

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: INVUE

Report Number: P822928

Luminaire Tested: **MSA-SA1B-735-U-T2-HSS**

Issue Date: 04/10/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P822928  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1910-543-9)  
Test Lab: INNOVATION CENTER  
Issue Date: 04/10/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: MSA-SA1B-735-U-T2-HSS  
Description: MESA POST TOP DECORATIVE LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS  
EACH AND TYPE II OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3558.7 lumens  
Efficiency: N/A  
Efficacy: 80.9 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type II - Medium  
BUG Rating: B0 - U0 - G1

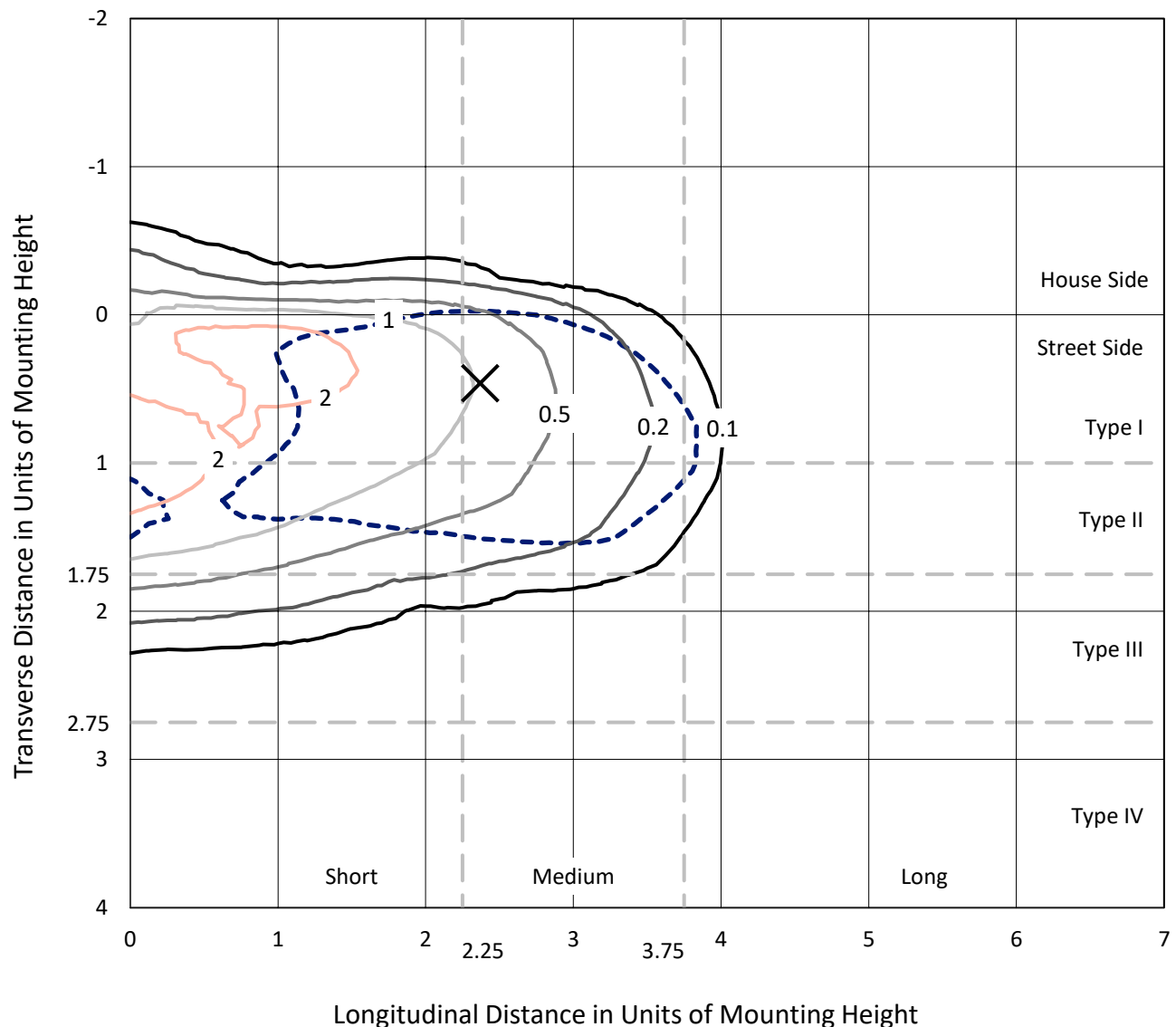
Input Watts (W): 44  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

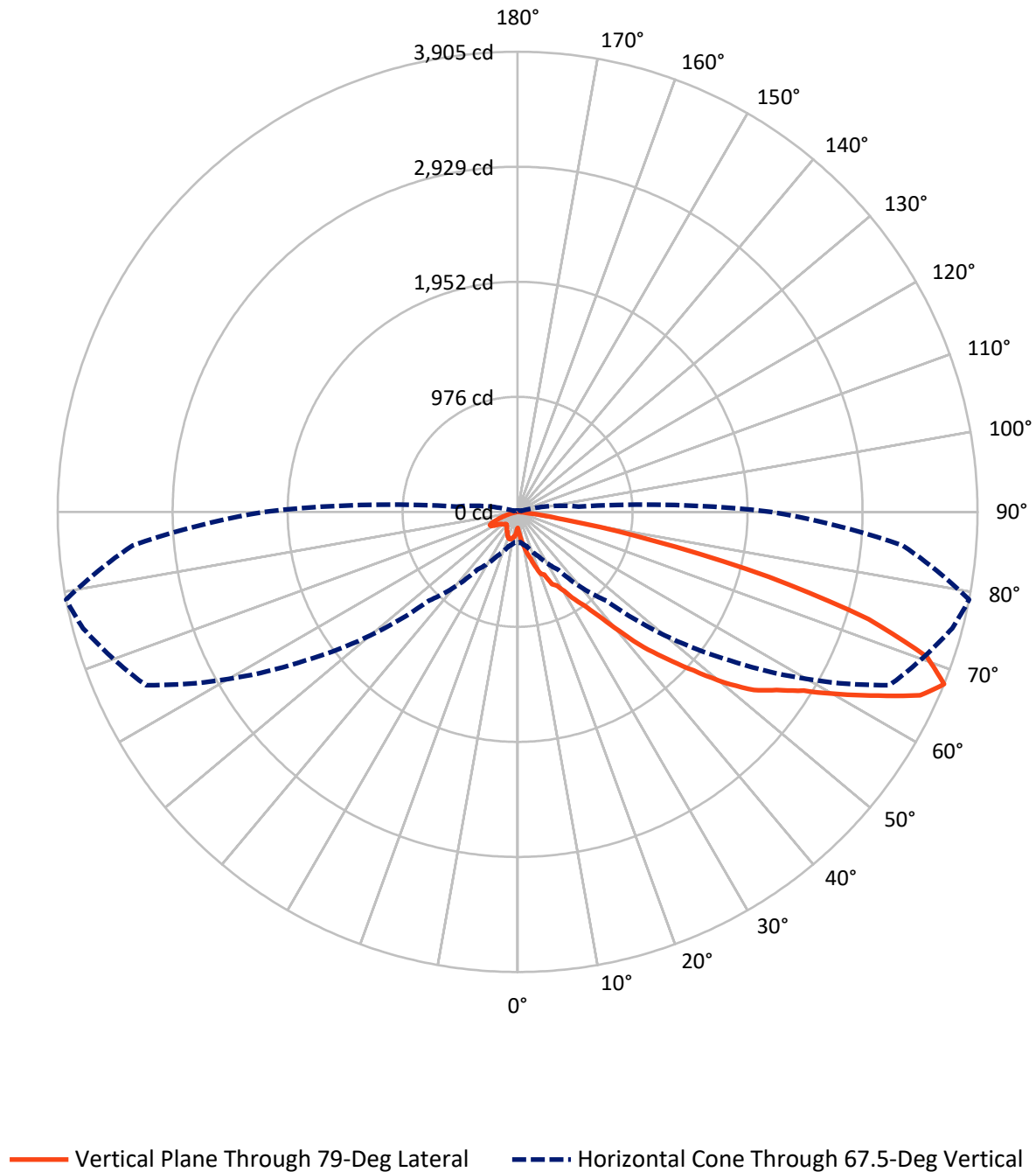


Based on 15 foot mounting height. Maximum calculated value = 3 fc  
 Type II - Medium - N/A

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## Luminous Intensity Polar Plot



