

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

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Peachtree City, GA 30269

Scaled data based on original data using  
LM-79-2024 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P1445126

Luminaire Tested: TPTN-VA1-830-U-WQ-GM

Issue Date: 05/21/2026

**Test Information**

Test Method: LM-79-2024  
Report Number: P1445126  
Test Lab: INNOVATION CENTER(G1)  
Issue Date: 5/21/2026  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: MCGRAW-EDISON  
Catalog Number: TPTN-VA1-830-U-WQ-GM  
Description: TOPTIER NANO SPIDER MOUNT VISUAL COMFORT LED LUMINAIRE 27W 80CRI 3000K w/  
TYPE V WIDE DISTRIBUTION OPTIC  
Light Source: 3000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 2485.6 lumens  
Efficiency: N/A  
Efficacy: 93.1 lumens/watt  
Luminous Opening: Circular (Dia: 0.71' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G2

Input Watts (W): 26.7  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: 0.98  
Total Harmonic Distortion (THDi): 11.9%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT

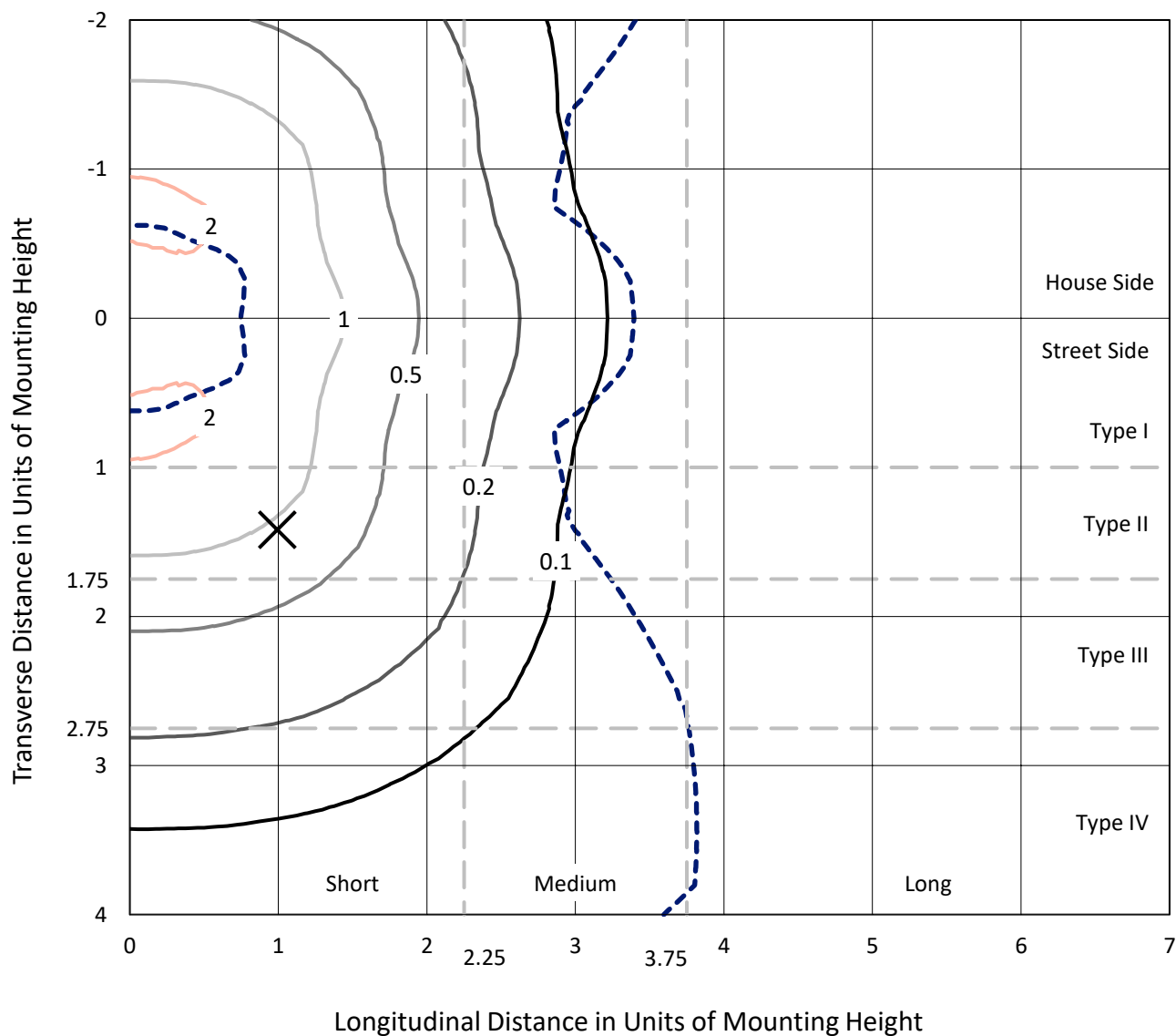
REPORT NUMBER: P1445126

CATALOG NUMBER: TPTN-VA1-830-U-WQ-GM

## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd



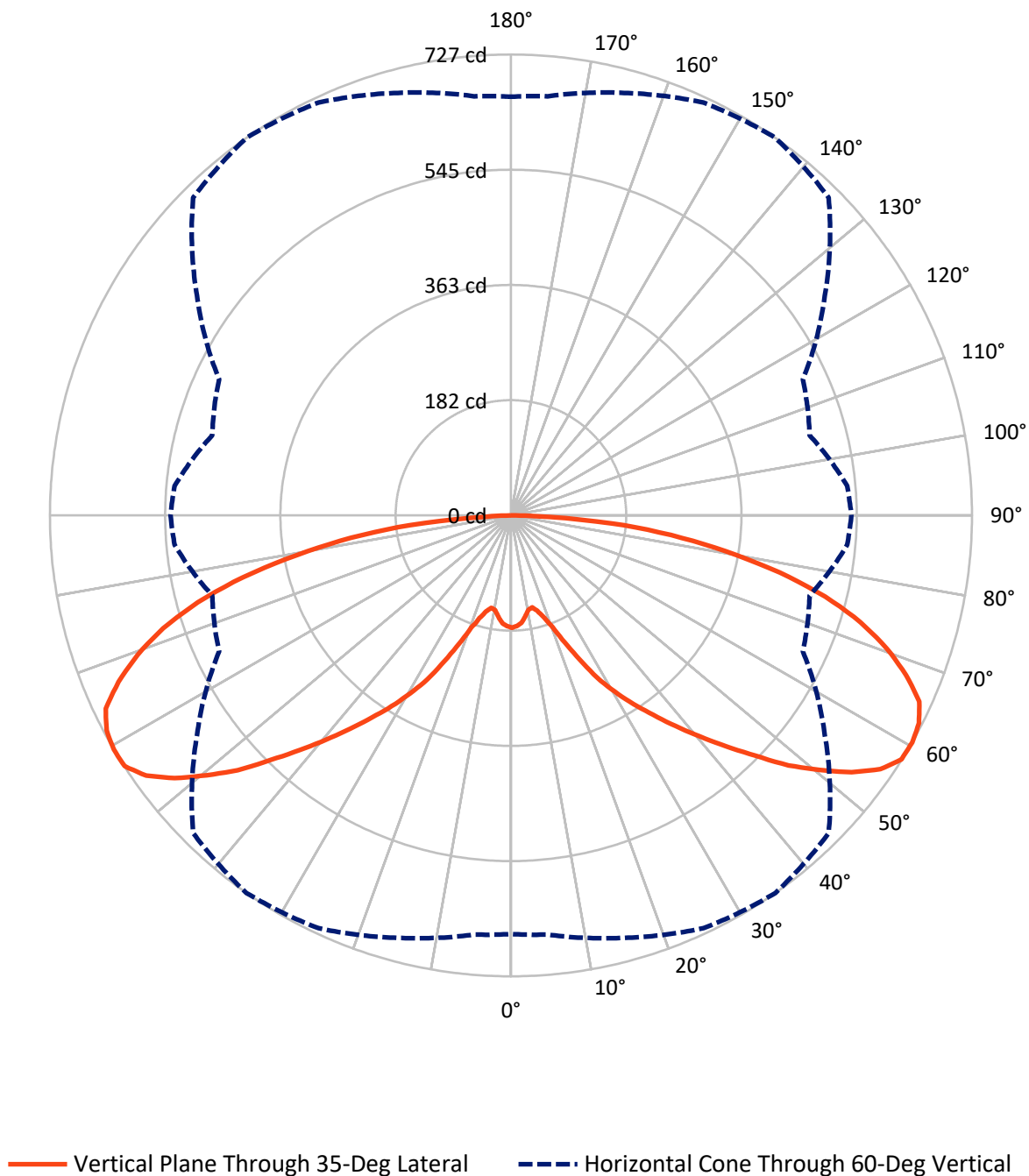
Based on 10 foot mounting height. Maximum calculated value = 2.2 fc

