Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled data based on original data using

LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P638989

Luminaire Tested: GWS-SA4F-830-U-T2R-W-HSS

Issue Date: 1/10/2023

Report Generated By 670246102 / DESKTOP-G35701P

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled Data Report

**Test Information**

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | P638989 |
| | TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-14) |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Issue Date: | 1/10/2023 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | McGRAW-EDISON |
| Catalog Number: | GWS-SA4F-830-U-T2R-W-HSS |
| Description: | GALLEON WALL SLIM LUMINAIRE. (4) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II ROADWAY OPTICS WITH HOUSE SIDE SHIELD |
| Light Source: | (64) 3000K CCT, 80 CRI LEDS |
| Ballast/Driver: | - |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 21798.1 lumens |
| Efficiency: | N/A |
| Efficacy: | 96.8 lumens/watt |
| Luminous Opening: | Rectangular (W 1' x L: 1' x H: 0') |
| IES Classification: | Type II - Short |
| BUG Rating: | B1 - U0 - G3 |

| | |
|---|---|
| Input Watts (W): | 225.3 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | NR |
| Total Harmonic Distortion (THDi): | NR |
| Frequency (hertz): | 0 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 28.75 FT |

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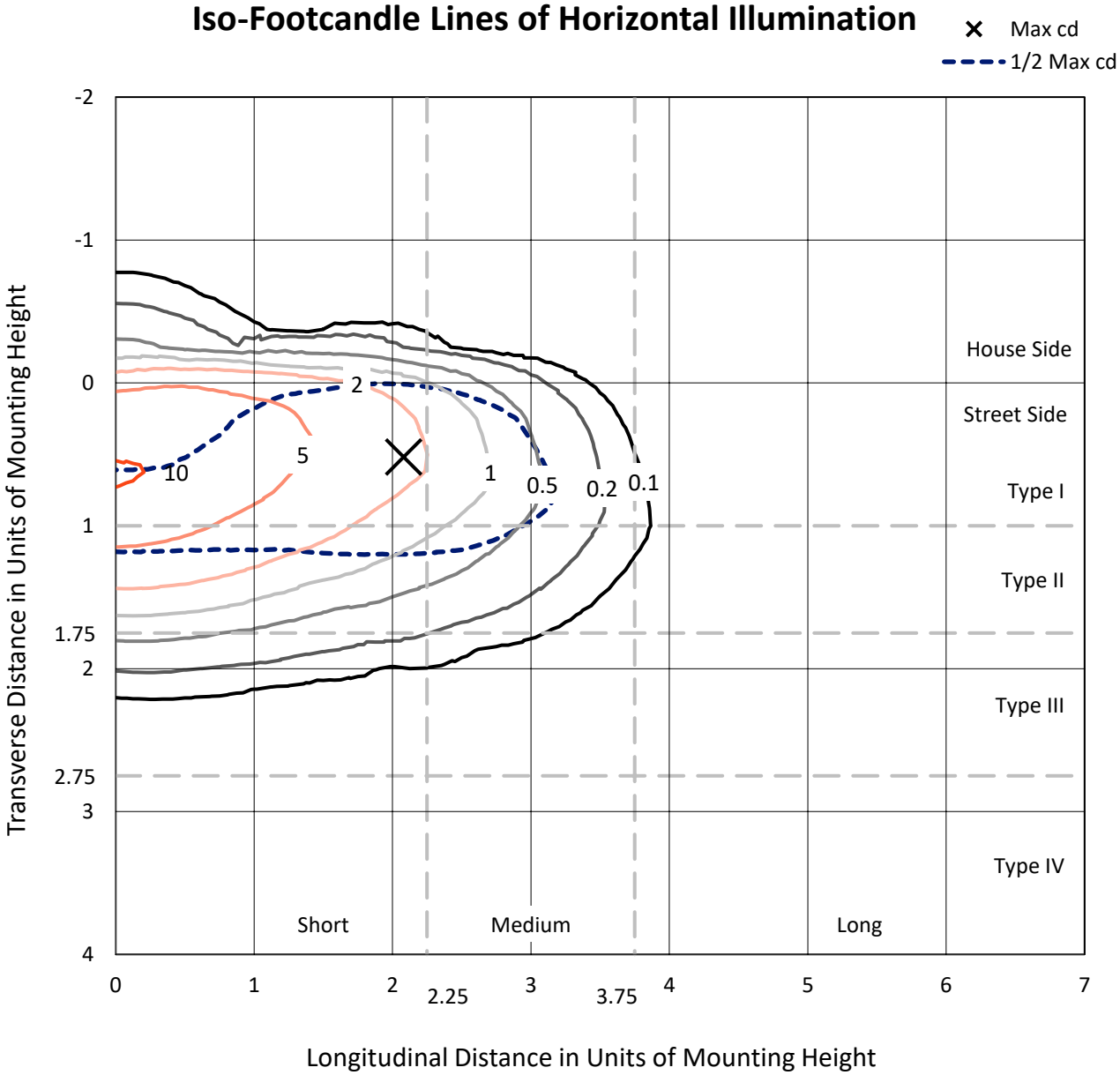
Scaled Data Report

REPORT NUMBER: P638989
CATALOG NUMBER: GWS-SA4F-830-U-T2R-W-HSS

## Iso-Footcandle Lines of Horizontal Illumination




Based on 25 foot mounting height. Maximum calculated value = 10.4 fc
Type II - Short - N/A

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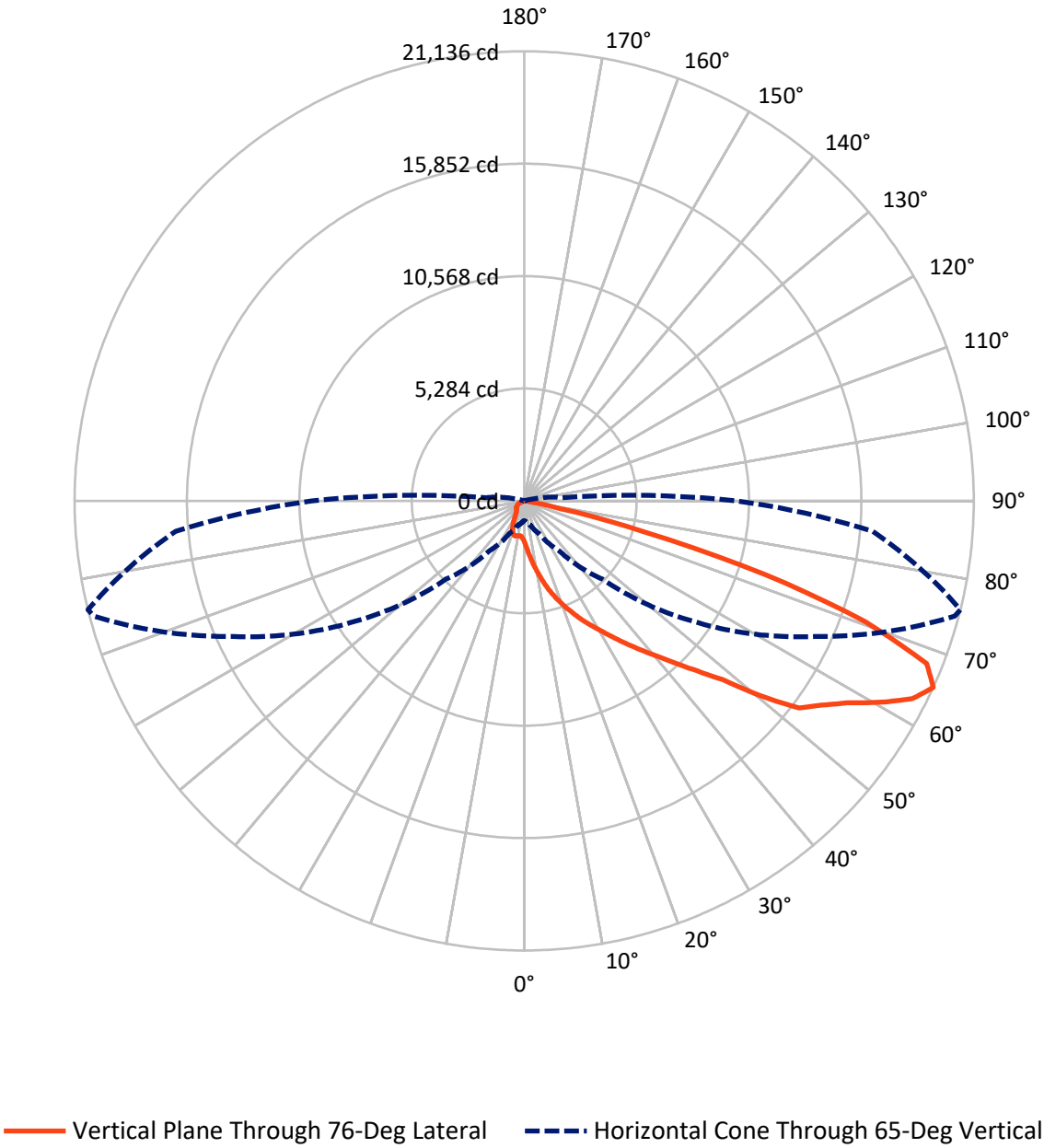
## Luminous Intensity Polar Plot



