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: P870892

Luminaire Tested: **EMM2-HTN-SA3A-840-U-T4W-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: | P870892 |
| Test Lab: | INNOVATION CENTER(G3) |
| Issue Date: | 09/05/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | INVUE |
| Catalog Number: | EMM2-HTN-SA3A-840-U-T4W-HSS |
| Description: | EPIC MODERN TALL HOUSING DISCRETE LED ARRAYS 130W 80CRI 4000K FIXTURE w/ TYPE IV WIDE DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD |
| Light Source: | (30) 4000K CCT, 80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 11335.7 lumens |
| Efficiency: | N/A |
| Efficacy: | 100.3 lumens/watt |
| Luminous Opening: | Rectangular (W 1' x L: 0.33' x H: 0') |
| IES Classification: | Type IV - Short |
| BUG Rating: | B1 - U0 - G2 |

| | |
|---|---|
| Input Watts (W): | 113 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | 0.99 |
| Total Harmonic Distortion (THDi): | 7.77% |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 24 FT |

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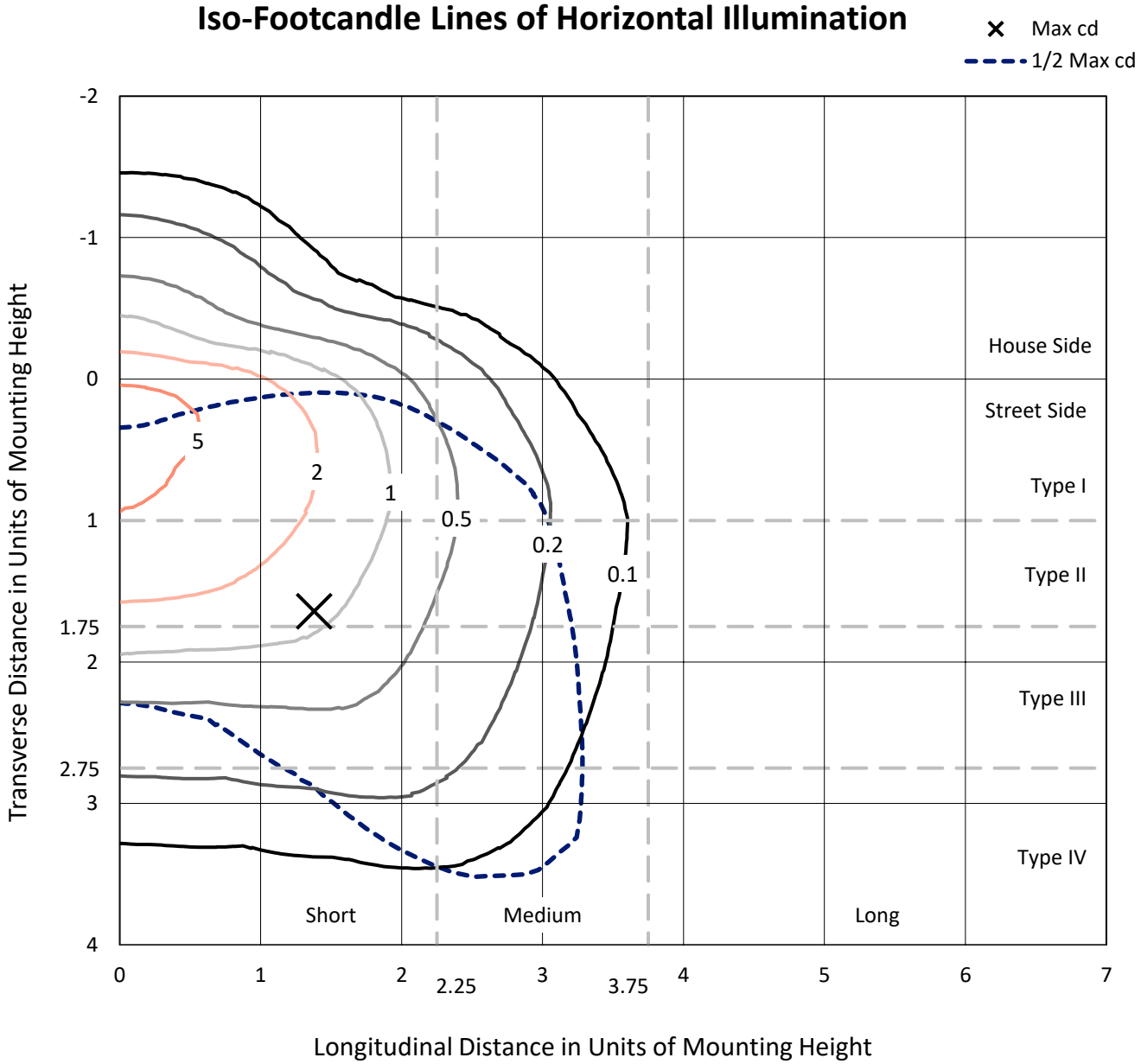
Scaled Data Report

REPORT NUMBER: P870892
CATALOG NUMBER: EMM2-HTN-SA3A-840-U-T4W-HSS

## Iso-Footcandle Lines of Horizontal Illumination




Based on 20 foot mounting height. Maximum calculated value = 6.6 fc
Type IV - Short - N/A

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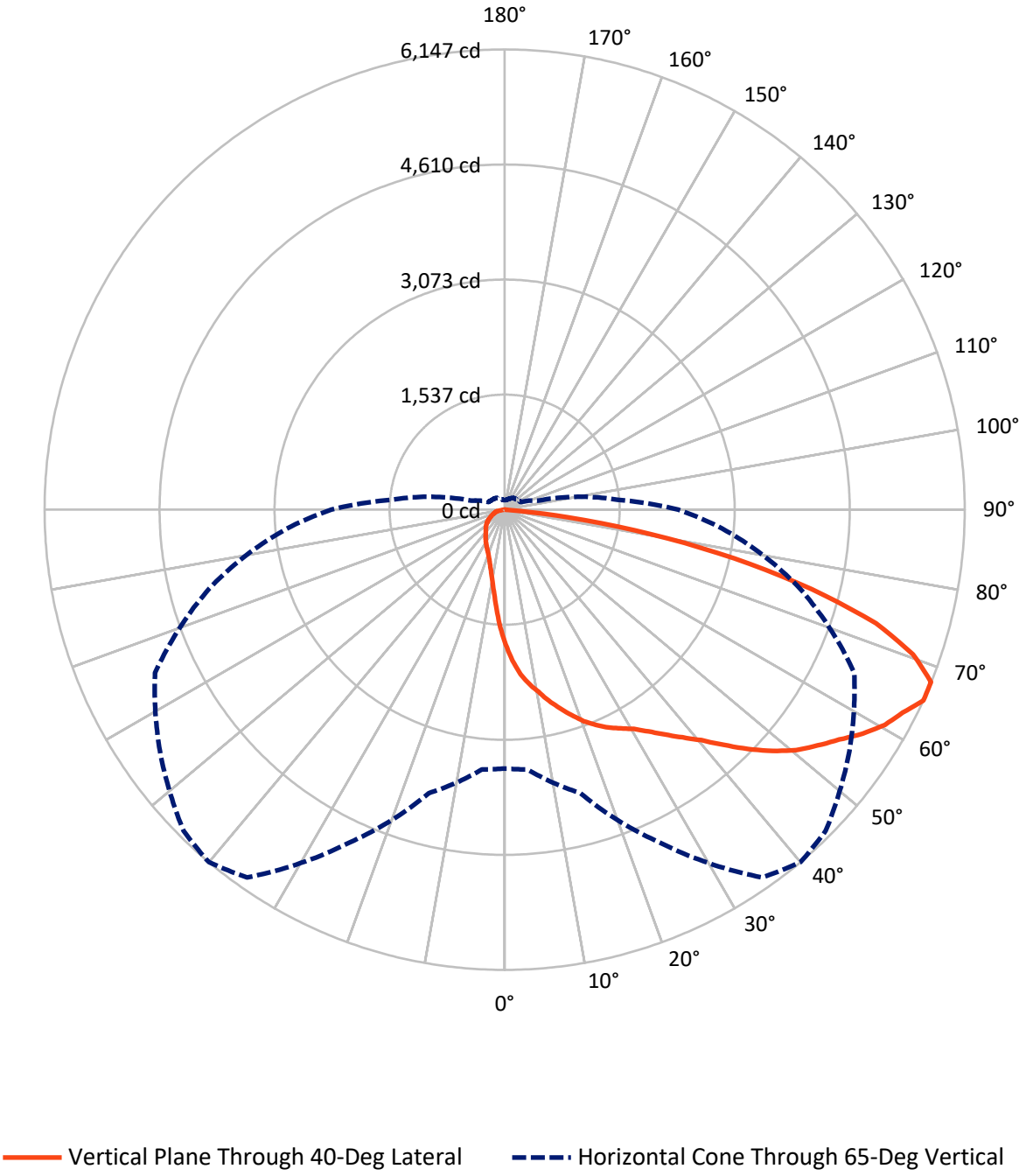
## Luminous Intensity Polar Plot



