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: McGRAW-EDISON

Report Number: P821189

Luminaire Tested: **TT-D1-735-24VDC-CQ-UPL**

Issue Date: 7/23/2020

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: | P821189 |
| | REPORT IS FROM IESNA LM-79-08 TEST DATA - UPLIGHT (G2-2002-677-2) AND |
| Test Lab: | INNOVATION CENTER |
| Issue Date: | 7/23/2020 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | McGRAW-EDISON |
| Catalog Number: | TT-D1-735-24VDC-CQ-UPL |
| Description: | TOPTIER LED PARKING GARAGE LUMINAIRE WITH UPLIGHT |
| | 3500K, 70 CRI LEDS AND CONCENTRATED DISTRIBUTION |
| Light Source: | - |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 4454.7 lumens |
| Efficiency: | N/A |
| Efficacy: | 159.1 lumens/watt |
| Luminous Opening: | Vertical Cylinder (Dia: 1.12' x H: 0.1') |
| IES Classification: | Type V - Short |
| BUG Rating: | B1 - U4 - G1 |

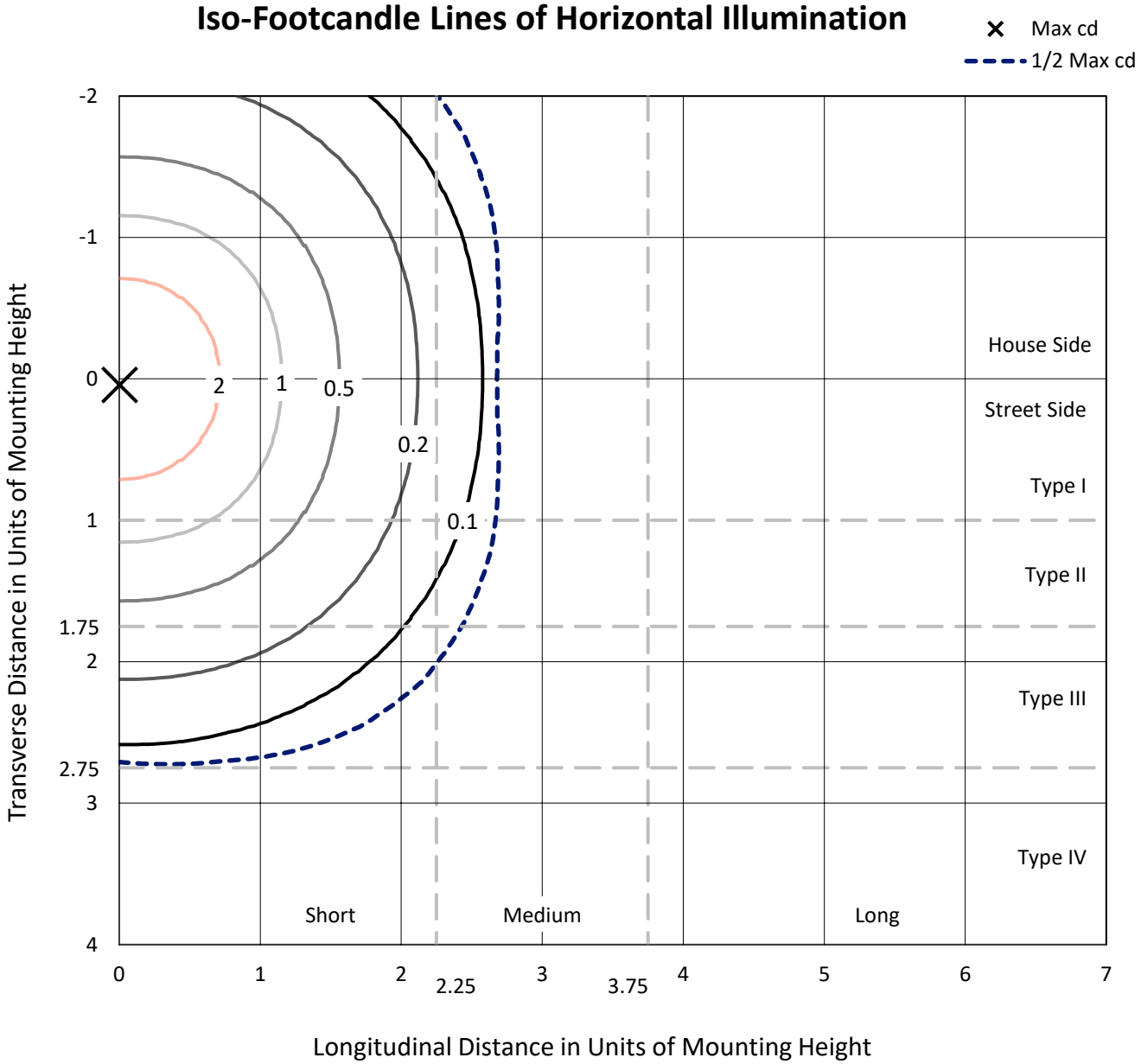
| | |
|---|---|
| Input Watts (W): | 28 |
| Input Voltage (V): | NR |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | NR |
| Total Harmonic Distortion (THDi): | NR |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 25 FT |

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Scaled Data Report

REPORT NUMBER: P821189
CATALOG NUMBER: TT-D1-735-24VDC-CQ-UPL

## Iso-Footcandle Lines of Horizontal Illumination



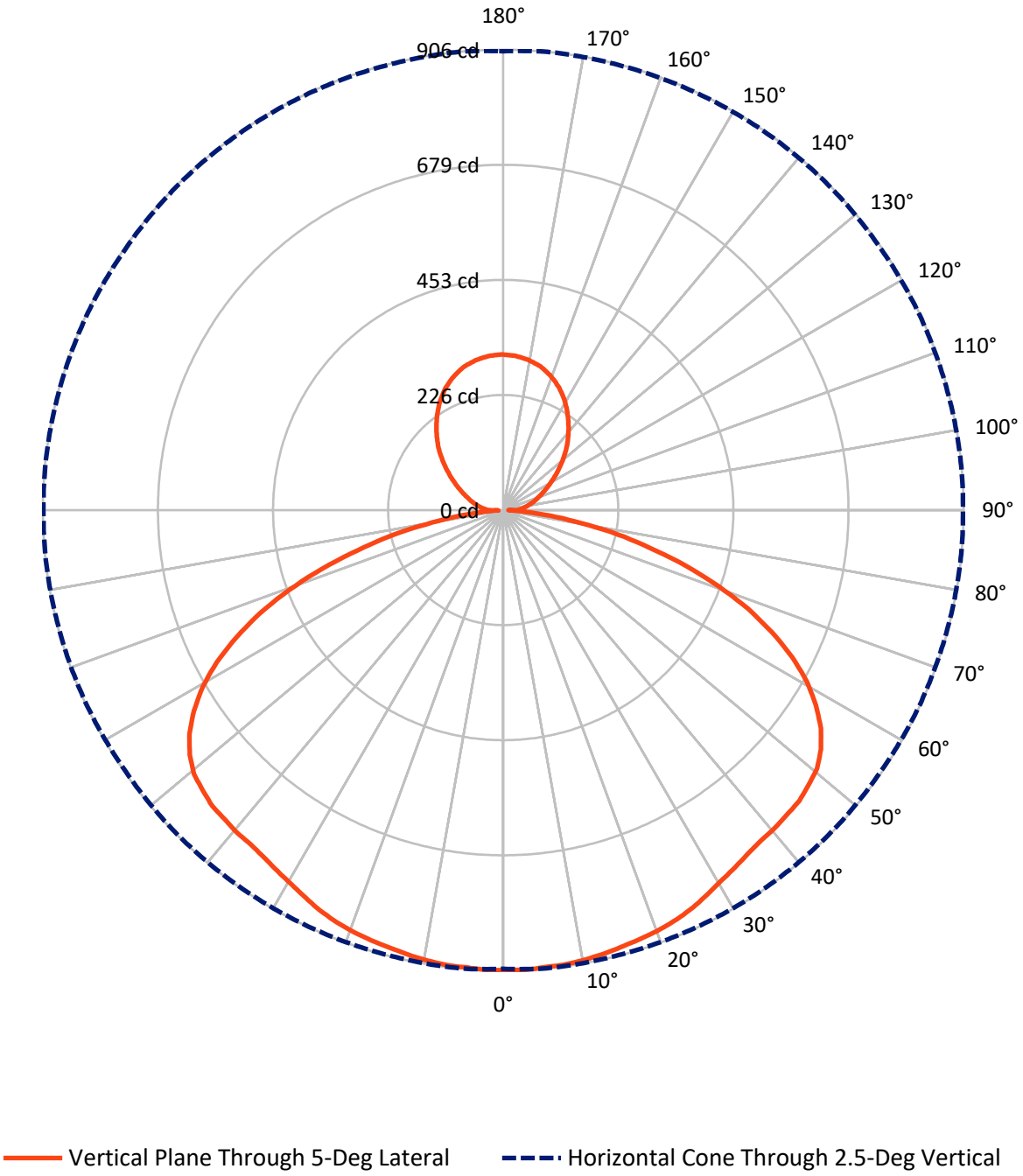

Based on 15 foot mounting height. Maximum calculated value = 4 fc
Type V - Short - N/A