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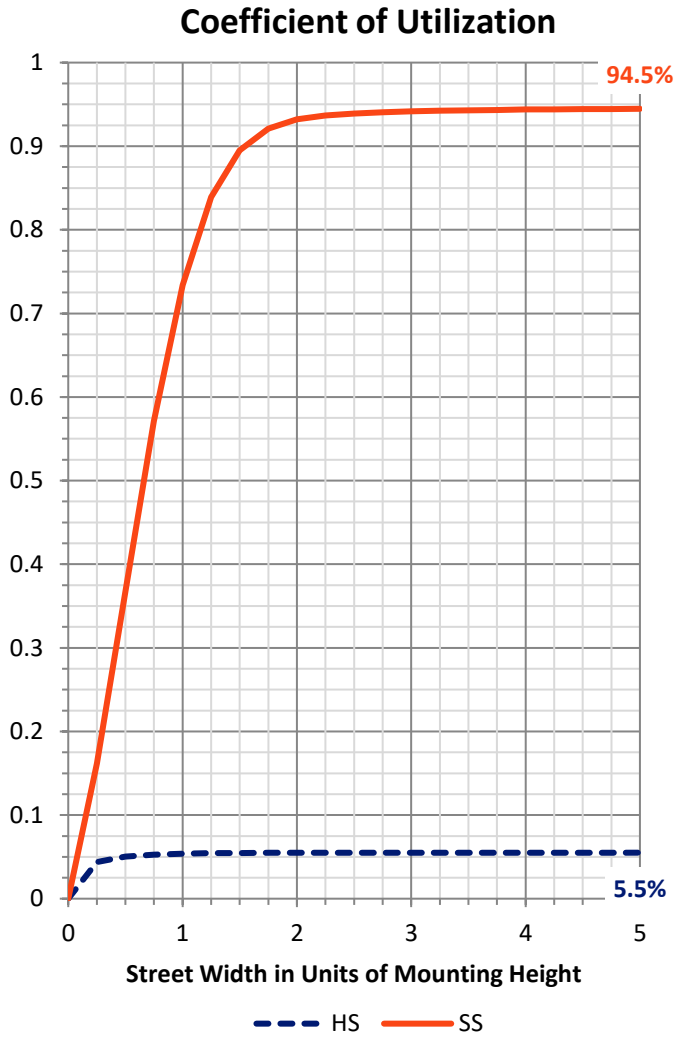
REPORT NUMBER: P638989
CATALOG NUMBER: GWS-SA4F-830-U-T2R-W-HSS

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 1205.3 | 0.0 | 1205.3 |
| | % Fixture | 5.5 | 0.0 | 5.5 |
| **Street Side** | Lumens | 20592.8 | 0.0 | 20592.8 |
| | % Fixture | 94.5 | 0.0 | 94.5 |
| **Total** | Lumens | 21798.1 | 0.0 | 21798.1 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 234.8 | 1.1 |
| 10°-20° | 890.9 | 4.1 |
| 20°-30° | 1817.5 | 8.3 |
| 30°-40° | 3232.6 | 14.8 |
| 40°-50° | 4778.5 | 21.9 |
| 50°-60° | 5471.0 | 25.1 |
| 60°-70° | 4174.1 | 19.1 |
| 70°-80° | 1169.3 | 5.4 |
| 80°-90° | 29.4 | 0.1 |
| 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° | 21798.1 | 100.0 |
| 0°-180° | 21798.1 | 100.0 |



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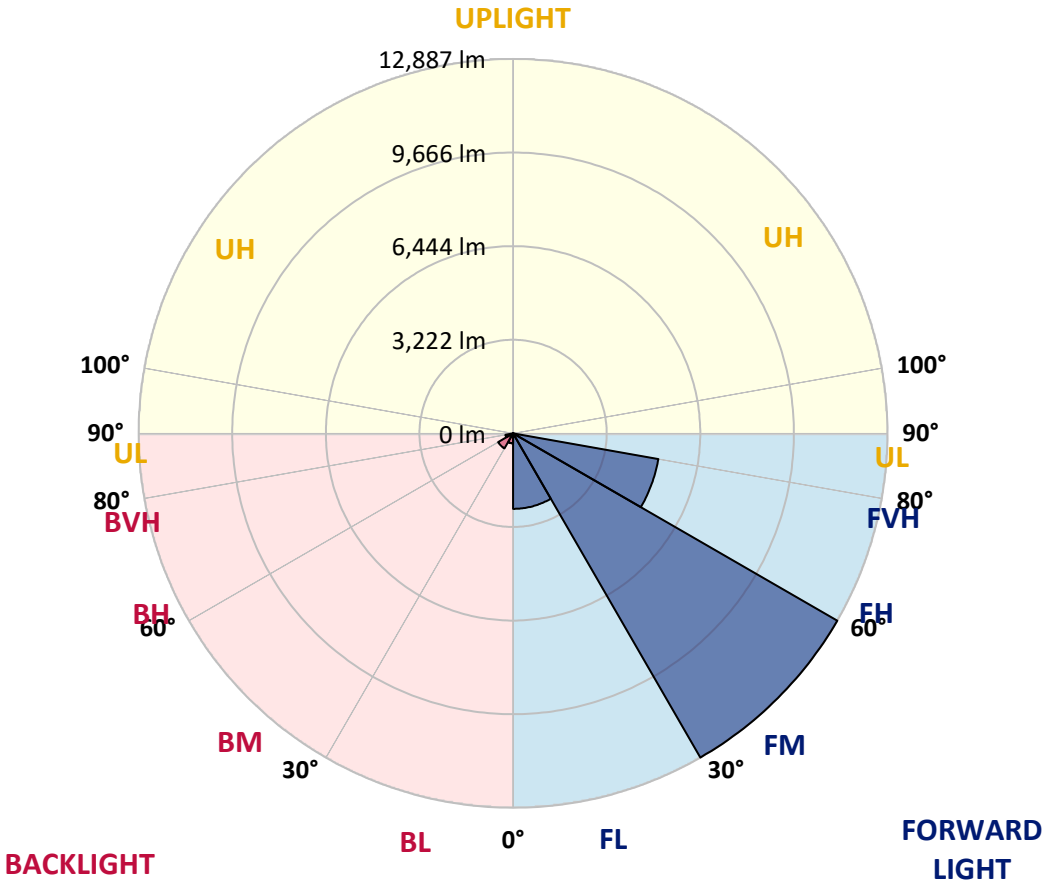
REPORT NUMBER: P638989
CATALOG NUMBER: GWS-SA4F-830-U-T2R-W-HSS

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 2599.3 | 11.9 | | | |
| FM | (30°-60°) | 12887.4 | 59.1 | | | |
| FH | (60°-80°) | 5078.4 | 23.3 | | | G3/7500 |
| FVH | (80°-90°) | 27.7 | 0.1 | | | G1/100 |
| BL | (0°-30°) | 343.9 | 1.6 | B1/500 | | |
| BM | (30°-60°) | 594.7 | 2.7 | B1/1000 | | |
| BH | (60°-80°) | 265.0 | 1.2 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 1.7 | 0.0 | | | G0/10 |
| UL | (90°-100°) | 0.0 | 0.0 | | U0/0 | |
| UH | (100°-180°) | 0.0 | 0.0 | | U0/0 | |

