

Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P406353

Luminaire Tested: **TT-D1-740-U-WQ-UPL**

Issue Date: 7/23/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P406353  
REPORT IS FROM IESNA LM-79-08 TEST DATA - UPLIGHT (G2-2002-677-1) AND  
Test Lab: INNOVATION CENTER  
Issue Date: 7/23/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: TT-D1-740-U-WQ-UPL  
Description: TOPTIER LED PARKING GARAGE LUMINAIRE WITH UPLIGHT  
4000K, 70 CRI LEDS AND WIDE DISTRIBUTION  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4763.7 lumens  
Efficiency: N/A  
Efficacy: 132.3 lumens/watt  
Luminous Opening: Vertical Cylinder (Dia: 1.12' x H: 0.1')  
IES Classification: Type V - Short - Non-Cutoff  
BUG Rating: B2 - U4 - G1

Input Watts (W): 36  
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: 28.75 FT

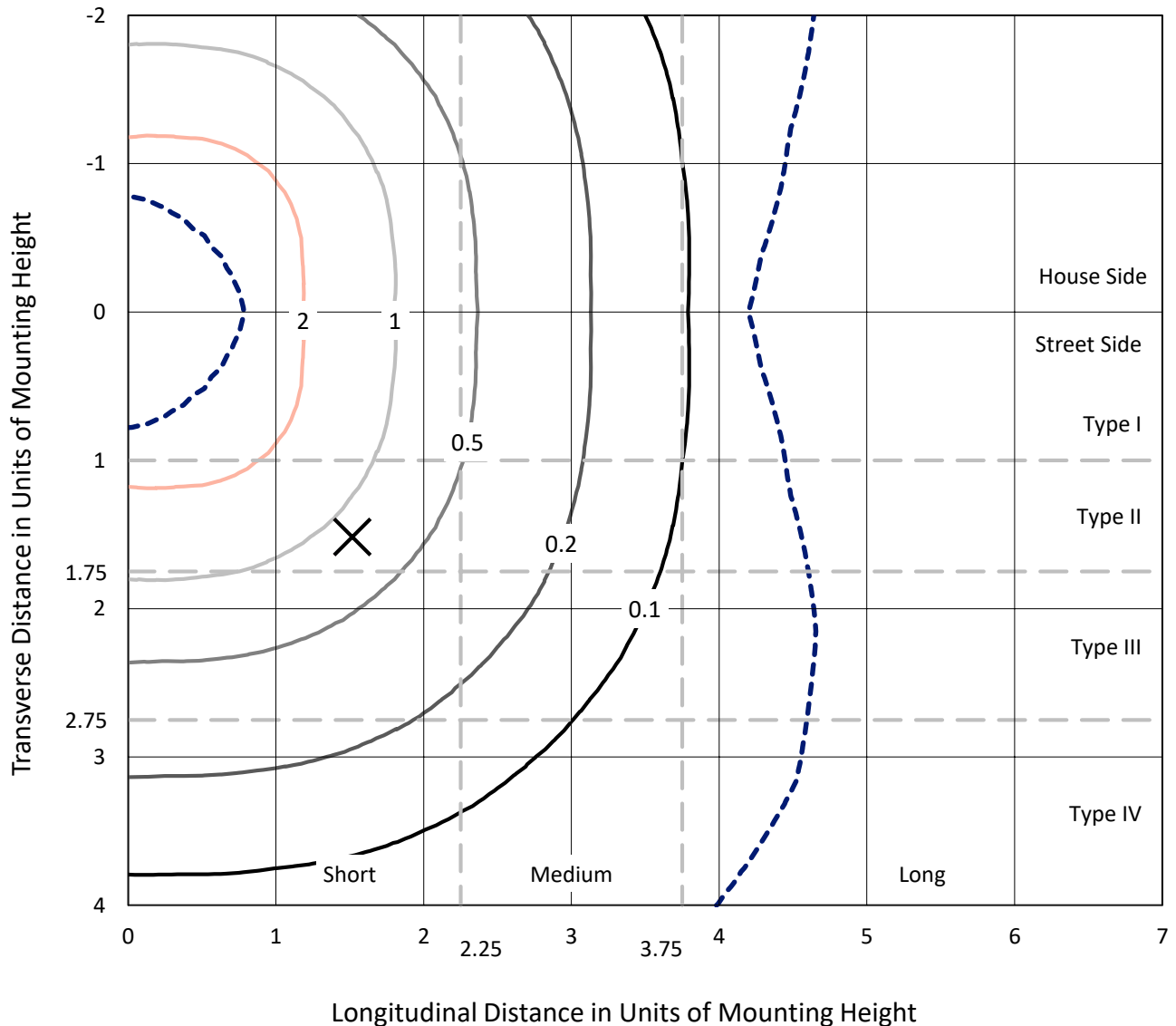


REPORT NUMBER: P406353

CATALOG NUMBER: TT-D1-740-U-WQ-UPL

### Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

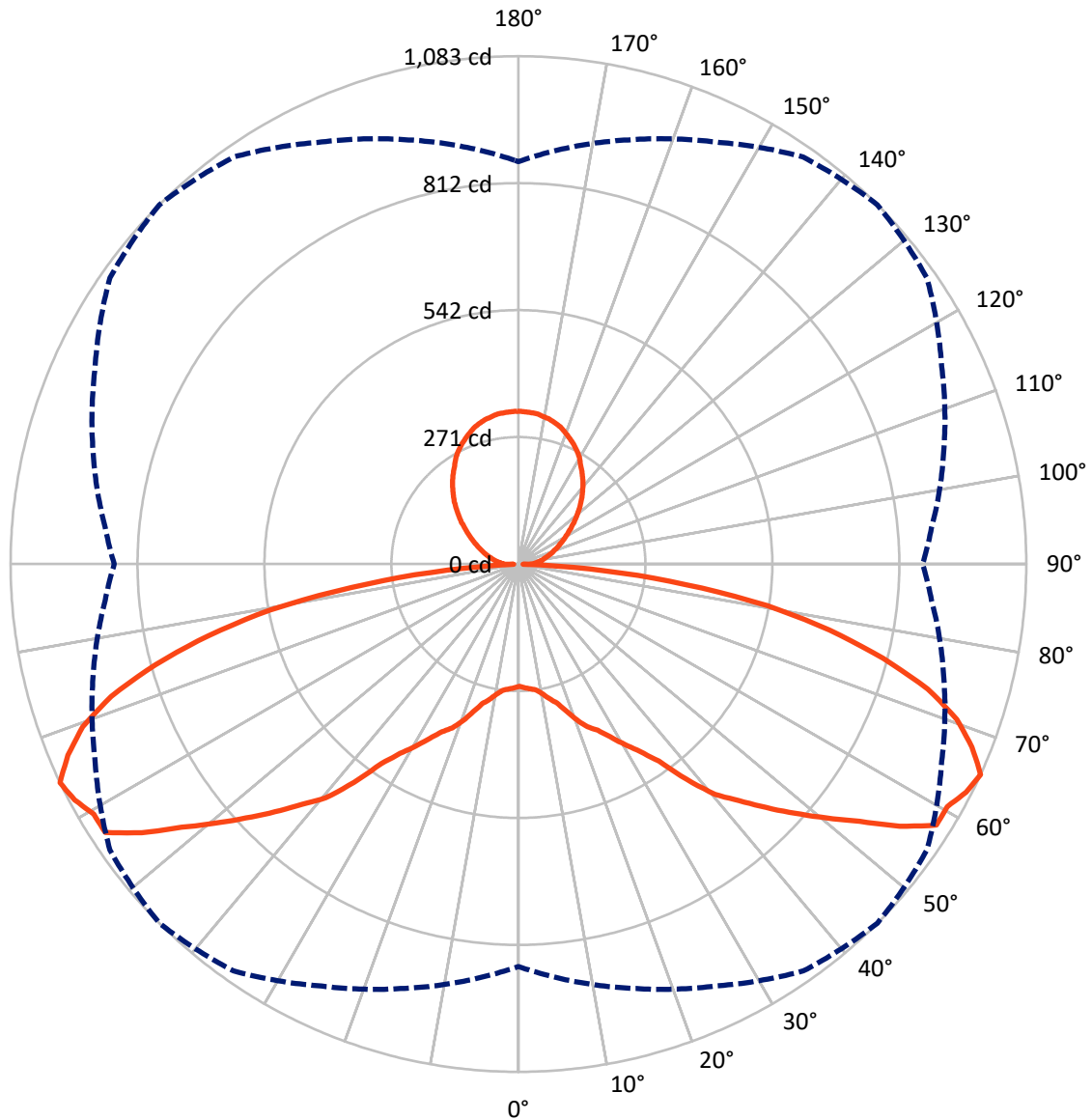


Based on 10 foot mounting height. Maximum calculated value = 3 fc  
 Type V - Short - Non-Cutoff

REPORT NUMBER: P406353

CATALOG NUMBER: TT-D1-740-U-WQ-UPL

### Luminous Intensity Polar Plot



— Vertical Plane Through 45-Deg Lateral      - - - Horizontal Cone Through 65-Deg Vertical

