

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: P386265

Luminaire Tested: **GWC-SA1D-827-U-T4W**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P386265  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: GWC-SA1D-827-U-T4W  
Description: GALLEON WALL LUMINAIRE  
(1) 80 CRI, 2700K, 1200mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 6049 lumens  
Efficiency: N/A  
Efficacy: 91.7 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

Input Watts (W): 66  
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

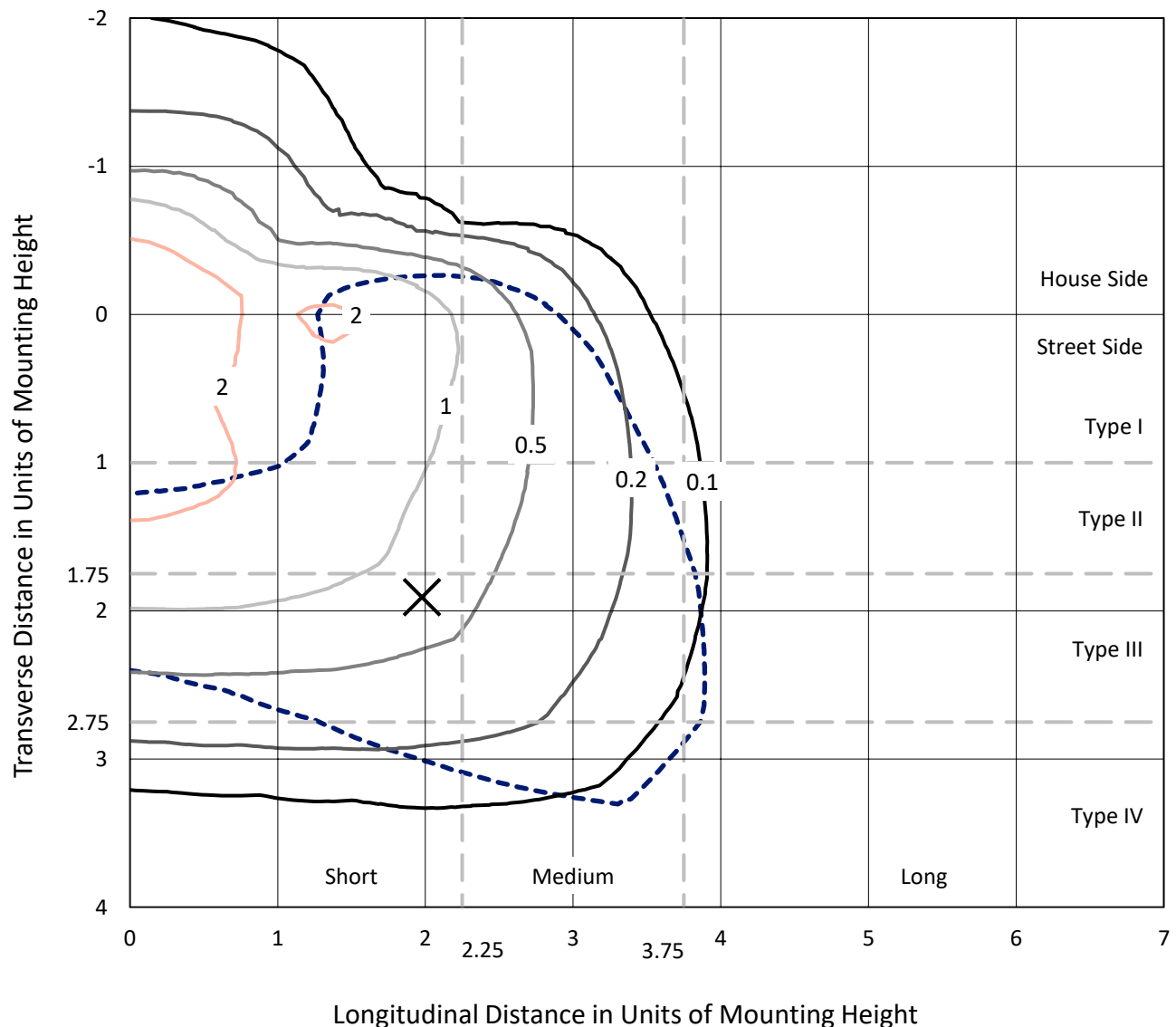


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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

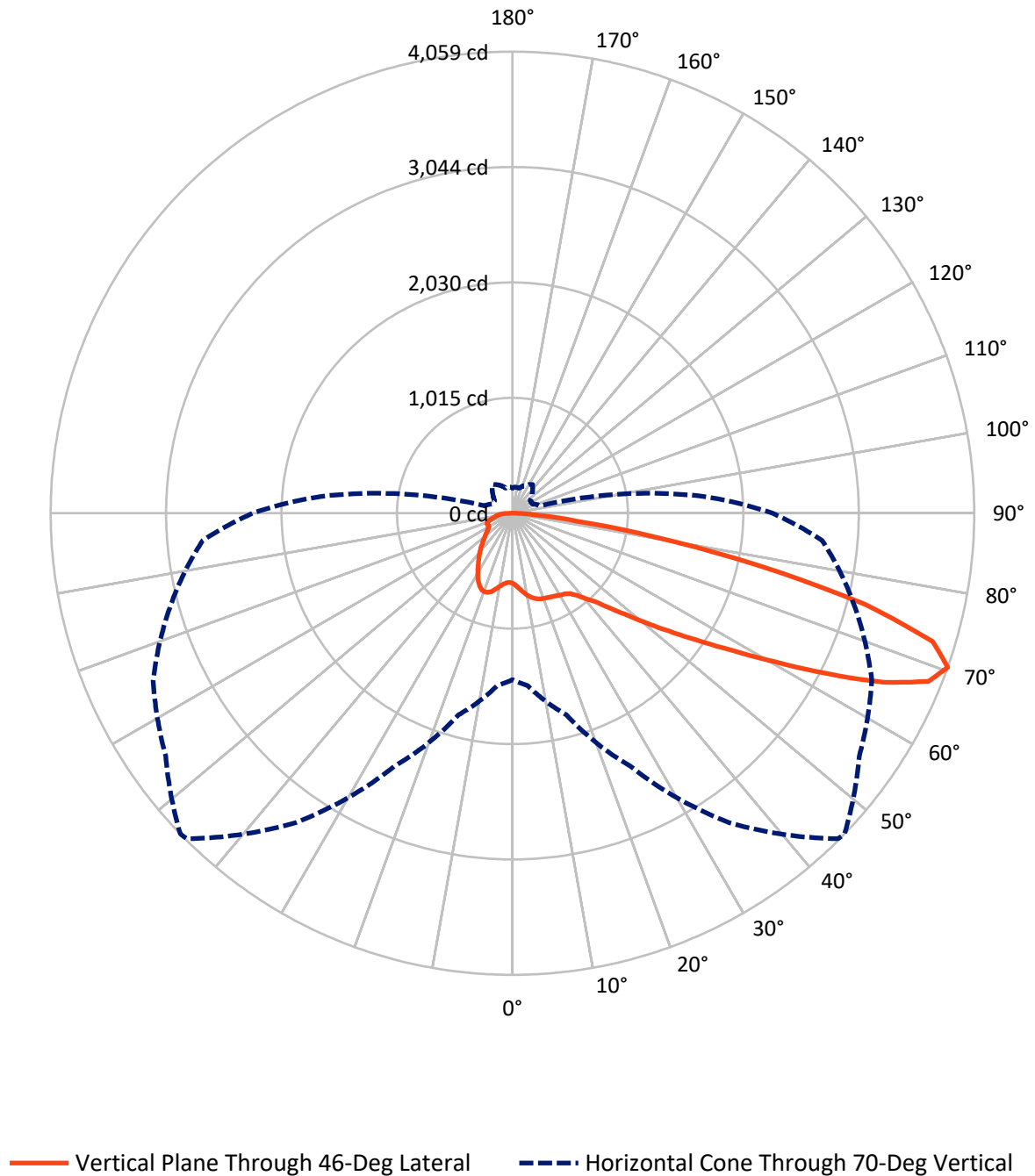


Based on 15 foot mounting height. Maximum calculated value = 3.4 fc  
 Type IV - Short - N/A

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CATALOG NUMBER: GWC-SA1D-827-U-T4W

