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: P871002

Luminaire Tested: **EMM2-HSN-SA2B-830-U-T1**

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: | P871002 |
| Test Lab: | INNOVATION CENTER(G3) |
| Issue Date: | 09/05/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | INVUE |
| Catalog Number: | EMM2-HSN-SA2B-830-U-T1 |
| Description: | EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 100W 80CRI 3000K FIXTURE w/ TYPE 1 DISTRIBUTION OPTIC |
| Light Source: | (20) 3000K CCT, 80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 11644.9 lumens |
| Efficiency: | N/A |
| Efficacy: | 129.4 lumens/watt |
| Luminous Opening: | Rectangular (W 0.67' x L: 0.33' x H: 0') |
| IES Classification: | Type I - Short |
| BUG Rating: | B3 - U0 - G3 |

| | |
|---|---|
| Input Watts (W): | 90 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | 0.99 |
| Total Harmonic Distortion (THDi): | 6.20% |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 24 FT |

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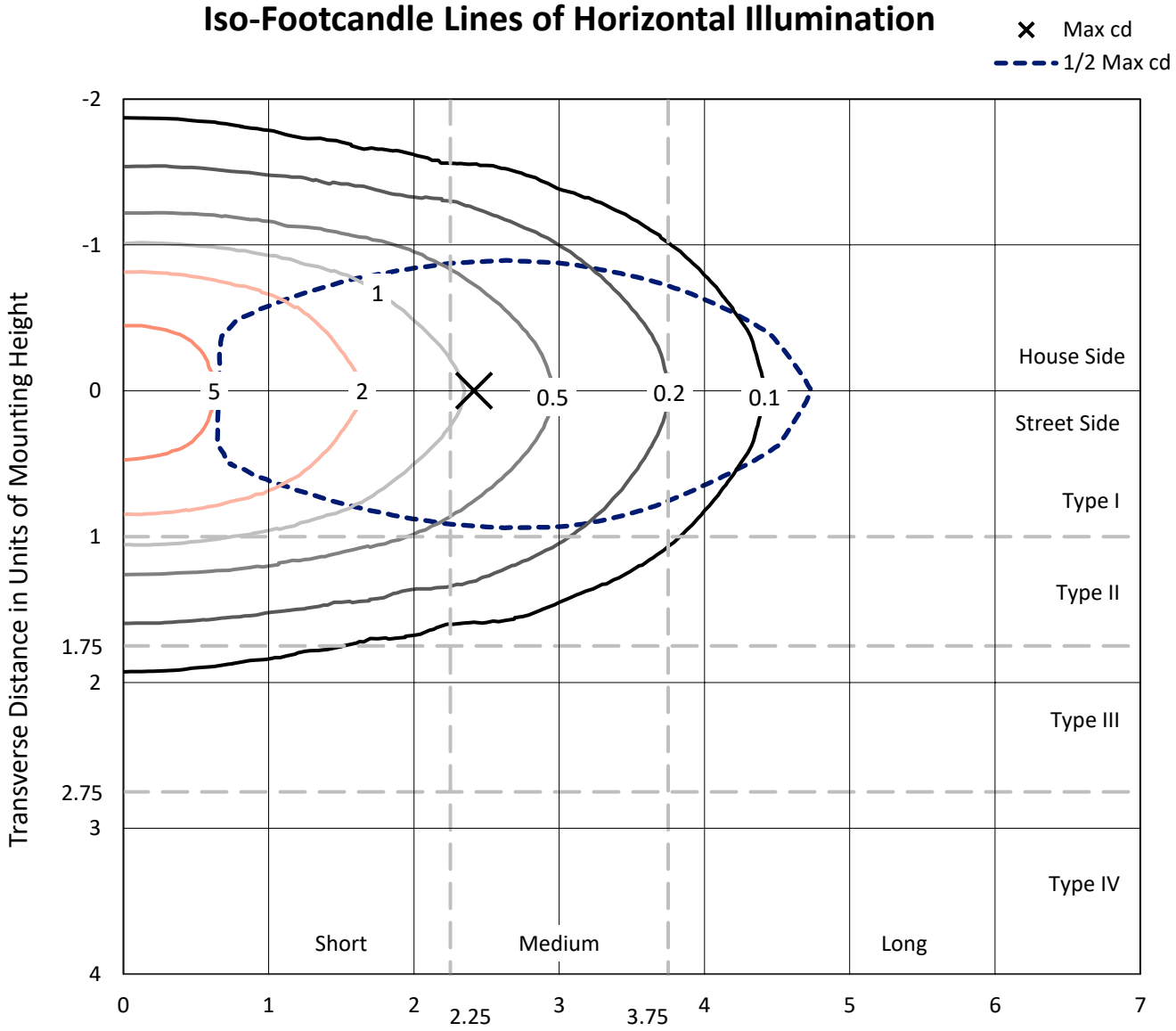
Scaled Data Report

REPORT NUMBER: P871002
CATALOG NUMBER: EMM2-HSN-SA2B-830-U-T1

## Iso-Footcandle Lines of Horizontal Illumination




Based on 20 foot mounting height. Maximum calculated value = 7.1 fc
Type I - Short - N/A

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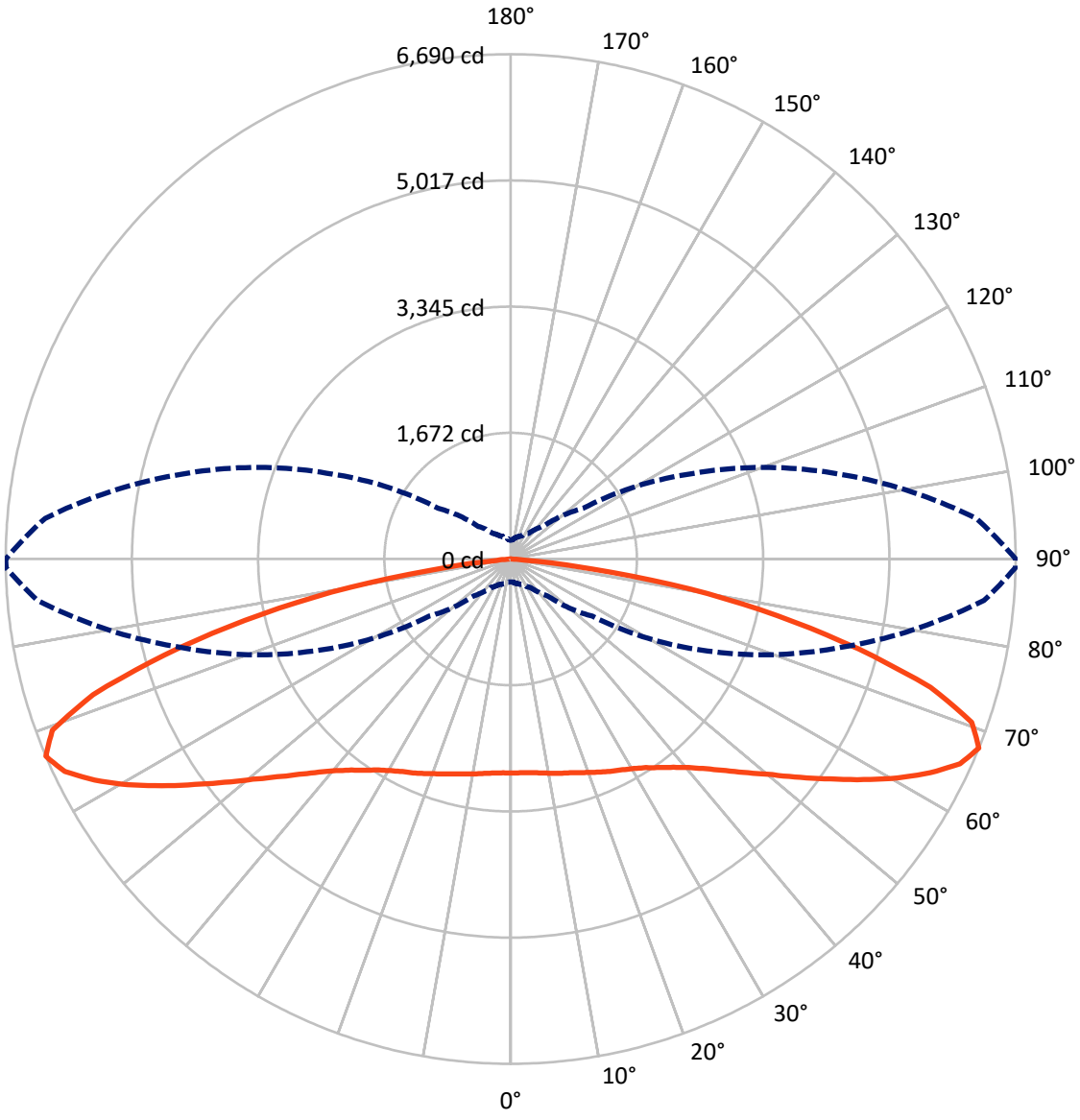
## Luminous Intensity Polar Plot



