

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: P868984

Luminaire Tested: **EMM2-HSN-SA1A-730-U-T3-HSS**

Issue Date: 08/22/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P868984  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/22/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: EMM2-HSN-SA1A-730-U-T3-HSS  
Description: EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 40W 70CRI 3000K  
FIXTURE w/ TYPE III DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD  
Light Source: (10) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

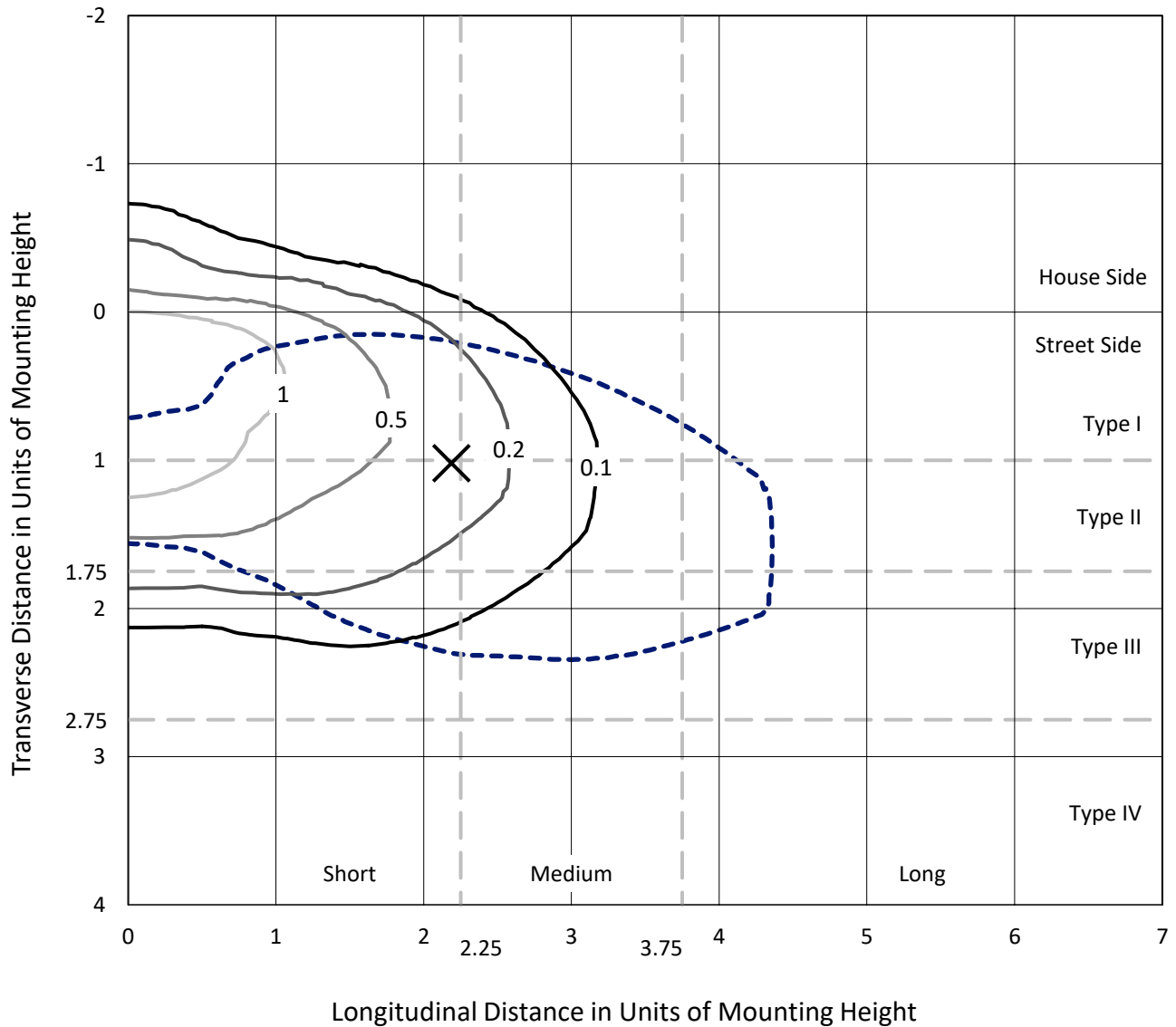
Lumens per Lamp: N/A  
Luminaire Lumens: 3265.2 lumens  
Efficiency: N/A  
Efficacy: 99.5 lumens/watt  
Luminous Opening: Rectangular (W 0.33' x L: 0.33' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B0 - U0 - G1

