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: INVUE

Report Number: P871147

Luminaire Tested: **EMM2-HSN-SA1B-840-U-T2U-HSS**

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: | P871147 |
| Test Lab: | INNOVATION CENTER(G3) |
| Issue Date: | 09/05/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | INVUE |
| Catalog Number: | EMM2-HSN-SA1B-840-U-T2U-HSS |
| Description: | EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 60W 80CRI 4000K FIXTURE w/ TYPE II URBAN DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD |
| Light Source: | (10) 4000K CCT, 80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 4024.6 lumens |
| Efficiency: | N/A |
| Efficacy: | 91.5 lumens/watt |
| Luminous Opening: | Rectangular (W 0.33' x L: 0.33' x H: 0') |
| IES Classification: | Type II - Short |
| BUG Rating: | B1 - U0 - G1 |

| | |
|---|---|
| Input Watts (W): | 44 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | 0.99 |
| Total Harmonic Distortion (THDi): | 6.91% |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 24 FT |

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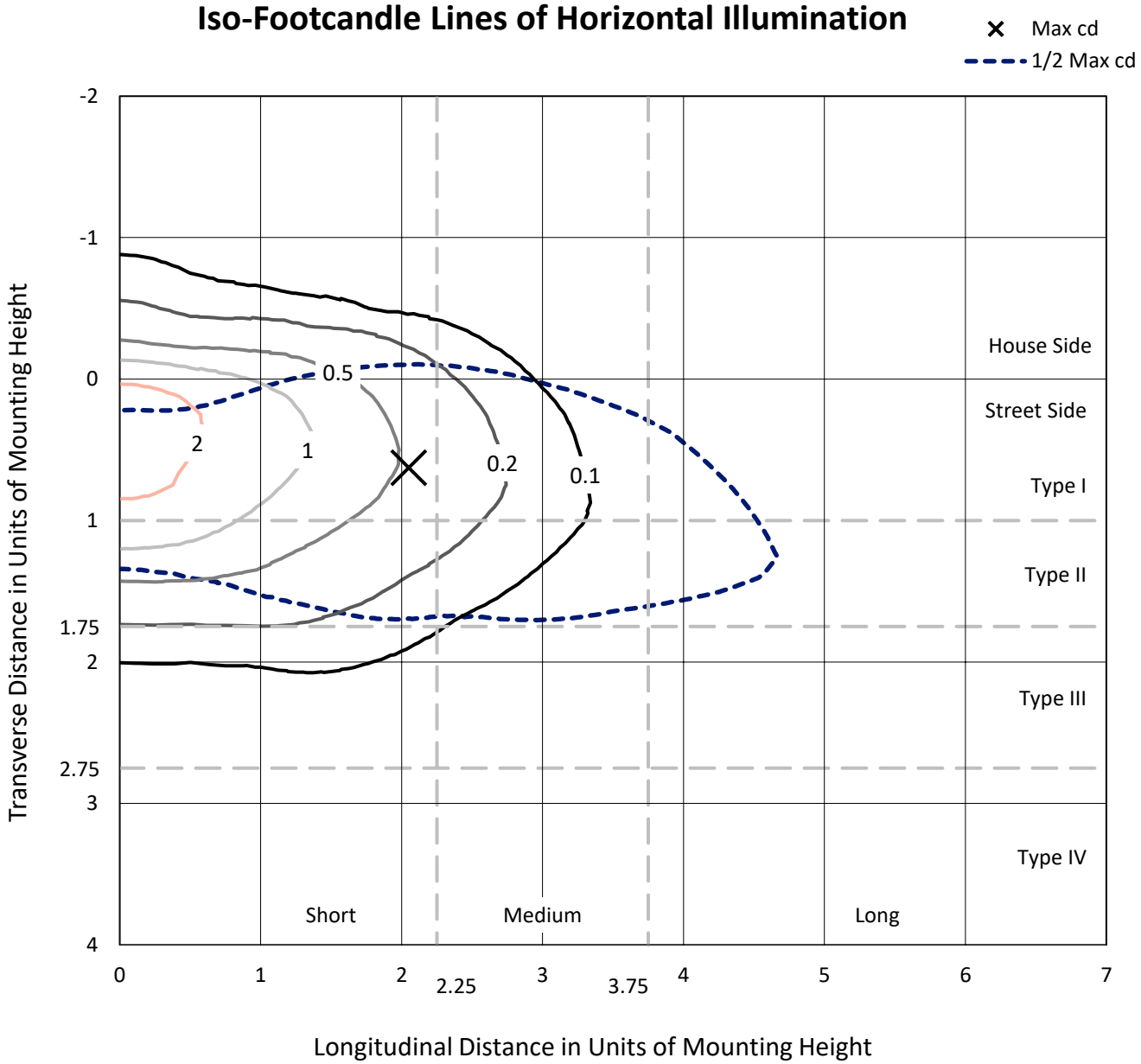
Scaled Data Report

REPORT NUMBER: P871147
CATALOG NUMBER: EMM2-HSN-SA1B-840-U-T2U-HSS

## Iso-Footcandle Lines of Horizontal Illumination




Based on 20 foot mounting height. Maximum calculated value = 2.9 fc
Type II - Short - N/A

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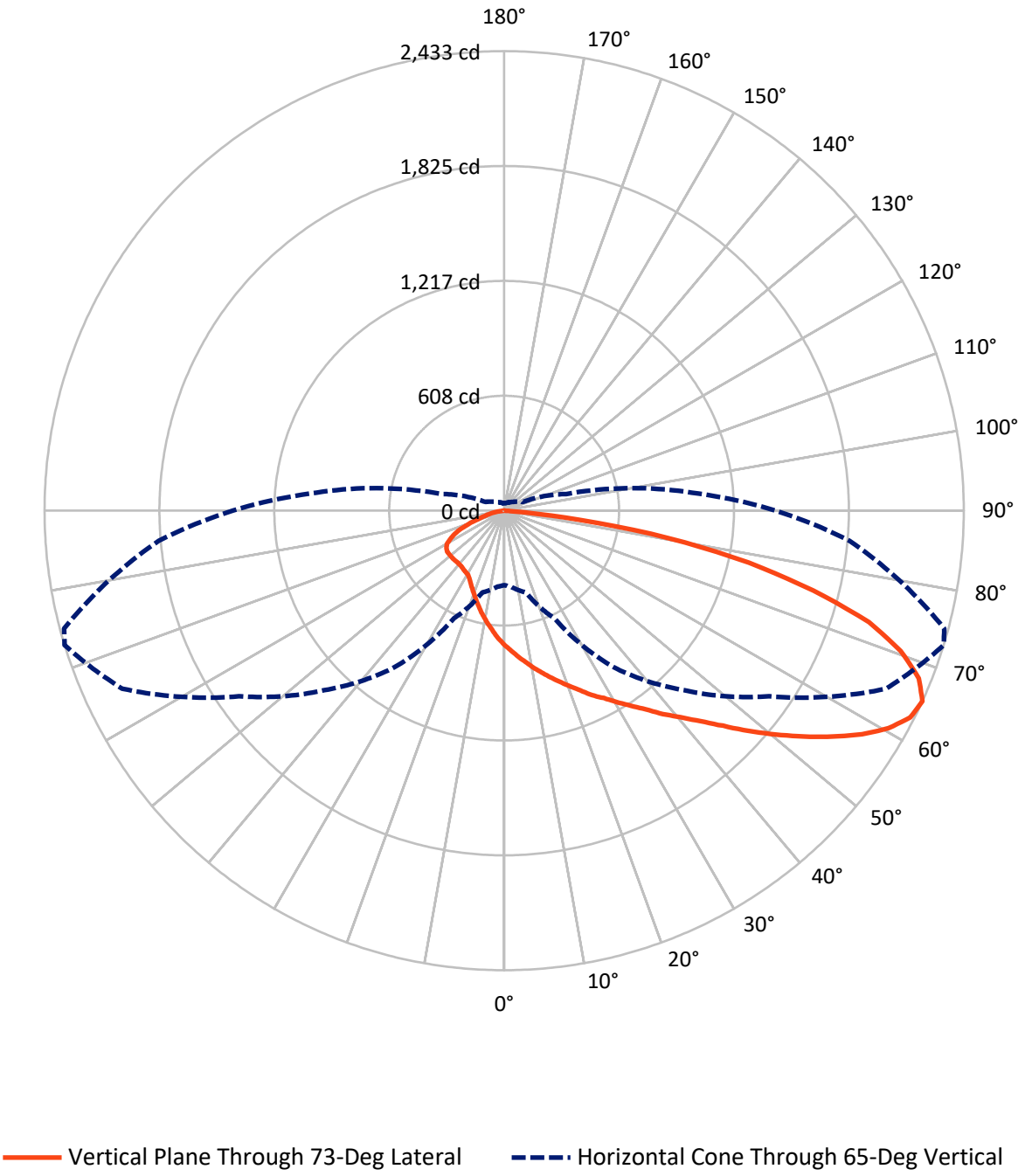
## Luminous Intensity Polar Plot