Type IV - Short - N/A

REPORT NUMBER: P1445126

CATALOG NUMBER: TPTN-VA1-830-U-WQ-GM

## Luminous Intensity Polar Plot



REPORT NUMBER: P1445126

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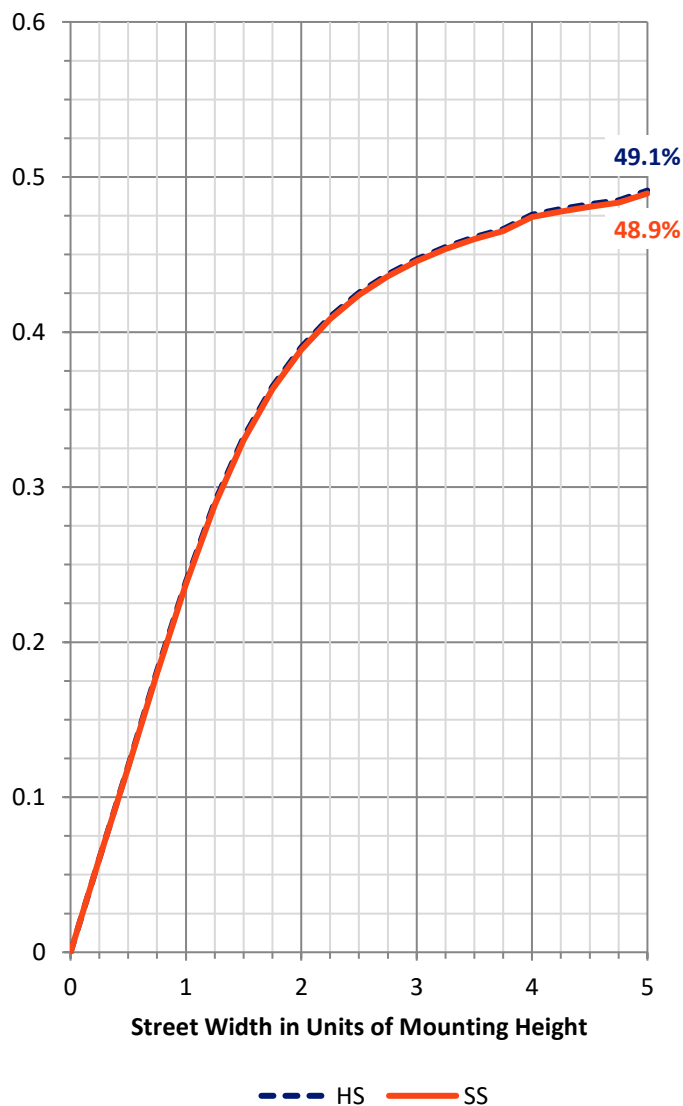
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1242.8   | 0.0    | 1242.8 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Street Side</b> | Lumens    | 1242.8   | 0.0    | 1242.8 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Total</b>       | Lumens    | 2485.6   | 0.0    | 2485.6 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 15.8   | 0.6       |
| 10°-20°   | 47.1   | 1.9       |
| 20°-30°   | 115.1  | 4.6       |
| 30°-40°   | 229.4  | 9.2       |
| 40°-50°   | 383.8  | 15.4      |
| 50°-60°   | 547.3  | 22.0      |
| 60°-70°   | 583.4  | 23.5      |
| 70°-80°   | 434.0  | 17.5      |
| 80°-90°   | 129.6  | 5.2       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 2485.6 | 100.0     |
| 0°-180°   | 2485.6 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P1445126

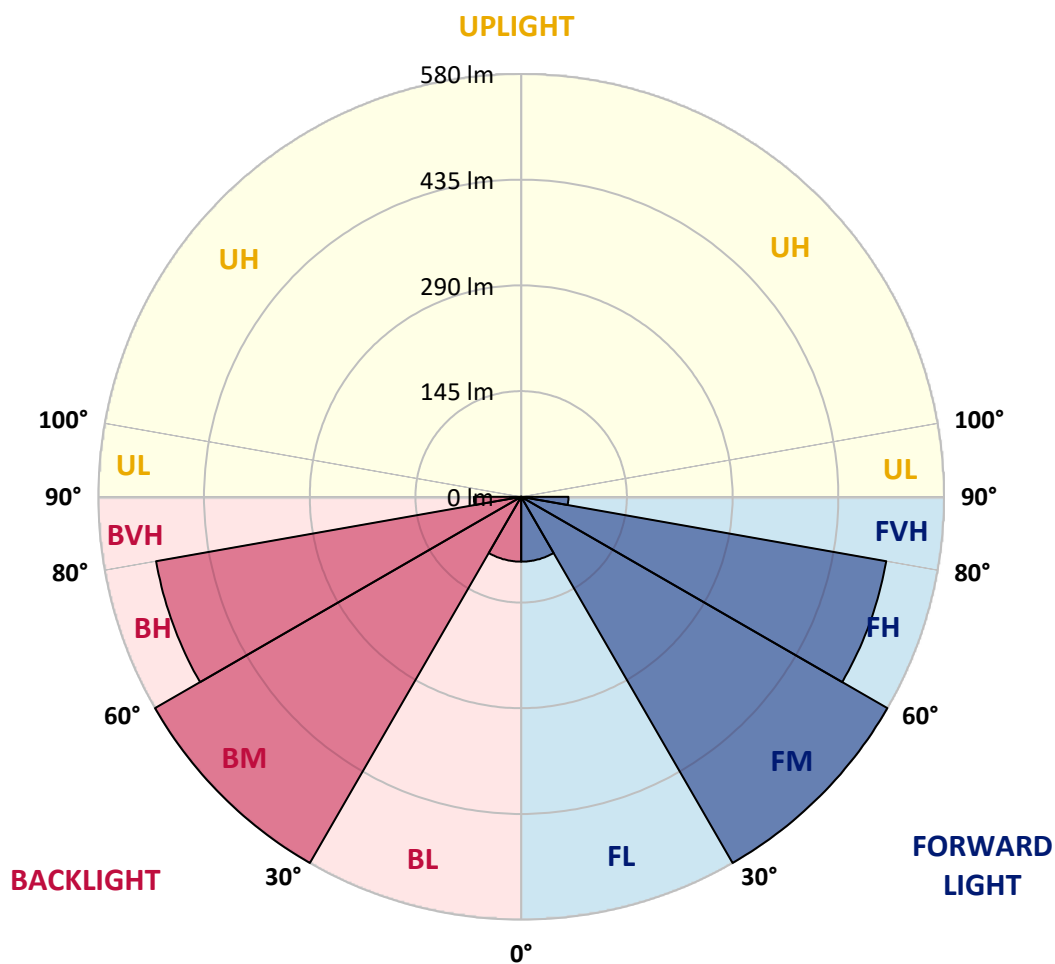
CATALOG NUMBER: TPTN-VA1-830-U-WQ-GM

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 89.0   | 3.6       |                         |      |         |
| FM   | (30°-60°)   | 580.2  | 23.3      |                         |      |         |
| FH   | (60°-80°)   | 508.7  | 20.5      |                         |      | G0/660  |
| FVH  | (80°-90°)   | 64.8   | 2.6       |                         |      | G1/100  |
| BL   | (0°-30°)    | 89.0   | 3.6       | B0/110                  |      |         |
| BM   | (30°-60°)   | 580.2  | 23.3      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 508.7  | 20.5      | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 64.8   | 2.6       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type IV Short



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CATALOG NUMBER: TPTN-VA1-830-U-WQ-GM

