

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



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

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: INVUE

Report Number: P822767

Luminaire Tested: **MSA-SA1C-840-U-T2-HSS**

Issue Date: 04/10/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P822767  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1910-543-9)  
Test Lab: INNOVATION CENTER  
Issue Date: 04/10/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: MSA-SA1C-840-U-T2-HSS  
Description: MESA POST TOP DECORATIVE LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS  
EACH AND TYPE II OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3977.5 lumens  
Efficiency: N/A  
Efficacy: 67.4 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type II - Medium  
BUG Rating: B0 - U0 - G1

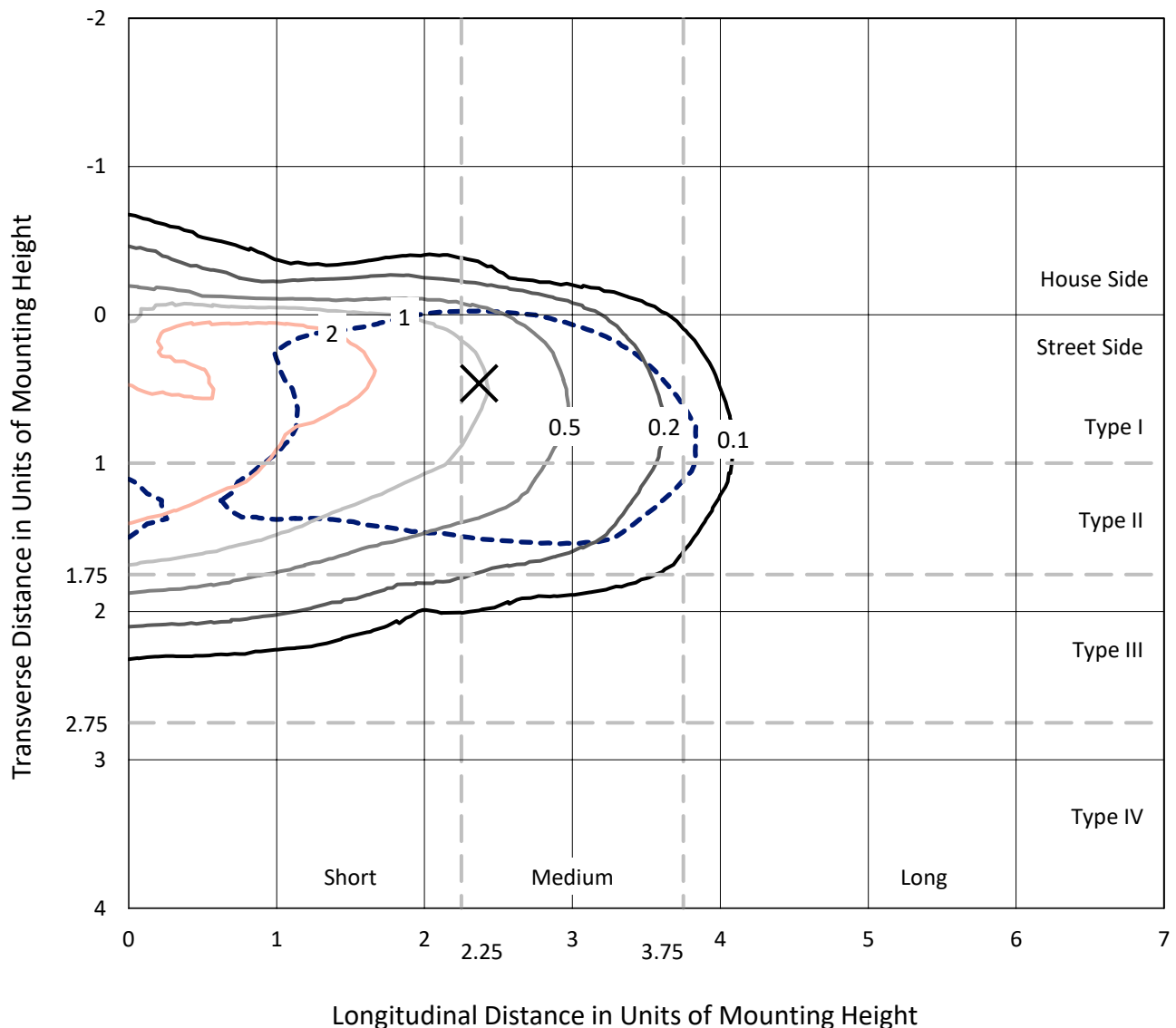
Input Watts (W): 59  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

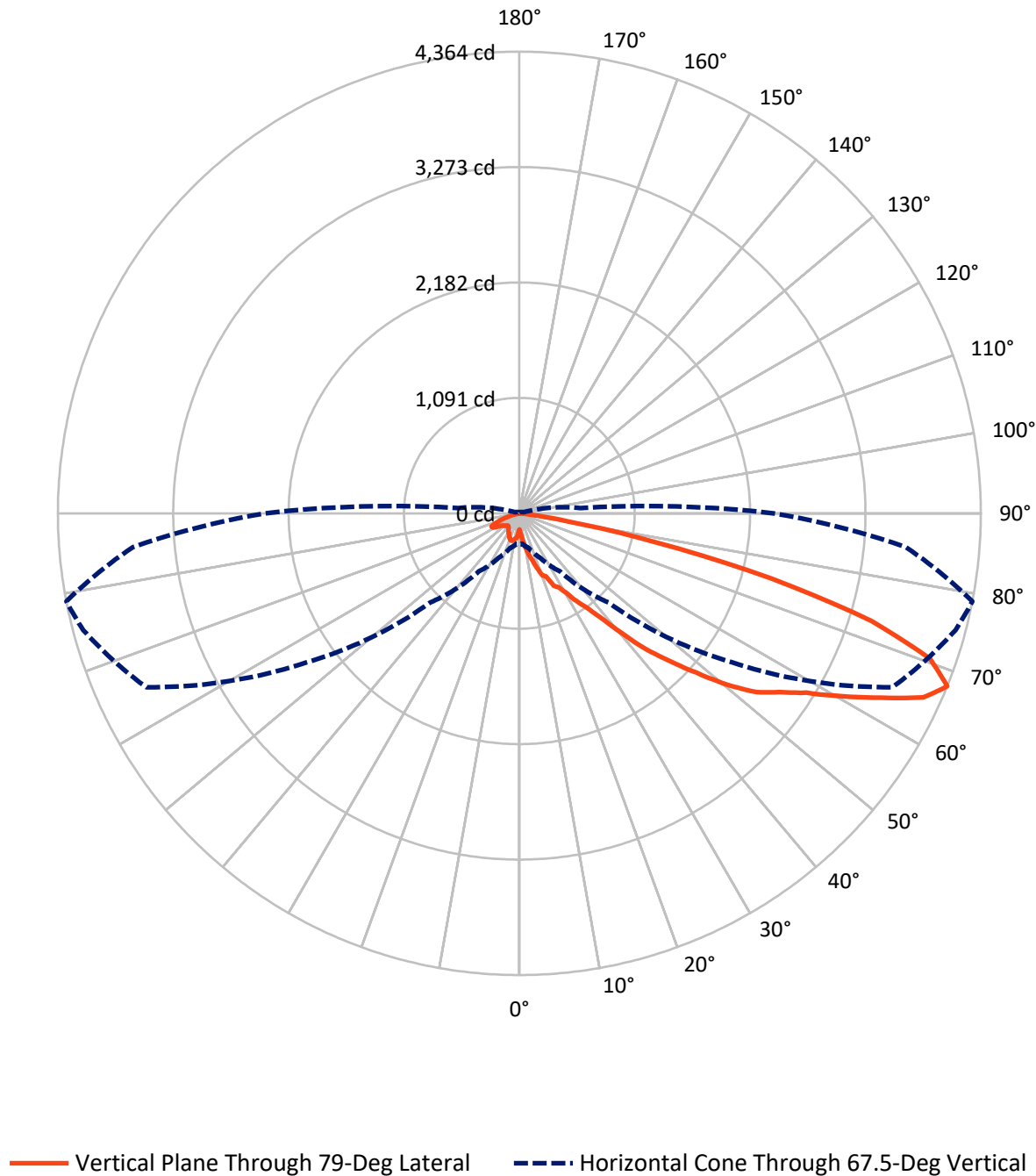
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 3.3 fc  
 Type II - Medium - N/A

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## Luminous Intensity Polar Plot