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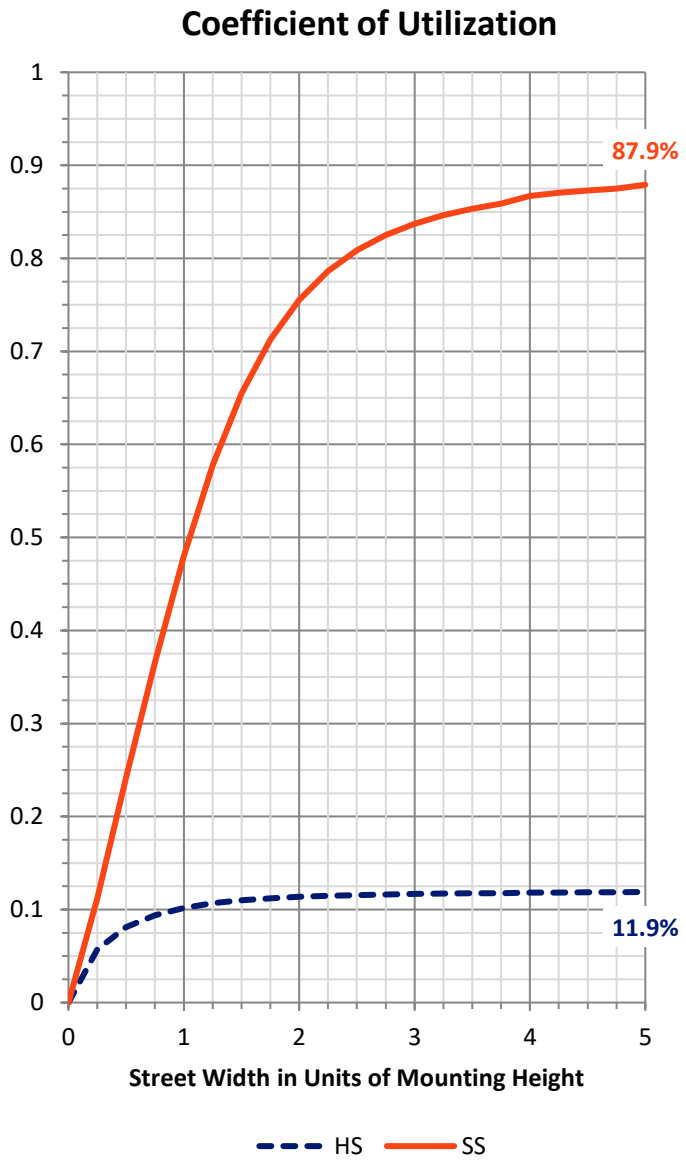
REPORT NUMBER: P870892
CATALOG NUMBER: EMM2-HTN-SA3A-840-U-T4W-HSS

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 1357.1 | 0.0 | 1357.1 |
| | % Fixture | 12.0 | 0.0 | 12.0 |
| **Street Side** | Lumens | 9978.6 | 0.0 | 9978.6 |
| | % Fixture | 88.0 | 0.0 | 88.0 |
| **Total** | Lumens | 11335.7 | 0.0 | 11335.7 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 168.7 | 1.5 |
| 10°-20° | 507.2 | 4.5 |
| 20°-30° | 872.4 | 7.7 |
| 30°-40° | 1318.8 | 11.6 |
| 40°-50° | 1928.4 | 17.0 |
| 50°-60° | 2463.1 | 21.7 |
| 60°-70° | 2458.1 | 21.7 |
| 70°-80° | 1441.4 | 12.7 |
| 80°-90° | 177.6 | 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° | 11335.7 | 100.0 |
| 0°-180° | 11335.7 | 100.0 |



