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: P871073

Luminaire Tested: **EMM2-HSN-SA2C-830-U-T2R-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: | P871073 |
| 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-T2R-HSS |
| Description: | EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 120W 80CRI 3000K FIXTURE w/ TYPE II ROADWAY DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD |
| Light Source: | (20) 3000K CCT, 80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 8582.6 lumens |
| Efficiency: | N/A |
| Efficacy: | 85.0 lumens/watt |
| Luminous Opening: | Rectangular (W 0.67' x L: 0.33' x H: 0') |
| IES Classification: | Type II - Short |
| BUG Rating: | B1 - 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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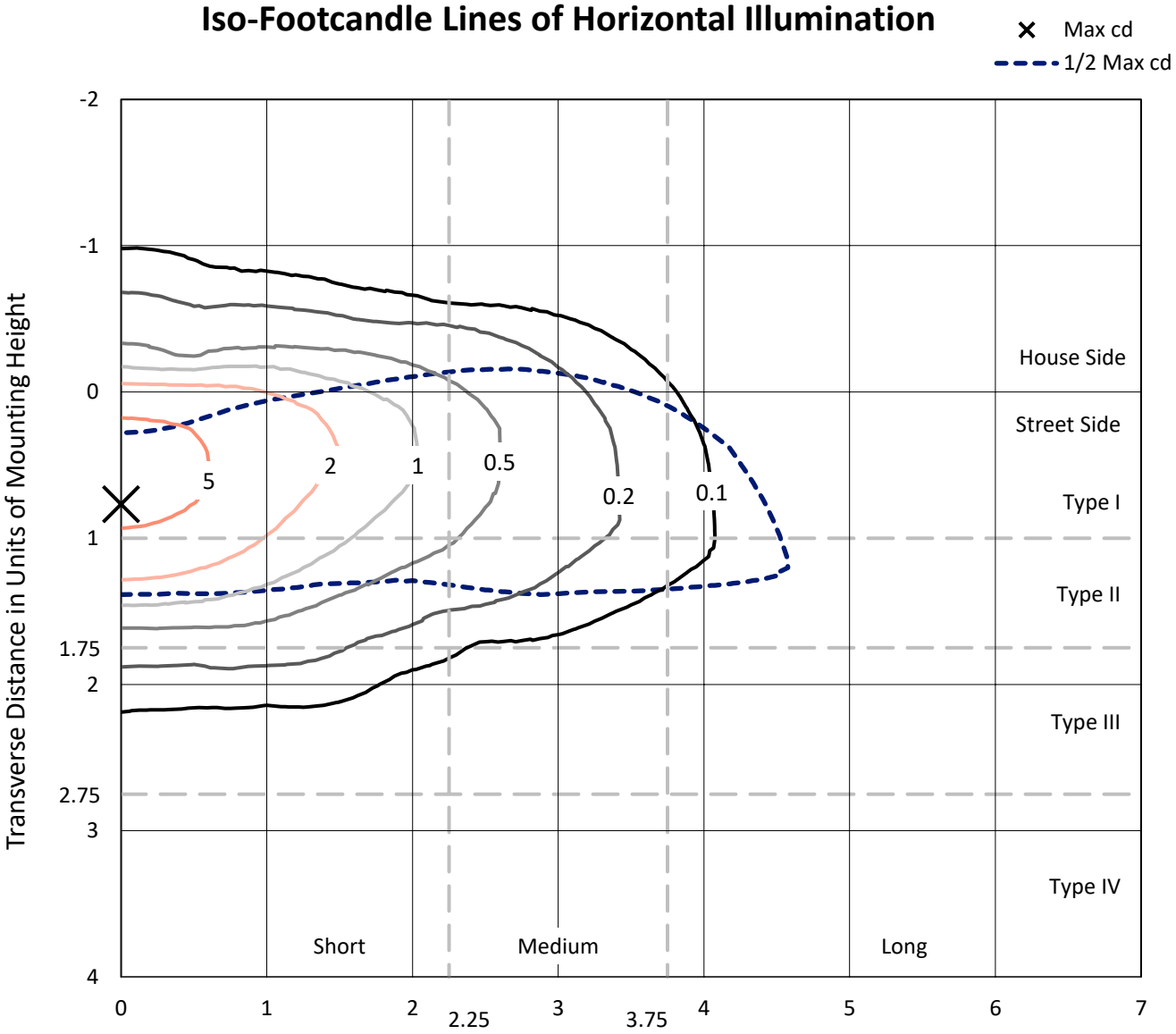
Scaled Data Report

REPORT NUMBER: P871073
CATALOG NUMBER: EMM2-HSN-SA2C-830-U-T2R-HSS

## Iso-Footcandle Lines of Horizontal Illumination




Based on 20 foot mounting height. Maximum calculated value = 7.4 fc
Type II - Short - N/A

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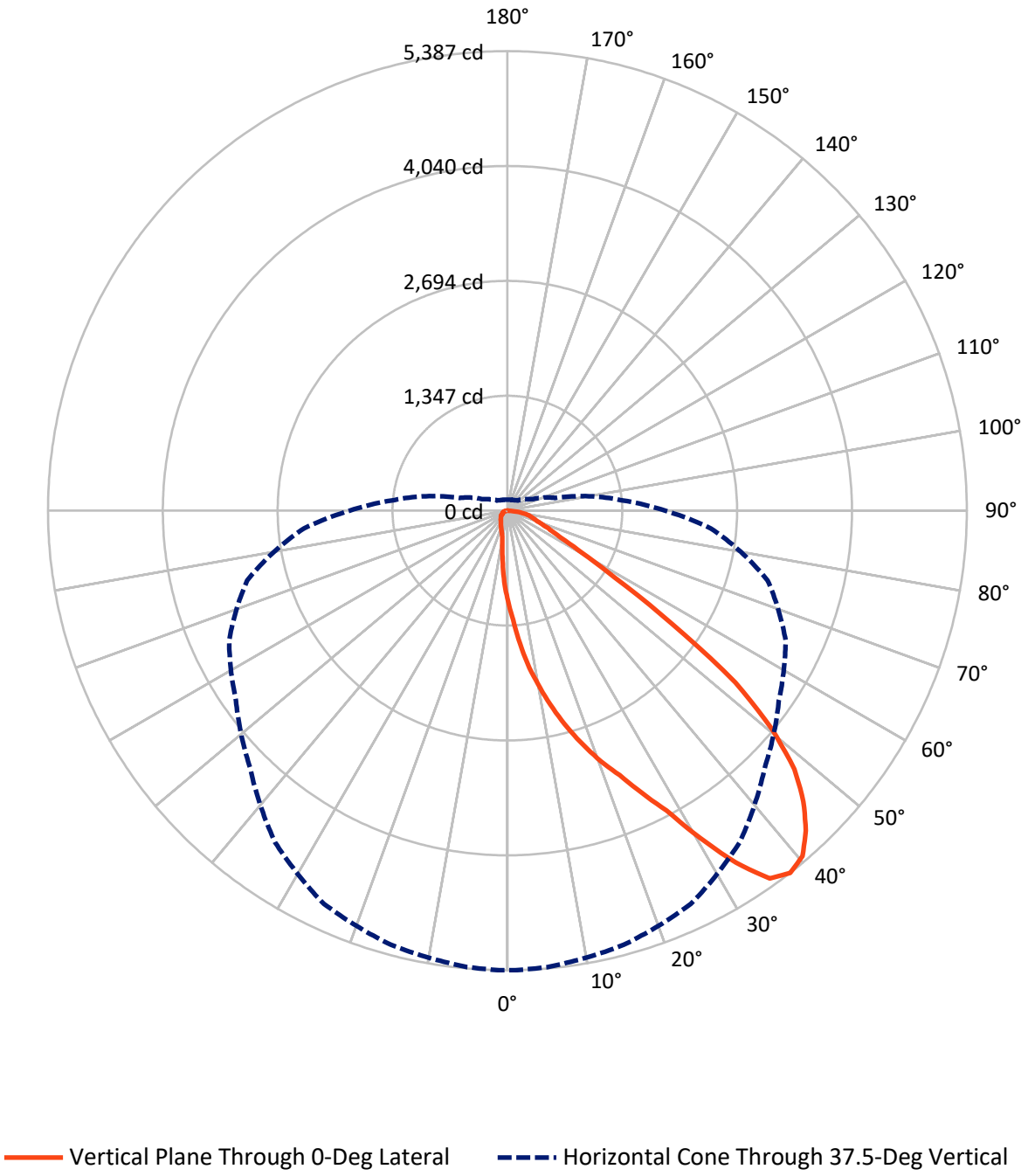
## Luminous Intensity Polar Plot



