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: P630021

Luminaire Tested: GWS-SA1C-827-U-T2-W

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: | P630021 |
| | TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-19) |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Issue Date: | 1/10/2023 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | McGRAW-EDISON |
| Catalog Number: | GWS-SA1C-827-U-T2-W |
| Description: | GALLEON WALL SLIM LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II OPTICS |
| Light Source: | (16) 2700K CCT, 80 CRI LEDS |
| Ballast/Driver: | - |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 3505.6 lumens |
| Efficiency: | N/A |
| Efficacy: | 102.8 lumens/watt |
| Luminous Opening: | Rectangular (W 0.5' x L: 0.5' x H: 0') |
| IES Classification: | Type II - Medium |
| BUG Rating: | B1 - U0 - G1 |

| | |
|---|---|
| Input Watts (W): | 34.1 |
| 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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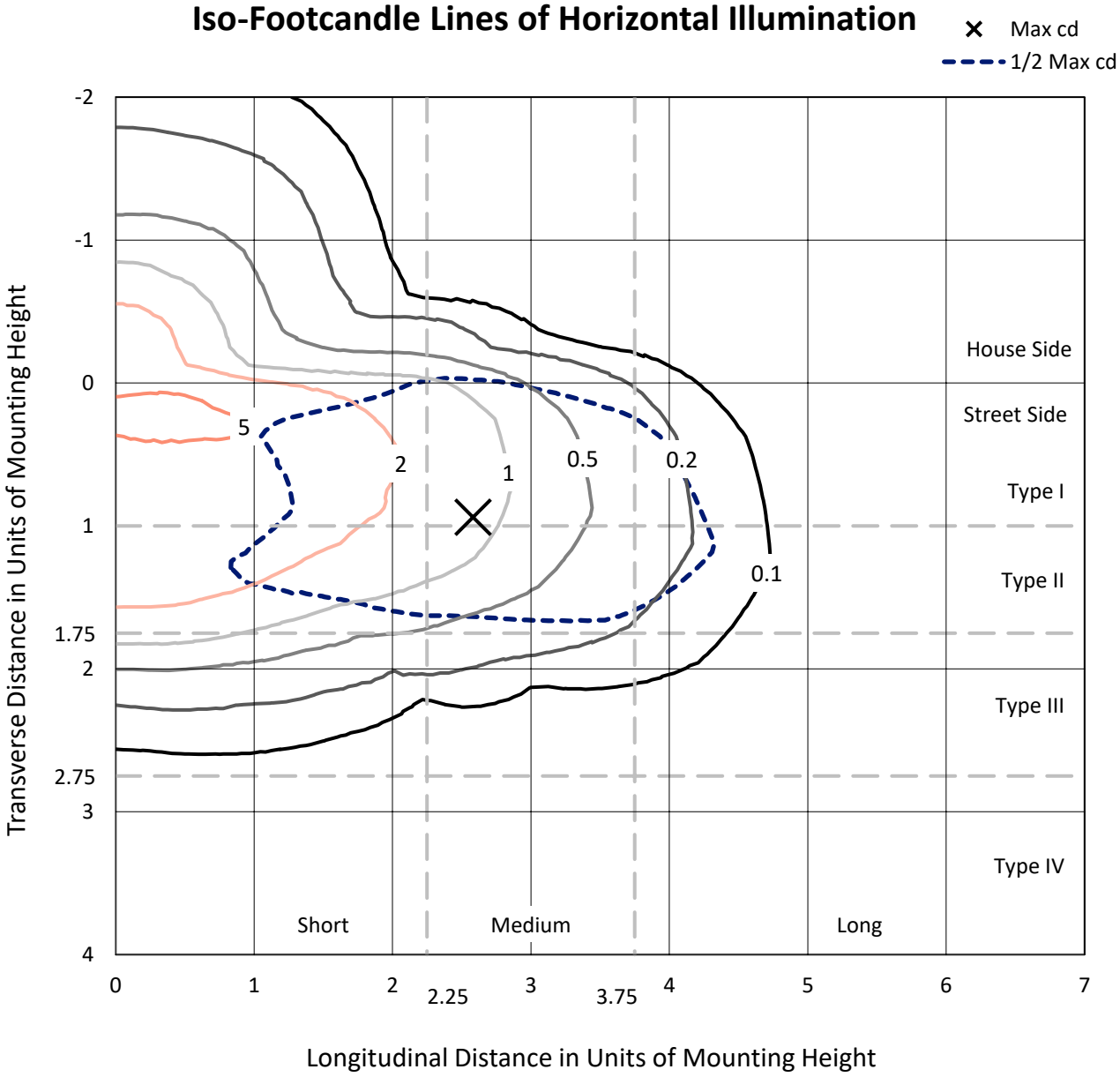
Scaled Data Report

REPORT NUMBER: P630021
CATALOG NUMBER: GWS-SA1C-827-U-T2-W

## Iso-Footcandle Lines of Horizontal Illumination




Based on 10 foot mounting height. Maximum calculated value = 5.9 fc
Type II - Medium - N/A

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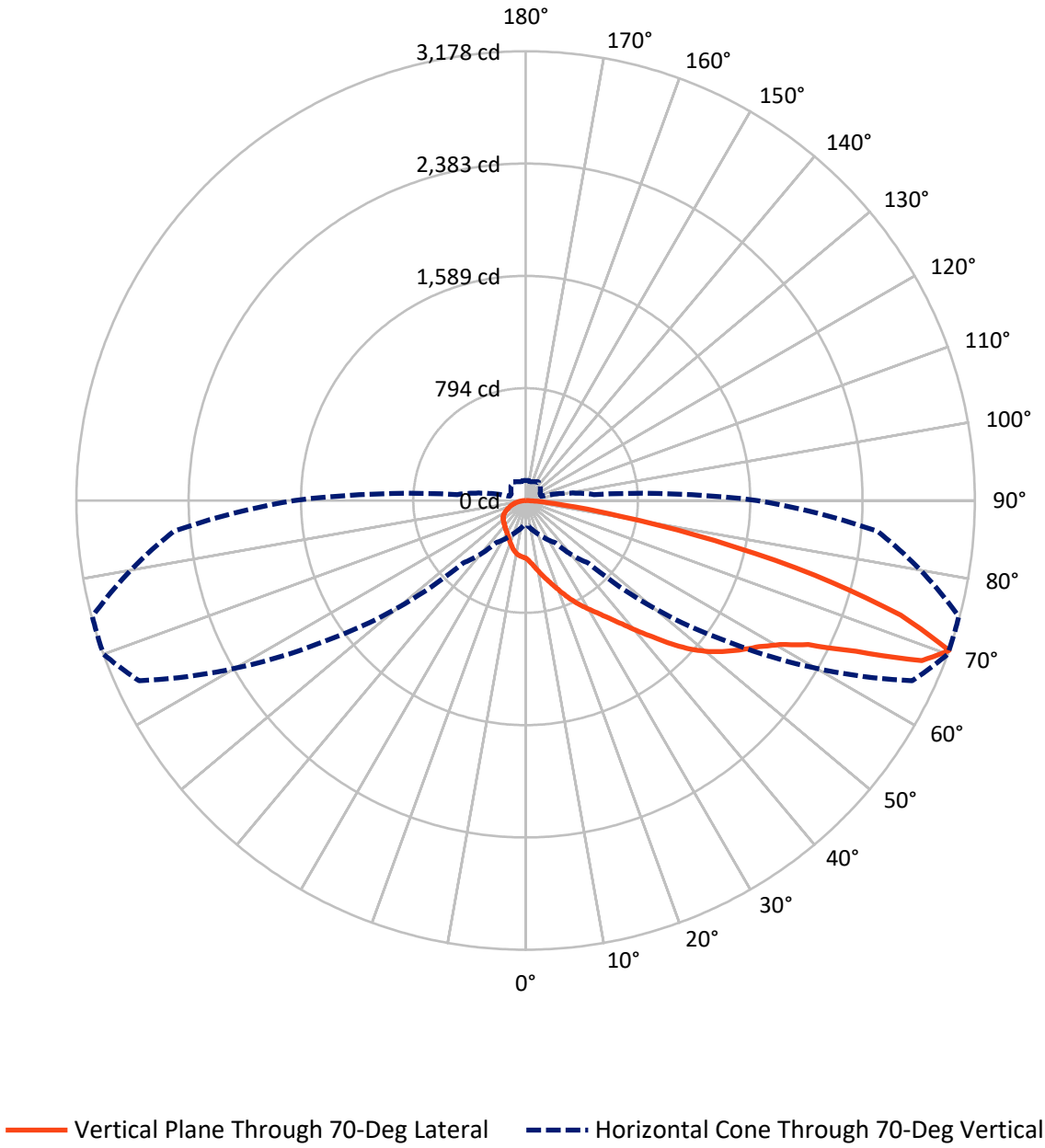
REPORT NUMBER: P630021
CATALOG NUMBER: GWS-SA1C-827-U-T2-W

