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: P871178

Luminaire Tested: **EMM2-HSN-SA2C-830-U-T3**

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: | P871178 |
| Test Lab: | INNOVATION CENTER(G3) |
| Issue Date: | 09/05/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | INVUE |
| Catalog Number: | EMM2-HSN-SA2C-830-U-T3 |
| Description: | EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 120W 80CRI 3000K FIXTURE w/ TYPE III DISTRIBUTION OPTIC |
| Light Source: | (20) 3000K CCT, 80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 12055 lumens |
| Efficiency: | N/A |
| Efficacy: | 119.4 lumens/watt |
| Luminous Opening: | Rectangular (W 0.67' x L: 0.33' x H: 0') |
| IES Classification: | Type III - Medium |
| BUG Rating: | B2 - U0 - G2 |

| | |
|---|---|
| Input Watts (W): | 101 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | 0.99 |
| Total Harmonic Distortion (THDi): | 9.45% |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 24 FT |

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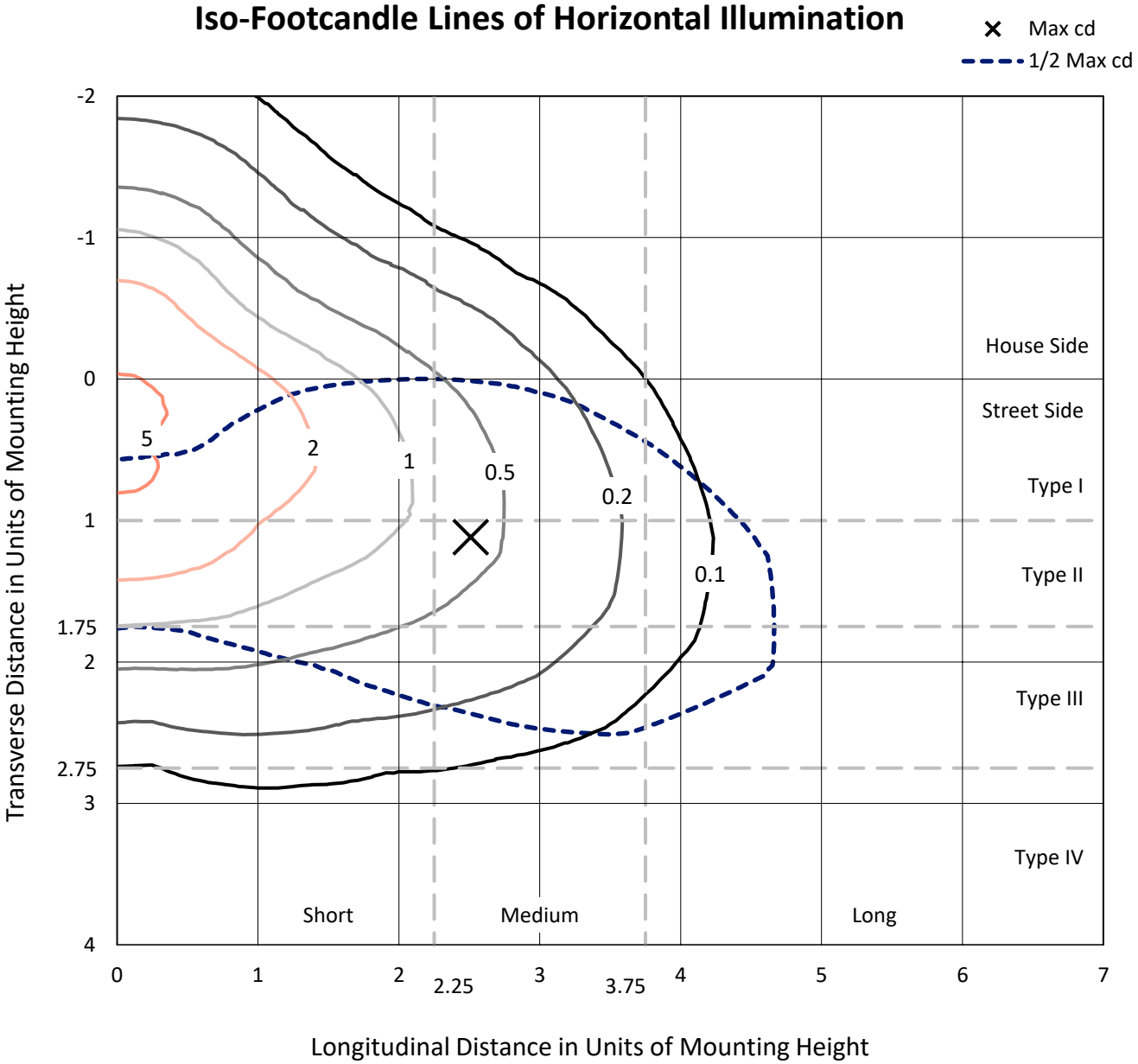
Scaled Data Report

REPORT NUMBER: P871178
CATALOG NUMBER: EMM2-HSN-SA2C-830-U-T3

## Iso-Footcandle Lines of Horizontal Illumination




Based on 20 foot mounting height. Maximum calculated value = 5.6 fc
Type III - Medium - N/A

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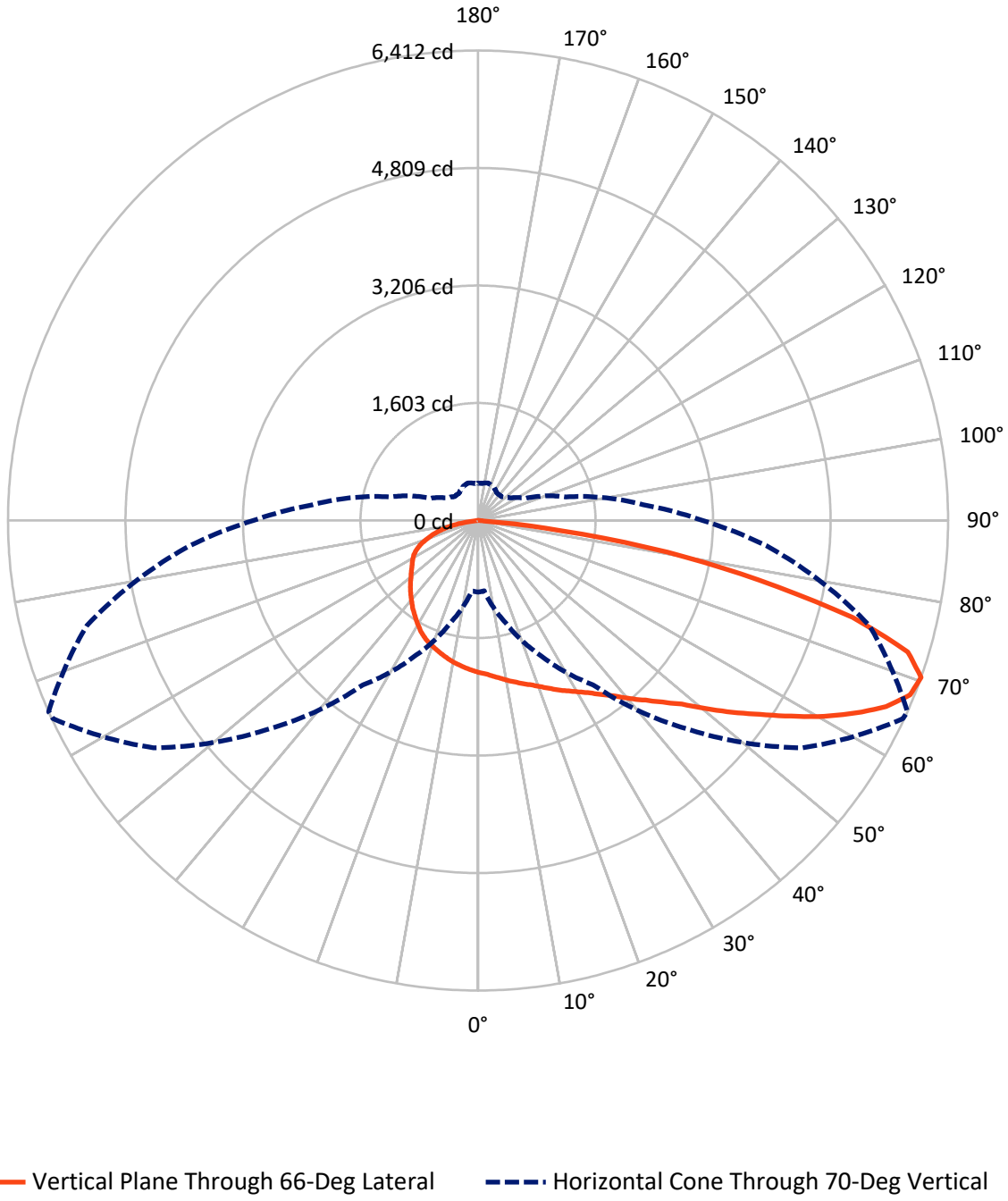
## Luminous Intensity Polar Plot



