

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: P472355

Luminaire Tested: **CCP-VA-3-860-U-T3**

Issue Date: 01/27/2021



**Test Information**

Test Method: LM-79-08  
Report Number: P472355  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 01/27/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-VA-3-860-U-T3  
Description: INVUE CLEARCURVE POLE MOUNT Wave Stream LUMINAIRE WITH T3  
DISTRIBUTION LENS  
Light Source: 5700K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4381.4 lumens  
Efficiency: N/A  
Efficacy: 89.6 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.54' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B2 - U0 - G2

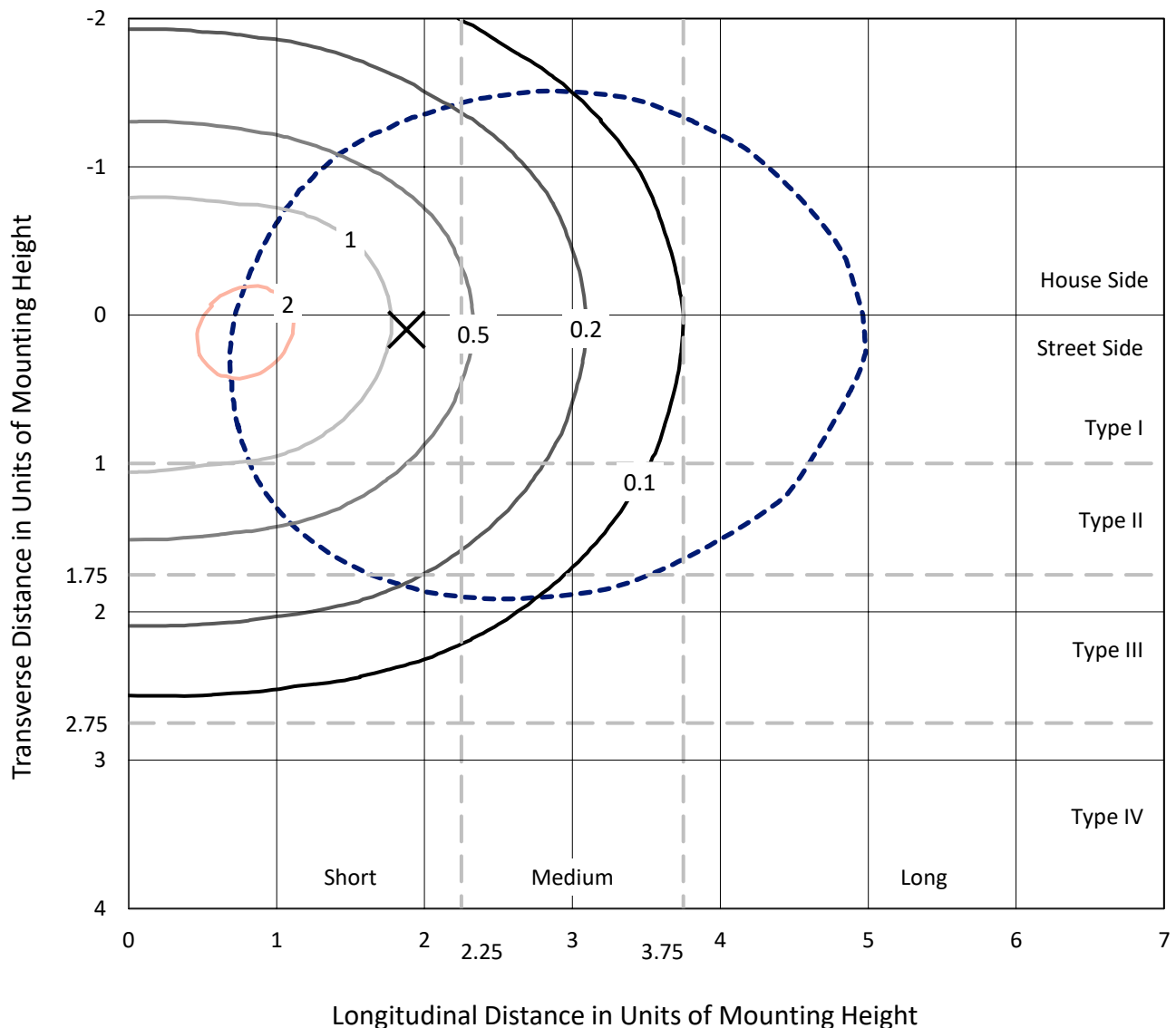
Input Watts (W): 48.9  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

REPORT NUMBER: P472355

CATALOG NUMBER: CCP-VA-3-860-U-T3

## Iso-Footcandle Lines of Horizontal Illumination

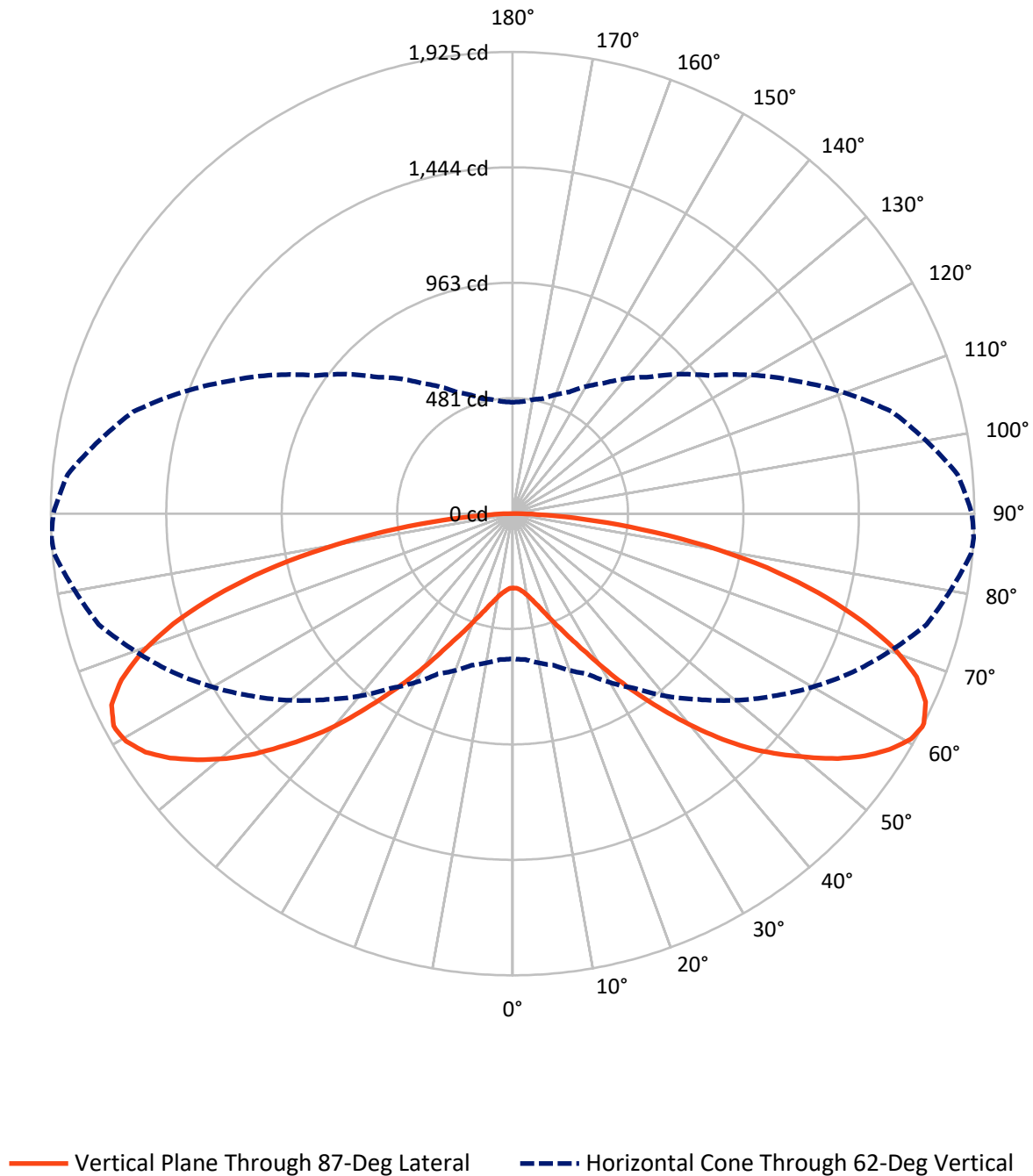
× Max cd  
 --- 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 2.3 fc  
 Type III - Short - N/A