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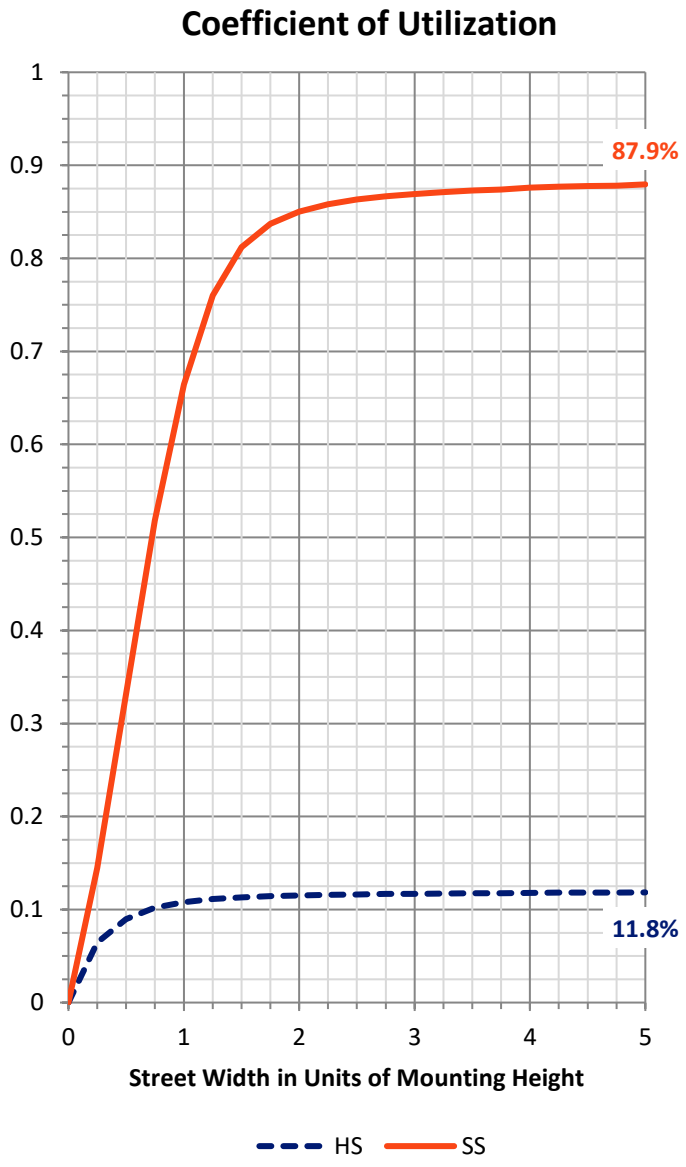
REPORT NUMBER: P871073
CATALOG NUMBER: EMM2-HSN-SA2C-830-U-T2R-HSS

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 1023.7 | 0.0 | 1023.7 |
| | % Fixture | 11.9 | 0.0 | 11.9 |
| **Street Side** | Lumens | 7558.9 | 0.0 | 7558.9 |
| | % Fixture | 88.1 | 0.0 | 88.1 |
| **Total** | Lumens | 8582.6 | 0.0 | 8582.6 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 106.7 | 1.2 |
| 10°-20° | 373.0 | 4.3 |
| 20°-30° | 769.5 | 9.0 |
| 30°-40° | 1354.0 | 15.8 |
| 40°-50° | 1838.4 | 21.4 |
| 50°-60° | 1821.4 | 21.2 |
| 60°-70° | 1402.3 | 16.3 |
| 70°-80° | 813.8 | 9.5 |
| 80°-90° | 103.5 | 1.2 |
| 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° | 8582.6 | 100.0 |
| 0°-180° | 8582.6 | 100.0 |



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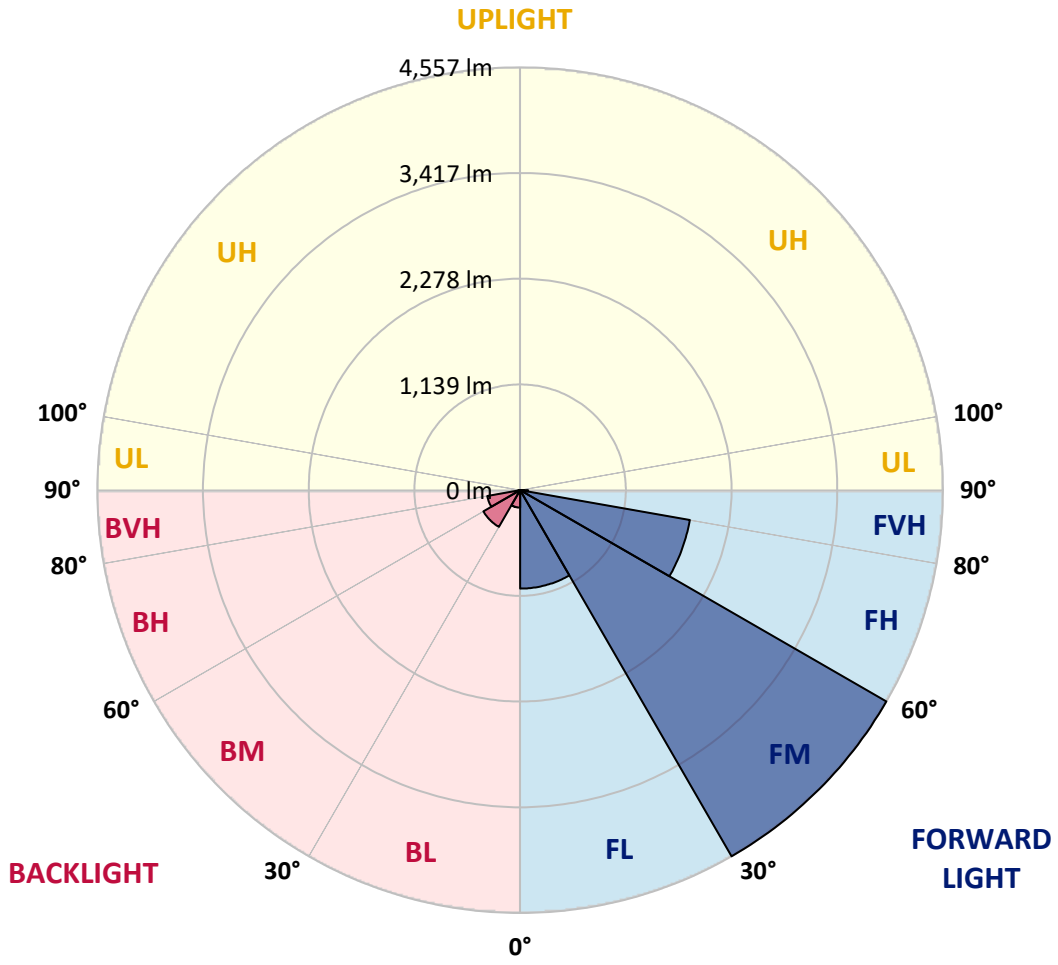
Scaled Data Report