REPORT NUMBER: P406353

CATALOG NUMBER: TT-D1-740-U-WQ-UPL

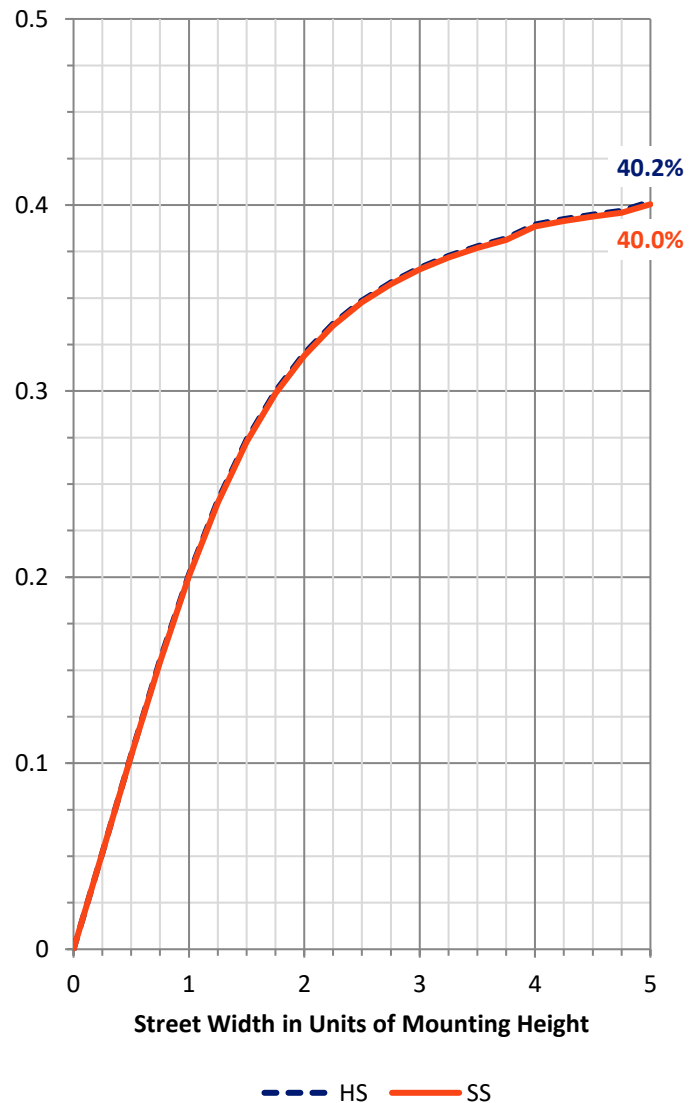
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1939.1   | 442.7  | 2381.9 |
|                    | % Fixture | 40.7     | 9.3    | 50.0   |
| <b>Street Side</b> | Lumens    | 1939.1   | 442.7  | 2381.9 |
|                    | % Fixture | 40.7     | 9.3    | 50.0   |
| <b>Total</b>       | Lumens    | 3878.2   | 885.5  | 4763.7 |
|                    | % Fixture | 81.4     | 18.6   | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 26.0   | 0.5       |
| 10°-20°   | 89.4   | 1.9       |
| 20°-30°   | 183.6  | 3.9       |
| 30°-40°   | 326.2  | 6.8       |
| 40°-50°   | 549.9  | 11.5      |
| 50°-60°   | 811.2  | 17.0      |
| 60°-70°   | 952.0  | 20.0      |
| 70°-80°   | 741.7  | 15.6      |
| 80°-90°   | 198.1  | 4.2       |
| 90°-100°  | 45.4   | 1.0       |
| 100°-110° | 70.3   | 1.5       |
| 110°-120° | 97.7   | 2.1       |
| 120°-130° | 126.6  | 2.7       |
| 130°-140° | 147.6  | 3.1       |
| 140°-150° | 149.5  | 3.1       |
| 150°-160° | 129.8  | 2.7       |
| 160°-170° | 87.7   | 1.8       |
| 170°-180° | 30.8   | 0.6       |
| 0°-90°    | 3878.2 | 81.4      |
| 0°-180°   | 4763.7 | 100.0     |



REPORT NUMBER: P406353

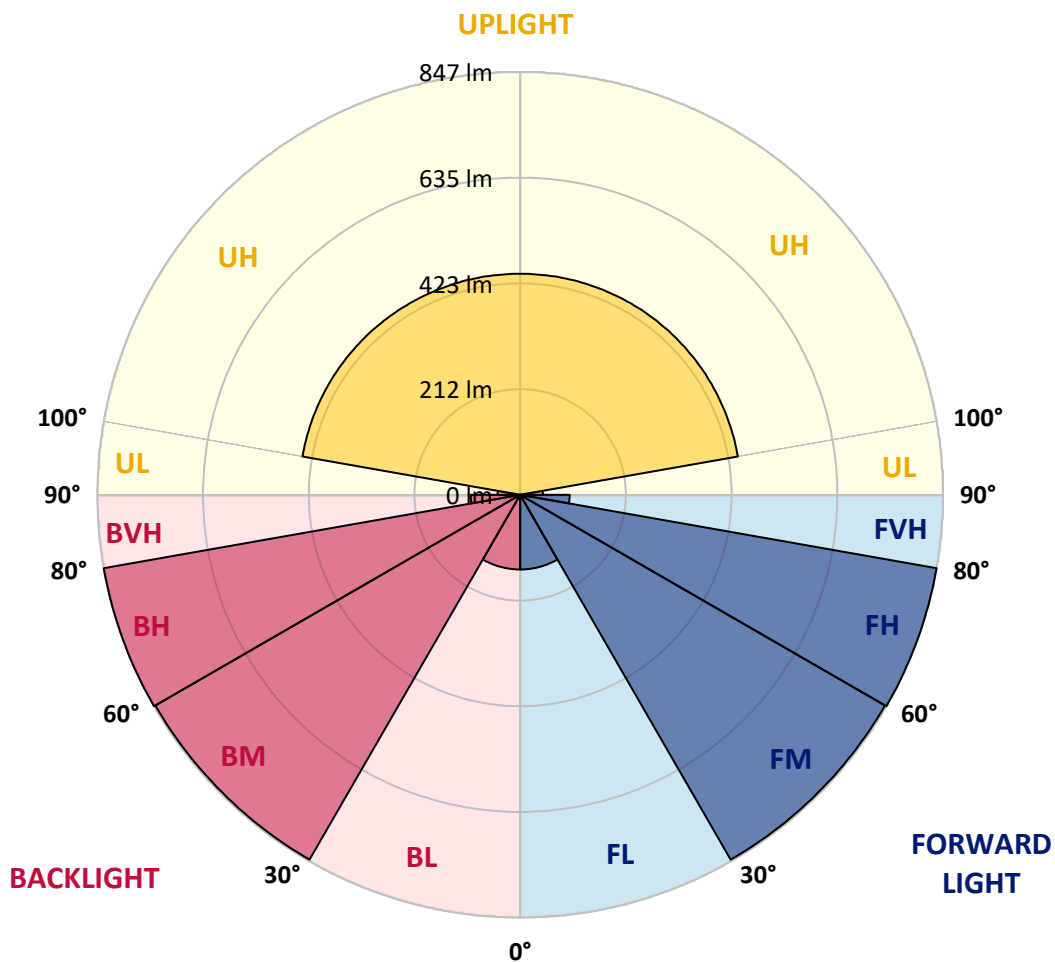
CATALOG NUMBER: TT-D1-740-U-WQ-UPL

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |        |         |
|----------------|--------|-----------|-------------------------|--------|---------|
|                |        |           | B                       | U      | G       |
| FL (0°-30°)    | 149.5  | 3.1       |                         |        |         |
| FM (30°-60°)   | 843.7  | 17.7      |                         |        |         |
| FH (60°-80°)   | 846.9  | 17.8      |                         |        | G1/1800 |
| FVH (80°-90°)  | 99.1   | 2.1       |                         |        | G1/100  |
| BL (0°-30°)    | 149.5  | 3.1       | B1/500                  |        |         |
| BM (30°-60°)   | 843.7  | 17.7      | B1/1000                 |        |         |
| BH (60°-80°)   | 846.9  | 17.8      | B2/1000                 |        | G1/1800 |
| BVH (80°-90°)  | 99.1   | 2.1       |                         |        | G1/100  |
| UL (90°-100°)  | 45.4   | 1.0       |                         | U2/50  |         |
| UH (100°-180°) | 442.7  | 9.3       |                         | U3/500 |         |