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REPORT NUMBER: P871178
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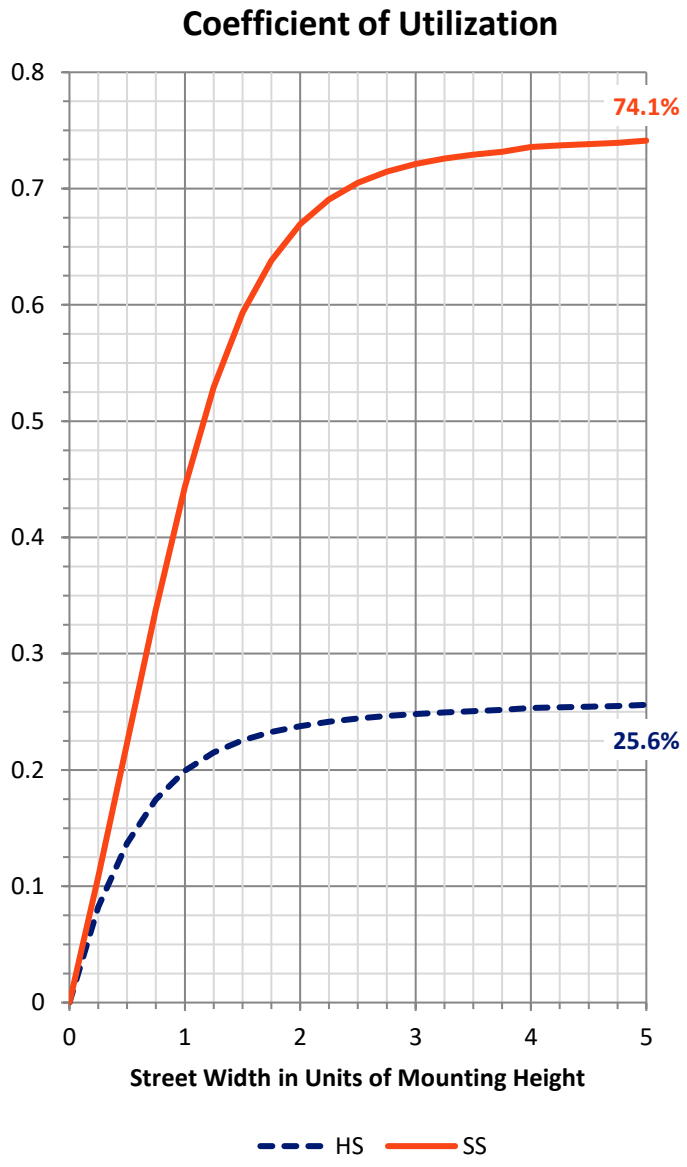
**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 3106.7 | 0.0 | 3106.7 |
| | % Fixture | 25.8 | 0.0 | 25.8 |
| **Street Side** | Lumens | 8948.3 | 0.0 | 8948.3 |
| | % Fixture | 74.2 | 0.0 | 74.2 |
| **Total** | Lumens | 12055.0 | 0.0 | 12055.0 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 198.5 | 1.6 |
| 10°-20° | 591.2 | 4.9 |
| 20°-30° | 993.1 | 8.2 |
| 30°-40° | 1496.1 | 12.4 |
| 40°-50° | 2031.2 | 16.8 |
| 50°-60° | 2413.7 | 20.0 |
| 60°-70° | 2463.3 | 20.4 |
| 70°-80° | 1647.6 | 13.7 |
| 80°-90° | 220.4 | 1.8 |
| 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° | 12055.0 | 100.0 |
| 0°-180° | 12055.0 | 100.0 |