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Peachtree City, GA 30269

Scaled Data Report

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CATALOG NUMBER: TT-D1-735-24VDC-CQ-UPL

## Luminous Intensity Polar Plot



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Scaled Data Report

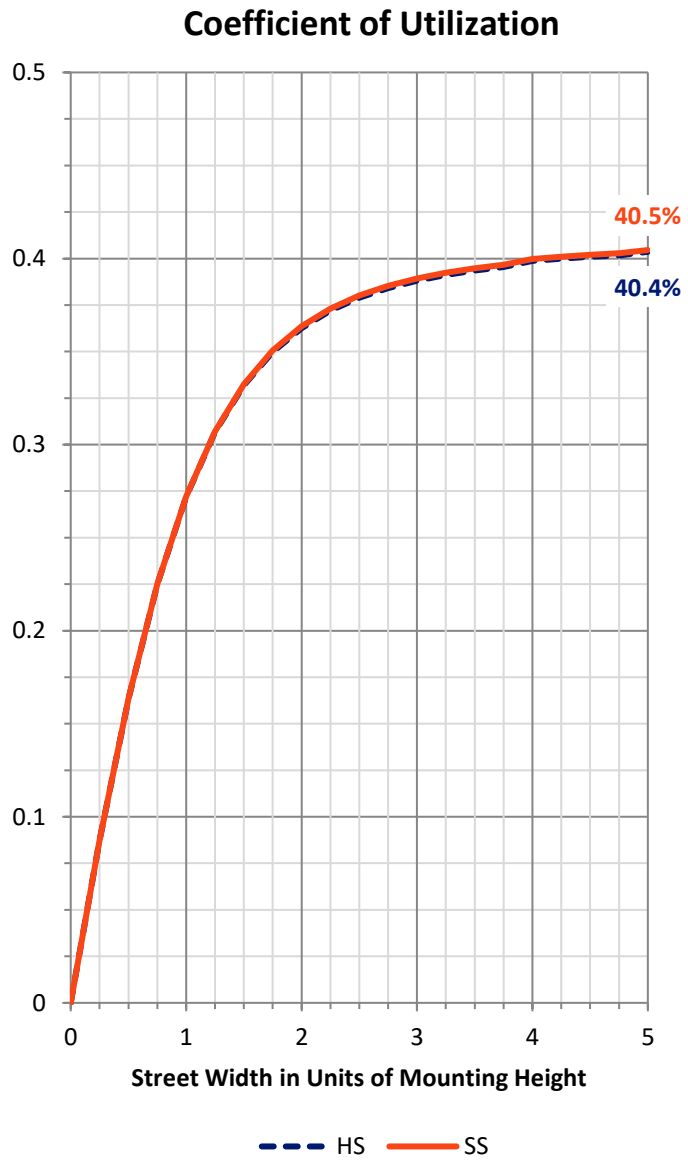
REPORT NUMBER: P821189
CATALOG NUMBER: TT-D1-735-24VDC-CQ-UPL

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 1811.5 | 415.9 | 2227.4 |
| | % Fixture | 40.7 | 9.3 | 50.0 |
| **Street Side** | Lumens | 1811.5 | 415.9 | 2227.4 |
| | % Fixture | 40.7 | 9.3 | 50.0 |
| **Total** | Lumens | 3623.0 | 831.7 | 4454.7 |
| | % Fixture | 81.3 | 18.7 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 86.1 | 1.9 |
| 10°-20° | 252.2 | 5.7 |
| 20°-30° | 401.0 | 9.0 |
| 30°-40° | 527.6 | 11.8 |
| 40°-50° | 645.7 | 14.5 |
| 50°-60° | 699.4 | 15.7 |
| 60°-70° | 601.7 | 13.5 |
| 70°-80° | 338.3 | 7.6 |
| 80°-90° | 71.1 | 1.6 |
| 90°-100° | 42.6 | 1.0 |
| 100°-110° | 66.0 | 1.5 |
| 110°-120° | 91.9 | 2.1 |
| 120°-130° | 119.0 | 2.7 |
| 130°-140° | 138.7 | 3.1 |
| 140°-150° | 140.5 | 3.2 |
| 150°-160° | 121.9 | 2.7 |
| 160°-170° | 82.2 | 1.8 |
| 170°-180° | 28.9 | 0.6 |
| 0°-90° | 3623.0 | 81.3 |
| 0°-180° | 4454.7 | 100.0 |



Cooper Lighting Solutions Photometric Lab
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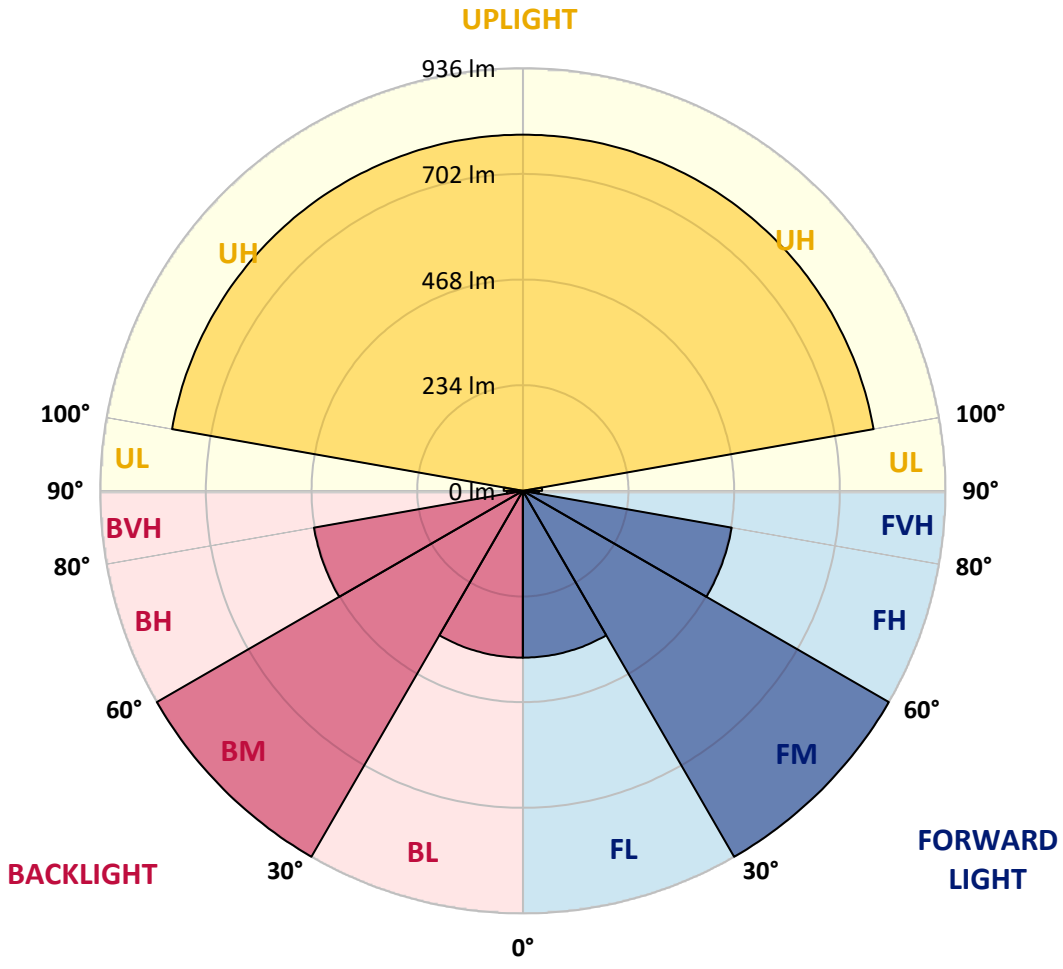
Scaled Data Report

