

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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: P359513

Luminaire Tested: NVN-SA1C-730-U-SL4

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P359513  
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-SA1C-730-U-SL4  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 3000K, 1050mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV SPILL  
LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 6307 lumens  
Efficiency: N/A  
Efficacy: 106.9 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G3

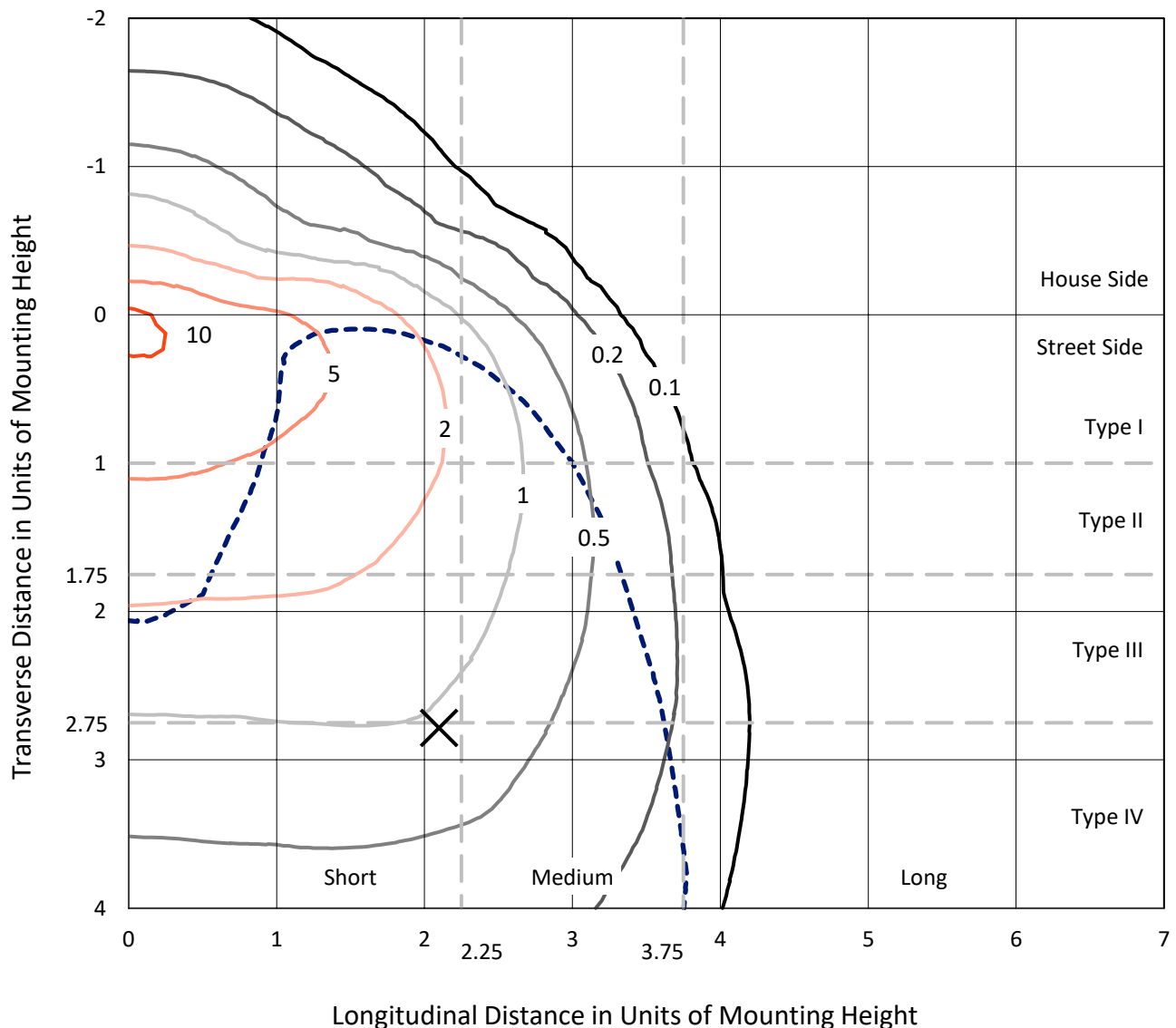
Input Watts (W): 59  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

