

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: P1445125

Luminaire Tested: TPTN-VA0-830-U-WQ-GM

Issue Date: 05/21/2026

**Test Information**

Test Method: LM-79-2024  
Report Number: P1445125  
Test Lab: INNOVATION CENTER(G1)  
Issue Date: 5/21/2026  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: MCGRAW-EDISON  
Catalog Number: TPTN-VA0-830-U-WQ-GM  
Description: TOPTIER NANO SPIDER MOUNT VISUAL COMFORT LED LUMINAIRE 9W 80CRI 3000K w/ TYP  
V WIDE DISTRIBUTION OPTIC  
Light Source: 3000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 845.2 lumens  
Efficiency: N/A  
Efficacy: 97.1 lumens/watt  
Luminous Opening: Circular (Dia: 0.71' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G1

Input Watts (W): 8.7  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: 0.98  
Total Harmonic Distortion (THDi): 29.6%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT

REPORT NUMBER: P1445125

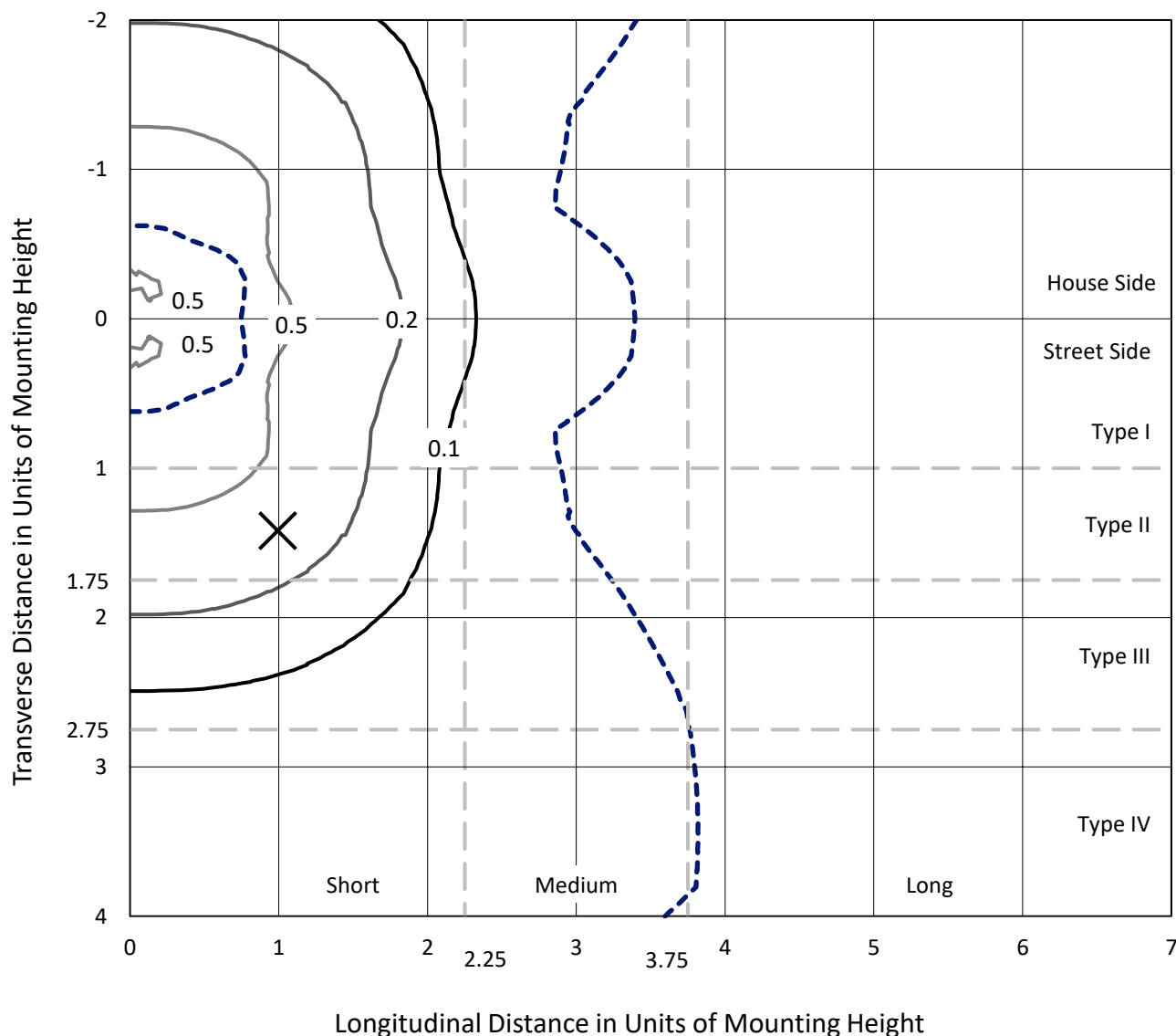
CATALOG NUMBER: TPTN-VA0-830-U-WQ-GM

## Iso-Footcandle Lines of Horizontal Illumination

'E

× Max cd

--- 1/2 Max cd



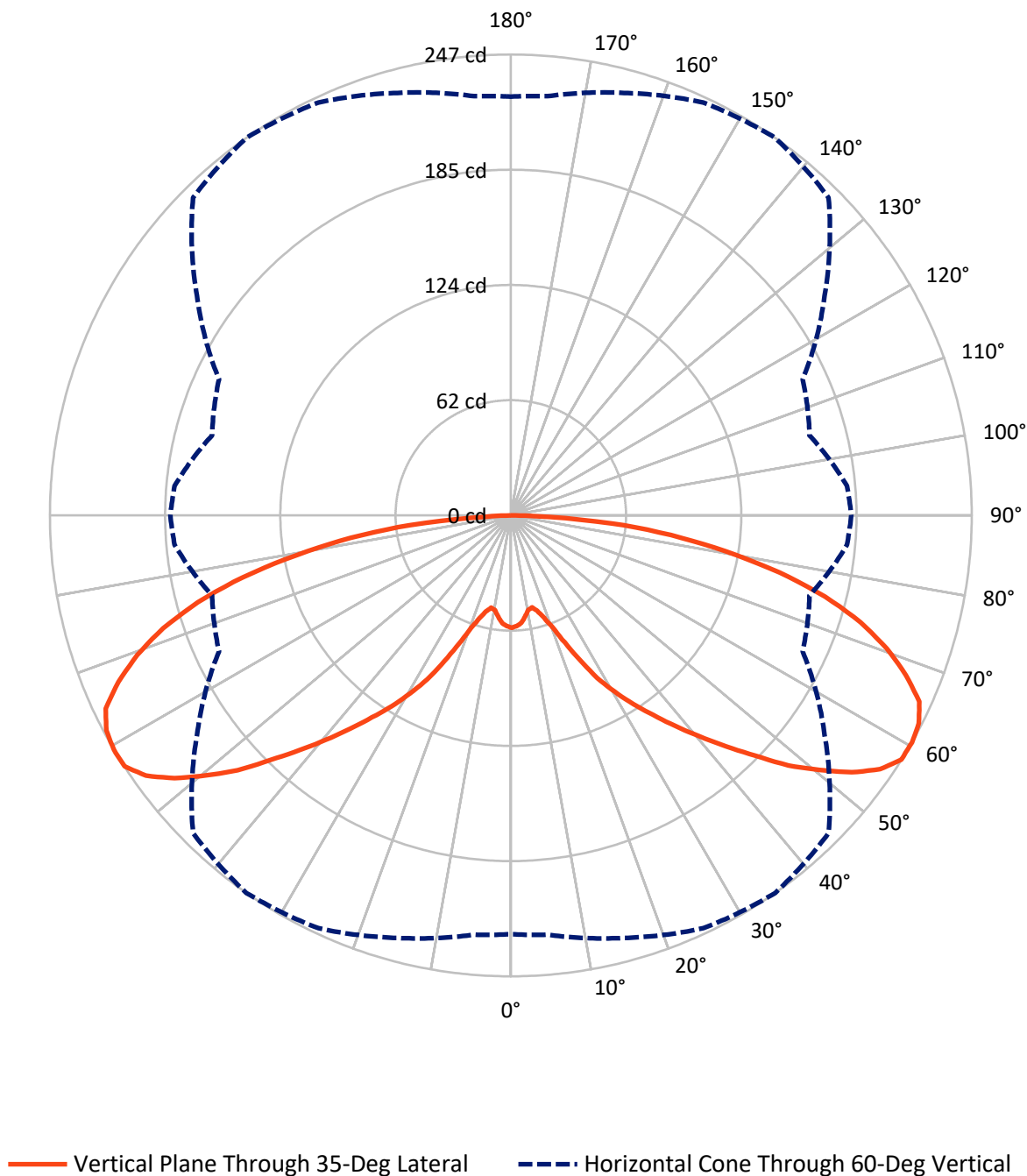
Based on 10 foot mounting height. Maximum calculated value = 0.8 fc

Type IV - Short - N/A