REPORT NUMBER: P472355  
CATALOG NUMBER: CCP-VA-3-860-U-T3

## Luminous Intensity Polar Plot



REPORT NUMBER: P472355

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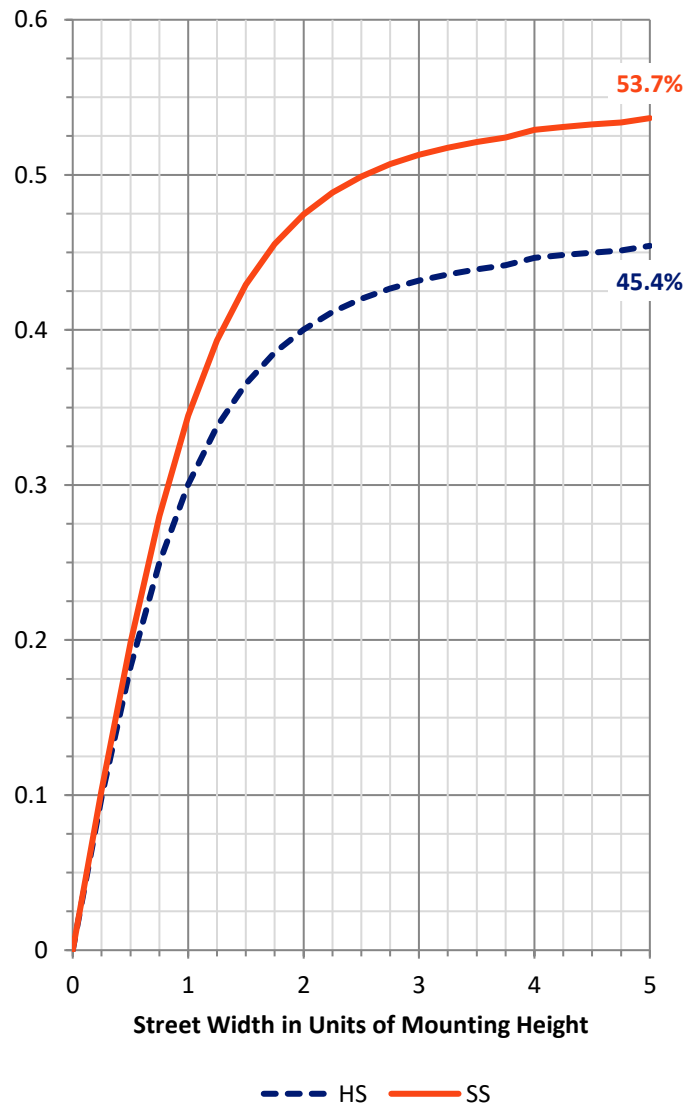
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2017.3   | 0.0    | 2017.3 |
|                    | % Fixture | 46.0     | 0.0    | 46.0   |
| <b>Street Side</b> | Lumens    | 2364.1   | 0.0    | 2364.1 |
|                    | % Fixture | 54.0     | 0.0    | 54.0   |
| <b>Total</b>       | Lumens    | 4381.4   | 0.0    | 4381.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 31.2   | 0.7       |
| 10°-20°   | 110.1  | 2.5       |
| 20°-30°   | 235.4  | 5.4       |
| 30°-40°   | 433.8  | 9.9       |
| 40°-50°   | 691.9  | 15.8      |
| 50°-60°   | 940.9  | 21.5      |
| 60°-70°   | 1019.4 | 23.3      |
| 70°-80°   | 728.4  | 16.6      |
| 80°-90°   | 190.4  | 4.3       |
| 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°    | 4381.4 | 100.0     |
| 0°-180°   | 4381.4 | 100.0     |



REPORT NUMBER: P472355

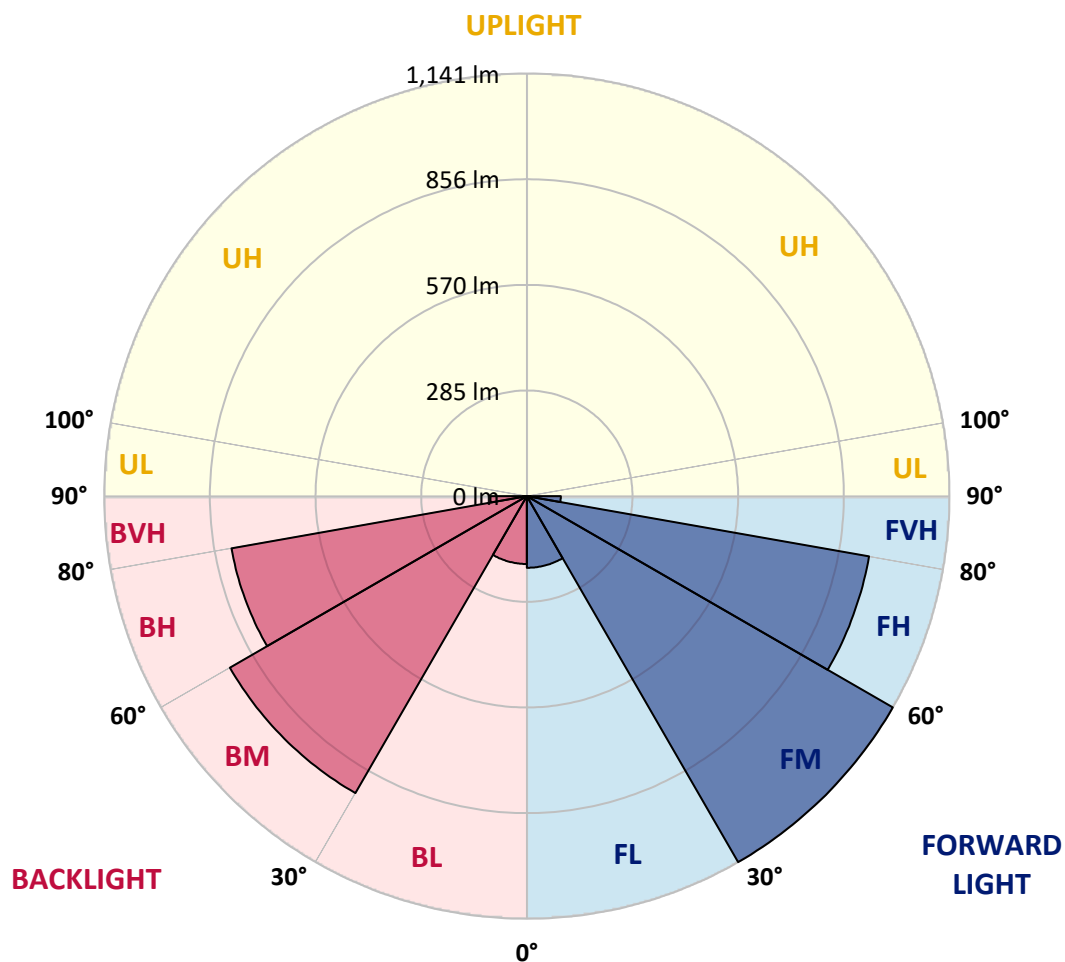
CATALOG NUMBER: CCP-VA-3-860-U-T3

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 193.5  | 4.4       |                         |      |         |
| FM   | (30°-60°)   | 1140.9 | 26.0      |                         |      |         |
| FH   | (60°-80°)   | 938.1  | 21.4      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 91.7   | 2.1       |                         |      | G1/100  |
| BL   | (0°-30°)    | 183.2  | 4.2       | B1/500                  |      |         |
| BM   | (30°-60°)   | 925.7  | 21.1      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 809.7  | 18.5      | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 98.7   | 2.3       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