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REPORT NUMBER: P871178
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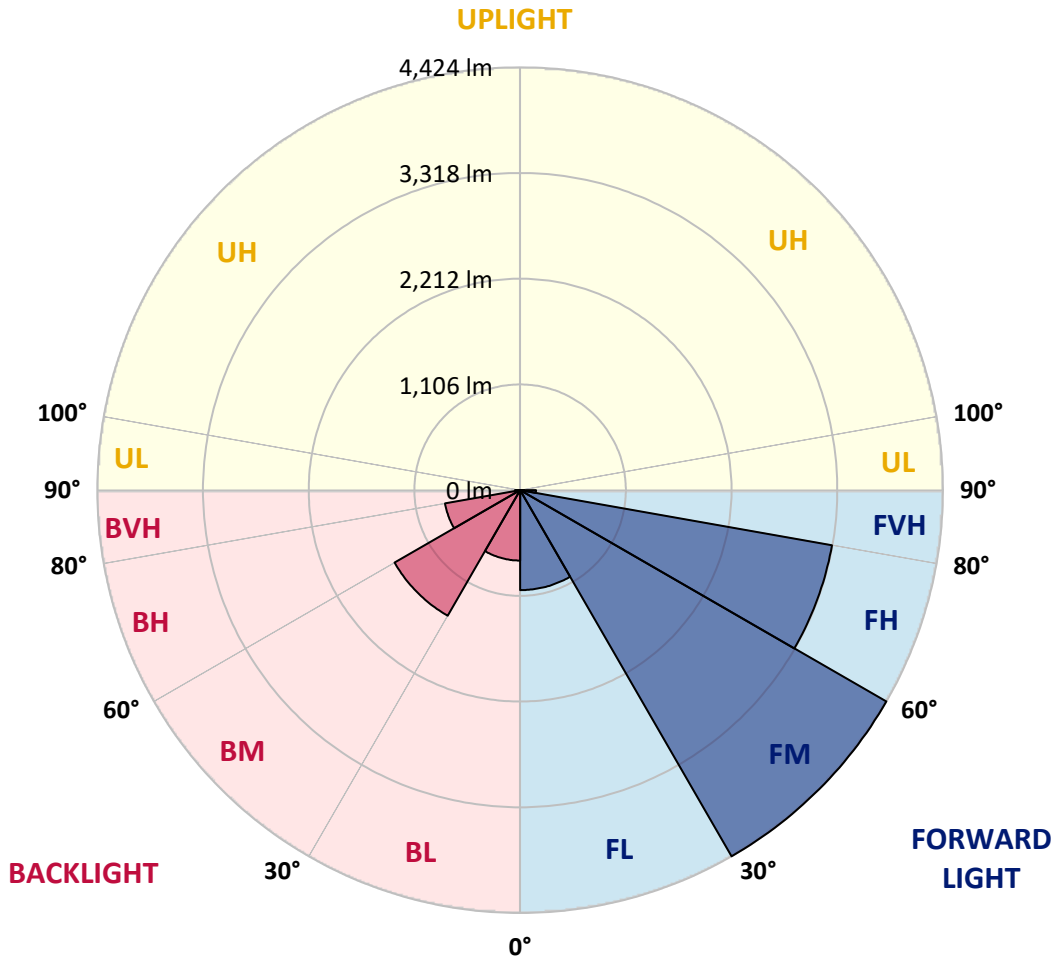
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 1046.2 | 8.7 | | | |
| FM | (30°-60°) | 4424.0 | 36.7 | | | |
| FH | (60°-80°) | 3313.1 | 27.5 | | | G2/5000 |
| FVH | (80°-90°) | 165.1 | 1.4 | | | G2/225 |
| BL | (0°-30°) | 736.6 | 6.1 | B2/1000 | | |
| BM | (30°-60°) | 1517.0 | 12.6 | B2/2500 | | |
| BH | (60°-80°) | 797.7 | 6.6 | B2/1000 | | G2/1000 |
| BVH | (80°-90°) | 55.3 | 0.5 | | | G1/100 |
| UL | (90°-100°) | 0.0 | 0.0 | | U0/0 | |
| UH | (100°-180°) | 0.0 | 0.0 | | U0/0 | |

**BUG Rating: B2-U0-G2**
Type III Medium



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Scaled Data Report

REPORT NUMBER: P871178
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**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 66° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | *2074.1* | 2074.1 | 2074.1 |
| 2.5° | 2148.4 | 2138.8 | 2131.6 | 2136.4 | 2122.0 | 2126.8 | 2110.1 | 2098.1 | *2095.7* | 2090.9 | 2086.1 |
| 5° | 2215.4 | 2215.4 | 2203.5 | 2203.5 | 2186.7 | 2184.3 | 2160.3 | 2134.0 | *2134.0* | 2117.2 | 2098.1 |
| 7.5° | 2287.3 | 2282.5 | 2268.1 | 2265.7 | 2246.6 | 2241.8 | 2215.4 | 2174.7 | *2172.3* | 2141.2 | 2112.4 |
| 10° | 2337.6 | 2340.0 | 2330.4 | 2330.4 | 2316.0 | 2304.1 | 2265.7 | 2222.6 | *2217.8* | 2177.1 | 2131.6 |
| 12.5° | 2375.9 | 2380.7 | 2378.3 | 2378.3 | 2366.3 | 2366.3 | 2323.2 | 2265.7 | *2260.9* | 2208.2 | 2143.6 |
| 15° | 2416.6 | 2414.2 | 2421.4 | 2423.8 | 2419.0 | 2411.8 | 2380.7 | 2313.6 | *2311.2* | 2241.8 | 2160.3 |
| 17.5° | 2452.5 | 2450.2 | 2452.5 | 2464.5 | 2466.9 | 2466.9 | 2435.8 | 2366.3 | *2356.7* | 2282.5 | 2174.7 |
| 20° | 2474.1 | 2478.9 | 2488.5 | 2502.8 | 2510.0 | 2529.2 | 2502.8 | 2428.6 | *2419.0* | 2325.6 | 2205.9 |
| 22.5° | 2555.5 | 2541.2 | 2548.3 | 2557.9 | 2567.5 | 2593.9 | 2569.9 | 2493.3 | *2486.1* | 2390.3 | 2241.8 |
| 25° | 2694.4 | 2694.4 | 2677.7 | 2660.9 | 2648.9 | 2660.9 | 2641.8 | 2567.5 | *2562.7* | 2447.8 | 2282.5 |
| 27.5° | 2936.3 | 2936.3 | 2900.4 | 2838.2 | 2759.1 | 2737.6 | 2723.2 | 2646.5 | *2632.2* | 2510.0 | 2308.8 |
| 30° | 3242.9 | 3252.5 | 3187.8 | 3082.4 | 2936.3 | 2840.5 | 2804.6 | 2720.8 | *2713.6* | 2572.3 | 2349.6 |
| 32.5° | 3571.0 | 3590.2 | 3542.3 | 3389.0 | 3149.5 | 2962.7 | 2905.2 | 2819.0 | *2802.2* | 2646.5 | 2402.3 |
| 35° | 3865.6 | 3884.8 | 3820.1 | 3676.4 | 3369.9 | 3139.9 | 3025.0 | 2926.8 | *2917.2* | 2742.3 | 2481.3 |
| 37.5° | 4105.1 | 4109.9 | 4069.2 | 3894.4 | 3554.3 | 3288.4 | 3173.5 | 3056.1 | *3036.9* | 2857.3 | 2565.1 |
| 40° | 4359.0 | 4378.2 | 4337.5 | 4121.9 | 3721.9 | 3448.9 | 3322.0 | 3211.8 | *3195.0* | 2977.1 | 2644.2 |
| 42.5° | 4624.9 | 4622.5 | 4622.5 | 4318.3 | 3889.6 | 3583.0 | 3482.4 | 3360.3 | *3350.7* | 3099.2 | 2730.4 |
| 45° | 4787.7 | 4797.3 | 4771.0 | 4435.7 | 4136.3 | 3721.9 | 3638.1 | 3549.5 | *3532.7* | 3269.3 | 2842.9 |
| 47.5° | 4828.5 | 4806.9 | 4687.1 | 4526.7 | 4414.1 | 3865.6 | 3834.5 | 3781.8 | *3743.5* | 3456.1 | 2981.9 |
| 50° | 4773.4 | 4739.8 | 4670.4 | 4567.4 | 4517.1 | 4038.1 | 4033.3 | 4059.6 | *4033.3* | 3683.6 | 3142.3 |
| 52.5° | 4567.4 | 4562.6 | 4550.6 | 4574.6 | 4493.1 | 4174.6 | 4258.4 | 4349.4 | *4344.6* | 3915.9 | 3310.0 |
| 55° | 4133.9 | 4165.0 | 4308.7 | 4459.6 | 4402.1 | 4268.0 | 4509.9 | 4684.7 | *4665.6* | 4189.0 | 3482.4 |
| 57.5° | 3690.8 | 3721.9 | 3906.4 | 4265.6 | 4313.5 | 4368.6 | 4792.5 | 5065.6 | *5034.4* | 4486.0 | 3640.5 |
| 60° | 3305.2 | 3271.7 | 3456.1 | 3973.4 | 4189.0 | 4459.6 | 5072.7 | 5451.2 | *5424.8* | 4782.9 | 3803.4 |
| 62.5° | 2694.4 | 2728.0 | 3022.6 | 3547.1 | 4014.1 | 4517.1 | 5302.7 | 5800.8 | *5784.1* | 5056.0 | 3935.1 |
| 65° | 2131.6 | 2086.1 | 2529.2 | 3099.2 | 3712.4 | 4497.9 | 5501.5 | 6129.0 | *6117.0* | 5324.2 | 4035.7 |
| 67.5° | 1449.0 | 1417.9 | 2002.3 | 2653.7 | 3302.8 | 4344.6 | 5547.0 | 6349.3 | *6354.1* | 5482.3 | 4062.0 |
| 70° | *977.2* | *962.8* | *1439.4* | *2040.6* | *2735.2* | *4014.1* | *5405.7* | *6394.8* | *6411.6* | *5523.0* | *3944.7* |
| 72.5° | 720.9 | 718.5 | 1053.8 | 1456.2 | 2035.8 | 3389.0 | 5020.1 | 6097.8 | *6129.0* | 5235.6 | 3599.8 |
| 75° | 567.6 | 574.8 | 752.1 | 1034.7 | 1358.0 | 2507.6 | 4222.5 | 5228.4 | *5276.3* | 4521.9 | 2989.0 |
| 77.5° | 464.6 | 464.6 | 526.9 | 742.5 | 907.7 | 1556.8 | 3036.9 | 3827.3 | *3923.1* | 3489.6 | 2301.7 |
| 80° | 376.0 | 383.2 | 390.4 | 517.3 | 601.2 | 888.6 | 1767.6 | 2553.1 | *2622.6* | 2431.0 | 1662.2 |
| 82.5° | 206.0 | 220.3 | 213.2 | 268.2 | 301.8 | 412.0 | 701.8 | 1032.3 | *1137.7* | 1013.1 | 754.4 |
| 85° | 14.4 | 9.6 | 16.8 | 21.6 | 26.3 | 40.7 | 55.1 | 76.6 | *71.9* | 103.0 | 52.7 |
| 87.5° | 2.4 | 2.4 | 2.4 | 4.8 | 4.8 | 7.2 | 9.6 | 9.6 | *9.6* | 9.6 | 9.6 |
| 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: P871178
CATALOG NUMBER: EMM2-HSN-SA2C-830-U-T3