**BUG Rating: B1-U0-G3**
Type II Short



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REPORT NUMBER: P638989
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**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 76° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | *1929.9* | 1929.9 |
| 2.5° | 2974.3 | 3018.9 | 2984.0 | 2925.9 | 2813.5 | 2705.0 | 2565.5 | 2373.7 | 2220.6 | *2201.2* | 2057.8 |
| 5° | 4016.8 | 4012.9 | 3937.4 | 3861.8 | 3743.6 | 3557.6 | 3276.6 | 2920.1 | 2577.1 | *2548.0* | 2226.4 |
| 7.5° | 4636.9 | 4642.7 | 4600.0 | 4541.9 | 4425.7 | 4233.8 | 3941.2 | 3511.1 | 3009.2 | *2951.1* | 2457.0 |
| 10° | 5158.1 | 5156.2 | 5125.2 | 5098.0 | 4993.4 | 4865.5 | 4551.6 | 4078.8 | 3474.3 | *3383.2* | 2714.7 |
| 12.5° | 5549.5 | 5563.1 | 5578.6 | 5605.7 | 5561.1 | 5435.2 | 5138.7 | 4623.3 | 3945.1 | *3844.4* | 3009.2 |
| 15° | 5859.5 | 5863.4 | 5921.5 | 6026.2 | 6063.0 | 5997.1 | 5727.8 | 5150.3 | 4410.2 | *4323.0* | 3348.3 |
| 17.5° | 5952.5 | 5960.3 | 6059.1 | 6250.9 | 6444.7 | 6481.5 | 6278.1 | 5681.3 | 4867.4 | *4774.4* | 3677.7 |
| 20° | 6148.3 | 6165.7 | 6239.3 | 6407.9 | 6652.0 | 6849.7 | 6770.2 | 6218.0 | 5324.7 | *5202.7* | 4014.9 |
| 22.5° | 6764.4 | 6774.1 | 6748.9 | 6770.2 | 6896.2 | 7124.8 | 7173.3 | 6737.3 | 5793.7 | *5663.8* | 4379.2 |
| 25° | 7824.3 | 7828.2 | 7651.9 | 7485.2 | 7390.3 | 7432.9 | 7539.5 | 7215.9 | 6258.7 | *6130.8* | 4718.2 |
| 27.5° | 8924.9 | 8938.5 | 8727.3 | 8444.4 | 8105.3 | 7911.5 | 7880.5 | 7653.8 | 6727.6 | *6586.2* | 5053.5 |
| 30° | 9961.6 | 9961.6 | 9738.8 | 9393.9 | 8940.4 | 8562.6 | 8339.8 | 8095.6 | 7229.5 | *7074.5* | 5396.4 |
| 32.5° | 10893.6 | 10885.9 | 10601.0 | 10227.1 | 9779.5 | 9364.8 | 8895.9 | 8556.8 | 7787.5 | *7615.1* | 5791.7 |
| 35° | 11662.9 | 11643.5 | 11319.9 | 10961.4 | 10482.8 | 10174.7 | 9651.6 | 9052.8 | 8392.1 | *8219.6* | 6198.6 |
| 37.5° | 12244.2 | 12222.9 | 11926.4 | 11546.6 | 11102.9 | 10903.3 | 10465.4 | 9647.7 | 9029.6 | *8872.6* | 6650.1 |
| 40° | 12560.0 | 12517.4 | 12312.0 | 12029.1 | 11657.1 | 11482.7 | 11300.5 | 10386.0 | 9779.5 | *9583.8* | 7183.0 |
| 42.5° | 12653.0 | 12602.7 | 12467.0 | 12335.3 | 12110.5 | 11972.9 | 12168.6 | 11219.2 | 10603.0 | *10434.4* | 7791.4 |
| 45° | 12377.9 | 12348.8 | 12337.2 | 12432.1 | 12472.8 | 12511.6 | 12994.1 | 12141.5 | 11511.7 | *11383.9* | 8556.8 |
| 47.5° | 11715.2 | 11707.4 | 11810.1 | 12205.4 | 12635.6 | 13044.4 | 13891.2 | 13278.9 | 12689.9 | *12552.3* | 9626.4 |
| 50° | 10490.6 | 10570.0 | 10856.8 | 11550.5 | 12410.8 | 13346.7 | 14730.2 | 14856.2 | 14596.5 | *14395.0* | 11021.5 |
| 52.5° | 8576.2 | 8729.2 | 9372.5 | 10426.6 | 11662.9 | 13261.5 | 15117.8 | 16119.5 | 16385.0 | *16175.7* | 12021.4 |
| 55° | 6729.6 | 6872.9 | 7446.5 | 8783.5 | 10432.5 | 12612.3 | 15135.2 | 16555.5 | 17134.9 | *16941.1* | 12697.6 |
| 57.5° | 5012.8 | 5144.5 | 5665.8 | 6944.6 | 8758.3 | 11335.4 | 14720.5 | 16797.7 | 18024.3 | *17900.3* | 13765.3 |
| 60° | 3276.6 | 3406.4 | 3877.3 | 4995.3 | 6793.5 | 9475.2 | 13699.4 | 16747.3 | 19235.3 | *19223.7* | 15077.1 |
| 62.5° | 1817.5 | 1920.2 | 2261.3 | 3133.2 | 4741.5 | 7338.0 | 12095.0 | 16241.6 | 20407.6 | *20481.3* | 16158.3 |
| 65° | *930.1* | *996.0* | *1203.3* | *1722.6* | *2869.7* | *5202.7* | *9984.9* | *15082.9* | *20950.2* | *21136.2* | *16443.1* |
| 67.5° | 608.4 | 629.7 | 680.1 | 895.2 | 1536.6 | 3272.7 | 7514.3 | 13224.6 | 20186.7 | *20403.7* | 15487.9 |
| 70° | 494.1 | 511.5 | 540.6 | 596.8 | 792.5 | 1738.1 | 4935.3 | 10562.3 | 16867.5 | *17014.7* | 12333.3 |
| 72.5° | 362.3 | 385.6 | 441.8 | 478.6 | 571.6 | 953.3 | 2567.4 | 6933.0 | 11583.4 | *11843.1* | 7750.7 |
| 75° | 267.4 | 281.0 | 327.5 | 377.8 | 467.0 | 602.6 | 982.4 | 3644.8 | 5981.6 | *5830.5* | 3255.3 |
| 77.5° | 160.8 | 170.5 | 209.3 | 242.2 | 333.3 | 375.9 | 343.0 | 1346.7 | 1819.5 | *1711.0* | 786.7 |
| 80° | 79.4 | 89.1 | 137.6 | 182.1 | 213.1 | 151.1 | 143.4 | 375.9 | 405.0 | *405.0* | 197.6 |
| 82.5° | 27.1 | 34.9 | 73.6 | 120.1 | 104.6 | 58.1 | 67.8 | 96.9 | 108.5 | *114.3* | 58.1 |
| 85° | 0.0 | 0.0 | 17.4 | 34.9 | 15.5 | 7.8 | 17.4 | 21.3 | 27.1 | *29.1* | 19.4 |
| 87.5° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 5.8 | *7.8* | 7.8 |
| 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: P638989
CATALOG NUMBER: GWS-SA4F-830-U-T2R-W-HSS