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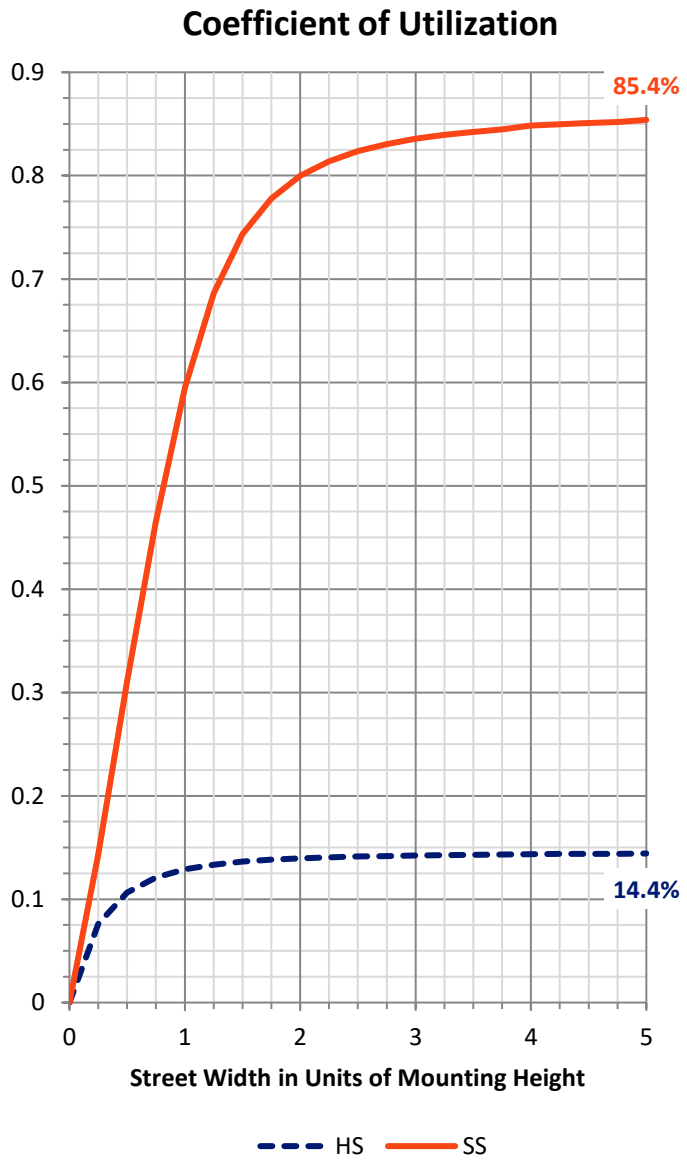
REPORT NUMBER: P871147
CATALOG NUMBER: EMM2-HSN-SA1B-840-U-T2U-HSS

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 585.2 | 0.0 | 585.2 |
| | % Fixture | 14.5 | 0.0 | 14.5 |
| **Street Side** | Lumens | 3439.4 | 0.0 | 3439.4 |
| | % Fixture | 85.5 | 0.0 | 85.5 |
| **Total** | Lumens | 4024.6 | 0.0 | 4024.6 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 68.9 | 1.7 |
| 10°-20° | 209.4 | 5.2 |
| 20°-30° | 350.8 | 8.7 |
| 30°-40° | 529.1 | 13.1 |
| 40°-50° | 747.7 | 18.6 |
| 50°-60° | 841.3 | 20.9 |
| 60°-70° | 754.4 | 18.7 |
| 70°-80° | 458.8 | 11.4 |
| 80°-90° | 64.2 | 1.6 |
| 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° | 4024.6 | 100.0 |
| 0°-180° | 4024.6 | 100.0 |



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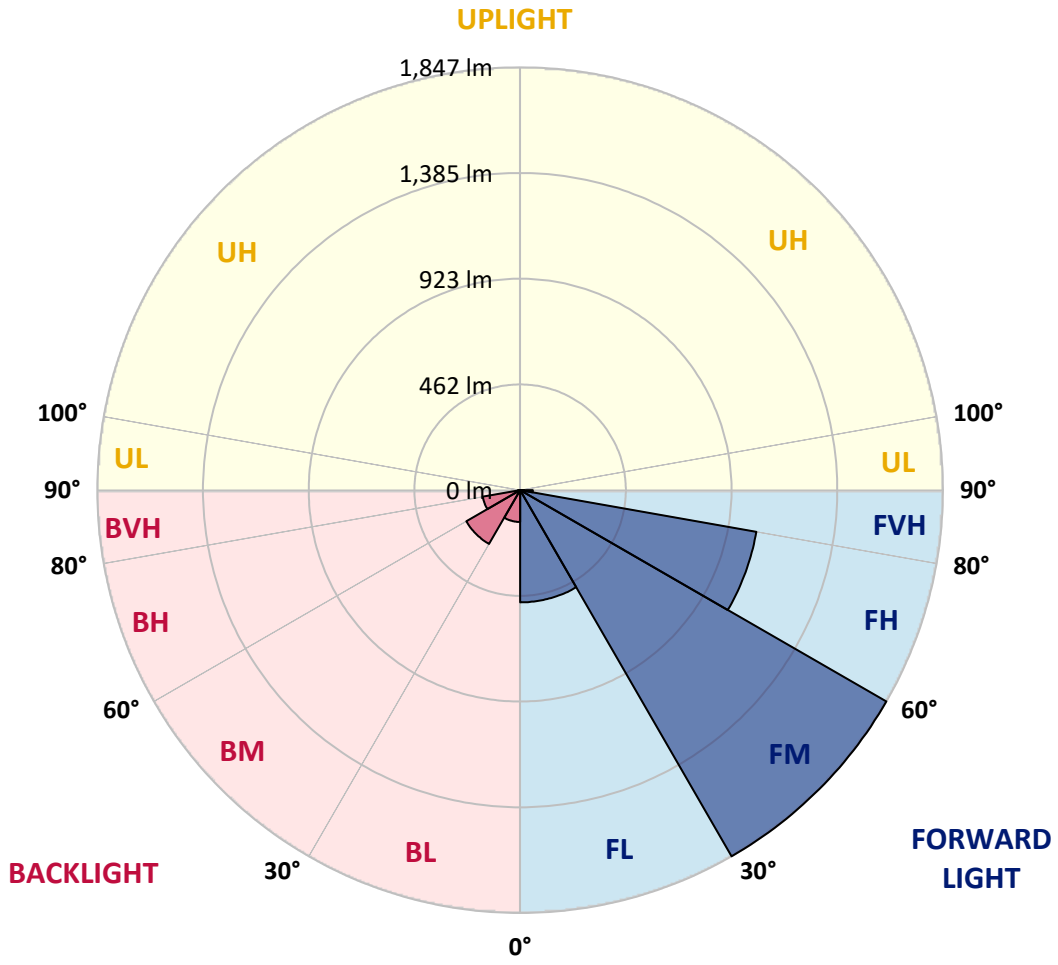
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 490.1 | 12.2 | | | |
| FM | (30°-60°) | 1846.7 | 45.9 | | | |
| FH | (60°-80°) | 1047.4 | 26.0 | | | G1/1800 |
| FVH | (80°-90°) | 55.2 | 1.4 | | | G1/100 |
| BL | (0°-30°) | 139.0 | 3.5 | B1/500 | | |
| BM | (30°-60°) | 271.4 | 6.7 | B1/1000 | | |
| BH | (60°-80°) | 165.8 | 4.1 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 9.1 | 0.2 | | | G0/10 |
| 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 Short



