

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: P821387

Luminaire Tested: **TT-D2-740-12VDC-T4-PM**

Issue Date: 5/19/2020



**Test Information**

Test Method: LM-79-08  
Report Number: P821387  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-1908-473-26)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/19/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: TT-D2-740-12VDC-T4-PM  
Description: TOPTIER LED SITE LUMINAIRE  
4000K, 70 CRI LEDS AND DRIVE LANE DISTRIBUTION  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4475 lumens  
Efficiency: N/A  
Efficacy: 117.8 lumens/watt  
Luminous Opening: Circular (Dia: 1.12' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G3

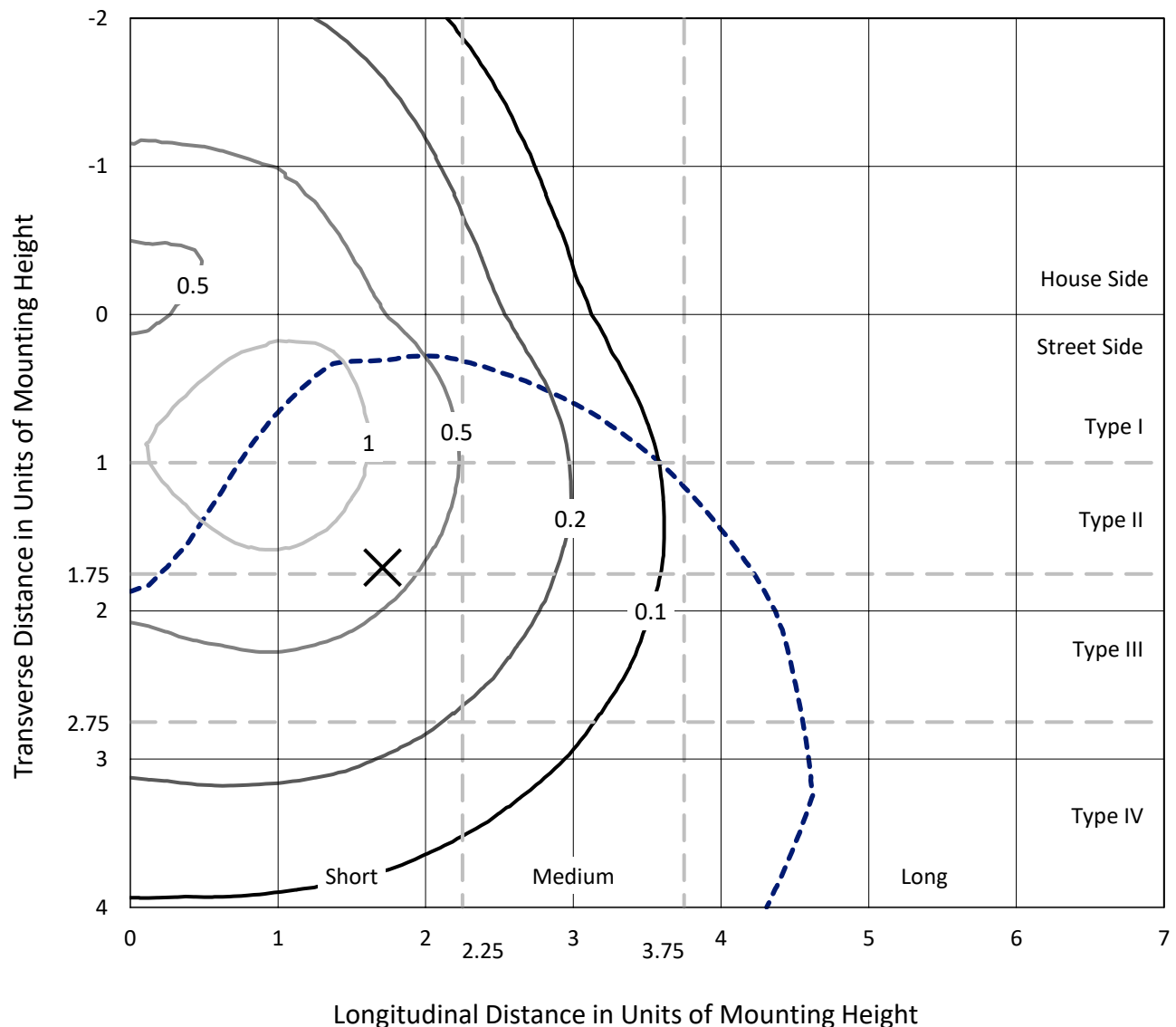
Input Watts (W): 38  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

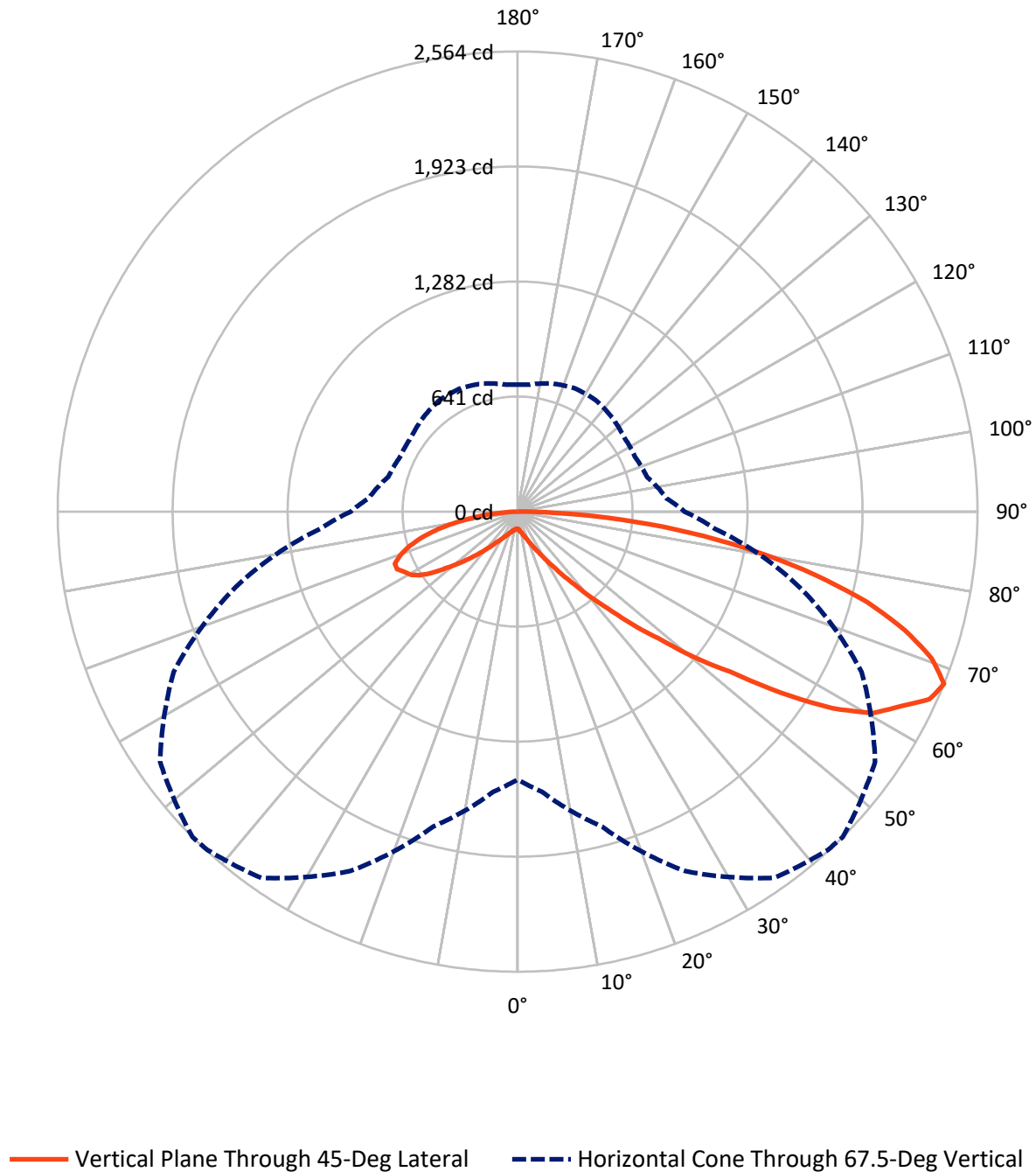
✕ Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 1.5 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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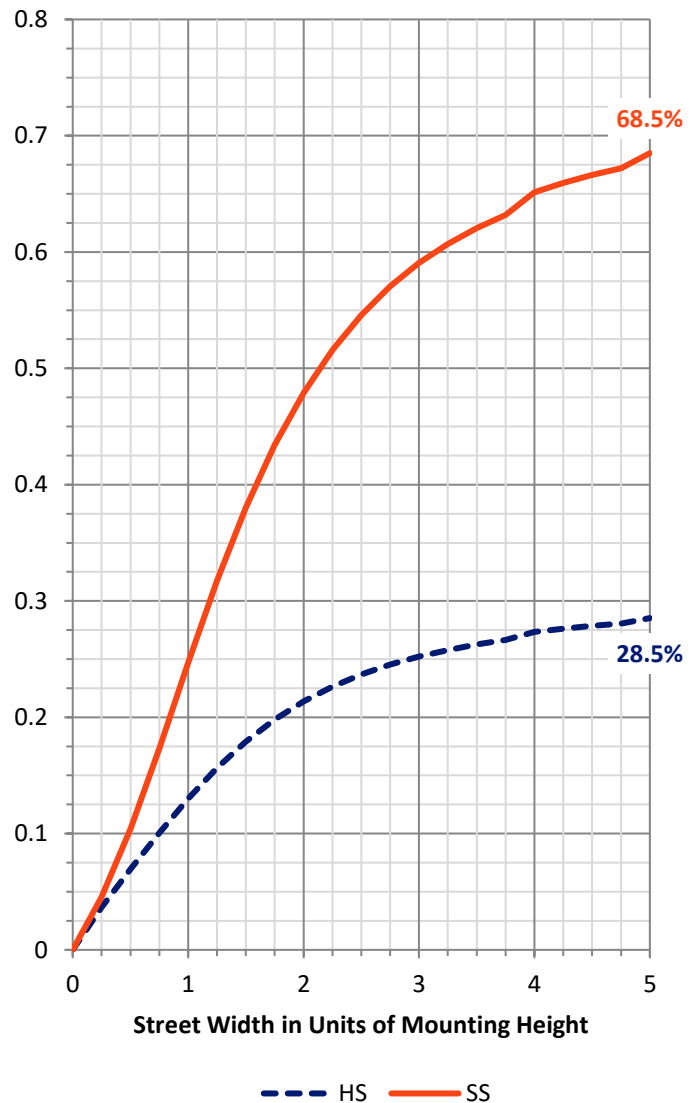
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1304.0   | 0.0    | 1304.0 |
|                    | % Fixture | 29.1     | 0.0    | 29.1   |
| <b>Street Side</b> | Lumens    | 3171.0   | 0.0    | 3171.0 |
|                    | % Fixture | 70.9     | 0.0    | 70.9   |
| <b>Total</b>       | Lumens    | 4475.0   | 0.0    | 4475.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 10.0   | 0.2       |
| 10°-20°   | 37.1   | 0.8       |
| 20°-30°   | 87.8   | 2.0       |
| 30°-40°   | 198.7  | 4.4       |
| 40°-50°   | 442.9  | 9.9       |
| 50°-60°   | 890.5  | 19.9      |
| 60°-70°   | 1307.9 | 29.2      |
| 70°-80°   | 1150.0 | 25.7      |
| 80°-90°   | 350.1  | 7.8       |
| 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°    | 4475.0 | 100.0     |
| 0°-180°   | 4475.0 | 100.0     |