REPORT NUMBER: P1445125

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## Luminous Intensity Polar Plot



REPORT NUMBER: P1445125

CATALOG NUMBER: TPTN-VA0-830-U-WQ-GM

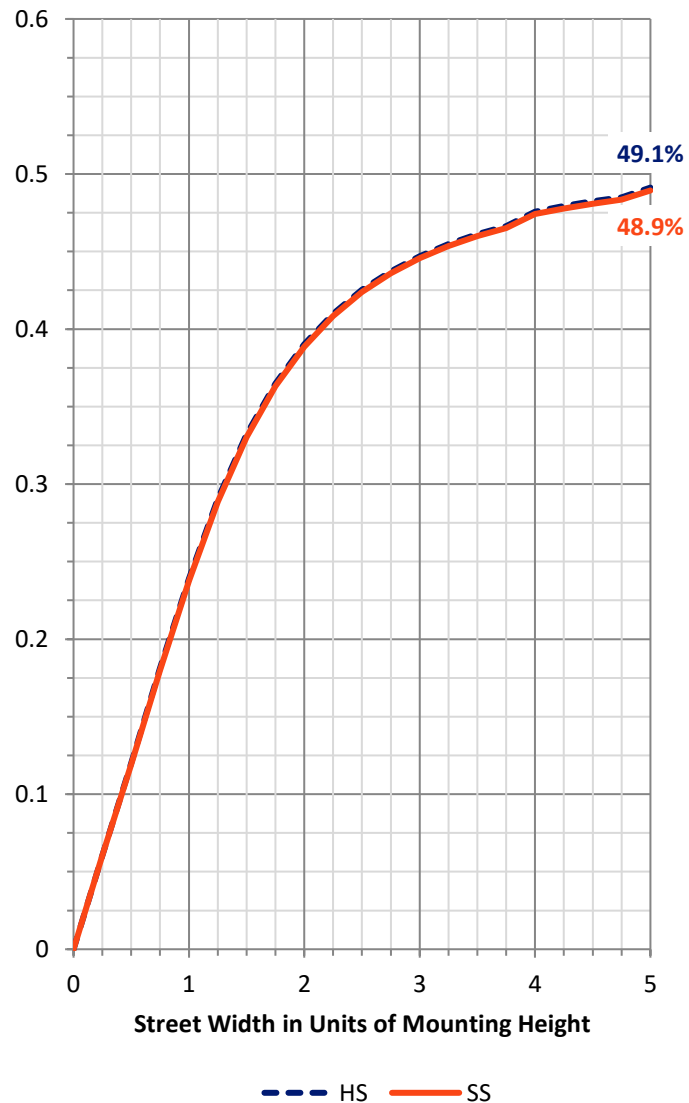
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total |
|--------------------|-----------|----------|--------|-------|
| <b>House Side</b>  | Lumens    | 422.6    | 0.0    | 422.6 |
|                    | % Fixture | 50.0     | 0.0    | 50.0  |
| <b>Street Side</b> | Lumens    | 422.6    | 0.0    | 422.6 |
|                    | % Fixture | 50.0     | 0.0    | 50.0  |
| <b>Total</b>       | Lumens    | 845.2    | 0.0    | 845.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0 |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 5.4    | 0.6       |
| 10°-20°   | 16.0   | 1.9       |
| 20°-30°   | 39.2   | 4.6       |
| 30°-40°   | 78.0   | 9.2       |
| 40°-50°   | 130.5  | 15.4      |
| 50°-60°   | 186.1  | 22.0      |
| 60°-70°   | 198.4  | 23.5      |
| 70°-80°   | 147.6  | 17.5      |
| 80°-90°   | 44.1   | 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°    | 845.2  | 100.0     |
| 0°-180°   | 845.2  | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P1445125