REPORT NUMBER: P871073
CATALOG NUMBER: EMM2-HSN-SA2C-830-U-T2R-HSS

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 1061.0 | 12.4 | | | |
| FM | (30°-60°) | 4556.6 | 53.1 | | | |
| FH | (60°-80°) | 1856.9 | 21.6 | | | G2/5000 |
| FVH | (80°-90°) | 84.4 | 1.0 | | | G1/100 |
| BL | (0°-30°) | 188.2 | 2.2 | B1/500 | | |
| BM | (30°-60°) | 457.2 | 5.3 | B1/1000 | | |
| BH | (60°-80°) | 359.2 | 4.2 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 19.1 | 0.2 | | | G1/100 |
| UL | (90°-100°) | 0.0 | 0.0 | | U0/0 | |
| UH | (100°-180°) | 0.0 | 0.0 | | U0/0 | |

**BUG Rating: B1-U0-G2**
Type II Short



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Scaled Data Report

REPORT NUMBER: P871073
CATALOG NUMBER: EMM2-HSN-SA2C-830-U-T2R-HSS

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 1° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 |
| 2.5° | 1281.5 | 1300.6 | 1286.3 | 1274.3 | 1257.5 | 1240.7 | 1216.8 | 1190.4 | 1156.9 | 1116.2 | 1080.3 |
| 5° | 1571.3 | 1580.9 | 1576.1 | 1568.9 | 1516.2 | 1465.9 | 1415.6 | 1353.3 | 1267.1 | 1190.4 | 1109.0 |
| 7.5° | 1861.1 | 1856.3 | 1844.4 | 1822.8 | 1774.9 | 1717.4 | 1626.4 | 1523.4 | 1401.2 | 1267.1 | 1140.1 |
| 10° | 2115.0 | 2122.2 | 2112.6 | 2079.1 | 2019.2 | 1940.2 | 1830.0 | 1712.6 | 1547.3 | 1360.5 | 1183.3 |
| 12.5° | 2380.9 | 2385.7 | 2385.7 | 2313.8 | 2273.1 | 2151.0 | 2033.6 | 1875.5 | 1691.1 | 1475.5 | 1233.6 |
| 15° | 2642.0 | 2632.4 | 2632.4 | 2584.5 | 2512.6 | 2376.1 | 2244.4 | 2052.7 | 1844.4 | 1583.3 | 1291.1 |
| 17.5° | 2891.1 | 2895.9 | 2874.3 | 2821.6 | 2752.2 | 2620.4 | 2457.5 | 2246.8 | 1995.3 | 1712.6 | 1350.9 |
| 20° | 3137.8 | 3123.4 | 3113.8 | 3061.2 | 2986.9 | 2831.2 | 2675.5 | 2436.0 | 2172.5 | 1858.7 | 1434.8 |
| 22.5° | 3367.7 | 3374.9 | 3351.0 | 3267.1 | 3197.7 | 3056.4 | 2879.1 | 2658.7 | 2359.3 | 2004.8 | 1525.8 |
| 25° | 3664.8 | 3640.8 | 3662.4 | 3561.8 | 3454.0 | 3286.3 | 3085.1 | 2867.1 | 2562.9 | 2184.5 | 1638.4 |
| 27.5° | 3980.9 | 3995.3 | 3983.3 | 3873.2 | 3727.0 | 3501.9 | 3291.1 | 3058.8 | 2768.9 | 2354.5 | 1765.3 |
| 30° | 4452.8 | 4445.6 | 4448.0 | 4282.7 | 4040.8 | 3772.5 | 3513.9 | 3260.0 | 2974.9 | 2562.9 | 1913.8 |
| 32.5° | 4919.9 | 4946.2 | 4881.6 | 4735.4 | 4457.6 | 4052.8 | 3736.6 | 3454.0 | 3173.7 | 2742.6 | 2064.7 |
| 35° | 5295.9 | 5288.8 | 5262.4 | 5099.5 | 4824.1 | 4431.2 | 3990.5 | 3669.6 | 3384.5 | 2962.9 | 2232.4 |
| 37.5° | 5387.0 | 5387.0 | 5370.2 | 5269.6 | 5087.6 | 4747.4 | 4266.0 | 3885.1 | 3600.1 | 3159.4 | 2395.3 |
| 40° | 5327.1 | 5315.1 | 5305.5 | 5238.5 | 5140.2 | 4939.0 | 4555.8 | 4107.9 | 3830.0 | 3413.3 | 2574.9 |
| 42.5° | 5130.7 | 5133.1 | 5121.1 | 5082.8 | 5030.1 | 4953.4 | 4735.4 | 4345.0 | 4055.2 | 3652.8 | 2752.2 |
| 45° | 4867.2 | 4872.0 | 4857.6 | 4852.8 | 4826.5 | 4826.5 | 4776.2 | 4531.8 | 4268.4 | 3897.1 | 2946.2 |
| 47.5° | 4529.5 | 4527.1 | 4519.9 | 4507.9 | 4560.6 | 4618.1 | 4663.6 | 4637.2 | 4457.6 | 4160.6 | 3121.0 |
| 50° | 4014.5 | 4009.7 | 4031.2 | 4091.1 | 4220.5 | 4347.4 | 4481.5 | 4606.1 | 4594.1 | 4404.9 | 3331.8 |
| 52.5° | 3346.2 | 3315.1 | 3339.0 | 3523.4 | 3789.3 | 4072.0 | 4261.2 | 4457.6 | 4663.6 | 4663.6 | 3540.2 |
| 55° | 2340.2 | 2366.5 | 2380.9 | 2651.6 | 3176.1 | 3662.4 | 3995.3 | 4249.2 | 4637.2 | 4869.6 | 3770.2 |
| 57.5° | 1489.9 | 1499.4 | 1542.6 | 1834.8 | 2450.4 | 3058.8 | 3648.0 | 4064.8 | 4539.0 | 5042.0 | 4000.1 |
| 60° | 1003.6 | 970.1 | 1003.6 | 1171.3 | 1762.9 | 2400.1 | 3137.8 | 3832.4 | 4397.7 | 5166.6 | 4254.0 |
| 62.5° | 709.0 | 706.6 | 716.2 | 814.4 | 1257.5 | 1803.6 | 2498.3 | 3518.7 | 4285.1 | 5173.8 | 4443.2 |
| 65° | 572.5 | 555.7 | 562.9 | 618.0 | 843.1 | 1322.2 | 1832.4 | 2951.0 | 4184.5 | 5046.8 | 4536.6 |
| 67.5° | 459.9 | 452.7 | 457.5 | 493.4 | 632.4 | 994.0 | 1291.1 | 2244.4 | 3971.4 | 4831.3 | 4483.9 |
| 70° | 376.1 | 378.5 | 380.8 | 416.8 | 503.0 | 752.1 | 922.2 | 1540.2 | 3516.3 | 4586.9 | 4246.8 |
| 72.5° | 325.8 | 325.8 | 328.2 | 352.1 | 421.6 | 596.4 | 697.0 | 1001.2 | 2845.6 | 4323.5 | 3810.9 |
| 75° | 287.4 | 287.4 | 287.4 | 309.0 | 359.3 | 479.1 | 541.3 | 685.0 | 2043.2 | 3834.8 | 3152.2 |
| 77.5° | 249.1 | 251.5 | 251.5 | 270.7 | 309.0 | 373.7 | 416.8 | 474.3 | 1303.0 | 2962.9 | 2385.7 |
| 80° | 191.6 | 191.6 | 194.0 | 215.6 | 263.5 | 292.2 | 306.6 | 335.3 | 685.0 | 1861.1 | 1513.8 |
| 82.5° | 134.1 | 136.5 | 136.5 | 138.9 | 177.2 | 179.6 | 165.3 | 167.7 | 249.1 | 618.0 | 574.9 |
| 85° | 14.4 | 16.8 | 19.2 | 19.2 | 31.1 | 38.3 | 40.7 | 38.3 | 40.7 | 71.9 | 71.9 |
| 87.5° | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 4.8 | 4.8 | 7.2 | 7.2 | 7.2 | 7.2 |
| 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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Scaled Data Report