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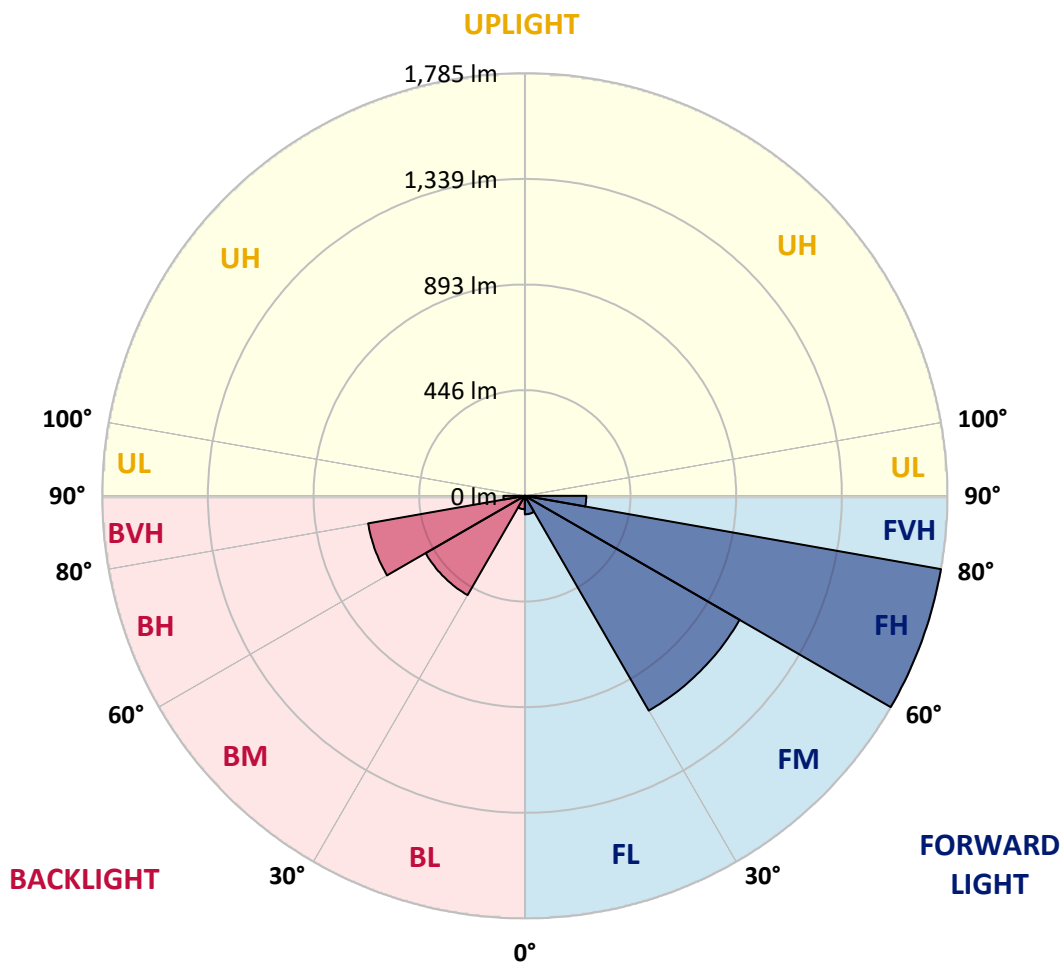
CATALOG NUMBER: TT-D2-740-12VDC-T4-PM

