Classified

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: HALO

Report Number: P832734

Luminaire Tested: **HLBT407FS5*-940**

Issue Date: 05/14/2024

Report Generated By 670245763 / DESKTOP-DVLU35A

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: | P832734 |
| Test Lab: | ETA Testing Technology |
| Issue Date: | 05/14/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | HALO |
| Catalog Number: | HLBT407FS5*-940 |
| Description: | HALO SLIM RETROFIT 4 inch 90 CRI COLOR SELECTABLE FIXTURE |
| Light Source: | 4000K CCT, 90 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 735.2 lumens |
| Efficiency: | N/A |
| Efficacy: | 94.3 lumens/watt |
| Spacing Criteria (0/90/45): | 1.25 / 1.25 / 1.36 |
| Luminous Opening: | Circular (Dia: 0.3' x H: 0') |
| CIE Type: | Direct |

| | |
|---|---|
| Input Watts (W): | 7.8 |
| Input Voltage (V): | 120 |
| 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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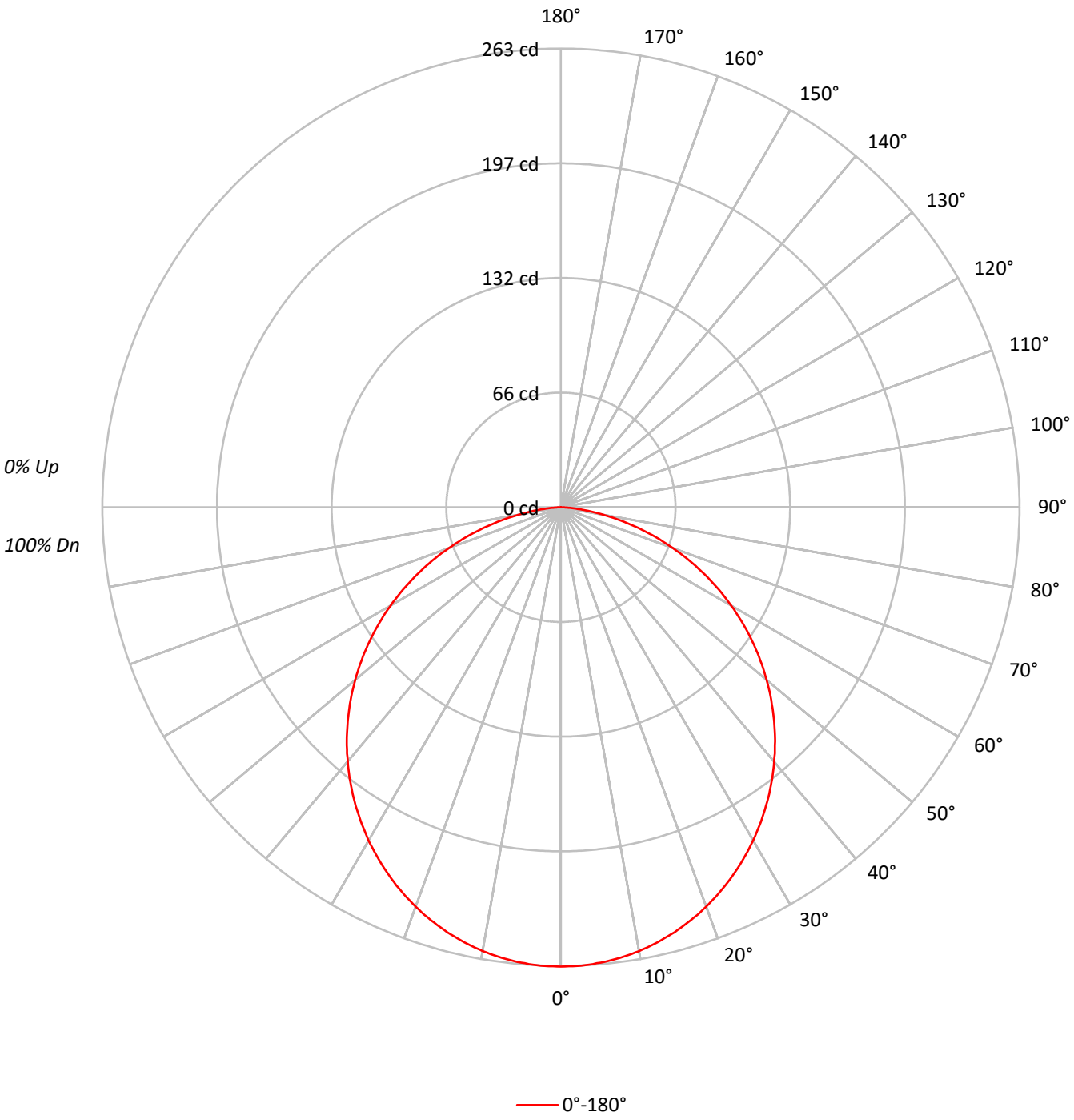
## Luminous Intensity Polar Plot



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## COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

| RF | 20 | | | | 20 | | | | 20 | | | 20 | | | 20 | | | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RC | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 |
| RW | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| RCR | | | | | | | | | | | | | | | | | | |
| 0 | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |
| 1 | 109 | 104 | 100 | 96 | 106 | 102 | 98 | 95 | 98 | 95 | 92 | 94 | 91 | 89 | 90 | 88 | 86 | 84 |
| 2 | 99 | 91 | 84 | 78 | 96 | 89 | 83 | 77 | 85 | 80 | 76 | 82 | 78 | 74 | 79 | 75 | 72 | 70 |
| 3 | 90 | 80 | 72 | 65 | 88 | 78 | 71 | 65 | 75 | 69 | 63 | 72 | 67 | 62 | 70 | 65 | 61 | 59 |
| 4 | 83 | 71 | 62 | 55 | 80 | 69 | 61 | 55 | 67 | 60 | 54 | 64 | 58 | 53 | 62 | 57 | 53 | 50 |
| 5 | 76 | 63 | 54 | 47 | 74 | 62 | 54 | 47 | 60 | 52 | 47 | 58 | 51 | 46 | 56 | 50 | 46 | 44 |
| 6 | 70 | 57 | 48 | 41 | 68 | 56 | 47 | 41 | 54 | 47 | 41 | 52 | 46 | 41 | 51 | 45 | 40 | 38 |
| 7 | 65 | 52 | 43 | 37 | 63 | 51 | 42 | 36 | 49 | 42 | 36 | 48 | 41 | 36 | 46 | 40 | 36 | 34 |
| 8 | 61 | 47 | 38 | 33 | 59 | 46 | 38 | 33 | 45 | 38 | 32 | 44 | 37 | 32 | 43 | 36 | 32 | 30 |
| 9 | 57 | 43 | 35 | 29 | 55 | 43 | 35 | 29 | 41 | 34 | 29 | 40 | 34 | 29 | 39 | 33 | 29 | 27 |
| 10 | 53 | 40 | 32 | 27 | 52 | 39 | 32 | 27 | 38 | 31 | 26 | 37 | 31 | 26 | 36 | 30 | 26 | 24 |