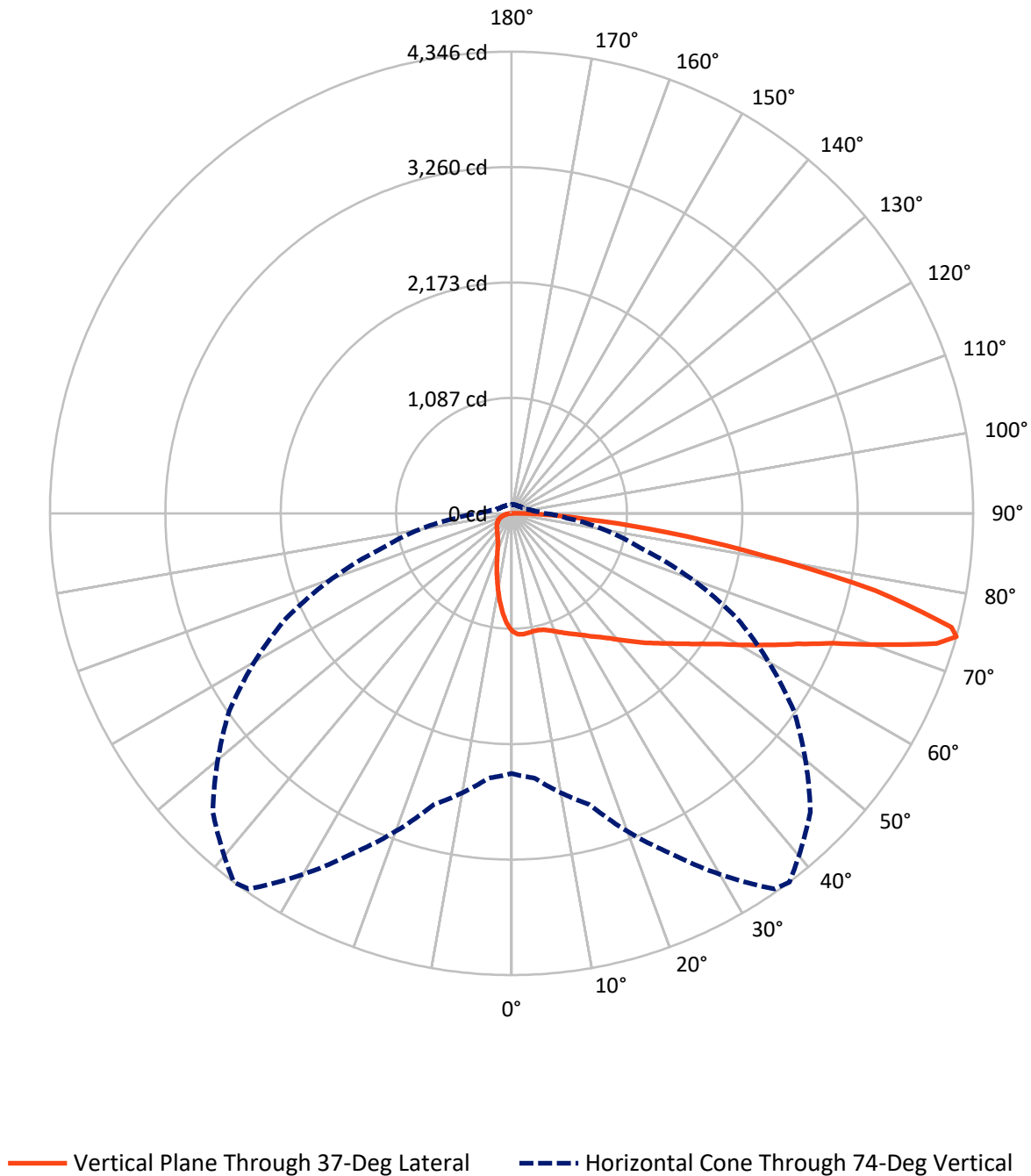
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 11.3 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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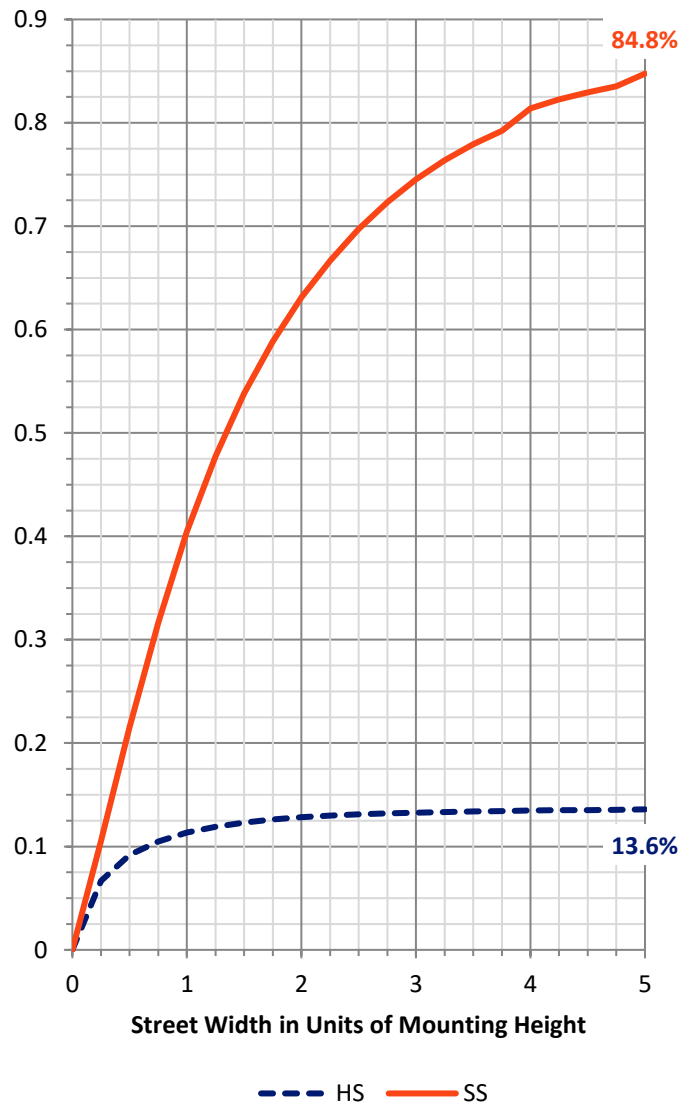
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 867.8    | 0.0    | 867.8  |
|                    | % Fixture | 13.8     | 0.0    | 13.8   |
| <b>Street Side</b> | Lumens    | 5439.2   | 0.0    | 5439.2 |
|                    | % Fixture | 86.2     | 0.0    | 86.2   |
| <b>Total</b>       | Lumens    | 6307.0   | 0.0    | 6307.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 97.9   | 1.6       |
| 10°-20°   | 250.8  | 4.0       |
| 20°-30°   | 386.5  | 6.1       |
| 30°-40°   | 562.0  | 8.9       |
| 40°-50°   | 827.2  | 13.1      |
| 50°-60°   | 1161.7 | 18.4      |
| 60°-70°   | 1470.3 | 23.3      |
| 70°-80°   | 1294.7 | 20.5      |
| 80°-90°   | 256.0  | 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°    | 6307.0 | 100.0     |
| 0°-180°   | 6307.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P359513