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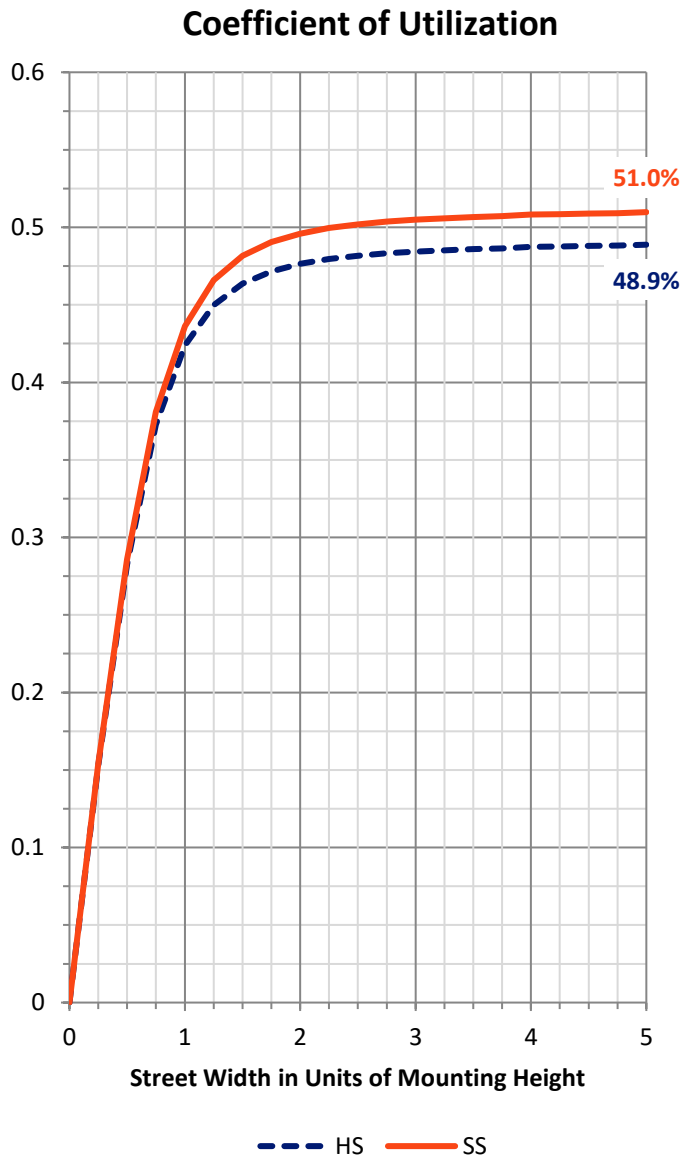
REPORT NUMBER: P871002
CATALOG NUMBER: EMM2-HSN-SA2B-830-U-T1

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 5719.0 | 0.0 | 5719.0 |
| | % Fixture | 49.1 | 0.0 | 49.1 |
| **Street Side** | Lumens | 5925.8 | 0.0 | 5925.8 |
| | % Fixture | 50.9 | 0.0 | 50.9 |
| **Total** | Lumens | 11644.9 | 0.0 | 11644.9 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 271.9 | 2.3 |
| 10°-20° | 817.1 | 7.0 |
| 20°-30° | 1352.3 | 11.6 |
| 30°-40° | 1793.2 | 15.4 |
| 40°-50° | 2021.8 | 17.4 |
| 50°-60° | 2072.6 | 17.8 |
| 60°-70° | 1957.6 | 16.8 |
| 70°-80° | 1201.2 | 10.3 |
| 80°-90° | 157.2 | 1.3 |
| 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° | 11644.9 | 100.0 |
| 0°-180° | 11644.9 | 100.0 |