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

Type III Short



REPORT NUMBER: P472355

CATALOG NUMBER: CCP-VA-3-860-U-T3

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°    | 55°    | 65°    | 75°    | 85°    | 87°    |
|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| 0°    | 310.1 | 310.1 | 310.1 | 310.1 | 310.1 | 310.1  | 310.1  | 310.1  | 310.1  | 310.1  | 310.1  |
| 2.5°  | 310.8 | 310.8 | 310.8 | 310.8 | 310.8 | 310.8  | 310.8  | 310.8  | 310.8  | 311.5  | 311.5  |
| 5°    | 312.9 | 312.2 | 312.2 | 312.9 | 313.6 | 314.3  | 315.7  | 316.4  | 317.8  | 319.3  | 318.5  |
| 7.5°  | 319.3 | 319.3 | 319.3 | 320.0 | 322.1 | 323.5  | 325.6  | 327.7  | 329.9  | 331.3  | 330.6  |
| 10°   | 329.1 | 329.1 | 329.1 | 330.6 | 332.7 | 336.9  | 340.4  | 344.0  | 346.1  | 347.5  | 348.2  |
| 12.5° | 339.7 | 339.7 | 341.2 | 344.0 | 348.2 | 353.9  | 360.2  | 365.2  | 368.7  | 370.1  | 370.8  |
| 15°   | 354.6 | 355.3 | 358.1 | 360.9 | 366.6 | 375.1  | 385.6  | 392.7  | 396.2  | 399.1  | 398.4  |
| 17.5° | 377.2 | 376.5 | 378.6 | 384.9 | 391.3 | 403.3  | 416.0  | 428.0  | 435.1  | 435.1  | 435.1  |
| 20°   | 402.6 | 401.9 | 403.3 | 408.3 | 418.8 | 435.1  | 454.9  | 471.1  | 478.9  | 477.5  | 478.9  |
| 22.5° | 430.9 | 430.9 | 432.3 | 436.5 | 447.1 | 470.4  | 498.0  | 522.0  | 532.6  | 529.0  | 527.6  |
| 25°   | 461.9 | 461.9 | 464.1 | 467.6 | 482.4 | 510.7  | 547.4  | 582.0  | 592.6  | 589.1  | 587.7  |
| 27.5° | 498.0 | 495.1 | 499.4 | 502.9 | 521.3 | 558.7  | 606.7  | 650.5  | 673.8  | 661.8  | 657.6  |
| 30°   | 536.1 | 534.0 | 534.7 | 541.7 | 562.9 | 611.0  | 668.2  | 726.8  | 759.3  | 751.5  | 745.2  |
| 32.5° | 569.3 | 570.7 | 572.8 | 584.8 | 608.8 | 666.8  | 733.2  | 810.1  | 846.9  | 844.8  | 843.3  |
| 35°   | 606.7 | 606.7 | 611.0 | 622.3 | 657.6 | 726.1  | 806.6  | 893.5  | 947.9  | 950.0  | 945.8  |
| 37.5° | 636.4 | 636.4 | 642.7 | 657.6 | 699.3 | 780.5  | 879.4  | 981.8  | 1047.5 | 1058.8 | 1055.2 |
| 40°   | 662.5 | 661.1 | 668.2 | 690.1 | 738.8 | 838.4  | 950.7  | 1069.4 | 1157.7 | 1176.7 | 1171.8 |
| 42.5° | 678.1 | 679.5 | 689.4 | 716.9 | 776.9 | 889.3  | 1020.6 | 1152.0 | 1255.1 | 1287.6 | 1287.6 |
| 45°   | 689.4 | 690.8 | 705.6 | 738.1 | 811.6 | 939.4  | 1084.2 | 1236.8 | 1350.5 | 1397.8 | 1399.9 |
| 47.5° | 694.3 | 696.4 | 714.8 | 754.3 | 840.5 | 985.3  | 1145.6 | 1313.0 | 1435.9 | 1503.0 | 1498.8 |
| 50°   | 694.3 | 697.1 | 719.0 | 766.4 | 866.7 | 1024.2 | 1203.6 | 1385.8 | 1522.8 | 1597.7 | 1597.0 |
| 52.5° | 690.1 | 693.6 | 720.4 | 775.5 | 888.5 | 1061.6 | 1255.1 | 1448.0 | 1606.2 | 1694.5 | 1697.3 |
| 55°   | 681.6 | 685.8 | 716.9 | 781.2 | 905.5 | 1091.3 | 1296.8 | 1505.9 | 1678.2 | 1777.8 | 1784.2 |
| 57.5° | 664.6 | 668.9 | 704.2 | 776.2 | 911.9 | 1106.8 | 1327.2 | 1546.8 | 1736.8 | 1853.4 | 1854.8 |
| 60°   | 636.4 | 641.3 | 679.5 | 760.0 | 905.5 | 1107.5 | 1334.9 | 1565.2 | 1776.4 | 1904.2 | 1909.2 |
| 62°   | 605.3 | 611.0 | 654.1 | 737.4 | 889.3 | 1096.2 | 1326.5 | 1564.5 | 1787.0 | 1919.1 | 1925.4 |
| 62.5° | 597.5 | 602.5 | 646.3 | 729.6 | 882.9 | 1090.6 | 1321.5 | 1561.0 | 1785.6 | 1919.8 | 1924.7 |
| 65°   | 549.5 | 554.5 | 599.0 | 687.2 | 844.0 | 1055.9 | 1285.5 | 1529.9 | 1760.1 | 1891.5 | 1892.9 |
| 67.5° | 496.5 | 501.5 | 546.0 | 629.3 | 788.3 | 998.0  | 1224.8 | 1468.4 | 1692.3 | 1806.1 | 1816.6 |
| 70°   | 435.1 | 442.2 | 483.1 | 565.8 | 714.8 | 914.7  | 1128.7 | 1371.0 | 1584.3 | 1681.0 | 1690.9 |
| 72.5° | 374.3 | 379.3 | 411.8 | 484.5 | 619.4 | 805.2  | 1004.4 | 1223.3 | 1417.6 | 1509.4 | 1517.9 |
| 75°   | 303.7 | 308.0 | 339.7 | 399.8 | 512.8 | 671.0  | 858.9  | 1050.3 | 1226.9 | 1309.5 | 1315.9 |
| 77.5° | 239.4 | 240.9 | 263.5 | 311.5 | 398.4 | 526.2  | 681.6  | 832.7  | 993.1  | 1068.0 | 1084.9 |
| 80°   | 168.8 | 175.9 | 191.4 | 224.6 | 279.7 | 377.2  | 489.5  | 618.7  | 731.0  | 815.1  | 820.7  |
| 82.5° | 109.5 | 110.9 | 120.8 | 132.8 | 172.3 | 238.0  | 311.5  | 391.3  | 491.6  | 546.0  | 541.7  |
| 85°   | 57.2  | 57.2  | 60.7  | 64.3  | 77.7  | 106.7  | 150.4  | 206.2  | 264.9  | 305.8  | 300.2  |
| 87.5° | 9.9   | 9.2   | 9.9   | 9.2   | 12.0  | 17.0   | 31.8   | 51.6   | 77.7   | 91.8   | 101.0  |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P472355

CATALOG NUMBER: CCP-VA-3-860-U-T3

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| 0°    | 310.1  | 310.1  | 310.1  | 310.1  | 310.1  | 310.1 | 310.1 | 310.1 | 310.1 | 310.1 | 310.1 |
| 2.5°  | 311.5  | 311.5  | 312.2  | 313.6  | 313.6  | 314.3 | 315.0 | 315.0 | 315.7 | 316.4 | 316.4 |
| 5°    | 320.0  | 320.0  | 320.7  | 322.1  | 322.8  | 322.8 | 323.5 | 324.2 | 324.2 | 324.2 | 324.9 |
| 7.5°  | 331.3  | 332.0  | 332.7  | 333.4  | 334.1  | 334.1 | 336.2 | 335.5 | 335.5 | 335.5 | 335.5 |
| 10°   | 347.5  | 348.9  | 348.9  | 348.9  | 348.9  | 348.2 | 348.9 | 348.2 | 346.8 | 346.8 | 346.1 |
| 12.5° | 371.5  | 371.5  | 370.1  | 368.7  | 366.6  | 365.9 | 365.2 | 363.0 | 360.2 | 358.8 | 358.8 |
| 15°   | 399.1  | 397.7  | 394.8  | 392.0  | 388.5  | 385.6 | 380.7 | 377.9 | 374.3 | 372.9 | 372.9 |
| 17.5° | 434.4  | 432.3  | 424.5  | 418.8  | 410.4  | 404.0 | 398.4 | 392.7 | 388.5 | 387.1 | 386.4 |
| 20°   | 474.6  | 469.7  | 458.4  | 445.7  | 434.4  | 424.5 | 413.9 | 406.8 | 402.6 | 399.1 | 398.4 |
| 22.5° | 525.5  | 518.4  | 498.7  | 478.9  | 458.4  | 444.3 | 430.9 | 421.0 | 413.2 | 409.7 | 408.3 |
| 25°   | 580.6  | 570.0  | 544.6  | 514.9  | 486.7  | 464.8 | 447.8 | 434.4 | 425.2 | 419.6 | 418.1 |
| 27.5° | 650.5  | 635.0  | 597.5  | 553.0  | 515.6  | 488.1 | 464.8 | 449.2 | 437.2 | 428.7 | 427.3 |
| 30°   | 732.5  | 716.2  | 654.1  | 595.4  | 548.1  | 509.3 | 483.8 | 463.3 | 448.5 | 438.6 | 436.5 |
| 32.5° | 829.9  | 800.3  | 728.9  | 646.3  | 581.3  | 534.0 | 501.5 | 477.5 | 459.1 | 447.8 | 445.0 |
| 35°   | 928.8  | 898.4  | 804.5  | 700.0  | 616.6  | 559.4 | 520.6 | 491.6 | 471.1 | 457.0 | 455.6 |
| 37.5° | 1039.7 | 1003.0 | 892.8  | 760.7  | 654.8  | 586.2 | 538.2 | 505.0 | 480.3 | 465.5 | 464.1 |
| 40°   | 1159.1 | 1121.6 | 987.4  | 830.6  | 700.0  | 612.4 | 555.2 | 517.7 | 490.2 | 473.9 | 471.8 |
| 42.5° | 1276.3 | 1231.8 | 1083.5 | 900.6  | 745.9  | 641.3 | 574.9 | 531.2 | 498.7 | 481.7 | 478.9 |
| 45°   | 1378.0 | 1339.2 | 1181.0 | 981.1  | 798.8  | 671.0 | 594.7 | 543.9 | 507.8 | 488.8 | 485.9 |
| 47.5° | 1493.2 | 1451.5 | 1287.6 | 1055.2 | 849.7  | 704.9 | 613.8 | 555.2 | 515.6 | 495.1 | 493.0 |
| 50°   | 1594.9 | 1557.4 | 1382.3 | 1123.8 | 898.4  | 736.7 | 631.4 | 565.8 | 522.0 | 500.1 | 497.2 |
| 52.5° | 1687.4 | 1654.2 | 1469.1 | 1188.0 | 940.1  | 766.4 | 647.7 | 573.5 | 526.2 | 502.2 | 498.7 |
| 55°   | 1780.6 | 1737.5 | 1544.7 | 1244.5 | 973.3  | 789.7 | 661.1 | 577.1 | 525.5 | 500.8 | 497.2 |
| 57.5° | 1850.6 | 1809.6 | 1599.8 | 1284.8 | 998.0  | 805.2 | 668.9 | 576.4 | 521.3 | 494.4 | 490.2 |
| 60°   | 1897.9 | 1852.7 | 1632.3 | 1304.6 | 1006.5 | 810.1 | 668.9 | 570.0 | 510.7 | 481.7 | 477.5 |
| 62°   | 1915.5 | 1863.3 | 1638.7 | 1307.4 | 1003.0 | 805.2 | 663.9 | 559.4 | 496.5 | 468.3 | 464.1 |
| 62.5° | 1916.2 | 1862.6 | 1636.5 | 1305.3 | 1000.9 | 803.1 | 661.1 | 555.9 | 493.0 | 464.1 | 459.8 |
| 65°   | 1885.2 | 1831.5 | 1611.1 | 1283.4 | 976.8  | 784.0 | 641.3 | 535.4 | 468.3 | 440.0 | 435.8 |
| 67.5° | 1796.2 | 1755.2 | 1550.4 | 1232.5 | 935.9  | 748.7 | 612.4 | 505.7 | 439.3 | 409.7 | 407.5 |
| 70°   | 1672.6 | 1635.1 | 1451.5 | 1155.5 | 876.5  | 697.8 | 569.3 | 466.2 | 402.6 | 375.8 | 370.8 |
| 72.5° | 1517.2 | 1468.4 | 1310.9 | 1052.4 | 791.1  | 627.9 | 512.8 | 416.7 | 360.2 | 336.2 | 333.4 |
| 75°   | 1324.3 | 1265.7 | 1134.3 | 916.1  | 688.7  | 543.9 | 447.1 | 361.6 | 311.5 | 291.0 | 293.1 |
| 77.5° | 1078.5 | 1051.0 | 916.8  | 730.3  | 560.8  | 449.9 | 366.6 | 306.5 | 263.5 | 246.5 | 245.1 |
| 80°   | 814.4  | 788.3  | 694.3  | 554.5  | 423.8  | 340.4 | 283.9 | 241.6 | 211.9 | 197.1 | 196.4 |
| 82.5° | 552.3  | 527.6  | 456.3  | 372.2  | 288.9  | 240.9 | 205.5 | 178.0 | 159.6 | 152.6 | 152.6 |
| 85°   | 303.7  | 282.5  | 241.6  | 201.3  | 163.2  | 137.7 | 132.8 | 118.7 | 113.7 | 112.3 | 113.7 |
| 87.5° | 94.6   | 93.9   | 79.8   | 65.7   | 57.2   | 57.9  | 52.3  | 53.7  | 50.9  | 50.1  | 53.7  |
| 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)

