Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled data based on original data using

LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

Brand: STREETWORKS

Report Number: P870236

Luminaire Tested: **MEM2-HSN-SA-40-830-U-T2R**

Issue Date: 09/05/2024

Report Generated By 670245763

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled Data Report

**Test Information**

| | |
|---|---|
| Test Method: | LM-79-08 |
| Report Number: | P870236 |
| Test Lab: | INNOVATION CENTER(G3) |
| Issue Date: | 09/05/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | STREETWORKS |
| Catalog Number: | MEM2-HSN-SA-40-830-U-T2R |
| Description: | EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 40W 80CRI 3000K FIXTURE w/ TYPE II ROADWAY DISTRIBUTION OPTIC |
| Light Source: | (10) 3000K CCT, 80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 4352.1 lumens |
| Efficiency: | N/A |
| Efficacy: | 132.7 lumens/watt |
| Luminous Opening: | Rectangular (W 0.33' x L: 0.33' x H: 0') |
| IES Classification: | Type II - Medium |
| BUG Rating: | B1 - U0 - G1 |

| | |
|---|---|
| Input Watts (W): | 32.8 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | 0.99 |
| Total Harmonic Distortion (THDi): | 9.76% |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 24 FT |

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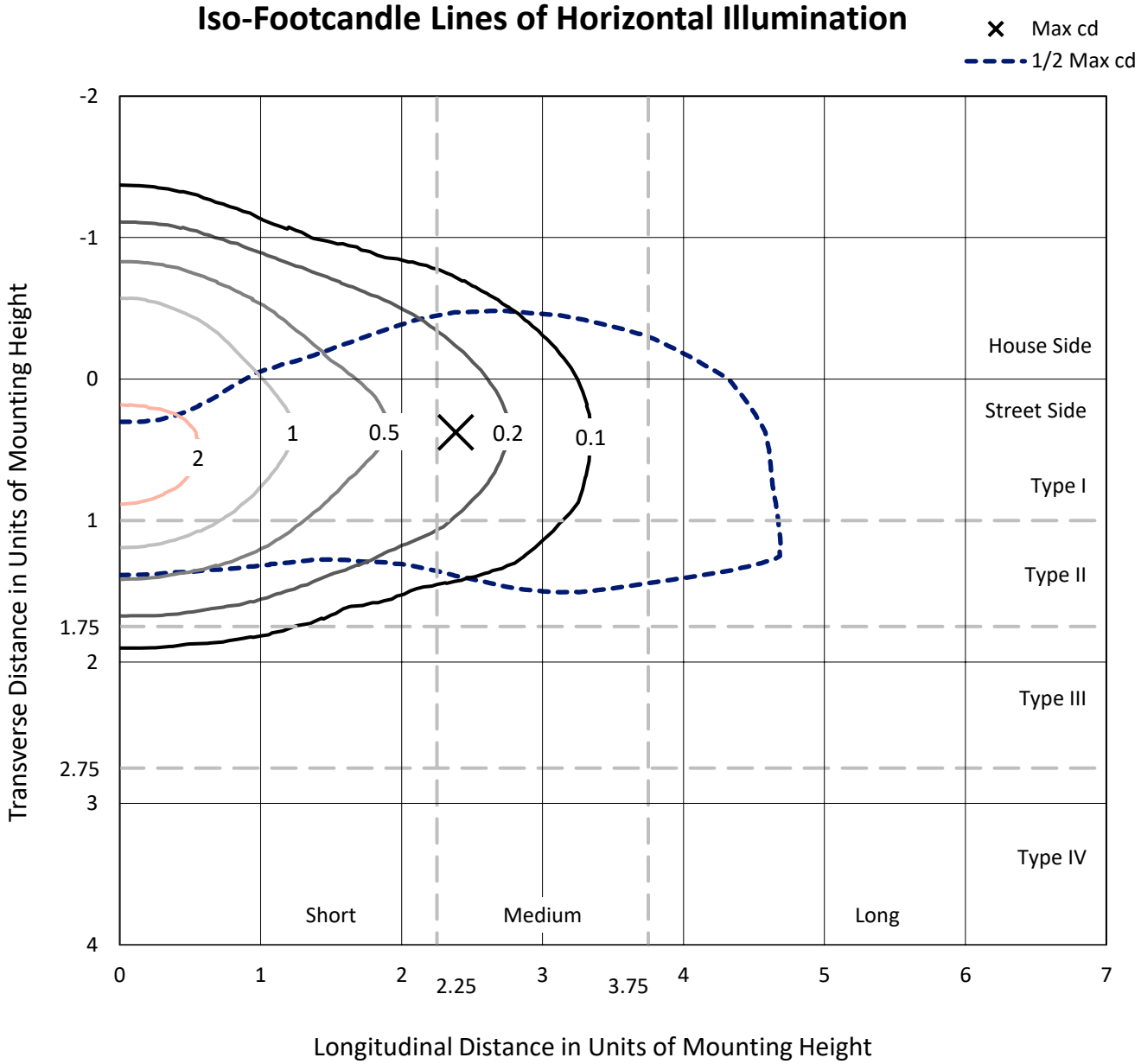
Scaled Data Report

REPORT NUMBER: P870236
CATALOG NUMBER: MEM2-HSN-SA-40-830-U-T2R

## Iso-Footcandle Lines of Horizontal Illumination




Based on 20 foot mounting height. Maximum calculated value = 2.8 fc
Type II - Medium - N/A

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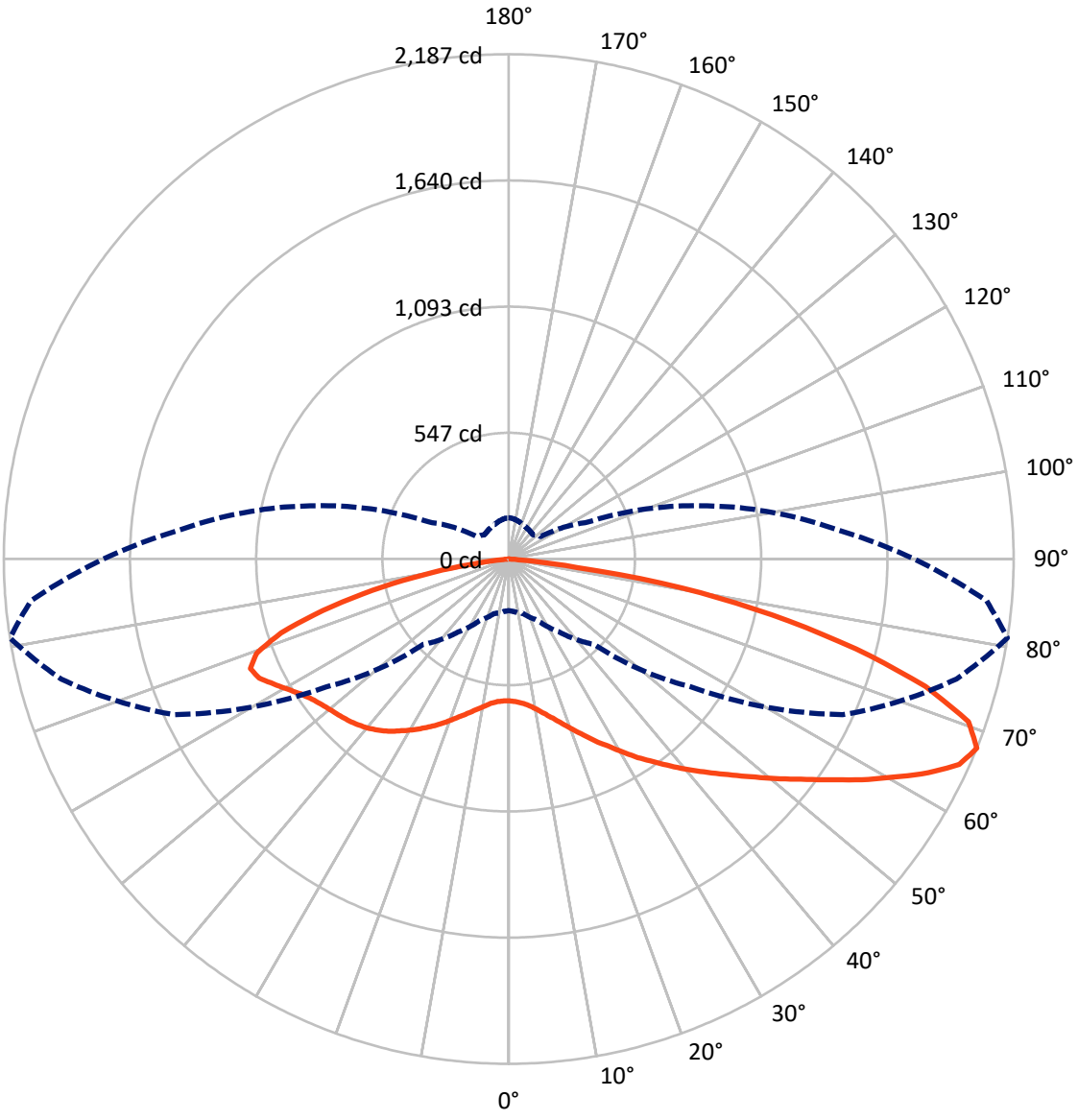
## Luminous Intensity Polar Plot



