

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P821333

Luminaire Tested: **TT-D5-830-12VDC-5MQ-PM**

Issue Date: 2/18/2020



**Test Information**

Test Method: LM-79-08  
Report Number: P821333  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-1908-473-16)  
Test Lab: INNOVATIONS CENTER  
Issue Date: 2/18/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: TT-D5-830-12VDC-5MQ-PM  
Description: TOPTIER LED SITE LUMINAIRE  
3000K, 80 CRI LEDS AND MEDIUM DISTRIBUTION  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

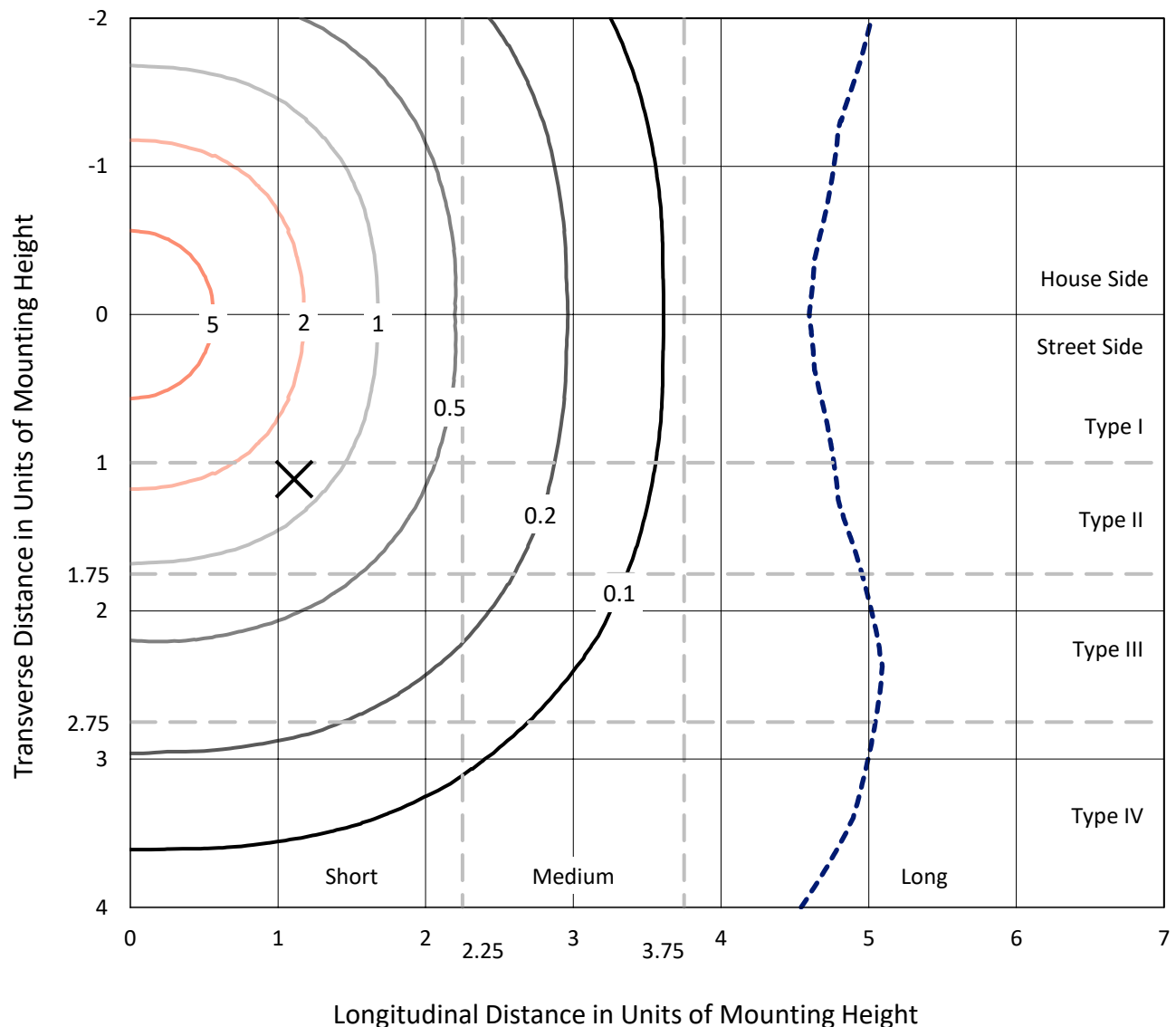
Lumens per Lamp: N/A  
Luminaire Lumens: 8968 lumens  
Efficiency: N/A  
Efficacy: 122.8 lumens/watt  
Luminous Opening: Circular (Dia: 1.12' x H: 0')  
IES Classification: Type V - Short  
BUG Rating: B3 - U0 - G2

Input Watts (W): 73  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

REPORT NUMBER: P821333  
 CATALOG NUMBER: TT-D5-830-12VDC-5MQ-PM

## Iso-Footcandle Lines of Horizontal Illumination

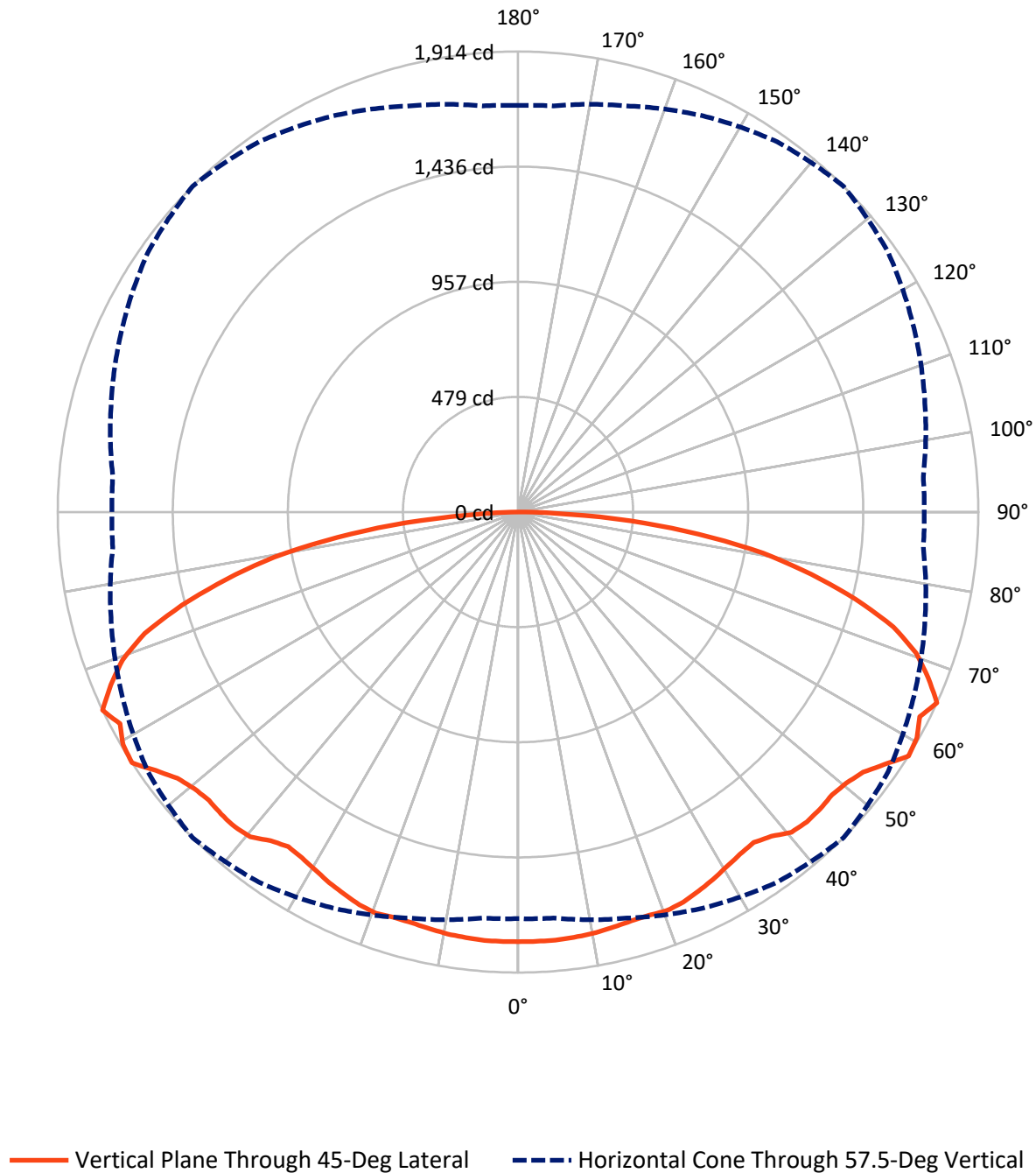
✕ Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 7.9 fc  
 Type V - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: TT-D5-830-12VDC-5MQ-PM