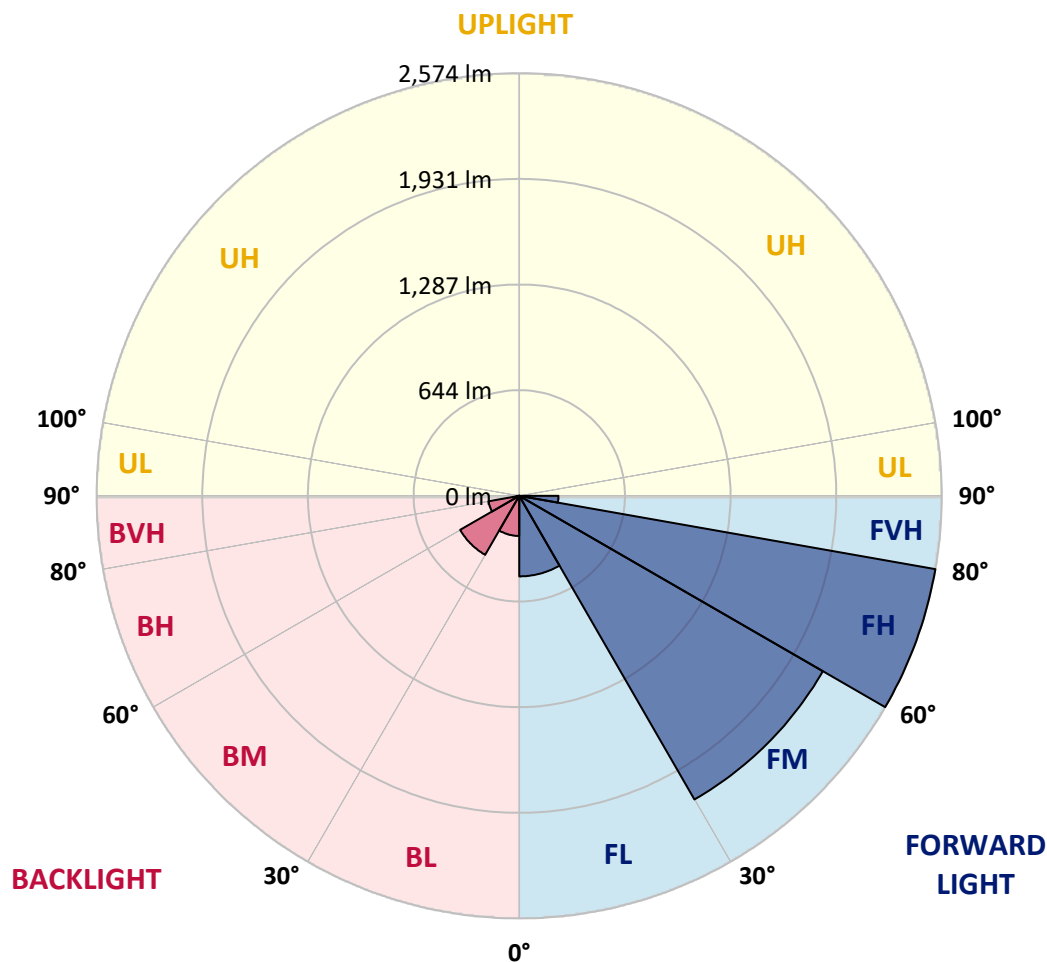
CATALOG NUMBER: NVN-SA1C-730-U-SL4

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 490.8  | 7.8       |                         |      |         |
| FM   | (30°-60°)   | 2135.6 | 33.9      |                         |      |         |
| FH   | (60°-80°)   | 2574.2 | 40.8      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 238.6  | 3.8       |                         |      | G3/500  |
| BL   | (0°-30°)    | 244.4  | 3.9       | B1/500                  |      |         |
| BM   | (30°-60°)   | 415.3  | 6.6       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 190.8  | 3.0       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 17.3   | 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°    | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 |
| 2.5°  | 1149.3 | 1149.5 | 1149.3 | 1147.5 | 1143.3 | 1139.7 | 1136.8 | 1132.6 | 1123.3 | 1116.2 | 1105.5 |
| 5°    | 1160.1 | 1158.8 | 1157.9 | 1154.6 | 1147.9 | 1143.9 | 1138.4 | 1130.4 | 1115.0 | 1100.8 | 1083.5 |
| 7.5°  | 1155.0 | 1153.5 | 1151.5 | 1147.5 | 1139.9 | 1136.6 | 1128.8 | 1118.4 | 1099.9 | 1081.3 | 1056.4 |
| 10°   | 1139.3 | 1138.8 | 1137.9 | 1137.0 | 1130.6 | 1127.9 | 1120.8 | 1109.7 | 1091.5 | 1068.8 | 1039.7 |
| 12.5° | 1121.7 | 1122.8 | 1126.4 | 1131.0 | 1128.2 | 1126.8 | 1122.4 | 1114.8 | 1096.2 | 1071.7 | 1036.6 |
| 15°   | 1110.6 | 1113.7 | 1123.3 | 1135.5 | 1137.9 | 1137.5 | 1136.4 | 1131.5 | 1111.7 | 1084.6 | 1043.7 |
| 17.5° | 1106.8 | 1111.9 | 1130.2 | 1150.4 | 1157.5 | 1159.0 | 1159.5 | 1151.0 | 1129.0 | 1100.4 | 1051.1 |
| 20°   | 1113.7 | 1120.2 | 1146.8 | 1174.6 | 1185.9 | 1186.8 | 1184.8 | 1170.1 | 1145.5 | 1113.9 | 1055.1 |
| 22.5° | 1134.6 | 1140.4 | 1173.7 | 1205.0 | 1217.9 | 1219.2 | 1213.2 | 1191.0 | 1162.8 | 1129.9 | 1060.6 |
| 25°   | 1174.8 | 1181.9 | 1215.2 | 1246.6 | 1253.2 | 1253.5 | 1244.8 | 1217.2 | 1185.5 | 1152.4 | 1072.6 |
| 27.5° | 1227.2 | 1234.3 | 1264.3 | 1295.0 | 1291.4 | 1289.4 | 1277.7 | 1250.1 | 1215.0 | 1183.3 | 1093.9 |
| 30°   | 1285.7 | 1293.4 | 1321.9 | 1343.7 | 1335.2 | 1331.2 | 1321.7 | 1286.1 | 1256.1 | 1225.5 | 1126.6 |
| 32.5° | 1346.1 | 1353.2 | 1378.1 | 1393.0 | 1382.3 | 1380.5 | 1366.1 | 1333.7 | 1309.7 | 1289.9 | 1179.5 |
| 35°   | 1408.1 | 1413.2 | 1437.6 | 1446.1 | 1431.9 | 1431.4 | 1427.4 | 1397.6 | 1382.5 | 1391.9 | 1256.3 |
| 37.5° | 1471.4 | 1472.7 | 1493.6 | 1494.1 | 1489.8 | 1491.6 | 1495.8 | 1477.2 | 1481.4 | 1510.5 | 1356.3 |
| 40°   | 1527.8 | 1531.4 | 1546.5 | 1551.2 | 1558.5 | 1564.7 | 1585.8 | 1573.6 | 1606.3 | 1657.8 | 1480.7 |
| 42.5° | 1569.6 | 1576.5 | 1600.7 | 1612.7 | 1636.5 | 1646.2 | 1676.0 | 1687.3 | 1753.1 | 1830.4 | 1628.7 |
| 45°   | 1604.9 | 1615.6 | 1654.5 | 1679.1 | 1719.3 | 1736.4 | 1779.1 | 1817.1 | 1919.1 | 2017.7 | 1784.4 |
| 47.5° | 1643.1 | 1656.7 | 1705.3 | 1752.4 | 1807.1 | 1826.4 | 1904.0 | 1960.8 | 2096.1 | 2206.1 | 1931.3 |
| 50°   | 1699.3 | 1709.8 | 1757.3 | 1831.3 | 1899.5 | 1924.4 | 2031.7 | 2113.2 | 2276.1 | 2385.6 | 2058.6 |
| 52.5° | 1777.8 | 1773.8 | 1814.0 | 1917.7 | 2009.3 | 2039.9 | 2168.1 | 2275.4 | 2458.5 | 2548.0 | 2166.1 |
| 55°   | 1856.6 | 1850.0 | 1878.2 | 2008.1 | 2137.2 | 2169.4 | 2318.3 | 2438.3 | 2632.0 | 2694.2 | 2248.5 |
| 57.5° | 1944.4 | 1931.7 | 1955.5 | 2110.1 | 2283.0 | 2321.4 | 2486.5 | 2611.3 | 2802.6 | 2812.4 | 2301.0 |
| 60°   | 2034.8 | 2017.7 | 2044.4 | 2236.5 | 2468.0 | 2513.4 | 2683.3 | 2780.2 | 2963.5 | 2907.0 | 2317.8 |
| 62.5° | 2113.9 | 2101.9 | 2143.0 | 2377.6 | 2676.6 | 2726.4 | 2876.6 | 2959.7 | 3122.1 | 2946.4 | 2257.0 |
| 65°   | 2183.0 | 2185.0 | 2256.1 | 2536.2 | 2909.2 | 2962.3 | 3098.3 | 3181.0 | 3246.9 | 2923.0 | 2114.6 |
| 67.5° | 2265.4 | 2276.7 | 2398.0 | 2745.1 | 3202.1 | 3260.3 | 3420.9 | 3422.2 | 3316.7 | 2786.2 | 1834.2 |
| 70°   | 2385.6 | 2408.9 | 2593.3 | 3034.8 | 3618.4 | 3698.4 | 3822.3 | 3564.0 | 3218.7 | 2415.2 | 1443.2 |
| 72.5° | 2492.2 | 2535.8 | 2801.1 | 3366.2 | 4125.8 | 4186.5 | 4057.2 | 3482.2 | 2809.3 | 1810.0 | 899.1  |
| 74°   | 2448.9 | 2502.9 | 2838.8 | 3529.5 | 4316.9 | 4346.0 | 3977.9 | 3243.6 | 2342.3 | 1253.5 | 522.5  |
| 75°   | 2355.6 | 2414.3 | 2783.7 | 3528.0 | 4292.7 | 4276.5 | 3786.4 | 2971.0 | 1929.1 | 854.9  | 347.7  |
| 77.5° | 1901.1 | 1963.0 | 2345.6 | 3023.7 | 3519.8 | 3504.4 | 2908.6 | 1993.0 | 844.9  | 280.4  | 176.6  |
| 80°   | 1105.3 | 1152.6 | 1456.1 | 1920.2 | 2373.4 | 2401.2 | 1912.8 | 986.2  | 332.4  | 157.5  | 119.7  |
| 82.5° | 491.0  | 523.6  | 703.4  | 980.2  | 1432.3 | 1468.1 | 1001.7 | 516.8  | 205.3  | 95.8   | 72.0   |
| 85°   | 322.1  | 346.4  | 427.0  | 466.8  | 682.0  | 706.5  | 490.3  | 402.3  | 135.5  | 52.7   | 52.9   |
| 87.5° | 231.7  | 255.0  | 317.3  | 277.0  | 313.0  | 296.4  | 266.8  | 372.3  | 54.4   | 30.0   | 17.8   |
| 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: NVN-SA1C-730-U-SL4

