

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P438450

Luminaire Tested: **IST-SA1C-830-U-SL4**

Issue Date: 12/10/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P438450  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2011-074-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 12/10/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: IST-SA1C-830-U-SL4  
Description: IMPACT ELITE LED TRAPEZOID LUMINAIRE  
(1) 80 CRI, 3000K, 615mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV SPILL LIGHT  
ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3497 lumens  
Efficiency: N/A  
Efficacy: 102.3 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G1  
  
Input Watts (W): 34.2  
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

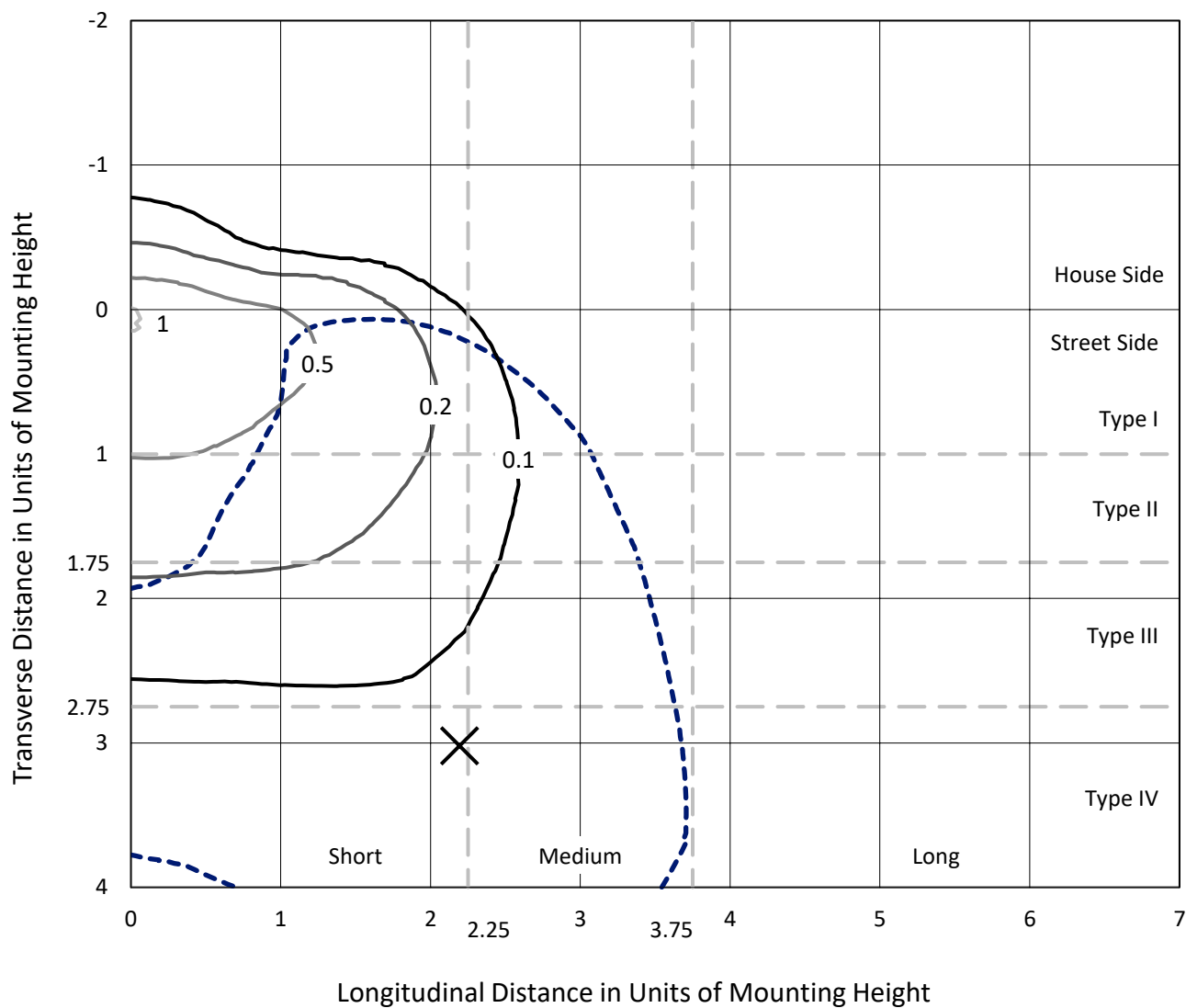


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 CATALOG NUMBER: IST-SA1C-830-U-SL4

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

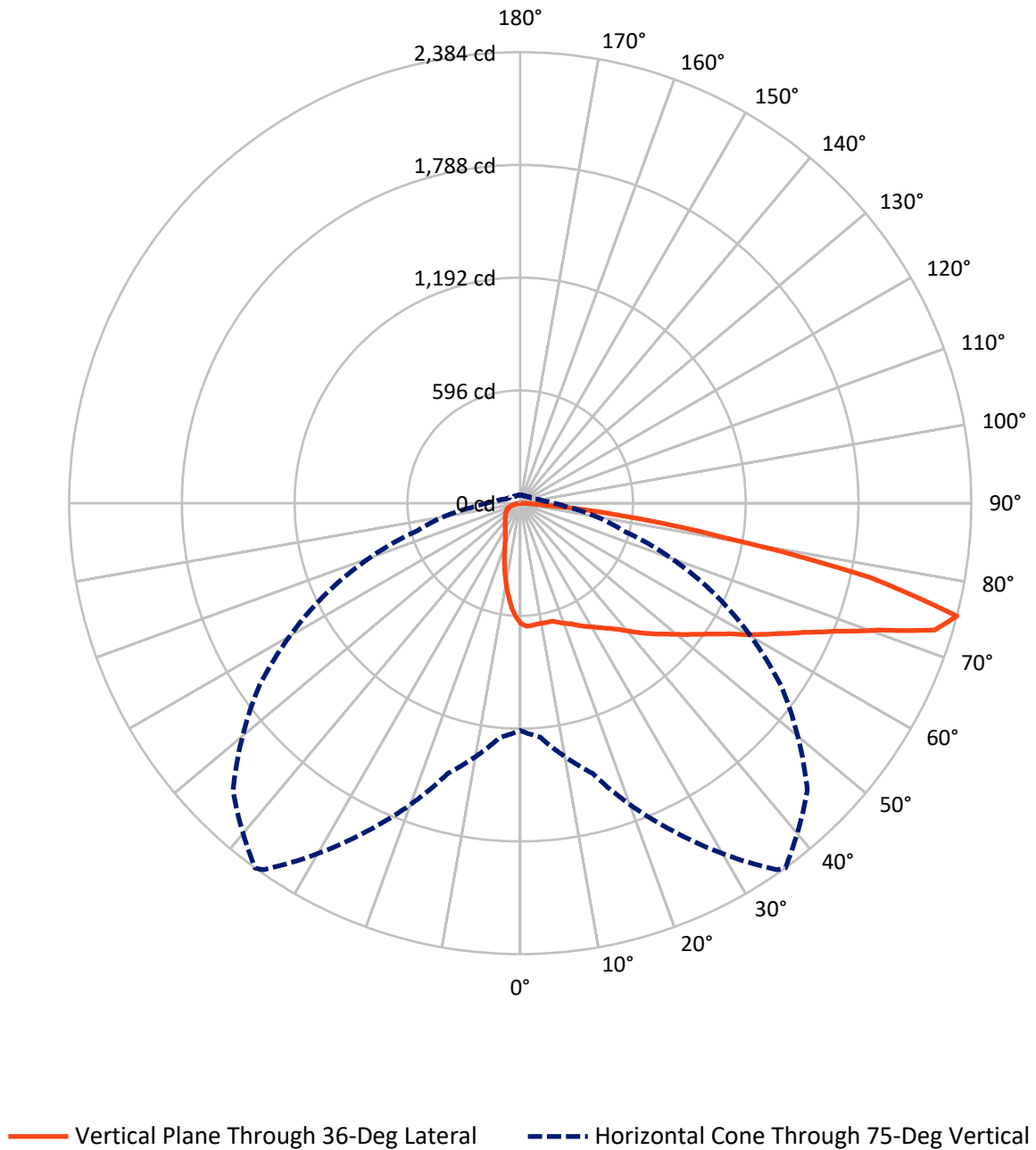
--- 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 1 fc  
 Type IV - Short - N/A

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CATALOG NUMBER: IST-SA1C-830-U-SL4