## AVERAGE LUMINANCE (cd/sqm):

| | 0° |
|---|---|
| 0° | 40110 |
| 5° | 40065 |
| 10° | 39956 |
| 15° | 39759 |
| 20° | 39492 |
| 25° | 39166 |
| 30° | 38789 |
| 35° | 38332 |
| 40° | 37829 |
| 45° | 37235 |
| 50° | 36507 |
| 55° | 35602 |
| 60° | 34384 |
| 65° | 32789 |
| 70° | 30498 |
| 75° | 27123 |
| 80° | 22011 |
| 85° | 14851 |

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**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 24.9 | 3.4 |
| 10°-20° | 71.1 | 9.7 |
| 20°-30° | 107.4 | 14.6 |
| 30°-40° | 129.0 | 17.5 |
| 40°-50° | 133.3 | 18.1 |
| 50°-60° | 119.7 | 16.3 |
| 60°-70° | 89.9 | 12.2 |
| 70°-80° | 48.8 | 6.6 |
| 80°-90° | 11.0 | 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°-30° | 203.4 | 27.7 |
| 0°-40° | 332.4 | 45.2 |
| 0°-60° | 585.5 | 79.6 |
| 0°-90° | 735.2 | 100.0 |
| 90°-120° | 0.0 | 0.0 |
| 90°-150° | 0.0 | 0.0 |
| 90°-180° | 0.0 | 0.0 |
| 0°-180° | 735.2 | 100.0 |

**CANDELA DISTRIBUTION:**

| | 0° | Flux |
|---|---|---|
| 0° | 263 | |
| 5° | 262 | 25 |
| 15° | 252 | 71 |
| 25° | 233 | 107 |
| 35° | 206 | 129 |
| 45° | 173 | 133 |
| 55° | 134 | 120 |
| 65° | 91 | 90 |
| 75° | 46 | 49 |
| 85° | 8 | 11 |
| 90° | 1 | |

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CATALOG NUMBER: HLBT407FS5*-940

**CANDELA DISTRIBUTION (FULL):**

| | 0° |
|---|---|
| 0° | 263.4 |
| 0.5° | 263.4 |
| 1° | 263.3 |
| 1.5° | 263.3 |
| 2° | 263.2 |
| 2.5° | 263.1 |
| 3° | 262.9 |
| 3.5° | 262.8 |
| 4° | 262.6 |
| 4.5° | 262.3 |
| 5° | 262.1 |
| 5.5° | 261.9 |
| 6° | 261.6 |
| 6.5° | 261.2 |
| 7° | 260.9 |
| 7.5° | 260.6 |
| 8° | 260.2 |
| 8.5° | 259.7 |
| 9° | 259.3 |
| 9.5° | 258.8 |
| 10° | 258.4 |
| 10.5° | 257.8 |
| 11° | 257.3 |
| 11.5° | 256.8 |
| 12° | 256.2 |
| 12.5° | 255.6 |
| 13° | 254.9 |
| 13.5° | 254.2 |
| 14° | 253.6 |
| 14.5° | 252.9 |
| 15° | 252.2 |
| 15.5° | 251.4 |
| 16° | 250.6 |
| 16.5° | 249.8 |
| 17° | 249.0 |
| 17.5° | 248.2 |
| 18° | 247.3 |
| 18.5° | 246.5 |
| 19° | 245.6 |
| 19.5° | 244.6 |
| 20° | 243.7 |
| 20.5° | 242.7 |
| 21° | 241.7 |
| 21.5° | 240.7 |
| 22° | 239.7 |

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**CANDELA DISTRIBUTION (continued):**

| | 0° |
|---|---|
| 22.5° | 238.6 |
| 23° | 237.5 |
| 23.5° | 236.5 |
| 24° | 235.4 |
| 24.5° | 234.2 |
| 25° | 233.1 |
| 25.5° | 231.9 |
| 26° | 230.7 |
| 26.5° | 229.5 |
| 27° | 228.3 |
| 27.5° | 227.0 |
| 28° | 225.7 |
| 28.5° | 224.5 |
| 29° | 223.2 |
| 29.5° | 221.9 |
| 30° | 220.6 |
| 30.5° | 219.2 |
| 31° | 217.8 |
| 31.5° | 216.4 |
| 32° | 215.0 |
| 32.5° | 213.6 |
| 33° | 212.1 |
| 33.5° | 210.7 |
| 34° | 209.2 |
| 34.5° | 207.7 |
| 35° | 206.2 |
| 35.5° | 204.7 |
| 36° | 203.2 |
| 36.5° | 201.6 |
| 37° | 200.0 |
| 37.5° | 198.5 |
| 38° | 196.9 |
| 38.5° | 195.2 |
| 39° | 193.6 |
| 39.5° | 192.0 |
| 40° | 190.3 |
| 40.5° | 188.6 |
| 41° | 187.0 |
| 41.5° | 185.2 |
| 42° | 183.5 |
| 42.5° | 181.8 |
| 43° | 180.1 |
| 43.5° | 178.3 |
| 44° | 176.5 |
| 44.5° | 174.7 |

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CATALOG NUMBER: HLBT407FS5*-940

**CANDELA DISTRIBUTION (continued):**

| | 0° |
|---|---|
| 45° | 172.9 |
| 45.5° | 171.1 |
| 46° | 169.2 |
| 46.5° | 167.4 |
| 47° | 165.5 |
| 47.5° | 163.6 |
| 48° | 161.8 |
| 48.5° | 159.9 |
| 49° | 158.0 |
| 49.5° | 156.0 |
| 50° | 154.1 |
| 50.5° | 152.1 |
| 51° | 150.2 |
| 51.5° | 148.2 |
| 52° | 146.2 |
| 52.5° | 144.2 |
| 53° | 142.2 |
| 53.5° | 140.2 |
| 54° | 138.1 |
| 54.5° | 136.1 |
| 55° | 134.1 |
| 55.5° | 132.0 |
| 56° | 129.9 |
| 56.5° | 127.8 |
| 57° | 125.7 |
| 57.5° | 123.6 |
| 58° | 121.5 |
| 58.5° | 119.4 |
| 59° | 117.2 |
| 59.5° | 115.1 |
| 60° | 112.9 |
| 60.5° | 110.7 |
| 61° | 108.6 |
| 61.5° | 106.4 |
| 62° | 104.2 |
| 62.5° | 102.1 |
| 63° | 99.8 |
| 63.5° | 97.6 |
| 64° | 95.4 |
| 64.5° | 93.2 |
| 65° | 91.0 |
| 65.5° | 88.7 |
| 66° | 86.5 |
| 66.5° | 84.3 |
| 67° | 82.0 |

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**CANDELA DISTRIBUTION (continued):**

| | 0° |
|---|---|
| 67.5° | 79.8 |
| 68° | 77.5 |
| 68.5° | 75.3 |
| 69° | 73.0 |
| 69.5° | 70.7 |
| 70° | 68.5 |
| 70.5° | 66.2 |
| 71° | 64.0 |
| 71.5° | 61.7 |
| 72° | 59.5 |
| 72.5° | 57.2 |
| 73° | 54.9 |
| 73.5° | 52.7 |
| 74° | 50.5 |
| 74.5° | 48.3 |
| 75° | 46.1 |
| 75.5° | 43.9 |
| 76° | 41.7 |
| 76.5° | 39.5 |
| 77° | 37.4 |
| 77.5° | 35.3 |
| 78° | 33.2 |
| 78.5° | 31.1 |
| 79° | 29.1 |
| 79.5° | 27.1 |
| 80° | 25.1 |
| 80.5° | 23.2 |
| 81° | 21.3 |
| 81.5° | 19.5 |
| 82° | 17.7 |
| 82.5° | 16.0 |
| 83° | 14.3 |
| 83.5° | 12.7 |
| 84° | 11.3 |
| 84.5° | 9.9 |
| 85° | 8.5 |
| 85.5° | 7.3 |
| 86° | 6.2 |
| 86.5° | 5.2 |
| 87° | 4.3 |
| 87.5° | 3.5 |
| 88° | 2.9 |
| 88.5° | 2.4 |
| 89° | 1.9 |
| 89.5° | 1.5 |

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**CANDELA DISTRIBUTION (continued):**

| | 0° |
|---|---|
| 90° | *1.1* |

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
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# LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

HALO

Report Number: SP1-2403-328-14

Test Date: 05/03/2024

Luminaire Tested: HLT407FS5-4000K

Data in this report applies to families of products HLT407FS5-4000K.