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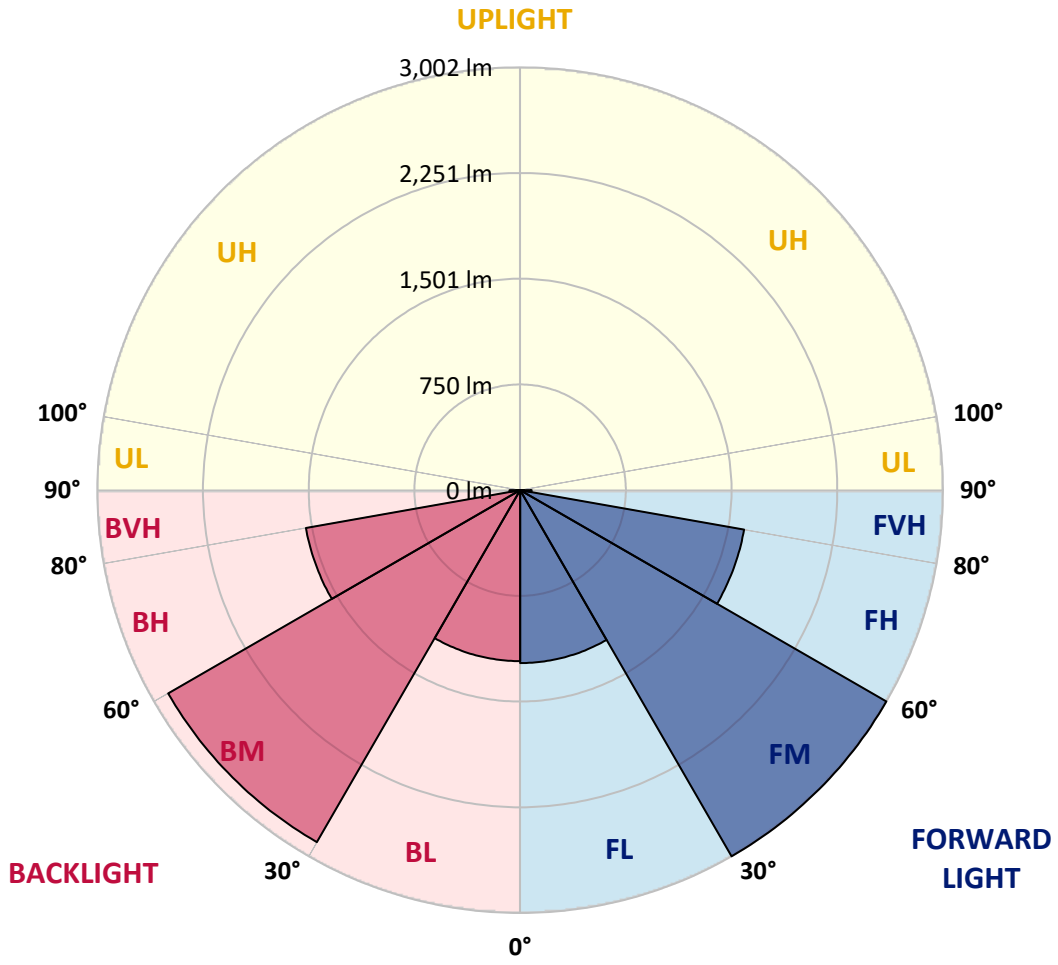
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 1227.7 | 10.5 | | | |
| FM | (30°-60°) | 3001.9 | 25.8 | | | |
| FH | (60°-80°) | 1614.4 | 13.9 | | | G1/1800 |
| FVH | (80°-90°) | 81.9 | 0.7 | | | G1/100 |
| BL | (0°-30°) | 1213.7 | 10.4 | B3/2500 | | |
| BM | (30°-60°) | 2885.7 | 24.8 | B3/5000 | | |
| BH | (60°-80°) | 1544.4 | 13.3 | B3/2500 | | G3/2500 |
| BVH | (80°-90°) | 75.3 | 0.6 | | | G1/100 |
| UL | (90°-100°) | 0.0 | 0.0 | | U0/0 | |
| UH | (100°-180°) | 0.0 | 0.0 | | U0/0 | |

**BUG Rating: B3-U0-G3**
Type I Short



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**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 89° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 |
| 2.5° | 2848.4 | 2848.4 | 2841.7 | 2830.5 | 2828.3 | 2830.5 | 2844.0 | 2837.3 | 2837.3 | 2839.5 | 2837.3 |
| 5° | 2848.4 | 2848.4 | 2844.0 | 2832.8 | 2832.8 | 2832.8 | 2848.4 | 2841.7 | 2844.0 | 2846.2 | 2846.2 |
| 7.5° | 2852.9 | 2852.9 | 2848.4 | 2839.5 | 2839.5 | 2839.5 | 2861.8 | 2857.4 | 2857.4 | 2864.1 | 2859.6 |
| 10° | 2864.1 | 2859.6 | 2855.1 | 2857.4 | 2850.7 | 2861.8 | 2873.0 | 2875.3 | 2884.2 | 2888.7 | 2886.4 |
| 12.5° | 2864.1 | 2859.6 | 2848.4 | 2861.8 | 2861.8 | 2877.5 | 2893.1 | 2902.1 | 2913.3 | 2913.3 | 2913.3 |
| 15° | 2850.7 | 2846.2 | 2837.3 | 2859.6 | 2868.6 | 2888.7 | 2911.0 | 2924.5 | 2944.6 | 2944.6 | 2942.3 |
| 17.5° | 2835.0 | 2828.3 | 2823.8 | 2857.4 | 2877.5 | 2904.3 | 2937.9 | 2955.8 | 2978.1 | 2980.3 | 2975.9 |
| 20° | 2806.0 | 2803.7 | 2806.0 | 2850.7 | 2886.4 | 2924.5 | 2964.7 | 2989.3 | 3018.4 | 3027.3 | 3020.6 |
| 22.5° | 2774.7 | 2774.7 | 2783.6 | 2844.0 | 2899.9 | 2951.3 | 3004.9 | 3036.2 | 3065.3 | 3074.2 | 3065.3 |
| 25° | 2732.2 | 2732.2 | 2750.1 | 2821.6 | 2904.3 | 2980.3 | 3042.9 | 3085.4 | 3112.3 | 3121.2 | 3116.7 |
| 27.5° | 2667.3 | 2667.3 | 2687.5 | 2776.9 | 2890.9 | 3002.7 | 3083.2 | 3132.4 | 3161.4 | 3170.4 | 3165.9 |
| 30° | 2575.7 | 2571.2 | 2598.0 | 2709.8 | 2866.3 | 3027.3 | 3130.1 | 3181.6 | 3219.6 | 3226.3 | 3219.6 |
| 32.5° | 2430.3 | 2437.0 | 2477.3 | 2618.1 | 2826.1 | 3042.9 | 3186.0 | 3246.4 | 3288.9 | 3302.3 | 3297.8 |
| 35° | 2253.7 | 2264.9 | 2320.8 | 2501.9 | 2750.1 | 3040.7 | 3244.2 | 3318.0 | 3373.8 | 3391.7 | 3389.5 |
| 37.5° | 2043.5 | 2059.2 | 2128.5 | 2340.9 | 2636.0 | 3007.2 | 3297.8 | 3398.4 | 3472.2 | 3494.6 | 3499.1 |
| 40° | 1813.2 | 1828.9 | 1918.3 | 2153.1 | 2481.8 | 2928.9 | 3329.1 | 3490.1 | 3588.5 | 3633.2 | 3639.9 |
| 42.5° | 1569.5 | 1596.4 | 1703.7 | 1931.7 | 2296.2 | 2803.7 | 3329.1 | 3579.5 | 3700.3 | 3783.0 | 3789.7 |
| 45° | 1334.8 | 1357.1 | 1486.8 | 1710.4 | 2097.2 | 2642.7 | 3291.1 | 3669.0 | 3852.3 | 3995.4 | 3990.9 |
| 47.5° | 1131.3 | 1138.0 | 1256.5 | 1482.3 | 1875.9 | 2459.4 | 3212.9 | 3749.5 | 4013.3 | 4203.3 | 4243.6 |
| 50° | 921.2 | 936.8 | 1037.4 | 1261.0 | 1650.0 | 2258.2 | 3081.0 | 3800.9 | 4178.7 | 4467.2 | 4518.6 |
| 52.5° | 773.6 | 775.8 | 851.8 | 1057.5 | 1415.3 | 2014.5 | 2922.2 | 3814.3 | 4337.5 | 4753.3 | 4816.0 |
| 55° | 630.5 | 641.7 | 706.5 | 860.8 | 1189.5 | 1775.2 | 2716.5 | 3794.2 | 4482.8 | 5030.6 | 5146.9 |
| 57.5° | 541.1 | 543.3 | 590.3 | 713.2 | 1003.9 | 1520.4 | 2488.5 | 3727.1 | 4603.5 | 5336.9 | 5484.5 |
| 60° | 465.1 | 465.1 | 500.8 | 594.7 | 811.6 | 1272.2 | 2220.2 | 3608.6 | 4670.6 | 5665.6 | 5880.2 |
| 62.5° | 404.7 | 406.9 | 438.2 | 507.5 | 675.2 | 1050.8 | 1925.0 | 3423.0 | 4695.2 | 5983.0 | 6229.0 |
| 65° | 366.7 | 368.9 | 386.8 | 433.7 | 556.7 | 854.1 | 1623.2 | 3197.2 | 4661.7 | 6220.0 | 6539.8 |
| 67.5° | *304.1* | *306.3* | *337.6* | *373.4* | *462.8* | *686.4* | *1319.1* | *2884.2* | *4525.3* | *6293.8* | *6685.1* |
| 70° | 232.5 | 239.2 | 281.7 | 319.7 | 384.6 | 547.8 | 1012.8 | 2470.6 | 4198.9 | 6043.4 | 6445.9 |
| 72.5° | 194.5 | 196.8 | 228.1 | 270.5 | 322.0 | 429.3 | 769.1 | 1945.2 | 3702.5 | 5397.3 | 5844.4 |
| 75° | 169.9 | 172.2 | 190.0 | 228.1 | 268.3 | 344.3 | 534.4 | 1343.7 | 2953.5 | 4364.3 | 4773.5 |
| 77.5° | 154.3 | 156.5 | 161.0 | 192.3 | 225.8 | 266.1 | 377.9 | 798.2 | 2083.8 | 3335.8 | 3550.5 |
| 80° | 147.6 | 147.6 | 136.4 | 158.7 | 185.6 | 207.9 | 252.6 | 458.3 | 1337.0 | 2249.2 | 2421.4 |
| 82.5° | 105.1 | 102.8 | 93.9 | 98.4 | 114.0 | 114.0 | 129.7 | 190.0 | 512.0 | 950.2 | 1030.7 |
| 85° | 6.7 | 6.7 | 11.2 | 13.4 | 20.1 | 26.8 | 33.5 | 44.7 | 129.7 | 176.6 | 183.3 |
| 87.5° | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 4.5 | 4.5 | 4.5 | 6.7 | 8.9 | 8.9 |
| 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: P871002
CATALOG NUMBER: EMM2-HSN-SA2B-830-U-T1

