

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: STREETWORKS

Report Number: P349010

Luminaire Tested: **ARCH-N-PA1-19-827-24VDC-T2U-HSS**

Issue Date: 3/3/2020



**Test Information**

Test Method: LM-79-08  
Report Number: P349010  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1908-474-2)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: ARCH-N-PA1-19-827-24VDC-T2U-HSS  
Description: ARCHEON ROADWAY AND AREA LUMINAIRE  
(1) 80 CRI, 2700K, 370mA LIGHT ENGINE WITH 16 LEDS AND  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 1585 lumens  
Efficiency: N/A  
Efficacy: 83.4 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.75' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B0 - U0 - G0

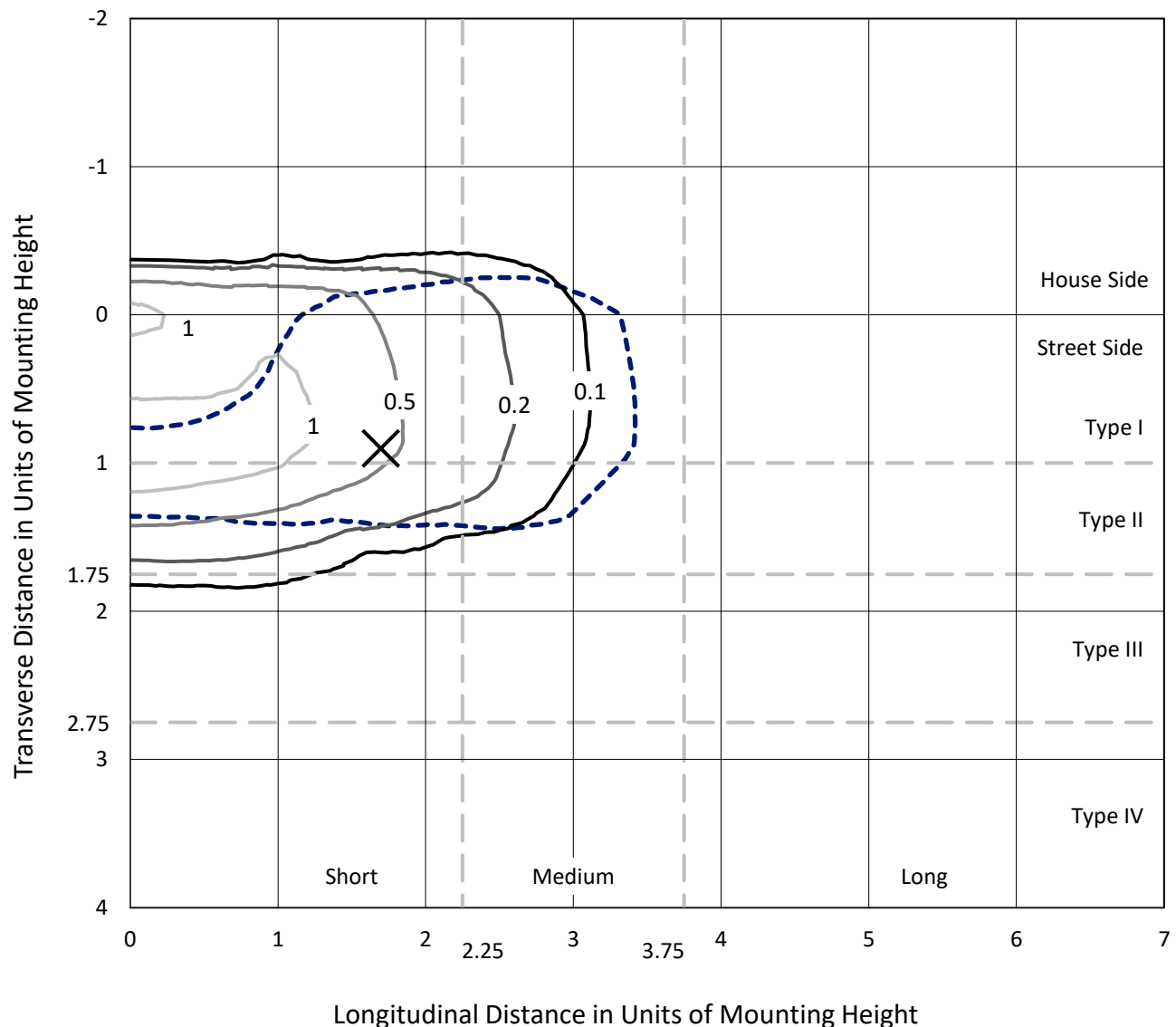
Input Watts (W): 19  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

REPORT NUMBER: P349010

CATALOG NUMBER: ARCH-N-PA1-19-827-24VDC-T2U-HSS

## Iso-Footcandle Lines of Horizontal Illumination

× Max cd  
 - - - 1/2 Max cd

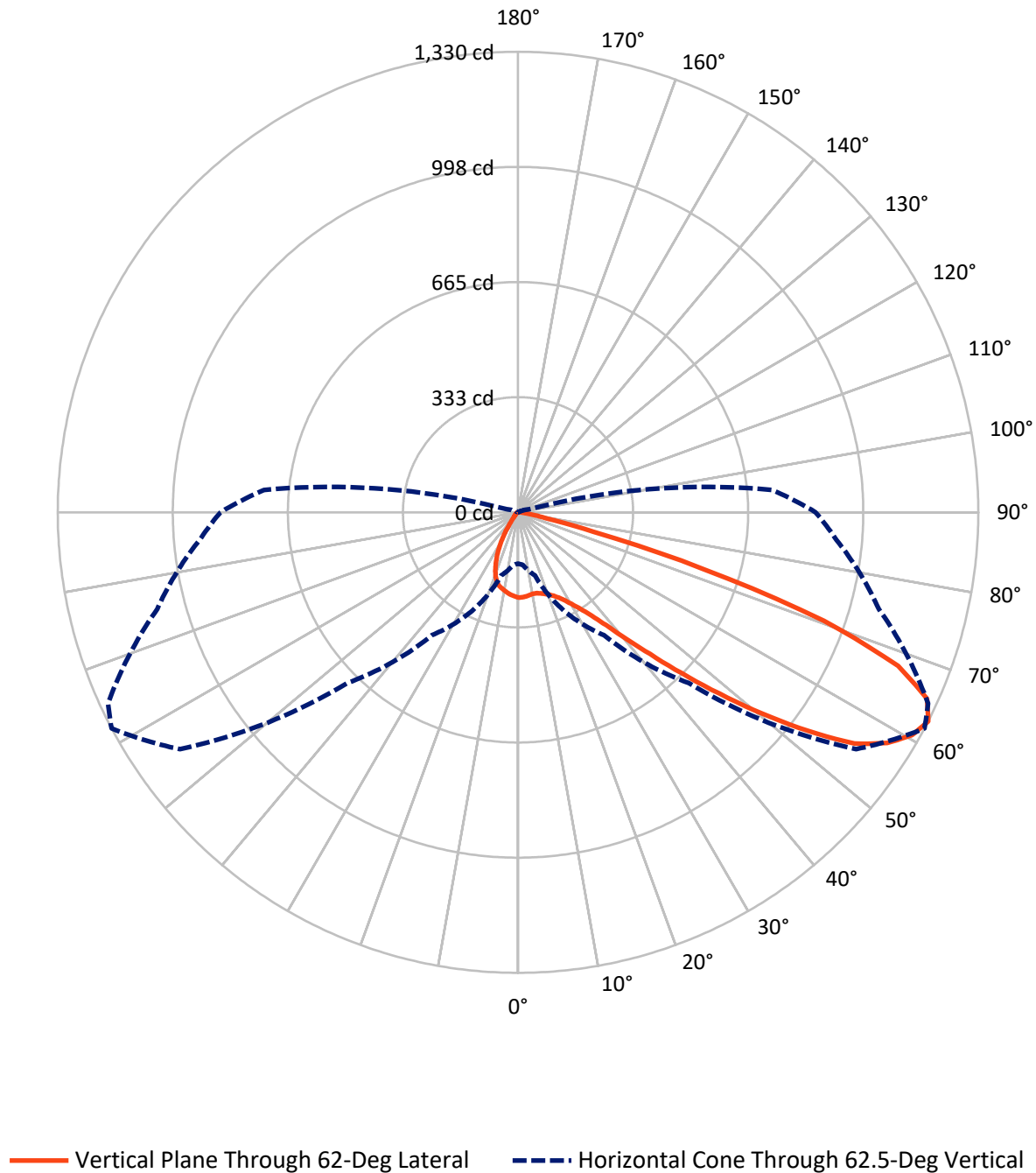


Based on 15 foot mounting height. Maximum calculated value = 1.6 fc  
 Type II - Short - N/A