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 | 2074.1 |
| 2.5° | 2083.7 | 2071.7 | 2052.6 | 2047.8 | 2040.6 | 2031.0 | 2021.4 | 2007.1 | 2002.3 | 2007.1 | 2011.9 |
| 5° | 2086.1 | 2069.3 | 2038.2 | 2019.0 | 1999.9 | 1983.1 | 1964.0 | 1944.8 | 1932.8 | 1935.2 | 1944.8 |
| 7.5° | 2093.3 | 2069.3 | 2021.4 | 1990.3 | 1959.2 | 1932.8 | 1901.7 | 1880.1 | 1865.8 | 1868.2 | 1875.3 |
| 10° | 2102.9 | 2069.3 | 2011.9 | 1959.2 | 1916.1 | 1877.7 | 1846.6 | 1820.2 | 1805.9 | 1803.5 | 1805.9 |
| 12.5° | 2105.3 | 2066.9 | 1990.3 | 1925.6 | 1872.9 | 1822.6 | 1789.1 | 1765.2 | 1750.8 | 1743.6 | 1748.4 |
| 15° | 2112.4 | 2059.8 | 1968.7 | 1889.7 | 1825.0 | 1772.3 | 1731.6 | 1702.9 | 1693.3 | 1688.5 | 1686.1 |
| 17.5° | 2122.0 | 2057.4 | 1949.6 | 1853.8 | 1777.1 | 1717.3 | 1681.3 | 1652.6 | 1640.6 | 1635.8 | 1640.6 |
| 20° | 2136.4 | 2059.8 | 1928.0 | 1817.9 | 1734.0 | 1674.2 | 1633.4 | 1604.7 | 1595.1 | 1592.7 | 1590.3 |
| 22.5° | 2155.6 | 2064.5 | 1911.3 | 1784.3 | 1686.1 | 1626.2 | 1585.5 | 1566.4 | 1559.2 | 1561.6 | 1561.6 |
| 25° | 2174.7 | 2069.3 | 1887.3 | 1738.8 | 1635.8 | 1573.6 | 1544.8 | 1530.4 | 1535.2 | 1544.8 | 1544.8 |
| 27.5° | 2191.5 | 2066.9 | 1853.8 | 1690.9 | 1576.0 | 1518.5 | 1496.9 | 1499.3 | 1511.3 | 1528.1 | 1530.4 |
| 30° | 2213.0 | 2066.9 | 1817.9 | 1631.0 | 1508.9 | 1453.8 | 1449.0 | 1468.2 | 1487.3 | 1504.1 | 1504.1 |
| 32.5° | 2246.6 | 2081.3 | 1789.1 | 1571.2 | 1439.4 | 1396.3 | 1417.9 | 1444.2 | 1465.8 | 1482.5 | 1487.3 |
| 35° | 2304.1 | 2112.4 | 1770.0 | 1511.3 | 1372.4 | 1341.2 | 1382.0 | 1425.1 | 1439.4 | 1451.4 | 1453.8 |
| 37.5° | 2359.1 | 2141.2 | 1746.0 | 1453.8 | 1302.9 | 1290.9 | 1346.0 | 1391.5 | 1393.9 | 1401.1 | 1401.1 |
| 40° | 2411.8 | 2162.7 | 1714.9 | 1391.5 | 1235.9 | 1235.9 | 1300.5 | 1338.8 | 1334.1 | 1326.9 | 1329.3 |
| 42.5° | 2469.3 | 2174.7 | 1678.9 | 1334.1 | 1180.8 | 1180.8 | 1233.5 | 1267.0 | 1264.6 | 1274.2 | 1281.4 |
| 45° | 2538.8 | 2198.7 | 1631.0 | 1281.4 | 1123.3 | 1113.7 | 1156.8 | 1185.6 | 1221.5 | 1264.6 | 1276.6 |
| 47.5° | 2634.6 | 2232.2 | 1592.7 | 1223.9 | 1075.4 | 1041.9 | 1058.6 | 1118.5 | 1159.2 | 1195.1 | 1199.9 |
| 50° | 2735.2 | 2280.1 | 1559.2 | 1164.0 | 1017.9 | 958.0 | 972.4 | 1039.5 | 1063.4 | 1077.8 | 1085.0 |
| 52.5° | 2842.9 | 2318.4 | 1530.4 | 1113.7 | 958.0 | 871.8 | 891.0 | 955.6 | 972.4 | 984.4 | 986.8 |
| 55° | 2936.3 | 2349.6 | 1494.5 | 1065.8 | 893.4 | 790.4 | 814.3 | 876.6 | 893.4 | 907.7 | 907.7 |
| 57.5° | 3034.5 | 2378.3 | 1470.6 | 1025.1 | 823.9 | 723.3 | 740.1 | 802.3 | 826.3 | 831.1 | 838.3 |
| 60° | 3116.0 | 2404.6 | 1449.0 | 986.8 | 759.2 | 663.4 | 675.4 | 730.5 | 759.2 | 761.6 | 766.4 |
| 62.5° | 3173.5 | 2421.4 | 1437.0 | 938.9 | 694.6 | 603.6 | 613.1 | 668.2 | 701.8 | 708.9 | 711.3 |
| 65° | 3209.4 | 2431.0 | 1415.5 | 876.6 | 639.5 | 553.3 | 553.3 | 608.3 | 641.9 | 658.6 | 663.4 |
| 67.5° | 3192.6 | 2414.2 | 1358.0 | 804.7 | 589.2 | 503.0 | 500.6 | 555.7 | 584.4 | 594.0 | 596.4 |
| 70° | *3063.3* | *2316.0* | *1240.6* | *716.1* | *536.5* | *457.5* | *452.7* | *503.0* | *529.3* | *507.8* | *510.1* |
| 72.5° | 2799.8 | 2093.3 | 1080.2 | 627.5 | 481.4 | 414.3 | 409.6 | 452.7 | 455.1 | 455.1 | 452.7 |
| 75° | 2359.1 | 1710.1 | 862.2 | 534.1 | 423.9 | 368.8 | 371.2 | 404.8 | 407.2 | 419.1 | 412.0 |
| 77.5° | 1808.3 | 1267.0 | 673.0 | 426.3 | 359.3 | 328.1 | 340.1 | 352.1 | 368.8 | 385.6 | 368.8 |
| 80° | 1314.9 | 874.2 | 467.0 | 318.5 | 277.8 | 277.8 | 282.6 | 294.6 | 318.5 | 335.3 | 318.5 |
| 82.5° | 562.8 | 385.6 | 215.6 | 158.1 | 136.5 | 134.1 | 136.5 | 136.5 | 167.7 | 172.4 | 150.9 |
| 85° | 43.1 | 35.9 | 26.3 | 26.3 | 21.6 | 12.0 | 12.0 | 9.6 | 7.2 | 7.2 | 7.2 |
| 87.5° | 9.6 | 7.2 | 7.2 | 7.2 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 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
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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: SP1-2407-157-7