REPORT NUMBER: P871073
CATALOG NUMBER: EMM2-HSN-SA2C-830-U-T2R-HSS

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 | 1063.5 |
| 2.5° | 1061.1 | 1044.3 | 1008.4 | 977.3 | 948.5 | 924.6 | 907.8 | 886.2 | 869.5 | 869.5 | 879.1 |
| 5° | 1068.3 | 1030.0 | 955.7 | 886.2 | 831.2 | 778.5 | 730.6 | 699.4 | 675.5 | 661.1 | 661.1 |
| 7.5° | 1077.9 | 1020.4 | 907.8 | 802.4 | 716.2 | 632.4 | 558.1 | 522.2 | 486.2 | 474.3 | 476.7 |
| 10° | 1097.0 | 1015.6 | 864.7 | 728.2 | 598.8 | 493.4 | 421.6 | 383.2 | 364.1 | 354.5 | 354.5 |
| 12.5° | 1118.6 | 1015.6 | 819.2 | 644.3 | 493.4 | 385.6 | 342.5 | 313.8 | 304.2 | 299.4 | 294.6 |
| 15° | 1147.3 | 1020.4 | 780.9 | 555.7 | 402.4 | 325.8 | 294.6 | 277.9 | 268.3 | 263.5 | 263.5 |
| 17.5° | 1180.9 | 1025.2 | 740.1 | 483.8 | 342.5 | 287.4 | 263.5 | 251.5 | 241.9 | 237.1 | 237.1 |
| 20° | 1224.0 | 1037.2 | 699.4 | 419.2 | 299.4 | 263.5 | 241.9 | 229.9 | 220.4 | 218.0 | 215.6 |
| 22.5° | 1276.7 | 1056.3 | 658.7 | 366.5 | 270.7 | 239.5 | 220.4 | 210.8 | 203.6 | 198.8 | 198.8 |
| 25° | 1339.0 | 1080.3 | 627.6 | 328.2 | 249.1 | 222.8 | 206.0 | 194.0 | 186.8 | 184.4 | 184.4 |
| 27.5° | 1425.2 | 1121.0 | 596.4 | 299.4 | 232.3 | 206.0 | 189.2 | 179.6 | 172.5 | 170.1 | 167.7 |
| 30° | 1506.6 | 1171.3 | 582.1 | 292.2 | 220.4 | 191.6 | 179.6 | 167.7 | 160.5 | 158.1 | 155.7 |
| 32.5° | 1612.0 | 1228.8 | 572.5 | 292.2 | 215.6 | 182.0 | 167.7 | 158.1 | 150.9 | 148.5 | 146.1 |
| 35° | 1724.6 | 1295.8 | 572.5 | 301.8 | 218.0 | 174.9 | 158.1 | 148.5 | 141.3 | 136.5 | 136.5 |
| 37.5° | *1846.8* | *1362.9* | *577.3* | *316.2* | *225.2* | *170.1* | *148.5* | *138.9* | *131.7* | *129.3* | *129.3* |
| 40° | 1976.1 | 1453.9 | 586.8 | 328.2 | 232.3 | 167.7 | 138.9 | 131.7 | 124.6 | 119.8 | 119.8 |
| 42.5° | 2095.9 | 1525.8 | 603.6 | 342.5 | 237.1 | 165.3 | 131.7 | 124.6 | 117.4 | 115.0 | 115.0 |
| 45° | 2234.8 | 1604.8 | 618.0 | 352.1 | 237.1 | 158.1 | 124.6 | 117.4 | 112.6 | 110.2 | 107.8 |
| 47.5° | 2345.0 | 1669.5 | 625.2 | 356.9 | 232.3 | 150.9 | 117.4 | 112.6 | 107.8 | 103.0 | 105.4 |
| 50° | 2479.1 | 1739.0 | 637.1 | 359.3 | 222.8 | 141.3 | 112.6 | 105.4 | 100.6 | 98.2 | 98.2 |
| 52.5° | 2608.4 | 1808.4 | 646.7 | 354.5 | 210.8 | 129.3 | 105.4 | 100.6 | 95.8 | 91.0 | 91.0 |
| 55° | 2761.7 | 1885.1 | 661.1 | 347.3 | 191.6 | 117.4 | 98.2 | 93.4 | 86.2 | 83.8 | 81.4 |
| 57.5° | 2936.6 | 1985.7 | 673.1 | 332.9 | 167.7 | 105.4 | 93.4 | 86.2 | 76.6 | 71.9 | 71.9 |
| 60° | 3097.1 | 2100.7 | 682.7 | 297.0 | 146.1 | 98.2 | 86.2 | 79.0 | 69.5 | 67.1 | 67.1 |
| 62.5° | 3269.5 | 2220.4 | 682.7 | 234.7 | 124.6 | 88.6 | 81.4 | 74.3 | 64.7 | 62.3 | 62.3 |
| 65° | 3389.3 | 2328.2 | 661.1 | 174.9 | 105.4 | 83.8 | 79.0 | 69.5 | 59.9 | 57.5 | 57.5 |
| 67.5° | 3422.8 | 2395.3 | 601.2 | 124.6 | 91.0 | 79.0 | 74.3 | 64.7 | 57.5 | 52.7 | 52.7 |
| 70° | 3315.1 | 2342.6 | 491.0 | 95.8 | 79.0 | 71.9 | 67.1 | 59.9 | 52.7 | 50.3 | 50.3 |
| 72.5° | 3006.1 | 2141.4 | 366.5 | 81.4 | 69.5 | 67.1 | 62.3 | 55.1 | 50.3 | 47.9 | 47.9 |
| 75° | 2517.4 | 1779.7 | 258.7 | 71.9 | 64.7 | 59.9 | 55.1 | 50.3 | 45.5 | 45.5 | 45.5 |
| 77.5° | 1906.6 | 1286.3 | 160.5 | 64.7 | 55.1 | 55.1 | 50.3 | 45.5 | 43.1 | 40.7 | 40.7 |
| 80° | 1231.2 | 812.0 | 91.0 | 45.5 | 38.3 | 40.7 | 35.9 | 31.1 | 31.1 | 28.7 | 28.7 |
| 82.5° | 522.2 | 321.0 | 47.9 | 26.3 | 19.2 | 16.8 | 12.0 | 12.0 | 9.6 | 9.6 | 9.6 |
| 85° | 52.7 | 19.2 | 9.6 | 7.2 | 7.2 | 4.8 | 4.8 | 4.8 | 4.8 | 2.4 | 2.4 |
| 87.5° | 7.2 | 7.2 | 7.2 | 4.8 | 4.8 | 4.8 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| 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