Report Generated By FNC07603 / LDUCLS01DT446
Version: v6.13

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

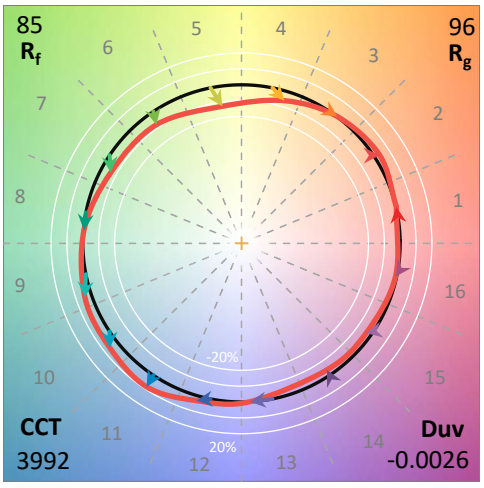
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2403-328-14 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 05/03/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | HALO |
| Catalog Number: | **HLT407FS5-4000K** |
| Description: | HLBSL RETROFIT 4 INCH SAMPLE #2. |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 3992 | CRI (Ra): | 90.4 | | |
| CIE u': | 0.2267 | R1: | 89.6 | R9: | 82.4 |
| CIE v': | 0.4985 | R2: | 90.8 | R10: | 83.3 |
| Duv: | -0.0026 | R3: | 95.4 | R11: | 93.8 |
| CIE x: | 0.3789 | R4: | 91.2 | R12: | 73.2 |
| CIE y: | 0.3703 | R5: | 90.1 | R13: | 89.3 |
| CIE z: | 0.2508 | R6: | 86.2 | R14: | 98.1 |
| Peak Wavelength (nm): | 632 | R7: | 89.6 | | |
| Dominant Wavelength (nm): | 580 | R8: | 90.3 | | |
| Purity: | 25 | | | | |

| | |
|---|---|
| Rf: | 85.2 |
| Rg: | 96 |




## Test Conditions

| | |
|---|---|
| Stabilization Time: | 21M |
| Operation Time: | 12H |
| Room Temperature (°C) / RH%: | 25.1/43% |
| Sphere Temperature (°C): | 24.9 |

Cooper Lighting Solutions Photometric Lab
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REPORT NUMBER: SP1-2403-328-14

| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | 76INCH SPHERE IN0058 | 2/12/2024 | 8/12/2024 |
| Power Meter | XITRON 2801 IN0071 | 10/23/2023 | 10/23/2024 |
| AC Power Source | CHROMA 61603 IN0063 | 10/24/2023 | 10/24/2024 |
| DC Power Source | AGILENT E3634A IN0208 | 10/24/2023 | 10/24/2024 |
| Sphere Thermometer | ONSET IN0085 | 10/24/2023 | 10/24/2024 |
| Room Thermometer | ONSET IN0046 | 10/24/2023 | 10/24/2024 |

Cooper Lighting Solutions Photometric Lab
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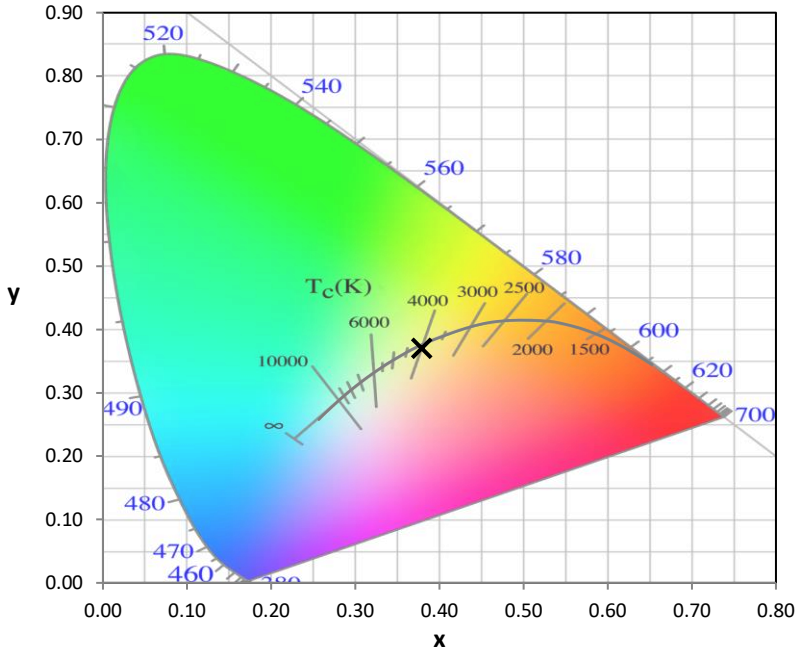
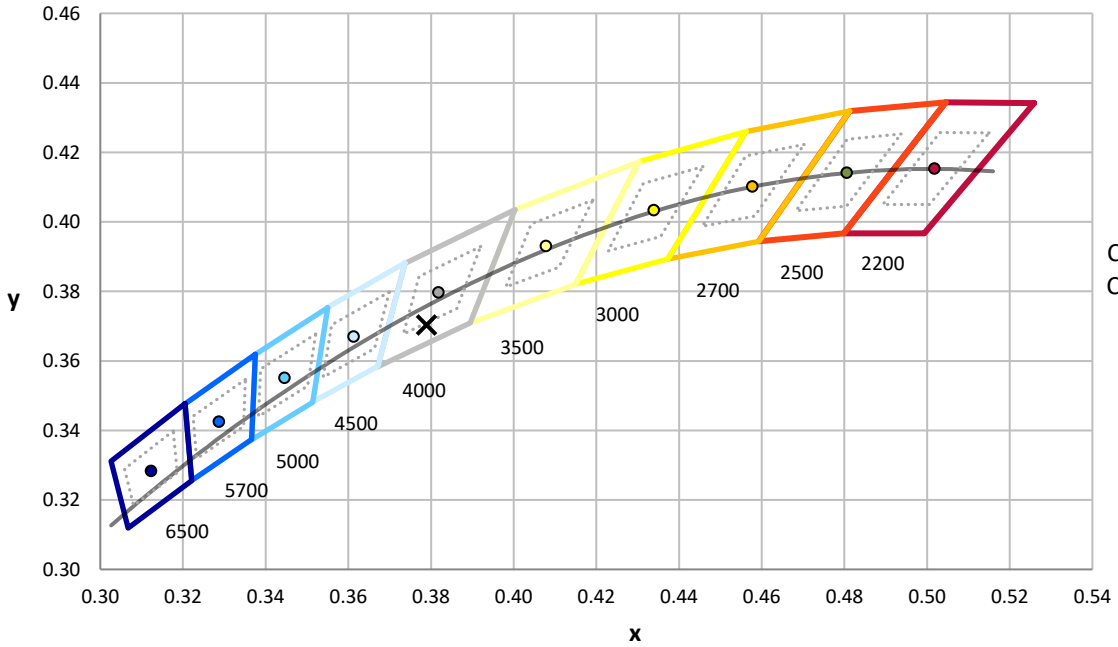
## CIE 1931 Chromaticity Diagram