REPORT NUMBER: P821189
CATALOG NUMBER: TT-D1-735-24VDC-CQ-UPL

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 369.7 | 8.3 | | | |
| FM | (30°-60°) | 936.3 | 21.0 | | | |
| FH | (60°-80°) | 470.0 | 10.6 | | | G0/660 |
| FVH | (80°-90°) | 35.5 | 0.8 | | | G1/100 |
| BL | (0°-30°) | 369.7 | 8.3 | B1/500 | | |
| BM | (30°-60°) | 936.3 | 21.0 | B1/1000 | | |
| BH | (60°-80°) | 470.0 | 10.6 | B1/500 | | G0/660 |
| BVH | (80°-90°) | 35.5 | 0.8 | | | G1/100 |
| UL | (90°-100°) | 42.6 | 1.0 | | U2/50 | |
| UH | (100°-180°) | 789.1 | 17.7 | | U4/1000 | |

**BUG Rating: B1-U4-G1**
Type V Short



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Scaled Data Report

REPORT NUMBER: P821189
CATALOG NUMBER: TT-D1-735-24VDC-CQ-UPL

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 905.4 | 905.4 | 905.4 | 905.4 | 905.4 | 905.4 | 905.4 | 905.4 | 905.4 | 905.4 | 905.4 |
| 2.5° | 903.1 | 905.9 | 904.8 | 904.8 | 904.8 | 904.8 | 903.6 | 904.8 | 904.8 | 905.4 | 904.8 |
| 5° | 903.6 | 903.1 | 903.1 | 903.6 | 903.6 | 904.2 | 903.1 | 903.6 | 904.2 | 904.2 | 904.8 |
| 7.5° | 901.9 | 902.5 | 901.3 | 902.5 | 901.3 | 901.9 | 901.9 | 902.5 | 901.9 | 902.5 | 903.6 |
| 10° | 898.5 | 899.0 | 898.5 | 898.5 | 898.5 | 899.6 | 897.3 | 899.0 | 898.5 | 899.0 | 898.5 |
| 12.5° | 892.1 | 895.0 | 893.8 | 895.0 | 895.0 | 895.0 | 893.3 | 894.4 | 895.0 | 895.0 | 895.0 |
| 15° | 889.2 | 889.8 | 888.1 | 890.4 | 891.0 | 891.5 | 889.2 | 890.4 | 890.4 | 891.0 | 891.5 |
| 17.5° | 882.9 | 885.8 | 885.2 | 886.9 | 886.4 | 888.1 | 887.5 | 886.9 | 886.4 | 887.5 | 886.4 |
| 20° | 878.3 | 881.2 | 880.6 | 882.3 | 882.9 | 884.6 | 882.9 | 882.9 | 881.2 | 881.8 | 883.5 |
| 22.5° | 873.7 | 874.8 | 874.8 | 876.6 | 876.6 | 878.3 | 876.6 | 876.0 | 876.0 | 875.4 | 877.1 |
| 25° | 866.2 | 866.8 | 866.2 | 867.9 | 869.1 | 870.2 | 869.7 | 868.5 | 867.9 | 867.9 | 867.4 |
| 27.5° | 854.1 | 856.4 | 857.6 | 859.9 | 860.4 | 862.2 | 859.9 | 859.9 | 858.7 | 857.6 | 858.1 |
| 30° | 844.9 | 846.0 | 846.0 | 851.2 | 851.2 | 854.1 | 851.2 | 850.7 | 850.1 | 849.5 | 848.4 |
| 32.5° | 836.3 | 838.0 | 839.7 | 843.7 | 846.6 | 847.8 | 846.0 | 844.9 | 842.0 | 840.3 | 839.7 |
| 35° | 829.3 | 829.9 | 833.4 | 839.1 | 842.6 | 845.5 | 843.2 | 840.3 | 836.3 | 833.4 | 835.7 |
| 37.5° | 824.2 | 824.7 | 829.9 | 837.4 | 843.7 | 846.0 | 842.6 | 838.0 | 831.6 | 828.2 | 827.0 |
| 40° | 819.6 | 823.0 | 828.8 | 839.1 | 846.0 | 849.5 | 846.6 | 840.3 | 831.1 | 824.2 | 823.6 |
| 42.5° | 817.2 | 819.0 | 827.6 | 839.7 | 849.5 | 854.1 | 850.1 | 841.4 | 829.9 | 821.9 | 821.3 |
| 45° | 811.5 | 816.7 | 824.7 | 840.3 | 851.2 | 857.0 | 851.2 | 840.3 | 826.5 | 817.2 | 815.5 |
| 47.5° | 806.9 | 808.6 | 821.3 | 839.1 | 852.4 | 857.0 | 851.2 | 837.4 | 820.1 | 808.0 | 806.9 |
| 50° | 795.9 | 800.0 | 812.6 | 831.6 | 847.2 | 851.8 | 844.9 | 826.5 | 806.9 | 793.6 | 791.3 |
| 52.5° | 779.2 | 782.7 | 797.7 | 821.3 | 836.3 | 841.4 | 831.1 | 811.5 | 788.5 | 772.3 | 772.3 |
| 55° | 753.3 | 758.5 | 774.1 | 798.2 | 817.2 | 821.9 | 809.8 | 789.0 | 763.1 | 747.0 | 746.4 |
| 57.5° | 722.2 | 725.7 | 742.4 | 768.9 | 787.3 | 794.2 | 782.1 | 759.1 | 733.2 | 714.2 | 712.4 |
| 60° | 681.9 | 686.5 | 704.4 | 729.7 | 748.7 | 754.5 | 744.1 | 721.1 | 694.6 | 674.4 | 674.4 |
| 62.5° | 633.5 | 638.7 | 656.6 | 682.5 | 702.1 | 710.7 | 696.3 | 674.4 | 646.8 | 627.2 | 625.5 |
| 65° | 577.1 | 581.7 | 597.8 | 624.9 | 645.0 | 651.4 | 640.4 | 617.4 | 590.9 | 572.5 | 570.8 |
| 67.5° | 513.7 | 520.1 | 536.2 | 559.2 | 576.5 | 584.6 | 577.7 | 556.9 | 529.3 | 510.3 | 508.5 |
| 70° | 445.2 | 449.8 | 462.5 | 483.8 | 503.4 | 509.1 | 498.8 | 484.9 | 459.0 | 441.7 | 439.4 |
| 72.5° | 372.1 | 376.1 | 386.5 | 406.6 | 420.4 | 427.9 | 422.2 | 404.3 | 383.6 | 369.2 | 371.5 |
| 75° | 298.3 | 297.8 | 309.3 | 323.7 | 336.3 | 341.5 | 337.5 | 326.0 | 307.0 | 294.9 | 294.3 |
| 77.5° | 224.6 | 230.4 | 234.4 | 246.5 | 256.9 | 260.9 | 255.1 | 245.9 | 231.5 | 221.7 | 223.5 |
| 80° | 157.8 | 154.4 | 161.8 | 169.3 | 176.2 | 180.3 | 176.8 | 171.6 | 161.8 | 154.4 | 153.2 |
| 82.5° | 96.8 | 93.9 | 97.3 | 104.2 | 108.9 | 110.0 | 110.6 | 104.2 | 100.2 | 94.5 | 95.6 |
| 85° | 42.6 | 43.2 | 46.1 | 50.7 | 51.3 | 51.8 | 51.8 | 50.7 | 46.1 | 45.5 | 44.3 |
| 87.5° | 10.4 | 10.4 | 10.9 | 12.7 | 12.7 | 13.2 | 13.2 | 11.5 | 10.9 | 9.8 | 10.4 |
| 90° | 30.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 |
| 92.5° | 34.8 | 34.2 | 34.2 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 |
| 95° | 39.4 | 39.4 | 39.4 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 |
| 97.5° | 44.6 | 44.6 | 44.6 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 |
| 100° | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 |
| 102.5° | 55.9 | 55.9 | 55.9 | 55.9 | 55.9 | 55.9 | 55.9 | 56.4 | 55.9 | 55.9 | 55.9 |
| 105° | 62.0 | 62.0 | 62.0 | 62.0 | 62.0 | 62.0 | 62.0 | 62.9 | 62.0 | 62.0 | 62.0 |
| 107.5° | 68.6 | 68.6 | 69.0 | 69.0 | 69.0 | 69.0 | 69.0 | 69.5 | 69.0 | 69.0 | 69.0 |
| 110° | 75.1 | 75.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 |

