

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: P868431

Luminaire Tested: **EMM2-HTN-SA1A-740-U-T2R-HSS**

Issue Date: 08/22/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P868431  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/22/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: EMM2-HTN-SA1A-740-U-T2R-HSS  
Description: EPIC MODERN TALL HOUSING DISCRETE LED ARRAYS 40W 70CRI 4000K  
FIXTURE w/ TYPE II ROADWAY DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD  
Light Source: (10) 4000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

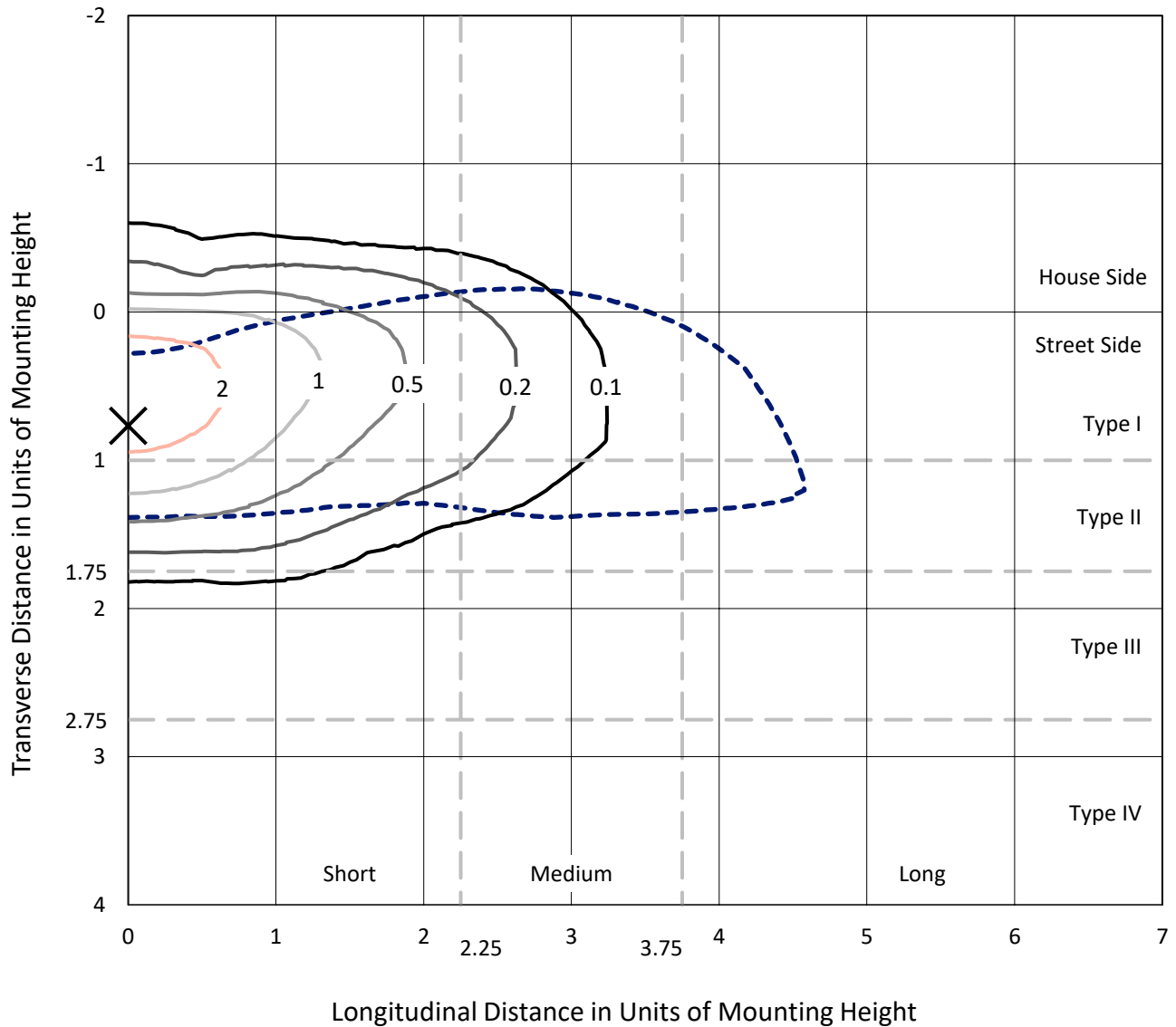
Lumens per Lamp: N/A  
Luminaire Lumens: 3540.4 lumens  
Efficiency: N/A  
Efficacy: 107.9 lumens/watt  
Luminous Opening: Rectangular (W 0.33' x L: 0.33' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G1

Input Watts (W): 32.8  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): NR  
Voltage Rise (V): NR  
Power Factor: 0.99  
Total Harmonic Distortion (THDi): 9.76%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT

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### Iso-Footcandle Lines of Horizontal Illumination