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 | 2837.3 |
| 2.5° | 2835.0 | 2837.3 | 2837.3 | 2841.7 | 2846.2 | 2844.0 | 2841.7 | 2846.2 | 2839.5 | 2826.1 | 2823.8 |
| 5° | 2844.0 | 2844.0 | 2841.7 | 2846.2 | 2850.7 | 2846.2 | 2841.7 | 2841.7 | 2837.3 | 2823.8 | 2821.6 |
| 7.5° | 2861.8 | 2859.6 | 2859.6 | 2859.6 | 2859.6 | 2852.9 | 2846.2 | 2841.7 | 2835.0 | 2821.6 | 2814.9 |
| 10° | 2886.4 | 2884.2 | 2882.0 | 2879.7 | 2868.6 | 2861.8 | 2850.7 | 2844.0 | 2835.0 | 2819.4 | 2814.9 |
| 12.5° | 2913.3 | 2908.8 | 2904.3 | 2906.6 | 2884.2 | 2864.1 | 2852.9 | 2837.3 | 2830.5 | 2794.8 | 2788.1 |
| 15° | 2940.1 | 2933.4 | 2931.2 | 2922.2 | 2899.9 | 2870.8 | 2848.4 | 2826.1 | 2803.7 | 2770.2 | 2759.0 |
| 17.5° | 2975.9 | 2971.4 | 2958.0 | 2949.0 | 2917.7 | 2877.5 | 2844.0 | 2812.7 | 2783.6 | 2743.3 | 2736.6 |
| 20° | 3018.4 | 3013.9 | 3000.5 | 2982.6 | 2942.3 | 2893.1 | 2846.2 | 2797.0 | 2761.2 | 2714.3 | 2703.1 |
| 22.5° | 3065.3 | 3058.6 | 3047.4 | 3027.3 | 2975.9 | 2917.7 | 2852.9 | 2788.1 | 2734.4 | 2680.7 | 2674.0 |
| 25° | 3114.5 | 3110.0 | 3098.8 | 3069.8 | 3013.9 | 2942.3 | 2852.9 | 2756.8 | 2689.7 | 2642.7 | 2622.6 |
| 27.5° | 3161.4 | 3159.2 | 3145.8 | 3112.3 | 3054.1 | 2960.2 | 2832.8 | 2705.3 | 2615.9 | 2553.3 | 2539.9 |
| 30° | 3221.8 | 3217.3 | 3201.7 | 3163.7 | 3098.8 | 2971.4 | 2792.5 | 2618.1 | 2506.4 | 2437.0 | 2416.9 |
| 32.5° | 3295.6 | 3291.1 | 3268.8 | 3221.8 | 3152.5 | 2973.6 | 2734.4 | 2506.4 | 2358.8 | 2285.0 | 2260.4 |
| 35° | 3394.0 | 3385.0 | 3356.0 | 3300.1 | 3203.9 | 2951.3 | 2631.6 | 2363.3 | 2182.2 | 2086.0 | 2052.5 |
| 37.5° | 3501.3 | 3490.1 | 3452.1 | 3382.8 | 3239.7 | 2890.9 | 2486.2 | 2171.0 | 1965.3 | 1851.3 | 1826.7 |
| 40° | 3633.2 | 3617.6 | 3559.4 | 3463.3 | 3253.1 | 2785.8 | 2323.0 | 1974.2 | 1755.1 | 1629.9 | 1600.8 |
| 42.5° | 3798.7 | 3771.8 | 3677.9 | 3552.7 | 3226.3 | 2642.7 | 2128.5 | 1770.8 | 1520.4 | 1404.1 | 1397.4 |
| 45° | 3997.6 | 3955.2 | 3814.3 | 3639.9 | 3168.2 | 2463.9 | 1922.8 | 1542.7 | 1303.5 | 1189.5 | 1160.4 |
| 47.5° | 4232.4 | 4181.0 | 3973.0 | 3707.0 | 3054.1 | 2280.5 | 1701.5 | 1321.4 | 1102.3 | 986.0 | 963.6 |
| 50° | 4491.8 | 4442.6 | 4140.7 | 3745.0 | 2931.2 | 2065.9 | 1484.6 | 1124.6 | 905.5 | 809.4 | 809.4 |
| 52.5° | 4807.0 | 4695.2 | 4301.7 | 3749.5 | 2743.3 | 1828.9 | 1276.7 | 932.3 | 760.2 | 675.2 | 657.3 |
| 55° | 5142.4 | 5010.5 | 4447.0 | 3709.2 | 2548.8 | 1612.0 | 1053.1 | 775.8 | 623.8 | 563.4 | 547.8 |
| 57.5° | 5515.8 | 5314.5 | 4552.1 | 3628.7 | 2302.9 | 1375.0 | 878.7 | 639.4 | 525.4 | 476.2 | 469.5 |
| 60° | 5891.4 | 5632.0 | 4614.7 | 3492.3 | 2041.3 | 1155.9 | 731.1 | 534.4 | 451.6 | 415.9 | 409.2 |
| 62.5° | 6240.2 | 5891.4 | 4619.2 | 3293.4 | 1786.4 | 963.6 | 599.2 | 460.6 | 400.2 | 373.4 | 373.4 |
| 65° | 6542.0 | 6108.3 | 4543.2 | 3038.5 | 1462.2 | 773.6 | 494.1 | 389.0 | 348.8 | 319.7 | 313.0 |
| 67.5° | 6689.6 | 6191.0 | 4409.0 | 2689.7 | 1171.6 | 612.6 | 415.9 | 337.6 | 299.6 | 254.9 | 250.4 |
| 70° | 6481.6 | 5951.7 | 4064.7 | 2242.5 | 905.5 | 487.4 | 346.6 | 288.4 | 250.4 | 212.4 | 207.9 |
| 72.5° | 5817.6 | 5314.5 | 3508.0 | 1737.2 | 681.9 | 393.5 | 288.4 | 245.9 | 205.7 | 185.6 | 181.1 |
| 75° | 4760.1 | 4420.2 | 2772.4 | 1196.2 | 476.2 | 308.5 | 241.5 | 207.9 | 174.4 | 165.5 | 163.2 |
| 77.5° | 3613.1 | 3286.7 | 2025.7 | 749.0 | 326.4 | 241.5 | 205.7 | 176.6 | 152.0 | 158.7 | 154.3 |
| 80° | 2412.4 | 2262.6 | 1346.0 | 424.8 | 219.1 | 176.6 | 156.5 | 129.7 | 116.3 | 134.1 | 129.7 |
| 82.5° | 1095.6 | 1037.4 | 632.7 | 185.6 | 98.4 | 76.0 | 53.7 | 40.2 | 31.3 | 29.1 | 33.5 |
| 85° | 183.3 | 161.0 | 44.7 | 20.1 | 11.2 | 6.7 | 4.5 | 4.5 | 2.2 | 2.2 | 2.2 |
| 87.5° | 8.9 | 6.7 | 6.7 | 4.5 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 0.0 | 0.0 |
| 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

