

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: P361283

Luminaire Tested: NVN-SA1B-727-U-T3

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P361283  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-14)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA1B-727-U-T3  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 2700K, 800mA LIGHTSQUARE WITH 16 LEDS AND TYPE III OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4906 lumens  
Efficiency: N/A  
Efficacy: 111.5 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B1 - U0 - G1

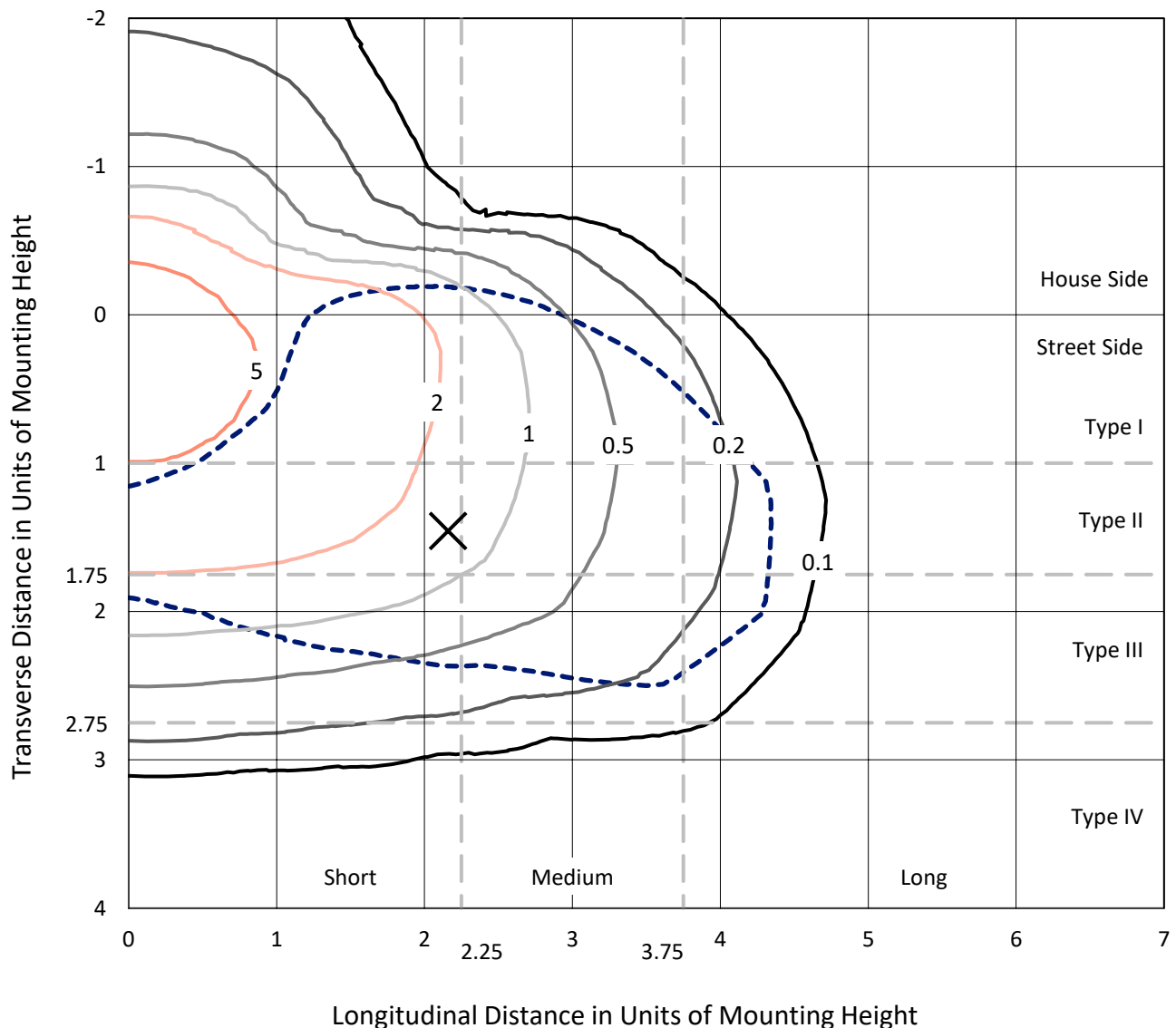
Input Watts (W): 44  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P361283  
 CATALOG NUMBER: NVN-SA1B-727-U-T3

## Iso-Footcandle Lines of Horizontal Illumination

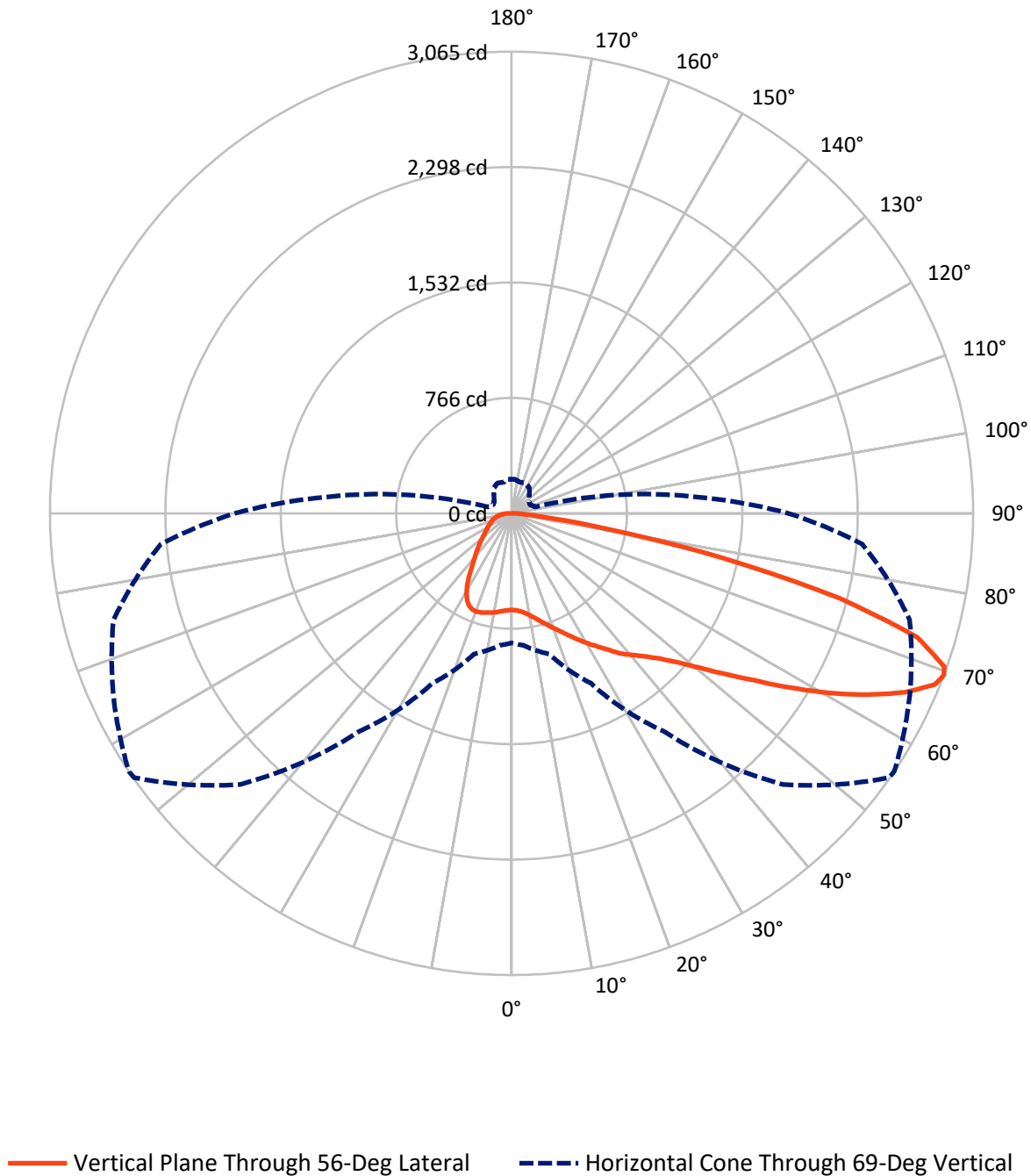
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 7 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: NVN-SA1B-727-U-T3