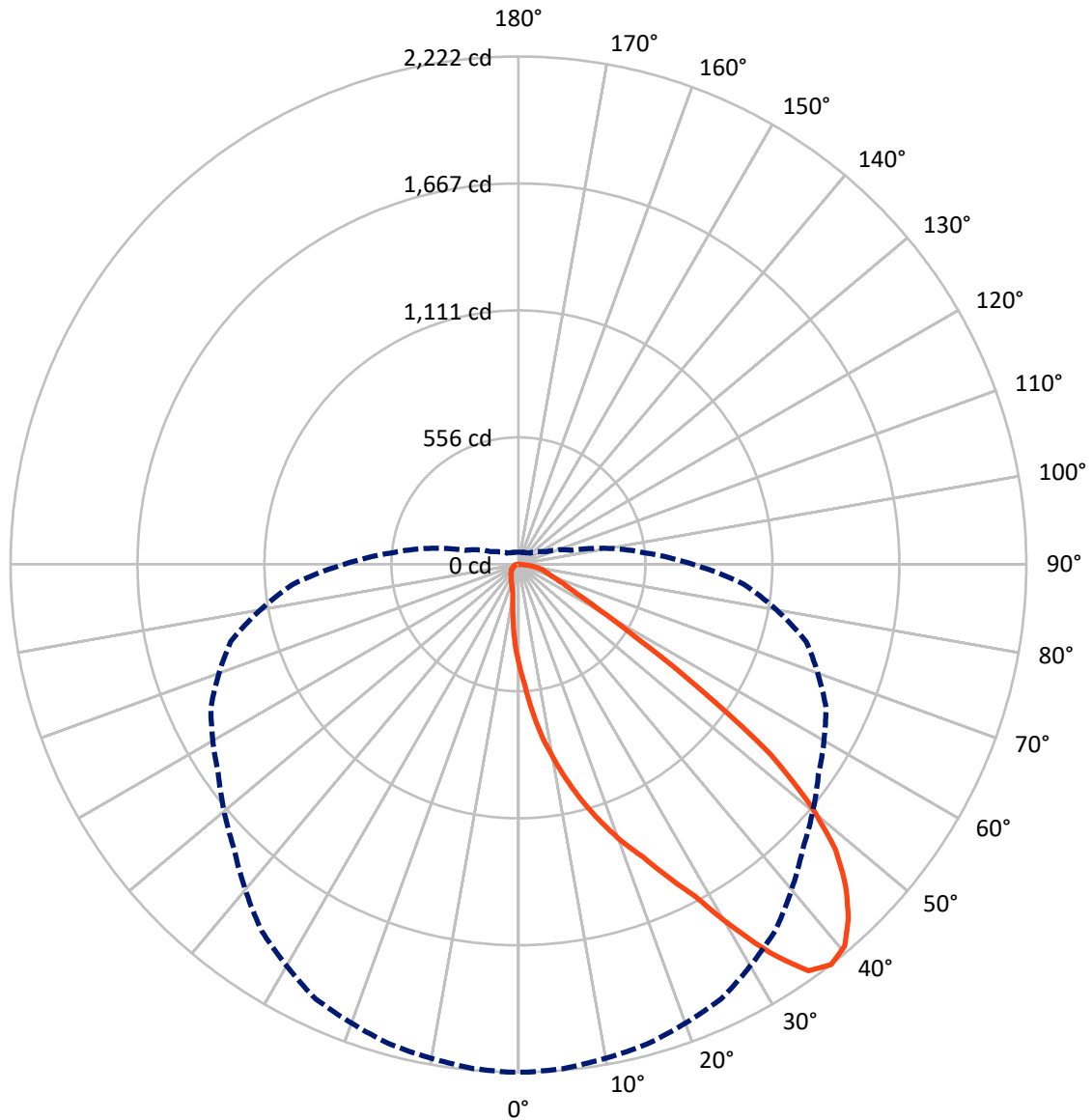
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 3 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 0-Deg Lateral      - - - Horizontal Cone Through 37.5-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 422.3    | 0.0    | 422.3  |
|                    | % Fixture | 11.9     | 0.0    | 11.9   |
| <b>Street Side</b> | Lumens    | 3118.2   | 0.0    | 3118.2 |
|                    | % Fixture | 88.1     | 0.0    | 88.1   |
| <b>Total</b>       | Lumens    | 3540.4   | 0.0    | 3540.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 44.0   | 1.2       |
| 10°-20°   | 153.9  | 4.3       |
| 20°-30°   | 317.4  | 9.0       |
| 30°-40°   | 558.5  | 15.8      |
| 40°-50°   | 758.4  | 21.4      |
| 50°-60°   | 751.4  | 21.2      |
| 60°-70°   | 578.4  | 16.3      |
| 70°-80°   | 335.7  | 9.5       |
| 80°-90°   | 42.7   | 1.2       |
| 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°    | 3540.4 | 100.0     |
| 0°-180°   | 3540.4 | 100.0     |

**Coefficient of Utilization**



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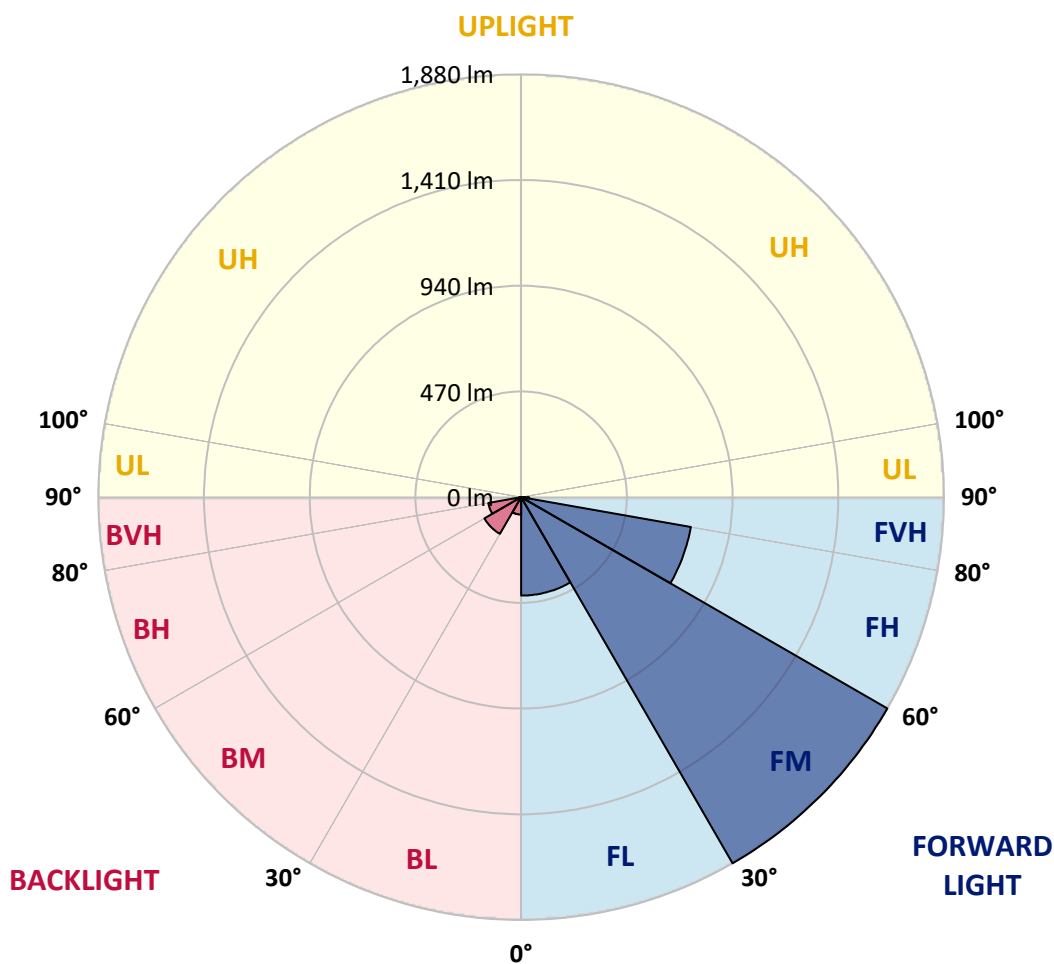
CATALOG NUMBER: EMM2-HTN-SA1A-740-U-T2R-HSS