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

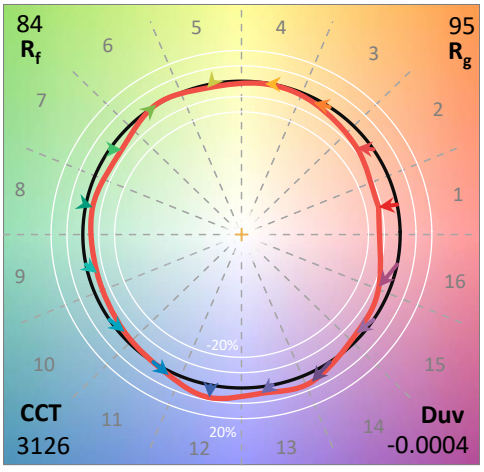
## Test Information

| | |
|---|---|
| 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 |

REPORT NUMBER: SP1-2407-157-7

| 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 |

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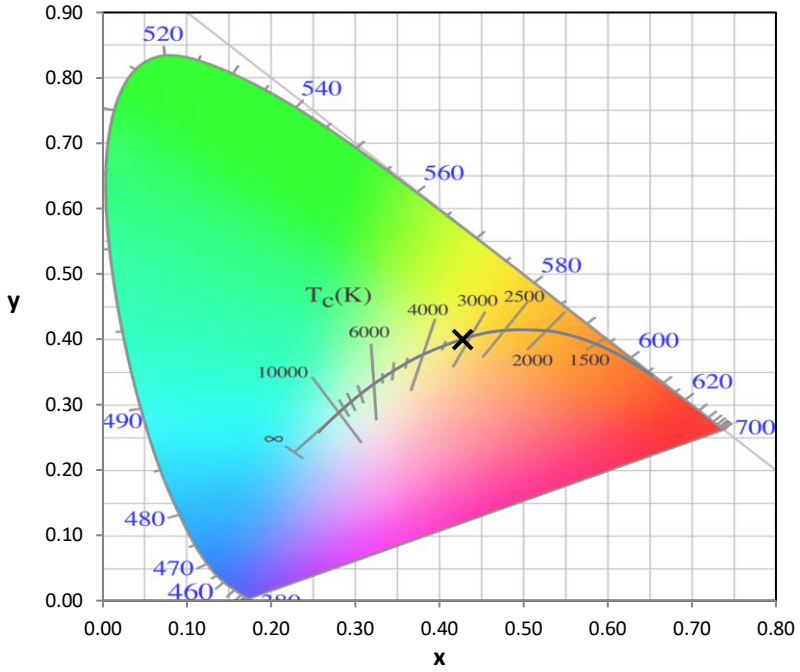
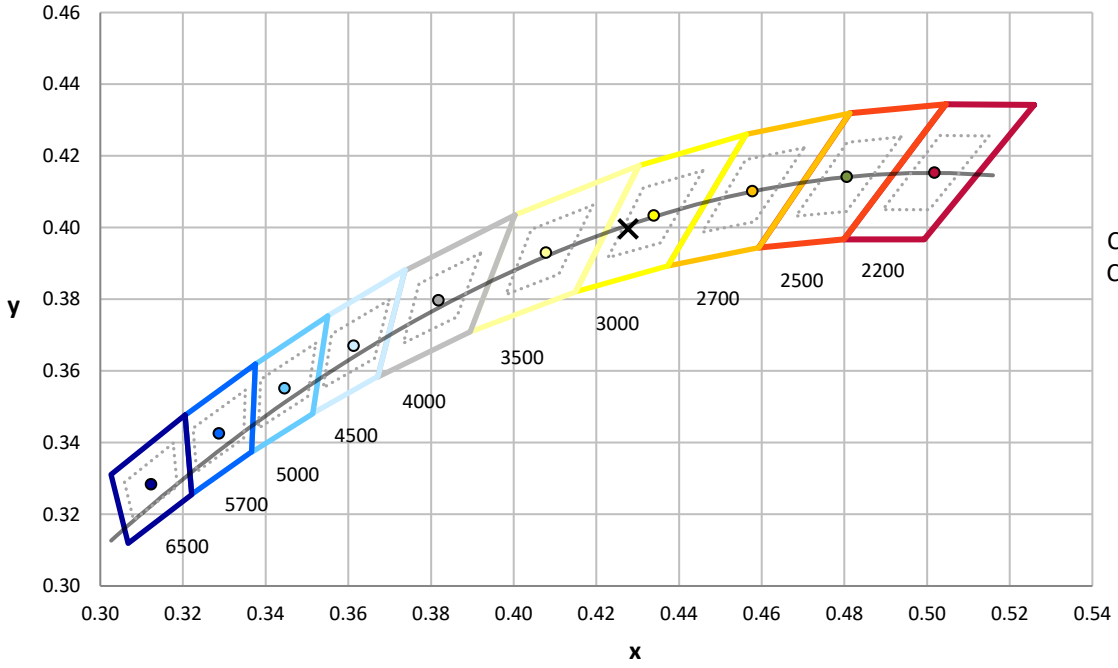
## CIE 1931 Chromaticity Diagram