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 177.1 | 177.1 | 177.1 | 177.1 | 177.1 | 177.1 | 177.1 | 177.1 | 177.1 | 177.1 | 177.1 |
| 2.5°  | 175.5 | 175.5 | 175.1 | 175.1 | 174.6 | 174.6 | 174.6 | 174.6 | 175.1 | 175.1 | 175.1 |
| 5°    | 170.1 | 169.7 | 170.1 | 170.1 | 170.6 | 170.6 | 171.8 | 173.0 | 173.4 | 173.8 | 173.8 |
| 7.5°  | 158.7 | 158.3 | 159.1 | 159.9 | 161.1 | 162.8 | 164.0 | 165.2 | 166.1 | 166.9 | 167.3 |
| 10°   | 149.7 | 149.7 | 149.7 | 150.5 | 151.3 | 153.4 | 156.6 | 159.1 | 161.1 | 162.4 | 162.8 |
| 12.5° | 147.7 | 147.7 | 147.7 | 148.1 | 148.9 | 150.5 | 155.0 | 159.5 | 162.4 | 163.6 | 164.0 |
| 15°   | 153.0 | 153.0 | 153.4 | 154.6 | 156.2 | 157.1 | 160.7 | 166.1 | 169.7 | 172.6 | 172.6 |
| 17.5° | 161.6 | 161.6 | 164.8 | 167.7 | 169.3 | 168.5 | 171.0 | 175.5 | 181.2 | 185.3 | 185.7 |
| 20°   | 178.3 | 179.6 | 185.3 | 188.6 | 188.1 | 184.9 | 184.9 | 189.0 | 196.3 | 202.0 | 203.7 |
| 22.5° | 209.0 | 209.8 | 215.5 | 218.0 | 217.6 | 209.4 | 203.7 | 206.5 | 216.4 | 223.7 | 225.4 |
| 25°   | 246.6 | 248.7 | 253.2 | 258.1 | 251.9 | 238.9 | 227.8 | 227.0 | 237.6 | 247.9 | 250.3 |
| 27.5° | 292.8 | 292.8 | 295.7 | 296.9 | 290.4 | 272.4 | 256.9 | 251.5 | 261.8 | 274.0 | 276.1 |
| 30°   | 331.7 | 332.5 | 328.8 | 325.2 | 322.3 | 299.8 | 281.0 | 274.4 | 284.3 | 297.3 | 299.0 |
| 32.5° | 372.2 | 370.6 | 361.2 | 356.2 | 354.6 | 329.7 | 306.8 | 297.3 | 304.7 | 320.3 | 321.5 |
| 35°   | 407.8 | 405.3 | 392.6 | 386.9 | 386.1 | 361.6 | 332.1 | 319.0 | 325.6 | 342.7 | 345.6 |
| 37.5° | 444.2 | 440.9 | 426.6 | 422.1 | 421.3 | 398.0 | 359.5 | 341.5 | 348.9 | 368.1 | 369.7 |
| 40°   | 478.1 | 476.5 | 463.0 | 459.7 | 458.1 | 435.6 | 387.7 | 367.3 | 371.4 | 394.3 | 396.3 |
| 42.5° | 510.8 | 511.3 | 503.1 | 498.6 | 497.8 | 473.2 | 419.2 | 391.8 | 396.7 | 421.7 | 424.5 |
| 45°   | 546.0 | 546.0 | 543.6 | 541.1 | 540.3 | 518.2 | 453.6 | 418.8 | 422.1 | 449.5 | 453.2 |
| 47.5° | 582.4 | 584.9 | 585.7 | 587.3 | 589.0 | 566.1 | 490.8 | 448.3 | 446.2 | 477.7 | 481.0 |
| 50°   | 613.5 | 615.6 | 627.0 | 628.6 | 630.7 | 608.2 | 523.5 | 472.0 | 468.3 | 501.4 | 503.5 |
| 52.5° | 639.7 | 642.1 | 659.3 | 668.7 | 672.8 | 647.5 | 558.3 | 493.3 | 484.7 | 520.7 | 523.9 |
| 55°   | 661.0 | 663.4 | 684.3 | 701.9 | 706.4 | 687.5 | 585.7 | 510.4 | 496.1 | 535.0 | 540.7 |
| 57.5° | 664.6 | 667.5 | 694.5 | 715.8 | 726.0 | 709.6 | 602.5 | 513.3 | 496.9 | 537.0 | 542.3 |
| 60°   | 660.1 | 663.4 | 689.6 | 718.2 | 726.8 | 708.4 | 604.1 | 507.6 | 487.5 | 532.1 | 536.6 |
| 62.5° | 649.1 | 654.8 | 678.5 | 706.8 | 721.9 | 701.4 | 599.6 | 493.3 | 474.9 | 523.1 | 526.4 |
| 65°   | 620.9 | 625.4 | 660.5 | 684.3 | 707.6 | 683.9 | 587.3 | 472.8 | 457.3 | 498.6 | 500.6 |
| 67.5° | 578.7 | 584.1 | 617.2 | 656.9 | 672.0 | 653.2 | 559.5 | 449.1 | 420.5 | 461.4 | 465.9 |
| 70°   | 540.3 | 541.5 | 568.1 | 613.5 | 628.6 | 618.8 | 526.4 | 413.5 | 382.0 | 426.2 | 431.5 |
| 72.5° | 486.7 | 490.0 | 517.0 | 557.1 | 576.7 | 572.6 | 485.5 | 370.6 | 340.7 | 384.1 | 386.1 |
| 75°   | 419.2 | 423.7 | 452.8 | 489.2 | 512.1 | 508.0 | 432.3 | 320.7 | 294.9 | 329.7 | 331.3 |
| 77.5° | 346.4 | 352.6 | 376.7 | 411.9 | 433.5 | 429.9 | 366.5 | 267.9 | 240.1 | 269.9 | 271.6 |
| 80°   | 267.9 | 272.8 | 296.1 | 328.4 | 343.2 | 344.0 | 294.5 | 207.4 | 183.2 | 207.0 | 206.5 |
| 82.5° | 183.6 | 190.2 | 211.9 | 235.6 | 254.4 | 256.4 | 217.2 | 148.1 | 126.0 | 139.5 | 139.5 |
| 85°   | 95.3  | 99.4  | 117.8 | 141.5 | 159.5 | 164.4 | 137.0 | 87.5  | 67.1  | 69.5  | 65.8  |
| 87.5° | 17.6  | 18.0  | 21.3  | 28.2  | 38.0  | 39.7  | 34.4  | 25.4  | 17.6  | 12.3  | 8.2   |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 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

MCGRAW EDISON

Report Number: SP1-2411-284-4

Test Date: 11/22/2024

Luminaire Tested: TTN-D0-830-U-WQ

Data in this report applies to families of products including TTN-D0-830-U-WQ



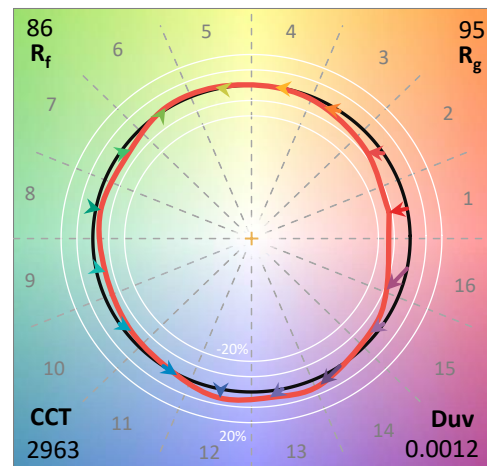
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2411-284-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 11/22/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **TTN-D0-830-U-WQ**  
 Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE. 3000K, 80 CRI LEDS AND WIDE DISTRIBUTION

### Spectral Parameters

CCT (K): 2963  
 CIE  $u'$ : 0.2515  
 CIE  $v'$ : 0.5238  
 Duv: 0.0012  
 CIE x: 0.4414  
 CIE y: 0.4086  
 CIE z: 0.1501  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 582  
 Purity: 55.12798  
 R<sub>f</sub>: 86.1  
 R<sub>g</sub>: 94.9

CRI (Ra): 82.9  
 R1: 81.4  
 R2: 91.9  
 R3: 95.2  
 R4: 81.6  
 R5: 82.3  
 R6: 91.4  
 R7: 82.0  
 R8: 57.2  
 R9: 3.9  
 R10: 82.5  
 R11: 82.3  
 R12: 76.5  
 R13: 83.9  
 R14: 97.8  
 R15: 72.6