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

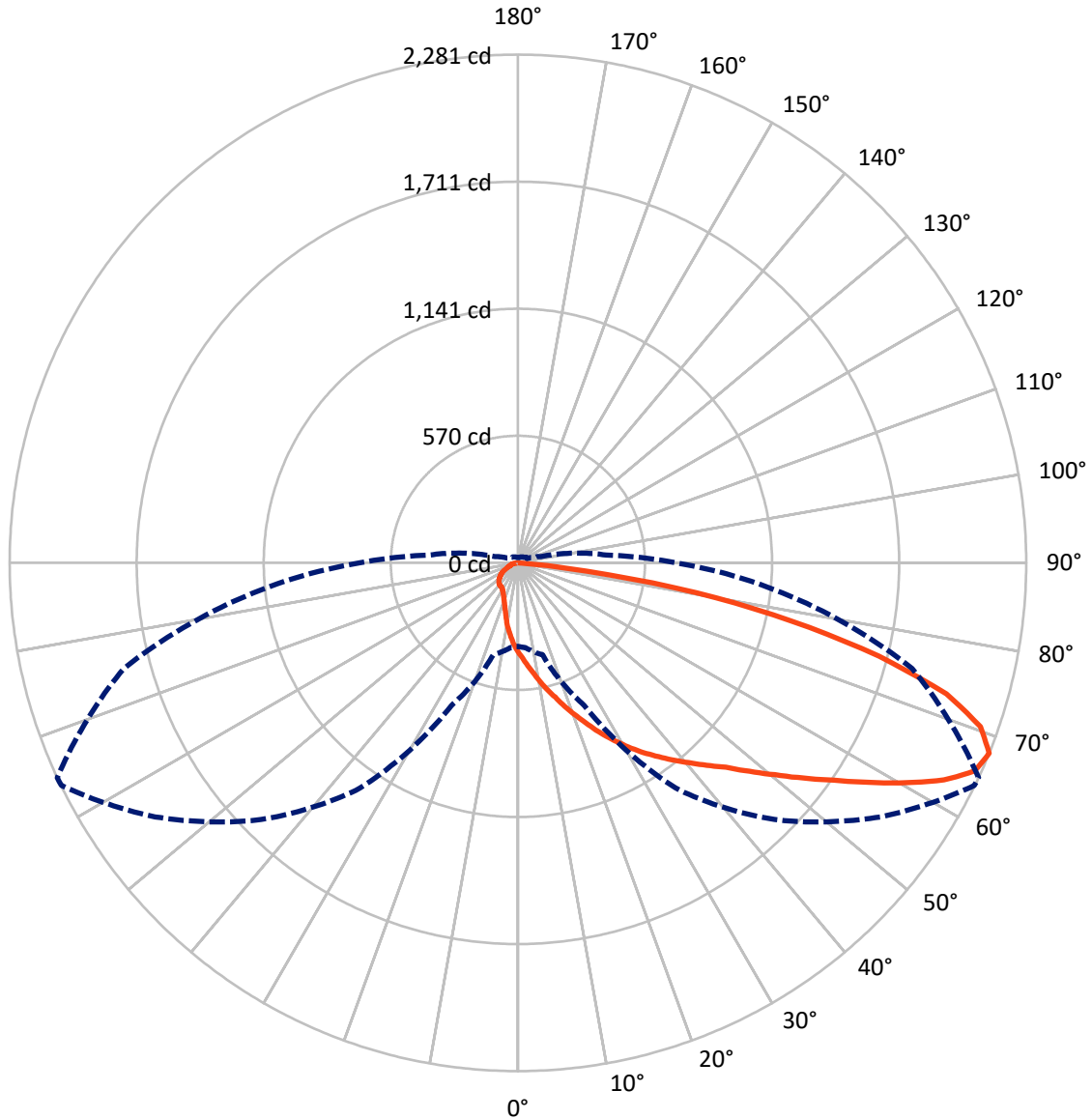
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 1.9 fc  
 Type III - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 65-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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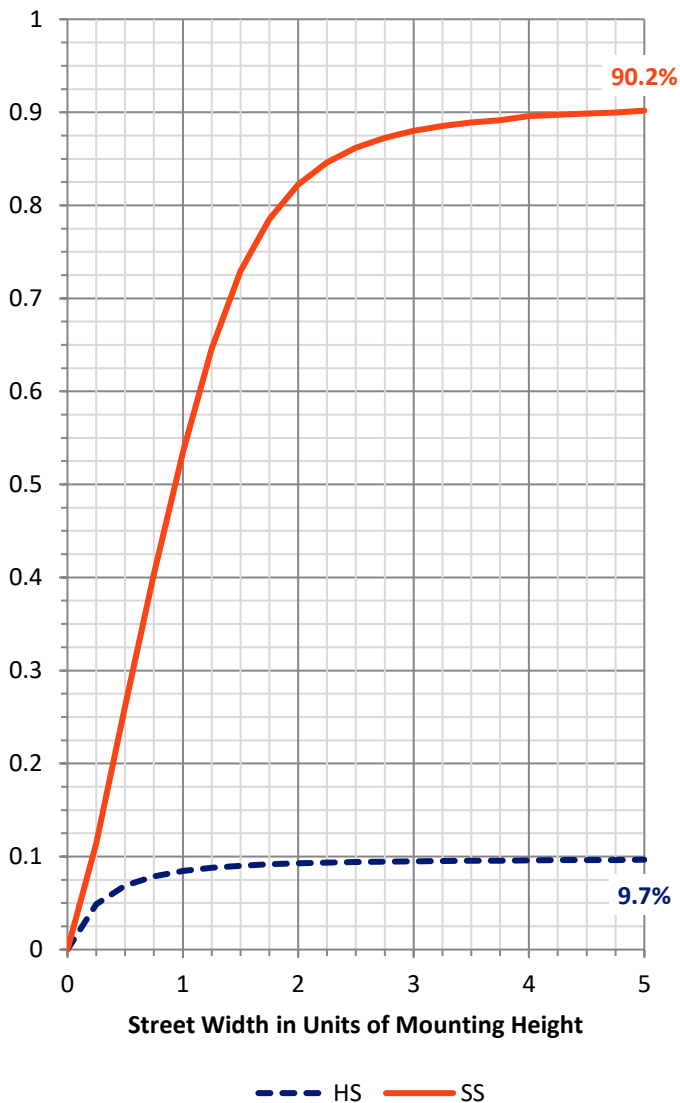
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 317.8    | 0.0    | 317.8  |
|                    | % Fixture | 9.7      | 0.0    | 9.7    |
| <b>Street Side</b> | Lumens    | 2947.3   | 0.0    | 2947.3 |
|                    | % Fixture | 90.3     | 0.0    | 90.3   |
| <b>Total</b>       | Lumens    | 3265.2   | 0.0    | 3265.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 39.5   | 1.2       |
| 10°-20°   | 131.0  | 4.0       |
| 20°-30°   | 238.5  | 7.3       |
| 30°-40°   | 369.0  | 11.3      |
| 40°-50°   | 557.9  | 17.1      |
| 50°-60°   | 725.7  | 22.2      |
| 60°-70°   | 715.9  | 21.9      |
| 70°-80°   | 435.8  | 13.3      |
| 80°-90°   | 51.8   | 1.6       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 3265.2 | 100.0     |
| 0°-180°   | 3265.2 | 100.0     |