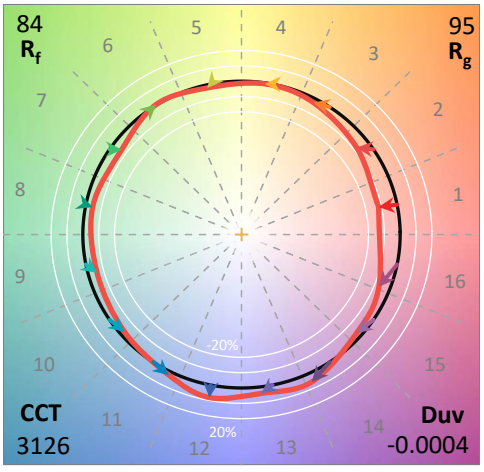
## Test Information

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

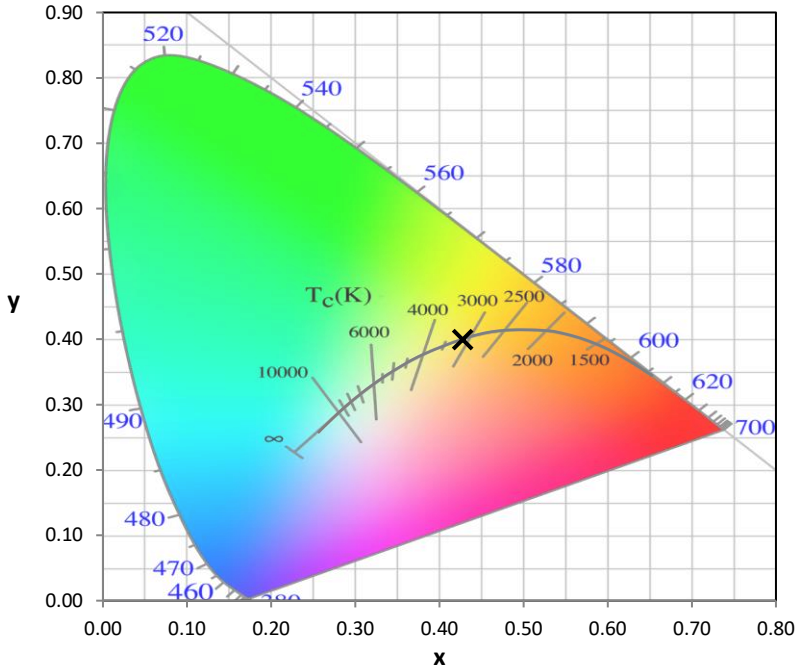
| | |
|---|---|
| Stabilization Time: | 22M |
| Operation Time: | 1H 22M |
| Sphere Temperature (°C): | 24.3 |

REPORT NUMBER: SP1-2407-157-7

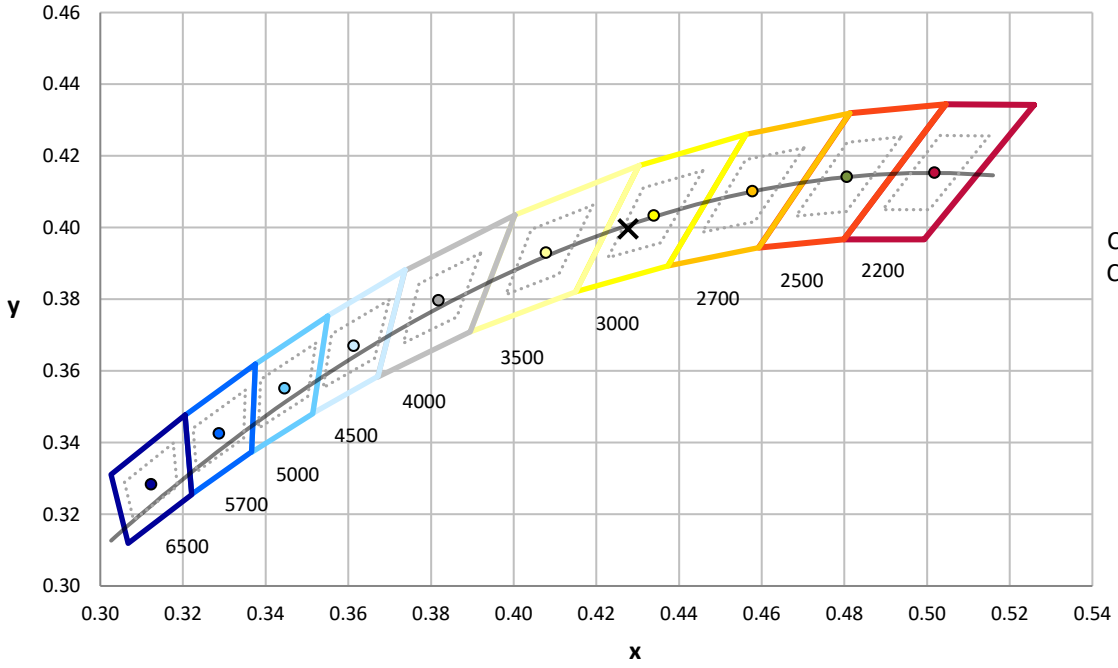
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC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