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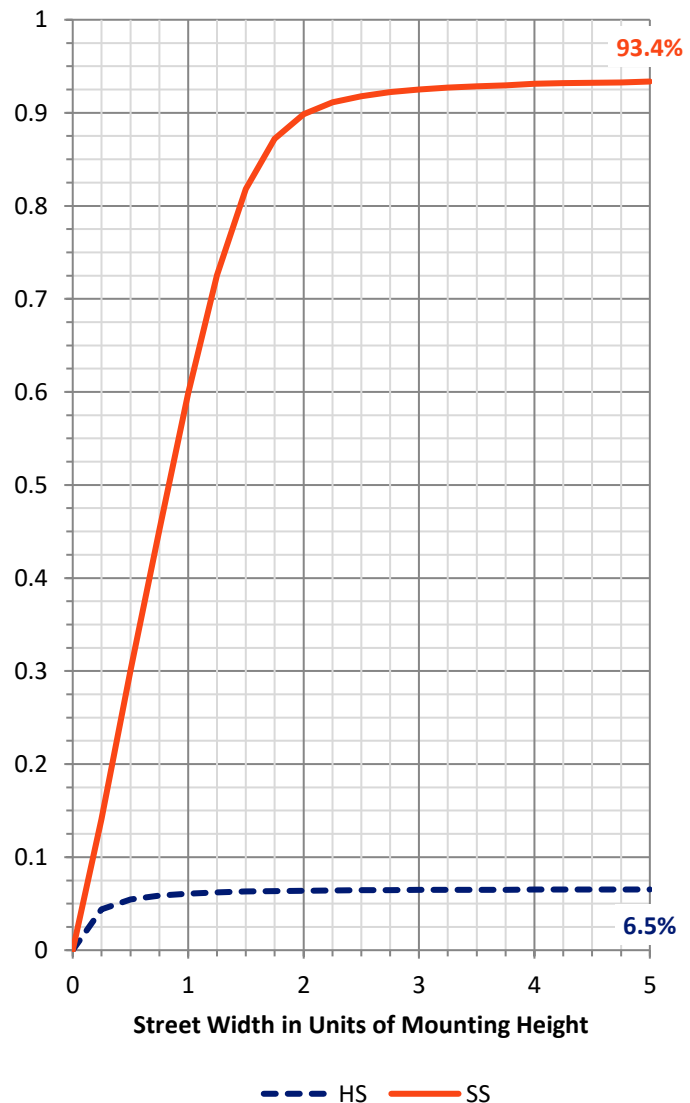
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 233.8    | 0.0    | 233.8  |
|                    | % Fixture | 6.6      | 0.0    | 6.6    |
| <b>Street Side</b> | Lumens    | 3324.9   | 0.0    | 3324.9 |
|                    | % Fixture | 93.4     | 0.0    | 93.4   |
| <b>Total</b>       | Lumens    | 3558.7   | 0.0    | 3558.7 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 19.9   | 0.6       |
| 10°-20°   | 79.5   | 2.2       |
| 20°-30°   | 153.4  | 4.3       |
| 30°-40°   | 301.3  | 8.5       |
| 40°-50°   | 603.7  | 17.0      |
| 50°-60°   | 964.9  | 27.1      |
| 60°-70°   | 970.9  | 27.3      |
| 70°-80°   | 438.0  | 12.3      |
| 80°-90°   | 27.1   | 0.8       |
| 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°    | 3558.7 | 100.0     |
| 0°-180°   | 3558.7 | 100.0     |



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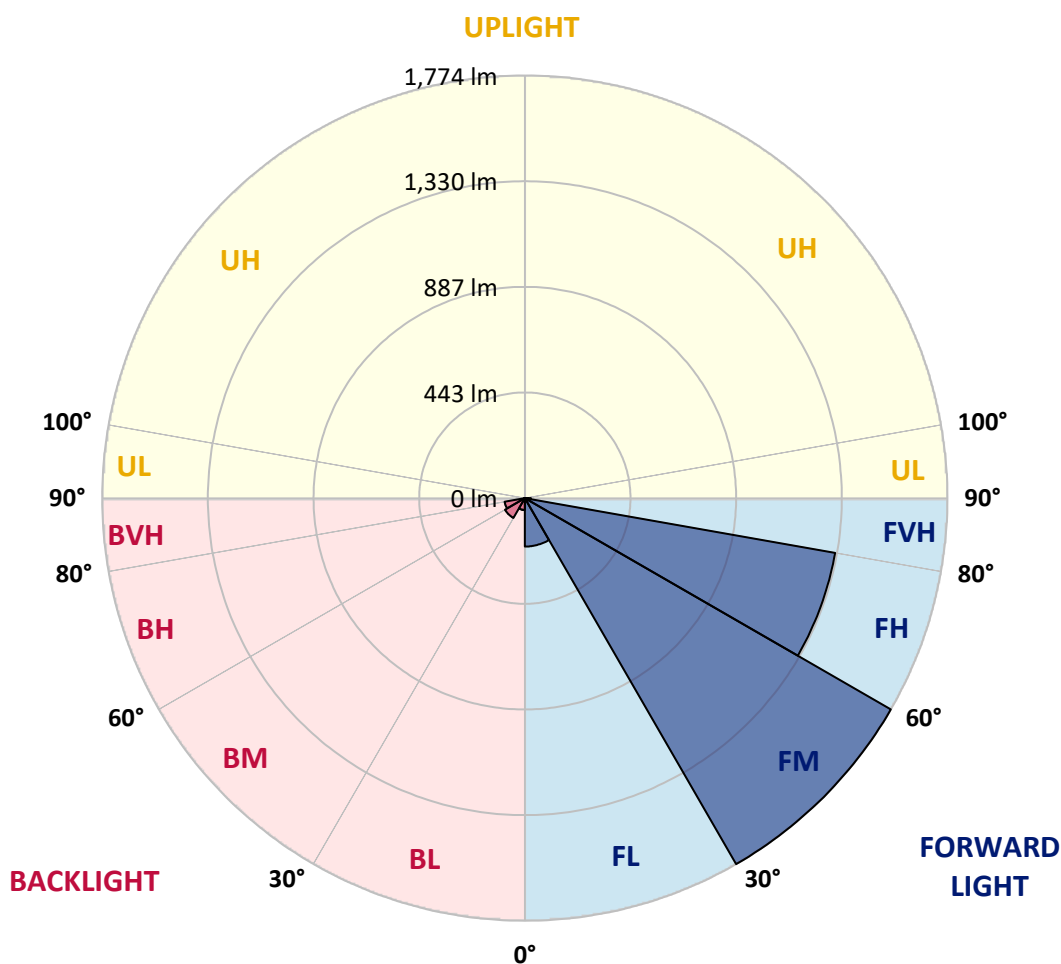
CATALOG NUMBER: MSA-SA1B-735-U-T2-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 203.2  | 5.7       |                         |      |         |
| FM   | (30°-60°)   | 1773.7 | 49.8      |                         |      |         |
| FH   | (60°-80°)   | 1322.6 | 37.2      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 25.4   | 0.7       |                         |      | G1/100  |
| BL   | (0°-30°)    | 49.7   | 1.4       | B0/110                  |      |         |
| BM   | (30°-60°)   | 96.2   | 2.7       | B0/220                  |      |         |
| BH   | (60°-80°)   | 86.2   | 2.4       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 1.7    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B0-U0-G1**