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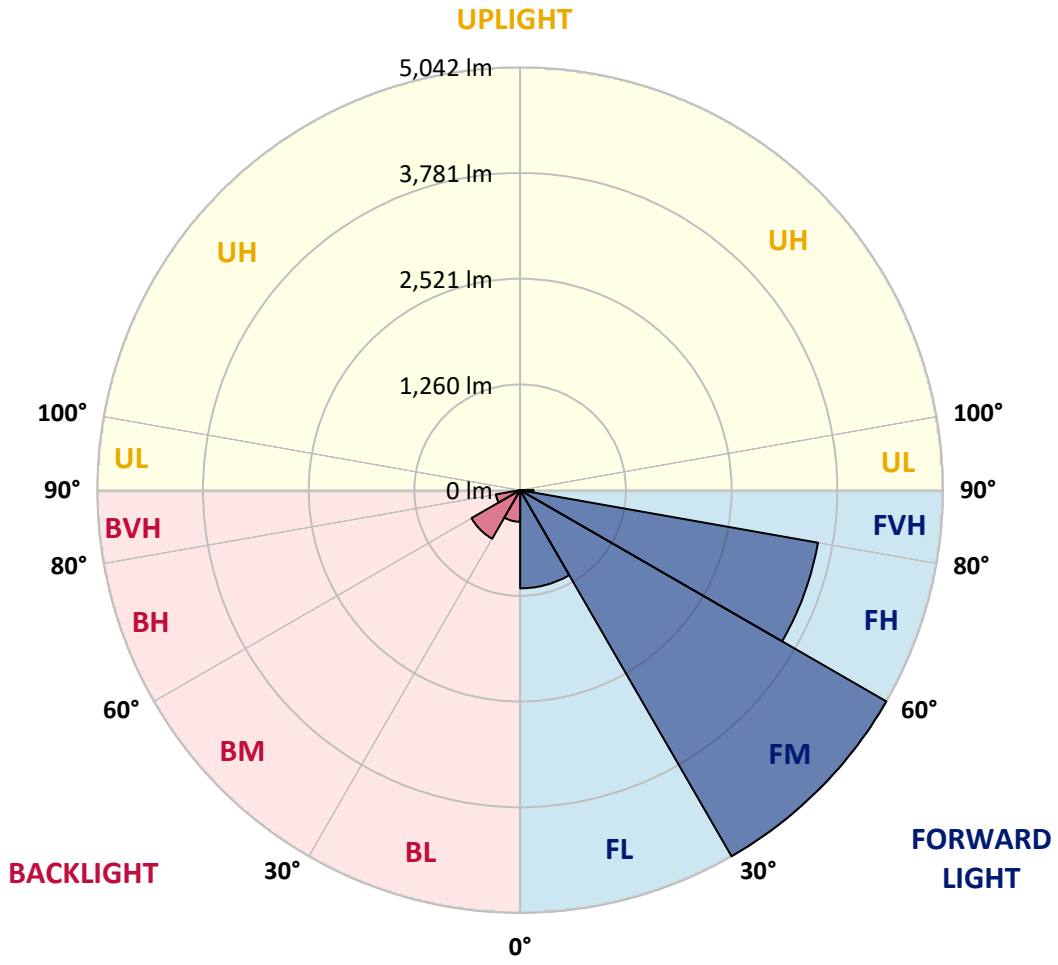
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 1170.8 | 10.3 | | | |
| FM | (30°-60°) | 5041.6 | 44.5 | | | |
| FH | (60°-80°) | 3605.7 | 31.8 | | | G2/5000 |
| FVH | (80°-90°) | 160.5 | 1.4 | | | G2/225 |
| BL | (0°-30°) | 377.5 | 3.3 | B1/500 | | |
| BM | (30°-60°) | 668.7 | 5.9 | B1/1000 | | |
| BH | (60°-80°) | 293.8 | 2.6 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 17.1 | 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 IV Short



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Scaled Data Report

REPORT NUMBER: P870892
CATALOG NUMBER: EMM2-HTN-SA3A-840-U-T4W-HSS

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 40° | 45° | 55° | 65° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 |
| 2.5° | 2102.2 | 2092.6 | 2073.5 | 2057.5 | 2035.1 | 2016.0 | 1996.8 | 1961.6 | 1916.9 | 1878.6 | 1830.7 |
| 5° | 2309.9 | 2293.9 | 2281.1 | 2262.0 | 2223.6 | 2207.6 | 2194.9 | 2121.4 | 2044.7 | 1964.8 | 1859.4 |
| 7.5° | 2456.8 | 2469.6 | 2444.1 | 2415.3 | 2367.4 | 2348.2 | 2329.1 | 2255.6 | 2159.7 | 2044.7 | 1894.5 |
| 10° | 2626.2 | 2629.4 | 2597.4 | 2562.3 | 2511.2 | 2472.8 | 2447.3 | 2357.8 | 2252.4 | 2124.6 | 1932.9 |
| 12.5° | 2789.1 | 2789.1 | 2769.9 | 2718.8 | 2651.7 | 2616.6 | 2571.9 | 2469.6 | 2341.8 | 2191.7 | 1977.6 |
| 15° | 2920.1 | 2926.5 | 2910.5 | 2872.2 | 2798.7 | 2750.8 | 2706.0 | 2587.8 | 2424.9 | 2268.3 | 2012.8 |
| 17.5° | 3038.3 | 3035.1 | 3025.5 | 2990.4 | 2920.1 | 2881.8 | 2837.0 | 2706.0 | 2520.7 | 2329.1 | 2067.1 |
| 20° | 3118.2 | 3118.2 | 3115.0 | 3095.8 | 3044.7 | 3015.9 | 2961.6 | 2824.3 | 2626.2 | 2418.5 | 2124.6 |
| 22.5° | 3178.9 | 3175.7 | 3175.7 | 3178.9 | 3150.1 | 3121.4 | 3099.0 | 2961.6 | 2734.8 | 2495.2 | 2182.1 |
| 25° | 3230.0 | 3226.8 | 3236.4 | 3242.8 | 3230.0 | 3223.6 | 3198.1 | 3092.6 | 2869.0 | 2584.6 | 2239.6 |
| 27.5° | 3297.1 | 3306.7 | 3303.5 | 3303.5 | 3300.3 | 3306.7 | 3303.5 | 3214.0 | 3000.0 | 2680.5 | 2300.3 |
| 30° | 3402.5 | 3418.5 | 3408.9 | 3396.1 | 3396.1 | 3399.3 | 3415.3 | 3357.8 | 3153.3 | 2798.7 | 2367.4 |
| 32.5° | 3648.5 | 3632.6 | 3565.5 | 3520.7 | 3527.1 | 3530.3 | 3546.3 | 3514.3 | 3306.7 | 2932.9 | 2437.7 |
| 35° | 3929.7 | 3910.5 | 3837.0 | 3734.8 | 3699.6 | 3686.9 | 3683.7 | 3664.5 | 3472.8 | 3076.6 | 2520.7 |
| 37.5° | 4293.9 | 4300.3 | 4191.7 | 4044.7 | 3939.3 | 3859.4 | 3843.4 | 3801.9 | 3616.6 | 3207.6 | 2607.0 |
| 40° | 4664.5 | 4638.9 | 4546.3 | 4402.5 | 4194.8 | 4047.9 | 4000.0 | 3942.5 | 3779.5 | 3345.0 | 2690.1 |
| 42.5° | 5022.3 | 4974.4 | 4853.0 | 4696.4 | 4453.6 | 4293.9 | 4185.3 | 4111.8 | 3929.7 | 3495.2 | 2769.9 |
| 45° | 5488.8 | 5351.4 | 5134.1 | 4993.6 | 4690.0 | 4559.1 | 4460.0 | 4297.1 | 4108.6 | 3645.3 | 2865.8 |
| 47.5° | 5856.2 | 5591.0 | 5392.9 | 5332.2 | 4936.1 | 4814.6 | 4725.2 | 4498.4 | 4290.7 | 3814.7 | 2964.8 |
| 50° | 5789.1 | 5626.1 | 5578.2 | 5523.9 | 5121.4 | 5047.9 | 4964.8 | 4728.4 | 4476.0 | 3993.6 | 3060.7 |
| 52.5° | 5616.6 | 5635.7 | 5696.4 | 5603.8 | 5284.3 | 5233.2 | 5178.9 | 4974.4 | 4661.3 | 4140.5 | 3146.9 |
| 55° | 5479.2 | 5517.5 | 5680.5 | 5651.7 | 5479.2 | 5421.7 | 5383.3 | 5217.2 | 4840.2 | 4274.7 | 3220.4 |
| 57.5° | 5230.0 | 5198.0 | 5402.5 | 5734.8 | 5686.8 | 5642.1 | 5603.8 | 5472.8 | 5022.3 | 4370.6 | 3268.3 |
| 60° | 4837.0 | 4718.8 | 4993.6 | 5632.5 | 5830.6 | 5837.0 | 5814.6 | 5664.5 | 5169.3 | 4370.6 | 3242.8 |
| 62.5° | 4284.3 | 4172.5 | 4511.1 | 5290.7 | 5907.3 | 5968.0 | 5955.2 | 5731.6 | 5233.2 | 4274.7 | 3143.7 |
| 65° | 3456.8 | 3482.4 | 3920.1 | 4904.1 | 5996.7 | 6146.9 | 6067.0 | 5622.9 | 5153.3 | 4089.4 | 2920.1 |
| 67.5° | 2760.4 | 2837.0 | 3230.0 | 4402.5 | 5955.2 | 6143.7 | 6031.9 | 5316.2 | 4811.5 | 3830.6 | 2578.2 |
| 70° | 2178.9 | 2230.0 | 2555.9 | 3725.2 | 5591.0 | 5789.1 | 5648.5 | 4846.6 | 4233.2 | 3431.3 | 2143.7 |
| 72.5° | 1702.9 | 1750.8 | 2028.7 | 2980.8 | 4958.4 | 5188.4 | 5012.7 | 4214.0 | 3511.1 | 2910.5 | 1702.9 |
| 75° | 1293.9 | 1329.1 | 1536.7 | 2297.1 | 3948.8 | 4236.4 | 4108.6 | 3373.8 | 2741.2 | 2303.5 | 1303.5 |
| 77.5° | 833.9 | 881.8 | 1115.0 | 1610.2 | 2789.1 | 3134.2 | 3150.1 | 2520.7 | 1971.2 | 1664.5 | 958.5 |
| 80° | 552.7 | 571.9 | 715.6 | 1047.9 | 1715.6 | 1984.0 | 2076.7 | 1702.9 | 1258.8 | 1060.7 | 690.1 |
| 82.5° | 230.0 | 255.6 | 341.8 | 527.2 | 859.4 | 862.6 | 987.2 | 718.8 | 511.2 | 450.5 | 290.7 |
| 85° | 6.4 | 12.8 | 9.6 | 25.6 | 22.4 | 35.1 | 41.5 | 57.5 | 41.5 | 44.7 | 44.7 |
| 87.5° | 0.0 | 0.0 | 3.2 | 3.2 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 9.6 | 6.4 |
| 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: P870892
CATALOG NUMBER: EMM2-HTN-SA3A-840-U-T4W-HSS