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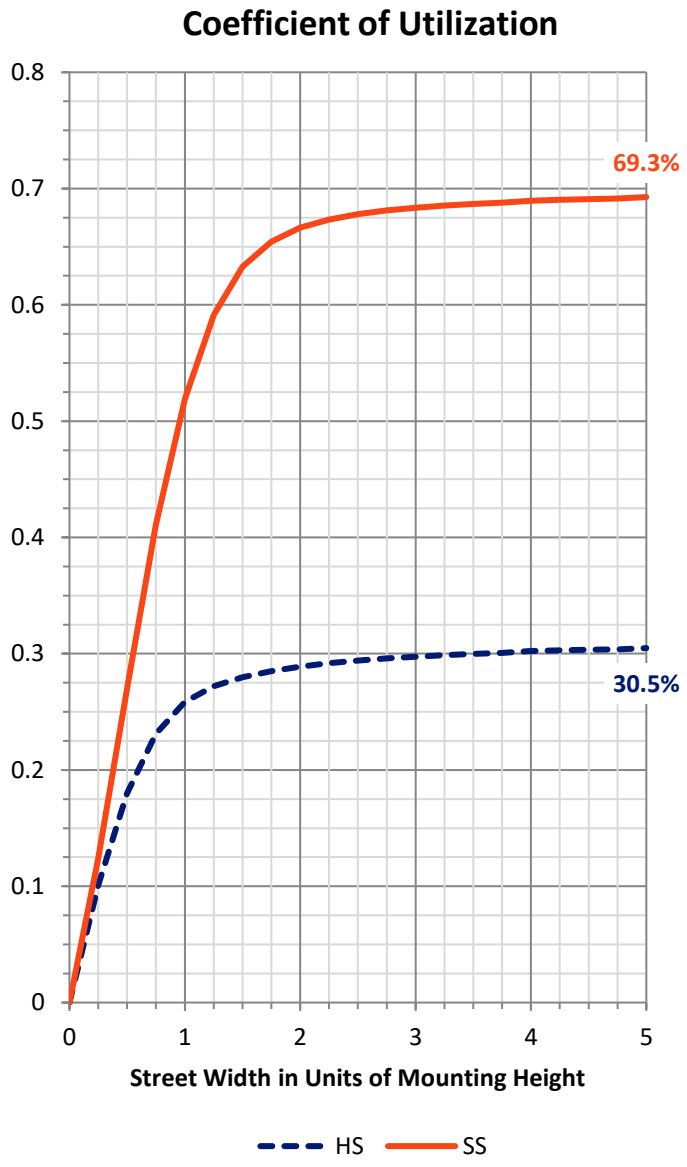
REPORT NUMBER: P870236
CATALOG NUMBER: MEM2-HSN-SA-40-830-U-T2R

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 1333.6 | 0.0 | 1333.6 |
| | % Fixture | 30.6 | 0.0 | 30.6 |
| **Street Side** | Lumens | 3018.5 | 0.0 | 3018.5 |
| | % Fixture | 69.4 | 0.0 | 69.4 |
| **Total** | Lumens | 4352.1 | 0.0 | 4352.1 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 62.7 | 1.4 |
| 10°-20° | 222.4 | 5.1 |
| 20°-30° | 443.0 | 10.2 |
| 30°-40° | 696.0 | 16.0 |
| 40°-50° | 863.1 | 19.8 |
| 50°-60° | 843.7 | 19.4 |
| 60°-70° | 709.5 | 16.3 |
| 70°-80° | 450.8 | 10.4 |
| 80°-90° | 60.9 | 1.4 |
| 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° | 4352.1 | 100.0 |
| 0°-180° | 4352.1 | 100.0 |



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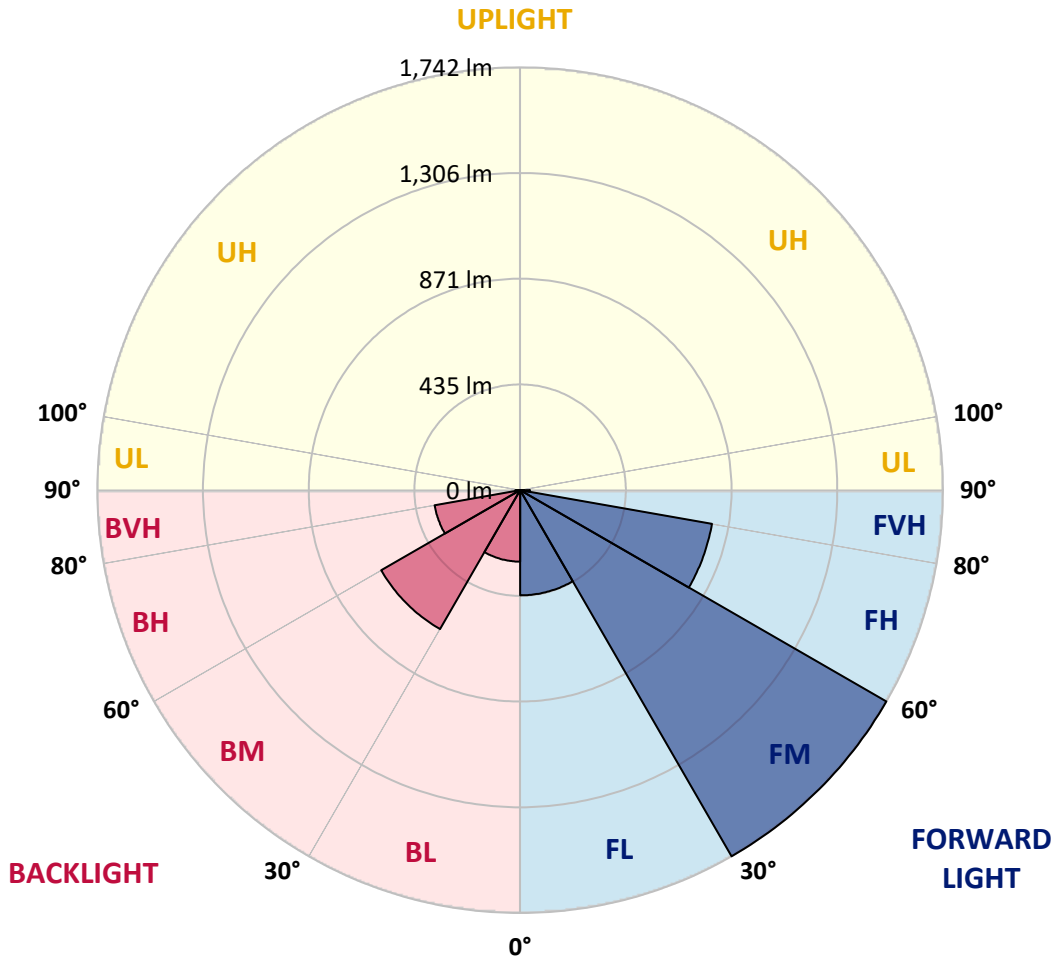
REPORT NUMBER: P870236
CATALOG NUMBER: MEM2-HSN-SA-40-830-U-T2R

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 433.5 | 10.0 | | | |
| FM | (30°-60°) | 1741.9 | 40.0 | | | |
| FH | (60°-80°) | 802.4 | 18.4 | | | G1/1800 |
| FVH | (80°-90°) | 40.8 | 0.9 | | | G1/100 |
| BL | (0°-30°) | 294.6 | 6.8 | B1/500 | | |
| BM | (30°-60°) | 661.0 | 15.2 | B1/1000 | | |
| BH | (60°-80°) | 358.0 | 8.2 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 20.1 | 0.5 | | | 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 II Medium