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**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 73° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | *714.0* | 714.0 | 714.0 |
| 2.5° | 824.1 | 819.4 | 812.3 | 806.3 | 795.7 | 781.5 | 769.6 | 754.2 | *743.6* | 740.0 | 724.6 |
| 5° | 943.7 | 937.8 | 929.5 | 915.3 | 886.8 | 870.3 | 839.5 | 804.0 | *775.5* | 769.6 | 734.1 |
| 7.5° | 1066.8 | 1064.5 | 1045.5 | 1024.2 | 989.9 | 953.2 | 905.8 | 850.1 | *808.7* | 799.2 | 744.8 |
| 10° | 1171.0 | 1160.4 | 1149.7 | 1129.6 | 1092.9 | 1040.8 | 979.2 | 902.2 | *844.2* | 828.8 | 755.4 |
| 12.5° | 1233.8 | 1230.2 | 1220.7 | 1197.1 | 1161.5 | 1116.6 | 1043.1 | 953.2 | *878.6* | 857.2 | 766.1 |
| 15° | 1280.0 | 1283.5 | 1274.0 | 1258.6 | 1221.9 | 1179.3 | 1108.3 | 1006.4 | *915.3* | 890.4 | 777.9 |
| 17.5° | 1323.8 | 1321.4 | 1320.2 | 1302.4 | 1269.3 | 1226.7 | 1154.4 | 1050.2 | *952.0* | 924.7 | 789.8 |
| 20° | 1348.6 | 1349.8 | 1347.4 | 1340.3 | 1308.4 | 1266.9 | 1199.4 | 1102.3 | *992.2* | 961.4 | 805.1 |
| 22.5° | 1361.7 | 1366.4 | 1371.1 | 1369.9 | 1343.9 | 1311.9 | 1242.1 | 1143.8 | *1033.7* | 1001.7 | 824.1 |
| 25° | 1369.9 | 1373.5 | 1384.1 | 1398.4 | 1374.7 | 1348.6 | 1289.4 | 1193.5 | *1082.2* | 1045.5 | 846.6 |
| 27.5° | 1377.0 | 1381.8 | 1394.8 | 1416.1 | 1397.2 | 1381.8 | 1330.9 | 1236.1 | *1123.7* | 1090.5 | 872.6 |
| 30° | 1423.2 | 1429.1 | 1429.1 | 1439.8 | 1418.5 | 1414.9 | 1377.0 | 1287.1 | *1175.8* | 1140.2 | 905.8 |
| 32.5° | 1545.2 | 1533.3 | 1512.0 | 1501.4 | 1450.5 | 1451.6 | 1422.0 | 1338.0 | *1231.4* | 1195.9 | 947.2 |
| 35° | 1650.6 | 1650.6 | 1624.5 | 1590.2 | 1508.5 | 1491.9 | 1474.1 | 1405.5 | *1291.8* | 1257.5 | 1001.7 |
| 37.5° | 1752.4 | 1753.6 | 1726.3 | 1696.7 | 1603.2 | 1544.0 | 1534.5 | 1470.6 | *1366.4* | 1326.1 | 1058.5 |
| 40° | 1816.3 | 1823.4 | 1816.3 | 1793.8 | 1703.8 | 1635.2 | 1593.7 | 1544.0 | *1437.4* | 1406.6 | 1123.7 |
| 42.5° | 1827.0 | 1841.2 | 1867.2 | 1874.3 | 1777.3 | 1716.9 | 1669.5 | 1619.8 | *1522.7* | 1488.3 | 1198.3 |
| 45° | 1799.7 | 1804.5 | 1862.5 | 1870.8 | 1831.7 | 1782.0 | 1750.0 | 1708.6 | *1624.5* | 1594.9 | 1281.1 |
| 47.5° | 1725.2 | 1715.7 | 1735.8 | 1808.0 | 1823.4 | 1821.1 | 1829.3 | 1809.2 | *1742.9* | 1705.0 | 1372.3 |
| 50° | 1565.3 | 1568.9 | 1634.0 | 1721.6 | 1774.9 | 1835.3 | 1888.6 | 1911.0 | *1862.5* | 1824.6 | 1470.6 |
| 52.5° | 1274.0 | 1290.6 | 1414.9 | 1622.1 | 1714.5 | 1825.8 | 1931.2 | 2007.0 | *1986.8* | 1950.1 | 1567.7 |
| 55° | 1046.7 | 1071.6 | 1195.9 | 1462.3 | 1631.6 | 1779.6 | 1956.0 | 2107.6 | *2111.2* | 2082.7 | 1656.5 |
| 57.5° | 819.4 | 839.5 | 970.9 | 1214.8 | 1513.2 | 1707.4 | 1959.6 | 2194.0 | *2234.3* | 2201.1 | 1734.6 |
| 60° | 641.8 | 656.0 | 732.9 | 1012.4 | 1367.6 | 1604.4 | 1933.5 | 2262.7 | *2338.5* | 2313.6 | 1802.1 |
| 62.5° | 486.6 | 497.3 | 566.0 | 800.4 | 1188.8 | 1483.6 | 1845.9 | 2287.6 | *2411.9* | 2388.2 | 1840.0 |
| 65° | *394.3* | *403.8* | *448.8* | *628.7* | *1012.4* | *1343.9* | *1713.3* | *2230.7* | *2433.2* | *2411.9* | *1835.3* |
| 67.5° | 322.1 | 325.6 | 362.3 | 490.2 | 856.1 | 1186.4 | 1519.1 | 2082.7 | *2368.1* | 2366.9 | 1780.8 |
| 70° | 260.5 | 270.0 | 300.7 | 390.7 | 711.6 | 1005.3 | 1293.0 | 1850.7 | *2227.2* | 2239.0 | 1671.9 |
| 72.5° | 221.4 | 223.8 | 251.0 | 323.2 | 580.2 | 815.8 | 1070.4 | 1583.1 | *2020.0* | 2029.5 | 1501.4 |
| 75° | 187.1 | 190.6 | 210.8 | 261.7 | 471.2 | 647.7 | 860.8 | 1278.8 | *1690.8* | 1731.1 | 1264.6 |
| 77.5° | 161.0 | 162.2 | 176.4 | 215.5 | 335.1 | 486.6 | 631.1 | 959.1 | *1323.8* | 1352.2 | 993.4 |
| 80° | 126.7 | 129.1 | 144.5 | 170.5 | 233.3 | 316.1 | 435.7 | 656.0 | *884.5* | 916.5 | 687.9 |
| 82.5° | 59.2 | 66.3 | 69.9 | 93.5 | 122.0 | 156.3 | 206.0 | 273.5 | *400.2* | 399.0 | 320.9 |
| 85° | 5.9 | 4.7 | 4.7 | 7.1 | 10.7 | 10.7 | 13.0 | 15.4 | *30.8* | 36.7 | 28.4 |
| 87.5° | 0.0 | 0.0 | 0.0 | 1.2 | 2.4 | 2.4 | 2.4 | 3.6 | *3.6* | 3.6 | 3.6 |
| 90° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 |