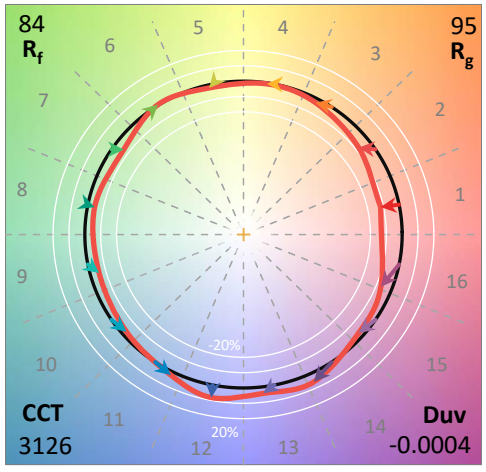
## Test Information

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



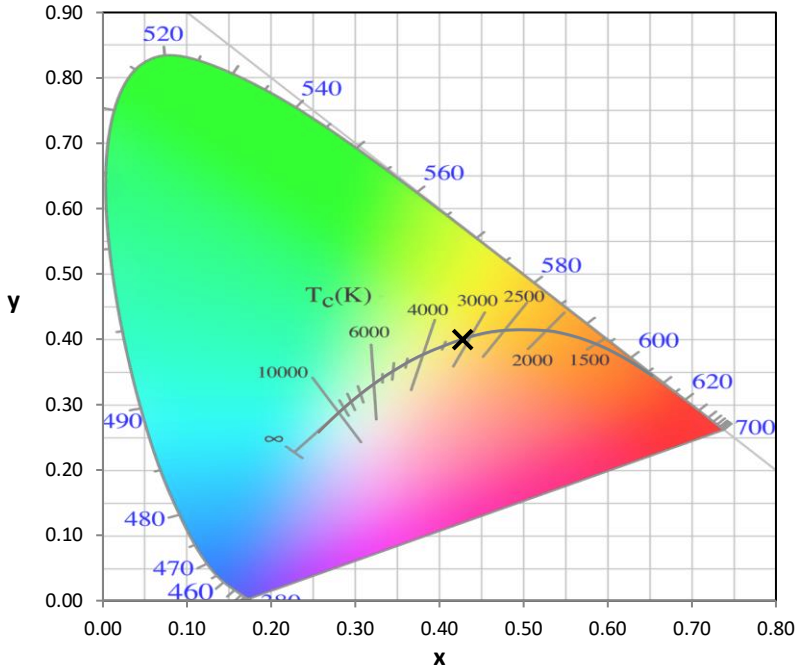

## Test Conditions

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

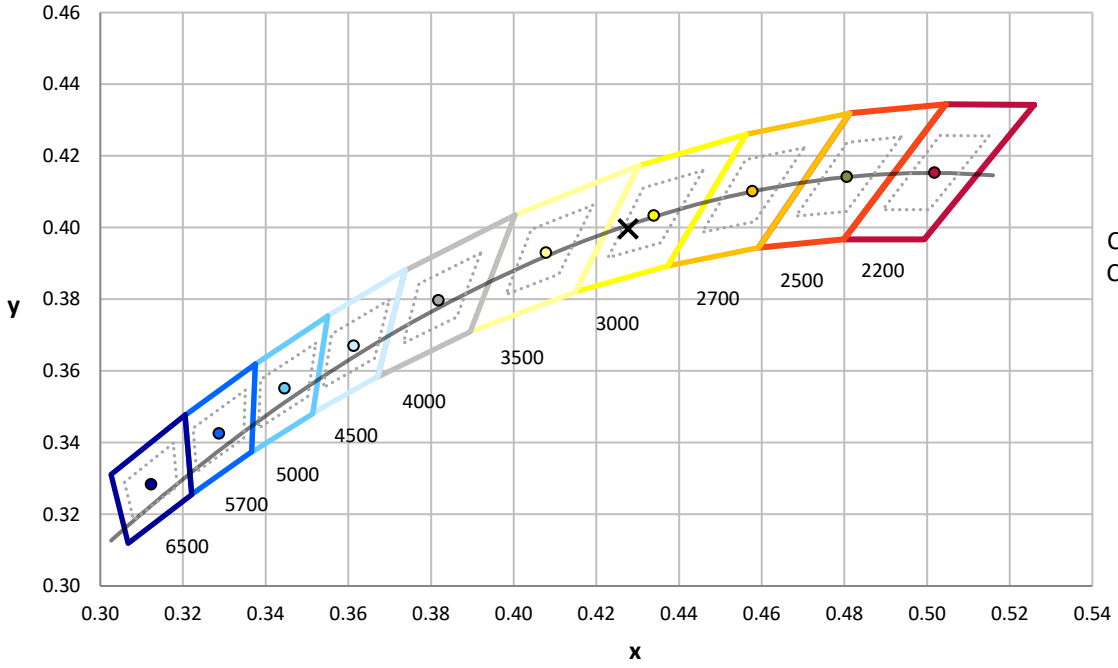
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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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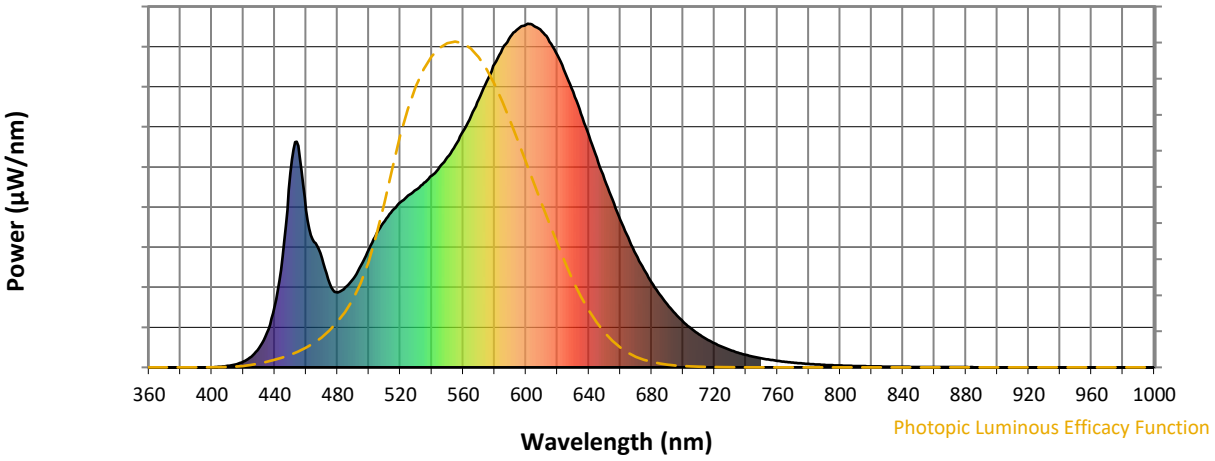
## Photopic Flux vs. Wavelength