INVUE

Report Number: SP1-2005-785-20

Luminaire Tested: WIS-VA-3-857-U-T4FT

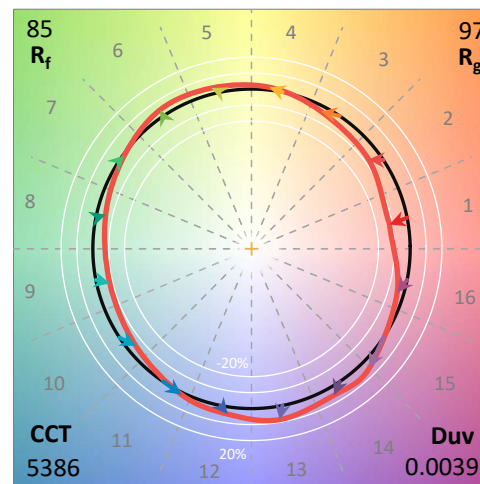
Test Date: 09/11/2020

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2005-785-20  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/11/2020  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-VA-3-857-U-T4FT**  
 Description: INVUE WALL PACK VA

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 5386   | CRI (Ra): | 83.7 |      |      |
| CIE u':                   | 0.2049 | R1:       | 81.8 | R9:  | 10.3 |
| CIE v':                   | 0.4830 | R2:       | 87.3 | R10: | 70.9 |
| Duv:                      | 0.0039 | R3:       | 92.0 | R11: | 85.0 |
| CIE x:                    | 0.3352 | R4:       | 84.6 | R12: | 66.4 |
| CIE y:                    | 0.3511 | R5:       | 83.2 | R13: | 83.0 |
| CIE z:                    | 0.3137 | R6:       | 83.3 | R14: | 95.8 |
| Peak Wavelength (nm):     | 450    | R7:       | 87.5 |      |      |
| Dominant Wavelength (nm): | 559    | R8:       | 69.6 |      |      |
| Purity:                   | 6.1    |           |      |      |      |
| Rf:                       | 84.9   |           |      |      |      |
| Rg:                       | 97     |           |      |      |      |



### Test Conditions

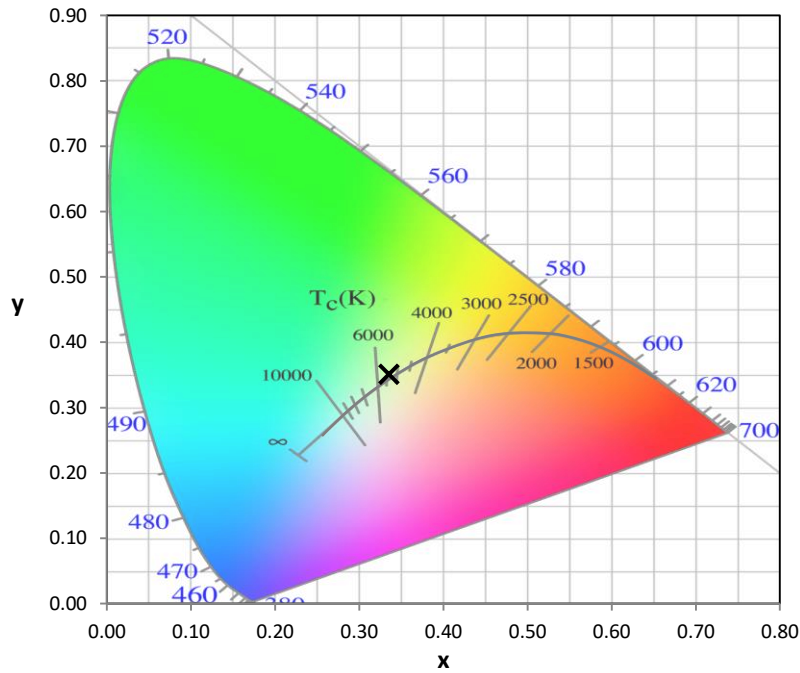
Stabilization Time: 53M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.1/46%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2005-785-20

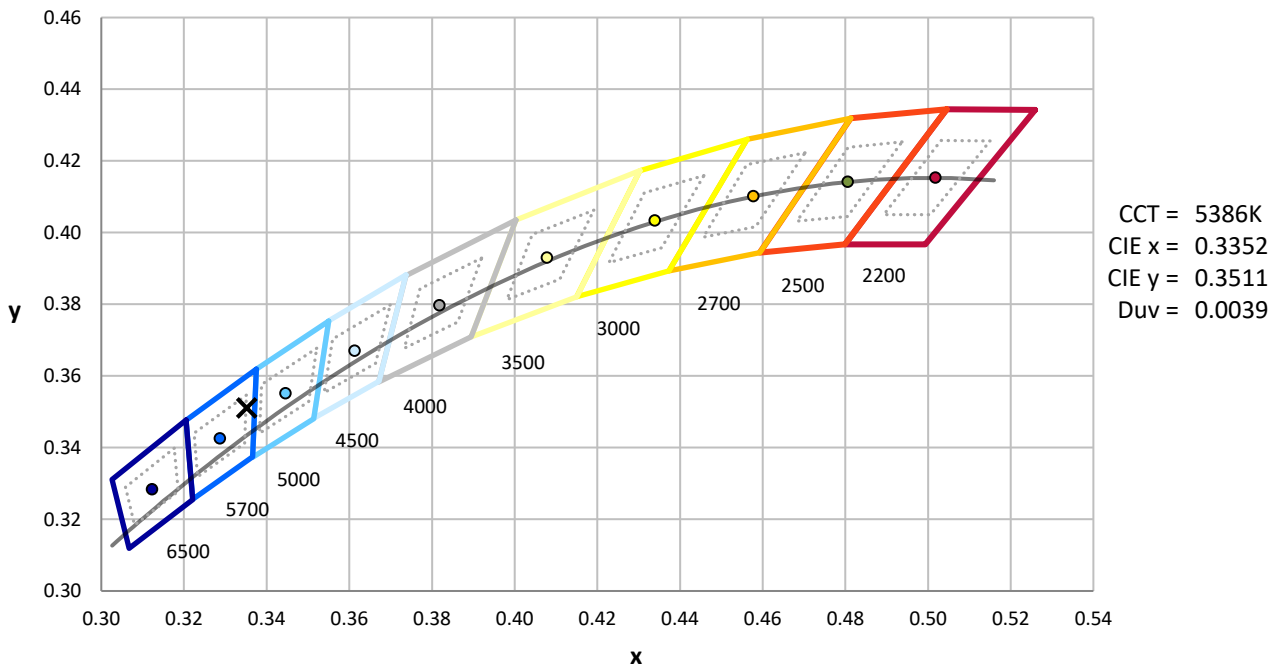
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| Power Meter                    | IN0071                | 12/3/2020        | 12/3/2020            |
| AC Power Source                | IN0063                | 12/3/2020        | 12/3/2020            |
| DC Power Source                | IN0208                | 12/3/2020        | 12/3/2020            |
| Sphere Thermometer             | IN0085                | 12/3/2020        | 12/3/2020            |
| Room Thermometer               | IN0046                | 12/3/2020        | 12/3/2020            |

REPORT NUMBER: SP1-2005-785-20

**CIE 1931 Chromaticity Diagram**



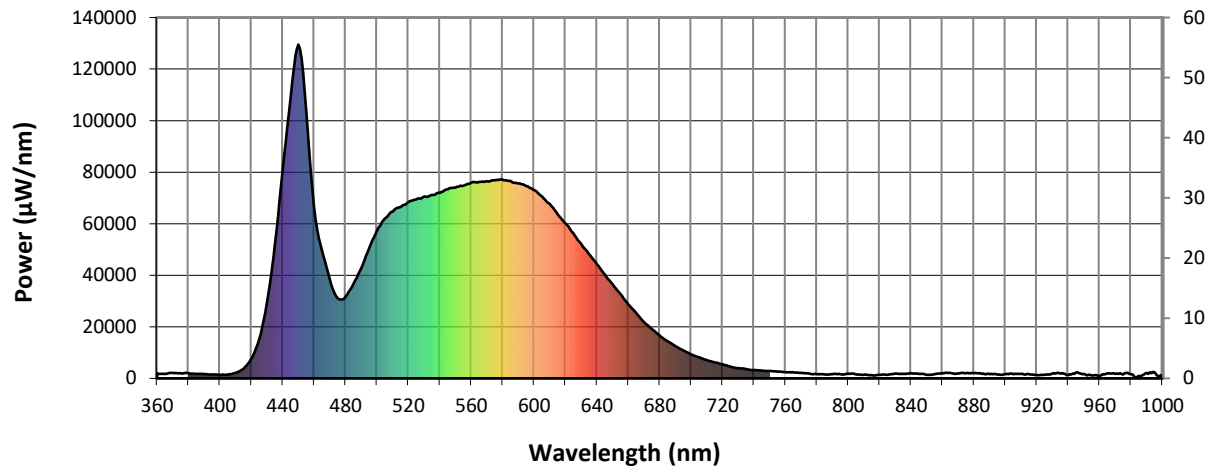
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 5700K 7-step quadrangle