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




CCT = 3992K
CIE x = 0.3789
CIE y = 0.3703
Duv = -0.0026

Point lies inside the ANSI 4000K 7-step quadrangle

Cooper Lighting Solutions Photometric Lab
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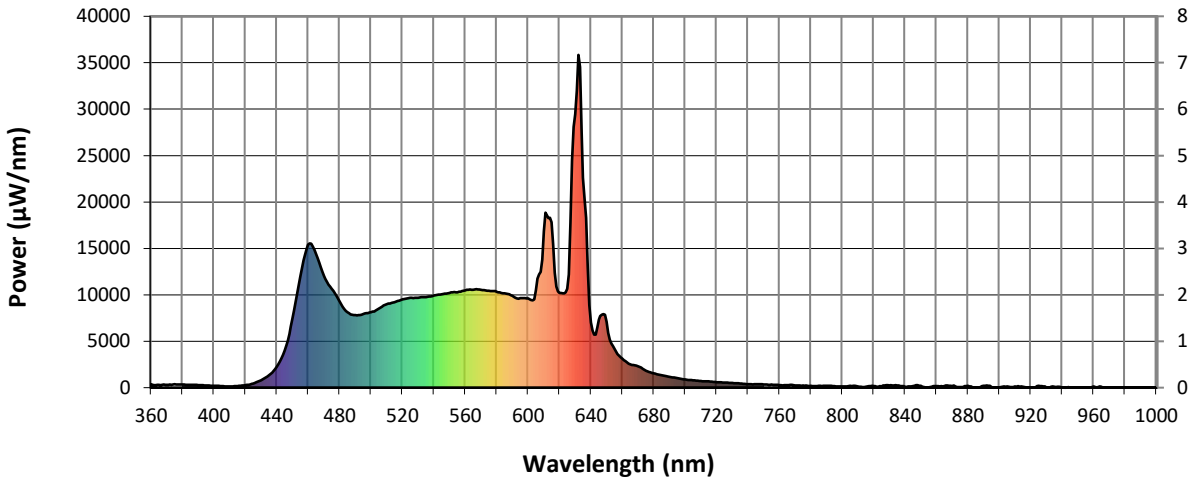
## Photopic Flux vs. Wavelength




######

| 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 | 366 | NR | 490 | 7801 | NR | 620 | 10192 | NR | 750 | 341 | NR | 880 | 186 | NR |
| 365 | 290 | NR | 495 | 7937 | NR | 625 | 10655 | NR | 755 | 328 | NR | 885 | 0 | NR |
| 370 | 296 | NR | 500 | 8140 | NR | 630 | 29455 | NR | 760 | 257 | NR | 890 | 199 | NR |
| 375 | 361 | NR | 505 | 8511 | NR | 635 | 22612 | NR | 765 | 285 | NR | 895 | 65 | NR |
| 380 | 354 | NR | 510 | 8978 | NR | 640 | 7017 | NR | 770 | 248 | NR | 900 | 16 | NR |
| 385 | 295 | NR | 515 | 9213 | NR | 645 | 7351 | NR | 775 | 218 | NR | 905 | 131 | NR |
| 390 | 279 | NR | 520 | 9502 | NR | 650 | 7083 | NR | 780 | 189 | NR | 910 | 121 | NR |
| 395 | 229 | NR | 525 | 9663 | NR | 655 | 4167 | NR | 785 | 206 | NR | 915 | 110 | NR |
| 400 | 212 | NR | 530 | 9696 | NR | 660 | 3120 | NR | 790 | 199 | NR | 920 | 8 | NR |
| 405 | 172 | NR | 535 | 9764 | NR | 665 | 2508 | NR | 795 | 154 | NR | 925 | 213 | NR |
| 410 | 140 | NR | 540 | 9922 | NR | 670 | 2310 | NR | 800 | 115 | NR | 930 | 22 | NR |
| 415 | 182 | NR | 545 | 10067 | NR | 675 | 1829 | NR | 805 | 183 | NR | 935 | 98 | NR |
| 420 | 276 | NR | 550 | 10199 | NR | 680 | 1540 | NR | 810 | 138 | NR | 940 | 0 | NR |
| 425 | 458 | NR | 555 | 10273 | NR | 685 | 1341 | NR | 815 | 96 | NR | 945 | 0 | NR |
| 430 | 801 | NR | 560 | 10476 | NR | 690 | 1170 | NR | 820 | 159 | NR | 950 | 0 | NR |
| 435 | 1326 | NR | 565 | 10544 | NR | 695 | 1018 | NR | 825 | 127 | NR | 955 | 0 | NR |
| 440 | 2247 | NR | 570 | 10540 | NR | 700 | 875 | NR | 830 | 249 | NR | 960 | 135 | NR |
| 445 | 3999 | NR | 575 | 10421 | NR | 705 | 796 | NR | 835 | 251 | NR | 965 | 89 | NR |
| 450 | 7408 | NR | 580 | 10347 | NR | 710 | 705 | NR | 840 | 105 | NR | 970 | 0 | NR |
| 455 | 11978 | NR | 585 | 10170 | NR | 715 | 669 | NR | 845 | 162 | NR | 975 | 0 | NR |
| 460 | 15410 | NR | 590 | 9900 | NR | 720 | 594 | NR | 850 | 197 | NR | 980 | 0 | NR |
| 465 | 14413 | NR | 595 | 9642 | NR | 725 | 549 | NR | 855 | 25 | NR | 985 | 0 | NR |
| 470 | 12038 | NR | 600 | 9603 | NR | 730 | 502 | NR | 860 | 158 | NR | 990 | 0 | NR |
| 475 | 10653 | NR | 605 | 10480 | NR | 735 | 443 | NR | 865 | 156 | NR | 995 | 0 | NR |
| 480 | 9269 | NR | 610 | 16848 | NR | 740 | 381 | NR | 870 | 181 | NR | 1000 | 0 | NR |
| 485 | 8111 | NR | 615 | 17818 | NR | 745 | 382 | NR | 875 | 66 | NR | | | |