### Test Conditions

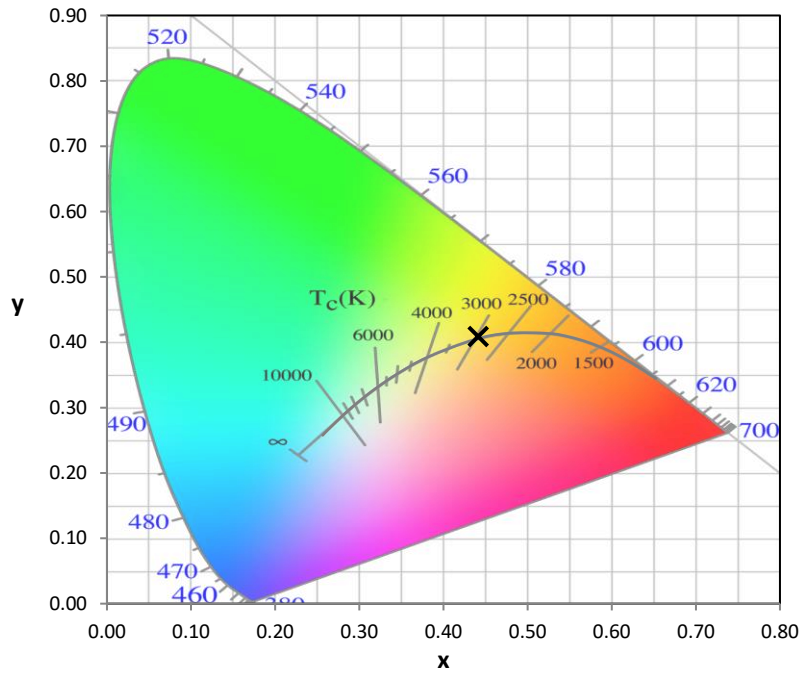
Stabilization Time: 37M  
 Operation Time: 1H 37M  
 Sphere Temperature (°C): 25.0

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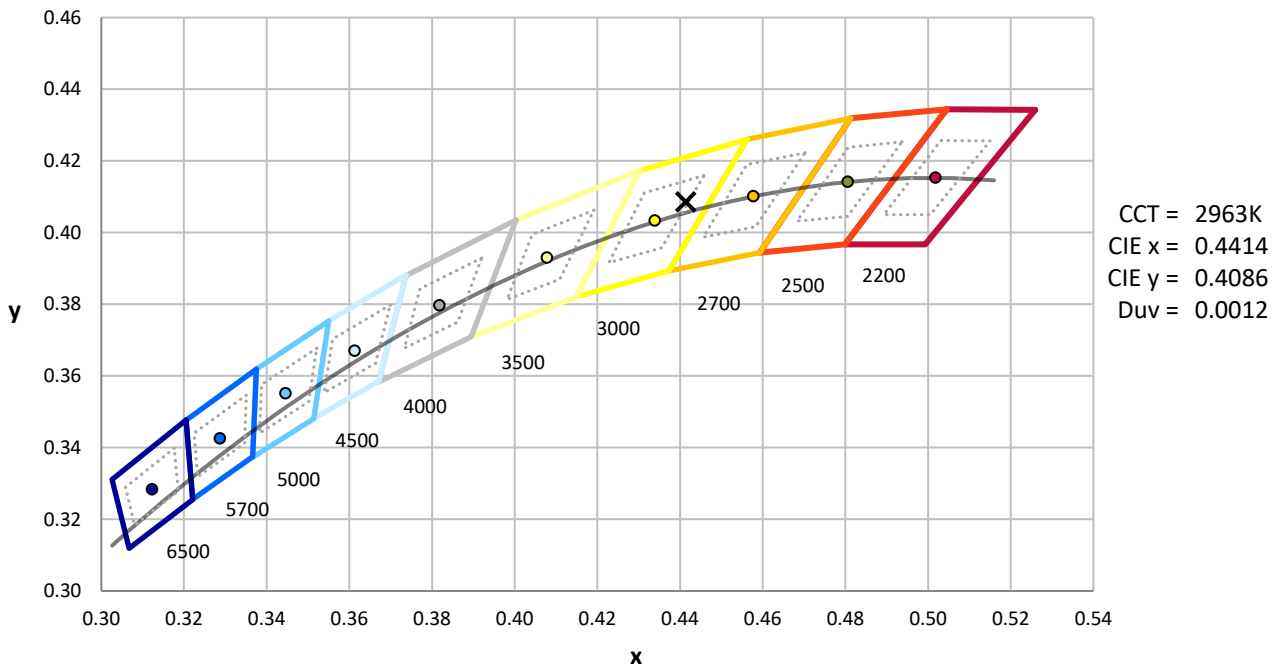
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/22/2024       | 10/22/2025           |
| DC Power Source                | IN0208                | 10/22/2024       | 10/22/2025           |
| Sphere Thermometer             | IN0085                | 10/22/2024       | 10/22/2025           |
| Room Thermometer               | IN0046                | 10/22/2024       | 10/22/2025           |

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**CIE 1931 Chromaticity Diagram**



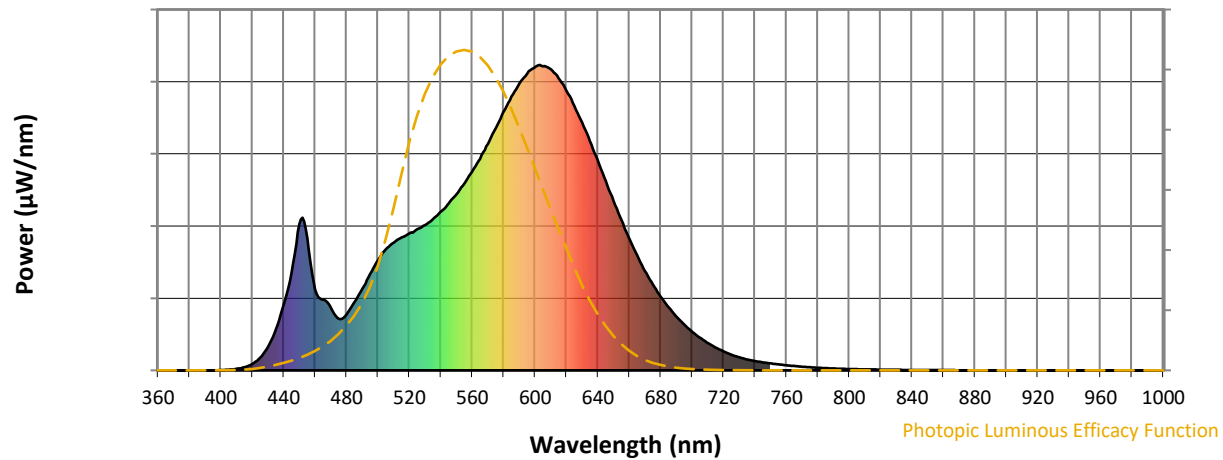
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