REPORT NUMBER: SP1-2005-785-20

### Photopic Flux vs. Wavelength

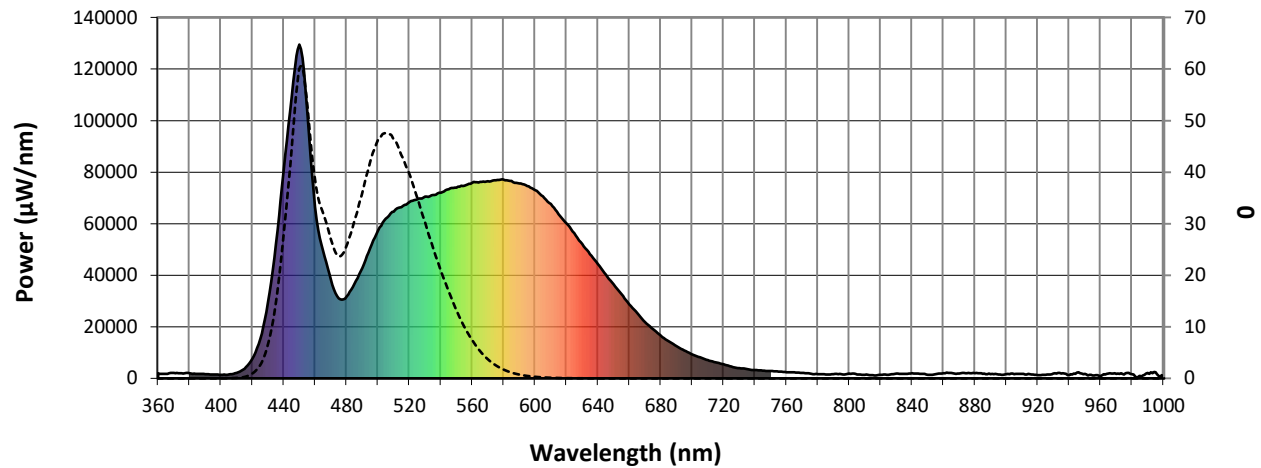


#####

| 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       | 1954             | 0.0              | 490       | 42831            | 6.1              | 620       | 60042            | 15.6             | 750       | 2873             | 0.0              | 880       | 2044             | 0.0              |
| 365       | 1724             | 0.0              | 495       | 50448            | 9.1              | 625       | 56351            | 12.4             | 755       | 2631             | 0.0              | 885       | 1734             | 0.0              |
| 370       | 2062             | 0.0              | 500       | 57301            | 12.6             | 630       | 52118            | 9.4              | 760       | 2425             | 0.0              | 890       | 1667             | 0.0              |
| 375       | 2008             | 0.0              | 505       | 61967            | 17.3             | 635       | 48230            | 7.2              | 765       | 2317             | 0.0              | 895       | 1441             | 0.0              |
| 380       | 1953             | 0.0              | 510       | 64719            | 22.2             | 640       | 44375            | 5.3              | 770       | 2102             | 0.0              | 900       | 1603             | 0.0              |
| 385       | 1682             | 0.0              | 515       | 66397            | 27.5             | 645       | 40217            | 3.9              | 775       | 1830             | 0.0              | 905       | 1642             | 0.0              |
| 390       | 1649             | 0.0              | 520       | 68407            | 33.2             | 650       | 36527            | 2.7              | 780       | 1607             | 0.0              | 910       | 1741             | 0.0              |
| 395       | 1482             | 0.0              | 525       | 69467            | 37.3             | 655       | 32673            | 1.9              | 785       | 1521             | 0.0              | 915       | 1565             | 0.0              |
| 400       | 1382             | 0.0              | 530       | 70500            | 41.5             | 660       | 28715            | 1.2              | 790       | 1655             | 0.0              | 920       | 1282             | 0.0              |
| 405       | 1525             | 0.0              | 535       | 71117            | 44.1             | 665       | 25303            | 0.8              | 795       | 1623             | 0.0              | 925       | 1374             | 0.0              |
| 410       | 2147             | 0.0              | 540       | 71985            | 46.9             | 670       | 21826            | 0.5              | 800       | 1833             | 0.0              | 930       | 1841             | 0.0              |
| 415       | 3759             | 0.0              | 545       | 73383            | 48.8             | 675       | 19145            | 0.3              | 805       | 1530             | 0.0              | 935       | 1813             | 0.0              |
| 420       | 7611             | 0.0              | 550       | 74010            | 50.3             | 680       | 16611            | 0.2              | 810       | 1397             | 0.0              | 940       | 1263             | 0.0              |
| 425       | 15319            | 0.1              | 555       | 74748            | 51.1             | 685       | 14392            | 0.1              | 815       | 1230             | 0.0              | 945       | 2229             | 0.0              |
| 430       | 29510            | 0.2              | 560       | 75851            | 51.5             | 690       | 12540            | 0.1              | 820       | 1409             | 0.0              | 950       | 1745             | 0.0              |
| 435       | 52212            | 0.6              | 565       | 76291            | 50.7             | 695       | 10850            | 0.0              | 825       | 1376             | 0.0              | 955       | 1081             | 0.0              |
| 440       | 80741            | 1.3              | 570       | 76525            | 49.8             | 700       | 9348             | 0.0              | 830       | 1909             | 0.0              | 960       | 876              | 0.0              |
| 445       | 108993           | 2.3              | 575       | 76882            | 47.8             | 705       | 8139             | 0.0              | 835       | 1697             | 0.0              | 965       | 1894             | 0.0              |
| 450       | 129500           | 3.4              | 580       | 77077            | 45.8             | 710       | 7042             | 0.0              | 840       | 1953             | 0.0              | 970       | 1743             | 0.0              |
| 455       | 103230           | 3.5              | 585       | 76634            | 42.6             | 715       | 6253             | 0.0              | 845       | 1765             | 0.0              | 975       | 1544             | 0.0              |
| 460       | 66471            | 2.7              | 590       | 75616            | 39.1             | 720       | 5450             | 0.0              | 850       | 1313             | 0.0              | 980       | 1583             | 0.0              |
| 465       | 49584            | 2.6              | 595       | 74612            | 35.4             | 725       | 4567             | 0.0              | 855       | 1616             | 0.0              | 985       | 953              | 0.0              |
| 470       | 38149            | 2.4              | 600       | 72977            | 31.5             | 730       | 3952             | 0.0              | 860       | 2001             | 0.0              | 990       | 2075             | 0.0              |
| 475       | 31044            | 2.4              | 605       | 70597            | 27.3             | 735       | 3632             | 0.0              | 865       | 2095             | 0.0              | 995       | 2336             | 0.0              |
| 480       | 31747            | 3.0              | 610       | 67624            | 23.2             | 740       | 3214             | 0.0              | 870       | 1923             | 0.0              | 1000      | 595              | 0.0              |
| 485       | 36675            | 4.3              | 615       | 63727            | 19.2             | 745       | 3034             | 0.0              | 875       | 2037             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2005-785-20

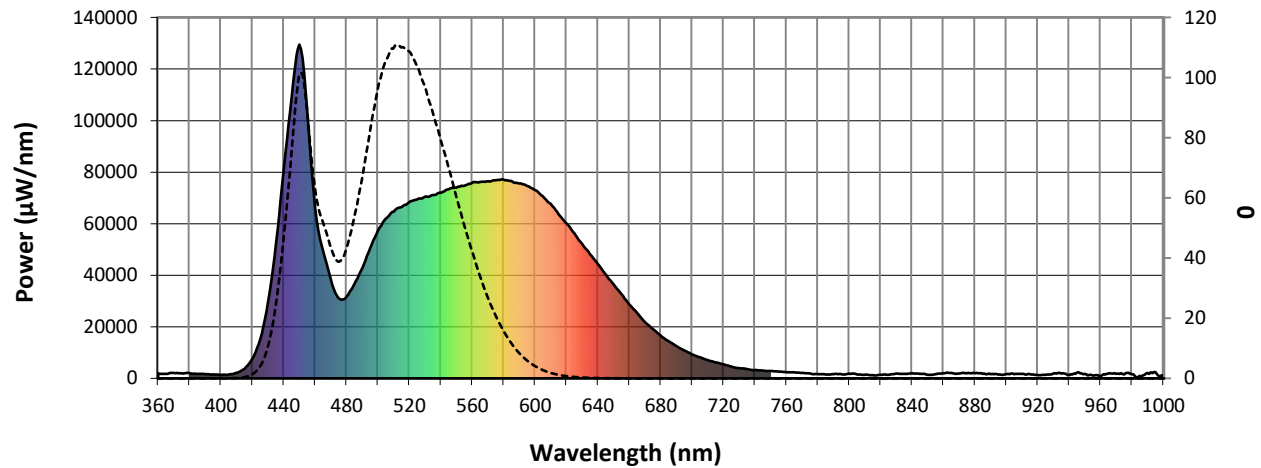
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 4315.3**
**S/P: 0.86**

