

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: METALUX

Report Number: P975202

Luminaire Tested: 14EN-LD2-25-UNV-L840-CD1

Issue Date: 03/13/2025

**Test Information**

Test Method: LM-79-2019  
Report Number: P975202  
Test Lab: INNOVATION CENTER(P3)  
Issue Date: 03/13/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: METALUX  
Catalog Number: 14EN-LD2-25-UNV-L840-CD1  
Description: METALUX ENCOUNTER 1x4 2500LM PACKAGE 80CRI 4000K STANDARD TROFFER  
Light Source: 4000K CCT, 80+ CRI LEDS  
Ballast/Driver: -

**Summary**

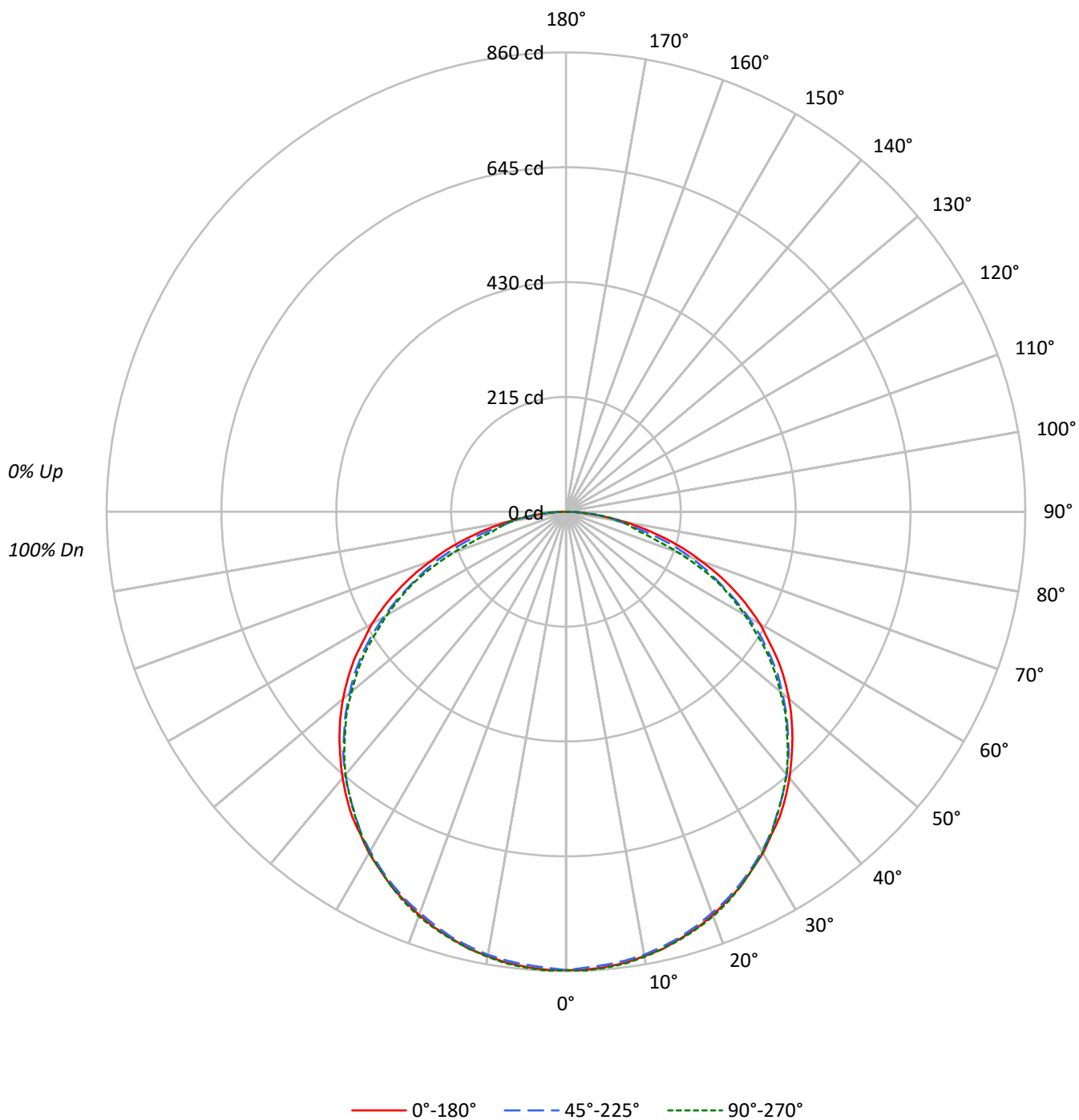
Lumens per Lamp: N/A  
Luminaire Lumens: 2532.0 lumens  
Efficiency: N/A  
Efficacy: 121.1 lumens/watt  
Spacing Criteria (0/90/45): 1.28 / 1.27 / 1.39  
Luminous Opening: Rectangular (W 1' x L: 3.83' x H: 0')  
CIE Type: Direct

Input Watts (W): 20.9  
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

TEST NUMBER: P975202

CATALOG NUMBER: 14EN-LD2-25-UNV-L840-CD1

### Luminous Intensity Polar Plot



TEST NUMBER: P975202

CATALOG NUMBER: 14EN-LD2-25-UNV-L840-CD1

**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |     |     |     |     |     |     |     |  |     |     |     |  |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|-----|--|-----|
| RF  | 20  |     |     |     | 20  |     |     |     | 20  |     |     |  | 20  |     |     |  | 20  |
| RC  | 80  |     |     |     | 70  |     |     |     | 50  |     |     |  | 30  |     |     |  | 10  |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50  |
| RCR |     |     |     |     |     |     |     |     |     |     |     |  |     |     |     |  |     |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 |  | 106 | 106 | 106 |  | 102 |
| 1   | 109 | 104 | 99  | 95  | 106 | 101 | 97  | 94  | 97  | 94  | 91  |  | 93  | 90  | 88  |  | 90  |
| 2   | 99  | 90  | 83  | 77  | 96  | 88  | 82  | 76  | 85  | 79  | 75  |  | 81  | 77  | 73  |  | 78  |
| 3   | 90  | 79  | 71  | 64  | 87  | 77  | 70  | 63  | 74  | 68  | 62  |  | 72  | 66  | 61  |  | 69  |
| 4   | 82  | 70  | 61  | 54  | 80  | 68  | 60  | 54  | 66  | 59  | 53  |  | 64  | 57  | 52  |  | 61  |
| 5   | 75  | 62  | 53  | 46  | 73  | 61  | 53  | 46  | 59  | 51  | 46  |  | 57  | 50  | 45  |  | 55  |
| 6   | 69  | 56  | 47  | 40  | 68  | 55  | 46  | 40  | 53  | 46  | 40  |  | 51  | 45  | 39  |  | 50  |
| 7   | 64  | 51  | 42  | 36  | 63  | 50  | 41  | 35  | 48  | 41  | 35  |  | 47  | 40  | 35  |  | 45  |
| 8   | 60  | 46  | 38  | 32  | 58  | 45  | 37  | 32  | 44  | 37  | 31  |  | 43  | 36  | 31  |  | 42  |
| 9   | 56  | 42  | 34  | 28  | 54  | 42  | 34  | 28  | 41  | 33  | 28  |  | 40  | 33  | 28  |  | 38  |
| 10  | 52  | 39  | 31  | 26  | 51  | 39  | 31  | 26  | 38  | 30  | 26  |  | 37  | 30  | 25  |  | 36  |