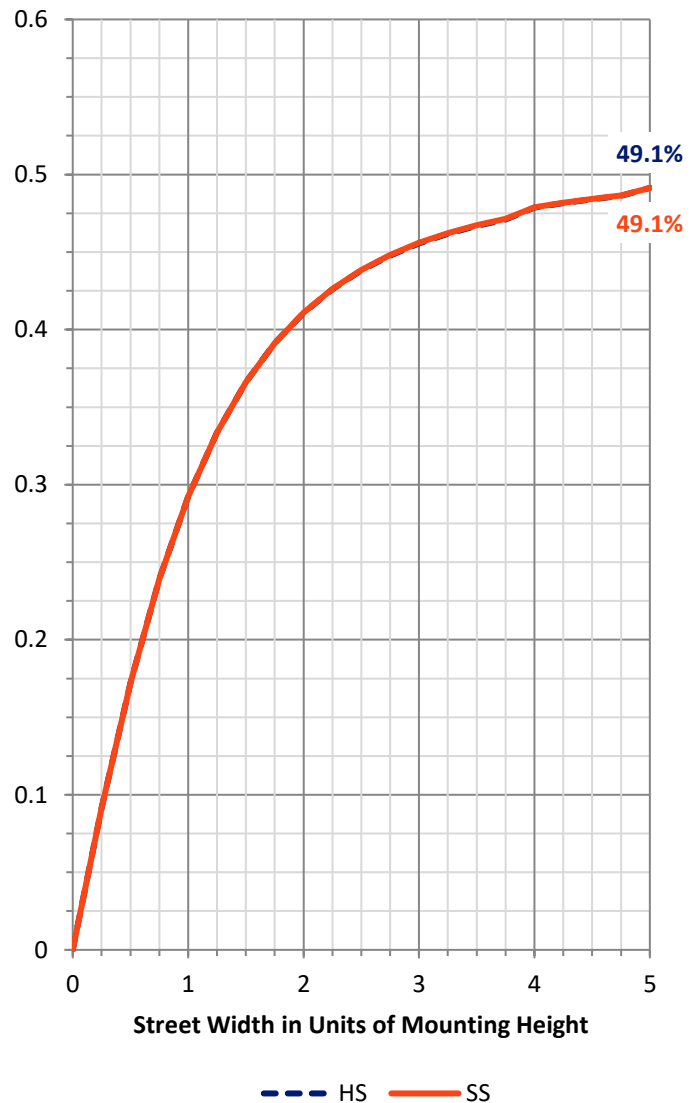
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 4484.0   | 0.0    | 4484.0 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Street Side</b> | Lumens    | 4484.0   | 0.0    | 4484.0 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Total</b>       | Lumens    | 8968.0   | 0.0    | 8968.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 170.2  | 1.9       |
| 10°-20°   | 500.6  | 5.6       |
| 20°-30°   | 804.4  | 9.0       |
| 30°-40°   | 1062.0 | 11.8      |
| 40°-50°   | 1328.7 | 14.8      |
| 50°-60°   | 1580.3 | 17.6      |
| 60°-70°   | 1714.0 | 19.1      |
| 70°-80°   | 1364.3 | 15.2      |
| 80°-90°   | 443.5  | 4.9       |
| 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°    | 8968.0 | 100.0     |
| 0°-180°   | 8968.0 | 100.0     |



REPORT NUMBER: P821333

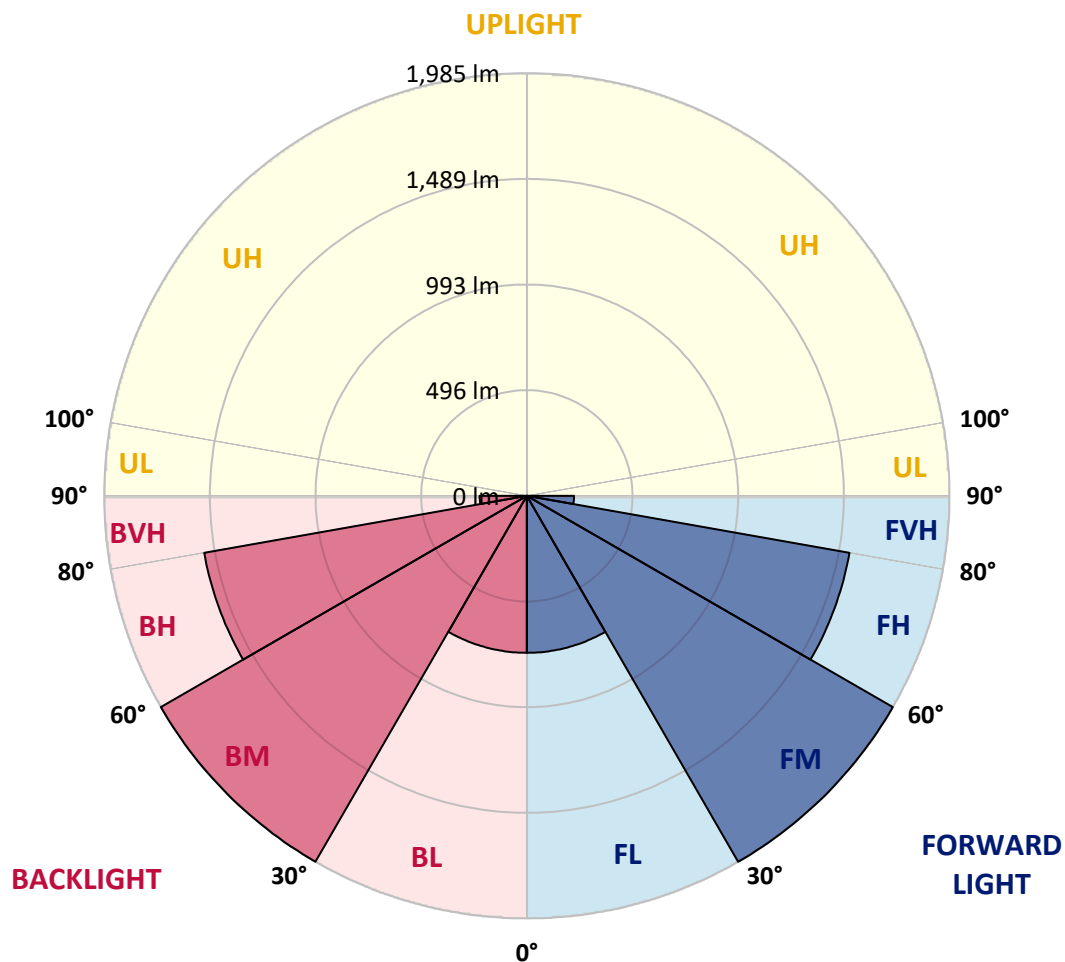
CATALOG NUMBER: TT-D5-830-12VDC-5MQ-PM

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 737.6  | 8.2       |                         |      |         |
| FM   | (30°-60°)   | 1985.5 | 22.1      |                         |      |         |
| FH   | (60°-80°)   | 1539.2 | 17.2      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 221.7  | 2.5       |                         |      | G2/225  |
| BL   | (0°-30°)    | 737.6  | 8.2       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1985.5 | 22.1      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1539.2 | 17.2      | B3/2500                 |      | G1/1800 |
| BVH  | (80°-90°)   | 221.7  | 2.5       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G2**