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 | 1929.9 |
| 2.5° | 1980.3 | 1889.2 | 1751.7 | 1627.6 | 1532.7 | 1443.6 | 1375.8 | 1321.5 | 1311.8 | 1280.8 | 1284.7 |
| 5° | 2069.4 | 1904.7 | 1650.9 | 1455.2 | 1317.6 | 1224.6 | 1147.1 | 1089.0 | 1063.8 | 1038.6 | 1019.2 |
| 7.5° | 2207.0 | 1968.7 | 1612.1 | 1373.8 | 1213.0 | 1069.6 | 949.5 | 852.6 | 806.1 | 777.0 | 757.6 |
| 10° | 2375.6 | 2057.8 | 1614.1 | 1325.4 | 1087.0 | 868.1 | 703.4 | 596.8 | 546.4 | 530.9 | 529.0 |
| 12.5° | 2577.1 | 2170.2 | 1629.6 | 1245.9 | 904.9 | 645.2 | 521.2 | 472.8 | 457.3 | 443.7 | 443.7 |
| 15° | 2790.3 | 2296.1 | 1629.6 | 1100.6 | 689.8 | 503.8 | 451.5 | 420.5 | 401.1 | 393.3 | 389.5 |
| 17.5° | 3015.0 | 2414.3 | 1590.8 | 901.0 | 529.0 | 443.7 | 401.1 | 372.0 | 356.5 | 344.9 | 341.0 |
| 20° | 3255.3 | 2526.7 | 1493.9 | 689.8 | 453.4 | 397.2 | 356.5 | 327.5 | 312.0 | 300.3 | 300.3 |
| 22.5° | 3499.4 | 2631.4 | 1337.0 | 530.9 | 401.1 | 352.7 | 313.9 | 286.8 | 271.3 | 259.6 | 259.6 |
| 25° | 3726.2 | 2701.1 | 1135.5 | 437.9 | 362.3 | 313.9 | 279.0 | 251.9 | 234.5 | 226.7 | 222.8 |
| 27.5° | 3937.4 | 2745.7 | 912.6 | 385.6 | 325.5 | 281.0 | 244.1 | 219.0 | 205.4 | 199.6 | 195.7 |
| 30° | 4156.3 | 2757.3 | 697.6 | 350.7 | 294.5 | 248.0 | 213.1 | 193.8 | 182.1 | 174.4 | 174.4 |
| 32.5° | 4369.5 | 2743.8 | 532.9 | 321.7 | 267.4 | 219.0 | 189.9 | 172.5 | 162.8 | 157.0 | 155.0 |
| 35° | 4586.5 | 2681.7 | 432.1 | 296.5 | 240.3 | 191.8 | 168.6 | 155.0 | 149.2 | 141.5 | 141.5 |
| 37.5° | 4822.9 | 2598.4 | 375.9 | 271.3 | 213.1 | 172.5 | 151.1 | 141.5 | 133.7 | 127.9 | 125.9 |
| 40° | 5117.4 | 2501.5 | 344.9 | 250.0 | 188.0 | 155.0 | 135.6 | 125.9 | 120.1 | 114.3 | 112.4 |
| 42.5° | 5466.2 | 2406.6 | 329.4 | 226.7 | 168.6 | 137.6 | 122.1 | 110.4 | 104.6 | 96.9 | 94.9 |
| 45° | 5960.3 | 2385.3 | 312.0 | 201.5 | 151.1 | 124.0 | 106.6 | 94.9 | 87.2 | 81.4 | 79.4 |
| 47.5° | 6754.7 | 2445.3 | 282.9 | 174.4 | 133.7 | 108.5 | 91.1 | 81.4 | 71.7 | 65.9 | 62.0 |
| 50° | 7543.4 | 2429.8 | 253.8 | 151.1 | 118.2 | 93.0 | 77.5 | 67.8 | 58.1 | 52.3 | 50.4 |
| 52.5° | 7973.5 | 2356.2 | 226.7 | 133.7 | 102.7 | 79.4 | 65.9 | 54.3 | 48.4 | 42.6 | 40.7 |
| 55° | 8363.0 | 2327.2 | 199.6 | 116.3 | 87.2 | 69.8 | 54.3 | 44.6 | 40.7 | 34.9 | 32.9 |
| 57.5° | 9126.5 | 2395.0 | 176.3 | 100.8 | 75.6 | 60.1 | 46.5 | 36.8 | 32.9 | 27.1 | 25.2 |
| 60° | 9924.8 | 2402.7 | 151.1 | 87.2 | 65.9 | 50.4 | 36.8 | 29.1 | 25.2 | 19.4 | 17.4 |
| 62.5° | 10341.4 | 2207.0 | 124.0 | 73.6 | 54.3 | 42.6 | 31.0 | 23.3 | 19.4 | 11.6 | 11.6 |
| 65° | *9992.6* | *1784.6* | *104.6* | *60.1* | *42.6* | *32.9* | *23.3* | *17.4* | *11.6* | *5.8* | *1.9* |
| 67.5° | 8843.6 | 1269.2 | 87.2 | 48.4 | 31.0 | 23.3 | 17.4 | 11.6 | 1.9 | 0.0 | 0.0 |
| 70° | 6475.7 | 724.7 | 67.8 | 34.9 | 23.3 | 15.5 | 11.6 | 5.8 | 0.0 | 0.0 | 0.0 |
| 72.5° | 3980.0 | 387.5 | 50.4 | 23.3 | 17.4 | 11.6 | 9.7 | 3.9 | 0.0 | 0.0 | 0.0 |
| 75° | 1509.5 | 186.0 | 31.0 | 15.5 | 13.6 | 9.7 | 5.8 | 1.9 | 0.0 | 0.0 | 0.0 |
| 77.5° | 408.8 | 91.1 | 17.4 | 11.6 | 9.7 | 5.8 | 3.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80° | 106.6 | 42.6 | 11.6 | 7.8 | 5.8 | 3.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 82.5° | 36.8 | 19.4 | 5.8 | 5.8 | 3.9 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 85° | 15.5 | 7.8 | 3.9 | 3.9 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 87.5° | 5.8 | 1.9 | 1.9 | 1.9 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 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 |

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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

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

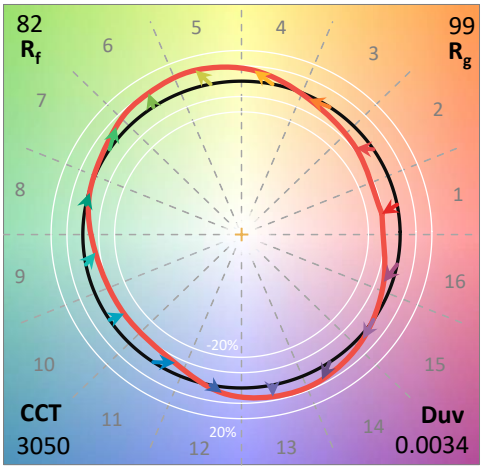
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2408-195-9 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 08/07/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | MCGRAW EDISON |
| Catalog Number: | **GALN-SB1A-830-U-5WQ** |
| Description: | GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 3050 | CRI (Ra): | 81.0 | | |
| CIE u': | 0.2476 | R1: | 79.6 | R9: | 7.1 |
| CIE v': | 0.5251 | R2: | 85.6 | R10: | 67.0 |
| Duv: | 0.0034 | R3: | 92.0 | R11: | 82.7 |
| CIE x: | 0.4383 | R4: | 82.6 | R12: | 63.2 |
| CIE y: | 0.4131 | R5: | 78.9 | R13: | 80.3 |
| CIE z: | 0.1487 | R6: | 81.7 | R14: | 95.0 |
| Peak Wavelength (nm): | 603 | R7: | 85.2 | R15: | 71.7 |
| Dominant Wavelength (nm): | 581 | R8: | 62.0 | | |
| Purity: | 55.55201 | | | | |

| | |
|---|---|
| Rf: | 81.5 |
| Rg: | 99.2 |




## Test Conditions

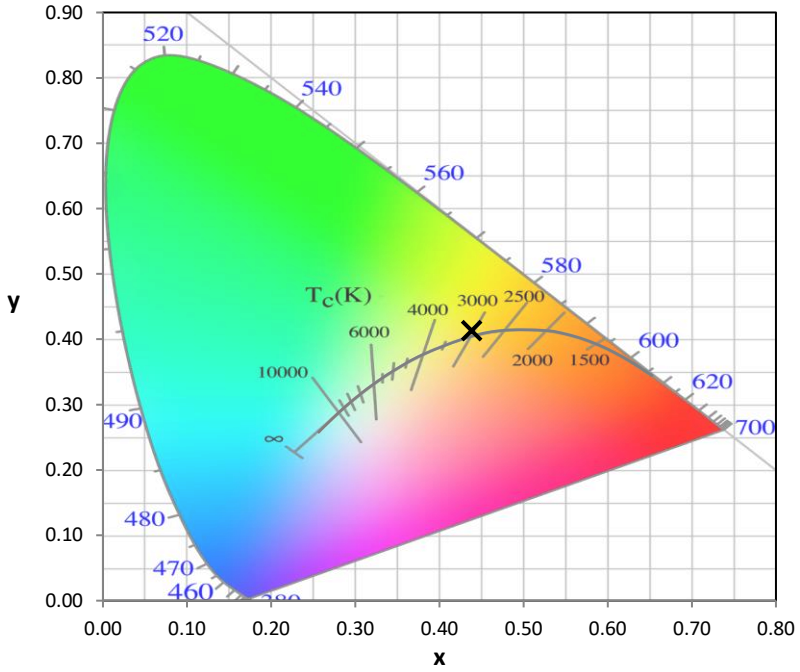
| | |
|---|---|
| Stabilization Time: | 20M |
| Operation Time: | 1H 20M |
| Sphere Temperature (°C): | 24.2 |