**AVERAGE LUMINANCE (cd/sqm):**

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 2410 | 2410 | 2410 |
| 5°  | 2411 | 2400 | 2415 |
| 10° | 2409 | 2401 | 2413 |
| 15° | 2405 | 2397 | 2409 |
| 20° | 2400 | 2388 | 2408 |
| 25° | 2397 | 2385 | 2397 |
| 30° | 2392 | 2378 | 2387 |
| 35° | 2391 | 2364 | 2368 |
| 40° | 2385 | 2355 | 2355 |
| 45° | 2381 | 2334 | 2323 |
| 50° | 2380 | 2310 | 2287 |
| 55° | 2372 | 2281 | 2248 |
| 60° | 2353 | 2210 | 2173 |
| 65° | 2304 | 2116 | 2090 |
| 70° | 2209 | 2033 | 1836 |
| 75° | 2077 | 1829 | 1540 |
| 80° | 1840 | 1580 | 1732 |
| 85° | 1424 | 1640 | 1553 |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 0°

Vertical Angle: 47.5°

Luminance: 2382 cd/sqm

TEST NUMBER: P975202

CATALOG NUMBER: 14EN-LD2-25-UNV-L840-CD1

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 81.2   | 3.2       |
| 10°-20°   | 233.4  | 9.2       |
| 20°-30°   | 355.7  | 14.0      |
| 30°-40°   | 433.2  | 17.1      |
| 40°-50°   | 455.5  | 18.0      |
| 50°-60°   | 418.1  | 16.5      |
| 60°-70°   | 321.2  | 12.7      |
| 70°-80°   | 179.3  | 7.1       |
| 80°-90°   | 54.4   | 2.1       |
| 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°-30°    | 670.4  | 26.5      |
| 0°-40°    | 1103.5 | 43.6      |
| 0°-60°    | 1977.1 | 78.1      |
| 0°-90°    | 2532.0 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 2532.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|-----|-----|-------|-----|-------|-----|------|
| 0°  | 858 | 858   | 858 | 858   | 858 |      |
| 5°  | 855 | 855   | 851 | 855   | 857 | 81   |
| 15° | 827 | 827   | 825 | 827   | 829 | 234  |
| 25° | 774 | 771   | 770 | 772   | 774 | 356  |
| 35° | 698 | 695   | 690 | 691   | 691 | 436  |
| 45° | 600 | 596   | 588 | 585   | 585 | 463  |
| 55° | 485 | 481   | 466 | 458   | 459 | 432  |
| 65° | 347 | 337   | 318 | 315   | 315 | 343  |
| 75° | 191 | 182   | 169 | 146   | 142 | 202  |
| 85° | 44  | 46    | 51  | 50    | 48  | 53   |
| 90° | 0   | 0     | 0   | 0     | 0   |      |

TEST NUMBER: P975202

CATALOG NUMBER: 14EN-LD2-25-UNV-L840-CD1

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|-------|-------|-------|-------|-------|-------|
| 0°    | 858.1 | 858.1 | 858.1 | 858.1 | 858.1 |
| 2.5°  | 858.1 | 858.1 | 854.1 | 858.1 | 859.5 |
| 5°    | 855.4 | 855.4 | 851.4 | 855.4 | 856.7 |
| 7.5°  | 851.4 | 851.4 | 847.5 | 850.0 | 852.8 |
| 10°   | 844.7 | 844.7 | 842.0 | 844.7 | 846.1 |
| 12.5° | 838.0 | 836.7 | 834.0 | 836.7 | 838.0 |
| 15°   | 827.3 | 827.3 | 824.7 | 827.3 | 828.6 |
| 17.5° | 816.6 | 815.3 | 812.5 | 816.6 | 818.0 |
| 20°   | 803.3 | 801.9 | 799.2 | 803.3 | 805.8 |
| 22.5° | 788.5 | 787.2 | 785.8 | 789.9 | 791.1 |
| 25°   | 773.8 | 771.1 | 769.7 | 772.4 | 773.8 |
| 27.5° | 755.0 | 753.7 | 752.4 | 753.7 | 755.0 |
| 30°   | 737.6 | 734.9 | 733.5 | 733.5 | 736.3 |
| 32.5° | 716.2 | 714.9 | 713.5 | 714.9 | 714.9 |
| 35°   | 697.5 | 694.8 | 689.5 | 690.7 | 690.7 |
| 37.5° | 674.7 | 670.7 | 666.7 | 666.7 | 666.7 |
| 40°   | 650.6 | 647.9 | 642.5 | 641.2 | 642.5 |
| 42.5° | 625.2 | 622.5 | 617.2 | 613.1 | 614.4 |
| 45°   | 599.7 | 595.8 | 587.7 | 585.0 | 585.0 |
| 47.5° | 573.0 | 568.9 | 559.6 | 555.5 | 556.9 |
| 50°   | 544.9 | 539.6 | 528.8 | 523.5 | 523.5 |
| 52.5° | 515.4 | 510.1 | 499.3 | 492.6 | 492.6 |
| 55°   | 484.6 | 480.6 | 465.9 | 457.8 | 459.2 |
| 57.5° | 449.8 | 445.8 | 431.1 | 421.7 | 421.7 |
| 60°   | 419.0 | 411.0 | 393.6 | 386.9 | 386.9 |
| 62.5° | 384.2 | 374.9 | 357.4 | 349.4 | 350.7 |
| 65°   | 346.8 | 337.4 | 318.5 | 314.6 | 314.6 |
| 67.5° | 309.3 | 301.2 | 283.8 | 277.1 | 270.4 |
| 70°   | 269.0 | 261.1 | 247.6 | 231.6 | 223.6 |
| 72.5° | 231.6 | 222.2 | 210.2 | 186.1 | 178.0 |
| 75°   | 191.4 | 182.1 | 168.6 | 146.0 | 141.9 |
| 77.5° | 152.7 | 144.6 | 125.8 | 120.5 | 123.2 |
| 80°   | 113.8 | 111.0 | 97.7  | 103.1 | 107.1 |
| 82.5° | 76.3  | 75.0  | 77.6  | 80.4  | 80.4  |
| 85°   | 44.2  | 45.6  | 50.9  | 49.5  | 48.2  |
| 87.5° | 18.7  | 22.8  | 21.4  | 21.4  | 21.4  |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