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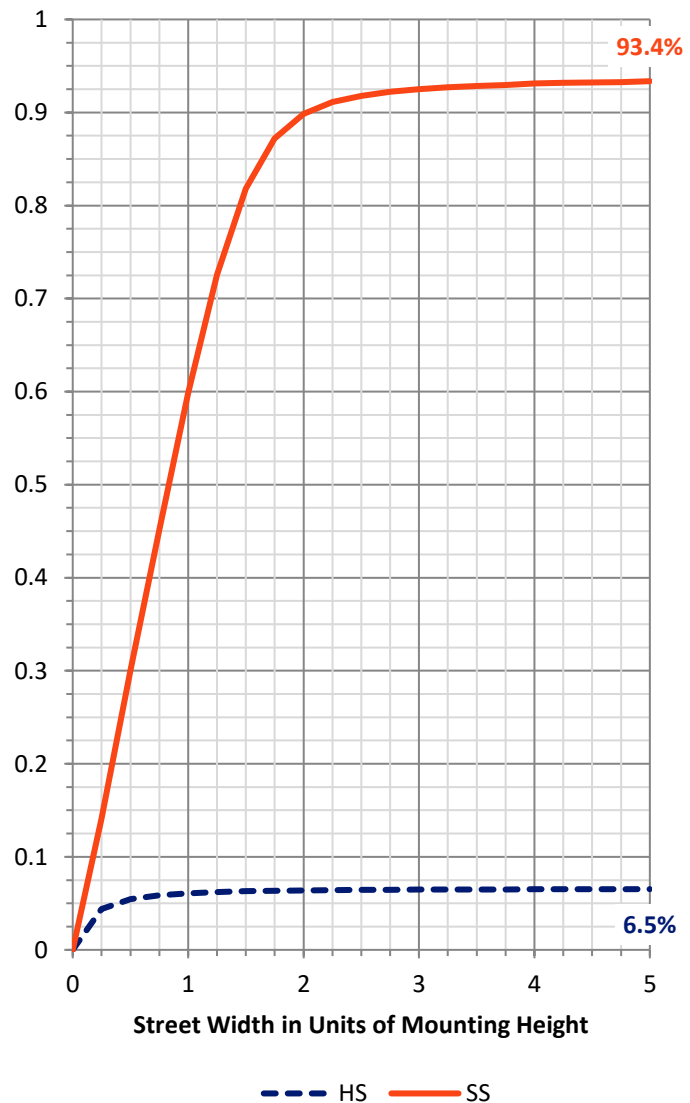
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 261.3    | 0.0    | 261.3  |
|                    | % Fixture | 6.6      | 0.0    | 6.6    |
| <b>Street Side</b> | Lumens    | 3716.1   | 0.0    | 3716.1 |
|                    | % Fixture | 93.4     | 0.0    | 93.4   |
| <b>Total</b>       | Lumens    | 3977.5   | 0.0    | 3977.5 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 22.3   | 0.6       |
| 10°-20°   | 88.9   | 2.2       |
| 20°-30°   | 171.5  | 4.3       |
| 30°-40°   | 336.8  | 8.5       |
| 40°-50°   | 674.7  | 17.0      |
| 50°-60°   | 1078.4 | 27.1      |
| 60°-70°   | 1085.1 | 27.3      |
| 70°-80°   | 489.5  | 12.3      |
| 80°-90°   | 30.3   | 0.8       |
| 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°    | 3977.5 | 100.0     |
| 0°-180°   | 3977.5 | 100.0     |



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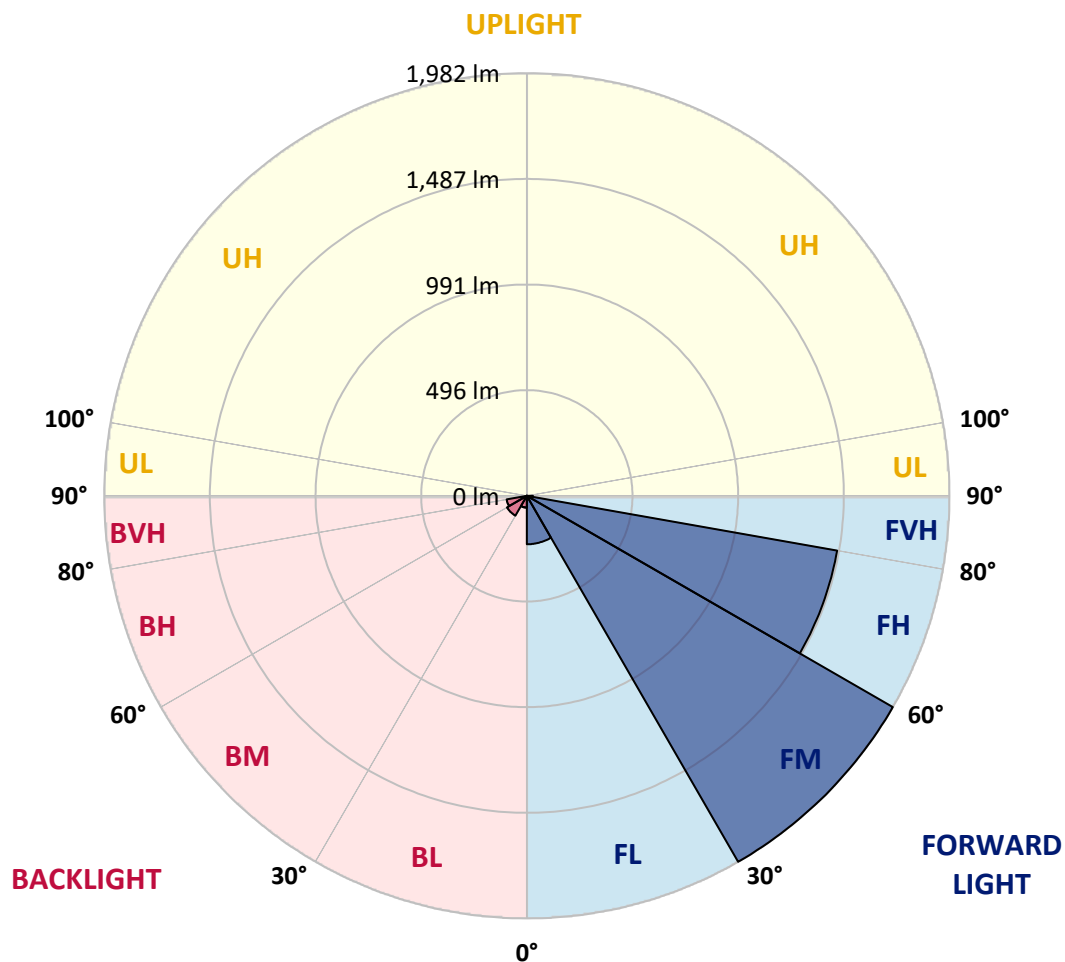
CATALOG NUMBER: MSA-SA1C-840-U-T2-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 227.1  | 5.7       |                         |      |         |
| FM   | (30°-60°)   | 1982.4 | 49.8      |                         |      |         |
| FH   | (60°-80°)   | 1478.3 | 37.2      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 28.4   | 0.7       |                         |      | G1/100  |
| BL   | (0°-30°)    | 55.6   | 1.4       | B0/110                  |      |         |
| BM   | (30°-60°)   | 107.5  | 2.7       | B0/220                  |      |         |
| BH   | (60°-80°)   | 96.3   | 2.4       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 1.9    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B0-U0-G1**