Type II Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 79°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 137.1  | 137.1  | 137.1  | 137.1  | 137.1  | 137.1  | 137.1  | 137.1  | 137.1  | 137.1  | 137.1  |
| 2.5°  | 185.2  | 178.5  | 167.7  | 173.8  | 173.5  | 176.5  | 170.7  | 164.2  | 153.8  | 164.2  | 165.0  |
| 5°    | 266.6  | 254.2  | 246.4  | 244.8  | 236.2  | 228.1  | 226.4  | 219.7  | 214.6  | 205.4  | 213.6  |
| 7.5°  | 332.1  | 326.4  | 312.6  | 311.0  | 289.7  | 278.0  | 281.7  | 278.7  | 259.4  | 249.8  | 257.8  |
| 10°   | 360.0  | 350.2  | 352.1  | 350.2  | 341.2  | 344.5  | 336.9  | 328.0  | 312.6  | 296.6  | 276.6  |
| 12.5° | 370.8  | 369.2  | 385.5  | 383.5  | 404.7  | 430.2  | 413.2  | 398.4  | 362.5  | 358.6  | 331.4  |
| 15°   | 393.9  | 403.8  | 401.3  | 409.6  | 423.1  | 466.5  | 466.1  | 469.6  | 431.6  | 411.2  | 371.7  |
| 17.5° | 414.6  | 421.7  | 410.0  | 419.4  | 456.3  | 482.6  | 517.7  | 504.0  | 508.3  | 487.5  | 426.5  |
| 20°   | 405.7  | 413.9  | 402.2  | 396.5  | 461.4  | 511.3  | 558.1  | 548.2  | 574.1  | 561.1  | 476.9  |
| 22.5° | 460.8  | 445.3  | 415.7  | 397.2  | 445.7  | 510.6  | 572.5  | 614.2  | 609.7  | 578.0  | 523.7  |
| 25°   | 528.9  | 519.5  | 484.0  | 451.4  | 455.7  | 507.1  | 617.6  | 679.0  | 692.3  | 678.8  | 568.3  |
| 27.5° | 620.7  | 618.6  | 545.9  | 531.9  | 489.8  | 491.6  | 624.6  | 760.6  | 730.2  | 708.9  | 620.3  |
| 30°   | 740.5  | 723.5  | 637.4  | 619.0  | 556.9  | 526.5  | 667.8  | 831.0  | 808.6  | 779.8  | 669.2  |
| 32.5° | 869.5  | 872.0  | 762.1  | 701.3  | 651.5  | 615.4  | 650.7  | 864.0  | 905.7  | 882.4  | 730.2  |
| 35°   | 1015.8 | 1027.2 | 892.8  | 821.4  | 724.5  | 671.3  | 724.0  | 965.1  | 1040.1 | 978.7  | 812.0  |
| 37.5° | 1241.2 | 1240.8 | 1083.8 | 941.7  | 871.2  | 813.6  | 846.3  | 1057.2 | 1205.3 | 1118.9 | 958.7  |
| 40°   | 1439.5 | 1396.4 | 1250.4 | 1087.0 | 977.2  | 961.4  | 937.7  | 1183.1 | 1381.7 | 1329.7 | 1089.1 |
| 42.5° | 1587.6 | 1557.3 | 1380.9 | 1253.7 | 1117.6 | 1067.8 | 1059.3 | 1367.8 | 1641.9 | 1569.2 | 1275.4 |
| 45°   | 1764.8 | 1665.1 | 1535.3 | 1420.7 | 1282.0 | 1267.4 | 1247.7 | 1555.1 | 1944.9 | 1780.8 | 1437.2 |
| 47.5° | 1923.5 | 1829.8 | 1706.9 | 1559.8 | 1400.5 | 1520.2 | 1444.1 | 1719.6 | 2165.2 | 2011.2 | 1615.7 |
| 50°   | 2057.1 | 1957.5 | 1819.9 | 1707.9 | 1639.6 | 1720.9 | 1594.0 | 1855.2 | 2403.2 | 2278.4 | 1782.6 |
| 52.5° | 2125.2 | 2012.3 | 1906.1 | 1836.7 | 1878.6 | 1860.3 | 1797.1 | 2019.4 | 2606.0 | 2512.6 | 1930.6 |
| 55°   | 2069.3 | 1959.0 | 1914.4 | 1948.8 | 2075.7 | 2023.0 | 2028.1 | 2273.8 | 2797.5 | 2668.8 | 2059.2 |
| 57.5° | 1821.3 | 1720.7 | 1740.5 | 1834.4 | 2077.7 | 2215.8 | 2291.4 | 2521.0 | 2951.0 | 2863.4 | 2257.8 |
| 60°   | 1377.7 | 1296.7 | 1370.1 | 1536.9 | 1882.3 | 2177.3 | 2478.1 | 2768.2 | 3170.6 | 3143.1 | 2558.4 |
| 62.5° | 841.4  | 797.4  | 901.4  | 1109.3 | 1500.0 | 1988.8 | 2587.0 | 3097.8 | 3405.4 | 3434.6 | 2877.1 |
| 65°   | 429.2  | 409.4  | 496.2  | 679.0  | 1013.4 | 1633.7 | 2508.3 | 3302.6 | 3648.1 | 3755.9 | 3180.9 |
| 67.5° | 270.4  | 257.6  | 303.9  | 414.1  | 597.9  | 1065.7 | 2196.2 | 3481.8 | 3819.6 | 3904.9 | 3282.4 |
| 70°   | 187.3  | 179.3  | 219.3  | 284.2  | 377.2  | 574.1  | 1630.6 | 3314.5 | 3683.5 | 3687.5 | 3037.0 |
| 72.5° | 118.9  | 112.6  | 151.7  | 210.5  | 278.4  | 296.4  | 934.8  | 2600.9 | 3153.1 | 3116.9 | 2459.4 |
| 75°   | 77.1   | 74.0   | 96.3   | 154.2  | 213.8  | 182.9  | 462.0  | 1754.9 | 2260.9 | 2204.1 | 1633.6 |
| 77.5° | 55.3   | 53.4   | 64.6   | 103.0  | 152.2  | 127.9  | 207.2  | 1046.0 | 1296.3 | 1172.0 | 793.0  |
| 80°   | 33.4   | 33.2   | 46.7   | 64.6   | 108.3  | 90.3   | 95.8   | 474.9  | 502.6  | 409.8  | 242.3  |
| 82.5° | 16.7   | 17.2   | 26.1   | 41.5   | 69.7   | 59.1   | 43.8   | 158.1  | 135.0  | 99.5   | 49.0   |
| 85°   | 3.9    | 4.9    | 13.7   | 28.6   | 34.9   | 23.6   | 20.8   | 41.4   | 37.1   | 28.0   | 14.3   |
| 87.5° | 0.0    | 0.0    | 4.3    | 6.9    | 9.4    | 3.9    | 7.1    | 7.8    | 10.0   | 7.8    | 3.0    |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 137.1  | 137.1 | 137.1 | 137.1 | 137.1 | 137.1 | 137.1 | 137.1 | 137.1 | 137.1 | 137.1 |
| 2.5°  | 165.2  | 162.8 | 148.5 | 144.8 | 144.4 | 140.3 | 141.2 | 137.3 | 137.5 | 146.4 | 146.4 |
| 5°    | 210.5  | 196.8 | 183.1 | 170.9 | 162.7 | 150.8 | 146.5 | 144.8 | 143.2 | 146.7 | 148.9 |
| 7.5°  | 247.2  | 226.9 | 202.3 | 175.8 | 151.3 | 134.3 | 132.0 | 127.7 | 126.1 | 129.7 | 132.4 |
| 10°   | 263.5  | 238.4 | 204.4 | 165.7 | 142.8 | 129.1 | 117.7 | 111.6 | 110.5 | 110.2 | 111.2 |
| 12.5° | 298.0  | 266.8 | 206.7 | 162.0 | 137.1 | 122.0 | 109.1 | 98.8  | 89.4  | 90.5  | 89.4  |
| 15°   | 325.7  | 288.8 | 206.7 | 153.1 | 123.4 | 108.3 | 85.5  | 80.4  | 79.1  | 81.2  | 79.5  |
| 17.5° | 367.4  | 310.5 | 196.4 | 136.9 | 111.6 | 84.1  | 75.6  | 75.2  | 77.9  | 81.0  | 79.1  |
| 20°   | 392.6  | 313.5 | 178.9 | 118.5 | 91.6  | 72.9  | 69.9  | 66.7  | 70.6  | 73.1  | 72.2  |
| 22.5° | 418.7  | 313.7 | 161.4 | 108.7 | 73.8  | 66.5  | 61.4  | 58.9  | 59.4  | 61.8  | 62.2  |
| 25°   | 429.8  | 306.0 | 145.1 | 95.8  | 66.9  | 59.4  | 54.1  | 51.4  | 50.4  | 51.6  | 51.2  |
| 27.5° | 460.2  | 291.3 | 127.5 | 81.6  | 63.5  | 52.7  | 47.9  | 44.5  | 41.5  | 43.5  | 44.0  |
| 30°   | 464.6  | 286.7 | 117.9 | 72.6  | 59.2  | 46.7  | 42.4  | 38.8  | 36.7  | 39.4  | 39.4  |
| 32.5° | 478.3  | 260.8 | 113.0 | 68.8  | 54.8  | 43.1  | 37.3  | 34.7  | 34.4  | 36.1  | 36.3  |
| 35°   | 499.4  | 249.3 | 105.7 | 66.0  | 50.6  | 39.0  | 33.5  | 32.3  | 32.0  | 33.4  | 33.4  |
| 37.5° | 571.3  | 235.2 | 97.7  | 63.3  | 47.0  | 36.9  | 32.6  | 30.6  | 30.8  | 32.0  | 32.8  |
| 40°   | 619.0  | 237.0 | 85.7  | 60.2  | 42.9  | 34.9  | 30.6  | 29.3  | 29.1  | 29.6  | 30.2  |
| 42.5° | 707.4  | 238.4 | 80.4  | 56.9  | 39.8  | 32.6  | 28.6  | 27.7  | 26.8  | 27.5  | 28.0  |
| 45°   | 806.3  | 245.6 | 77.7  | 54.1  | 38.1  | 31.2  | 26.8  | 26.3  | 24.5  | 24.9  | 25.7  |
| 47.5° | 901.6  | 272.1 | 74.3  | 50.2  | 36.5  | 30.4  | 25.2  | 23.8  | 22.5  | 22.4  | 23.1  |
| 50°   | 1009.9 | 297.8 | 70.6  | 45.9  | 34.9  | 29.3  | 23.4  | 21.1  | 20.4  | 20.4  | 21.0  |
| 52.5° | 1106.8 | 322.3 | 67.1  | 42.9  | 33.7  | 27.1  | 21.8  | 19.7  | 19.0  | 19.0  | 19.8  |
| 55°   | 1208.8 | 348.0 | 63.9  | 40.2  | 32.1  | 24.9  | 20.4  | 18.4  | 18.3  | 17.9  | 18.4  |
| 57.5° | 1388.9 | 404.1 | 60.0  | 37.8  | 30.0  | 23.1  | 19.2  | 17.2  | 16.9  | 16.3  | 16.9  |
| 60°   | 1651.2 | 490.2 | 55.0  | 35.5  | 27.5  | 22.0  | 18.3  | 15.9  | 15.3  | 14.3  | 14.5  |
| 62.5° | 1907.6 | 559.9 | 49.0  | 32.6  | 25.2  | 20.8  | 16.7  | 14.3  | 13.3  | 12.2  | 12.4  |
| 65°   | 2127.3 | 587.4 | 42.8  | 29.1  | 22.7  | 18.1  | 14.5  | 12.6  | 11.2  | 9.6   | 9.4   |
| 67.5° | 2153.2 | 518.7 | 36.7  | 25.7  | 20.4  | 15.3  | 12.4  | 11.2  | 9.0   | 7.6   | 7.3   |
| 70°   | 1937.8 | 386.4 | 30.6  | 22.7  | 17.7  | 12.9  | 10.6  | 9.8   | 8.5   | 7.3   | 6.7   |
| 72.5° | 1543.1 | 285.3 | 25.7  | 20.2  | 15.5  | 11.0  | 9.0   | 9.2   | 8.5   | 7.1   | 6.2   |
| 75°   | 1020.5 | 163.2 | 21.0  | 16.9  | 12.9  | 8.9   | 8.2   | 8.2   | 8.0   | 6.7   | 5.9   |
| 77.5° | 491.0  | 70.4  | 16.1  | 13.3  | 10.4  | 6.7   | 7.5   | 7.5   | 7.6   | 6.1   | 4.9   |
| 80°   | 139.3  | 21.1  | 10.0  | 9.0   | 7.6   | 4.5   | 5.9   | 5.7   | 5.1   | 3.5   | 2.1   |
| 82.5° | 24.9   | 8.2   | 4.5   | 4.8   | 4.3   | 1.8   | 3.4   | 3.2   | 2.5   | 1.4   | 0.2   |
| 85°   | 6.9    | 3.2   | 2.5   | 2.7   | 2.1   | 0.6   | 1.4   | 1.8   | 1.4   | 0.7   | 0.0   |
| 87.5° | 1.8    | 1.4   | 1.8   | 2.0   | 1.6   | 0.2   | 0.6   | 0.2   | 0.6   | 0.2   | 0.0   |
| 90°   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2101-121-7