Cooper Lighting Solutions Photometric Lab
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Peachtree City, GA 30269

Scaled Data Report

REPORT NUMBER: P821189
CATALOG NUMBER: TT-D1-735-24VDC-CQ-UPL

**CANDELA DISTRIBUTION (continued):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 112.5° | 83.1 | *83.1* | 84.0 | 84.0 | 84.0 | 84.0 | 84.6 | 84.6 | 84.0 | 84.0 | 84.0 |
| 115° | 91.1 | *91.1* | 92.0 | 92.0 | 92.0 | 92.0 | 93.0 | 93.0 | 92.0 | 92.0 | 92.0 |
| 117.5° | 100.5 | *100.5* | 101.0 | 101.4 | 101.4 | 101.4 | 102.4 | 102.4 | 101.4 | 101.4 | 101.4 |
| 120° | 109.9 | *109.9* | 109.9 | 110.8 | 110.8 | 110.8 | 111.8 | 111.8 | 110.8 | 110.8 | 110.8 |
| 122.5° | 120.7 | *120.7* | 121.2 | 121.6 | 121.6 | 121.6 | 122.6 | 122.6 | 122.1 | 122.1 | 121.6 |
| 125° | 131.5 | *131.5* | 132.4 | 132.4 | 132.4 | 132.4 | 133.4 | 133.4 | 133.4 | 133.4 | 132.4 |
| 127.5° | 143.2 | *143.2* | 144.2 | 144.2 | 144.2 | 144.2 | 145.1 | 145.1 | 145.1 | 145.1 | 144.2 |
| 130° | 155.0 | *155.0* | 155.9 | 155.9 | 155.9 | 155.9 | 156.8 | 156.8 | 156.8 | 156.8 | 155.9 |
| 132.5° | 167.2 | *167.2* | 167.6 | 167.6 | 167.6 | 168.1 | 168.6 | 168.6 | 168.6 | 168.6 | 168.1 |
| 135° | 179.4 | *179.4* | 179.4 | 179.4 | 179.4 | 180.3 | 180.3 | 180.3 | 180.3 | 180.3 | 180.3 |
| 137.5° | 191.2 | *190.6* | 191.2 | 190.6 | 191.2 | 191.6 | 191.6 | 191.6 | 191.6 | 191.6 | 191.6 |
| 140° | 202.9 | *201.9* | 202.9 | 201.9 | 202.9 | 202.9 | 202.9 | 202.9 | 202.9 | 202.9 | 202.9 |
| 142.5° | 213.7 | *213.2* | 213.7 | 212.7 | 213.7 | 213.7 | 213.7 | 213.7 | 213.7 | 213.7 | 213.7 |
| 145° | 224.5 | *224.5* | 224.5 | 223.5 | 224.5 | 224.5 | 224.5 | 224.5 | 224.5 | 224.5 | 224.5 |
| 147.5° | 235.8 | *235.3* | 235.8 | 234.8 | 235.8 | 235.8 | 235.8 | 235.8 | 235.8 | 235.8 | 235.8 |
| 150° | 247.0 | *246.1* | 247.0 | 246.1 | 247.0 | 247.0 | 247.0 | 247.0 | 247.0 | 247.0 | 247.0 |
| 152.5° | 256.0 | *255.5* | 256.4 | 255.5 | 256.0 | 256.0 | 256.4 | 256.0 | 256.0 | 256.0 | 256.0 |
| 155° | 264.9 | *264.9* | 265.8 | 264.9 | 264.9 | 264.9 | 265.8 | 264.9 | 264.9 | 264.9 | 264.9 |
| 157.5° | 272.4 | *272.4* | 273.3 | 272.4 | 272.4 | 272.4 | 273.3 | 272.4 | 272.4 | 272.4 | 272.4 |
| 160° | 279.9 | *279.9* | 280.8 | 279.9 | 279.9 | 279.9 | 280.8 | 279.9 | 279.9 | 279.9 | 279.9 |
| 162.5° | 286.0 | *286.0* | 286.9 | 286.0 | 286.0 | 286.0 | 286.9 | 286.0 | 286.0 | 286.0 | 286.0 |
| 165° | 292.1 | *292.1* | 293.0 | 292.1 | 292.1 | 292.1 | 293.0 | 292.1 | 292.1 | 292.1 | 292.1 |
| 167.5° | 295.8 | *295.8* | 296.8 | 295.8 | 295.8 | 295.8 | 296.8 | 295.8 | 295.8 | 295.8 | 295.8 |
| 170° | 299.6 | *299.6* | 300.5 | 299.6 | 299.6 | 299.6 | 300.5 | 299.6 | 299.6 | 299.6 | 299.6 |
| 172.5° | 302.0 | *302.0* | 302.8 | 302.0 | 302.4 | 302.0 | 302.8 | 302.0 | 302.0 | 302.0 | 302.0 |
| 175° | 304.3 | *304.3* | 305.2 | 304.3 | 305.2 | 304.3 | 305.2 | 304.3 | 304.3 | 304.3 | 304.3 |
| 177.5° | 305.2 | *305.2* | 305.7 | 305.2 | 305.7 | 305.2 | 305.7 | 305.2 | 305.2 | 305.2 | 305.2 |
| 180° | 306.2 | *306.2* | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 |

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: SP1-2407-176-4

Test Date: 09/24/2024

Luminaire Tested: MEM2-HTN-VA-30-735-U-WQ

Data in this report applies to families of products including MEM2-HTN-VA-30-735-U-WQ

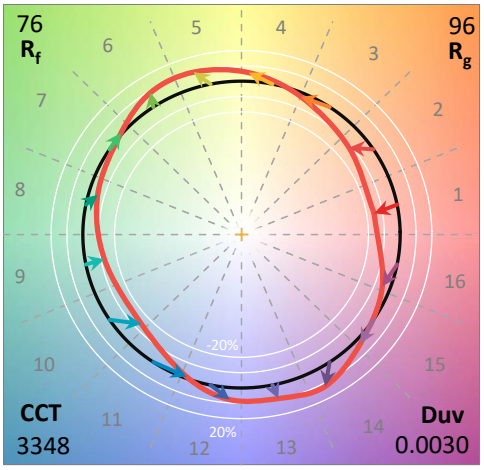
Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-176-4 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 09/27/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Streetworks |
| Catalog Number: | **MEM2-HTN-VA-30-735-U-WQ** |
| Description: | EPIC MODERN VISUAL COMFORT 30W WAVESTREAM WIDE |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 3348 | CRI (Ra): | 73.4 | | |
| CIE u': | 0.2384 | R1: | 70.8 | R9: | -19.2 |
| CIE v': | 0.5184 | R2: | 79.9 | R10: | 52.5 |
| Duv: | 0.0030 | R3: | 87.6 | R11: | 68.0 |
| CIE x: | 0.4177 | R4: | 72.6 | R12: | 42.6 |
| CIE y: | 0.4036 | R5: | 69.3 | R13: | 72.0 |
| CIE z: | 0.1787 | R6: | 71.3 | R14: | 92.6 |
| Peak Wavelength (nm): | 593 | R7: | 82.1 | R15: | 63.8 |
| Dominant Wavelength (nm): | 580 | R8: | 53.3 | | |
| Purity: | 46.5223 | | | | |
| Rf: | 75.8 | | | | |
| Rg: | 95.8 | | | | |