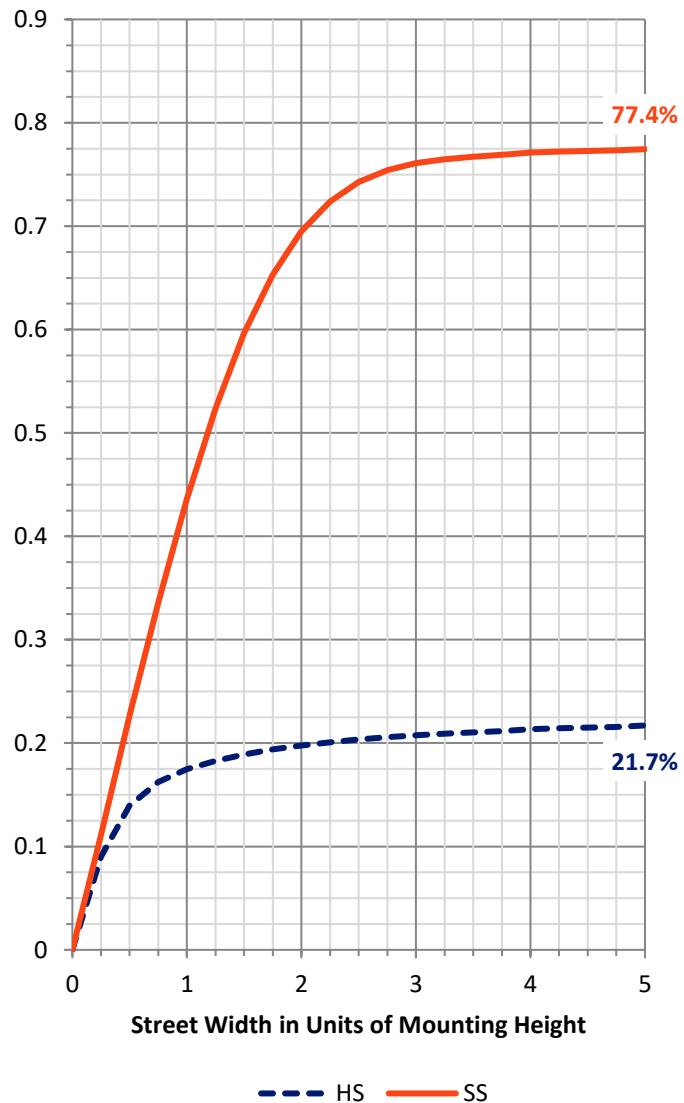
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1092.6   | 0.0    | 1092.6 |
|                    | % Fixture | 22.3     | 0.0    | 22.3   |
| <b>Street Side</b> | Lumens    | 3813.4   | 0.0    | 3813.4 |
|                    | % Fixture | 77.7     | 0.0    | 77.7   |
| <b>Total</b>       | Lumens    | 4906.0   | 0.0    | 4906.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 63.0   | 1.3       |
| 10°-20°   | 202.6  | 4.1       |
| 20°-30°   | 353.6  | 7.2       |
| 30°-40°   | 507.9  | 10.4      |
| 40°-50°   | 703.0  | 14.3      |
| 50°-60°   | 1029.9 | 21.0      |
| 60°-70°   | 1255.7 | 25.6      |
| 70°-80°   | 694.2  | 14.2      |
| 80°-90°   | 96.1   | 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°    | 4906.0 | 100.0     |
| 0°-180°   | 4906.0 | 100.0     |

**Coefficient of Utilization**



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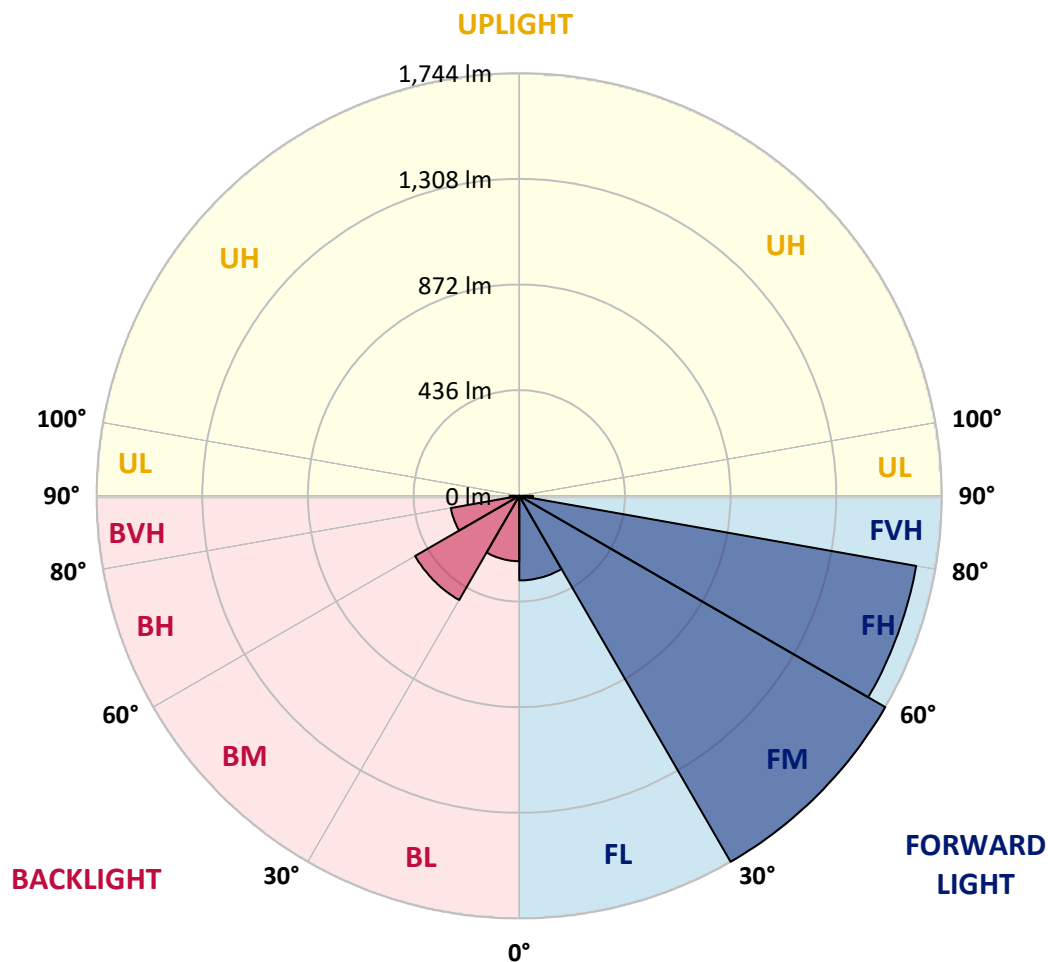
CATALOG NUMBER: NVN-SA1B-727-U-T3

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 349.2  | 7.1       |                         |      |         |
| FM   | (30°-60°)   | 1744.3 | 35.6      |                         |      |         |
| FH   | (60°-80°)   | 1663.4 | 33.9      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 56.6   | 1.2       |                         |      | G1/100  |
| BL   | (0°-30°)    | 270.0  | 5.5       | B1/500                  |      |         |
| BM   | (30°-60°)   | 496.5  | 10.1      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 286.5  | 5.8       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 39.5   | 0.8       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**