REPORT NUMBER: SP1-2408-195-9

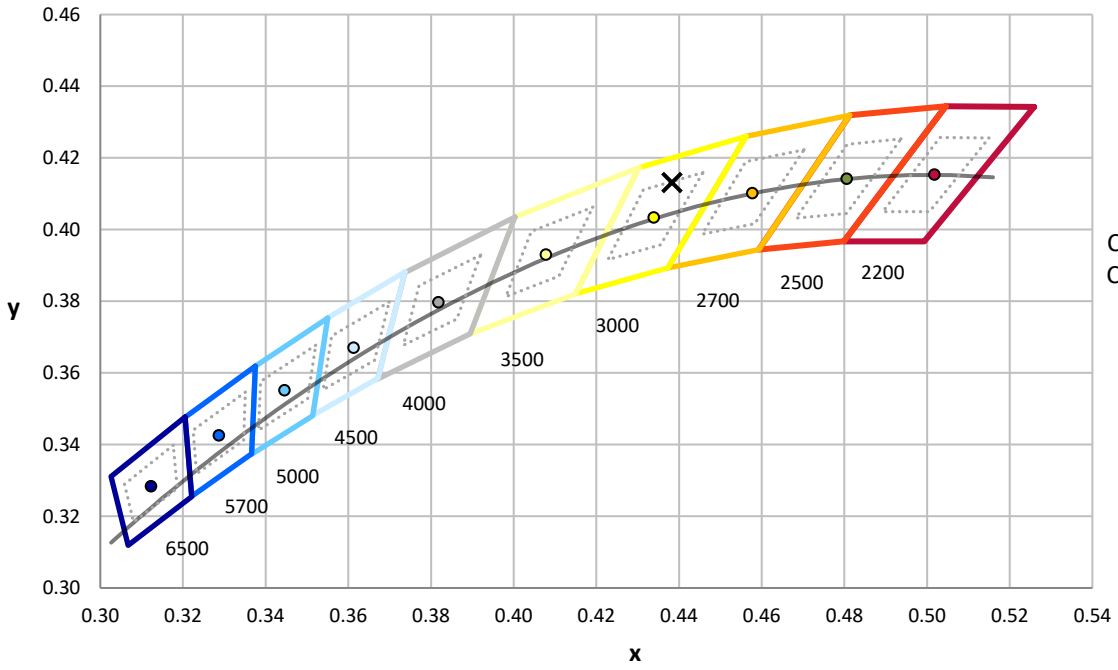
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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: SP1-2408-195-9

## CIE 1931 Chromaticity Diagram




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




CCT = 3050K
CIE x = 0.4383
CIE y = 0.4131
Duv = 0.0034

Point lies inside the ANSI 3000K 4-step quadrangle

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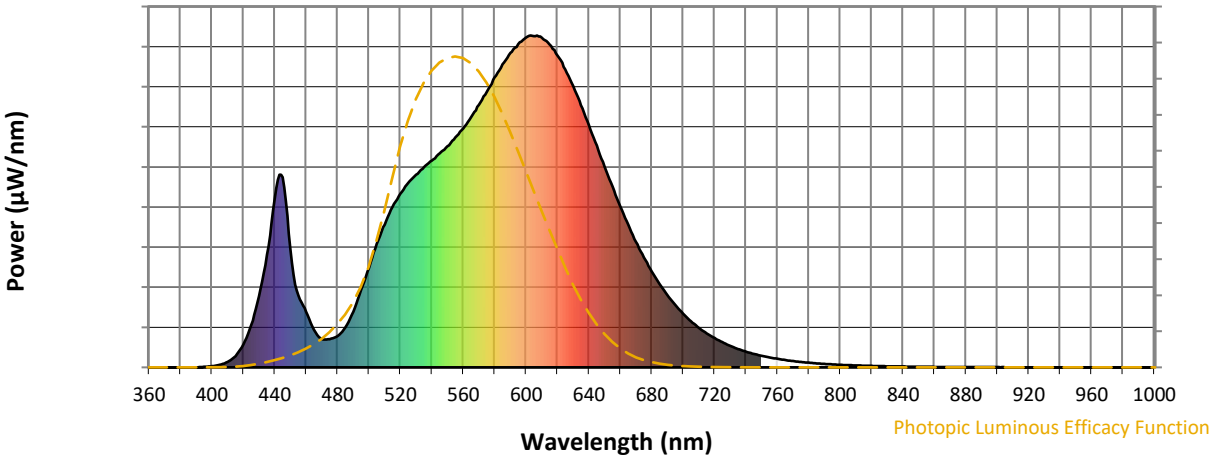
## Photopic Flux vs. Wavelength




## 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 | 168 | NR | 620 | 940 | NR | 750 | 35 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 233 | NR | 625 | 897 | NR | 755 | 30 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 300 | NR | 630 | 847 | NR | 760 | 26 | NR | 890 | 1 | NR |
| 375 | 0 | NR | 505 | 372 | NR | 635 | 790 | NR | 765 | 22 | NR | 895 | 1 | NR |
| 380 | 0 | NR | 510 | 430 | NR | 640 | 730 | NR | 770 | 19 | NR | 900 | 1 | NR |
| 385 | 0 | NR | 515 | 483 | NR | 645 | 668 | NR | 775 | 16 | NR | 905 | 1 | NR |
| 390 | 0 | NR | 520 | 524 | NR | 650 | 605 | NR | 780 | 14 | NR | 910 | 0 | NR |
| 395 | 2 | NR | 525 | 555 | NR | 655 | 545 | NR | 785 | 12 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 581 | NR | 660 | 485 | NR | 790 | 10 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 604 | NR | 665 | 430 | NR | 795 | 9 | NR | 925 | 0 | NR |
| 410 | 17 | NR | 540 | 623 | NR | 670 | 378 | NR | 800 | 8 | NR | 930 | 0 | NR |
| 415 | 34 | NR | 545 | 645 | NR | 675 | 331 | NR | 805 | 7 | NR | 935 | 0 | NR |
| 420 | 68 | NR | 550 | 667 | NR | 680 | 290 | NR | 810 | 6 | NR | 940 | 0 | NR |
| 425 | 128 | NR | 555 | 693 | NR | 685 | 251 | NR | 815 | 5 | NR | 945 | 0 | NR |
| 430 | 214 | NR | 560 | 719 | NR | 690 | 218 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 339 | NR | 565 | 754 | NR | 695 | 188 | NR | 825 | 4 | NR | 955 | 0 | NR |
| 440 | 507 | NR | 570 | 791 | NR | 700 | 162 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 573 | NR | 575 | 830 | NR | 705 | 139 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 356 | NR | 580 | 873 | NR | 710 | 119 | NR | 840 | 3 | NR | 970 | 0 | NR |
| 455 | 217 | NR | 585 | 913 | NR | 715 | 102 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 168 | NR | 590 | 948 | NR | 720 | 88 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 113 | NR | 595 | 974 | NR | 725 | 76 | NR | 855 | 2 | NR | 985 | 0 | NR |
| 470 | 85 | NR | 600 | 994 | NR | 730 | 65 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 85 | NR | 605 | 998 | NR | 735 | 55 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 94 | NR | 610 | 994 | NR | 740 | 47 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 120 | NR | 615 | 973 | NR | 745 | 41 | NR | 875 | 1 | NR | | | |