Luminaire Tested: IFLD-S-SA2A-735-U-T2

Test Date: 03/04/2021

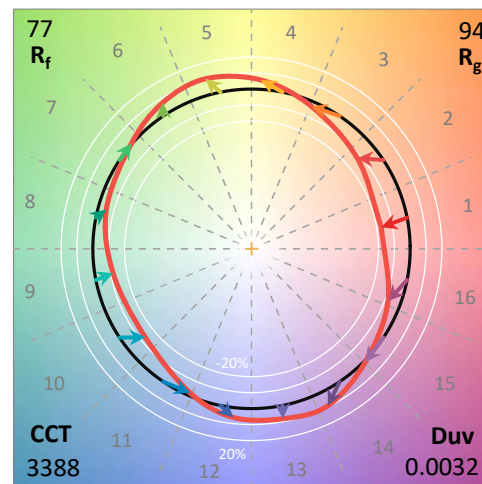
### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-7  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/04/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-735-U-T2**  
 Description: STREETWORKS INF FLOOD

PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 3388   | CRI (Ra): | 73.1 |      |       |
| CIE u':                   | 0.2371 | R1:       | 68.9 | R9:  | -34.6 |
| CIE v':                   | 0.5177 | R2:       | 81.1 | R10: | 57.8  |
| Duv:                      | 0.0032 | R3:       | 93.1 | R11: | 68.6  |
| CIE x:                    | 0.4153 | R4:       | 71.6 | R12: | 53.9  |
| CIE y:                    | 0.4030 | R5:       | 69.4 | R13: | 70.9  |
| CIE z:                    | 0.1817 | R6:       | 75.0 | R14: | 96.2  |
| Peak Wavelength (nm):     | 590    | R7:       | 79.5 |      |       |
| Dominant Wavelength (nm): | 580    | R8:       | 46.4 |      |       |
| Purity:                   | 45.7   |           |      |      |       |
| Rf:                       | 76.9   |           |      |      |       |
| Rg:                       | 94.4   |           |      |      |       |



### Test Conditions

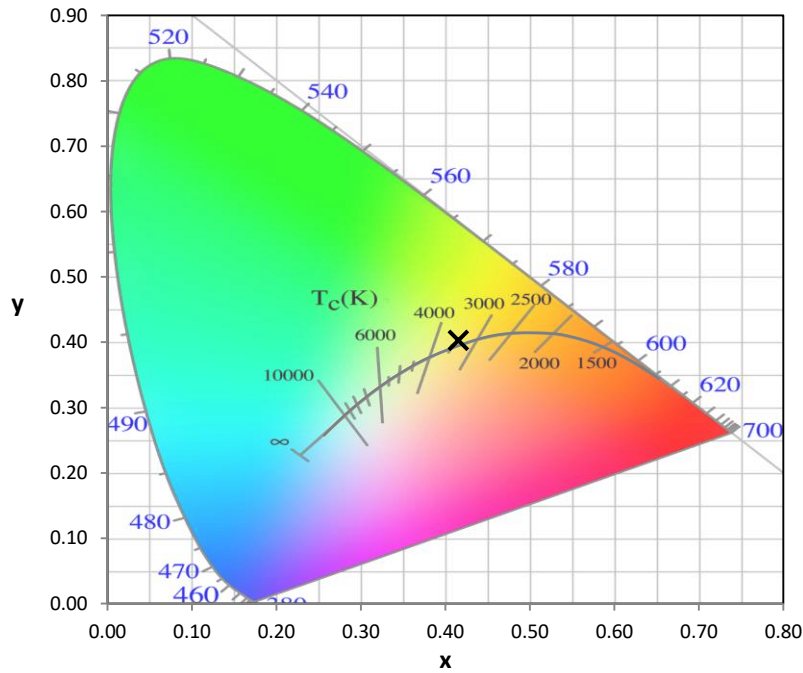
Stabilization Time: 81M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0/30%  
 Sphere Temperature (°C): 24.1

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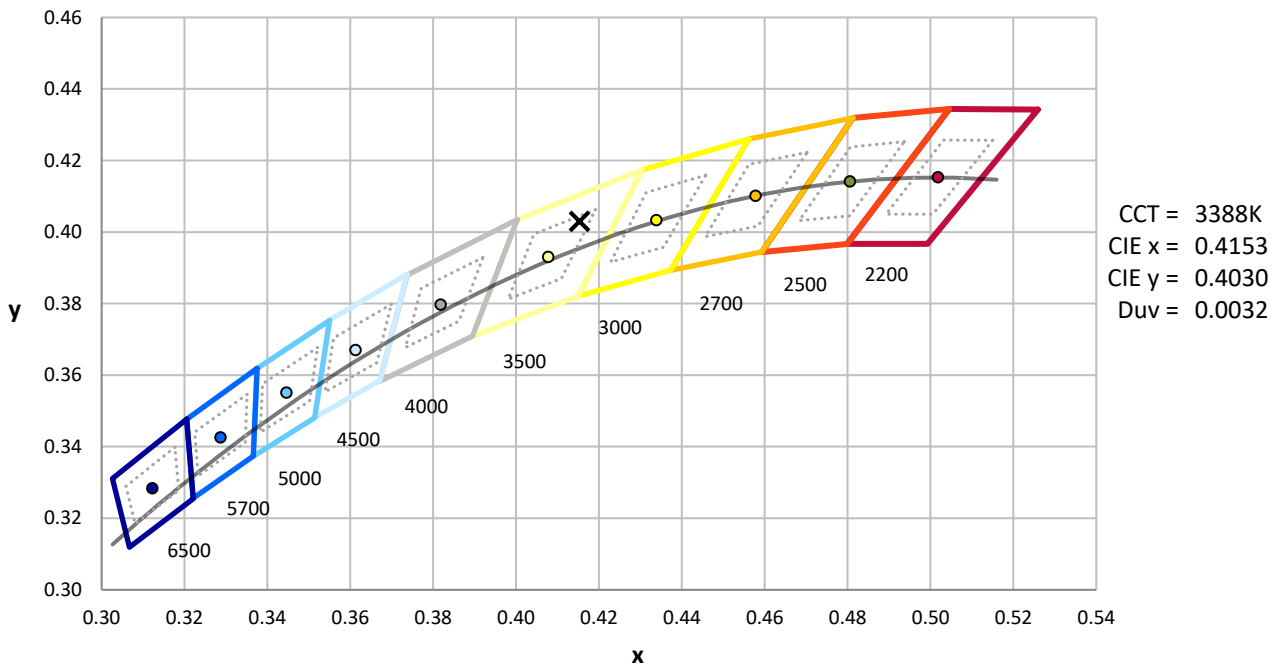
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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**CIE 1931 Chromaticity Diagram**



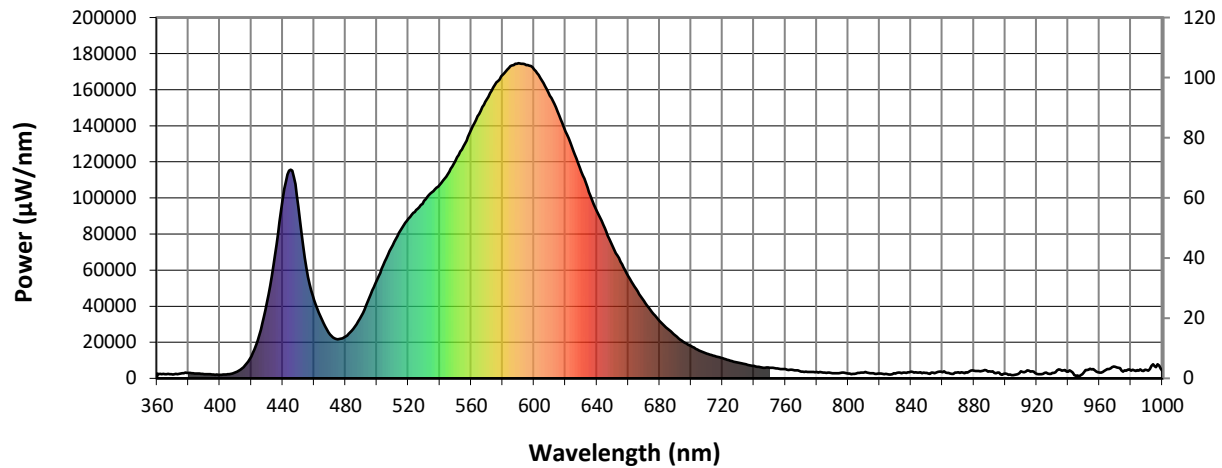
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3500K 4-step quadrangle

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### Photopic Flux vs. Wavelength