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Scaled Data Report

REPORT NUMBER: P870236
CATALOG NUMBER: MEM2-HSN-SA-40-830-U-T2R

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 81° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | *614.4* | 614.4 |
| 2.5° | 636.0 | 635.2 | 635.2 | 628.2 | 628.2 | 626.5 | 627.4 | 622.2 | 619.6 | *618.8* | 617.9 |
| 5° | 681.8 | 681.8 | 676.6 | 672.3 | 663.6 | 655.9 | 649.0 | 638.6 | 630.8 | *627.4* | 624.8 |
| 7.5° | 750.8 | 745.6 | 743.9 | 730.9 | 712.8 | 697.3 | 683.5 | 661.0 | 646.4 | *641.2* | 637.7 |
| 10° | 835.4 | 828.5 | 815.5 | 800.8 | 777.5 | 754.2 | 726.6 | 696.4 | 672.3 | *661.9* | 657.6 |
| 12.5° | 922.5 | 913.0 | 894.9 | 881.1 | 850.9 | 815.5 | 776.7 | 735.3 | 701.6 | *686.9* | 679.2 |
| 15° | 1018.3 | 1013.1 | 991.6 | 963.9 | 928.6 | 878.5 | 830.2 | 779.3 | 736.1 | *715.4* | 702.5 |
| 17.5° | 1121.9 | 1114.1 | 1090.8 | 1057.2 | 1007.1 | 947.6 | 891.5 | 825.9 | 775.8 | *749.1* | 734.4 |
| 20° | 1223.7 | 1222.0 | 1187.5 | 1155.5 | 1096.8 | 1022.6 | 950.1 | 881.1 | 818.1 | *787.0* | 768.1 |
| 22.5° | 1337.6 | 1326.4 | 1296.2 | 1251.3 | 1181.4 | 1113.2 | 1027.8 | 938.1 | 863.8 | *827.6* | 806.0 |
| 25° | 1455.8 | 1455.0 | 1417.9 | 1362.6 | 1280.7 | 1194.4 | 1102.0 | 1002.8 | 918.2 | *874.2* | 845.7 |
| 27.5° | 1602.6 | 1591.3 | 1543.9 | 1480.9 | 1385.9 | 1286.7 | 1179.7 | 1070.1 | 970.0 | *917.3* | 882.8 |
| 30° | 1731.1 | 1727.7 | 1674.2 | 1603.4 | 1497.3 | 1379.0 | 1263.4 | 1146.0 | 1031.3 | *969.1* | 931.2 |
| 32.5° | 1835.6 | 1831.2 | 1785.5 | 1714.7 | 1600.8 | 1478.3 | 1345.4 | 1217.7 | 1092.5 | *1025.2* | 975.2 |
| 35° | 1922.7 | 1915.8 | 1868.4 | 1797.6 | 1699.2 | 1574.9 | 1433.4 | 1292.7 | 1159.8 | *1077.9* | 1030.4 |
| 37.5° | 1957.2 | 1951.2 | 1912.4 | 1853.7 | 1763.1 | 1649.2 | 1512.8 | 1375.6 | 1227.2 | *1137.4* | 1083.9 |
| 40° | 1944.3 | 1940.8 | 1913.2 | 1872.7 | 1803.6 | 1708.7 | 1588.7 | 1461.9 | 1303.1 | *1200.4* | 1136.5 |
| 42.5° | 1883.0 | 1883.0 | 1865.8 | 1845.1 | 1810.5 | 1742.4 | 1656.1 | 1544.7 | 1376.5 | *1263.4* | 1186.6 |
| 45° | 1796.7 | 1793.3 | 1787.2 | 1779.5 | 1774.3 | 1748.4 | 1700.1 | 1616.4 | 1457.6 | *1332.4* | 1247.0 |
| 47.5° | 1681.9 | 1684.5 | 1680.2 | 1683.7 | 1705.2 | 1721.6 | 1719.1 | 1682.8 | 1540.4 | *1408.4* | 1306.6 |
| 50° | 1501.6 | 1513.7 | 1527.5 | 1568.0 | 1612.0 | 1657.8 | 1700.1 | 1730.3 | 1637.9 | *1494.7* | 1375.6 |
| 52.5° | 1278.1 | 1283.3 | 1320.4 | 1416.2 | 1510.2 | 1570.6 | 1650.9 | 1751.8 | 1724.2 | *1584.4* | 1456.7 |
| 55° | 1002.8 | 1012.3 | 1068.4 | 1203.9 | 1371.3 | 1486.9 | 1581.0 | 1742.4 | 1812.3 | *1687.1* | 1551.6 |
| 57.5° | 718.9 | 724.9 | 814.7 | 954.5 | 1172.8 | 1367.0 | 1501.6 | 1704.4 | 1883.0 | *1803.6* | 1649.2 |
| 60° | 510.9 | 522.1 | 579.9 | 716.3 | 926.0 | 1201.3 | 1429.1 | 1649.2 | 1948.6 | *1917.5* | 1776.9 |
| 62.5° | 377.1 | 383.2 | 423.7 | 523.0 | 695.6 | 975.2 | 1335.0 | 1608.6 | 1991.8 | *2040.1* | 1904.6 |
| 65° | 283.9 | 286.5 | 314.1 | 382.3 | 520.4 | 718.9 | 1186.6 | 1600.8 | 2015.9 | *2144.5* | 2017.6 |
| 67.5° | *223.5* | *227.8* | *245.1* | *291.7* | *387.5* | *523.0* | *966.5* | *1595.6* | *2007.3* | *2186.8* | *2077.2* |
| 70° | 188.1 | 189.0 | 201.9 | 227.8 | 290.0 | 376.3 | 722.3 | 1518.0 | 1959.0 | *2112.6* | 2022.0 |
| 72.5° | 163.1 | 163.1 | 169.1 | 189.9 | 233.0 | 284.8 | 491.9 | 1332.4 | 1836.4 | *1887.3* | 1830.4 |
| 75° | 132.0 | 131.2 | 141.5 | 161.4 | 187.3 | 219.2 | 330.5 | 1008.8 | 1579.3 | *1553.4* | 1506.8 |
| 77.5° | 114.8 | 113.9 | 122.5 | 139.8 | 154.5 | 175.2 | 226.1 | 655.0 | 1242.7 | *1165.0* | 1135.7 |
| 80° | 98.4 | 95.8 | 102.7 | 119.1 | 126.9 | 136.4 | 156.2 | 381.4 | 812.1 | *763.7* | 728.4 |
| 82.5° | 74.2 | 68.2 | 66.4 | 80.3 | 85.4 | 79.4 | 79.4 | 133.8 | 295.1 | *297.7* | 275.3 |
| 85° | 6.0 | 6.9 | 8.6 | 10.4 | 14.7 | 16.4 | 17.3 | 28.5 | 44.0 | *42.3* | 43.1 |
| 87.5° | 0.9 | 0.9 | 0.9 | 1.7 | 1.7 | 2.6 | 2.6 | 2.6 | 3.5 | *3.5* | 3.5 |
| 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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Peachtree City, GA 30269