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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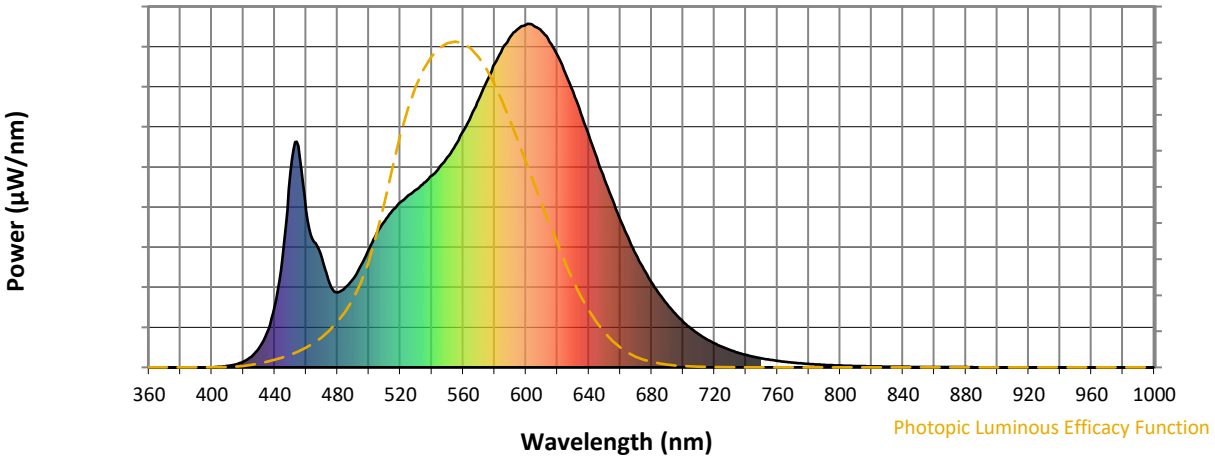
## Photopic Flux vs. Wavelength




## 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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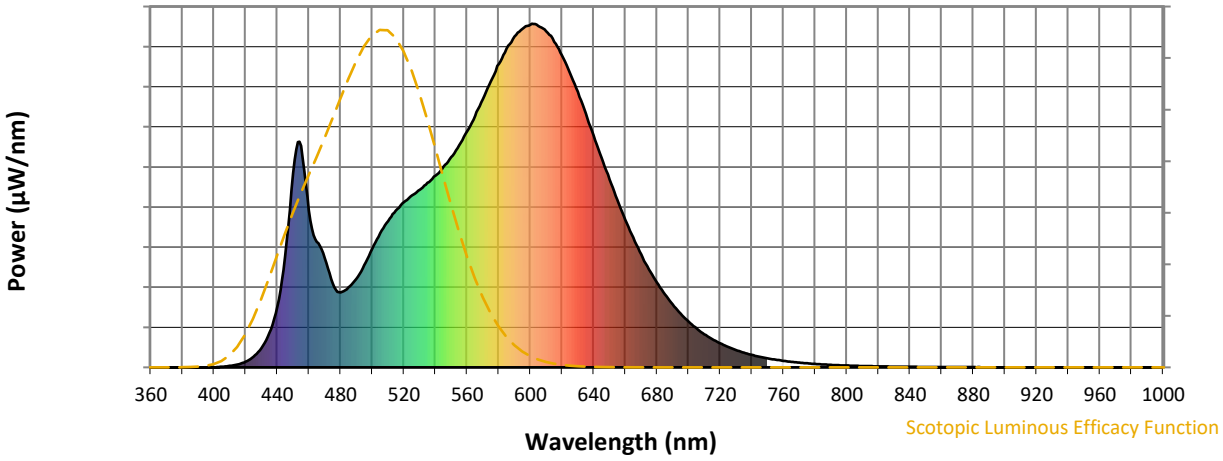
## Scotopic Flux vs. Wavelength




**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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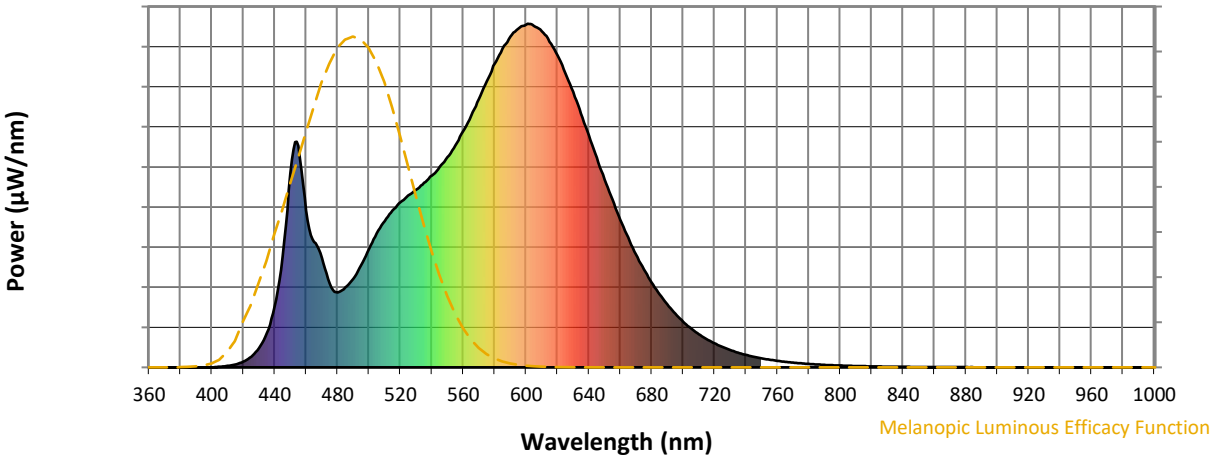
## Melanopic Flux vs. Wavelength




**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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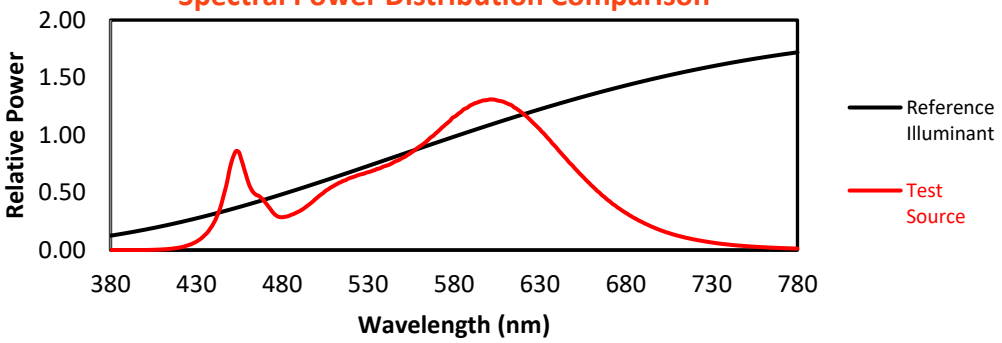
# TM-30-18