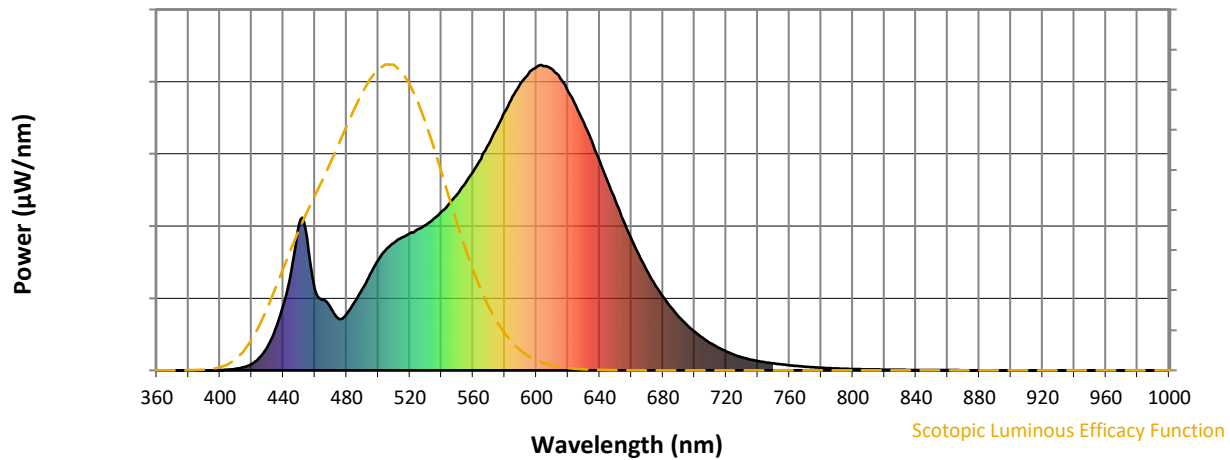


### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 0                             | NR                             | 490               | 267                           | NR                             | 620               | 915                           | NR                             | 750               | 23                            | NR                             | 880               | 0                             | NR                             |
| 365               | 0                             | NR                             | 495               | 315                           | NR                             | 625               | 866                           | NR                             | 755               | 20                            | NR                             | 885               | 0                             | NR                             |
| 370               | 0                             | NR                             | 500               | 360                           | NR                             | 630               | 811                           | NR                             | 760               | 17                            | NR                             | 890               | 0                             | NR                             |
| 375               | 0                             | NR                             | 505               | 396                           | NR                             | 635               | 750                           | NR                             | 765               | 14                            | NR                             | 895               | 0                             | NR                             |
| 380               | 0                             | NR                             | 510               | 418                           | NR                             | 640               | 686                           | NR                             | 770               | 12                            | NR                             | 900               | 0                             | NR                             |
| 385               | 0                             | NR                             | 515               | 435                           | NR                             | 645               | 619                           | NR                             | 775               | 10                            | NR                             | 905               | 0                             | NR                             |
| 390               | 0                             | NR                             | 520               | 448                           | NR                             | 650               | 554                           | NR                             | 780               | 9                             | NR                             | 910               | 0                             | NR                             |
| 395               | 0                             | NR                             | 525               | 462                           | NR                             | 655               | 491                           | NR                             | 785               | 7                             | NR                             | 915               | 0                             | NR                             |
| 400               | 1                             | NR                             | 530               | 476                           | NR                             | 660               | 431                           | NR                             | 790               | 6                             | NR                             | 920               | 0                             | NR                             |
| 405               | 2                             | NR                             | 535               | 495                           | NR                             | 665               | 376                           | NR                             | 795               | 5                             | NR                             | 925               | 0                             | NR                             |
| 410               | 5                             | NR                             | 540               | 520                           | NR                             | 670               | 325                           | NR                             | 800               | 4                             | NR                             | 930               | 0                             | NR                             |
| 415               | 10                            | NR                             | 545               | 547                           | NR                             | 675               | 280                           | NR                             | 805               | 4                             | NR                             | 935               | 0                             | NR                             |
| 420               | 21                            | NR                             | 550               | 576                           | NR                             | 680               | 241                           | NR                             | 810               | 3                             | NR                             | 940               | 0                             | NR                             |
| 425               | 42                            | NR                             | 555               | 612                           | NR                             | 685               | 207                           | NR                             | 815               | 3                             | NR                             | 945               | 0                             | NR                             |
| 430               | 77                            | NR                             | 560               | 651                           | NR                             | 690               | 176                           | NR                             | 820               | 2                             | NR                             | 950               | 0                             | NR                             |
| 435               | 135                           | NR                             | 565               | 693                           | NR                             | 695               | 149                           | NR                             | 825               | 2                             | NR                             | 955               | 0                             | NR                             |
| 440               | 215                           | NR                             | 570               | 741                           | NR                             | 700               | 127                           | NR                             | 830               | 2                             | NR                             | 960               | 0                             | NR                             |
| 445               | 321                           | NR                             | 575               | 793                           | NR                             | 705               | 107                           | NR                             | 835               | 2                             | NR                             | 965               | 0                             | NR                             |
| 450               | 479                           | NR                             | 580               | 847                           | NR                             | 710               | 89                            | NR                             | 840               | 1                             | NR                             | 970               | 0                             | NR                             |
| 455               | 432                           | NR                             | 585               | 897                           | NR                             | 715               | 75                            | NR                             | 845               | 1                             | NR                             | 975               | 0                             | NR                             |
| 460               | 265                           | NR                             | 590               | 940                           | NR                             | 720               | 62                            | NR                             | 850               | 1                             | NR                             | 980               | 0                             | NR                             |
| 465               | 231                           | NR                             | 595               | 971                           | NR                             | 725               | 51                            | NR                             | 855               | 1                             | NR                             | 985               | 0                             | NR                             |
| 470               | 204                           | NR                             | 600               | 993                           | NR                             | 730               | 43                            | NR                             | 860               | 1                             | NR                             | 990               | 0                             | NR                             |
| 475               | 168                           | NR                             | 605               | 996                           | NR                             | 735               | 36                            | NR                             | 865               | 1                             | NR                             | 995               | 0                             | NR                             |
| 480               | 183                           | NR                             | 610               | 986                           | NR                             | 740               | 31                            | NR                             | 870               | 1                             | NR                             | 1000              | 0                             | NR                             |
| 485               | 223                           | NR                             | 615               | 957                           | NR                             | 745               | 26                            | NR                             | 875               | 0                             | NR                             |                   |                               |                                |

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### Scotopic Flux vs. Wavelength