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 | 1801.9 |
| 2.5° | 1808.3 | 1779.5 | 1722.0 | 1677.3 | 1629.4 | 1594.2 | 1562.3 | 1527.1 | 1504.8 | 1508.0 | 1485.6 |
| 5° | 1808.3 | 1754.0 | 1639.0 | 1536.7 | 1444.1 | 1377.0 | 1303.5 | 1246.0 | 1204.5 | 1198.1 | 1217.2 |
| 7.5° | 1817.9 | 1728.4 | 1555.9 | 1402.5 | 1274.7 | 1169.3 | 1092.6 | 1035.1 | 1006.4 | 987.2 | 984.0 |
| 10° | 1827.5 | 1709.2 | 1479.2 | 1284.3 | 1124.6 | 1009.6 | 942.5 | 878.6 | 846.6 | 843.4 | 833.9 |
| 12.5° | 1833.8 | 1686.9 | 1408.9 | 1166.1 | 1000.0 | 891.4 | 824.3 | 773.2 | 747.6 | 747.6 | 744.4 |
| 15° | 1856.2 | 1680.5 | 1335.4 | 1076.7 | 904.1 | 798.7 | 741.2 | 699.7 | 683.7 | 674.1 | 670.9 |
| 17.5° | 1875.4 | 1667.7 | 1271.6 | 987.2 | 817.9 | 725.2 | 670.9 | 642.2 | 626.2 | 619.8 | 616.6 |
| 20° | 1904.1 | 1661.3 | 1210.9 | 913.7 | 754.0 | 664.5 | 623.0 | 597.4 | 587.9 | 581.5 | 581.5 |
| 22.5° | 1932.9 | 1654.9 | 1150.1 | 849.8 | 699.7 | 619.8 | 581.5 | 559.1 | 549.5 | 546.3 | 543.1 |
| 25° | 1968.0 | 1651.7 | 1099.0 | 795.5 | 651.8 | 584.7 | 549.5 | 530.3 | 517.6 | 511.2 | 511.2 |
| 27.5° | 2003.2 | 1654.9 | 1047.9 | 741.2 | 610.2 | 552.7 | 517.6 | 495.2 | 485.6 | 472.8 | 476.0 |
| 30° | 2051.1 | 1658.1 | 1006.4 | 696.5 | 575.1 | 520.8 | 488.8 | 460.1 | 447.3 | 440.9 | 440.9 |
| 32.5° | 2099.0 | 1670.9 | 964.8 | 654.9 | 539.9 | 495.2 | 456.9 | 431.3 | 415.3 | 412.1 | 408.9 |
| 35° | 2150.1 | 1680.5 | 926.5 | 619.8 | 511.2 | 466.4 | 428.1 | 402.6 | 389.8 | 386.6 | 386.6 |
| 37.5° | 2207.6 | 1696.5 | 897.8 | 587.9 | 482.4 | 437.7 | 402.6 | 377.0 | 367.4 | 364.2 | 364.2 |
| 40° | 2268.3 | 1722.0 | 875.4 | 559.1 | 460.1 | 412.1 | 380.2 | 357.8 | 351.4 | 348.2 | 348.2 |
| 42.5° | 2329.1 | 1744.4 | 856.2 | 536.7 | 437.7 | 389.8 | 364.2 | 341.8 | 332.3 | 332.3 | 332.3 |
| 45° | 2386.6 | 1760.4 | 837.1 | 514.4 | 415.3 | 373.8 | 345.0 | 325.9 | 316.3 | 316.3 | 316.3 |
| 47.5° | 2437.7 | 1776.3 | 808.3 | 492.0 | 393.0 | 351.4 | 329.1 | 309.9 | 300.3 | 300.3 | 300.3 |
| 50° | 2492.0 | 1785.9 | 776.4 | 463.3 | 370.6 | 335.5 | 313.1 | 290.7 | 284.3 | 281.1 | 281.1 |
| 52.5° | 2536.7 | 1785.9 | 734.8 | 434.5 | 345.0 | 313.1 | 293.9 | 274.8 | 265.2 | 258.8 | 258.8 |
| 55° | 2568.7 | 1785.9 | 690.1 | 399.4 | 319.5 | 293.9 | 274.8 | 255.6 | 242.8 | 233.2 | 233.2 |
| 57.5° | 2587.8 | 1776.3 | 639.0 | 357.8 | 293.9 | 268.4 | 255.6 | 233.2 | 207.7 | 188.5 | 182.1 |
| 60° | 2571.9 | 1747.6 | 584.7 | 313.1 | 265.2 | 246.0 | 236.4 | 207.7 | 172.5 | 162.9 | 162.9 |
| 62.5° | 2504.8 | 1680.5 | 530.3 | 274.8 | 242.8 | 223.6 | 214.1 | 182.1 | 156.5 | 147.0 | 147.0 |
| 65° | *2316.3* | *1517.6* | *463.3* | *239.6* | *217.3* | *204.5* | *191.7* | *162.9* | *140.6* | *127.8* | *127.8* |
| 67.5° | 2041.5 | 1309.9 | 386.6 | 210.9 | 194.9 | 185.3 | 175.7 | 147.0 | 124.6 | 111.8 | 111.8 |
| 70° | 1654.9 | 1057.5 | 329.1 | 185.3 | 172.5 | 166.1 | 156.5 | 134.2 | 108.6 | 99.0 | 99.0 |
| 72.5° | 1300.3 | 830.7 | 274.8 | 166.1 | 159.7 | 147.0 | 140.6 | 118.2 | 99.0 | 89.5 | 89.5 |
| 75° | 968.0 | 619.8 | 242.8 | 147.0 | 147.0 | 131.0 | 127.8 | 105.4 | 86.3 | 79.9 | 79.9 |
| 77.5° | 712.5 | 460.1 | 210.9 | 127.8 | 127.8 | 115.0 | 108.6 | 92.7 | 79.9 | 73.5 | 73.5 |
| 80° | 482.4 | 313.1 | 156.5 | 95.8 | 95.8 | 92.7 | 86.3 | 79.9 | 67.1 | 60.7 | 57.5 |
| 82.5° | 204.5 | 131.0 | 76.7 | 47.9 | 44.7 | 35.1 | 28.8 | 22.4 | 22.4 | 19.2 | 19.2 |
| 85° | 35.1 | 16.0 | 16.0 | 12.8 | 9.6 | 9.6 | 9.6 | 6.4 | 6.4 | 6.4 | 6.4 |
| 87.5° | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 |
| 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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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: SP1-2407-157-8