Cooper Lighting Solutions Photometric Lab
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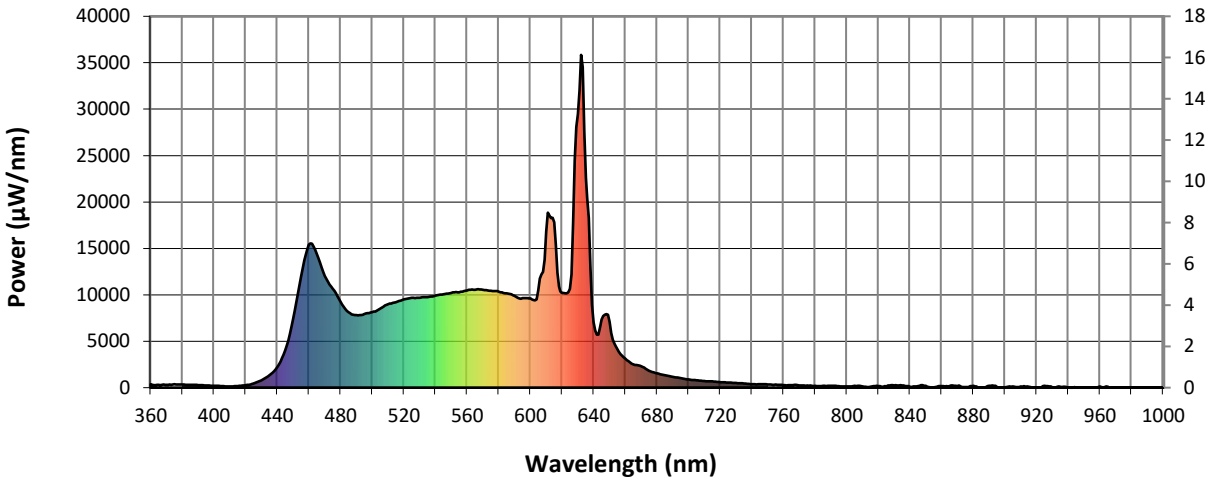
REPORT NUMBER: SP1-2403-328-14

## Scotopic Flux vs. Wavelength




**Scotopic Lumens: 1510.7** **S/P: 1.98**

| 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 | 366 | NR | 490 | 7801 | NR | 620 | 10192 | NR | 750 | 341 | NR | 880 | 186 | NR |
| 365 | 290 | NR | 495 | 7937 | NR | 625 | 10655 | NR | 755 | 328 | NR | 885 | 0 | NR |
| 370 | 296 | NR | 500 | 8140 | NR | 630 | 29455 | NR | 760 | 257 | NR | 890 | 199 | NR |
| 375 | 361 | NR | 505 | 8511 | NR | 635 | 22612 | NR | 765 | 285 | NR | 895 | 65 | NR |
| 380 | 354 | NR | 510 | 8978 | NR | 640 | 7017 | NR | 770 | 248 | NR | 900 | 16 | NR |
| 385 | 295 | NR | 515 | 9213 | NR | 645 | 7351 | NR | 775 | 218 | NR | 905 | 131 | NR |
| 390 | 279 | NR | 520 | 9502 | NR | 650 | 7083 | NR | 780 | 189 | NR | 910 | 121 | NR |
| 395 | 229 | NR | 525 | 9663 | NR | 655 | 4167 | NR | 785 | 206 | NR | 915 | 110 | NR |
| 400 | 212 | NR | 530 | 9696 | NR | 660 | 3120 | NR | 790 | 199 | NR | 920 | 8 | NR |
| 405 | 172 | NR | 535 | 9764 | NR | 665 | 2508 | NR | 795 | 154 | NR | 925 | 213 | NR |
| 410 | 140 | NR | 540 | 9922 | NR | 670 | 2310 | NR | 800 | 115 | NR | 930 | 22 | NR |
| 415 | 182 | NR | 545 | 10067 | NR | 675 | 1829 | NR | 805 | 183 | NR | 935 | 98 | NR |
| 420 | 276 | NR | 550 | 10199 | NR | 680 | 1540 | NR | 810 | 138 | NR | 940 | 0 | NR |
| 425 | 458 | NR | 555 | 10273 | NR | 685 | 1341 | NR | 815 | 96 | NR | 945 | 0 | NR |
| 430 | 801 | NR | 560 | 10476 | NR | 690 | 1170 | NR | 820 | 159 | NR | 950 | 0 | NR |
| 435 | 1326 | NR | 565 | 10544 | NR | 695 | 1018 | NR | 825 | 127 | NR | 955 | 0 | NR |
| 440 | 2247 | NR | 570 | 10540 | NR | 700 | 875 | NR | 830 | 249 | NR | 960 | 135 | NR |
| 445 | 3999 | NR | 575 | 10421 | NR | 705 | 796 | NR | 835 | 251 | NR | 965 | 89 | NR |
| 450 | 7408 | NR | 580 | 10347 | NR | 710 | 705 | NR | 840 | 105 | NR | 970 | 0 | NR |
| 455 | 11978 | NR | 585 | 10170 | NR | 715 | 669 | NR | 845 | 162 | NR | 975 | 0 | NR |
| 460 | 15410 | NR | 590 | 9900 | NR | 720 | 594 | NR | 850 | 197 | NR | 980 | 0 | NR |
| 465 | 14413 | NR | 595 | 9642 | NR | 725 | 549 | NR | 855 | 25 | NR | 985 | 0 | NR |
| 470 | 12038 | NR | 600 | 9603 | NR | 730 | 502 | NR | 860 | 158 | NR | 990 | 0 | NR |
| 475 | 10653 | NR | 605 | 10480 | NR | 735 | 443 | NR | 865 | 156 | NR | 995 | 0 | NR |
| 480 | 9269 | NR | 610 | 16848 | NR | 740 | 381 | NR | 870 | 181 | NR | 1000 | 0 | NR |
| 485 | 8111 | NR | 615 | 17818 | NR | 745 | 382 | NR | 875 | 66 | NR | | | |

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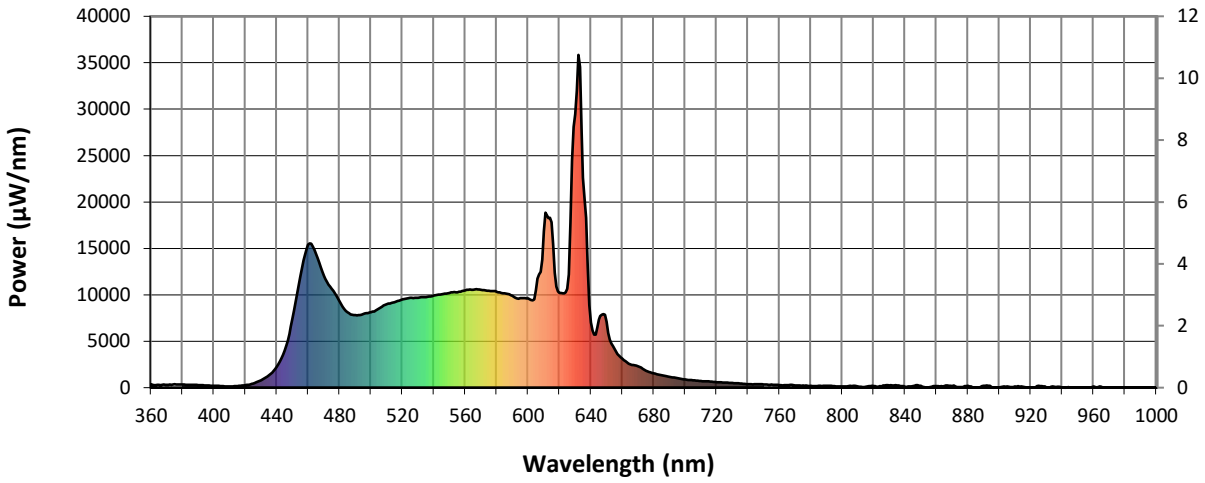
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: 652.7** **M/P: 0.85**