Type V Short





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CATALOG NUMBER: TT-D5-830-12VDC-5MQ-PM

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    | 90°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 |
| 2.5°  | 1788.8 | 1787.5 | 1788.8 | 1787.5 | 1787.5 | 1786.1 | 1787.5 | 1787.5 | 1787.5 | 1787.5 | 1787.5 |
| 5°    | 1787.5 | 1786.1 | 1786.1 | 1787.5 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 | 1786.1 |
| 7.5°  | 1782.1 | 1782.1 | 1783.5 | 1782.1 | 1782.1 | 1782.1 | 1782.1 | 1782.1 | 1782.1 | 1783.5 | 1783.5 |
| 10°   | 1778.1 | 1776.8 | 1778.1 | 1778.1 | 1776.8 | 1778.1 | 1776.8 | 1778.1 | 1778.1 | 1778.1 | 1778.1 |
| 12.5° | 1772.8 | 1771.5 | 1772.8 | 1772.8 | 1771.5 | 1770.1 | 1771.5 | 1771.5 | 1772.8 | 1772.8 | 1772.8 |
| 15°   | 1763.5 | 1763.5 | 1766.1 | 1764.8 | 1764.8 | 1763.5 | 1766.1 | 1764.8 | 1763.5 | 1764.8 | 1764.8 |
| 17.5° | 1756.8 | 1756.8 | 1759.5 | 1762.1 | 1762.1 | 1762.1 | 1762.1 | 1760.8 | 1758.1 | 1759.5 | 1756.8 |
| 20°   | 1758.1 | 1759.5 | 1760.8 | 1764.8 | 1767.5 | 1768.8 | 1768.8 | 1764.8 | 1760.8 | 1762.1 | 1760.8 |
| 22.5° | 1754.1 | 1752.8 | 1754.1 | 1756.8 | 1760.8 | 1760.8 | 1760.8 | 1755.5 | 1754.1 | 1752.8 | 1752.8 |
| 25°   | 1738.1 | 1738.1 | 1740.8 | 1743.5 | 1746.1 | 1744.8 | 1746.1 | 1743.5 | 1740.8 | 1738.1 | 1738.1 |
| 27.5° | 1719.5 | 1719.5 | 1723.5 | 1726.1 | 1728.8 | 1728.8 | 1727.5 | 1724.8 | 1723.5 | 1720.8 | 1719.5 |
| 30°   | 1700.8 | 1700.8 | 1704.8 | 1707.4 | 1711.4 | 1710.1 | 1710.1 | 1706.1 | 1702.1 | 1699.4 | 1699.4 |
| 32.5° | 1680.8 | 1679.4 | 1683.4 | 1690.1 | 1695.4 | 1695.4 | 1695.4 | 1687.4 | 1682.1 | 1679.4 | 1678.1 |
| 35°   | 1663.4 | 1663.4 | 1668.8 | 1680.8 | 1687.4 | 1687.4 | 1684.8 | 1679.4 | 1667.4 | 1663.4 | 1663.4 |
| 37.5° | 1658.1 | 1662.1 | 1676.8 | 1694.1 | 1707.4 | 1710.1 | 1706.1 | 1691.4 | 1675.4 | 1663.4 | 1659.4 |
| 40°   | 1675.4 | 1679.4 | 1698.1 | 1726.1 | 1746.1 | 1750.1 | 1746.1 | 1724.8 | 1696.8 | 1678.1 | 1676.8 |
| 42.5° | 1678.1 | 1680.8 | 1703.4 | 1735.5 | 1754.1 | 1760.8 | 1754.1 | 1732.8 | 1702.1 | 1679.4 | 1678.1 |
| 45°   | 1668.8 | 1670.1 | 1696.8 | 1730.1 | 1752.8 | 1760.8 | 1752.8 | 1727.5 | 1695.4 | 1670.1 | 1668.8 |
| 47.5° | 1656.8 | 1659.4 | 1688.8 | 1723.5 | 1751.5 | 1756.8 | 1750.1 | 1722.1 | 1686.1 | 1660.8 | 1656.8 |
| 50°   | 1647.4 | 1655.4 | 1682.1 | 1720.8 | 1754.1 | 1770.1 | 1754.1 | 1716.8 | 1680.8 | 1652.8 | 1647.4 |
| 52.5° | 1652.8 | 1655.4 | 1690.1 | 1744.8 | 1790.2 | 1796.8 | 1788.8 | 1744.8 | 1687.4 | 1655.4 | 1651.4 |
| 55°   | 1668.8 | 1680.8 | 1718.1 | 1796.8 | 1838.2 | 1850.2 | 1832.8 | 1794.2 | 1719.5 | 1680.8 | 1668.8 |
| 57.5° | 1690.1 | 1694.1 | 1747.5 | 1816.8 | 1878.2 | 1914.2 | 1879.5 | 1815.5 | 1751.5 | 1691.4 | 1688.8 |
| 60°   | 1672.8 | 1660.8 | 1727.5 | 1808.8 | 1891.5 | 1906.2 | 1886.2 | 1810.2 | 1724.8 | 1659.4 | 1671.4 |
| 62.5° | 1626.1 | 1634.1 | 1688.8 | 1800.8 | 1858.2 | 1874.2 | 1852.8 | 1800.8 | 1686.1 | 1640.7 | 1622.1 |
| 65°   | 1588.7 | 1636.7 | 1696.8 | 1776.8 | 1868.9 | 1914.2 | 1870.2 | 1774.1 | 1699.4 | 1628.7 | 1584.7 |
| 67.5° | 1536.7 | 1546.0 | 1635.4 | 1734.1 | 1816.8 | 1839.5 | 1815.5 | 1735.5 | 1627.4 | 1539.4 | 1546.0 |
| 70°   | 1448.7 | 1435.3 | 1526.0 | 1640.7 | 1719.5 | 1755.5 | 1722.1 | 1635.4 | 1522.0 | 1432.7 | 1444.7 |
| 72.5° | 1303.3 | 1311.3 | 1395.3 | 1516.7 | 1598.1 | 1632.7 | 1599.4 | 1507.4 | 1392.6 | 1319.3 | 1311.3 |
| 75°   | 1151.2 | 1160.5 | 1241.9 | 1352.6 | 1435.3 | 1450.0 | 1440.7 | 1345.9 | 1244.6 | 1159.2 | 1151.2 |
| 77.5° | 977.8  | 987.1  | 1053.8 | 1175.2 | 1224.6 | 1247.2 | 1227.2 | 1181.9 | 1051.1 | 985.8  | 975.1  |
| 80°   | 785.7  | 783.0  | 841.7  | 945.8  | 1007.1 | 1032.5 | 1007.1 | 948.4  | 839.0  | 788.4  | 771.0  |
| 82.5° | 561.6  | 564.3  | 618.9  | 691.0  | 749.7  | 757.7  | 745.7  | 697.7  | 613.6  | 570.9  | 546.9  |
| 85°   | 312.1  | 324.1  | 364.2  | 417.5  | 456.2  | 469.5  | 449.5  | 404.2  | 362.8  | 329.5  | 318.8  |
| 87.5° | 74.7   | 81.4   | 94.7   | 120.1  | 134.7  | 148.1  | 134.7  | 125.4  | 89.4   | 81.4   | 74.7   |
| 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

Streetworks

Report Number: SP1-2407-176-7

Test Date: 09/27/2024

Luminaire Tested: MEM2-HTN-VA-30-830-U-WQ

Data in this report applies to families of products including MEM2-HTN-VA-30-830-U-WQ