## 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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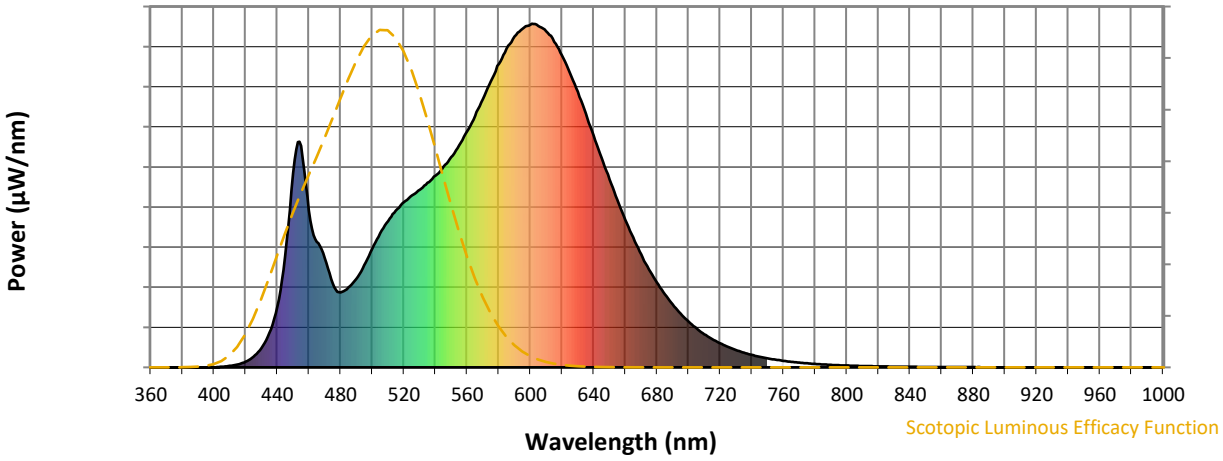
## Scotopic Flux vs. Wavelength




**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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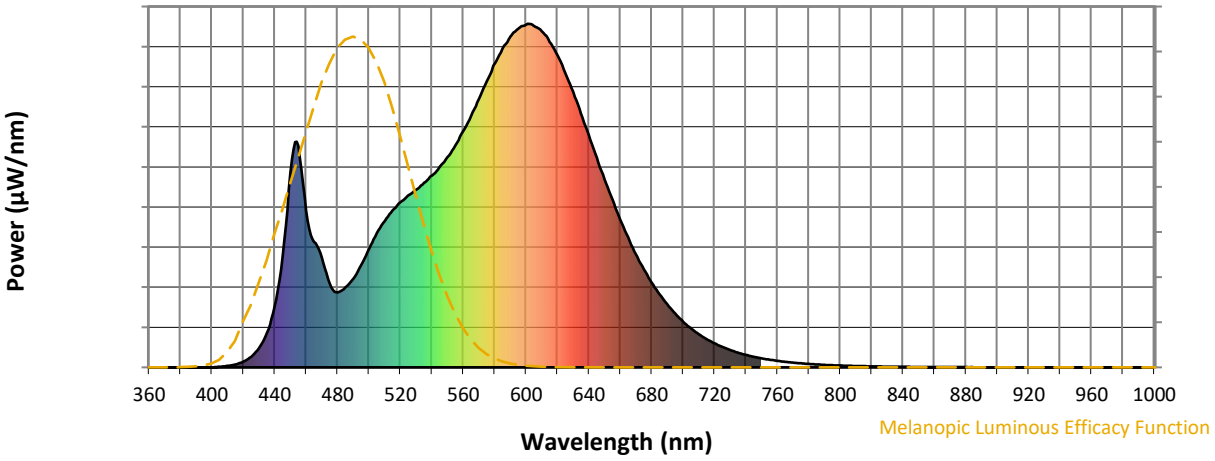
## Melanopic Flux vs. Wavelength




**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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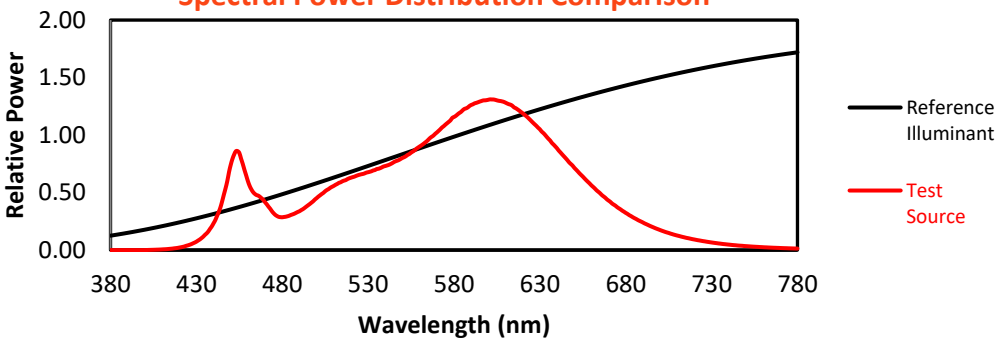
# TM-30-18