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 78.1   | 1.7       |                         |      |         |
| FM   | (30°-60°)   | 1047.9 | 23.4      |                         |      |         |
| FH   | (60°-80°)   | 1785.4 | 39.9      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 259.4  | 5.8       |                         |      | G3/500  |
| BL   | (0°-30°)    | 56.8   | 1.3       | B0/110                  |      |         |
| BM   | (30°-60°)   | 484.1  | 10.8      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 672.5  | 15.0      | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 90.7   | 2.0       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 42.5°  | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 97.1   | 97.1   | 97.1   | 97.1   | 97.1   | 97.1   | 97.1   | 97.1   | 97.1   | 97.1   | 97.1   |
| 2.5°  | 101.3  | 100.4  | 100.4  | 100.4  | 99.6   | 99.6   | 99.6   | 99.6   | 98.7   | 98.7   | 98.7   |
| 5°    | 107.1  | 106.3  | 107.1  | 105.4  | 104.6  | 104.6  | 103.8  | 103.8  | 102.9  | 102.1  | 101.3  |
| 7.5°  | 115.5  | 114.6  | 114.6  | 113.0  | 112.1  | 111.3  | 111.3  | 109.6  | 108.8  | 107.1  | 105.4  |
| 10°   | 124.7  | 124.7  | 123.8  | 123.0  | 121.3  | 119.7  | 119.7  | 117.1  | 116.3  | 113.8  | 111.3  |
| 12.5° | 135.6  | 135.6  | 135.6  | 133.9  | 132.2  | 131.4  | 129.7  | 128.0  | 125.5  | 121.3  | 118.8  |
| 15°   | 148.9  | 148.9  | 148.9  | 147.3  | 145.6  | 143.9  | 143.1  | 139.7  | 135.6  | 131.4  | 126.4  |
| 17.5° | 165.7  | 164.0  | 164.0  | 162.3  | 160.7  | 159.8  | 158.2  | 154.8  | 148.9  | 143.9  | 137.2  |
| 20°   | 184.1  | 183.3  | 182.4  | 182.4  | 180.7  | 179.1  | 178.2  | 173.2  | 166.5  | 157.3  | 148.9  |
| 22.5° | 205.0  | 204.2  | 204.2  | 205.8  | 205.0  | 202.5  | 202.5  | 195.0  | 185.8  | 174.9  | 162.3  |
| 25°   | 231.0  | 230.1  | 231.8  | 235.1  | 235.1  | 233.5  | 231.0  | 223.4  | 210.0  | 195.0  | 179.9  |
| 27.5° | 259.4  | 258.6  | 261.9  | 267.8  | 269.4  | 266.9  | 265.3  | 256.9  | 241.8  | 221.7  | 200.0  |
| 30°   | 293.7  | 294.5  | 303.8  | 310.4  | 314.6  | 313.0  | 312.1  | 302.9  | 278.6  | 255.2  | 226.8  |
| 32.5° | 335.6  | 333.0  | 344.8  | 355.6  | 363.2  | 367.3  | 364.8  | 354.0  | 333.0  | 296.2  | 260.2  |
| 35°   | 379.9  | 380.7  | 395.0  | 410.9  | 428.4  | 430.1  | 435.1  | 424.2  | 395.8  | 352.3  | 302.1  |
| 37.5° | 437.6  | 430.9  | 449.4  | 479.5  | 500.4  | 518.8  | 515.5  | 508.8  | 475.3  | 417.6  | 348.9  |
| 40°   | 489.5  | 487.8  | 513.8  | 555.6  | 594.1  | 620.9  | 624.2  | 615.9  | 571.5  | 489.5  | 399.1  |
| 42.5° | 548.9  | 554.0  | 589.9  | 647.7  | 706.2  | 744.7  | 735.5  | 731.3  | 679.5  | 574.9  | 467.8  |
| 45°   | 609.2  | 625.9  | 671.9  | 755.6  | 824.2  | 879.5  | 895.4  | 881.1  | 817.5  | 709.6  | 554.8  |
| 47.5° | 682.0  | 704.6  | 761.5  | 874.4  | 986.6  | 1051.0 | 1054.3 | 1097.0 | 1000.8 | 839.3  | 645.2  |
| 50°   | 778.2  | 788.2  | 867.7  | 1005.8 | 1159.8 | 1250.2 | 1276.1 | 1276.9 | 1180.7 | 969.8  | 747.2  |
| 52.5° | 872.8  | 880.3  | 984.9  | 1163.1 | 1372.3 | 1475.2 | 1481.1 | 1513.7 | 1382.4 | 1180.7 | 893.7  |
| 55°   | 986.6  | 983.2  | 1127.1 | 1341.4 | 1588.2 | 1738.0 | 1781.5 | 1825.9 | 1658.5 | 1347.2 | 977.4  |
| 57.5° | 1097.0 | 1092.0 | 1265.2 | 1546.4 | 1883.6 | 2032.5 | 2068.5 | 2036.7 | 1788.2 | 1416.7 | 1018.4 |
| 60°   | 1199.1 | 1216.7 | 1427.6 | 1773.1 | 2112.0 | 2254.3 | 2278.6 | 2192.4 | 1871.9 | 1470.2 | 1044.3 |
| 62.5° | 1305.4 | 1340.5 | 1595.7 | 1962.3 | 2286.9 | 2389.0 | 2390.7 | 2289.4 | 2011.6 | 1574.0 | 1128.8 |
| 65°   | 1405.0 | 1461.0 | 1726.3 | 2123.8 | 2409.1 | 2511.2 | 2522.9 | 2431.7 | 2148.9 | 1664.4 | 1143.0 |
| 67.5° | 1492.8 | 1567.3 | 1816.7 | 2210.8 | 2491.9 | 2558.0 | 2563.9 | 2432.5 | 2116.2 | 1627.5 | 1103.7 |
| 70°   | 1563.9 | 1624.2 | 1872.7 | 2212.5 | 2434.2 | 2452.6 | 2448.4 | 2308.7 | 2025.9 | 1554.7 | 1037.6 |
| 72.5° | 1591.6 | 1640.9 | 1845.9 | 2108.7 | 2264.3 | 2260.2 | 2256.8 | 2127.9 | 1876.9 | 1433.4 | 942.2  |
| 75°   | 1552.2 | 1566.5 | 1699.5 | 1886.9 | 1985.7 | 2009.1 | 2012.5 | 1896.2 | 1646.8 | 1253.5 | 808.3  |
| 77.5° | 1389.9 | 1382.4 | 1484.5 | 1608.3 | 1682.8 | 1699.5 | 1696.2 | 1599.1 | 1380.7 | 1041.8 | 677.8  |
| 80°   | 1102.0 | 1117.9 | 1181.5 | 1263.5 | 1338.0 | 1356.4 | 1344.7 | 1271.1 | 1074.4 | 812.5  | 520.5  |
| 82.5° | 770.7  | 789.9  | 843.5  | 905.4  | 961.5  | 961.5  | 972.3  | 901.2  | 761.5  | 583.2  | 364.0  |
| 85°   | 415.9  | 405.0  | 463.6  | 533.9  | 574.0  | 581.6  | 585.7  | 562.3  | 471.1  | 352.3  | 215.9  |
| 87.5° | 68.6   | 73.6   | 91.2   | 139.7  | 159.0  | 184.1  | 195.8  | 153.1  | 92.9   | 59.4   | 43.5   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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CATALOG NUMBER: TT-D2-740-12VDC-T4-PM

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  |
| 2.5°  | 98.7  | 97.9  | 97.1  | 96.2  | 96.2  | 95.4  | 95.4  | 95.4  | 96.2  | 96.2  | 96.2  |
| 5°    | 101.3 | 100.4 | 99.6  | 98.7  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  | 97.1  |
| 7.5°  | 105.4 | 103.8 | 102.9 | 101.3 | 99.6  | 99.6  | 98.7  | 98.7  | 98.7  | 99.6  | 98.7  |
| 10°   | 110.5 | 108.8 | 107.1 | 104.6 | 103.8 | 102.9 | 102.1 | 102.1 | 102.9 | 102.9 | 102.1 |
| 12.5° | 116.3 | 115.5 | 112.1 | 109.6 | 107.9 | 107.1 | 106.3 | 107.1 | 106.3 | 107.1 | 107.1 |
| 15°   | 124.7 | 122.2 | 118.0 | 115.5 | 113.0 | 112.1 | 111.3 | 112.1 | 112.1 | 113.0 | 112.1 |
| 17.5° | 133.9 | 130.5 | 126.4 | 122.2 | 118.8 | 118.0 | 118.0 | 118.0 | 118.8 | 119.7 | 118.8 |
| 20°   | 144.8 | 140.6 | 134.7 | 129.7 | 126.4 | 125.5 | 125.5 | 126.4 | 127.2 | 128.0 | 128.0 |
| 22.5° | 155.6 | 152.3 | 143.9 | 137.2 | 135.6 | 134.7 | 133.9 | 135.6 | 137.2 | 138.1 | 138.9 |
| 25°   | 172.4 | 165.7 | 155.6 | 148.1 | 144.8 | 144.8 | 145.6 | 147.3 | 148.1 | 149.8 | 148.9 |
| 27.5° | 189.9 | 182.4 | 169.9 | 159.8 | 157.3 | 156.5 | 158.2 | 159.8 | 163.2 | 163.2 | 162.3 |
| 30°   | 214.2 | 201.7 | 185.8 | 176.6 | 169.9 | 170.7 | 173.2 | 175.7 | 179.1 | 180.7 | 180.7 |
| 32.5° | 241.8 | 228.4 | 206.7 | 192.5 | 189.1 | 189.9 | 190.8 | 195.0 | 198.3 | 201.7 | 199.2 |
| 35°   | 277.8 | 261.1 | 234.3 | 218.4 | 210.0 | 209.2 | 212.5 | 217.6 | 220.9 | 222.6 | 222.6 |
| 37.5° | 317.1 | 295.4 | 261.9 | 248.5 | 238.5 | 237.6 | 238.5 | 242.7 | 246.9 | 248.5 | 251.9 |
| 40°   | 364.8 | 338.1 | 298.7 | 277.0 | 269.4 | 267.8 | 271.1 | 277.0 | 277.0 | 279.5 | 280.3 |
| 42.5° | 423.4 | 389.1 | 345.6 | 317.1 | 307.9 | 307.9 | 307.1 | 312.1 | 312.1 | 312.1 | 310.4 |
| 45°   | 497.9 | 459.4 | 402.5 | 373.2 | 357.3 | 348.9 | 351.4 | 348.1 | 347.3 | 349.8 | 342.2 |
| 47.5° | 569.8 | 521.3 | 454.4 | 422.6 | 406.7 | 401.7 | 392.5 | 389.9 | 385.8 | 385.8 | 374.9 |
| 50°   | 653.5 | 593.3 | 528.8 | 483.7 | 468.6 | 454.4 | 446.8 | 435.1 | 422.6 | 420.1 | 415.9 |
| 52.5° | 793.3 | 718.0 | 616.7 | 568.2 | 529.7 | 515.5 | 497.9 | 482.8 | 467.8 | 456.0 | 462.7 |
| 55°   | 850.2 | 773.2 | 677.0 | 630.1 | 603.3 | 589.9 | 557.3 | 537.2 | 514.6 | 497.9 | 507.1 |
| 57.5° | 878.6 | 794.9 | 705.4 | 670.3 | 662.7 | 650.2 | 625.9 | 591.6 | 565.7 | 544.7 | 546.4 |
| 60°   | 894.5 | 806.7 | 720.5 | 688.7 | 684.5 | 692.9 | 680.3 | 656.9 | 616.7 | 595.8 | 593.3 |
| 62.5° | 955.6 | 863.6 | 763.1 | 718.0 | 708.8 | 714.6 | 718.0 | 703.7 | 670.3 | 642.6 | 635.1 |
| 65°   | 968.2 | 870.3 | 771.5 | 742.2 | 743.1 | 744.7 | 747.2 | 732.2 | 715.4 | 681.1 | 674.4 |
| 67.5° | 930.5 | 834.3 | 746.4 | 722.1 | 723.8 | 743.1 | 758.1 | 757.3 | 738.9 | 709.6 | 707.1 |
| 70°   | 873.6 | 779.9 | 698.7 | 677.0 | 681.1 | 698.7 | 731.3 | 748.1 | 744.7 | 725.5 | 729.7 |
| 72.5° | 784.9 | 701.2 | 630.1 | 613.4 | 623.4 | 640.1 | 671.1 | 701.2 | 718.8 | 723.0 | 732.2 |
| 75°   | 681.1 | 614.2 | 547.3 | 537.2 | 544.7 | 564.0 | 592.4 | 627.6 | 666.1 | 687.0 | 692.9 |
| 77.5° | 562.3 | 501.2 | 451.9 | 445.2 | 456.0 | 473.6 | 502.1 | 529.7 | 573.2 | 610.0 | 618.4 |
| 80°   | 440.1 | 387.4 | 352.3 | 346.4 | 353.1 | 368.2 | 389.9 | 412.5 | 454.4 | 482.8 | 487.0 |
| 82.5° | 305.4 | 273.6 | 251.0 | 247.7 | 251.9 | 257.7 | 275.3 | 296.2 | 319.7 | 342.2 | 344.8 |
| 85°   | 177.4 | 157.3 | 151.5 | 146.4 | 155.6 | 155.6 | 159.8 | 171.5 | 183.3 | 184.9 | 189.9 |
| 87.5° | 32.6  | 31.0  | 31.8  | 23.4  | 29.3  | 20.9  | 20.9  | 26.8  | 20.1  | 23.4  | 19.2  |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