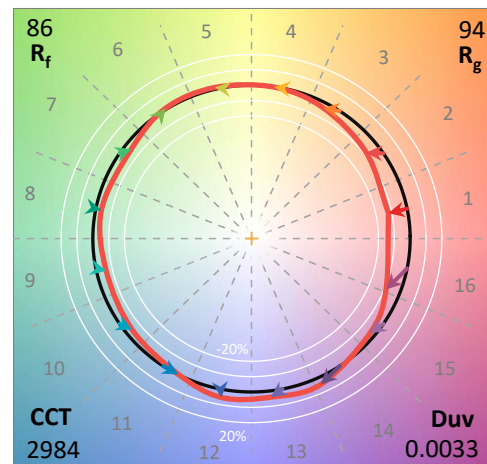
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-176-7  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/27/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Streetworks  
 Catalog Number: **MEM2-HTN-VA-30-830-U-WQ**  
 Description: EPIC MODERN VISUAL COMFORT 30W WAVESTREAM WIDE

### Spectral Parameters

CCT (K): 2984  
 CIE  $u'$ : 0.2500  
 CIE  $v'$ : 0.5264  
 Duv: 0.0033  
 CIE x: 0.4431  
 CIE y: 0.4147  
 CIE z: 0.1422  
 Peak Wavelength (nm): 601  
 Dominant Wavelength (nm): 581  
 Purity: 57.4798  
 R<sub>f</sub>: 85.8  
 R<sub>g</sub>: 94.1

CRI (Ra): 81.8  
 R1: 79.4  
 R2: 89.9  
 R3: 96.6  
 R4: 80.6  
 R5: 80.1  
 R6: 88.9  
 R7: 82.6  
 R8: 56.0  
 R9: -1.1  
 R10: 78.4  
 R11: 80.8  
 R12: 72.8  
 R13: 81.7  
 R14: 98.5  
 R15: 70.2



### Test Conditions

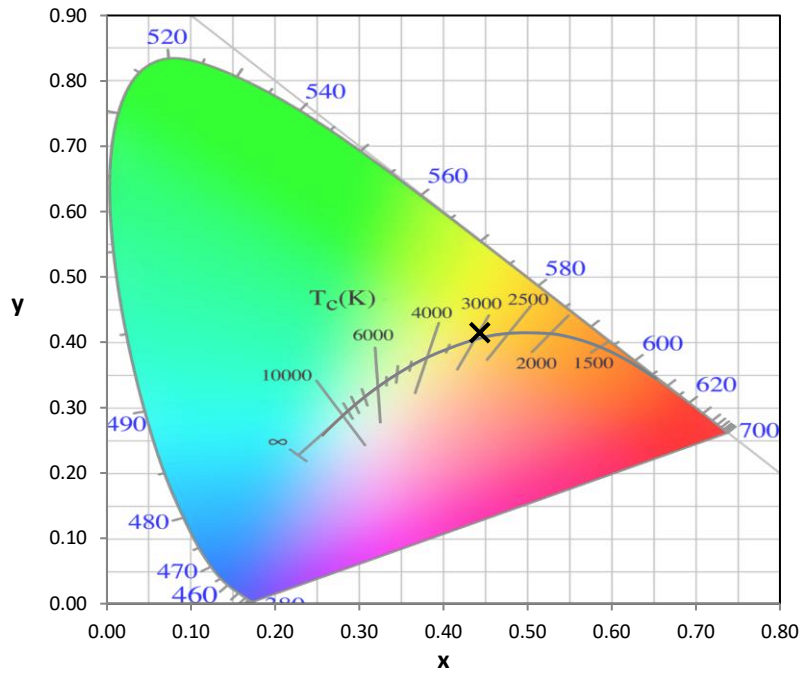
Stabilization Time: 29M  
 Operation Time: 1H 29M  
 Sphere Temperature (°C): 25.2

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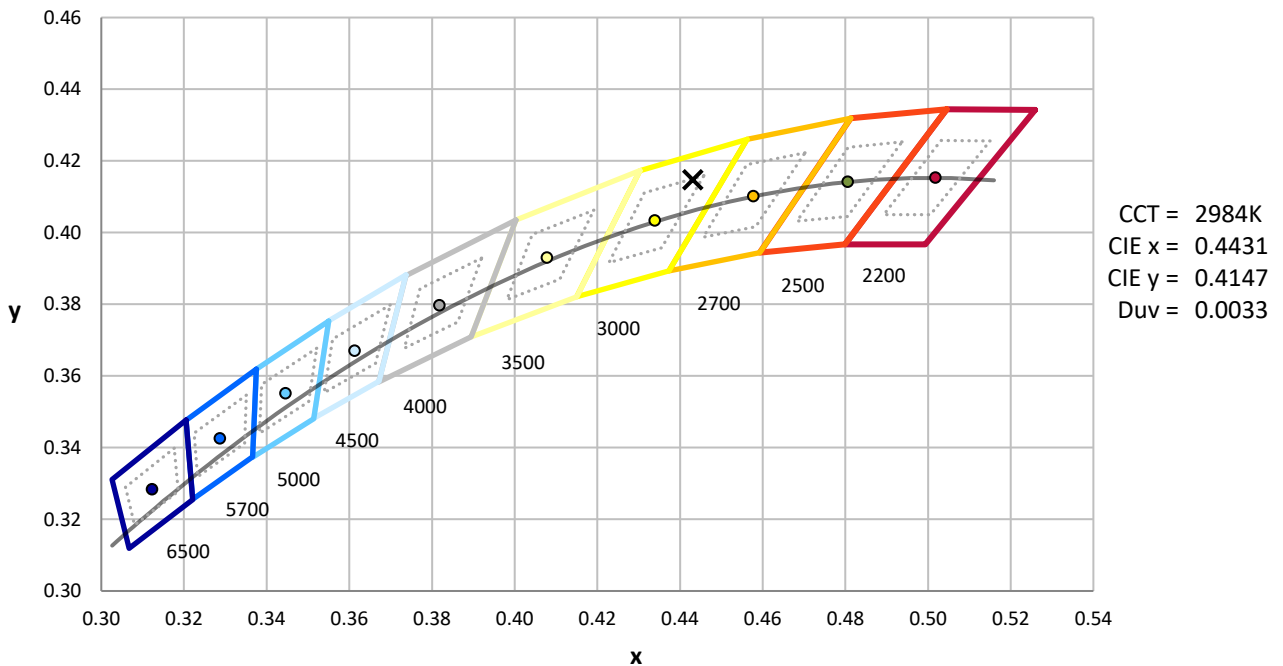
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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**CIE 1931 Chromaticity Diagram**



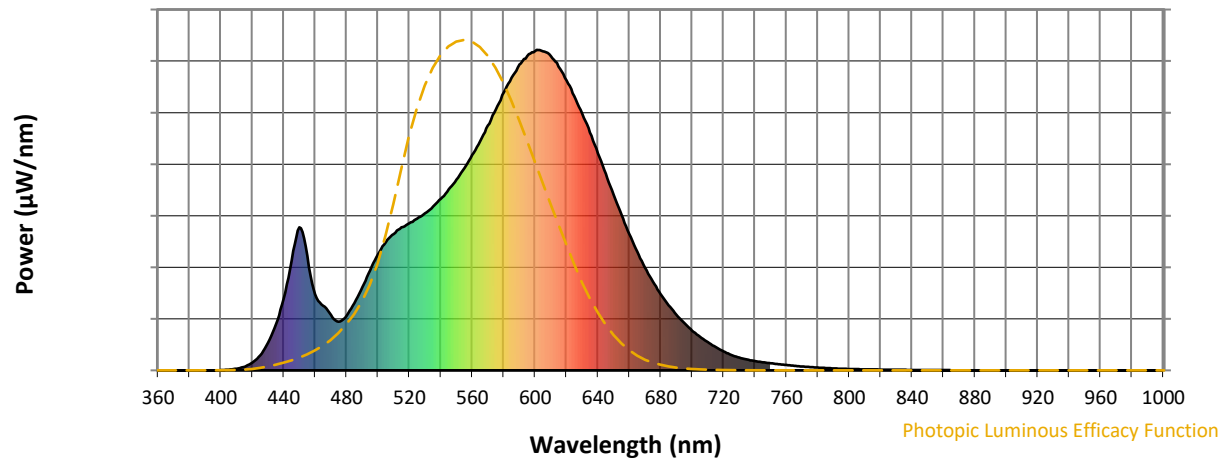
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