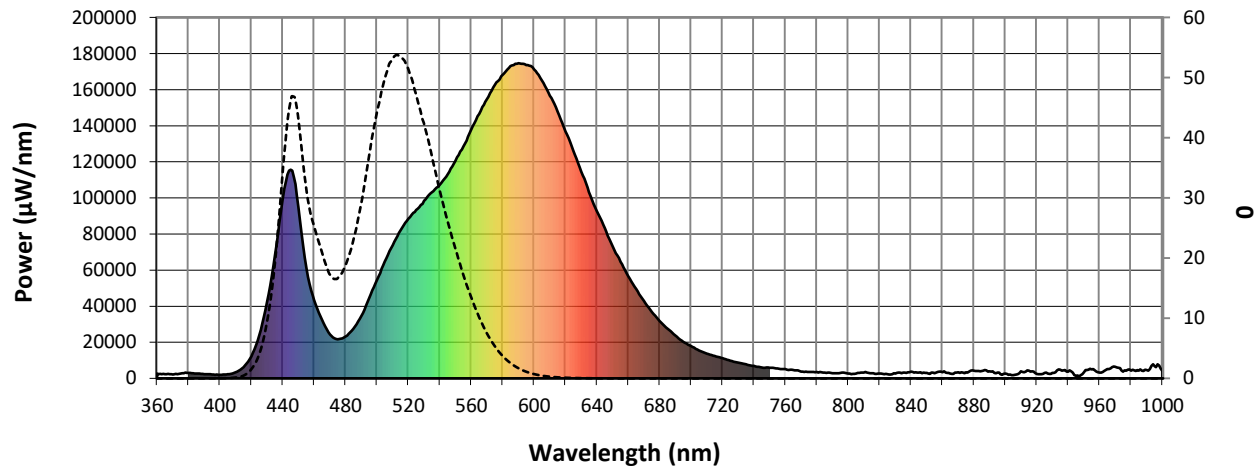


#####

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 2672                          | 0.0                            | 490               | 34553                         | 4.9                            | 620               | 136720                        | 35.6                           | 750               | 5870                          | 0.0                            | 880               | 4216                          | 0.0                            |
| 365               | 2252                          | 0.0                            | 495               | 44336                         | 8.0                            | 625               | 126308                        | 27.9                           | 755               | 5421                          | 0.0                            | 885               | 4132                          | 0.0                            |
| 370               | 2217                          | 0.0                            | 500               | 54643                         | 12.1                           | 630               | 114625                        | 20.7                           | 760               | 5097                          | 0.0                            | 890               | 3992                          | 0.0                            |
| 375               | 2697                          | 0.0                            | 505               | 64676                         | 18.1                           | 635               | 103216                        | 15.5                           | 765               | 4626                          | 0.0                            | 895               | 3214                          | 0.0                            |
| 380               | 3039                          | 0.0                            | 510               | 73825                         | 25.4                           | 640               | 92605                         | 11.1                           | 770               | 3782                          | 0.0                            | 900               | 2580                          | 0.0                            |
| 385               | 2655                          | 0.0                            | 515               | 81872                         | 33.9                           | 645               | 83234                         | 8.0                            | 775               | 3506                          | 0.0                            | 905               | 1776                          | 0.0                            |
| 390               | 2357                          | 0.0                            | 520               | 88574                         | 43.0                           | 650               | 73263                         | 5.4                            | 780               | 3507                          | 0.0                            | 910               | 3995                          | 0.0                            |
| 395               | 2186                          | 0.0                            | 525               | 93289                         | 50.1                           | 655               | 64627                         | 3.7                            | 785               | 3267                          | 0.0                            | 915               | 4288                          | 0.0                            |
| 400               | 2015                          | 0.0                            | 530               | 98393                         | 57.9                           | 660               | 56614                         | 2.4                            | 790               | 2849                          | 0.0                            | 920               | 2446                          | 0.0                            |
| 405               | 2234                          | 0.0                            | 535               | 103269                        | 64.0                           | 665               | 49537                         | 1.6                            | 795               | 3037                          | 0.0                            | 925               | 3009                          | 0.0                            |
| 410               | 3412                          | 0.0                            | 540               | 107316                        | 69.9                           | 670               | 42866                         | 0.9                            | 800               | 2716                          | 0.0                            | 930               | 3026                          | 0.0                            |
| 415               | 6135                          | 0.0                            | 545               | 113101                        | 75.3                           | 675               | 36708                         | 0.6                            | 805               | 2648                          | 0.0                            | 935               | 4734                          | 0.0                            |
| 420               | 12146                         | 0.0                            | 550               | 120690                        | 82.0                           | 680               | 31814                         | 0.4                            | 810               | 3187                          | 0.0                            | 940               | 3719                          | 0.0                            |
| 425               | 23983                         | 0.1                            | 555               | 128583                        | 87.8                           | 685               | 27485                         | 0.2                            | 815               | 2931                          | 0.0                            | 945               | 1480                          | 0.0                            |
| 430               | 42142                         | 0.3                            | 560               | 137796                        | 93.6                           | 690               | 23698                         | 0.1                            | 820               | 2717                          | 0.0                            | 950               | 3450                          | 0.0                            |
| 435               | 68228                         | 0.8                            | 565               | 146577                        | 97.5                           | 695               | 20309                         | 0.1                            | 825               | 2236                          | 0.0                            | 955               | 5051                          | 0.0                            |
| 440               | 99323                         | 1.6                            | 570               | 154581                        | 100.5                          | 700               | 17890                         | 0.1                            | 830               | 2628                          | 0.0                            | 960               | 3176                          | 0.0                            |
| 445               | 115584                        | 2.4                            | 575               | 162633                        | 101.2                          | 705               | 15500                         | 0.0                            | 835               | 3140                          | 0.0                            | 965               | 5178                          | 0.0                            |
| 450               | 94997                         | 2.5                            | 580               | 168101                        | 99.9                           | 710               | 13699                         | 0.0                            | 840               | 3675                          | 0.0                            | 970               | 6385                          | 0.0                            |
| 455               | 61433                         | 2.1                            | 585               | 173145                        | 96.2                           | 715               | 12398                         | 0.0                            | 845               | 3283                          | 0.0                            | 975               | 3810                          | 0.0                            |
| 460               | 43373                         | 1.8                            | 590               | 174675                        | 90.3                           | 720               | 11147                         | 0.0                            | 850               | 3055                          | 0.0                            | 980               | 4322                          | 0.0                            |
| 465               | 32472                         | 1.7                            | 595               | 173724                        | 82.3                           | 725               | 9761                          | 0.0                            | 855               | 2932                          | 0.0                            | 985               | 4200                          | 0.0                            |
| 470               | 24257                         | 1.5                            | 600               | 171241                        | 73.8                           | 730               | 8651                          | 0.0                            | 860               | 3382                          | 0.0                            | 990               | 4661                          | 0.0                            |
| 475               | 21690                         | 1.7                            | 605               | 165134                        | 64.0                           | 735               | 7730                          | 0.0                            | 865               | 2605                          | 0.0                            | 995               | 6746                          | 0.0                            |
| 480               | 23173                         | 2.2                            | 610               | 156652                        | 53.8                           | 740               | 6847                          | 0.0                            | 870               | 3325                          | 0.0                            | 1000              | 4150                          | 0.0                            |
| 485               | 27564                         | 3.3                            | 615               | 147879                        | 44.6                           | 745               | 6124                          | 0.0                            | 875               | 3325                          | 0.0                            |                   |                               |                                |