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Scaled Data Report

REPORT NUMBER: P871147
CATALOG NUMBER: EMM2-HSN-SA1B-840-U-T2U-HSS

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 | 714.0 |
| 2.5° | 717.5 | 706.9 | 687.9 | 670.2 | 658.3 | 648.9 | 633.5 | 624.0 | 616.9 | 607.4 | 606.2 |
| 5° | 715.2 | 696.2 | 658.3 | 626.4 | 595.6 | 569.5 | 542.3 | 525.7 | 508.0 | 499.7 | 506.8 |
| 7.5° | 717.5 | 686.7 | 627.5 | 579.0 | 532.8 | 491.4 | 455.9 | 433.4 | 416.8 | 408.5 | 409.7 |
| 10° | 718.7 | 678.5 | 601.5 | 534.0 | 474.8 | 426.3 | 386.0 | 355.2 | 335.1 | 330.3 | 324.4 |
| 12.5° | 716.3 | 667.8 | 575.4 | 490.2 | 419.2 | 365.9 | 318.5 | 294.8 | 274.7 | 265.2 | 265.2 |
| 15° | 718.7 | 659.5 | 548.2 | 449.9 | 369.4 | 307.9 | 267.6 | 241.5 | 229.7 | 221.4 | 222.6 |
| 17.5° | 718.7 | 652.4 | 522.2 | 410.9 | 320.9 | 264.0 | 227.3 | 206.0 | 194.2 | 189.4 | 188.3 |
| 20° | 727.0 | 646.5 | 497.3 | 374.2 | 278.3 | 225.0 | 195.4 | 178.8 | 169.3 | 164.6 | 162.2 |
| 22.5° | 732.9 | 641.8 | 474.8 | 338.6 | 242.7 | 196.6 | 171.7 | 156.3 | 149.2 | 146.8 | 146.8 |
| 25° | 743.6 | 640.6 | 454.7 | 304.3 | 214.3 | 175.2 | 152.7 | 140.9 | 135.0 | 132.6 | 132.6 |
| 27.5° | 759.0 | 642.9 | 435.7 | 274.7 | 193.0 | 153.9 | 137.3 | 127.9 | 124.3 | 123.1 | 122.0 |
| 30° | 781.5 | 653.6 | 423.9 | 252.2 | 172.9 | 140.9 | 125.5 | 119.6 | 117.2 | 116.0 | 116.0 |
| 32.5° | 811.1 | 672.5 | 419.2 | 240.4 | 161.0 | 130.2 | 117.2 | 112.5 | 110.1 | 110.1 | 108.9 |
| 35° | 847.8 | 693.8 | 415.6 | 229.7 | 152.7 | 123.1 | 111.3 | 106.6 | 105.4 | 105.4 | 105.4 |
| 37.5° | 891.6 | 716.3 | 409.7 | 222.6 | 148.0 | 117.2 | 106.6 | 101.8 | 101.8 | 101.8 | 101.8 |
| 40° | 940.1 | 749.5 | 408.5 | 217.9 | 144.5 | 113.7 | 101.8 | 97.1 | 97.1 | 97.1 | 97.1 |
| 42.5° | 994.6 | 785.0 | 407.3 | 214.3 | 142.1 | 111.3 | 97.1 | 92.4 | 92.4 | 92.4 | 92.4 |
| 45° | 1060.9 | 830.0 | 409.7 | 211.9 | 142.1 | 108.9 | 93.5 | 87.6 | 86.4 | 86.4 | 86.4 |
| 47.5° | 1126.0 | 872.6 | 412.0 | 209.6 | 139.7 | 105.4 | 88.8 | 82.9 | 81.7 | 80.5 | 80.5 |
| 50° | 1195.9 | 916.5 | 412.0 | 207.2 | 137.3 | 101.8 | 85.3 | 77.0 | 75.8 | 74.6 | 74.6 |
| 52.5° | 1264.6 | 953.2 | 413.2 | 203.7 | 131.4 | 95.9 | 79.3 | 72.2 | 69.9 | 68.7 | 67.5 |
| 55° | 1330.9 | 992.2 | 414.4 | 197.7 | 124.3 | 90.0 | 75.8 | 67.5 | 63.9 | 61.6 | 61.6 |
| 57.5° | 1380.6 | 1024.2 | 408.5 | 185.9 | 114.9 | 84.1 | 69.9 | 61.6 | 56.8 | 54.5 | 54.5 |
| 60° | 1428.0 | 1044.3 | 397.8 | 168.1 | 105.4 | 78.1 | 65.1 | 55.7 | 50.9 | 48.5 | 48.5 |
| 62.5° | 1446.9 | 1047.9 | 373.0 | 137.3 | 93.5 | 72.2 | 59.2 | 50.9 | 47.4 | 46.2 | 46.2 |
| 65° | *1436.2* | *1032.5* | *339.8* | *108.9* | *82.9* | *65.1* | *54.5* | *47.4* | *42.6* | *39.1* | *39.1* |
| 67.5° | 1378.2 | 979.2 | 294.8 | 86.4 | 72.2 | 59.2 | 49.7 | 42.6 | 37.9 | 34.3 | 34.3 |
| 70° | 1268.1 | 894.0 | 229.7 | 68.7 | 62.8 | 52.1 | 45.0 | 39.1 | 34.3 | 30.8 | 30.8 |
| 72.5° | 1105.9 | 775.5 | 167.0 | 58.0 | 54.5 | 46.2 | 40.3 | 35.5 | 30.8 | 28.4 | 28.4 |
| 75° | 911.7 | 597.9 | 118.4 | 49.7 | 48.5 | 41.4 | 36.7 | 32.0 | 28.4 | 26.0 | 26.0 |
| 77.5° | 684.4 | 416.8 | 92.4 | 43.8 | 42.6 | 37.9 | 33.2 | 29.6 | 26.0 | 24.9 | 23.7 |
| 80° | 455.9 | 258.1 | 69.9 | 33.2 | 32.0 | 29.6 | 27.2 | 24.9 | 21.3 | 18.9 | 18.9 |
| 82.5° | 203.7 | 108.9 | 35.5 | 18.9 | 16.6 | 14.2 | 11.8 | 8.3 | 8.3 | 7.1 | 7.1 |
| 85° | 21.3 | 14.2 | 7.1 | 4.7 | 4.7 | 3.6 | 3.6 | 3.6 | 2.4 | 2.4 | 2.4 |
| 87.5° | 3.6 | 3.6 | 2.4 | 2.4 | 2.4 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| 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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# LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Streetworks

Report Number: SP1-2407-157-8

Test Date: 09/05/2024

Luminaire Tested: MEM2-HTN-SA-40-840-U-5WQ

Data in this report applies to families of products including MEM2-HTN-SA-40-840-U-5WQ

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

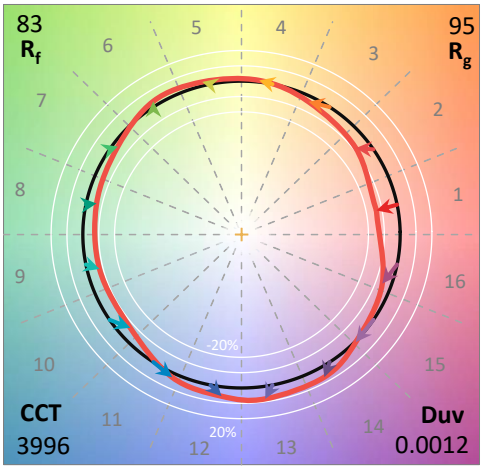
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-157-8 |
| 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-40-840-U-5WQ** |
| Description: | Epic Modern Light Square 40W 5WQ Optic |

## Spectral Parameters

| | |
|---|---|
| CCT (K): | 3996 |
| CIE u': | 0.2245 |
| CIE v': | 0.5031 |
| Duv: | 0.0012 |
| CIE x: | 0.3815 |
| CIE y: | 0.3799 |
| CIE z: | 0.2386 |
| Peak Wavelength (nm): | 449 |
| Dominant Wavelength (nm): | 578 |
| Purity: | 28.49233 |
| Rf: | 82.6 |
| Rg: | 95.1 |

| | |
|---|---|
| CRI (Ra): | 80.6 |
| R1: | 78.1 |
| R2: | 87.1 |
| R3: | 94.5 |
| R4: | 79.7 |
| R5: | 78.7 |
| R6: | 82.7 |
| R7: | 84.3 |
| R8: | 59.5 |
| R9: | -5.8 |
| R10: | 70.3 |
| R11: | 78.7 |
| R12: | 60.5 |
| R13: | 80.2 |
| R14: | 97.2 |
| R15: | 70.6 |