## Test Conditions

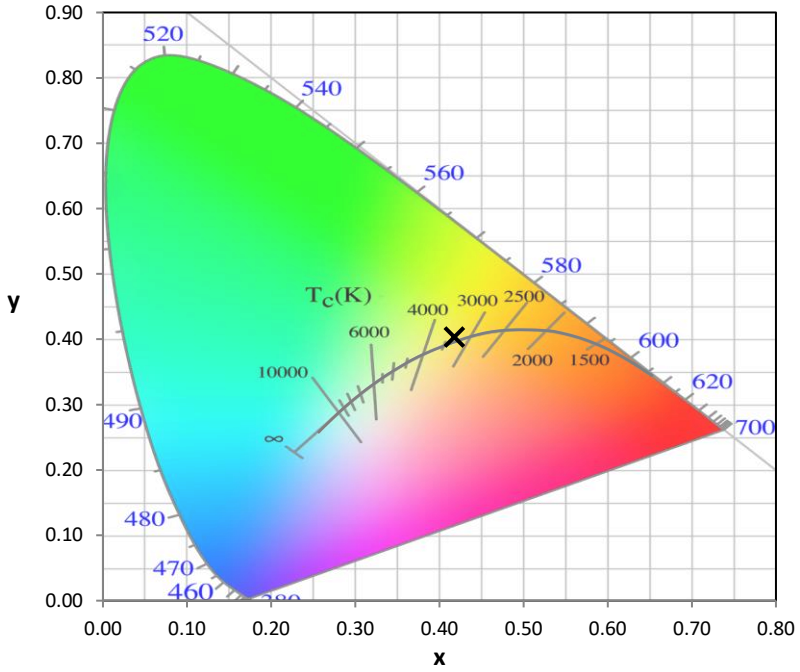
| | |
|---|---|
| Stabilization Time: | 30M |
| Operation Time: | 1H 30M |
| Sphere Temperature (°C): | 25.2 |

REPORT NUMBER: SP1-2407-176-4

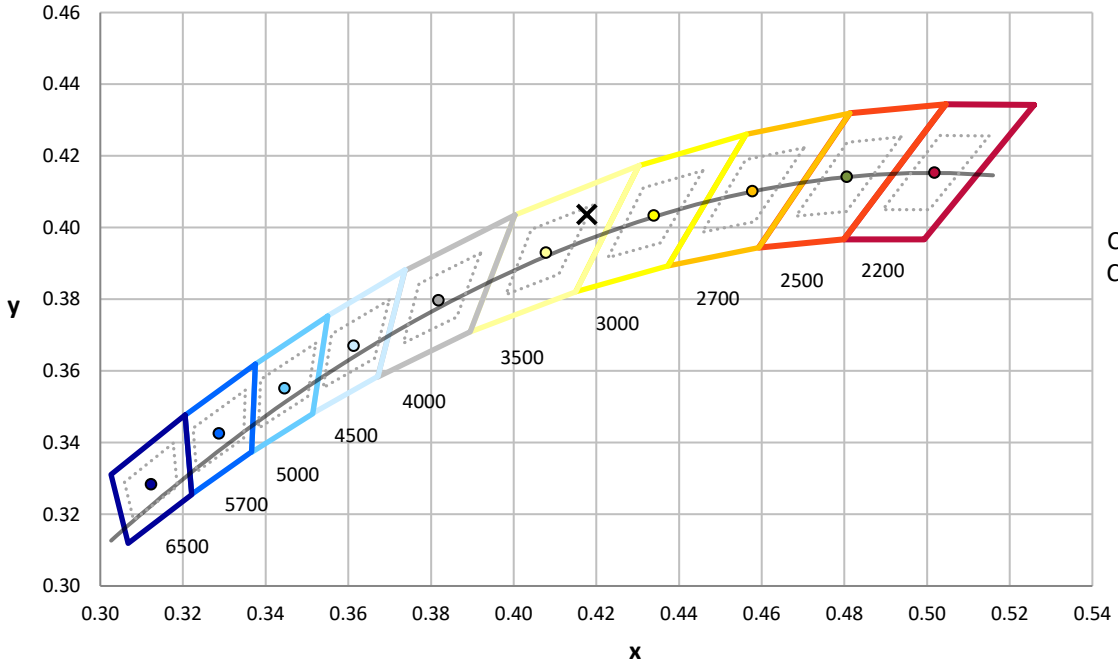
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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: SP1-2407-176-4

## CIE 1931 Chromaticity Diagram




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

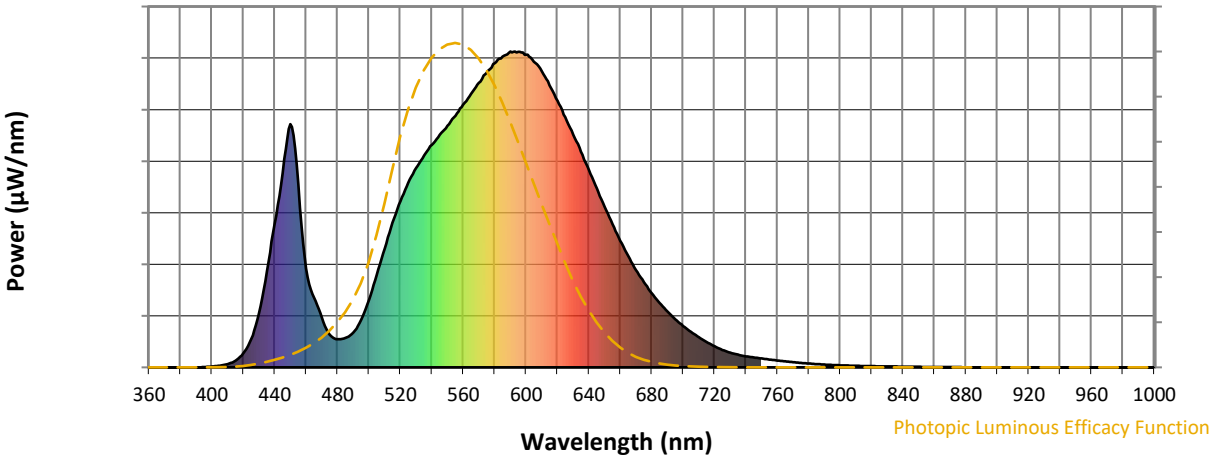



CCT = 3348K
CIE x = 0.4177
CIE y = 0.4036
Duv = 0.0030

Point lies inside the ANSI 3500K 4-step quadrangle

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## Photopic Flux vs. Wavelength

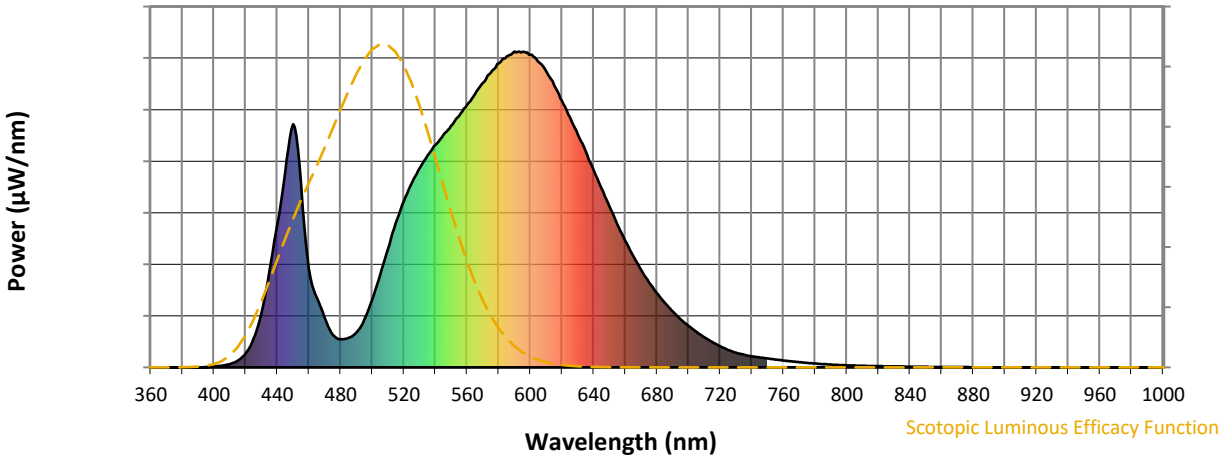



## Photopic Lumens: NR

| 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 | 110 | NR | 620 | 844 | NR | 750 | 28 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 150 | NR | 625 | 792 | NR | 755 | 25 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 214 | NR | 630 | 737 | NR | 760 | 22 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 293 | NR | 635 | 683 | NR | 765 | 19 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 376 | NR | 640 | 625 | NR | 770 | 16 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 458 | NR | 645 | 566 | NR | 775 | 14 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 526 | NR | 650 | 509 | NR | 780 | 12 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 584 | NR | 655 | 453 | NR | 785 | 10 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 631 | NR | 660 | 401 | NR | 790 | 9 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 671 | NR | 665 | 353 | NR | 795 | 8 | NR | 925 | 0 | NR |
| 410 | 10 | NR | 540 | 704 | NR | 670 | 308 | NR | 800 | 7 | NR | 930 | 0 | NR |
| 415 | 21 | NR | 545 | 737 | NR | 675 | 269 | NR | 805 | 6 | NR | 935 | 0 | NR |
| 420 | 44 | NR | 550 | 766 | NR | 680 | 235 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 90 | NR | 555 | 797 | NR | 685 | 204 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 171 | NR | 560 | 832 | NR | 690 | 177 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 305 | NR | 565 | 866 | NR | 695 | 152 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 455 | NR | 570 | 901 | NR | 700 | 131 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 615 | NR | 575 | 933 | NR | 705 | 112 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 771 | NR | 580 | 963 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 579 | NR | 585 | 984 | NR | 715 | 80 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 313 | NR | 590 | 1000 | NR | 720 | 67 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 221 | NR | 595 | 999 | NR | 725 | 55 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 156 | NR | 600 | 990 | NR | 730 | 46 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 103 | NR | 605 | 968 | NR | 735 | 40 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 89 | NR | 610 | 937 | NR | 740 | 35 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 93 | NR | 615 | 893 | NR | 745 | 31 | NR | 875 | 1 | NR | | | |

