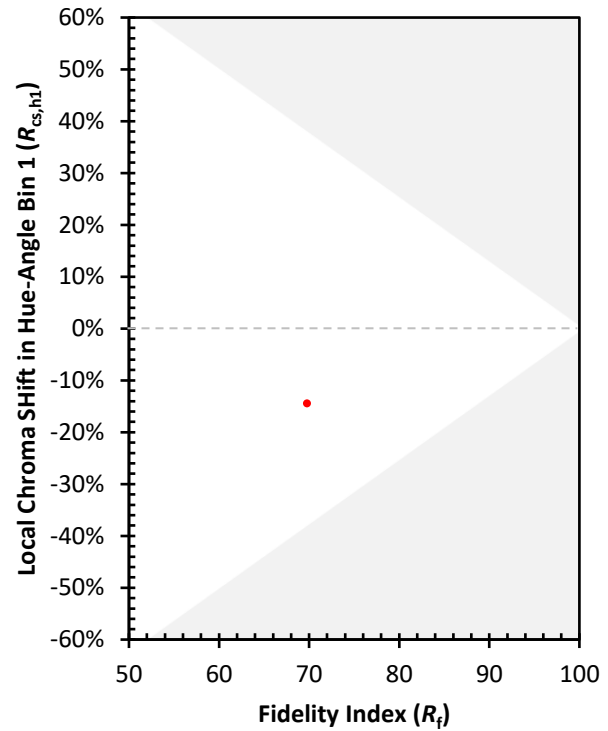
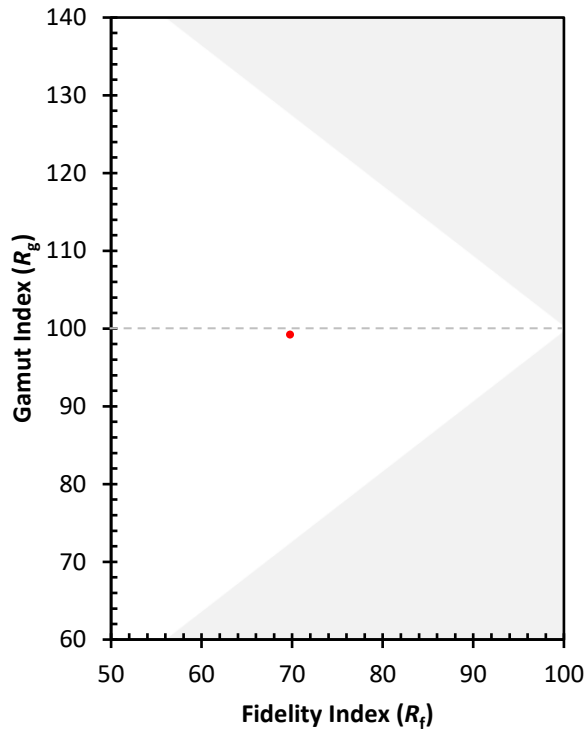
Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)