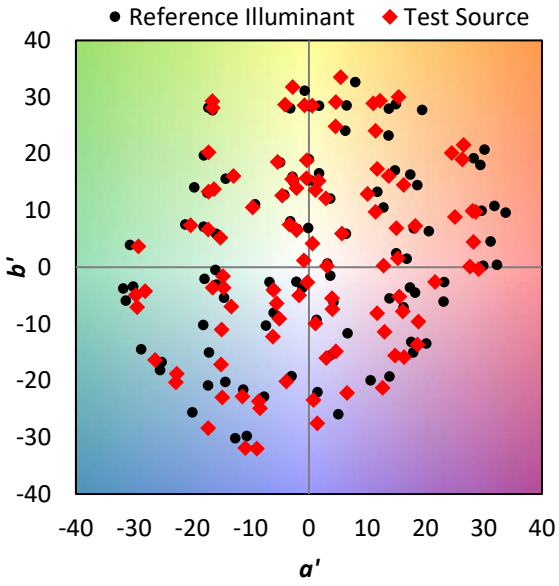
## Summary

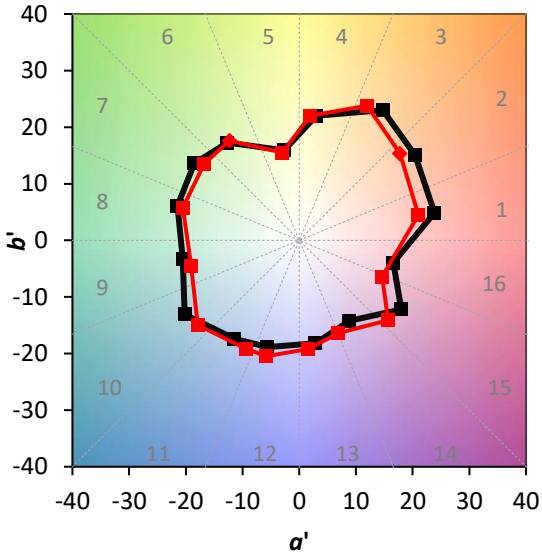
$R_f$ = 84.4
$R_g$ = 94.7
CIE $R_a$ = 82.6
$R_9$ = 5.1

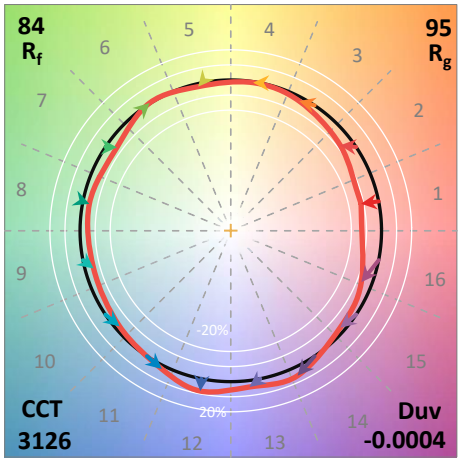
## Spectral Power Distribution Comparison

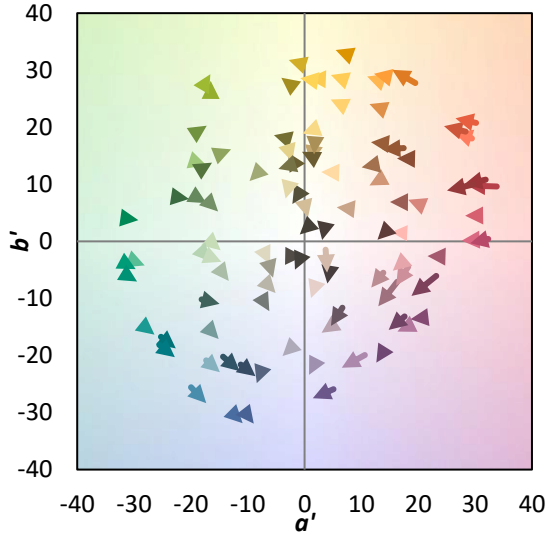



## Color Vector Graphics



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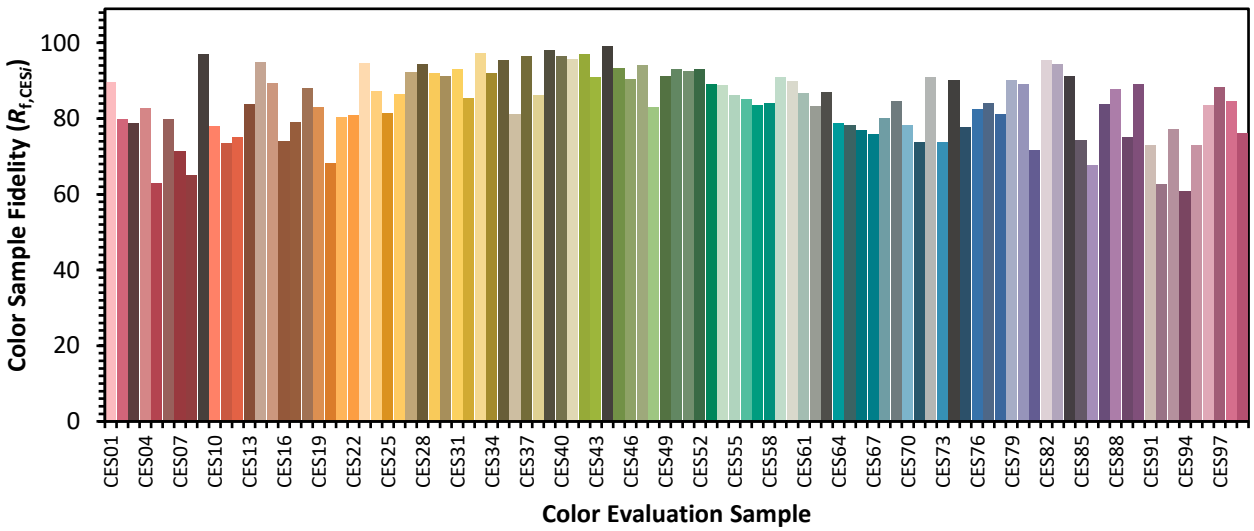
# TM-30-18