REPORT NUMBER: P349010

CATALOG NUMBER: ARCH-N-PA1-19-827-24VDC-T2U-HSS

## Luminous Intensity Polar Plot



REPORT NUMBER: P349010

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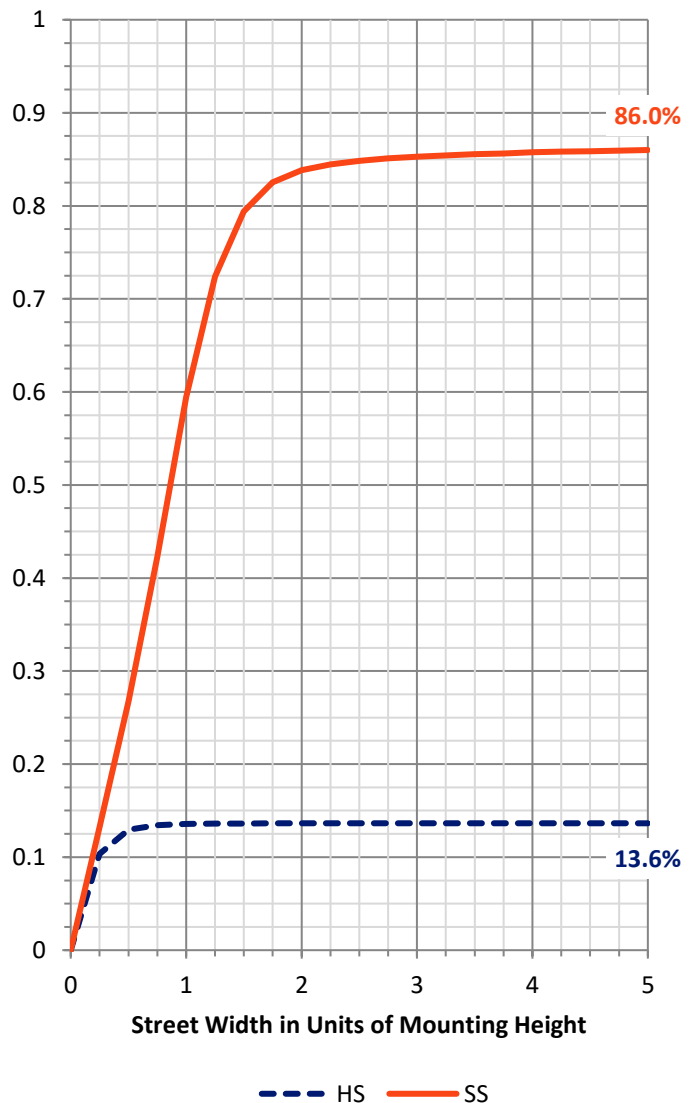
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 218.8    | 0.0    | 218.8  |
|                    | % Fixture | 13.8     | 0.0    | 13.8   |
| <b>Street Side</b> | Lumens    | 1366.1   | 0.0    | 1366.1 |
|                    | % Fixture | 86.2     | 0.0    | 86.2   |
| <b>Total</b>       | Lumens    | 1585.0   | 0.0    | 1585.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 22.4   | 1.4       |
| 10°-20°   | 56.3   | 3.6       |
| 20°-30°   | 84.1   | 5.3       |
| 30°-40°   | 160.2  | 10.1      |
| 40°-50°   | 334.0  | 21.1      |
| 50°-60°   | 443.7  | 28.0      |
| 60°-70°   | 345.9  | 21.8      |
| 70°-80°   | 130.7  | 8.2       |
| 80°-90°   | 7.8    | 0.5       |
| 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°    | 1585.0 | 100.0     |
| 0°-180°   | 1585.0 | 100.0     |

**Coefficient of Utilization**



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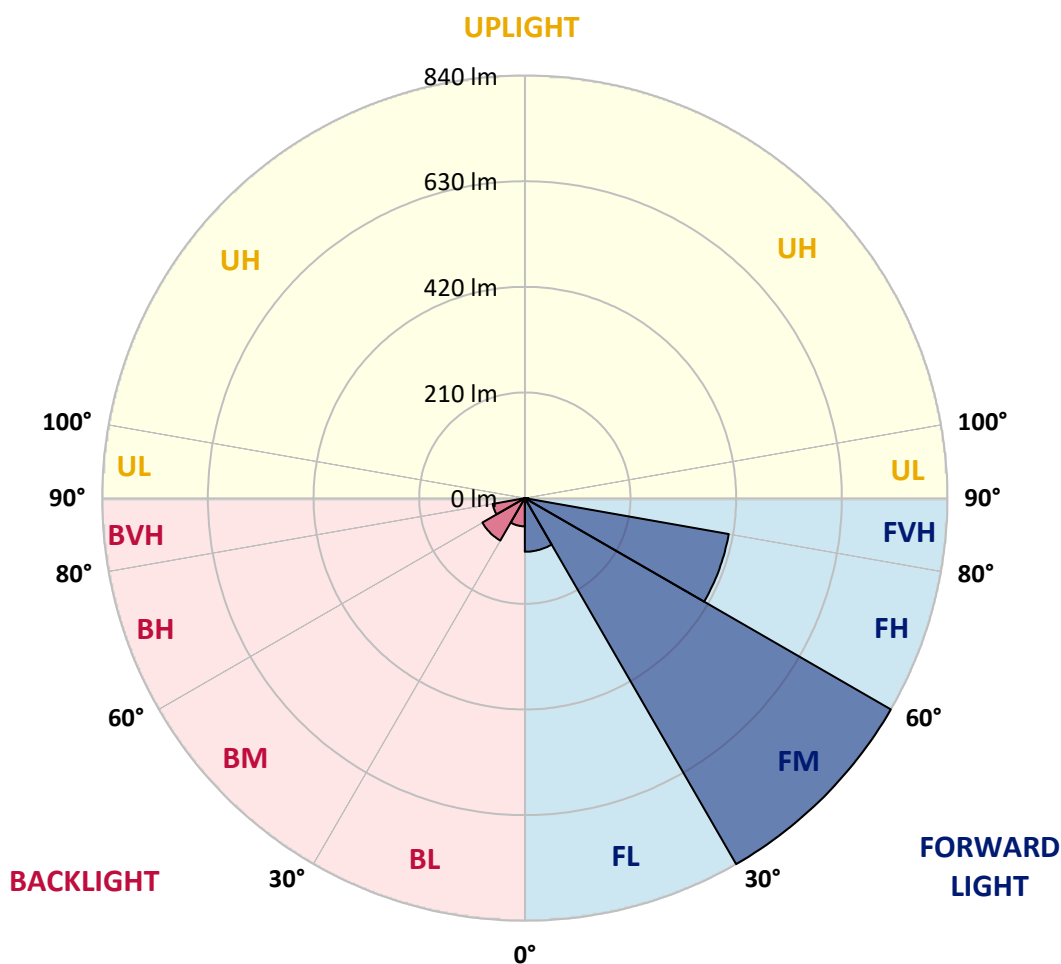
CATALOG NUMBER: ARCH-N-PA1-19-827-24VDC-T2U-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|--------|-----------|-------------------------|------|--------|
|      |             |        |           | B                       | U    | G      |
| FL   | (0°-30°)    | 106.7  | 6.7       |                         |      |        |
| FM   | (30°-60°)   | 840.4  | 53.0      |                         |      |        |
| FH   | (60°-80°)   | 411.7  | 26.0      |                         |      | G0/660 |
| FVH  | (80°-90°)   | 7.5    | 0.5       |                         |      | G0/10  |
| BL   | (0°-30°)    | 56.1   | 3.5       | B0/110                  |      |        |
| BM   | (30°-60°)   | 97.4   | 6.1       | B0/220                  |      |        |
| BH   | (60°-80°)   | 64.9   | 4.1       | B0/110                  |      | G0/110 |
| BVH  | (80°-90°)   | 0.4    | 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-G0**