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 | 1111.3 |
| 2.5°  | 1100.8 | 1097.3 | 1089.3 | 1074.2 | 1065.7 | 1058.6 | 1046.8 | 1040.0 | 1036.8 | 1036.6 | 1038.0 |
| 5°    | 1073.5 | 1065.3 | 1044.6 | 1019.3 | 999.1  | 980.6  | 957.8  | 944.0  | 934.2  | 928.4  | 930.0  |
| 7.5°  | 1041.7 | 1028.8 | 996.4  | 956.0  | 923.5  | 887.8  | 852.4  | 831.3  | 814.9  | 802.7  | 804.9  |
| 10°   | 1020.0 | 1002.2 | 954.9  | 896.7  | 842.7  | 790.7  | 742.0  | 712.9  | 689.8  | 672.0  | 673.4  |
| 12.5° | 1012.6 | 988.6  | 923.1  | 845.3  | 769.6  | 698.5  | 634.9  | 590.3  | 566.5  | 546.3  | 547.9  |
| 15°   | 1013.7 | 981.5  | 896.4  | 799.1  | 703.8  | 614.3  | 537.2  | 485.0  | 452.8  | 438.8  | 439.0  |
| 17.5° | 1014.6 | 973.3  | 868.4  | 749.6  | 638.7  | 535.6  | 451.9  | 399.0  | 368.6  | 355.7  | 355.9  |
| 20°   | 1011.7 | 960.0  | 833.8  | 692.7  | 570.7  | 463.4  | 382.3  | 337.5  | 314.4  | 304.4  | 304.4  |
| 22.5° | 1008.0 | 944.2  | 794.7  | 635.6  | 503.6  | 400.8  | 332.6  | 298.4  | 285.0  | 278.4  | 278.2  |
| 25°   | 1009.7 | 932.4  | 754.7  | 577.0  | 441.9  | 350.8  | 299.5  | 276.8  | 267.9  | 263.7  | 263.5  |
| 27.5° | 1019.3 | 926.9  | 717.8  | 518.5  | 387.9  | 313.3  | 277.3  | 261.3  | 255.5  | 252.8  | 252.8  |
| 30°   | 1036.6 | 926.9  | 679.4  | 468.8  | 343.0  | 285.5  | 260.2  | 249.3  | 245.3  | 243.5  | 243.5  |
| 32.5° | 1066.8 | 932.0  | 642.3  | 419.4  | 307.3  | 263.7  | 245.9  | 238.6  | 235.5  | 234.6  | 234.6  |
| 35°   | 1118.8 | 949.3  | 606.1  | 372.8  | 278.4  | 245.9  | 232.4  | 228.2  | 225.9  | 225.7  | 226.4  |
| 37.5° | 1191.9 | 984.6  | 572.1  | 338.4  | 257.9  | 231.5  | 221.1  | 217.7  | 216.4  | 217.5  | 218.4  |
| 40°   | 1283.9 | 1032.6 | 541.2  | 307.3  | 242.4  | 219.9  | 210.6  | 208.4  | 207.7  | 209.3  | 210.6  |
| 42.5° | 1395.0 | 1097.5 | 515.9  | 284.8  | 230.4  | 210.2  | 201.7  | 199.1  | 198.4  | 200.2  | 201.9  |
| 45°   | 1515.2 | 1167.3 | 498.1  | 268.2  | 221.1  | 202.8  | 193.9  | 191.1  | 189.7  | 190.6  | 192.6  |
| 47.5° | 1624.5 | 1233.2 | 491.0  | 256.4  | 212.2  | 196.6  | 187.1  | 183.5  | 181.3  | 180.8  | 182.4  |
| 50°   | 1716.7 | 1282.3 | 494.3  | 249.3  | 205.1  | 189.7  | 180.4  | 176.4  | 173.1  | 171.1  | 172.2  |
| 52.5° | 1783.8 | 1313.2 | 497.4  | 246.2  | 199.5  | 182.2  | 173.1  | 169.3  | 164.8  | 161.5  | 161.5  |
| 55°   | 1832.4 | 1320.3 | 490.5  | 243.7  | 195.3  | 174.0  | 164.8  | 161.3  | 156.8  | 153.1  | 152.6  |
| 57.5° | 1851.5 | 1300.3 | 465.0  | 240.2  | 192.4  | 166.2  | 156.2  | 153.5  | 149.7  | 145.3  | 145.1  |
| 60°   | 1825.8 | 1238.6 | 415.7  | 232.6  | 188.6  | 159.7  | 147.5  | 145.7  | 144.0  | 139.7  | 139.5  |
| 62.5° | 1722.2 | 1103.0 | 351.9  | 217.3  | 181.1  | 152.8  | 139.5  | 140.4  | 140.6  | 137.7  | 137.3  |
| 65°   | 1534.5 | 916.9  | 289.7  | 197.3  | 169.7  | 144.6  | 131.3  | 135.5  | 138.0  | 137.5  | 136.9  |
| 67.5° | 1261.7 | 713.6  | 245.5  | 176.2  | 154.8  | 133.3  | 122.4  | 127.3  | 129.3  | 130.9  | 130.4  |
| 70°   | 936.4  | 503.2  | 203.1  | 154.0  | 136.9  | 120.0  | 110.9  | 113.3  | 112.0  | 113.7  | 114.4  |
| 72.5° | 522.1  | 301.9  | 165.5  | 131.7  | 118.2  | 104.4  | 98.0   | 97.5   | 94.6   | 94.6   | 94.6   |
| 74°   | 313.3  | 221.5  | 145.5  | 118.0  | 106.9  | 94.2   | 88.6   | 86.6   | 84.0   | 84.2   | 84.0   |
| 75°   | 251.9  | 190.4  | 133.5  | 108.9  | 98.9   | 88.2   | 82.6   | 80.0   | 78.0   | 78.0   | 77.8   |
| 77.5° | 159.1  | 144.6  | 107.5  | 86.6   | 79.1   | 72.6   | 68.9   | 65.3   | 65.3   | 65.1   | 64.9   |
| 80°   | 120.2  | 115.1  | 83.8   | 65.5   | 60.7   | 55.8   | 53.3   | 51.8   | 51.8   | 52.4   | 52.2   |
| 82.5° | 82.4   | 86.6   | 58.9   | 45.8   | 43.3   | 39.8   | 39.3   | 39.5   | 38.9   | 38.0   | 37.8   |
| 85°   | 60.2   | 65.1   | 39.8   | 28.9   | 26.4   | 24.2   | 26.0   | 26.9   | 25.8   | 23.8   | 22.9   |
| 87.5° | 23.1   | 42.7   | 21.3   | 12.0   | 11.1   | 9.6    | 11.1   | 11.6   | 12.4   | 9.8    | 10.0   |
| 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: SP1-1908-441-2-R4

Test Date: 10/03/2019

Luminaire Tested: SA1C-730-U-5WQ

Data in this report applies to families of products SA1C-730-U-5WQ .