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 437.7  | 12.4      |                         |      |         |
| FM (30°-60°)   | 1879.7 | 53.1      |                         |      |         |
| FH (60°-80°)   | 766.0  | 21.6      |                         |      | G1/1800 |
| FVH (80°-90°)  | 34.8   | 1.0       |                         |      | G1/100  |
| BL (0°-30°)    | 77.6   | 2.2       | B0/110                  |      |         |
| BM (30°-60°)   | 188.6  | 5.3       | B0/220                  |      |         |
| BH (60°-80°)   | 148.2  | 4.2       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 7.9    | 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 II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 1°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 438.7  | 438.7  | 438.7  | 438.7  | 438.7  | 438.7  | 438.7  | 438.7  | 438.7  | 438.7  | 438.7  |
| 2.5°  | 528.6  | 536.5  | 530.6  | 525.7  | 518.7  | 511.8  | 501.9  | 491.1  | 477.2  | 460.4  | 445.6  |
| 5°    | 648.2  | 652.1  | 650.2  | 647.2  | 625.5  | 604.7  | 584.0  | 558.3  | 522.7  | 491.1  | 457.5  |
| 7.5°  | 767.7  | 765.8  | 760.8  | 751.9  | 732.2  | 708.5  | 670.9  | 628.4  | 578.0  | 522.7  | 470.3  |
| 10°   | 872.5  | 875.4  | 871.5  | 857.7  | 833.0  | 800.3  | 754.9  | 706.5  | 638.3  | 561.2  | 488.1  |
| 12.5° | 982.2  | 984.1  | 984.1  | 954.5  | 937.7  | 887.3  | 838.9  | 773.7  | 697.6  | 608.7  | 508.9  |
| 15°   | 1089.9 | 1085.9 | 1085.9 | 1066.1 | 1036.5 | 980.2  | 925.8  | 846.8  | 760.8  | 653.1  | 532.6  |
| 17.5° | 1192.6 | 1194.6 | 1185.7 | 1164.0 | 1135.3 | 1081.0 | 1013.8 | 926.8  | 823.1  | 706.5  | 557.3  |
| 20°   | 1294.4 | 1288.5 | 1284.5 | 1262.8 | 1232.1 | 1167.9 | 1103.7 | 1004.9 | 896.2  | 766.8  | 591.9  |
| 22.5° | 1389.2 | 1392.2 | 1382.3 | 1347.7 | 1319.1 | 1260.8 | 1187.7 | 1096.8 | 973.3  | 827.0  | 629.4  |
| 25°   | 1511.8 | 1501.9 | 1510.8 | 1469.3 | 1424.8 | 1355.6 | 1272.7 | 1182.7 | 1057.2 | 901.1  | 675.8  |
| 27.5° | 1642.2 | 1648.1 | 1643.2 | 1597.7 | 1537.5 | 1444.6 | 1357.6 | 1261.8 | 1142.2 | 971.3  | 728.2  |
| 30°   | 1836.8 | 1833.9 | 1834.9 | 1766.7 | 1666.9 | 1556.2 | 1449.5 | 1344.8 | 1227.2 | 1057.2 | 789.5  |
| 32.5° | 2029.5 | 2040.4 | 2013.7 | 1953.4 | 1838.8 | 1671.8 | 1541.4 | 1424.8 | 1309.2 | 1131.4 | 851.7  |
| 35°   | 2184.7 | 2181.7 | 2170.8 | 2103.6 | 1990.0 | 1828.0 | 1646.1 | 1513.7 | 1396.2 | 1222.3 | 920.9  |
| 37.5° | 2222.2 | 2222.2 | 2215.3 | 2173.8 | 2098.7 | 1958.4 | 1759.8 | 1602.7 | 1485.1 | 1303.3 | 988.1  |
| 40°   | 2197.5 | 2192.6 | 2188.6 | 2160.9 | 2120.4 | 2037.4 | 1879.3 | 1694.6 | 1579.9 | 1408.0 | 1062.2 |
| 42.5° | 2116.5 | 2117.5 | 2112.5 | 2096.7 | 2075.0 | 2043.4 | 1953.4 | 1792.4 | 1672.8 | 1506.8 | 1135.3 |
| 45°   | 2007.8 | 2009.8 | 2003.8 | 2001.9 | 1991.0 | 1991.0 | 1970.2 | 1869.5 | 1760.8 | 1607.6 | 1215.3 |
| 47.5° | 1868.5 | 1867.5 | 1864.5 | 1859.6 | 1881.3 | 1905.0 | 1923.8 | 1912.9 | 1838.8 | 1716.3 | 1287.5 |
| 50°   | 1656.0 | 1654.1 | 1662.9 | 1687.6 | 1741.0 | 1793.4 | 1848.7 | 1900.1 | 1895.1 | 1817.1 | 1374.4 |
| 52.5° | 1380.4 | 1367.5 | 1377.4 | 1453.5 | 1563.1 | 1679.7 | 1757.8 | 1838.8 | 1923.8 | 1923.8 | 1460.4 |
| 55°   | 965.4  | 976.2  | 982.2  | 1093.8 | 1310.2 | 1510.8 | 1648.1 | 1752.9 | 1912.9 | 2008.8 | 1555.2 |
| 57.5° | 614.6  | 618.5  | 636.3  | 756.9  | 1010.8 | 1261.8 | 1504.8 | 1676.8 | 1872.4 | 2079.9 | 1650.1 |
| 60°   | 414.0  | 400.2  | 414.0  | 483.2  | 727.2  | 990.1  | 1294.4 | 1580.9 | 1814.1 | 2131.3 | 1754.8 |
| 62.5° | 292.5  | 291.5  | 295.4  | 335.9  | 518.7  | 744.0  | 1030.6 | 1451.5 | 1767.7 | 2134.3 | 1832.9 |
| 65°   | 236.2  | 229.2  | 232.2  | 254.9  | 347.8  | 545.4  | 755.9  | 1217.3 | 1726.2 | 2081.9 | 1871.4 |
| 67.5° | 189.7  | 186.7  | 188.7  | 203.5  | 260.9  | 410.1  | 532.6  | 925.8  | 1638.2 | 1993.0 | 1849.7 |
| 70°   | 155.1  | 156.1  | 157.1  | 171.9  | 207.5  | 310.3  | 380.4  | 635.3  | 1450.5 | 1892.2 | 1751.9 |
| 72.5° | 134.4  | 134.4  | 135.4  | 145.2  | 173.9  | 246.0  | 287.5  | 413.0  | 1173.8 | 1783.5 | 1572.0 |
| 75°   | 118.6  | 118.6  | 118.6  | 127.5  | 148.2  | 197.6  | 223.3  | 282.6  | 842.8  | 1581.9 | 1300.3 |
| 77.5° | 102.8  | 103.7  | 103.7  | 111.7  | 127.5  | 154.1  | 171.9  | 195.6  | 537.5  | 1222.3 | 984.1  |
| 80°   | 79.0   | 79.0   | 80.0   | 88.9   | 108.7  | 120.5  | 126.5  | 138.3  | 282.6  | 767.7  | 624.5  |
| 82.5° | 55.3   | 56.3   | 56.3   | 57.3   | 73.1   | 74.1   | 68.2   | 69.2   | 102.8  | 254.9  | 237.1  |
| 85°   | 5.9    | 6.9    | 7.9    | 7.9    | 12.8   | 15.8   | 16.8   | 15.8   | 16.8   | 29.6   | 29.6   |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 1.0    | 2.0    | 2.0    | 3.0    | 3.0    | 3.0    | 3.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P868431