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## Scotopic Flux vs. Wavelength

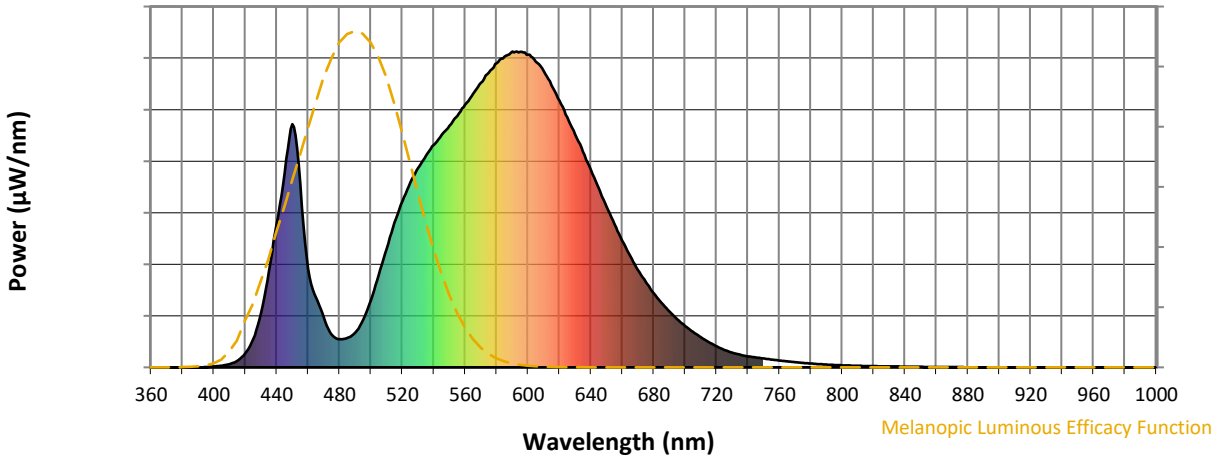



**Scotopic Lumens: NR** **S/P: 1.31**

| 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 | 110 | NR | 620 | 844 | NR | 750 | 28 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 150 | NR | 625 | 792 | NR | 755 | 25 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 214 | NR | 630 | 737 | NR | 760 | 22 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 293 | NR | 635 | 683 | NR | 765 | 19 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 376 | NR | 640 | 625 | NR | 770 | 16 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 458 | NR | 645 | 566 | NR | 775 | 14 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 526 | NR | 650 | 509 | NR | 780 | 12 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 584 | NR | 655 | 453 | NR | 785 | 10 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 631 | NR | 660 | 401 | NR | 790 | 9 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 671 | NR | 665 | 353 | NR | 795 | 8 | NR | 925 | 0 | NR |
| 410 | 10 | NR | 540 | 704 | NR | 670 | 308 | NR | 800 | 7 | NR | 930 | 0 | NR |
| 415 | 21 | NR | 545 | 737 | NR | 675 | 269 | NR | 805 | 6 | NR | 935 | 0 | NR |
| 420 | 44 | NR | 550 | 766 | NR | 680 | 235 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 90 | NR | 555 | 797 | NR | 685 | 204 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 171 | NR | 560 | 832 | NR | 690 | 177 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 305 | NR | 565 | 866 | NR | 695 | 152 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 455 | NR | 570 | 901 | NR | 700 | 131 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 615 | NR | 575 | 933 | NR | 705 | 112 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 771 | NR | 580 | 963 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 579 | NR | 585 | 984 | NR | 715 | 80 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 313 | NR | 590 | 1000 | NR | 720 | 67 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 221 | NR | 595 | 999 | NR | 725 | 55 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 156 | NR | 600 | 990 | NR | 730 | 46 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 103 | NR | 605 | 968 | NR | 735 | 40 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 89 | NR | 610 | 937 | NR | 740 | 35 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 93 | NR | 615 | 893 | NR | 745 | 31 | NR | 875 | 1 | NR | | | |

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## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 2.4**

| 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 | 110 | NR | 620 | 844 | NR | 750 | 28 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 150 | NR | 625 | 792 | NR | 755 | 25 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 214 | NR | 630 | 737 | NR | 760 | 22 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 293 | NR | 635 | 683 | NR | 765 | 19 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 376 | NR | 640 | 625 | NR | 770 | 16 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 458 | NR | 645 | 566 | NR | 775 | 14 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 526 | NR | 650 | 509 | NR | 780 | 12 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 584 | NR | 655 | 453 | NR | 785 | 10 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 631 | NR | 660 | 401 | NR | 790 | 9 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 671 | NR | 665 | 353 | NR | 795 | 8 | NR | 925 | 0 | NR |
| 410 | 10 | NR | 540 | 704 | NR | 670 | 308 | NR | 800 | 7 | NR | 930 | 0 | NR |
| 415 | 21 | NR | 545 | 737 | NR | 675 | 269 | NR | 805 | 6 | NR | 935 | 0 | NR |
| 420 | 44 | NR | 550 | 766 | NR | 680 | 235 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 90 | NR | 555 | 797 | NR | 685 | 204 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 171 | NR | 560 | 832 | NR | 690 | 177 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 305 | NR | 565 | 866 | NR | 695 | 152 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 455 | NR | 570 | 901 | NR | 700 | 131 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 615 | NR | 575 | 933 | NR | 705 | 112 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 771 | NR | 580 | 963 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 579 | NR | 585 | 984 | NR | 715 | 80 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 313 | NR | 590 | 1000 | NR | 720 | 67 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 221 | NR | 595 | 999 | NR | 725 | 55 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 156 | NR | 600 | 990 | NR | 730 | 46 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 103 | NR | 605 | 968 | NR | 735 | 40 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 89 | NR | 610 | 937 | NR | 740 | 35 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 93 | NR | 615 | 893 | NR | 745 | 31 | NR | 875 | 1 | NR | | | |

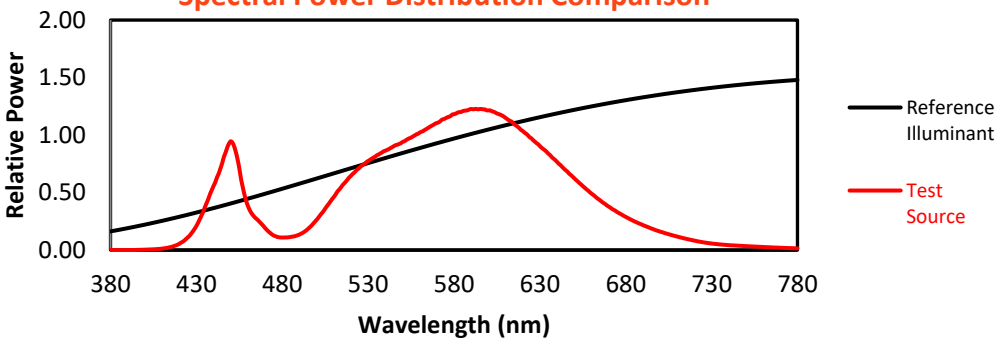
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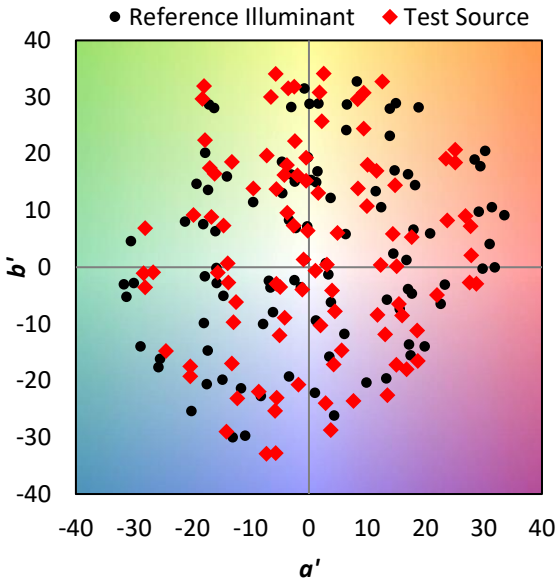
## Summary