Scaled Data Report

REPORT NUMBER: P870236
CATALOG NUMBER: MEM2-HSN-SA-40-830-U-T2R

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 | 614.4 |
| 2.5° | 617.0 | 615.3 | 613.6 | 613.6 | 613.6 | 611.9 | 611.0 | 611.0 | 610.1 | 607.5 | 606.7 |
| 5° | 623.1 | 620.5 | 617.9 | 617.9 | 617.9 | 617.0 | 616.2 | 617.0 | 616.2 | 613.6 | 612.7 |
| 7.5° | 635.2 | 631.7 | 628.2 | 628.2 | 630.0 | 629.1 | 629.1 | 630.0 | 629.1 | 626.5 | 625.7 |
| 10° | 652.4 | 647.2 | 645.5 | 645.5 | 647.2 | 646.4 | 645.5 | 645.5 | 644.6 | 640.3 | 642.1 |
| 12.5° | 671.4 | 666.2 | 664.5 | 665.4 | 664.5 | 662.8 | 663.6 | 661.0 | 660.2 | 653.3 | 652.4 |
| 15° | 695.6 | 689.5 | 686.1 | 686.9 | 684.3 | 680.9 | 677.4 | 675.7 | 672.3 | 666.2 | 664.5 |
| 17.5° | 723.2 | 713.7 | 709.4 | 709.4 | 704.2 | 697.3 | 692.1 | 686.9 | 681.8 | 674.9 | 673.1 |
| 20° | 749.9 | 741.3 | 734.4 | 732.7 | 722.3 | 711.1 | 701.6 | 693.0 | 686.9 | 679.2 | 677.4 |
| 22.5° | 783.6 | 771.5 | 762.0 | 754.2 | 738.7 | 720.6 | 705.9 | 693.8 | 685.2 | 676.6 | 674.0 |
| 25° | 819.0 | 801.7 | 786.2 | 771.5 | 749.9 | 724.0 | 703.3 | 686.1 | 674.9 | 665.4 | 663.6 |
| 27.5° | 854.4 | 831.9 | 809.5 | 786.2 | 753.4 | 719.7 | 690.4 | 669.7 | 655.0 | 642.9 | 641.2 |
| 30° | 892.3 | 864.7 | 829.3 | 795.7 | 752.5 | 708.5 | 671.4 | 642.1 | 624.8 | 611.0 | 609.3 |
| 32.5° | 931.2 | 896.6 | 848.3 | 802.6 | 748.2 | 692.1 | 643.8 | 612.7 | 591.1 | 575.6 | 571.3 |
| 35° | 974.3 | 932.0 | 865.6 | 805.2 | 736.1 | 667.9 | 614.4 | 575.6 | 550.6 | 535.0 | 531.6 |
| 37.5° | 1018.3 | 964.8 | 876.8 | 803.4 | 718.9 | 639.5 | 576.5 | 536.8 | 507.4 | 485.9 | 482.4 |
| 40° | 1063.2 | 995.0 | 883.7 | 794.8 | 694.7 | 604.1 | 541.1 | 492.8 | 450.5 | 430.6 | 421.1 |
| 42.5° | 1104.6 | 1022.6 | 887.1 | 782.7 | 667.9 | 567.0 | 494.5 | 431.5 | 391.8 | 370.2 | 374.5 |
| 45° | 1147.8 | 1048.5 | 888.0 | 768.1 | 632.6 | 519.5 | 435.8 | 377.1 | 337.4 | 321.0 | 319.3 |
| 47.5° | 1184.9 | 1070.1 | 886.3 | 747.3 | 592.9 | 465.1 | 374.5 | 318.4 | 289.1 | 273.6 | 271.8 |
| 50° | 1234.1 | 1094.3 | 883.7 | 723.2 | 541.1 | 403.0 | 317.6 | 271.8 | 245.1 | 233.0 | 232.1 |
| 52.5° | 1283.3 | 1121.0 | 882.0 | 689.5 | 486.7 | 344.3 | 265.8 | 229.6 | 211.4 | 205.4 | 203.7 |
| 55° | 1348.0 | 1153.8 | 882.8 | 650.7 | 424.6 | 283.9 | 225.2 | 200.2 | 190.7 | 188.1 | 188.1 |
| 57.5° | 1422.2 | 1196.1 | 888.0 | 607.5 | 359.9 | 234.7 | 195.9 | 184.7 | 183.8 | 185.5 | 186.4 |
| 60° | 1511.9 | 1252.2 | 898.4 | 562.7 | 300.3 | 198.5 | 178.6 | 177.8 | 180.4 | 186.4 | 188.1 |
| 62.5° | 1612.9 | 1313.5 | 911.3 | 504.0 | 243.4 | 174.3 | 169.1 | 172.6 | 176.0 | 183.0 | 183.8 |
| 65° | 1701.8 | 1382.5 | 919.1 | 447.9 | 203.7 | 160.5 | 163.1 | 164.8 | 173.5 | 183.0 | 183.0 |
| 67.5° | *1755.3* | *1432.5* | *889.7* | *377.1* | *170.0* | *148.4* | *153.6* | *158.8* | *168.3* | *176.9* | *178.6* |
| 70° | 1737.2 | 1416.2 | 789.6 | 292.6 | 144.1 | 137.2 | 143.3 | 151.0 | 160.5 | 170.9 | 176.0 |
| 72.5° | 1611.2 | 1299.6 | 641.2 | 213.2 | 125.1 | 126.9 | 134.6 | 145.0 | 153.6 | 164.8 | 171.7 |
| 75° | 1347.1 | 1084.8 | 462.6 | 153.6 | 109.6 | 116.5 | 128.6 | 137.2 | 143.3 | 145.8 | 146.7 |
| 77.5° | 1022.6 | 797.4 | 315.0 | 114.8 | 94.9 | 104.4 | 117.4 | 126.9 | 128.6 | 130.3 | 132.0 |
| 80° | 667.9 | 507.4 | 177.8 | 80.3 | 72.5 | 85.4 | 95.8 | 106.1 | 102.7 | 107.9 | 109.6 |
| 82.5° | 282.2 | 221.8 | 81.1 | 39.7 | 33.7 | 36.2 | 38.8 | 34.5 | 31.9 | 31.9 | 27.6 |
| 85° | 37.1 | 28.5 | 12.1 | 5.2 | 4.3 | 2.6 | 2.6 | 2.6 | 1.7 | 1.7 | 1.7 |
| 87.5° | 3.5 | 3.5 | 2.6 | 2.6 | 1.7 | 1.7 | 0.9 | 1.7 | 0.9 | 0.9 | 0.9 |
| 90° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

# LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Streetworks

Report Number: SP1-2407-157-7

Test Date: 09/05/2024

Luminaire Tested: MEM2-HTN-SA-40-830-U-5WQ

Data in this report applies to families of products including MEM2-HTN-SA-40-830-U-5WQ

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

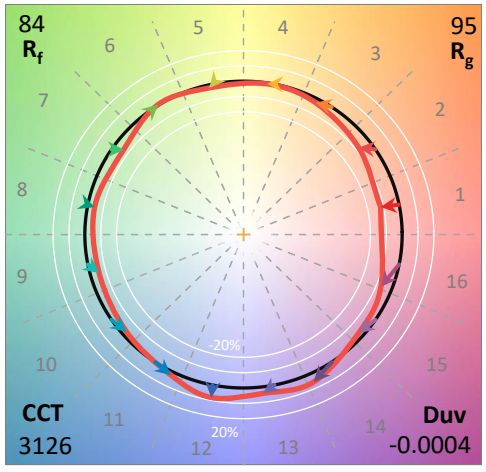
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-157-7 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 09/05/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Streetworks |
| Catalog Number: | **MEM2-HTN-SA-40-830-U-5WQ** |
| Description: | Epic Modern Light Square 40W 5WQ Optic |

## Spectral Parameters

| | |
|---|---|
| CCT (K): | 3126 |
| CIE u': | 0.2465 |
| CIE v': | 0.5182 |
| Duv: | -0.0004 |
| CIE x: | 0.4277 |
| CIE y: | 0.3997 |
| CIE z: | 0.1727 |
| Peak Wavelength (nm): | 601 |
| Dominant Wavelength (nm): | 582 |
| Purity: | 48.31913 |
| Rf: | 84.4 |
| Rg: | 94.7 |

| | |
|---|---|
| CRI (Ra): | 82.6 |
| R1: | 81.4 |
| R2: | 92.2 |
| R3: | 94.9 |
| R4: | 80.1 |
| R5: | 81.8 |
| R6: | 90.5 |
| R7: | 81.8 |
| R8: | 58.0 |
| R9: | 5.1 |
| R10: | 82.2 |
| R11: | 79.8 |
| R12: | 70.4 |
| R13: | 84.2 |
| R14: | 97.9 |
| R15: | 73.6 |