## Luminous Intensity Polar Plot



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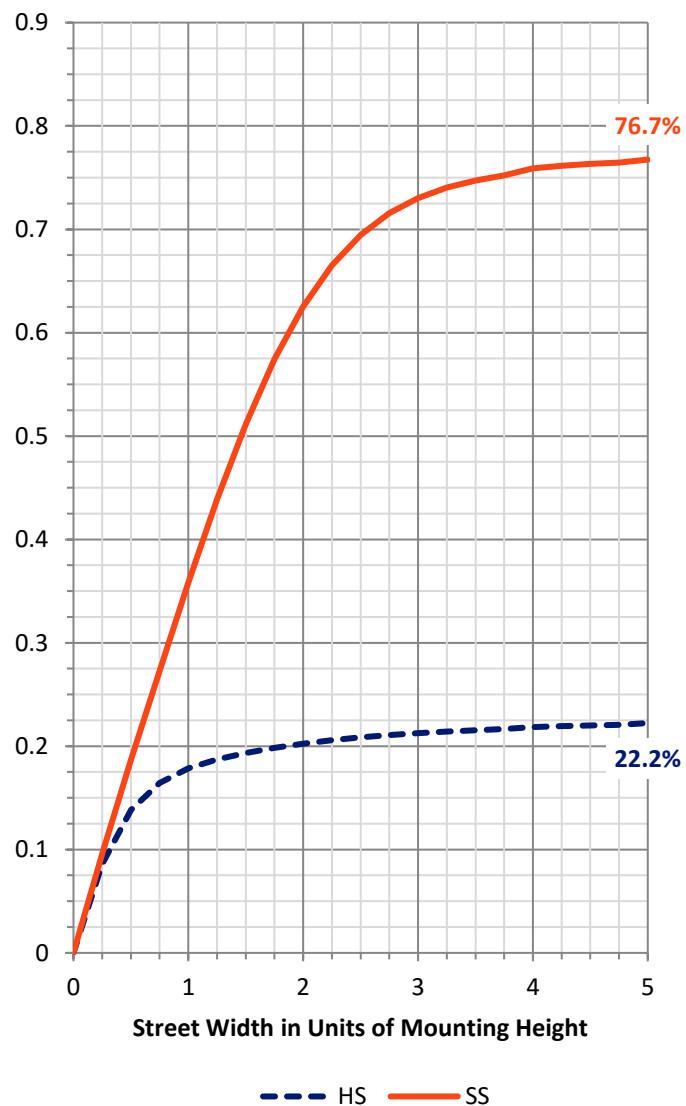
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1386.4   | 0.0    | 1386.4 |
|                    | % Fixture | 22.9     | 0.0    | 22.9   |
| <b>Street Side</b> | Lumens    | 4662.6   | 0.0    | 4662.6 |
|                    | % Fixture | 77.1     | 0.0    | 77.1   |
| <b>Total</b>       | Lumens    | 6049.0   | 0.0    | 6049.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 62.8   | 1.0       |
| 10°-20°   | 209.3  | 3.5       |
| 20°-30°   | 349.0  | 5.8       |
| 30°-40°   | 495.3  | 8.2       |
| 40°-50°   | 728.5  | 12.0      |
| 50°-60°   | 1233.7 | 20.4      |
| 60°-70°   | 1751.2 | 29.0      |
| 70°-80°   | 1063.9 | 17.6      |
| 80°-90°   | 155.3  | 2.6       |
| 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°    | 6049.0 | 100.0     |
| 0°-180°   | 6049.0 | 100.0     |

**Coefficient of Utilization**



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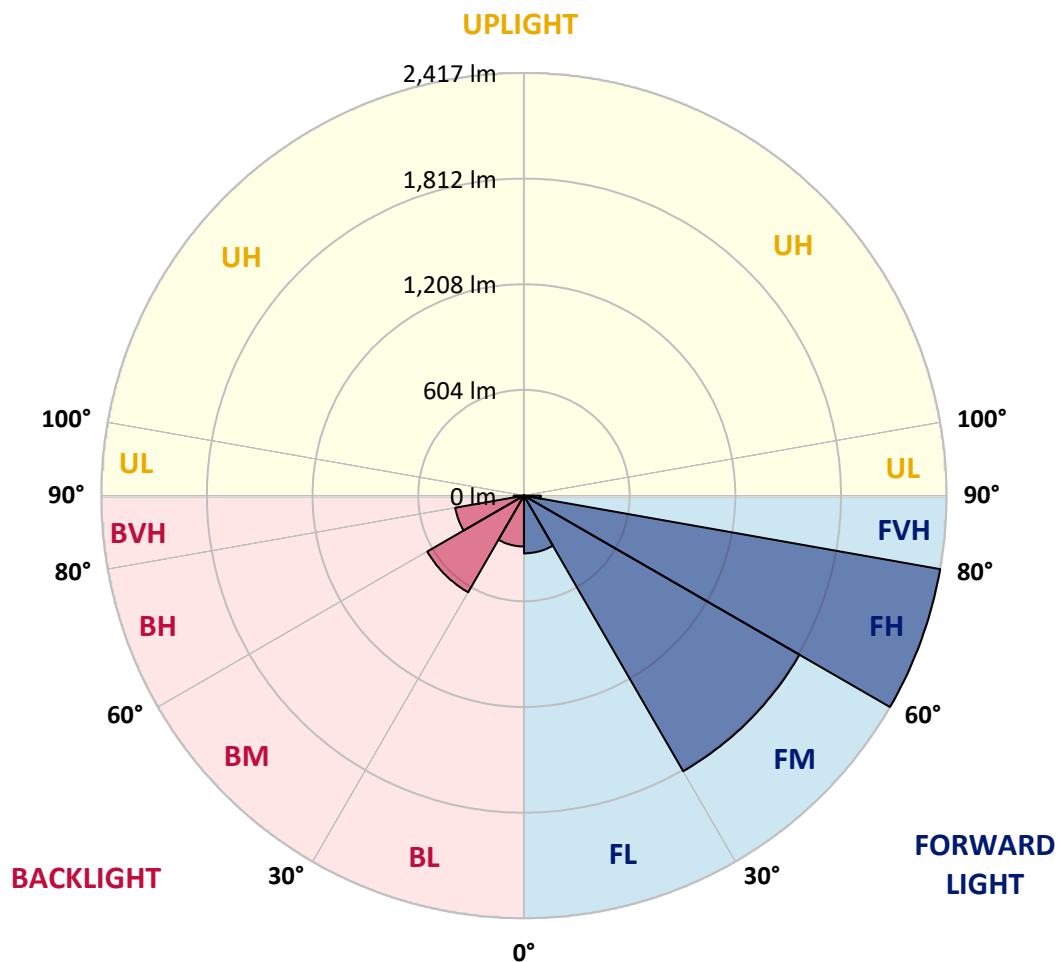
CATALOG NUMBER: GWC-SA1D-827-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 330.1  | 5.5       |                         |      |         |
| FM   | (30°-60°)   | 1819.3 | 30.1      |                         |      |         |
| FH   | (60°-80°)   | 2416.5 | 39.9      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 96.7   | 1.6       |                         |      | G1/100  |
| BL   | (0°-30°)    | 291.1  | 4.8       | B1/500                  |      |         |
| BM   | (30°-60°)   | 638.2  | 10.6      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 398.6  | 6.6       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 58.5   | 1.0       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 46°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 616.3  | 616.3  | 616.3  | 616.3  | 616.3  | 616.3  | 616.3  | 616.3  | 616.3  | 616.3  | 616.3  |
| 2.5°  | 647.1  | 647.5  | 648.4  | 646.3  | 640.5  | 638.8  | 638.2  | 632.2  | 628.3  | 622.5  | 617.5  |
| 5°    | 698.9  | 699.3  | 698.0  | 692.2  | 679.4  | 669.9  | 669.1  | 655.4  | 643.0  | 629.7  | 619.8  |
| 7.5°  | 752.9  | 753.5  | 749.6  | 738.6  | 720.6  | 704.0  | 703.0  | 684.4  | 665.5  | 645.5  | 630.6  |
| 10°   | 800.7  | 798.2  | 791.8  | 776.5  | 755.2  | 734.9  | 734.1  | 714.6  | 692.9  | 668.6  | 648.8  |
| 12.5° | 832.6  | 830.5  | 822.3  | 803.6  | 780.2  | 761.6  | 759.9  | 741.9  | 720.8  | 694.3  | 670.5  |
| 15°   | 850.2  | 851.6  | 840.5  | 819.4  | 796.6  | 780.8  | 779.4  | 766.6  | 747.7  | 721.0  | 693.7  |
| 17.5° | 852.5  | 853.7  | 843.0  | 822.0  | 803.4  | 792.6  | 792.0  | 783.5  | 769.9  | 744.2  | 715.6  |
| 20°   | 839.2  | 840.1  | 831.2  | 814.0  | 801.8  | 798.4  | 798.2  | 794.5  | 784.4  | 761.6  | 733.9  |
| 22.5° | 820.0  | 820.6  | 814.2  | 801.8  | 797.6  | 802.8  | 804.2  | 802.8  | 795.5  | 774.2  | 748.1  |
| 25°   | 815.2  | 814.8  | 808.2  | 795.5  | 799.1  | 810.0  | 811.9  | 812.5  | 807.6  | 788.9  | 766.4  |
| 27.5° | 838.2  | 836.7  | 824.1  | 803.8  | 806.1  | 819.4  | 821.8  | 827.8  | 824.7  | 808.4  | 787.1  |
| 30°   | 904.6  | 902.2  | 876.3  | 835.3  | 824.1  | 830.9  | 834.1  | 843.6  | 844.2  | 830.5  | 814.6  |
| 32.5° | 1016.8 | 1013.7 | 967.4  | 894.1  | 854.5  | 842.7  | 845.6  | 859.9  | 867.6  | 857.0  | 839.8  |
| 35°   | 1158.6 | 1155.1 | 1094.3 | 994.1  | 905.5  | 865.3  | 867.4  | 878.8  | 894.1  | 879.2  | 856.4  |
| 37.5° | 1306.5 | 1298.0 | 1239.4 | 1111.7 | 986.4  | 913.5  | 913.5  | 915.0  | 922.2  | 891.2  | 875.9  |
| 40°   | 1453.4 | 1444.9 | 1391.9 | 1249.9 | 1091.2 | 989.5  | 984.8  | 952.7  | 946.9  | 920.2  | 915.0  |
| 42.5° | 1590.1 | 1587.6 | 1556.3 | 1406.2 | 1214.1 | 1064.2 | 1057.6 | 1003.2 | 1004.4 | 987.9  | 988.1  |
| 45°   | 1735.4 | 1735.4 | 1709.9 | 1564.0 | 1357.4 | 1184.3 | 1177.7 | 1097.6 | 1110.0 | 1102.3 | 1120.8 |
| 47.5° | 1854.0 | 1857.7 | 1854.2 | 1728.3 | 1524.0 | 1336.9 | 1324.9 | 1228.4 | 1263.2 | 1289.5 | 1343.1 |
| 50°   | 1975.1 | 1980.9 | 1981.5 | 1908.7 | 1725.4 | 1518.2 | 1504.6 | 1402.1 | 1479.7 | 1555.1 | 1660.4 |
| 52.5° | 2150.9 | 2163.9 | 2111.9 | 2088.5 | 1972.2 | 1733.5 | 1720.1 | 1625.5 | 1755.0 | 1860.8 | 2042.4 |
| 55°   | 2313.8 | 2302.4 | 2265.3 | 2279.8 | 2236.4 | 1978.6 | 1968.5 | 1885.5 | 2061.8 | 2199.3 | 2435.1 |
| 57.5° | 2402.0 | 2401.1 | 2438.4 | 2500.5 | 2521.2 | 2280.9 | 2272.4 | 2191.6 | 2407.8 | 2511.1 | 2803.8 |
| 60°   | 2505.5 | 2506.9 | 2599.2 | 2740.2 | 2825.5 | 2657.2 | 2653.5 | 2592.2 | 2743.7 | 2802.1 | 3093.0 |
| 62.5° | 2520.0 | 2546.0 | 2705.0 | 2947.6 | 3110.4 | 3096.9 | 3105.2 | 2953.0 | 3044.3 | 3034.4 | 3308.9 |
| 65°   | 2353.3 | 2387.7 | 2675.4 | 3010.4 | 3393.5 | 3577.8 | 3585.4 | 3315.9 | 3281.3 | 3232.9 | 3386.1 |
| 67.5° | 2011.7 | 2062.7 | 2375.3 | 2873.9 | 3486.9 | 3933.2 | 3944.0 | 3597.2 | 3478.0 | 3300.2 | 3200.2 |
| 70°   | 1464.0 | 1520.5 | 1835.2 | 2454.5 | 3320.5 | 4046.9 | 4059.1 | 3721.7 | 3485.5 | 3108.7 | 2731.9 |
| 72.5° | 884.4  | 928.7  | 1188.0 | 1807.0 | 2802.5 | 3839.9 | 3861.6 | 3563.9 | 3182.2 | 2633.2 | 2017.3 |
| 75°   | 388.4  | 417.3  | 574.5  | 1041.3 | 2006.4 | 3177.0 | 3204.1 | 3050.5 | 2585.6 | 1913.6 | 1192.4 |
| 77.5° | 165.4  | 173.7  | 235.6  | 452.3  | 1134.2 | 2170.9 | 2208.2 | 2228.9 | 1754.2 | 1041.3 | 503.9  |
| 80°   | 103.1  | 106.4  | 133.3  | 204.7  | 530.8  | 1219.3 | 1259.5 | 1311.4 | 871.1  | 382.8  | 176.0  |
| 82.5° | 62.7   | 66.5   | 88.6   | 123.8  | 276.4  | 552.7  | 572.0  | 608.6  | 338.1  | 165.4  | 91.1   |
| 85°   | 37.7   | 40.4   | 54.2   | 78.3   | 157.3  | 217.4  | 217.2  | 240.1  | 159.2  | 106.4  | 48.0   |
| 87.5° | 18.0   | 20.1   | 29.0   | 40.6   | 79.3   | 81.6   | 76.4   | 86.5   | 96.7   | 69.8   | 24.2   |
| 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: P386265