Type III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 56°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 641.4  | 641.4  | 641.4  | 641.4  | 641.4  | 641.4  | 641.4  | 641.4  | 641.4  | 641.4  | 641.4  |
| 2.5°  | 645.4  | 646.1  | 645.6  | 647.0  | 645.4  | 646.5  | 645.6  | 645.6  | 645.1  | 643.6  | 641.9  |
| 5°    | 655.6  | 656.9  | 656.1  | 657.4  | 655.6  | 655.9  | 654.4  | 654.4  | 652.9  | 649.7  | 646.3  |
| 7.5°  | 671.5  | 673.0  | 672.3  | 673.7  | 671.1  | 671.1  | 669.1  | 668.9  | 665.9  | 660.7  | 656.8  |
| 10°   | 690.4  | 692.4  | 691.8  | 693.8  | 691.8  | 692.4  | 690.4  | 690.4  | 686.3  | 678.9  | 674.0  |
| 12.5° | 717.9  | 720.5  | 718.6  | 718.5  | 717.6  | 719.0  | 717.3  | 716.9  | 713.2  | 703.1  | 696.3  |
| 15°   | 754.8  | 757.5  | 753.6  | 753.3  | 748.5  | 748.0  | 748.0  | 747.5  | 745.2  | 733.0  | 721.8  |
| 17.5° | 797.2  | 798.1  | 794.7  | 789.3  | 783.2  | 779.3  | 778.8  | 780.1  | 780.1  | 765.9  | 748.2  |
| 20°   | 838.8  | 840.3  | 837.6  | 831.5  | 823.7  | 818.0  | 813.9  | 816.6  | 816.5  | 799.6  | 774.4  |
| 22.5° | 884.1  | 887.6  | 883.6  | 875.8  | 866.7  | 860.3  | 853.2  | 855.5  | 855.7  | 834.9  | 800.1  |
| 25°   | 942.7  | 939.5  | 937.0  | 926.0  | 913.0  | 906.4  | 899.8  | 902.2  | 901.5  | 872.9  | 826.6  |
| 27.5° | 994.6  | 995.3  | 991.9  | 980.2  | 965.2  | 950.7  | 950.3  | 951.9  | 949.3  | 912.5  | 851.6  |
| 30°   | 1054.9 | 1055.3 | 1050.6 | 1040.1 | 1023.7 | 1004.9 | 1000.5 | 1003.1 | 997.7  | 950.0  | 878.0  |
| 32.5° | 1114.9 | 1116.6 | 1111.4 | 1098.7 | 1085.5 | 1062.7 | 1053.9 | 1055.6 | 1042.1 | 988.4  | 905.2  |
| 35°   | 1167.5 | 1169.9 | 1168.2 | 1159.7 | 1145.4 | 1125.8 | 1115.3 | 1114.3 | 1097.5 | 1035.3 | 941.2  |
| 37.5° | 1221.1 | 1223.3 | 1221.4 | 1214.3 | 1208.6 | 1187.8 | 1182.2 | 1182.2 | 1153.1 | 1083.3 | 987.0  |
| 40°   | 1276.2 | 1279.6 | 1277.4 | 1267.6 | 1262.7 | 1253.2 | 1239.8 | 1236.6 | 1205.2 | 1141.0 | 1061.7 |
| 42.5° | 1327.4 | 1331.8 | 1340.6 | 1334.8 | 1324.9 | 1326.2 | 1299.3 | 1297.6 | 1274.7 | 1226.2 | 1155.5 |
| 45°   | 1400.1 | 1406.5 | 1421.4 | 1417.0 | 1414.9 | 1407.5 | 1375.6 | 1374.0 | 1365.2 | 1340.7 | 1272.0 |
| 47.5° | 1479.3 | 1488.1 | 1515.0 | 1515.8 | 1537.6 | 1523.6 | 1480.2 | 1474.9 | 1477.0 | 1478.0 | 1414.1 |
| 50°   | 1552.3 | 1562.0 | 1606.1 | 1626.9 | 1678.3 | 1681.3 | 1611.8 | 1607.1 | 1615.0 | 1638.4 | 1579.7 |
| 52.5° | 1610.6 | 1622.8 | 1677.9 | 1742.1 | 1830.2 | 1855.2 | 1773.9 | 1770.4 | 1776.3 | 1816.5 | 1767.0 |
| 55°   | 1653.4 | 1666.6 | 1726.6 | 1843.5 | 1984.2 | 2028.3 | 1960.5 | 1957.1 | 1960.8 | 2012.0 | 1970.6 |
| 57.5° | 1663.4 | 1666.6 | 1753.6 | 1911.8 | 2114.1 | 2220.1 | 2188.8 | 2182.1 | 2163.8 | 2208.4 | 2195.4 |
| 60°   | 1616.6 | 1629.4 | 1731.3 | 1935.8 | 2214.7 | 2409.2 | 2427.5 | 2419.0 | 2367.8 | 2404.3 | 2393.8 |
| 62.5° | 1521.6 | 1544.6 | 1648.0 | 1899.3 | 2254.1 | 2563.7 | 2661.5 | 2651.4 | 2563.2 | 2586.8 | 2536.5 |
| 65°   | 1366.4 | 1376.2 | 1484.9 | 1773.4 | 2204.0 | 2662.6 | 2870.3 | 2865.2 | 2754.2 | 2717.1 | 2562.8 |
| 67.5° | 1088.9 | 1107.3 | 1199.6 | 1510.3 | 1999.4 | 2650.9 | 3031.7 | 3031.2 | 2878.9 | 2765.5 | 2469.4 |
| 69°   | 860.3  | 879.3  | 967.2  | 1244.1 | 1769.2 | 2544.2 | 3058.7 | 3064.6 | 2914.0 | 2736.1 | 2335.9 |
| 70°   | 685.8  | 708.0  | 768.3  | 1047.9 | 1564.8 | 2403.6 | 3036.2 | 3046.9 | 2907.3 | 2687.6 | 2212.7 |
| 72.5° | 291.9  | 309.8  | 352.7  | 540.1  | 953.7  | 1794.9 | 2776.1 | 2816.4 | 2750.6 | 2459.7 | 1828.7 |
| 75°   | 127.4  | 133.0  | 152.4  | 220.2  | 423.4  | 976.9  | 2174.8 | 2249.2 | 2351.9 | 2079.1 | 1362.2 |
| 77.5° | 93.3   | 95.7   | 106.3  | 129.3  | 190.0  | 368.9  | 1398.5 | 1441.8 | 1696.2 | 1513.0 | 835.6  |
| 80°   | 72.2   | 73.9   | 82.1   | 95.0   | 124.1  | 149.2  | 637.8  | 675.0  | 953.7  | 777.1  | 348.0  |
| 82.5° | 57.5   | 58.6   | 64.4   | 70.0   | 85.7   | 90.4   | 211.8  | 234.9  | 352.0  | 214.6  | 92.1   |
| 85°   | 53.4   | 54.8   | 56.8   | 51.0   | 54.9   | 53.1   | 91.6   | 95.8   | 106.3  | 84.3   | 38.5   |
| 87.5° | 24.2   | 28.6   | 56.3   | 39.7   | 29.2   | 23.3   | 37.5   | 39.2   | 44.1   | 44.3   | 17.1   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P361283

CATALOG NUMBER: NVN-SA1B-727-U-T3

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 641.4  | 641.4  | 641.4 | 641.4 | 641.4 | 641.4 | 641.4 | 641.4 | 641.4 | 641.4 | 641.4 |
| 2.5°  | 642.9  | 642.4  | 643.2 | 641.2 | 643.8 | 643.6 | 642.7 | 643.1 | 644.8 | 644.6 | 644.8 |
| 5°    | 646.8  | 646.5  | 647.5 | 645.9 | 649.0 | 650.0 | 650.2 | 651.7 | 653.6 | 654.1 | 654.1 |
| 7.5°  | 656.6  | 656.6  | 657.1 | 655.1 | 657.1 | 656.9 | 656.1 | 657.6 | 659.5 | 659.6 | 659.5 |
| 10°   | 673.5  | 673.7  | 672.8 | 667.6 | 665.9 | 661.3 | 657.1 | 657.3 | 659.6 | 661.5 | 662.0 |
| 12.5° | 694.8  | 694.1  | 690.4 | 680.8 | 673.7 | 664.4 | 660.0 | 659.8 | 662.2 | 663.7 | 664.2 |
| 15°   | 719.1  | 717.3  | 707.6 | 691.9 | 679.4 | 670.3 | 663.2 | 661.5 | 660.1 | 658.5 | 658.6 |
| 17.5° | 742.1  | 737.9  | 721.8 | 700.0 | 686.8 | 674.7 | 661.0 | 650.0 | 642.4 | 638.0 | 636.7 |
| 20°   | 765.4  | 757.2  | 734.0 | 707.6 | 690.9 | 668.8 | 642.4 | 620.1 | 606.2 | 599.8 | 598.6 |
| 22.5° | 786.7  | 773.4  | 745.3 | 715.6 | 687.7 | 648.8 | 607.4 | 575.0 | 555.7 | 547.1 | 547.8 |
| 25°   | 807.5  | 788.9  | 757.2 | 721.2 | 671.5 | 613.7 | 558.7 | 518.9 | 496.5 | 486.9 | 486.6 |
| 27.5° | 825.8  | 804.6  | 770.0 | 716.6 | 641.2 | 563.6 | 501.1 | 462.2 | 443.6 | 435.4 | 434.0 |
| 30°   | 846.7  | 824.4  | 787.1 | 699.2 | 596.9 | 505.8 | 444.8 | 417.4 | 404.3 | 396.0 | 394.5 |
| 32.5° | 872.3  | 851.3  | 801.1 | 667.6 | 540.3 | 445.5 | 400.9 | 381.8 | 369.8 | 360.5 | 358.8 |
| 35°   | 909.4  | 886.8  | 804.6 | 622.3 | 478.1 | 397.8 | 368.6 | 349.0 | 332.8 | 320.8 | 319.6 |
| 37.5° | 956.1  | 931.2  | 796.5 | 563.6 | 417.8 | 366.9 | 341.7 | 317.6 | 296.4 | 279.5 | 276.8 |
| 40°   | 1023.3 | 985.8  | 774.1 | 496.0 | 373.3 | 343.1 | 315.5 | 288.0 | 261.8 | 242.0 | 238.1 |
| 42.5° | 1104.1 | 1049.9 | 739.6 | 428.8 | 340.7 | 318.9 | 289.5 | 255.4 | 230.4 | 216.3 | 214.3 |
| 45°   | 1206.9 | 1116.5 | 691.8 | 370.0 | 308.6 | 294.8 | 261.5 | 230.0 | 214.5 | 204.2 | 202.5 |
| 47.5° | 1324.2 | 1191.2 | 641.6 | 322.1 | 281.4 | 272.1 | 239.0 | 218.7 | 206.4 | 198.2 | 196.7 |
| 50°   | 1468.3 | 1275.5 | 588.3 | 282.9 | 254.0 | 244.9 | 228.3 | 212.4 | 202.6 | 196.4 | 194.9 |
| 52.5° | 1630.9 | 1370.7 | 550.0 | 252.0 | 231.4 | 224.8 | 222.8 | 209.1 | 201.1 | 196.4 | 194.9 |
| 55°   | 1806.0 | 1467.5 | 508.5 | 226.0 | 211.8 | 213.6 | 219.0 | 209.4 | 204.0 | 198.2 | 196.0 |
| 57.5° | 1981.3 | 1567.5 | 462.4 | 204.0 | 196.2 | 205.3 | 216.5 | 210.1 | 205.5 | 199.9 | 197.9 |
| 60°   | 2119.9 | 1630.9 | 390.9 | 185.6 | 183.9 | 196.2 | 210.4 | 205.0 | 199.1 | 199.3 | 198.9 |
| 62.5° | 2184.6 | 1627.5 | 312.0 | 169.2 | 171.5 | 183.9 | 200.6 | 197.1 | 192.2 | 198.8 | 199.3 |
| 65°   | 2148.3 | 1546.4 | 242.9 | 154.3 | 158.4 | 171.0 | 190.5 | 193.2 | 194.9 | 207.5 | 209.2 |
| 67.5° | 1995.8 | 1388.6 | 188.1 | 141.3 | 146.4 | 162.2 | 191.5 | 210.4 | 212.6 | 226.0 | 225.8 |
| 69°   | 1838.1 | 1240.5 | 163.4 | 134.5 | 140.4 | 164.4 | 204.7 | 221.4 | 213.1 | 227.3 | 225.3 |
| 70°   | 1706.0 | 1123.4 | 150.2 | 130.0 | 137.7 | 168.3 | 213.5 | 221.2 | 210.6 | 222.8 | 219.4 |
| 72.5° | 1313.9 | 808.2  | 127.4 | 121.5 | 128.6 | 161.1 | 216.0 | 216.3 | 204.7 | 207.0 | 201.3 |
| 75°   | 901.2  | 510.7  | 111.2 | 110.0 | 114.8 | 145.2 | 207.9 | 206.7 | 189.3 | 185.9 | 181.2 |
| 77.5° | 496.9  | 259.4  | 94.5  | 99.0  | 102.2 | 128.6 | 189.0 | 187.3 | 172.9 | 165.8 | 164.1 |
| 80°   | 191.7  | 113.6  | 79.8  | 88.1  | 90.1  | 111.4 | 165.6 | 164.1 | 152.1 | 143.0 | 140.4 |
| 82.5° | 72.3   | 59.5   | 65.9  | 76.2  | 75.5  | 91.9  | 140.3 | 139.4 | 127.8 | 114.4 | 110.4 |
| 85°   | 33.5   | 35.7   | 52.2  | 62.9  | 58.0  | 68.1  | 112.2 | 113.7 | 99.5  | 83.7  | 83.7  |
| 87.5° | 14.2   | 19.9   | 37.0  | 47.5  | 39.0  | 46.0  | 82.3  | 78.6  | 72.2  | 50.0  | 47.0  |
| 90°   | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