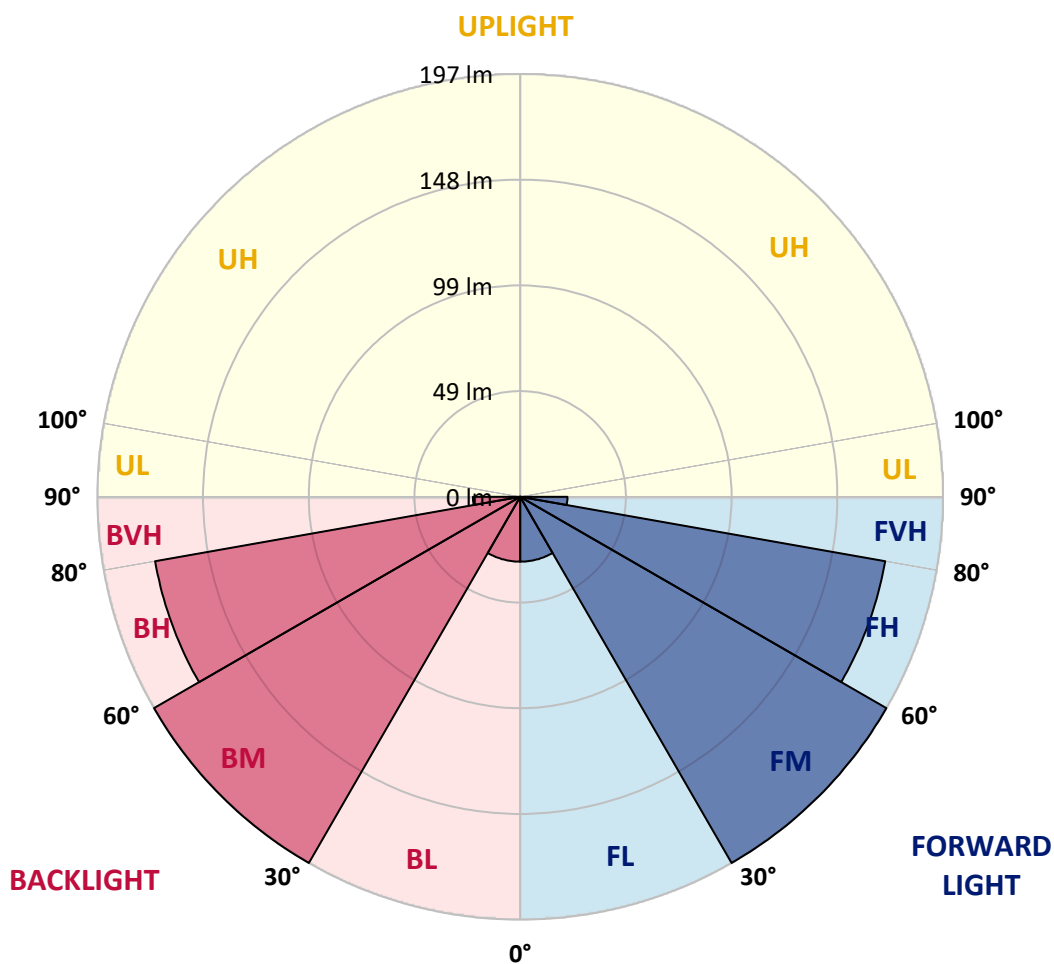
CATALOG NUMBER: TPTN-VA0-830-U-WQ-GM

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|--------|-----------|-------------------------|------|--------|
|      |             |        |           | B                       | U    | G      |
| FL   | (0°-30°)    | 30.3   | 3.6       |                         |      |        |
| FM   | (30°-60°)   | 197.3  | 23.3      |                         |      |        |
| FH   | (60°-80°)   | 173.0  | 20.5      |                         |      | G0/660 |
| FVH  | (80°-90°)   | 22.0   | 2.6       |                         |      | G1/100 |
| BL   | (0°-30°)    | 30.3   | 3.6       | B0/110                  |      |        |
| BM   | (30°-60°)   | 197.3  | 23.3      | B0/220                  |      |        |
| BH   | (60°-80°)   | 173.0  | 20.5      | B1/500                  |      | G1/500 |
| BVH  | (80°-90°)   | 22.0   | 2.6       |                         |      | G1/100 |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |        |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |        |