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

Report Prepared for

Cooper Lighting Solutions

Metalux

Report Number: SP1-2506-457-3

Test Date: 07/15/2025

Luminaire Tested: 14EN-LD2-51-UNV-L940-CD1-U

Data in this report applies to families of products including 14EN-LD2-51-UNV-L940-CD1-U

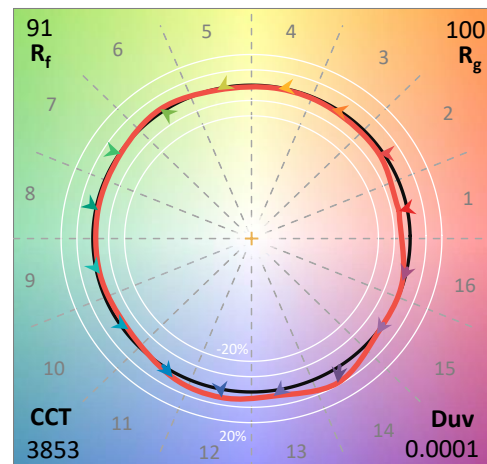
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2506-457-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 07/15/2025  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Metalux  
 Catalog Number: **14EN-LD2-51-UNV-L940-CD1-U**  
 Description: 1x4 ENCOUNTER 5100LM WITH LIGHTNING BOARDS

### Spectral Parameters

CCT (K): 3853  
 CIE  $u'$ : 0.2278  
 CIE  $v'$ : 0.5044  
 Duv: 0.0001  
 CIE x: 0.3872  
 CIE y: 0.3810  
 CIE z: 0.2318  
 Peak Wavelength (nm): 630  
 Dominant Wavelength (nm): 579  
 Purity: 30.54407  
 R<sub>f</sub>: 91.2  
 R<sub>g</sub>: 99.8

CRI (Ra): 93.4  
 R1: 94.4  
 R2: 95.6  
 R3: 95.4  
 R4: 94.7  
 R5: 93.7  
 R6: 93.8  
 R7: 93.9  
 R8: 85.8  
 R9: 62.8  
 R10: 88.3  
 R11: 95.1  
 R12: 75.5  
 R13: 94.6  
 R14: 96.8  
 R15: 91.2



### Test Conditions

Stabilization Time: 35M  
 Operation Time: 1H 35M  
 Sphere Temperature (°C): 25.0

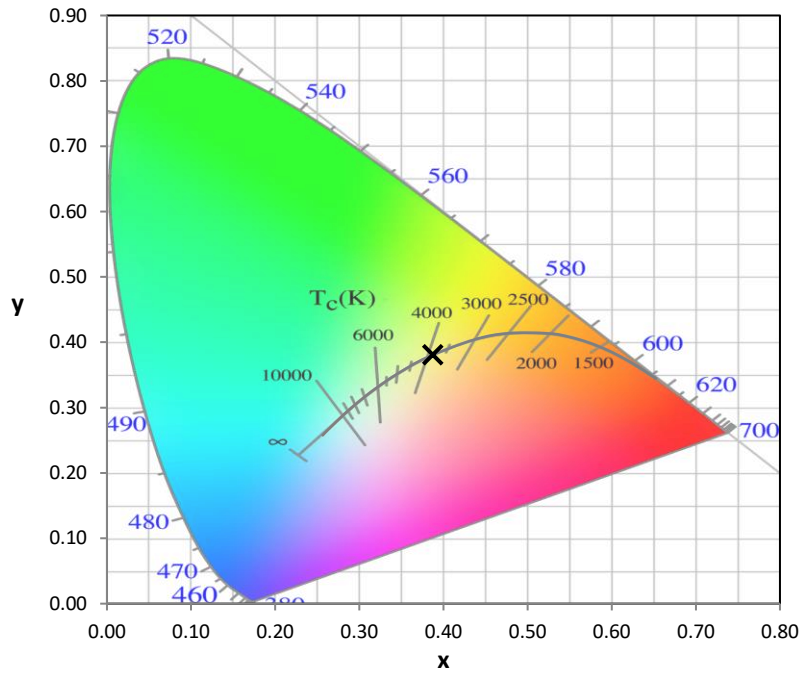


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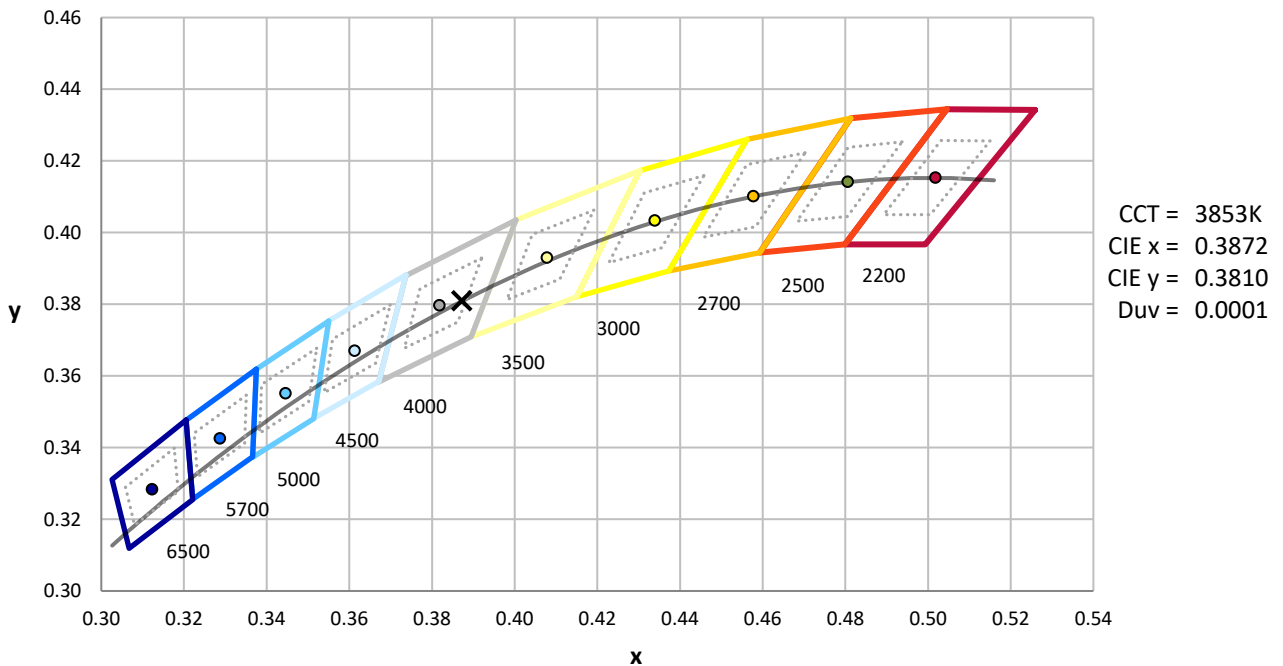
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 6/16/2025        | 12/16/2025           |
| Power Meter                    | XITRON INXT2011004    | 1/21/2025        | 1/21/2026            |
| AC Power Source                | CHROMA 61603 IN0063   | 10/22/2024       | 10/22/2025           |
| DC Power Source                | AGILENT E3634A IN0208 | 10/22/2024       | 10/22/2025           |
| Sphere Thermometer             | ONSET IN0085          | 10/22/2024       | 10/22/2025           |
| Room Thermometer               | ONSET IN0046          | 10/22/2024       | 10/22/2025           |