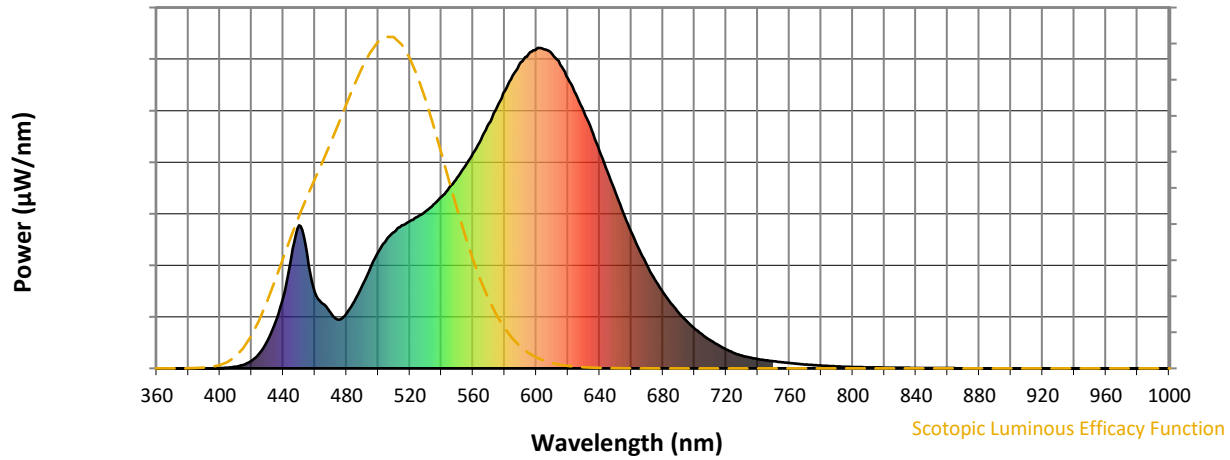


### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | 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               | 260                                    | NR                             | 620               | 905                                    | NR                             | 750               | 22                                     | NR                             | 880               | 0                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 312                                    | NR                             | 625               | 856                                    | NR                             | 755               | 19                                     | NR                             | 885               | 0                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 362                                    | NR                             | 630               | 801                                    | NR                             | 760               | 17                                     | NR                             | 890               | 0                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 399                                    | NR                             | 635               | 742                                    | NR                             | 765               | 14                                     | NR                             | 895               | 0                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 425                                    | NR                             | 640               | 677                                    | NR                             | 770               | 12                                     | NR                             | 900               | 0                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 446                                    | NR                             | 645               | 613                                    | NR                             | 775               | 10                                     | NR                             | 905               | 0                                      | NR                             |
| 390               | 0                                      | NR                             | 520               | 459                                    | NR                             | 650               | 549                                    | NR                             | 780               | 9                                      | NR                             | 910               | 0                                      | NR                             |
| 395               | 0                                      | NR                             | 525               | 473                                    | NR                             | 655               | 485                                    | NR                             | 785               | 7                                      | NR                             | 915               | 0                                      | NR                             |
| 400               | 1                                      | NR                             | 530               | 490                                    | NR                             | 660               | 425                                    | NR                             | 790               | 6                                      | NR                             | 920               | 0                                      | NR                             |
| 405               | 2                                      | NR                             | 535               | 511                                    | NR                             | 665               | 371                                    | NR                             | 795               | 5                                      | NR                             | 925               | 0                                      | NR                             |
| 410               | 5                                      | NR                             | 540               | 535                                    | NR                             | 670               | 321                                    | NR                             | 800               | 4                                      | NR                             | 930               | 0                                      | NR                             |
| 415               | 11                                     | NR                             | 545               | 565                                    | NR                             | 675               | 276                                    | NR                             | 805               | 4                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 24                                     | NR                             | 550               | 595                                    | NR                             | 680               | 238                                    | NR                             | 810               | 3                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 47                                     | NR                             | 555               | 631                                    | NR                             | 685               | 203                                    | NR                             | 815               | 3                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 86                                     | NR                             | 560               | 672                                    | NR                             | 690               | 174                                    | NR                             | 820               | 2                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 144                                    | NR                             | 565               | 715                                    | NR                             | 695               | 148                                    | NR                             | 825               | 2                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 224                                    | NR                             | 570               | 763                                    | NR                             | 700               | 124                                    | NR                             | 830               | 2                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 342                                    | NR                             | 575               | 814                                    | NR                             | 705               | 105                                    | NR                             | 835               | 2                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 446                                    | NR                             | 580               | 866                                    | NR                             | 710               | 88                                     | NR                             | 840               | 1                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 357                                    | NR                             | 585               | 912                                    | NR                             | 715               | 73                                     | NR                             | 845               | 1                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 237                                    | NR                             | 590               | 954                                    | NR                             | 720               | 59                                     | NR                             | 850               | 1                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 202                                    | NR                             | 595               | 981                                    | NR                             | 725               | 48                                     | NR                             | 855               | 1                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 172                                    | NR                             | 600               | 996                                    | NR                             | 730               | 40                                     | NR                             | 860               | 1                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 152                                    | NR                             | 605               | 996                                    | NR                             | 735               | 34                                     | NR                             | 865               | 1                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 171                                    | NR                             | 610               | 980                                    | NR                             | 740               | 29                                     | NR                             | 870               | 0                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 210                                    | NR                             | 615               | 947                                    | NR                             | 745               | 25                                     | NR                             | 875               | 0                                      | NR                             |                   |                                        |                                |

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### Scotopic Flux vs. Wavelength