## 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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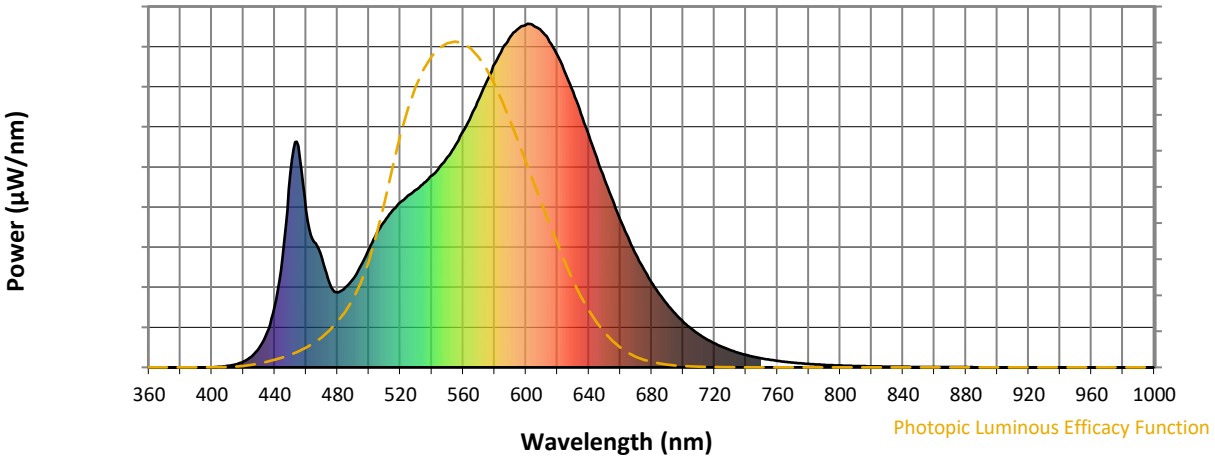
## Photopic Flux vs. Wavelength




## 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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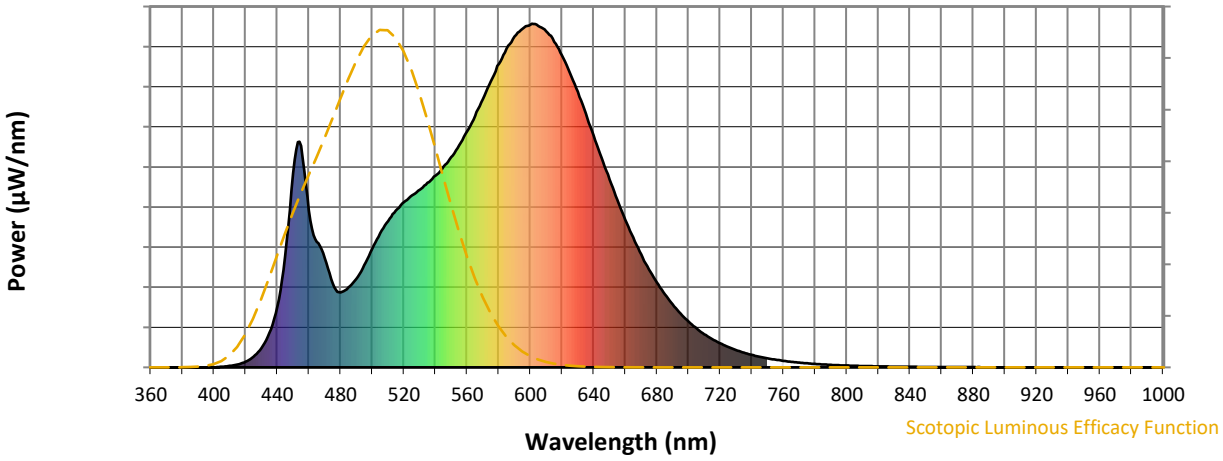
## Scotopic Flux vs. Wavelength




**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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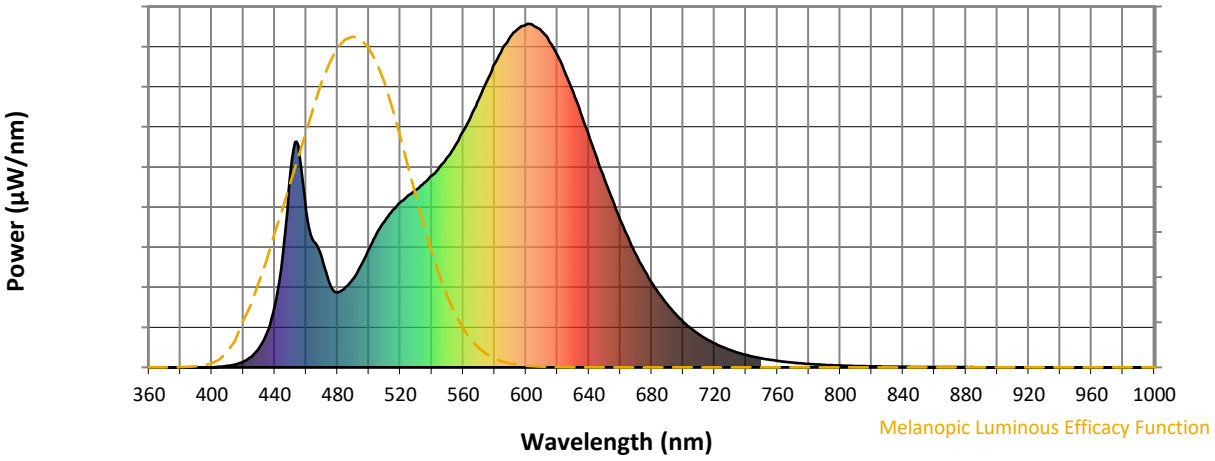
## Melanopic Flux vs. Wavelength




**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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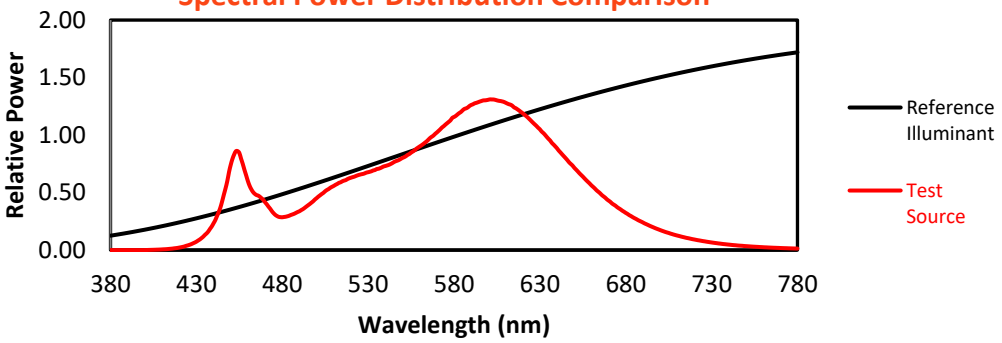
# TM-30-18