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

Report Prepared for

Cooper Lighting Solutions

Streetworks

Report Number: SP1-2407-176-5

Test Date: 09/24/2024

Luminaire Tested: MEM2-HTN-VA-30-740-U-WQ

Data in this report applies to families of products including MEM2-HTN-VA-30-740-U-WQ

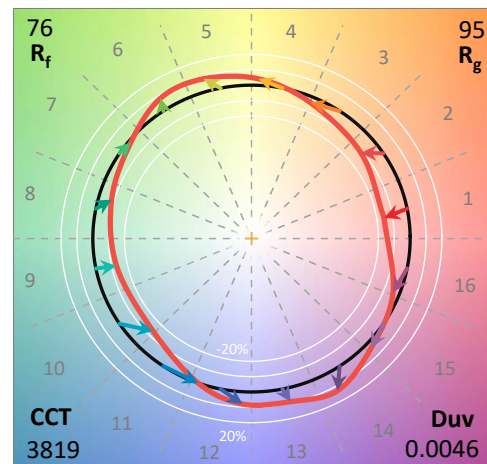
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-176-5  
 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-30-740-U-WQ**  
 Description: EPIC MODERN VISUAL COMFORT 30W WAVESTREAM WIDE

### Spectral Parameters

CCT (K): 3819  
 CIE  $u'$ : 0.2261  
 CIE  $v'$ : 0.5108  
 Duv: 0.0046  
 CIE x: 0.3926  
 CIE y: 0.3942  
 CIE z: 0.2132  
 Peak Wavelength (nm): 450  
 Dominant Wavelength (nm): 577  
 Purity: 36.15483  
 R<sub>f</sub>: 75.6  
 R<sub>g</sub>: 94.8

CRI (Ra): 72.9  
 R1: 70.1  
 R2: 78.4  
 R3: 85.0  
 R4: 72.9  
 R5: 69.1  
 R6: 69.2  
 R7: 82.8  
 R8: 55.4  
 R9: -21.5  
 R10: 48.5  
 R11: 68.4  
 R12: 39.0  
 R13: 71.1  
 R14: 91.3  
 R15: 63.2



### Test Conditions

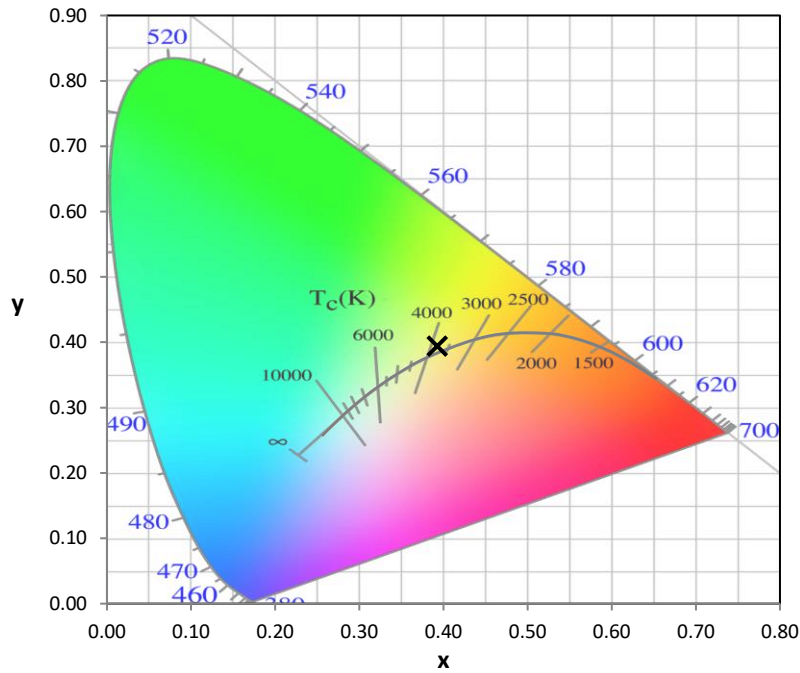
Stabilization Time: 30M  
 Operation Time: 1H 30M  
 Sphere Temperature (°C): 25.2

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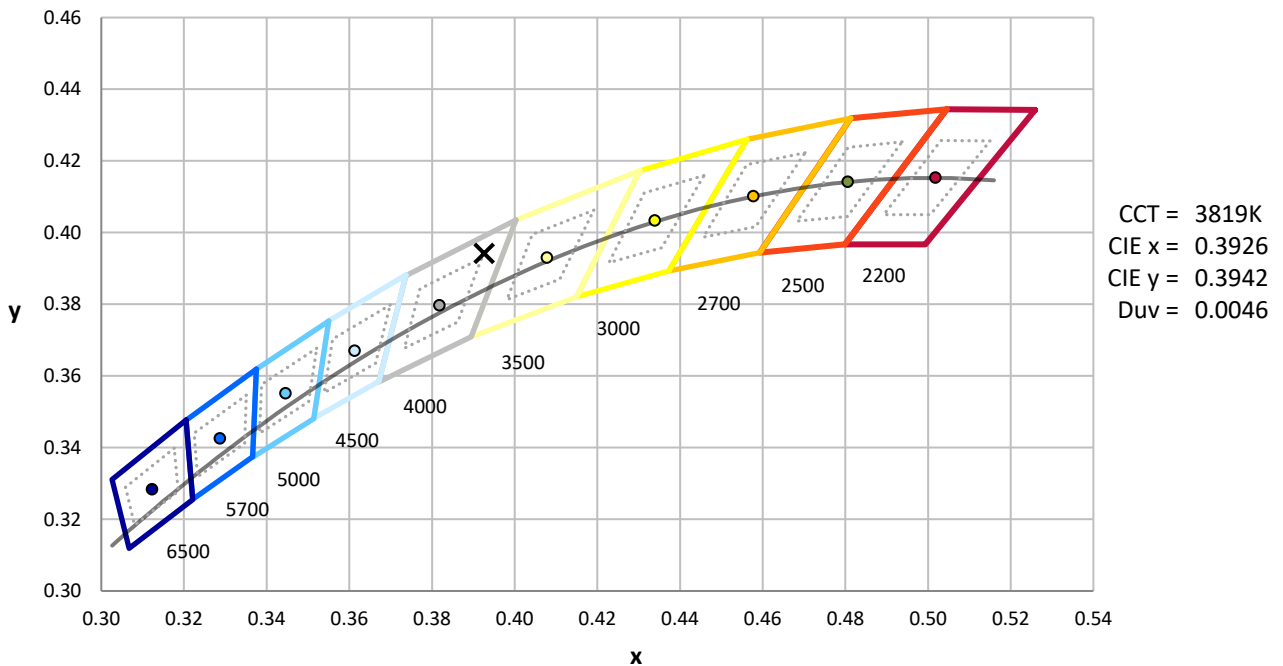
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

