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: P869051

Luminaire Tested: **EMM2-HSN-SA2C-727-U-T4W-HSS**

Issue Date: 08/22/2024

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: | P869051 |
| Test Lab: | INNOVATION CENTER(G3) |
| Issue Date: | 08/22/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | INVUE |
| Catalog Number: | EMM2-HSN-SA2C-727-U-T4W-HSS |
| Description: | EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 120W 70CRI 2700K FIXTURE w/ TYPE IV WIDE DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD |
| Light Source: | (20) 2700K CCT, 70 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 8981.7 lumens |
| Efficiency: | N/A |
| Efficacy: | 88.9 lumens/watt |
| Luminous Opening: | Rectangular (W 0.67' x L: 0.33' x H: 0') |
| IES Classification: | Type IV - 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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REPORT NUMBER: P869051
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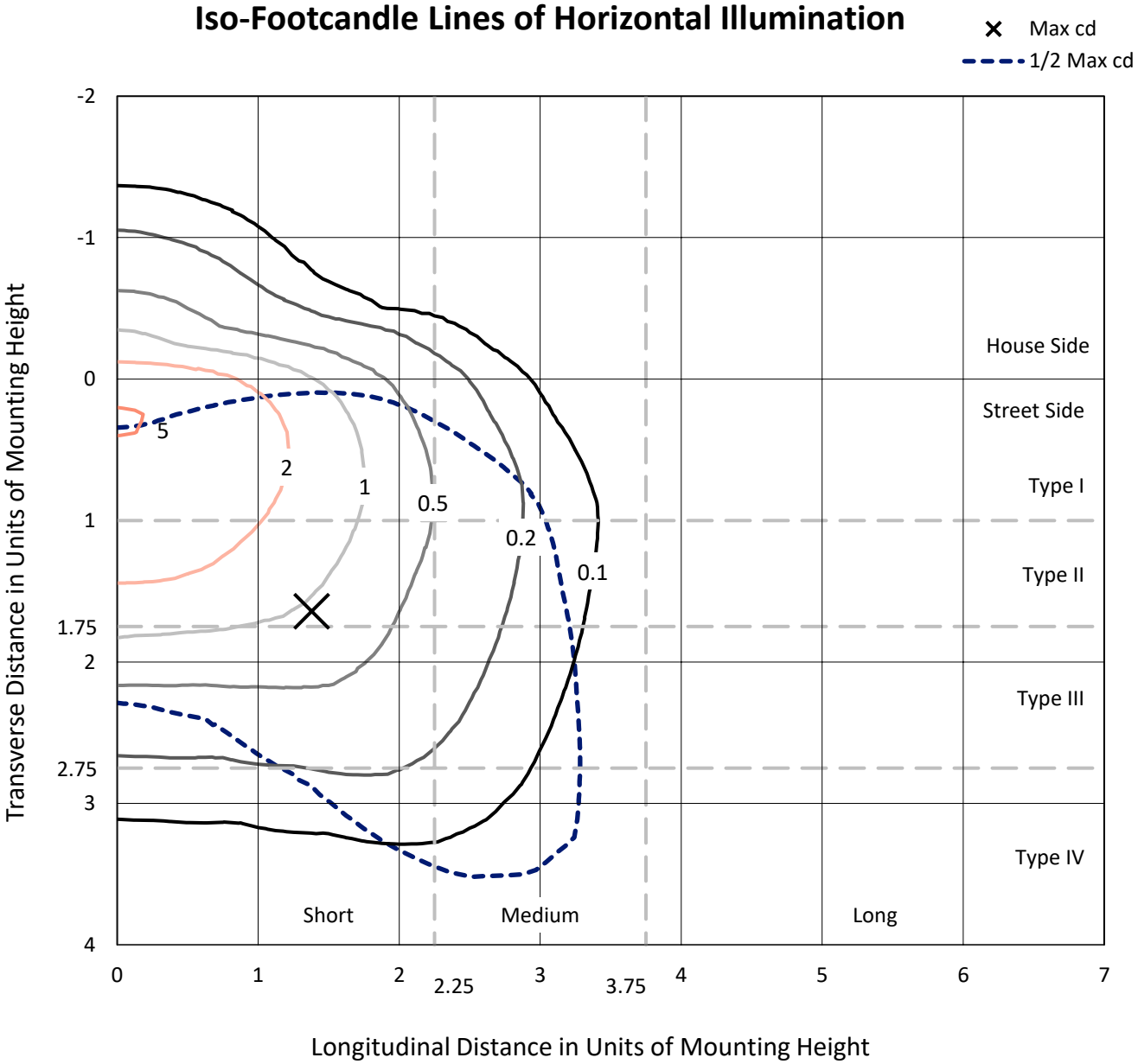
## Iso-Footcandle Lines of Horizontal Illumination




Based on 20 foot mounting height. Maximum calculated value = 5.2 fc
Type IV - Short - N/A

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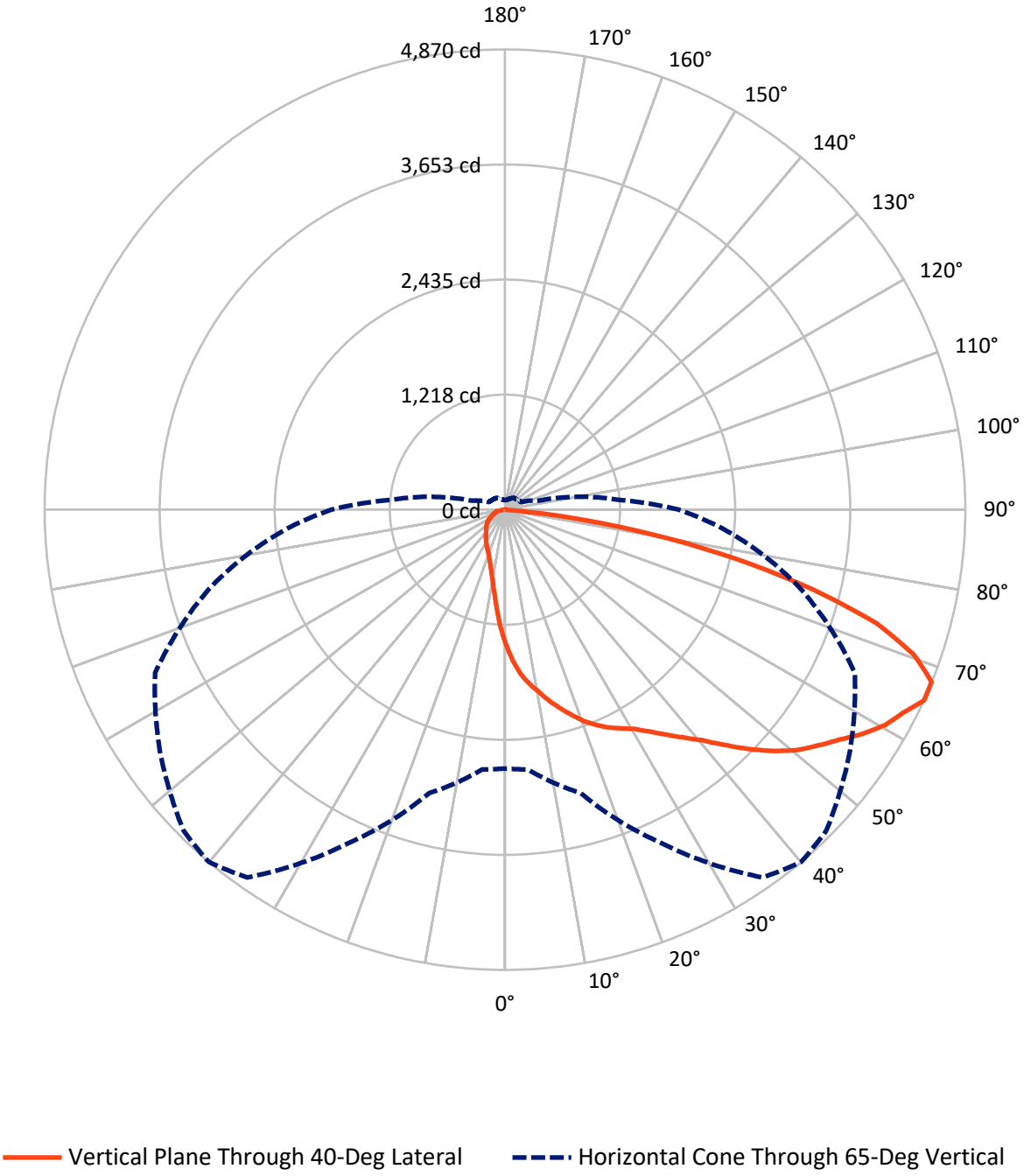
## Luminous Intensity Polar Plot