## Luminous Intensity Polar Plot



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CATALOG NUMBER: IST-SA1C-830-U-SL4

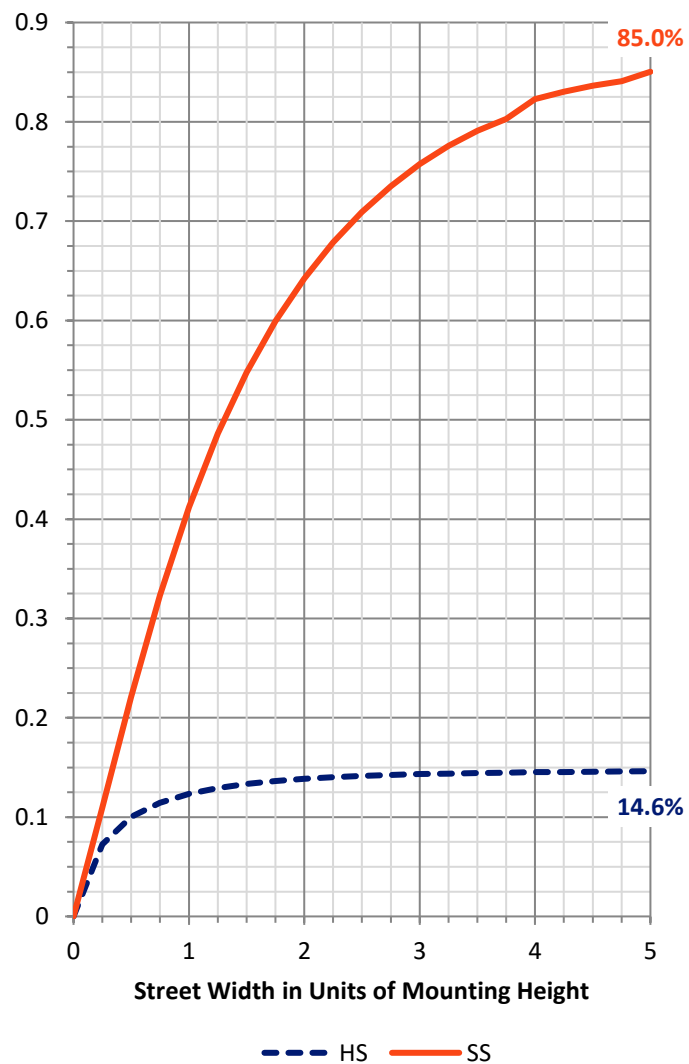
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 516.1    | 0.0    | 516.1  |
|                    | % Fixture | 14.8     | 0.0    | 14.8   |
| <b>Street Side</b> | Lumens    | 2980.9   | 0.0    | 2980.9 |
|                    | % Fixture | 85.2     | 0.0    | 85.2   |
| <b>Total</b>       | Lumens    | 3497.0   | 0.0    | 3497.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 56.3   | 1.6       |
| 10°-20°   | 145.5  | 4.2       |
| 20°-30°   | 225.0  | 6.4       |
| 30°-40°   | 325.9  | 9.3       |
| 40°-50°   | 471.4  | 13.5      |
| 50°-60°   | 653.8  | 18.7      |
| 60°-70°   | 825.6  | 23.6      |
| 70°-80°   | 709.1  | 20.3      |
| 80°-90°   | 84.5   | 2.4       |
| 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°    | 3497.0 | 100.0     |
| 0°-180°   | 3497.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P438450