Type II Short



REPORT NUMBER: P349010

CATALOG NUMBER: ARCH-N-PA1-19-827-24VDC-T2U-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°    | 45°    | 55°    | 62°    | 65°    | 75°    | 85°   |
|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|-------|
| 0°    | 246.2 | 246.2 | 246.2 | 246.2 | 246.2  | 246.2  | 246.2  | 246.2  | 246.2  | 246.2  | 246.2 |
| 2.5°  | 245.4 | 245.0 | 246.0 | 246.0 | 245.8  | 246.2  | 245.8  | 245.6  | 245.4  | 245.0  | 244.6 |
| 5°    | 239.0 | 239.0 | 240.4 | 241.1 | 241.7  | 242.9  | 243.3  | 243.8  | 243.6  | 244.0  | 244.2 |
| 7.5°  | 231.5 | 232.0 | 233.6 | 234.4 | 235.5  | 238.0  | 239.4  | 241.1  | 241.3  | 242.7  | 243.6 |
| 10°   | 225.3 | 225.7 | 227.4 | 228.4 | 229.9  | 233.2  | 236.3  | 239.2  | 239.6  | 242.3  | 242.9 |
| 12.5° | 221.2 | 221.6 | 223.3 | 224.7 | 227.8  | 232.0  | 236.3  | 239.6  | 240.7  | 244.0  | 244.0 |
| 15°   | 219.5 | 219.9 | 222.0 | 224.5 | 228.6  | 234.0  | 239.4  | 242.9  | 245.0  | 247.7  | 246.4 |
| 17.5° | 218.9 | 219.7 | 223.3 | 227.0 | 231.5  | 237.3  | 244.0  | 247.7  | 249.8  | 252.7  | 250.0 |
| 20°   | 220.8 | 221.8 | 226.4 | 231.5 | 236.3  | 242.3  | 249.6  | 253.7  | 255.8  | 257.6  | 252.5 |
| 22.5° | 227.4 | 229.1 | 233.0 | 238.8 | 242.5  | 249.8  | 257.0  | 261.8  | 264.1  | 263.8  | 257.0 |
| 25°   | 243.3 | 245.4 | 247.3 | 250.4 | 252.0  | 260.7  | 268.4  | 273.2  | 274.8  | 274.2  | 266.3 |
| 27.5° | 281.0 | 283.7 | 277.1 | 270.3 | 266.5  | 274.6  | 283.1  | 288.1  | 289.5  | 288.3  | 276.3 |
| 30°   | 344.6 | 344.8 | 329.7 | 308.2 | 292.2  | 291.4  | 301.7  | 308.4  | 308.4  | 305.9  | 290.4 |
| 32.5° | 437.2 | 430.6 | 411.5 | 373.4 | 337.4  | 318.5  | 326.4  | 332.8  | 332.8  | 329.7  | 311.9 |
| 35°   | 553.6 | 548.6 | 517.1 | 471.4 | 407.2  | 362.0  | 360.4  | 366.6  | 366.8  | 365.9  | 345.7 |
| 37.5° | 672.0 | 659.8 | 633.5 | 578.6 | 503.3  | 428.9  | 409.0  | 413.4  | 416.5  | 416.1  | 390.8 |
| 40°   | 782.2 | 770.0 | 747.8 | 695.0 | 621.3  | 527.5  | 479.9  | 479.9  | 480.1  | 478.0  | 447.5 |
| 42.5° | 868.8 | 863.2 | 846.6 | 810.0 | 753.0  | 682.6  | 575.3  | 559.6  | 556.3  | 554.2  | 514.2 |
| 45°   | 924.9 | 919.1 | 910.2 | 902.5 | 884.1  | 858.8  | 703.5  | 662.3  | 656.9  | 636.6  | 588.0 |
| 47.5° | 928.0 | 919.1 | 925.1 | 954.1 | 995.7  | 1008.8 | 861.7  | 782.0  | 767.7  | 731.1  | 661.9 |
| 50°   | 858.8 | 859.7 | 883.1 | 953.5 | 1065.9 | 1140.3 | 1029.5 | 913.7  | 891.2  | 817.8  | 727.1 |
| 52.5° | 731.7 | 740.0 | 776.2 | 884.5 | 1069.3 | 1224.4 | 1175.5 | 1049.6 | 1004.9 | 895.7  | 773.1 |
| 55°   | 572.8 | 580.3 | 639.5 | 756.7 | 988.7  | 1236.4 | 1281.7 | 1179.6 | 1120.4 | 950.0  | 814.3 |
| 57.5° | 405.1 | 419.2 | 492.7 | 600.4 | 835.0  | 1144.6 | 1310.7 | 1257.5 | 1200.1 | 1002.8 | 853.0 |
| 60°   | 246.2 | 253.3 | 329.7 | 455.0 | 629.4  | 952.7  | 1276.8 | 1307.2 | 1260.8 | 1048.5 | 889.3 |
| 62.5° | 148.1 | 152.2 | 188.9 | 313.3 | 433.0  | 697.5  | 1192.7 | 1330.0 | 1307.2 | 1079.0 | 924.1 |
| 65°   | 87.6  | 90.3  | 107.5 | 189.3 | 288.5  | 427.9  | 1011.1 | 1298.7 | 1317.2 | 1105.3 | 944.4 |
| 67.5° | 63.2  | 64.0  | 70.2  | 101.9 | 193.6  | 229.3  | 703.1  | 1184.8 | 1253.8 | 1114.0 | 932.4 |
| 70°   | 54.5  | 55.5  | 61.5  | 71.7  | 137.1  | 135.2  | 365.9  | 937.8  | 1062.8 | 1068.6 | 881.6 |
| 72.5° | 41.2  | 43.1  | 53.0  | 67.3  | 98.4   | 96.1   | 137.9  | 559.2  | 721.5  | 877.3  | 760.1 |
| 75°   | 28.0  | 29.0  | 39.3  | 57.2  | 76.8   | 71.7   | 72.3   | 224.5  | 352.9  | 550.1  | 522.3 |
| 77.5° | 17.6  | 18.4  | 24.0  | 41.0  | 65.9   | 50.5   | 51.2   | 79.7   | 127.4  | 233.2  | 223.9 |
| 80°   | 12.0  | 12.4  | 14.5  | 26.5  | 44.5   | 43.9   | 32.9   | 41.6   | 47.4   | 71.9   | 48.3  |
| 82.5° | 7.2   | 7.2   | 9.5   | 15.7  | 26.9   | 34.8   | 20.7   | 23.0   | 25.3   | 26.7   | 11.0  |
| 85°   | 2.5   | 2.7   | 5.8   | 9.7   | 16.6   | 17.4   | 11.8   | 13.7   | 14.3   | 15.5   | 5.2   |
| 87.5° | 1.0   | 0.8   | 3.1   | 5.4   | 7.0    | 8.1    | 6.8    | 6.2    | 6.8    | 9.1    | 2.3   |
| 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: P349010