**BUG Rating: B1-U0-G1**

Type IV Short



REPORT NUMBER: P1445125

CATALOG NUMBER: TPTN-VA0-830-U-WQ-GM

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 60.2  | 60.2  | 60.2  | 60.2  | 60.2  | 60.2  | 60.2  | 60.2  | 60.2  | 60.2  | 60.2  |
| 2.5°  | 59.7  | 59.7  | 59.5  | 59.5  | 59.4  | 59.4  | 59.4  | 59.4  | 59.5  | 59.5  | 59.5  |
| 5°    | 57.9  | 57.7  | 57.9  | 57.9  | 58.0  | 58.0  | 58.4  | 58.8  | 59.0  | 59.1  | 59.1  |
| 7.5°  | 54.0  | 53.8  | 54.1  | 54.4  | 54.8  | 55.4  | 55.8  | 56.2  | 56.5  | 56.7  | 56.9  |
| 10°   | 50.9  | 50.9  | 50.9  | 51.2  | 51.5  | 52.2  | 53.3  | 54.1  | 54.8  | 55.2  | 55.4  |
| 12.5° | 50.2  | 50.2  | 50.2  | 50.3  | 50.6  | 51.2  | 52.7  | 54.2  | 55.2  | 55.6  | 55.8  |
| 15°   | 52.0  | 52.0  | 52.2  | 52.6  | 53.1  | 53.4  | 54.7  | 56.5  | 57.7  | 58.7  | 58.7  |
| 17.5° | 54.9  | 54.9  | 56.0  | 57.0  | 57.6  | 57.3  | 58.1  | 59.7  | 61.6  | 63.0  | 63.1  |
| 20°   | 60.6  | 61.1  | 63.0  | 64.1  | 64.0  | 62.9  | 62.9  | 64.3  | 66.8  | 68.7  | 69.3  |
| 22.5° | 71.1  | 71.3  | 73.3  | 74.1  | 74.0  | 71.2  | 69.3  | 70.2  | 73.6  | 76.1  | 76.6  |
| 25°   | 83.9  | 84.6  | 86.1  | 87.8  | 85.7  | 81.2  | 77.5  | 77.2  | 80.8  | 84.3  | 85.1  |
| 27.5° | 99.6  | 99.6  | 100.6 | 101.0 | 98.7  | 92.6  | 87.3  | 85.5  | 89.0  | 93.2  | 93.9  |
| 30°   | 112.8 | 113.1 | 111.8 | 110.6 | 109.6 | 101.9 | 95.5  | 93.3  | 96.7  | 101.1 | 101.7 |
| 32.5° | 126.6 | 126.0 | 122.8 | 121.1 | 120.6 | 112.1 | 104.3 | 101.1 | 103.6 | 108.9 | 109.3 |
| 35°   | 138.7 | 137.8 | 133.5 | 131.6 | 131.3 | 122.9 | 112.9 | 108.5 | 110.7 | 116.5 | 117.5 |
| 37.5° | 151.0 | 149.9 | 145.1 | 143.5 | 143.2 | 135.3 | 122.2 | 116.1 | 118.6 | 125.2 | 125.7 |
| 40°   | 162.6 | 162.0 | 157.4 | 156.3 | 155.8 | 148.1 | 131.8 | 124.9 | 126.3 | 134.1 | 134.8 |
| 42.5° | 173.7 | 173.8 | 171.1 | 169.5 | 169.3 | 160.9 | 142.6 | 133.2 | 134.9 | 143.4 | 144.4 |
| 45°   | 185.7 | 185.7 | 184.8 | 184.0 | 183.7 | 176.2 | 154.2 | 142.4 | 143.5 | 152.8 | 154.1 |
| 47.5° | 198.0 | 198.9 | 199.2 | 199.7 | 200.3 | 192.5 | 166.9 | 152.4 | 151.7 | 162.4 | 163.6 |
| 50°   | 208.6 | 209.3 | 213.2 | 213.8 | 214.5 | 206.8 | 178.0 | 160.5 | 159.2 | 170.5 | 171.2 |
| 52.5° | 217.5 | 218.3 | 224.2 | 227.4 | 228.8 | 220.2 | 189.8 | 167.7 | 164.8 | 177.0 | 178.2 |
| 55°   | 224.7 | 225.6 | 232.7 | 238.7 | 240.2 | 233.8 | 199.2 | 173.6 | 168.7 | 181.9 | 183.9 |
| 57.5° | 226.0 | 227.0 | 236.1 | 243.4 | 246.9 | 241.3 | 204.9 | 174.5 | 169.0 | 182.6 | 184.4 |
| 60°   | 224.5 | 225.6 | 234.5 | 244.2 | 247.1 | 240.9 | 205.4 | 172.6 | 165.8 | 180.9 | 182.5 |
| 62.5° | 220.7 | 222.7 | 230.7 | 240.3 | 245.5 | 238.5 | 203.9 | 167.7 | 161.5 | 177.9 | 179.0 |
| 65°   | 211.1 | 212.6 | 224.6 | 232.7 | 240.6 | 232.5 | 199.7 | 160.8 | 155.5 | 169.5 | 170.2 |
| 67.5° | 196.8 | 198.6 | 209.9 | 223.4 | 228.5 | 222.1 | 190.3 | 152.7 | 143.0 | 156.9 | 158.4 |
| 70°   | 183.7 | 184.1 | 193.2 | 208.6 | 213.8 | 210.4 | 179.0 | 140.6 | 129.9 | 144.9 | 146.7 |
| 72.5° | 165.5 | 166.6 | 175.8 | 189.4 | 196.1 | 194.7 | 165.1 | 126.0 | 115.8 | 130.6 | 131.3 |
| 75°   | 142.6 | 144.1 | 154.0 | 166.3 | 174.1 | 172.7 | 147.0 | 109.0 | 100.3 | 112.1 | 112.6 |
| 77.5° | 117.8 | 119.9 | 128.1 | 140.0 | 147.4 | 146.2 | 124.6 | 91.1  | 81.6  | 91.8  | 92.3  |
| 80°   | 91.1  | 92.8  | 100.7 | 111.7 | 116.7 | 117.0 | 100.1 | 70.5  | 62.3  | 70.4  | 70.2  |
| 82.5° | 62.4  | 64.7  | 72.0  | 80.1  | 86.5  | 87.2  | 73.8  | 50.3  | 42.8  | 47.4  | 47.4  |
| 85°   | 32.4  | 33.8  | 40.1  | 48.1  | 54.2  | 55.9  | 46.6  | 29.8  | 22.8  | 23.6  | 22.4  |
| 87.5° | 6.0   | 6.1   | 7.2   | 9.6   | 12.9  | 13.5  | 11.7  | 8.6   | 6.0   | 4.2   | 2.8   |
| 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

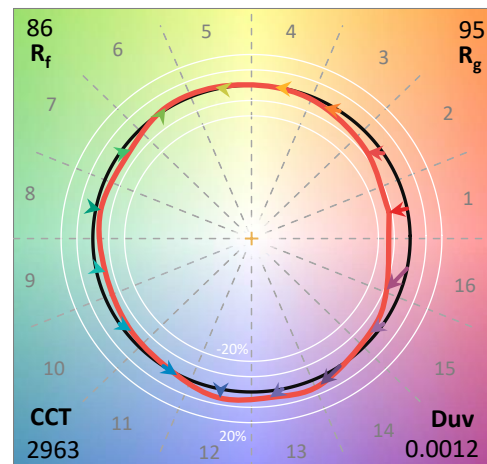
### Test Information

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

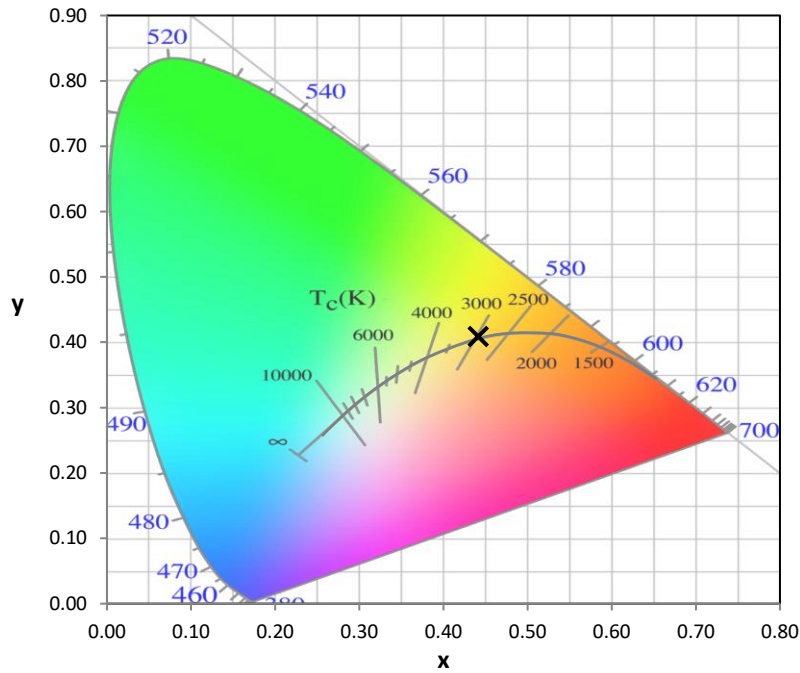
Stabilization Time: 37M  
 Operation Time: 1H 37M  
 Sphere Temperature (°C): 25.0