## Test Conditions

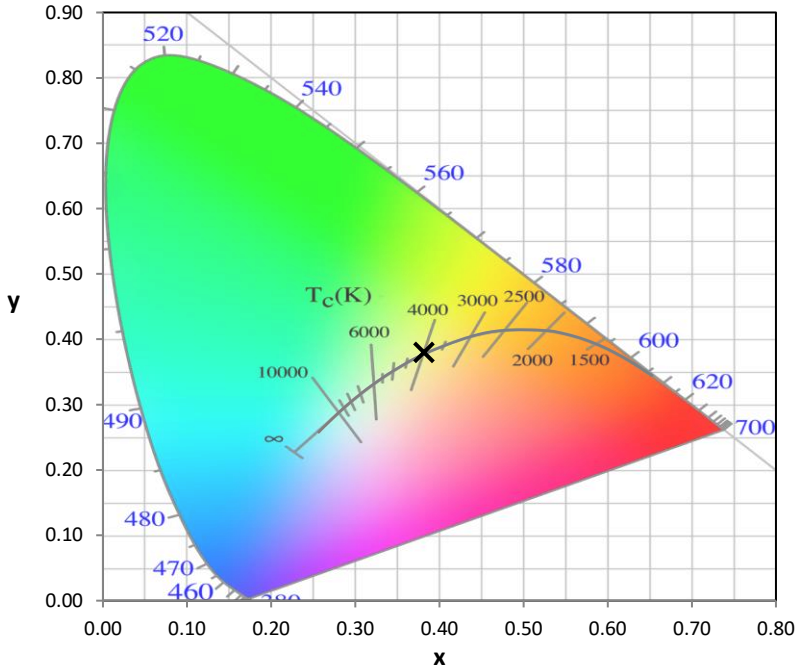
| | |
|---|---|
| Stabilization Time: | 29M |
| Operation Time: | 1H 29M |
| Sphere Temperature (°C): | 24.3 |

REPORT NUMBER: SP1-2407-157-8

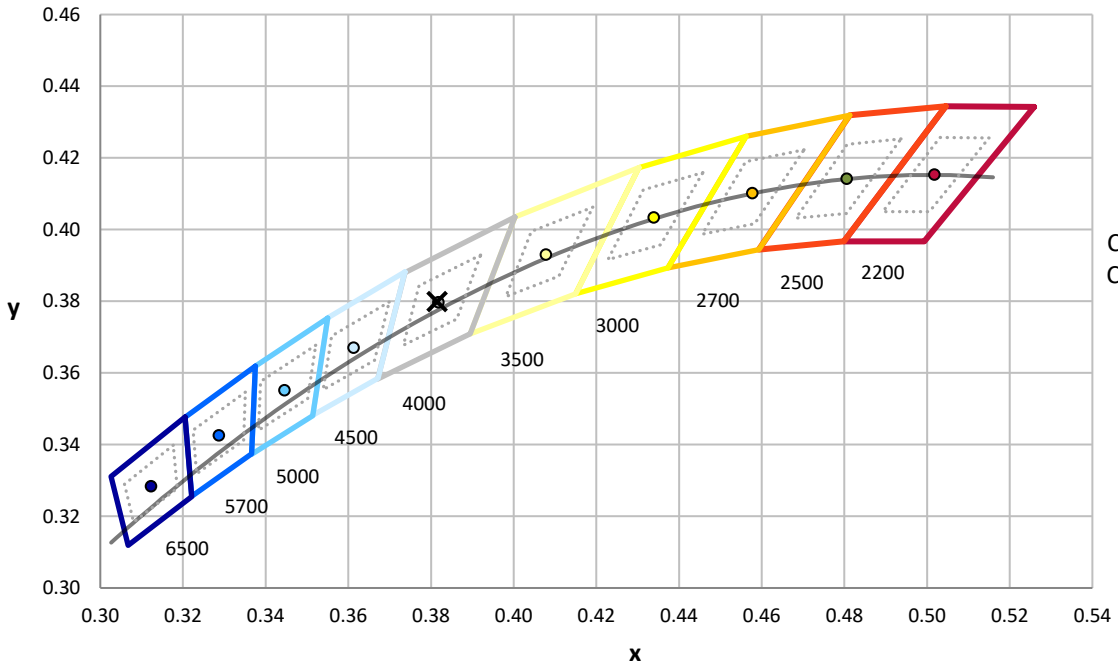
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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: SP1-2407-157-8

## CIE 1931 Chromaticity Diagram




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




CCT = 3996K
CIE x = 0.3815
CIE y = 0.3799
Duv = 0.0012

Point lies inside the ANSI 4000K 4-step quadrangle

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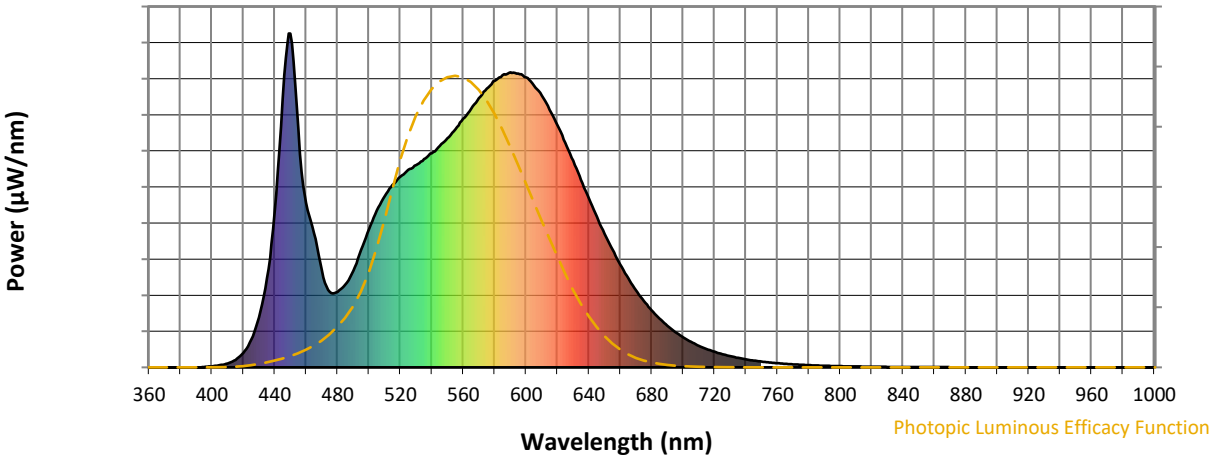
## Photopic Flux vs. Wavelength




## 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 | 289 | NR | 620 | 725 | NR | 750 | 17 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 351 | NR | 625 | 673 | NR | 755 | 15 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 414 | NR | 630 | 619 | NR | 760 | 13 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 470 | NR | 635 | 562 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 513 | NR | 640 | 506 | NR | 770 | 9 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 546 | NR | 645 | 452 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 571 | NR | 650 | 400 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 592 | NR | 655 | 352 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 606 | NR | 660 | 307 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 624 | NR | 665 | 267 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 12 | NR | 540 | 642 | NR | 670 | 231 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 22 | NR | 545 | 663 | NR | 675 | 199 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 44 | NR | 550 | 686 | NR | 680 | 171 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 83 | NR | 555 | 713 | NR | 685 | 146 | NR | 815 | 2 | NR | 945 | 0 | NR |
| 430 | 150 | NR | 560 | 745 | NR | 690 | 125 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 267 | NR | 565 | 774 | NR | 695 | 106 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 466 | NR | 570 | 806 | NR | 700 | 90 | NR | 830 | 1 | NR | 960 | 0 | NR |
| 445 | 804 | NR | 575 | 835 | NR | 705 | 76 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 1000 | NR | 580 | 858 | NR | 710 | 65 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 715 | NR | 585 | 875 | NR | 715 | 55 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 492 | NR | 590 | 884 | NR | 720 | 47 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 402 | NR | 595 | 880 | NR | 725 | 40 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 288 | NR | 600 | 868 | NR | 730 | 34 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 226 | NR | 605 | 844 | NR | 735 | 28 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 227 | NR | 610 | 814 | NR | 740 | 24 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 248 | NR | 615 | 771 | NR | 745 | 20 | NR | 875 | 0 | NR | | | |