CATALOG NUMBER: ARCH-N-PA1-19-827-24VDC-T2U-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 246.2 | 246.2 | 246.2 | 246.2 | 246.2 | 246.2 | 246.2 | 246.2 | 246.2 | 246.2 | 246.2 |
| 2.5°  | 244.8 | 244.0 | 244.0 | 243.8 | 242.5 | 241.9 | 241.3 | 239.6 | 240.7 | 239.4 | 238.6 |
| 5°    | 243.6 | 242.9 | 241.9 | 240.9 | 238.0 | 235.5 | 234.4 | 232.4 | 232.2 | 230.5 | 229.7 |
| 7.5°  | 243.3 | 241.9 | 240.2 | 236.7 | 232.4 | 228.4 | 224.9 | 221.4 | 219.9 | 218.1 | 217.0 |
| 10°   | 242.3 | 240.4 | 237.3 | 231.7 | 225.3 | 219.1 | 211.2 | 201.5 | 194.3 | 190.1 | 189.5 |
| 12.5° | 242.5 | 240.4 | 235.7 | 227.4 | 218.9 | 205.2 | 184.1 | 162.0 | 143.7 | 136.1 | 134.8 |
| 15°   | 244.2 | 241.9 | 234.6 | 223.5 | 209.0 | 178.9 | 140.2 | 106.2 | 82.6  | 74.1  | 72.3  |
| 17.5° | 246.2 | 242.3 | 232.4 | 217.9 | 189.9 | 138.8 | 88.2  | 55.7  | 42.5  | 37.7  | 36.9  |
| 20°   | 247.5 | 242.1 | 228.6 | 209.4 | 160.9 | 92.8  | 48.0  | 32.7  | 28.8  | 27.8  | 27.3  |
| 22.5° | 250.6 | 242.7 | 225.5 | 196.1 | 124.5 | 55.9  | 30.4  | 25.5  | 23.2  | 22.0  | 21.7  |
| 25°   | 257.0 | 246.9 | 225.7 | 178.9 | 87.2  | 33.8  | 24.6  | 20.7  | 18.6  | 17.4  | 17.0  |
| 27.5° | 266.3 | 254.3 | 229.7 | 157.6 | 53.8  | 25.5  | 20.5  | 16.8  | 14.5  | 13.5  | 13.3  |
| 30°   | 278.1 | 263.4 | 234.2 | 129.9 | 33.6  | 21.3  | 16.6  | 13.0  | 11.4  | 10.8  | 10.6  |
| 32.5° | 296.8 | 279.2 | 238.2 | 97.1  | 23.2  | 17.6  | 13.0  | 10.4  | 9.3   | 8.7   | 8.7   |
| 35°   | 327.6 | 306.3 | 244.6 | 65.0  | 18.4  | 14.1  | 10.6  | 8.5   | 7.7   | 7.2   | 7.2   |
| 37.5° | 371.1 | 345.0 | 247.7 | 40.4  | 15.1  | 11.0  | 8.5   | 7.0   | 6.4   | 6.0   | 6.0   |
| 40°   | 424.1 | 392.0 | 243.3 | 25.1  | 12.6  | 8.9   | 7.0   | 6.0   | 5.4   | 5.2   | 5.2   |
| 42.5° | 485.2 | 446.1 | 229.7 | 17.8  | 10.6  | 7.2   | 6.0   | 5.2   | 4.8   | 4.6   | 4.6   |
| 45°   | 553.6 | 505.3 | 205.0 | 14.9  | 8.9   | 6.2   | 5.2   | 4.3   | 4.1   | 3.9   | 3.9   |
| 47.5° | 621.7 | 565.4 | 173.1 | 12.8  | 7.5   | 5.2   | 4.3   | 3.7   | 3.5   | 3.3   | 3.3   |
| 50°   | 681.2 | 618.0 | 139.4 | 11.2  | 6.2   | 4.6   | 3.7   | 3.1   | 2.9   | 2.7   | 2.7   |
| 52.5° | 715.1 | 649.3 | 107.9 | 9.3   | 5.4   | 3.9   | 2.9   | 2.5   | 2.3   | 2.1   | 2.1   |
| 55°   | 751.8 | 675.4 | 80.6  | 7.9   | 4.3   | 3.3   | 2.3   | 1.9   | 1.7   | 1.4   | 1.4   |
| 57.5° | 785.9 | 698.8 | 59.9  | 6.4   | 3.7   | 2.5   | 1.9   | 1.4   | 1.2   | 1.0   | 1.0   |
| 60°   | 819.1 | 718.6 | 44.3  | 5.2   | 3.1   | 2.1   | 1.4   | 1.0   | 0.8   | 0.6   | 0.6   |
| 62.5° | 859.5 | 736.9 | 32.5  | 4.1   | 2.7   | 1.4   | 1.0   | 0.6   | 0.4   | 0.2   | 0.2   |
| 65°   | 889.5 | 746.2 | 24.4  | 3.1   | 2.3   | 1.0   | 0.6   | 0.4   | 0.0   | 0.0   | 0.0   |
| 67.5° | 889.3 | 728.2 | 17.8  | 2.3   | 1.7   | 0.8   | 0.4   | 0.0   | 0.0   | 0.0   | 0.0   |
| 70°   | 847.7 | 673.5 | 12.4  | 1.9   | 1.2   | 0.6   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   |
| 72.5° | 726.9 | 532.7 | 8.1   | 1.2   | 1.0   | 0.4   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   |
| 75°   | 490.6 | 270.5 | 4.8   | 1.0   | 0.8   | 0.4   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   |
| 77.5° | 209.8 | 106.2 | 2.5   | 0.6   | 0.6   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 80°   | 43.9  | 25.7  | 1.0   | 0.4   | 0.4   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 82.5° | 7.5   | 3.7   | 0.4   | 0.4   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 1.9   | 1.0   | 0.2   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 0.8   | 0.4   | 0.2   | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 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: SP1-2101-121-9

Luminaire Tested: IFLD-S-SA2A-827-U-T2

Test Date: 03/05/2021

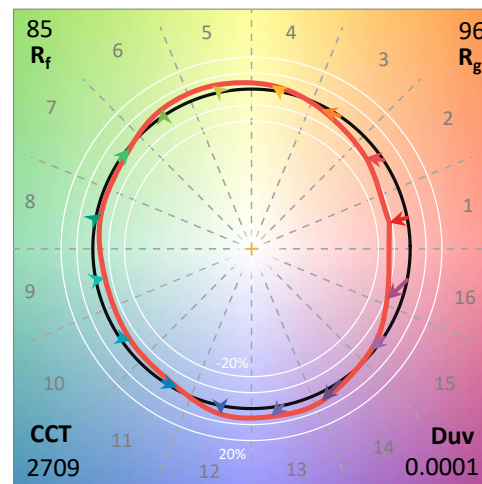
### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/05/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-827-U-T2**  
 Description: STREETWORKS INF FLOOD

PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 2709   | CRI (Ra): | 82.1 |      |      |
| CIE u':                   | 0.2620 | R1:       | 80.4 | R9:  | 4.5  |
| CIE v':                   | 0.5273 | R2:       | 91.2 | R10: | 81.3 |
| Duv:                      | 0.0001 | R3:       | 95.2 | R11: | 81.0 |
| CIE x:                    | 0.4591 | R4:       | 80.5 | R12: | 79.0 |
| CIE y:                    | 0.4107 | R5:       | 81.2 | R13: | 82.9 |
| CIE z:                    | 0.1301 | R6:       | 90.9 | R14: | 97.9 |
| Peak Wavelength (nm):     | 606    | R7:       | 81.1 |      |      |
| Dominant Wavelength (nm): | 584    | R8:       | 56.0 |      |      |
| Purity:                   | 61.2   |           |      |      |      |
| Rf:                       | 85.2   |           |      |      |      |
| Rg:                       | 96.4   |           |      |      |      |



### Test Conditions

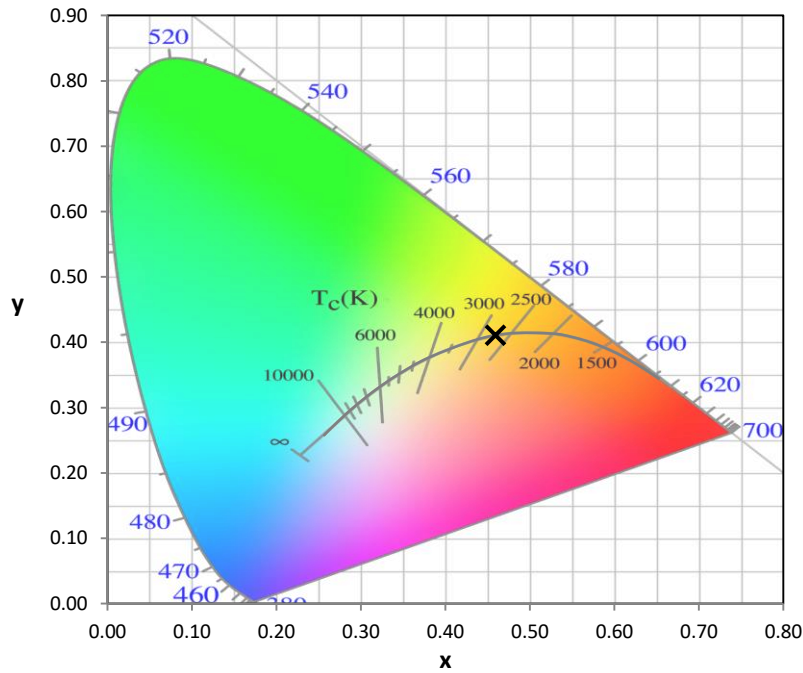
Stabilization Time: 60M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.9/31%  
 Sphere Temperature (°C): 24.4