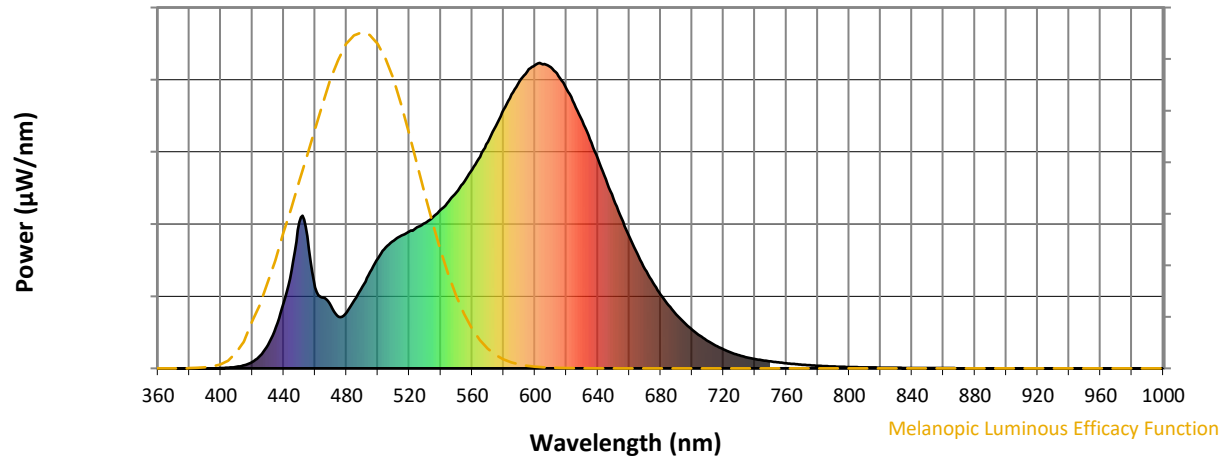
Scotopic Lumens: NR

S/P: 1.34

| λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(Φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 267                         | NR               | 620       | 915                         | NR               | 750       | 23                          | NR               | 880       | 0                           | NR               |
| 365       | 0                           | NR               | 495       | 315                         | NR               | 625       | 866                         | NR               | 755       | 20                          | NR               | 885       | 0                           | NR               |
| 370       | 0                           | NR               | 500       | 360                         | NR               | 630       | 811                         | NR               | 760       | 17                          | NR               | 890       | 0                           | NR               |
| 375       | 0                           | NR               | 505       | 396                         | NR               | 635       | 750                         | NR               | 765       | 14                          | NR               | 895       | 0                           | NR               |
| 380       | 0                           | NR               | 510       | 418                         | NR               | 640       | 686                         | NR               | 770       | 12                          | NR               | 900       | 0                           | NR               |
| 385       | 0                           | NR               | 515       | 435                         | NR               | 645       | 619                         | NR               | 775       | 10                          | NR               | 905       | 0                           | NR               |
| 390       | 0                           | NR               | 520       | 448                         | NR               | 650       | 554                         | NR               | 780       | 9                           | NR               | 910       | 0                           | NR               |
| 395       | 0                           | NR               | 525       | 462                         | NR               | 655       | 491                         | NR               | 785       | 7                           | NR               | 915       | 0                           | NR               |
| 400       | 1                           | NR               | 530       | 476                         | NR               | 660       | 431                         | NR               | 790       | 6                           | NR               | 920       | 0                           | NR               |
| 405       | 2                           | NR               | 535       | 495                         | NR               | 665       | 376                         | NR               | 795       | 5                           | NR               | 925       | 0                           | NR               |
| 410       | 5                           | NR               | 540       | 520                         | NR               | 670       | 325                         | NR               | 800       | 4                           | NR               | 930       | 0                           | NR               |
| 415       | 10                          | NR               | 545       | 547                         | NR               | 675       | 280                         | NR               | 805       | 4                           | NR               | 935       | 0                           | NR               |
| 420       | 21                          | NR               | 550       | 576                         | NR               | 680       | 241                         | NR               | 810       | 3                           | NR               | 940       | 0                           | NR               |
| 425       | 42                          | NR               | 555       | 612                         | NR               | 685       | 207                         | NR               | 815       | 3                           | NR               | 945       | 0                           | NR               |
| 430       | 77                          | NR               | 560       | 651                         | NR               | 690       | 176                         | NR               | 820       | 2                           | NR               | 950       | 0                           | NR               |
| 435       | 135                         | NR               | 565       | 693                         | NR               | 695       | 149                         | NR               | 825       | 2                           | NR               | 955       | 0                           | NR               |
| 440       | 215                         | NR               | 570       | 741                         | NR               | 700       | 127                         | NR               | 830       | 2                           | NR               | 960       | 0                           | NR               |
| 445       | 321                         | NR               | 575       | 793                         | NR               | 705       | 107                         | NR               | 835       | 2                           | NR               | 965       | 0                           | NR               |
| 450       | 479                         | NR               | 580       | 847                         | NR               | 710       | 89                          | NR               | 840       | 1                           | NR               | 970       | 0                           | NR               |
| 455       | 432                         | NR               | 585       | 897                         | NR               | 715       | 75                          | NR               | 845       | 1                           | NR               | 975       | 0                           | NR               |
| 460       | 265                         | NR               | 590       | 940                         | NR               | 720       | 62                          | NR               | 850       | 1                           | NR               | 980       | 0                           | NR               |
| 465       | 231                         | NR               | 595       | 971                         | NR               | 725       | 51                          | NR               | 855       | 1                           | NR               | 985       | 0                           | NR               |
| 470       | 204                         | NR               | 600       | 993                         | NR               | 730       | 43                          | NR               | 860       | 1                           | NR               | 990       | 0                           | NR               |
| 475       | 168                         | NR               | 605       | 996                         | NR               | 735       | 36                          | NR               | 865       | 1                           | NR               | 995       | 0                           | NR               |
| 480       | 183                         | NR               | 610       | 986                         | NR               | 740       | 31                          | NR               | 870       | 1                           | NR               | 1000      | 0                           | NR               |
| 485       | 223                         | NR               | 615       | 957                         | NR               | 745       | 26                          | NR               | 875       | 0                           | NR               |           |                             |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: NR**
**M/P: 2.58**

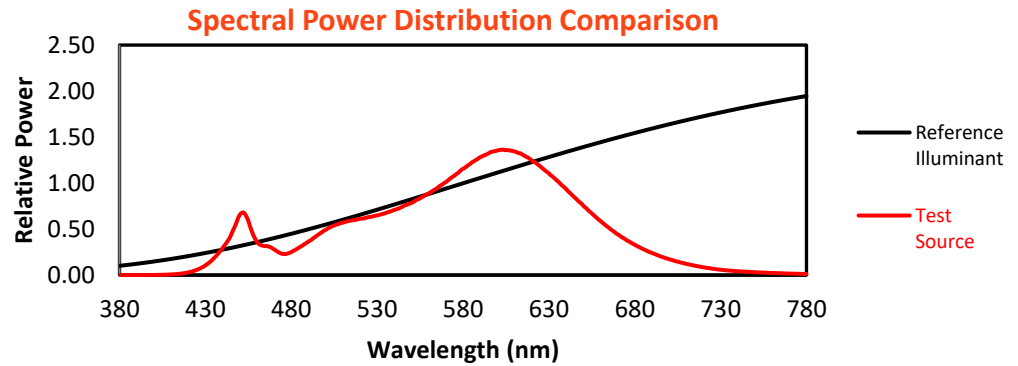
| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<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               | 267                                  | NR                             | 620               | 915                                  | NR                             | 750               | 23                                   | NR                             | 880               | 0                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 315                                  | NR                             | 625               | 866                                  | NR                             | 755               | 20                                   | NR                             | 885               | 0                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 360                                  | NR                             | 630               | 811                                  | NR                             | 760               | 17                                   | NR                             | 890               | 0                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 396                                  | NR                             | 635               | 750                                  | NR                             | 765               | 14                                   | NR                             | 895               | 0                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 418                                  | NR                             | 640               | 686                                  | NR                             | 770               | 12                                   | NR                             | 900               | 0                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 435                                  | NR                             | 645               | 619                                  | NR                             | 775               | 10                                   | NR                             | 905               | 0                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 448                                  | NR                             | 650               | 554                                  | NR                             | 780               | 9                                    | NR                             | 910               | 0                                    | NR                             |
| 395               | 0                                    | NR                             | 525               | 462                                  | NR                             | 655               | 491                                  | NR                             | 785               | 7                                    | NR                             | 915               | 0                                    | NR                             |
| 400               | 1                                    | NR                             | 530               | 476                                  | NR                             | 660               | 431                                  | NR                             | 790               | 6                                    | NR                             | 920               | 0                                    | NR                             |
| 405               | 2                                    | NR                             | 535               | 495                                  | NR                             | 665               | 376                                  | NR                             | 795               | 5                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 5                                    | NR                             | 540               | 520                                  | NR                             | 670               | 325                                  | NR                             | 800               | 4                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 10                                   | NR                             | 545               | 547                                  | NR                             | 675               | 280                                  | NR                             | 805               | 4                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 21                                   | NR                             | 550               | 576                                  | NR                             | 680               | 241                                  | NR                             | 810               | 3                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 42                                   | NR                             | 555               | 612                                  | NR                             | 685               | 207                                  | NR                             | 815               | 3                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 77                                   | NR                             | 560               | 651                                  | NR                             | 690               | 176                                  | NR                             | 820               | 2                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 135                                  | NR                             | 565               | 693                                  | NR                             | 695               | 149                                  | NR                             | 825               | 2                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 215                                  | NR                             | 570               | 741                                  | NR                             | 700               | 127                                  | NR                             | 830               | 2                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 321                                  | NR                             | 575               | 793                                  | NR                             | 705               | 107                                  | NR                             | 835               | 2                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 479                                  | NR                             | 580               | 847                                  | NR                             | 710               | 89                                   | NR                             | 840               | 1                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 432                                  | NR                             | 585               | 897                                  | NR                             | 715               | 75                                   | NR                             | 845               | 1                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 265                                  | NR                             | 590               | 940                                  | NR                             | 720               | 62                                   | NR                             | 850               | 1                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 231                                  | NR                             | 595               | 971                                  | NR                             | 725               | 51                                   | NR                             | 855               | 1                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 204                                  | NR                             | 600               | 993                                  | NR                             | 730               | 43                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 168                                  | NR                             | 605               | 996                                  | NR                             | 735               | 36                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 183                                  | NR                             | 610               | 986                                  | NR                             | 740               | 31                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 223                                  | NR                             | 615               | 957                                  | NR                             | 745               | 26                                   | NR                             | 875               | 0                                    | NR                             |                   |                                      |                                |