| 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       | 1954             | 0.0              | 490       | 42831            | 66.0             | 620       | 60042            | 0.8              | 750       | 2873             | 0.0              | 880       | 2044             | 0.0              |
| 365       | 1724             | 0.0              | 495       | 50448            | 81.6             | 625       | 56351            | 0.5              | 755       | 2631             | 0.0              | 885       | 1734             | 0.0              |
| 370       | 2062             | 0.0              | 500       | 57301            | 95.8             | 630       | 52118            | 0.3              | 760       | 2425             | 0.0              | 890       | 1667             | 0.0              |
| 375       | 2008             | 0.0              | 505       | 61967            | 105.3            | 635       | 48230            | 0.2              | 765       | 2317             | 0.0              | 895       | 1441             | 0.0              |
| 380       | 1953             | 0.0              | 510       | 64719            | 109.7            | 640       | 44375            | 0.1              | 770       | 2102             | 0.0              | 900       | 1603             | 0.0              |
| 385       | 1682             | 0.0              | 515       | 66397            | 110.1            | 645       | 40217            | 0.1              | 775       | 1830             | 0.0              | 905       | 1642             | 0.0              |
| 390       | 1649             | 0.0              | 520       | 68407            | 108.7            | 650       | 36527            | 0.0              | 780       | 1607             | 0.0              | 910       | 1741             | 0.0              |
| 395       | 1482             | 0.0              | 525       | 69467            | 103.9            | 655       | 32673            | 0.0              | 785       | 1521             | 0.0              | 915       | 1565             | 0.0              |
| 400       | 1382             | 0.0              | 530       | 70500            | 97.2             | 660       | 28715            | 0.0              | 790       | 1655             | 0.0              | 920       | 1282             | 0.0              |
| 405       | 1525             | 0.0              | 535       | 71117            | 88.6             | 665       | 25303            | 0.0              | 795       | 1623             | 0.0              | 925       | 1374             | 0.0              |
| 410       | 2147             | 0.1              | 540       | 71985            | 79.5             | 670       | 21826            | 0.0              | 800       | 1833             | 0.0              | 930       | 1841             | 0.0              |
| 415       | 3759             | 0.4              | 545       | 73383            | 70.4             | 675       | 19145            | 0.0              | 805       | 1530             | 0.0              | 935       | 1813             | 0.0              |
| 420       | 7611             | 1.3              | 550       | 74010            | 60.5             | 680       | 16611            | 0.0              | 810       | 1397             | 0.0              | 940       | 1263             | 0.0              |
| 425       | 15319            | 3.7              | 555       | 74748            | 51.1             | 685       | 14392            | 0.0              | 815       | 1230             | 0.0              | 945       | 2229             | 0.0              |
| 430       | 29510            | 10.0             | 560       | 75851            | 42.4             | 690       | 12540            | 0.0              | 820       | 1409             | 0.0              | 950       | 1745             | 0.0              |
| 435       | 52212            | 23.3             | 565       | 76291            | 34.2             | 695       | 10850            | 0.0              | 825       | 1376             | 0.0              | 955       | 1081             | 0.0              |
| 440       | 80741            | 45.1             | 570       | 76525            | 27.0             | 700       | 9348             | 0.0              | 830       | 1909             | 0.0              | 960       | 876              | 0.0              |
| 445       | 108993           | 73.0             | 575       | 76882            | 20.9             | 705       | 8139             | 0.0              | 835       | 1697             | 0.0              | 965       | 1894             | 0.0              |
| 450       | 129500           | 100.4            | 580       | 77077            | 15.9             | 710       | 7042             | 0.0              | 840       | 1953             | 0.0              | 970       | 1743             | 0.0              |
| 455       | 103230           | 90.2             | 585       | 76634            | 11.7             | 715       | 6253             | 0.0              | 845       | 1765             | 0.0              | 975       | 1544             | 0.0              |
| 460       | 66471            | 64.2             | 590       | 75616            | 8.4              | 720       | 5450             | 0.0              | 850       | 1313             | 0.0              | 980       | 1583             | 0.0              |
| 465       | 49584            | 52.4             | 595       | 74612            | 5.9              | 725       | 4567             | 0.0              | 855       | 1616             | 0.0              | 985       | 953              | 0.0              |
| 470       | 38149            | 43.9             | 600       | 72977            | 4.1              | 730       | 3952             | 0.0              | 860       | 2001             | 0.0              | 990       | 2075             | 0.0              |
| 475       | 31044            | 38.8             | 605       | 70597            | 2.8              | 735       | 3632             | 0.0              | 865       | 2095             | 0.0              | 995       | 2336             | 0.0              |
| 480       | 31747            | 42.9             | 610       | 67624            | 1.8              | 740       | 3214             | 0.0              | 870       | 1923             | 0.0              | 1000      | 595              | 0.0              |
| 485       | 36675            | 53.2             | 615       | 63727            | 1.2              | 745       | 3034             | 0.0              | 875       | 2037             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2005-785-20

### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 10248.4 S/P: 2.05**

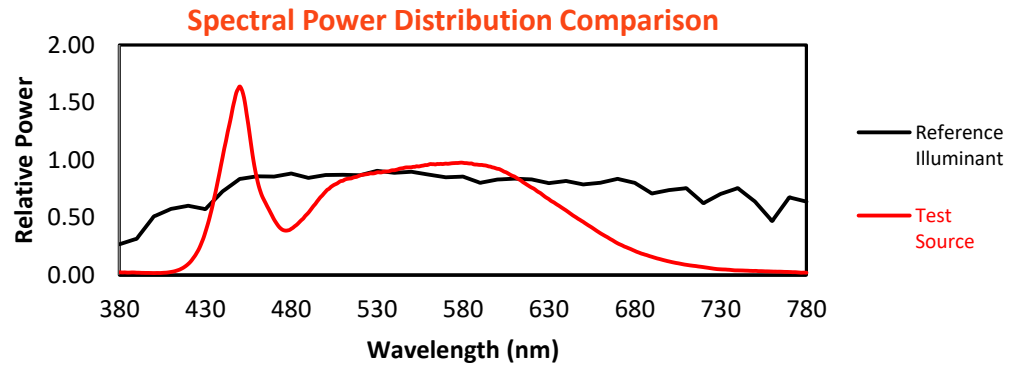
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1954             | 0.0              | 490       | 42831            | 35.6             | 620       | 60042            | 0.0              | 750       | 2873             | 0.0              | 880       | 2044             | 0.0              |
| 365       | 1724             | 0.0              | 495       | 50448            | 41.6             | 625       | 56351            | 0.0              | 755       | 2631             | 0.0              | 885       | 1734             | 0.0              |
| 370       | 2062             | 0.0              | 500       | 57301            | 46.1             | 630       | 52118            | 0.0              | 760       | 2425             | 0.0              | 890       | 1667             | 0.0              |
| 375       | 2008             | 0.0              | 505       | 61967            | 47.6             | 635       | 48230            | 0.0              | 765       | 2317             | 0.0              | 895       | 1441             | 0.0              |
| 380       | 1953             | 0.0              | 510       | 64719            | 46.5             | 640       | 44375            | 0.0              | 770       | 2102             | 0.0              | 900       | 1603             | 0.0              |
| 385       | 1682             | 0.0              | 515       | 66397            | 43.4             | 645       | 40217            | 0.0              | 775       | 1830             | 0.0              | 905       | 1642             | 0.0              |
| 390       | 1649             | 0.0              | 520       | 68407            | 39.8             | 650       | 36527            | 0.0              | 780       | 1607             | 0.0              | 910       | 1741             | 0.0              |
| 395       | 1482             | 0.0              | 525       | 69467            | 35.2             | 655       | 32673            | 0.0              | 785       | 1521             | 0.0              | 915       | 1565             | 0.0              |
| 400       | 1382             | 0.0              | 530       | 70500            | 30.5             | 660       | 28715            | 0.0              | 790       | 1655             | 0.0              | 920       | 1282             | 0.0              |
| 405       | 1525             | 0.0              | 535       | 71117            | 25.6             | 665       | 25303            | 0.0              | 795       | 1623             | 0.0              | 925       | 1374             | 0.0              |
| 410       | 2147             | 0.1              | 540       | 71985            | 21.1             | 670       | 21826            | 0.0              | 800       | 1833             | 0.0              | 930       | 1841             | 0.0              |
| 415       | 3759             | 0.2              | 545       | 73383            | 17.0             | 675       | 19145            | 0.0              | 805       | 1530             | 0.0              | 935       | 1813             | 0.0              |
| 420       | 7611             | 0.9              | 550       | 74010            | 13.3             | 680       | 16611            | 0.0              | 810       | 1397             | 0.0              | 940       | 1263             | 0.0              |
| 425       | 15319            | 2.4              | 555       | 74748            | 10.1             | 685       | 14392            | 0.0              | 815       | 1230             | 0.0              | 945       | 2229             | 0.0              |
| 430       | 29510            | 6.2              | 560       | 75851            | 7.5              | 690       | 12540            | 0.0              | 820       | 1409             | 0.0              | 950       | 1745             | 0.0              |
| 435       | 52212            | 13.9             | 565       | 76291            | 5.4              | 695       | 10850            | 0.0              | 825       | 1376             | 0.0              | 955       | 1081             | 0.0              |
| 440       | 80741            | 27.0             | 570       | 76525            | 3.7              | 700       | 9348             | 0.0              | 830       | 1909             | 0.0              | 960       | 876              | 0.0              |
| 445       | 108993           | 43.0             | 575       | 76882            | 2.6              | 705       | 8139             | 0.0              | 835       | 1697             | 0.0              | 965       | 1894             | 0.0              |
| 450       | 129500           | 59.7             | 580       | 77077            | 1.7              | 710       | 7042             | 0.0              | 840       | 1953             | 0.0              | 970       | 1743             | 0.0              |
| 455       | 103230           | 54.1             | 585       | 76634            | 1.1              | 715       | 6253             | 0.0              | 845       | 1765             | 0.0              | 975       | 1544             | 0.0              |
| 460       | 66471            | 39.2             | 590       | 75616            | 0.7              | 720       | 5450             | 0.0              | 850       | 1313             | 0.0              | 980       | 1583             | 0.0              |
| 465       | 49584            | 32.4             | 595       | 74612            | 0.5              | 725       | 4567             | 0.0              | 855       | 1616             | 0.0              | 985       | 953              | 0.0              |
| 470       | 38149            | 27.3             | 600       | 72977            | 0.3              | 730       | 3952             | 0.0              | 860       | 2001             | 0.0              | 990       | 2075             | 0.0              |
| 475       | 31044            | 23.7             | 605       | 70597            | 0.2              | 735       | 3632             | 0.0              | 865       | 2095             | 0.0              | 995       | 2336             | 0.0              |
| 480       | 31747            | 25.5             | 610       | 67624            | 0.1              | 740       | 3214             | 0.0              | 870       | 1923             | 0.0              | 1000      | 595              | 0.0              |
| 485       | 36675            | 30.2             | 615       | 63727            | 0.1              | 745       | 3034             | 0.0              | 875       | 2037             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2005-785-20