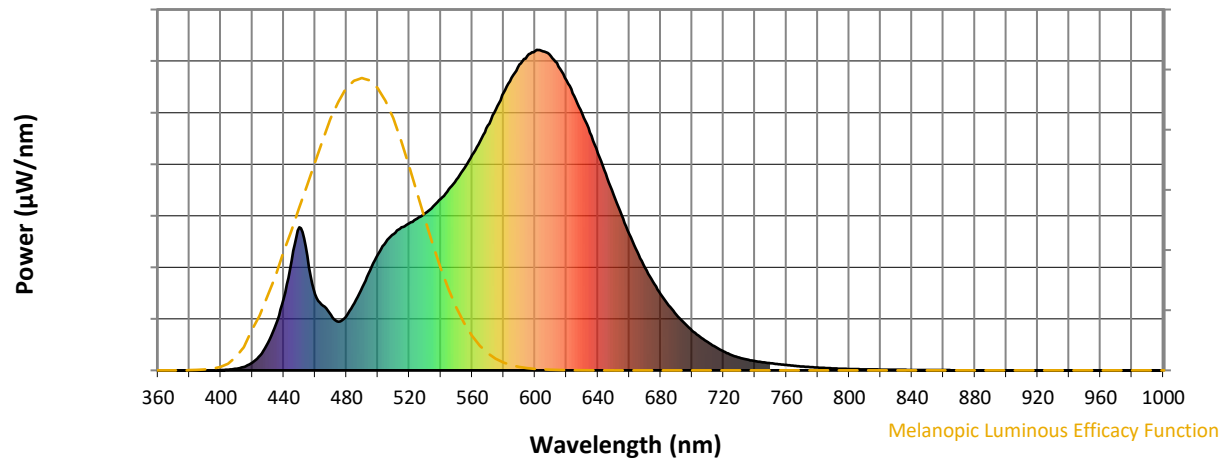
Scotopic Lumens: NR

S/P: 1.32

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 260                      | NR            | 620    | 905                      | NR            | 750    | 22                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 312                      | NR            | 625    | 856                      | NR            | 755    | 19                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 362                      | NR            | 630    | 801                      | NR            | 760    | 17                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 399                      | NR            | 635    | 742                      | NR            | 765    | 14                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 425                      | NR            | 640    | 677                      | NR            | 770    | 12                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 446                      | NR            | 645    | 613                      | NR            | 775    | 10                       | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 459                      | NR            | 650    | 549                      | NR            | 780    | 9                        | NR            | 910    | 0                        | NR            |
| 395    | 0                        | NR            | 525    | 473                      | NR            | 655    | 485                      | NR            | 785    | 7                        | NR            | 915    | 0                        | NR            |
| 400    | 1                        | NR            | 530    | 490                      | NR            | 660    | 425                      | NR            | 790    | 6                        | NR            | 920    | 0                        | NR            |
| 405    | 2                        | NR            | 535    | 511                      | NR            | 665    | 371                      | NR            | 795    | 5                        | NR            | 925    | 0                        | NR            |
| 410    | 5                        | NR            | 540    | 535                      | NR            | 670    | 321                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 11                       | NR            | 545    | 565                      | NR            | 675    | 276                      | NR            | 805    | 4                        | NR            | 935    | 0                        | NR            |
| 420    | 24                       | NR            | 550    | 595                      | NR            | 680    | 238                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 47                       | NR            | 555    | 631                      | NR            | 685    | 203                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 86                       | NR            | 560    | 672                      | NR            | 690    | 174                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 144                      | NR            | 565    | 715                      | NR            | 695    | 148                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 224                      | NR            | 570    | 763                      | NR            | 700    | 124                      | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 342                      | NR            | 575    | 814                      | NR            | 705    | 105                      | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 446                      | NR            | 580    | 866                      | NR            | 710    | 88                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 357                      | NR            | 585    | 912                      | NR            | 715    | 73                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 237                      | NR            | 590    | 954                      | NR            | 720    | 59                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 202                      | NR            | 595    | 981                      | NR            | 725    | 48                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 172                      | NR            | 600    | 996                      | NR            | 730    | 40                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 152                      | NR            | 605    | 996                      | NR            | 735    | 34                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 171                      | NR            | 610    | 980                      | NR            | 740    | 29                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 210                      | NR            | 615    | 947                      | NR            | 745    | 25                       | NR            | 875    | 0                        | NR            |        |                          |               |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 2.51

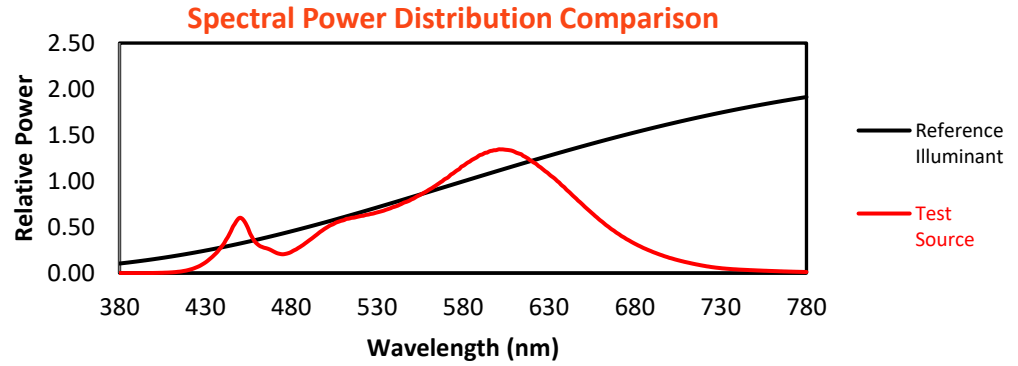
| $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | 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               | 260                                    | NR                             | 620               | 905                                    | NR                             | 750               | 22                                     | NR                             | 880               | 0                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 312                                    | NR                             | 625               | 856                                    | NR                             | 755               | 19                                     | NR                             | 885               | 0                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 362                                    | NR                             | 630               | 801                                    | NR                             | 760               | 17                                     | NR                             | 890               | 0                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 399                                    | NR                             | 635               | 742                                    | NR                             | 765               | 14                                     | NR                             | 895               | 0                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 425                                    | NR                             | 640               | 677                                    | NR                             | 770               | 12                                     | NR                             | 900               | 0                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 446                                    | NR                             | 645               | 613                                    | NR                             | 775               | 10                                     | NR                             | 905               | 0                                      | NR                             |
| 390               | 0                                      | NR                             | 520               | 459                                    | NR                             | 650               | 549                                    | NR                             | 780               | 9                                      | NR                             | 910               | 0                                      | NR                             |
| 395               | 0                                      | NR                             | 525               | 473                                    | NR                             | 655               | 485                                    | NR                             | 785               | 7                                      | NR                             | 915               | 0                                      | NR                             |
| 400               | 1                                      | NR                             | 530               | 490                                    | NR                             | 660               | 425                                    | NR                             | 790               | 6                                      | NR                             | 920               | 0                                      | NR                             |
| 405               | 2                                      | NR                             | 535               | 511                                    | NR                             | 665               | 371                                    | NR                             | 795               | 5                                      | NR                             | 925               | 0                                      | NR                             |
| 410               | 5                                      | NR                             | 540               | 535                                    | NR                             | 670               | 321                                    | NR                             | 800               | 4                                      | NR                             | 930               | 0                                      | NR                             |
| 415               | 11                                     | NR                             | 545               | 565                                    | NR                             | 675               | 276                                    | NR                             | 805               | 4                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 24                                     | NR                             | 550               | 595                                    | NR                             | 680               | 238                                    | NR                             | 810               | 3                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 47                                     | NR                             | 555               | 631                                    | NR                             | 685               | 203                                    | NR                             | 815               | 3                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 86                                     | NR                             | 560               | 672                                    | NR                             | 690               | 174                                    | NR                             | 820               | 2                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 144                                    | NR                             | 565               | 715                                    | NR                             | 695               | 148                                    | NR                             | 825               | 2                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 224                                    | NR                             | 570               | 763                                    | NR                             | 700               | 124                                    | NR                             | 830               | 2                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 342                                    | NR                             | 575               | 814                                    | NR                             | 705               | 105                                    | NR                             | 835               | 2                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 446                                    | NR                             | 580               | 866                                    | NR                             | 710               | 88                                     | NR                             | 840               | 1                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 357                                    | NR                             | 585               | 912                                    | NR                             | 715               | 73                                     | NR                             | 845               | 1                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 237                                    | NR                             | 590               | 954                                    | NR                             | 720               | 59                                     | NR                             | 850               | 1                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 202                                    | NR                             | 595               | 981                                    | NR                             | 725               | 48                                     | NR                             | 855               | 1                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 172                                    | NR                             | 600               | 996                                    | NR                             | 730               | 40                                     | NR                             | 860               | 1                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 152                                    | NR                             | 605               | 996                                    | NR                             | 735               | 34                                     | NR                             | 865               | 1                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 171                                    | NR                             | 610               | 980                                    | NR                             | 740               | 29                                     | NR                             | 870               | 0                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 210                                    | NR                             | 615               | 947                                    | NR                             | 745               | 25                                     | NR                             | 875               | 0                                      | NR                             |                   |                                        |                                |