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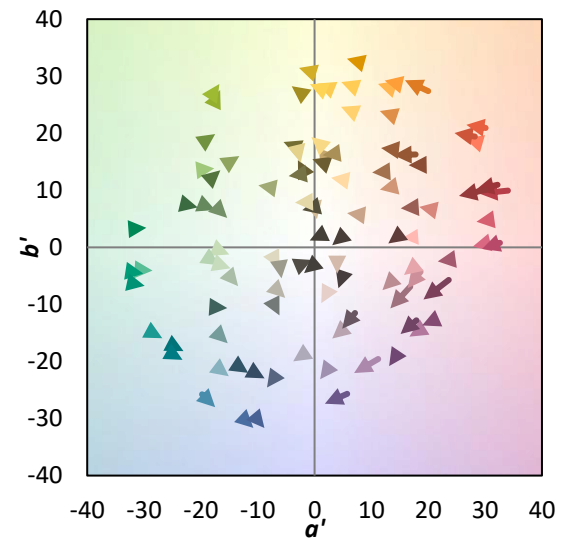
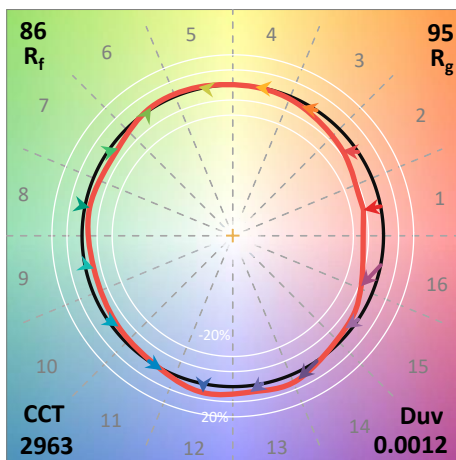
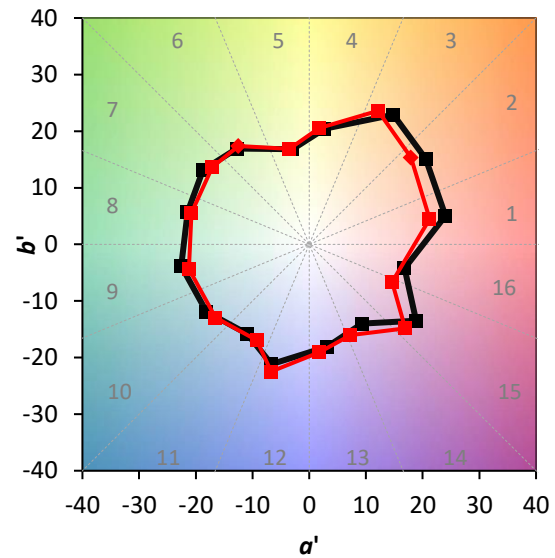
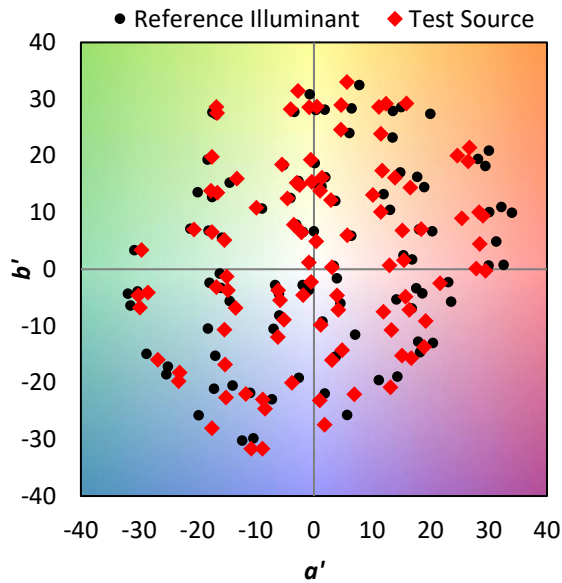
TM-30-18