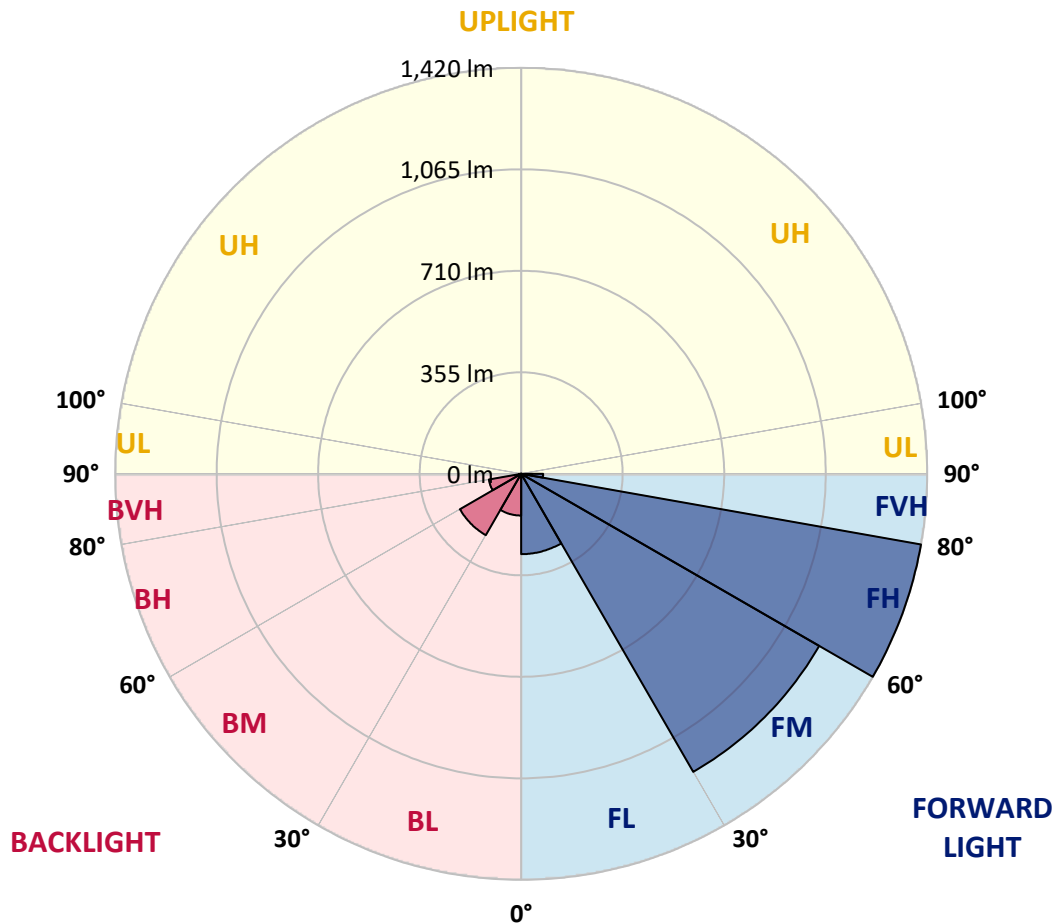
CATALOG NUMBER: IST-SA1C-830-U-SL4

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 280.8  | 8.0       |                         |      |         |
| FM   | (30°-60°)   | 1203.6 | 34.4      |                         |      |         |
| FH   | (60°-80°)   | 1419.8 | 40.6      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 76.7   | 2.2       |                         |      | G1/100  |
| BL   | (0°-30°)    | 146.0  | 4.2       | B1/500                  |      |         |
| BM   | (30°-60°)   | 247.4  | 7.1       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 114.9  | 3.3       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 7.8    | 0.2       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 36°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 638.0  | 638.0  | 638.0  | 638.0  | 638.0  | 638.0  | 638.0  | 638.0  | 638.0  | 638.0  | 638.0  |
| 2.5°  | 656.3  | 656.3  | 656.3  | 655.0  | 652.4  | 651.1  | 648.4  | 645.8  | 644.5  | 639.3  | 638.0  |
| 5°    | 656.3  | 657.6  | 656.3  | 655.0  | 652.4  | 649.8  | 647.1  | 641.9  | 638.0  | 631.5  | 625.0  |
| 7.5°  | 649.8  | 651.1  | 651.1  | 649.8  | 647.1  | 645.8  | 643.2  | 636.7  | 631.5  | 622.4  | 611.9  |
| 10°   | 639.3  | 641.9  | 641.9  | 643.2  | 644.5  | 644.5  | 641.9  | 636.7  | 628.9  | 618.4  | 601.5  |
| 12.5° | 626.3  | 632.8  | 636.7  | 640.6  | 645.8  | 645.8  | 647.1  | 639.3  | 632.8  | 618.4  | 601.5  |
| 15°   | 622.4  | 626.3  | 634.1  | 645.8  | 651.1  | 647.1  | 652.4  | 648.4  | 640.6  | 626.3  | 605.4  |
| 17.5° | 621.0  | 625.0  | 638.0  | 652.4  | 660.2  | 662.8  | 662.8  | 657.6  | 648.4  | 634.1  | 608.0  |
| 20°   | 626.3  | 631.5  | 648.4  | 666.7  | 678.5  | 678.5  | 677.2  | 670.6  | 658.9  | 641.9  | 613.2  |
| 22.5° | 643.2  | 644.5  | 664.1  | 686.3  | 695.4  | 692.8  | 695.4  | 683.7  | 670.6  | 653.7  | 619.7  |
| 25°   | 665.4  | 668.0  | 683.7  | 709.8  | 715.0  | 716.3  | 712.4  | 699.3  | 685.0  | 668.0  | 627.6  |
| 27.5° | 695.4  | 699.3  | 711.1  | 735.9  | 739.8  | 737.2  | 732.0  | 716.3  | 701.9  | 686.3  | 643.2  |
| 30°   | 730.6  | 733.3  | 747.6  | 758.0  | 762.0  | 759.3  | 755.4  | 738.5  | 726.7  | 712.4  | 666.7  |
| 32.5° | 764.6  | 765.9  | 781.5  | 792.0  | 785.4  | 785.4  | 780.2  | 763.3  | 754.1  | 751.5  | 696.7  |
| 35°   | 799.8  | 802.4  | 816.8  | 822.0  | 811.5  | 812.8  | 811.5  | 797.2  | 799.8  | 805.0  | 742.4  |
| 37.5° | 832.4  | 836.3  | 853.3  | 854.6  | 850.7  | 846.8  | 850.7  | 842.9  | 848.1  | 868.9  | 795.9  |
| 40°   | 861.1  | 866.3  | 887.2  | 891.1  | 889.8  | 889.8  | 892.4  | 891.1  | 910.7  | 944.6  | 861.1  |
| 42.5° | 884.6  | 891.1  | 915.9  | 926.4  | 934.2  | 938.1  | 947.2  | 949.8  | 978.5  | 1033.3 | 936.8  |
| 45°   | 908.1  | 914.6  | 948.5  | 965.5  | 983.8  | 985.1  | 1003.3 | 1012.5 | 1066.0 | 1115.5 | 1019.0 |
| 47.5° | 935.5  | 943.3  | 974.6  | 1008.6 | 1029.4 | 1033.3 | 1067.3 | 1085.5 | 1150.8 | 1214.7 | 1096.0 |
| 50°   | 973.3  | 975.9  | 1000.7 | 1058.1 | 1084.2 | 1090.7 | 1128.6 | 1166.4 | 1238.2 | 1302.1 | 1163.8 |
| 52.5° | 1020.3 | 1017.7 | 1029.4 | 1102.5 | 1142.9 | 1152.1 | 1213.4 | 1251.2 | 1337.3 | 1396.1 | 1217.3 |
| 55°   | 1059.4 | 1056.8 | 1073.8 | 1153.4 | 1217.3 | 1219.9 | 1293.0 | 1329.5 | 1428.7 | 1465.2 | 1263.0 |
| 57.5° | 1105.1 | 1099.9 | 1116.8 | 1214.7 | 1302.1 | 1303.4 | 1388.2 | 1430.0 | 1510.9 | 1526.5 | 1293.0 |
| 60°   | 1142.9 | 1142.9 | 1165.1 | 1274.7 | 1396.1 | 1410.4 | 1487.4 | 1520.0 | 1590.5 | 1570.9 | 1307.3 |
| 62.5° | 1178.2 | 1184.7 | 1216.0 | 1354.3 | 1507.0 | 1518.7 | 1597.0 | 1610.0 | 1672.7 | 1604.8 | 1291.7 |
| 65°   | 1219.9 | 1230.4 | 1290.4 | 1449.5 | 1638.7 | 1646.6 | 1711.8 | 1730.1 | 1754.9 | 1603.5 | 1223.8 |
| 67.5° | 1264.3 | 1281.2 | 1360.8 | 1556.5 | 1783.6 | 1804.4 | 1874.9 | 1856.6 | 1809.7 | 1552.6 | 1081.6 |
| 70°   | 1324.3 | 1345.2 | 1458.7 | 1698.8 | 1981.9 | 2008.0 | 2100.6 | 1988.4 | 1780.9 | 1371.3 | 876.8  |
| 72.5° | 1370.0 | 1397.4 | 1552.6 | 1882.7 | 2250.6 | 2291.1 | 2268.9 | 1991.0 | 1597.0 | 1093.4 | 587.1  |
| 75°   | 1201.7 | 1243.4 | 1478.3 | 1912.7 | 2365.5 | 2383.7 | 2146.3 | 1683.1 | 1131.2 | 564.9  | 253.1  |
| 77.5° | 878.1  | 875.5  | 1080.3 | 1486.1 | 1938.8 | 1890.5 | 1628.3 | 1094.7 | 537.5  | 204.8  | 127.9  |
| 80°   | 441.0  | 424.0  | 584.5  | 792.0  | 1046.4 | 1079.0 | 962.9  | 568.9  | 212.7  | 109.6  | 77.0   |
| 82.5° | 163.1  | 167.0  | 214.0  | 323.6  | 525.8  | 533.6  | 388.8  | 241.4  | 116.1  | 57.4   | 40.4   |
| 85°   | 62.6   | 65.2   | 70.5   | 70.5   | 97.9   | 108.3  | 100.5  | 96.5   | 39.1   | 19.6   | 22.2   |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 1.3    | 1.3    | 1.3    | 1.3    | 1.3    | 1.3    | 1.3    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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CATALOG NUMBER: IST-SA1C-830-U-SL4