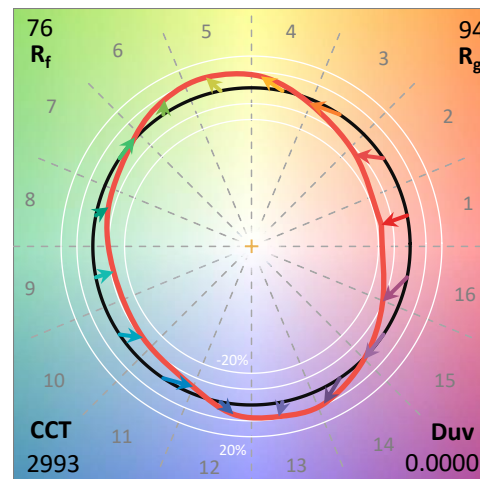
### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-2-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-730-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-2-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. (1) 70 CRI, 3000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 2993   | CRI (Ra): | 71.8 |      |       |
| CIE u':                   | 0.2508 | R1:       | 67.5 | R9:  | -38.3 |
| CIE v':                   | 0.5215 | R2:       | 82.9 | R10: | 62.5  |
| Duv:                      | 0.0000 | R3:       | 94.7 | R11: | 63.7  |
| CIE x:                    | 0.4374 | R4:       | 67.7 | R12: | 57.8  |
| CIE y:                    | 0.4043 | R5:       | 67.9 | R13: | 70.4  |
| CIE z:                    | 0.1583 | R6:       | 77.6 | R14: | 97.3  |
| Peak Wavelength (nm):     | 593    | R7:       | 76.0 |      |       |
| Dominant Wavelength (nm): | 582    | R8:       | 40.5 |      |       |
| Purity:                   | 53     |           |      |      |       |
| Rf:                       | 75.7   |           |      |      |       |
| Rg:                       | 93.9   |           |      |      |       |



### Test Conditions

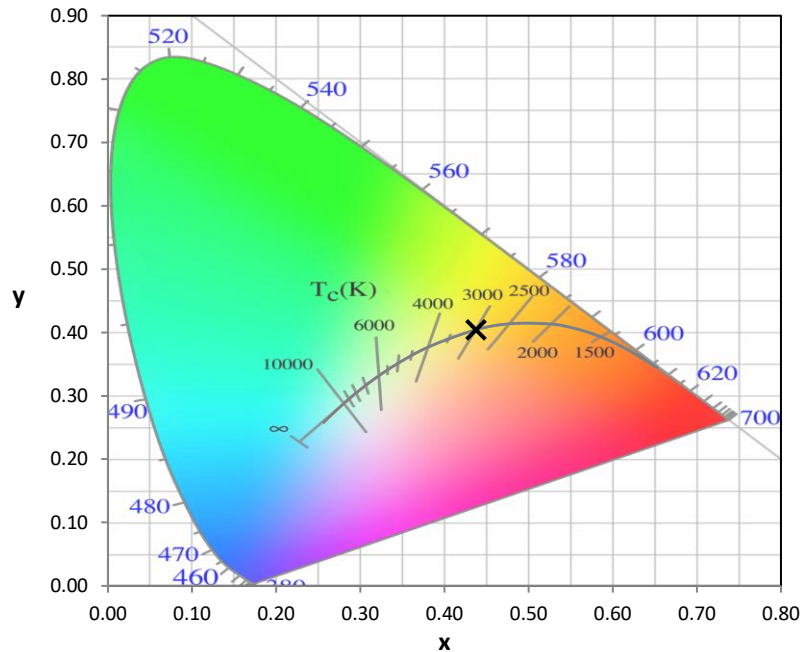
Stabilization Time: 53M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0./44%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-2-R4

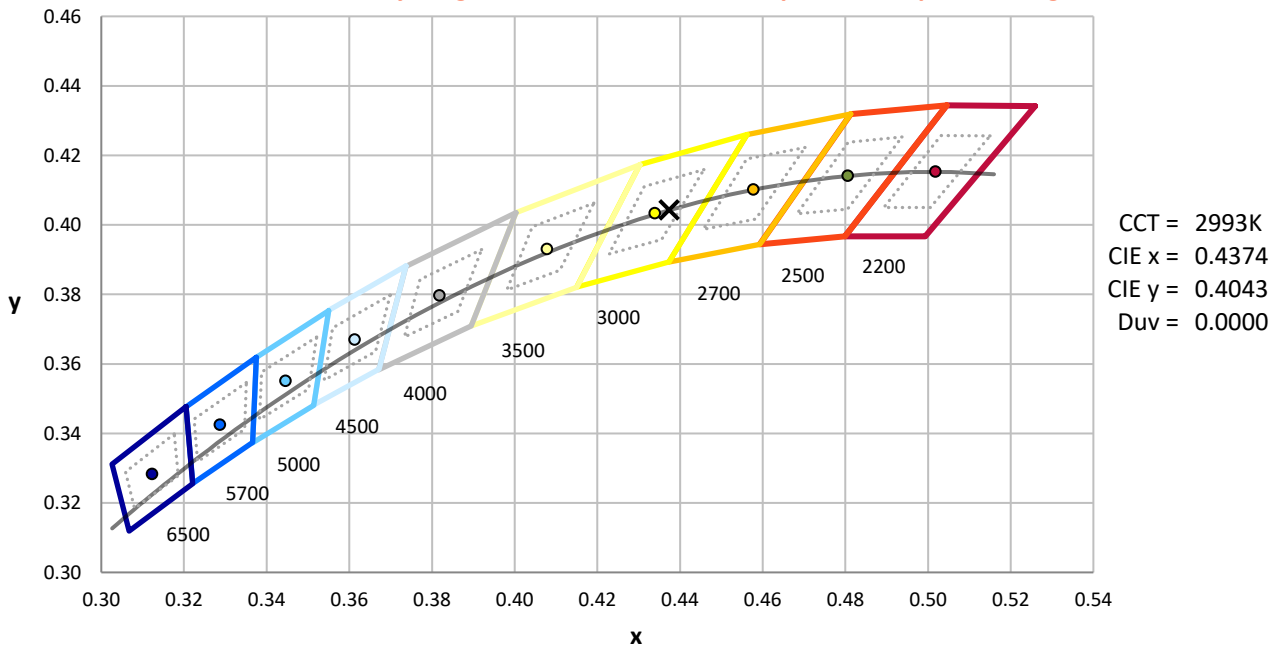
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



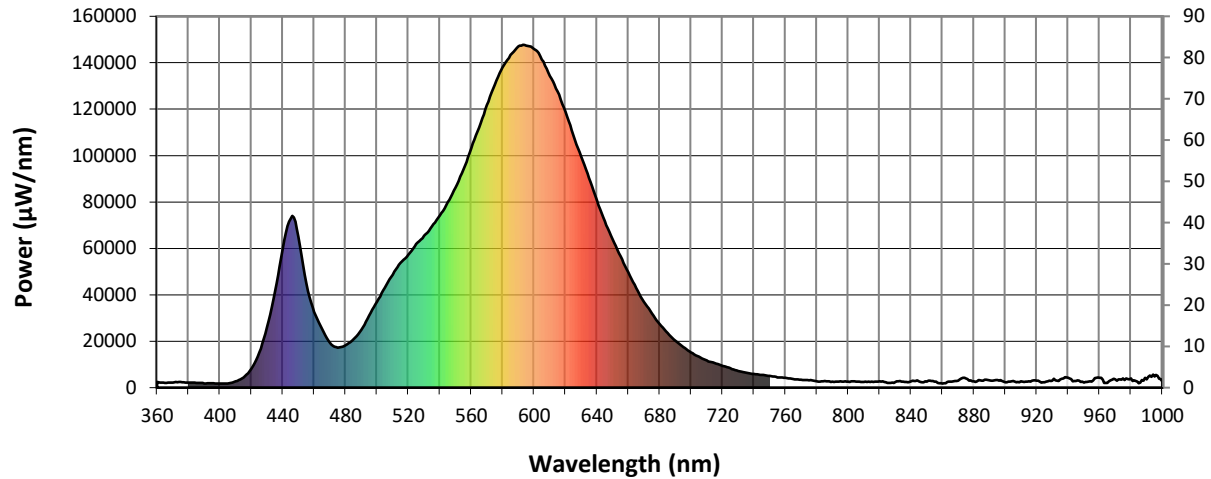
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