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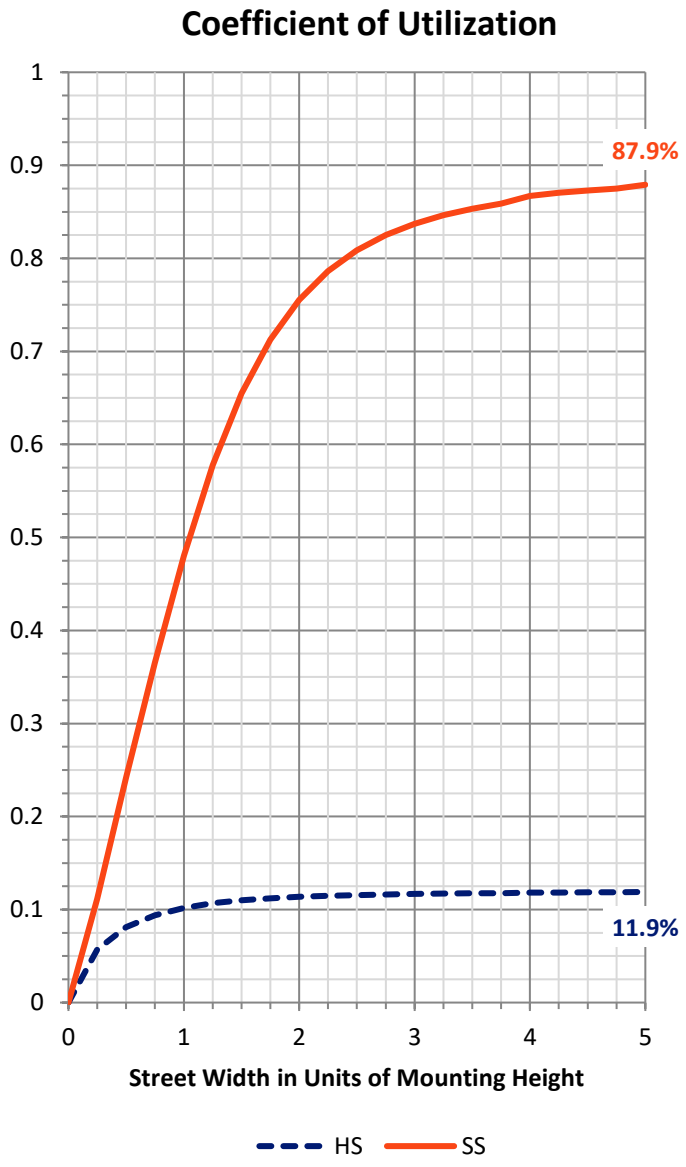
REPORT NUMBER: P869051
CATALOG NUMBER: EMM2-HSN-SA2C-727-U-T4W-HSS

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 1075.3 | 0.0 | 1075.3 |
| | % Fixture | 12.0 | 0.0 | 12.0 |
| **Street Side** | Lumens | 7906.4 | 0.0 | 7906.4 |
| | % Fixture | 88.0 | 0.0 | 88.0 |
| **Total** | Lumens | 8981.7 | 0.0 | 8981.7 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 133.6 | 1.5 |
| 10°-20° | 401.9 | 4.5 |
| 20°-30° | 691.3 | 7.7 |
| 30°-40° | 1045.0 | 11.6 |
| 40°-50° | 1528.0 | 17.0 |
| 50°-60° | 1951.6 | 21.7 |
| 60°-70° | 1947.6 | 21.7 |
| 70°-80° | 1142.1 | 12.7 |
| 80°-90° | 140.7 | 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° | 8981.7 | 100.0 |
| 0°-180° | 8981.7 | 100.0 |



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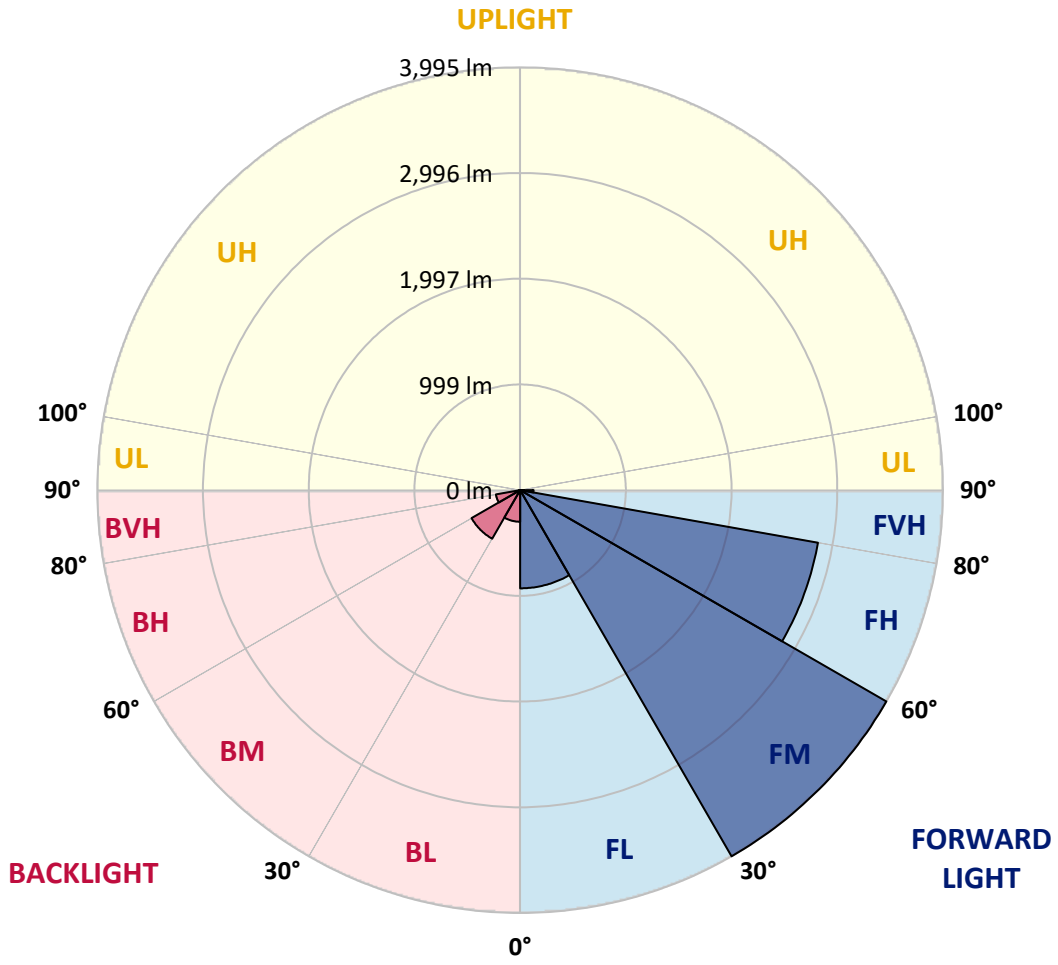
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 927.7 | 10.3 | | | |
| FM | (30°-60°) | 3994.6 | 44.5 | | | |
| FH | (60°-80°) | 2856.9 | 31.8 | | | G2/5000 |
| FVH | (80°-90°) | 127.1 | 1.4 | | | G2/225 |
| BL | (0°-30°) | 299.1 | 3.3 | B1/500 | | |
| BM | (30°-60°) | 529.9 | 5.9 | B1/1000 | | |
| BH | (60°-80°) | 232.8 | 2.6 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 13.5 | 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 IV Short