## Luminous Intensity Polar Plot



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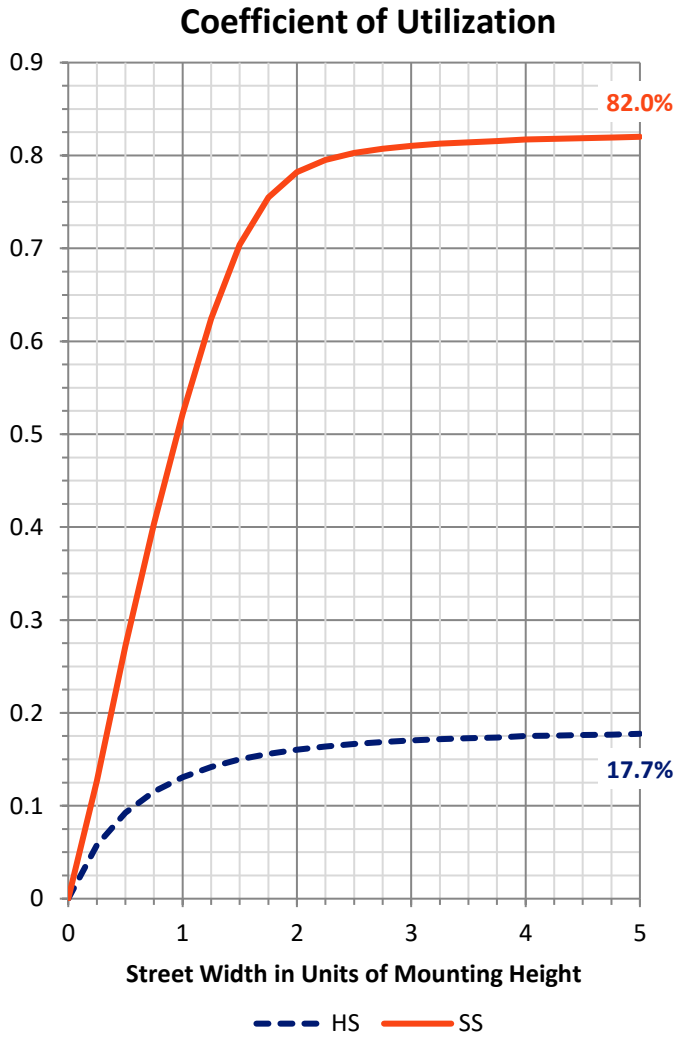
CATALOG NUMBER: GWS-SA1C-827-U-T2-W

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 628.2 | 0.0 | 628.2 |
| | % Fixture | 17.9 | 0.0 | 17.9 |
| **Street Side** | Lumens | 2877.4 | 0.0 | 2877.4 |
| | % Fixture | 82.1 | 0.0 | 82.1 |
| **Total** | Lumens | 3505.6 | 0.0 | 3505.6 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 41.6 | 1.2 |
| 10°-20° | 135.2 | 3.9 |
| 20°-30° | 239.5 | 6.8 |
| 30°-40° | 360.4 | 10.3 |
| 40°-50° | 545.2 | 15.6 |
| 50°-60° | 781.1 | 22.3 |
| 60°-70° | 863.4 | 24.6 |
| 70°-80° | 487.2 | 13.9 |
| 80°-90° | 52.1 | 1.5 |
| 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° | 3505.6 | 100.0 |
| 0°-180° | 3505.6 | 100.0 |



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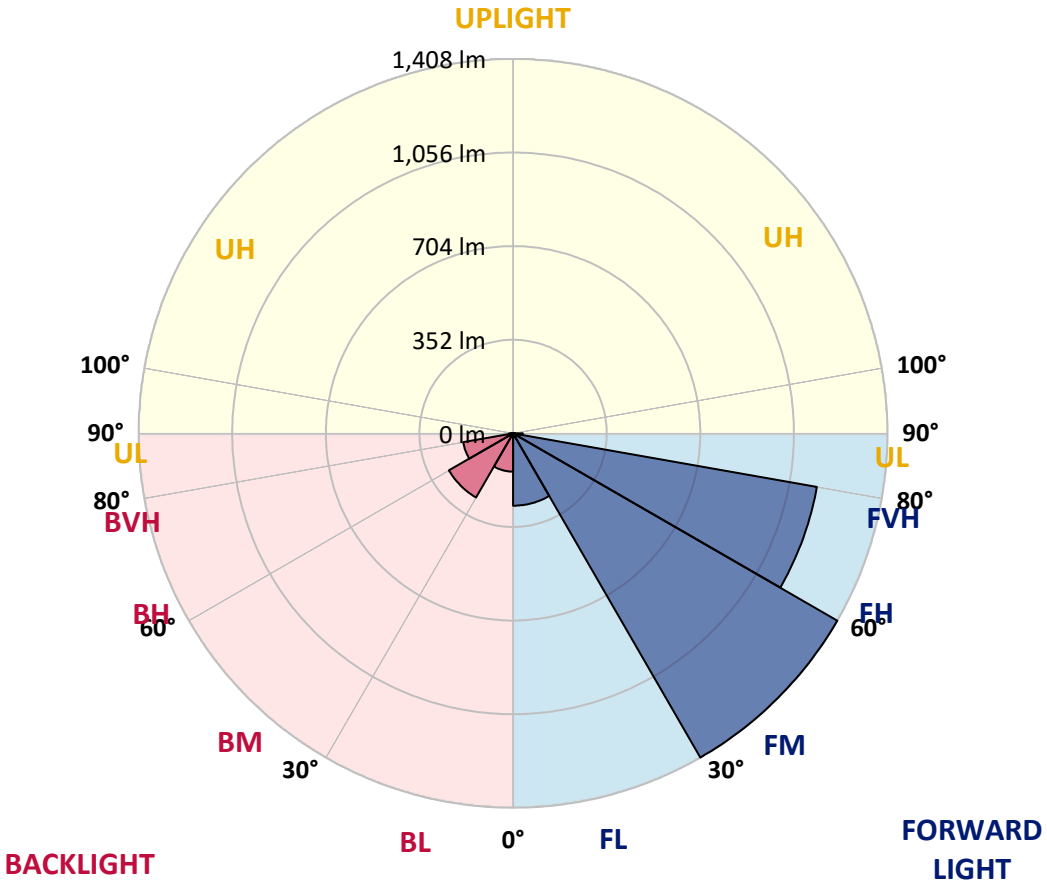
REPORT NUMBER: P630021
CATALOG NUMBER: GWS-SA1C-827-U-T2-W

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 272.1 | 7.8 | | | |
| FM | (30°-60°) | 1408.2 | 40.2 | | | |
| FH | (60°-80°) | 1160.2 | 33.1 | | | G1/1800 |
| FVH | (80°-90°) | 36.8 | 1.1 | | | G1/100 |
| BL | (0°-30°) | 144.0 | 4.1 | B1/500 | | |
| BM | (30°-60°) | 278.5 | 7.9 | B1/1000 | | |
| BH | (60°-80°) | 190.4 | 5.4 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 15.3 | 0.4 | | | G1/100 |
| UL | (90°-100°) | 0.0 | 0.0 | | U0/0 | |
| UH | (100°-180°) | 0.0 | 0.0 | | U0/0 | |

**BUG Rating: B1-U0-G1**
Type II Medium



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REPORT NUMBER: P630021
CATALOG NUMBER: GWS-SA1C-827-U-T2-W