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



LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-1-R4

Test Date: 08/20/2019

Luminaire Tested: SA1C-727-U-5WQ

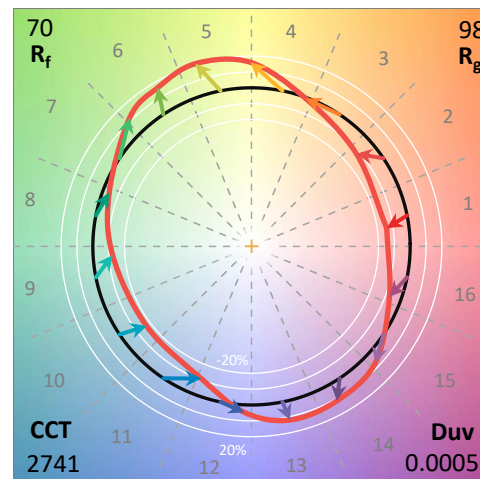
### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-1-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-727-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-1-R3. TO UPDATE THE CATALOG NUMBER. \*\*\*TESTED IN SITU. (1) 70 CRI, 2700K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 2741   | CRI (Ra): | 71.5 |      |       |
| CIE u':                   | 0.2605 | R1:       | 69.2 | R9:  | -16.1 |
| CIE v':                   | 0.5272 | R2:       | 79.4 | R10: | 51.4  |
| Duv:                      | 0.0005 | R3:       | 87.8 | R11: | 63.1  |
| CIE x:                    | 0.4573 | R4:       | 69.4 | R12: | 42.0  |
| CIE y:                    | 0.4113 | R5:       | 66.4 | R13: | 70.2  |
| CIE z:                    | 0.1313 | R6:       | 69.8 | R14: | 92.4  |
| Peak Wavelength (nm):     | 602    | R7:       | 79.8 |      |       |
| Dominant Wavelength (nm): | 583    | R8:       | 50.1 |      |       |
| Purity:                   | 61.2   |           |      |      |       |
| Rf:                       | 69.9   |           |      |      |       |
| Rg:                       | 98.3   |           |      |      |       |



### Test Conditions

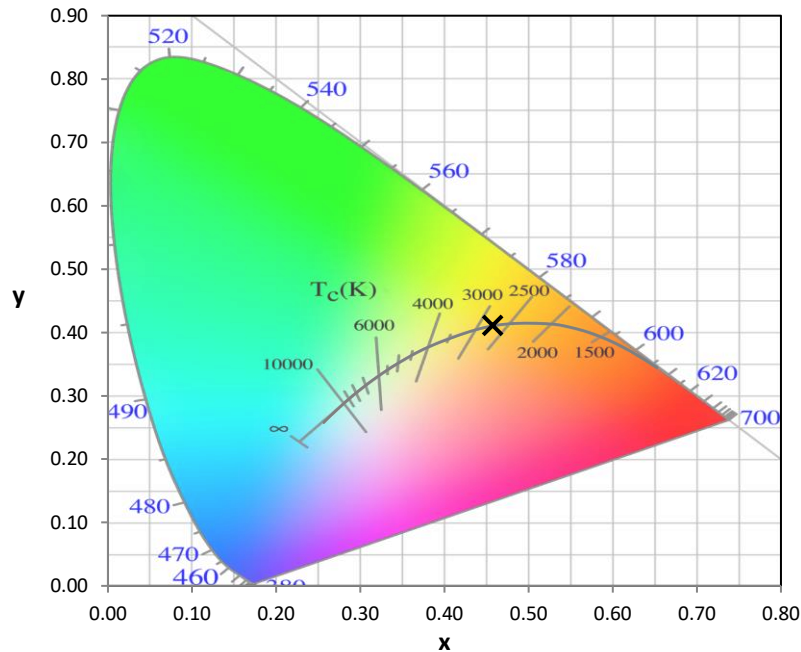
Stabilization Time: 56M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.3./42%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-1-R4

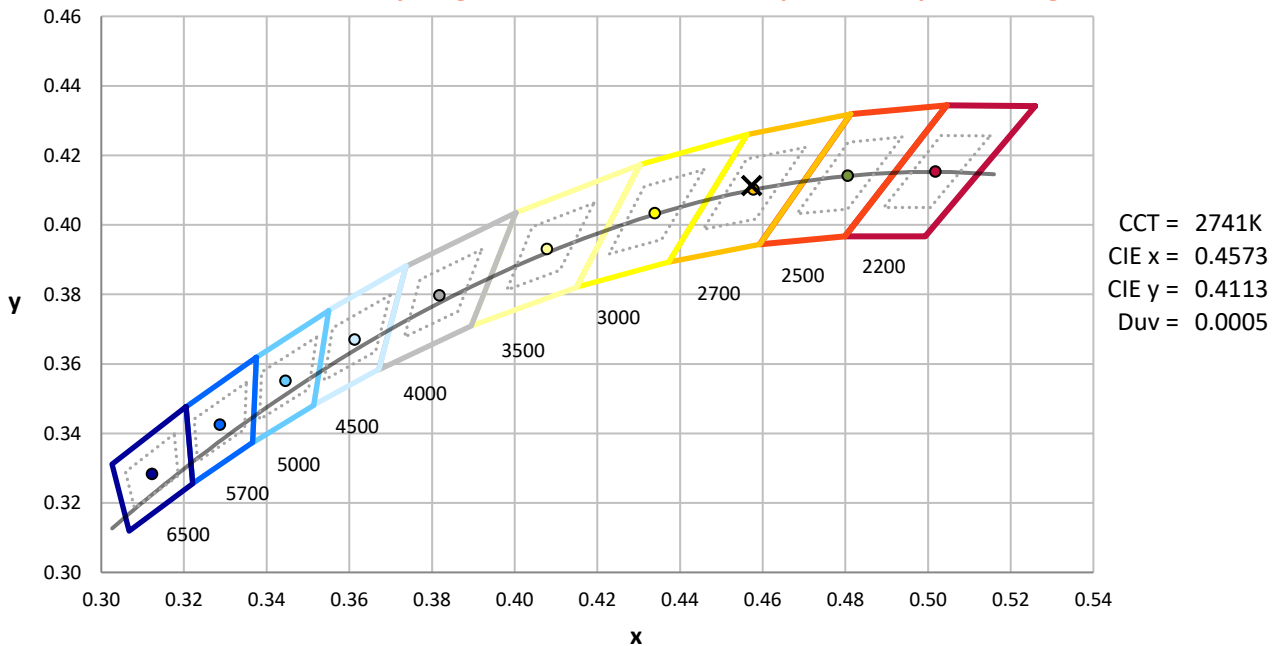
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



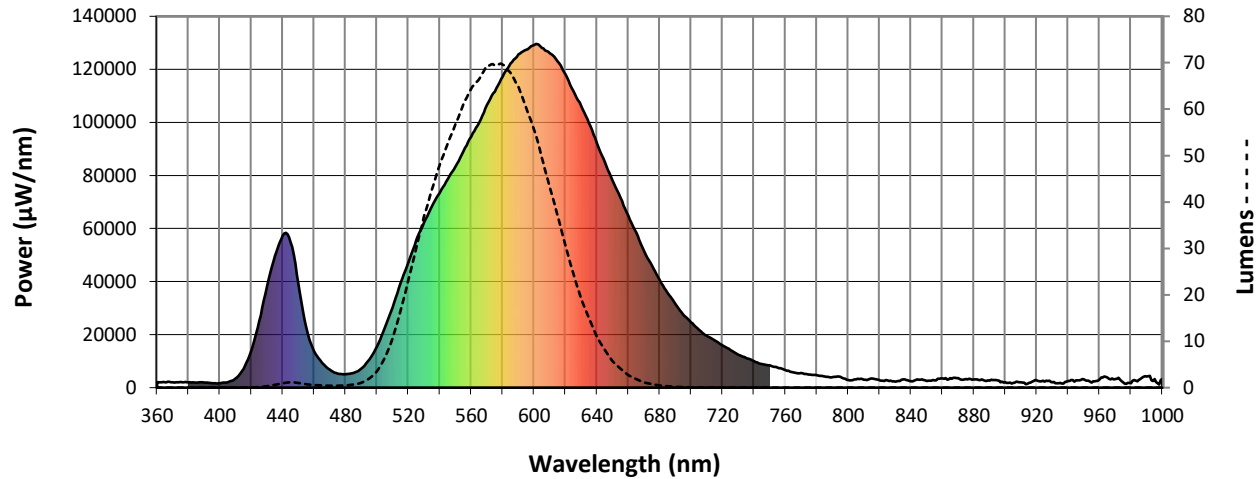
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