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 638.0  | 638.0 | 638.0 | 638.0 | 638.0 | 638.0 | 638.0 | 638.0 | 638.0 | 638.0 | 638.0 |
| 2.5°  | 634.1  | 631.5 | 626.3 | 617.1 | 611.9 | 608.0 | 602.8 | 597.6 | 596.3 | 595.0 | 601.5 |
| 5°    | 618.4  | 614.5 | 601.5 | 589.7 | 576.7 | 566.3 | 555.8 | 546.7 | 541.5 | 540.2 | 542.8 |
| 7.5°  | 602.8  | 597.6 | 578.0 | 554.5 | 532.3 | 514.1 | 495.8 | 486.7 | 472.3 | 472.3 | 473.6 |
| 10°   | 593.6  | 584.5 | 557.1 | 521.9 | 493.2 | 460.6 | 438.4 | 416.2 | 407.1 | 400.6 | 397.9 |
| 12.5° | 588.4  | 574.1 | 537.5 | 498.4 | 454.0 | 411.0 | 381.0 | 353.6 | 339.2 | 328.8 | 328.8 |
| 15°   | 589.7  | 574.1 | 524.5 | 473.6 | 416.2 | 364.0 | 326.2 | 296.2 | 277.9 | 267.5 | 264.9 |
| 17.5° | 588.4  | 568.9 | 508.8 | 442.3 | 378.4 | 323.6 | 277.9 | 246.6 | 228.3 | 221.8 | 220.5 |
| 20°   | 591.0  | 564.9 | 490.6 | 413.6 | 341.8 | 283.1 | 236.2 | 207.5 | 197.0 | 191.8 | 190.5 |
| 22.5° | 592.3  | 557.1 | 472.3 | 382.3 | 302.7 | 245.3 | 206.1 | 186.6 | 178.7 | 174.8 | 173.5 |
| 25°   | 595.0  | 555.8 | 451.4 | 353.6 | 270.1 | 216.6 | 186.6 | 169.6 | 165.7 | 163.1 | 163.1 |
| 27.5° | 605.4  | 555.8 | 433.2 | 317.0 | 236.2 | 193.1 | 169.6 | 159.2 | 156.6 | 155.3 | 155.3 |
| 30°   | 618.4  | 558.4 | 416.2 | 287.0 | 210.1 | 174.8 | 157.9 | 150.0 | 148.7 | 147.4 | 147.4 |
| 32.5° | 640.6  | 567.6 | 396.6 | 258.3 | 187.9 | 161.8 | 148.7 | 142.2 | 139.6 | 139.6 | 139.6 |
| 35°   | 670.6  | 583.2 | 377.1 | 232.2 | 169.6 | 148.7 | 139.6 | 133.1 | 131.8 | 133.1 | 133.1 |
| 37.5° | 713.7  | 601.5 | 360.1 | 208.8 | 155.3 | 138.3 | 130.5 | 126.6 | 125.3 | 125.3 | 126.6 |
| 40°   | 767.2  | 634.1 | 343.1 | 190.5 | 144.8 | 129.2 | 123.9 | 120.0 | 118.7 | 120.0 | 120.0 |
| 42.5° | 825.9  | 669.3 | 328.8 | 172.2 | 134.4 | 122.6 | 116.1 | 113.5 | 112.2 | 113.5 | 114.8 |
| 45°   | 891.1  | 705.9 | 317.0 | 159.2 | 126.6 | 116.1 | 110.9 | 109.6 | 108.3 | 108.3 | 109.6 |
| 47.5° | 945.9  | 745.0 | 307.9 | 150.0 | 120.0 | 110.9 | 107.0 | 104.4 | 103.1 | 101.8 | 103.1 |
| 50°   | 996.8  | 775.0 | 305.3 | 144.8 | 116.1 | 105.7 | 101.8 | 99.2  | 97.9  | 96.5  | 97.9  |
| 52.5° | 1034.6 | 790.7 | 305.3 | 140.9 | 112.2 | 101.8 | 97.9  | 95.2  | 93.9  | 91.3  | 92.6  |
| 55°   | 1060.7 | 798.5 | 301.4 | 138.3 | 108.3 | 97.9  | 92.6  | 91.3  | 90.0  | 87.4  | 87.4  |
| 57.5° | 1076.4 | 797.2 | 287.0 | 137.0 | 107.0 | 92.6  | 88.7  | 87.4  | 86.1  | 83.5  | 83.5  |
| 60°   | 1073.8 | 772.4 | 260.9 | 131.8 | 104.4 | 88.7  | 83.5  | 83.5  | 83.5  | 80.9  | 80.9  |
| 62.5° | 1036.0 | 703.2 | 217.9 | 123.9 | 101.8 | 84.8  | 78.3  | 80.9  | 82.2  | 79.6  | 79.6  |
| 65°   | 934.2  | 597.6 | 180.1 | 113.5 | 95.2  | 80.9  | 74.4  | 78.3  | 80.9  | 79.6  | 78.3  |
| 67.5° | 786.7  | 473.6 | 148.7 | 103.1 | 88.7  | 75.7  | 69.2  | 74.4  | 75.7  | 75.7  | 75.7  |
| 70°   | 608.0  | 340.5 | 122.6 | 90.0  | 79.6  | 67.8  | 62.6  | 65.2  | 66.5  | 66.5  | 67.8  |
| 72.5° | 360.1  | 203.5 | 100.5 | 77.0  | 67.8  | 58.7  | 54.8  | 56.1  | 54.8  | 54.8  | 54.8  |
| 75°   | 177.4  | 126.6 | 80.9  | 65.2  | 57.4  | 49.6  | 45.7  | 43.1  | 43.1  | 43.1  | 41.8  |
| 77.5° | 108.3  | 93.9  | 66.5  | 52.2  | 45.7  | 37.8  | 35.2  | 32.6  | 32.6  | 32.6  | 32.6  |
| 80°   | 77.0   | 73.1  | 50.9  | 39.1  | 31.3  | 27.4  | 26.1  | 24.8  | 24.8  | 23.5  | 23.5  |
| 82.5° | 48.3   | 54.8  | 37.8  | 26.1  | 20.9  | 19.6  | 18.3  | 17.0  | 15.7  | 14.4  | 14.4  |
| 85°   | 27.4   | 35.2  | 22.2  | 14.4  | 11.7  | 9.1   | 7.8   | 7.8   | 6.5   | 6.5   | 5.2   |
| 87.5° | 1.3    | 2.6   | 2.6   | 2.6   | 2.6   | 1.3   | 1.3   | 1.3   | 0.0   | 0.0   | 0.0   |
| 90°   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

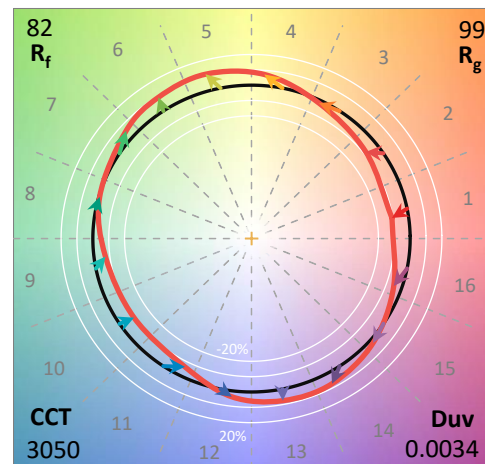
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2408-195-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/07/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **GALN-SB1A-830-U-5WQ**  
 Description: GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS

### Spectral Parameters

CCT (K): 3050  
 CIE  $u'$ : 0.2476  
 CIE  $v'$ : 0.5251  
 Duv: 0.0034  
 CIE x: 0.4383  
 CIE y: 0.4131  
 CIE z: 0.1487  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 581  
 Purity: 55.55201  
 R<sub>f</sub>: 81.5  
 R<sub>g</sub>: 99.2

CRI (Ra): 81.0  
 R1: 79.6  
 R2: 85.6  
 R3: 92.0  
 R4: 82.6  
 R5: 78.9  
 R6: 81.7  
 R7: 85.2  
 R8: 62.0  
 R9: 7.1  
 R10: 67.0  
 R11: 82.7  
 R12: 63.2  
 R13: 80.3  
 R14: 95.0  
 R15: 71.7



### Test Conditions

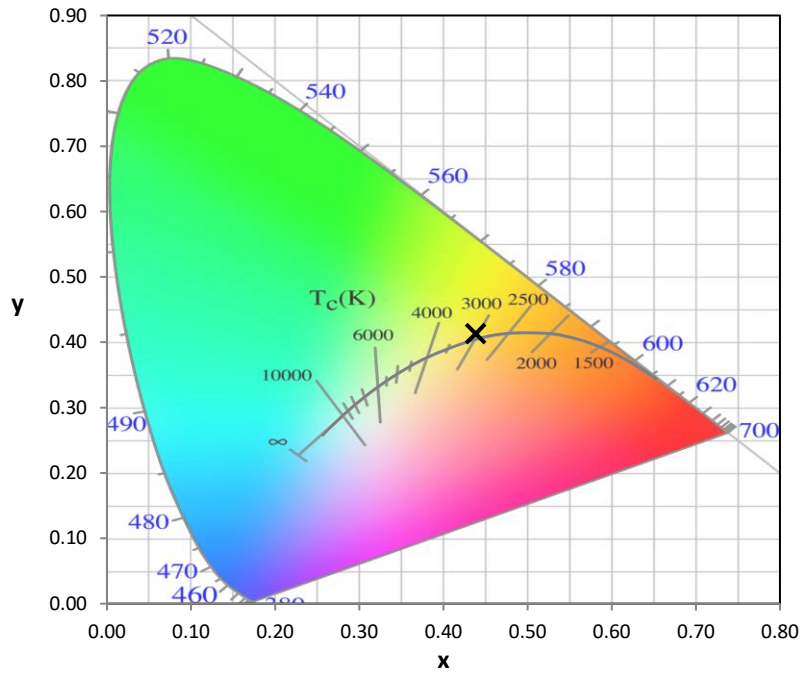
Stabilization Time: 20M  
 Operation Time: 1H 20M  
 Sphere Temperature (°C): 24.2