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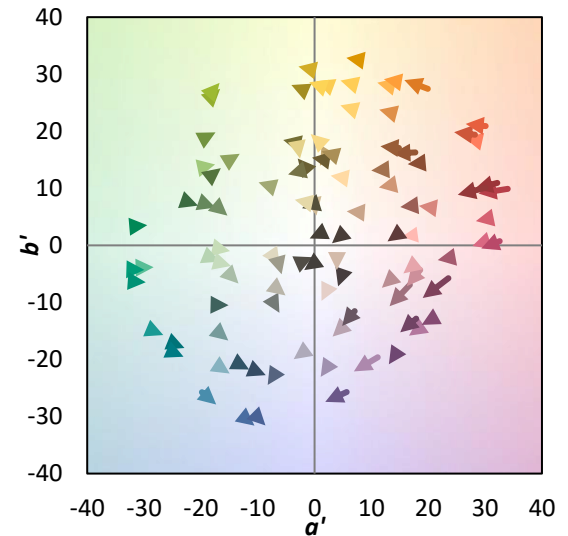
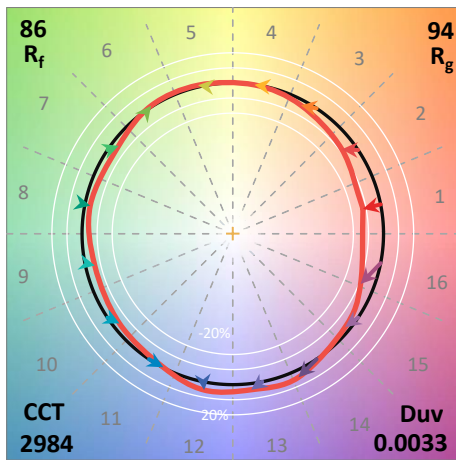
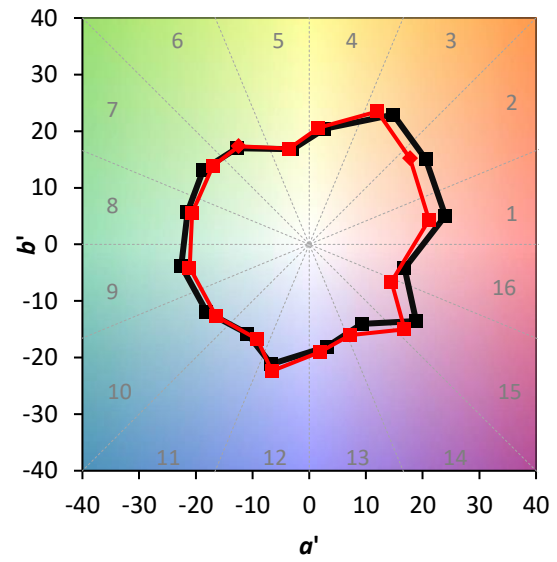
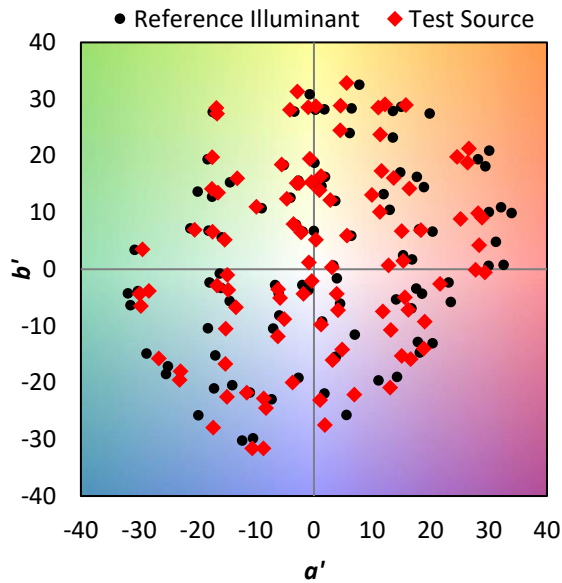
TM-30-18

### Summary

$R_f = 85.8$   
 $R_g = 94.1$   
 $CIE R_a = 81.8$   
 $R_g = -1.1$

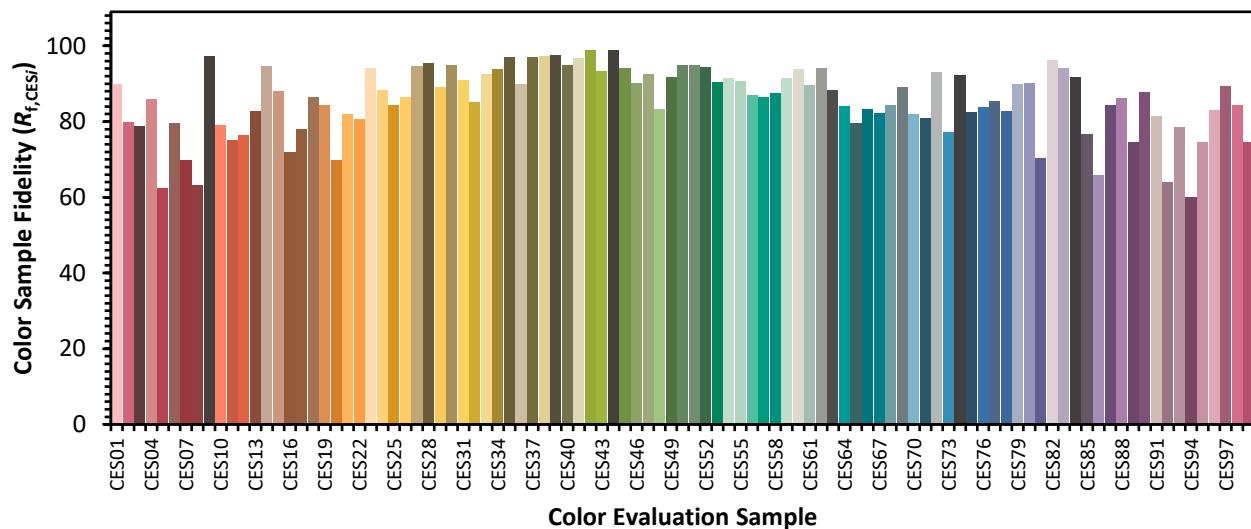


### Color Vector Graphics

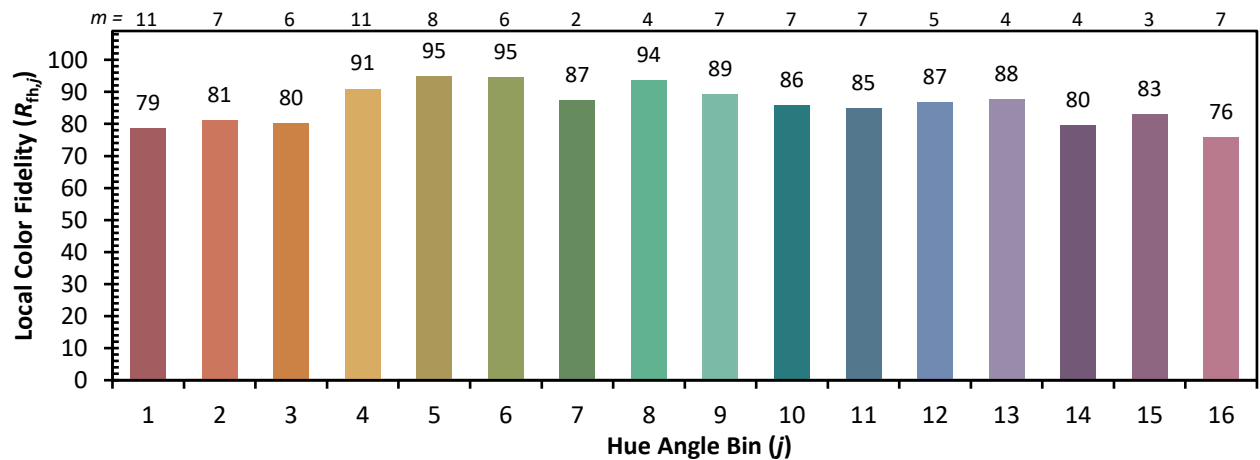
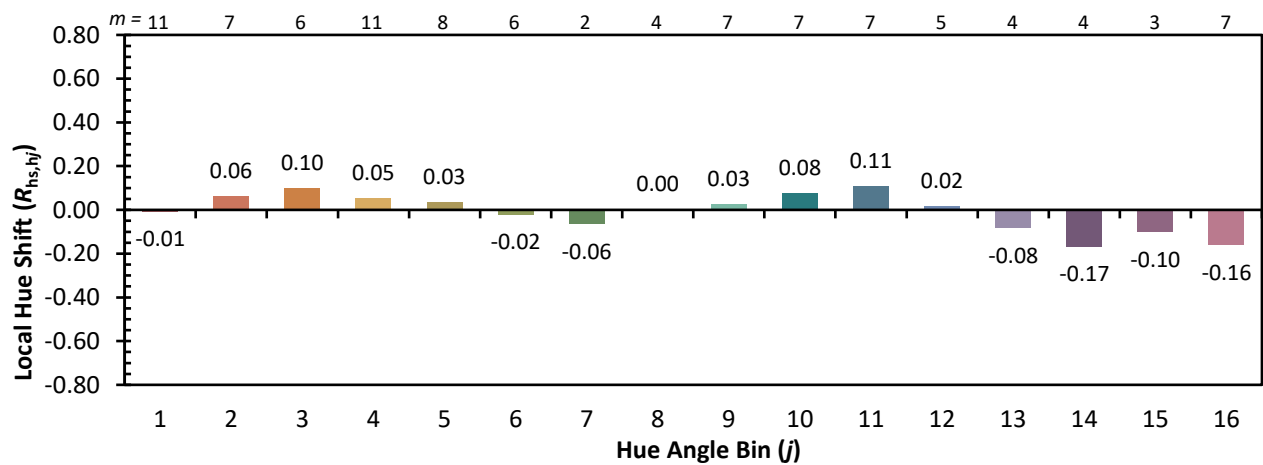
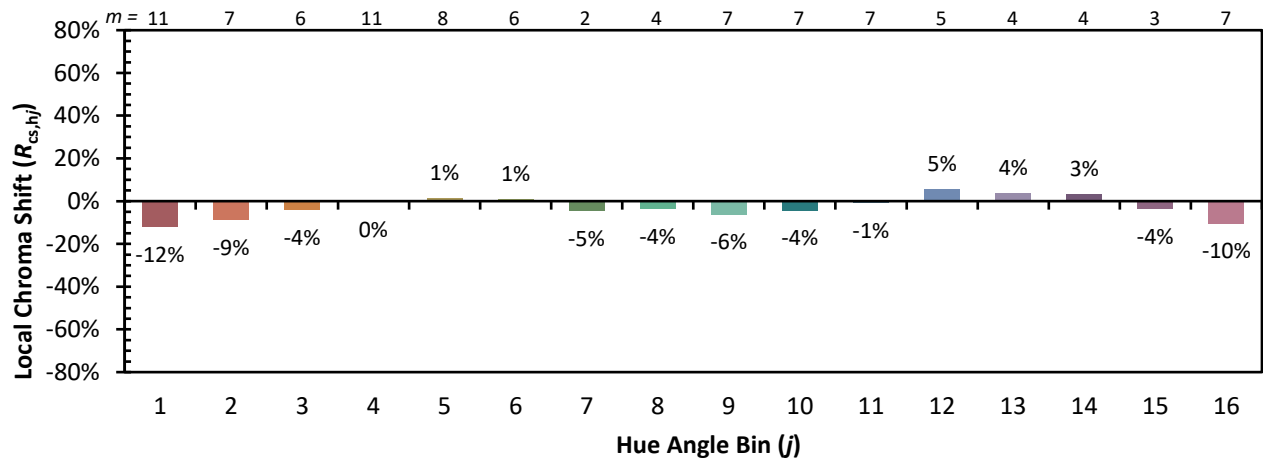