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**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 40° | 45° | 55° | 65° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 |
| 2.5° | 1665.7 | 1658.1 | 1642.9 | 1630.2 | 1612.5 | 1597.3 | 1582.1 | 1554.3 | 1518.8 | 1488.5 | 1450.5 |
| 5° | 1830.2 | 1817.5 | 1807.4 | 1792.2 | 1761.9 | 1749.2 | 1739.1 | 1680.9 | 1620.1 | 1556.8 | 1473.3 |
| 7.5° | 1946.7 | 1956.8 | 1936.5 | 1913.7 | 1875.8 | 1860.6 | 1845.4 | 1787.2 | 1711.2 | 1620.1 | 1501.1 |
| 10° | 2080.8 | 2083.3 | 2058.0 | 2030.2 | 1989.7 | 1959.3 | 1939.1 | 1868.2 | 1784.6 | 1683.4 | 1531.5 |
| 12.5° | 2209.9 | 2209.9 | 2194.7 | 2154.2 | 2101.1 | 2073.2 | 2037.8 | 1956.8 | 1855.5 | 1736.5 | 1566.9 |
| 15° | 2313.7 | 2318.8 | 2306.1 | 2275.7 | 2217.5 | 2179.5 | 2144.1 | 2050.4 | 1921.3 | 1797.3 | 1594.8 |
| 17.5° | 2407.4 | 2404.8 | 2397.2 | 2369.4 | 2313.7 | 2283.3 | 2247.9 | 2144.1 | 1997.3 | 1845.4 | 1637.8 |
| 20° | 2470.7 | 2470.7 | 2468.1 | 2452.9 | 2412.4 | 2389.6 | 2346.6 | 2237.8 | 2080.8 | 1916.3 | 1683.4 |
| 22.5° | 2518.7 | 2516.2 | 2516.2 | 2518.7 | 2496.0 | 2473.2 | 2455.5 | 2346.6 | 2166.9 | 1977.0 | 1729.0 |
| 25° | 2559.3 | 2556.7 | 2564.3 | 2569.4 | 2559.3 | 2554.2 | 2533.9 | 2450.4 | 2273.2 | 2047.9 | 1774.5 |
| 27.5° | 2612.4 | 2620.0 | 2617.5 | 2617.5 | 2614.9 | 2620.0 | 2617.5 | 2546.6 | 2377.0 | 2123.8 | 1822.6 |
| 30° | 2695.9 | 2708.6 | 2701.0 | 2690.9 | 2690.9 | 2693.4 | 2706.1 | 2660.5 | 2498.5 | 2217.5 | 1875.8 |
| 32.5° | 2890.9 | 2878.2 | 2825.0 | 2789.6 | 2794.7 | 2797.2 | 2809.9 | 2784.5 | 2620.0 | 2323.8 | 1931.5 |
| 35° | 3113.6 | 3098.4 | 3040.2 | 2959.2 | 2931.4 | 2921.2 | 2918.7 | 2903.5 | 2751.6 | 2437.7 | 1997.3 |
| 37.5° | 3402.2 | 3407.3 | 3321.2 | 3204.8 | 3121.2 | 3057.9 | 3045.3 | 3012.4 | 2865.6 | 2541.5 | 2065.6 |
| 40° | 3695.9 | 3675.6 | 3602.2 | 3488.3 | 3323.7 | 3207.3 | 3169.3 | 3123.8 | 2994.7 | 2650.4 | 2131.4 |
| 42.5° | 3979.4 | 3941.4 | 3845.2 | 3721.2 | 3528.8 | 3402.2 | 3316.1 | 3257.9 | 3113.6 | 2769.4 | 2194.7 |
| 45° | 4349.0 | 4240.1 | 4068.0 | 3956.6 | 3716.1 | 3612.3 | 3533.8 | 3404.7 | 3255.4 | 2888.3 | 2270.7 |
| 47.5° | 4640.1 | 4430.0 | 4273.0 | 4224.9 | 3911.0 | 3814.8 | 3743.9 | 3564.2 | 3399.7 | 3022.5 | 2349.1 |
| 50° | 4586.9 | 4457.8 | 4419.8 | 4376.8 | 4057.8 | 3999.6 | 3933.8 | 3746.5 | 3546.5 | 3164.3 | 2425.1 |
| 52.5° | 4450.2 | 4465.4 | 4513.5 | 4440.1 | 4186.9 | 4146.4 | 4103.4 | 3941.4 | 3693.3 | 3280.7 | 2493.4 |
| 55° | 4341.4 | 4371.7 | 4500.8 | 4478.1 | 4341.4 | 4295.8 | 4265.4 | 4133.8 | 3835.1 | 3387.0 | 2551.7 |
| 57.5° | 4143.9 | 4118.6 | 4280.6 | 4543.9 | 4505.9 | 4470.5 | 4440.1 | 4336.3 | 3979.4 | 3463.0 | 2589.6 |
| 60° | 3832.5 | 3738.9 | 3956.6 | 4462.9 | 4619.8 | 4624.9 | 4607.2 | 4488.2 | 4095.8 | 3463.0 | 2569.4 |
| 62.5° | 3394.6 | 3306.0 | 3574.3 | 4192.0 | 4680.6 | 4728.7 | 4718.5 | 4541.3 | 4146.4 | 3387.0 | 2490.9 |
| 65° | 2739.0 | 2759.2 | 3106.0 | 3885.7 | 4751.4 | 4870.4 | 4807.1 | 4455.3 | 4083.2 | 3240.2 | 2313.7 |
| 67.5° | 2187.1 | 2247.9 | 2559.3 | 3488.3 | 4718.5 | 4867.9 | 4779.3 | 4212.3 | 3812.3 | 3035.2 | 2042.8 |
| 70° | 1726.4 | 1766.9 | 2025.1 | 2951.6 | 4430.0 | 4586.9 | 4475.5 | 3840.1 | 3354.1 | 2718.7 | 1698.6 |
| 72.5° | 1349.2 | 1387.2 | 1607.4 | 2361.8 | 3928.7 | 4111.0 | 3971.8 | 3338.9 | 2782.0 | 2306.1 | 1349.2 |
| 75° | 1025.2 | 1053.1 | 1217.6 | 1820.1 | 3128.8 | 3356.6 | 3255.4 | 2673.2 | 2171.9 | 1825.1 | 1032.8 |
| 77.5° | 660.7 | 698.7 | 883.5 | 1275.8 | 2209.9 | 2483.3 | 2496.0 | 1997.3 | 1561.9 | 1318.9 | 759.4 |
| 80° | 437.9 | 453.1 | 567.0 | 830.3 | 1359.4 | 1572.0 | 1645.4 | 1349.2 | 997.4 | 840.4 | 546.8 |
| 82.5° | 182.3 | 202.5 | 270.9 | 417.7 | 680.9 | 683.5 | 782.2 | 569.6 | 405.0 | 356.9 | 230.4 |
| 85° | 5.1 | 10.1 | 7.6 | 20.3 | 17.7 | 27.8 | 32.9 | 45.6 | 32.9 | 35.4 | 35.4 |
| 87.5° | 0.0 | 0.0 | 2.5 | 2.5 | 5.1 | 5.1 | 5.1 | 5.1 | 5.1 | 7.6 | 5.1 |
| 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: P869051
CATALOG NUMBER: EMM2-HSN-SA2C-727-U-T4W-HSS