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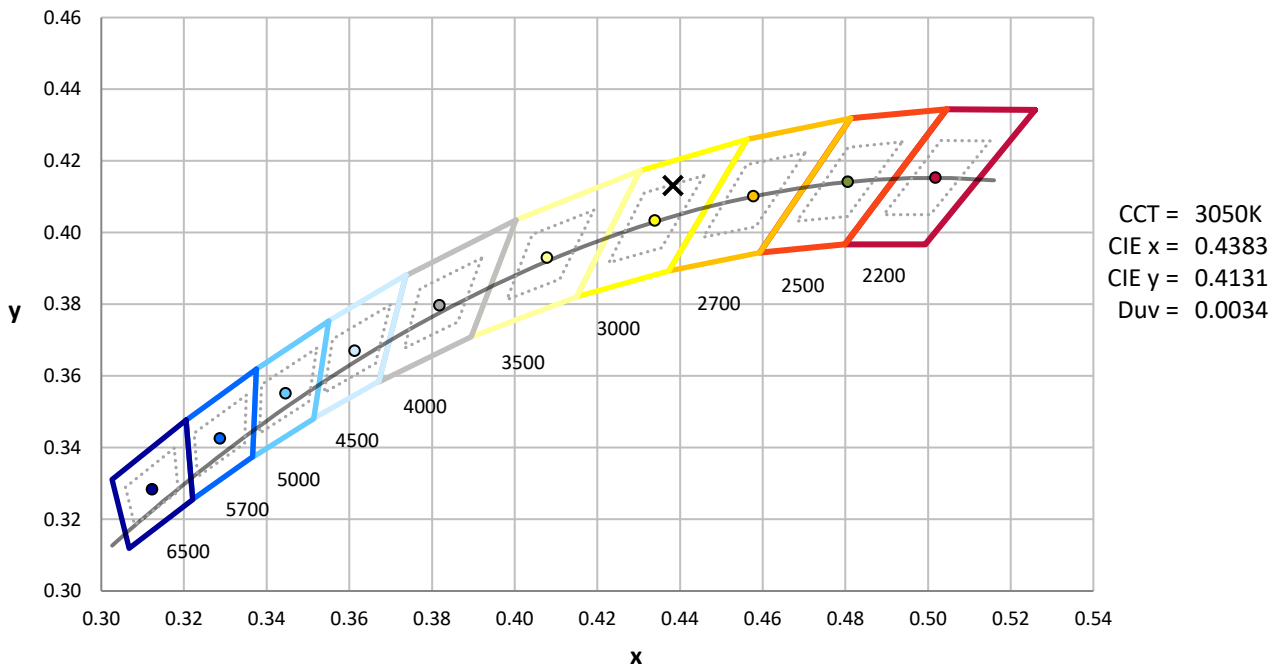
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

REPORT NUMBER: SP1-2408-195-9

**CIE 1931 Chromaticity Diagram**



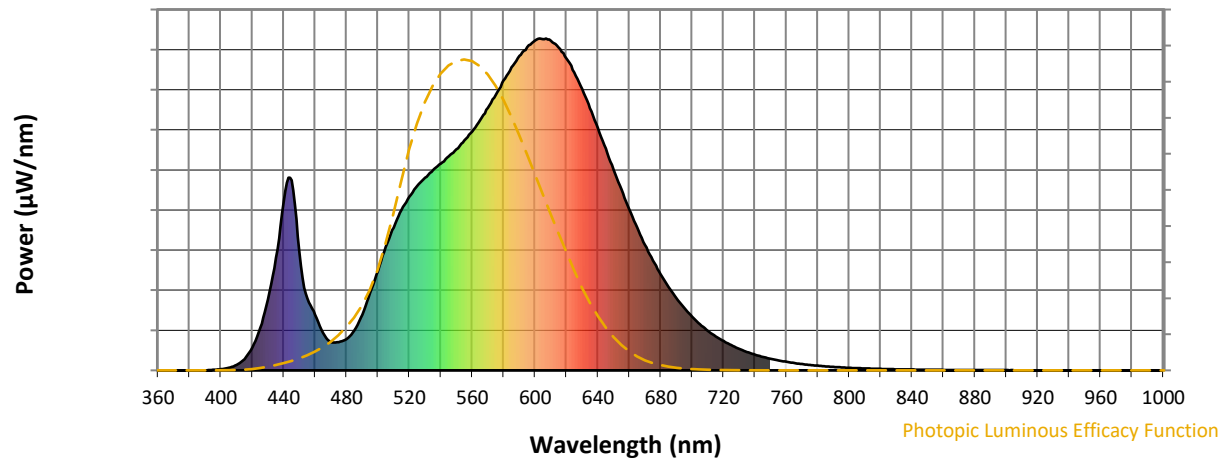
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

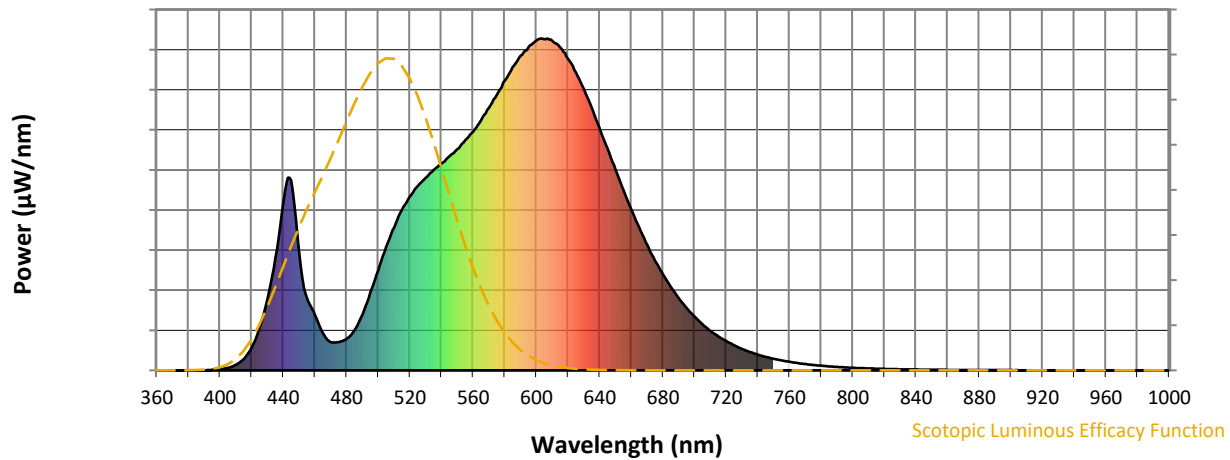


### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|
| 360               | 0                                      | NR                             | 490               | 168                                    | NR                             | 620               | 940                                    | NR                             | 750               | 35                                     | NR                             | 880               | 1                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 233                                    | NR                             | 625               | 897                                    | NR                             | 755               | 30                                     | NR                             | 885               | 1                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 300                                    | NR                             | 630               | 847                                    | NR                             | 760               | 26                                     | NR                             | 890               | 1                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 372                                    | NR                             | 635               | 790                                    | NR                             | 765               | 22                                     | NR                             | 895               | 1                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 430                                    | NR                             | 640               | 730                                    | NR                             | 770               | 19                                     | NR                             | 900               | 1                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 483                                    | NR                             | 645               | 668                                    | NR                             | 775               | 16                                     | NR                             | 905               | 1                                      | NR                             |
| 390               | 0                                      | NR                             | 520               | 524                                    | NR                             | 650               | 605                                    | NR                             | 780               | 14                                     | NR                             | 910               | 0                                      | NR                             |
| 395               | 2                                      | NR                             | 525               | 555                                    | NR                             | 655               | 545                                    | NR                             | 785               | 12                                     | NR                             | 915               | 0                                      | NR                             |
| 400               | 4                                      | NR                             | 530               | 581                                    | NR                             | 660               | 485                                    | NR                             | 790               | 10                                     | NR                             | 920               | 0                                      | NR                             |
| 405               | 7                                      | NR                             | 535               | 604                                    | NR                             | 665               | 430                                    | NR                             | 795               | 9                                      | NR                             | 925               | 0                                      | NR                             |
| 410               | 17                                     | NR                             | 540               | 623                                    | NR                             | 670               | 378                                    | NR                             | 800               | 8                                      | NR                             | 930               | 0                                      | NR                             |
| 415               | 34                                     | NR                             | 545               | 645                                    | NR                             | 675               | 331                                    | NR                             | 805               | 7                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 68                                     | NR                             | 550               | 667                                    | NR                             | 680               | 290                                    | NR                             | 810               | 6                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 128                                    | NR                             | 555               | 693                                    | NR                             | 685               | 251                                    | NR                             | 815               | 5                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 214                                    | NR                             | 560               | 719                                    | NR                             | 690               | 218                                    | NR                             | 820               | 4                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 339                                    | NR                             | 565               | 754                                    | NR                             | 695               | 188                                    | NR                             | 825               | 4                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 507                                    | NR                             | 570               | 791                                    | NR                             | 700               | 162                                    | NR                             | 830               | 3                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 573                                    | NR                             | 575               | 830                                    | NR                             | 705               | 139                                    | NR                             | 835               | 3                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 356                                    | NR                             | 580               | 873                                    | NR                             | 710               | 119                                    | NR                             | 840               | 3                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 217                                    | NR                             | 585               | 913                                    | NR                             | 715               | 102                                    | NR                             | 845               | 2                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 168                                    | NR                             | 590               | 948                                    | NR                             | 720               | 88                                     | NR                             | 850               | 2                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 113                                    | NR                             | 595               | 974                                    | NR                             | 725               | 76                                     | NR                             | 855               | 2                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 85                                     | NR                             | 600               | 994                                    | NR                             | 730               | 65                                     | NR                             | 860               | 1                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 85                                     | NR                             | 605               | 998                                    | NR                             | 735               | 55                                     | NR                             | 865               | 1                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 94                                     | NR                             | 610               | 994                                    | NR                             | 740               | 47                                     | NR                             | 870               | 1                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 120                                    | NR                             | 615               | 973                                    | NR                             | 745               | 41                                     | NR                             | 875               | 1                                      | NR                             |                   |                                        |                                |