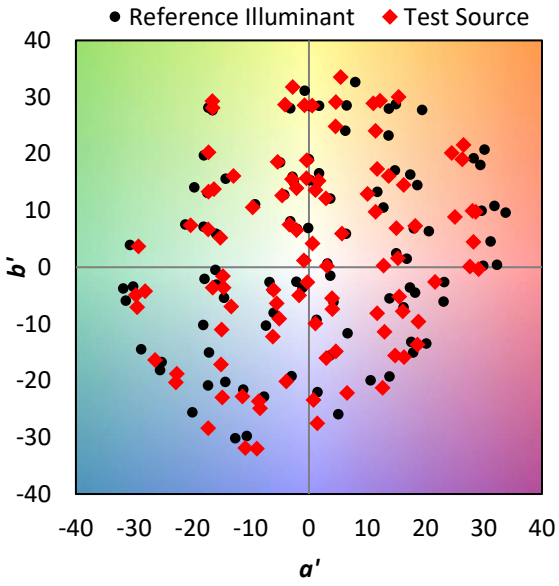
## Summary

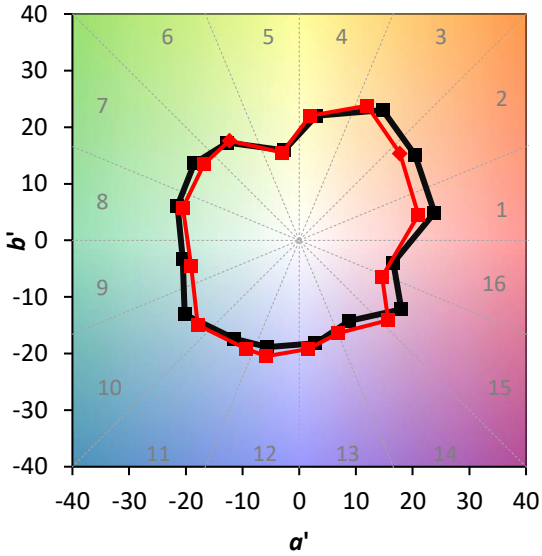
$R_f$ = 84.4
$R_g$ = 94.7
CIE $R_a$ = 82.6
$R_9$ = 5.1

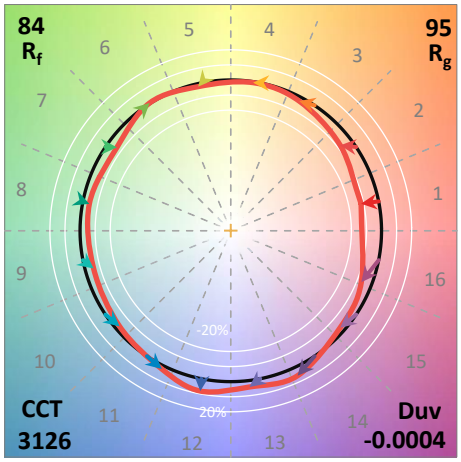
## Spectral Power Distribution Comparison

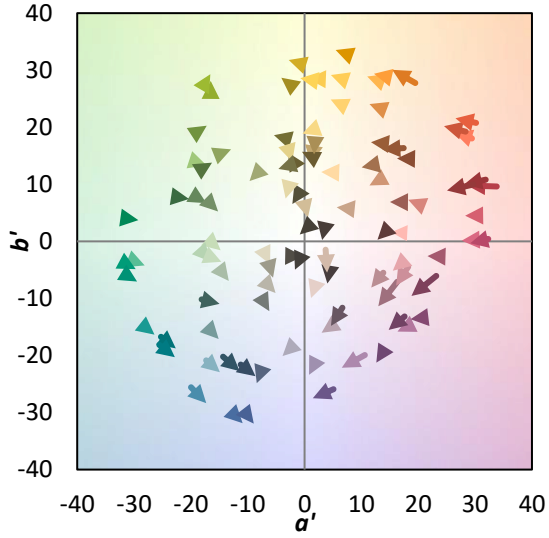



## Color Vector Graphics



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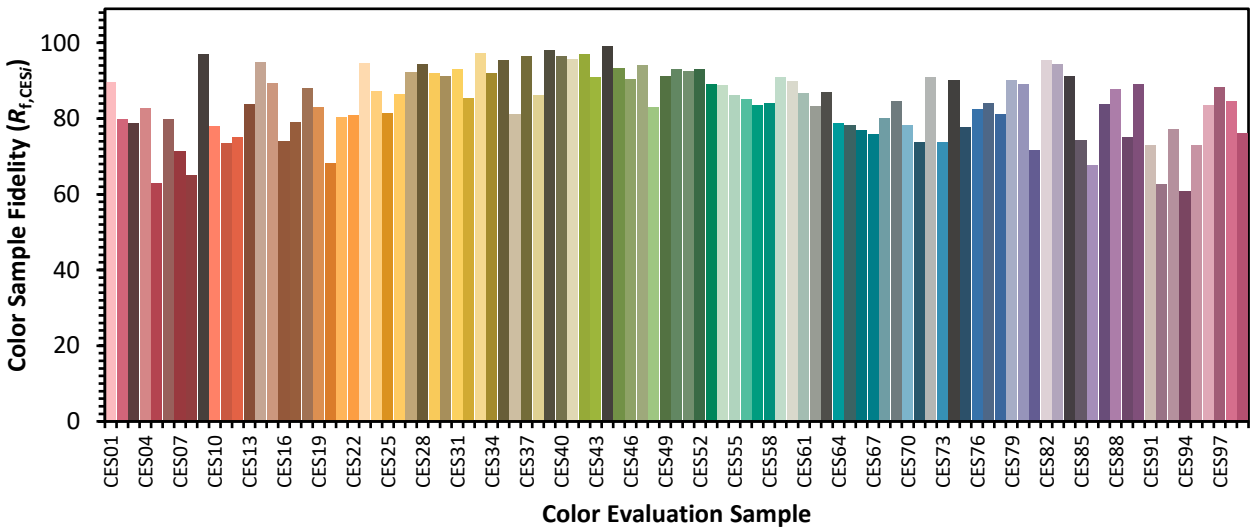
# TM-30-18