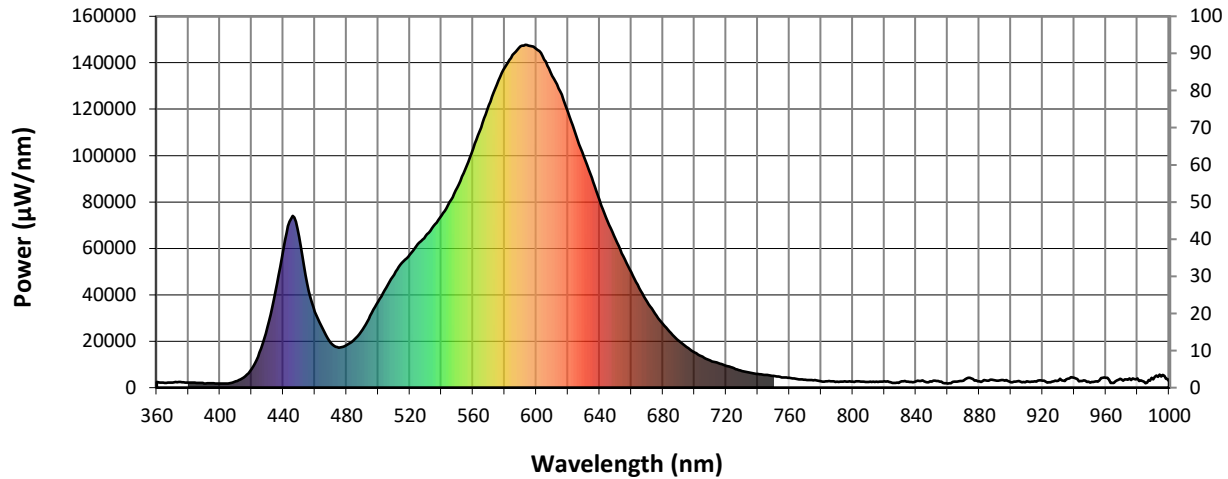


#####

| 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       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



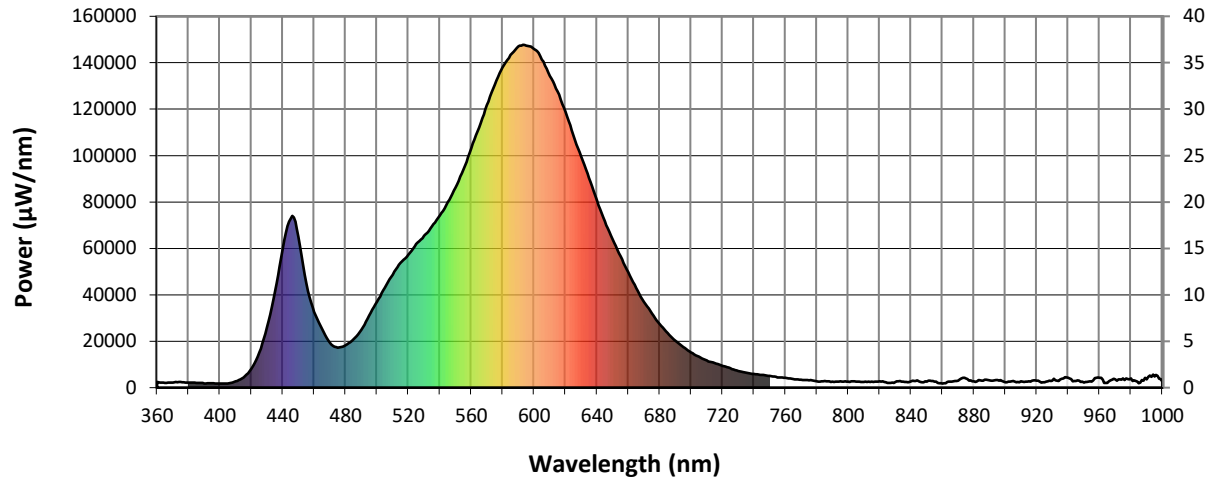
Scotopic Lumens: 8494.8

S/P: 1.23

| 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       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 3101.5 M/P: 0.45**

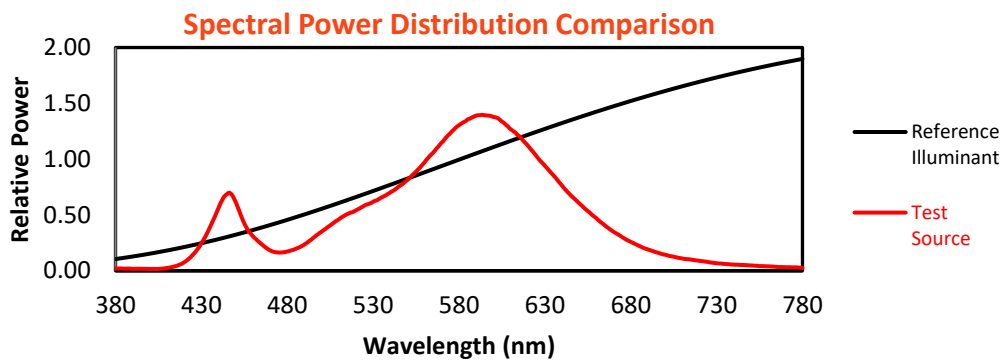
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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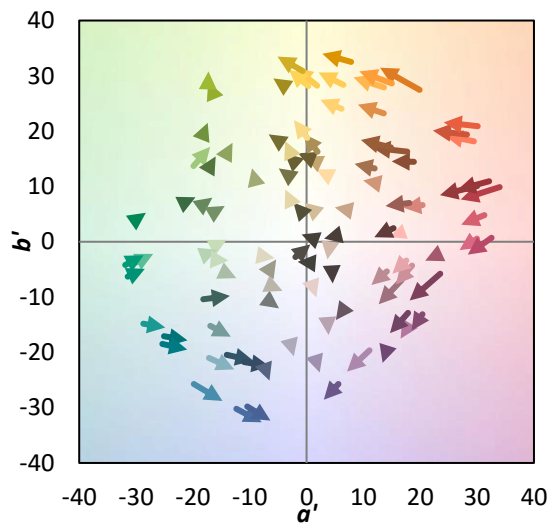
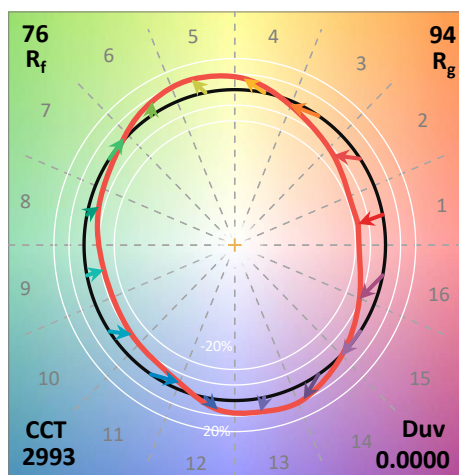
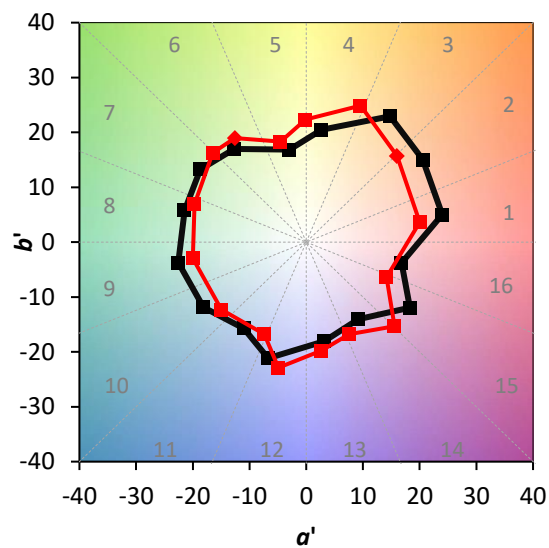
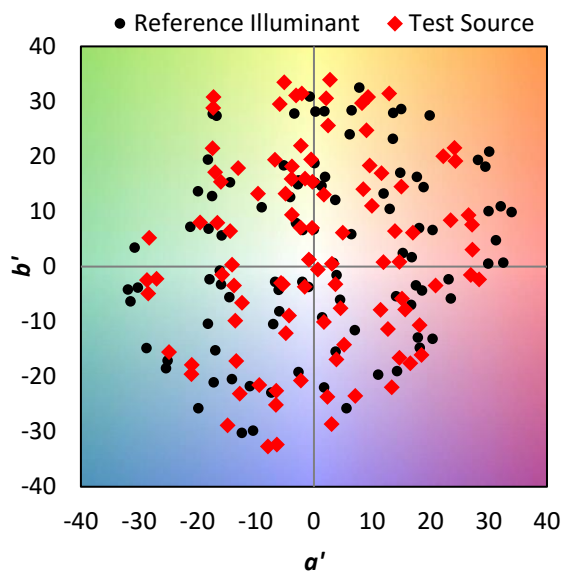
**TM-30-18**