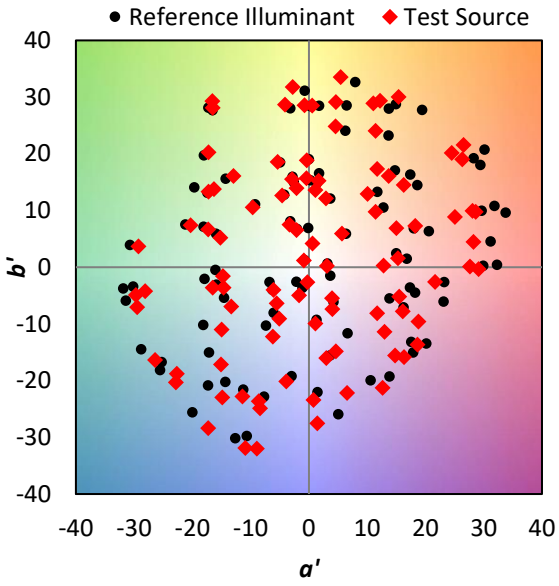
## Summary

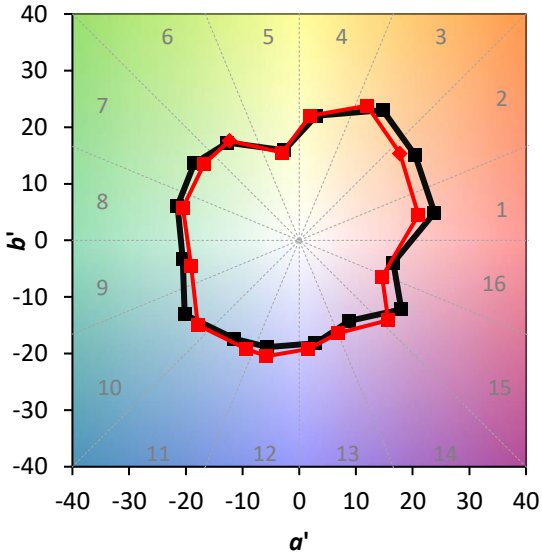
$R_f$ = 84.4
$R_g$ = 94.7
CIE $R_a$ = 82.6
$R_9$ = 5.1

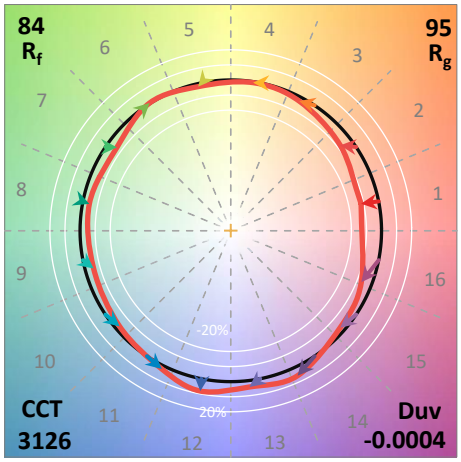
## Spectral Power Distribution Comparison

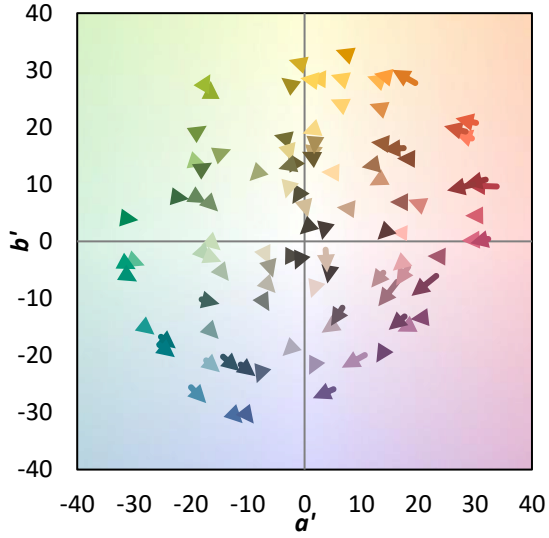



## Color Vector Graphics



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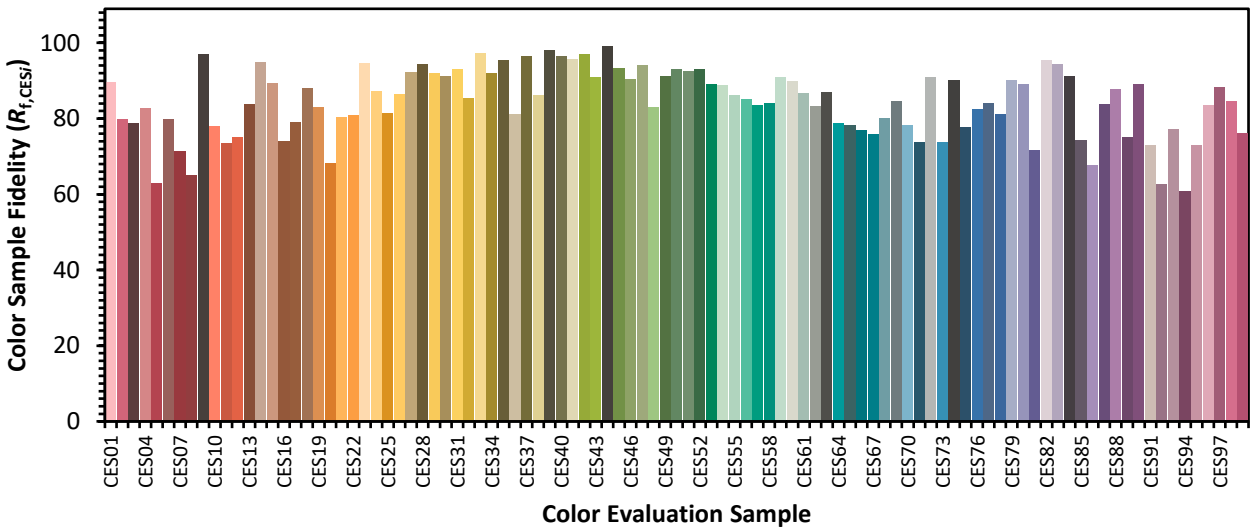
# TM-30-18