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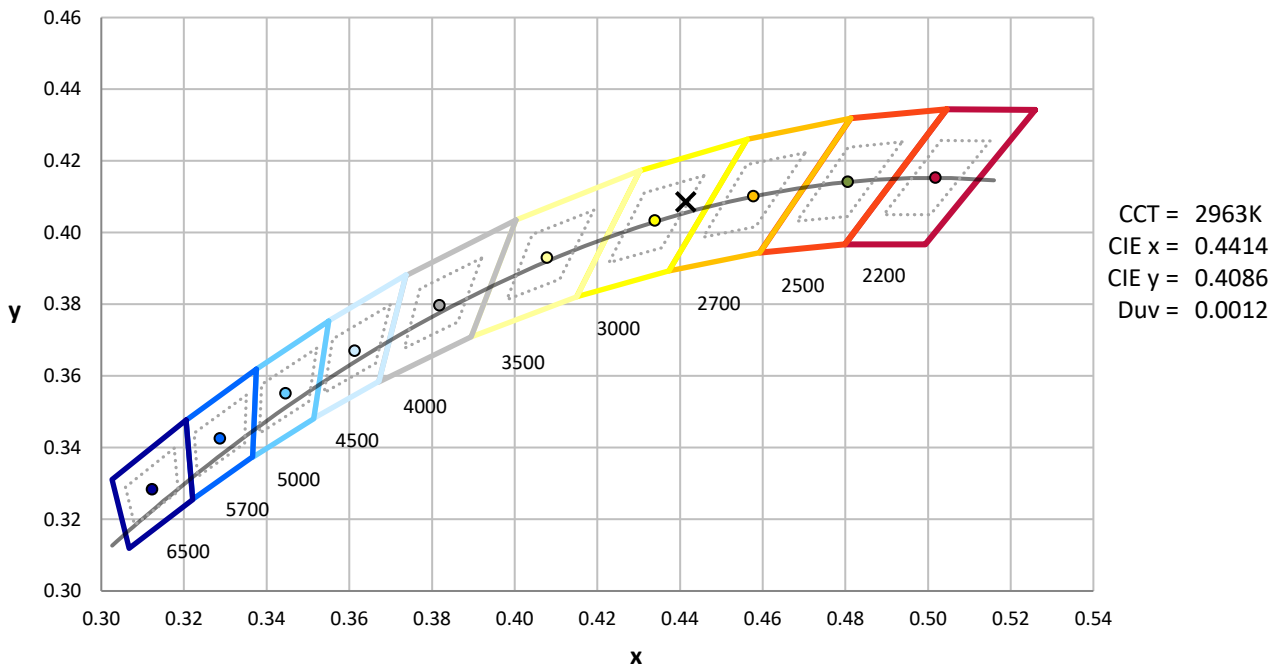
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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**



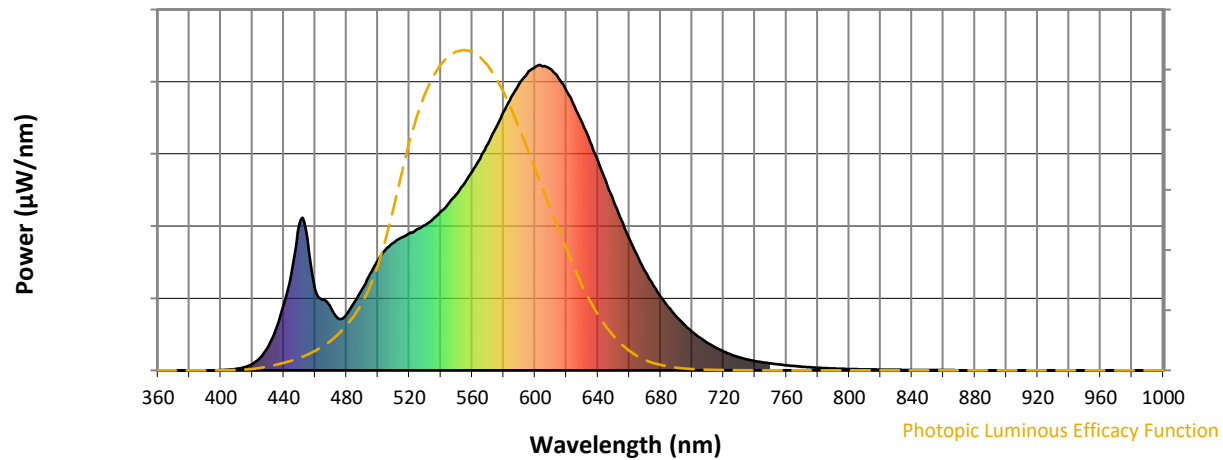
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