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 | 1427.7 |
| 2.5° | 1432.8 | 1410.0 | 1364.4 | 1329.0 | 1291.0 | 1263.2 | 1237.9 | 1210.0 | 1192.3 | 1194.8 | 1177.1 |
| 5° | 1432.8 | 1389.7 | 1298.6 | 1217.6 | 1144.2 | 1091.0 | 1032.8 | 987.2 | 954.3 | 949.3 | 964.5 |
| 7.5° | 1440.4 | 1369.5 | 1232.8 | 1111.3 | 1010.0 | 926.5 | 865.7 | 820.2 | 797.4 | 782.2 | 779.7 |
| 10° | 1448.0 | 1354.3 | 1172.0 | 1017.6 | 891.1 | 799.9 | 746.8 | 696.1 | 670.8 | 668.3 | 660.7 |
| 12.5° | 1453.0 | 1336.6 | 1116.4 | 924.0 | 792.3 | 706.3 | 653.1 | 612.6 | 592.3 | 592.3 | 589.8 |
| 15° | 1470.7 | 1331.5 | 1058.1 | 853.1 | 716.4 | 632.9 | 587.3 | 554.4 | 541.7 | 534.1 | 531.6 |
| 17.5° | 1485.9 | 1321.4 | 1007.5 | 782.2 | 648.0 | 574.6 | 531.6 | 508.8 | 496.2 | 491.1 | 488.6 |
| 20° | 1508.7 | 1316.3 | 959.4 | 724.0 | 597.4 | 526.5 | 493.6 | 473.4 | 465.8 | 460.7 | 460.7 |
| 22.5° | 1531.5 | 1311.3 | 911.3 | 673.4 | 554.4 | 491.1 | 460.7 | 443.0 | 435.4 | 432.9 | 430.3 |
| 25° | 1559.3 | 1308.7 | 870.8 | 630.3 | 516.4 | 463.2 | 435.4 | 420.2 | 410.1 | 405.0 | 405.0 |
| 27.5° | 1587.2 | 1311.3 | 830.3 | 587.3 | 483.5 | 437.9 | 410.1 | 392.4 | 384.8 | 374.6 | 377.2 |
| 30° | 1625.2 | 1313.8 | 797.4 | 551.8 | 455.7 | 412.6 | 387.3 | 364.5 | 354.4 | 349.3 | 349.3 |
| 32.5° | 1663.1 | 1323.9 | 764.5 | 518.9 | 427.8 | 392.4 | 362.0 | 341.7 | 329.1 | 326.6 | 324.0 |
| 35° | 1703.6 | 1331.5 | 734.1 | 491.1 | 405.0 | 369.6 | 339.2 | 319.0 | 308.8 | 306.3 | 306.3 |
| 37.5° | 1749.2 | 1344.2 | 711.3 | 465.8 | 382.2 | 346.8 | 319.0 | 298.7 | 291.1 | 288.6 | 288.6 |
| 40° | 1797.3 | 1364.4 | 693.6 | 443.0 | 364.5 | 326.6 | 301.2 | 283.5 | 278.5 | 275.9 | 275.9 |
| 42.5° | 1845.4 | 1382.1 | 678.4 | 425.3 | 346.8 | 308.8 | 288.6 | 270.9 | 263.3 | 263.3 | 263.3 |
| 45° | 1891.0 | 1394.8 | 663.2 | 407.6 | 329.1 | 296.2 | 273.4 | 258.2 | 250.6 | 250.6 | 250.6 |
| 47.5° | 1931.5 | 1407.5 | 640.4 | 389.8 | 311.4 | 278.5 | 260.7 | 245.5 | 238.0 | 238.0 | 238.0 |
| 50° | 1974.5 | 1415.1 | 615.1 | 367.1 | 293.6 | 265.8 | 248.1 | 230.4 | 225.3 | 222.8 | 222.8 |
| 52.5° | 2009.9 | 1415.1 | 582.2 | 344.3 | 273.4 | 248.1 | 232.9 | 217.7 | 210.1 | 205.0 | 205.0 |
| 55° | 2035.3 | 1415.1 | 546.8 | 316.4 | 253.1 | 232.9 | 217.7 | 202.5 | 192.4 | 184.8 | 184.8 |
| 57.5° | 2050.4 | 1407.5 | 506.3 | 283.5 | 232.9 | 212.6 | 202.5 | 184.8 | 164.5 | 149.4 | 144.3 |
| 60° | 2037.8 | 1384.7 | 463.2 | 248.1 | 210.1 | 194.9 | 187.3 | 164.5 | 136.7 | 129.1 | 129.1 |
| 62.5° | 1984.6 | 1331.5 | 420.2 | 217.7 | 192.4 | 177.2 | 169.6 | 144.3 | 124.0 | 116.4 | 116.4 |
| 65° | *1835.3* | *1202.4* | *367.1* | *189.9* | *172.1* | *162.0* | *151.9* | *129.1* | *111.4* | *101.3* | *101.3* |
| 67.5° | 1617.6 | 1037.9 | 306.3 | 167.1 | 154.4 | 146.8 | 139.2 | 116.4 | 98.7 | 88.6 | 88.6 |
| 70° | 1311.3 | 837.9 | 260.7 | 146.8 | 136.7 | 131.6 | 124.0 | 106.3 | 86.1 | 78.5 | 78.5 |
| 72.5° | 1030.3 | 658.2 | 217.7 | 131.6 | 126.6 | 116.4 | 111.4 | 93.7 | 78.5 | 70.9 | 70.9 |
| 75° | 767.0 | 491.1 | 192.4 | 116.4 | 116.4 | 103.8 | 101.3 | 83.5 | 68.3 | 63.3 | 63.3 |
| 77.5° | 564.5 | 364.5 | 167.1 | 101.3 | 101.3 | 91.1 | 86.1 | 73.4 | 63.3 | 58.2 | 58.2 |
| 80° | 382.2 | 248.1 | 124.0 | 75.9 | 75.9 | 73.4 | 68.3 | 63.3 | 53.2 | 48.1 | 45.6 |
| 82.5° | 162.0 | 103.8 | 60.8 | 38.0 | 35.4 | 27.8 | 22.8 | 17.7 | 17.7 | 15.2 | 15.2 |
| 85° | 27.8 | 12.7 | 12.7 | 10.1 | 7.6 | 7.6 | 7.6 | 5.1 | 5.1 | 5.1 | 5.1 |
| 87.5° | 5.1 | 5.1 | 5.1 | 5.1 | 5.1 | 5.1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 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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# LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Streetworks

Report Number: SP1-2407-157-3

Test Date: 08/07/2024

Luminaire Tested: MEM2-HTN-SA-40-727-U-5WQ-2

Data in this report applies to families of products including MEM2-HTN-SA-40-727-U-5WQ-2

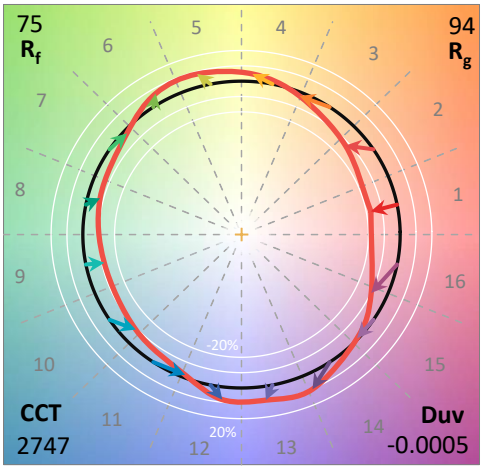
Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-157-3 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 08/20/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Streetworks |
| Catalog Number: | **MEM2-HTN-SA-40-727-U-5WQ-2** |
| Description: | Epic Modern Light Square 40W 5WQ Optic and Flare Trim |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 2747 | CRI (Ra): | 71.7 | | |
| CIE u': | 0.2606 | R1: | 68.1 | R9: | -35.3 |
| CIE v': | 0.5257 | R2: | 83.9 | R10: | 64.2 |
| Duv: | -0.0005 | R3: | 94.7 | R11: | 61.7 |
| CIE x: | 0.4552 | R4: | 66.3 | R12: | 53.9 |
| CIE y: | 0.4082 | R5: | 67.4 | R13: | 71.2 |
| CIE z: | 0.1366 | R6: | 78.7 | R14: | 97.6 |
| Peak Wavelength (nm): | 597 | R7: | 75.0 | R15: | 59.3 |
| Dominant Wavelength (nm): | 584 | R8: | 39.4 | | |
| Purity: | 59.16856 | | | | |
| Rf: | 75.5 | | | | |
| Rg: | 93.6 | | | | |




## Test Conditions

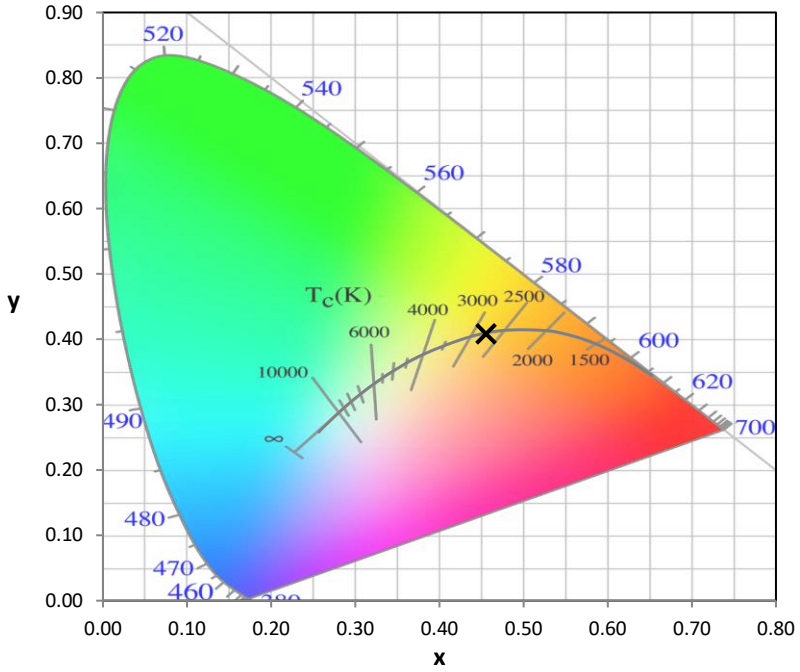
| | |
|---|---|
| Stabilization Time: | 22M |
| Operation Time: | 1H 22M |
| Sphere Temperature (°C): | 24.2 |