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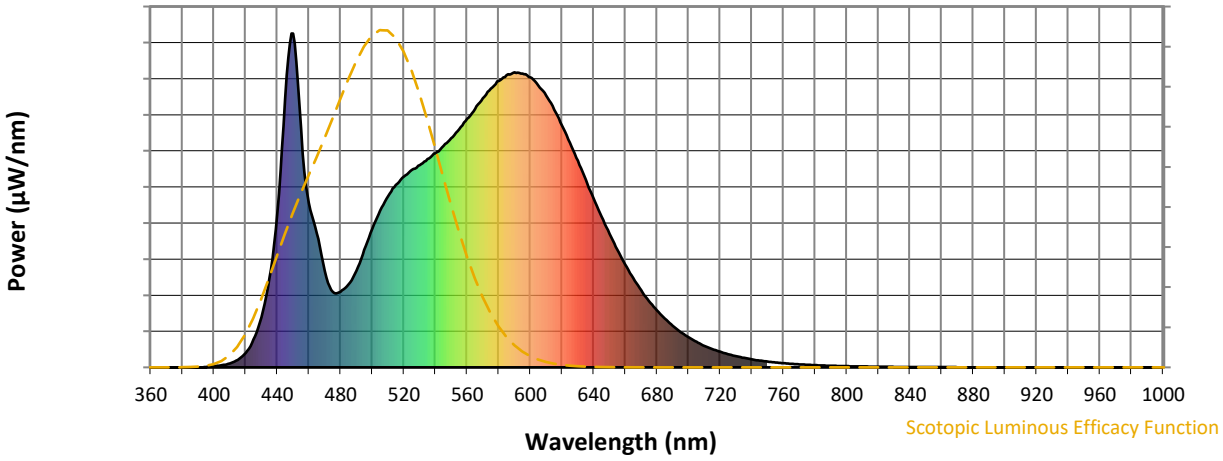
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 1.66**

| 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 | 289 | NR | 620 | 725 | NR | 750 | 17 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 351 | NR | 625 | 673 | NR | 755 | 15 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 414 | NR | 630 | 619 | NR | 760 | 13 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 470 | NR | 635 | 562 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 513 | NR | 640 | 506 | NR | 770 | 9 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 546 | NR | 645 | 452 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 571 | NR | 650 | 400 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 592 | NR | 655 | 352 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 606 | NR | 660 | 307 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 624 | NR | 665 | 267 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 12 | NR | 540 | 642 | NR | 670 | 231 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 22 | NR | 545 | 663 | NR | 675 | 199 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 44 | NR | 550 | 686 | NR | 680 | 171 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 83 | NR | 555 | 713 | NR | 685 | 146 | NR | 815 | 2 | NR | 945 | 0 | NR |
| 430 | 150 | NR | 560 | 745 | NR | 690 | 125 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 267 | NR | 565 | 774 | NR | 695 | 106 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 466 | NR | 570 | 806 | NR | 700 | 90 | NR | 830 | 1 | NR | 960 | 0 | NR |
| 445 | 804 | NR | 575 | 835 | NR | 705 | 76 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 1000 | NR | 580 | 858 | NR | 710 | 65 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 715 | NR | 585 | 875 | NR | 715 | 55 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 492 | NR | 590 | 884 | NR | 720 | 47 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 402 | NR | 595 | 880 | NR | 725 | 40 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 288 | NR | 600 | 868 | NR | 730 | 34 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 226 | NR | 605 | 844 | NR | 735 | 28 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 227 | NR | 610 | 814 | NR | 740 | 24 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 248 | NR | 615 | 771 | NR | 745 | 20 | NR | 875 | 0 | NR | | | |

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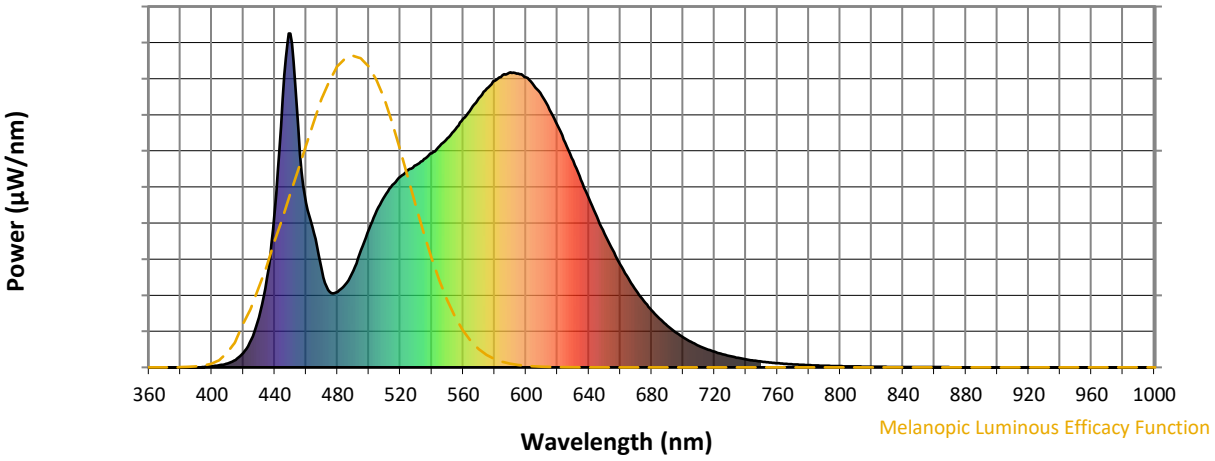
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 3.37**

| 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 | 289 | NR | 620 | 725 | NR | 750 | 17 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 351 | NR | 625 | 673 | NR | 755 | 15 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 414 | NR | 630 | 619 | NR | 760 | 13 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 470 | NR | 635 | 562 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 513 | NR | 640 | 506 | NR | 770 | 9 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 546 | NR | 645 | 452 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 571 | NR | 650 | 400 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 592 | NR | 655 | 352 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 606 | NR | 660 | 307 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 624 | NR | 665 | 267 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 12 | NR | 540 | 642 | NR | 670 | 231 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 22 | NR | 545 | 663 | NR | 675 | 199 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 44 | NR | 550 | 686 | NR | 680 | 171 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 83 | NR | 555 | 713 | NR | 685 | 146 | NR | 815 | 2 | NR | 945 | 0 | NR |
| 430 | 150 | NR | 560 | 745 | NR | 690 | 125 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 267 | NR | 565 | 774 | NR | 695 | 106 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 466 | NR | 570 | 806 | NR | 700 | 90 | NR | 830 | 1 | NR | 960 | 0 | NR |
| 445 | 804 | NR | 575 | 835 | NR | 705 | 76 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 1000 | NR | 580 | 858 | NR | 710 | 65 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 715 | NR | 585 | 875 | NR | 715 | 55 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 492 | NR | 590 | 884 | NR | 720 | 47 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 402 | NR | 595 | 880 | NR | 725 | 40 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 288 | NR | 600 | 868 | NR | 730 | 34 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 226 | NR | 605 | 844 | NR | 735 | 28 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 227 | NR | 610 | 814 | NR | 740 | 24 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 248 | NR | 615 | 771 | NR | 745 | 20 | NR | 875 | 0 | NR | | | |

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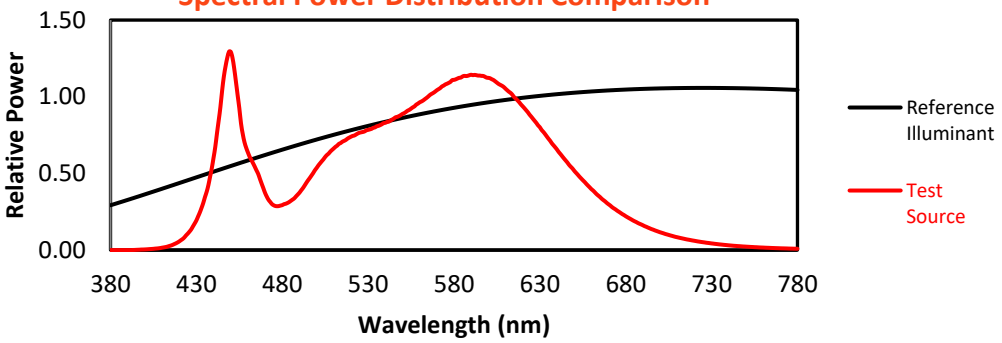
# TM-30-18