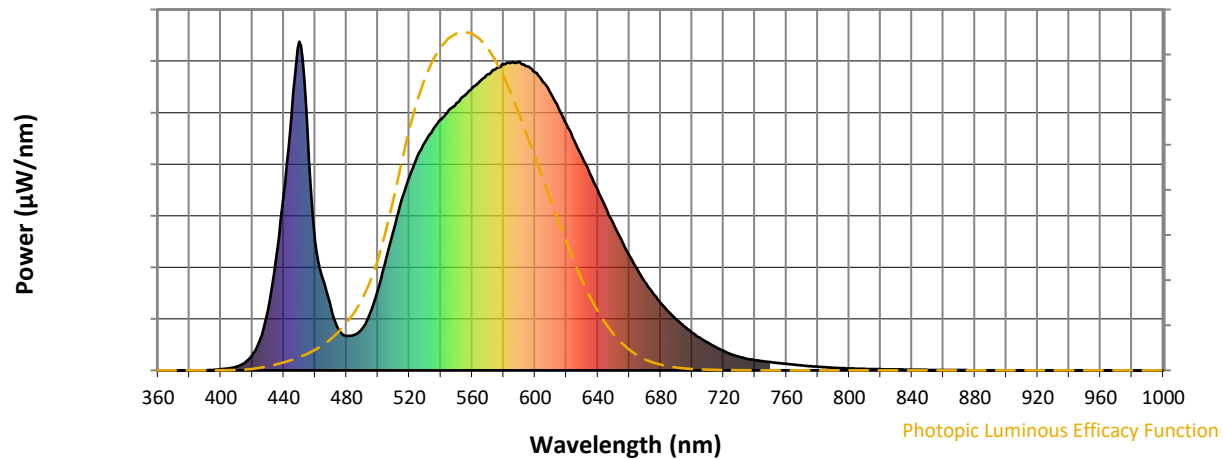


**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



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### Photopic Flux vs. Wavelength

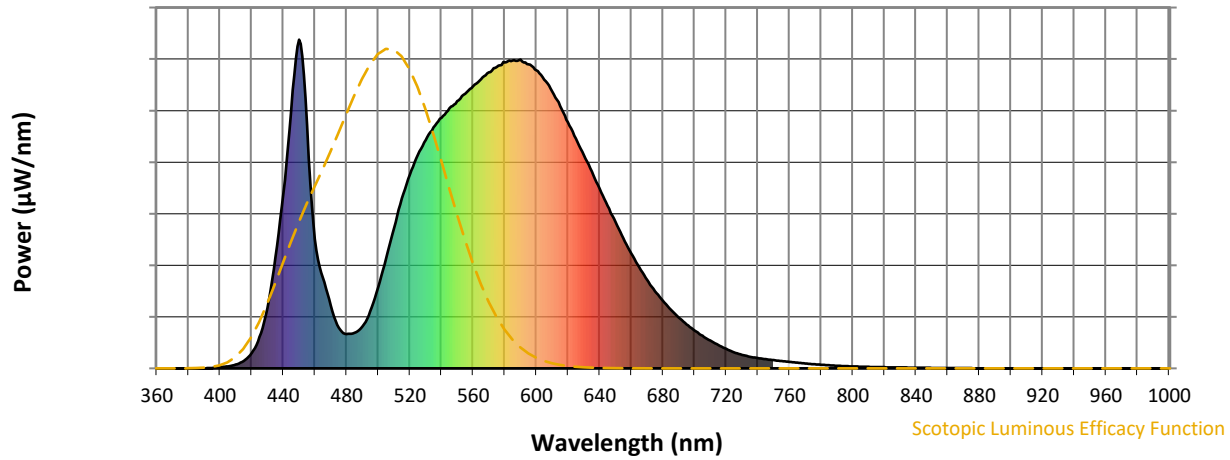


### Photopic Lumens: NR

| λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 127                         | NR               | 620       | 748                         | NR               | 750       | 25                          | NR               | 880       | 0                           | NR               |
| 365       | 0                           | NR               | 495       | 173                         | NR               | 625       | 699                         | NR               | 755       | 22                          | NR               | 885       | 0                           | NR               |
| 370       | 0                           | NR               | 500       | 246                         | NR               | 630       | 648                         | NR               | 760       | 20                          | NR               | 890       | 0                           | NR               |
| 375       | 0                           | NR               | 505       | 335                         | NR               | 635       | 599                         | NR               | 765       | 17                          | NR               | 895       | 0                           | NR               |
| 380       | 0                           | NR               | 510       | 427                         | NR               | 640       | 547                         | NR               | 770       | 15                          | NR               | 900       | 0                           | NR               |
| 385       | 0                           | NR               | 515       | 517                         | NR               | 645       | 495                         | NR               | 775       | 13                          | NR               | 905       | 0                           | NR               |
| 390       | 0                           | NR               | 520       | 589                         | NR               | 650       | 445                         | NR               | 780       | 11                          | NR               | 910       | 0                           | NR               |
| 395       | 1                           | NR               | 525       | 649                         | NR               | 655       | 396                         | NR               | 785       | 9                           | NR               | 915       | 0                           | NR               |
| 400       | 4                           | NR               | 530       | 695                         | NR               | 660       | 349                         | NR               | 790       | 8                           | NR               | 920       | 0                           | NR               |
| 405       | 6                           | NR               | 535       | 733                         | NR               | 665       | 308                         | NR               | 795       | 7                           | NR               | 925       | 0                           | NR               |
| 410       | 11                          | NR               | 540       | 763                         | NR               | 670       | 269                         | NR               | 800       | 6                           | NR               | 930       | 0                           | NR               |
| 415       | 23                          | NR               | 545       | 792                         | NR               | 675       | 235                         | NR               | 805       | 5                           | NR               | 935       | 0                           | NR               |
| 420       | 46                          | NR               | 550       | 813                         | NR               | 680       | 205                         | NR               | 810       | 5                           | NR               | 940       | 0                           | NR               |
| 425       | 95                          | NR               | 555       | 835                         | NR               | 685       | 178                         | NR               | 815       | 4                           | NR               | 945       | 0                           | NR               |
| 430       | 183                         | NR               | 560       | 859                         | NR               | 690       | 155                         | NR               | 820       | 3                           | NR               | 950       | 0                           | NR               |
| 435       | 338                         | NR               | 565       | 880                         | NR               | 695       | 134                         | NR               | 825       | 3                           | NR               | 955       | 0                           | NR               |
| 440       | 534                         | NR               | 570       | 900                         | NR               | 700       | 115                         | NR               | 830       | 3                           | NR               | 960       | 0                           | NR               |
| 445       | 782                         | NR               | 575       | 918                         | NR               | 705       | 99                          | NR               | 835       | 2                           | NR               | 965       | 0                           | NR               |
| 450       | 1000                        | NR               | 580       | 931                         | NR               | 710       | 84                          | NR               | 840       | 2                           | NR               | 970       | 0                           | NR               |
| 455       | 739                         | NR               | 585       | 937                         | NR               | 715       | 71                          | NR               | 845       | 2                           | NR               | 975       | 0                           | NR               |
| 460       | 393                         | NR               | 590       | 939                         | NR               | 720       | 59                          | NR               | 850       | 1                           | NR               | 980       | 0                           | NR               |
| 465       | 276                         | NR               | 595       | 925                         | NR               | 725       | 49                          | NR               | 855       | 1                           | NR               | 985       | 0                           | NR               |
| 470       | 190                         | NR               | 600       | 907                         | NR               | 730       | 41                          | NR               | 860       | 1                           | NR               | 990       | 0                           | NR               |
| 475       | 123                         | NR               | 605       | 878                         | NR               | 735       | 35                          | NR               | 865       | 1                           | NR               | 995       | 0                           | NR               |
| 480       | 105                         | NR               | 610       | 842                         | NR               | 740       | 31                          | NR               | 870       | 1                           | NR               | 1000      | 0                           | NR               |
| 485       | 108                         | NR               | 615       | 797                         | NR               | 745       | 28                          | NR               | 875       | 1                           | NR               |           |                             |                  |