REPORT NUMBER: SP1-2407-157-3

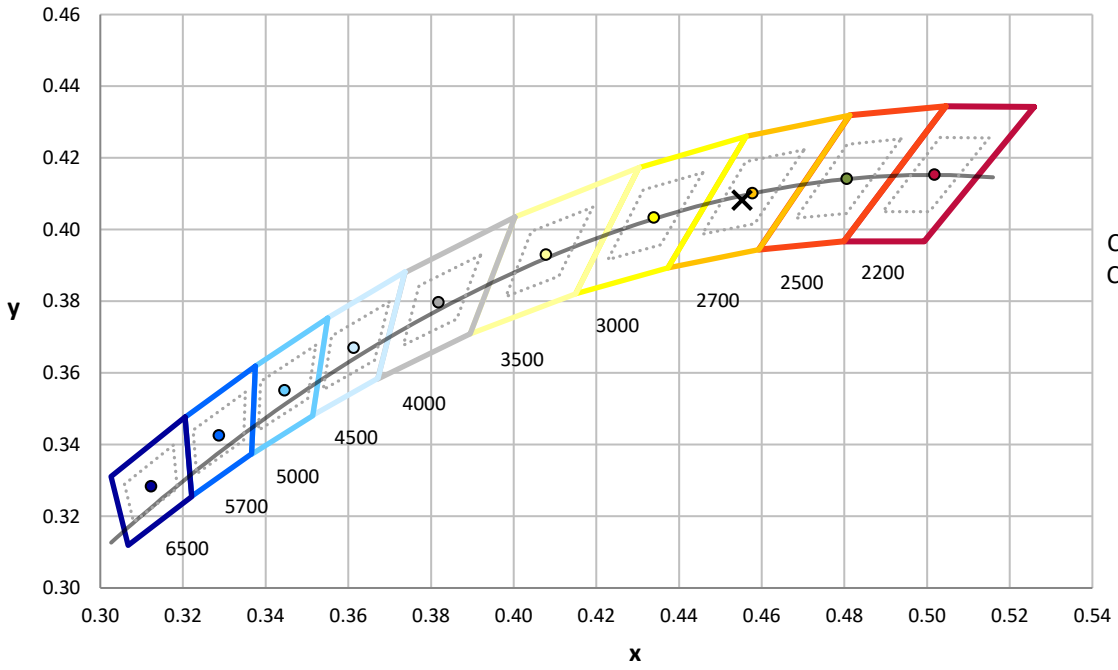
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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: SP1-2407-157-3

**CIE 1931 Chromaticity Diagram**




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




CCT = 2747K
CIE x = 0.4552
CIE y = 0.4082
Duv = -0.0005

Point lies inside the ANSI 2700K 4-step quadrangle

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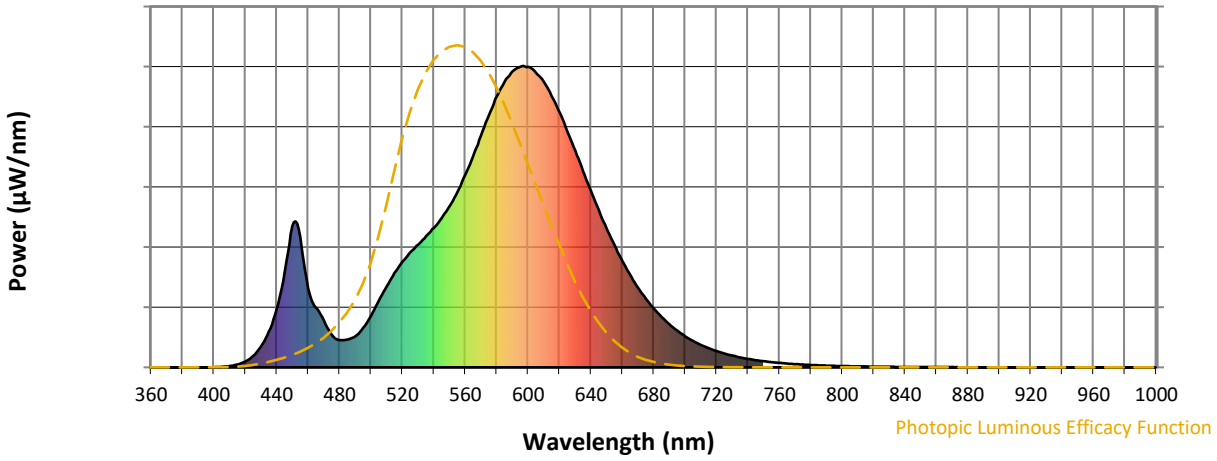
## Photopic Flux vs. Wavelength




## 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 | 103 | NR | 620 | 846 | NR | 750 | 20 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 130 | NR | 625 | 784 | NR | 755 | 17 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 171 | NR | 630 | 720 | NR | 760 | 15 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 221 | NR | 635 | 652 | NR | 765 | 13 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 268 | NR | 640 | 587 | NR | 770 | 11 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 313 | NR | 645 | 521 | NR | 775 | 9 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 350 | NR | 650 | 461 | NR | 780 | 8 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 381 | NR | 655 | 406 | NR | 785 | 7 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 407 | NR | 660 | 353 | NR | 790 | 6 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 435 | NR | 665 | 307 | NR | 795 | 5 | NR | 925 | 0 | NR |
| 410 | 4 | NR | 540 | 462 | NR | 670 | 264 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 9 | NR | 545 | 496 | NR | 675 | 227 | NR | 805 | 4 | NR | 935 | 0 | NR |
| 420 | 20 | NR | 550 | 534 | NR | 680 | 196 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 38 | NR | 555 | 582 | NR | 685 | 167 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 69 | NR | 560 | 638 | NR | 690 | 144 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 120 | NR | 565 | 700 | NR | 695 | 122 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 193 | NR | 570 | 767 | NR | 700 | 103 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 316 | NR | 575 | 836 | NR | 705 | 88 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 469 | NR | 580 | 898 | NR | 710 | 74 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 431 | NR | 585 | 947 | NR | 715 | 63 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 264 | NR | 590 | 982 | NR | 720 | 54 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 197 | NR | 595 | 997 | NR | 725 | 46 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 155 | NR | 600 | 997 | NR | 730 | 39 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 108 | NR | 605 | 978 | NR | 735 | 33 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 90 | NR | 610 | 947 | NR | 740 | 28 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 92 | NR | 615 | 900 | NR | 745 | 24 | NR | 875 | 1 | NR | | | |