CATALOG NUMBER: EMM2-HTN-SA1A-740-U-T2R-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 438.7  | 438.7 | 438.7 | 438.7 | 438.7 | 438.7 | 438.7 | 438.7 | 438.7 | 438.7 | 438.7 |
| 2.5°  | 437.7  | 430.8 | 416.0 | 403.1 | 391.3 | 381.4 | 374.5 | 365.6 | 358.7 | 358.7 | 362.6 |
| 5°    | 440.7  | 424.9 | 394.2 | 365.6 | 342.9 | 321.1 | 301.4 | 288.5 | 278.6 | 272.7 | 272.7 |
| 7.5°  | 444.6  | 420.9 | 374.5 | 331.0 | 295.4 | 260.9 | 230.2 | 215.4 | 200.6 | 195.6 | 196.6 |
| 10°   | 452.5  | 418.9 | 356.7 | 300.4 | 247.0 | 203.5 | 173.9 | 158.1 | 150.2 | 146.2 | 146.2 |
| 12.5° | 461.4  | 418.9 | 337.9 | 265.8 | 203.5 | 159.1 | 141.3 | 129.4 | 125.5 | 123.5 | 121.5 |
| 15°   | 473.3  | 420.9 | 322.1 | 229.2 | 166.0 | 134.4 | 121.5 | 114.6 | 110.7 | 108.7 | 108.7 |
| 17.5° | 487.1  | 422.9 | 305.3 | 199.6 | 141.3 | 118.6 | 108.7 | 103.7 | 99.8  | 97.8  | 97.8  |
| 20°   | 504.9  | 427.8 | 288.5 | 172.9 | 123.5 | 108.7 | 99.8  | 94.9  | 90.9  | 89.9  | 88.9  |
| 22.5° | 526.6  | 435.7 | 271.7 | 151.2 | 111.7 | 98.8  | 90.9  | 87.0  | 84.0  | 82.0  | 82.0  |
| 25°   | 552.3  | 445.6 | 258.9 | 135.4 | 102.8 | 91.9  | 85.0  | 80.0  | 77.1  | 76.1  | 76.1  |
| 27.5° | 587.9  | 462.4 | 246.0 | 123.5 | 95.8  | 85.0  | 78.1  | 74.1  | 71.1  | 70.2  | 69.2  |
| 30°   | 621.5  | 483.2 | 240.1 | 120.5 | 90.9  | 79.0  | 74.1  | 69.2  | 66.2  | 65.2  | 64.2  |
| 32.5° | 665.0  | 506.9 | 236.2 | 120.5 | 88.9  | 75.1  | 69.2  | 65.2  | 62.2  | 61.3  | 60.3  |
| 35°   | 711.4  | 534.6 | 236.2 | 124.5 | 89.9  | 72.1  | 65.2  | 61.3  | 58.3  | 56.3  | 56.3  |
| 37.5° | 761.8  | 562.2 | 238.1 | 130.4 | 92.9  | 70.2  | 61.3  | 57.3  | 54.3  | 53.4  | 53.4  |
| 40°   | 815.2  | 599.8 | 242.1 | 135.4 | 95.8  | 69.2  | 57.3  | 54.3  | 51.4  | 49.4  | 49.4  |
| 42.5° | 864.6  | 629.4 | 249.0 | 141.3 | 97.8  | 68.2  | 54.3  | 51.4  | 48.4  | 47.4  | 47.4  |
| 45°   | 921.9  | 662.0 | 254.9 | 145.2 | 97.8  | 65.2  | 51.4  | 48.4  | 46.4  | 45.5  | 44.5  |
| 47.5° | 967.3  | 688.7 | 257.9 | 147.2 | 95.8  | 62.2  | 48.4  | 46.4  | 44.5  | 42.5  | 43.5  |
| 50°   | 1022.7 | 717.3 | 262.8 | 148.2 | 91.9  | 58.3  | 46.4  | 43.5  | 41.5  | 40.5  | 40.5  |
| 52.5° | 1076.0 | 746.0 | 266.8 | 146.2 | 87.0  | 53.4  | 43.5  | 41.5  | 39.5  | 37.5  | 37.5  |
| 55°   | 1139.3 | 777.6 | 272.7 | 143.3 | 79.0  | 48.4  | 40.5  | 38.5  | 35.6  | 34.6  | 33.6  |
| 57.5° | 1211.4 | 819.1 | 277.7 | 137.3 | 69.2  | 43.5  | 38.5  | 35.6  | 31.6  | 29.6  | 29.6  |
| 60°   | 1277.6 | 866.5 | 281.6 | 122.5 | 60.3  | 40.5  | 35.6  | 32.6  | 28.7  | 27.7  | 27.7  |
| 62.5° | 1348.7 | 916.0 | 281.6 | 96.8  | 51.4  | 36.6  | 33.6  | 30.6  | 26.7  | 25.7  | 25.7  |
| 65°   | 1398.1 | 960.4 | 272.7 | 72.1  | 43.5  | 34.6  | 32.6  | 28.7  | 24.7  | 23.7  | 23.7  |
| 67.5° | 1412.0 | 988.1 | 248.0 | 51.4  | 37.5  | 32.6  | 30.6  | 26.7  | 23.7  | 21.7  | 21.7  |
| 70°   | 1367.5 | 966.3 | 202.6 | 39.5  | 32.6  | 29.6  | 27.7  | 24.7  | 21.7  | 20.7  | 20.7  |
| 72.5° | 1240.0 | 883.3 | 151.2 | 33.6  | 28.7  | 27.7  | 25.7  | 22.7  | 20.7  | 19.8  | 19.8  |
| 75°   | 1038.5 | 734.1 | 106.7 | 29.6  | 26.7  | 24.7  | 22.7  | 20.7  | 18.8  | 18.8  | 18.8  |
| 77.5° | 786.5  | 530.6 | 66.2  | 26.7  | 22.7  | 22.7  | 20.7  | 18.8  | 17.8  | 16.8  | 16.8  |
| 80°   | 507.9  | 335.0 | 37.5  | 18.8  | 15.8  | 16.8  | 14.8  | 12.8  | 12.8  | 11.9  | 11.9  |
| 82.5° | 215.4  | 132.4 | 19.8  | 10.9  | 7.9   | 6.9   | 4.9   | 4.9   | 4.0   | 4.0   | 4.0   |
| 85°   | 21.7   | 7.9   | 4.0   | 3.0   | 3.0   | 2.0   | 2.0   | 2.0   | 2.0   | 1.0   | 1.0   |
| 87.5° | 3.0    | 3.0   | 3.0   | 2.0   | 2.0   | 2.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| 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

Streetworks

Report Number: SP1-2407-157-5

Test Date: 08/07/2024

Luminaire Tested: MEM2-HTN-SA-40-740-U-5WQ-2

Data in this report applies to families of products including MEM2-HTN-SA-40-740-U-5WQ-2

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-5  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/20/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Streetworks  
 Catalog Number: **MEM2-HTN-SA-40-740-U-5WQ-2**  
 Description: Epic Modern Light Square 40W 5WQ Optic and Flare Trim

**Spectral Parameters**

CCT (K): 3915  
 CIE u': 0.2262  
 CIE v': 0.5044  
 Duv: 0.0010  
 CIE x: 0.3850  
 CIE y: 0.3816  
 CIE z: 0.2334  
 Peak Wavelength (nm): 449  
 Dominant Wavelength (nm): 578  
 Purity: 30.05482  
 R<sub>f</sub>: 73.2  
 R<sub>g</sub>: 93.9