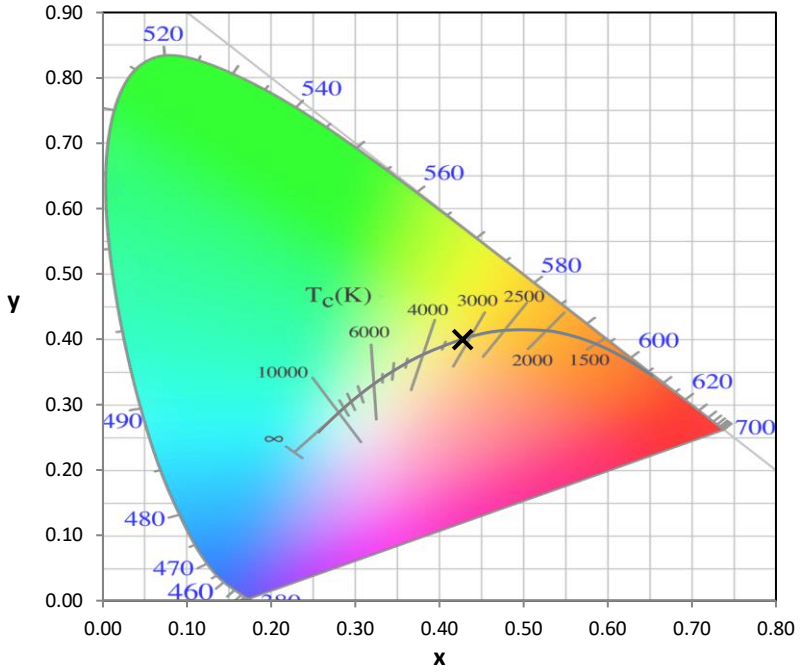

## Test Conditions

| | |
|---|---|
| Stabilization Time: | 22M |
| Operation Time: | 1H 22M |
| Sphere Temperature (°C): | 24.3 |

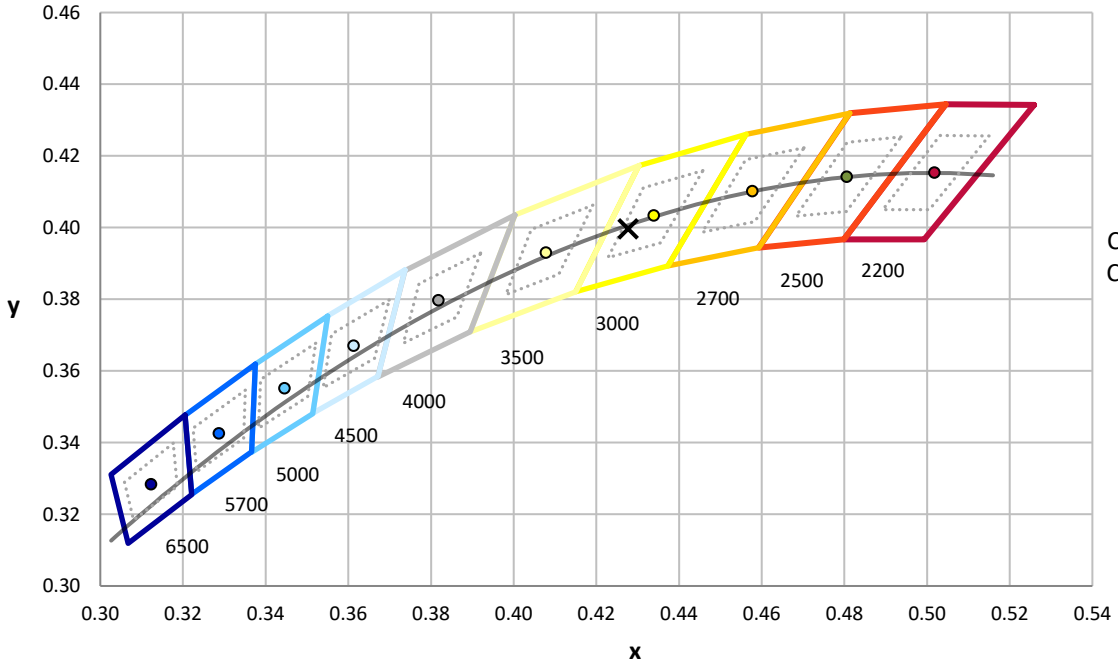
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC Power Source | IN0208 | 10/24/2023 | 10/24/2024 |
| Sphere Thermometer | IN0085 | 10/24/2023 | 10/24/2024 |
| Room Thermometer | IN0046 | 10/24/2023 | 10/24/2024 |

REPORT NUMBER: SP1-2407-157-7

## CIE 1931 Chromaticity Diagram




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




CCT = 3126K
CIE x = 0.4277
CIE y = 0.3997
Duv = -0.0004

Point lies inside the ANSI 3000K 4-step quadrangle

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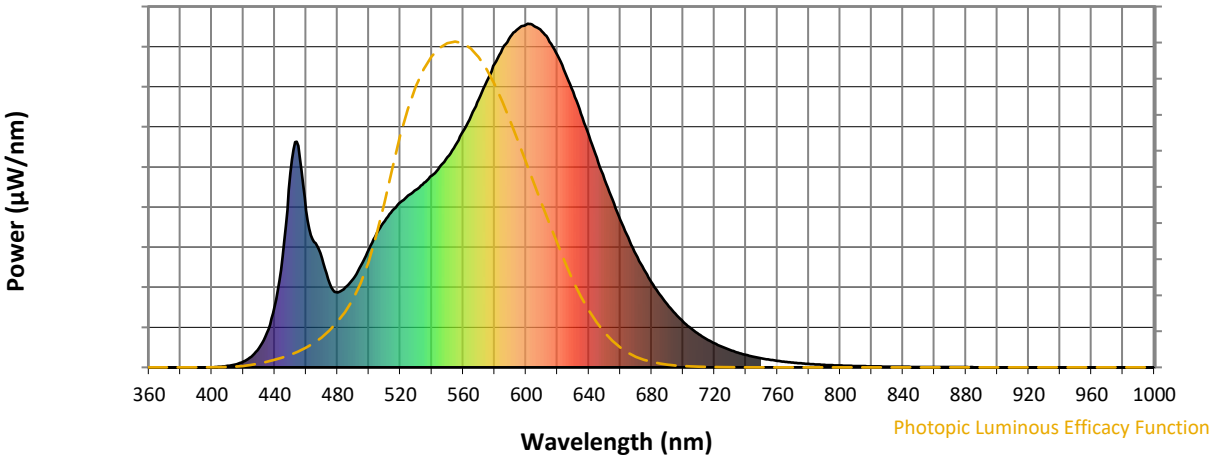
## Photopic Flux vs. Wavelength




## Photopic Lumens: NR

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 258 | NR | 620 | 908 | NR | 750 | 26 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 297 | NR | 625 | 857 | NR | 755 | 22 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 345 | NR | 630 | 801 | NR | 760 | 19 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 391 | NR | 635 | 738 | NR | 765 | 16 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 426 | NR | 640 | 675 | NR | 770 | 14 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 456 | NR | 645 | 610 | NR | 775 | 12 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 480 | NR | 650 | 547 | NR | 780 | 10 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 500 | NR | 655 | 488 | NR | 785 | 9 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 517 | NR | 660 | 429 | NR | 790 | 7 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 538 | NR | 665 | 378 | NR | 795 | 6 | NR | 925 | 0 | NR |
| 410 | 4 | NR | 540 | 558 | NR | 670 | 328 | NR | 800 | 5 | NR | 930 | 0 | NR |
| 415 | 9 | NR | 545 | 584 | NR | 675 | 285 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 16 | NR | 550 | 611 | NR | 680 | 247 | NR | 810 | 4 | NR | 940 | 0 | NR |
| 425 | 31 | NR | 555 | 646 | NR | 685 | 212 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 56 | NR | 560 | 687 | NR | 690 | 183 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 101 | NR | 565 | 731 | NR | 695 | 156 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 178 | NR | 570 | 780 | NR | 700 | 133 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 323 | NR | 575 | 832 | NR | 705 | 114 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 566 | NR | 580 | 883 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 645 | NR | 585 | 927 | NR | 715 | 82 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 457 | NR | 590 | 963 | NR | 720 | 70 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 365 | NR | 595 | 985 | NR | 725 | 59 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 317 | NR | 600 | 998 | NR | 730 | 50 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 244 | NR | 605 | 994 | NR | 735 | 43 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 218 | NR | 610 | 978 | NR | 740 | 36 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 233 | NR | 615 | 947 | NR | 745 | 31 | NR | 875 | 1 | NR | | | |