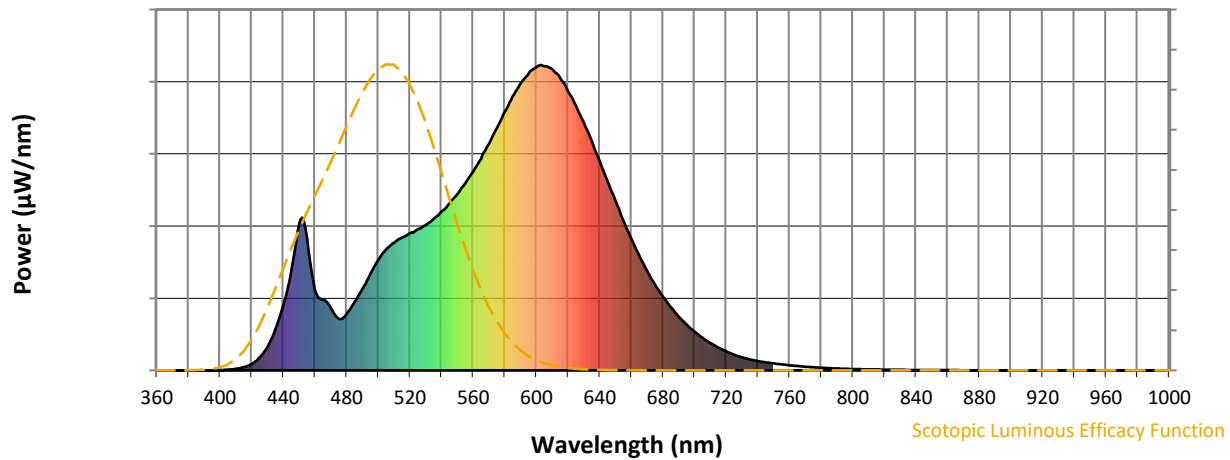


### Photopic Lumens: NR

| $\lambda$<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



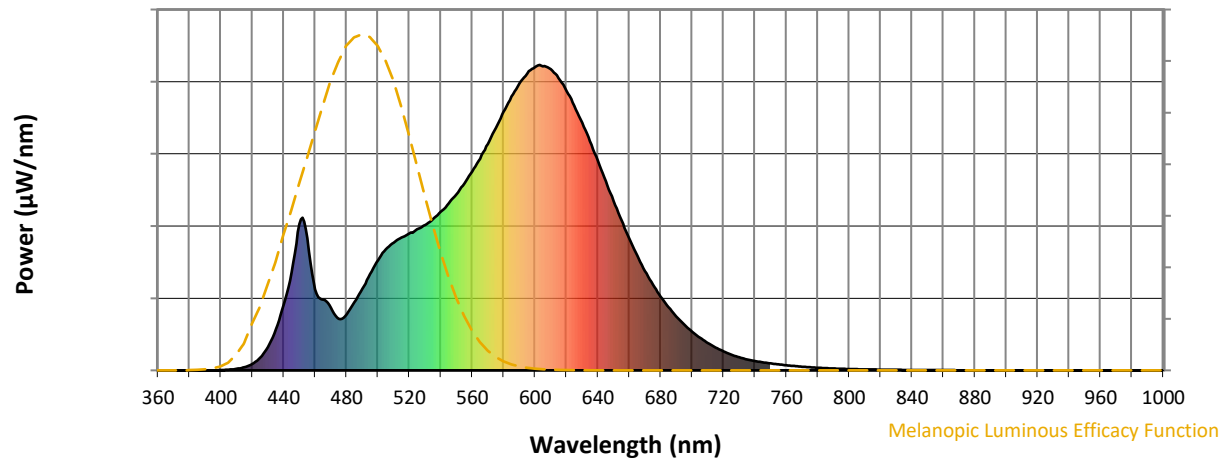
Scotopic Lumens: NR

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

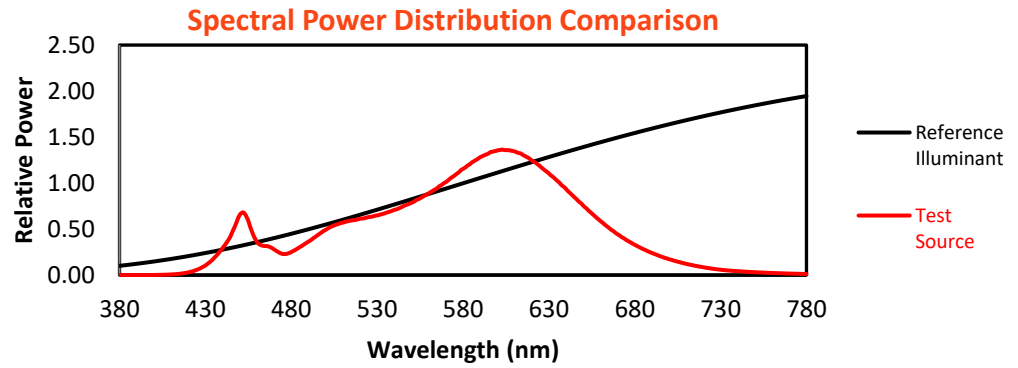
| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<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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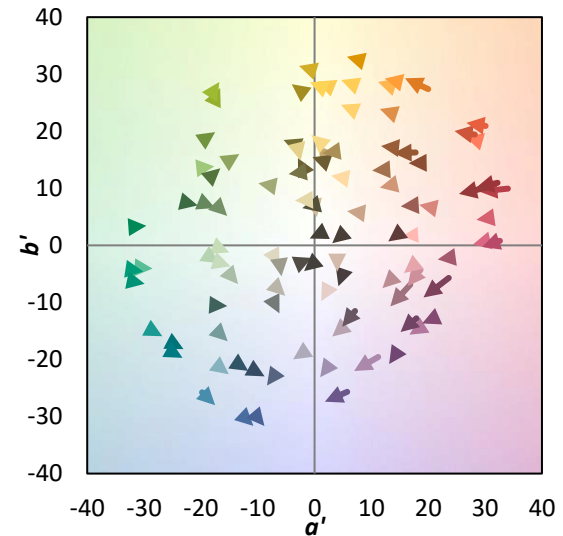
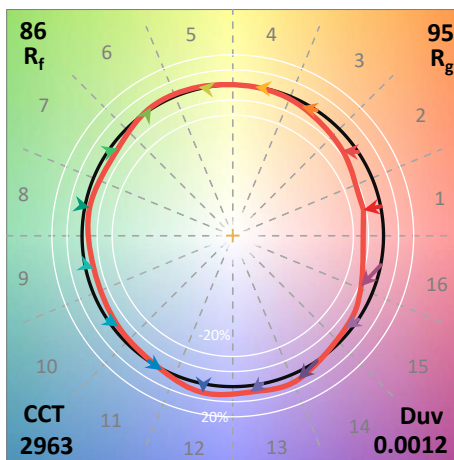
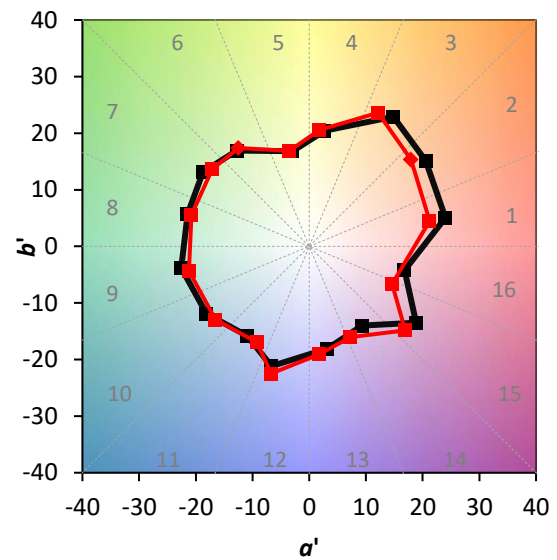
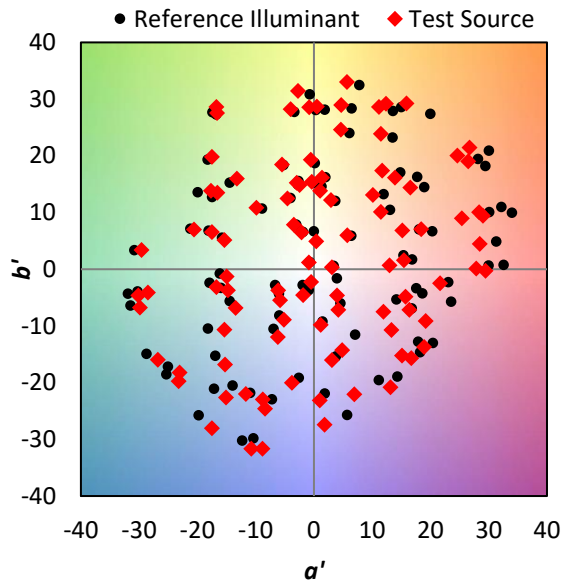
TM-30-18