**BUG Rating: B2-U4-G1**

Type V Short





REPORT NUMBER: P406353

CATALOG NUMBER: TT-D1-740-U-WQ-UPL

**CANDELA DISTRIBUTION (FULL):**

|        | 0°    | 5°    | 15°   | 25°    | 35°    | 45°    | 55°    | 65°    | 75°   | 85°   | 90°   |
|--------|-------|-------|-------|--------|--------|--------|--------|--------|-------|-------|-------|
| 0°     | 260.7 | 260.7 | 260.7 | 260.7  | 260.7  | 260.7  | 260.7  | 260.7  | 260.7 | 260.7 | 260.7 |
| 2.5°   | 265.0 | 265.0 | 265.0 | 264.4  | 264.4  | 264.4  | 264.4  | 265.0  | 265.0 | 265.0 | 265.0 |
| 5°     | 271.1 | 271.1 | 269.9 | 268.7  | 267.4  | 267.4  | 268.0  | 268.7  | 269.3 | 270.5 | 270.5 |
| 7.5°   | 274.7 | 274.7 | 274.1 | 272.9  | 271.1  | 271.1  | 271.7  | 272.9  | 273.5 | 273.5 | 272.9 |
| 10°    | 279.6 | 280.2 | 282.1 | 282.7  | 281.4  | 281.4  | 282.1  | 282.7  | 281.4 | 279.6 | 279.6 |
| 12.5°  | 291.2 | 291.8 | 294.2 | 296.1  | 296.1  | 294.8  | 295.5  | 296.7  | 293.6 | 290.6 | 291.2 |
| 15°    | 307.6 | 307.6 | 308.2 | 310.1  | 308.9  | 307.6  | 308.9  | 309.5  | 307.6 | 307.0 | 308.2 |
| 17.5°  | 329.6 | 329.6 | 325.9 | 329.0  | 329.6  | 329.0  | 330.2  | 327.1  | 325.3 | 327.7 | 329.0 |
| 20°    | 353.3 | 350.9 | 349.1 | 351.5  | 356.4  | 354.5  | 357.0  | 350.3  | 348.5 | 349.7 | 350.3 |
| 22.5°  | 368.6 | 370.4 | 371.6 | 372.8  | 379.5  | 377.1  | 379.5  | 372.2  | 371.0 | 368.6 | 366.7 |
| 25°    | 386.8 | 388.7 | 396.0 | 392.3  | 396.6  | 392.9  | 396.0  | 391.7  | 394.1 | 386.8 | 386.8 |
| 27.5°  | 407.5 | 411.2 | 415.5 | 413.6  | 419.1  | 417.3  | 419.1  | 413.0  | 413.6 | 410.6 | 409.4 |
| 30°    | 435.6 | 435.6 | 434.4 | 438.0  | 447.8  | 446.5  | 447.1  | 439.2  | 433.7 | 434.4 | 436.8 |
| 32.5°  | 463.6 | 459.9 | 461.8 | 472.7  | 478.8  | 476.4  | 477.6  | 473.9  | 461.8 | 459.3 | 461.2 |
| 35°    | 489.8 | 495.3 | 499.5 | 508.7  | 517.2  | 516.0  | 515.4  | 509.3  | 501.4 | 491.6 | 488.6 |
| 37.5°  | 530.6 | 536.7 | 548.3 | 564.7  | 579.9  | 583.0  | 575.1  | 567.2  | 548.9 | 534.9 | 527.6 |
| 40°    | 584.2 | 584.8 | 598.2 | 629.9  | 643.9  | 646.3  | 642.1  | 628.7  | 600.7 | 584.8 | 584.2 |
| 42.5°  | 631.1 | 626.9 | 648.8 | 675.6  | 688.4  | 689.6  | 686.6  | 675.6  | 648.8 | 626.2 | 630.5 |
| 45°    | 667.7 | 667.7 | 693.9 | 715.2  | 735.9  | 740.8  | 735.3  | 712.1  | 694.5 | 668.3 | 666.5 |
| 47.5°  | 701.2 | 710.3 | 732.2 | 758.4  | 787.7  | 794.4  | 787.7  | 760.3  | 730.4 | 710.9 | 700.6 |
| 50°    | 741.4 | 752.3 | 768.2 | 809.0  | 841.9  | 851.0  | 841.3  | 811.4  | 768.2 | 751.7 | 745.6 |
| 52.5°  | 788.3 | 797.4 | 822.4 | 873.6  | 897.9  | 911.3  | 903.4  | 874.8  | 823.6 | 798.6 | 793.8 |
| 55°    | 844.3 | 835.8 | 874.8 | 924.1  | 969.2  | 986.9  | 971.0  | 925.4  | 880.9 | 835.8 | 844.3 |
| 57.5°  | 873.0 | 863.2 | 918.0 | 965.0  | 1027.7 | 1050.8 | 1031.4 | 968.6  | 918.0 | 866.3 | 872.4 |
| 60°    | 875.4 | 879.7 | 921.1 | 997.8  | 1041.1 | 1050.8 | 1044.8 | 1003.3 | 922.9 | 883.3 | 871.7 |
| 62.5°  | 868.1 | 894.3 | 929.6 | 1008.8 | 1047.8 | 1071.6 | 1050.8 | 1010.0 | 933.3 | 898.6 | 868.7 |
| 65°    | 858.3 | 884.5 | 936.9 | 993.0  | 1059.4 | 1083.1 | 1063.6 | 996.0  | 939.4 | 884.5 | 862.0 |
| 67.5°  | 841.3 | 832.2 | 896.7 | 971.7  | 1029.5 | 1043.5 | 1031.4 | 972.9  | 896.1 | 830.9 | 843.1 |
| 70°    | 787.1 | 779.2 | 834.6 | 916.8  | 972.3  | 991.8  | 977.1  | 918.0  | 835.8 | 781.0 | 788.3 |
| 72.5°  | 706.7 | 709.1 | 762.7 | 841.3  | 901.0  | 913.2  | 905.3  | 840.7  | 765.7 | 712.1 | 702.4 |
| 75°    | 612.8 | 618.9 | 670.1 | 741.4  | 795.6  | 802.9  | 795.0  | 744.4  | 669.5 | 622.6 | 609.8 |
| 77.5°  | 503.8 | 512.9 | 554.4 | 625.6  | 661.6  | 678.0  | 665.2  | 627.5  | 557.4 | 515.4 | 502.6 |
| 80°    | 390.5 | 393.5 | 422.8 | 480.0  | 527.6  | 538.5  | 526.3  | 481.9  | 426.4 | 394.8 | 385.6 |
| 82.5°  | 255.9 | 260.7 | 286.9 | 330.8  | 361.9  | 358.8  | 361.9  | 327.1  | 290.0 | 259.5 | 244.3 |
| 85°    | 113.9 | 123.7 | 141.3 | 162.0  | 182.1  | 187.6  | 182.1  | 164.5  | 141.3 | 121.2 | 118.8 |
| 87.5°  | 7.9   | 9.1   | 11.0  | 11.6   | 12.8   | 9.7    | 9.7    | 9.7    | 8.5   | 9.7   | 7.9   |
| 90°    | 32.0  | 31.0  | 31.0  | 31.0   | 31.0   | 31.0   | 31.0   | 31.0   | 31.0  | 31.0  | 31.0  |
| 92.5°  | 37.0  | 37.0  | 36.0  | 36.0   | 36.0   | 36.0   | 36.0   | 36.0   | 36.0  | 36.0  | 36.0  |
| 95°    | 42.0  | 42.0  | 42.0  | 41.0   | 41.0   | 41.0   | 41.0   | 41.0   | 41.0  | 41.0  | 41.0  |
| 97.5°  | 48.0  | 48.0  | 47.0  | 47.0   | 47.0   | 47.0   | 47.0   | 47.0   | 47.0  | 47.0  | 47.0  |
| 100°   | 53.0  | 53.0  | 53.0  | 53.0   | 53.0   | 53.0   | 53.0   | 53.0   | 53.0  | 53.0  | 53.0  |
| 102.5° | 60.0  | 59.0  | 60.0  | 60.0   | 59.0   | 59.0   | 59.0   | 60.0   | 60.0  | 60.0  | 59.0  |
| 105°   | 66.0  | 66.0  | 66.0  | 66.0   | 66.0   | 66.0   | 66.0   | 67.0   | 66.0  | 66.0  | 66.0  |
| 107.5° | 73.0  | 73.0  | 73.0  | 74.0   | 74.0   | 74.0   | 74.0   | 74.0   | 73.0  | 74.0  | 73.0  |
| 110°   | 80.0  | 80.0  | 81.0  | 81.0   | 81.0   | 81.0   | 81.0   | 81.0   | 81.0  | 81.0  | 81.0  |



REPORT NUMBER: P406353

CATALOG NUMBER: TT-D1-740-U-WQ-UPL

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 112.5° | 89.0  | 89.0  | 89.0  | 89.0  | 89.0  | 90.0  | 90.0  | 90.0  | 90.0  | 90.0  | 89.0  |
| 115°   | 97.0  | 97.0  | 98.0  | 98.0  | 98.0  | 98.0  | 99.0  | 99.0  | 98.0  | 98.0  | 98.0  |
| 117.5° | 107.0 | 107.0 | 107.0 | 107.0 | 107.0 | 108.0 | 108.0 | 108.0 | 108.0 | 108.0 | 107.0 |
| 120°   | 117.0 | 117.0 | 117.0 | 118.0 | 118.0 | 118.0 | 119.0 | 119.0 | 118.0 | 118.0 | 118.0 |
| 122.5° | 129.0 | 128.0 | 129.0 | 129.0 | 129.0 | 129.0 | 130.0 | 130.0 | 130.0 | 130.0 | 129.0 |
| 125°   | 140.0 | 140.0 | 141.0 | 141.0 | 141.0 | 141.0 | 142.0 | 142.0 | 142.0 | 142.0 | 141.0 |
| 127.5° | 153.0 | 153.0 | 153.0 | 153.0 | 153.0 | 153.0 | 154.0 | 154.0 | 154.0 | 154.0 | 154.0 |
| 130°   | 165.0 | 165.0 | 166.0 | 166.0 | 166.0 | 166.0 | 167.0 | 167.0 | 167.0 | 167.0 | 166.0 |
| 132.5° | 179.0 | 178.0 | 179.0 | 178.0 | 178.0 | 178.0 | 179.0 | 180.0 | 179.0 | 180.0 | 179.0 |
| 135°   | 191.0 | 191.0 | 191.0 | 191.0 | 191.0 | 191.0 | 192.0 | 192.0 | 192.0 | 192.0 | 192.0 |
| 137.5° | 204.0 | 203.0 | 204.0 | 203.0 | 203.0 | 203.0 | 204.0 | 204.0 | 204.0 | 204.0 | 204.0 |
| 140°   | 216.0 | 215.0 | 216.0 | 215.0 | 216.0 | 216.0 | 216.0 | 216.0 | 216.0 | 216.0 | 216.0 |
| 142.5° | 228.0 | 227.0 | 228.0 | 227.0 | 227.0 | 228.0 | 228.0 | 228.0 | 228.0 | 228.0 | 228.0 |
| 145°   | 239.0 | 239.0 | 239.0 | 238.0 | 239.0 | 239.0 | 239.0 | 239.0 | 239.0 | 239.0 | 239.0 |
| 147.5° | 250.0 | 249.0 | 250.0 | 249.0 | 249.0 | 250.0 | 250.0 | 250.0 | 250.0 | 250.0 | 250.0 |
| 150°   | 263.0 | 262.0 | 263.0 | 262.0 | 263.0 | 263.0 | 263.0 | 263.0 | 263.0 | 263.0 | 263.0 |
| 152.5° | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 |
| 155°   | 282.0 | 282.0 | 283.0 | 282.0 | 282.0 | 282.0 | 283.0 | 282.0 | 282.0 | 282.0 | 282.0 |
| 157.5° | 290.0 | 290.0 | 290.0 | 290.0 | 290.0 | 290.0 | 291.0 | 291.0 | 290.0 | 291.0 | 290.0 |
| 160°   | 298.0 | 298.0 | 299.0 | 298.0 | 298.0 | 298.0 | 299.0 | 298.0 | 298.0 | 298.0 | 298.0 |
| 162.5° | 306.0 | 305.0 | 306.0 | 305.0 | 306.0 | 306.0 | 306.0 | 306.0 | 306.0 | 306.0 | 306.0 |
| 165°   | 311.0 | 311.0 | 312.0 | 311.0 | 311.0 | 311.0 | 312.0 | 311.0 | 311.0 | 311.0 | 311.0 |
| 167.5° | 316.0 | 315.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 |
| 170°   | 319.0 | 319.0 | 320.0 | 319.0 | 319.0 | 319.0 | 320.0 | 319.0 | 319.0 | 319.0 | 319.0 |
| 172.5° | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 |
| 175°   | 324.0 | 324.0 | 325.0 | 324.0 | 325.0 | 324.0 | 325.0 | 324.0 | 324.0 | 324.0 | 324.0 |
| 177.5° | 325.0 | 325.0 | 326.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 |
| 180°   | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 |



LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

McGRAW-EDISON

Report Number: SP1-2006-844-6

Luminaire Tested: TT-D2-740-U-RW

Test Date: 06/30/2020

Data applicable to product families TT-x-740 and TTN-x-740

**Test Information**

Test Method: LM-79-08  
 Report Number: SP1-2006-844-6  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry: 4π  
 Issue Date: 06/30/2020  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **TT-D2-740-U-RW**  
 Description: MCGRAW EDISON

RECTANGULAR DISTRIBUTION

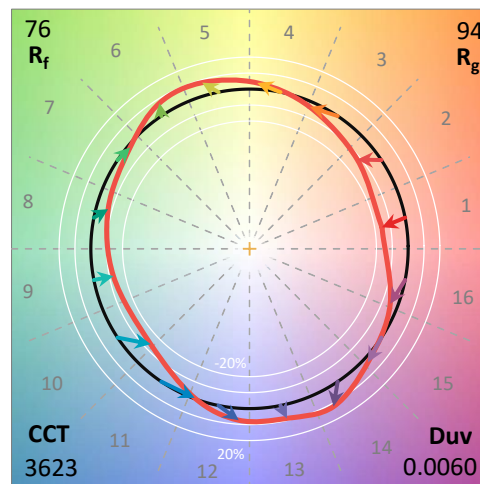
**Spectral Parameters**

CCT (K): 3623  
 CIE u': 0.2297  
 CIE v': 0.5166  
 Duv: 0.0060  
 CIE x: 0.4044  
 CIE y: 0.4042  
 CIE z: 0.1914  
 Peak Wavelength (nm): 588  
 Dominant Wavelength (nm): 578  
 Purity: 42.8  
  
 Rf: 76.2  
 Rg: 94.3

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 72.6 |      |       |
| R1:       | 69.4 | R9:  | -22.4 |
| R2:       | 78.4 | R10: | 49.0  |
| R3:       | 86.1 | R11: | 67.4  |
| R4:       | 72.3 | R12: | 39.3  |
| R5:       | 68.2 | R13: | 70.5  |
| R6:       | 69.2 | R14: | 91.9  |
| R7:       | 83.0 |      |       |
| R8:       | 54.2 |      |       |

**Test Conditions**

Stabilization Time: 207M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.9/42%  
 Sphere Temperature (°C): 25.8

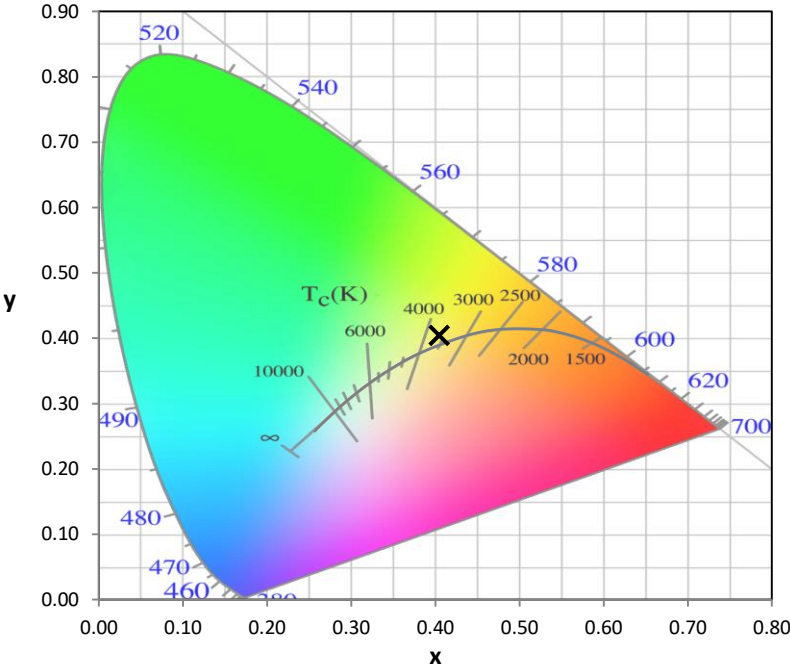


REPORT NUMBER: SP1-2006-844-6

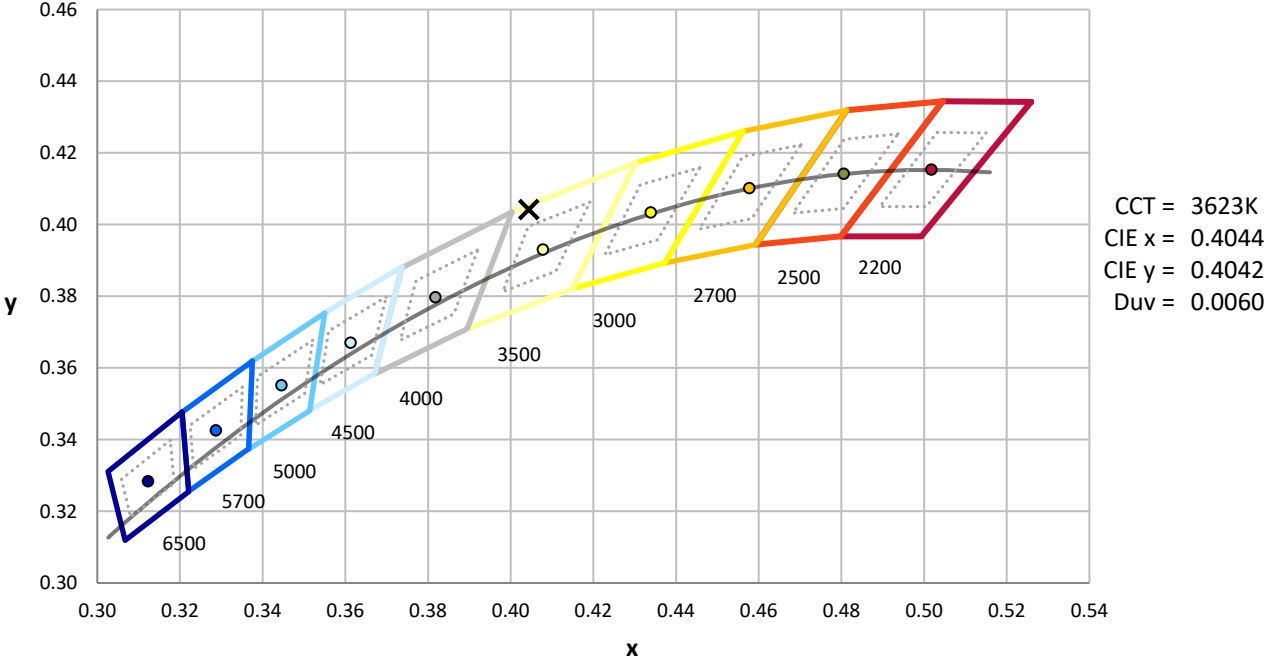
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| Power Meter                    | IN0071                | 12/3/2019        | 12/3/2020            |
| AC Power Source                | IN0063                | 12/3/2019        | 12/3/2020            |
| DC Power Source                | IN0208                | 12/3/2019        | 12/3/2020            |
| Sphere Thermometer             | IN0085                | 12/3/2019        | 12/3/2020            |
| Room Thermometer               | IN0046                | 12/3/2019        | 12/3/2020            |

REPORT NUMBER: SP1-2006-844-6

CIE 1931 Chromaticity Diagram



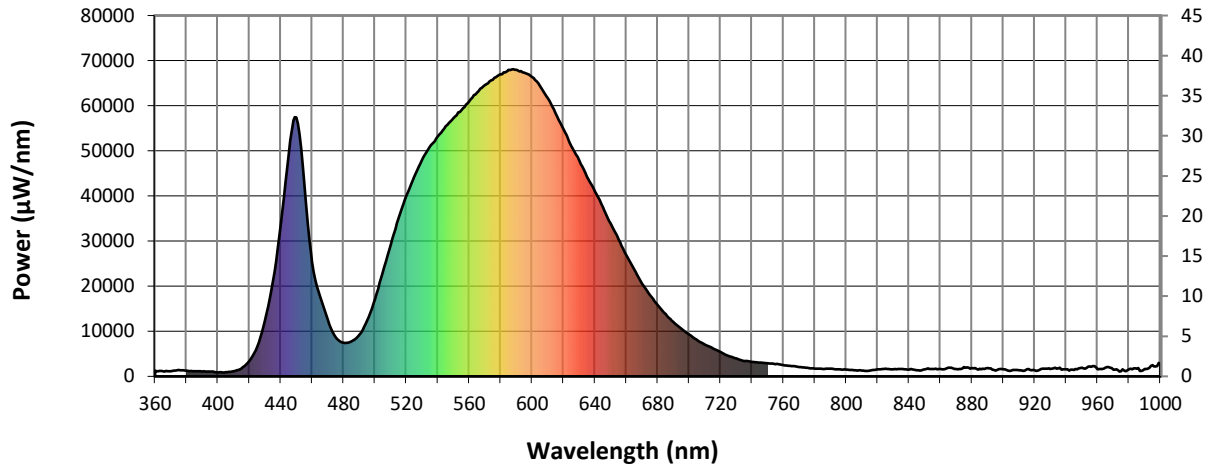
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3500K 7-step quadrangle