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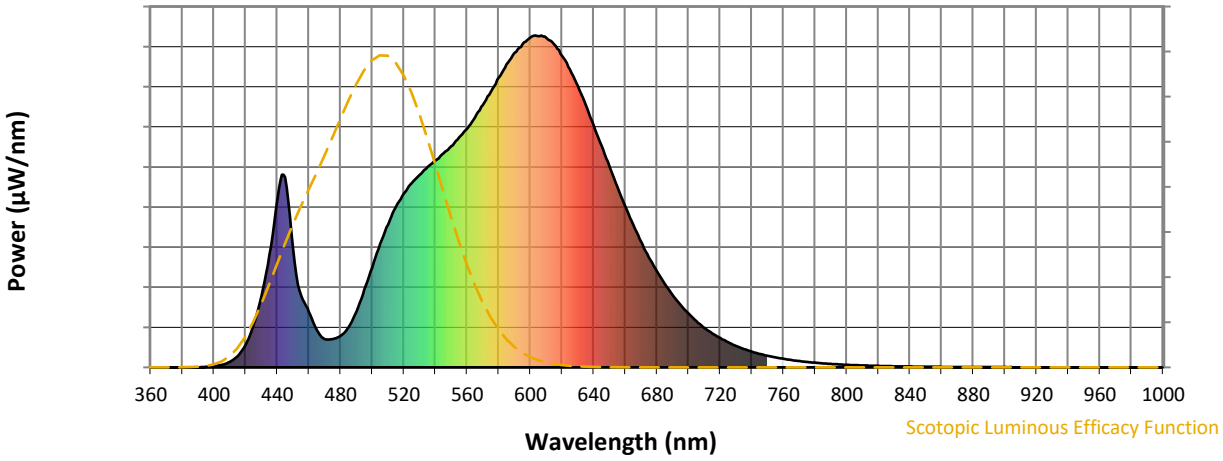
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 1.27**

| 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 | 168 | NR | 620 | 940 | NR | 750 | 35 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 233 | NR | 625 | 897 | NR | 755 | 30 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 300 | NR | 630 | 847 | NR | 760 | 26 | NR | 890 | 1 | NR |
| 375 | 0 | NR | 505 | 372 | NR | 635 | 790 | NR | 765 | 22 | NR | 895 | 1 | NR |
| 380 | 0 | NR | 510 | 430 | NR | 640 | 730 | NR | 770 | 19 | NR | 900 | 1 | NR |
| 385 | 0 | NR | 515 | 483 | NR | 645 | 668 | NR | 775 | 16 | NR | 905 | 1 | NR |
| 390 | 0 | NR | 520 | 524 | NR | 650 | 605 | NR | 780 | 14 | NR | 910 | 0 | NR |
| 395 | 2 | NR | 525 | 555 | NR | 655 | 545 | NR | 785 | 12 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 581 | NR | 660 | 485 | NR | 790 | 10 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 604 | NR | 665 | 430 | NR | 795 | 9 | NR | 925 | 0 | NR |
| 410 | 17 | NR | 540 | 623 | NR | 670 | 378 | NR | 800 | 8 | NR | 930 | 0 | NR |
| 415 | 34 | NR | 545 | 645 | NR | 675 | 331 | NR | 805 | 7 | NR | 935 | 0 | NR |
| 420 | 68 | NR | 550 | 667 | NR | 680 | 290 | NR | 810 | 6 | NR | 940 | 0 | NR |
| 425 | 128 | NR | 555 | 693 | NR | 685 | 251 | NR | 815 | 5 | NR | 945 | 0 | NR |
| 430 | 214 | NR | 560 | 719 | NR | 690 | 218 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 339 | NR | 565 | 754 | NR | 695 | 188 | NR | 825 | 4 | NR | 955 | 0 | NR |
| 440 | 507 | NR | 570 | 791 | NR | 700 | 162 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 573 | NR | 575 | 830 | NR | 705 | 139 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 356 | NR | 580 | 873 | NR | 710 | 119 | NR | 840 | 3 | NR | 970 | 0 | NR |
| 455 | 217 | NR | 585 | 913 | NR | 715 | 102 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 168 | NR | 590 | 948 | NR | 720 | 88 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 113 | NR | 595 | 974 | NR | 725 | 76 | NR | 855 | 2 | NR | 985 | 0 | NR |
| 470 | 85 | NR | 600 | 994 | NR | 730 | 65 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 85 | NR | 605 | 998 | NR | 735 | 55 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 94 | NR | 610 | 994 | NR | 740 | 47 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 120 | NR | 615 | 973 | NR | 745 | 41 | NR | 875 | 1 | NR | | | |

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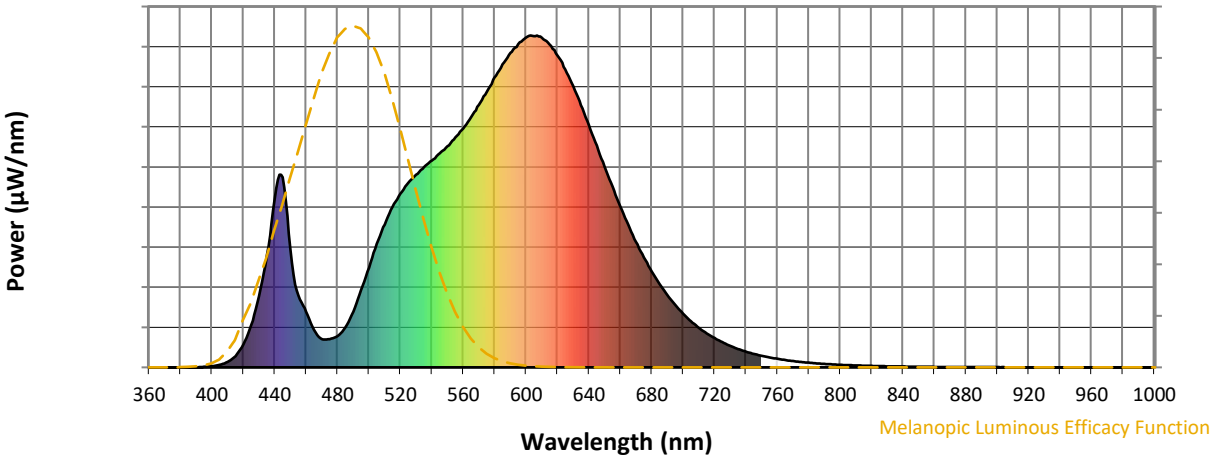
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 2.32**

| 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 | 168 | NR | 620 | 940 | NR | 750 | 35 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 233 | NR | 625 | 897 | NR | 755 | 30 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 300 | NR | 630 | 847 | NR | 760 | 26 | NR | 890 | 1 | NR |
| 375 | 0 | NR | 505 | 372 | NR | 635 | 790 | NR | 765 | 22 | NR | 895 | 1 | NR |
| 380 | 0 | NR | 510 | 430 | NR | 640 | 730 | NR | 770 | 19 | NR | 900 | 1 | NR |
| 385 | 0 | NR | 515 | 483 | NR | 645 | 668 | NR | 775 | 16 | NR | 905 | 1 | NR |
| 390 | 0 | NR | 520 | 524 | NR | 650 | 605 | NR | 780 | 14 | NR | 910 | 0 | NR |
| 395 | 2 | NR | 525 | 555 | NR | 655 | 545 | NR | 785 | 12 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 581 | NR | 660 | 485 | NR | 790 | 10 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 604 | NR | 665 | 430 | NR | 795 | 9 | NR | 925 | 0 | NR |
| 410 | 17 | NR | 540 | 623 | NR | 670 | 378 | NR | 800 | 8 | NR | 930 | 0 | NR |
| 415 | 34 | NR | 545 | 645 | NR | 675 | 331 | NR | 805 | 7 | NR | 935 | 0 | NR |
| 420 | 68 | NR | 550 | 667 | NR | 680 | 290 | NR | 810 | 6 | NR | 940 | 0 | NR |
| 425 | 128 | NR | 555 | 693 | NR | 685 | 251 | NR | 815 | 5 | NR | 945 | 0 | NR |
| 430 | 214 | NR | 560 | 719 | NR | 690 | 218 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 339 | NR | 565 | 754 | NR | 695 | 188 | NR | 825 | 4 | NR | 955 | 0 | NR |
| 440 | 507 | NR | 570 | 791 | NR | 700 | 162 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 573 | NR | 575 | 830 | NR | 705 | 139 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 356 | NR | 580 | 873 | NR | 710 | 119 | NR | 840 | 3 | NR | 970 | 0 | NR |
| 455 | 217 | NR | 585 | 913 | NR | 715 | 102 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 168 | NR | 590 | 948 | NR | 720 | 88 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 113 | NR | 595 | 974 | NR | 725 | 76 | NR | 855 | 2 | NR | 985 | 0 | NR |
| 470 | 85 | NR | 600 | 994 | NR | 730 | 65 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 85 | NR | 605 | 998 | NR | 735 | 55 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 94 | NR | 610 | 994 | NR | 740 | 47 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 120 | NR | 615 | 973 | NR | 745 | 41 | NR | 875 | 1 | NR | | | |