**Summary**

$R_f = 75.7$   
 $R_g = 93.9$   
 $CIE R_a = 71.8$   
 $R_g = -38.3$



**Color Vector Graphics**



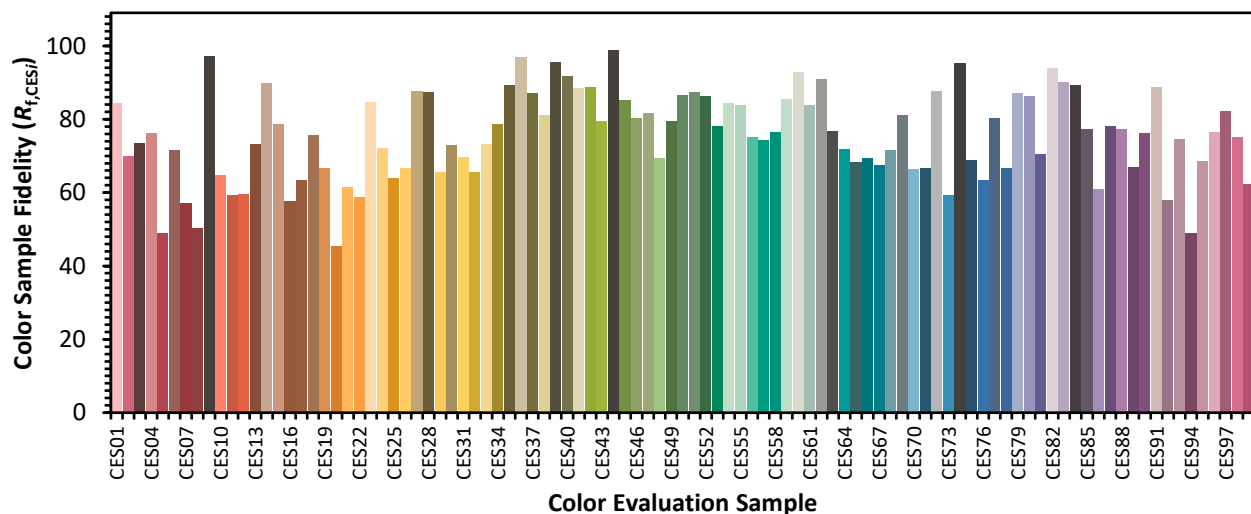


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

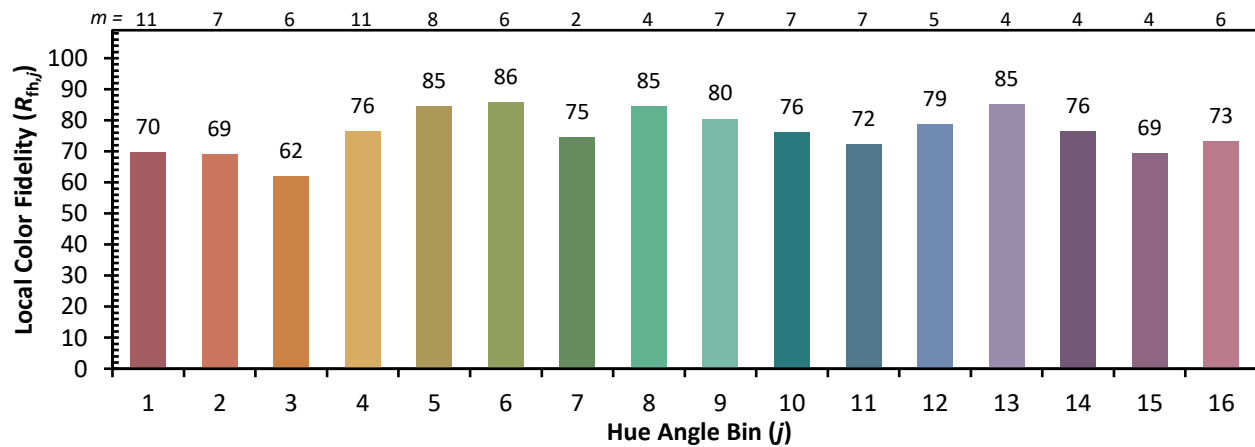
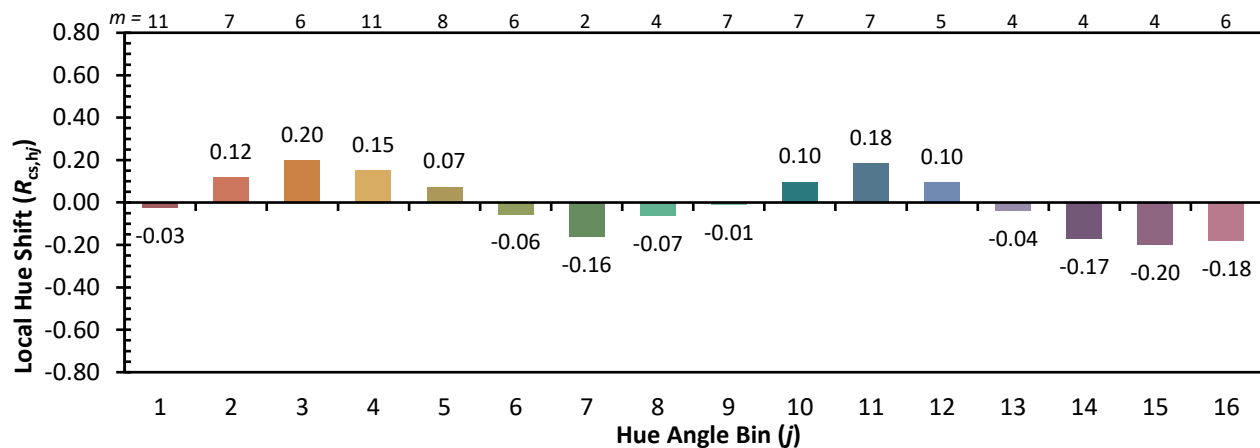
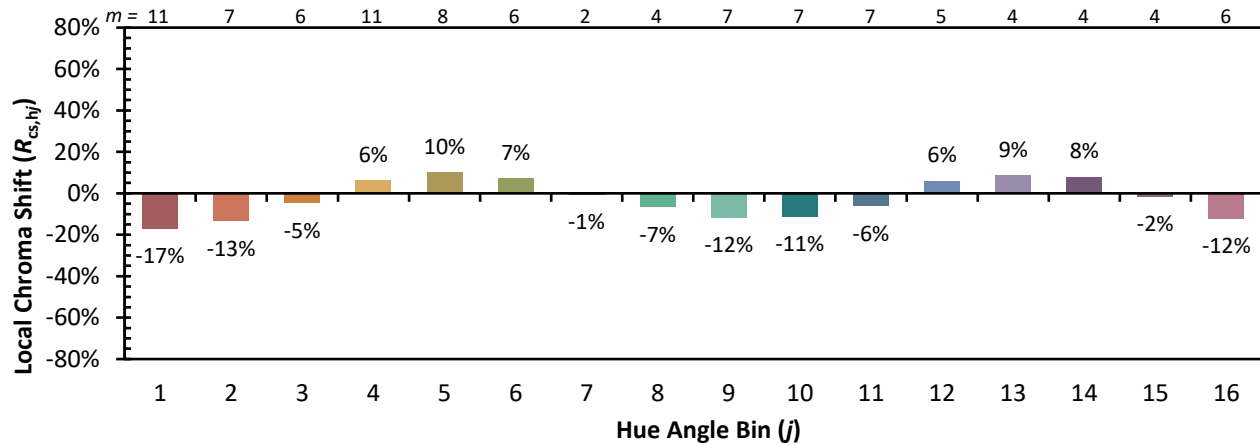
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|------------|------------|------------|------------|
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| CES02 = 63 | CES27 = 88 | CES52 = 86 | CES77 = 80 |
| CES03 = 31 | CES28 = 87 | CES53 = 78 | CES78 = 67 |
| CES04 = 71 | CES29 = 66 | CES54 = 84 | CES79 = 87 |
| CES05 = 49 | CES30 = 73 | CES55 = 84 | CES80 = 86 |
| CES06 = 51 | CES31 = 70 | CES56 = 75 | CES81 = 71 |
| CES07 = 41 | CES32 = 65 | CES57 = 74 | CES82 = 94 |
| CES08 = 40 | CES33 = 73 | CES58 = 76 | CES83 = 90 |
| CES09 = 29 | CES34 = 79 | CES59 = 85 | CES84 = 89 |
| CES10 = 76 | CES35 = 89 | CES60 = 93 | CES85 = 77 |