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**CIE 1931 Chromaticity Diagram**



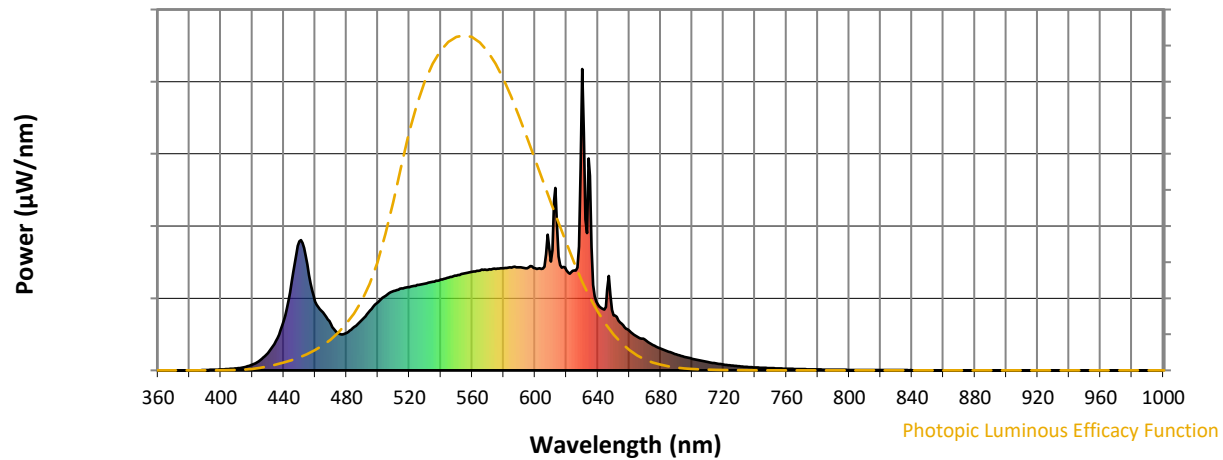
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 4000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

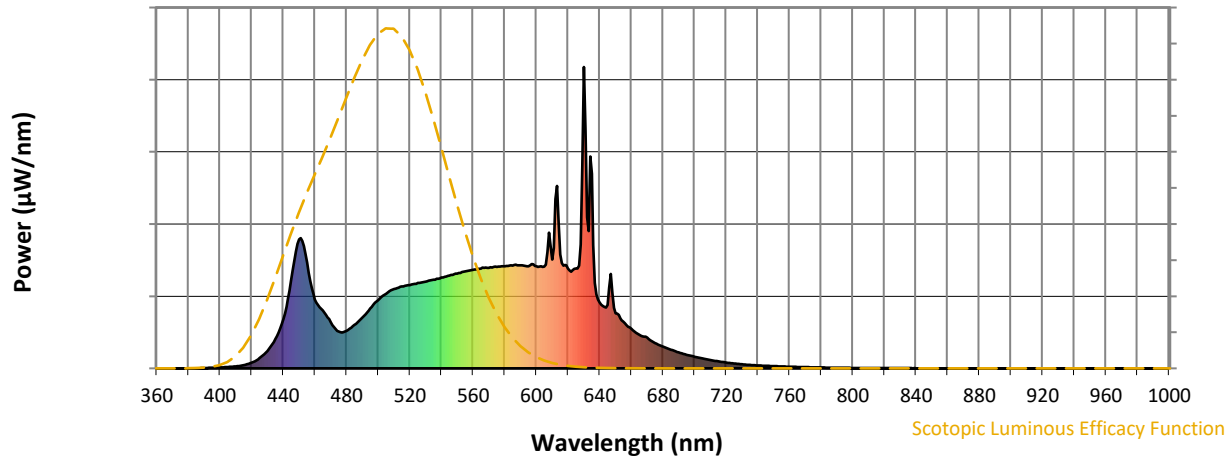


### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | NR                             | 490               | 168                                  | NR                             | 620               | 331                                  | NR                             | 750               | 8                                    | NR                             | 880               | 0                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 199                                  | NR                             | 625               | 331                                  | NR                             | 755               | 6                                    | NR                             | 885               | 0                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 227                                  | NR                             | 630               | 1000                                 | NR                             | 760               | 6                                    | NR                             | 890               | 0                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 248                                  | NR                             | 635               | 646                                  | NR                             | 765               | 5                                    | NR                             | 895               | 0                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 263                                  | NR                             | 640               | 219                                  | NR                             | 770               | 4                                    | NR                             | 900               | 0                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 272                                  | NR                             | 645               | 210                                  | NR                             | 775               | 3                                    | NR                             | 905               | 0                                    | NR                             |
| 390               | 1                                    | NR                             | 520               | 277                                  | NR                             | 650               | 183                                  | NR                             | 780               | 3                                    | NR                             | 910               | 0                                    | NR                             |
| 395               | 2                                    | NR                             | 525               | 283                                  | NR                             | 655               | 155                                  | NR                             | 785               | 3                                    | NR                             | 915               | 0                                    | NR                             |
| 400               | 3                                    | NR                             | 530               | 288                                  | NR                             | 660               | 132                                  | NR                             | 790               | 2                                    | NR                             | 920               | 0                                    | NR                             |
| 405               | 5                                    | NR                             | 535               | 294                                  | NR                             | 665               | 111                                  | NR                             | 795               | 2                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 7                                    | NR                             | 540               | 301                                  | NR                             | 670               | 102                                  | NR                             | 800               | 2                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 11                                   | NR                             | 545               | 308                                  | NR                             | 675               | 84                                   | NR                             | 805               | 1                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 19                                   | NR                             | 550               | 315                                  | NR                             | 680               | 72                                   | NR                             | 810               | 1                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 34                                   | NR                             | 555               | 322                                  | NR                             | 685               | 61                                   | NR                             | 815               | 1                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 57                                   | NR                             | 560               | 327                                  | NR                             | 690               | 53                                   | NR                             | 820               | 1                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 97                                   | NR                             | 565               | 331                                  | NR                             | 695               | 45                                   | NR                             | 825               | 1                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 163                                  | NR                             | 570               | 334                                  | NR                             | 700               | 39                                   | NR                             | 830               | 1                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 293                                  | NR                             | 575               | 337                                  | NR                             | 705               | 33                                   | NR                             | 835               | 1                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 428                                  | NR                             | 580               | 339                                  | NR                             | 710               | 28                                   | NR                             | 840               | 1                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 351                                  | NR                             | 585               | 341                                  | NR                             | 715               | 23                                   | NR                             | 845               | 0                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 229                                  | NR                             | 590               | 342                                  | NR                             | 720               | 19                                   | NR                             | 850               | 0                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 192                                  | NR                             | 595               | 339                                  | NR                             | 725               | 16                                   | NR                             | 855               | 0                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 152                                  | NR                             | 600               | 338                                  | NR                             | 730               | 13                                   | NR                             | 860               | 0                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 122                                  | NR                             | 605               | 337                                  | NR                             | 735               | 11                                   | NR                             | 865               | 0                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 125                                  | NR                             | 610               | 361                                  | NR                             | 740               | 10                                   | NR                             | 870               | 0                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 144                                  | NR                             | 615               | 378                                  | NR                             | 745               | 9                                    | NR                             | 875               | 0                                    | NR                             |                   |                                      |                                |