### Summary

$R_f = 86.1$   
 $R_g = 94.9$   
 $CIE R_a = 82.9$   
 $R_9 = 3.9$

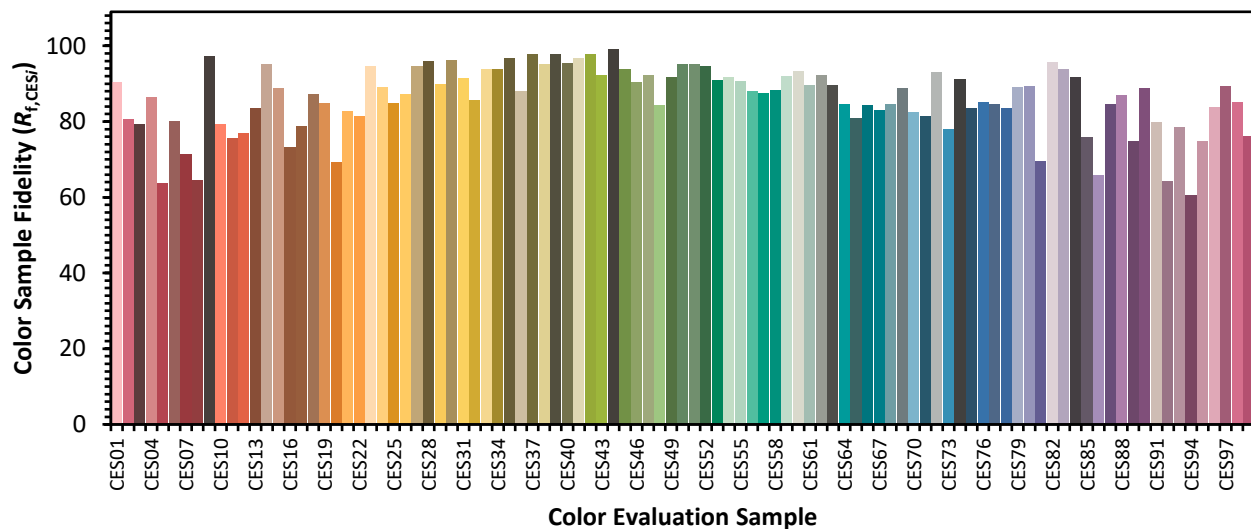


### Color Vector Graphics



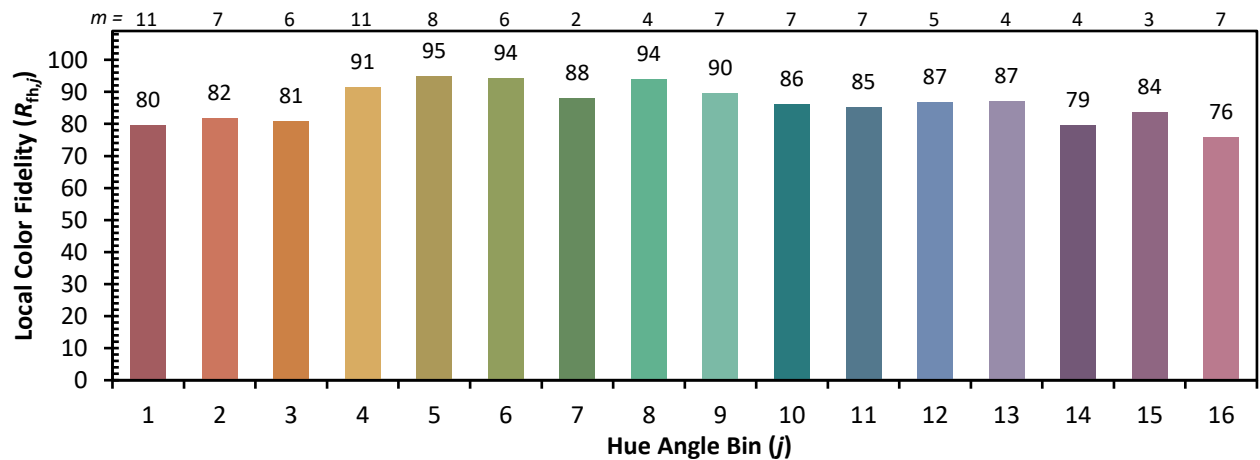
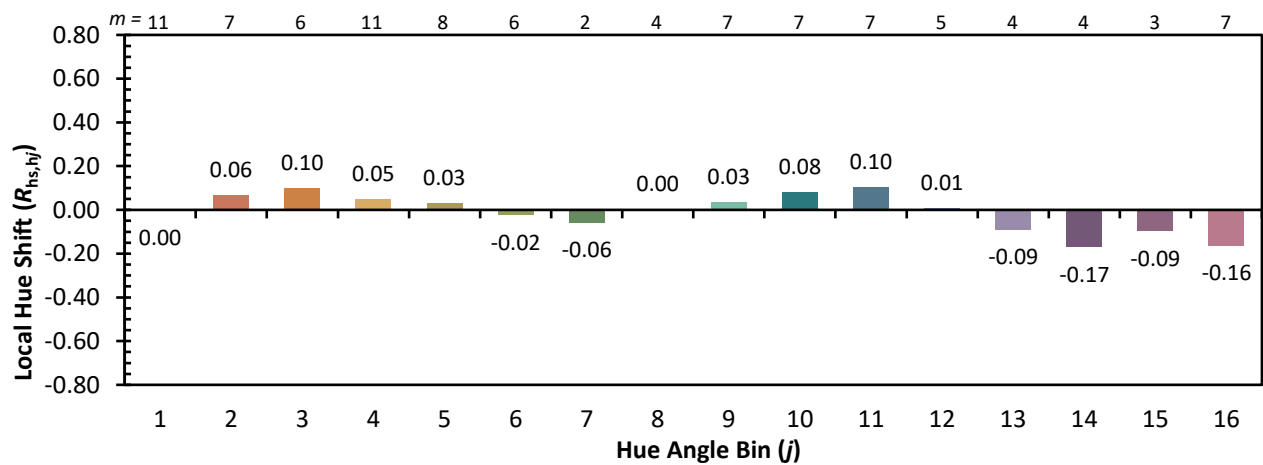
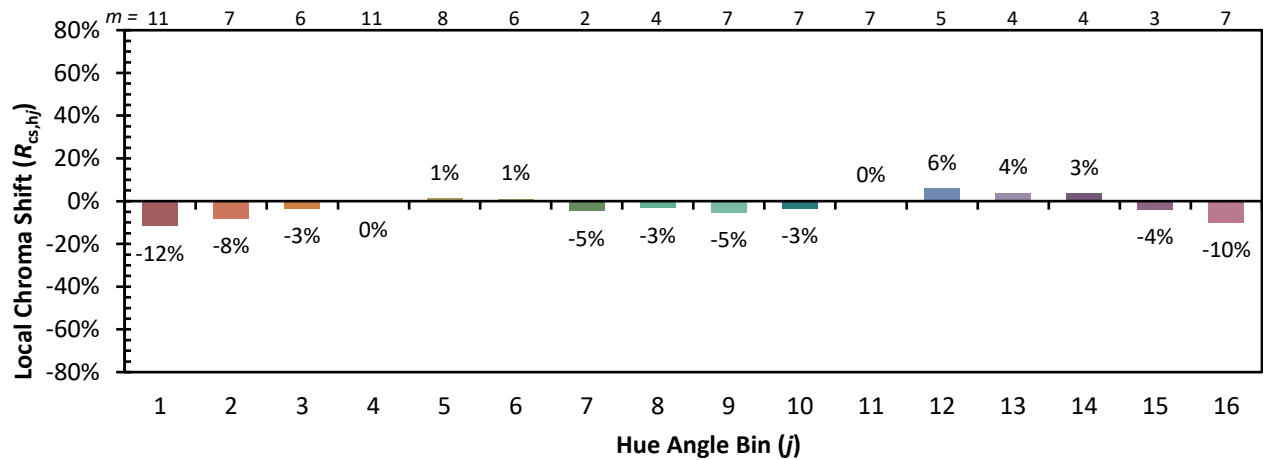
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

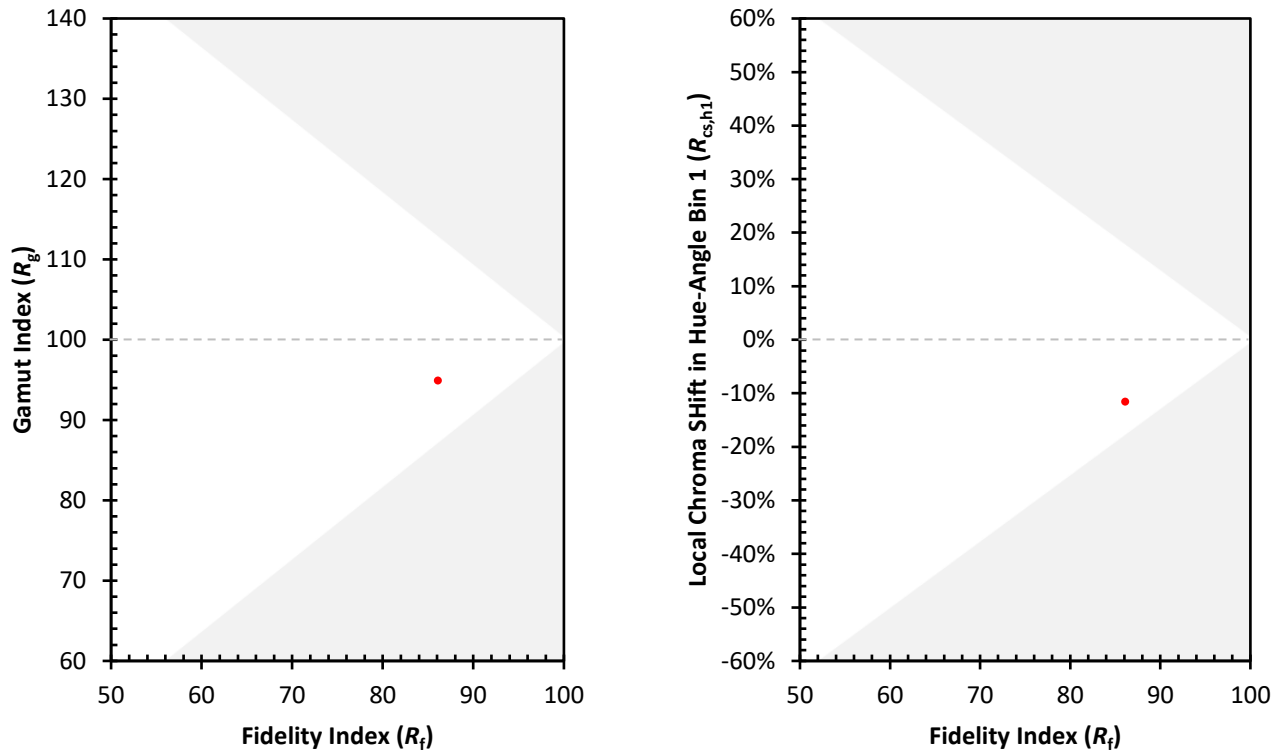
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 87 | CES51 = 95 | CES76 = 85 |
| CES02 = 63 | CES27 = 95 | CES52 = 95 | CES77 = 85 |
| CES03 = 31 | CES28 = 96 | CES53 = 91 | CES78 = 83 |
| CES04 = 70 | CES29 = 90 | CES54 = 92 | CES79 = 89 |
| CES05 = 50 | CES30 = 96 | CES55 = 91 | CES80 = 89 |
| CES06 = 51 | CES31 = 92 | CES56 = 88 | CES81 = 70 |
| CES07 = 42 | CES32 = 86 | CES57 = 87 | CES82 = 96 |
| CES08 = 41 | CES33 = 94 | CES58 = 88 | CES83 = 94 |
| CES09 = 29 | CES34 = 94 | CES59 = 92 | CES84 = 92 |
| CES10 = 76 | CES35 = 97 | CES60 = 93 | CES85 = 76 |
| CES11 = 59 | CES36 = 88 | CES61 = 90 | CES86 = 66 |
| CES12 = 65 | CES37 = 98 | CES62 = 92 | CES87 = 85 |
| CES13 = 44 | CES38 = 95 | CES63 = 90 | CES88 = 87 |
| CES14 = 74 | CES39 = 98 | CES64 = 85 | CES89 = 75 |
| CES15 = 72 | CES40 = 96 | CES65 = 81 | CES90 = 89 |
| CES16 = 48 | CES41 = 97 | CES66 = 84 | CES91 = 80 |
| CES17 = 50 | CES42 = 98 | CES67 = 83 | CES92 = 64 |
| CES18 = 57 | CES43 = 92 | CES68 = 85 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 89 | CES94 = 61 |
| CES20 = 67 | CES45 = 94 | CES70 = 83 | CES95 = 75 |
| CES21 = 87 | CES46 = 91 | CES71 = 81 | CES96 = 84 |
| CES22 = 79 | CES47 = 92 | CES72 = 93 | CES97 = 89 |
| CES23 = 92 | CES48 = 84 | CES73 = 78 | CES98 = 85 |
| CES24 = 91 | CES49 = 92 | CES74 = 91 | CES99 = 76 |
| CES25 = 72 | CES50 = 95 | CES75 = 84 |            |





Color Rendition by Hue-Angle Bin



**Measure Comparisons**


(END OF REPORT)