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

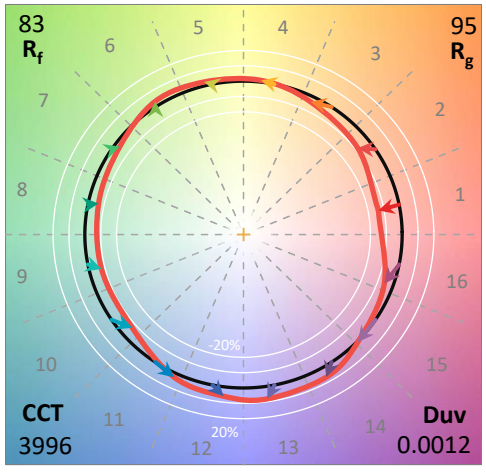
## Test Information

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

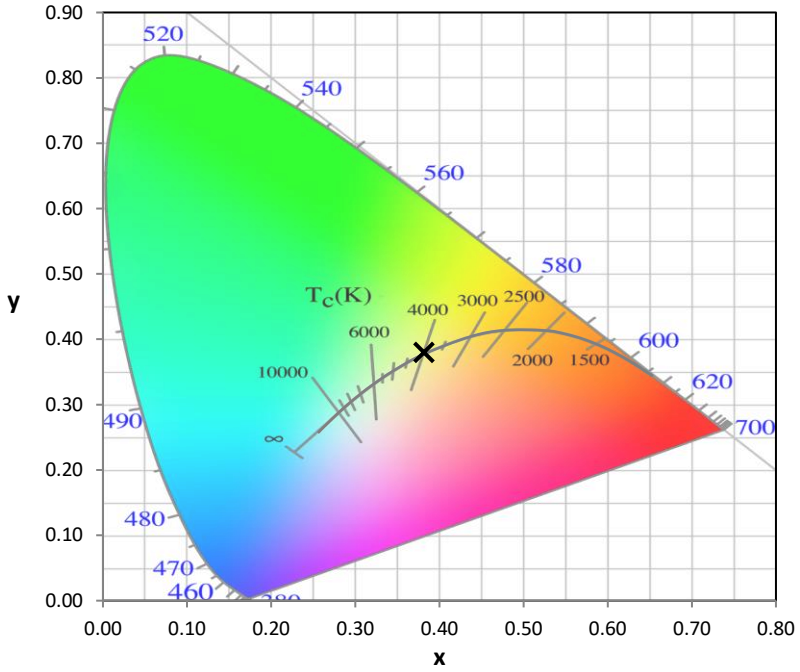
| | |
|---|---|
| Stabilization Time: | 29M |
| Operation Time: | 1H 29M |
| Sphere Temperature (°C): | 24.3 |

REPORT NUMBER: SP1-2407-157-8

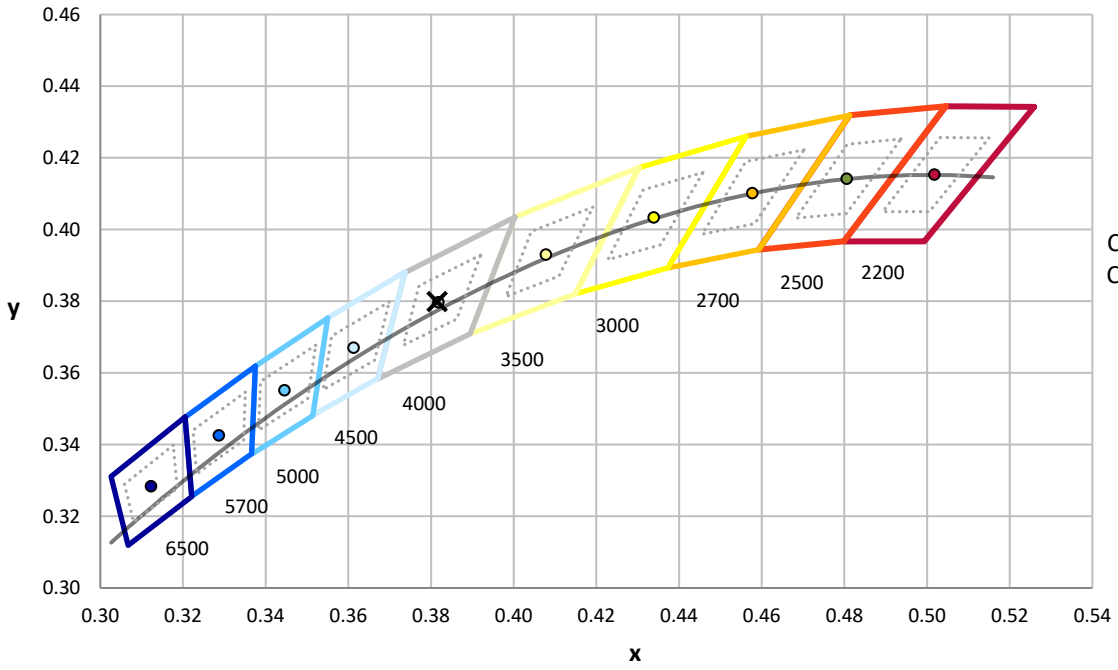
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC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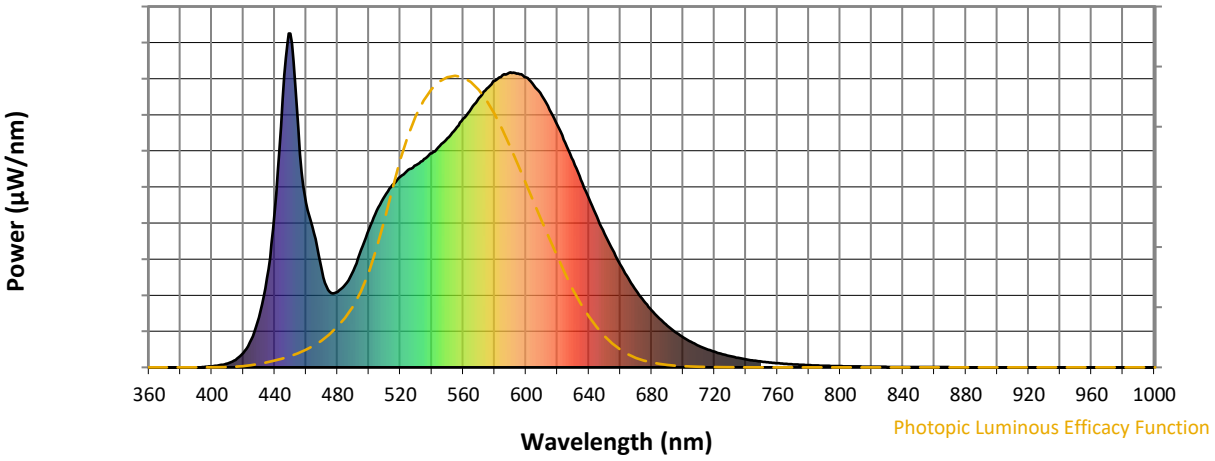
## Photopic Flux vs. Wavelength