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### Scotopic Flux vs. Wavelength



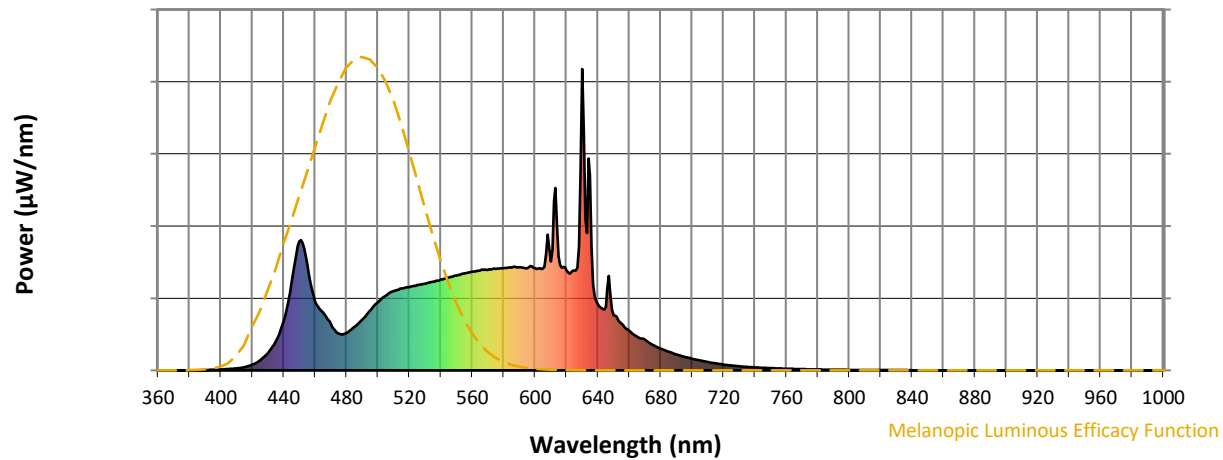
Scotopic Lumens: NR

S/P: 1.74

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 331                      | NR            | 750    | 8                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 199                      | NR            | 625    | 331                      | NR            | 755    | 6                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 227                      | NR            | 630    | 1000                     | NR            | 760    | 6                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 248                      | NR            | 635    | 646                      | NR            | 765    | 5                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 263                      | NR            | 640    | 219                      | NR            | 770    | 4                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 272                      | NR            | 645    | 210                      | NR            | 775    | 3                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 277                      | NR            | 650    | 183                      | NR            | 780    | 3                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 283                      | NR            | 655    | 155                      | NR            | 785    | 3                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 288                      | NR            | 660    | 132                      | NR            | 790    | 2                        | NR            | 920    | 0                        | NR            |
| 405    | 5                        | NR            | 535    | 294                      | NR            | 665    | 111                      | NR            | 795    | 2                        | NR            | 925    | 0                        | NR            |
| 410    | 7                        | NR            | 540    | 301                      | NR            | 670    | 102                      | NR            | 800    | 2                        | NR            | 930    | 0                        | NR            |
| 415    | 11                       | NR            | 545    | 308                      | NR            | 675    | 84                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 19                       | NR            | 550    | 315                      | NR            | 680    | 72                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 34                       | NR            | 555    | 322                      | NR            | 685    | 61                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 57                       | NR            | 560    | 327                      | NR            | 690    | 53                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 97                       | NR            | 565    | 331                      | NR            | 695    | 45                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 163                      | NR            | 570    | 334                      | NR            | 700    | 39                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 293                      | NR            | 575    | 337                      | NR            | 705    | 33                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 428                      | NR            | 580    | 339                      | NR            | 710    | 28                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 351                      | NR            | 585    | 341                      | NR            | 715    | 23                       | NR            | 845    | 0                        | NR            | 975    | 0                        | NR            |
| 460    | 229                      | NR            | 590    | 342                      | NR            | 720    | 19                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 192                      | NR            | 595    | 339                      | NR            | 725    | 16                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 152                      | NR            | 600    | 338                      | NR            | 730    | 13                       | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 122                      | NR            | 605    | 337                      | NR            | 735    | 11                       | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 125                      | NR            | 610    | 361                      | NR            | 740    | 10                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 144                      | NR            | 615    | 378                      | NR            | 745    | 9                        | NR            | 875    | 0                        | NR            |        |                          |               |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: NR**
**M/P: 3.58**