**Coefficient of Utilization**



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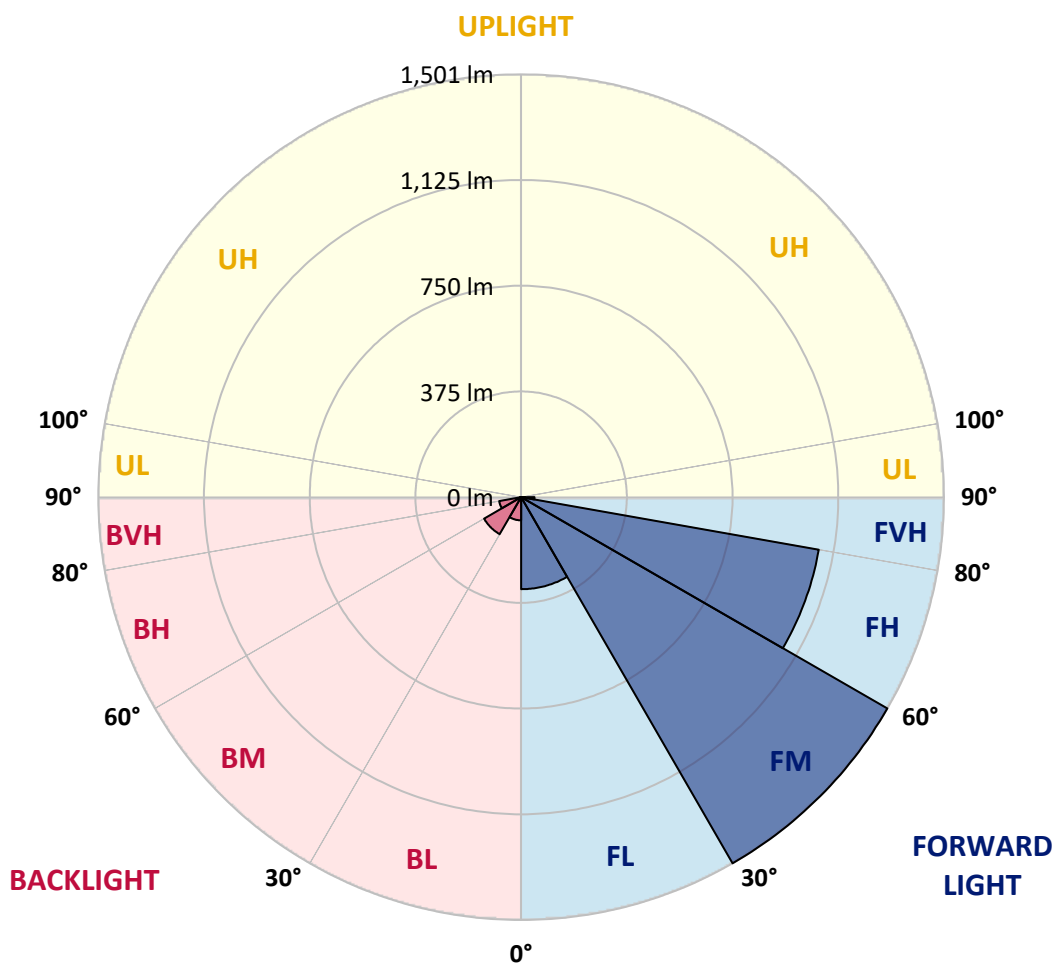
CATALOG NUMBER: EMM2-HSN-SA1A-730-U-T3-HSS