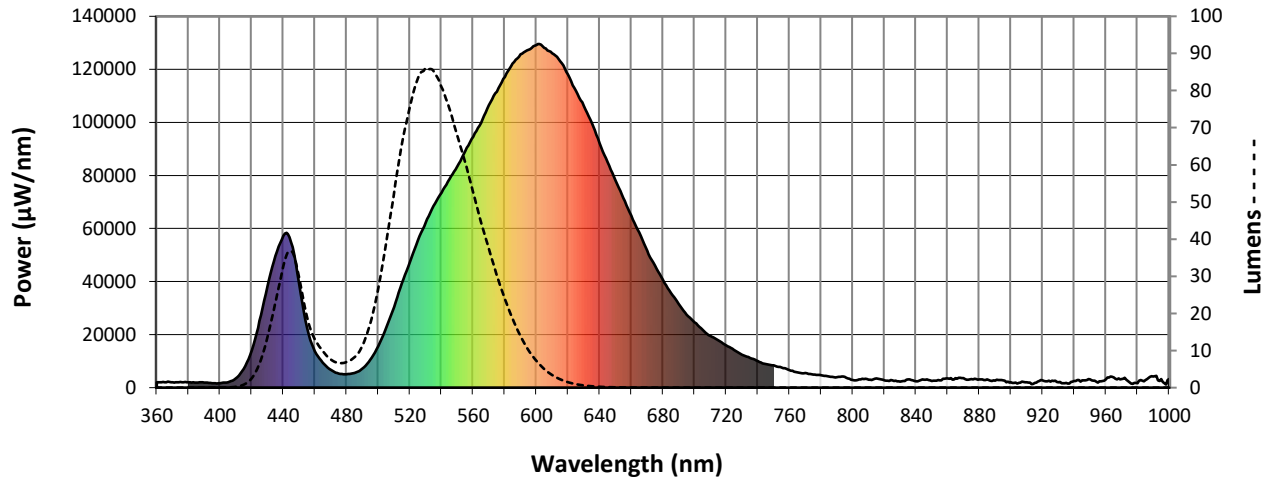


**Photopic Lumens: 6211.7**

| 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       | 2044             | 0.0              | 490       | 7179             | 1.0              | 620       | 118034           | 30.7             | 750       | 8362             | 0.0              | 880       | 3128             | 0.0              |
| 365       | 2016             | 0.0              | 495       | 10476            | 1.9              | 625       | 111884           | 24.7             | 755       | 7635             | 0.0              | 885       | 3110             | 0.0              |
| 370       | 2020             | 0.0              | 500       | 15549            | 3.4              | 630       | 106119           | 19.2             | 760       | 6582             | 0.0              | 890       | 2632             | 0.0              |
| 375       | 2137             | 0.0              | 505       | 22477            | 6.3              | 635       | 99706            | 15.0             | 765       | 5777             | 0.0              | 895       | 2709             | 0.0              |
| 380       | 2046             | 0.0              | 510       | 30417            | 10.4             | 640       | 92142            | 11.0             | 770       | 5474             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1925             | 0.0              | 515       | 39274            | 16.3             | 645       | 84987            | 8.2              | 775       | 4977             | 0.0              | 905       | 1748             | 0.0              |
| 390       | 1893             | 0.0              | 520       | 47282            | 22.9             | 650       | 78016            | 5.7              | 780       | 4723             | 0.0              | 910       | 2046             | 0.0              |
| 395       | 1695             | 0.0              | 525       | 55413            | 29.7             | 655       | 71541            | 4.1              | 785       | 4219             | 0.0              | 915       | 1844             | 0.0              |
| 400       | 1633             | 0.0              | 530       | 62377            | 36.7             | 660       | 64863            | 2.7              | 790       | 3969             | 0.0              | 920       | 2734             | 0.0              |
| 405       | 2065             | 0.0              | 535       | 68520            | 42.5             | 665       | 58485            | 1.9              | 795       | 4122             | 0.0              | 925       | 2307             | 0.0              |
| 410       | 3449             | 0.0              | 540       | 73435            | 47.8             | 670       | 51641            | 1.1              | 800       | 2864             | 0.0              | 930       | 2039             | 0.0              |
| 415       | 7117             | 0.0              | 545       | 78677            | 52.4             | 675       | 46030            | 0.8              | 805       | 3151             | 0.0              | 935       | 1784             | 0.0              |
| 420       | 13992            | 0.0              | 550       | 83331            | 56.6             | 680       | 40590            | 0.5              | 810       | 3022             | 0.0              | 940       | 2464             | 0.0              |
| 425       | 25176            | 0.1              | 555       | 89120            | 60.9             | 685       | 35691            | 0.3              | 815       | 3471             | 0.0              | 945       | 2794             | 0.0              |
| 430       | 38151            | 0.3              | 560       | 94613            | 64.3             | 690       | 31631            | 0.2              | 820       | 2749             | 0.0              | 950       | 3090             | 0.0              |
| 435       | 49673            | 0.6              | 565       | 99818            | 66.4             | 695       | 27437            | 0.1              | 825       | 2729             | 0.0              | 955       | 1866             | 0.0              |
| 440       | 57273            | 0.9              | 570       | 106526           | 69.3             | 700       | 24589            | 0.1              | 830       | 2282             | 0.0              | 960       | 3110             | 0.0              |
| 445       | 54802            | 1.1              | 575       | 111610           | 69.4             | 705       | 21832            | 0.0              | 835       | 3140             | 0.0              | 965       | 3880             | 0.0              |
| 450       | 39184            | 1.0              | 580       | 117163           | 69.6             | 710       | 19500            | 0.0              | 840       | 2365             | 0.0              | 970       | 3243             | 0.0              |
| 455       | 22506            | 0.8              | 585       | 122201           | 67.9             | 715       | 17870            | 0.0              | 845       | 3024             | 0.0              | 975       | 2014             | 0.0              |
| 460       | 13692            | 0.6              | 590       | 125662           | 65.0             | 720       | 15924            | 0.0              | 850       | 2510             | 0.0              | 980       | 1688             | 0.0              |
| 465       | 9446             | 0.5              | 595       | 127415           | 60.4             | 725       | 14268            | 0.0              | 855       | 2739             | 0.0              | 985       | 2827             | 0.0              |
| 470       | 6698             | 0.4              | 600       | 129155           | 55.7             | 730       | 12438            | 0.0              | 860       | 3515             | 0.0              | 990       | 4172             | 0.0              |
| 475       | 5328             | 0.4              | 605       | 128057           | 49.6             | 735       | 11255            | 0.0              | 865       | 3600             | 0.0              | 995       | 3177             | 0.0              |
| 480       | 5081             | 0.5              | 610       | 126031           | 43.3             | 740       | 9951             | 0.0              | 870       | 3609             | 0.0              | 1000      | 3241             | 0.0              |
| 485       | 5579             | 0.7              | 615       | 123059           | 37.1             | 745       | 8870             | 0.0              | 875       | 3208             | 0.0              |           |                  |                  |

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Scotopic Flux vs. Wavelength