REPORT NUMBER: SP1-2006-844-6

**Photopic Flux vs. Wavelength**

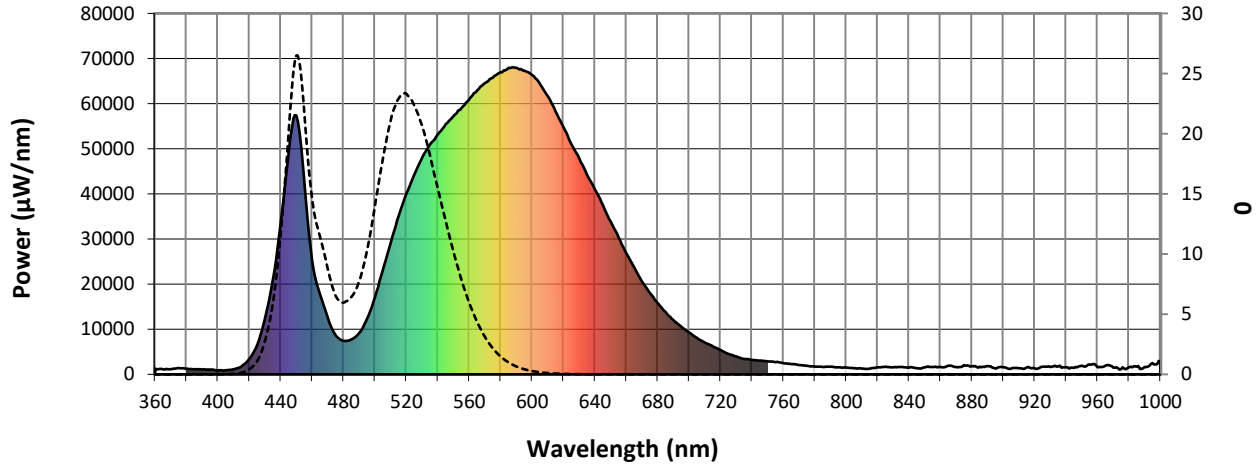


#####

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 1254          | 0.0           | 490    | 9219          | 1.3           | 620    | 54761         | 14.3          | 750    | 2901          | 0.0           | 880    | 1835          | 0.0           |
| 365    | 1158          | 0.0           | 495    | 12322         | 2.2           | 625    | 51064         | 11.3          | 755    | 2733          | 0.0           | 885    | 1690          | 0.0           |
| 370    | 1131          | 0.0           | 500    | 17160         | 3.8           | 630    | 47879         | 8.7           | 760    | 2503          | 0.0           | 890    | 1819          | 0.0           |
| 375    | 1414          | 0.0           | 505    | 23071         | 6.5           | 635    | 44248         | 6.6           | 765    | 2289          | 0.0           | 895    | 1314          | 0.0           |
| 380    | 1275          | 0.0           | 510    | 29162         | 10.0          | 640    | 41034         | 4.9           | 770    | 2078          | 0.0           | 900    | 1547          | 0.0           |
| 385    | 1122          | 0.0           | 515    | 34992         | 14.5          | 645    | 37515         | 3.6           | 775    | 1927          | 0.0           | 905    | 1281          | 0.0           |
| 390    | 1074          | 0.0           | 520    | 40102         | 19.4          | 650    | 33900         | 2.5           | 780    | 1724          | 0.0           | 910    | 1345          | 0.0           |
| 395    | 1058          | 0.0           | 525    | 44194         | 23.7          | 655    | 30384         | 1.7           | 785    | 1617          | 0.0           | 915    | 1561          | 0.0           |
| 400    | 885           | 0.0           | 530    | 48014         | 28.3          | 660    | 26883         | 1.1           | 790    | 1709          | 0.0           | 920    | 1368          | 0.0           |
| 405    | 912           | 0.0           | 535    | 51019         | 31.6          | 665    | 23703         | 0.8           | 795    | 1561          | 0.0           | 925    | 1730          | 0.0           |
| 410    | 1108          | 0.0           | 540    | 53190         | 34.7          | 670    | 20603         | 0.5           | 800    | 1525          | 0.0           | 930    | 1629          | 0.0           |
| 415    | 1763          | 0.0           | 545    | 55452         | 36.9          | 675    | 18039         | 0.3           | 805    | 1332          | 0.0           | 935    | 1796          | 0.0           |
| 420    | 3421          | 0.0           | 550    | 57280         | 38.9          | 680    | 15849         | 0.2           | 810    | 1269          | 0.0           | 940    | 1595          | 0.0           |
| 425    | 6610          | 0.0           | 555    | 59041         | 40.3          | 685    | 13806         | 0.1           | 815    | 1261          | 0.0           | 945    | 1410          | 0.0           |
| 430    | 12444         | 0.1           | 560    | 60976         | 41.4          | 690    | 12093         | 0.1           | 820    | 1551          | 0.0           | 950    | 1937          | 0.0           |
| 435    | 21116         | 0.2           | 565    | 62904         | 41.8          | 695    | 10566         | 0.0           | 825    | 1708          | 0.0           | 955    | 2186          | 0.0           |
| 440    | 33463         | 0.5           | 570    | 64555         | 42.0          | 700    | 9300          | 0.0           | 830    | 1592          | 0.0           | 960    | 1583          | 0.0           |
| 445    | 49089         | 1.0           | 575    | 65785         | 40.9          | 705    | 8110          | 0.0           | 835    | 1642          | 0.0           | 965    | 1953          | 0.0           |
| 450    | 57374         | 1.5           | 580    | 66948         | 39.8          | 710    | 7052          | 0.0           | 840    | 1514          | 0.0           | 970    | 1519          | 0.0           |
| 455    | 42663         | 1.4           | 585    | 67963         | 37.8          | 715    | 6233          | 0.0           | 845    | 1376          | 0.0           | 975    | 1168          | 0.0           |
| 460    | 25334         | 1.0           | 590    | 68001         | 35.2          | 720    | 5362          | 0.0           | 850    | 1592          | 0.0           | 980    | 1593          | 0.0           |
| 465    | 17751         | 0.9           | 595    | 67308         | 31.9          | 725    | 4563          | 0.0           | 855    | 1667          | 0.0           | 985    | 1722          | 0.0           |
| 470    | 12447         | 0.8           | 600    | 66343         | 28.6          | 730    | 3976          | 0.0           | 860    | 1662          | 0.0           | 990    | 1648          | 0.0           |
| 475    | 8641          | 0.7           | 605    | 64393         | 24.9          | 735    | 3424          | 0.0           | 865    | 1916          | 0.0           | 995    | 2495          | 0.0           |
| 480    | 7423          | 0.7           | 610    | 61634         | 21.2          | 740    | 3222          | 0.0           | 870    | 1655          | 0.0           | 1000   | 2643          | 0.0           |
| 485    | 7759          | 0.9           | 615    | 58349         | 17.6          | 745    | 3060          | 0.0           | 875    | 2036          | 0.0           |        |               |               |