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### Scotopic Flux vs. Wavelength



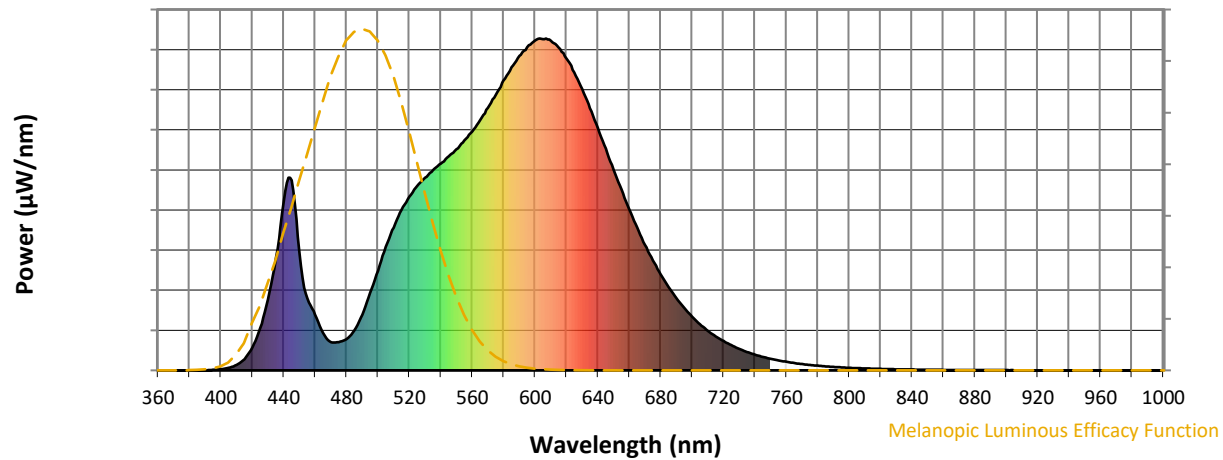
Scotopic Lumens: NR

S/P: 1.27

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 940                      | NR            | 750    | 35                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 233                      | NR            | 625    | 897                      | NR            | 755    | 30                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 300                      | NR            | 630    | 847                      | NR            | 760    | 26                       | NR            | 890    | 1                        | NR            |
| 375    | 0                        | NR            | 505    | 372                      | NR            | 635    | 790                      | NR            | 765    | 22                       | NR            | 895    | 1                        | NR            |
| 380    | 0                        | NR            | 510    | 430                      | NR            | 640    | 730                      | NR            | 770    | 19                       | NR            | 900    | 1                        | NR            |
| 385    | 0                        | NR            | 515    | 483                      | NR            | 645    | 668                      | NR            | 775    | 16                       | NR            | 905    | 1                        | NR            |
| 390    | 0                        | NR            | 520    | 524                      | NR            | 650    | 605                      | NR            | 780    | 14                       | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 555                      | NR            | 655    | 545                      | NR            | 785    | 12                       | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 581                      | NR            | 660    | 485                      | NR            | 790    | 10                       | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 604                      | NR            | 665    | 430                      | NR            | 795    | 9                        | NR            | 925    | 0                        | NR            |
| 410    | 17                       | NR            | 540    | 623                      | NR            | 670    | 378                      | NR            | 800    | 8                        | NR            | 930    | 0                        | NR            |
| 415    | 34                       | NR            | 545    | 645                      | NR            | 675    | 331                      | NR            | 805    | 7                        | NR            | 935    | 0                        | NR            |
| 420    | 68                       | NR            | 550    | 667                      | NR            | 680    | 290                      | NR            | 810    | 6                        | NR            | 940    | 0                        | NR            |
| 425    | 128                      | NR            | 555    | 693                      | NR            | 685    | 251                      | NR            | 815    | 5                        | NR            | 945    | 0                        | NR            |
| 430    | 214                      | NR            | 560    | 719                      | NR            | 690    | 218                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 339                      | NR            | 565    | 754                      | NR            | 695    | 188                      | NR            | 825    | 4                        | NR            | 955    | 0                        | NR            |
| 440    | 507                      | NR            | 570    | 791                      | NR            | 700    | 162                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 573                      | NR            | 575    | 830                      | NR            | 705    | 139                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 356                      | NR            | 580    | 873                      | NR            | 710    | 119                      | NR            | 840    | 3                        | NR            | 970    | 0                        | NR            |
| 455    | 217                      | NR            | 585    | 913                      | NR            | 715    | 102                      | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 168                      | NR            | 590    | 948                      | NR            | 720    | 88                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 113                      | NR            | 595    | 974                      | NR            | 725    | 76                       | NR            | 855    | 2                        | NR            | 985    | 0                        | NR            |
| 470    | 85                       | NR            | 600    | 994                      | NR            | 730    | 65                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 998                      | NR            | 735    | 55                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 94                       | NR            | 610    | 994                      | NR            | 740    | 47                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 120                      | NR            | 615    | 973                      | NR            | 745    | 41                       | NR            | 875    | 1                        | NR            |        |                          |               |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: NR**
**M/P: 2.32**

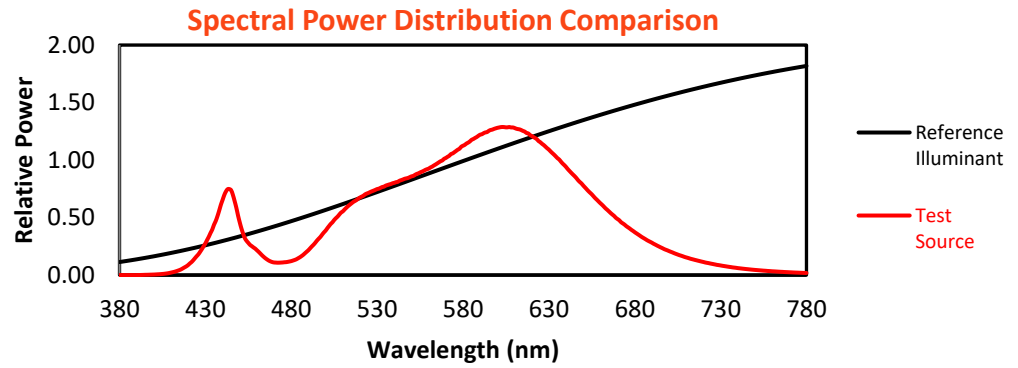
| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | NR                             | 490               | 168                                  | NR                             | 620               | 940                                  | NR                             | 750               | 35                                   | NR                             | 880               | 1                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 233                                  | NR                             | 625               | 897                                  | NR                             | 755               | 30                                   | NR                             | 885               | 1                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 300                                  | NR                             | 630               | 847                                  | NR                             | 760               | 26                                   | NR                             | 890               | 1                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 372                                  | NR                             | 635               | 790                                  | NR                             | 765               | 22                                   | NR                             | 895               | 1                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 430                                  | NR                             | 640               | 730                                  | NR                             | 770               | 19                                   | NR                             | 900               | 1                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 483                                  | NR                             | 645               | 668                                  | NR                             | 775               | 16                                   | NR                             | 905               | 1                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 524                                  | NR                             | 650               | 605                                  | NR                             | 780               | 14                                   | NR                             | 910               | 0                                    | NR                             |
| 395               | 2                                    | NR                             | 525               | 555                                  | NR                             | 655               | 545                                  | NR                             | 785               | 12                                   | NR                             | 915               | 0                                    | NR                             |
| 400               | 4                                    | NR                             | 530               | 581                                  | NR                             | 660               | 485                                  | NR                             | 790               | 10                                   | NR                             | 920               | 0                                    | NR                             |
| 405               | 7                                    | NR                             | 535               | 604                                  | NR                             | 665               | 430                                  | NR                             | 795               | 9                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 17                                   | NR                             | 540               | 623                                  | NR                             | 670               | 378                                  | NR                             | 800               | 8                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 34                                   | NR                             | 545               | 645                                  | NR                             | 675               | 331                                  | NR                             | 805               | 7                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 68                                   | NR                             | 550               | 667                                  | NR                             | 680               | 290                                  | NR                             | 810               | 6                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 128                                  | NR                             | 555               | 693                                  | NR                             | 685               | 251                                  | NR                             | 815               | 5                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 214                                  | NR                             | 560               | 719                                  | NR                             | 690               | 218                                  | NR                             | 820               | 4                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 339                                  | NR                             | 565               | 754                                  | NR                             | 695               | 188                                  | NR                             | 825               | 4                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 507                                  | NR                             | 570               | 791                                  | NR                             | 700               | 162                                  | NR                             | 830               | 3                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 573                                  | NR                             | 575               | 830                                  | NR                             | 705               | 139                                  | NR                             | 835               | 3                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 356                                  | NR                             | 580               | 873                                  | NR                             | 710               | 119                                  | NR                             | 840               | 3                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 217                                  | NR                             | 585               | 913                                  | NR                             | 715               | 102                                  | NR                             | 845               | 2                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 168                                  | NR                             | 590               | 948                                  | NR                             | 720               | 88                                   | NR                             | 850               | 2                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 113                                  | NR                             | 595               | 974                                  | NR                             | 725               | 76                                   | NR                             | 855               | 2                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 85                                   | NR                             | 600               | 994                                  | NR                             | 730               | 65                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 85                                   | NR                             | 605               | 998                                  | NR                             | 735               | 55                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 94                                   | NR                             | 610               | 994                                  | NR                             | 740               | 47                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 120                                  | NR                             | 615               | 973                                  | NR                             | 745               | 41                                   | NR                             | 875               | 1                                    | NR                             |                   |                                      |                                |