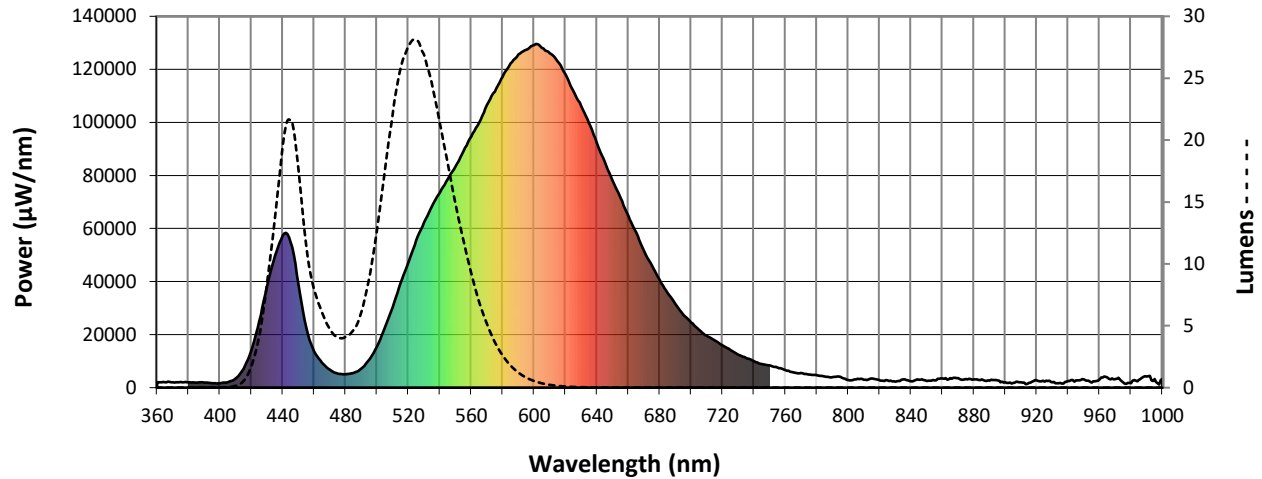
Scotopic Lumens: 6474.3

S/P: 1.04

| 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       | 2044             | 0.0              | 490       | 7179             | 6.0              | 620       | 118034           | 0.1              | 750       | 8362             | 0.0              | 880       | 3128             | 0.0              |
| 365       | 2016             | 0.0              | 495       | 10476            | 8.6              | 625       | 111884           | 0.1              | 755       | 7635             | 0.0              | 885       | 3110             | 0.0              |
| 370       | 2020             | 0.0              | 500       | 15549            | 12.5             | 630       | 106119           | 0.0              | 760       | 6582             | 0.0              | 890       | 2632             | 0.0              |
| 375       | 2137             | 0.0              | 505       | 22477            | 17.3             | 635       | 99706            | 0.0              | 765       | 5777             | 0.0              | 895       | 2709             | 0.0              |
| 380       | 2046             | 0.0              | 510       | 30417            | 21.8             | 640       | 92142            | 0.0              | 770       | 5474             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1925             | 0.0              | 515       | 39274            | 25.7             | 645       | 84987            | 0.0              | 775       | 4977             | 0.0              | 905       | 1748             | 0.0              |
| 390       | 1893             | 0.0              | 520       | 47282            | 27.5             | 650       | 78016            | 0.0              | 780       | 4723             | 0.0              | 910       | 2046             | 0.0              |
| 395       | 1695             | 0.0              | 525       | 55413            | 28.1             | 655       | 71541            | 0.0              | 785       | 4219             | 0.0              | 915       | 1844             | 0.0              |
| 400       | 1633             | 0.0              | 530       | 62377            | 27.0             | 660       | 64863            | 0.0              | 790       | 3969             | 0.0              | 920       | 2734             | 0.0              |
| 405       | 2065             | 0.0              | 535       | 68520            | 24.7             | 665       | 58485            | 0.0              | 795       | 4122             | 0.0              | 925       | 2307             | 0.0              |
| 410       | 3449             | 0.1              | 540       | 73435            | 21.5             | 670       | 51641            | 0.0              | 800       | 2864             | 0.0              | 930       | 2039             | 0.0              |
| 415       | 7117             | 0.5              | 545       | 78677            | 18.3             | 675       | 46030            | 0.0              | 805       | 3151             | 0.0              | 935       | 1784             | 0.0              |
| 420       | 13992            | 1.6              | 550       | 83331            | 15.0             | 680       | 40590            | 0.0              | 810       | 3022             | 0.0              | 940       | 2464             | 0.0              |
| 425       | 25176            | 3.9              | 555       | 89120            | 12.0             | 685       | 35691            | 0.0              | 815       | 3471             | 0.0              | 945       | 2794             | 0.0              |
| 430       | 38151            | 8.1              | 560       | 94613            | 9.3              | 690       | 31631            | 0.0              | 820       | 2749             | 0.0              | 950       | 3090             | 0.0              |
| 435       | 49673            | 13.3             | 565       | 99818            | 7.0              | 695       | 27437            | 0.0              | 825       | 2729             | 0.0              | 955       | 1866             | 0.0              |
| 440       | 57273            | 19.1             | 570       | 106526           | 5.2              | 700       | 24589            | 0.0              | 830       | 2282             | 0.0              | 960       | 3110             | 0.0              |
| 445       | 54802            | 21.6             | 575       | 111610           | 3.7              | 705       | 21832            | 0.0              | 835       | 3140             | 0.0              | 965       | 3880             | 0.0              |
| 450       | 39184            | 18.1             | 580       | 117163           | 2.6              | 710       | 19500            | 0.0              | 840       | 2365             | 0.0              | 970       | 3243             | 0.0              |
| 455       | 22506            | 11.8             | 585       | 122201           | 1.8              | 715       | 17870            | 0.0              | 845       | 3024             | 0.0              | 975       | 2014             | 0.0              |
| 460       | 13692            | 8.1              | 590       | 125662           | 1.2              | 720       | 15924            | 0.0              | 850       | 2510             | 0.0              | 980       | 1688             | 0.0              |
| 465       | 9446             | 6.2              | 595       | 127415           | 0.8              | 725       | 14268            | 0.0              | 855       | 2739             | 0.0              | 985       | 2827             | 0.0              |
| 470       | 6698             | 4.8              | 600       | 129155           | 0.5              | 730       | 12438            | 0.0              | 860       | 3515             | 0.0              | 990       | 4172             | 0.0              |
| 475       | 5328             | 4.1              | 605       | 128057           | 0.4              | 735       | 11255            | 0.0              | 865       | 3600             | 0.0              | 995       | 3177             | 0.0              |
| 480       | 5081             | 4.1              | 610       | 126031           | 0.2              | 740       | 9951             | 0.0              | 870       | 3609             | 0.0              | 1000      | 3241             | 0.0              |
| 485       | 5579             | 4.6              | 615       | 123059           | 0.1              | 745       | 8870             | 0.0              | 875       | 3208             | 0.0              |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 2145.7 M/P: 0.35**

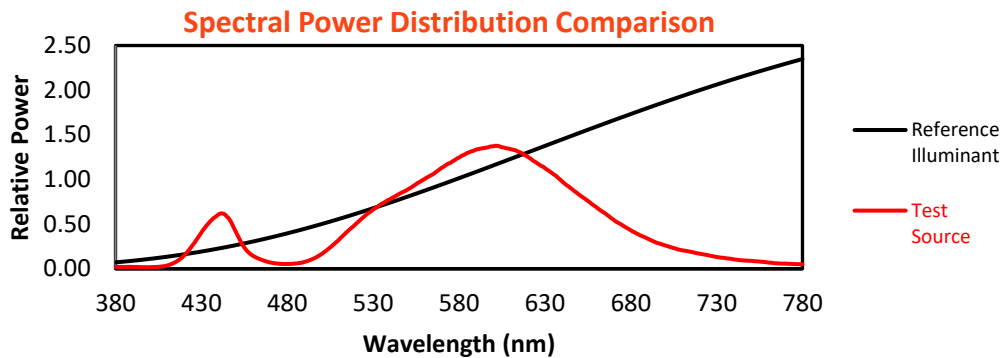
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2044             | 0.0              | 490       | 7179             | 11.1             | 620       | 118034           | 1.5              | 750       | 8362             | 0.0              | 880       | 3128             | 0.0              |
| 365       | 2016             | 0.0              | 495       | 10476            | 16.9             | 625       | 111884           | 0.9              | 755       | 7635             | 0.0              | 885       | 3110             | 0.0              |
| 370       | 2020             | 0.0              | 500       | 15549            | 26.0             | 630       | 106119           | 0.6              | 760       | 6582             | 0.0              | 890       | 2632             | 0.0              |
| 375       | 2137             | 0.0              | 505       | 22477            | 38.2             | 635       | 99706            | 0.4              | 765       | 5777             | 0.0              | 895       | 2709             | 0.0              |
| 380       | 2046             | 0.0              | 510       | 30417            | 51.6             | 640       | 92142            | 0.2              | 770       | 5474             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1925             | 0.0              | 515       | 39274            | 65.1             | 645       | 84987            | 0.1              | 775       | 4977             | 0.0              | 905       | 1748             | 0.0              |
| 390       | 1893             | 0.0              | 520       | 47282            | 75.2             | 650       | 78016            | 0.1              | 780       | 4723             | 0.0              | 910       | 2046             | 0.0              |
| 395       | 1695             | 0.0              | 525       | 55413            | 82.9             | 655       | 71541            | 0.1              | 785       | 4219             | 0.0              | 915       | 1844             | 0.0              |
| 400       | 1633             | 0.0              | 530       | 62377            | 86.0             | 660       | 64863            | 0.0              | 790       | 3969             | 0.0              | 920       | 2734             | 0.0              |
| 405       | 2065             | 0.1              | 535       | 68520            | 85.4             | 665       | 58485            | 0.0              | 795       | 4122             | 0.0              | 925       | 2307             | 0.0              |
| 410       | 3449             | 0.2              | 540       | 73435            | 81.1             | 670       | 51641            | 0.0              | 800       | 2864             | 0.0              | 930       | 2039             | 0.0              |
| 415       | 7117             | 0.7              | 545       | 78677            | 75.4             | 675       | 46030            | 0.0              | 805       | 3151             | 0.0              | 935       | 1784             | 0.0              |
| 420       | 13992            | 2.3              | 550       | 83331            | 68.1             | 680       | 40590            | 0.0              | 810       | 3022             | 0.0              | 940       | 2464             | 0.0              |
| 425       | 25176            | 6.2              | 555       | 89120            | 60.9             | 685       | 35691            | 0.0              | 815       | 3471             | 0.0              | 945       | 2794             | 0.0              |
| 430       | 38151            | 13.0             | 560       | 94613            | 52.9             | 690       | 31631            | 0.0              | 820       | 2749             | 0.0              | 950       | 3090             | 0.0              |
| 435       | 49673            | 22.2             | 565       | 99818            | 44.8             | 695       | 27437            | 0.0              | 825       | 2729             | 0.0              | 955       | 1866             | 0.0              |
| 440       | 57273            | 32.0             | 570       | 106526           | 37.6             | 700       | 24589            | 0.0              | 830       | 2282             | 0.0              | 960       | 3110             | 0.0              |
| 445       | 54802            | 36.7             | 575       | 111610           | 30.4             | 705       | 21832            | 0.0              | 835       | 3140             | 0.0              | 965       | 3880             | 0.0              |
| 450       | 39184            | 30.4             | 580       | 117163           | 24.1             | 710       | 19500            | 0.0              | 840       | 2365             | 0.0              | 970       | 3243             | 0.0              |
| 455       | 22506            | 19.7             | 585       | 122201           | 18.7             | 715       | 17870            | 0.0              | 845       | 3024             | 0.0              | 975       | 2014             | 0.0              |
| 460       | 13692            | 13.2             | 590       | 125662           | 14.0             | 720       | 15924            | 0.0              | 850       | 2510             | 0.0              | 980       | 1688             | 0.0              |
| 465       | 9446             | 10.0             | 595       | 127415           | 10.2             | 725       | 14268            | 0.0              | 855       | 2739             | 0.0              | 985       | 2827             | 0.0              |
| 470       | 6698             | 7.7              | 600       | 129155           | 7.3              | 730       | 12438            | 0.0              | 860       | 3515             | 0.0              | 990       | 4172             | 0.0              |
| 475       | 5328             | 6.7              | 605       | 128057           | 5.0              | 735       | 11255            | 0.0              | 865       | 3600             | 0.0              | 995       | 3177             | 0.0              |
| 480       | 5081             | 6.9              | 610       | 126031           | 3.4              | 740       | 9951             | 0.0              | 870       | 3609             | 0.0              | 1000      | 3241             | 0.0              |
| 485       | 5579             | 8.1              | 615       | 123059           | 2.3              | 745       | 8870             | 0.0              | 875       | 3208             | 0.0              |           |                  |                  |