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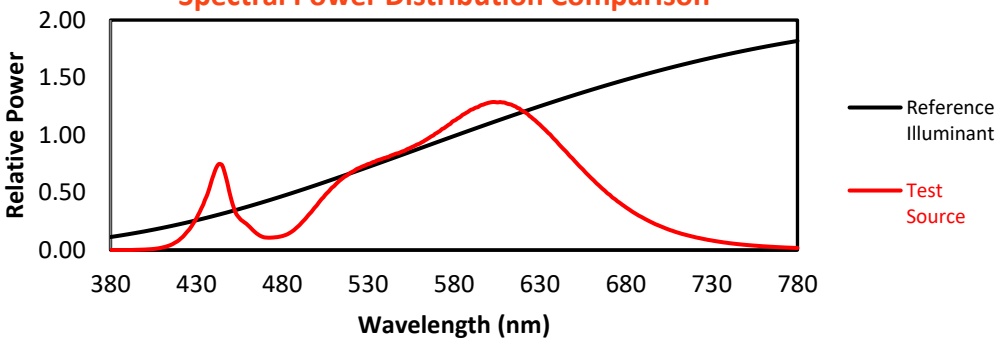
# TM-30-18

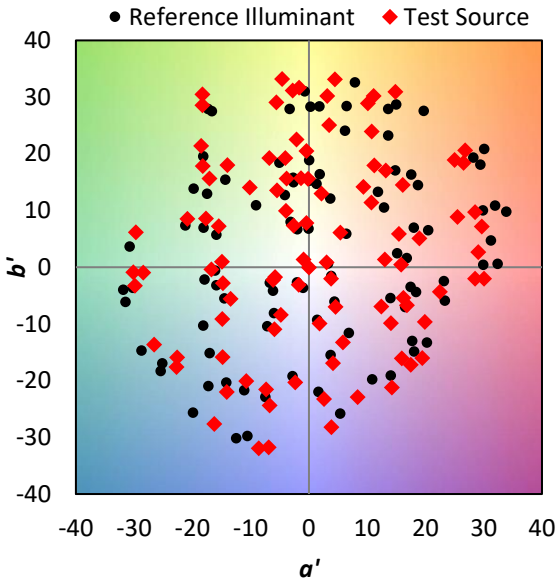
## Summary

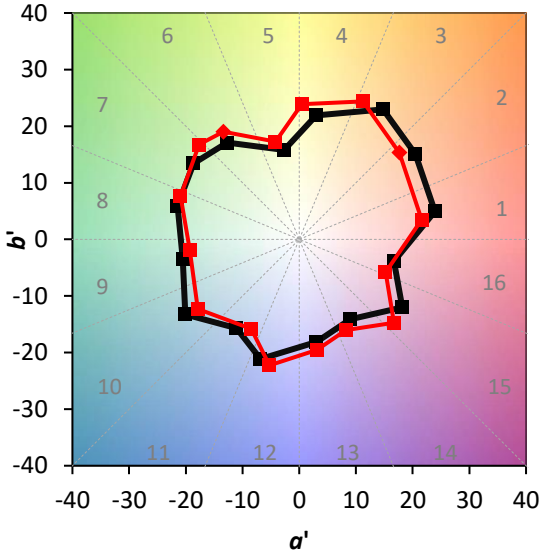
$R_f$ = 81.5
$R_g$ = 99.2
CIE $R_a$ = 81.0
$R_9$ = 7.1

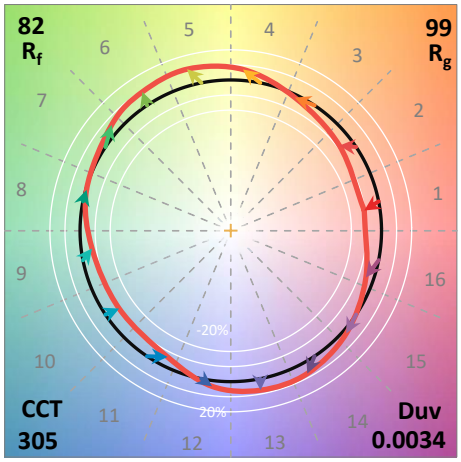
## Spectral Power Distribution Comparison

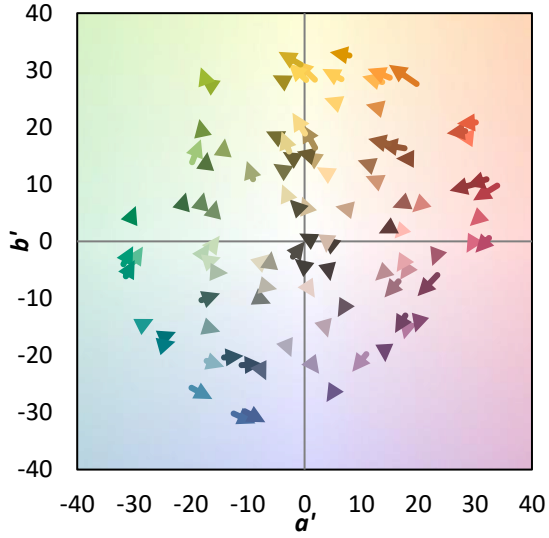



## Color Vector Graphics



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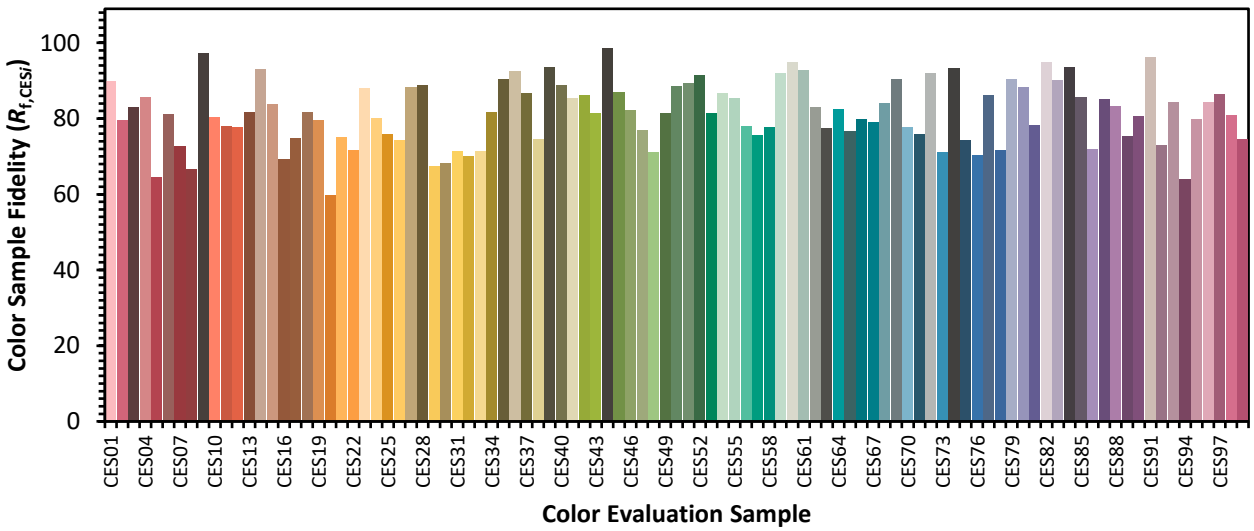
# TM-30-18