REPORT NUMBER: SP1-2101-121-9

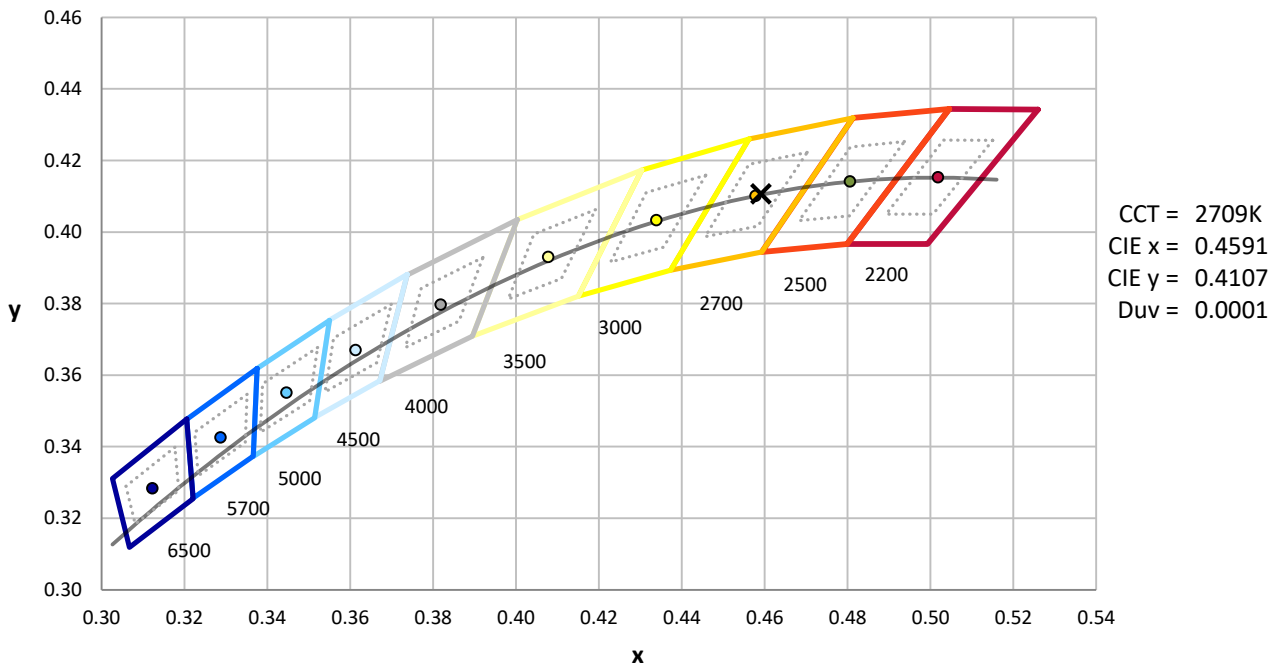
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

REPORT NUMBER: SP1-2101-121-9

**CIE 1931 Chromaticity Diagram**



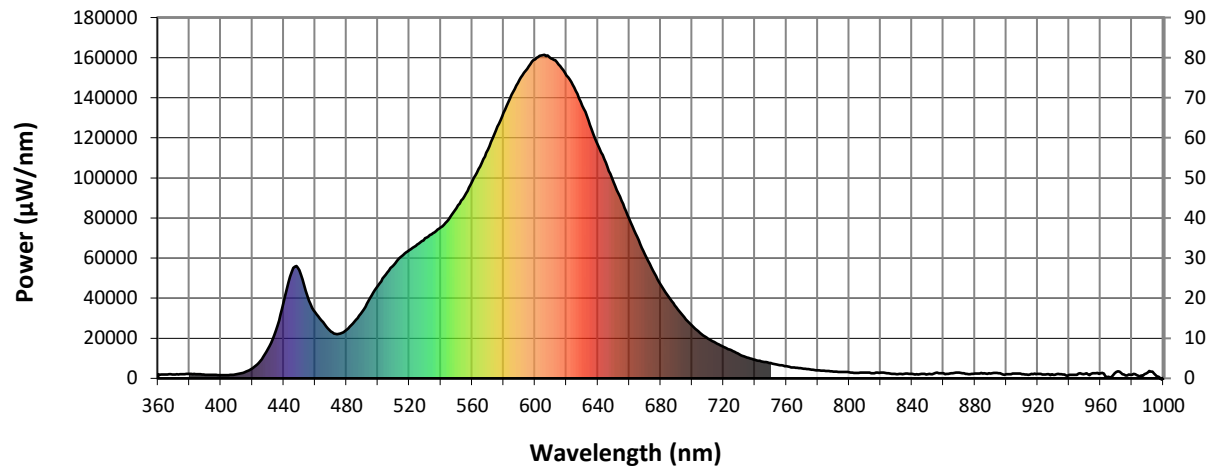
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

REPORT NUMBER: SP1-2101-121-9

### Photopic Flux vs. Wavelength

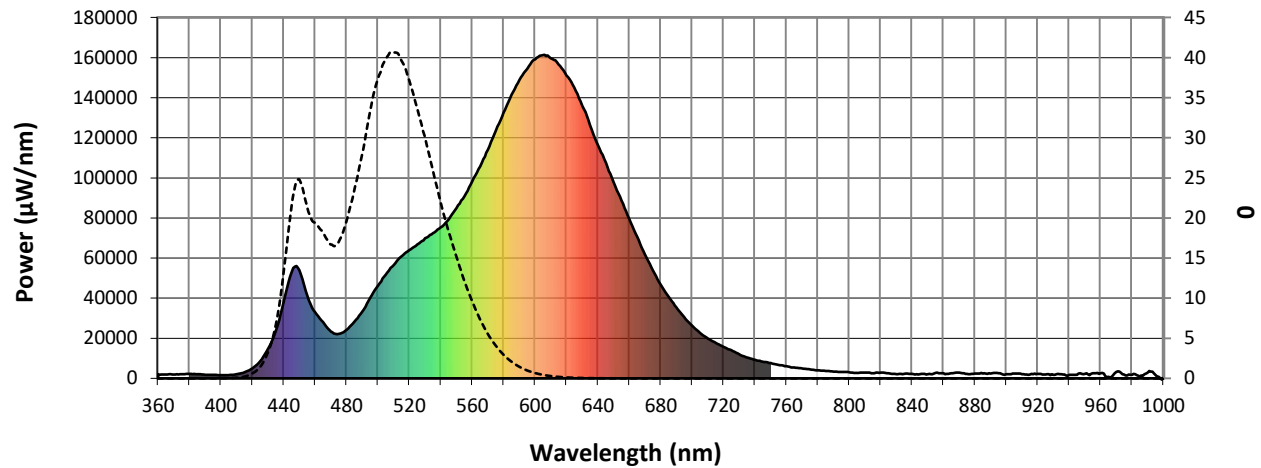


#####

| 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       | 2013             | 0.0              | 490       | 33356            | 4.7              | 620       | 150993           | 39.3             | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 7.3              | 625       | 145077           | 32.0             | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 10.2             | 630       | 136072           | 24.6             | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 14.5             | 635       | 126417           | 19.0             | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 19.4             | 640       | 116412           | 13.9             | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 25.2             | 645       | 107525           | 10.4             | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 31.0             | 650       | 97857            | 7.2              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 35.8             | 655       | 88582            | 5.1              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 41.1             | 660       | 79462            | 3.3              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.0              | 535       | 72510            | 45.0             | 665       | 70606            | 2.2              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.0              | 540       | 75299            | 49.1             | 670       | 61774            | 1.4              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.0              | 545       | 79297            | 52.8             | 675       | 53771            | 0.9              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.0              | 550       | 84946            | 57.7             | 680       | 46786            | 0.5              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 0.0              | 555       | 90790            | 62.0             | 685       | 40747            | 0.4              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 0.1              | 560       | 98231            | 66.8             | 690       | 35400            | 0.2              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 0.3              | 565       | 105738           | 70.3             | 695       | 30445            | 0.1              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 0.6              | 570       | 114034           | 74.1             | 700       | 26278            | 0.1              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 1.1              | 575       | 123632           | 76.9             | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 1.4              | 580       | 132443           | 78.7             | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 1.4              | 585       | 141502           | 78.6             | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 1.4              | 590       | 148917           | 77.0             | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 1.4              | 595       | 154326           | 73.2             | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 1.5              | 600       | 159208           | 68.6             | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 1.7              | 605       | 161290           | 62.5             | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 2.3              | 610       | 159549           | 54.8             | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 3.3              | 615       | 156663           | 47.3             | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-9