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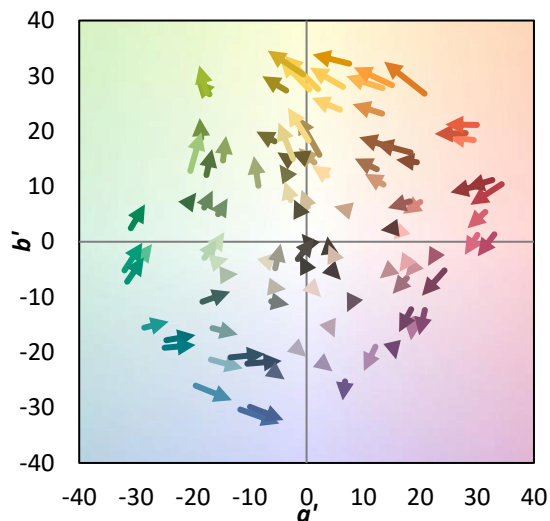
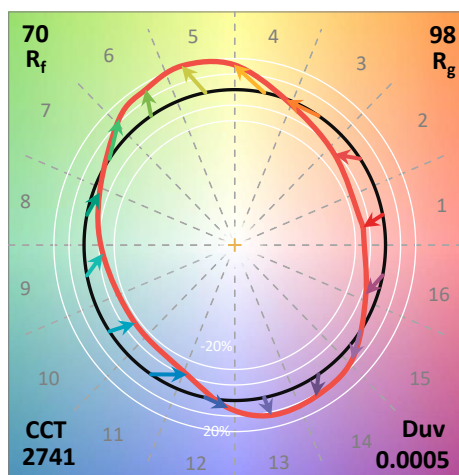
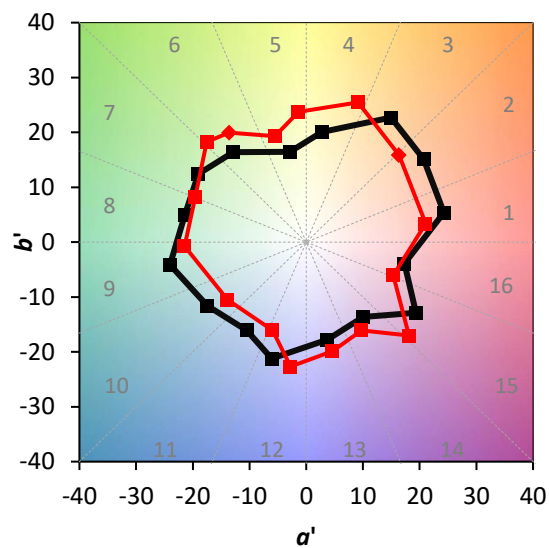
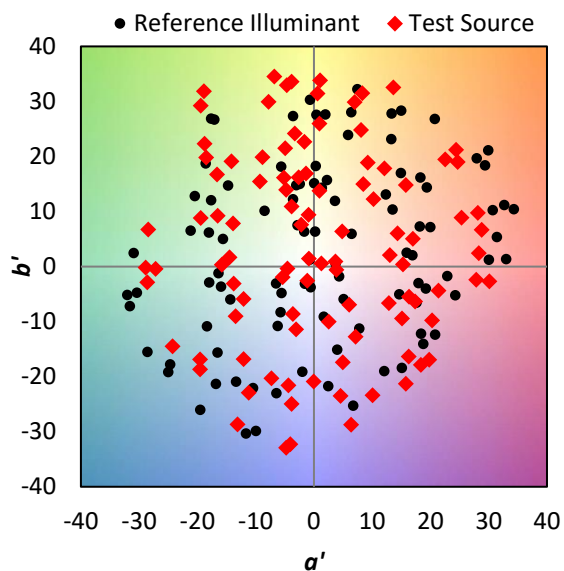
**TM-30-18**