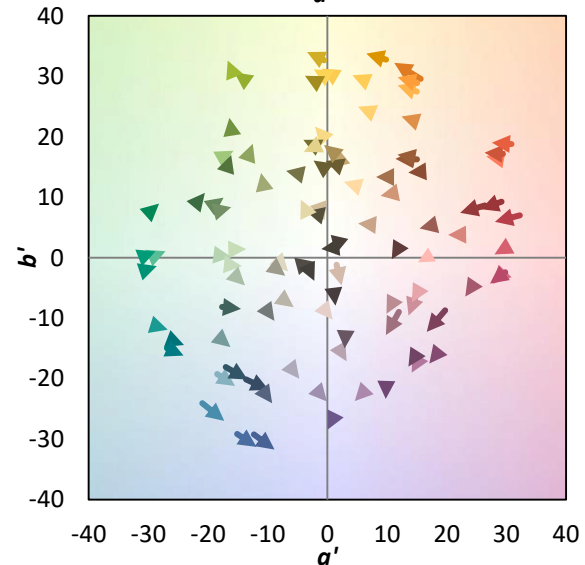
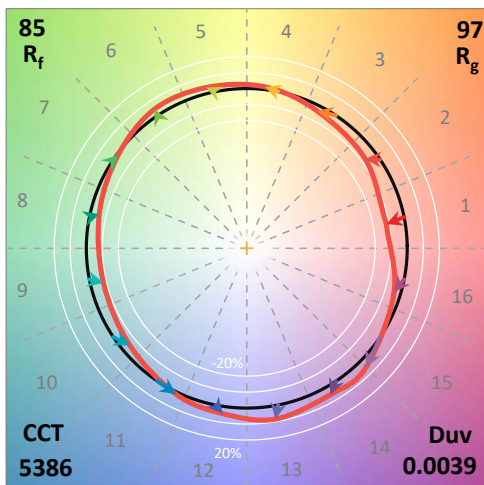
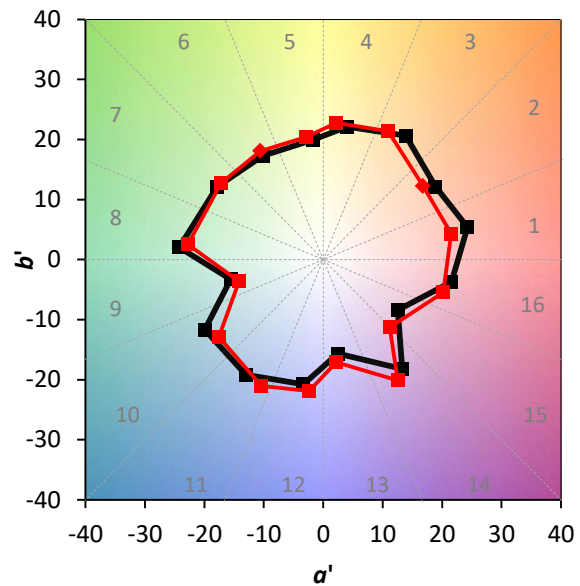
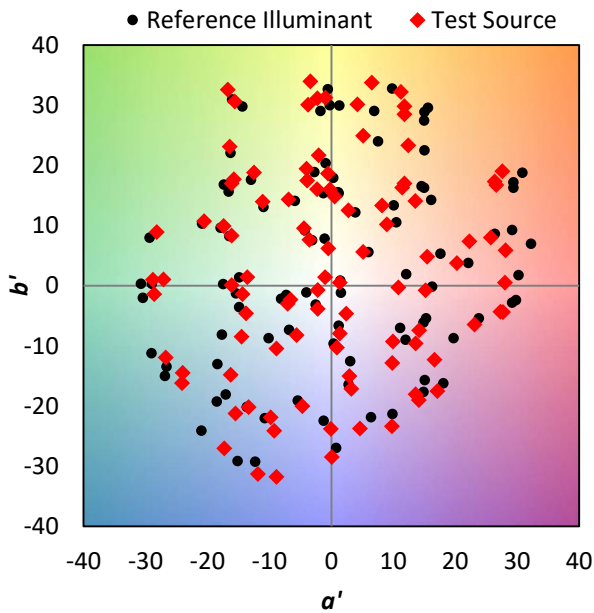
TM-30-18