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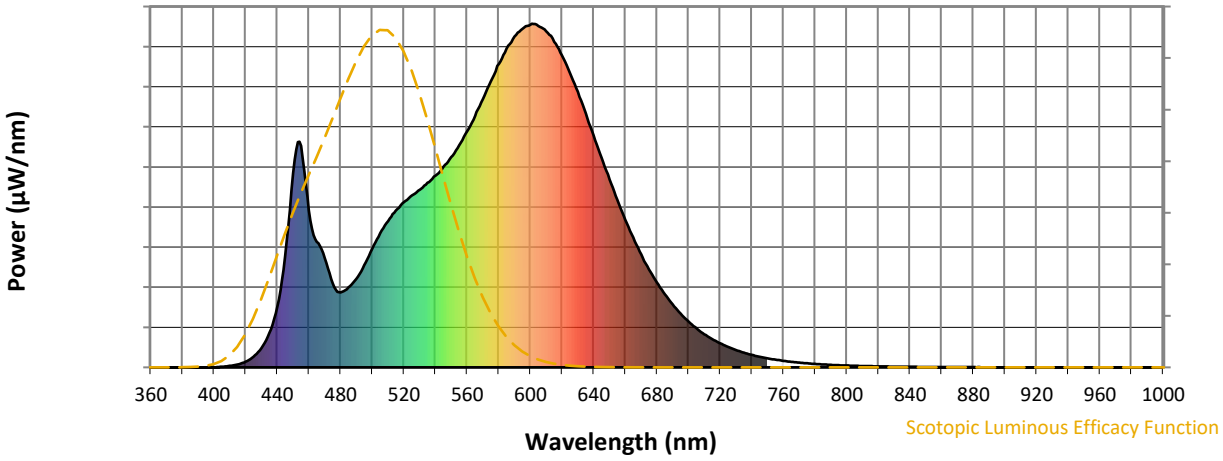
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 1.42**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 258 | NR | 620 | 908 | NR | 750 | 26 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 297 | NR | 625 | 857 | NR | 755 | 22 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 345 | NR | 630 | 801 | NR | 760 | 19 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 391 | NR | 635 | 738 | NR | 765 | 16 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 426 | NR | 640 | 675 | NR | 770 | 14 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 456 | NR | 645 | 610 | NR | 775 | 12 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 480 | NR | 650 | 547 | NR | 780 | 10 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 500 | NR | 655 | 488 | NR | 785 | 9 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 517 | NR | 660 | 429 | NR | 790 | 7 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 538 | NR | 665 | 378 | NR | 795 | 6 | NR | 925 | 0 | NR |
| 410 | 4 | NR | 540 | 558 | NR | 670 | 328 | NR | 800 | 5 | NR | 930 | 0 | NR |
| 415 | 9 | NR | 545 | 584 | NR | 675 | 285 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 16 | NR | 550 | 611 | NR | 680 | 247 | NR | 810 | 4 | NR | 940 | 0 | NR |
| 425 | 31 | NR | 555 | 646 | NR | 685 | 212 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 56 | NR | 560 | 687 | NR | 690 | 183 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 101 | NR | 565 | 731 | NR | 695 | 156 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 178 | NR | 570 | 780 | NR | 700 | 133 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 323 | NR | 575 | 832 | NR | 705 | 114 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 566 | NR | 580 | 883 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 645 | NR | 585 | 927 | NR | 715 | 82 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 457 | NR | 590 | 963 | NR | 720 | 70 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 365 | NR | 595 | 985 | NR | 725 | 59 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 317 | NR | 600 | 998 | NR | 730 | 50 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 244 | NR | 605 | 994 | NR | 735 | 43 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 218 | NR | 610 | 978 | NR | 740 | 36 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 233 | NR | 615 | 947 | NR | 745 | 31 | NR | 875 | 1 | NR | | | |

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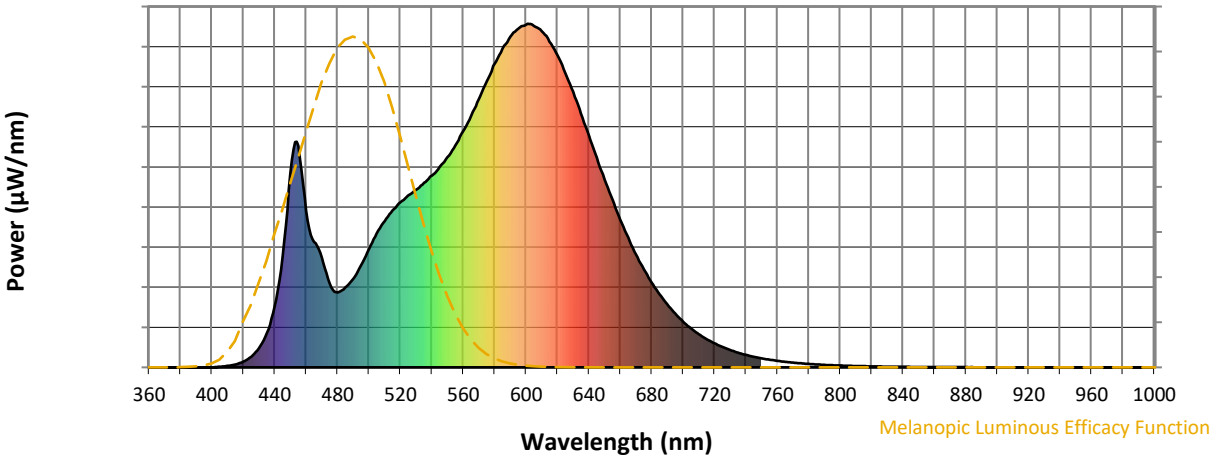
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 2.79**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 258 | NR | 620 | 908 | NR | 750 | 26 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 297 | NR | 625 | 857 | NR | 755 | 22 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 345 | NR | 630 | 801 | NR | 760 | 19 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 391 | NR | 635 | 738 | NR | 765 | 16 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 426 | NR | 640 | 675 | NR | 770 | 14 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 456 | NR | 645 | 610 | NR | 775 | 12 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 480 | NR | 650 | 547 | NR | 780 | 10 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 500 | NR | 655 | 488 | NR | 785 | 9 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 517 | NR | 660 | 429 | NR | 790 | 7 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 538 | NR | 665 | 378 | NR | 795 | 6 | NR | 925 | 0 | NR |
| 410 | 4 | NR | 540 | 558 | NR | 670 | 328 | NR | 800 | 5 | NR | 930 | 0 | NR |
| 415 | 9 | NR | 545 | 584 | NR | 675 | 285 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 16 | NR | 550 | 611 | NR | 680 | 247 | NR | 810 | 4 | NR | 940 | 0 | NR |
| 425 | 31 | NR | 555 | 646 | NR | 685 | 212 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 56 | NR | 560 | 687 | NR | 690 | 183 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 101 | NR | 565 | 731 | NR | 695 | 156 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 178 | NR | 570 | 780 | NR | 700 | 133 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 323 | NR | 575 | 832 | NR | 705 | 114 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 566 | NR | 580 | 883 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 645 | NR | 585 | 927 | NR | 715 | 82 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 457 | NR | 590 | 963 | NR | 720 | 70 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 365 | NR | 595 | 985 | NR | 725 | 59 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 317 | NR | 600 | 998 | NR | 730 | 50 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 244 | NR | 605 | 994 | NR | 735 | 43 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 218 | NR | 610 | 978 | NR | 740 | 36 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 233 | NR | 615 | 947 | NR | 745 | 31 | NR | 875 | 1 | NR | | | |

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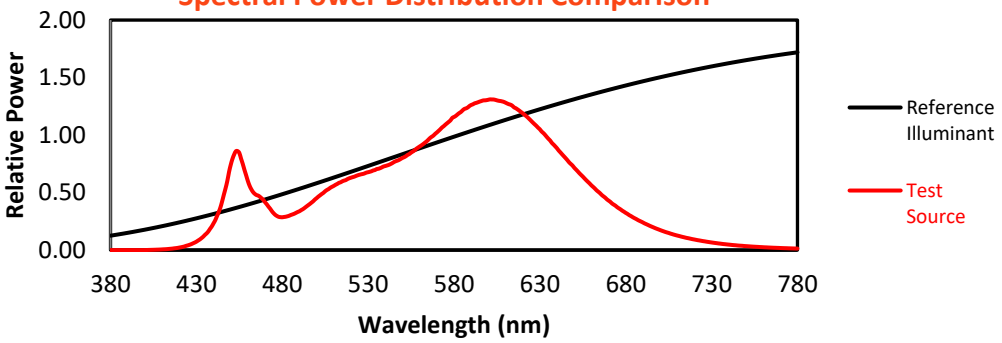
# TM-30-18