### Scotopic Flux vs. Wavelength



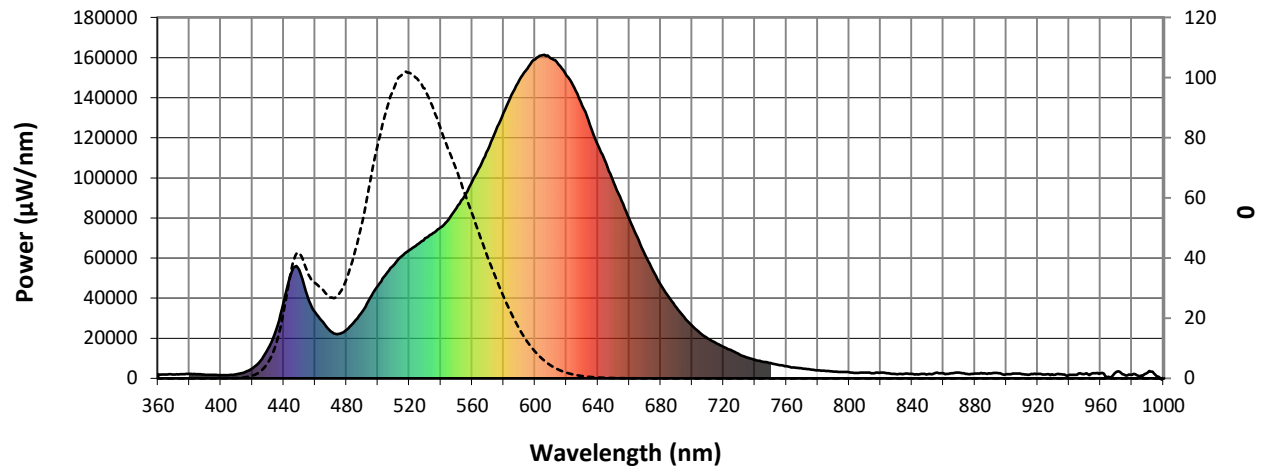
Scotopic Lumens: 8911.3

S/P: 1.22

| 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       | 2013             | 0.0              | 490       | 33356            | 51.4             | 620       | 150993           | 1.9              | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 64.7             | 625       | 145077           | 1.2              | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 77.4             | 630       | 136072           | 0.8              | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 88.0             | 635       | 126417           | 0.5              | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 95.9             | 640       | 116412           | 0.3              | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 100.7            | 645       | 107525           | 0.2              | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 101.7            | 650       | 97857            | 0.1              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 99.8             | 655       | 88582            | 0.1              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 96.3             | 660       | 79462            | 0.0              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.1              | 535       | 72510            | 90.4             | 665       | 70606            | 0.0              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.1              | 540       | 75299            | 83.2             | 670       | 61774            | 0.0              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.3              | 545       | 79297            | 76.0             | 675       | 53771            | 0.0              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.8              | 550       | 84946            | 69.5             | 680       | 46786            | 0.0              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 2.1              | 555       | 90790            | 62.0             | 685       | 40747            | 0.0              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 5.0              | 560       | 98231            | 54.9             | 690       | 35400            | 0.0              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 10.7             | 565       | 105738           | 47.4             | 695       | 30445            | 0.0              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 21.3             | 570       | 114034           | 40.2             | 700       | 26278            | 0.0              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 35.5             | 575       | 123632           | 33.7             | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 41.8             | 580       | 132443           | 27.3             | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 36.0             | 585       | 141502           | 21.6             | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 31.8             | 590       | 148917           | 16.6             | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 29.6             | 595       | 154326           | 12.3             | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 26.9             | 600       | 159208           | 9.0              | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 27.7             | 605       | 161290           | 6.3              | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 32.7             | 610       | 159549           | 4.3              | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 40.9             | 615       | 156663           | 2.9              | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-9

### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 3277.6**
**M/P: 0.45**

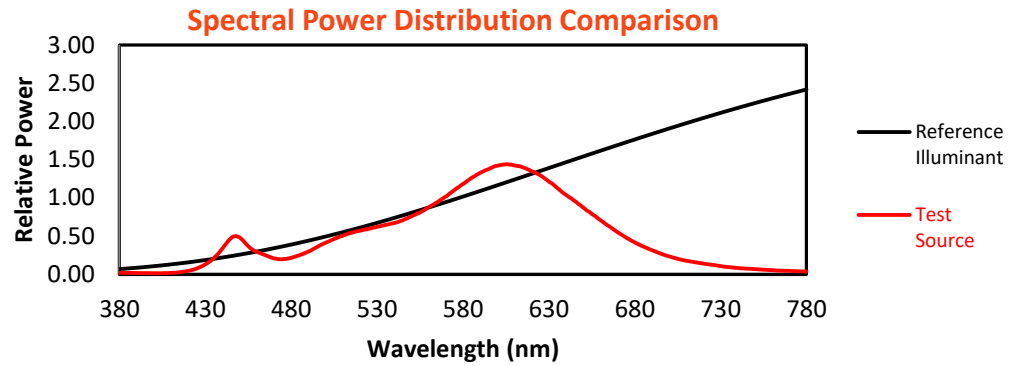
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2013             | 0.0              | 490       | 33356            | 27.8             | 620       | 150993           | 0.1              | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 33.0             | 625       | 145077           | 0.1              | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 37.2             | 630       | 136072           | 0.0              | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 39.7             | 635       | 126417           | 0.0              | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 40.6             | 640       | 116412           | 0.0              | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 39.7             | 645       | 107525           | 0.0              | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 37.2             | 650       | 97857            | 0.0              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 33.8             | 655       | 88582            | 0.0              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 30.2             | 660       | 79462            | 0.0              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.0              | 535       | 72510            | 26.1             | 665       | 70606            | 0.0              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.1              | 540       | 75299            | 22.0             | 670       | 61774            | 0.0              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.2              | 545       | 79297            | 18.4             | 675       | 53771            | 0.0              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.6              | 550       | 84946            | 15.2             | 680       | 46786            | 0.0              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 1.3              | 555       | 90790            | 12.2             | 685       | 40747            | 0.0              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 3.1              | 560       | 98231            | 9.7              | 690       | 35400            | 0.0              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 6.4              | 565       | 105738           | 7.4              | 695       | 30445            | 0.0              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 12.8             | 570       | 114034           | 5.6              | 700       | 26278            | 0.0              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 20.9             | 575       | 123632           | 4.1              | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 24.8             | 580       | 132443           | 3.0              | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 21.6             | 585       | 141502           | 2.1              | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 19.4             | 590       | 148917           | 1.5              | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 18.3             | 595       | 154326           | 1.0              | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 16.7             | 600       | 159208           | 0.7              | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 16.9             | 605       | 161290           | 0.4              | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 19.4             | 610       | 159549           | 0.3              | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 23.3             | 615       | 156663           | 0.2              | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-9