Type II Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 79°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 153.3  | 153.3  | 153.3  | 153.3  | 153.3  | 153.3  | 153.3  | 153.3  | 153.3  | 153.3  | 153.3  |
| 2.5°  | 206.9  | 199.5  | 187.4  | 194.2  | 193.8  | 197.4  | 190.7  | 183.5  | 171.9  | 183.5  | 184.4  |
| 5°    | 297.9  | 284.1  | 275.4  | 273.6  | 264.0  | 255.0  | 253.0  | 245.5  | 239.9  | 229.6  | 238.7  |
| 7.5°  | 371.2  | 364.9  | 349.3  | 347.5  | 323.8  | 310.7  | 314.8  | 311.6  | 289.9  | 279.1  | 288.1  |
| 10°   | 402.4  | 391.4  | 393.5  | 391.4  | 381.3  | 385.0  | 376.5  | 366.6  | 349.3  | 331.5  | 309.1  |
| 12.5° | 414.4  | 412.6  | 430.9  | 428.7  | 452.3  | 480.8  | 461.7  | 445.3  | 405.2  | 400.8  | 370.3  |
| 15°   | 440.3  | 451.2  | 448.6  | 457.8  | 472.9  | 521.4  | 520.9  | 524.9  | 482.3  | 459.6  | 415.5  |
| 17.5° | 463.3  | 471.4  | 458.3  | 468.8  | 510.0  | 539.4  | 578.6  | 563.2  | 568.1  | 544.8  | 476.7  |
| 20°   | 453.4  | 462.7  | 449.5  | 443.2  | 515.7  | 571.4  | 623.8  | 612.6  | 641.5  | 627.1  | 533.0  |
| 22.5° | 515.1  | 497.7  | 464.6  | 444.0  | 498.1  | 570.7  | 639.8  | 686.5  | 681.5  | 645.9  | 585.4  |
| 25°   | 591.2  | 580.6  | 541.0  | 504.5  | 509.3  | 566.8  | 690.2  | 758.8  | 773.8  | 758.7  | 635.2  |
| 27.5° | 693.7  | 691.3  | 610.2  | 594.4  | 547.5  | 549.4  | 698.1  | 850.1  | 816.1  | 792.4  | 693.3  |
| 30°   | 827.7  | 808.6  | 712.4  | 691.7  | 622.4  | 588.5  | 746.4  | 928.8  | 903.8  | 871.6  | 747.9  |
| 32.5° | 971.7  | 974.6  | 851.8  | 783.9  | 728.1  | 687.9  | 727.3  | 965.6  | 1012.3 | 986.2  | 816.1  |
| 35°   | 1135.3 | 1148.0 | 997.8  | 918.0  | 809.7  | 750.3  | 809.3  | 1078.8 | 1162.5 | 1093.8 | 907.5  |
| 37.5° | 1387.2 | 1386.8 | 1211.4 | 1052.5 | 973.8  | 909.3  | 945.8  | 1181.5 | 1347.1 | 1250.7 | 1071.6 |
| 40°   | 1608.9 | 1560.7 | 1397.6 | 1214.9 | 1092.2 | 1074.6 | 1048.1 | 1322.3 | 1544.2 | 1486.1 | 1217.3 |
| 42.5° | 1774.5 | 1740.5 | 1543.4 | 1401.3 | 1249.2 | 1193.4 | 1184.0 | 1528.7 | 1835.2 | 1753.9 | 1425.4 |
| 45°   | 1972.4 | 1861.1 | 1715.9 | 1587.9 | 1432.9 | 1416.7 | 1394.5 | 1738.1 | 2173.7 | 1990.4 | 1606.3 |
| 47.5° | 2149.8 | 2045.0 | 1907.7 | 1743.4 | 1565.3 | 1699.0 | 1613.9 | 1922.0 | 2419.9 | 2247.8 | 1805.8 |
| 50°   | 2299.1 | 2187.8 | 2034.1 | 1908.8 | 1832.6 | 1923.3 | 1781.4 | 2073.5 | 2685.9 | 2546.5 | 1992.4 |
| 52.5° | 2375.2 | 2249.2 | 2130.3 | 2052.9 | 2099.6 | 2079.2 | 2008.7 | 2257.1 | 2912.6 | 2808.3 | 2157.7 |
| 55°   | 2312.7 | 2189.5 | 2139.8 | 2178.1 | 2320.0 | 2261.0 | 2266.7 | 2541.5 | 3126.6 | 2982.8 | 2301.5 |
| 57.5° | 2035.6 | 1923.1 | 1945.3 | 2050.3 | 2322.1 | 2476.5 | 2561.0 | 2817.7 | 3298.3 | 3200.3 | 2523.5 |
| 60°   | 1539.9 | 1449.3 | 1531.3 | 1717.7 | 2103.8 | 2433.6 | 2769.7 | 3093.9 | 3543.6 | 3512.9 | 2859.3 |
| 62.5° | 940.4  | 891.3  | 1007.5 | 1239.9 | 1676.4 | 2222.8 | 2891.4 | 3462.3 | 3806.1 | 3838.8 | 3215.7 |
| 65°   | 479.7  | 457.6  | 554.5  | 758.8  | 1132.7 | 1826.0 | 2803.5 | 3691.2 | 4077.4 | 4197.9 | 3555.2 |
| 67.5° | 302.1  | 287.9  | 339.6  | 462.8  | 668.3  | 1191.1 | 2454.6 | 3891.4 | 4269.0 | 4364.4 | 3668.6 |
| 70°   | 209.4  | 200.4  | 245.1  | 317.7  | 421.6  | 641.5  | 1822.5 | 3704.6 | 4117.0 | 4121.4 | 3394.4 |
| 72.5° | 132.9  | 125.9  | 169.5  | 235.3  | 311.1  | 331.3  | 1044.7 | 2906.9 | 3524.1 | 3483.6 | 2748.8 |
| 75°   | 86.2   | 82.7   | 107.6  | 172.3  | 239.0  | 204.3  | 516.3  | 1961.5 | 2527.0 | 2463.3 | 1825.8 |
| 77.5° | 61.8   | 59.6   | 72.1   | 115.1  | 170.1  | 143.0  | 231.5  | 1169.1 | 1448.9 | 1309.9 | 886.2  |
| 80°   | 37.3   | 37.1   | 52.2   | 72.1   | 121.0  | 100.8  | 107.0  | 530.9  | 561.7  | 458.0  | 270.8  |
| 82.5° | 18.7   | 19.3   | 29.2   | 46.5   | 77.9   | 66.0   | 48.9   | 176.8  | 150.9  | 111.2  | 54.8   |
| 85°   | 4.4    | 5.5    | 15.4   | 32.0   | 39.0   | 26.3   | 23.2   | 46.2   | 41.5   | 31.4   | 16.0   |
| 87.5° | 0.0    | 0.0    | 4.8    | 7.7    | 10.5   | 4.4    | 7.9    | 8.7    | 11.2   | 8.7    | 3.3    |
| 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: MSA-SA1C-840-U-T2-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 153.3  | 153.3 | 153.3 | 153.3 | 153.3 | 153.3 | 153.3 | 153.3 | 153.3 | 153.3 | 153.3 |
| 2.5°  | 184.6  | 182.0 | 166.0 | 161.8 | 161.4 | 156.7 | 157.8 | 153.5 | 153.7 | 163.6 | 163.6 |
| 5°    | 235.3  | 219.9 | 204.6 | 191.0 | 181.8 | 168.6 | 163.8 | 161.8 | 160.0 | 164.0 | 166.4 |
| 7.5°  | 276.2  | 253.7 | 226.0 | 196.4 | 169.0 | 150.2 | 147.6 | 142.7 | 141.0 | 145.0 | 148.0 |
| 10°   | 294.5  | 266.4 | 228.5 | 185.3 | 159.6 | 144.3 | 131.5 | 124.8 | 123.4 | 123.2 | 124.3 |
| 12.5° | 333.1  | 298.2 | 231.1 | 181.1 | 153.3 | 136.4 | 121.9 | 110.5 | 100.0 | 101.1 | 100.0 |
| 15°   | 363.9  | 322.7 | 231.1 | 171.0 | 137.9 | 121.0 | 95.6  | 89.9  | 88.4  | 90.7  | 88.8  |
| 17.5° | 410.7  | 347.1 | 219.5 | 153.0 | 124.8 | 94.1  | 84.4  | 84.0  | 87.0  | 90.6  | 88.4  |
| 20°   | 438.7  | 350.4 | 200.0 | 132.4 | 102.4 | 81.6  | 78.0  | 74.6  | 79.0  | 81.8  | 80.7  |
| 22.5° | 467.9  | 350.6 | 180.5 | 121.5 | 82.4  | 74.3  | 68.6  | 65.8  | 66.4  | 69.0  | 69.5  |
| 25°   | 480.4  | 342.1 | 162.2 | 107.0 | 74.8  | 66.4  | 60.5  | 57.4  | 56.3  | 57.7  | 57.3  |
| 27.5° | 514.4  | 325.6 | 142.5 | 91.2  | 71.1  | 58.9  | 53.5  | 49.8  | 46.5  | 48.7  | 49.1  |
| 30°   | 519.2  | 320.3 | 131.8 | 81.1  | 66.2  | 52.2  | 47.3  | 43.4  | 41.0  | 44.1  | 44.1  |
| 32.5° | 534.6  | 291.4 | 126.3 | 76.9  | 61.1  | 48.3  | 41.6  | 38.8  | 38.3  | 40.4  | 40.5  |
| 35°   | 558.3  | 278.7 | 118.1 | 73.7  | 56.6  | 43.6  | 37.5  | 36.2  | 35.7  | 37.3  | 37.3  |
| 37.5° | 638.5  | 262.9 | 109.1 | 70.8  | 52.6  | 41.2  | 36.4  | 34.2  | 34.4  | 35.7  | 36.6  |
| 40°   | 691.7  | 264.9 | 95.8  | 67.3  | 48.0  | 39.0  | 34.2  | 32.7  | 32.5  | 33.1  | 33.8  |
| 42.5° | 790.6  | 266.4 | 89.9  | 63.6  | 44.5  | 36.4  | 32.0  | 30.9  | 30.0  | 30.7  | 31.4  |
| 45°   | 901.2  | 274.5 | 86.9  | 60.5  | 42.5  | 34.9  | 30.0  | 29.3  | 27.4  | 27.8  | 28.8  |
| 47.5° | 1007.7 | 304.2 | 83.1  | 56.2  | 40.8  | 34.0  | 28.1  | 26.5  | 25.2  | 25.0  | 25.9  |
| 50°   | 1128.7 | 332.8 | 79.0  | 51.3  | 39.0  | 32.7  | 26.1  | 23.7  | 22.8  | 22.8  | 23.5  |
| 52.5° | 1237.0 | 360.2 | 75.0  | 48.0  | 37.7  | 30.3  | 24.3  | 21.9  | 21.3  | 21.3  | 22.1  |
| 55°   | 1351.1 | 389.0 | 71.5  | 45.0  | 36.0  | 27.8  | 22.8  | 20.6  | 20.3  | 19.9  | 20.6  |
| 57.5° | 1552.4 | 451.6 | 67.1  | 42.3  | 33.6  | 25.9  | 21.5  | 19.3  | 18.8  | 18.2  | 18.8  |
| 60°   | 1845.5 | 547.9 | 61.4  | 39.7  | 30.7  | 24.6  | 20.3  | 17.7  | 17.1  | 16.0  | 16.2  |
| 62.5° | 2132.1 | 625.8 | 54.8  | 36.4  | 28.1  | 23.2  | 18.7  | 16.0  | 14.9  | 13.6  | 13.8  |
| 65°   | 2377.6 | 656.5 | 47.8  | 32.5  | 25.4  | 20.2  | 16.2  | 14.0  | 12.5  | 10.8  | 10.5  |
| 67.5° | 2406.6 | 579.7 | 41.0  | 28.8  | 22.8  | 17.1  | 13.8  | 12.5  | 10.1  | 8.6   | 8.1   |
| 70°   | 2165.8 | 432.0 | 34.2  | 25.4  | 19.8  | 14.5  | 11.9  | 10.9  | 9.4   | 8.1   | 7.5   |
| 72.5° | 1724.7 | 318.8 | 28.8  | 22.6  | 17.3  | 12.3  | 10.1  | 10.3  | 9.4   | 7.9   | 7.0   |
| 75°   | 1140.6 | 182.4 | 23.5  | 18.8  | 14.5  | 9.8   | 9.2   | 9.2   | 9.0   | 7.5   | 6.6   |
| 77.5° | 548.8  | 78.7  | 18.0  | 14.9  | 11.6  | 7.5   | 8.3   | 8.3   | 8.6   | 6.8   | 5.5   |
| 80°   | 155.7  | 23.7  | 11.2  | 10.1  | 8.6   | 5.0   | 6.6   | 6.4   | 5.7   | 4.0   | 2.4   |
| 82.5° | 27.8   | 9.2   | 5.0   | 5.3   | 4.8   | 1.9   | 3.7   | 3.5   | 2.9   | 1.5   | 0.3   |
| 85°   | 7.7    | 3.5   | 2.9   | 3.1   | 2.4   | 0.7   | 1.5   | 1.9   | 1.5   | 0.8   | 0.0   |
| 87.5° | 1.9    | 1.5   | 1.9   | 2.2   | 1.8   | 0.3   | 0.7   | 0.3   | 0.7   | 0.3   | 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: SP1-2309-178-2