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.0 |      |       |
| R1:       | 67.6 | R9:  | -38.4 |
| R2:       | 78.3 | R10: | 48.9  |
| R3:       | 87.1 | R11: | 65.3  |
| R4:       | 69.7 | R12: | 40.4  |
| R5:       | 67.4 | R13: | 69.3  |
| R6:       | 69.3 | R14: | 92.6  |
| R7:       | 79.7 | R15: | 59.9  |
| R8:       | 48.7 |      |       |



**Test Conditions**

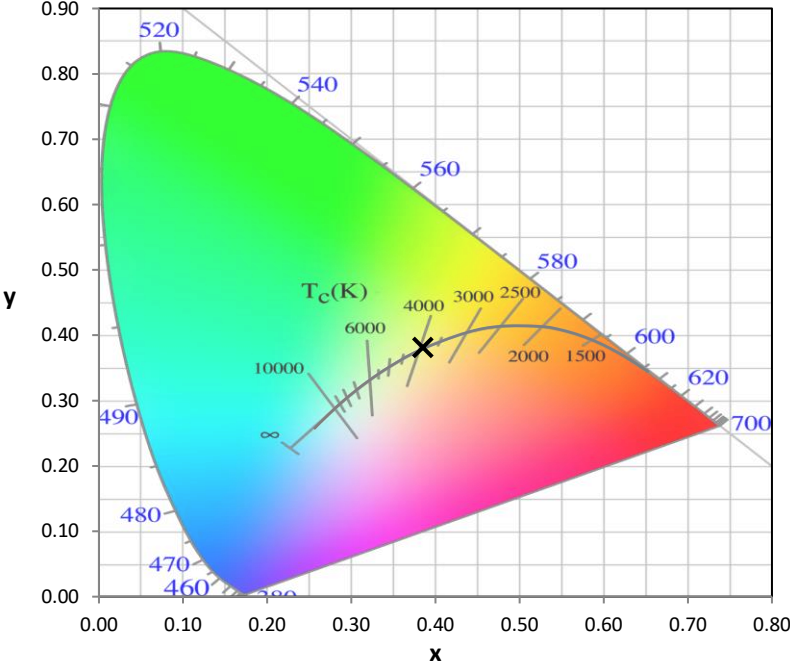
Stabilization Time: 21M  
 Operation Time: 1H 21M  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2407-157-5

| 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: SP1-2407-157-5

CIE 1931 Chromaticity Diagram



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



CCT = 3915K  
 CIE x = 0.3850  
 CIE y = 0.3816  
 Duv = 0.0010

Point lies inside the ANSI 4000K 4-step quadrangle

REPORT NUMBER: SP1-2407-157-5

**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360               | 0                           | NR                      | 490               | 112                         | NR                      | 620               | 618                         | NR                      | 750               | 15                          | NR                      | 880               | 0                           | NR                      |
| 365               | 0                           | NR                      | 495               | 153                         | NR                      | 625               | 563                         | NR                      | 755               | 13                          | NR                      | 885               | 0                           | NR                      |
| 370               | 0                           | NR                      | 500               | 216                         | NR                      | 630               | 510                         | NR                      | 760               | 11                          | NR                      | 890               | 0                           | NR                      |
| 375               | 0                           | NR                      | 505               | 291                         | NR                      | 635               | 456                         | NR                      | 765               | 9                           | NR                      | 895               | 0                           | NR                      |
| 380               | 0                           | NR                      | 510               | 366                         | NR                      | 640               | 407                         | NR                      | 770               | 8                           | NR                      | 900               | 0                           | NR                      |
| 385               | 0                           | NR                      | 515               | 436                         | NR                      | 645               | 359                         | NR                      | 775               | 7                           | NR                      | 905               | 0                           | NR                      |
| 390               | 0                           | NR                      | 520               | 492                         | NR                      | 650               | 316                         | NR                      | 780               | 6                           | NR                      | 910               | 0                           | NR                      |
| 395               | 2                           | NR                      | 525               | 536                         | NR                      | 655               | 277                         | NR                      | 785               | 5                           | NR                      | 915               | 0                           | NR                      |
| 400               | 4                           | NR                      | 530               | 567                         | NR                      | 660               | 240                         | NR                      | 790               | 4                           | NR                      | 920               | 0                           | NR                      |
| 405               | 7                           | NR                      | 535               | 596                         | NR                      | 665               | 208                         | NR                      | 795               | 4                           | NR                      | 925               | 0                           | NR                      |
| 410               | 12                          | NR                      | 540               | 619                         | NR                      | 670               | 179                         | NR                      | 800               | 3                           | NR                      | 930               | 0                           | NR                      |
| 415               | 25                          | NR                      | 545               | 644                         | NR                      | 675               | 154                         | NR                      | 805               | 3                           | NR                      | 935               | 0                           | NR                      |
| 420               | 51                          | NR                      | 550               | 671                         | NR                      | 680               | 133                         | NR                      | 810               | 3                           | NR                      | 940               | 0                           | NR                      |
| 425               | 100                         | NR                      | 555               | 701                         | NR                      | 685               | 114                         | NR                      | 815               | 2                           | NR                      | 945               | 0                           | NR                      |
| 430               | 180                         | NR                      | 560               | 735                         | NR                      | 690               | 98                          | NR                      | 820               | 2                           | NR                      | 950               | 0                           | NR                      |
| 435               | 315                         | NR                      | 565               | 768                         | NR                      | 695               | 83                          | NR                      | 825               | 2                           | NR                      | 955               | 0                           | NR                      |
| 440               | 514                         | NR                      | 570               | 798                         | NR                      | 700               | 71                          | NR                      | 830               | 1                           | NR                      | 960               | 0                           | NR                      |
| 445               | 828                         | NR                      | 575               | 825                         | NR                      | 705               | 61                          | NR                      | 835               | 1                           | NR                      | 965               | 0                           | NR                      |
| 450               | 992                         | NR                      | 580               | 843                         | NR                      | 710               | 52                          | NR                      | 840               | 1                           | NR                      | 970               | 0                           | NR                      |
| 455               | 652                         | NR                      | 585               | 848                         | NR                      | 715               | 44                          | NR                      | 845               | 1                           | NR                      | 975               | 0                           | NR                      |
| 460               | 382                         | NR                      | 590               | 844                         | NR                      | 720               | 38                          | NR                      | 850               | 1                           | NR                      | 980               | 0                           | NR                      |
| 465               | 282                         | NR                      | 595               | 826                         | NR                      | 725               | 32                          | NR                      | 855               | 1                           | NR                      | 985               | 0                           | NR                      |
| 470               | 180                         | NR                      | 600               | 800                         | NR                      | 730               | 28                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 119                         | NR                      | 605               | 762                         | NR                      | 735               | 24                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 101                         | NR                      | 610               | 719                         | NR                      | 740               | 20                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 98                          | NR                      | 615               | 669                         | NR                      | 745               | 17                          | NR                      | 875               | 0                           | NR                      |                   |                             |                         |