**Summary**

$R_f = 69.9$   
 $R_g = 98.3$   
 $CIE R_a = 71.5$   
 $R_g = -16.1$



**Color Vector Graphics**



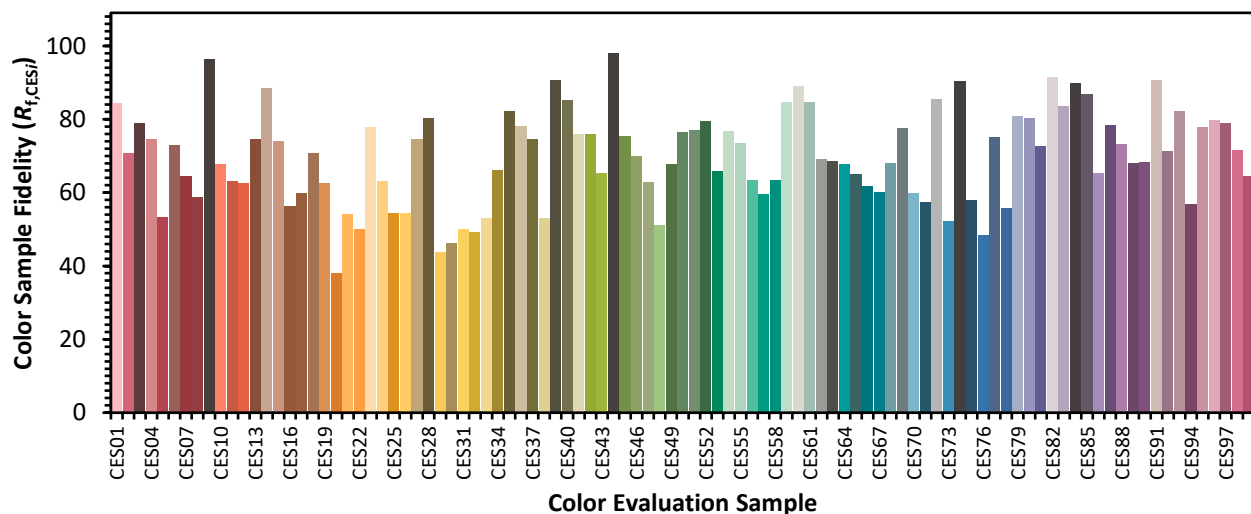


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

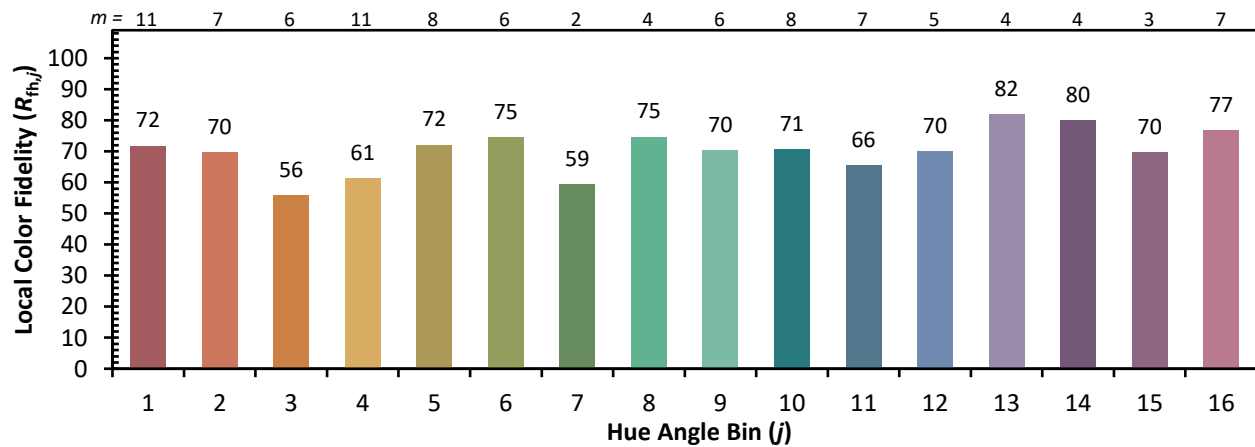
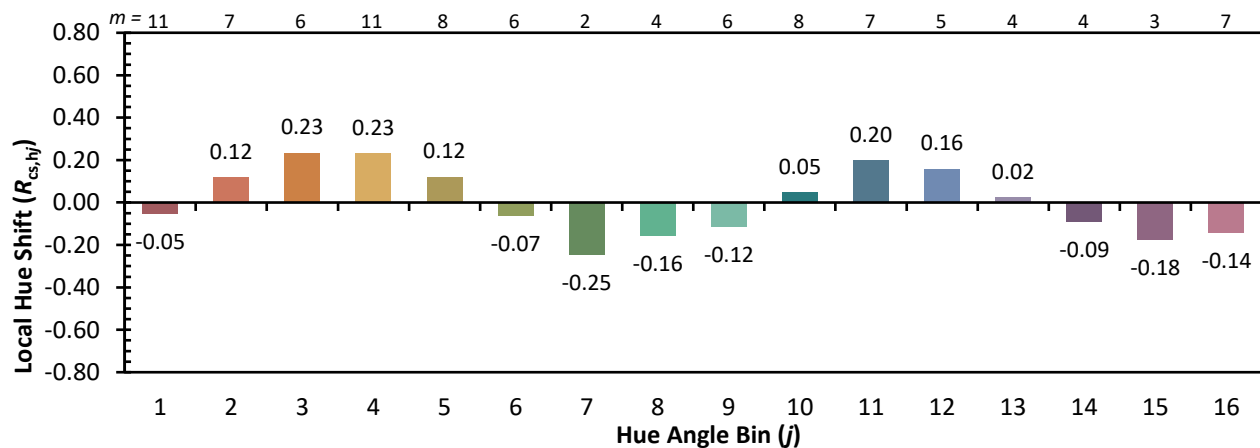
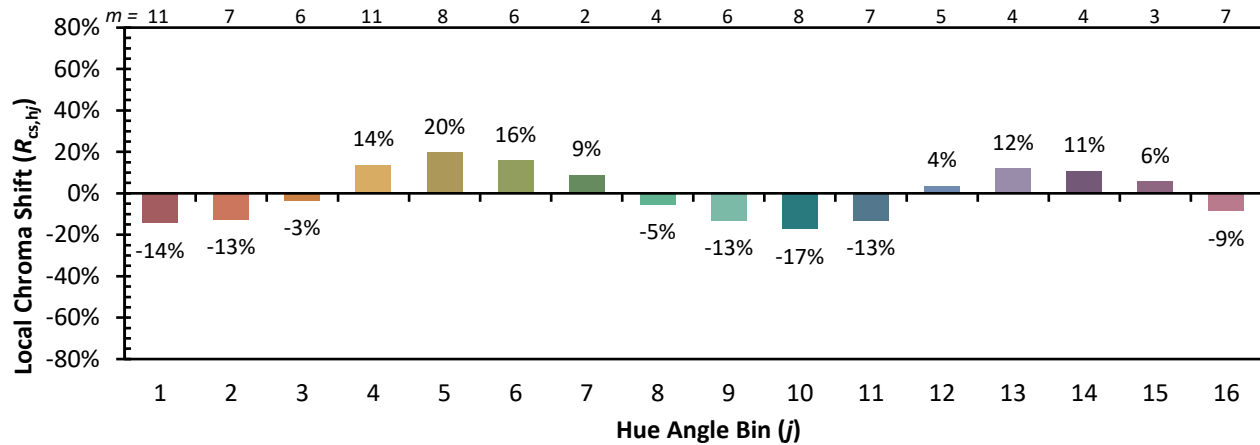
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 54 | CES51 = 77 | CES76 = 48 |
| CES02 = 63 | CES27 = 74 | CES52 = 80 | CES77 = 75 |
| CES03 = 31 | CES28 = 80 | CES53 = 66 | CES78 = 56 |
| CES04 = 71 | CES29 = 44 | CES54 = 77 | CES79 = 81 |
| CES05 = 50 | CES30 = 46 | CES55 = 74 | CES80 = 80 |
| CES06 = 52 | CES31 = 50 | CES56 = 63 | CES81 = 73 |
| CES07 = 42 | CES32 = 49 | CES57 = 60 | CES82 = 91 |
| CES08 = 41 | CES33 = 53 | CES58 = 63 | CES83 = 84 |
| CES09 = 29 | CES34 = 66 | CES59 = 85 | CES84 = 90 |
| CES10 = 77 | CES35 = 82 | CES60 = 89 | CES85 = 87 |
| CES11 = 60 | CES36 = 78 | CES61 = 85 | CES86 = 65 |
| CES12 = 66 | CES37 = 75 | CES62 = 69 | CES87 = 78 |
| CES13 = 43 | CES38 = 53 | CES63 = 68 | CES88 = 73 |
| CES14 = 74 | CES39 = 91 | CES64 = 68 | CES89 = 68 |
| CES15 = 71 | CES40 = 85 | CES65 = 65 | CES90 = 68 |
| CES16 = 48 | CES41 = 76 | CES66 = 62 | CES91 = 91 |
| CES17 = 50 | CES42 = 76 | CES67 = 60 | CES92 = 71 |
| CES18 = 57 | CES43 = 65 | CES68 = 68 | CES93 = 82 |
| CES19 = 73 | CES44 = 98 | CES69 = 77 | CES94 = 57 |
| CES20 = 67 | CES45 = 75 | CES70 = 60 | CES95 = 78 |
| CES21 = 88 | CES46 = 70 | CES71 = 57 | CES96 = 80 |
| CES22 = 80 | CES47 = 63 | CES72 = 86 | CES97 = 79 |
| CES23 = 92 | CES48 = 51 | CES73 = 52 | CES98 = 71 |
| CES24 = 91 | CES49 = 68 | CES74 = 90 | CES99 = 64 |
| CES25 = 73 | CES50 = 77 | CES75 = 58 |            |



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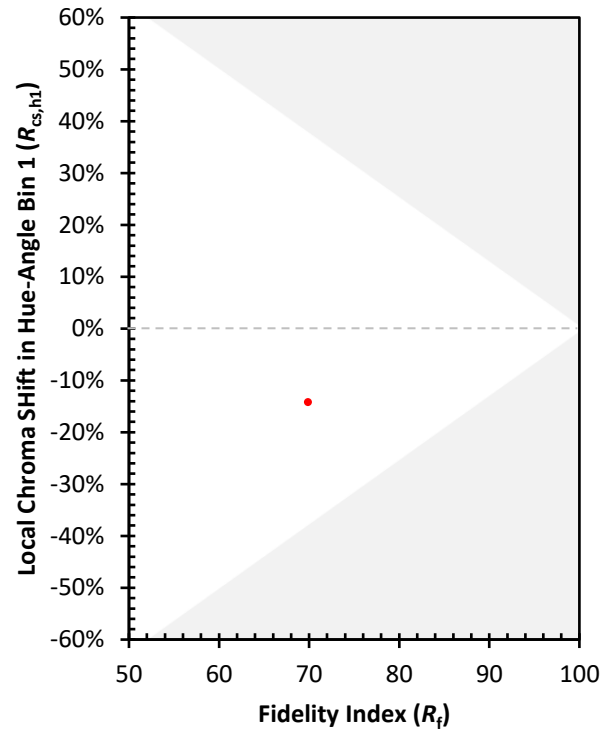
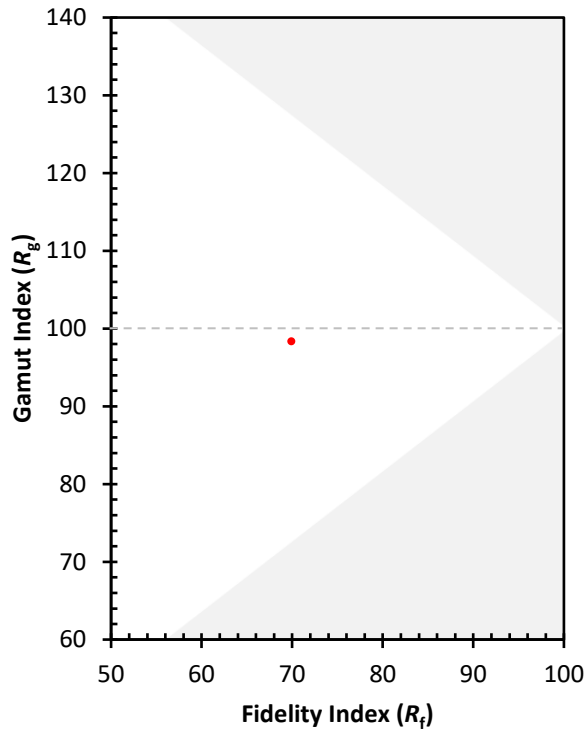
**Color Rendition by Hue-Angle Bin**



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)