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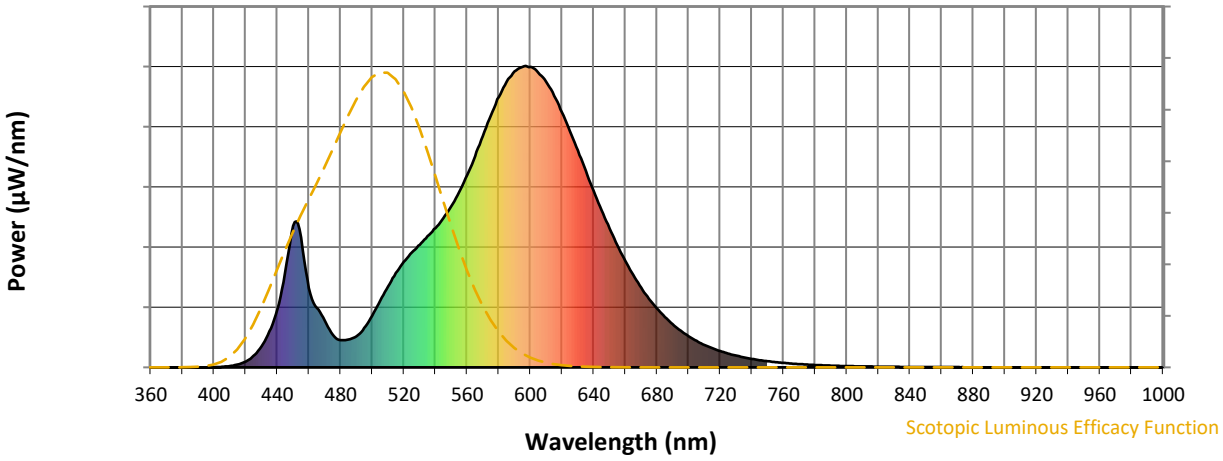
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 1.13**

| 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 | 103 | NR | 620 | 846 | NR | 750 | 20 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 130 | NR | 625 | 784 | NR | 755 | 17 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 171 | NR | 630 | 720 | NR | 760 | 15 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 221 | NR | 635 | 652 | NR | 765 | 13 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 268 | NR | 640 | 587 | NR | 770 | 11 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 313 | NR | 645 | 521 | NR | 775 | 9 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 350 | NR | 650 | 461 | NR | 780 | 8 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 381 | NR | 655 | 406 | NR | 785 | 7 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 407 | NR | 660 | 353 | NR | 790 | 6 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 435 | NR | 665 | 307 | NR | 795 | 5 | NR | 925 | 0 | NR |
| 410 | 4 | NR | 540 | 462 | NR | 670 | 264 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 9 | NR | 545 | 496 | NR | 675 | 227 | NR | 805 | 4 | NR | 935 | 0 | NR |
| 420 | 20 | NR | 550 | 534 | NR | 680 | 196 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 38 | NR | 555 | 582 | NR | 685 | 167 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 69 | NR | 560 | 638 | NR | 690 | 144 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 120 | NR | 565 | 700 | NR | 695 | 122 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 193 | NR | 570 | 767 | NR | 700 | 103 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 316 | NR | 575 | 836 | NR | 705 | 88 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 469 | NR | 580 | 898 | NR | 710 | 74 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 431 | NR | 585 | 947 | NR | 715 | 63 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 264 | NR | 590 | 982 | NR | 720 | 54 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 197 | NR | 595 | 997 | NR | 725 | 46 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 155 | NR | 600 | 997 | NR | 730 | 39 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 108 | NR | 605 | 978 | NR | 735 | 33 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 90 | NR | 610 | 947 | NR | 740 | 28 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 92 | NR | 615 | 900 | NR | 745 | 24 | NR | 875 | 1 | NR | | | |

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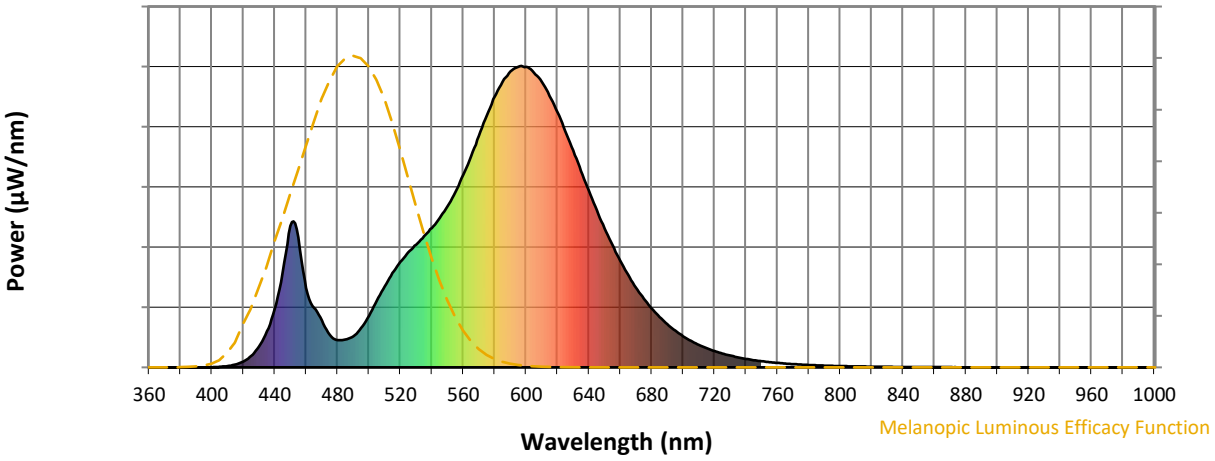
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 2.04**

| 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 | 103 | NR | 620 | 846 | NR | 750 | 20 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 130 | NR | 625 | 784 | NR | 755 | 17 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 171 | NR | 630 | 720 | NR | 760 | 15 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 221 | NR | 635 | 652 | NR | 765 | 13 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 268 | NR | 640 | 587 | NR | 770 | 11 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 313 | NR | 645 | 521 | NR | 775 | 9 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 350 | NR | 650 | 461 | NR | 780 | 8 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 381 | NR | 655 | 406 | NR | 785 | 7 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 407 | NR | 660 | 353 | NR | 790 | 6 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 435 | NR | 665 | 307 | NR | 795 | 5 | NR | 925 | 0 | NR |
| 410 | 4 | NR | 540 | 462 | NR | 670 | 264 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 9 | NR | 545 | 496 | NR | 675 | 227 | NR | 805 | 4 | NR | 935 | 0 | NR |
| 420 | 20 | NR | 550 | 534 | NR | 680 | 196 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 38 | NR | 555 | 582 | NR | 685 | 167 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 69 | NR | 560 | 638 | NR | 690 | 144 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 120 | NR | 565 | 700 | NR | 695 | 122 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 193 | NR | 570 | 767 | NR | 700 | 103 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 316 | NR | 575 | 836 | NR | 705 | 88 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 469 | NR | 580 | 898 | NR | 710 | 74 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 431 | NR | 585 | 947 | NR | 715 | 63 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 264 | NR | 590 | 982 | NR | 720 | 54 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 197 | NR | 595 | 997 | NR | 725 | 46 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 155 | NR | 600 | 997 | NR | 730 | 39 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 108 | NR | 605 | 978 | NR | 735 | 33 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 90 | NR | 610 | 947 | NR | 740 | 28 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 92 | NR | 615 | 900 | NR | 745 | 24 | NR | 875 | 1 | NR | | | |

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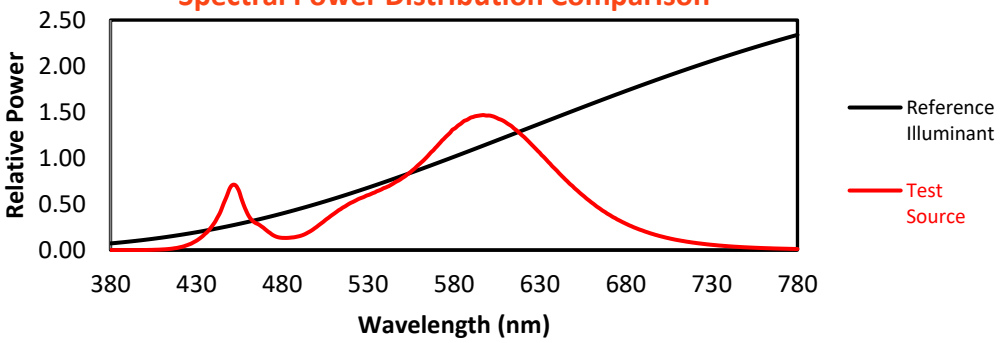
# TM-30-18