REPORT NUMBER: SP1-2407-157-5

**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.49**

| $\lambda$<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               | 112                                    | NR                           | 620               | 618                                    | NR                           | 750               | 15                                     | NR                           | 880               | 0                                      | NR                           |
| 365               | 0                                      | NR                           | 495               | 153                                    | NR                           | 625               | 563                                    | NR                           | 755               | 13                                     | NR                           | 885               | 0                                      | NR                           |
| 370               | 0                                      | NR                           | 500               | 216                                    | NR                           | 630               | 510                                    | NR                           | 760               | 11                                     | NR                           | 890               | 0                                      | NR                           |
| 375               | 0                                      | NR                           | 505               | 291                                    | NR                           | 635               | 456                                    | NR                           | 765               | 9                                      | NR                           | 895               | 0                                      | NR                           |
| 380               | 0                                      | NR                           | 510               | 366                                    | NR                           | 640               | 407                                    | NR                           | 770               | 8                                      | NR                           | 900               | 0                                      | NR                           |
| 385               | 0                                      | NR                           | 515               | 436                                    | NR                           | 645               | 359                                    | NR                           | 775               | 7                                      | NR                           | 905               | 0                                      | NR                           |
| 390               | 0                                      | NR                           | 520               | 492                                    | NR                           | 650               | 316                                    | NR                           | 780               | 6                                      | NR                           | 910               | 0                                      | NR                           |
| 395               | 2                                      | NR                           | 525               | 536                                    | NR                           | 655               | 277                                    | NR                           | 785               | 5                                      | NR                           | 915               | 0                                      | NR                           |
| 400               | 4                                      | NR                           | 530               | 567                                    | NR                           | 660               | 240                                    | NR                           | 790               | 4                                      | NR                           | 920               | 0                                      | NR                           |
| 405               | 7                                      | NR                           | 535               | 596                                    | NR                           | 665               | 208                                    | NR                           | 795               | 4                                      | NR                           | 925               | 0                                      | NR                           |
| 410               | 12                                     | NR                           | 540               | 619                                    | NR                           | 670               | 179                                    | NR                           | 800               | 3                                      | NR                           | 930               | 0                                      | NR                           |
| 415               | 25                                     | NR                           | 545               | 644                                    | NR                           | 675               | 154                                    | NR                           | 805               | 3                                      | NR                           | 935               | 0                                      | NR                           |
| 420               | 51                                     | NR                           | 550               | 671                                    | NR                           | 680               | 133                                    | NR                           | 810               | 3                                      | NR                           | 940               | 0                                      | NR                           |
| 425               | 100                                    | NR                           | 555               | 701                                    | NR                           | 685               | 114                                    | NR                           | 815               | 2                                      | NR                           | 945               | 0                                      | NR                           |
| 430               | 180                                    | NR                           | 560               | 735                                    | NR                           | 690               | 98                                     | NR                           | 820               | 2                                      | NR                           | 950               | 0                                      | NR                           |
| 435               | 315                                    | NR                           | 565               | 768                                    | NR                           | 695               | 83                                     | NR                           | 825               | 2                                      | NR                           | 955               | 0                                      | NR                           |
| 440               | 514                                    | NR                           | 570               | 798                                    | NR                           | 700               | 71                                     | NR                           | 830               | 1                                      | NR                           | 960               | 0                                      | NR                           |
| 445               | 828                                    | NR                           | 575               | 825                                    | NR                           | 705               | 61                                     | NR                           | 835               | 1                                      | NR                           | 965               | 0                                      | NR                           |
| 450               | 992                                    | NR                           | 580               | 843                                    | NR                           | 710               | 52                                     | NR                           | 840               | 1                                      | NR                           | 970               | 0                                      | NR                           |
| 455               | 652                                    | NR                           | 585               | 848                                    | NR                           | 715               | 44                                     | NR                           | 845               | 1                                      | NR                           | 975               | 0                                      | NR                           |
| 460               | 382                                    | NR                           | 590               | 844                                    | NR                           | 720               | 38                                     | NR                           | 850               | 1                                      | NR                           | 980               | 0                                      | NR                           |
| 465               | 282                                    | NR                           | 595               | 826                                    | NR                           | 725               | 32                                     | NR                           | 855               | 1                                      | NR                           | 985               | 0                                      | NR                           |
| 470               | 180                                    | NR                           | 600               | 800                                    | NR                           | 730               | 28                                     | NR                           | 860               | 1                                      | NR                           | 990               | 0                                      | NR                           |
| 475               | 119                                    | NR                           | 605               | 762                                    | NR                           | 735               | 24                                     | NR                           | 865               | 1                                      | NR                           | 995               | 0                                      | NR                           |
| 480               | 101                                    | NR                           | 610               | 719                                    | NR                           | 740               | 20                                     | NR                           | 870               | 1                                      | NR                           | 1000              | 0                                      | NR                           |
| 485               | 98                                     | NR                           | 615               | 669                                    | NR                           | 745               | 17                                     | NR                           | 875               | 0                                      | NR                           |                   |  |                              |