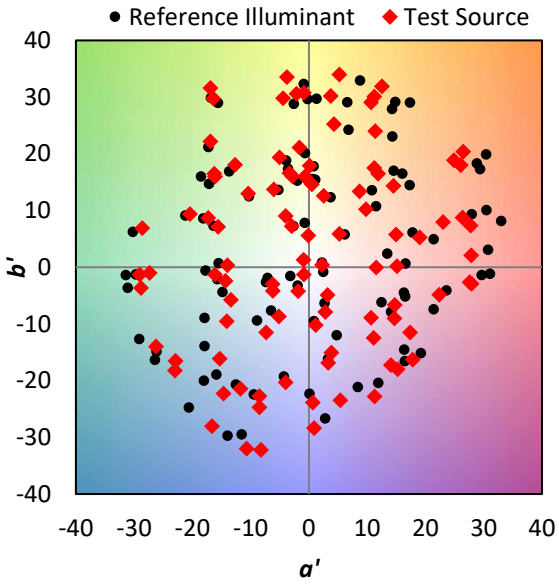
## Summary

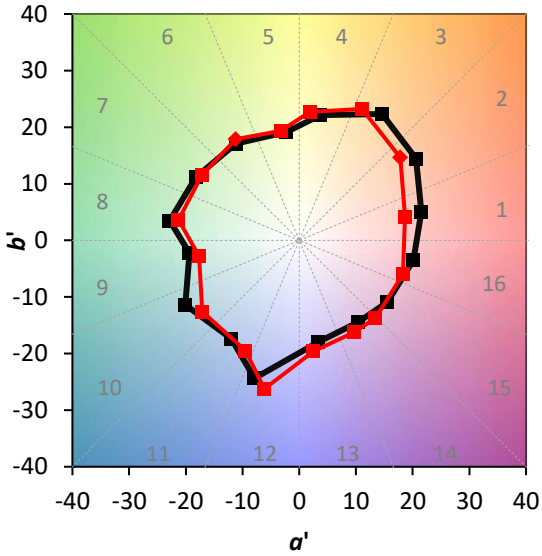
$R_f$ = 82.6
$R_g$ = 95.1
CIE $R_a$ = 80.6
$R_9$ = -5.8

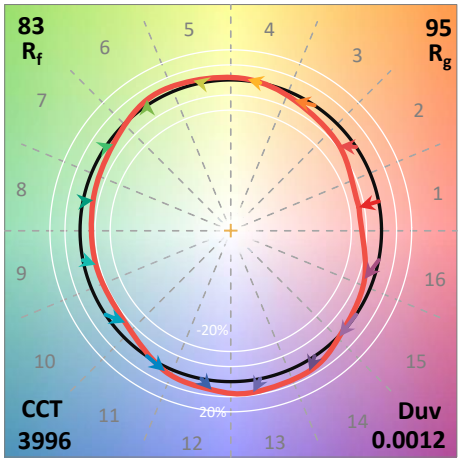
## Spectral Power Distribution Comparison

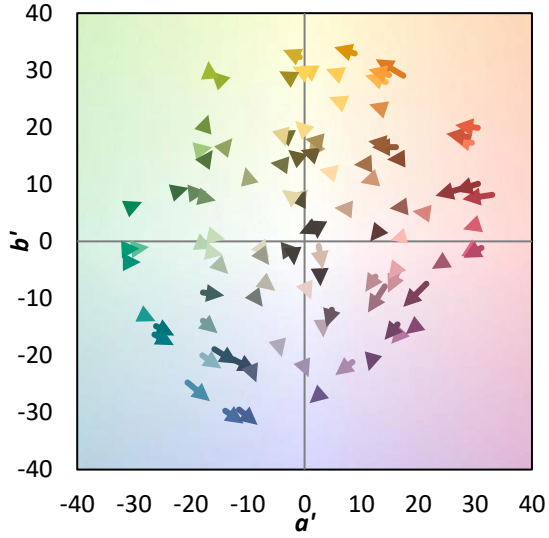



## Color Vector Graphics



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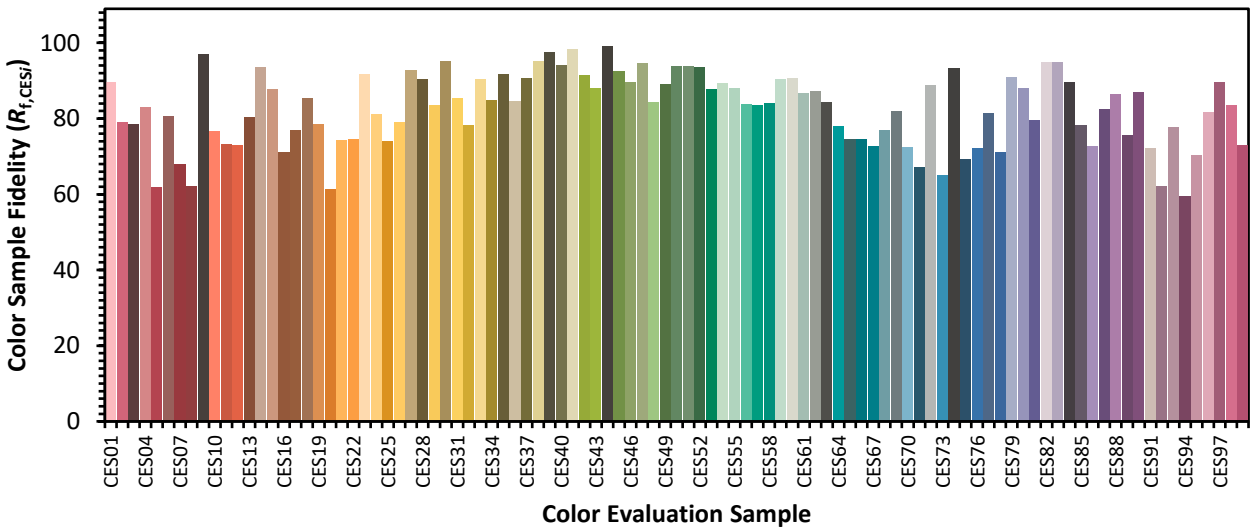
**Individual Sample Fidelity Index ($R_{f,i}$)**

| | | | |
|---|---|---|---|
| CES01 = 85 | CES26 = 79 | CES51 = 94 | CES76 = 72 |
| CES02 = 61 | CES27 = 93 | CES52 = 94 | CES77 = 82 |
| CES03 = 31 | CES28 = 90 | CES53 = 88 | CES78 = 71 |
| CES04 = 69 | CES29 = 83 | CES54 = 89 | CES79 = 91 |
| CES05 = 48 | CES30 = 95 | CES55 = 88 | CES80 = 88 |
| CES06 = 50 | CES31 = 86 | CES56 = 84 | CES81 = 80 |
| CES07 = 40 | CES32 = 78 | CES57 = 84 | CES82 = 95 |
| CES08 = 39 | CES33 = 90 | CES58 = 84 | CES83 = 95 |
| CES09 = 29 | CES34 = 85 | CES59 = 90 | CES84 = 90 |
| CES10 = 74 | CES35 = 92 | CES60 = 91 | CES85 = 78 |
| CES11 = 57 | CES36 = 85 | CES61 = 87 | CES86 = 73 |
| CES12 = 63 | CES37 = 91 | CES62 = 87 | CES87 = 83 |
| CES13 = 42 | CES38 = 95 | CES63 = 84 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 78 | CES89 = 76 |
| CES15 = 71 | CES40 = 94 | CES65 = 75 | CES90 = 87 |
| CES16 = 46 | CES41 = 98 | CES66 = 75 | CES91 = 72 |
| CES17 = 49 | CES42 = 92 | CES67 = 73 | CES92 = 62 |
| CES18 = 56 | CES43 = 88 | CES68 = 77 | CES93 = 78 |
| CES19 = 71 | CES44 = 99 | CES69 = 82 | CES94 = 60 |
| CES20 = 65 | CES45 = 93 | CES70 = 72 | CES95 = 70 |
| CES21 = 86 | CES46 = 90 | CES71 = 67 | CES96 = 82 |
| CES22 = 78 | CES47 = 95 | CES72 = 89 | CES97 = 90 |
| CES23 = 91 | CES48 = 84 | CES73 = 65 | CES98 = 84 |
| CES24 = 90 | CES49 = 89 | CES74 = 93 | CES99 = 73 |
| CES25 = 71 | CES50 = 94 | CES75 = 69 | |