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 326.7  | 10.0      |                         |      |         |
| FM (30°-60°)   | 1500.7 | 46.0      |                         |      |         |
| FH (60°-80°)   | 1072.6 | 32.9      |                         |      | G1/1800 |
| FVH (80°-90°)  | 47.4   | 1.5       |                         |      | G1/100  |
| BL (0°-30°)    | 82.2   | 2.5       | B0/110                  |      |         |
| BM (30°-60°)   | 152.0  | 4.7       | B0/220                  |      |         |
| BH (60°-80°)   | 79.1   | 2.4       | B0/110                  |      | G0/110  |
| BVH (80°-90°)  | 4.4    | 0.1       |                         |      | 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 III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 64°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 403.5  | 403.5  | 403.5  | 403.5  | 403.5  | 403.5  | 403.5  | 403.5  | 403.5  | 403.5  | 403.5  |
| 2.5°  | 471.5  | 467.8  | 470.6  | 464.0  | 456.6  | 451.0  | 439.8  | 430.5  | 429.6  | 420.2  | 410.0  |
| 5°    | 561.9  | 549.8  | 550.7  | 537.6  | 521.8  | 505.0  | 487.3  | 464.0  | 464.0  | 441.7  | 418.4  |
| 7.5°  | 642.9  | 641.1  | 632.7  | 612.2  | 593.6  | 567.5  | 534.8  | 505.0  | 498.5  | 464.0  | 427.7  |
| 10°   | 721.2  | 718.4  | 711.0  | 695.1  | 663.4  | 634.5  | 593.6  | 548.8  | 540.4  | 491.1  | 438.9  |
| 12.5° | 783.6  | 784.6  | 776.2  | 763.1  | 735.2  | 700.7  | 646.7  | 590.8  | 583.3  | 517.1  | 450.1  |
| 15°   | 838.6  | 837.7  | 835.8  | 824.6  | 797.6  | 765.9  | 702.6  | 637.3  | 625.2  | 545.1  | 461.2  |
| 17.5° | 880.5  | 878.7  | 875.0  | 865.6  | 852.6  | 821.8  | 761.3  | 686.7  | 676.5  | 577.7  | 474.3  |
| 20°   | 892.7  | 891.7  | 891.7  | 898.2  | 892.7  | 874.0  | 820.0  | 738.0  | 726.8  | 612.2  | 492.0  |
| 22.5° | 915.0  | 914.1  | 913.2  | 919.7  | 923.4  | 921.5  | 875.0  | 790.2  | 779.9  | 652.3  | 514.3  |
| 25°   | 943.9  | 942.0  | 939.2  | 945.8  | 950.4  | 961.6  | 929.9  | 851.7  | 839.5  | 698.8  | 536.7  |
| 27.5° | 982.1  | 984.0  | 980.2  | 979.3  | 979.3  | 985.8  | 978.4  | 906.6  | 895.5  | 743.6  | 562.8  |
| 30°   | 1032.4 | 1035.2 | 1028.7 | 1024.0 | 1015.7 | 1014.7 | 1016.6 | 968.1  | 952.3  | 792.0  | 589.8  |
| 32.5° | 1081.8 | 1084.6 | 1080.9 | 1074.4 | 1052.9 | 1044.5 | 1052.0 | 1020.3 | 1010.1 | 845.1  | 624.3  |
| 35°   | 1121.9 | 1128.4 | 1128.4 | 1115.4 | 1085.5 | 1080.9 | 1093.0 | 1071.6 | 1064.1 | 907.6  | 665.3  |
| 37.5° | 1175.9 | 1179.6 | 1175.9 | 1151.7 | 1114.4 | 1120.0 | 1138.6 | 1125.6 | 1120.9 | 974.7  | 713.8  |
| 40°   | 1291.5 | 1296.1 | 1271.9 | 1214.1 | 1154.5 | 1161.0 | 1193.6 | 1186.2 | 1178.7 | 1040.8 | 758.5  |
| 42.5° | 1452.7 | 1441.5 | 1436.8 | 1308.2 | 1216.0 | 1212.3 | 1253.3 | 1243.0 | 1242.1 | 1107.9 | 799.5  |
| 45°   | 1558.9 | 1562.6 | 1539.3 | 1417.3 | 1345.5 | 1275.6 | 1319.4 | 1315.7 | 1308.2 | 1175.9 | 848.9  |
| 47.5° | 1632.5 | 1624.1 | 1566.3 | 1507.6 | 1521.6 | 1358.6 | 1393.0 | 1402.3 | 1397.7 | 1253.3 | 909.4  |
| 50°   | 1663.2 | 1654.9 | 1616.7 | 1577.5 | 1594.3 | 1453.6 | 1468.5 | 1499.3 | 1494.6 | 1331.5 | 960.7  |
| 52.5° | 1625.0 | 1614.8 | 1617.6 | 1627.8 | 1619.5 | 1528.1 | 1561.7 | 1610.1 | 1604.5 | 1422.8 | 1020.3 |
| 55°   | 1381.8 | 1408.9 | 1513.2 | 1617.6 | 1614.8 | 1585.0 | 1661.4 | 1732.2 | 1721.0 | 1517.9 | 1071.6 |
| 57.5° | 1114.4 | 1129.3 | 1261.6 | 1544.0 | 1599.9 | 1632.5 | 1775.1 | 1862.6 | 1858.9 | 1612.9 | 1118.1 |
| 60°   | 886.1  | 902.0  | 1002.6 | 1391.2 | 1565.4 | 1681.9 | 1891.5 | 2007.1 | 2003.3 | 1708.9 | 1151.7 |
| 62.5° | 704.4  | 704.4  | 793.9  | 1171.3 | 1499.3 | 1710.8 | 1983.8 | 2152.4 | 2145.9 | 1786.2 | 1160.1 |
| 65°   | 506.9  | 513.4  | 580.5  | 942.0  | 1392.1 | 1703.3 | 2028.5 | 2255.9 | 2252.1 | 1830.0 | 1142.4 |
| 67.5° | 374.6  | 382.0  | 426.8  | 706.3  | 1233.7 | 1628.8 | 1987.5 | 2279.2 | 2281.0 | 1831.0 | 1084.6 |
| 70°   | 292.6  | 294.4  | 328.0  | 491.1  | 1011.0 | 1462.9 | 1833.8 | 2201.8 | 2201.8 | 1785.3 | 998.9  |
| 72.5° | 222.7  | 224.6  | 253.4  | 334.5  | 744.5  | 1209.5 | 1603.6 | 1996.8 | 2010.8 | 1664.2 | 872.2  |
| 75°   | 172.4  | 176.1  | 195.7  | 240.4  | 466.8  | 860.0  | 1317.6 | 1635.3 | 1673.5 | 1429.4 | 718.4  |