REPORT NUMBER: SP1-2407-157-5

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: NR**

**M/P: 2.88**

| $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) |
|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|
| 360            | 0                        | NR                   | 490            | 112                      | NR                   | 620            | 618                      | NR                   | 750            | 15                       | NR                   | 880            | 0                        | NR                   |
| 365            | 0                        | NR                   | 495            | 153                      | NR                   | 625            | 563                      | NR                   | 755            | 13                       | NR                   | 885            | 0                        | NR                   |
| 370            | 0                        | NR                   | 500            | 216                      | NR                   | 630            | 510                      | NR                   | 760            | 11                       | NR                   | 890            | 0                        | NR                   |
| 375            | 0                        | NR                   | 505            | 291                      | NR                   | 635            | 456                      | NR                   | 765            | 9                        | NR                   | 895            | 0                        | NR                   |
| 380            | 0                        | NR                   | 510            | 366                      | NR                   | 640            | 407                      | NR                   | 770            | 8                        | NR                   | 900            | 0                        | NR                   |
| 385            | 0                        | NR                   | 515            | 436                      | NR                   | 645            | 359                      | NR                   | 775            | 7                        | NR                   | 905            | 0                        | NR                   |
| 390            | 0                        | NR                   | 520            | 492                      | NR                   | 650            | 316                      | NR                   | 780            | 6                        | NR                   | 910            | 0                        | NR                   |
| 395            | 2                        | NR                   | 525            | 536                      | NR                   | 655            | 277                      | NR                   | 785            | 5                        | NR                   | 915            | 0                        | NR                   |
| 400            | 4                        | NR                   | 530            | 567                      | NR                   | 660            | 240                      | NR                   | 790            | 4                        | NR                   | 920            | 0                        | NR                   |
| 405            | 7                        | NR                   | 535            | 596                      | NR                   | 665            | 208                      | NR                   | 795            | 4                        | NR                   | 925            | 0                        | NR                   |
| 410            | 12                       | NR                   | 540            | 619                      | NR                   | 670            | 179                      | NR                   | 800            | 3                        | NR                   | 930            | 0                        | NR                   |
| 415            | 25                       | NR                   | 545            | 644                      | NR                   | 675            | 154                      | NR                   | 805            | 3                        | NR                   | 935            | 0                        | NR                   |
| 420            | 51                       | NR                   | 550            | 671                      | NR                   | 680            | 133                      | NR                   | 810            | 3                        | NR                   | 940            | 0                        | NR                   |
| 425            | 100                      | NR                   | 555            | 701                      | NR                   | 685            | 114                      | NR                   | 815            | 2                        | NR                   | 945            | 0                        | NR                   |
| 430            | 180                      | NR                   | 560            | 735                      | NR                   | 690            | 98                       | NR                   | 820            | 2                        | NR                   | 950            | 0                        | NR                   |
| 435            | 315                      | NR                   | 565            | 768                      | NR                   | 695            | 83                       | NR                   | 825            | 2                        | NR                   | 955            | 0                        | NR                   |
| 440            | 514                      | NR                   | 570            | 798                      | NR                   | 700            | 71                       | NR                   | 830            | 1                        | NR                   | 960            | 0                        | NR                   |
| 445            | 828                      | NR                   | 575            | 825                      | NR                   | 705            | 61                       | NR                   | 835            | 1                        | NR                   | 965            | 0                        | NR                   |
| 450            | 992                      | NR                   | 580            | 843                      | NR                   | 710            | 52                       | NR                   | 840            | 1                        | NR                   | 970            | 0                        | NR                   |
| 455            | 652                      | NR                   | 585            | 848                      | NR                   | 715            | 44                       | NR                   | 845            | 1                        | NR                   | 975            | 0                        | NR                   |
| 460            | 382                      | NR                   | 590            | 844                      | NR                   | 720            | 38                       | NR                   | 850            | 1                        | NR                   | 980            | 0                        | NR                   |
| 465            | 282                      | NR                   | 595            | 826                      | NR                   | 725            | 32                       | NR                   | 855            | 1                        | NR                   | 985            | 0                        | NR                   |
| 470            | 180                      | NR                   | 600            | 800                      | NR                   | 730            | 28                       | NR                   | 860            | 1                        | NR                   | 990            | 0                        | NR                   |
| 475            | 119                      | NR                   | 605            | 762                      | NR                   | 735            | 24                       | NR                   | 865            | 1                        | NR                   | 995            | 0                        | NR                   |
| 480            | 101                      | NR                   | 610            | 719                      | NR                   | 740            | 20                       | NR                   | 870            | 1                        | NR                   | 1000           | 0                        | NR                   |
| 485            | 98                       | NR                   | 615            | 669                      | NR                   | 745            | 17                       | NR                   | 875            | 0                        | NR                   |                |                          |                      |