| 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 | 366 | NR | 490 | 7801 | NR | 620 | 10192 | NR | 750 | 341 | NR | 880 | 186 | NR |
| 365 | 290 | NR | 495 | 7937 | NR | 625 | 10655 | NR | 755 | 328 | NR | 885 | 0 | NR |
| 370 | 296 | NR | 500 | 8140 | NR | 630 | 29455 | NR | 760 | 257 | NR | 890 | 199 | NR |
| 375 | 361 | NR | 505 | 8511 | NR | 635 | 22612 | NR | 765 | 285 | NR | 895 | 65 | NR |
| 380 | 354 | NR | 510 | 8978 | NR | 640 | 7017 | NR | 770 | 248 | NR | 900 | 16 | NR |
| 385 | 295 | NR | 515 | 9213 | NR | 645 | 7351 | NR | 775 | 218 | NR | 905 | 131 | NR |
| 390 | 279 | NR | 520 | 9502 | NR | 650 | 7083 | NR | 780 | 189 | NR | 910 | 121 | NR |
| 395 | 229 | NR | 525 | 9663 | NR | 655 | 4167 | NR | 785 | 206 | NR | 915 | 110 | NR |
| 400 | 212 | NR | 530 | 9696 | NR | 660 | 3120 | NR | 790 | 199 | NR | 920 | 8 | NR |
| 405 | 172 | NR | 535 | 9764 | NR | 665 | 2508 | NR | 795 | 154 | NR | 925 | 213 | NR |
| 410 | 140 | NR | 540 | 9922 | NR | 670 | 2310 | NR | 800 | 115 | NR | 930 | 22 | NR |
| 415 | 182 | NR | 545 | 10067 | NR | 675 | 1829 | NR | 805 | 183 | NR | 935 | 98 | NR |
| 420 | 276 | NR | 550 | 10199 | NR | 680 | 1540 | NR | 810 | 138 | NR | 940 | 0 | NR |
| 425 | 458 | NR | 555 | 10273 | NR | 685 | 1341 | NR | 815 | 96 | NR | 945 | 0 | NR |
| 430 | 801 | NR | 560 | 10476 | NR | 690 | 1170 | NR | 820 | 159 | NR | 950 | 0 | NR |
| 435 | 1326 | NR | 565 | 10544 | NR | 695 | 1018 | NR | 825 | 127 | NR | 955 | 0 | NR |
| 440 | 2247 | NR | 570 | 10540 | NR | 700 | 875 | NR | 830 | 249 | NR | 960 | 135 | NR |
| 445 | 3999 | NR | 575 | 10421 | NR | 705 | 796 | NR | 835 | 251 | NR | 965 | 89 | NR |
| 450 | 7408 | NR | 580 | 10347 | NR | 710 | 705 | NR | 840 | 105 | NR | 970 | 0 | NR |
| 455 | 11978 | NR | 585 | 10170 | NR | 715 | 669 | NR | 845 | 162 | NR | 975 | 0 | NR |
| 460 | 15410 | NR | 590 | 9900 | NR | 720 | 594 | NR | 850 | 197 | NR | 980 | 0 | NR |
| 465 | 14413 | NR | 595 | 9642 | NR | 725 | 549 | NR | 855 | 25 | NR | 985 | 0 | NR |
| 470 | 12038 | NR | 600 | 9603 | NR | 730 | 502 | NR | 860 | 158 | NR | 990 | 0 | NR |
| 475 | 10653 | NR | 605 | 10480 | NR | 735 | 443 | NR | 865 | 156 | NR | 995 | 0 | NR |
| 480 | 9269 | NR | 610 | 16848 | NR | 740 | 381 | NR | 870 | 181 | NR | 1000 | 0 | NR |
| 485 | 8111 | NR | 615 | 17818 | NR | 745 | 382 | NR | 875 | 66 | NR | | | |

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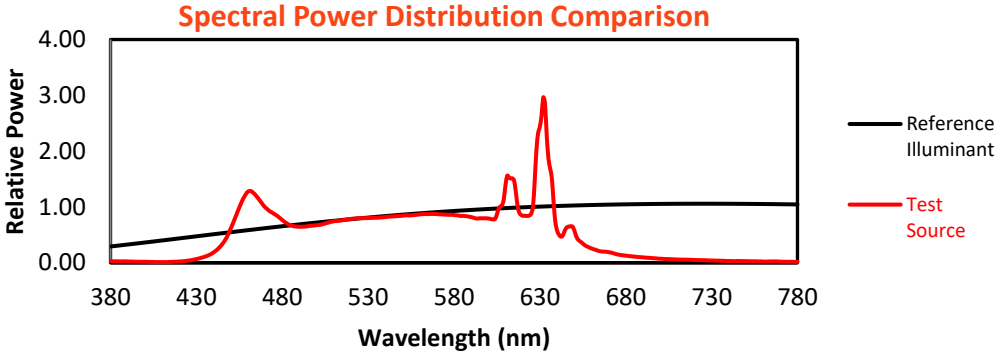
# TM-30-18

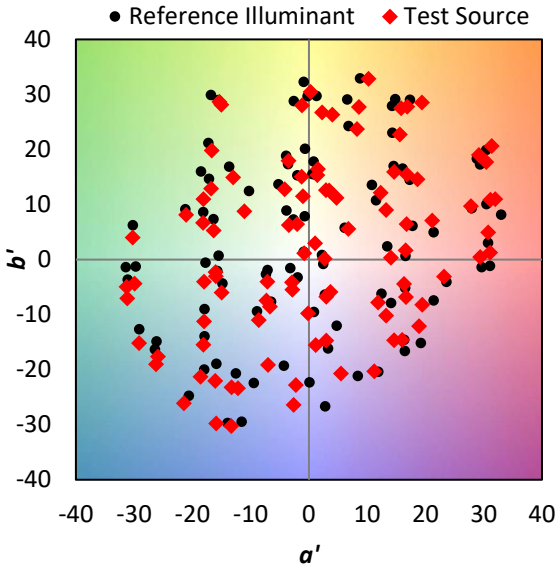
## Summary

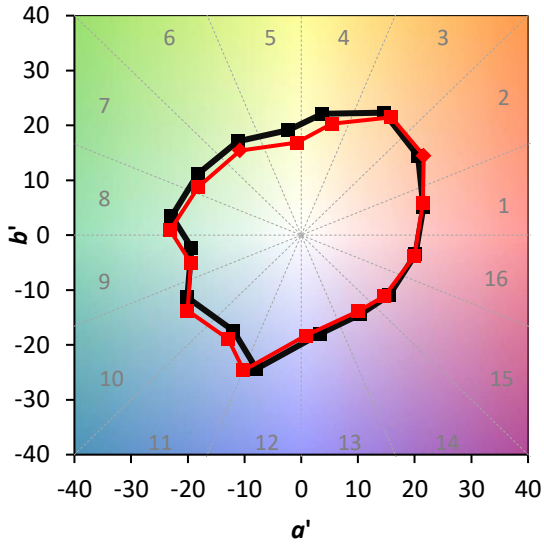
$R_f$ = 85.2
$R_g$ = 96
CIE $R_a$ = 90.4
$R_9$ = 82.4