### Summary

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

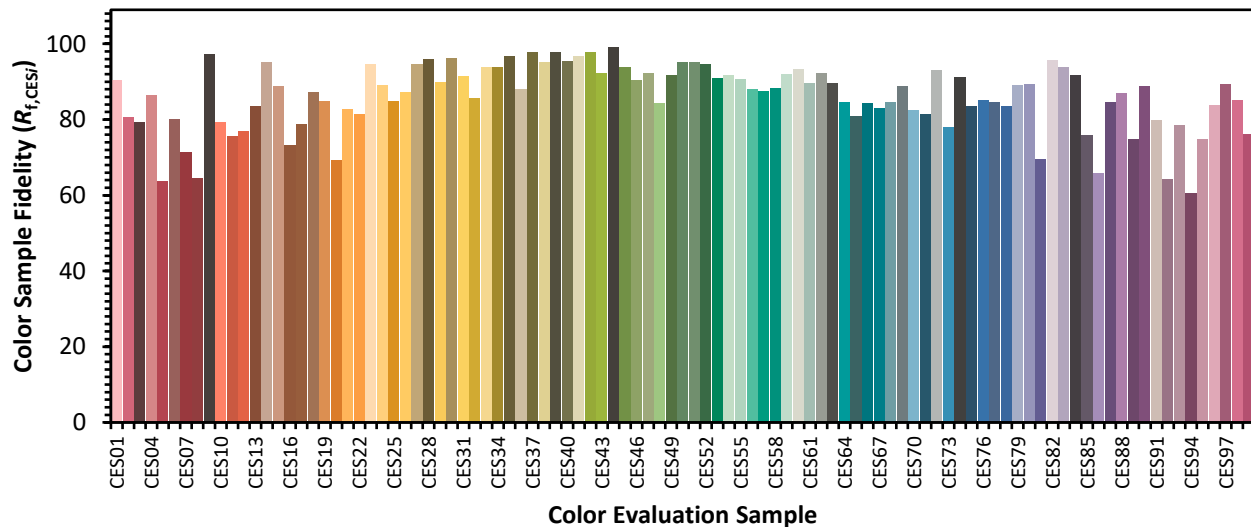


### Color Vector Graphics

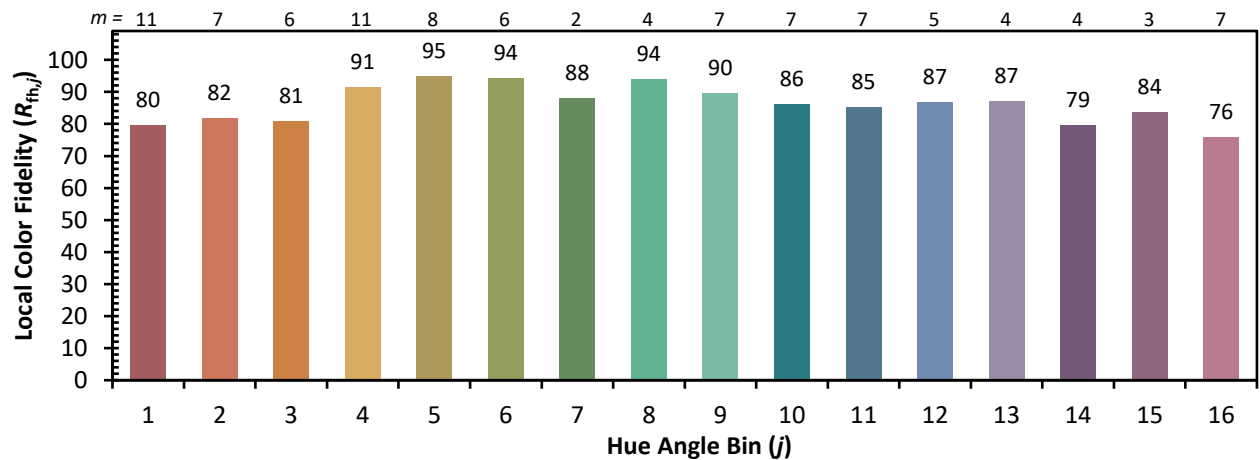
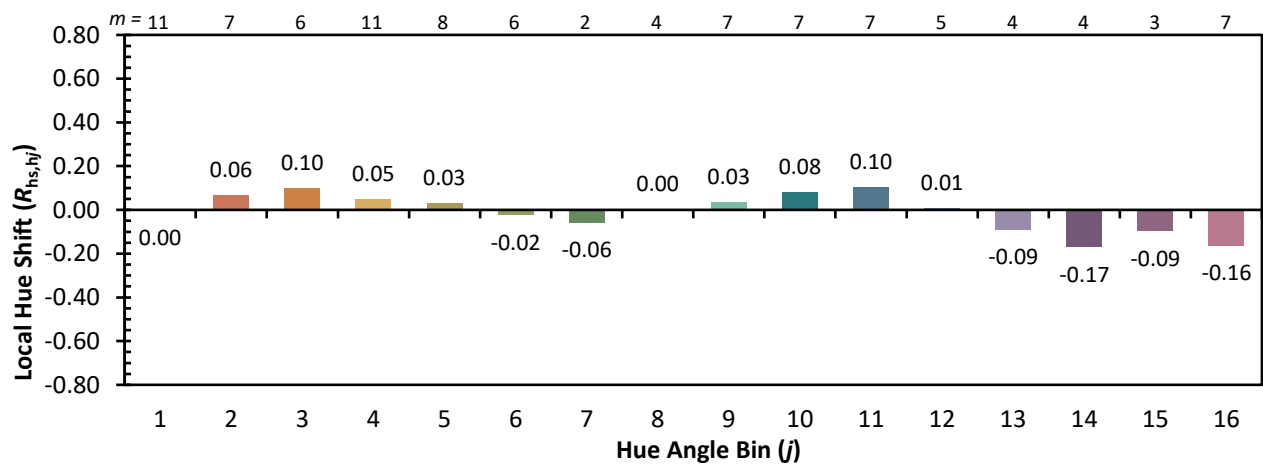
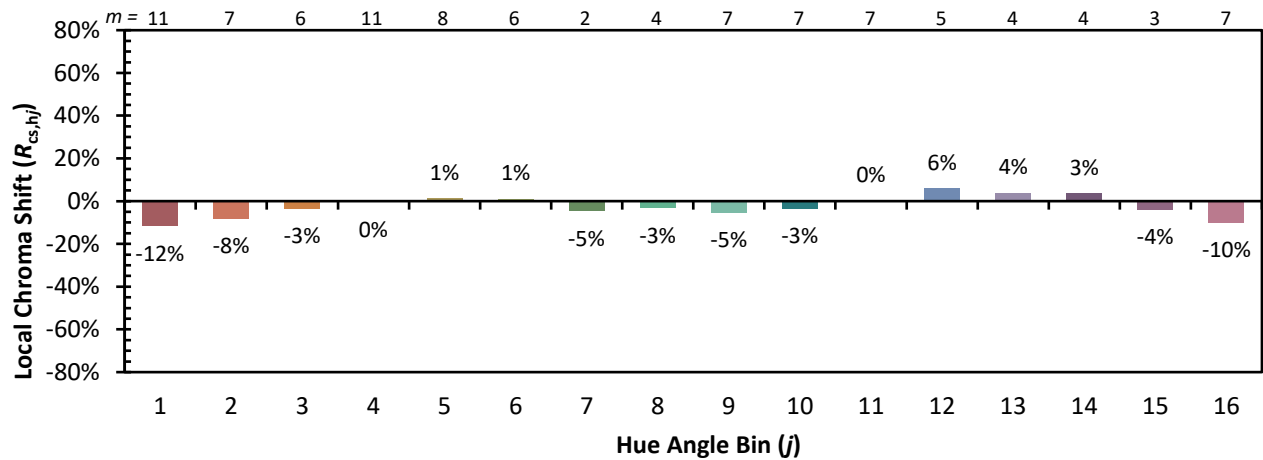


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

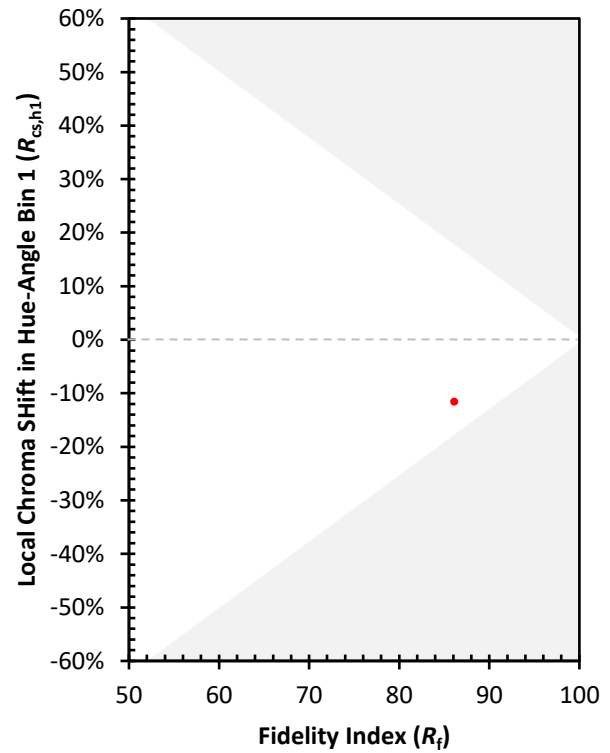