## 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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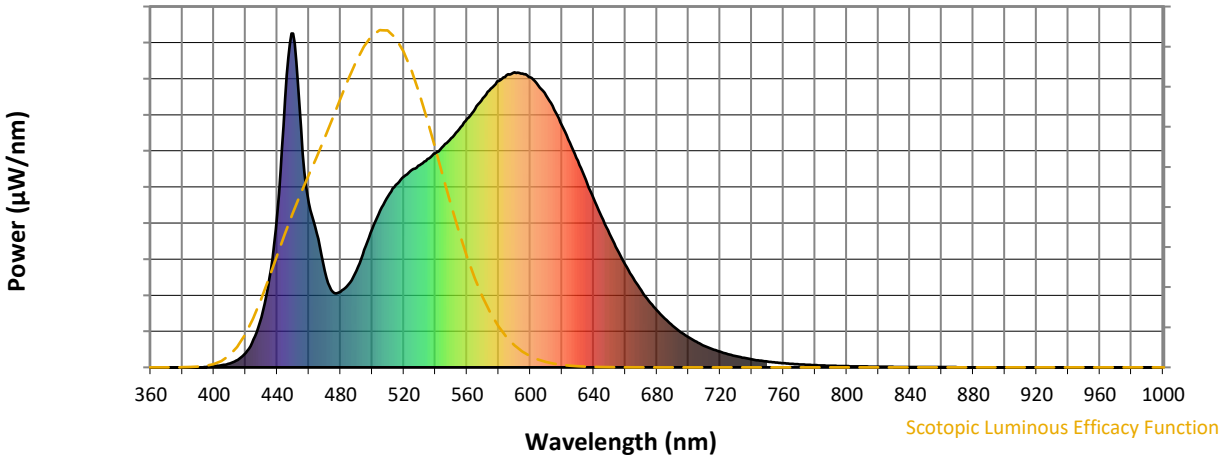
## Scotopic Flux vs. Wavelength




**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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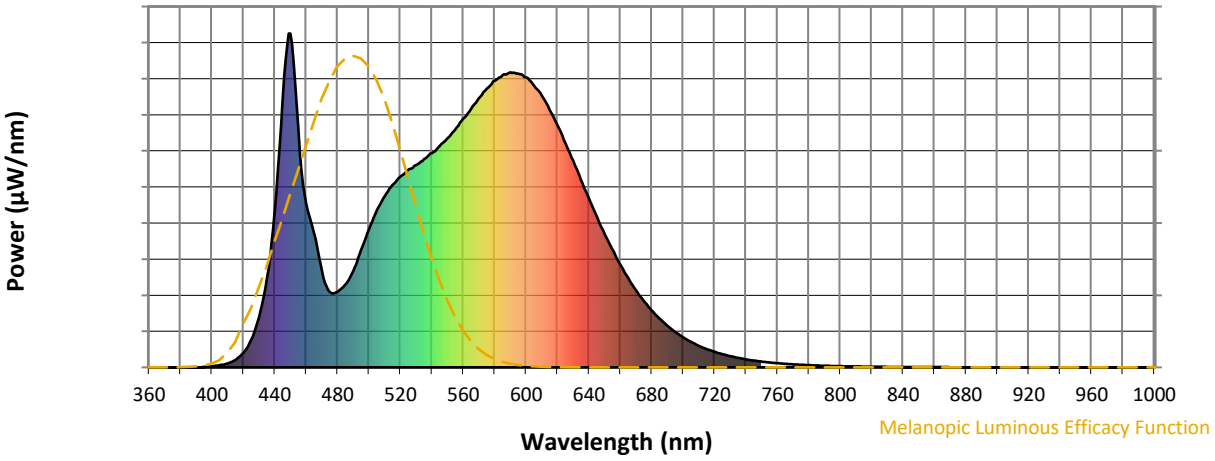
## Melanopic Flux vs. Wavelength




**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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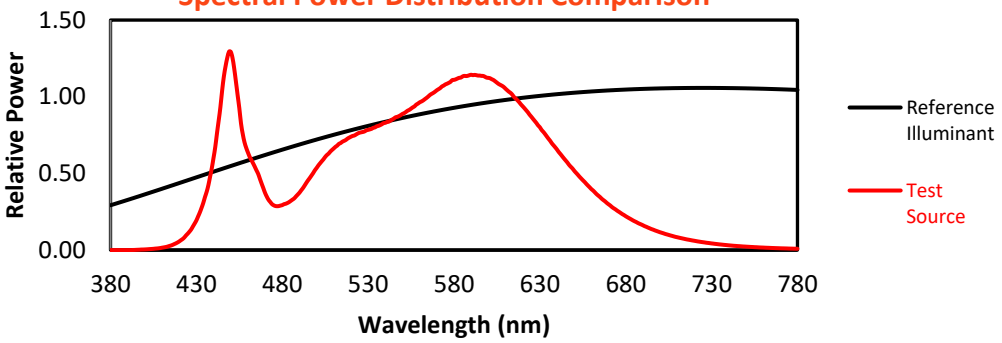
# TM-30-18