### Summary

$R_f = 84.9$   
 $R_g = 97$   
 CIE  $R_a = 83.7$   
 $R_9 = 10.3$

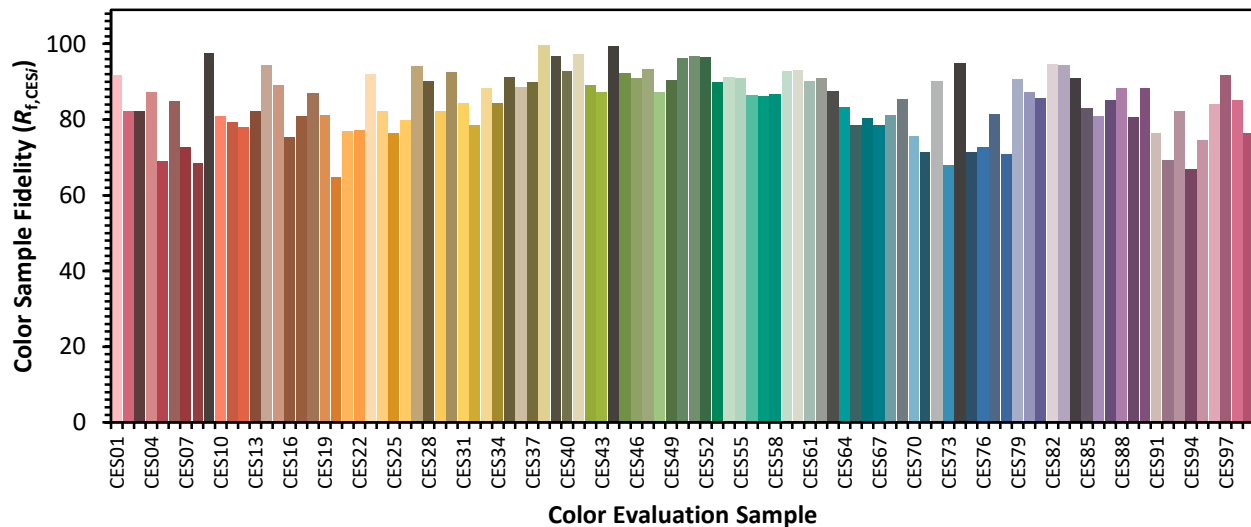


### Color Vector Graphics

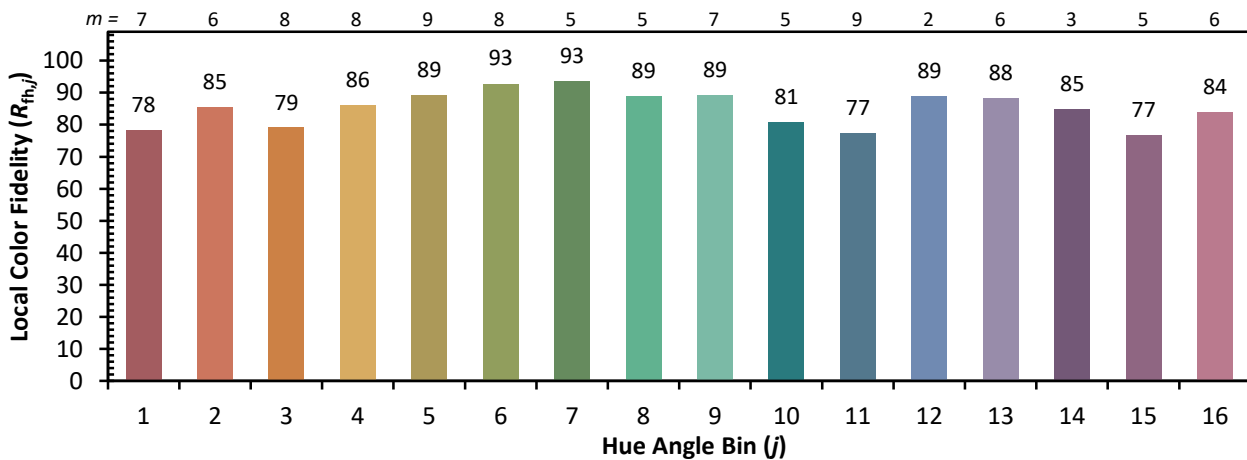
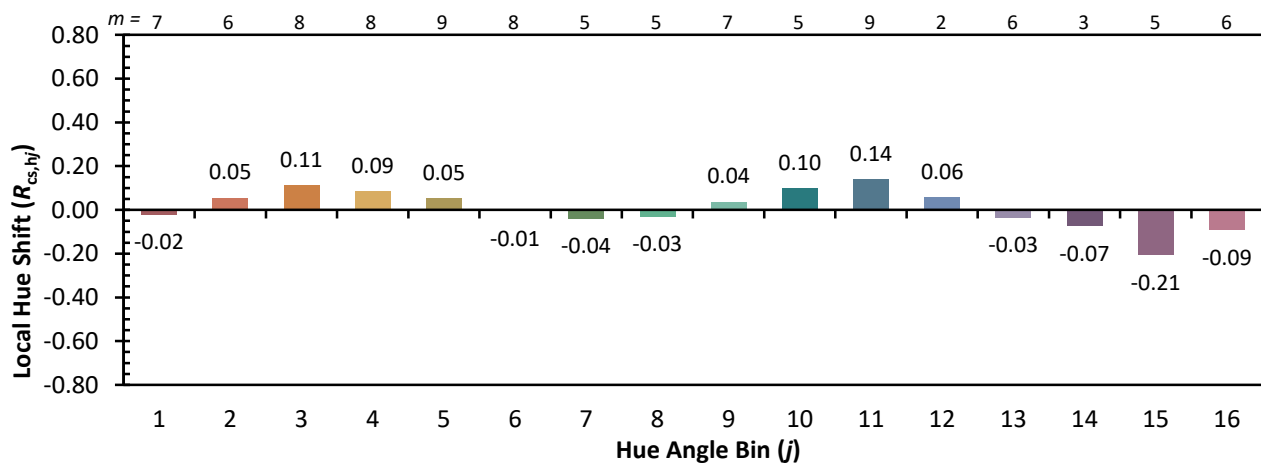
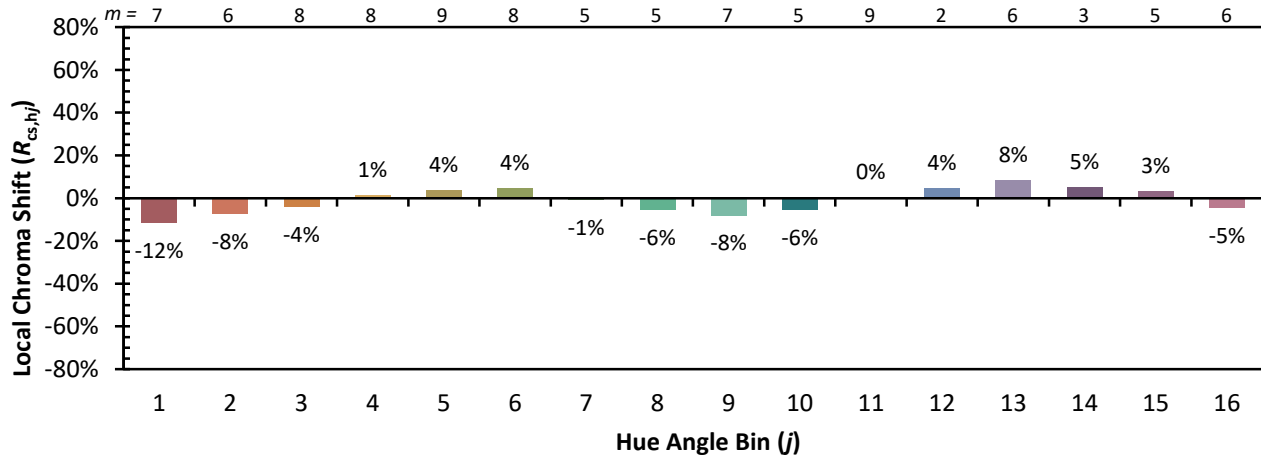


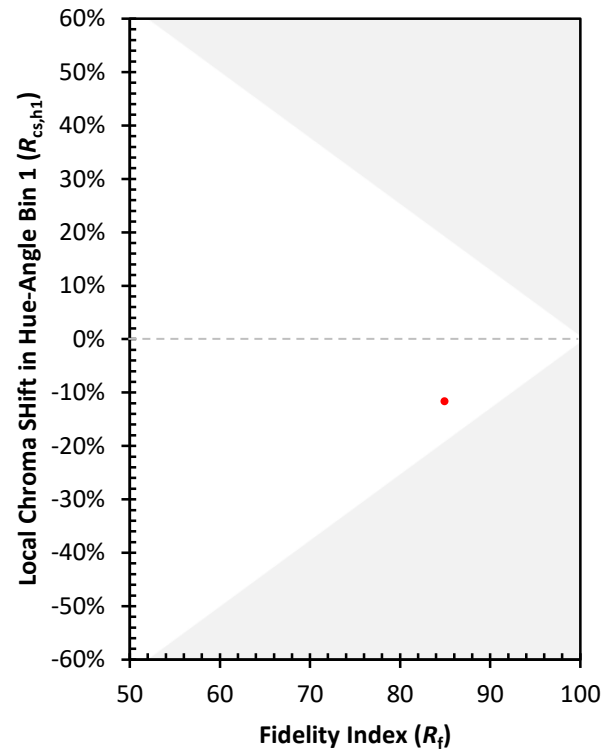
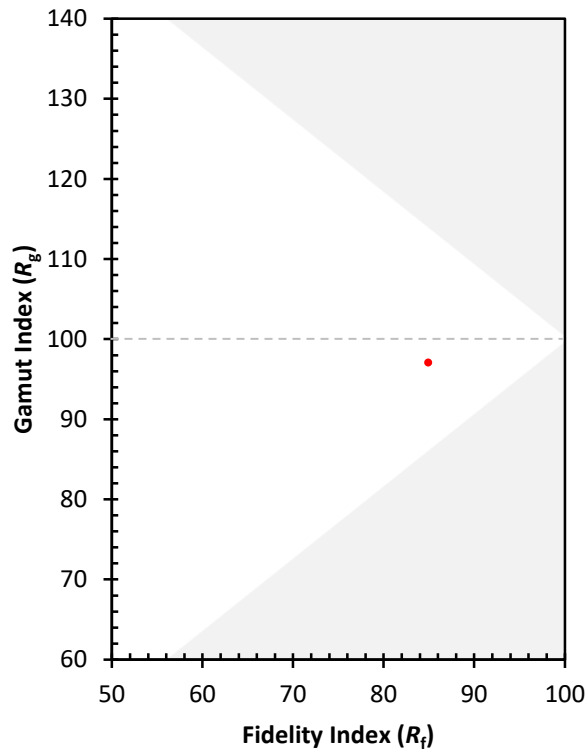
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |             |            |            |
|------------|-------------|------------|------------|
| CES01 = 85 | CES26 = 80  | CES51 = 97 | CES76 = 73 |
| CES02 = 60 | CES27 = 94  | CES52 = 96 | CES77 = 81 |
| CES03 = 30 | CES28 = 90  | CES53 = 90 | CES78 = 71 |
| CES04 = 68 | CES29 = 82  | CES54 = 91 | CES79 = 91 |
| CES05 = 46 | CES30 = 92  | CES55 = 91 | CES80 = 87 |
| CES06 = 50 | CES31 = 84  | CES56 = 86 | CES81 = 86 |
| CES07 = 39 | CES32 = 79  | CES57 = 86 | CES82 = 95 |
| CES08 = 38 | CES33 = 88  | CES58 = 87 | CES83 = 94 |
| CES09 = 29 | CES34 = 84  | CES59 = 93 | CES84 = 91 |
| CES10 = 72 | CES35 = 91  | CES60 = 93 | CES85 = 83 |
| CES11 = 55 | CES36 = 89  | CES61 = 90 | CES86 = 81 |
| CES12 = 61 | CES37 = 90  | CES62 = 91 | CES87 = 85 |
| CES13 = 42 | CES38 = 100 | CES63 = 88 | CES88 = 88 |
| CES14 = 74 | CES39 = 97  | CES64 = 83 | CES89 = 81 |
| CES15 = 70 | CES40 = 93  | CES65 = 79 | CES90 = 88 |
| CES16 = 46 | CES41 = 97  | CES66 = 80 | CES91 = 76 |
| CES17 = 48 | CES42 = 89  | CES67 = 79 | CES92 = 69 |
| CES18 = 55 | CES43 = 87  | CES68 = 81 | CES93 = 82 |
| CES19 = 70 | CES44 = 99  | CES69 = 85 | CES94 = 67 |
| CES20 = 64 | CES45 = 92  | CES70 = 76 | CES95 = 75 |
| CES21 = 85 | CES46 = 91  | CES71 = 71 | CES96 = 84 |
| CES22 = 77 | CES47 = 93  | CES72 = 90 | CES97 = 92 |
| CES23 = 91 | CES48 = 87  | CES73 = 68 | CES98 = 85 |
| CES24 = 90 | CES49 = 90  | CES74 = 95 | CES99 = 76 |
| CES25 = 70 | CES50 = 96  | CES75 = 71 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**


(END OF REPORT)