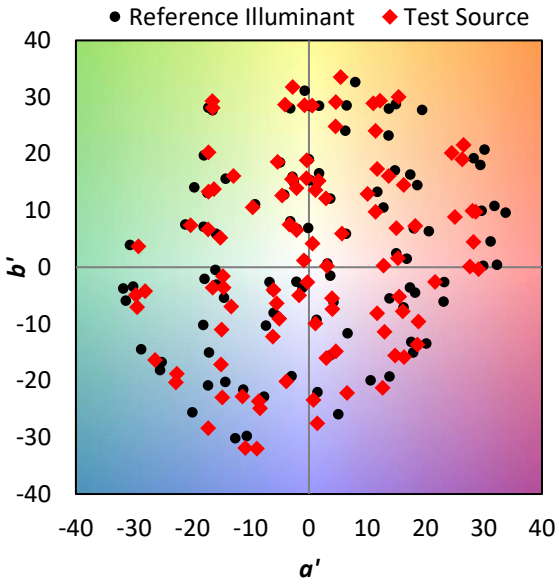
## Summary

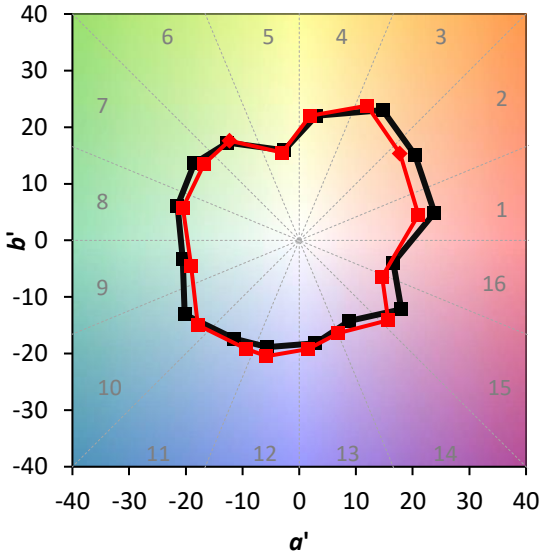
$R_f$ = 84.4
$R_g$ = 94.7
CIE $R_a$ = 82.6
$R_9$ = 5.1

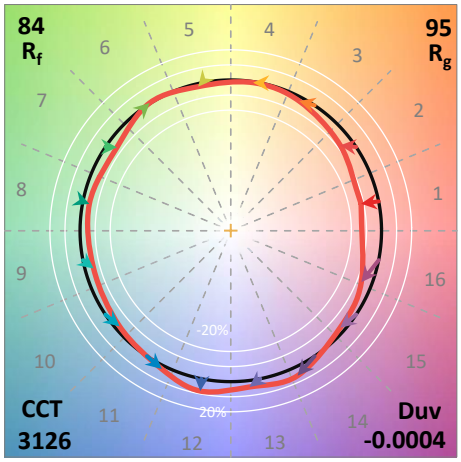
## Spectral Power Distribution Comparison

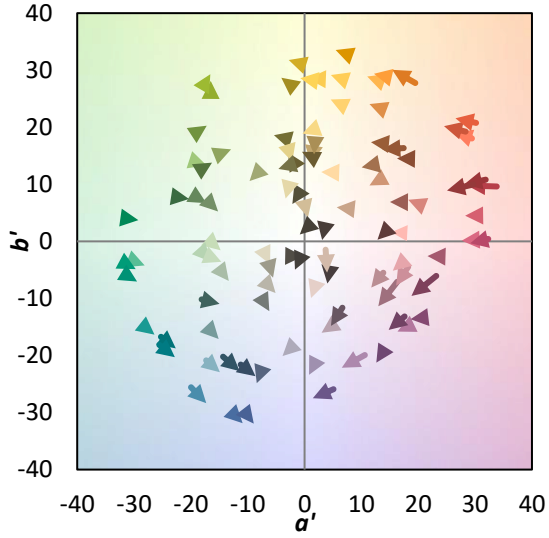



## Color Vector Graphics



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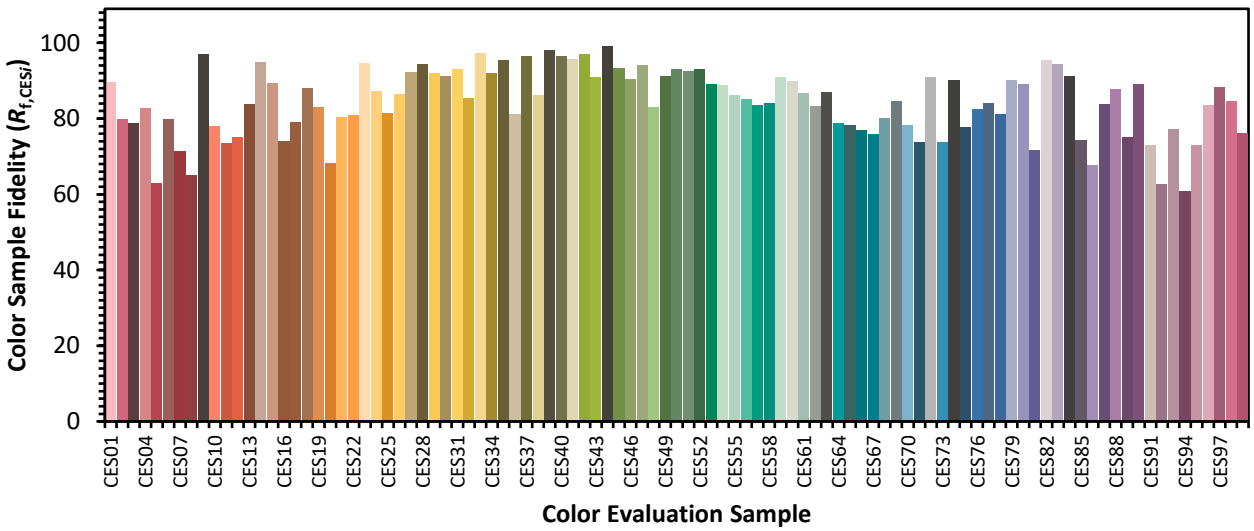
**Individual Sample Fidelity Index ($R_{f,i}$)**

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 86 | CES51 = 93 | CES76 = 82 |
| CES02 = 63 | CES27 = 92 | CES52 = 93 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 70 | CES29 = 92 | CES54 = 89 | CES79 = 90 |
| CES05 = 49 | CES30 = 91 | CES55 = 86 | CES80 = 89 |
| CES06 = 51 | CES31 = 93 | CES56 = 85 | CES81 = 72 |
| CES07 = 42 | CES32 = 85 | CES57 = 83 | CES82 = 95 |
| CES08 = 41 | CES33 = 97 | CES58 = 84 | CES83 = 94 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 91 |
| CES10 = 76 | CES35 = 96 | CES60 = 90 | CES85 = 74 |
| CES11 = 59 | CES36 = 81 | CES61 = 87 | CES86 = 68 |
| CES12 = 65 | CES37 = 96 | CES62 = 83 | CES87 = 84 |
| CES13 = 43 | CES38 = 86 | CES63 = 87 | CES88 = 88 |
| CES14 = 74 | CES39 = 98 | CES64 = 79 | CES89 = 75 |
| CES15 = 71 | CES40 = 96 | CES65 = 78 | CES90 = 89 |
| CES16 = 47 | CES41 = 96 | CES66 = 77 | CES91 = 73 |
| CES17 = 50 | CES42 = 97 | CES67 = 76 | CES92 = 63 |
| CES18 = 56 | CES43 = 91 | CES68 = 80 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 85 | CES94 = 61 |
| CES20 = 66 | CES45 = 93 | CES70 = 78 | CES95 = 73 |
| CES21 = 87 | CES46 = 90 | CES71 = 74 | CES96 = 84 |
| CES22 = 79 | CES47 = 94 | CES72 = 91 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 74 | CES98 = 85 |
| CES24 = 91 | CES49 = 91 | CES74 = 90 | CES99 = 76 |
| CES25 = 72 | CES50 = 93 | CES75 = 78 | |