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 70° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | *408.8* | 408.8 | 408.8 |
| 2.5° | 452.9 | 452.1 | 452.6 | 452.1 | 449.4 | 442.5 | 436.9 | 429.8 | *425.0* | 422.3 | 415.7 |
| 5° | 506.1 | 505.3 | 503.6 | 501.0 | 496.0 | 486.6 | 472.7 | 457.2 | *447.8* | 440.7 | 426.8 |
| 7.5° | 544.3 | 544.3 | 544.1 | 541.0 | 537.5 | 527.6 | 511.2 | 490.9 | *477.2* | 465.1 | 442.3 |
| 10° | 563.8 | 565.1 | 566.9 | 571.2 | 570.4 | 565.1 | 549.7 | 527.9 | *510.7* | 496.5 | 462.5 |
| 12.5° | 574.5 | 575.2 | 578.3 | 587.1 | 596.3 | 597.5 | 588.4 | 565.6 | *546.9* | 527.9 | 485.1 |
| 15° | 588.2 | 588.4 | 592.5 | 603.1 | 616.5 | 630.0 | 627.7 | 604.9 | *585.6* | 564.6 | 510.1 |
| 17.5° | 598.8 | 600.6 | 607.9 | 620.3 | 637.0 | 655.5 | 666.7 | 652.5 | *628.7* | 604.6 | 537.5 |
| 20° | 602.6 | 603.9 | 613.5 | 632.5 | 655.3 | 681.4 | 706.2 | 702.4 | *678.3* | 650.0 | 568.4 |
| 22.5° | 616.3 | 616.3 | 623.4 | 639.3 | 666.2 | 704.2 | 744.4 | 754.3 | *733.0* | 699.9 | 601.6 |
| 25° | 646.4 | 645.4 | 648.7 | 655.3 | 675.6 | 722.4 | 782.2 | 811.8 | *788.0* | 750.8 | 634.8 |
| 27.5° | 687.7 | 687.2 | 686.9 | 688.0 | 694.8 | 738.4 | 814.1 | 865.5 | *841.7* | 799.7 | 664.4 |
| 30° | 732.5 | 731.0 | 734.3 | 731.3 | 729.8 | 757.4 | 841.2 | 913.7 | *895.2* | 848.0 | 689.0 |
| 32.5° | 793.6 | 790.8 | 790.0 | 780.2 | 774.1 | 787.0 | 863.0 | 968.4 | *953.7* | 900.2 | 716.6 |
| 35° | 874.1 | 871.6 | 858.7 | 843.0 | 825.0 | 831.1 | 890.1 | 1021.8 | *1022.8* | 965.6 | 752.8 |
| 37.5° | 955.4 | 956.0 | 945.8 | 908.8 | 890.3 | 886.8 | 931.4 | 1086.9 | *1108.7* | 1043.6 | 799.7 |
| 40° | 1023.1 | 1026.1 | 1026.1 | 987.1 | 959.5 | 956.2 | 989.4 | 1164.2 | *1207.5* | 1139.3 | 858.9 |
| 42.5° | 1074.5 | 1077.3 | 1086.1 | 1058.0 | 1028.9 | 1040.3 | 1059.8 | 1241.7 | *1319.4* | 1257.6 | 933.9 |
| 45° | 1131.0 | 1133.3 | 1138.1 | 1121.9 | 1104.9 | 1135.3 | 1139.6 | 1334.4 | *1447.6* | 1390.4 | 1021.1 |
| 47.5° | 1206.0 | 1203.9 | 1204.4 | 1192.5 | 1179.4 | 1228.5 | 1227.5 | 1412.4 | *1571.5* | 1535.8 | 1115.5 |
| 50° | 1299.2 | 1303.0 | 1299.4 | 1275.9 | 1260.4 | 1305.3 | 1311.1 | 1498.8 | *1680.4* | 1679.6 | 1210.8 |
| 52.5° | 1388.8 | 1390.4 | 1409.1 | 1410.1 | 1378.5 | 1369.1 | 1384.3 | 1585.9 | *1772.3* | 1811.3 | 1302.2 |
| 55° | 1393.4 | 1399.2 | 1455.5 | 1496.0 | 1547.2 | 1471.9 | 1458.2 | 1669.0 | *1861.2* | 1940.3 | 1397.2 |
| 57.5° | 1296.4 | 1305.8 | 1401.3 | 1488.6 | 1631.0 | 1648.5 | 1584.9 | 1776.4 | *1950.2* | 2067.2 | 1507.1 |
| 60° | 1089.2 | 1108.7 | 1238.4 | 1372.1 | 1593.3 | 1775.4 | 1844.0 | 1922.3 | *2066.9* | 2196.9 | 1640.6 |
| 62.5° | 695.6 | 703.2 | 885.0 | 1108.9 | 1423.3 | 1763.0 | 2126.2 | 2179.4 | *2244.7* | 2365.8 | 1846.3 |
| 65° | 348.3 | 372.6 | 479.2 | 661.9 | 1026.4 | 1553.5 | 2268.8 | 2650.3 | *2570.2* | 2655.1 | 2179.6 |
| 67.5° | 236.3 | 244.2 | 298.1 | 397.7 | 601.8 | 1100.6 | 2180.4 | 3046.9 | *3023.4* | 3037.3 | 2535.0 |
| 70° | *174.3* | *179.3* | *221.9* | *281.7* | *364.0* | *624.9* | *1735.9* | *3017.1* | *3177.9* | *3172.8* | *2497.8* |
| 72.5° | 127.2 | 129.7 | 161.9 | 215.1 | 269.8 | 323.2 | 1060.1 | 2437.2 | *2774.1* | 2920.3 | 2184.5 |
| 75° | 92.5 | 95.5 | 112.5 | 160.8 | 209.7 | 201.6 | 523.3 | 1760.4 | *2115.6* | 2396.7 | 1779.7 |
| 77.5° | 68.9 | 72.7 | 80.5 | 100.8 | 146.9 | 144.4 | 226.2 | 1143.1 | *1368.3* | 1565.4 | 1081.1 |
| 80° | 49.6 | 50.4 | 55.0 | 64.6 | 93.2 | 84.6 | 107.7 | 596.0 | *683.4* | 748.8 | 423.8 |
| 82.5° | 30.1 | 30.9 | 36.7 | 39.8 | 57.8 | 53.2 | 56.0 | 193.0 | *276.6* | 293.6 | 158.3 |
| 85° | 8.9 | 9.4 | 16.7 | 18.2 | 24.1 | 22.8 | 22.5 | 78.5 | *93.7* | 119.8 | 62.3 |
| 87.5° | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 1.5 | 2.8 | 13.9 | *21.0* | 29.1 | 15.2 |
| 90° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 |

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Peachtree City, GA 30269

Scaled Data Report

REPORT NUMBER: P630021
CATALOG NUMBER: GWS-SA1C-827-U-T2-W

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 | 408.8 |
| 2.5° | 413.1 | 407.3 | 404.3 | 398.9 | 395.1 | 391.3 | 387.5 | 384.0 | 382.5 | 380.2 | 380.7 |
| 5° | 420.5 | 411.4 | 402.2 | 391.9 | 383.0 | 375.6 | 369.1 | 363.2 | 360.7 | 358.4 | 359.4 |
| 7.5° | 431.6 | 417.9 | 400.5 | 381.5 | 367.5 | 357.4 | 350.6 | 346.5 | 345.2 | 343.5 | 343.5 |
| 10° | 445.8 | 425.3 | 394.6 | 367.5 | 350.8 | 342.7 | 339.7 | 339.4 | 340.7 | 340.9 | 340.4 |
| 12.5° | 461.5 | 432.4 | 386.0 | 351.1 | 336.9 | 334.4 | 336.6 | 340.9 | 345.2 | 347.5 | 347.0 |
| 15° | 477.7 | 436.9 | 371.3 | 335.4 | 326.8 | 330.0 | 337.4 | 346.0 | 354.4 | 358.7 | 358.4 |
| 17.5° | 492.9 | 438.0 | 352.3 | 320.2 | 317.9 | 326.2 | 338.9 | 352.3 | 363.7 | 369.8 | 370.1 |
| 20° | 509.9 | 436.2 | 332.8 | 306.5 | 309.0 | 322.7 | 339.4 | 355.6 | 369.1 | 375.1 | 376.7 |
| 22.5° | 525.3 | 430.1 | 313.8 | 293.6 | 301.4 | 318.4 | 335.4 | 350.6 | 362.5 | 368.3 | 370.3 |
| 25° | 539.3 | 418.5 | 293.1 | 282.7 | 295.6 | 312.3 | 325.2 | 335.9 | 344.2 | 347.8 | 350.6 |
| 27.5° | 546.9 | 401.0 | 277.4 | 274.1 | 290.0 | 303.7 | 310.8 | 314.1 | 316.9 | 315.9 | 317.9 |
| 30° | 548.4 | 379.2 | 263.7 | 267.2 | 281.7 | 291.8 | 293.3 | 290.0 | 285.2 | 277.4 | 279.1 |
| 32.5° | 546.9 | 354.1 | 252.3 | 259.9 | 272.3 | 278.4 | 276.3 | 267.7 | 256.1 | 243.9 | 244.7 |
| 35° | 547.4 | 328.8 | 242.9 | 251.8 | 261.4 | 264.7 | 259.6 | 247.7 | 235.3 | 224.2 | 223.7 |
| 37.5° | 553.0 | 307.5 | 235.1 | 243.9 | 250.8 | 251.3 | 245.7 | 233.3 | 227.0 | 218.6 | 217.6 |
| 40° | 568.4 | 291.8 | 228.0 | 236.1 | 240.4 | 240.1 | 233.8 | 224.9 | 229.2 | 226.4 | 225.7 |
| 42.5° | 593.7 | 282.2 | 222.1 | 227.7 | 230.8 | 231.3 | 226.2 | 220.6 | 230.0 | 226.4 | 225.2 |
| 45° | 634.5 | 281.7 | 218.1 | 219.4 | 224.2 | 227.7 | 224.2 | 217.8 | 221.4 | 204.2 | 200.9 |
| 47.5° | 682.9 | 290.3 | 215.1 | 212.0 | 220.4 | 226.7 | 221.1 | 211.0 | 203.7 | 187.9 | 185.7 |
| 50° | 741.2 | 307.8 | 212.3 | 204.2 | 214.8 | 222.9 | 217.3 | 203.4 | 192.3 | 183.9 | 182.6 |
| 52.5° | 810.3 | 330.8 | 208.7 | 195.3 | 206.4 | 220.9 | 217.3 | 202.6 | 187.9 | 180.3 | 179.1 |
| 55° | 882.7 | 357.4 | 204.7 | 184.7 | 197.1 | 221.4 | 219.1 | 197.3 | 184.7 | 180.6 | 179.6 |
| 57.5° | 972.7 | 389.3 | 197.3 | 172.2 | 188.7 | 216.8 | 212.0 | 194.3 | 182.4 | 179.1 | 178.1 |
| 60° | 1089.4 | 436.7 | 183.4 | 159.6 | 179.1 | 208.7 | 205.7 | 189.2 | 176.3 | 173.5 | 172.8 |
| 62.5° | 1274.4 | 517.0 | 166.4 | 147.4 | 167.7 | 191.7 | 196.3 | 179.6 | 168.7 | 168.4 | 168.2 |
| 65° | 1575.8 | 613.5 | 146.4 | 136.5 | 155.8 | 177.8 | 183.9 | 169.7 | 160.8 | 163.6 | 163.4 |
| 67.5° | 1787.0 | 621.9 | 129.9 | 125.1 | 141.8 | 162.6 | 171.5 | 159.6 | 150.0 | 155.3 | 155.0 |
| 70° | *1636.8* | *485.1* | *115.8* | *113.2* | *126.9* | *146.2* | *158.1* | *146.9* | *137.3* | *142.4* | *141.3* |
| 72.5° | 1380.5 | 371.8 | 102.3 | 100.8 | 111.7 | 128.9 | 140.8 | 134.2 | 124.1 | 124.1 | 121.8 |
| 75° | 1109.5 | 306.7 | 88.1 | 87.4 | 94.7 | 111.5 | 124.9 | 113.7 | 104.4 | 103.9 | 102.3 |
| 77.5° | 636.3 | 201.1 | 74.0 | 73.5 | 75.7 | 93.2 | 97.0 | 94.7 | 87.6 | 84.3 | 83.3 |
| 80° | 253.6 | 104.6 | 58.3 | 55.0 | 57.2 | 68.4 | 76.5 | 72.7 | 66.6 | 62.6 | 60.3 |
| 82.5° | 98.3 | 52.4 | 41.0 | 36.0 | 39.3 | 49.4 | 55.5 | 54.2 | 50.2 | 41.0 | 38.5 |
| 85° | 40.0 | 25.6 | 24.6 | 20.8 | 22.8 | 26.6 | 31.9 | 27.6 | 22.8 | 16.2 | 15.5 |
| 87.5° | 10.6 | 9.4 | 9.1 | 5.6 | 4.3 | 1.3 | 0.3 | 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 |