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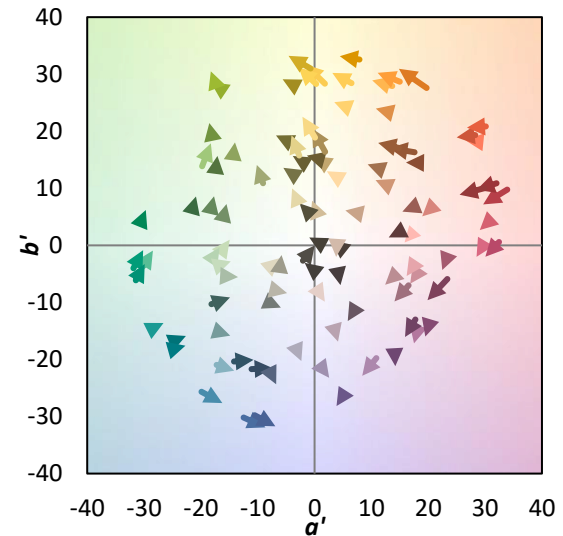
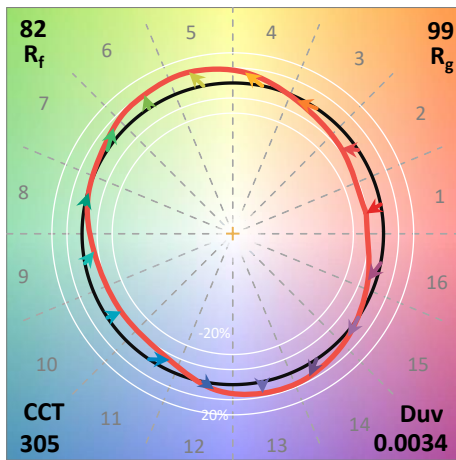
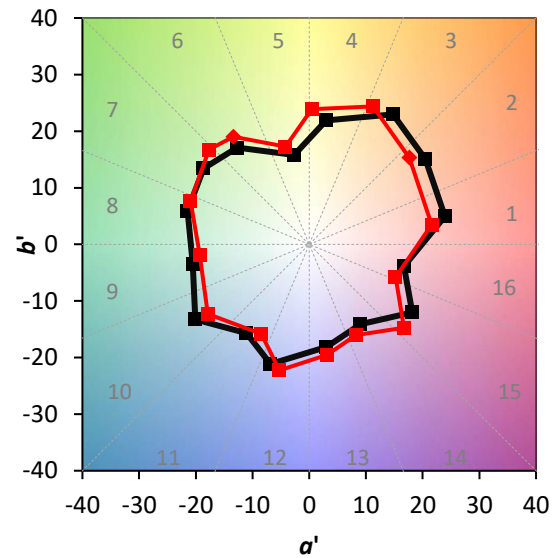
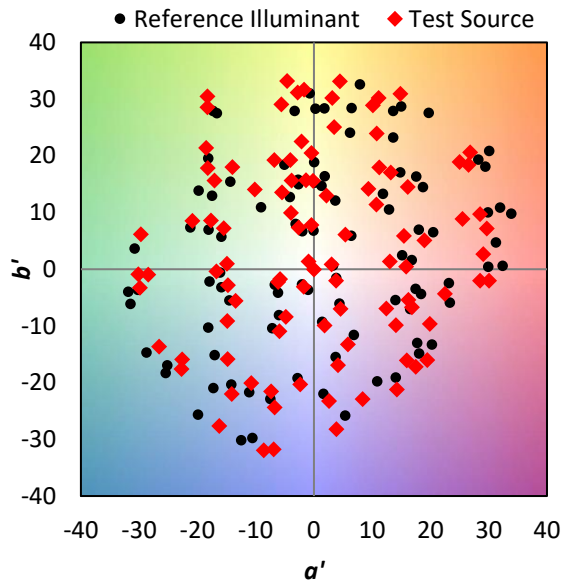
TM-30-18