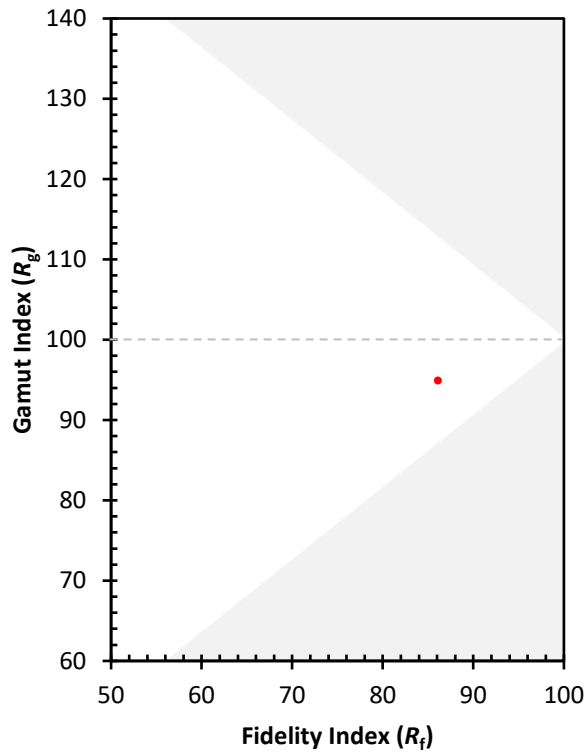
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 87 | CES51 = 95 | CES76 = 85 |
| CES02 = 63 | CES27 = 95 | CES52 = 95 | CES77 = 85 |
| CES03 = 31 | CES28 = 96 | CES53 = 91 | CES78 = 83 |
| CES04 = 70 | CES29 = 90 | CES54 = 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)