CATALOG NUMBER: GWC-SA1D-827-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 616.3  | 616.3  | 616.3 | 616.3 | 616.3 | 616.3 | 616.3 | 616.3 | 616.3 | 616.3 | 616.3 |
| 2.5°  | 615.9  | 615.0  | 612.3 | 610.3 | 609.9 | 608.6 | 607.6 | 608.2 | 609.0 | 609.2 | 609.2 |
| 5°    | 615.7  | 613.4  | 609.9 | 608.4 | 610.3 | 612.8 | 615.9 | 620.0 | 622.5 | 624.3 | 625.6 |
| 7.5°  | 625.6  | 621.2  | 617.3 | 616.5 | 620.2 | 626.8 | 633.9 | 642.6 | 648.6 | 652.7 | 653.5 |
| 10°   | 642.2  | 636.8  | 632.8 | 633.7 | 640.3 | 649.8 | 659.7 | 670.9 | 680.0 | 685.6 | 686.0 |
| 12.5° | 661.2  | 656.0  | 652.3 | 655.8 | 666.8 | 678.4 | 688.7 | 698.5 | 706.7 | 712.3 | 712.3 |
| 15°   | 683.1  | 679.4  | 675.1 | 683.1 | 698.0 | 708.4 | 712.7 | 717.5 | 722.1 | 726.2 | 725.4 |
| 17.5° | 704.3  | 700.7  | 698.5 | 708.0 | 723.5 | 728.3 | 725.4 | 721.9 | 721.9 | 724.1 | 724.5 |
| 20°   | 722.5  | 719.4  | 720.8 | 730.1 | 738.2 | 733.2 | 722.5 | 711.3 | 706.7 | 708.0 | 709.2 |
| 22.5° | 738.4  | 737.0  | 741.3 | 745.7 | 739.9 | 722.5 | 702.6 | 687.5 | 681.9 | 681.5 | 681.9 |
| 25°   | 757.0  | 756.8  | 762.2 | 754.4 | 728.7 | 696.6 | 669.9 | 655.2 | 652.1 | 654.6 | 658.7 |
| 27.5° | 780.2  | 782.5  | 785.2 | 756.4 | 705.9 | 657.5 | 630.4 | 620.2 | 623.3 | 629.3 | 633.2 |
| 30°   | 809.8  | 816.0  | 810.2 | 751.2 | 673.2 | 612.8 | 586.9 | 584.0 | 592.5 | 601.0 | 605.1 |
| 32.5° | 838.6  | 848.3  | 834.3 | 737.8 | 631.0 | 565.3 | 545.3 | 544.4 | 554.8 | 563.1 | 568.9 |
| 35°   | 861.8  | 881.0  | 852.3 | 711.1 | 582.1 | 521.7 | 507.0 | 501.4 | 505.1 | 514.8 | 521.5 |
| 37.5° | 892.0  | 924.1  | 864.7 | 670.3 | 529.1 | 485.7 | 468.5 | 455.6 | 452.3 | 456.3 | 459.6 |
| 40°   | 947.3  | 989.7  | 870.5 | 613.4 | 477.4 | 449.6 | 432.2 | 413.4 | 400.4 | 390.8 | 391.0 |
| 42.5° | 1037.5 | 1075.2 | 866.8 | 544.2 | 429.5 | 414.4 | 394.8 | 373.0 | 351.9 | 330.4 | 328.7 |
| 45°   | 1184.1 | 1202.3 | 855.6 | 471.0 | 387.5 | 377.6 | 359.2 | 337.4 | 309.3 | 284.8 | 282.6 |
| 47.5° | 1418.7 | 1378.3 | 838.2 | 407.0 | 350.5 | 346.3 | 329.4 | 304.3 | 274.5 | 254.8 | 253.2 |
| 50°   | 1738.5 | 1632.3 | 829.7 | 356.1 | 317.8 | 319.0 | 305.1 | 278.6 | 250.5 | 236.0 | 234.3 |
| 52.5° | 2121.0 | 1928.1 | 846.1 | 316.7 | 291.5 | 295.8 | 285.5 | 260.6 | 237.0 | 225.6 | 224.0 |
| 55°   | 2517.9 | 2234.5 | 863.7 | 288.2 | 266.6 | 275.1 | 271.6 | 251.1 | 229.8 | 219.2 | 217.8 |
| 57.5° | 2857.6 | 2463.2 | 828.5 | 265.0 | 244.5 | 257.7 | 260.8 | 245.1 | 226.1 | 216.5 | 214.9 |
| 60°   | 3071.4 | 2555.4 | 736.1 | 243.2 | 226.9 | 243.9 | 254.6 | 243.4 | 227.5 | 226.7 | 225.4 |
| 62.5° | 3172.9 | 2547.3 | 597.6 | 226.1 | 215.9 | 237.9 | 259.2 | 252.8 | 244.1 | 251.5 | 252.1 |
| 65°   | 3127.3 | 2425.6 | 445.1 | 214.7 | 208.0 | 240.1 | 272.8 | 270.4 | 248.8 | 256.3 | 257.3 |
| 67.5° | 2827.6 | 2135.1 | 329.6 | 204.7 | 199.4 | 246.6 | 297.7 | 276.2 | 239.5 | 244.9 | 241.6 |
| 70°   | 2285.4 | 1692.7 | 254.2 | 193.6 | 190.5 | 245.7 | 308.9 | 272.6 | 229.4 | 230.6 | 221.7 |
| 72.5° | 1576.0 | 1154.3 | 206.8 | 183.2 | 177.6 | 224.0 | 301.0 | 263.9 | 220.9 | 211.4 | 199.6 |
| 75°   | 857.0  | 619.6  | 175.8 | 172.4 | 155.1 | 196.7 | 286.5 | 257.7 | 213.2 | 200.6 | 194.0 |
| 77.5° | 337.2  | 257.1  | 152.6 | 157.7 | 135.6 | 173.7 | 270.4 | 245.9 | 202.7 | 186.1 | 182.8 |
| 80°   | 137.7  | 131.2  | 126.5 | 136.4 | 116.5 | 151.9 | 250.9 | 232.1 | 190.0 | 172.6 | 166.0 |
| 82.5° | 78.0   | 81.6   | 98.3  | 107.6 | 94.6  | 139.9 | 241.6 | 220.9 | 174.9 | 154.6 | 146.8 |
| 85°   | 40.0   | 47.8   | 68.5  | 77.2  | 69.6  | 119.0 | 222.5 | 193.3 | 140.4 | 118.4 | 119.0 |
| 87.5° | 19.3   | 26.7   | 43.3  | 48.4  | 45.1  | 86.1  | 166.2 | 140.1 | 109.3 | 86.5  | 83.8  |
| 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: SP1-2104-224-5