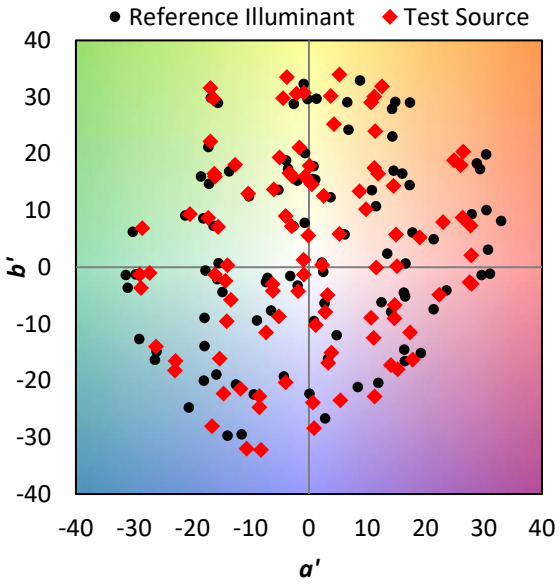
## Summary

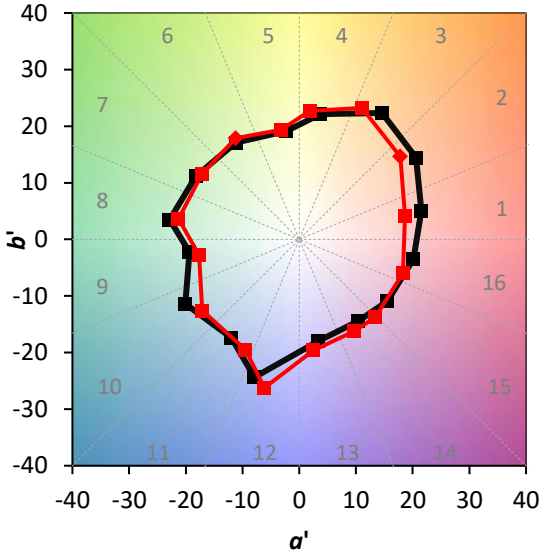
$R_f$ = 82.6
$R_g$ = 95.1
CIE $R_a$ = 80.6
$R_9$ = -5.8

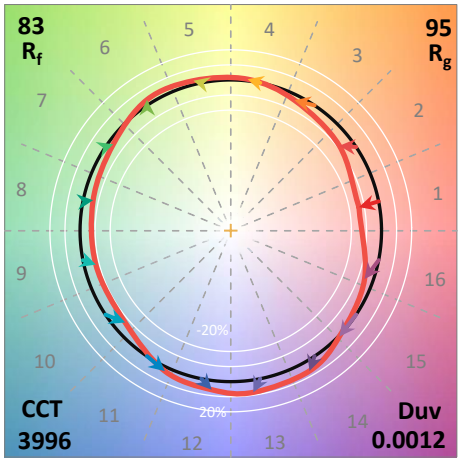
## Spectral Power Distribution Comparison

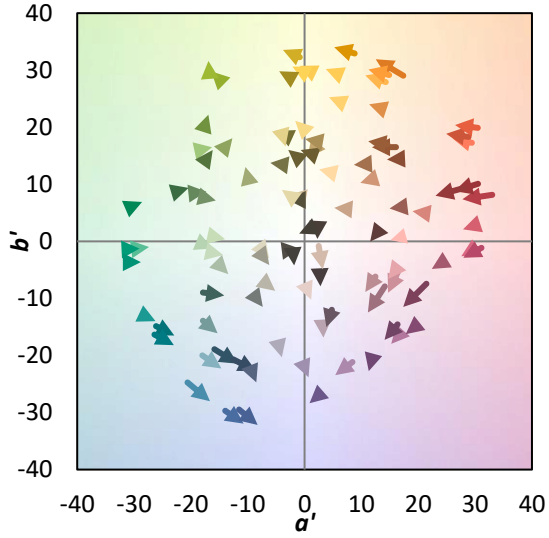



## Color Vector Graphics



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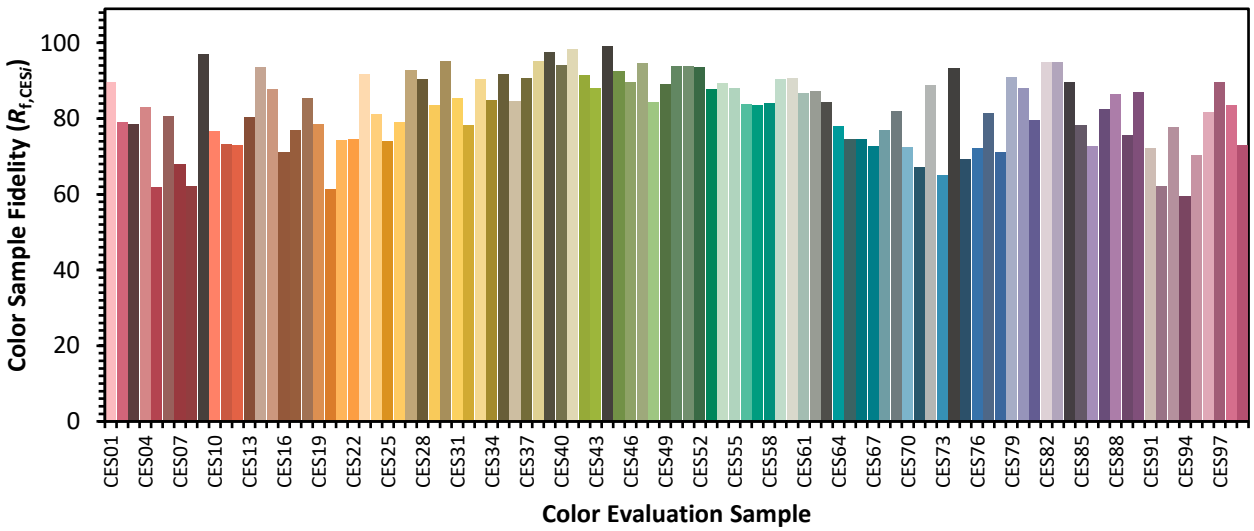
# TM-30-18