REPORT NUMBER: SP1-2407-176-5

### Scotopic Flux vs. Wavelength



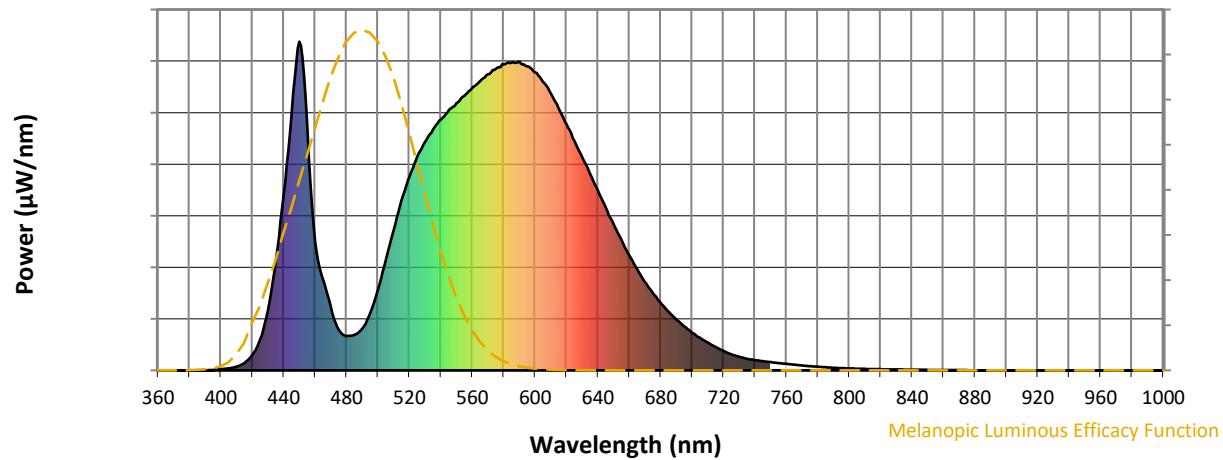
Scotopic Lumens: NR

S/P: 1.45

| $\lambda$<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               | 127                                  | NR                             | 620               | 748                                  | NR                             | 750               | 25                                   | NR                             | 880               | 0                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 173                                  | NR                             | 625               | 699                                  | NR                             | 755               | 22                                   | NR                             | 885               | 0                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 246                                  | NR                             | 630               | 648                                  | NR                             | 760               | 20                                   | NR                             | 890               | 0                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 335                                  | NR                             | 635               | 599                                  | NR                             | 765               | 17                                   | NR                             | 895               | 0                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 427                                  | NR                             | 640               | 547                                  | NR                             | 770               | 15                                   | NR                             | 900               | 0                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 517                                  | NR                             | 645               | 495                                  | NR                             | 775               | 13                                   | NR                             | 905               | 0                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 589                                  | NR                             | 650               | 445                                  | NR                             | 780               | 11                                   | NR                             | 910               | 0                                    | NR                             |
| 395               | 1                                    | NR                             | 525               | 649                                  | NR                             | 655               | 396                                  | NR                             | 785               | 9                                    | NR                             | 915               | 0                                    | NR                             |
| 400               | 4                                    | NR                             | 530               | 695                                  | NR                             | 660               | 349                                  | NR                             | 790               | 8                                    | NR                             | 920               | 0                                    | NR                             |
| 405               | 6                                    | NR                             | 535               | 733                                  | NR                             | 665               | 308                                  | NR                             | 795               | 7                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 11                                   | NR                             | 540               | 763                                  | NR                             | 670               | 269                                  | NR                             | 800               | 6                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 23                                   | NR                             | 545               | 792                                  | NR                             | 675               | 235                                  | NR                             | 805               | 5                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 46                                   | NR                             | 550               | 813                                  | NR                             | 680               | 205                                  | NR                             | 810               | 5                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 95                                   | NR                             | 555               | 835                                  | NR                             | 685               | 178                                  | NR                             | 815               | 4                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 183                                  | NR                             | 560               | 859                                  | NR                             | 690               | 155                                  | NR                             | 820               | 3                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 338                                  | NR                             | 565               | 880                                  | NR                             | 695               | 134                                  | NR                             | 825               | 3                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 534                                  | NR                             | 570               | 900                                  | NR                             | 700               | 115                                  | NR                             | 830               | 3                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 782                                  | NR                             | 575               | 918                                  | NR                             | 705               | 99                                   | NR                             | 835               | 2                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 1000                                 | NR                             | 580               | 931                                  | NR                             | 710               | 84                                   | NR                             | 840               | 2                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 739                                  | NR                             | 585               | 937                                  | NR                             | 715               | 71                                   | NR                             | 845               | 2                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 393                                  | NR                             | 590               | 939                                  | NR                             | 720               | 59                                   | NR                             | 850               | 1                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 276                                  | NR                             | 595               | 925                                  | NR                             | 725               | 49                                   | NR                             | 855               | 1                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 190                                  | NR                             | 600               | 907                                  | NR                             | 730               | 41                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 123                                  | NR                             | 605               | 878                                  | NR                             | 735               | 35                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 105                                  | NR                             | 610               | 842                                  | NR                             | 740               | 31                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 108                                  | NR                             | 615               | 797                                  | NR                             | 745               | 28                                   | NR                             | 875               | 1                                    | NR                             |                   |                                      |                                |

REPORT NUMBER: SP1-2407-176-5

### Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 2.76

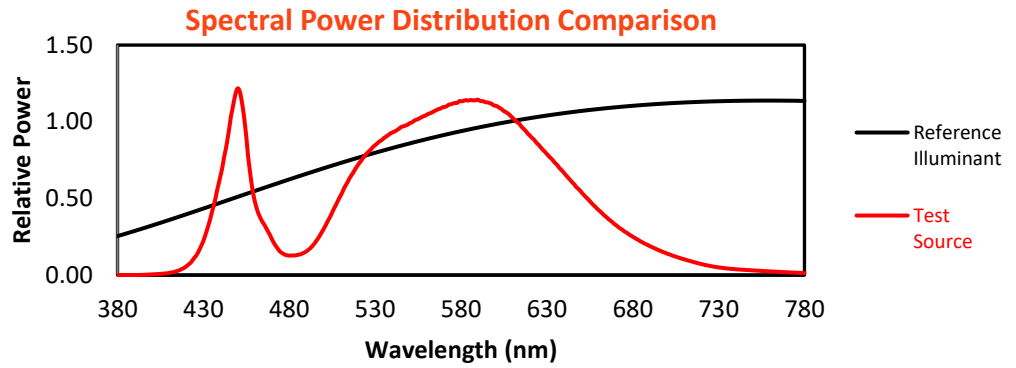
| $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | 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               | 127                                    | NR                             | 620               | 748                                    | NR                             | 750               | 25                                     | NR                             | 880               | 0                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 173                                    | NR                             | 625               | 699                                    | NR                             | 755               | 22                                     | NR                             | 885               | 0                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 246                                    | NR                             | 630               | 648                                    | NR                             | 760               | 20                                     | NR                             | 890               | 0                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 335                                    | NR                             | 635               | 599                                    | NR                             | 765               | 17                                     | NR                             | 895               | 0                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 427                                    | NR                             | 640               | 547                                    | NR                             | 770               | 15                                     | NR                             | 900               | 0                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 517                                    | NR                             | 645               | 495                                    | NR                             | 775               | 13                                     | NR                             | 905               | 0                                      | NR                             |
| 390               | 0                                      | NR                             | 520               | 589                                    | NR                             | 650               | 445                                    | NR                             | 780               | 11                                     | NR                             | 910               | 0                                      | NR                             |
| 395               | 1                                      | NR                             | 525               | 649                                    | NR                             | 655               | 396                                    | NR                             | 785               | 9                                      | NR                             | 915               | 0                                      | NR                             |
| 400               | 4                                      | NR                             | 530               | 695                                    | NR                             | 660               | 349                                    | NR                             | 790               | 8                                      | NR                             | 920               | 0                                      | NR                             |
| 405               | 6                                      | NR                             | 535               | 733                                    | NR                             | 665               | 308                                    | NR                             | 795               | 7                                      | NR                             | 925               | 0                                      | NR                             |
| 410               | 11                                     | NR                             | 540               | 763                                    | NR                             | 670               | 269                                    | NR                             | 800               | 6                                      | NR                             | 930               | 0                                      | NR                             |
| 415               | 23                                     | NR                             | 545               | 792                                    | NR                             | 675               | 235                                    | NR                             | 805               | 5                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 46                                     | NR                             | 550               | 813                                    | NR                             | 680               | 205                                    | NR                             | 810               | 5                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 95                                     | NR                             | 555               | 835                                    | NR                             | 685               | 178                                    | NR                             | 815               | 4                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 183                                    | NR                             | 560               | 859                                    | NR                             | 690               | 155                                    | NR                             | 820               | 3                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 338                                    | NR                             | 565               | 880                                    | NR                             | 695               | 134                                    | NR                             | 825               | 3                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 534                                    | NR                             | 570               | 900                                    | NR                             | 700               | 115                                    | NR                             | 830               | 3                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 782                                    | NR                             | 575               | 918                                    | NR                             | 705               | 99                                     | NR                             | 835               | 2                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 1000                                   | NR                             | 580               | 931                                    | NR                             | 710               | 84                                     | NR                             | 840               | 2                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 739                                    | NR                             | 585               | 937                                    | NR                             | 715               | 71                                     | NR                             | 845               | 2                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 393                                    | NR                             | 590               | 939                                    | NR                             | 720               | 59                                     | NR                             | 850               | 1                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 276                                    | NR                             | 595               | 925                                    | NR                             | 725               | 49                                     | NR                             | 855               | 1                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 190                                    | NR                             | 600               | 907                                    | NR                             | 730               | 41                                     | NR                             | 860               | 1                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 123                                    | NR                             | 605               | 878                                    | NR                             | 735               | 35                                     | NR                             | 865               | 1                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 105                                    | NR                             | 610               | 842                                    | NR                             | 740               | 31                                     | NR                             | 870               | 1                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 108                                    | NR                             | 615               | 797                                    | NR                             | 745               | 28                                     | NR                             | 875               | 1                                      | NR                             |                   |                                        |                                |