Luminaire Tested: CCW-SA-2A-827-U-SL4

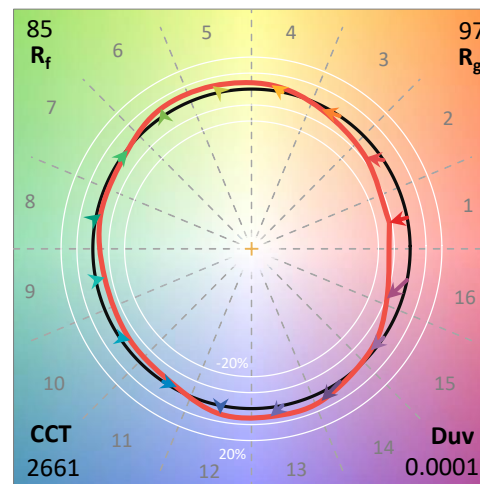
Test Date: 04/27/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-224-5  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/27/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **CCW-SA-2A-827-U-SL4**  
 Description: INVUE WALL PACK ClearCurve Light Square

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 2661   | CRI (Ra): | 82.2 |      |      |
| CIE u':                   | 0.2642 | R1:       | 80.7 | R9:  | 5.2  |
| CIE v':                   | 0.5282 | R2:       | 91.5 | R10: | 82.2 |
| Duv:                      | 0.0001 | R3:       | 94.9 | R11: | 81.4 |
| CIE x:                    | 0.4631 | R4:       | 80.7 | R12: | 80.4 |
| CIE y:                    | 0.4115 | R5:       | 81.5 | R13: | 83.2 |
| CIE z:                    | 0.1254 | R6:       | 91.6 | R14: | 97.8 |
| Peak Wavelength (nm):     | 606    | R7:       | 81.0 |      |      |
| Dominant Wavelength (nm): | 584    | R8:       | 56.0 |      |      |
| Purity:                   | 62.8   |           |      |      |      |
| Rf:                       | 85.3   |           |      |      |      |
| Rg:                       | 96.5   |           |      |      |      |



### Test Conditions

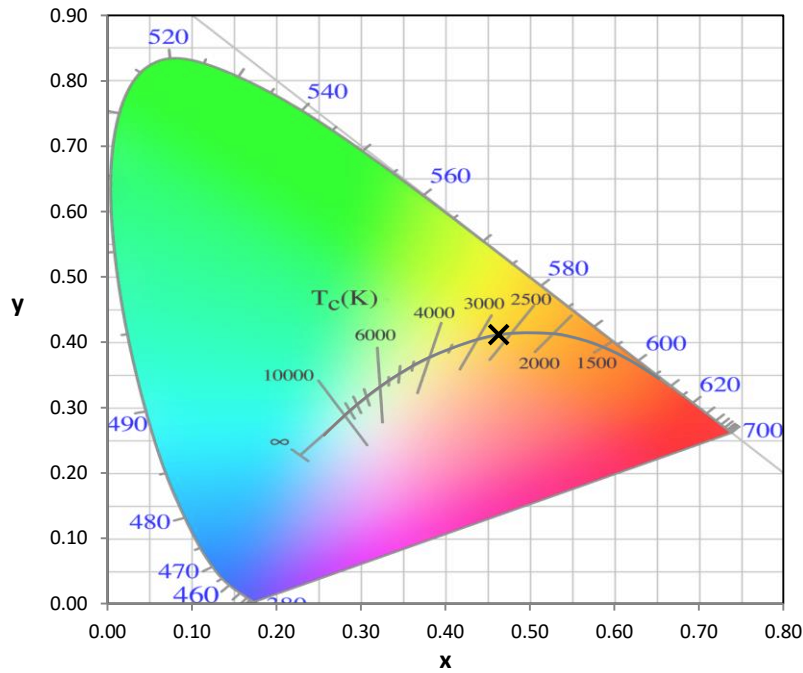
Stabilization Time: 163M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0/47%  
 Sphere Temperature (°C): 24.1

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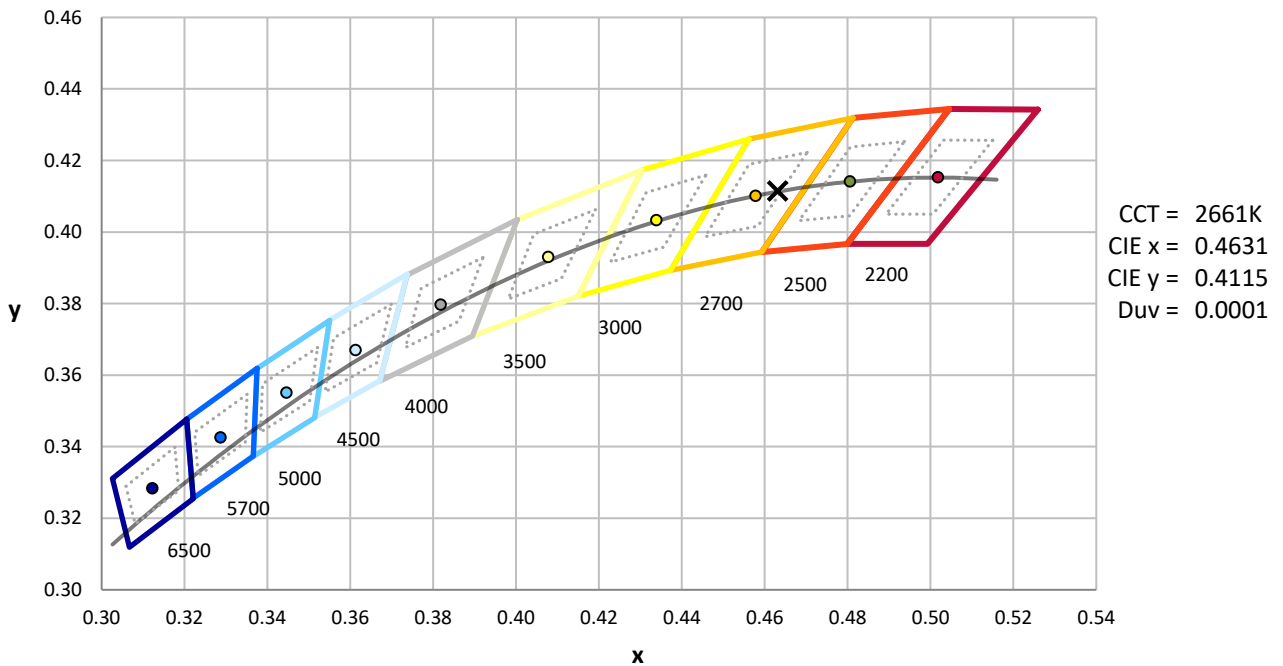
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

REPORT NUMBER: SP1-2104-224-5

**CIE 1931 Chromaticity Diagram**



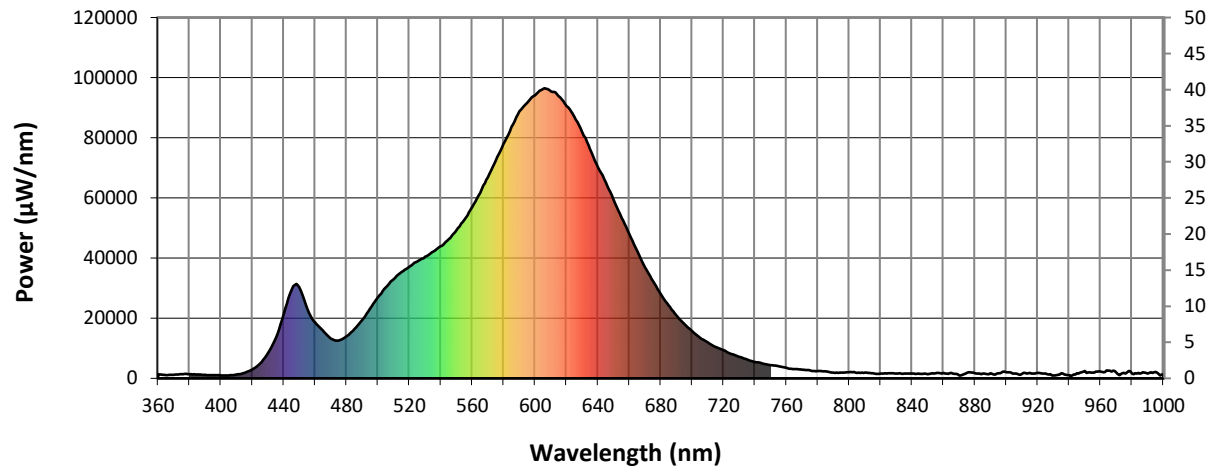
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength

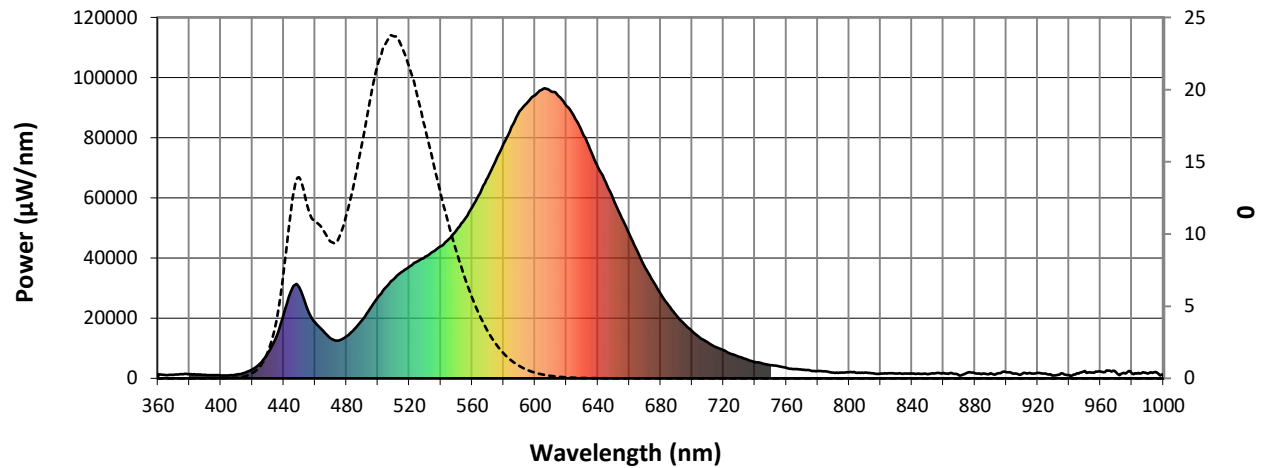


#####

| 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       | 1379             | 0.0              | 490       | 19477            | 2.8              | 620       | 90616            | 23.6             | 750       | 4384             | 0.0              | 880       | 1655             | 0.0              |
| 365       | 1114             | 0.0              | 495       | 23200            | 4.2              | 625       | 87050            | 19.2             | 755       | 4013             | 0.0              | 885       | 1597             | 0.0              |
| 370       | 1169             | 0.0              | 500       | 26999            | 6.0              | 630       | 81805            | 14.8             | 760       | 3486             | 0.0              | 890       | 1696             | 0.0              |
| 375       | 1418             | 0.0              | 505       | 30185            | 8.4              | 635       | 76273            | 11.5             | 765       | 3111             | 0.0              | 895       | 1694             | 0.0              |
| 380       | 1358             | 0.0              | 510       | 33025            | 11.3             | 640       | 70276            | 8.4              | 770       | 2922             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1234             | 0.0              | 515       | 35307            | 14.6             | 645       | 65174            | 6.3              | 775       | 2649             | 0.0              | 905       | 1631             | 0.0              |
| 390       | 1133             | 0.0              | 520       | 37140            | 18.0             | 650       | 59417            | 4.3              | 780       | 2399             | 0.0              | 910       | 1506             | 0.0              |
| 395       | 1066             | 0.0              | 525       | 38834            | 20.8             | 655       | 53417            | 3.1              | 785       | 2386             | 0.0              | 915       | 1763             | 0.0              |
| 400       | 982              | 0.0              | 530       | 40401            | 23.8             | 660       | 48038            | 2.0              | 790       | 1912             | 0.0              | 920       | 1860             | 0.0              |
| 405       | 996              | 0.0              | 535       | 42121            | 26.1             | 665       | 42350            | 1.3              | 795       | 1902             | 0.0              | 925       | 1612             | 0.0              |
| 410       | 1276             | 0.0              | 540       | 43918            | 28.6             | 670       | 36925            | 0.8              | 800       | 2023             | 0.0              | 930       | 976              | 0.0              |
| 415       | 1798             | 0.0              | 545       | 46244            | 30.8             | 675       | 32385            | 0.5              | 805       | 1813             | 0.0              | 935       | 1702             | 0.0              |
| 420       | 2943             | 0.0              | 550       | 49225            | 33.5             | 680       | 28089            | 0.3              | 810       | 1888             | 0.0              | 940       | 1083             | 0.0              |
| 425       | 4989             | 0.0              | 555       | 52758            | 36.0             | 685       | 24306            | 0.2              | 815       | 1669             | 0.0              | 945       | 1672             | 0.0              |
| 430       | 8360             | 0.1              | 560       | 56904            | 38.7             | 690       | 20941            | 0.1              | 820       | 1558             | 0.0              | 950       | 2462             | 0.0              |
| 435       | 13537            | 0.2              | 565       | 61643            | 41.0             | 695       | 18065            | 0.1              | 825       | 1689             | 0.0              | 955       | 1958             | 0.0              |
| 440       | 21265            | 0.3              | 570       | 66872            | 43.5             | 700       | 15715            | 0.0              | 830       | 1632             | 0.0              | 960       | 2236             | 0.0              |
| 445       | 29496            | 0.6              | 575       | 72519            | 45.1             | 705       | 13502            | 0.0              | 835       | 1615             | 0.0              | 965       | 2541             | 0.0              |
| 450       | 30225            | 0.8              | 580       | 78030            | 46.4             | 710       | 11899            | 0.0              | 840       | 1583             | 0.0              | 970       | 1960             | 0.0              |
| 455       | 23120            | 0.8              | 585       | 83595            | 46.4             | 715       | 10427            | 0.0              | 845       | 1541             | 0.0              | 975       | 1763             | 0.0              |
| 460       | 18596            | 0.8              | 590       | 88814            | 45.9             | 720       | 9351             | 0.0              | 850       | 1350             | 0.0              | 980       | 1627             | 0.0              |
| 465       | 15865            | 0.8              | 595       | 91588            | 43.4             | 725       | 8139             | 0.0              | 855       | 1689             | 0.0              | 985       | 1556             | 0.0              |
| 470       | 13251            | 0.8              | 600       | 94210            | 40.6             | 730       | 7143             | 0.0              | 860       | 1763             | 0.0              | 990       | 1638             | 0.0              |
| 475       | 12609            | 1.0              | 605       | 96240            | 37.3             | 735       | 6273             | 0.0              | 865       | 1765             | 0.0              | 995       | 2124             | 0.0              |
| 480       | 14016            | 1.3              | 610       | 95474            | 32.8             | 740       | 5462             | 0.0              | 870       | 942              | 0.0              | 1000      | 1228             | 0.0              |
| 485       | 16368            | 1.9              | 615       | 93812            | 28.3             | 745       | 4946             | 0.0              | 875       | 1844             | 0.0              |           |                  |                  |