Test Date: 09/22/2023

Luminaire Tested: GALN-SA2A-840-U-T4W

Data in this report applies to families of products including GALN-SA2A-840-U-T4W.

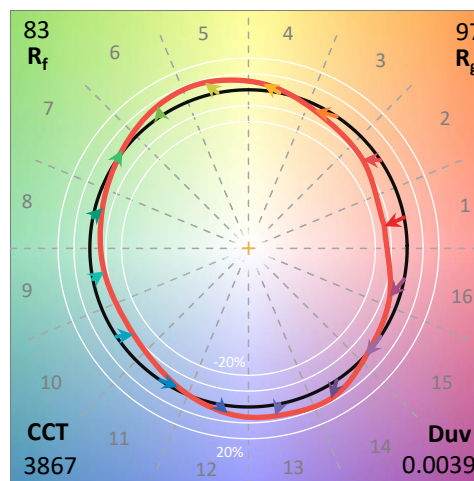
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2309-178-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 09/22/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **GALN-SA2A-840-U-T4W**  
 Description: GALLEON 2 AREA AND ROADWAY LUMINAIRE. (2) 80 CRI, 4000K, 615MA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS

LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3867   | CRI (Ra): | 79.8 |      |      |
| CIE u':                   | 0.2254 | R1:       | 76.6 | R9:  | -8.6 |
| CIE v':                   | 0.5090 | R2:       | 84.7 | R10: | 66.3 |
| Duv:                      | 0.0039 | R3:       | 93.7 | R11: | 80.5 |
| CIE x:                    | 0.3895 | R4:       | 80.6 | R12: | 67.3 |
| CIE y:                    | 0.3908 | R5:       | 77.9 | R13: | 77.9 |
| CIE z:                    | 0.2197 | R6:       | 81.2 | R14: | 96.6 |
| Peak Wavelength (nm):     | 593    | R7:       | 84.2 |      |      |
| Dominant Wavelength (nm): | 577    | R8:       | 59.0 |      |      |
| Purity:                   | 34.3   |           |      |      |      |
| Rf:                       | 82.7   |           |      |      |      |
| Rg:                       | 96.5   |           |      |      |      |



### Test Conditions

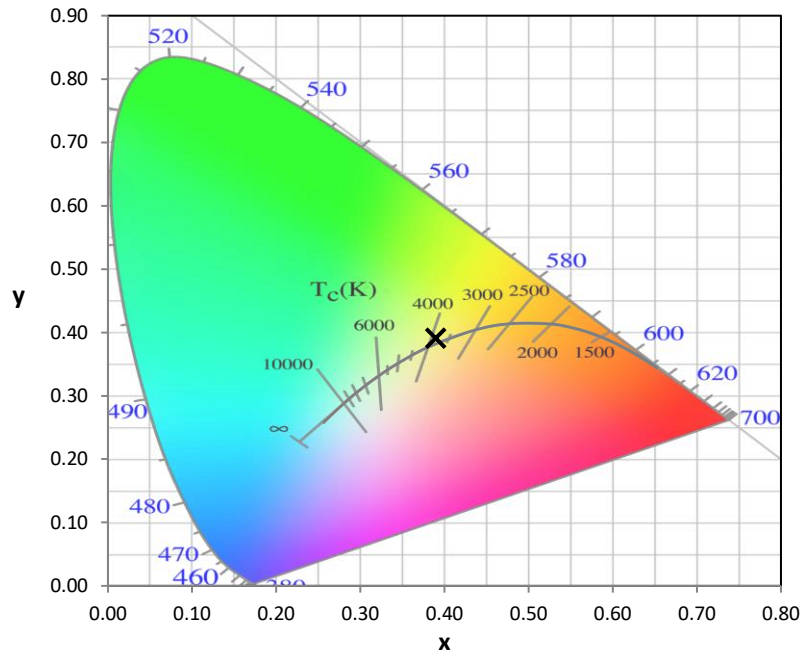
Stabilization Time: 25M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.8/46%  
 Sphere Temperature (°C): 24.7

REPORT NUMBER: SP1-2309-178-2

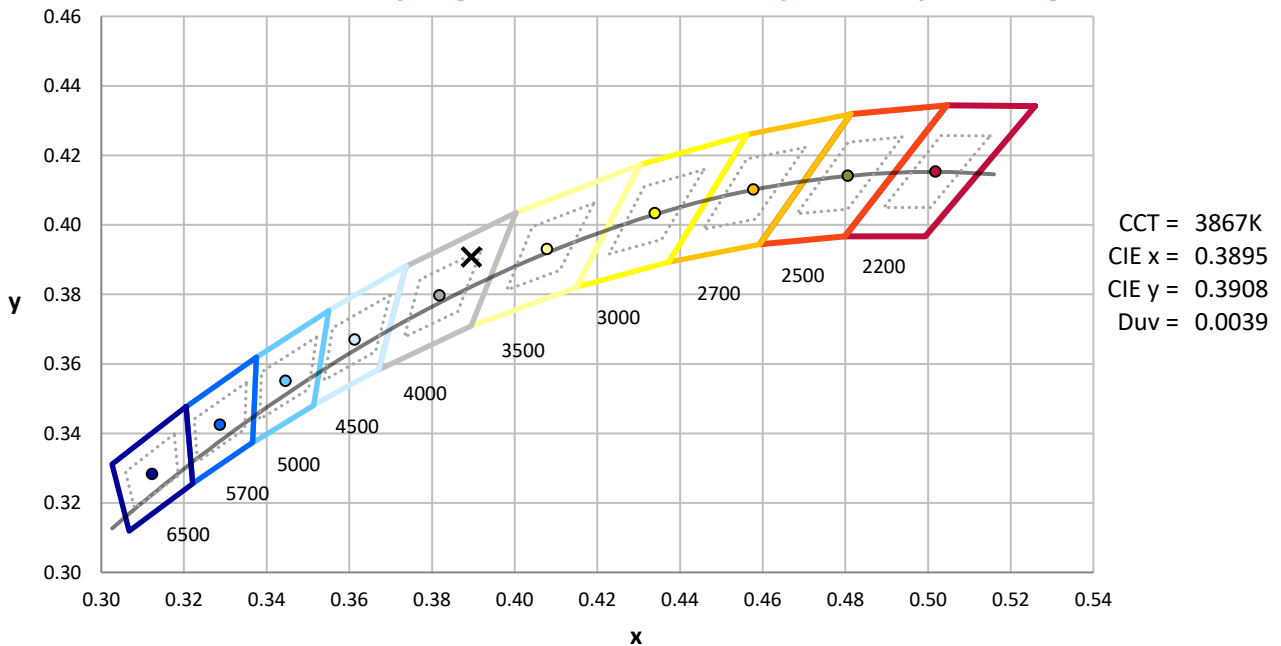
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 8/9/2023         | 2/9/2024             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2022       | 11/29/2023           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/28/2022       | 11/28/2023           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/28/2022       | 11/28/2023           |
| Sphere Thermometer             | ONSET IN0085          | 11/28/2022       | 11/28/2023           |
| Room Thermometer               | ONSET IN0046          | 11/28/2022       | 11/28/2023           |

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CIE 1931 Chromaticity Diagram