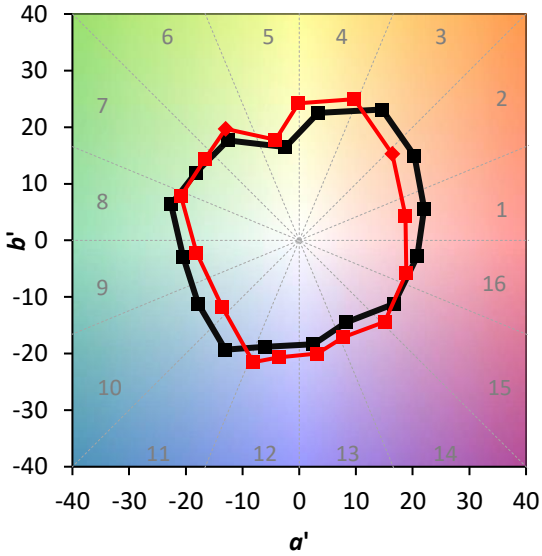
$R_f$ = 75.8
$R_g$ = 95.8
CIE $R_a$ = 73.4
$R_9$ = -19.2

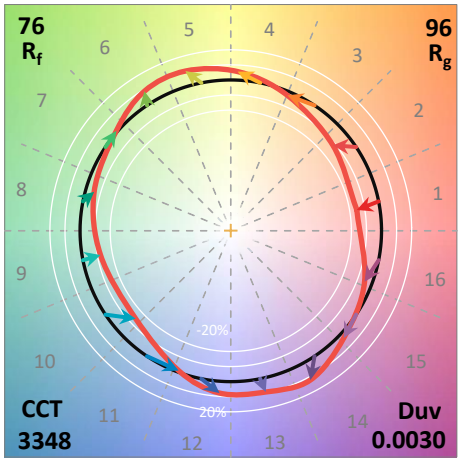
## Spectral Power Distribution Comparison

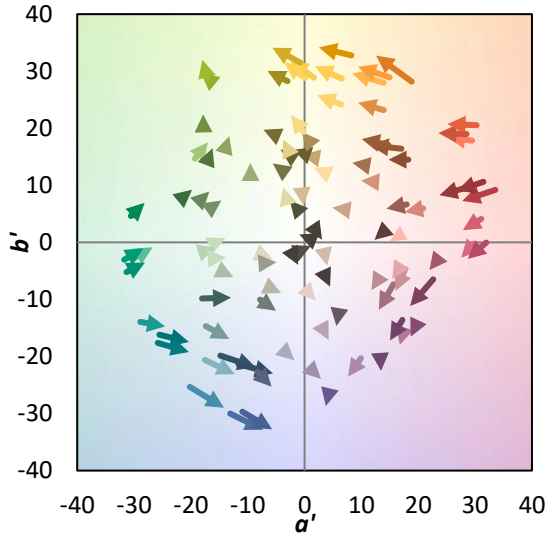



## Color Vector Graphics



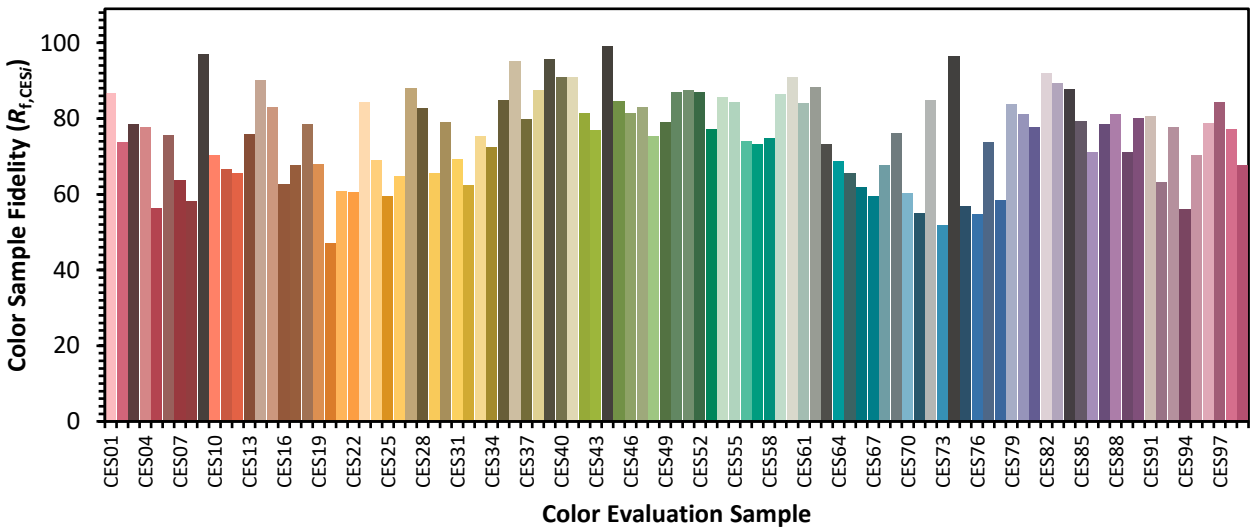



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**Individual Sample Fidelity Index ($R_{f,i}$)**

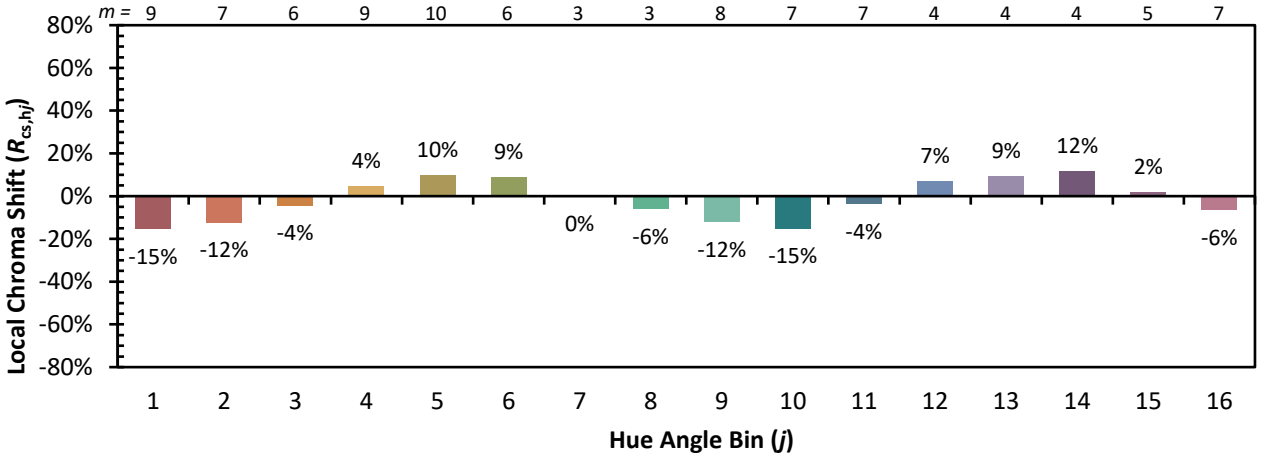
| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 65 | CES51 = 88 | CES76 = 55 |
| CES02 = 62 | CES27 = 88 | CES52 = 87 | CES77 = 74 |
| CES03 = 31 | CES28 = 83 | CES53 = 77 | CES78 = 58 |
| CES04 = 70 | CES29 = 66 | CES54 = 86 | CES79 = 84 |
| CES05 = 48 | CES30 = 79 | CES55 = 84 | CES80 = 81 |
| CES06 = 51 | CES31 = 69 | CES56 = 74 | CES81 = 78 |
| CES07 = 41 | CES32 = 62 | CES57 = 73 | CES82 = 92 |
| CES08 = 40 | CES33 = 75 | CES58 = 75 | CES83 = 89 |
| CES09 = 29 | CES34 = 73 | CES59 = 87 | CES84 = 88 |
| CES10 = 75 | CES35 = 85 | CES60 = 91 | CES85 = 79 |
| CES11 = 58 | CES36 = 95 | CES61 = 84 | CES86 = 71 |
| CES12 = 64 | CES37 = 80 | CES62 = 88 | CES87 = 79 |
| CES13 = 43 | CES38 = 88 | CES63 = 73 | CES88 = 81 |
| CES14 = 74 | CES39 = 96 | CES64 = 69 | CES89 = 71 |
| CES15 = 71 | CES40 = 91 | CES65 = 66 | CES90 = 80 |
| CES16 = 47 | CES41 = 91 | CES66 = 62 | CES91 = 81 |
| CES17 = 50 | CES42 = 81 | CES67 = 60 | CES92 = 63 |
| CES18 = 56 | CES43 = 77 | CES68 = 68 | CES93 = 78 |
| CES19 = 72 | CES44 = 99 | CES69 = 76 | CES94 = 56 |
| CES20 = 65 | CES45 = 85 | CES70 = 60 | CES95 = 70 |
| CES21 = 87 | CES46 = 82 | CES71 = 55 | CES96 = 79 |
| CES22 = 79 | CES47 = 83 | CES72 = 85 | CES97 = 84 |
| CES23 = 92 | CES48 = 75 | CES73 = 52 | CES98 = 77 |
| CES24 = 91 | CES49 = 79 | CES74 = 96 | CES99 = 68 |
| CES25 = 72 | CES50 = 87 | CES75 = 57 | |