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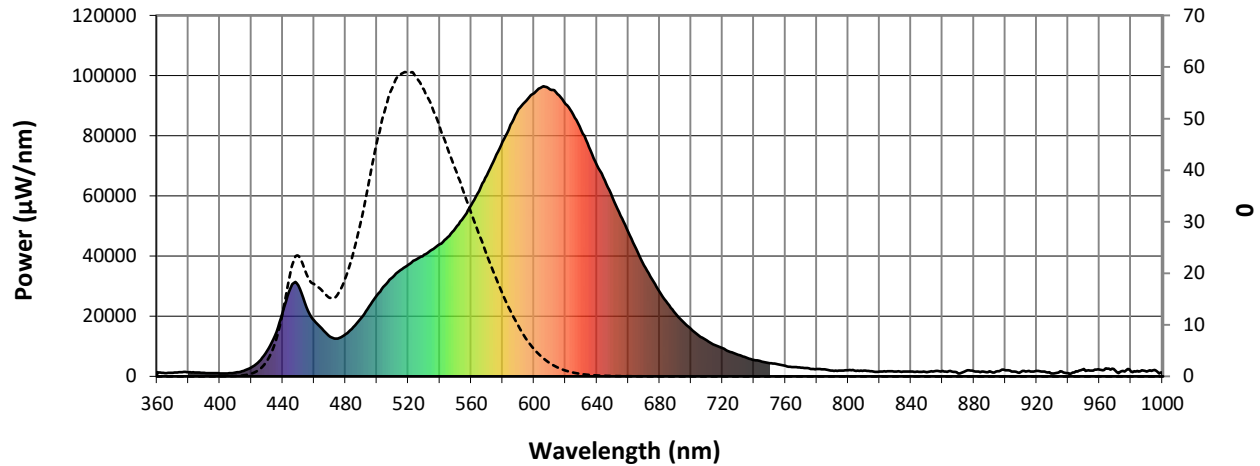
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 5165.4**
**S/P: 1.2**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 1379                          | 0.0                            | 490               | 19477                         | 30.0                           | 620               | 90616                         | 1.1                            | 750               | 4384                          | 0.0                            | 880               | 1655                          | 0.0                            |
| 365               | 1114                          | 0.0                            | 495               | 23200                         | 37.5                           | 625               | 87050                         | 0.7                            | 755               | 4013                          | 0.0                            | 885               | 1597                          | 0.0                            |
| 370               | 1169                          | 0.0                            | 500               | 26999                         | 45.2                           | 630               | 81805                         | 0.5                            | 760               | 3486                          | 0.0                            | 890               | 1696                          | 0.0                            |
| 375               | 1418                          | 0.0                            | 505               | 30185                         | 51.3                           | 635               | 76273                         | 0.3                            | 765               | 3111                          | 0.0                            | 895               | 1694                          | 0.0                            |
| 380               | 1358                          | 0.0                            | 510               | 33025                         | 56.0                           | 640               | 70276                         | 0.2                            | 770               | 2922                          | 0.0                            | 900               | 2016                          | 0.0                            |
| 385               | 1234                          | 0.0                            | 515               | 35307                         | 58.5                           | 645               | 65174                         | 0.1                            | 775               | 2649                          | 0.0                            | 905               | 1631                          | 0.0                            |
| 390               | 1133                          | 0.0                            | 520               | 37140                         | 59.0                           | 650               | 59417                         | 0.1                            | 780               | 2399                          | 0.0                            | 910               | 1506                          | 0.0                            |
| 395               | 1066                          | 0.0                            | 525               | 38834                         | 58.1                           | 655               | 53417                         | 0.0                            | 785               | 2386                          | 0.0                            | 915               | 1763                          | 0.0                            |
| 400               | 982                           | 0.0                            | 530               | 40401                         | 55.7                           | 660               | 48038                         | 0.0                            | 790               | 1912                          | 0.0                            | 920               | 1860                          | 0.0                            |
| 405               | 996                           | 0.0                            | 535               | 42121                         | 52.5                           | 665               | 42350                         | 0.0                            | 795               | 1902                          | 0.0                            | 925               | 1612                          | 0.0                            |
| 410               | 1276                          | 0.1                            | 540               | 43918                         | 48.5                           | 670               | 36925                         | 0.0                            | 800               | 2023                          | 0.0                            | 930               | 976                           | 0.0                            |
| 415               | 1798                          | 0.2                            | 545               | 46244                         | 44.3                           | 675               | 32385                         | 0.0                            | 805               | 1813                          | 0.0                            | 935               | 1702                          | 0.0                            |
| 420               | 2943                          | 0.5                            | 550               | 49225                         | 40.3                           | 680               | 28089                         | 0.0                            | 810               | 1888                          | 0.0                            | 940               | 1083                          | 0.0                            |
| 425               | 4989                          | 1.2                            | 555               | 52758                         | 36.1                           | 685               | 24306                         | 0.0                            | 815               | 1669                          | 0.0                            | 945               | 1672                          | 0.0                            |
| 430               | 8360                          | 2.8                            | 560               | 56904                         | 31.8                           | 690               | 20941                         | 0.0                            | 820               | 1558                          | 0.0                            | 950               | 2462                          | 0.0                            |
| 435               | 13537                         | 6.1                            | 565               | 61643                         | 27.7                           | 695               | 18065                         | 0.0                            | 825               | 1689                          | 0.0                            | 955               | 1958                          | 0.0                            |
| 440               | 21265                         | 11.9                           | 570               | 66872                         | 23.6                           | 700               | 15715                         | 0.0                            | 830               | 1632                          | 0.0                            | 960               | 2236                          | 0.0                            |
| 445               | 29496                         | 19.8                           | 575               | 72519                         | 19.7                           | 705               | 13502                         | 0.0                            | 835               | 1615                          | 0.0                            | 965               | 2541                          | 0.0                            |
| 450               | 30225                         | 23.4                           | 580               | 78030                         | 16.1                           | 710               | 11899                         | 0.0                            | 840               | 1583                          | 0.0                            | 970               | 1960                          | 0.0                            |
| 455               | 23120                         | 20.2                           | 585               | 83595                         | 12.8                           | 715               | 10427                         | 0.0                            | 845               | 1541                          | 0.0                            | 975               | 1763                          | 0.0                            |
| 460               | 18596                         | 18.0                           | 590               | 88814                         | 9.9                            | 720               | 9351                          | 0.0                            | 850               | 1350                          | 0.0                            | 980               | 1627                          | 0.0                            |
| 465               | 15865                         | 16.8                           | 595               | 91588                         | 7.3                            | 725               | 8139                          | 0.0                            | 855               | 1689                          | 0.0                            | 985               | 1556                          | 0.0                            |
| 470               | 13251                         | 15.3                           | 600               | 94210                         | 5.3                            | 730               | 7143                          | 0.0                            | 860               | 1763                          | 0.0                            | 990               | 1638                          | 0.0                            |
| 475               | 12609                         | 15.8                           | 605               | 96240                         | 3.8                            | 735               | 6273                          | 0.0                            | 865               | 1765                          | 0.0                            | 995               | 2124                          | 0.0                            |
| 480               | 14016                         | 18.9                           | 610               | 95474                         | 2.6                            | 740               | 5462                          | 0.0                            | 870               | 942                           | 0.0                            | 1000              | 1228                          | 0.0                            |
| 485               | 16368                         | 23.7                           | 615               | 93812                         | 1.7                            | 745               | 4946                          | 0.0                            | 875               | 1844                          | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 1892.1**      **M/P: 0.44**

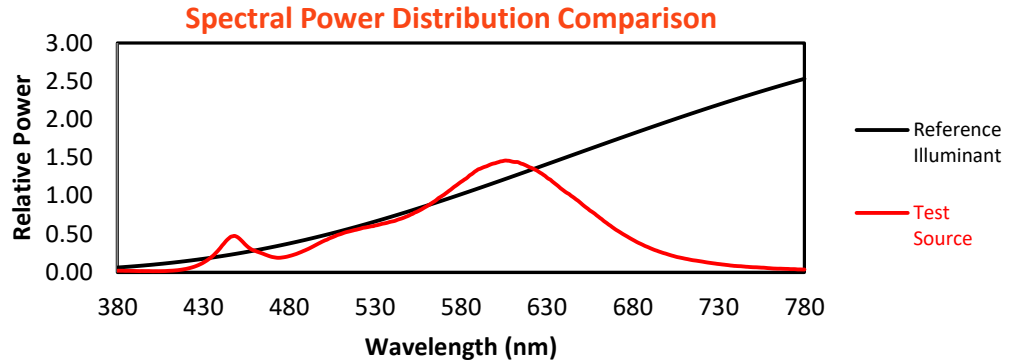
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1379             | 0.0              | 490       | 19477            | 16.2             | 620       | 90616            | 0.1              | 750       | 4384             | 0.0              | 880       | 1655             | 0.0              |
| 365       | 1114             | 0.0              | 495       | 23200            | 19.2             | 625       | 87050            | 0.0              | 755       | 4013             | 0.0              | 885       | 1597             | 0.0              |
| 370       | 1169             | 0.0              | 500       | 26999            | 21.7             | 630       | 81805            | 0.0              | 760       | 3486             | 0.0              | 890       | 1696             | 0.0              |
| 375       | 1418             | 0.0              | 505       | 30185            | 23.2             | 635       | 76273            | 0.0              | 765       | 3111             | 0.0              | 895       | 1694             | 0.0              |
| 380       | 1358             | 0.0              | 510       | 33025            | 23.7             | 640       | 70276            | 0.0              | 770       | 2922             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1234             | 0.0              | 515       | 35307            | 23.1             | 645       | 65174            | 0.0              | 775       | 2649             | 0.0              | 905       | 1631             | 0.0              |
| 390       | 1133             | 0.0              | 520       | 37140            | 21.6             | 650       | 59417            | 0.0              | 780       | 2399             | 0.0              | 910       | 1506             | 0.0              |
| 395       | 1066             | 0.0              | 525       | 38834            | 19.7             | 655       | 53417            | 0.0              | 785       | 2386             | 0.0              | 915       | 1763             | 0.0              |
| 400       | 982              | 0.0              | 530       | 40401            | 17.5             | 660       | 48038            | 0.0              | 790       | 1912             | 0.0              | 920       | 1860             | 0.0              |
| 405       | 996              | 0.0              | 535       | 42121            | 15.2             | 665       | 42350            | 0.0              | 795       | 1902             | 0.0              | 925       | 1612             | 0.0              |
| 410       | 1276             | 0.0              | 540       | 43918            | 12.9             | 670       | 36925            | 0.0              | 800       | 2023             | 0.0              | 930       | 976              | 0.0              |
| 415       | 1798             | 0.1              | 545       | 46244            | 10.7             | 675       | 32385            | 0.0              | 805       | 1813             | 0.0              | 935       | 1702             | 0.0              |
| 420       | 2943             | 0.3              | 550       | 49225            | 8.8              | 680       | 28089            | 0.0              | 810       | 1888             | 0.0              | 940       | 1083             | 0.0              |
| 425       | 4989             | 0.8              | 555       | 52758            | 7.1              | 685       | 24306            | 0.0              | 815       | 1669             | 0.0              | 945       | 1672             | 0.0              |
| 430       | 8360             | 1.8              | 560       | 56904            | 5.6              | 690       | 20941            | 0.0              | 820       | 1558             | 0.0              | 950       | 2462             | 0.0              |
| 435       | 13537            | 3.6              | 565       | 61643            | 4.3              | 695       | 18065            | 0.0              | 825       | 1689             | 0.0              | 955       | 1958             | 0.0              |
| 440       | 21265            | 7.1              | 570       | 66872            | 3.3              | 700       | 15715            | 0.0              | 830       | 1632             | 0.0              | 960       | 2236             | 0.0              |
| 445       | 29496            | 11.6             | 575       | 72519            | 2.4              | 705       | 13502            | 0.0              | 835       | 1615             | 0.0              | 965       | 2541             | 0.0              |
| 450       | 30225            | 13.9             | 580       | 78030            | 1.7              | 710       | 11899            | 0.0              | 840       | 1583             | 0.0              | 970       | 1960             | 0.0              |
| 455       | 23120            | 12.1             | 585       | 83595            | 1.2              | 715       | 10427            | 0.0              | 845       | 1541             | 0.0              | 975       | 1763             | 0.0              |
| 460       | 18596            | 11.0             | 590       | 88814            | 0.9              | 720       | 9351             | 0.0              | 850       | 1350             | 0.0              | 980       | 1627             | 0.0              |
| 465       | 15865            | 10.4             | 595       | 91588            | 0.6              | 725       | 8139             | 0.0              | 855       | 1689             | 0.0              | 985       | 1556             | 0.0              |
| 470       | 13251            | 9.5              | 600       | 94210            | 0.4              | 730       | 7143             | 0.0              | 860       | 1763             | 0.0              | 990       | 1638             | 0.0              |
| 475       | 12609            | 9.6              | 605       | 96240            | 0.3              | 735       | 6273             | 0.0              | 865       | 1765             | 0.0              | 995       | 2124             | 0.0              |
| 480       | 14016            | 11.3             | 610       | 95474            | 0.2              | 740       | 5462             | 0.0              | 870       | 942              | 0.0              | 1000      | 1228             | 0.0              |
| 485       | 16368            | 13.5             | 615       | 93812            | 0.1              | 745       | 4946             | 0.0              | 875       | 1844             | 0.0              |           |                  |                  |