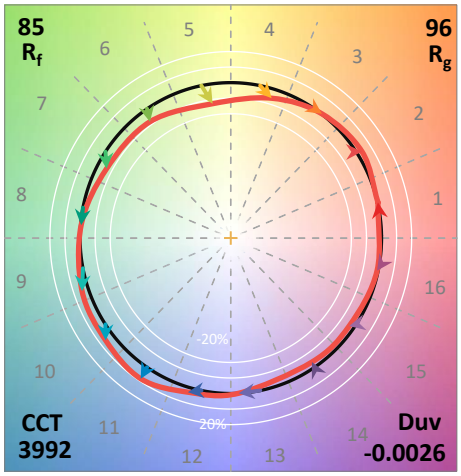
## Spectral Power Distribution Comparison

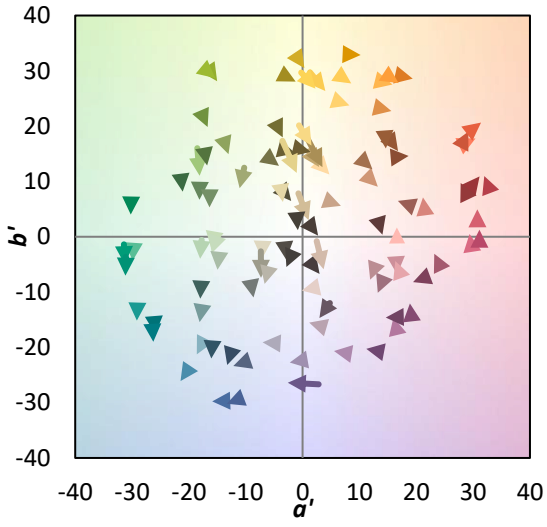



## Color Vector Graphics



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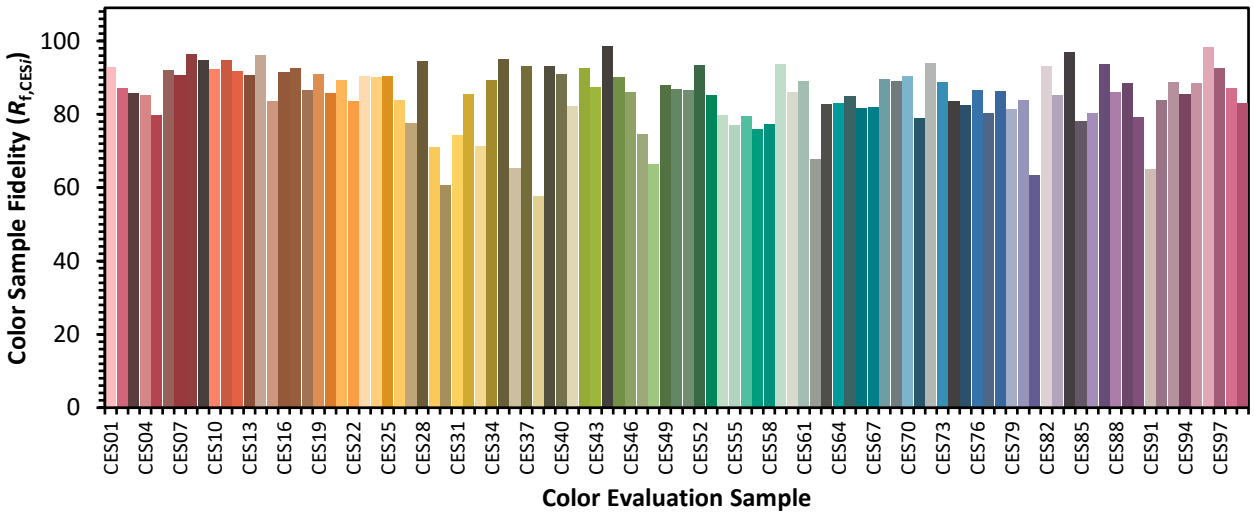
### Individual Sample Fidelity Index ($R_{f,i}$)

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 84 | CES51 = 86 | CES76 = 87 |
| CES02 = 62 | CES27 = 78 | CES52 = 93 | CES77 = 80 |
| CES03 = 32 | CES28 = 94 | CES53 = 85 | CES78 = 86 |
| CES04 = 69 | CES29 = 71 | CES54 = 80 | CES79 = 81 |
| CES05 = 50 | CES30 = 61 | CES55 = 77 | CES80 = 84 |
| CES06 = 50 | CES31 = 74 | CES56 = 79 | CES81 = 63 |
| CES07 = 43 | CES32 = 85 | CES57 = 76 | CES82 = 93 |
| CES08 = 42 | CES33 = 71 | CES58 = 77 | CES83 = 85 |
| CES09 = 29 | CES34 = 89 | CES59 = 94 | CES84 = 97 |
| CES10 = 74 | CES35 = 95 | CES60 = 86 | CES85 = 78 |
| CES11 = 57 | CES36 = 65 | CES61 = 89 | CES86 = 80 |
| CES12 = 63 | CES37 = 93 | CES62 = 68 | CES87 = 94 |
| CES13 = 43 | CES38 = 58 | CES63 = 83 | CES88 = 86 |
| CES14 = 74 | CES39 = 93 | CES64 = 83 | CES89 = 88 |
| CES15 = 72 | CES40 = 91 | CES65 = 85 | CES90 = 79 |
| CES16 = 47 | CES41 = 82 | CES66 = 82 | CES91 = 65 |
| CES17 = 49 | CES42 = 93 | CES67 = 82 | CES92 = 84 |
| CES18 = 56 | CES43 = 87 | CES68 = 90 | CES93 = 89 |
| CES19 = 70 | CES44 = 99 | CES69 = 89 | CES94 = 86 |
| CES20 = 67 | CES45 = 90 | CES70 = 90 | CES95 = 89 |
| CES21 = 85 | CES46 = 86 | CES71 = 79 | CES96 = 98 |
| CES22 = 77 | CES47 = 75 | CES72 = 94 | CES97 = 93 |
| CES23 = 91 | CES48 = 66 | CES73 = 89 | CES98 = 87 |
| CES24 = 90 | CES49 = 88 | CES74 = 84 | CES99 = 83 |
| CES25 = 70 | CES50 = 87 | CES75 = 82 | |