REPORT NUMBER: SP1-2407-176-5

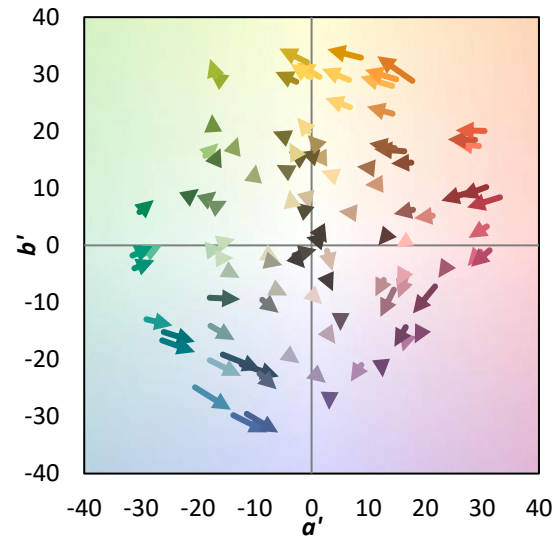
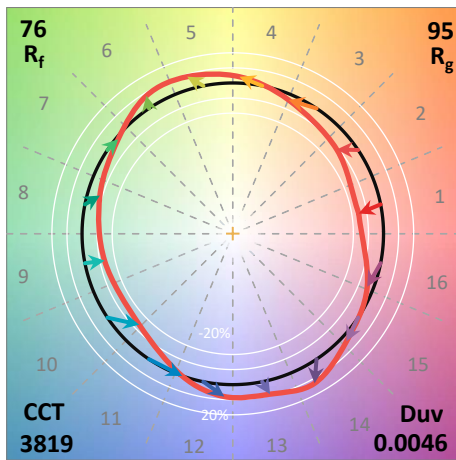
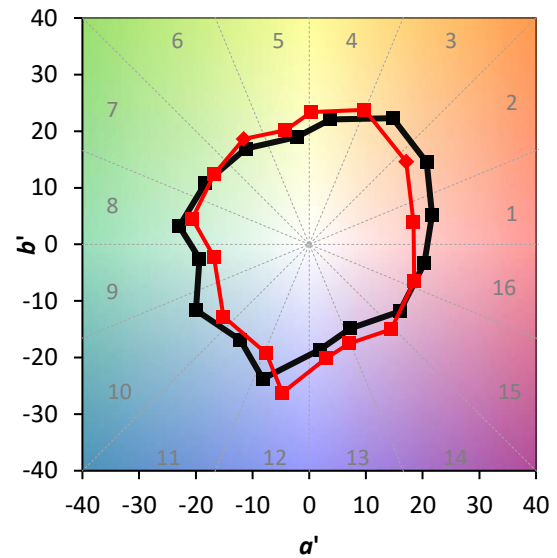
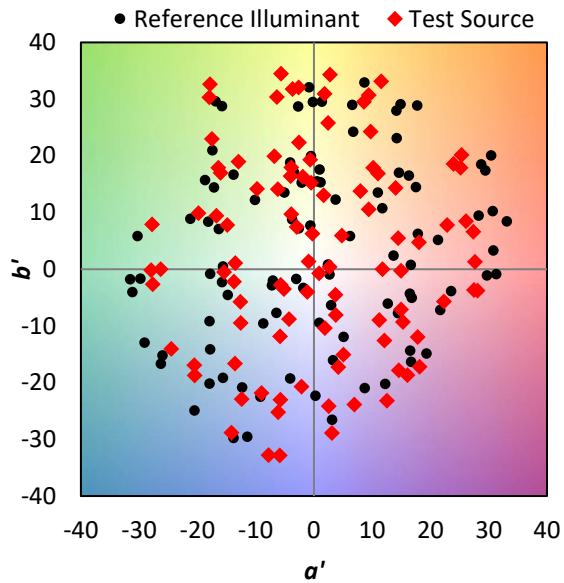
TM-30-18