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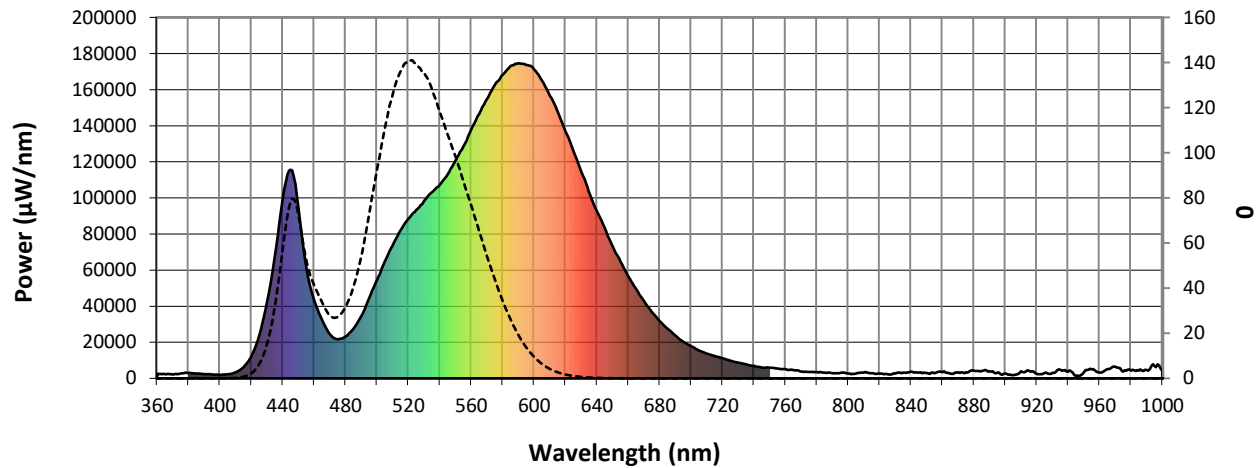
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 12126**
**S/P: 1.36**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2672             | 0.0              | 490       | 34553            | 53.2             | 620       | 136720           | 1.7              | 750       | 5870             | 0.0              | 880       | 4216             | 0.0              |
| 365       | 2252             | 0.0              | 495       | 44336            | 71.7             | 625       | 126308           | 1.1              | 755       | 5421             | 0.0              | 885       | 4132             | 0.0              |
| 370       | 2217             | 0.0              | 500       | 54643            | 91.4             | 630       | 114625           | 0.6              | 760       | 5097             | 0.0              | 890       | 3992             | 0.0              |
| 375       | 2697             | 0.0              | 505       | 64676            | 110.0            | 635       | 103216           | 0.4              | 765       | 4626             | 0.0              | 895       | 3214             | 0.0              |
| 380       | 3039             | 0.0              | 510       | 73825            | 125.1            | 640       | 92605            | 0.2              | 770       | 3782             | 0.0              | 900       | 2580             | 0.0              |
| 385       | 2655             | 0.0              | 515       | 81872            | 135.7            | 645       | 83234            | 0.1              | 775       | 3506             | 0.0              | 905       | 1776             | 0.0              |
| 390       | 2357             | 0.0              | 520       | 88574            | 140.8            | 650       | 73263            | 0.1              | 780       | 3507             | 0.0              | 910       | 3995             | 0.0              |
| 395       | 2186             | 0.0              | 525       | 93289            | 139.6            | 655       | 64627            | 0.1              | 785       | 3267             | 0.0              | 915       | 4288             | 0.0              |
| 400       | 2015             | 0.0              | 530       | 98393            | 135.7            | 660       | 56614            | 0.0              | 790       | 2849             | 0.0              | 920       | 2446             | 0.0              |
| 405       | 2234             | 0.1              | 535       | 103269           | 128.7            | 665       | 49537            | 0.0              | 795       | 3037             | 0.0              | 925       | 3009             | 0.0              |
| 410       | 3412             | 0.2              | 540       | 107316           | 118.6            | 670       | 42866            | 0.0              | 800       | 2716             | 0.0              | 930       | 3026             | 0.0              |
| 415       | 6135             | 0.6              | 545       | 113101           | 108.4            | 675       | 36708            | 0.0              | 805       | 2648             | 0.0              | 935       | 4734             | 0.0              |
| 420       | 12146            | 2.0              | 550       | 120690           | 98.7             | 680       | 31814            | 0.0              | 810       | 3187             | 0.0              | 940       | 3719             | 0.0              |
| 425       | 23983            | 5.9              | 555       | 128583           | 87.9             | 685       | 27485            | 0.0              | 815       | 2931             | 0.0              | 945       | 1480             | 0.0              |
| 430       | 42142            | 14.3             | 560       | 137796           | 77.0             | 690       | 23698            | 0.0              | 820       | 2717             | 0.0              | 950       | 3450             | 0.0              |
| 435       | 68228            | 30.5             | 565       | 146577           | 65.8             | 695       | 20309            | 0.0              | 825       | 2236             | 0.0              | 955       | 5051             | 0.0              |
| 440       | 99323            | 55.5             | 570       | 154581           | 54.6             | 700       | 17890            | 0.0              | 830       | 2628             | 0.0              | 960       | 3176             | 0.0              |
| 445       | 115584           | 77.4             | 575       | 162633           | 44.3             | 705       | 15500            | 0.0              | 835       | 3140             | 0.0              | 965       | 5178             | 0.0              |
| 450       | 94997            | 73.6             | 580       | 168101           | 34.6             | 710       | 13699            | 0.0              | 840       | 3675             | 0.0              | 970       | 6385             | 0.0              |
| 455       | 61433            | 53.7             | 585       | 173145           | 26.5             | 715       | 12398            | 0.0              | 845       | 3283             | 0.0              | 975       | 3810             | 0.0              |
| 460       | 43373            | 41.9             | 590       | 174675           | 19.5             | 720       | 11147            | 0.0              | 850       | 3055             | 0.0              | 980       | 4322             | 0.0              |
| 465       | 32472            | 34.3             | 595       | 173724           | 13.9             | 725       | 9761             | 0.0              | 855       | 2932             | 0.0              | 985       | 4200             | 0.0              |
| 470       | 24257            | 27.9             | 600       | 171241           | 9.7              | 730       | 8651             | 0.0              | 860       | 3382             | 0.0              | 990       | 4661             | 0.0              |
| 475       | 21690            | 27.1             | 605       | 165134           | 6.5              | 735       | 7730             | 0.0              | 865       | 2605             | 0.0              | 995       | 6746             | 0.0              |
| 480       | 23173            | 31.3             | 610       | 156652           | 4.2              | 740       | 6847             | 0.0              | 870       | 3325             | 0.0              | 1000      | 4150             | 0.0              |
| 485       | 27564            | 40.0             | 615       | 147879           | 2.7              | 745       | 6124             | 0.0              | 875       | 3325             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: 4490.7

M/P: 0.5

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2672             | 0.0              | 490       | 34553            | 28.8             | 620       | 136720           | 0.1              | 750       | 5870             | 0.0              | 880       | 4216             | 0.0              |
| 365       | 2252             | 0.0              | 495       | 44336            | 36.6             | 625       | 126308           | 0.1              | 755       | 5421             | 0.0              | 885       | 4132             | 0.0              |
| 370       | 2217             | 0.0              | 500       | 54643            | 43.9             | 630       | 114625           | 0.0              | 760       | 5097             | 0.0              | 890       | 3992             | 0.0              |
| 375       | 2697             | 0.0              | 505       | 64676            | 49.6             | 635       | 103216           | 0.0              | 765       | 4626             | 0.0              | 895       | 3214             | 0.0              |
| 380       | 3039             | 0.0              | 510       | 73825            | 53.0             | 640       | 92605            | 0.0              | 770       | 3782             | 0.0              | 900       | 2580             | 0.0              |
| 385       | 2655             | 0.0              | 515       | 81872            | 53.5             | 645       | 83234            | 0.0              | 775       | 3506             | 0.0              | 905       | 1776             | 0.0              |
| 390       | 2357             | 0.0              | 520       | 88574            | 51.6             | 650       | 73263            | 0.0              | 780       | 3507             | 0.0              | 910       | 3995             | 0.0              |
| 395       | 2186             | 0.0              | 525       | 93289            | 47.3             | 655       | 64627            | 0.0              | 785       | 3267             | 0.0              | 915       | 4288             | 0.0              |
| 400       | 2015             | 0.0              | 530       | 98393            | 42.5             | 660       | 56614            | 0.0              | 790       | 2849             | 0.0              | 920       | 2446             | 0.0              |
| 405       | 2234             | 0.0              | 535       | 103269           | 37.2             | 665       | 49537            | 0.0              | 795       | 3037             | 0.0              | 925       | 3009             | 0.0              |
| 410       | 3412             | 0.1              | 540       | 107316           | 31.4             | 670       | 42866            | 0.0              | 800       | 2716             | 0.0              | 930       | 3026             | 0.0              |
| 415       | 6135             | 0.4              | 545       | 113101           | 26.3             | 675       | 36708            | 0.0              | 805       | 2648             | 0.0              | 935       | 4734             | 0.0              |
| 420       | 12146            | 1.4              | 550       | 120690           | 21.7             | 680       | 31814            | 0.0              | 810       | 3187             | 0.0              | 940       | 3719             | 0.0              |
| 425       | 23983            | 3.7              | 555       | 128583           | 17.3             | 685       | 27485            | 0.0              | 815       | 2931             | 0.0              | 945       | 1480             | 0.0              |
| 430       | 42142            | 8.9              | 560       | 137796           | 13.6             | 690       | 23698            | 0.0              | 820       | 2717             | 0.0              | 950       | 3450             | 0.0              |
| 435       | 68228            | 18.2             | 565       | 146577           | 10.3             | 695       | 20309            | 0.0              | 825       | 2236             | 0.0              | 955       | 5051             | 0.0              |
| 440       | 99323            | 33.2             | 570       | 154581           | 7.6              | 700       | 17890            | 0.0              | 830       | 2628             | 0.0              | 960       | 3176             | 0.0              |
| 445       | 115584           | 45.6             | 575       | 162633           | 5.4              | 705       | 15500            | 0.0              | 835       | 3140             | 0.0              | 965       | 5178             | 0.0              |
| 450       | 94997            | 43.8             | 580       | 168101           | 3.8              | 710       | 13699            | 0.0              | 840       | 3675             | 0.0              | 970       | 6385             | 0.0              |
| 455       | 61433            | 32.2             | 585       | 173145           | 2.6              | 715       | 12398            | 0.0              | 845       | 3283             | 0.0              | 975       | 3810             | 0.0              |
| 460       | 43373            | 25.6             | 590       | 174675           | 1.7              | 720       | 11147            | 0.0              | 850       | 3055             | 0.0              | 980       | 4322             | 0.0              |
| 465       | 32472            | 21.2             | 595       | 173724           | 1.1              | 725       | 9761             | 0.0              | 855       | 2932             | 0.0              | 985       | 4200             | 0.0              |
| 470       | 24257            | 17.4             | 600       | 171241           | 0.7              | 730       | 8651             | 0.0              | 860       | 3382             | 0.0              | 990       | 4661             | 0.0              |
| 475       | 21690            | 16.6             | 605       | 165134           | 0.5              | 735       | 7730             | 0.0              | 865       | 2605             | 0.0              | 995       | 6746             | 0.0              |
| 480       | 23173            | 18.6             | 610       | 156652           | 0.3              | 740       | 6847             | 0.0              | 870       | 3325             | 0.0              | 1000      | 4150             | 0.0              |
| 485       | 27564            | 22.7             | 615       | 147879           | 0.2              | 745       | 6124             | 0.0              | 875       | 3325             | 0.0              |           |                  |                  |