| 77.5° | 133.2  | 137.0  | 152.8  | 176.1  | 272.1  | 530.2  | 926.2  | 1222.5 | 1257.0 | 1125.6 | 554.4  |
| 80°   | 107.2  | 109.0  | 119.3  | 132.3  | 164.9  | 273.0  | 565.6  | 803.2  | 813.5  | 765.0  | 367.1  |
| 82.5° | 49.4   | 53.1   | 64.3   | 72.7   | 82.0   | 126.7  | 241.3  | 297.2  | 310.3  | 303.8  | 151.0  |
| 85°   | 5.6    | 5.6    | 6.5    | 7.5    | 8.4    | 13.0   | 16.8   | 14.9   | 14.9   | 17.7   | 15.8   |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.9    | 1.9    | 1.9    | 2.8    | 2.8    | 2.8    | 2.8    | 2.8    |
| 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: EMM2-HSN-SA1A-730-U-T3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 403.5 | 403.5 | 403.5 | 403.5 | 403.5 | 403.5 | 403.5 | 403.5 | 403.5 | 403.5 | 403.5 |
| 2.5°  | 404.4 | 397.9 | 385.8 | 375.5 | 366.2 | 356.9 | 352.2 | 341.0 | 338.2 | 340.1 | 333.6 |
| 5°    | 406.3 | 393.2 | 368.1 | 344.8 | 325.2 | 306.6 | 290.7 | 273.9 | 270.2 | 264.6 | 261.8 |
| 7.5°  | 409.1 | 389.5 | 350.4 | 314.0 | 284.2 | 257.2 | 237.6 | 224.6 | 214.3 | 211.5 | 210.6 |
| 10°   | 412.8 | 384.8 | 330.8 | 285.1 | 244.1 | 216.2 | 198.5 | 189.2 | 185.4 | 182.6 | 183.6 |
| 12.5° | 415.6 | 380.2 | 312.1 | 252.5 | 212.4 | 187.3 | 178.9 | 171.4 | 169.6 | 168.7 | 168.7 |
| 15°   | 419.3 | 375.5 | 289.8 | 223.6 | 185.4 | 170.5 | 162.1 | 159.3 | 159.3 | 158.4 | 158.4 |
| 17.5° | 424.0 | 371.8 | 271.2 | 201.3 | 169.6 | 155.6 | 151.9 | 148.2 | 148.2 | 148.2 | 147.2 |
| 20°   | 433.3 | 369.9 | 254.4 | 182.6 | 155.6 | 146.3 | 140.7 | 137.9 | 137.0 | 136.0 | 136.0 |
| 22.5° | 442.6 | 369.9 | 235.7 | 168.7 | 146.3 | 136.0 | 130.5 | 127.7 | 126.7 | 126.7 | 126.7 |
| 25°   | 455.6 | 369.0 | 220.8 | 156.5 | 137.9 | 125.8 | 120.2 | 117.4 | 115.5 | 115.5 | 114.6 |
| 27.5° | 470.6 | 369.0 | 207.8 | 147.2 | 128.6 | 116.5 | 110.0 | 107.2 | 104.4 | 104.4 | 103.4 |
| 30°   | 485.5 | 370.9 | 196.6 | 139.8 | 119.3 | 108.1 | 99.7  | 96.0  | 94.1  | 93.2  | 93.2  |
| 32.5° | 505.0 | 376.4 | 189.2 | 134.2 | 110.9 | 99.7  | 91.3  | 87.6  | 85.7  | 84.8  | 84.8  |
| 35°   | 534.8 | 390.4 | 190.1 | 131.4 | 105.3 | 92.2  | 83.9  | 79.2  | 78.3  | 78.3  | 77.3  |
| 37.5° | 566.5 | 403.5 | 192.9 | 129.5 | 99.7  | 86.7  | 78.3  | 73.6  | 72.7  | 72.7  | 72.7  |
| 40°   | 593.6 | 414.6 | 196.6 | 128.6 | 95.0  | 81.1  | 73.6  | 69.9  | 68.0  | 68.0  | 68.0  |
| 42.5° | 620.6 | 421.2 | 197.5 | 125.8 | 92.2  | 76.4  | 69.9  | 66.2  | 64.3  | 65.2  | 65.2  |
| 45°   | 647.6 | 425.8 | 194.7 | 122.1 | 89.5  | 72.7  | 66.2  | 62.4  | 60.6  | 60.6  | 60.6  |
| 47.5° | 680.2 | 436.1 | 190.1 | 116.5 | 87.6  | 69.9  | 62.4  | 58.7  | 57.8  | 57.8  | 57.8  |
| 50°   | 712.8 | 444.5 | 186.4 | 110.0 | 82.9  | 66.2  | 59.6  | 55.0  | 54.0  | 54.0  | 54.0  |
| 52.5° | 739.8 | 448.2 | 181.7 | 101.6 | 78.3  | 62.4  | 55.9  | 51.2  | 49.4  | 49.4  | 49.4  |
| 55°   | 760.3 | 449.1 | 175.2 | 95.0  | 71.7  | 58.7  | 52.2  | 47.5  | 45.7  | 44.7  | 44.7  |
| 57.5° | 777.1 | 448.2 | 168.7 | 88.5  | 66.2  | 54.0  | 47.5  | 43.8  | 41.0  | 40.1  | 40.1  |
| 60°   | 786.4 | 445.4 | 159.3 | 80.1  | 58.7  | 49.4  | 43.8  | 39.1  | 37.3  | 36.3  | 36.3  |
| 62.5° | 780.8 | 437.9 | 146.3 | 67.1  | 53.1  | 44.7  | 40.1  | 36.3  | 33.5  | 32.6  | 32.6  |
| 65°   | 754.8 | 423.0 | 129.5 | 55.0  | 47.5  | 40.1  | 36.3  | 32.6  | 28.9  | 28.0  | 28.0  |
| 67.5° | 709.1 | 397.9 | 107.2 | 46.6  | 43.8  | 36.3  | 32.6  | 28.9  | 26.1  | 24.2  | 24.2  |
| 70°   | 645.7 | 364.3 | 83.9  | 40.1  | 39.1  | 33.5  | 29.8  | 26.1  | 23.3  | 21.4  | 21.4  |
| 72.5° | 555.3 | 309.4 | 62.4  | 34.5  | 34.5  | 30.7  | 27.0  | 24.2  | 21.4  | 19.6  | 19.6  |
| 75°   | 449.1 | 233.9 | 47.5  | 31.7  | 30.7  | 28.0  | 24.2  | 21.4  | 19.6  | 17.7  | 17.7  |
| 77.5° | 328.0 | 155.6 | 39.1  | 28.9  | 28.9  | 25.2  | 22.4  | 19.6  | 17.7  | 16.8  | 16.8  |
| 80°   | 199.4 | 89.5  | 28.0  | 22.4  | 22.4  | 21.4  | 18.6  | 16.8  | 15.8  | 14.0  | 13.0  |
| 82.5° | 81.1  | 34.5  | 14.9  | 11.2  | 11.2  | 10.2  | 6.5   | 5.6   | 5.6   | 5.6   | 4.7   |
| 85°   | 8.4   | 5.6   | 3.7   | 2.8   | 2.8   | 2.8   | 1.9   | 1.9   | 1.9   | 1.9   | 1.9   |
| 87.5° | 2.8   | 2.8   | 1.9   | 1.9   | 1.9   | 1.9   | 0.9   | 0.9   | 0.9   | 0.9   | 0.9   |
| 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: SP1-2407-157-4