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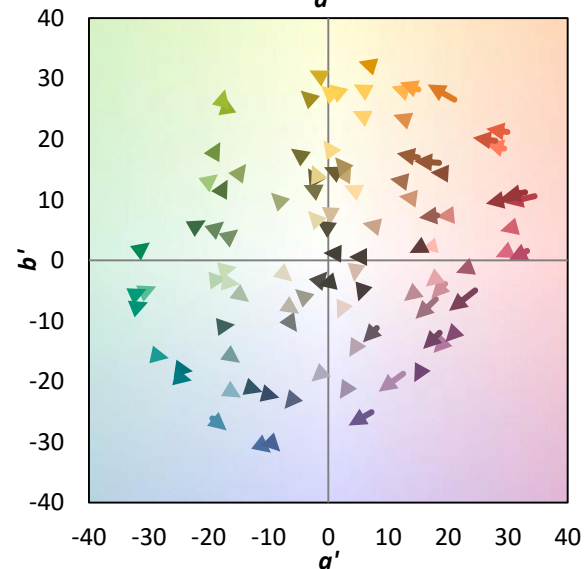
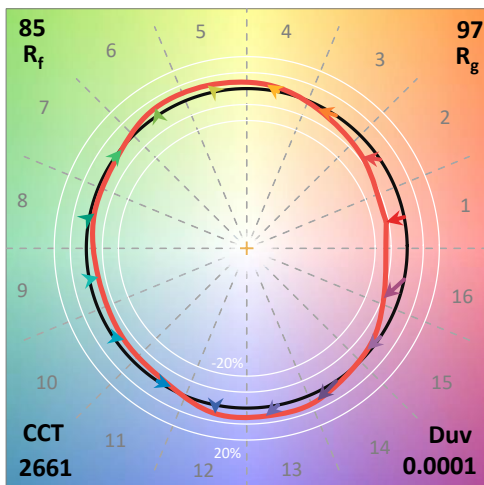
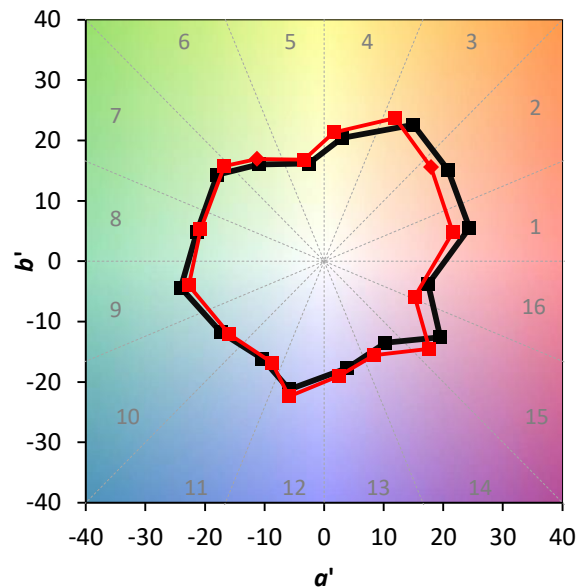
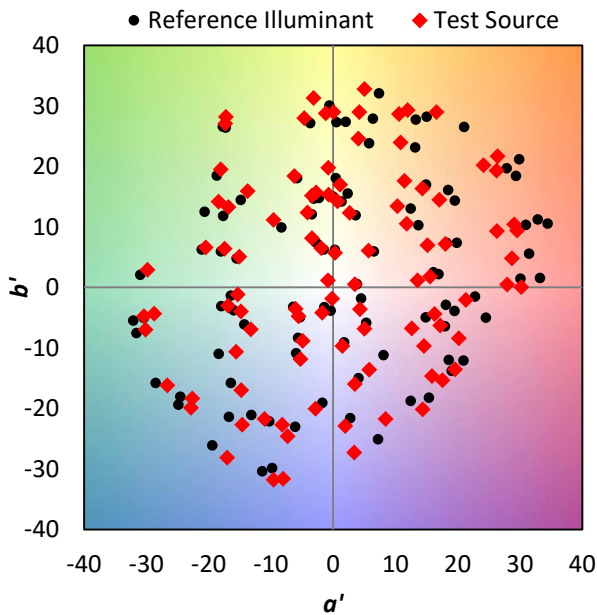
TM-30-18