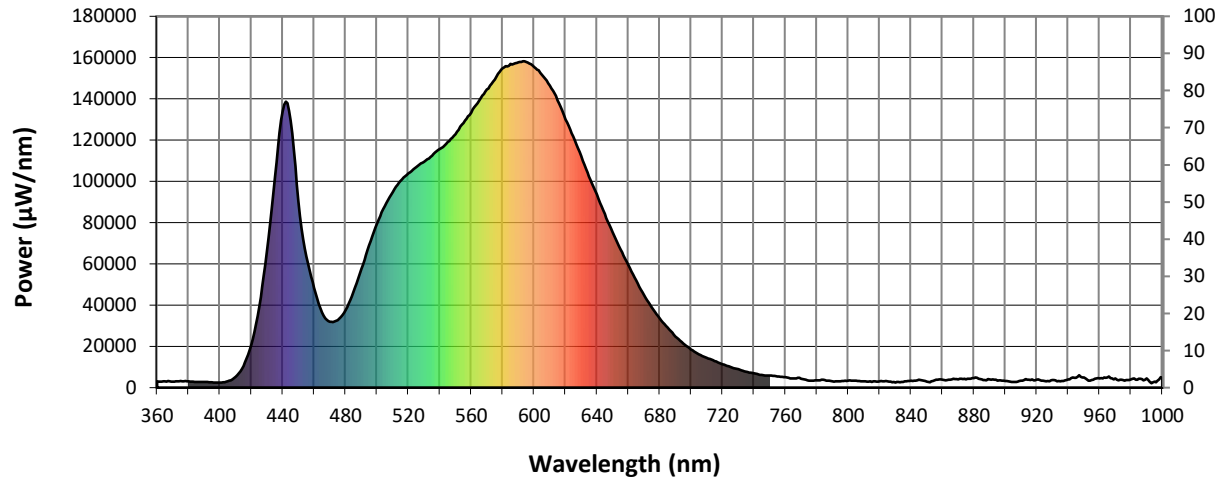
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 4000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

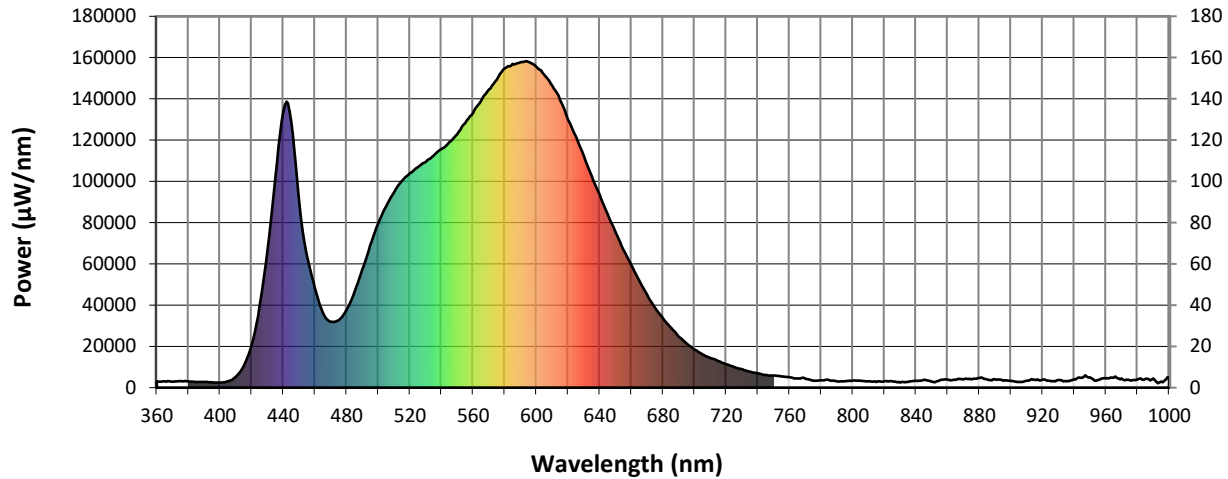


#####

| 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       | 3123             | NR               | 490       | 57459            | NR               | 620       | 129941           | NR               | 750       | 5858             | NR               | 880       | 4622             | NR               |
| 365       | 3041             | NR               | 495       | 69038            | NR               | 625       | 121678           | NR               | 755       | 5395             | NR               | 885       | 3949             | NR               |
| 370       | 2965             | NR               | 500       | 79493            | NR               | 630       | 112252           | NR               | 760       | 5011             | NR               | 890       | 4035             | NR               |
| 375       | 3195             | NR               | 505       | 87950            | NR               | 635       | 102369           | NR               | 765       | 4514             | NR               | 895       | 3391             | NR               |
| 380       | 3028             | NR               | 510       | 94704            | NR               | 640       | 93616            | NR               | 770       | 4375             | NR               | 900       | 3268             | NR               |
| 385       | 2738             | NR               | 515       | 100214           | NR               | 645       | 84211            | NR               | 775       | 3450             | NR               | 905       | 2767             | NR               |
| 390       | 2690             | NR               | 520       | 103961           | NR               | 650       | 75380            | NR               | 780       | 3547             | NR               | 910       | 3391             | NR               |
| 395       | 2604             | NR               | 525       | 106854           | NR               | 655       | 66946            | NR               | 785       | 3648             | NR               | 915       | 3784             | NR               |
| 400       | 2384             | NR               | 530       | 109533           | NR               | 660       | 59483            | NR               | 790       | 3081             | NR               | 920       | 3790             | NR               |
| 405       | 3031             | NR               | 535       | 112417           | NR               | 665       | 51858            | NR               | 795       | 3104             | NR               | 925       | 3175             | NR               |
| 410       | 5239             | NR               | 540       | 115725           | NR               | 670       | 44882            | NR               | 800       | 3444             | NR               | 930       | 3642             | NR               |
| 415       | 10499            | NR               | 545       | 119091           | NR               | 675       | 38742            | NR               | 805       | 3315             | NR               | 935       | 3040             | NR               |
| 420       | 20790            | NR               | 550       | 122884           | NR               | 680       | 33597            | NR               | 810       | 3022             | NR               | 940       | 4039             | NR               |
| 425       | 39276            | NR               | 555       | 128300           | NR               | 685       | 29101            | NR               | 815       | 2832             | NR               | 945       | 4797             | NR               |
| 430       | 66418            | NR               | 560       | 133274           | NR               | 690       | 24855            | NR               | 820       | 3142             | NR               | 950       | 4945             | NR               |
| 435       | 101961           | NR               | 565       | 139112           | NR               | 695       | 21367            | NR               | 825       | 3115             | NR               | 955       | 3757             | NR               |
| 440       | 134023           | NR               | 570       | 144467           | NR               | 700       | 18479            | NR               | 830       | 2520             | NR               | 960       | 4539             | NR               |
| 445       | 129385           | NR               | 575       | 149331           | NR               | 705       | 16131            | NR               | 835       | 2783             | NR               | 965       | 4857             | NR               |
| 450       | 90434            | NR               | 580       | 154784           | NR               | 710       | 14388            | NR               | 840       | 3364             | NR               | 970       | 4463             | NR               |
| 455       | 63521            | NR               | 585       | 156899           | NR               | 715       | 12865            | NR               | 845       | 3807             | NR               | 975       | 3718             | NR               |
| 460       | 48429            | NR               | 590       | 157796           | NR               | 720       | 11277            | NR               | 850       | 2907             | NR               | 980       | 3955             | NR               |
| 465       | 36445            | NR               | 595       | 157849           | NR               | 725       | 10063            | NR               | 855       | 3470             | NR               | 985       | 4314             | NR               |
| 470       | 31953            | NR               | 600       | 155418           | NR               | 730       | 8942             | NR               | 860       | 3820             | NR               | 990       | 4478             | NR               |
| 475       | 32768            | NR               | 605       | 151601           | NR               | 735       | 7722             | NR               | 865       | 3922             | NR               | 995       | 2959             | NR               |
| 480       | 37631            | NR               | 610       | 146416           | NR               | 740       | 6964             | NR               | 870       | 4061             | NR               | 1000      | 4570             | NR               |
| 485       | 46354            | NR               | 615       | 139241           | NR               | 745       | 6117             | NR               | 875       | 3975             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