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

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

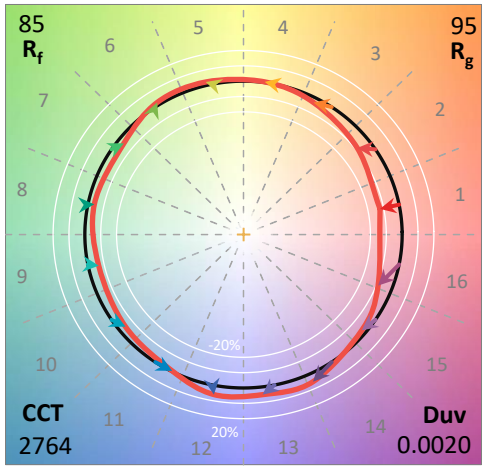
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-157-9 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 10/03/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Invue |
| Catalog Number: | **EMM2-HTN-SA1A-827-U-5WQ** |
| Description: | Epic Modern Light Square 40W 5WQ Optic |

## Spectral Parameters

| | |
|---|---|
| CCT (K): | 2764 |
| CIE u': | 0.2591 |
| CIE v': | 0.5290 |
| Duv: | 0.0020 |
| CIE x: | 0.4581 |
| CIE y: | 0.4156 |
| CIE z: | 0.1263 |
| Peak Wavelength (nm): | 603 |
| Dominant Wavelength (nm): | 583 |
| Purity: | 62.2537 |
| Rf: | 84.7 |
| Rg: | 94.6 |

| | |
|---|---|
| CRI (Ra): | 80.9 |
| R1: | 78.8 |
| R2: | 89.9 |
| R3: | 96.2 |
| R4: | 79.1 |
| R5: | 79.1 |
| R6: | 88.8 |
| R7: | 81.3 |
| R8: | 54.3 |
| R9: | -1.5 |
| R10: | 77.9 |
| R11: | 78.9 |
| R12: | 71.6 |
| R13: | 81.2 |
| R14: | 98.5 |
| R15: | 69.9 |




## Test Conditions

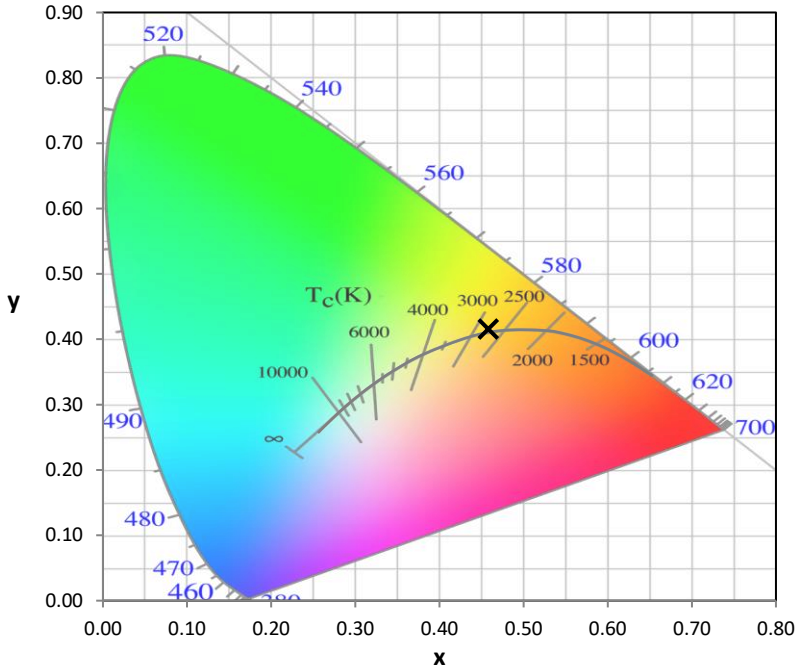
| | |
|---|---|
| Stabilization Time: | 81M |
| Operation Time: | 2H 21M |
| Sphere Temperature (°C): | 25.2 |

REPORT NUMBER: SP1-2407-157-9

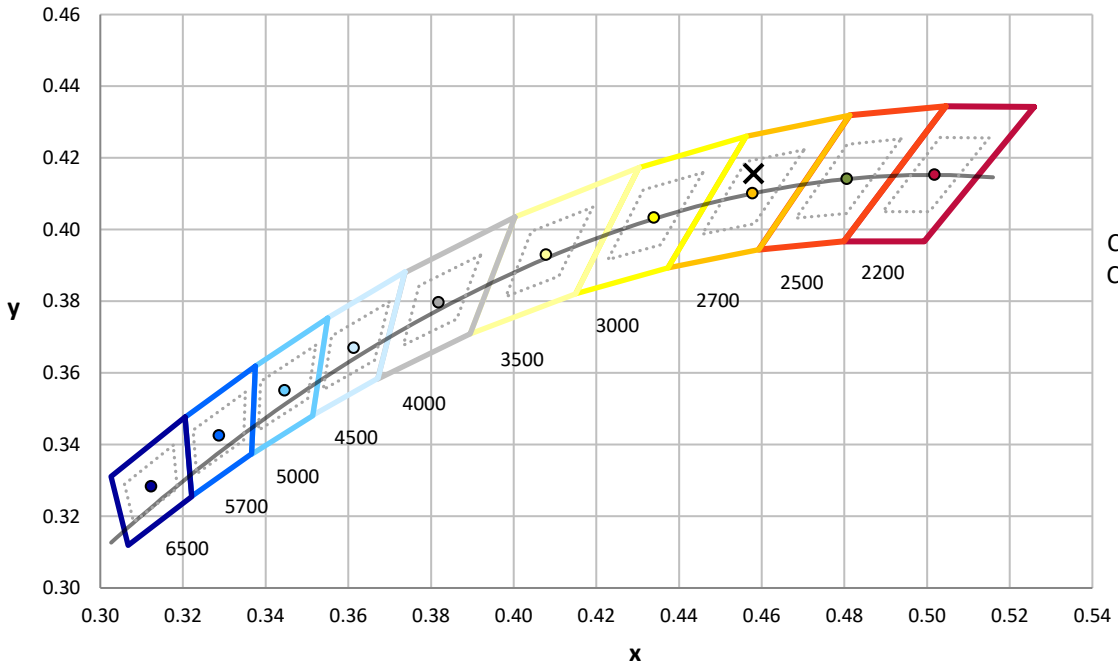
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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: SP1-2407-157-9