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

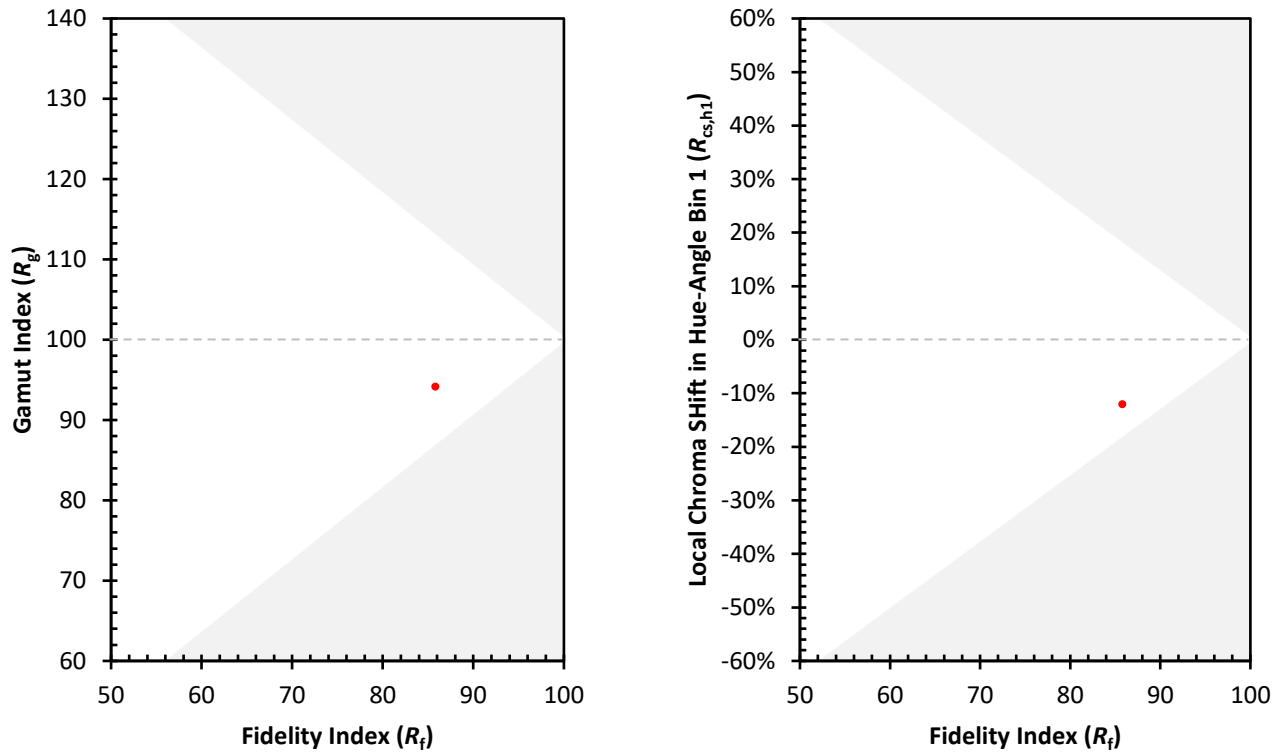
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 86 | CES51 = 95 | CES76 = 84 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 86 |
| CES03 = 31 | CES28 = 95 | CES53 = 90 | CES78 = 83 |
| CES04 = 70 | CES29 = 89 | CES54 = 91 | CES79 = 90 |
| CES05 = 50 | CES30 = 95 | CES55 = 91 | CES80 = 90 |
| CES06 = 51 | CES31 = 91 | CES56 = 87 | CES81 = 70 |
| CES07 = 42 | CES32 = 85 | CES57 = 86 | CES82 = 96 |
| CES08 = 41 | CES33 = 93 | CES58 = 87 | CES83 = 94 |
| CES09 = 29 | CES34 = 94 | CES59 = 92 | CES84 = 92 |
| CES10 = 76 | CES35 = 97 | CES60 = 94 | CES85 = 77 |
| CES11 = 59 | CES36 = 90 | CES61 = 90 | CES86 = 66 |
| CES12 = 65 | CES37 = 97 | CES62 = 94 | CES87 = 84 |
| CES13 = 43 | CES38 = 97 | CES63 = 88 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 84 | CES89 = 75 |
| CES15 = 72 | CES40 = 95 | CES65 = 80 | CES90 = 88 |
| CES16 = 47 | CES41 = 97 | CES66 = 83 | CES91 = 81 |
| CES17 = 50 | CES42 = 99 | CES67 = 82 | CES92 = 64 |
| CES18 = 56 | CES43 = 93 | CES68 = 84 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 89 | CES94 = 60 |
| CES20 = 67 | CES45 = 94 | CES70 = 82 | CES95 = 74 |
| CES21 = 87 | CES46 = 90 | CES71 = 81 | CES96 = 83 |
| CES22 = 79 | CES47 = 93 | CES72 = 93 | CES97 = 89 |
| CES23 = 92 | CES48 = 83 | CES73 = 77 | CES98 = 84 |
| CES24 = 91 | CES49 = 92 | CES74 = 92 | CES99 = 75 |
| CES25 = 72 | CES50 = 95 | CES75 = 83 |            |



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**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)