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

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 | |



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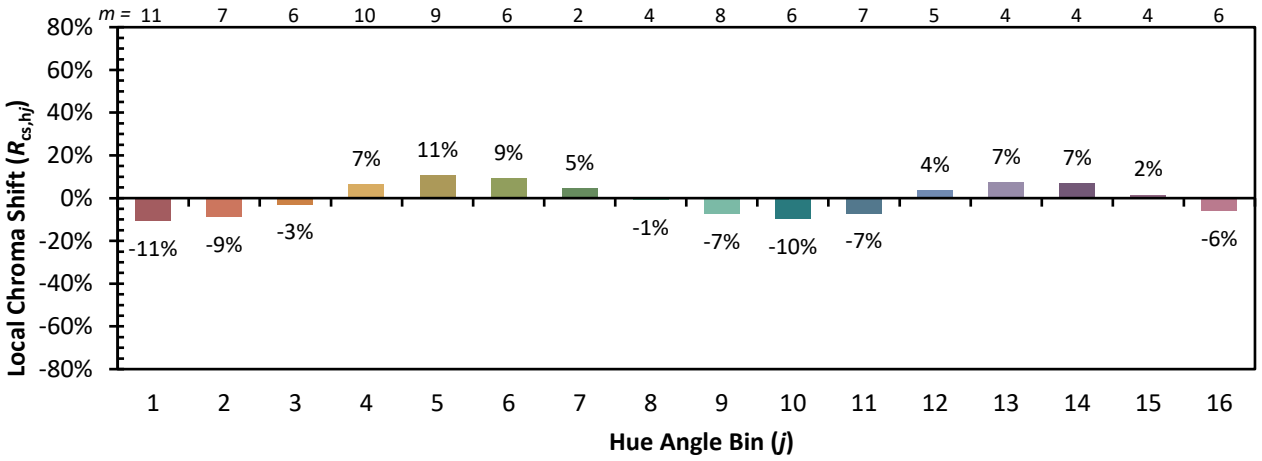
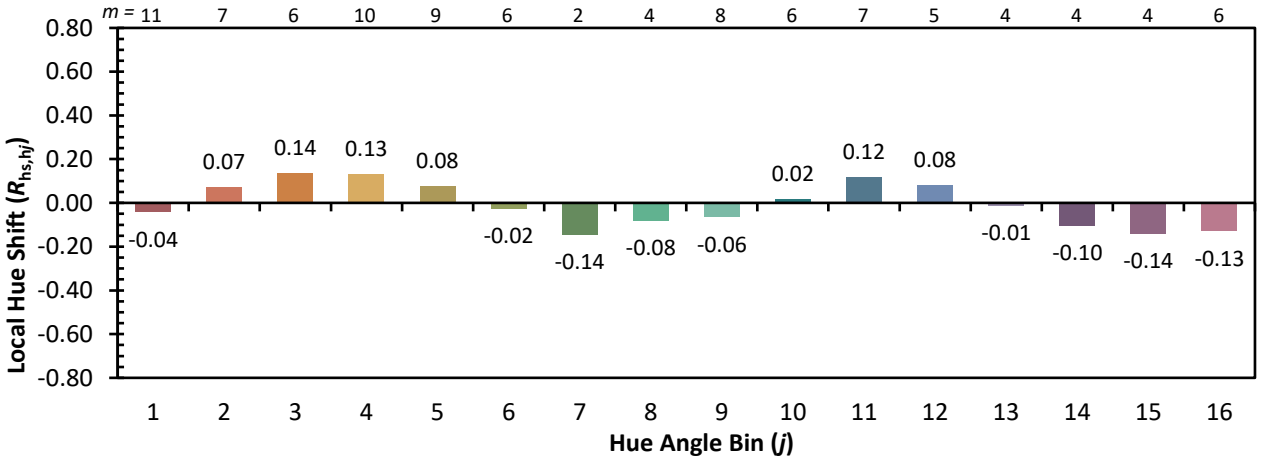
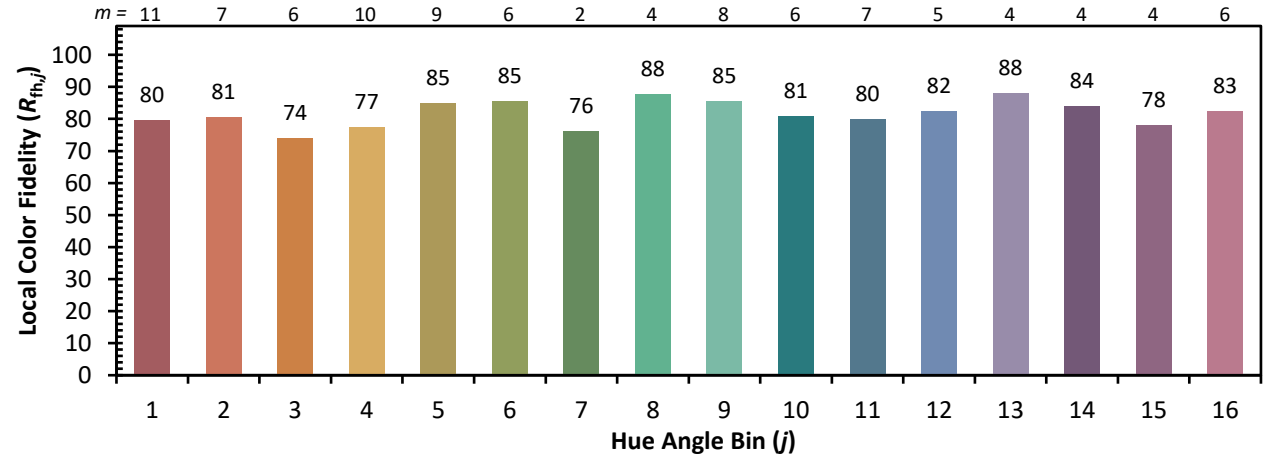
## Color Rendition by Hue-Angle Bin



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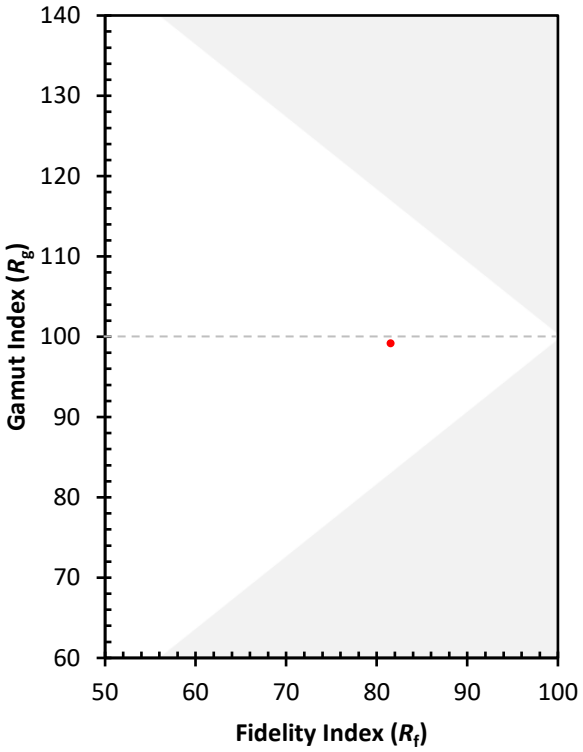
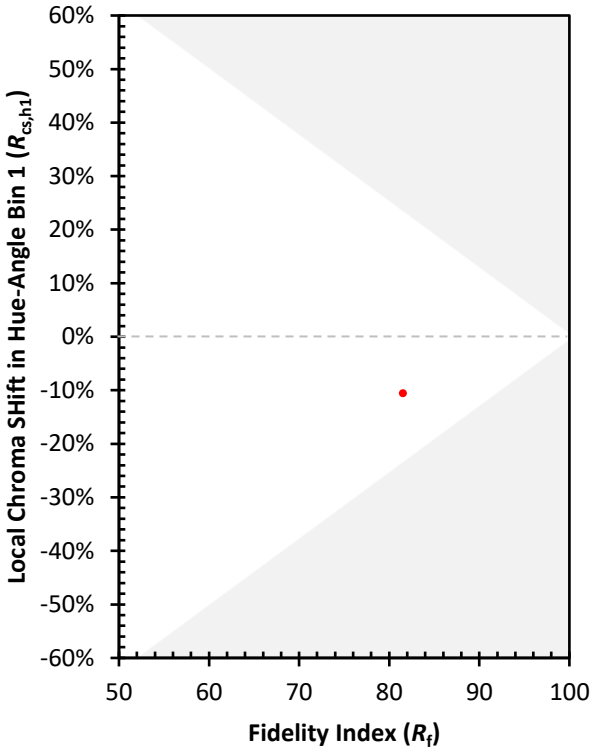
## TM-30-18

### Measure Comparisons

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