| $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|
| 360               | 0                                      | NR                             | 490               | 168                                    | NR                             | 620               | 331                                    | NR                             | 750               | 8                                      | NR                             | 880               | 0                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 199                                    | NR                             | 625               | 331                                    | NR                             | 755               | 6                                      | NR                             | 885               | 0                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 227                                    | NR                             | 630               | 1000                                   | NR                             | 760               | 6                                      | NR                             | 890               | 0                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 248                                    | NR                             | 635               | 646                                    | NR                             | 765               | 5                                      | NR                             | 895               | 0                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 263                                    | NR                             | 640               | 219                                    | NR                             | 770               | 4                                      | NR                             | 900               | 0                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 272                                    | NR                             | 645               | 210                                    | NR                             | 775               | 3                                      | NR                             | 905               | 0                                      | NR                             |
| 390               | 1                                      | NR                             | 520               | 277                                    | NR                             | 650               | 183                                    | NR                             | 780               | 3                                      | NR                             | 910               | 0                                      | NR                             |
| 395               | 2                                      | NR                             | 525               | 283                                    | NR                             | 655               | 155                                    | NR                             | 785               | 3                                      | NR                             | 915               | 0                                      | NR                             |
| 400               | 3                                      | NR                             | 530               | 288                                    | NR                             | 660               | 132                                    | NR                             | 790               | 2                                      | NR                             | 920               | 0                                      | NR                             |
| 405               | 5                                      | NR                             | 535               | 294                                    | NR                             | 665               | 111                                    | NR                             | 795               | 2                                      | NR                             | 925               | 0                                      | NR                             |
| 410               | 7                                      | NR                             | 540               | 301                                    | NR                             | 670               | 102                                    | NR                             | 800               | 2                                      | NR                             | 930               | 0                                      | NR                             |
| 415               | 11                                     | NR                             | 545               | 308                                    | NR                             | 675               | 84                                     | NR                             | 805               | 1                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 19                                     | NR                             | 550               | 315                                    | NR                             | 680               | 72                                     | NR                             | 810               | 1                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 34                                     | NR                             | 555               | 322                                    | NR                             | 685               | 61                                     | NR                             | 815               | 1                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 57                                     | NR                             | 560               | 327                                    | NR                             | 690               | 53                                     | NR                             | 820               | 1                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 97                                     | NR                             | 565               | 331                                    | NR                             | 695               | 45                                     | NR                             | 825               | 1                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 163                                    | NR                             | 570               | 334                                    | NR                             | 700               | 39                                     | NR                             | 830               | 1                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 293                                    | NR                             | 575               | 337                                    | NR                             | 705               | 33                                     | NR                             | 835               | 1                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 428                                    | NR                             | 580               | 339                                    | NR                             | 710               | 28                                     | NR                             | 840               | 1                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 351                                    | NR                             | 585               | 341                                    | NR                             | 715               | 23                                     | NR                             | 845               | 0                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 229                                    | NR                             | 590               | 342                                    | NR                             | 720               | 19                                     | NR                             | 850               | 0                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 192                                    | NR                             | 595               | 339                                    | NR                             | 725               | 16                                     | NR                             | 855               | 0                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 152                                    | NR                             | 600               | 338                                    | NR                             | 730               | 13                                     | NR                             | 860               | 0                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 122                                    | NR                             | 605               | 337                                    | NR                             | 735               | 11                                     | NR                             | 865               | 0                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 125                                    | NR                             | 610               | 361                                    | NR                             | 740               | 10                                     | NR                             | 870               | 0                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 144                                    | NR                             | 615               | 378                                    | NR                             | 745               | 9                                      | NR                             | 875               | 0                                      | NR                             |                   |                                        |                                |

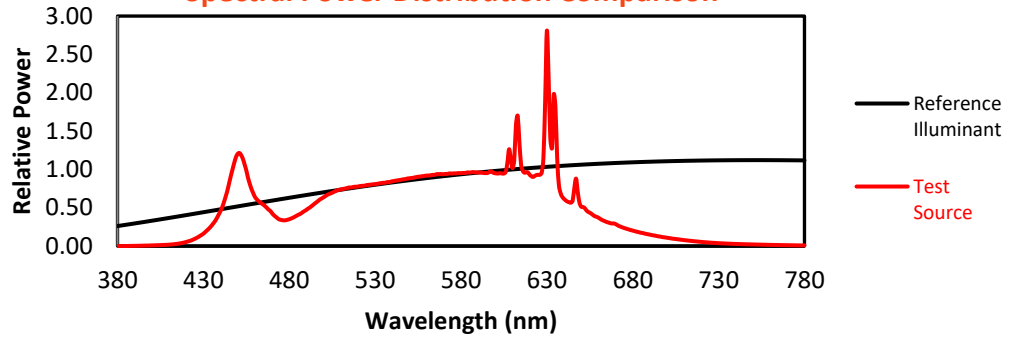
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TM-30-18

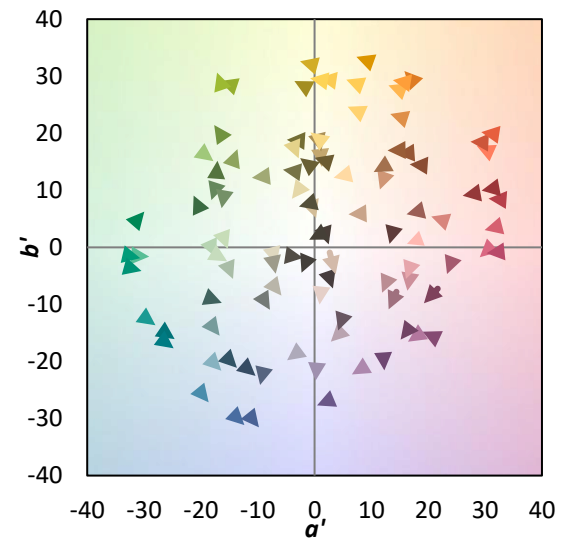
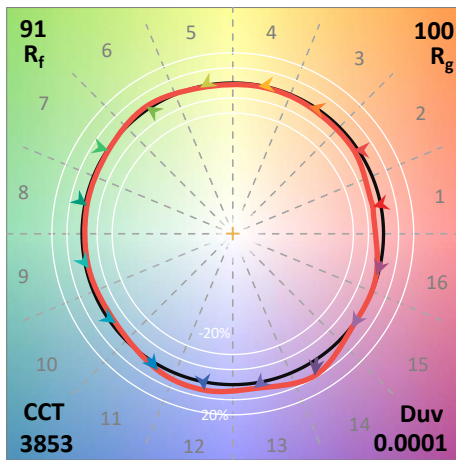
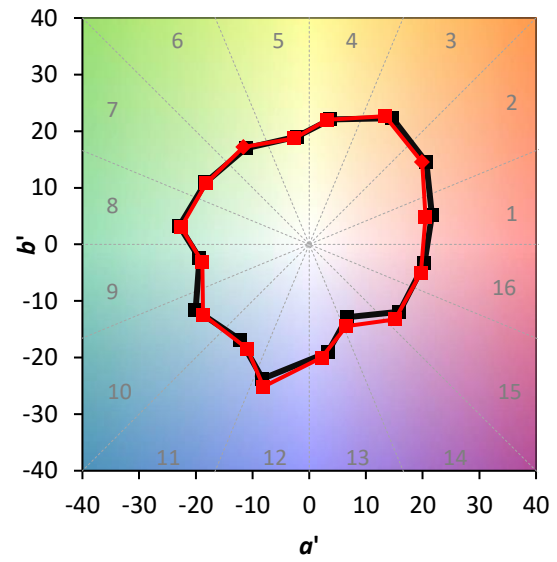
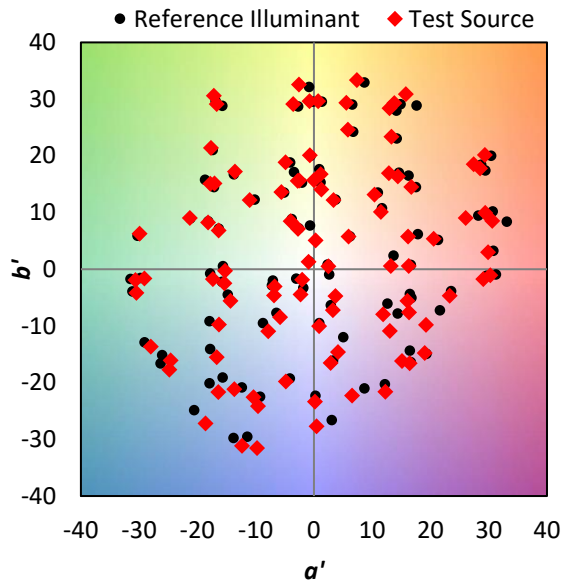
### Summary