Test Date: 08/07/2024

Luminaire Tested: MEM2-HTN-SA-40-730-U-5WQ-2

Data in this report applies to families of products including MEM2-HTN-SA-40-730-U-5WQ-2

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-4  
 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-40-730-U-5WQ-2**  
 Description: Epic Modern Light Square 40W 5WQ Optic and Flare Trim

**Spectral Parameters**

CCT (K): 3057  
 CIE u': 0.2487  
 CIE v': 0.5199  
 Duv: -0.0002  
 CIE x: 0.4326  
 CIE y: 0.4020  
 CIE z: 0.1654  
 Peak Wavelength (nm): 593  
 Dominant Wavelength (nm): 582  
 Purity: 50.50735  
 Rf: 74.6  
 Rg: 94

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.7 |      |       |
| R1:       | 68.1 | R9:  | -34.8 |
| R2:       | 82.0 | R10: | 58.5  |
| R3:       | 93.5 | R11: | 62.5  |
| R4:       | 67.5 | R12: | 47.5  |
| R5:       | 67.2 | R13: | 70.7  |
| R6:       | 74.9 | R14: | 96.4  |
| R7:       | 77.4 | R15: | 60.0  |
| R8:       | 43.1 |      |       |



**Test Conditions**

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

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

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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 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$ (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            | 104                      | NR                   | 620            | 818                      | NR                   | 750            | 20                       | NR                   | 880            | 1                        | NR                   |
| 365            | 0                        | NR                   | 495            | 135                      | NR                   | 625            | 755                      | NR                   | 755            | 17                       | NR                   | 885            | 0                        | NR                   |
| 370            | 0                        | NR                   | 500            | 184                      | NR                   | 630            | 691                      | NR                   | 760            | 15                       | NR                   | 890            | 0                        | NR                   |
| 375            | 0                        | NR                   | 505            | 247                      | NR                   | 635            | 625                      | NR                   | 765            | 13                       | NR                   | 895            | 0                        | NR                   |
| 380            | 0                        | NR                   | 510            | 309                      | NR                   | 640            | 561                      | NR                   | 770            | 11                       | NR                   | 900            | 0                        | NR                   |
| 385            | 0                        | NR                   | 515            | 369                      | NR                   | 645            | 499                      | NR                   | 775            | 9                        | NR                   | 905            | 0                        | NR                   |
| 390            | 0                        | NR                   | 520            | 419                      | NR                   | 650            | 441                      | NR                   | 780            | 8                        | NR                   | 910            | 0                        | NR                   |
| 395            | 0                        | NR                   | 525            | 460                      | NR                   | 655            | 388                      | NR                   | 785            | 7                        | NR                   | 915            | 0                        | NR                   |
| 400            | 1                        | NR                   | 530            | 492                      | NR                   | 660            | 338                      | NR                   | 790            | 6                        | NR                   | 920            | 0                        | NR                   |
| 405            | 3                        | NR                   | 535            | 524                      | NR                   | 665            | 294                      | NR                   | 795            | 5                        | NR                   | 925            | 0                        | NR                   |
| 410            | 7                        | NR                   | 540            | 553                      | NR                   | 670            | 253                      | NR                   | 800            | 4                        | NR                   | 930            | 0                        | NR                   |
| 415            | 15                       | NR                   | 545            | 588                      | NR                   | 675            | 218                      | NR                   | 805            | 4                        | NR                   | 935            | 0                        | NR                   |
| 420            | 31                       | NR                   | 550            | 625                      | NR                   | 680            | 188                      | NR                   | 810            | 3                        | NR                   | 940            | 0                        | NR                   |
| 425            | 60                       | NR                   | 555            | 670                      | NR                   | 685            | 161                      | NR                   | 815            | 3                        | NR                   | 945            | 0                        | NR                   |
| 430            | 107                      | NR                   | 560            | 723                      | NR                   | 690            | 139                      | NR                   | 820            | 3                        | NR                   | 950            | 0                        | NR                   |
| 435            | 183                      | NR                   | 565            | 780                      | NR                   | 695            | 118                      | NR                   | 825            | 2                        | NR                   | 955            | 0                        | NR                   |
| 440            | 289                      | NR                   | 570            | 837                      | NR                   | 700            | 100                      | NR                   | 830            | 2                        | NR                   | 960            | 0                        | NR                   |
| 445            | 460                      | NR                   | 575            | 894                      | NR                   | 705            | 85                       | NR                   | 835            | 2                        | NR                   | 965            | 0                        | NR                   |
| 450            | 646                      | NR                   | 580            | 942                      | NR                   | 710            | 73                       | NR                   | 840            | 1                        | NR                   | 970            | 0                        | NR                   |
| 455            | 561                      | NR                   | 585            | 976                      | NR                   | 715            | 62                       | NR                   | 845            | 1                        | NR                   | 975            | 0                        | NR                   |
| 460            | 331                      | NR                   | 590            | 998                      | NR                   | 720            | 53                       | NR                   | 850            | 1                        | NR                   | 980            | 0                        | NR                   |
| 465            | 238                      | NR                   | 595            | 1000                     | NR                   | 725            | 45                       | NR                   | 855            | 1                        | NR                   | 985            | 0                        | NR                   |
| 470            | 178                      | NR                   | 600            | 990                      | NR                   | 730            | 39                       | NR                   | 860            | 1                        | NR                   | 990            | 0                        | NR                   |
| 475            | 120                      | NR                   | 605            | 962                      | NR                   | 735            | 33                       | NR                   | 865            | 1                        | NR                   | 995            | 0                        | NR                   |
| 480            | 96                       | NR                   | 610            | 925                      | NR                   | 740            | 28                       | NR                   | 870            | 1                        | NR                   | 1000           | 0                        | NR                   |
| 485            | 95                       | NR                   | 615            | 873                      | NR                   | 745            | 24                       | NR                   | 875            | 1                        | NR                   |                |                          |                      |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.23**