## CIE 1931 Chromaticity Diagram




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




CCT = 2764K
CIE x = 0.4581
CIE y = 0.4156
Duv = 0.0020

Point lies inside the ANSI 2700K 4-step quadrangle

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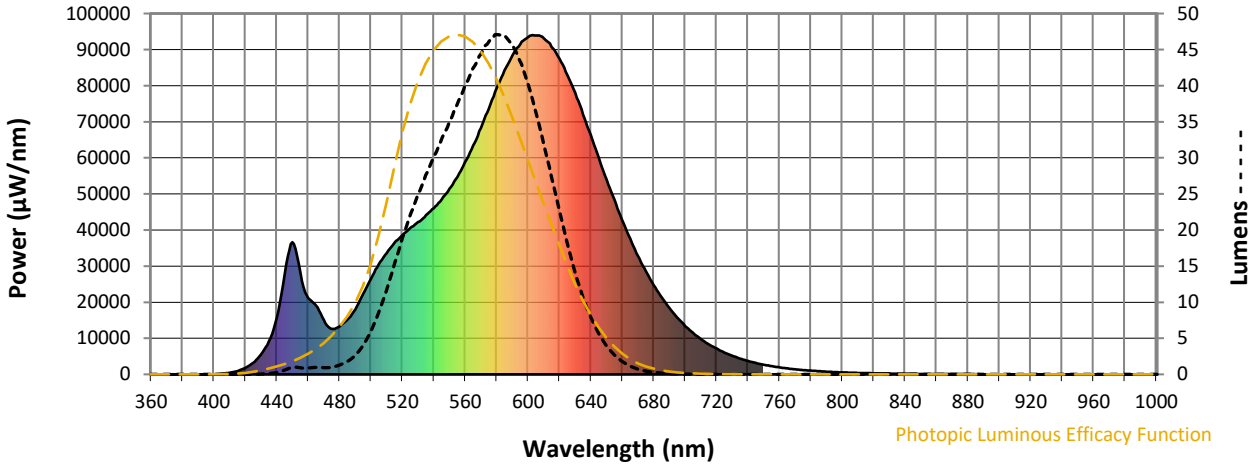
## Photopic Flux vs. Wavelength




**Photopic Lumens: 4337.9**

| λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | 0.0 | 490 | 18018 | 2.6 | 620 | 87426 | 22.8 | 750 | 2680 | 0.0 | 880 | 58 | 0.0 |
| 365 | 0 | 0.0 | 495 | 22295 | 3.9 | 625 | 83013 | 18.2 | 755 | 2287 | 0.0 | 885 | 46 | 0.0 |
| 370 | 0 | 0.0 | 500 | 26478 | 5.8 | 630 | 78077 | 14.1 | 760 | 1944 | 0.0 | 890 | 45 | 0.0 |
| 375 | 0 | 0.0 | 505 | 30524 | 8.5 | 635 | 72080 | 10.7 | 765 | 1653 | 0.0 | 895 | 41 | 0.0 |
| 380 | 0 | 0.0 | 510 | 33611 | 11.5 | 640 | 66249 | 7.9 | 770 | 1413 | 0.0 | 900 | 38 | 0.0 |
| 385 | 0 | 0.0 | 515 | 36490 | 15.2 | 645 | 59973 | 5.7 | 775 | 1198 | 0.0 | 905 | 33 | 0.0 |
| 390 | 0 | 0.0 | 520 | 38610 | 18.7 | 650 | 53972 | 3.9 | 780 | 1025 | 0.0 | 910 | 30 | 0.0 |
| 395 | 0 | 0.0 | 525 | 40511 | 21.9 | 655 | 48369 | 2.7 | 785 | 874 | 0.0 | 915 | 23 | 0.0 |
| 400 | 48 | 0.0 | 530 | 42223 | 24.9 | 660 | 42641 | 1.8 | 790 | 747 | 0.0 | 920 | 24 | 0.0 |
| 405 | 201 | 0.0 | 535 | 44137 | 27.6 | 665 | 37602 | 1.1 | 795 | 639 | 0.0 | 925 | 22 | 0.0 |
| 410 | 457 | 0.0 | 540 | 46032 | 30.0 | 670 | 32798 | 0.7 | 800 | 547 | 0.0 | 930 | 22 | 0.0 |
| 415 | 925 | 0.0 | 545 | 48553 | 32.5 | 675 | 28558 | 0.5 | 805 | 473 | 0.0 | 935 | 17 | 0.0 |
| 420 | 1816 | 0.0 | 550 | 51408 | 34.9 | 680 | 24782 | 0.3 | 810 | 401 | 0.0 | 940 | 13 | 0.0 |
| 425 | 3217 | 0.0 | 555 | 54711 | 37.4 | 685 | 21386 | 0.2 | 815 | 351 | 0.0 | 945 | 6 | 0.0 |
| 430 | 5520 | 0.0 | 560 | 58847 | 40.0 | 690 | 18413 | 0.1 | 820 | 307 | 0.0 | 950 | 10 | 0.0 |
| 435 | 9225 | 0.1 | 565 | 63386 | 42.4 | 695 | 15721 | 0.1 | 825 | 261 | 0.0 | 955 | 11 | 0.0 |
| 440 | 15522 | 0.2 | 570 | 68196 | 44.3 | 700 | 13432 | 0.0 | 830 | 228 | 0.0 | 960 | 8 | 0.0 |
| 445 | 27642 | 0.6 | 575 | 73613 | 46.0 | 705 | 11513 | 0.0 | 835 | 193 | 0.0 | 965 | 12 | 0.0 |
| 450 | 36602 | 0.9 | 580 | 79207 | 47.1 | 710 | 9780 | 0.0 | 840 | 174 | 0.0 | 970 | 3 | 0.0 |
| 455 | 28292 | 0.9 | 585 | 84248 | 47.0 | 715 | 8356 | 0.0 | 845 | 151 | 0.0 | 975 | 8 | 0.0 |
| 460 | 21166 | 0.9 | 590 | 88397 | 45.7 | 720 | 7161 | 0.0 | 850 | 123 | 0.0 | 980 | 2 | 0.0 |
| 465 | 19092 | 1.0 | 595 | 91428 | 43.4 | 725 | 6067 | 0.0 | 855 | 106 | 0.0 | 985 | 13 | 0.0 |
| 470 | 14951 | 0.9 | 600 | 93452 | 40.3 | 730 | 5164 | 0.0 | 860 | 95 | 0.0 | 990 | 16 | 0.0 |
| 475 | 12606 | 1.0 | 605 | 93959 | 36.4 | 735 | 4393 | 0.0 | 865 | 82 | 0.0 | 995 | 20 | 0.0 |
| 480 | 13323 | 1.3 | 610 | 93079 | 32.0 | 740 | 3694 | 0.0 | 870 | 77 | 0.0 | 1000 | 0 | 0.0 |
| 485 | 15164 | 1.8 | 615 | 90707 | 27.3 | 745 | 3157 | 0.0 | 875 | 65 | 0.0 | | | |

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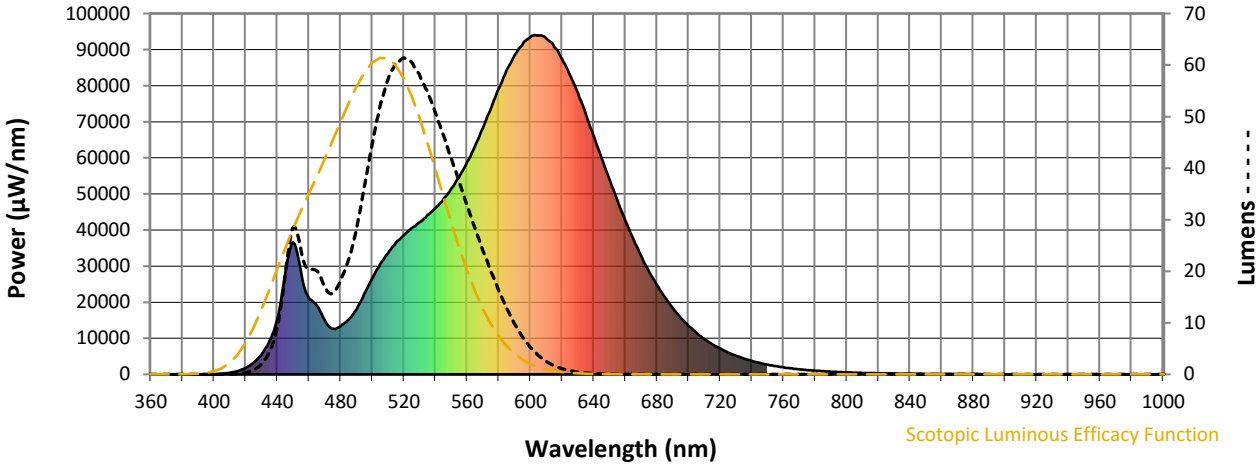
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: 5286.7** **S/P: 1.22**

| λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | 0.0 | 490 | 18018 | 75.9 | 620 | 87426 | 0.4 | 750 | 2680 | 0.0 | 880 | 58 | 0.0 |
| 365 | 0 | 0.0 | 495 | 22295 | 93.2 | 625 | 83013 | 0.2 | 755 | 2287 | 0.0 | 885 | 46 | 0.0 |
| 370 | 0 | 0.0 | 500 | 26478 | 107.8 | 630 | 78077 | 0.1 | 760 | 1944 | 0.0 | 890 | 45 | 0.0 |
| 375 | 0 | 0.0 | 505 | 30524 | 118.7 | 635 | 72080 | 0.1 | 765 | 1653 | 0.0 | 895 | 41 | 0.0 |
| 380 | 0 | 0.0 | 510 | 33611 | 122.2 | 640 | 66249 | 0.1 | 770 | 1413 | 0.0 | 900 | 38 | 0.0 |
| 385 | 0 | 0.0 | 515 | 36490 | 120.8 | 645 | 59973 | 0.0 | 775 | 1198 | 0.0 | 905 | 33 | 0.0 |
| 390 | 0 | 0.0 | 520 | 38610 | 113.9 | 650 | 53972 | 0.0 | 780 | 1025 | 0.0 | 910 | 30 | 0.0 |
| 395 | 0 | 0.0 | 525 | 40511 | 104.1 | 655 | 48369 | 0.0 | 785 | 874 | 0.0 | 915 | 23 | 0.0 |
| 400 | 48 | 0.0 | 530 | 42223 | 92.4 | 660 | 42641 | 0.0 | 790 | 747 | 0.0 | 920 | 24 | 0.0 |
| 405 | 201 | 0.0 | 535 | 44137 | 80.5 | 665 | 37602 | 0.0 | 795 | 639 | 0.0 | 925 | 22 | 0.0 |
| 410 | 457 | 0.1 | 540 | 46032 | 68.2 | 670 | 32798 | 0.0 | 800 | 547 | 0.0 | 930 | 22 | 0.0 |
| 415 | 925 | 0.3 | 545 | 48553 | 57.1 | 675 | 28558 | 0.0 | 805 | 473 | 0.0 | 935 | 17 | 0.0 |
| 420 | 1816 | 1.1 | 550 | 51408 | 46.7 | 680 | 24782 | 0.0 | 810 | 401 | 0.0 | 940 | 13 | 0.0 |
| 425 | 3217 | 2.5 | 555 | 54711 | 37.4 | 685 | 21386 | 0.0 | 815 | 351 | 0.0 | 945 | 6 | 0.0 |
| 430 | 5520 | 5.9 | 560 | 58847 | 29.4 | 690 | 18413 | 0.0 | 820 | 307 | 0.0 | 950 | 10 | 0.0 |
| 435 | 9225 | 12.5 | 565 | 63386 | 22.5 | 695 | 15721 | 0.0 | 825 | 261 | 0.0 | 955 | 11 | 0.0 |
| 440 | 15522 | 26.3 | 570 | 68196 | 16.9 | 700 | 13432 | 0.0 | 830 | 228 | 0.0 | 960 | 8 | 0.0 |
| 445 | 27642 | 55.2 | 575 | 73613 | 12.4 | 705 | 11513 | 0.0 | 835 | 193 | 0.0 | 965 | 12 | 0.0 |
| 450 | 36602 | 85.4 | 580 | 79207 | 9.0 | 710 | 9780 | 0.0 | 840 | 174 | 0.0 | 970 | 3 | 0.0 |
| 455 | 28292 | 75.1 | 585 | 84248 | 6.3 | 715 | 8356 | 0.0 | 845 | 151 | 0.0 | 975 | 8 | 0.0 |
| 460 | 21166 | 63.2 | 590 | 88397 | 4.4 | 720 | 7161 | 0.0 | 850 | 123 | 0.0 | 980 | 2 | 0.0 |
| 465 | 19092 | 63.2 | 595 | 91428 | 3.0 | 725 | 6067 | 0.0 | 855 | 106 | 0.0 | 985 | 13 | 0.0 |
| 470 | 14951 | 54.2 | 600 | 93452 | 2.0 | 730 | 5164 | 0.0 | 860 | 95 | 0.0 | 990 | 16 | 0.0 |
| 475 | 12606 | 48.8 | 605 | 93959 | 1.3 | 735 | 4393 | 0.0 | 865 | 82 | 0.0 | 995 | 20 | 0.0 |
| 480 | 13323 | 54.2 | 610 | 93079 | 0.9 | 740 | 3694 | 0.0 | 870 | 77 | 0.0 | 1000 | 0 | 0.0 |
| 485 | 15164 | 63.3 | 615 | 90707 | 0.5 | 745 | 3157 | 0.0 | 875 | 65 | 0.0 | | | |

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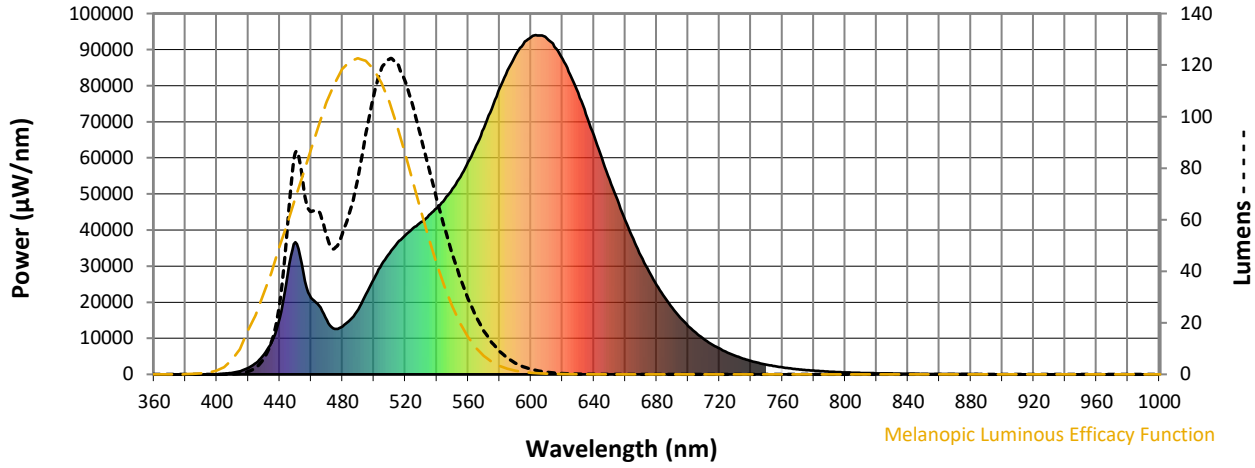
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: 9797** **M/P: 2.26**

| λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | 0.0 | 490 | 18018 | 27.7 | 620 | 87426 | 1.1 | 750 | 2680 | 0.0 | 880 | 58 | 0.0 |
| 365 | 0 | 0.0 | 495 | 22295 | 36.0 | 625 | 83013 | 0.7 | 755 | 2287 | 0.0 | 885 | 46 | 0.0 |
| 370 | 0 | 0.0 | 500 | 26478 | 44.2 | 630 | 78077 | 0.4 | 760 | 1944 | 0.0 | 890 | 45 | 0.0 |
| 375 | 0 | 0.0 | 505 | 30524 | 51.8 | 635 | 72080 | 0.3 | 765 | 1653 | 0.0 | 895 | 41 | 0.0 |
| 380 | 0 | 0.0 | 510 | 33611 | 57.0 | 640 | 66249 | 0.2 | 770 | 1413 | 0.0 | 900 | 38 | 0.0 |
| 385 | 0 | 0.0 | 515 | 36490 | 60.5 | 645 | 59973 | 0.1 | 775 | 1198 | 0.0 | 905 | 33 | 0.0 |
| 390 | 0 | 0.0 | 520 | 38610 | 61.4 | 650 | 53972 | 0.1 | 780 | 1025 | 0.0 | 910 | 30 | 0.0 |
| 395 | 0 | 0.0 | 525 | 40511 | 60.6 | 655 | 48369 | 0.0 | 785 | 874 | 0.0 | 915 | 23 | 0.0 |
| 400 | 48 | 0.0 | 530 | 42223 | 58.2 | 660 | 42641 | 0.0 | 790 | 747 | 0.0 | 920 | 24 | 0.0 |
| 405 | 201 | 0.0 | 535 | 44137 | 55.0 | 665 | 37602 | 0.0 | 795 | 639 | 0.0 | 925 | 22 | 0.0 |
| 410 | 457 | 0.0 | 540 | 46032 | 50.9 | 670 | 32798 | 0.0 | 800 | 547 | 0.0 | 930 | 22 | 0.0 |
| 415 | 925 | 0.1 | 545 | 48553 | 46.6 | 675 | 28558 | 0.0 | 805 | 473 | 0.0 | 935 | 17 | 0.0 |
| 420 | 1816 | 0.3 | 550 | 51408 | 42.0 | 680 | 24782 | 0.0 | 810 | 401 | 0.0 | 940 | 13 | 0.0 |
| 425 | 3217 | 0.8 | 555 | 54711 | 37.4 | 685 | 21386 | 0.0 | 815 | 351 | 0.0 | 945 | 6 | 0.0 |
| 430 | 5520 | 1.9 | 560 | 58847 | 32.9 | 690 | 18413 | 0.0 | 820 | 307 | 0.0 | 950 | 10 | 0.0 |
| 435 | 9225 | 4.1 | 565 | 63386 | 28.4 | 695 | 15721 | 0.0 | 825 | 261 | 0.0 | 955 | 11 | 0.0 |
| 440 | 15522 | 8.7 | 570 | 68196 | 24.1 | 700 | 13432 | 0.0 | 830 | 228 | 0.0 | 960 | 8 | 0.0 |
| 445 | 27642 | 18.5 | 575 | 73613 | 20.0 | 705 | 11513 | 0.0 | 835 | 193 | 0.0 | 965 | 12 | 0.0 |
| 450 | 36602 | 28.3 | 580 | 79207 | 16.3 | 710 | 9780 | 0.0 | 840 | 174 | 0.0 | 970 | 3 | 0.0 |
| 455 | 28292 | 24.7 | 585 | 84248 | 12.9 | 715 | 8356 | 0.0 | 845 | 151 | 0.0 | 975 | 8 | 0.0 |
| 460 | 21166 | 20.4 | 590 | 88397 | 9.8 | 720 | 7161 | 0.0 | 850 | 123 | 0.0 | 980 | 2 | 0.0 |
| 465 | 19092 | 20.1 | 595 | 91428 | 7.3 | 725 | 6067 | 0.0 | 855 | 106 | 0.0 | 985 | 13 | 0.0 |
| 470 | 14951 | 17.2 | 600 | 93452 | 5.3 | 730 | 5164 | 0.0 | 860 | 95 | 0.0 | 990 | 16 | 0.0 |
| 475 | 12606 | 15.7 | 605 | 93959 | 3.7 | 735 | 4393 | 0.0 | 865 | 82 | 0.0 | 995 | 20 | 0.0 |
| 480 | 13323 | 18.0 | 610 | 93079 | 2.5 | 740 | 3694 | 0.0 | 870 | 77 | 0.0 | 1000 | 0 | 0.0 |
| 485 | 15164 | 21.9 | 615 | 90707 | 1.7 | 745 | 3157 | 0.0 | 875 | 65 | 0.0 | | | |