### Summary

$R_f = 75.6$   
 $R_g = 94.8$   
 $CIE R_a = 72.9$   
 $R_g = -21.5$



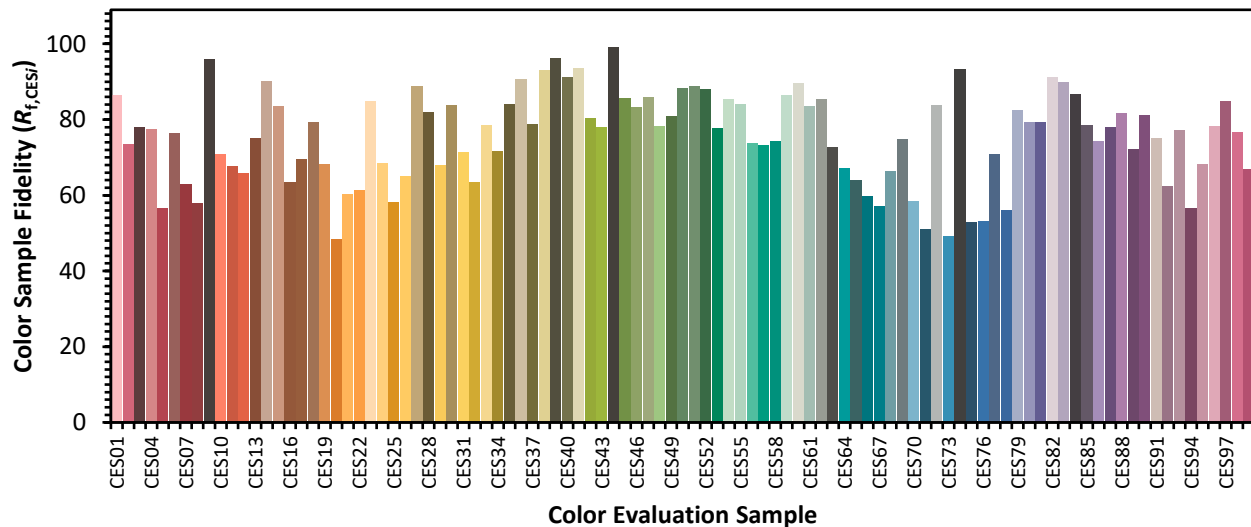
### Color Vector Graphics



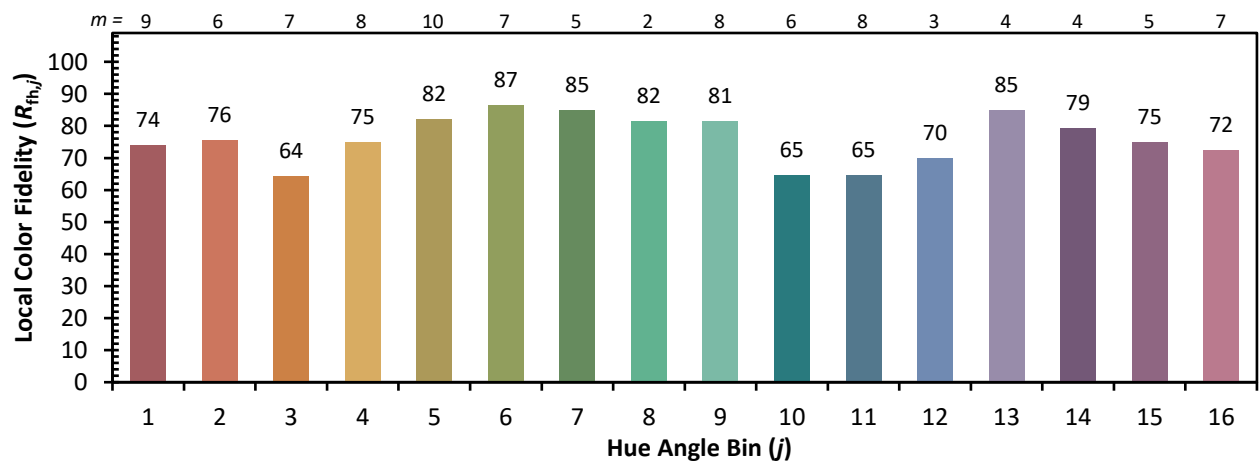
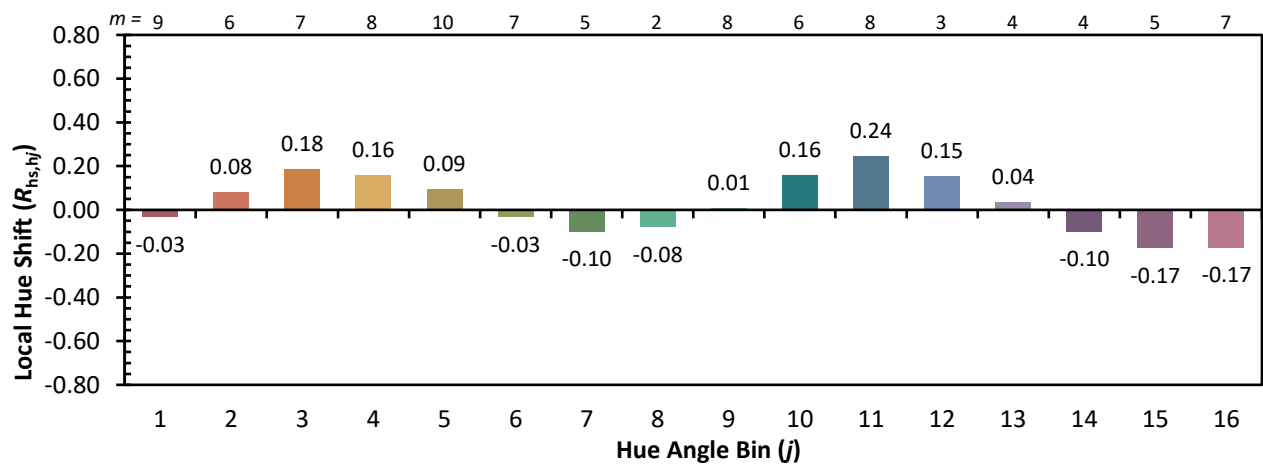
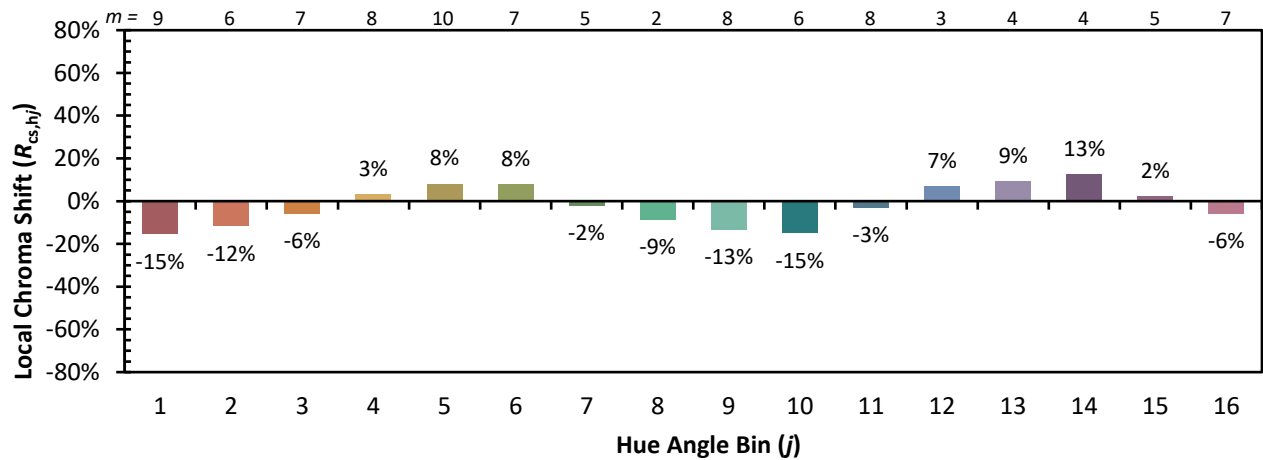


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

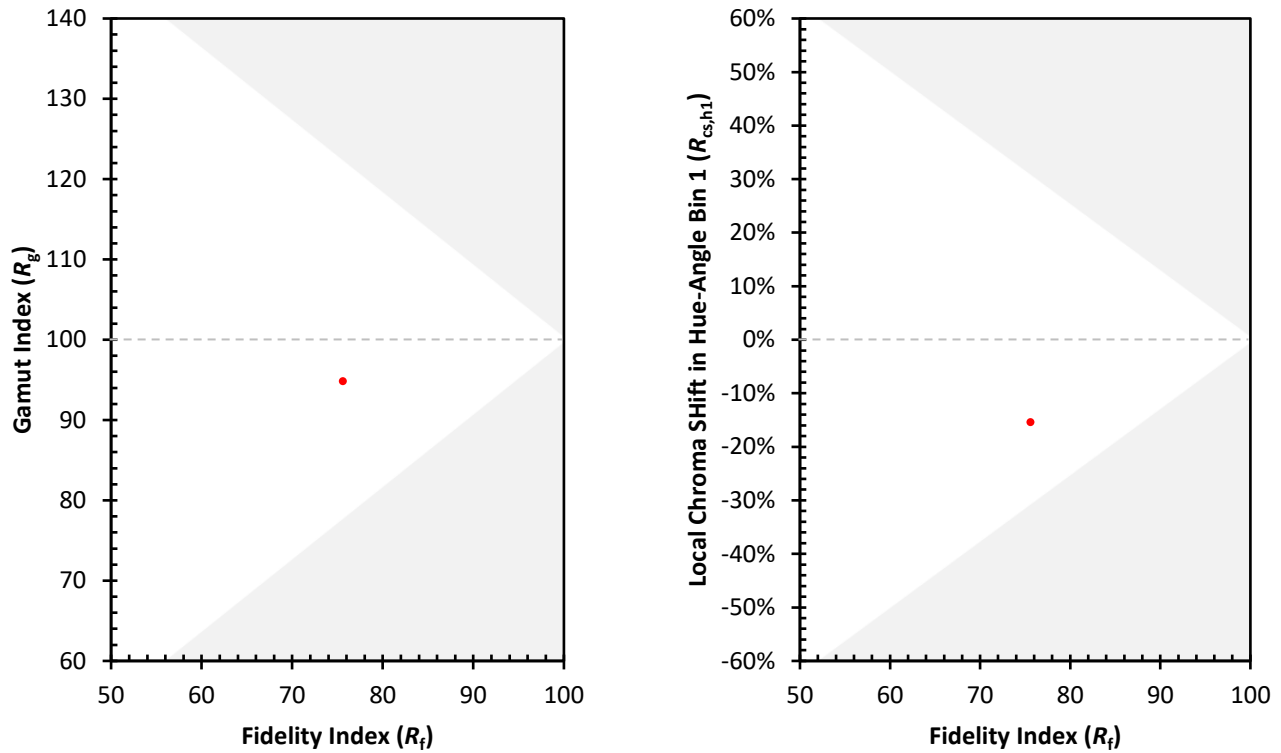
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 65 | CES51 = 89 | CES76 = 53 |
| CES02 = 61 | CES27 = 89 | CES52 = 88 | CES77 = 71 |
| CES03 = 30 | CES28 = 82 | CES53 = 78 | CES78 = 56 |
| CES04 = 70 | CES29 = 68 | CES54 = 85 | CES79 = 83 |
| CES05 = 48 | CES30 = 84 | CES55 = 84 | CES80 = 79 |
| CES06 = 50 | CES31 = 71 | CES56 = 74 | CES81 = 79 |
| CES07 = 40 | CES32 = 63 | CES57 = 73 | CES82 = 91 |
| CES08 = 39 | CES33 = 79 | CES58 = 74 | CES83 = 90 |
| CES09 = 29 | CES34 = 72 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 84 | CES60 = 90 | CES85 = 78 |
| CES11 = 57 | CES36 = 91 | CES61 = 84 | CES86 = 74 |
| CES12 = 63 | CES37 = 79 | CES62 = 85 | CES87 = 78 |
| CES13 = 42 | CES38 = 93 | CES63 = 73 | CES88 = 82 |
| CES14 = 74 | CES39 = 96 | CES64 = 67 | CES89 = 72 |
| CES15 = 71 | CES40 = 91 | CES65 = 64 | CES90 = 81 |
| CES16 = 47 | CES41 = 93 | CES66 = 60 | CES91 = 75 |
| CES17 = 49 | CES42 = 80 | CES67 = 57 | CES92 = 62 |
| CES18 = 56 | CES43 = 78 | CES68 = 66 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 75 | CES94 = 57 |
| CES20 = 65 | CES45 = 86 | CES70 = 58 | CES95 = 68 |
| CES21 = 86 | CES46 = 83 | CES71 = 51 | CES96 = 78 |
| CES22 = 78 | CES47 = 86 | CES72 = 84 | CES97 = 85 |
| CES23 = 92 | CES48 = 78 | CES73 = 49 | CES98 = 77 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 67 |
| CES25 = 72 | CES50 = 88 | CES75 = 53 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)