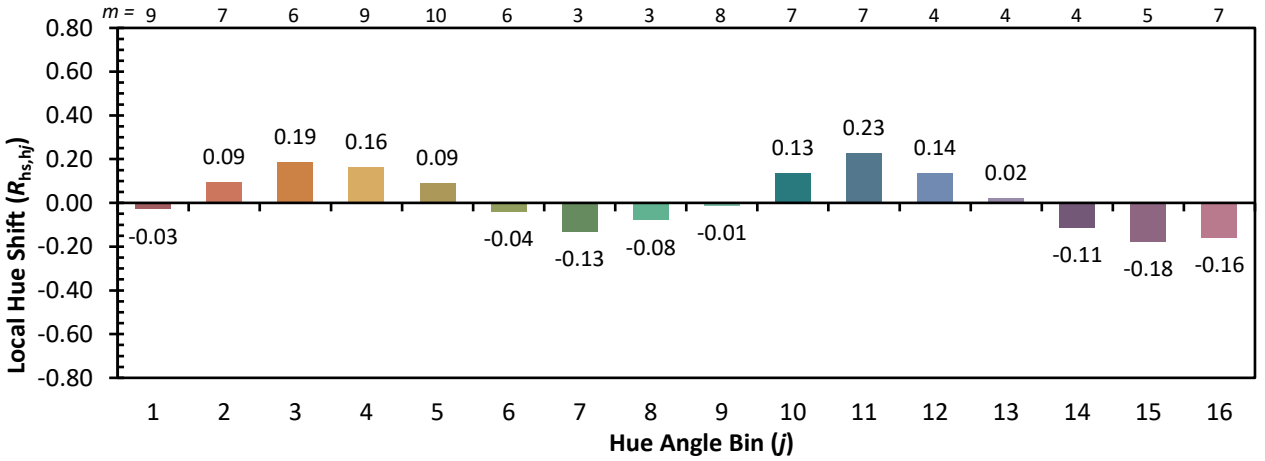


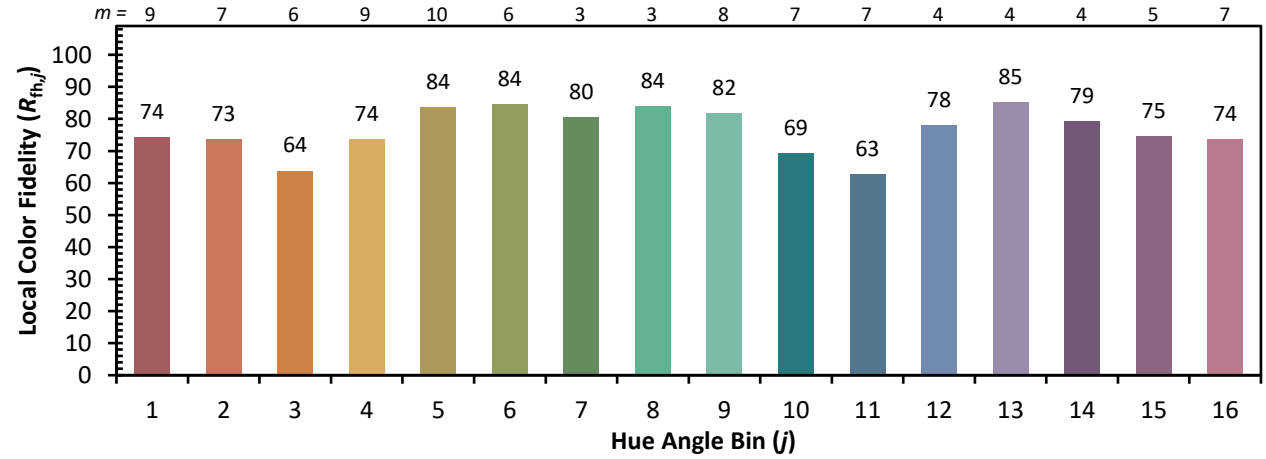
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## Color Rendition by Hue-Angle Bin



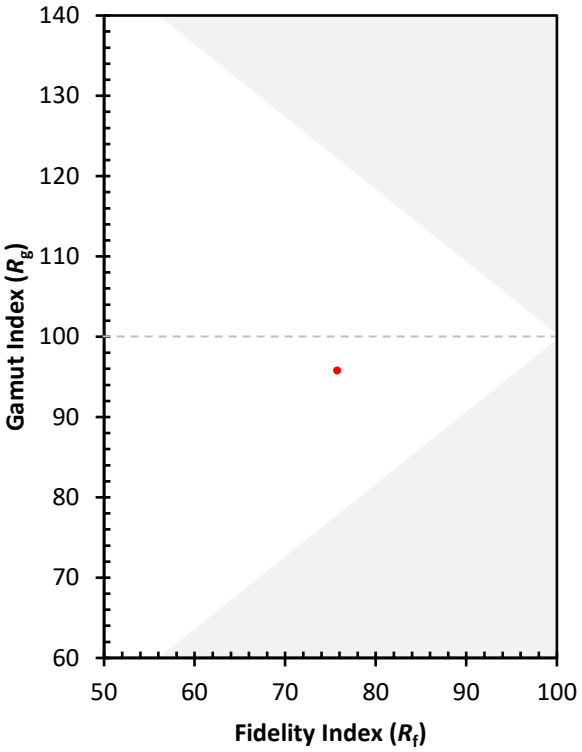



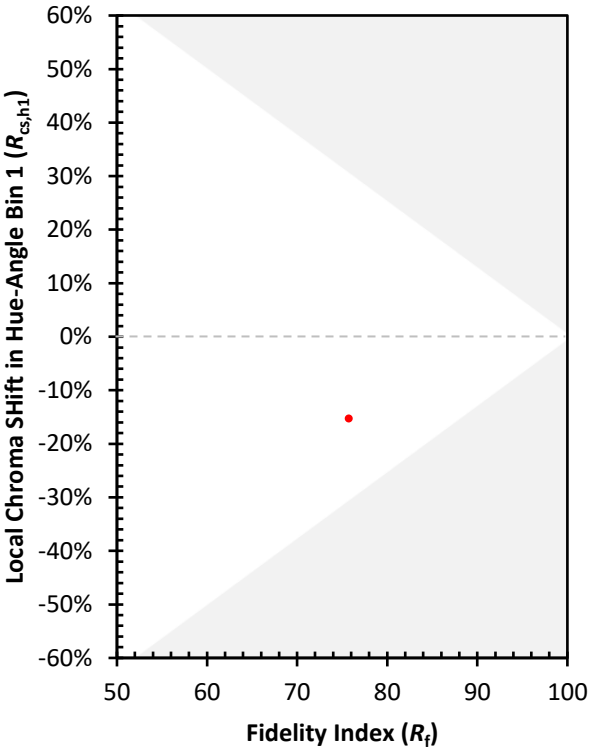



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## Measure Comparisons




(END OF REPORT)