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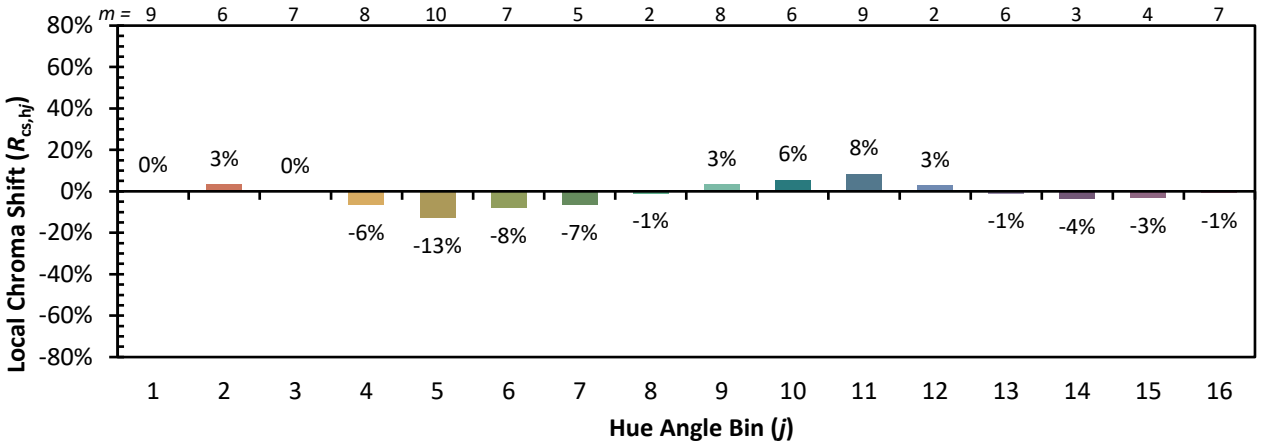
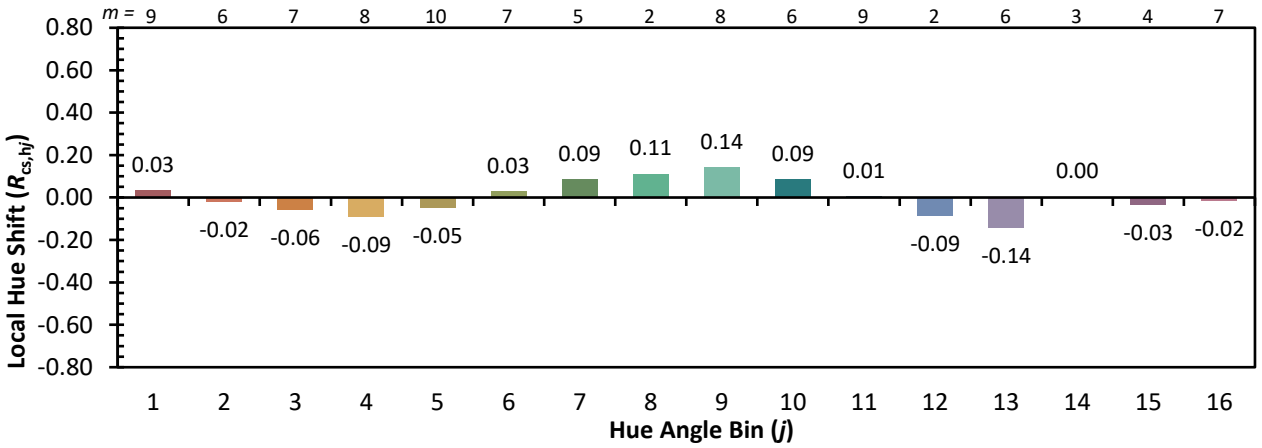
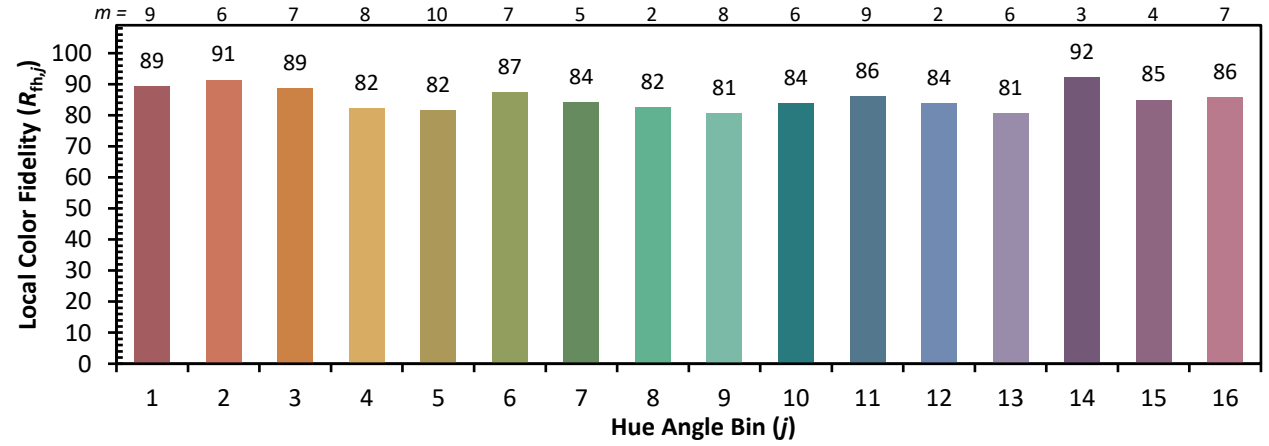
### Color Rendition by Hue-Angle Bin



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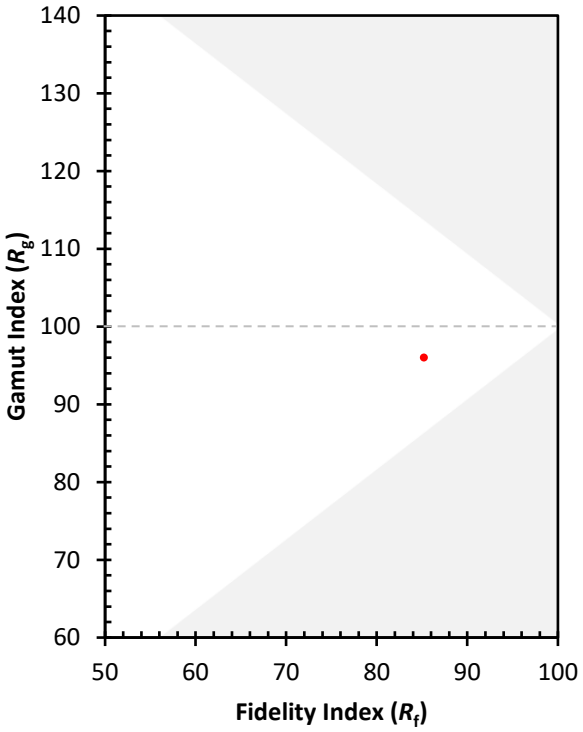
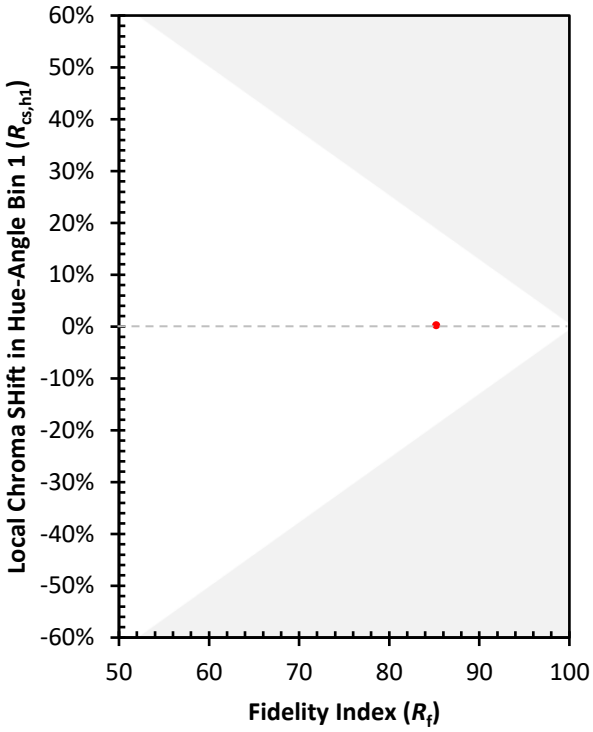
### Measure Comparisons




(END OF REPORT)