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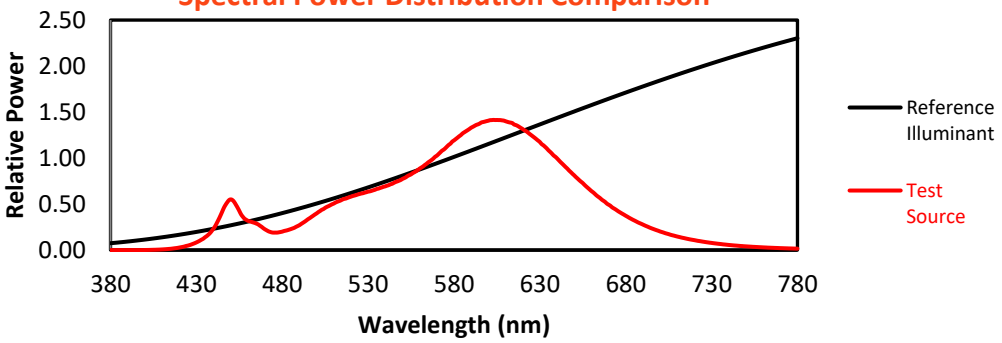
# TM-30-18

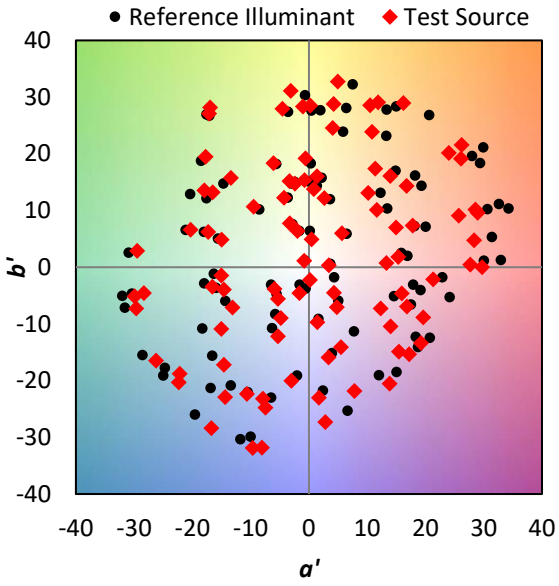
## Summary

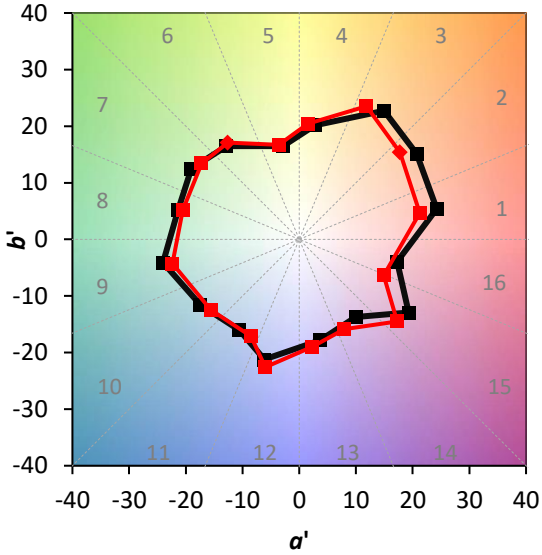
$R_f$ = 84.7
$R_g$ = 94.6
CIE $R_a$ = 80.9
$R_9$ = -1.5

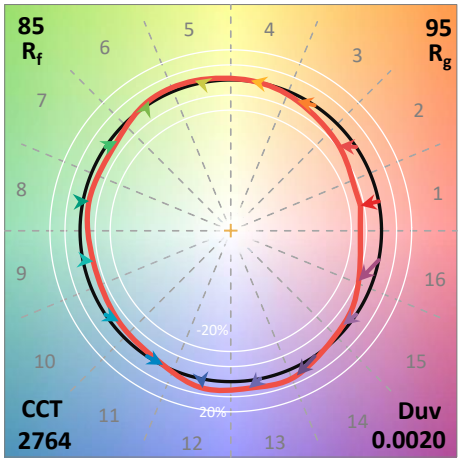
## Spectral Power Distribution Comparison

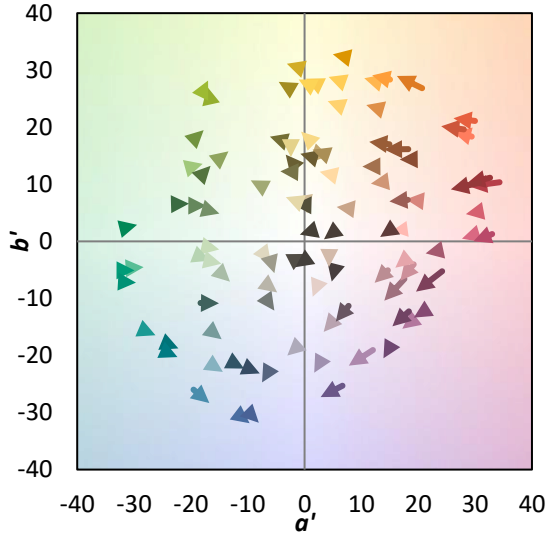



## Color Vector Graphics



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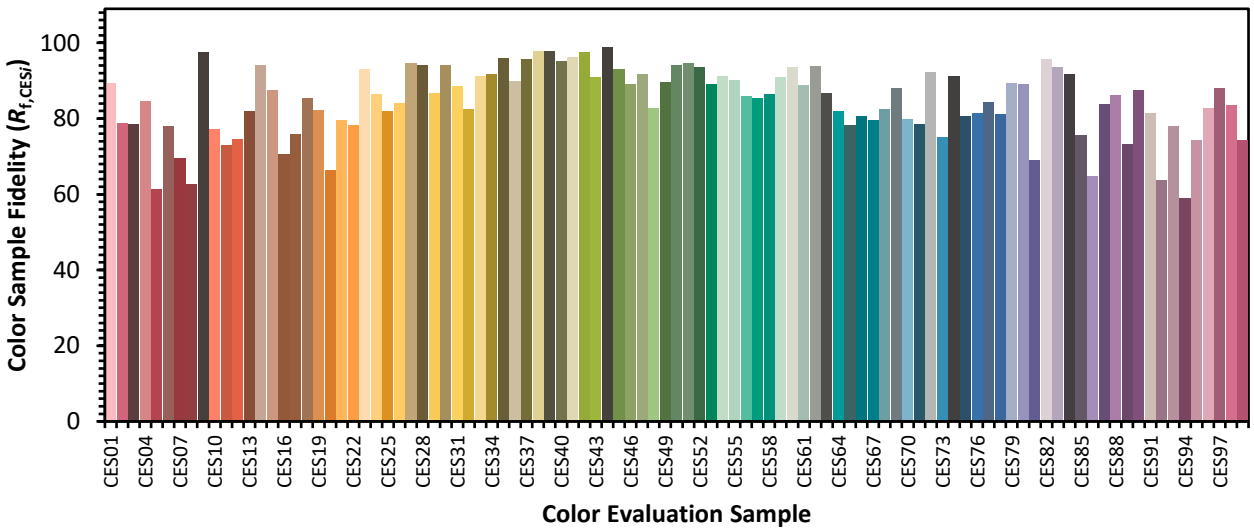
## TM-30-18