| $\lambda$ (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            | 104                      | NR                   | 620            | 818                      | NR                   | 750            | 20                       | NR                   | 880            | 1                        | NR                   |
| 365            | 0                        | NR                   | 495            | 135                      | NR                   | 625            | 755                      | NR                   | 755            | 17                       | NR                   | 885            | 0                        | NR                   |
| 370            | 0                        | NR                   | 500            | 184                      | NR                   | 630            | 691                      | NR                   | 760            | 15                       | NR                   | 890            | 0                        | NR                   |
| 375            | 0                        | NR                   | 505            | 247                      | NR                   | 635            | 625                      | NR                   | 765            | 13                       | NR                   | 895            | 0                        | NR                   |
| 380            | 0                        | NR                   | 510            | 309                      | NR                   | 640            | 561                      | NR                   | 770            | 11                       | NR                   | 900            | 0                        | NR                   |
| 385            | 0                        | NR                   | 515            | 369                      | NR                   | 645            | 499                      | NR                   | 775            | 9                        | NR                   | 905            | 0                        | NR                   |
| 390            | 0                        | NR                   | 520            | 419                      | NR                   | 650            | 441                      | NR                   | 780            | 8                        | NR                   | 910            | 0                        | NR                   |
| 395            | 0                        | NR                   | 525            | 460                      | NR                   | 655            | 388                      | NR                   | 785            | 7                        | NR                   | 915            | 0                        | NR                   |
| 400            | 1                        | NR                   | 530            | 492                      | NR                   | 660            | 338                      | NR                   | 790            | 6                        | NR                   | 920            | 0                        | NR                   |
| 405            | 3                        | NR                   | 535            | 524                      | NR                   | 665            | 294                      | NR                   | 795            | 5                        | NR                   | 925            | 0                        | NR                   |
| 410            | 7                        | NR                   | 540            | 553                      | NR                   | 670            | 253                      | NR                   | 800            | 4                        | NR                   | 930            | 0                        | NR                   |
| 415            | 15                       | NR                   | 545            | 588                      | NR                   | 675            | 218                      | NR                   | 805            | 4                        | NR                   | 935            | 0                        | NR                   |
| 420            | 31                       | NR                   | 550            | 625                      | NR                   | 680            | 188                      | NR                   | 810            | 3                        | NR                   | 940            | 0                        | NR                   |
| 425            | 60                       | NR                   | 555            | 670                      | NR                   | 685            | 161                      | NR                   | 815            | 3                        | NR                   | 945            | 0                        | NR                   |
| 430            | 107                      | NR                   | 560            | 723                      | NR                   | 690            | 139                      | NR                   | 820            | 3                        | NR                   | 950            | 0                        | NR                   |
| 435            | 183                      | NR                   | 565            | 780                      | NR                   | 695            | 118                      | NR                   | 825            | 2                        | NR                   | 955            | 0                        | NR                   |
| 440            | 289                      | NR                   | 570            | 837                      | NR                   | 700            | 100                      | NR                   | 830            | 2                        | NR                   | 960            | 0                        | NR                   |
| 445            | 460                      | NR                   | 575            | 894                      | NR                   | 705            | 85                       | NR                   | 835            | 2                        | NR                   | 965            | 0                        | NR                   |
| 450            | 646                      | NR                   | 580            | 942                      | NR                   | 710            | 73                       | NR                   | 840            | 1                        | NR                   | 970            | 0                        | NR                   |
| 455            | 561                      | NR                   | 585            | 976                      | NR                   | 715            | 62                       | NR                   | 845            | 1                        | NR                   | 975            | 0                        | NR                   |
| 460            | 331                      | NR                   | 590            | 998                      | NR                   | 720            | 53                       | NR                   | 850            | 1                        | NR                   | 980            | 0                        | NR                   |
| 465            | 238                      | NR                   | 595            | 1000                     | NR                   | 725            | 45                       | NR                   | 855            | 1                        | NR                   | 985            | 0                        | NR                   |
| 470            | 178                      | NR                   | 600            | 990                      | NR                   | 730            | 39                       | NR                   | 860            | 1                        | NR                   | 990            | 0                        | NR                   |
| 475            | 120                      | NR                   | 605            | 962                      | NR                   | 735            | 33                       | NR                   | 865            | 1                        | NR                   | 995            | 0                        | NR                   |
| 480            | 96                       | NR                   | 610            | 925                      | NR                   | 740            | 28                       | NR                   | 870            | 1                        | NR                   | 1000           | 0                        | NR                   |
| 485            | 95                       | NR                   | 615            | 873                      | NR                   | 745            | 24                       | NR                   | 875            | 1                        | NR                   |                |                          |                      |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: NR**

**M/P: 2.27**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 104                      | NR            | 620    | 818                      | NR            | 750    | 20                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 135                      | NR            | 625    | 755                      | NR            | 755    | 17                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 184                      | NR            | 630    | 691                      | NR            | 760    | 15                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 247                      | NR            | 635    | 625                      | NR            | 765    | 13                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 309                      | NR            | 640    | 561                      | NR            | 770    | 11                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 369                      | NR            | 645    | 499                      | NR            | 775    | 9                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 419                      | NR            | 650    | 441                      | NR            | 780    | 8                        | NR            | 910    | 0                        | NR            |
| 395    | 0                        | NR            | 525    | 460                      | NR            | 655    | 388                      | NR            | 785    | 7                        | NR            | 915    | 0                        | NR            |
| 400    | 1                        | NR            | 530    | 492                      | NR            | 660    | 338                      | NR            | 790    | 6                        | NR            | 920    | 0                        | NR            |
| 405    | 3                        | NR            | 535    | 524                      | NR            | 665    | 294                      | NR            | 795    | 5                        | NR            | 925    | 0                        | NR            |
| 410    | 7                        | NR            | 540    | 553                      | NR            | 670    | 253                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 15                       | NR            | 545    | 588                      | NR            | 675    | 218                      | NR            | 805    | 4                        | NR            | 935    | 0                        | NR            |
| 420    | 31                       | NR            | 550    | 625                      | NR            | 680    | 188                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 60                       | NR            | 555    | 670                      | NR            | 685    | 161                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 107                      | NR            | 560    | 723                      | NR            | 690    | 139                      | NR            | 820    | 3                        | NR            | 950    | 0                        | NR            |
| 435    | 183                      | NR            | 565    | 780                      | NR            | 695    | 118                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 289                      | NR            | 570    | 837                      | NR            | 700    | 100                      | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 460                      | NR            | 575    | 894                      | NR            | 705    | 85                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 646                      | NR            | 580    | 942                      | NR            | 710    | 73                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 561                      | NR            | 585    | 976                      | NR            | 715    | 62                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 331                      | NR            | 590    | 998                      | NR            | 720    | 53                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 238                      | NR            | 595    | 1000                     | NR            | 725    | 45                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 178                      | NR            | 600    | 990                      | NR            | 730    | 39                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 120                      | NR            | 605    | 962                      | NR            | 735    | 33                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 96                       | NR            | 610    | 925                      | NR            | 740    | 28                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 95                       | NR            | 615    | 873                      | NR            | 745    | 24                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 74.6$   
 $R_g = 94$   
 $CIE R_a = 71.7$   
 $R_9 = -34.8$