REPORT NUMBER: SP1-2006-844-6

**Scotopic Flux vs. Wavelength**



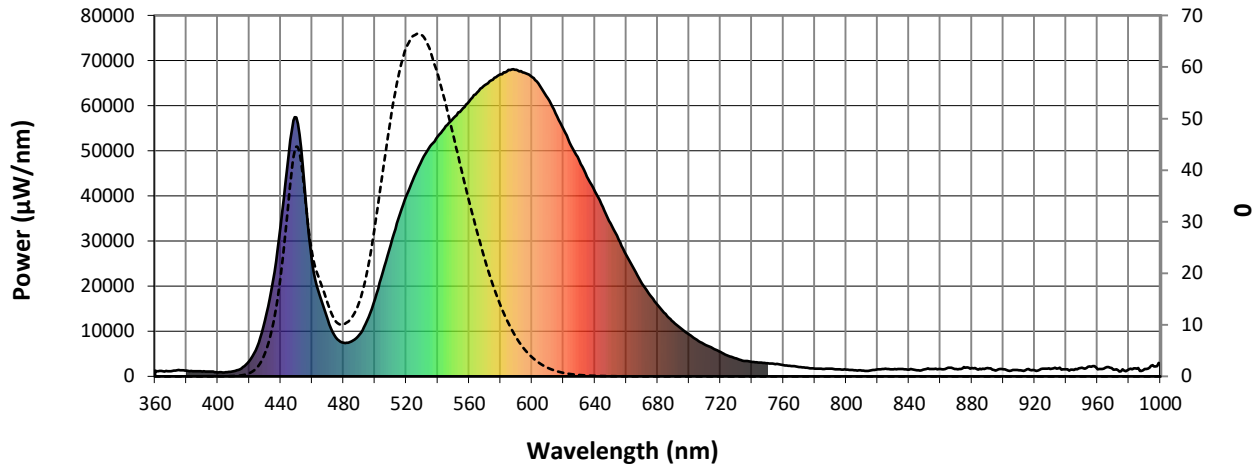
**Scotopic Lumens: 1941.7**

**S/P: 0.51**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 1254                                 | 0.0                            | 490               | 9219                                 | 14.2                           | 620               | 54761                                | 0.7                            | 750               | 2901                                 | 0.0                            | 880               | 1835                                 | 0.0                            |
| 365               | 1158                                 | 0.0                            | 495               | 12322                                | 19.9                           | 625               | 51064                                | 0.4                            | 755               | 2733                                 | 0.0                            | 885               | 1690                                 | 0.0                            |
| 370               | 1131                                 | 0.0                            | 500               | 17160                                | 28.7                           | 630               | 47879                                | 0.3                            | 760               | 2503                                 | 0.0                            | 890               | 1819                                 | 0.0                            |
| 375               | 1414                                 | 0.0                            | 505               | 23071                                | 39.2                           | 635               | 44248                                | 0.2                            | 765               | 2289                                 | 0.0                            | 895               | 1314                                 | 0.0                            |
| 380               | 1275                                 | 0.0                            | 510               | 29162                                | 49.4                           | 640               | 41034                                | 0.1                            | 770               | 2078                                 | 0.0                            | 900               | 1547                                 | 0.0                            |
| 385               | 1122                                 | 0.0                            | 515               | 34992                                | 58.0                           | 645               | 37515                                | 0.1                            | 775               | 1927                                 | 0.0                            | 905               | 1281                                 | 0.0                            |
| 390               | 1074                                 | 0.0                            | 520               | 40102                                | 63.7                           | 650               | 33900                                | 0.0                            | 780               | 1724                                 | 0.0                            | 910               | 1345                                 | 0.0                            |
| 395               | 1058                                 | 0.0                            | 525               | 44194                                | 66.1                           | 655               | 30384                                | 0.0                            | 785               | 1617                                 | 0.0                            | 915               | 1561                                 | 0.0                            |
| 400               | 885                                  | 0.0                            | 530               | 48014                                | 66.2                           | 660               | 26883                                | 0.0                            | 790               | 1709                                 | 0.0                            | 920               | 1368                                 | 0.0                            |
| 405               | 912                                  | 0.0                            | 535               | 51019                                | 63.6                           | 665               | 23703                                | 0.0                            | 795               | 1561                                 | 0.0                            | 925               | 1730                                 | 0.0                            |
| 410               | 1108                                 | 0.1                            | 540               | 53190                                | 58.8                           | 670               | 20603                                | 0.0                            | 800               | 1525                                 | 0.0                            | 930               | 1629                                 | 0.0                            |
| 415               | 1763                                 | 0.2                            | 545               | 55452                                | 53.2                           | 675               | 18039                                | 0.0                            | 805               | 1332                                 | 0.0                            | 935               | 1796                                 | 0.0                            |
| 420               | 3421                                 | 0.6                            | 550               | 57280                                | 46.8                           | 680               | 15849                                | 0.0                            | 810               | 1269                                 | 0.0                            | 940               | 1595                                 | 0.0                            |
| 425               | 6610                                 | 1.6                            | 555               | 59041                                | 40.3                           | 685               | 13806                                | 0.0                            | 815               | 1261                                 | 0.0                            | 945               | 1410                                 | 0.0                            |
| 430               | 12444                                | 4.2                            | 560               | 60976                                | 34.1                           | 690               | 12093                                | 0.0                            | 820               | 1551                                 | 0.0                            | 950               | 1937                                 | 0.0                            |
| 435               | 21116                                | 9.4                            | 565               | 62904                                | 28.2                           | 695               | 10566                                | 0.0                            | 825               | 1708                                 | 0.0                            | 955               | 2186                                 | 0.0                            |
| 440               | 33463                                | 18.7                           | 570               | 64555                                | 22.8                           | 700               | 9300                                 | 0.0                            | 830               | 1592                                 | 0.0                            | 960               | 1583                                 | 0.0                            |
| 445               | 49089                                | 32.9                           | 575               | 65785                                | 17.9                           | 705               | 8110                                 | 0.0                            | 835               | 1642                                 | 0.0                            | 965               | 1953                                 | 0.0                            |
| 450               | 57374                                | 44.5                           | 580               | 66948                                | 13.8                           | 710               | 7052                                 | 0.0                            | 840               | 1514                                 | 0.0                            | 970               | 1519                                 | 0.0                            |
| 455               | 42663                                | 37.3                           | 585               | 67963                                | 10.4                           | 715               | 6233                                 | 0.0                            | 845               | 1376                                 | 0.0                            | 975               | 1168                                 | 0.0                            |
| 460               | 25334                                | 24.5                           | 590               | 68001                                | 7.6                            | 720               | 5362                                 | 0.0                            | 850               | 1592                                 | 0.0                            | 980               | 1593                                 | 0.0                            |
| 465               | 17751                                | 18.7                           | 595               | 67308                                | 5.4                            | 725               | 4563                                 | 0.0                            | 855               | 1667                                 | 0.0                            | 985               | 1722                                 | 0.0                            |
| 470               | 12447                                | 14.3                           | 600               | 66343                                | 3.7                            | 730               | 3976                                 | 0.0                            | 860               | 1662                                 | 0.0                            | 990               | 1648                                 | 0.0                            |
| 475               | 8641                                 | 10.8                           | 605               | 64393                                | 2.5                            | 735               | 3424                                 | 0.0                            | 865               | 1916                                 | 0.0                            | 995               | 2495                                 | 0.0                            |
| 480               | 7423                                 | 10.0                           | 610               | 61634                                | 1.7                            | 740               | 3222                                 | 0.0                            | 870               | 1655                                 | 0.0                            | 1000              | 2643                                 | 0.0                            |
| 485               | 7759                                 | 11.2                           | 615               | 58349                                | 1.1                            | 745               | 3060                                 | 0.0                            | 875               | 2036                                 | 0.0                            |                   |                                      |                                |