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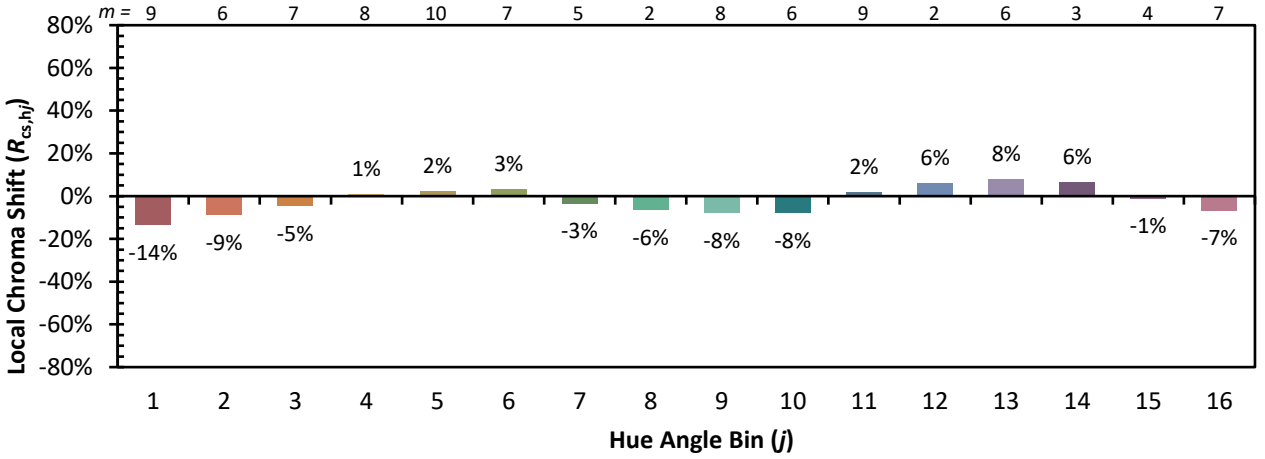
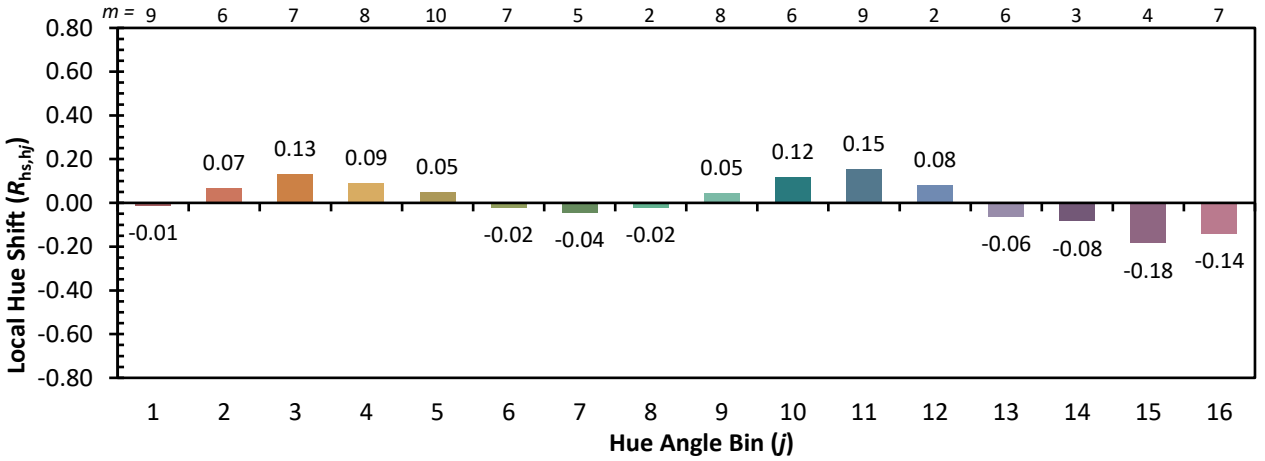
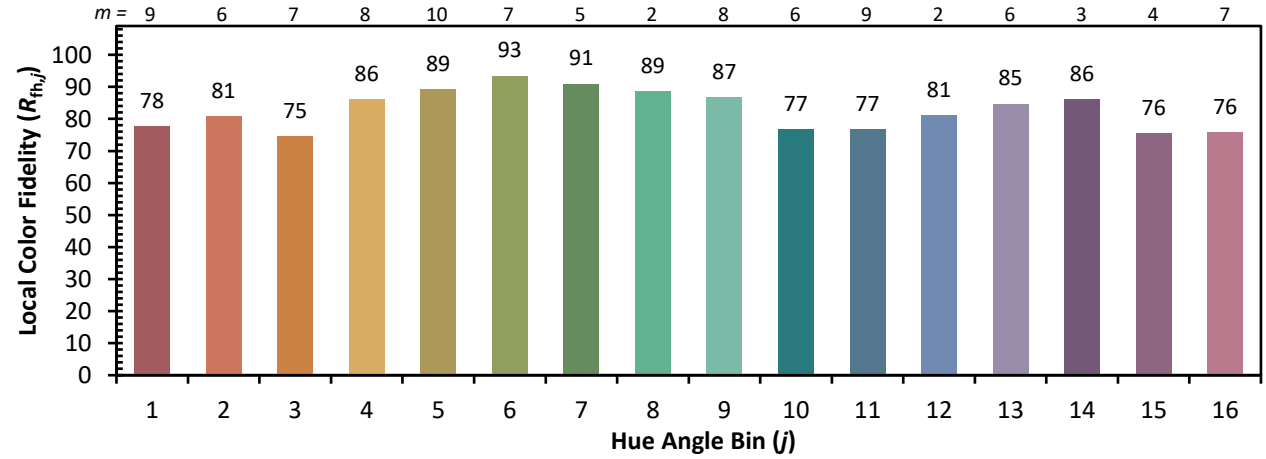
## Color Rendition by Hue-Angle Bin



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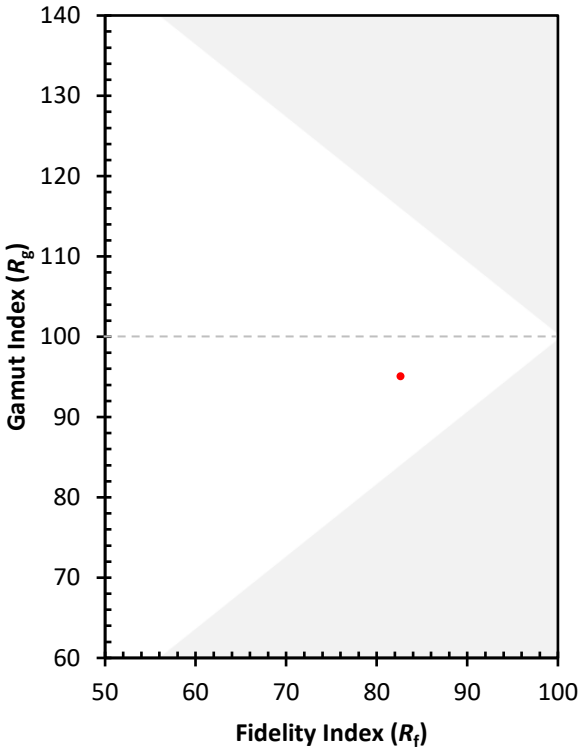
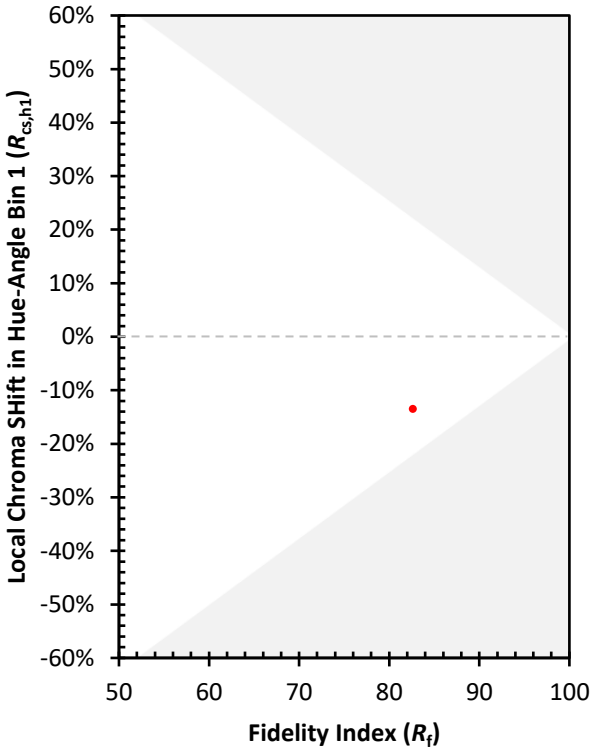
## Measure Comparisons

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