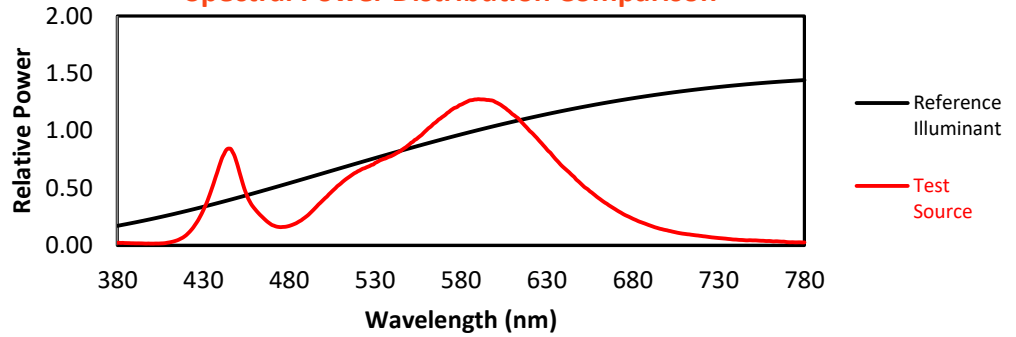
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TM-30-18

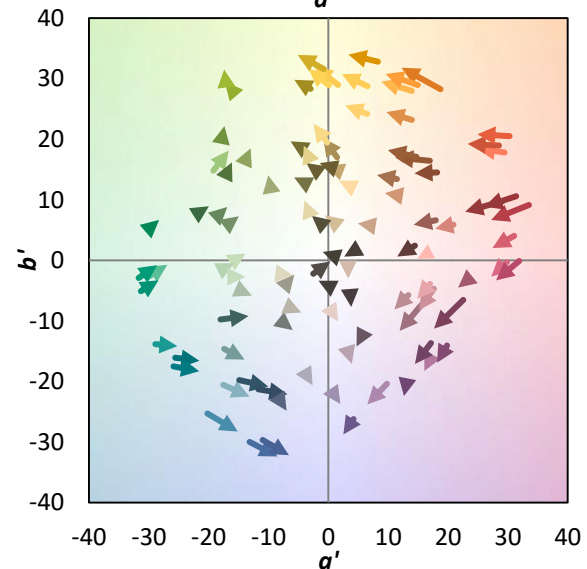
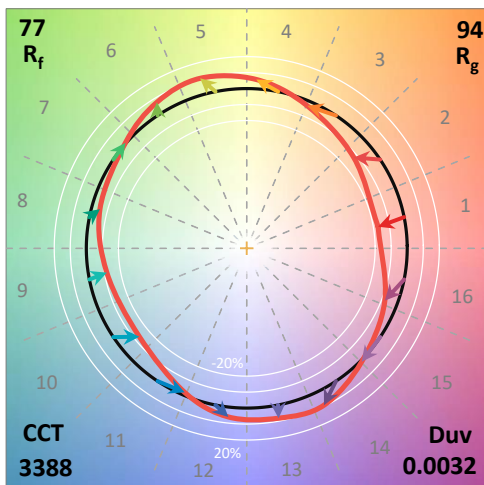
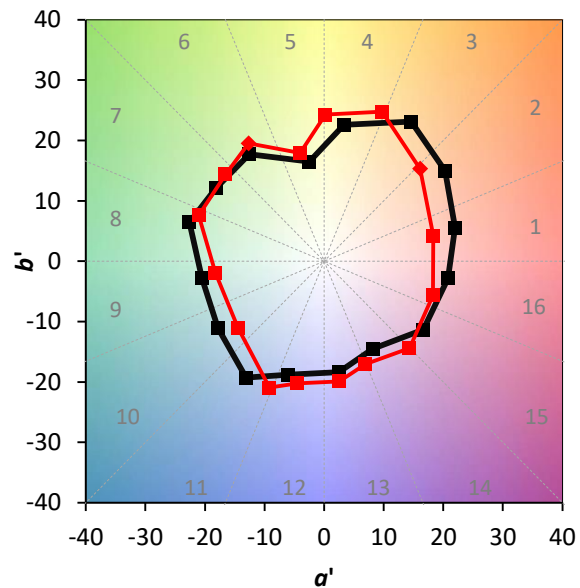
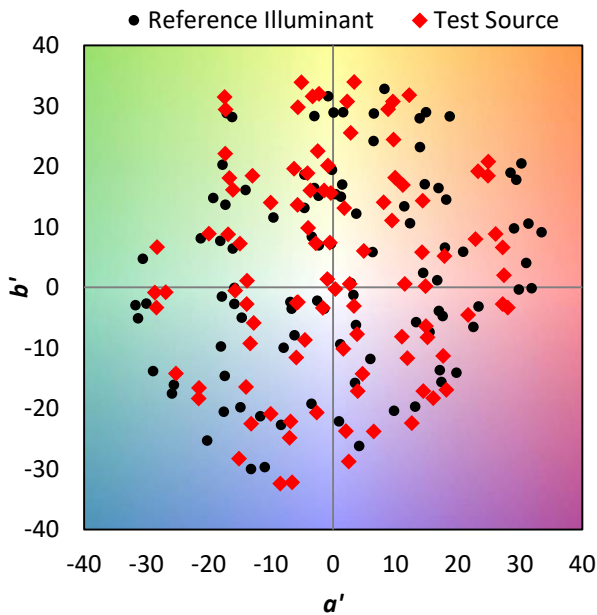
### Summary