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

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 | |



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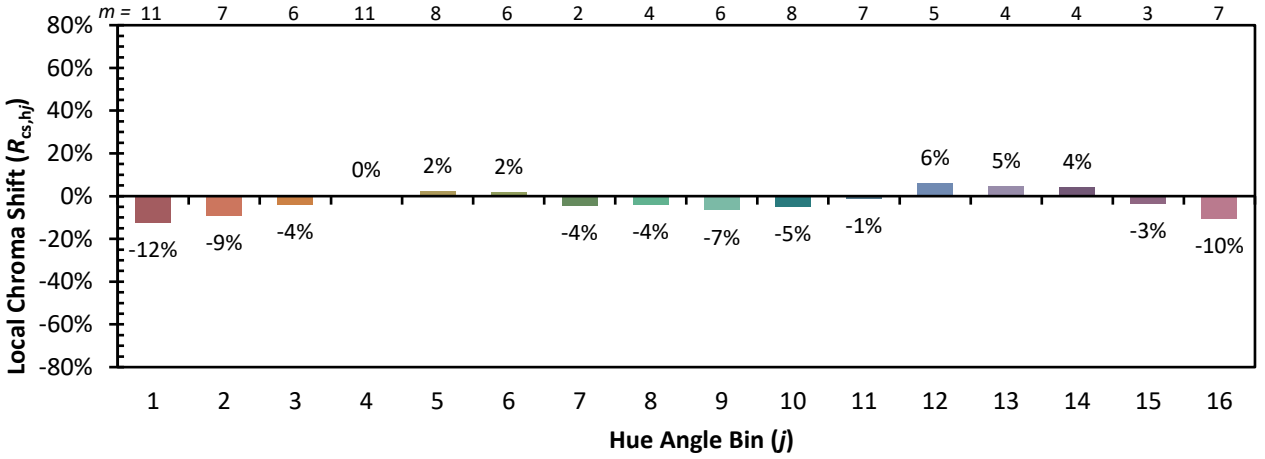
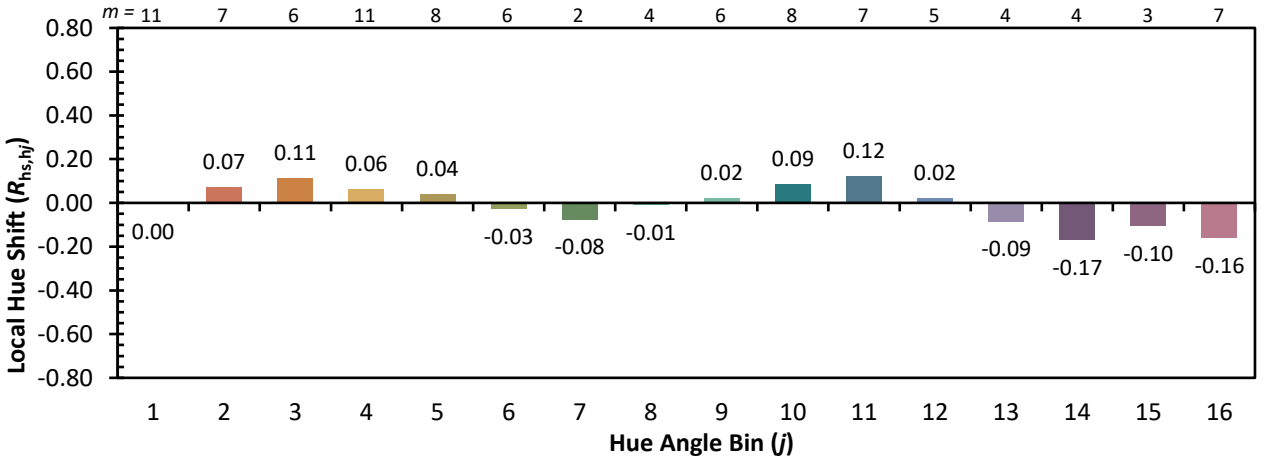
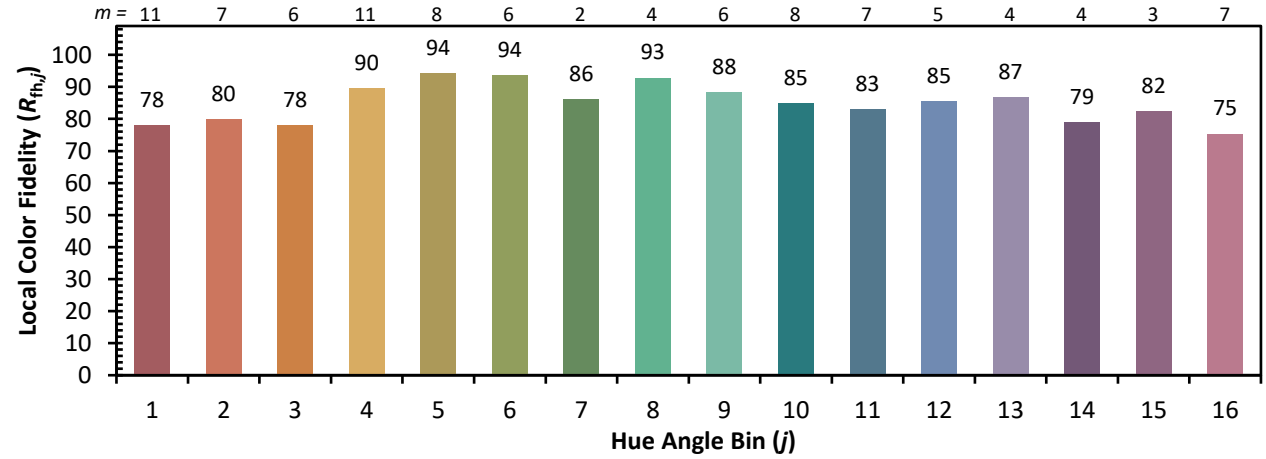
## Color Rendition by Hue-Angle Bin



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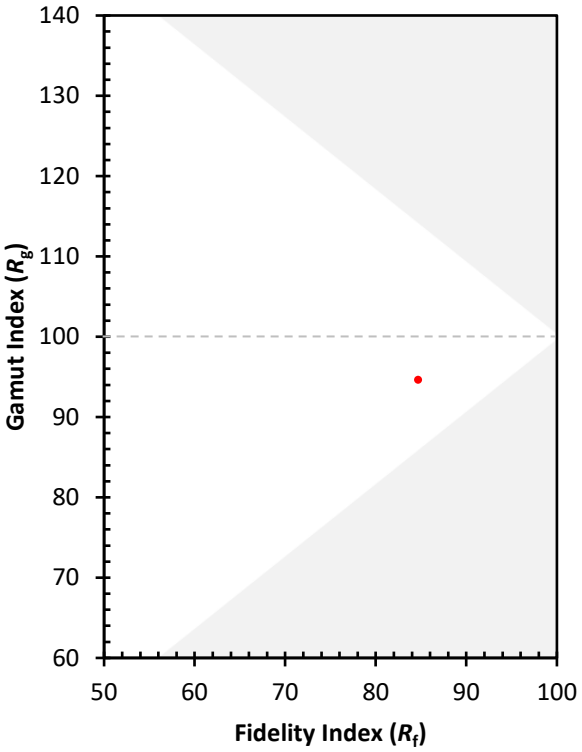
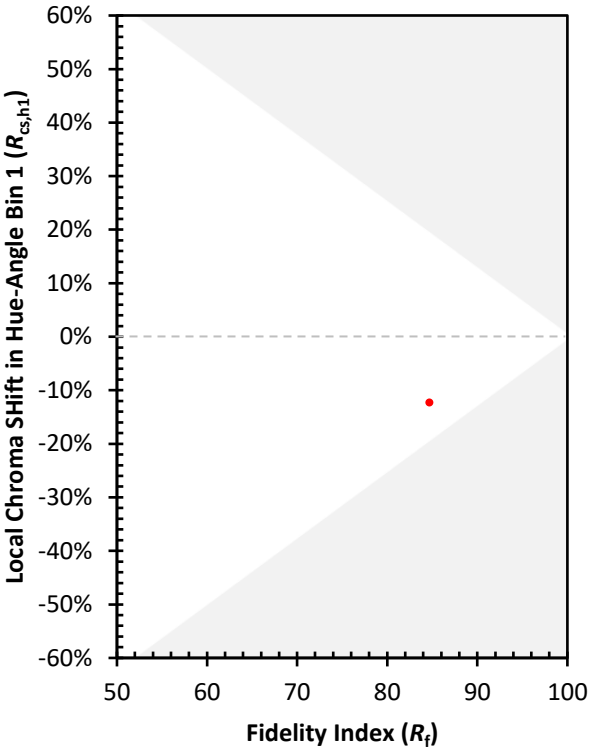
# TM-30-18

## Measure Comparisons




(END OF REPORT)