$R_f = 91.2$   
 $R_g = 99.8$   
 $CIE R_a = 93.4$   
 $R_9 = 62.8$

### Spectral Power Distribution Comparison

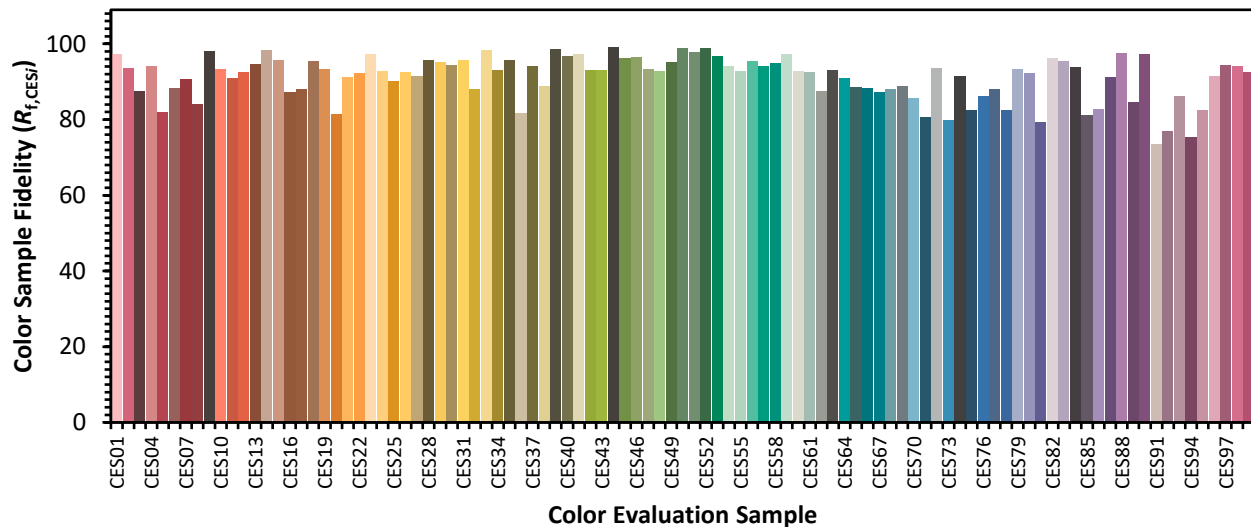


### Color Vector Graphics

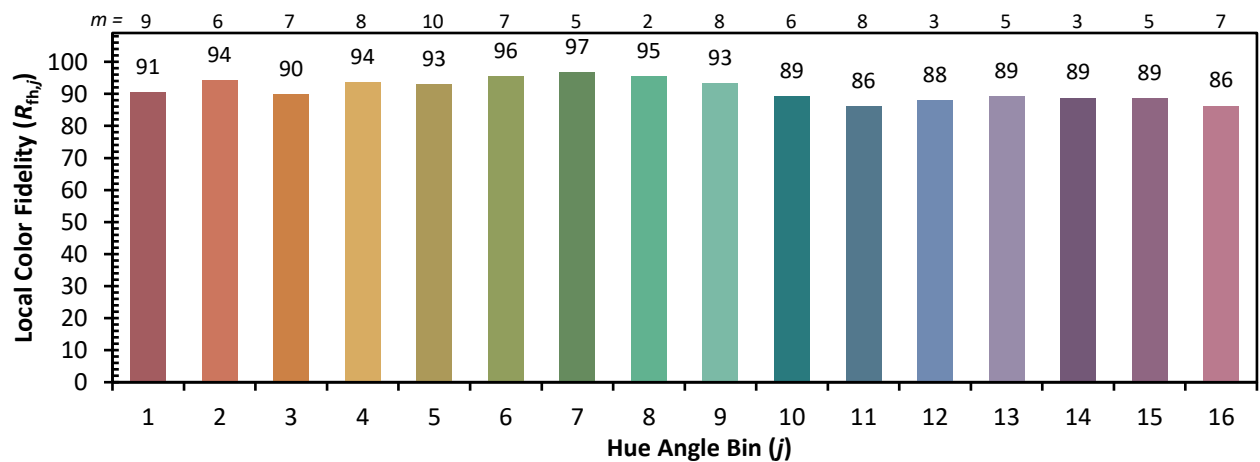
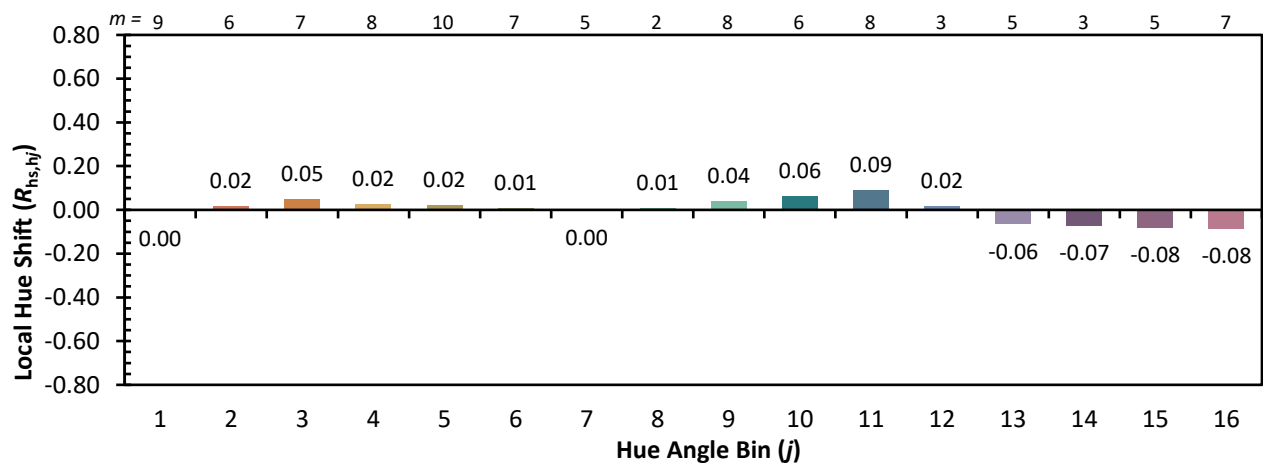
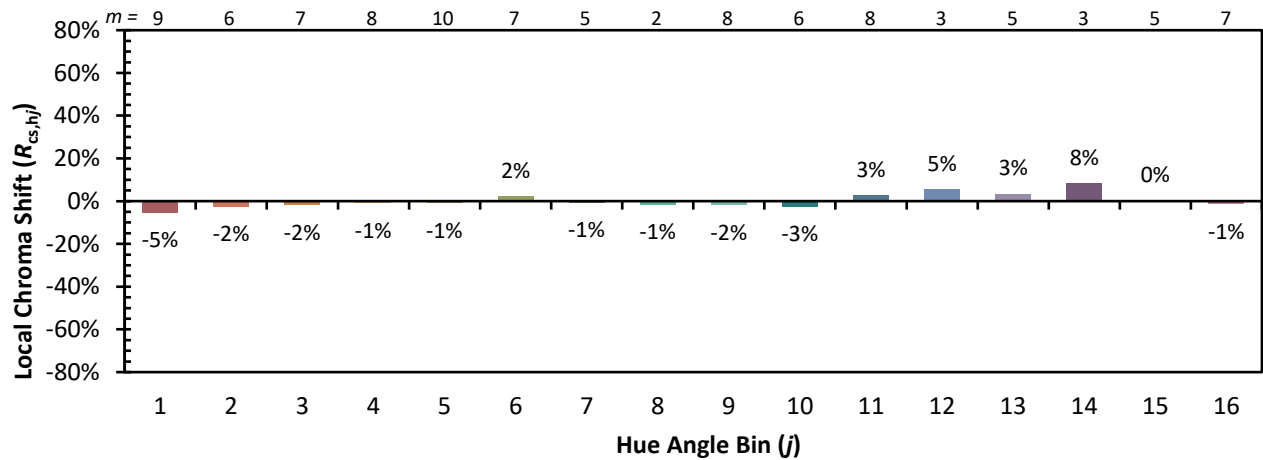