### Summary

$R_f = 85.3$   
 $R_g = 96.5$   
 CIE  $R_a = 82.2$   
 $R_9 = 5.2$



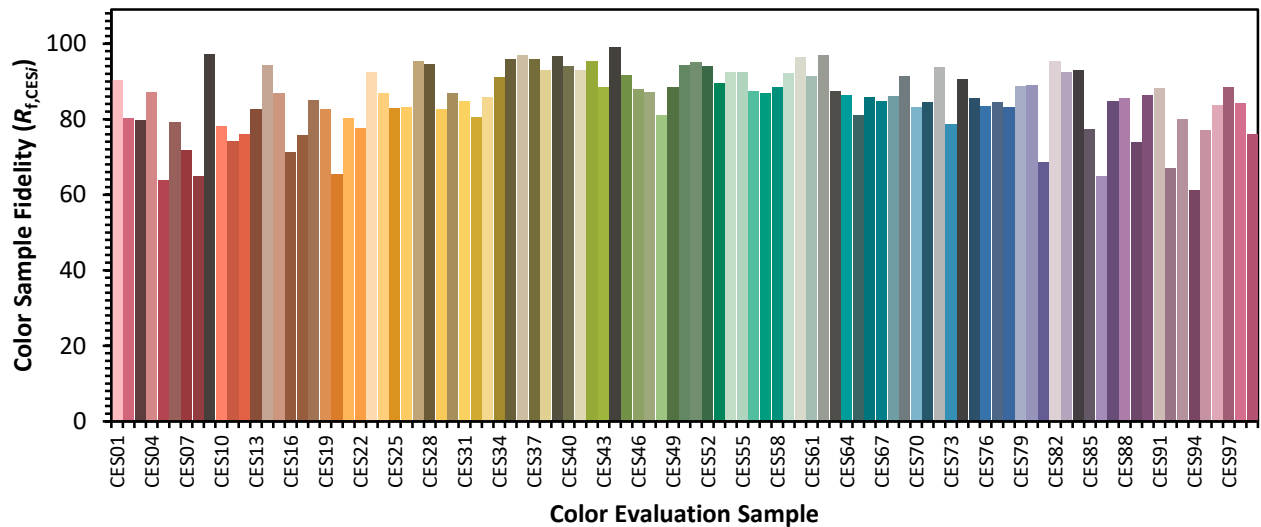
### Color Vector Graphics



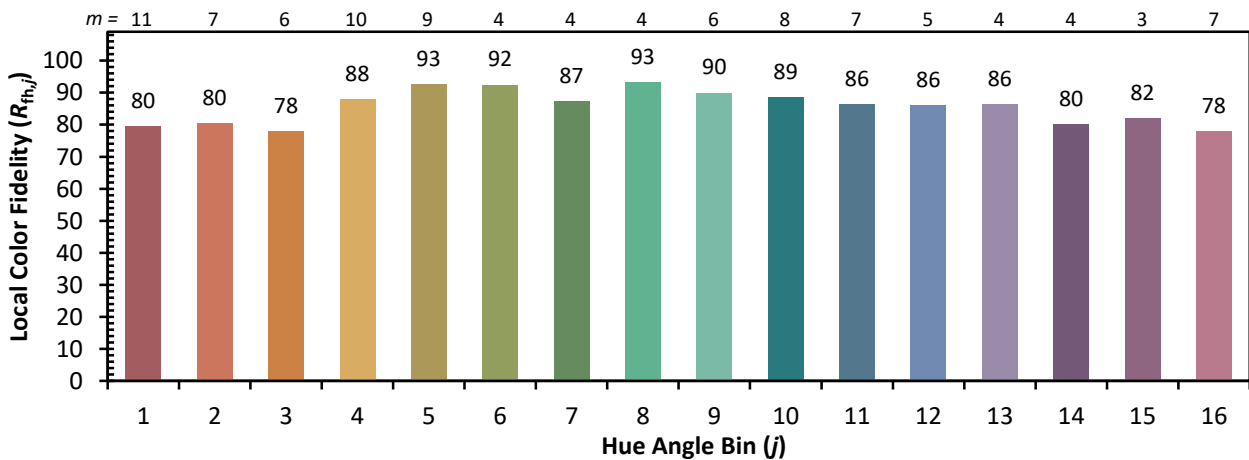
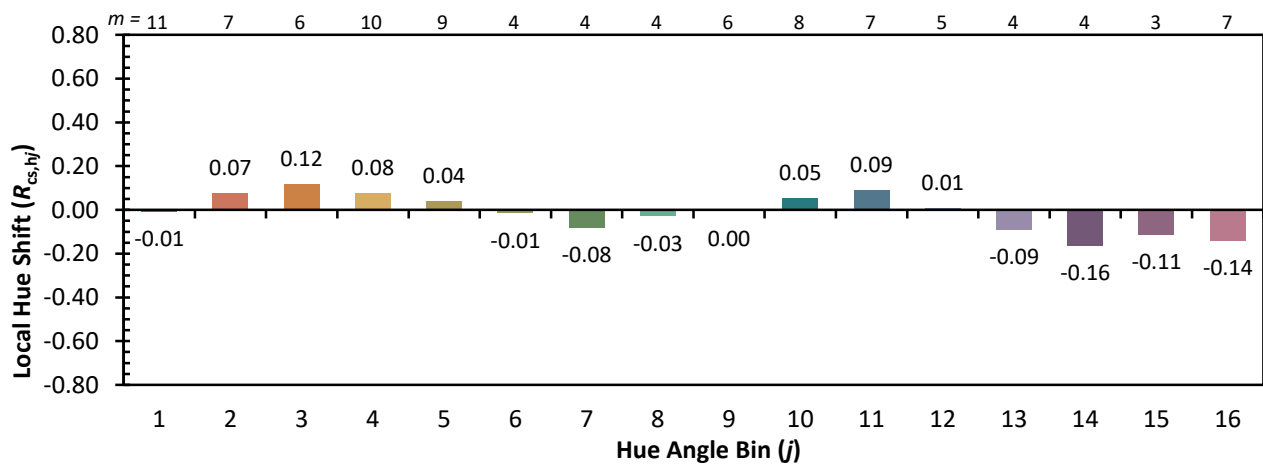
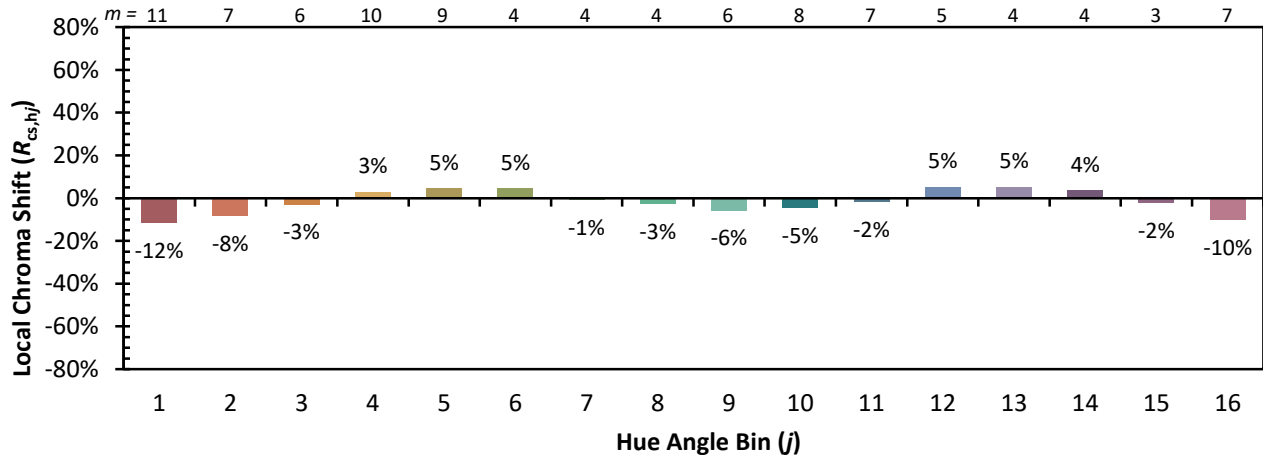


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

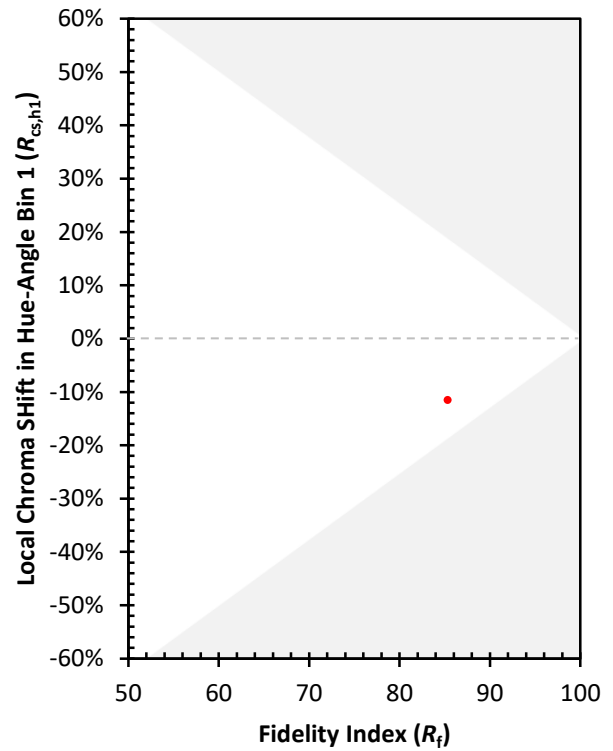
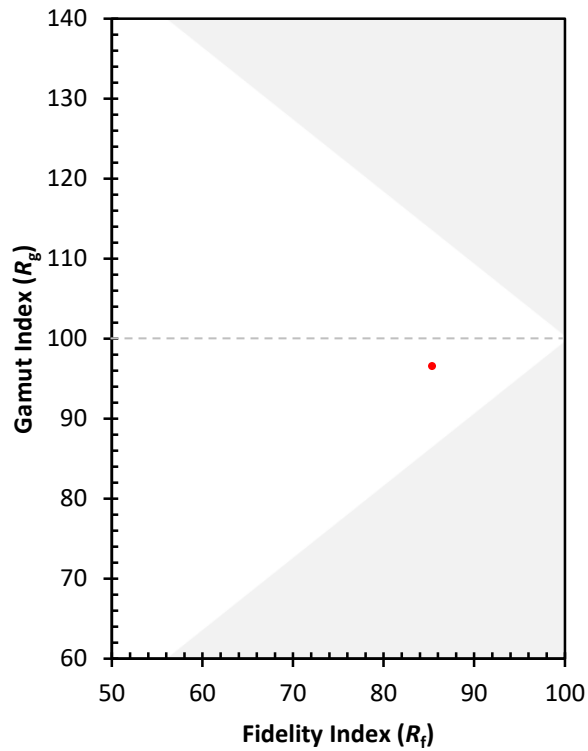
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 83 | CES51 = 95 | CES76 = 83 |
| CES02 = 64 | CES27 = 95 | CES52 = 94 | CES77 = 85 |
| CES03 = 32 | CES28 = 95 | CES53 = 89 | CES78 = 83 |
| CES04 = 71 | CES29 = 83 | CES54 = 92 | CES79 = 89 |
| CES05 = 51 | CES30 = 87 | CES55 = 92 | CES80 = 89 |
| CES06 = 52 | CES31 = 85 | CES56 = 87 | CES81 = 69 |
| CES07 = 43 | CES32 = 81 | CES57 = 87 | CES82 = 95 |
| CES08 = 42 | CES33 = 86 | CES58 = 88 | CES83 = 92 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 93 |
| CES10 = 77 | CES35 = 96 | CES60 = 96 | CES85 = 77 |
| CES11 = 60 | CES36 = 97 | CES61 = 91 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 97 | CES87 = 85 |
| CES13 = 44 | CES38 = 93 | CES63 = 87 | CES88 = 85 |
| CES14 = 74 | CES39 = 97 | CES64 = 86 | CES89 = 74 |
| CES15 = 72 | CES40 = 94 | CES65 = 81 | CES90 = 86 |
| CES16 = 48 | CES41 = 93 | CES66 = 86 | CES91 = 88 |
| CES17 = 50 | CES42 = 95 | CES67 = 85 | CES92 = 67 |
| CES18 = 57 | CES43 = 88 | CES68 = 86 | CES93 = 80 |
| CES19 = 73 | CES44 = 99 | CES69 = 91 | CES94 = 61 |
| CES20 = 67 | CES45 = 92 | CES70 = 83 | CES95 = 77 |
| CES21 = 87 | CES46 = 88 | CES71 = 85 | CES96 = 84 |
| CES22 = 80 | CES47 = 87 | CES72 = 94 | CES97 = 88 |
| CES23 = 92 | CES48 = 81 | CES73 = 79 | CES98 = 84 |
| CES24 = 91 | CES49 = 88 | CES74 = 90 | CES99 = 76 |
| CES25 = 72 | CES50 = 94 | CES75 = 86 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)