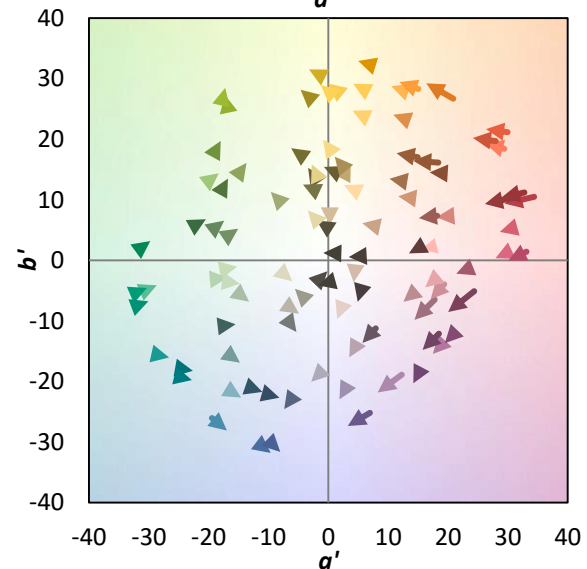
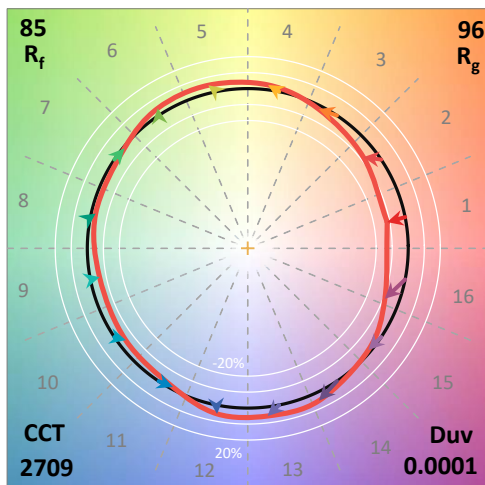
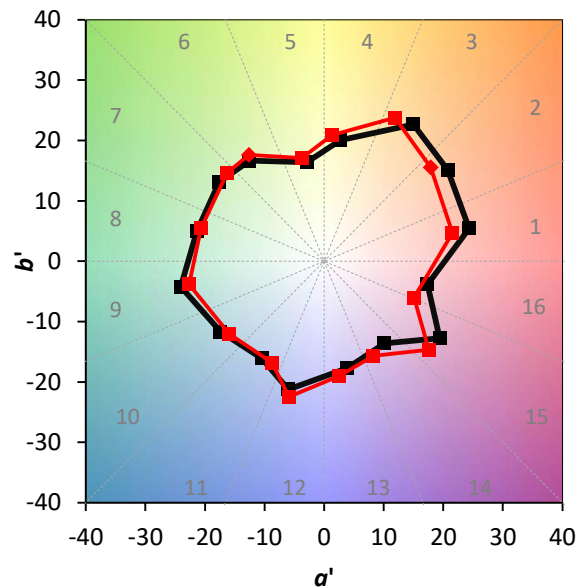
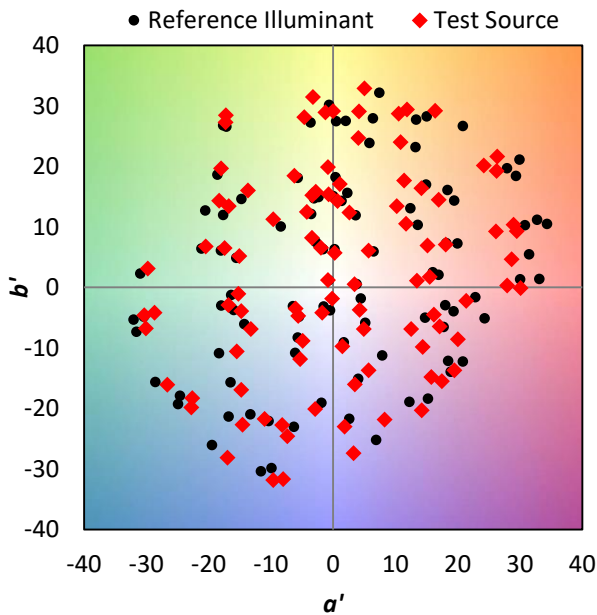
TM-30-18