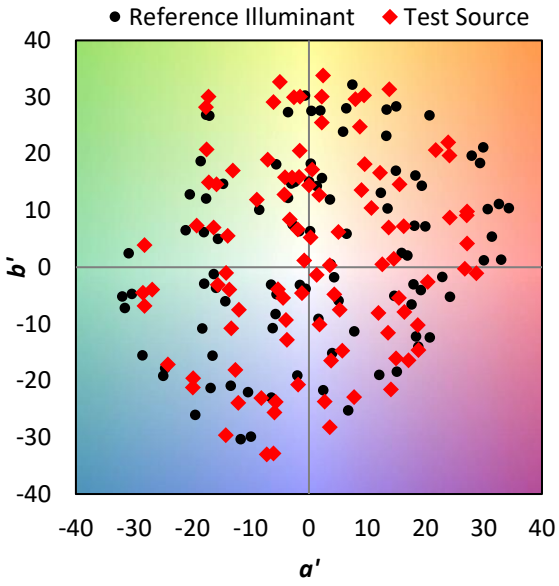
## Summary

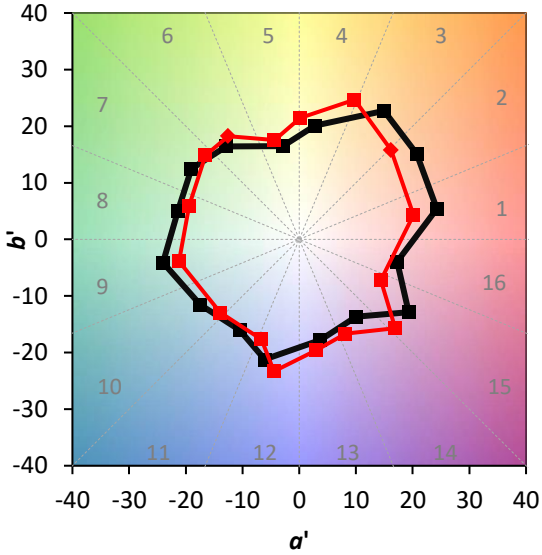
$R_f$ = 75.5
$R_g$ = 93.6
CIE $R_a$ = 71.7
$R_9$ = -35.3

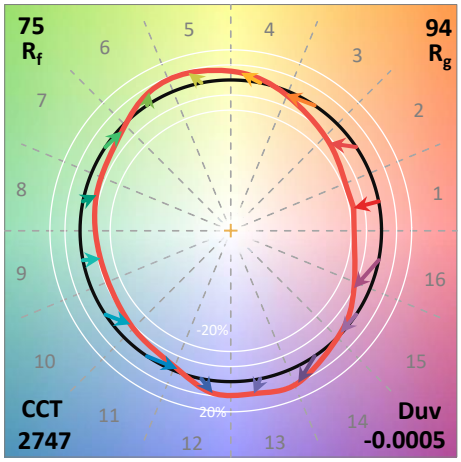
## Spectral Power Distribution Comparison

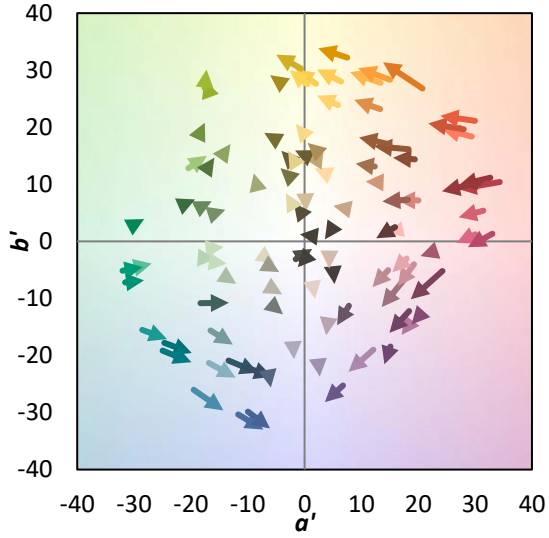



## Color Vector Graphics



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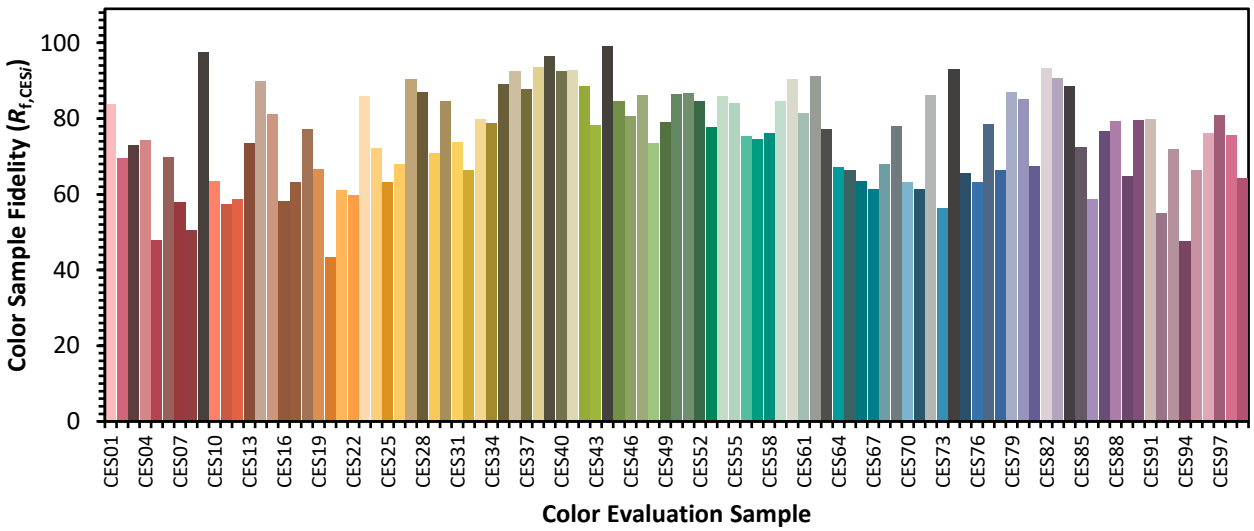
**Individual Sample Fidelity Index ($R_{f,i}$)**

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 68 | CES51 = 87 | CES76 = 63 |
| CES02 = 63 | CES27 = 90 | CES52 = 85 | CES77 = 79 |
| CES03 = 31 | CES28 = 87 | CES53 = 78 | CES78 = 66 |
| CES04 = 71 | CES29 = 71 | CES54 = 86 | CES79 = 87 |
| CES05 = 50 | CES30 = 85 | CES55 = 84 | CES80 = 85 |
| CES06 = 52 | CES31 = 74 | CES56 = 75 | CES81 = 67 |
| CES07 = 42 | CES32 = 66 | CES57 = 75 | CES82 = 93 |
| CES08 = 41 | CES33 = 80 | CES58 = 76 | CES83 = 91 |
| CES09 = 29 | CES34 = 79 | CES59 = 85 | CES84 = 89 |
| CES10 = 77 | CES35 = 89 | CES60 = 90 | CES85 = 72 |
| CES11 = 60 | CES36 = 93 | CES61 = 81 | CES86 = 59 |
| CES12 = 66 | CES37 = 88 | CES62 = 91 | CES87 = 77 |
| CES13 = 43 | CES38 = 93 | CES63 = 77 | CES88 = 79 |
| CES14 = 74 | CES39 = 97 | CES64 = 67 | CES89 = 65 |
| CES15 = 72 | CES40 = 93 | CES65 = 66 | CES90 = 80 |
| CES16 = 48 | CES41 = 93 | CES66 = 63 | CES91 = 80 |
| CES17 = 51 | CES42 = 89 | CES67 = 61 | CES92 = 55 |
| CES18 = 57 | CES43 = 78 | CES68 = 68 | CES93 = 72 |
| CES19 = 73 | CES44 = 99 | CES69 = 78 | CES94 = 48 |
| CES20 = 67 | CES45 = 85 | CES70 = 63 | CES95 = 66 |
| CES21 = 88 | CES46 = 81 | CES71 = 61 | CES96 = 76 |
| CES22 = 80 | CES47 = 86 | CES72 = 86 | CES97 = 81 |
| CES23 = 92 | CES48 = 74 | CES73 = 56 | CES98 = 76 |
| CES24 = 91 | CES49 = 79 | CES74 = 93 | CES99 = 64 |
| CES25 = 73 | CES50 = 86 | CES75 = 66 | |