**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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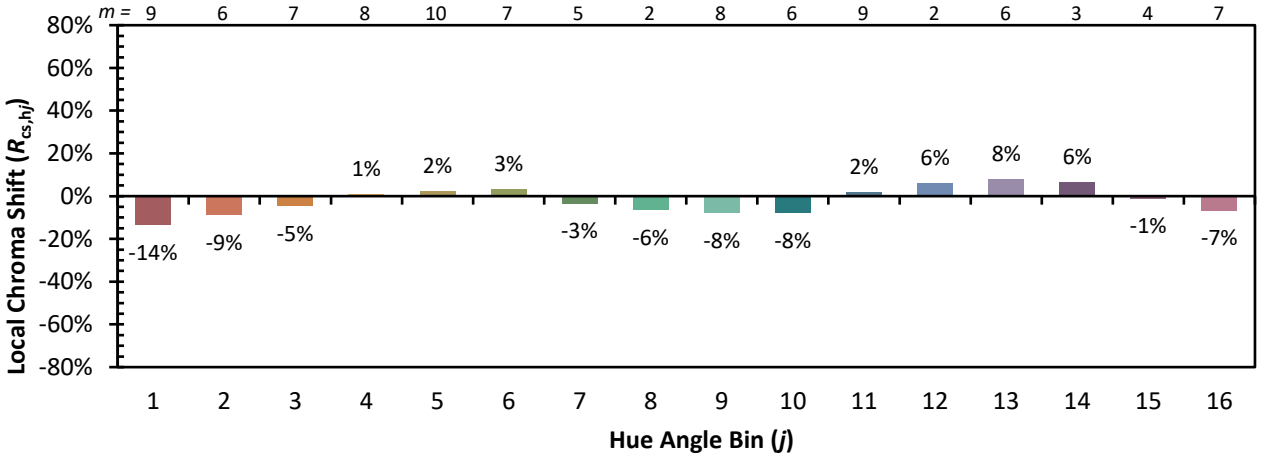
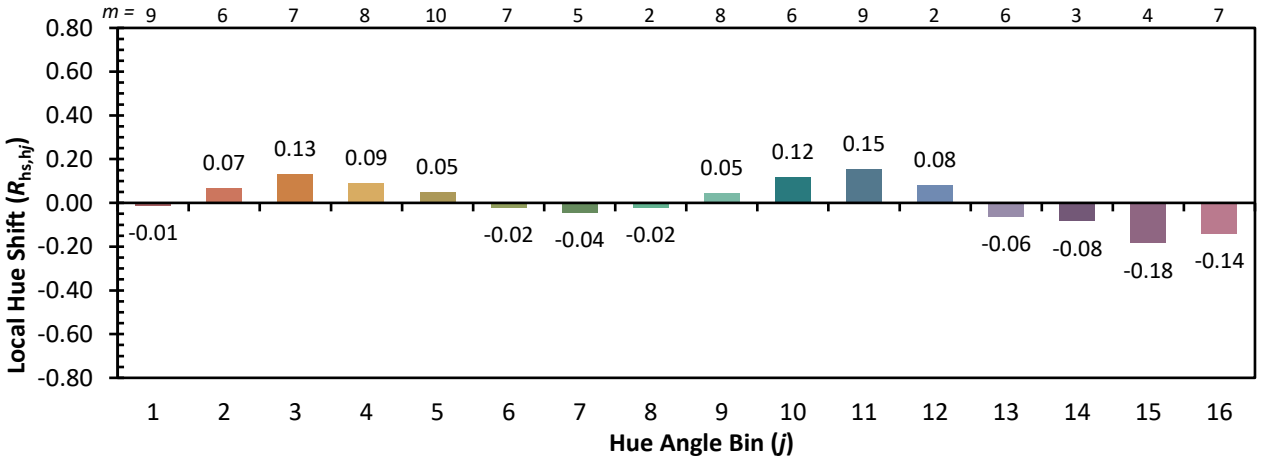
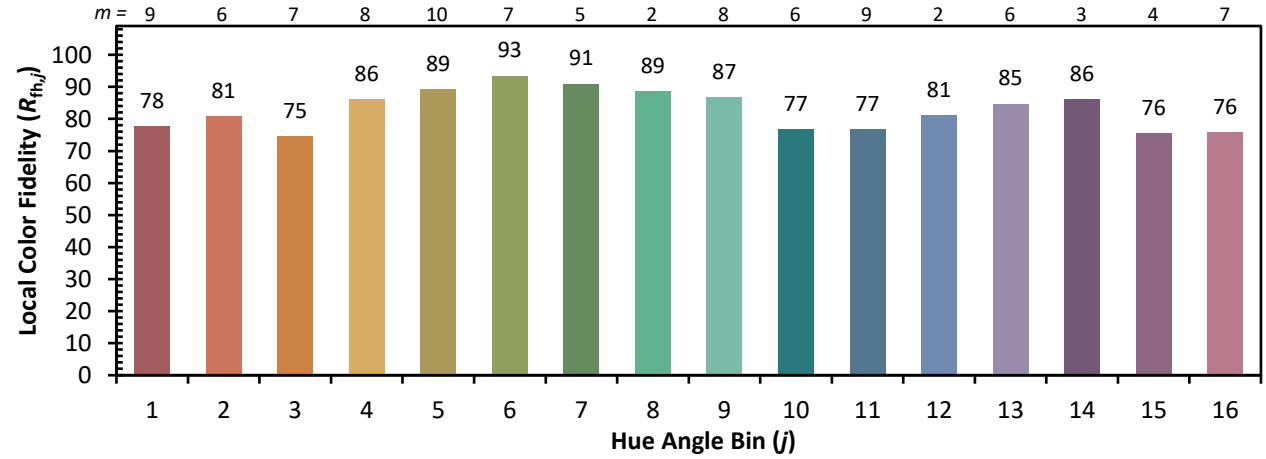
**TM-30-18**

## Color Rendition by Hue-Angle Bin



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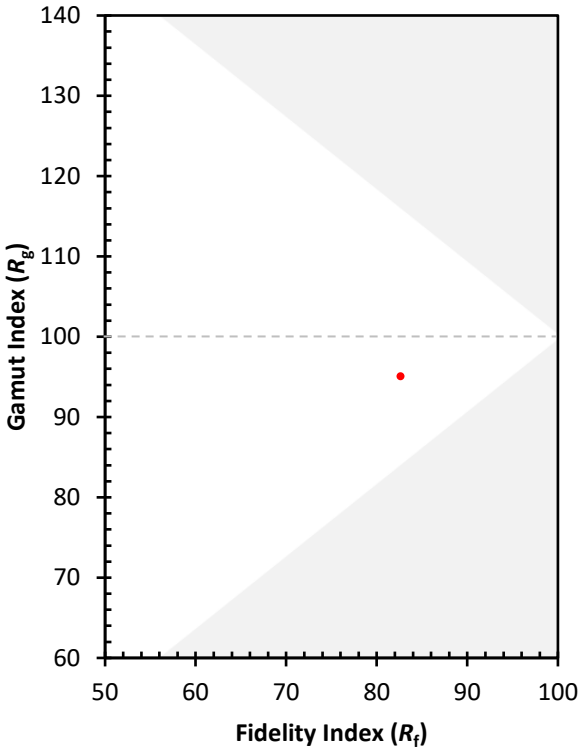
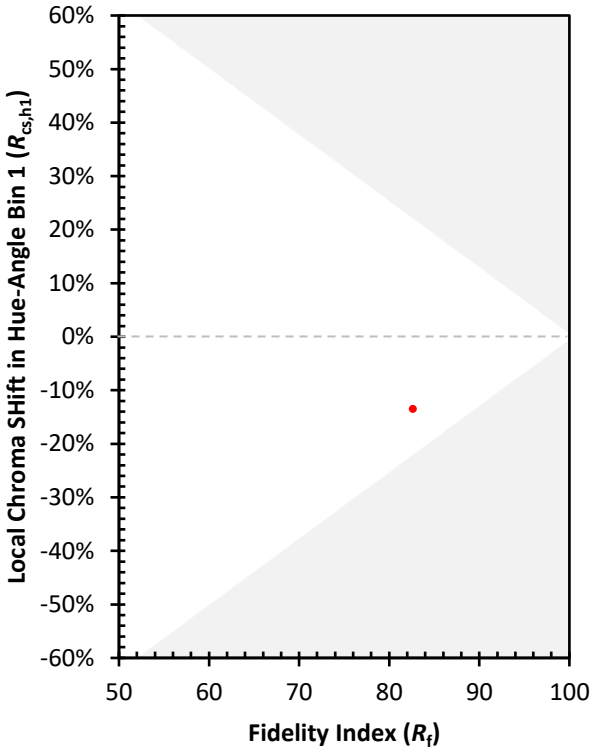
## Measure Comparisons

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