**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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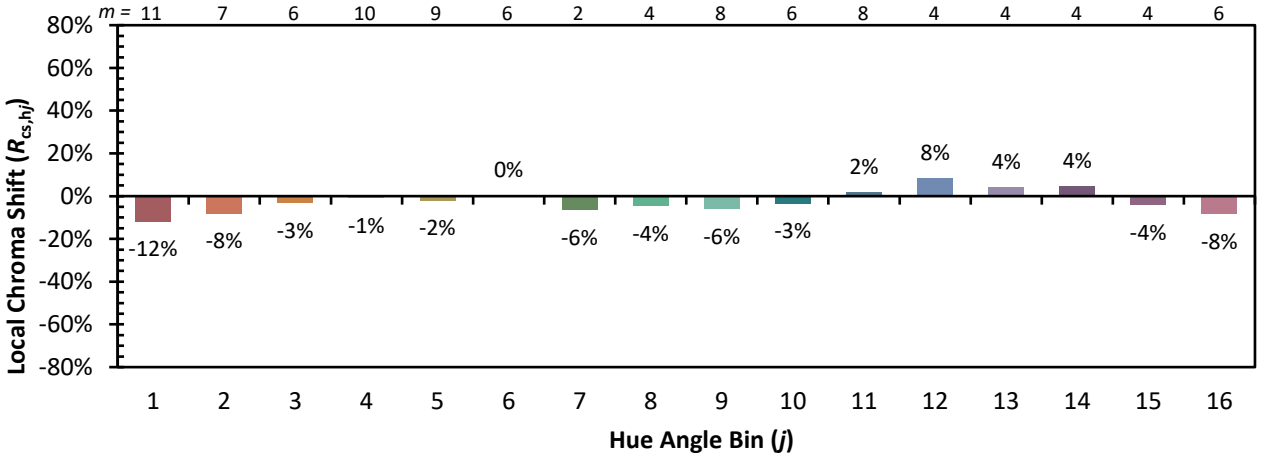
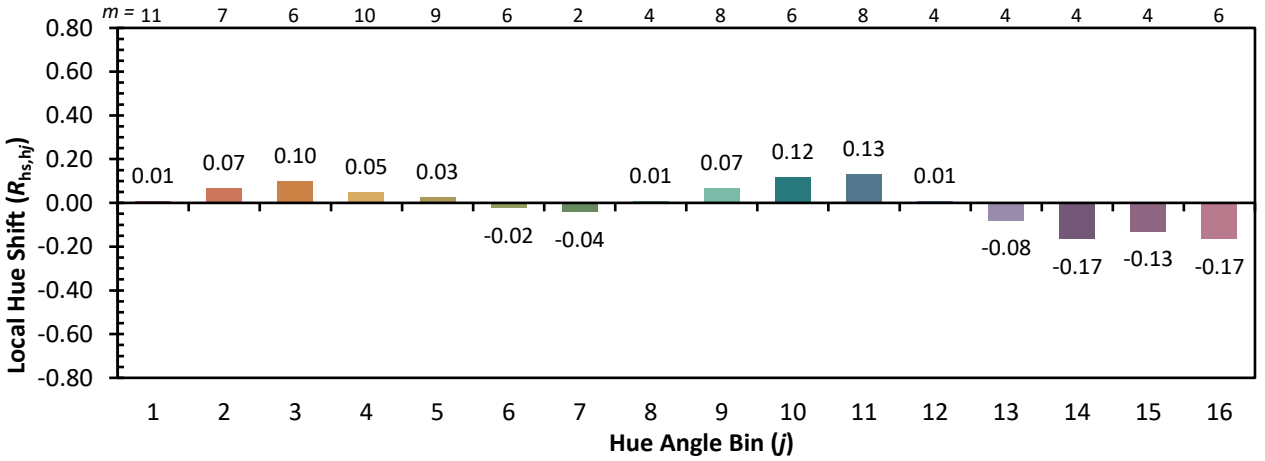
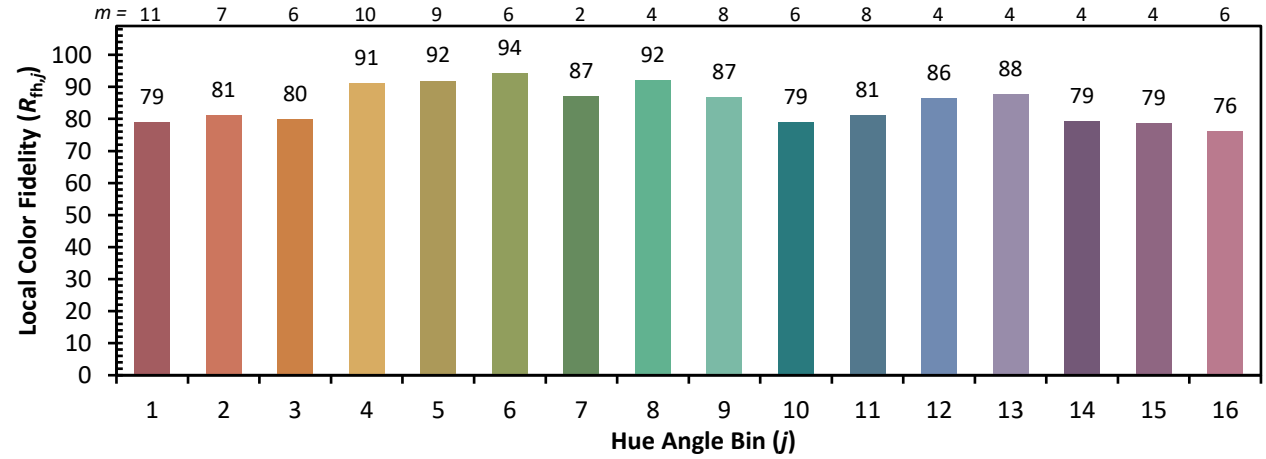
**TM-30-18**

## Color Rendition by Hue-Angle Bin



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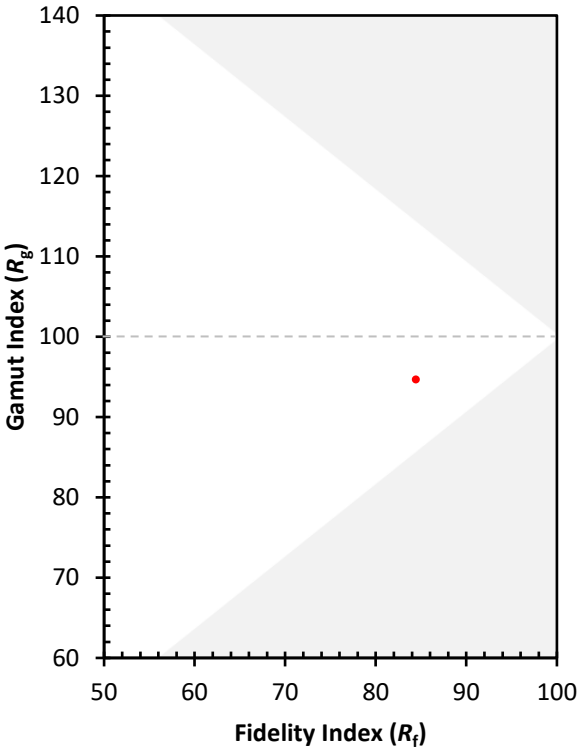
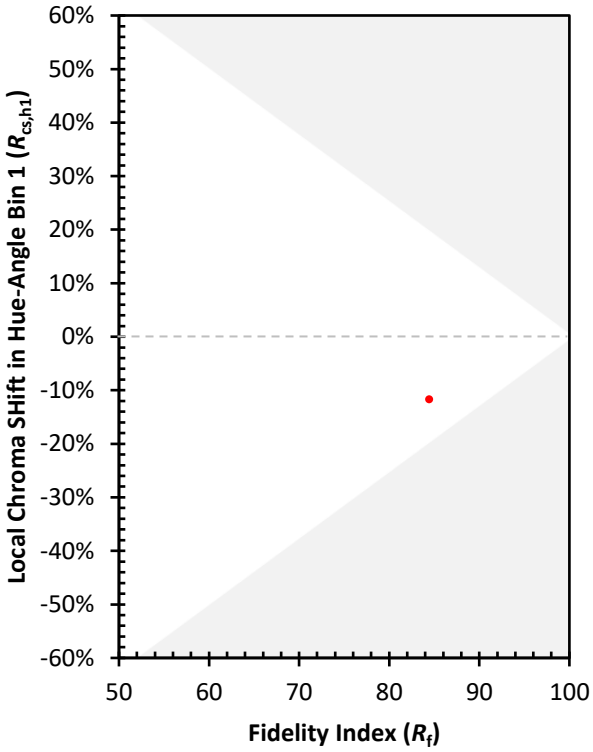
## Measure Comparisons




(END OF REPORT)