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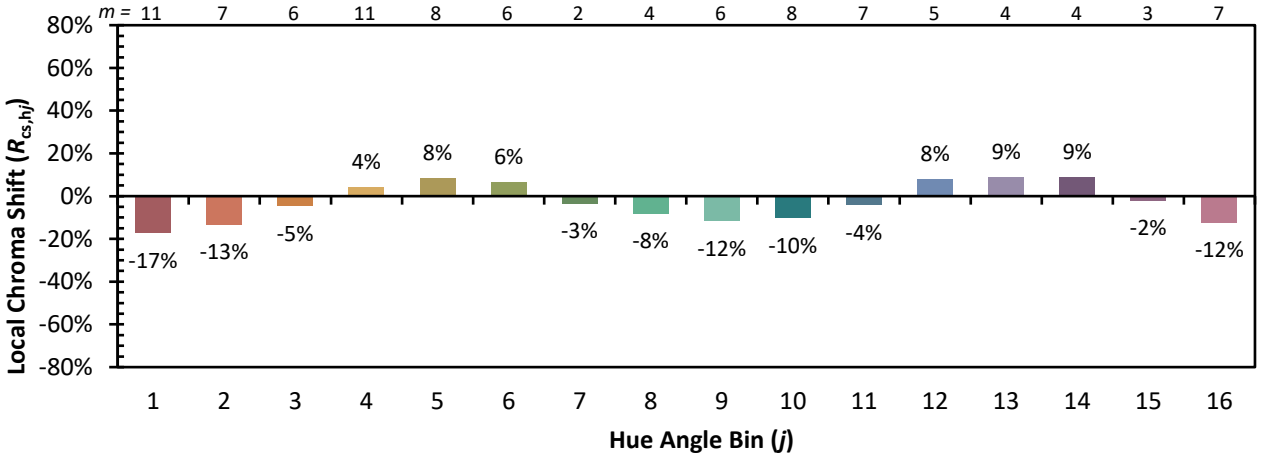
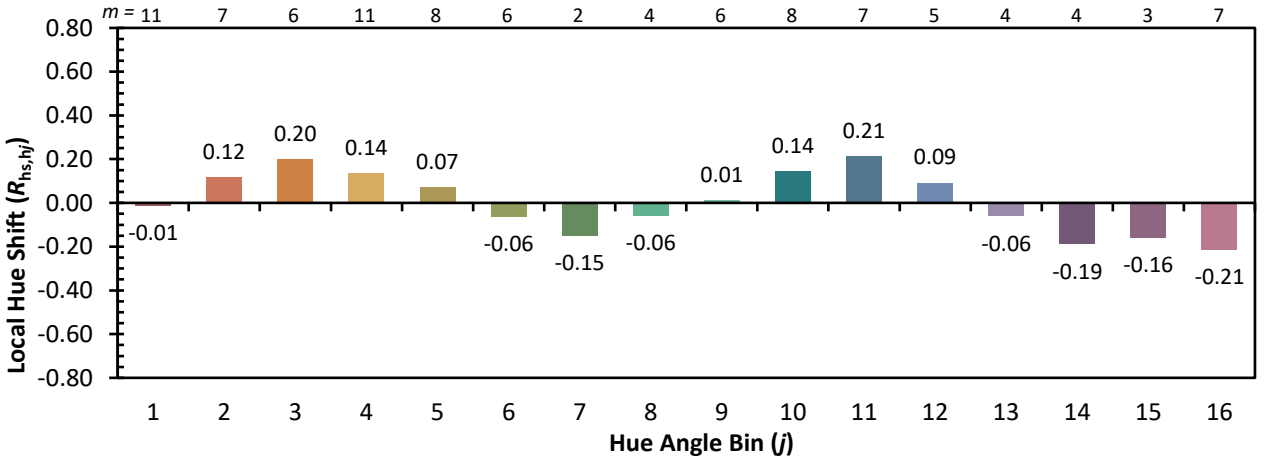
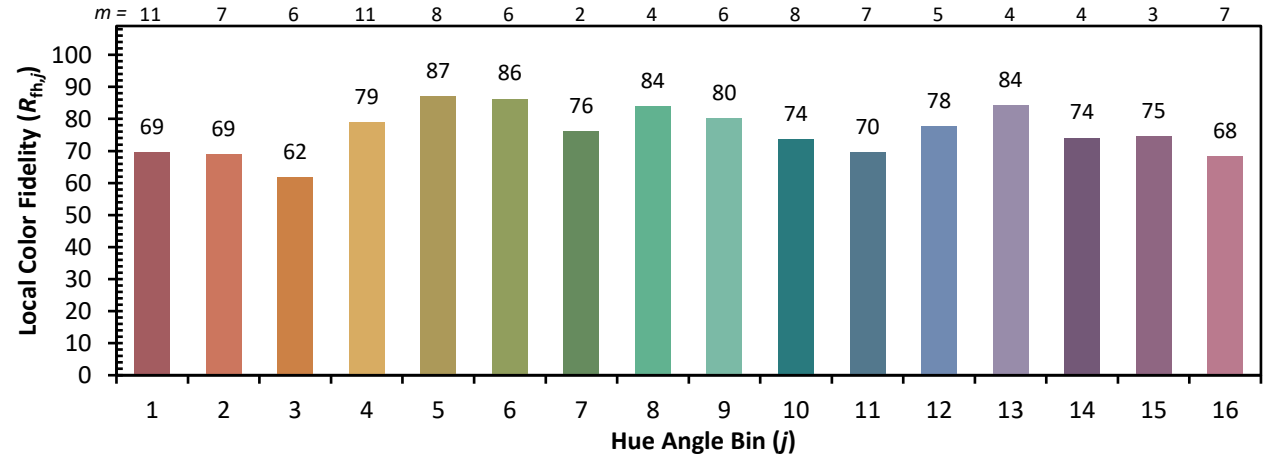
## Color Rendition by Hue-Angle Bin



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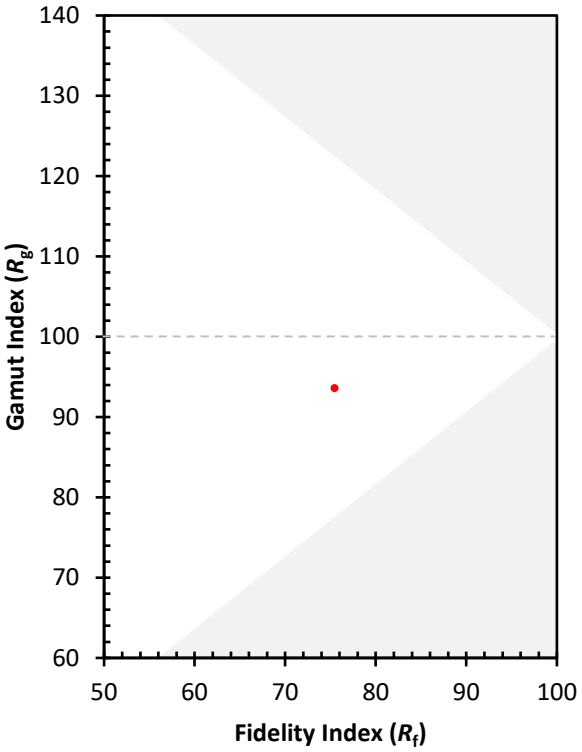
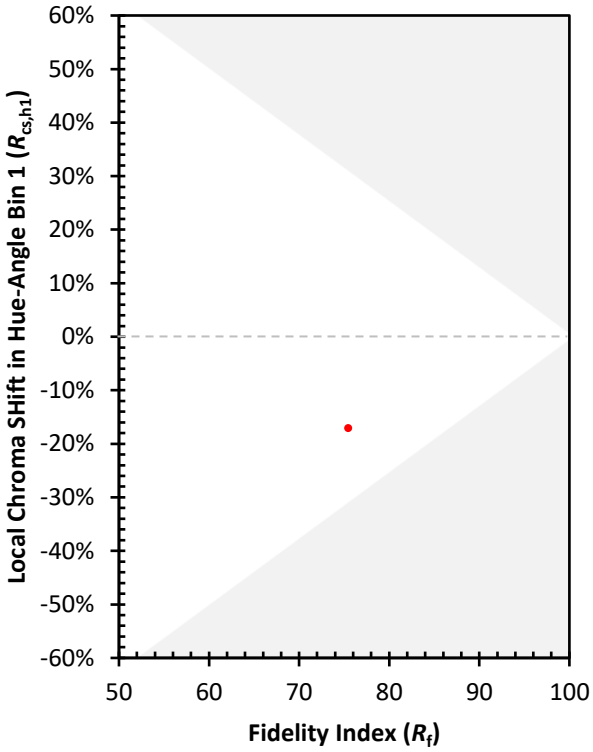
## Measure Comparisons




(END OF REPORT)