**Summary**

$R_f = 73.2$   
 $R_g = 93.9$   
 $CIE R_a = 71.0$   
 $R_g = -38.4$



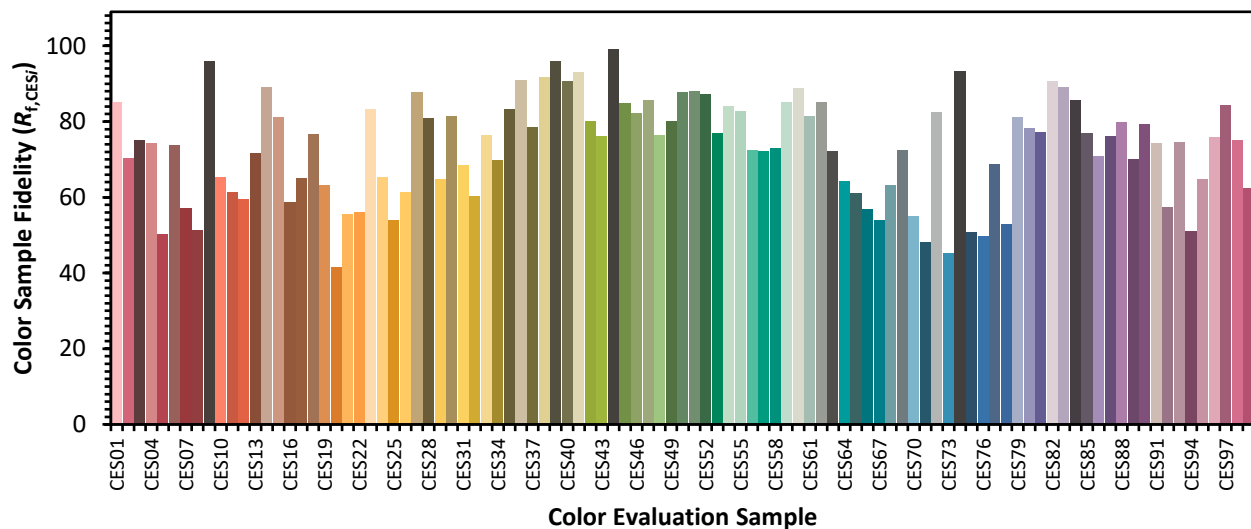
**Color Vector Graphics**



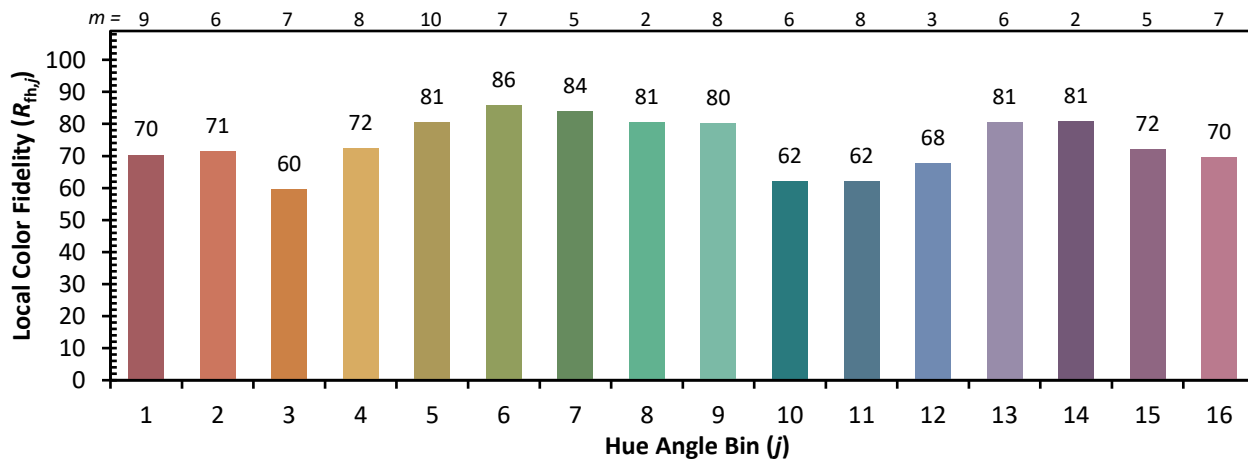
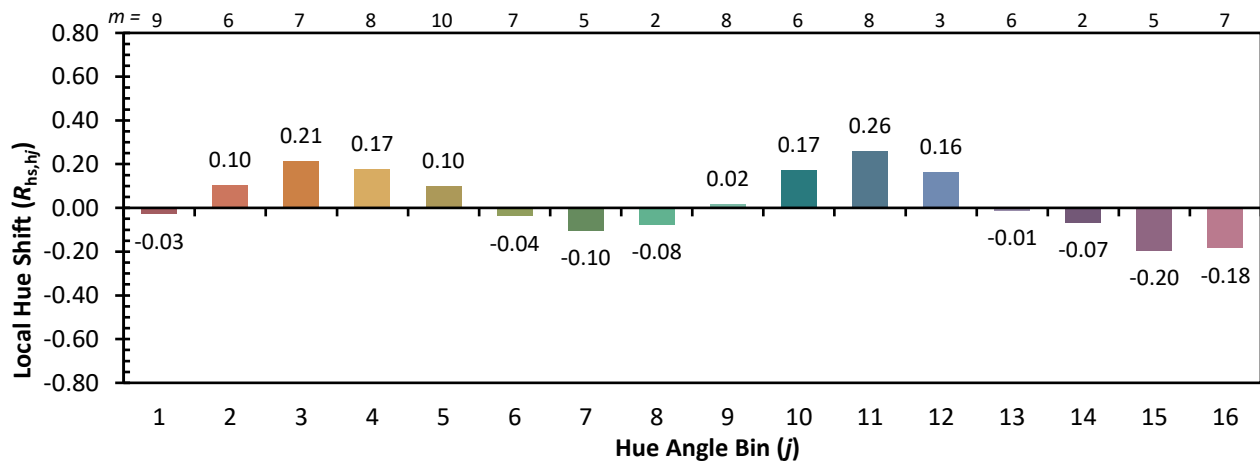
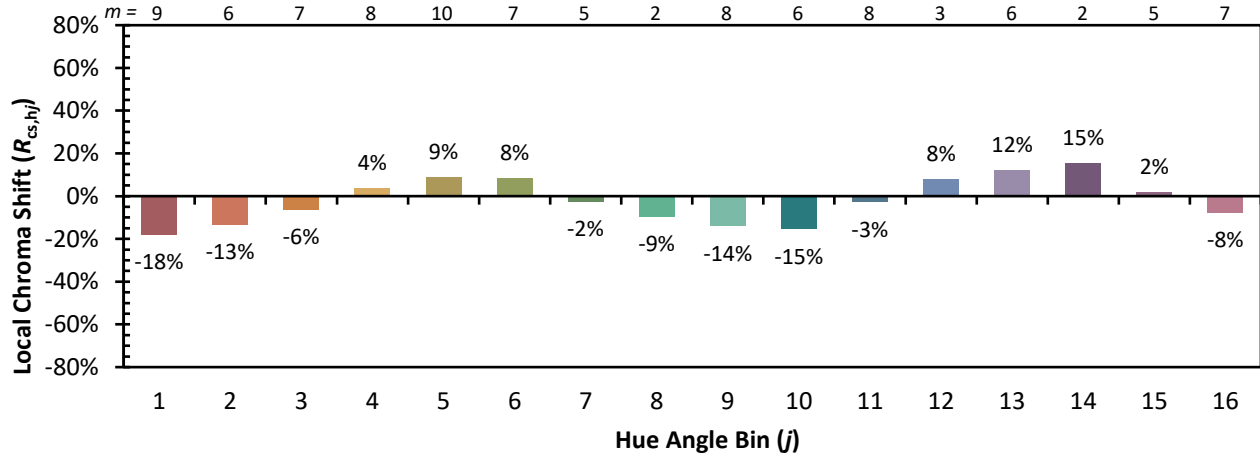


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

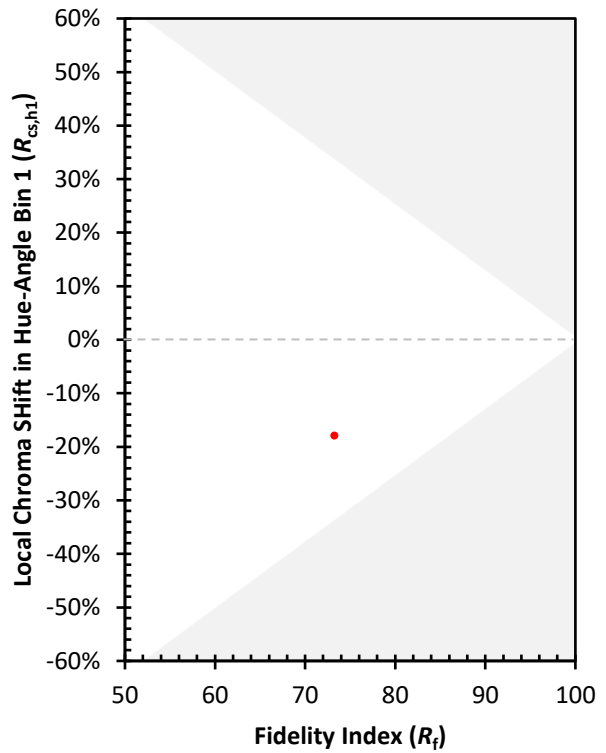
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 61 | CES51 = 88 | CES76 = 50 |
| CES02 = 61 | CES27 = 88 | CES52 = 87 | CES77 = 69 |
| CES03 = 30 | CES28 = 81 | CES53 = 77 | CES78 = 53 |
| CES04 = 70 | CES29 = 65 | CES54 = 84 | CES79 = 81 |
| CES05 = 47 | CES30 = 81 | CES55 = 83 | CES80 = 78 |
| CES06 = 50 | CES31 = 69 | CES56 = 73 | CES81 = 77 |
| CES07 = 40 | CES32 = 60 | CES57 = 72 | CES82 = 91 |
| CES08 = 39 | CES33 = 76 | CES58 = 73 | CES83 = 89 |
| CES09 = 29 | CES34 = 70 | CES59 = 85 | CES84 = 86 |
| CES10 = 74 | CES35 = 83 | CES60 = 89 | CES85 = 77 |
| CES11 = 57 | CES36 = 91 | CES61 = 81 | CES86 = 71 |
| CES12 = 63 | CES37 = 79 | CES62 = 85 | CES87 = 76 |
| CES13 = 42 | CES38 = 92 | CES63 = 72 | CES88 = 80 |
| CES14 = 74 | CES39 = 96 | CES64 = 64 | CES89 = 70 |
| CES15 = 71 | CES40 = 91 | CES65 = 61 | CES90 = 79 |
| CES16 = 46 | CES41 = 93 | CES66 = 57 | CES91 = 74 |
| CES17 = 49 | CES42 = 80 | CES67 = 54 | CES92 = 57 |
| CES18 = 56 | CES43 = 76 | CES68 = 63 | CES93 = 74 |
| CES19 = 72 | CES44 = 99 | CES69 = 73 | CES94 = 51 |
| CES20 = 65 | CES45 = 85 | CES70 = 55 | CES95 = 65 |
| CES21 = 86 | CES46 = 82 | CES71 = 48 | CES96 = 76 |
| CES22 = 78 | CES47 = 86 | CES72 = 83 | CES97 = 84 |
| CES23 = 92 | CES48 = 77 | CES73 = 45 | CES98 = 75 |
| CES24 = 91 | CES49 = 80 | CES74 = 93 | CES99 = 62 |
| CES25 = 72 | CES50 = 88 | CES75 = 51 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)