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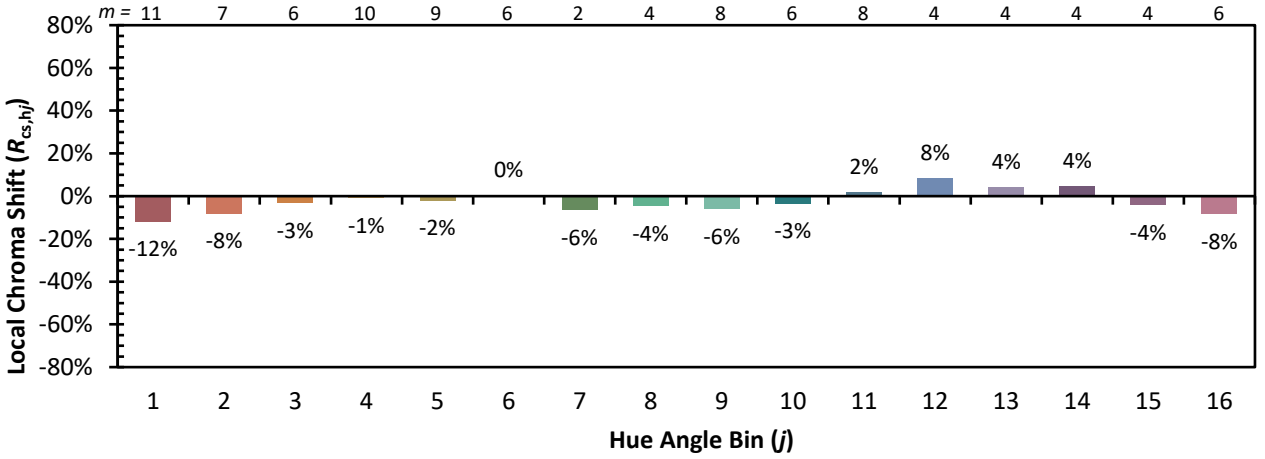
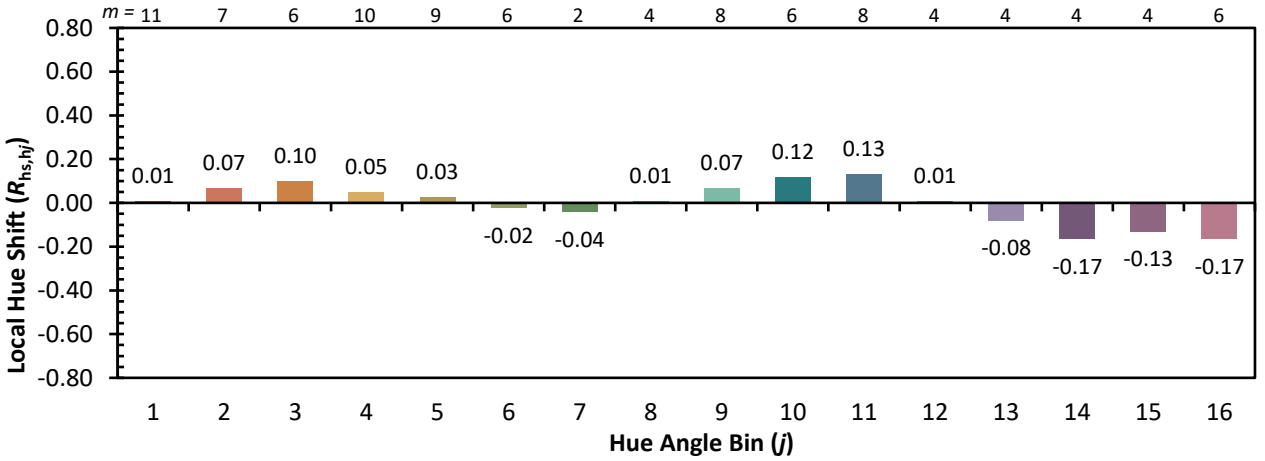
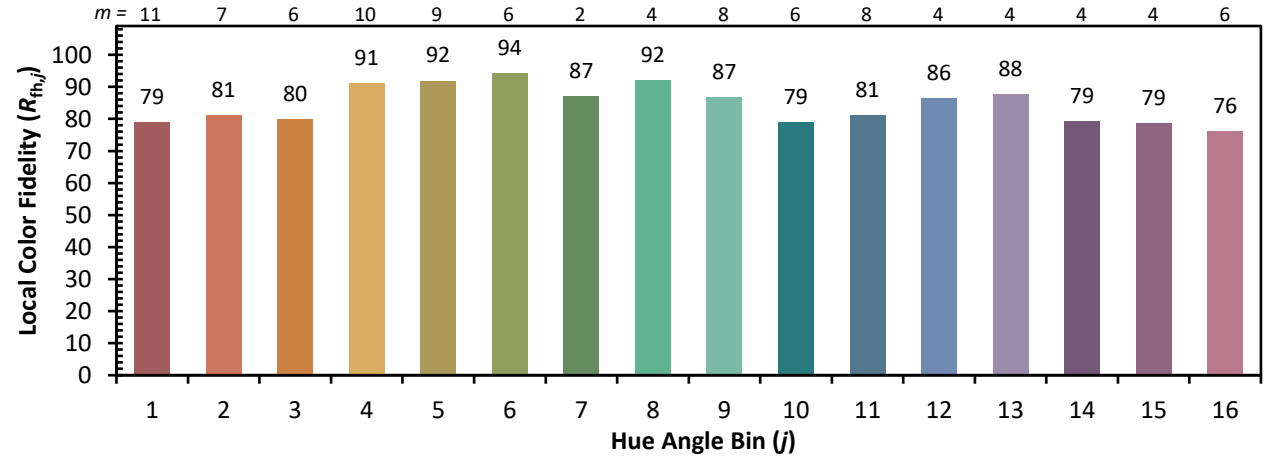
## Color Rendition by Hue-Angle Bin



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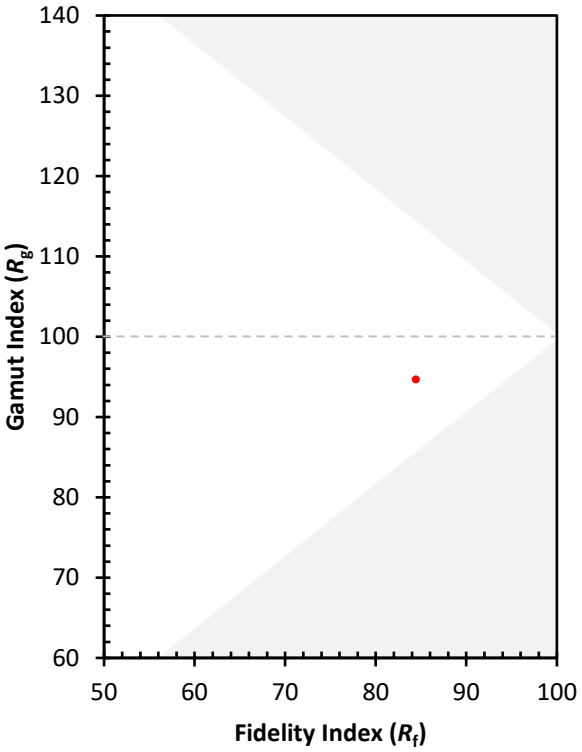
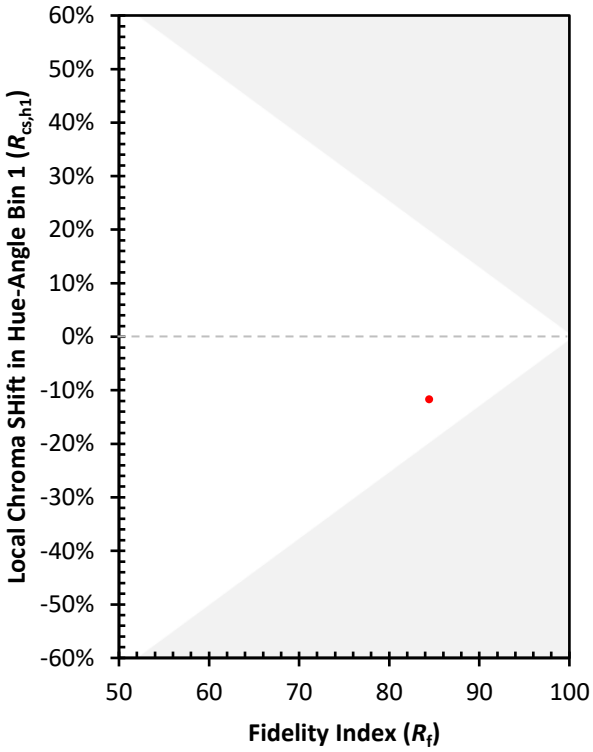
## Measure Comparisons

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