**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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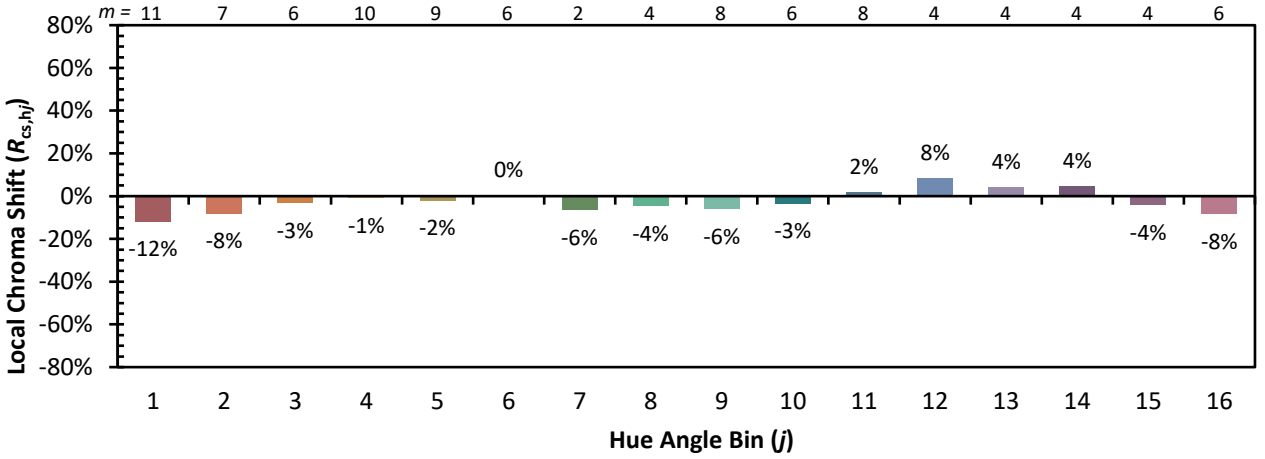
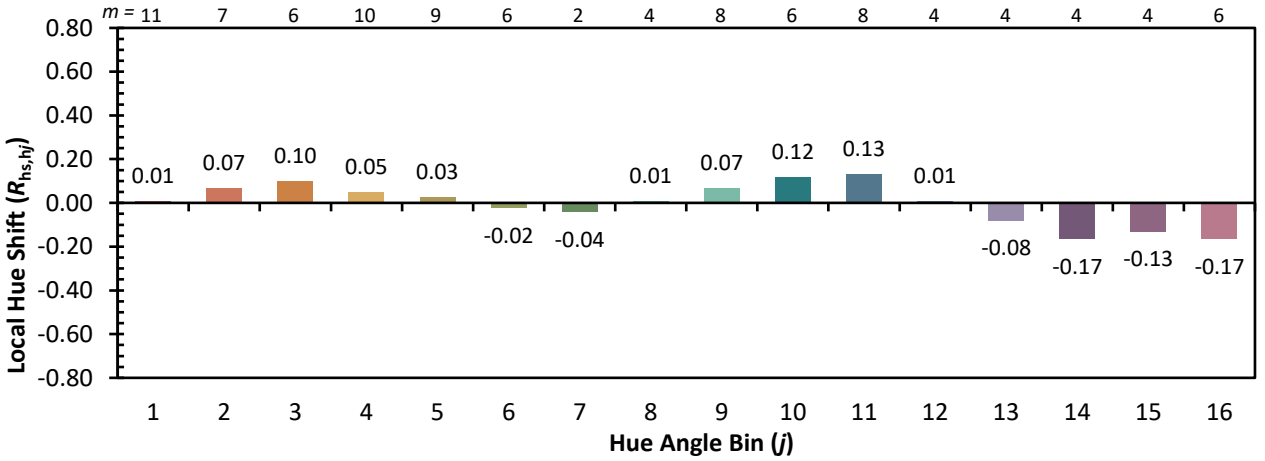
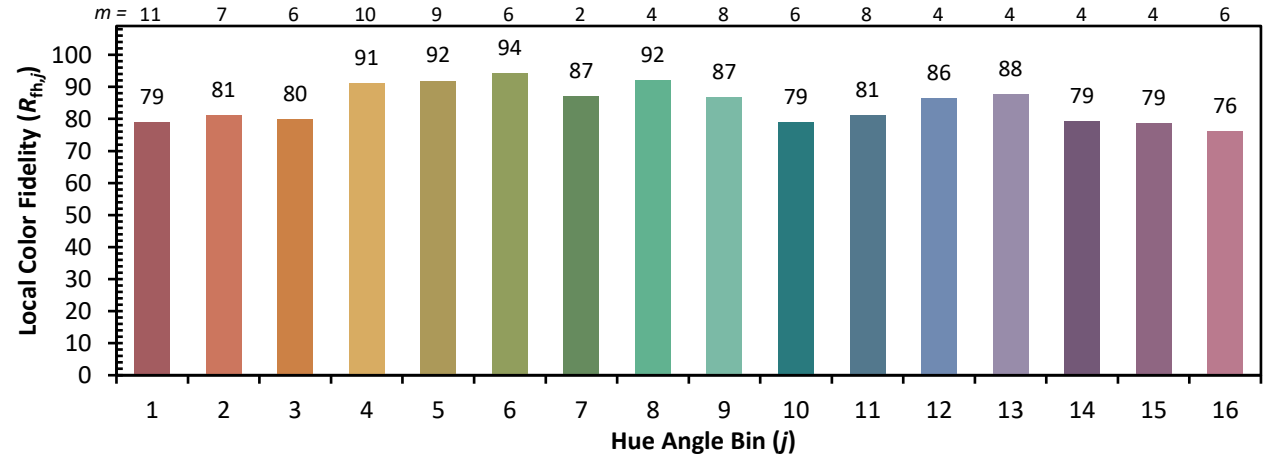
## Color Rendition by Hue-Angle Bin



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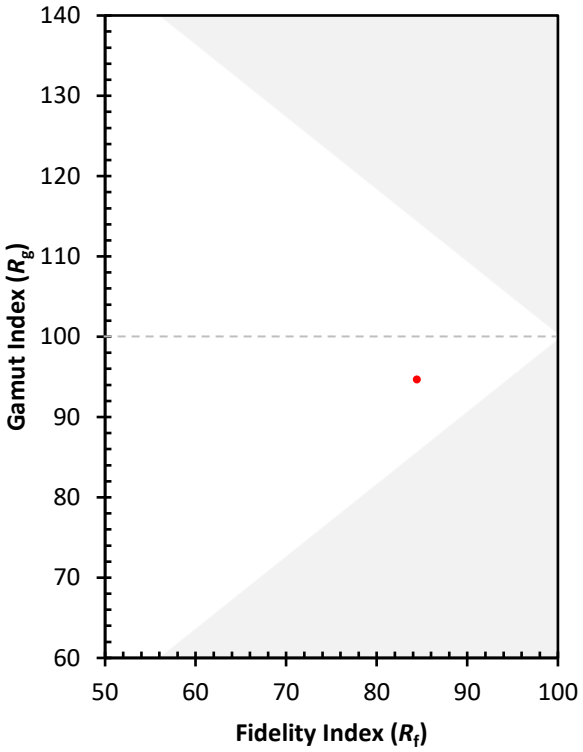
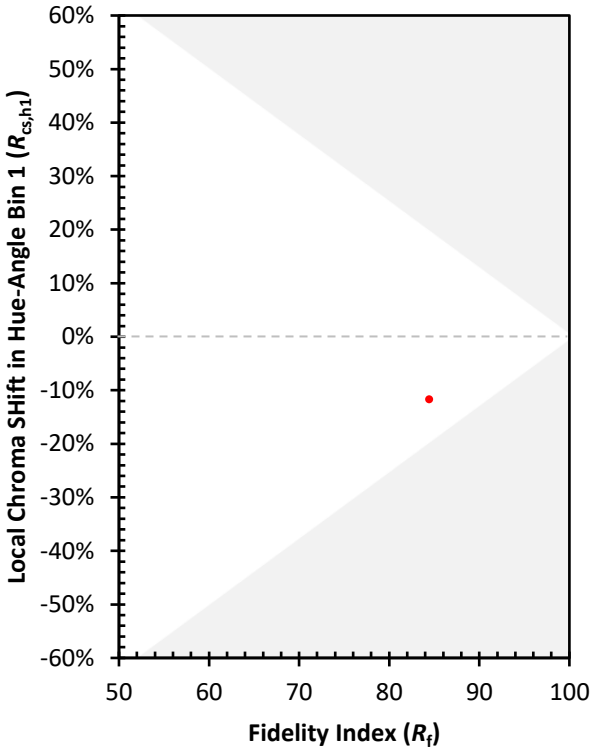
## Measure Comparisons

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