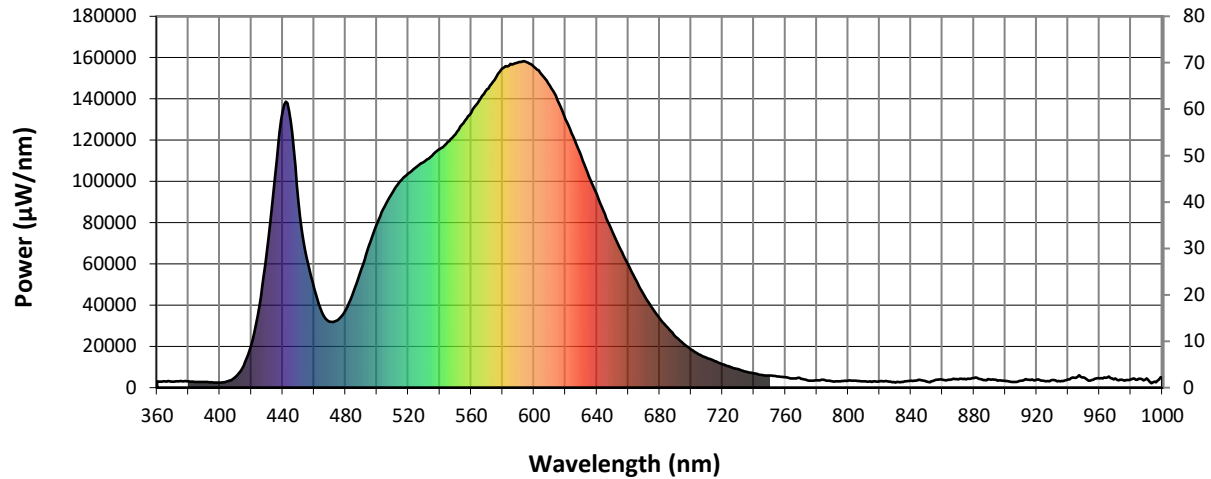
Scotopic Lumens: 14236

S/P: 1.59

| 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       | 3123             | NR               | 490       | 57459            | NR               | 620       | 129941           | NR               | 750       | 5858             | NR               | 880       | 4622             | NR               |
| 365       | 3041             | NR               | 495       | 69038            | NR               | 625       | 121678           | NR               | 755       | 5395             | NR               | 885       | 3949             | NR               |
| 370       | 2965             | NR               | 500       | 79493            | NR               | 630       | 112252           | NR               | 760       | 5011             | NR               | 890       | 4035             | NR               |
| 375       | 3195             | NR               | 505       | 87950            | NR               | 635       | 102369           | NR               | 765       | 4514             | NR               | 895       | 3391             | NR               |
| 380       | 3028             | NR               | 510       | 94704            | NR               | 640       | 93616            | NR               | 770       | 4375             | NR               | 900       | 3268             | NR               |
| 385       | 2738             | NR               | 515       | 100214           | NR               | 645       | 84211            | NR               | 775       | 3450             | NR               | 905       | 2767             | NR               |
| 390       | 2690             | NR               | 520       | 103961           | NR               | 650       | 75380            | NR               | 780       | 3547             | NR               | 910       | 3391             | NR               |
| 395       | 2604             | NR               | 525       | 106854           | NR               | 655       | 66946            | NR               | 785       | 3648             | NR               | 915       | 3784             | NR               |
| 400       | 2384             | NR               | 530       | 109533           | NR               | 660       | 59483            | NR               | 790       | 3081             | NR               | 920       | 3790             | NR               |
| 405       | 3031             | NR               | 535       | 112417           | NR               | 665       | 51858            | NR               | 795       | 3104             | NR               | 925       | 3175             | NR               |
| 410       | 5239             | NR               | 540       | 115725           | NR               | 670       | 44882            | NR               | 800       | 3444             | NR               | 930       | 3642             | NR               |
| 415       | 10499            | NR               | 545       | 119091           | NR               | 675       | 38742            | NR               | 805       | 3315             | NR               | 935       | 3040             | NR               |
| 420       | 20790            | NR               | 550       | 122884           | NR               | 680       | 33597            | NR               | 810       | 3022             | NR               | 940       | 4039             | NR               |
| 425       | 39276            | NR               | 555       | 128300           | NR               | 685       | 29101            | NR               | 815       | 2832             | NR               | 945       | 4797             | NR               |
| 430       | 66418            | NR               | 560       | 133274           | NR               | 690       | 24855            | NR               | 820       | 3142             | NR               | 950       | 4945             | NR               |
| 435       | 101961           | NR               | 565       | 139112           | NR               | 695       | 21367            | NR               | 825       | 3115             | NR               | 955       | 3757             | NR               |
| 440       | 134023           | NR               | 570       | 144467           | NR               | 700       | 18479            | NR               | 830       | 2520             | NR               | 960       | 4539             | NR               |
| 445       | 129385           | NR               | 575       | 149331           | NR               | 705       | 16131            | NR               | 835       | 2783             | NR               | 965       | 4857             | NR               |
| 450       | 90434            | NR               | 580       | 154784           | NR               | 710       | 14388            | NR               | 840       | 3364             | NR               | 970       | 4463             | NR               |
| 455       | 63521            | NR               | 585       | 156899           | NR               | 715       | 12865            | NR               | 845       | 3807             | NR               | 975       | 3718             | NR               |
| 460       | 48429            | NR               | 590       | 157796           | NR               | 720       | 11277            | NR               | 850       | 2907             | NR               | 980       | 3955             | NR               |
| 465       | 36445            | NR               | 595       | 157849           | NR               | 725       | 10063            | NR               | 855       | 3470             | NR               | 985       | 4314             | NR               |
| 470       | 31953            | NR               | 600       | 155418           | NR               | 730       | 8942             | NR               | 860       | 3820             | NR               | 990       | 4478             | NR               |
| 475       | 32768            | NR               | 605       | 151601           | NR               | 735       | 7722             | NR               | 865       | 3922             | NR               | 995       | 2959             | NR               |
| 480       | 37631            | NR               | 610       | 146416           | NR               | 740       | 6964             | NR               | 870       | 4061             | NR               | 1000      | 4570             | NR               |
| 485       | 46354            | NR               | 615       | 139241           | NR               | 745       | 6117             | NR               | 875       | 3975             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5542.6**

**M/P: 0.62**

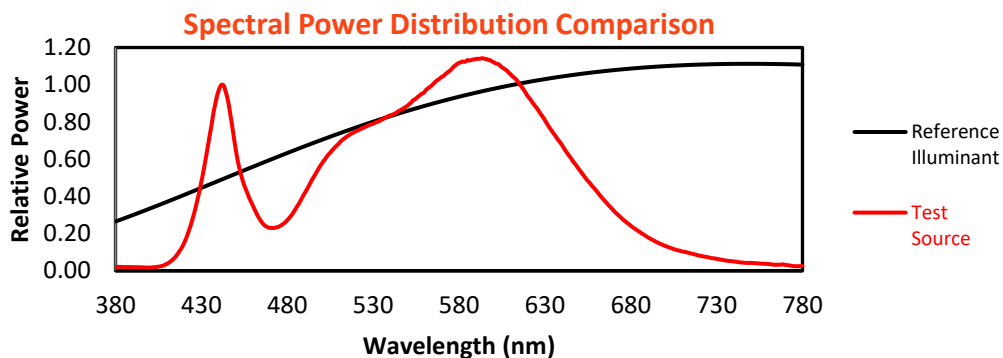
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 3123             | NR               | 490       | 57459            | NR               | 620       | 129941           | NR               | 750       | 5858             | NR               | 880       | 4622             | NR               |
| 365       | 3041             | NR               | 495       | 69038            | NR               | 625       | 121678           | NR               | 755       | 5395             | NR               | 885       | 3949             | NR               |
| 370       | 2965             | NR               | 500       | 79493            | NR               | 630       | 112252           | NR               | 760       | 5011             | NR               | 890       | 4035             | NR               |
| 375       | 3195             | NR               | 505       | 87950            | NR               | 635       | 102369           | NR               | 765       | 4514             | NR               | 895       | 3391             | NR               |
| 380       | 3028             | NR               | 510       | 94704            | NR               | 640       | 93616            | NR               | 770       | 4375             | NR               | 900       | 3268             | NR               |
| 385       | 2738             | NR               | 515       | 100214           | NR               | 645       | 84211            | NR               | 775       | 3450             | NR               | 905       | 2767             | NR               |
| 390       | 2690             | NR               | 520       | 103961           | NR               | 650       | 75380            | NR               | 780       | 3547             | NR               | 910       | 3391             | NR               |
| 395       | 2604             | NR               | 525       | 106854           | NR               | 655       | 66946            | NR               | 785       | 3648             | NR               | 915       | 3784             | NR               |
| 400       | 2384             | NR               | 530       | 109533           | NR               | 660       | 59483            | NR               | 790       | 3081             | NR               | 920       | 3790             | NR               |
| 405       | 3031             | NR               | 535       | 112417           | NR               | 665       | 51858            | NR               | 795       | 3104             | NR               | 925       | 3175             | NR               |
| 410       | 5239             | NR               | 540       | 115725           | NR               | 670       | 44882            | NR               | 800       | 3444             | NR               | 930       | 3642             | NR               |
| 415       | 10499            | NR               | 545       | 119091           | NR               | 675       | 38742            | NR               | 805       | 3315             | NR               | 935       | 3040             | NR               |
| 420       | 20790            | NR               | 550       | 122884           | NR               | 680       | 33597            | NR               | 810       | 3022             | NR               | 940       | 4039             | NR               |
| 425       | 39276            | NR               | 555       | 128300           | NR               | 685       | 29101            | NR               | 815       | 2832             | NR               | 945       | 4797             | NR               |
| 430       | 66418            | NR               | 560       | 133274           | NR               | 690       | 24855            | NR               | 820       | 3142             | NR               | 950       | 4945             | NR               |
| 435       | 101961           | NR               | 565       | 139112           | NR               | 695       | 21367            | NR               | 825       | 3115             | NR               | 955       | 3757             | NR               |
| 440       | 134023           | NR               | 570       | 144467           | NR               | 700       | 18479            | NR               | 830       | 2520             | NR               | 960       | 4539             | NR               |
| 445       | 129385           | NR               | 575       | 149331           | NR               | 705       | 16131            | NR               | 835       | 2783             | NR               | 965       | 4857             | NR               |
| 450       | 90434            | NR               | 580       | 154784           | NR               | 710       | 14388            | NR               | 840       | 3364             | NR               | 970       | 4463             | NR               |
| 455       | 63521            | NR               | 585       | 156899           | NR               | 715       | 12865            | NR               | 845       | 3807             | NR               | 975       | 3718             | NR               |
| 460       | 48429            | NR               | 590       | 157796           | NR               | 720       | 11277            | NR               | 850       | 2907             | NR               | 980       | 3955             | NR               |
| 465       | 36445            | NR               | 595       | 157849           | NR               | 725       | 10063            | NR               | 855       | 3470             | NR               | 985       | 4314             | NR               |
| 470       | 31953            | NR               | 600       | 155418           | NR               | 730       | 8942             | NR               | 860       | 3820             | NR               | 990       | 4478             | NR               |
| 475       | 32768            | NR               | 605       | 151601           | NR               | 735       | 7722             | NR               | 865       | 3922             | NR               | 995       | 2959             | NR               |
| 480       | 37631            | NR               | 610       | 146416           | NR               | 740       | 6964             | NR               | 870       | 4061             | NR               | 1000      | 4570             | NR               |
| 485       | 46354            | NR               | 615       | 139241           | NR               | 745       | 6117             | NR               | 875       | 3975             | NR               |           |                  |                  |