REPORT NUMBER: SP1-2006-844-6

**Melanopic Flux vs. Wavelength**

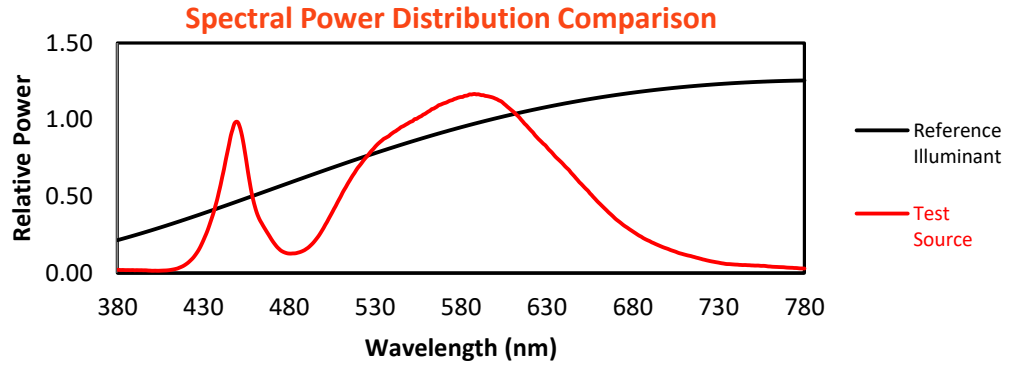


**Melanopic Lumens: 5289.9 S/P: 1.39**

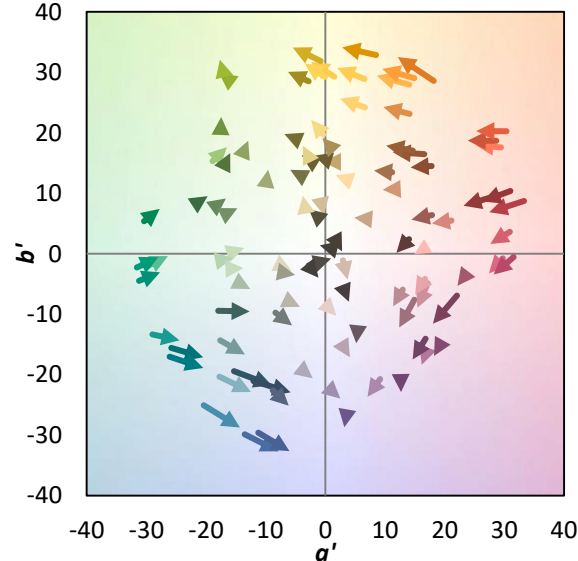
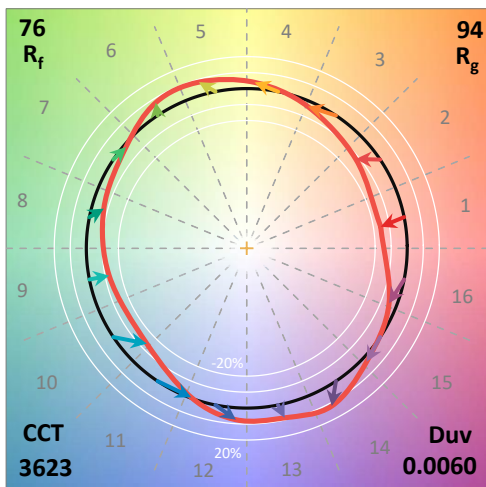
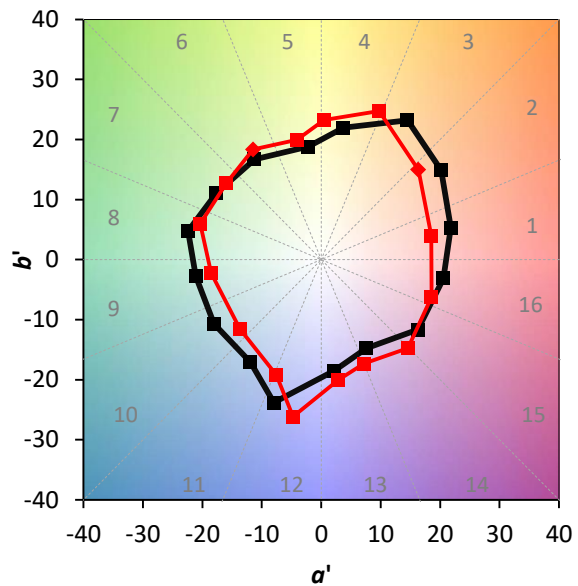
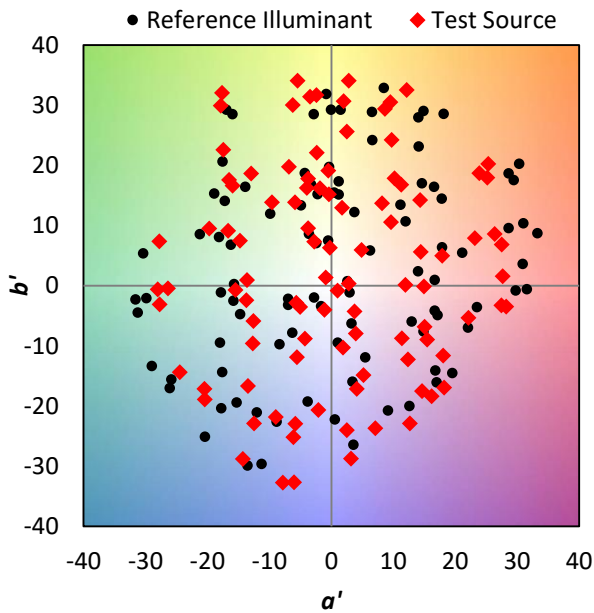
| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 1254          | 0.0           | 490    | 9219          | 7.7           | 620    | 54761         | 0.0           | 750    | 2901          | 0.0           | 880    | 1835          | 0.0           |
| 365    | 1158          | 0.0           | 495    | 12322         | 10.2          | 625    | 51064         | 0.0           | 755    | 2733          | 0.0           | 885    | 1690          | 0.0           |
| 370    | 1131          | 0.0           | 500    | 17160         | 13.8          | 630    | 47879         | 0.0           | 760    | 2503          | 0.0           | 890    | 1819          | 0.0           |
| 375    | 1414          | 0.0           | 505    | 23071         | 17.7          | 635    | 44248         | 0.0           | 765    | 2289          | 0.0           | 895    | 1314          | 0.0           |
| 380    | 1275          | 0.0           | 510    | 29162         | 20.9          | 640    | 41034         | 0.0           | 770    | 2078          | 0.0           | 900    | 1547          | 0.0           |
| 385    | 1122          | 0.0           | 515    | 34992         | 22.9          | 645    | 37515         | 0.0           | 775    | 1927          | 0.0           | 905    | 1281          | 0.0           |
| 390    | 1074          | 0.0           | 520    | 40102         | 23.3          | 650    | 33900         | 0.0           | 780    | 1724          | 0.0           | 910    | 1345          | 0.0           |
| 395    | 1058          | 0.0           | 525    | 44194         | 22.4          | 655    | 30384         | 0.0           | 785    | 1617          | 0.0           | 915    | 1561          | 0.0           |
| 400    | 885           | 0.0           | 530    | 48014         | 20.7          | 660    | 26883         | 0.0           | 790    | 1709          | 0.0           | 920    | 1368          | 0.0           |
| 405    | 912           | 0.0           | 535    | 51019         | 18.4          | 665    | 23703         | 0.0           | 795    | 1561          | 0.0           | 925    | 1730          | 0.0           |
| 410    | 1108          | 0.0           | 540    | 53190         | 15.6          | 670    | 20603         | 0.0           | 800    | 1525          | 0.0           | 930    | 1629          | 0.0           |
| 415    | 1763          | 0.1           | 545    | 55452         | 12.9          | 675    | 18039         | 0.0           | 805    | 1332          | 0.0           | 935    | 1796          | 0.0           |
| 420    | 3421          | 0.4           | 550    | 57280         | 10.3          | 680    | 15849         | 0.0           | 810    | 1269          | 0.0           | 940    | 1595          | 0.0           |
| 425    | 6610          | 1.0           | 555    | 59041         | 8.0           | 685    | 13806         | 0.0           | 815    | 1261          | 0.0           | 945    | 1410          | 0.0           |
| 430    | 12444         | 2.6           | 560    | 60976         | 6.0           | 690    | 12093         | 0.0           | 820    | 1551          | 0.0           | 950    | 1937          | 0.0           |
| 435    | 21116         | 5.6           | 565    | 62904         | 4.4           | 695    | 10566         | 0.0           | 825    | 1708          | 0.0           | 955    | 2186          | 0.0           |
| 440    | 33463         | 11.2          | 570    | 64555         | 3.2           | 700    | 9300          | 0.0           | 830    | 1592          | 0.0           | 960    | 1583          | 0.0           |
| 445    | 49089         | 19.4          | 575    | 65785         | 2.2           | 705    | 8110          | 0.0           | 835    | 1642          | 0.0           | 965    | 1953          | 0.0           |
| 450    | 57374         | 26.4          | 580    | 66948         | 1.5           | 710    | 7052          | 0.0           | 840    | 1514          | 0.0           | 970    | 1519          | 0.0           |
| 455    | 42663         | 22.4          | 585    | 67963         | 1.0           | 715    | 6233          | 0.0           | 845    | 1376          | 0.0           | 975    | 1168          | 0.0           |
| 460    | 25334         | 14.9          | 590    | 68001         | 0.7           | 720    | 5362          | 0.0           | 850    | 1592          | 0.0           | 980    | 1593          | 0.0           |
| 465    | 17751         | 11.6          | 595    | 67308         | 0.4           | 725    | 4563          | 0.0           | 855    | 1667          | 0.0           | 985    | 1722          | 0.0           |
| 470    | 12447         | 8.9           | 600    | 66343         | 0.3           | 730    | 3976          | 0.0           | 860    | 1662          | 0.0           | 990    | 1648          | 0.0           |
| 475    | 8641          | 6.6           | 605    | 64393         | 0.2           | 735    | 3424          | 0.0           | 865    | 1916          | 0.0           | 995    | 2495          | 0.0           |
| 480    | 7423          | 6.0           | 610    | 61634         | 0.1           | 740    | 3222          | 0.0           | 870    | 1655          | 0.0           | 1000   | 2643          | 0.0           |
| 485    | 7759          | 6.4           | 615    | 58349         | 0.1           | 745    | 3060          | 0.0           | 875    | 2036          | 0.0           |        |               |               |