$R_f = 76.9$   
 $R_g = 94.4$   
 CIE  $R_a = 73.1$   
 $R_g = -34.6$

### Spectral Power Distribution Comparison



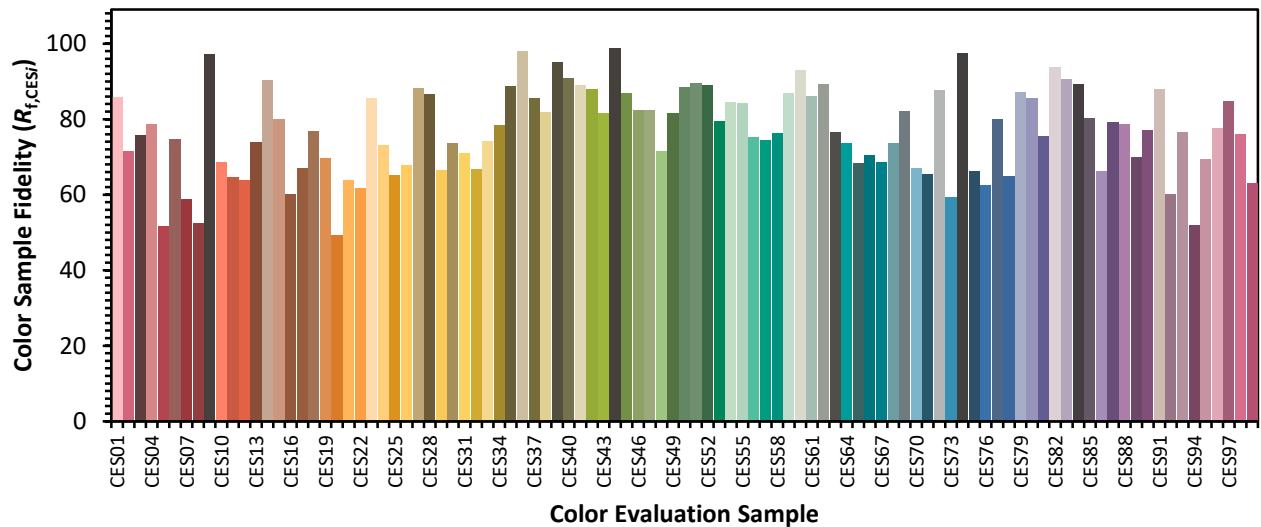
### Color Vector Graphics

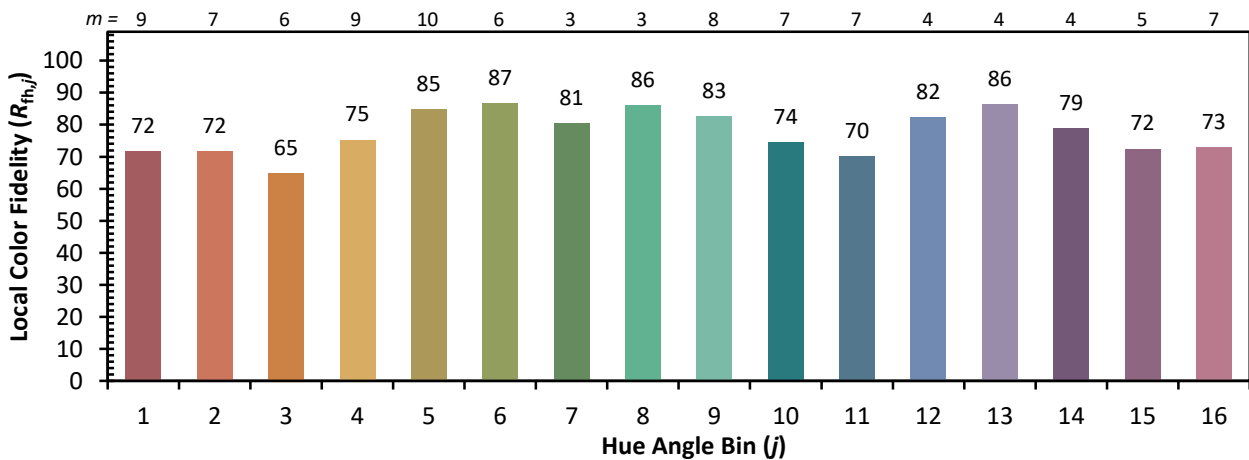
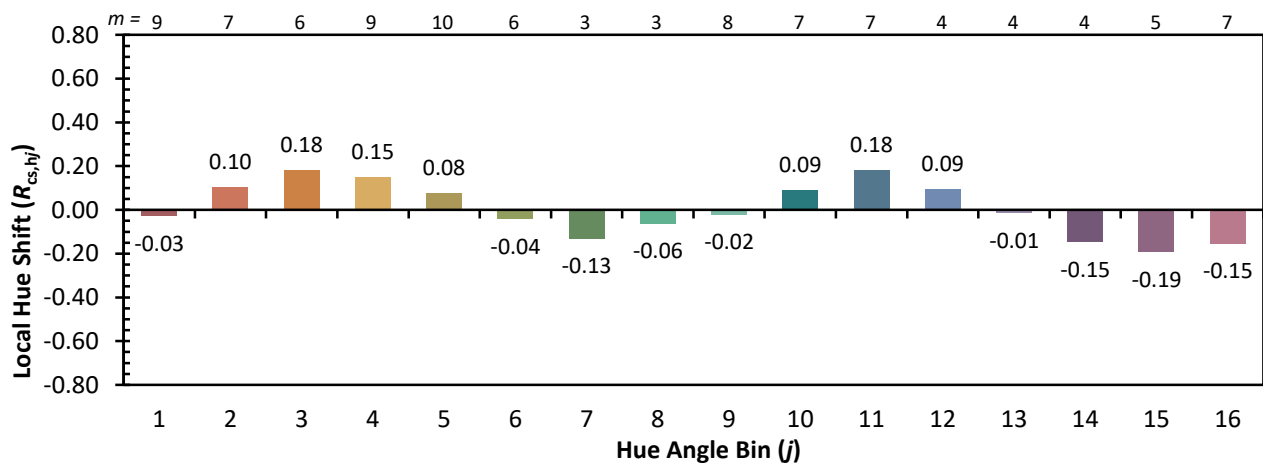
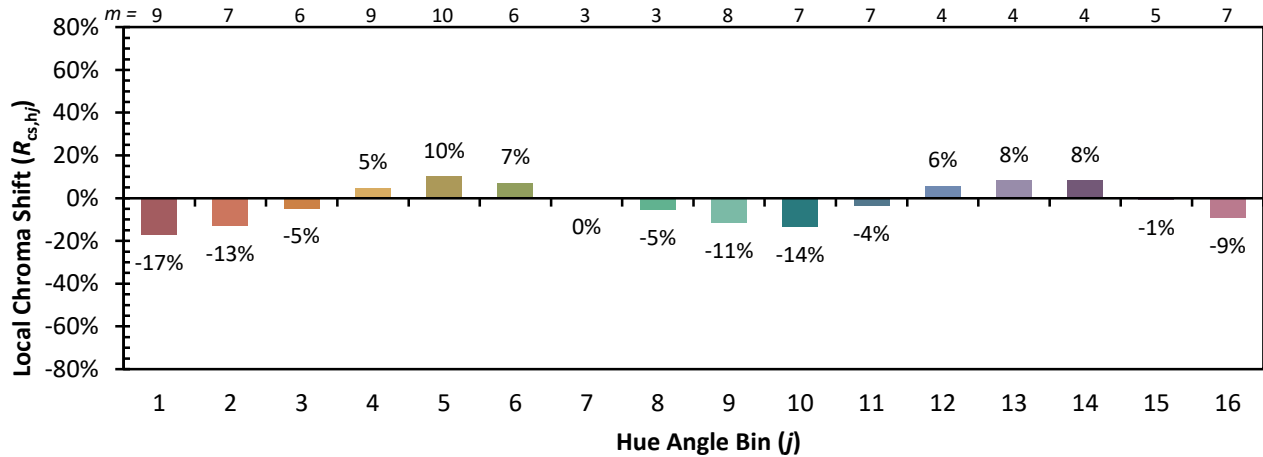




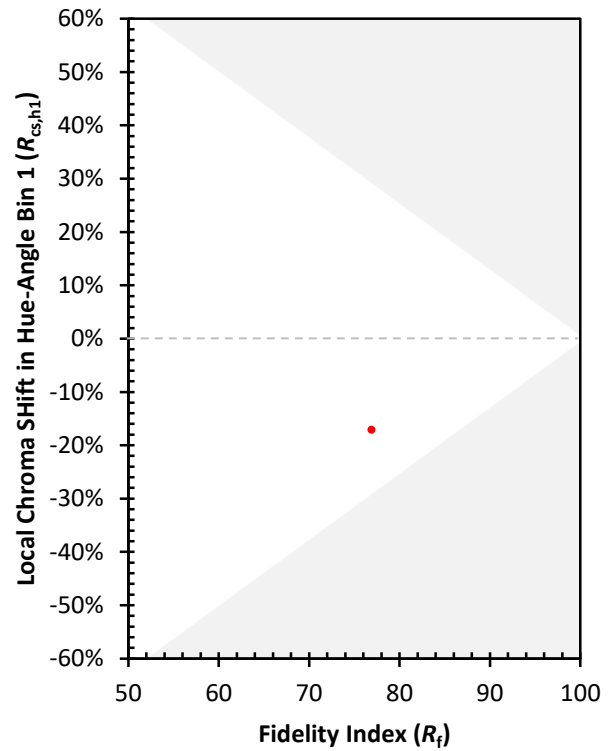
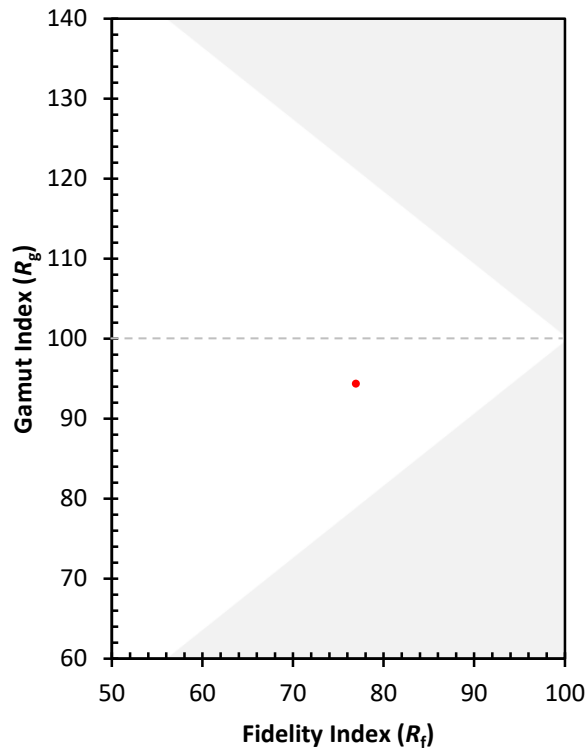
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 68 | CES51 = 90 | CES76 = 63 |
| CES02 = 62 | CES27 = 88 | CES52 = 89 | CES77 = 80 |
| CES03 = 31 | CES28 = 87 | CES53 = 80 | CES78 = 65 |
| CES04 = 70 | CES29 = 67 | CES54 = 84 | CES79 = 87 |
| CES05 = 48 | CES30 = 74 | CES55 = 84 | CES80 = 86 |
| CES06 = 51 | CES31 = 71 | CES56 = 75 | CES81 = 75 |
| CES07 = 40 | CES32 = 67 | CES57 = 74 | CES82 = 94 |
| CES08 = 39 | CES33 = 74 | CES58 = 76 | CES83 = 91 |
| CES09 = 29 | CES34 = 78 | CES59 = 87 | CES84 = 89 |
| CES10 = 75 | CES35 = 89 | CES60 = 93 | CES85 = 80 |
| CES11 = 58 | CES36 = 98 | CES61 = 86 | CES86 = 66 |
| CES12 = 64 | CES37 = 86 | CES62 = 89 | CES87 = 79 |
| CES13 = 43 | CES38 = 82 | CES63 = 77 | CES88 = 79 |
| CES14 = 74 | CES39 = 95 | CES64 = 74 | CES89 = 70 |
| CES15 = 71 | CES40 = 91 | CES65 = 68 | CES90 = 77 |
| CES16 = 47 | CES41 = 89 | CES66 = 71 | CES91 = 88 |
| CES17 = 50 | CES42 = 88 | CES67 = 69 | CES92 = 60 |
| CES18 = 56 | CES43 = 82 | CES68 = 74 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 82 | CES94 = 52 |
| CES20 = 65 | CES45 = 87 | CES70 = 67 | CES95 = 69 |
| CES21 = 86 | CES46 = 82 | CES71 = 66 | CES96 = 78 |
| CES22 = 79 | CES47 = 82 | CES72 = 88 | CES97 = 85 |
| CES23 = 92 | CES48 = 72 | CES73 = 59 | CES98 = 76 |
| CES24 = 91 | CES49 = 82 | CES74 = 97 | CES99 = 63 |
| CES25 = 72 | CES50 = 88 | CES75 = 66 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)