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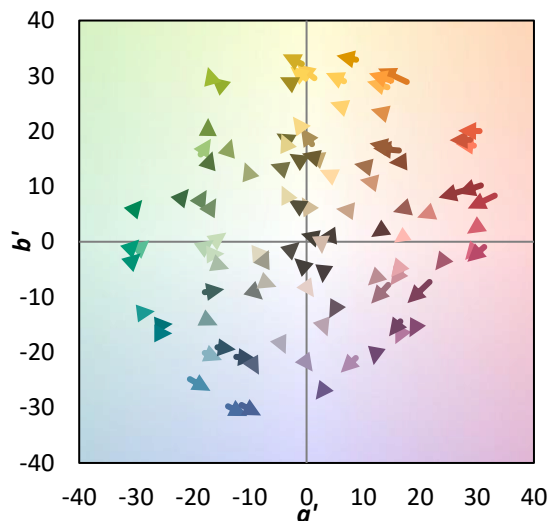
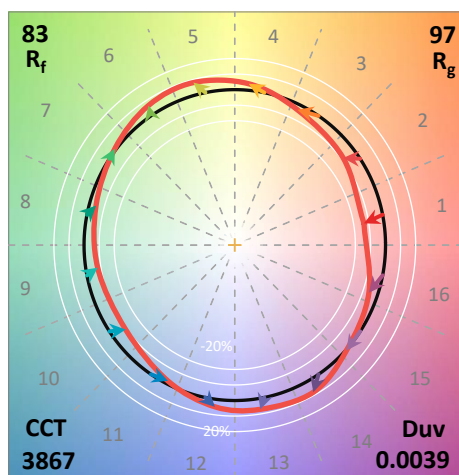
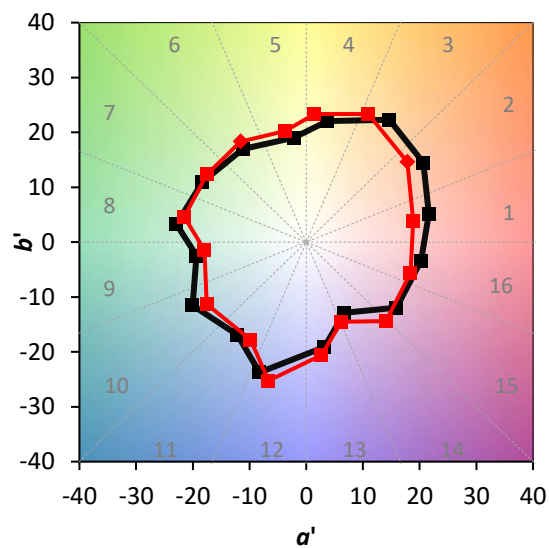
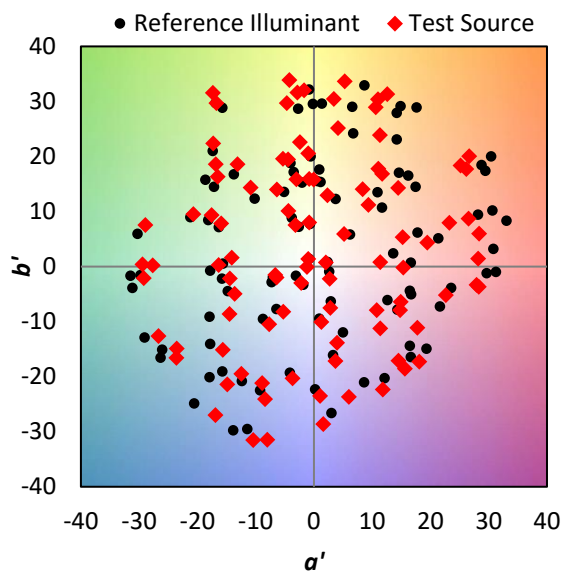
**TM-30-18**