### Summary

$R_f = 81.5$   
 $R_g = 99.2$   
 $CIE R_a = 81.0$   
 $R_9 = 7.1$



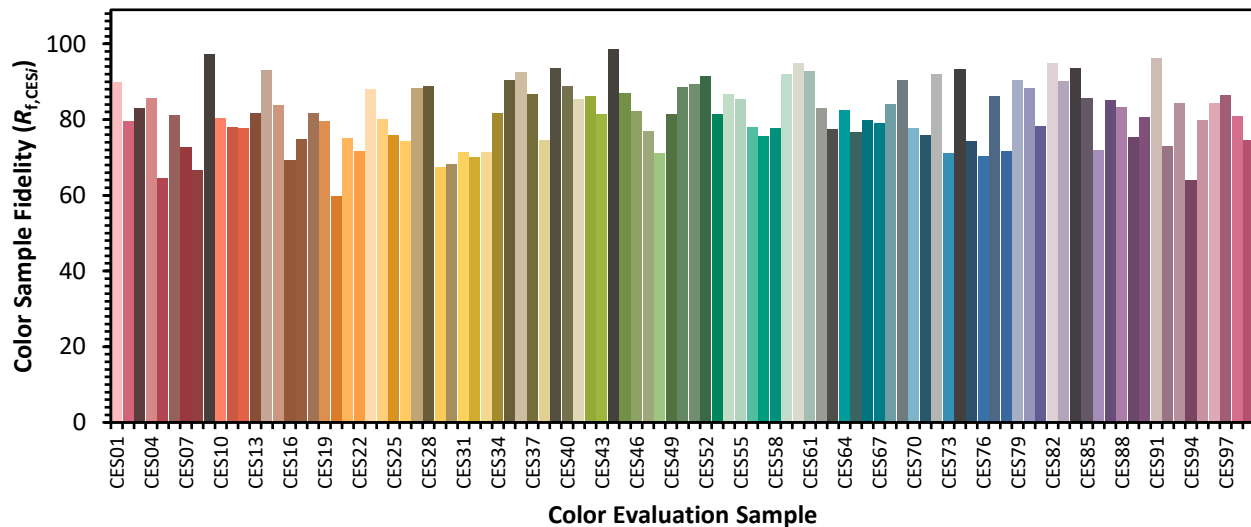
### Color Vector Graphics



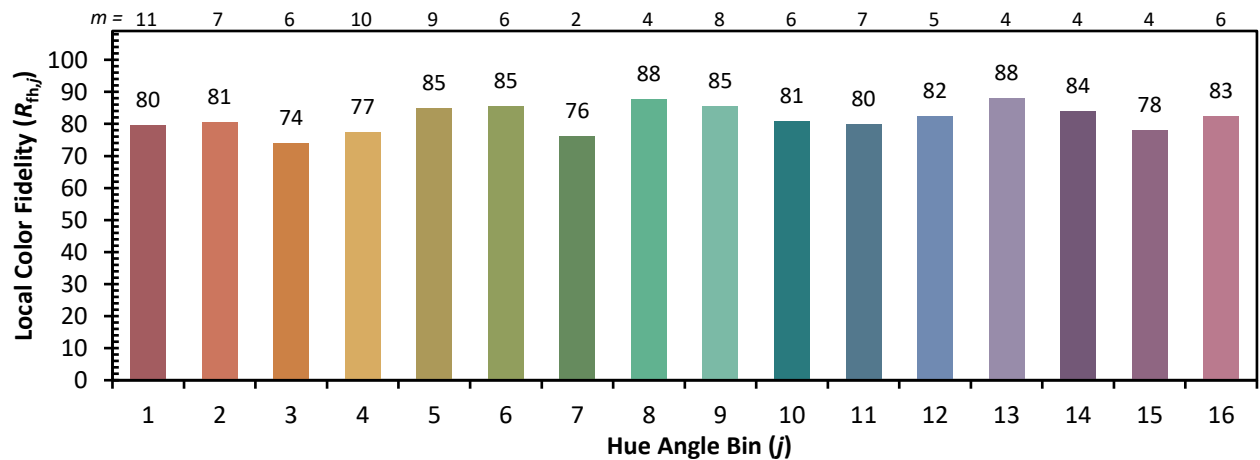
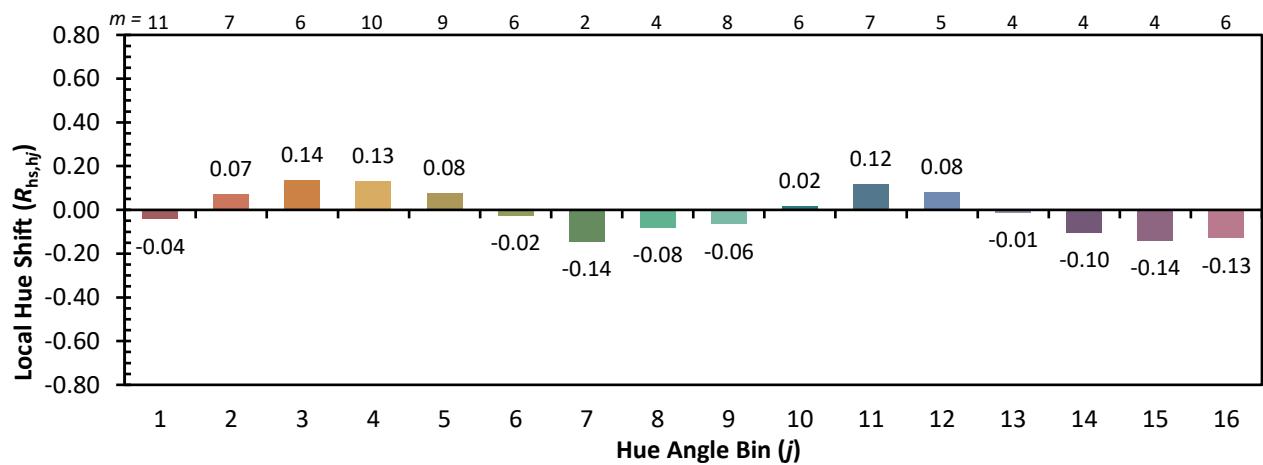
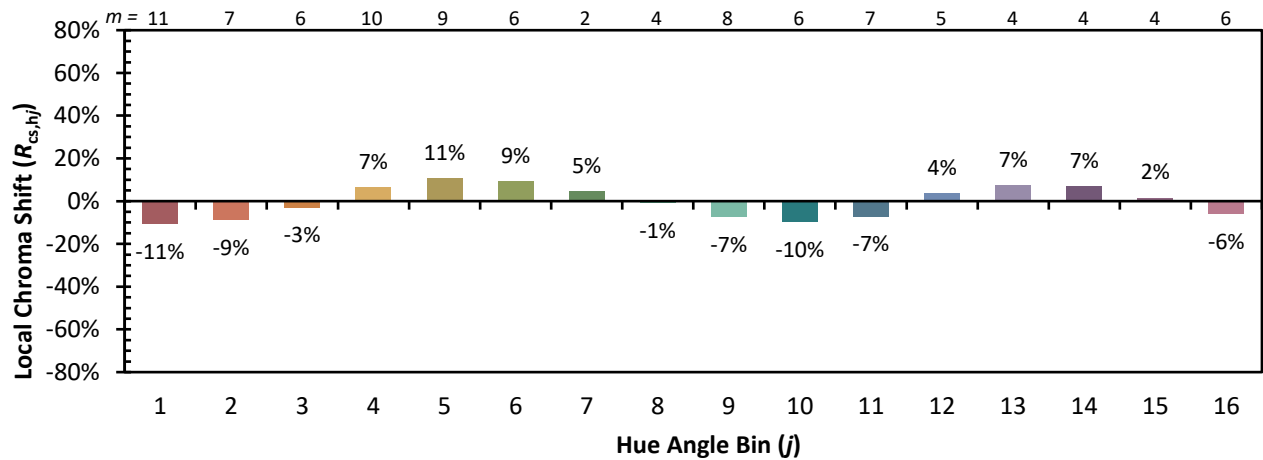


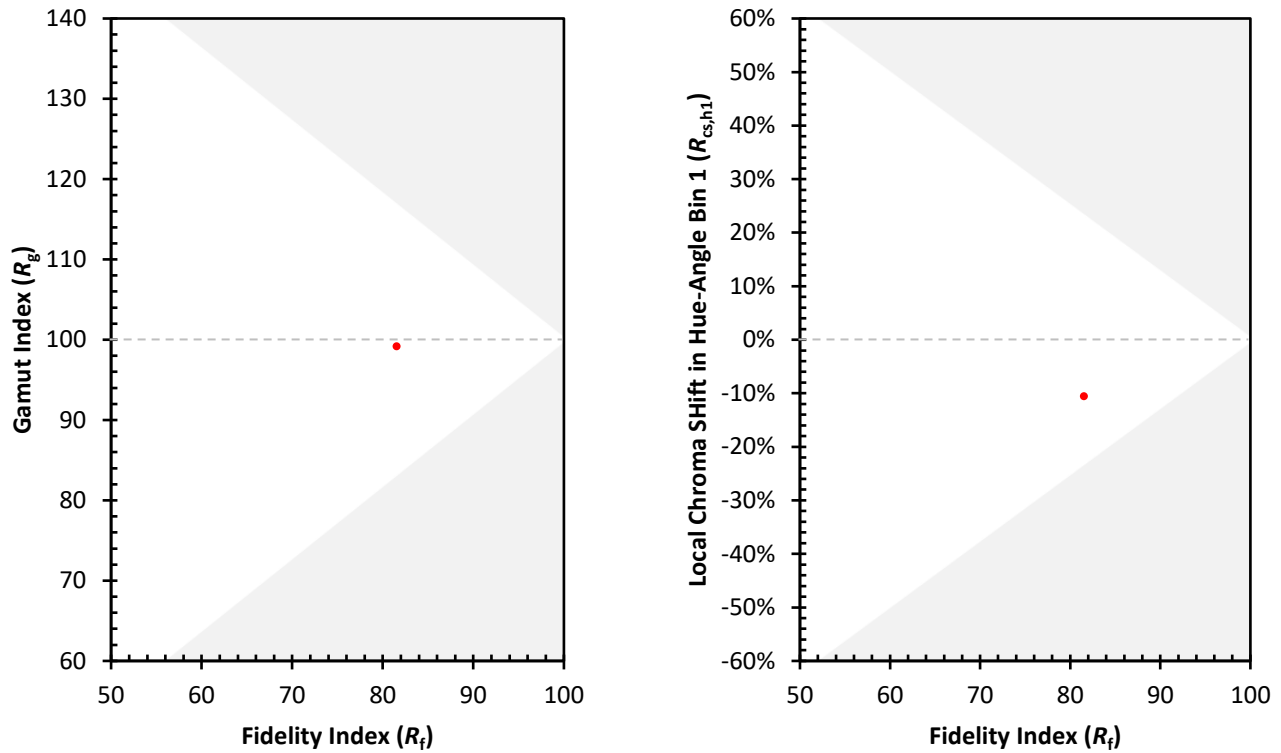
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**


(END OF REPORT)