**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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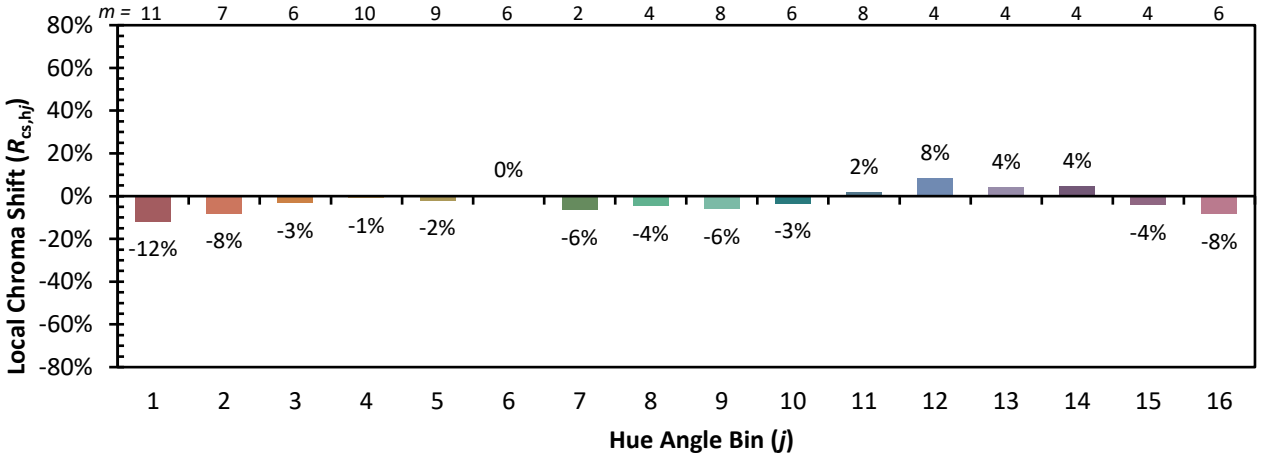
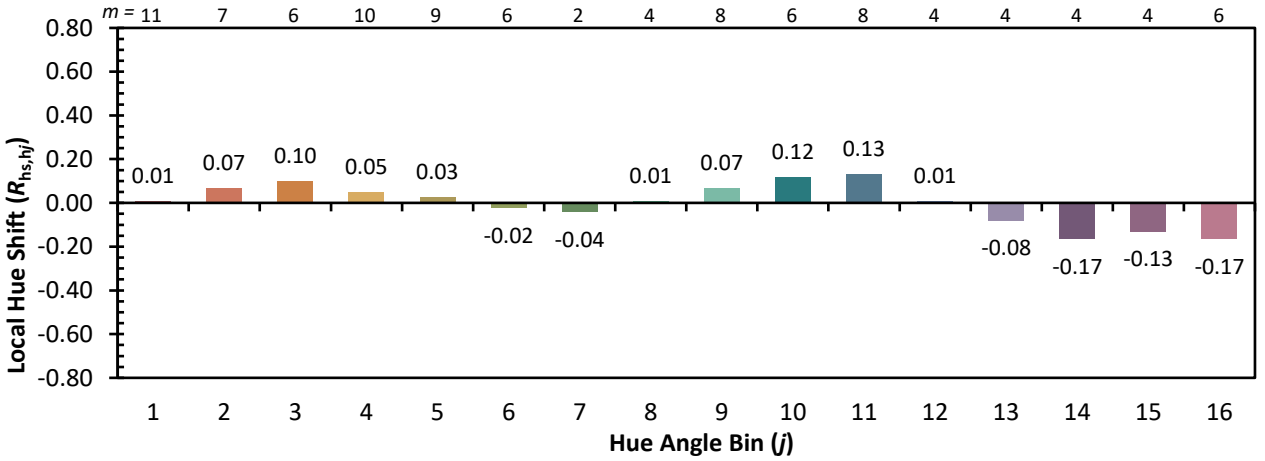
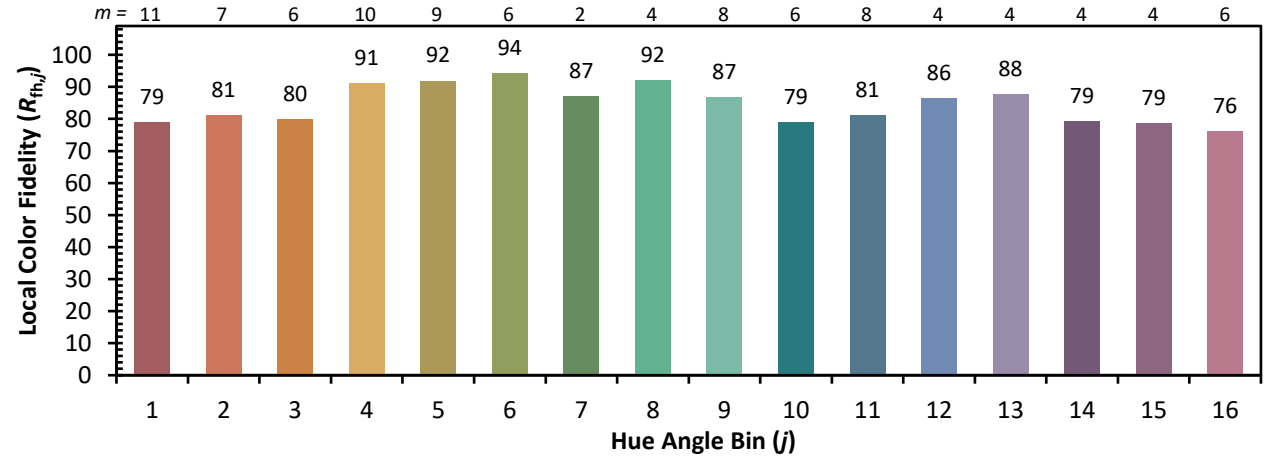
## Color Rendition by Hue-Angle Bin



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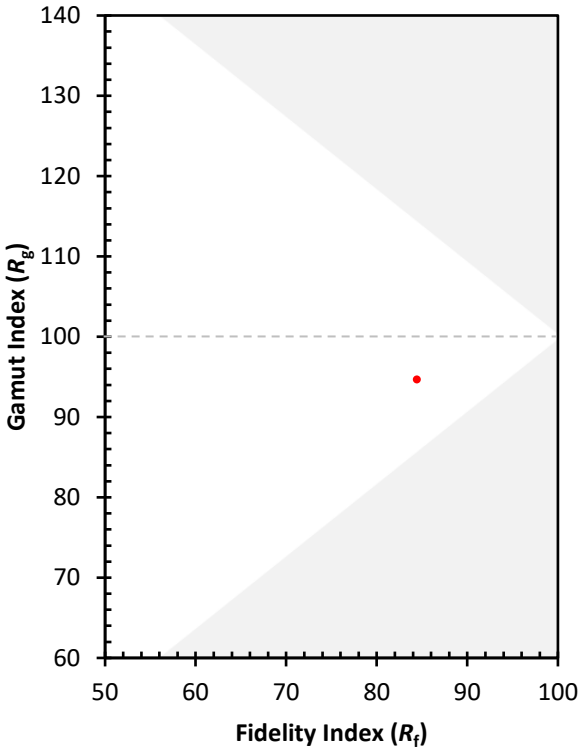
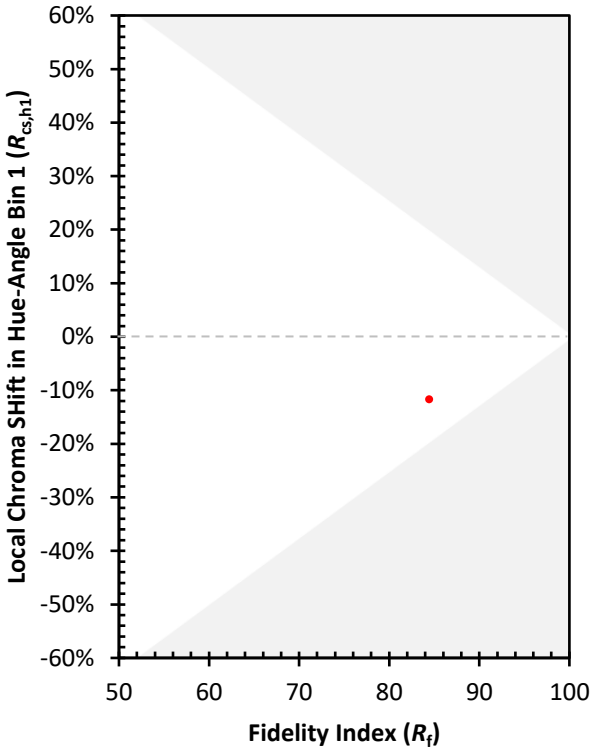
## Measure Comparisons




(END OF REPORT)