### Summary

$R_f = 85.2$   
 $R_g = 96.4$   
 CIE  $R_a = 82.1$   
 $R_9 = 4.5$



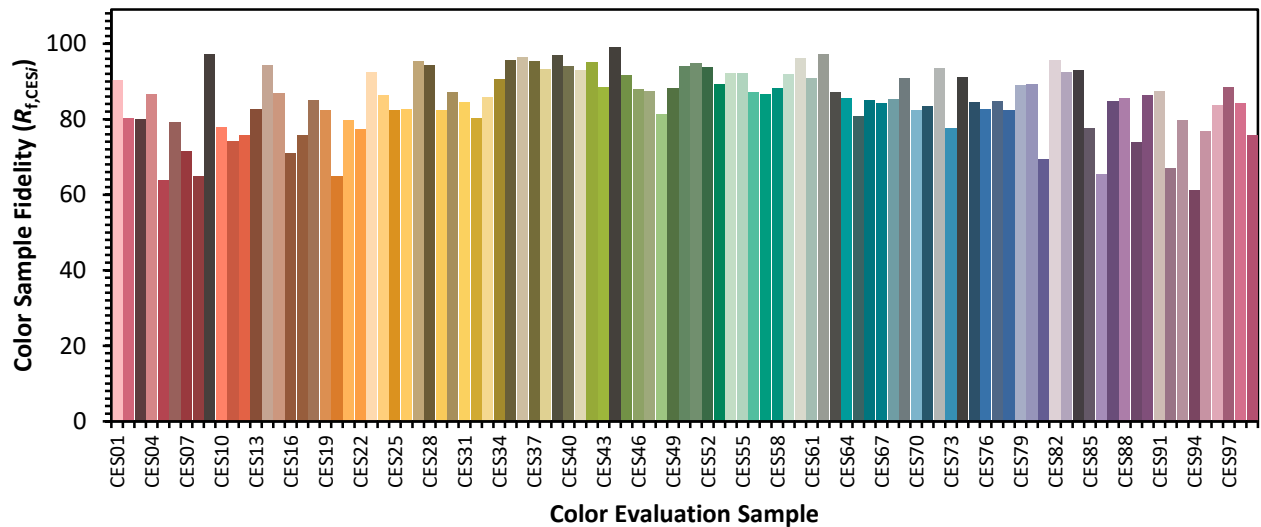
### Color Vector Graphics



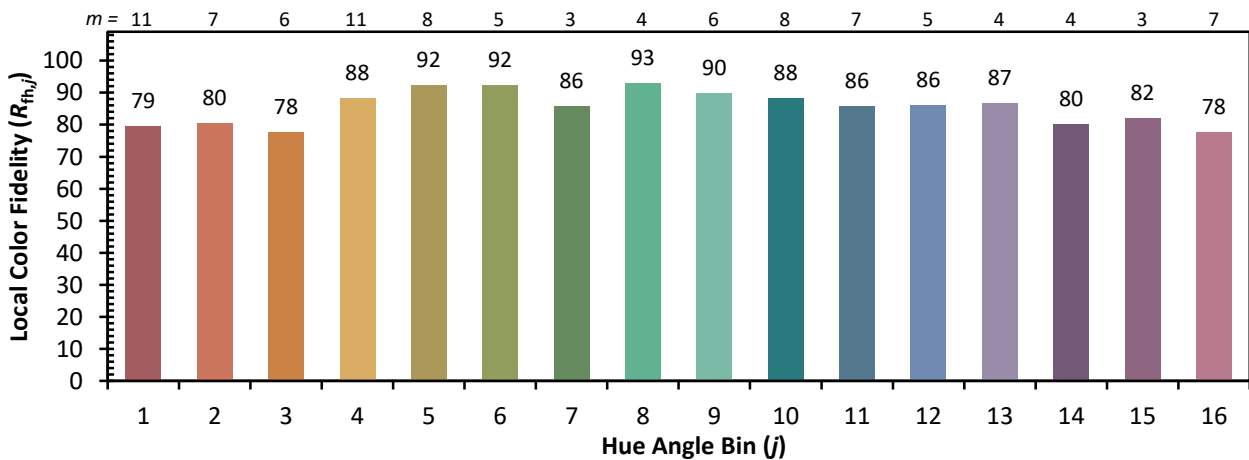
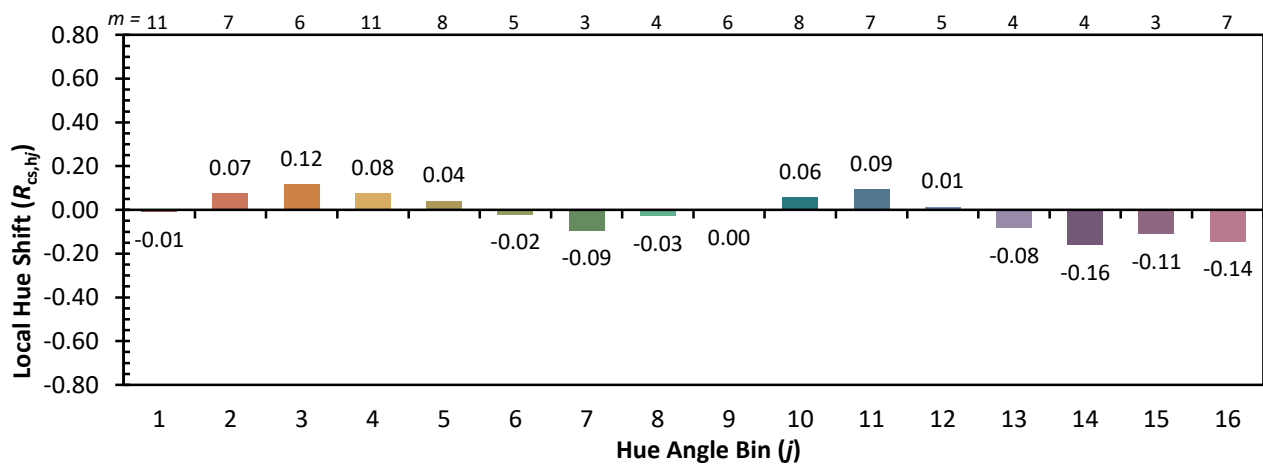
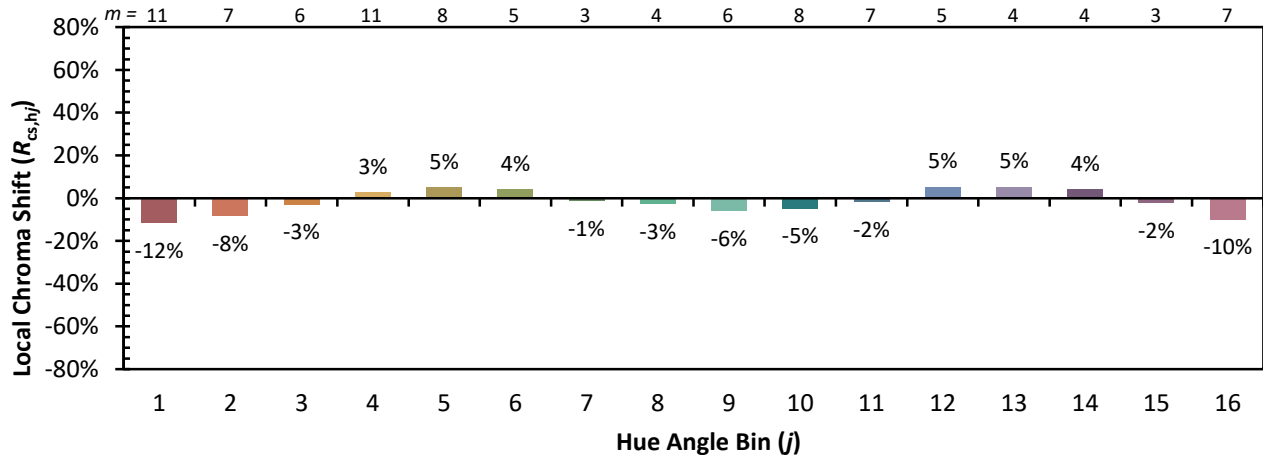


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

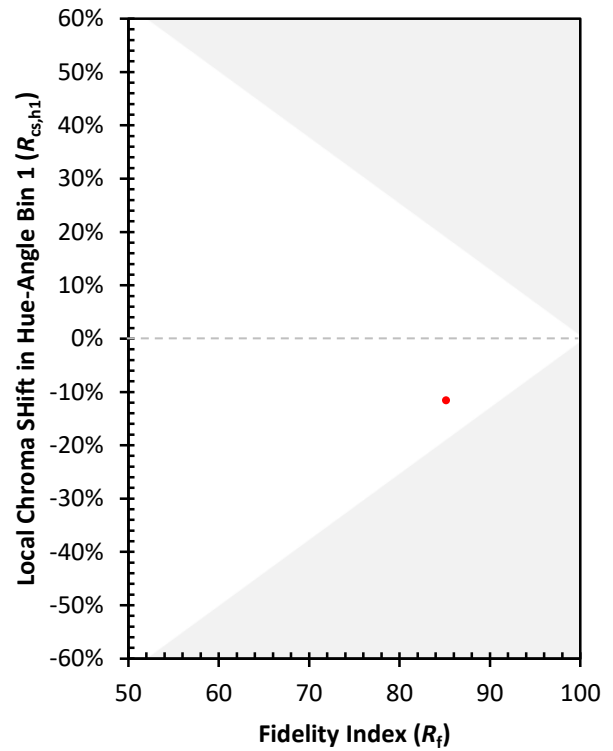
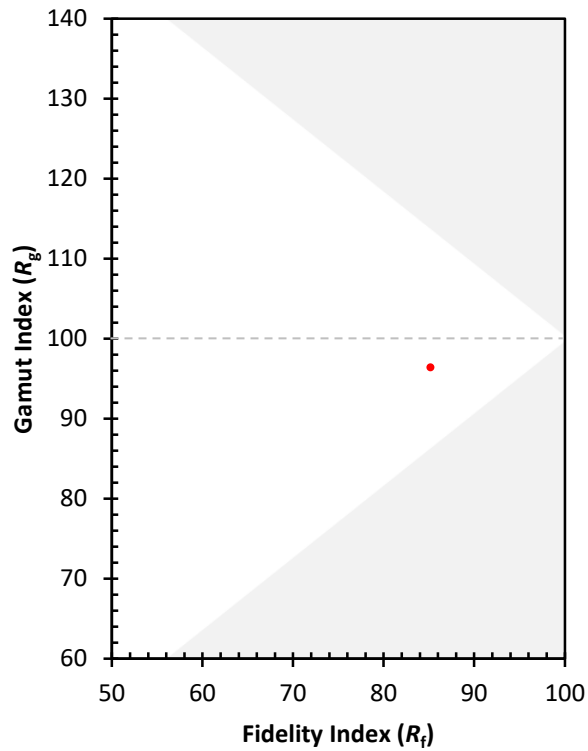
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 83 | CES51 = 95 | CES76 = 83 |
| CES02 = 64 | CES27 = 95 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 82 |
| CES04 = 71 | CES29 = 82 | CES54 = 92 | CES79 = 89 |
| CES05 = 50 | CES30 = 87 | CES55 = 92 | CES80 = 89 |
| CES06 = 52 | CES31 = 85 | CES56 = 87 | CES81 = 69 |
| CES07 = 43 | CES32 = 80 | CES57 = 87 | CES82 = 96 |
| CES08 = 42 | CES33 = 86 | CES58 = 88 | CES83 = 93 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 93 |
| CES10 = 77 | CES35 = 96 | CES60 = 96 | CES85 = 78 |
| CES11 = 60 | CES36 = 96 | CES61 = 91 | CES86 = 65 |
| CES12 = 66 | CES37 = 95 | CES62 = 97 | CES87 = 85 |
| CES13 = 44 | CES38 = 93 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 97 | CES64 = 86 | CES89 = 74 |
| CES15 = 72 | CES40 = 94 | CES65 = 81 | CES90 = 86 |
| CES16 = 48 | CES41 = 93 | CES66 = 85 | CES91 = 87 |
| CES17 = 50 | CES42 = 95 | CES67 = 84 | CES92 = 67 |
| CES18 = 57 | CES43 = 88 | CES68 = 85 | CES93 = 80 |
| CES19 = 73 | CES44 = 99 | CES69 = 91 | CES94 = 61 |
| CES20 = 67 | CES45 = 92 | CES70 = 82 | CES95 = 77 |
| CES21 = 87 | CES46 = 88 | CES71 = 83 | CES96 = 84 |
| CES22 = 79 | CES47 = 88 | CES72 = 93 | CES97 = 88 |
| CES23 = 92 | CES48 = 81 | CES73 = 78 | CES98 = 84 |
| CES24 = 91 | CES49 = 88 | CES74 = 91 | CES99 = 76 |
| CES25 = 72 | CES50 = 94 | CES75 = 85 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)