**Color Vector Graphics**





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

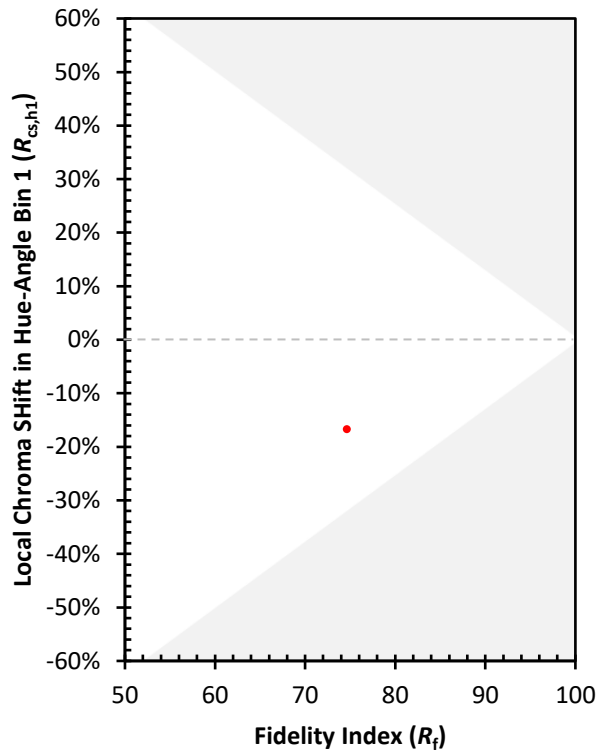
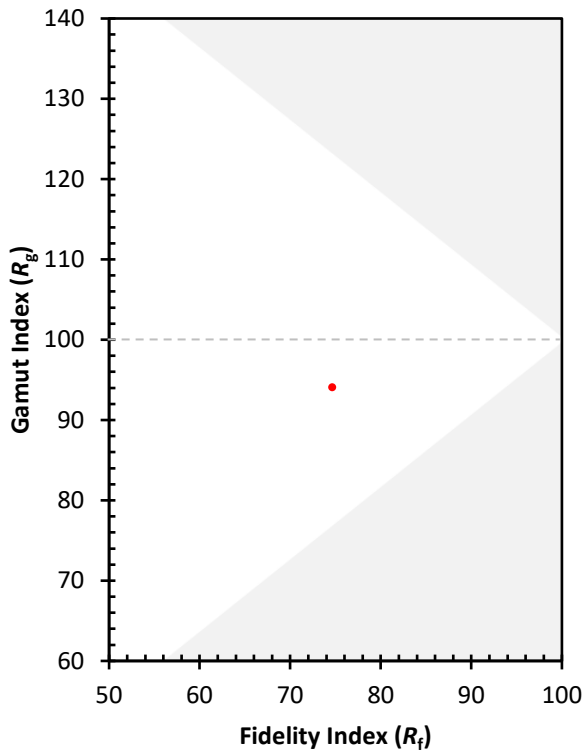
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 65 | CES51 = 87 | CES76 = 58 |
| CES02 = 62 | CES27 = 89 | CES52 = 85 | CES77 = 76 |
| CES03 = 31 | CES28 = 84 | CES53 = 77 | CES78 = 61 |
| CES04 = 71 | CES29 = 68 | CES54 = 85 | CES79 = 86 |
| CES05 = 49 | CES30 = 83 | CES55 = 84 | CES80 = 83 |
| CES06 = 51 | CES31 = 71 | CES56 = 74 | CES81 = 73 |
| CES07 = 41 | CES32 = 64 | CES57 = 74 | CES82 = 93 |
| CES08 = 40 | CES33 = 78 | CES58 = 75 | CES83 = 91 |
| CES09 = 29 | CES34 = 75 | CES59 = 85 | CES84 = 88 |
| CES10 = 76 | CES35 = 87 | CES60 = 90 | CES85 = 75 |
| CES11 = 59 | CES36 = 92 | CES61 = 81 | CES86 = 64 |
| CES12 = 65 | CES37 = 84 | CES62 = 89 | CES87 = 77 |
| CES13 = 43 | CES38 = 92 | CES63 = 75 | CES88 = 80 |
| CES14 = 74 | CES39 = 96 | CES64 = 65 | CES89 = 67 |
| CES15 = 71 | CES40 = 92 | CES65 = 64 | CES90 = 80 |
| CES16 = 47 | CES41 = 93 | CES66 = 60 | CES91 = 78 |
| CES17 = 50 | CES42 = 86 | CES67 = 58 | CES92 = 56 |
| CES18 = 56 | CES43 = 77 | CES68 = 66 | CES93 = 73 |
| CES19 = 73 | CES44 = 99 | CES69 = 75 | CES94 = 49 |
| CES20 = 66 | CES45 = 85 | CES70 = 60 | CES95 = 66 |
| CES21 = 87 | CES46 = 81 | CES71 = 56 | CES96 = 76 |
| CES22 = 79 | CES47 = 86 | CES72 = 85 | CES97 = 82 |
| CES23 = 92 | CES48 = 75 | CES73 = 52 | CES98 = 76 |
| CES24 = 91 | CES49 = 79 | CES74 = 95 | CES99 = 64 |
| CES25 = 73 | CES50 = 86 | CES75 = 60 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)