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 93 | CES51 = 98 | CES76 = 86 |
| CES02 = 62 | CES27 = 92 | CES52 = 99 | CES77 = 88 |
| CES03 = 31 | CES28 = 96 | CES53 = 97 | CES78 = 82 |
| CES04 = 69 | CES29 = 95 | CES54 = 94 | CES79 = 93 |
| CES05 = 49 | CES30 = 94 | CES55 = 93 | CES80 = 92 |
| CES06 = 50 | CES31 = 96 | CES56 = 95 | CES81 = 79 |
| CES07 = 42 | CES32 = 88 | CES57 = 94 | CES82 = 96 |
| CES08 = 41 | CES33 = 98 | CES58 = 95 | CES83 = 95 |
| CES09 = 29 | CES34 = 93 | CES59 = 97 | CES84 = 94 |
| CES10 = 74 | CES35 = 96 | CES60 = 93 | CES85 = 81 |
| CES11 = 57 | CES36 = 82 | CES61 = 92 | CES86 = 83 |
| CES12 = 63 | CES37 = 94 | CES62 = 88 | CES87 = 91 |
| CES13 = 43 | CES38 = 89 | CES63 = 93 | CES88 = 97 |
| CES14 = 74 | CES39 = 99 | CES64 = 91 | CES89 = 85 |
| CES15 = 71 | CES40 = 97 | CES65 = 89 | CES90 = 97 |
| CES16 = 47 | CES41 = 97 | CES66 = 88 | CES91 = 73 |
| CES17 = 49 | CES42 = 93 | CES67 = 87 | CES92 = 77 |
| CES18 = 56 | CES43 = 93 | CES68 = 88 | CES93 = 86 |
| CES19 = 71 | CES44 = 99 | CES69 = 89 | CES94 = 75 |
| CES20 = 66 | CES45 = 96 | CES70 = 86 | CES95 = 82 |
| CES21 = 85 | CES46 = 96 | CES71 = 81 | CES96 = 92 |
| CES22 = 78 | CES47 = 93 | CES72 = 94 | CES97 = 94 |
| CES23 = 91 | CES48 = 93 | CES73 = 80 | CES98 = 94 |
| CES24 = 90 | CES49 = 95 | CES74 = 92 | CES99 = 93 |
| CES25 = 71 | CES50 = 99 | CES75 = 82 |            |

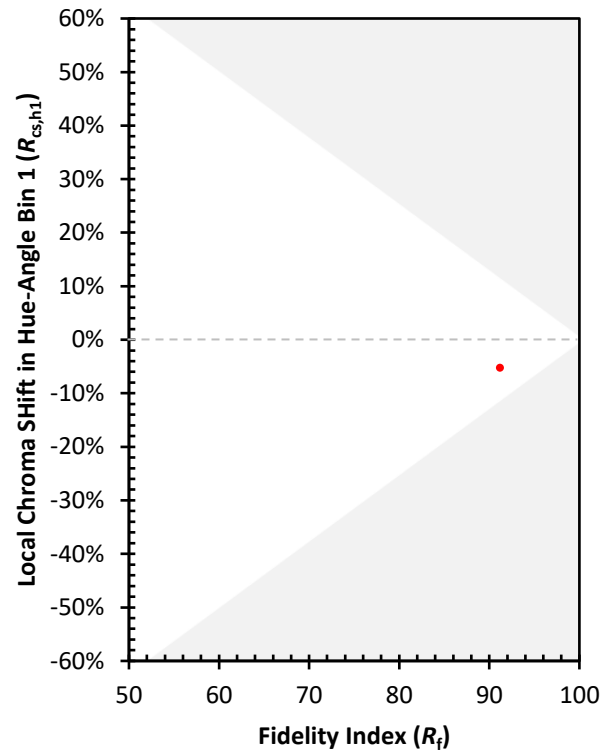
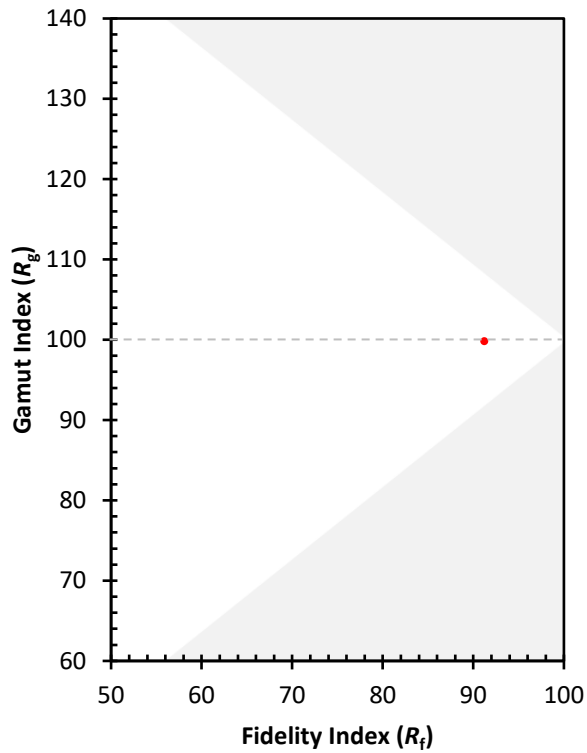


Color Rendition by Hue-Angle Bin





**Measure Comparisons**



(END OF REPORT)