**Summary**

$R_f = 76.2$   
 $R_g = 94.3$   
 CIE  $R_a = 72.6$   
 $R_g = -22.4$



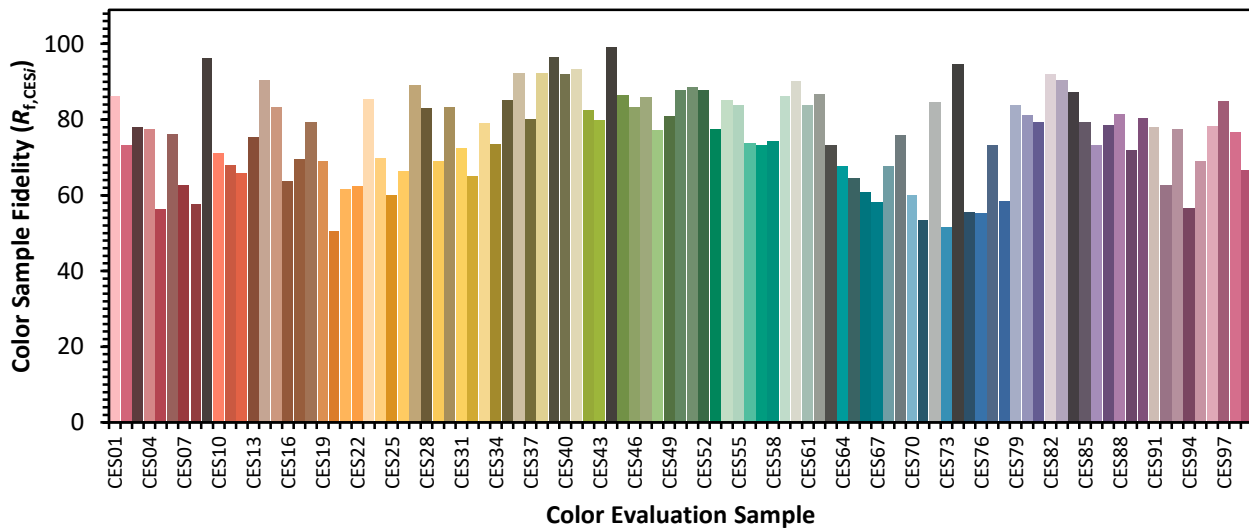
**Color Vector Graphics**



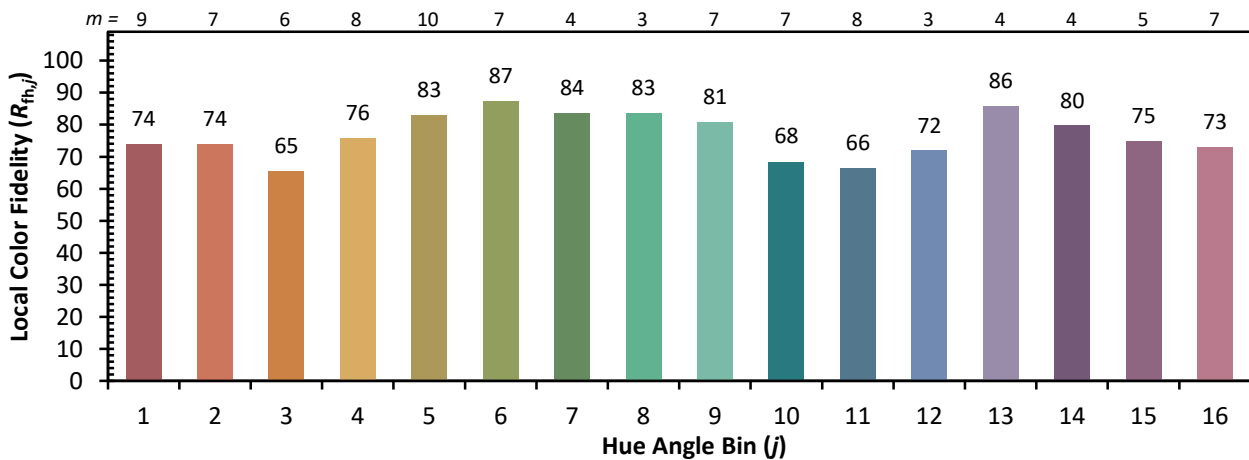
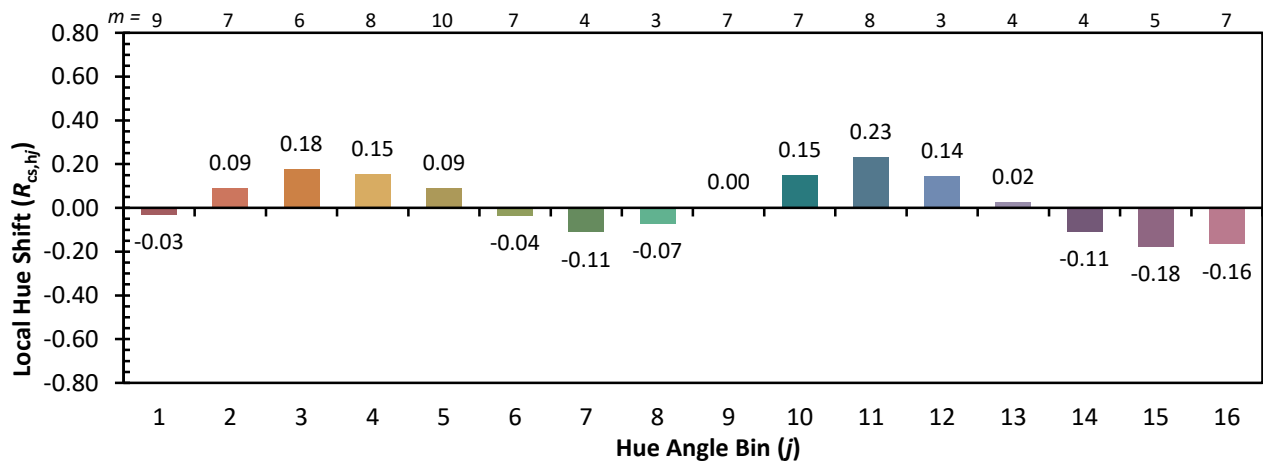
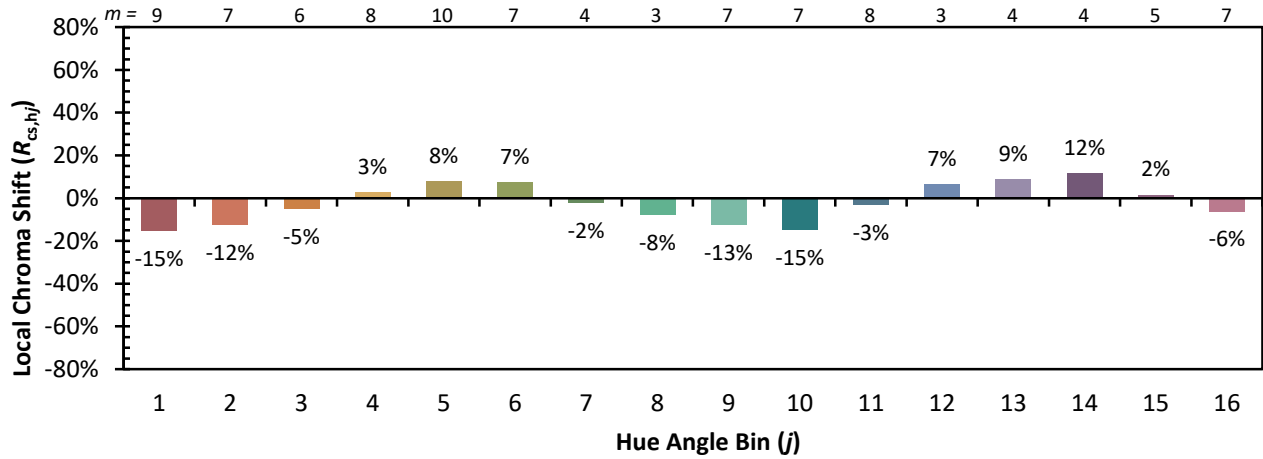


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

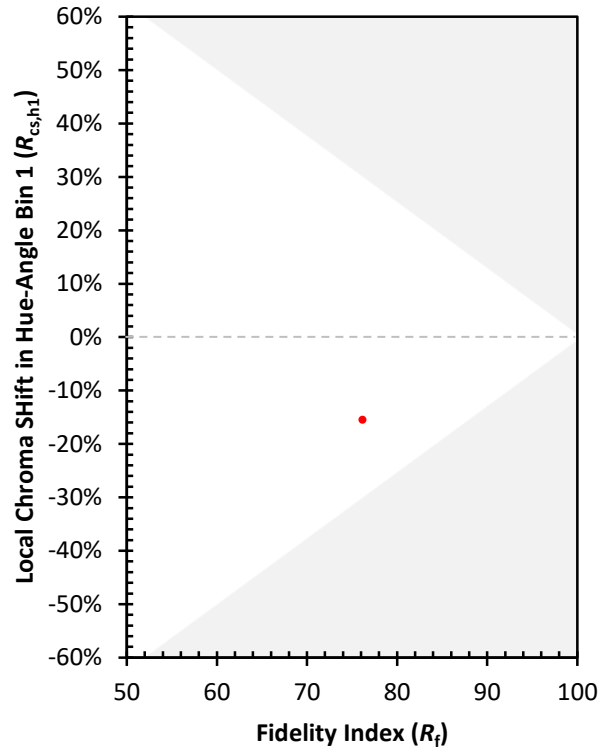
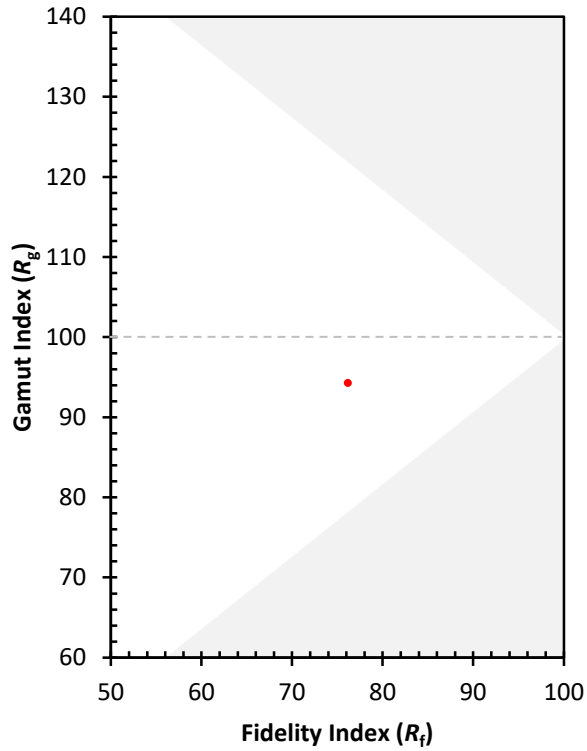
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 66 | CES51 = 88 | CES76 = 55 |
| CES02 = 61 | CES27 = 89 | CES52 = 88 | CES77 = 73 |
| CES03 = 31 | CES28 = 83 | CES53 = 78 | CES78 = 59 |
| CES04 = 70 | CES29 = 69 | CES54 = 85 | CES79 = 84 |
| CES05 = 48 | CES30 = 83 | CES55 = 84 | CES80 = 81 |
| CES06 = 51 | CES31 = 73 | CES56 = 74 | CES81 = 79 |
| CES07 = 40 | CES32 = 65 | CES57 = 73 | CES82 = 92 |
| CES08 = 39 | CES33 = 79 | CES58 = 74 | CES83 = 90 |
| CES09 = 29 | CES34 = 74 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 85 | CES60 = 90 | CES85 = 79 |
| CES11 = 57 | CES36 = 92 | CES61 = 84 | CES86 = 73 |
| CES12 = 63 | CES37 = 80 | CES62 = 87 | CES87 = 78 |
| CES13 = 42 | CES38 = 92 | CES63 = 73 | CES88 = 81 |
| CES14 = 74 | CES39 = 97 | CES64 = 68 | CES89 = 72 |
| CES15 = 71 | CES40 = 92 | CES65 = 65 | CES90 = 80 |
| CES16 = 47 | CES41 = 93 | CES66 = 61 | CES91 = 78 |
| CES17 = 49 | CES42 = 82 | CES67 = 58 | CES92 = 63 |
| CES18 = 56 | CES43 = 80 | CES68 = 68 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 76 | CES94 = 57 |
| CES20 = 65 | CES45 = 86 | CES70 = 60 | CES95 = 69 |
| CES21 = 86 | CES46 = 83 | CES71 = 54 | CES96 = 78 |
| CES22 = 78 | CES47 = 86 | CES72 = 85 | CES97 = 85 |
| CES23 = 92 | CES48 = 77 | CES73 = 52 | CES98 = 77 |
| CES24 = 91 | CES49 = 81 | CES74 = 95 | CES99 = 67 |
| CES25 = 72 | CES50 = 88 | CES75 = 56 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)