| CES11 = 59 | CES36 = 97 | CES61 = 84 | CES86 = 61 |
| CES12 = 65 | CES37 = 87 | CES62 = 91 | CES87 = 78 |
| CES13 = 43 | CES38 = 81 | CES63 = 77 | CES88 = 77 |
| CES14 = 74 | CES39 = 95 | CES64 = 72 | CES89 = 67 |
| CES15 = 71 | CES40 = 92 | CES65 = 68 | CES90 = 76 |
| CES16 = 47 | CES41 = 88 | CES66 = 69 | CES91 = 89 |
| CES17 = 50 | CES42 = 89 | CES67 = 67 | CES92 = 58 |
| CES18 = 56 | CES43 = 79 | CES68 = 72 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 81 | CES94 = 49 |
| CES20 = 66 | CES45 = 85 | CES70 = 66 | CES95 = 68 |
| CES21 = 87 | CES46 = 80 | CES71 = 67 | CES96 = 76 |
| CES22 = 79 | CES47 = 82 | CES72 = 88 | CES97 = 82 |
| CES23 = 92 | CES48 = 69 | CES73 = 59 | CES98 = 75 |
| CES24 = 91 | CES49 = 80 | CES74 = 95 | CES99 = 62 |
| CES25 = 73 | CES50 = 87 | CES75 = 69 |            |



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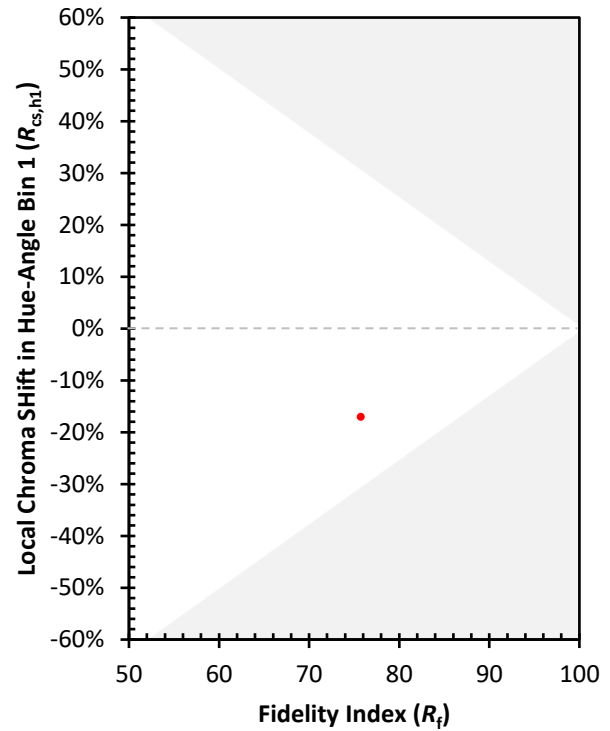
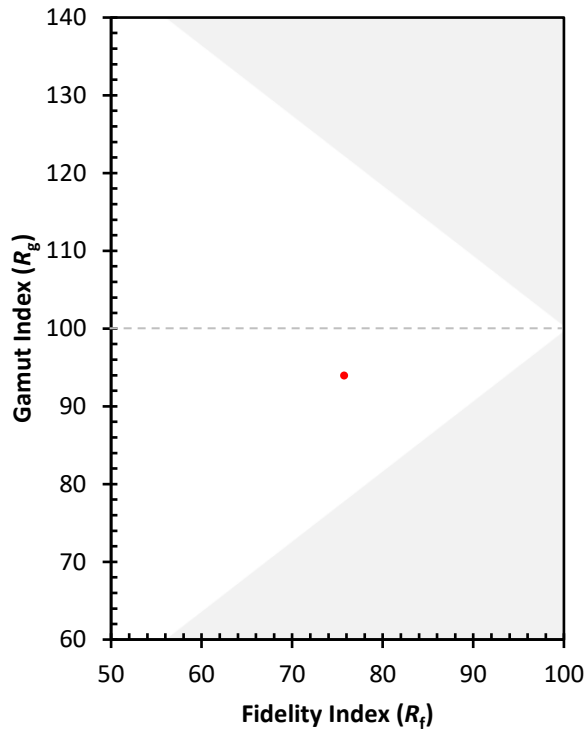
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)