**Summary**

$R_f = 82.7$   
 $R_g = 96.5$   
 $CIE R_a = 79.8$   
 $R_g = -8.6$



**Color Vector Graphics**

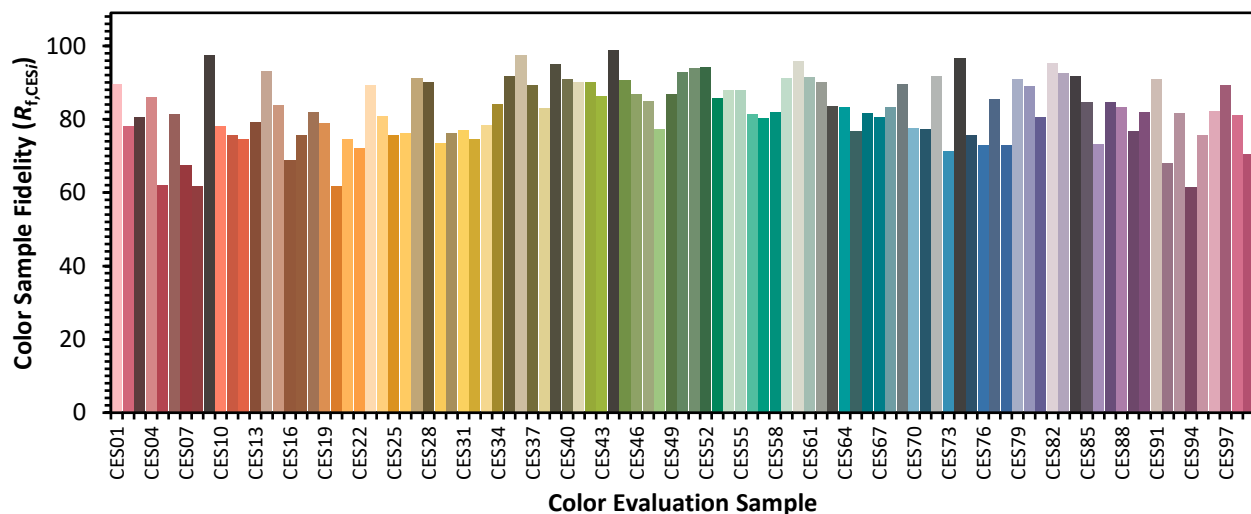


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

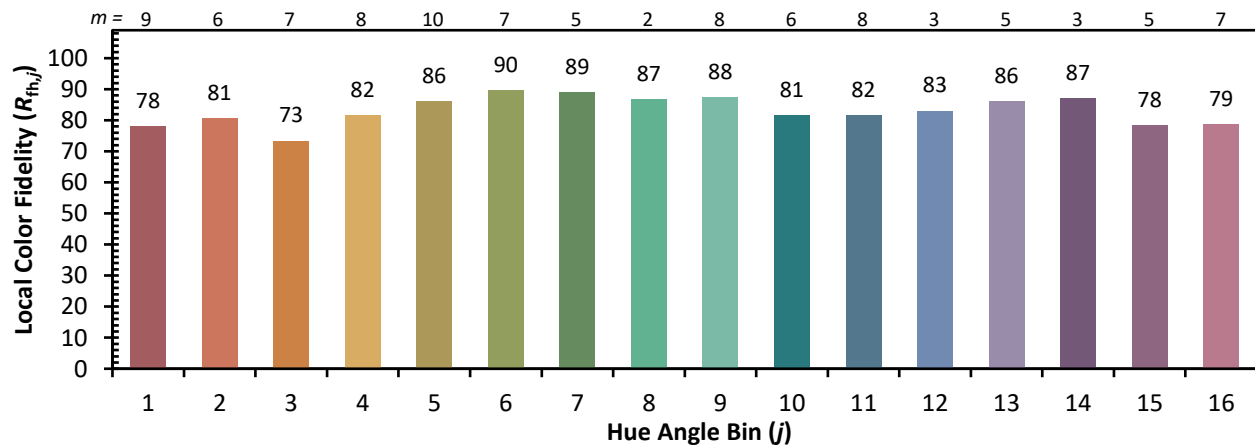
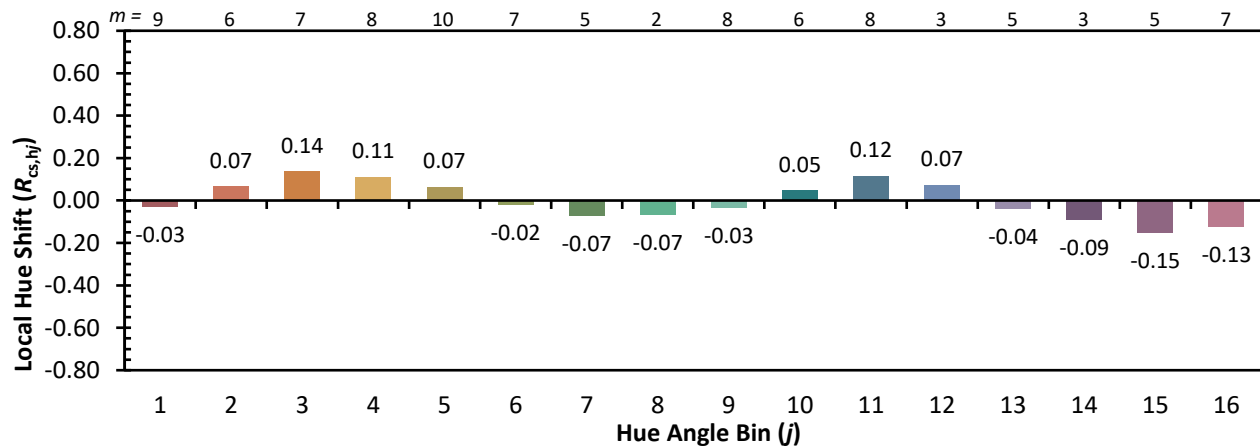
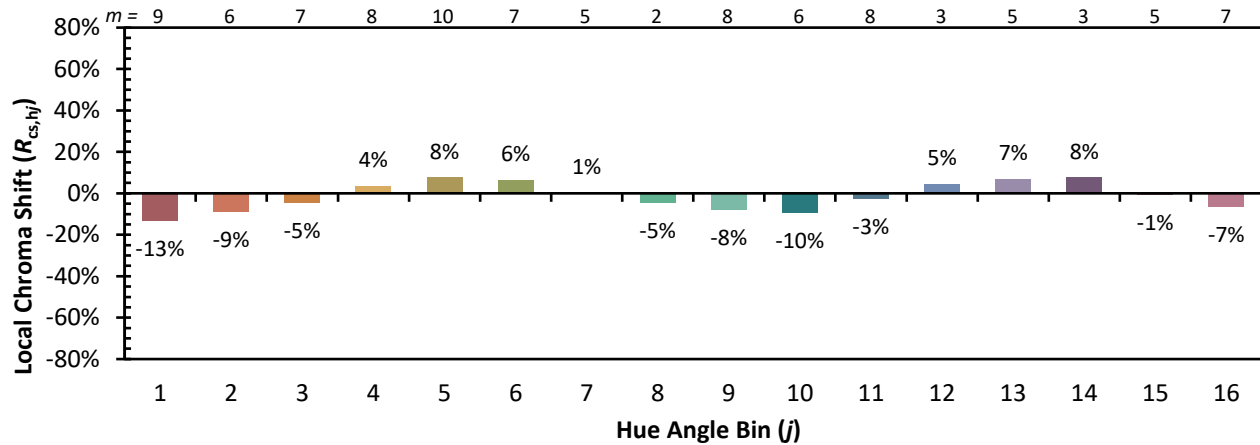
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 76 | CES51 = 94 | CES76 = 73 |
| CES02 = 61 | CES27 = 91 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 90 | CES53 = 86 | CES78 = 73 |
| CES04 = 69 | CES29 = 73 | CES54 = 88 | CES79 = 91 |
| CES05 = 48 | CES30 = 76 | CES55 = 88 | CES80 = 89 |
| CES06 = 50 | CES31 = 77 | CES56 = 81 | CES81 = 80 |
| CES07 = 40 | CES32 = 74 | CES57 = 80 | CES82 = 95 |
| CES08 = 39 | CES33 = 78 | CES58 = 82 | CES83 = 92 |
| CES09 = 29 | CES34 = 84 | CES59 = 91 | CES84 = 92 |
| CES10 = 74 | CES35 = 92 | CES60 = 96 | CES85 = 85 |
| CES11 = 57 | CES36 = 97 | CES61 = 92 | CES86 = 73 |
| CES12 = 63 | CES37 = 89 | CES62 = 90 | CES87 = 85 |
| CES13 = 42 | CES38 = 83 | CES63 = 83 | CES88 = 83 |
| CES14 = 74 | CES39 = 95 | CES64 = 83 | CES89 = 77 |
| CES15 = 71 | CES40 = 91 | CES65 = 77 | CES90 = 82 |
| CES16 = 47 | CES41 = 90 | CES66 = 82 | CES91 = 91 |
| CES17 = 49 | CES42 = 90 | CES67 = 80 | CES92 = 68 |
| CES18 = 56 | CES43 = 86 | CES68 = 83 | CES93 = 82 |
| CES19 = 71 | CES44 = 99 | CES69 = 90 | CES94 = 61 |
| CES20 = 65 | CES45 = 91 | CES70 = 77 | CES95 = 76 |
| CES21 = 86 | CES46 = 87 | CES71 = 77 | CES96 = 82 |
| CES22 = 78 | CES47 = 85 | CES72 = 92 | CES97 = 89 |
| CES23 = 91 | CES48 = 77 | CES73 = 71 | CES98 = 81 |
| CES24 = 90 | CES49 = 87 | CES74 = 97 | CES99 = 70 |
| CES25 = 71 | CES50 = 93 | CES75 = 76 |            |



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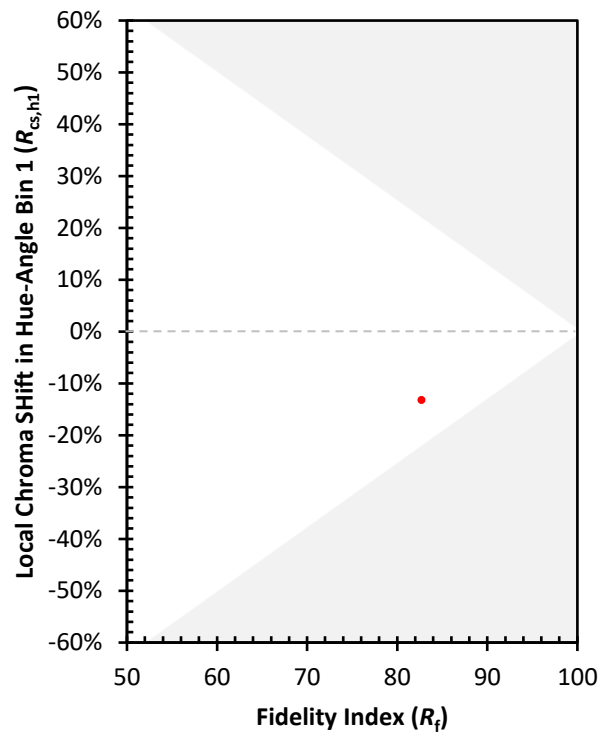
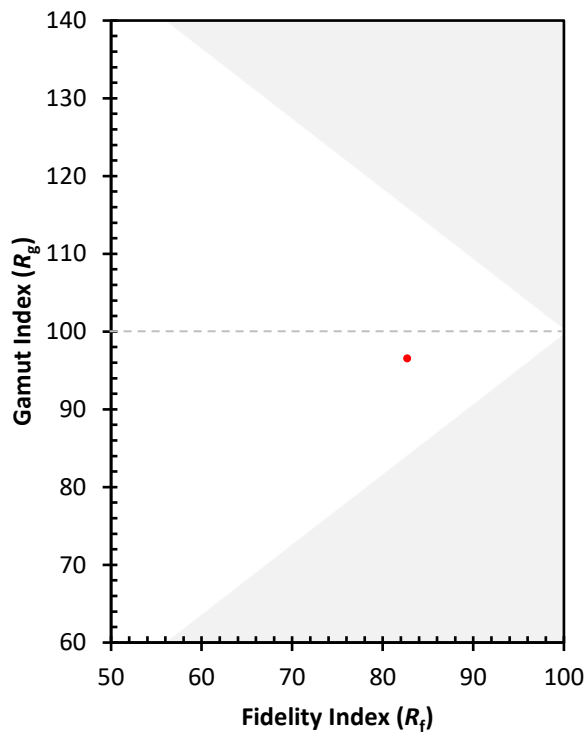
Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)